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

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

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:

Sam Chuang
Manager
Compliance Certification Services Inc.

Tested by:

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; π/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)	See table below
Antenna Specification	FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 2.5dBi Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 4dBi
Temperature Range	0℃ ~ +70℃
S.W Version	1.0
H.W: Version	A1

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

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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☒ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☐ **P**laced 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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☐ **P**laced in fixed position at X-Plane (E2-Plane) ☒ **P**laced in fixed position at Y-Plane (E1-Plane) ☐ **P**laced 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.

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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☒ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☐ **P**laced 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.

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 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%

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 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.

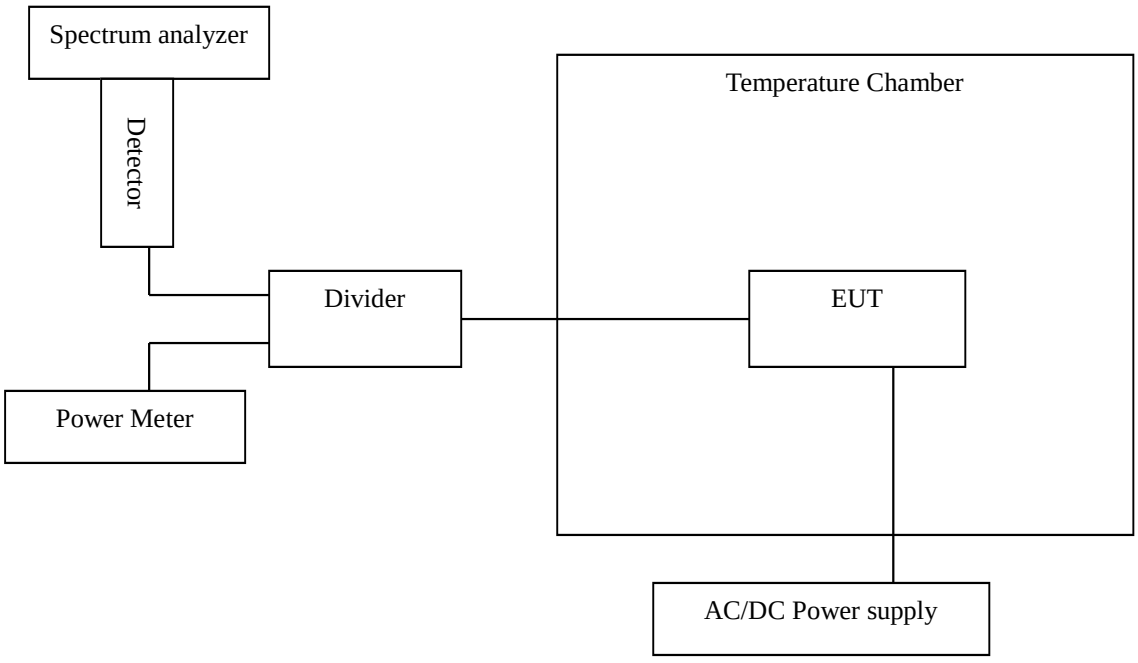
Other than FHSS:

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be20 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(℃)		
		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(℃)		
		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

Test Results: PASS **Test Mode:** IEEE 802.11n HT 20 MHz Mode
Tested By: Dally Hong **Test Date:** July 31, 2018

Antenna Gain =				4 dBi
Test Conditions		**Transmitter Power (dBm)**		
		Temp(℃)		
		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 **Test Mode:** IEEE 802.11n HT 40 MHz Mode
Tested By: Dally Hong **Test Date:** July 31, 2018

Antenna Gain =				4 dBi
Test Conditions		**Transmitter Power (dBm)**		
		Temp(℃)		
		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

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(℃)		
		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(℃)		
		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

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(℃)		
		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

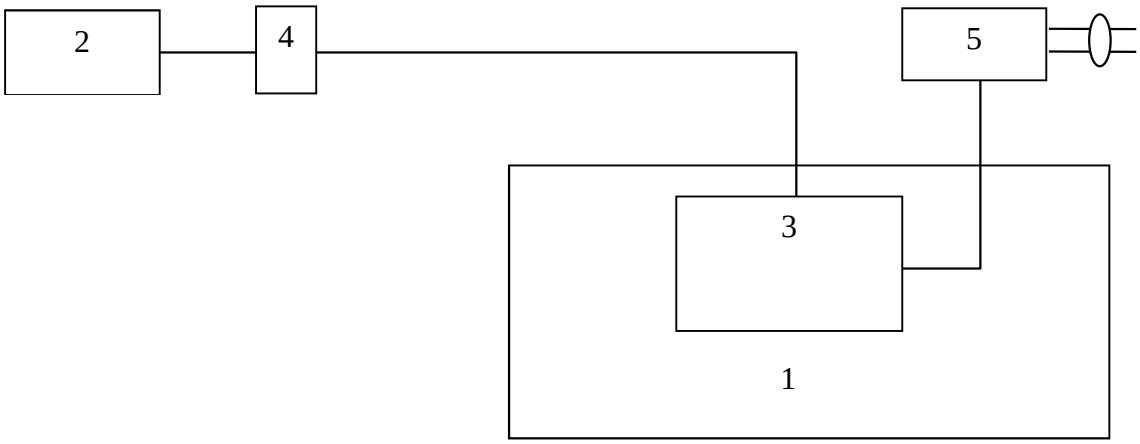
7.2 MAXIMUM SPECTRAL POWER DENSITY

LIMIT

ETSI EN 300 328

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to10 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=Readimg+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=Readimg+Antenna Gain+Cable Loss*

Test Results: PASS **Test Mode:** IEEE 802.11n HT 20 MHz 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	3.23	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=Readimg+Antenna Gain+Cable Loss*

Test Results: PASS **Test Mode:** IEEE 802.11n HT 40 MHz 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	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=Readimg+Antenna Gain+Cable Loss*

Bluetooth 2.1 + EDR

Please refer to ETSI EN 300 328
For wide band modulations other then 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=Readimg+Antenna Gain+Cable Loss*

7.3 DUTY CYCLE, TX-SEQUENCE, TX-GAP

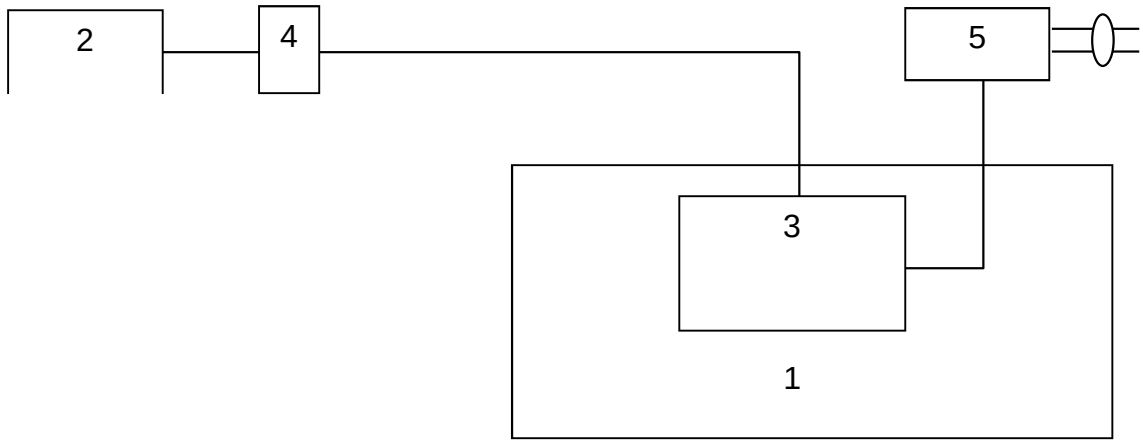
LIMIT

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.

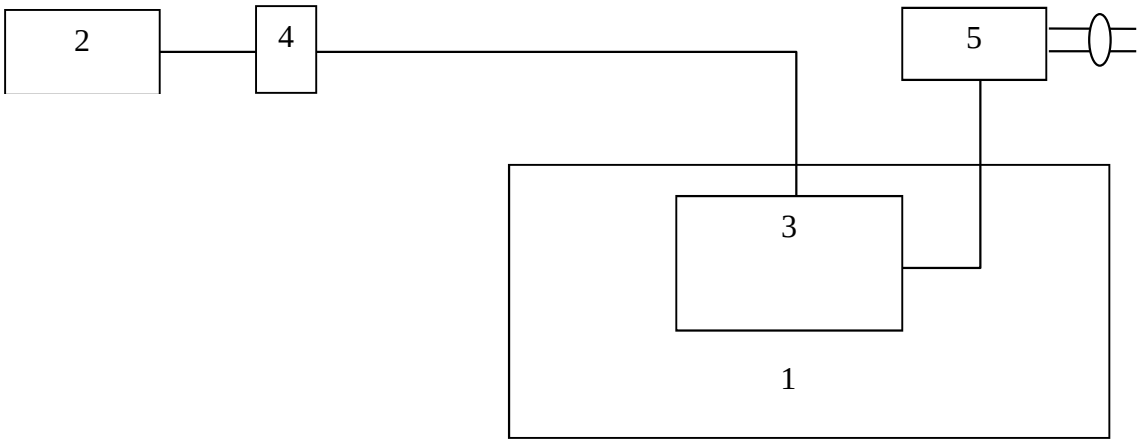
Adaptive frequency hopping systems

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

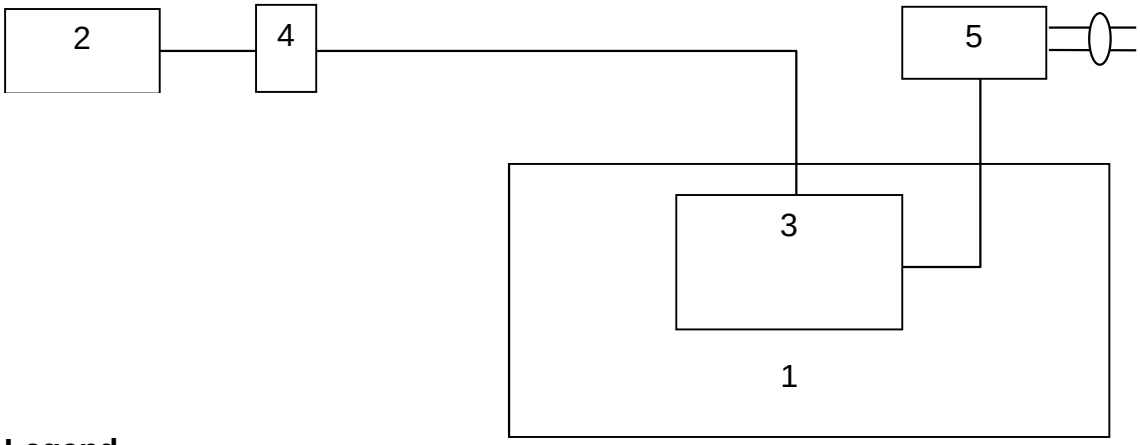
Non-adaptive frequency hopping systems

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

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 µs. 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 µs. 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 µs.

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 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout 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)
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.		
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.		
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.		

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 µs 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:

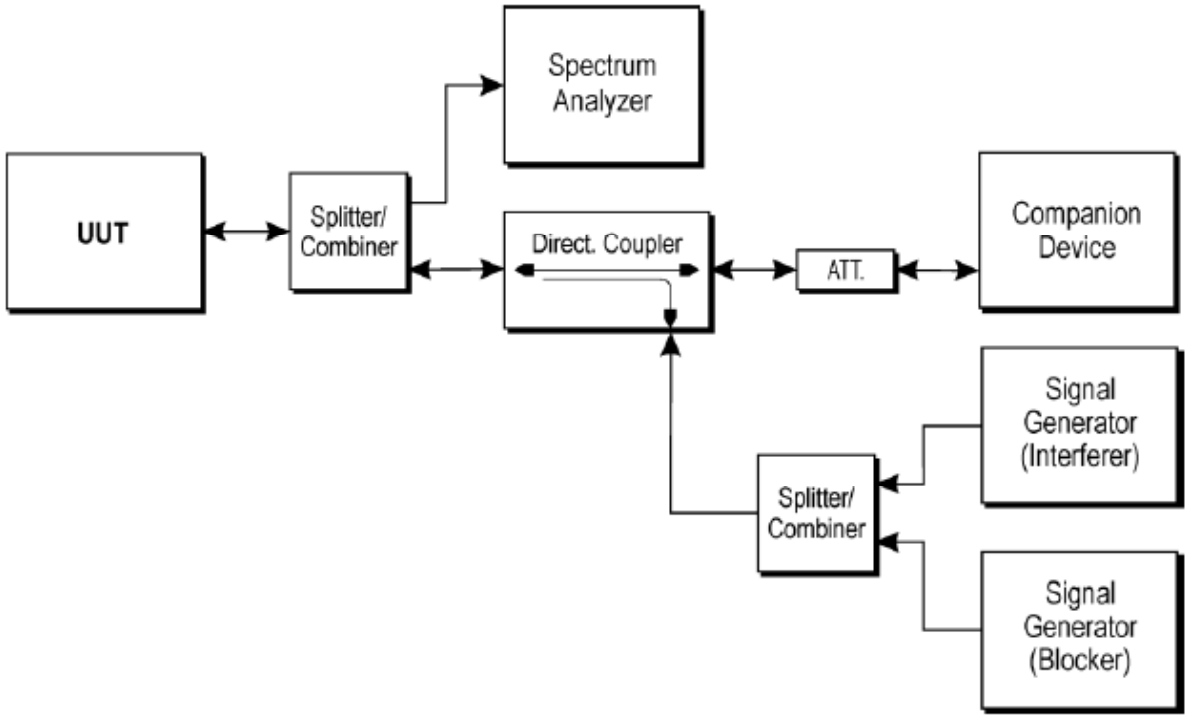
   TL = -70 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout in mW e.i.r.p.

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)
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.		
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.		

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.

TEST RESULTS

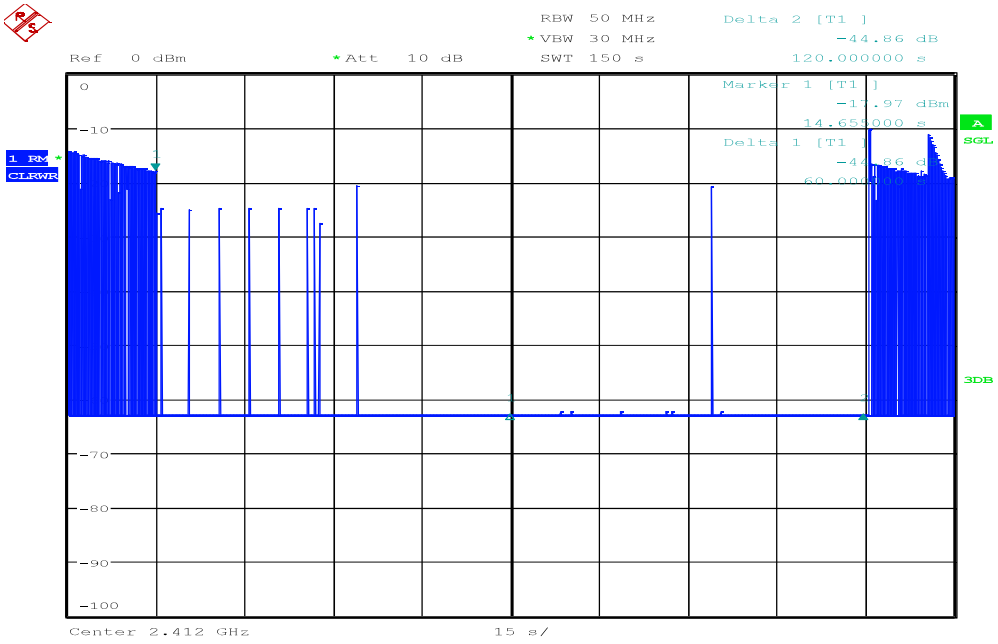
IEEE 802.11b Mode	Signal duration after interfering (s)	
	CH Low	CH High
	Pass	Pass

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

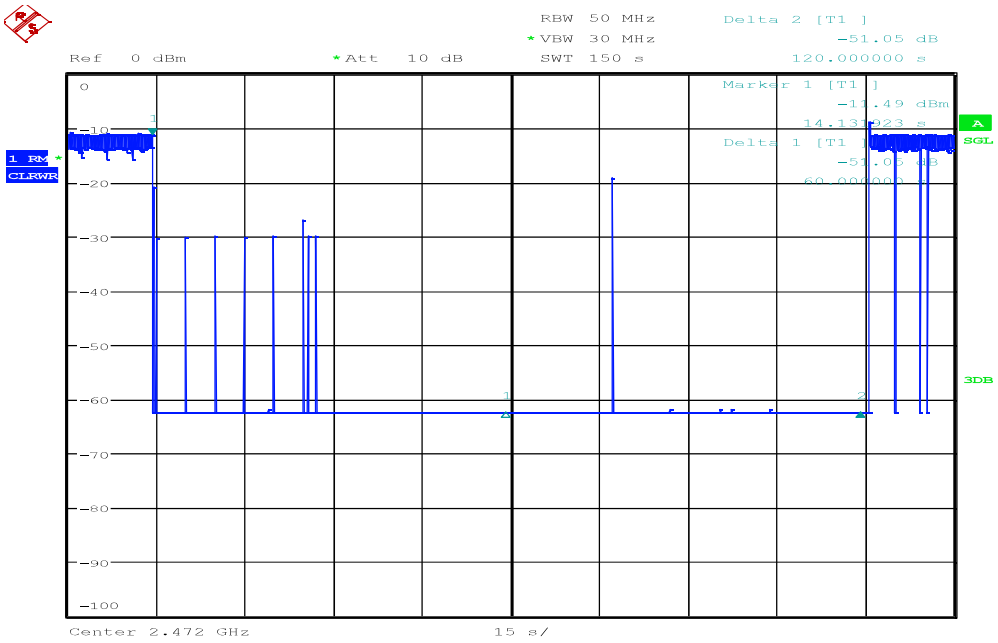
IEEE 802.11n HT 40 MHz Mode	Signal duration after interfering (s)	
	CH Low	CH High
	Pass	Pass

Test results: IEEE 802.11b Mode, Low



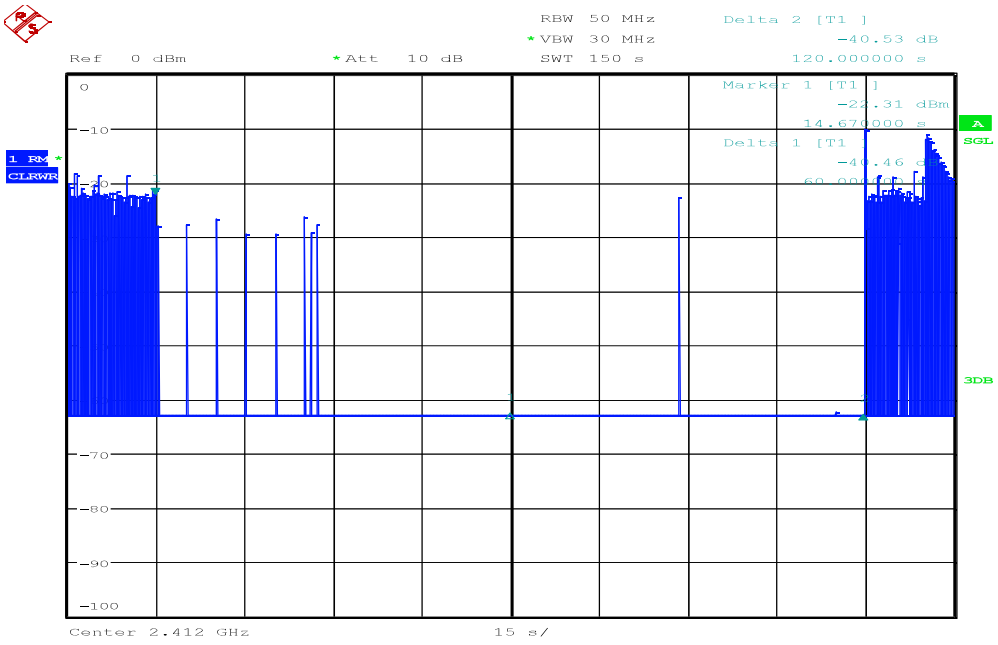
Date: 25.JUL.2018 15:58:50

Test results: IEEE 802.11b Mode, High



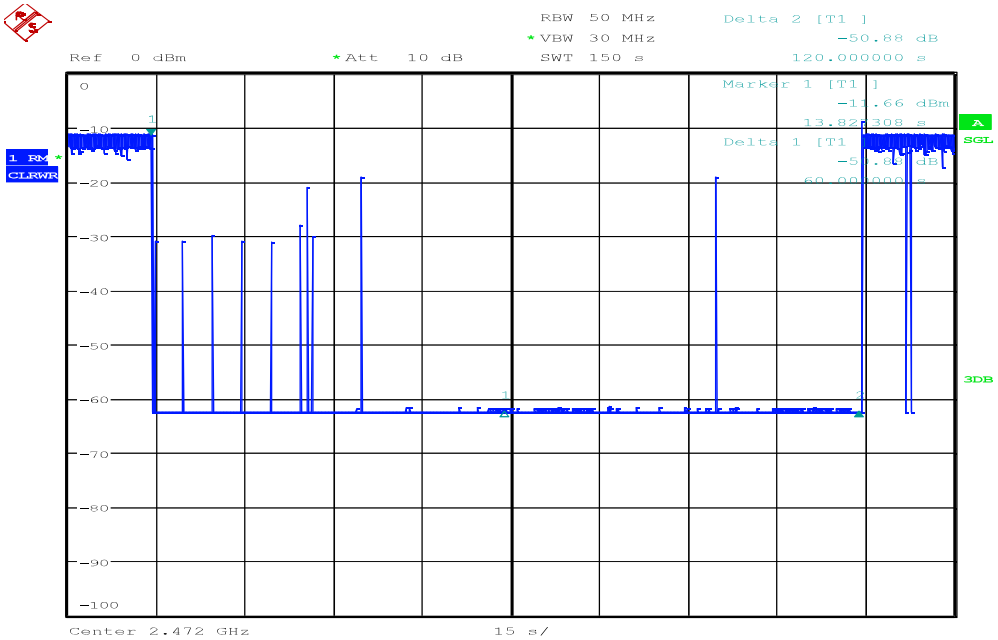
Date: 25.JUL.2018 17:16:41

Test results: IEEE 802.11g Mode, Low



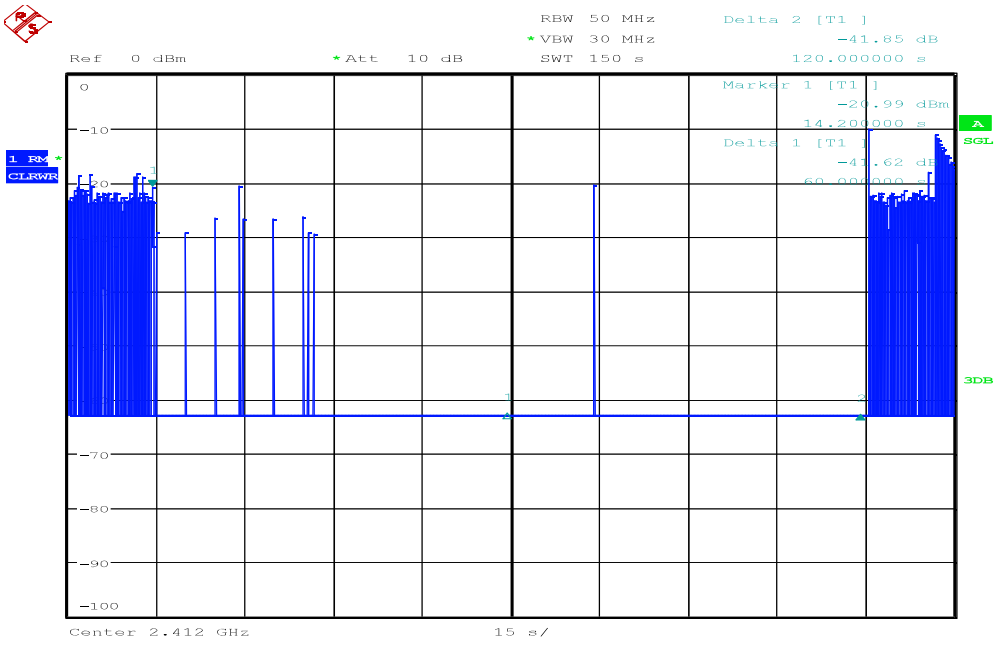
Date: 25.JUL.2018 16:02:07

Test results: IEEE 802.11g Mode, High



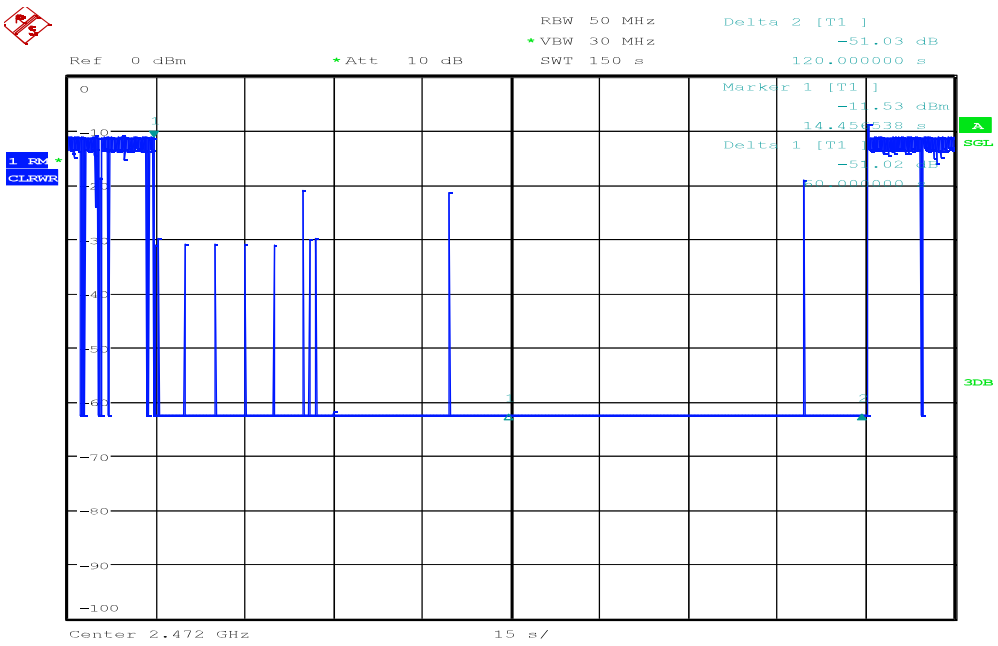
Date: 25.JUL.2018 17:07:38

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



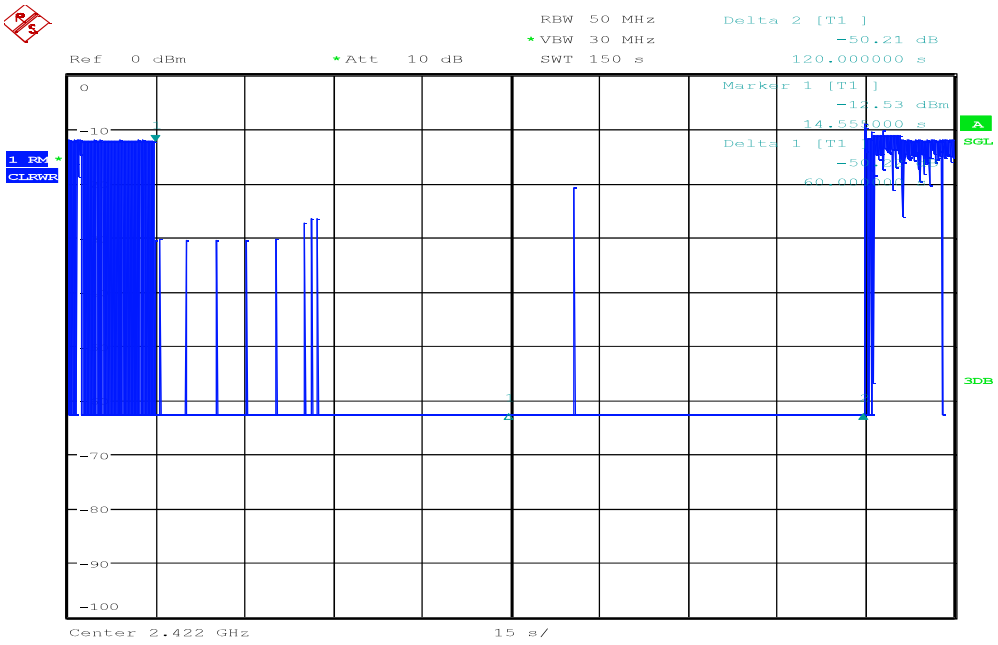
Date: 25.JUL.2018 16:05:06

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



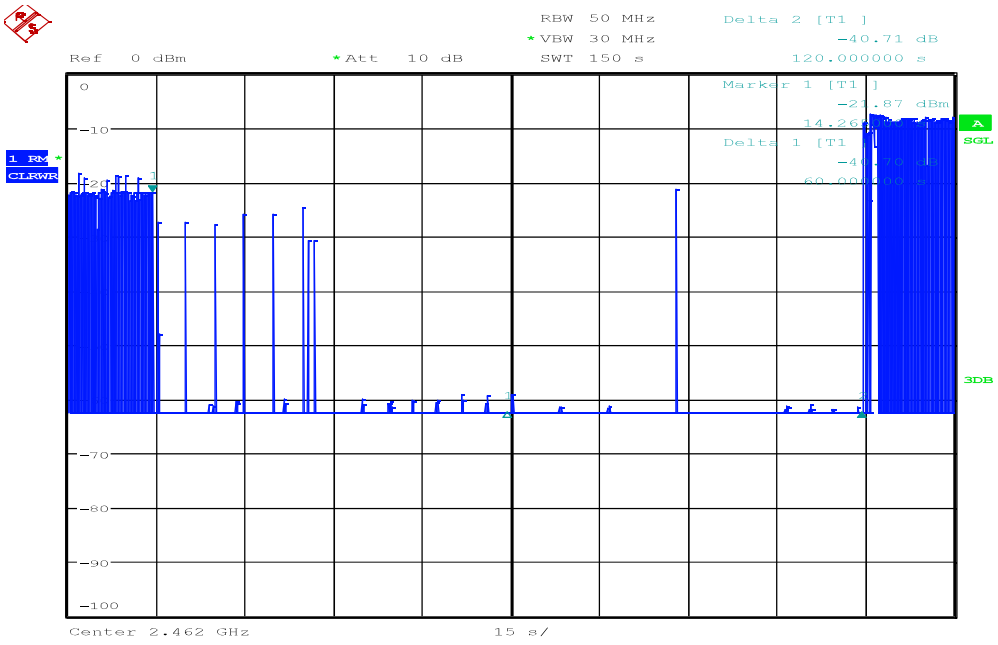
Date: 25.JUL.2018 16:56:24

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



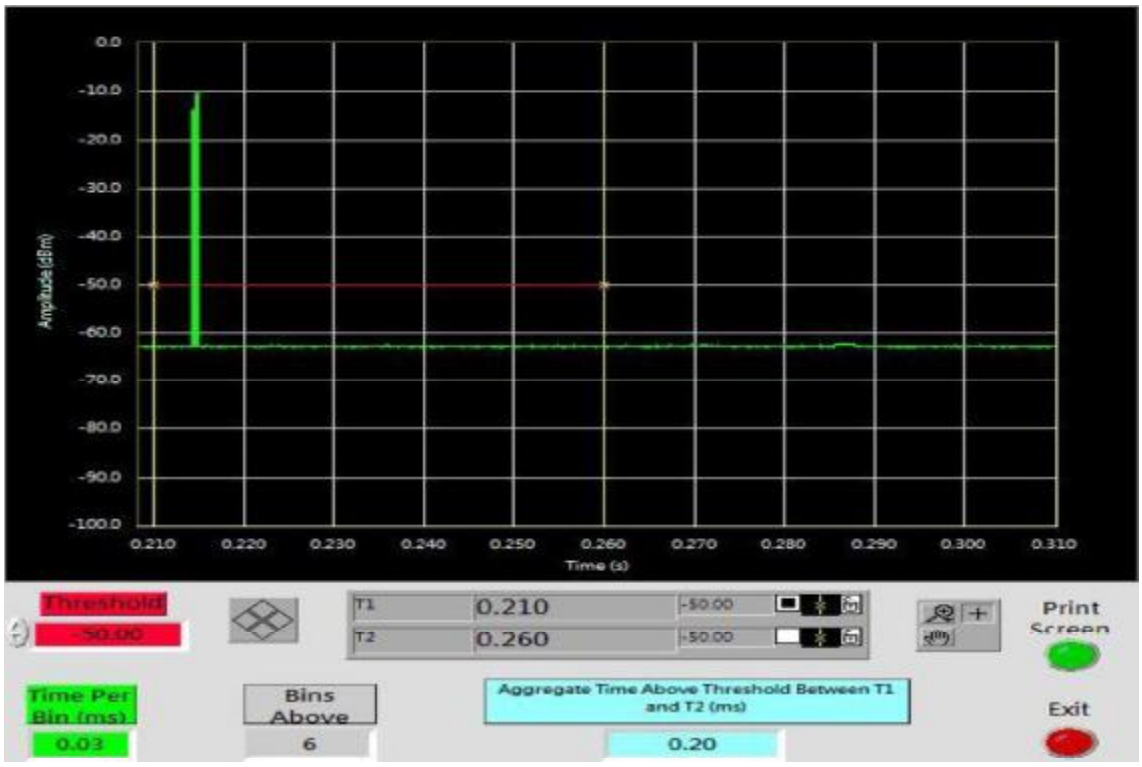
Date: 25.JUL.2018 19:17:01

TEST RESULTS

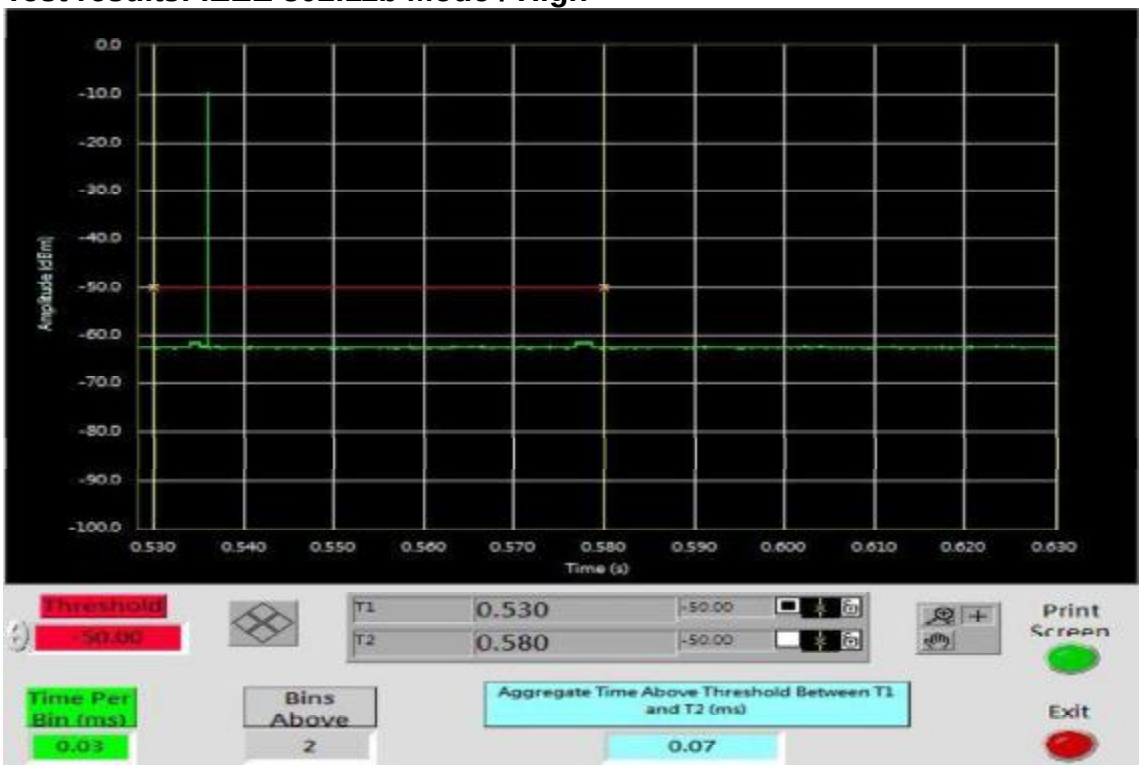
Short Control Signalling Transmissions			
Mode	Maximum duty cycle(ms)		Limit(ms)
	CH Low	CH High	
IEEE 802.11b Mode	0.20	0.07	5
IEEE 802.11g Mode	0.23	0.37	5
IEEE 802.11n HT 20 MHz Mode	0.40	0.23	5

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

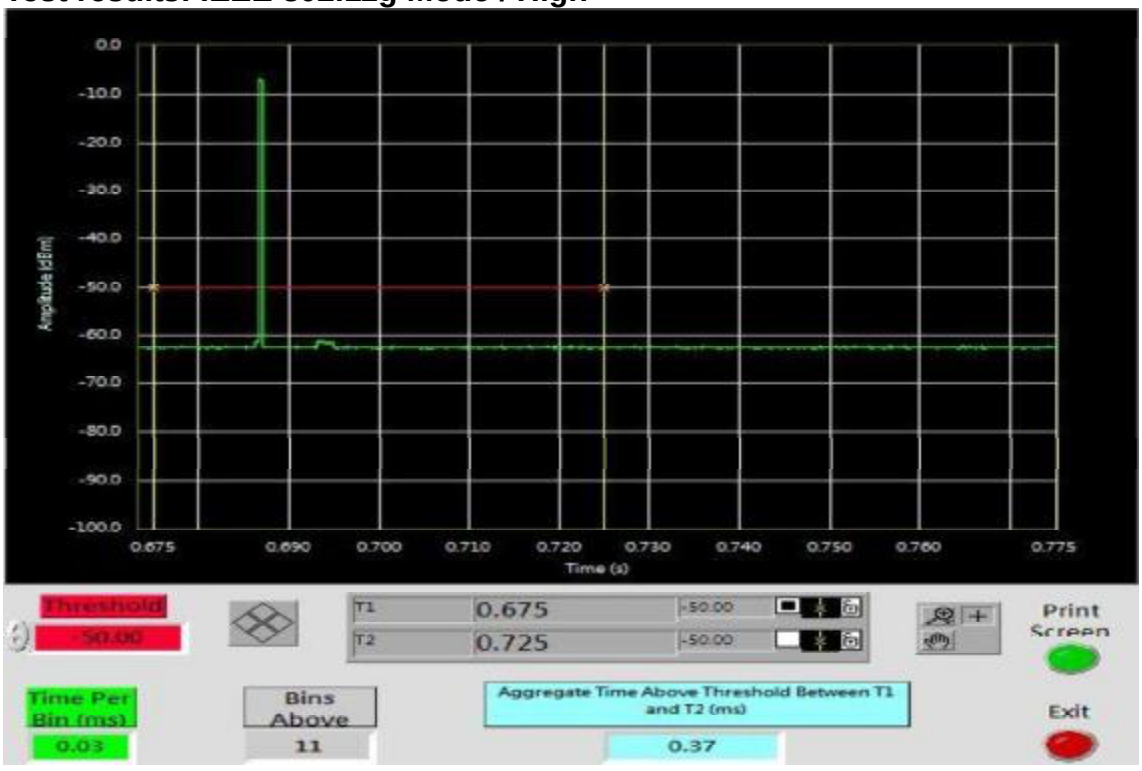


Test results: IEEE 802.11b Mode / High

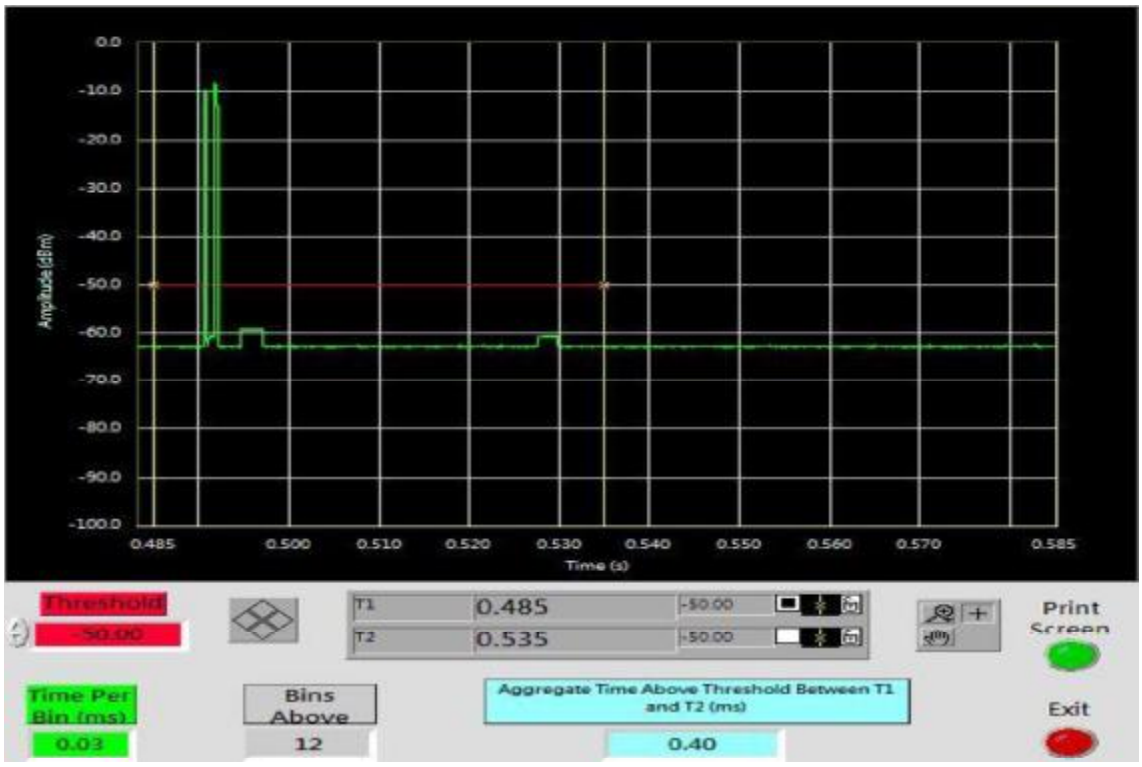


Test results: IEEE 802.11g Mode / Low

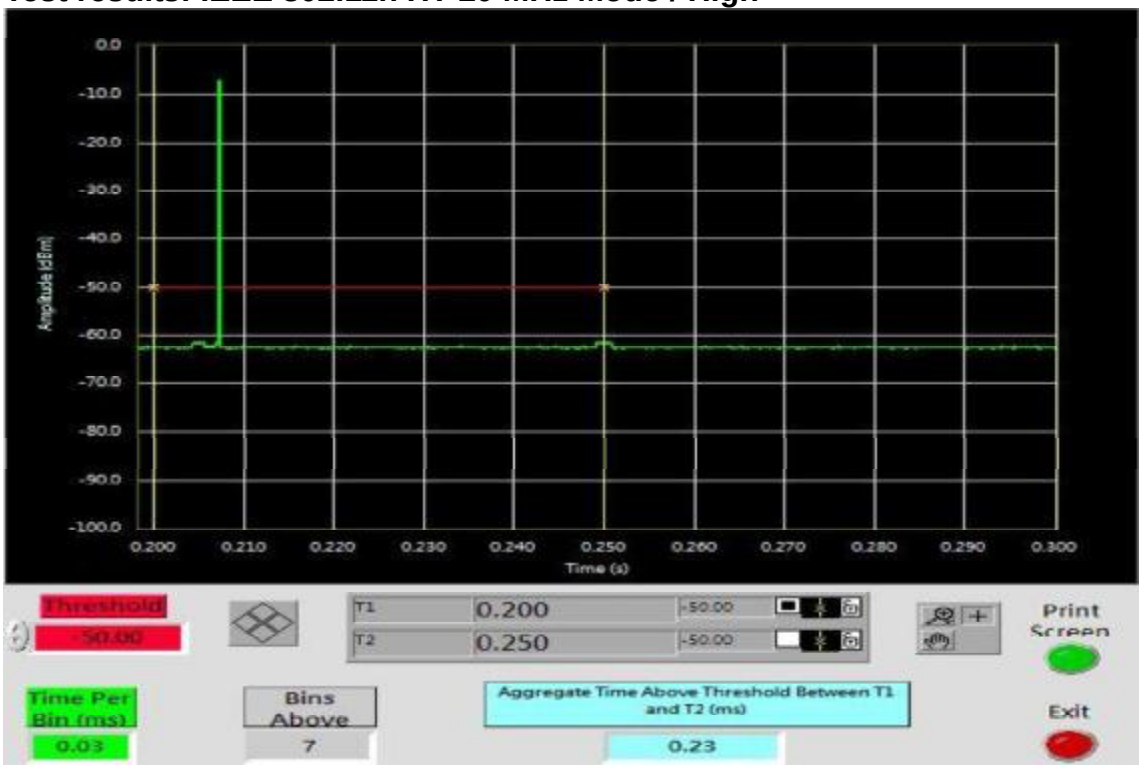
Test results: IEEE 802.11g Mode / High



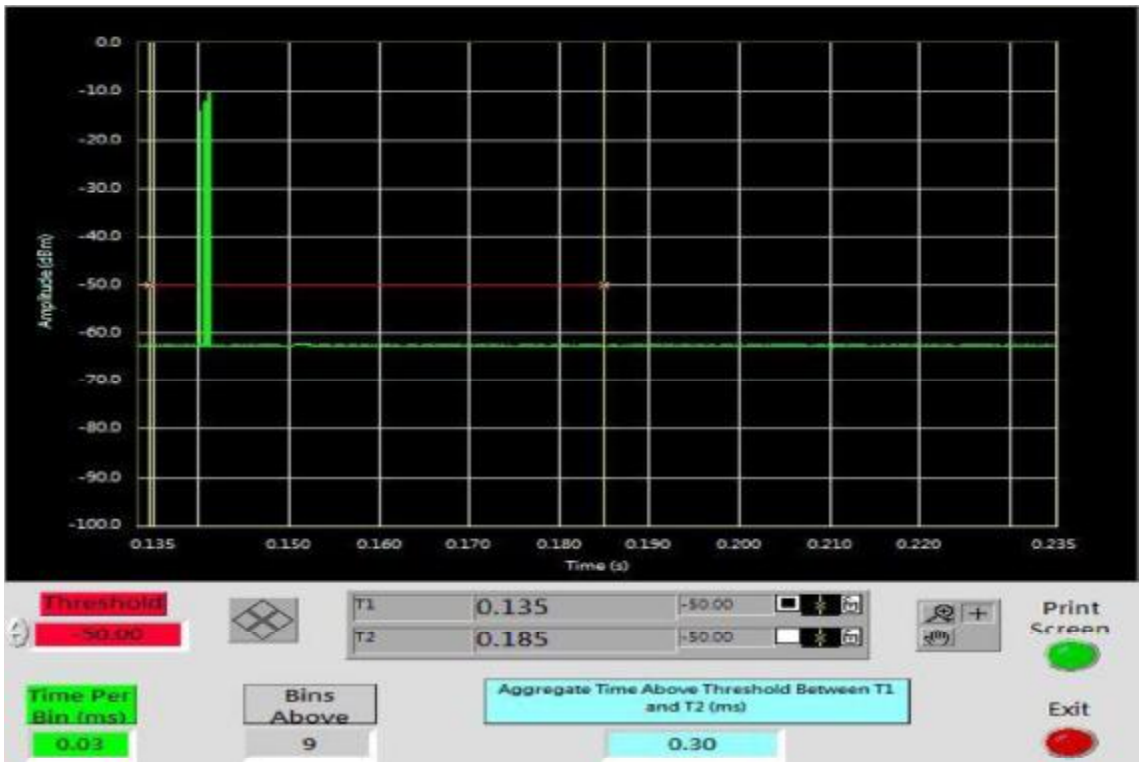
Test results: IEEE 802.11n HT 20 MHz Mode / Low



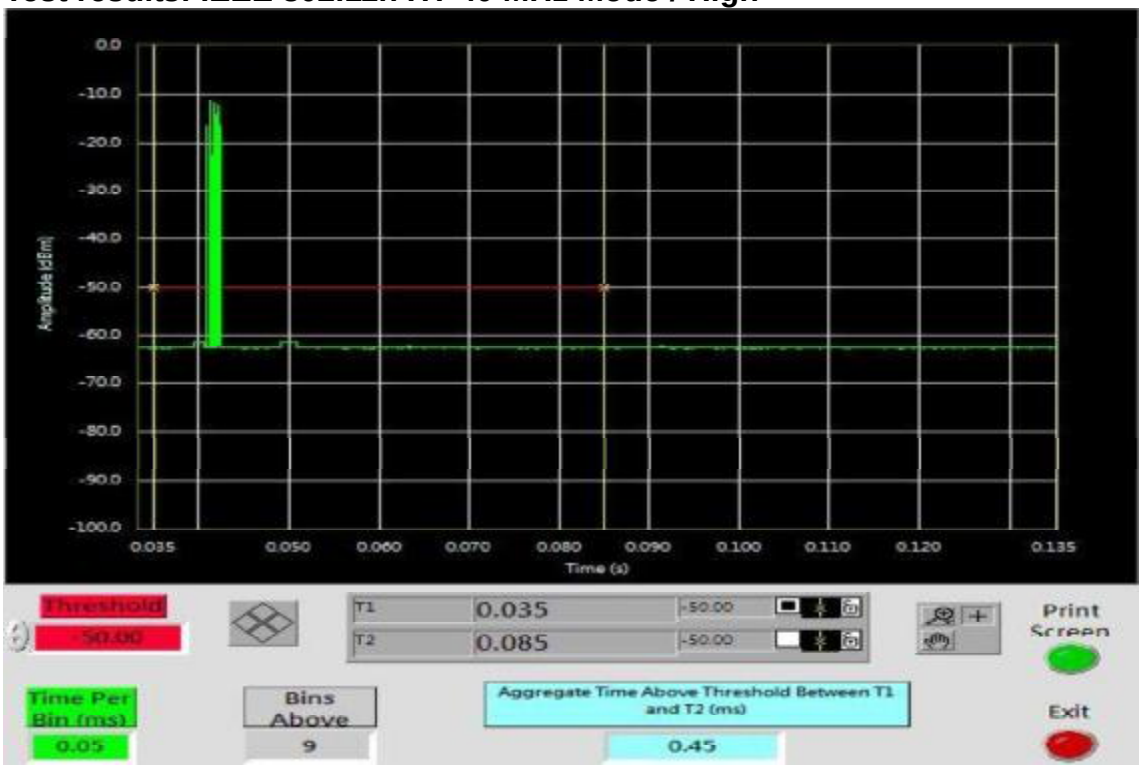
Test results: IEEE 802.11n HT 20 MHz Mode / High



