FCC RF Test Report

APPLICANT	:	PAX Technology Limited
EQUIPMENT	:	Wireless POS Terminal
BRAND NAME	:	PAX
MODEL NAME	:	PAX D220
MARKETING NAME	:	PAX D220
FCC ID	:	V5P-D2204GMA
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Aug. 22, 2018 and testing was completed on Sep. 23, 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
FR882223C	Rev. 01	Initial issue of report	Dec. 06, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	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 3.27 dB at 30.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 5.90 dB at 0.500 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

PAX Technology Limited
Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour Road, Wanchai, Hong Kong

1.2 Manufacturer

PAX Computer Technology (Shenzhen) Co., Ltd.
4/F, No.3 Building, Software Park, Second Central Science-Tech Road, High-Tech industrial Park, Shenzhen, Guangdong, P.R.C.

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wireless POS Terminal
Brand Name	PAX
Model Name	PAX D220
Marketing Name	PAX D220
FCC ID	V5P-D2204GMA
EUT supports Radios application	LTE/NFC WLAN2.4GHz 802.11b/g/n HT20 Bluetooth BR/EDR/LE
EUT Stage	Identical Prototype

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 : 17.62 dBm (0.0578 W) 802.11g : 23.10 dBm (0.2042 W) 802.11n HT20 : 22.12 dBm (0.1629 W)
99% Occupied Bandwidth	802.11b : 14.186MHz 802.11g : 18.182MHz 802.11n HT20 : 18.881MHz
Antenna Type / Gain	FPC Antenna with gain 0.60 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).

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 designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ CO01-SZ	CN5018	337463

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 designation No.**	**FCC Test Firm Registration No.**
	03CH02-SZ	CN5019	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 558074 D01 15.247 Meas Guidance v05
- 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 (Z 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		

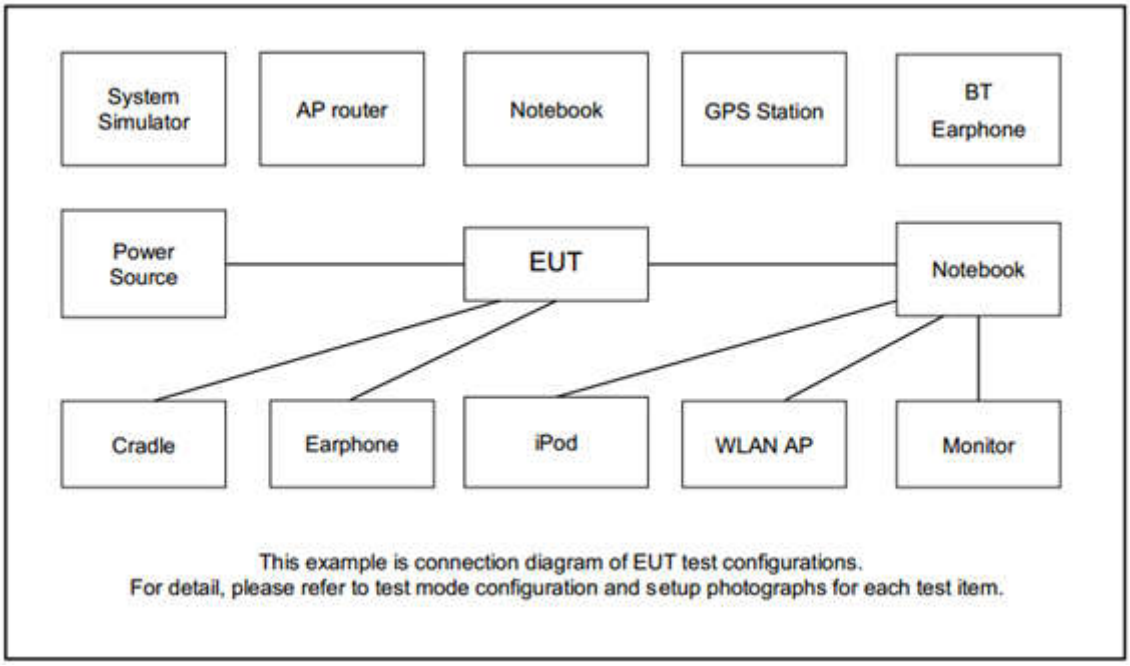
2.2 Test Mode

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

Test Cases	
AC Conducted Emission	Mode 1 :LTE Cat M1 Band 4 Idle + WLAN2.4G Link + USB Cable (Charging from Adapter 1) Mode 2 :LTE Cat M1 Band 12 Idle + Bluetooth Link + USB Cable (Charging from Adapter 1) Mode 3 : LTE Cat M1 Band 4 Idle + WLAN2.4G Link + USB Cable (Charging from Adapter 2)
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.	

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, 1.8 m
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Moto	N/A	N/A	N/A	N/A
4.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

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 and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

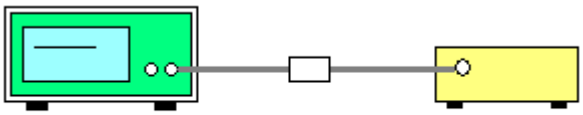
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

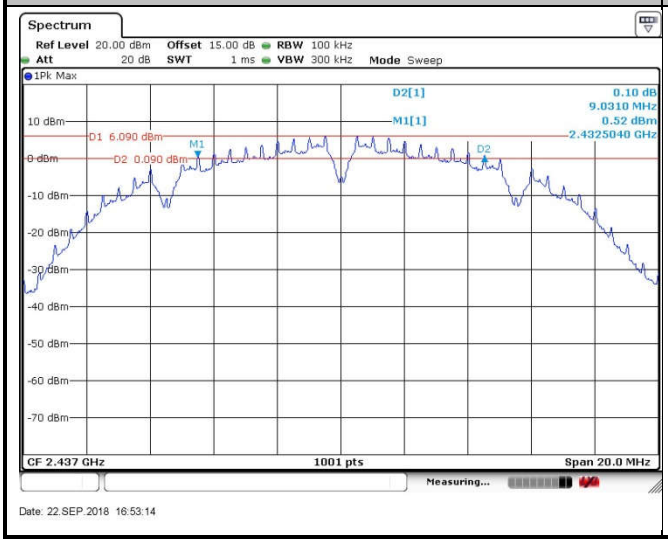
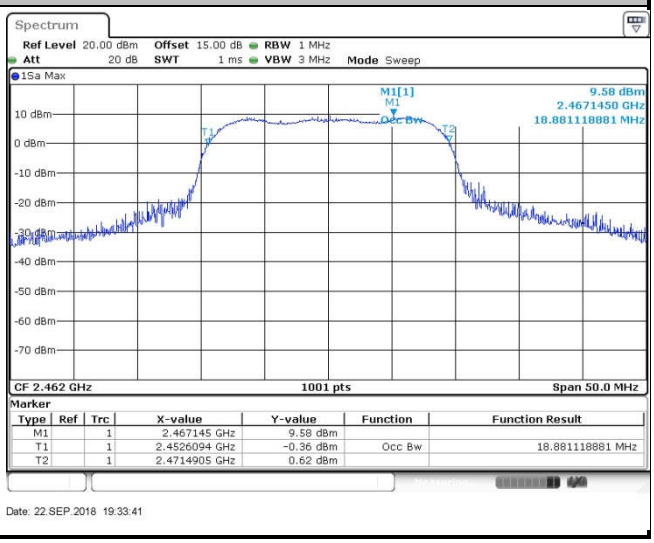
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth	Maximum 99% Occupied 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.

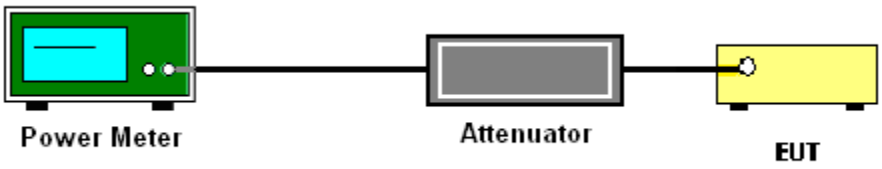
3.2.2 Measuring Instruments

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 ANSI C63.10-2013 clause 11.9.1.3 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.

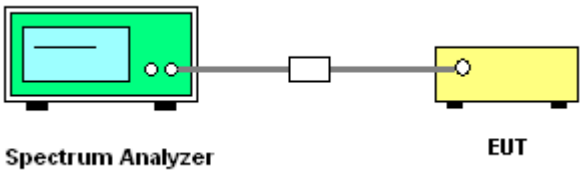
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
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.

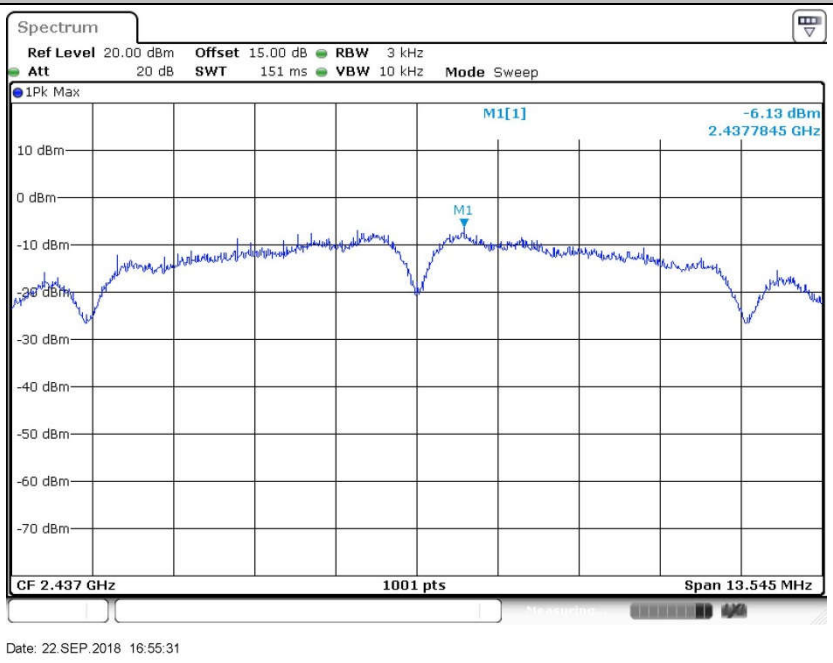
3.3.4 Test Setup



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.

