FCC RF Test Report

APPLICANT	:	Brightstar Corporation
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	Avvio
MODEL NAME	:	Avvio L640
FCC ID	:	WVBAL640X
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Jul. 06, 2016 and testing was completed on Aug. 15, 2016. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Prepared by: Ken Chen / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
2353

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR670610C	Rev. 01	Initial issue of report	Aug. 19, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.99 dB at 30.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 4.26 dB at 0.490 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Brightstar Corporation
9725 NW 117th Ave., Miami, Florida, FL 33178, United States

1.2 Manufacturer

Heng Da Chuang Xin Technology Limited
Rm14H Taibang Building, 4 Rd., High Tech South, Nanshan, SZ, P. R. C. 518000

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Avvio
Model Name	Avvio L640
FCC ID	WVBAL640X
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+/ DC-HSDPA/LTE WLAN2.4GHz 802.11b/g/n HT20/HT40 Bluetooth v3.0+EDR Bluetooth v4.0 LE
IMEI Code	Conducted: 357275070002271 Radiation/Conduction: 357275070002255
HW Version	V03
SW Version	Avvio_L640_Claro_V1.00
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 17.20 dBm (0.0525 W) 802.11g : 22.03 dBm (0.1596 W) 802.11n HT20 : 22.22 dBm (0.1667 W) 802.11n HT40 : 22.14 dBm (0.1637 W)
Antenna Type	802.11b/g/n : PIFA Antenna with gain -1.00 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 (SHENZHEN) INC.	
Test Site Location	1F & 2F,Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	**Sporton Site No.**	
	TH01-SZ	CO01-SZ

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755- 3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Registration No.**
	03CH03-SZ	565805

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 v03r05
- ANSI C63.10-2013

Remark:

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

2 Test Configuration of Equipment Under Test

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 (Y plane) were recorded in this report.

2.1 Carrier Frequency 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.

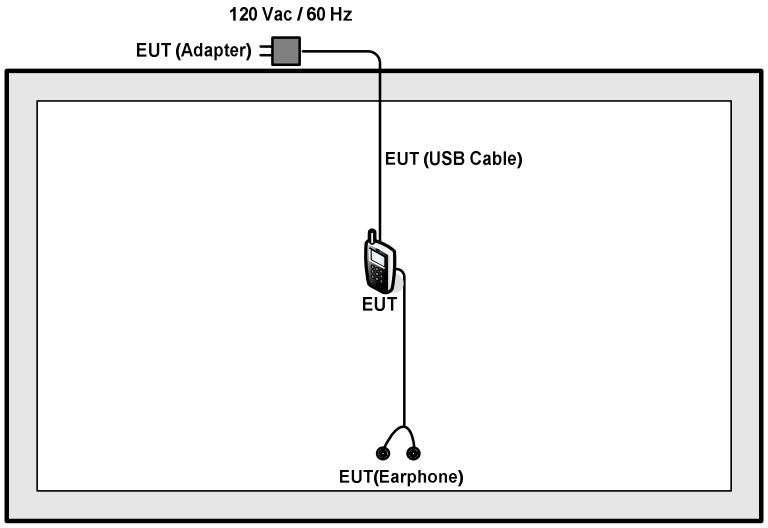
<2.4GHz>

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

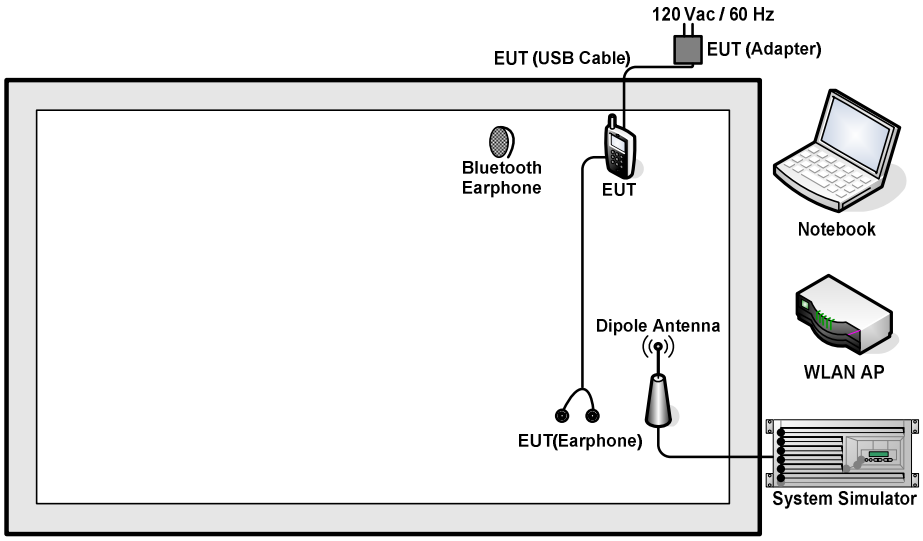
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)

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	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	Shielded cable DC O/P 1.8 m Unshielded AC I/P cable1.2 m
4.	Bluetooth Earphone	Lenovo	LBH-520	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the 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 and attenuator factor.

Offset = RF cable loss + attenuator factor.

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

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

= 5.0 + 10 = 15.0 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

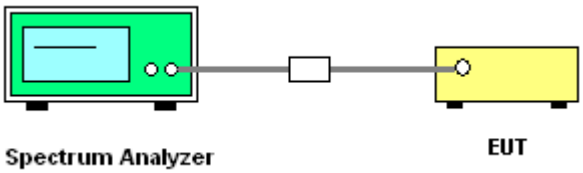
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

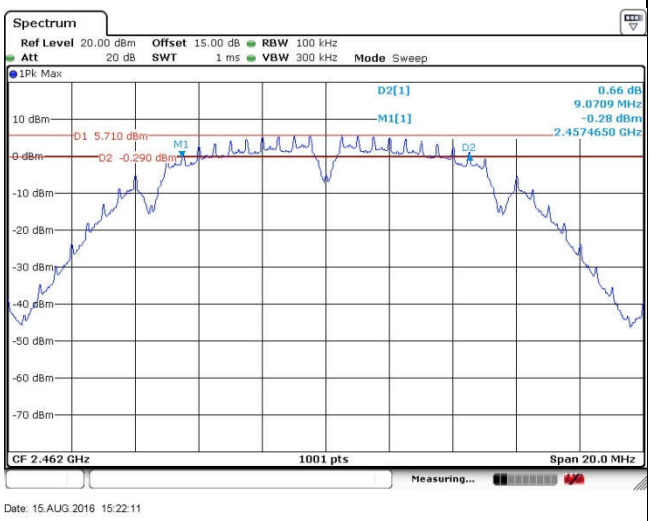
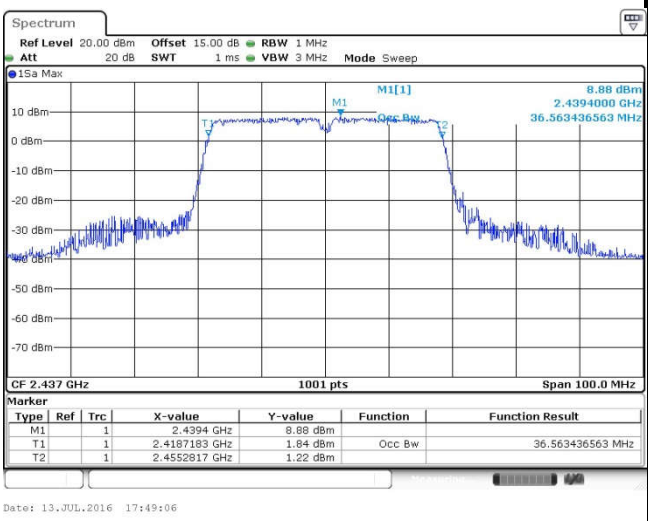
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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 of this test report.

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna 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.

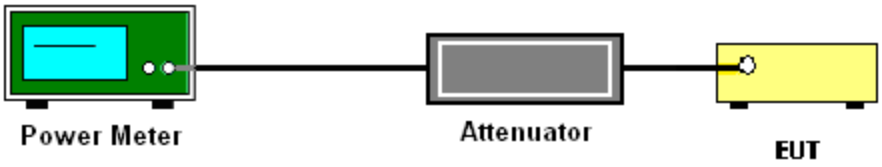
3.2.2 Measuring Instruments

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 v03r05 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 of this test report.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

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.

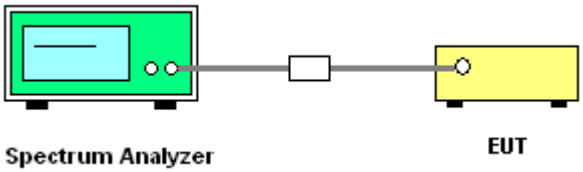
3.3.2 Measuring Instruments

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 v03r05
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.

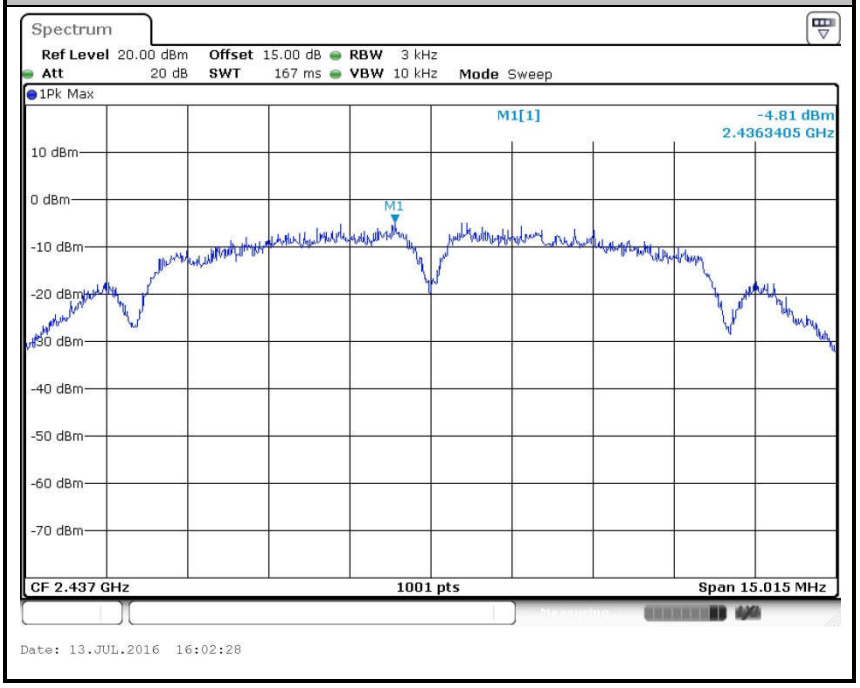
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.

