FCC RF Test Report

APPLICANT	**:**	**Maestro Wireless Solutions Limited**
EQUIPMENT	**:**	**E210 Series Cellualr Router**
BRAND NAME	**:**	**Maestro**
MODEL NAME	**:**	**E214G#00**
FCC ID	**:**	**2AJF3-E214G-5**
STANDARD	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**(DTS) Digital Transmission System**

The product was received on Jun. 01, 2018 and testing was completed on Aug. 24, 2018. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.

Eric Shih

NVLAP TESTING
NVLAP LAB CODE 600156-0

Approved by: Eric Shih / Manager

Sporton International (Shenzhen) Inc.
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR860104	Rev. 01	Initial issue of report	Aug. 27, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.41 dB at 2484.74 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Required	-
3.6	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Maestro Wireless Solutions Limited

Units A & B, 9th Floor, Wing Cheong Factory Building 121 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong

1.2 Manufacturer

Maestro Wireless Solutions Limited

Units A & B, 9th Floor, Wing Cheong Factory Building 121 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	E210 Series Cellualr Router
Brand Name	Maestro
Model Name	E214G#00
FCC ID	2AJF3-E214G-5
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40
HW Version	V05
SW Version	maestro-e210-v230
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 18.44 dBm (0.0698 W) 802.11g : 22.48 dBm (0.1770 W) 802.11n HT20 : 22.04 dBm (0.1600 W) 802.11n HT40 : 21.91 dBm (0.1552 W)
Antenna Type / Gain	Dipole Antenna with gain 3.80 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No. are CN5018 / CN5019.

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	**Sporton Site No.**	**FCC Test Firm Registration No.**
	TH01-SZ	251365

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	577730

1.7 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

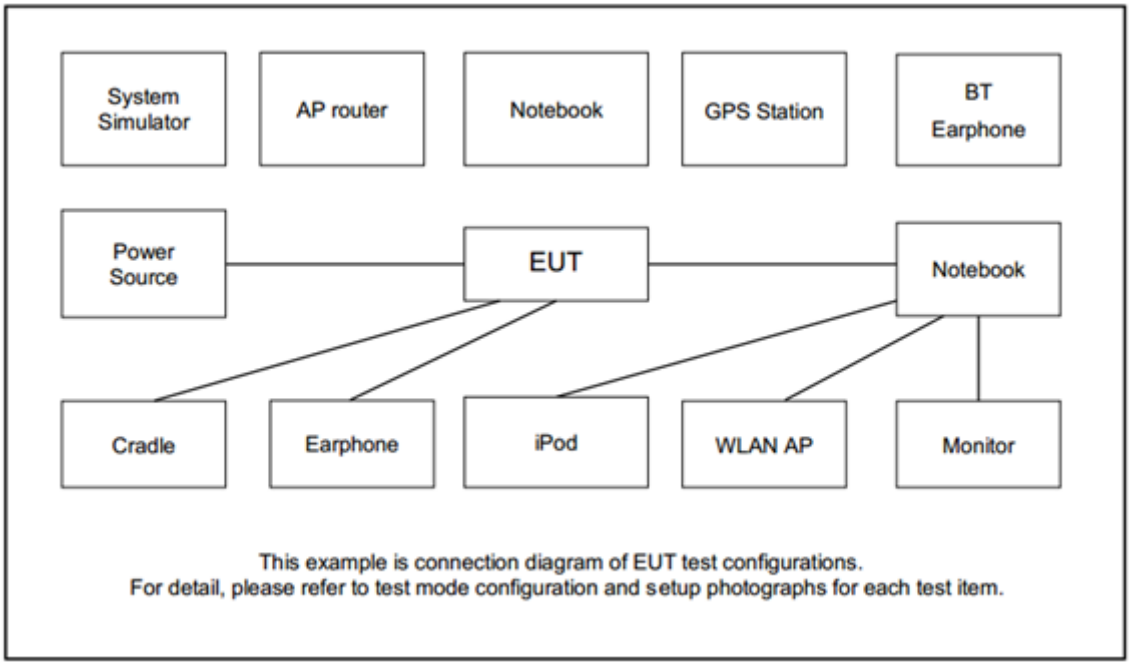
Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11b	**1 Mbps**
802.11g	**6 Mbps**
802.11n HT20	**MCS0**
802.11n HT40	**MCS0**

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	BT Base Station	R&S	CBT	N/A	N/A	Unshielded,1.8m
3.	DC Power	Supply Topward	3303DR	N/A	N/A	Unshielded,1.8m

2.5 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5.0 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

=5.0 + 10 = 15.0 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

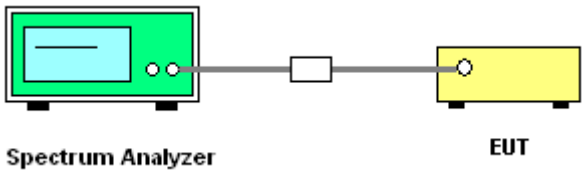
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz..
5. Measure and record the results in the test report.

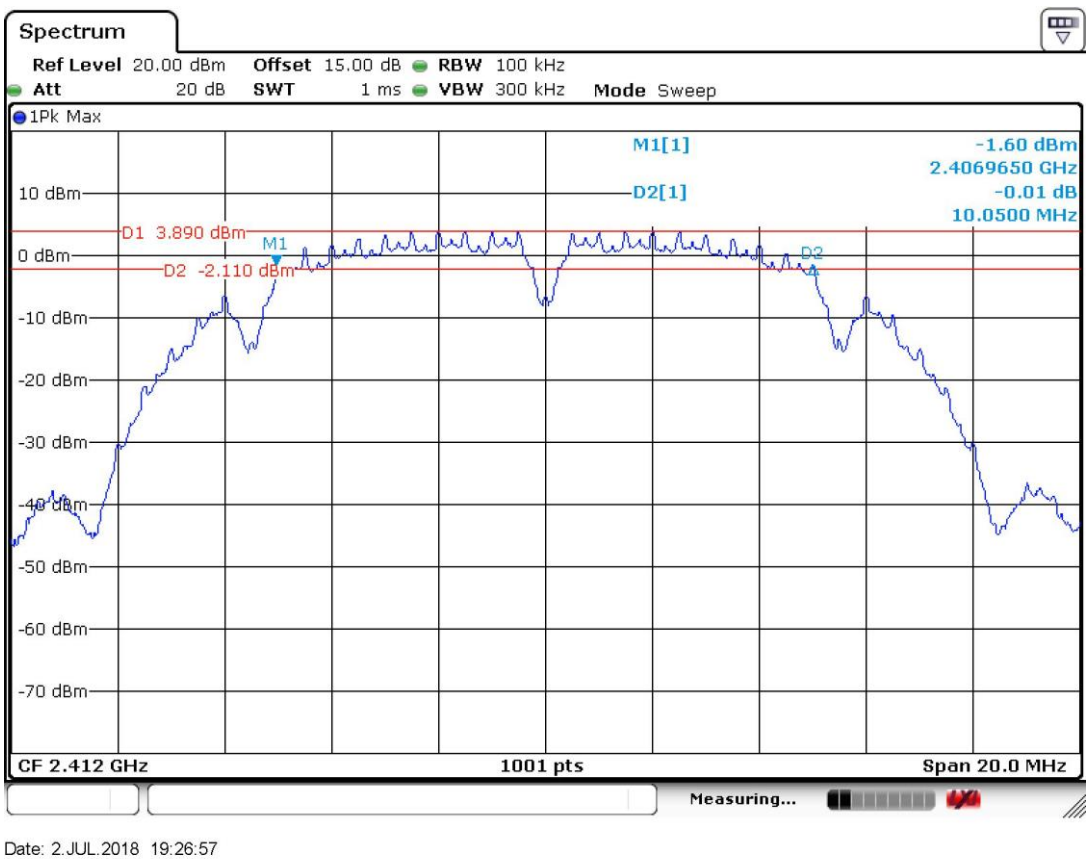
3.1.4 Test Setup



3.1.5 Test Result of 6dB Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

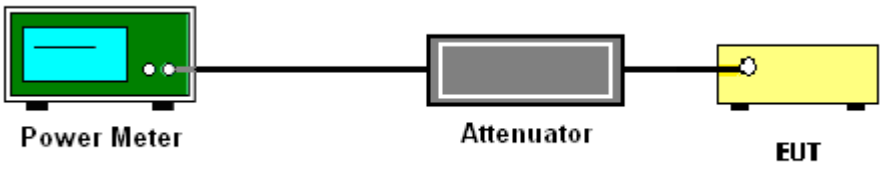
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.3 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

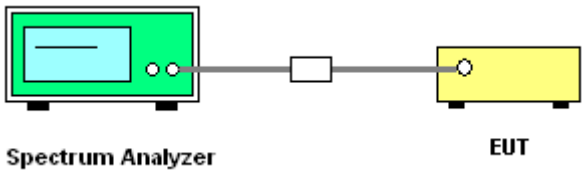
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

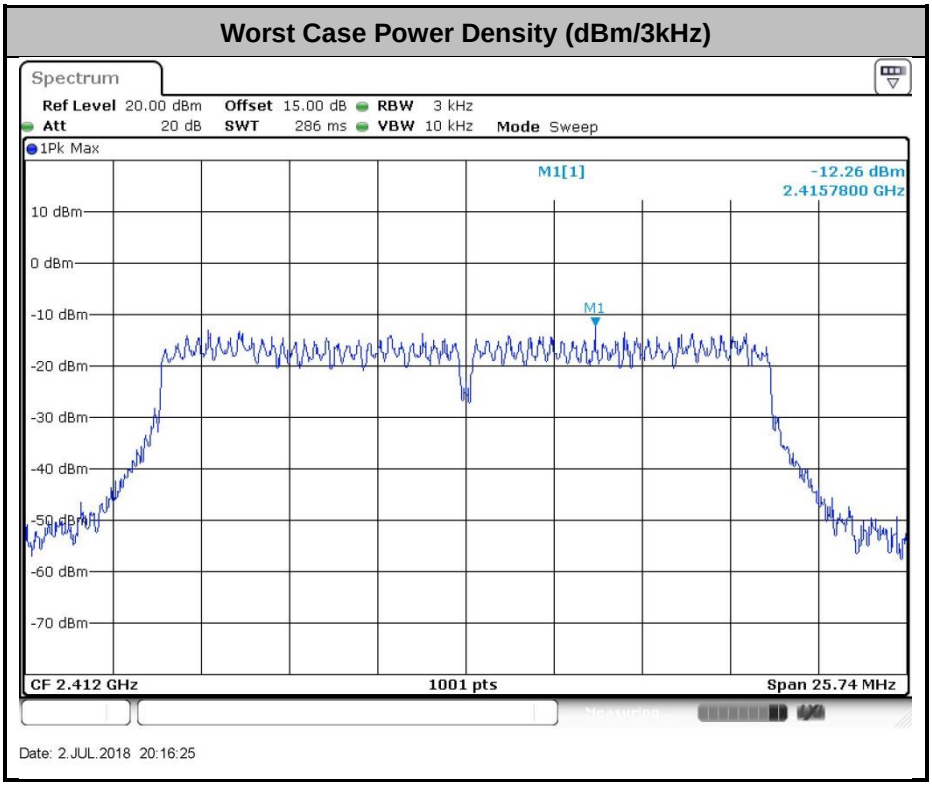
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz)



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

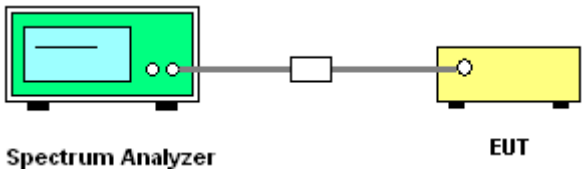
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