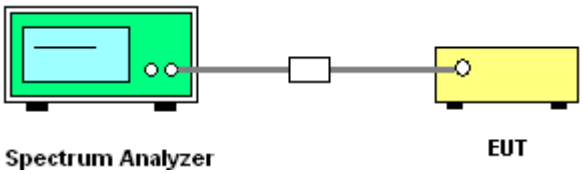
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.13
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.

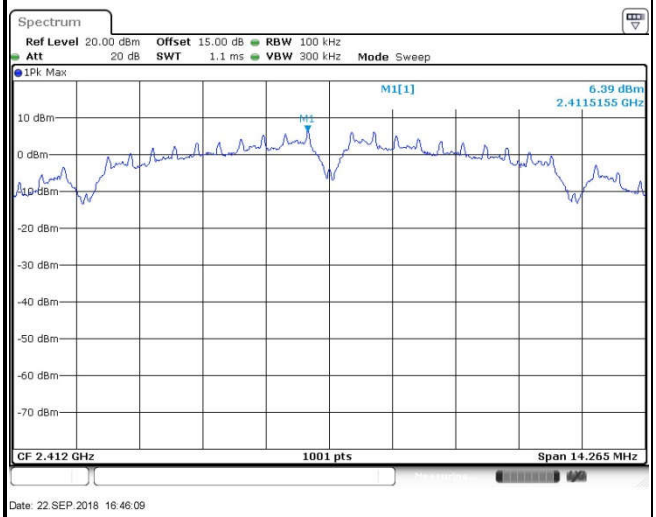
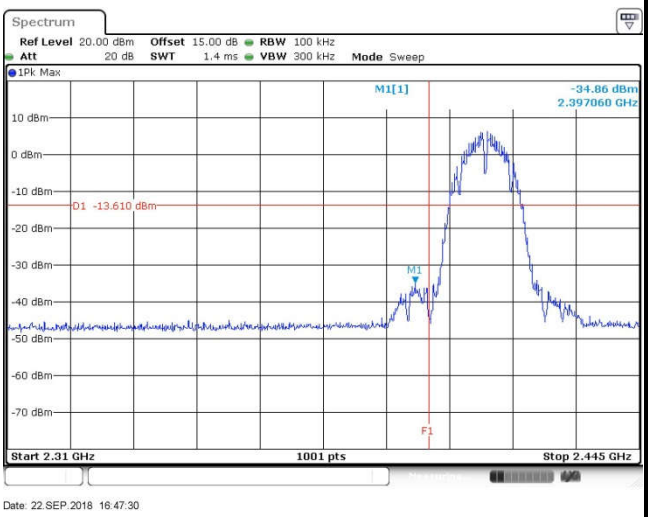
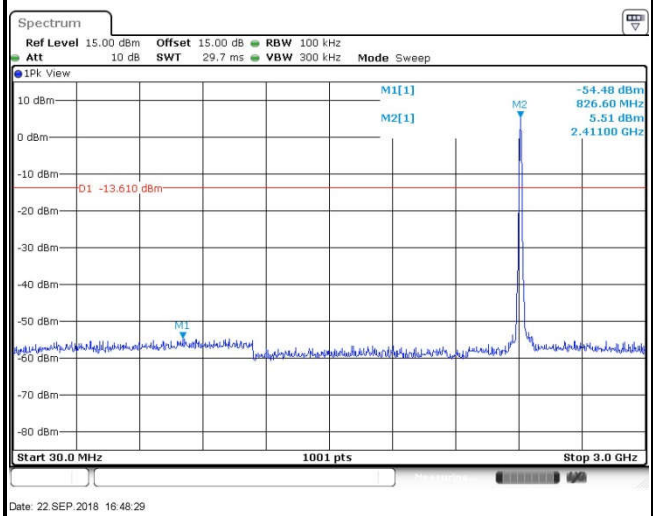
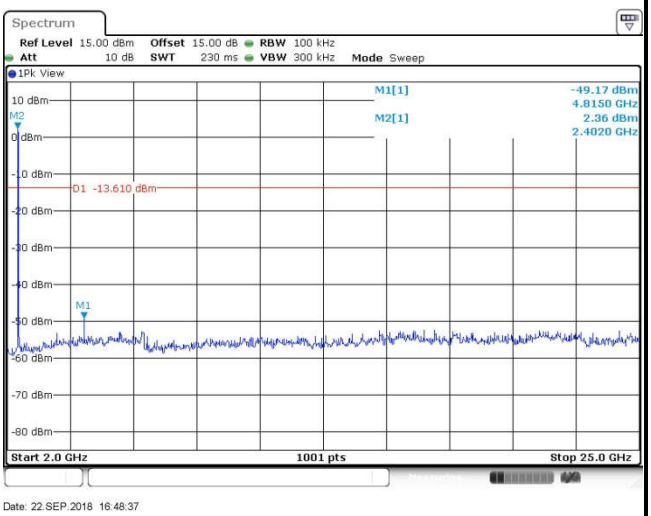
3.4.4 Test Setup



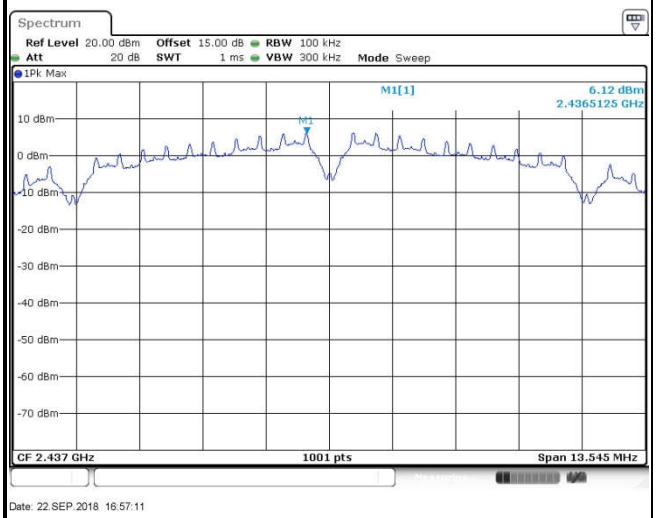
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

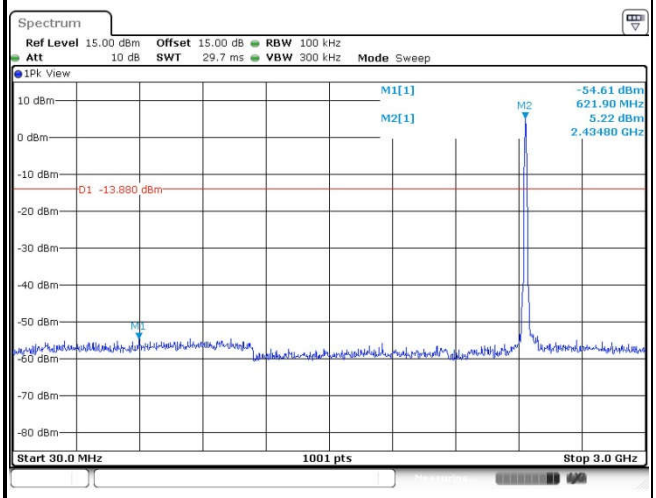
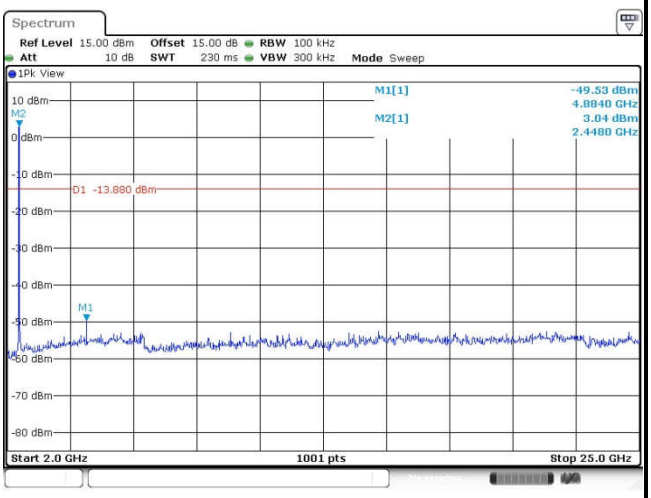
Test Engineer :	Hayden Chen	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

