



VERIFICATION OF COMPLIANCE

This Verification of Compliance is hereby issued to the product designated below.

Product	WiFi+Bluetooth 4.1(HS) System on Module
Model	PIXI-9377
Trade name	TechNexion
Applicant	TechNexion Ltd. 16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC
Manufacturer	TechNexion Ltd. 16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC
Applicable Standard(s)	ETSI EN 300 328 V2.1.1: 2016 ETSI EN 301 893 V2.1.1 (2017-05) EN 62311: 2008 EN 62479: 2010 EN 50663: 2017
Reference No.	T180627D10-RT1, T180627D10-RT2, T180627D10-MC
Test Laboratory	Compliance Certification Services Inc. Wugu Laboratory No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) http://www.ccsrf.com

This device has been tested and found to comply with the stated standard(s), which is(are) required by the article 3 of the RED of 2014/53/EU. The test results are indicated in the test report and are applicable only to the tested sample identified in the report.



Sam Chuang / Manager
Wugu RF Certification Center
Date: August 16, 2018

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**ETSI EN 300 328 V2.1.1: 2016
+
AS/NZS 4268: 2017**

TEST REPORT

For

WiFi+Bluetooth 4.1(HS) System on Module

MODEL: PIXI-9377

Issued to:

TechNexion Ltd.

**16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei
City, 23511 Taiwan ROC**

Issued by

Compliance Certification Services Inc.

Wugu Laboratory

**No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)**

Issued Date: August 17, 2018

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 17, 2018	Initial Issue	ALL	Allison Chen
01	September 11, 2018	1. Revised FPC antenna gain.	P.5	Allison Chen



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1. TEST RESULT CERTIFICATION

Applicant: TechNexion Ltd.
16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC

Manufacturer: TechNexion Ltd.
16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC

Equipment Under Test: WiFi+Bluetooth 4.1(HS) System on Module

Trade Name: TechNexion

Model Number: PIXI-9377

Date of Test: July 25 ~ August 6, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
ETSI EN 300 328 V2.1.1: 2016 + AS/NZS 4268: 2017	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in ETSI EN 300 328. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Tested by:

Sam Chuang
Manager
Compliance Certification Services Inc.

Jerry Chuang
Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	WiFi+Bluetooth 4.1(HS) System on Module		
Trade Name	TechNexion		
Model Number	PIXI-9377		
Model Discrepancy	N/A		
Received Date	June 27, 2018		
EUT Power Rating	Powered from host system. (DC 5V)		
Frequency Range	IEEE 802.11b Mode: 2412 ~ 2472 MHz IEEE 802.11g Mode: 2412 ~ 2472 MHz IEEE 802.11n HT 20 MHz Mode: 2412 ~ 2472 MHz IEEE 802.11n HT 40 MHz Mode: 2422~2462 MHz Bluetooth: 2402 ~ 2480 MHz		
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g Mode: OFDM IEEE 802.11n HT 20 MHz Mode: OFDM IEEE 802.11n HT 40 MHz Mode: OFDM Bluetooth 2.1 + EDR: GFSK for 1Mbps; $\pi/4$ -DQPSK for 2Mbps; 8DPSK for 3Mbps Bluetooth 4.1: GFSK		
Number of Channels	IEEE 802.11b Mode: 13 Channels IEEE 802.11g Mode: 13 Channels IEEE 802.11n HT 20 MHz Mode: 13 Channels IEEE 802.11n HT 40 MHz Mode: 9 Channels Bluetooth 2.1 + EDR: 79 Channels Bluetooth 4.1: 40 Channels (37 hopping + 3 advertising Channel)		
Transmit Power (mean EIRP)	Mode	Transmit Power (dBm)	Transmit Power (mW)
	IEEE 802.11b Mode	18.39	69.02
	IEEE 802.11g Mode	19.99	99.77
	IEEE 802.11n HT 20 MHz Mode	19.75	94.41
	IEEE 802.11n HT 40 MHz Mode	19.99	99.77
	Bluetooth 2.1 + EDR	9.66	9.25
	Bluetooth 4.1	9.89	9.75
Antenna Specification	FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 2.5dBi Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 4dBi		
Temperature Range	0°C ~ +70°C		
S.W Version	1.0		
H.W: Version	A1		

Remark: For more details, refer to the User's manual of the EUT.

3. TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

ETSI EN 300 328 –Wideband transmission systems;Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

3.2 DESCRIPTION OF TEST MODES

The EUT (model: PIXI-9377) had been tested under operating and standby condition. Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE 802.11b Mode: (1TX)

Channel Low (2412MHz) and Channel High (2472MHz) with 1Mbps data rate were chosen for full testing.

IEEE 802.11g Mode: (1TX)

Channel Low (2412MHz) and Channel High (2472MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz Mode: (1TX)

Channel Low (2412MHz) and Channel High (2472MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Mode: (1TX)

Channel Low (2422MHz) and Channel High (2462MHz) with 13.5Mbps data rate were chosen for full testing.

Bluetooth 2.1 + EDR

Following channels were selected for the radiated emission testing only as listed below:

Tested Channel	Modulation Type	Packet Type	Date Rate
Low, High	GFSK	DH 5	1
Low, High	8DPSK	DH 5	3

Bluetooth 4.1

Tested Channel	Frequency (MHz)
Low	2402
High	2480

Normal Link: EUT for staying in normal used mode.

TX mode: Software used to control the EUT for staying in continuous transmitting mode is programmed.

RX mode: Software used to control the EUT for staying in continuous receiving mode is programmed.

3.2.1 The worst mode of measurement

For FPC Antenna
WiFi 2.4GHz + BT 4.1

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: EUT Power by host system
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X, Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (X-Plane) were recorded in this report.

BT2.1+EDR

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: EUT Power by host system
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X, Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (Y-Plane) were recorded in this report.



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For Dipole Antenna

WiFi 2.4GHz + BT2.1+EDR + BT 4.1

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: EUT Power by host system
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Remark:

- 1. The worst mode was record in this test report.*
- 2. The EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (X-Plane) were recorded in this report.*

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4 INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Directional Couplers	Agilent	87301D	MY44350252	07/24/2018	07/23/2019
Power Divider	Solvang Technology	ST108-0015	008	07/27/2018	07/26/2019
Power Meter	Anritsu	ML2495A	1012009	09/18/2017	09/17/2018
Power Seneor	Anritsu	MA2411B	1126148	02/06/2018	02/05/2019
Signal Analyzer	R&S	FSV 40	101073	10/02/2017	10/01/2018
Thermostatic/Hrgrosatic Chamber	GWINSTEK	GTC-288MH-CC	TH160402	05/17/2018	05/16/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54250027	07/05/2018	07/04/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54260016	07/05/2018	07/04/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54260020	07/05/2018	07/04/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54260007	07/05/2018	07/04/2019

Wugu Fully Chamber B					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	05/14/2018	05/13/2019
Bilog Antenna	Sunol Sciences	JB1	A052609	03/14/2018	03/13/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	23452	06/29/2018	06/28/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	33960	06/29/2018	06/28/2019
Digital Thermo-Hygro Meter	WISEWIND	1110	D06	02/08/2018	02/07/2019
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/14/2018	03/13/2019
Pre-Amplifier	Anritsu	MH648A	M89145	06/29/2018	06/28/2019
Pre-Amplifier	EMEC	EM01M26G	060570	06/29/2018	06/28/2019
Signal Analyzer	Agilent	N9010A	MY52220817	03/22/2018	03/21/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

WiFi 2.4GHz

Adaptivity Room					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Attenuator	E-INSTRUMENT	EPA-600H	EC1400050	07/25/2018	07/24/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Directional Couplers	Agilent	87301D	MY44350252	07/24/2018	07/23/2019
Power Divider	Marvelous Microwave	MVE8586	16011206	07/27/2018	07/26/2019
Power Divider	Solvang Technology	STI08-0015	008	07/27/2018	07/26/2019
Power Splitter	Mini-Circuits	ZN2PD-9G-S	777	07/23/2018	07/22/2019
Spectrum Analyzer	R&S	FSU 26	100258	06/25/2018	06/24/2019
Vector Signal Generator	R&S	SMU 200A	101480	04/10/2018	04/09/2019
Vector Signal Genertor	R&S	SMU 200A	103439	05/04/2018	05/03/2019
Software	GPIBSHOT,DFS-Aggregate-Time FSU				

BT2.1+EDR+BT 4.1

Adaptivity Room					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Bluetooth Test Set	Anritsu	MT8852B	750013	05/24/2018	05/23/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Directional Couplers	Agilent	87301D	MY44350252	07/24/2018	07/23/2019
Power Divider	Marvelous Microwave	MVE8586	16011206	07/27/2018	07/26/2019
Power Splitter	Mini-Circuits	ZN2PD-9G-S	777	07/23/2018	07/22/2019
Spectrum Analyzer	R&S	FSU 26	100258	06/25/2018	06/24/2019
Wideband Radio Communication Tester	R&S	CMW 500	116875	04/20/2018	04/19/2019
Vector Signal Genertor	R&S	SMU 200A	103439	05/04/2018	05/03/2019

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

4.3 MEASUREMENT UNCERTAINTY

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [2] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 7 is based on such expansion factors.

Table 7: Maximum measurement uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	+/- 5%
RF output power, conducted	+/- 1,5 dB
Power Spectral Density, conducted	+/- 3 dB
Unwanted Emissions, conducted	+/- 3 dB
All emissions, radiated	+/- 6 dB
Temperature	+/- 3°C
Supply voltages	+/- 3%
Time	+/- 5%



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5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



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6 SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Cable length & Type Describe
	N/A					

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7 ETSI EN 300 328 REQUIREMENTS

7.1 RF OUTPUT POWER

LIMIT

EN 300 328

FHSS:

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm. The maximum RF output power for non-adaptive Frequency Hopping equipment, shall be declared by the supplier. See clause 5.3.1 m). The maximum RF output power for this equipment shall be equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.

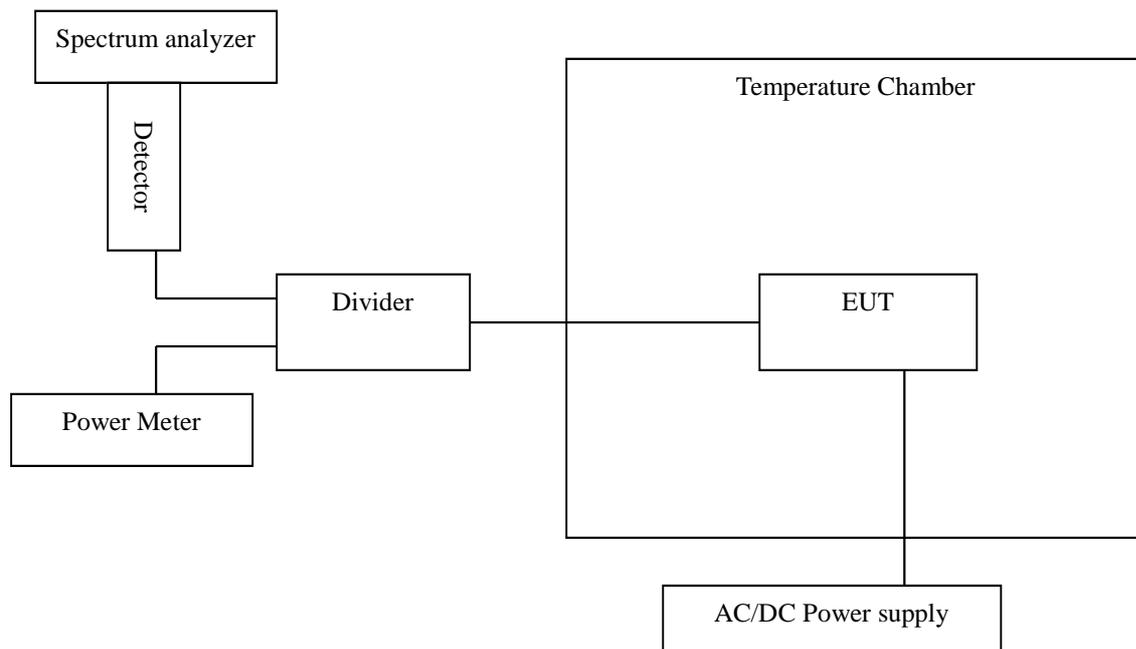
Other than FHSS:

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm. The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

Test Configuration

Temperature and Voltage Measurement (under normal and extreme test conditions)



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) or the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

No non-compliance noted.

Test Results: PASS **Test Mode:** IEEE 802.11b Mode
Tested By: Dally Hong **Test Date:** July 31, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Low	EIRP	17.92	18.18	18.08
Mid	EIRP	18.23	18.03	18.25
High	EIRP	17.81	18.13	*18.39
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+/- 1.20dB		

Test Results: PASS **Test Mode:** IEEE 802.11g Mode
Tested By: Dally Hong **Test Date:** July 31, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Low	EIRP	19.84	19.94	19.80
Mid	EIRP	19.88	19.92	*19.99
High	EIRP	19.98	19.73	19.94
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+/- 1.20dB		

Remark: 1. $EIRP=A+G+CL$
A = Reading
G = Antenna Gain
CL = Cable Loss



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Test Results: PASS
Tested By: Dally Hong

Test Mode: IEEE 802.11n HT 20 MHz Mode
Test Date: July 31, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Low	EIRP	19.31	19.20	19.62
Mid	EIRP	19.43	19.50	*19.75
High	EIRP	19.46	19.42	19.67
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+/- 1.20dB		

Remark: 1. $EIRP=A+G+CL$
A = Reading
G = Antenna Gain
CL = Cable Loss

Test Results: PASS
Tested By: Dally Hong

Test Mode: IEEE 802.11n HT 40 MHz Mode
Test Date: July 31, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Low	EIRP	19.94	19.98	*19.99
Mid	EIRP	19.38	19.31	19.55
High	EIRP	19.86	19.78	19.97
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+/- 1.20dB		

Remark: 1. $EIRP=A+G+CL$
A = Reading
G = Antenna Gain
CL = Cable Loss



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Bluetooth for GFSK (BR-1M)

Test Results: PASS **Test Mode:** Bluetooth
Tested By: Dally Hong **Test Date:** July 30, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Hopping	Measured Power	3.61	3.82	2.39
	EIRP	9.45	*9.66	8.23
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+ 0.28dB / - 0.30dB		

Bluetooth for 8DPSK (EDR-3M)

Test Results: PASS **Test Mode:** Bluetooth
Tested By: Dally Hong **Test Date:** July 30, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Hopping	Measured Power	3.85	4.05	3.33
	EIRP	8.90	9.10	8.38
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+ 0.28dB / - 0.30dB		

Remark: 1. $EIRP=A+G+CL$
A = Reading
G = Antenna Gain
CL = Cable Loss



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Bluetooth 4.1

Test Results: PASS

Test Mode: Bluetooth

Tested By: Dally Hong

Test Date: July 30, 2018

Antenna Gain =		4 dBi		
Test Conditions		Transmitter Power (dBm)		
		Temp(°C)		
		Normal	Low	High
Channel	Voltage Power	5v	5v	5v
Low	EIRP	8.82	9.53	8.49
Mid	EIRP	9.65	9.59	9.60
High	EIRP	*9.89	9.85	9.82
Limit		Average Limit= 20 dBm		
Measurement Uncertainty		+/- 1.20dB		

Remark: 1. $EIRP=A+G+CL$
A = Reading
G = Antenna Gain
CL = Cable Loss

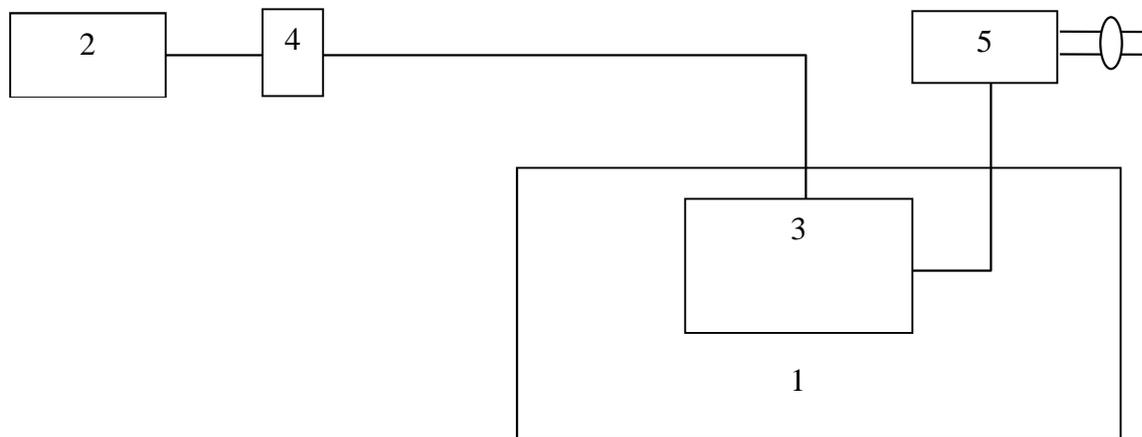
7.2 MAXIMUM SPECTRAL POWER DENSITY

LIMIT

ETSI EN 300 328

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

Test Configuration



Legend

1. Wooden table
2. Spectrum analyzer
3. EUT
4. DC block
5. Power supply (Refer to power rating of section 2)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

For MIMO operation that employs simultaneous transmission at two chains of the transmission, measurements were done, and point of sample is captured at respective chain individually, and sums out to produce the final result.

TEST RESULTS

No non-compliance noted.

Test Results: PASS **Test Mode:** IEEE 802.11b Mode
Tested By: Dally Hong **Test Date:** July 31, 2018

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	Measured Power Density (dBm/MHz) (A+B)
Measured Power Density	Low	3.52	4.00	7.52
	Mid	5.84		9.84
	High	5.73		9.73
Limit		10 dBm/MHz		
Measurement Uncertainty		+1.5dB / -1.4dB		

Remark: 1. $Power\ Density = Reading + Antenna\ Gain + Cable\ Loss$

Test Results: PASS **Test Mode:** IEEE 802.11g Mode
Tested By: Dally Hong **Test Date:** July 31, 2018

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	Measured Power Density (dBm/MHz) (A+B)
Measured Power Density	Low	3.84	4.00	7.84
	Mid	4.13		8.13
	High	4.01		8.01
Limit		10 dBm/MHz		
Measurement Uncertainty		+1.5dB / -1.4dB		

Remark: 1. $Power\ Density = Reading + Antenna\ Gain + Cable\ Loss$



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Test Results: PASS
Tested By: Dally Hong

Test Mode: IEEE 802.11n HT 20 MHz Mode
Test Date: July 31, 2018

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	Measured Power Density (dBm/MHz) (A+B)
Measured Power Density	Low	3.23	4.00	7.23
	Mid	3.47		7.47
	High	3.42		7.42
Limit		10 dBm/MHz		
Measurement Uncertainty		+1.5dB / -1.4dB		

Remark: 1. Power Density=Reading+Antenna Gain+Cable Loss

Test Results: PASS
Tested By: Dally Hong

Test Mode: IEEE 802.11n HT 40 MHz Mode
Test Date: July 31, 2018

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	Measured Power Density (dBm/MHz) (A+B)
Measured Power Density	Low	0.61	4.00	4.61
	Mid	0.18		4.18
	High	0.64		4.64
Limit		10 dBm/MHz		
Measurement Uncertainty		+1.5dB / -1.4dB		

Remark: 1. Power Density=Reading+Antenna Gain+Cable Loss



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Bluetooth 2.1 + EDR

Please refer to ETSI EN 300 328

For wide band modulations other than FHSS (e.g. DSSS, OFDM, etc.), the maximum spectral power density shall be measured and recorded.

Bluetooth 4.1

Test Results: PASS **Test Mode:** Bluetooth
Tested By: Dally Hong **Test Date:** July 30, 2018

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	Measured Power Density (dBm/MHz) (A+B)
Measured Power Density	Low	3.35	4	7.35
	Mid	4.34		8.34
	High	4.81		8.81
Limit		10 dBm/MHz		
Measurement Uncertainty		+1.5dB / -1.4dB		

Remark: 1. Power Density=Reading+Antenna Gain+Cable Loss

7.3 DUTY CYCLE, TX-SEQUENCE, TX-GAP

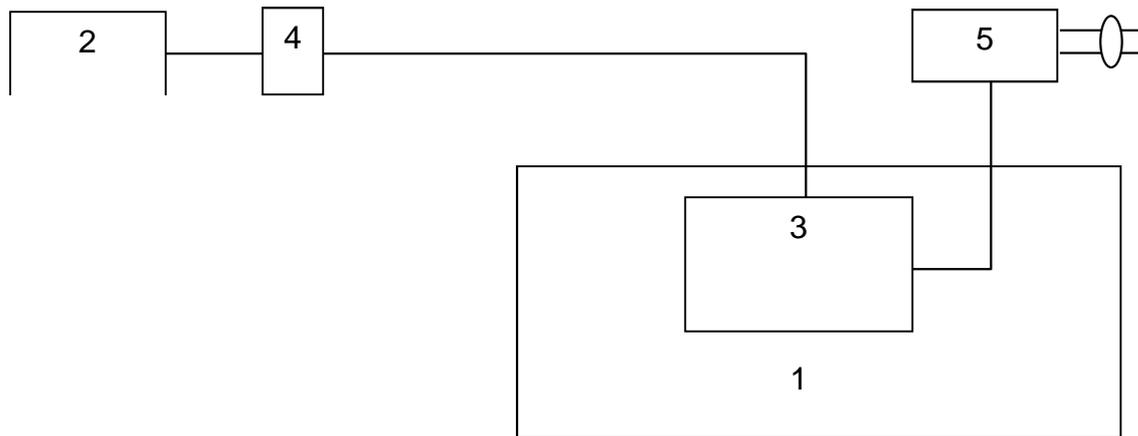
LIMIT

ETSI EN 300 328

For non-adaptive FHSS equipment, the Duty Cycle shall be equal to or less than the maximum value declared by the supplier. In addition, the maximum Tx-sequence time shall be 5 ms while the minimum Tx-gap time shall be 5 ms.

For non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. The equipment is using wide band modulations other than FHSS. The Duty Cycle shall be equal to or less than the maximum value declared by the supplier

Test Configuration



Legend

1. Wooden table
2. Spectrum analyzer
3. EUT
4. DC block
5. Power supply (Refer to power rating of section 2)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

N/A for Modulation Technology other than non-adaptive FHSS or non-adaptive wide band modulations other than FHSS.

7.4 DWELL TIME, MINIMUM FREQUENCT OCCUPATION AND HOPPING SEQUENCE

LIMIT

ETSI EN 300 328

Non-adaptive frequency hopping systems

The accumulated Dwell Time on any hopping frequency shall not be greater than 15 ms within any period of 15 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. Non-adaptive medical devices requiring reverse compatibility with other medical devices placed on the market when earlier versions of the present document were harmonised, are allowed to have an operating mode in which the maximum dwell time is 400 ms. The hopping sequence(s) shall contain at least N hopping frequencies where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.

Adaptive frequency hopping systems

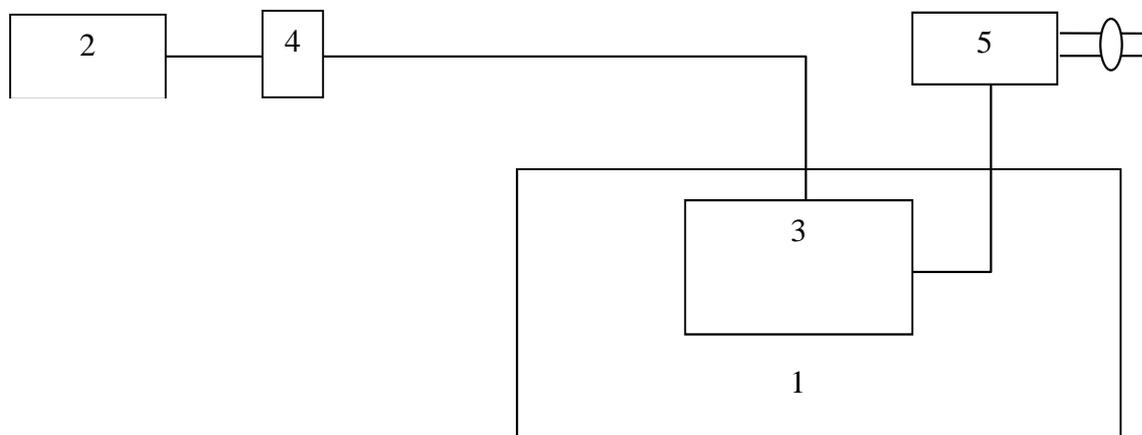
Adaptive Frequency Hopping systems shall be capable of operating over a minimum of 70 % of the band specified in clause 1. The maximum accumulated dwell time on any hopping frequency shall be 400 ms within any period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.

Other Requirements

Frequency Hopping equipment shall transmit on a minimum of two hopping frequencies. For non-Adaptive Frequency Hopping equipment, when not transmitting on a hopping frequency, the equipment has to occupy that frequency for the duration of the typical dwell time.

For Adaptive Frequency Hopping systems using LBT based DAA, if a signal is detected during the CCA, these systems may jump immediately to the next frequency in the hopping sequence (see clause 4.3.1.6.1.2 point 2) provided the limit for maximum dwell is respected.

Test Configuration



Legend

1. Wooden table
2. Spectrum analyzer
3. EUT
4. DC block
5. Power supply (Refer to power rating of section 2)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

Dwell Time:

Dwell Time					
Mode	Data Rate	Frequency	Dwell Time (ms)	Limit	Result
BR	1 Mbps	Hopping	6.51	15	Pass
EDR	3 Mbps	Hopping	316.28	400	Pass

Minimum Frequency Occupation Time Result:

Minimum Frequency Occupation Time						
Mode	Data Rate	Frequency	Total Channel	Duty Cycle On (ms)	Minimum Frequency Occupation (ms)	Sweep time (ms)
BR	1 Mbps	Hopping	79	1.63	2.927	515.08
EDR	3 Mbps	Hopping	20	2.97	3.476	237.6

Hopping sequence:

Hopping Sequence							
Mode	Data Rate	Frequency	FL 20dB (MHz)	FH 20dB (MHz)	Hopping Range (%)	Limit	Result
BR	1 Mbps	Hopping	N/A	N/A	N/A	N/A	Pass
EDR	3 Mbps	Hopping	2401.83	2480.32	100.63%	70%	Pass

7.5 HOPPING FREQUENCY SEPARATION

LIMIT

ETSI EN 300 328

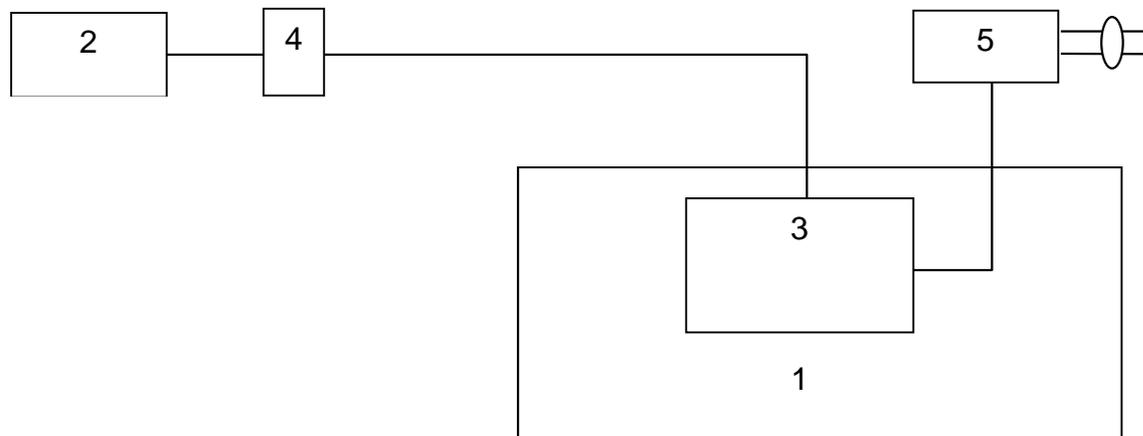
Non-adaptive frequency hopping systems

The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth (see clause 4.3.1.7) of a single hop, with a minimum separation of 100 kHz.

Adaptive frequency hopping systems

The minimum Hopping Frequency Separation shall be 100 kHz.

Test Configuration



Legend

1. Wooden table
2. Spectrum analyzer
3. EUT
4. DC block
5. Power supply (Refer to power rating of section 2)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

N/A for Modulation Technology other than FHSS

TEST RESULTS

Hopping Frequency Separation							
Mode	Data Rate	Frequency	F1 _{PK} (MHz)	F2 _{PK} (MHz)	F _{HS} (MHz)	F _{HS} Limit (kHz)	Result
BR	1 Mbps	Hopping	2441.1613	2442.1599	0.9986	100	Pass
EDR	3 Mbps	Hopping	2441.1613	2442.1686	1.0073	100	Pass



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7.6 MEDIUM UTILISATION

LIMIT

ETSI EN 300 328

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

N/A for equipments that employs the adaptive mechanism. This given UE implements adaptive mechanism to identify transmission of likely presence in the band.

7.7 ADAPTIVITY

LIMIT

ETSI EN 300 328

Adaptive Frequency Hopping using LBT based DAA

Adaptive Frequency Hopping equipment using LBT based DAA shall comply with the following minimum set of requirements:

- 1) At the start of every dwell time, before transmission on a hopping frequency, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The CCA observation time shall be not less than 0,2 % of the Channel Occupancy Time (see step 3) with a minimum of 18 μ s. If the equipment finds the hopping frequency to be clear, it may transmit immediately (see step 3).
- 2) If it is determined that a signal is present with a level above the detection threshold defined in step 5. the hopping frequency shall be marked as 'unavailable'. Then the equipment may jump to the next frequency in the hopping scheme even before the end of the dwell time, but in that case the 'unavailable' channel cannot be considered as being 'occupied' and shall be disregarded with respect to the requirement to maintain a minimum of 15 hopping frequencies. Alternatively, the equipment can remain on the frequency during the remainder of the dwell time. However, if the equipment remains on the frequency with the intention to transmit, it shall perform an extended CCA check in which the (unavailable) channel is observed for a random duration between the value defined for the CCA observation time in step 1 and 5 % of the Channel Occupancy Time defined in step 3. If the extended CCA check has determined the frequency to be no longer occupied, the hopping frequency becomes available again. The CCA observation time used by the equipment shall be declared by the supplier.
- 3) The total time during which an equipment has transmissions on a given hopping frequency without re-evaluating the availability of that frequency is defined as the Channel Occupancy Time. The Channel Occupancy Time for a given hopping frequency, which starts immediately after a successful CCA, shall be less than 60 ms followed by an Idle Period of minimum 5 % of the Channel Occupancy Time with a minimum of 100 μ s. After this, the procedure as in step 1 shall be repeated before having new transmissions on this hopping frequency during the same dwell time.

EXAMPLE: A system with a dwell time of 400 ms can have 6 transmission sequences of 60 ms each, Separated with an Idle Period of 3 ms. Each transmission sequence was preceded with a successful CCA check of 120 μ s.

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NOTE: For LBT based frequency hopping systems with a dwell time < 60 ms, the maximum Channel Occupancy Time is limited by the dwell time.

4) Unavailable' channels may be removed from or may remain in the hopping sequence, but in any case:

- there shall be no transmissions on 'unavailable' channels;
- a minimum of 15 hopping frequencies shall always be maintained.

5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to:

$$TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out}) \quad (P_{out} \text{ in mW e.i.r.p.})$$

6) The equipment shall comply with the requirements defined in step 1 to step 4 of the present clause in the presence of an unwanted CW signal as defined in table 2.

Table 2: Unwanted Signal parameters

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
<p>NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.</p> <p>NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.</p> <p>NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.</p>		

Adaptive Frequency Hopping using other forms of DAA (non-LBT based)

Adaptive Frequency Hopping equipment using non-LBT based DAA, shall comply with the following minimum set of requirements:

- 1) During normal operation, the equipment shall evaluate the presence of a signal for each of its hopping frequencies. If it is determined that a signal is present with a level above the detection threshold defined in step 5, the hopping frequency shall be marked as 'unavailable'.
- 2) The frequency shall remain unavailable for a minimum time equal to 1 second or 5 times the actual number of hopping frequencies multiplied with the Channel Occupancy Time whichever is the longest. There shall be no transmissions during this period on this frequency. After this, the hopping frequency may be considered again as an 'available' frequency.
- 3) The total time during which an equipment has transmissions on a given hopping frequency without re-evaluating the availability of that frequency is defined as the Channel Occupancy Time. The Channel Occupancy Time for a given hopping frequency shall be less than 40 ms. For equipment using a dwell time > 40 ms that want to have other transmissions during the same hop (dwell time) an Idle Period (no transmissions) of minimum 5 % of the Channel Occupancy Period with a minimum of 100 μ s shall be implemented. After this, the procedure as in step 1 need to be repeated before having new transmissions on this hopping frequency during the same dwell time.

EXAMPLE: A system with a dwell time of 400 ms can have 9 transmission sequences of 40 ms each, Separated with an Idle Period of 3 ms.

NOTE: For non-LBT based frequency hopping systems with a dwell time < 40 ms, the maximum Channel Occupancy Time may be non-contiguous, i.e. spread over a number of hopping sequences (equal to 40 msec divided by the dwell time [msec]).

- 4) 'Unavailable' channels may be removed from or may remain in the hopping sequence, but in any case:
 - there shall be no transmissions on 'unavailable' channels;
 - a minimum of 15 hopping frequencies shall always be maintained.
- 5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels below 20 dBm e.i.r.p., the detection threshold level may be relaxed to:

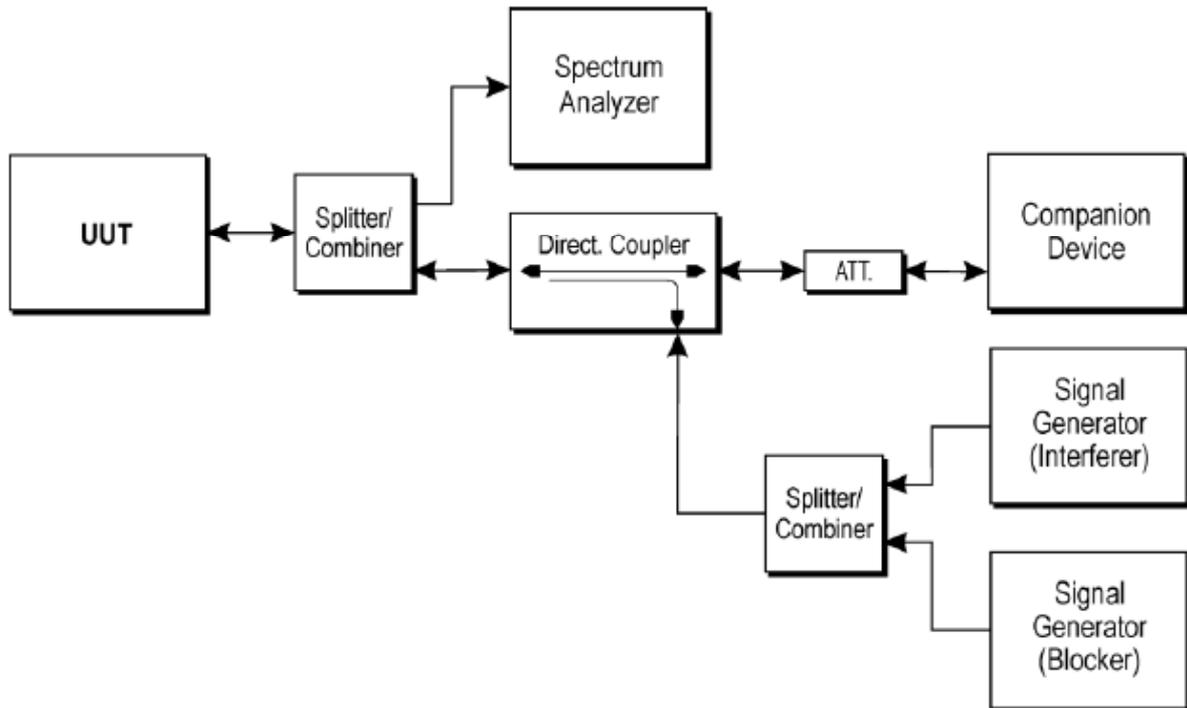
$$TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out}) \quad (P_{out} \text{ in mW e.i.r.p.})$$

- 6) The equipment shall comply with the requirements defined in step 1 to step 4 of the present clause in the presence of an unwanted CW signal as defined in table 3.

Table 3: Unwanted Signal parameters

Wanted signal mean power from companion device (dBm)	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
-30	2 395 or 2 488,5 (see note 1)	-35 (see note 2)
<p>NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.</p> <p>NOTE 2: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.</p>		

Test Configuration



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

The spectrum analyser sweep was triggered by the start of the interfering signal , with the interfering signal present, a 100 % duty cycle CW signal is inserted as the blocking signal.



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TEST RESULTS

IEEE 802.11b Mode	Signal duration after interfering (s)	
	CH Low	CH High
	Pass	Pass

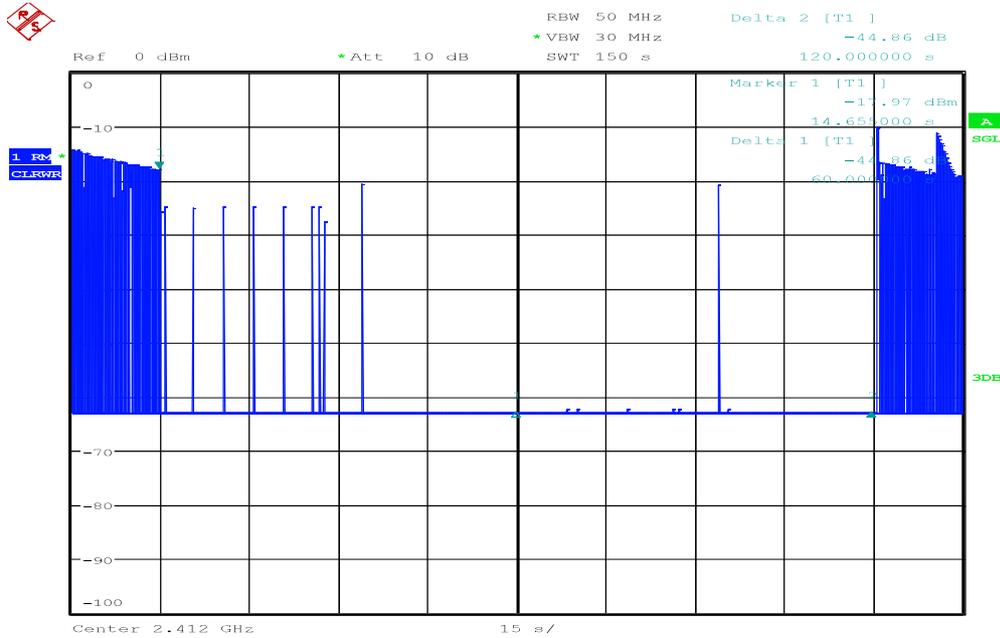
IEEE 802.11g Mode	Signal duration after interfering (s)	
	CH Low	CH High
	Pass	Pass

IEEE 802.11n HT 20 MHz Mode	Signal duration after interfering (s)	
	CH Low	CH High
	Pass	Pass

IEEE 802.11n HT 40 MHz Mode	Signal duration after interfering (s)	
	CH Low	CH High
	Pass	Pass

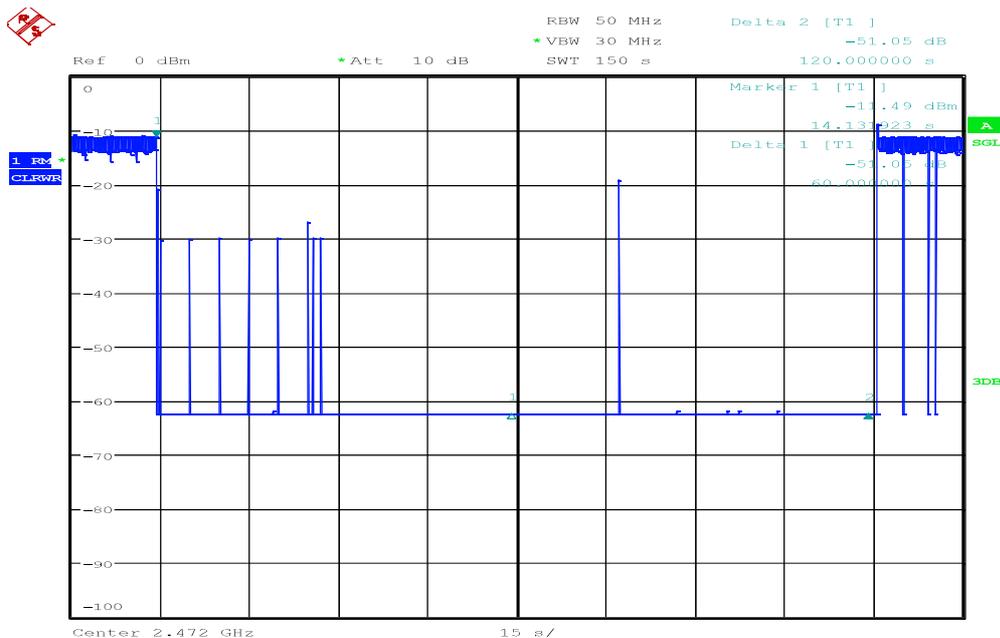
Report No.: T180627D10-RT1

Test results: IEEE 802.11b Mode, Low



Date: 25.JUL.2018 15:58:50

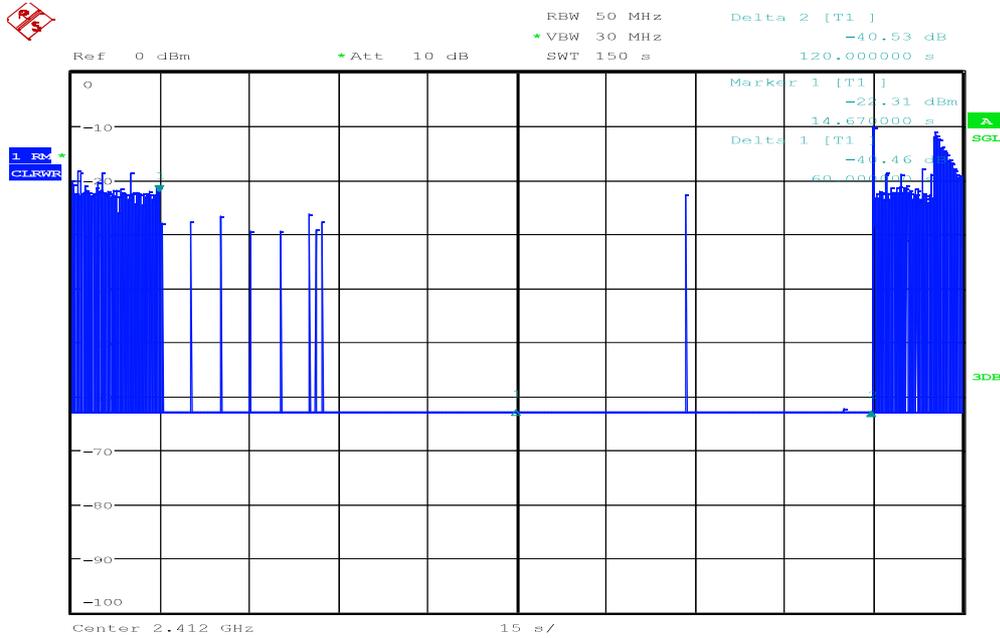
Test results: IEEE 802.11b Mode, High



Date: 25.JUL.2018 17:16:41

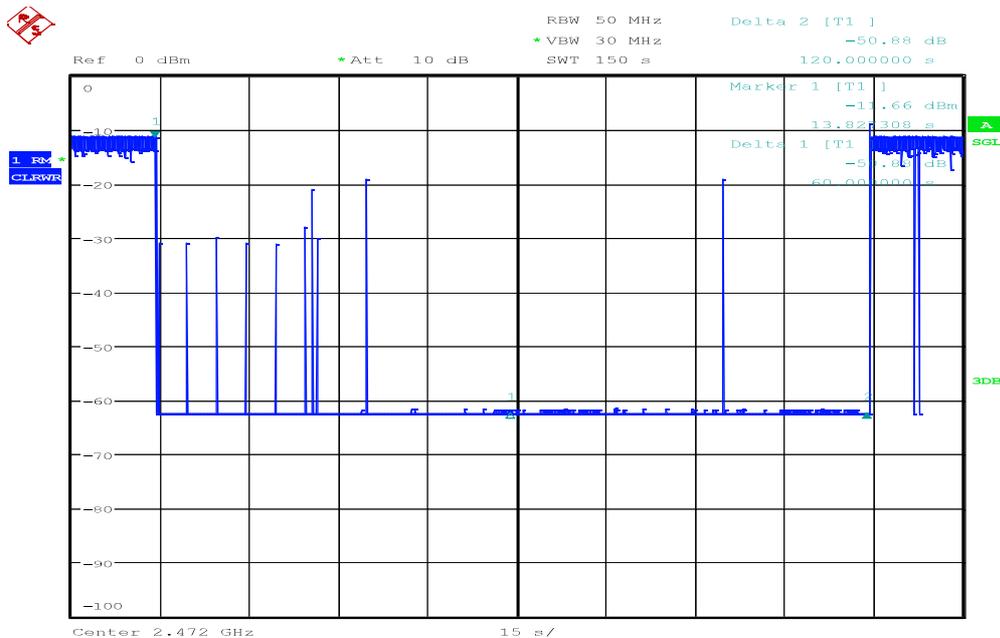
Report No.: T180627D10-RT1

Test results: IEEE 802.11g Mode, Low



Date: 25.JUL.2018 16:02:07

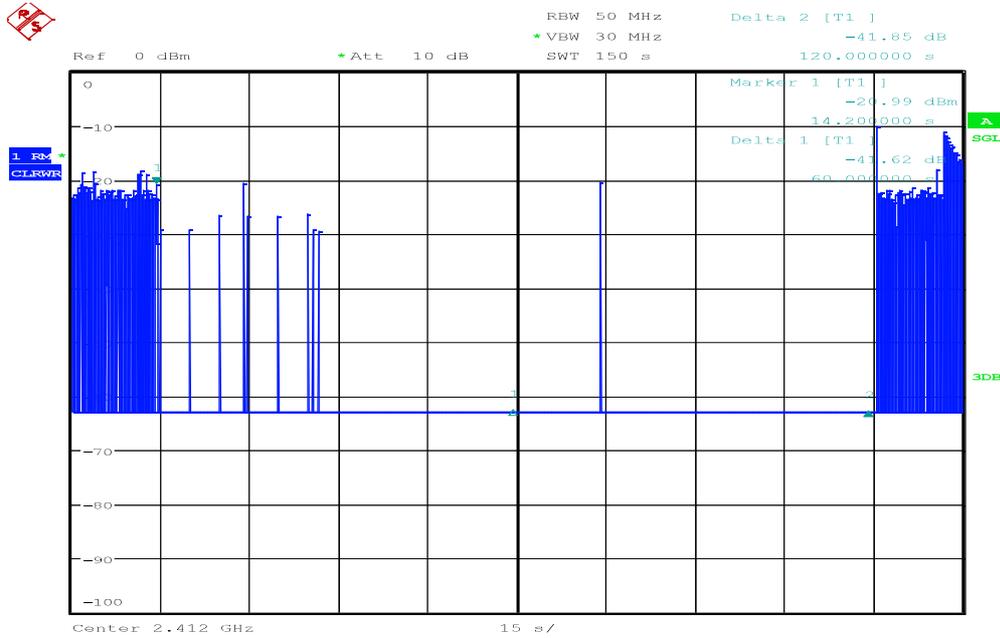
Test results: IEEE 802.11g Mode, High



Date: 25.JUL.2018 17:07:38

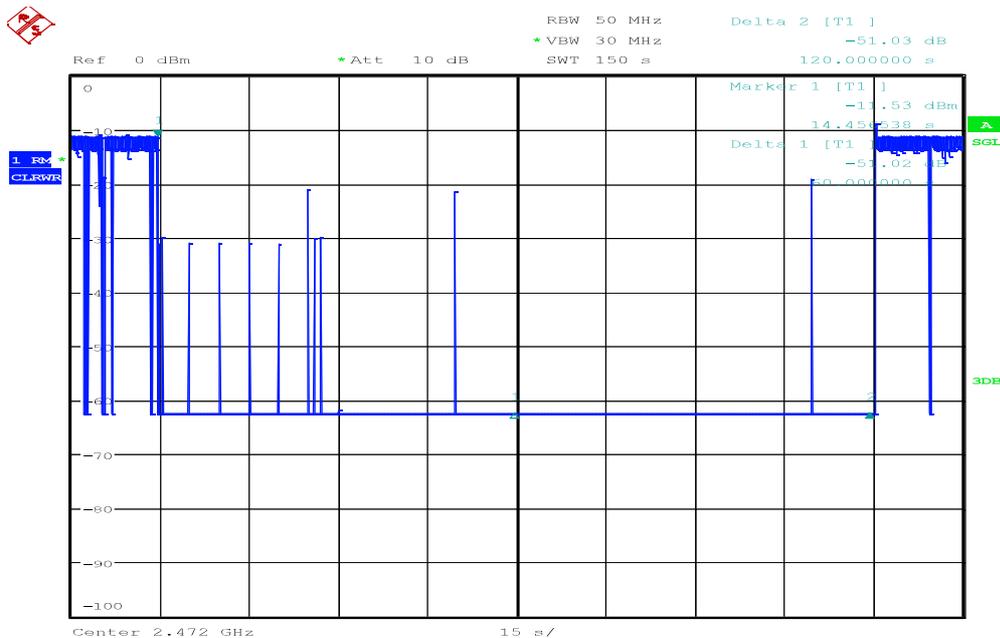
Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 20 MHz Mode, Low



Date: 25.JUL.2018 16:05:06

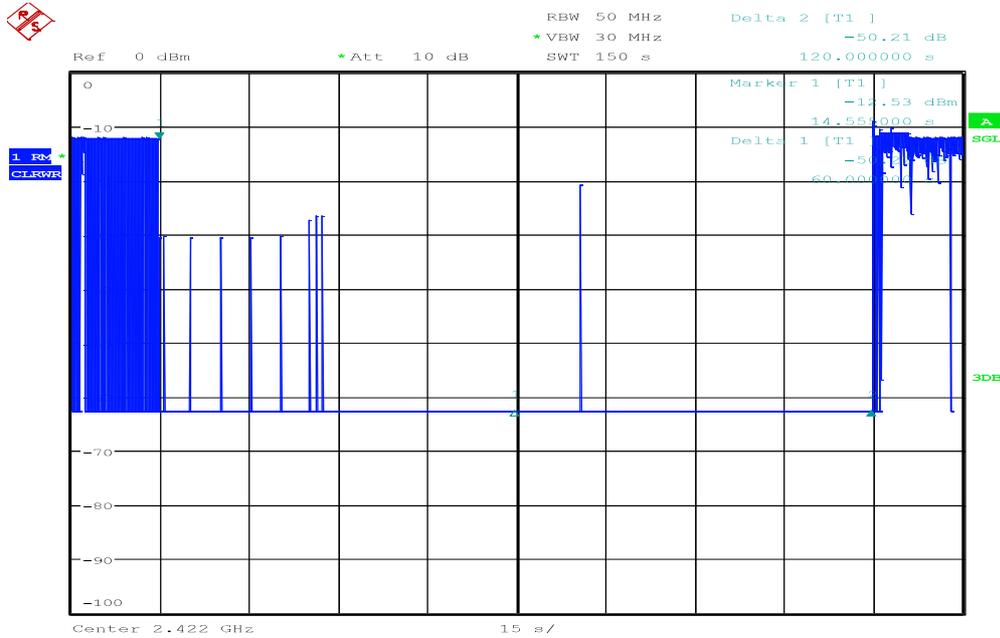
Test results: IEEE 802.11n HT 20 MHz Mode, High



Date: 25.JUL.2018 16:56:24

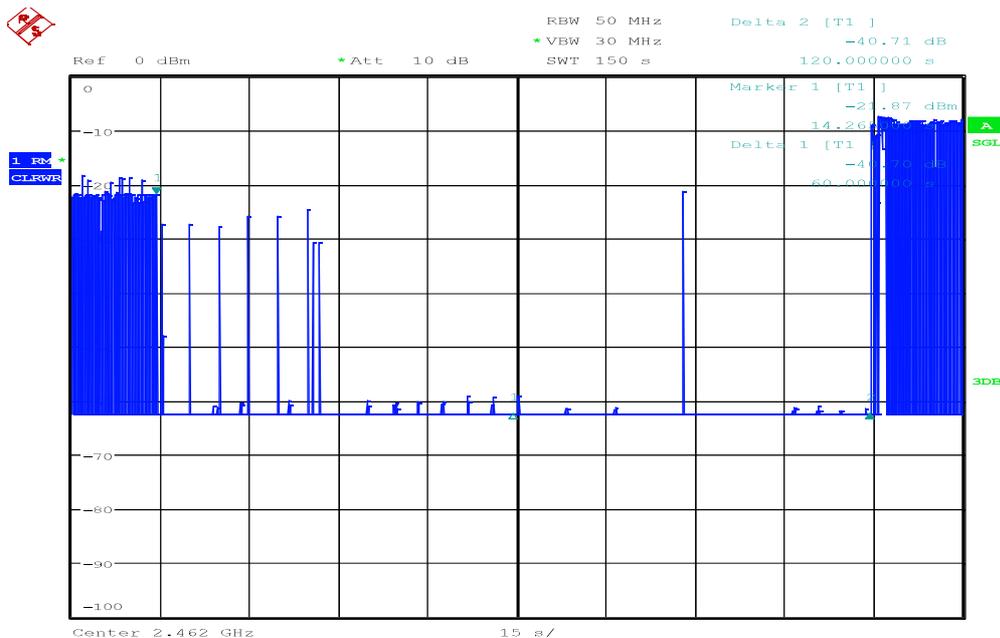
Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 40 MHz Mode, Low



Date: 25.JUL.2018 18:29:01

Test results: IEEE 802.11n HT 40 MHz Mode, High



Date: 25.JUL.2018 19:17:01



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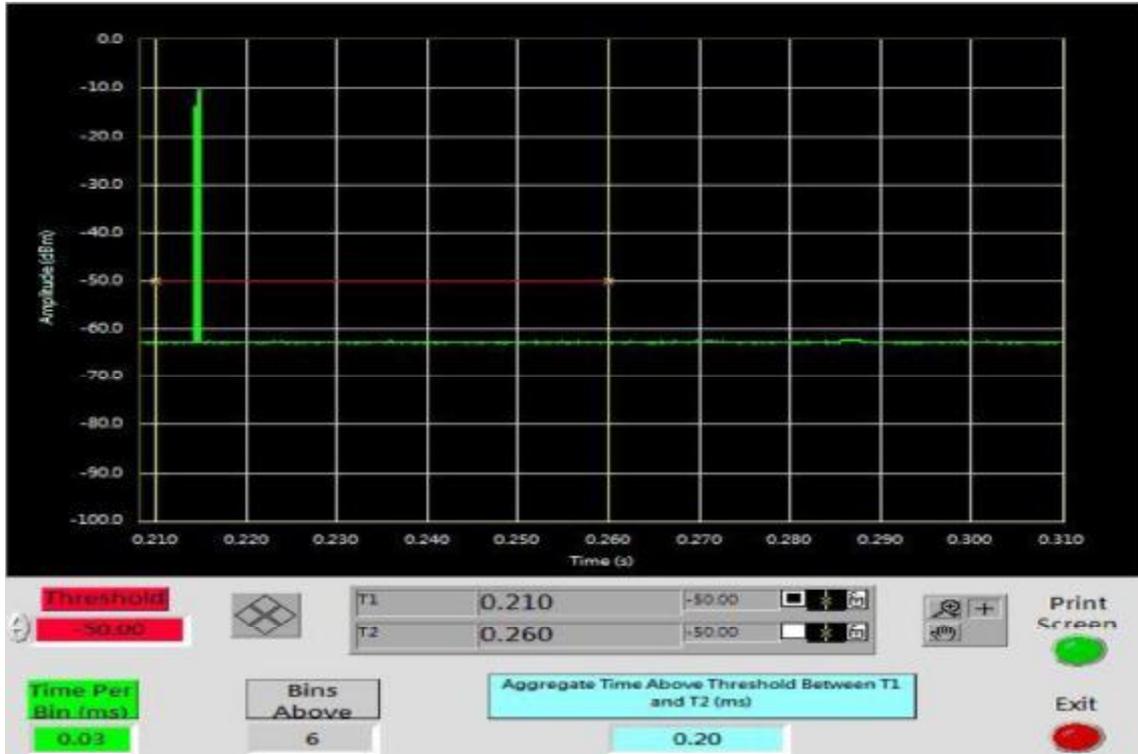
Rev.: 01

TEST RESULTS

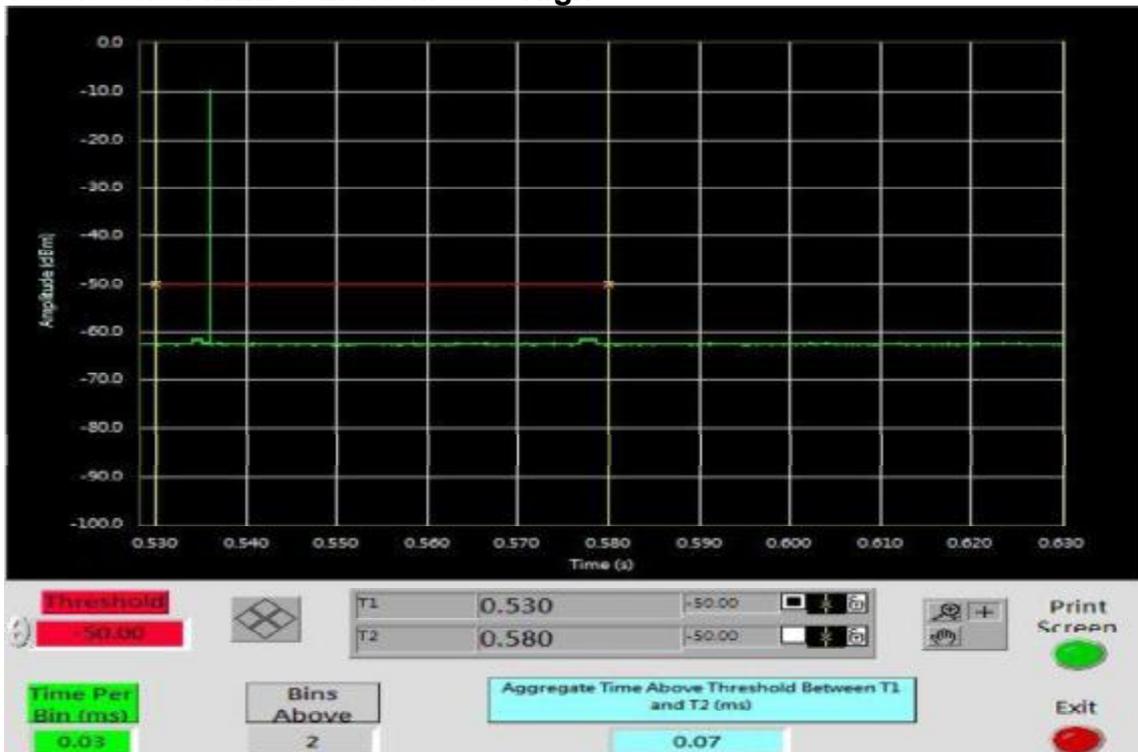
Short Control Signalling Transmissions			
Mode	Maximum duty cycle(ms)		Limit(ms)
	CH Low	CH High	
IEEE 802.11b Mode	0.20	0.07	5
IEEE 802.11g Mode	0.23	0.37	5
IEEE 802.11n HT 20 MHz Mode	0.40	0.23	5

Short Control Signalling Transmissions			
Mode	Maximum duty cycle(ms)		Limit(ms)
	CH Low	CH High	
IEEE 802.11n HT 40 MHz Mode	0.30	0.45	5

Test results: IEEE 802.11b Mode / Low

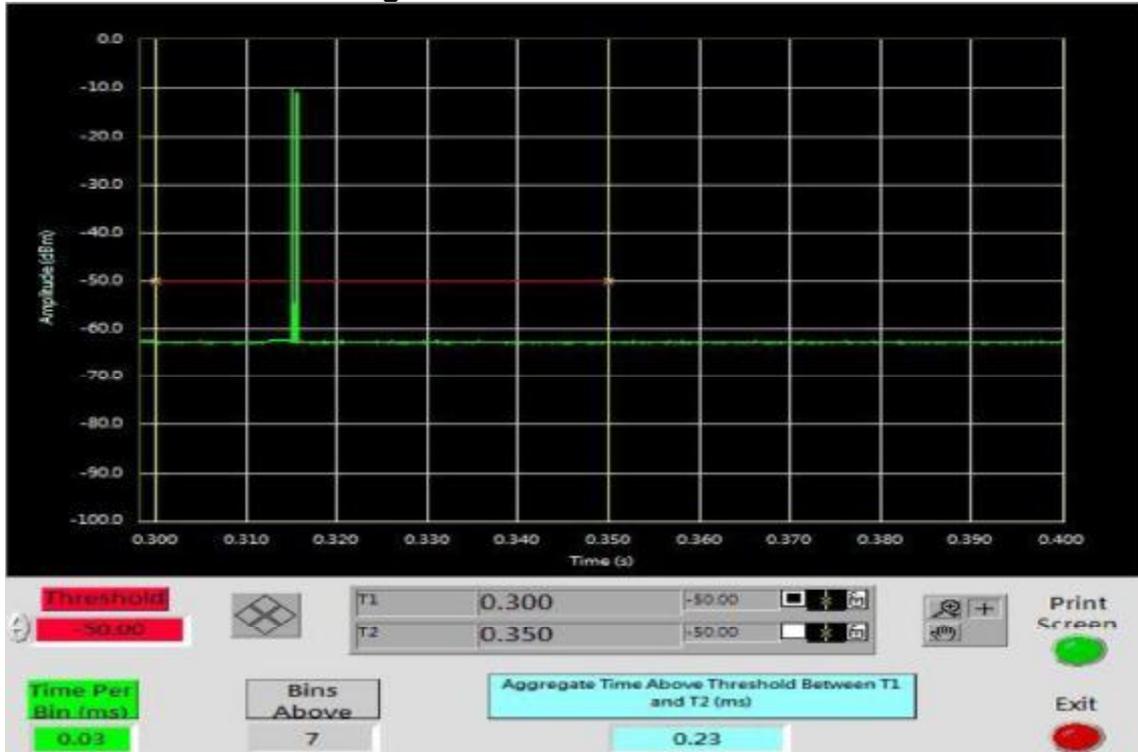


Test results: IEEE 802.11b Mode / High

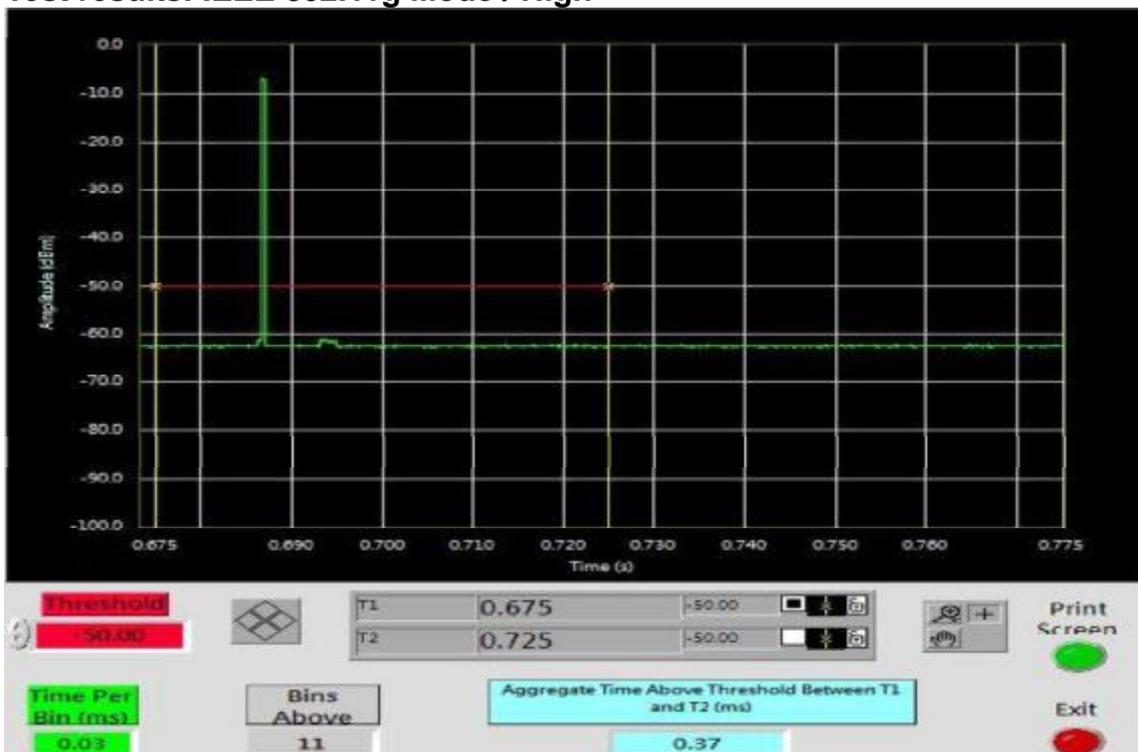


Report No.: T180627D10-RT1

Test results: IEEE 802.11g Mode / Low

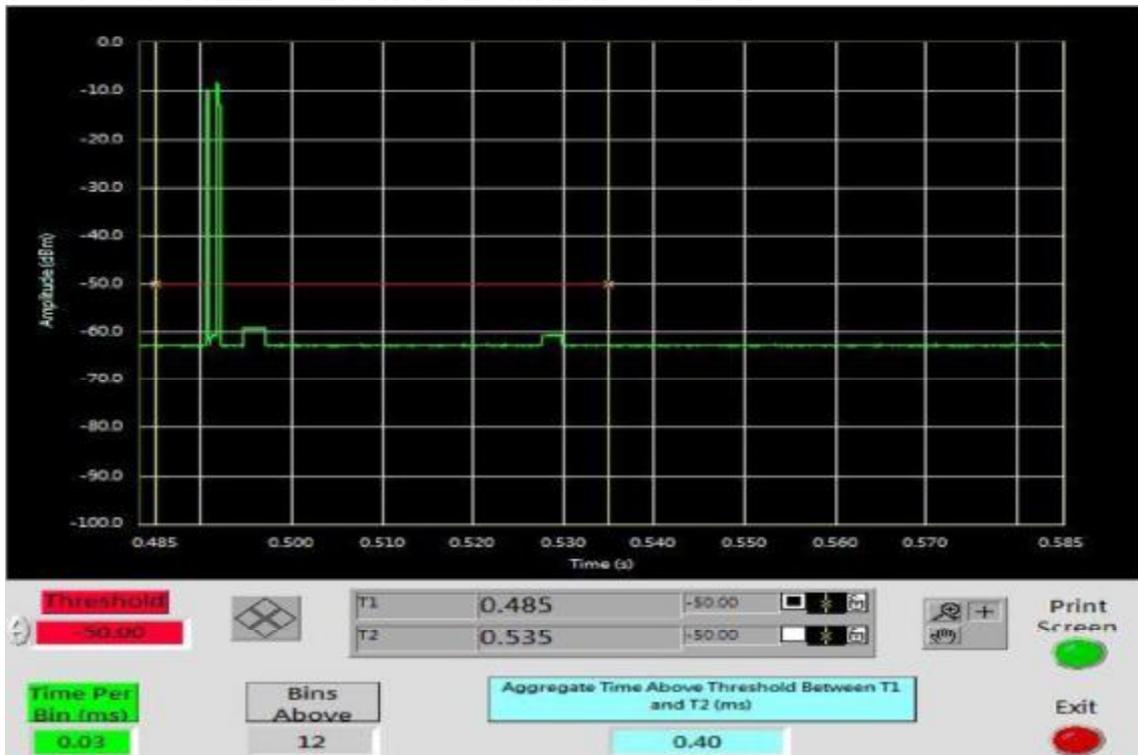


Test results: IEEE 802.11g Mode / High

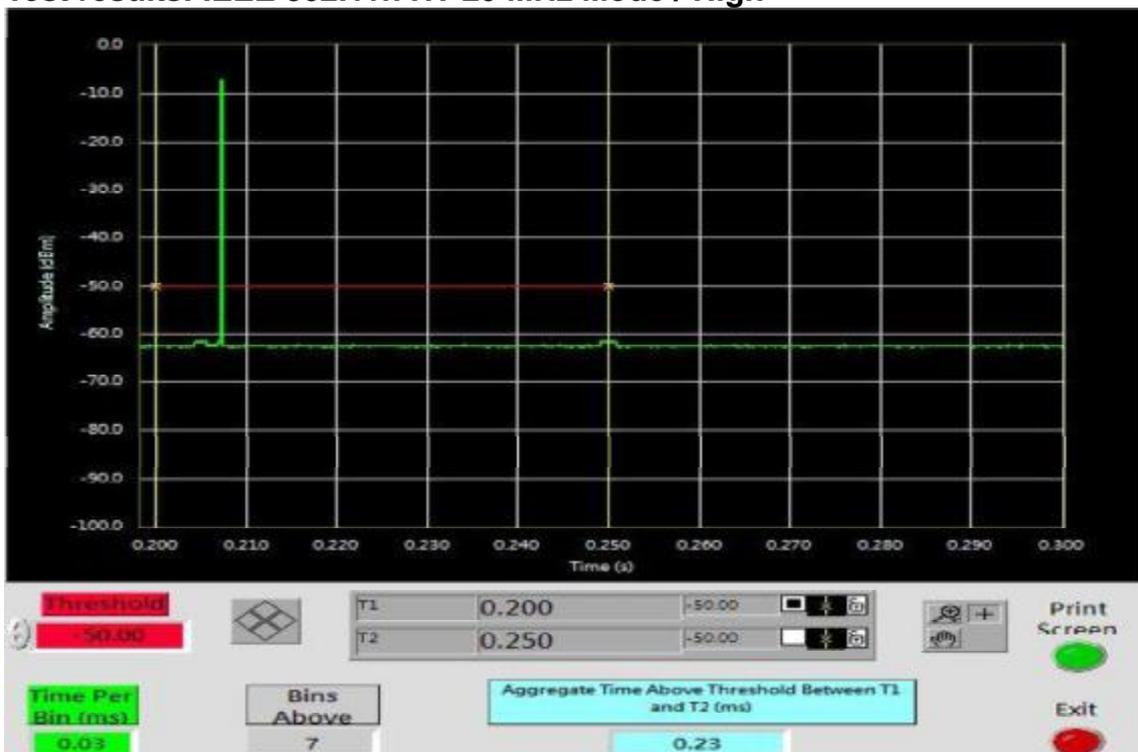


Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 20 MHz Mode / Low

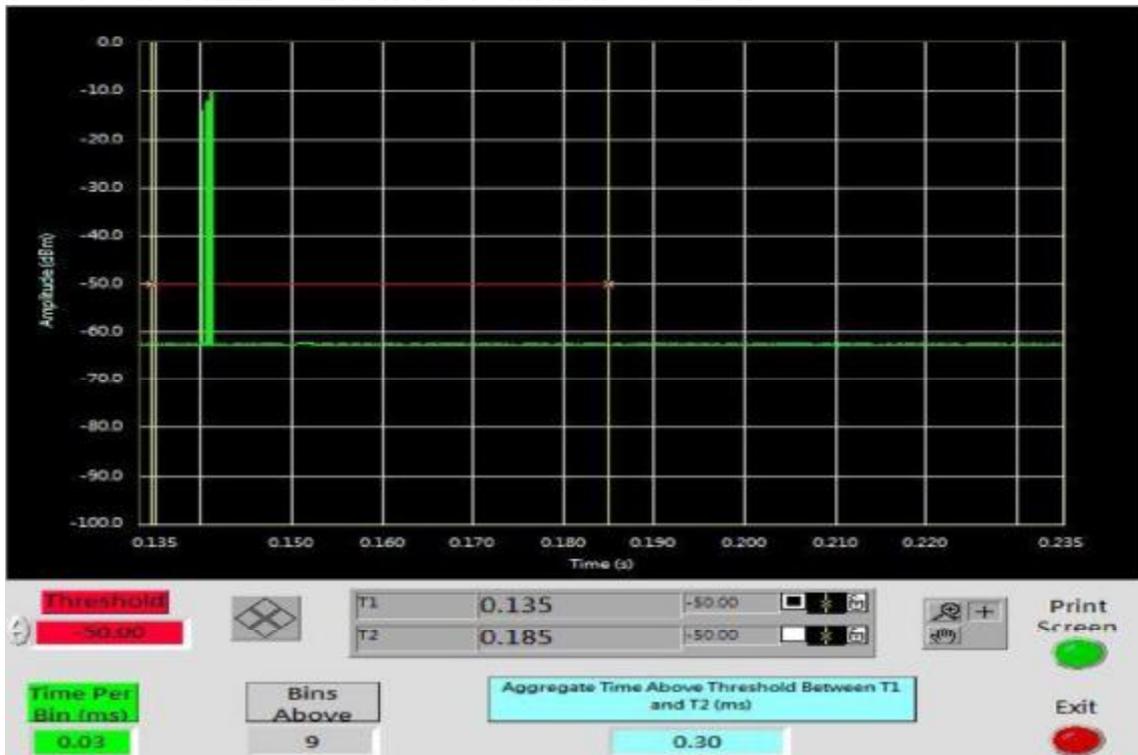


Test results: IEEE 802.11n HT 20 MHz Mode / High

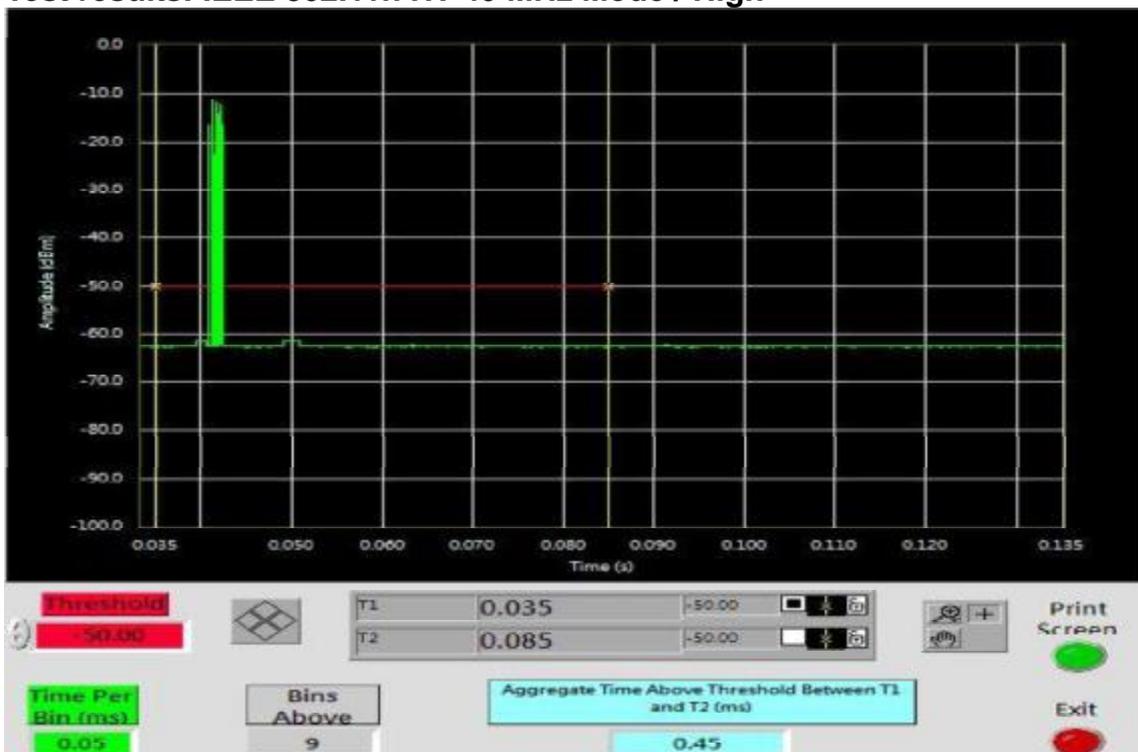


Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 40 MHz Mode / Low

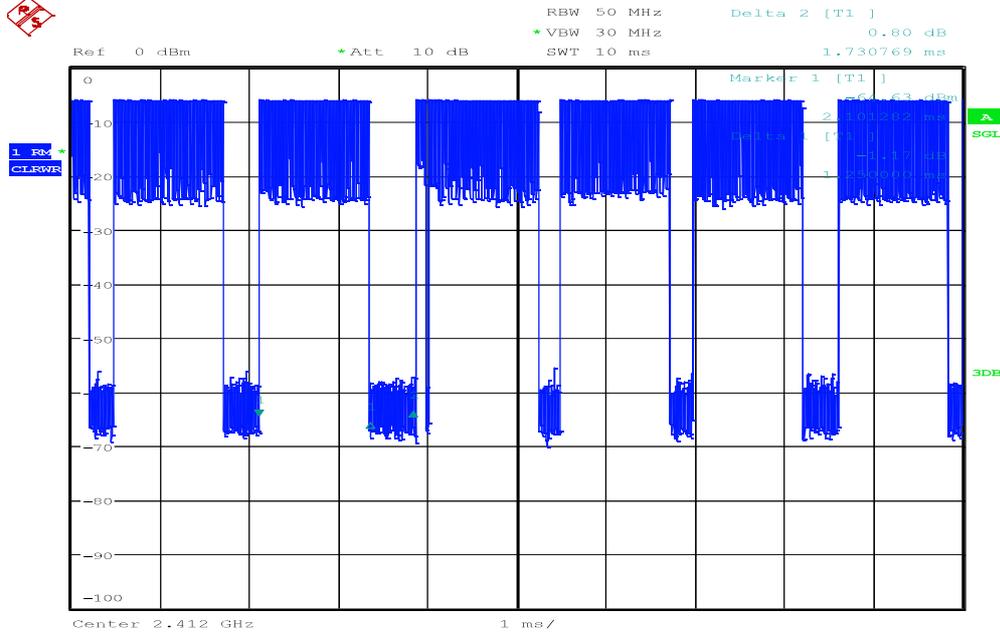


Test results: IEEE 802.11n HT 40 MHz Mode / High



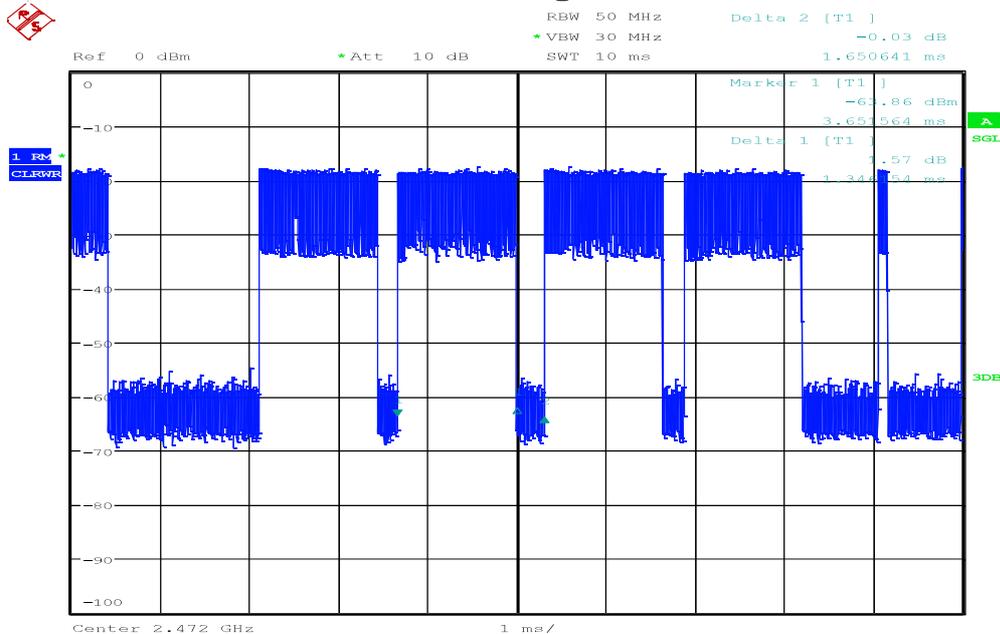
Report No.: T180627D10-RT1

Occupancy time Test results: IEEE 802.11b Mode / Low



Date: 25.JUL.2018 14:42:27

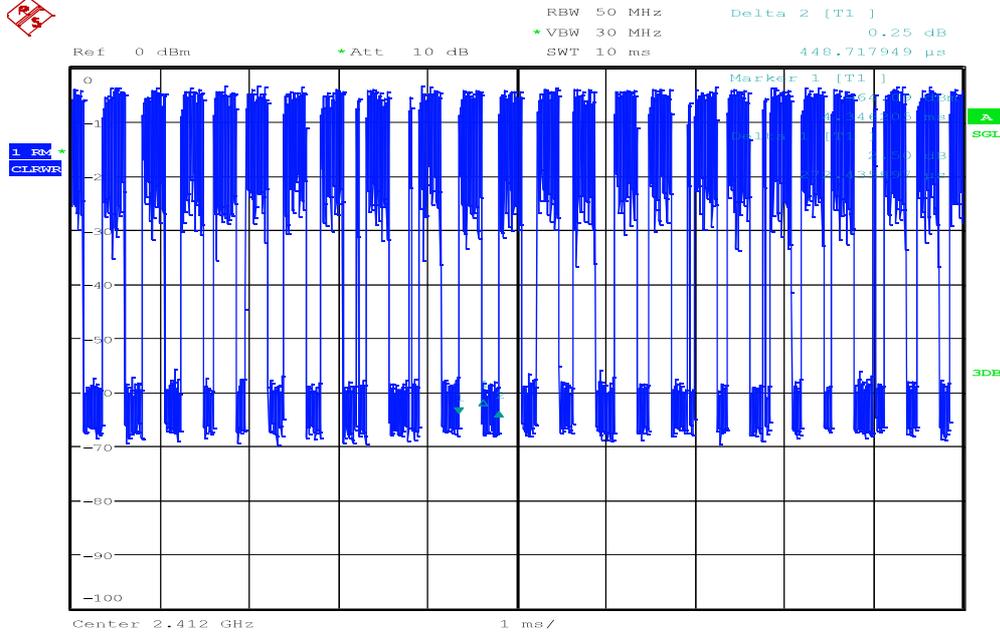
Test results: IEEE 802.11b Mode / High



Date: 25.JUL.2018 17:52:22

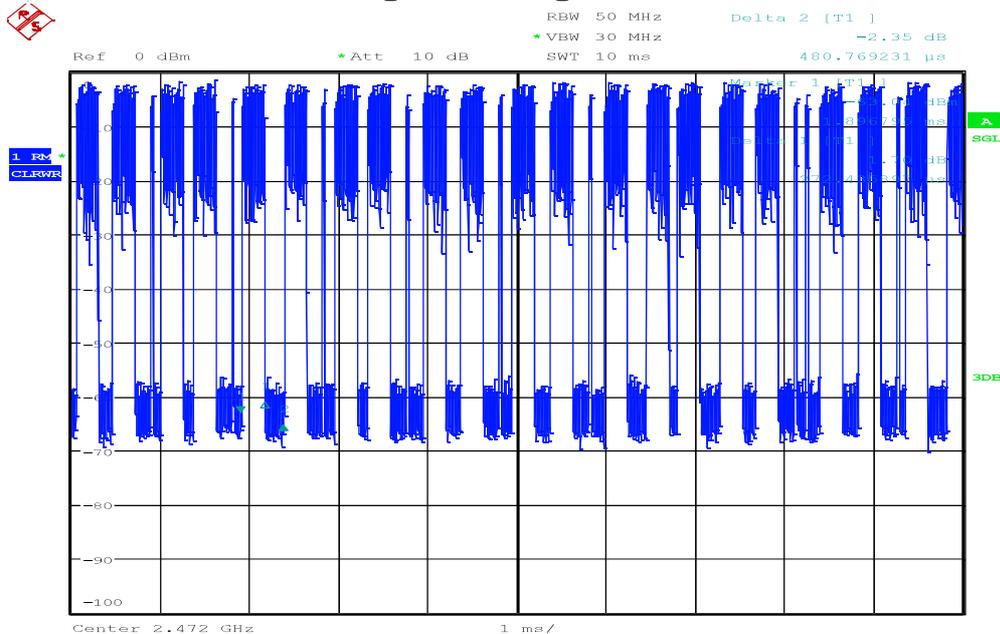
Report No.: T180627D10-RT1

Test results: IEEE 802.11g Mode / Low



Date: 25.JUL.2018 15:11:48

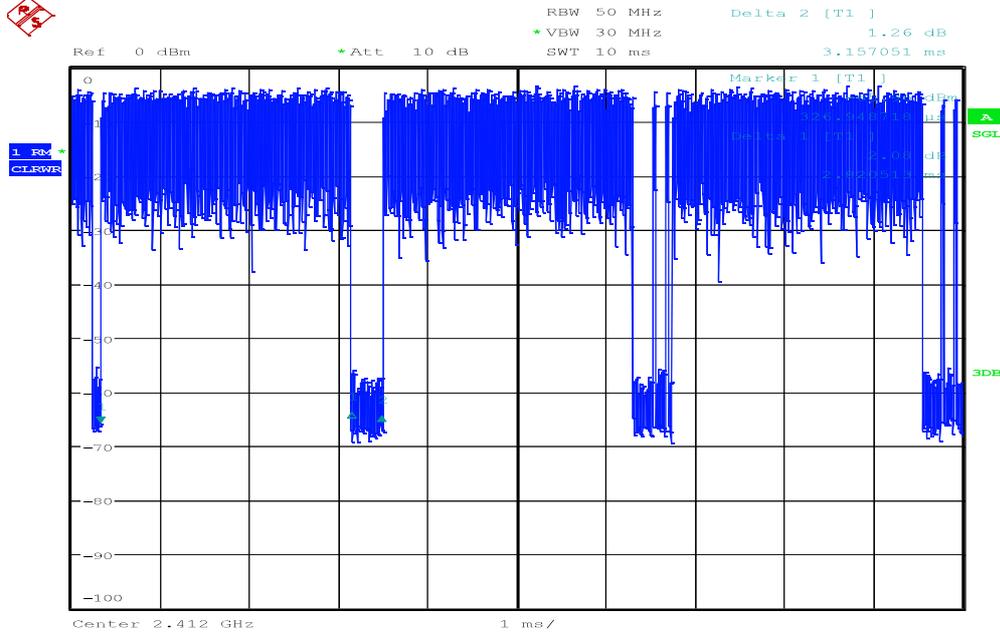
Test results: IEEE 802.11g Mode / High



Date: 25.JUL.2018 17:04:25

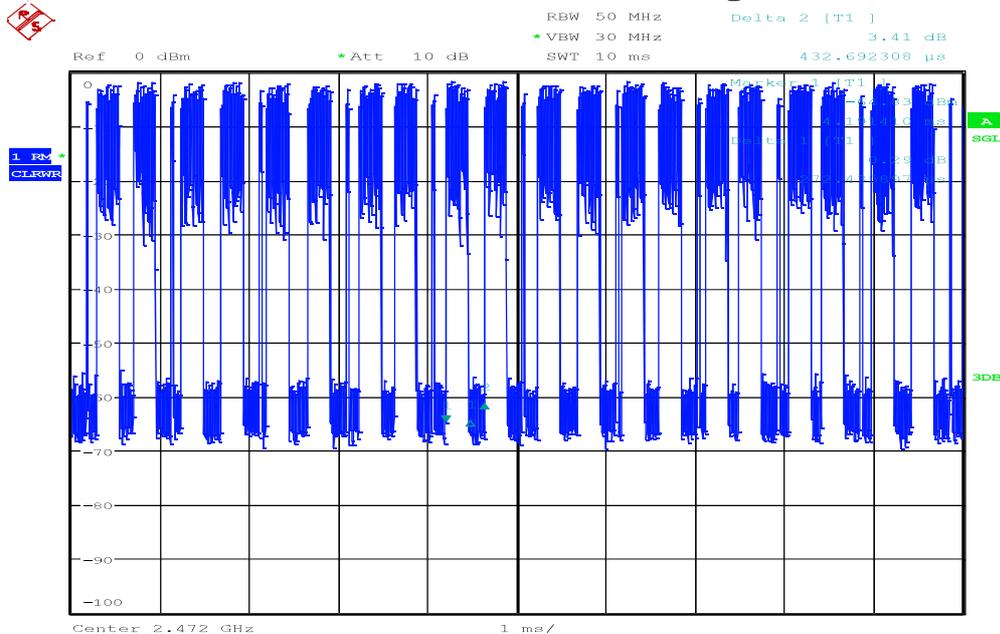
Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 20 MHz Mode / Low



