FCC RF Test Report

APPLICANT	:	**Motorola Mobility LLC**
EQUIPMENT	:	**Mobile Cellular Phone**
BRAND NAME	:	**Motorola**
MODEL NAME	:	**XT1920-18, XT1920-19**
FCC ID	:	**IHDT56XH2**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**

The product was received on Apr. 12, 2018 and testing was completed on May 04, 2018. We, Sporton International (Kunshan) 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

James Huang

Approved by: James Huang / Manager

TESTING
NVLAP LAB CODE 600155-0

Sporton International (Kunshan) Inc.
No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR841203C	Rev. 01	Initial issue of report	May 24, 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 3.35 dB at 2487.340 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.79 dB at 0.156 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT1920-18, XT1920-19
FCC ID	IHDT56XH2
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported)/LTE/ WLAN 2.4GHz 802.11b/g/n HT20 Bluetooth v3.0 + EDR/Bluetooth v4.0 LE Bluetooth v4.1 LE/Bluetooth v4.2 LE
IMEI Code	Conducted: 355534090027292/355534090027300 Conduction: 355534090027391/355534090027409 Radiation: 355534090027433/355534090027441
HW Version	DVT2
SW Version	OPG28.25
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples are only for SIM slot, the sample 1(XT1920-19) is dual SIM slot, the sample 2(XT1920-18) is single SIM slot. We only choose dual SIM sample to perform full tests

1.4 Modification of EUT

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

1.5 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 : 20.96 dBm (0.1247 W) 802.11g : 23.83 dBm (0.2415 W) 802.11n HT20 : 23.73 dBm (0.2360 W)
Antenna Type / Gain	PIFA Antenna with gain -3.20 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.6 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No. is CN5013.

Test Site	Sporton International (Kunshan) Inc.			
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958			
Test Site No.	**Sporton Site No.**			**FCC Test Firm Registration No.**
	TH01-KS	CO01-KS	03CH03-KS	630927

Note: The test site complies with ANSI C63.4 2014 requirement.

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.

1.8 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	**Brand Name**	Motorola (Acbel)	**Model Name**	C-P56 SPN5947A
	Power Rating	I/P: 100-240 Vac, 130mA, O/P: 5Vdc,1000mA		
AC Adapter 1(EU)	**Brand Name**	Motorola (Acbel)	**Model Name**	C-P57 SPN5948A
	Power Rating	I/P: 100-240 Vac, 130mA, O/P: 5Vdc,1000mA		
AC Adapter 1(AR)	**Brand Name**	Motorola (Acbel)	**Model Name**	C-P60 SPN5951A
	Power Rating	I/P: 100-240 Vac, 130mA, O/P: 5Vdc,1000mA		
AC Adapter 2(US)	**Brand Name**	Motorola(Chenyang)	**Model Name**	C-P56 SPN5987A
	Power Rating	I/P: 100-240 Vac, 130mA, O/P: 5Vdc,1000mA		
AC Adapter 2(EU)	**Brand Name**	Motorola(Chenyang)	**Model Name**	C-P57 SPN5985A
	Power Rating	I/P: 100-240 Vac, 130mA, O/P: 5Vdc,1000mA		
AC Adapter 2(AR)	**Brand Name**	Motorola(Chenyang)	**Model Name**	C-P60 SPN5984A
	Power Rating	I/P: 100-240 Vac, 130mA, O/P: 5Vdc,1000mA		
AC Adapter 3(BR)	**Brand Name**	Motorola(Salcomp)	**Model Name**	S11D38LNA
	Power Rating	I/P: 100-240 Vac, 450mA, O/P: 5Vdc,2000mA		
AC Adapter 4(BR)	**Brand Name**	Motorola(Salom)	**Model Name**	SSW-2865BR
	Power Rating	I/P: 100-240 Vac, 500mA, O/P: 5Vdc,2000mA		
AC Adapter 5(BR)	**Brand Name**	Motorola(Cliptech)	**Model Name**	S010BFD0500200
	Power Rating	I/P: 100-240 Vac, 500mA, O/P: 5Vdc,2000mA		
Battery	**Brand Name**	Amperex (Motorola)	**Model Name**	JE30
	Power Rating	3.8Vdc,2000/2120mAh	Type	Li-ion, ATL355763
Earphone 1	**Brand Name**	Motorola(JuWei)	**Model Name**	711411000731
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		
Earphone 2	**Brand Name**	Motorola(New leader)	**Model Name**	711411000711
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		
Earphone 3	**Brand Name**	Motorola(Lianyun)	**Model Name**	TS910A-38AMS01WHR-M
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		
Earphone 4	**Brand Name**	Motorola	**Model Name**	LS118
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		
USB Cable 1	**Brand Name**	Motorola (SAIBAO)	**Model Name**	711310002261
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
USB Cable 2	**Brand Name**	Motorola (I-SHENG)	**Model Name**	SKN6471A
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		

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		

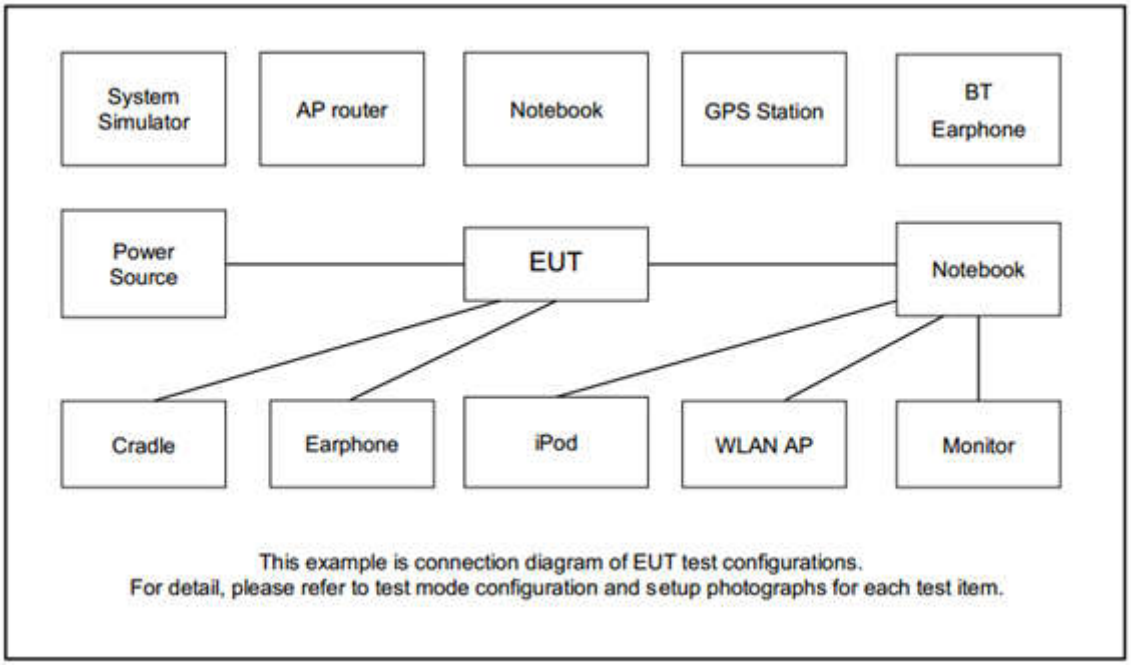
2.2 Test Mode

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 :GSM850 Idle + Bluetooth Link + WLAN Link(2.4GHz) + USB Cable 1 (Charging from Adapter 1) + Earphone 1
Remark: For Radiated Test Cases, The tests were performed with Adapter 1, Earphone 1 and USB Cable 1.	

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	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	FCC DoC	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an 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 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.

Offset = RF cable loss

Following shows an offset computation example with cable loss 5.4 dB.

Offset(dB) = RF cable loss(dB).

= 5.4 (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.

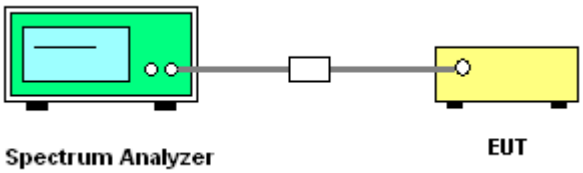
3.1.2 Measuring Instruments

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.

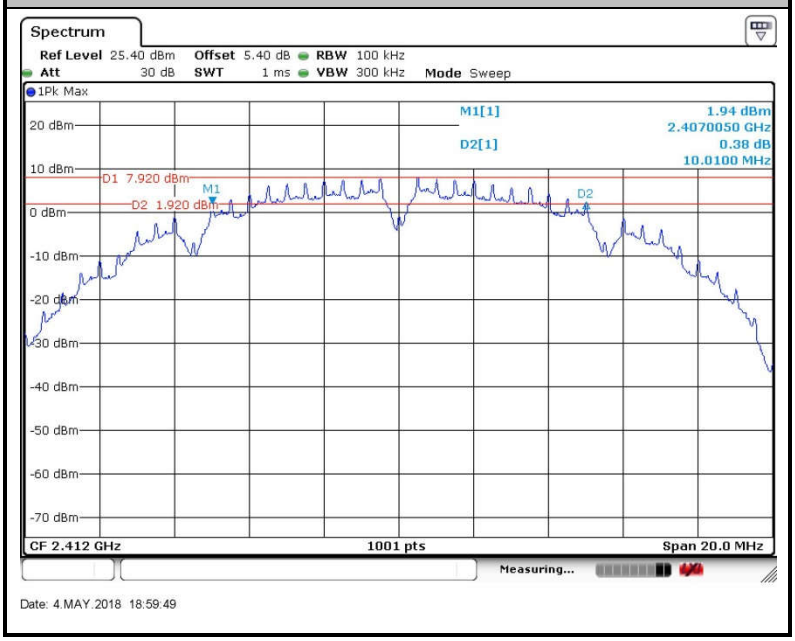
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



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.

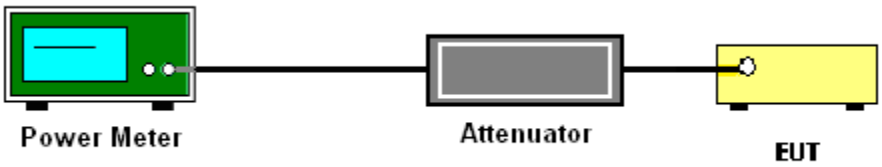
3.2.2 Measuring Instruments

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.

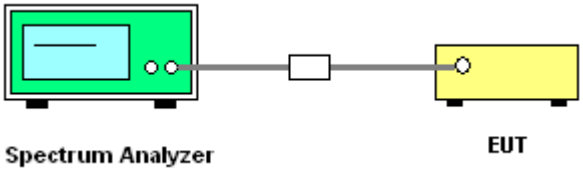
3.3.2 Measuring Instruments

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.

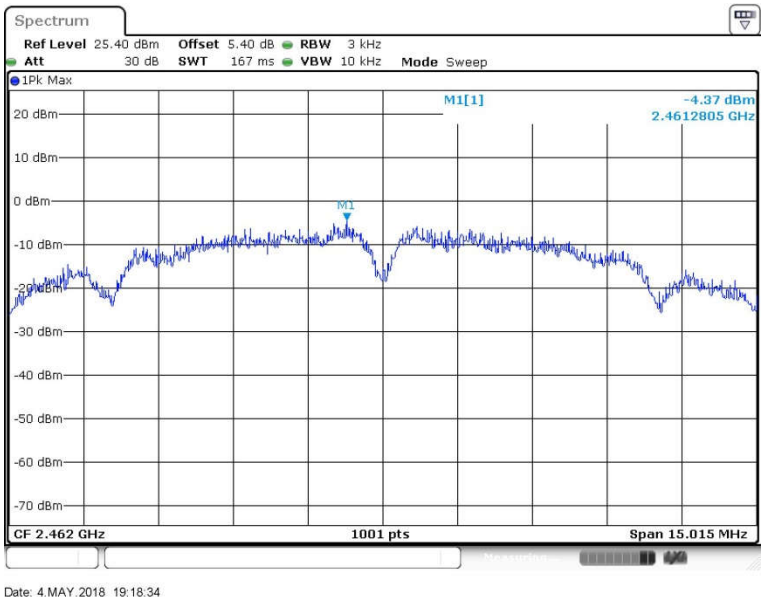
3.3.4 Test Setup



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.

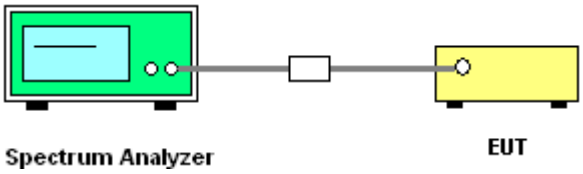
3.4.2 Measuring Instruments

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

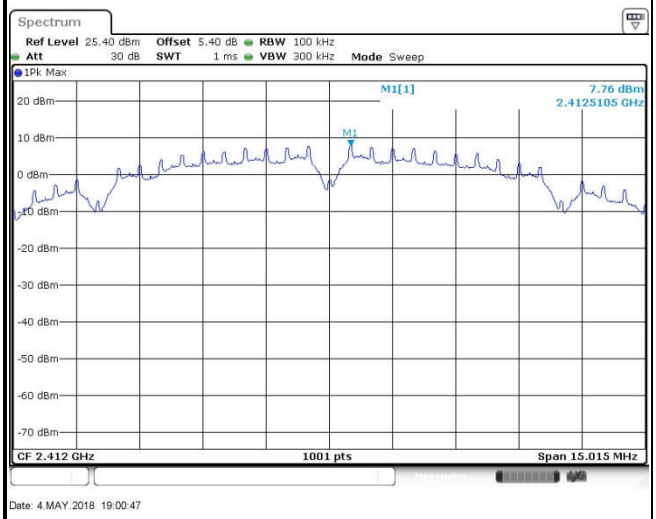


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

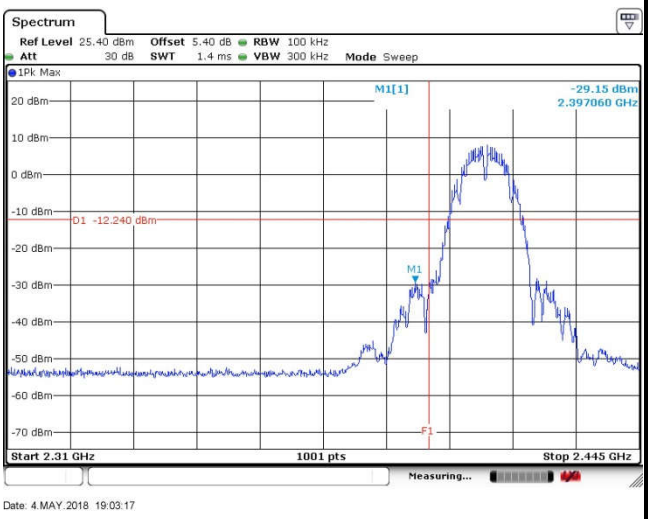
Test Engineer :	Silent Hai	**Temperature :**	21~25℃
		Relative Humidity :	51~55%