Test Mode :	802.11b	**Test Channel :**	01

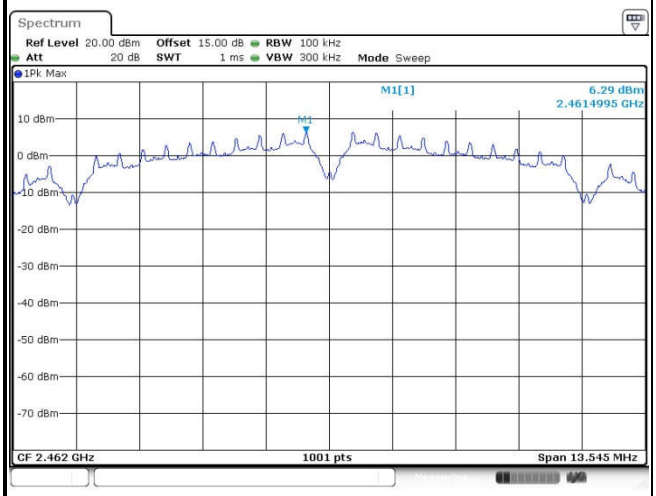
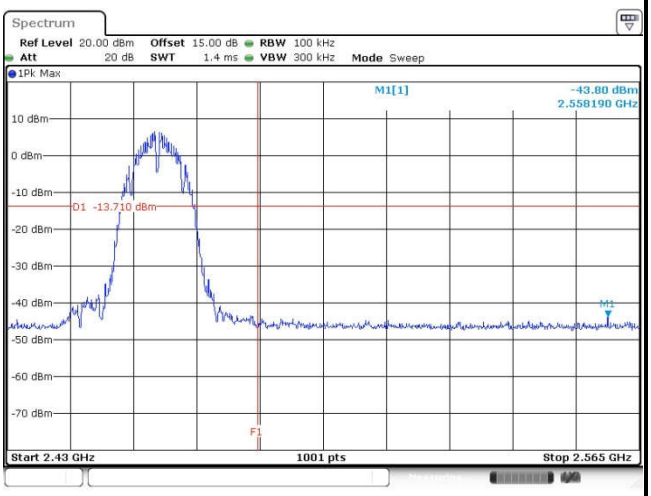
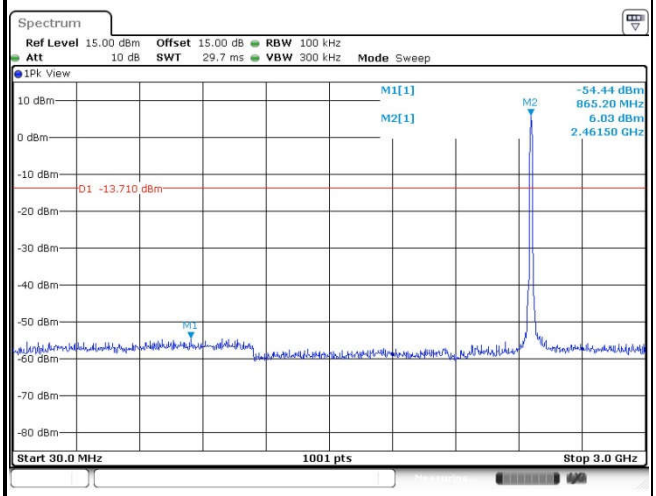
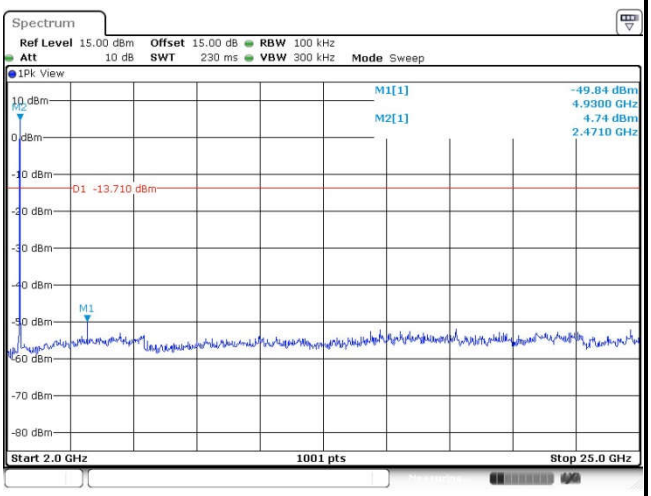
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

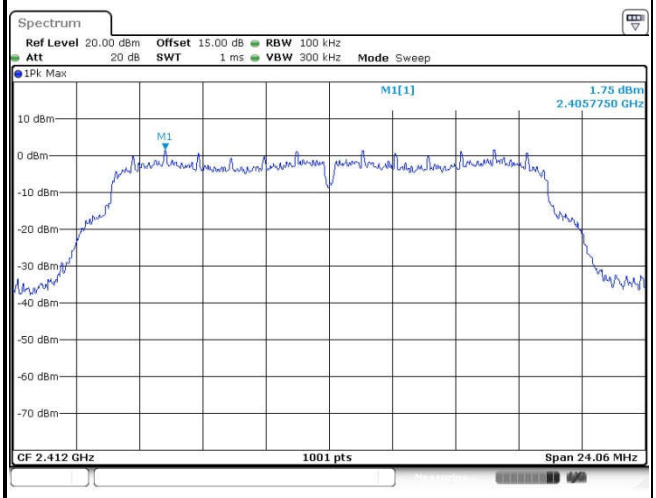
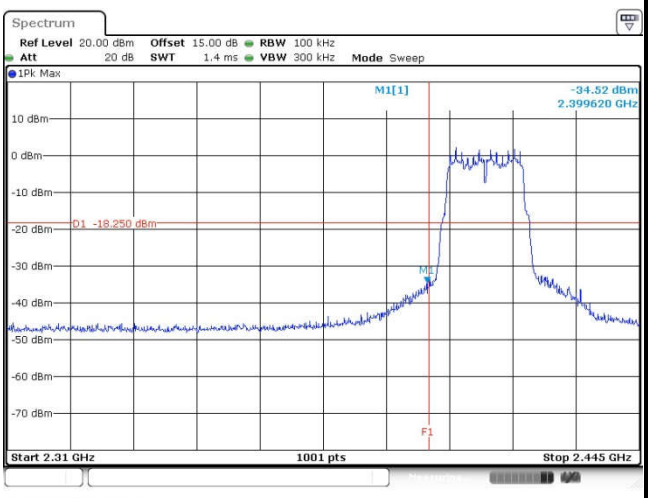
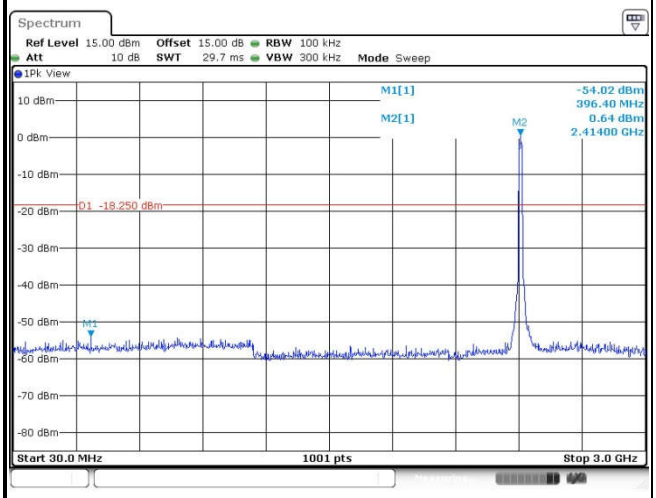
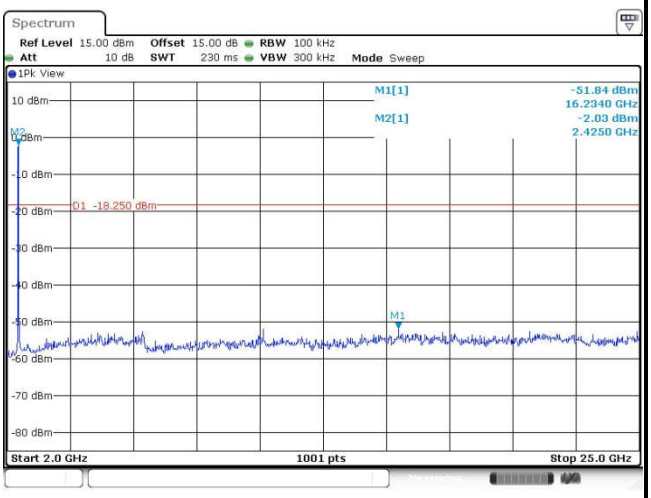
100kHz PSD reference Level	
	

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

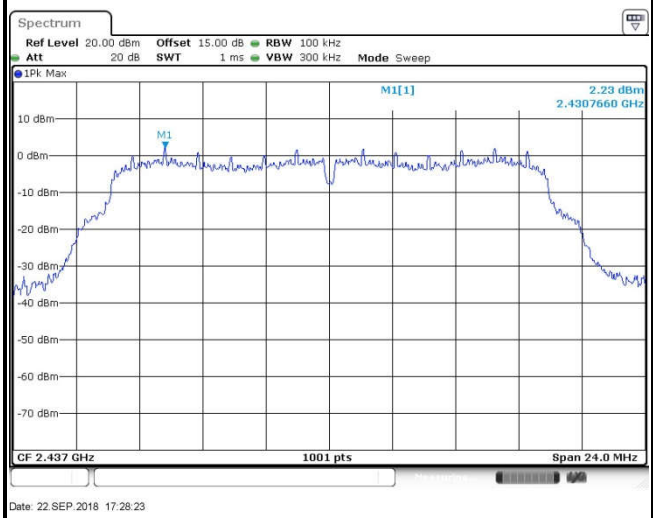
Test Mode :	802.11b	Test Channel :	11

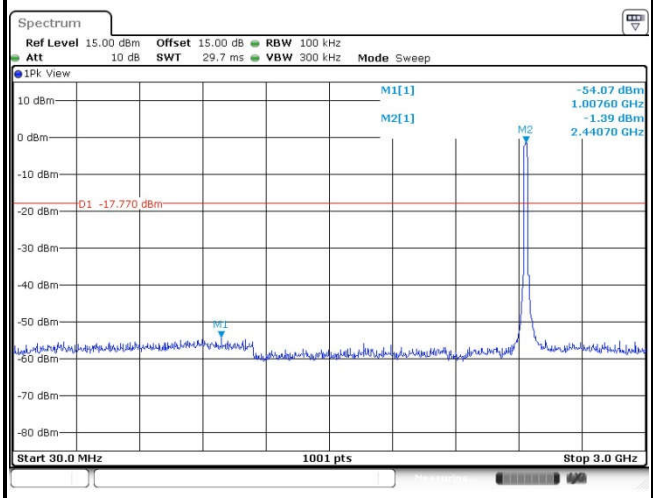
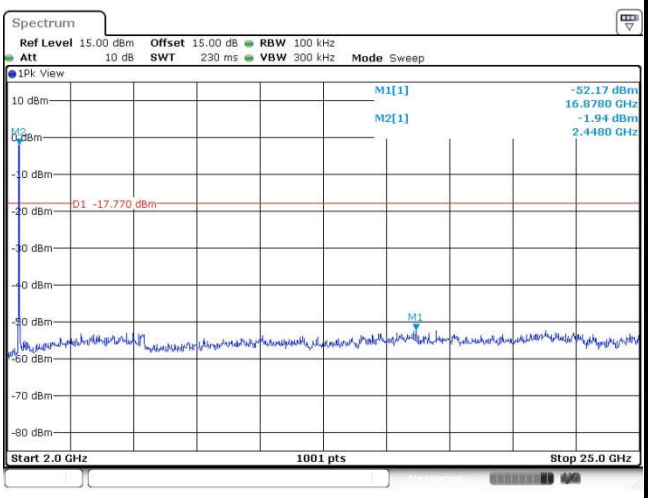
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