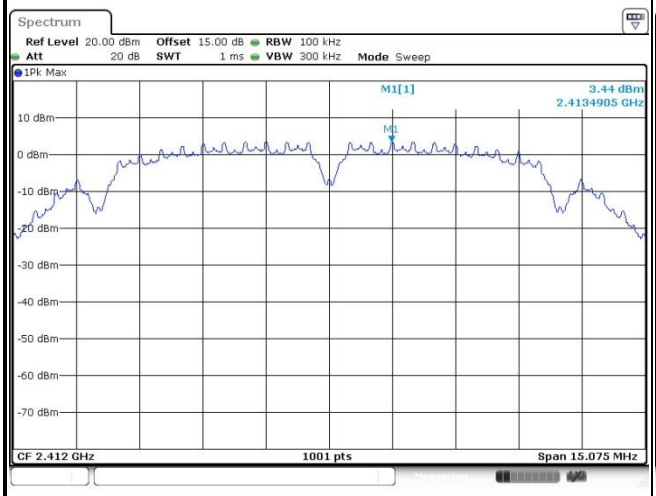
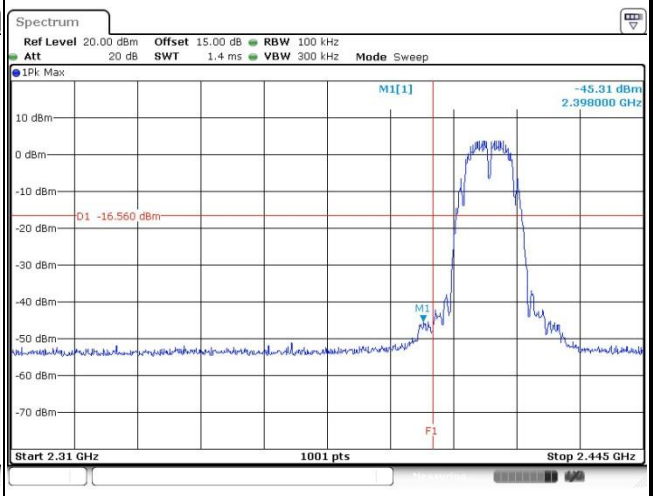
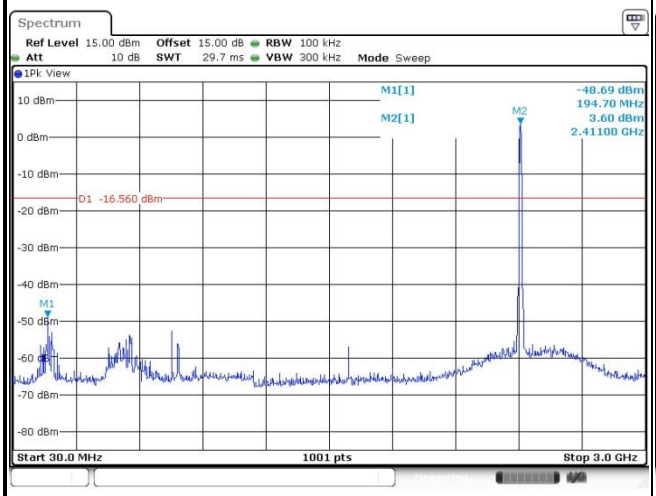
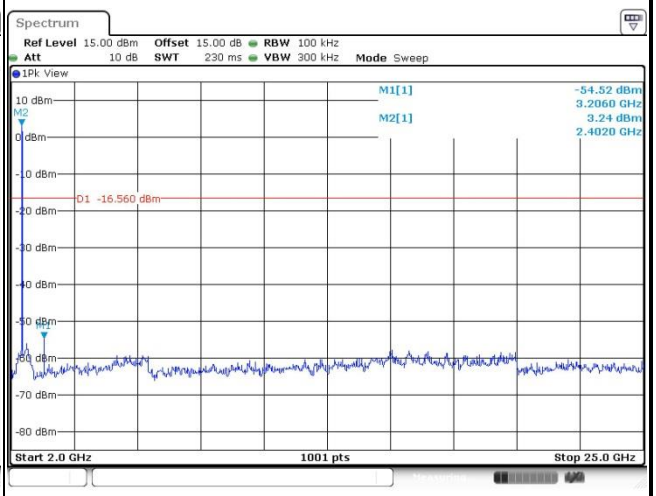
3.4.4 Test Setup



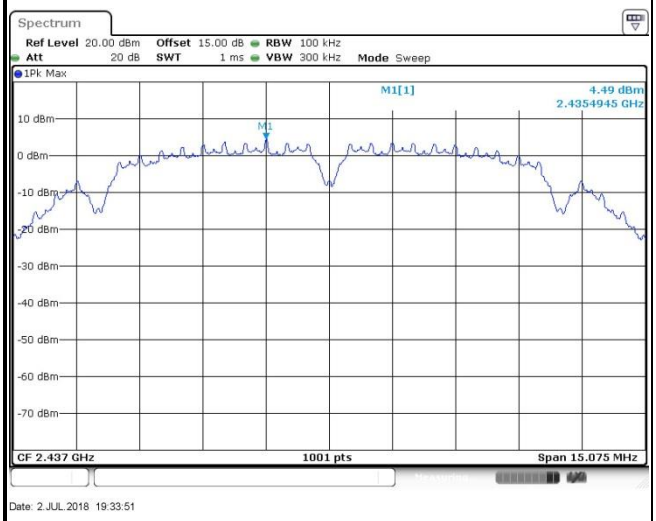
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

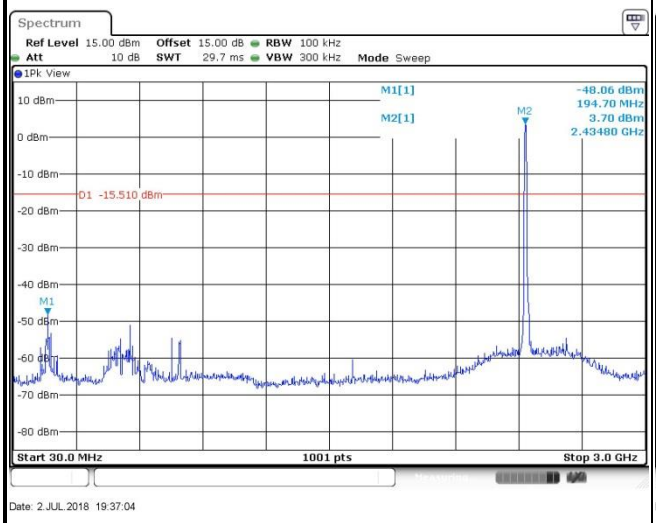
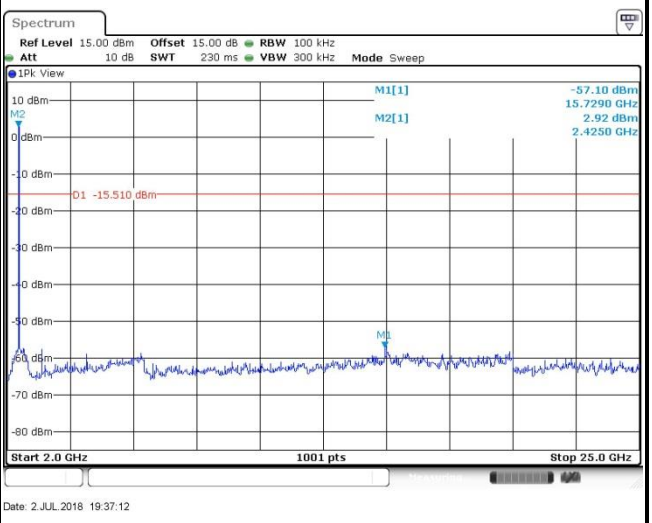
Test Engineer :	Wilson chen	Temperature :	24~26℃
		Relative Humidity :	50~53%

Test Mode :	802.11b	Test Channel :	01

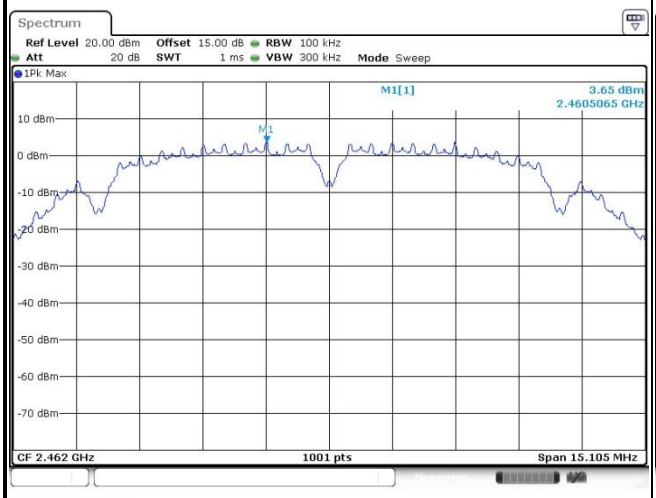
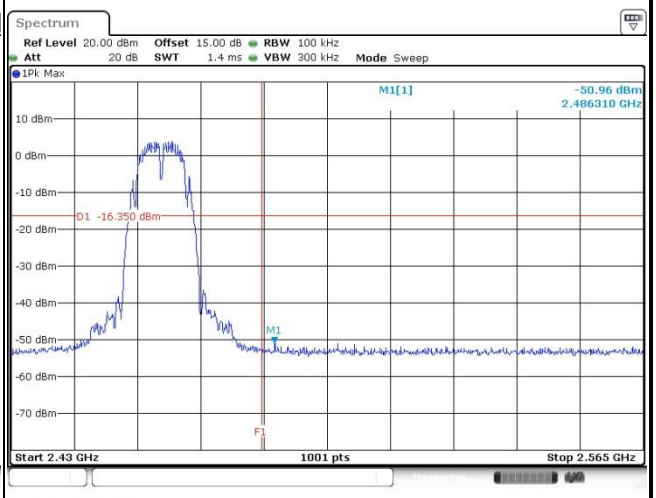
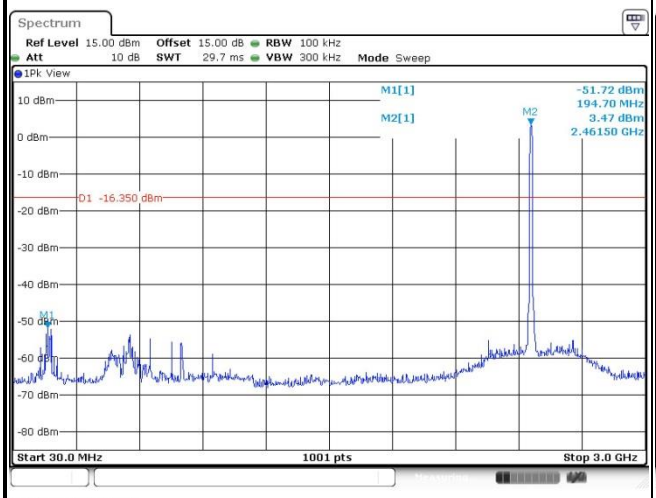
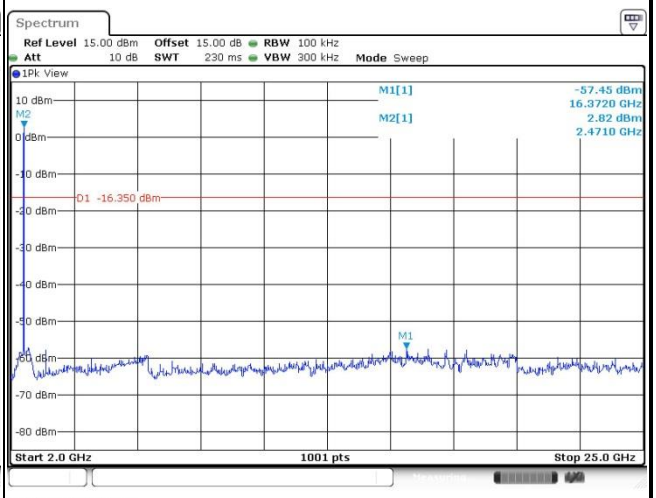
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