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

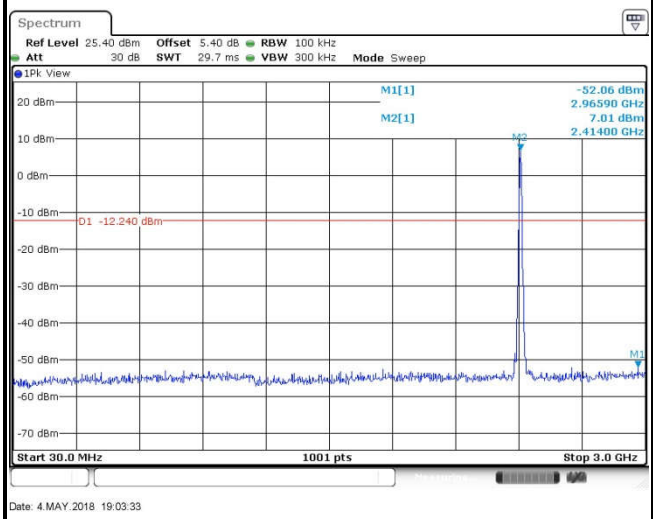
100kHz PSD reference Level



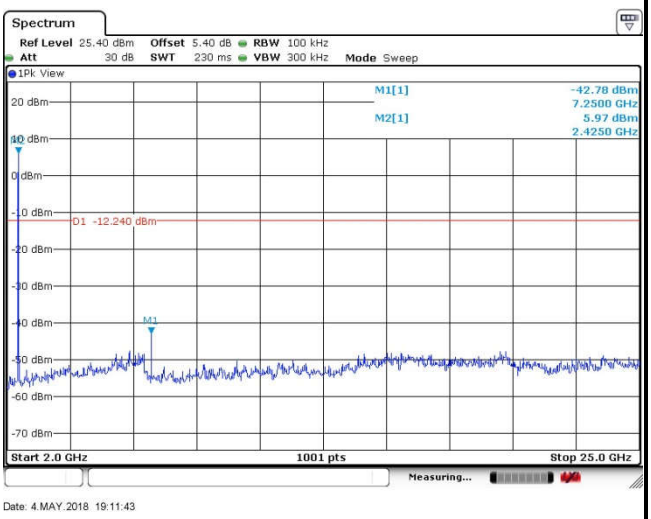
Low Channel Plot



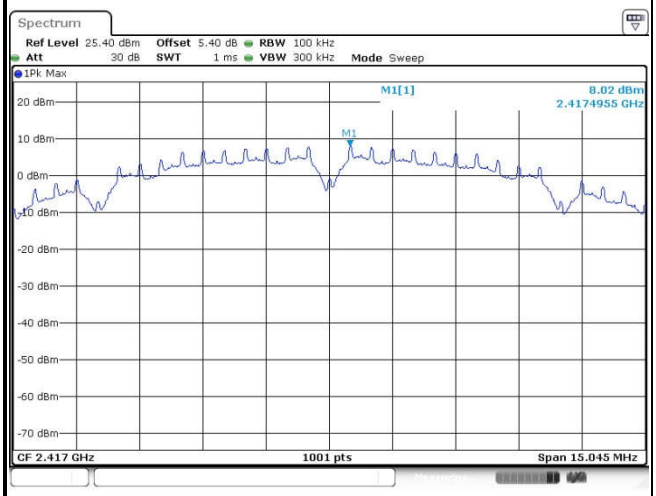
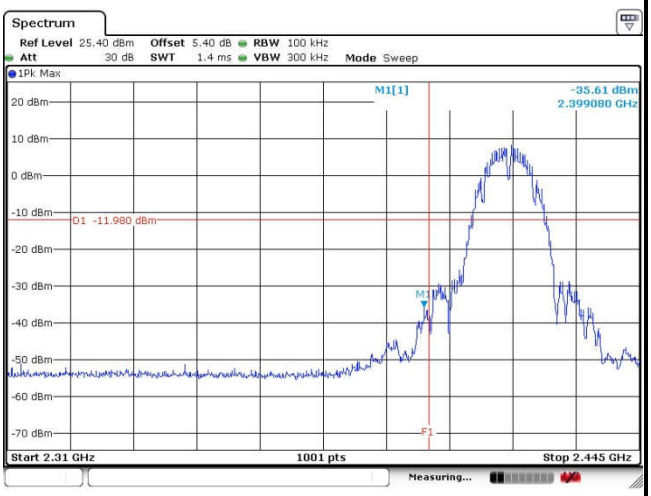
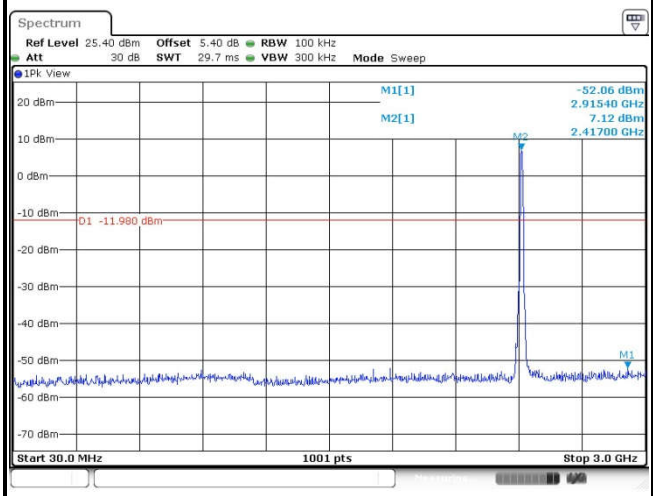
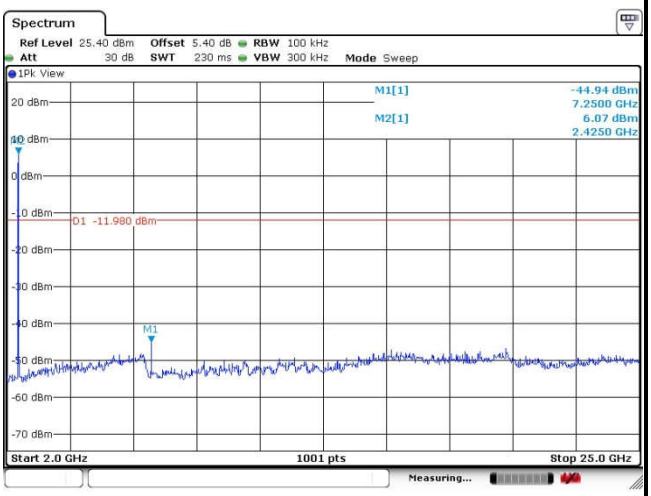
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



Test Mode :	802.11b	Test Channel :	02

100kHz PSD reference Level	Low Channel Plot
	
Date: 4.MAY.2018 19:07:30	Date: 4.MAY.2018 19:09:08
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
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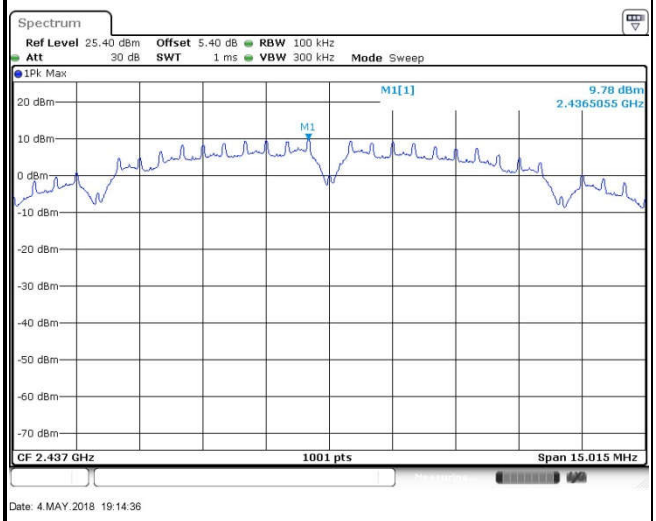
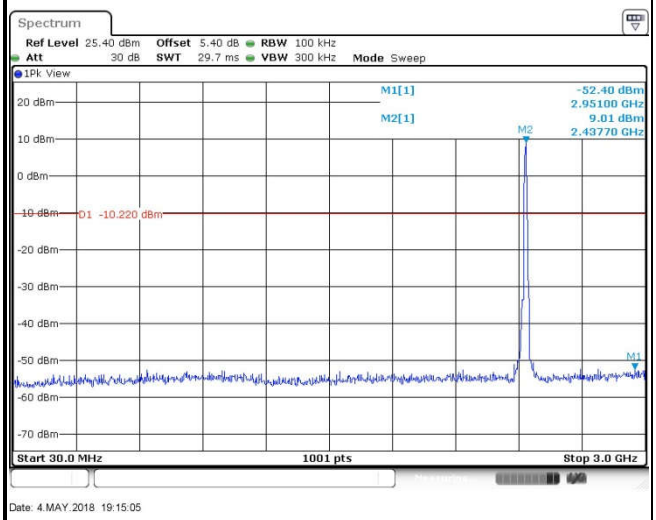
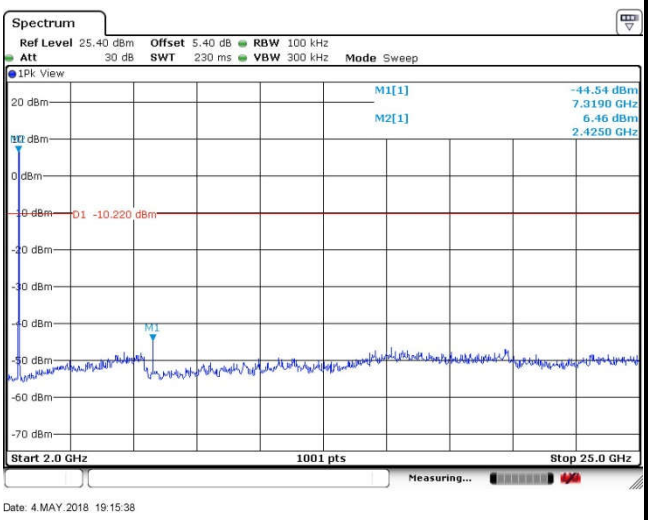
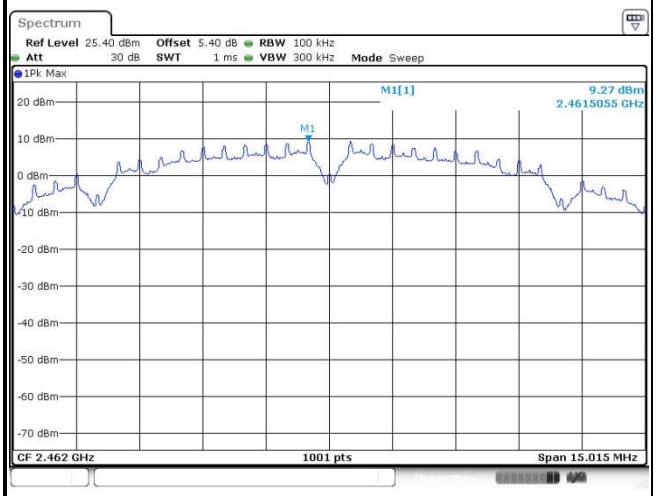
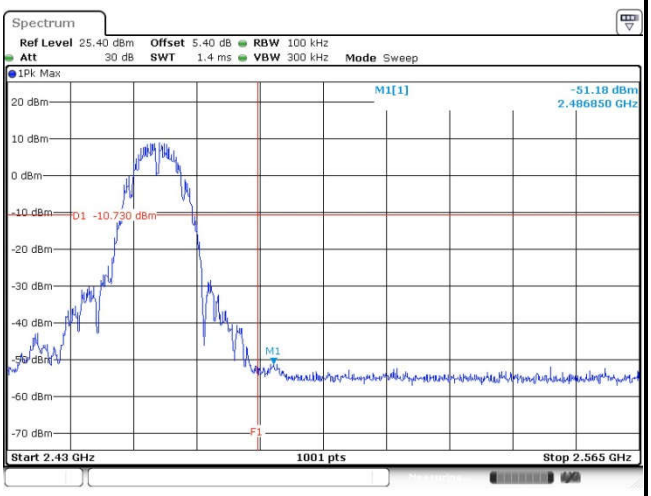
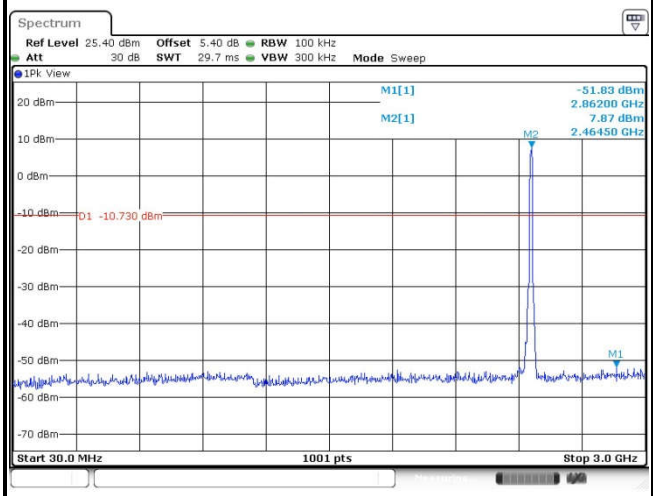
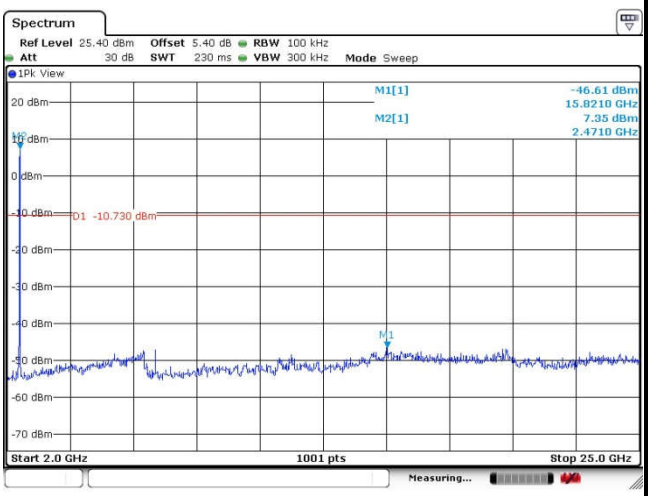
Test Mode :	802.11b	Test Channel :	06