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 and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

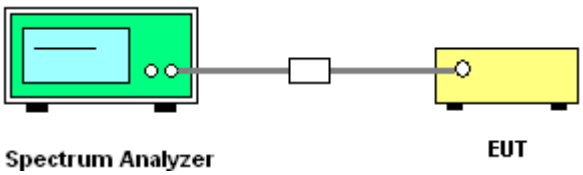
3.4.2 Measuring Instruments

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 v03r05.
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

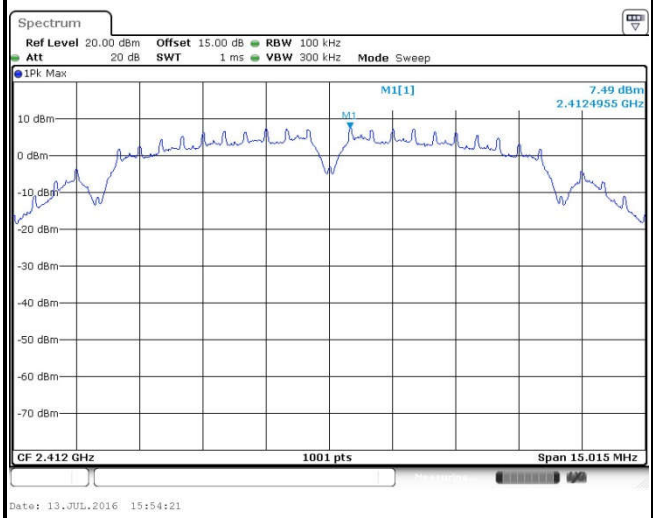


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

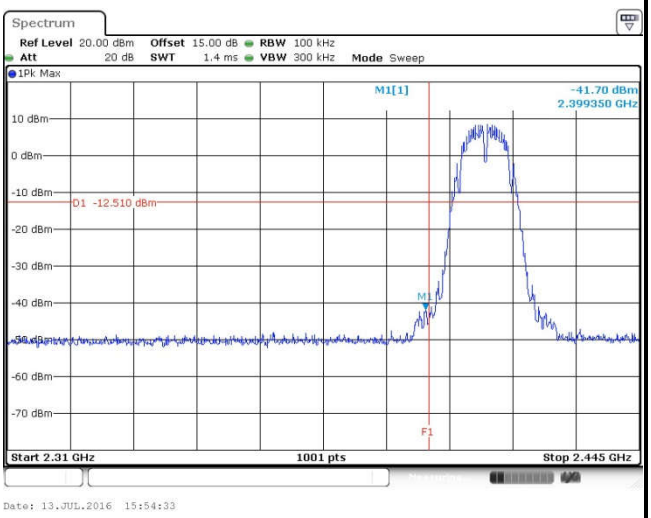
Test Mode :	802.11b	Temperature :	24~26℃
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Sam Zheng

WLAN 802.11b Channel 01

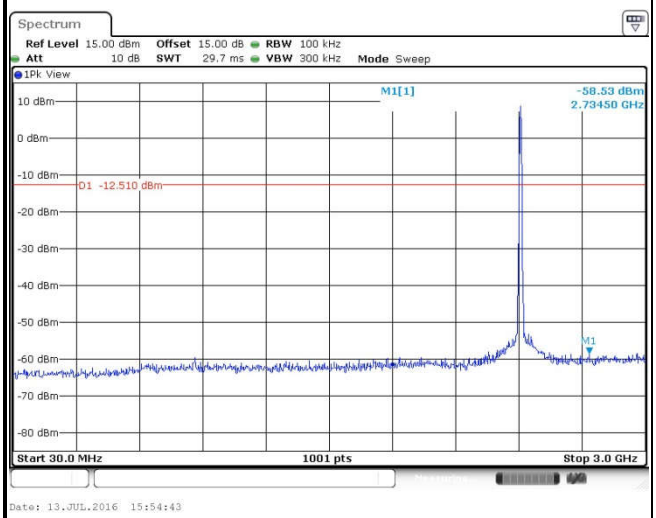
100kHz PSD reference Level



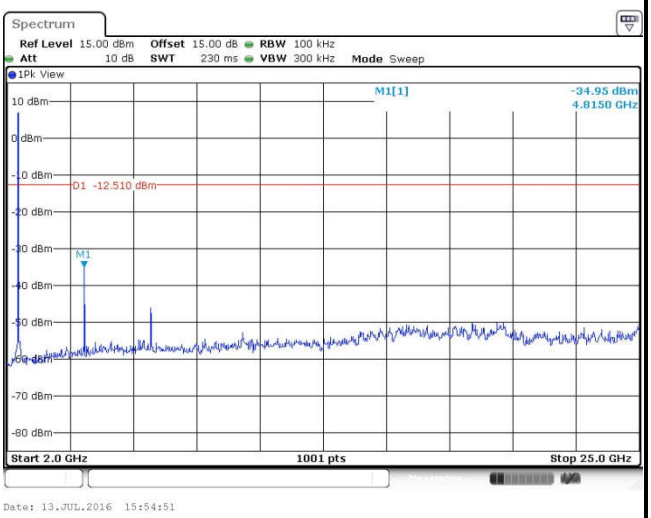
Low Channel Plot



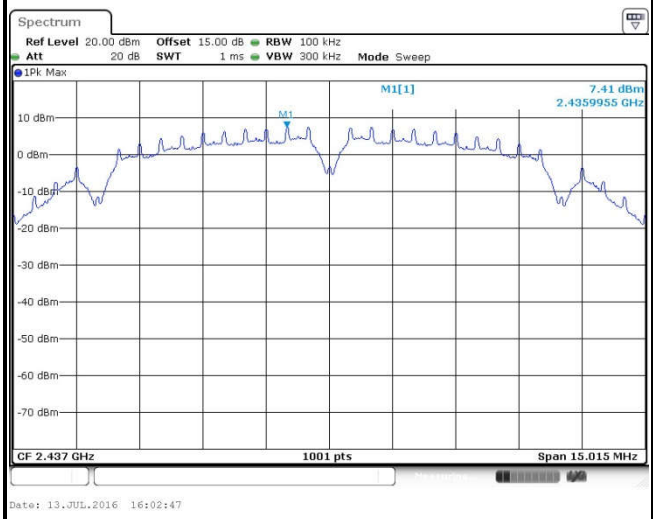
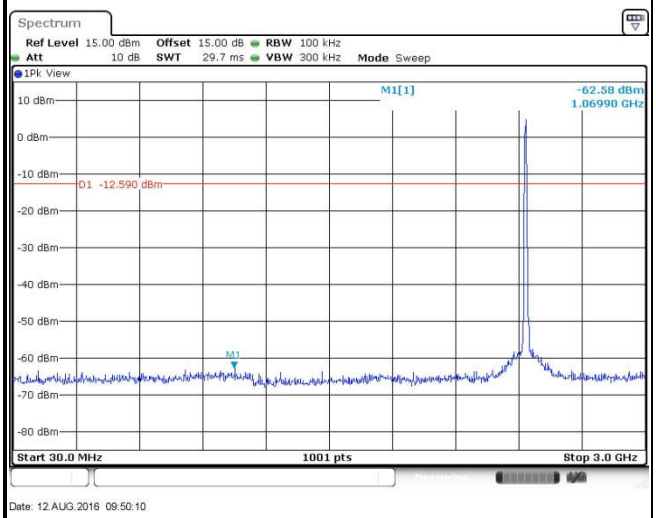
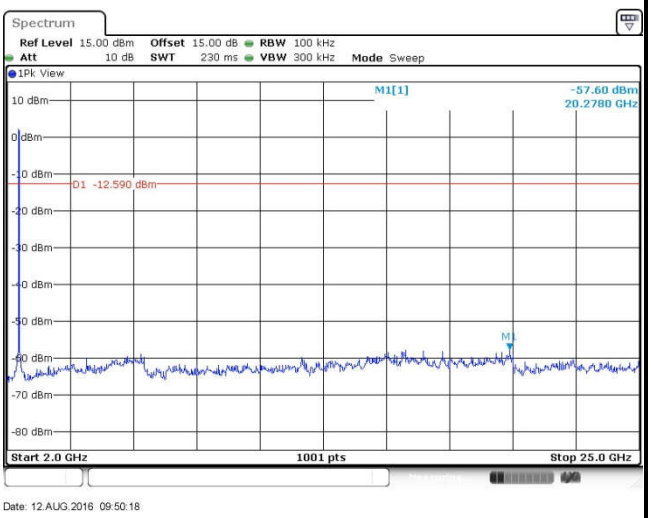
Spurious Emission 30MHz~3GHz



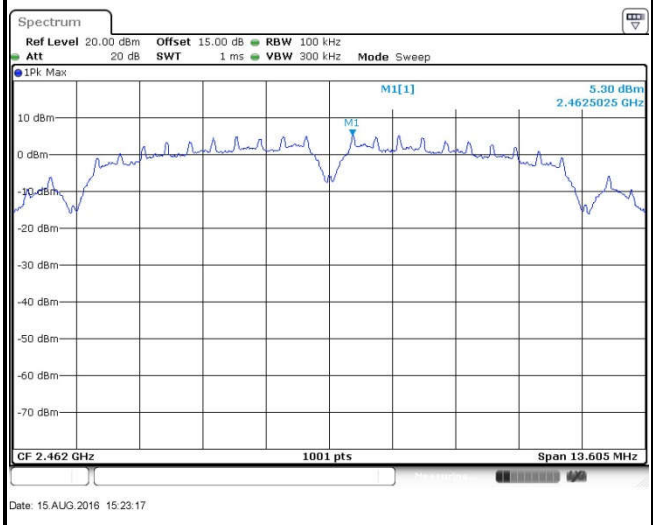
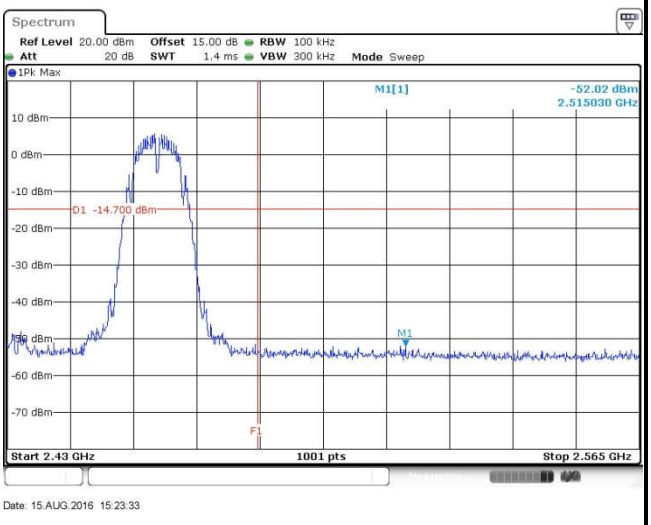
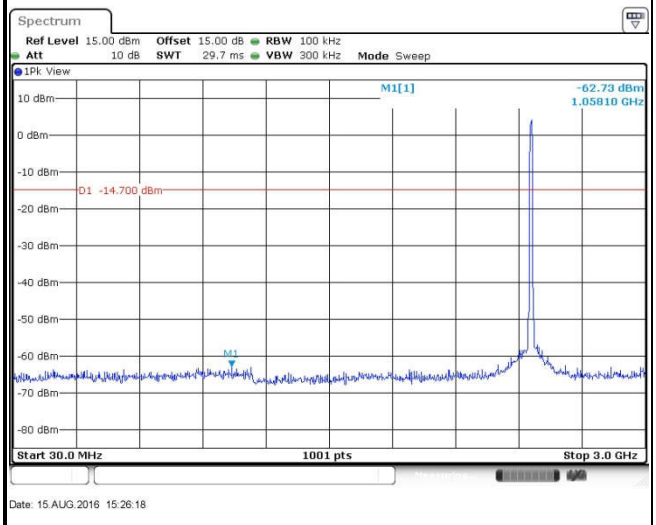
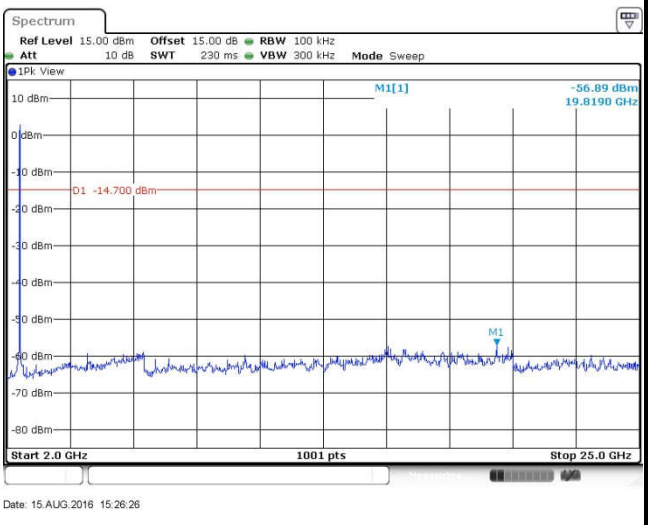
Spurious Emission 2GHz~25GHz