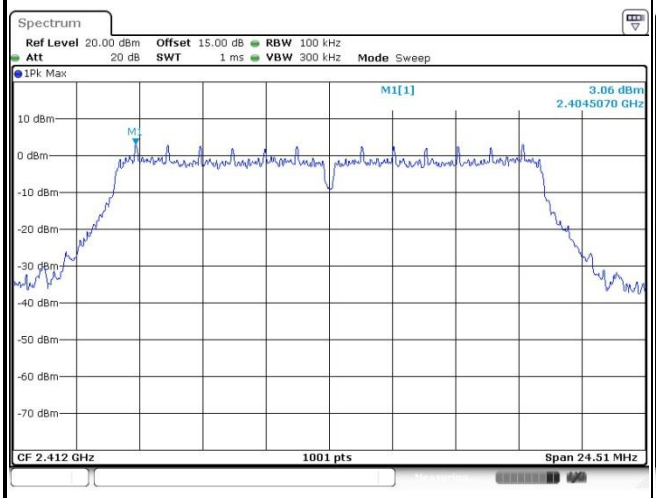
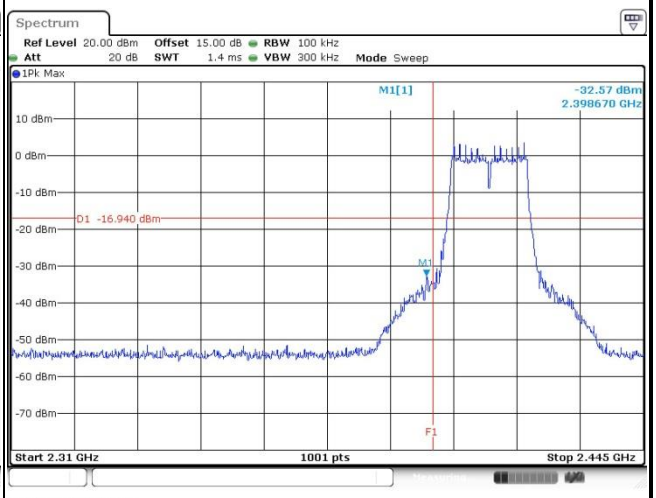
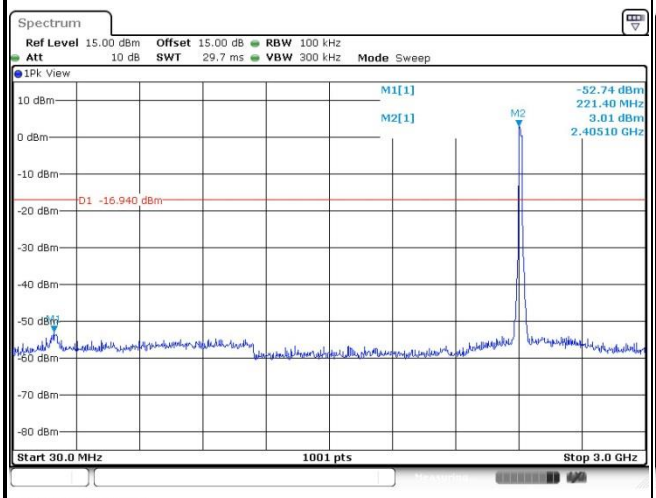
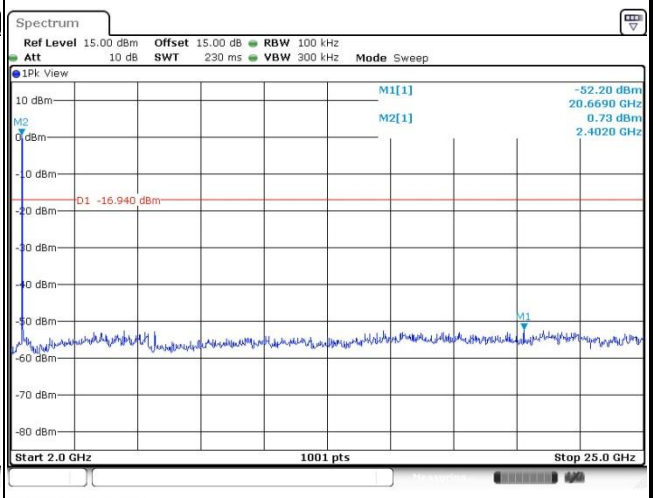
100kHz PSD reference Level	
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

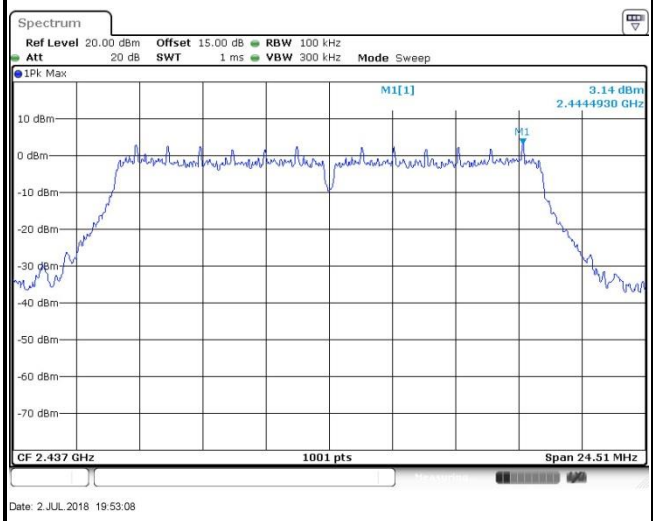
Test Mode :	802.11b	Test Channel :	11

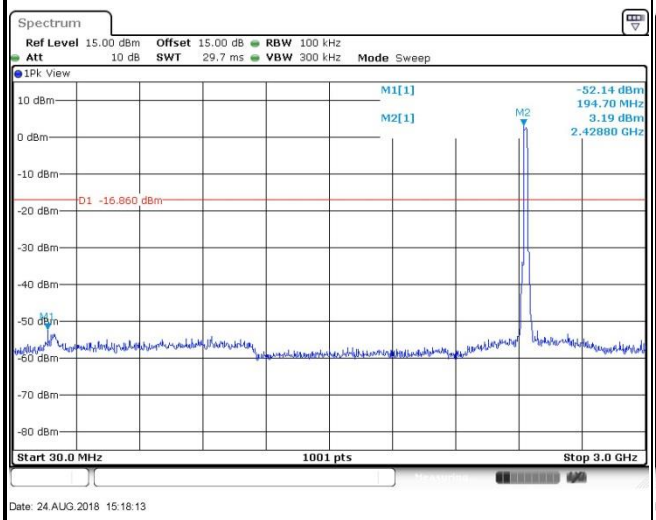
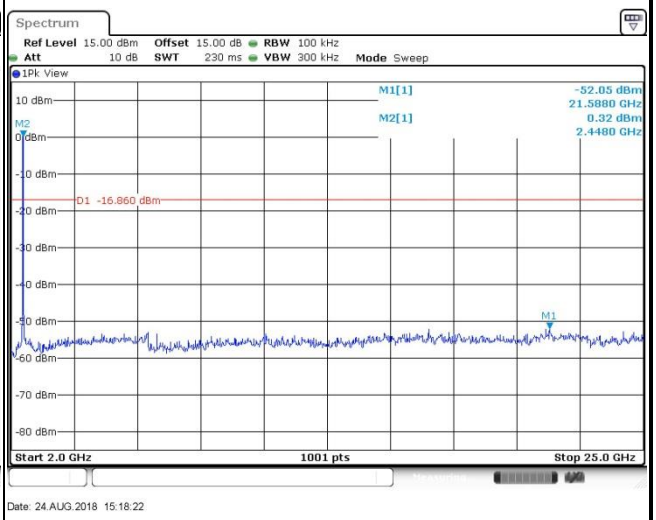
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

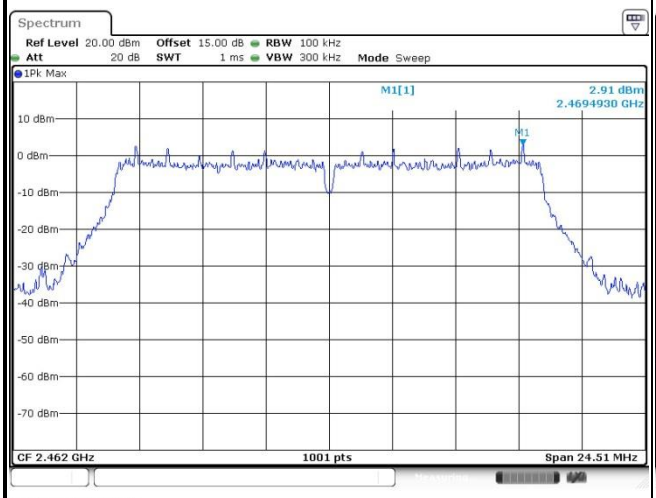
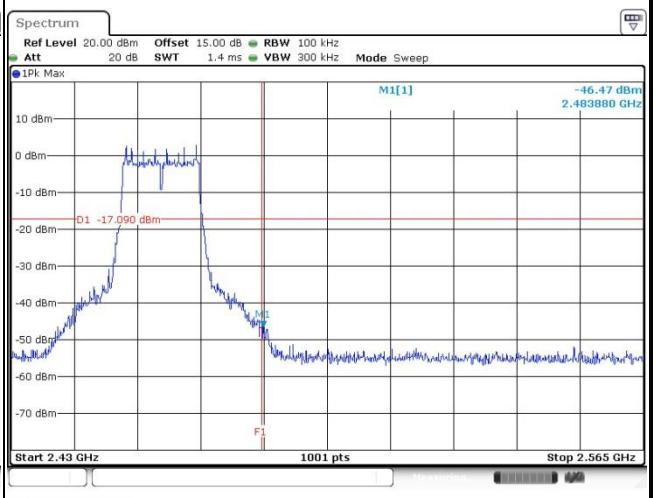
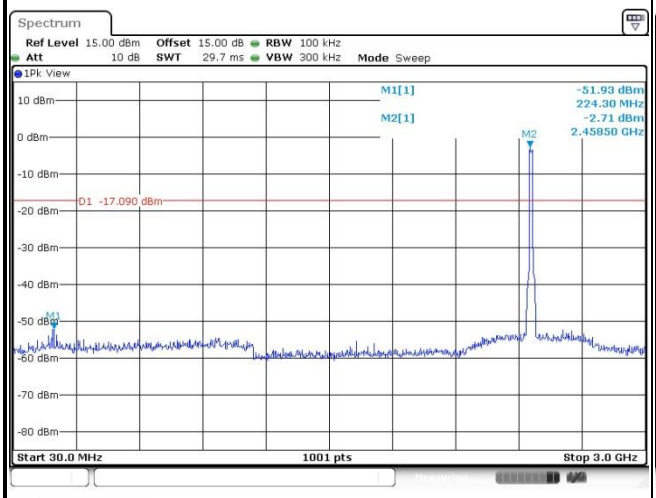
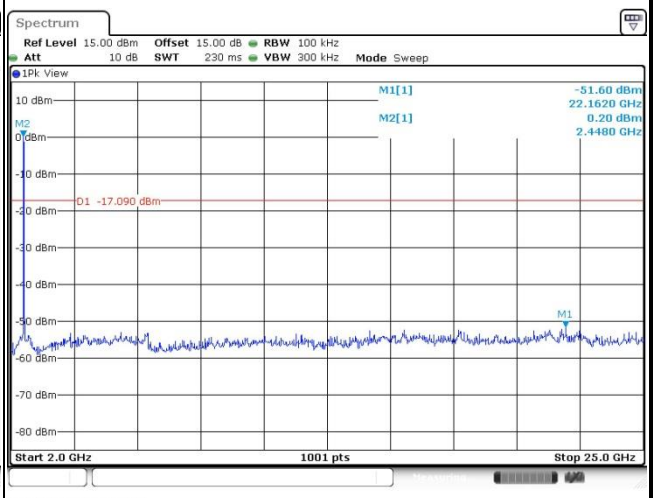
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