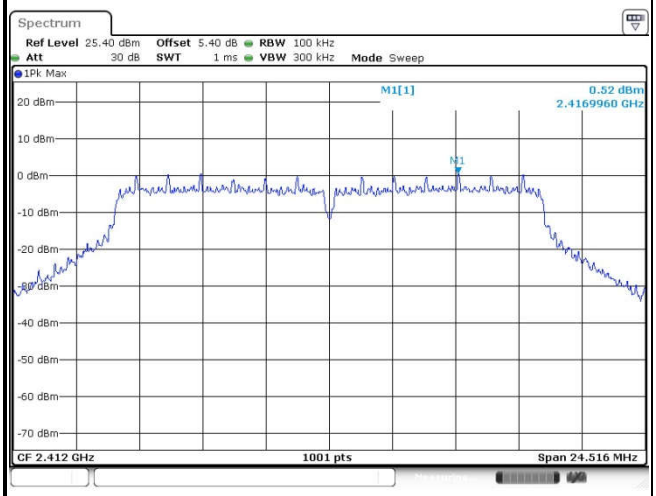
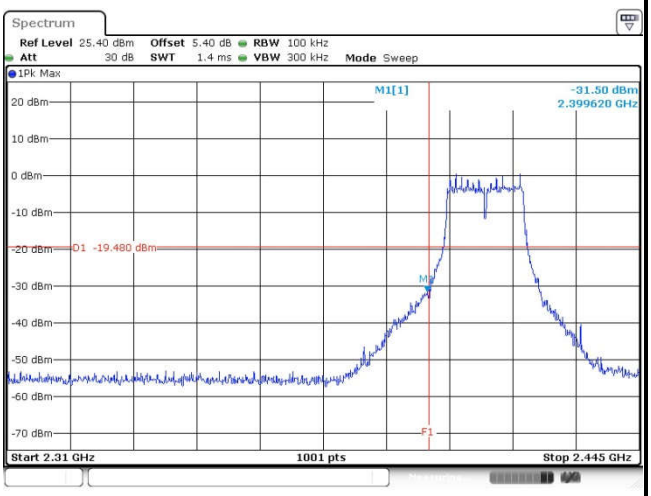
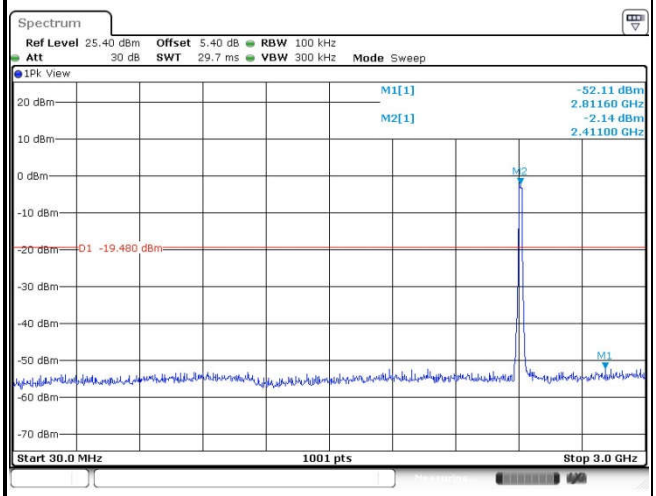
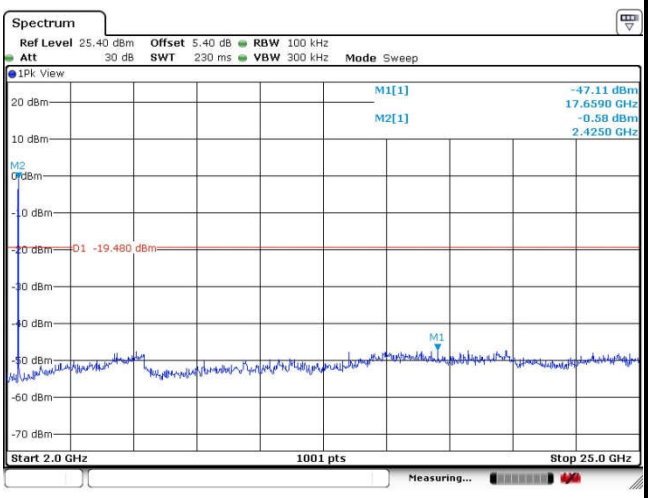
100kHz PSD reference Level	
	

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

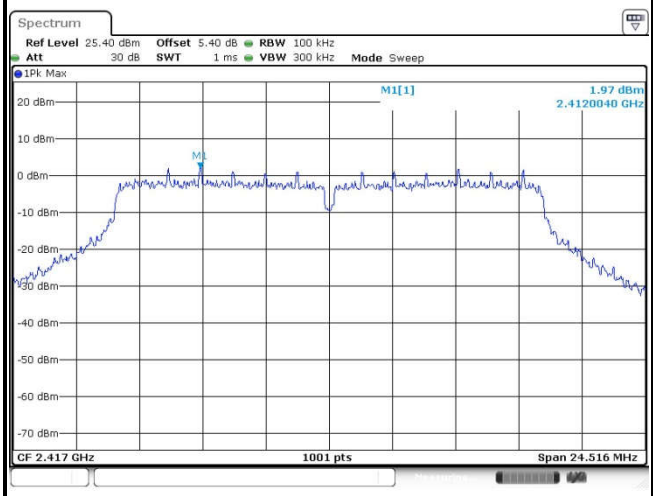
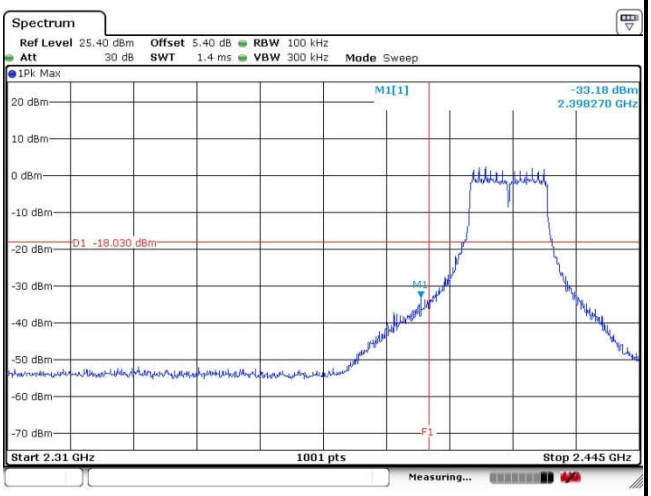
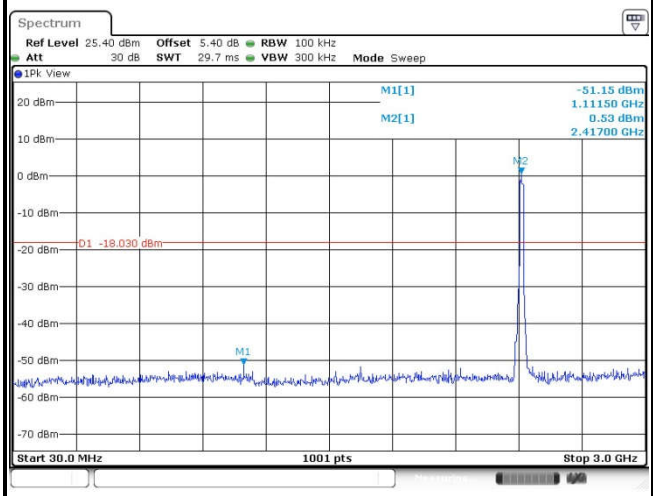
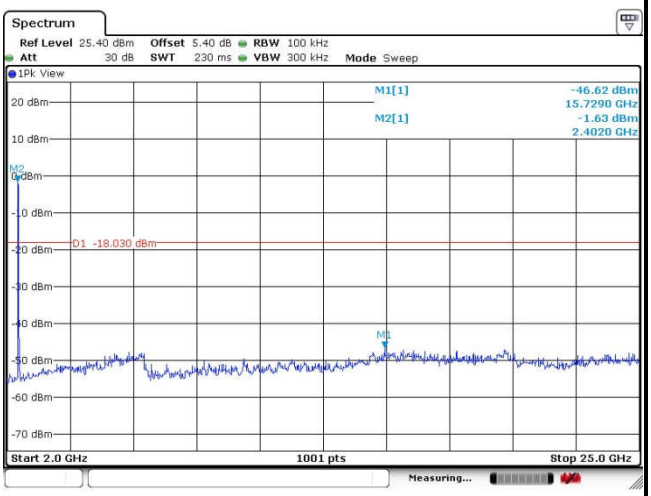
Test Mode :	802.11b	Test Channel :	11

100kHz PSD reference Level	High Channel Plot
	
Date: 4.MAY.2018 19:18:48	Date: 4.MAY.2018 19:18:56
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 19:19:45	Date: 4.MAY.2018 19:20:07

Test Mode :	802.11g	Test Channel :	01

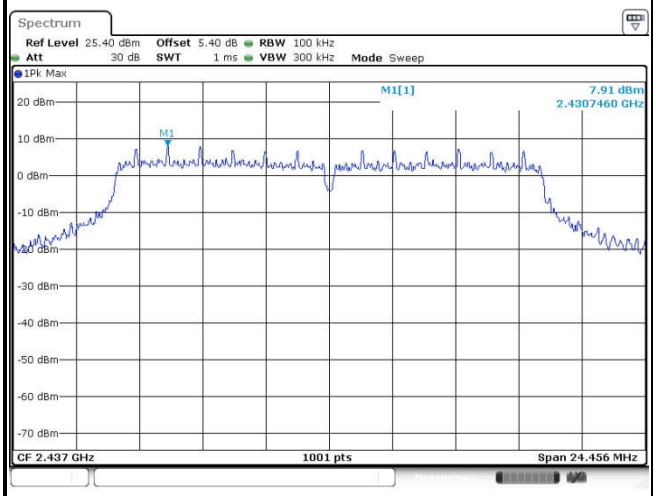
100kHz PSD reference Level	Low Channel Plot
	
Date: 4.MAY.2018 19:28:47	Date: 4.MAY.2018 19:28:54
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 19:29:04	Date: 4.MAY.2018 19:29:23

Test Mode :	802.11g	Test Channel :	02

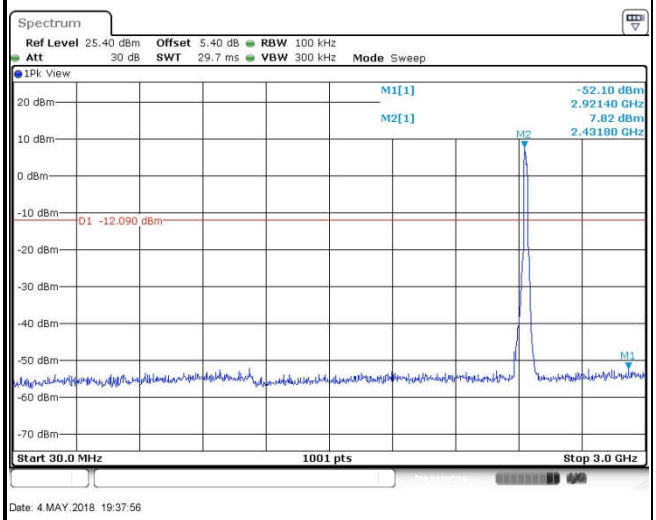
100kHz PSD reference Level	Low Channel Plot
	
Date: 4.MAY.2018 19:31:57	Date: 4.MAY.2018 19:33:27
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 19:34:27	Date: 4.MAY.2018 19:34:43