Test Mode :	802.11b	Temperature :	24~26℃
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Sam Zheng

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

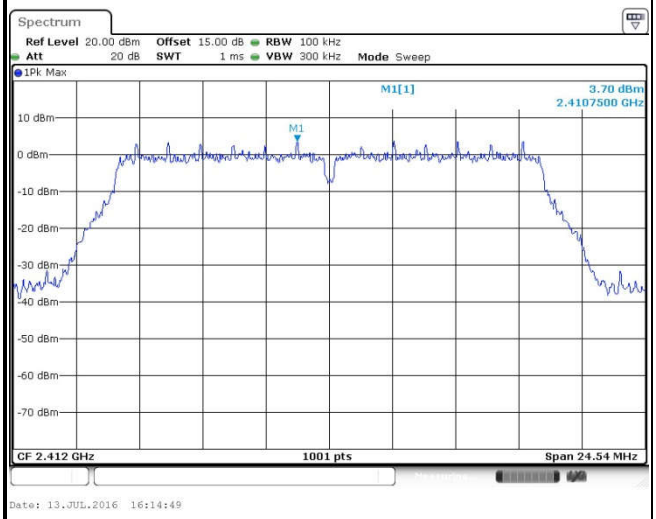
Test Mode :	802.11b	Temperature :	24~26℃
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Sam Zheng

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

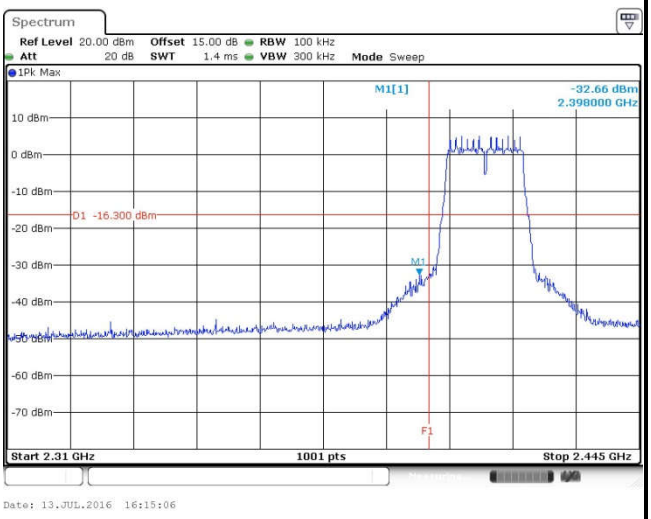
Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Sam Zheng

WLAN 802.11g Channel 01

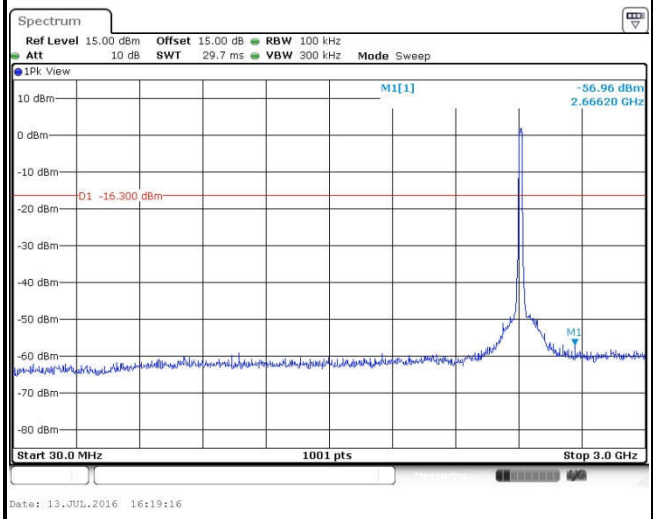
100kHz PSD reference Level



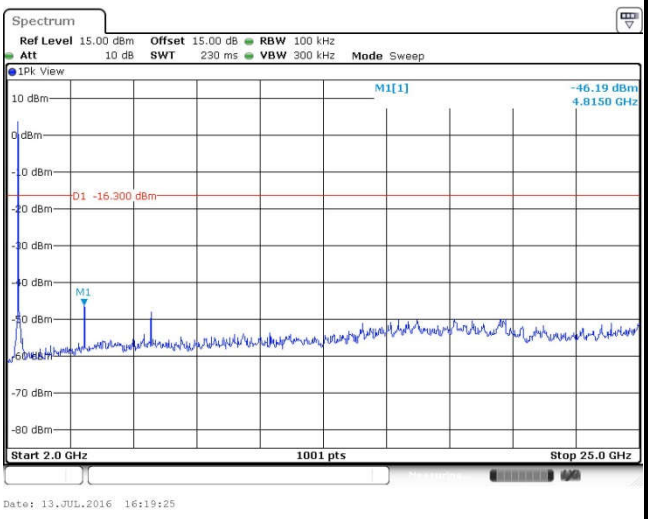
Low Channel Plot



Spurious Emission 30MHz~3GHz



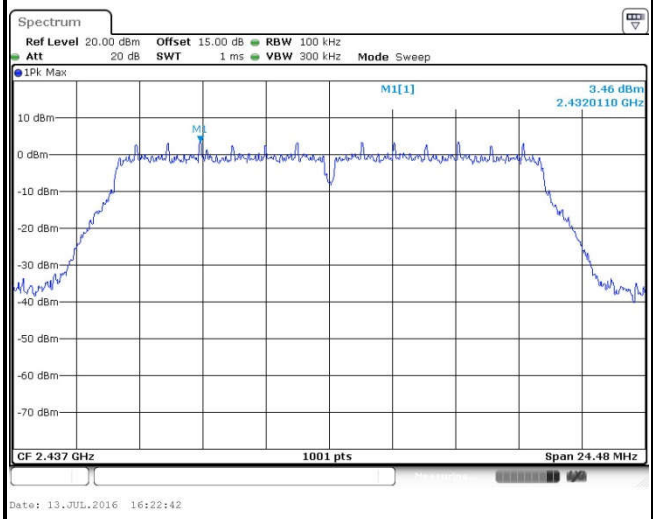
Spurious Emission 2GHz~25GHz



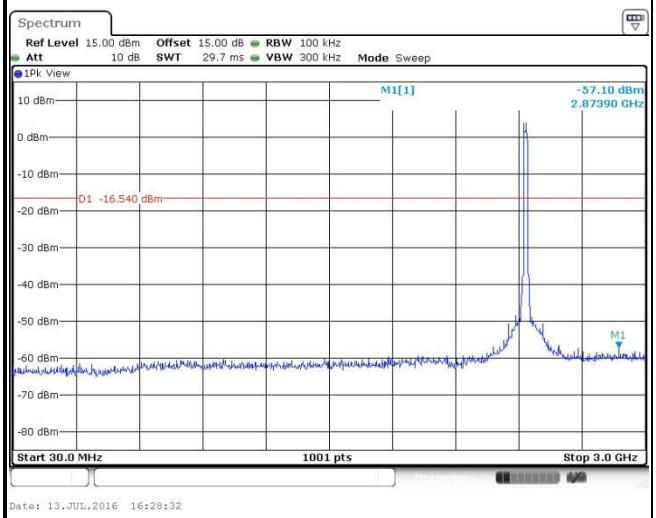
Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Sam Zheng