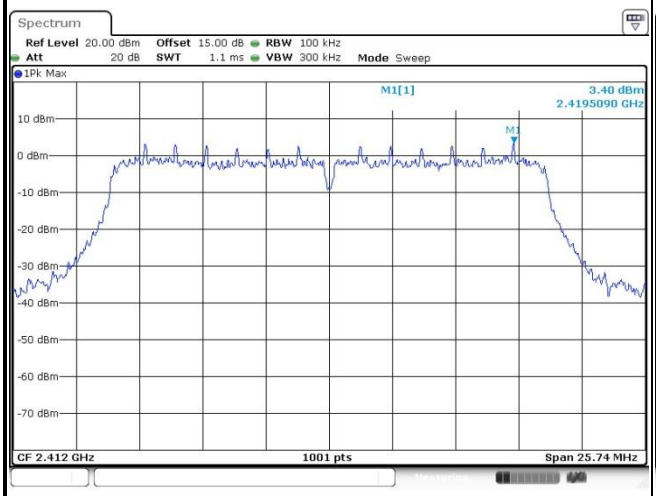
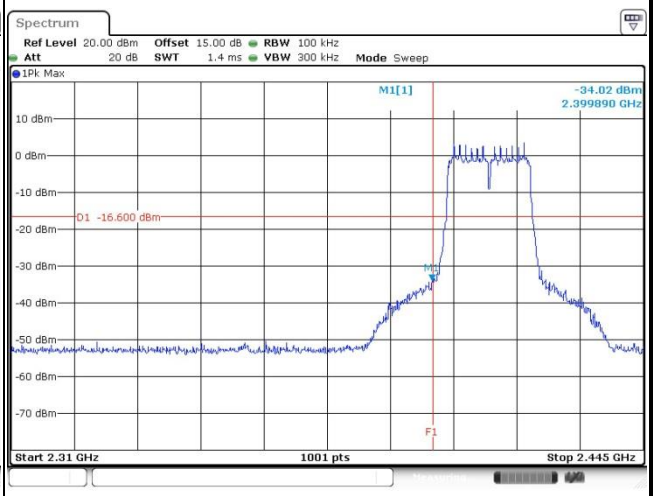
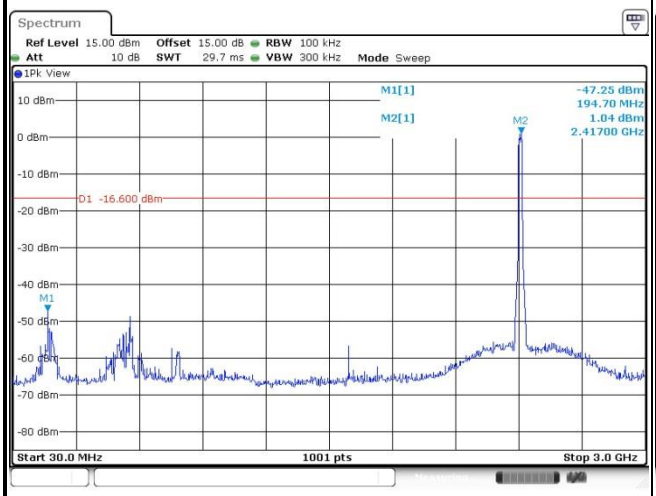
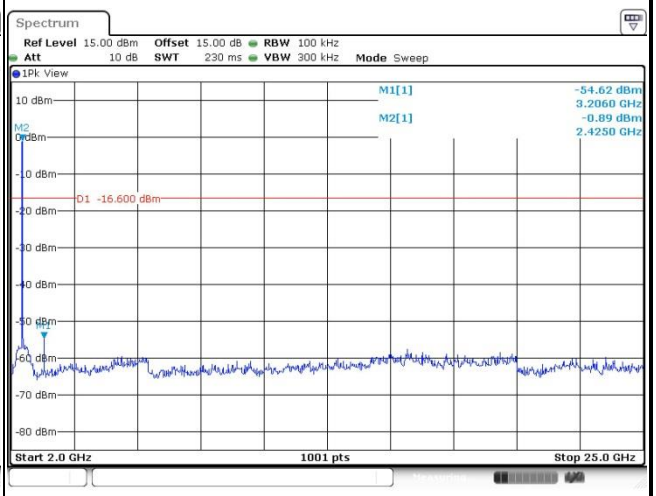
100kHz PSD reference Level	
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

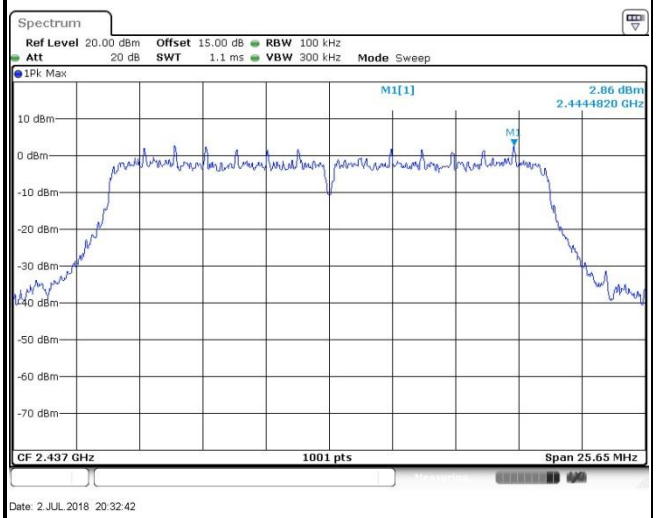
Test Mode :	802.11g	Test Channel :	11

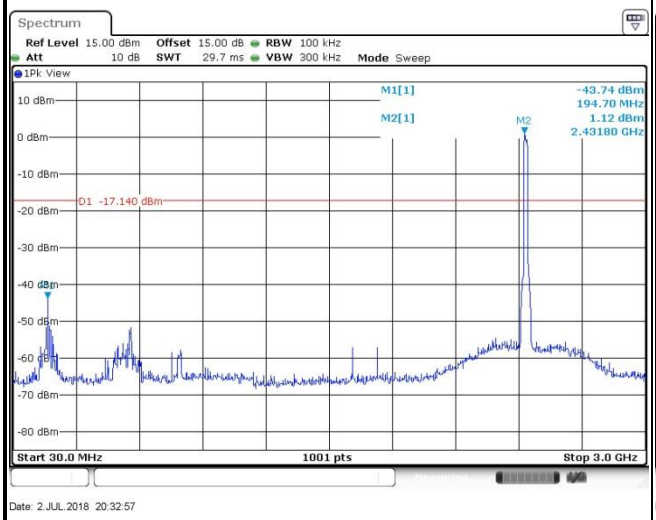
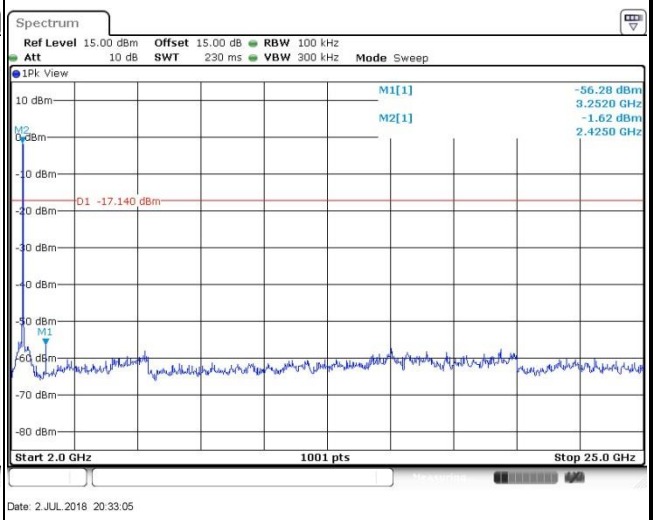
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	01

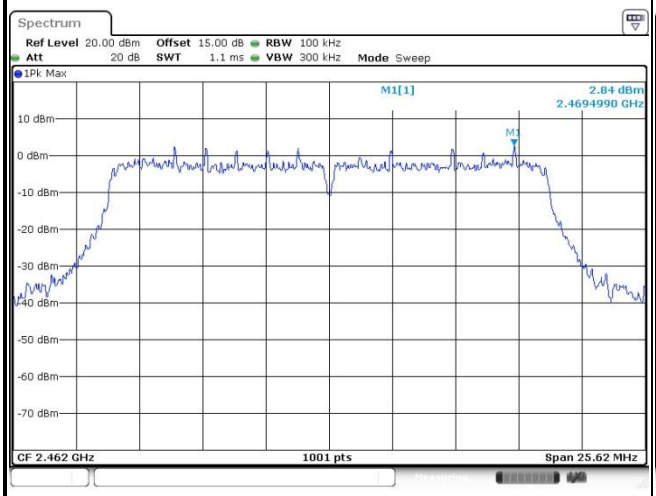
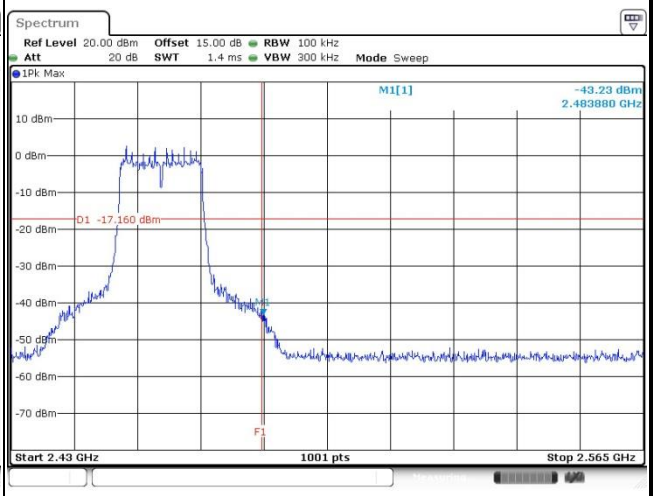
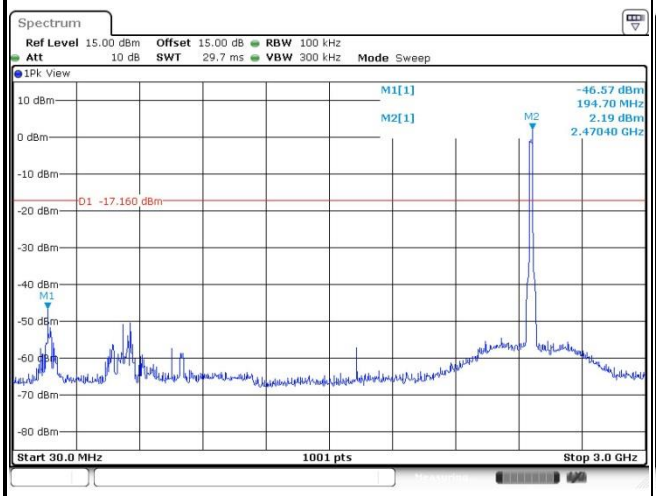
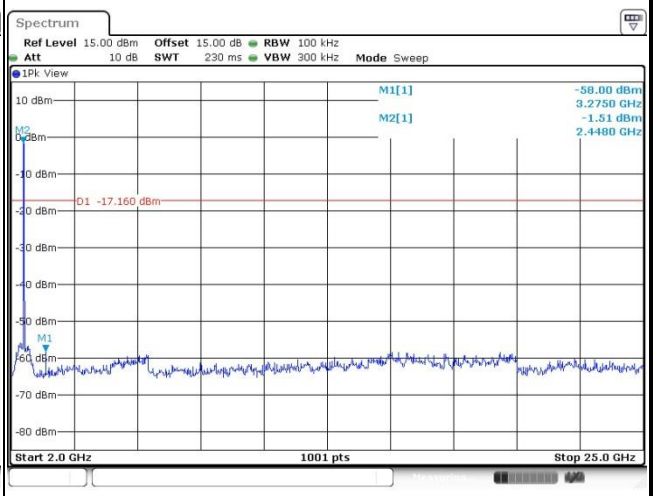
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	06