Test Mode :	802.11g	Test Channel :	06

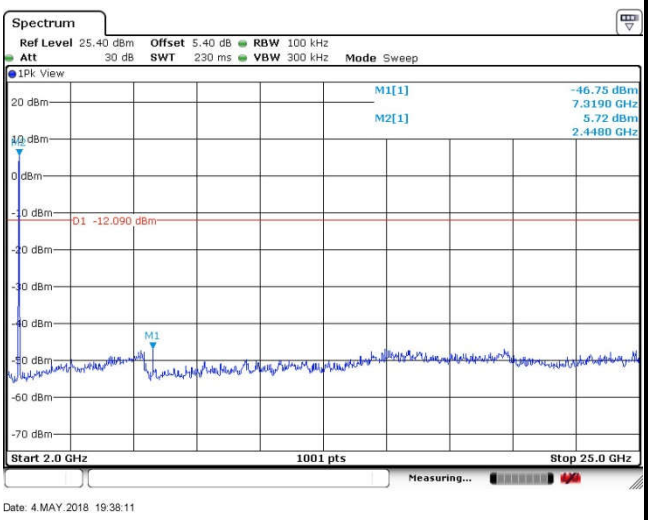
100kHz PSD reference Level



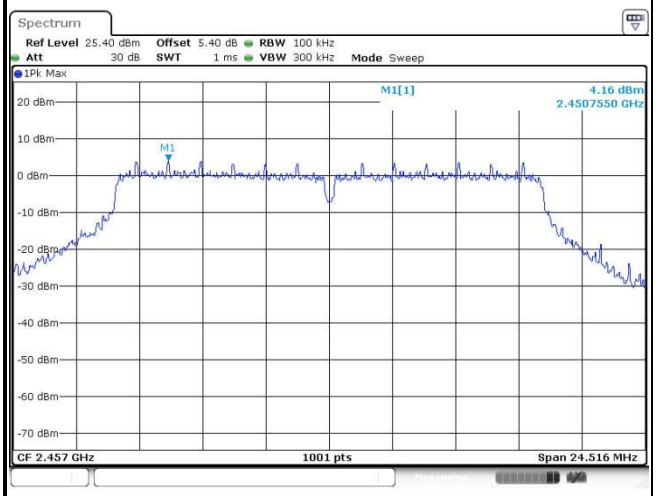
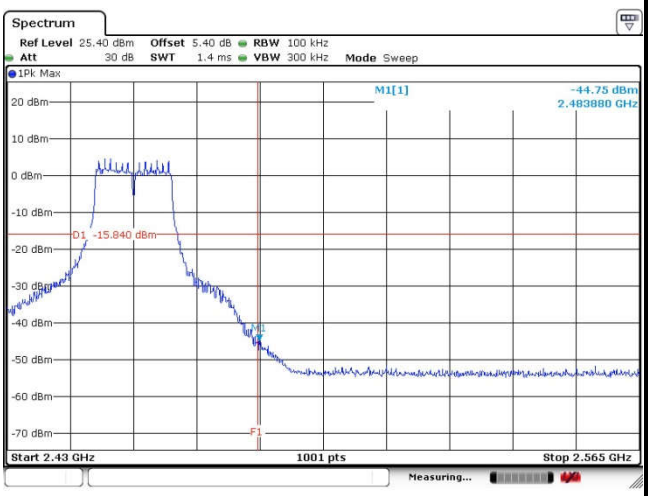
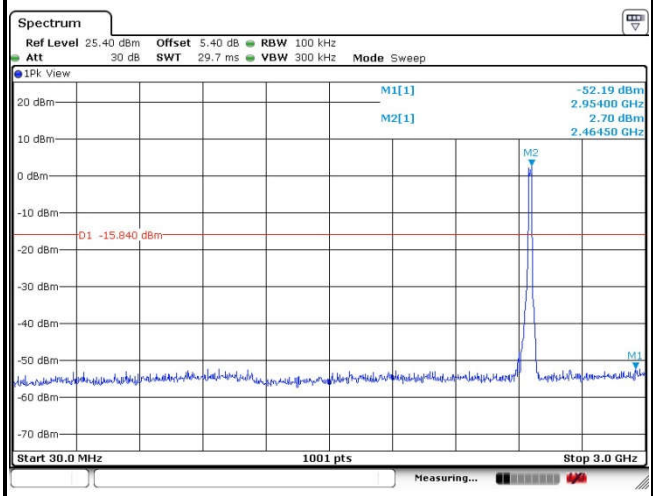
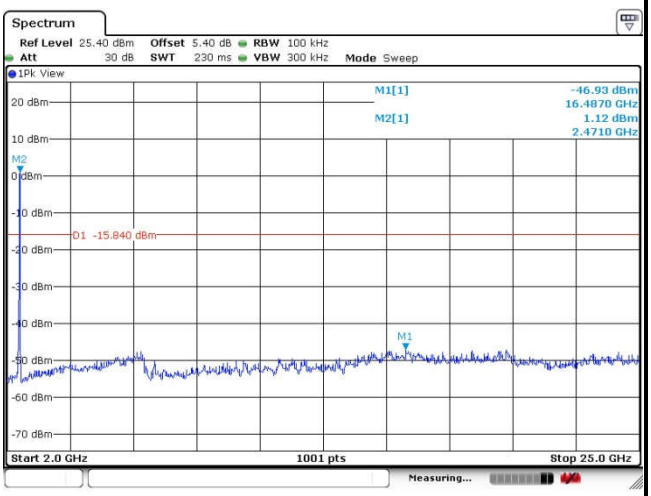
Spurious Emission 30MHz~3GHz



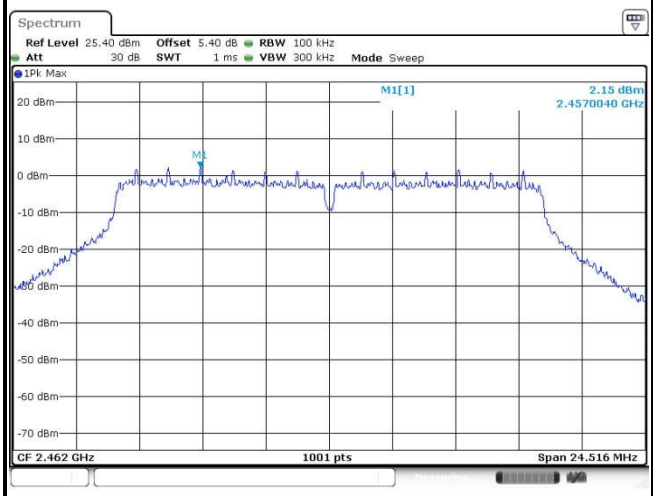
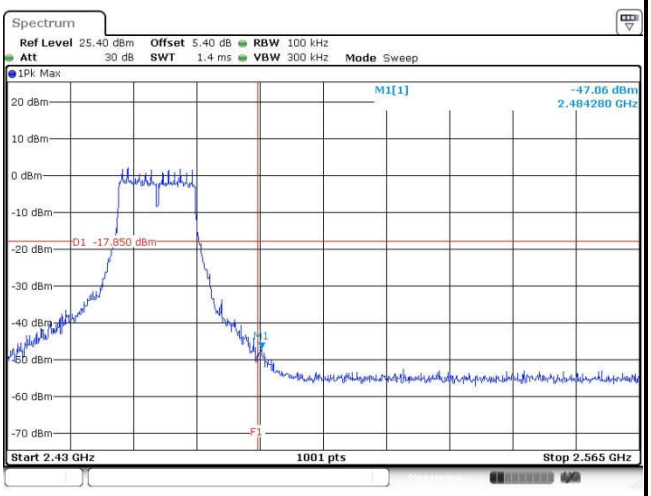
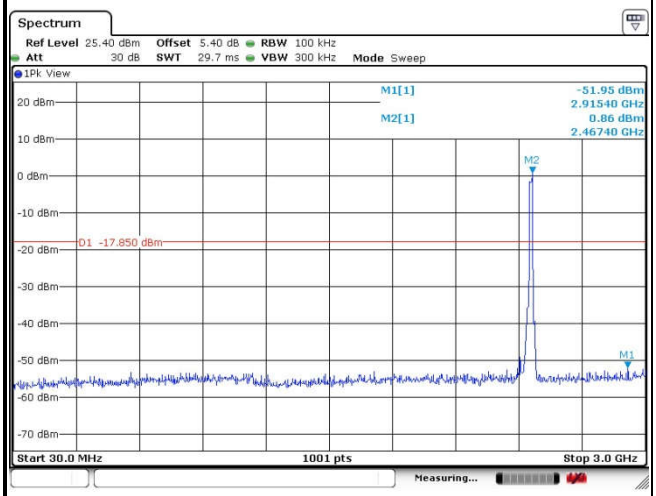
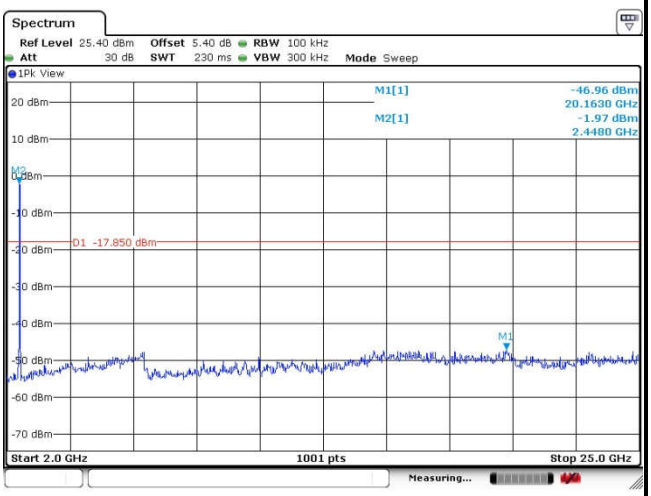
Spurious Emission 2GHz~25GHz



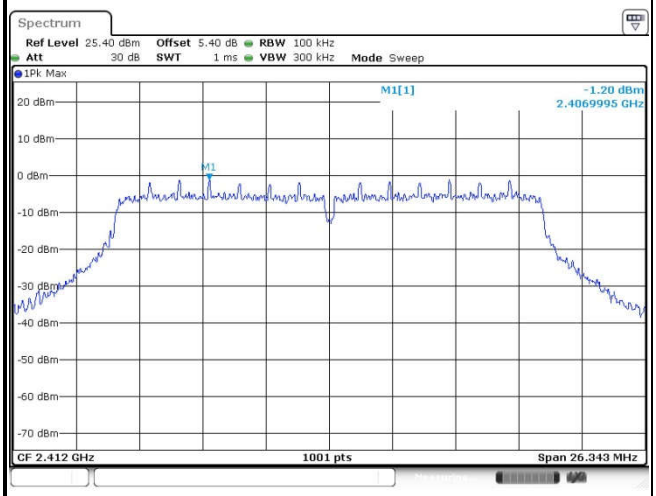
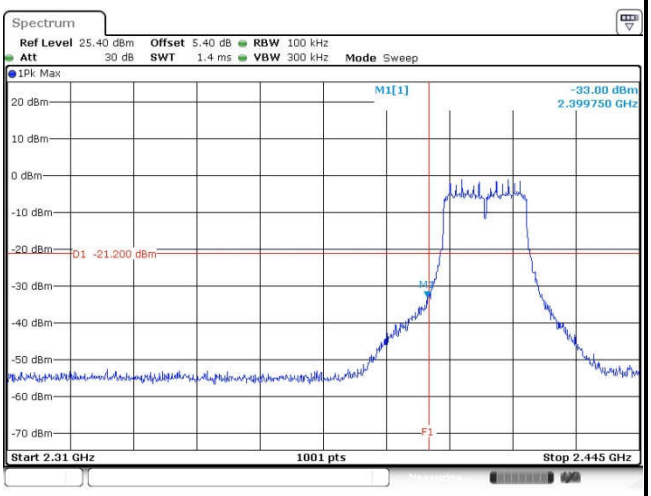
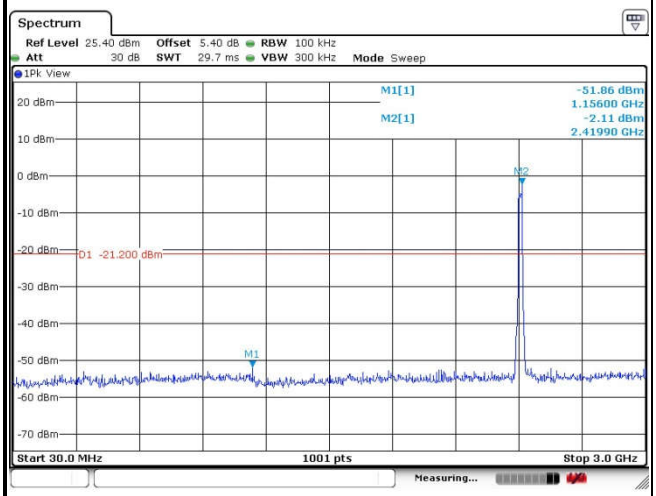
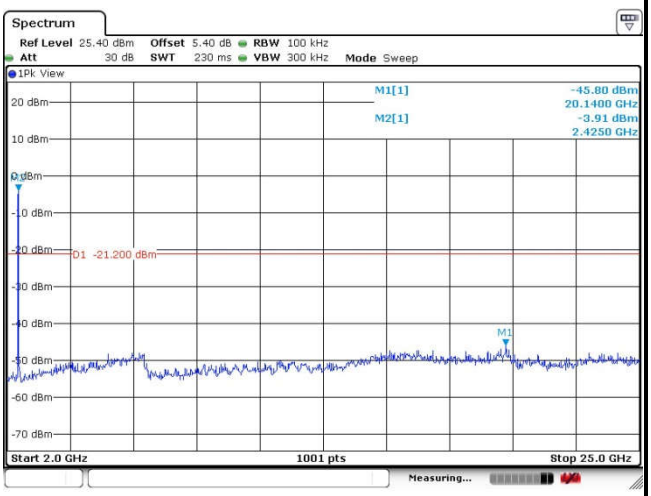
Test Mode :	802.11g	Test Channel :	10

100kHz PSD reference Level	High Channel Plot
	
Date: 4.MAY.2018 19:48:24	Date: 4.MAY.2018 19:49:38
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 19:52:54	Date: 4.MAY.2018 19:52:15

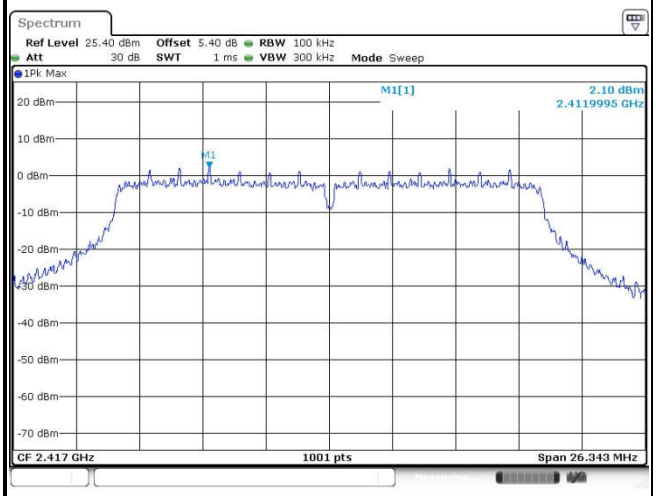
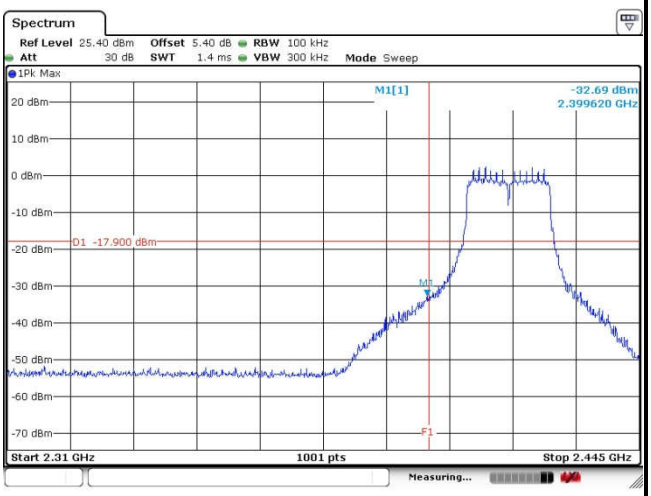
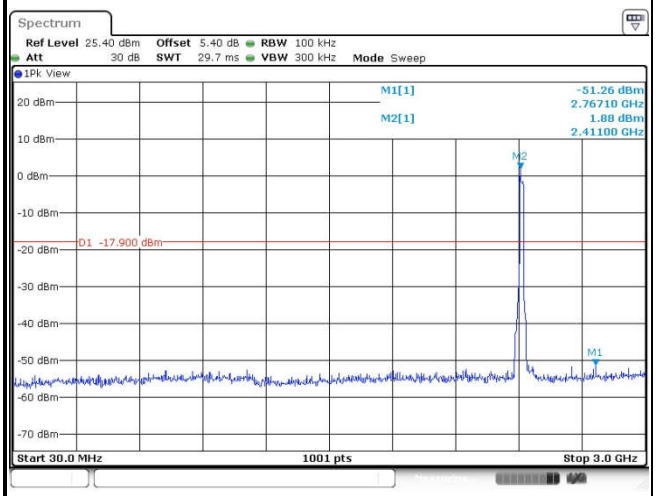
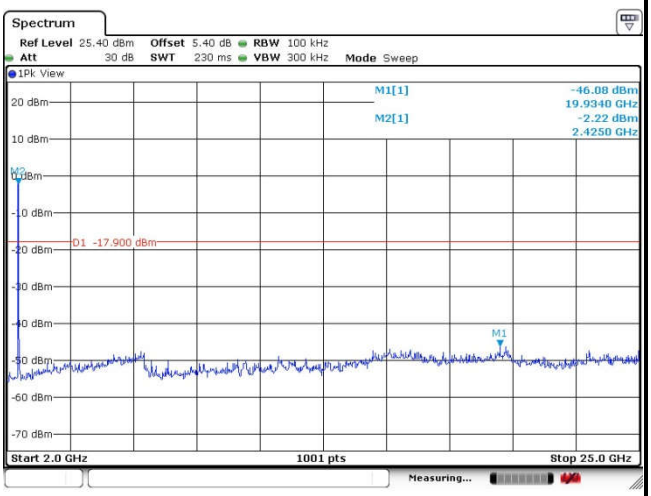
Test Mode :	802.11g	Test Channel :	11