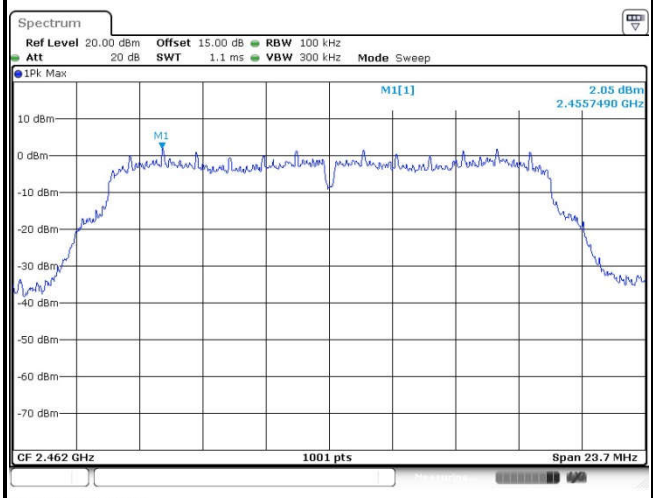
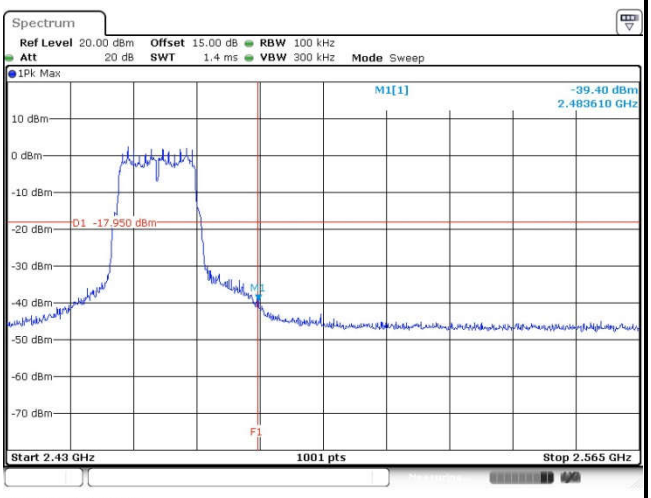
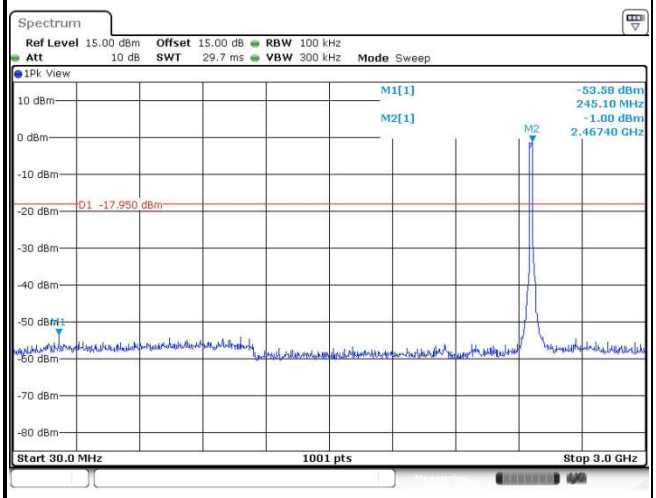
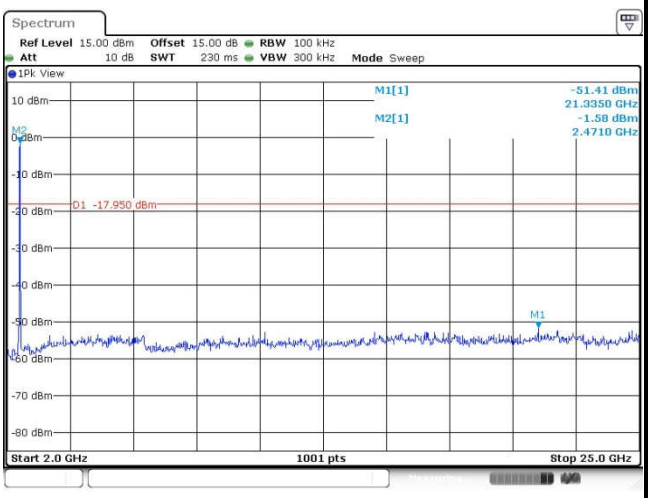
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

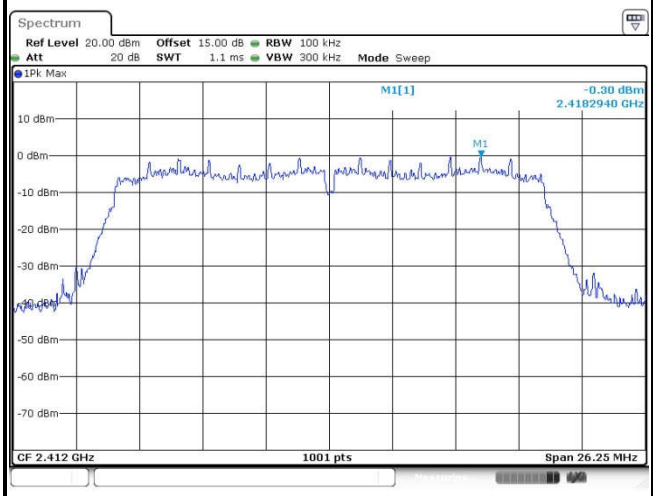
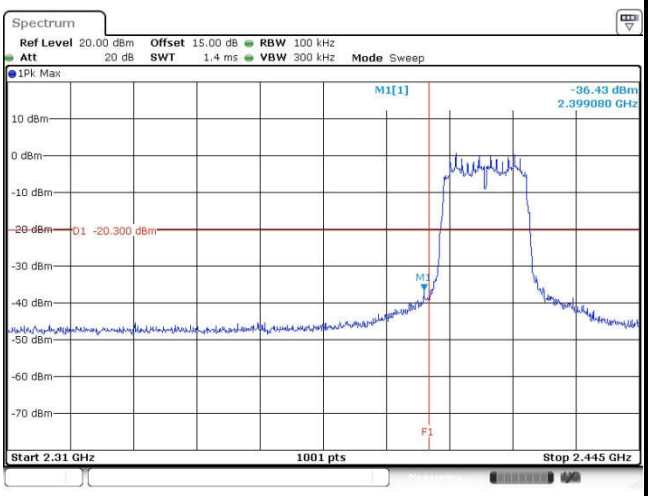
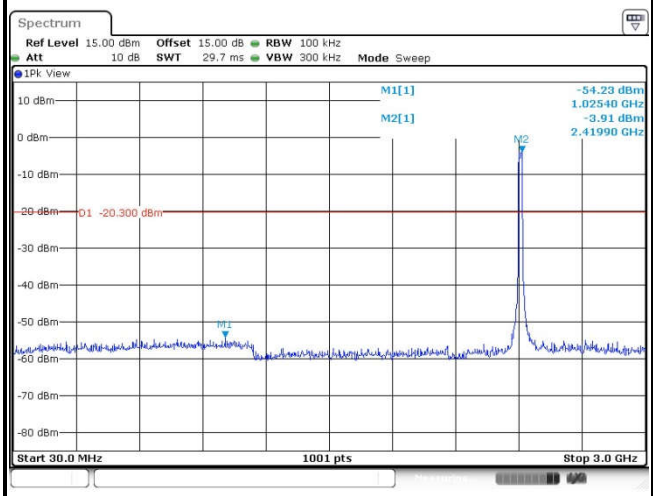
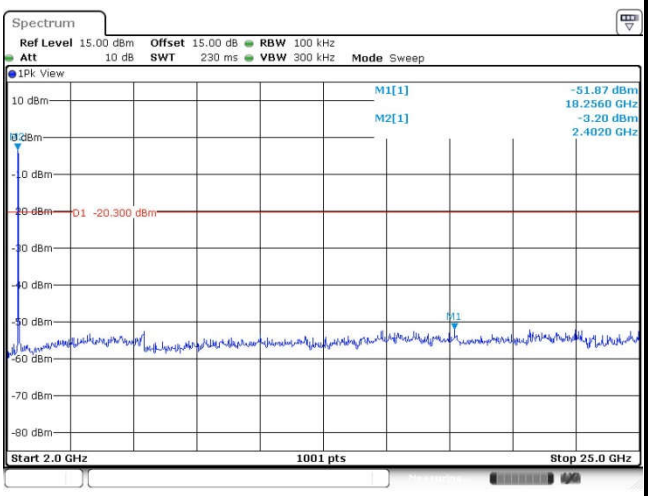
100kHz PSD reference Level	
	