Date: 25.JUL.2018 15:41:28

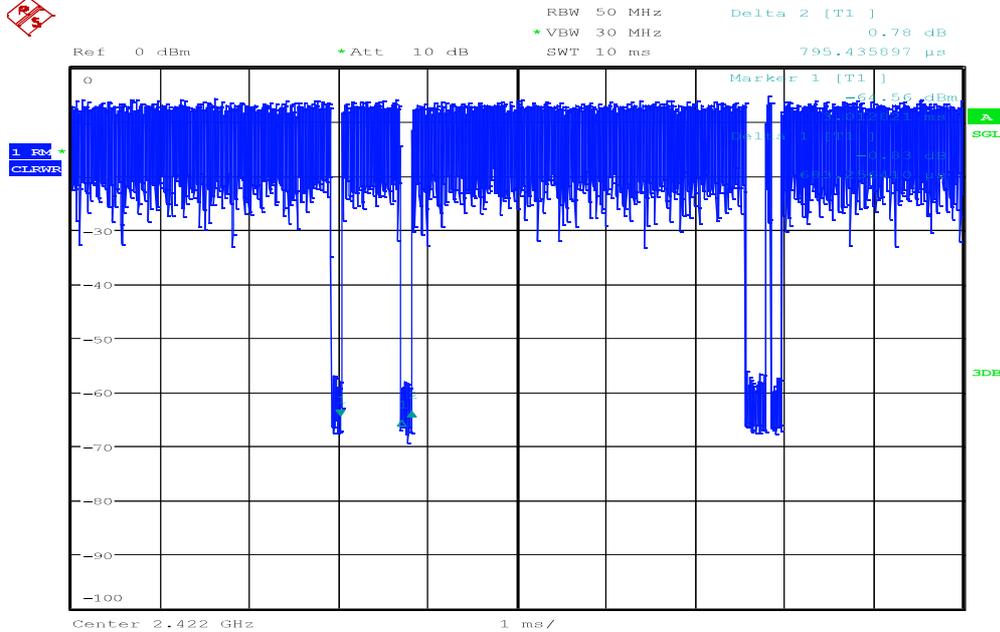
Test results: IEEE 802.11n HT 20 MHz Mode / High



Date: 25.JUL.2018 16:53:07

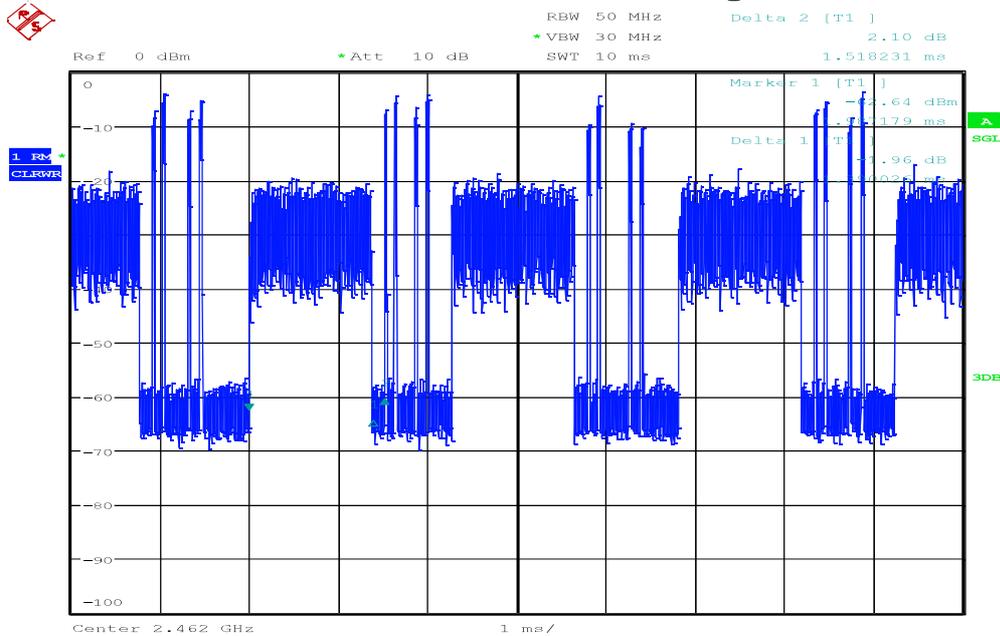
Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 40 MHz Mode / Low



Date: 25.JUL.2018 18:25:47

Test results: IEEE 802.11n HT 40 MHz Mode / High



Date: 25.JUL.2018 19:13:46

7.8 OCCUPIED CHANNEL BANDWIDTH

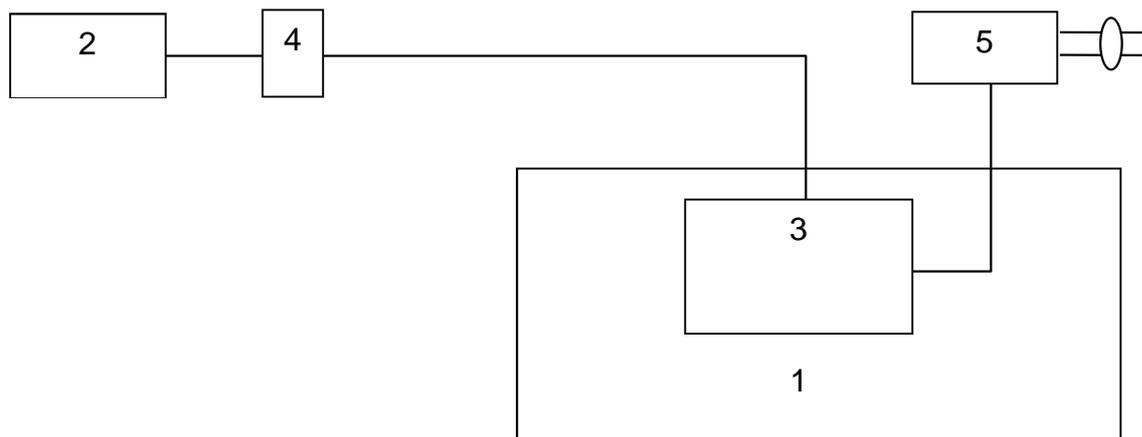
LIMIT

ETSI EN 300 328

For non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the value declared by the supplier. This declared value shall not be greater than 5 MHz.

Test Configuration



Legend

1. Wooden table
2. Spectrum analyzer
3. EUT
4. DC block
5. Power supply (Refer to power rating of section 2)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

No non-compliance noted.

IEEE 802.11b Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.068
High	2472	13.056

Data Rate	Frequency	FL at 99% Bandwidth(MHz)	FH at 99% Bandwidth(MHz)	Limit	Result
1 Mbps	2412	2405.5173	2418.6183	2400	Pass
	2472	2465.6178	2478.6188	2483.5	Pass

IEEE 802.11g Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.235
High	2472	16.245

Data Rate	Frequency	FL at 99% Bandwidth(MHz)	FH at 99% Bandwidth(MHz)	Limit	Result
6 Mbps	2412	2404.013	2420.214	2400	Pass
	2472	2463.9119	2480.2136	2483.5	Pass

IEEE 802.11n HT20 MHz Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.351
High	2472	17.345

Data Rate	Frequency	FL at 99% Bandwidth(MHz)	FH at 99% Bandwidth(MHz)	Limit	Result
MCS 0	2412	2403.4138	2420.8142	2400	Pass
	2472	2463.4135	2480.8144	2483.5	Pass

IEEE 802.11n HT40 MHz Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	36.091
High	2462	36.066

Data Rate	Frequency	FL at 99% Bandwidth(MHz)	FH at 99% Bandwidth(MHz)	Limit	Result
MCS 0	2422	2404.1106	2440.211	2400	Pass
	2462	2444.0109	2480.1112	2483.5	Pass

Bluetooth for GFSK (BR-1M)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.993
High	2480	0.993

Data Rate	Frequency (MHz)	FL at 99% Bandwidth (MHz)	FH at 99% Bandwidth (MHz)	Limit (MHz)	Result
1 Mbps	2402	2401.5155	2402.5156	2400	Pass
	2480	2479.5153	2480.5155	2483.5	Pass

Bluetooth for 8DPSK (EDR-3M)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.219
High	2480	1.213

Data Rate	Frequency (MHz)	FL at 99% Bandwidth (MHz)	FH at 99% Bandwidth (MHz)	Limit (MHz)	Result
3 Mbps	2402	2401.4147	2402.6156	2400	Pass
	2480	2479.4141	2480.6154	2483.5	Pass

Bluetooth 4.1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.09
High	2480	1.09

Data Rate	Frequency (MHz)	FL at 99% Bandwidth (MHz)	FH at 99% Bandwidth (MHz)	Limit (MHz)	Result
BLE	2402	2401.5196	2402.6198	2400	Pass
	2480	2479.5178	2480.6182	2483.5	Pass

7.9 TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

LIMIT

ETSI EN 300 328

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1.

NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.7.

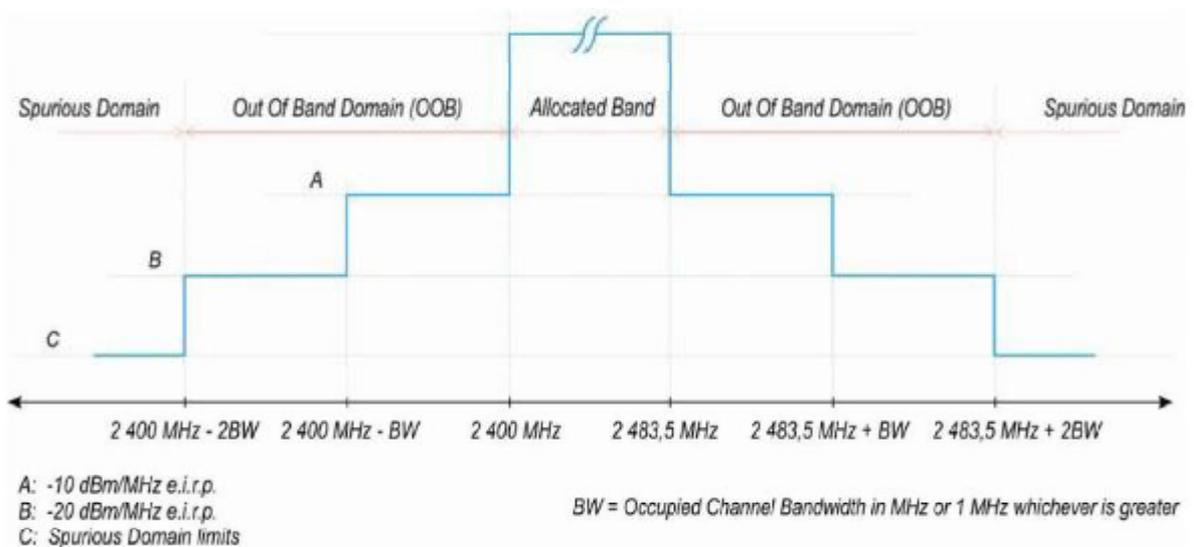
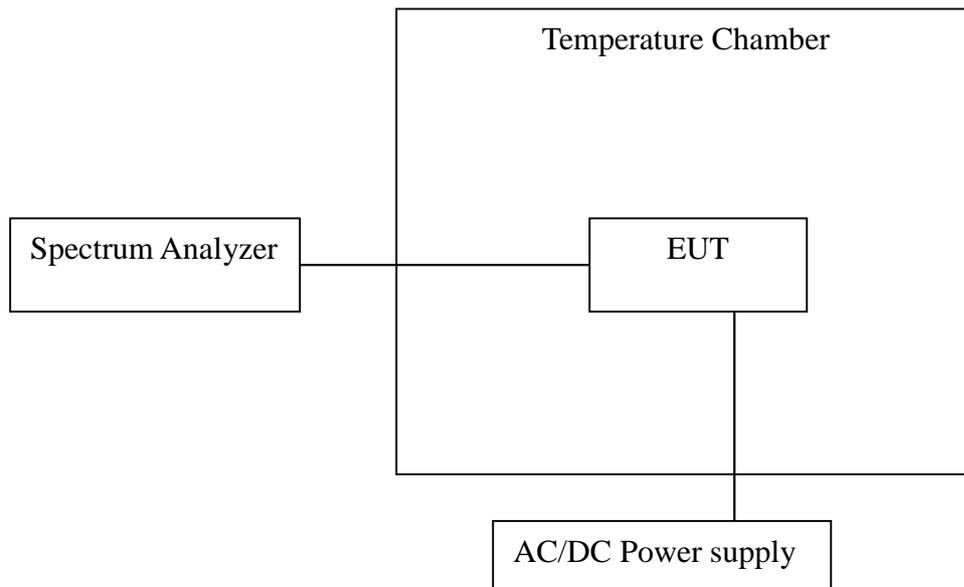


Figure 1: Transmit mask

Test Configuration**Temperature and Voltage Measurement (under normal and extreme test conditions)****TEST PROCEDURE**

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

No non-compliance noted.



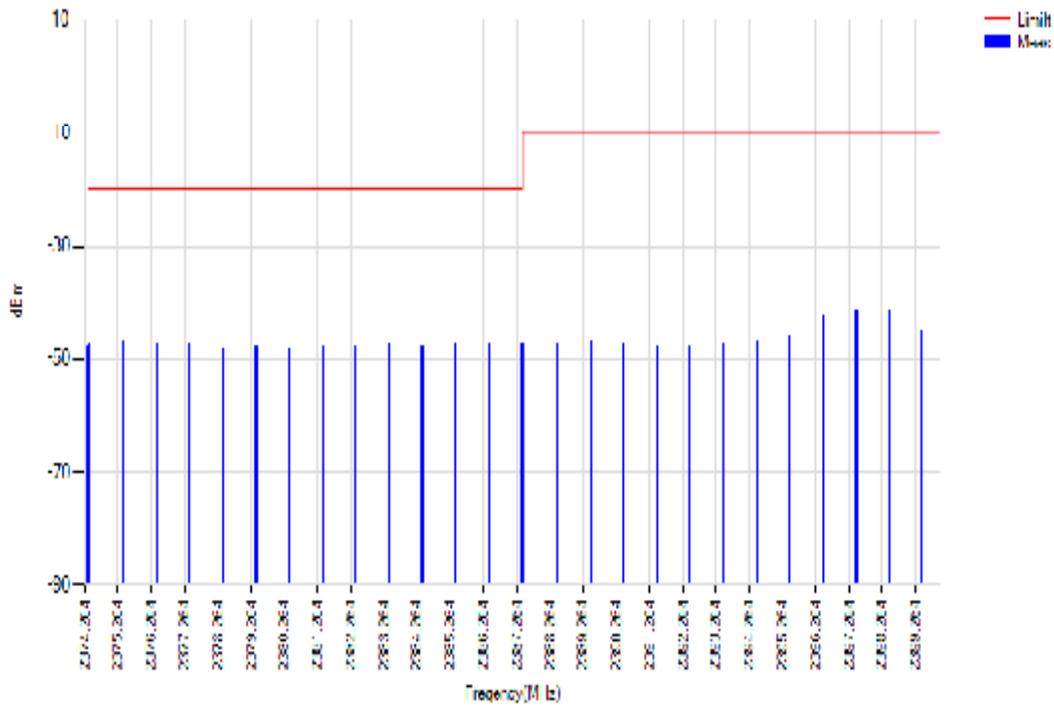
Report No.: T180627D10-RT1

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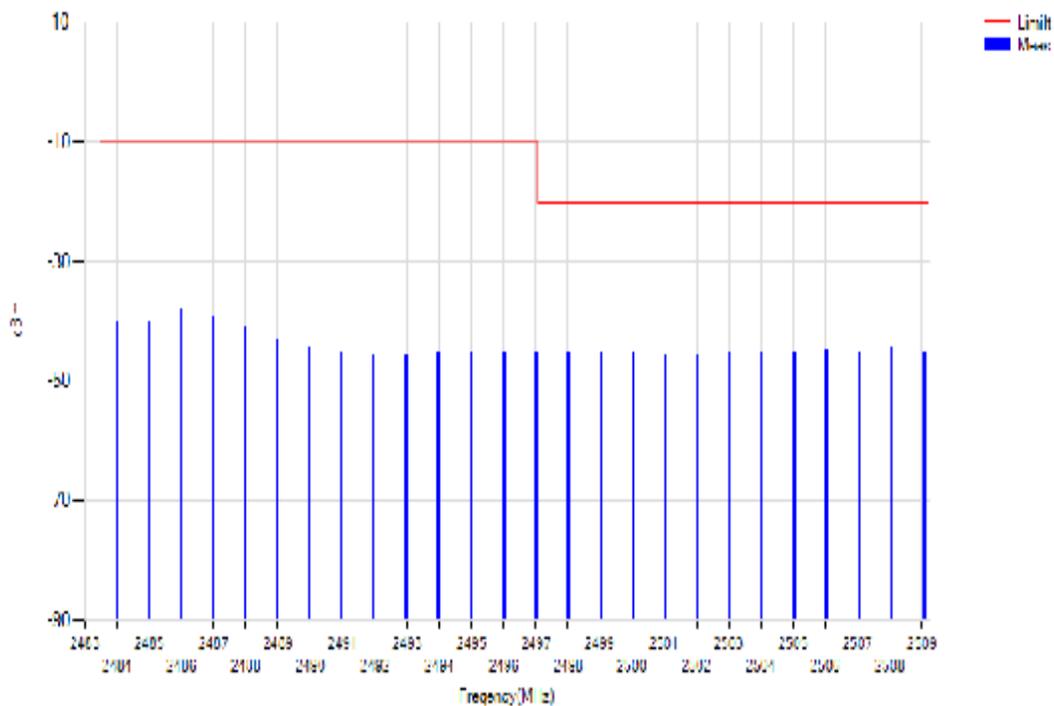
Rev: 01

Test results: IEEE 802.11b Mode

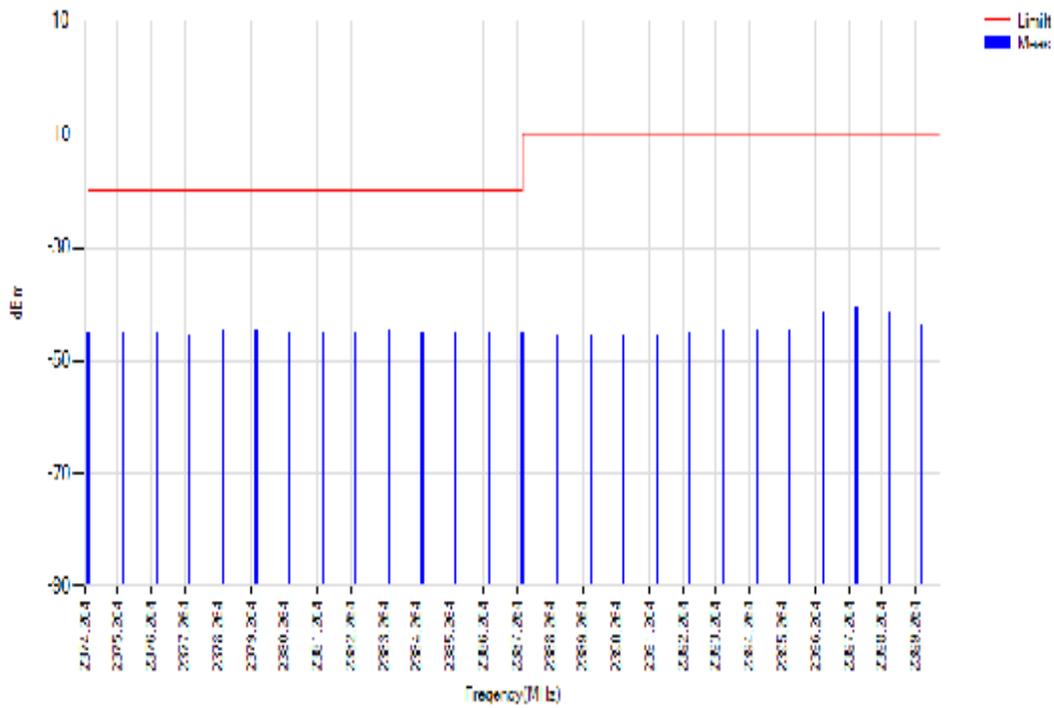
25°C /5v CH Low



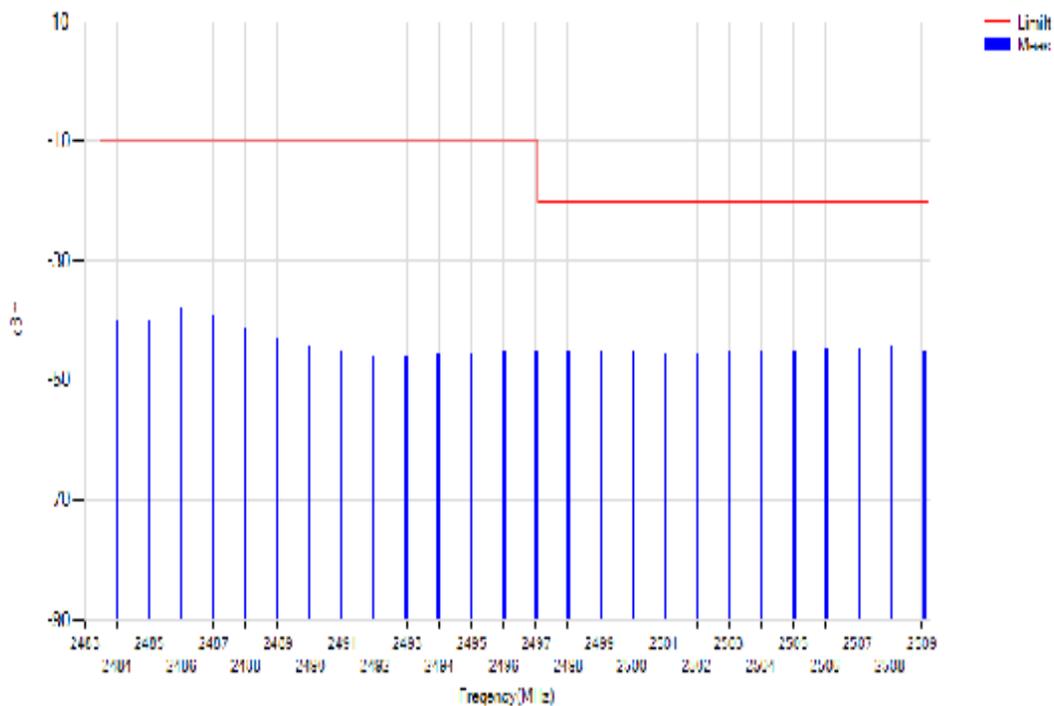
25°C /5v CH High



70°C /5v CH Low



70°C /5v CH High





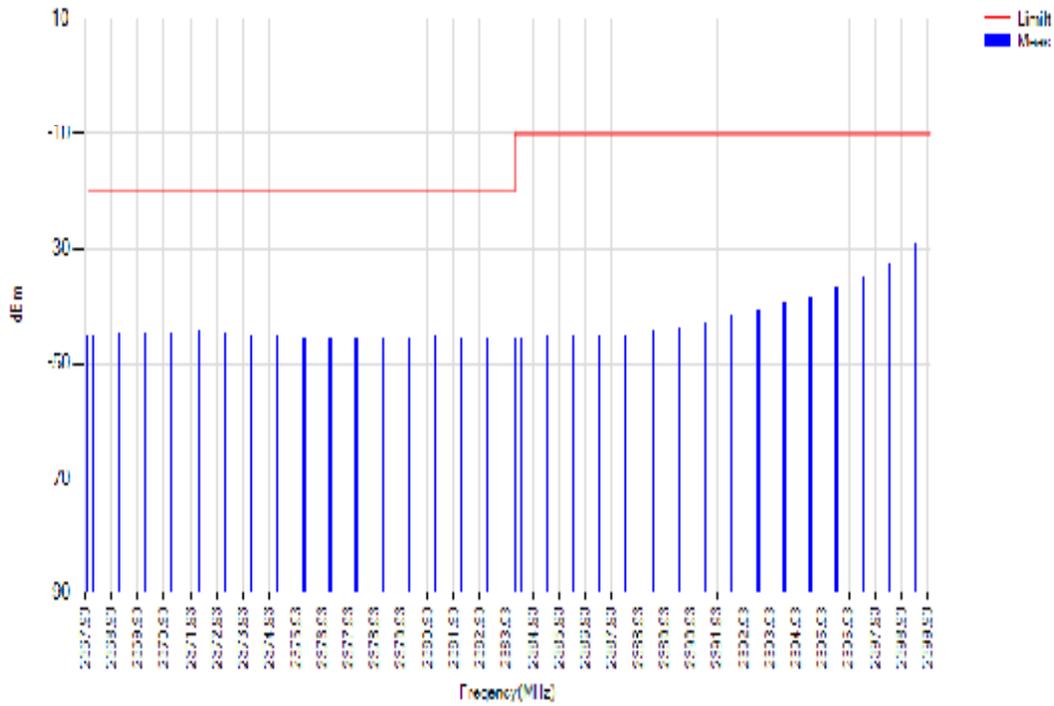
Report No.: T180627D10-RT1

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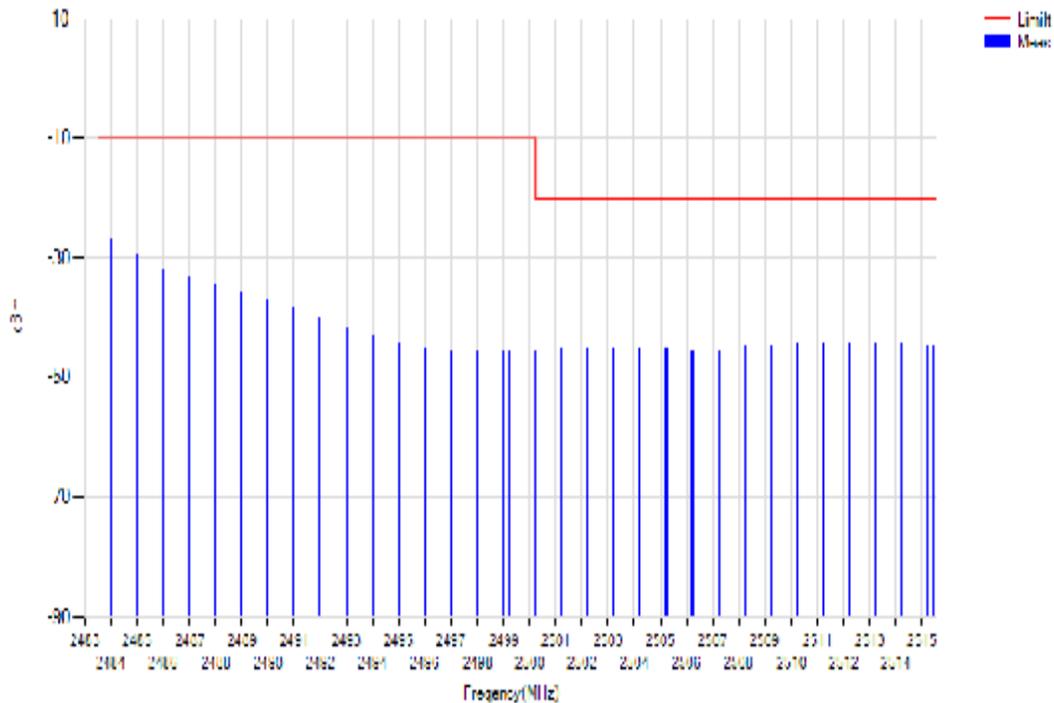
Rev.: 01

Test results: IEEE 802.11g Mode

25°C /5v CH Low



25°C /5v CH High



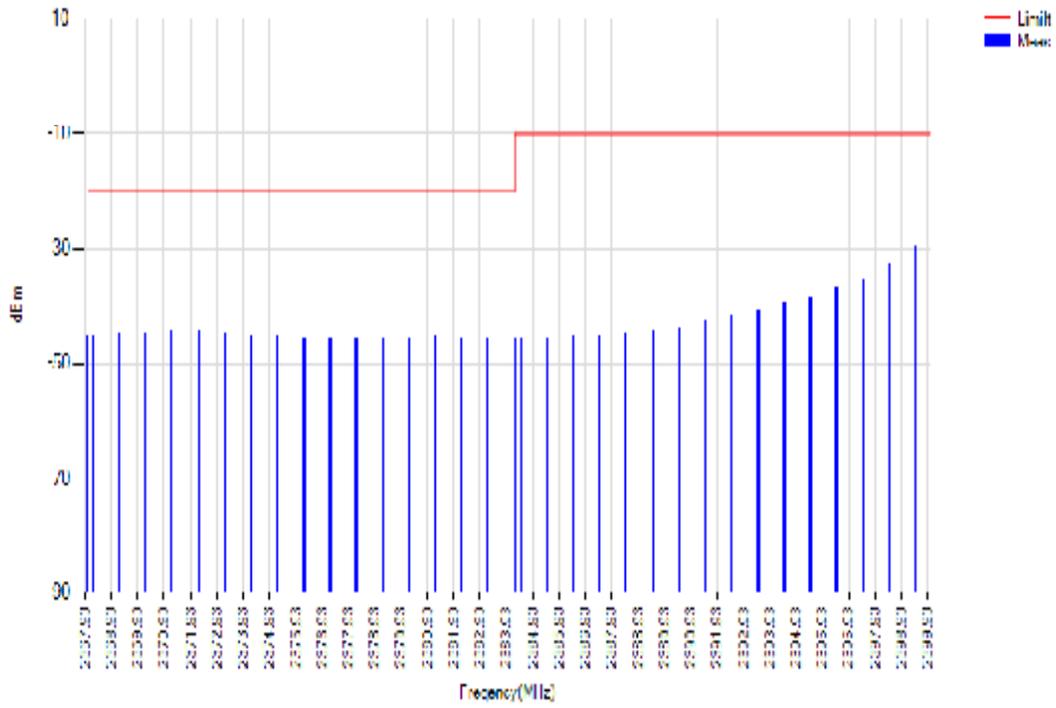


Report No.: T180627D10-RT1

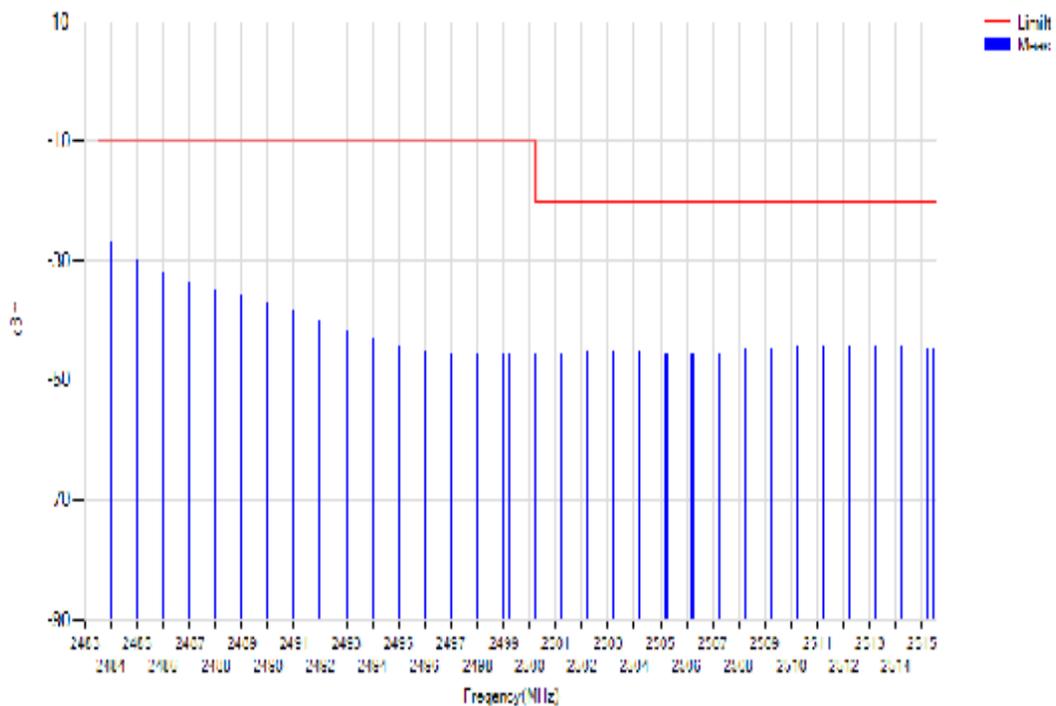
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0°C /5v CH Low



0°C /5v CH High



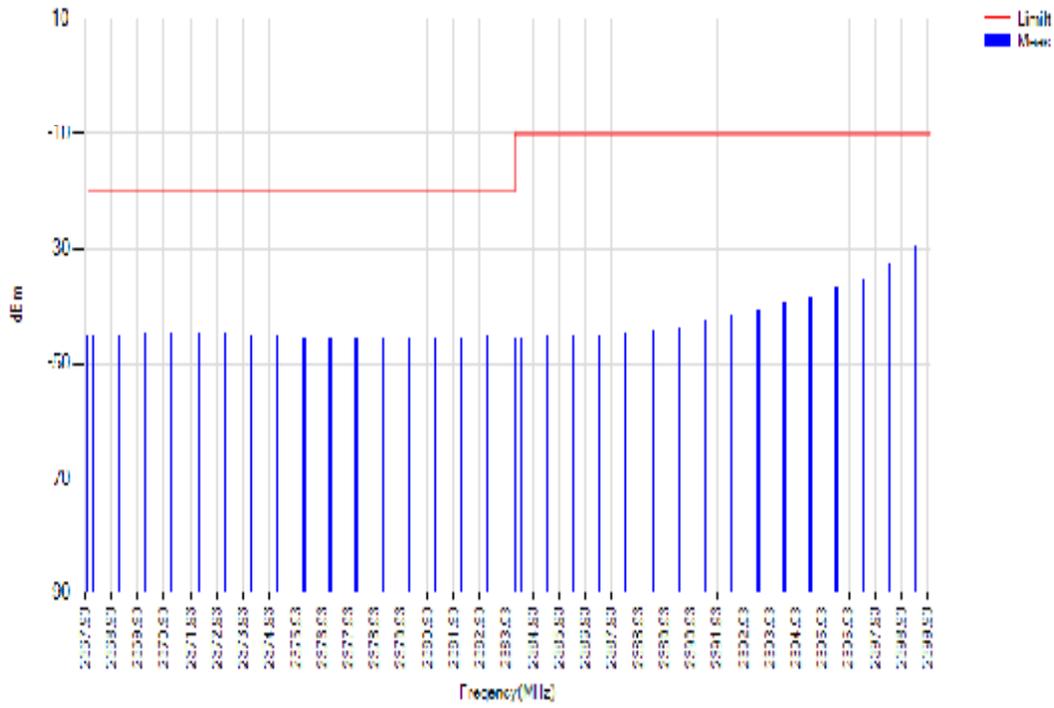


Report No.: T180627D10-RT1

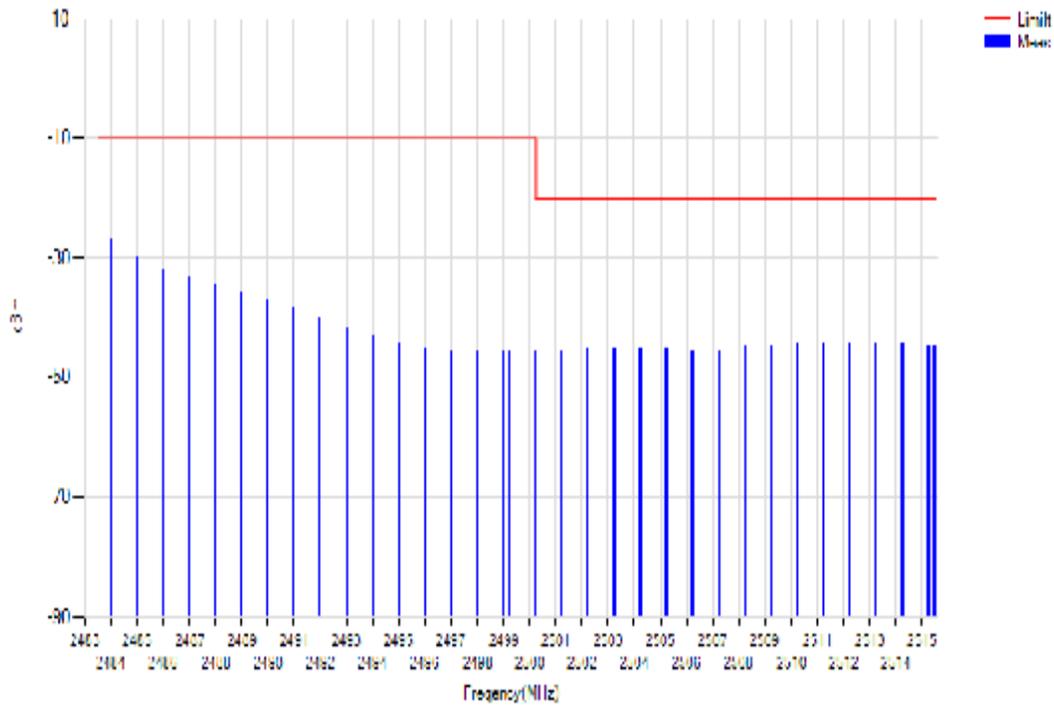
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70°C /5v CH Low

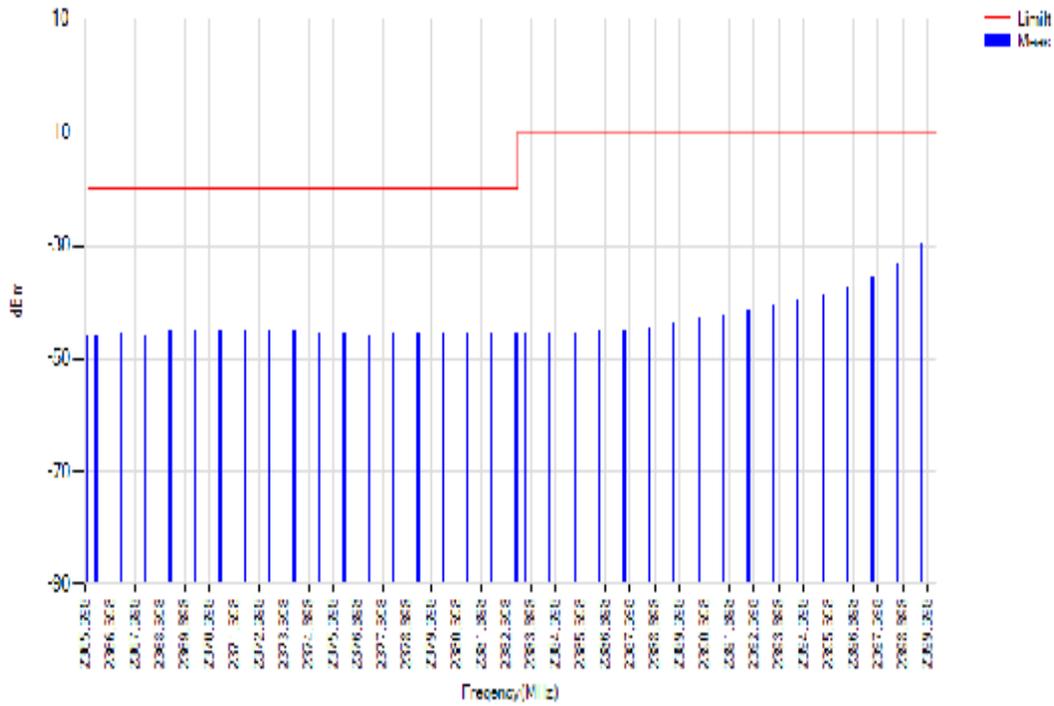


70°C /5v CH High

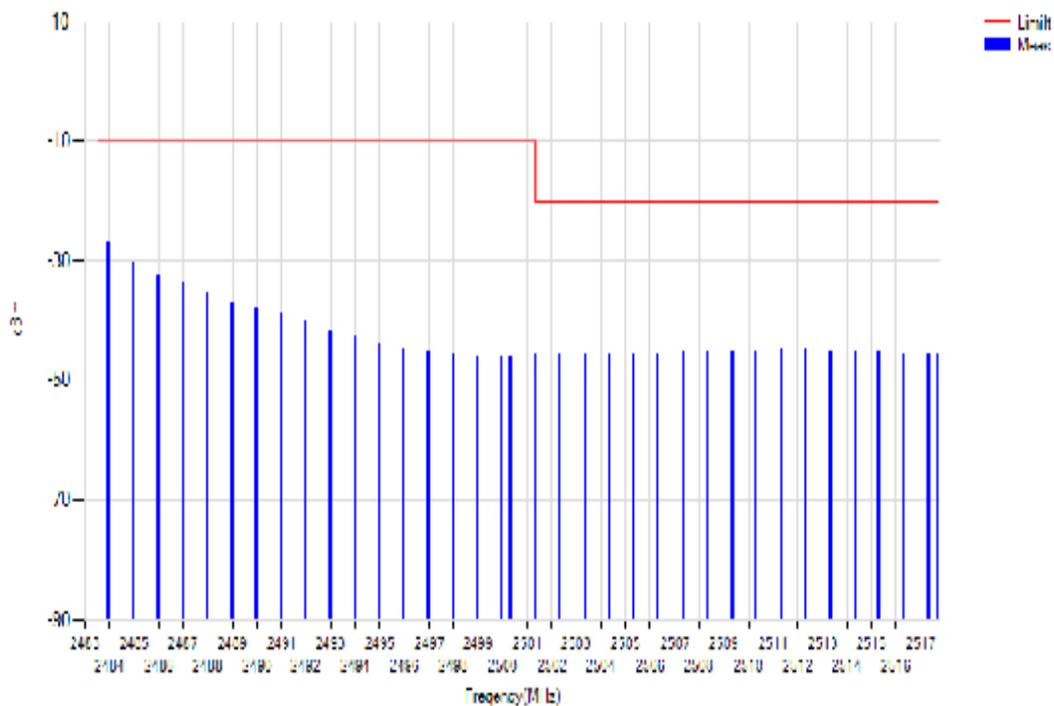


Report No.: T180627D10-RT1

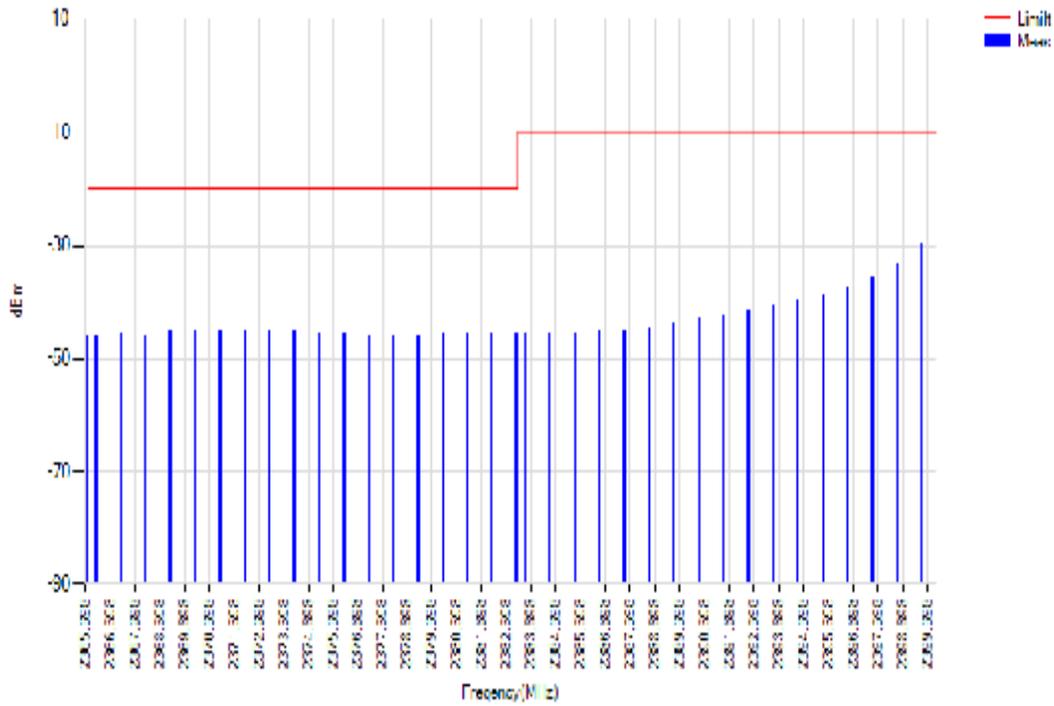
**Test results: IEEE 802.11n HT 20 MHz Mode:
25°C /5v CH Low**



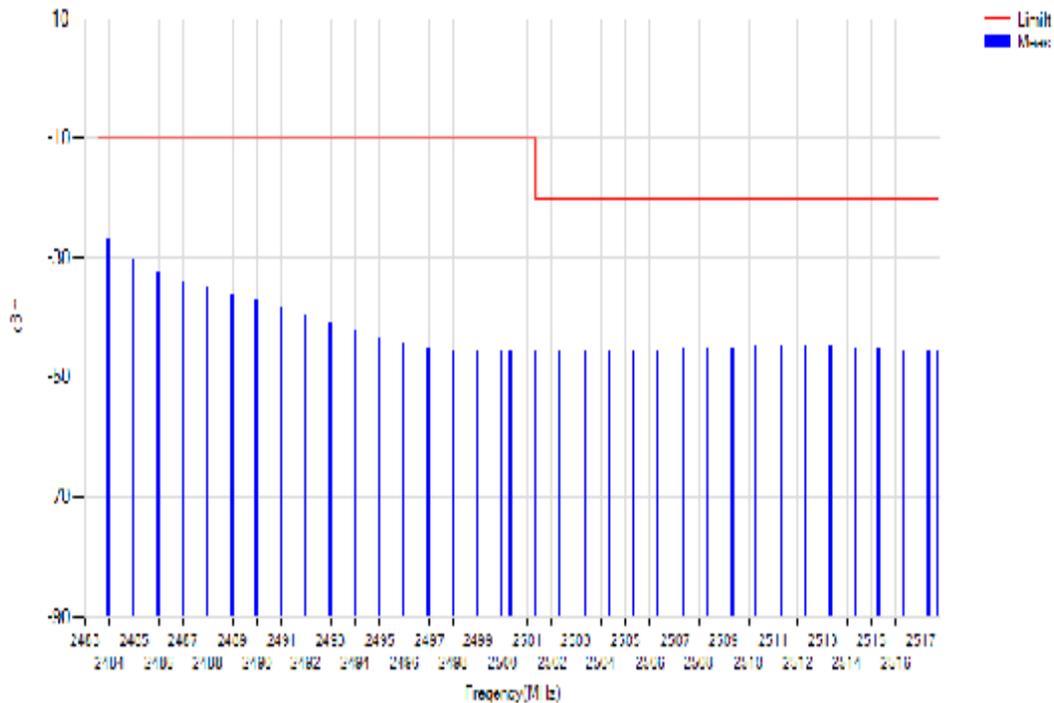
25°C /5v CH High



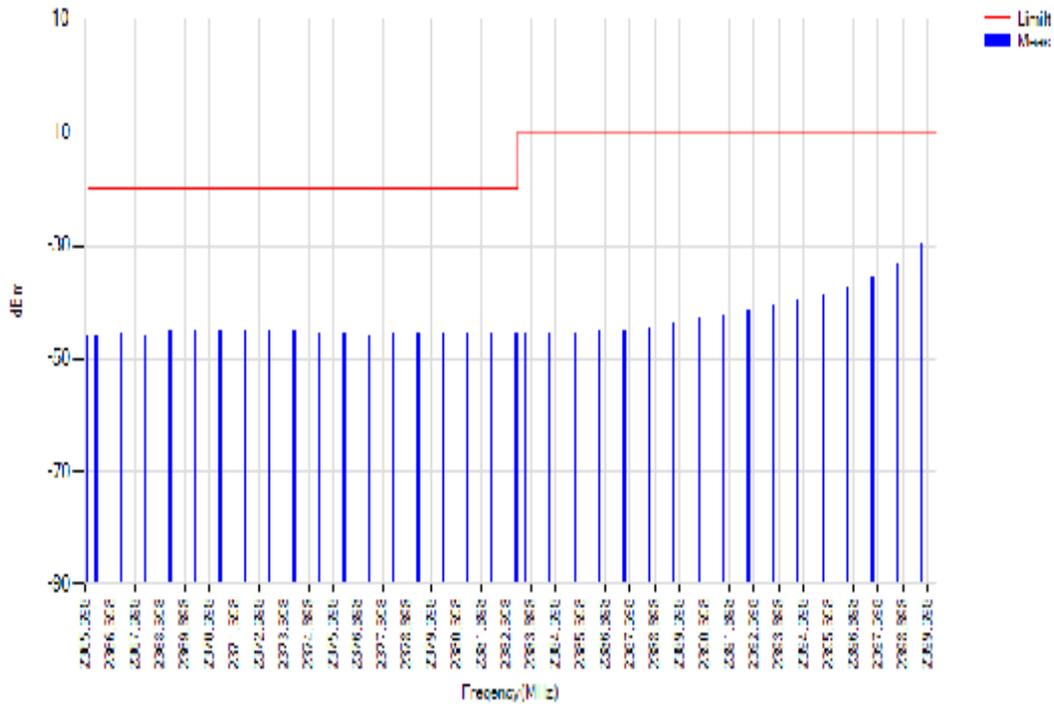
0°C /5v CH Low



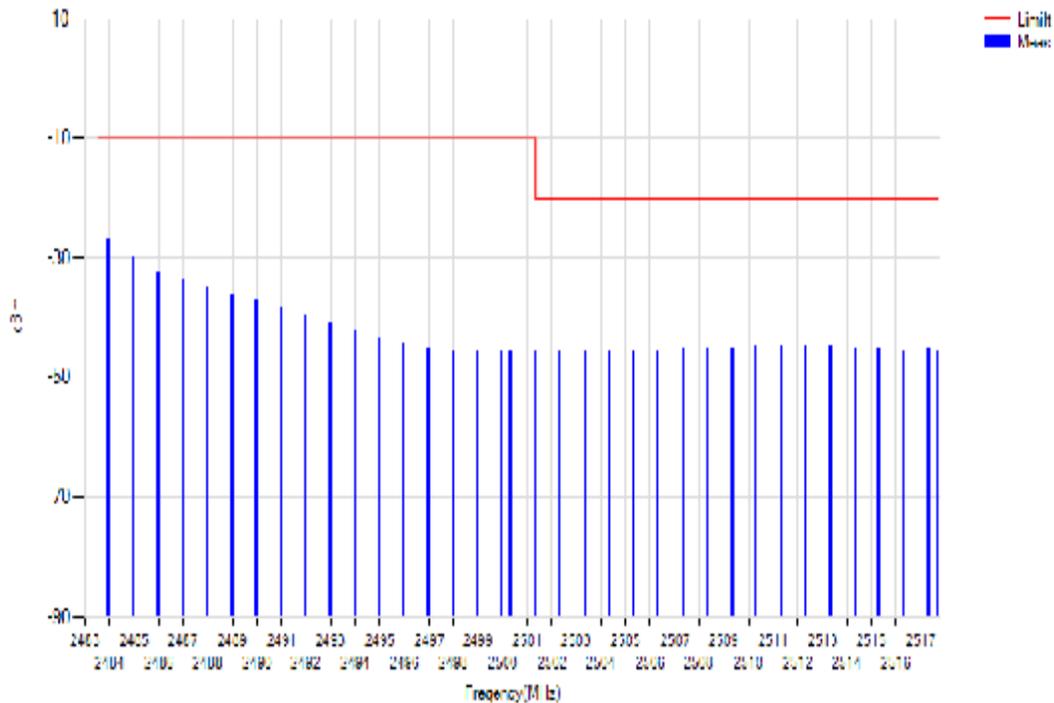
0°C /5v CH High



70°C /5v CH Low

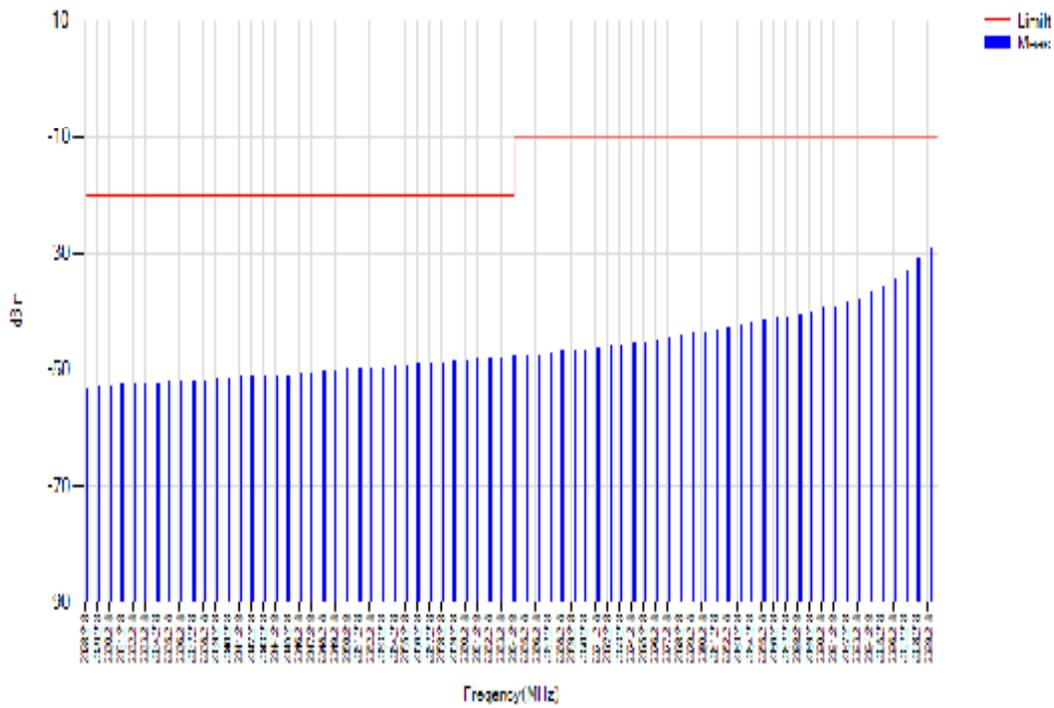


70°C /5v CH High

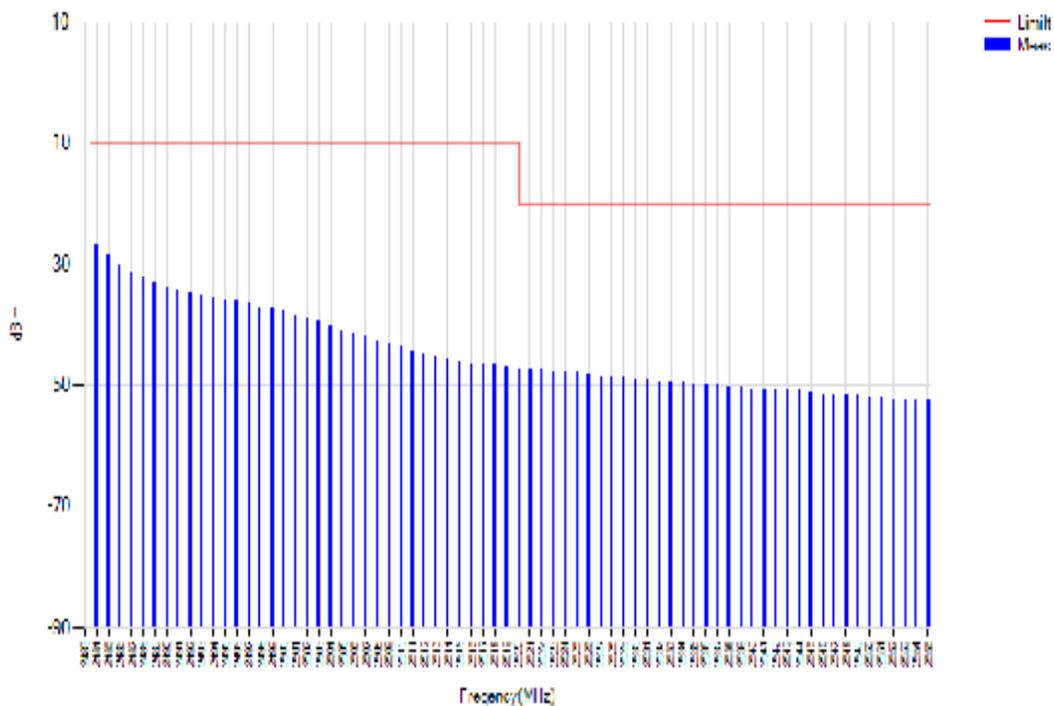


Report No.: T180627D10-RT1

Test results: IEEE 802.11n HT 40 MHz Mode:
25°C /5v CH Low



25°C /5v CH High



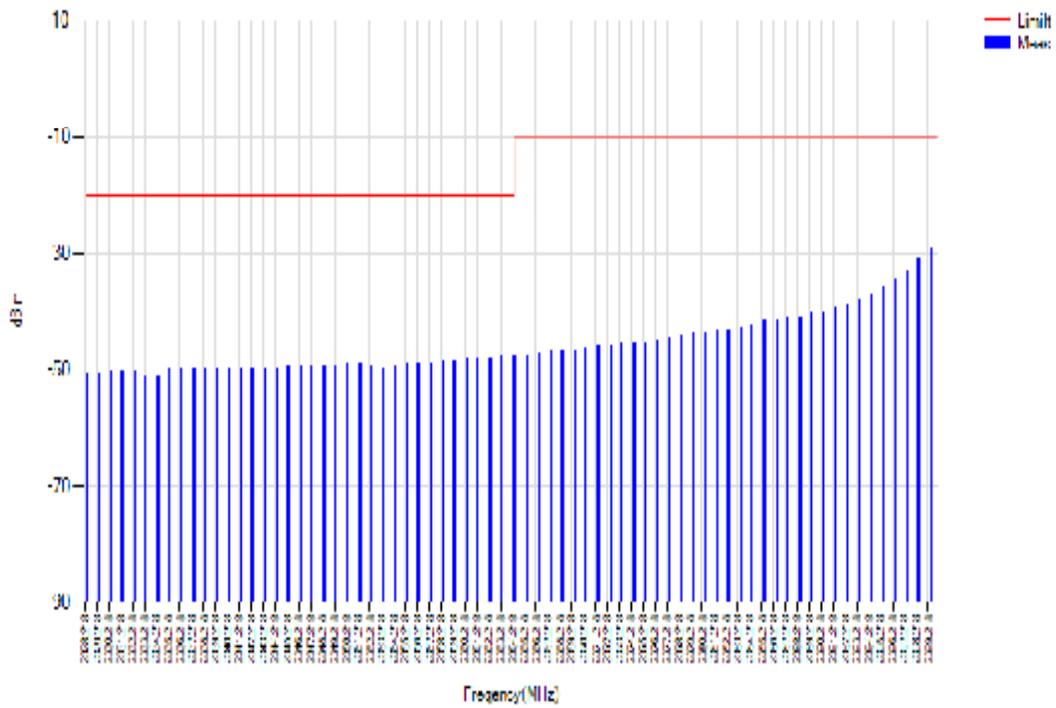


Report No.: T180627D10-RT1

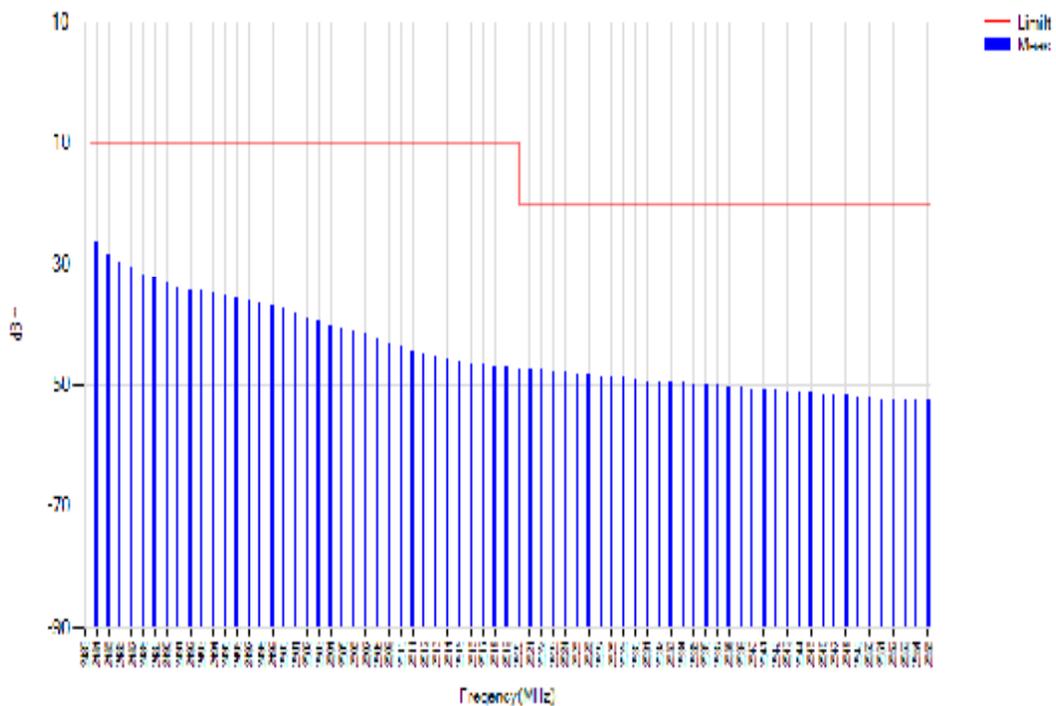
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70°C /5v CH Low

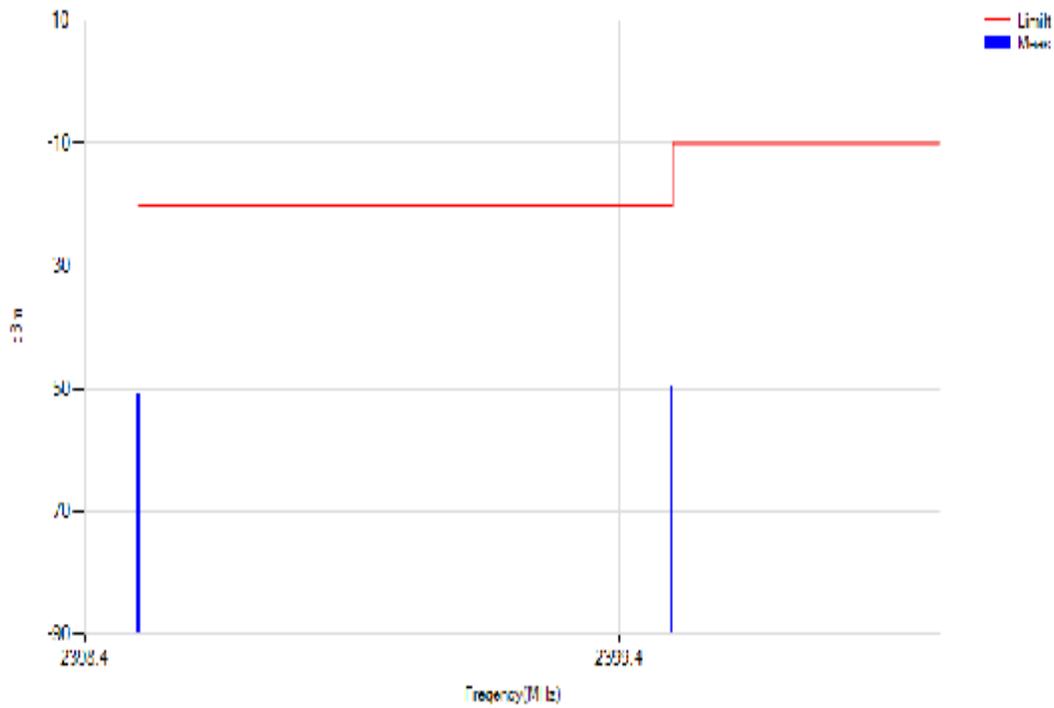


70°C /5v CH High



Test results: Bluetooth for GFSK (BR-1M)