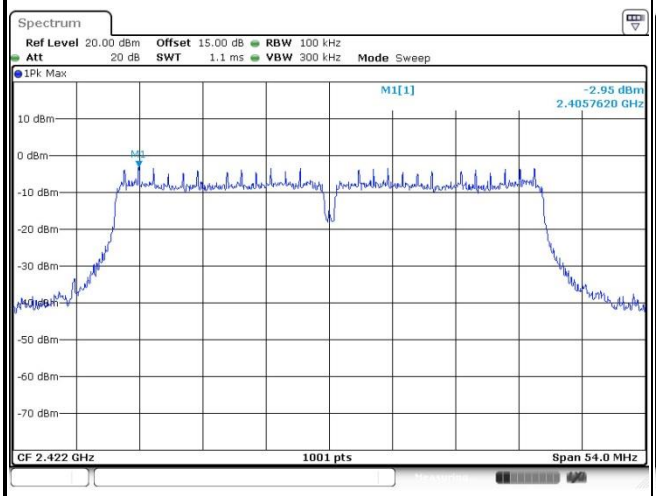
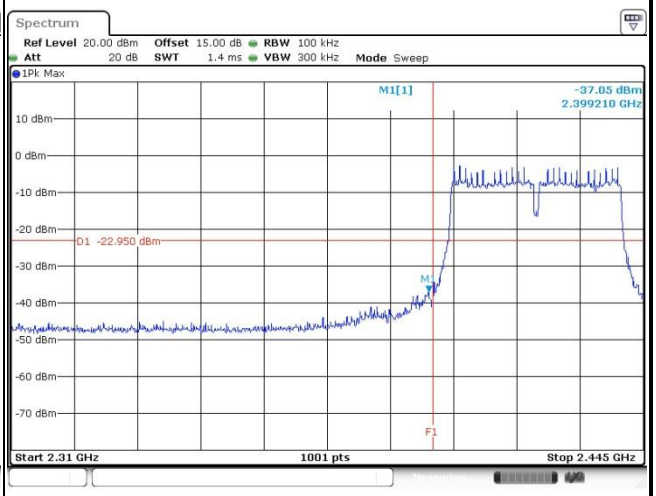
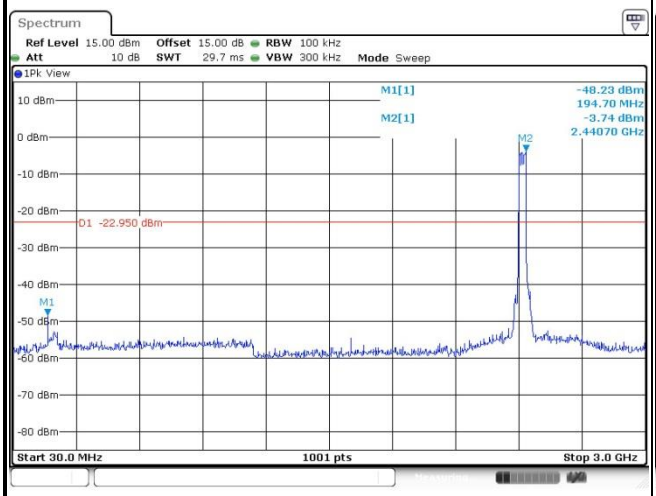
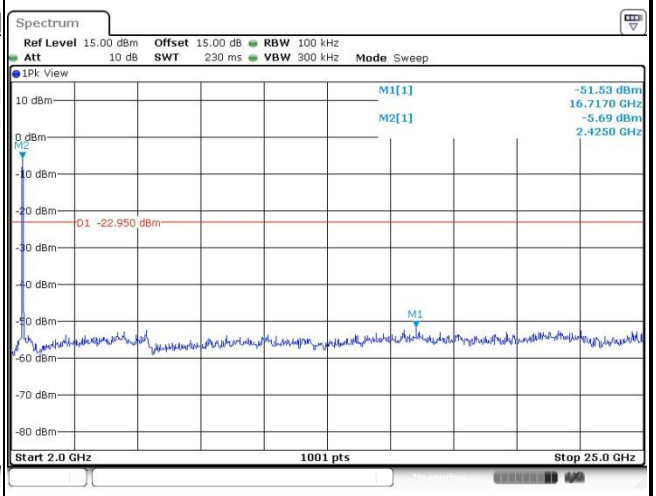
100kHz PSD reference Level	
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

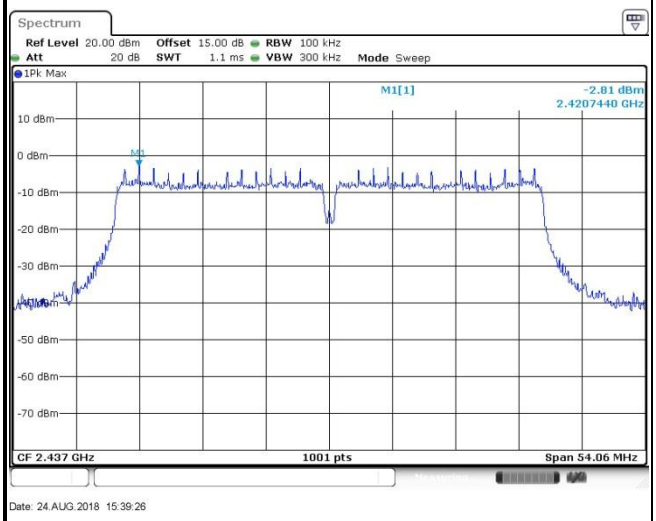
Test Mode :	802.11n HT20	Test Channel :	11

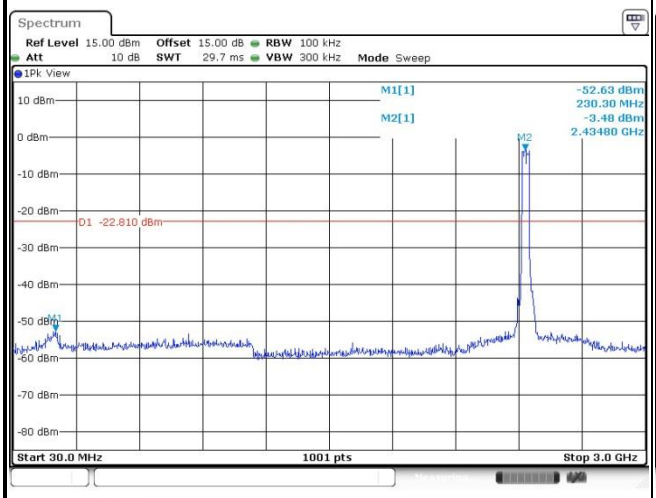
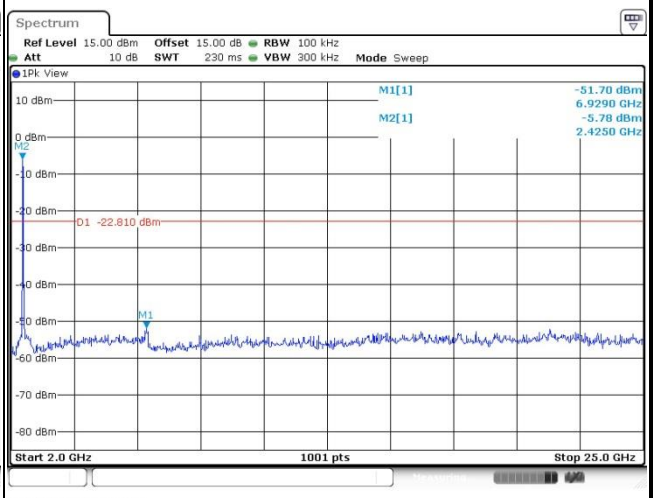
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT40	Test Channel :	03

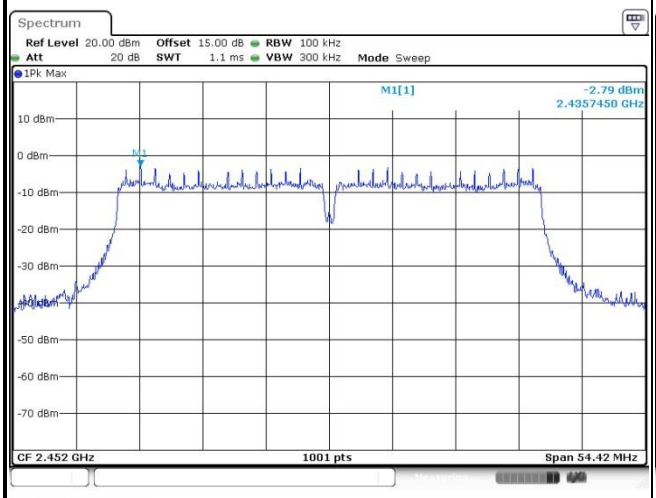
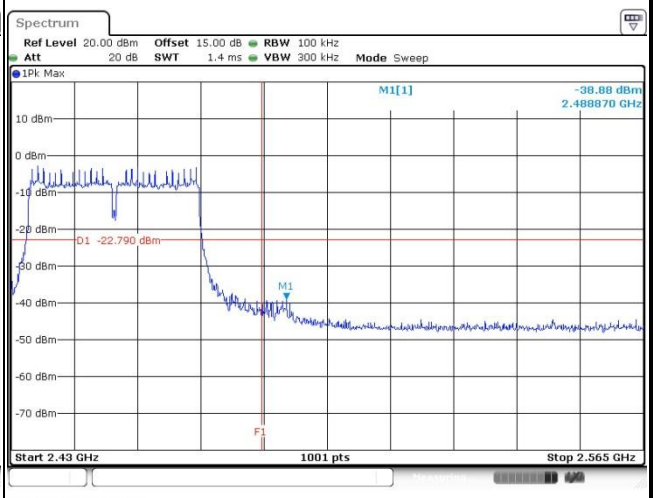
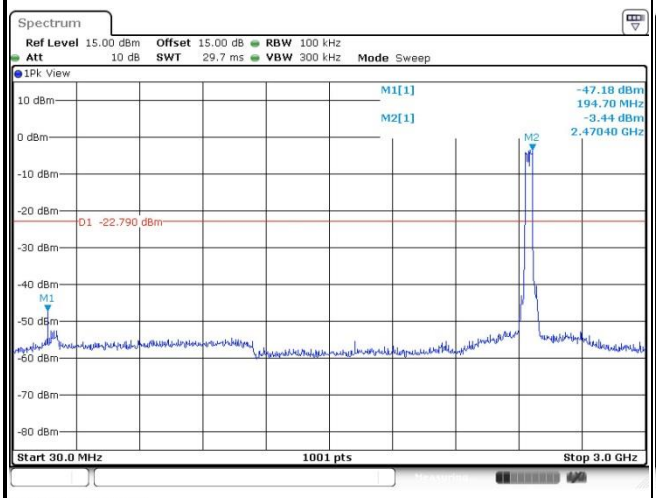
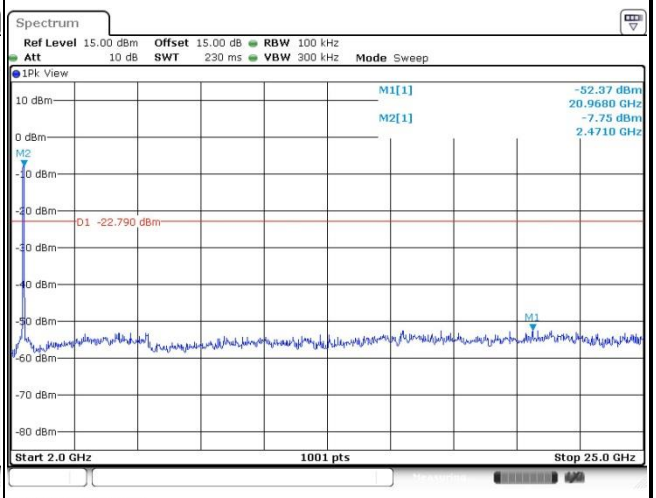
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