WLAN 802.11g Channel 06

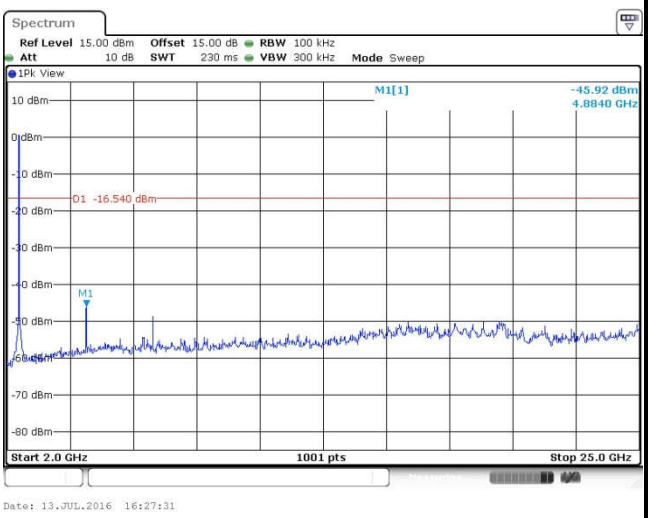
100kHz PSD reference Level



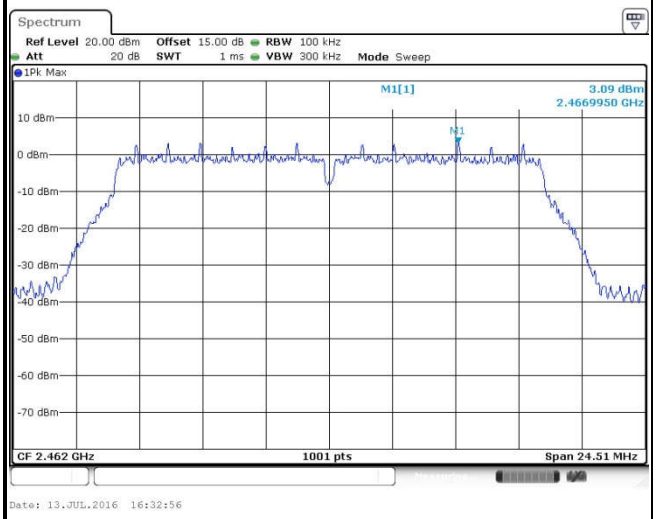
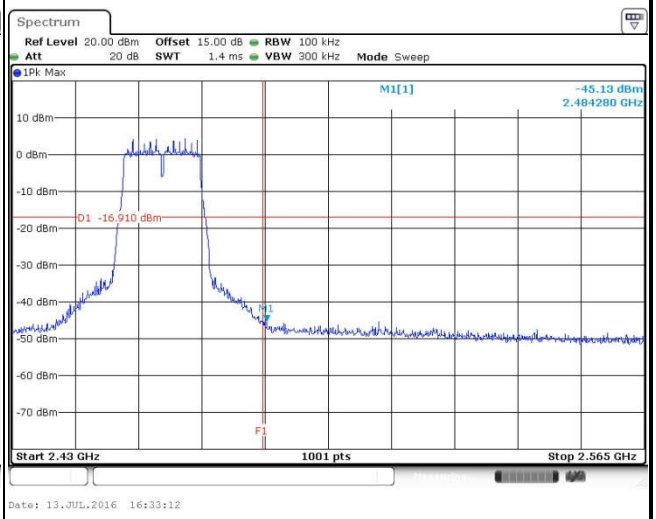
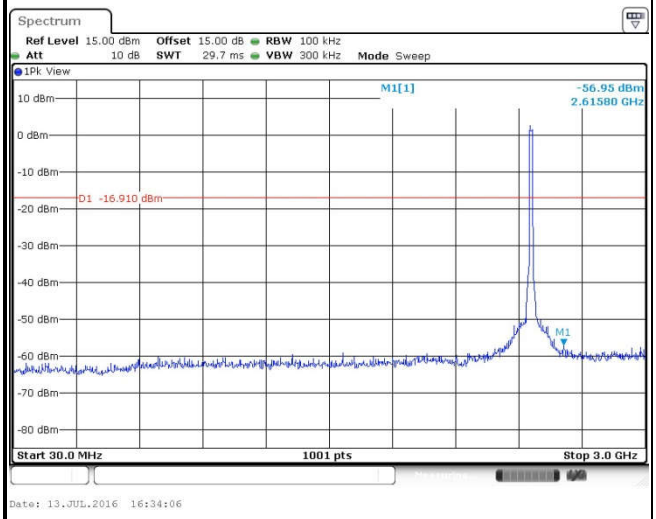
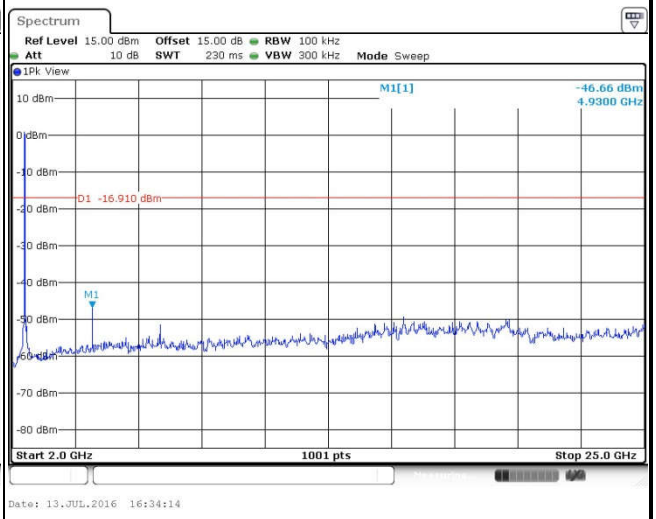
Spurious Emission 30MHz~3GHz



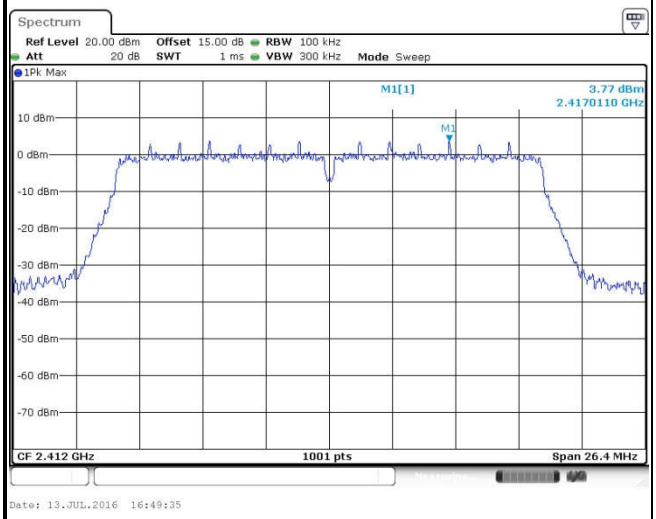
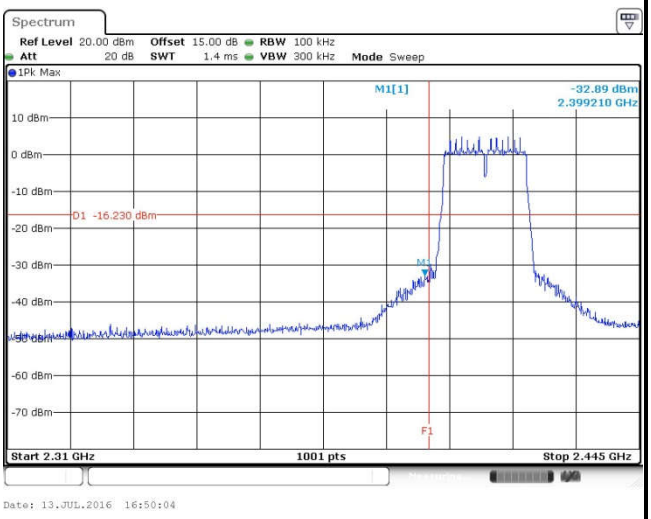
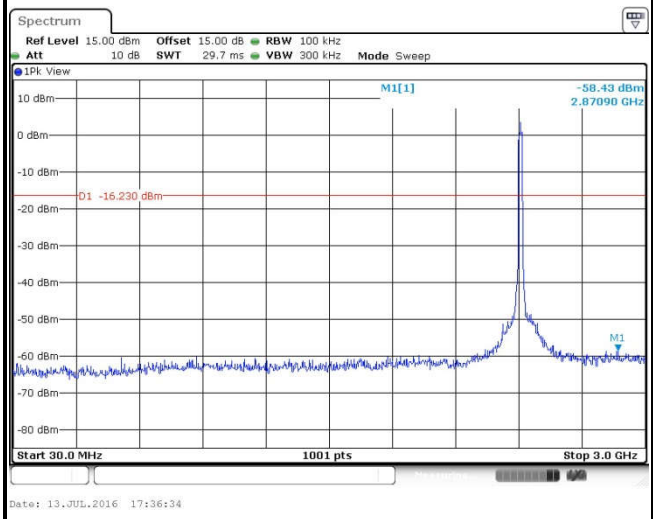
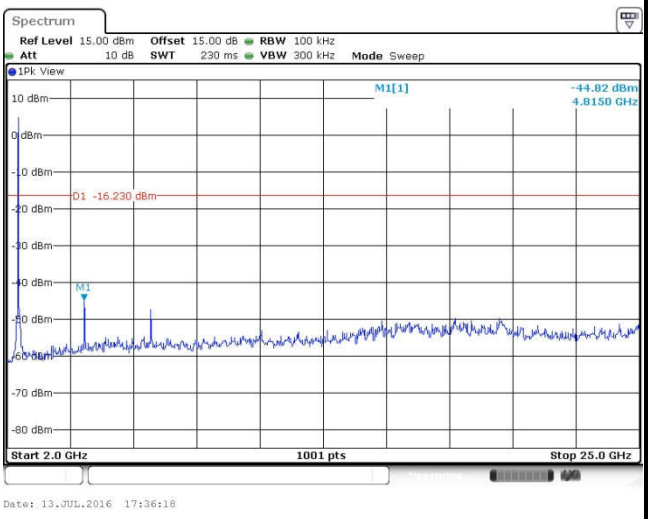
Spurious Emission 2GHz~25GHz



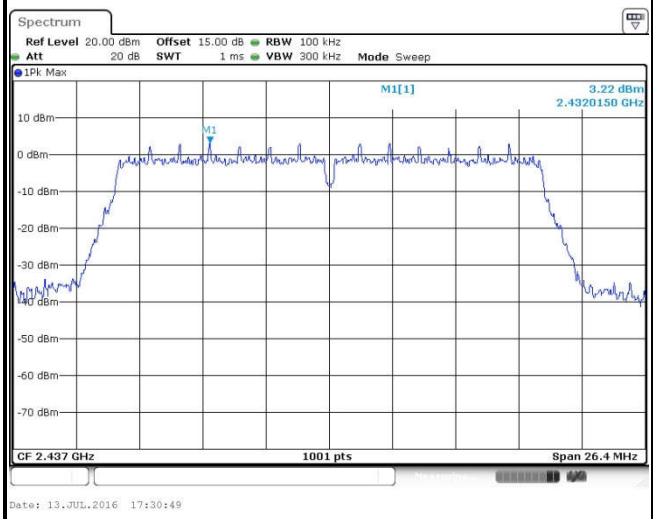
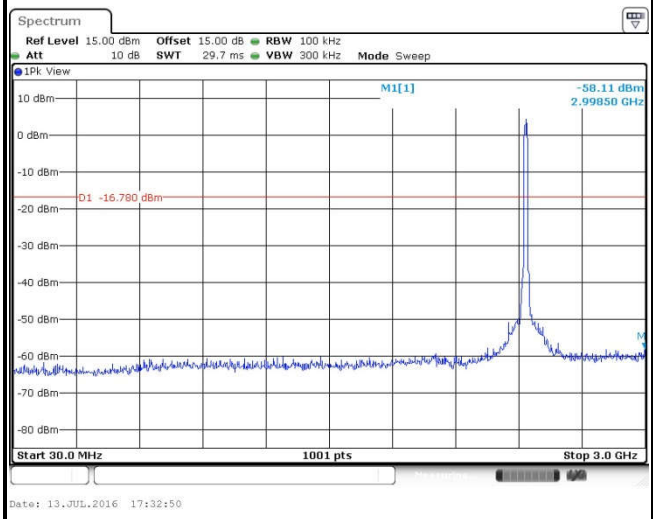
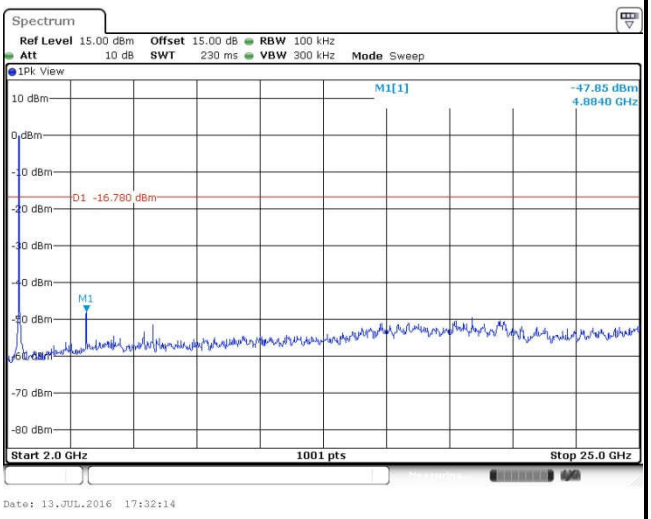
Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Sam Zheng