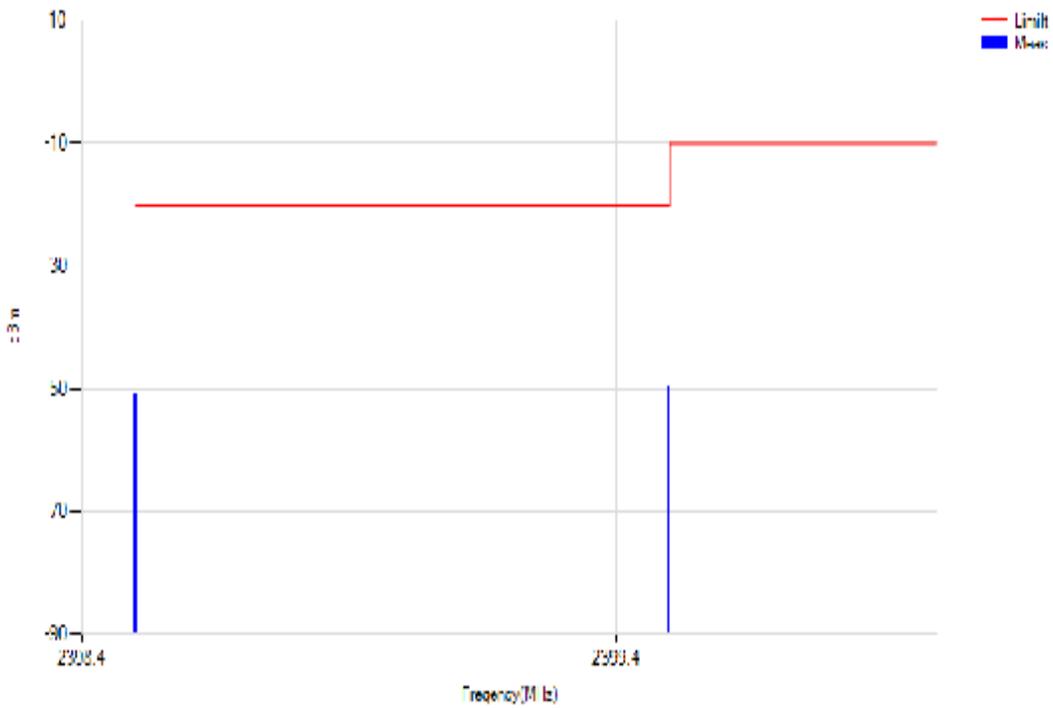
25°C /5v CH Low



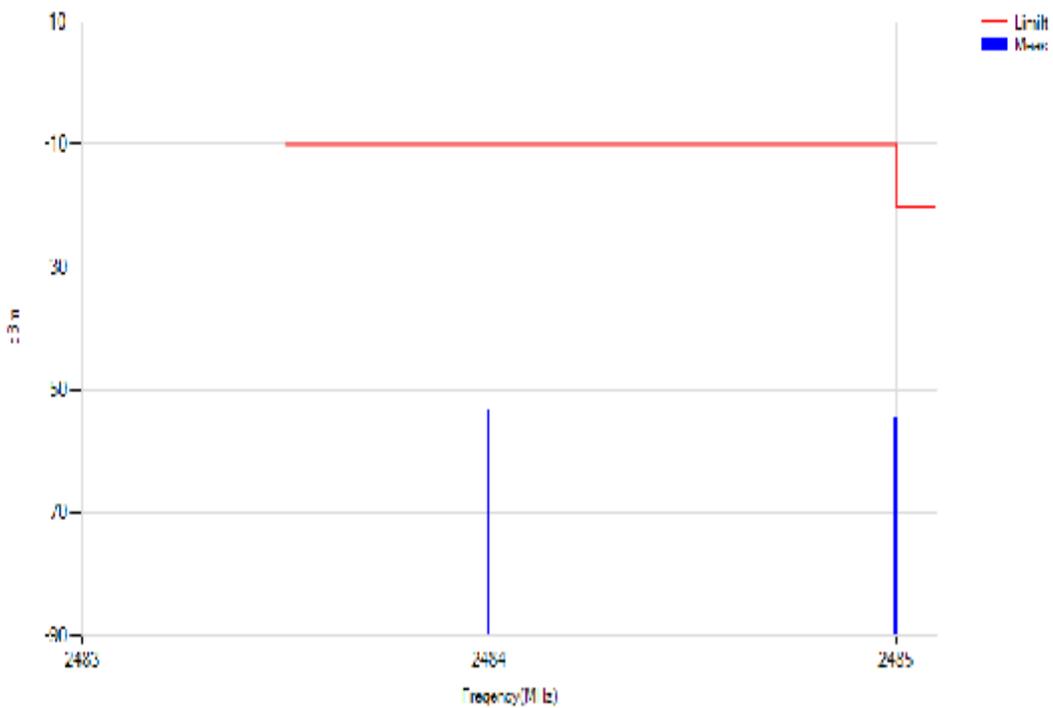
25°C /5v CH High



0°C /5v CH Low



0°C /5v CH High



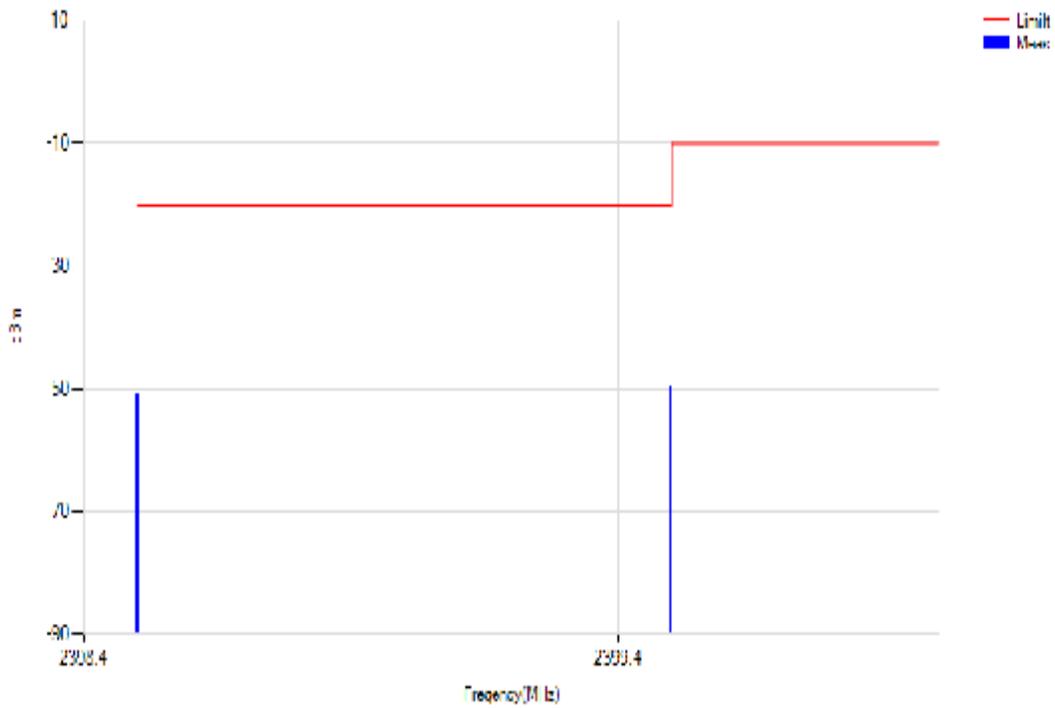


Report No.: T180627D10-RT1

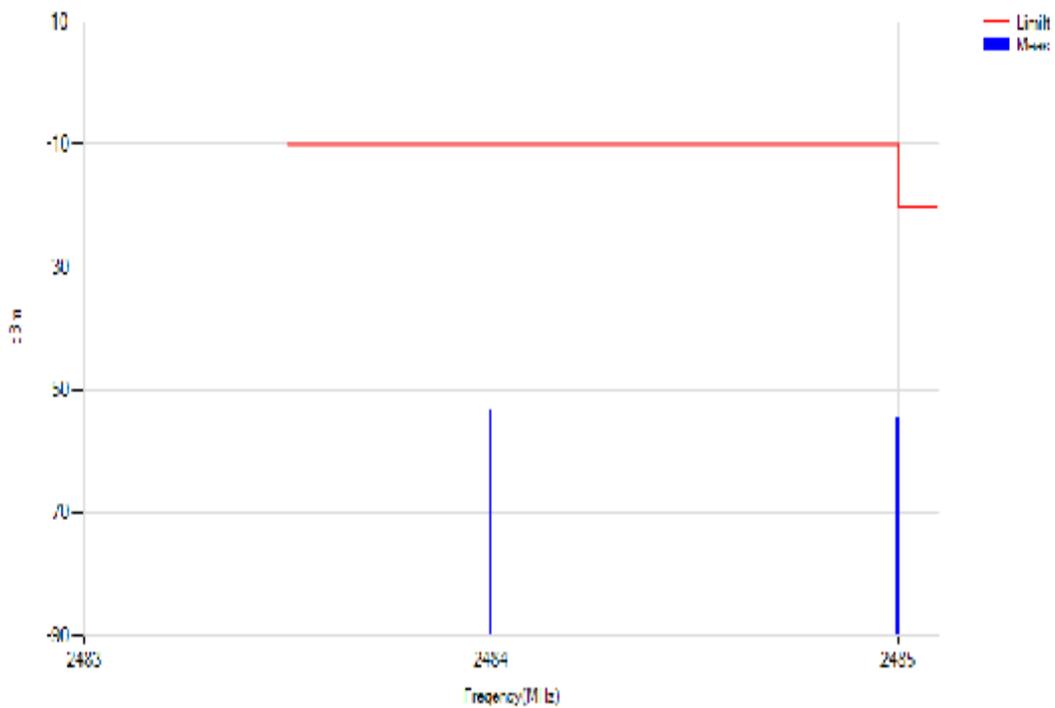
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70°C /5v CH Low

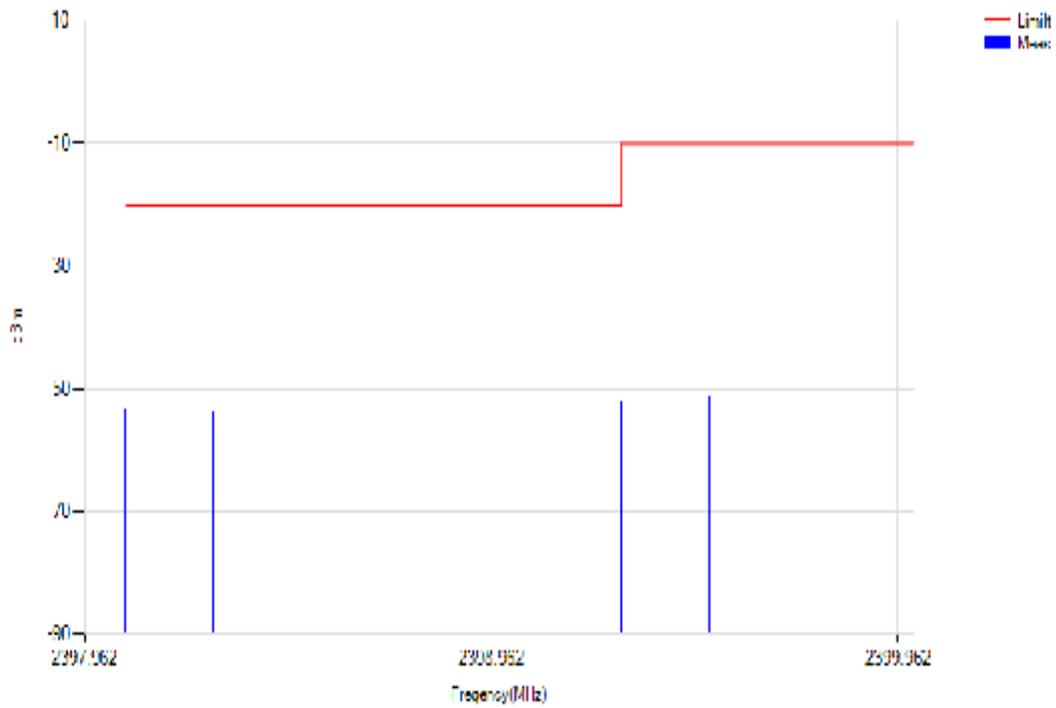


70°C /5v CH High

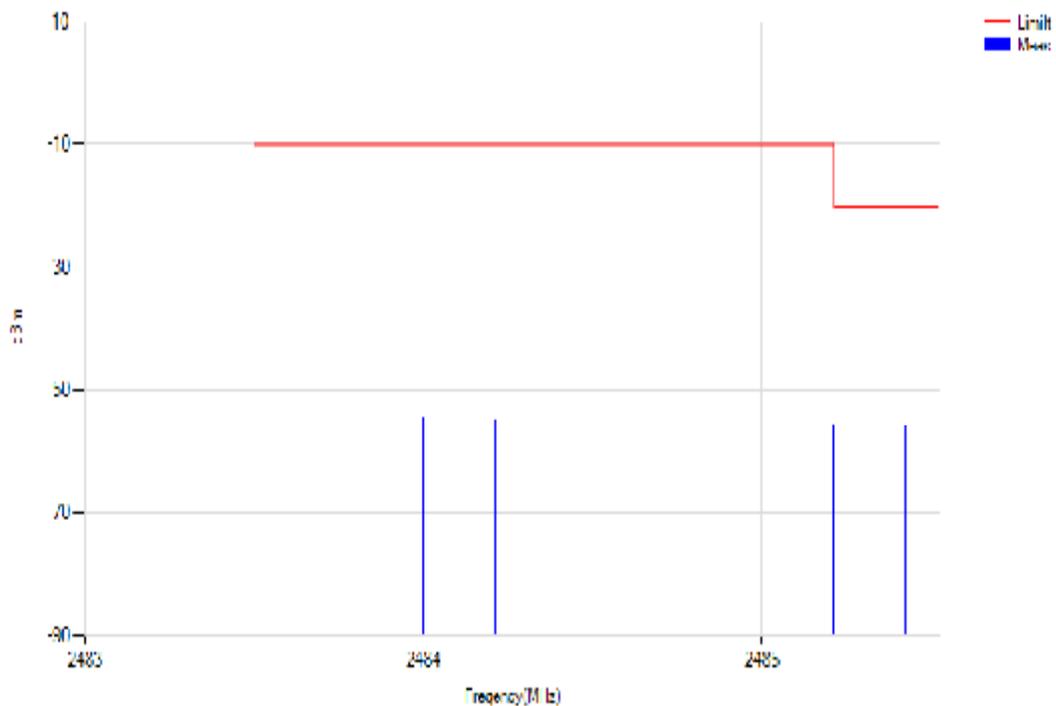


Test results: Bluetooth for 8DPSK (EDR-3M)

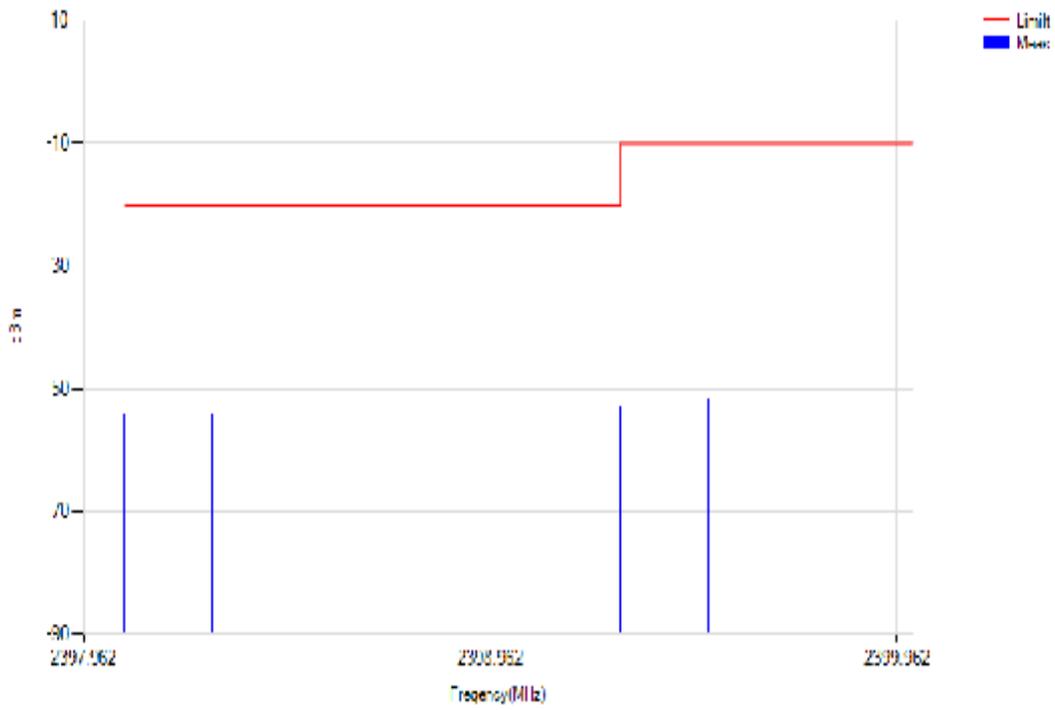
25°C /5v CH Low



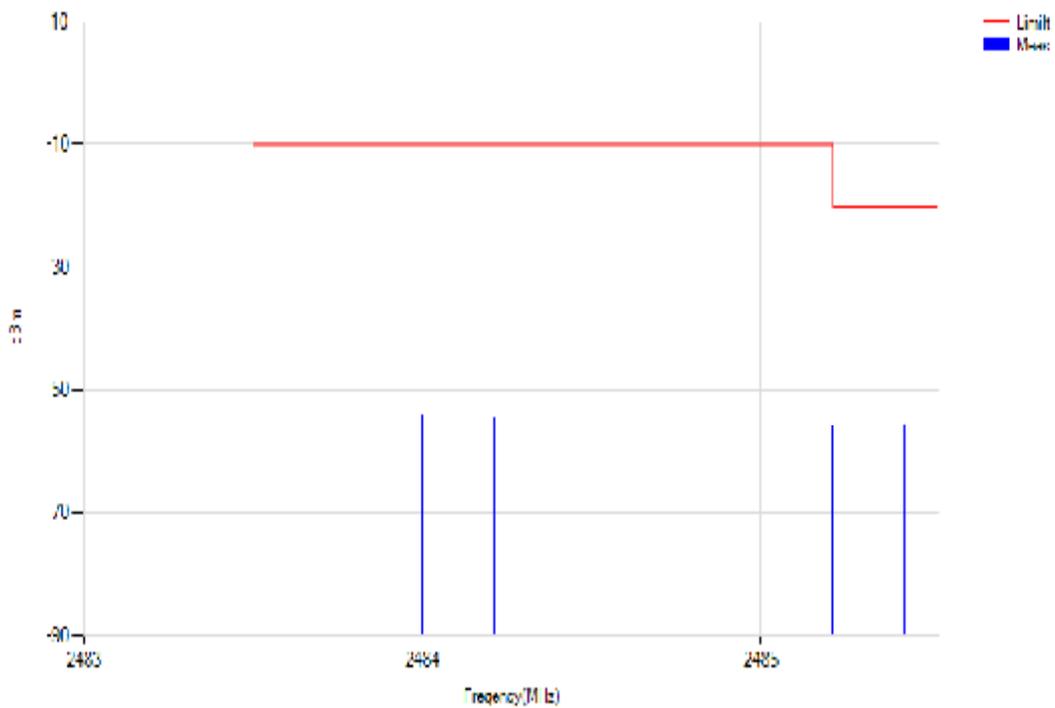
25°C /5v CH High



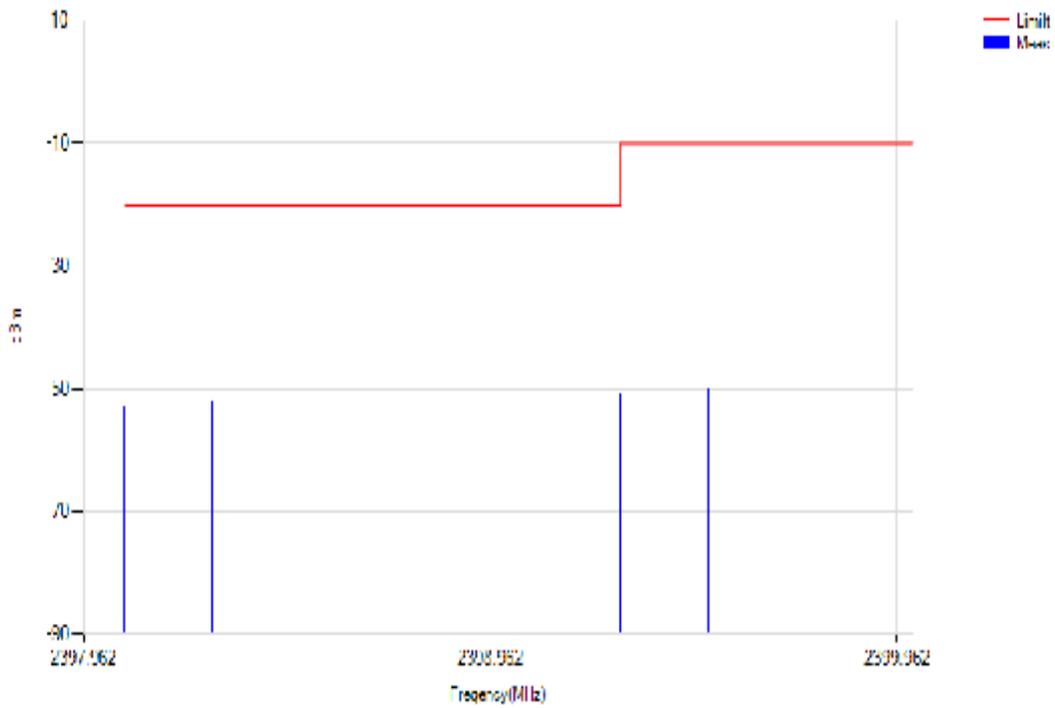
0°C /5v CH Low



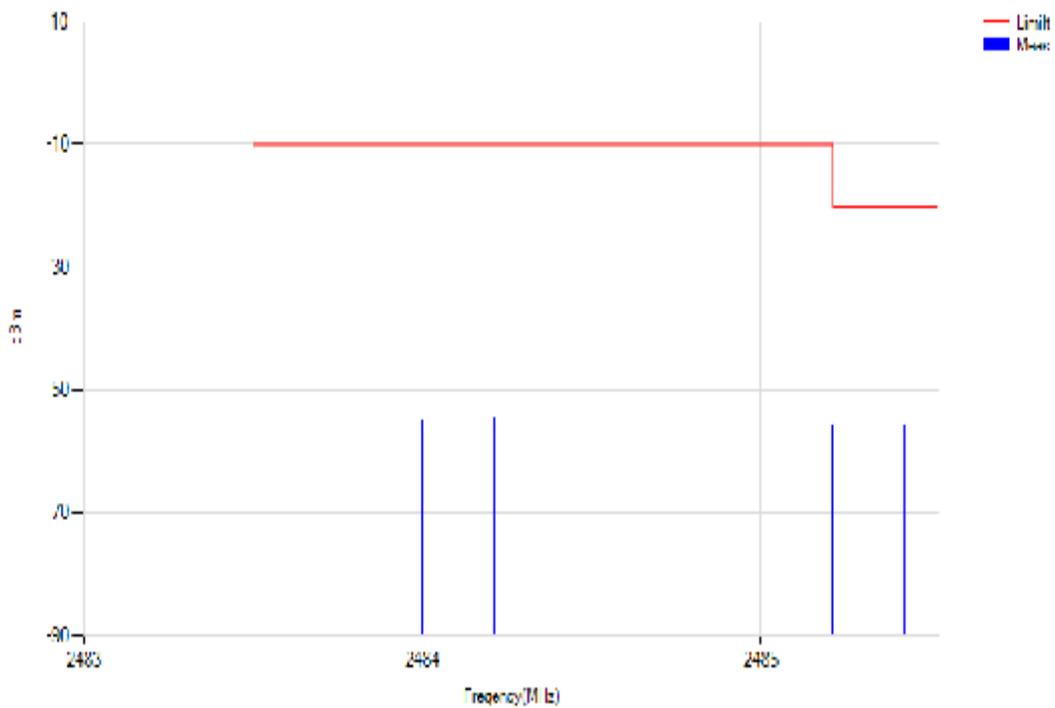
0°C /5v CH High



70°C /5v CH Low



70°C /5v CH High





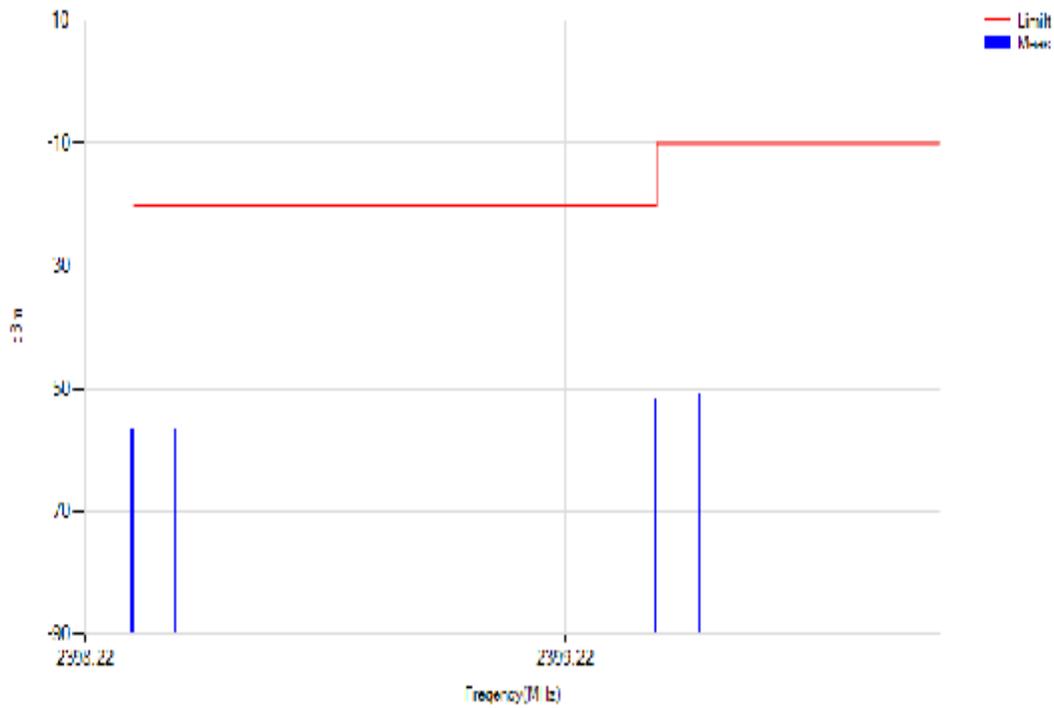
Report No.: T180627D10-RT1

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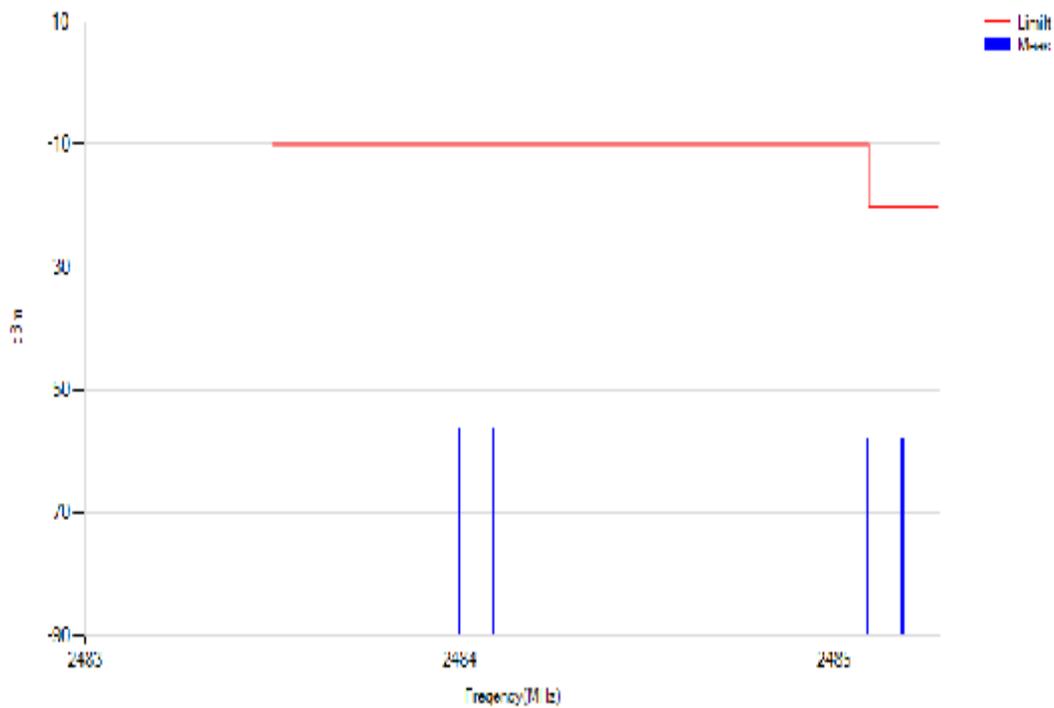
Rev.: 01

Test results: Bluetooth 4.1

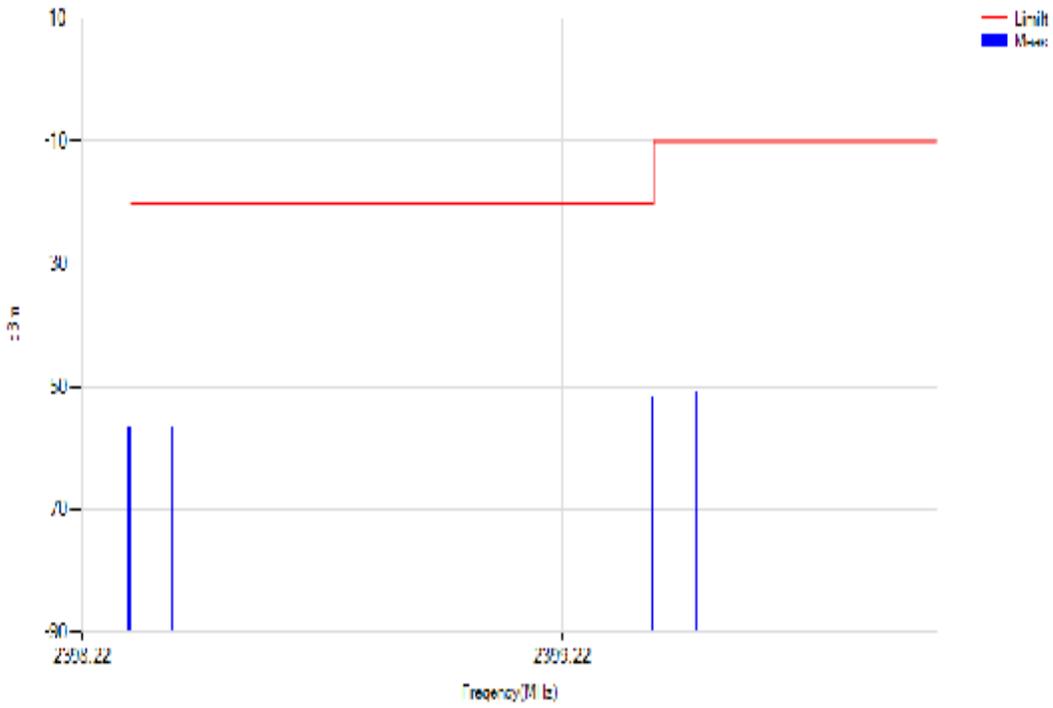
25°C /5v CH Low



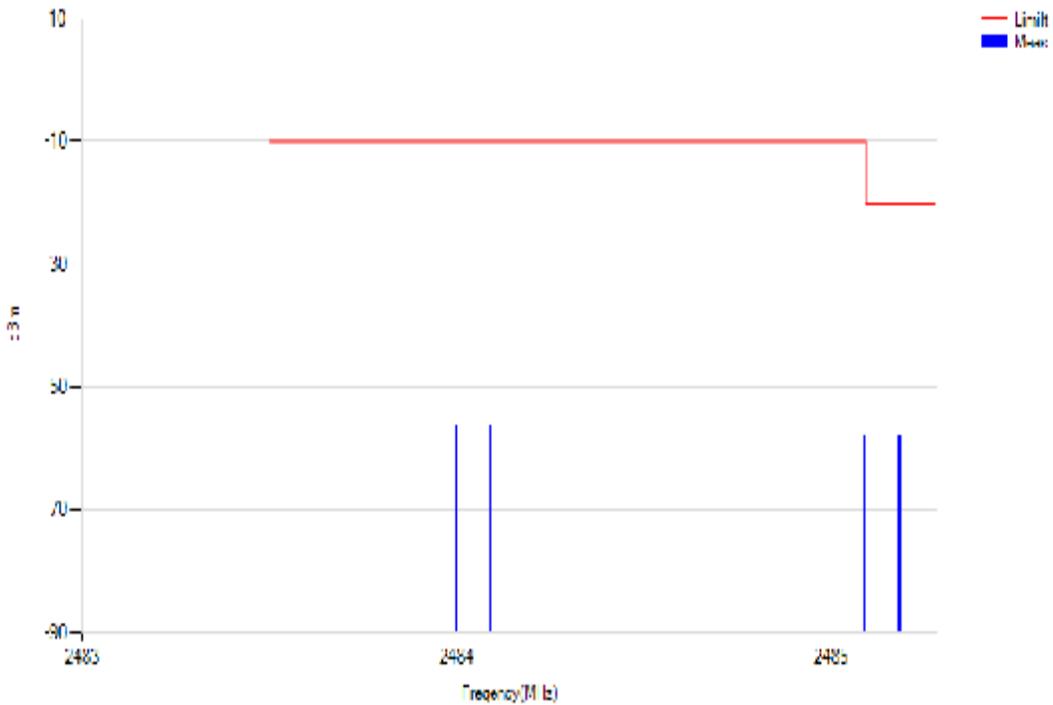
25°C /5v CH High



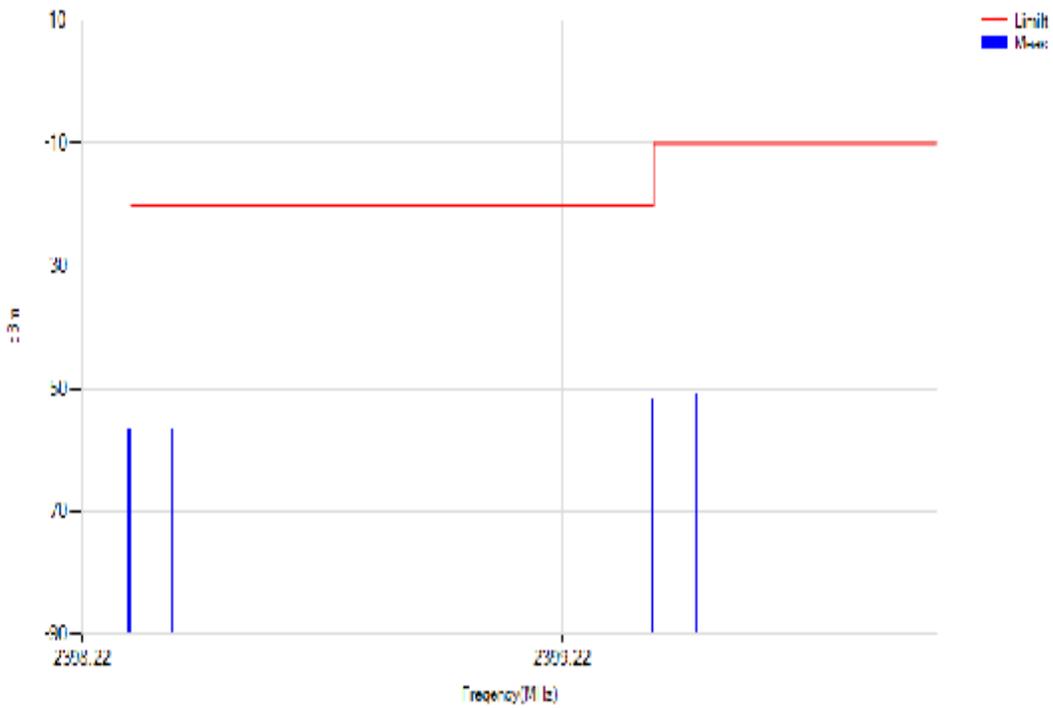
0°C /5v CH Low



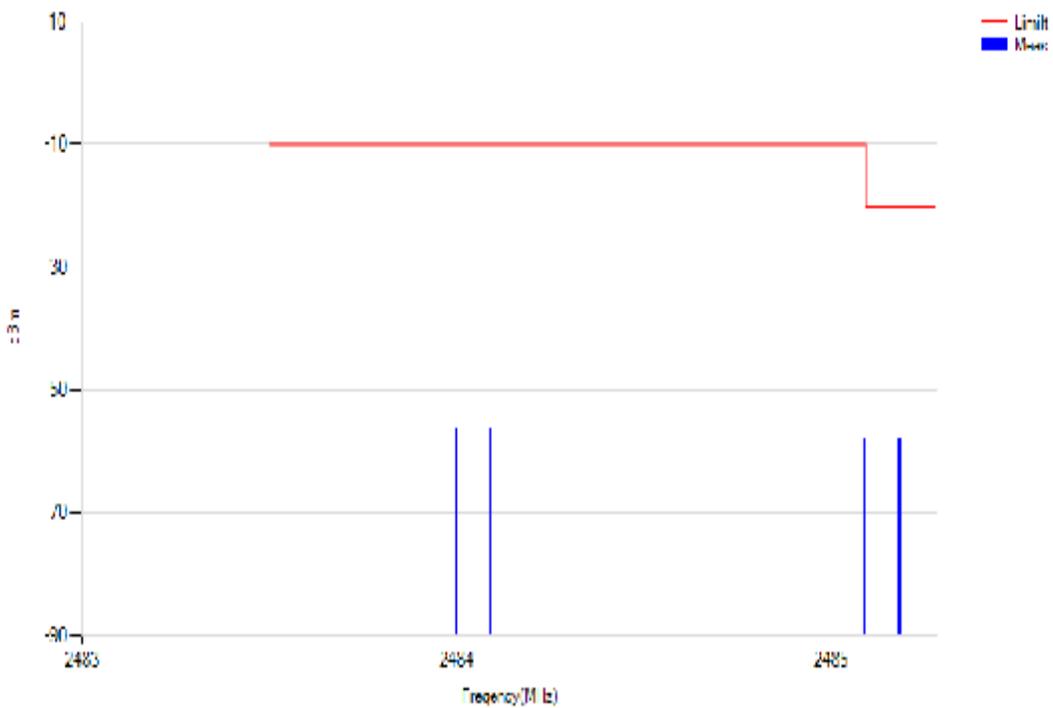
0°C /5v CH High



70°C /5v CH Low



70°C /5v CH High



IEEE 802.11b Mode:

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2397.5000	-41.62	-10.00
				2375.4320	-46.92	-20.00
				2486.0000	-38.19	-10.00
				2508.0560	-44.58	-20.00
0	°C	Vnom	5v	2396.5000	-41.44	-10.00
				2380.4320	-47.50	-20.00
				2486.0000	-38.21	-10.00
				2508.0560	-44.58	-20.00
70	°C	Vnom	5v	2397.5000	-40.78	-10.00
				2383.4320	-44.80	-20.00
				2486.0000	-38.16	-10.00
				2508.0560	-44.59	-20.00

IEEE 802.11g Mode:

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2399.5000	-29.42	-10.00
				2372.2650	-44.65	-20.00
				2484.0000	-26.65	-10.00
				2512.2350	-44.42	-20.00
0	°C	Vnom	5v	2399.5000	-29.60	-10.00
				2372.2650	-44.64	-20.00
				2484.0000	-26.78	-10.00
				2512.2350	-44.41	-20.00
70	°C	Vnom	5v	2399.5000	-29.58	-10.00
				2372.2650	-44.68	-20.00
				2484.0000	-26.57	-10.00
				2511.2450	-44.44	-20.00

IEEE 802.11n HT 20 MHz Mode:

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2399.5000	-29.90	-10.00
				2372.1490	-45.00	-20.00
				2484.0000	-26.92	-10.00
				2511.3450	-44.84	-20.00
0	°C	Vnom	5v	2399.5000	-29.91	-10.00
				2371.1490	-45.07	-20.00
				2484.0000	-26.99	-10.00
				2511.3450	-44.79	-20.00
70	°C	Vnom	5v	2399.5000	-29.82	-10.00
				2372.1490	-45.05	-20.00
				2484.0000	-26.88	-10.00
				2511.3450	-44.78	-20.00

IEEE 802.11n HT 40 MHz Mode:

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2399.5000	-29.05	-10.00
				2363.4090	-47.86	-20.00
				2484.0000	-26.73	-10.00
				2520.0660	-47.14	-20.00
0	°C	Vnom	5v	2399.5000	-28.99	-10.00
				2363.4090	-47.79	-20.00
				2484.0000	-26.42	-10.00
				2520.0660	-47.13	-20.00
70	°C	Vnom	5v	2399.5000	-29.04	-10.00
				2363.4090	-47.70	-20.00
				2484.0000	-26.53	-10.00
				2520.0660	-47.24	-20.00

Bluetooth for GFSK (BR-1M)

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2399.5000	-49.57	-10.00
				2398.5000	-50.90	-20.00
				2484.0000	-53.11	-10.00
				2485.0000	-54.53	-20.00
0	°C	Vnom	5v	2399.5000	-49.52	-10.00
				2398.5000	-50.89	-20.00
				2484.0000	-53.12	-10.00
				2485.0000	-54.50	-20.00
70	°C	Vnom	5v	2399.5000	-49.50	-10.00
				2398.5000	-50.96	-20.00
				2484.0000	-53.21	-10.00
				2485.0000	-54.47	-20.00

Bluetooth for 8DPSK (EDR-3M)

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2399.5000	-51.12	-10.00
				2398.0620	-53.33	-20.00
				2484.0000	-54.56	-10.00
				2485.2130	-55.93	-20.00
0	°C	Vnom	5v	2399.5000	-51.40	-10.00
				2398.0620	-53.99	-20.00
				2484.0000	-54.31	-10.00
				2485.4260	-55.64	-20.00
70	°C	Vnom	5v	2399.5000	-50.21	-10.00
				2398.2810	-52.28	-20.00
				2484.2130	-54.52	-10.00
				2485.2130	-55.44	-20.00

Bluetooth 4.1

TEST CONDITION				Out of Band Emissions		
				Frequency	Measured Power	Limit
Temp.		Voltage		MHz	dBm/MHz(e.i.r.p)	dBm/MHz(e.i.r.p)
25	°C	Vnom	5v	2399.5000	-50.52	-10.00
				2398.4100	-56.52	-20.00
				2484.0000	-56.25	-10.00
				2485.0900	-57.86	-20.00
0	°C	Vnom	5v	2399.5000	-50.53	-10.00
				2398.4100	-56.58	-20.00
				2484.0000	-56.28	-10.00
				2485.0900	-57.82	-20.00
70	°C	Vnom	5v	2399.5000	-50.49	-10.00
				2398.4100	-56.51	-20.00
				2484.0000	-56.29	-10.00
				2485.0900	-57.86	-20.00

7.10 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

LIMIT

ETSI EN 300 328

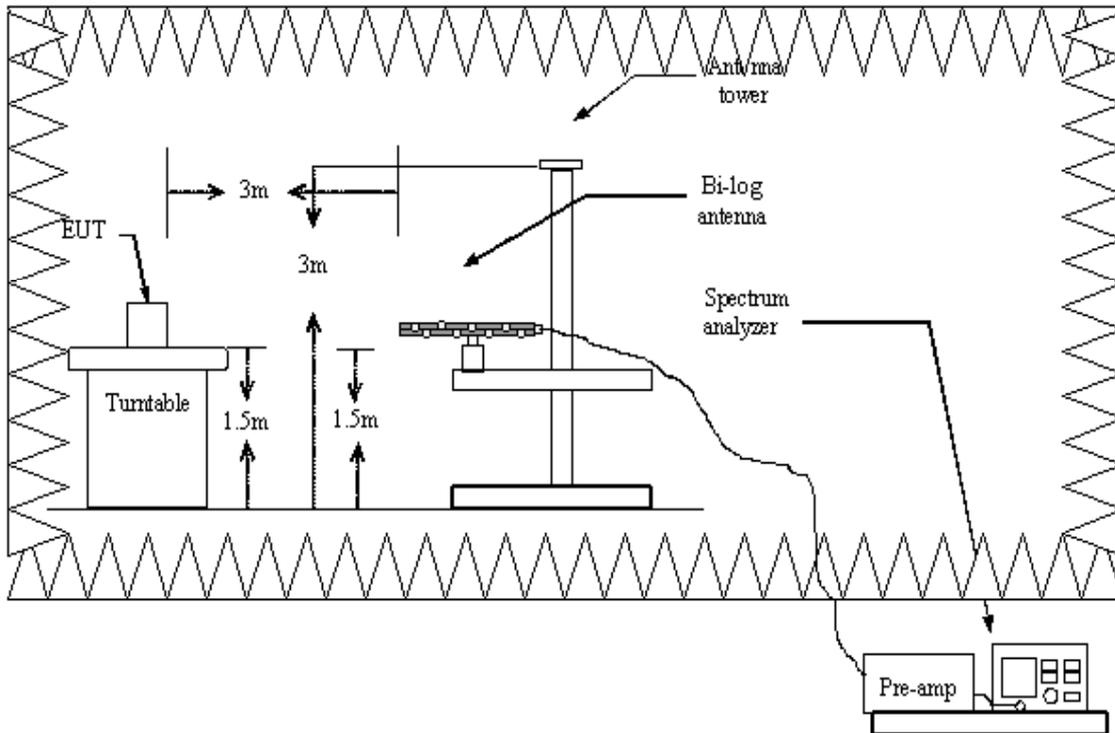
The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 1.

Table 1: Transmitter limits for spurious emissions

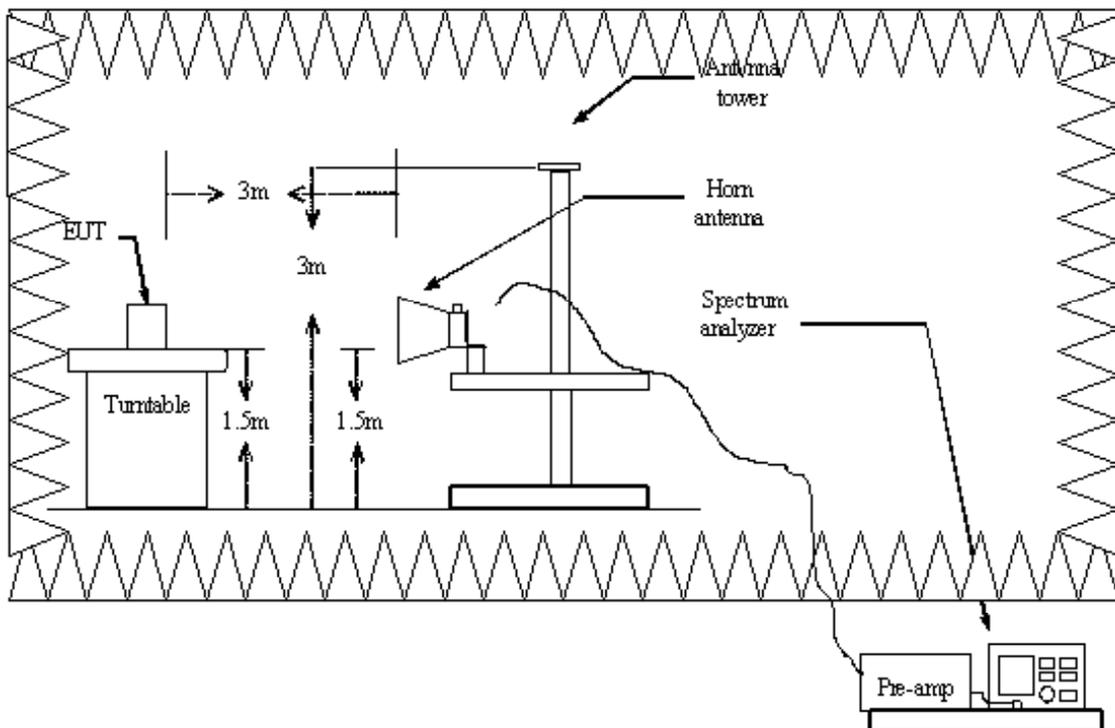
Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

Test Configuration

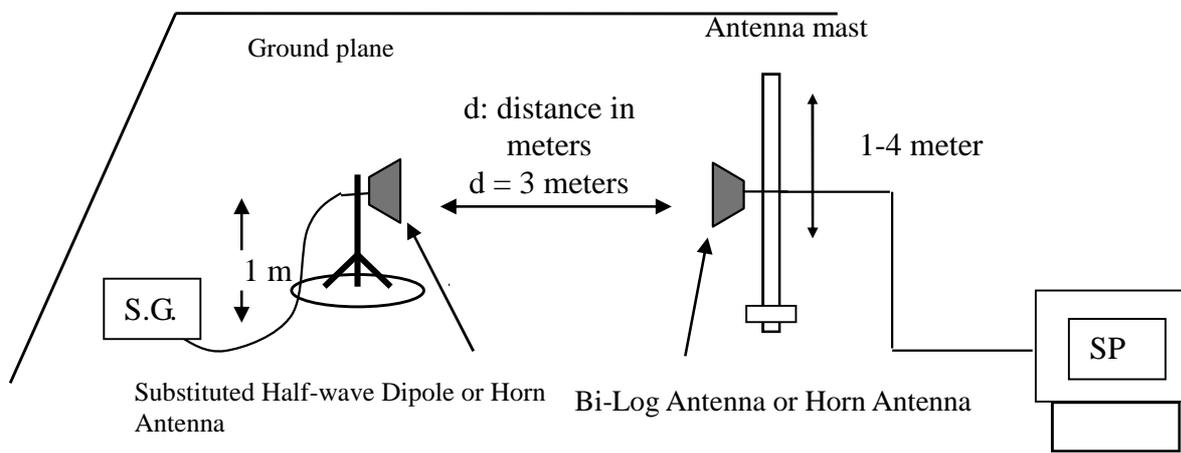
Below 1GHz



Above 1GHz



Substituted Method Test Set-up



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement methods.

TEST RESULTS

No value of the measurement limit is within 6dB, and therefore no further investigation and identification to measure emission with point of measurement is required.

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For FPC Antenna
Below 1GHz
Test Mode: Normal Link
Tested by: Jerry Chuang
Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.0600	-67.00	-6.38	-73.38	-36.00	-37.38	V
441.7650	-68.61	-2.82	-71.43	-36.00	-35.43	V
499.9650	-72.04	-1.65	-73.69	-54.00	-19.69	V
625.0950	-66.15	-0.07	-66.22	-54.00	-12.22	V
750.2250	-61.73	2.11	-59.62	-54.00	-5.62	V
874.8700	-68.14	4.03	-64.11	-36.00	-28.11	V
250.1900	-54.22	-8.51	-62.73	-36.00	-26.73	H
374.8350	-62.60	-4.83	-67.43	-36.00	-31.43	H
499.9650	-61.98	-1.65	-63.63	-54.00	-9.63	H
625.0950	-70.18	-0.07	-70.25	-54.00	-16.25	H
750.2250	-67.35	2.11	-65.24	-54.00	-11.24	H
901.5450	-64.10	4.54	-59.56	-36.00	-23.56	H

Test Mode: Bluetooth
Tested by: Jerry Chuang
Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.0600	-63.78	-6.38	-70.16	-36.00	-34.16	V
224.9700	-64.95	-9.23	-74.18	-54.00	-20.18	V
441.7650	-68.58	-2.82	-71.40	-36.00	-35.40	V
625.0950	-65.99	-0.07	-66.06	-54.00	-12.06	V
750.2250	-61.37	2.11	-59.26	-54.00	-5.26	V
874.8700	-68.05	4.03	-64.02	-36.00	-28.02	V
250.1900	-57.28	-8.51	-65.79	-36.00	-29.79	H
374.8350	-69.40	-4.83	-74.23	-36.00	-38.23	H
499.9650	-63.33	-1.65	-64.98	-54.00	-10.98	H
625.0950	-70.95	-0.07	-71.02	-54.00	-17.02	H
750.2250	-65.39	2.11	-63.28	-54.00	-9.28	H
874.8700	-70.01	4.03	-65.98	-36.00	-29.98	H

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



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Above 1GHz

Test Mode: IEEE 802.11b Mode / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4824.000	-36.44	-12.00	-48.44	-30.00	-18.44	V
7236.000	-51.45	-5.92	-57.37	-30.00	-27.37	V
N/A						
4824.000	-39.26	-12.00	-51.26	-30.00	-21.26	H
7236.000	-52.19	-5.92	-58.11	-30.00	-28.11	H
N/A						

Test Mode: IEEE 802.11b Mode / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4944.500	-28.46	-11.30	-39.76	-30.00	-9.76	V
7416.000	-50.72	-5.20	-55.92	-30.00	-25.92	V
N/A						
4944.500	-33.18	-11.30	-44.48	-30.00	-14.48	H
7416.000	-51.46	-5.20	-56.66	-30.00	-26.66	H
N/A						

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*



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Test Mode: IEEE 802.11g Mode / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4824.000	-38.47	-12.00	-50.47	-30.00	-20.47	V
7236.000	-51.86	-5.92	-57.78	-30.00	-27.78	V
N/A						
4824.000	-41.50	-12.00	-53.50	-30.00	-23.50	H
7236.000	-52.15	-5.92	-58.07	-30.00	-28.07	H
N/A						

Test Mode: IEEE 802.11g Mode / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4944.000	-32.00	-11.30	-43.30	-30.00	-13.30	V
7416.000	-51.27	-5.20	-56.47	-30.00	-26.47	V
N/A						
4944.000	-37.30	-11.30	-48.60	-30.00	-18.60	H
7416.000	-52.27	-5.20	-57.47	-30.00	-27.47	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Test Mode: IEEE 802.11n HT 20 MHz Mode / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4824.000	-39.06	-12.00	-51.06	-30.00	-21.06	V
7236.000	-51.89	-5.92	-57.81	-30.00	-27.81	V
N/A						
4824.000	-43.63	-12.00	-55.63	-30.00	-25.63	H
7236.000	-52.75	-5.92	-58.67	-30.00	-28.67	H
N/A						

Test Mode: IEEE 802.11n HT 20 MHz Mode / TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4944.000	-32.51	-11.30	-43.81	-30.00	-13.81	V
7416.000	-51.89	-5.20	-57.09	-30.00	-27.09	V
N/A						
4944.000	-37.39	-11.30	-48.69	-30.00	-18.69	H
7416.000	-52.74	-5.20	-57.94	-30.00	-27.94	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Test Mode: IEEE 802.11n HT 40 MHz Mode / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4844.000	-42.27	-11.88	-54.15	-30.00	-24.15	V
7266.000	-52.42	-5.80	-58.22	-30.00	-28.22	V
N/A						
4844.000	-46.25	-11.88	-58.13	-30.00	-28.13	H
7266.000	-51.96	-5.80	-57.76	-30.00	-27.76	H
N/A						

Test Mode: IEEE 802.11n HT 40 MHz Mode / TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4941.000	-37.01	-11.33	-48.34	-30.00	-18.34	V
7386.000	-52.71	-5.31	-58.02	-30.00	-28.02	V
N/A						
4924.000	-42.03	-11.42	-53.45	-30.00	-23.45	H
7386.000	-51.54	-5.31	-56.85	-30.00	-26.85	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Bluetooth for GFSK (BR-1M)

Test Mode: Bluetooth / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4804.500	-36.10	-12.11	-48.21	-30.00	-18.21	V
7206.000	-52.72	-6.05	-58.77	-30.00	-28.77	V
N/A						
4804.000	-40.27	-12.11	-52.38	-30.00	-22.38	H
7206.000	-52.25	-6.05	-58.30	-30.00	-28.30	H
N/A						

Test Mode: Bluetooth / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4960.000	-38.75	-11.23	-49.98	-30.00	-19.98	V
7440.000	-52.29	-5.10	-57.39	-30.00	-27.39	V
N/A						
4960.000	-40.44	-11.23	-51.67	-30.00	-21.67	H
7440.000	-53.01	-5.10	-58.11	-30.00	-28.11	H
N/A						

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*



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Bluetooth for 8DPSK (EDR-3M)

Test Mode: Bluetooth / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4804.000	-38.30	-12.11	-50.41	-30.00	-20.41	V
7206.000	-52.43	-6.05	-58.48	-30.00	-28.48	V
N/A						
4804.000	-41.95	-12.11	-54.06	-30.00	-24.06	H
7206.000	-51.88	-6.05	-57.93	-30.00	-27.93	H
N/A						

Test Mode: Bluetooth / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4960.000	-41.97	-11.23	-53.20	-30.00	-23.20	V
7440.000	-52.71	-5.10	-57.81	-30.00	-27.81	V
N/A						
4960.000	-41.90	-11.23	-53.13	-30.00	-23.13	H
7440.000	-52.81	-5.10	-57.91	-30.00	-27.91	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Bluetooth 4.1

Test Mode: Bluetooth / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4804.500	-38.15	-12.11	-50.26	-30.00	-20.26	V
7206.000	-52.32	-6.05	-58.37	-30.00	-28.37	V
N/A						
4804.500	-37.11	-12.11	-49.22	-30.00	-19.22	H
7206.000	-51.84	-6.05	-57.89	-30.00	-27.89	H
N/A						

Test Mode: Bluetooth / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4960.000	-38.10	-11.23	-49.33	-30.00	-19.33	V
7440.000	-52.73	-5.10	-57.83	-30.00	-27.83	V
N/A						
4960.000	-36.62	-11.23	-47.85	-30.00	-17.85	H
7440.000	-52.83	-5.10	-57.93	-30.00	-27.93	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

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For Dipole Antenna
Below 1GHz
Test Mode: Normal Link
Tested by: Jerry Chuang
Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.0600	-62.85	-6.38	-69.23	-36.00	-33.23	V
289.9600	-66.03	-6.60	-72.63	-36.00	-36.63	V
441.7650	-67.76	-2.82	-70.58	-36.00	-34.58	V
625.0950	-64.91	-0.07	-64.98	-54.00	-10.98	V
750.2250	-61.59	2.11	-59.48	-54.00	-5.48	V
874.8700	-67.85	4.03	-63.82	-36.00	-27.82	V
125.0600	-64.62	-6.38	-71.00	-36.00	-35.00	H
250.1900	-57.60	-8.51	-66.11	-36.00	-30.11	H
499.9650	-63.10	-1.65	-64.75	-54.00	-10.75	H
625.0950	-71.78	-0.07	-71.85	-54.00	-17.85	H
750.2250	-63.35	2.11	-61.24	-54.00	-7.24	H
874.8700	-70.19	4.03	-66.16	-36.00	-30.16	H

Test Mode: Bluetooth
Tested by: Jerry Chuang
Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.0600	-63.36	-6.38	-69.74	-36.00	-33.74	V
224.9700	-63.41	-9.23	-72.64	-54.00	-18.64	V
499.9650	-72.38	-1.65	-74.03	-54.00	-20.03	V
625.0950	-65.57	-0.07	-65.64	-54.00	-11.64	V
750.2250	-62.01	2.11	-59.90	-54.00	-5.90	V
874.8700	-67.74	4.03	-63.71	-36.00	-27.71	V
250.1900	-57.74	-8.51	-66.25	-36.00	-30.25	H
374.8350	-66.83	-4.83	-71.66	-36.00	-35.66	H
499.9650	-63.00	-1.65	-64.65	-54.00	-10.65	H
625.0950	-71.83	-0.07	-71.90	-54.00	-17.90	H
750.2250	-63.60	2.11	-61.49	-54.00	-7.49	H
874.8700	-70.51	4.03	-66.48	-36.00	-30.48	H

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



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Above 1GHz

Test Mode: IEEE 802.11b Mode / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4824.000	-45.36	-12.00	-57.36	-30.00	-27.36	V
7236.000	-51.73	-5.92	-57.65	-30.00	-27.65	V
N/A						
4825.500	-36.59	-11.99	-48.58	-30.00	-18.58	H
7236.000	-52.00	-5.92	-57.92	-30.00	-27.92	H
N/A						

Test Mode: IEEE 802.11b Mode / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4944.500	-43.59	-11.30	-54.89	-30.00	-24.89	V
7416.000	-53.74	-5.20	-58.94	-30.00	-28.94	V
N/A						
4944.500	-37.33	-11.30	-48.63	-30.00	-18.63	H
7416.000	-53.53	-5.20	-58.73	-30.00	-28.73	H
N/A						

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*



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Test Mode: IEEE 802.11g Mode / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4824.000	-47.21	-12.00	-59.21	-30.00	-29.21	V
7236.000	-51.00	-5.92	-56.92	-30.00	-26.92	V
N/A						
4824.000	-36.82	-12.00	-48.82	-30.00	-18.82	H
7236.000	-51.94	-5.92	-57.86	-30.00	-27.86	H
N/A						

Test Mode: IEEE 802.11g Mode / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4944.000	-45.42	-11.30	-56.72	-30.00	-26.72	V
7416.000	-53.28	-5.20	-58.48	-30.00	-28.48	V
N/A						
4944.500	-38.16	-11.30	-49.46	-30.00	-19.46	H
7416.000	-53.24	-5.20	-58.44	-30.00	-28.44	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Test Mode: IEEE 802.11n HT 20 MHz Mode / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4824.000	-48.13	-12.00	-60.13	-30.00	-30.13	V
7236.000	-51.81	-5.92	-57.73	-30.00	-27.73	V
N/A						
4822.000	-37.02	-12.01	-49.03	-30.00	-19.03	H
7236.000	-51.28	-5.92	-57.20	-30.00	-27.20	H
N/A						

Test Mode: IEEE 802.11n HT 20 MHz Mode / TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4944.000	-47.27	-11.30	-58.57	-30.00	-28.57	V
7416.000	-52.82	-5.20	-58.02	-30.00	-28.02	V
N/A						
4941.000	-38.94	-11.33	-50.27	-30.00	-20.27	H
7416.000	-53.32	-5.20	-58.52	-30.00	-28.52	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Test Mode: IEEE 802.11n HT 40 MHz Mode / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4844.000	-48.86	-11.88	-60.74	-30.00	-30.74	V
7266.000	-52.23	-5.80	-58.03	-30.00	-28.03	V
N/A						
4844.000	-49.54	-11.88	-61.42	-30.00	-31.42	H
7266.000	-51.24	-5.80	-57.04	-30.00	-27.04	H
N/A						

Test Mode: IEEE 802.11n HT 40 MHz Mode / TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4924.000	-49.39	-11.42	-60.81	-30.00	-30.81	V
7386.000	-53.71	-5.31	-59.02	-30.00	-29.02	V
N/A						
4924.000	-44.16	-11.42	-55.58	-30.00	-25.58	H
7386.000	-53.34	-5.31	-58.65	-30.00	-28.65	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Bluetooth for GFSK (BR-1M)

Test Mode: Bluetooth / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4804.000	-45.03	-12.11	-57.14	-30.00	-27.14	V
7206.000	-51.97	-6.05	-58.02	-30.00	-28.02	V
N/A						
4804.500	-32.12	-12.11	-44.23	-30.00	-14.23	H
7206.000	-52.14	-6.05	-58.19	-30.00	-28.19	H
N/A						

Test Mode: Bluetooth / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4960.000	-49.61	-11.23	-60.84	-30.00	-30.84	V
7440.000	-52.68	-5.10	-57.78	-30.00	-27.78	V
N/A						
4960.000	-37.83	-11.23	-49.06	-30.00	-19.06	H
7440.000	-52.40	-5.10	-57.50	-30.00	-27.50	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Bluetooth for 8DPSK (EDR-3M)

Test Mode: Bluetooth / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4804.000	-46.80	-12.11	-58.91	-30.00	-28.91	V
7206.000	-51.85	-6.05	-57.90	-30.00	-27.90	V
N/A						
4804.500	-34.41	-12.11	-46.52	-30.00	-16.52	H
7206.000	-52.60	-6.05	-58.65	-30.00	-28.65	H
N/A						

Test Mode: Bluetooth / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4960.000	-49.94	-11.23	-61.17	-30.00	-31.17	V
7440.000	-53.05	-5.10	-58.15	-30.00	-28.15	V
N/A						
4960.000	-41.52	-11.23	-52.75	-30.00	-22.75	H
7440.000	-53.28	-5.10	-58.38	-30.00	-28.38	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.



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Bluetooth 4.1

Test Mode: Bluetooth / TX (CH Low)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4804.000	-46.26	-12.11	-58.37	-30.00	-28.37	V
7206.000	-50.99	-6.05	-57.04	-30.00	-27.04	V
N/A						
4804.000	-31.72	-12.11	-43.83	-30.00	-13.83	H
7206.000	-52.31	-6.05	-58.36	-30.00	-28.36	H
N/A						

Test Mode: Bluetooth / TX (CH High)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
4960.000	-47.39	-11.23	-58.62	-30.00	-28.62	V
7440.000	-52.39	-5.10	-57.49	-30.00	-27.49	V
N/A						
4960.000	-35.72	-11.23	-46.95	-30.00	-16.95	H
7440.000	-52.84	-5.10	-57.94	-30.00	-27.94	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

7.11 RECEIVER SPURIOUS EMISSIONS

LIMIT

The spurious emissions of the receiver shall not exceed the values given in table 2.

Table 2: Spurious emission limits for receivers

Frequency range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

Test Configuration

Radiated Spurious Emissions:

(Same as section 7.10 in this test report)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement methods.

Measurement Uncertainty

The measurement uncertainty of the test is ± 2.65 dB.

TEST RESULTS

No non-compliance noted.

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For FPC Antenna
Below 1GHz
Test Mode: RX
Tested by: Jerry Chuang
Ambient temperature: 22°C Relative humidity: 42 % RH Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
224.4850	-64.46	-9.26	-73.72	-57.00	-16.72	V
289.4750	-68.49	-6.60	-75.09	-57.00	-18.09	V
441.7650	-68.77	-2.82	-71.59	-57.00	-14.59	V
625.0950	-65.75	-0.07	-65.82	-57.00	-8.82	V
750.2250	-64.19	2.11	-62.08	-57.00	-5.08	V
874.8700	-68.62	4.03	-64.59	-57.00	-7.59	V
250.1900	-57.44	-8.51	-65.95	-57.00	-8.95	H
374.8350	-69.53	-4.83	-74.36	-57.00	-17.36	H
499.9650	-63.63	-1.65	-65.28	-57.00	-8.28	H
625.0950	-70.59	-0.07	-70.66	-57.00	-13.66	H
750.2250	-64.63	2.11	-62.52	-57.00	-5.52	H
874.8700	-70.23	4.03	-66.20	-57.00	-9.20	H

Test Mode: Bluetooth / RX
Tested by: Jerry Chuang
Ambient temperature: 22°C Relative humidity: 42 % RH Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
224.4850	-65.07	-9.26	-74.33	-57.00	-17.33	V
441.7650	-68.86	-2.82	-71.68	-57.00	-14.68	V
499.9650	-72.16	-1.65	-73.81	-57.00	-16.81	V
625.0950	-66.63	-0.07	-66.70	-57.00	-9.70	V
750.2250	-64.21	2.11	-62.10	-57.00	-5.10	V
874.8700	-69.21	4.03	-65.18	-57.00	-8.18	V
250.1900	-56.89	-8.51	-65.40	-57.00	-8.40	H
299.6600	-66.28	-6.61	-72.89	-57.00	-15.89	H
499.9650	-62.89	-1.65	-64.54	-57.00	-7.54	H
625.0950	-70.15	-0.07	-70.22	-57.00	-13.22	H
750.2250	-64.31	2.11	-62.20	-57.00	-5.20	H
874.8700	-70.35	4.03	-66.32	-57.00	-9.32	H

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



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Above 1GHz

Test Mode: RX

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
2200.500	-37.39	-19.66	-57.05	-47.00	-10.05	V
3187.500	-36.86	-17.40	-54.26	-47.00	-7.26	V
N/A						
1500.500	-37.23	-22.21	-59.44	-47.00	-12.44	H
2400.000	-42.43	-18.89	-61.32	-47.00	-14.32	H
3194.500	-44.74	-17.41	-62.15	-47.00	-15.15	H
5074.000	-49.12	-10.70	-59.82	-47.00	-12.82	H
6456.500	-49.95	-8.90	-58.85	-47.00	-11.85	H
7160.000	-50.09	-6.23	-56.32	-47.00	-9.32	H

Test Mode: Bluetooth / RX

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1248.500	-37.37	-23.10	-60.47	-47.00	-13.47	V
2974.000	-44.84	-17.27	-62.11	-47.00	-15.11	V
N/A						
1500.500	-37.31	-22.21	-59.52	-47.00	-12.52	H
2393.000	-43.27	-18.91	-62.18	-47.00	-15.18	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

For Dipole Antenna

Below 1GHz

Test Mode: RX

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
224.9700	-63.47	-9.23	-72.70	-57.00	-15.70	V
441.7650	-68.61	-2.82	-71.43	-57.00	-14.43	V
499.9650	-70.74	-1.65	-72.39	-57.00	-15.39	V
625.0950	-64.94	-0.07	-65.01	-57.00	-8.01	V
750.2250	-63.19	2.11	-61.08	-57.00	-4.08	V
874.8700	-67.97	4.03	-63.94	-57.00	-6.94	V
250.1900	-58.58	-8.51	-67.09	-57.00	-10.09	H
374.8350	-67.79	-4.83	-72.62	-57.00	-15.62	H
499.9650	-63.08	-1.65	-64.73	-57.00	-7.73	H
625.0950	-72.40	-0.07	-72.47	-57.00	-15.47	H
750.2250	-63.37	2.11	-61.26	-57.00	-4.26	H
874.8700	-70.09	4.03	-66.06	-57.00	-9.06	H

Test Mode: Bluetooth / RX

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
224.9700	-62.34	-9.23	-71.57	-57.00	-14.57	V
374.8350	-66.59	-4.83	-71.42	-57.00	-14.42	V
499.9650	-64.73	-1.65	-66.38	-57.00	-9.38	V
625.0950	-64.90	-0.07	-64.97	-57.00	-7.97	V
750.2250	-63.60	2.11	-61.49	-57.00	-4.49	V
874.8700	-67.10	4.03	-63.07	-57.00	-6.07	V
250.1900	-58.83	-8.51	-67.34	-57.00	-10.34	H
374.8350	-66.45	-4.83	-71.28	-57.00	-14.28	H
499.9650	-64.06	-1.65	-65.71	-57.00	-8.71	H
625.0950	-71.68	-0.07	-71.75	-57.00	-14.75	H
750.2250	-64.18	2.11	-62.07	-57.00	-5.07	H
874.8700	-71.80	4.03	-67.77	-57.00	-10.77	H

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



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Above 1GHz

Test Mode: RX

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1794.500	-32.30	-21.16	-53.46	-47.00	-6.46	V
2988.000	-37.42	-17.23	-54.65	-47.00	-7.65	V
N/A						
1126.000	-33.86	-23.54	-57.40	-47.00	-10.40	H
3194.500	-43.86	-17.41	-61.27	-47.00	-14.27	H
N/A						

Test Mode: Bluetooth / RX

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
2197.000	-37.24	-19.67	-56.91	-47.00	-9.91	V
3194.500	-39.14	-17.41	-56.55	-47.00	-9.55	V
N/A						
1374.500	-36.47	-22.66	-59.13	-47.00	-12.13	H
3187.500	-45.59	-17.40	-62.99	-47.00	-15.99	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

7.12 RECEIVER BLOCKING

Limit

Receiver Category	<input checked="" type="checkbox"/> Category 1 : Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment. <input type="checkbox"/> Category 2 : Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment. <input type="checkbox"/> Category 3 : Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment
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Category 1			
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
Pmin + 6 dB	2 380 2 503,5	-53	CW
Pmin + 6 dB	2 300 2 330 2 360	-47	CW
Pmin + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW

NOTE 1:

Pmin is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 2:

The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Category 2			
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
Pmin + 6 dB	2 380 2 503,5	-57	CW
Pmin + 6 dB	2 300 2 583,5	-47	CW

NOTE 1:
Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

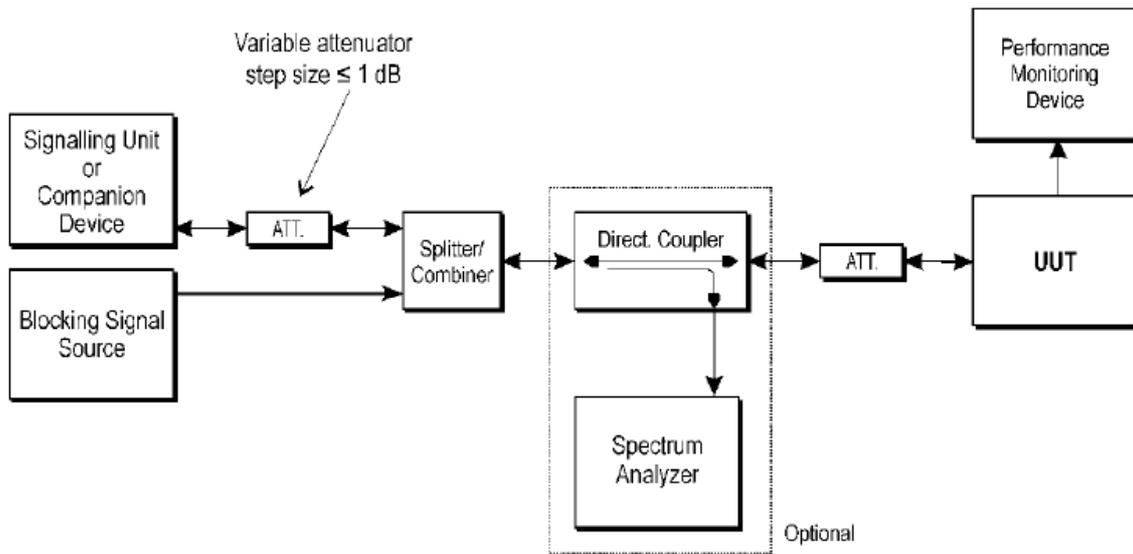
NOTE 2:
The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Category 3			
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
Pmin + 12 dB	2 380 2 503,5	-57	CW
Pmin + 12 dB	2 300 2 583,5	-47	CW

NOTE 1:
Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 2:
The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Test Configuration



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

Configuration	Frequency (MHz)	Blocking signal frequency(MHz)	Receiver Blocking signal power (dBm)	Wanted signal mean power from companion device (dBm) [Pmin]	Pmin + 6dB Per Values (dBm)	Per Results	Limit (%)	Result
IEEE 802.11b Mode	2412	2380	-53	-96	-90	0.00%	10.00%	Pass
		2503.5		-96	-90	0.00%	10.00%	Pass
		2300	-47	-96	-90	0.00%	10.00%	Pass
		2330		-96	-90	0.00%	10.00%	Pass
		2360		-96	-90	0.00%	10.00%	Pass
		2523.5	-47	-96	-90	0.00%	10.00%	Pass
		2553.5		-96	-90	0.00%	10.00%	Pass
		2583.5		-96	-90	0.00%	10.00%	Pass
		2613.5		-96	-90	0.00%	10.00%	Pass
		2643.5		-96	-90	0.00%	10.00%	Pass
		2673.5	-96	-90	0.00%	10.00%	Pass	
IEEE 802.11b Mode	2472	2380	-53	-96	-90	0.00%	10.00%	Pass
		2503.5		-96	-90	0.00%	10.00%	Pass
		2300	-47	-96	-90	0.00%	10.00%	Pass
		2330		-96	-90	0.00%	10.00%	Pass
		2360		-96	-90	0.00%	10.00%	Pass
		2523.5	-47	-96	-90	0.00%	10.00%	Pass
		2553.5		-96	-90	0.00%	10.00%	Pass
		2583.5		-96	-90	0.00%	10.00%	Pass
		2613.5		-96	-90	0.00%	10.00%	Pass
		2643.5		-96	-90	0.00%	10.00%	Pass
		2673.5	-96	-90	0.00%	10.00%	Pass	

Configuration	Frequency (MHz)	Blocking signal frequency(MHz)	Receiver Blocking signal power (dBm)	Wanted signal mean power from companion device (dBm) [Pmin]	Pmin + 6dB Per Values (dBm)	Per Results	Limit (%)	Result
Bluetooth 2.1+EDR	2402	2380	-53	-90	-84	0.15%	10.00%	Pass
		2503.5		-90	-84	0.12%	10.00%	Pass
		2300	-47	-90	-84	0.63%	10.00%	Pass
		2330		-90	-84	0.49%	10.00%	Pass
		2360		-90	-84	0.14%	10.00%	Pass
		2523.5	-47	-90	-84	0.16%	10.00%	Pass
		2553.5		-90	-84	0.41%	10.00%	Pass
		2583.5		-90	-84	0.38%	10.00%	Pass
		2613.5		-90	-84	0.12%	10.00%	Pass
		2643.5		-90	-84	0.11%	10.00%	Pass
2673.5	-90	-84	0.13%	10.00%	Pass			
Bluetooth 2.1+EDR	2480	2380	-53	-90	-84	0.10%	10.00%	Pass
		2503.5		-90	-84	0.12%	10.00%	Pass
		2300	-47	-90	-84	0.62%	10.00%	Pass
		2330		-90	-84	0.65%	10.00%	Pass
		2360		-90	-84	0.13%	10.00%	Pass
		2523.5	-47	-90	-84	0.17%	10.00%	Pass
		2553.5		-90	-84	0.30%	10.00%	Pass
		2583.5		-90	-84	0.30%	10.00%	Pass
		2613.5		-90	-84	0.12%	10.00%	Pass
		2643.5		-90	-84	0.12%	10.00%	Pass
2673.5	-90	-84	0.06%	10.00%	Pass			

Configuration	Frequency (MHz)	Blocking signal frequency(MHz)	Receiver Blocking signal power (dBm)	Wanted signal mean power from companion device (dBm) [Pmin]	Pmin + 6dB Per Values (dBm)	Per Results	Limit (%)	Result
BLE Mode	2402	2380	-53	-82	-76	0.02%	10.00%	Pass
		2503.5		-82	-76	0.05%	10.00%	Pass
		2300	-47	-82	-76	0.08%	10.00%	Pass
		2330		-82	-76	0.03%	10.00%	Pass
		2360		-82	-76	0.05%	10.00%	Pass
		2523.5	-47	-82	-76	0.03%	10.00%	Pass
		2553.5		-82	-76	0.07%	10.00%	Pass
		2583.5		-82	-76	0.06%	10.00%	Pass
		2613.5		-82	-76	0.08%	10.00%	Pass
		2643.5		-82	-76	0.06%	10.00%	Pass
2673.5	-82	-76	0.05%	10.00%	Pass			
BLE Mode	2480	2380	-53	-82	-76	0.05%	10.00%	Pass
		2503.5		-82	-76	0.03%	10.00%	Pass
		2300	-47	-82	-76	0.09%	10.00%	Pass
		2330		-82	-76	0.09%	10.00%	Pass
		2360		-82	-76	0.10%	10.00%	Pass
		2523.5	-47	-82	-76	0.02%	10.00%	Pass
		2553.5		-82	-76	0.06%	10.00%	Pass
		2583.5		-82	-76	0.10%	10.00%	Pass
		2613.5		-82	-76	0.08%	10.00%	Pass
		2643.5		-82	-76	0.05%	10.00%	Pass
2673.5	-82	-76	0.12%	10.00%	Pass			