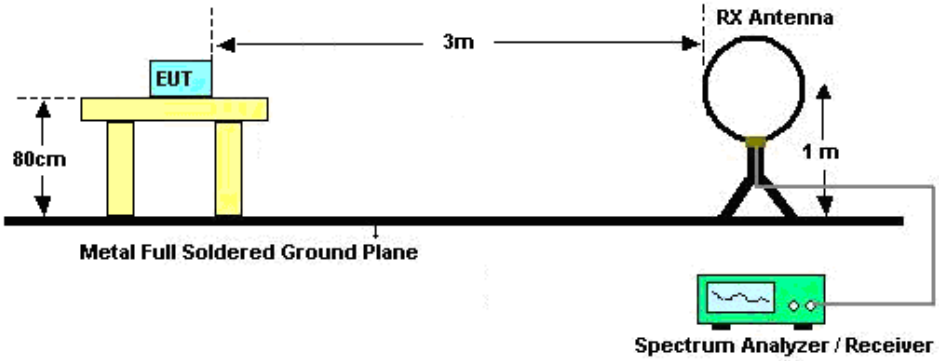
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

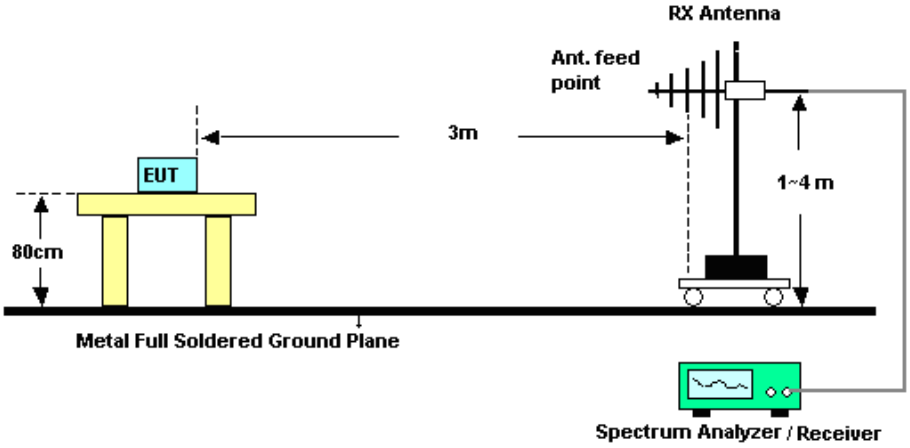
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

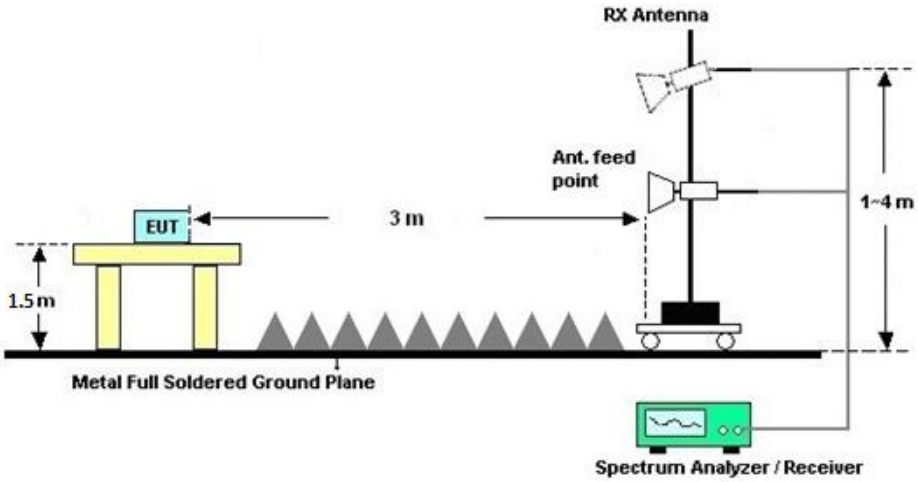
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C.

3.6 Antenna Requirements

3.6.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.6.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.6.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101400	9kHz~30GHz	Dec. 26, 2017	Jul. 02, 2018~ Aug. 24, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	Jul. 02, 2018~ Aug. 24, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	Jul. 02, 2018~ Aug. 24, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Jul. 02, 2018~ Aug. 24, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 19, 2018	Aug. 19, 2018~ Aug. 22, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2018	Aug. 19, 2018~ Aug. 22, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2018	Aug. 19, 2018~ Aug. 22, 2018	May 13, 2019	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Aug 29, 2017	Aug. 19, 2018~ Aug. 22, 2018	Aug. 28, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Aug. 19, 2018~ Aug. 22, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Apr. 20, 2018	Aug. 19, 2018~ Aug. 22, 2018	Apr. 19, 2019	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2017	Aug. 19, 2018~ Aug. 22, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1989346	1GHz~18GHz	Jul. 30, 2018	Aug. 19, 2018~ Aug. 22, 2018	Jul. 29, 2019	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 19, 2018	Aug. 19, 2018~ Aug. 22, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 26, 2018	Aug. 19, 2018~ Aug. 22, 2018	Jul. 25, 2019	Radiation (03CH04-SZ
AC Power Source	Chroma	61601	N/A	N/A	NCR	Aug. 19, 2018~ Aug. 22, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Aug. 19, 2018~ Aug. 22, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Aug. 19, 2018~ Aug. 22, 2018	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.8 dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1 dB**

Appendix A. Conducted Test Results

Report Number : FR860104

A1 - DTS Part

Test Engineer:	Wilson Chen	Temperature:	24~26	°C
Test Date:	2018/7/2~2018/8/24	Relative Humidity:	50~53	%

Report Number : FR860104

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	12.29	10.05	0.50	Pass
11b	1Mbps	1	6	2437	12.29	10.05	0.50	Pass
11b	1Mbps	1	11	2462	12.29	10.07	0.50	Pass
11g	6Mbps	1	1	2412	17.83	16.34	0.50	Pass
11g	6Mbps	1	6	2437	17.88	16.34	0.50	Pass
11g	6Mbps	1	11	2462	17.88	16.34	0.50	Pass
HT20	MCS0	1	1	2412	18.43	17.16	0.50	Pass
HT20	MCS0	1	6	2437	18.43	17.10	0.50	Pass
HT20	MCS0	1	11	2462	18.38	17.08	0.50	Pass
HT40	MCS0	1	3	2422	36.86	36.00	0.50	Pass
HT40	MCS0	1	6	2437	36.86	36.04	0.50	Pass
HT40	MCS0	1	9	2452	36.96	36.28	0.50	Pass

Report Number : FR860104

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	1	2412	18.03	30.00	3.80	21.83	36.00	Pass
11b	1Mbps	1	6	2437	18.33	30.00	3.80	22.13	36.00	Pass
11b	1Mbps	1	11	2462	18.44	30.00	3.80	22.24	36.00	Pass
11g	6Mbps	1	1	2412	22.48	30.00	3.80	26.28	36.00	Pass
11g	6Mbps	1	6	2437	22.32	30.00	3.80	26.12	36.00	Pass
11g	6Mbps	1	11	2462	21.99	30.00	3.80	25.79	36.00	Pass
HT20	MCS0	1	1	2412	22.04	30.00	3.80	25.84	36.00	Pass
HT20	MCS0	1	6	2437	21.81	30.00	3.80	25.61	36.00	Pass
HT20	MCS0	1	11	2462	21.44	30.00	3.80	25.24	36.00	Pass
HT40	MCS0	1	3	2422	21.91	30.00	3.80	25.71	36.00	Pass
HT40	MCS0	1	6	2437	21.55	30.00	3.80	25.35	36.00	Pass
HT40	MCS0	1	9	2452	21.35	30.00	3.80	25.15	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.10	14.54
11b	1Mbps	1	6	2437	0.10	14.84
11b	1Mbps	1	11	2462	0.10	14.95
11g	6Mbps	1	1	2412	0.57	12.52
11g	6Mbps	1	6	2437	0.57	12.49
11g	6Mbps	1	11	2462	0.57	12.31
HT20	MCS0	1	1	2412	0.61	12.51
HT20	MCS0	1	6	2437	0.61	12.41
HT20	MCS0	1	11	2462	0.61	12.25
HT40	MCS0	1	3	2422	1.15	12.18
HT40	MCS0	1	6	2437	1.15	12.08
HT40	MCS0	1	9	2452	1.15	11.98

Report Number : FR860104

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-13.40	3.80	8.00	Pass
11b	1Mbps	1	6	2437	-12.54	3.80	8.00	Pass
11b	1Mbps	1	11	2462	-13.43	3.80	8.00	Pass
11g	6Mbps	1	1	2412	-13.31	3.80	8.00	Pass
11g	6Mbps	1	6	2437	-12.91	3.80	8.00	Pass
11g	6Mbps	1	11	2462	-12.95	3.80	8.00	Pass
HT20	MCS0	1	1	2412	-12.26	3.80	8.00	Pass
HT20	MCS0	1	6	2437	-13.23	3.80	8.00	Pass
HT20	MCS0	1	11	2462	-13.31	3.80	8.00	Pass
HT40	MCS0	1	3	2422	-18.82	3.80	8.00	Pass
HT40	MCS0	1	6	2437	-18.89	3.80	8.00	Pass
HT40	MCS0	1	9	2452	-19.23	3.80	8.00	Pass

Appendix B. Radiated Spurious Emission

Test Engineer :	Feiyan Zhang	Temperature :	22~25°C
		Relative Humidity :	48~52%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.17	48	-26	74	50.22	27.7	4.78	34.7	159	278	P	H
		2389.275	36.02	-17.98	54	38.24	27.7	4.78	34.7	159	278	A	H
	*	2412	93.65	-	-	95.86	27.69	4.78	34.68	159	278	P	H
	*	2412	90.55	-	-	92.76	27.69	4.78	34.68	159	278	A	H
		2388.96	51.6	-22.4	74	53.82	27.7	4.78	34.7	111	205	P	V
		2390	39.99	-14.01	54	42.19	27.7	4.78	34.68	111	205	A	V
	*	2412	102.95	-	-	105.16	27.69	4.78	34.68	111	205	P	V
	*	2412	99.93	-	-	102.14	27.69	4.78	34.68	111	205	A	V
802.11b CH 06 2437MHz		2312.38	45.99	-28.01	74	48.3	27.79	4.66	34.76	186	281	P	H
		2344.58	36.79	-17.21	54	39.1	27.75	4.66	34.72	186	281	A	H
	*	2437	92.62	-	-	94.8	27.66	4.82	34.66	186	281	P	H
	*	2437	89.59	-	-	91.77	27.66	4.82	34.66	186	281	A	H
		2498.88	45.85	-28.15	74	47.99	27.61	4.85	34.6	186	281	P	H
		2493.84	36.45	-17.55	54	38.59	27.61	4.85	34.6	186	281	A	H
		2388.68	50.09	-23.91	74	52.31	27.7	4.78	34.7	106	224	P	V
		2389.66	38.91	-15.09	54	41.13	27.7	4.78	34.7	106	224	A	V
	*	2437	102.47	-	-	104.65	27.66	4.82	34.66	106	224	P	V
	*	2437	99.43	-	-	101.61	27.66	4.82	34.66	106	224	A	V
		2487.12	51.37	-22.63	74	53.51	27.63	4.85	34.62	106	224	P	V
		2494.82	40.5	-13.5	54	42.64	27.61	4.85	34.6	106	224	A	V

