FCC RF Test Report

APPLICANT	**:**	**Quectel Wireless Solutions Co., Ltd.**
EQUIPMENT	**:**	**LTE Module**
BRAND NAME	**:**	**Quectel**
MODEL NAME	**:**	**SC20-A**
FCC ID	**:**	**XMR201706SC20A**
STANDARD	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**(DTS) Digital Transmission System**

The product was received on Apr.10, 2017 and testing was completed on Jul. 10, 2017. 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.

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Jones Tsai

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR741007C	Rev. 01	Initial issue of report	Aug. 11, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-247 5.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	RSS-Gen 6.6	99% Bandwidth	-	Pass	-
3.2	15.247(b)	RSS-247 5.4(d)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	RSS-247 5.2(b)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	RSS-247 5.5	Conducted Band Edges	≤ 20dBc	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-247 5.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.55 dB at 2483.510 MHz
3.6	15.207	RSS-GEN 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 3.98 dB at 0.172 MHz
3.7	15.203 & 15.247(b)	N/A	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Quectel Wireless Solutions Co., Ltd.
7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

1.2 Manufacturer

Quectel Wireless Solutions Co., Ltd
7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	LTE Module
Brand Name	Quectel
Model Name	SC20-A
FCC ID	XMR201706SC20A
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/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth v3.0+EDR/ Bluetooth v 4.1 LE
IMEI Code	Conducted:861097036481350/861097036481368 Conduction: 861097036481350/861097036481368 Radiation: 861097036472730/861097036472748
HW Version	R1.0
SW Version	SC20ASAR04A03H8G
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 : 16.22 dBm (0.0419 W) 802.11g : 21.67 dBm (0.1469 W) 802.11n HT20 : 21.64 dBm (0.1459 W) 802.11n HT40 : 22.11 dBm (0.1626 W)
99% Occupied Bandwidth	802.11b : 12.94MHz 802.11g : 18.83MHz 802.11n HT20 : 19.28MHz 802.11n HT40 : 37.06MHz
Antenna Type / Gain	Dipole Antennawith gain 3.00 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

Test Site	Sporton International (KunShan) INC.			
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC/IC Registration No.**
	TH01-KS	03CH03-KS	CO01-KS	306251/4086E

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
- IC RSS-247 Issue 2
- IC RSS-Gen Issue 4

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

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: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

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

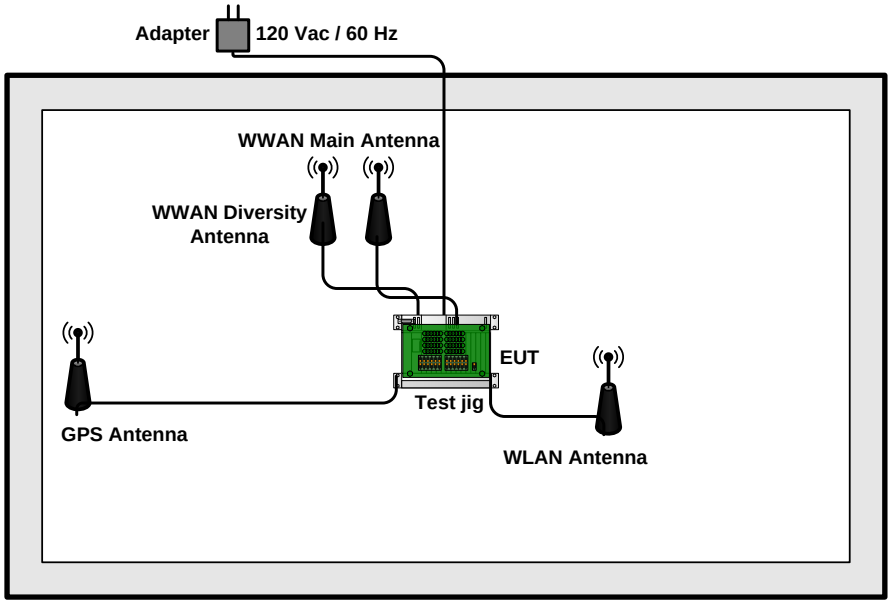
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

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

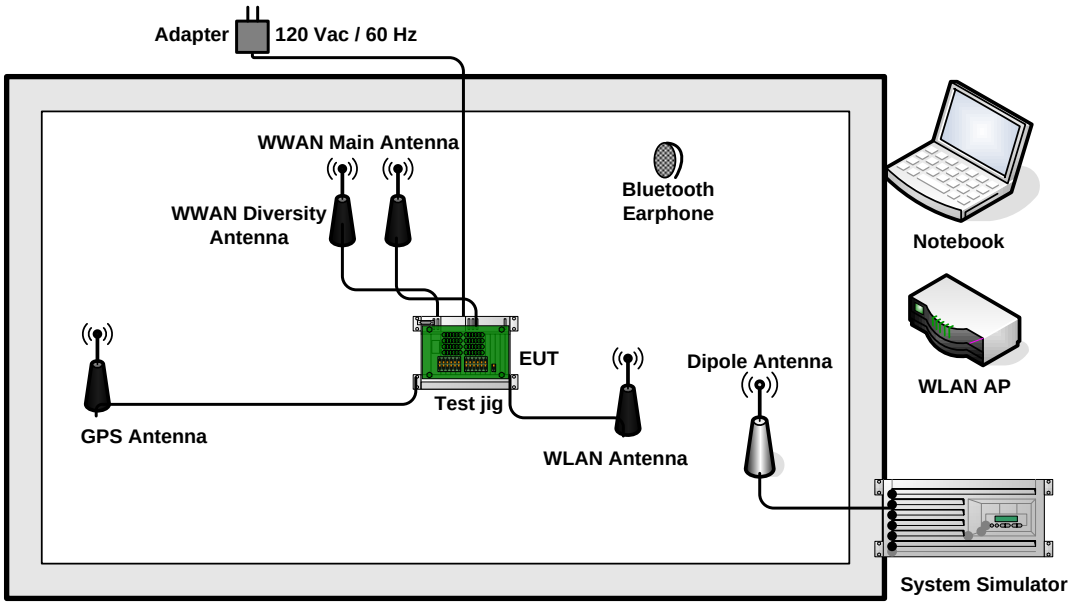
Test Cases	
AC Conducted Emission	Mode 1 : GSM 850 Idle + Bluetooth Link + WLAN Link(2.4G) + Adapter

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	PRC4	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
4.	WLAN AP	D-link	DIR-855	KA2DIR855A2	N/A	Unshielded,1.8m
5.	Adapter	N/A	P-050B	N/A	N/A	Unshielded,1.8m
6.	Test jig	N/A	N/A	N/A	N/A	N/A
7.	Dipole WWAN Antenna	Saintenna	SAA30968A	N/A	N/A	N/A
8.	Dipole WLAN/BT Antenna	INPAQ	DAM-L0-H-N0-000-08-13	N/A	N/A	N/A
9.	GNSS Antenna	INPAQ	03D-S3-00-A	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 continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the Notebook 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
Offset = RF cable loss.
Following shows an offset computation example with cable loss 5.5 dB.

Offset(dB) = RF cable loss(dB.)
= 5.5 (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.

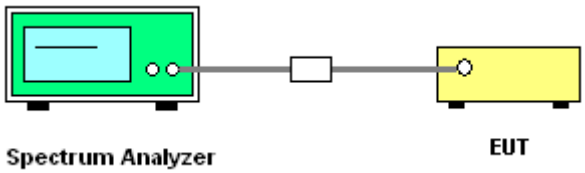
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

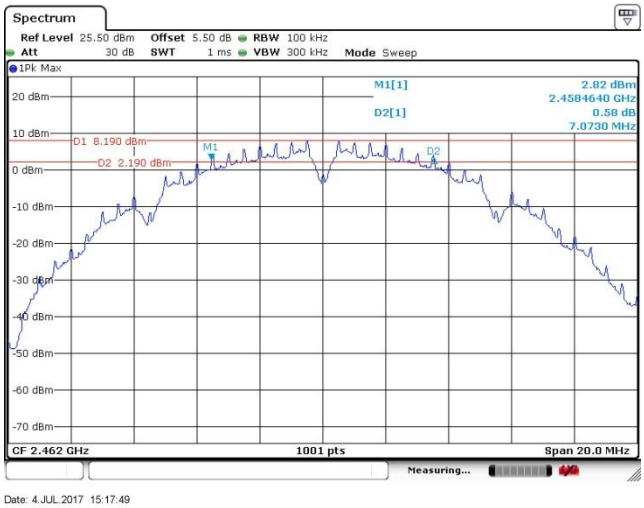
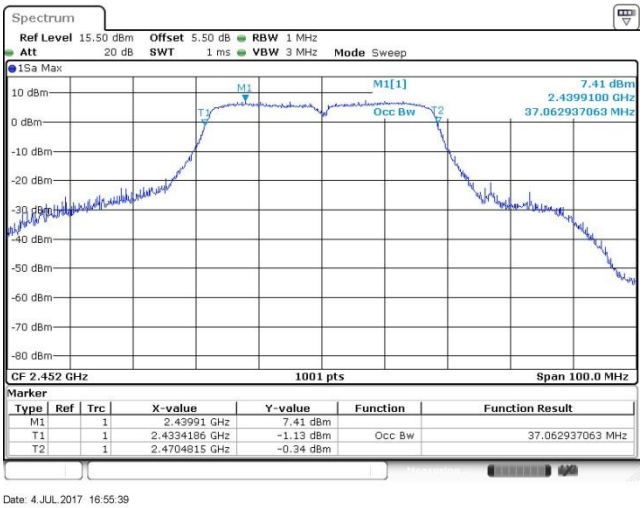
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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. 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
	

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 of directional gain greater than 6dBi are 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.

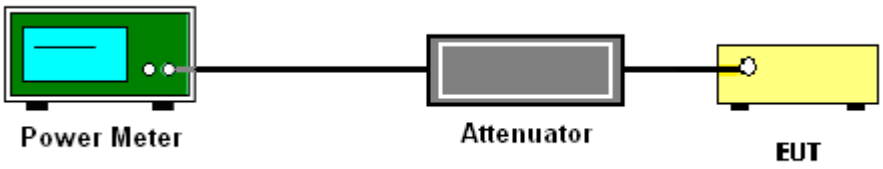
3.2.2 Measuring Instruments

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 9.1.2 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.

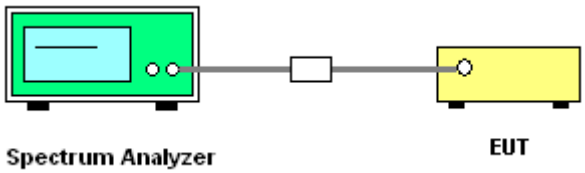
3.3.2 Measuring Instruments

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.

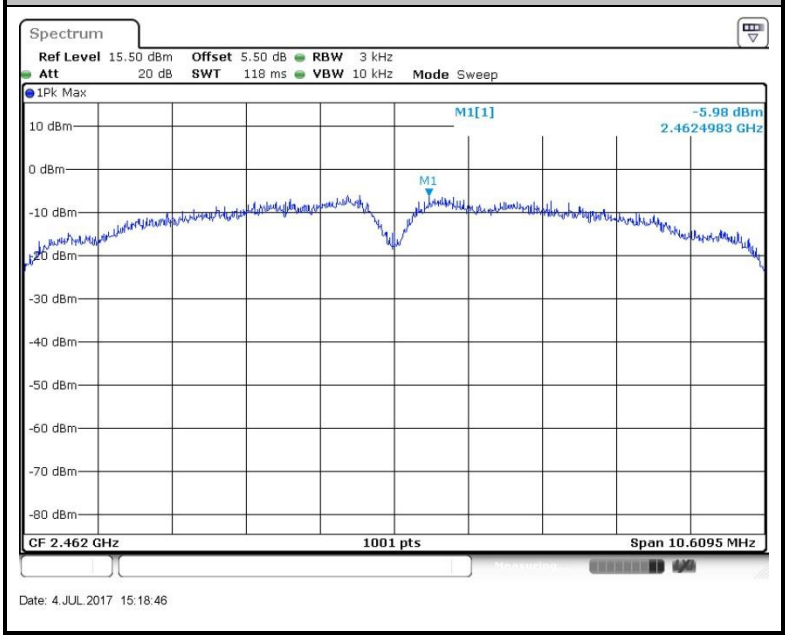
3.3.4 Test Setup



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.