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

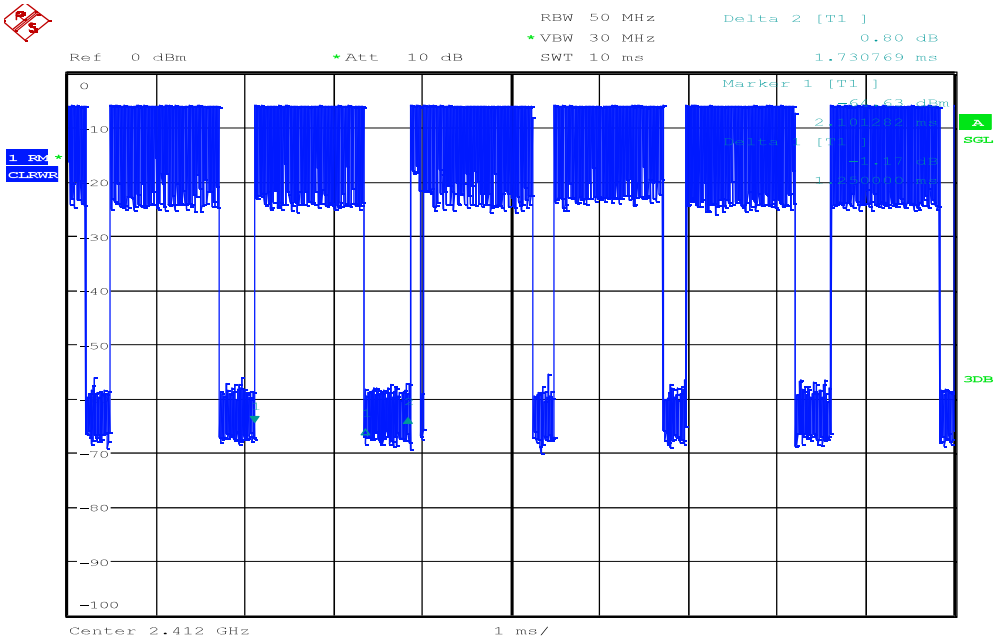


Test results: IEEE 802.11n HT 40 MHz Mode / High



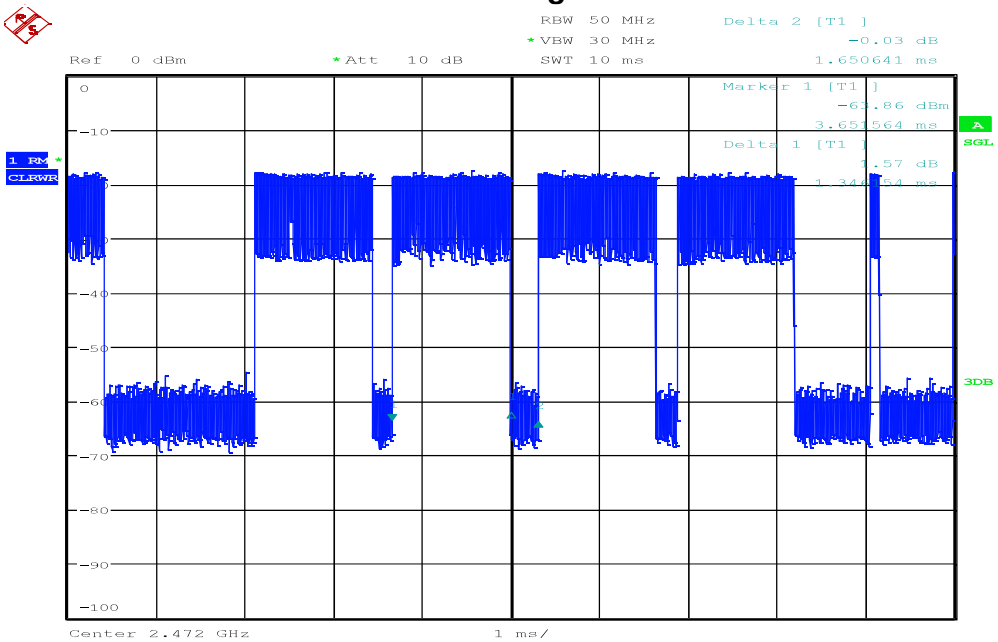
Occupancy time

Test results: IEEE 802.11b Mode / Low



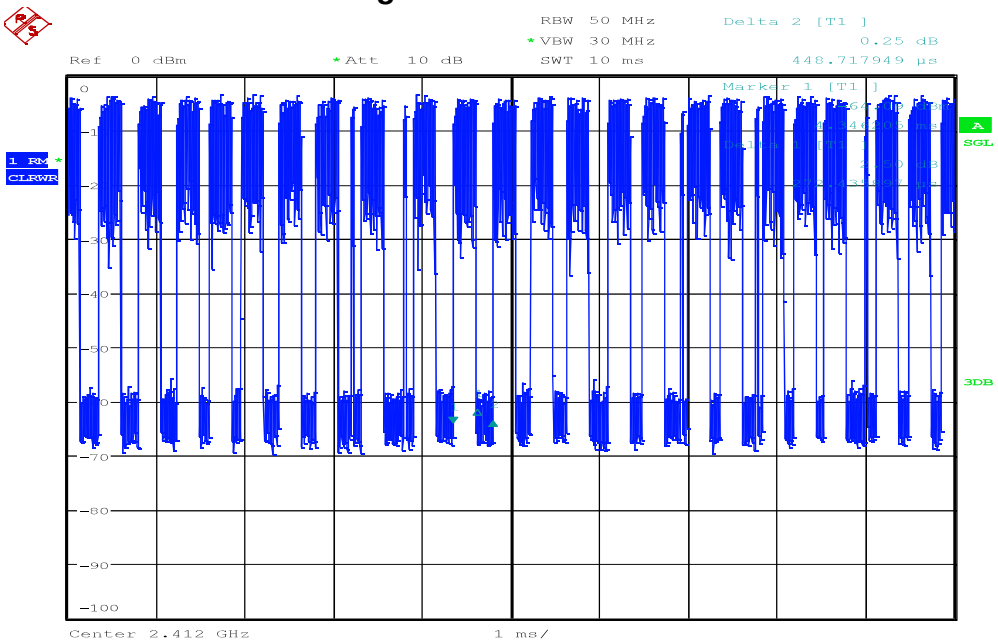
Date: 25.JUL.2018 14:42:27

Test results: IEEE 802.11b Mode / High



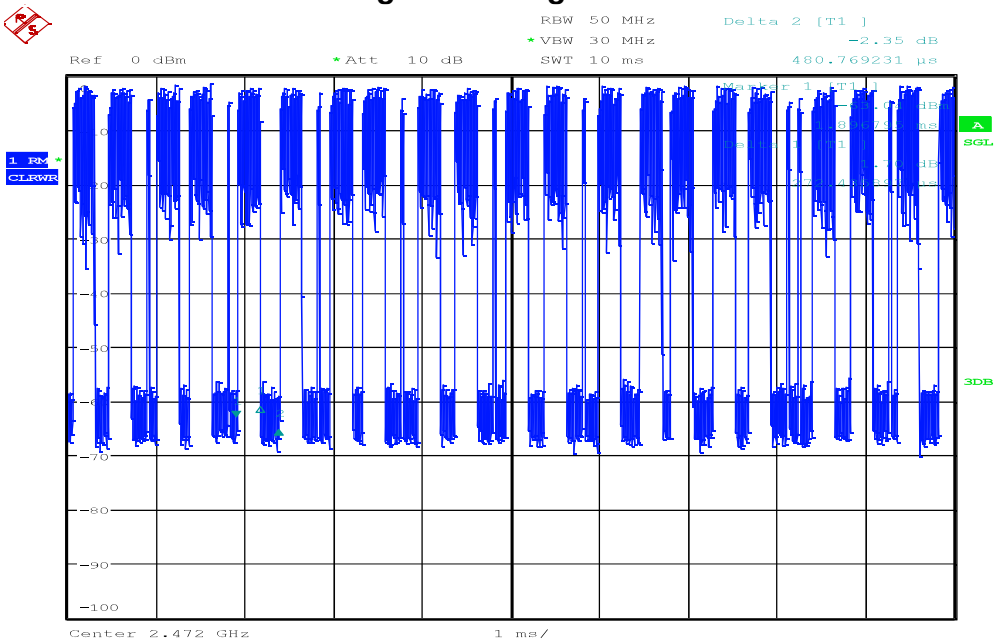
Date: 25.JUL.2018 17:52:22

Test results: IEEE 802.11g Mode / Low



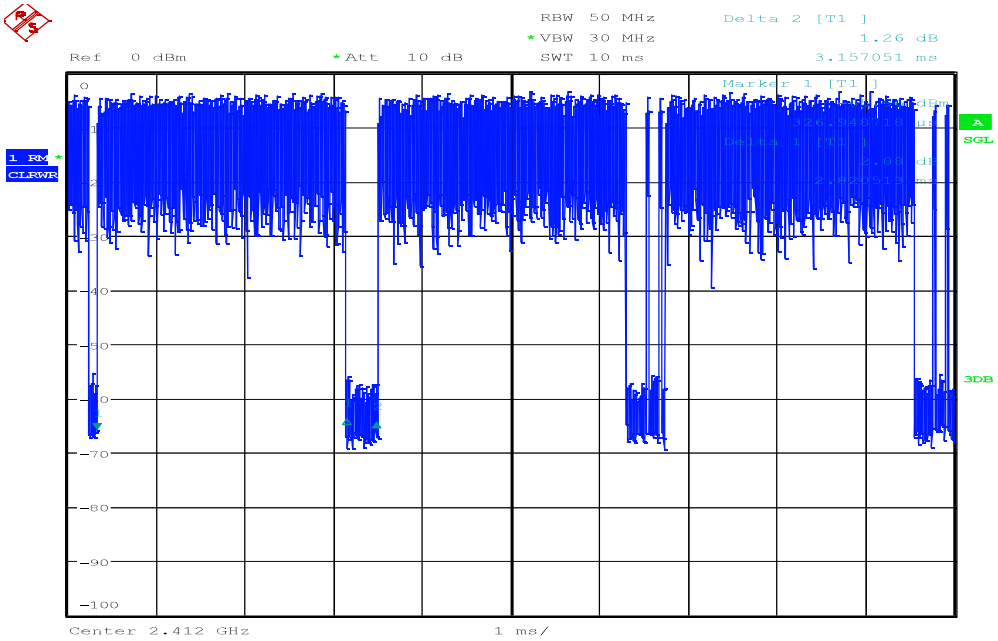
Date: 25.JUL.2018 15:11:48

Test results: IEEE 802.11g Mode / High



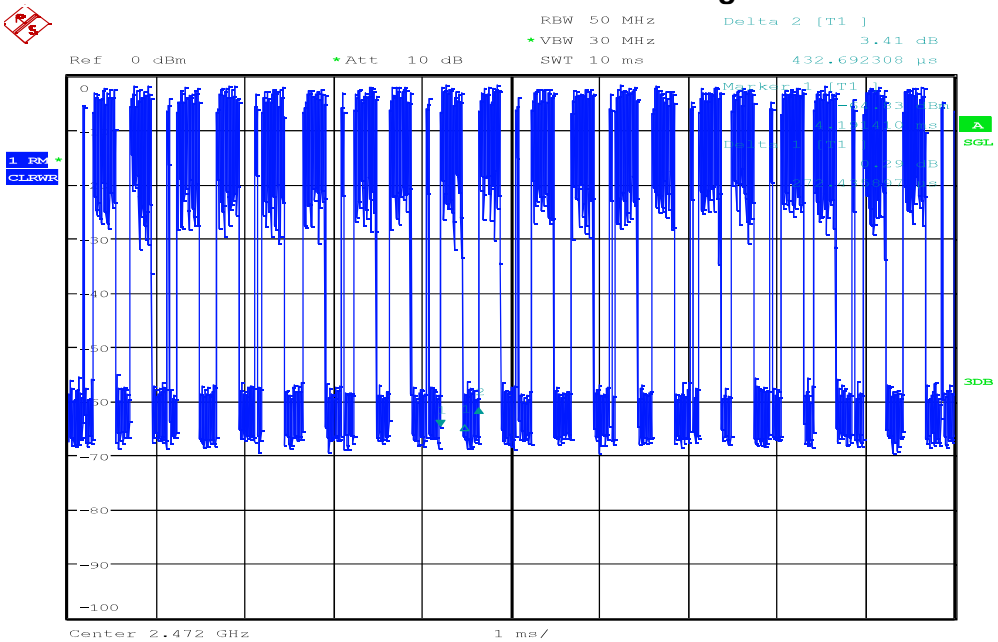
Date: 25.JUL.2018 17:04:25

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



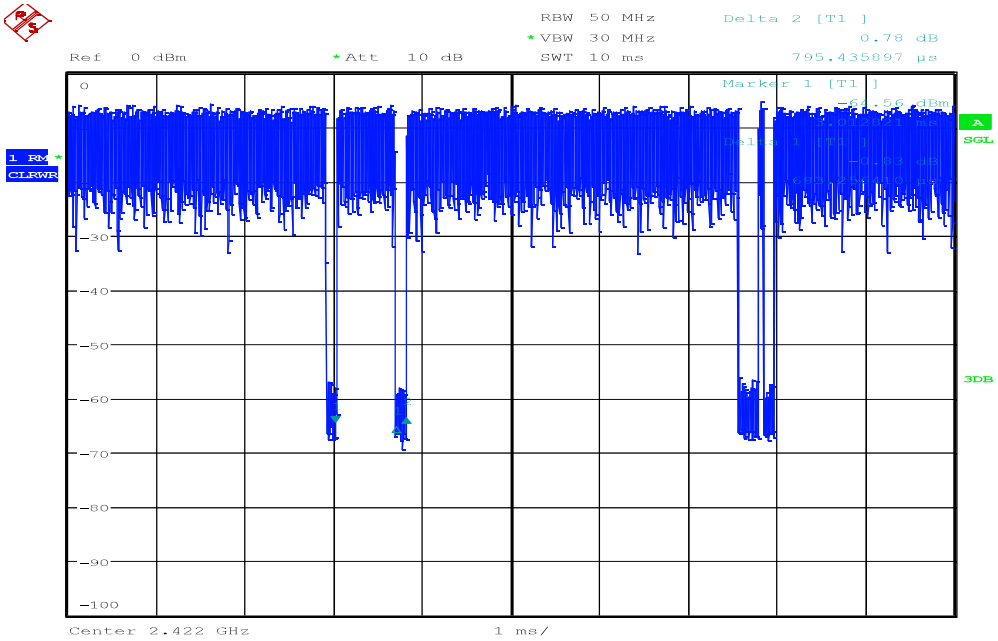
Date: 25.JUL.2018 15:41:28

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



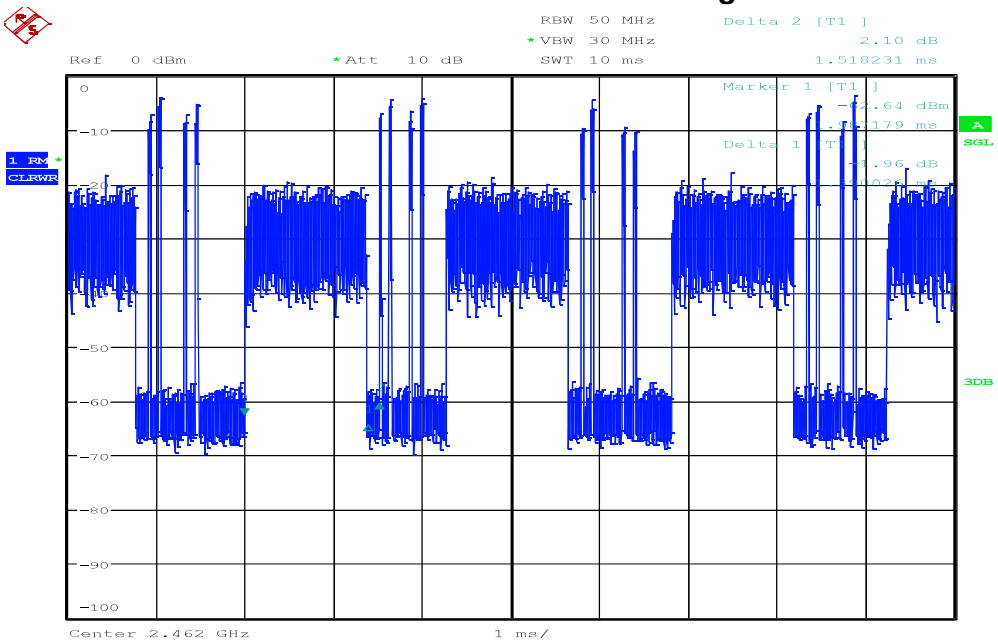
Date: 25.JUL.2018 16:53:07

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

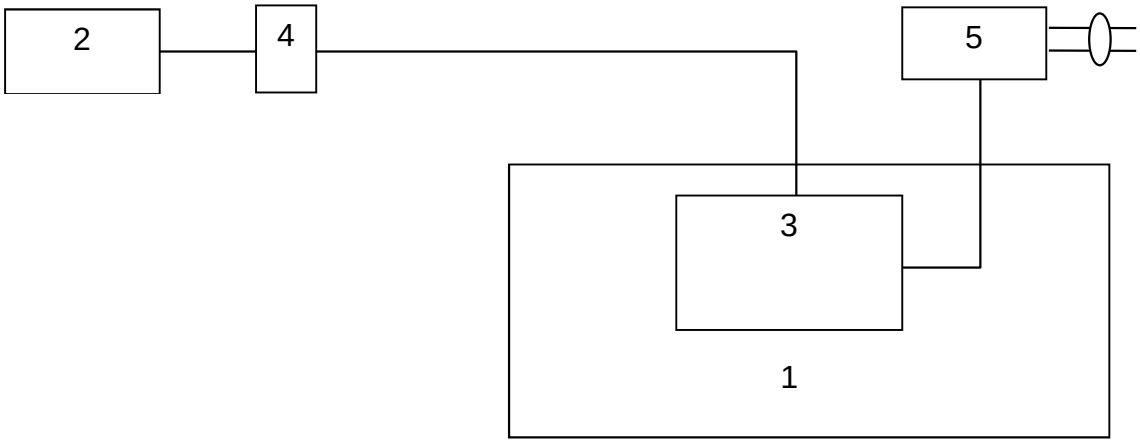
LIMIT

ETSI EN 300 328

For non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than10 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.

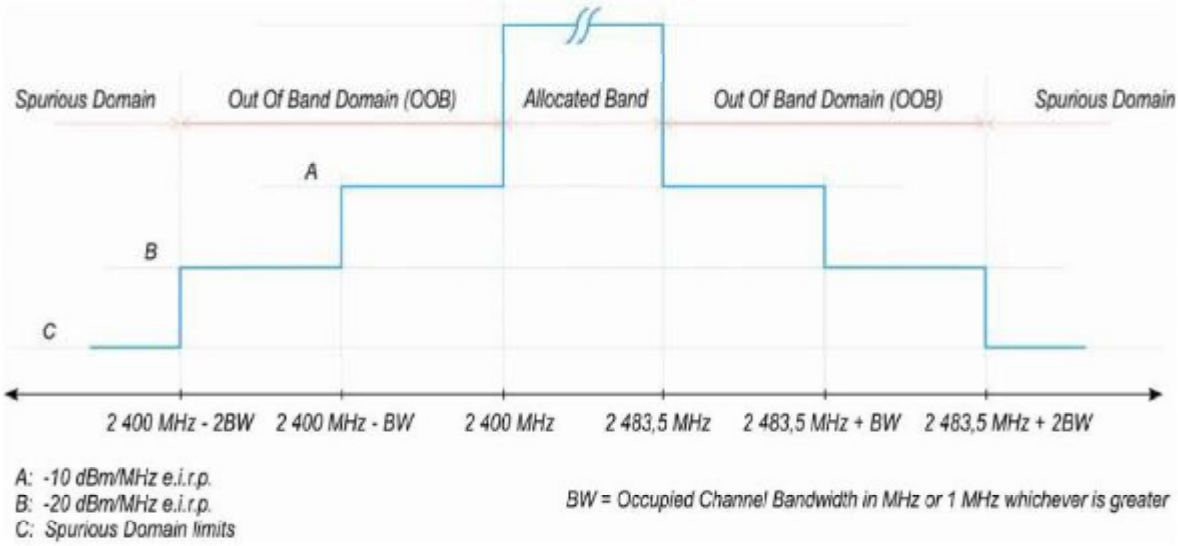
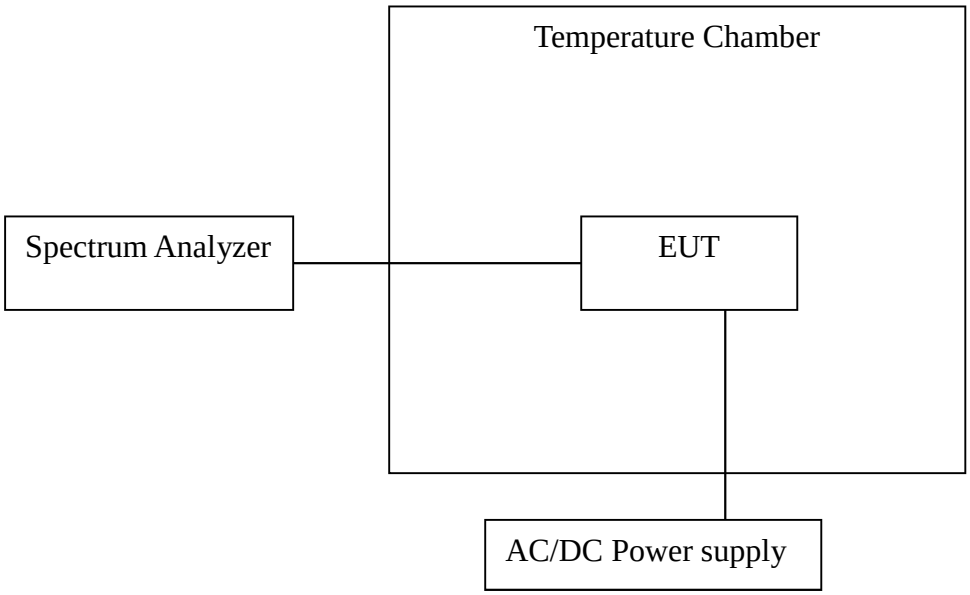


Figure 1: Transmit mask

Test Configuration

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



TEST PROCEDURE

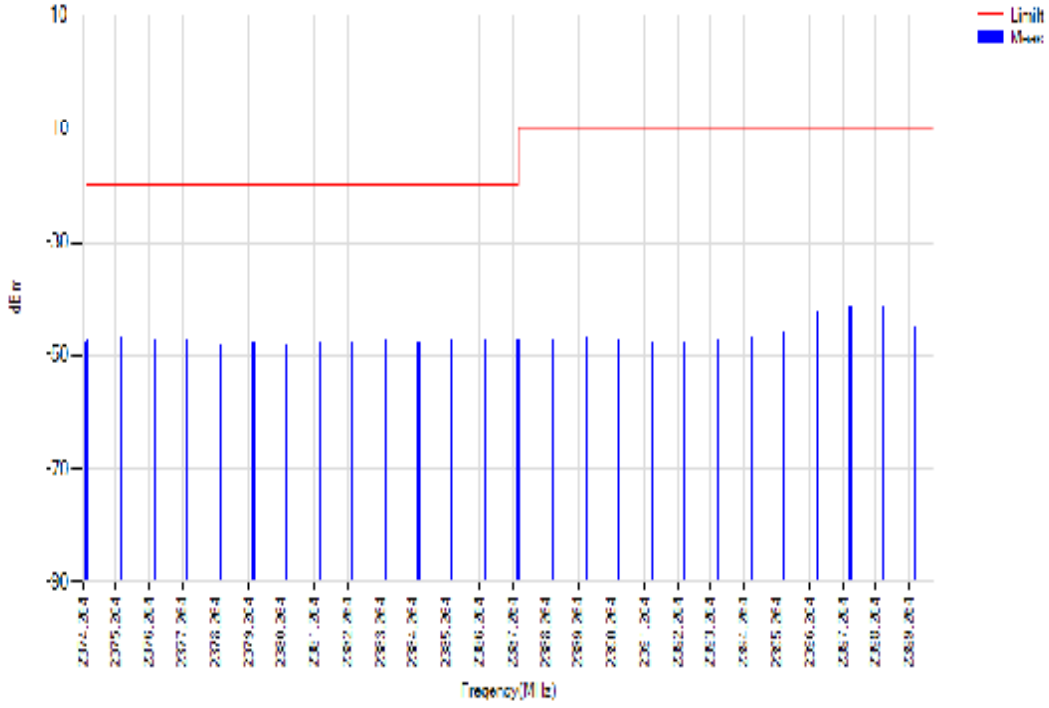
1. Please refer to ETSI EN 300 328 (V2.1.1) for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) for the measurement method.

TEST RESULTS

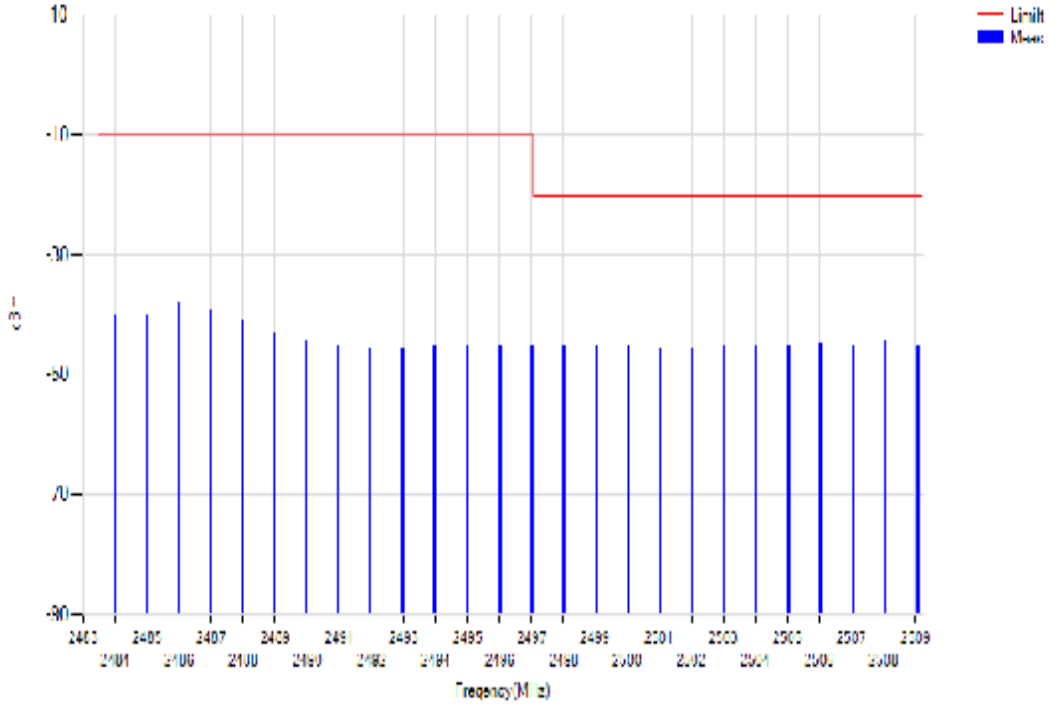
No non-compliance noted.

Test results: IEEE 802.11b Mode

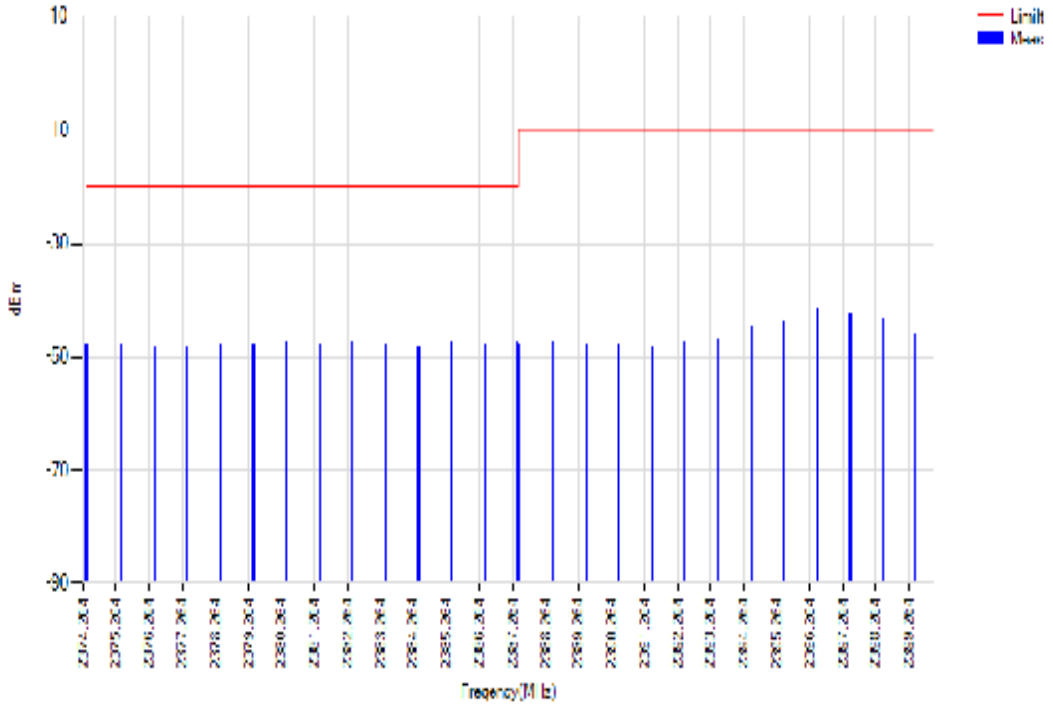
25℃ /5v CH Low



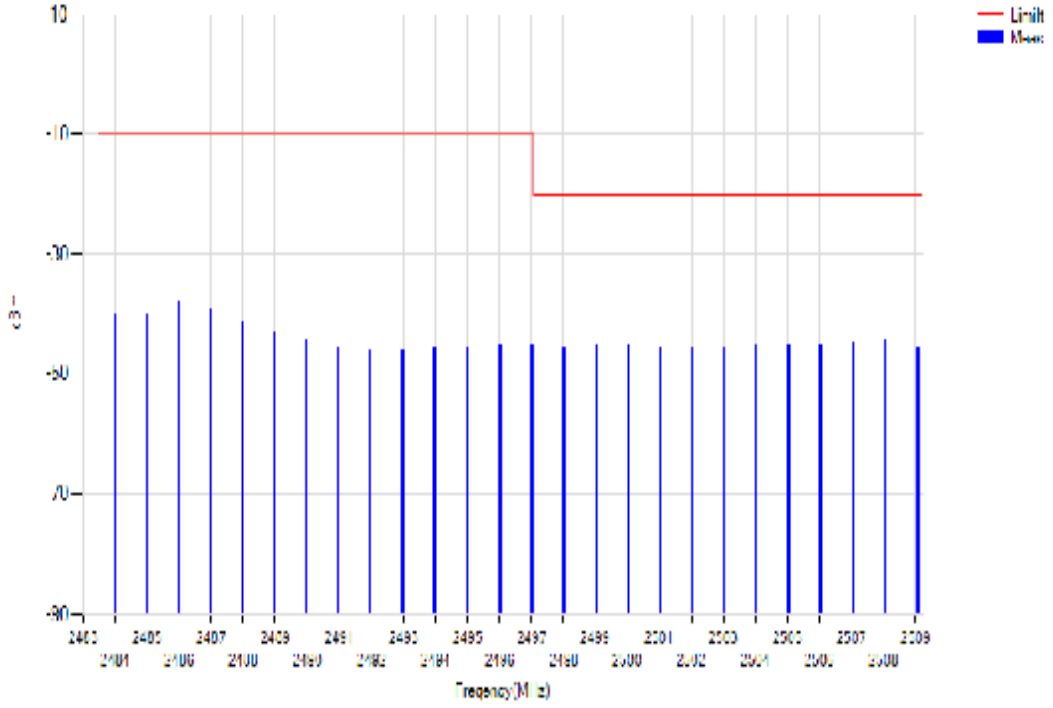
25℃ /5v CH High



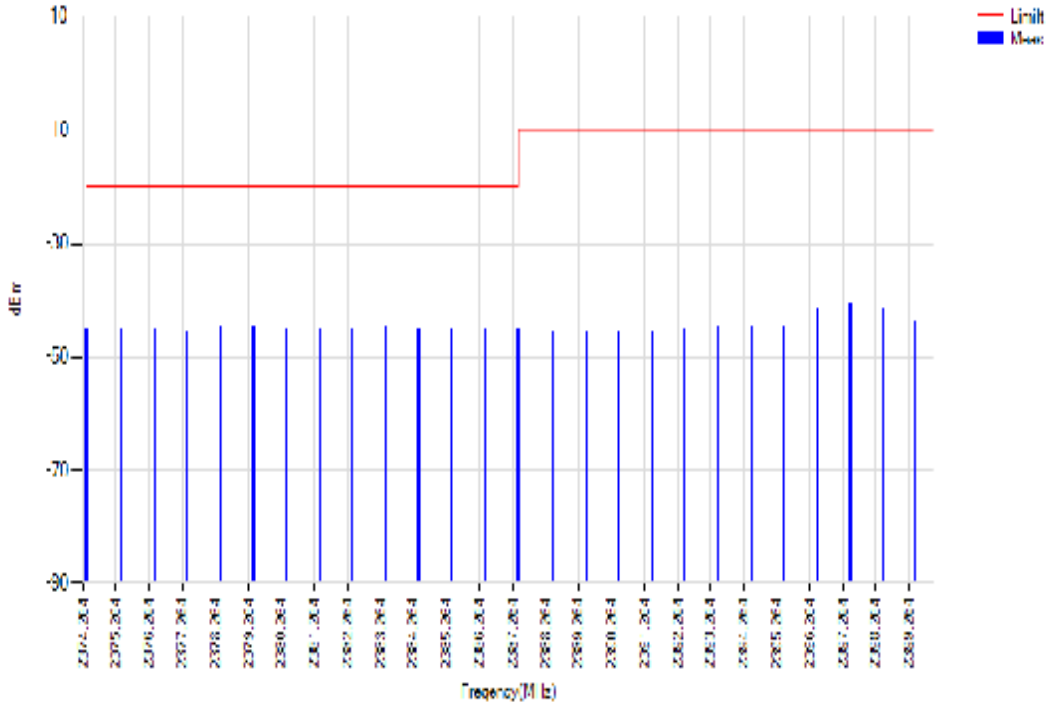
0℃ /5v CH Low



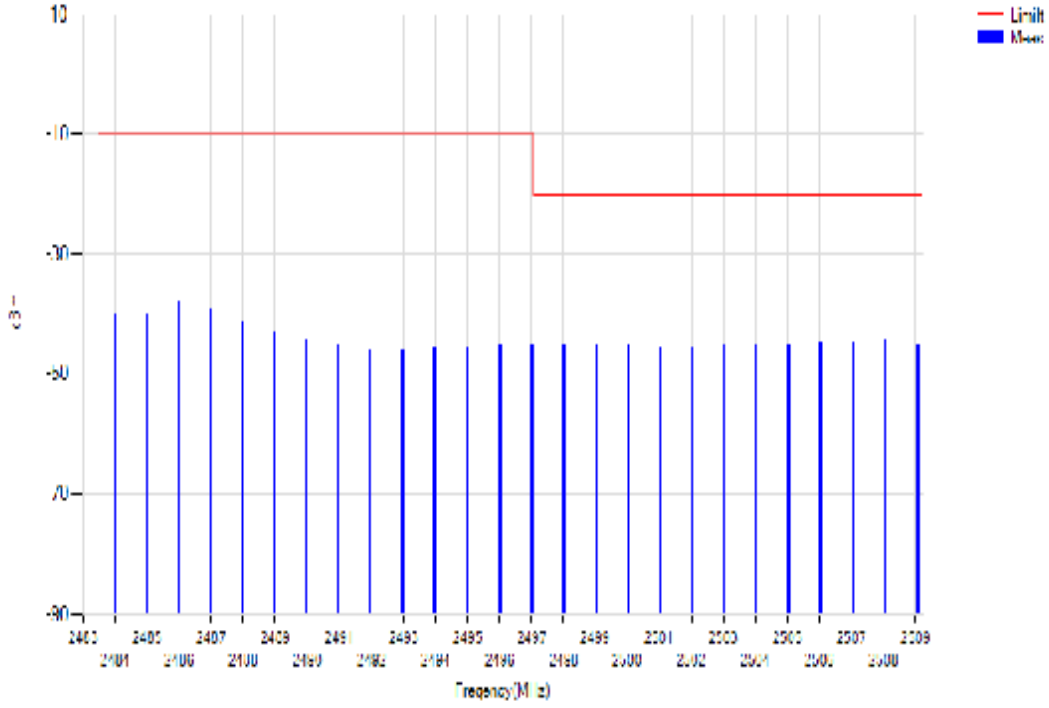
0℃ /5v CH High



70℃ /5v CH Low

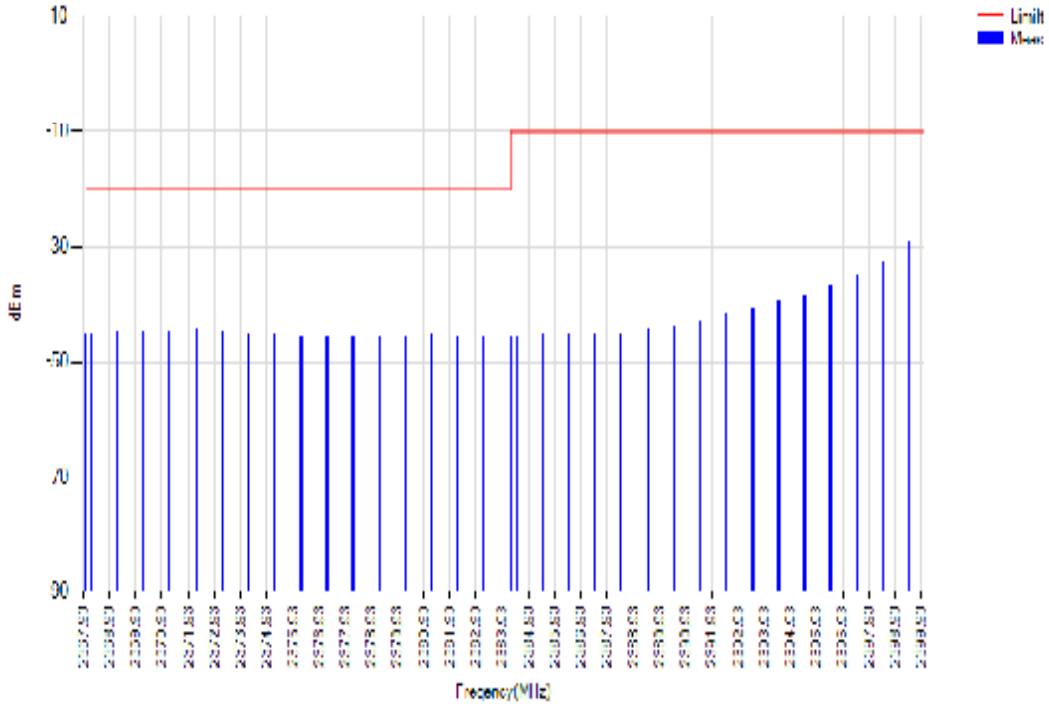


70℃ /5v CH High

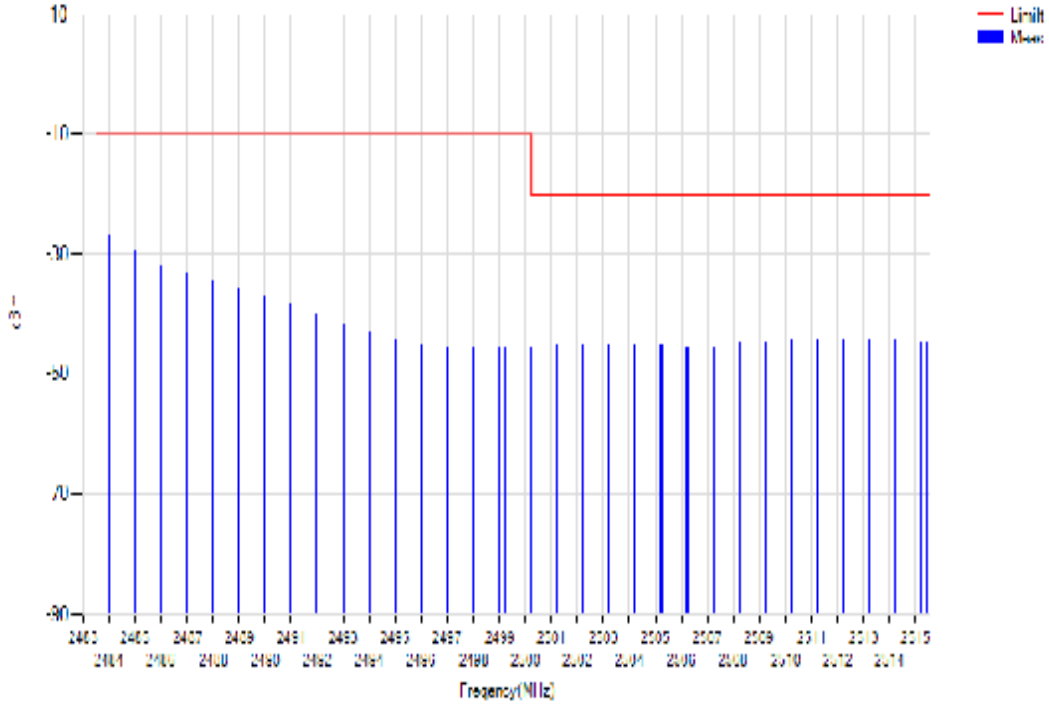


Test results: IEEE 802.11g Mode

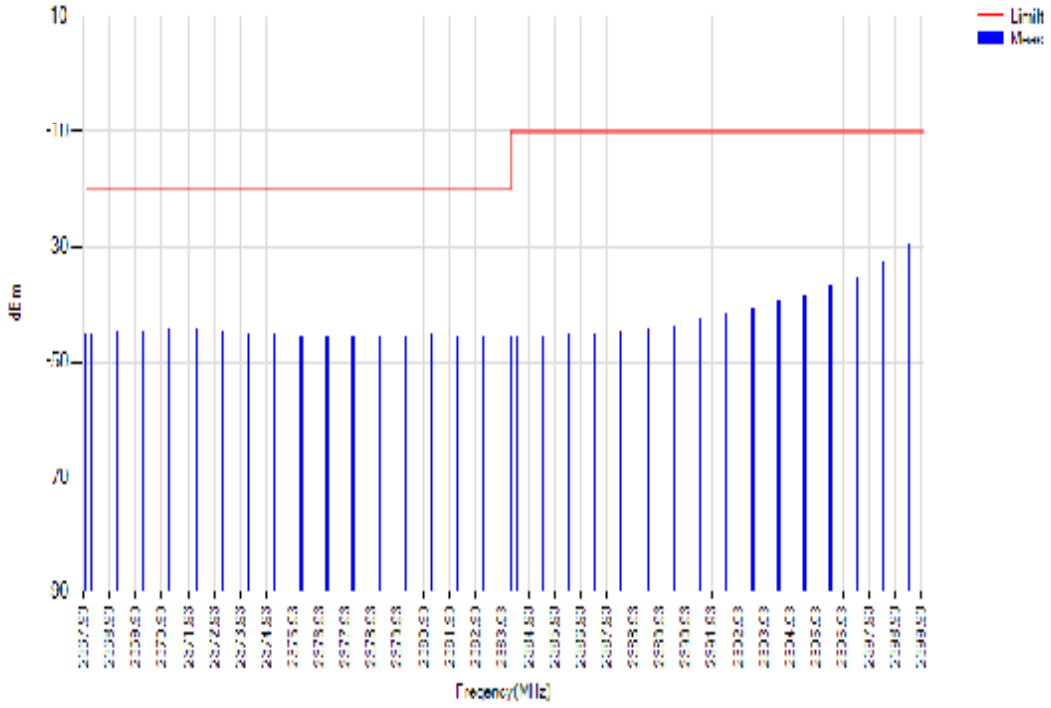
25℃ /5v CH Low



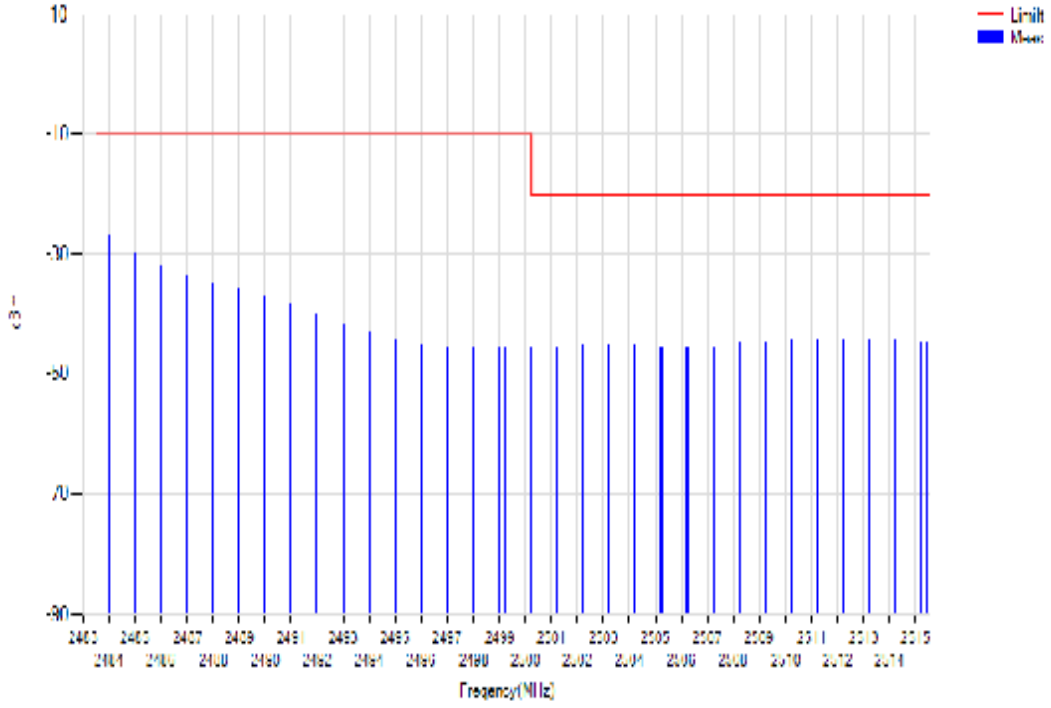
25℃ /5v CH High



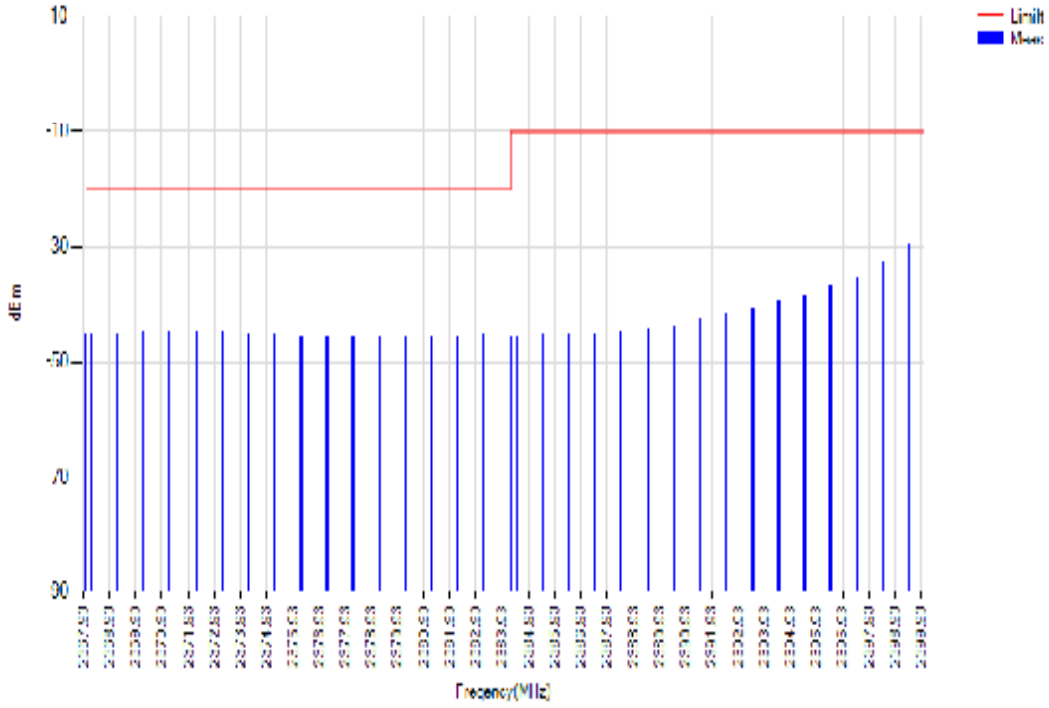
0℃ /5v CH Low



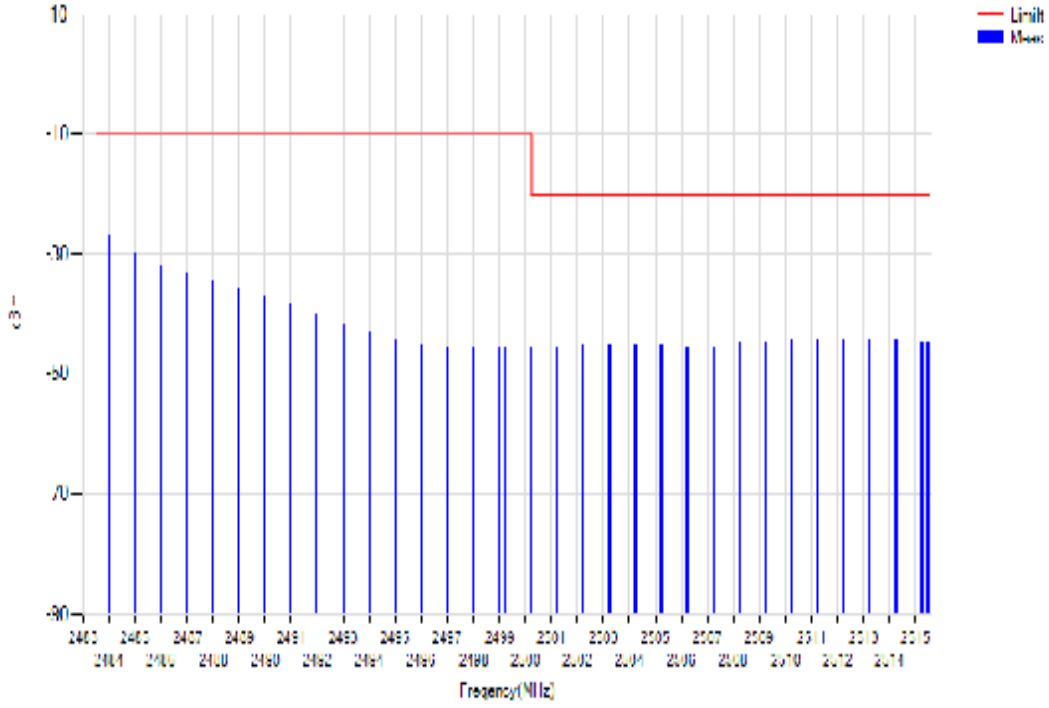
0℃ /5v CH High



70℃ /5v CH Low

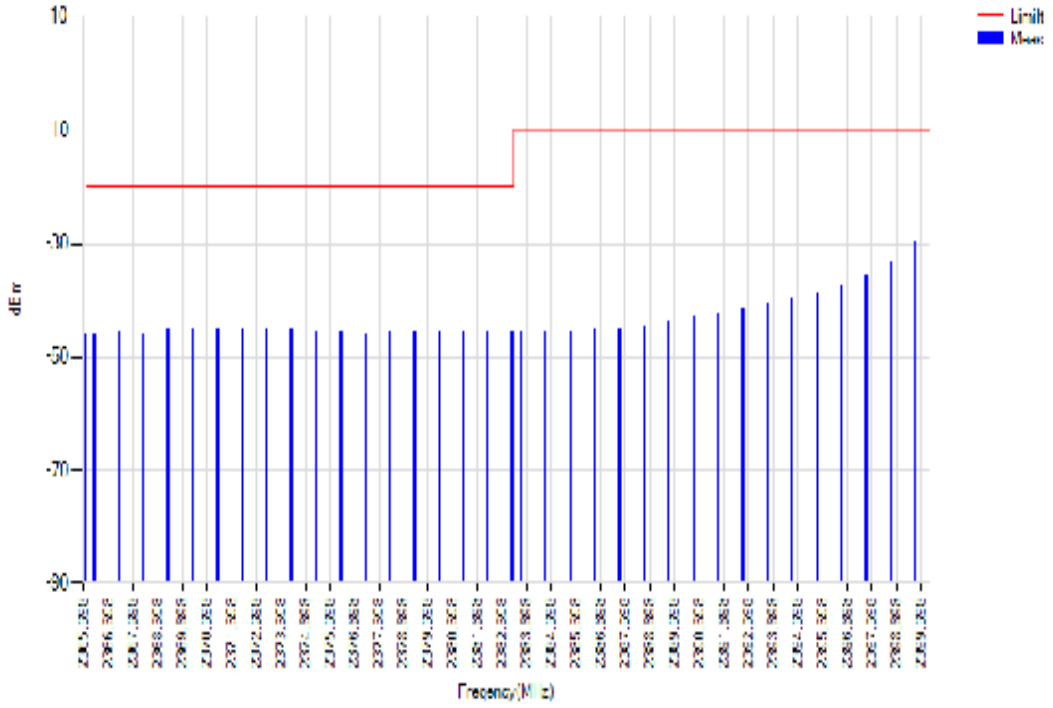


70℃ /5v CH High

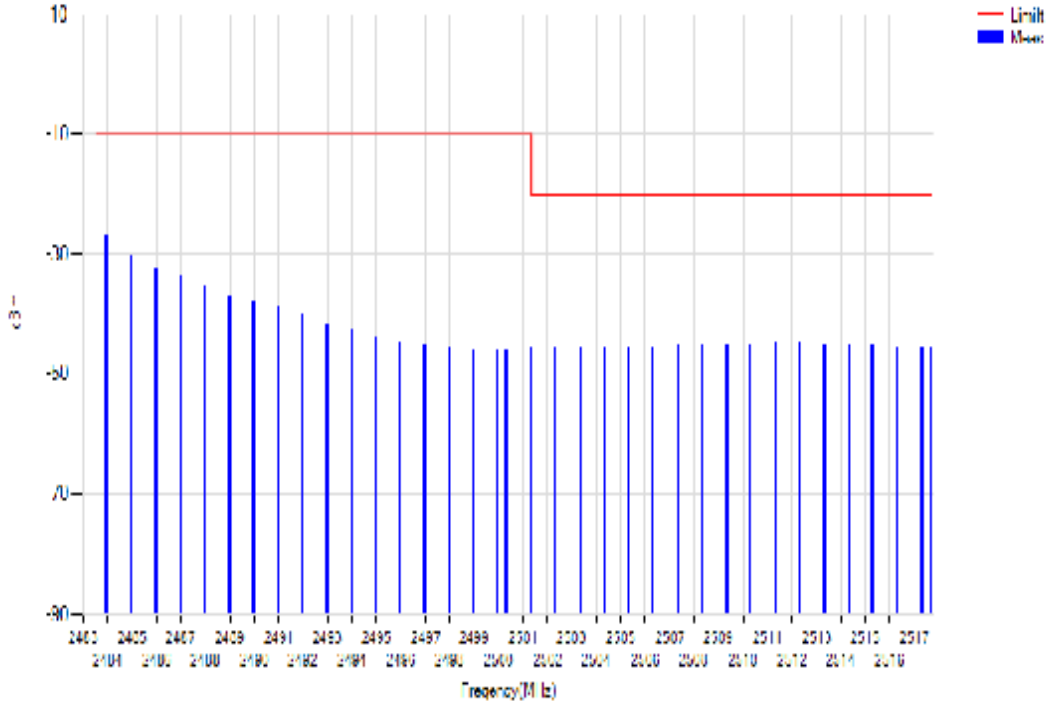


Test results: IEEE 802.11n HT 20 MHz Mode:

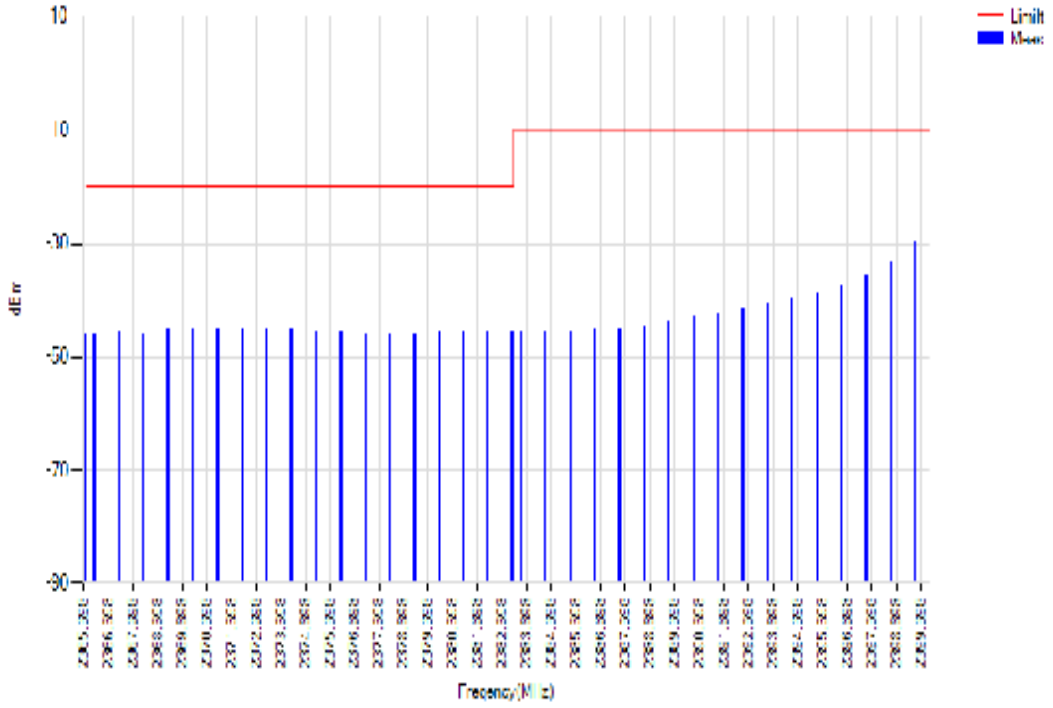
25℃ /5v CH Low



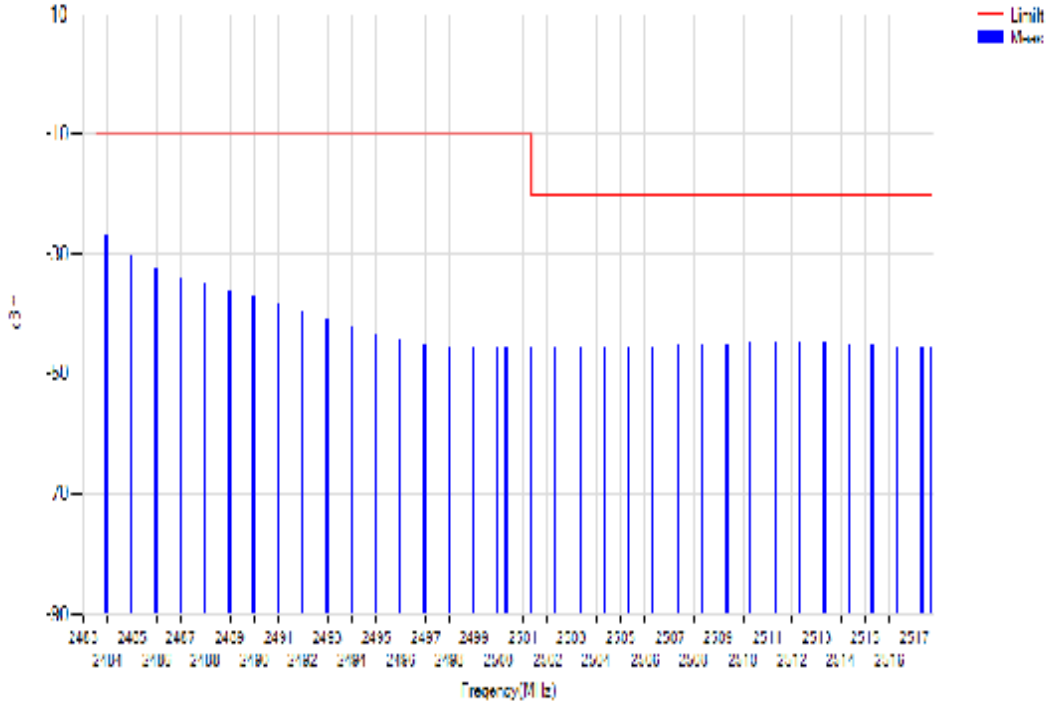
25℃ /5v CH High



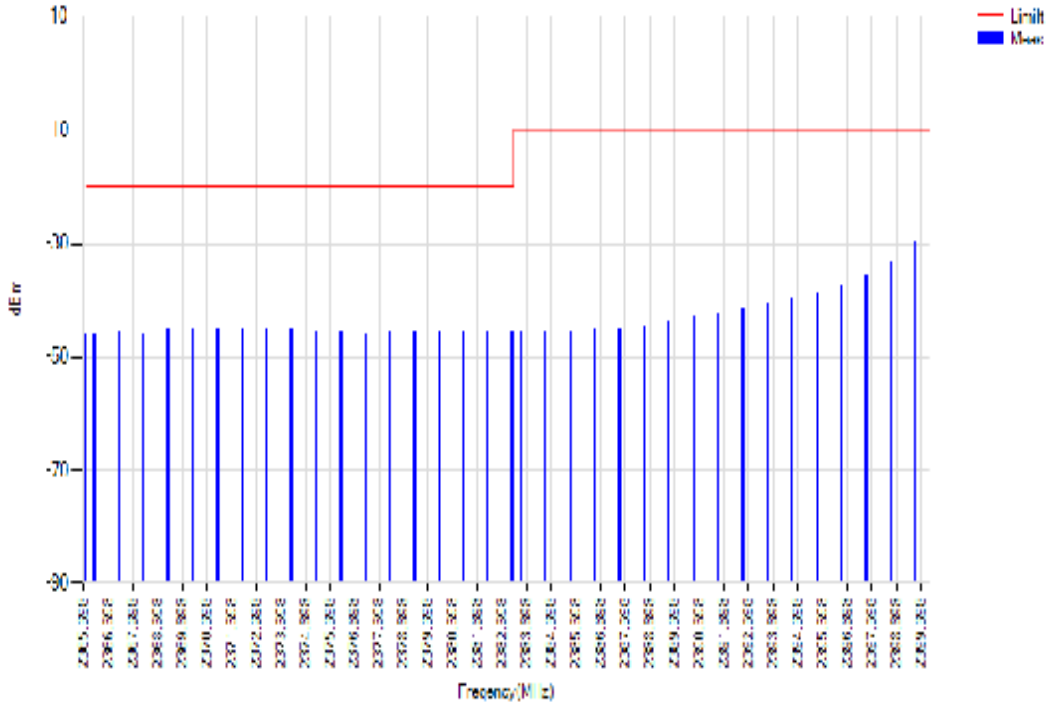
0℃ /5v CH Low



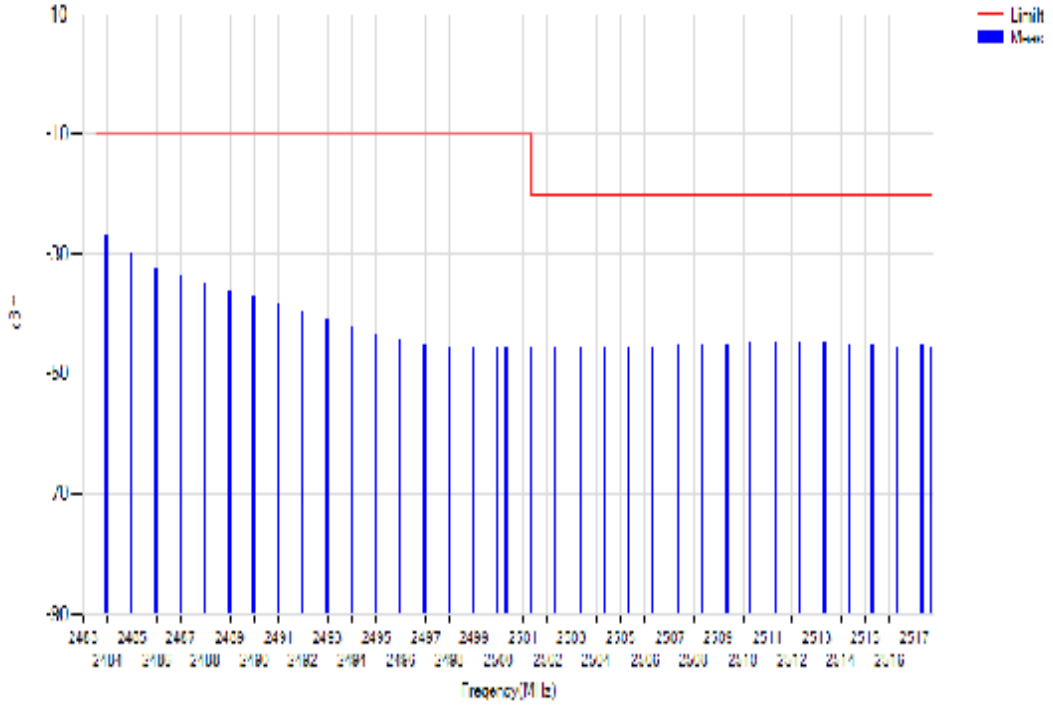
0℃ /5v CH High



70℃ /5v CH Low

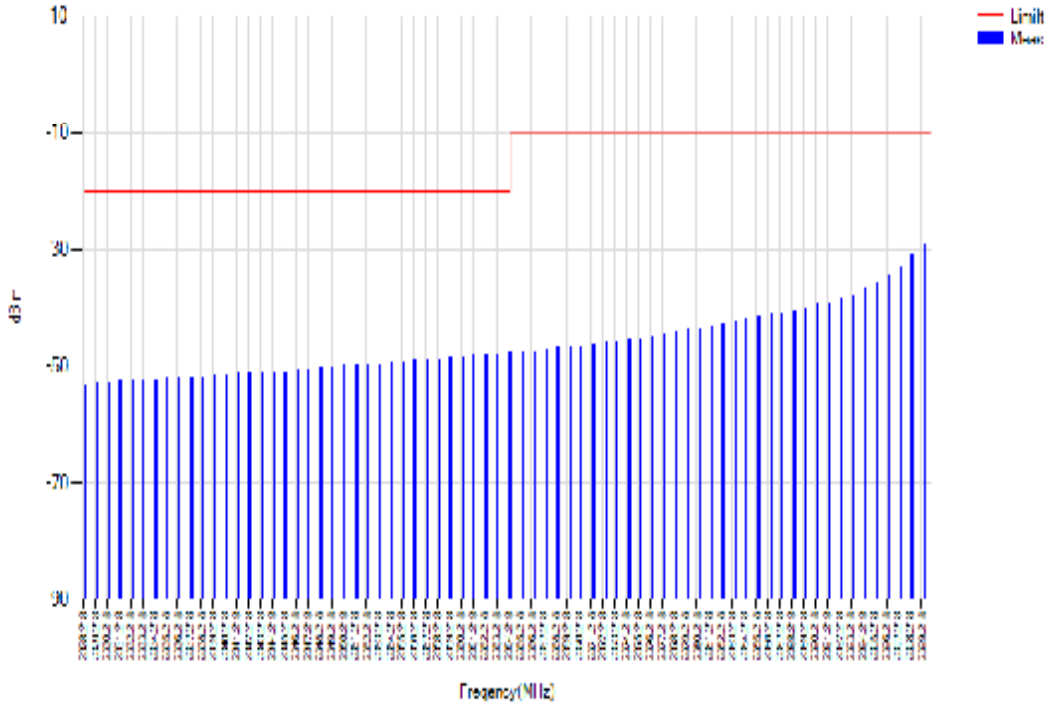


70℃ /5v CH High

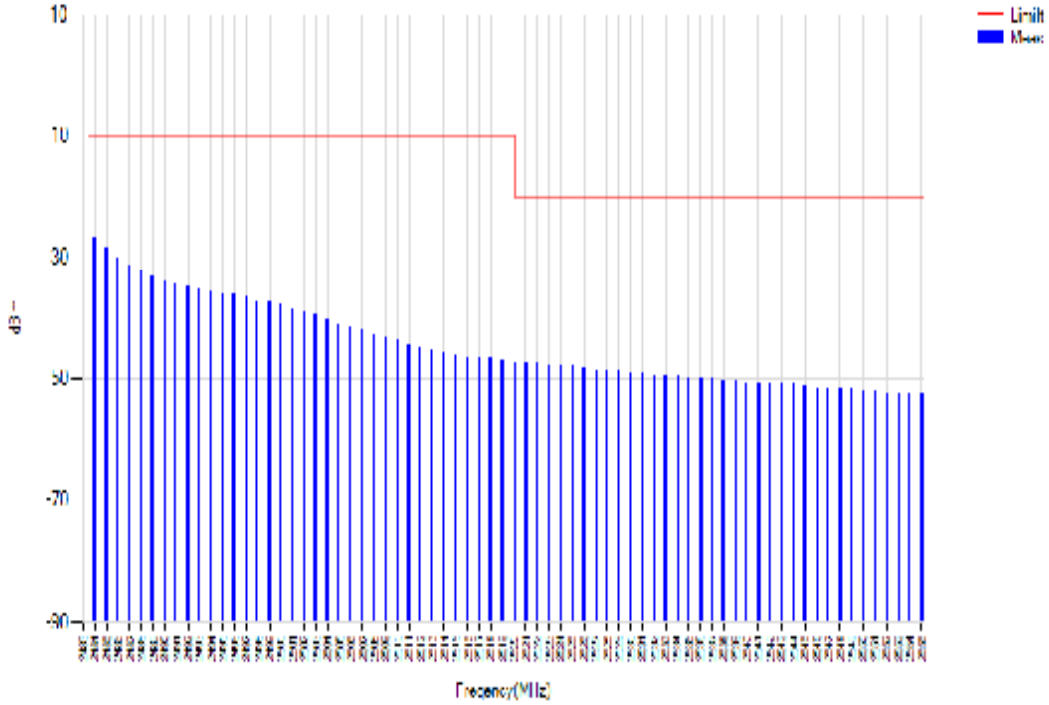


Test results: IEEE 802.11n HT 40 MHz Mode:

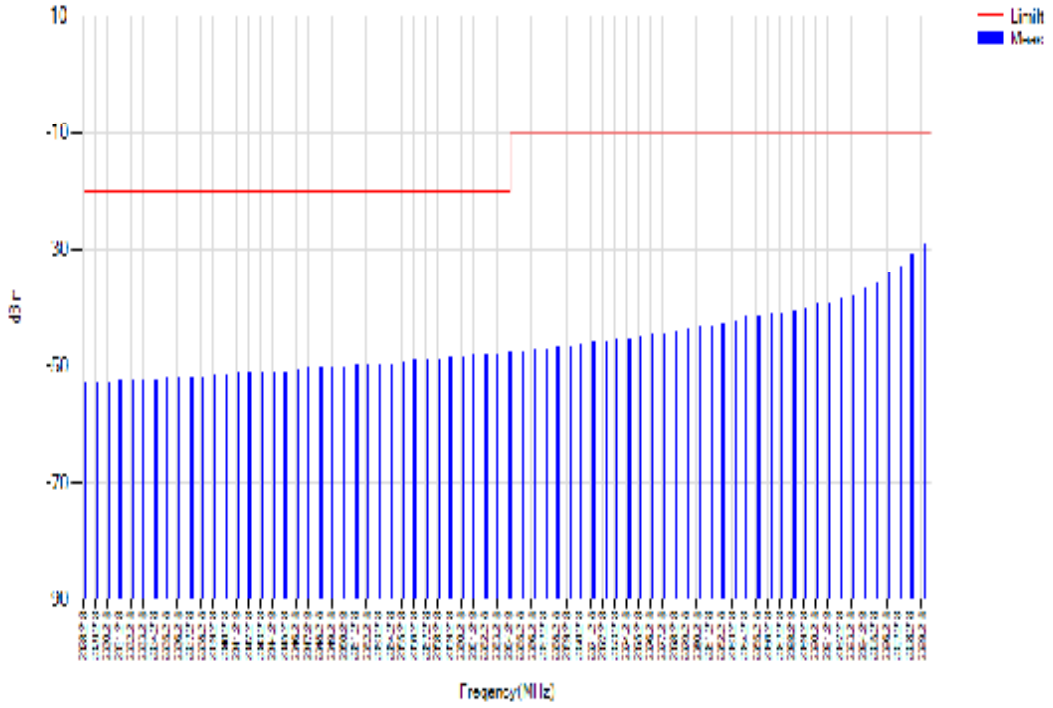
25℃ /5v CH Low



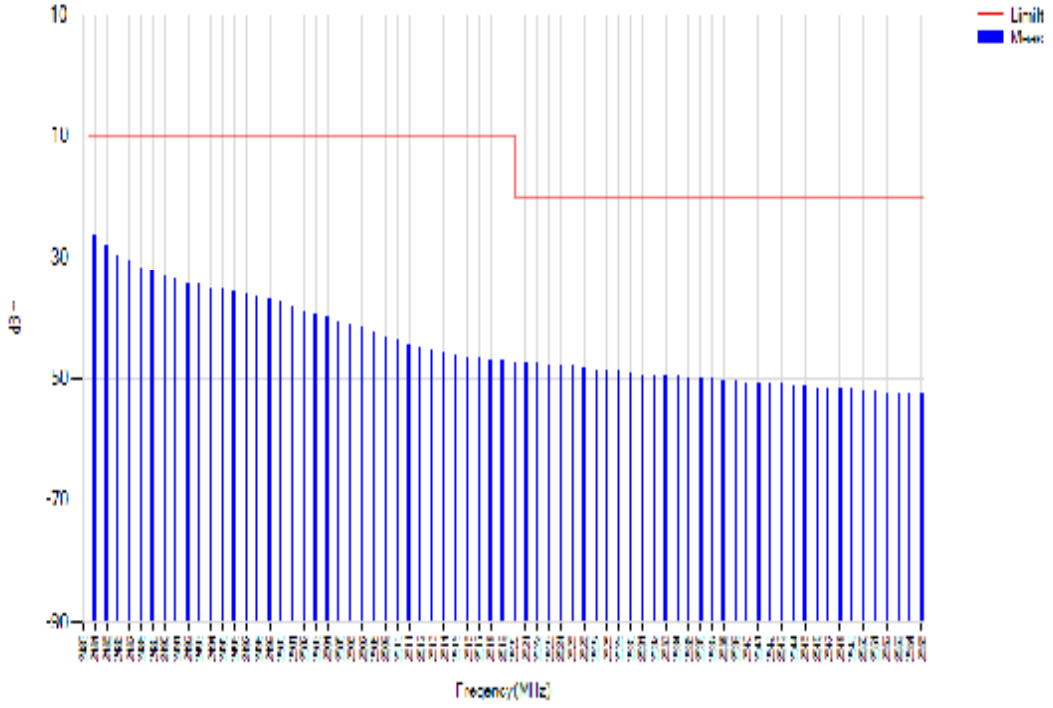
25℃ /5v CH High



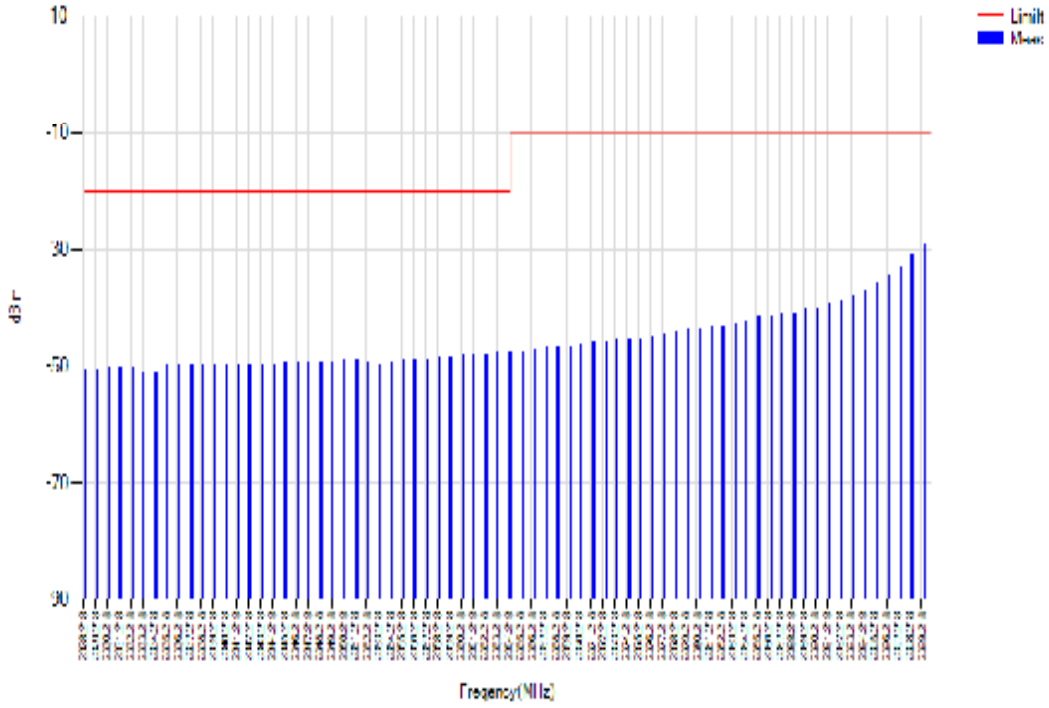
0℃ /5v CH Low



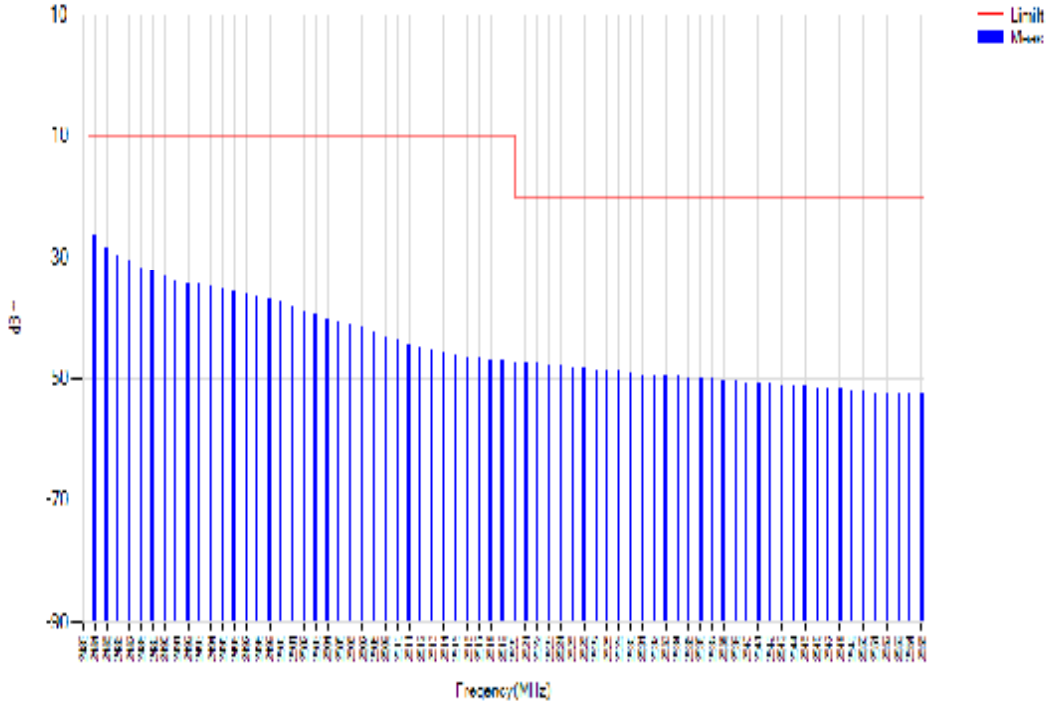
0℃ /5v CH High



70℃ /5v CH Low

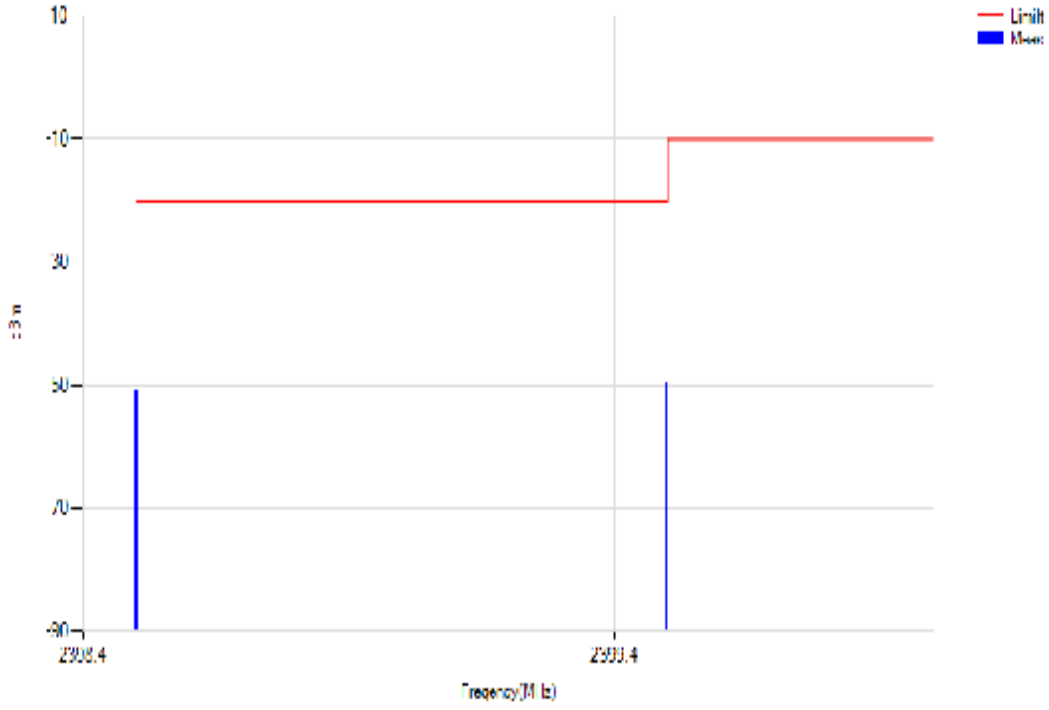


70℃ /5v CH High

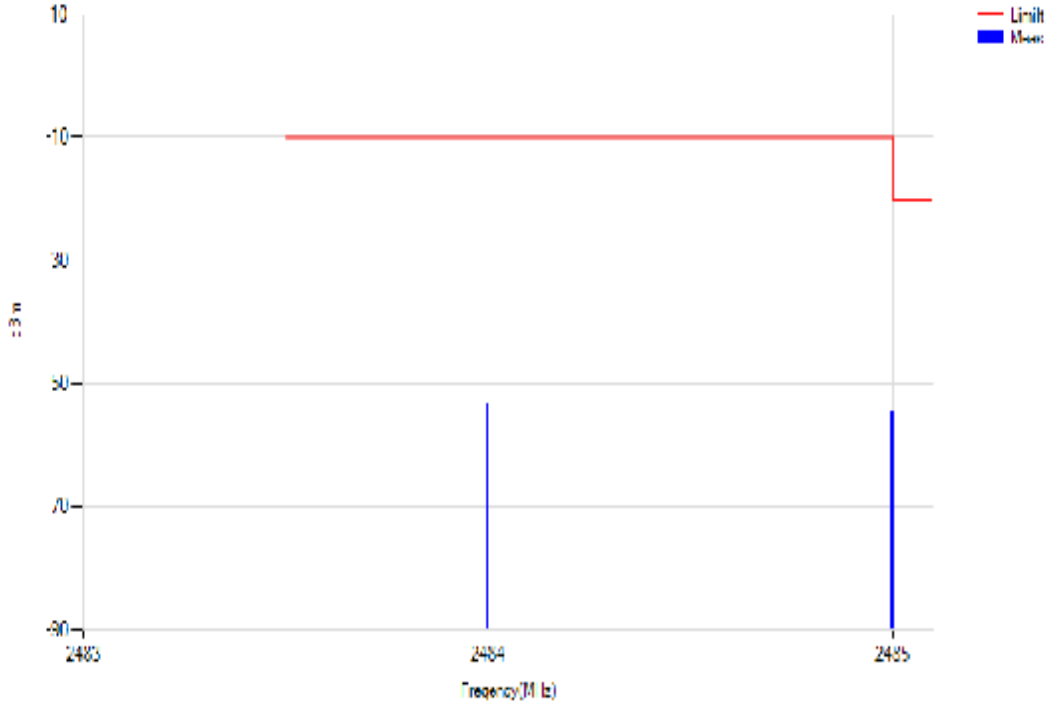


Test results: Bluetooth for GFSK (BR-1M)

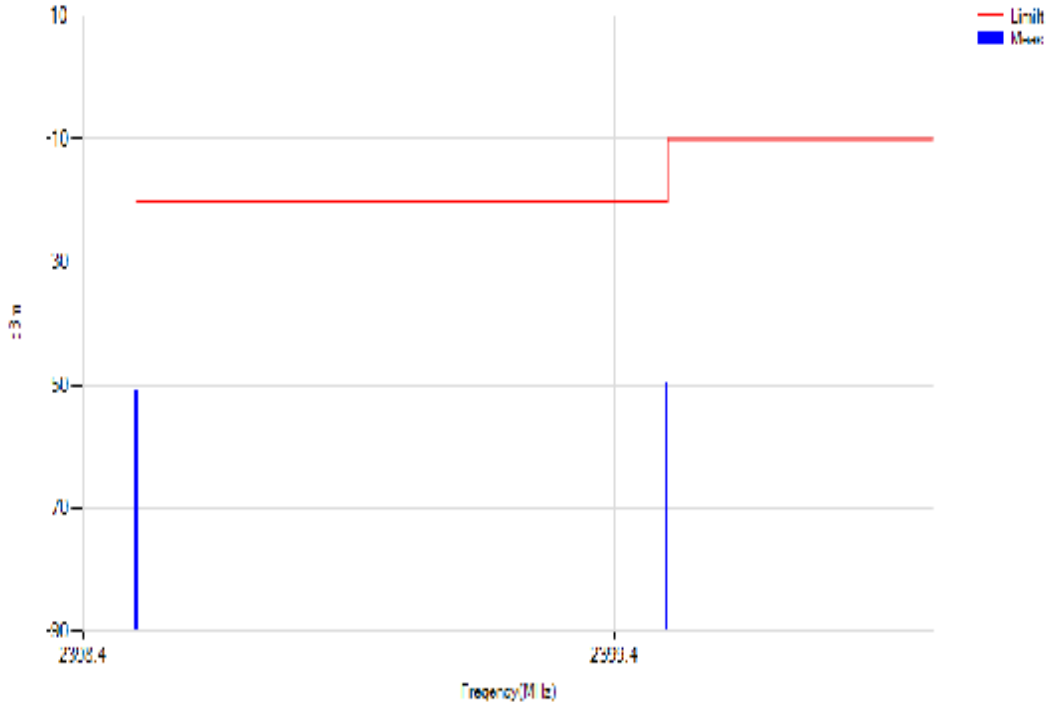
25℃ /5v CH Low



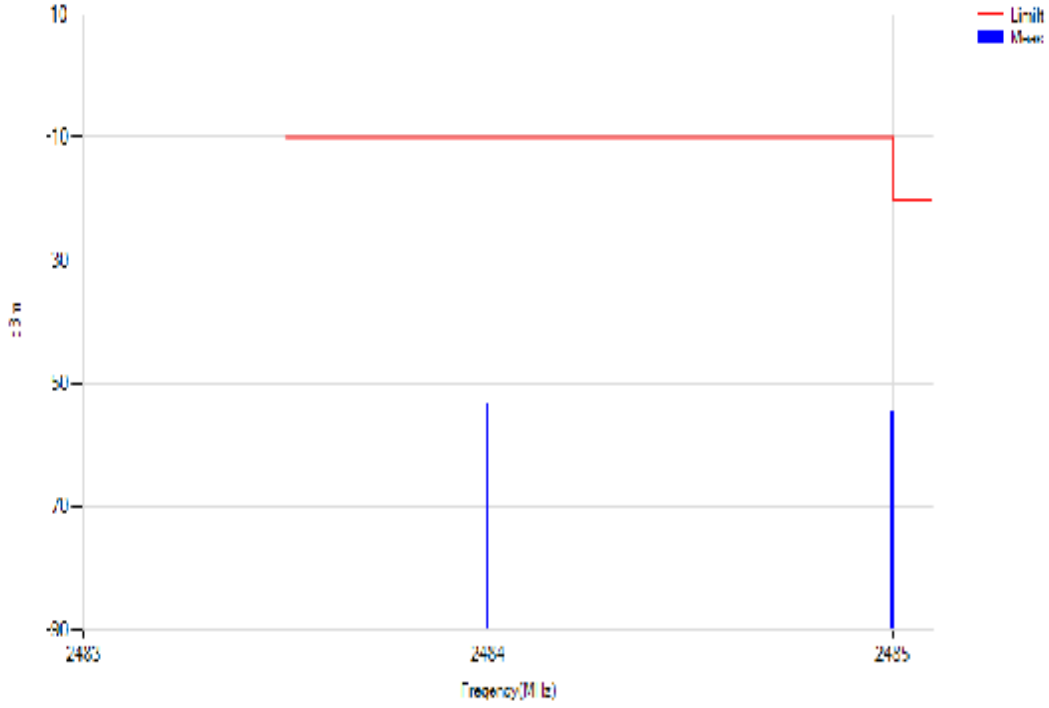
25℃ /5v CH High



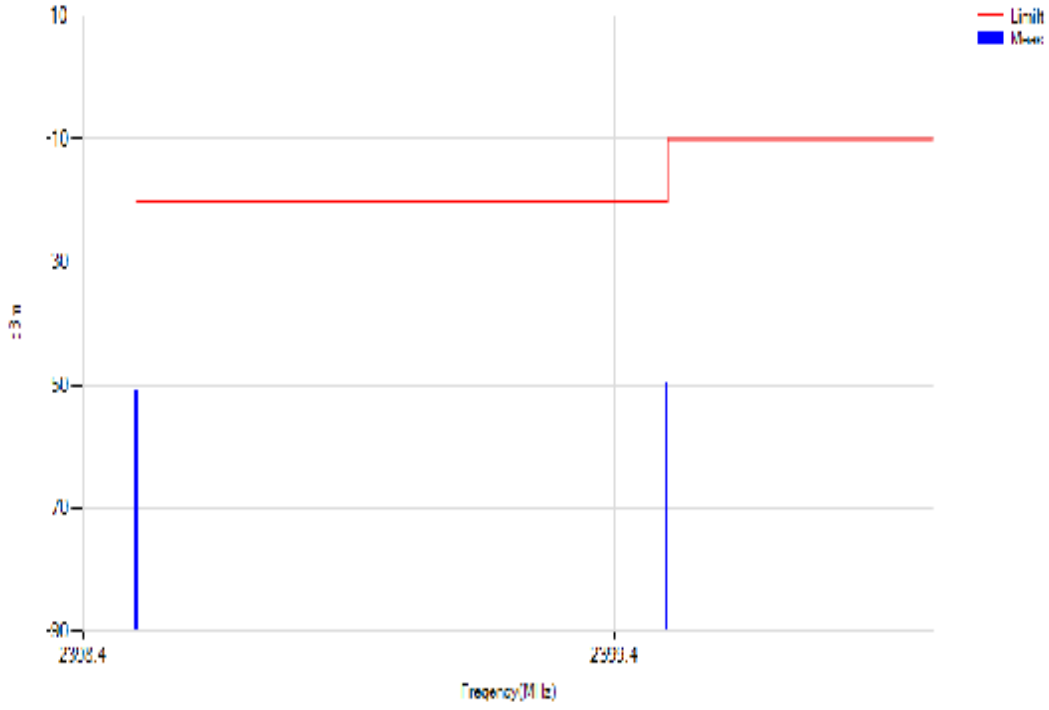
0℃ /5v CH Low



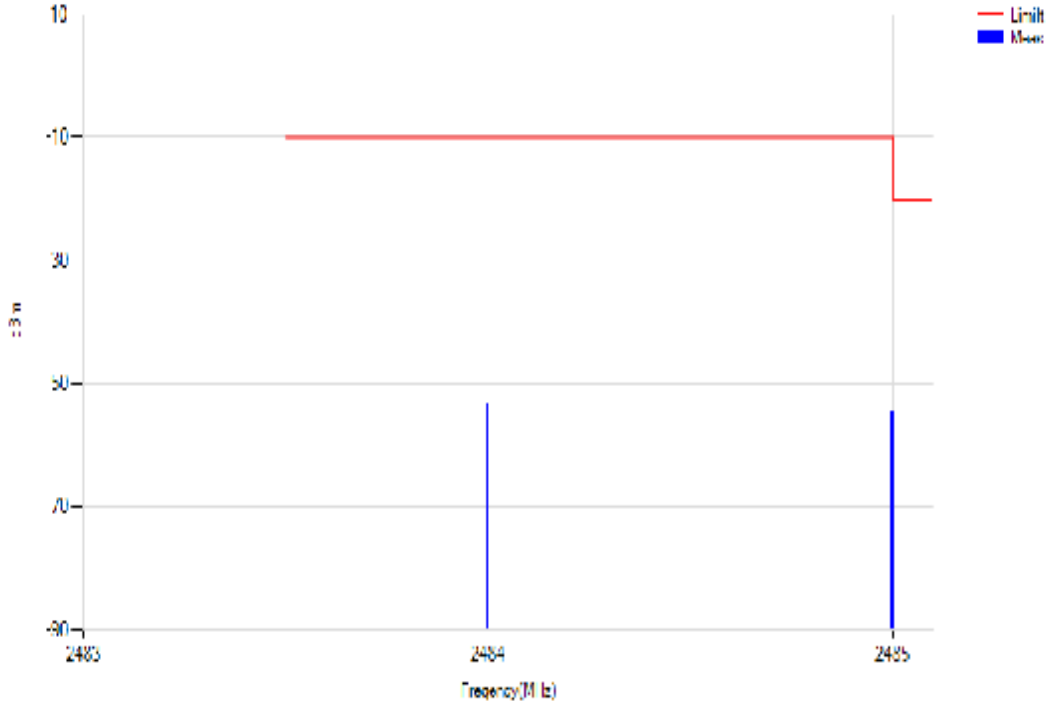
0℃ /5v CH High



70℃ /5v CH Low

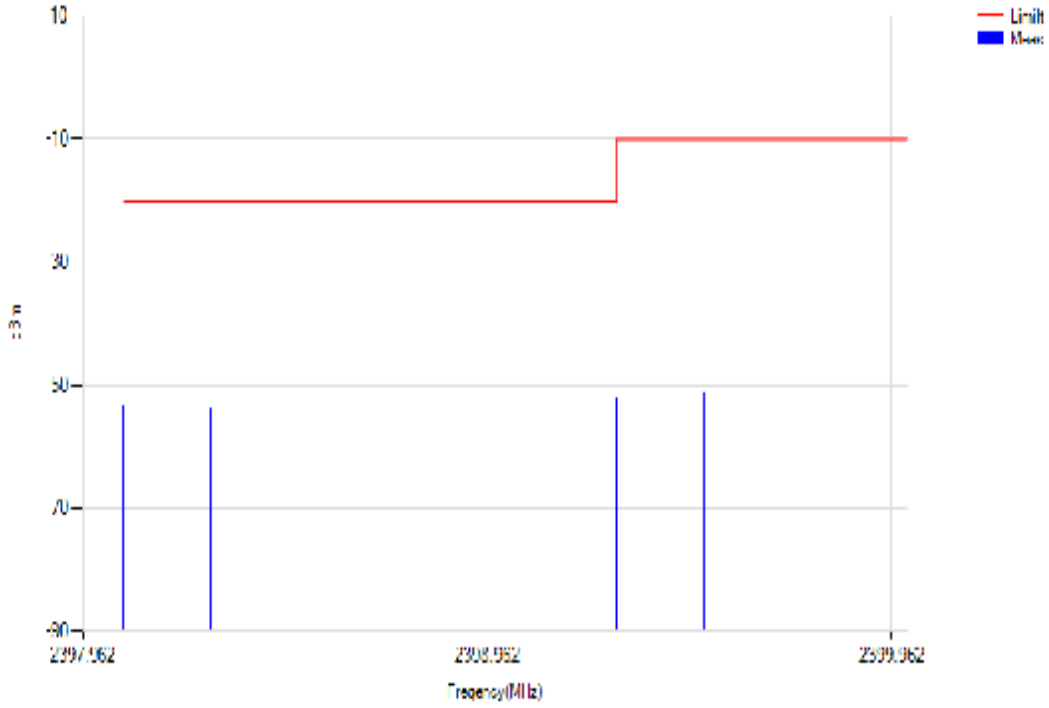


70℃ /5v CH High

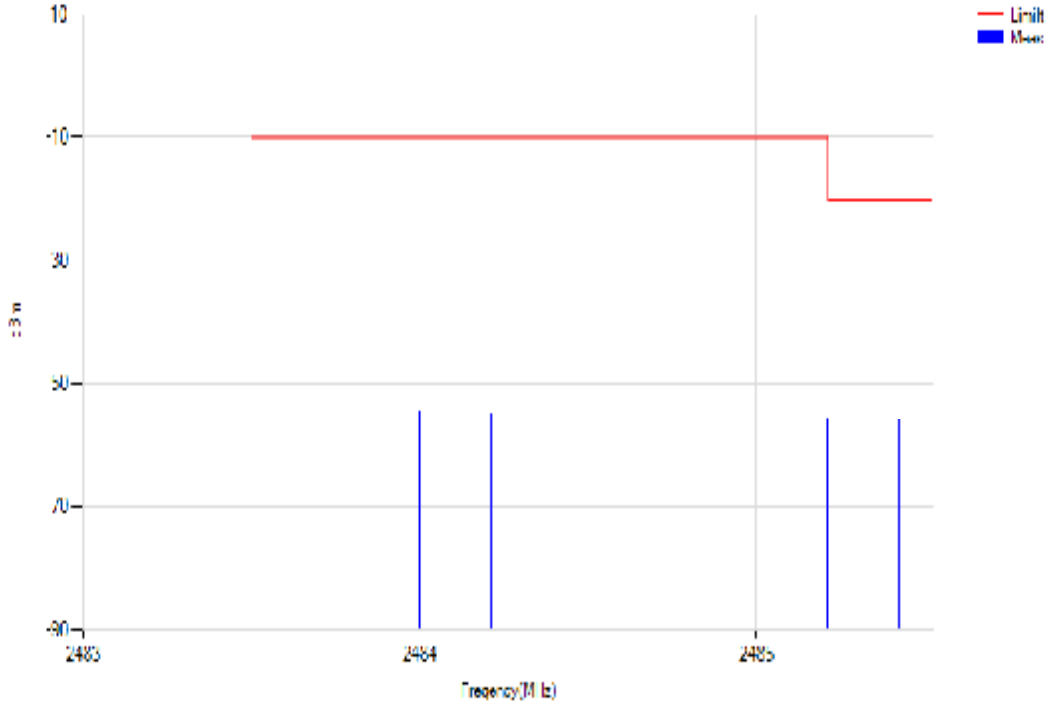


Test results: Bluetooth for 8DPSK (EDR-3M)

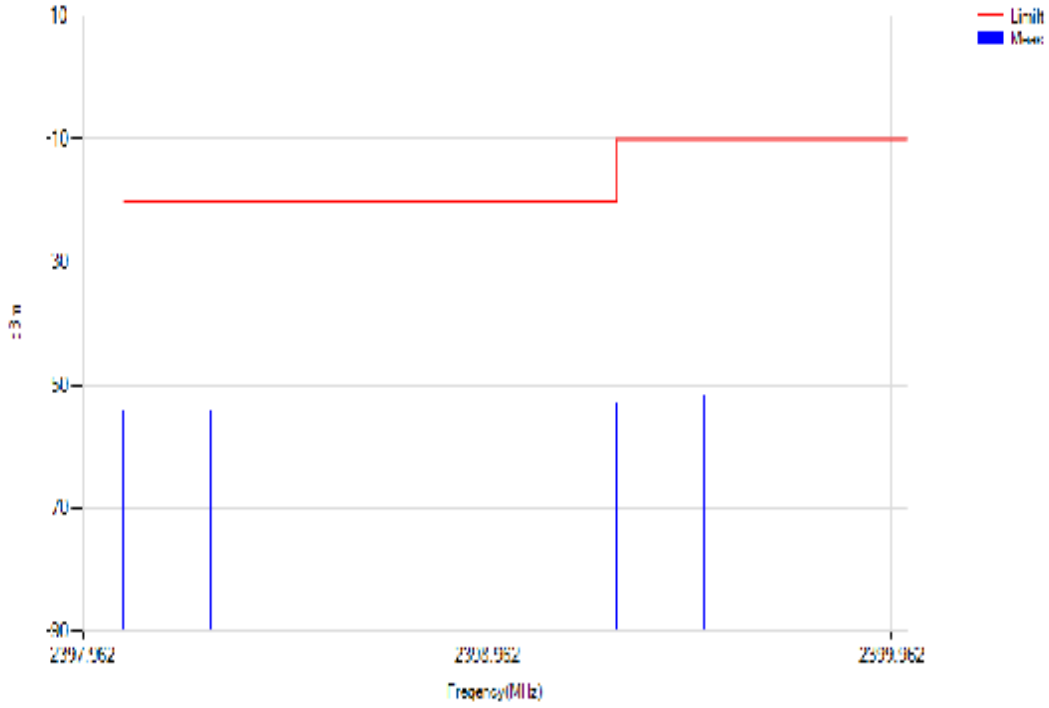
25℃ /5v CH Low



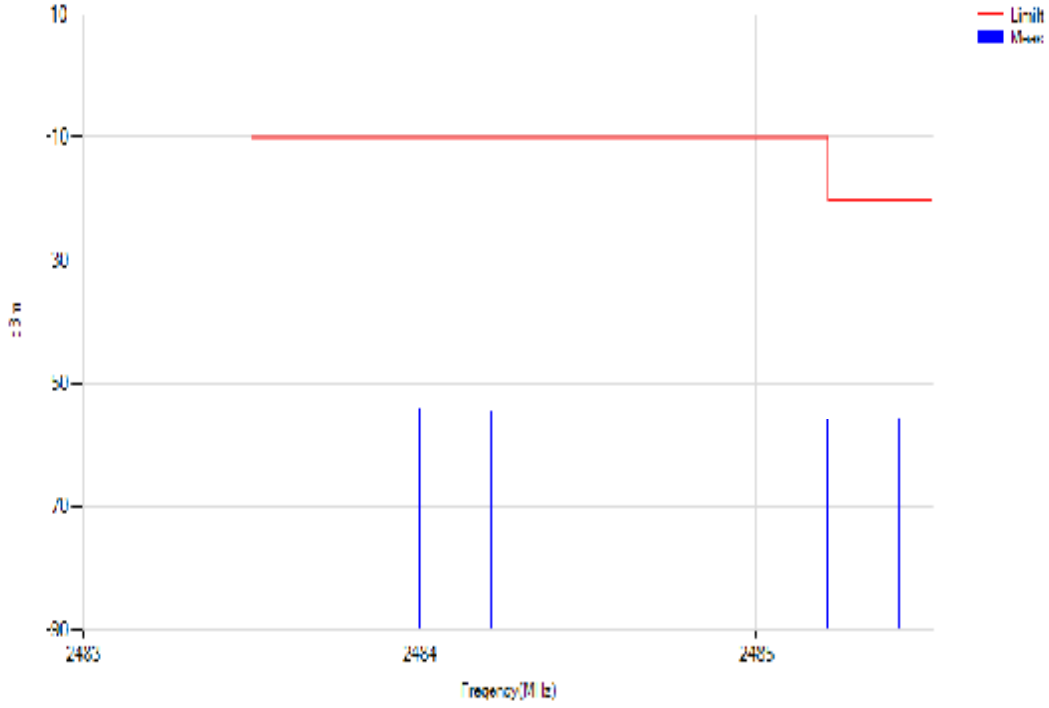
25℃ /5v CH High



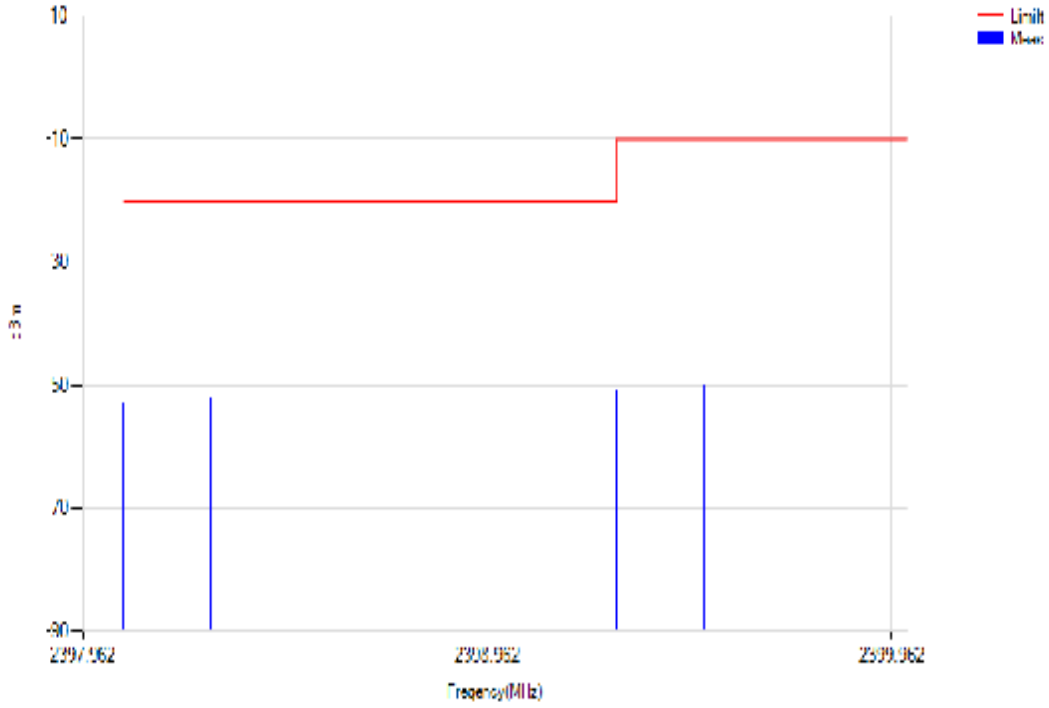
0℃ /5v CH Low



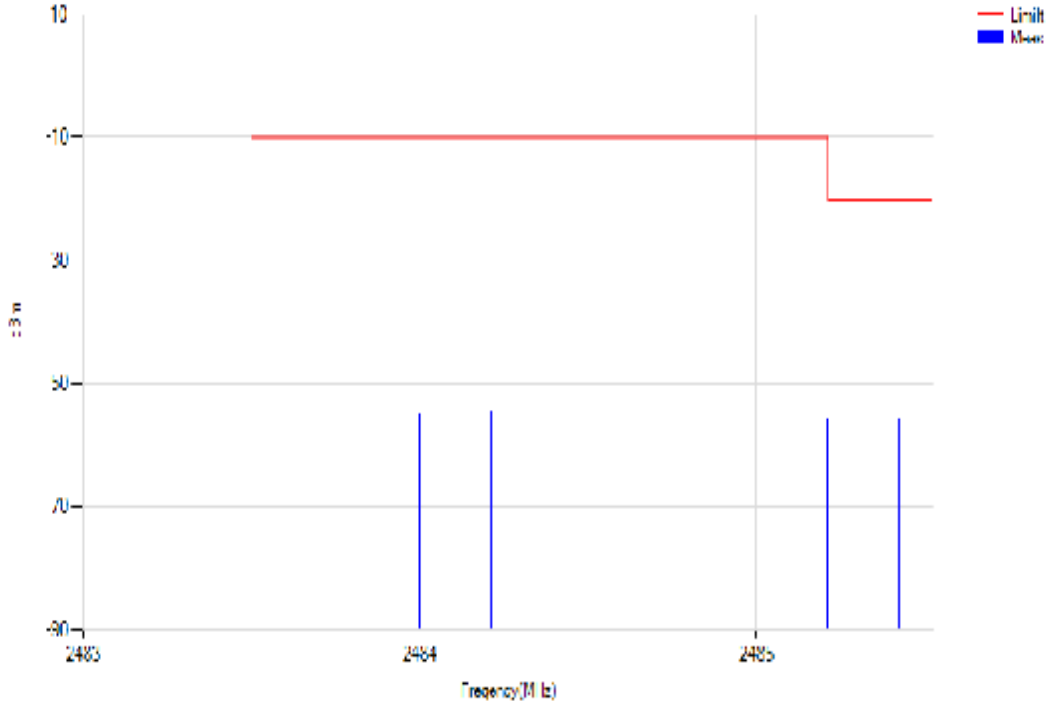
0℃ /5v CH High



70℃ /5v CH Low

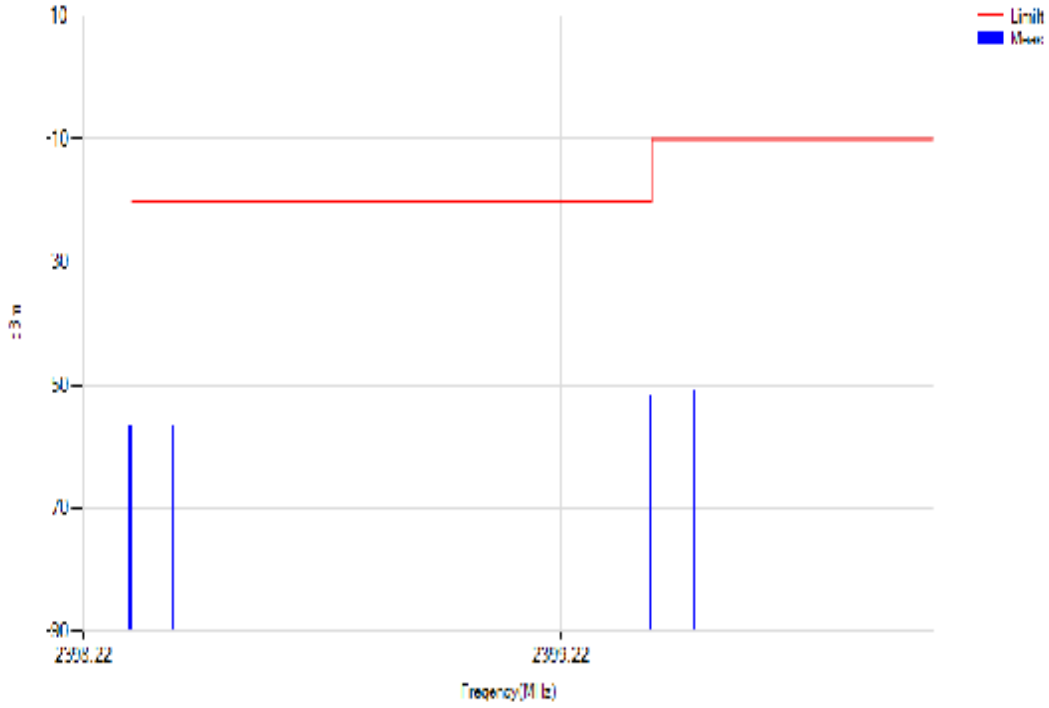


70℃ /5v CH High

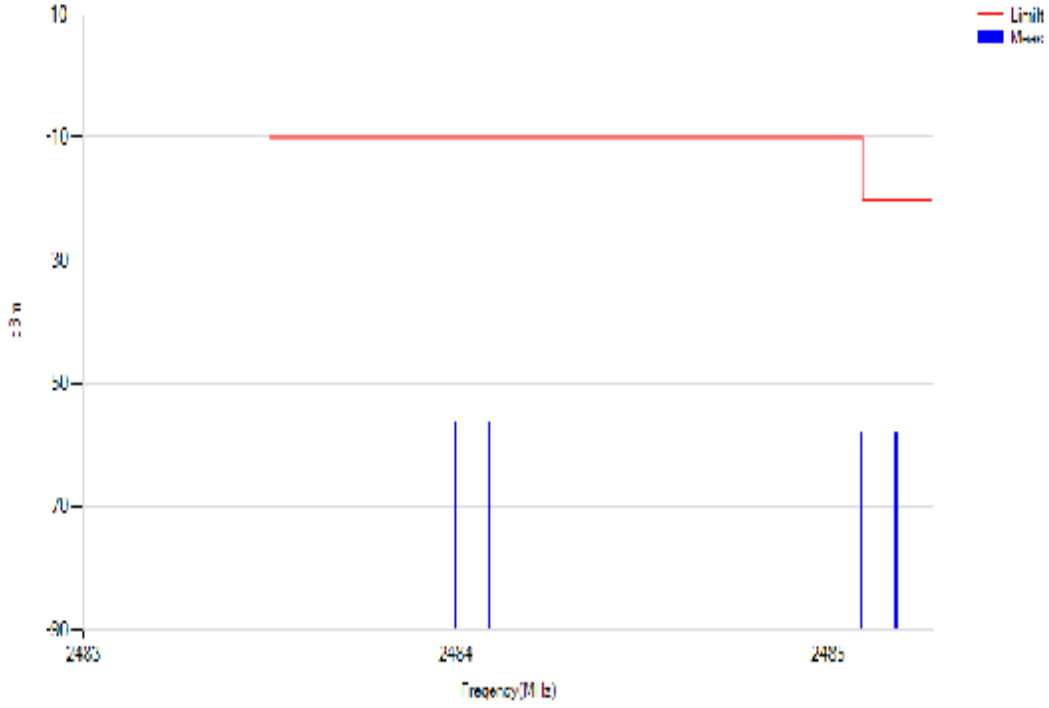


Test results: Bluetooth 4.1

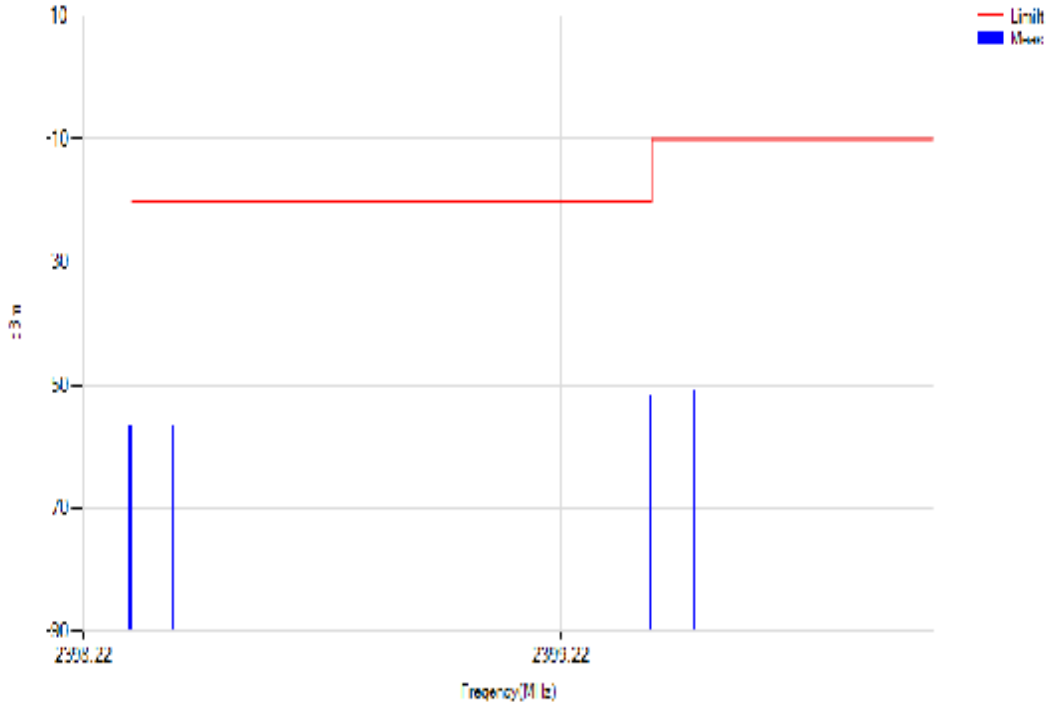
25℃ /5v CH Low



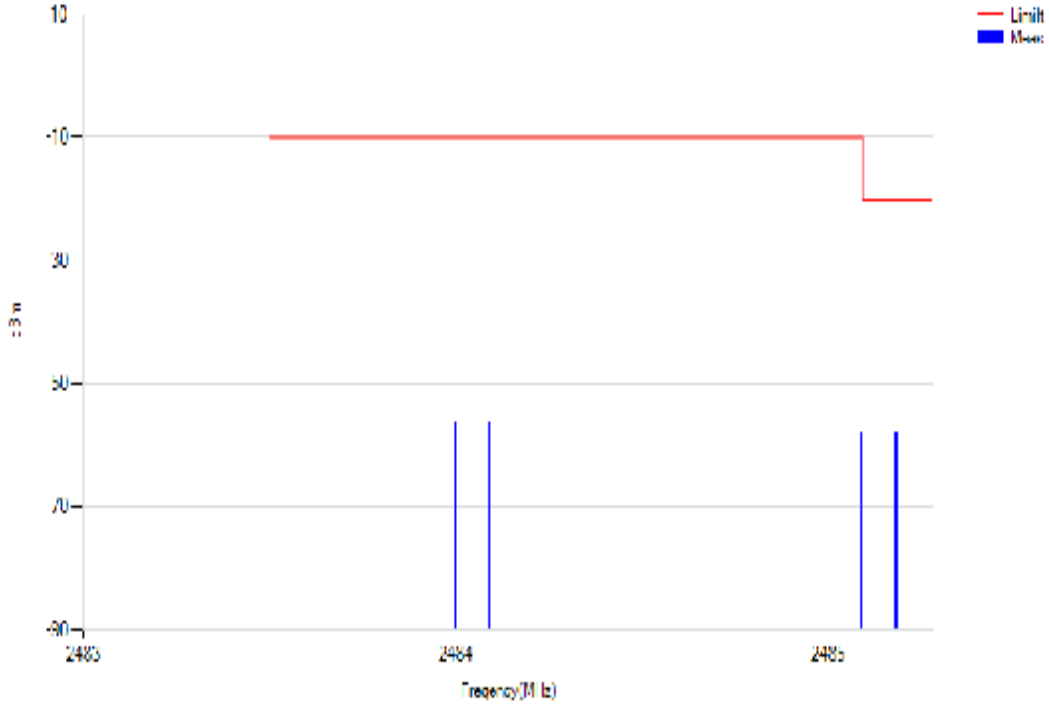
25℃ /5v CH High



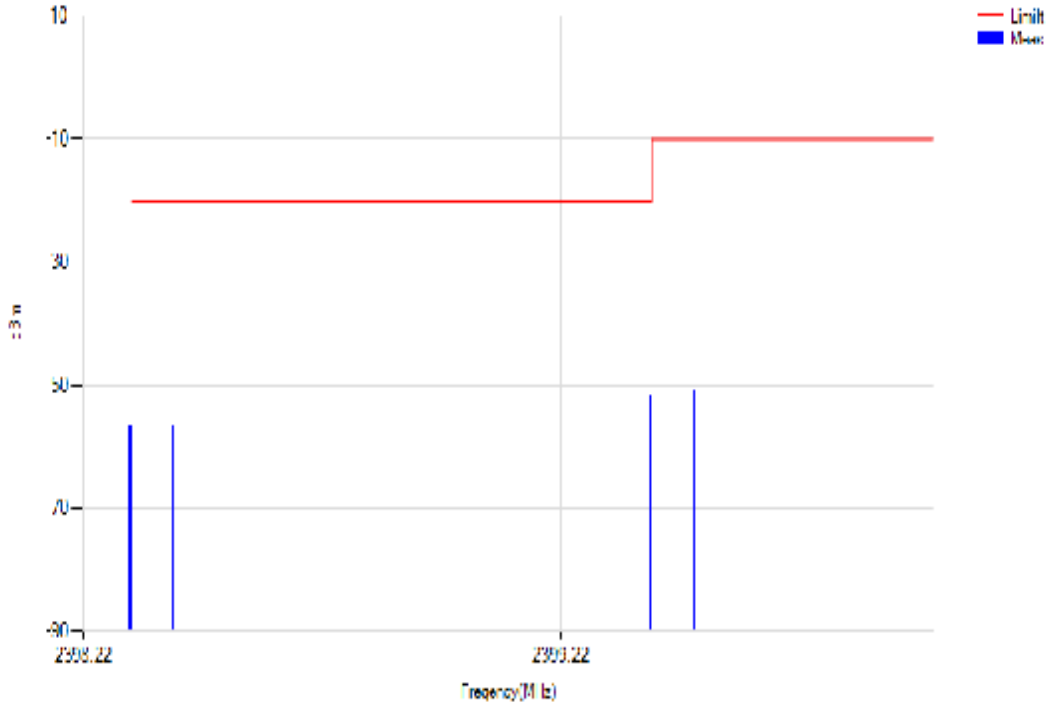
0℃ /5v CH Low



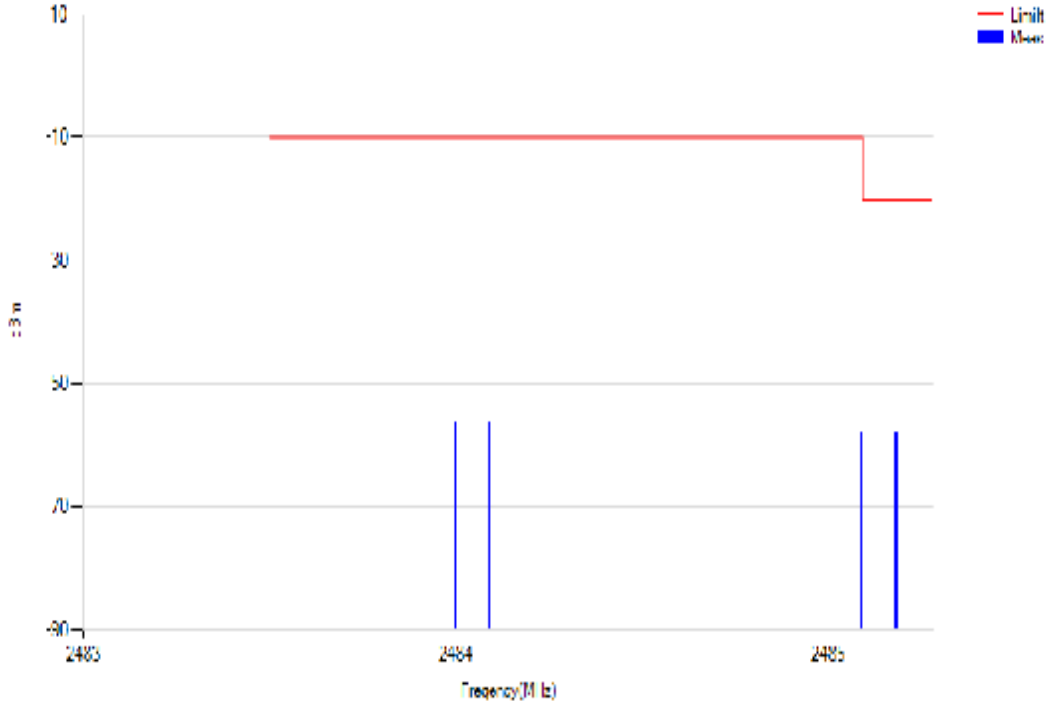
0℃ /5v CH High



70℃ /5v CH Low



70℃ /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

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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

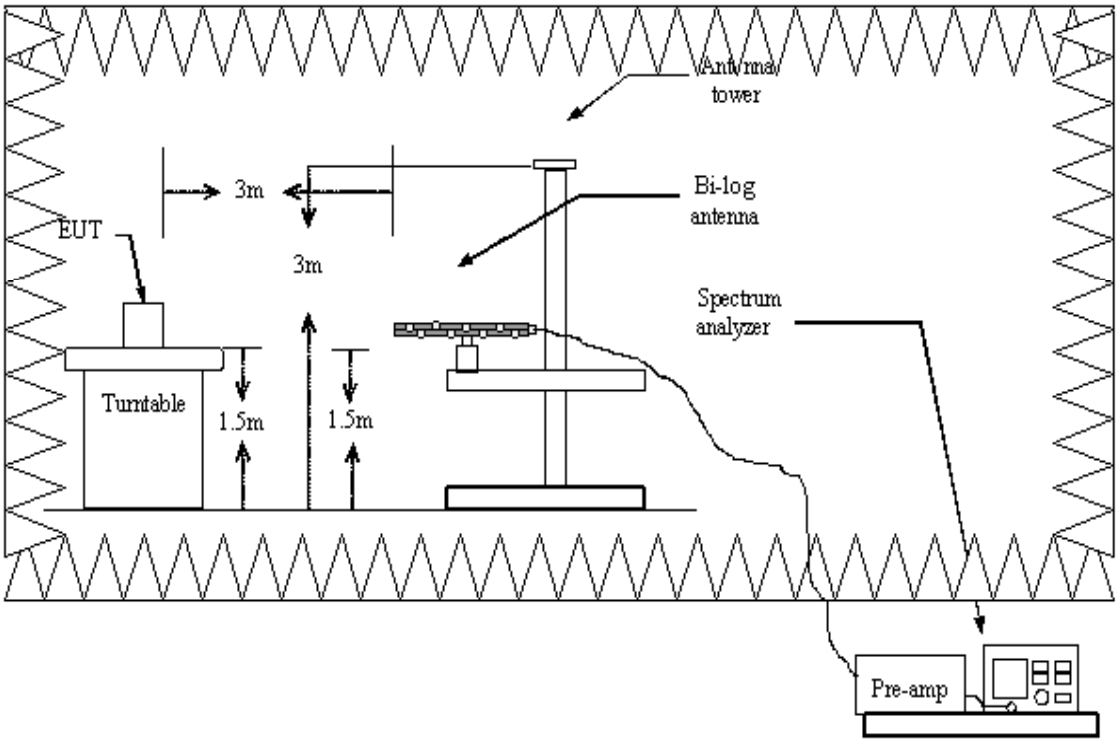
The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 1.