100kHz PSD reference Level	High Channel Plot
	
Date: 4.MAY.2018 19:42:44	Date: 4.MAY.2018 19:42:52
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 19:44:15	Date: 4.MAY.2018 19:43:20

Test Mode :	802.11n HT20	Test Channel :	01

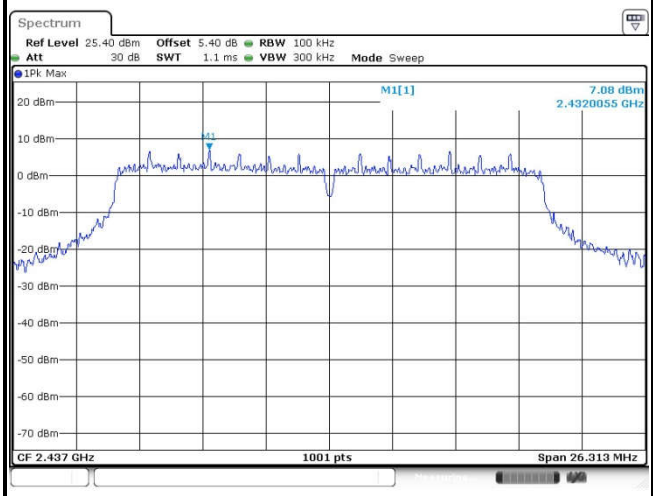
100kHz PSD reference Level	Low Channel Plot
	
Date: 4.MAY.2018 20:12:28	Date: 4.MAY.2018 20:12:37
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 20:16:25	Date: 4.MAY.2018 20:15:32

Test Mode :	802.11n HT20	Test Channel :	02

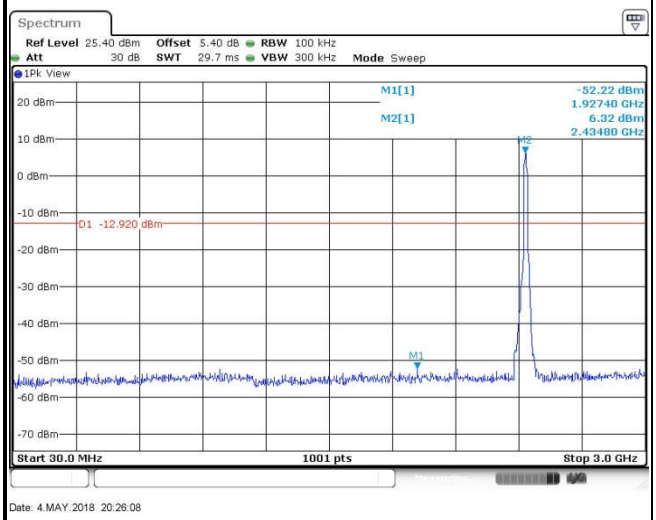
100kHz PSD reference Level	Low Channel Plot
	
Date: 4.MAY.2018 20:20:57	Date: 4.MAY.2018 20:21:52
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 20:22:17	Date: 4.MAY.2018 20:22:50

Test Mode :	802.11n HT20	Test Channel :	06

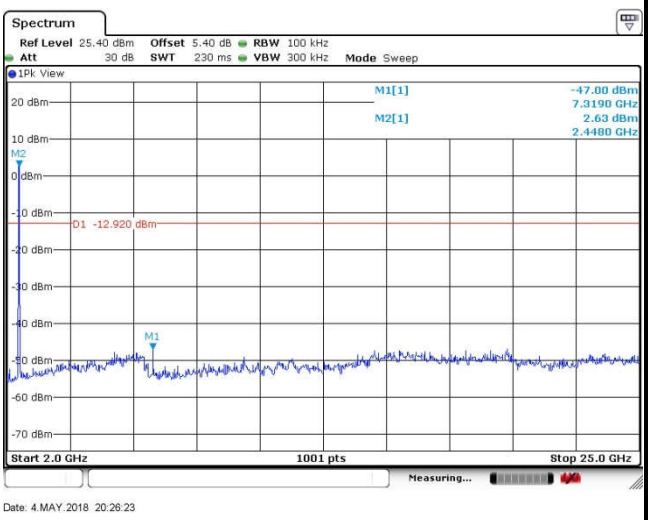
100kHz PSD reference Level



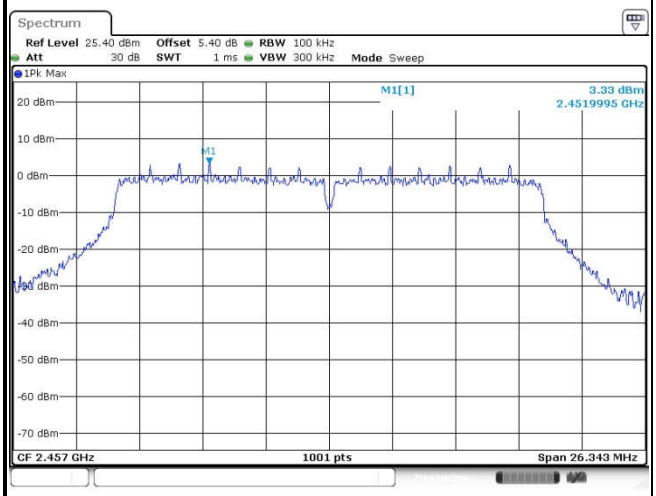
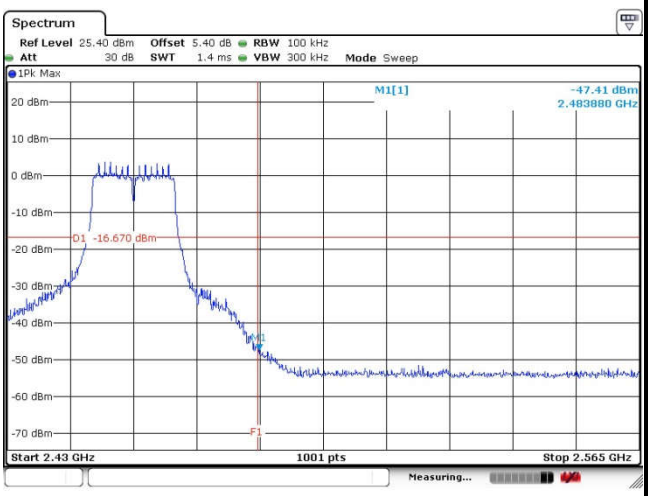
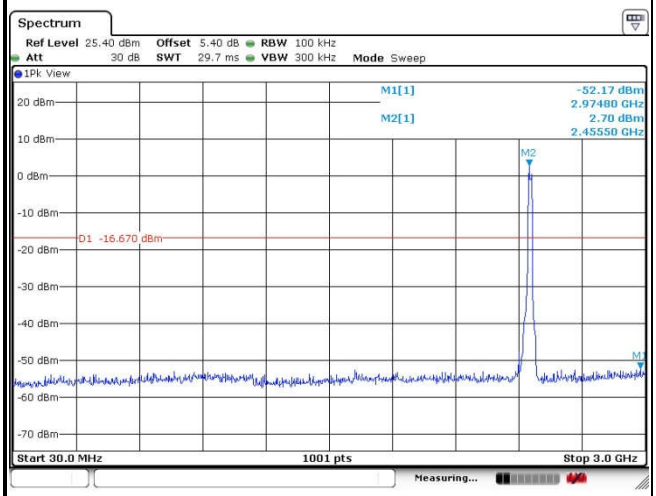
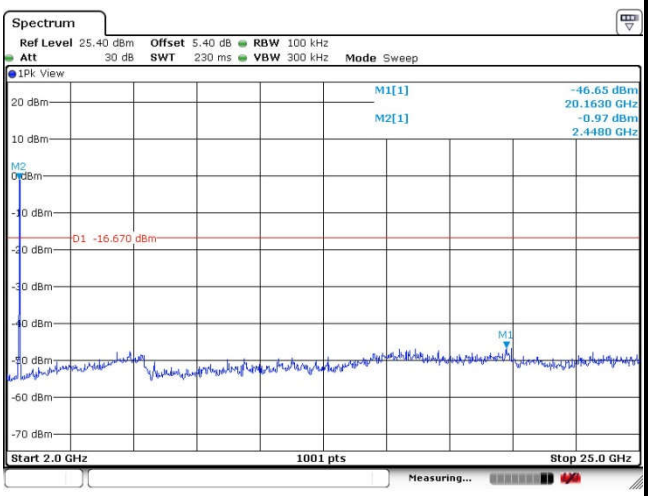
Spurious Emission 30MHz~3GHz



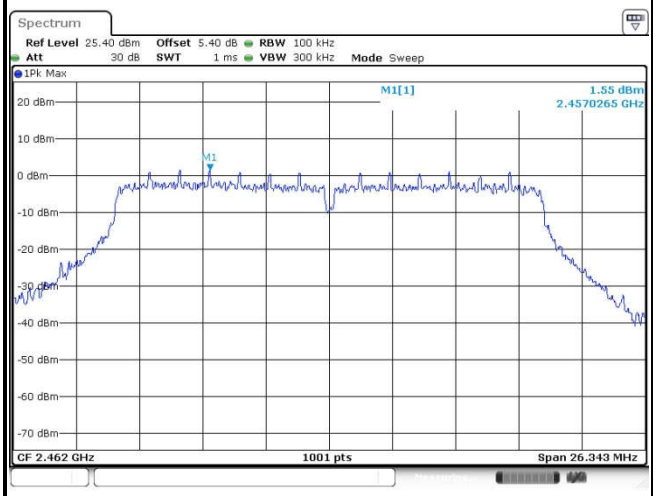
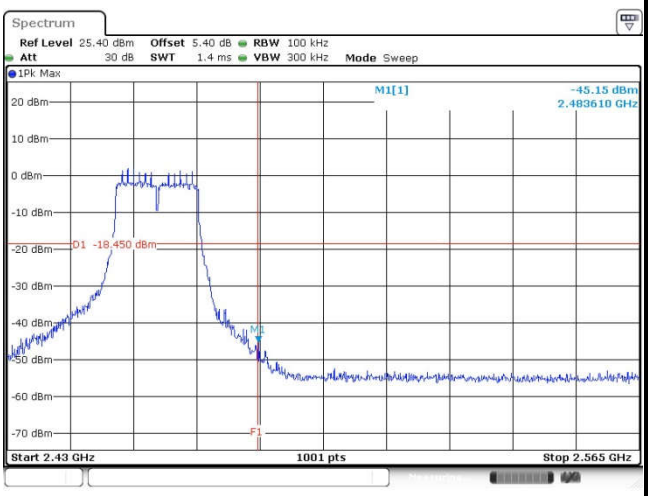
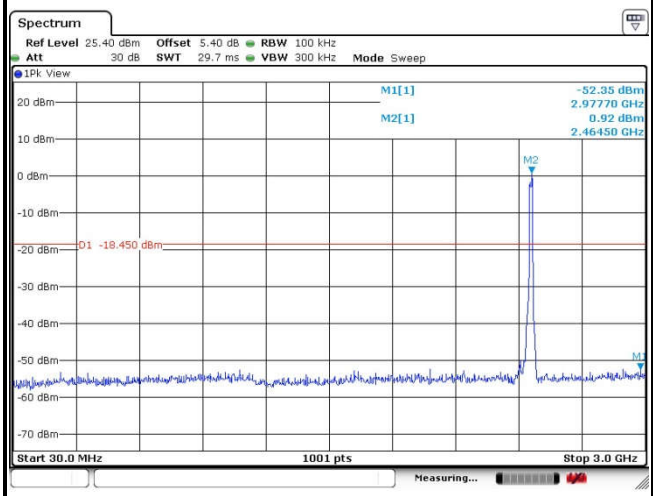
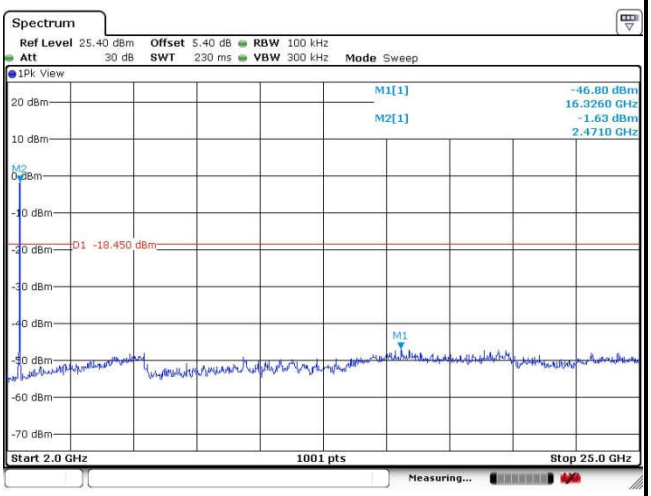
Spurious Emission 2GHz~25GHz