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 :	24~26℃
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Sam Zheng

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

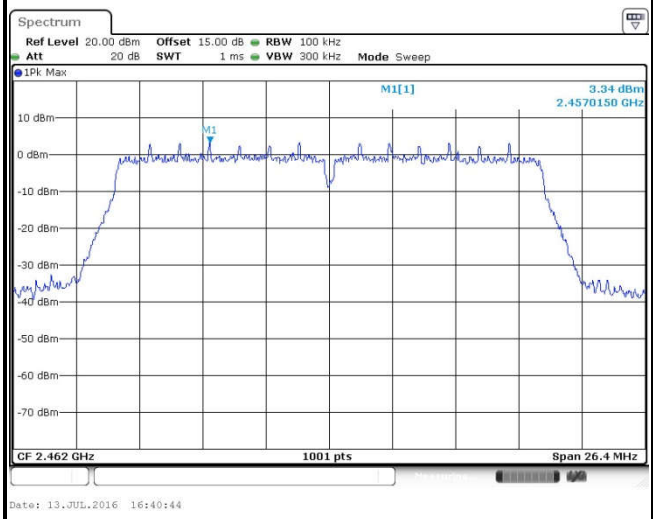
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Sam Zheng

WLAN 802.11n HT20 Channel 06	
100kHz PSD reference Level	
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

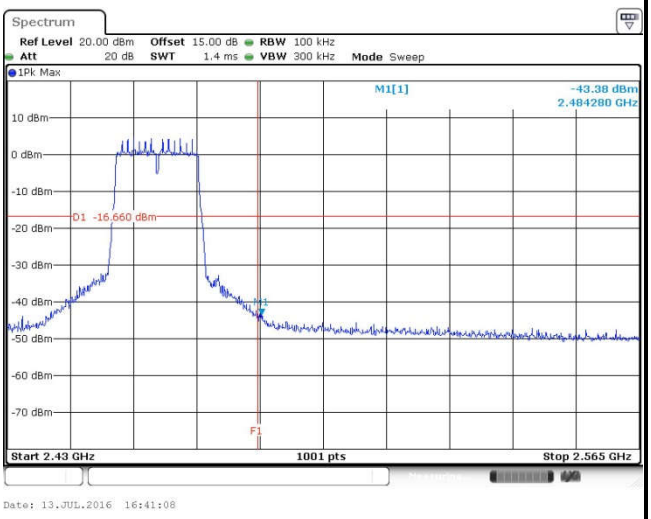
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Sam Zheng

WLAN 802.11n HT20 Channel 11

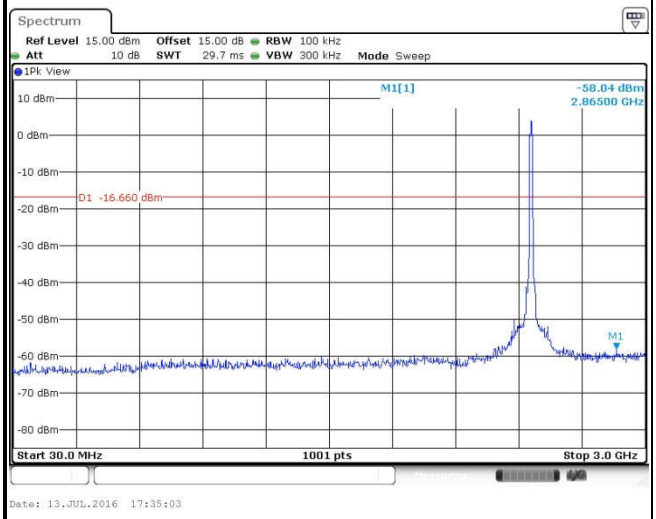
100kHz PSD reference Level



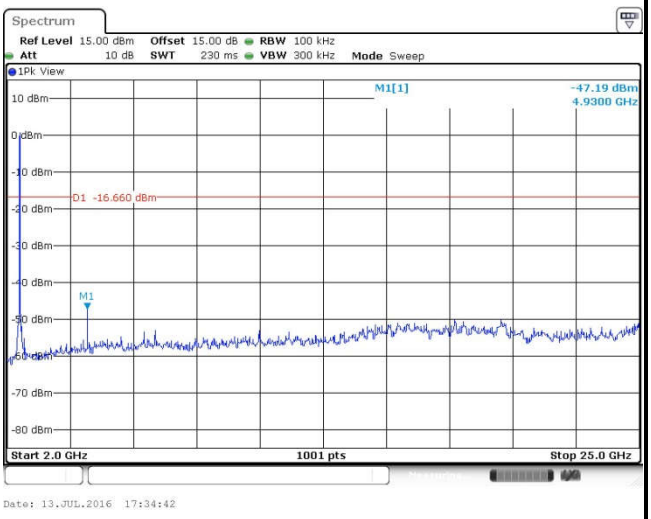
High Channel Plot



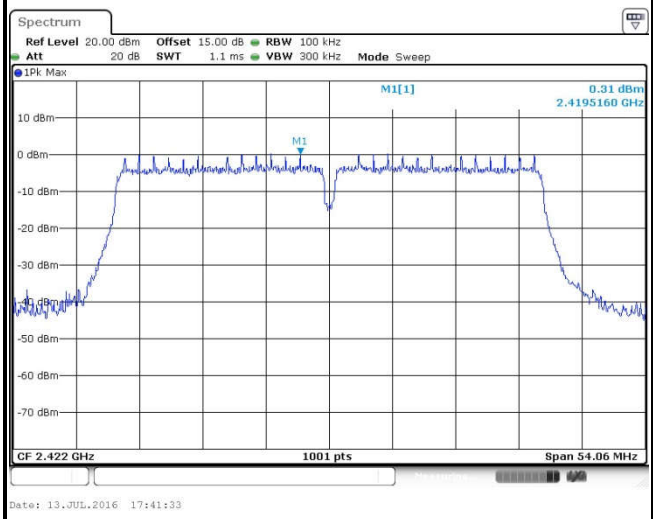
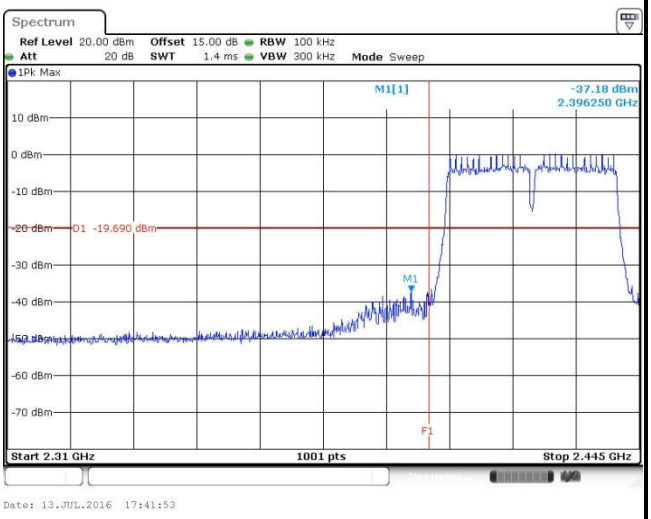
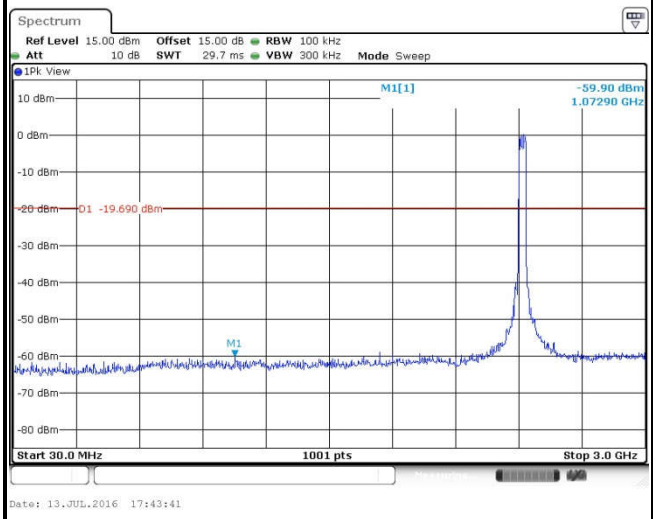
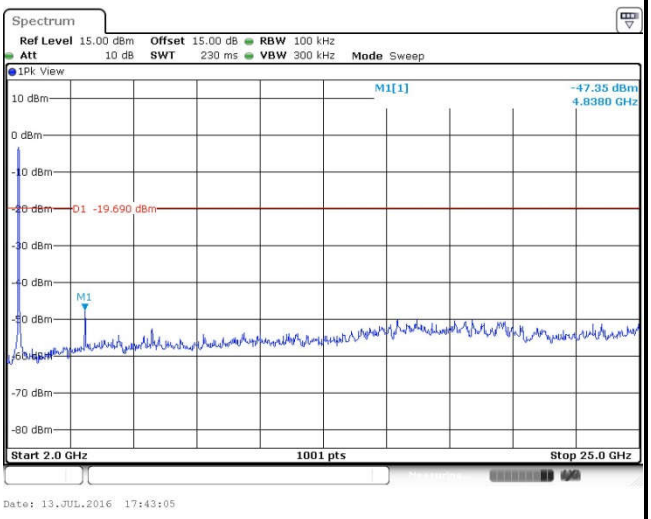
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



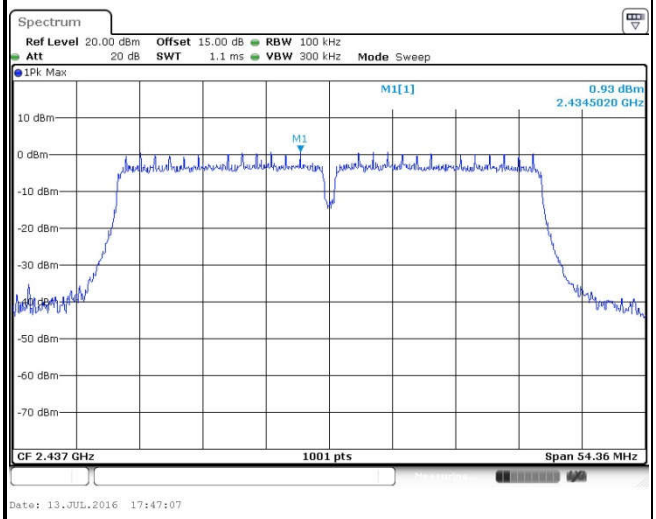
Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	03	Test Engineer :	Sam Zheng

WLAN 802.11n HT40 Channel 03	
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