Table 1: Transmitter limits for spurious emissions

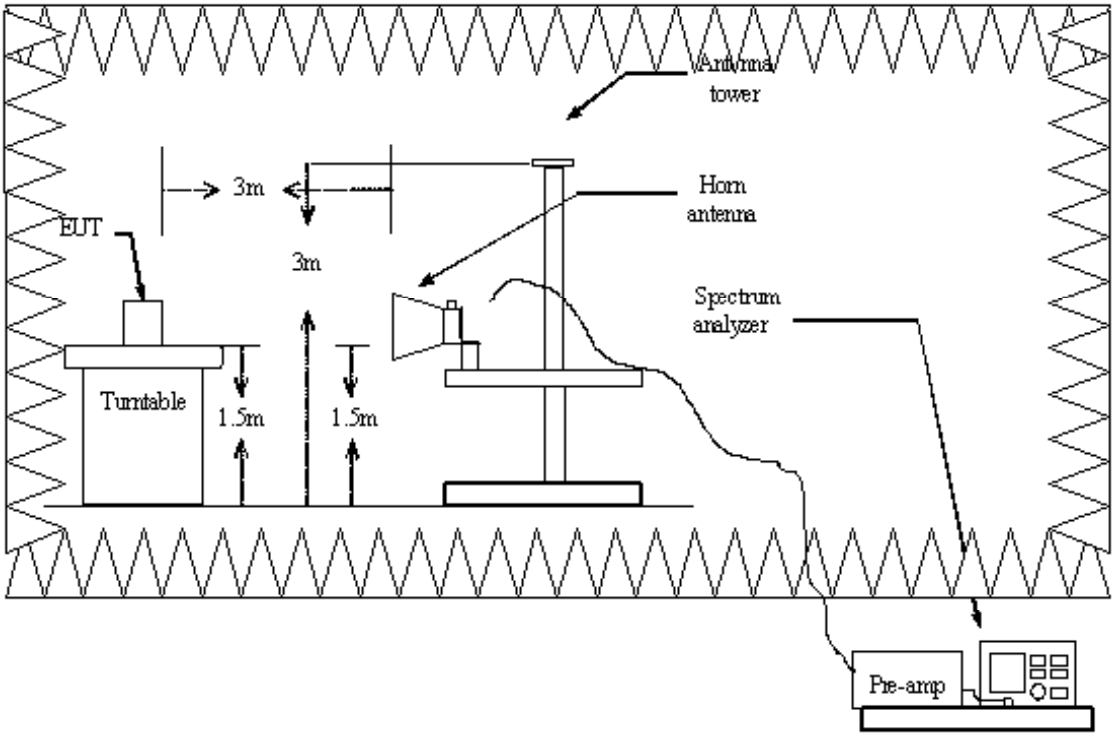
Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz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

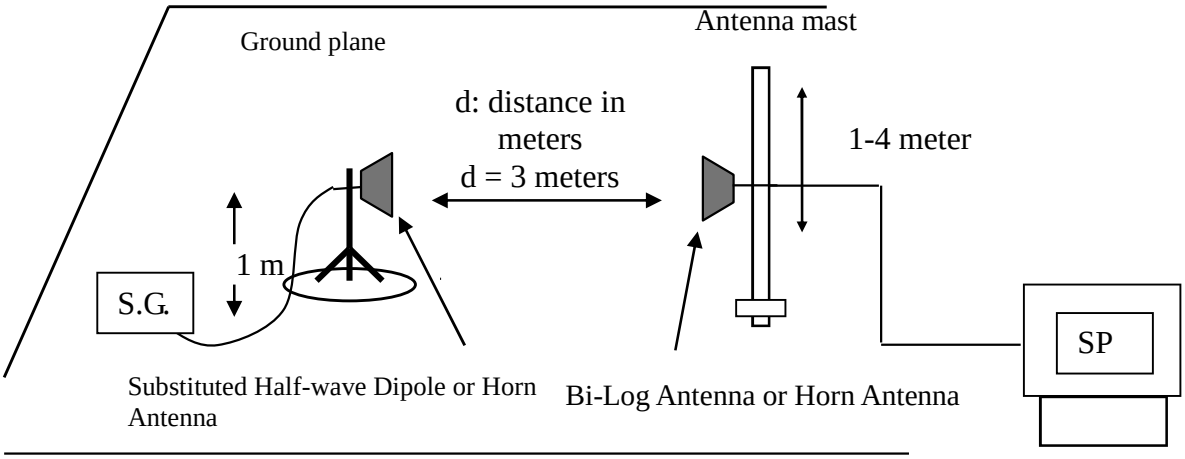
Below 1GHz



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.

For FPC Antenna

Below 1GHz

Test Mode: Normal Link **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.*

Above 1GHz

Test Mode: IEEE 802.11b Mode / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.

Test Mode: IEEE 802.11g Mode **/** TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.

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

Ambient temperature: 22℃ **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℃ **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.

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

Ambient temperature: 22℃ **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℃ **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.

Bluetooth for GFSK (BR-1M)

Test Mode: Bluetooth / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.

Bluetooth for 8DPSK (EDR-3M)

Test Mode: Bluetooth / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.

Bluetooth 4.1

Test Mode: Bluetooth / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.

For Dipole Antenna

Below 1GHz

Test Mode: Normal Link **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.*

Above 1GHz

Test Mode: IEEE 802.11b Mode / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.*

Test Mode: IEEE 802.11g Mode **/** TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.*

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

Ambient temperature: 22℃ **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℃ **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.*

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

Ambient temperature: 22℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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.*

Bluetooth 4.1

Test Mode: Bluetooth / TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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 ± 2.65dB.

TEST RESULTS

No non-compliance noted.

For FPC Antenna

Below 1GHz

Test Mode: RX **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.*

Above 1GHz

Test Mode: RX **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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℃ **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℃ **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.*

Above 1GHz

Test Mode: RX **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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

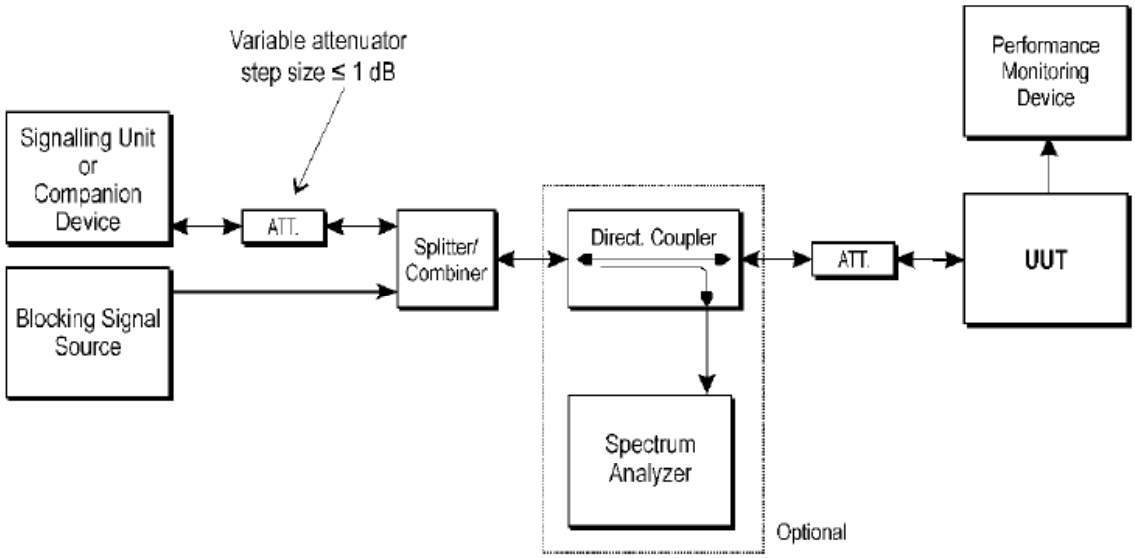
Receiver Category	☒ **Category 1 :** Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment. ☐ **Category 2 :** Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment. ☐ **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

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

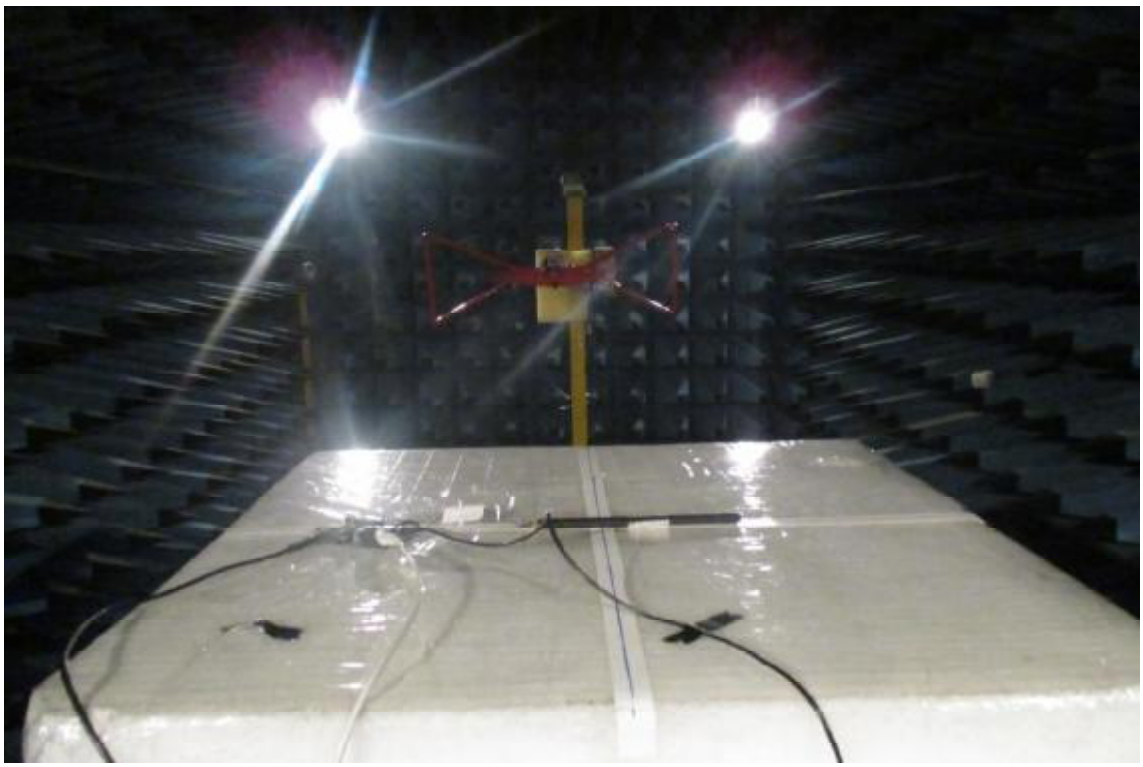
-- End of Test Report --

APPENDIX A PHOTOGRAPHS OF TEST SETUP

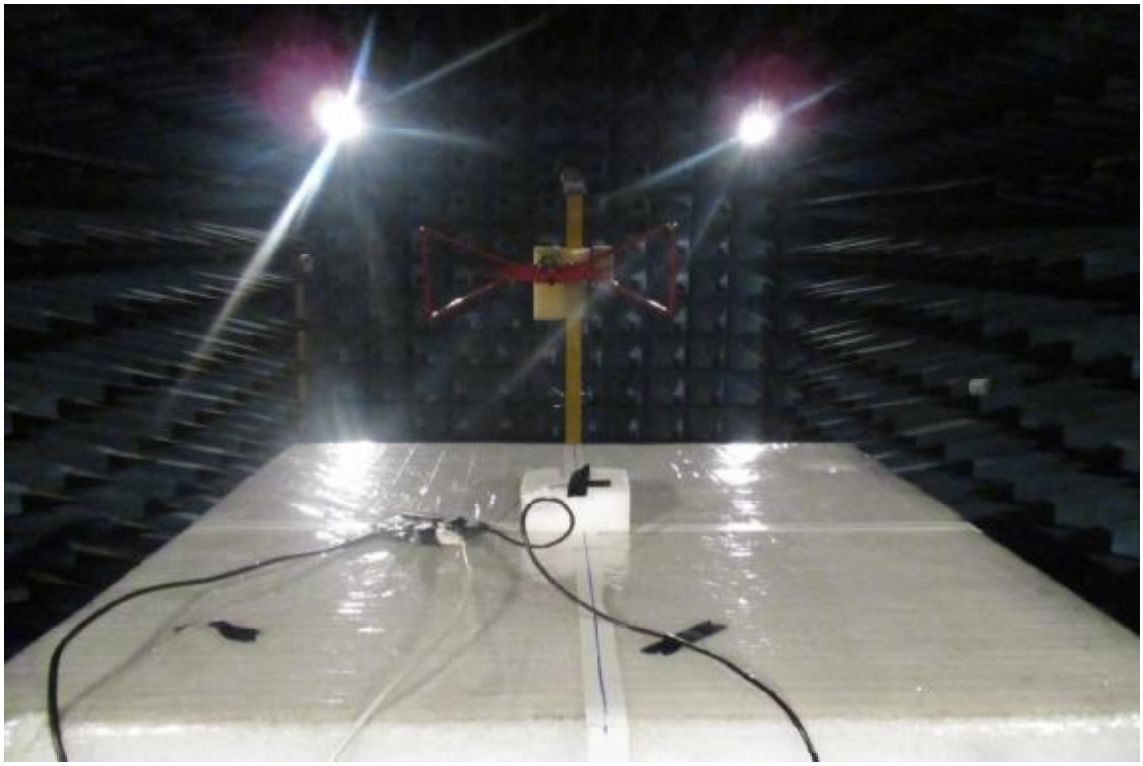
Below 1GHz

For Dipole Antenna

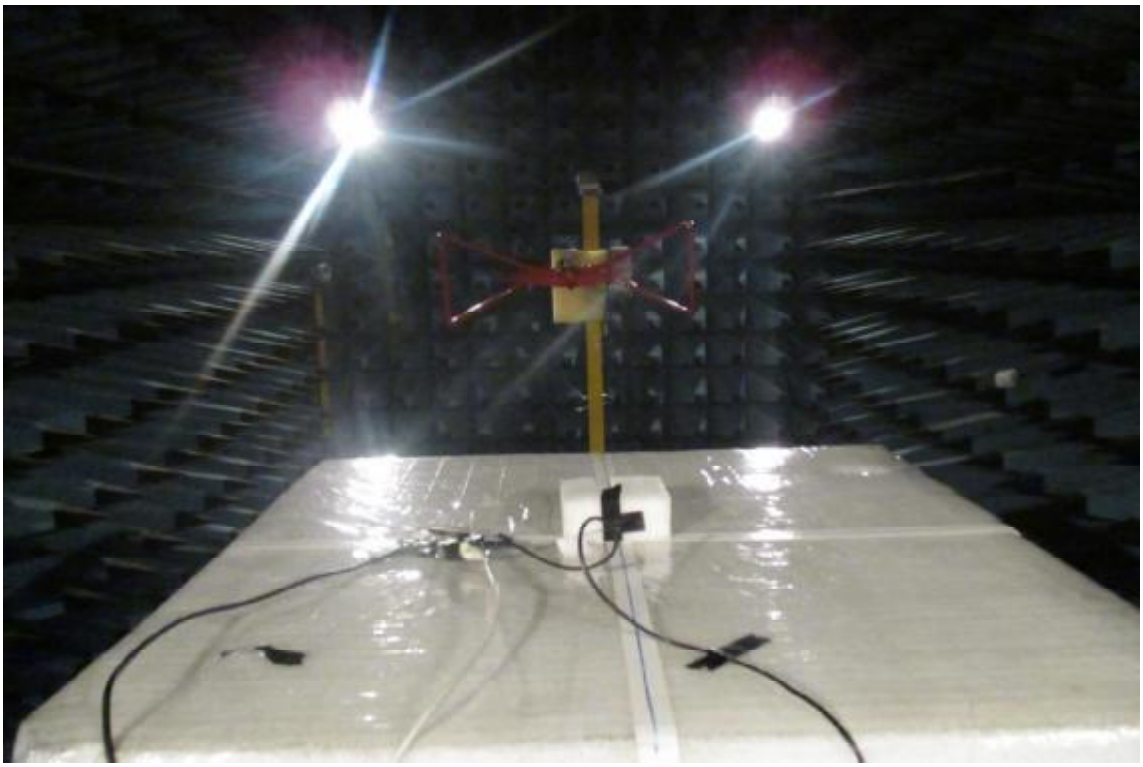
WiFi 2.4GHz+ BT2.1+EDR+BT 4.1



For FPC Antenna
WiFi 2.4GHz+BT 4.1



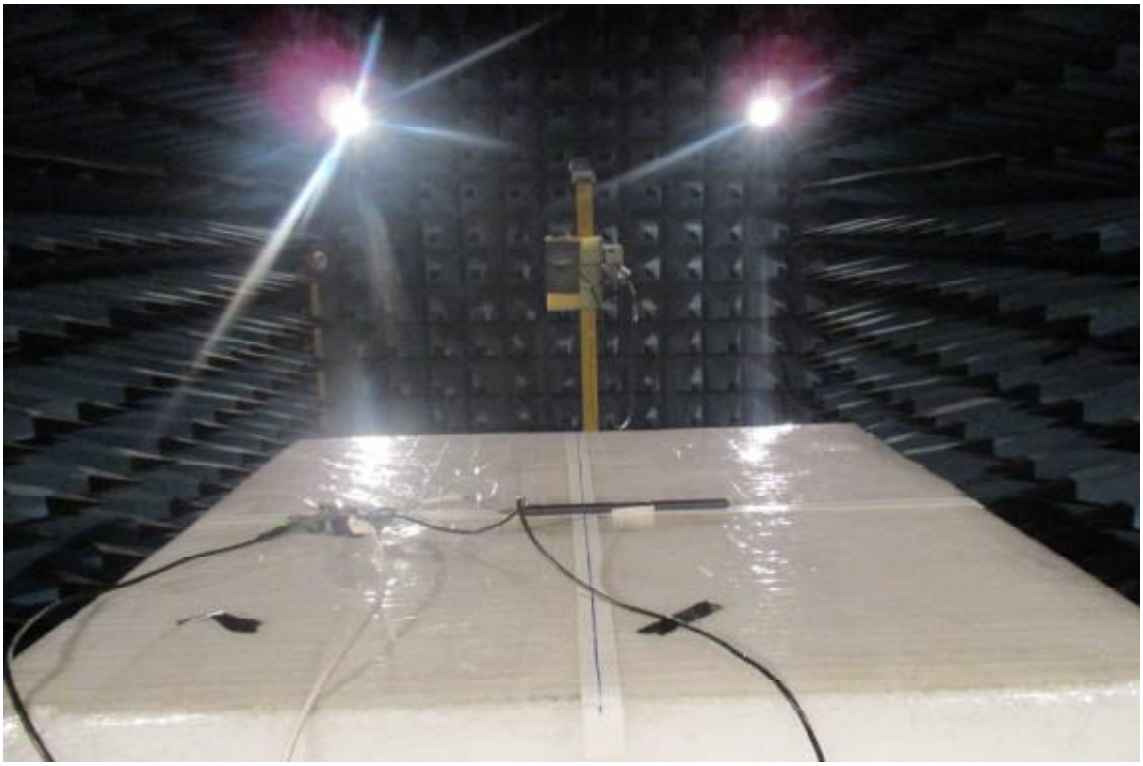
BT2.1+EDR



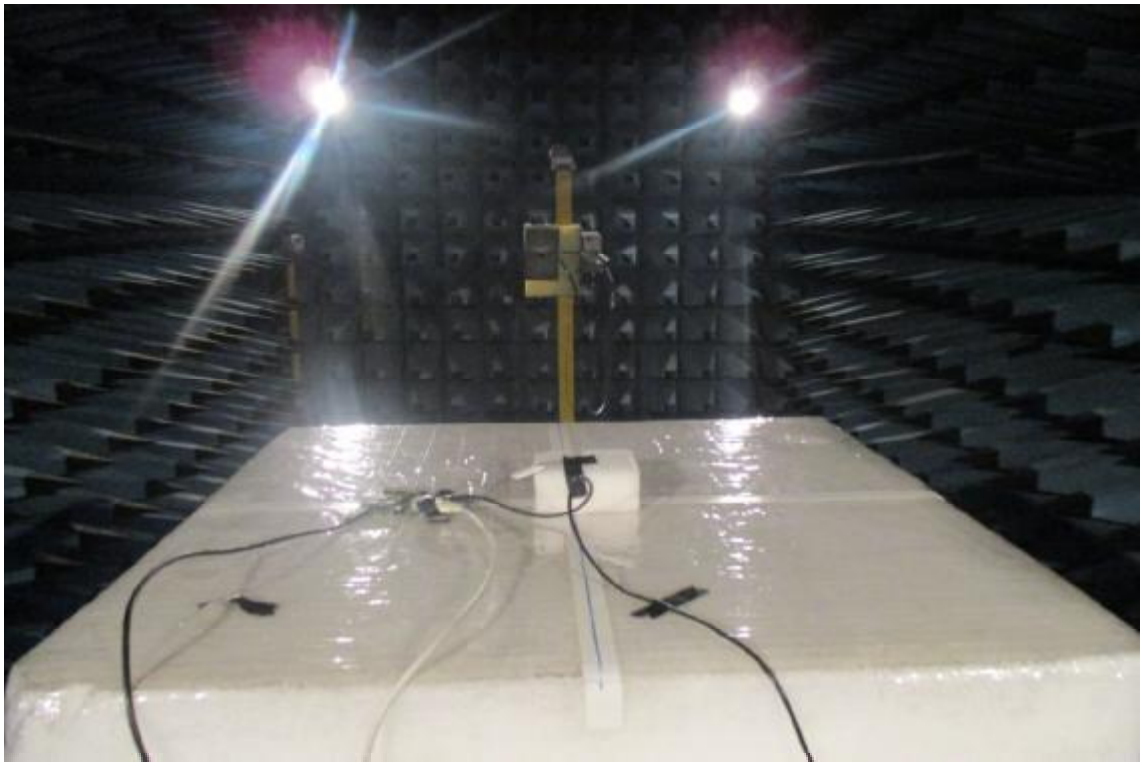
Above 1GHz

For Dipole Antenna

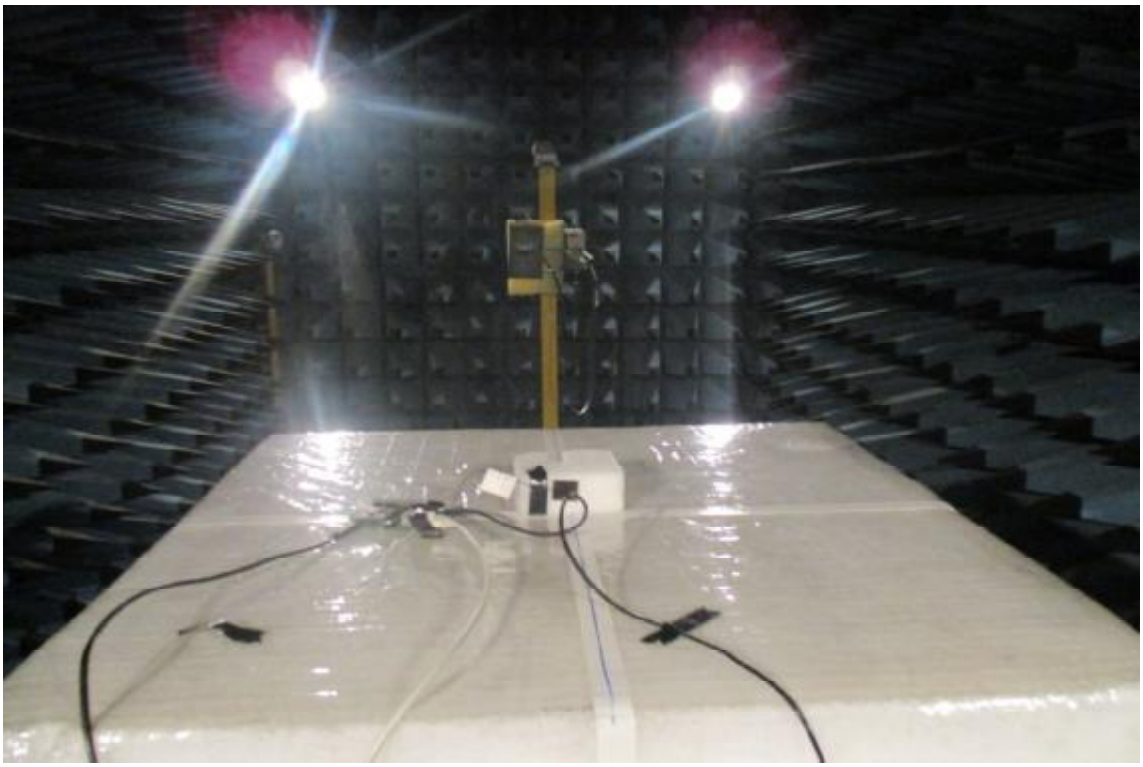
WiFi 2.4GHz+ BT2.1+EDR+BT 4.1



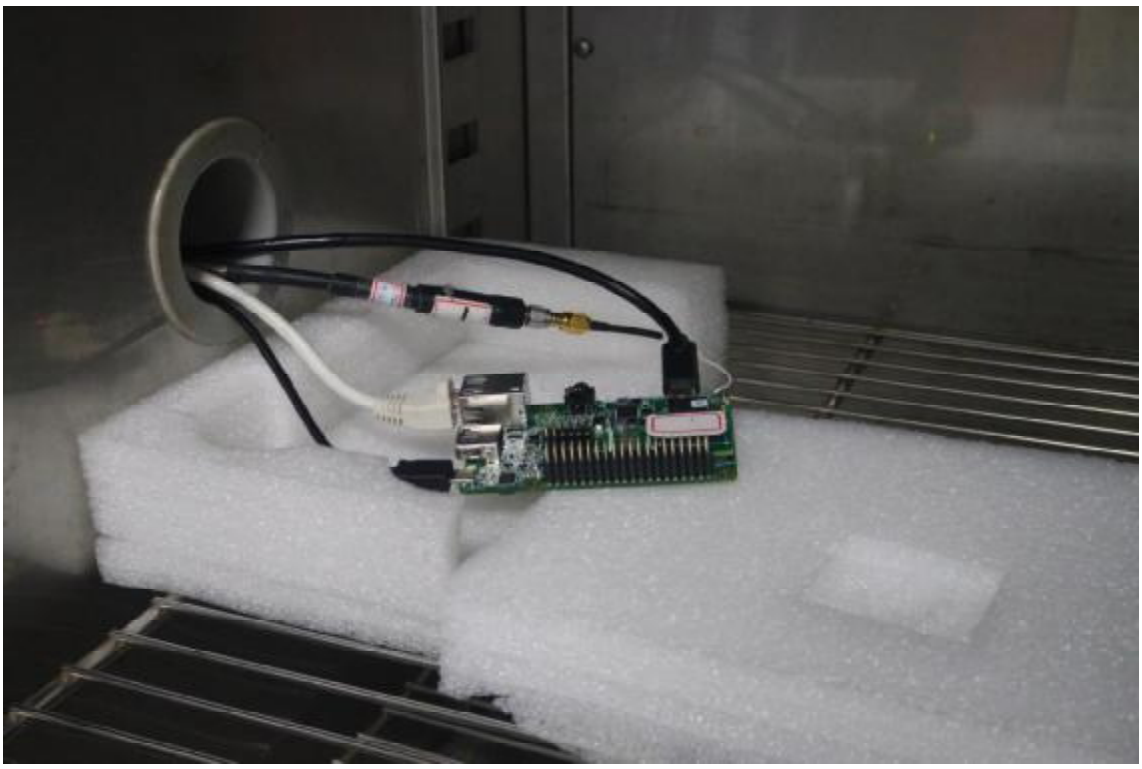
For FPC Antenna
WiFi 2.4GHz+BT 4.1



BT2.1+EDR



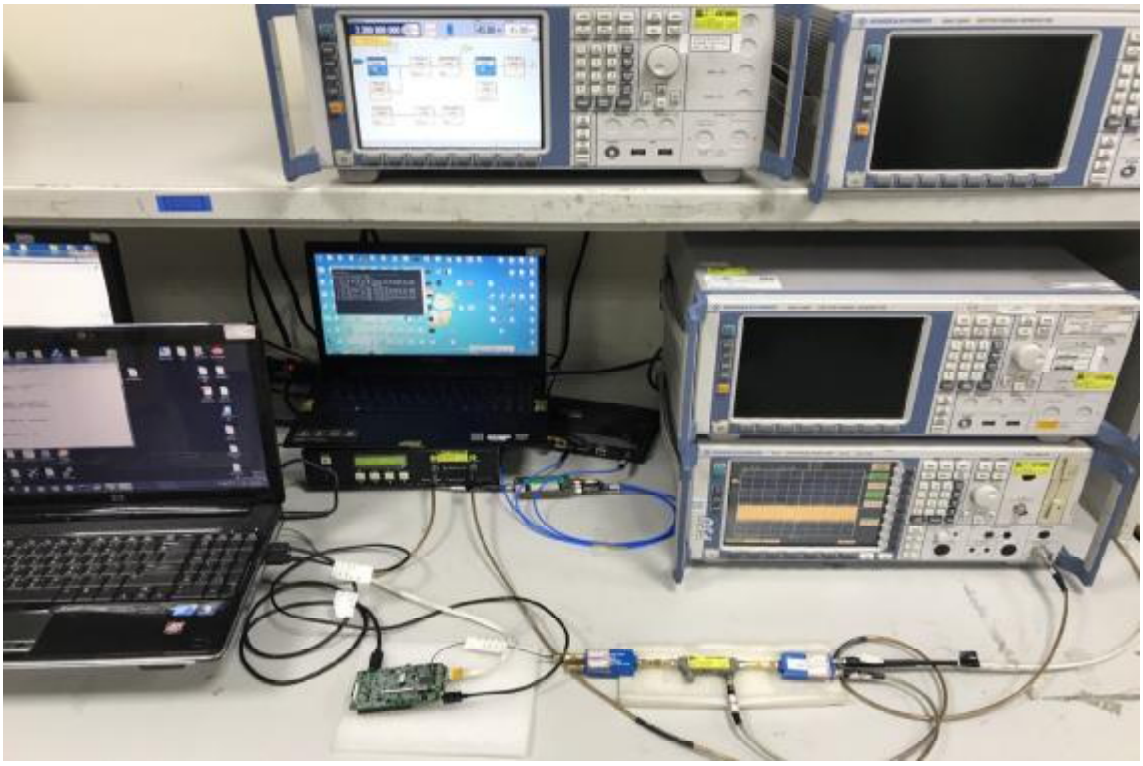
Conducted



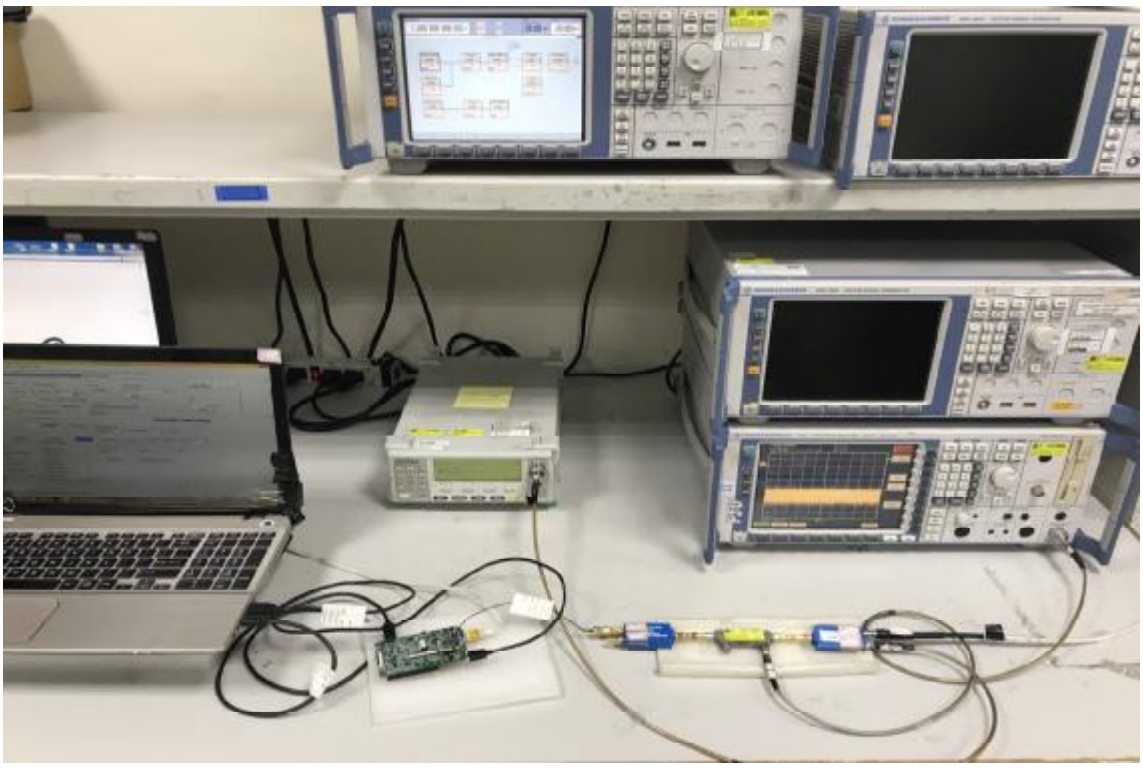
Adaptivity

Receiver Blocking

WiFi 2.4GHz



Bluetooth for 2.1+EDR



Bluetooth 4.1

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

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

TABLE OF CONTENTS

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

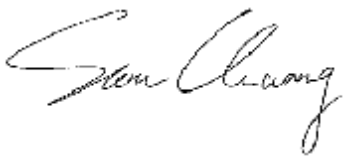
Model Number: PIXI-9377

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:



Sam Chuang
Manager
Compliance Certification Services Inc.

Tested by:

Jerry Chuang
Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

<table>
<tr><td>Product</td><td>WiFi+Bluetooth 4.1(HS) System on Module</td></tr>
<tr><td>Trade Name</td><td>TechNexion</td></tr>
<tr><td>Model Number</td><td>PIXI-9377</td></tr>
<tr><td>Model Discrepancy</td><td>N/A</td></tr>
<tr><td>Received Date</td><td>June 27, 2018</td></tr>
<tr><td>EUT Power Rating</td><td>Power from host system. (DC 5V)</td></tr>
<tr><td>Frequency Range</td><td>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</td></tr>
<tr><td>Modulation Technique</td><td>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</td></tr>
<tr><td>Number of Channels</td><td>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</td></tr>
<tr><td>Transmit Power (Mean EIRP)</td><td>
<table>
<tr><th>Mode</th><th>Transmit Power (dBm)</th><th>Transmit Power (mW)</th></tr>
<tr><td colspan="3">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">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">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">IEEE 802.11ac VHT80 MHz Mode</td></tr>
<tr><td>5210 MHz</td><td>17.36</td><td>54.45</td></tr>
</table>
</td></tr>
<tr><td>Antenna Specification</td><td>FPC Antenna: TechNexion / VM2450-25523-OOX-180
Gain: 3dBi
Dipole Antenna: TechNexion / VM2450-ASSY1005
Gain: 6dBi</td></tr>
<tr><td>Temperature Range</td><td>0℃ ~ +70℃</td></tr>
<tr><td>S.W Version</td><td>1.0</td></tr>
<tr><td>H.W: Version</td><td>A1</td></tr>
</table>

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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☐ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☒ **P**laced 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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☒ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☐ **P**laced 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.

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 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**
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.

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				

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 * 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℃
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

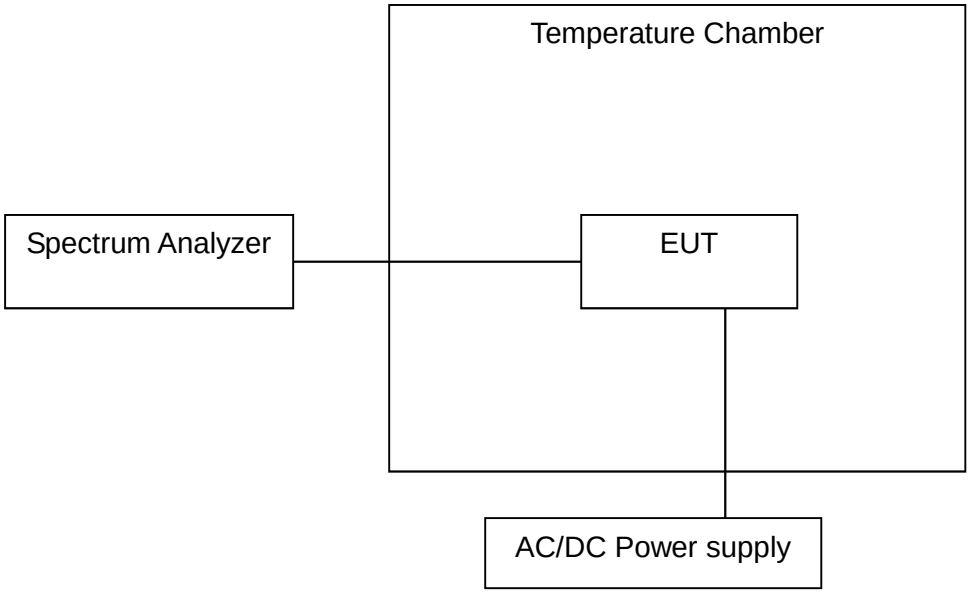
LIMIT

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.

IEEE802.11a Mode:

20℃, 5V NORMAL CONDITION RESULTS

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

0℃, 5.5V EXTREME CONDITION RESULTS

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

0℃, 4.5V EXTREME CONDITION RESULTS

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

70℃, 5.5V EXTREME CONDITION RESULTS

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

70℃, 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

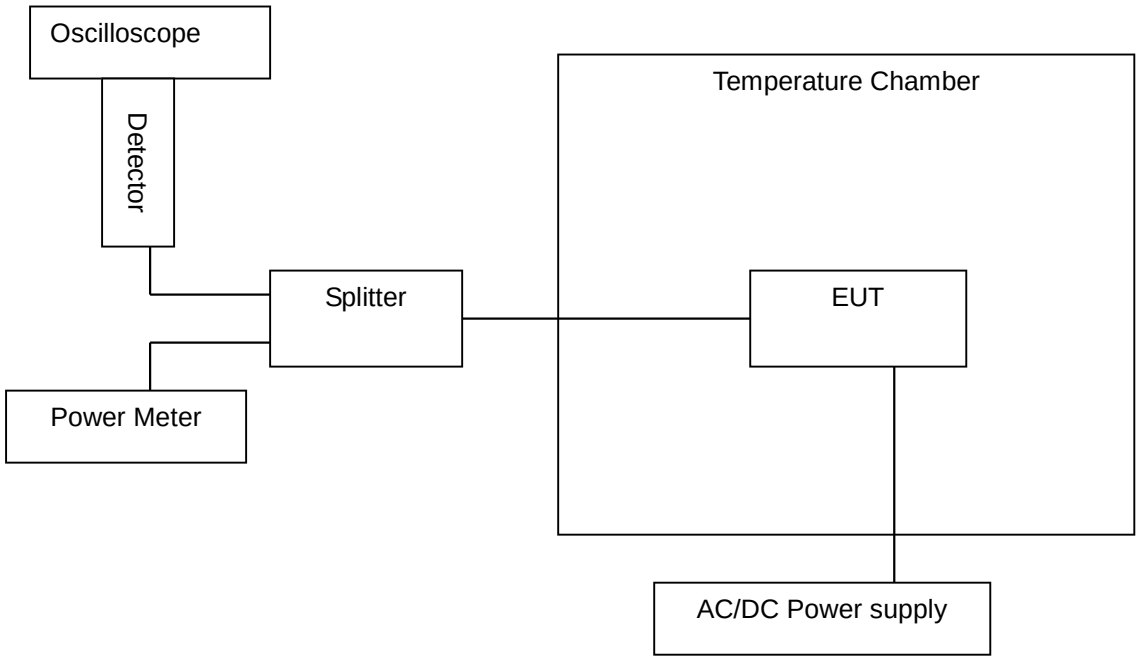
Frequency band (MHz)	Mean e.i.r.p. limit (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5150 – 5350	23	20/23 (see note 1)	10	7/10 (see note 2)

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.

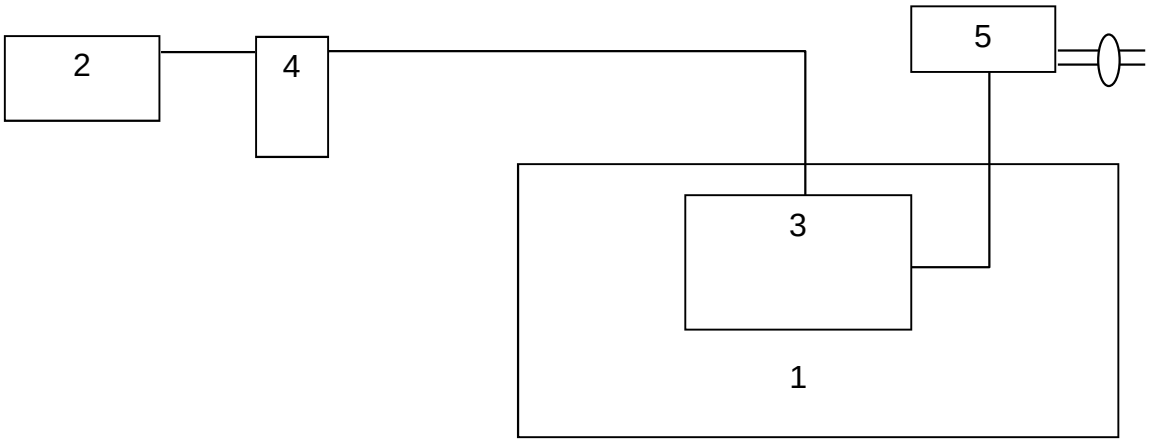
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.

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 (℃)	**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 (℃)	**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

IEEE 802.11n HT 40 MHz Mode:

Antenna Gain =				6 dBi			
TEST CONDITIONS				**TRANSMITTER POWER (dBm)**			
Temp (℃)	**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 (℃)	**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 (℃)	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 (℃)	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 (℃)	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 (℃)	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,

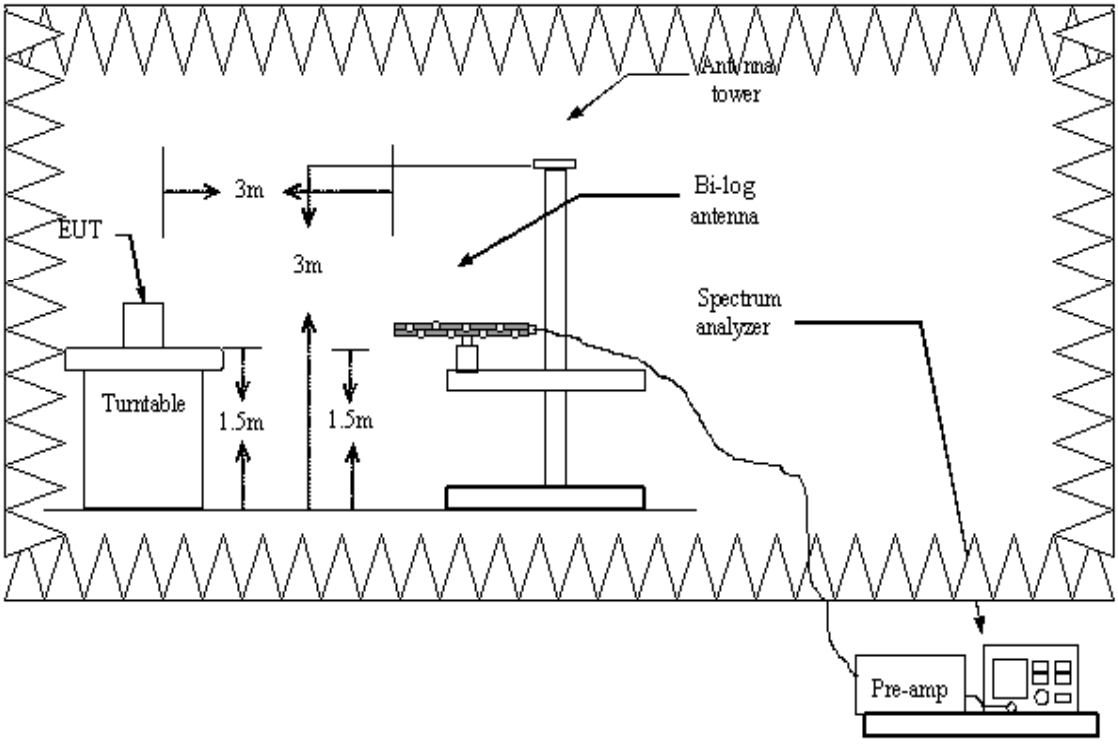
The level of unwanted emissions (radio frequency emissions outside the 5GHz RLAN bands) shall not exceed the limits given below:

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

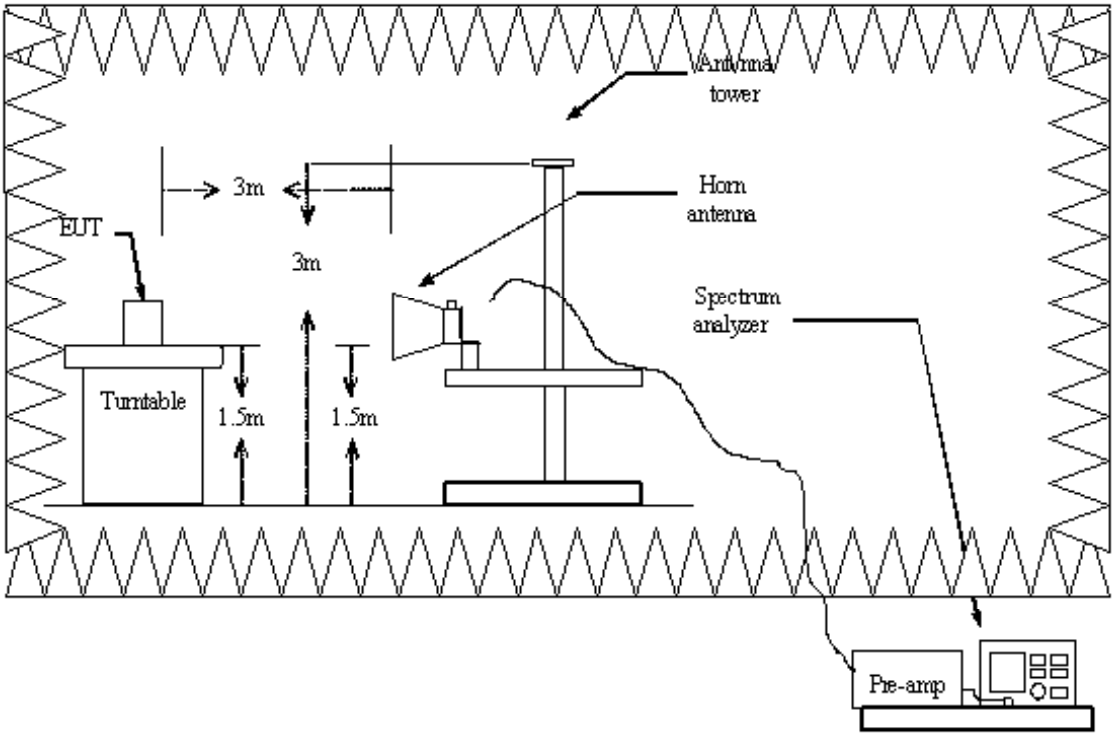
Frequency Range (MHz)	Max. Power, EIRP (dBm)	Bandwidth
30 MHz to 47 MHz	-36	100 kHz
47 MHz to 74 MHz	-54	100 kHz
74 MHz to 87.5 MHz	-36	100 kHz
87.5 MHz to 118 MHz	-54	100 kHz
118 MHz to 174 MHz	-36	100 kHz
174 MHz to 230 MHz	-54	100 kHz
230 MHz to 470 MHz	-36	100 kHz
470 MHz to 862 MHz	-54	100 kHz
862 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:

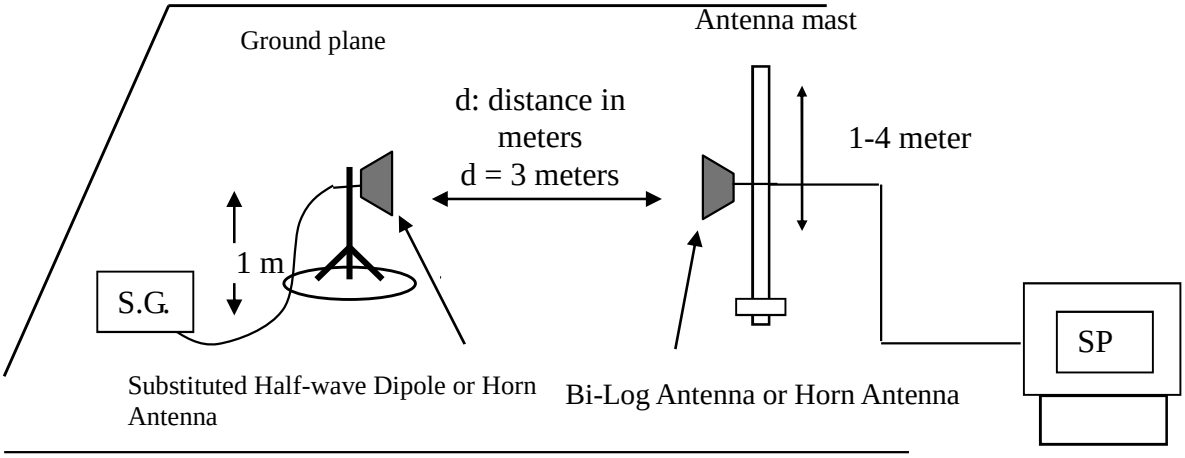
Below 1GHz



Above 1GHz



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

For FPC Antenna

Below 1GHz

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

Ambient temperature: 22℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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℃ **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						

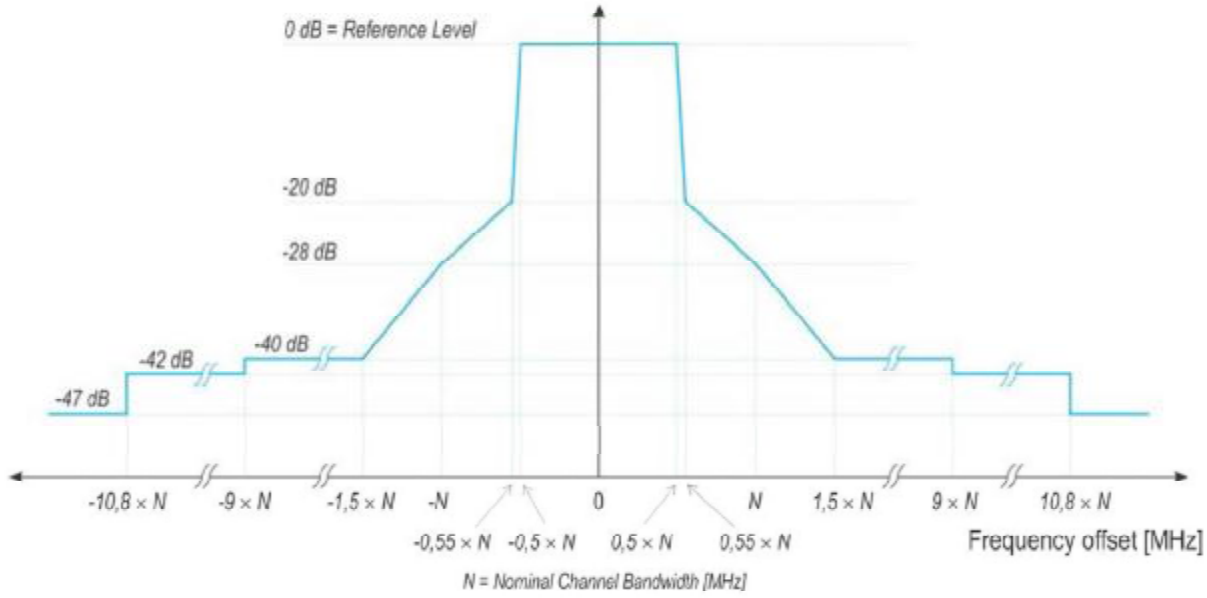
Remark:

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

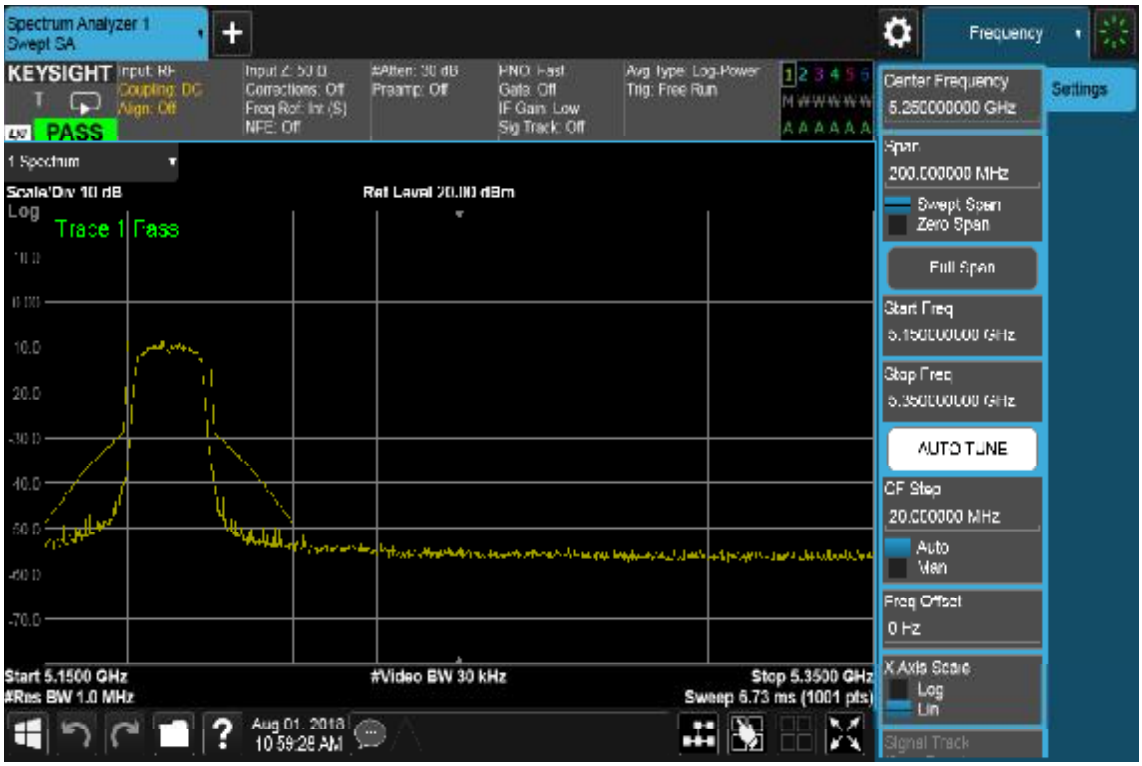
1. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the test conditions.
2. Please refer to ETSI EN 301 893 V2.1.1 (2017-05). for the measurement methods.

TEST RESULTS

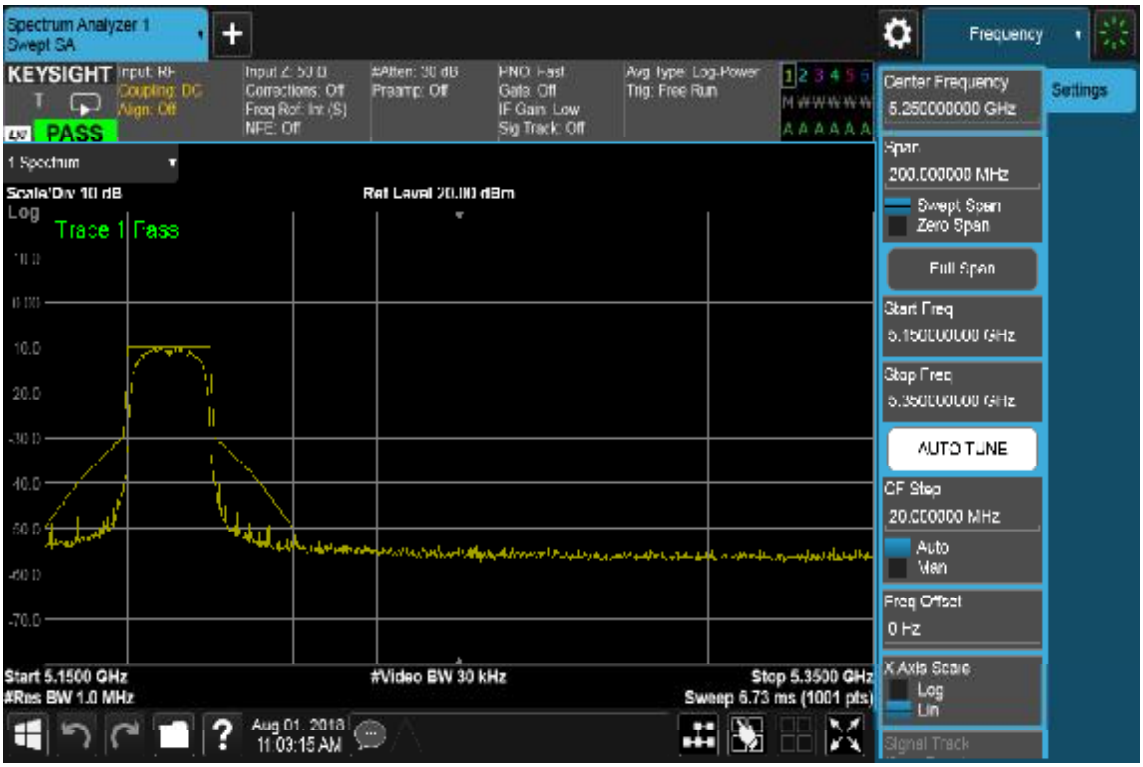
No non-compliance noted.