Test Mode :	802.11n HT20	Test Channel :	10

100kHz PSD reference Level	High Channel Plot
	
Date: 4.MAY.2018 20:29:26	Date: 4.MAY.2018 20:30:26
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 20:32:03	Date: 4.MAY.2018 20:31:31

Test Mode :	802.11n HT20	Test Channel :	11

100kHz PSD reference Level	High Channel Plot
	
Date: 4.MAY.2018 20:35:10	Date: 4.MAY.2018 20:35:42
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAY.2018 20:36:56	Date: 4.MAY.2018 20:36:24

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

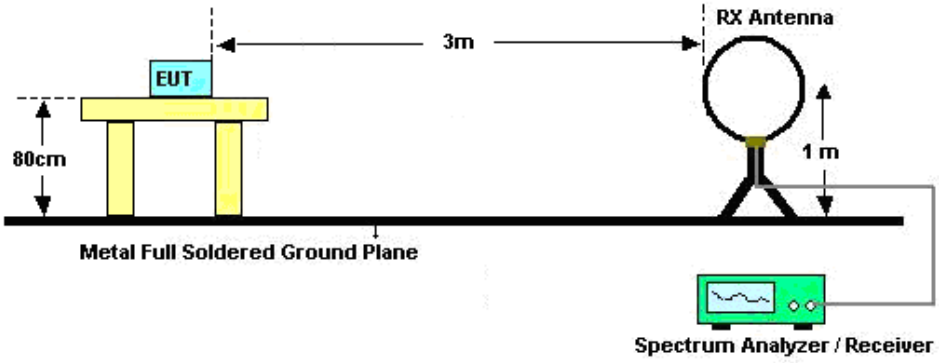
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

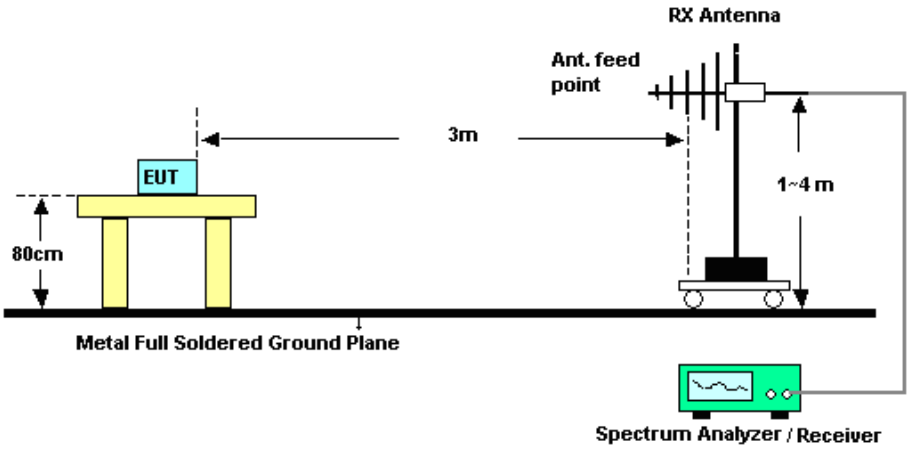
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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

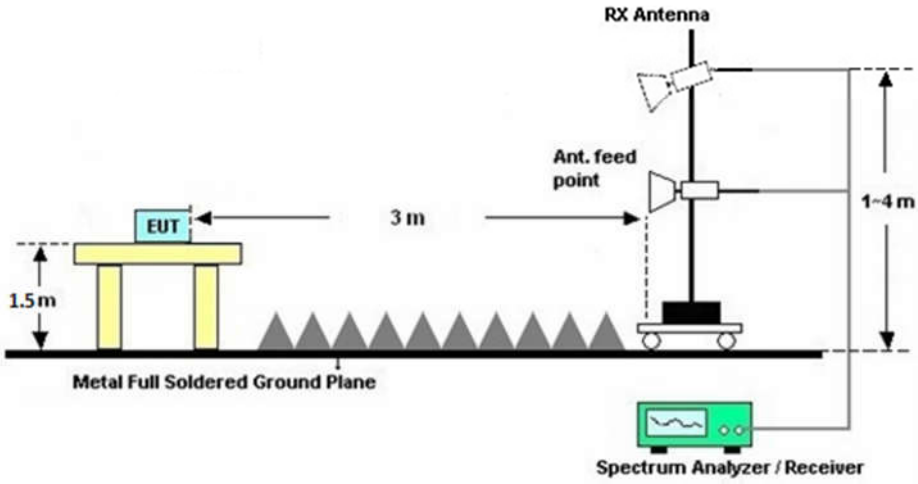
For radiated emissions below 30MHz



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 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.

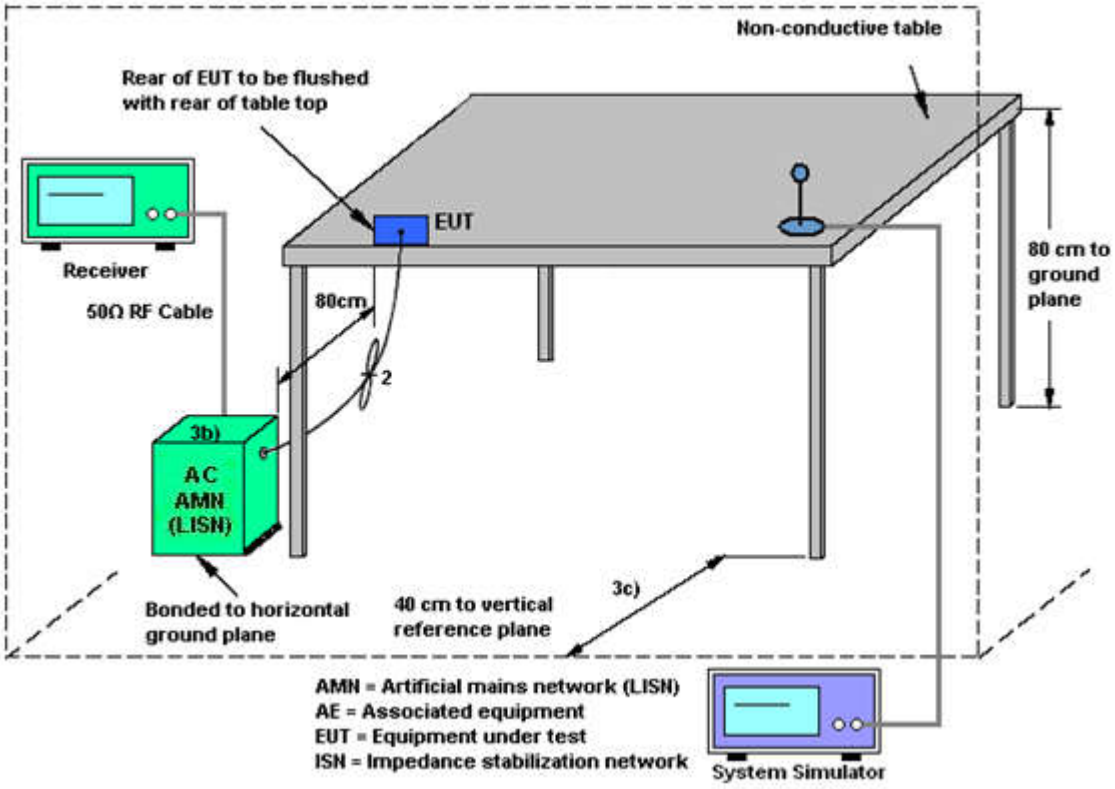
3.6.2 Measuring Instruments

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	101040	10Hz~40GHz	Aug. 08, 2017	Apr. 26, 2018~ May 04, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	Apr. 26, 2018~ May 04, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Apr. 26, 2018~ May 04, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 19, 2017	Apr. 26, 2018	Oct. 18, 2018	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 17, 2018	Apr. 26, 2018	Apr. 16, 2019	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 22, 2017	Apr. 26, 2018	Oct. 21, 2018	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	47610	30MHz-1GHz	Sep. 12, 2017	Apr. 26, 2018	Sep. 11, 2018	Radiation (03CH03-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 21, 2018	Apr. 26, 2018	Jan. 20, 2019	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Apr. 26, 2018	Feb. 06, 2019	Radiation (03CH03-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr. 17, 2018	Apr. 26, 2018	Apr. 16, 2019	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Oct. 12, 2017	Apr. 26, 2018	Oct. 11, 2018	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 12, 2017	Apr. 26, 2018	Oct. 11, 2018	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Apr. 26, 2018	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Apr. 26, 2018	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Apr. 26, 2018	NCR	Radiation (03CH03-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Apr. 28, 2018	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Apr. 28, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Apr. 28, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Apr. 28, 2018	Oct. 11, 2018	Conduction (CO01-KS)

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))	2.3dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.1dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5dB

Appendix A. conducted test results

Report Number : FR841203C

A1 - DTS Part

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/4/26~2018/5/4	Relative Humidity:	51~55	%

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	14.39	10.01	0.50	Pass
11b	1Mbps	1	2	2417	14.39	10.03	0.50	Pass
11b	1Mbps	1	6	2437	14.59	10.01	0.50	Pass
11b	1Mbps	1	11	2462	14.24	10.01	0.50	Pass
11g	6Mbps	1	1	2412	18.78	16.34	0.50	Pass
11g	6Mbps	1	2	2417	18.68	16.34	0.50	Pass
11g	6Mbps	1	6	2437	19.83	16.30	0.50	Pass
11g	6Mbps	1	10	2457	18.73	16.34	0.50	Pass
11g	6Mbps	1	11	2462	18.83	16.34	0.50	Pass
HT20	MCS0	1	1	2412	19.38	17.56	0.50	Pass
HT20	MCS0	1	2	2417	19.48	17.56	0.50	Pass
HT20	MCS0	1	6	2437	19.78	17.54	0.50	Pass
HT20	MCS0	1	10	2457	19.58	17.56	0.50	Pass
HT20	MCS0	1	11	2462	19.38	17.56	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	18.85	30.00	-3.20	15.65	36.00	Pass
11b	1Mbps	1	2	2417	18.93	30.00	-3.20	15.73	36.00	Pass
11b	1Mbps	1	6	2437	20.96	30.00	-3.20	17.76	36.00	Pass
11b	1Mbps	1	11	2462	20.77	30.00	-3.20	17.57	36.00	Pass
11g	6Mbps	1	1	2412	21.24	30.00	-3.20	18.04	36.00	Pass
11g	6Mbps	1	2	2417	22.05	30.00	-3.20	18.85	36.00	Pass
11g	6Mbps	1	6	2437	23.83	30.00	-3.20	20.63	36.00	Pass
11g	6Mbps	1	10	2457	23.35	30.00	-3.20	20.15	36.00	Pass
11g	6Mbps	1	11	2462	22.82	30.00	-3.20	19.62	36.00	Pass
HT20	MCS0	1	1	2412	19.22	30.00	-3.20	16.02	36.00	Pass
HT20	MCS0	1	2	2417	22.14	30.00	-3.20	18.94	36.00	Pass
HT20	MCS0	1	6	2437	23.73	30.00	-3.20	20.53	36.00	Pass
HT20	MCS0	1	10	2457	23.24	30.00	-3.20	20.04	36.00	Pass
HT20	MCS0	1	11	2462	22.43	30.00	-3.20	19.23	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

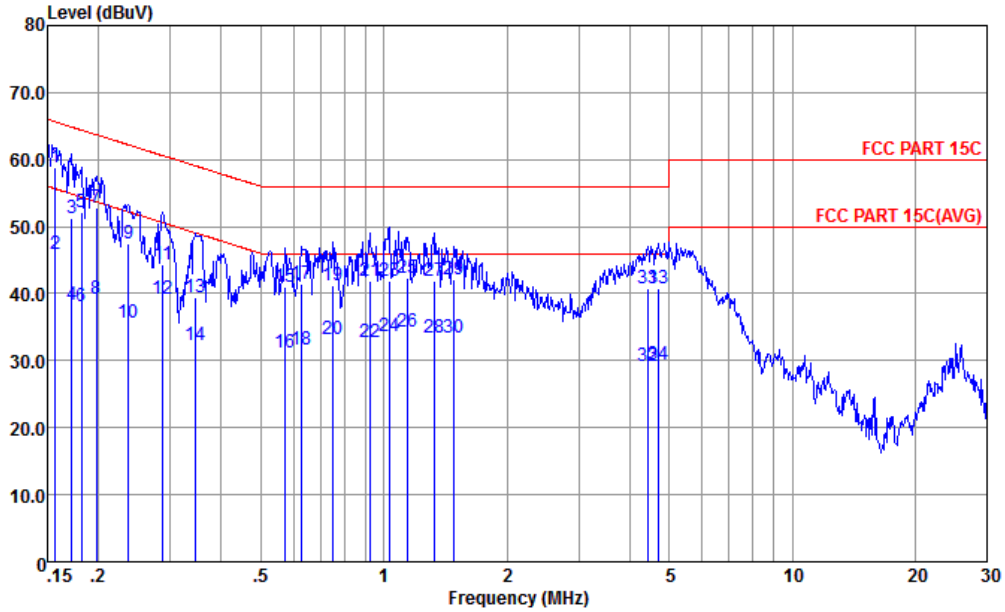
2.4GHz Band						
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.11	16.47
11b	1Mbps	1	2	2417	0.11	16.54
11b	1Mbps	1	6	2437	0.11	18.66
11b	1Mbps	1	11	2462	0.11	18.26
11g	6Mbps	1	1	2412	0.58	11.20
11g	6Mbps	1	2	2417	0.58	12.85
11g	6Mbps	1	6	2437	0.58	18.46
11g	6Mbps	1	10	2457	0.58	14.74
11g	6Mbps	1	11	2462	0.58	12.95
HT20	MCS0	1	1	2412	0.62	9.44
HT20	MCS0	1	2	2417	0.62	12.86
HT20	MCS0	1	6	2437	0.62	17.67
HT20	MCS0	1	10	2457	0.62	17.67
HT20	MCS0	1	11	2462	0.62	12.54