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

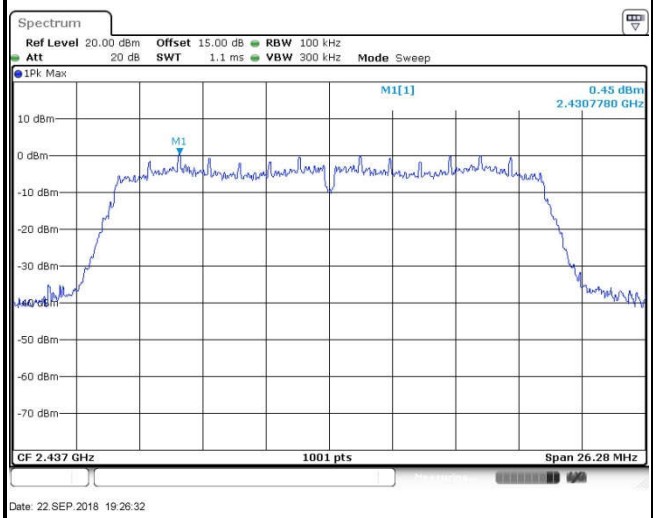
Test Mode :	802.11g	Test Channel :	11

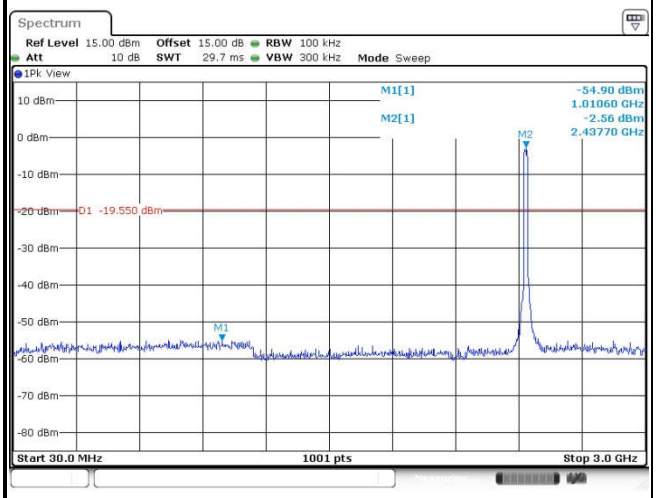
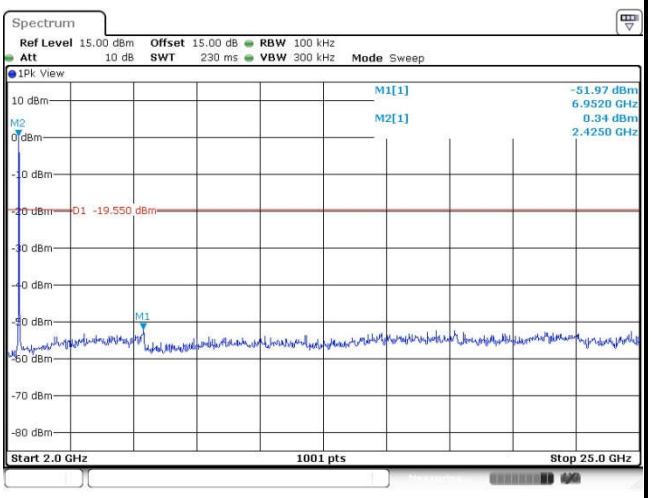
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	01

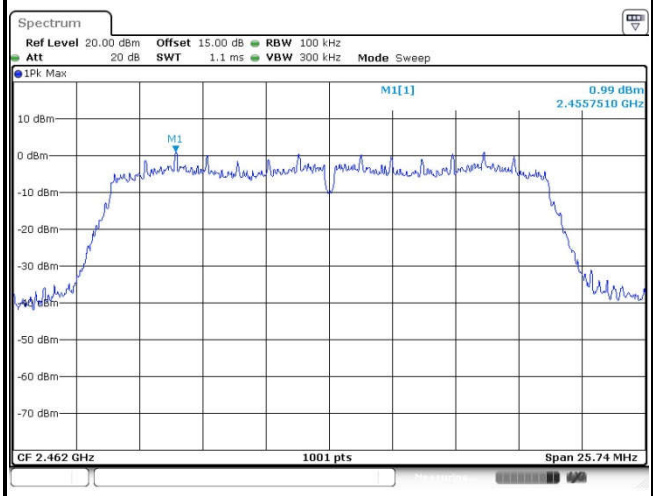
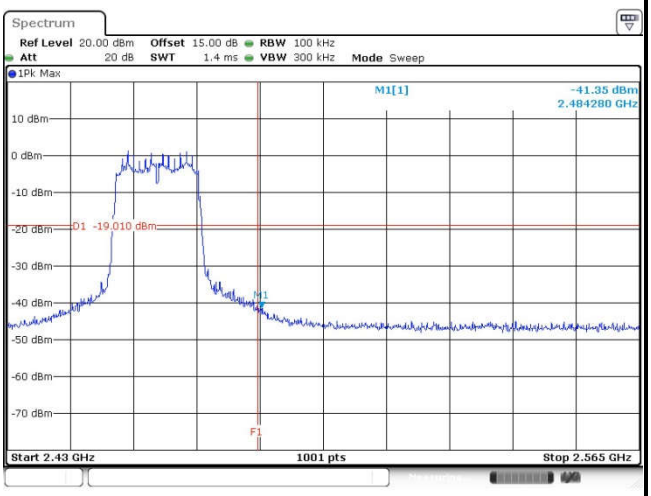
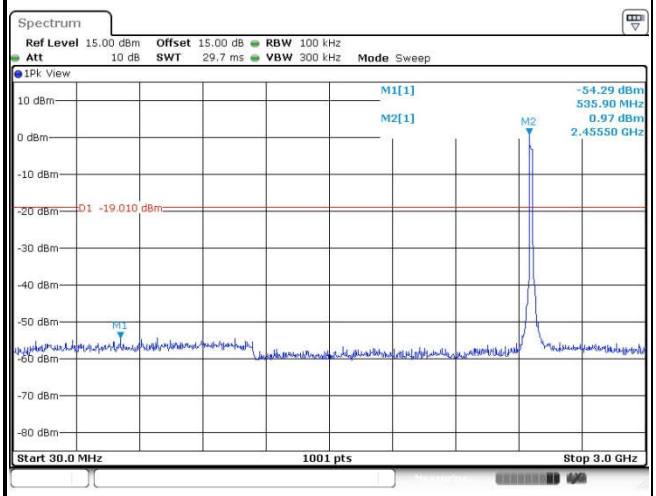
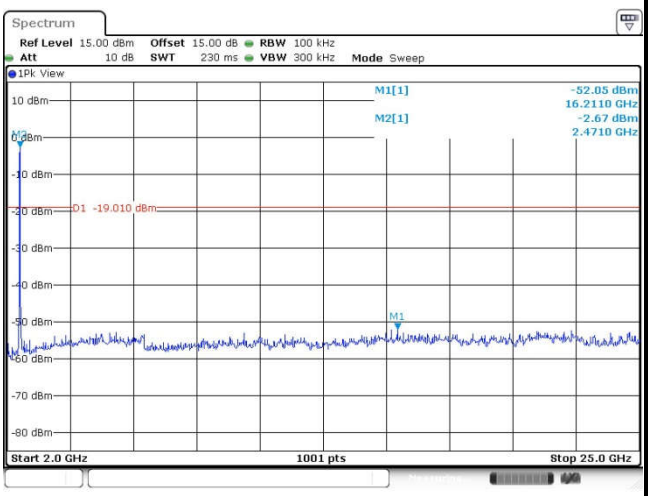
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

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**
	

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

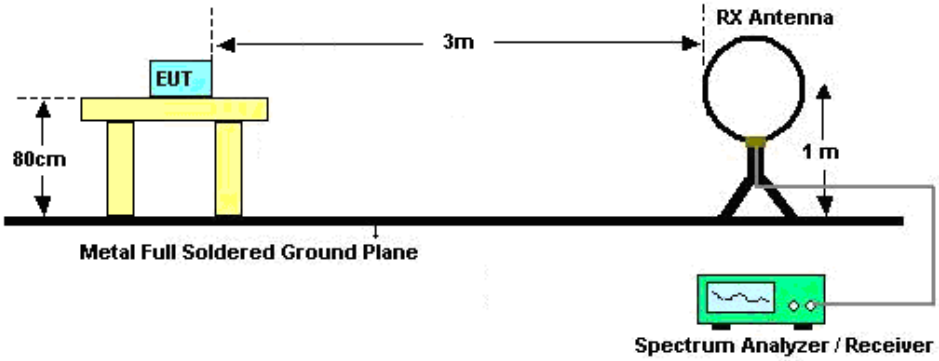
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

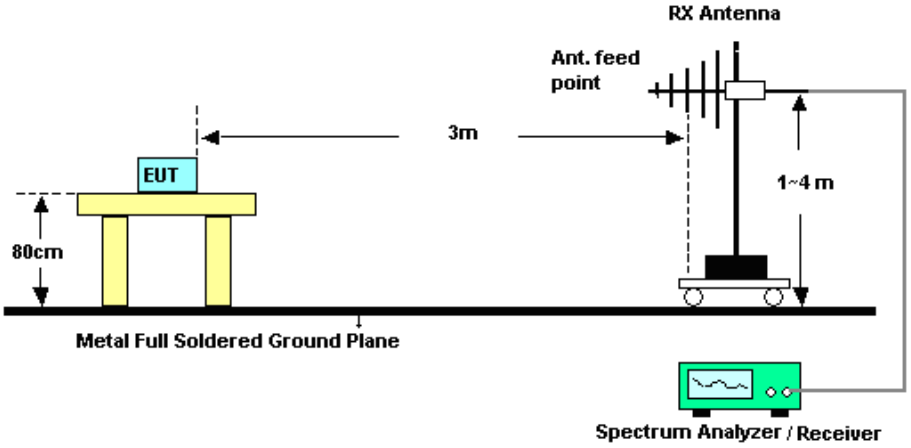
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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

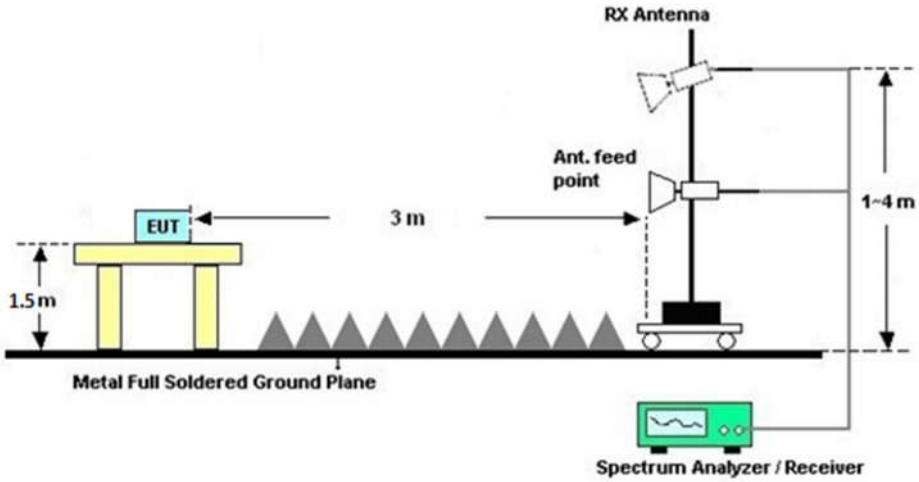
For radiated emissions below 30MHz



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 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