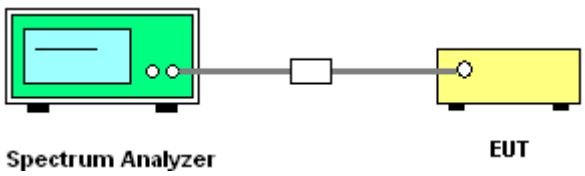
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

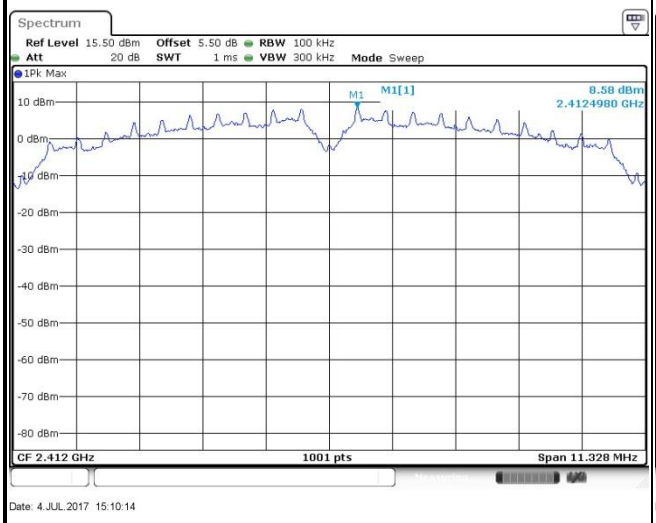
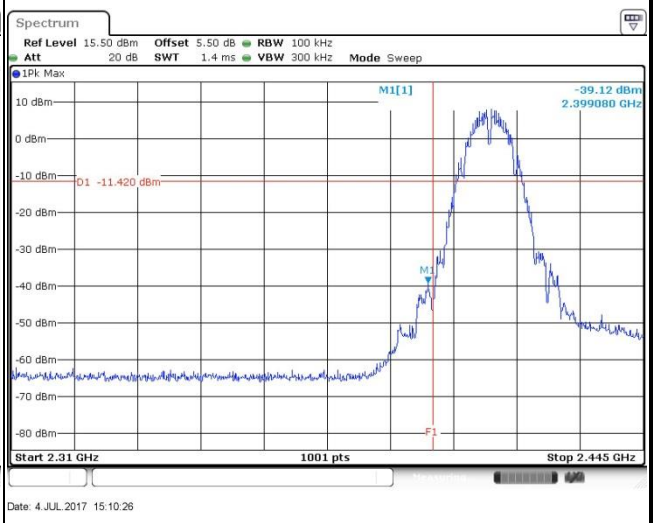
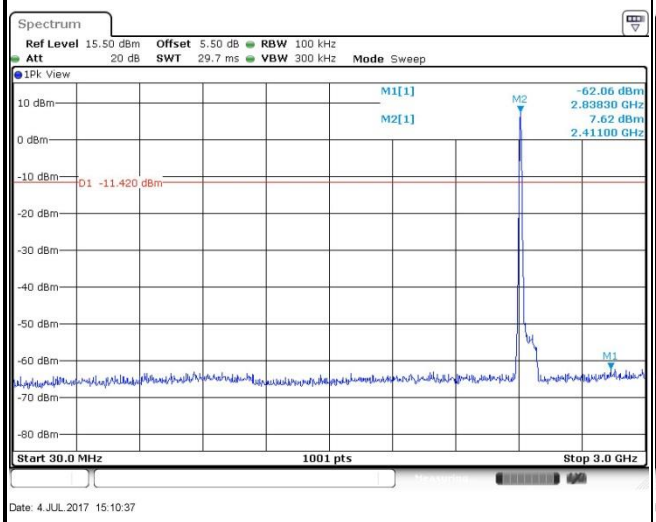
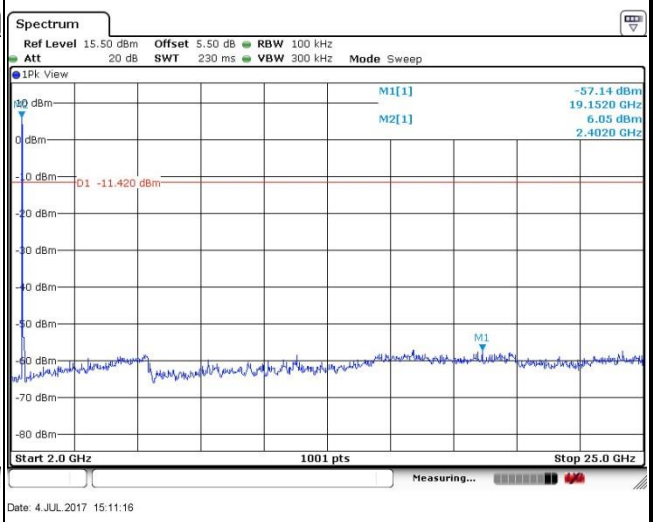
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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.
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

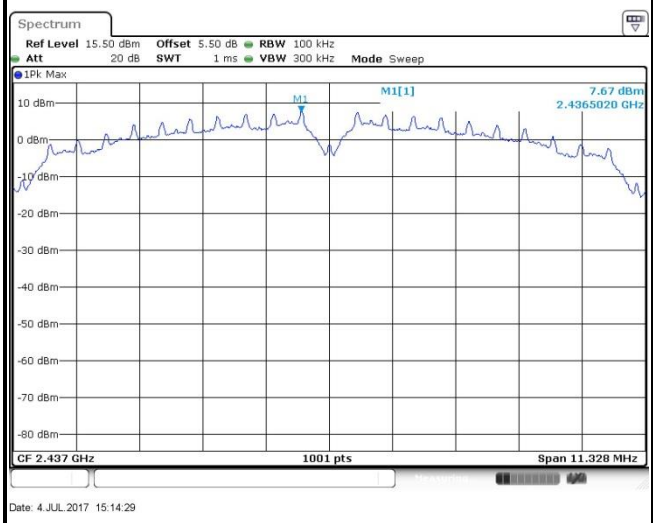
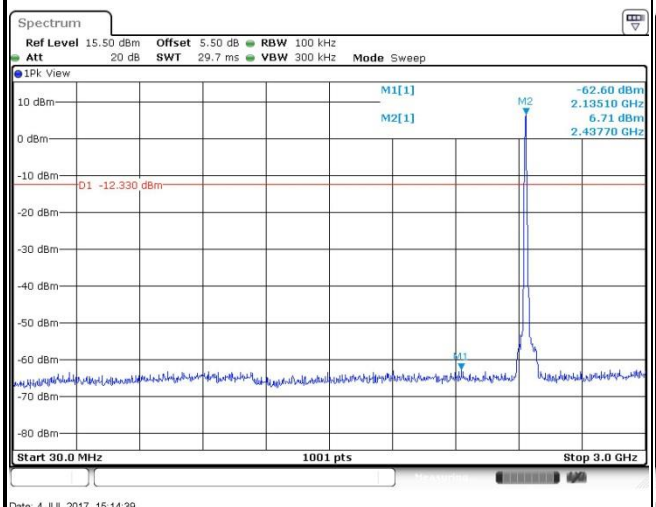
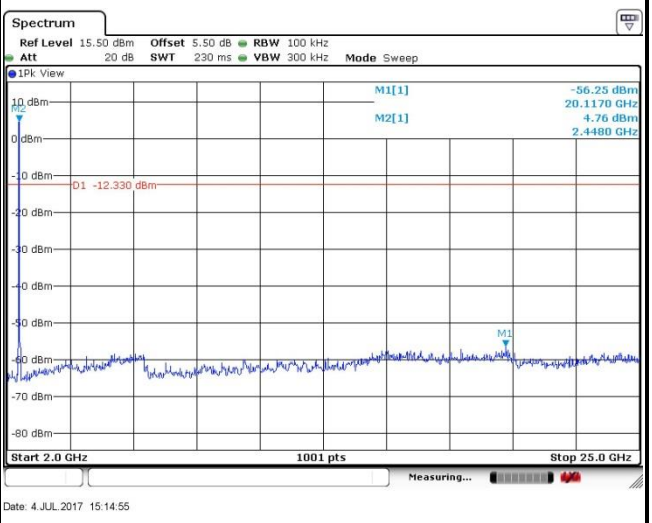


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

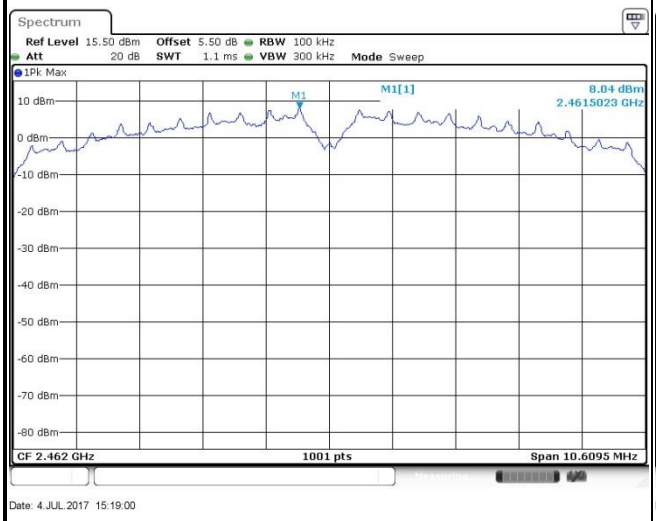
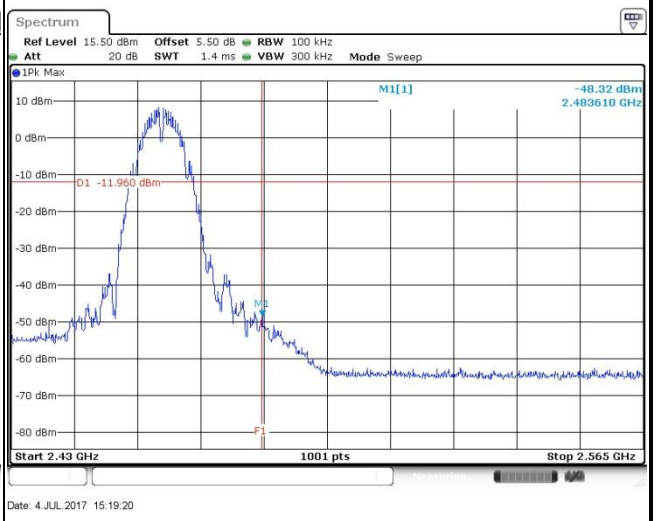
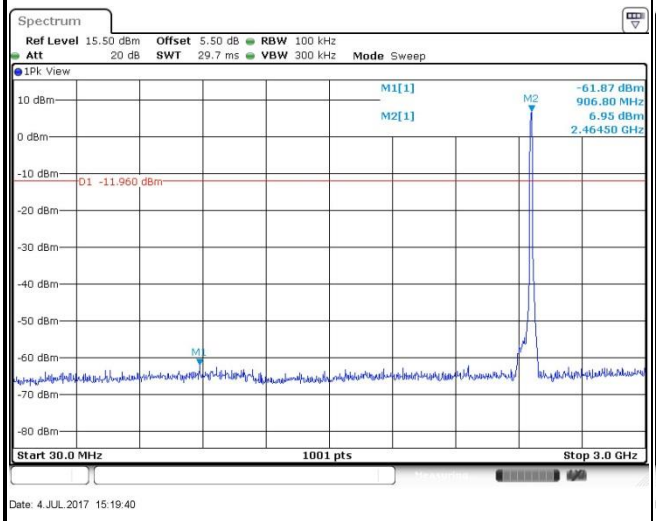
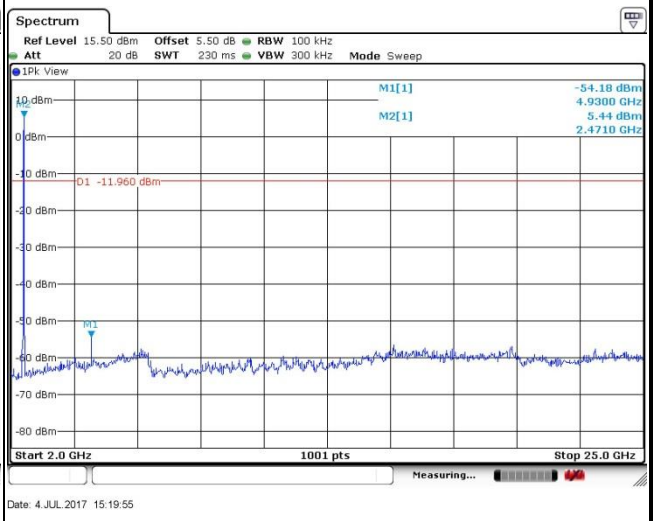
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent Hai