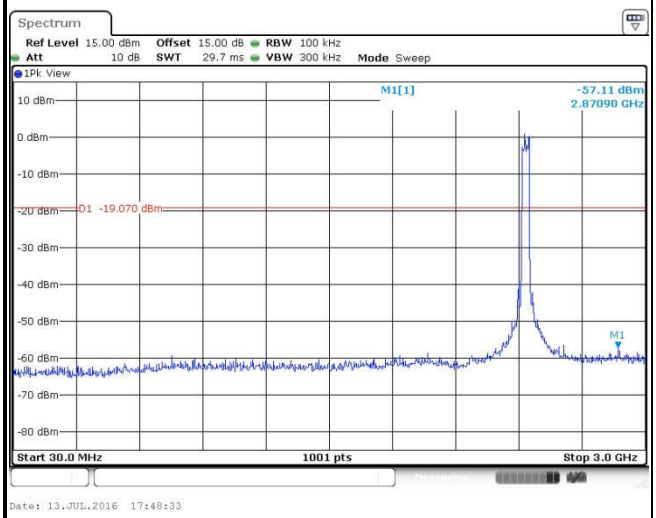
Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Sam Zheng

WLAN 802.11n HT40 Channel 06

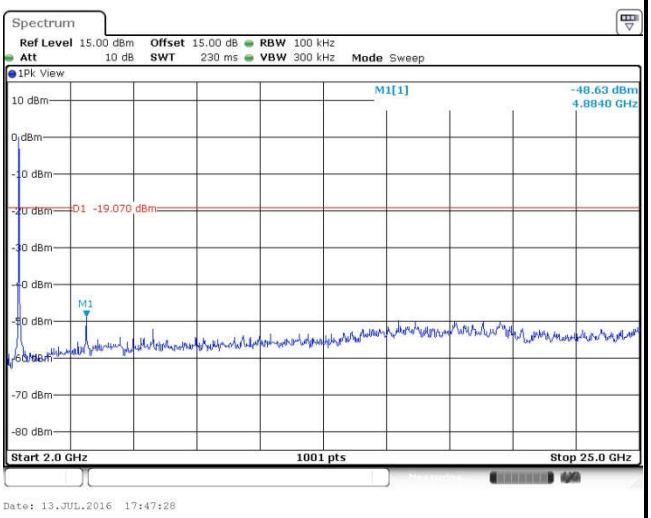
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



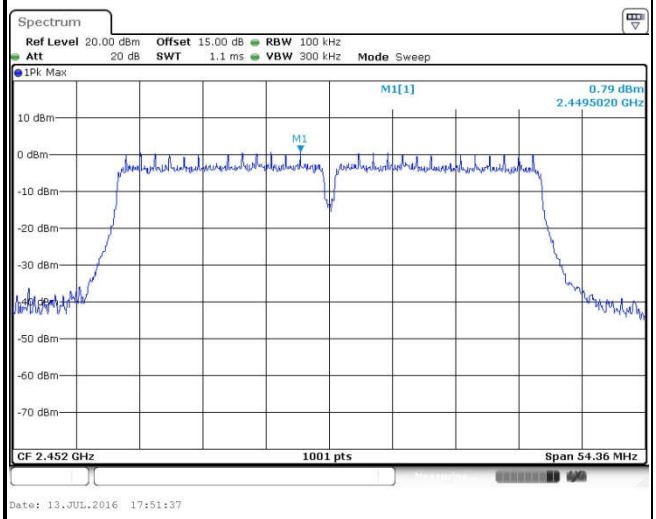
Spurious Emission 2GHz~25GHz



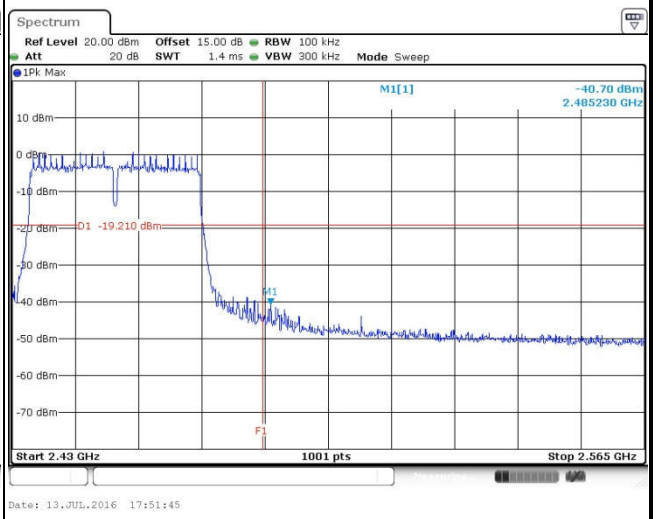
Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	09	Test Engineer :	Sam Zheng

WLAN 802.11n HT40 Channel 09

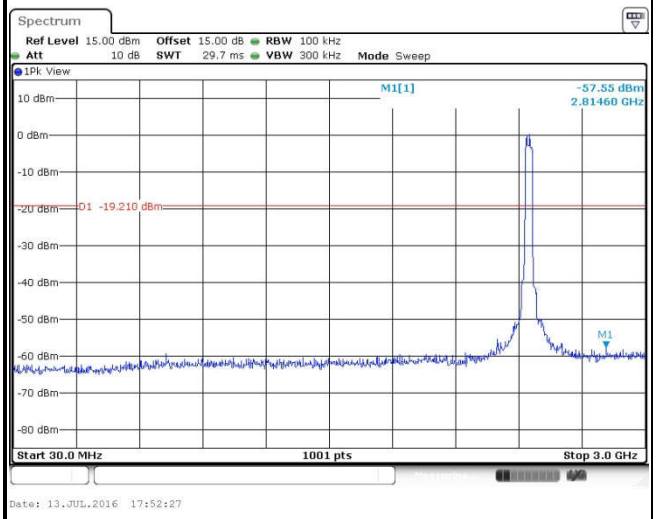
100kHz PSD reference Level



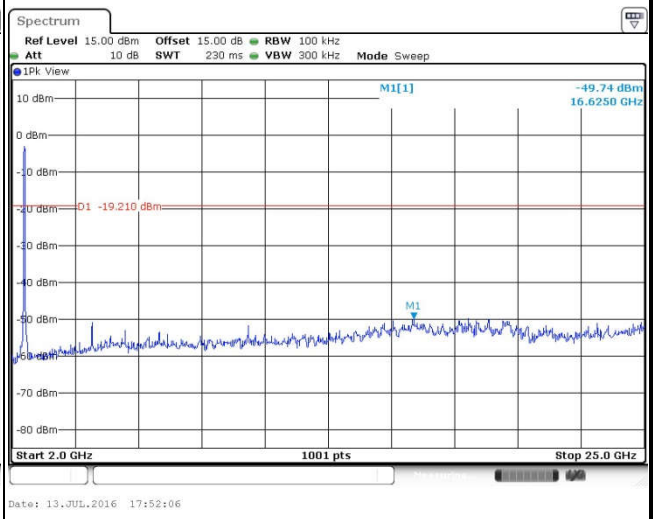
High Channel Plot



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 FCC section 15.209 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

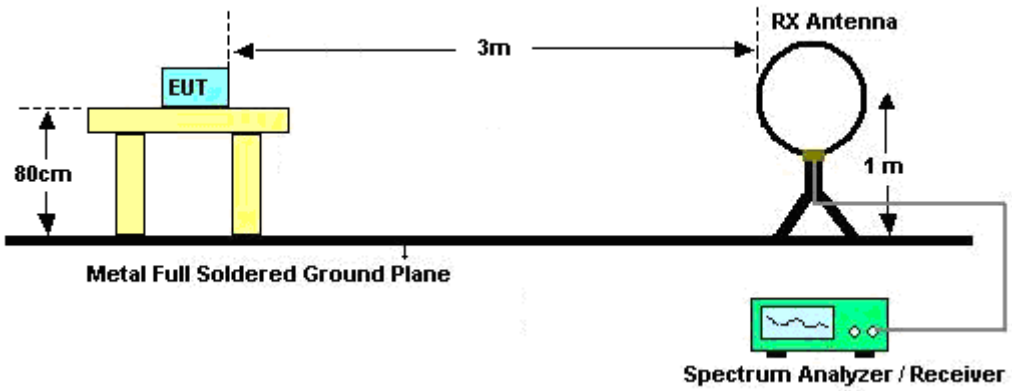
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

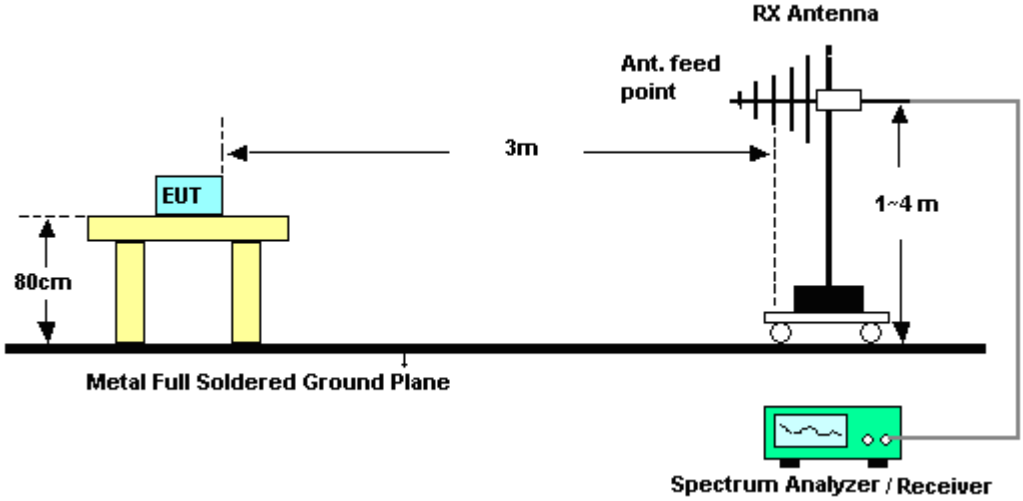
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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

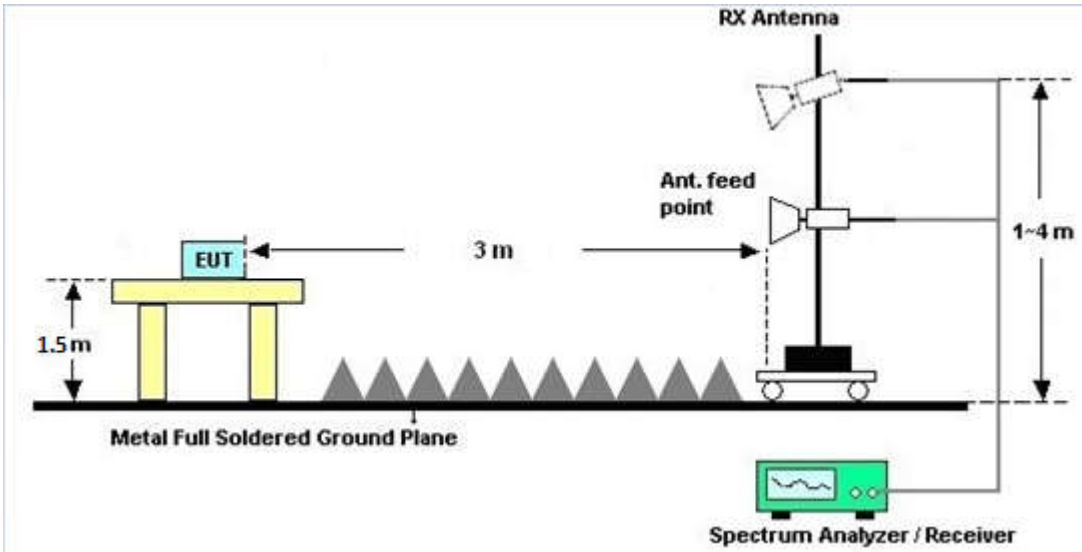
For radiated emissions below 30MHz



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 per 15.31(o) 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.