WITHIN BAND

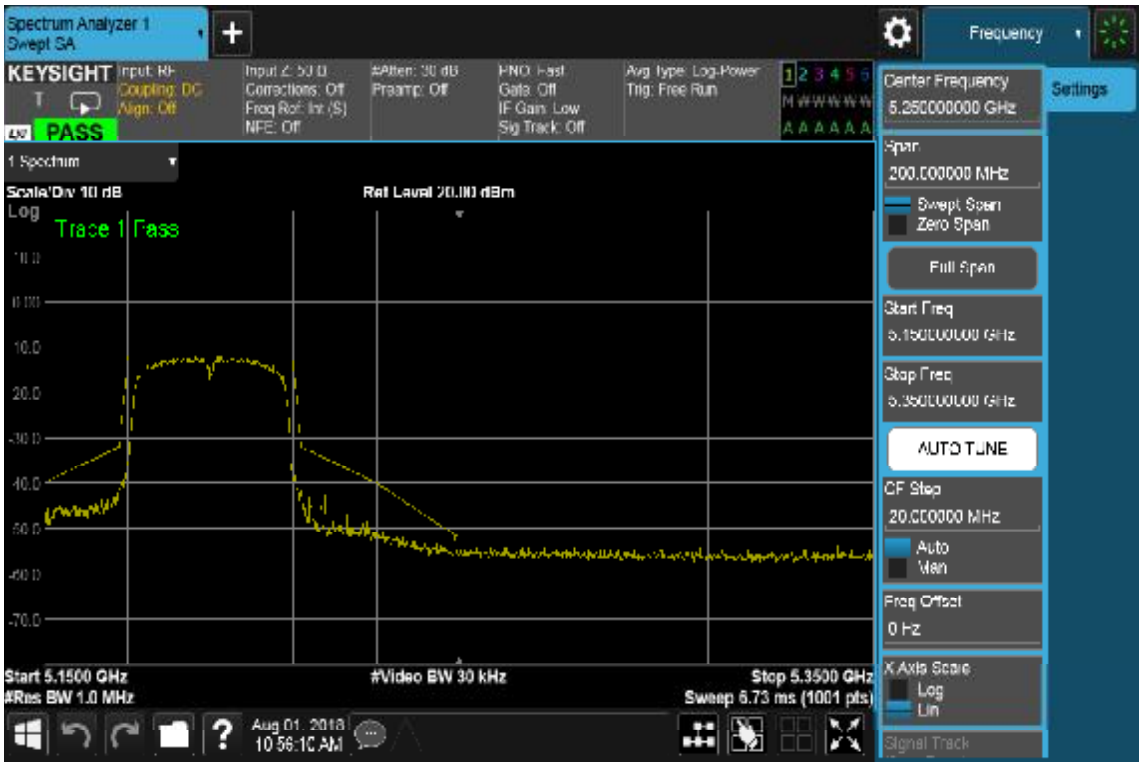
IEEE 802.11a Mode:
5180 MHz



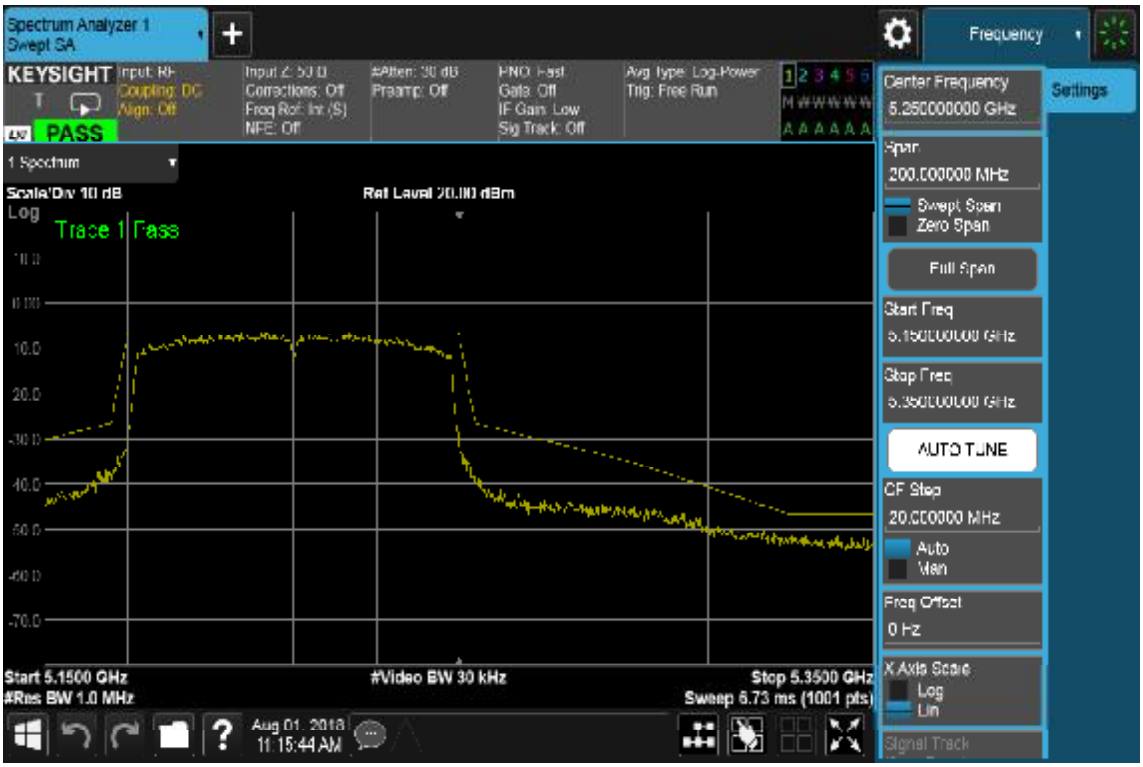
IEEE 802.11n 20 MHz Mode
5180 MHz



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:

1. Two identical EUT's are used for this test. One is set to transmit and the other is set to receive.
2. 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.
3. 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.
4. The step attenuator is connected to the Receive EUT via the power splitter.
5. 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.
6. 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

For FPC Antenna

Below 1GHz

Test Mode: IEEE 802.11AC VHT80 / RX (CH 5210) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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.

For Dipole Antenna

Below 1GHz

Test Mode: IEEE 802.11AC VHT80 / RX (CH 5210) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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℃ **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

☒ Priority Class dependent Channel Access parameters for Supervised Devices:

Class #	p_0	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 *Channel Occupancy Time* (COT) 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.

☐ Priority Class dependent Channel Access parameters for Supervising Devices:

Class #	p_0	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 *Channel Occupancy Time* (COT) 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):

☒ 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

☐ 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 PH ≤13 dBm: TL= -75 dBm/MHz

For 13 dBm < PH < 23 dBm: TL= -85 dBm/MHz + (23 dBm - PH)

For PH ≥ 23 dBm: TL= -85 dBm/MHz

☒ 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 µs within said observation period.

TEST CONFIGURATION

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

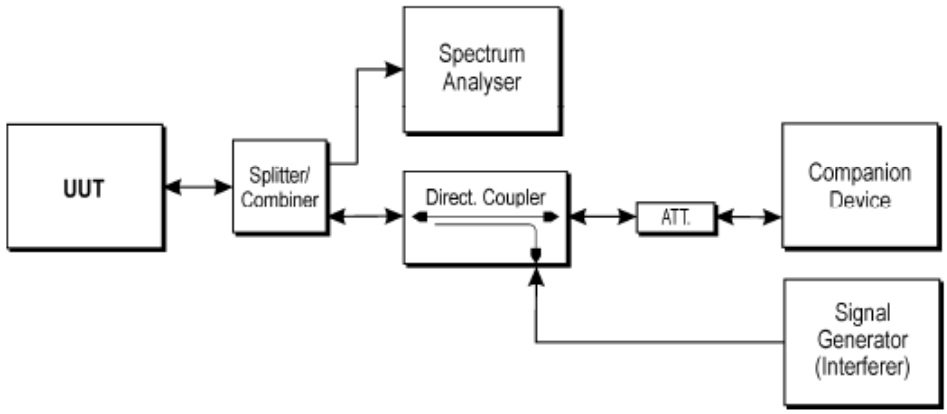


Figure 13: Example Test Set-up for verifying the adaptivity of an equipment

TEST PROCEDURE

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

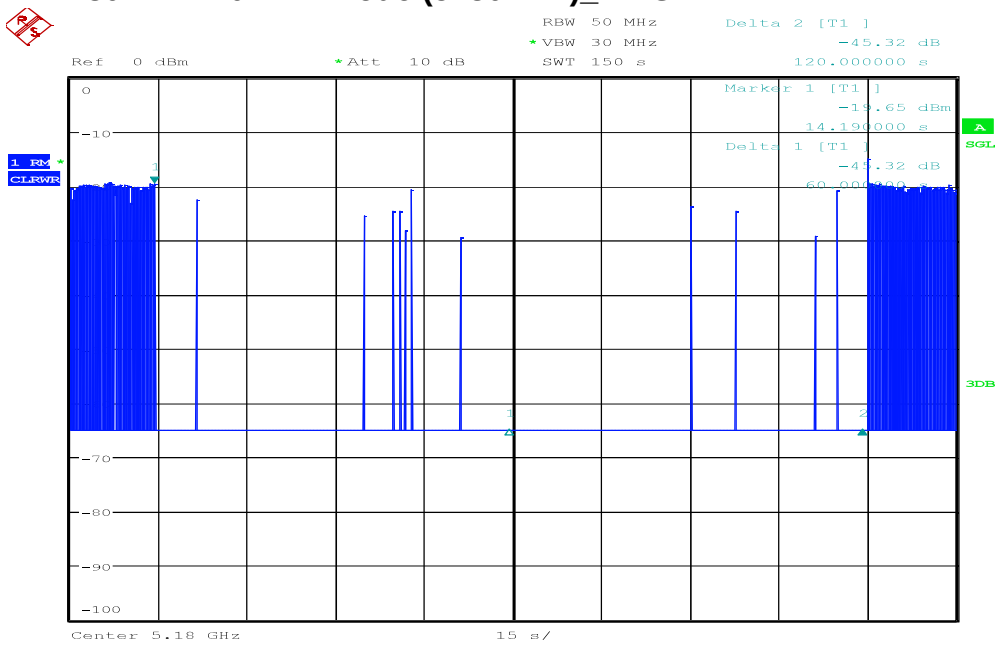
TEST RESULTS

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*

Adaptive Test Results:

IEEE 802.11n 20 MHz Mode (5180MHz)_AWGN



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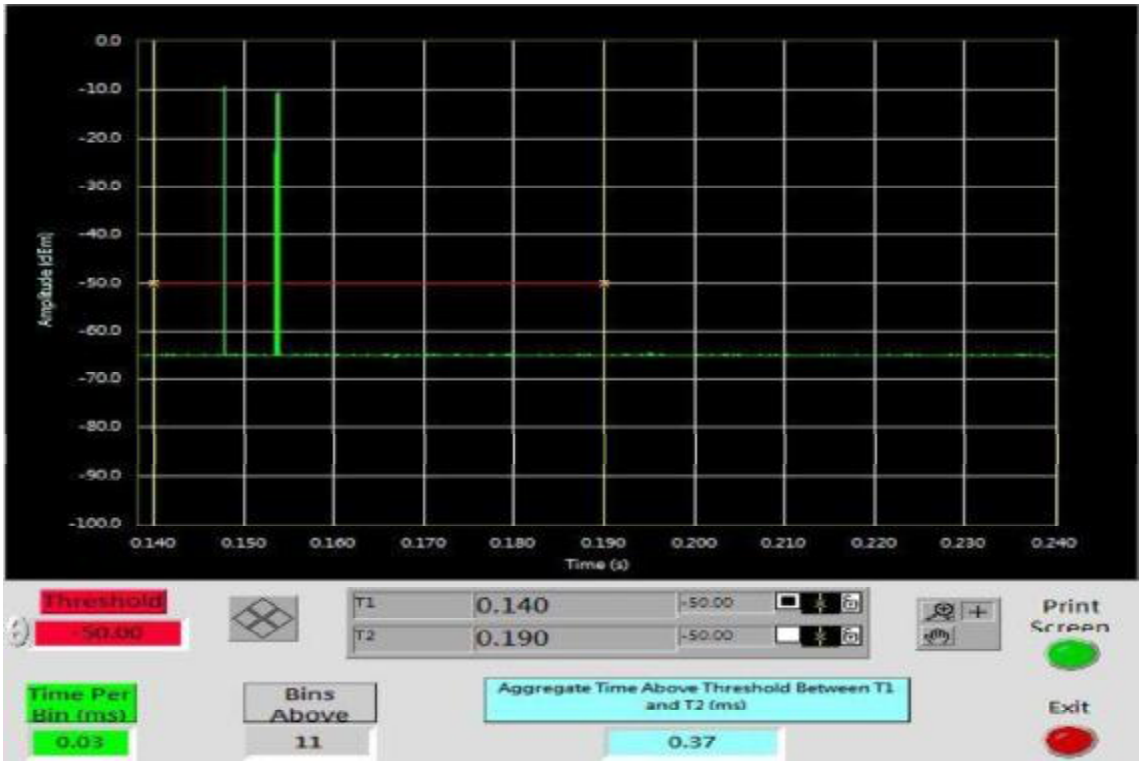
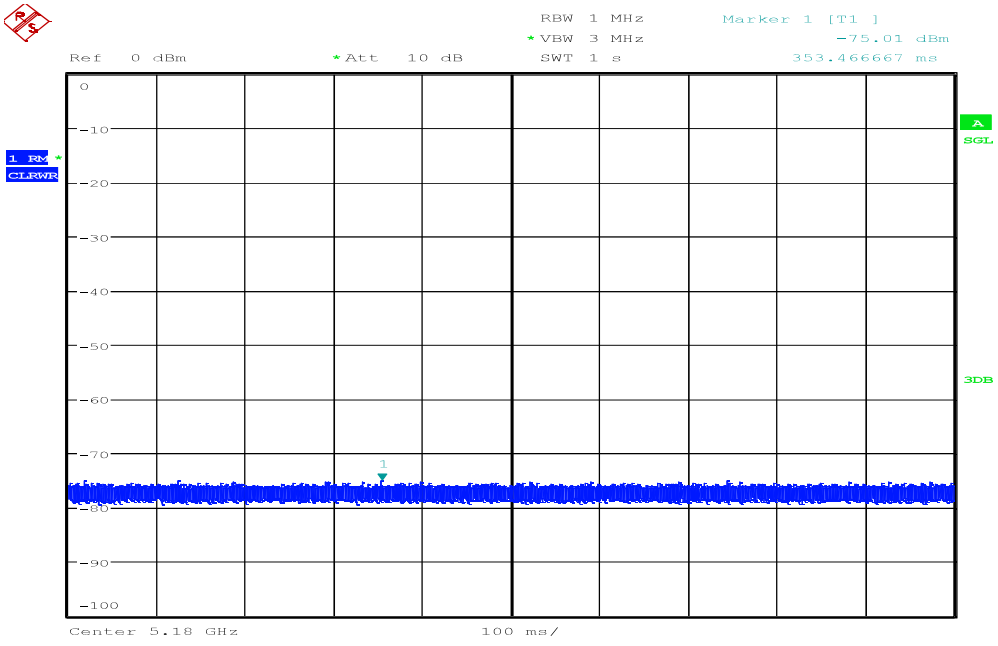


Threshold level / CH 5180



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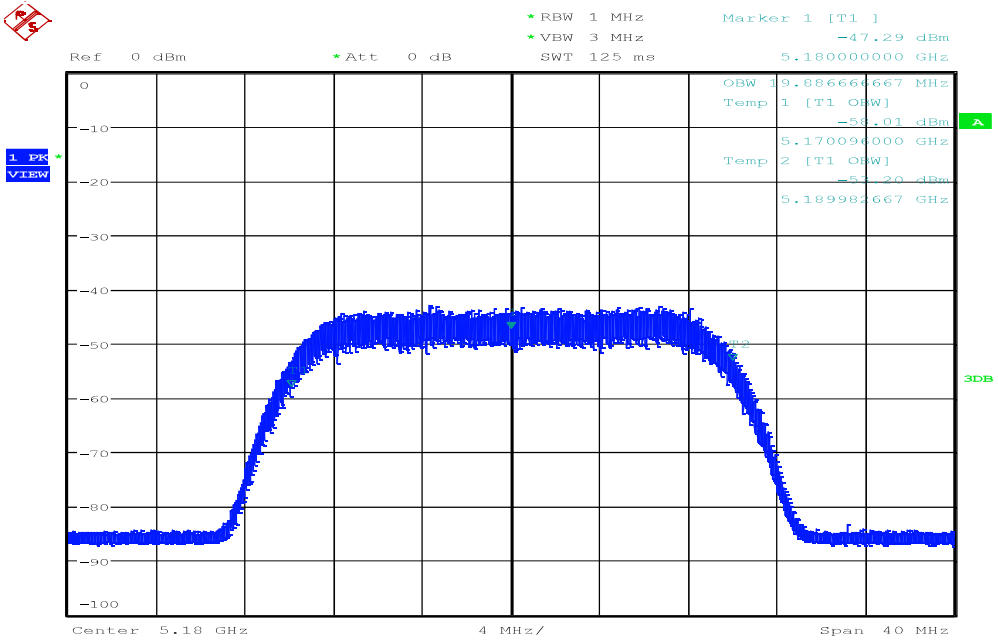
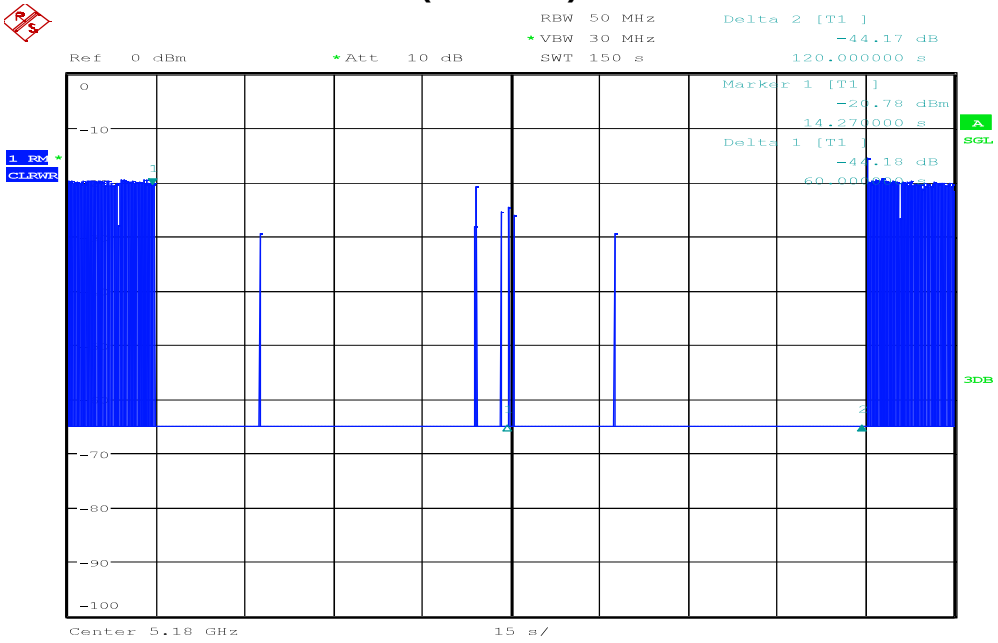
OBW / CH 5180



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

IEEE 802.11n 20 MHz Mode (5180MHz)_LTE



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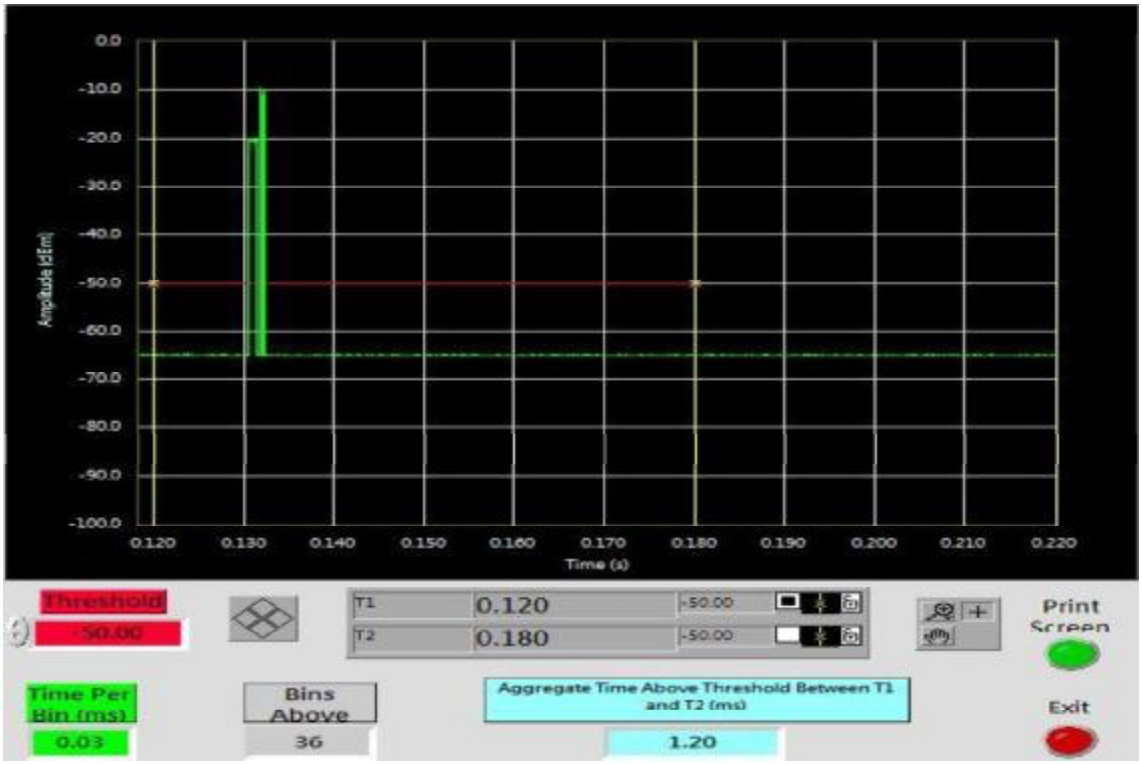
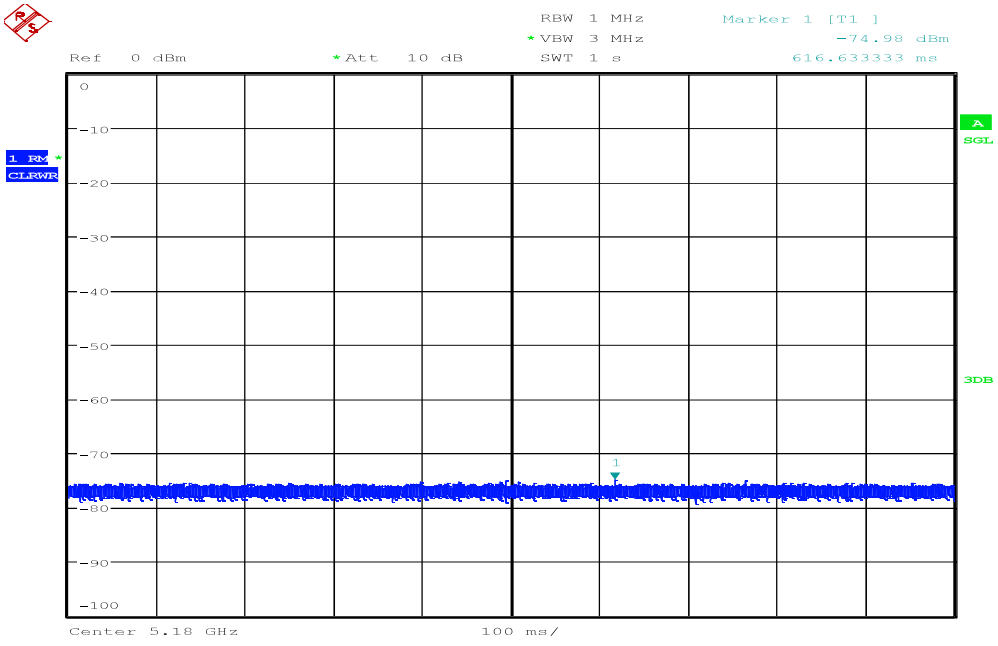


Threshold level / CH 5180



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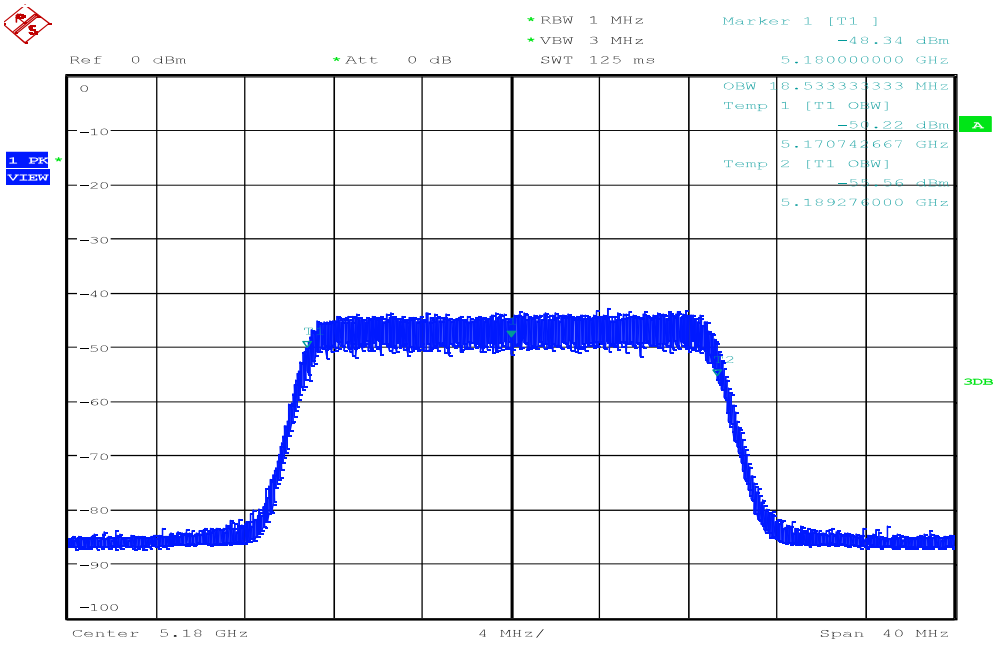
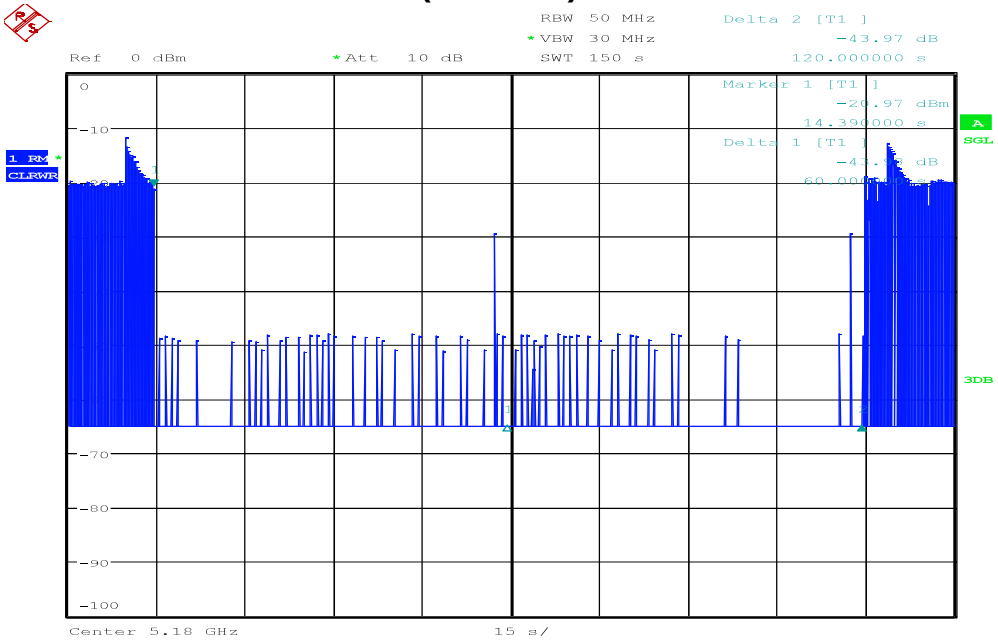
OBW / CH 5180

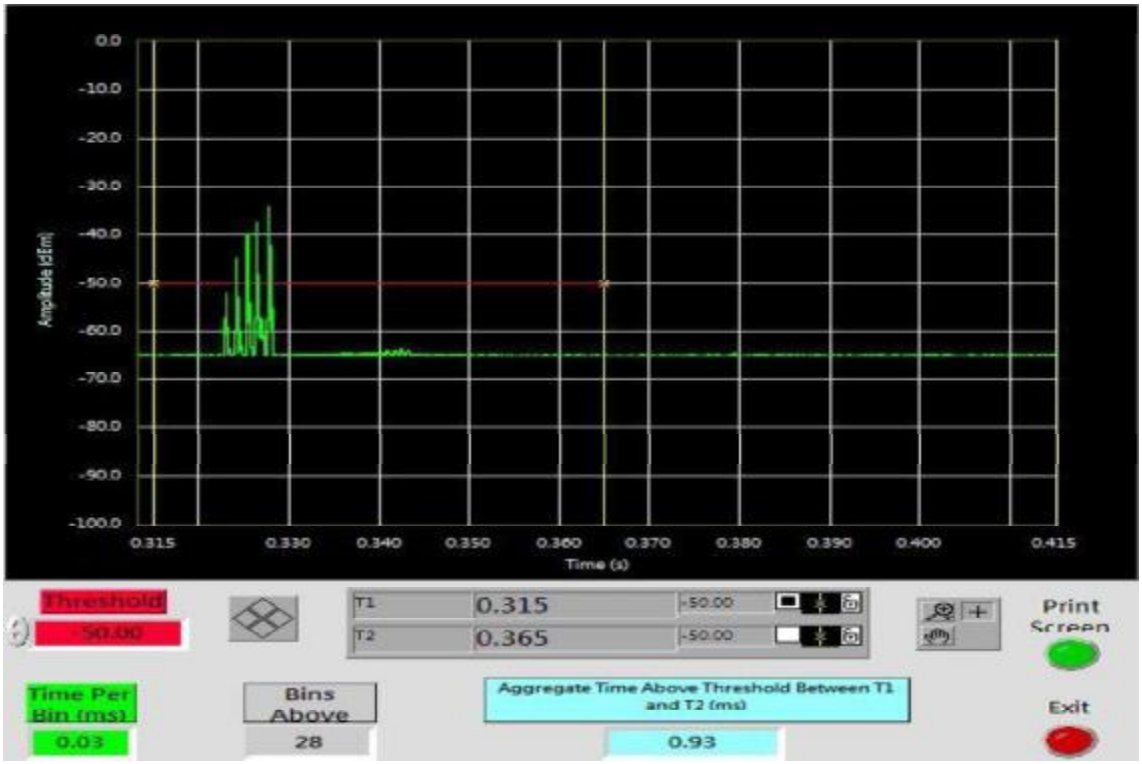


Date: 30.JUL.2018 10:23:48

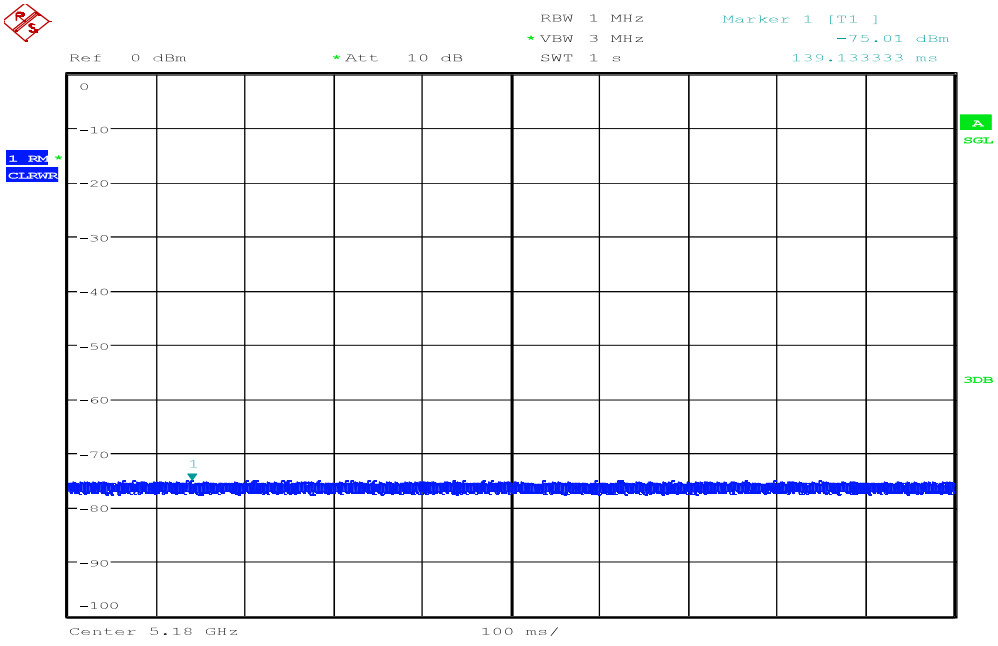
IEEE 802.11n 20 MHz Mode (5180MHz)_OFDM



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



Threshold level / CH 5180



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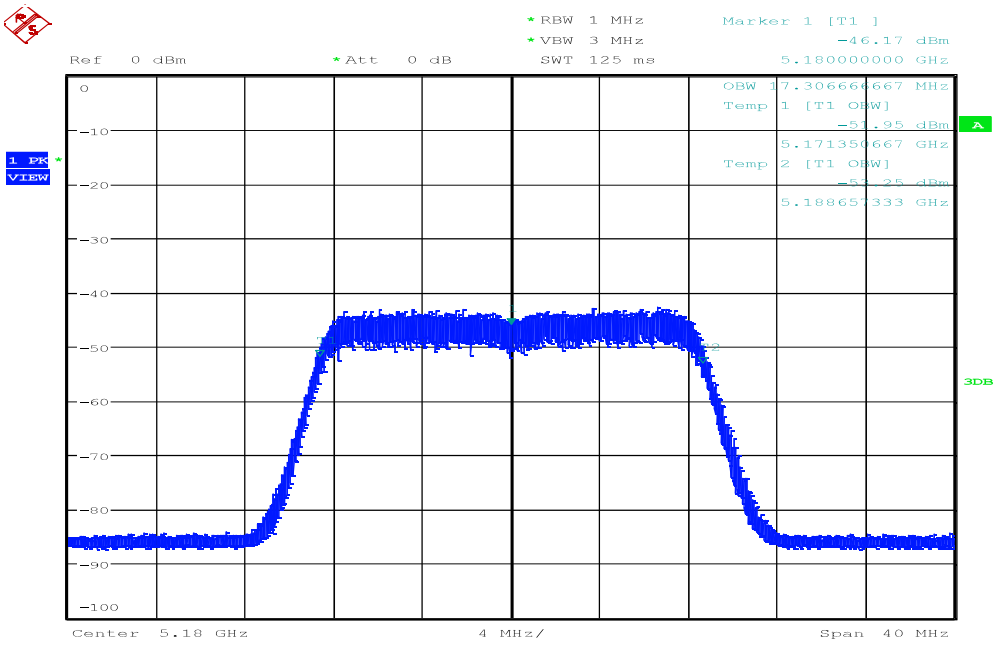
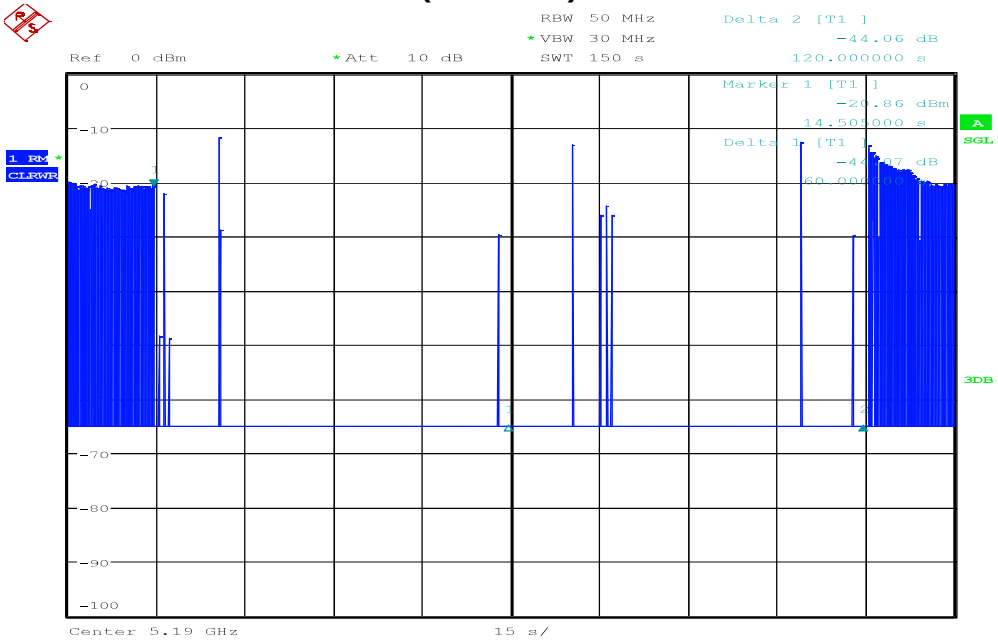
OBW / CH 5180



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

IEEE 802.11n 40 MHz Mode (5190MHz)_AWGN



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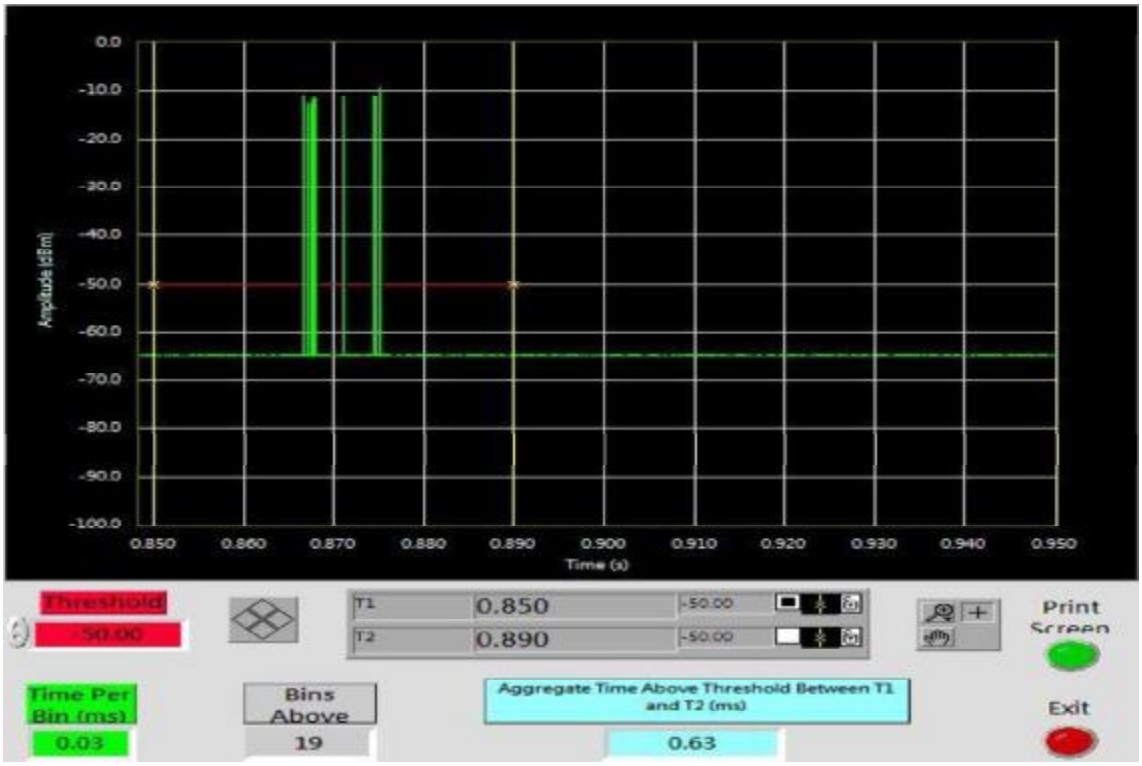
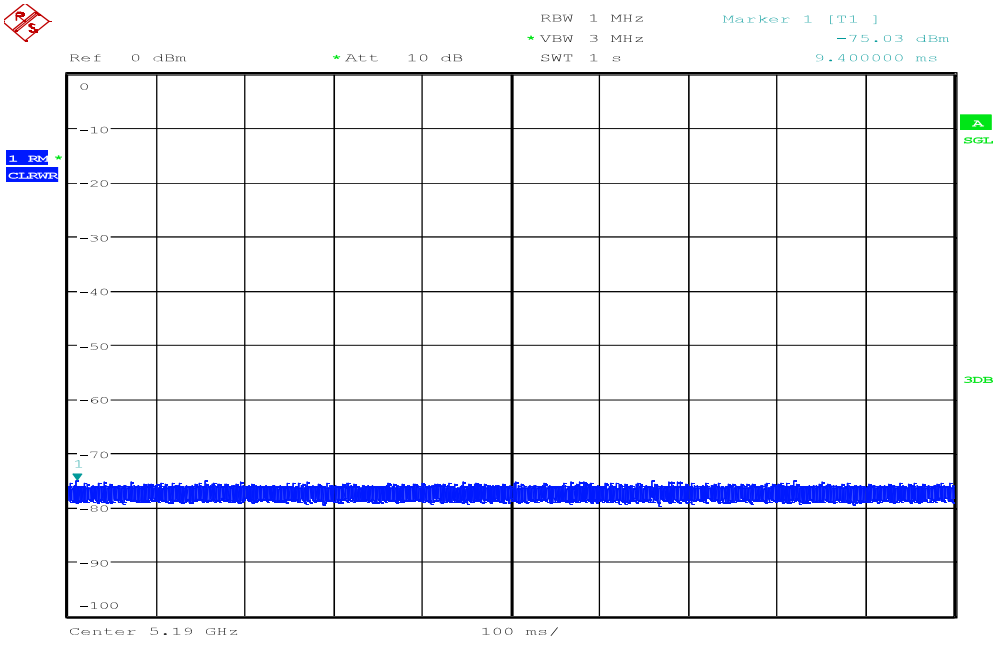
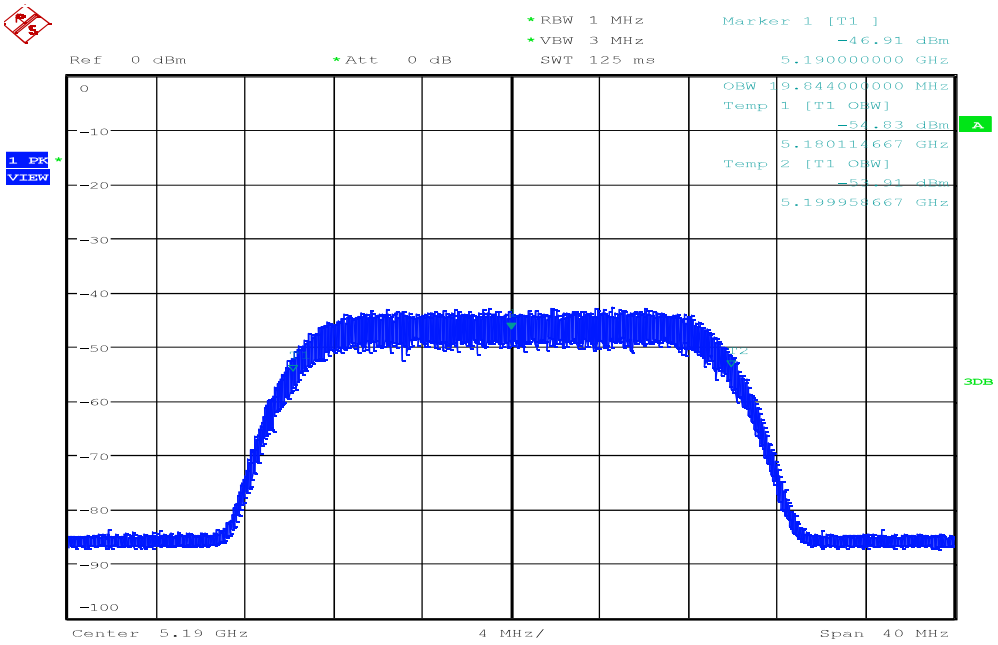


Threshold level / CH 5190



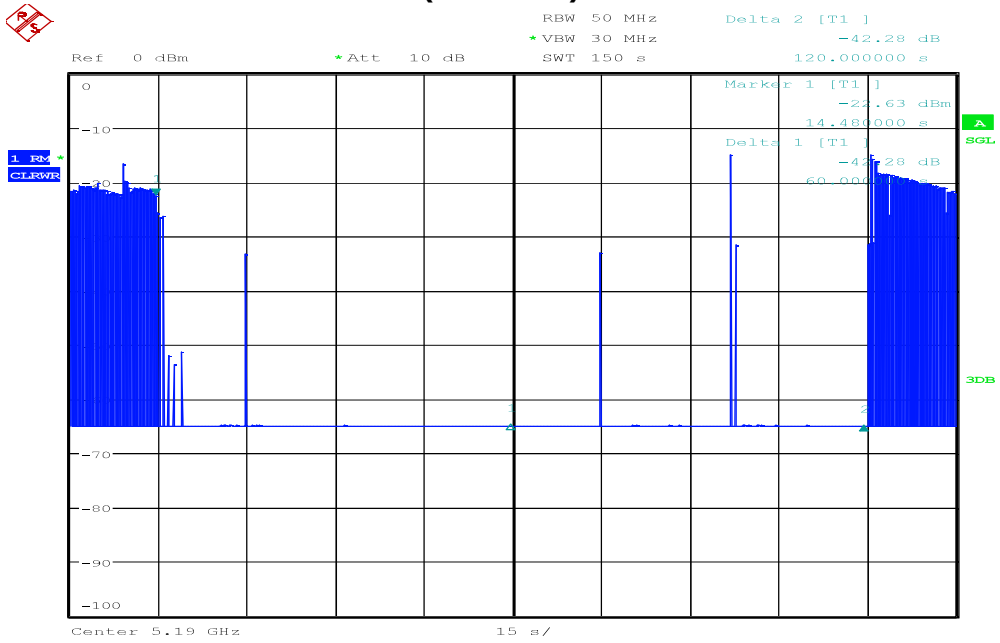
Date: 30.JUL.2018 10:43:32

OBW / CH 5190



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

IEEE 802.11n 40 MHz Mode (5190MHz)_LTE



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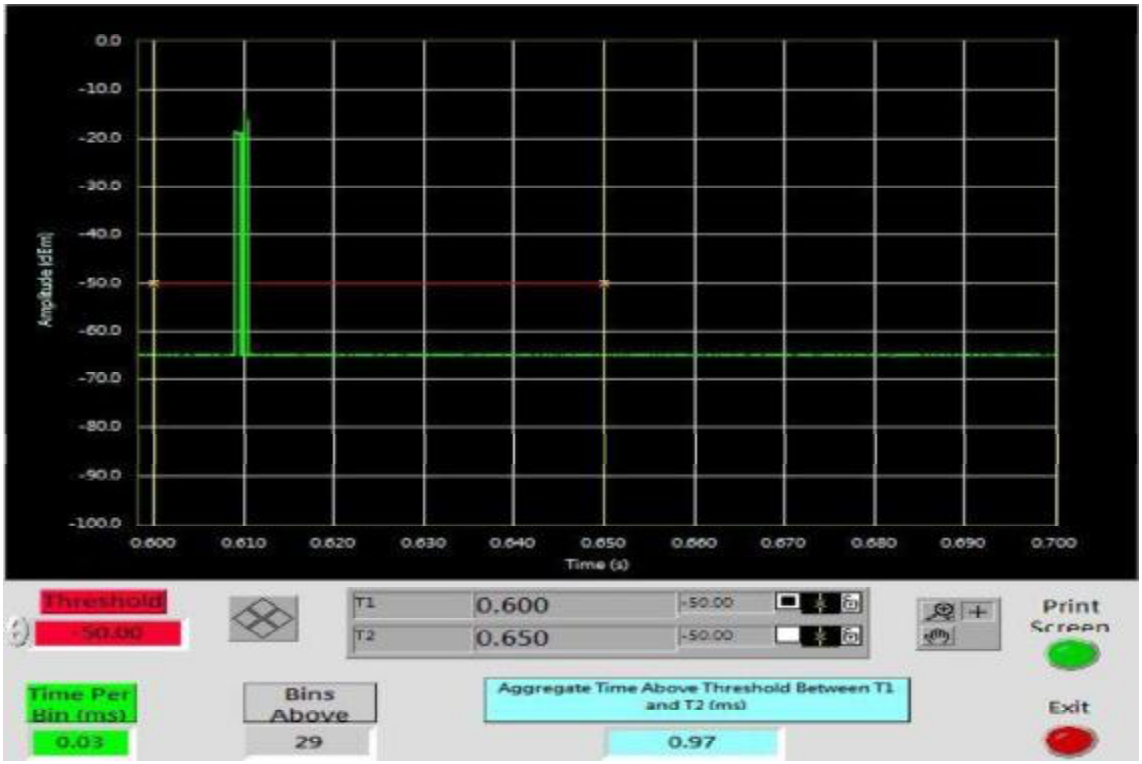
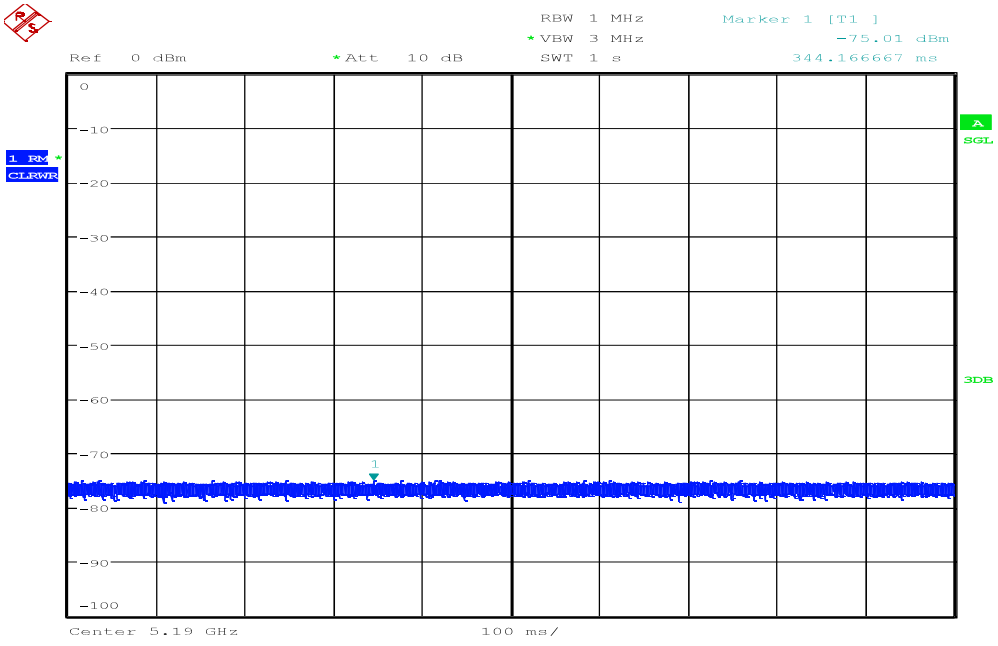
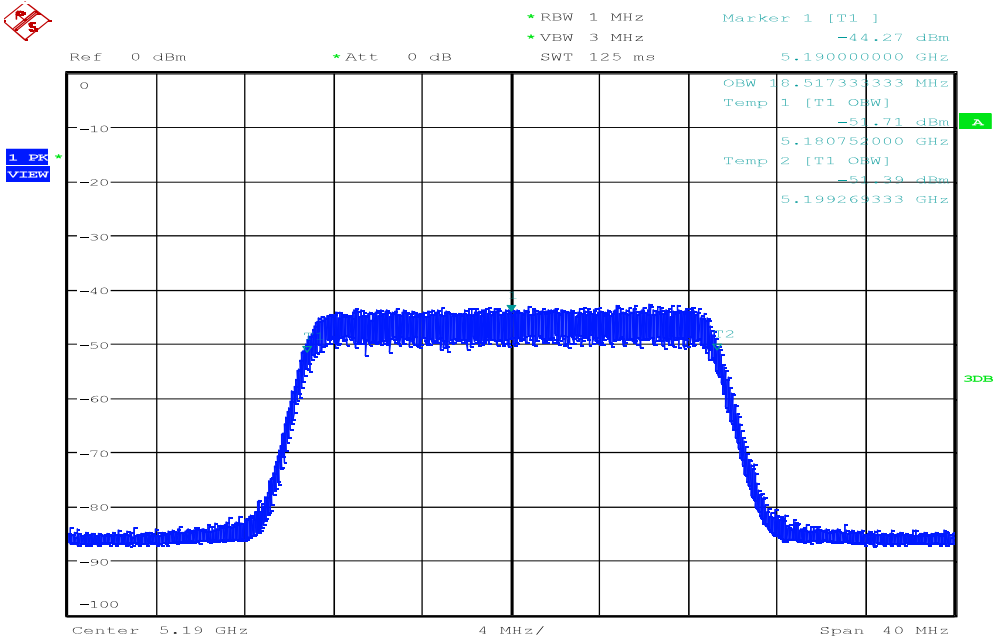