WLAN 802.11b Channel 01	
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

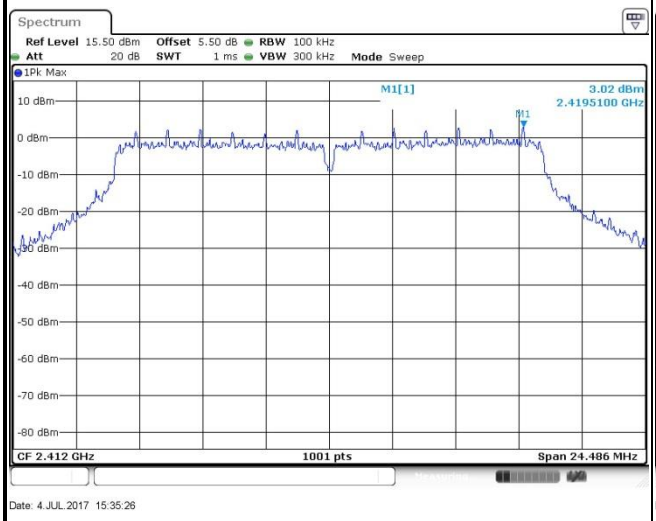
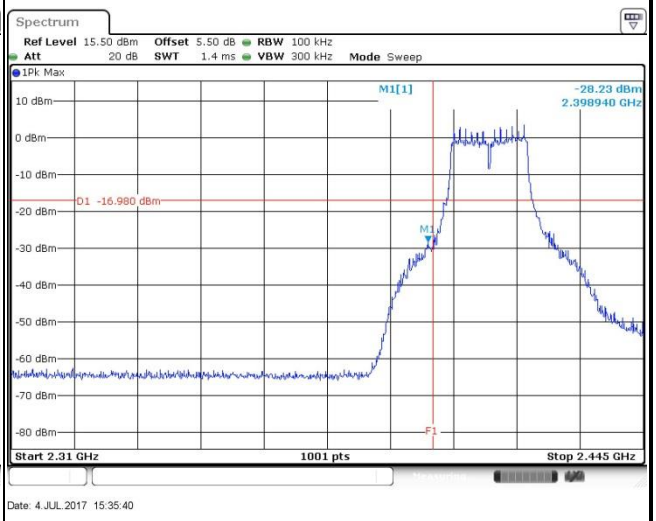
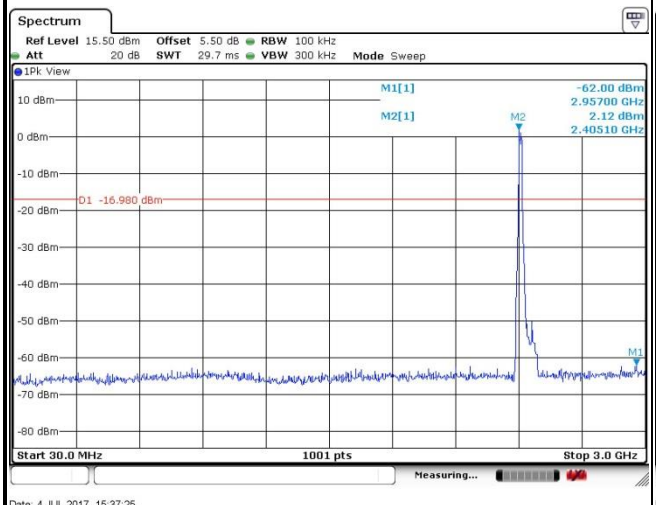
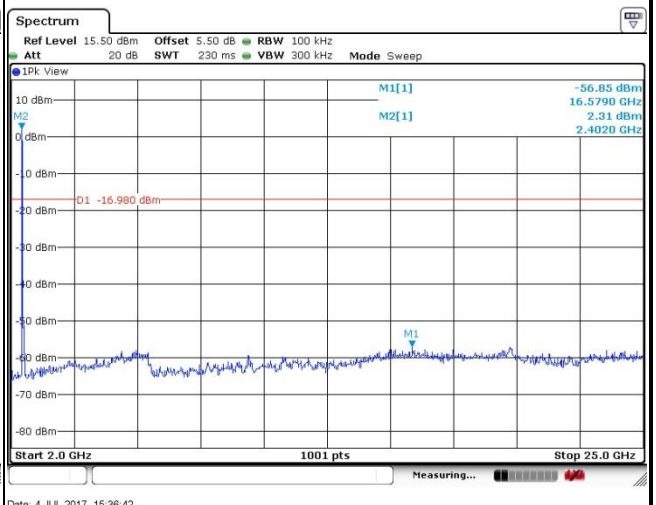
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

WLAN 802.11b Channel 06	
100kHz PSD reference Level	Mid Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

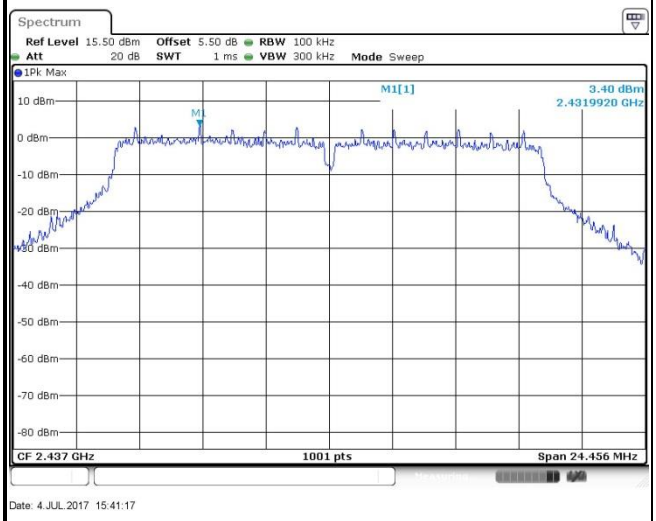
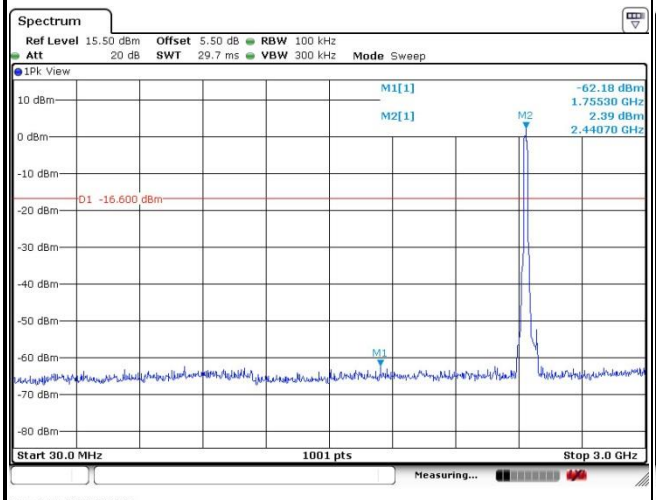
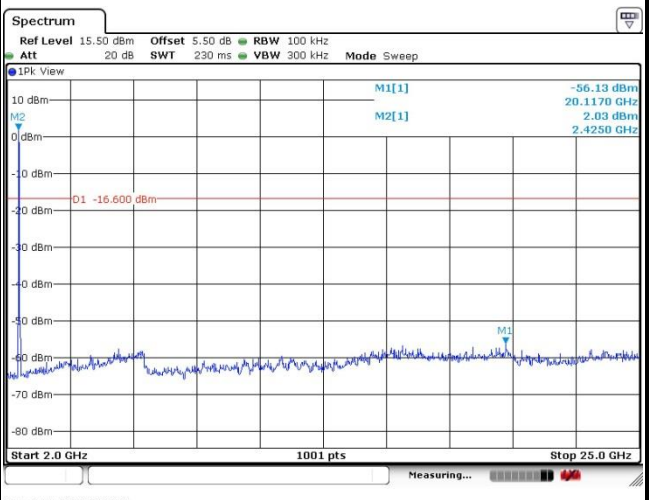
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent Hai

WLAN 802.11b Channel 11	
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

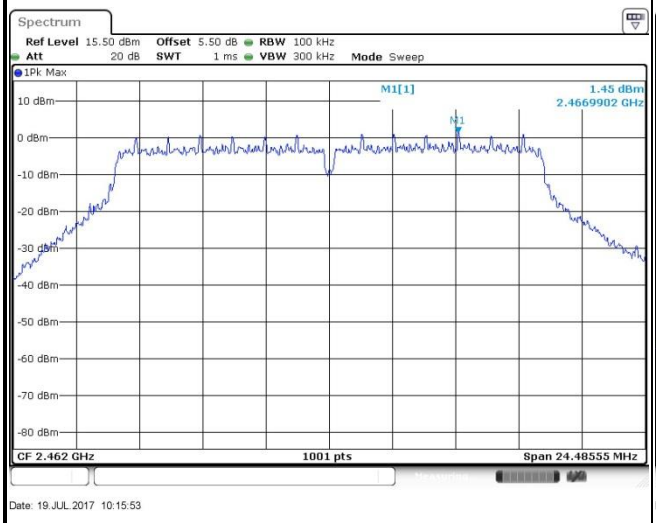
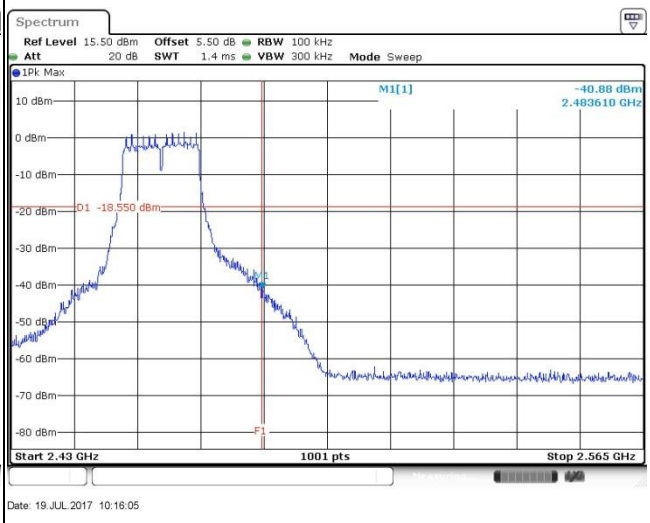
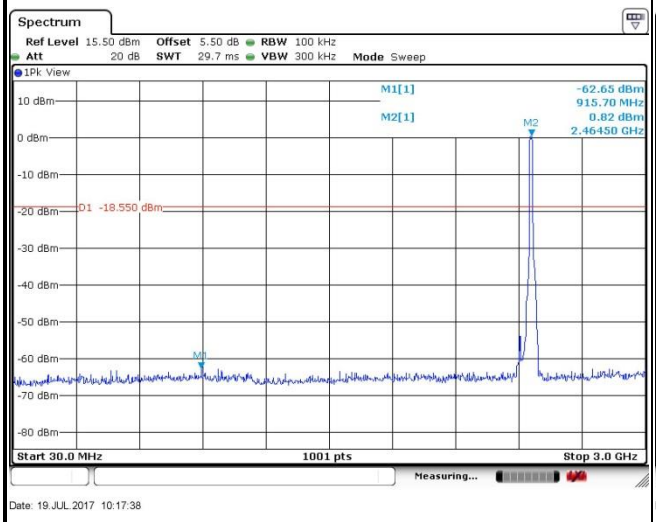
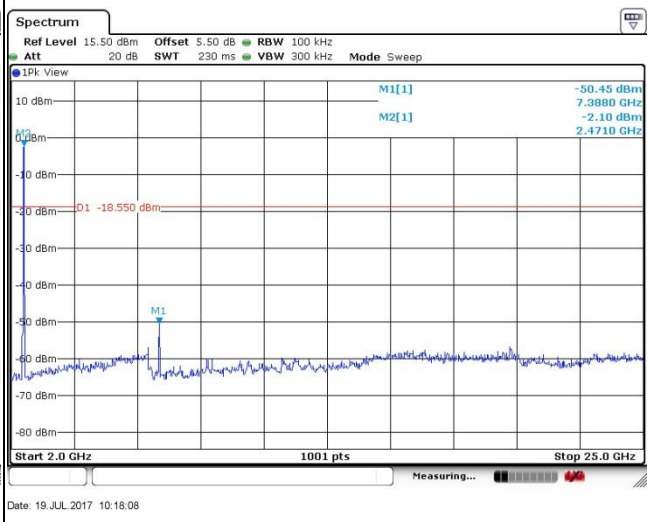
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent Hai