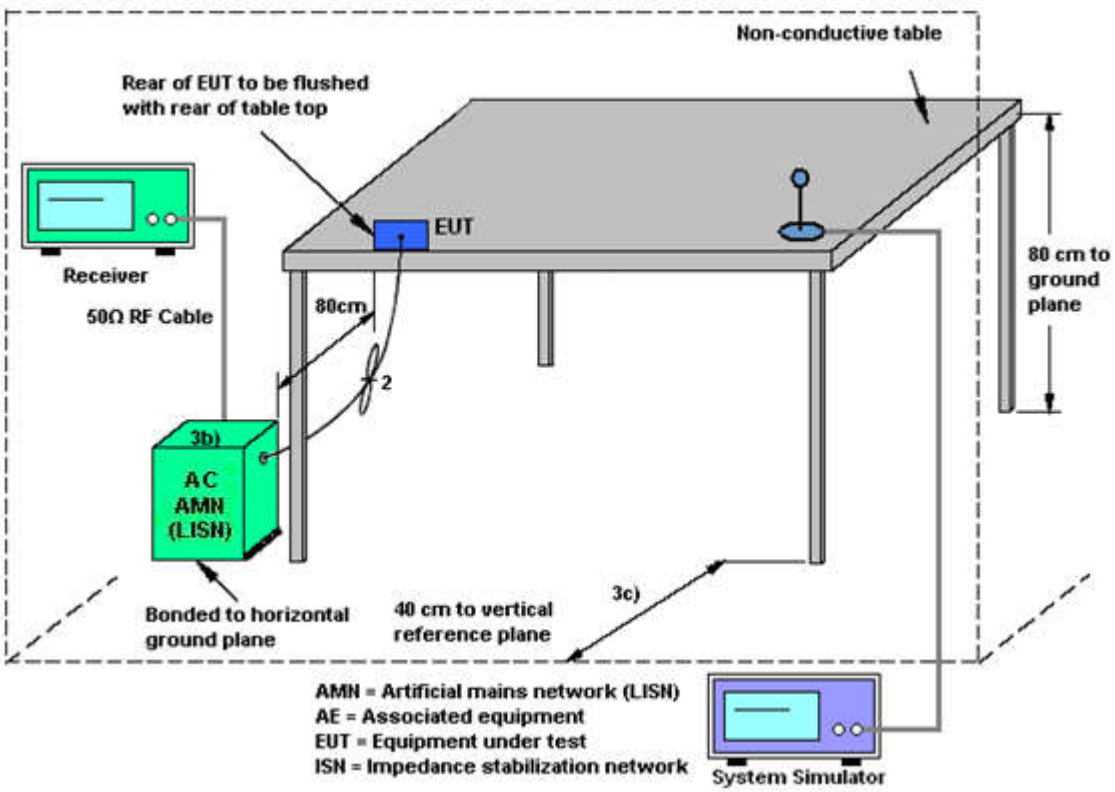
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 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.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 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	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	Sep. 22, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	Sep. 22, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Sep. 22, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz; Max 30dBm	Oct. 19, 2017	Sep. 23, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2018	Sep. 23, 2018	May 13, 2019	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	May 10, 2018	Sep. 23, 2018	May 09, 2019	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Sep. 23, 2018	Dec. 12, 2018	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Mar. 30, 2018	Sep. 23, 2018	Mar. 29, 2019	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 30, 2018	Sep. 23, 2018	Jul. 29, 2019	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 19, 2017	Sep. 23, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1707137	1GHz~18GHz	Oct. 19, 2017	Sep. 23, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 19, 2017	Sep. 23, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Sep. 23, 2018	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Sep. 23, 2018	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Sep. 23, 2018	NCR	Radiation (03CH02-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	Sep. 13, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	Sep. 13, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	Sep. 13, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 18, 2018	Sep. 13, 2018	Jul. 17, 2019	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.6 dB

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

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

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.4 dB

A1 - DTS Part

Test Engineer:	Hayden Chen	Temperature:	21~25	°C
Test Date:	2018/9/22	Relative Humidity:	51~54	%

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	14.186	9.51	0.50	Pass
11b	1Mbps	1	6	2437	14.186	9.03	0.50	Pass
11b	1Mbps	1	11	2462	14.186	9.03	0.50	Pass
11g	6Mbps	1	1	2412	18.132	16.04	0.50	Pass
11g	6Mbps	1	6	2437	18.182	16.00	0.50	Pass
11g	6Mbps	1	11	2462	18.132	15.80	0.50	Pass
HT20	MCS0	1	1	2412	18.731	17.50	0.50	Pass
HT20	MCS0	1	6	2437	18.681	17.52	0.50	Pass
HT20	MCS0	1	11	2462	18.881	17.16	0.50	Pass

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	17.34	30.00	0.60	17.94	36.00	Pass
11b	1Mbps	1	6	2437	17.38	30.00	0.60	17.98	36.00	Pass
11b	1Mbps	1	11	2462	17.62	30.00	0.60	18.22	36.00	Pass
11g	6Mbps	1	1	2412	22.65	30.00	0.60	23.25	36.00	Pass
11g	6Mbps	1	6	2437	22.85	30.00	0.60	23.45	36.00	Pass
11g	6Mbps	1	11	2462	23.10	30.00	0.60	23.70	36.00	Pass
HT20	MCS0	1	1	2412	21.16	30.00	0.60	21.76	36.00	Pass
HT20	MCS0	1	6	2437	21.48	30.00	0.60	22.08	36.00	Pass
HT20	MCS0	1	11	2462	22.12	30.00	0.60	22.72	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

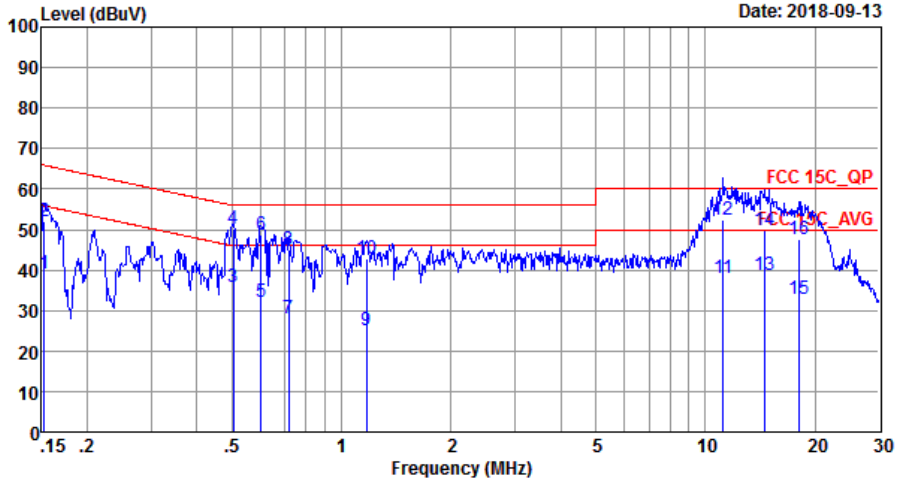
2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.10	14.63
11b	1Mbps	1	6	2437	0.10	14.83
11b	1Mbps	1	11	2462	0.10	15.12
11g	6Mbps	1	1	2412	0.60	13.16
11g	6Mbps	1	6	2437	0.60	13.39
11g	6Mbps	1	11	2462	0.60	13.68
HT20	MCS0	1	1	2412	0.64	11.58
HT20	MCS0	1	6	2437	0.64	11.71
HT20	MCS0	1	11	2462	0.64	11.96

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	-6.32	0.60	8.00	Pass
11b	1Mbps	1	6	2437	-6.13	0.60	8.00	Pass
11b	1Mbps	1	11	2462	-6.58	0.60	8.00	Pass
11g	6Mbps	1	1	2412	-11.77	0.60	8.00	Pass
11g	6Mbps	1	6	2437	-11.42	0.60	8.00	Pass
11g	6Mbps	1	11	2462	-11.53	0.60	8.00	Pass
HT20	MCS0	1	1	2412	-13.87	0.60	8.00	Pass
HT20	MCS0	1	6	2437	-12.90	0.60	8.00	Pass
HT20	MCS0	1	11	2462	-11.74	0.60	8.00	Pass

Appendix B. AC Conducted Emission Test Results

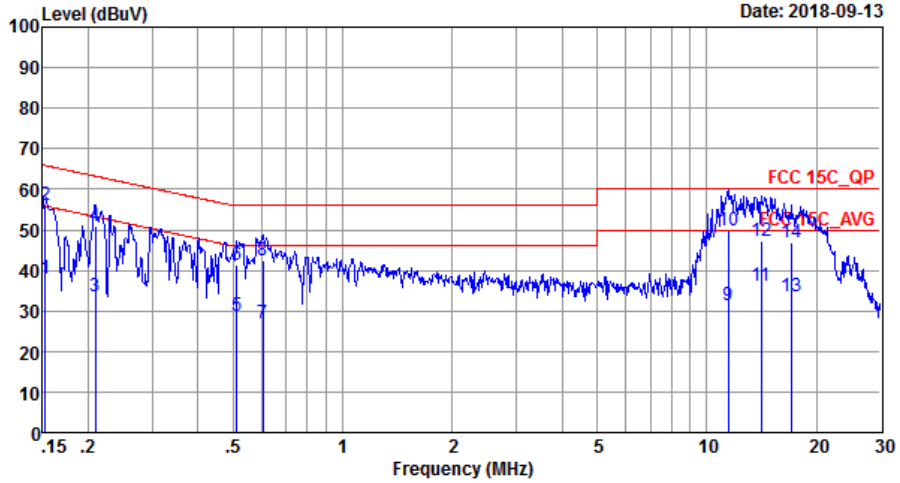
Test Engineer :	Zhang Xu	Temperature :	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20170907_L LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.15	39.19	-16.68	55.87	29.10	0.03	10.06	Average
2		0.15	52.19	-13.68	65.87	42.10	0.03	10.06	QP
3		0.50	35.70	-10.30	46.00	25.60	0.02	10.08	Average
4	*	0.50	50.10	-5.90	56.00	40.00	0.02	10.08	QP
5		0.60	32.00	-14.00	46.00	21.90	0.02	10.08	Average
6		0.60	48.60	-7.40	56.00	38.50	0.02	10.08	QP
7		0.72	28.10	-17.90	46.00	18.00	0.02	10.08	Average
8		0.72	44.90	-11.10	56.00	34.80	0.02	10.08	QP
9		1.17	25.27	-20.73	46.00	15.10	0.08	10.09	Average
10		1.17	42.87	-13.13	56.00	32.70	0.08	10.09	QP
11		11.20	38.06	-11.94	50.00	27.30	0.40	10.36	Average
12		11.20	52.56	-7.44	60.00	41.80	0.40	10.36	QP
13		14.52	38.80	-11.20	50.00	27.90	0.50	10.40	Average
14		14.52	49.70	-10.30	60.00	38.80	0.50	10.40	QP
15		18.14	33.01	-16.99	50.00	21.60	1.04	10.37	Average
16		18.14	47.51	-12.49	60.00	36.10	1.04	10.37	QP