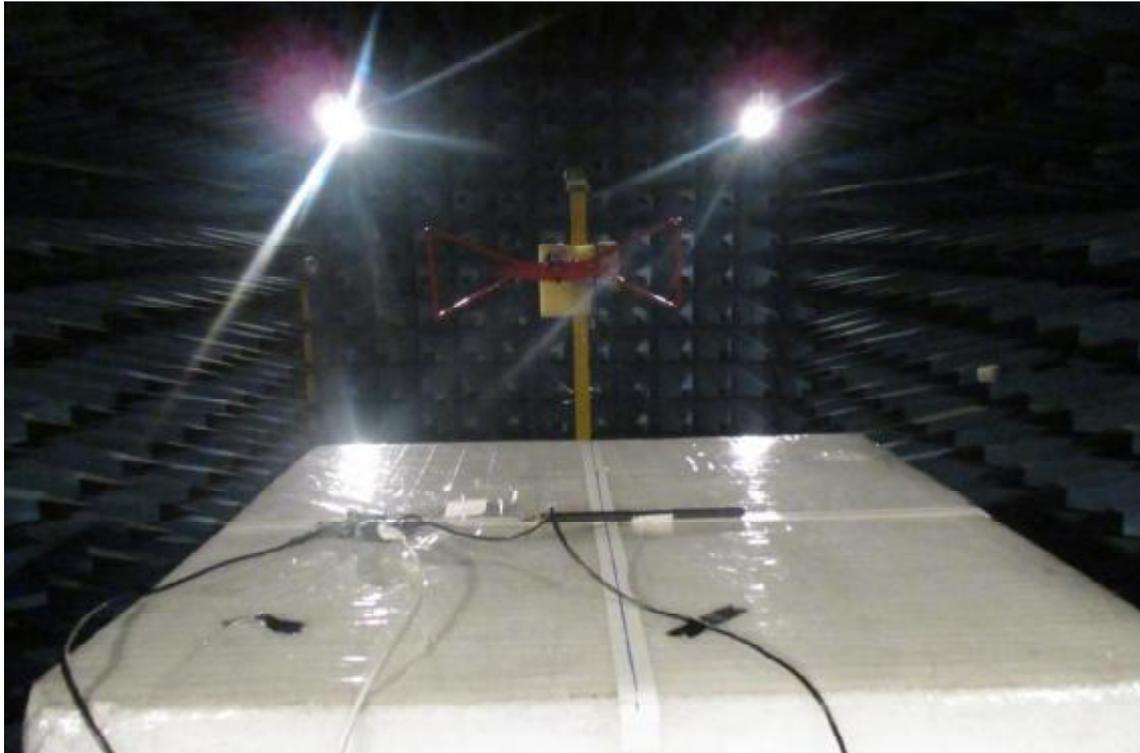
-- End of Test Report --

APPENDIX A PHOTOGRAPHS OF TEST SETUP

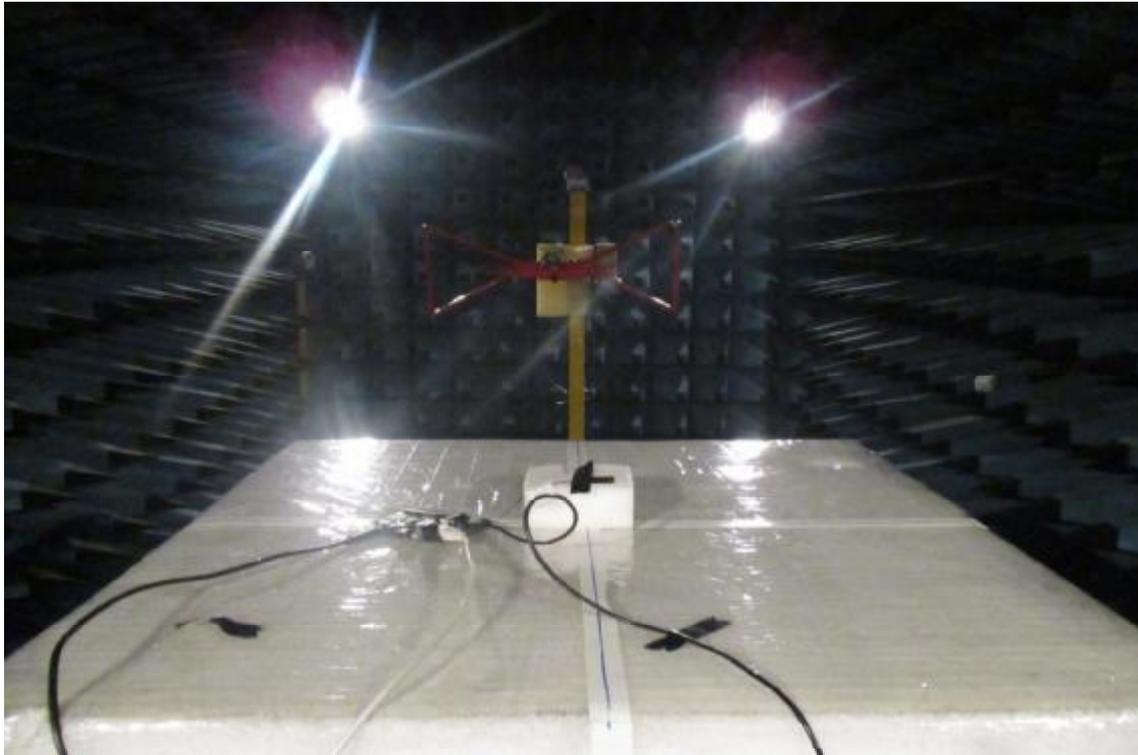
Below 1GHz

For Dipole Antenna

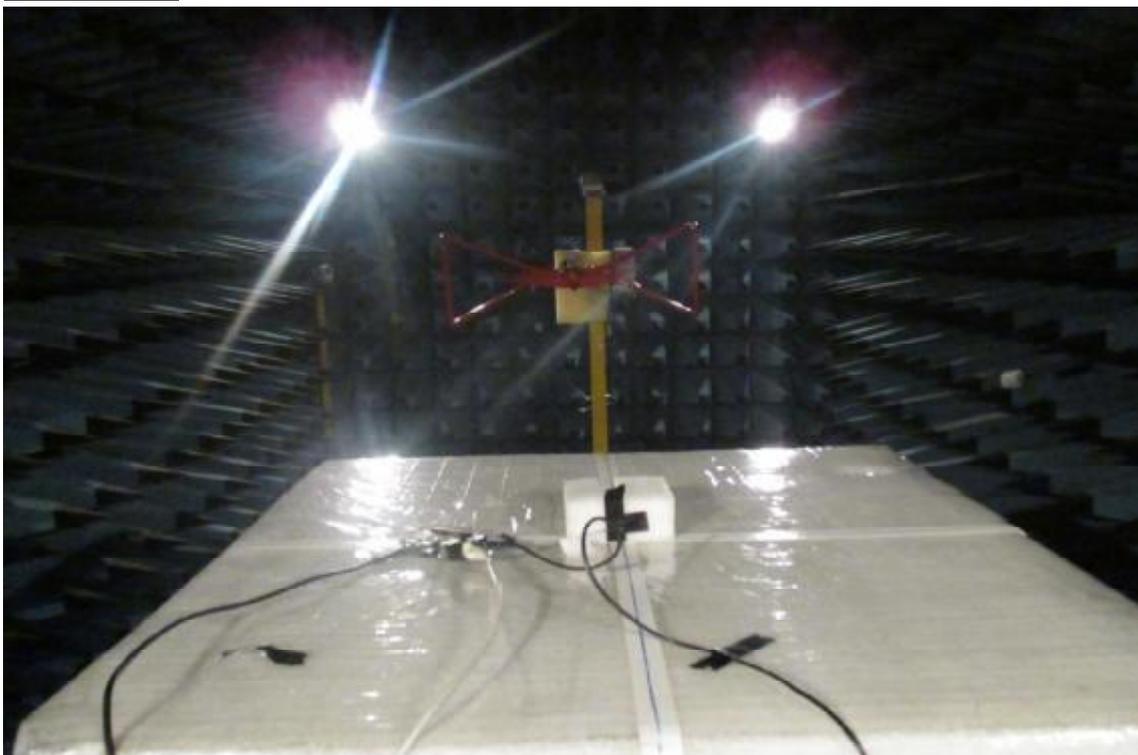
WiFi 2.4GHz+ BT2.1+EDR+BT 4.1



For FPC Antenna
WiFi 2.4GHz+BT 4.1



BT2.1+EDR



Report No.: T180627D10-RT1

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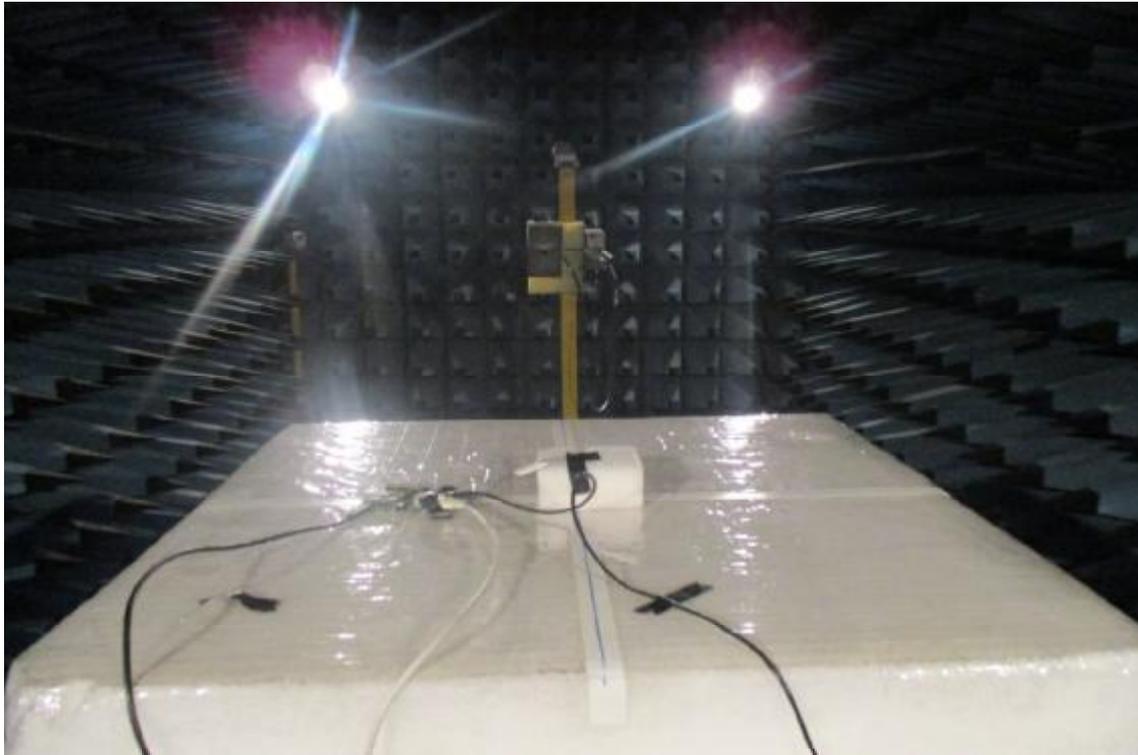
Above 1GHz

For Dipole Antenna

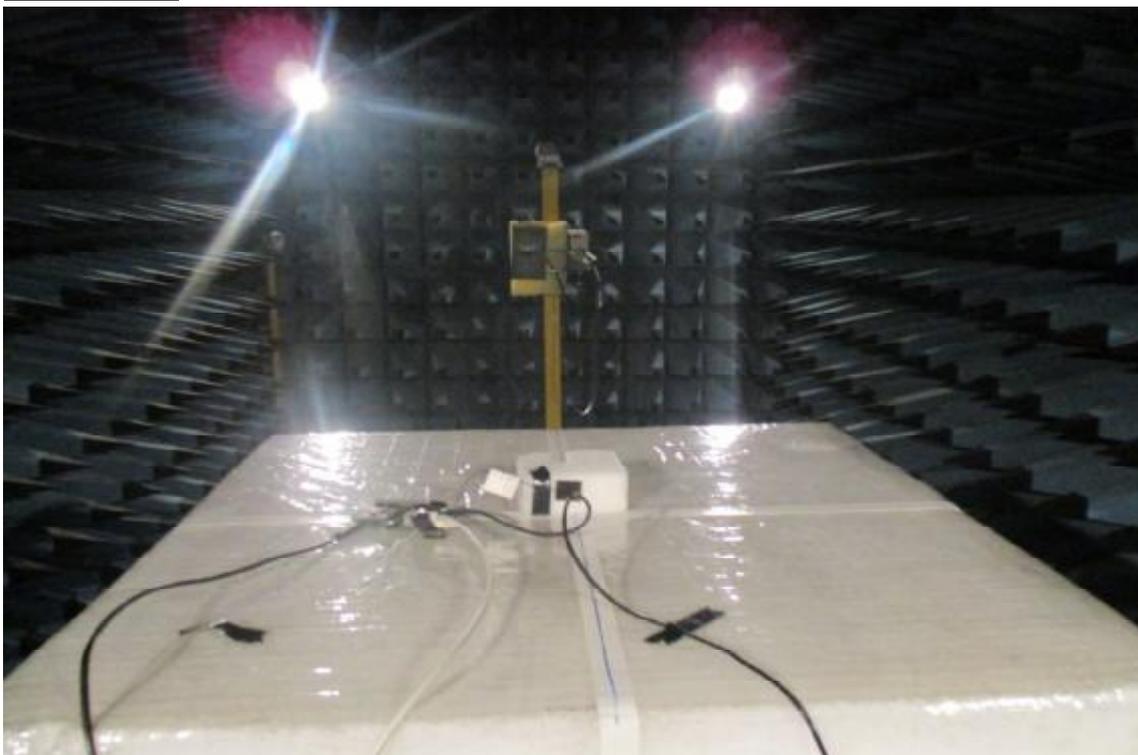
WiFi 2.4GHz+ BT2.1+EDR+BT 4.1



For FPC Antenna
WiFi 2.4GHz+BT 4.1



BT2.1+EDR



Report No.: T180627D10-RT1

Page: A-5 / A-8

Rev.: 00

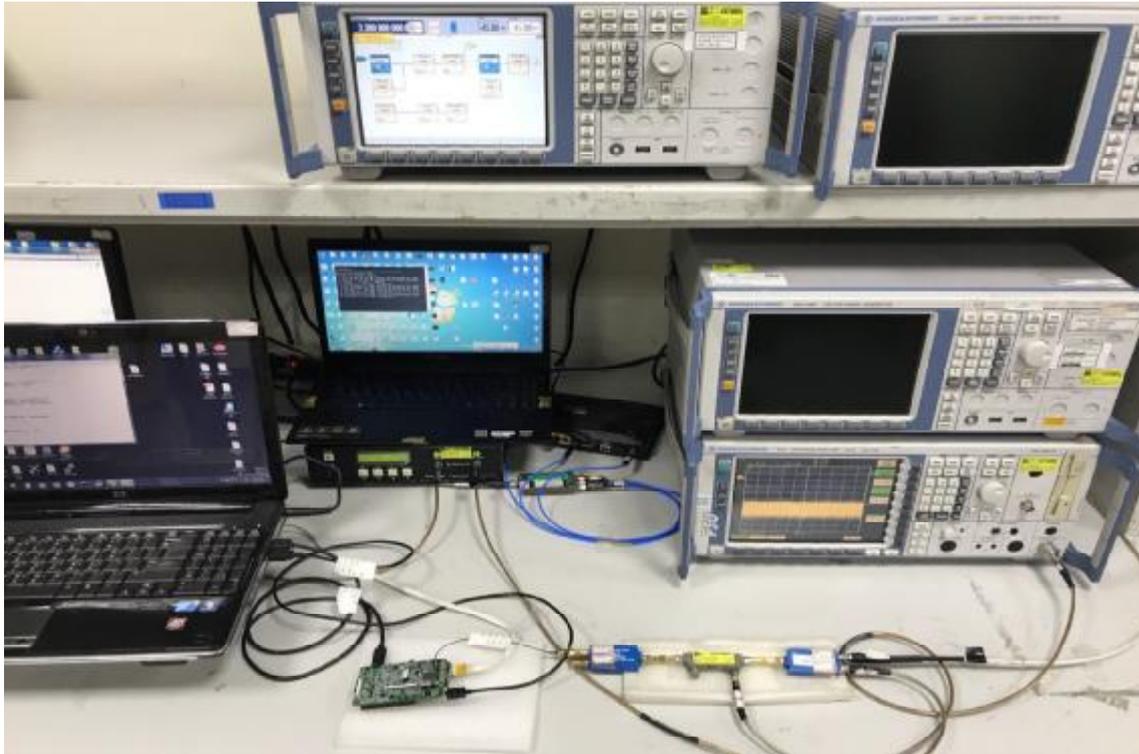
Conducted



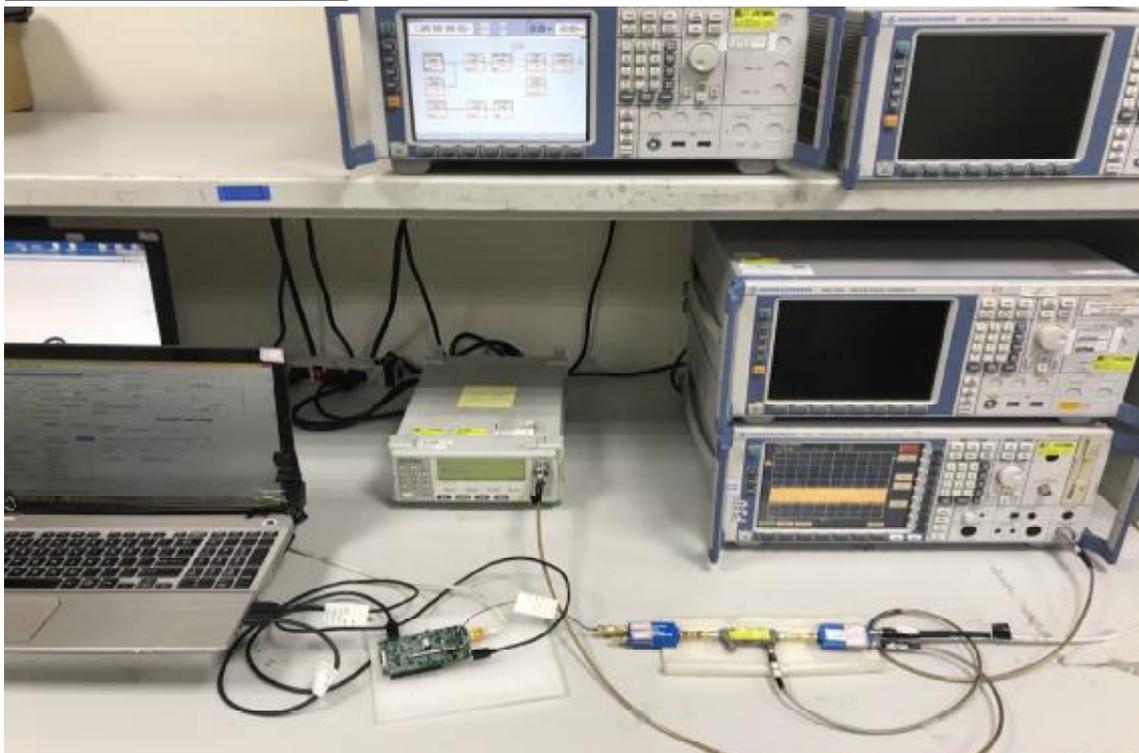
Adaptivity



Receiver Blocking **WiFi 2.4GHz**



Bluetooth for 2.1+EDR



Bluetooth 4.1





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Rev. 01

ETSI EN 301 893 V2.1.1 (2017-05)
+
AS/NZS 4268: 2017

TEST REPORT

For

WiFi+Bluetooth 4.1(HS) System on Module

MODEL: PIXI-9377

Issued to:

TechNexion Ltd.

**16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei
City, 23511 Taiwan ROC**

Issued by

Compliance Certification Services Inc.

**No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)**

Issued Date: August 17, 2018

Note: This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NIST or any government agencies. The test results in the report only apply to the tested sample

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 17, 2018	Initial Issue	ALL	Allison Chen
01	September 11, 2018	1.Revised FPC antenna gain.	P.5	Allison Chen



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1. TEST RESULT CERTIFICATION

Applicant: TechNexion Ltd.
16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC

Manufacturer: TechNexion Ltd.
16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC

Equipment Under Test: WiFi+Bluetooth 4.1(HS) System on Module

Trade Name: TechNexion

Model Number: PIXI-9377

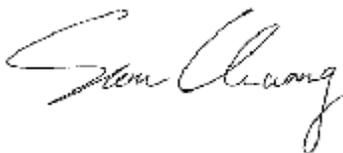
Date of Test: July 30 ~ August 6, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
ETSI EN 301 893 V2.1.1 (2017-05) + AS/NZS 4268: 2017	No non-compliance noted
Deviation from Applicable Standard	
None	

Compliance Certification Services Inc. tested the above equipment for compliance with the requirements set forth in the ETSI EN 301 893. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Tested by:




Sam Chuang
Manager
Compliance Certification Services Inc.

Jerry Chuang
Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	WiFi+Bluetooth 4.1(HS) System on Module																													
Trade Name	TechNexion																													
Model Number	PIXI-9377																													
Model Discrepancy	N/A																													
Received Date	June 27, 2018																													
EUT Power Rating	Power from host system. (DC 5V)																													
Frequency Range	IEEE 802.11a Mode: 5180 ~ 5240 MHz IEEE 802.11n HT 20 MHz Mode: 5180 ~ 5240 MHz IEEE 802.11n HT 40 MHz Mode: 5190 ~ 5230 MHz IEEE 802.11ac VHT80 MHz Mode: 5210 MHz																													
Modulation Technique	IEEE 802.11a Mode: OFDM IEEE 802.11n HT20 MHz Mode: OFDM IEEE 802.11n HT40 MHz Mode: OFDM IEEE 802.11ac VHT80 MHz Mode: OFDM																													
Number of Channels	IEEE 802.11a Mode: 5180 ~ 5240 MHz: 4 Channels IEEE 802.11n HT20 MHz Mode: 5180 ~ 5240 MHz: 4 Channels IEEE 802.11n HT40 MHz Mode: 5190 ~ 5230 MHz: 2 Channels IEEE 802.11ac VHT80 MHz Mode: 5210MHz: 1 Channels																													
Transmit Power (Mean EIRP)	<table border="1"> <thead> <tr> <th>Mode</th> <th>Transmit Power (dBm)</th> <th>Transmit Power (mW)</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">IEEE 802.11a Mode</td> </tr> <tr> <td>5180 ~ 5240 MHz</td> <td>19.32</td> <td>85.51</td> </tr> <tr> <td colspan="3" style="text-align: center;">IEEE 802.11n 20 MHz Mode</td> </tr> <tr> <td>5180 ~ 5240 MHz</td> <td>16.83</td> <td>48.19</td> </tr> <tr> <td colspan="3" style="text-align: center;">IEEE 802.11n 40 MHz Mode</td> </tr> <tr> <td>5190 ~ 5230 MHz</td> <td>17.28</td> <td>53.46</td> </tr> <tr> <td colspan="3" style="text-align: center;">IEEE 802.11ac VHT80 MHz Mode</td> </tr> <tr> <td>5210 MHz</td> <td>17.36</td> <td>54.45</td> </tr> </tbody> </table>			Mode	Transmit Power (dBm)	Transmit Power (mW)	IEEE 802.11a Mode			5180 ~ 5240 MHz	19.32	85.51	IEEE 802.11n 20 MHz Mode			5180 ~ 5240 MHz	16.83	48.19	IEEE 802.11n 40 MHz Mode			5190 ~ 5230 MHz	17.28	53.46	IEEE 802.11ac VHT80 MHz Mode			5210 MHz	17.36	54.45
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5210 MHz	17.36	54.45																												
Antenna Specification	FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 3dBi Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 6dBi																													
Temperature Range	0°C ~ +70°C																													
S.W Version	1.0																													
H.W: Version	A1																													

Remark: For more details, please refer to the User's manual of the EUT.

3. TEST METHODOLOGY

3.1. GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

ETSI EN 301 893 V2.1.1 (2017-05) 5GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

3.2. DESCRIPTION OF TEST MODES

The EUT (model: PIXI-9377) had been tested under operating and standby condition. Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11a Mode: 5180 ~ 5240 MHz

Channel Low (5180MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for the final testing.

IEEE 802.11n HT 20 MHz Mode: 5180 ~ 5240 MHz

Channel Low (5180MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for the final testing.

IEEE 802.11n HT 40 MHz Mode: 5190 ~ 5230 MHz

Channel Low (5190MHz) and Channel High (5230MHz) with 13.5Mbps data rate were chosen for the final testing.

IEEE 802.11ac VHT 80 MHz Mode 5210 MHz

Channel (5210MHz) with 13.5Mbps data rate was chosen for the final testing.

Final test mode of conducted test items and radiation spurious emissions are considering the modulation and worse data rate from the power table

Mode	Data Rate
802.11a (1TX)	6 Mbps
802.11n HT20 (1TX)	MCS 0
802.11n HT40 (1TX)	MCS 0
802.11ac VHT80 (1TX)	MCS 0

3.2.1 The worst mode of measurement

For FPC Antenna

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: EUT Power by host system
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (Z-Plane) were recorded in this report.

For Dipole Antenna

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: EUT Power by host system
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (X-Plane) were recorded in this report.

Report No.: T180627D10-RT2

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Directional Couplers	Agilent	87301D	MY44350252	07/24/2018	07/23/2019
Power Divider	Solvang Technology	STI08-0015	008	07/27/2018	07/26/2019
Power Meter	Anritsu	ML2495A	1012009	09/18/2017	09/17/2018
Power Sensor	Anritsu	MA2411B	1126148	02/06/2018	02/05/2019
Signal Analyzer	R&S	FSV 40	101073	10/02/2017	10/01/2018
Thermostatic/Hrgrosatic Chamber	GWINSTEK	GTC-288MH-CC	TH160402	05/17/2018	05/16/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54250027	07/05/2018	07/04/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54260016	07/05/2018	07/04/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54260020	07/05/2018	07/04/2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54260007	07/05/2018	07/04/2019

Wugu Fully Chamber B					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Bilog Antenna	Sunol Sciences	JB1	A052609	03/14/2018	03/13/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	23452	06/29/2018	06/28/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	33960	06/29/2018	06/28/2019
Digital Thermo-Hygro Meter	WISEWIND	1110	D06	02/08/2018	02/07/2019
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/14/2018	03/13/2019
Pre-Amplifier	Anritsu	MH648A	M89145	06/29/2018	06/28/2019
Pre-Amplifier	EMEC	EM01M26G	060570	06/29/2018	06/28/2019
Signal Analyzer	Agilent	N9010A	MY52220817	03/22/2018	03/21/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

Report No.: T180627D10-RT2

Adaptivity Room					
Name of Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Attenuator	E-INSTRUMENT	EPA-600H	EC1400050	07/25/2018	07/24/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Directional Couplers	Agilent	87301D	MY44350252	07/24/2018	07/23/2019
Power Divider	Marvelous Microwave	MVE8586	16011206	07/27/2018	07/26/2019
Power Divider	Solvang Technology	STI08-0015	008	07/27/2018	07/26/2019
Power Splitter	Mini-Circuits	ZN2PD-9G-S	777	07/23/2018	07/22/2019
Spectrum Analyzer	R&S	FSU 26	100258	06/25/2018	06/24/2019
Vector Signal Generator	R&S	SMU 200A	101480	04/10/2018	04/09/2019
Vector Signal Generator	R&S	SMU 200A	103439	05/04/2018	05/03/2019
Software	GPIBShot,DFS-Aggregate-Time FSU				

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

4.3 MEASUREMENT UNCERTAINTY

For the test methods to determine RF power levels, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [2] and TR 100 028-2 [3] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 7 is based on such expansion factors.

Table 7: Maximum measurement uncertainty

Parameter	Uncertainty
RF frequency	+/- $1 \cdot 10^{-5}$
RF power conducted	+/- 1,5 dB
RF power radiated	+/- 6 dB
Spurious emissions, conducted	+/- 3 dB
Spurious emissions, radiated	+/- 6 dB
Humidity	+/- 5 %
Temperature	+/- 1°C
Time	+/- 10 %

5. FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

- No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. SETUP OF EQUIPMENT UNDER TEST

6.1. SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2. SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Cable length & Type Discribe
	N/A					

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

7. ETSI EN 301 893 REQUIREMENTS

7.1. CARRIER FREQUENCIES AND CHANNELIZATION

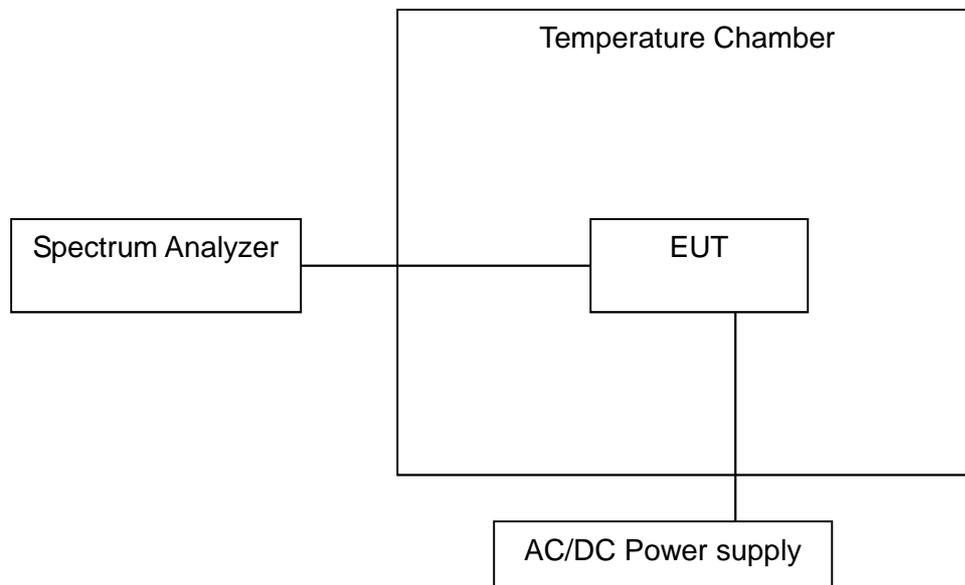
LIMIT

ETSI EN 301 893

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range $f_c \pm 20$ ppm over Normal and Extreme conditions.

TEST CONFIGURATION

Temperature and Voltage Measurement (under normal and extreme test conditions)



TEST PROCEDURE

1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05).

TEST RESULTS

No non-compliance noted.

Report No.: T180627D10-RT2

IEEE802.11a Mode:

20°C, 5V NORMAL CONDITION RESULTS

Channel Frequency (MHz)	Measured Frequency (MHz)	± 20 ppm Limit (ppm)
5180	5179.9377	-12.04

0°C, 5.5V EXTREME CONDITION RESULTS

Channel Frequency (MHz)	Measured Frequency (MHz)	± 20 ppm Limit (ppm)
5180	5179.9369	-12.19

0°C, 4.5V EXTREME CONDITION RESULTS

Channel Frequency (MHz)	Measured Frequency (MHz)	± 20 ppm Limit (ppm)
5180	5179.9445	-10.72

70°C, 5.5V EXTREME CONDITION RESULTS

Channel Frequency (MHz)	Measured Frequency (MHz)	± 20 ppm Limit (ppm)
5180	5179.9168	-16.07

70°C, 4.5V EXTREME CONDITION RESULTS

Channel Frequency (MHz)	Measured Frequency (MHz)	± 20 ppm Limit (ppm)
5180	5179.9170	-16.02

7.2. RF OUTPUT POWER, TRANSMIT POWER CONTROL (TPC) AND POWER DENSITY

LIMIT

ETSI EN 301 893

RF output power and power density at the highest power level

TPC is not required for channels whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz.

For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in table 1.

Devices are allowed to operate without TPC. See table 1 for the applicable limits in this case.

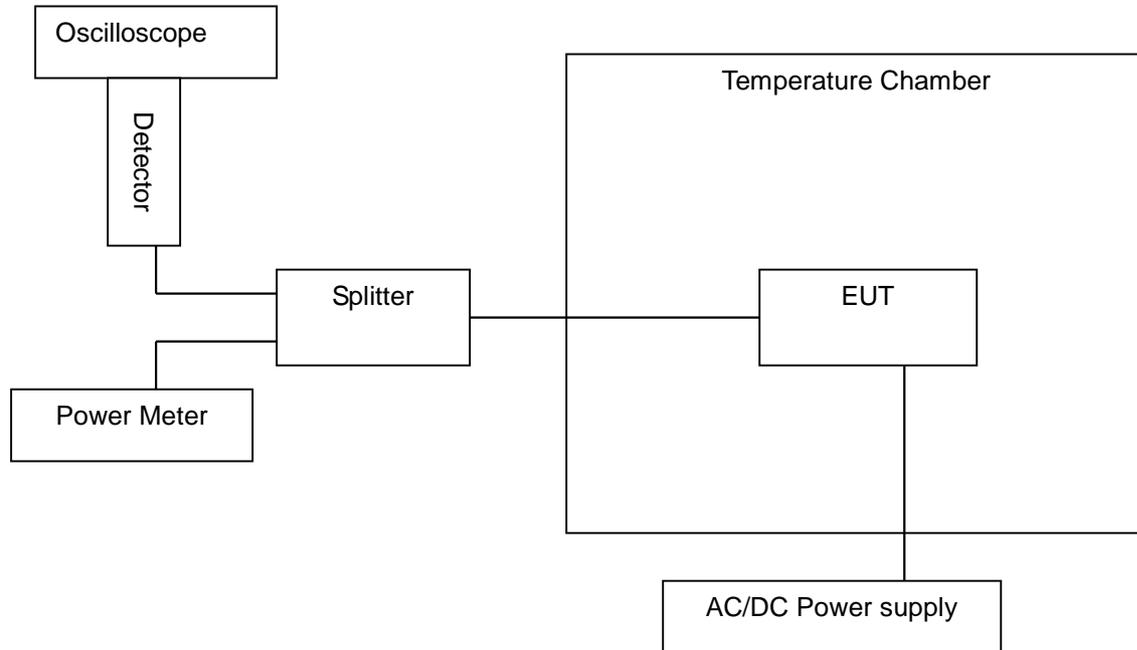
Table 1: Mean EIRP limits for RF output power and power density at the highest power level

Frequency band (MHz)	Mean e.i.r.p. limit (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5150 – 5350	23	20/23 (see note 1)	10	7/10 (see note 2)
NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm. NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.				

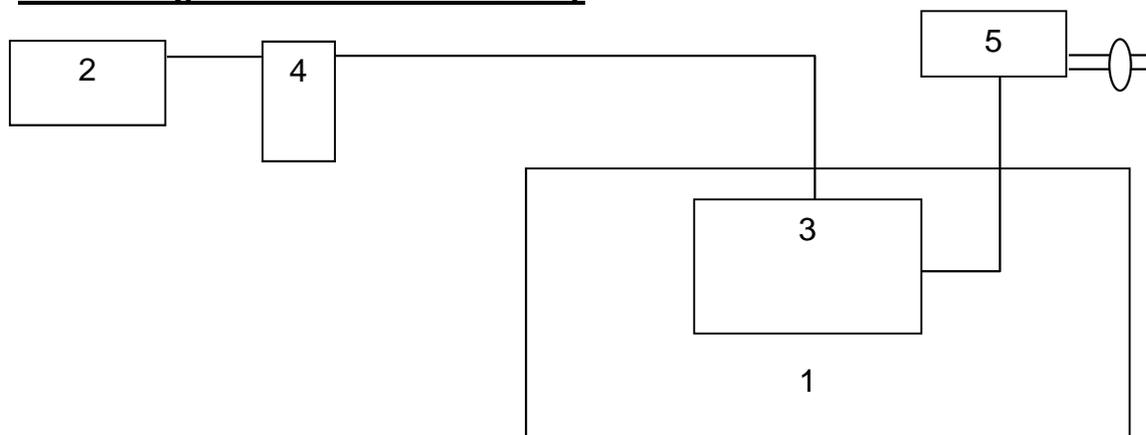
Report No.: T180627D10-RT2

Test Configuration for RF Output Power

Temperature and Voltage Measurement (under normal and extreme test conditions)



Test Configuration for Power Density



Legend

- 1. Wooden table
- 2. Spectrum analyzer
- 3. EUT
- 4. DC block
- 5. Power supply

TEST PROCEDURE

1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the test conditions.
2. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the measurement methods.

TEST RESULTS

No non-compliance noted.

IEEE802.11a Mode:

Antenna Gain =				6 dBi			
TEST CONDITIONS				TRANSMITTER POWER (dBm)			
Temp (°C)	Mode	Voltage (V)	Frequency (MHz)	Total Power	Mean EIRP (dBm)	Limit (dBm)	Margin (dB)
25	Vnor	5	5180	12.92	18.92	23.00	-4.08
0	Vmax	5.5	5180	13.31	19.31	23.00	-3.69
	Vmin	4.5	5180	13.32	*19.32	23.00	-3.68
70	Vmax	5.5	5180	11.93	17.93	23.00	-5.07
	Vmin	4.5	5180	11.93	17.93	23.00	-5.07
Limit			BAND1 23dBm With TPC				
Measurement uncertainty			+ 0.28dB / - 0.30dB				

Remark: 1. EIRP=Reading + Antenna Gain + Cable Loss

IEEE 802.11n HT 20 MHz Mode:

Antenna Gain =				6 dBi			
TEST CONDITIONS				TRANSMITTER POWER (dBm)			
Temp (°C)	Mode	Voltage (V)	Frequency (MHz)	Total Power	Mean EIRP (dBm)	Limit (dBm)	Margin (dB)
25	Vnor	5	5180	10.81	16.81	23.00	-6.19
0	Vmax	5.5	5180	10.83	*16.83	23.00	-6.17
	Vmin	4.5	5180	10.83	16.83	23.00	-6.17
70	Vmax	5.5	5180	9.81	15.81	23.00	-7.19
	Vmin	4.5	5180	9.82	15.82	23.00	-7.18
Limit			BAND1 23dBm With TPC				
Measurement uncertainty			+ 0.28dB / - 0.30dB				

Remark: 1. EIRP=Reading + Antenna Gain + Cable Loss

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IEEE 802.11n HT 40 MHz Mode:

Antenna Gain =				6 dBi			
TEST CONDITIONS				TRANSMITTER POWER (dBm)			
Temp (°C)	Mode	Voltage (V)	Frequency (MHz)	Total Power	Mean EIRP (dBm)	Limit (dBm)	Margin (dB)
25	Vnor	5	5190	11.28	*17.28	23.00	-5.72
0	Vmax	5.5	5190	11.17	17.17	23.00	-5.83
	Vmin	4.5	5190	11.18	17.18	23.00	-5.82
70	Vmax	5.5	5190	10.26	16.26	23.00	-6.74
	Vmin	4.5	5190	10.27	16.27	23.00	-6.73
Limit				BAND1 23dBm With TPC			
Measurement uncertainty				+ 0.28dB / - 0.30dB			

Remark: 1. EIRP=Reading + Antenna Gain + Cable Loss

IEEE 802.11ac VHT80 MHz Mode:

Antenna Gain =				6 dBi			
TEST CONDITIONS				TRANSMITTER POWER (dBm)			
Temp (°C)	Mode	Voltage (V)	Frequency (MHz)	Total Power	Mean EIRP (dBm)	Limit (dBm)	Margin (dB)
25	Vnor	5	5210	11.36	*17.36	23.00	-5.64
0	Vmax	5.5	5210	10.85	16.85	23.00	-6.15
	Vmin	4.5	5210	10.86	16.86	23.00	-6.14
70	Vmax	5.5	5210	8.73	14.73	23.00	-8.27
	Vmin	4.5	5210	8.74	14.74	23.00	-8.26
Limit				BAND1 23dBm With TPC			
Measurement uncertainty				+ 0.28dB / - 0.30dB			

Remark: 1. EIRP=Reading + Antenna Gain + Cable Loss

POWER DENSITY

IEEE802.11a Mode:

Antenna Gain =

6 dBi

Temperature (°C)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5180	9.36	10	-0.64

IEEE 802.11n HT 20 MHz Mode:

Antenna Gain =

6 dBi

Temperature (°C)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5180	6.63	10	-3.37

IEEE 802.11n HT 40 MHz Mode:

Antenna Gain =

6 dBi

Temperature (°C)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5190	3.40	10	-6.60

IEEE 802.11ac VHT80 MHz Mode:

Antenna Gain =

6 dBi

Temperature (°C)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5210	-1.44	10	-11.44

7.3. TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5GHZ RLAN BANDS

LIMIT

ETSI EN 301 893,

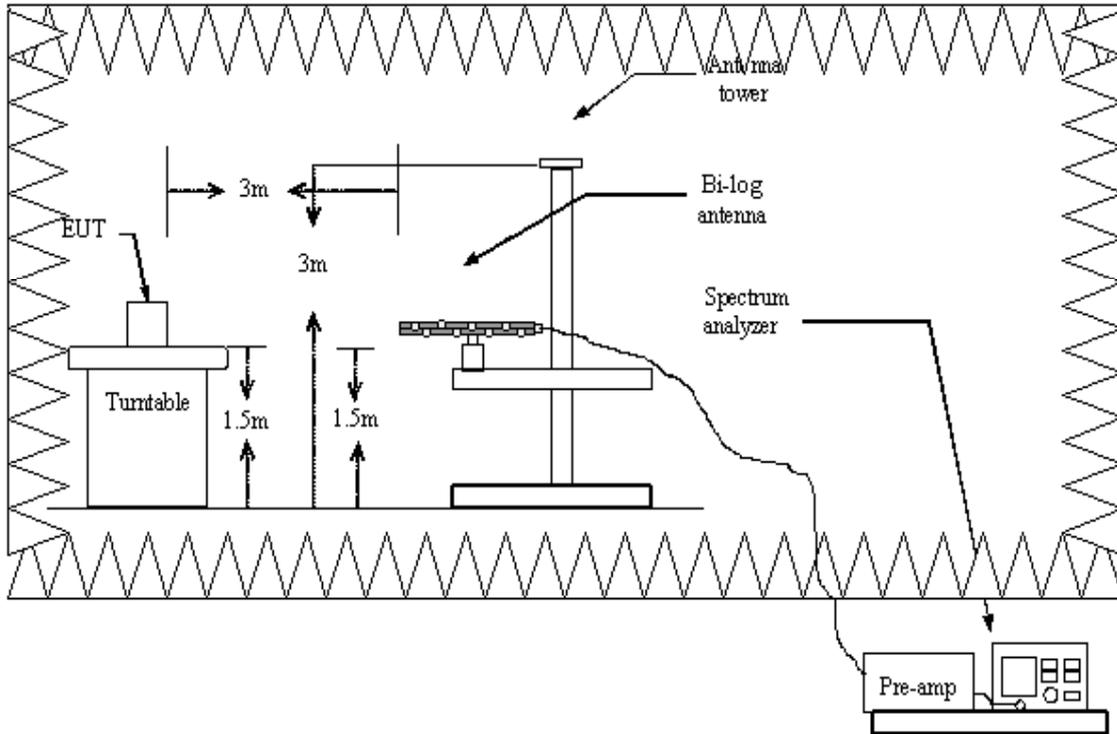
The level of unwanted emissions (radio frequency emissions outside the 5GHz RLAN bands) shall not exceed the limits given below:

Table 3: Transmitter unwanted emission limits outside the 5 GHz RLAN bands

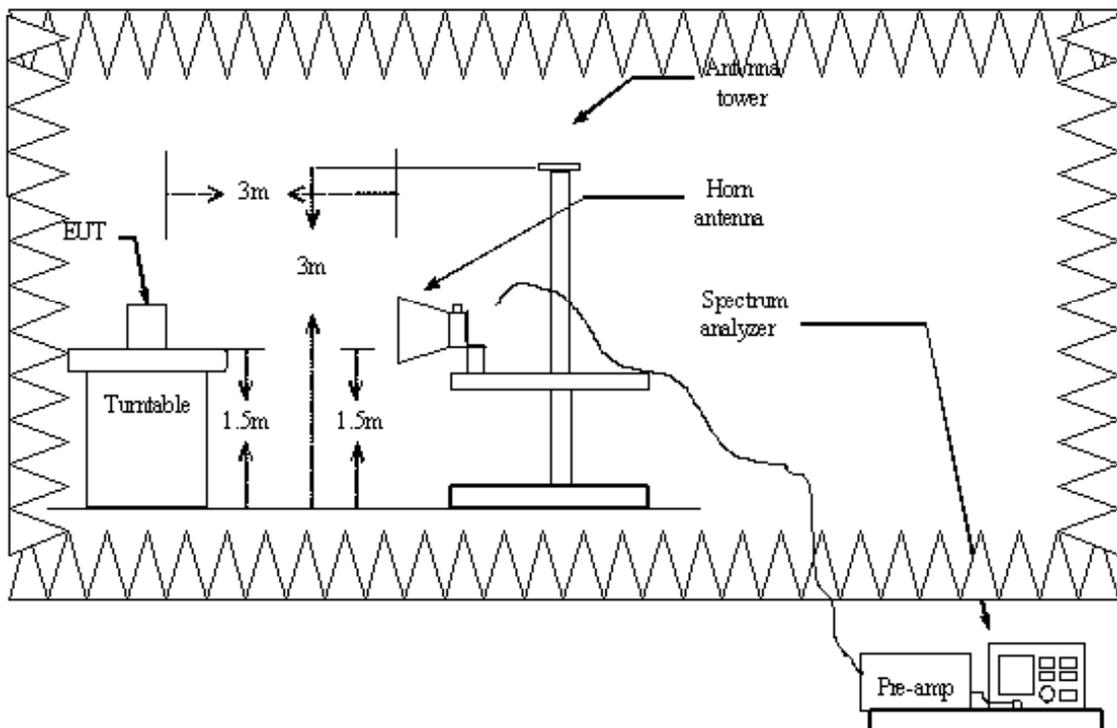
Frequency Range (MHz)	Max. Power, EIRP (dBm)	Bandwidth
30 MHz to 47 MHz	-36	100 kHz
47 MHz to 74 MHz	-54	100 kHz
74 MHz to 87.5 MHz	-36	100 kHz
87.5 MHz to 118 MHz	-54	100 kHz
118 MHz to 174 MHz	-36	100 kHz
174 MHz to 230 MHz	-54	100 kHz
230 MHz to 470 MHz	-36	100 kHz
470 MHz to 862 MHz	-54	100 kHz
862 MHz to 1 GHz	-36	100 kHz
1 GHz to 5.15 GHz	-30	1 MHz
5.35 GHz to 5.47 GHz	-30	1 MHz
5.725 GHz to 26 GHz	-30	1 MHz

Test Configuration:

Below 1GHz

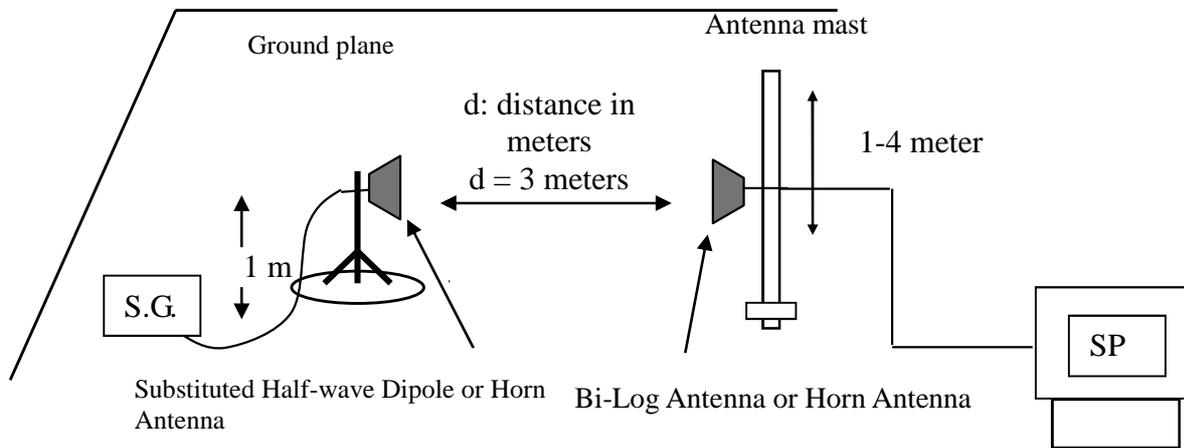


Above 1GHz



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Substituted Method Test Set-up



TEST PROCEDURE

1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the test conditions.
2. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the measurement methods.

TEST RESULTS

No non-compliance noted

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For FPC Antenna

Below 1GHz

Test Mode: IEEE 802.11ac VHT 80 MHz / TX (CH 5210) Tested by: Jerry Chuang

Ambient temperature: 22°C Relative humidity: 42 % RH Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.0600	-65.06	-6.38	-71.44	-36.00	-35.44	V
250.1900	-60.14	-8.51	-68.65	-36.00	-32.65	V
499.9650	-64.55	-1.65	-66.20	-54.00	-12.20	V
625.0950	-66.23	-0.07	-66.30	-54.00	-12.30	V
750.2250	-61.13	2.11	-59.02	-54.00	-5.02	V
874.8700	-68.18	4.03	-64.15	-36.00	-28.15	V
250.1900	-58.16	-8.51	-66.67	-36.00	-30.67	H
298.6900	-66.50	-6.61	-73.11	-36.00	-37.11	H
499.9650	-64.26	-1.65	-65.91	-54.00	-11.91	H
625.0950	-70.12	-0.07	-70.19	-54.00	-16.19	H
750.2250	-64.49	2.11	-62.38	-54.00	-8.38	H
874.8700	-71.10	4.03	-67.07	-36.00	-31.07	H

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Above 1GHz

Test Mode: IEEE 802.11a Mode / TX (CH 5180)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10360.000	-47.30	0.23	-47.07	-30.00	-17.07	V
15540.000	-56.71	3.77	-52.94	-30.00	-22.94	V
N/A						
10360.000	-43.72	0.23	-43.49	-30.00	-13.49	H
15540.000	-56.26	3.77	-52.49	-30.00	-22.49	H
N/A						

Test Mode: IEEE 802.11a Mode / TX (CH 5240)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10480.000	-54.51	0.48	-54.03	-30.00	-24.03	V
15720.000	-56.32	3.81	-52.51	-30.00	-22.51	V
N/A						
10480.000	-48.93	0.48	-48.45	-30.00	-18.45	H
15720.000	-56.68	3.81	-52.87	-30.00	-22.87	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: IEEE 802.11n 20MHz Mode / TX (CH 5180) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10360.000	-46.70	0.23	-46.47	-30.00	-16.47	V
15540.000	-56.95	3.77	-53.18	-30.00	-23.18	V
N/A						
10360.000	-42.77	0.23	-42.54	-30.00	-12.54	H
15540.000	-57.06	3.77	-53.29	-30.00	-23.29	H
N/A						

Test Mode: IEEE 802.11n 20MHz Mode / TX (CH 5240) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10480.000	-54.12	0.48	-53.64	-30.00	-23.64	V
15720.000	-57.13	3.81	-53.32	-30.00	-23.32	V
N/A						
10480.000	-49.15	0.48	-48.67	-30.00	-18.67	H
15720.000	-55.99	3.81	-52.18	-30.00	-22.18	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: IEEE 802.11n 40MHz Mode / TX (CH 5190) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10380.000	-51.24	0.28	-50.96	-30.00	-20.96	V
15570.000	-56.06	3.77	-52.29	-30.00	-22.29	V
N/A						
10380.000	-46.85	0.28	-46.57	-30.00	-16.57	H
15570.000	-56.75	3.77	-52.98	-30.00	-22.98	H
N/A						

Test Mode: IEEE 802.11n 40MHz Mode / TX (CH 5230) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10460.000	-55.60	0.44	-55.16	-30.00	-25.16	V
15690.000	-56.89	3.80	-53.09	-30.00	-23.09	V
N/A						
10460.000	-51.50	0.44	-51.06	-30.00	-21.06	H
15690.000	-57.00	3.80	-53.20	-30.00	-23.20	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: IEEE 802.11AC VHT80 / TX (CH 5210)

Tested by: Jerry Chuang

Ambient temperature: 22°C

Relative humidity: 42 % RH

Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10380.000	-53.07	0.28	-52.79	-30.00	-22.79	V
15630.000	-56.29	3.78	-52.51	-30.00	-22.51	V
N/A						
10400.000	-49.25	0.32	-48.93	-30.00	-18.93	H
15630.000	-57.39	3.78	-53.61	-30.00	-23.61	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

For Dipole Antenna

Below 1GHz

Test Mode: IEEE 802.11ac VHT 80 MHz / TX (CH 5210) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
441.7650	-68.65	-2.82	-71.47	-36.00	-35.47	V
499.9650	-72.98	-1.65	-74.63	-54.00	-20.63	V
575.1400	-75.22	-1.01	-76.23	-54.00	-22.23	V
625.0950	-65.39	-0.07	-65.46	-54.00	-11.46	V
750.2250	-61.88	2.11	-59.77	-54.00	-5.77	V
874.8700	-68.73	4.03	-64.70	-36.00	-28.70	V
125.0600	-65.27	-6.38	-71.65	-36.00	-35.65	H
250.1900	-58.08	-8.51	-66.59	-36.00	-30.59	H
499.9650	-63.06	-1.65	-64.71	-54.00	-10.71	H
625.0950	-71.47	-0.07	-71.54	-54.00	-17.54	H
750.2250	-61.97	2.11	-59.86	-54.00	-5.86	H
874.8700	-68.94	4.03	-64.91	-36.00	-28.91	H

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Above 1GHz

Test Mode: IEEE 802.11a Mode / TX (CH 5180)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10360.000	-54.55	0.23	-54.32	-30.00	-24.32	V
15540.000	-57.04	3.77	-53.27	-30.00	-23.27	V
N/A						
10360.000	-47.35	0.23	-47.12	-30.00	-17.12	H
15540.000	-57.35	3.77	-53.58	-30.00	-23.58	H
N/A						

Test Mode: IEEE 802.11a Mode / TX (CH 5240)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10480.000	-55.66	0.48	-55.18	-30.00	-25.18	V
15720.000	-56.49	3.81	-52.68	-30.00	-22.68	V
N/A						
10480.000	-52.34	0.48	-51.86	-30.00	-21.86	H
15720.000	-56.92	3.81	-53.11	-30.00	-23.11	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: IEEE 802.11n 20MHz Mode / TX (CH 5180) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10360.000	-54.17	0.23	-53.94	-30.00	-23.94	V
15540.000	-55.50	3.77	-51.73	-30.00	-21.73	V
N/A						
10355.000	-47.07	0.23	-46.84	-30.00	-16.84	H
15540.000	-56.57	3.77	-52.80	-30.00	-22.80	H
N/A						

Test Mode: IEEE 802.11n 20MHz Mode / TX (CH 5240) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10480.000	-55.93	0.48	-55.45	-30.00	-25.45	V
15720.000	-56.61	3.81	-52.80	-30.00	-22.80	V
N/A						
10480.000	-53.04	0.48	-52.56	-30.00	-22.56	H
15720.000	-56.15	3.81	-52.34	-30.00	-22.34	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: IEEE 802.11n 40MHz Mode / TX (CH 5190) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10380.000	-56.10	0.28	-55.82	-30.00	-25.82	V
15570.000	-56.70	3.77	-52.93	-30.00	-22.93	V
N/A						
10385.000	-50.17	0.29	-49.88	-30.00	-19.88	H
15570.000	-57.27	3.77	-53.50	-30.00	-23.50	H
N/A						

Test Mode: IEEE 802.11n 40MHz Mode / TX (CH 5230) **Tested by:** Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10460.000	-55.14	0.44	-54.70	-30.00	-24.70	V
15690.000	-55.89	3.80	-52.09	-30.00	-22.09	V
N/A						
10460.000	-50.34	0.44	-49.90	-30.00	-19.90	H
15690.000	-56.28	3.80	-52.48	-30.00	-22.48	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: IEEE 802.11AC VHT80 / TX (CH 5210)

Tested by: Jerry Chuang

Ambient temperature: 22°C

Relative humidity: 42 % RH

Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
10420.000	-55.94	0.36	-55.58	-30.00	-25.58	V
15630.000	-57.34	3.78	-53.56	-30.00	-23.56	V
N/A						
10420.000	-52.32	0.36	-51.96	-30.00	-21.96	H
15630.000	-57.36	3.78	-53.58	-30.00	-23.58	H
N/A						

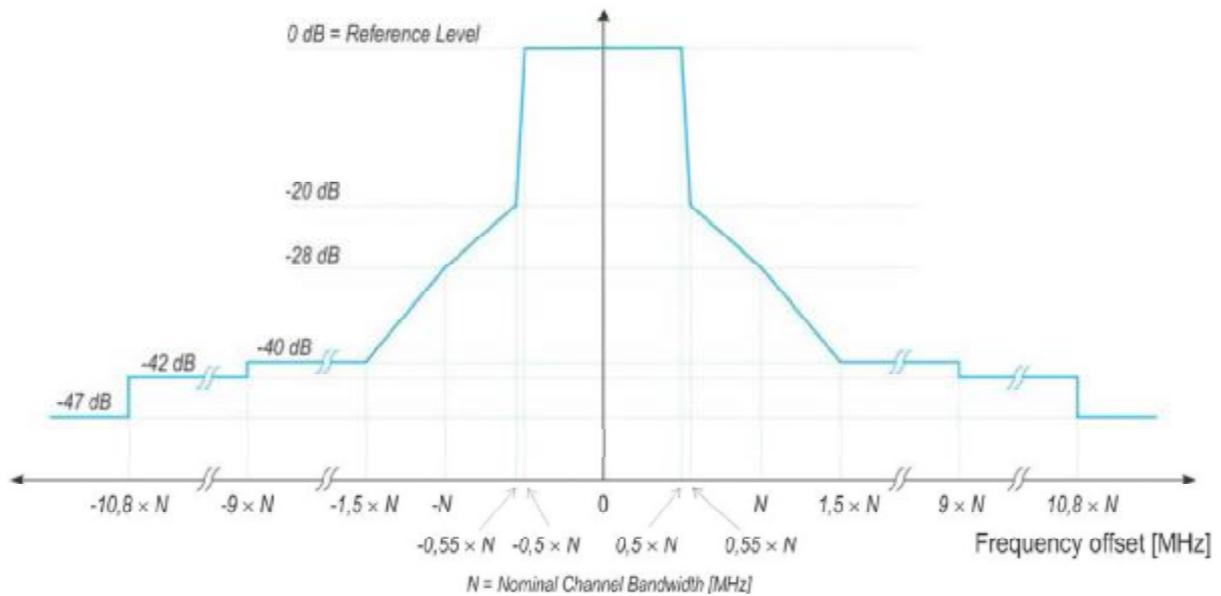
Remark:

1. The emission behaviour belongs to narrowband spurious emission.

7.4. TRANSMITTER UNWANTED EMISSIONS WITHIN THE 5GHZ RLAN BANDS

LIMIT

ETSI EN 301 893.



NOTE: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal.

Figure 1: Transmit spectral power mask

TEST PROCEDURE

1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the test conditions.
2. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the measurement methods.

TEST RESULTS

No non-compliance noted.

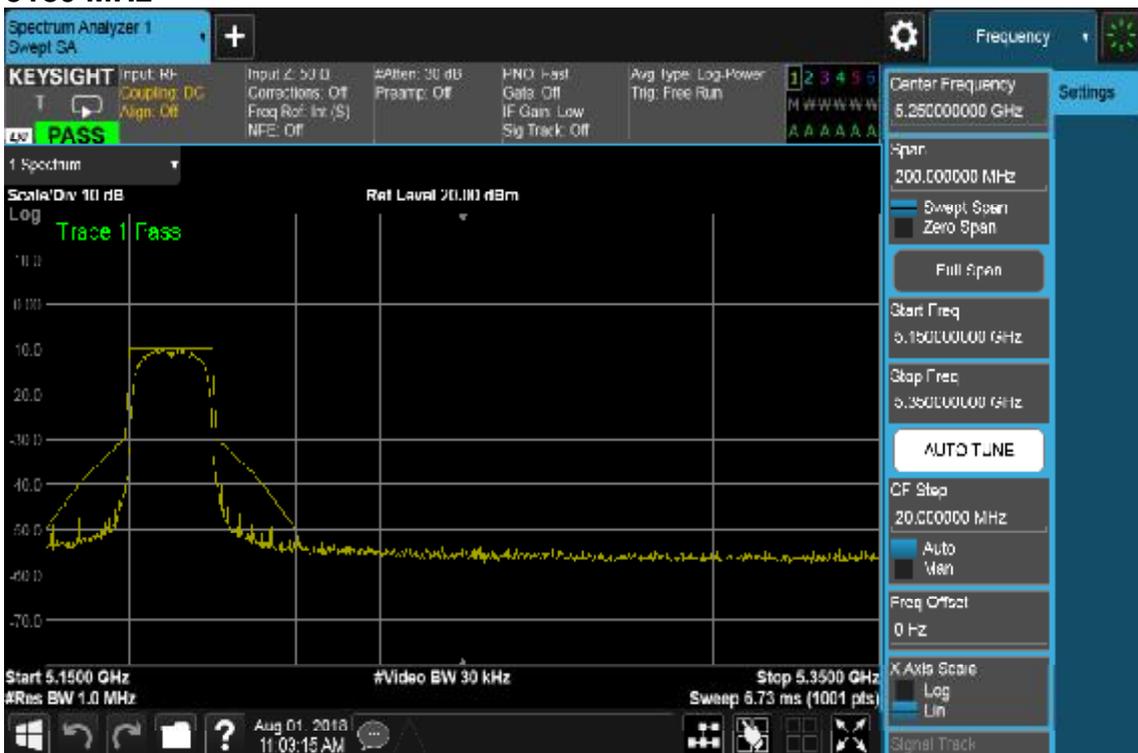
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WITHIN BAND

IEEE 802.11a Mode:
5180 MHz



IEEE 802.11n 20 MHz Mode
5180 MHz

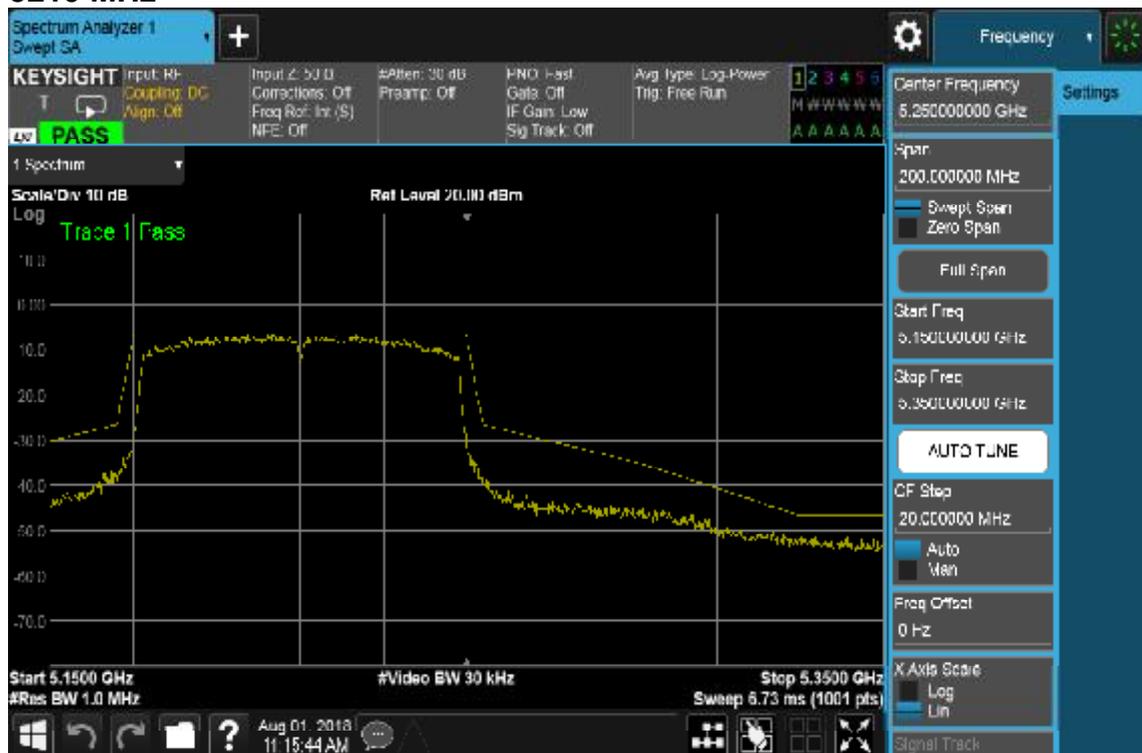


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IEEE 802.11n 40 MHz Mode 5190 MHz



IEEE 802.11ac VHT 80 MHz Mode 5210 MHz



7.5. RECEIVER SPURIOUS EMISSIONS

LIMIT

ETSI EN 301 893

The spurious emissions of the receiver shall not exceed the limits given as follows.

Table 4: Spurious radiated emission limits

Frequency band	Maximum power, ERP	Measurement Bandwidth
30 MHz to 1GHz	-57 dBm	100 kHz
1GHz to 26.5GHz	-47 dBm	1 MHz

Test Configuration

Conducted Spurious Emissions:

(Same as the above section <Transmitter Conducted Spurious Emissions>)

Radiated Spurious Emissions:

(Same as the above section <Transmitter Radiated Spurious Emissions>)

TEST PROCEDURE

Per the description of the ETSI EN 301 893, the setting up procedures are summarized as follows:

- Two identical EUT's are used for this test. One is set to transmit and the other is set to receive.
- The transmit EUT RF output is connected to the directional coupler. The coupler direct output arm is connected to the microwave detector. The coupled output arm is connected to the step attenuator.
- The microwave detector is connected to an oscilloscope set up to generate the time gating pulse for the spectrum analyzer. The second oscilloscope is set up to simultaneously monitor the time gating pulse and the detected RF output.
- The step attenuator is connected to the Receive EUT via the power splitter.
- The Receive EUT RF input is connected to the input of the power splitter. One output arm of this splitter is connected to the spectrum analyzer to measure the spurious emissions. The other arm of this splitter is connected to the Transmit EUT RF output via the step attenuator.
- Prior to the measurement, the spectrum analyzer is connected to the input of the power splitter, the remaining output arm of the power splitter is terminated, then the Transmit EUT power and the step attenuator are adjusted to produce the required reference sensitivity level that will be applied to the Receive EUT during the measurement.

Remark: *The Nominal bit rate is 6Mbit/s, therefore the reference sensitivity is -85dBm.*

TEST RESULTS

No non-compliance noted

Report No.: T180627D10-RT2

For FPC Antenna

Below 1GHz

Test Mode: IEEE 802.11AC VHT80 / RX (CH 5210)

Tested by: Jerry Chuang

Ambient temperature: 22°C Relative humidity: 42 % RH Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
250.1900	-60.90	-8.51	-69.41	-57.00	-12.41	V
499.9650	-63.87	-1.65	-65.52	-57.00	-8.52	V
625.0950	-66.09	-0.07	-66.16	-57.00	-9.16	V
750.2250	-63.07	2.11	-60.96	-57.00	-3.96	V
839.9500	-75.25	3.40	-71.85	-57.00	-14.85	V
874.8700	-67.83	4.03	-63.80	-57.00	-6.80	V
125.0600	-64.05	-6.38	-70.43	-57.00	-13.43	H
250.1900	-57.76	-8.51	-66.27	-57.00	-9.27	H
499.9650	-64.21	-1.65	-65.86	-57.00	-8.86	H
625.0950	-69.21	-0.07	-69.28	-57.00	-12.28	H
750.2250	-64.99	2.11	-62.88	-57.00	-5.88	H
874.8700	-70.86	4.03	-66.83	-57.00	-9.83	H

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Above 1GHz

Test Mode: IEEE 802.11AC VHT80 / RX (CH 5210)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
2396.500	-38.55	-18.90	-57.45	-47.00	-10.45	V
3187.500	-36.77	-17.40	-54.17	-47.00	-7.17	V
N/A						
1756.000	-33.36	-21.31	-54.67	-47.00	-7.67	H
3194.500	-44.46	-17.41	-61.87	-47.00	-14.87	H
N/A						

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*

Report No.: T180627D10-RT2

For Dipole Antenna

Below 1GHz

Test Mode: IEEE 802.11AC VHT80 / RX (CH 5210)

Tested by: Jerry Chuang

Ambient temperature: 22°C Relative humidity: 42 % RH Date: August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.0600	-63.51	-6.38	-69.89	-57.00	-12.89	V
224.9700	-63.23	-9.23	-72.46	-57.00	-15.46	V
441.7650	-68.94	-2.82	-71.76	-57.00	-14.76	V
625.0950	-65.07	-0.07	-65.14	-57.00	-8.14	V
750.2250	-61.75	2.11	-59.64	-57.00	-2.64	V
874.8700	-67.91	4.03	-63.88	-57.00	-6.88	V
250.1900	-57.75	-8.51	-66.26	-57.00	-9.26	H
374.8350	-68.80	-4.83	-73.63	-57.00	-16.63	H
499.9650	-63.12	-1.65	-64.77	-57.00	-7.77	H
625.0950	-71.44	-0.07	-71.51	-57.00	-14.51	H
750.2250	-63.44	2.11	-61.33	-57.00	-4.33	H
900.5750	-68.14	4.53	-63.61	-57.00	-6.61	H

Remark:

1. The emission behaviour belongs to narrowband spurious emission.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

Above 1GHz

Test Mode: IEEE 802.11AC VHT80 / RX (CH 5210)

Tested by: Jerry Chuang

Ambient temperature: 22°C **Relative humidity:** 42 % RH **Date:** August 6, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1248.500	-36.38	-23.10	-59.48	-47.00	-12.48	V
3198.000	-44.14	-17.41	-61.55	-47.00	-14.55	V
N/A						
1126.000	-33.73	-23.54	-57.27	-47.00	-10.27	H
5816.000	-49.42	-9.83	-59.25	-47.00	-12.25	H
N/A						

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*

7.6. ADAPTIVITY (CHANNEL ACCESS MECHANISM)

PRODUCT INFORMATION

- Frame Based Equipment
 - The Frame Based Equipment operates as an Initiating Device
 - The Frame Based Equipment operates as an Responding Device
 - The Frame Based Equipment can operate as an Initiating Device and as a Responding Device

- Load Based Equipment
 - The Load Based Equipment operates as a Supervising Device
 - The Load Based Equipment operates as a Supervised Device
 - The Load Based Equipment can operate as a Supervising and as a Supervised Device

LIMIT

Adaptivity Limit				
<input checked="" type="checkbox"/> Priority Class dependent Channel Access parameters for Supervised Devices:				
Class #	P₀	CW_{min}	CW_{max}	Maximum Channel Occupancy Time (COT)
4	2	3	7	2 ms
3	2	7	15	4 ms
2	3	15	1 023	6 ms (see note 1)
1	7	15	1 023	6 ms (see note 1)
NOTE 1: The maximum <i>Channel Occupancy Time (COT)</i> of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 μs. The maximum duration (Channel Occupancy) before including any such pause shall be 6 ms. Pause duration is not included in the channel occupancy time.				
NOTE 2: The values for p ₀ , CW _{min} , CW _{max} are minimum values. Greater values are allowed.				
<input type="checkbox"/> Priority Class dependent Channel Access parameters for Supervising Devices:				
Class #	P₀	CW_{min}	CW_{max}	Maximum Channel Occupancy Time (COT)
4	1	3	7	2 ms
3	1	7	15	4 ms
2	3	15	63	6 ms (see note 1 and note 2)
1	7	15	1 023	6 ms (see note 1)
NOTE 1: The maximum <i>Channel Occupancy Time (COT)</i> of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 μs. The maximum duration (Channel Occupancy) before including any such pause shall be 6 ms. Pause duration is not included in the channel occupancy time.				
NOTE 2: The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 10 ms by extending CW to CW × 2 + 1 when selecting the random number q for any backoff(s) that precede the Channel Occupancy that may exceed 6 ms or which follow the Channel Occupancy that exceeded 6 ms. The choice between preceding or following a Channel Occupancy shall remain unchanged during the operation time of the device.				
NOTE 3: The values for p ₀ , CW _{min} , CW _{max} are minimum values. Greater values are allowed.				
Energy Detect Threshold (ED Threshold):				
<input checked="" type="checkbox"/> Option 1:				
For equipment that for its operation in the 5 GHz bands is conforming to IEEE 802.11™ac-2013 [10], clause 22, or to IEEE 802.11™-2012, clause 18 or clause 20, or any combination of these clauses, the Energy Detect Threshold (ED Threshold) is independent of the equipment's maximum transmit power (P _H). The Energy Detect Threshold (ED Threshold) shall be:				
TL = -75 dBm/MHz				
<input type="checkbox"/> Option 2:				
For equipment conforming to one or more of the clauses listed in Option 1, and to at least one other operating mode, and for equipment conforming to none of the clauses listed in Option 1, the Energy Detect Threshold (ED Threshold) shall be proportional to the equipment's maximum transmit power (P _H). Assuming a 0 dBi receive antenna the Energy Detect Threshold (ED Threshold) shall be:				
For P _H ≤ 13 dBm: TL = -75 dBm/MHz				
For 13 dBm < P _H < 23 dBm: TL = -85 dBm/MHz + (23 dBm - P _H)				
For P _H ≥ 23 dBm: TL = -85 dBm/MHz				
<input checked="" type="checkbox"/> Short Control Signalling Transmissions:				

- Within an observation period of 50 ms, the number of Short Control Signalling Transmissions by the equipment shall be equal to or less than 50.
- The total duration of the equipment's Short Control Signalling Transmissions shall be less than 2 500 μ s within said observation period.

TEST CONFIGURATION

Figure 13 shows an example of the test set-up.

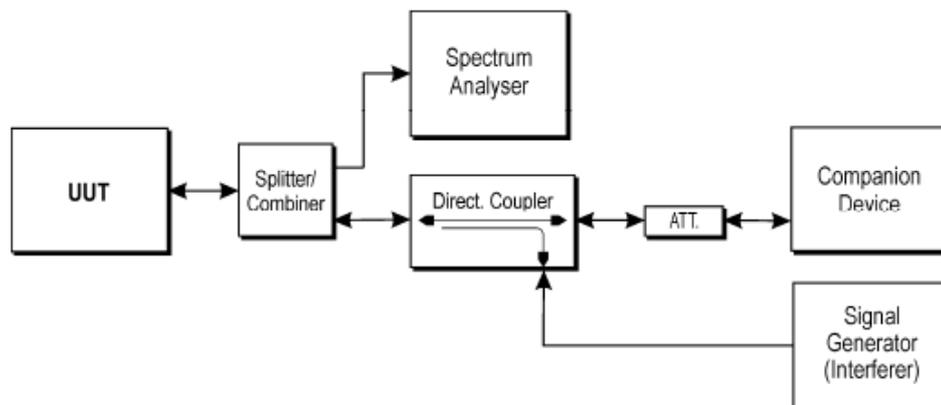


Figure 13: Example Test Set-up for verifying the adaptivity of an equipment

TEST PROCEDURE

1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05).

TEST RESULTS

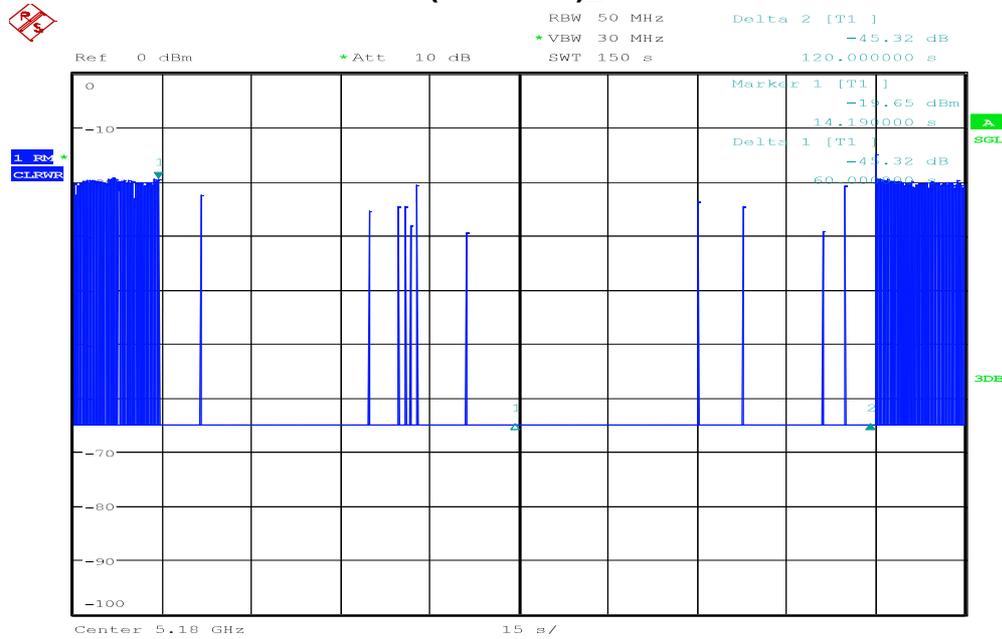
No non-compliance noted.