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	-6.37	-3.20	8.00	Pass
11b	1Mbps	1	2	2417	-6.56	-3.20	8.00	Pass
11b	1Mbps	1	6	2437	-4.38	-3.20	8.00	Pass
11b	1Mbps	1	11	2462	-4.37	-3.20	8.00	Pass
11g	6Mbps	1	1	2412	-13.64	-3.20	8.00	Pass
11g	6Mbps	1	2	2417	-12.36	-3.20	8.00	Pass
11g	6Mbps	1	6	2437	-6.14	-3.20	8.00	Pass
11g	6Mbps	1	10	2457	-9.50	-3.20	8.00	Pass
11g	6Mbps	1	11	2462	-11.99	-3.20	8.00	Pass
HT20	MCS0	1	1	2412	-16.16	-3.20	8.00	Pass
HT20	MCS0	1	2	2417	-12.60	-3.20	8.00	Pass
HT20	MCS0	1	6	2437	-7.10	-3.20	8.00	Pass
HT20	MCS0	1	10	2457	-9.73	-3.20	8.00	Pass
HT20	MCS0	1	11	2462	-12.51	-3.20	8.00	Pass

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	**Temperature :**	22.1~22.7℃
		Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line

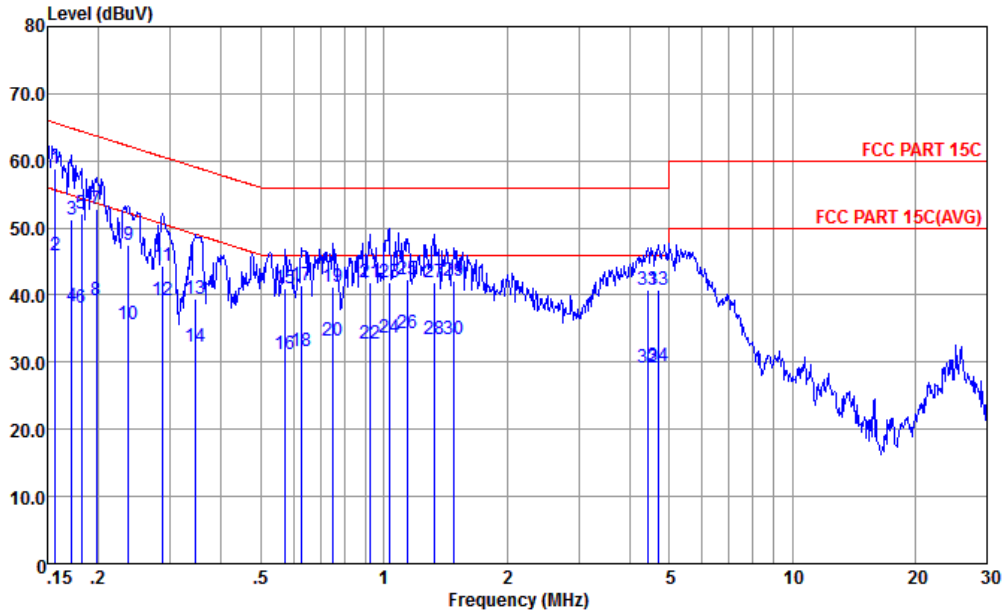


Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE

mode : Mode 1
: 355534090027391/355534090027409 #11

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.156	58.86	-6.79	65.65	48.10	0.17	10.59	QP
2	0.156	45.96	-9.69	55.65	35.20	0.17	10.59	Average
3	0.172	51.22	-13.64	64.86	40.50	0.18	10.54	QP
4	0.172	38.32	-16.54	54.86	27.60	0.18	10.54	Average
5	0.182	52.20	-12.22	64.42	41.50	0.19	10.51	QP
6	0.182	38.00	-16.42	54.42	27.30	0.19	10.51	Average
7	0.198	52.86	-10.85	63.71	42.20	0.20	10.46	QP
8	0.198	39.26	-14.45	53.71	28.60	0.20	10.46	Average
9	0.237	47.45	-14.77	62.22	36.80	0.21	10.44	QP
10	0.237	35.75	-16.47	52.22	25.10	0.21	10.44	Average
11	0.288	44.45	-16.14	60.59	33.80	0.22	10.43	QP
12	0.288	39.25	-11.34	50.59	28.60	0.22	10.43	Average
13	0.346	39.55	-19.50	59.05	28.89	0.24	10.42	QP
14	0.346	32.25	-16.80	49.05	21.59	0.24	10.42	Average
15	0.570	41.11	-14.89	56.00	30.60	0.26	10.25	QP
16	0.570	31.11	-14.89	46.00	20.60	0.26	10.25	Average
17	0.627	41.37	-14.63	56.00	30.90	0.26	10.21	QP

Test Engineer :	Amos Zhang	Temperature :	22.1~22.7℃
		Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line

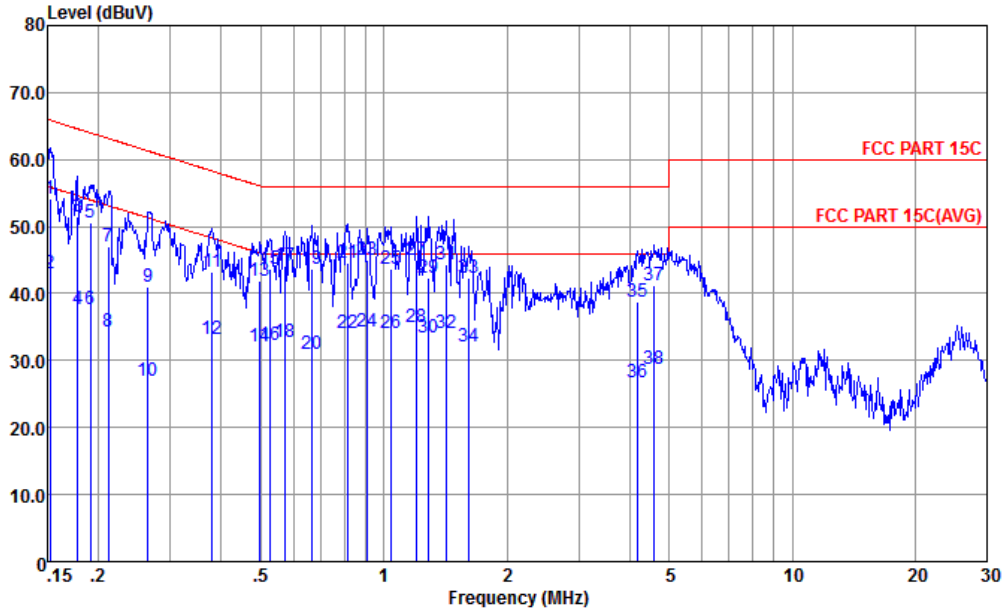


Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE

mode : Mode 1
: 355534090027391/355534090027409 #11

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.627	31.67	-14.33	46.00	21.20	0.26	10.21	Average
19	0.747	41.19	-14.81	56.00	30.80	0.26	10.13	QP
20	0.747	33.29	-12.71	46.00	22.90	0.26	10.13	Average
21	0.923	41.87	-14.13	56.00	31.50	0.26	10.11	QP
22	0.923	32.67	-13.33	46.00	22.30	0.26	10.11	Average
23	1.032	41.97	-14.03	56.00	31.60	0.26	10.11	QP
24	1.032	33.67	-12.33	46.00	23.30	0.26	10.11	Average
25	1.141	42.29	-13.71	56.00	31.90	0.26	10.13	QP
26	1.141	34.29	-11.71	46.00	23.90	0.26	10.13	Average
27	1.324	41.92	-14.08	56.00	31.50	0.27	10.15	QP
28	1.324	33.32	-12.68	46.00	22.90	0.27	10.15	Average
29	1.480	42.04	-13.96	56.00	31.60	0.27	10.17	QP
30	1.480	33.34	-12.66	46.00	22.90	0.27	10.17	Average
31	4.430	40.75	-15.25	56.00	30.19	0.36	10.20	QP
32	4.430	29.15	-16.85	46.00	18.59	0.36	10.20	Average
33	4.721	40.78	-15.22	56.00	30.20	0.36	10.22	QP
34	4.721	29.48	-16.52	46.00	18.90	0.36	10.22	Average

Test Engineer :	Amos Zhang	Temperature :	22.1~22.7℃
		Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral

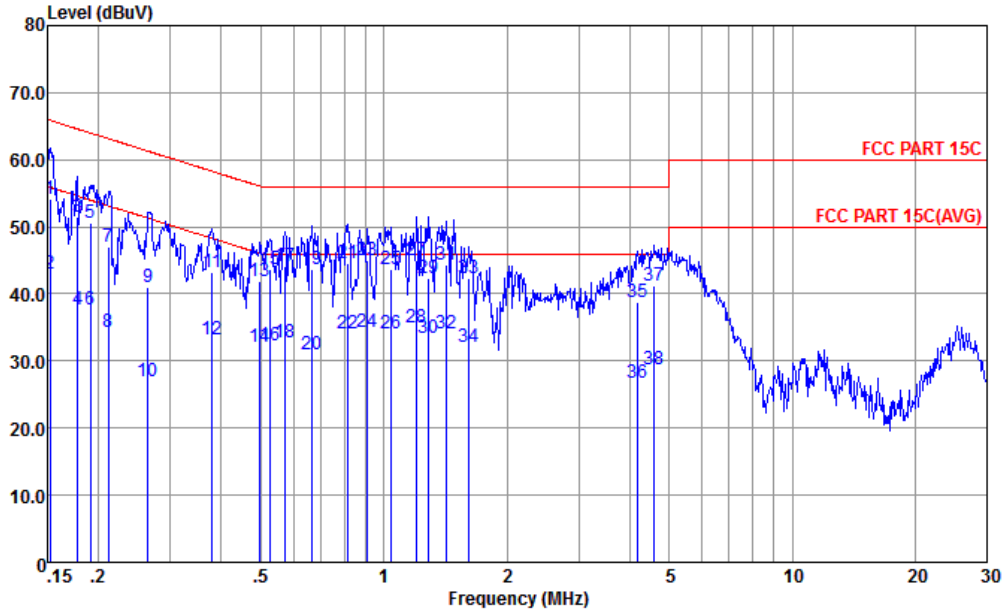


Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

mode : Mode 1
: 355534090027391/355534090027409 #11

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.152	54.19	-11.68	65.87	43.30	0.28	10.61	QP
2	0.152	43.09	-12.78	55.87	32.20	0.28	10.61	Average
3	0.178	51.40	-13.19	64.59	40.60	0.28	10.52	QP
4	0.178	37.70	-16.89	54.59	26.90	0.28	10.52	Average
5	0.191	50.66	-13.32	63.98	39.90	0.28	10.48	QP
6	0.191	37.66	-16.32	53.98	26.90	0.28	10.48	Average
7	0.212	46.93	-16.21	63.14	36.20	0.28	10.45	QP
8	0.212	34.33	-18.81	53.14	23.60	0.28	10.45	Average
9	0.264	40.92	-20.37	61.29	30.20	0.28	10.44	QP
10	0.264	27.02	-24.27	51.29	16.30	0.28	10.44	Average
11	0.379	43.20	-15.10	58.30	32.50	0.29	10.41	QP
12	0.379	33.30	-15.00	48.30	22.60	0.29	10.41	Average
13	0.497	41.80	-14.25	56.05	31.20	0.29	10.31	QP
14	0.497	32.20	-13.85	46.05	21.60	0.29	10.31	Average
15	0.527	43.78	-12.22	56.00	33.21	0.29	10.28	QP
16	0.527	32.38	-13.62	46.00	21.81	0.29	10.28	Average
17	0.570	44.04	-11.96	56.00	33.50	0.29	10.25	QP

Test Engineer :	Amos Zhang	**Temperature :**	22.1~22.7℃
		Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

mode : Mode 1
: 355534090027391/355534090027409 #11

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.570	32.84	-13.16	46.00	22.30	0.29	10.25	Average
19	0.668	43.68	-12.32	56.00	33.20	0.30	10.18	QP
20	0.668	31.08	-14.92	46.00	20.60	0.30	10.18	Average
21	0.817	44.61	-11.39	56.00	34.21	0.30	10.10	QP
22	0.817	34.01	-11.99	46.00	23.61	0.30	10.10	Average
23	0.909	44.91	-11.09	56.00	34.49	0.31	10.11	QP
24	0.909	34.31	-11.69	46.00	23.89	0.31	10.11	Average
25	1.037	43.62	-12.38	56.00	33.20	0.31	10.11	QP
26	1.037	34.02	-11.98	46.00	23.60	0.31	10.11	Average
27	1.203	44.95	-11.05	56.00	34.50	0.31	10.14	QP
28 *	1.203	35.05	-10.95	46.00	24.60	0.31	10.14	Average
29	1.282	42.26	-13.74	56.00	31.80	0.31	10.15	QP
30	1.282	33.36	-12.64	46.00	22.90	0.31	10.15	Average
31	1.426	44.38	-11.62	56.00	33.90	0.32	10.16	QP
32	1.426	34.08	-11.92	46.00	23.60	0.32	10.16	Average
33	1.619	42.40	-13.60	56.00	31.90	0.32	10.18	QP
34	1.619	32.10	-13.90	46.00	21.60	0.32	10.18	Average
35	4.180	38.71	-17.29	56.00	28.19	0.34	10.18	QP
36	4.180	26.81	-19.19	46.00	16.29	0.34	10.18	Average
37	4.598	41.15	-14.85	56.00	30.60	0.34	10.21	QP
38	4.598	28.75	-17.25	46.00	18.20	0.34	10.21	Average

Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (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)
802.11b CH 01 2412MHz		2386.31	58.49	-15.51	74	55.75	31.8	7.59	36.65	290	120	P	H
		2386.18	48.85	-5.15	54	46.11	31.8	7.59	36.65	290	120	A	H
	*	2412	105.4	-	-	102.56	31.86	7.62	36.64	290	120	P	H
	*	2410	102.16	-	-	99.32	31.86	7.62	36.64	290	120	A	H
		2387.48	59.55	-14.45	74	56.81	31.8	7.59	36.65	152	59	P	V
		2386.57	49.92	-4.08	54	47.18	31.8	7.59	36.65	152	59	A	V
	*	2412	107.68	-	-	104.84	31.86	7.62	36.64	152	59	P	V
	*	2410	104.49	-	-	101.65	31.86	7.62	36.64	152	59	A	V
802.11b CH 11 2462MHz	*	2462	106.93	-	-	103.88	32.03	7.69	36.67	356	141	P	H
	*	2460	103.77	-	-	100.72	32.03	7.69	36.67	356	141	A	H
		2495.26	59.08	-14.92	74	55.89	32.14	7.74	36.69	356	141	P	H
		2487.28	48.76	-5.24	54	45.63	32.09	7.72	36.68	356	141	A	H
	*	2462	110.02	-	-	106.97	32.03	7.69	36.67	145	59	P	V
	*	2460	106.84	-	-	103.79	32.03	7.69	36.67	145	59	A	V
		2486.92	59.12	-14.88	74	55.99	32.09	7.72	36.68	145	59	P	V
		2487.34	50.65	-3.35	54	47.52	32.09	7.72	36.68	145	59	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	41.03	-32.97	74	59.82	34.24	11.5	64.53	100	360	P	H
		4824	41.22	-32.78	74	60.01	34.24	11.5	64.53	100	360	P	V
802.11b CH 06 2437MHz		4872	40.29	-33.71	74	59.02	34.31	11.56	64.6	100	360	P	H
		7308	41.92	-32.08	74	57.16	35.79	13.98	65.01	100	360	P	H
		4872	41.07	-32.93	74	59.8	34.31	11.56	64.6	100	360	P	V
		7308	43.67	-30.33	74	58.91	35.79	13.98	65.01	100	360	P	V
802.11b CH 11 2462MHz		4926	40.75	-33.25	74	59.43	34.38	11.62	64.68	100	360	P	H
		7386	42.62	-31.38	74	57.86	35.84	13.97	65.05	100	360	P	H
		4926	40.98	-33.02	74	59.66	34.38	11.62	64.68	100	360	P	V
		7386	43.37	-30.63	74	58.61	35.84	13.97	65.05	100	360	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		2387.61	61.97	-12.03	74	59.23	31.8	7.59	36.65	298	120	P	H
		2389.95	49.66	-4.34	54	46.91	31.8	7.59	36.64	298	120	A	H
	*	2408	102.48	-	-	99.64	31.86	7.62	36.64	298	120	P	H
	*	2408	94.5	-	-	91.66	31.86	7.62	36.64	298	120	A	H
		2389.82	62.46	-11.54	74	59.71	31.8	7.59	36.64	118	88	P	V
		2389.95	49.64	-4.36	54	46.89	31.8	7.59	36.64	118	88	A	V
	*	2410	103.42	-	-	100.58	31.86	7.62	36.64	118	88	P	V
	*	2408	95.87	-	-	93.03	31.86	7.62	36.64	118	88	A	V
802.11g CH 11 2462MHz	*	2456	105.81	-	-	102.76	32.03	7.69	36.67	352	129	P	H
	*	2456	98.13	-	-	95.08	32.03	7.69	36.67	352	129	A	H
		2483.56	63.94	-10.06	74	60.81	32.09	7.72	36.68	352	129	P	H
		2483.51	49.24	-4.76	54	46.11	32.09	7.72	36.68	352	129	A	H
	*	2458	107.27	-	-	104.22	32.03	7.69	36.67	149	71	P	V
	*	2454	99.2	-	-	96.15	32.03	7.69	36.67	149	71	A	V
		2483.51	65.51	-8.49	74	62.38	32.09	7.72	36.68	149	71	P	V
		2483.92	50.39	-3.61	54	47.26	32.09	7.72	36.68	149	57	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	41.03	-32.97	74	59.82	34.24	11.5	64.53	100	360	P	H
		4824	41.98	-32.02	74	60.77	34.24	11.5	64.53	100	360	P	V
802.11g CH 06 2437MHz		4872	41.16	-32.84	74	59.89	34.31	11.56	64.6	100	360	P	H
		7308	42.27	-31.73	74	57.51	35.79	13.98	65.01	100	360	P	H
		4872	40.94	-33.06	74	59.67	34.31	11.56	64.6	100	360	P	V
		7308	42.37	-31.63	74	57.61	35.79	13.98	65.01	100	360	P	V
802.11g CH 11 2462MHz		4926	40.64	-33.36	74	59.32	34.38	11.62	64.68	100	360	P	H
		7386	42.85	-31.15	74	58.09	35.84	13.97	65.05	100	360	P	H
		4926	41.24	-32.76	74	59.92	34.38	11.62	64.68	100	360	P	V
		7386	42.05	-31.95	74	57.29	35.84	13.97	65.05	100	360	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)
802.11n HT20 CH 01 2412MHz		2389.3	60.63	-13.37	74	57.89	31.8	7.59	36.65	329	143	P	H
		2389.95	48.9	-5.1	54	46.15	31.8	7.59	36.64	329	143	A	H
	*	2416	99.63	-	-	96.8	31.86	7.62	36.65	329	143	P	H
	*	2408	91.76	-	-	88.92	31.86	7.62	36.64	329	143	A	H
		2389.56	61.49	-12.51	74	58.75	31.8	7.59	36.65	151	61	P	V
		2389.95	50.22	-3.78	54	47.47	31.8	7.59	36.64	151	61	A	V
	*	2408	103.36	-	-	100.52	31.86	7.62	36.64	151	61	P	V
	*	2408	95.24	-	-	92.4	31.86	7.62	36.64	151	61	A	V
802.11n HT20 CH 02 2417MHz		2386.18	60.48	-13.52	74	57.74	31.8	7.59	36.65	327	126	P	H
		2389.43	48.55	-5.45	54	45.81	31.8	7.59	36.65	327	126	A	H
	*	2412	102.82	-	-	99.98	31.86	7.62	36.64	327	126	P	H
	*	2412	95.03	-	-	92.19	31.86	7.62	36.64	327	126	A	H
		2389.69	65.02	-8.98	74	62.28	31.8	7.59	36.65	104	75	P	V
		2389.3	50.28	-3.72	54	47.54	31.8	7.59	36.65	104	75	A	V
	*	2410	106.37	-	-	103.53	31.86	7.62	36.64	104	75	P	V
	*	2412	98.48	-	-	95.64	31.86	7.62	36.64	104	75	A	V
802.11n HT20 CH 11 2462MHz	*	2456	104.45	-	-	101.4	32.03	7.69	36.67	355	142	P	H
	*	2456	96.67	-	-	93.62	32.03	7.69	36.67	355	142	A	H
		2483.56	63.17	-10.83	74	60.04	32.09	7.72	36.68	355	142	P	H
		2483.51	49.74	-4.26	54	46.61	32.09	7.72	36.68	355	142	A	H
	*	2454	107.29	-	-	104.24	32.03	7.69	36.67	149	62	P	V
	*	2456	99.5	-	-	96.45	32.03	7.69	36.67	149	62	A	V
		2485.18	65.38	-8.62	74	62.25	32.09	7.72	36.68	149	62	P	V
		2483.51	50.08	-3.92	54	46.95	32.09	7.72	36.68	149	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 802.11n 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	41.25	-32.75	74	60.04	34.24	11.5	64.53	100	360	P	H
		4824	40.74	-33.26	74	59.53	34.24	11.5	64.53	100	360	P	V
802.11n HT20 CH 02 2417MHz		4836	40.81	-33.19	74	59.57	34.27	11.52	64.55	100	360	P	H
		7251	42.67	-31.33	74	57.9	35.76	13.99	64.98	100	360	P	H
		4834	40.47	-33.53	74	59.23	34.27	11.52	64.55	100	360	P	V
		7248	42.29	-31.71	74	57.52	35.76	13.99	64.98	100	360	P	V
802.11n HT20 CH 06 2437MHz		4872	41.32	-32.68	74	60.05	34.31	11.56	64.6	300	0	P	H
		7311	40.93	-33.07	74	56.17	35.79	13.98	65.01	300	0	P	H
		4874	41.88	-32.12	74	60.61	34.31	11.56	64.6	300	0	P	V
		7308	45.47	-28.53	74	60.71	35.79	13.98	65.01	300	0	P	V
802.11n HT20 CH 11 2462MHz		4926	40.94	-33.06	74	59.62	34.38	11.62	64.68	100	360	P	H
		7386	43.01	-30.99	74	58.25	35.84	13.97	65.05	100	360	P	H
		4926	41.23	-32.77	74	59.91	34.38	11.62	64.68	100	360	P	V
		7386	43.67	-30.33	74	58.91	35.84	13.97	65.05	100	360	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 802.11b (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 802.11b LF		39.7	24.68	-15.32	40	36.25	19.7	0.94	32.21	100	25	P	H
		48.43	19.66	-20.34	40	35.76	15.12	1.04	32.26	-	-	P	H
		216.24	21.92	-24.08	46	36.81	15.16	2.16	32.21	-	-	P	H
		260.86	21.76	-24.24	46	31.52	19.94	2.39	32.09	-	-	P	H
		327.79	21.98	-24.02	46	31.25	19.88	2.93	32.08	-	-	P	H
		805.03	29.43	-16.57	46	28.39	28.33	4.28	31.57	-	-	P	H
		40.67	33.61	-6.39	40	45.67	19.19	0.96	32.21	100	326	P	V
		48.43	31.87	-8.13	40	47.97	15.12	1.04	32.26	-	-	P	V
		106.63	22.43	-21.07	43.5	36.86	16.37	1.47	32.27	-	-	P	V
		306.45	24.69	-21.31	46	34.75	19.36	2.65	32.07	-	-	P	V
		323.91	27.01	-18.99	46	36.43	19.78	2.88	32.08	-	-	P	V
		342.34	24.41	-21.59	46	33.15	20.23	3.12	32.09	-	-	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.	
2		(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)

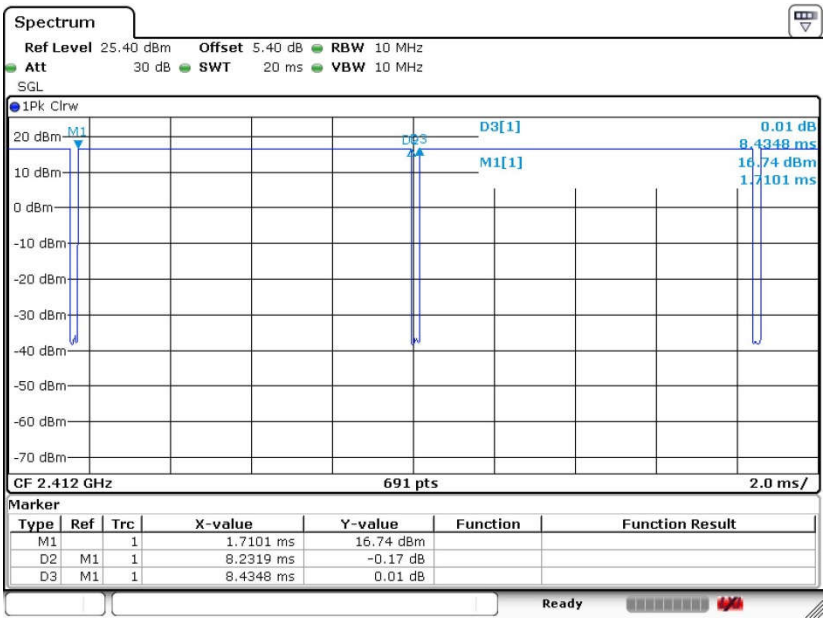
= -10.46(dB)

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
11b	97.59	8.232	0.121	300Hz
11g	87.50	1.370	0.730	1kHz
11n HT20	86.76	1.283	0.780	1kHz

11b



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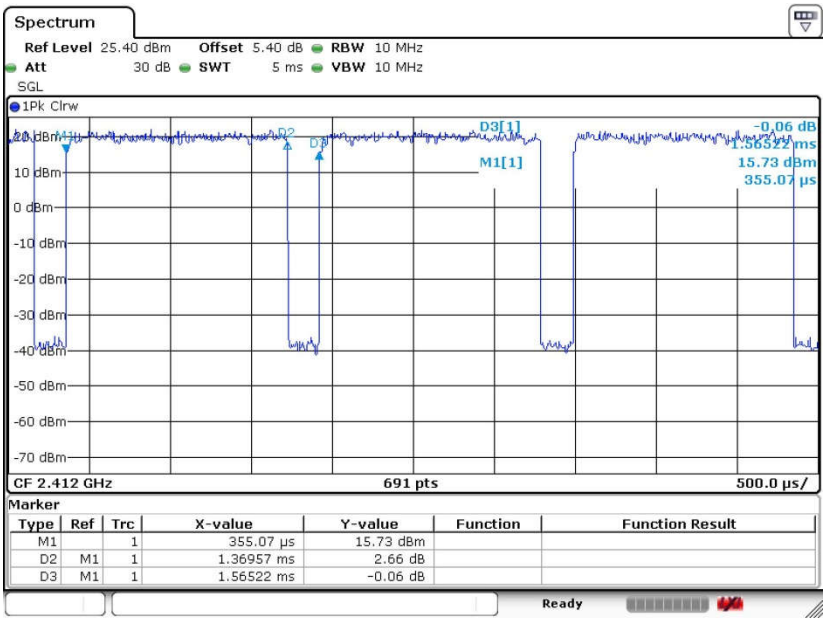
11g



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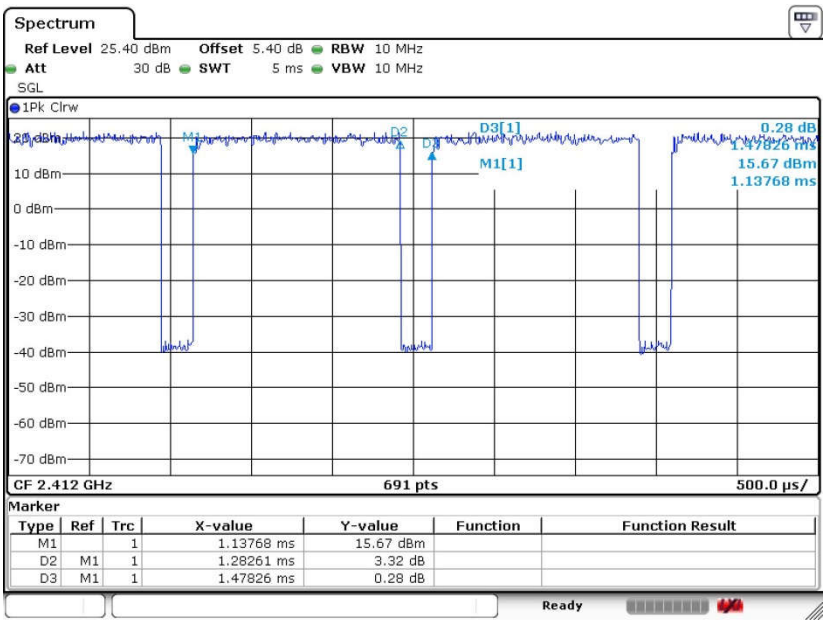
11n HT20



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