WLAN 802.11g Channel 01	
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

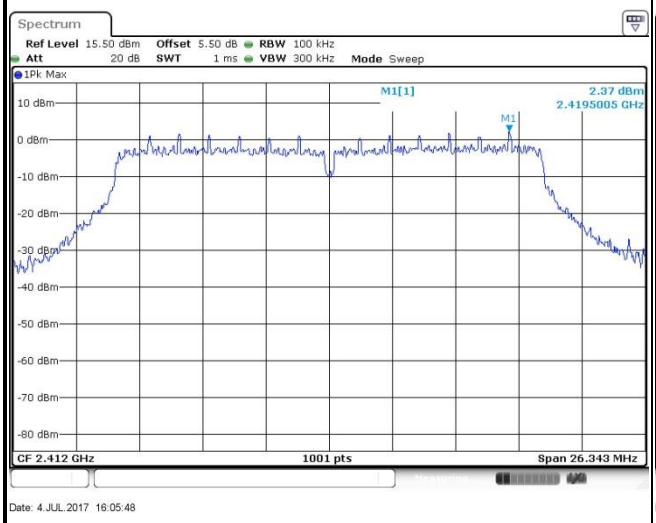
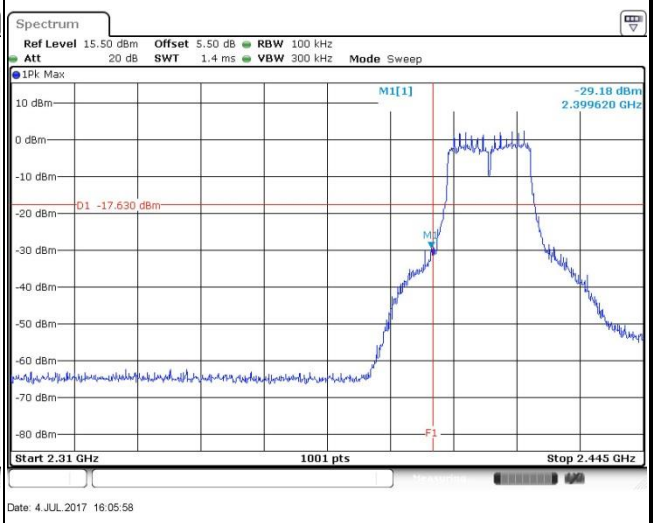
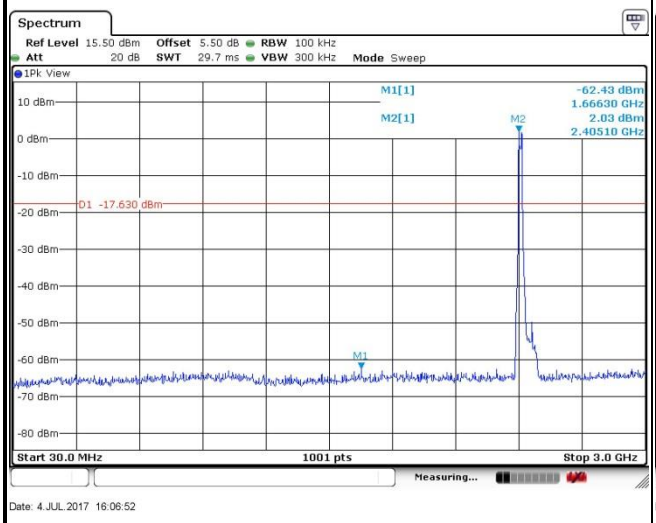
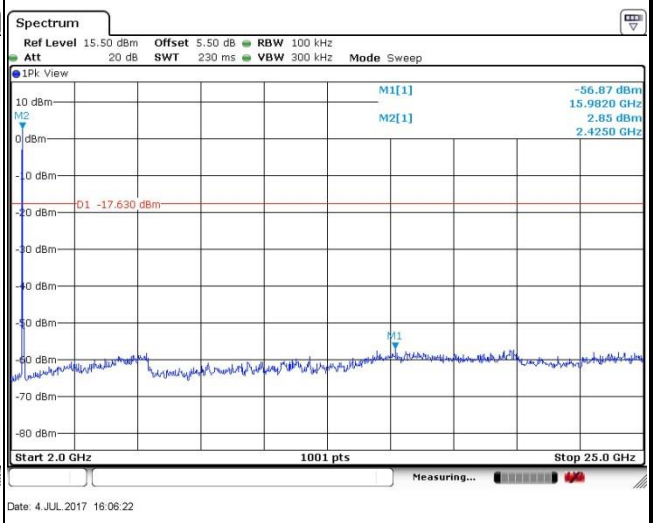
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

WLAN 802.11g Channel 06	
100kHz PSD reference Level	Mid Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent Hai

WLAN 802.11g Channel 11	
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

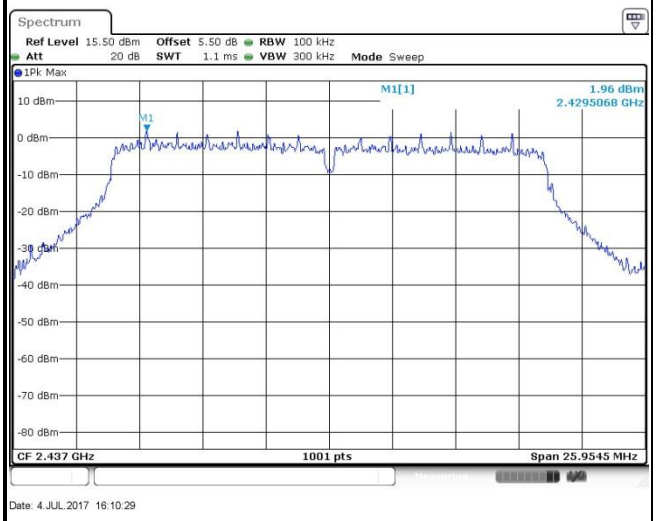
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent Hai

WLAN 802.11n HT20 Channel 01	
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

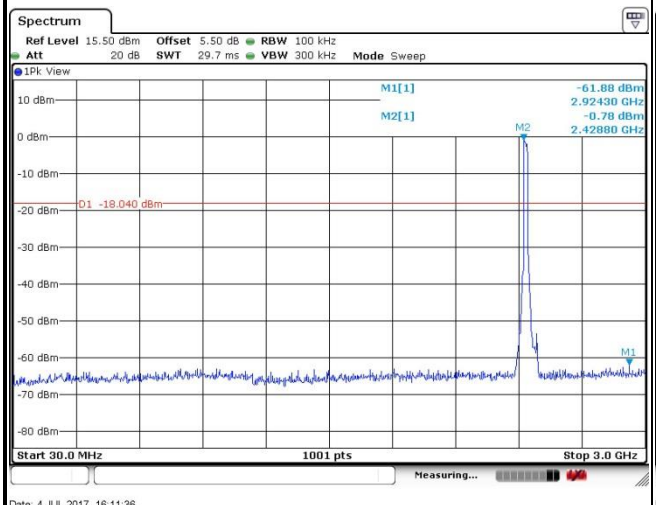
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level

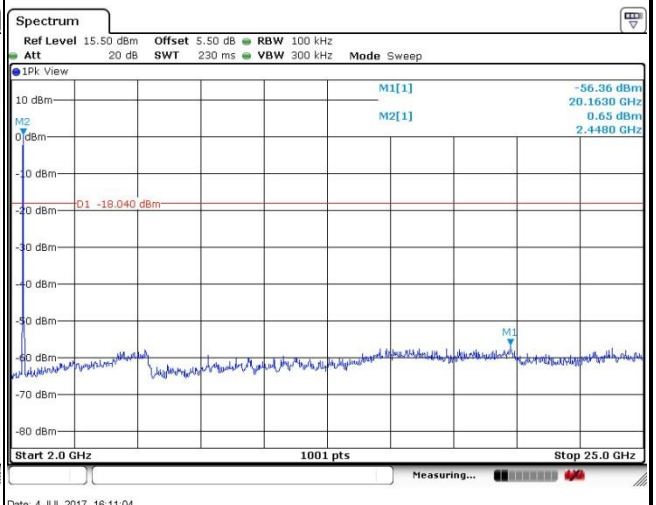


Mid Channel Plot

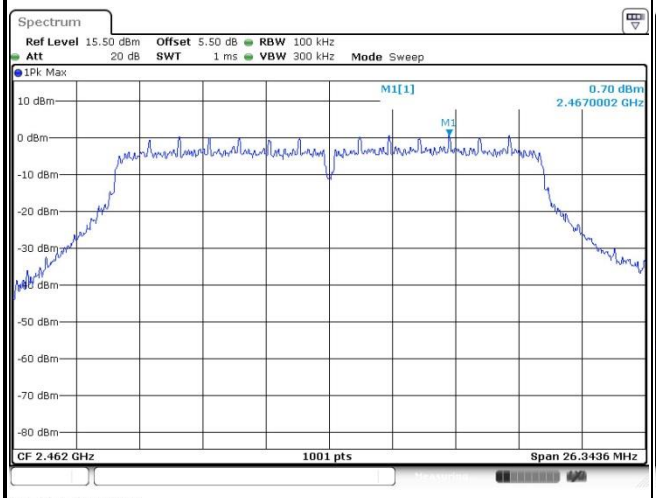
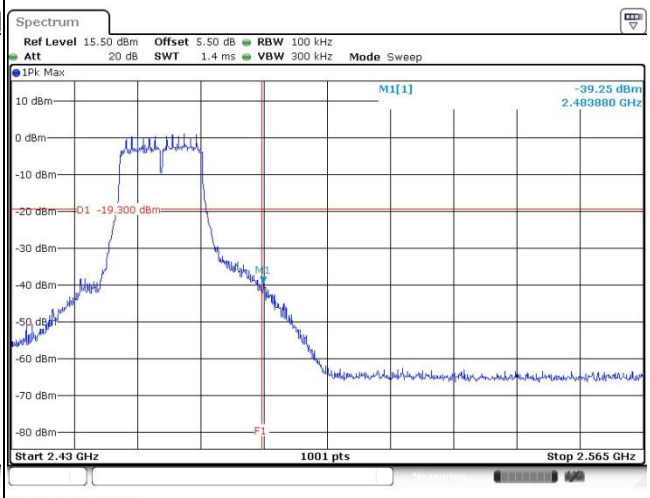
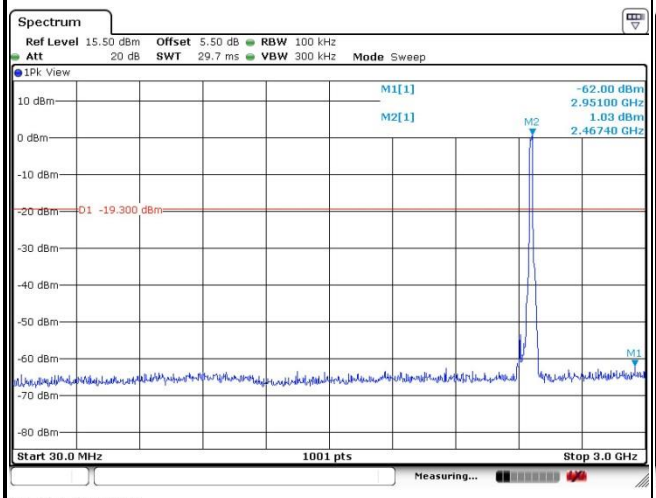
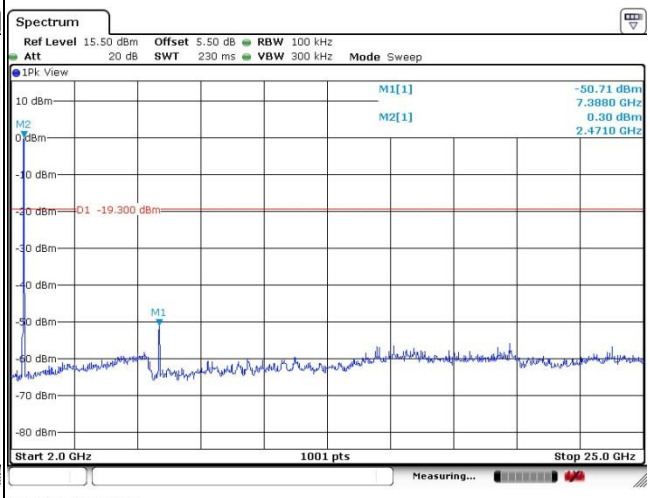
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



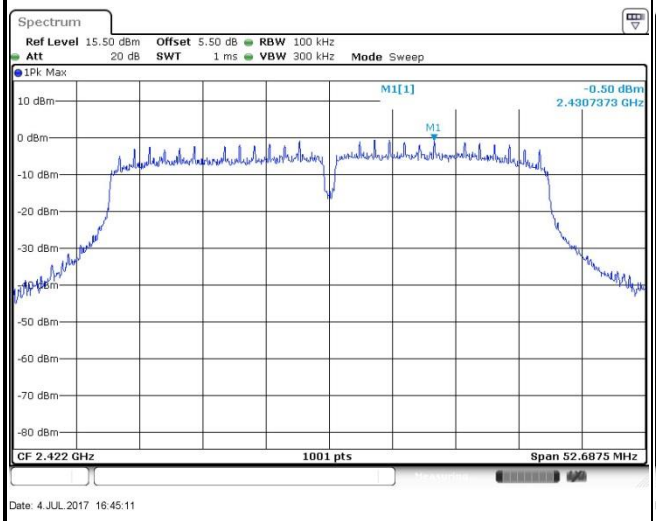
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent Hai

WLAN 802.11n HT20 Channel 11	
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

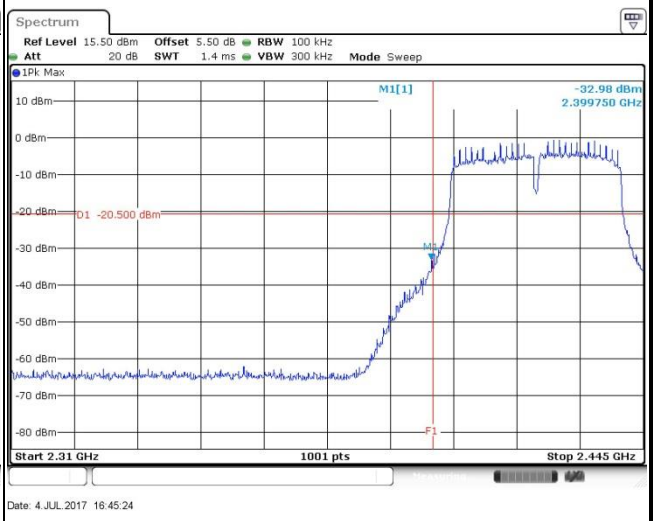
Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	03	Test Engineer :	Silent Hai