Detection Threshold Level		-75 dBm/MHz		
Mode	Frequency (MHz)	Signal duration after interfering (s)		
		AWGN	LTE	OFDM
802.11n 20	5180	PASS	PASS	PASS
802.11n 40	5190	PASS	PASS	PASS

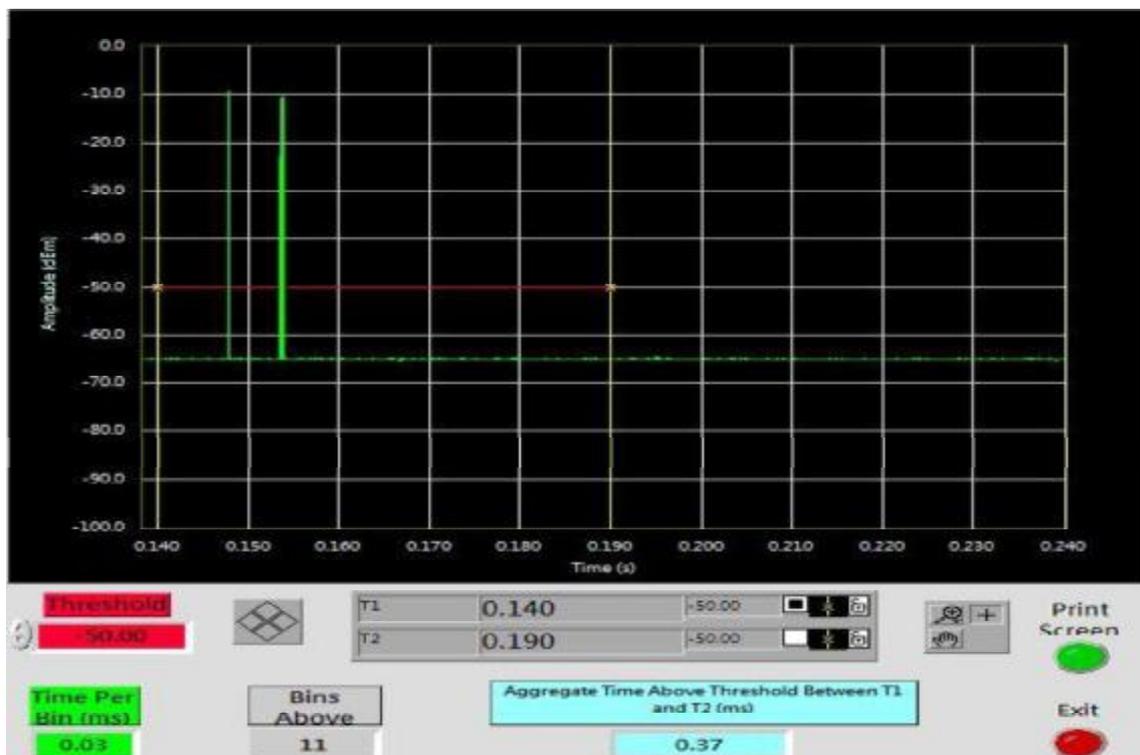
Report No.: T180627D10-RT2

Adaptive Test Results:

IEEE 802.11n 20 MHz Mode (5180MHz)_AWGN

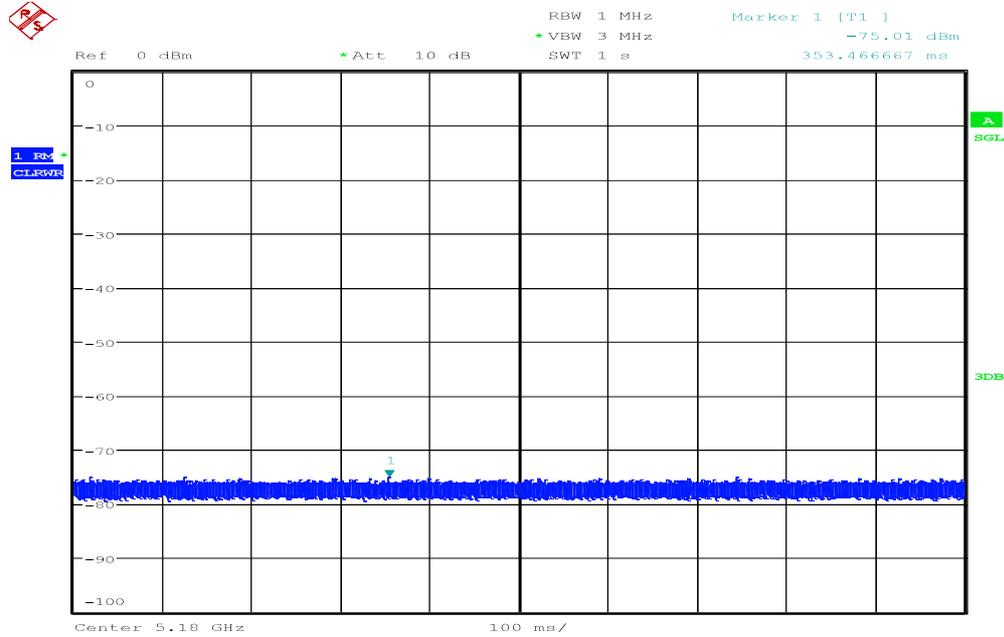


Date: 30.JUL.2018 11:39:22



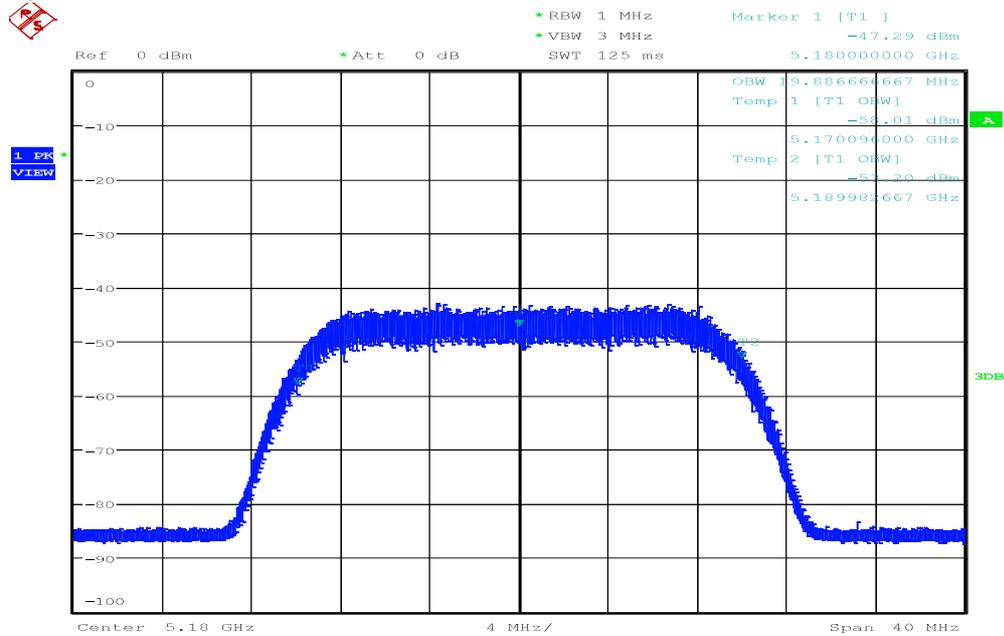
Report No.: T180627D10-RT2

Threshold level / CH 5180



Date: 30.JUL.2018 10:34:39

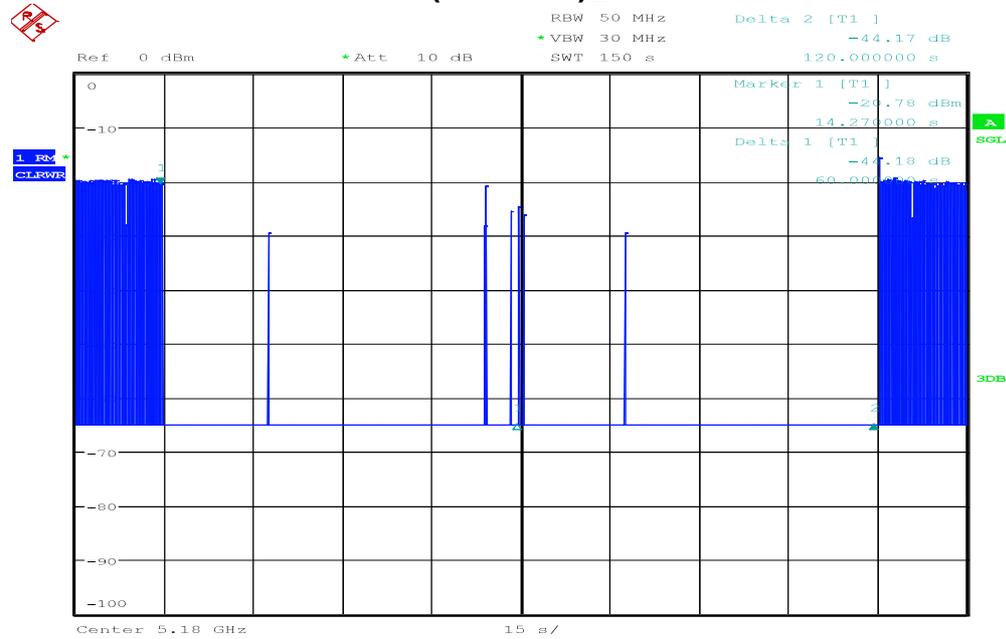
OBW / CH 5180



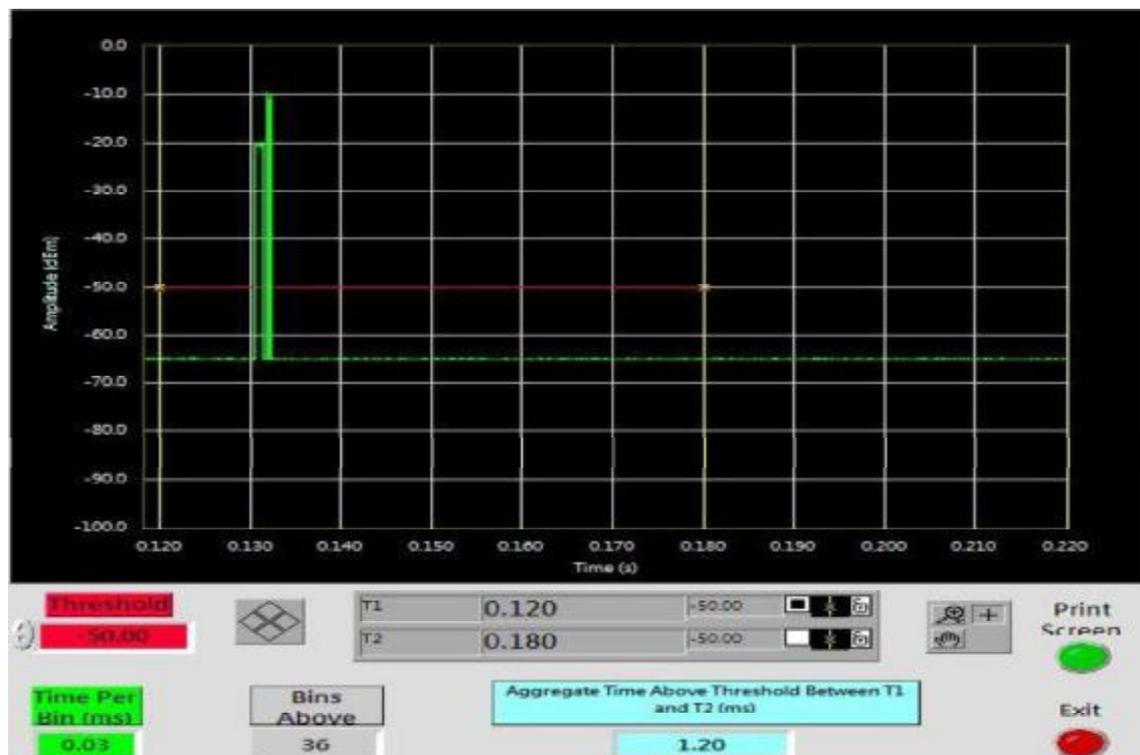
Date: 30.JUL.2018 10:22:04

Report No.: T180627D10-RT2

IEEE 802.11n 20 MHz Mode (5180MHz)_LTE

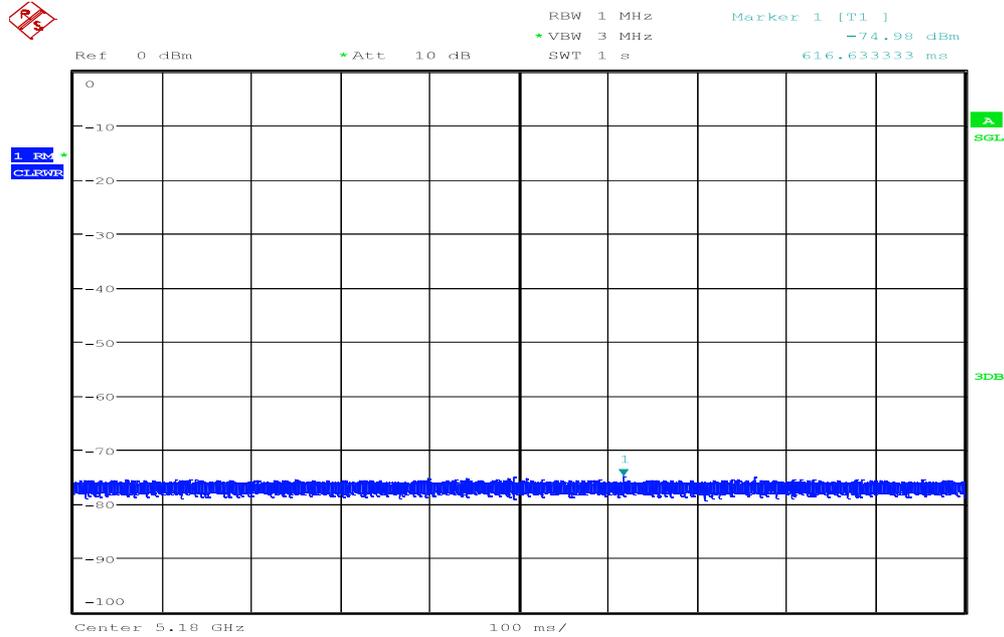


Date: 30.JUL.2018 11:47:57



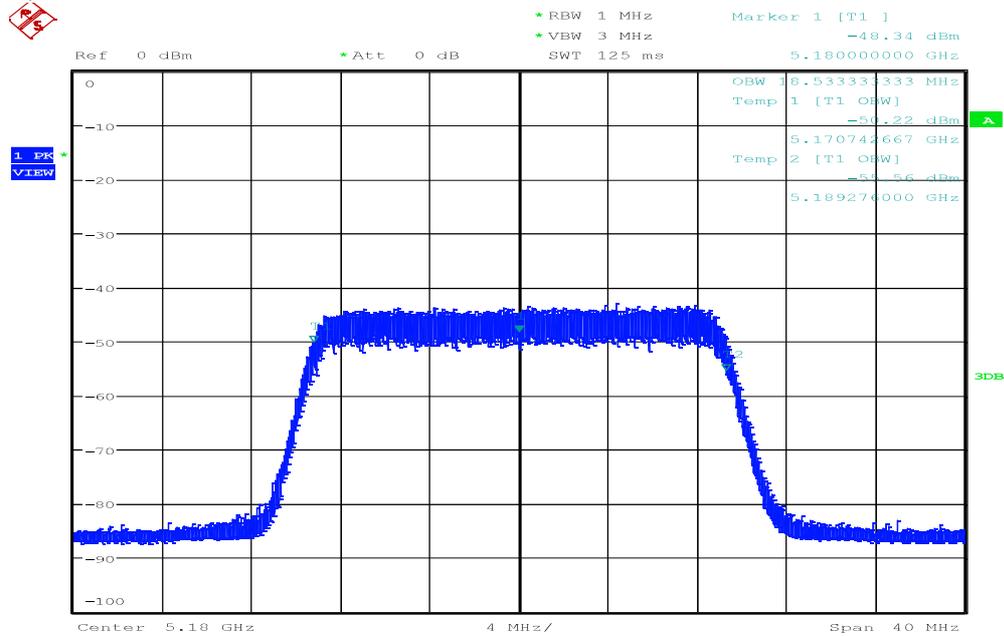
Report No.: T180627D10-RT2

Threshold level / CH 5180



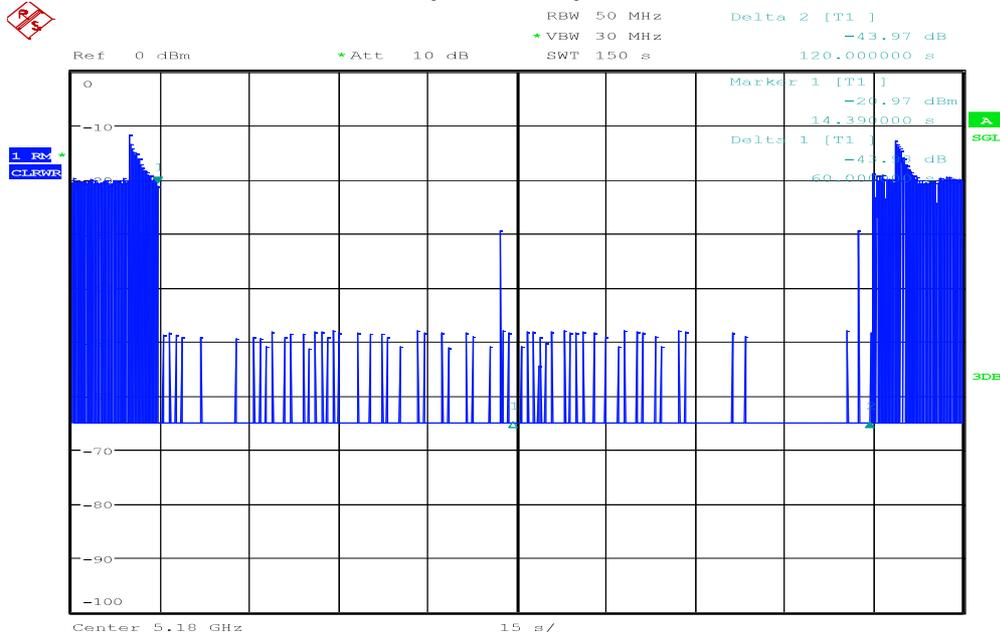
Date: 30.JUL.2018 10:36:44

OBW / CH 5180



Date: 30.JUL.2018 10:23:48

IEEE 802.11n 20 MHz Mode (5180MHz)_OFDM

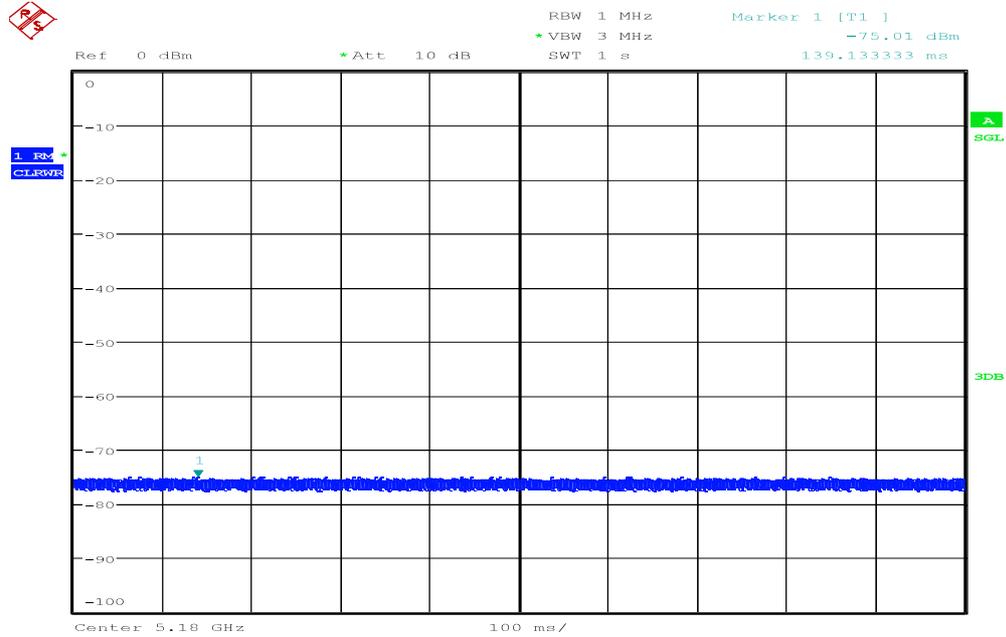


Date: 30.JUL.2018 12:02:10



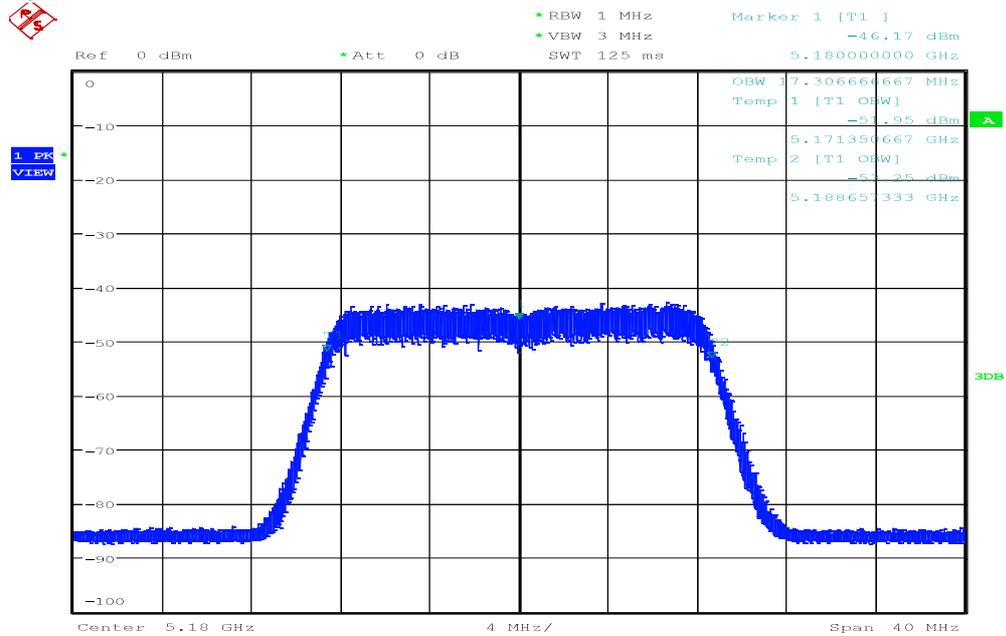
Report No.: T180627D10-RT2

Threshold level / CH 5180



Date: 30.JUL.2018 10:39:44

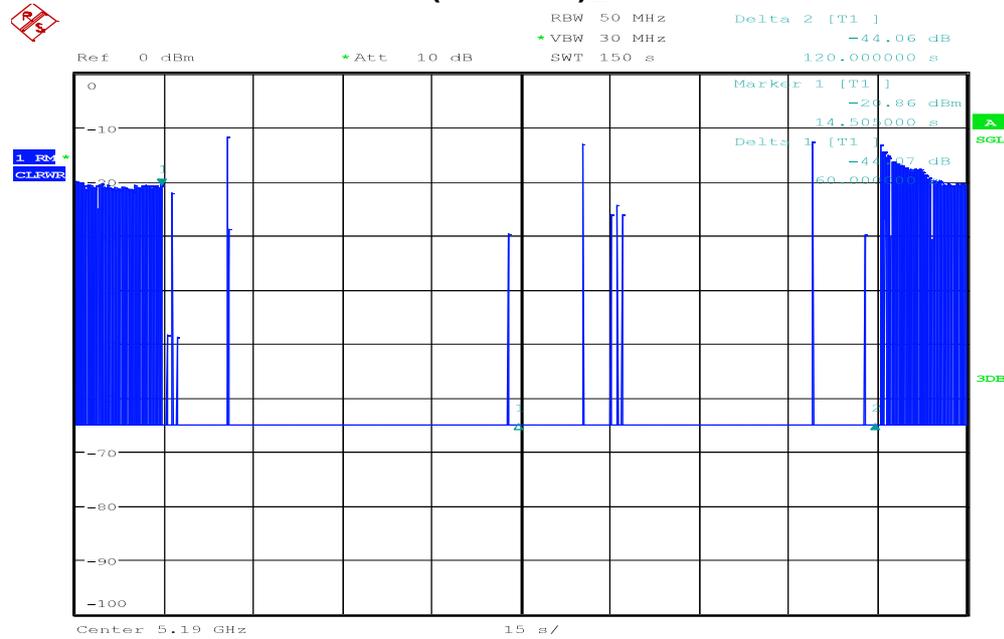
OBW / CH 5180



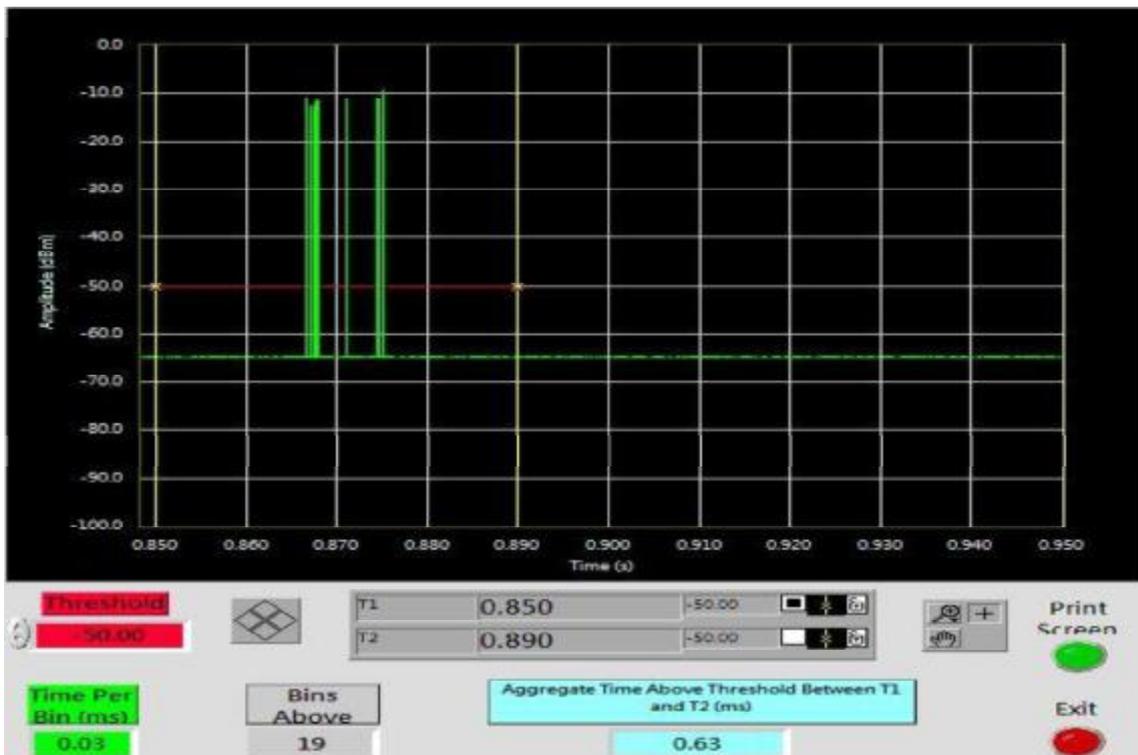
Date: 30.JUL.2018 10:24:35

Report No.: T180627D10-RT2

IEEE 802.11n 40 MHz Mode (5190MHz)_AWGN

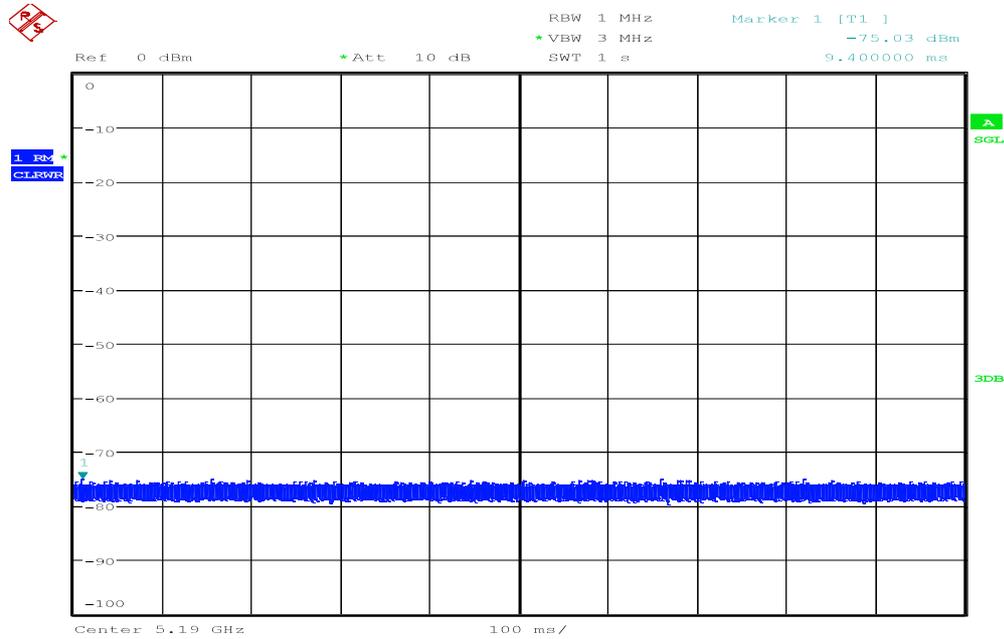


Date: 30.JUL.2018 12:33:16



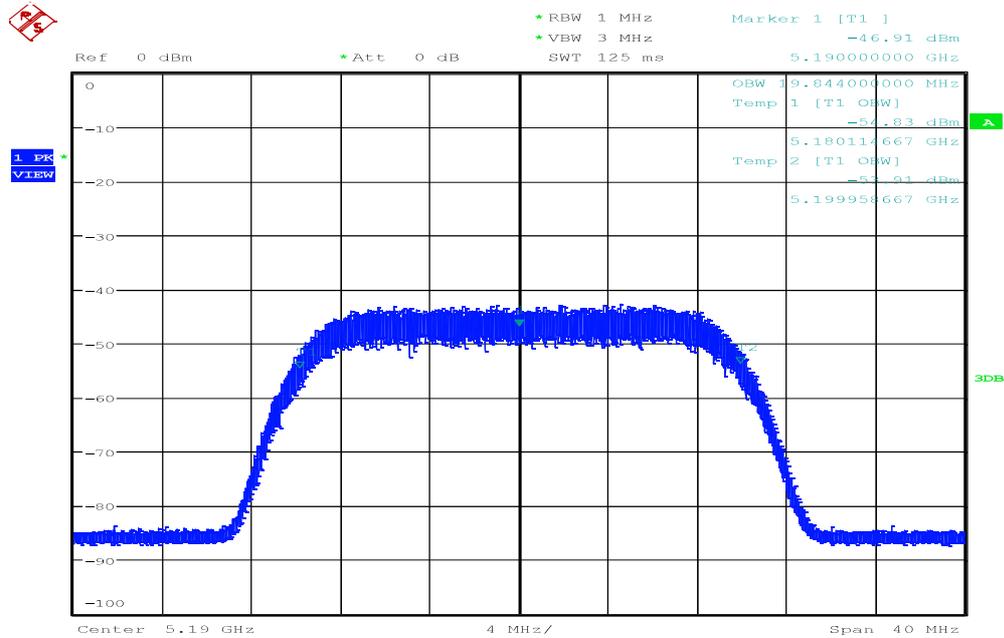
Report No.: T180627D10-RT2

Threshold level / CH 5190



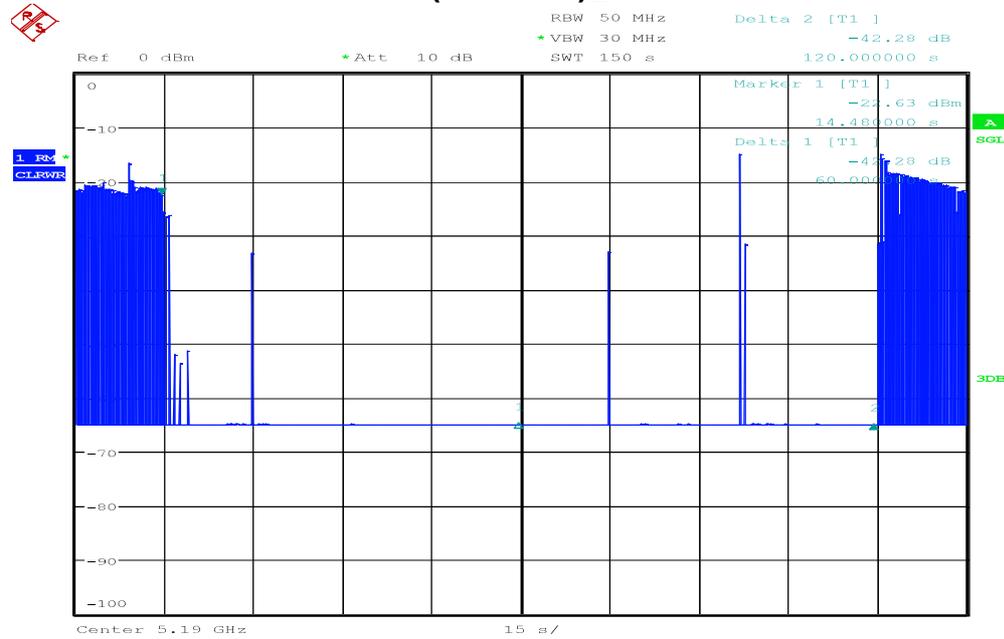
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OBW / CH 5190

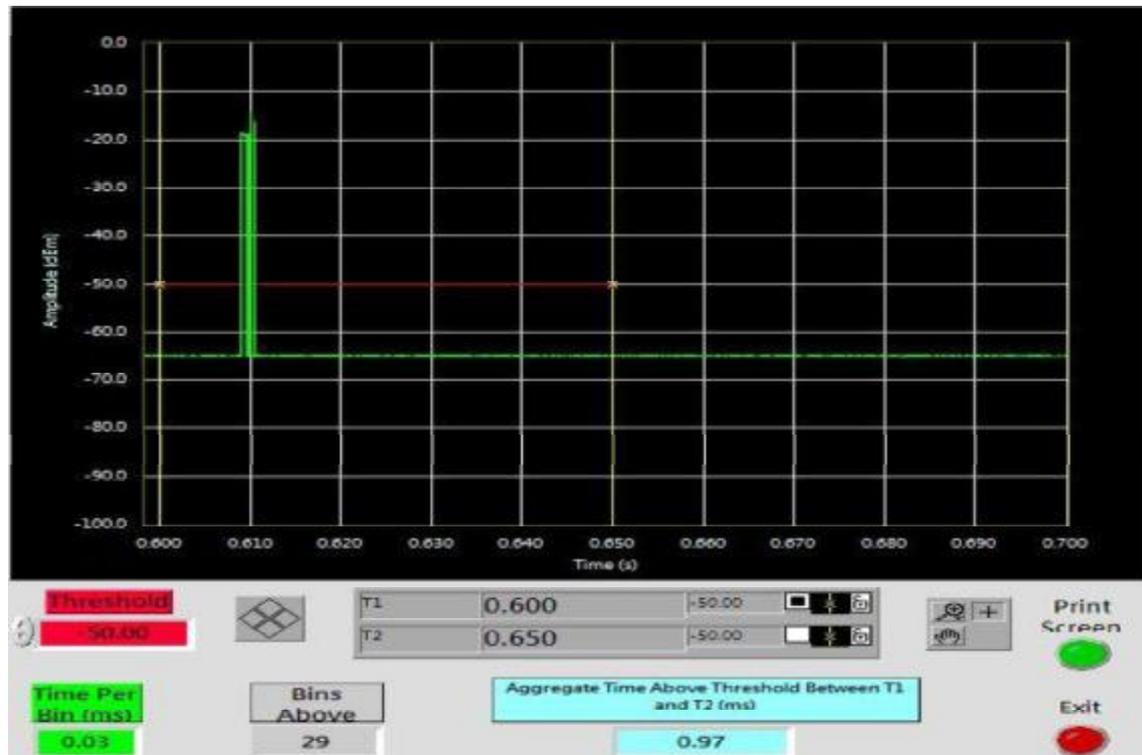


Date: 30.JUL.2018 10:26:03

IEEE 802.11n 40 MHz Mode (5190MHz)_LTE

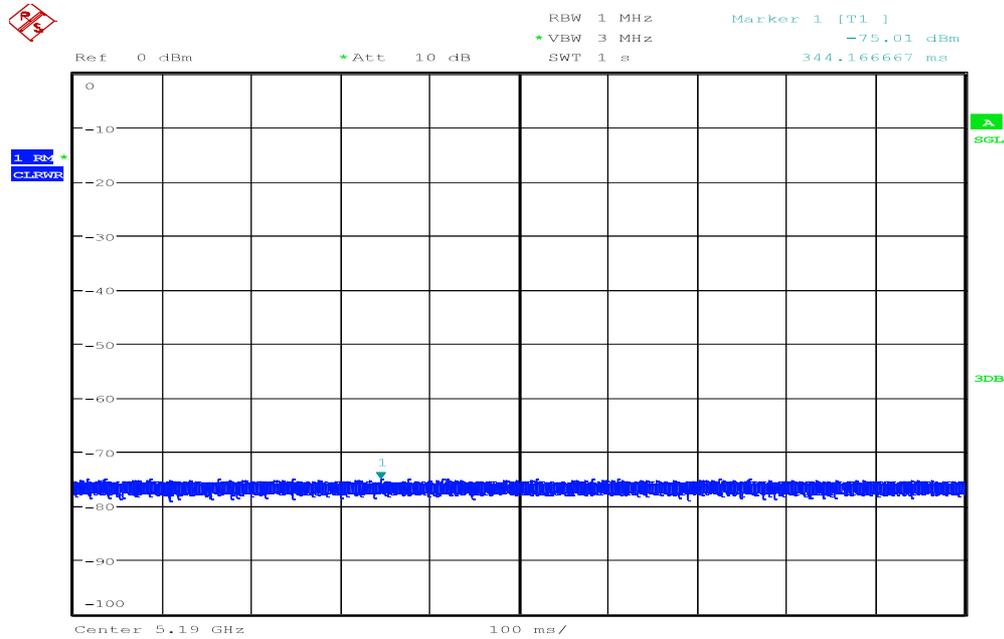


Date: 30.JUL.2018 15:24:04



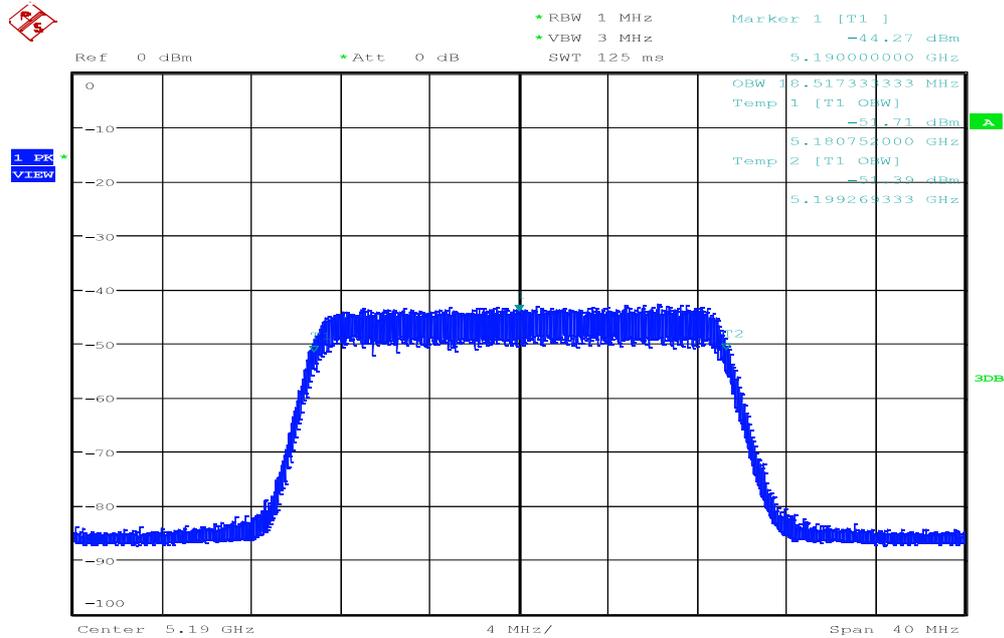
Report No.: T180627D10-RT2

Threshold level / CH 5190



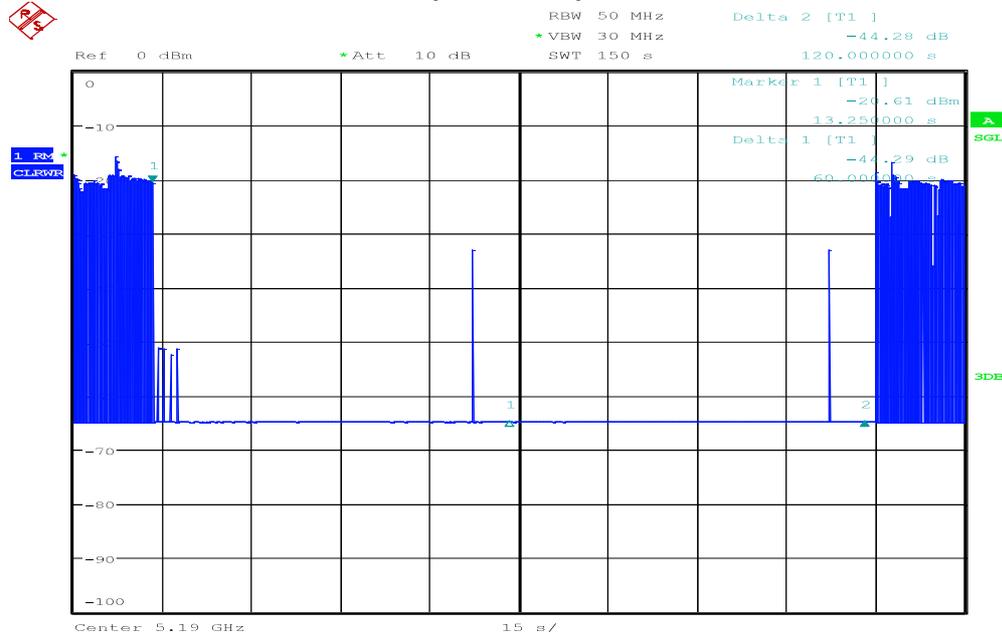
Date: 30.JUL.2018 10:45:51

OBW / CH 5190



Date: 30.JUL.2018 10:28:47

IEEE 802.11n 40 MHz Mode (5190MHz)_OFDM

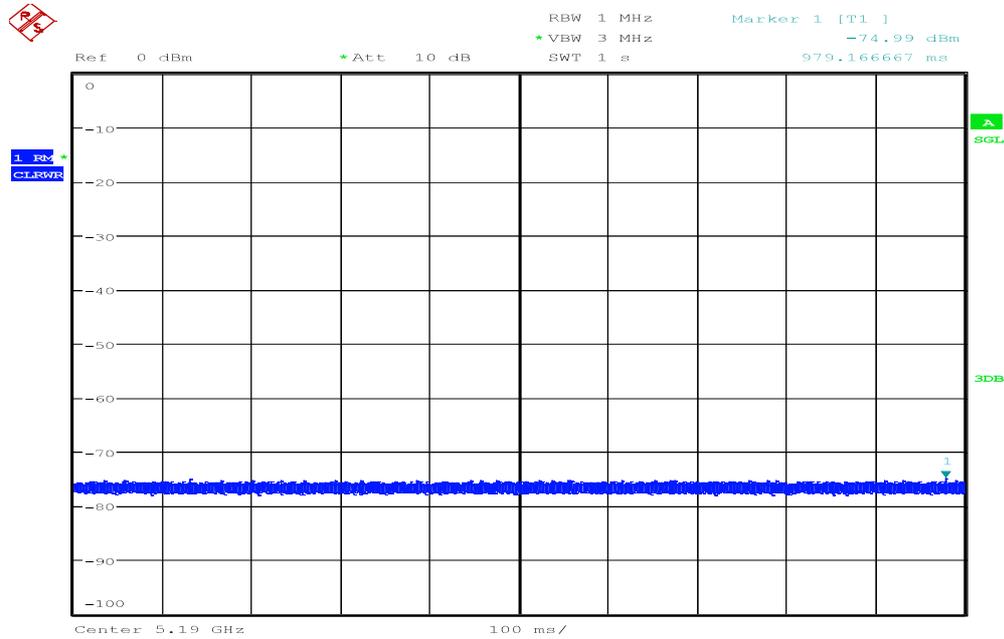


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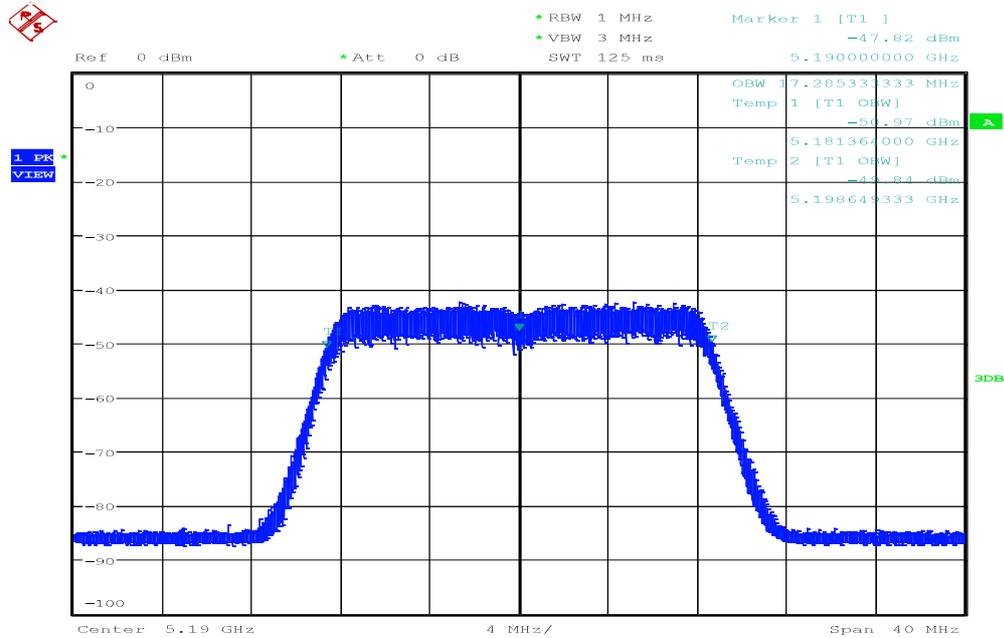
Report No.: T180627D10-RT2

Threshold level / CH 5190



Date: 30.JUL.2018 10:48:43

OBW / CH 5190

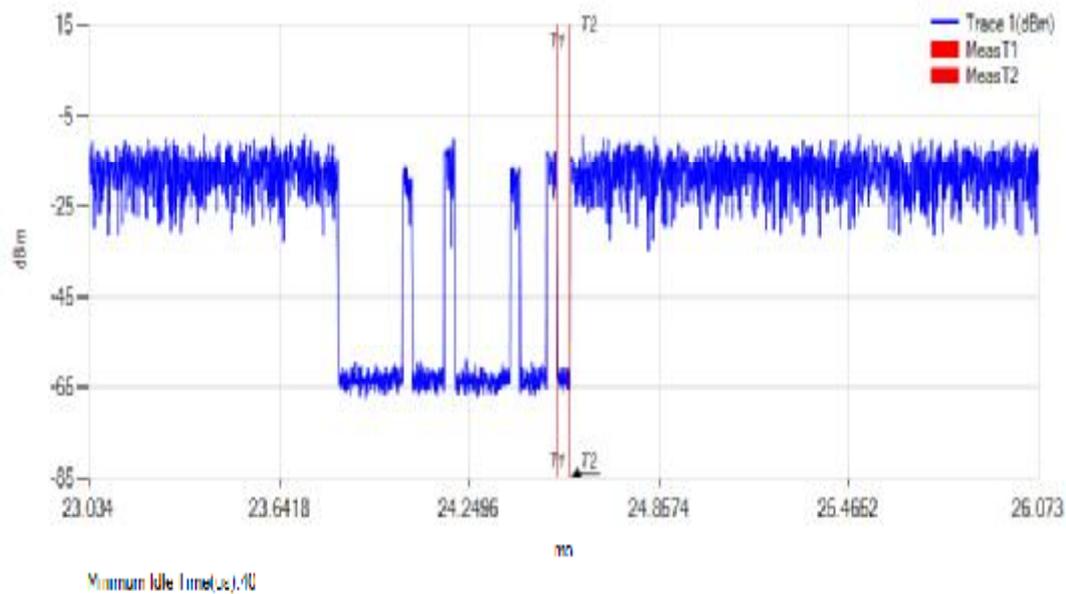


Date: 30.JUL.2018 10:30:24

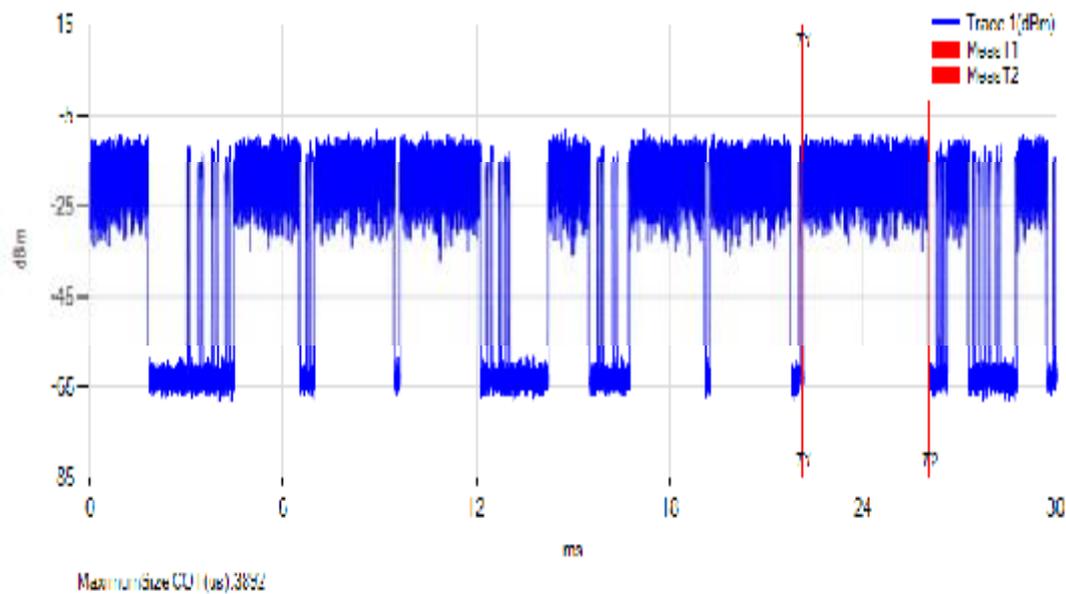
Report No.: T180627D10-RT2

Medium Access Mechanism Test Results:

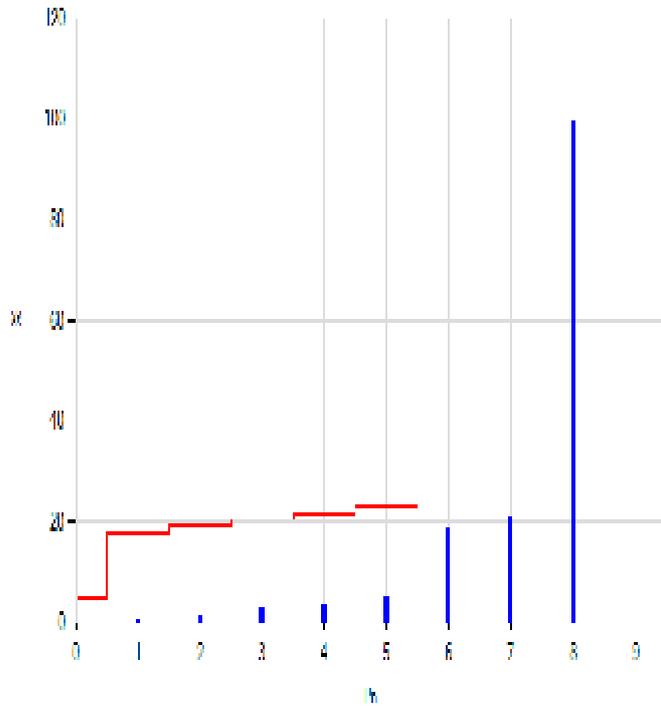
IEEE 802.11n 40 MHz Mode (5190MHz) *Min Idle*



Max COT



Idle Period



Idle Period

h	Unit (%)	Fuel (%)	Power
0	5	0	Idle
1	18	0.4	Fuel
2	19.25	0.6	Fuel
3	20.5	2.69	Fuel
4	21.5	11	Idle
5	22	5.15	Idle
6	22	10.76	Idle
7	22	2.01	Fuel
8	22	100	Fuel
9	22	0	Idle

7.7. RECEIVER BLOCKING

LIMIT

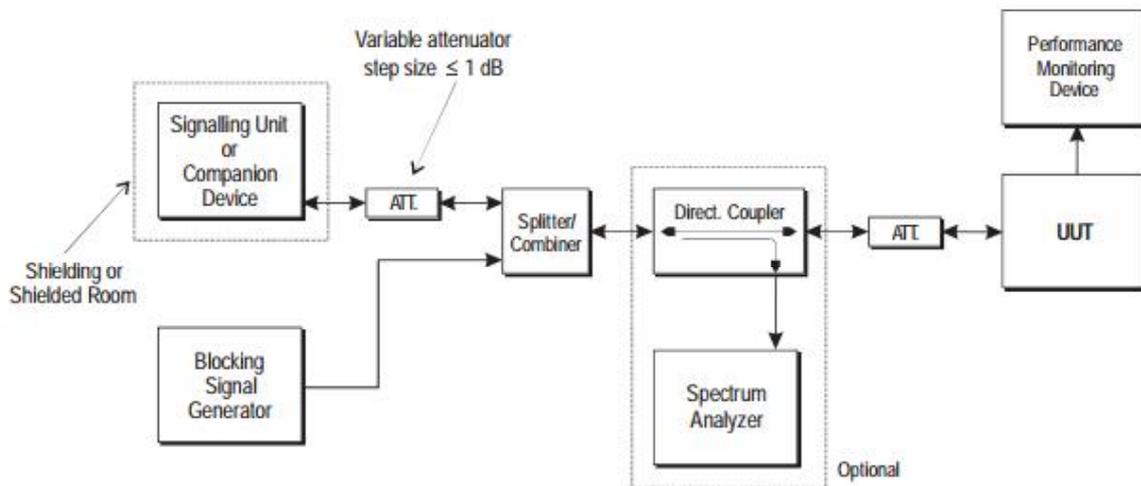
The minimum performance criterion shall be a PER of less than or equal to 10 %.

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
$P_{min} + 6$ dB	5 100	-53	-59	Continuous Wave
$P_{min} + 6$ dB	4 900 5 000 5 975	-47	-53	Continuous Wave

NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05).

TEST RESULTS

Configuration	Frequency (MHz)	Blocking signal frequency(MHz)	Receiver Blocking signal power (dBm)	Wanted signal mean power from companion device (dBm) [Pmin]	Pmin + 6dB Per Values (dBm)	Per Results	Limit (%)	Result
IEEE 802.11a Mode	5180	5100	-59	-96	-90	0.00%	10.00%	Pass
		4900	-53	-96	-90	0.00%	10.00%	Pass
		5000		-96	-90	0.00%	10.00%	Pass
		5975		-96	-90	0.00%	10.00%	Pass

7.8. NOMINAL CHANNEL BANDWIDTH AND OCCUPIED CHANNEL BANDWIDTH

LIMIT

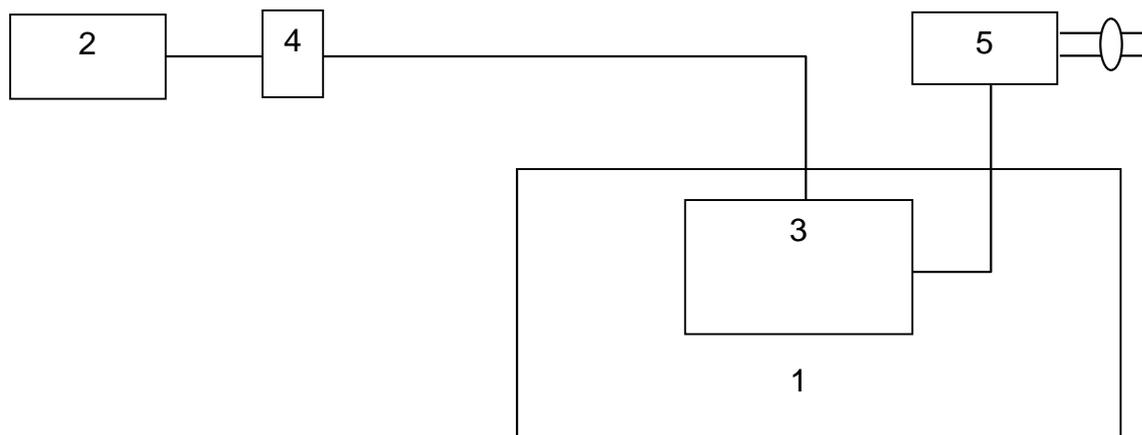
ETSI EN 301 893

The Nominal Channel Bandwidth shall be at least 5 MHz at all times.

The Occupied Channel Bandwidth shall be between 80 % and 100 % of the declared Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

During an established communication, the device is allowed to operate temporarily with an Occupied Channel Bandwidth below 80 % of its Nominal Channel Bandwidth with a minimum of 4 MHz.

Test Configuration



Legend

1. Wooden table
2. Spectrum analyzer
3. EUT
4. DC block
5. Power supply

TEST PROCEDURE

1. Please refer to ETSI EN 301 893 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 301 893 (V2.1.1) for the measurement method.

TEST RESULTS

No non-compliance noted.

IEEE802.11a Mode:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
36	5180	16.40

IEEE 802.11n 20 MHz Mode:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
36	5180	17.36

IEEE 802.11n 40 MHz Mode:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
38	5190	36.32

IEEE 802.11ac VHT80 MHz Mode:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
38	5210	75.07

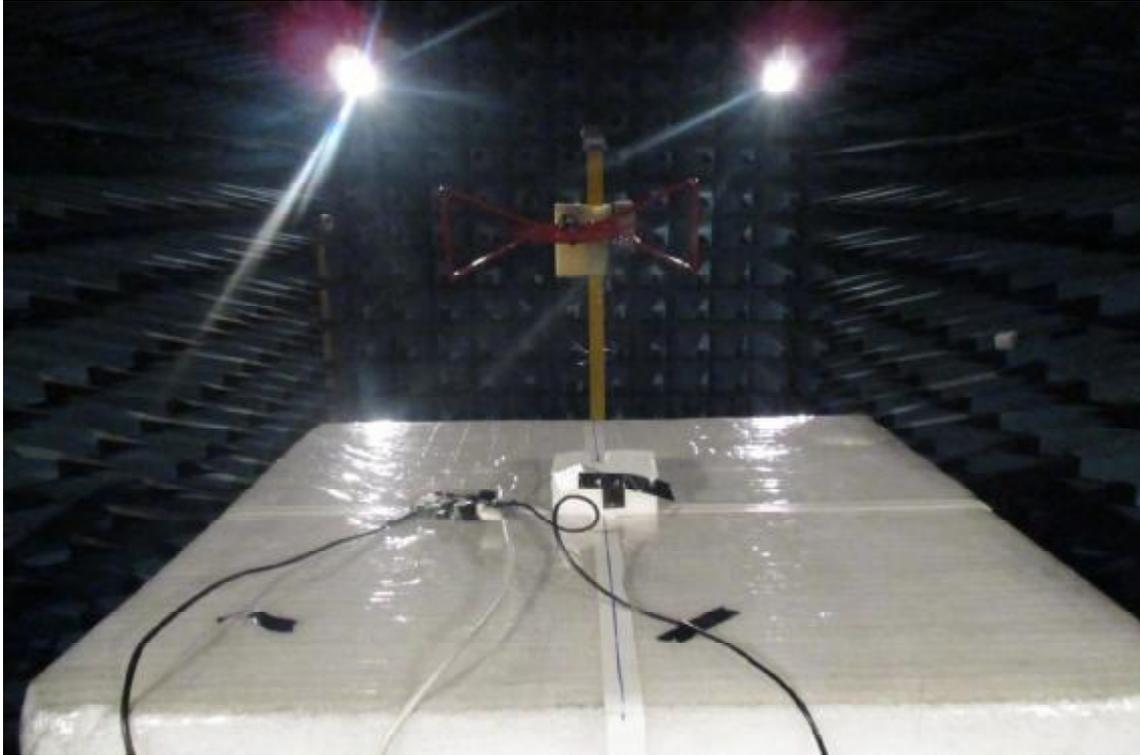
-- End of Test Report --

APPENDIX A PHOTOGRAPHS OF TEST SETUP

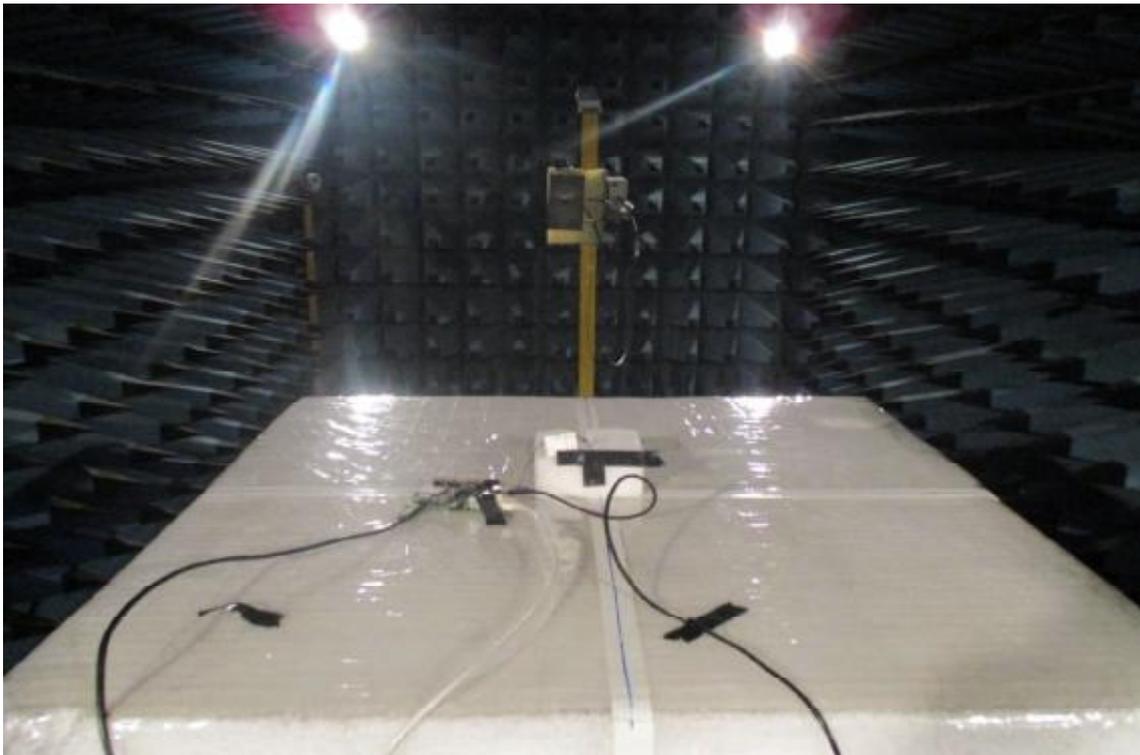
Conducted Emissions Setup Photos

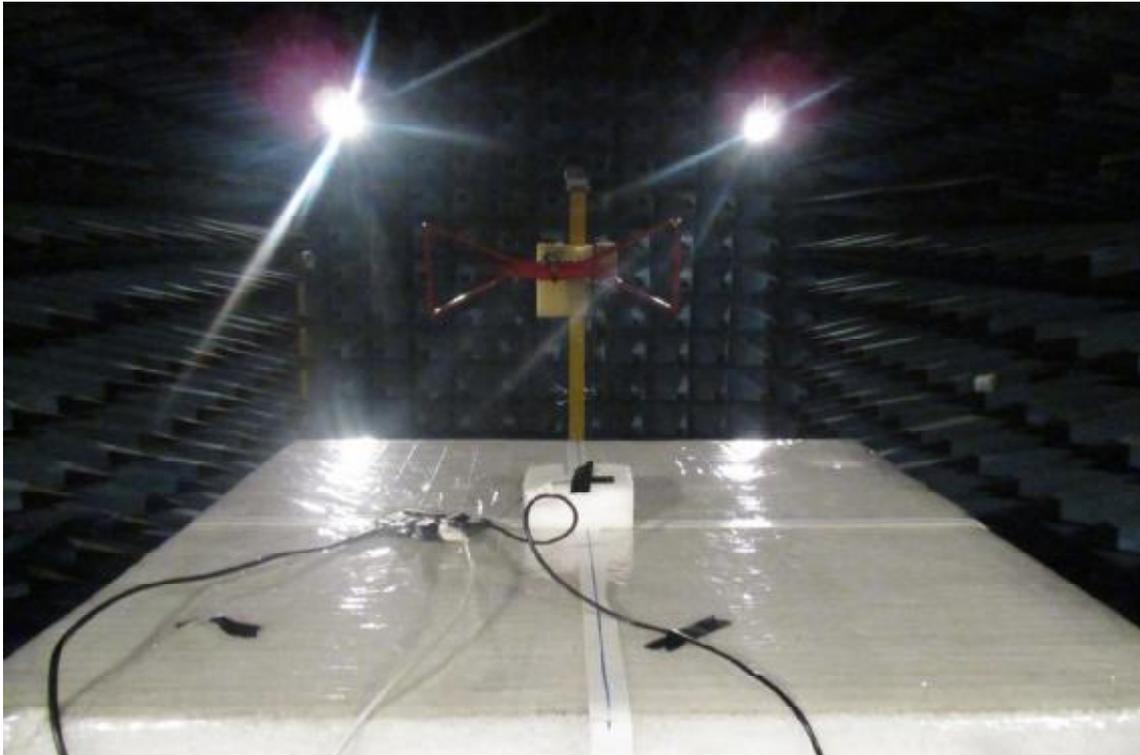
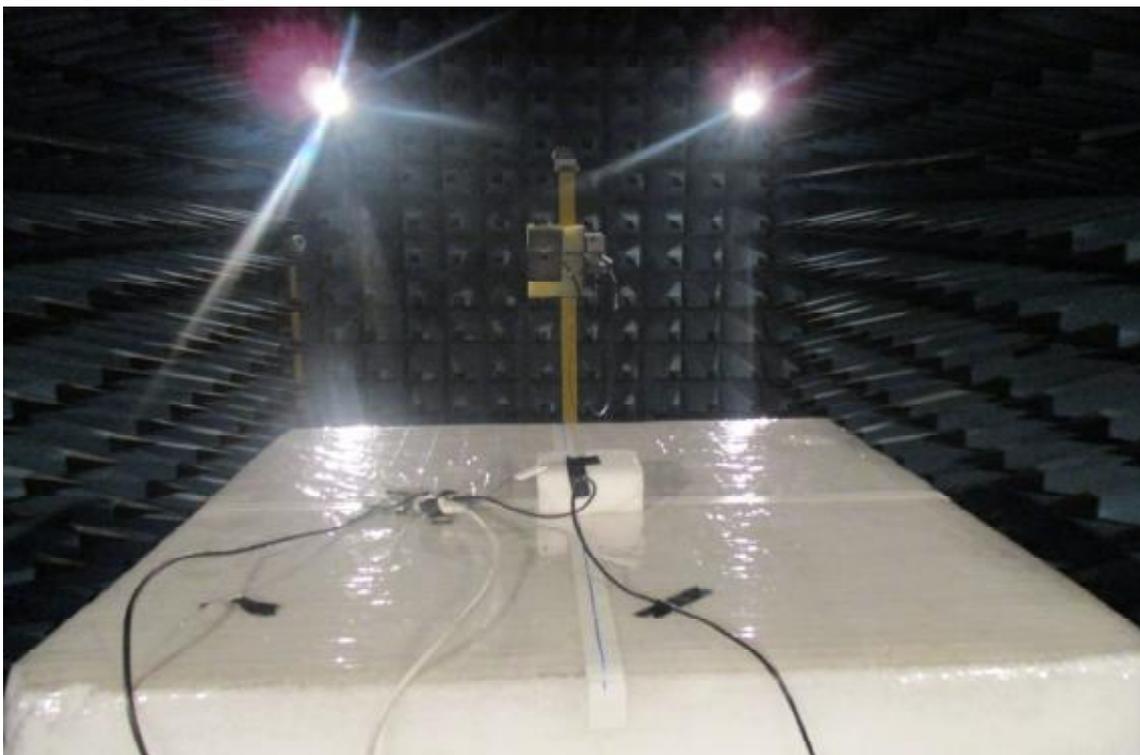


**Radiated Emissions Setup Photos
For FPC Antenna
Below 1GHz**

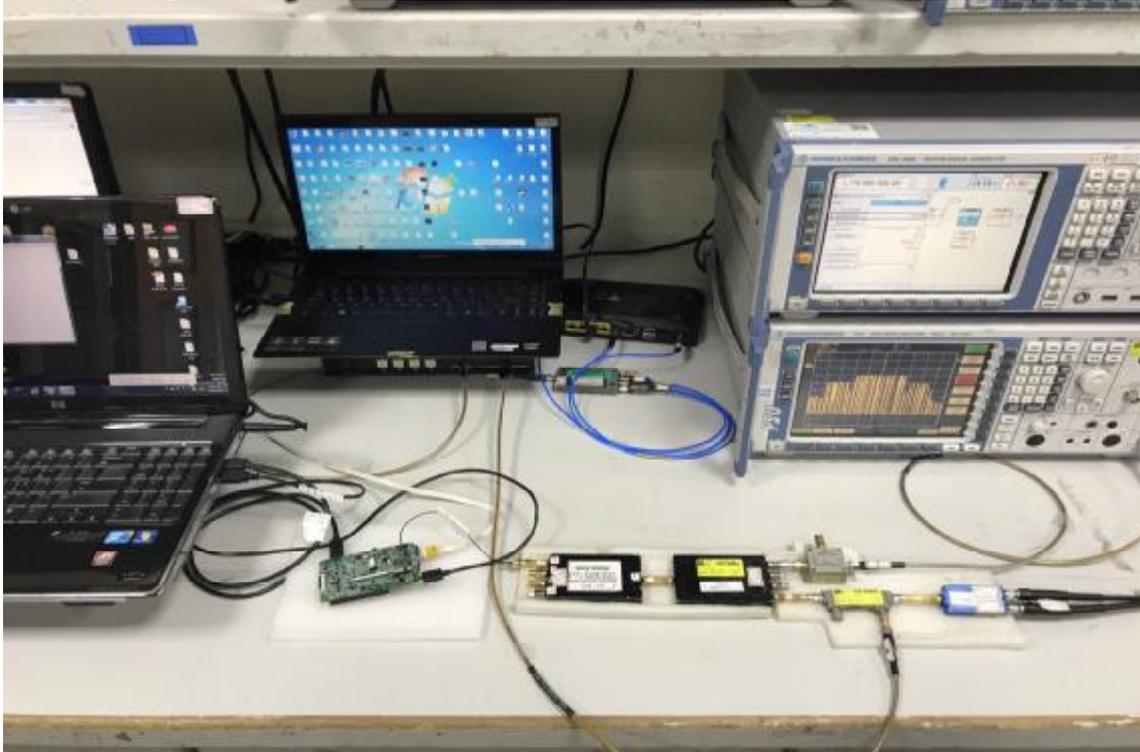


Above 1GHz

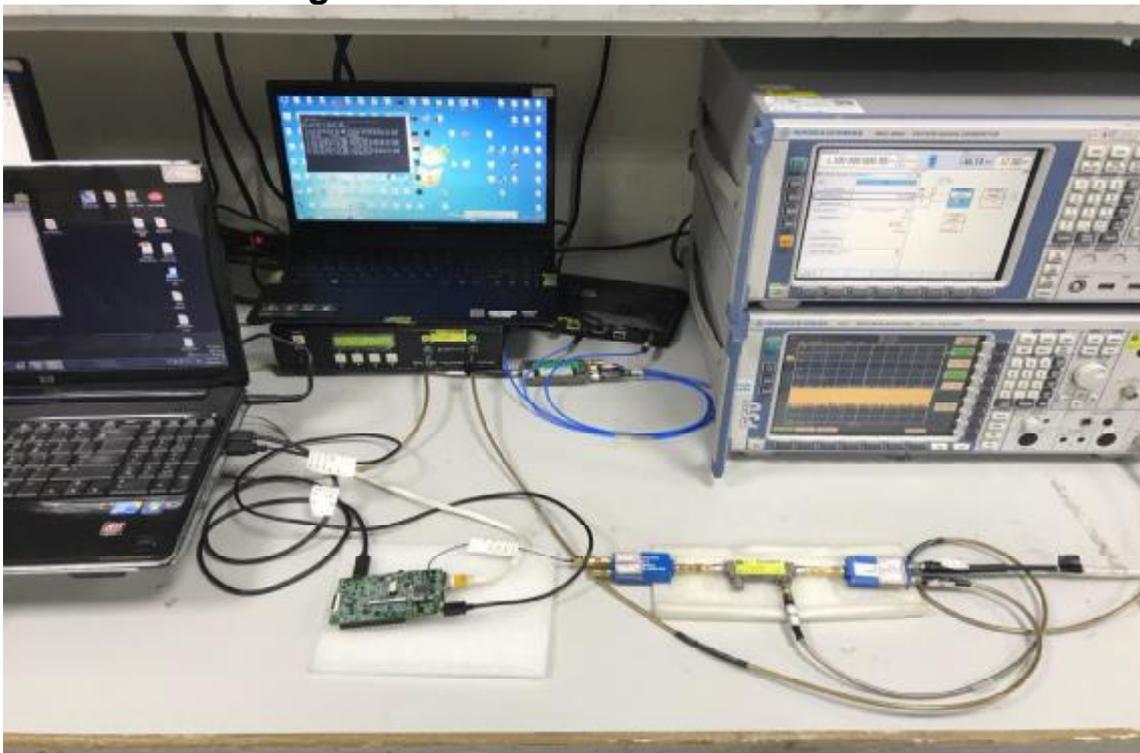


**For Dipole Antenna
Below 1GHz****Above 1GHz**

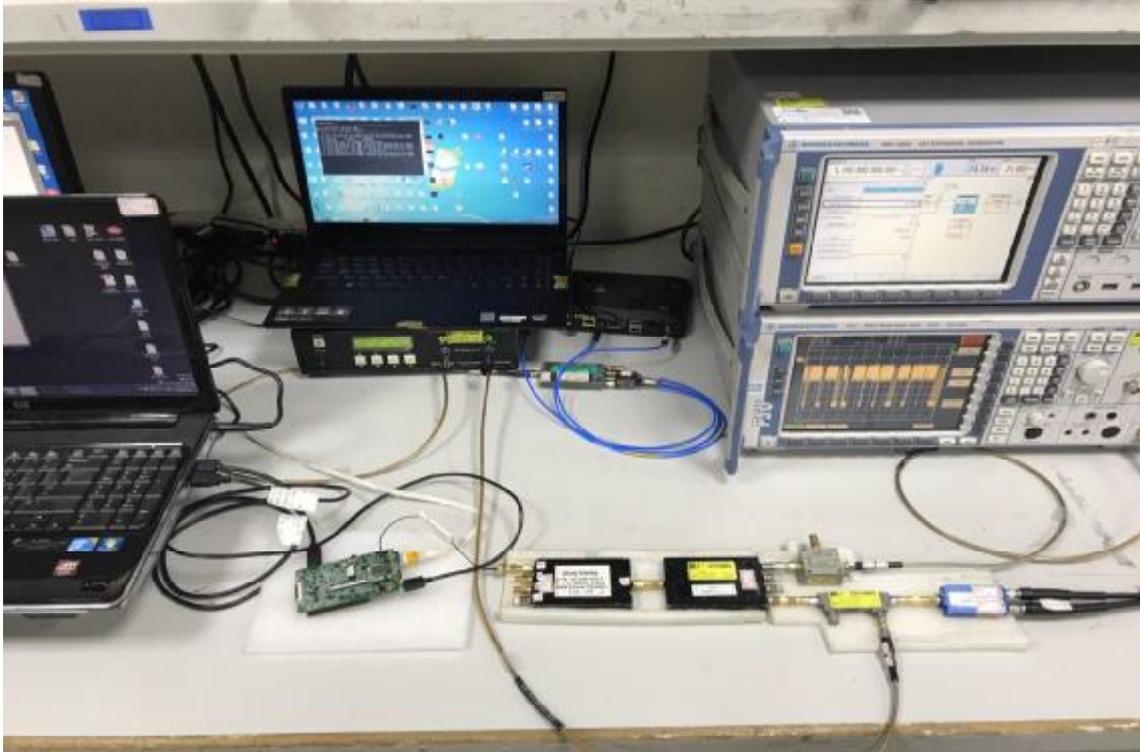
Adaptive Set Up Photo Adaptivity



Receiver Blocking



MAM





Report No.: T180627D10-MC

Page 1 / 9
Rev. 01

EN 62311: 2008
EN 62479: 2010
EN 50663: 2017

TEST REPORT

For

WiFi+Bluetooth 4.1(HS) System on Module

Model: PIXI-9377

Trade Name: TechNexion

Issued to

TechNexion Ltd.

**16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan
ROC**

Issued by

Compliance Certification Services Inc.

**No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)**

<http://www.ccsrf.com>

Issued Date: August 17, 2018

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部分複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 17, 2018	Initial Issue	ALL	Allison Chen
01	September 11, 2018	1.Revised FPC antenna gain.	P.5	Allison Chen

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1 Test Result Certification

Applicant: TechNexion Ltd.
16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC

Equipment Under Test: WiFi+Bluetooth 4.1(HS) System on Module

Trade Name: TechNexion

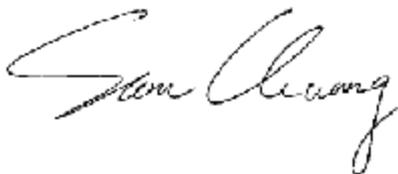
Model: PIXI-9377

Model Discrepancy: N/A

Applicable Standards
EN 62311: 2008 EN 62479: 2010 EN 50663: 2017
Limit
Electric Field: 61 V/m
Result
PASS

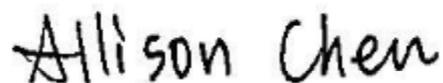
The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in EN 62311. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:



Sam Chuang
Manager

Reporter:



Allison Chen
Report coordinator

2 EUT Description

Frequency Range	Bluetooth: 2402 ~ 2480 MHz WiFi 2.4GHz 2412 ~ 2472 MHz WiFi 5GHz IEEE 802.11a 5180 ~ 5240 MHz IEEE 802.11n HT20 5180 ~ 5240 MHz IEEE 802.11n HT40 5190 ~ 5230 MHz IEEE 802.11ac VHT80 5210 MHz
Max EIRP Power in Watt (TP)	Bluetooth: 9.89 dBm (0.010 W) WiFi 2.4GHz 19.98 dBm (0.100 W) WiFi 5GHz 18.92 dBm (0.078 W)
Antenna gain (G)	<p>Bluetooth & WiFi 2.4GHz FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 2.5dBi</p> <p>Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 4dBi</p> <p>WiFi 5GHz: FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 3dBi</p> <p>Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 6dBi</p> <p>Bluetooth: 4.00 dBi (Numeric gain: 2.51) worst 2.4GHz 4.00 dBi (Numeric gain: 2.51) worst 5GHz 6.00 dBi (Numeric gain: 3.98) worst</p>

Remark:

1. For more details, please refer to the User's manual of the EUT.

3 Facilities and Accreditations

3.1. Facilities

All measurement facilities used to collect the measurement data are located at

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wugong 6th Rd., Wugu Dist, New Taipei City 24891, Taiwan (R.O.C.)
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

3.2. Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

3.3. Laboratory Accreditations and Listings

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200600-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: 93105 and 90471).

4 EN 62311 Requirement

4.1. Limit

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the following limits.

Basic Restrictions Reference levels

Council Recommendation 99/519/EC

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	$0,73/f$	$0,92/f$	—
1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375 f^{1/2}$	$0,0037 f^{1/2}$	$0,0046 f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

Frequency range	Magnetic flux density (mT)	Current density (Ma/m ²) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density, S (W/m ²)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

For Frequency Range 10 MHz to 10 GHz

The basic restriction at frequencies between 10 MHz and 100 GHz is on localized SAR in the head. Any device with output power below 20 mW cannot produce an exposure exceeding this restriction under the most pessimistic exposure conditions.

The basic restriction is 2 W/kg so any unit which supplies less than 20 mW ($=2/100W$) from its antenna port, averaged over 6 minutes, will meet the basic restriction.