802.11b CH 11 2462MHz	*	2462	91.58	-	-	93.76	27.64	4.82	34.64	100	9	P	H
	*	2462	88.54	-	-	90.72	27.64	4.82	34.64	100	9	A	H
		2484.56	46.87	-27.13	74	49.01	27.63	4.85	34.62	100	9	P	H
		2494.36	36.87	-17.13	54	39.01	27.61	4.85	34.6	100	9	A	H
	*	2462	103.06	-	-	105.24	27.64	4.82	34.64	121	231	P	V
	*	2462	100.06	-	-	102.24	27.64	4.82	34.64	121	231	A	V
		2488.4	54.21	-19.79	74	56.37	27.61	4.85	34.62	121	231	P	V
		2487.16	40.52	-13.48	54	42.66	27.63	4.85	34.62	121	231	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	39.42	-34.58	74	60.3	31.76	5.55	58.19	141	214	P	H
		4824	39.63	-34.37	74	60.51	31.76	5.55	58.19	158	320	P	V
802.11b CH 06 2437MHz		4874	38.49	-35.51	74	59.06	31.88	5.65	58.1	122	136	P	H
		7311	45.91	-28.09	74	59.69	36.88	7.26	57.92	112	298	P	H
		4874	40.16	-33.84	74	60.73	31.88	5.65	58.1	233	102	P	V
		7311	45.84	-28.16	74	59.62	36.88	7.26	57.92	185	32	P	V
802.11b CH 11 2462MHz		4924	37.01	-36.99	74	57.17	32	5.86	58.02	102	203	P	H
		7386	45.52	-28.48	74	58.76	37.21	7.2	57.65	172	214	P	H
		4924	38.5	-35.5	74	58.66	32	5.86	58.02	150	271	P	V
		7386	45.32	-28.68	74	58.56	37.21	7.2	57.65	195	226	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.485	47.57	-26.43	74	49.79	27.7	4.78	34.7	112	322	P	H
		2319.975	37.16	-16.84	54	39.47	27.77	4.66	34.74	112	322	A	H
	*	2412	93.3	-	-	95.51	27.69	4.78	34.68	112	322	P	H
	*	2412	85.55	-	-	87.76	27.69	4.78	34.68	112	322	A	H
		2389.275	54.82	-19.18	74	57.04	27.7	4.78	34.7	100	194	P	V
		2389.8	42.75	-11.25	54	44.95	27.7	4.78	34.68	100	194	A	V
	*	2412	103.48	-	-	105.69	27.69	4.78	34.68	100	194	P	V
	*	2412	94.93	-	-	97.14	27.69	4.78	34.68	100	194	A	V
802.11g CH 06 2437MHz		2323.86	46.75	-27.25	74	49.06	27.77	4.66	34.74	192	280	P	H
		2349.06	36.91	-17.09	54	39.16	27.75	4.72	34.72	192	280	A	H
	*	2437	93.51	-	-	95.69	27.66	4.82	34.66	192	280	P	H
	*	2437	84.96	-	-	87.14	27.66	4.82	34.66	192	280	A	H
		2489.43	45.86	-28.14	74	48.02	27.61	4.85	34.62	192	280	P	H
		2495.52	35.91	-18.09	54	38.05	27.61	4.85	34.6	192	280	A	H
		2346.82	49.94	-24.06	74	52.19	27.75	4.72	34.72	111	224	P	V
		2388.54	40.16	-13.84	54	42.38	27.7	4.78	34.7	111	224	A	V
	*	2437	102.94	-	-	105.12	27.66	4.82	34.66	111	224	P	V
	*	2437	95.14	-	-	97.32	27.66	4.82	34.66	111	224	A	V
		2492.65	50.34	-23.66	74	52.48	27.61	4.85	34.6	111	224	P	V
		2495.66	40.72	-13.28	54	42.86	27.61	4.85	34.6	111	224	A	V

802.11g CH 11 2462MHz	*	2462	92.23	-	-	94.41	27.64	4.82	34.64	100	11	P	H
	*	2462	83.4	-	-	85.58	27.64	4.82	34.64	100	11	A	H
		2484.52	49.05	-24.95	74	51.19	27.63	4.85	34.62	100	11	P	H
		2483.52	38.06	-15.94	54	40.2	27.63	4.85	34.62	100	11	A	H
	*	2462	102.01	-	-	104.19	27.64	4.82	34.64	117	234	P	V
	*	2462	94.91	-	-	97.09	27.64	4.82	34.64	117	234	A	V
		2484.08	59.12	-14.88	74	61.26	27.63	4.85	34.62	117	234	P	V
		2483.72	45.76	-8.24	54	47.9	27.63	4.85	34.62	117	234	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	39.34	-34.66	74	60.22	31.76	5.55	58.19	141	214	P	H
		4824	39.24	-34.76	74	60.12	31.76	5.55	58.19	158	320	P	V
802.11g CH 06 2437MHz		4874	38.21	-35.79	74	58.78	31.88	5.65	58.1	217	201	P	H
		7311	46.07	-27.93	74	59.85	36.88	7.26	57.92	100	140	P	H
		4874	39.88	-34.12	74	60.45	31.88	5.65	58.1	217	201	P	V
		7311	45.2	-28.8	74	58.98	36.88	7.26	57.92	100	140	P	V
802.11g CH 11 2462MHz		4924	37.37	-36.63	74	57.53	32	5.86	58.02	102	203	P	H
		7386	44.36	-29.64	74	57.6	37.21	7.2	57.65	172	214	P	H
		4924	37.72	-36.28	74	57.88	32	5.86	58.02	150	269	P	V
		7386	44.45	-29.55	74	57.69	37.21	7.2	57.65	189	238	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2388.33	50.74	-23.26	74	51.26	27.7	4.78	33	113	321	P	H
		2389.8	39.38	-14.62	54	39.9	27.7	4.78	33	113	321	A	H
802.11n	*	2412	94.19	-	-	94.72	27.69	4.78	33	113	321	P	H
HT20	*	2412	86.71	-	-	87.24	27.69	4.78	33	113	321	A	H
CH 01		2388.435	59.28	-14.72	74	59.8	27.7	4.78	33	112	201	P	V
2412MHz		2389.8	46.55	-7.45	54	47.07	27.7	4.78	33	112	201	A	V
	*	2412	104.3	-	-	104.83	27.69	4.78	33	112	201	P	V
	*	2412	96.88	-	-	97.41	27.69	4.78	33	112	201	A	V
		2330.16	48.71	-25.29	74	49.28	27.77	4.66	33	111	319	P	H
		2368.24	38.36	-15.64	54	38.9	27.74	4.72	33	111	319	A	H
	*	2437	92.11	-	-	92.63	27.66	4.82	33	111	319	P	H
	*	2437	84.77	-	-	85.29	27.66	4.82	33	111	319	A	H
802.11n		2495.59	48.33	-25.67	74	48.87	27.61	4.85	33	111	319	P	H
HT20		2484.88	37.8	-16.2	54	38.32	27.63	4.85	33	111	319	A	H
CH 06		2388.54	51.38	-22.62	74	51.9	27.7	4.78	33	109	222	P	V
2437MHz		2385.32	41.83	-12.17	54	42.33	27.72	4.78	33	109	222	A	V
	*	2437	103.87	-	-	104.39	27.66	4.82	33	109	222	P	V
	*	2437	96.51	-	-	97.03	27.66	4.82	33	109	222	A	V
		2495.66	51.61	-22.39	74	52.15	27.61	4.85	33	109	222	P	V
		2493.49	42.22	-11.78	54	42.76	27.61	4.85	33	109	222	A	V

802.11n HT20 CH 11 2462MHz	*	2462	92.38	-	-	92.92	27.64	4.82	33	100	9	P	H
	*	2462	84.87	-	-	85.41	27.64	4.82	33	100	9	A	H
		2485.76	53.09	-20.91	74	53.61	27.63	4.85	33	100	9	P	H
		2483.6	40.51	-13.49	54	41.03	27.63	4.85	33	100	9	A	H
	*	2462	103.61	-	-	104.15	27.64	4.82	33	118	233	P	V
	*	2462	96.29	-	-	96.83	27.64	4.82	33	118	233	A	V
		2484.8	66.66	-7.34	74	67.18	27.63	4.85	33	118	233	P	V
		2483.52	49.33	-4.67	54	49.85	27.63	4.85	33	118	233	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	39.75	-34.25	74	60.63	31.76	5.55	58.19	158	320	P	H
		4824	39.09	-34.91	74	59.97	31.76	5.55	58.19	141	31	P	V
802.11n HT20 CH 06 2437MHz		4874	38.37	-35.63	74	58.94	31.88	5.65	58.1	122	136	P	H
		7311	44.7	-29.3	74	58.48	36.88	7.26	57.92	112	298	P	H
		4874	38.94	-35.06	74	59.51	31.88	5.65	58.1	233	102	P	V
		7311	45.38	-28.62	74	59.16	36.88	7.26	57.92	185	32	P	V
802.11n HT20 CH 11 2462MHz		4924	38.06	-35.94	74	58.22	32	5.86	58.02	102	203	P	H
		7386	45.56	-28.44	74	58.8	37.21	7.2	57.65	172	214	P	H
		4924	37.16	-36.84	74	57.32	32	5.86	58.02	150	271	P	V
		7386	45.44	-28.56	74	58.68	37.21	7.2	57.65	195	226	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2386.3	55.58	-18.42	74	56.1	27.7	4.78	33	113	325	P	H
		2389.94	44.26	-9.74	54	44.78	27.7	4.78	33	113	325	A	H
	*	2422	93.04	-	-	93.59	27.67	4.78	33	113	325	P	H
	*	2422	86.02	-	-	86.57	27.67	4.78	33	113	325	A	H
802.11n		2499.86	48.78	-25.22	74	49.32	27.61	4.85	33	113	325	P	H
HT40		2487.96	39.47	-14.53	54	40.01	27.61	4.85	33	113	325	A	H
CH 03		2387.98	63.22	-10.78	74	63.74	27.7	4.78	33	116	206	P	V
2422MHz		2389.52	50.49	-3.51	54	51.01	27.7	4.78	33	116	206	A	V
	*	2422	100.87	-	-	101.42	27.67	4.78	33	116	206	P	V
	*	2422	94.69	-	-	95.24	27.67	4.78	33	116	206	A	V
		2484.32	53.38	-20.62	74	53.9	27.63	4.85	33	116	206	P	V
		2486.56	44.24	-9.76	54	44.76	27.63	4.85	33	116	206	A	V
		2367.96	49.32	-24.68	74	49.86	27.74	4.72	33	113	324	P	H
		2388.26	40.17	-13.83	54	40.69	27.7	4.78	33	113	324	A	H
	*	2437	91.54	-	-	92.06	27.66	4.82	33	113	324	P	H
	*	2437	84.28	-	-	84.8	27.66	4.82	33	113	324	A	H
802.11n		2484.11	49.02	-24.98	74	49.54	27.63	4.85	33	113	324	P	H
HT40		2484.25	40.13	-13.87	54	40.65	27.63	4.85	33	113	324	A	H
CH 06		2389.66	54.06	-19.94	74	54.58	27.7	4.78	33	121	205	P	V
2437MHz		2389.94	44.73	-9.27	54	45.25	27.7	4.78	33	121	205	A	V
	*	2437	100.56	-	-	101.08	27.66	4.82	33	121	205	P	V
	*	2437	93.27	-	-	93.79	27.66	4.82	33	121	205	A	V
		2484.95	61.48	-12.52	74	62	27.63	4.85	33	121	205	P	V
		2484.04	45.48	-8.52	54	46	27.63	4.85	33	121	205	A	V