WLAN 802.11n HT40 Channel 03

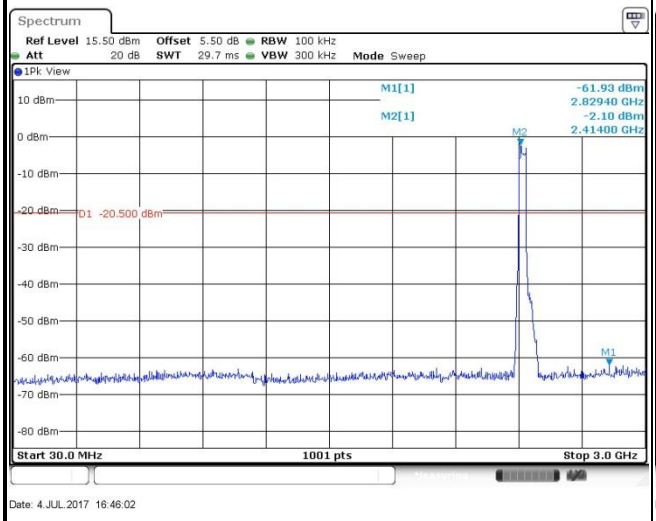
100kHz PSD reference Level



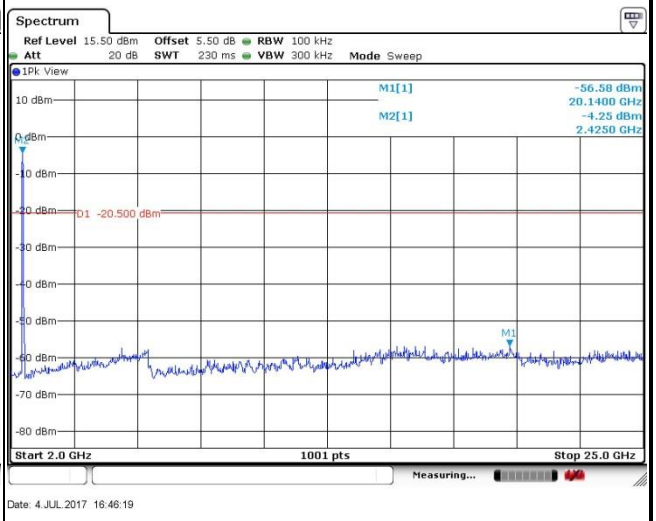
Low Channel Plot



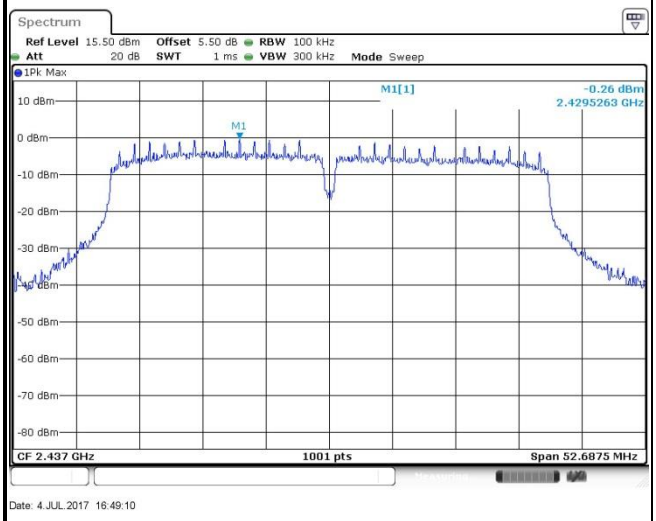
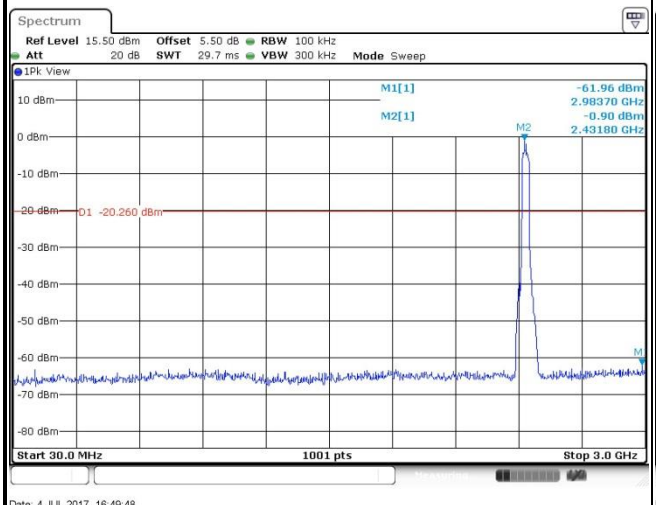
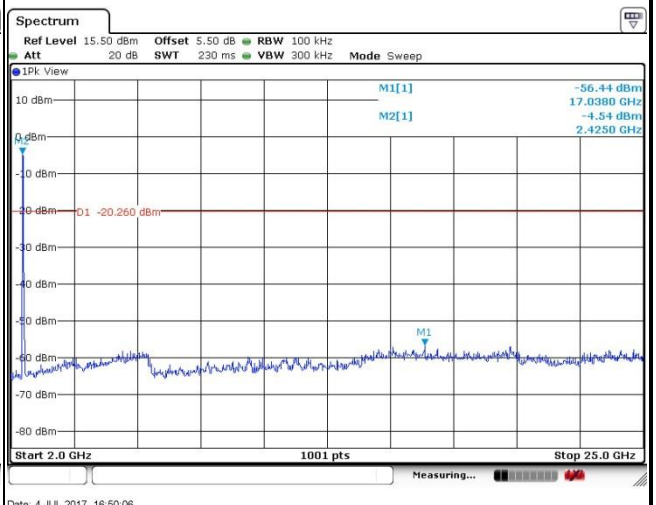
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



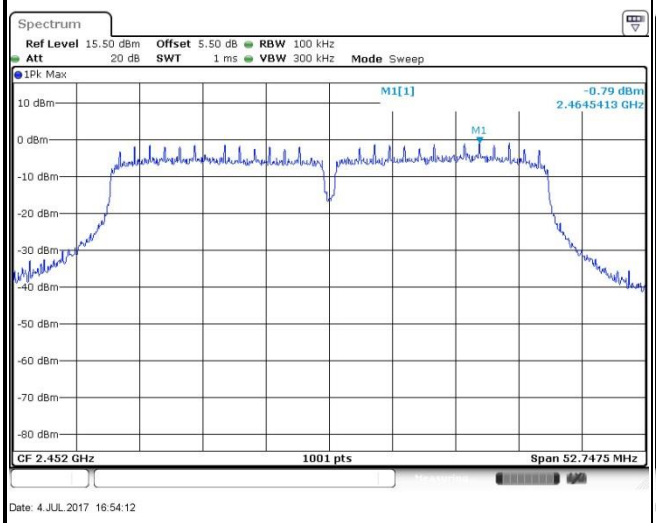
Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

WLAN 802.11n HT40 Channel 06	
100kHz PSD reference Level	Mid Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

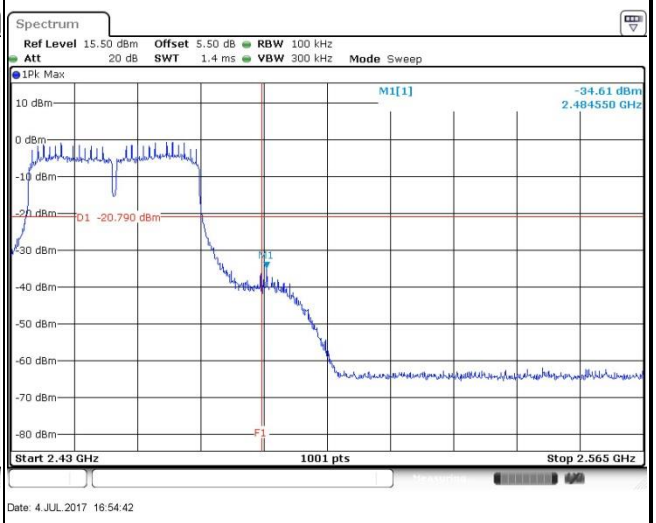
Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	09	Test Engineer :	Silent Hai

WLAN 802.11n HT40 Channel 09

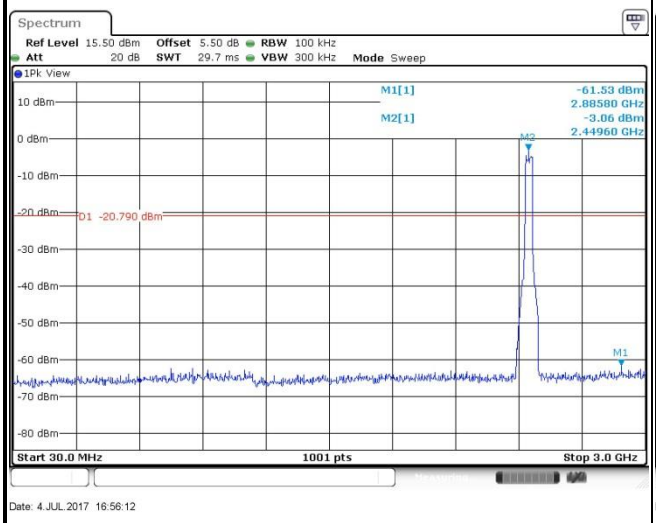
100kHz PSD reference Level



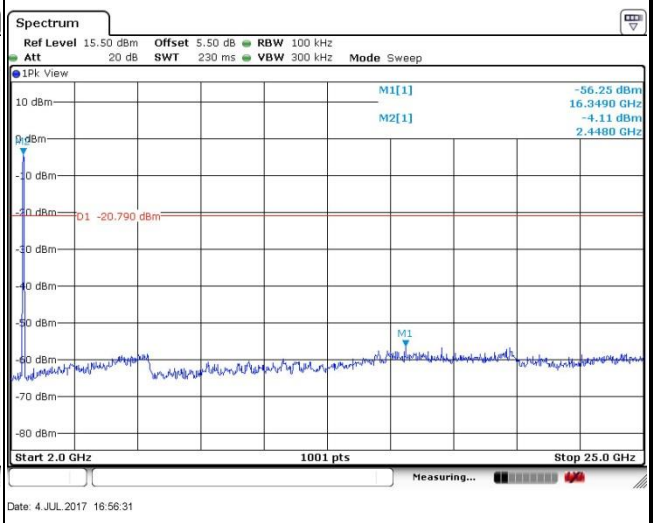
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

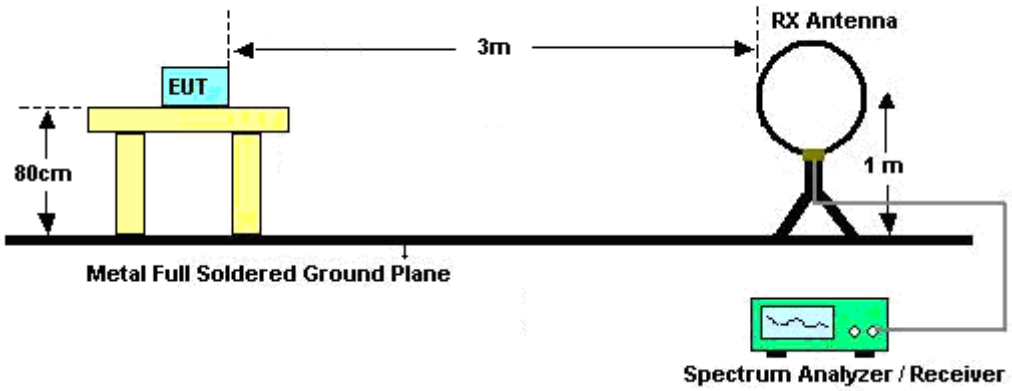
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

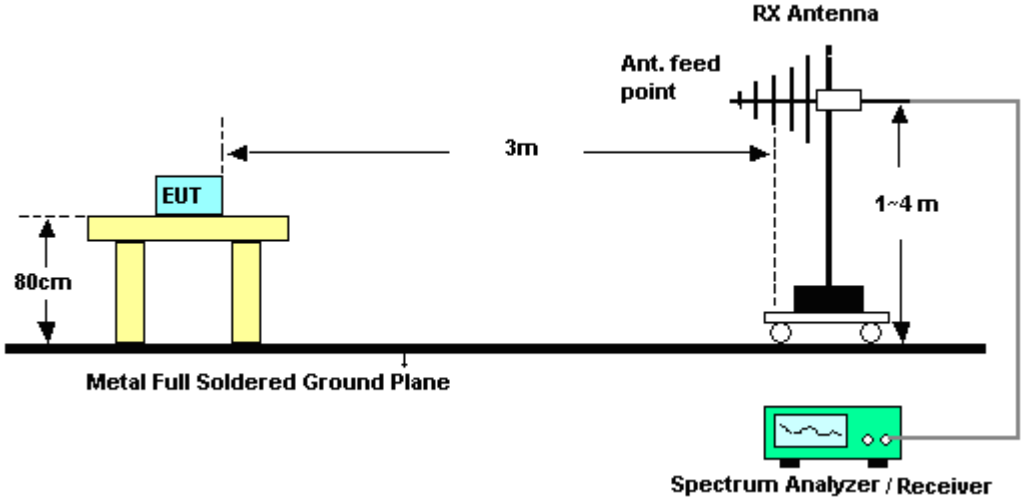
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. 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