For Frequency Range 10 GHz to 300 GHz

The most conservative assumption is that all the transmitted power is absorbed within the specified area, therefore any device which supplies less than 20 mW will meet the basic restriction. The average time is equal to $68/f^{-1.05}$ minutes (where f is in GHz)

In the frequency range 10 GHz to 300 GHz, the basic restriction is $10 Wm^{-2}$ averaged over any $20 cm^2$ of exposed area with a spatial maximum of $200 Wm^{-2}$ averaged over $1 cm^2$

4.2. Human Exposure Assessment

Exposure evaluation	
<p>Given</p> $E = \frac{\sqrt{30 \times TP}}{D}$ $D = \frac{\sqrt{30 \times TP}}{E}$	<p>Where:</p> <ul style="list-style-type: none"> ● E: E field Strength ● TP: Transmitted power in watt ● D: distance from the transmitting antenna in meter

Bluetooth :

Ch.	Frq.(MHz)	TP (W)	Gain (num.)	D (m)	Electric Field(V/m)	Limit of Electric Field (V/m)	Result
39	2480	0.01	2.51	0.2	4.34	61	Pass

WiFi 2.4GHz:

Ch.	Frq.(MHz)	TP (W)	Gain (num.)	D (m)	Electric Field(V/m)	Limit of Electric Field (V/m)	Result
11	2472	0.1	2.51	0.2	8.66	61	Pass

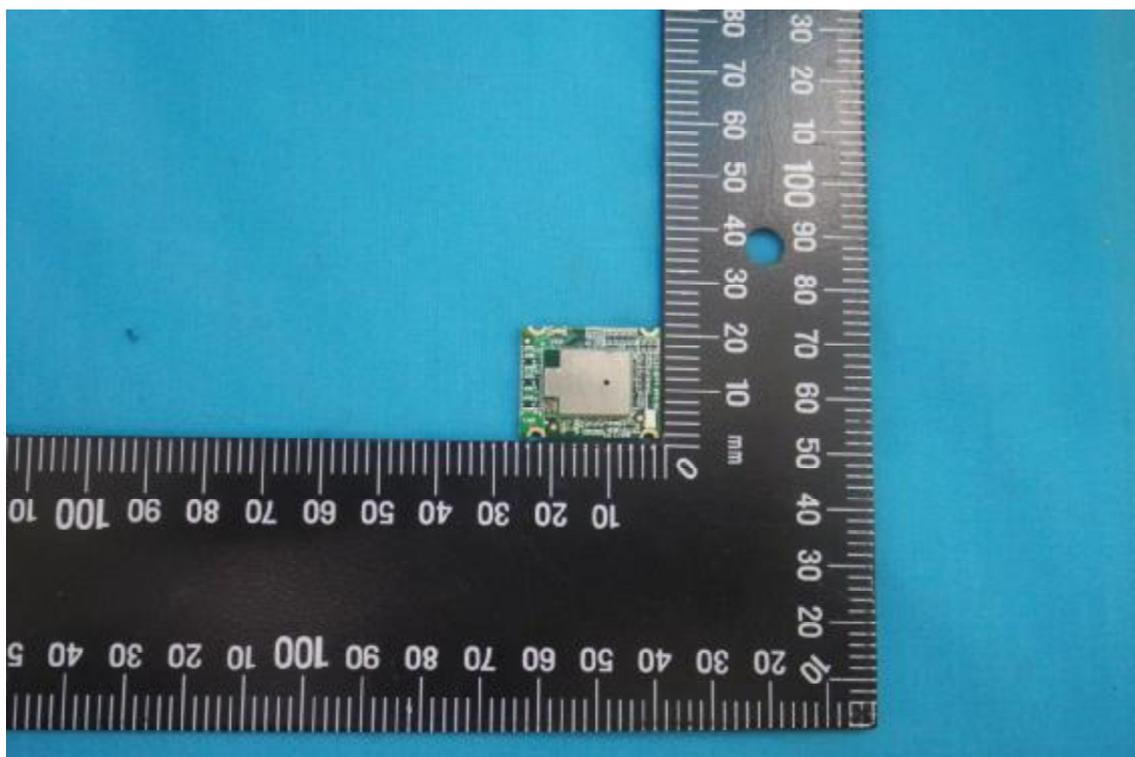
WiFi 5GHz:

Ch.	Frq.(MHz)	TP (W)	Gain (num.)	D (m)	Electric Field(V/m)	Limit of Electric Field (V/m)	Result
36	5180	0.078	3.98	0.2	7.65	61	Pass

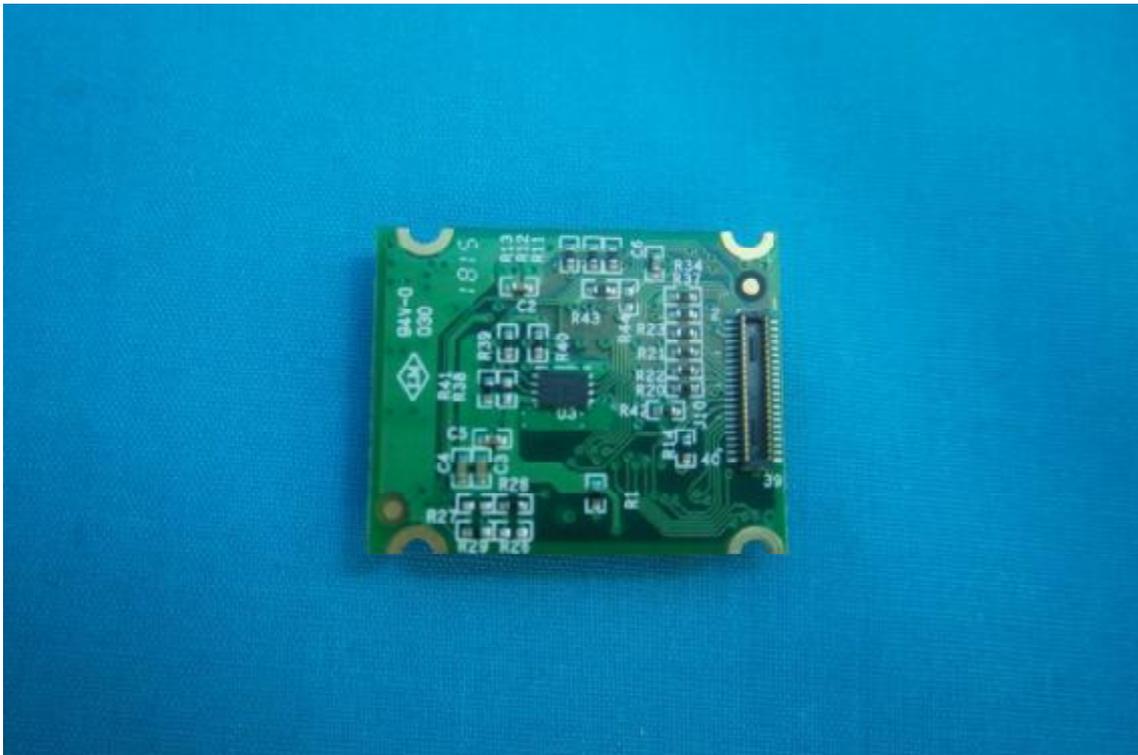
Conclusion:

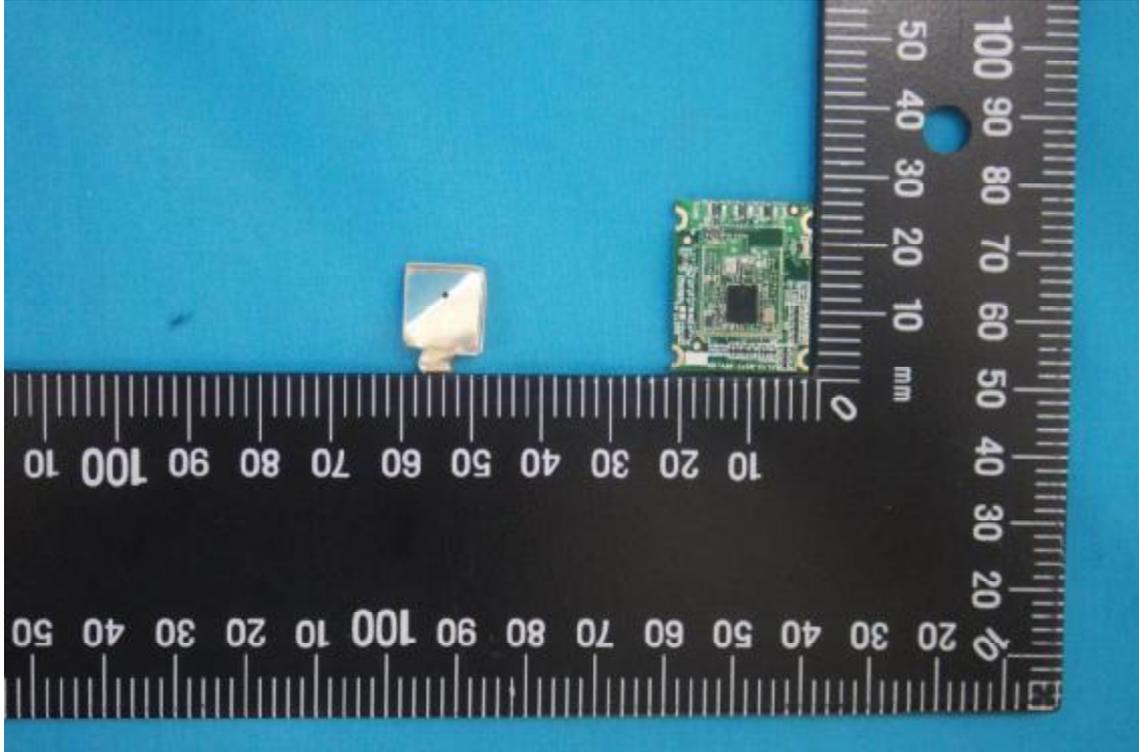
→ $E = 8.66 \text{V/m (max)}$ is the E-Field strength when safety distance between the EUT and human body is 0.2m, which is below 61V/m as required in Annex II table 2 of EC Council Recommendation (99/519/EC).

APPENDIX 1 - PHOTOGRAPHS OF EUT EXTERNAL PHOTOGRAPHS OF EUT



INTERNAL PHOTOGRAPHS OF EUT





FPC Antenna

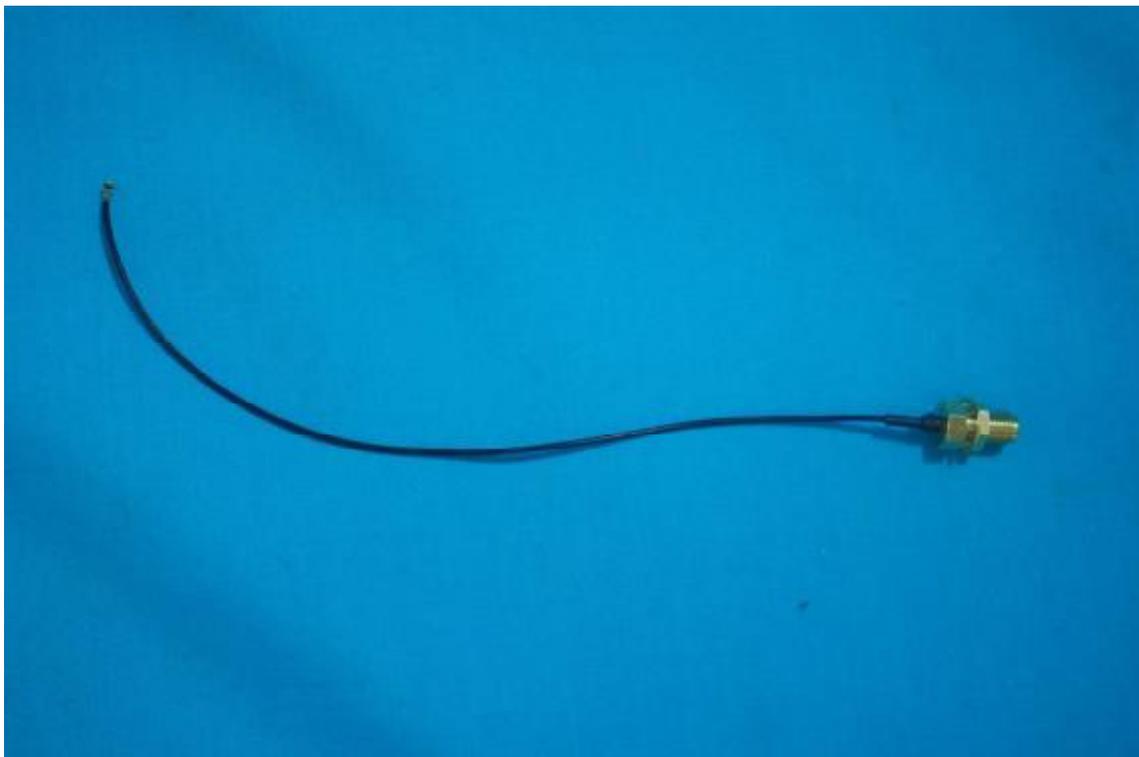
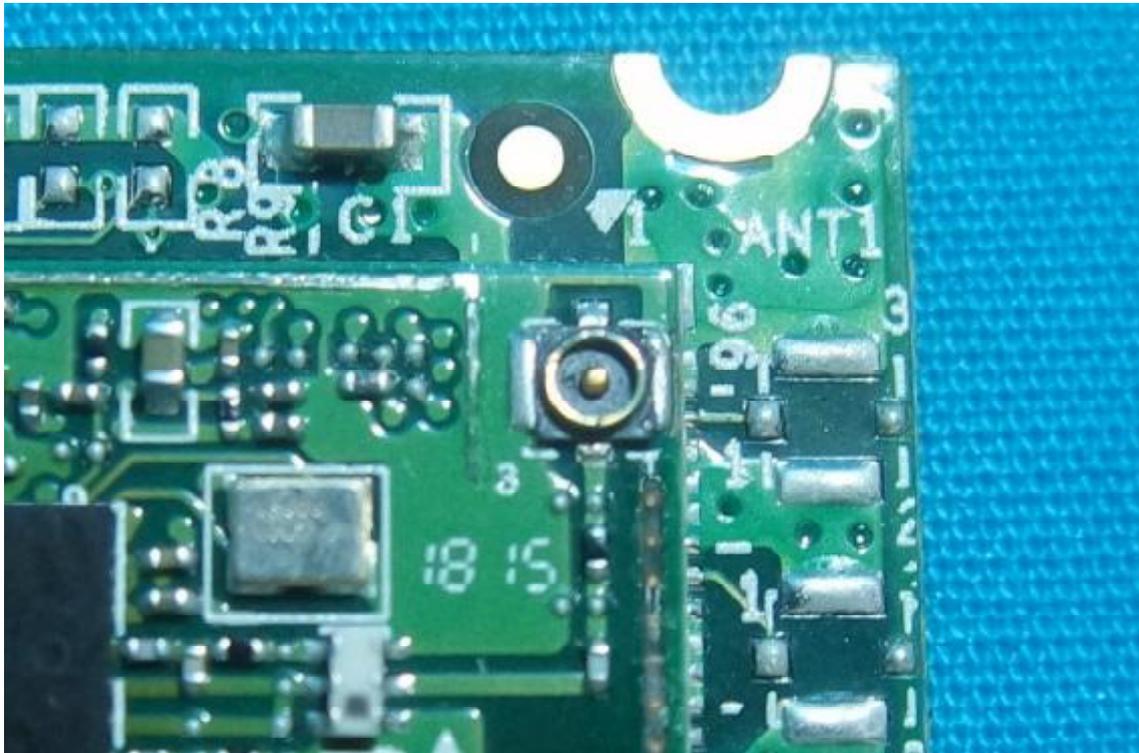




Dipole Antenna

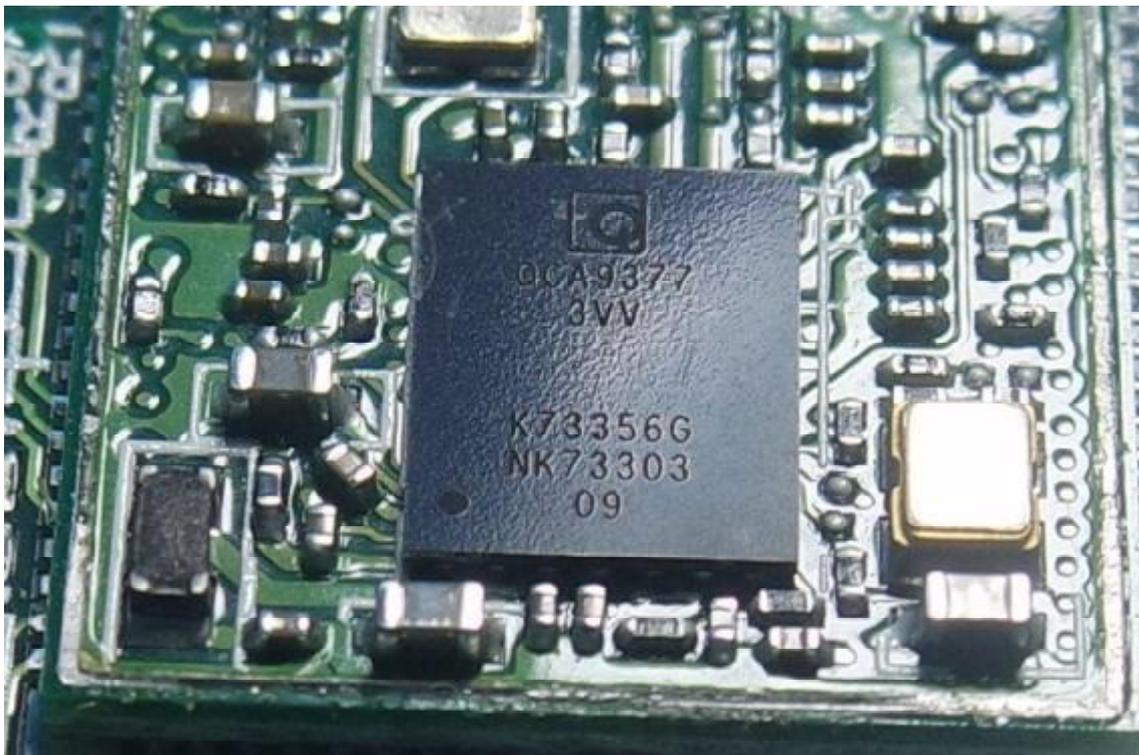
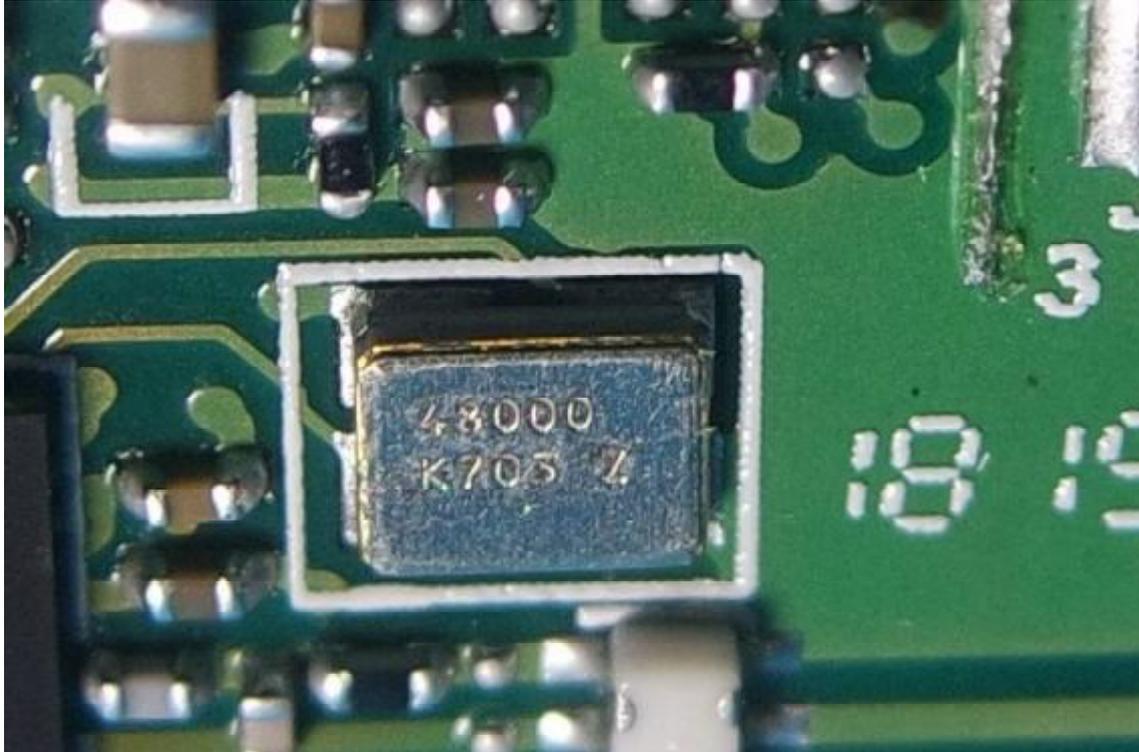








Crystal & Module





VERIFICATION OF COMPLIANCE

This Verification of Compliance is hereby issued to the below named company and for below described product, based on

**Technical Standard : EMC DIRECTIVE 2014/30/EU
(EN55032 / EN55024)**

General Information

Applicant : TechNexion Ltd.
Address of Applicant : 16f-5, No.736, Zhongzheng Road, Zhonghe Dist.,
New Taipei City, 23511 Taiwan ROC

Product Description

Product Name : WiFi+Bluetooth 4.1(HS) System on Module
Brand Name : TechNexion
Model Number : PIXI-9377

Measurement Standard

EN 55032: 2015 / AC: 2016
CISPR 32: 2015 (Ed 2.0) / C1: 2016
AS/NZS CISPR 32: 2015
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55024: 2010 + A1: 2015
(IEC 61000-4-2: 2008; IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010; IEC 61000-4-4: 2012;
IEC 61000-4-5: 2014; IEC 61000-4-6: 2013; IEC 61000-4-8: 2009; IEC 61000-4-11: 2004 + A1: 2017)

Measurement Facilities

Company Name : **Compliance Certification Services Inc.**
Test Laboratory : Xindian Lab.
Address of Test Lab. : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, 23151 Taiwan.

This device has been tested and found to be in compliance with the measurement procedures specified in the Standards & Specifications listed above and as indicated in the measurement report with the number: T180627D10-E

The test results shown in this report are applicable only to the investigated sample identified in this report.

Sam Hu / Assistant Manager

Date: August 24, 2018

CE EMC TEST REPORT

for

WiFi+Bluetooth 4.1(HS) System on Module

MODEL: PIXI-9377

Test Report Number:
T180627D10-E

Issued to:

TechNexion Ltd.

**16f-5, No.736, Zhongzheng Road, Zhonghe Dist.,
New Taipei City, 23511 Taiwan ROC**

Issued by:

Compliance Certification Services Inc.

Xindian Lab.

**No.163-1, Jhongsheng Rd., Xindian Dist.,
New Taipei City, 23151 Taiwan.**

TEL: 886-2-22170894

FAX: 886-2-22171029

Issued Date: August 24, 2018



Note: This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NVLAP, NIST or any government agencies. The test results in the report only apply to the tested sample.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 24, 2018	Initial Issue	ALL	Joy Hsiao

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APPENDIX 1 - PHOTOGRAPHS OF EUTA1-1

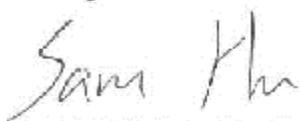
1 TEST CERTIFICATION

Product:	WiFi+Bluetooth 4.1(HS) System on Module	
Model:	PIXI-9377	
Brand:	TechNexion	
Applicant:	TechNexion Ltd. 16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC	
Manufacturer:	TechNexion Ltd. 16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC	
Tested:	June 29, 2018 ~ July 9, 2018	
Applicable Standards:	EN 55032: 2015 / AC: 2016, Class B CISPR 32: 2015 (Ed 2.0) / C1: 2016 AS/NZS CISPR 32: 2015 EN 61000-3-2: 2014 EN 61000-3-3: 2013	EN 55024: 2010 + A1: 2015 IEC 61000-4-2: 2008 IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 IEC 61000-4-4: 2012 IEC 61000-4-5: 2014 IEC 61000-4-6: 2013 IEC 61000-4-8: 2009 IEC 61000-4-11: 2004 + A1: 2017

Deviation from Applicable Standard
None

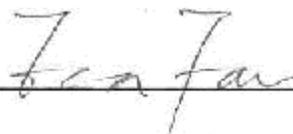
The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements of technical standards specified above under the EMC Directive 2014/30/EU. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:



Sam Hu
Assistant Manager

Reviewed by:



Eva Fan
Supervisor of report document dept.

2 TEST RESULT SUMMARY

EMISSION			
Standard	Item	Result	Remarks
EN 55032: 2015 / AC: 2016 CISPR 32: 2015 (Ed 2.0) / C1: 2016 AS/NZS CISPR 32: 2015	Conducted (Power Port)	PASS	Meet Class B limit
	Conducted (Telecom port)	N/A	Please see the page 18
	Radiated	PASS	Meet Class B limit
	Radiated emissions from FM receivers	N/A	Please see the page 27
	Conducted differential voltage emissions from Class B equipment	N/A	Please see the page 30
EN 61000-3-2: 2014	Harmonic current emissions	N/A	Please see the page 32
EN 61000-3-3: 2013	Voltage fluctuations & flicker	N/A	Please see the page 34

IMMUNITY [EN 55024 (2010 + A1: 2015)]			
Standard	Item	Result	Remarks
IEC 61000-4-2: 2008	ESD	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5: 2014	Surge	N/A	Please see the page 47
IEC 61000-4-6: 2013	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8: 2009	PFMF	N/A	Please see the page 51
IEC 61000-4-11: 2004 + A1: 2017	Voltage dips & voltage variations	N/A	Please see the page 53

- Note:**
1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
 2. The information of measurement uncertainty is available upon the customer's request.

3 EUT DESCRIPTION

Product	WiFi+Bluetooth 4.1(HS) System on Module
Brand Name	TechNexion
Model	PIXI-9377
Applicant	TechNexion Ltd.
Housing material	N/A
Identify Number	T180627D10
Received Date	June 27, 2018
EUT Power Rating	5VDC from Host PC Power Supply
AC Power During Test	230VAC / 50Hz to Host PC Power Supply

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH

Note: Client consigns only one model sample to test (Model Number: PIXI-9377).

4 TEST METHODOLOGY

4.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the below additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration modes are as the following:

Conduction Modes:

1	WiFi 2.4G Mode
2	WiFi 5G Mode
3	BT Mode
4	FPC 2.4G Mode

Radiation Modes:

1	WiFi 2.4G Mode
	WiFi 2.4G Mode / 1-6GHz
2	WiFi 5G Mode
3	BT Mode
4	FPC 2.4G Mode

Worst:

Conduction: Mode 1

Radiation: Mode 1

4.2. EUT SYSTEM OPERATION

1. Windows 7 boots system.
2. Run Emctest.exe to activate all peripherals and display "H" pattern on monitor screen.
3. Run puttey.exe to test EUT.
4. Setup WiFi function of the EUT for test.
5. Setup FPC function of the EUT for test.

Note: Test program is self-repeating throughout the test.

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Host PC Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name
1	HDD	DT01ACA100	N/A	N/A	TOSHIBA
2	CPU (Socket FCLGA1151 / 3.5GHz)	i5-6600K	N/A	N/A	INTEL
3	RAM (DDR4 2666)	N/A	N/A	N/A	Samsung
4	Graphic card	GTX980	N/A	N/A	NVIDIA
5	Power Supply	DPS-600WB B	N/A	N/A	DELTA
6	Motherboard	IPM17-TP	N/A	N/A	HP
7	ODD	DU-8AESH	N/A	N/A	LiteOn

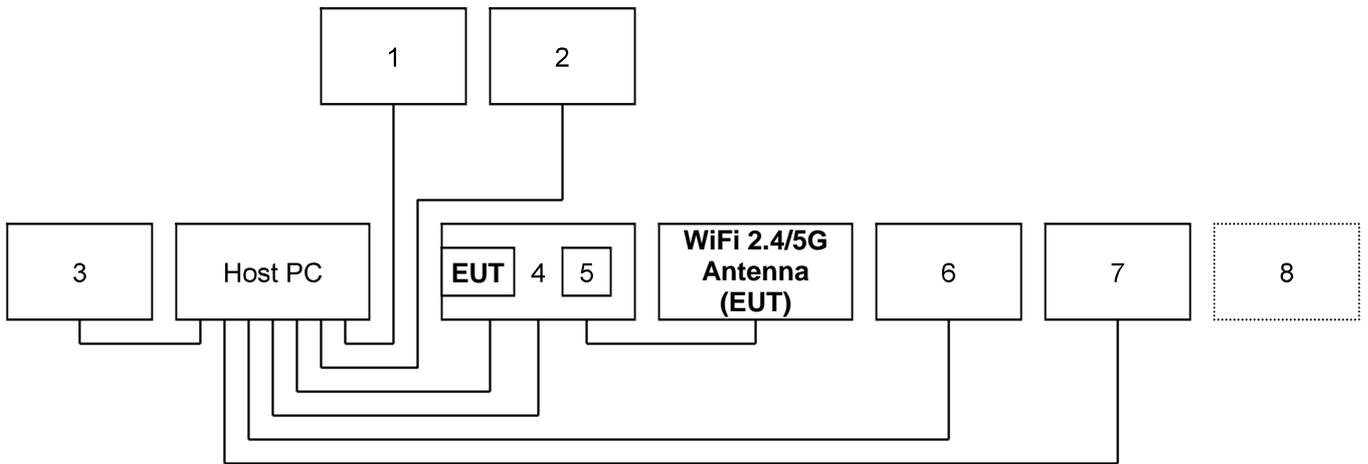
Peripherals Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	USB Mouse	M-U0026	N/A	DOC BSMI: T41126	Logitech	Shielded, 1.8m	N/A
2	USB Keyboard	Y-U0011	N/A	DOC BSMI: T51160	Logitech	Shielded, 1.8m	N/A
3	Modem	AL-56ERM	0MERM04A0212	DOC	GALILEO	Shielded, 1.8m	Unshielded, 1.8m
4	ARM Cortex-A7 NXP i.MX7, Small Footprint, System on Module	PICO-IMX7	N/A	N/A	TechNexion	N/A	N/A
5	Qualcomm Atheros QCA-9377 CLIX module	CLIX-9377	N/A	N/A	TechNexion	N/A	N/A
6	Monitor	PA248Q	G5LMQS071275	BSMI: R31018	ASUS	Shielded, 1.8m	Unshielded, 1.8m
7	Printer	SNPRB-1202-01	CN54K185HY	BSMI: R33001	HP	Shielded, 1.6m	Unshielded, 1.8m
8	Server Notebook	XPS13	7R0S3G2	BSMI: R31199	DELL	N/A	Unshielded, 1.8m

Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5.2. CONFIGURATION OF SYSTEM UNDER TEST



6 FACILITIES AND ACCREDITATIONS

6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at CCSrf Taiwan Xindian Lab. at No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, 23151 Taiwan.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF
USA	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions	0.15MHz ~ 30MHz	± 2.8
Radiated emissions	30MHz ~ 1000MHz	± 5.3
	1000MHz ~ 6000MHz	± 4.6

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22: 2005, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than UCISPR which is 3.6dB and 5.2dB respectively. CCS values (called ULab in CISPR 16-4-2) is less than UCISPR as shown in the table above. Therefore, MU need not be considered for compliance.

7 EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT

7.1.1. LIMITS

FREQUENCY (MHz)	Class A (dBUV)		Class B (dBUV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

7.1.2. TEST INSTRUMENTS

Conducted Emission room # A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
BNC CABLE	EMEC	EMG178	BNC#A9	03/26/2019
EMI Test Receiver	R&S	ESCI	101201	09/28/2018
LISN	Schwarzbeck	NNLK 8129	8129-286	08/15/2018
LISN(EUT)	Schwarzbeck	NSLK 8127	8127527	08/15/2018
Pulse Limiter	R&S	ESH3Z2	SD-C002	08/17/2018
Thermo-Hygro Meter	Wisewind	201A	No. 02	05/06/2019
Test S/W	EZ-EMC			

- NOTE:**
- 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 - 2. N.C.R = No Calibration Request.

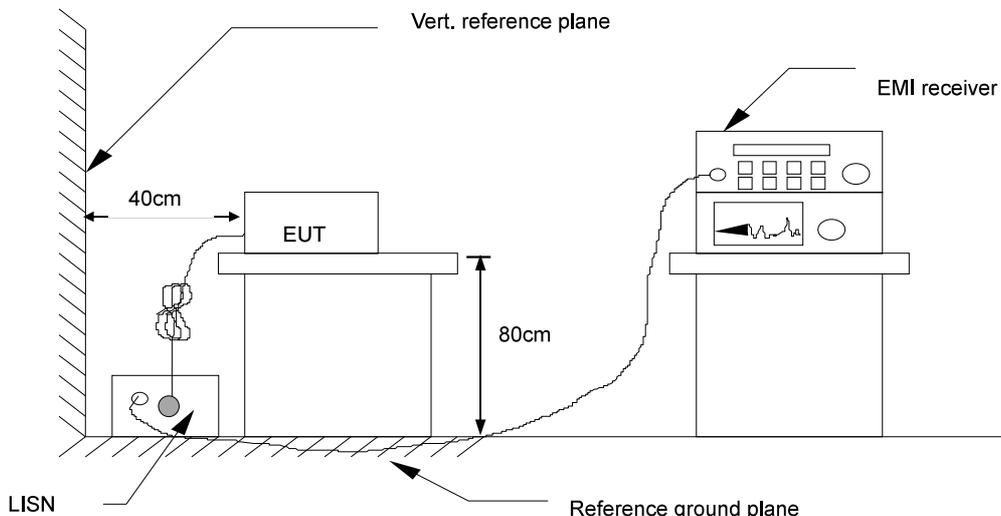
7.1.3. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031& PA-041)**Procedure of Preliminary Test**

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55032 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per EN 55032.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

7.1.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
x.xx	42.95	0.55	43.50	56	-12.50	Q	L1

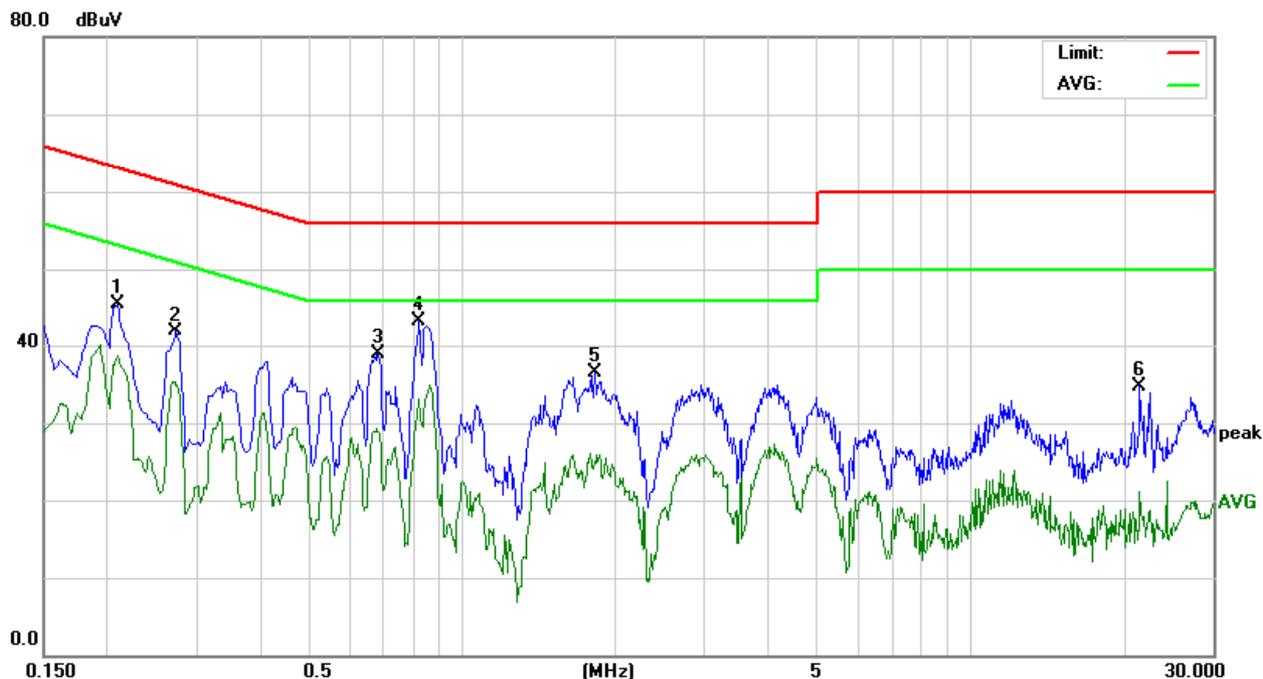
- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
- Result = Reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading
- L1 = Hot side
- L2 = Neutral side

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.1.6. TEST RESULTS

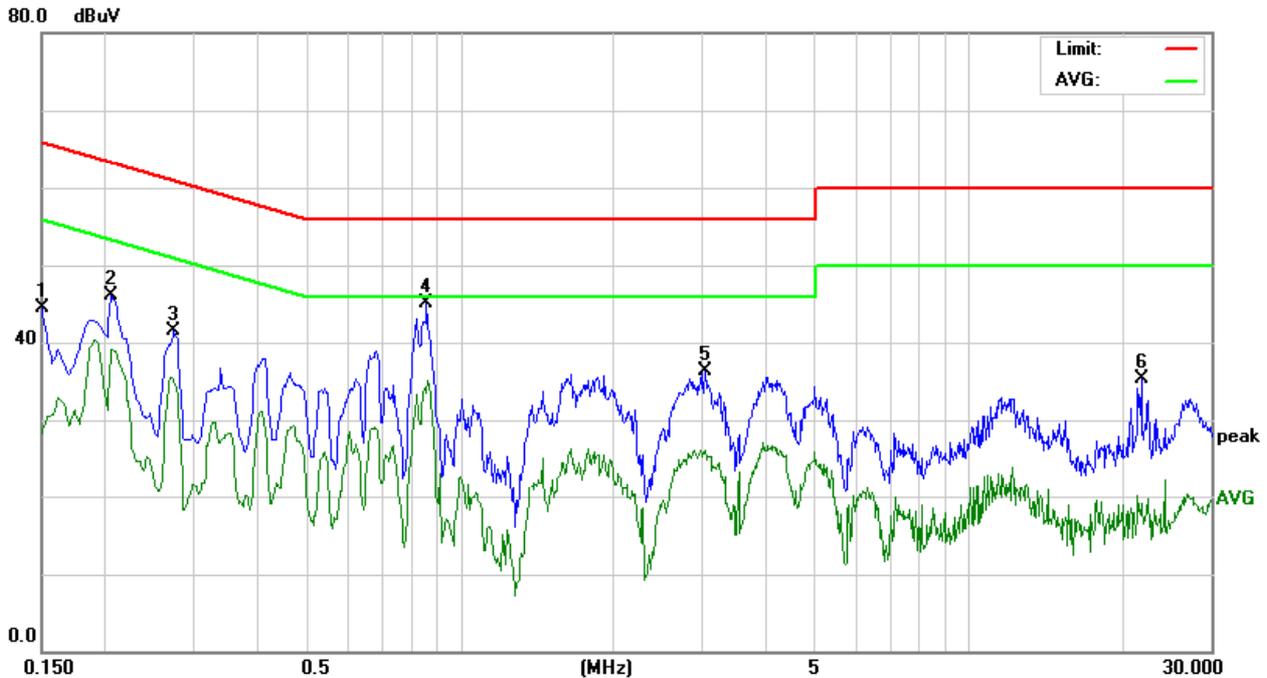
Model No.	PIXI-9377	6dB Bandwidth	9 kHz
Environmental Conditions	26°C, 53% RH	Test Mode	Mode 1
Tested by	Alee Shen	Phase	L1
Standard	EN 55032 CLASS B		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.2100	35.55	10.02	45.57	63.21	-17.64	P	L1
0.2740	31.81	10.02	41.83	61.00	-19.17	P	L1
0.6860	28.89	10.05	38.94	56.00	-17.06	P	L1
0.8220	33.25	10.06	43.31	56.00	-12.69	P	L1
1.8220	26.43	10.13	36.56	56.00	-19.44	P	L1
21.5900	23.75	11.01	34.76	60.00	-25.24	P	L1

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Model No.	PIXI-9377	6dB Bandwidth	9 kHz
Environmental Conditions	26°C, 53% RH	Test Mode	Mode 1
Tested by	Alee Shen	Phase	L2
Standard	EN 55032 CLASS B		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1500	34.45	10.01	44.46	66.00	-21.54	P	L2
0.2060	36.18	10.02	46.20	63.37	-17.17	P	L2
0.2740	31.43	10.02	41.45	61.00	-19.55	P	L2
0.8580	35.01	10.06	45.07	56.00	-10.93	P	L2
3.0340	26.15	10.17	36.32	56.00	-19.68	P	L2
21.9100	24.28	11.03	35.31	60.00	-24.69	P	L2

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

7.2. REQUIREMENTS FOR ASYMMETRIC MODE CONDUCTED EMISSIONS

7.2.1. LIMITS

For Class A Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	97 ~ 87	84 ~ 74	53 ~ 43	40 ~ 30
0.5 ~ 30.0	87	74	43	30

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

For Class B Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	84 ~ 74	74 ~ 64	40 ~ 30	30 ~ 20
0.5 - 30.0	74	64	30	20

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

7.2.2. TEST INSTRUMENTS

Conducted Emission room #				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.

7.2.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-031)

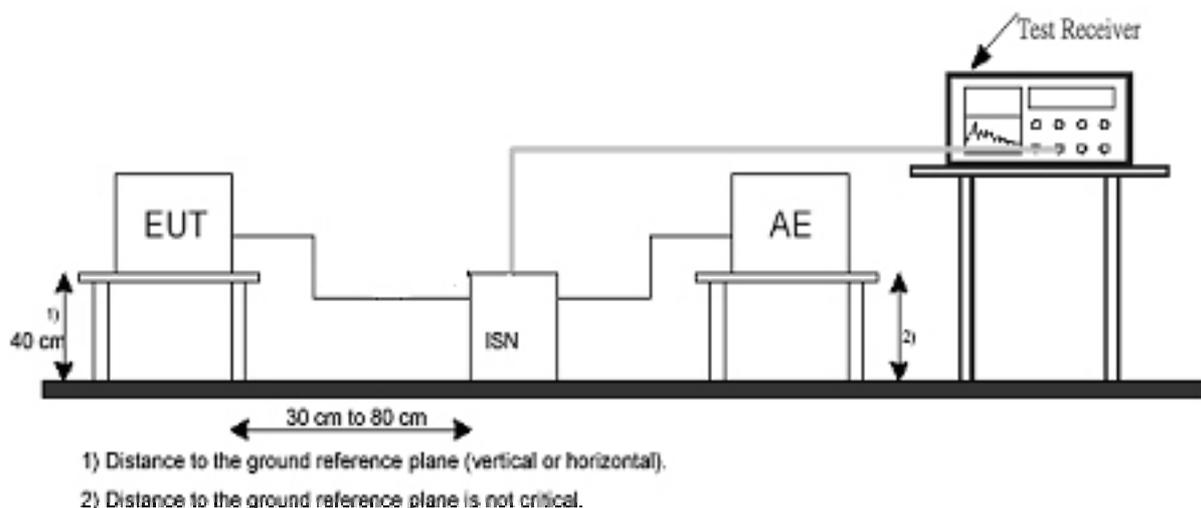
- Selecting AAN for unscreened cable or a current probe for screened cable to take measurement.
- The port of the EUT was connected to the remote side support equipment through the AAN/Current Probe and communication in normal condition.
- Making a overall range scan by using the test receiver controlled by controller and record at least six highest emissions for showing in the test report.
- Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- In case of measuring on the screened cable, the current limit shall be applied; otherwise the voltage limit should be applied.
- The following test modes was scanned during the preliminary test:

N/A

- After the preliminary scan, we found the following test mode(s) producing the highest emission level and test data of the worst case was recorded.

N/A

7.2.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)
x.xx	62.95	0.55	63.50	84	-20.50	Q

- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
- Result = Reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.2.6. TEST RESULTS

Model No.	N/A	6dB Bandwidth	N/A
Environmental Conditions	N/A	Test Mode	N/A
Tested by	N/A		

Note: No applicable, the EUT doesn't have LAN Port or Modem port.

7.3. RADIATED EMISSION MEASUREMENT

7.3.1. LIMITS

Below 1GHz

FREQUENCY (MHz)	dBuV/m (At 10m)		dBuV/m (At 3m)	
	Class A	Class B	Class A	Class B
30 ~ 230	40	30	50	40
230 ~ 1000	47	37	57	47

Above 1GHz

Frequency (MHz)	Class A (dBuV/m) (At 3m)		Class B (dBuV/m) (At 3m)	
	Average	Peak	Average	Peak
1000 ~ 3000	56	76	50	70
3000 ~ 6000	60	80	54	74

NOTE: The lower limit shall apply at the transition frequencies.

According to EN 55032: 2015 / AC: 2016 Table 1 the measurement frequency range shown in the following table:

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest internal frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	
NOTE 2 F_x is defined in 3.1.19.	

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Radiated emissions from FM receivers

Frequency range MHz	Measurement		Class B limit dB(μV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS / SAC (see Table A.1)	OATS / SAC (see Table A.1)
30 – 230	10	Quasi peak/ 120kHz	50	42
230 – 300				42
300 – 1000				46
30 – 230	3		60	52
230 – 300				52
300 – 1000				56

These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in 7.3.1 Class B Limit

7.3.2. TEST INSTRUMENTS

Open Area Test Site # H				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Bilog Antenna	Teseq	CBL 6112D	36995	06/25/2019
Cable	EMEC	CFD400NL-LW	N-Type#H11	08/17/2018
EMI Test Receiver	R&S	ESCI	101340	03/26/2019
Pre-Amplifier	HP	8447D	1937A01554	09/28/2018
Thermo-Hygro Meter	Wisewind	201A	No. 03	05/27/2019
Test S/W	EZ-EMC			
Above 1GHz Used				
Horn Antenna	EMCO	3115	00022256	08/09/2018
K-Type Cable	Rosnol	K1K50-UP0264-K1k 50-1000	170803-1	08/22/2018
Microflex Cable	Rosnol	N1K50-EW0630-N1 k50-7000	170803-1	08/22/2018
Pre-Amplifier	Com-Power	PAM-118A	551041	06/18/2019
Signal Analyzer	R&S	FSV40	101269	04/17/2019
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.

7.3.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-031 & PA-041)**Procedure of Preliminary Test**

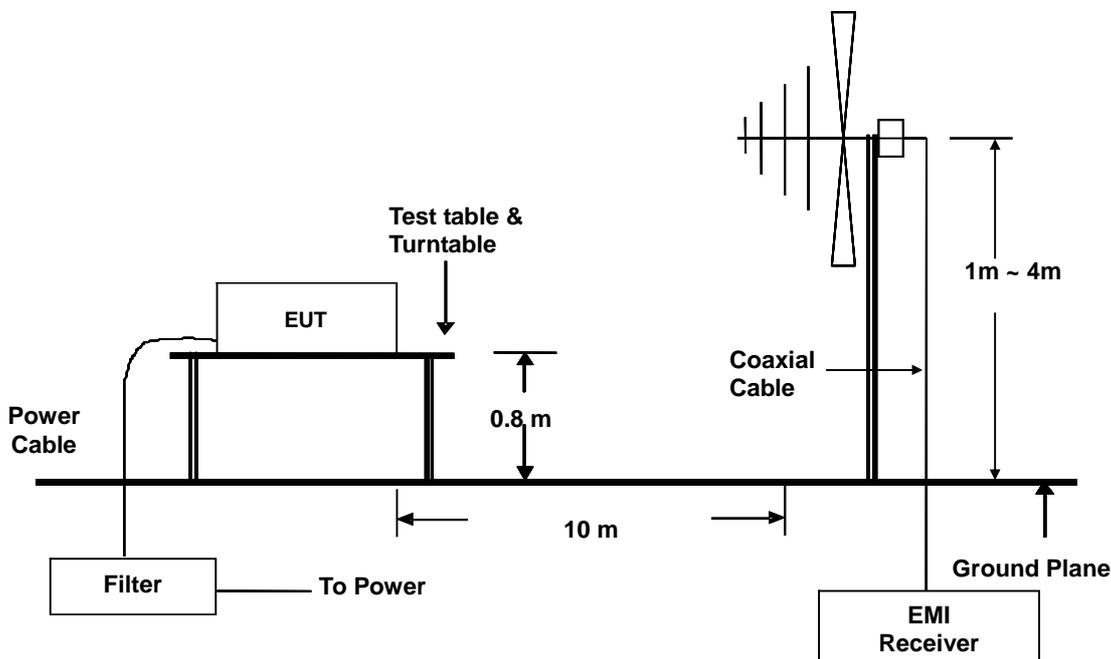
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 or 10 meter away from the EUT as stated in EN 55032. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

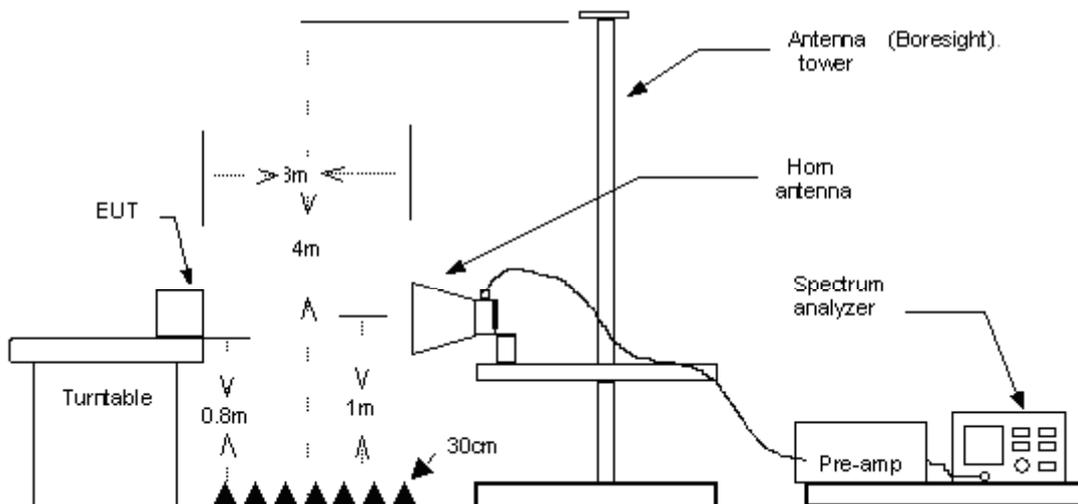
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. Below 1GHz the Q.P. reading and above 1GHz the Peak and Average reading are presented.
- The test data of the worst-case condition(s) was recorded.

7.3.4. TEST SETUP

Below 1GHz



Above 1GHz



- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

7.3.5. DATA SAMPLE

Below 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
x.xx	14.0	12.2	26.2	30	-3.8	Q	H

Above 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
x.xx	42.95	0.55	43.50	54	-10.50	A	H

- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Antenna Factor + Cable Loss - Amplifier Gain
- Result = Reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading
- H = Antenna Polarization: Horizontal
- V = Antenna Polarization: Vertical

Calculation Formula

Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)

7.3.6. TEST RESULTS

Below 1GHz

Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	29°C, 56% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Alee Shen
Standard	EN 55032 CLASS B		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
245.0050	36.30	-7.82	28.48	37.00	-8.52	100	116	Q	V
275.0040	36.10	-6.68	29.42	37.00	-7.58	100	232	Q	V
400.0110	34.20	-3.07	31.13	37.00	-5.87	400	205	Q	V
445.0020	33.70	-2.13	31.57	37.00	-5.43	400	98	Q	V
565.2290	32.10	0.37	32.47	37.00	-4.53	400	104	Q	V
616.0330	31.90	0.27	32.17	37.00	-4.83	400	183	Q	V

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	29°C, 56% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Alee Shen
Standard	EN 55032 CLASS B		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
191.5520	33.40	-10.91	22.49	30.00	-7.51	400	50	Q	H
245.0620	33.60	-7.80	25.80	37.00	-11.20	400	198	Q	H
345.0090	35.20	-5.30	29.90	37.00	-7.10	400	220	Q	H
400.0020	33.30	-3.07	30.23	37.00	-6.77	100	304	Q	H
445.1150	32.80	-2.13	30.67	37.00	-6.33	100	172	Q	H
600.0190	31.50	-0.13	31.37	37.00	-5.63	100	113	Q	H

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Above 1GHz

Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	26°C, 60% RH	6dB Bandwidth	1 MHz
Antenna Pole	Vertical / Horizontal	Antenna Distance	3m
Highest frequency generated or used	5000MHz	Upper frequency	6000MHz
Detector Function	Peak and average.	Tested by	Pipo Hou
Standard	EN 55032 CLASS B		

Radiated Emission Readings							
Frequency Range Investigated				Above 1GHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1035.000	66.58	-9.08	57.50	70.00	-12.50	P	V
1039.555	58.61	-9.07	49.54	50.00	-0.46	A	V
1485.000	59.64	-8.28	51.36	70.00	-18.64	P	V
1485.200	51.16	-8.28	42.88	50.00	-7.12	A	V
1780.000	62.50	-6.41	56.09	70.00	-13.91	P	V
1782.797	40.08	-6.40	33.68	50.00	-16.32	A	V
1930.000	55.53	-5.43	50.10	70.00	-19.90	P	V
1930.539	49.65	-5.43	44.22	50.00	-5.78	A	V
2080.000	53.76	-4.88	48.88	70.00	-21.12	P	V
2225.000	55.43	-4.71	50.72	70.00	-19.28	P	V
2226.978	42.23	-4.70	37.53	50.00	-12.47	A	V

Radiated Emission Readings							
Frequency Range Investigated				Above 1GHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1035.000	64.19	-9.08	55.11	70.00	-14.89	P	H
1039.675	54.53	-9.07	45.46	50.00	-4.54	A	H
1780.000	58.68	-6.41	52.27	70.00	-17.73	P	H
1781.698	48.49	-6.40	42.09	50.00	-7.91	A	H
1930.000	58.27	-5.43	52.84	70.00	-17.16	P	H
1930.619	47.51	-5.43	42.08	50.00	-7.92	A	H
2080.000	54.06	-4.88	49.18	70.00	-20.82	P	H
2225.000	57.92	-4.71	53.21	70.00	-16.79	P	H
2227.997	43.19	-4.70	38.49	50.00	-11.51	A	H
2394.600	37.05	-4.50	32.55	50.00	-17.45	A	H
2395.000	55.28	-4.50	50.78	70.00	-19.22	P	H
2995.000	52.95	-4.13	48.82	70.00	-21.18	P	H

Note: 1. P= Peak Reading; A= Average Reading.

Radiated emissions from FM receivers

Model No.	N/A	Test Mode	N/A
Environmental Conditions	N/A	6dB Bandwidth	N/A
Antenna Pole	N/A	Antenna Distance	N/A
Detector Function	N/A	Tested by	N/A

Note: No applicable, the EUT doesn't have FM port.

7.4. CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS FROM CLASS B EQUIPMENT

Applicable to				
1. TV broadcast receiver tuner ports with an accessible connector				
2. RF modulator output ports				
3. FM broadcast receiver tuner ports with an accessible connector				
Frequency range MHz	Class B limits DB(μ V) 75 Ω			Applicability
	other	Local Oscillator Fundamental	Local Oscillator Harmonics	
30 – 950	46	46	46	See a)
950 – 2 150	46	54	54	
950 – 2 150	46	54	54	See b)
30 – 300	46	54	50	See c)
300 – 1 000			52	
30 – 300	46	66	59	See d)
300 – 1 000			52	
30 – 950	46	76	46	See e)
950 – 2 150		n/a	54	
a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.				
b) Tuner units (not the LNB) for satellite signal reception.				
c) Frequency modulation audio receivers and PC tuner cards.				
d) Frequency modulation car radios.				
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.				
Testing is required at only one EUT supply voltage and frequency.				
The term 'other' refers to all emissions other than the fundamental and the harmonics of the local oscillator.				
The test shall be performed with the device operating at each reception channel.				
The test shall cover the entire frequency range.				

7.4.1. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-041)**Procedure of Preliminary Test**

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. The EUT was placed on a wooden table with a height of 0.8 meters was used that was placed on the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source, from the outlet socket. All support equipment received power was from another socket.
- Added a $75 \longleftrightarrow 50 \Omega$ matching network, between EUT and EMI test receiver to get impedance match condition during the test.
- The output level of the auxiliary signal generator shall be set to give the value of 60 dB (μV) for FM receiver or 70 dB (μV) for TV and VCR to the input of the frequency-modulation or television receiver (or video recorder) respectively, on a 75Ω impedance. An additional amplifier should be inserted at the generator output, if necessary.
- The output level of the auxiliary signal generator shall be a standard TV color bar Move signal for TV receivers and video recorders with sound carrier that defined in Table A12 of EN 55032. An additional amplifier should be inserted at the generator output, if necessary.
- The results shall be expressed in the terms of the substitution voltage in decibels (μV), as supplied by the standard signal generator. The specified source impedance of the receiver shall be stated with the results.
- When measurements are made at the antenna terminals of the EUT, an auxiliary signal generator shall be used to feed the equipment under test input with a standard test signal (see Table A.12 of CISPR 32/ EN 55032) at the receiver tuning frequency (30MHz to 2150MHz).
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration of the above highest emission levels were recorded for the final test.

Procedure of Final Test

- EUT and support equipment were set up on the table as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 2150MHz. recorded the value, the local frequency, amplitude, were recorded in which correction factors were used to calculate the emission level and compare reading to the applicable limit, and only Q.P reading will record in this report.
- Recorded at least the six highest emissions. Emission frequencies, amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst-case condition(s) was recorded.

7.4.2. DATA SAMPLE

Freq. (MHz)	Matching Factor (dB)	Spectrum Reading (dBuV)	SG Level (dBuV)	Emission (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Note (F/H/O)
x.xx	12.2	14.0	38.4	26.2	46	-19.8	F

- Freq. = Emission frequency in MHz
- Matching Factor = Matching network(50/75Ω) attenuation
- Spectrum Reading= Spectrum analyzer reading
- S.G. Level = Standard S.G. output level
- Emission = SG Level - Matching Factor
- Limit Line = Limit stated in standard
- Over Limit = Reading in reference to limit
- F = Fundamental
- H = Harmonics
- O = Other

Calculation Formula

Over Limit (dB) = Emission (dBμV) – Limit Line (dBμV)

7.4.3. TEST RESULTS

Model No.	N/A	6dB Bandwidth	N/A
Environmental Conditions	N/A	Test Mode	N/A
Tested by	N/A		

Note: No applicable, the EUT doesn't have tuner port.

7.5. HARMONICS CURRENT MEASUREMENT

7.5.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15<=n<=39	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

- NOTE:** 1. Class A and Class D are classified according to item 7.5.3.
 2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.5.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

- NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-029)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The classification of EUT is according to section 5 of EN 61000-3-2.
- The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

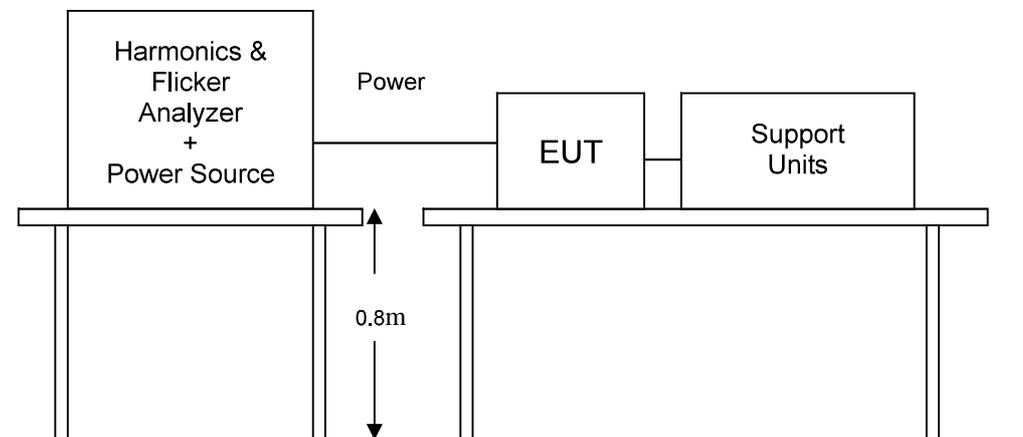
Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; television receivers and refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

7.5.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5.5. TEST RESULTS

Power Consumption	N/A	Test Results	N/A
Environmental Conditions	N/A	Limits	Class <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Test Mode	N/A	Tested by	N/A

NOTE: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

7.6. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.6.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

TEST ITEM	LIMIT	REMARK
P_{st}	1.0	P_{st} means short-term flicker indicator.
P_{lt}	0.65	P_{lt} means long-term flicker indicator.
T_{dt} (ms)	500	T_{dt} means maximum time that dt exceeds 3 %.
d_{max} (%)	4%	d_{max} means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

7.6.2. TEST INSTRUMENTS

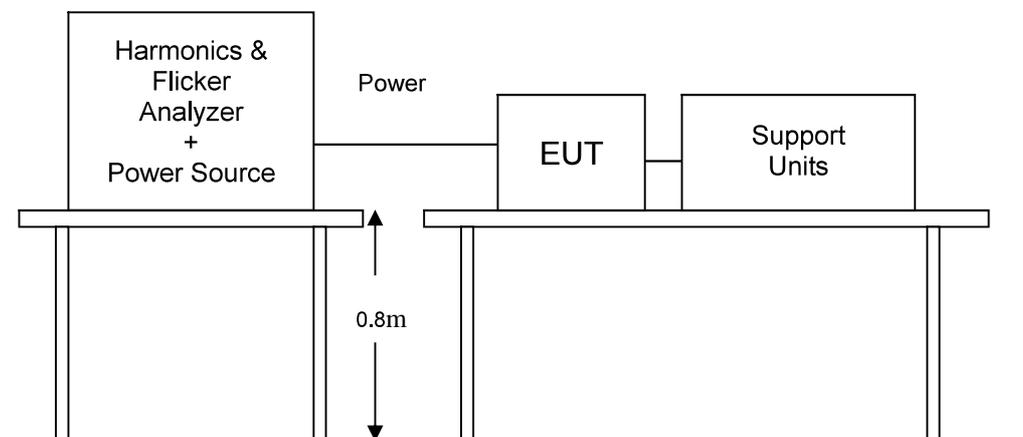
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-030)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.6.5. TEST RESULTS

Observation Period (Tp)	N/A	Test Mode	N/A
Environmental Conditions	N/A	Tested by	N/A

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARK
P _{st}	N/A	1.0	N/A
P _{It}	N/A	0.65	N/A
T _{dt} (ms)	N/A	500	N/A
d _{max} (%)	N/A	4%	N/A
dc (%)	N/A	3.3%	N/A

NOTE: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

8 IMMUNITY TEST

8.1. GENERAL DESCRIPTION

Product Standard	EN 55024: 2010 + A1: 2015	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	IEC 61000-4-2	Electrostatic Discharge - ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test - RS: 80 ~1000 MHz, 3V/m, 80% AM(1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT, AC Power Port: 1kV DC Power Port: 0.5kV Signal Ports and Telecommunication Ports: 0.5kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 μ s Open Circuit Voltage, 8/20 μ s Short Circuit Current, AC Power Port ~ line to line: 1kV, line to ground: 2kV DC Power Port ~ line to ground: 0.5kV Signal Ports and Telecommunication Ports ~ line to ground: 1kV Performance Criterion B 10/700 μ s Open Circuit Voltage Performance Criterion C
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test - CS: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power frequency magnetic field immunity test 50 or 60Hz, 1A/m Performance Criterion A
	IEC 61000-4-11	Voltage Dips: i) >95% reduction for 0.5 period, Performance Criterion B ii) 30% reduction for 25 period, Performance Criterion C Voltage Interruptions: >95% reduction for 250 period Performance Criterion C

8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

<p>Criteria A:</p>	<p>The apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<p>Criteria B:</p>	<p>After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is however allowed. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<p>Criteria C:</p>	<p>Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

8.3. ELECTROSTATIC DISCHARGE (ESD)

8.3.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 2 ; 4 ; 8 kV (Direct) Contact Discharge: 2 ; 4 kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 10 times at each test point for each polarity Contact Discharge: min. 200 times in total
Discharge Mode:	Single Discharge 1 second minimum

8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Aneroid Barometer	SATO	7610-20	89090	09/25/2018
ESD Simulator	Teseq	NSG 437	1189	10/05/2018
Thermo-Hygro Meter	Wisewind	N/A	SD-S017	10/01/2018

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

8.3.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-022)

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the **Horizontal Coupling Plane (HCP)**. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

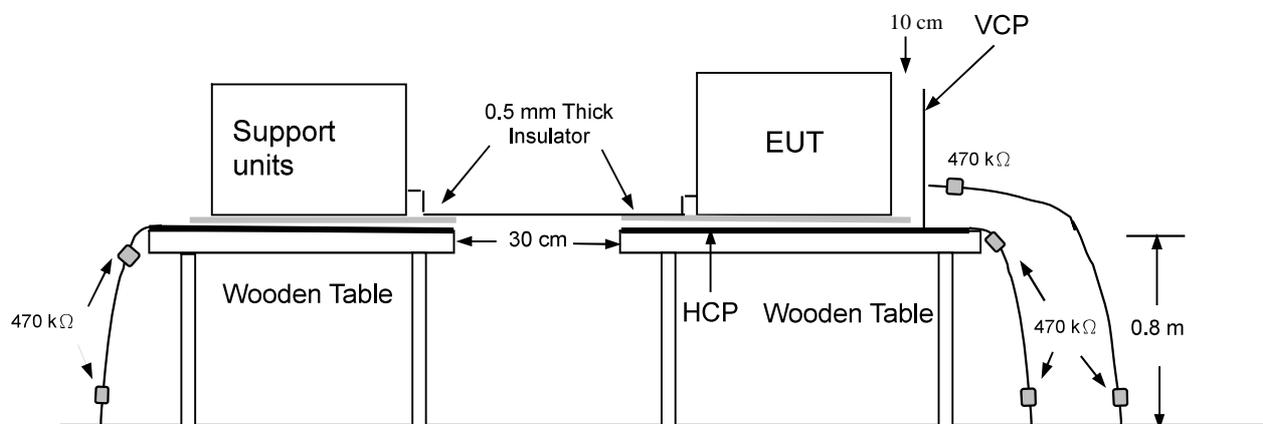
b) Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with IEC 61000-4-2:

- a) The EUT was located 0.1 m minimum from all side of the **HCP** (dimensions 1.6m x 0.8m).
- b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
- c) The time interval between two successive single discharges was at least 1 second.
- d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each **HCP** opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the **HCP** and perpendicular to its front edge during the discharge.
- g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane (VCP)** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

8.3.4. TEST SETUP



Ground Reference Plane

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

8.3.5. TEST RESULTS

Temperature	20°C	Humidity	49% RH
Pressure	1010mbar	Tested By	Alee Shen
Required Passing Performance		Criterion B	

Air Discharge							
Test Points	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2

Contact Discharge							
Test Points	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2

Discharge To Horizontal Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2

Discharge To Vertical Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2

NOTE: 1. There was no change compared with initial operation during the test.
 2. No discharge point.

8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)

8.4.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz ~ 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5m

8.4.2. TEST INSTRUMENT

844 RS Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Electric Field Probe	AR	FL7006	0338955	04/03/2019
Field of Calibration	CCS	Chamber#RS	80-1000MHz	05/01/2019
Power Sensor	Boonton	51013-4E	35812	02/08/2019
RF Power Meter	Boonton	4242-01-02	14357	02/08/2019
Thermo-Hygro Meter	Wisewind	N/A	SD-S018	11/06/2018
Broadband Antenna	AR	AT1080	311819	N.C.R
Power Amplifier	Milmega	80RF1000-600	1079361	N.C.R
Signal Generator	Agilent	N5181A	MY47421336	11/23/2018
Software	Emcware Ver. 2.6.0.16			

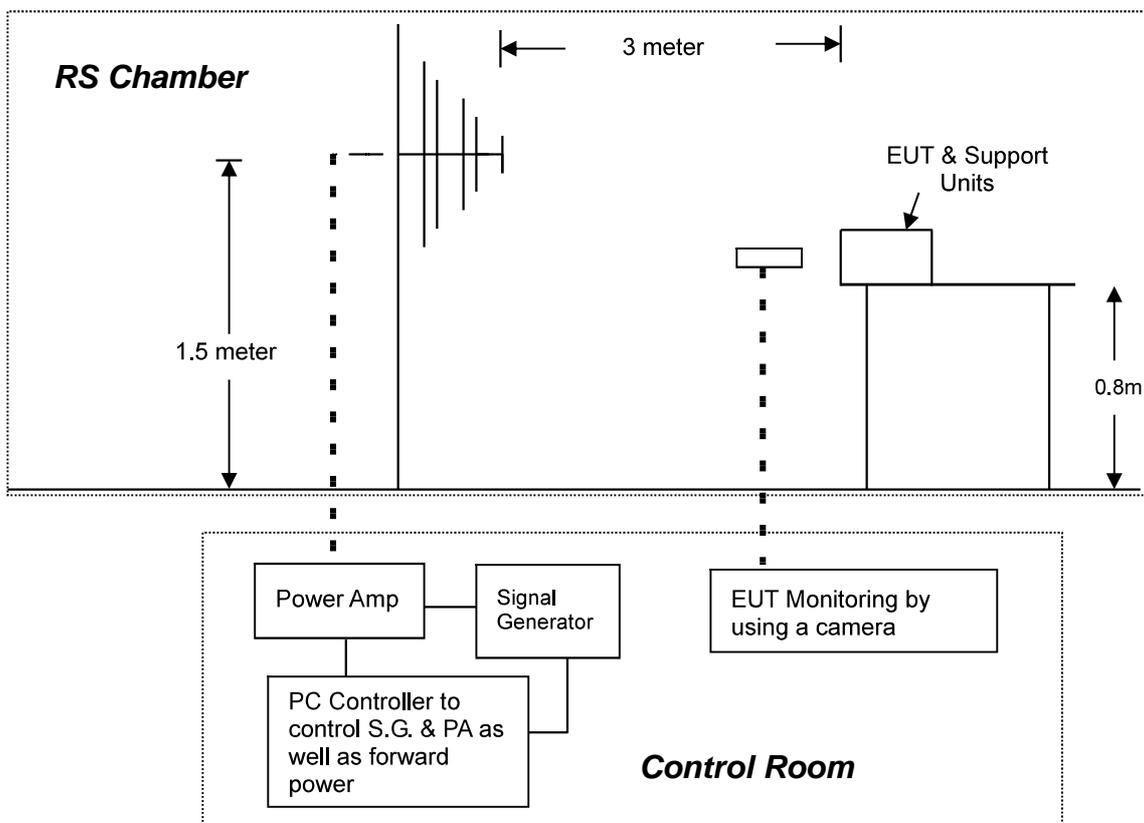
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R.= No Calibration required.

8.4.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-023)

The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

8.4.4. TEST SETUP



- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

8.4.5. TEST RESULTS

Temperature	25°C	Humidity	57% RH
Pressure	1010mbar	Dwell Time	3 sec.
Tested By	Alee Shen	Required Passing Performance	Criterion A

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 1000	V&H	0	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 1000	V&H	90	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 1000	V&H	180	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 1000	V&H	270	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

NOTE: 1. There was no change compared with the initial operation during the test.

8.5. ELECTRICAL FAST TRANSIENT (EFT)

8.5.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	AC Power Port: 1kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave-shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

8.5.2. TEST INSTRUMENT

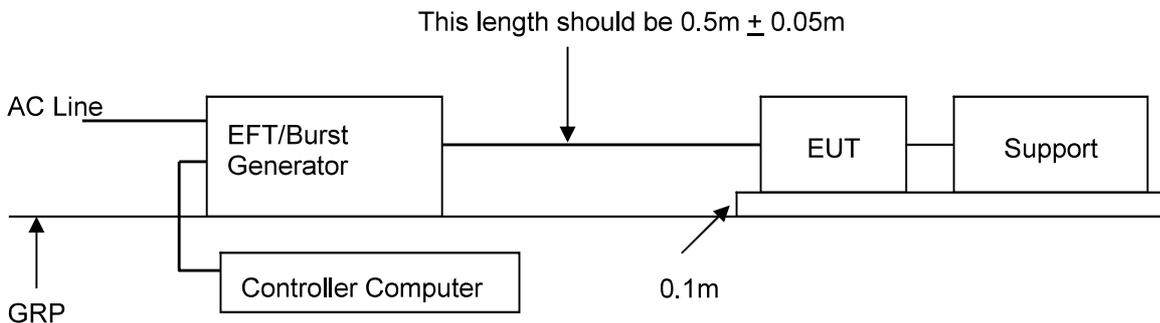
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Capacitive Clamp	EMC-Partner	CN-EFT1000	589	07/17/2018
EMC Test System	Teseq	NSG 3060	1718	11/07/2018
Software	WIN 3000Ver. 1.3.2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-024)

- a) All types of cables, including their length, and the interface port of the EUT to which they were connected.
- b) Both positive and negative polarity discharges were applied.
- c) The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter.
- d) The duration time of each test sequential was 1 minute.
- e) The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

8.5.4. TEST SETUP



- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.1m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

8.5.5. TEST RESULTS

Temperature	26°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Alee Shen
Required Passing Performance		Criterion B	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L – N	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L – PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N – PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L – N – PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

NOTE: 1. There was no change compared with initial operation during the test.

8.6. SURGE IMMUNITY TEST

8.6.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 μ s Open Circuit Voltage 8/20 μ s Short Circuit Current
Test Voltage:	AC Power Port~ line to line: 1kV, line to ground: 2kV
Surge Input/Output:	AC Power Line: L-N / L-PE / N-PE
Generator Source Impedance:	2 ohm between networks 12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0° / 90° / 180° / 270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

8.6.2. TEST INSTRUMENT

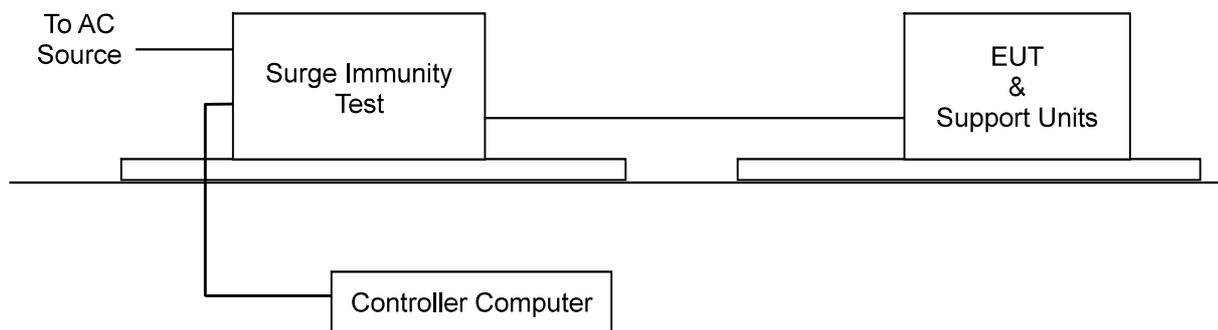
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R.= No Calibration required.

8.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-025)

- a) For EUT power supply:
The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.
- b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:
The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.
- c) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:
The surge was applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor were not specified. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

8.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

8.6.5. TEST RESULTS

Temperature	N/A	Humidity	N/A
Pressure	N/A	Tested By	N/A
Required Passing Performance		Criterion B	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L - N	+/-	1	<input type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
L - PE	+/-	2	<input type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
N - PE	+/-	2	<input type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

NOTE: 1. The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

8.7.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz ~ 80 MHz
Field Strength:	3 Vrms
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupled cable:	Power Mains, Unshielded
Coupling device:	CDN-M3(3 wires)

8.7.2. TEST INSTRUMENT

CS Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Attenuator	EMCI	SA3NL	10006F	N.C.R
CDN	Teseq	CDN M016	35820	02/05/2019
CDN	Teseq	CDN M016	35821	02/05/2019
Continuous Wave Simulator	EM Test	CWS 500N1.4	P1446143188	02/04/2019
CDN	SCHAFFNER	CDN M325	17457	12/07/2018
Software	icd.controlVer. 5.3.5			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.7.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-026)

The EUT shall be tested within its intended operating and climatic conditions.

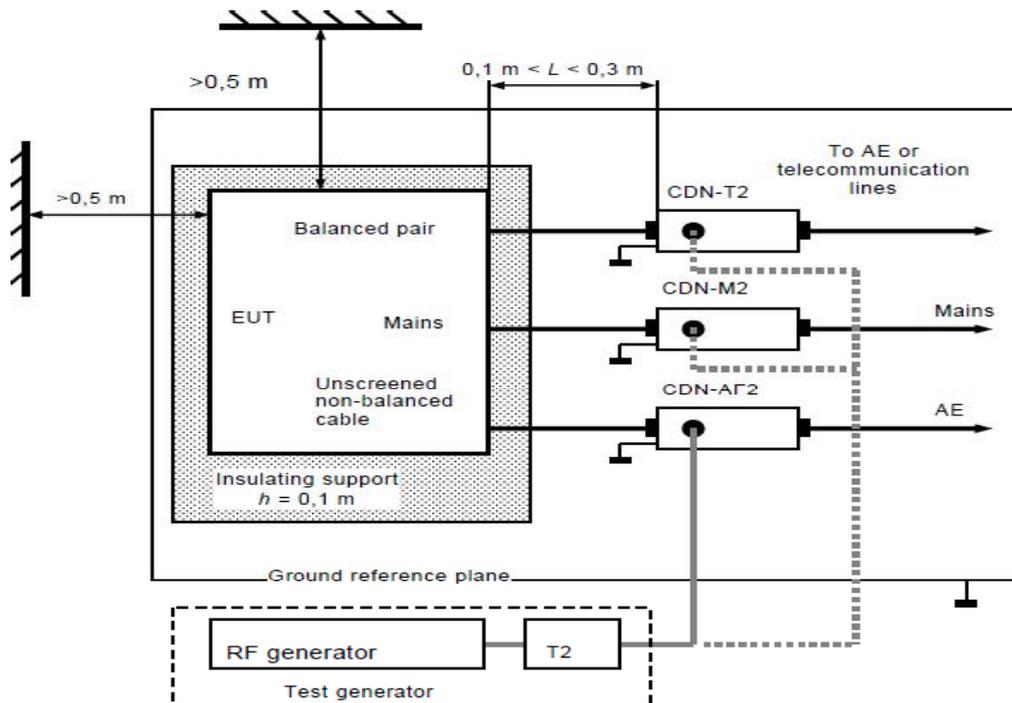
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5×10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts were made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

8.7.4. TEST SETUP



Note: 1. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.
 2. The EUT clearance from any metallic obstacles shall be at least 0.5m.

- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

NOTE:

TABLE-TOP AND FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

8.7.5. TEST RESULTS

Temperature	26°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Alee Shen
Required Passing Performance		Criterion A	

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Power Line (0.3m)	CDN-M3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

NOTE: 1. There was no change compared with initial operation during the test.

8.8. POWER FREQUENCY MAGNETIC FIELD

8.8.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-8
Frequency Range:	50 Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

8.8.2. TEST INSTRUMENT

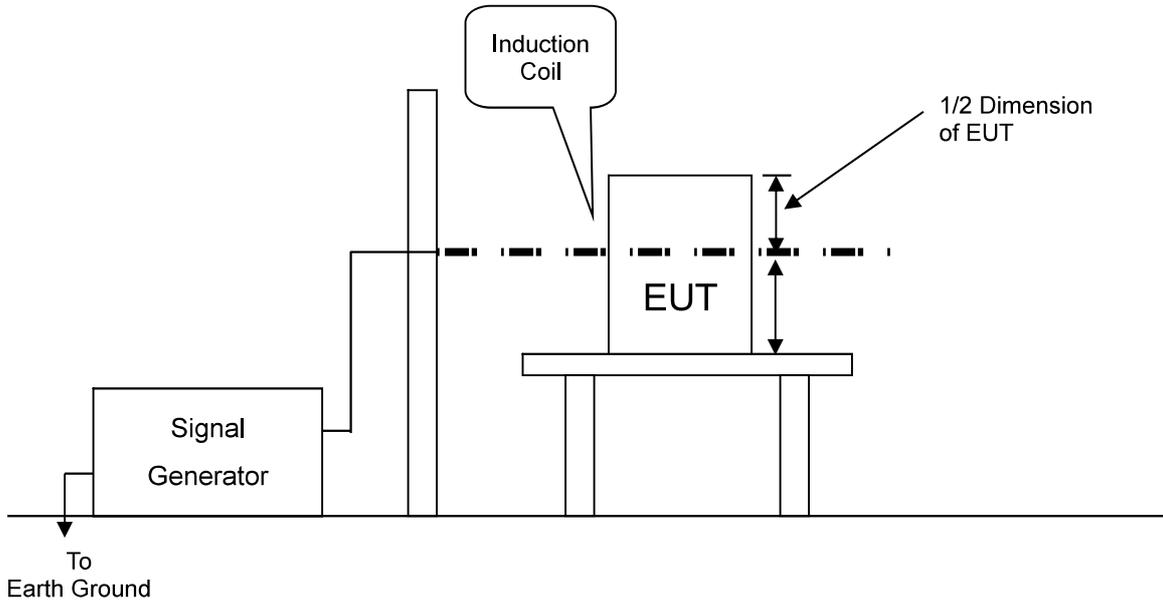
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.8.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-027)

- a. The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.
- b. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- c. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- d. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

8.8.4. TEST SETUP



- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

8.8.5. TEST RESULTS

Temperature	N/A	Humidity	N/A
Pressure	N/A	Tested By	N/A
Required Passing Performance		Criterion A	

DIRECTION	Field Strength (A/m)	Performance Criterion	OBSERVATION	RESULTS
X	1	A	Note	N/A
Y	1	A	Note	N/A
Z	1	A	Note	N/A

NOTE: There is no any sensitive part for magnetic field test. Applicable only to equipment containing susceptible to magnetic field.

8.9. VOLTAGE DIPS & VOLTAGE INTERRUPTIONS

8.9.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11
Test duration time:	Minimum three test events in sequence
Interval between event:	Minimum 10 seconds
Phase Angle:	0° / 180°
Test cycle:	3 times

8.9.2. TEST INSTRUMENT

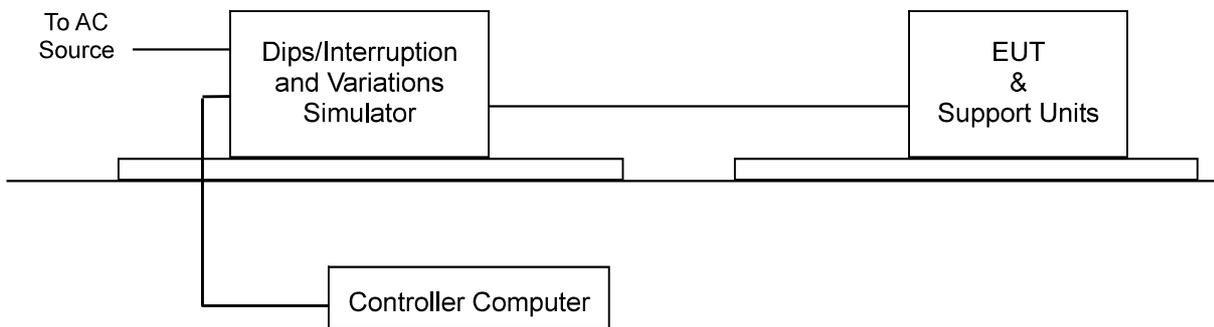
Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.9.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-028)

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

8.9.4. TEST SETUP



- For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

8.9.5. TEST RESULTS

Temperature	N/A	Humidity	N/A
Pressure	N/A	Tested By	N/A
Required Passing Performance	Criterion B: >95% reduction 0.5 period Criterion C: 30% reduction 25 period & >95% reduction 250 period		

Test Power: 230Vac, 50Hz				
Voltage (% Reduction)	Duration (Period)	Performance Criterion	Observation	Test Result
>95	0.5	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
30	25	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
>95	250	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

- NOTE:** 1. There was no change compared with initial operation during and after the test. No unintentional response was found during the test.
 2. EUT shut down, but it could recover automatically afterwards.

9 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



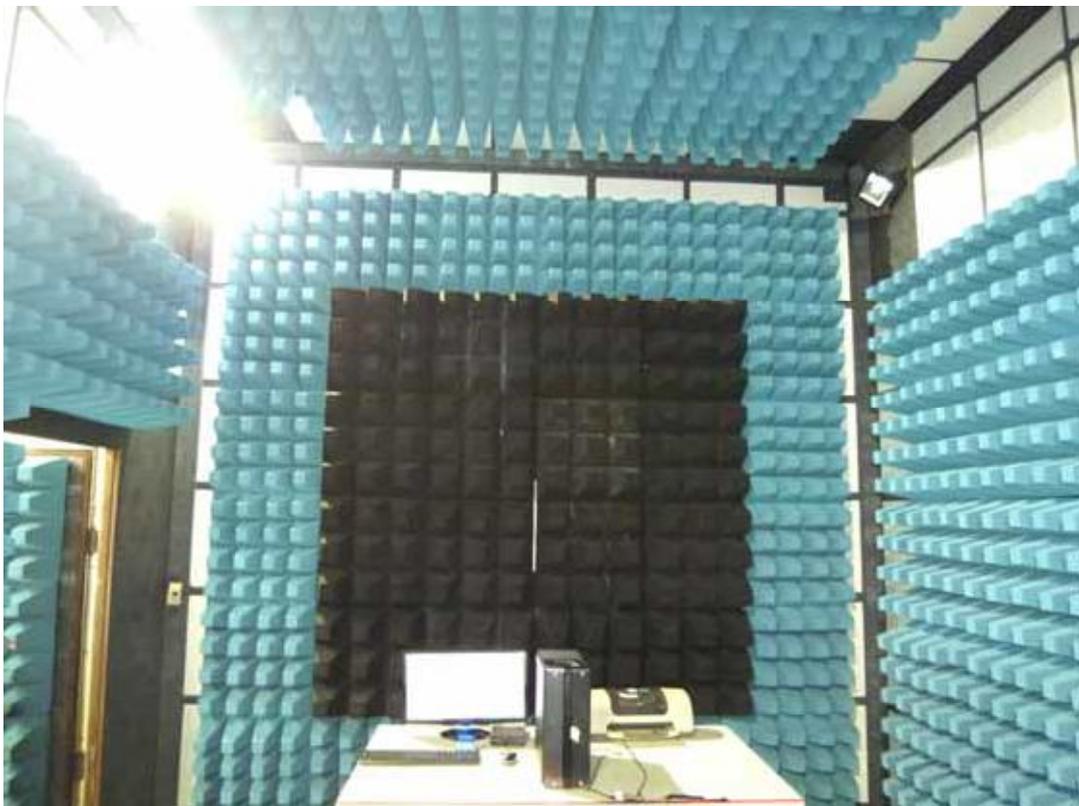
RADIATED EMISSION TEST



ESD Test



RS Test



EFT Test



CS Test



CE EMC TEST REPORT

for

WiFi+Bluetooth 4.1(HS) System on Module

MODEL: PIXI-9377

Test Report Number:
T180627D10-RE

Issued to:

TechNexion Ltd.

**16f-5, No.736, Zhongzheng Road, Zhonghe Dist.,
New Taipei City, 23511 Taiwan ROC**

Issued by:

Compliance Certification Services Inc.

Xindian Lab.

**No.163-1, Jhongsheng Rd., Xindian Dist.,
New Taipei City, 23151 Taiwan.**

TEL: 886-2-22170894

FAX: 886-2-22171029

Issued Date: August 24, 2018



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 24, 2018	Initial Issue	ALL	Joy Hsiao

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APPENDIX 1 - PHOTOGRAPHS OF EUTA1-1

1 TEST CERTIFICATION

Product: WiFi+Bluetooth 4.1(HS) System on Module

Model: PIXI-9377

Brand: TechNexion

Applicant: **TechNexion Ltd.**
16f-5, No.736, Zhongzheng Road, Zhonghe Dist.,
New Taipei City, 23511 Taiwan ROC

Manufacturer: **TechNexion Ltd.**
16f-5, No.736, Zhongzheng Road, Zhonghe Dist.,
New Taipei City, 23511 Taiwan ROC

Tested: June 29, 2018 ~ July 9, 2018

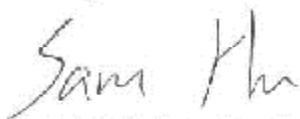
Test Voltage: 230VAC / 50Hz

Applicable Standards: **ETSI EN 301 489-17 V3.1.1 (2017-02)**
ETSI EN 301 489-1 V2.1.1 (2017-02)
EN 55032: 2015 / AC: 2016, Class B
CISPR 32: 2015 (Ed 2.0) / C1: 2016
AS/NZS CISPR 32: 2015
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 61000-4-2: 2009
EN 61000-4-3: 2006 + A1: 2008 + A2: 2010
EN 61000-4-4: 2012
EN 61000-4-5: 2014
EN 61000-4-6: 2014
EN 61000-4-11: 2004 + A1: 2017

Deviation from Applicable Standard
None

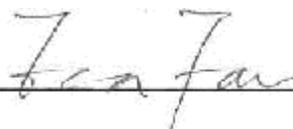
The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:



Sam Hu
Assistant Manager

Reviewed by:



Eva Fan
Supervisor of report document dept.

2 TEST RESULT SUMMARY

EMISSION			
Standard	Item	Result	Remarks
EN 55032: 2015 / AC: 2016 CISPR 32: 2015 (Ed 2.0) / C1: 2016 AS/NZS CISPR 32: 2015	Conducted (Power Port)	PASS	Meet Class B limit
	Conducted (Telecom port)	N/A	Please see the page 19
	Radiated	PASS	Meet Class B limit
	Radiated emissions from FM receivers	N/A	Please see the page 28
	Conducted differential voltage emissions from Class B equipment	N/A	Please see the page 31
EN 61000-3-2: 2014	Harmonic current emissions	N/A	Please see the page 33
EN 61000-3-3: 2013	Voltage fluctuations & flicker	N/A	Please see the page 35

IMMUNITY [ETSI EN 301 489-1 V2.1.1 (2017-02)]			
Standard	Item	Result	Remarks
EN 61000-4-2: 2009	ESD	PASS	Meets the requirements of Performance Criterion CT&CR
EN 61000-4-3: 2006 + A1: 2008 + A2: 2010	RS	PASS	Meets the requirements of Performance Criterion CT&CR
EN 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion CT&CR
EN 61000-4-5: 2014	Surge	N/A	Please see the page 49
EN 61000-4-6: 2014	CS	PASS	Meets the requirements of Performance Criterion CT&CR
EN 61000-4-11: 2004 + A1: 2017	Voltage dips & voltage variations	N/A	Please see the page 53

- Note:** 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
 2. The information of measurement uncertainty is available upon the customer's request.

3 EUT DESCRIPTION

Product	WiFi+Bluetooth 4.1(HS) System on Module
Brand Name	TechNexion
Model	PIXI-9377
Applicant	TechNexion Ltd.
Housing material	N/A
Identify Number	T180627D10
Received Date	June 27, 2018
EUT Power Rating	5VDC from Host PC Power Supply
AC Power During Test	230VAC / 50Hz to Host PC Power Supply
Frequency Range	IEEE 802.11b Mode: 2412 ~ 2472 MHz IEEE 802.11g Mode: 2412 ~ 2472 MHz IEEE 802.11n HT 20 MHz Mode: 2412 ~ 2472 MHz IEEE 802.11n HT 40 MHz Mode: 2422 ~ 2462 MHz Bluetooth: 2402 ~ 2480 MHz IEEE 802.11a Mode: 5180 ~ 5240 MHz IEEE 802.11n HT 20 MHz Mode: 5180 ~ 5240 MHz IEEE 802.11n HT 40 MHz Mode: 5190 ~ 5230 MHz IEEE 802.11ac VHT80 MHz Mode: 5210 MHz
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g Mode: OFDM IEEE 802.11n HT 20 MHz Mode: OFDM IEEE 802.11n HT 40 MHz Mode: OFDM Bluetooth 2.1 + EDR: GFSK for 1Mbps; $\pi/4$ -DQPSK for 2Mbps; 8DPSK for 3Mbps Bluetooth 4.1: GFSK IEEE 802.11a Mode: OFDM IEEE 802.11n HT20 MHz Mode: OFDM IEEE 802.11n HT40 MHz Mode: OFDM IEEE 802.11ac VHT80 MHz Mode: OFDM
Number of Channels	IEEE 802.11b Mode: 13 Channels IEEE 802.11g Mode: 13 Channels IEEE 802.11n HT 20 MHz Mode: 13 Channels IEEE 802.11n HT 40 MHz Mode: 9 Channels Bluetooth 2.1 + EDR: 79 Channels Bluetooth 4.1: 40 Channels (37 hopping + 3 advertising Channel) IEEE 802.11a Mode: 5180 ~ 5240 MHz: 4 Channels IEEE 802.11n HT20 MHz Mode: 5180 ~ 5240 MHz: 4 Channels IEEE 802.11n HT40 MHz Mode: 5190 ~ 5230 MHz: 2 Channels IEEE 802.11ac VHT80 MHz Mode: 5210MHz: 1 Channels

Transmit Power (mean EIRP)	Mode	Transmit Power (dBm)	Transmit Power (mW)
	IEEE 802.11b Mode	18.39	69.02
	IEEE 802.11g Mode	19.99	99.77
	IEEE 802.11n HT 20 MHz Mode	19.75	94.41
	IEEE 802.11n HT 40 MHz Mode	19.99	99.77
	Bluetooth 2.1 + EDR	9.66	9.25
	Bluetooth 4.1	9.89	9.75
	Mode	Transmit Power (dBm)	Transmit Power (mW)
	IEEE 802.11a Mode		
	5180 ~ 5240 MHz	19.32	85.51
	IEEE 802.11n 20 MHz Mode		
	5180 ~ 5240 MHz	16.83	48.19
	IEEE 802.11n 40 MHz Mode		
	5190 ~ 5230 MHz	17.28	53.46
IEEE 802.11ac VHT80 MHz Mode			
5210 MHz	17.36	54.45	
Antenna Specification	FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 4dBi Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 4dBi FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 6dBi Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 6dBi		
Temperature Range	0°C ~ +70°C		
S.W Version	1.0		
H.W: Version	A1		

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH

Note: Client consigns only one model sample to test (Model Number: PIXI-9377).

4 TEST METHODOLOGY

4.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the below additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration modes are as the following:

Conduction Modes:

1	WiFi 2.4G Mode
2	WiFi 5G Mode
3	BT Mode
4	FPC 2.4G Mode

Radiation Modes:

1	WiFi 2.4G Mode
	WiFi 2.4G Mode / 1-6GHz
2	WiFi 5G Mode
3	BT Mode
4	FPC 2.4G Mode

Worst:

Conduction: Mode 1

Radiation: Mode 1

4.2. EUT SYSTEM OPERATION

1. Windows 7 boots system.
2. Run Emctest.exe to activate all peripherals and display "H" pattern on monitor screen.
3. Run puttey.exe to test EUT.
4. Setup WiFi function of the EUT for test.
5. Setup FPC function of the EUT for test.

Note: Test program is self-repeating throughout the test.

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Host PC Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name
1	HDD	DT01ACA100	N/A	N/A	TOSHIBA
2	CPU (Socket FCLGA1151 / 3.5GHz)	i5-6600K	N/A	N/A	INTEL
3	RAM (DDR4 2666)	N/A	N/A	N/A	Samsung
4	Graphic card	GTX980	N/A	N/A	NVIDIA
5	Power Supply	DPS-600WB B	N/A	N/A	DELTA
6	Motherboard	IPM17-TP	N/A	N/A	HP
7	ODD	DU-8AESH	N/A	N/A	LiteOn

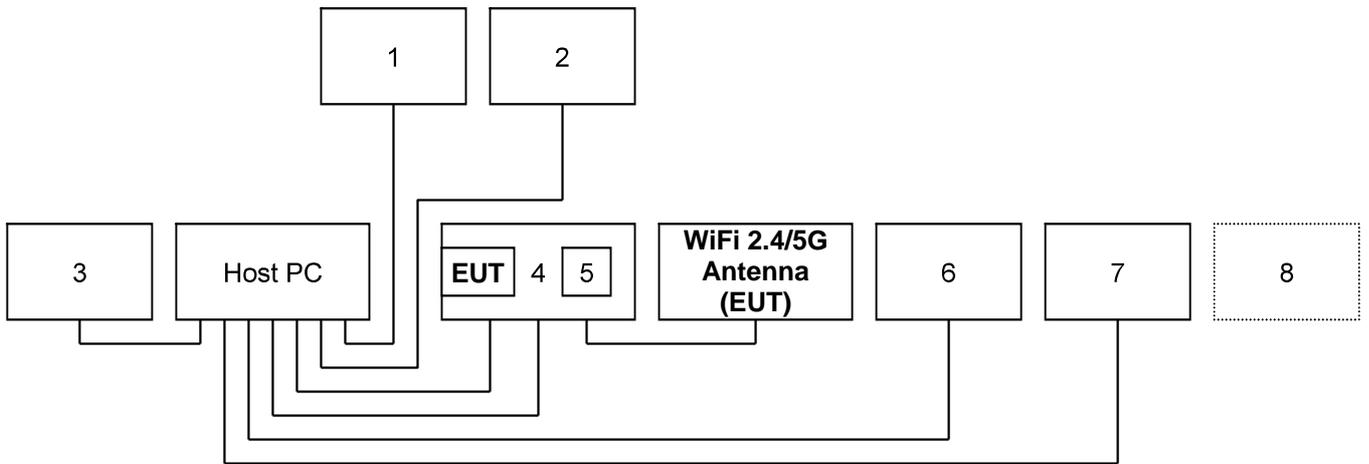
Peripherals Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	USB Mouse	M-U0026	N/A	DOC BSMI: T41126	Logitech	Shielded, 1.8m	N/A
2	USB Keyboard	Y-U0011	N/A	DOC BSMI: T51160	Logitech	Shielded, 1.8m	N/A
3	Modem	AL-56ERM	0MERM04A0212	DOC	GALILEO	Shielded, 1.8m	Unshielded, 1.8m
4	ARM Cortex-A7 NXP i.MX7, Small Footprint, System on Module	PICO-IMX7	N/A	N/A	TechNexion	N/A	N/A
5	Qualcomm Atheros QCA-9377 CLIX module	CLIX-9377	N/A	N/A	TechNexion	N/A	N/A
6	Monitor	PA248Q	G5LMQS071275	BSMI: R31018	ASUS	Shielded, 1.8m	Unshielded, 1.8m
7	Printer	SNPRB-1202-01	CN54K185HY	BSMI: R33001	HP	Shielded, 1.6m	Unshielded, 1.8m
8	Server Notebook	XPS13	7R0S3G2	BSMI: R31199	DELL	N/A	Unshielded, 1.8m

Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5.2. CONFIGURATION OF SYSTEM UNDER TEST



6 FACILITIES AND ACCREDITATIONS

6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at:

- No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, 23151 Taiwan.
- No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.
- No.11, Wu-Gong 6th Rd., Wugu Industrial Park, New Taipei City 248, Taiwan (R.O.C.)
- No.139, Wugong Rd., Wugu Industrial Park, New Taipei City 248, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4, CISPR 16-1-5.

6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF
USA	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions	0.15MHz ~ 30MHz	± 2.8
Radiated emissions	30MHz ~ 1000MHz	± 5.3
	1000MHz ~ 6000MHz	± 4.6

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22: 2005, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than U_{CISPR} which is 3.6dB and 5.2dB respectively. CCS values (called U_{Lab} in CISPR 16-4-2) is less than U_{CISPR} as shown in the table above. Therefore, MU need not be considered for compliance.

7 EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT

7.1.1. LIMITS

FREQUENCY (MHz)	Class A (dBUV)		Class B (dBUV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

7.1.2. TEST INSTRUMENTS

Conducted Emission room # A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
BNC CABLE	EMEC	EMG178	BNC#A9	03/26/2019
EMI Test Receiver	R&S	ESCI	101201	09/28/2018
LISN	Schwarzbeck	NNLK 8129	8129-286	08/15/2018
LISN(EUT)	Schwarzbeck	NSLK 8127	8127527	08/15/2018
Pulse Limiter	R&S	ESH3Z2	SD-C002	08/17/2018
Thermo-Hygro Meter	Wisewind	201A	No. 02	05/06/2019
Test S/W	EZ-EMC			

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.

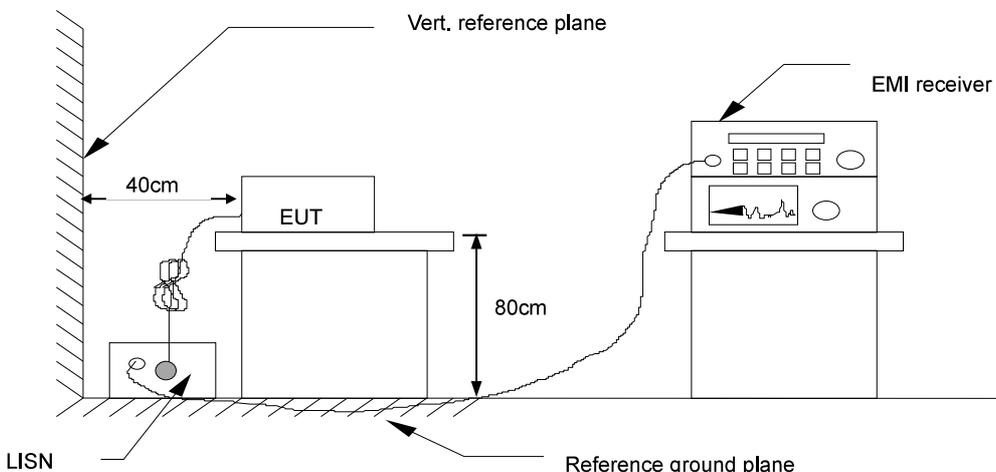
7.1.3. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031 & PA-041)**Procedure of Preliminary Test**

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55032 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per EN 55032.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

7.1.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.5. DATA SAMPLE

Freq. (MHz)	Reading (dBUV)	Factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
x.xx	42.95	0.55	43.50	56	-12.50	Q	L1

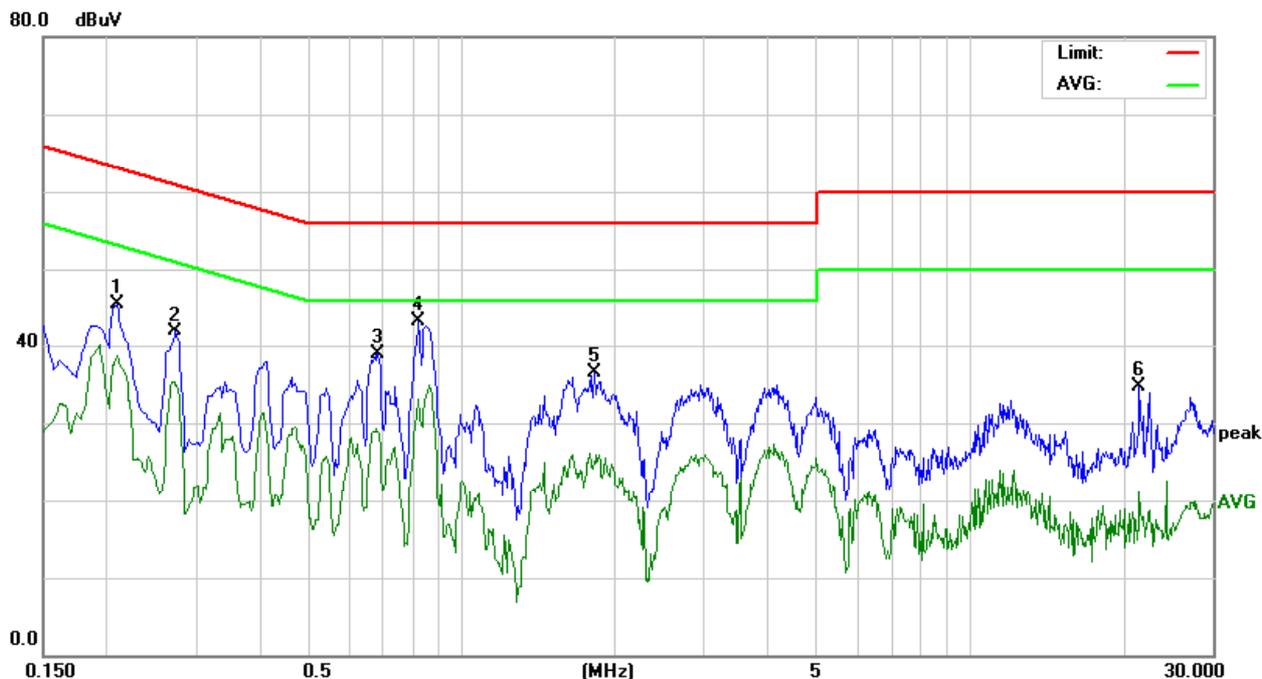
- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
- Result = Reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading
- L1 = Hot side
- L2 = Neutral side

Calculation Formula

Margin (dB) = Result (dBUV) – Limit (dBUV)

7.1.6. TEST RESULTS

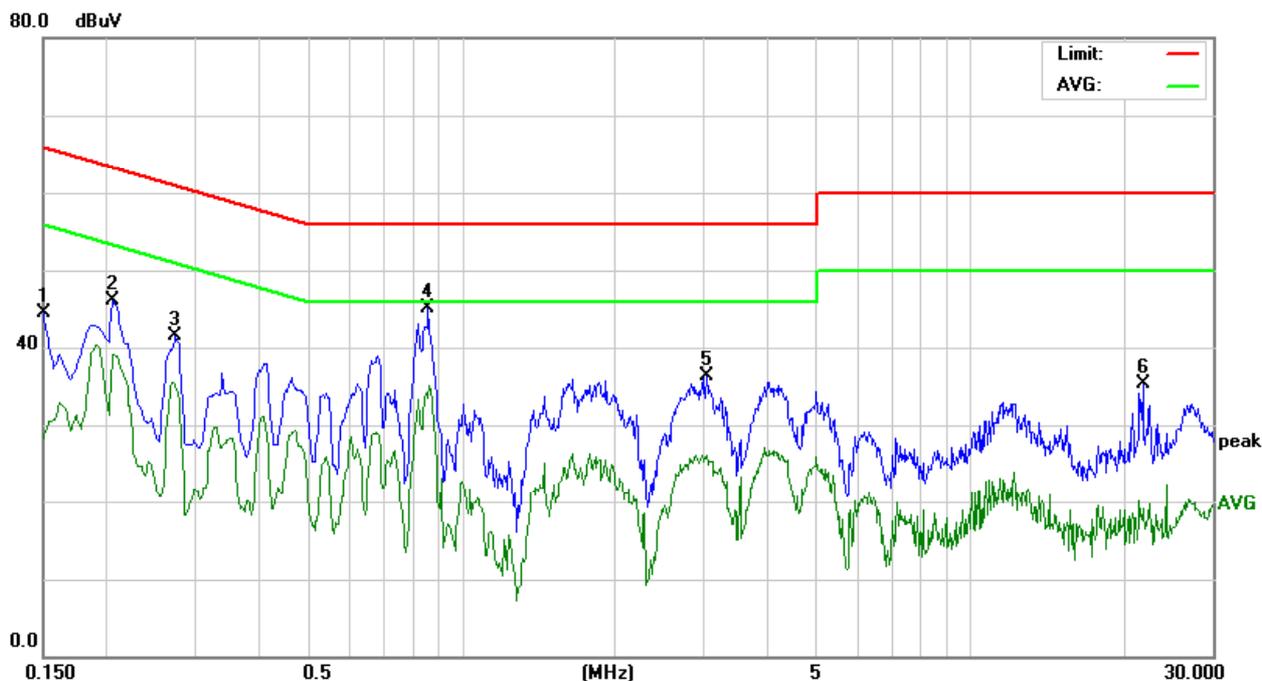
Model No.	PIXI-9377	6dB Bandwidth	9 kHz
Environmental Conditions	26°C, 53% RH	Test Mode	Mode 1
Tested by	Alee Shen	Phase	L1
Standard	EN 55032 CLASS B		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.2100	35.55	10.02	45.57	63.21	-17.64	P	L1
0.2740	31.81	10.02	41.83	61.00	-19.17	P	L1
0.6860	28.89	10.05	38.94	56.00	-17.06	P	L1
0.8220	33.25	10.06	43.31	56.00	-12.69	P	L1
1.8220	26.43	10.13	36.56	56.00	-19.44	P	L1
21.5900	23.75	11.01	34.76	60.00	-25.24	P	L1

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Model No.	PIXI-9377	6dB Bandwidth	9 kHz
Environmental Conditions	26°C, 53% RH	Test Mode	Mode 1
Tested by	Alee Shen	Phase	L2
Standard	EN 55032 CLASS B		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1500	34.45	10.01	44.46	66.00	-21.54	P	L2
0.2060	36.18	10.02	46.20	63.37	-17.17	P	L2
0.2740	31.43	10.02	41.45	61.00	-19.55	P	L2
0.8580	35.01	10.06	45.07	56.00	-10.93	P	L2
3.0340	26.15	10.17	36.32	56.00	-19.68	P	L2
21.9100	24.28	11.03	35.31	60.00	-24.69	P	L2

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

7.2. REQUIREMENTS FOR ASYMMETRIC MODE CONDUCTED EMISSIONS

7.2.1. LIMITS

For Class A Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	97 ~ 87	84 ~ 74	53 ~ 43	40 ~ 30
0.5 ~ 30.0	87	74	43	30

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

For Class B Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	84 ~ 74	74 ~ 64	40 ~ 30	30 ~ 20
0.5 - 30.0	74	64	30	20

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

7.2.2. TEST INSTRUMENTS

Conducted Emission room #				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.

7.2.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-031)

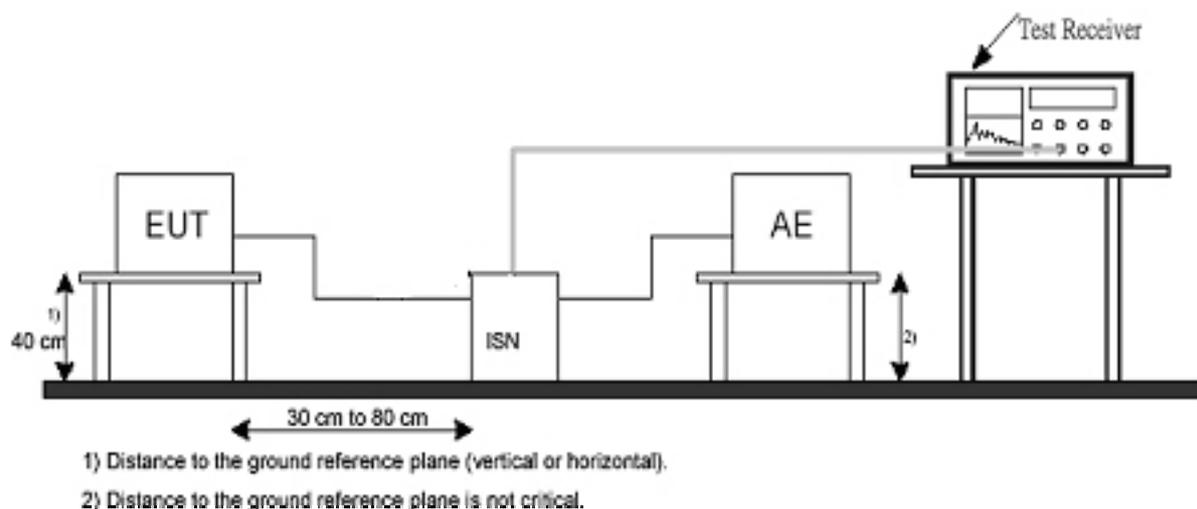
- Selecting AAN for unscreened cable or a current probe for screened cable to take measurement.
- The port of the EUT was connected to the remote side support equipment through the AAN/Current Probe and communication in normal condition.
- Making a overall range scan by using the test receiver controlled by controller and record at least six highest emissions for showing in the test report.
- Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- In case of measuring on the screened cable, the current limit shall be applied; otherwise the voltage limit should be applied.
- The following test mode was scanned during the preliminary test:

N/A

- After the preliminary scan, we found the following test mode(s) producing the highest emission level and test data of the worst case was recorded.

N/A

7.2.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)
x.xx	62.95	0.55	63.50	84	-20.50	Q

- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
- Result = Reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.2.6. TEST RESULTS

Model No.	N/A	6dB Bandwidth	N/A
Environmental Conditions	N/A	Test Mode	N/A
Tested by	N/A		

Note: No applicable, the EUT doesn't have LAN Port or Modem port.

7.3. RADIATED EMISSION MEASUREMENT

7.3.1. LIMITS

Below 1GHz

FREQUENCY (MHz)	dBuV/m (At 10m)		dBuV/m (At 3m)	
	Class A	Class B	Class A	Class B
30 ~ 230	40	30	50	40
230 ~ 1000	47	37	57	47

Above 1GHz

Frequency (MHz)	Class A (dBuV/m) (At 3m)		Class B (dBuV/m) (At 3m)	
	Average	Peak	Average	Peak
1000 ~ 3000	56	76	50	70
3000 ~ 6000	60	80	54	74

NOTE: The lower limit shall apply at the transition frequencies.

According to EN 55032: 2015 / AC: 2016 Table 1 the measurement frequency range shown in the following table:

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest internal frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	
NOTE 2 F_x is defined in 3.1.19.	

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Radiated emissions from FM receivers

Frequency range MHz	Measurement		Class B limit dB(µV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS / SAC (see Table A.1)	OATS / SAC (see Table A.1)
30 – 230	10	Quasi peak/ 120kHz	50	42
230 – 300				42
300 – 1000				46
30 – 230	3		60	52
230 – 300				52
300 – 1000				56

These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in 7.3.1 Class B Limit

7.3.2. TEST INSTRUMENTS

Open Area Test Site # H				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Bilog Antenna	Teseq	CBL 6112D	36995	06/25/2019
Cable	EMEC	CFD400NL-LW	N-Type#H11	08/17/2018
EMI Test Receiver	R&S	ESCI	101340	03/26/2019
Pre-Amplifier	HP	8447D	1937A01554	09/28/2018
Thermo-Hygro Meter	Wisewind	201A	No. 03	05/27/2019
Test S/W	EZ-EMC			
Above 1GHz Used				
Horn Antenna	EMCO	3115	00022256	08/09/2018
K-Type Cable	Rosnol	K1K50-UP0264-K1k 50-1000	170803-1	08/22/2018
Microflex Cable	Rosnol	N1K50-EW0630-N1 k50-7000	170803-1	08/22/2018
Pre-Amplifier	Com-Power	PAM-118A	551041	06/18/2019
Signal Analyzer	R&S	FSV40	101269	04/17/2019
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.

7.3.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-031 & PA-041)**Procedure of Preliminary Test**

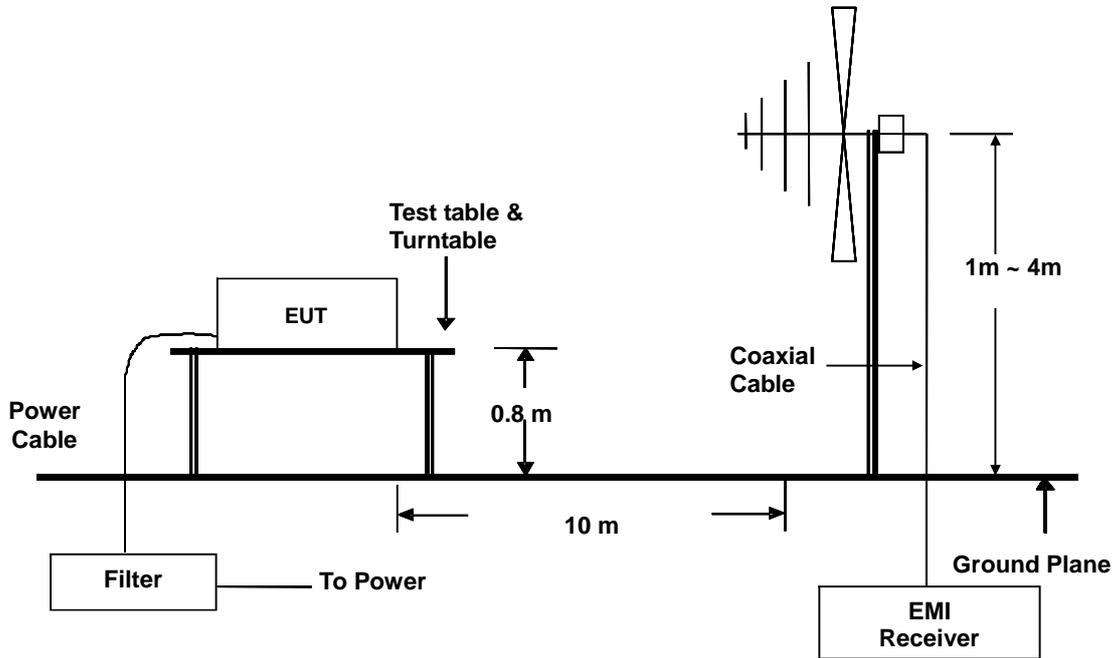
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 or 10 meter away from the EUT as stated in EN 55032. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

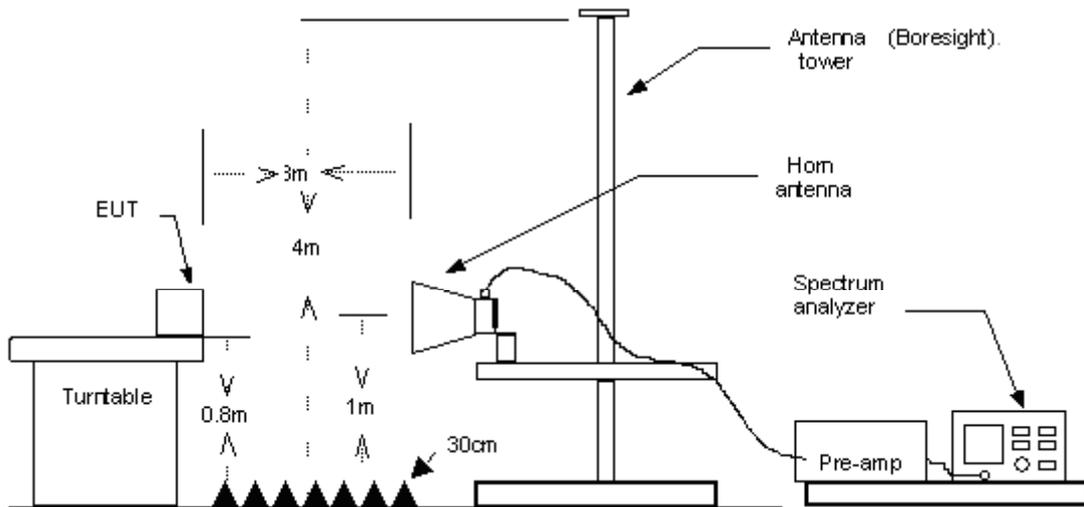
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. Below 1GHz the Q.P. reading and above 1GHz the Peak and Average reading are presented.
- The test data of the worst-case condition(s) was recorded.

7.3.4. TEST SETUP

Below 1GHz



Above 1GHz



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.
-

7.3.5. DATA SAMPLE

Below 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
x.xx	14.0	12.2	26.2	30	-3.8	Q	H

Above 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
x.xx	42.95	0.55	43.50	54	-10.50	A	H

- Freq. = Emission frequency in MHz
- Reading = Uncorrected Analyzer/Receiver reading
- Factor = Antenna Factor + Cable Loss - Amplifier Gain
- Result = Reading + Factor
- Limit = Limit stated in standard
- Margin = Reading in reference to limit
- P = Peak Reading
- Q = Quasi-peak Reading
- A = Average Reading
- H = Antenna Polarization: Horizontal
- V = Antenna Polarization: Vertical

Calculation Formula

Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)

7.3.6. TEST RESULTS

Below 1GHz

Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	29°C, 56% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Alee Shen
Standard	EN 55032 CLASS B		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
245.0050	36.30	-7.82	28.48	37.00	-8.52	100	116	Q	V
275.0040	36.10	-6.68	29.42	37.00	-7.58	100	232	Q	V
400.0110	34.20	-3.07	31.13	37.00	-5.87	400	205	Q	V
445.0020	33.70	-2.13	31.57	37.00	-5.43	400	98	Q	V
565.2290	32.10	0.37	32.47	37.00	-4.53	400	104	Q	V
616.0330	31.90	0.27	32.17	37.00	-4.83	400	183	Q	V

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	29°C, 56% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Alee Shen
Standard	EN 55032 CLASS B		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
191.5520	33.40	-10.91	22.49	30.00	-7.51	400	50	Q	H
245.0620	33.60	-7.80	25.80	37.00	-11.20	400	198	Q	H
345.0090	35.20	-5.30	29.90	37.00	-7.10	400	220	Q	H
400.0020	33.30	-3.07	30.23	37.00	-6.77	100	304	Q	H
445.1150	32.80	-2.13	30.67	37.00	-6.33	100	172	Q	H
600.0190	31.50	-0.13	31.37	37.00	-5.63	100	113	Q	H

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Above 1GHz

Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	26°C, 60% RH	6dB Bandwidth	1 MHz
Antenna Pole	Vertical / Horizontal	Antenna Distance	3m
Highest frequency generated or used	5000MHz	Upper frequency	6000MHz
Detector Function	Peak and average.	Tested by	Pipo Hou
Standard	EN 55032 CLASS B		

Radiated Emission Readings							
Frequency Range Investigated				Above 1GHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1035.000	66.58	-9.08	57.50	70.00	-12.50	P	V
1039.555	58.61	-9.07	49.54	50.00	-0.46	A	V
1485.000	59.64	-8.28	51.36	70.00	-18.64	P	V
1485.200	51.16	-8.28	42.88	50.00	-7.12	A	V
1780.000	62.50	-6.41	56.09	70.00	-13.91	P	V
1782.797	40.08	-6.40	33.68	50.00	-16.32	A	V
1930.000	55.53	-5.43	50.10	70.00	-19.90	P	V
1930.539	49.65	-5.43	44.22	50.00	-5.78	A	V
2080.000	53.76	-4.88	48.88	70.00	-21.12	P	V
2225.000	55.43	-4.71	50.72	70.00	-19.28	P	V
2226.978	42.23	-4.70	37.53	50.00	-12.47	A	V

Radiated Emission Readings							
Frequency Range Investigated				Above 1GHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1035.000	64.19	-9.08	55.11	70.00	-14.89	P	H
1039.675	54.53	-9.07	45.46	50.00	-4.54	A	H
1780.000	58.68	-6.41	52.27	70.00	-17.73	P	H
1781.698	48.49	-6.40	42.09	50.00	-7.91	A	H
1930.000	58.27	-5.43	52.84	70.00	-17.16	P	H
1930.619	47.51	-5.43	42.08	50.00	-7.92	A	H
2080.000	54.06	-4.88	49.18	70.00	-20.82	P	H
2225.000	57.92	-4.71	53.21	70.00	-16.79	P	H
2227.997	43.19	-4.70	38.49	50.00	-11.51	A	H
2394.600	37.05	-4.50	32.55	50.00	-17.45	A	H
2395.000	55.28	-4.50	50.78	70.00	-19.22	P	H
2995.000	52.95	-4.13	48.82	70.00	-21.18	P	H

Note: 1. P= Peak Reading; A= Average Reading.

Radiated emissions from FM receivers

Model No.	N/A	Test Mode	N/A
Environmental Conditions	N/A	6dB Bandwidth	N/A
Antenna Pole	N/A	Antenna Distance	N/A
Detector Function	N/A	Tested by	N/A

Note: No applicable, the EUT doesn't have FM port.

7.4. CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS FROM CLASS B EQUIPMENT

Applicable to				
1. TV broadcast receiver tuner ports with an accessible connector				
2. RF modulator output ports				
3. FM broadcast receiver tuner ports with an accessible connector				
Frequency range MHz	Class B limits DB(μV) 75 Ω			Applicability
	other	Local Oscillator Fundamental	Local Oscillator Harmonics	
30 – 950	46	46	46	See a)
950 – 2 150	46	54	54	
950 – 2 150	46	54	54	See b)
30 – 300	46	54	50	See c)
300 – 1 000			52	
30 – 300	46	66	59	See d)
300 – 1 000			52	
30 – 950	46	76	46	See e)
950 – 2 150		n/a	54	
a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.				
b) Tuner units (not the LNB) for satellite signal reception.				
c) Frequency modulation audio receivers and PC tuner cards.				
d) Frequency modulation car radios.				
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.				
Testing is required at only one EUT supply voltage and frequency.				
The term 'other' refers to all emissions other than the fundamental and the harmonics of the local oscillator.				
The test shall be performed with the device operating at each reception channel.				
The test shall cover the entire frequency range.				

7.4.1. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-041)**Procedure of Preliminary Test**

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. The EUT was placed on a wooden table with a height of 0.8 meters was used that was placed on the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source, from the outlet socket. All support equipment received power was from another socket.
- Added a $75 \longleftrightarrow 50 \Omega$ matching network, between EUT and EMI test receiver to get impedance match condition during the test.
- The output level of the auxiliary signal generator shall be set to give the value of 60 dB (μV) for FM receiver or 70 dB (μV) for TV and VCR to the input of the frequency-modulation or television receiver (or video recorder) respectively, on a 75Ω impedance. An additional amplifier should be inserted at the generator output, if necessary.
- The output level of the auxiliary signal generator shall be a standard TV color bar Move signal for TV receivers and video recorders with sound carrier that defined in Table A12 of EN 55032. An additional amplifier should be inserted at the generator output, if necessary.
- The results shall be expressed in the terms of the substitution voltage in decibels (μV), as supplied by the standard signal generator. The specified source impedance of the receiver shall be stated with the results.
- When measurements are made at the antenna terminals of the EUT, an auxiliary signal generator shall be used to feed the equipment under test input with a standard test signal (see Table A.12 of CISPR 32/ EN 55032) at the receiver tuning frequency (30MHz to 2150MHz).
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration of the above highest emission levels were recorded for the final test.

Procedure of Final Test

- EUT and support equipment were set up on the table as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 2150MHz. recorded the value, the local frequency, amplitude, were recorded in which correction factors were used to calculate the emission level and compare reading to the applicable limit, and only Q.P reading will record in this report.
- Recorded at least the six highest emissions. Emission frequencies, amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst-case condition(s) was recorded.

7.4.2. DATA SAMPLE

Freq. (MHz)	Matching Factor (dB)	Spectrum Reading (dBuV)	SG Level (dBuV)	Emission (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Note (F/H/O)
x.xx	12.2	14.0	38.4	26.2	46	-19.8	F

- Freq. = Emission frequency in MHz
- Matching Factor = Matching network(50/75Ω) attenuation
- Spectrum Reading= Spectrum analyzer reading
- S.G. Level = Standard S.G. output level
- Emission = SG Level - Matching Factor
- Limit Line = Limit stated in standard
- Over Limit = Reading in reference to limit
- F = Fundamental
- H = Harmonics
- O = Other

Calculation Formula

Over Limit (dB) = Emission (dBμV) – Limit Line (dBμV)

7.4.3. TEST RESULTS

Model No.	N/A	6dB Bandwidth	N/A
Environmental Conditions	N/A	Test Mode	N/A
Tested by	N/A		

Note: No applicable, the EUT doesn't have tuner port.

7.5. HARMONICS CURRENT MEASUREMENT

7.5.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15<=n<=39	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

- Note:** 1. Class A and Class D are classified according to item 7.5.3.
 2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.5.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-029)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The classification of EUT is according to section 5 of EN 61000-3-2.
- The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

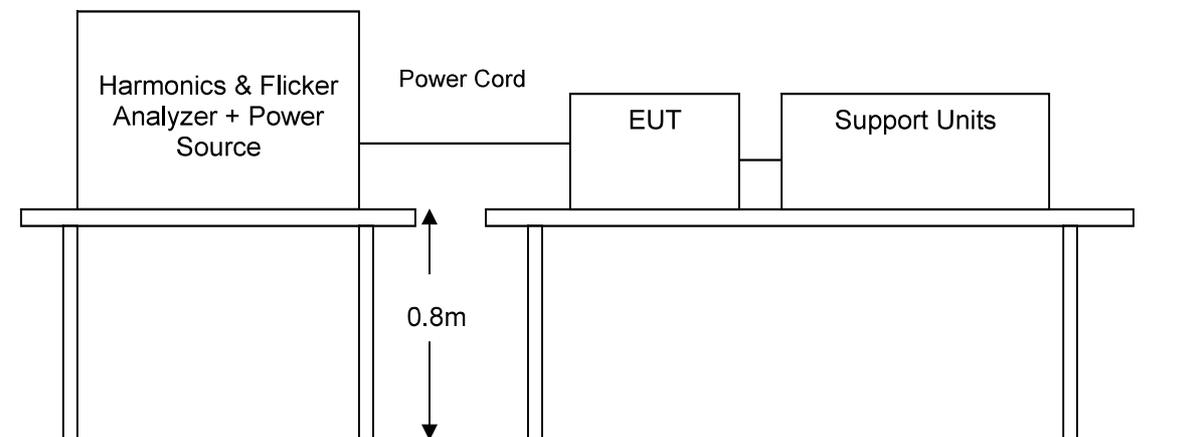
Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; television receivers and refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

7.5.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5.5. TEST RESULTS

Power Consumption	N/A	Test Results	N/A
Environmental Conditions	N/A	Limits	Class <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Test Mode	N/A	Tested by	N/A

NOTE: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

7.6. VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

7.6.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

Test Item	Limit	Remark
P _{st}	1.0	P _{st} means short-term flicker indicator.
P _{lt}	0.65	P _{lt} means long-term flicker indicator.
T _{dt} (ms)	500	T _{dt} means maximum time that dt exceeds 3.3 %.
d _{max} (%)	4%	d _{max} means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

7.6.2. TEST INSTRUMENTS

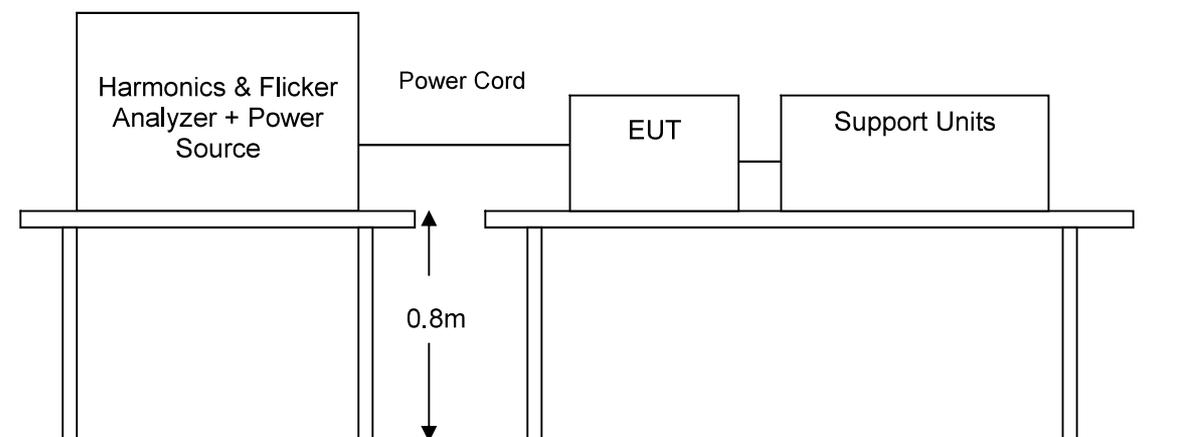
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-030)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.6.5. TEST RESULTS

Observation Period (Tp)	N/A	Test Mode	N/A
Environmental Conditions	N/A	Tested by	N/A

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARK
P _{st}	N/A	1.0	N/A
P _{lt}	N/A	0.65	N/A
T _{dt} (ms)	N/A	500	N/A
d _{max} (%)	N/A	4%	N/A
dc (%)	N/A	3.3%	N/A

NOTE: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

8 IMMUNITY TEST

8.1. GENERAL DESCRIPTION

Product Standard	ETSI EN 301 489-1 V2.1.1 (2017-02)	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion TT&TR
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 6000MHz, 3V/m, 80% AM(1kHz) Performance Criterion CT&CR
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, AC Power Port: 1kV, DC Power Port: 0.5kV; Signal Port: 0.5kV Performance Criterion TT&TR
	EN 61000-4-5	Surge Immunity Test: 1.2/50 μ s Open Circuit Voltage, 8 /20 μ s Short Circuit Current, 10/700 μ s Open Circuit Voltage AC Power Port ~ line to line: 1kV, line to earth: 2kV Signal Port ~ line to line: 0.5kV, line to earth: 1kV (Outdoor Cable) Signal Port ~ line to earth: 0.5kV (Indoor Cable) Performance Criterion TT&TR
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test –CS: AC Power Port; DC Power Port; Signal Ports: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion CT&CR
	EN 61000-4-11	Voltage Dips: 1) 0% residual 0.5 cycle Performance TT or TR 2) 0% residual 1 cycle Performance TT or TR 3) 70% residual 25 cycles Performance TT or TR 4) 0% residual 250 cycles Performance TT or TR

8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

General performance criteria

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Performance table

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Transmitters (TT)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement.

(NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

8.3. ELECTROSTATIC DISCHARGE (ESD)

8.3.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 2 ; 4 ; 8 kV (Direct) Contact Discharge: 2 ; 4 kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge 1 second minimum

8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Aneroid Barometer	SATO	7610-20	89090	09/25/2018
ESD Simulator	Teseq	NSG 437	1189	10/05/2018
Thermo-Hygro Meter	Wisewind	N/A	SD-S017	10/01/2018

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

8.3.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-022)

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 20 discharges, 10 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the **Horizontal Coupling Plane (HCP)**. The remaining three test points shall each receive at least 10 direct contact discharges. If no direct contact test points are available, then at least 20 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

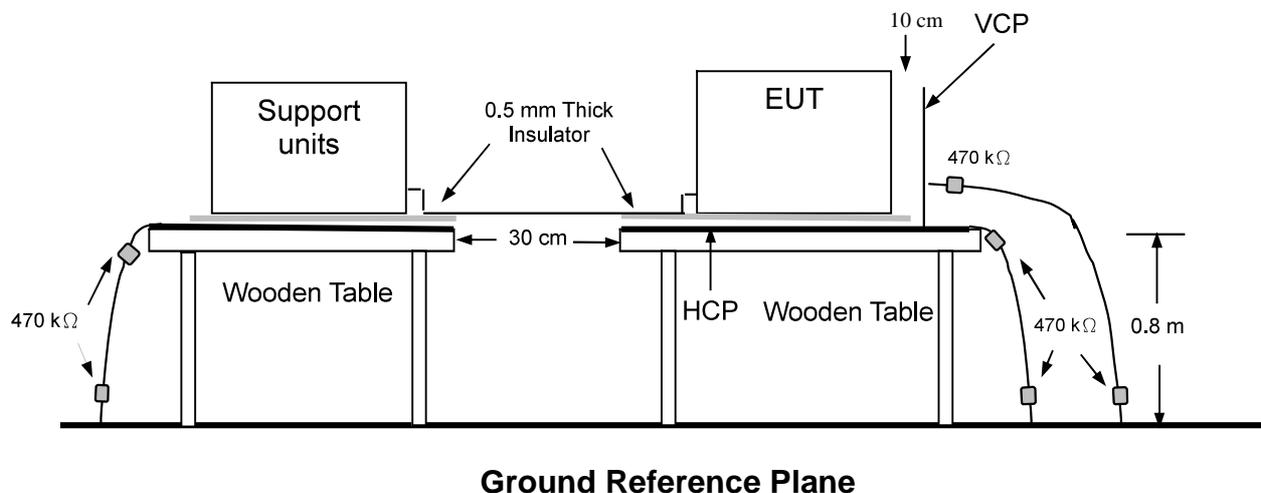
b) Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with EN 61000-4-2:

- a) The EUT was located 0.1 m minimum from all side of the **HCP** (dimensions 1.6m x 0.8m).
- b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
- c) The time interval between two successive single discharges was at least 1 second.
- d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each **HCP** opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the **HCP** and perpendicular to its front edge during the discharge.
- g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane (VCP)** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

8.3.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

8.3.5. TEST RESULTS

Temperature	20°C	Humidity	49% RH
Pressure	1010mbar	Tested By	Alee Shen
Required Passing Performance		Criterion TT&TR	

Air Discharge							
Test Points	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2

Contact Discharge							
Test Points	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2

Discharge To Horizontal Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2

Discharge To Vertical Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2

NOTE: 1. There was no change compared with initial operation during the test.
 2. No discharge point.

8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)

8.4.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-3
Frequency Range:	80 MHz ~ 6000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5m

8.4.2. TEST INSTRUMENT

RS Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Electric Field Probe	AR	FL7006	0338955	04/03/2019
Field of Calibration	CCS	Chamber#RS	80-1000MHz	05/01/2019
Power Sensor	Boonton	51013-4E	35812	02/08/2019
RF Power Meter	Boonton	4242-01-02	14357	02/08/2019
Thermo-Hygro Meter	Wisewind	N/A	SD-S018	11/06/2018
Broadband Antenna	AR	AT1080	311819	N.C.R
Power Amplifier	Milmega	80RF1000-600	1079361	N.C.R
Signal Generator	Agilent	N5181A	MY47421336	11/23/2018
Field of Calibration	CCS	Chamber#RS	1-3GHz	03/12/2019
Field of Calibration	CCS	Chamber#RS	1.7-6GHz	04/29/2019
Direction Coupler	AR	DC7200	0343647	N.C.R
Horn Antenna	EMCO	3115	5761	N.C.R
Power Amplifier	AR	60S1G3	302728	N.C.R
Power Amplifier	Milmega	AS1860-100	1075832	N.C.R
Software	Emcware Ver. 2.6.0.16			

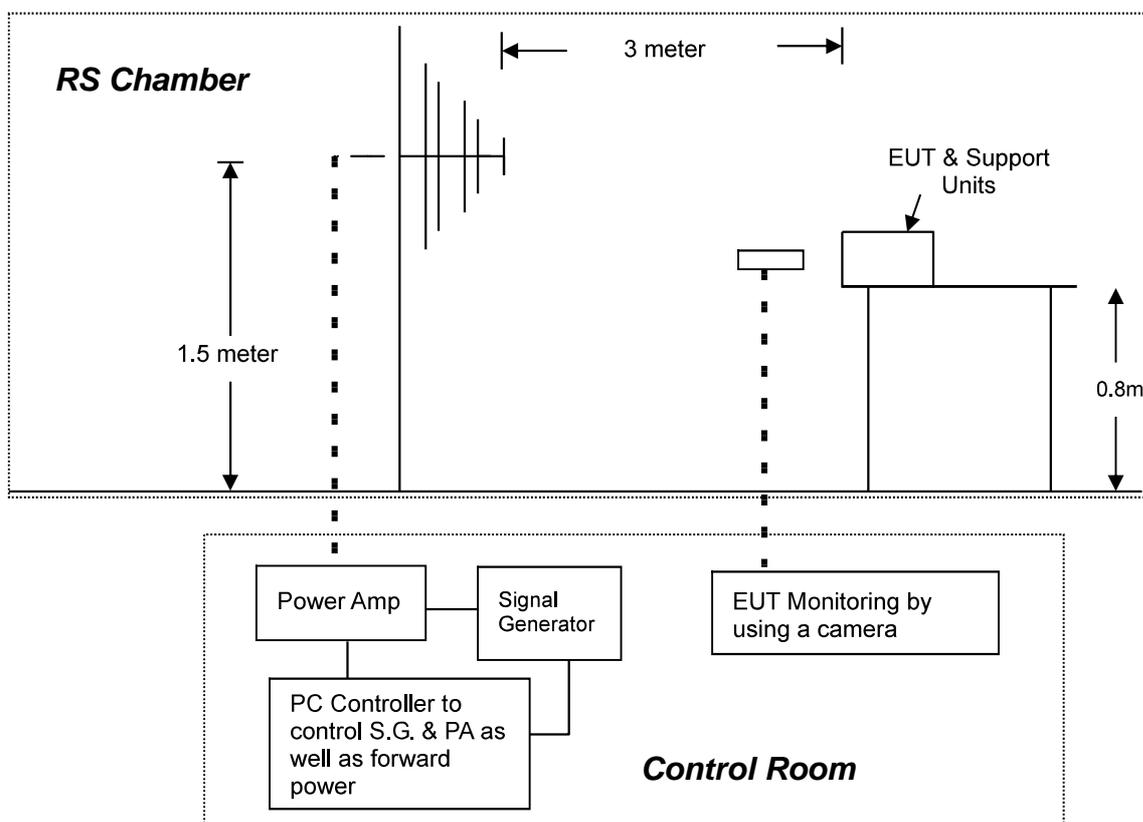
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.4.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-023)

The test procedure was in accordance with EN 61000-4-3

- a) The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- b) The frequency range is swept from 80 MHz to 6000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.
- c) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- d) The field strength level was 3 V/m.
- e) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

8.4.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

8.4.5. TEST RESULTS

Temperature	25°C	Humidity	57% RH
Pressure	1010mbar	Dwell Time	3 sec.
Tested By	Alee Shen	Required Passing Performance	Criterion CT&CR

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 6000	V&H	0	3	<input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 6000	V&H	90	3	<input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 6000	V&H	180	3	<input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 6000	V&H	270	3	<input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

NOTE: 1. There was no change compared with the initial operation during the test.

8.5. ELECTRICAL FAST TRANSIENT (EFT)

8.5.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-4
Test Voltage:	AC Power Port: 1kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave-shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

8.5.2. TEST INSTRUMENT

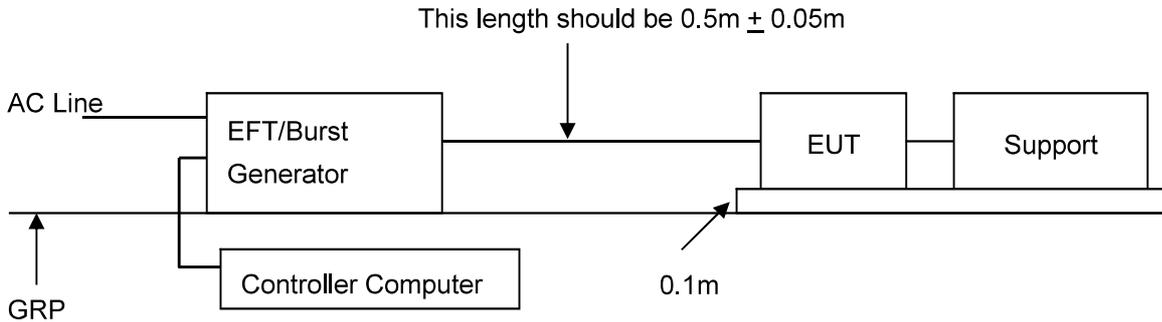
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Capacitive Clamp	EMC-Partner	CN-EFT1000	589	07/17/2018
EMC Test System	Teseq	NSG 3060	1718	11/07/2018
Software	WIN 3000Ver. 1.3.2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-024)

- a) All types of cables, including their length, and the interface port of the EUT to which they were connected.
- b) Both positive and negative polarity discharges were applied.
- c) The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter.
- d) The duration time of each test sequential was 1 minute.
- e) The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.

8.5.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

8.5.5. TEST RESULTS

Temperature	26°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Alee Shen
Required Passing Performance		Criterion TT&TR	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L - N	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
PE	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L - PE	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N - PE	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L - N - PE	+/-	1	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

NOTE: 1. There was no change compared with initial operation during the test.

8.6. SURGE IMMUNITY TEST

8.6.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 μ s Open Circuit Voltage 8/20 μ s Short Circuit Current 10/700 μ s Open Circuit Voltage
Test Voltage:	AC Power Port ~ line to line: 1kV, line to earth: 2kV
Surge Input/Output:	AC Power Line: L-N / L-PE / N-PE
Generator Source Impedance:	2 ohm between networks 12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0° / 90° / 180° / 270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

8.6.2. TEST INSTRUMENT

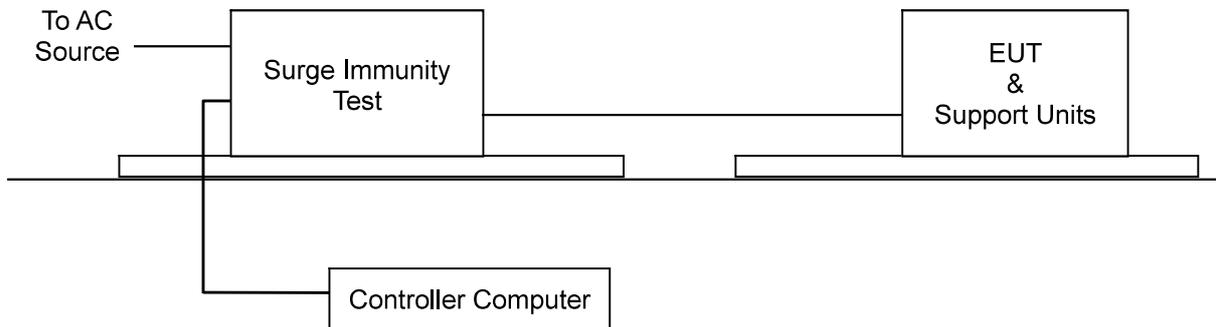
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R.= No Calibration required.

8.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-025)

- a) For EUT power supply:
The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.
- b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:
The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.
- c) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:
The surge was applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor were not specified. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

8.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.6.5. TEST RESULTS

Temperature	N/A	Humidity	N/A
Pressure	N/A	Tested By	N/A
Required Passing Performance		Criterion TT&TR	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L - N	+/-	1	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
L - PE	+/-	2	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
N - PE	+/-	2	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

NOTE: 1. The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

8.7.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-6
Frequency Range:	0.15 MHz ~ 80 MHz
Field Strength:	3 Vrms
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupled cable:	Power Mains, Unshielded
Coupling device:	CDN-M3 (3 wires)

8.7.2. TEST INSTRUMENT

CS Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Attenuator	EMCI	SA3NL	10006F	N.C.R
CDN	Teseq	CDN M016	35820	02/05/2019
CDN	Teseq	CDN M016	35821	02/05/2019
Continuous Wave Simulator	EM Test	CWS 500N1.4	P1446143188	02/04/2019
CDN	SCHAFFNER	CDN M325	17457	12/07/2018
Software	icd.controlVer. 5.3.5			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.7.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-026)

The EUT shall be tested within its intended operating and climatic conditions.

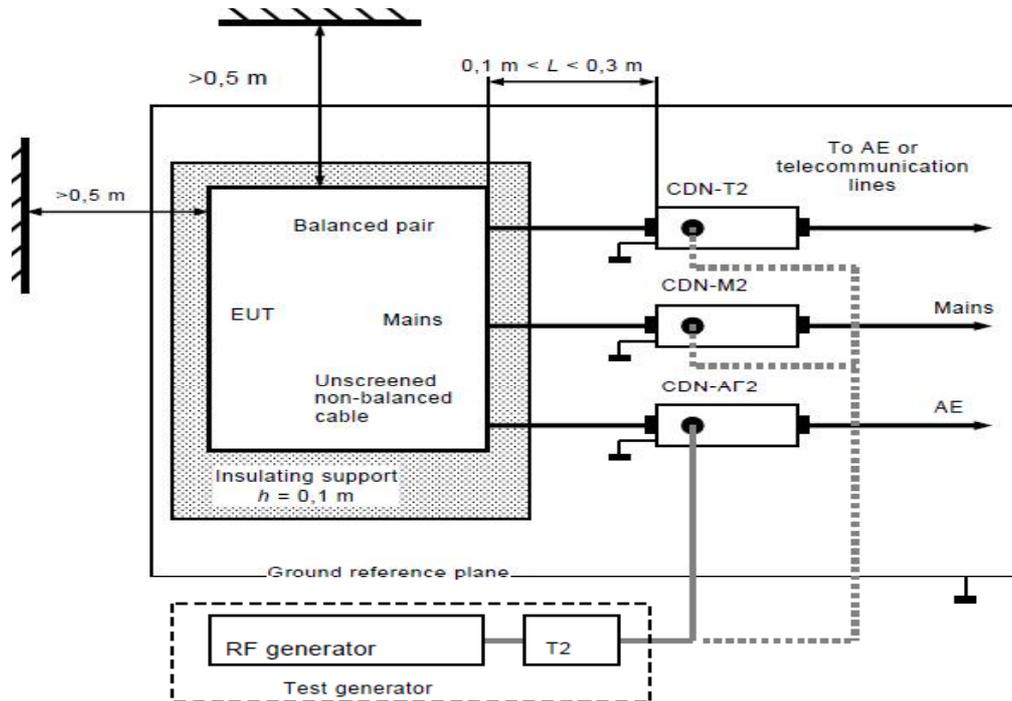
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5×10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts were made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

8.7.4. TEST SETUP



Note: 1. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.
 2. The EUT clearance from any metallic obstacles shall be at least 0.5m.

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLE-TOP AND FLOOR-STANDING EQUIPMENT

The equipment to be tested was placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

8.7.5. TEST RESULTS

Temperature	26°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Alee Shen
Required Passing Performance		Criterion CT&CR	

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Power Line (0.3m)	CDN-M3	<input checked="" type="checkbox"/> CT <input type="checkbox"/> CR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

NOTE: 1. There was no change compared with initial operation during the test.