Test Engineer :	Zhang Xu	Temperature :	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20170907_N NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.15	37.99	-17.88	55.87	27.90	0.03	10.06	Average
2	*	0.15	56.19	-9.68	65.87	46.10	0.03	10.06	QP
3		0.21	33.70	-19.53	53.23	23.60	0.03	10.07	Average
4		0.21	51.10	-12.13	63.23	41.00	0.03	10.07	QP
5		0.51	28.70	-17.30	46.00	18.60	0.02	10.08	Average
6		0.51	41.20	-14.80	56.00	31.10	0.02	10.08	QP
7		0.60	26.80	-19.20	46.00	16.70	0.02	10.08	Average
8		0.60	42.40	-13.60	56.00	32.30	0.02	10.08	QP
9		11.44	31.27	-18.73	50.00	20.70	0.21	10.36	Average
10		11.44	49.77	-10.23	60.00	39.20	0.21	10.36	QP
11		14.14	36.10	-13.90	50.00	25.40	0.30	10.40	Average
12		14.14	47.40	-12.60	60.00	36.70	0.30	10.40	QP
13		17.02	33.52	-16.48	50.00	22.69	0.44	10.39	Average
14		17.02	46.72	-13.28	60.00	35.89	0.44	10.39	QP

Appendix C. Radiated Spurious Emission

Test Engineer :	Xiaoshi Tan	Temperature :	24~25°C
		Relative Humidity :	48~49%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

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		2383.61	48.75	-25.25	74	46.45	27.04	31.31	6.57	207	70	P	H
		2383.71	40.09	-13.91	54	37.79	27.04	31.31	6.57	207	70	A	H
	*	2412	101.81	-	-	99.33	27.14	31.26	6.6	207	70	P	H
	*	2412	98.52	-	-	96.04	27.14	31.26	6.6	207	70	A	H
		2385.92	48.74	-25.26	74	46.36	27.09	31.28	6.57	168	65	P	V
		2383.92	38.91	-15.09	54	36.61	27.04	31.31	6.57	168	65	A	V
	*	2412	98.22	-	-	95.74	27.14	31.26	6.6	168	65	P	V
	*	2412	94.33	-	-	91.85	27.14	31.26	6.6	168	65	A	V
802.11b CH 06 2437MHz		2335.9	46.9	-27.1	74	44.8	26.93	31.33	6.5	202	66	P	H
		2382.1	36.71	-17.29	54	34.41	27.04	31.31	6.57	202	66	A	H
	*	2437	102.62	-	-	100.01	27.24	31.26	6.63	202	66	P	H
	*	2437	98.83	-	-	96.22	27.24	31.26	6.63	202	66	A	H
		2488.1	49.29	-24.71	74	46.38	27.4	31.22	6.73	202	66	P	H
		2492.02	38.35	-15.65	54	35.42	27.4	31.2	6.73	202	66	A	H
		2388.54	47.4	-26.6	74	44.99	27.09	31.28	6.6	198	62	P	V
		2388.96	36.68	-17.32	54	34.27	27.09	31.28	6.6	198	62	A	V
	*	2437	99.97	-	-	97.36	27.24	31.26	6.63	198	62	P	V
	*	2437	95.99	-	-	93.38	27.24	31.26	6.63	198	62	A	V
		2485.79	49.27	-24.73	74	46.44	27.35	31.22	6.7	198	62	P	V
		2492.09	37.68	-16.32	54	34.75	27.4	31.2	6.73	198	62	A	V

802.11b CH 11 2462MHz	*	2462	102.9	-	-	100.17	27.3	31.24	6.67	196	69	P	H
	*	2462	99.23	-	-	96.5	27.3	31.24	6.67	196	69	A	H
		2489.4	50.23	-23.77	74	47.3	27.4	31.2	6.73	196	69	P	H
		2488.84	42.34	-11.66	54	39.43	27.4	31.22	6.73	196	69	A	H
	*	2462	100.03	-	-	97.3	27.3	31.24	6.67	198	62	P	V
	*	2462	96.61	-	-	93.88	27.3	31.24	6.67	198	62	A	V
		2489.36	49.23	-24.77	74	46.3	27.4	31.2	6.73	198	62	P	V
		2488.64	39.34	-14.66	54	36.43	27.4	31.22	6.73	198	62	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	39.18	-34.82	74	56.3	31.42	58.19	9.65	185	255	P	H
		4824	39.86	-34.14	74	56.98	31.42	58.19	9.65	185	255	P	V
802.11b CH 06 2437MHz		4874	39.07	-34.93	74	55.95	31.51	58.1	9.71	165	106	P	H
		7311	47.8	-26.2	74	57.35	36.36	57.92	12.01	174	100	P	H
		4874	38.47	-35.53	74	55.35	31.51	58.1	9.71	165	106	P	V
		7311	47.06	-26.94	74	56.61	36.36	57.92	12.01	174	100	P	V
802.11b CH 11 2462MHz		4924	39.89	-34.11	74	56.55	31.59	58.02	9.77	150	285	P	H
		7386	47.27	-26.73	74	56.19	36.65	57.65	12.08	155	274	P	H
		4924	39.59	-34.41	74	56.25	31.59	58.02	9.77	150	285	P	V
		7386	49.28	-24.72	74	58.2	36.65	57.65	12.08	155	274	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		2389.8	53.87	-20.13	74	51.46	27.09	31.28	6.6	137	48	P	H
		2390	42.58	-11.42	54	40.17	27.09	31.28	6.6	137	48	A	H
	*	2412	100.85	-	-	98.37	27.14	31.26	6.6	137	48	P	H
	*	2412	92.76	-	-	90.28	27.14	31.26	6.6	137	48	A	H
		2389.69	52.47	-21.53	74	50.06	27.09	31.28	6.6	147	63	P	V
		2390	40.52	-13.48	54	38.11	27.09	31.28	6.6	147	63	A	V
	*	2412	97.31	-	-	94.83	27.14	31.26	6.6	147	63	P	V
	*	2412	89.95	-	-	87.47	27.14	31.26	6.6	147	63	A	V
802.11g CH 06 2437MHz		2382.52	47.47	-26.53	74	45.17	27.04	31.31	6.57	116	67	P	H
		2389.8	36.78	-17.22	54	34.37	27.09	31.28	6.6	116	67	A	H
	*	2437	100.13	-	-	97.52	27.24	31.26	6.63	116	67	P	H
	*	2437	92.49	-	-	89.88	27.24	31.26	6.63	116	67	A	H
		2490.97	48.17	-25.83	74	45.24	27.4	31.2	6.73	116	67	P	H
		2483.69	38.34	-15.66	54	35.51	27.35	31.22	6.7	116	67	A	H
		2371.88	47.11	-26.89	74	44.81	27.04	31.31	6.57	147	217	P	V
		2389.8	36.58	-17.42	54	34.17	27.09	31.28	6.6	147	217	A	V
	*	2437	98.13	-	-	95.52	27.24	31.26	6.63	147	217	P	V
	*	2437	90.03	-	-	87.42	27.24	31.26	6.63	147	217	A	V
		2490.76	49.15	-24.85	74	46.22	27.4	31.2	6.73	147	217	P	V
		2484.11	37.57	-16.43	54	34.74	27.35	31.22	6.7	147	217	A	V

802.11g CH 11 2462MHz	*	2462	101.09	-	-	98.36	27.3	31.24	6.67	116	62	P	H
	*	2462	93.38	-	-	90.65	27.3	31.24	6.67	116	62	A	H
		2483.56	61.49	-12.51	74	58.66	27.35	31.22	6.7	116	62	P	H
		2483.52	46.46	-7.54	54	43.63	27.35	31.22	6.7	116	62	A	H
	*	2462	98.02	-	-	95.29	27.3	31.24	6.67	151	216	P	V
	*	2462	90.69	-	-	87.96	27.3	31.24	6.67	151	216	A	V
		2483.88	60.62	-13.38	74	57.79	27.35	31.22	6.7	151	216	P	V
		2483.52	43.42	-10.58	54	40.59	27.35	31.22	6.7	151	216	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	39.48	-34.52	74	56.6	31.42	58.19	9.65	185	255	P	H
		4824	39.34	-34.66	74	56.46	31.42	58.19	9.65	185	255	P	V
802.11g CH 06 2437MHz		4874	39.06	-34.94	74	55.94	31.51	58.1	9.71	165	106	P	H
		7311	48.36	-25.64	74	57.91	36.36	57.92	12.01	174	100	P	H
		4874	39.26	-34.74	74	56.14	31.51	58.1	9.71	165	106	P	V
		7311	47.81	-26.19	74	57.36	36.36	57.92	12.01	174	100	P	V
802.11g CH 11 2462MHz		4924	41.11	-32.89	74	57.77	31.59	58.02	9.77	150	285	P	H
		7386	48.16	-25.84	74	57.08	36.65	57.65	12.08	155	274	P	H
		4924	39.64	-34.36	74	56.3	31.59	58.02	9.77	150	285	P	V
		7386	47.62	-26.38	74	56.54	36.65	57.65	12.08	155	274	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)
		2387.59	54.32	-19.68	74	51.91	27.09	31.28	6.6	134	45	P	H
		2389.8	43.07	-10.93	54	40.66	27.09	31.28	6.6	134	45	A	H
802.11n	*	2412	98.37	-	-	95.89	27.14	31.26	6.6	134	45	P	H
HT20	*	2412	91	-	-	88.52	27.14	31.26	6.6	134	45	A	H
CH 01		2389.49	52.32	-21.68	74	49.91	27.09	31.28	6.6	132	214	P	V
2412MHz		2389.69	40.95	-13.05	54	38.54	27.09	31.28	6.6	132	214	A	V
	*	2412	95.22	-	-	92.74	27.14	31.26	6.6	132	214	P	V
	*	2412	86.36	-	-	83.88	27.14	31.26	6.6	132	214	A	V
		2388.82	47.23	-26.77	74	44.82	27.09	31.28	6.6	132	46	P	H
		2388.54	37.56	-16.44	54	35.15	27.09	31.28	6.6	132	46	A	H
	*	2437	99.67	-	-	97.06	27.24	31.26	6.63	132	46	P	H
	*	2437	92.04	-	-	89.43	27.24	31.26	6.63	132	46	A	H
802.11n		2484.46	52.11	-21.89	74	49.28	27.35	31.22	6.7	132	46	P	H
HT20		2484.74	39.3	-14.7	54	36.47	27.35	31.22	6.7	132	46	A	H
CH 06		2388.12	47.45	-26.55	74	45.04	27.09	31.28	6.6	132	214	P	V
2437MHz		2387.56	37.5	-16.5	54	35.09	27.09	31.28	6.6	132	214	A	V
	*	2437	96.19	-	-	93.58	27.24	31.26	6.63	132	214	P	V
	*	2437	87.96	-	-	85.35	27.24	31.26	6.63	132	214	A	V
		2486.77	48.37	-25.63	74	45.54	27.35	31.22	6.7	132	214	P	V
		2485.16	38.44	-15.56	54	35.61	27.35	31.22	6.7	132	214	A	V