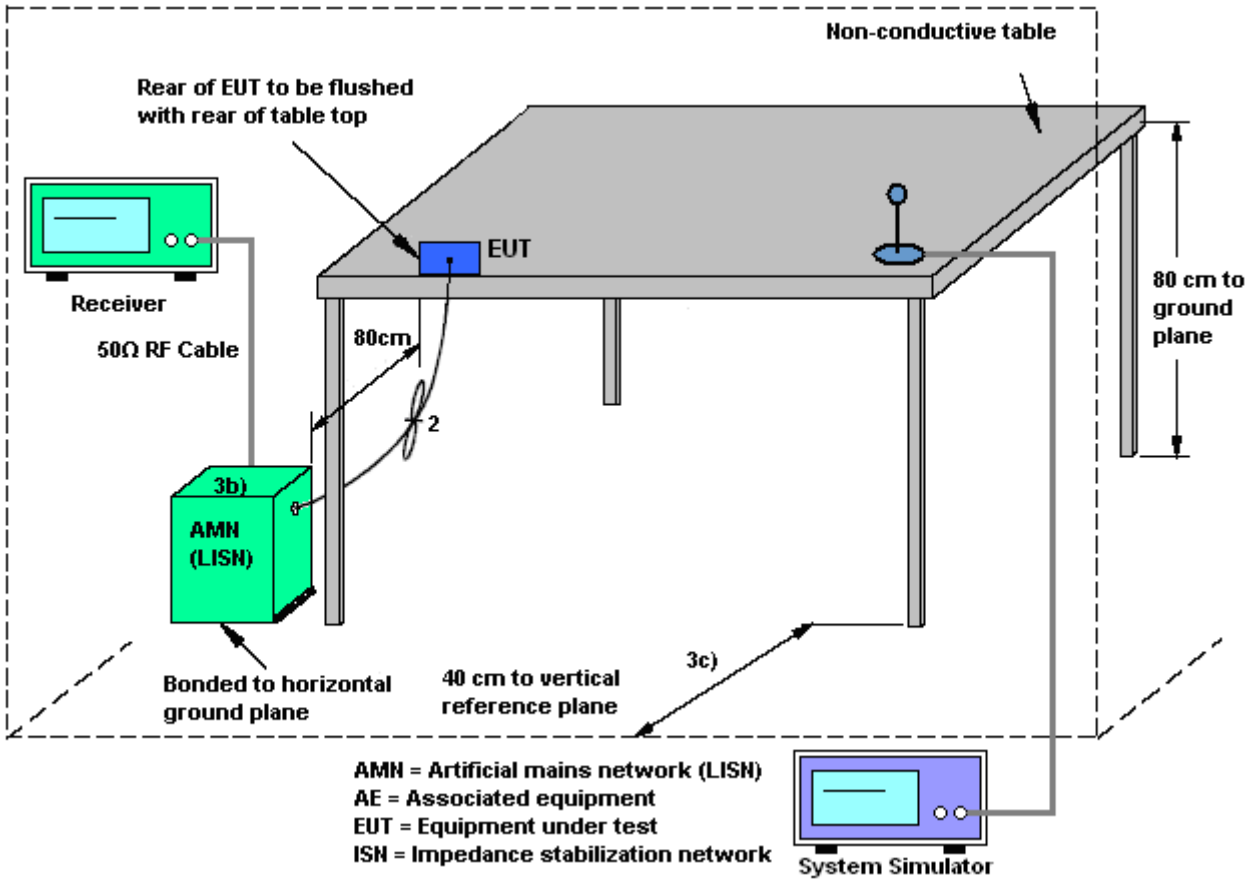
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

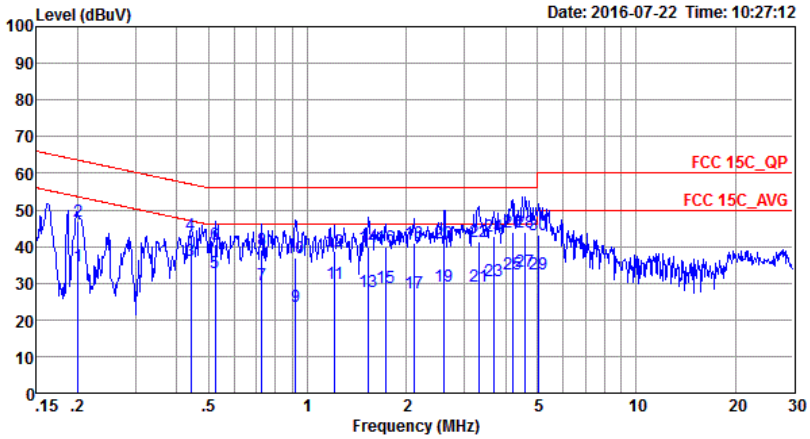
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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 :	21~23℃
Test Engineer :	Tao Cheng	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)		

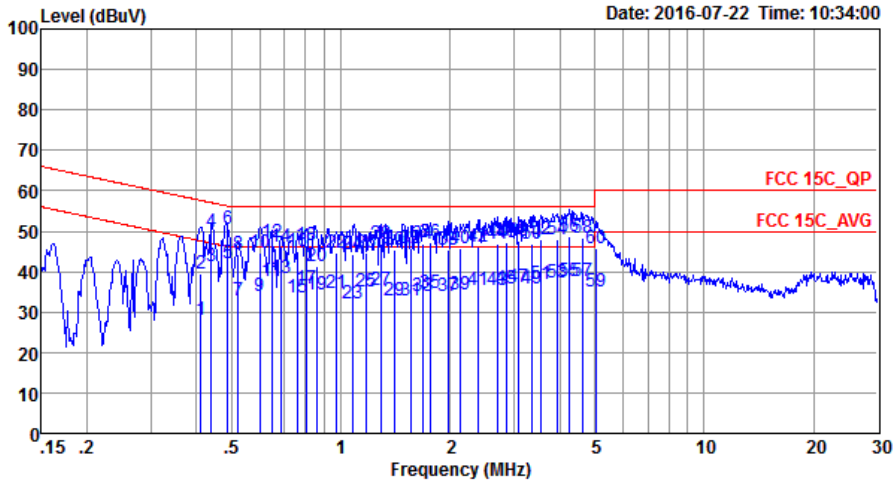


Site : CO01-SZ
Condition: FCC 15C_QP LISN_20160509 LINE

Mode : Mode 1
IMEI : 357275070002255

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.20	34.81	-18.77	53.58	24.20	0.11	10.50	Average
2		0.20	47.01	-16.57	63.58	36.40	0.11	10.50	QP
3	*	0.44	36.35	-10.69	47.04	26.00	0.11	10.24	Average
4		0.44	43.15	-13.89	57.04	32.80	0.11	10.24	QP
5		0.52	32.72	-13.28	46.00	22.40	0.11	10.21	Average
6		0.52	40.52	-15.48	56.00	30.20	0.11	10.21	QP
7		0.73	29.37	-16.63	46.00	19.10	0.11	10.16	Average
8		0.73	39.07	-16.93	56.00	28.80	0.11	10.16	QP
9		0.92	23.67	-22.33	46.00	13.40	0.11	10.16	Average
10		0.92	36.87	-19.13	56.00	26.60	0.11	10.16	QP
11		1.21	29.87	-16.13	46.00	19.60	0.11	10.16	Average
12		1.21	38.87	-17.13	56.00	28.60	0.11	10.16	QP
13		1.54	27.78	-18.22	46.00	17.50	0.11	10.17	Average
14		1.54	39.68	-16.32	56.00	29.40	0.11	10.17	QP
15		1.73	28.78	-17.22	46.00	18.50	0.11	10.17	Average
16		1.73	39.68	-16.32	56.00	29.40	0.11	10.17	QP
17		2.11	27.29	-18.71	46.00	17.01	0.11	10.17	Average
18		2.11	40.79	-15.21	56.00	30.51	0.11	10.17	QP
19		2.61	29.31	-16.69	46.00	19.00	0.12	10.19	Average
20		2.61	41.11	-14.89	56.00	30.80	0.12	10.19	QP
21		3.31	29.13	-16.87	46.00	18.80	0.12	10.21	Average
22		3.31	41.43	-14.57	56.00	31.10	0.12	10.21	QP
23		3.68	30.54	-15.46	46.00	20.20	0.13	10.21	Average
24		3.68	42.74	-13.26	56.00	32.40	0.13	10.21	QP
25		4.20	32.36	-13.64	46.00	22.00	0.13	10.23	Average
26		4.20	43.76	-12.24	56.00	33.40	0.13	10.23	QP
27		4.60	33.28	-12.72	46.00	22.90	0.14	10.24	Average
28		4.60	44.08	-11.92	56.00	33.70	0.14	10.24	QP
29		5.06	32.30	-17.70	50.00	21.90	0.15	10.25	Average
30		5.06	43.00	-17.00	60.00	32.60	0.15	10.25	QP

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Tao Cheng	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)		