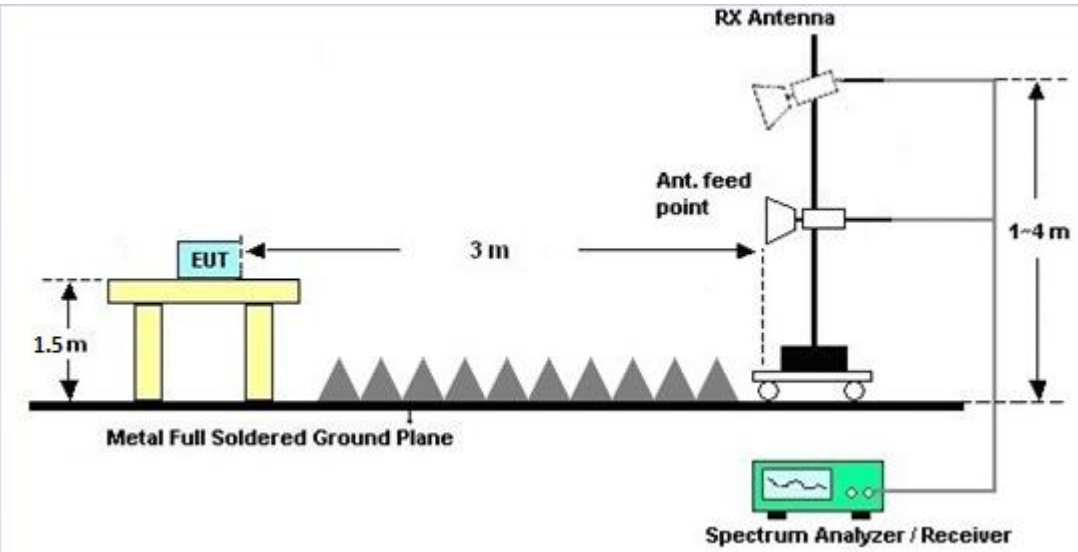
For radiated emissions below 30MHz



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.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B

3.5.7 Duty Cycle

Please refer to Appendix C

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

Please refer to Appendix B.

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.

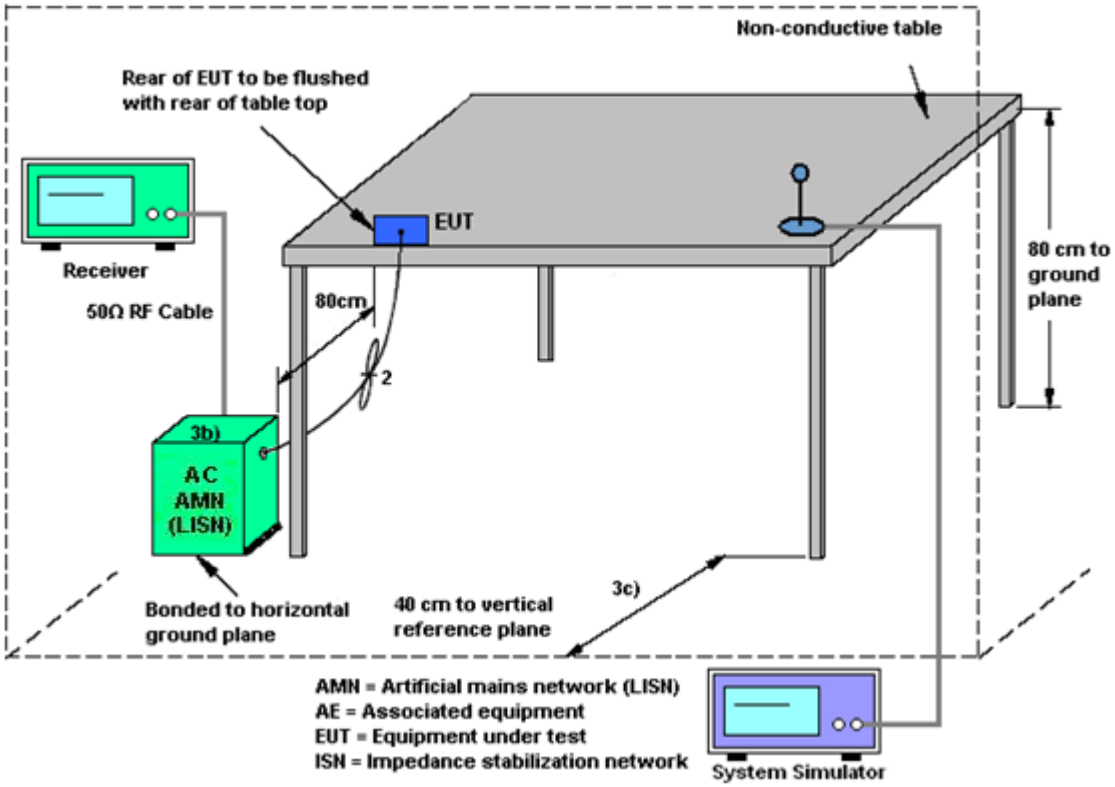
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

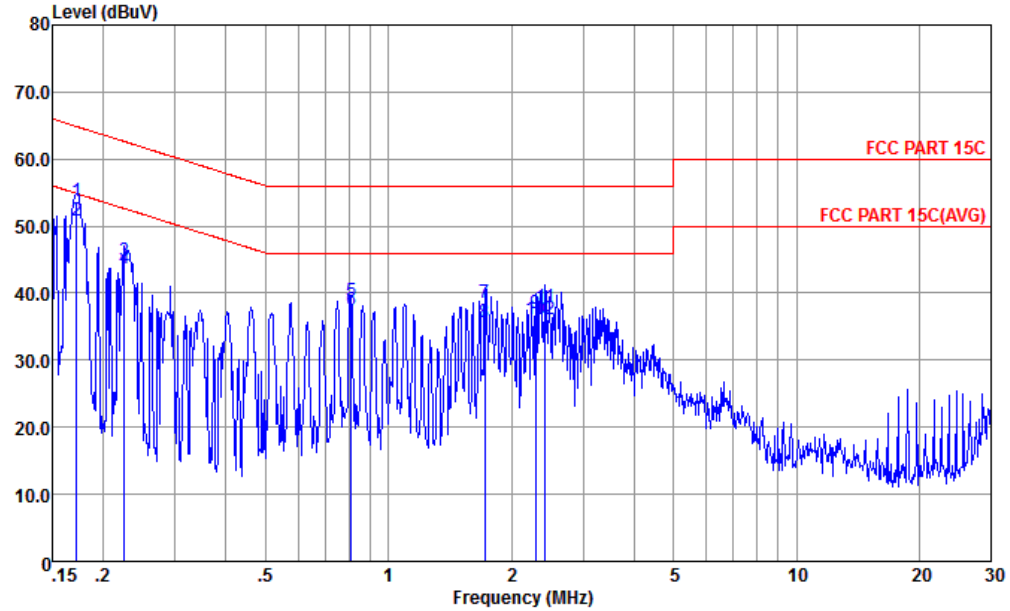
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link(2.4G) + Adapter		

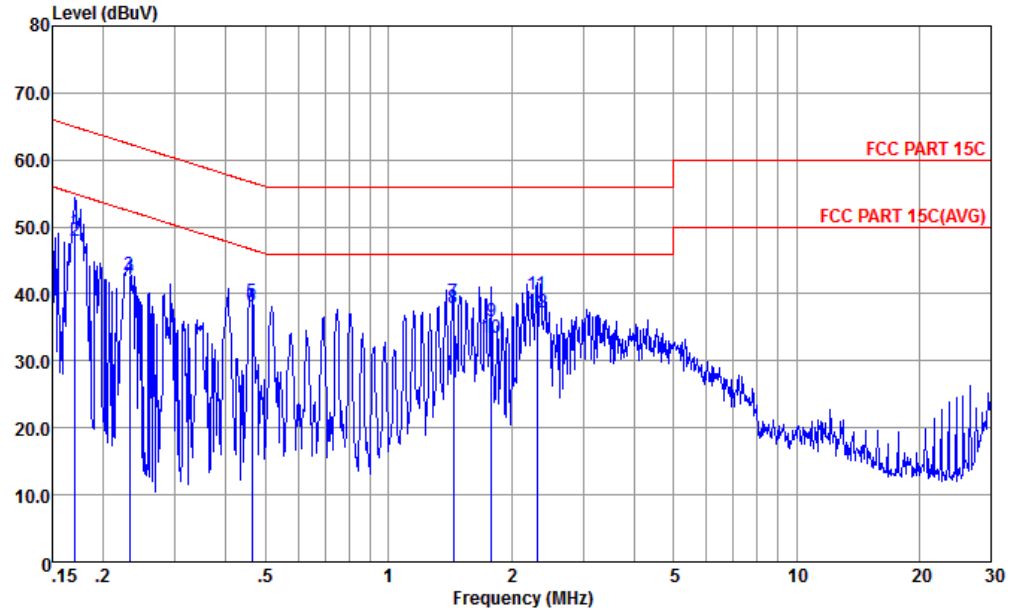


Site : CO01-KS
Condition : FCC PART 15C LISN-L-161017-060103 LINE

mode : Mode 1
: #14

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.172	53.68	-11.18	64.86	42.91	0.41	10.36	QP
2	*	0.172	50.88	-3.98	54.86	40.11	0.41	10.36	Average
3		0.226	44.88	-17.73	62.61	34.30	0.27	10.31	QP
4		0.226	43.78	-8.83	52.61	33.20	0.27	10.31	Average
5		0.809	38.73	-17.27	56.00	28.31	0.25	10.17	QP
6		0.809	37.33	-8.67	46.00	26.91	0.25	10.17	Average
7		1.725	38.61	-17.39	56.00	28.20	0.22	10.19	QP
8		1.725	35.71	-10.29	46.00	25.30	0.22	10.19	Average
9		2.297	37.01	-18.99	56.00	26.60	0.21	10.20	QP
10		2.297	36.21	-9.79	46.00	25.80	0.21	10.20	Average
11		2.422	37.91	-18.09	56.00	27.50	0.21	10.20	QP
12		2.422	36.01	-9.99	46.00	25.60	0.21	10.20	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link(2.4G) + Adapter		



Site : CO01-KS
Condition : FCC PART 15C LISN-N-161017-060103 NEUTRAL

mode : Mode 1
: #14

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.170	49.30	-15.64	64.94	38.59	0.34	10.37	QP
2	*	0.170	47.80	-7.14	54.94	37.09	0.34	10.37	Average
3		0.232	42.84	-19.55	62.39	32.20	0.34	10.30	QP
4		0.232	42.34	-10.05	52.39	31.70	0.34	10.30	Average
5		0.464	38.77	-17.86	56.63	28.20	0.38	10.19	QP
6		0.464	38.17	-8.46	46.63	27.60	0.38	10.19	Average
7		1.441	38.79	-17.21	56.00	28.19	0.41	10.19	QP
8		1.441	37.89	-8.11	46.00	27.29	0.41	10.19	Average
9		1.790	35.80	-20.20	56.00	25.20	0.41	10.19	QP
10		1.790	33.50	-12.50	46.00	22.90	0.41	10.19	Average
11		2.309	39.90	-16.10	56.00	29.29	0.41	10.20	QP
12		2.309	37.20	-8.80	46.00	26.59	0.41	10.20	Average

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. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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

Non-standard antenna connector 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. 09, 2016	Jun. 15, 2017~ Jul. 04, 2017	Aug. 08, 2017	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 19, 2017	Jun. 15, 2017~ Jul. 04, 2017	Jan. 19, 2018	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 19, 2017	Jun. 15, 2017~ Jul. 04, 2017	Jan. 19, 2018	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 20, 2017	Jun. 26, 2017	Apr. 19, 2018	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2016	Jun. 26, 2017	Oct. 13, 2017	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2016	Jun. 26, 2017	Oct. 13, 2017	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 13, 2016	Jun. 26, 2017	Oct. 13, 2017	Conduction (CO01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct.22, 2016	Jul. 04, 2017~ Jul. 10, 2017	Oct.21, 2017	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 18, 2017	Jul. 04, 2017~ Jul. 10, 2017	Apr.17, 2018	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 23, 2016	Jul. 04, 2017~ Jul. 10, 2017	Nov.22, 2017	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 22, 2017	Jul. 04, 2017~ Jul. 10, 2017	Apr 21, 2018	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 22, 2017	Jul. 04, 2017~ Jul. 10, 2017	Apr 21, 2018	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz ~40GHz	Oct. 19, 2016	Jul. 04, 2017~ Jul. 10, 2017	Oct. 18, 2017	Radiation (03CH03-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr 18, 2017	Jul. 04, 2017~ Jul. 10, 2017	Apr 17, 2018	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Oct. 13, 2016	Jul. 04, 2017~ Jul. 10, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Apr.18, 2017	Jul. 04, 2017~ Jul. 10, 2017	Apr.17, 2018	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 13, 2016	Jul. 04, 2017~ Jul. 10, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 04, 2017~ Jul. 10, 2017	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jul. 04, 2017~ Jul. 10, 2017	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jul. 04, 2017~ Jul. 10, 2017	NCR	Radiation (03CH03-KS)