802.11n HT20 CH 11 2462MHz	*	2462	99.94	-	-	97.21	27.3	31.24	6.67	132	46	P	H
	*	2462	93.01	-	-	90.28	27.3	31.24	6.67	132	46	A	H
		2483.84	64.44	-9.56	74	61.61	27.35	31.22	6.7	132	46	P	H
		2483.52	48.29	-5.71	54	45.46	27.35	31.22	6.7	132	46	A	H
	*	2462	96.67	-	-	93.94	27.3	31.24	6.67	106	214	P	V
	*	2462	89.32	-	-	86.59	27.3	31.24	6.67	106	214	A	V
		2483.88	60.07	-13.93	74	57.24	27.35	31.22	6.7	106	214	P	V
		2483.88	44.69	-9.31	54	41.86	27.35	31.22	6.7	106	214	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	41.07	-32.93	74	58.19	31.42	58.19	9.65	185	255	P	H
		4824	39.51	-34.49	74	56.63	31.42	58.19	9.65	185	255	P	V
802.11n HT20 CH 06 2437MHz		4874	39.99	-34.01	74	56.87	31.51	58.1	9.71	165	106	P	H
		7311	46.27	-27.73	74	55.82	36.36	57.92	12.01	174	100	P	H
		4874	38.53	-35.47	74	55.41	31.51	58.1	9.71	165	106	P	V
		7311	47.03	-26.97	74	56.58	36.36	57.92	12.01	174	100	P	V
802.11n HT20 CH 11 2462MHz		4924	39.36	-34.64	74	56.02	31.59	58.02	9.77	150	285	P	H
		7386	46.99	-27.01	74	55.91	36.65	57.65	12.08	155	274	P	H
		4924	39.55	-34.45	74	56.21	31.59	58.02	9.77	150	285	P	V
		7386	49.05	-24.95	74	57.97	36.65	57.65	12.08	155	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (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 HT20 LF		30	26.41	-13.59	40	33.33	24.8	31.97	0.25	100	254	P	H
		104.69	22.87	-20.63	43.5	37.09	16.41	31.71	1.08			P	H
		166.77	18.84	-24.66	43.5	33.04	15.93	31.47	1.34			P	H
		312.27	27.25	-18.75	46	36.86	19.7	31.22	1.91			P	H
		383.08	26.15	-19.85	46	33.81	21.4	31.2	2.14			P	H
		728.4	30.49	-15.51	46	31.52	27.21	31.23	2.99			P	H
		30	36.73	-3.27	40	43.65	24.8	31.97	0.25	120	111	P	V
		74.62	27.93	-12.07	40	46.02	12.96	31.86	0.81			P	V
		97.9	30.61	-12.89	43.5	45.46	15.84	31.74	1.05			P	V
		166.77	27.57	-15.93	43.5	41.77	15.93	31.47	1.34			P	V
		637.22	29.69	-16.31	46	32.01	26.13	31.24	2.79			P	V
		879.72	31.7	-14.3	46	30.64	28.9	31.17	3.33			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)

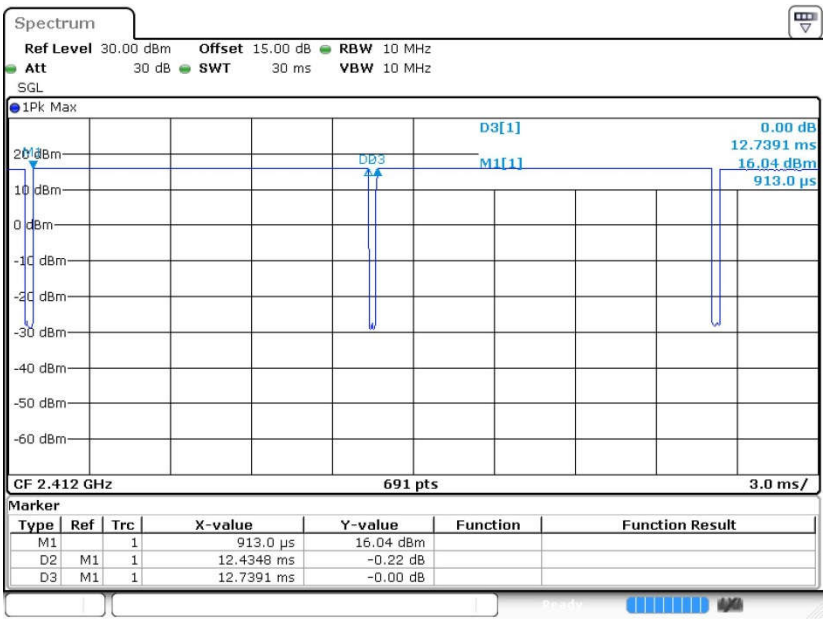
= -10.46(dB)

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

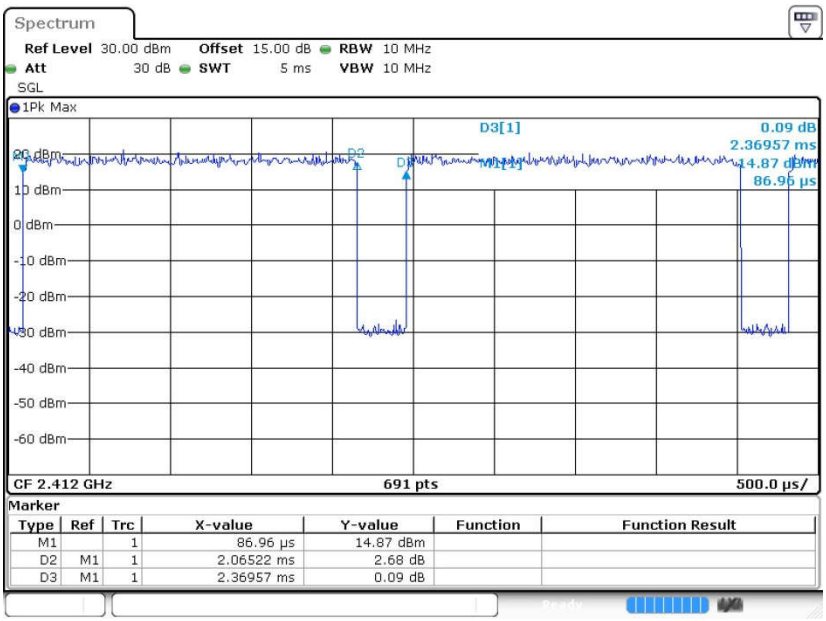
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.61	12.435	0.080	100Hz
802.11g	87.16	2.065	0.484	1KHz
802.11n HT20	86.32	1.920	0.521	1KHz

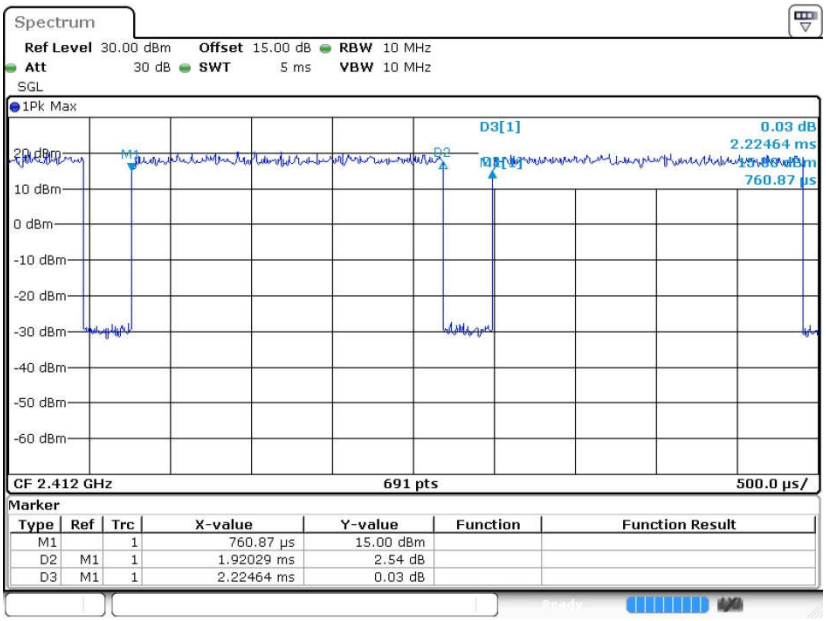
802.11b



802.11g



802.11n20


Spectrum
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Att 30 dB SWT 5 ms VBW 10 MHz
SGL
1Pk Max
D3[1] 0.03 dB
2.22464 ms
760.87 µs
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.412 GHz
691 pts
500.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 760.87 µs 15.00 dBm
D2 M1 1 1.92029 ms 2.54 dB
D3 M1 1 2.22464 ms 0.03 dB