Threshold level / CH 5190



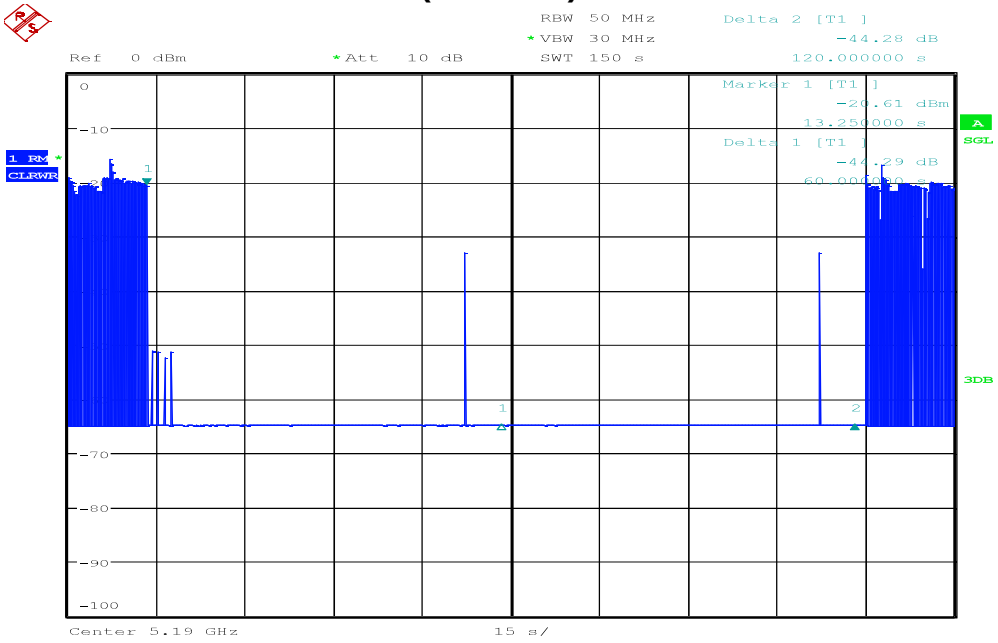
Date: 30.JUL.2018 10:45:51

OBW / CH 5190



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

IEEE 802.11n 40 MHz Mode (5190MHz)_OFDM



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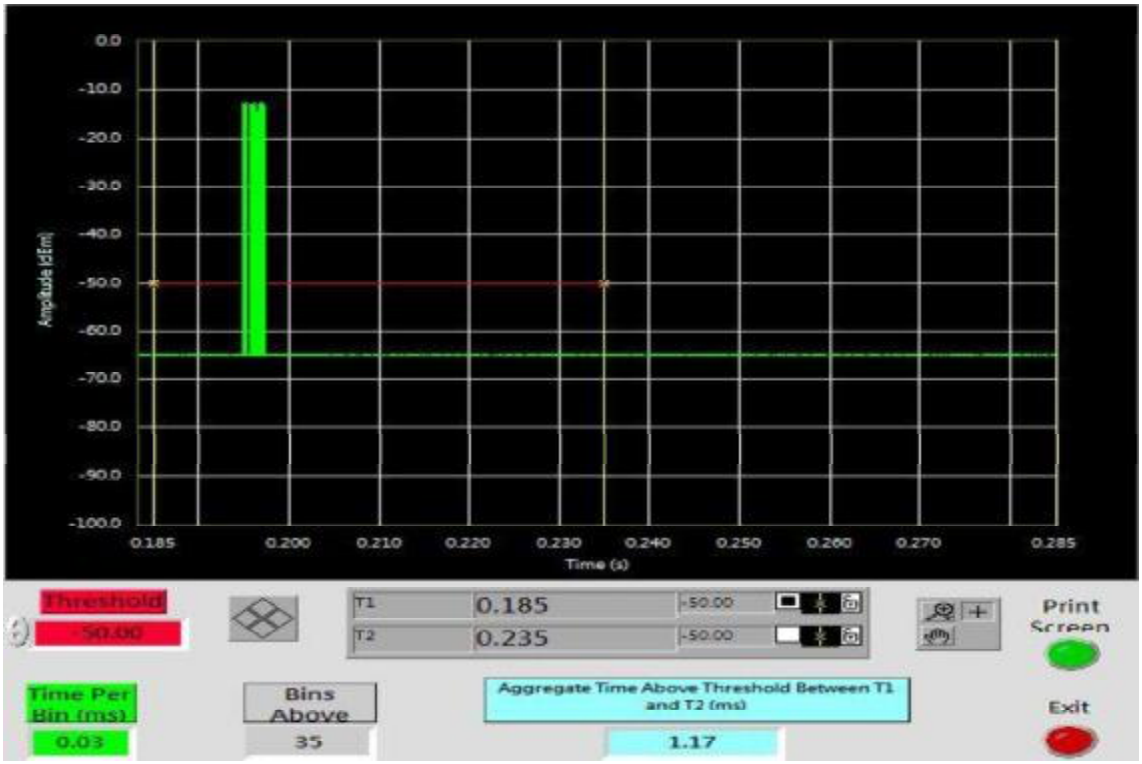
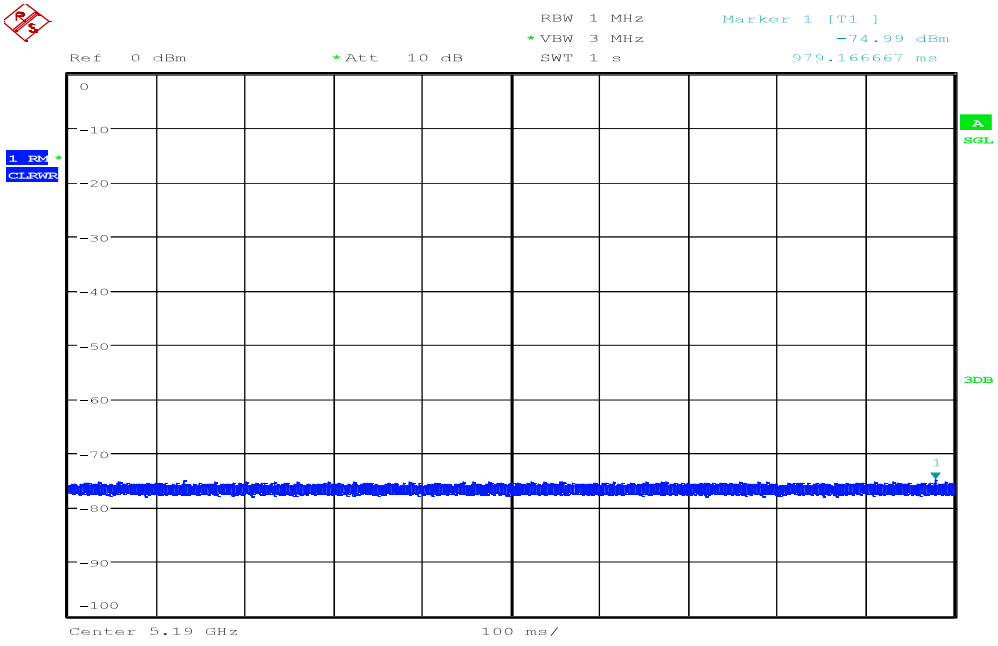
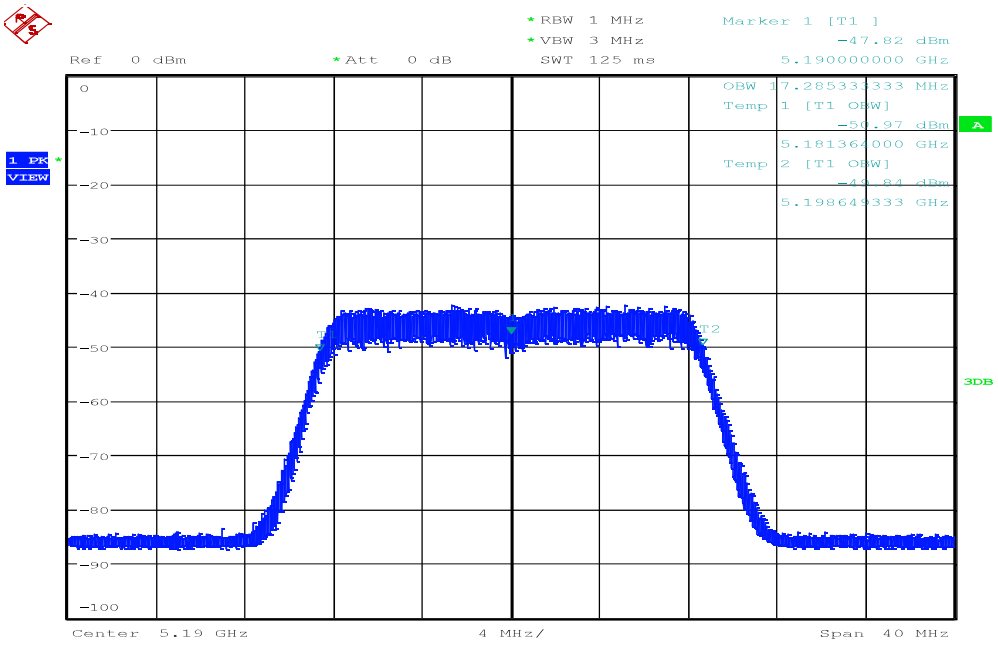


Threshold level / CH 5190



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

OBW / CH 5190

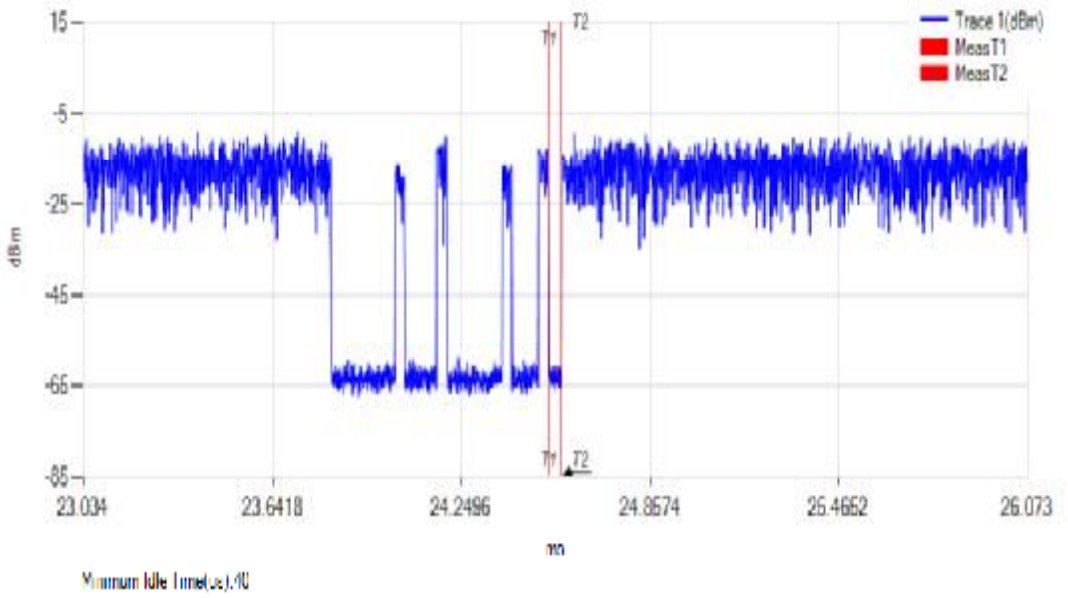


Date: 30.JUL.2018 10:30:24

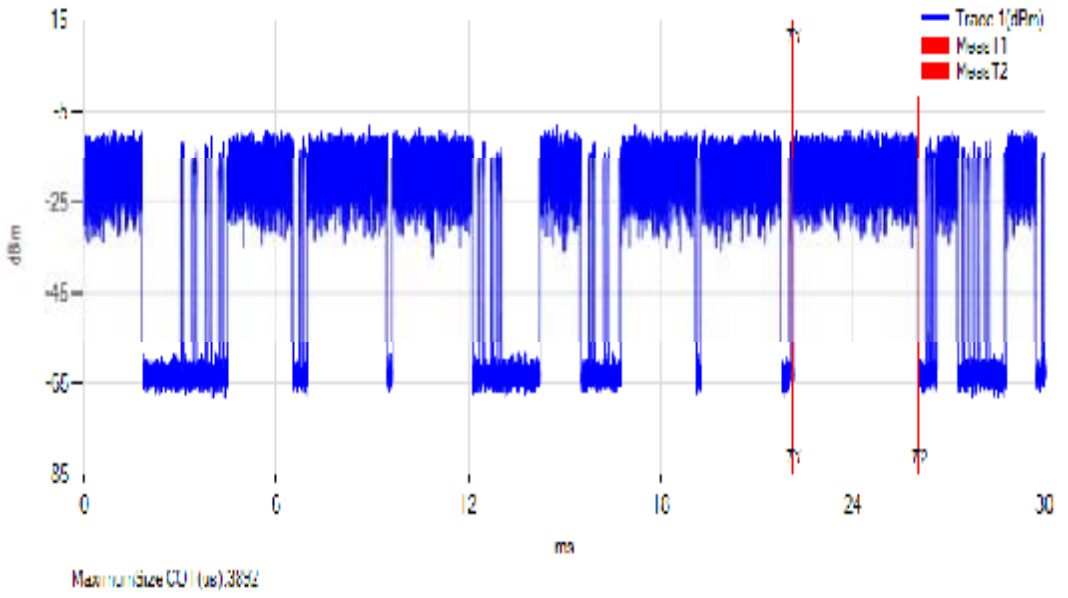
Medium Access Mechanism Test Results:

IEEE 802.11n 40 MHz Mode (5190MHz)

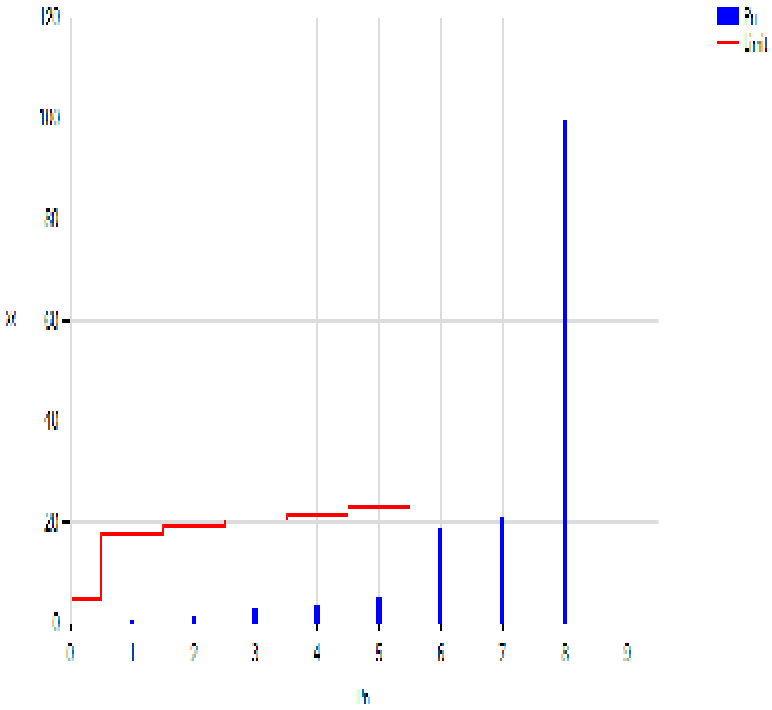
Min Idle

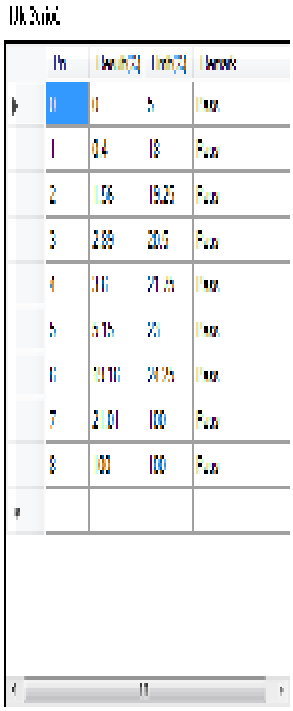


Max COT



Idle Period





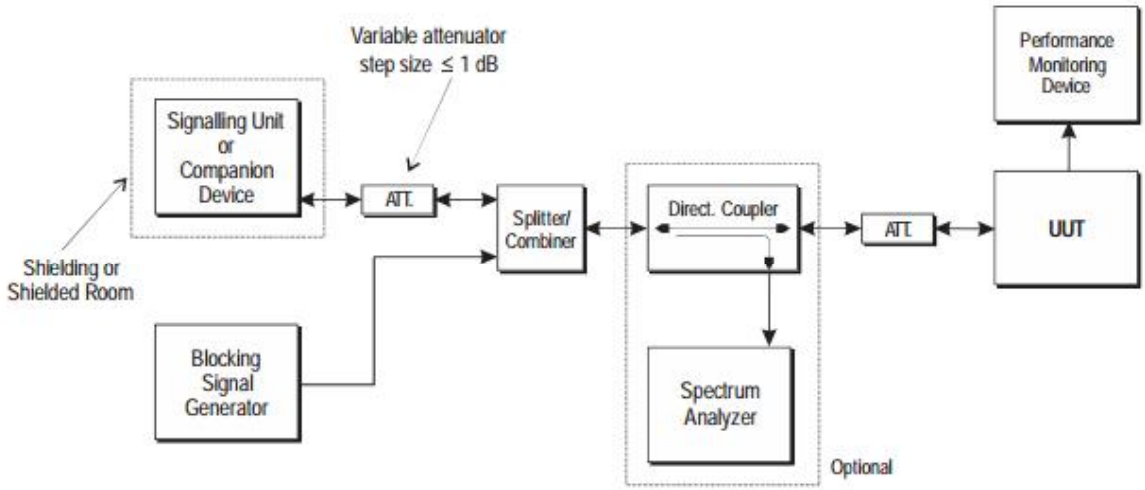
7.7. RECEIVER BLOCKING

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)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 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

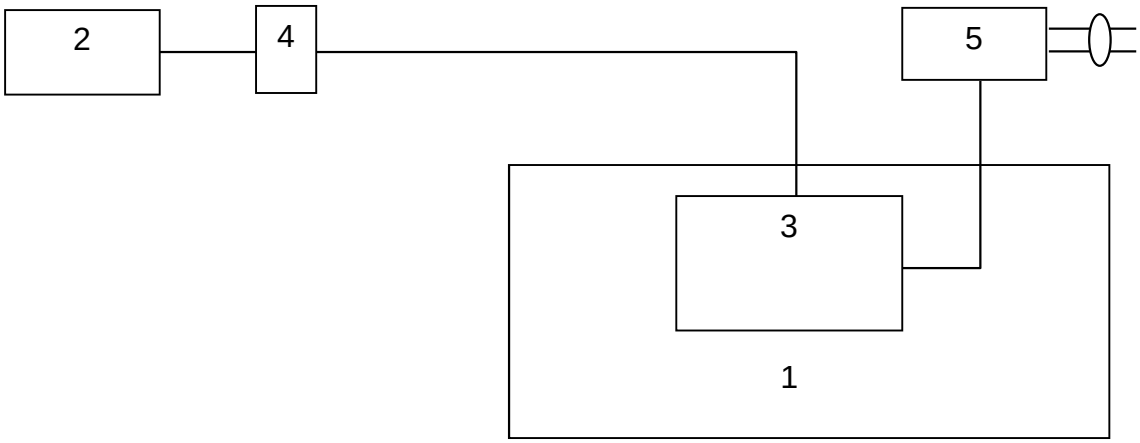
ETSI EN 301 893

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

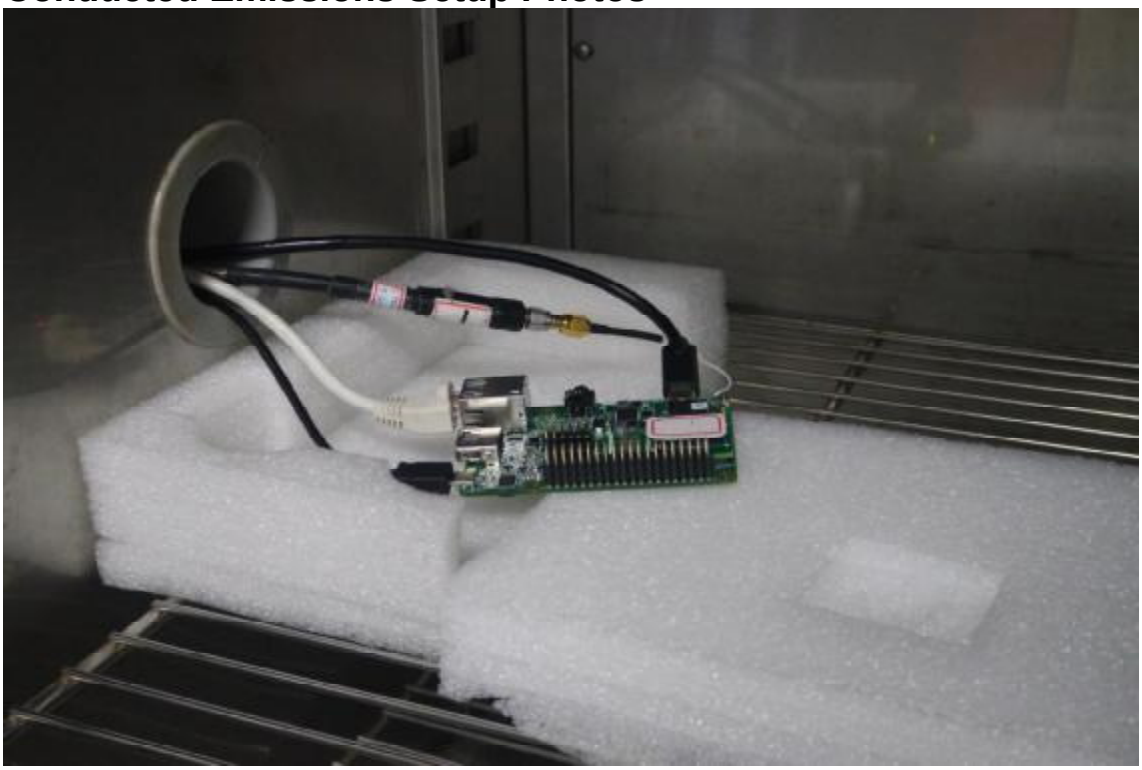
IEEE 802.11ac VHT80 MHz Mode:

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

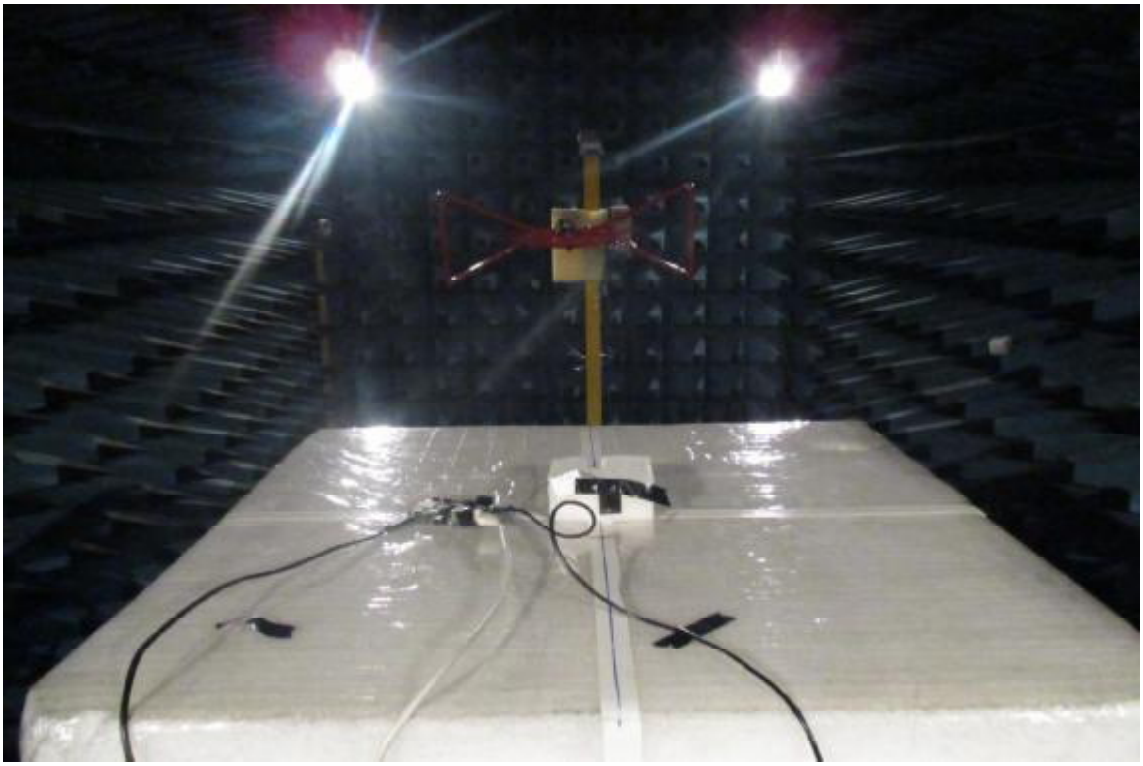
-- End of Test Report --

APPENDIX A PHOTOGRAPHS OF TEST SETUP

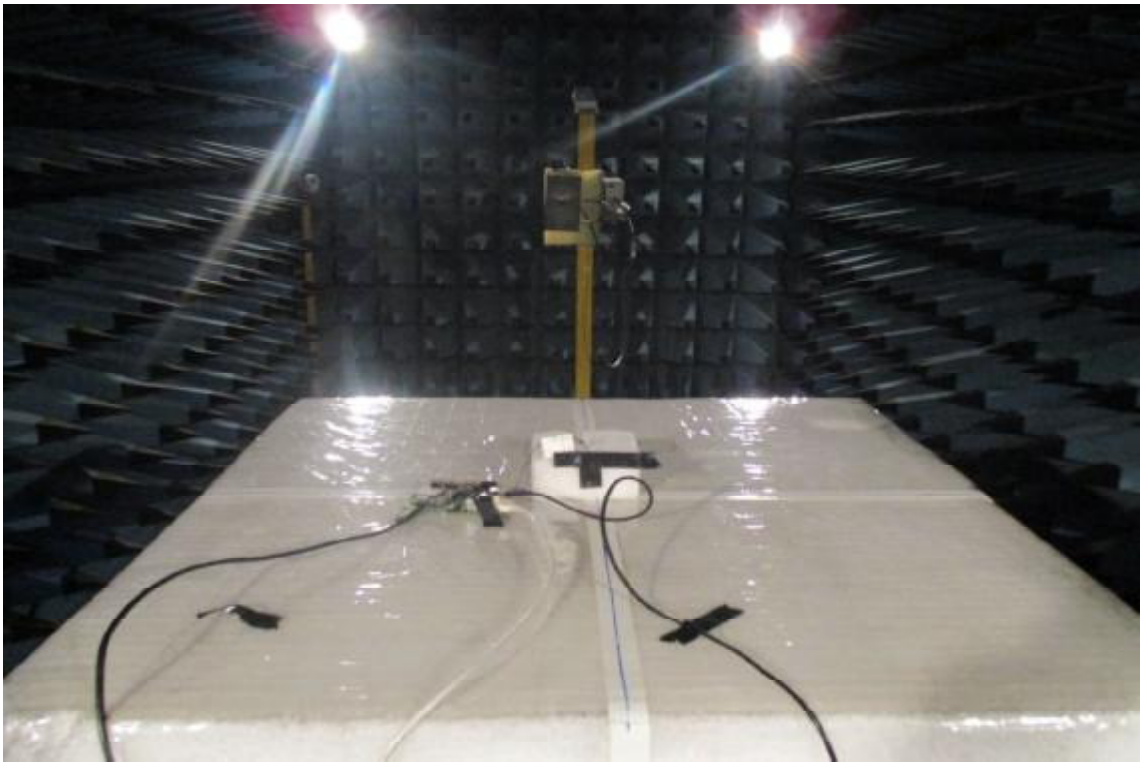
Conducted Emissions Setup Photos



Radiated Emissions Setup Photos
For FPC Antenna
Below 1GHz

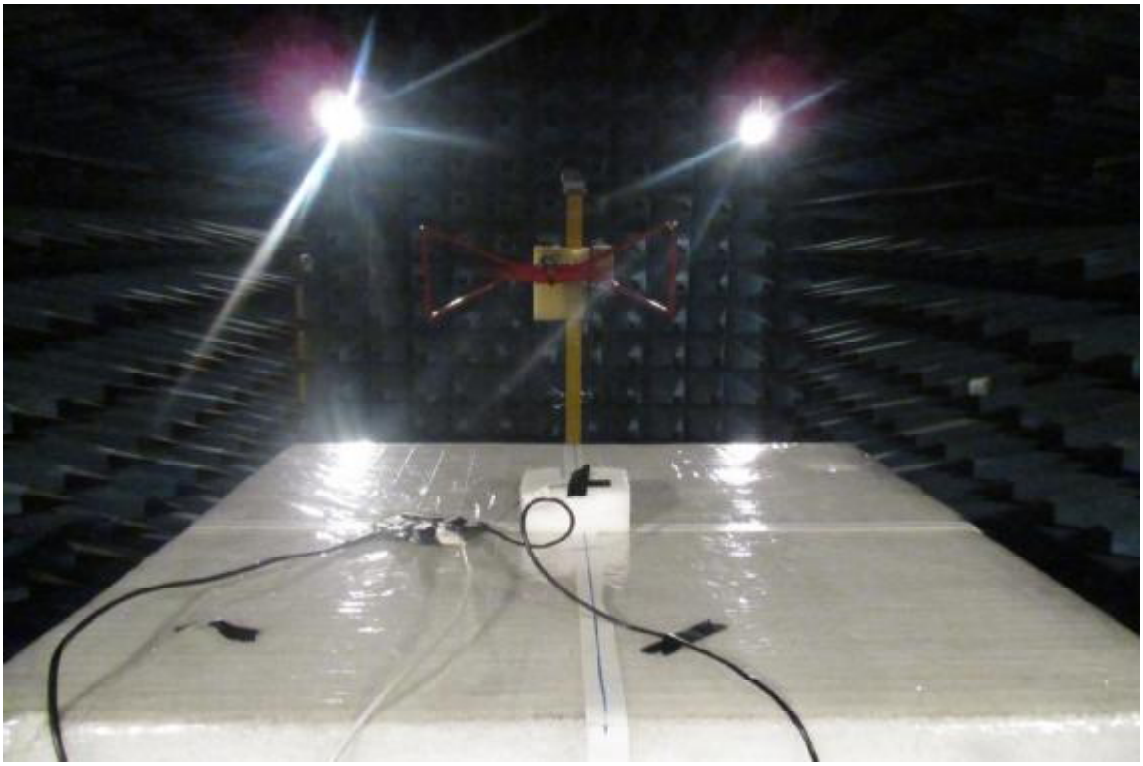


Above 1GHz

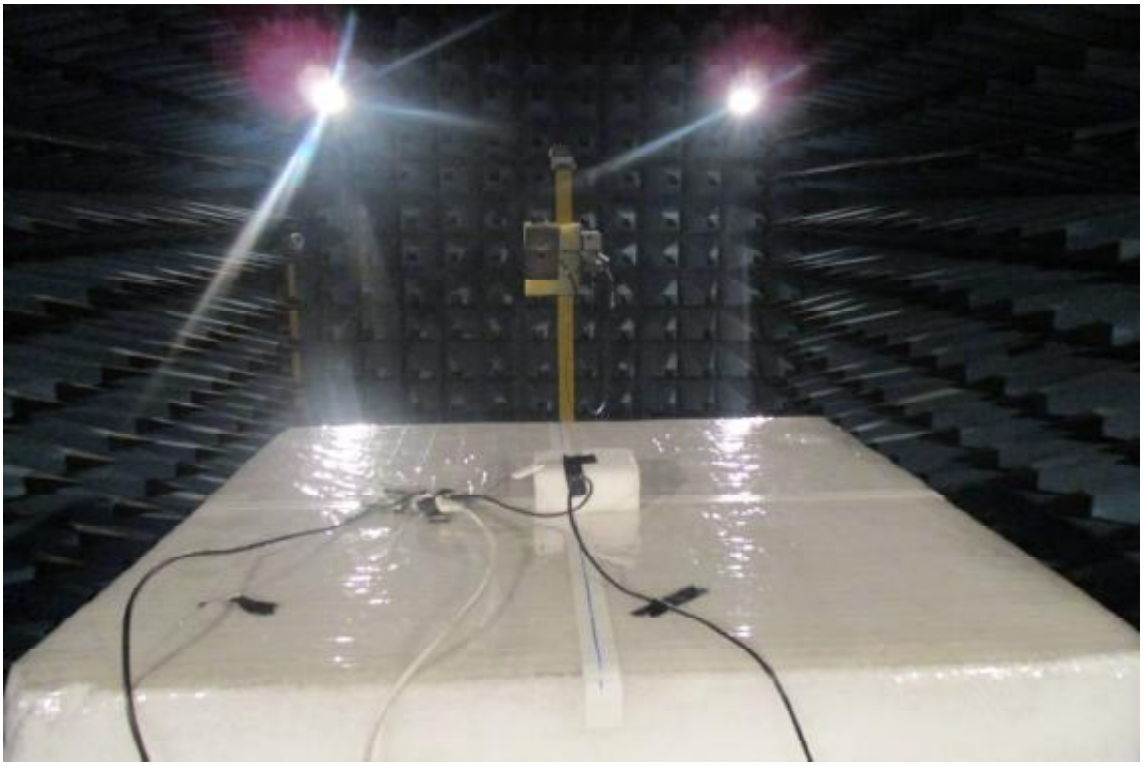


For Dipole Antenna

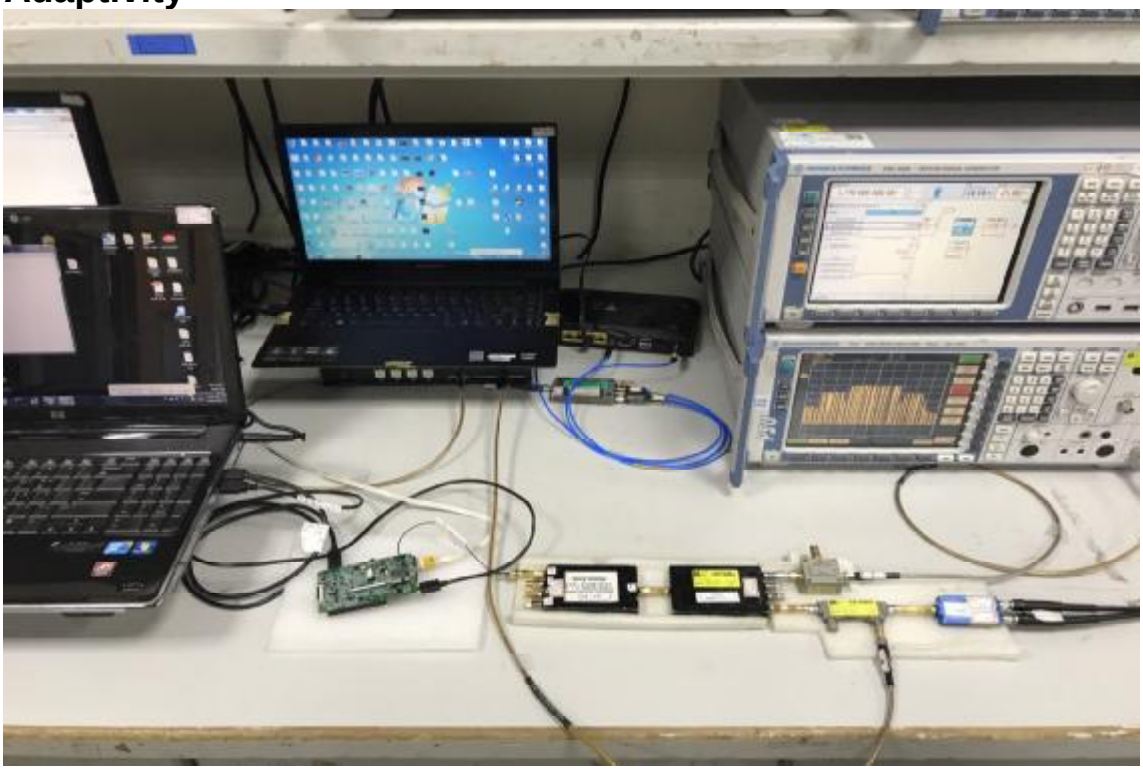
Below 1GHz



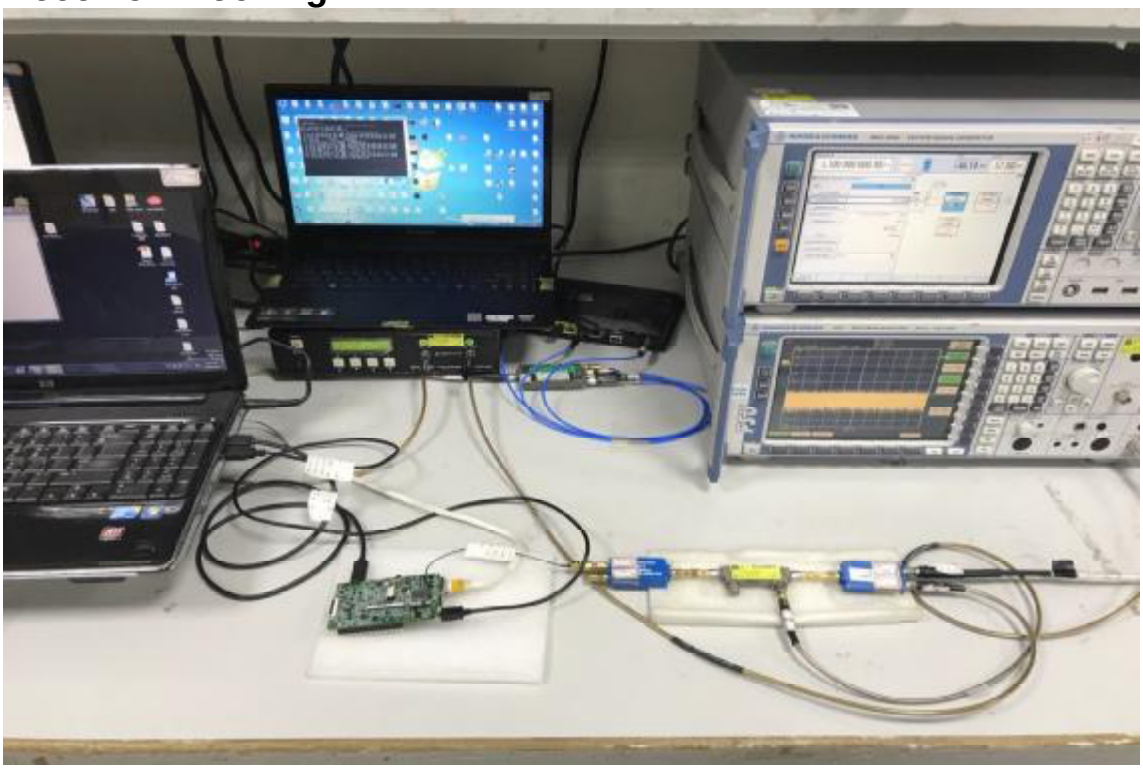
Above 1GHz



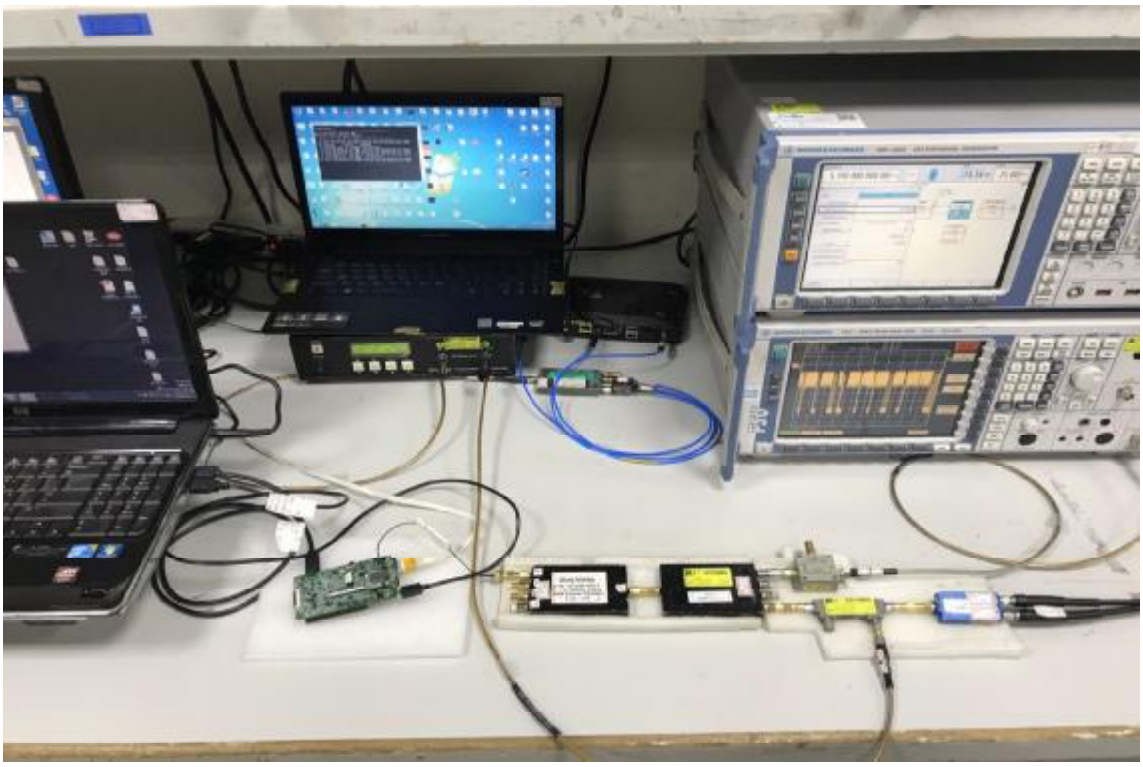
Adaptive Set Up Photo
Adaptivity



Receiver Blocking



MAM



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

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

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

TABLE OF CONTENTS

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 7, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
AS/NZS 4268:2017	No non-compliance noted

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment for compliance with the requirements set forth in above standard. 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
Compliance Certification Services Inc.

Tested by:

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
Frequency Range	IEEE 802.11a Mode: 5745 ~ 5825 MHz IEEE 802.11n HT 20 MHz Mode: 5745 ~ 5825 MHz IEEE 802.11n HT 40 MHz Mode: 5755 ~ 5795 MHz IEEE 802.11ac VHT80 MHz Mode: 5775 MHz
Transmit Power	IEEE 802.11a Mode: 23.95dBm IEEE 802.11n HT 20 MHz Mode: 24.16dBm IEEE 802.11n HT 40 MHz Mode: 25.06dBm IEEE 802.11ac VHT80 MHz Mode: 24.33dBm
Modulation Technique	IEEE 802.11a Mode: OFDM IEEE 802.11n HT 20 MHz Mode: OFDM IEEE 802.11n HT 40 MHz Mode: OFDM IEEE 802.11ac VHT80 MHz Mode: OFDM
Number of Channels	IEEE 802.11a Mode: 5 Channels IEEE 802.11n HT 20 Mode: 5 Channels IEEE 802.11n HT 40 Mode: 2 Channels IEEE 802.11ac VHT80 MHz Mode: 1 Channels
Antenna Specification	FPC Antenna: TechNexion / VM2450-25523-OOX-180 Gain: 3dBi Dipole Antenna: TechNexion / VM2450-ASSY1005 Gain: 6dBi
Temperature Range	0℃ ~ +70℃

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

3. TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

All tests were performed in accordance with the procedures documented in AS/NZS 4268:2017 (Radio equipment and systems-Short range device-Limits and methods of measurement)

3.2 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.3 DESCRIPTION OF TEST MODES

The EUT (model: PIXI-9377) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed. The worst case data rate is determined as the data rate with highest output power.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

IEEE 802.11a Mode:
Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz Mode:
Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Mode:
Channel Low (5755MHz) and Channel High (5795MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac (VHT 80) MHz Mode:

Channel Mid (5775MHz) with 29.3Mbps data rate was chosen for full testing.

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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☐ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☒ **P**laced 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	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☒ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☐ **P**laced 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.

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 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**
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.

4.3 MEASUREMENT UNCERTAINTY

For the test methods, according to the present document (ETSI EN 301 893) the uncertainty figures shall be calculated according to the methods described in the ETR 028 [4] 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 case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 3 is based on such expansion factors.

Table 3: Measurement uncertainty

Parameter	Uncertainty
Frequency	+/-1 * 10^{-7}
RF power, conducted	+/- 4 dB
Adjacent channel power	+/- 3 dB
Conducted emission of transmitter, valid up to valid up to 12.75 GHz	+/- 4 dB
Conducted emission of receivers	+/- 3 dB
Radiated emission of transmitter, valid up to12.75 GHz	+/- 6 dB
Radiated emission of receiver, valid up to12.75 GH	+/- 6 dB

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 C63.10 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 pre-selectors 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 1 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.*

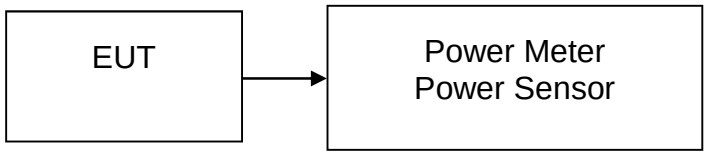
7. AS/NZS 4268 REQUIREMENTS

7.1 MAXIMUM EIRP

LIMIT

The effective radiated power shall be equal to or less than 4 W (36 dBm) e.i.r.p. This limit shall apply for any combination of power level and intended antenna assembly.

Test Configuration



TEST RESULTS

No non-compliance noted.

Test Data

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	5745	17.29	23.29	36.00	-12.71
			5785	17.01	23.01	36.00	-12.99
			5825	16.66	22.66	36.00	-13.34
0	Vmin	4.5	5745	17.94	23.94	36.00	-12.06
			5785	17.66	23.66	36.00	-12.34
			5825	17.31	23.31	36.00	-12.69
	Vmax	5.5	5745	17.95	***23.95**	36.00	-12.05
			5785	17.69	23.69	36.00	-12.31
			5825	17.32	23.32	36.00	-12.68
70	Vmin	4.5	5745	16.92	22.92	36.00	-13.08
			5785	16.64	22.64	36.00	-13.36
			5825	16.29	22.29	36.00	-13.71
	Vmax	5.5	5745	16.93	22.93	36.00	-13.07
			5785	16.65	22.65	36.00	-13.35
			5825	16.30	22.30	36.00	-13.70
Measurement uncertainty			**+ 0.28dB / - 0.30dB**				

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	5745	17.40	23.40	36.00	-12.60
			5785	16.56	22.56	36.00	-13.44
			5825	15.70	21.70	36.00	-14.30
0	Vmin	4.5	5745	18.15	24.15	36.00	-11.85
			5785	17.31	23.31	36.00	-12.69
			5825	16.45	22.45	36.00	-13.55
	Vmax	5.5	5745	18.16	***24.16**	36.00	-11.84
			5785	17.33	23.33	36.00	-12.67
			5825	16.46	22.46	36.00	-13.54
70	Vmin	4.5	5745	17.14	23.14	36.00	-12.86
			5785	16.30	22.30	36.00	-13.70
			5825	15.44	21.44	36.00	-14.56
	Vmax	5.5	5745	17.15	23.15	36.00	-12.85
			5785	16.31	22.31	36.00	-13.69
			5825	15.45	21.45	36.00	-14.55
Measurement uncertainty			**+ 0.28dB / - 0.30dB**				

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	5755	18.55	24.55	36.00	-11.45
			5795	17.92	23.92	36.00	-12.08
0	Vmin	4.5	5755	19.05	25.05	36.00	-10.95
			5795	18.25	24.25	36.00	-11.75
	Vmax	5.5	5755	19.06	***25.06**	36.00	-10.94
			5795	18.27	24.27	36.00	-11.73
70	Vmin	4.5	5755	17.74	23.74	36.00	-12.26
			5795	17.55	23.55	36.00	-12.45
	Vmax	5.5	5755	17.76	23.76	36.00	-12.24
			5795	17.56	23.56	36.00	-12.44
Measurement uncertainty			**+ 0.28dB / - 0.30dB**				

IEEE 802.11ac VHT80 MHz Mode:

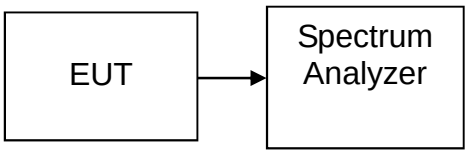
Antenna Gain =							6 dBi
TEST CONDITIONS				**TRANSMITTER POWER (dBm)**			
Temp (°C)	**Mode**	**Voltage (V)**	**Frequency (MHz)**	**Total Power**	**Mean EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**
25	Vnor	5	5755	18.10	24.10	36.00	-11.90
0	Vmin	4.5	5755	18.31	24.31	36.00	-11.69
	Vmax	5.5	5755	18.33	***24.33**	36.00	-11.67
70	Vmin	4.5	5755	17.10	23.10	36.00	-12.90
	Vmax	5.5	5755	17.12	23.12	36.00	-12.88
Measurement uncertainty			**+ 0.28dB / - 0.30dB**				

7.2 PEAK POWER SPECTRAL DENSITY

LIMIT

The radiated peak power spectral density in any 3 kHz is limited to 14 dBm per 3 kHz.

Test Configuration



TEST RESULTS

No non-compliance noted

IEEE802.11a Mode:

Antenna Gain = 6 dBi

Temperature (℃)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5745	12.10	14	-1.90
		5785	12.08	14	-1.92
		5825	11.19	14	-2.81

IEEE 802.11n HT 20 MHz Mode:

Antenna Gain = 6 dBi

Temperature (℃)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5745	12.03	14	-1.97
		5785	11.97	14	-2.03
		5825	10.11	14	-3.89

IEEE 802.11n HT 40 MHz Mode:

Antenna Gain = 6 dBi

Temperature (℃)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5755	10.69	14	-3.31
		5795	10.33	14	-3.67

IEEE 802.11ac VHT 80 MHz Mode:

Antenna Gain = 6 dBi

Temperature (℃)	Voltage (V)	Frequency (MHz)	Power Density EIRP (dBm/MHz)	Limit EIRP (dBm/MHz)	Margin (dB)
25	5	5755	6.78	14	-7.22

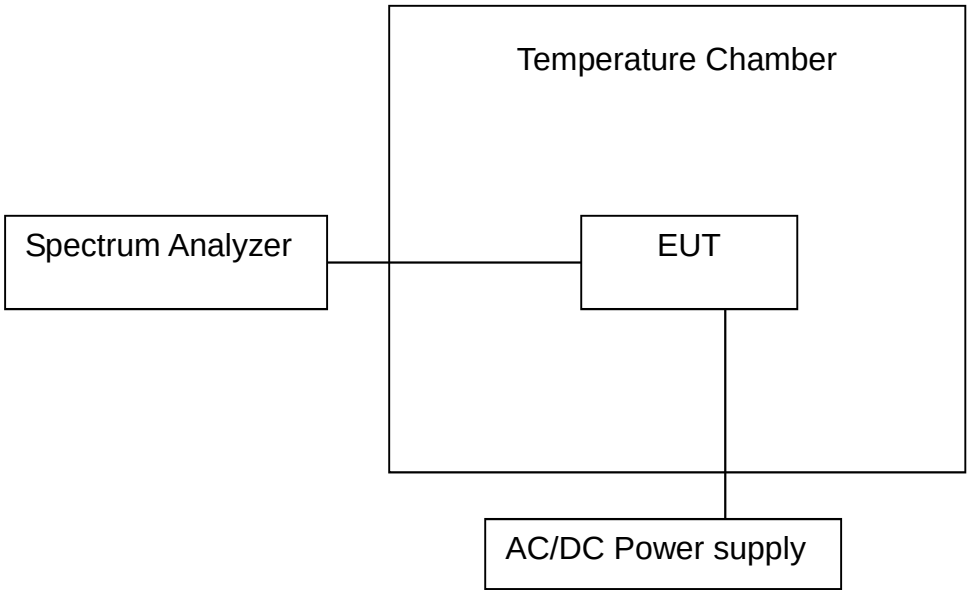
7.3 FREQUENCY RANGE

LIMIT

For all equipment the frequency shall lie within the band 5725~5850MHz (FL>5725 FH<5850)

Test Configuration

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



Test Results: PASS **Test Mode:** IEEE802.11a Mode

Tested By: Dally Hong **Test Date:** July 31, 2018

Test Condition			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 ℃	Vnor	5.0V	5726.1930	5848.3430
0 ℃	Vmin	4.5V	5726.6129	5847.2330
	Vmax	5.5V	5726.8530	5847.2630
70 ℃	Vmin	4.5V	5726.9129	5846.8730
	Vmax	5.5V	5726.8830	5846.8829
Measured frequencies (Lowest and Highest)			5726.1930	5846.8730
Limit			FL > 5725MHz	FH < 5850MHz

Test Results: PASS **Test Mode:** IEEE 802.11n HT 20 MHz Mode

Tested By: Dally Hong **Test Date:** July 31, 2018

Test Condition			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 ℃	Vnor	5.0V	5725.8630	5849.3629
0 ℃	Vmin	4.5V	5725.6230	5848.7630
	Vmax	5.5V	5725.6529	5848.7729
70 ℃	Vmin	4.5V	5725.3830	5848.8530
	Vmax	5.5V	5725.3629	5848.7930
Measured frequencies (Lowest and Highest)			5725.3629	5848.7630
Limit			FL > 5725MHz	FH < 5850MHz

Test Results: PASS **Test Mode:** IEEE 802.11n HT 40 MHz Mode

Tested By: Dally Hong **Test Date:** July 31, 2018

Test Condition			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 ℃	Vnor	5.0V	5726.2830	5838.6829
0 ℃	Vmin	4.5V	5726.1230	5838.6829
	Vmax	5.5V	5726.1329	5838.7630
70 ℃	Vmin	4.5V	5725.9630	5732.6029
	Vmax	5.5V	5725.9429	5732.7030
Measured frequencies (Lowest and Highest)			5725.9429	5732.6029
Limit			FL > 5725MHz	FH < 5850MHz

Test Results: PASS **Test Mode:** IEEE 802.11ac VHT 80 MHz Mode

Tested By: Dally Hong **Test Date:** July 31, 2018

Test Condition			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 ℃	Vnor	5.0V	5730.9029	5835.6028
0 ℃	Vmin	4.5V	5729.4303	5825.4288
	Vmax	5.5V	5731.4305	5829.4284
70 ℃	Vmin	4.5V	5736.4835	5813.8571
	Vmax	5.5V	5736.5189	5814.6517
Measured frequencies (Lowest and Highest)			5729.4303	5813.8571
Limit			FL > 5725MHz	FH < 5850MHz

7.4 TRANSIMITTER SPURIOUS EMISSIONS

DEFINITION

Spurious emissions are emissions at frequencies, other than those of the carrier and sidebands associated with normal modulation. The level of spurious emissions shall be measured as either:

a)

i) their power level in a specified load (conducted emission); and

ii) their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation);

b) their effective radiated power when radiated by the cabinet and the integral or dedicated antenna, in the case of equipment fitted with such an antenna and no permanent RF connector.

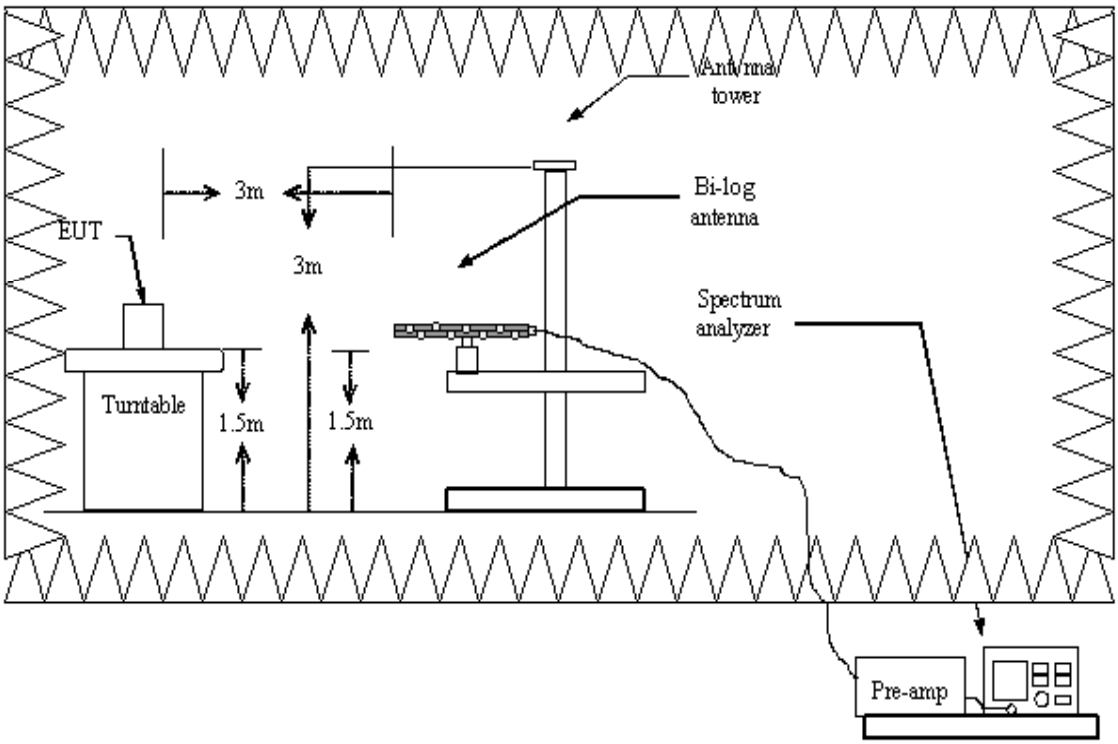
LIMIT

The power of any spurious emission shall not exceed the following values given in table:

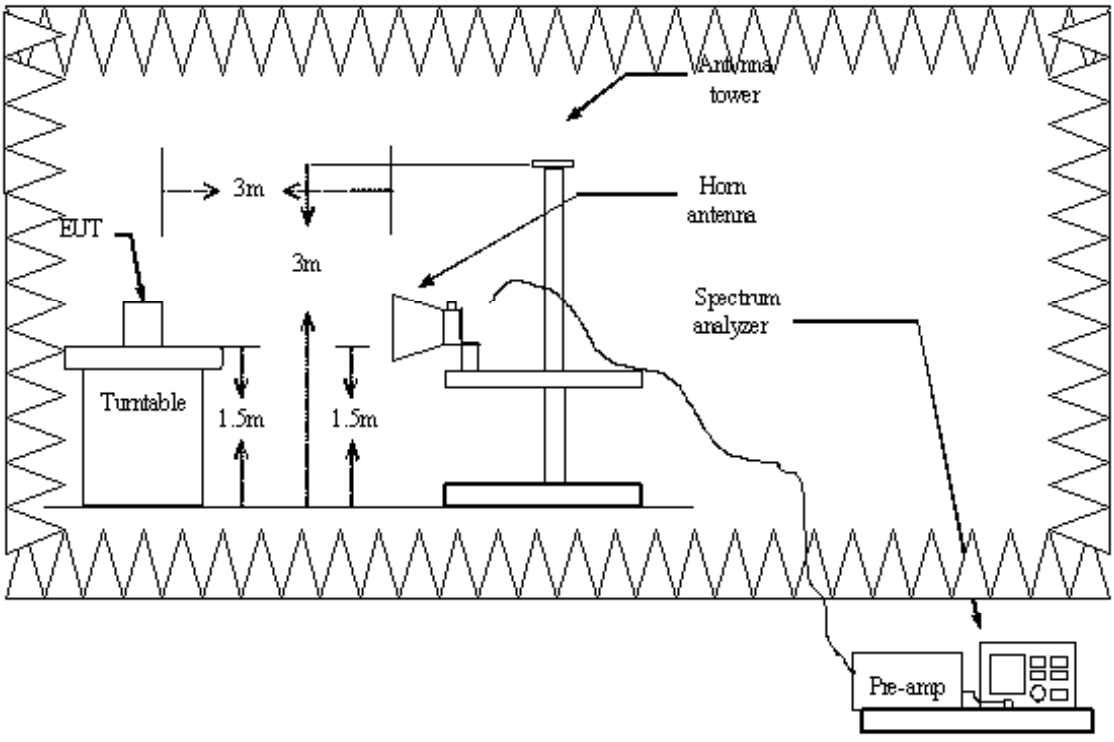
Radiated spurious emissions			
State	**47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz**	**Other frequencies ≦ 1000 MHz**	**Frequencies ＞ 1000 MHz**
Operating	4 nW -54dBm	250 nW -36 dBm	1 μW -30dBm
Standby	2 nW -57dBm	2 nW -57dBm	20 nW -47dBm

Test Configuration

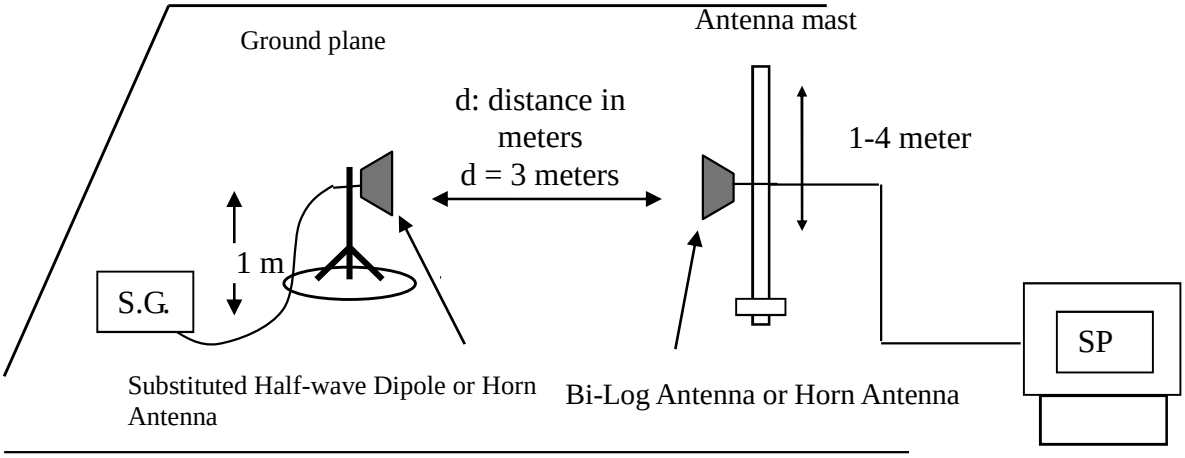
Below 1GHz



Above 1GHz



Substituted Method Test Set-up



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5.1 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.3.5.3.2for the measurement method.