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))	**4.6 dB**

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.7 dB**

Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2017/6/15~2017/7/4	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	12.94	7.55	0.50	Pass
11b	1Mbps	1	6	2437	12.29	7.55	0.50	Pass
11b	1Mbps	1	11	2462	11.99	7.07	0.50	Pass
11g	6Mbps	1	1	2412	18.83	16.32	0.50	Pass
11g	6Mbps	1	6	2437	18.48	16.30	0.50	Pass
11g	6Mbps	1	11	2462	18.43	16.32	0.50	Pass
HT20	MCS0	1	1	2412	19.28	17.56	0.50	Pass
HT20	MCS0	1	6	2437	19.08	17.30	0.50	Pass
HT20	MCS0	1	11	2462	19.13	17.56	0.50	Pass
HT40	MCS0	1	3	2422	36.26	35.13	0.50	Pass
HT40	MCS0	1	6	2437	36.46	35.13	0.50	Pass
HT40	MCS0	1	9	2452	37.06	35.17	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	16.01	30.00	3.00	19.01	36.00	Pass
11b	1Mbps	1	6	2437	15.75	30.00	3.00	18.75	36.00	Pass
11b	1Mbps	1	11	2462	16.22	30.00	3.00	19.22	36.00	Pass
11g	6Mbps	1	1	2412	20.82	30.00	3.00	23.82	36.00	Pass
11g	6Mbps	1	6	2437	21.67	30.00	3.00	24.67	36.00	Pass
11g	6Mbps	1	11	2462	21.56	30.00	3.00	24.56	36.00	Pass
HT20	MCS0	1	1	2412	20.95	30.00	3.00	23.95	36.00	Pass
HT20	MCS0	1	6	2437	21.64	30.00	3.00	24.64	36.00	Pass
HT20	MCS0	1	11	2462	21.26	30.00	3.00	24.26	36.00	Pass
HT40	MCS0	1	3	2422	21.76	30.00	3.00	24.76	36.00	Pass
HT40	MCS0	1	6	2437	21.88	30.00	3.00	24.88	36.00	Pass
HT40	MCS0	1	9	2452	22.11	30.00	3.00	25.11	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	0.11	15.82
11b	1Mbps	1	6	2437	0.11	15.22
11b	1Mbps	1	11	2462	0.11	15.47
11g	6Mbps	1	1	2412	0.58	13.79
11g	6Mbps	1	6	2437	0.58	13.24
11g	6Mbps	1	11	2462	0.58	12.33
HT20	MCS0	1	1	2412	0.62	12.99
HT20	MCS0	1	6	2437	0.62	12.33
HT20	MCS0	1	11	2462	0.62	11.47
HT40	MCS0	1	3	2422	0.64	12.31
HT40	MCS0	1	6	2437	0.64	12.50
HT40	MCS0	1	9	2452	0.64	12.16

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	-6.31	3.00	8.00	Pass
11b	1Mbps	1	6	2437	-6.61	3.00	8.00	Pass
11b	1Mbps	1	11	2462	-5.98	3.00	8.00	Pass
11g	6Mbps	1	1	2412	-10.80	3.00	8.00	Pass
11g	6Mbps	1	6	2437	-10.62	3.00	8.00	Pass
11g	6Mbps	1	11	2462	-12.17	3.00	8.00	Pass
HT20	MCS0	1	1	2412	-11.86	3.00	8.00	Pass
HT20	MCS0	1	6	2437	-12.43	3.00	8.00	Pass
HT20	MCS0	1	11	2462	-13.28	3.00	8.00	Pass
HT40	MCS0	1	3	2422	-14.65	3.00	8.00	Pass
HT40	MCS0	1	6	2437	-14.54	3.00	8.00	Pass
HT40	MCS0	1	9	2452	-15.37	3.00	8.00	Pass

Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.04	41.47	-32.53	74	43.61	25.4	4.76	32.3	102	35	P	H
		2389.95	31.68	-22.32	54	33.82	25.4	4.76	32.3	102	35	A	H
		2412	103.76	-	-	105.75	25.54	4.78	32.31	102	35	P	H
		2412	100.32	-	-	102.31	25.54	4.78	32.31	102	35	A	H
		2389.17	40.91	-33.09	74	43.05	25.4	4.76	32.3	367	14	P	V
		2389.95	31.13	-22.87	54	33.27	25.4	4.76	32.3	367	14	A	V
		2412	103.7	-	-	105.69	25.54	4.78	32.31	367	14	P	V
		2412	100.41	-	-	102.4	25.54	4.78	32.31	367	14	A	V
802.11b CH 06 2437MHz		2389.95	40.35	-33.65	74	42.49	25.4	4.76	32.3	177	33	P	H
		2389.95	30.16	-23.84	54	32.3	25.4	4.76	32.3	177	33	A	H
		2436	101.75	-	-	103.59	25.69	4.8	32.33	177	33	P	H
		2436	98.54	-	-	100.38	25.69	4.8	32.33	177	33	A	H
		2489.98	44.06	-29.94	74	45.31	26.26	4.88	32.39	177	33	P	H
		2483.68	33.86	-20.14	54	35.26	26.11	4.86	32.37	177	33	A	H
		2346.01	40.18	-33.82	74	42.48	25.24	4.71	32.25	351	15	P	V
		2389.95	29.73	-24.27	54	31.87	25.4	4.76	32.3	351	15	A	V
		2436	101.24	-	-	103.08	25.69	4.8	32.33	351	15	P	V
		2436	98.04	-	-	99.88	25.69	4.8	32.33	351	15	A	V
		2484.16	44.28	-29.72	74	45.68	26.11	4.86	32.37	351	15	P	V
		2483.51	33.6	-20.4	54	35	26.11	4.86	32.37	351	15	A	V

802.11b CH 11 2462MHz		2483.8	49.78	-24.22	74	51.18	26.11	4.86	32.37	167	332	P	H
		2487.16	41.17	-12.83	54	42.57	26.11	4.86	32.37	167	332	A	H
		2462	102.87	-	-	104.42	25.97	4.84	32.36	167	332	P	H
		2464	98.92	-	-	100.47	25.97	4.84	32.36	167	332	A	H
		2484.22	50.49	-23.51	74	51.89	26.11	4.86	32.37	390	11	P	V
		2483.51	41.35	-12.65	54	42.75	26.11	4.86	32.37	390	11	A	V
		2462	101.95	-	-	103.5	25.97	4.84	32.36	390	11	P	V
		2464	97.89	-	-	99.44	25.97	4.84	32.36	390	11	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	40.8	-33.2	74	64.34	30.9	6.87	61.31	100	360	P	H
		4824	39.64	-34.36	74	63.18	30.9	6.87	61.31	100	360	P	V
802.11b CH 06 2437MHz		4872	38.8	-35.2	74	62.13	31.01	6.86	61.2	100	360	P	H
		7308	40.74	-33.26	74	60.03	35.34	8.47	63.1	100	360	P	H
		4872	38.6	-35.4	74	61.93	31.01	6.86	61.2	100	360	P	V
		7308	40.07	-33.93	74	59.36	35.34	8.47	63.1	100	360	P	V
802.11b CH 11 2462MHz		4926	37.65	-36.35	74	60.77	31.12	6.84	61.08	100	360	P	H
		7386	39.65	-34.35	74	58.78	35.55	8.49	63.17	100	360	P	H
		4926	37.97	-36.03	74	61.09	31.12	6.84	61.08	100	360	P	V
		7386	39.62	-34.38	74	58.75	35.55	8.49	63.17	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		2406	102.6	-	-	104.59	25.54	4.78	32.31	100	37	P	H
		2408	94.53	-	-	96.52	25.54	4.78	32.31	100	37	A	H
		2389.69	59.97	-14.03	74	62.11	25.4	4.76	32.3	100	37	P	H
		2389.95	44.47	-9.53	54	46.61	25.4	4.76	32.3	100	37	A	H
		2418	103.5	-	-	105.49	25.54	4.78	32.31	365	15	P	V
		2408	95.36	-	-	97.35	25.54	4.78	32.31	365	15	A	V
		2389.95	60	-14	74	62.14	25.4	4.76	32.3	365	15	P	V
		2389.95	44.78	-9.22	54	46.92	25.4	4.76	32.3	365	15	A	V
802.11g CH 06 2437MHz		2388.91	40.18	-33.82	74	42.32	25.4	4.76	32.3	166	290	P	H
		2389.95	31.18	-22.82	54	33.32	25.4	4.76	32.3	166	290	A	H
		2430	102.86	-	-	104.7	25.69	4.8	32.33	166	290	P	H
		2430	95.31	-	-	97.15	25.69	4.8	32.33	166	290	A	H
		2489.08	47.78	-26.22	74	49.03	26.26	4.88	32.39	166	290	P	H
		2489.26	39.05	-14.95	54	40.3	26.26	4.88	32.39	166	290	A	H
		2349.26	40.9	-33.1	74	43.2	25.24	4.71	32.25	349	16	P	V
		2389.95	29.99	-24.01	54	32.13	25.4	4.76	32.3	349	16	A	V
		2430	101.78	-	-	103.62	25.69	4.8	32.33	349	16	P	V
		2430	94.1	-	-	95.94	25.69	4.8	32.33	349	16	A	V
		2489.5	46.51	-27.49	74	47.76	26.26	4.88	32.39	349	16	P	V
		2489.26	37.8	-16.2	54	39.05	26.26	4.88	32.39	349	16	A	V

802.11g CH 11 2462MHz		2458	101.06	-	-	102.61	25.97	4.84	32.36	124	289	P	H
		2466	92.66	-	-	94.21	25.97	4.84	32.36	124	289	A	H
		2484.34	63.29	-10.71	74	64.69	26.11	4.86	32.37	124	289	P	H
		2483.5	50.14	-3.86	54	51.54	26.11	4.86	32.37	124	289	A	H
		2466	99.38	-	-	100.93	25.97	4.84	32.36	342	8	P	V
		2468	91.69	-	-	93.24	25.97	4.84	32.36	342	8	A	V
		2483.8	65.49	-8.51	74	66.89	26.11	4.86	32.37	342	8	P	V
		2483.51	50.45	-3.55	54	51.85	26.11	4.86	32.37	342	8	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	38.68	-35.32	74	62.22	30.9	6.87	61.31	100	360	P	H
		4824	38.44	-35.56	74	61.98	30.9	6.87	61.31	100	360	P	V
802.11g CH 06 2437MHz		4872	38.37	-35.63	74	61.7	31.01	6.86	61.2	100	360	P	H
		7308	39.98	-34.02	74	59.27	35.34	8.47	63.1	100	360	P	H
		4872	38.42	-35.58	74	61.75	31.01	6.86	61.2	100	360	P	V
		7308	39.92	-34.08	74	59.21	35.34	8.47	63.1	100	360	P	V
802.11g CH 11 2462MHz		4926	38.31	-35.69	74	61.43	31.12	6.84	61.08	100	360	P	H
		7386	40.48	-33.52	74	59.61	35.55	8.49	63.17	100	360	P	H
		4926	38.56	-35.44	74	61.68	31.12	6.84	61.08	100	0	P	V
		7386	39.66	-34.34	74	58.79	35.55	8.49	63.17	100	0	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)
		2389.82	60.2	-13.8	74	62.34	25.4	4.76	32.3	100	31	P	H
		2389.95	43.95	-10.05	54	46.09	25.4	4.76	32.3	100	31	A	H
802.11n		2420	101.48	-	-	103.32	25.69	4.8	32.33	100	31	P	H
HT20		2418	93.38	-	-	95.37	25.54	4.78	32.31	100	31	A	H
CH 01		2389.69	60.73	-13.27	74	62.87	25.4	4.76	32.3	358	10	P	V
2412MHz		2389.95	42.47	-11.53	54	44.61	25.4	4.76	32.3	358	10	A	V
		2404	99.62	-	-	101.61	25.54	4.78	32.31	358	10	P	V
		2404	91.45	-	-	93.44	25.54	4.78	32.31	358	10	A	V
		2358.36	39.7	-34.3	74	41.94	25.29	4.73	32.26	100	61	P	H
		2389.95	30.31	-23.69	54	32.45	25.4	4.76	32.3	100	61	A	H
		2430	100.43	-	-	102.27	25.69	4.8	32.33	100	61	P	H
		2432	92.86	-	-	94.7	25.69	4.8	32.33	100	61	A	H
802.11n		2489.26	47.53	-26.47	74	48.78	26.26	4.88	32.39	100	61	P	H
HT20		2488.54	40.06	-13.94	54	41.31	26.26	4.88	32.39	100	61	A	H
CH 06		2369.67	40.06	-33.94	74	42.24	25.35	4.75	32.28	349	20	P	V
2437MHz		2389.69	29.7	-24.3	54	31.84	25.4	4.76	32.3	349	20	A	V
		2432	98.73	-	-	100.57	25.69	4.8	32.33	349	20	P	V
		2430	90.78	-	-	92.62	25.69	4.8	32.33	349	20	A	V
		2488.12	45.74	-28.26	74	46.99	26.26	4.88	32.39	349	20	P	V
		2488.66	36.78	-17.22	54	38.03	26.26	4.88	32.39	349	20	A	V