8.8. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

8.8.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-11
Test duration time:	Minimum three test events in sequence
Interval between event:	Minimum 10 seconds
Angle:	0~360 degree
Step:	45 degree

8.8.2. TEST INSTRUMENT

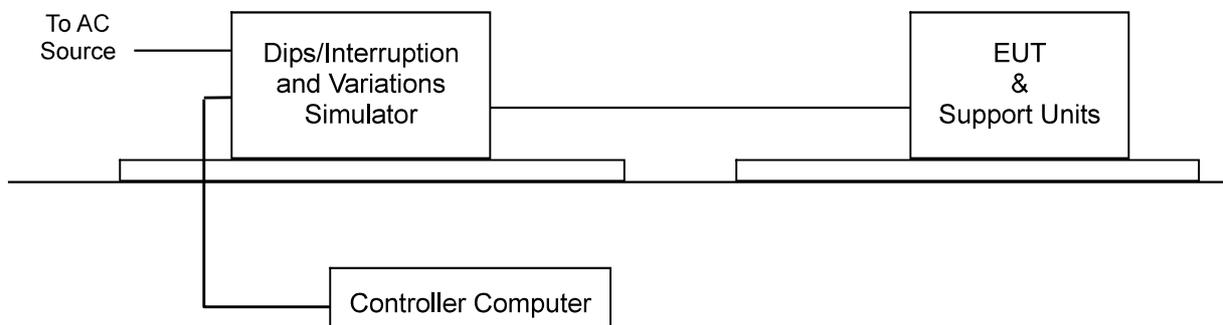
Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.8.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-028)

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

8.8.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.8.5. TEST RESULTS

Temperature	N/A	Humidity	N/A
Pressure	N/A	Tested By	N/A
Required Passing Performance	TT or TR: 0% residual 0.5 cycle 0% residual 1 cycle 70% residual 25 cycles TT or TR: 0% residual 250 cycles		

Test Power: 230Vac, 50Hz				
Voltage (% Residual)	Duration (Cycle)	Performance Criterion	Observation	Test Result
0	0.5	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
0	1	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
70	25	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
0	250	<input type="checkbox"/> CT / <input type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

NOTE: 1. The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

9 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



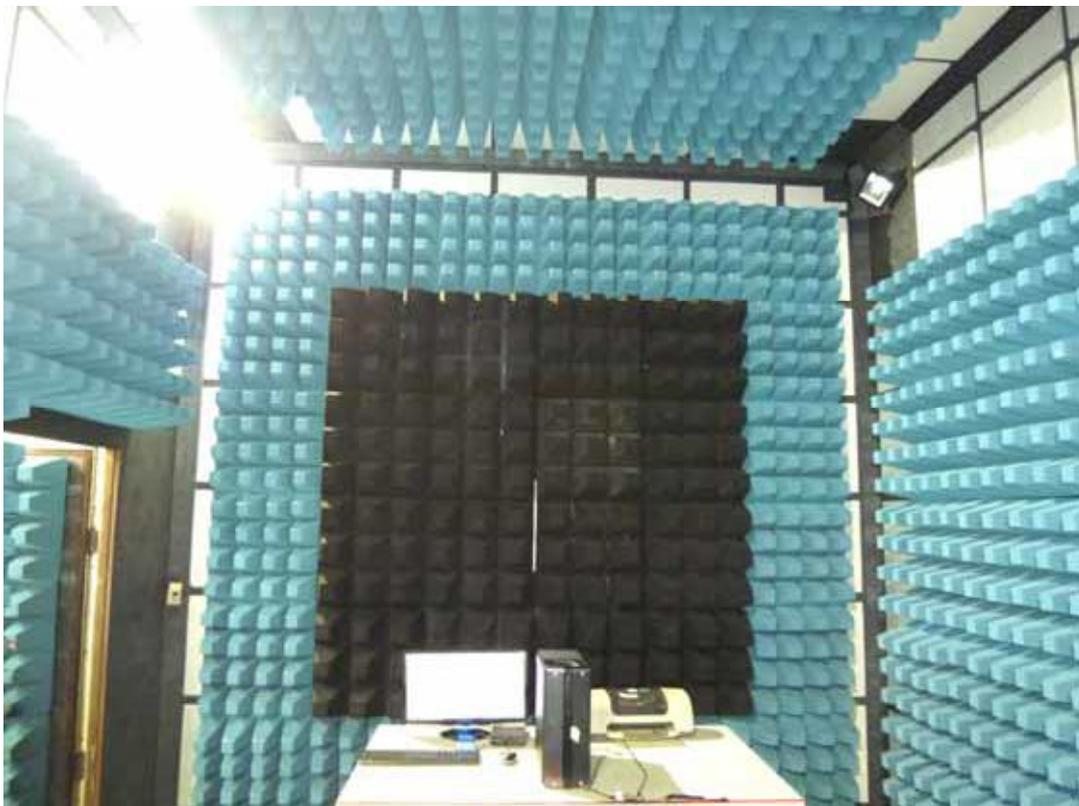
RADIATED EMISSION TEST



ESD Test



RS Test



EFT Test

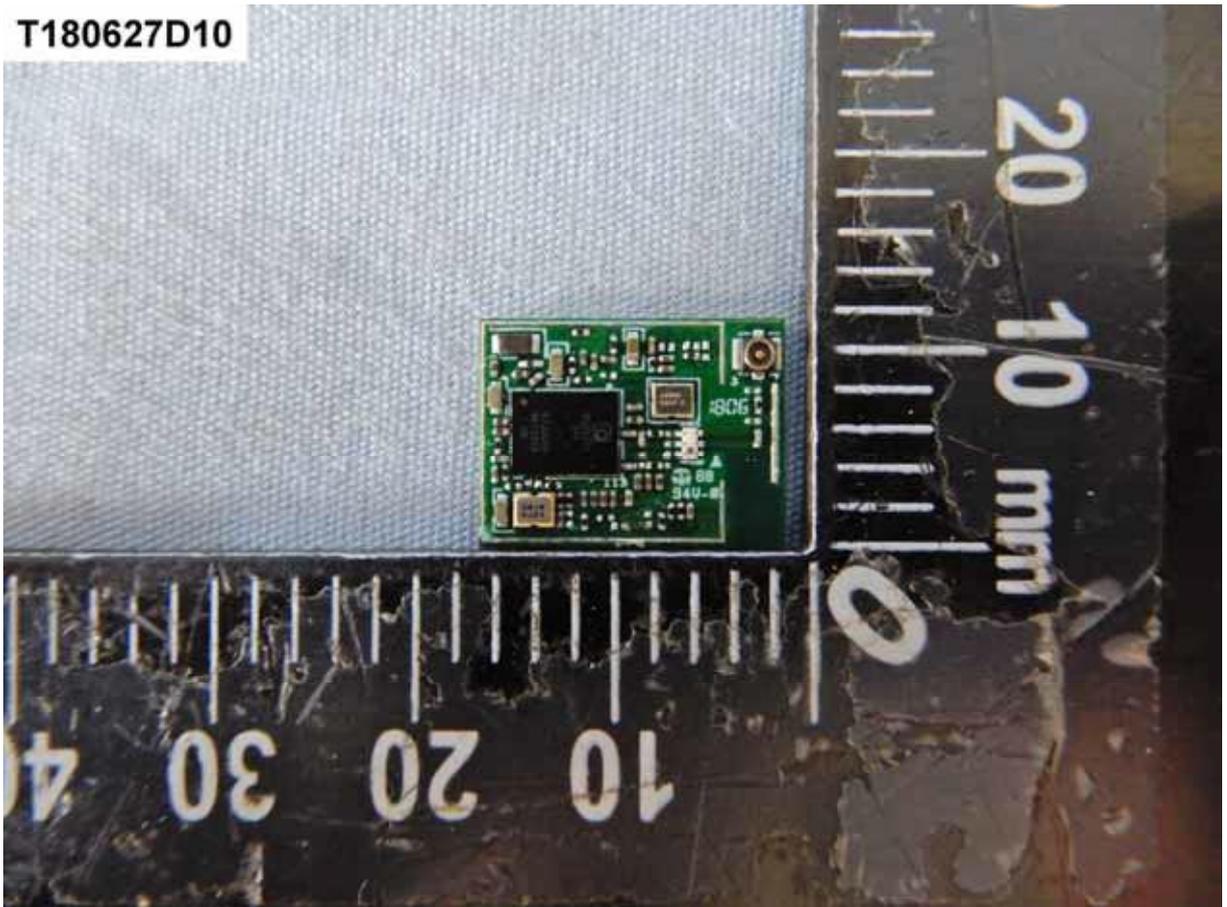


CS Test

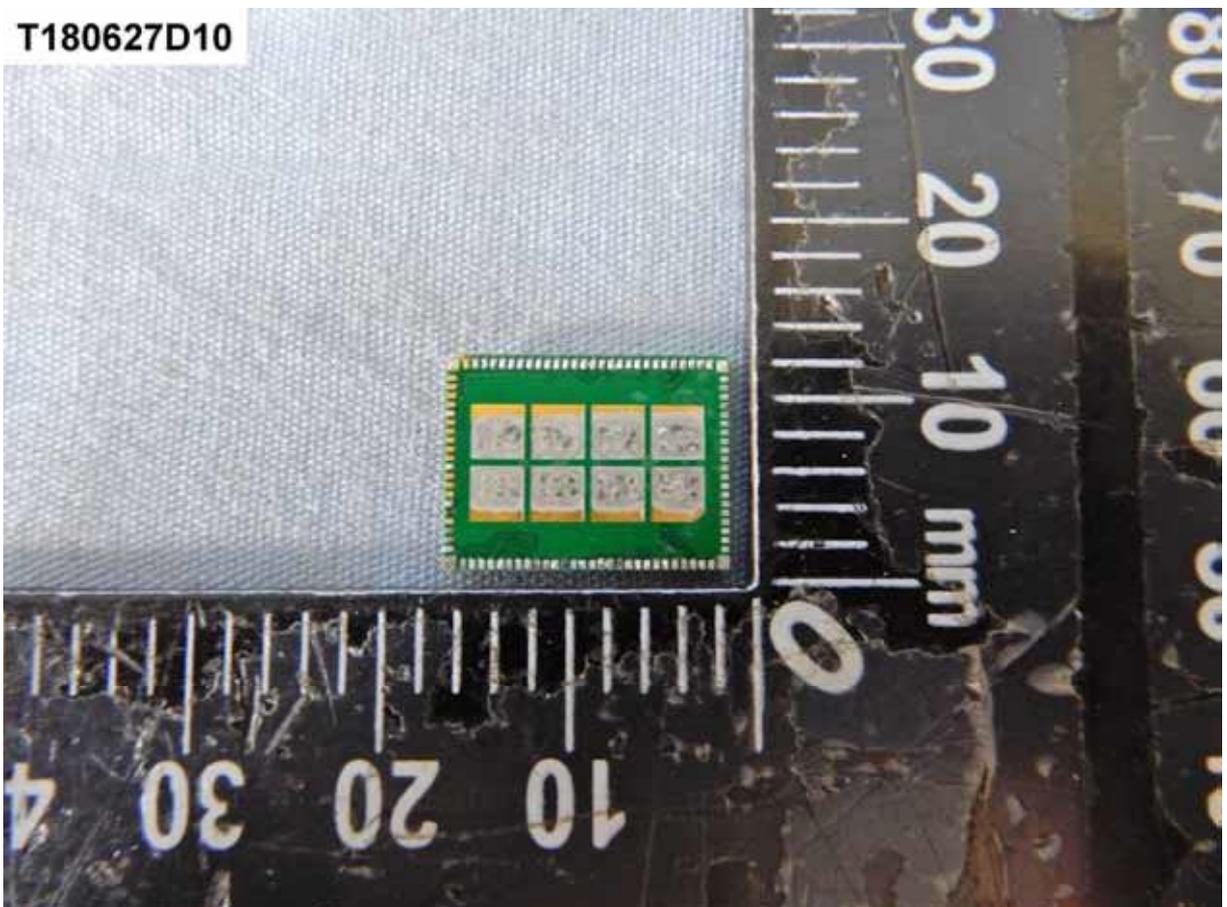


APPENDIX 1 - PHOTOGRAPHS OF EUT

T180627D10



T180627D10

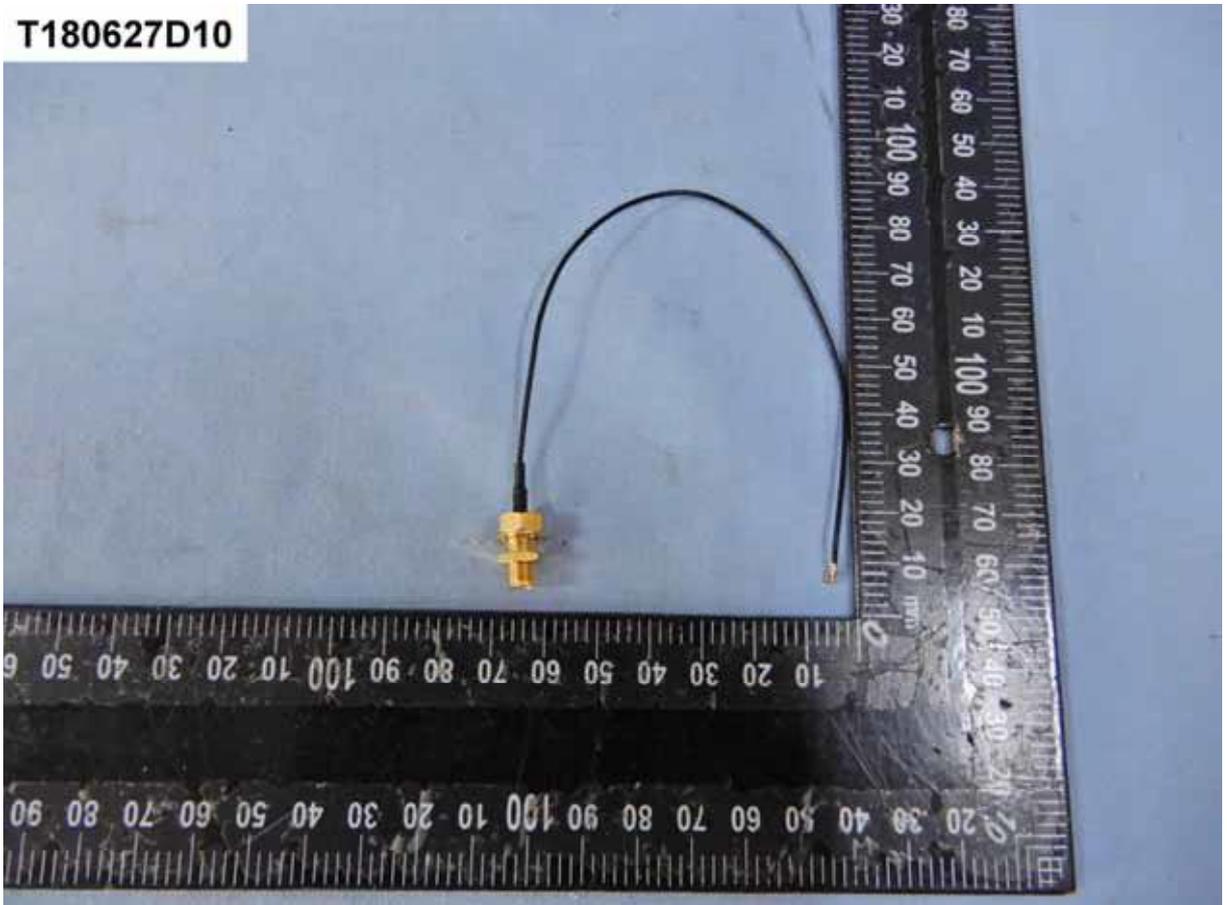


WIFI 2.4/5G Antenna

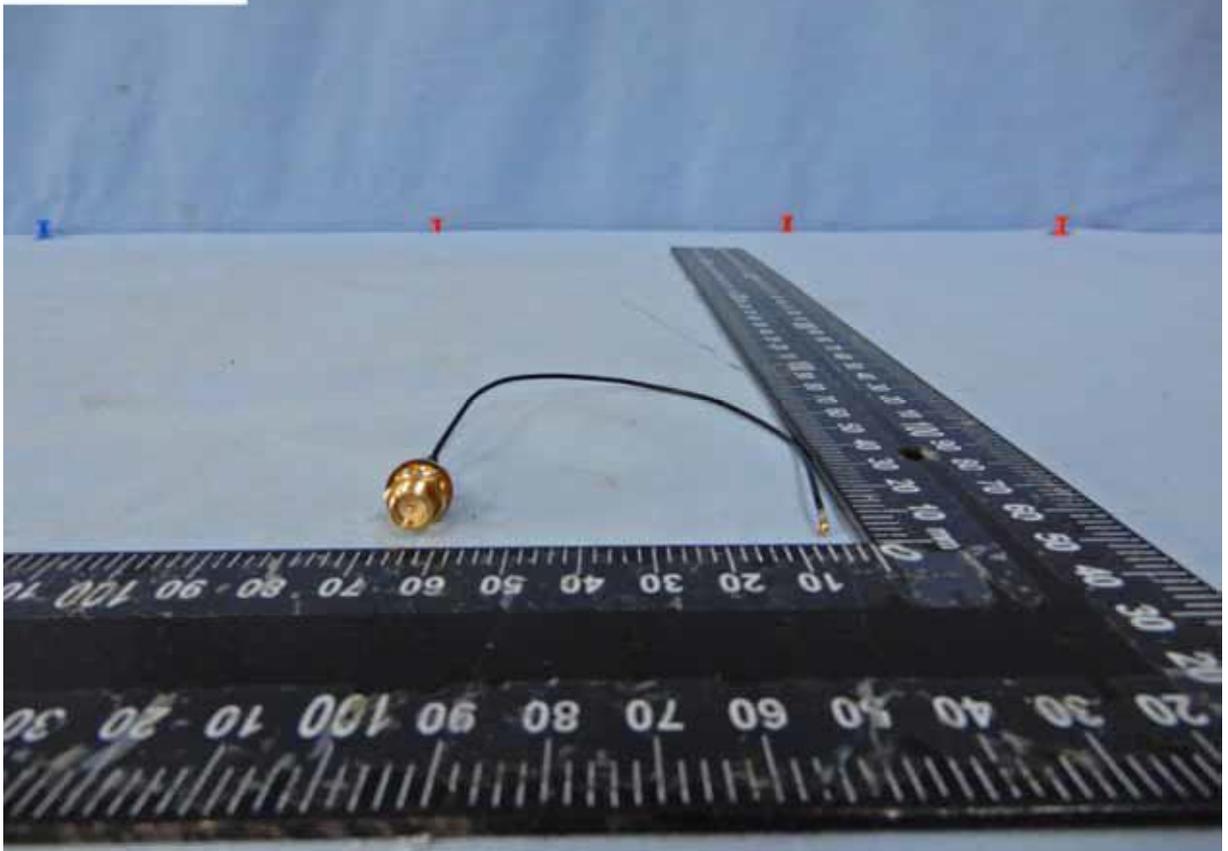
T180627D10



T180627D10



T180627D10



FPC 2.4/5G Antenna

T180627D10



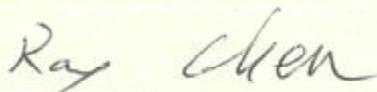
SGSCCSRFCE

VERIFICATION OF COMPLIANCE

This Verification of Compliance is hereby issued to the product designated below.

Product	WiFi+Bluetooth 4.1(HS) System on Module
Model	PIXI-9377
Trade name	TechNexion
Applicant	TECHNEXION LTD. 16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC
Applicable Standard(s)	EN 60950-1:2006+A11: 2009+A1:2010+A12:2011+A 2:2013 IEC 60950-1:2005(2nd Edition)+Am 1:2009+Am 2:2013
Report No.	T180627D10-LV
Test Laboratory	Compliance Certification Services Inc. No.11, Wugong 6th Rd., Wugu Dist.,New Taipei City 24891, Taiwan. (R.O.C.) Tel: +886-2-2299-9720 / Fax: +886-2-2299-1792

This device has been tested and found to comply with the stated standard(s), which is(are) required by the Directive 2014/35/EU . The test results are indicated in the test report and are applicable only to the tested sample identified in the report.



Ray Chen / Safety Lab. Supervisor
Date: Aug. 02, 2018

TEST REPORT
IEC 60950-1 : 2005(2nd Edition) and/or EN 60950-1 : 2006

Information Technology Equipment – Safety – Part 1:General Requirements

Report No.	T180627D10-LV
Report reference No.	N/A
Date of duration	2018-07-05 to 2018-07-10
Organization	Compliance Certification Services Inc.
Organization Address.....	No.11, Wugong 6th Rd., Wugu Dist.,New Taipei City 24891, Taiwan. (R.O.C.)
Applicant.....	TECHNEXION LTD.
Address.....	16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC
Standards.....	EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013 IEC 60950-1:2005(2nd Edition)+Am 1:2009+Am 2:2013
Procedure deviation.....	N/A
Non-standard test method.....	N/A
Type of test equipment	WiFi+Bluetooth 4.1(HS) System on Module
Trade mark.....	TechNexion
Model/Type designation.....	PIXI-9377
Manufacturer.....	TECHNEXION LTD. 16f-5, No.736, Zhongzheng Road, Zhonghe Dist., New Taipei City, 23511 Taiwan ROC
Rating.....	3.3 Vdc, 1.0A
Copyright TRF.....	This test report is based on a blank TRF (Test Report Form Ref. No. IEC60950_1F, dated 2014-02) that was prepared by SGS Fimko Ltd. The copyright of blank test report is belong to the CCB body of SGS Fimko Ltd.

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Compliance Certification Services Inc. | Test Location: No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

程智科技股份有限公司

t (886-2) 229-99720

f (886-2) 229-91792

www.ccsrf.com

Member of SGS Group

Declaration:

CCS represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (NML) of R.O.C., or National Institute of Standards and Technology (NIST) of U.S.A.

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Tested by:

Van Wang

Reviewed by:

Ray Chen

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Test item particulars:

Equipment mobility	Building-in equipment
Operating Condition.....	Continuous
Mains supply tolerance (%).....	No direct mains connection
Tested for IT power systems.....	N/A
IT testing, phase-phase voltage (V).....	N/A
Class of equipment.....	Class III
Mass of equipment (kg).....	0.003 kg
Protection against ingress of water.....	IPX0

Possible test case verdicts:

-Test case does not apply to the test object.	N/A
-Test object does meet the requirement.	P(ass)
-Test object does not meet the requirement.	F(ail)

General Remarks:

The test results presented in this report relate only to the object tested.
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 "(see attachment)" refers to additional information appended to the report.
 "(see appended table)" refers to a table appended to the report.

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This report included the following content:		
1	Clause of this standard	Page 5-22
2	National differences	Page 23-48
3	Test table	Page 49
4	Attachment A: EUT Photos	Page 50
5	Attachment B: Product ID Label	Page 51
6	Attachment C: Measuring Instrument List	Page 52

Report revise record:

Issue Date	Report Number	Rev.	Revisions	Affect Page
2018-07-13	T180627D10-LV	00	Original Report.	N/A
2018-08-01	T180627D10-LV	01	Change type of test equipment	Page 1, Page 4

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Sample Number : T180627D10-01

General product information:

The equipment is a WiFi+Bluetooth 4.1(HS) System on Module.

Operating voltage : 3.3 Vdc, 1.0A

This module is not a final product and needs to be powered by peripheral devices.

The product was submitted and tested for use at the manufacturer's recommended maximum ambient temperature of 85 °C.

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IEC/EN 60950-1

Clause	Requirement - Test	Result - Remark	Verdict
1	General		P
1.5	Components		P
1.5.1	General		P
	Comply with IEC 60950 or relevant component standard	(see appended table 1.5.1)	P
1.5.2	Evaluation and testing components	Components that were certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3	Thermal controls		N/A
1.5.4	Transformers		N/A
1.5.5	Interconnecting cables		N/A
1.5.6	Capacitors bridging insulation		N/A
1.5.7	Resistors bridging insulation		N/A
1.5.7.1	Resistors bridging functional, basic or supplementary insulation		N/A
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits		N/A
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable	Class III equipment.	N/A
1.5.8	Components in equipment for IT power systems	Class III equipment.	N/A
1.5.9	Surge suppressors		N/A
1.5.9.1	General	Class III equipment.	N/A
1.5.9.2	Protection of VDRs		N/A
1.5.9.3	Bridging of functional insulation by a VDR		N/A
1.5.9.4	Bridging of basic insulation by a VDR		N/A
1.5.9.5	Bridging of Supplementary, double or reinforced insulation by a VDR		N/A
1.6	Power interface		P
1.6.1	AC power distribution systems	Not directly connected to the mains.	N/A
1.6.2	Input current	See table 1.6.2	P

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IEC/EN 60950-1

Clause	Requirement - Test	Result - Remark	Verdict
1.6.3	Voltage limit of hand-held equipment	Building-in equipment	N/A
1.6.4	Neutral conductor	Class III equipment.	N/A
1.7	Marking and instructions		P
1.7.1	Power rating and identification markings	See below.	P
1.7.1.1	Power rating marking	Class III equipment need not be marked with any electrical rating.	N/A
	Multiple mains supply connections	See below.	N/A
	Rated voltage(s) or voltage range(s) (V)	3.3 Vdc (optional)	N/A
	Symbol for nature of supply for d.c. only.	Optionally marked when DC input voltage/current is marked.	N/A
	Rated frequency or rated frequency range (Hz)	DC Source.	N/A
	Rated current (mA or A)	1.0A (optional)	N/A
1.7.1.2	Identification markings	See below.	P
	Manufacturer's name or Trade-mark or identification mark	TechNexion	P
	Model identification or type reference	PIXI-9377	P
	Symbol for Class II equipment only	Class III equipment.	N/A
	Other markings and symbols	Additional symbols or markings do not cause misunderstanding.	P
1.7.1.3	Use of graphical symbols	No such symbol used.	N/A
1.7.2	Safety instructions and marking	The user's manual contains information for operation, installation and technical.	P
1.7.2.1	General	Instruction is available.	P
1.7.2.2	Disconnect devices	Class III equipment.	N/A
1.7.2.3	Overcurrent protective device	No such considered.	N/A
1.7.2.4	IT power distribution system	No direct mains connection.	N/A
1.7.2.5	Operator access with a tool	No operator access area with a tool.	N/A
1.7.2.6	Ozone		N/A
1.7.3	Short duty cycles	Unit is designed for continuous operation.	N/A
1.7.4	Supply voltage adjustment	Class III equipment.	N/A
	Methods and means of adjustment ; reference to installation instructions		N/A
1.7.5	Power outlets on the equipment	No outlet.	N/A
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference)		N/A

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IEC/EN 60950-1			
Clause	Requirement - Test	Result - Remark	Verdict
1.7.7	Wiring terminals	See below.	N/A
1.7.7.1	Protective earthing and bonding terminals	Class III equipment.	N/A
1.7.7.2	Terminal for a.c. mains supply conductors	Class III equipment.	N/A
1.7.7.3	Terminal for d.c. mains supply conductors	No direct connection to the DC mains supply.	N/A
1.7.8	Controls and indicators	No safety relevant controls and indicators	N/A
1.7.8.1	Identification, location and marking		N/A
1.7.8.2	Colours	No safety involved colour identification.	N/A
1.7.8.3	Symbols according to IEC 60417		N/A
1.7.8.4	Markings using figures		N/A
1.7.9	Isolation of multiple power sources	Class III equipment.	N/A
1.7.10	Thermostats and other regulating devices	No such device used.	N/A
1.7.11	Durability	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15s and then again for 15s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was no curling nor lifting of the label edge.	P
1.7.12	Removable parts		N/A
1.7.13	Replaceable batteries		N/A
	Language(s)		—
1.7.14	Equipment for restricted access locations	This equipment is not used for restricted access location.	N/A

2	Protection from hazards		P
----------	--------------------------------	--	----------

2.1	Protection from electric shock and energy hazards		P
2.1.1	Protection in operator access areas	There are no hazardous voltages generated internally. Therefore there are no protective measures required for the protection against electrical shock.	P
2.1.1.1	Access to energized parts	Units do not contain hazardous voltages nor hazardous energy levels.	P
	Test by inspection	Ditto.	N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Test with test finger(Figure 2A)	Ditto.	N/A
	Test with test pin(Figure 2B)	Ditto.	N/A
	Test with test probe(Figure 2C)	Ditto.	N/A
2.1.1.2	Battery compartments		N/A
2.1.1.3	Access to ELV wiring	SELV circuit only	N/A
	Working voltage (V_{peak} or V_{rms}); minimum distance through insulation(mm)		—
2.1.1.4	Access to hazardous voltage circuit wiring		N/A
2.1.1.5	Energy hazards		N/A
2.1.1.6	Manual controls		N/A
2.1.1.7	Discharge of capacitors in equipment		N/A
	Measured voltage(V) ; time-constant(s)		N/A
2.1.1.8	Energy hazard-d.c. mains supply	Not directly connected to the mains.	N/A
	a)Capacitor connected to the d.c. mains supply		N/A
	b)Internal battery connected to the d.c. mains supply		N/A
2.1.1.9	Audio amplifiers		N/A
2.1.2	Protection in service access areas		N/A
2.1.3	Protection in restricted access locations		N/A
2.2	SELV circuits		P
2.2.1	General requirements	Class III equipment. The equipment supplied from SELV only.	P
2.2.2	Voltage under normal conditions (V)	All accessible voltages are less than 42.2 Vpk or 60 Vdc and are classified as SELV.	P
2.2.3	Voltage under fault conditions (V)		N/A
2.2.4	Connection of SELV circuits to other circuits	SELV circuits are only connected to other SELV circuits.	P
2.3	TNV circuits		N/A
2.3.1	Limits	No TNV circuits.	N/A
	Type of TNV circuit		—
2.3.2	Separation from other circuits and from accessible parts		N/A
2.3.2.1	General requirements		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
2.3.2.2	Protection by basic insulation		N/A
2.3.2.3	Protection by earthing		N/A
2.3.2.4	Protection by other constructions		N/A
2.3.3	Separation from hazardous voltages		N/A
	Insulation employed		—
2.3.4	Connection of TNV circuits to other circuits		N/A
	Insulation employed		—
2.3.5	Test for operating voltages generated externally		N/A
2.4	Limited current circuits		N/A
2.4.1	General requirements		N/A
2.4.2	Limit values		N/A
	Frequency (Hz)		—
	Measured current (mA)		—
	Measured voltage (V)		—
	Measured circuit capacitance (nF or μF)		—
2.4.3	Connection of limited current circuits to other circuits		N/A
2.5	Limited power source		N/A
	a)Inherently limited output		N/A
	b)Impedance limited output		N/A
	c)Regulating network limited output under normal operating and single fault condition		N/A
	Use of integrated circuit (IC) current limiters		N/A
	d)Overcurrent protective device limited output		N/A
	Max. output voltage (V), max. output current (A), max. apparent power (VA)		—
	Current rating of overcurrent protective device (A)		—
2.6	Provisions for earthing and bonding		N/A
2.6.1	Protective earthing	Class III equipment.	N/A
2.6.2	Functional earthing		N/A
	Use of symbol for functional earthing		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
2.6.3	Protective earthing and protective bonding conductors		N/A
2.6.3.1	General		N/A
2.6.3.2	Size of protective earthing conductors		N/A
	Rated current (A), cross-sectional area (mm ²), AWG		—
2.6.3.3	Size of protective bonding conductors		N/A
	Rated current (A), cross-sectional area (mm ²), AWG		—
	Protective current rating (A), cross-sectional area (mm ²), AWG		N/A
2.6.3.4	Resistance of earthing conductors and their terminations, resistance (Ω), voltage drop (V), test current (A), duration (min)		N/A
2.6.3.5	Colour of insulation		N/A
2.6.4	Terminals	Class III equipment.	N/A
2.6.4.1	General		N/A
2.6.4.2	Protective earthing and bonding terminals		N/A
	Rated current (A), type nominal thread diameter (mm)		—
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N/A
2.6.5	Integrity of protective earthing	Class III equipment.	N/A
2.6.5.1	Interconnection of equipment		N/A
2.6.5.2	Components in protective earthing conductors and protective bonding conductors		N/A
2.6.5.3	Disconnection of protective earth		N/A
2.6.5.4	Parts that can be removed by an operator		N/A
2.6.5.5	Parts removed during servicing		N/A
2.6.5.6	Corrosion resistance		N/A
2.6.5.7	Screws for protective bonding		N/A
2.6.5.8	Reliance on telecommunication network or cable distribution system		N/A
2.7	Overcurrent and earth fault protection in primary circuits		N/A
2.7.1	Basic requirements	Class III equipment.	N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Instruction when protection relies on building installation		N/A
2.7.2	Faults not simulated in 5.3.7		N/A
2.7.3	Short-circuit backup protection		N/A
2.7.4	Number and location of protective devices		N/A
2.7.5	Protection by several devices		N/A
2.7.6	Warning to service personnel		N/A
2.8	Safety interlocks		N/A
2.8.1	General principles	There is no safety interlock provided within this equipment.	N/A
2.8.2	Protection requirements		N/A
2.8.3	Inadvertent reactivation		N/A
2.8.4	Fail-safe operation		N/A
	Protection against extreme hazard		N/A
2.8.5	Moving parts		N/A
2.8.6	Overriding		N/A
2.8.7	Switches and relays and their related circuits		N/A
2.8.7.1	Separation distances for contact gaps and their related circuits (mm)		N/A
2.8.7.2	Overload test		N/A
2.8.7.3	Endurance test		N/A
2.8.7.4	Electric strength test (V)		N/A
2.8.8	Mechanical actuators		N/A
2.9	Electrical insulation		P
2.9.1	Properties of insulating materials	Only functional insulation inside the equipment.	P
2.9.2	Humidity conditioning		N/A
	Relative humidity (%), temperature (°C)		N/A
2.9.3	Grade of insulation	Only functional insulation inside the equipment.	P
2.9.4	Separation from hazardous voltage		N/A
	Method (s) used		N/A
2.10	Clearance, creepage distances and distances through insulation		P

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Clause	Requirement - Test	Result - Remark	Verdict
2.10.1	General	See below.	P
2.10.1.1	Frequency		N/A
2.10.1.2	Pollution degrees	Pollution degrees 2.	P
2.10.1.3	Reduced values for functional insulation	See sub-clause 5.3.4.	P
2.10.1.4	Intervening unconnected conductive parts		N/A
2.10.1.5	Insulation with varying dimensions		N/A
2.10.1.6	Special separation requirements		N/A
2.10.1.7	Insulation in circuits generating Starting pulses		N/A
2.10.2	Determination of working voltage		N/A
2.10.2.1	General		N/A
2.10.2.2	RMS working voltage		N/A
2.10.2.3	Peak working voltage		N/A
2.10.3	Clearances		N/A
2.10.3.1	General		N/A
2.10.3.2	Main Transient voltage		N/A
	a)AC mains supply		N/A
	b)Earthed d.c. mains supplies		N/A
	c)Unearthed d.c. mains supply		N/A
	d)Battery operation		N/A
2.10.3.3	Clearance in primary circuits	No primary circuits.	N/A
2.10.3.4	Clearance in secondary circuits	Please refer to sub-clause 5.3.4.	N/A
2.10.3.5	Clearance in circuits having starting pulses	Not directly connected to mains.	N/A
2.10.3.6	Transients from a.c. mains supply		N/A
2.10.3.7	Transients from d.c. mains supply		N/A
2.10.3.8	Transients from telecommunication networks and cable distribution systems		N/A
2.10.3.9	Measurement of transient voltage levels		N/A
	a)Transients from a mains supply		N/A
	For an a.c. mains supply		N/A
	For a d.c. mains supply		N/A
	b)Transients from a telecommunication network		N/A
2.10.4	Creepage distance	Functional insulation only.	N/A
2.10.4.1	General		N/A
2.10.4.2	Material group and comparative tracking index		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	CTI tests		—
2.10.4.3	Minimum creepage distances		N/A
2.10.5	Solid insulation	No used such parts in equipment.	N/A
2.10.5.1	General	Class III equipment.	N/A
2.10.5.2	Distances through insulation	No used such parts in equipment.	N/A
2.10.5.3	Insulating compound as solid insulation	No applied.	N/A
2.10.5.4	Semiconductor devices	No used such parts in equipment.	N/A
2.10.5.5	Cemented joints		N/A
2.10.5.6	Thin sheet material-General		N/A
2.10.5.7	Separable thin sheet material		N/A
	Number of layers (pcb)		—
2.10.5.8	Non-separable thin sheet material		N/A
2.10.5.9	Thin sheet material-standard test procedure		N/A
	Electric strength test		—
2.10.5.10	Thin sheet material-alternative test procedure		N/A
	Electric strength test		—
2.10.5.11	Insulation in wound components		N/A
2.10.5.12	Wire in wound components		N/A
	Working voltage		N/A
	a)basic insulation not under stress		N/A
	b)basic supplementary, reinforced insulation		N/A
	c)Compliance with Annex U		N/A
	Tow wires in contact inside wound component : angle between 45° and 90°		N/A
2.10.5.13	Wire with solvent-based enamel in wound components		N/A
	Electric strength test		—
	Routine test		N/A
2.10.5.14	Additional insulation in wound components		N/A
	Working voltage		N/A
	-basic insulation not under stress		N/A
	-supplementary, reinforced insulation		N/A
2.10.6	Construction of printed boards		N/A
2.10.6.1	Uncoated printed boards		N/A
2.10.6.2	Coated printed boards		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N/A
2.10.6.4	Insulation between conductors on different layers of a printed board		N/A
	Distance through insulation		N/A
	Number of insulation layers (pcs)		N/A
2.10.7	Component external terminations		N/A
2.10.8	Test on coated printed boards and coated components		N/A
2.10.8.1	Sample preparation and preliminary inspection		N/A
2.10.8.2	Thermal conditioning		N/A
2.10.8.3	Electric strength test		N/A
2.10.8.4	Abrasion resistance test		N/A
2.10.9	Thermal cycling		N/A
2.10.10	Test for Pollution Degree 1 environment and insulation compound		N/A
2.10.11	Test for semiconductor devices and cemented joints		N/A
2.10.12	Enclosed and sealed parts		N/A

3	WIRING, CONNECTIONS AND SUPPLY		P
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3.1	General		N/A
3.1.1	Current rating and overcurrent protection	No internal wiring	N/A
3.1.2	Protection against mechanical damage		N/A
3.1.3	Securing of internal wiring		N/A
3.1.4	Insulation of conductors		N/A
3.1.5	Beads and ceramic insulators	Not used.	N/A
3.1.6	Screws for electrical contact pressure		N/A
3.1.7	Insulation materials in electrical connections		N/A
3.1.8	Self-tapping and spaced thread screws	No self tapping screws are used.	N/A
3.1.9	Termination of conductors		N/A
	10N pull test		N/A
3.1.10	Sleeving on wiring	Not used.	N/A

3.2	Connection to a mains supply		N/A
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Clause	Requirement - Test	Result - Remark	Verdict
3.2.1	Means of connection	No direct connection to the mains.	N/A
3.2.1.1	Connection to an a.c. mains supply		N/A
3.2.1.2	Connection to a d.c. mains supply		N/A
3.2.2	Multiple supply connections		N/A
3.2.3	Permanently connected equipment		N/A
	Number of conductors, diameter (mm) of cable and conduits		—
3.2.4	Appliance inlets		N/A
3.2.5	Power supply cords		N/A
3.2.5.1	AC Power supply cords		N/A
	Type		—
	Rated current (A), cross-sectional area (mm ²), AWG		—
3.2.5.2	DC Power supply cords		N/A
3.2.6	Cord anchorages and strain relief		N/A
	Mass of equipment (kg), pull (N)		—
	Longitudinal displacement (mm)		—
3.2.7	Protection against mechanical damage		N/A
3.2.8	Cord guards		N/A
	Diameter or minor dimension D (mm); test mass (g)		—
	Radius of curvature of cord (mm)		—
3.2.9	Supply wiring space		N/A
3.3	Wiring terminals for connection of external conductors		N/A
3.3.1	Wiring terminals	Class III equipment.	N/A
3.3.2	Connection of non-detachable power supply cords		N/A
3.3.3	Screw terminals		N/A
3.3.4	Conductor sizes to be connected		—
	Rated current (A), type and nominal thread diameter (mm)		N/A
3.3.5	Wiring terminal sizes		N/A
	Rated current (A), type and nominal thread diameter (mm)		—
3.3.6	Wiring terminals design		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
3.3.7	Grouping of wiring terminals		N/A
3.3.8	Standard wire		N/A
3.4	Disconnection from the mains supply		N/A
3.4.1	General requirement	Class III equipment.	N/A
3.4.2	Disconnect devices		N/A
3.4.3	Permanently connected equipment		N/A
3.4.4	Parts which remain energized		N/A
3.4.5	Switches in flexible cords		N/A
3.4.6	Number of poles-Single-phase and d.c. equipment		N/A
3.4.7	Number of poles -Three-phase equipment		N/A
3.4.8	Switches as disconnect devices		N/A
3.4.9	Plugs as disconnect devices		N/A
3.4.10	Interconnected equipment		N/A
3.4.11	Multiple power source		N/A
3.5	Interconnection of equipment		P
3.5.1	General requirements	Only SELV circuits	P
3.5.2	Types of interconnection circuits	SELV	P
3.5.3	ELV circuits as interconnection circuits	No ELV interconnections.	N/A
3.5.4	Data ports for additional equipment		N/A
4	Physical requirements		P
4.1	Stability		N/A
	Angle of 10°	The equipment having a mass less than 7 kg.	N/A
	Test force (N)		N/A
4.2	Mechanical strength		N/A
4.2.1	General	Building-in equipment. To be evaluated in the end use.	N/A
	Rack-mounted equipment.		N/A
4.2.2	Steady force test, 10N		N/A
4.2.3	Steady force test, 30N		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
4.2.4	Steady force test, 250N		N/A
4.2.5	Impact test		N/A
	Fall test		N/A
	Swing test		N/A
4.2.6	Drop test ; height (mm)		N/A
4.2.7	Stress relief test		N/A
4.2.8	Cathode ray tubes		N/A
	Picture tube separately certified		N/A
4.2.9	High pressure lamps		N/A
4.2.10	Wall or ceiling mounted equipment		N/A
	force (N)		N/A
4.3	Design and construction		P
4.3.1	Edges and corners	Building-in equipment. To be evaluated in the end use.	N/A
4.3.2	Handles and manual controls; force (N)		N/A
4.3.3	Adjustable controls		N/A
4.3.4	Securing of parts		N/A
4.3.5	Connection of plugs and sockets		N/A
4.3.6	Direct plug-In equipment		N/A
	Torque		N/A
	Compliance with the relevant mains plug standard		N/A
4.3.7	Heating elements in earthed equipment	No heating elements.	N/A
4.3.8	Batteries		N/A
	-Overcharging of a rechargeable battery		N/A
	-Unintentional charging of a non-rechargeable battery		N/A
	-Reverse charging of a rechargeable battery		N/A
	Excessive discharging rate for any battery		N/A
4.3.9	Oil and grease	No oil and grease.	N/A
4.3.10	Dust, powders, liquids and gases	Equipment in intended use not considered to be exposed to these.	N/A
4.3.11	Containers for liquids or gases	No container for liquid or gases.	N/A
4.3.12	Flammable liquids	No flammable liquids.	N/A
	Quantity of liquid (l)		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Flash point (°C)		N/A
4.3.13	Radiation; type of radiation	See below.	N/A
4.3.13.1	General	See sub-clause 4.3.13.5.2	N/A
4.3.13.2	Ionizing radiation		N/A
	Measured radiation (pA/kg)		—
	Measured High-voltage (kV)		—
	Measured focus voltage (kV)		—
	CRT markings		—
4.3.13.3	Effect of ultraviolet (UV) radiation on materials		N/A
	Part, property, retention after test, flammability classification		—
4.3.13.4	Human exposure to ultraviolet (UV) radiation		N/A
4.3.13.5	Laser (including laser diodes) and LEDs		N/A
4.3.13.5.1	Laser (including laser diodes)		N/A
	Laser class		—
4.3.13.5.2	Light emitting diodes (LEDs)		N/A
4.3.13.6	Other types		N/A
4.4	Protection against hazardous moving parts		N/A
4.4.1	General	There is no such device within this equipment.	N/A
4.4.2	Protection in operator access areas		N/A
	Household and home/office document/media shredders		N/A
4.4.3	Protection in restricted access locations		N/A
4.4.4	Protection in service access areas		N/A
4.4.5	Protection against moving fan blades		N/A
4.4.5.1	General		N/A
	Not considered to cause pain or injury. a)		N/A
	Is considered to cause pain, not injury. b)		N/A
	Considered to cause injury. c)		N/A
4.4.5.2	Protection for users		N/A
	Use of symbol or warning		N/A
4.4.5.3	Protection for service persons		N/A
	Use of symbol or warning		N/A
4.5	Thermal requirements		P

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Clause	Requirement - Test	Result - Remark	Verdict
4.5.1	General	No exceeding temperature.	P
4.5.2	Temperature rise	(see appended table 4.5.2)	P
	Normal load condition per Annex L	Considered.	—
4.5.3	Temperature limits for materials	(see appended table 4.5.2)	P
4.5.4	Touch temperature limits	(see appended table 4.5.2)	P
4.5.5	Resistance to abnormal heat	No thermoplastic parts on which parts at hazardous voltage are directly mounted.	N/A
4.6	Openings in enclosures		N/A
4.6.1	Top and side openings	Building-in equipment. To be evaluated in the end use.	N/A
	Dimensions (mm)		—
4.6.2	Bottom of fire enclosures	Building-in equipment. To be evaluated in the end use.	N/A
	Construction of the bottom, dimensions (mm)		—
4.6.3	Doors or covers in fire enclosures		N/A
4.6.4	Openings in transportable equipment		N/A
4.6.4.1	Constructional design measures		N/A
	Dimensions(mm)		—
4.6.4.2	Evaluation measures for larger openings		N/A
4.6.4.3	Use of metalized parts		N/A
4.6.5	Adhesives for constructional purposes		N/A
	Conditioning temperature (°C),time (weeks)		—
4.7	Resistance to fire		P
4.7.1	Reducing the risk of ignition and spread of flame	See below.	P
	Method 1, selection and application of components wiring and materials	Please refer to sub-clause 4.7.2.2.	P
	Method 2, application of all of simulated fault condition tests		N/A
4.7.2	Conditions for a fire enclosure	Building-in equipment. To be evaluated in the end use.	N/A
4.7.2.1	Parts requiring a fire enclosure	Building-in equipment. To be evaluated in the end use.	N/A
4.7.2.2	Parts no requiring a fire enclosure	Building-in equipment. To be evaluated in the end use.	N/A

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Clause	Requirement - Test	Result - Remark	Verdict
4.7.3	Materials		N/A
4.7.3.1	General		N/A
4.7.3.2	Materials for fire enclosures	Building-in equipment. To be evaluated in the end use.	N/A
4.7.3.3	Materials for components and other parts outside fire enclosures	See sub-clause 4.7.2	P
4.7.3.4	Materials for components and other parts inside fire enclosures.	Internal components except small parts are V-2 or better.	P
4.7.3.5	Materials for air filter assemblies	No air filter provided.	N/A
4.7.3.6	Materials used in high-components	No such component used.	N/A

5	ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS		P
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5.1	Touch current and protective conductor current		N/A
5.1.1	General	Class III equipment.	N/A
5.1.2	Configuration of equipment under test (EUT)		N/A
5.1.2.1	Single connection to an a.c. mains supply		N/A
5.1.2.2	Redundant multiple connections to an a.c. mains supply		N/A
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply		N/A
5.1.3	Test circuit		N/A
5.1.4	Application of measuring instrument		N/A
5.1.5	Test procedure		N/A
5.1.6	Test measurements		N/A
	Supply voltage (V)		—
	Measured touch current (mA)		—
	Max. allowed touch current (mA)		—
	Measured protective conductor current (mA)		—
	Max. allowed protective conductor current (mA)		—
5.1.7	Equipment with touch current exceeding 3.5 mA		N/A
5.1.7.1	General		—
5.1.7.2	Simultaneous multiple connections to the supply		N/A

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IEC/EN 60950-1			
Clause	Requirement - Test	Result - Remark	Verdict
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks		N/A
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system		N/A
	Supply voltage (V)		—
	Measured touch current (mA)		—
	Max. allowed touch current (mA)		—
5.1.8.2	Summation of touch current from telecommunication networks		N/A
	a)EUT with earthed telecommunication ports		N/A
	b)EUT whose telecommunication ports have no reference to protective earth		N/A
5.2	Electric strength		N/A
5.2.1	General	Class III equipment.	N/A
5.2.2	Test procedure		N/A
5.3	Abnormal operating and fault conditions		P
5.3.1	Protection against overload and abnormal operation	No test had been performed due to no risk of electric shock and fire no fire hazards foreseeable for this Class III equipment.	P
5.3.2	Motors	No motor.	N/A
5.3.3	Transformers	No such parts.	N/A
5.3.4	Functional insulation	Method c) considered. However, no test had been performed. See 5.3.1 for details.	P
5.3.5	Electromechanical components	No electromechanical components.	N/A
5.3.6	Audio amplifiers in ITE	No audio amplifiers function.	N/A
5.3.7	Simulation of faults	See clause 5.3.4.	N/A
5.3.8	Unattended equipment		N/A
5.3.9	Compliance criteria for abnormal operating and fault conditions	See clause 5.3.4.	N/A
5.3.9.1	During the tests		N/A
5.3.9.2	After the tests		N/A

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IEC/EN 60950-1

Clause	Requirement - Test	Result - Remark	Verdict
6	CONNECTION TO TELECOMMUNICATION NETWORKS		N/A
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment.		N/A
6.1.1	Protection from hazardous voltages		N/A
6.1.2	Separation of the telecommunication network from earth		N/A
6.1.2.1	Requirements		N/A
	Supply voltage (V)		—
	Current in the test circuit (mA)		—
6.1.2.2	Exclusions		N/A
6.2	Protection of equipment users from overvoltages on telecommunication networks		N/A
6.2.1	Separation requirements		N/A
6.2.2	Electric strength test procedure		N/A
6.2.2.1	Impulse test		N/A
6.2.2.2	Steady-state test		N/A
6.2.2.3	Compliance criteria		N/A
6.3	Protection of telecommunication wiring system from overheating		N/A
	Max. output current (A)		—
	Current limiting method		—
7	CONNECTION TO CABLE DISTRIBUTION SYSTEMS		N/A
7.1	General		N/A
7.2	Protection of cable distribution system service personnel, and users of other equipment connected to the system, from hazards voltage in the equipment.		N/A
7.3	Protection of equipment users from overvoltages on the cable distribution system		N/A
7.4	Insulation between primary circuits and cable distribution system		N/A
7.4.1	General		N/A
7.4.2	Voltage surge test		N/A
7.4.3	Impulse test		N/A

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IEC/EN 60950-1			
Clause	Requirement - Test	Result - Remark	Verdict
A	ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE		N/A
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment(see 4.7.3.2)		N/A
A.1.1	Samples		N/A
	Wall thickness(mm)		—
A.1.2	Conditioning of samples; temperature(°C) ...		N/A
A.1.3	Mounting of samples		N/A
A.1.4	Test flame(see IEC 60695-11-3)		N/A
	Flame A, B, C or D		—
A.1.5	Test procedure		N/A
A.1.6	Compliance criteria		N/A
	Sample 1 burning time(s)		—
	Sample 2 burning time(s)		—
	Sample 3 burning time(s)		—
A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)		N/A
A.2.1	Samples material		N/A
	Wall thickness(mm)		—
A.2.2	Conditioning of samples; temperature(°C) ...		N/A
A.2.3	Mounting of samples		N/A
A.2.4	Test flame(see IEC 60695-11-4)		N/A
A.2.5	Test procedure		N/A
A.2.6	Compliance criteria		N/A
	Sample 1 burning time(s)		—
	Sample 2 burning time(s)		—
	Sample 3 burning time(s)		—
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		N/A
	Sample 1 burning time(s)		—
	Sample 2 burning time(s)		—
	Sample 3 burning time(s)		—
A.3	Hot flaming oil test(see 4.6.2)		N/A
A.3.1	Mounting of Samples		N/A
A.3.2	Test procedure		N/A

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IEC/EN 60950-1

Clause	Requirement - Test	Result - Remark	Verdict
A.3.3	Compliance criterion		N/A
B	ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS(see 4.7.2.2 and 5.3.2)		N/A
B.1	General requirements		N/A
	Position		—
	Manufacturer		—
	Type		—
	Rated values		—
B.2	Test conditions		N/A
B.3	Maximum temperatures		N/A
B.4	Running overload test		N/A
B.5	Locked-rotor overload test		N/A
	Test duration (days)		—
	Electric strength test: test voltage (V)		—
B.6	Running overload test for DC motors in secondary circuits		N/A
B.6.1	General		N/A
B.6.2	Test procedure		N/A
B.6.3	Alternative test procedure		N/A
B.6.4	Electric strength test; test voltage (V)		N/A
B.7	Locked-rotor overload test for DC motors in secondary circuits		N/A
B.7.1	General		N/A
B.7.2	Test procedure		N/A
B.7.3	Alternative test procedure		N/A
B.7.4	Electric strength test; test voltage (V)		N/A
B.8	Test for motors with capacitors		N/A
B.9	Test for three-phase motors		N/A
B.10	Test for series motors		N/A
	Operating voltage (V)		—
C	ANNEX C, TRANSFORMERS(see 1.5.4 and 5.3.3)		N/A
	Position		—
	Manufacturer		—
	Type		—

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IEC/EN 60950-1

Clause	Requirement - Test	Result - Remark	Verdict
	Rated values		—
	Method of protection.....		—
C.1	Overload test		N/A
C.2	Insulation		N/A
	Protection from displacement of winding		N/A
D	ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)		N/A
D.1	Measuring instrument		N/A
D.2	Alternative measuring instrument		N/A
E	ANNEX E, TEMPERATURE RISE OF A WINDING(see 1.4.13)		N/A
F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)		N/A
G	ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES		N/A
G.1	Clearances		N/A
G.1.1	General		N/A
G.1.2	Summary of the procedure for determining minimum clearances		N/A
G.2	Determination of mains transient voltage (V)		N/A
G.2.1	AC mains supply		N/A
G.2.2	Earthed d.c. mains supplies		N/A
G.2.3	Unearthed d.c. amins supplies		N/A
G.2.4	Battery operation		N/A
G.3	Determination of telecommunication network transient voltage (V)		N/A
G.4	Determination of required withstand voltage(V)		N/A
G.4.1	Mains transients and internal repetitive peaks		N/A
G.4.2	Transients from telecommunication networks		N/A
G.4.3	Combination of transients		N/A
G.4.4	Transients from cable distribution systems		N/A
G.5	Measurement of transient levels (V)		N/A

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IEC/EN 60950-1			
Clause	Requirement - Test	Result - Remark	Verdict
	a)transients from a mains supply		N/A
	For an a.c. mains supply		N/A
	For a d.c. mains supply		N/A
	b)transients from a telecommunication network		N/A
G.6	Determination of minimum clearances :		N/A
H	ANNEX H, IONIZING RADIATION (see 4.3.13)		N/A
J	ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)		N/A
	Metal used :		—
K	ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)		N/A
K.1	Making and breaking capacity		N/A
K.2	Thermostat reliability; operating voltage(V).. :		N/A
K.3	Thermostat endurance test; operating voltage(V) :		N/A
K.4	Temperature limiter endurance; operating voltage(V) :		N/A
K.5	Thermal cut-out reliability		N/A
K.6	Stability of operation		N/A
L	ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)		P
L.1	Typewriters		N/A
L.2	Adding machines and cash registers		N/A
L.3	Erasers		N/A
L.4	Pencil sharpeners		N/A
L.5	Duplicators and copy machines		N/A
L.6	Motor-operated files		N/A
L.7	Other business equipment	Maximum normal load based on operating instructions.	P
M	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)		N/A
M.1	Introduction		N/A
M.2	Method A		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
M.3	Method B		N/A
M.3.1	Ringing signal		N/A
M.3.1.1	Frequency(Hz)		N/A
M.3.1.2	Voltage(V)		N/A
M.3.1.3	Cadence; time(s), voltage(V)		N/A
M.3.1.4	Single fault current (mA)		—
M.3.2	Tripping device and monitoring voltage		N/A
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
M.3.2.2	Tripping device		N/A
M.3.2.3	Monitoring voltage (V)		N/A
N	ANNEX N/A, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)		N/A
N.1	ITU-T impulse test generators		N/A
N.2	IEC 60065 impulse test generators		N/A
P	ANNEX P, NORMATIVE REFERENCES		—
Q	ANNEX Q, Voltage dependent resistors (VDRs)(see 1.5.9.1)		N/A
	a)preferred climatic categories		N/A
	b)Maximum continuous voltage		N/A
	c)Pulse current		N/A
R	ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES		N/A
R.1	Minimum separation distances for unpopulated coated printed boards(see 2.10.6.2)		N/A
R.2	Reduced clearances (see 2.10.3)		N/A
S	ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)		N/A
S.1	Test equipment		N/A
S.2	Test procedure		N/A
S.3	Examples of waveforms during impulse testing		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
T	ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)		N/A
U	ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)		N/A
V	ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)		N/A
V.1	Introduction		N/A
V.2	TN power distribution systems		N/A
W	ANNEX W, SUMMATION OF TOUCH CURRENTS		N/A
W.1	Touch current from electronic circuits		N/A
W.1.1	Floating circuits		N/A
W.1.2	Earthed circuits		N/A
W.2	Interconnection of several equipments		N/A
W.2.1	Isolation		N/A
W.2.2	Common return, isolated from earth		N/A
W.2.3	Common return, connected to protective earth		N/A
X	ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS(see clause c.1)		N/A
X.1	Determination of maximum input current		N/A
X.2	Overload test procedure		N/A
Y	ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)		N/A
Y.1	Test apparatus		N/A
Y.2	Mounting of test samples		N/A
Y.3	Carbon-arc light-exposure apparatus		N/A
Y.4	Xenon-arc light exposure apparatus		N/A
Z	ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)		N/A
AA	ANNEX AA, MANDREL TEST (see 2.10.5.8)		N/A
BB	ANNEX BB, CHANGES IN THE SECOND EDITION		—

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Attachment B: Product ID Label

CC	ANNEX CC, Evaluation of integrated circuit (IC) current limiters		N/A
CC.1	General		N/A
CC.2	Test program 1		N/A
CC.3	Test program 2		N/A
CC.4	Test program 3		N/A
CC.5	Compliance		N/A

DD	ANNEX DD, Requirements for the mounting means of rack-mounted equipment		N/A
DD.1	General		N/A
DD.2	Mechanical strength test, variable N		N/A
DD.3	Mechanical strength test, 250N, including end stops		N/A
DD.4	Compliance		N/A

EE	ANNEX EE, Household and home/office document/media shredders		N/A
EE.1	General		N/A
EE.2	Markings and instructions		N/A
	Use of markings or symbols		N/A
	Information of user instructions, maintenance and/or servicing instructions		N/A
EE.3	Inadvertent reactivation test		N/A
EE.4	Disconnection of power to hazardous moving parts		N/A
	Use of markings or symbols		N/A
EE.5	Protection against hazardous moving parts		N/A
	Test with test finger (Figure 2A)		N/A
	Test with wedge probe (Figure EE1 and EE2)		N/A

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ATTACHMENT TO TEST REPORT IEC 60950-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Information technology equipment – Safety – Part 1: General requirements	
Differences according to.....:	EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013
Attachment Form No.:	EU_GD_IEC60950_1F
Attachment Originator	SGS Fimko Ltd
Master Attachment	Date 2014-02
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EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013 – CENELEC COMMON MODIFICATIONS

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
Contents (A2:2013)	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZD (normative) IEC and CENELEC code designations for flexible cords		P
General	Delete all the "country" notes in the reference document (IEC 60950-1:2005) according to the following list: 1.4.8 Note 2 1.5.1 Note 2 & 3 1.5.7.1 Note 1.5.8 Note 2 1.5.9.4 Note 1.7.2.1 Note 4, 5 & 6 2.2.3 Note 2.2.4 Note 2.3.2 Note 2.3.2.1 Note 2 2.3.4 Note 2 2.6.3.3 Note 2 & 3 2.7.1 Note 2.10.3.2 Note 2 2.10.5.13 Note 3 3.2.1.1 Note 3.2.4 Note 3, 2.5.1 Note 2 4.3.6 Note 1 & 2 4.7 Note 4 4.7.2.2 Note 4.7.3.1 Note 2 5.1.7.1 Note 3 & 4 5.3.7 Note 1 6 Note 2 & 5 6.1.2.1 Note 2 6.1.2.2 Note 6.2.2 Note 6.2.2.1 Note 2 6.2.2.2 Note 7.1 Note 3 7.2 Note 7.3 Note 1 & 2 G.2.1 Note 2 Annex H Note 2		P
General (A1:2010)	Delete all the "country" notes in the reference document (IEC 60950-1:2005/A1:2010) according to the following list: 1.5.7.1 Note 6.1.2.1 Note 2 6.2.2.1 Note 2 EE.3 Note		P
General (A2:2013)	Delete all the "country" notes in the reference document (IEC 60950-1:2005/A2:2013) according to the following list: 1.5.7.1 Note 6.1.2.1 Note 2 6.2.2.1 Note 2 EE.3 Note		P

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.1.1 (A1:2010)	Replace the text of NOTE 3 by the following. NOTE 3 The requirements of EN 60065 may also be used to meet safety requirements for multimedia equipment. See IEC Guide 112, Guide on the safety of multimedia equipment. For television sets EN 60065 applies.		P
1.3.Z1	Add the following subclause: 1.3.Z1 Exposure to excessive sound pressure The apparatus shall be so designed and constructed as to present no danger when used for its intended purpose, either in normal operating conditions or under fault conditions, particularly providing protection against exposure to excessive sound pressures from headphones or earphones. NOTE Z1 A new method of measurement is described in EN 50332-1, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for "one package equipment", and in EN 50332-2, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 2: Guidelines to associate sets with headphones coming from different manufacturers.		P
(A12:2011)	In EN 60950-1:2006/A12:2011 Delete the addition of 1.3.Z1 / EN 60950-1:2006 Delete the definition 1.2.3.Z1 / EN 60950-1:2006 /A1:2010		P
1.5.1	Add the following NOTE: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2002/95/EC		N/A
1.7.2.1 (A1:2010)	In addition, for a PORTABLE SOUND SYSTEM, the instructions shall include a warning that excessive sound pressure from earphones and headphones can cause hearing loss.		N/A
1.7.2.1 (A12:2011)	In EN 60950-1:2006/A12:2011 Delete NOTE Z1 and the addition for Portable Sound System. Add the following clause and annex to the existing standard and amendments.		N/A
	Zx Protection against excessive sound pressure from personal music players		N/A

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>Zx.1 General This sub-clause specifies requirements for protection against excessive sound pressure from personal music players that are closely coupled to the ear. It also specifies requirements for earphones and headphones intended for use with personal music players.</p> <p>A personal music player is a portable equipment for personal use, that: is designed to allow the user to listen to recorded or broadcast sound or video; and primarily uses headphones or earphones that can be worn in or on or around the ears; and allows the user to walk around while in use.</p> <p>NOTE 1 Examples are hand-held or body-worn portable CD players, MP3 audio players, mobile phones with MP3 type features, PDA's or similar equipment.</p> <p>A personal music player and earphones or headphones intended to be used with personal music players shall comply with the requirements of this sub-clause.</p> <p>The requirements in this sub-clause are valid for music or video mode only.</p> <p>The requirements do not apply: while the personal music player is connected to an external amplifier; or while the headphones or earphones are not used.</p> <p>NOTE 2 An external amplifier is an amplifier which is not part of the personal music player or the listening device, but which is intended to play the music as a standalone music player.</p> <p>The requirements do not apply to: hearing aid equipment and professional equipment;</p> <p>NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment.</p>		N/A

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>analogue personal music players (personal music players without any kind of digital processing of the sound signal) that are brought to the market before the end of 2015.</p> <p>NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies.</p> <p>For equipment which is clearly designed or intended for use by young children, the limits of EN 71-1 apply.</p>		N/A
	<p>Zx.2 Equipment requirements No safety provision is required for equipment that complies with the following:</p> <ul style="list-style-type: none"> equipment provided as a package (personal music player with its listening device), where the acoustic output LAeq,T is ≤ 85 dBA measured while playing the fixed “programme simulation noise” as described in EN 50332-1; and a personal music player provided with an analogue electrical output socket for a listening device, where the electrical output is ≤ 27 mV measured as described in EN 50332-2, while playing the fixed “programme simulation noise” as described in EN 50332-1. <p>NOTE 1 Wherever the term acoustic output is used in this clause, the 30 s A-weighted equivalent sound pressure level LAeq,T is meant. See also Zx.5 and Annex Zx.</p> <p>All other equipment shall:</p> <ul style="list-style-type: none"> a) protect the user from unintentional acoustic outputs exceeding those mentioned above; and b) have a standard acoustic output level not exceeding those mentioned above, and automatically return to an output level not exceeding those mentioned above when the power is switched off; and 		N/A
	<p>c) provide a means to actively inform the user of the increased sound pressure when the equipment is operated with an acoustic output exceeding those mentioned above. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an acoustic output exceeding those mentioned above. The acknowledgement does not need to be</p>		N/A

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>repeated more than once every 20 h of cumulative listening time; and</p> <p>NOTE 2 Examples of means include visual or audible signals. Action from the user is always required.</p> <p>NOTE 3 The 20 h listening time is the accumulative listening time, independent how often and how long the personal music player has been switched off.</p> <p>d) have a warning as specified in Zx.3; and</p> <p>e) not exceed the following:</p> <ol style="list-style-type: none"> 1) equipment provided as a package (player with its listening device), the acoustic output shall be ≤ 100 dBA measured while playing the fixed "programme simulation noise" described in EN 50332-1; and 2) a personal music player provided with an analogue electrical output socket for a listening device, the electrical output shall be ≤ 150 mV measured as described in EN 50332-2, while playing the fixed "programme simulation noise" described in EN 50332-1. <p>For music where the average sound pressure (long term LAeq,T) measured over the duration of the song is lower than the average produced by the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song is below the basic limit of 85 dBA. In this case T becomes the duration of the song.</p> <p>NOTE 4 Classical music typically has an average sound pressure (long term LAeq,T) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the song and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song is below the basic limit of 85 dBA.</p> <p>For example, if the player is set with the programme simulation noise to 85 dBA, but the average music level of the song is only 65 dBA, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dBA.</p>		

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>Zx.3 Warning The warning shall be placed on the equipment, or on the packaging, or in the instruction manual and shall consist of the following: the symbol of Figure 1 with a minimum height of 5 mm; and the following wording, or similar: "To prevent possible hearing damage, do not listen at high volume levels for long periods."</p>  <p>Figure 1 – Warning label (IEC 60417-6044)</p> <p>Alternatively, the entire warning may be given through the equipment display during use, when the user is asked to acknowledge activation of the higher level.</p>		N/A
	Zx.4 Requirements for listening devices (headphones and earphones)		N/A
	<p>Zx.4.1 Wired listening devices with analogue input With 94 dBA sound pressure output LAeq,T, the input voltage of the fixed "programme simulation noise" described in EN 50332-2 shall be ≥ 75 mV. This requirement is applicable in any mode where the headphones can operate (active or passive), including any available setting (for example built-in volume level control). NOTE The values of 94 dBA – 75 mV correspond with 85dBA – 27 mV and 100 dBA – 150 mV.</p>		N/A

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>Zx.4.2 Wired listening devices with digital input With any playing device playing the fixed “programme simulation noise” described in EN 50332-1 (and respecting the digital interface standards, where a digital interface standard exists that specifies the equivalent acoustic level), the acoustic output LAeq,T of the listening device shall be ≤ 100 dBA.</p> <p>This requirement is applicable in any mode where the headphones can operate, including any available setting (for example built-in volume level control, additional sound feature like equalization, etc.).</p> <p>NOTE An example of a wired listening device with digital input is a USB headphone.</p>		N/A
	<p>Zx.4.3 Wireless listening devices In wireless mode: with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and respecting the wireless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and with volume and sound settings in the listening device (for example built-in volume level control, additional sound feature like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the abovementioned programme simulation noise, the acoustic output LAeq,T of the listening device shall be ≤ 100 dBA.</p> <p>NOTE An example of a wireless listening device is a Bluetooth headphone.</p>		N/A
	<p>Zx.5 Measurement methods Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable. Unless stated otherwise, the time interval T shall be 30 s.</p> <p>NOTE Test method for wireless equipment provided without listening device should be defined.</p>		N/A

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
2.7.1	<p>Replace the subclause as follows:</p> <p>Basic requirements</p> <p>To protect against excessive current, short-circuits and earth faults in PRIMARY CIRCUITS, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c):</p> <p>a) except as detailed in b) and c), protective devices necessary to comply with the requirements of 5.3 shall be included as parts of the equipment;</p> <p>b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation;</p>		N/A
	<p>c) it is permitted for PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions.</p> <p>If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for PLUGGABLE EQUIPMENT TYPE A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.</p>		N/A
2.7.2	This subclause has been declared 'void'.		N/A
3.2.3	Delete the NOTE in Table 3A, and delete also in this table the conduit sizes in parentheses.		N/A

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IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)											
Clause	Requirement + Test	Result - Remark	Verdict								
3.2.5.1	<p>Replace “60245 IEC 53” by “H05 RR-F”; “60227 IEC 52” by “H03 VV-F or H03 VVH2-F”; “60227 IEC 53” by “H05 VV-F or H05 VVH2-F2”.</p> <p>In Table 3B, replace the first four lines by the following:</p> <table border="0"> <tr> <td>Up to and including 6 </td> <td>0,75^{a)} </td> </tr> <tr> <td>Over 6 up to and including 10 </td> <td>(0,75)^{b)} 1,0</td> </tr> <tr> <td> Over 10 up to and including 16 </td> <td>(1,0)^{c)}</td> </tr> <tr> <td>1,5 </td> <td></td> </tr> </table> <p>In the conditions applicable to Table 3B delete the words “in some countries” in condition^{a)}.</p> <p>In NOTE 1, applicable to Table 3B, delete the second sentence.</p>	Up to and including 6	0,75 ^{a)}	Over 6 up to and including 10	(0,75) ^{b)} 1,0	Over 10 up to and including 16	(1,0) ^{c)}	1,5			N/A
Up to and including 6	0,75 ^{a)}										
Over 6 up to and including 10	(0,75) ^{b)} 1,0										
Over 10 up to and including 16	(1,0) ^{c)}										
1,5											
3.3.4	<p>In Table 3D, delete the fourth line: conductor sizes for 10 to 13 A, and replace with the following:</p> <table border="0"> <tr> <td>Over 10 up to and including 16 </td> <td>1,5 to 2,5 </td> <td>1,5 to 4 </td> </tr> </table> <p>Delete the fifth line: conductor sizes for 13 to 16 A</p>	Over 10 up to and including 16	1,5 to 2,5	1,5 to 4		N/A					
Over 10 up to and including 16	1,5 to 2,5	1,5 to 4									
4.3.13.6 (A1:2010)	<p>Replace the existing NOTE by the following:</p> <p>NOTE Z1 Attention is drawn to:</p> <p>1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz, and</p> <p>2006/25/EC: Directive on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation).</p>		N/A								
	<p>Standards taking into account mentioned Recommendation and Directive which demonstrate compliance with the applicable EU Directive are indicated in the OJEC.</p>		N/A								
Annex H	<p>Replace the last paragraph of this annex by:</p> <p>At any point 10 cm from the surface of the OPERATOR ACCESS AREA, the dose rate shall not exceed 1 µSv/h (0,1 mR/h) (see NOTE). Account is taken of the background level.</p> <p>Replace the notes as follows:</p> <p>NOTE These values appear in Directive 96/29/Euratom.</p> <p>Delete NOTE 2.</p>		N/A								
Bibliography	Additional EN standards.		—								

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ZA	NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS	—
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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.2.4.1	In Denmark , certain types of Class I appliances (see 3.2.1.1) may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets.		N/A
1.2.13.14 (A11:2009)	In Norway and Sweden , for requirements see 1.7.2.1 and 7.3 of this annex.		N/A
1.5.7.1 (A11:2009)	In Finland, Norway and Sweden , resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with the requirements in 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.		N/A
1.5.8	In Norway , due to the IT power system used (see annex V, Figure V.7), capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
1.5.9.4	In Finland, Norway and Sweden , the third dashed sentence is applicable only to equipment as defined in 6.1.2.2 of this annex.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.1 (A11:2009)	<p>In Finland, Norway and Sweden, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet.</p> <p>The marking text in the applicable countries shall be as follows:</p> <p>In Finland: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"</p> <p>In Norway: "Apparatet må tilkoples jordet stikkontakt"</p> <p>In Sweden: "Apparaten skall anslutas till jordat uttag"</p> <p>In Norway and Sweden, the screen of the cable distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation need to be isolated from the screen of a cable distribution system.</p> <p>It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by e.g. a retailer.</p> <p>The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in:</p> <p>"Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)."</p>		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>NOTE In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min.</p> <p>Translation to Norwegian (the Swedish text will also be accepted in Norway): "Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet." Translation to Swedish: "Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet."</p>		N/A
1.7.2.1 (A2:2013)	<p>In Denmark, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in Denmark shall be as follows: In Denmark: "Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord."</p>		N/A
1.7.5 (A11:2009)	<p>In Denmark, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on Class I equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. For CLASS II EQUIPMENT the socket outlet shall be in accordance with Standard Sheet DKA 1-4a.</p>		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.5 (A2:2013)	<p>In Denmark, socket-outlets for providing power to other equipment shall be in accordance with the DS 60884-2-D1:2011.</p> <p>For class I equipment the following Standard Sheets are applicable: DK 1-3a, DK 1-1c, DK 1-1d, DK 1-5a or DK 1-7a, with the exception for STATIONARY EQUIPMENT where the socketoutlets shall be in accordance with Standard Sheet DK 1-1b, DK 1-1c, DK 1-1d or DK 1-5a.</p> <p>Socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance with DS 60884-2-D1 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with by DS 60884-2-D1 Standard Sheet DKA 1-3a or DKA 1-3b.</p> <p>Justification the Heavy Current Regulations, 6c</p>		N/A
2.2.4	In Norway , for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N/A
2.3.2	In Finland, Norway and Sweden there are additional requirements for the insulation. See 6.1.2.1 and 6.1.2.2 of this annex.		N/A
2.3.4	In Norway , for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N/A
2.6.3.3	In the United Kingdom , the current rating of the circuit shall be taken as 13 A, not 16 A.		N/A
2.7.1	In the United Kingdom , to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, tests according to 5.3 shall be conducted, using an external protective device rated 30 A or 32 A. If these tests fail, suitable protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT, so that the requirements of 5.3 are met.		N/A
2.10.5.13	In Finland, Norway and Sweden , there are additional requirements for the insulation, see 6.1.2.1 and 6.1.2.2 of this annex.		N/A
3.2.1.1	<p>In Switzerland, supply cords of equipment having a RATED CURRENT not exceeding 10 A shall be provided with a plug complying with SEV 1011 or IEC 60884-1 and one of the following dimension sheets:</p> <p>SEV 6532-2.1991 Plug Type 15 3P+N+PE 250/400 V, 10 A</p>		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>SEV 6533-2.1991 Plug Type 11 L+N 250 V, 10 A</p> <p>SEV 6534-2.1991 Plug Type 12 L+N+PE 250 V, 10 A</p> <p>In general, EN 60309 applies for plugs for currents exceeding 10 A. However, a 16 A plug and socket-outlet system is being introduced in Switzerland, the plugs of which are according to the following dimension sheets, published in February 1998:</p> <p>SEV 5932-2.1998: Plug Type 25 , 3L+N+PE 230/400 V, 16 A</p> <p>SEV 5933-2.1998: Plug Type 21, L+N, 250 V, 16A</p> <p>SEV 5934-2.1998: Plug Type 23, L+N+PE 250 V, 16 A</p>		
3.2.1.1	<p>In Denmark, supply cords of single-phase equipment having a rated current not exceeding 13 A shall be provided with a plug according to the Heavy Current Regulations, Section 107-2-D1.</p> <p>CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a.</p> <p>If poly-phase equipment and single-phase equipment having a RATED CURRENT exceeding 13 A is provided with a supply cord with a plug, this plug shall be in accordance with the Heavy Current Regulations, Section 107-2-D1 or EN 60309-2.</p>		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1 (A2:2013)	<p>In Denmark, supply cords of single-phase equipment having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1.</p> <p>CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a.</p> <p>If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2.</p> <p>Justification the Heavy Current Regulations, 6c</p>		N/A
3.2.1.1	<p>In Spain, supply cords of single-phase equipment having a rated current not exceeding 10 A shall be provided with a plug according to UNE 20315:1994.</p> <p>Supply cords of single-phase equipment having a rated current not exceeding 2,5 A shall be provided with a plug according to UNE-EN 50075:1993.</p> <p>CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules, shall be provided with a plug in accordance with standard UNE 20315:1994.</p> <p>If poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with UNE-EN 60309-2.</p>		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In the United Kingdom , apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord and plug, shall be fitted with a 'standard plug' in accordance with Statutory Instrument 1768:1994 - The Plugs and Sockets etc. (Safety) Regulations 1994, unless exempted by those regulations. NOTE 'Standard plug' is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
3.2.1.1	In Ireland , apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to I.S. 411 by means of that flexible cable or cord and plug, shall be fitted with a 13 A plug in accordance with Statutory Instrument 525:1997 - National Standards Authority of Ireland (section 28) (13 A Plugs and Conversion Adaptors for Domestic Use) Regulations 1997.		N/A
3.2.4	In Switzerland , for requirements see 3.2.1.1 of this annex.		N/A
3.2.5.1	In the United Kingdom , a power supply cord with conductor of 1,25 mm ² is allowed for equipment with a rated current over 10 A and up to and including 13 A.		N/A
3.3.4	In the United Kingdom , the range of conductor sizes of flexible cords to be accepted by terminals for equipment with a RATED CURRENT of over 10 A up to and including 13 A is: • 1,25 mm ² to 1,5 mm ² nominal cross-sectional area.		N/A
4.3.6	In the United Kingdom , the torque test is performed using a socket outlet complying with BS 1363 part 1:1995, including Amendment 1:1997 and Amendment 2:2003 and the plug part of DIRECT PLUG-IN EQUIPMENT shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16 and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.6	In Ireland , DIRECT PLUG-IN EQUIPMENT is known as plug similar devices. Such devices shall comply with Statutory Instrument 526:1997 - National Standards Authority of Ireland (Section 28) (Electrical plugs, plug similar devices and sockets for domestic use) Regulations, 1997.		N/A
5.1.7.1	In Finland, Norway and Sweden TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for the following equipment: <ul style="list-style-type: none"> • STATIONARY PLUGGABLE EQUIPMENT TYPE A that is intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, for example, in a telecommunication centre; and has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR; and is provided with instructions for the installation of that conductor by a SERVICE PERSON; • STATIONARY PLUGGABLE EQUIPMENT TYPE B; • STATIONARY PERMANENTLY CONNECTED EQUIPMENT. 		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
6.1.2.1 (A1:2010)	<p>In Finland, Norway and Sweden, add the following text between the first and second paragraph of the compliance clause:</p> <p>If this insulation is solid, including insulation forming part of a component, it shall at least consist of either</p> <ul style="list-style-type: none"> - two layers of thin sheet material, each of which shall pass the electric strength test below, or - one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. <p>Alternatively for components, there is no distance through insulation requirements for the insulation consisting of an insulating compound completely filling the casing, so that CLEARANCES and CREEPAGE DISTANCES do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition</p> <ul style="list-style-type: none"> - passes the tests and inspection criteria of 2.10.11 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 2.10.10 shall be performed using 1,5 kV), and - is subject to ROUTINE TESTING for electric strength during manufacturing, using a test voltage of 1,5 kV. 		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>It is permitted to bridge this insulation with an optocoupler complying with 2.10.5.4 b).</p> <p>It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2.</p> <p>A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions:</p> <ul style="list-style-type: none"> - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in EN 60950-1:2006, 6.2.2.1; - the additional testing shall be performed on all the test specimens as described in EN 60384-14: - the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14. 		N/A
6.1.2.2	<p>In Finland, Norway and Sweden, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT, PLUGGABLE EQUIPMENT TYPE B and equipment intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, e.g. in a telecommunication centre, and which has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR and is provided with instructions for the installation of that conductor by a SERVICE PERSON.</p>		N/A
7.2	<p>In Finland, Norway and Sweden, for requirements see 6.1.2.1 and 6.1.2.2 of this annex.</p> <p>The term TELECOMMUNICATION NETWORK in 6.1.2 being replaced by the term CABLE DISTRIBUTION SYSTEM.</p>		N/A
7.3 (A11:2009)	<p>In Norway and Sweden, for requirements see 1.2.13.14 and 1.7.2.1 of this annex.</p>		N/A

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IEC/EN 60950-1

Clause	Requirement - Test	Result - Remark	Verdict
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1.5.1	TABLE : List of critical components					P
Object / Part No.	Manufacturer Trademark	Type / Model	Technical Data	Standard	Mark(s) of Conformity ¹⁾	
1. PCB	Interchangeable	Interchangeable	V-1 min, 105 °C min	UL 796 UL 94	UL	
Note(s): 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

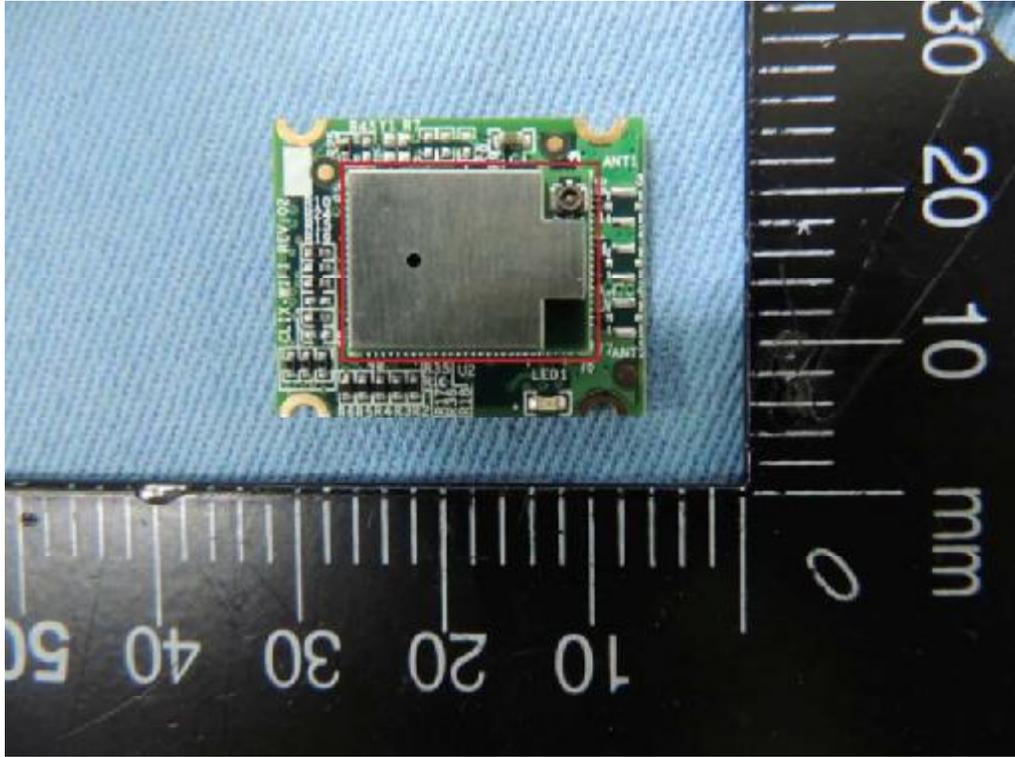
1.6.2	TABLE : Electrical data (in normal conditions)						P
I rated (A)	U (Vdc)	I (mA)	P (W)	Fuse #	I fuse (mA)	Condition/status	
1.0	3.3	--	--	--	--	Maximum normal load	
Note(s): 1. This module is not a final product and needs to be powered by peripheral devices. 2. The steady state input current of the equipment shall not exceed the RATED CURRENT by more than 10 % under NORMAL LOAD.							

4.5.2	TABLE : Temperature rise measurements			P
Test voltage:	3.3 Vdc	Maximum normal load	--	
Test position:	T (°C)	Allowed T (°C)		
1. PCB near heat sink	97.4	105		
2. Ambient	85.0	--		
Note(s): The product was submitted and tested for use at the manufacturer's recommended maximum ambient temperature of 85 °C.				

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Attachment A: EUT Photos

Red frame for test sample



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Compliance Certification Services Inc. | Test Location: No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

程智科技股份有限公司

t (886-2) 229-99720

f (886-2) 229-91792

www.ccsrf.com

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Attachment B: Product ID Label



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Attachment C: Measuring Instrument List

Asset No.	Manufacture	Description	Model Number	Cal. Day	Cal. Due	Specification
CR07	YOKOGAWA	Hybrid Recorder	DR130	2018-04-22	2019-04-21	-200~400°C 20 Channel / 60min
WT04	鉅盛	Electric Scale	JWB2-150L	2018-04-30	2019-04-29	0-150g

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