TEST RESULTS

No non-compliance noted

For FPC Antenna

Below 1GHz

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **Relative humidity:** 42 % RH **Date:** August 7, 2018

Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
250.1900	-60.38	-8.51	-68.89	-36.00	-32.89	V
441.7650	-68.28	-2.82	-71.10	-36.00	-35.10	V
499.9650	-64.80	-1.65	-66.45	-54.00	-12.45	V
625.0950	-66.20	-0.07	-66.27	-54.00	-12.27	V
750.2250	-61.07	2.11	-58.96	-54.00	-4.96	V
874.8700	-68.16	4.03	-64.13	-36.00	-28.13	V
250.1900	-57.85	-8.51	-66.36	-36.00	-30.36	H
374.8350	-70.79	-4.83	-75.62	-36.00	-39.62	H
499.9650	-64.65	-1.65	-66.30	-54.00	-12.30	H
625.0950	-68.48	-0.07	-68.55	-54.00	-14.55	H
750.2250	-65.76	2.11	-63.65	-54.00	-9.65	H
874.8700	-70.97	4.03	-66.94	-36.00	-30.94	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
IEEE 802.11a mode:

Test Mode: TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11490.000	-43.59	2.28	-41.31	-30.00	-11.31	V
17235.000	-56.91	9.00	-47.91	-30.00	-17.91	V
N/A						
11490.000	-43.10	2.28	-40.82	-30.00	-10.82	H
17235.000	-56.95	9.00	-47.95	-30.00	-17.95	H
N/A						

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11570.000	-49.31	2.23	-47.08	-30.00	-17.08	V
17355.000	-56.52	9.80	-46.72	-30.00	-16.72	V
N/A						
11570.000	-45.93	2.23	-43.70	-30.00	-13.70	H
17355.000	-57.52	9.80	-47.72	-30.00	-17.72	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11650.000	-56.06	2.16	-53.90	-30.00	-23.90	V
17475.000	-55.81	10.58	-45.23	-30.00	-15.23	V
N/A						
11650.000	-50.18	2.16	-48.02	-30.00	-18.02	H
17475.000	-56.62	10.58	-46.04	-30.00	-16.04	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

IEEE 802.11n HT 20 mode:

Test Mode: TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11490.000	-44.48	2.28	-42.20	-30.00	-12.20	V
17235.000	-56.96	9.00	-47.96	-30.00	-17.96	V
N/A						
11490.000	-43.14	2.28	-40.86	-30.00	-10.86	H
17235.000	-57.29	9.00	-48.29	-30.00	-18.29	H
N/A						

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11570.000	-51.62	2.23	-49.39	-30.00	-19.39	V
17235.000	-56.46	9.00	-47.46	-30.00	-17.46	V
N/A						
11570.000	-49.14	2.23	-46.91	-30.00	-16.91	H
17355.000	-56.54	9.80	-46.74	-30.00	-16.74	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11650.000	-56.77	2.16	-54.61	-30.00	-24.61	V
17475.000	-56.30	10.58	-45.72	-30.00	-15.72	V
N/A						
11650.000	-49.38	2.16	-47.22	-30.00	-17.22	H
17475.000	-56.63	10.58	-46.05	-30.00	-16.05	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

IEEE 802.11n HT 40 mode:

Test Mode: TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11510.000	-49.38	2.30	-47.08	-30.00	-17.08	V
17265.000	-57.40	9.20	-48.20	-30.00	-18.20	V
N/A						
11510.000	-47.29	2.30	-44.99	-30.00	-14.99	H
17265.000	-57.42	9.20	-48.22	-30.00	-18.22	H
N/A						

Test Mode: TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11590.000	-54.98	2.21	-52.77	-30.00	-22.77	V
17385.000	-57.02	9.99	-47.03	-30.00	-17.03	V
N/A						
11590.000	-50.21	2.21	-48.00	-30.00	-18.00	H
17385.000	-56.59	9.99	-46.60	-30.00	-16.60	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

IEEE 802.11ac VHT 80 mode:

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11500.000	-50.36	2.30	-48.06	-30.00	-18.06	V
17325.000	-56.26	9.59	-46.67	-30.00	-16.67	V
N/A						
11510.000	-48.37	2.30	-46.07	-30.00	-16.07	H
17325.000	-56.37	9.59	-46.78	-30.00	-16.78	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

For Dipole Antenna

Below 1GHz

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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	-60.01	-8.51	-68.52	-36.00	-32.52	V
374.8350	-61.36	-4.83	-66.19	-36.00	-30.19	V
499.9650	-60.64	-1.65	-62.29	-54.00	-8.29	V
625.0950	-65.00	-0.07	-65.07	-54.00	-11.07	V
750.2250	-63.60	2.11	-61.49	-54.00	-7.49	V
874.8700	-64.76	4.03	-60.73	-36.00	-24.73	V
125.0600	-56.13	-6.38	-62.51	-36.00	-26.51	H
250.1900	-54.47	-8.51	-62.98	-36.00	-26.98	H
499.9650	-59.72	-1.65	-61.37	-54.00	-7.37	H
625.0950	-65.68	-0.07	-65.75	-54.00	-11.75	H
750.2250	-63.45	2.11	-61.34	-54.00	-7.34	H
895.7250	-61.99	4.44	-57.55	-36.00	-21.55	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
IEEE 802.11a mode:

Test Mode: TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11485.000	-49.67	2.27	-47.40	-30.00	-17.40	V
17235.000	-56.71	9.00	-47.71	-30.00	-17.71	V
N/A						
11490.000	-45.15	2.28	-42.87	-30.00	-12.87	H
15540.000	-56.42	3.77	-52.65	-30.00	-22.65	H
N/A						

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11570.000	-55.75	2.23	-53.52	-30.00	-23.52	V
17355.000	-57.09	9.80	-47.29	-30.00	-17.29	V
N/A						
11570.000	-53.53	2.23	-51.30	-30.00	-21.30	H
17355.000	-56.17	9.80	-46.37	-30.00	-16.37	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11650.000	-56.90	2.16	-54.74	-30.00	-24.74	V
17475.000	-56.21	10.58	-45.63	-30.00	-15.63	V
N/A						
11650.000	-56.56	2.16	-54.40	-30.00	-24.40	H
17475.000	-56.49	10.58	-45.91	-30.00	-15.91	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

IEEE 802.11n HT 20 mode:

Test Mode: TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11485.000	-48.86	2.27	-46.59	-30.00	-16.59	V
17235.000	-56.43	9.00	-47.43	-30.00	-17.43	V
N/A						
11485.000	-45.93	2.27	-43.66	-30.00	-13.66	H
17235.000	-57.02	9.00	-48.02	-30.00	-18.02	H
N/A						

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11570.000	-55.46	2.23	-53.23	-30.00	-23.23	V
17355.000	-56.61	9.80	-46.81	-30.00	-16.81	V
N/A						
11570.000	-54.32	2.23	-52.09	-30.00	-22.09	H
17355.000	-56.85	9.80	-47.05	-30.00	-17.05	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

Test Mode: TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11650.000	-57.02	2.16	-54.86	-30.00	-24.86	V
16535.000	-54.19	7.23	-46.96	-30.00	-16.96	V
17475.000	-56.93	10.58	-46.35	-30.00	-16.35	V
N/A						
11650.000	-54.87	2.16	-52.71	-30.00	-22.71	H
17475.000	-56.45	10.58	-45.87	-30.00	-15.87	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

IEEE 802.11n HT 40 mode:

Test Mode: TX (CH Low) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11505.000	-52.19	2.29	-49.90	-30.00	-19.90	V
17385.000	-57.00	9.99	-47.01	-30.00	-17.01	V
N/A						
11485.000	-50.60	2.27	-48.33	-30.00	-18.33	H
17265.000	-55.90	9.20	-46.70	-30.00	-16.70	H
N/A						

Test Mode: TX (CH High) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11590.000	-56.35	2.21	-54.14	-30.00	-24.14	V
17385.000	-56.72	9.99	-46.73	-30.00	-16.73	V
N/A						
11590.000	-56.45	2.21	-54.24	-30.00	-24.24	H
17385.000	-55.92	9.99	-45.93	-30.00	-15.93	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

IEEE 802.11ac VHT 80 mode:

Test Mode: TX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
11550.000	-56.37	2.25	-54.12	-30.00	-24.12	V
17325.000	-56.26	9.59	-46.67	-30.00	-16.67	V
N/A						
11485.000	-52.57	2.27	-50.30	-30.00	-20.30	H
17325.000	-56.55	9.59	-46.96	-30.00	-16.96	H
N/A						

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

7.5 RECEIVER SPURIOUS EMISSIONS

LIMIT

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

Mode	25 MHz - 1 GHz	Above1 GHz
Operating	2 nW -57dBm	20nW -47dBm

Remark: *The limits are applicable to all receiver classes.*

Test Configuration

Radiated Spurious Emissions:
(Same as section 7.3 in this test report)

TEST RESULTS

No non-compliance noted

For FPC Antenna

Below 1 GHz

Test Mode: RX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
288.9900	-67.15	-6.60	-73.75	-57.00	-16.75	V
441.7650	-69.04	-2.82	-71.86	-57.00	-14.86	V
499.9650	-71.22	-1.65	-72.87	-57.00	-15.87	V
625.0950	-66.53	-0.07	-66.60	-57.00	-9.60	V
750.2250	-63.96	2.11	-61.85	-57.00	-4.85	V
899.1200	-69.34	4.52	-64.82	-57.00	-7.82	V
125.0600	-62.30	-6.38	-68.68	-57.00	-11.68	H
250.1900	-57.65	-8.51	-66.16	-57.00	-9.16	H
499.9650	-63.69	-1.65	-65.34	-57.00	-8.34	H
625.0950	-68.56	-0.07	-68.63	-57.00	-11.63	H
750.2250	-65.29	2.11	-63.18	-57.00	-6.18	H
874.8700	-70.49	4.03	-66.46	-57.00	-9.46	H

Above 1GHz

Test Mode: RX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
2239.000	-38.03	-19.52	-57.55	-47.00	-10.55	V
3194.500	-36.18	-17.41	-53.59	-47.00	-6.59	V
N/A						
1500.500	-37.78	-22.21	-59.99	-47.00	-12.99	H
3194.500	-44.41	-17.41	-61.82	-47.00	-14.82	H
N/A						

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.*

For Dipole Antenna

Below 1 GHz

Test Mode: RX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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	-60.44	-6.38	-66.82	-57.00	-9.82	V
374.8350	-62.00	-4.83	-66.83	-57.00	-9.83	V
499.9650	-64.20	-1.65	-65.85	-57.00	-8.85	V
625.0950	-65.26	-0.07	-65.33	-57.00	-8.33	V
750.2250	-63.58	2.11	-61.47	-57.00	-4.47	V
874.8700	-67.72	4.03	-63.69	-57.00	-6.69	V
250.1900	-56.62	-8.51	-65.13	-57.00	-8.13	H
374.8350	-63.71	-4.83	-68.54	-57.00	-11.54	H
499.9650	-58.76	-1.65	-60.41	-57.00	-3.41	H
625.0950	-65.79	-0.07	-65.86	-57.00	-8.86	H
750.2250	-65.16	2.11	-63.05	-57.00	-6.05	H
874.8700	-67.27	4.03	-63.24	-57.00	-6.24	H

Above 1GHz

Test Mode: RX (CH Mid) **Tested by:** Jerry Chuang

Ambient temperature: 22℃ **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)
1374.500	-37.24	-22.66	-59.90	-47.00	-12.90	V
3198.000	-45.41	-17.41	-62.82	-47.00	-15.82	V
N/A						
1126.000	-35.87	-23.54	-59.41	-47.00	-12.41	H
5441.500	-49.82	-9.28	-59.10	-47.00	-12.10	H
N/A						

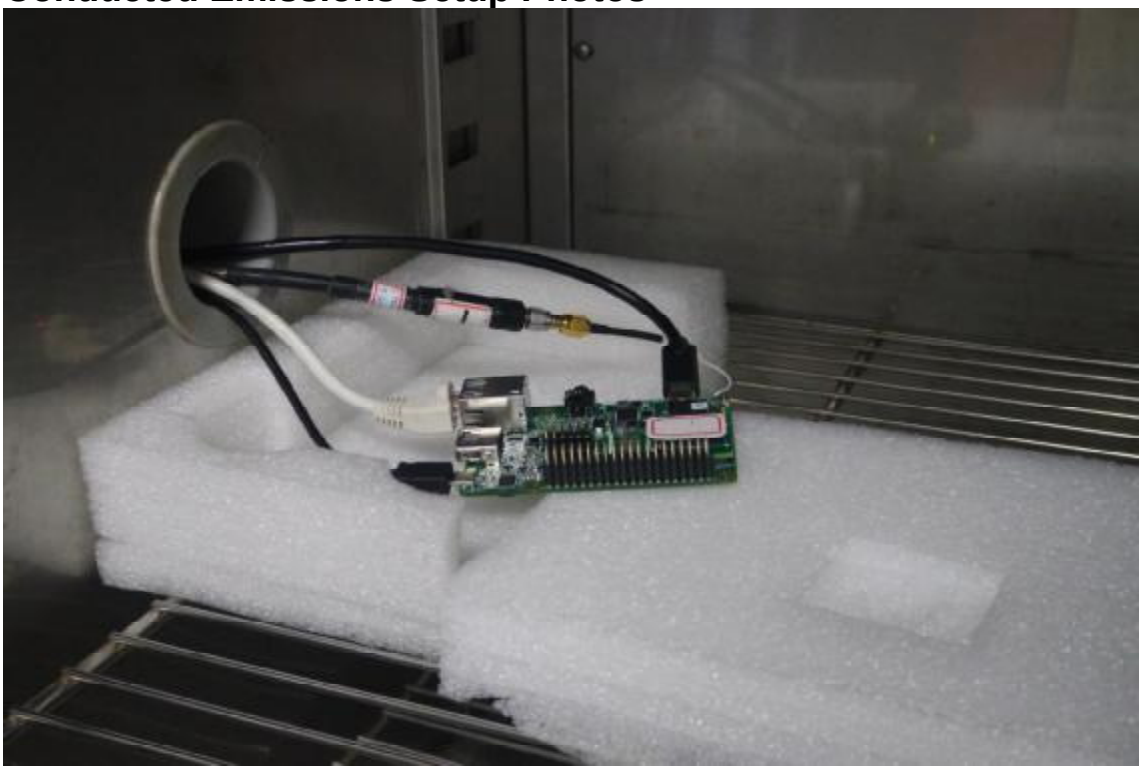
Remark:

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.*

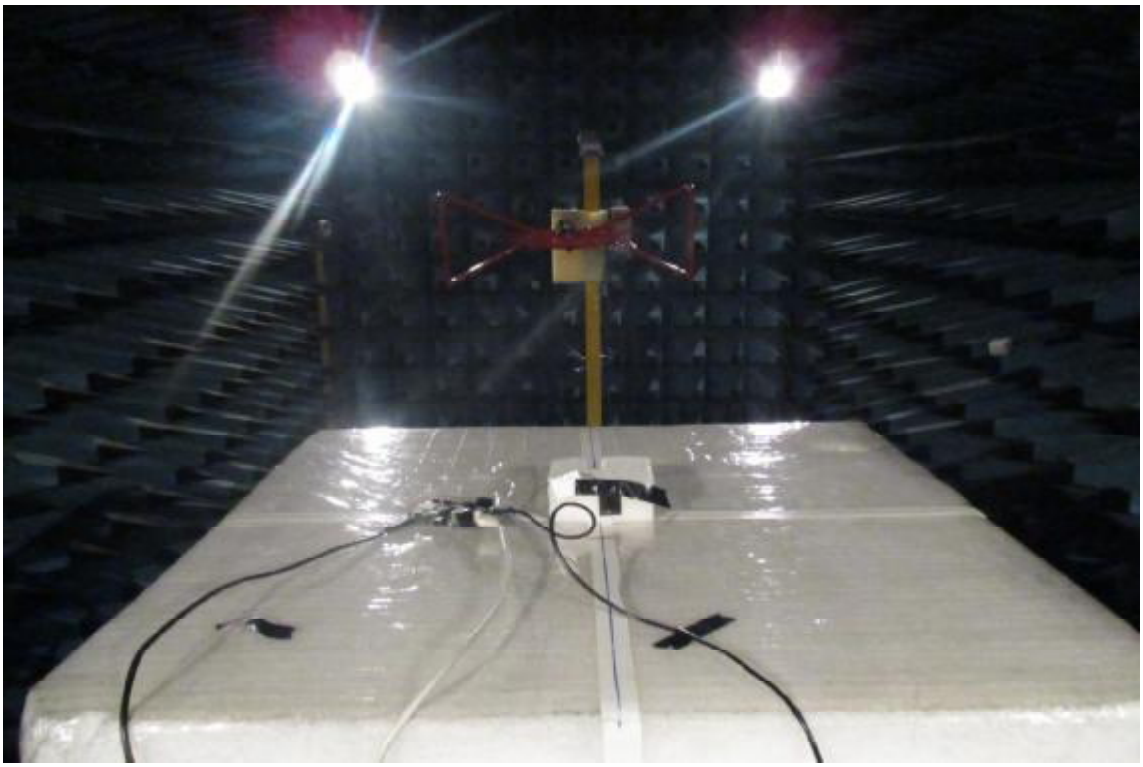
-- End of Test Report –

APPENDIX A PHOTOGRAPHS OF TEST SETUP

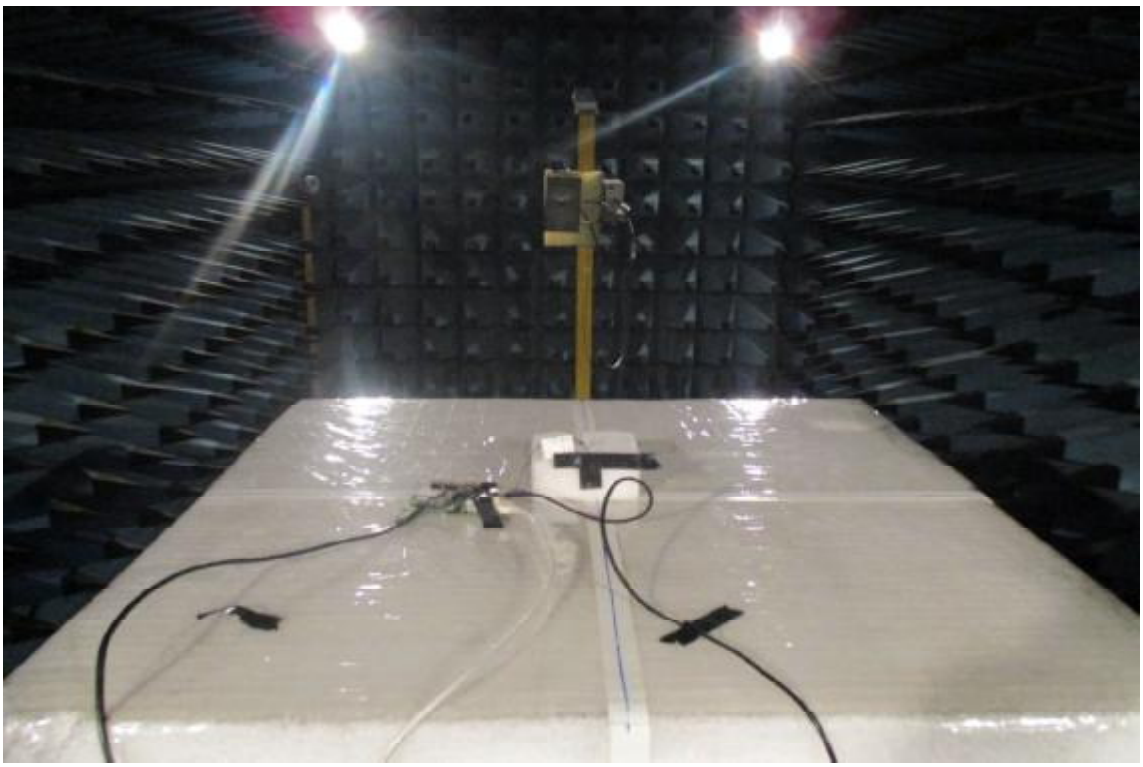
Conducted Emissions Setup Photos



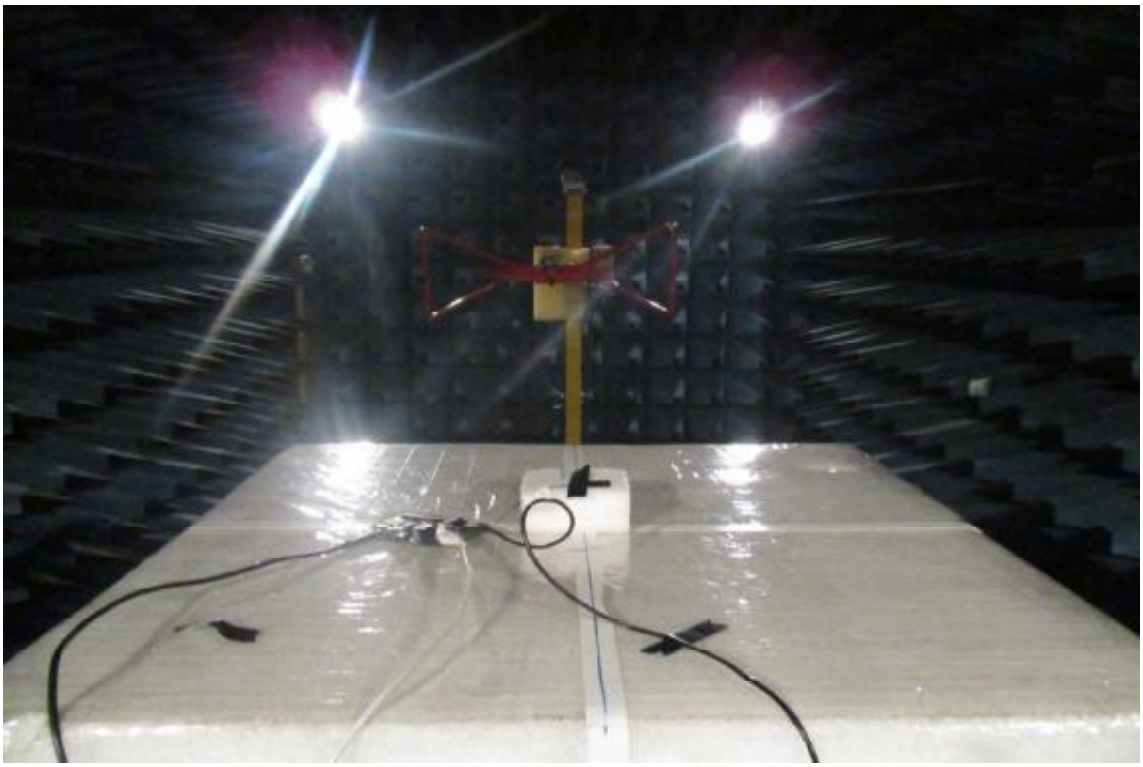
RADIATED EMISSION SETUP PHOTOS
For FPC Antenna
Below 1GHz



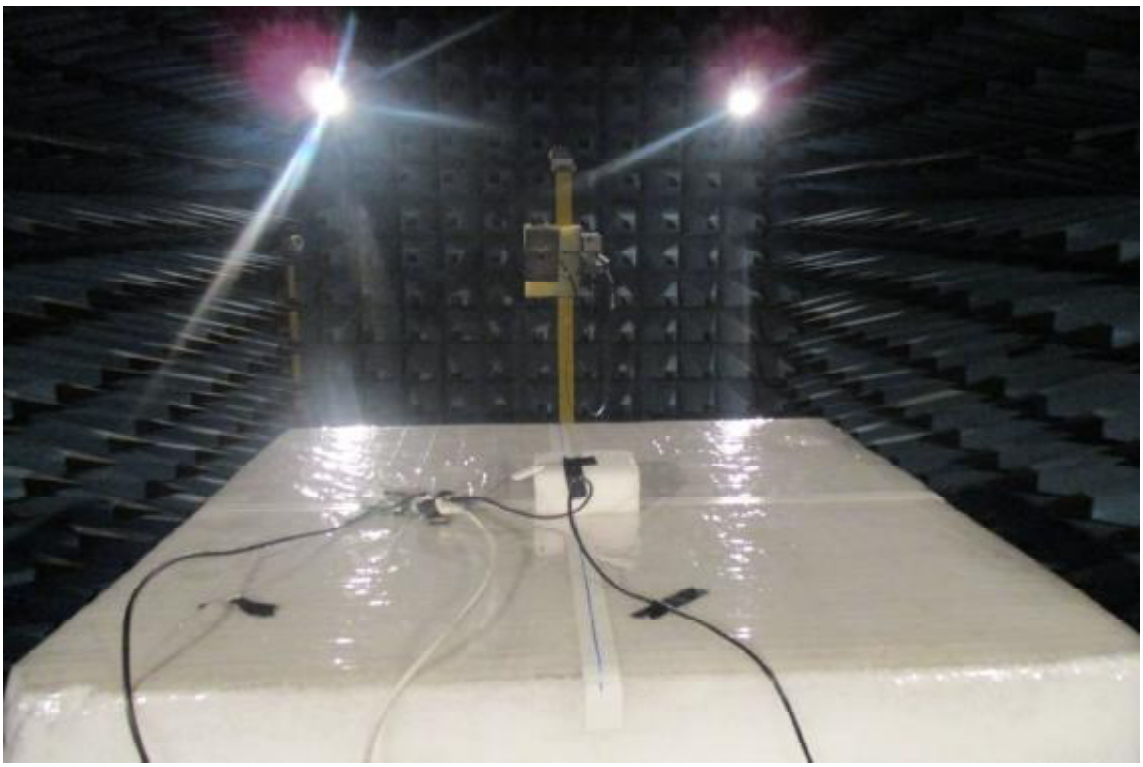
Above 1GHz



For Dipole Antenna
Below 1GHz

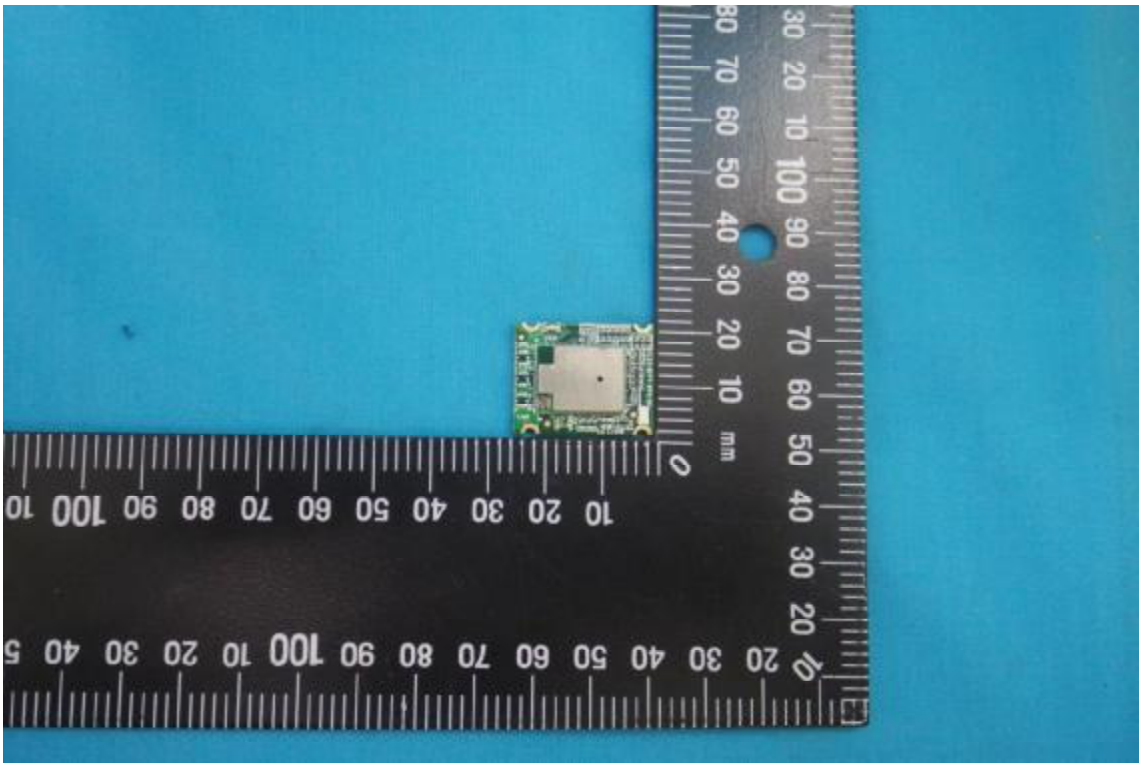


Above 1GHz

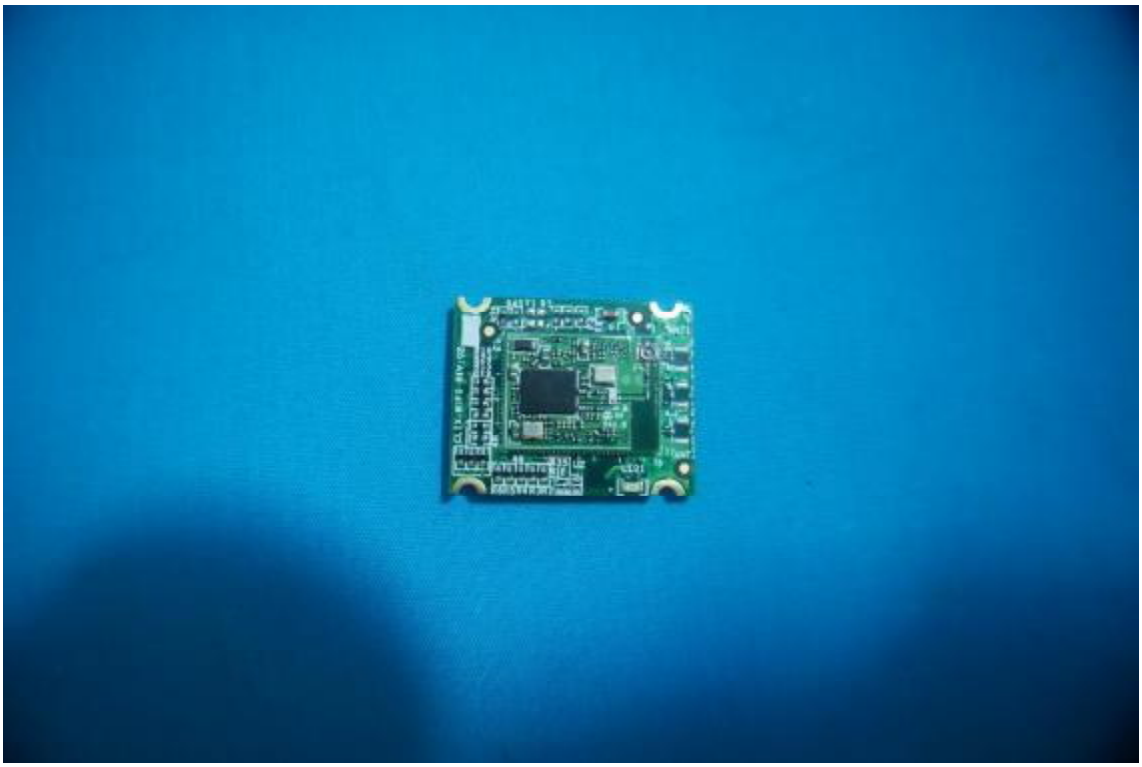


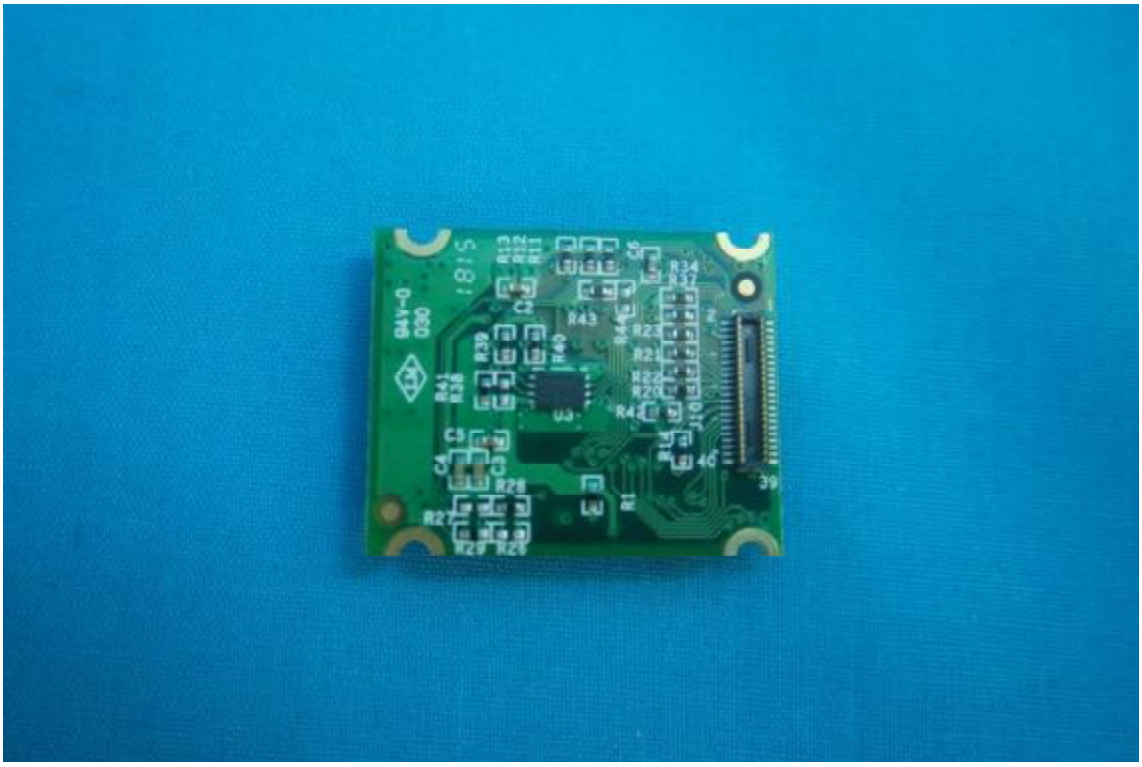
APPENDIX 1 - PHOTOGRAPHS OF EUT

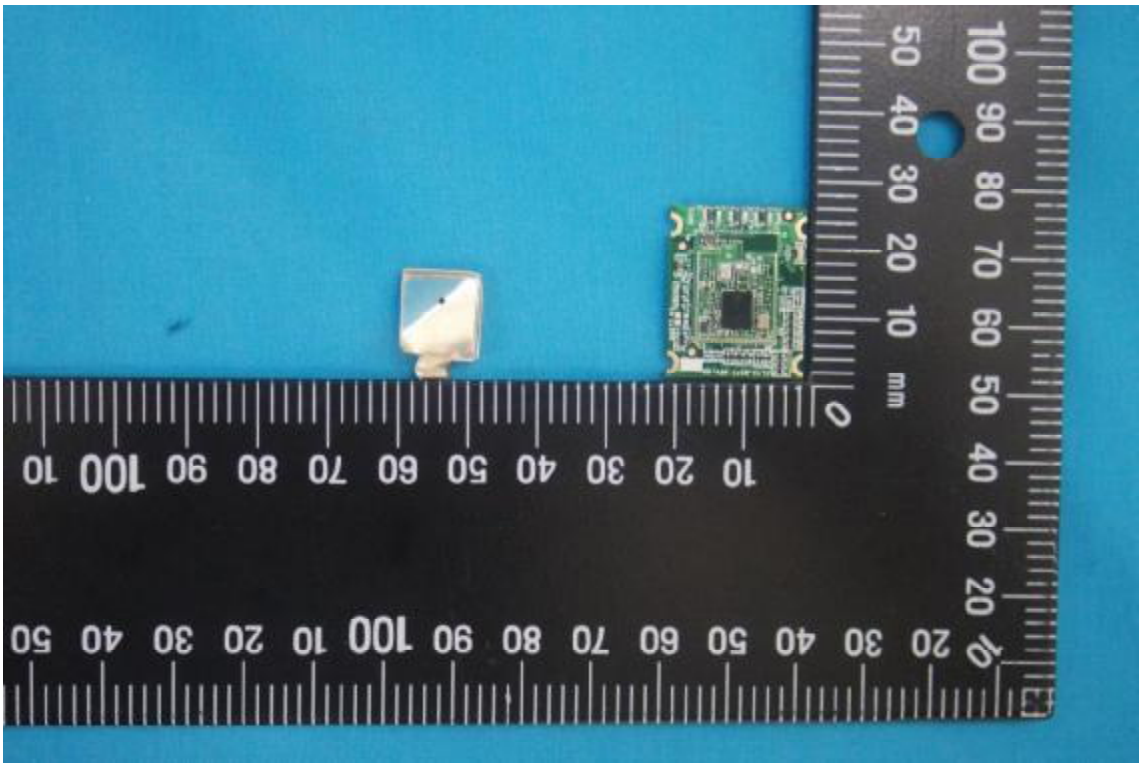
EXTERNAL PHOTOGRAPHS OF EUT



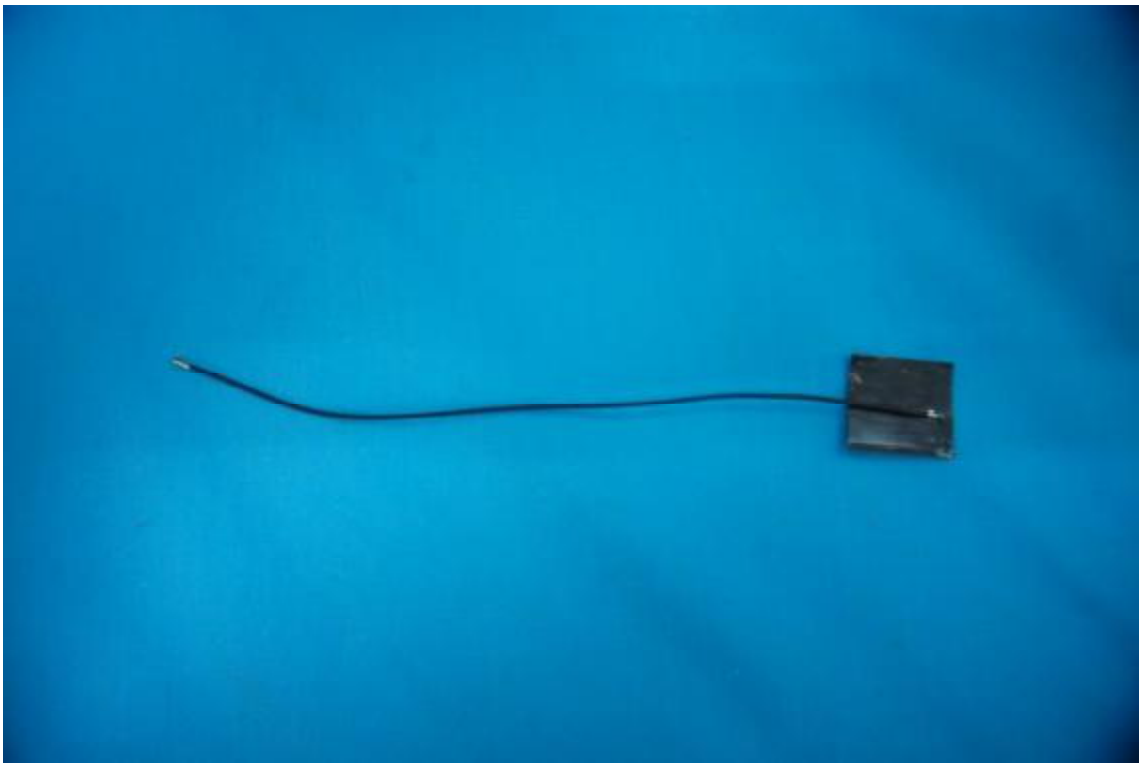
INTERNAL PHOTOGRAPHS OF EUT

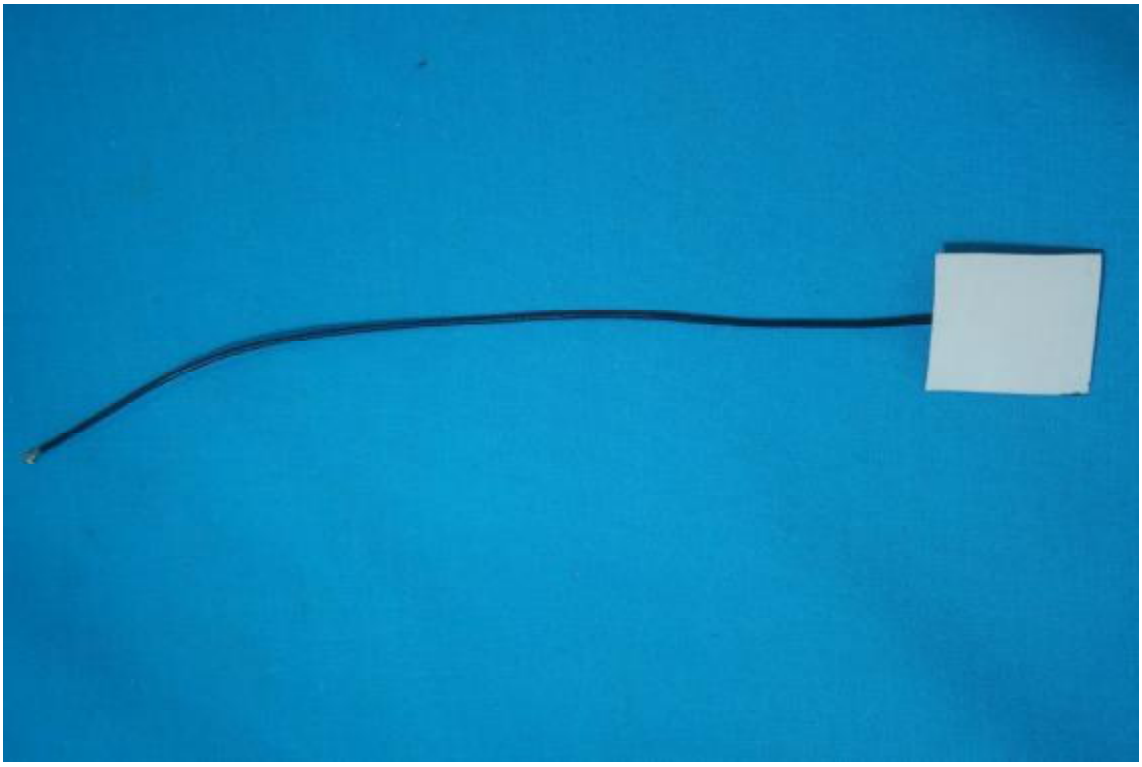


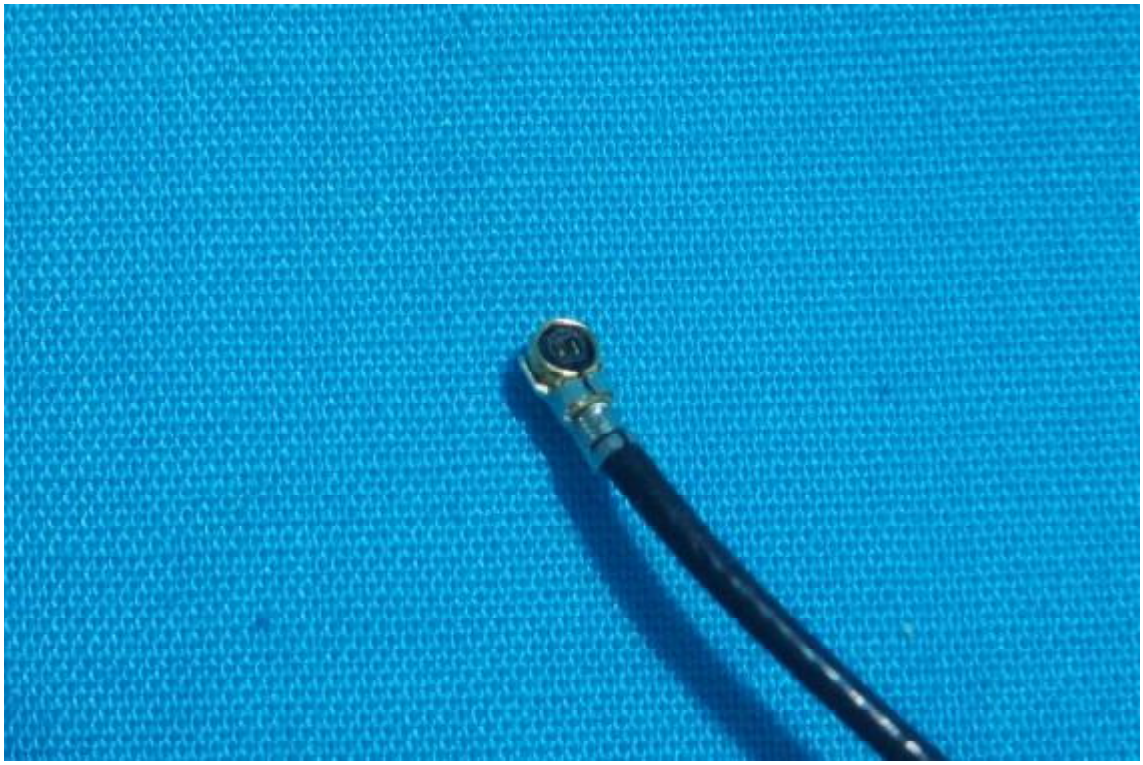




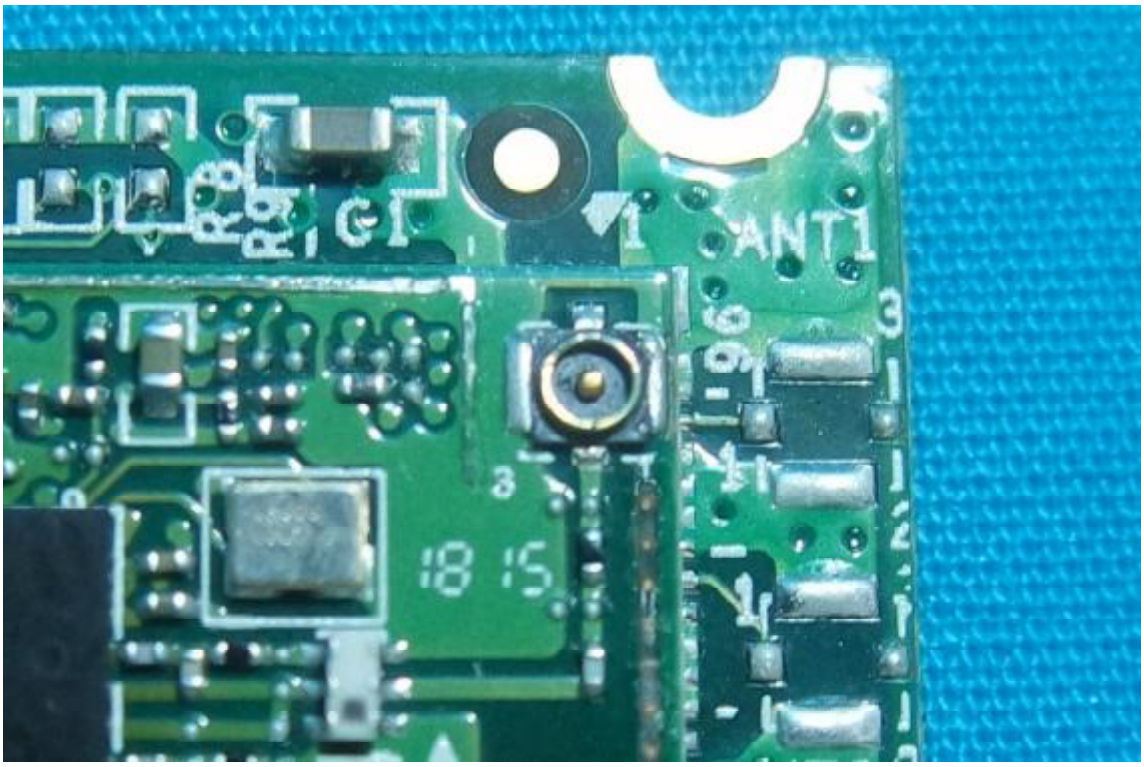
FPC Antenna

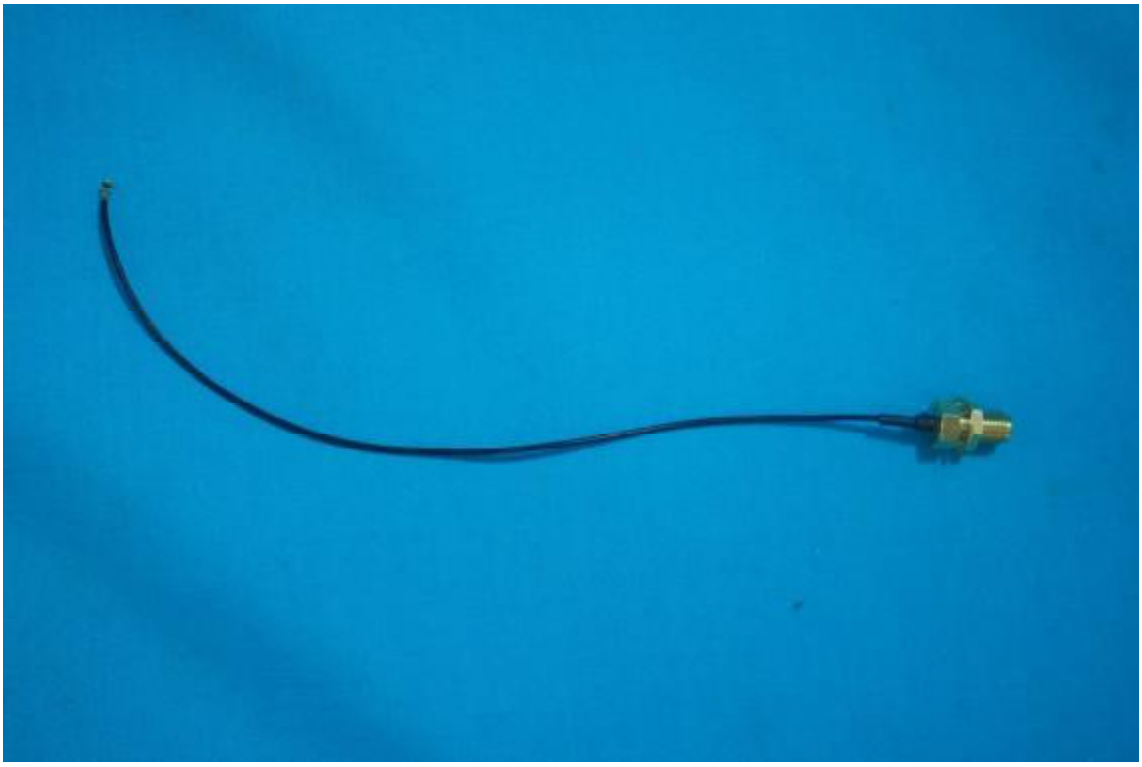


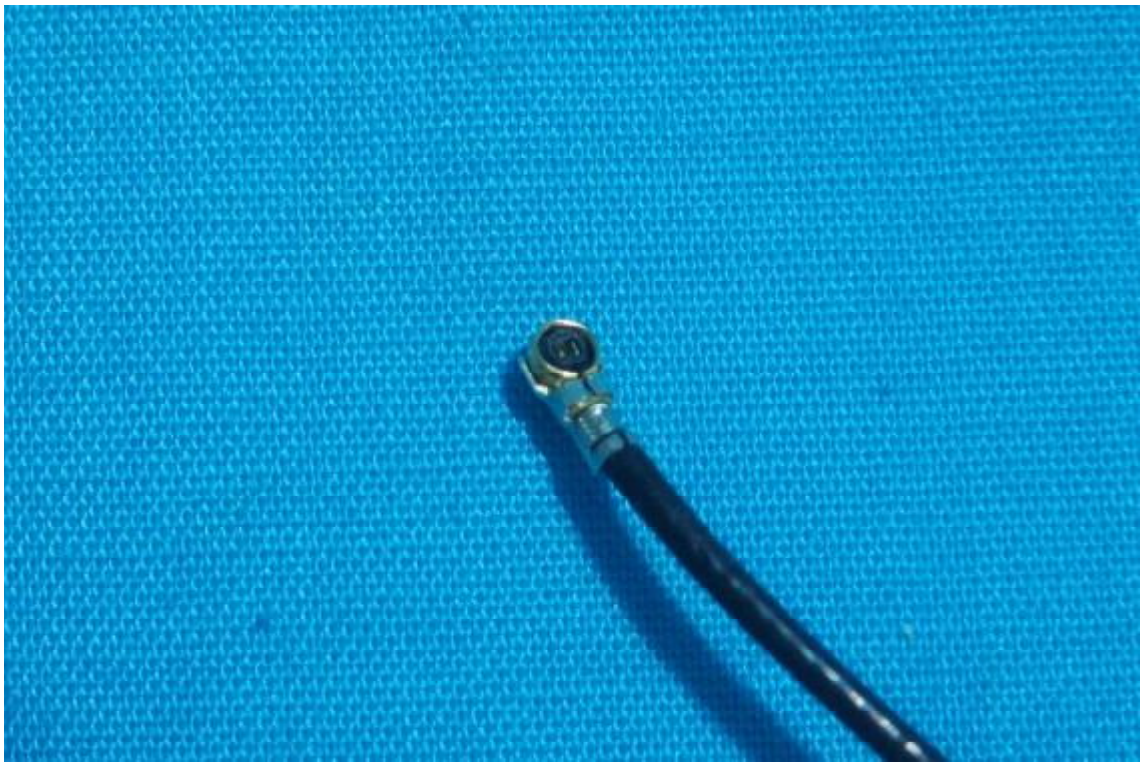




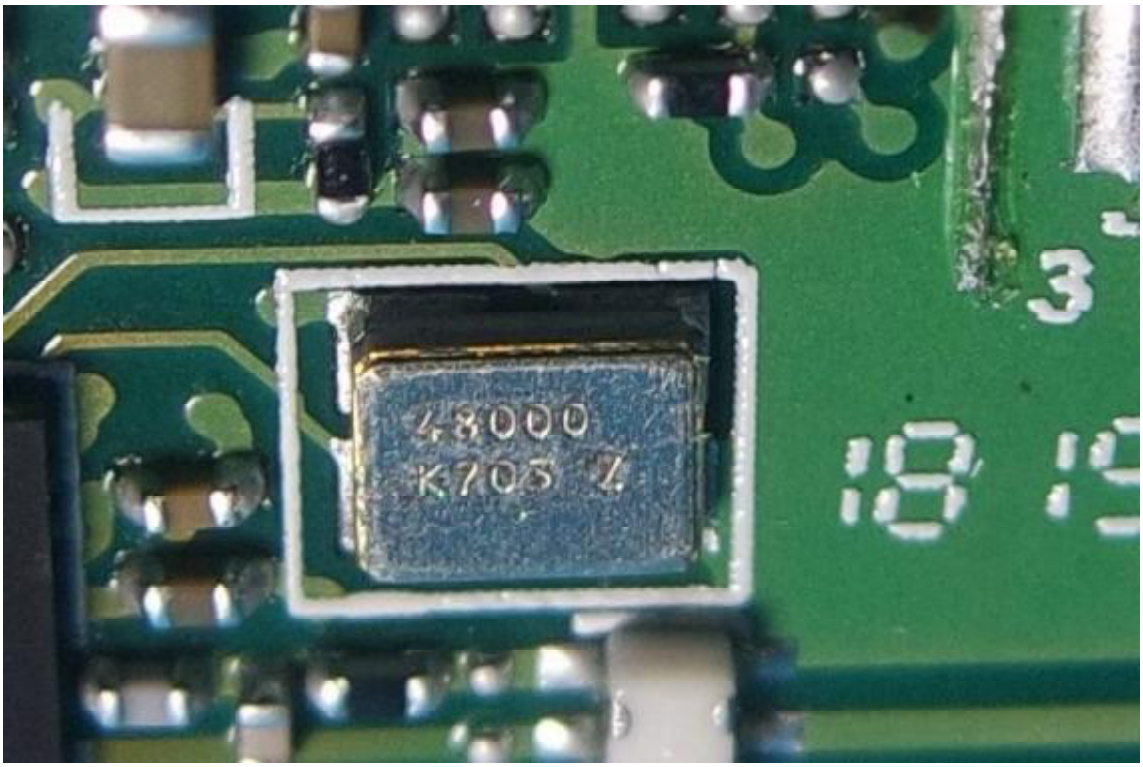
Dipole Antenna

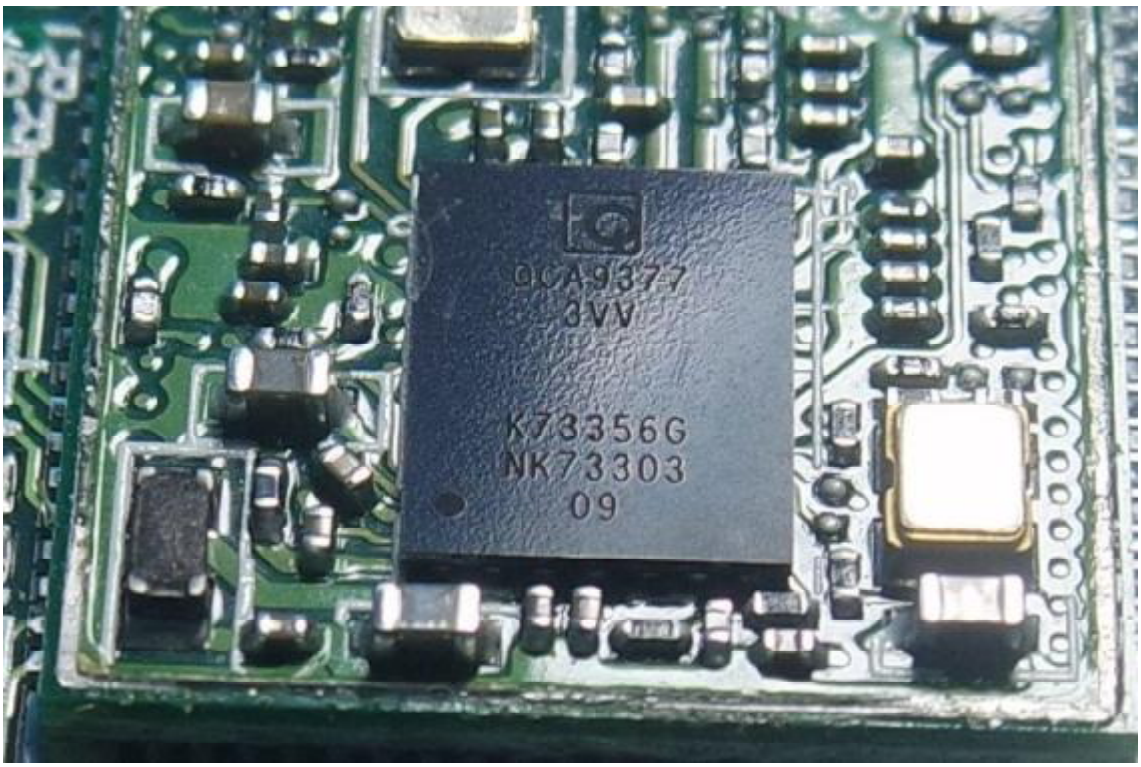






Crystal & Module





CE

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

Sam Hu / Assistant Manager
Date: August 24, 2018

CCSRF
程智科技股份有限公司
Compliance Certification Services inc.