802.11n HT40 CH 09 2452MHz		2368.52	49.55	-24.45	74	50.11	27.72	4.72	33	120	324	P	H
		2347.8	40.14	-13.86	54	40.67	27.75	4.72	33	120	324	A	H
	*	2452	92.24	-	-	92.76	27.66	4.82	33	120	324	P	H
	*	2452	84.78	-	-	85.3	27.66	4.82	33	120	324	A	H
		2484.88	57.49	-16.51	74	58.01	27.63	4.85	33	120	324	P	H
		2483.69	45.3	-8.7	54	45.82	27.63	4.85	33	120	324	A	H
		2356.06	51.25	-22.75	74	51.79	27.74	4.72	33	100	64	P	V
		2351.3	42.15	-11.85	54	42.68	27.75	4.72	33	100	64	A	V
	*	2452	99.42	-	-	99.94	27.66	4.82	33	100	64	P	V
	*	2452	92	-	-	92.52	27.66	4.82	33	100	64	A	V
		2484.46	64.25	-9.75	74	64.77	27.63	4.85	33	100	64	P	V
		2484.74	50.59	-3.41	54	51.11	27.63	4.85	33	100	64	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4844	39.75	-34.25	74	60.46	31.8	5.65	58.16	114	148	P	H
HT40		7266	44.47	-29.53	74	58.46	36.75	7.29	58.03	189	238	P	H
CH 03		4844	38.73	-35.27	74	59.44	31.8	5.65	58.16	200	210	P	V
2422MHz		7266	45.22	-28.78	74	59.21	36.75	7.29	58.03	105	269	P	V
802.11n		4874	38.37	-35.63	74	58.94	31.88	5.65	58.1	122	136	P	H
HT40		7311	44.7	-29.3	74	58.48	36.88	7.26	57.92	112	298	P	H
CH 06		4874	38.94	-35.06	74	59.51	31.88	5.65	58.1	233	102	P	V
2437MHz		7311	45.38	-28.62	74	59.16	36.88	7.26	57.92	185	32	P	V
802.11n		4904	37.85	-36.15	74	58.17	31.96	5.76	58.04	200	89	P	H
HT40		7356	44.46	-29.54	74	57.91	37.08	7.23	57.76	181	318	P	H
CH 09		4904	37.72	-36.28	74	58.04	31.96	5.76	58.04	152	149	P	V
2452MHz		7356	45.54	-28.46	74	58.99	37.08	7.23	57.76	180	225	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT40 LF		192.96	32.58	-10.92	43.5	46.94	15.46	1.54	31.36	-	-	P	H
		214.3	33.95	-9.55	43.5	48.22	15.39	1.64	31.3	-	-	P	H
		289.96	34.13	-11.87	46	44.48	19.05	1.82	31.22	-	-	P	H
		435.46	34.42	-11.58	46	41.19	22.24	2.26	31.27	-	-	P	H
		579.99	41.22	-4.78	46	45.56	24.28	2.64	31.26	100	76	P	H
		967.02	39.94	-14.06	54	40.68	27.1	3.5	31.34	-	-	P	H
		32.91	26.49	-13.51	40	35.48	22.66	0.32	31.97	-	-	P	V
		113.42	27.51	-15.99	43.5	40.51	17.57	1.11	31.68	-	-	P	V
		192.96	32.69	-10.81	43.5	47.05	15.46	1.54	31.36	-	-	P	V
		482.99	41.13	-4.87	46	46.91	23.09	2.38	31.25	100	22	P	V
		579.99	39.95	-6.05	46	44.29	24.28	2.64	31.26	-	-	P	V
		773.02	36.51	-9.49	46	38.76	25.85	3.09	31.19	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBµV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBµV/m) – Limit Line(dBµV/m)

For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) – 35.86 (dB)

= 55.45 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 55.45(dBµV/m) – 74(dBµV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBµV) – 35.86 (dB)

= 43.54 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 43.54(dBµV/m) – 54(dBµV/m)

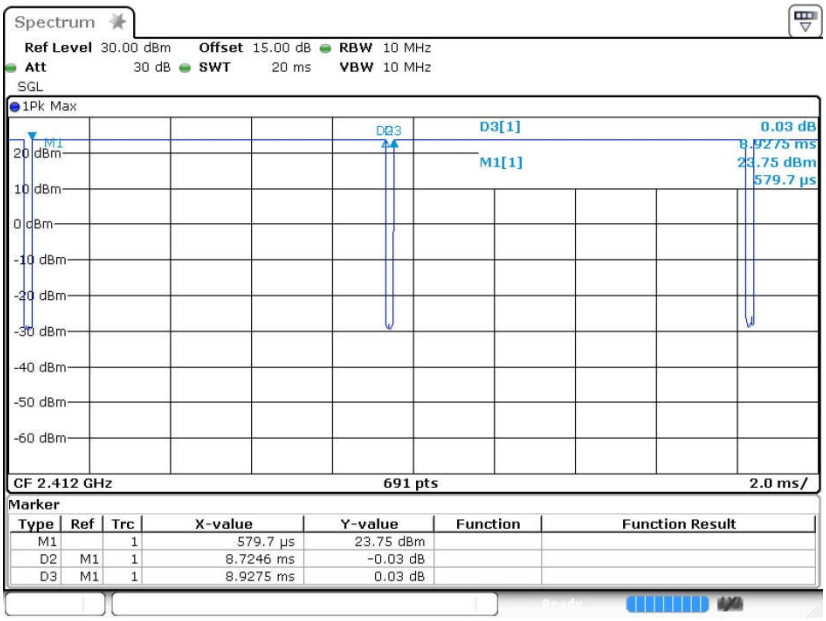
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.

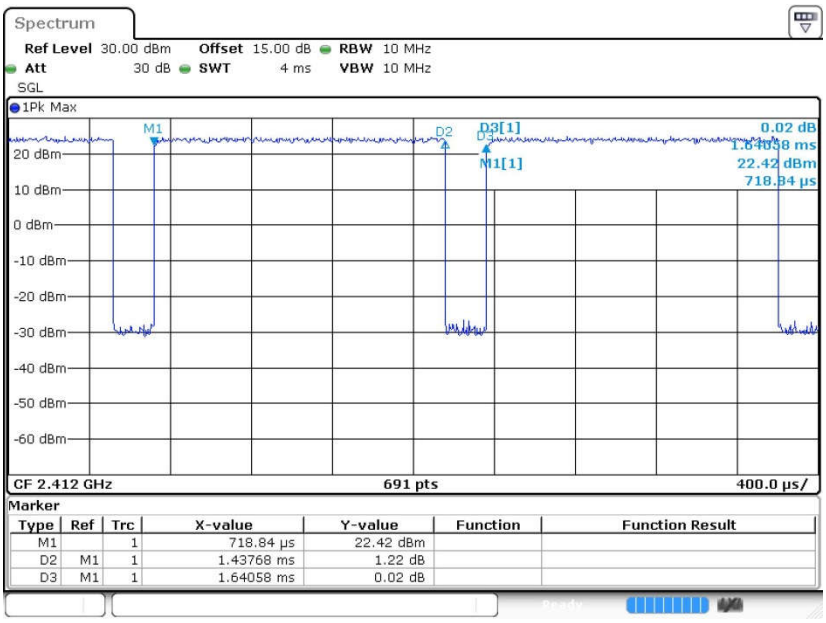
Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.73	8.725	0.115	300Hz
802.11g	87.63	1.438	0.696	1KHz
802.11n HT20	86.94	1.351	0.740	1KHz
802.11n HT40	76.67	0.667	1.500	3KHz

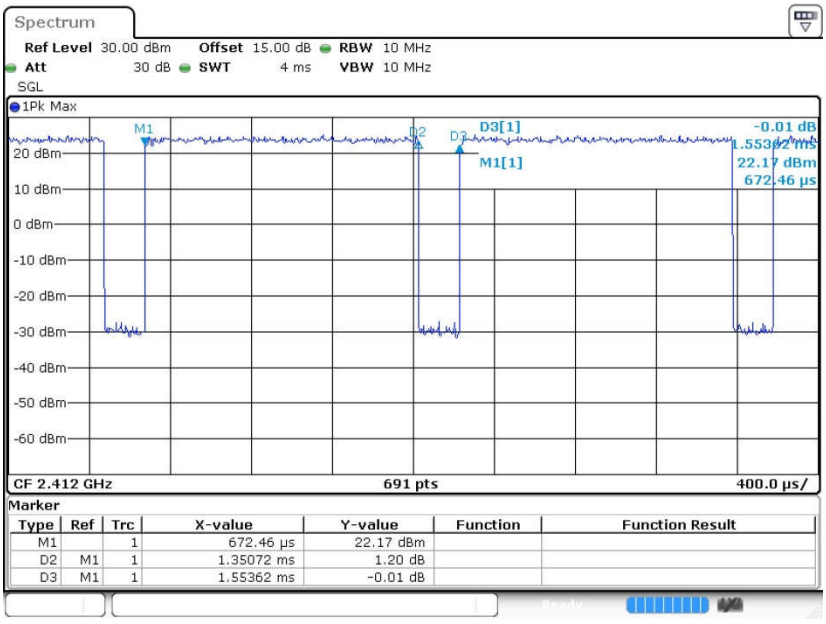
802.11b



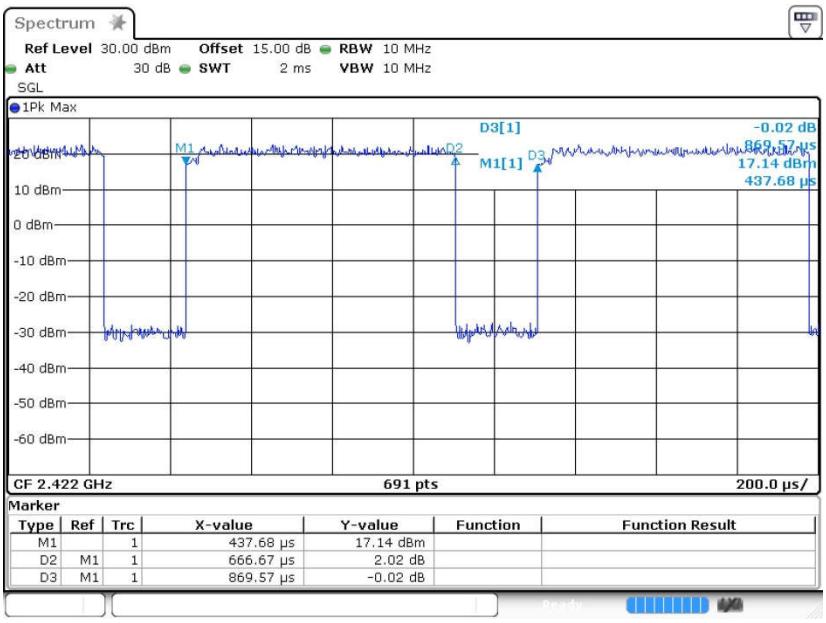
802.11g



802.11n HT20



802.11n HT40


Spectrum
Ref Level 30.00 dBm Offset 15.00 dB RBW 10 MHz
Att 30 dB SWT 2 ms VBW 10 MHz
SGL
1Pk Max
D3[1] -0.02 dB
869.57 µs
M1[1] 17.14 dBm
437.68 µs
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.422 GHz
691 pts
200.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 437.68 µs 17.14 dBm
D2 M1 1 666.67 µs 2.02 dB
D3 M1 1 869.57 µs -0.02 dB