		2466	100.19	-	-	101.74	25.97	4.84	32.36	100	36	P	H
		2466	91.96	-	-	93.51	25.97	4.84	32.36	100	36	A	H
802.11n		2483.8	63.6	-10.4	74	65	26.11	4.86	32.37	100	36	P	H
HT20		2483.51	50.09	-3.91	54	51.49	26.11	4.86	32.37	100	36	A	H
CH 11		2468	97.74	-	-	99.29	25.97	4.84	32.36	382	8	P	V
2462MHz		2466	90.02	-	-	91.57	25.97	4.84	32.36	382	8	A	V
		2484.52	64.56	-9.44	74	65.96	26.11	4.86	32.37	382	8	P	V
		2483.51	48.39	-5.61	54	49.79	26.11	4.86	32.37	382	8	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	36.86	-37.14	74	60.4	30.9	6.87	61.31	100	360	P	H
		4824	36.78	-37.22	74	60.32	30.9	6.87	61.31	100	360	P	V
802.11n HT20 CH 06 2437MHz		4872	36.89	-37.11	74	60.22	31.01	6.86	61.2	100	360	P	H
		7308	39.12	-34.88	74	58.41	35.34	8.47	63.1	100	360	P	H
		4872	36.31	-37.69	74	59.64	31.01	6.86	61.2	100	360	P	V
		7308	38.79	-35.21	74	58.08	35.34	8.47	63.1	100	360	P	V
802.11n HT20 CH 11 2462MHz		4926	36.03	-37.97	74	59.15	31.12	6.84	61.08	100	360	P	H
		7386	38.57	-35.43	74	57.7	35.55	8.49	63.17	100	360	P	H
		4926	36.68	-37.32	74	59.8	31.12	6.84	61.08	100	360	P	V
		7386	38.58	-35.42	74	57.71	35.55	8.49	63.17	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 HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2389.43	52.93	-21.07	74	55.07	25.4	4.76	32.3	120	41	P	H
		2389.95	39.11	-14.89	54	41.25	25.4	4.76	32.3	120	41	A	H
		2434	98.11	-	-	99.95	25.69	4.8	32.33	120	41	P	H
		2430	90.41	-	-	92.25	25.69	4.8	32.33	120	41	A	H
802.11n		2485.12	48.93	-25.07	74	50.33	26.11	4.86	32.37	120	41	P	H
HT40		2484.16	37.31	-16.69	54	38.71	26.11	4.86	32.37	120	41	A	H
CH 03		2389.69	50.57	-23.43	74	52.71	25.4	4.76	32.3	348	7	P	V
2422MHz		2389.95	38.42	-15.58	54	40.56	25.4	4.76	32.3	348	7	A	V
		2432	96.4	-	-	98.24	25.69	4.8	32.33	348	7	P	V
		2430	88.55	-	-	90.39	25.69	4.8	32.33	348	7	A	V
		2484.1	46.48	-27.52	74	47.88	26.11	4.86	32.37	348	7	P	V
		2483.86	34.5	-19.5	54	35.9	26.11	4.86	32.37	348	7	A	V
		2389.95	49.17	-24.83	74	51.31	25.4	4.76	32.3	102	39	P	H
		2389.82	34.18	-19.82	54	36.32	25.4	4.76	32.3	102	39	A	H
		2426	98.61	-	-	100.45	25.69	4.8	32.33	102	39	P	H
		2430	90.4	-	-	92.24	25.69	4.8	32.33	102	39	A	H
802.11n		2485.42	56.56	-17.44	74	57.96	26.11	4.86	32.37	102	39	P	H
HT40		2483.51	40.77	-13.23	54	42.17	26.11	4.86	32.37	102	39	A	H
CH 06		2389.82	44.97	-29.03	74	47.11	25.4	4.76	32.3	394	9	P	V
2437MHz		2389.82	32.66	-21.34	54	34.8	25.4	4.76	32.3	394	9	A	V
		2430	97.38	-	-	99.22	25.69	4.8	32.33	394	9	P	V
		2428	88.78	-	-	90.62	25.69	4.8	32.33	394	9	A	V
		2483.68	58.2	-15.8	74	59.6	26.11	4.86	32.37	394	9	P	V
		2483.56	38.86	-15.14	54	40.26	26.11	4.86	32.37	394	9	A	V

		2389.95	41.9	-32.1	74	44.04	25.4	4.76	32.3	100	38	P	H
		2389.95	31.23	-22.77	54	33.37	25.4	4.76	32.3	100	38	A	H
		2466	97.42	-	-	98.97	25.97	4.84	32.36	100	38	P	H
		2466	90.25	-	-	91.8	25.97	4.84	32.36	100	38	A	H
802.11n		2484.82	63.64	-10.36	74	65.04	26.11	4.86	32.37	100	38	P	H
HT40		2483.86	49.43	-4.57	54	50.83	26.11	4.86	32.37	100	38	A	H
CH 09		2389.69	40.11	-33.89	74	42.25	25.4	4.76	32.3	391	13	P	V
2452MHz		2389.69	30.58	-23.42	54	32.72	25.4	4.76	32.3	391	13	A	V
		2456	95.95	-	-	97.5	25.97	4.84	32.36	391	13	P	V
		2460	88.41	-	-	89.96	25.97	4.84	32.36	391	13	A	V
		2486.38	62.6	-11.4	74	64	26.11	4.86	32.37	391	13	P	V
		2484.16	49.46	-4.54	54	50.86	26.11	4.86	32.37	391	13	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4842	38.53	-35.47	74	62	30.93	6.87	61.27	100	360	P	H
HT40		7266	40.93	-33.07	74	60.27	35.26	8.46	63.06	100	360	P	H
CH 03		4842	37.56	-36.44	74	61.03	30.93	6.87	61.27	100	360	P	V
2422MHz		7266	39.88	-34.12	74	59.22	35.26	8.46	63.06	100	360	P	V
802.11n		4872	36.23	-37.77	74	59.56	31.01	6.86	61.2	100	360	P	H
HT40		7308	38.32	-35.68	74	57.61	35.34	8.47	63.1	100	360	P	H
CH 06		4872	36.65	-37.35	74	59.98	31.01	6.86	61.2	100	360	P	V
2437MHz		7308	37.97	-36.03	74	57.26	35.34	8.47	63.1	100	360	P	V
802.11n		4902	35.81	-38.19	74	59	31.08	6.85	61.12	100	360	P	H
HT40		7356	38.85	-35.15	74	58.03	35.47	8.49	63.14	100	360	P	H
CH 09		4902	36.1	-37.9	74	59.29	31.08	6.85	61.12	100	360	P	V
2452MHz		7356	39.98	-34.02	74	59.16	35.47	8.49	63.14	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11g (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 802.11g LF		30	25.78	-14.22	40	30.08	26.3	0.5	31.1	-	-	P	H
		240.49	26.35	-19.65	46	38.5	17.48	1.55	31.18	-	-	P	H
		317.12	27.84	-18.16	46	37.41	20.15	1.78	31.5	-	-	P	H
		395.69	30.43	-15.57	46	37.45	22.49	1.99	31.5	-	-	P	H
		474.26	34.7	-11.3	46	40.41	23.68	2.21	31.6	100	258	P	H
		518.88	30.4	-15.6	46	35.3	24.36	2.3	31.56	-	-	P	H
		33.88	31.33	-8.67	40	37.74	24.06	0.55	31.02	100	25	P	V
		114.39	24.71	-18.79	43.5	37.34	17.66	0.47	30.76	-	-	P	V
		134.76	23.68	-19.82	43.5	35.91	17.45	1.16	30.84	-	-	P	V
		479.11	29.35	-16.65	46	34.97	23.76	2.22	31.6	-	-	P	V
		547.01	28.61	-17.39	46	33.01	24.76	2.35	31.51	-	-	P	V
		642.07	30.44	-15.56	46	32.46	26.17	2.55	30.74	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

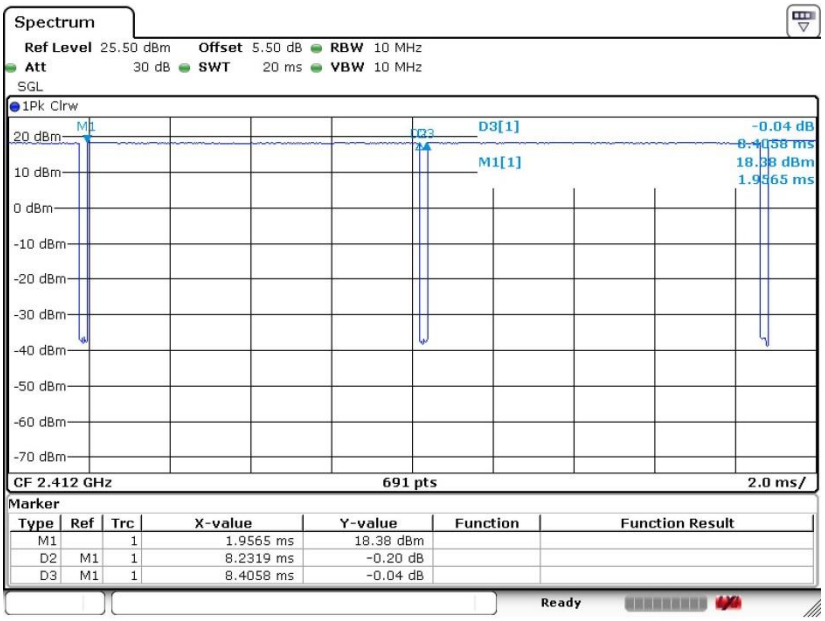
= -10.46(dB)

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

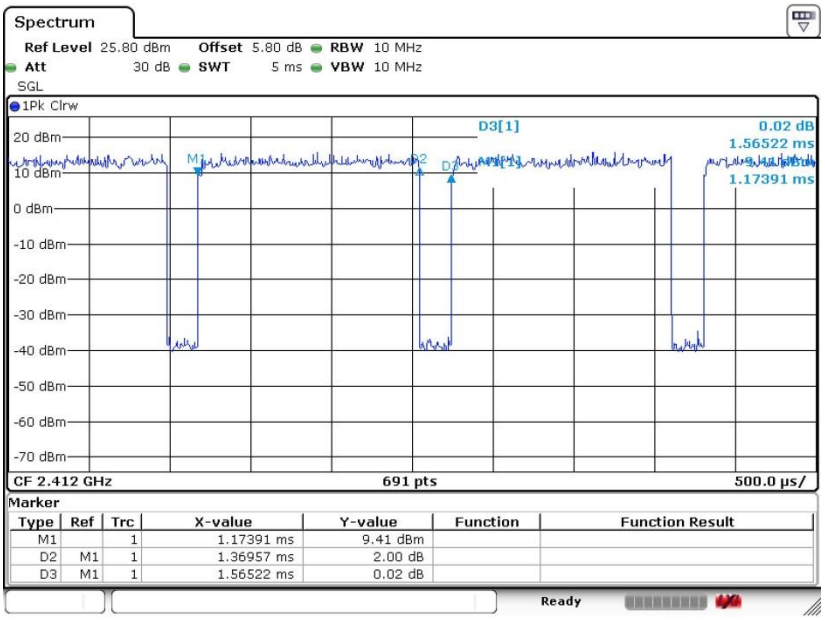
Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
802.11b	97.93	8.232	0.121	300Hz
802.11g	87.50	1.370	0.730	1KHz
802.11n HT20	86.76	1.283	0.780	1KHz
802.11n HT40	86.29	1.232	0.812	1KHz

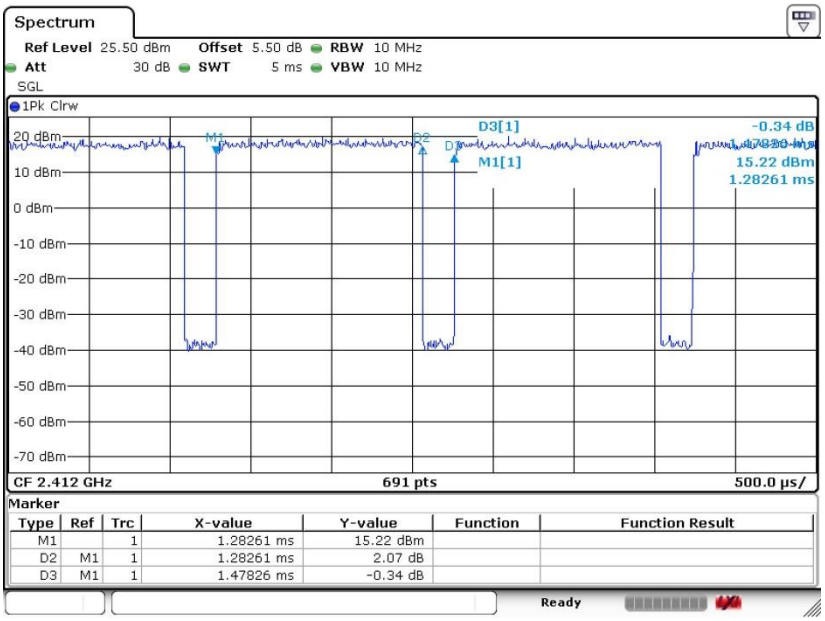
802.11b



802.11g



802.11n HT20



802.11n HT40