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

Revision History

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

TABLE OF CONTENTS

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:

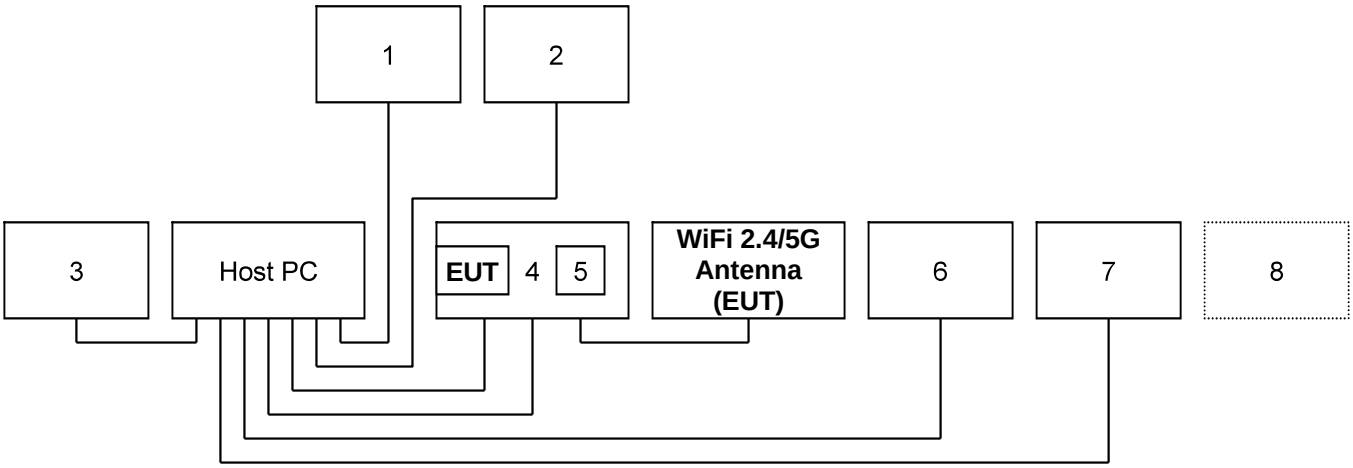
No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name
1	HDD	DT01ACA100	N/A	N/A	TOSHIBA
2	CPU (Socket FCLGA1151 / 3.5GHz)	i5-6600K	N/A	N/A	INTEL
3	RAM (DDR4 2666)	N/A	N/A	N/A	Samsung
4	Graphic card	GTX980	N/A	N/A	NVIDIA
5	Power Supply	DPS-600WB B	N/A	N/A	DELTA
6	Motherboard	IPM17-TP	N/A	N/A	HP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

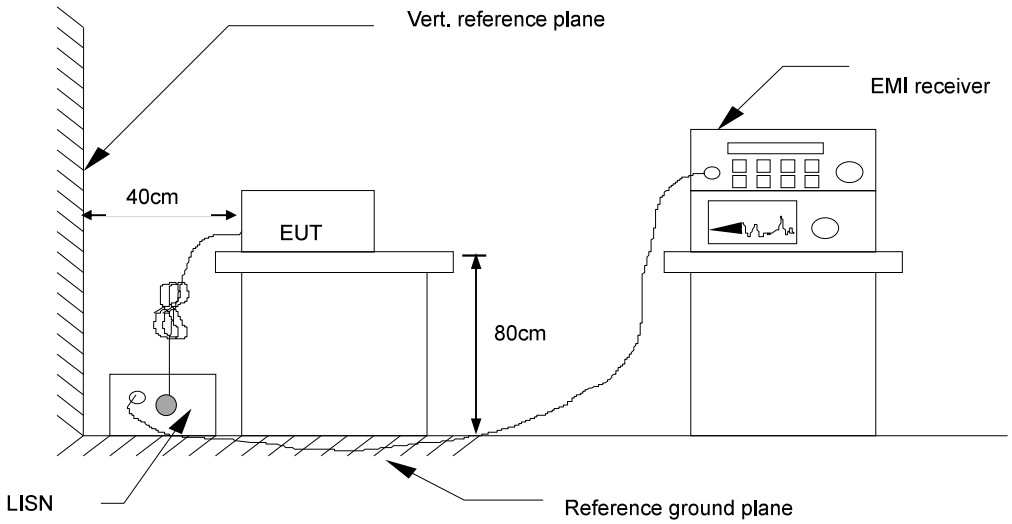
Procedure of Preliminary Test

- 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

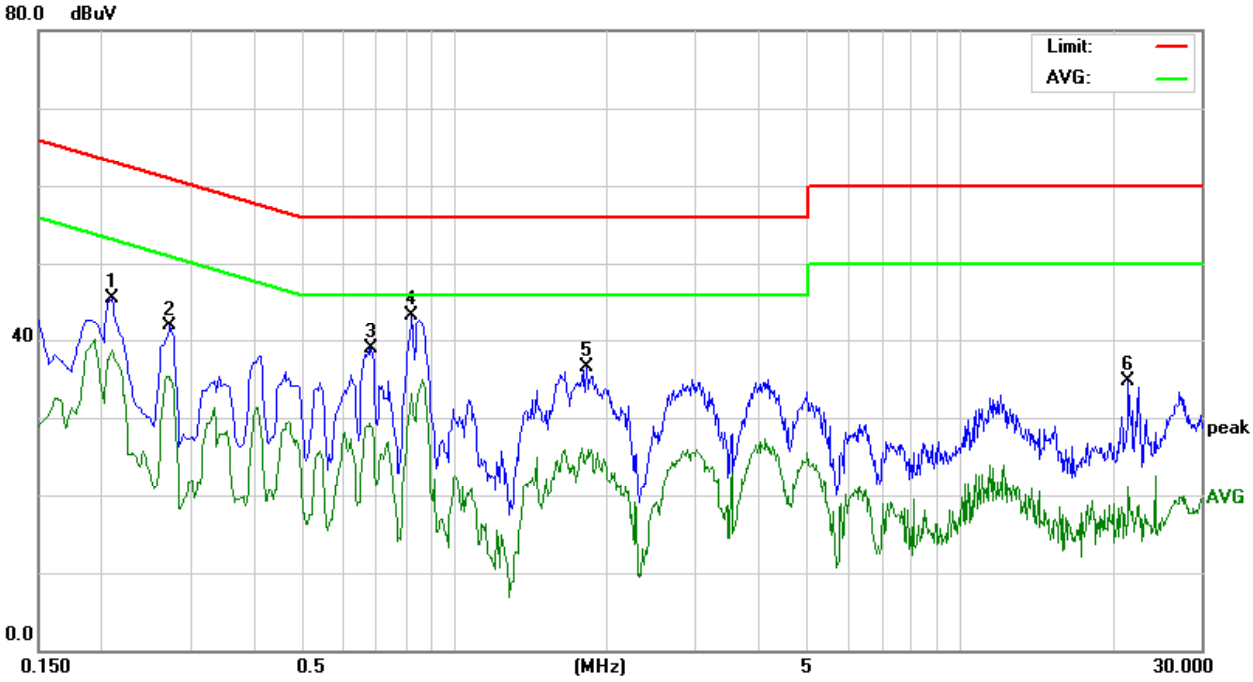
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
L1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

Calculation Formula

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

7.1.6. TEST RESULTS

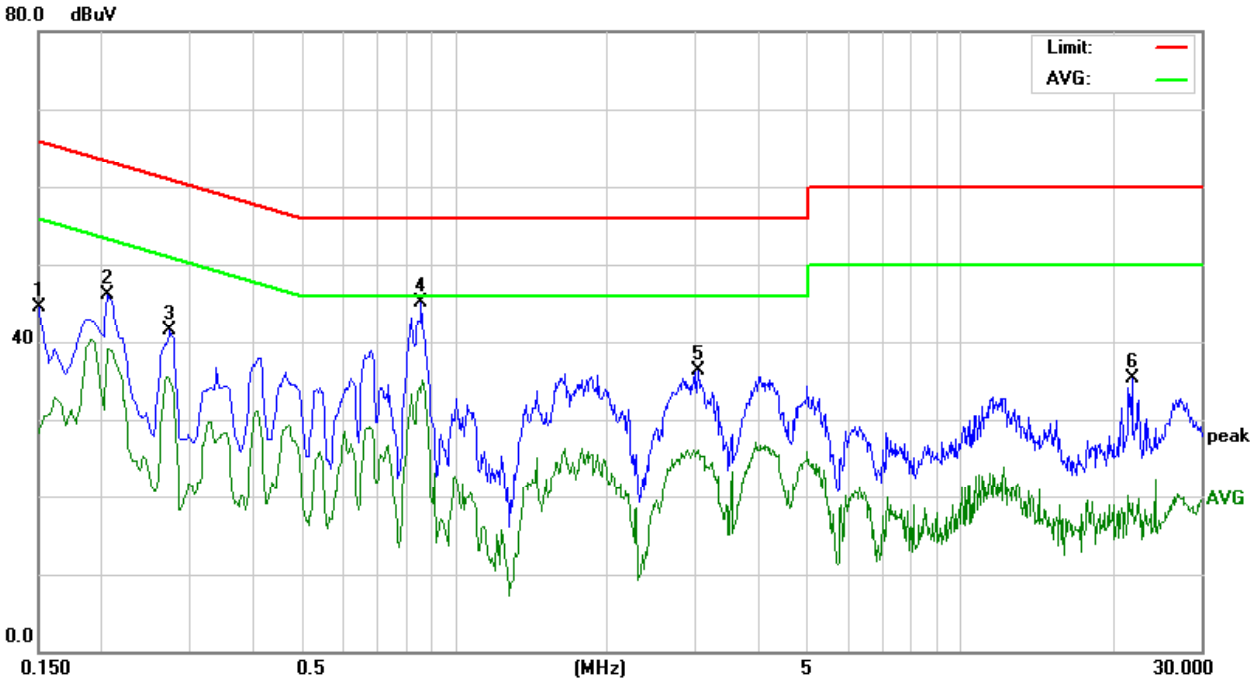
Model No.	PIXI-9377	6dB Bandwidth	9 kHz
Environmental Conditions	26°C, 53% RH	Test Mode	Mode 1
Tested by	Alee Shen	Phase	L1
Standard	EN 55032 CLASS B		



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)

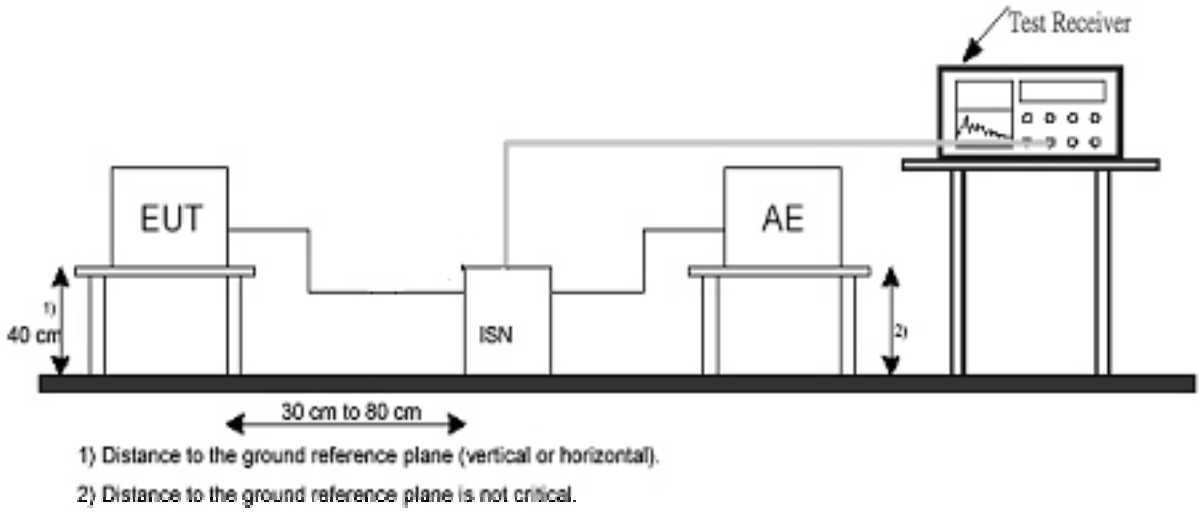
- Selecting AAN for unscreened cable or a current probe for screened cable to take measurement.
- The port of the EUT was connected to the remote side support equipment through the AAN/Current Probe and communication in normal condition.
- Making a overall range scan by using the test receiver controlled 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 x 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

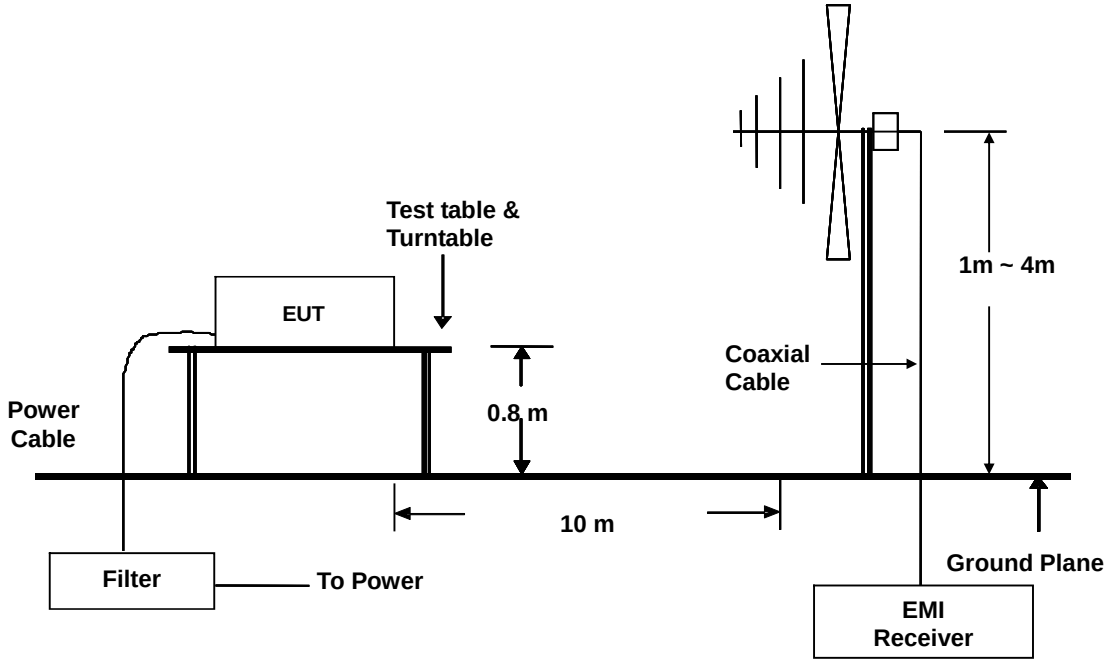
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground 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

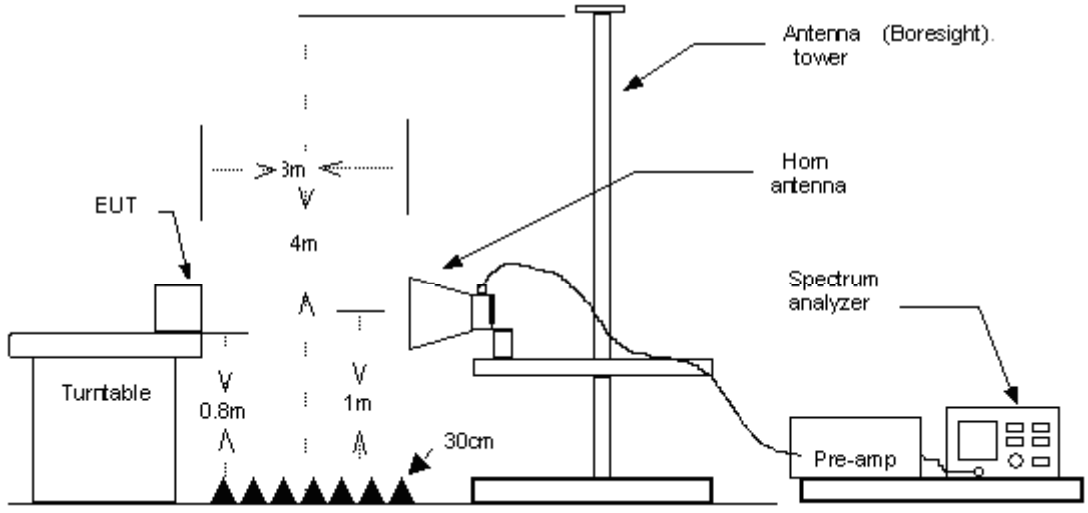
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning 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

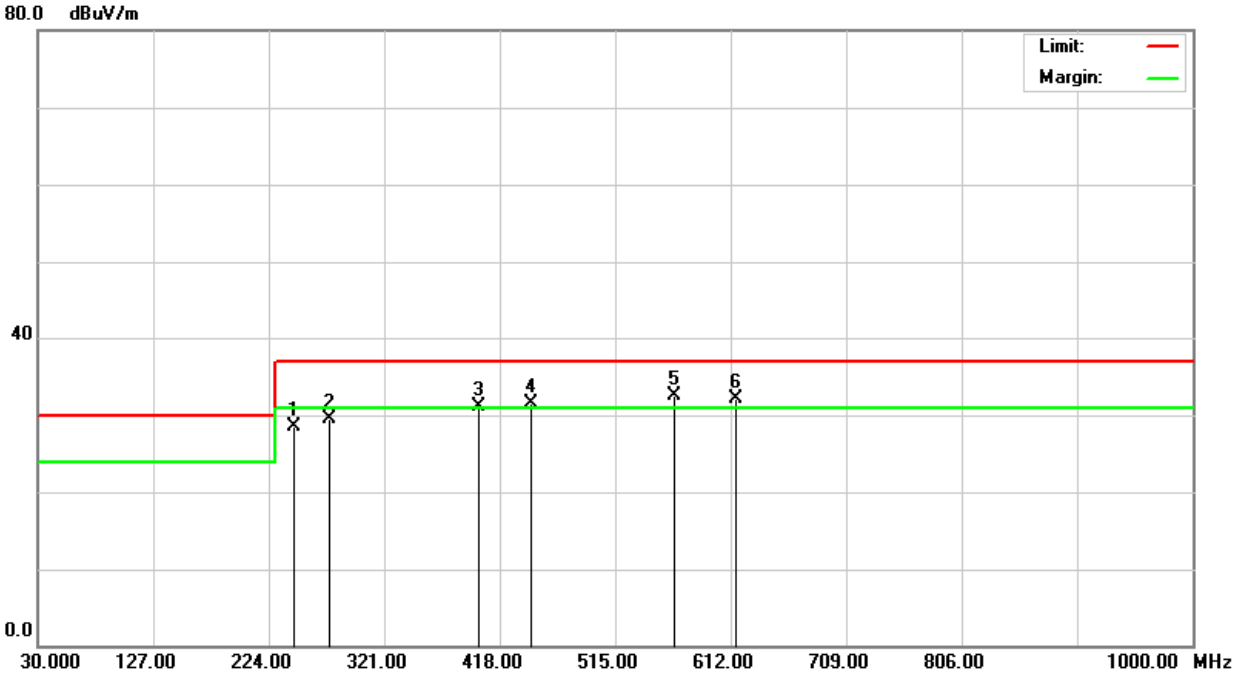
Calculation Formula

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

7.3.6. TEST RESULTS

Below 1GHz

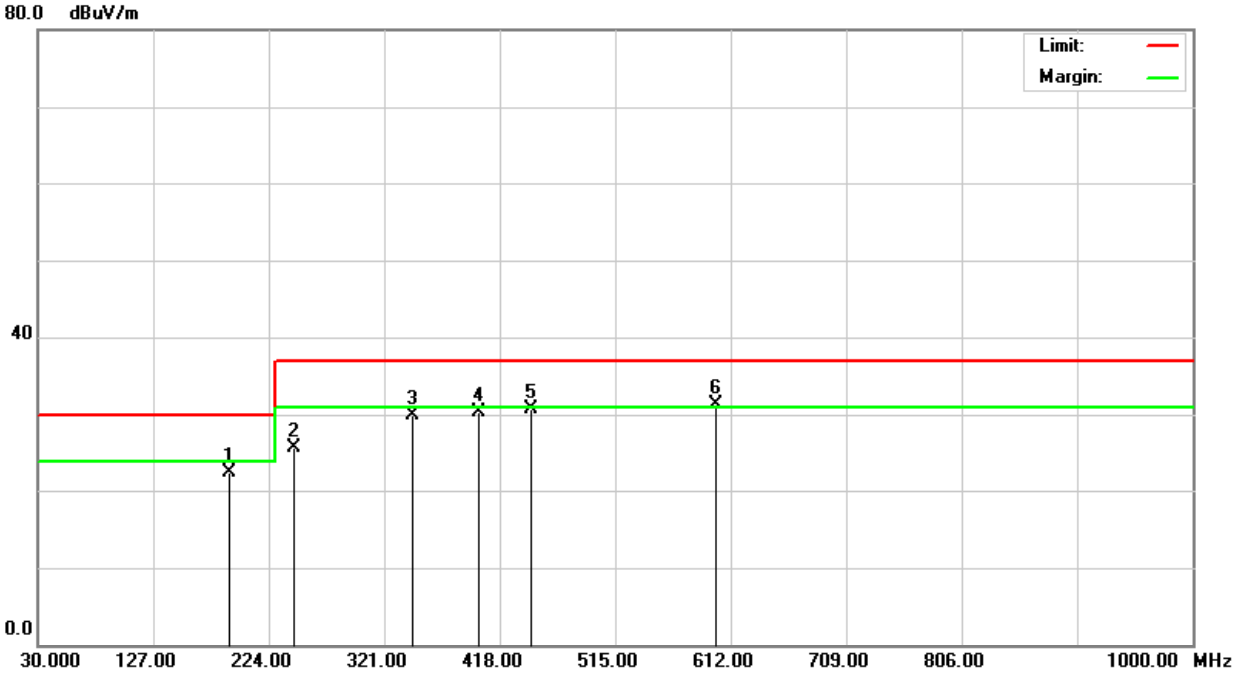
Model No.	PIXI-9377	Test Mode	Mode 1
Environmental Conditions	29°C, 56% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Alee Shen
Standard	EN 55032 CLASS B		



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 place 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$50Ω 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 insert 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 insert 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	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

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

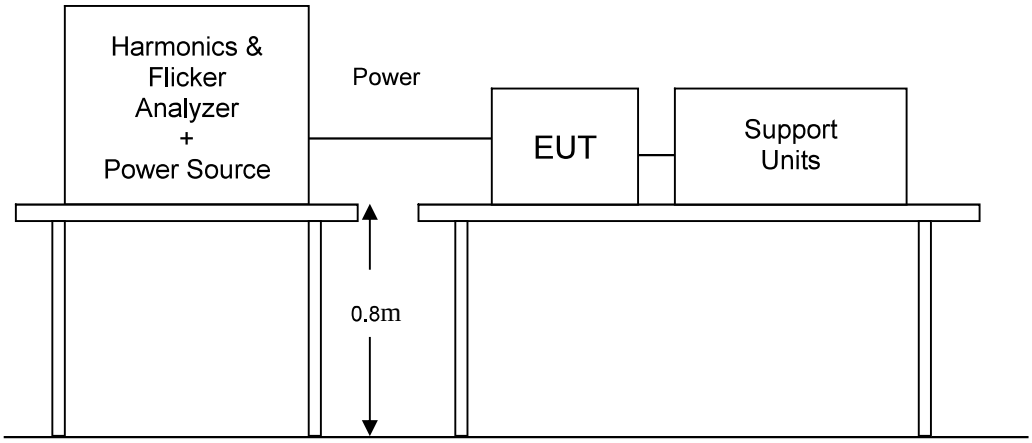
  Class B: Portable tools; Arc welding equipment which is not professional equipment.

  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 ☐ A ☐ B ☐ C ☐ 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

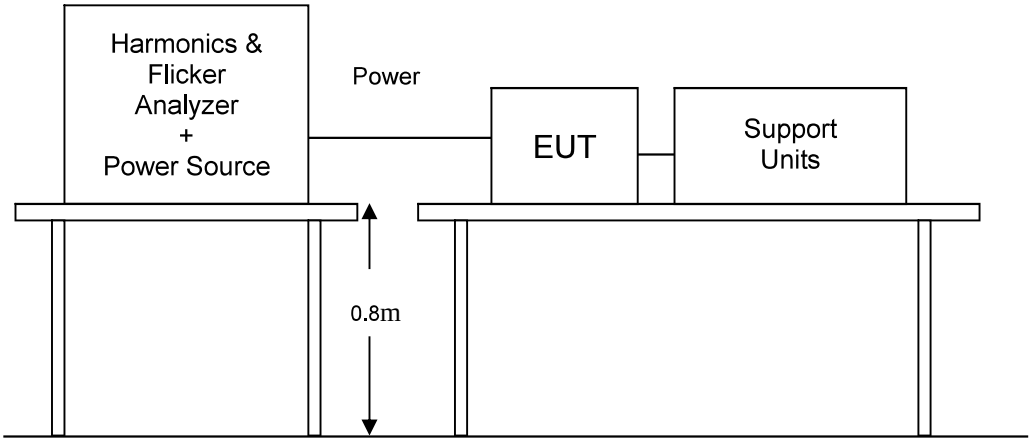
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due

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_{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	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 μs Open Circuit Voltage, 8/20 μs 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 μs 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

Criteria A:	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.
Criteria B:	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. 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.
Criteria C:	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. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

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:

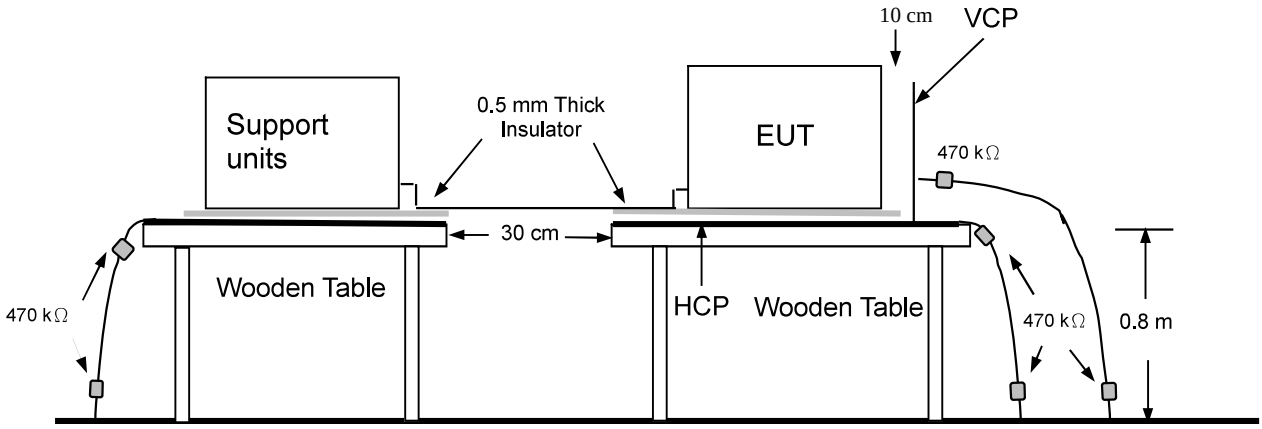
a) Contact discharges to the conductive surfaces and coupling planes:
   The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the **H**orizontal **C**oupling **P**lane (**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 **V**ertical **C**oupling **P**lane (**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 **G**round **R**eference **P**lane. 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 **H**orizontal **C**oupling **P**lane (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	☒	☒	☒	☒	☐	☒A ☐B	Note ☐1 ☒2
Back	☒	☒	☒	☒	☐	☒A ☐B	Note ☐1 ☒2
Left	☒	☒	☒	☒	☐	☒A ☐B	Note ☐1 ☒2

Contact Discharge							
Test Points	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2

Discharge To Horizontal Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Back	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Left	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Right	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2

Discharge To Vertical Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Back	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Left	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Right	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐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

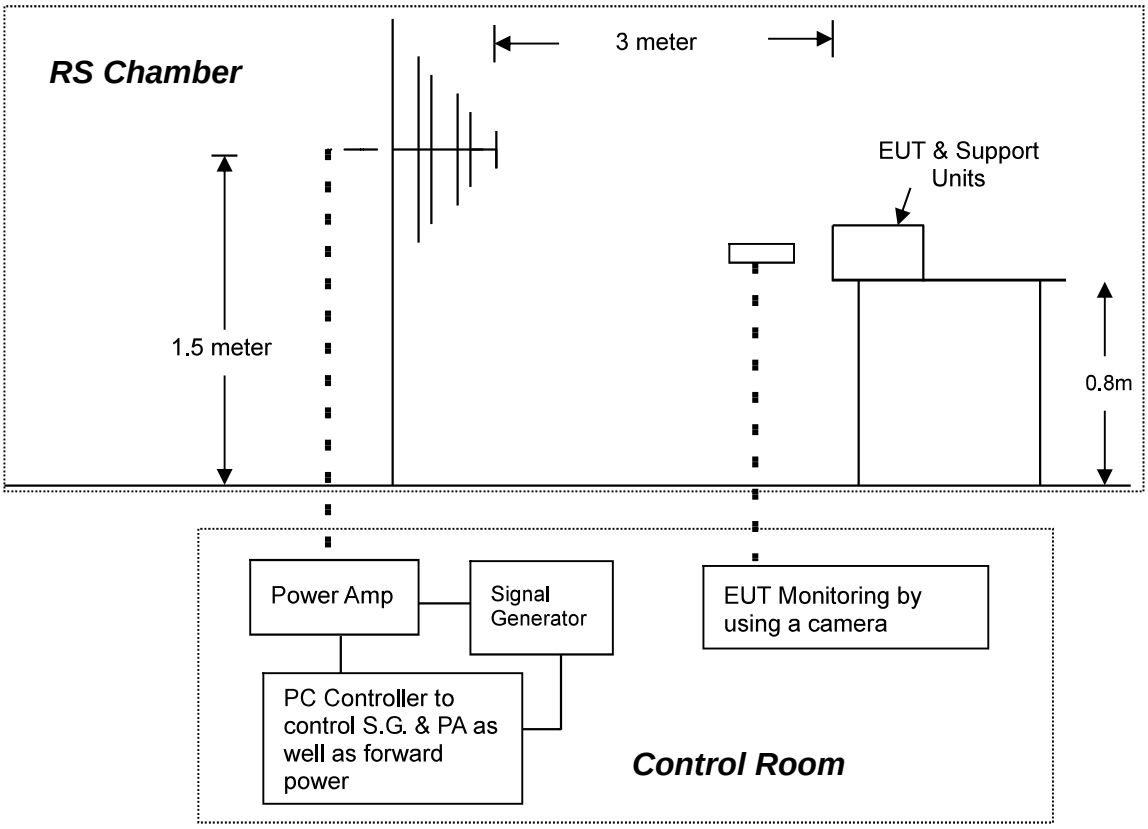
a) The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

b) The frequency range is swept from 80 MHz to 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.

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 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	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	90	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	180	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	270	3	☒A ☐B	Note ☒1 ☐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.

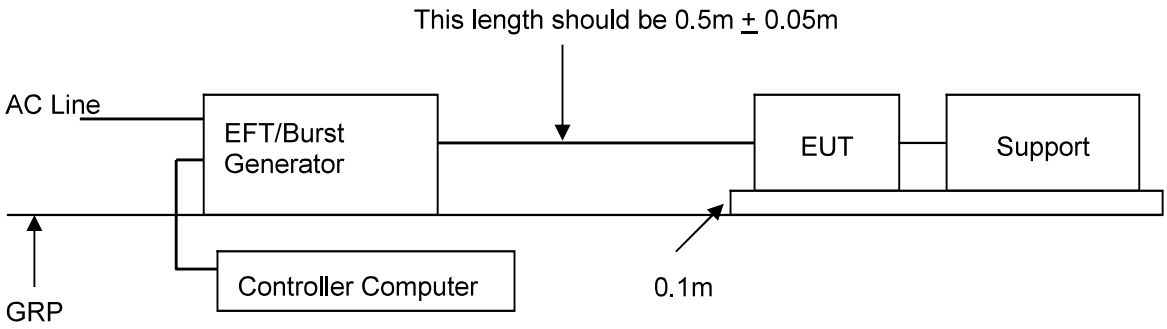
b) Both positive and negative polarity discharges were applied.

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	☒A ☐B	Note ☒1 ☐2	PASS
N	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L – N	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L – PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
N – PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L – N – PE	+/-	1	☒A ☐B	Note ☒1 ☐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 μs Open Circuit Voltage 8/20 μs 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.

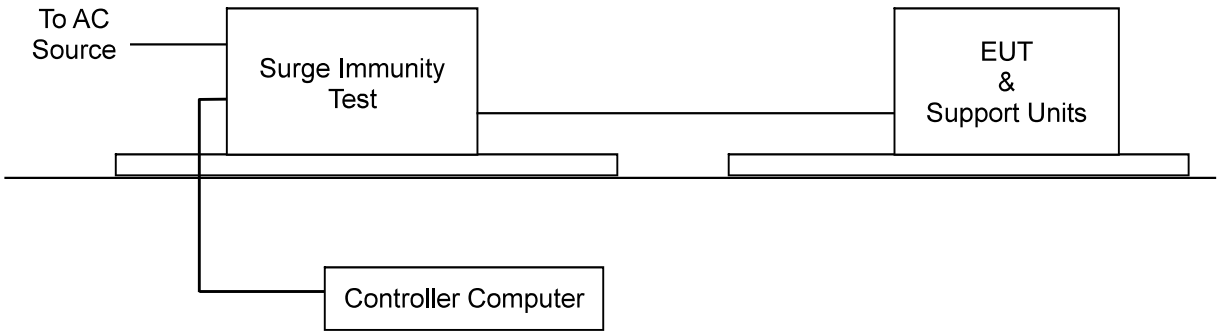
8.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-025)

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	☐A ☐B	Note ☒1 ☐2	N/A
L - PE	+/-	2	☐A ☐B	Note ☒1 ☐2	N/A
N - PE	+/-	2	☐A ☐B	Note ☒1 ☐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.

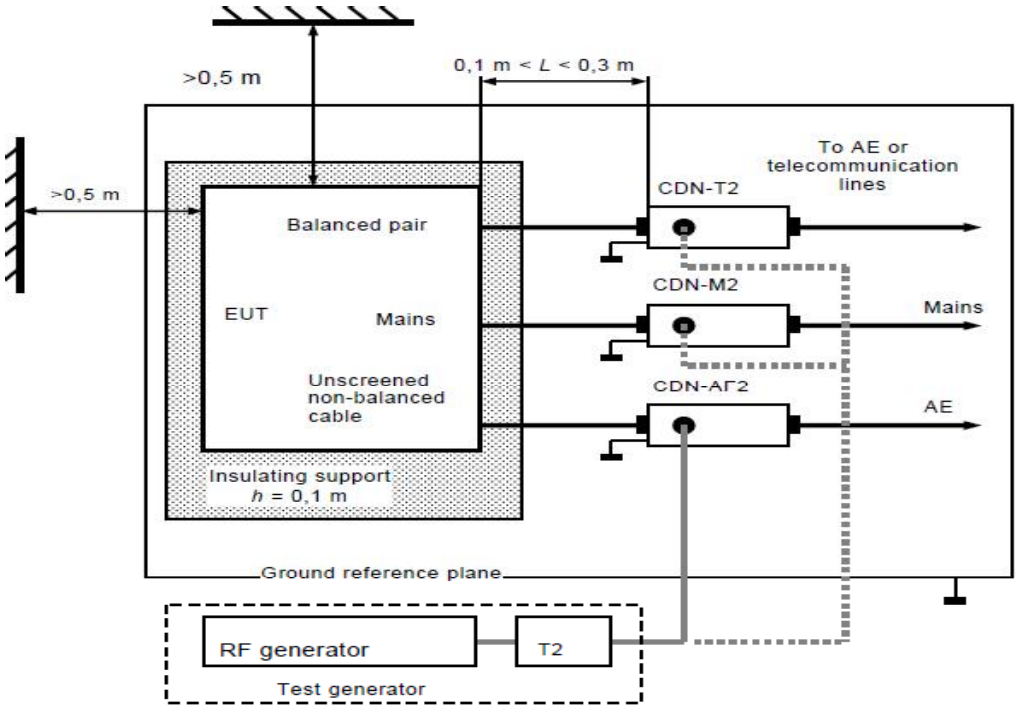
The test shell performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

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 x 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 was 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	☒A ☐B	Note ☒1 ☐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)

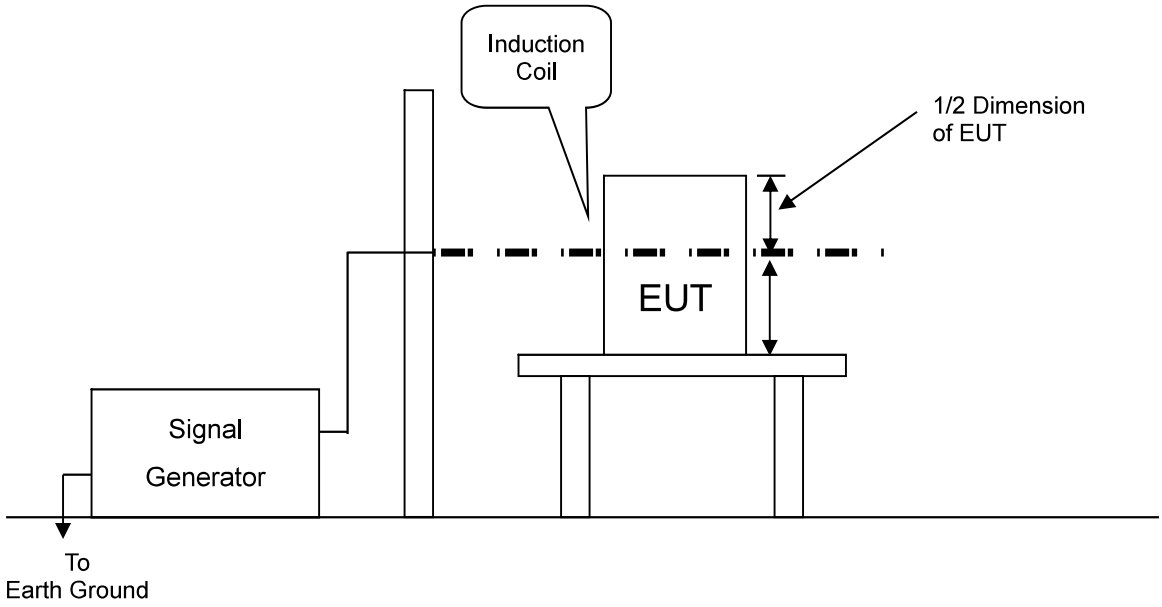
a. The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.

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

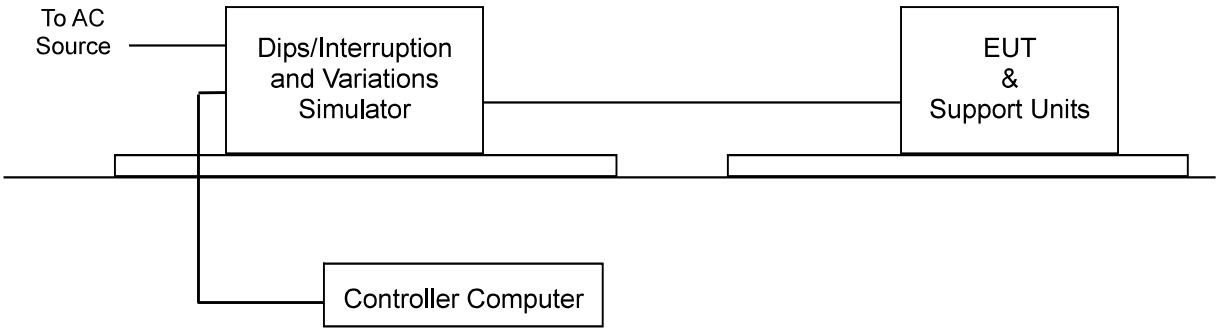
Immunity shielded room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**

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	☐**A** ☐**B** ☐**C**	**Note** ☒**1** ☐**2**	N/A
30	25	☐**A** ☐**B** ☐**C**	**Note** ☒**1** ☐**2**	N/A
>95	250	☐**A** ☐**B** ☐**C**	**Note** ☒**1** ☐**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.

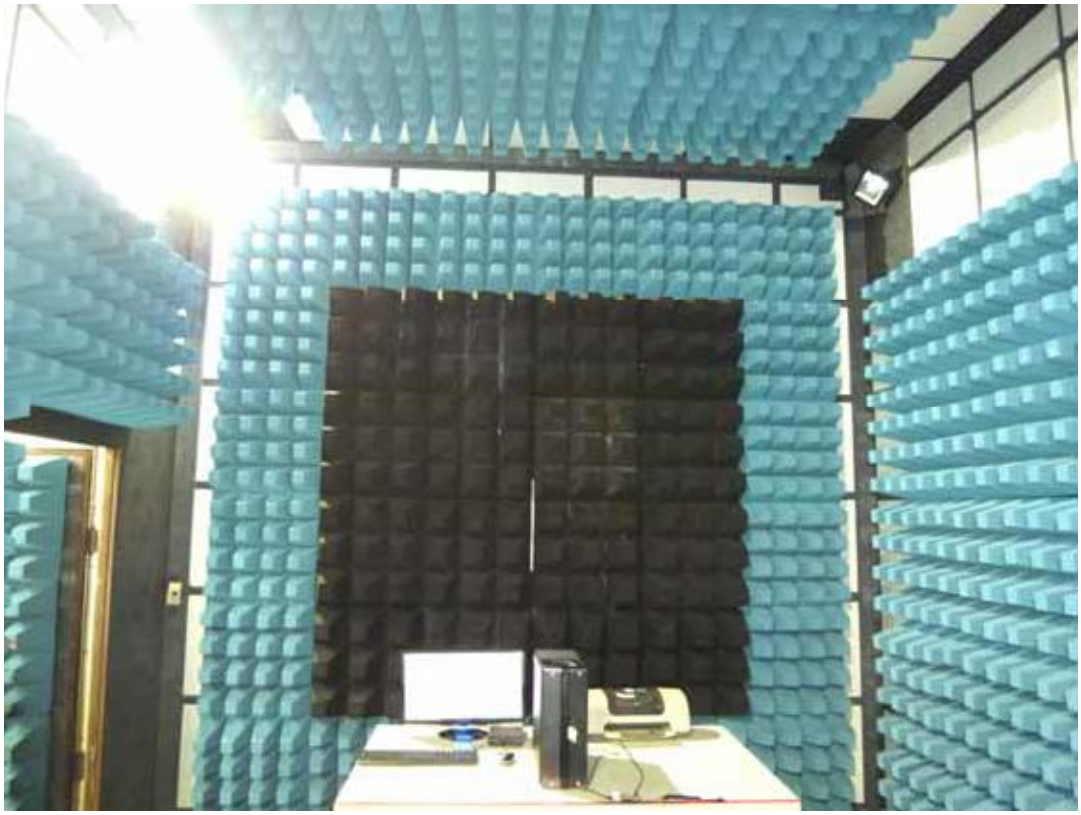
9 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

ESD Test

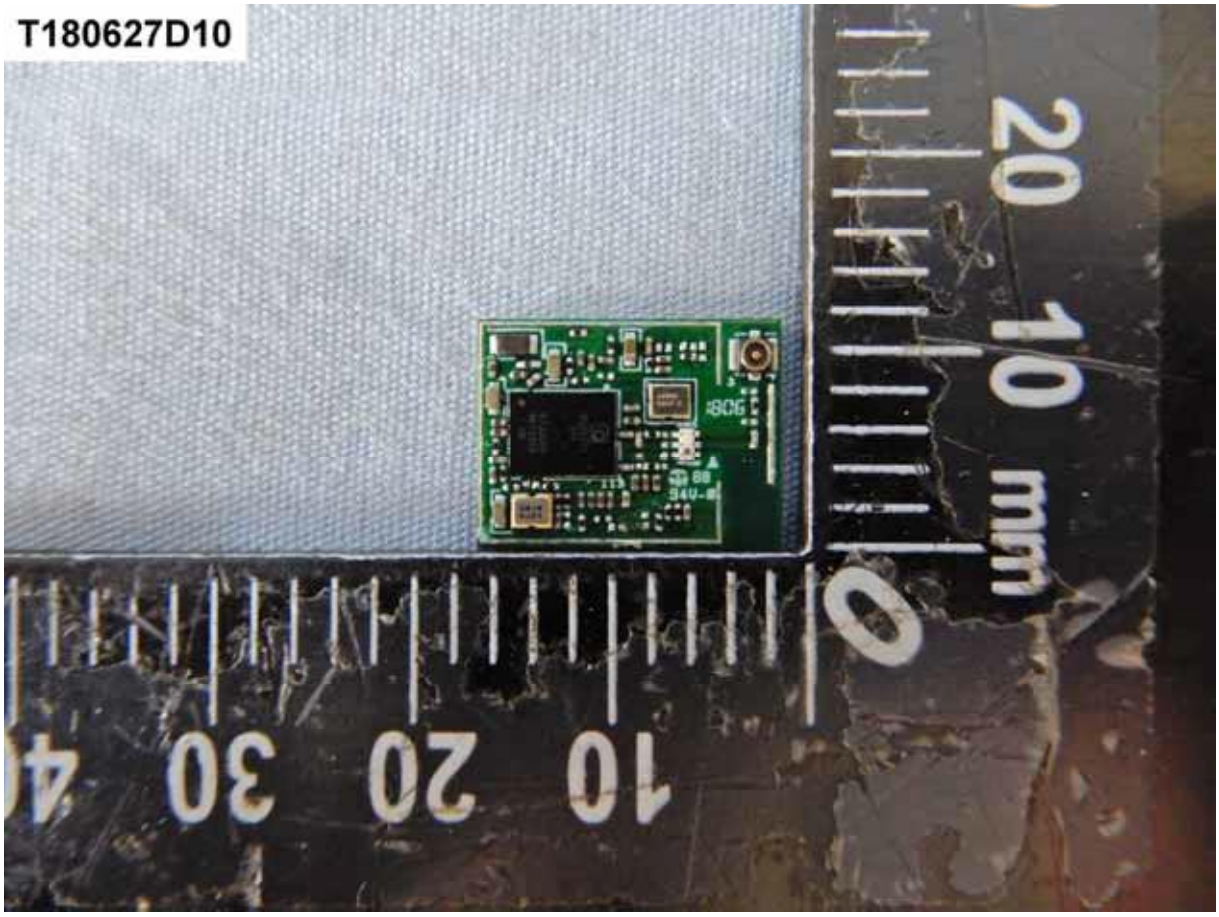
RS Test

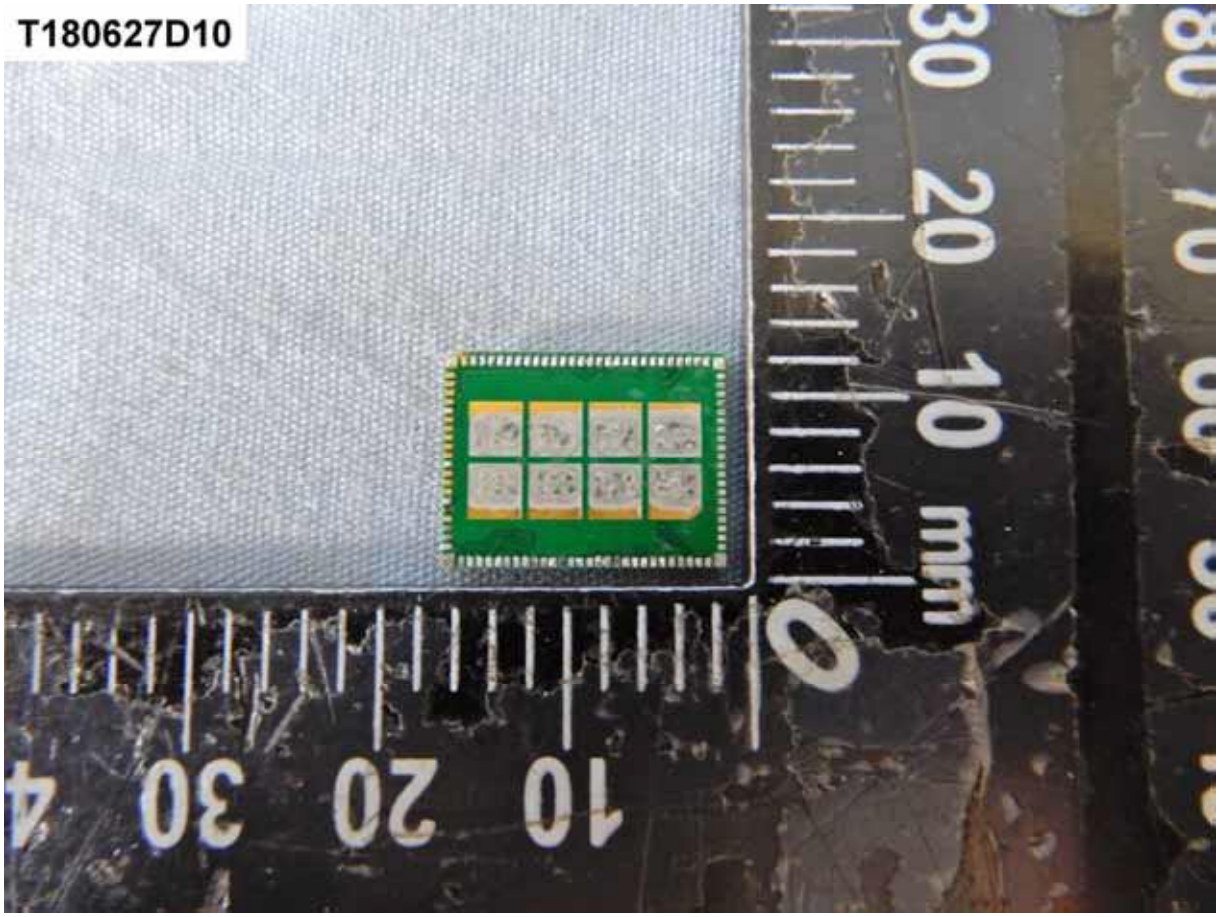


EFT Test

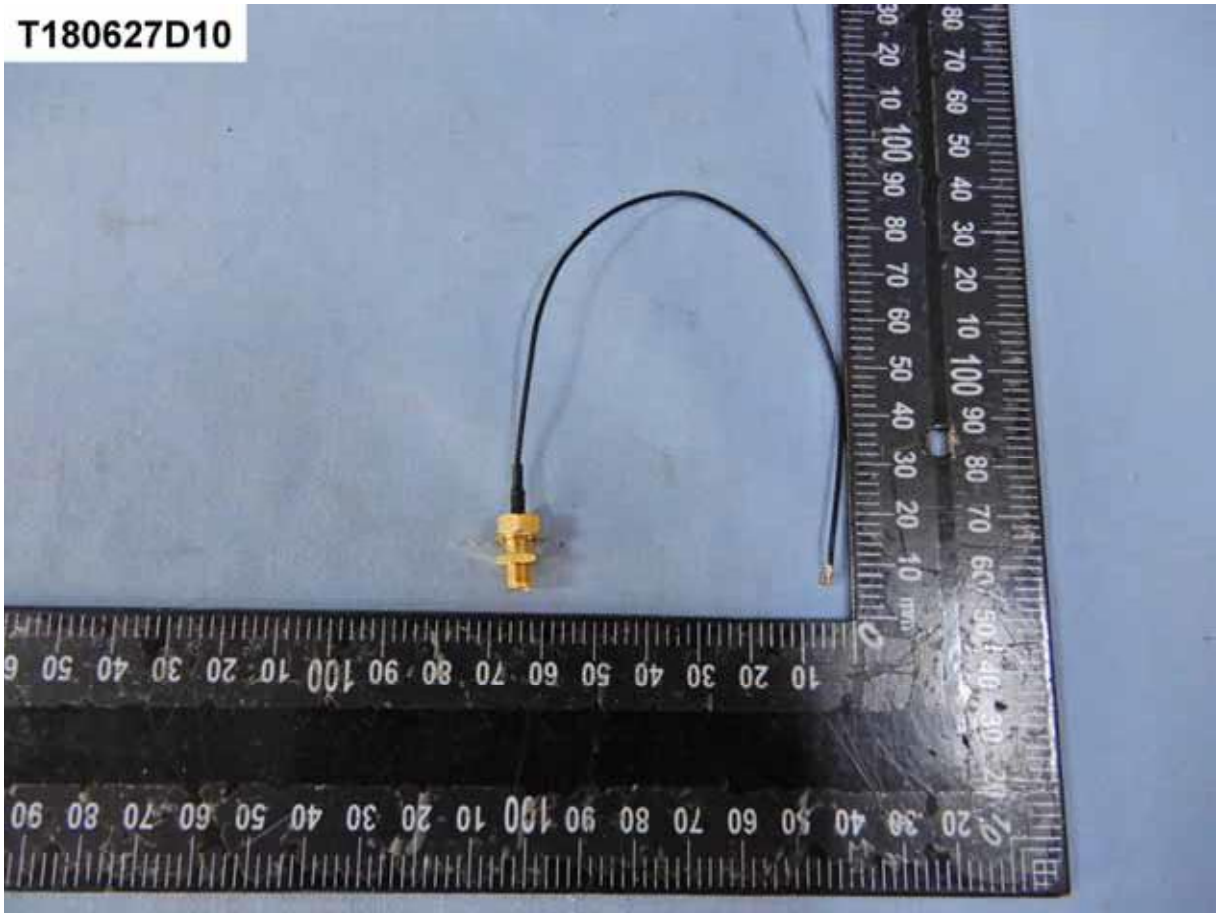
CS Test

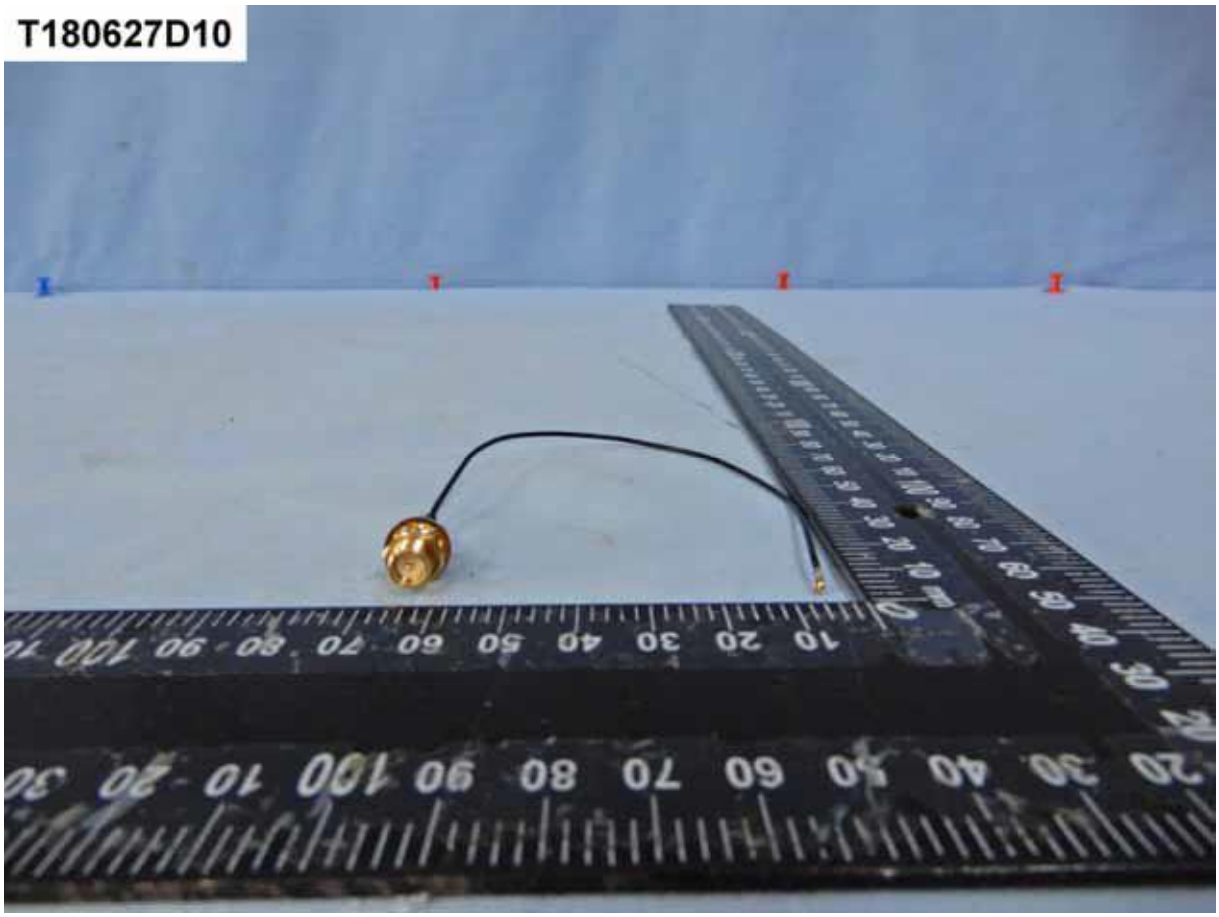
APPENDIX 1 - PHOTOGRAPHS OF EUT





WIFI 2.4/5G Antenna





FPC 2.4/5G Antenna