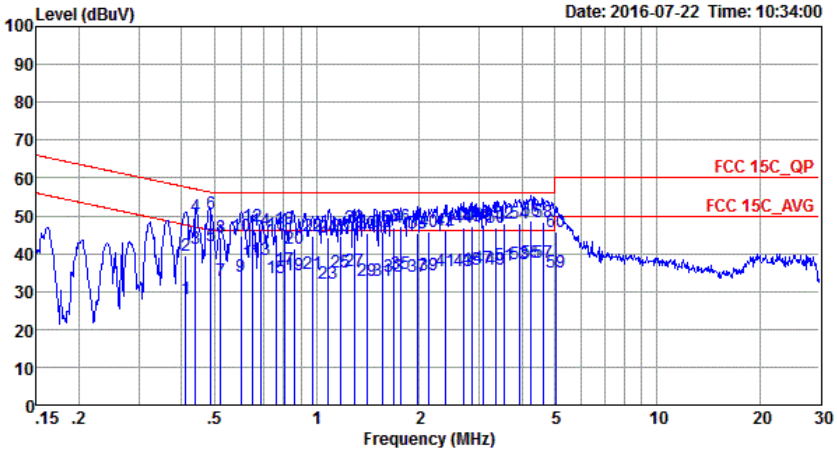


Site : CO01-SZ
Condition: FCC 15C_QP LISN_20160509 NEUTRAL

Mode : Mode 1
IMEI : 357275070002255

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.41	27.96	-19.63	47.59	17.60	0.11	10.25	Average
2		0.41	39.46	-18.13	57.59	29.10	0.11	10.25	QP
3		0.44	41.35	-5.72	47.07	31.00	0.11	10.24	Average
4		0.44	49.75	-7.32	57.07	39.40	0.11	10.24	QP
5	*	0.49	41.93	-4.26	46.19	31.60	0.11	10.22	Average
6		0.49	50.73	-5.46	56.19	40.40	0.11	10.22	QP
7		0.52	32.92	-13.08	46.00	22.60	0.11	10.21	Average
8		0.52	44.42	-11.58	56.00	34.10	0.11	10.21	QP
9		0.60	34.00	-12.00	46.00	23.70	0.11	10.19	Average
10		0.60	44.50	-11.50	56.00	34.20	0.11	10.19	QP
11		0.64	37.58	-8.42	46.00	27.29	0.11	10.18	Average
12		0.64	47.08	-8.92	56.00	36.79	0.11	10.18	QP
13		0.69	38.27	-7.73	46.00	28.00	0.11	10.16	Average
14		0.69	46.27	-9.73	56.00	36.00	0.11	10.16	QP
15		0.76	33.67	-12.33	46.00	23.40	0.11	10.16	Average
16		0.76	45.17	-10.83	56.00	34.90	0.11	10.16	QP
17		0.80	35.87	-10.13	46.00	25.60	0.11	10.16	Average
18		0.80	46.57	-9.43	56.00	36.30	0.11	10.16	QP
19		0.86	34.27	-11.73	46.00	24.00	0.11	10.16	Average
20		0.86	41.37	-14.63	56.00	31.10	0.11	10.16	QP
21		0.97	34.77	-11.23	46.00	24.50	0.11	10.16	Average
22		0.97	44.47	-11.53	56.00	34.20	0.11	10.16	QP
23		1.08	32.07	-13.93	46.00	21.80	0.11	10.16	Average
24		1.08	44.17	-11.83	56.00	33.90	0.11	10.16	QP
25		1.17	34.97	-11.03	46.00	24.70	0.11	10.16	Average
26		1.17	44.67	-11.33	56.00	34.40	0.11	10.16	QP
27		1.29	35.47	-10.53	46.00	25.20	0.11	10.16	Average
28		1.29	46.87	-9.13	56.00	36.60	0.11	10.16	QP
29		1.40	32.87	-13.13	46.00	22.60	0.11	10.16	Average

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Tao Cheng	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20160509 NEUTRAL

Mode : Mode 1
IMEI : 357275070002255

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
30	1.40	45.47	-10.53	56.00	35.20	0.11	10.16	QP
31	1.56	32.98	-13.02	46.00	22.70	0.11	10.17	Average
32	1.56	45.78	-10.22	56.00	35.50	0.11	10.17	QP
33	1.68	34.08	-11.92	46.00	23.80	0.11	10.17	Average
34	1.68	46.78	-9.22	56.00	36.50	0.11	10.17	QP
35	1.77	34.68	-11.32	46.00	24.40	0.11	10.17	Average
36	1.77	47.28	-8.72	56.00	37.00	0.11	10.17	QP
37	1.98	33.88	-12.12	46.00	23.60	0.11	10.17	Average
38	1.98	45.28	-10.72	56.00	35.00	0.11	10.17	QP
39	2.13	34.49	-11.51	46.00	24.21	0.11	10.17	Average
40	2.13	45.79	-10.21	56.00	35.51	0.11	10.17	QP
41	2.40	35.40	-10.60	46.00	25.10	0.12	10.18	Average
42	2.40	46.00	-10.00	56.00	35.70	0.12	10.18	QP
43	2.69	35.51	-10.49	46.00	25.20	0.12	10.19	Average
44	2.69	46.91	-9.09	56.00	36.60	0.12	10.19	QP
45	2.85	35.82	-10.18	46.00	25.50	0.12	10.20	Average
46	2.85	47.12	-8.88	56.00	36.80	0.12	10.20	QP
47	3.09	36.22	-9.78	46.00	25.90	0.12	10.20	Average
48	3.09	47.52	-8.48	56.00	37.20	0.12	10.20	QP
49	3.35	35.83	-10.17	46.00	25.50	0.12	10.21	Average
50	3.35	47.03	-8.97	56.00	36.70	0.12	10.21	QP
51	3.57	36.74	-9.26	46.00	26.40	0.13	10.21	Average
52	3.57	47.94	-8.06	56.00	37.60	0.13	10.21	QP
53	3.94	37.35	-8.65	46.00	27.00	0.13	10.22	Average
54	3.94	48.05	-7.95	56.00	37.70	0.13	10.22	QP
55	4.27	37.66	-8.34	46.00	27.30	0.13	10.23	Average
56	4.27	48.56	-7.44	56.00	38.20	0.13	10.23	QP
57	4.65	37.48	-8.52	46.00	27.10	0.14	10.24	Average
58	4.65	48.48	-7.52	56.00	38.10	0.14	10.24	QP
59	5.03	34.90	-15.10	50.00	24.50	0.15	10.25	Average
60	5.03	45.70	-14.30	60.00	35.30	0.15	10.25	QP

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 FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	May 07, 2016	Jul. 13, 2016~ Aug. 15, 2016	May 06, 2017	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSP30	101400	9kHz~30GHz	Jan. 12, 2016	Jul. 13, 2016~ Aug. 15, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Jan. 12, 2016	Jul. 13, 2016~ Aug. 15, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Jan. 12, 2016	Jul. 13, 2016~ Aug. 15, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	May 07, 2016	Aug. 12, 2016	May 06, 2017	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz	May 07, 2016	Aug. 12, 2016	May 06, 2017	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 07, 2016	Aug. 12, 2016	May 06, 2017	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz~2GHz	May 21, 2016	Aug. 12, 2016	May 20, 2017	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	May 07, 2016	Aug. 12, 2016	May 06, 2017	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Aug.19, 2015	Aug. 12, 2016	Aug. 18, 2016	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz ~3000MHz	Oct. 20, 2015	Aug. 12, 2016	Oct. 19, 2016	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 20, 2015	Aug. 12, 2016	Oct. 19, 2016	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 12, 2016	Aug. 12, 2016	Jan. 11, 2017	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Aug. 12, 2016	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Aug. 12, 2016	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Aug. 12, 2016	NCR	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESCI7	100724	9kHz~3GHz;	Nov. 23, 2015	Jul. 22, 2016	Nov. 22, 2016	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103892	9kHz~30MHz	Jan. 12, 2016	Jul. 22, 2016	Jan. 11, 2017	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103912	9kHz~30MHz	Jan. 12, 2016	Jul. 22, 2016	Jan. 11, 2017	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 16, 2016	Jul. 22, 2016	Jul. 15, 2017	Conduction (CO01-SZ)
Pulse Limiter	COM-POWER	LIT-153 Transient Limiter	53139	150kHz~30MHz	Oct. 20, 2015	Jul. 22, 2016	Oct. 19, 2016	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5dB

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

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

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

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

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

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

Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Sam Zheng	Temperature:	24~26	°C
Test Date:	2016/7/13~2016/8/15	Relative Humidity:	50~53	%

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	12.39	10.01	0.50	Pass
11b	1Mbps	1	6	2437	12.34	10.01	0.50	Pass
11b	1Mbps	1	11	2462	12.34	9.07	0.50	Pass
11g	6Mbps	1	1	2412	17.98	16.36	0.50	Pass
11g	6Mbps	1	6	2437	17.73	16.32	0.50	Pass
11g	6Mbps	1	11	2462	18.03	16.34	0.50	Pass
HT20	MCS0	1	1	2412	18.48	17.60	0.50	Pass
HT20	MCS0	1	6	2437	18.48	17.60	0.50	Pass
HT20	MCS0	1	11	2462	18.63	17.60	0.50	Pass
HT40	MCS0	1	3	2422	36.46	36.04	0.50	Pass
HT40	MCS0	1	6	2437	36.56	36.24	0.50	Pass
HT40	MCS0	1	9	2452	36.56	36.24	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	16.86	30.00	-1.00	15.86	36.00	Pass
11b	1Mbps	1	6	2437	16.88	30.00	-1.00	15.88	36.00	Pass
11b	1Mbps	1	11	2462	17.20	30.00	-1.00	16.20	36.00	Pass
11g	6Mbps	1	1	2412	21.73	30.00	-1.00	20.73	36.00	Pass
11g	6Mbps	1	6	2437	22.03	30.00	-1.00	21.03	36.00	Pass
11g	6Mbps	1	11	2462	21.75	30.00	-1.00	20.75	36.00	Pass
HT20	MCS0	1	1	2412	21.71	30.00	-1.00	20.71	36.00	Pass
HT20	MCS0	1	6	2437	21.88	30.00	-1.00	20.88	36.00	Pass
HT20	MCS0	1	11	2462	22.22	30.00	-1.00	21.22	36.00	Pass
HT40	MCS0	1	3	2422	21.72	30.00	-1.00	20.72	36.00	Pass
HT40	MCS0	1	6	2437	22.14	30.00	-1.00	21.14	36.00	Pass
HT40	MCS0	1	9	2452	22.06	30.00	-1.00	21.06	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	0.08	13.73
11b	1Mbps	1	6	2437	0.08	13.71
11b	1Mbps	1	11	2462	0.08	14.09
11g	6Mbps	1	1	2412	0.50	11.80
11g	6Mbps	1	6	2437	0.50	11.95
11g	6Mbps	1	11	2462	0.50	11.88
HT20	MCS0	1	1	2412	0.53	11.79
HT20	MCS0	1	6	2437	0.53	11.98
HT20	MCS0	1	11	2462	0.53	12.21
HT40	MCS0	1	3	2422	1.01	10.58
HT40	MCS0	1	6	2437	1.01	10.13
HT40	MCS0	1	9	2452	1.01	11.17

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	-5.01	-1.00	8.00	Pass
11b	1Mbps	1	6	2437	-4.81	-1.00	8.00	Pass
11b	1Mbps	1	11	2462	-8.58	-1.00	8.00	Pass
11g	6Mbps	1	1	2412	-8.86	-1.00	8.00	Pass
11g	6Mbps	1	6	2437	-9.53	-1.00	8.00	Pass
11g	6Mbps	1	11	2462	-9.14	-1.00	8.00	Pass
HT20	MCS0	1	1	2412	-9.04	-1.00	8.00	Pass
HT20	MCS0	1	6	2437	-10.48	-1.00	8.00	Pass
HT20	MCS0	1	11	2462	-9.67	-1.00	8.00	Pass
HT40	MCS0	1	3	2422	-14.17	-1.00	8.00	Pass
HT40	MCS0	1	6	2437	-14.55	-1.00	8.00	Pass
HT40	MCS0	1	9	2452	-13.10	-1.00	8.00	Pass

Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2386.755	48.37	-25.63	74	51.24	27.29	4.86	35.02	232	351	P	H
		2386.125	37.67	-16.33	54	40.54	27.29	4.86	35.02	232	351	A	H
	*	2412	87.31	-	-	90.1	27.33	4.88	35	232	351	P	H
	*	2412	85.61	-	-	88.4	27.33	4.88	35	232	351	A	H
		2332.47	48.62	-25.38	74	51.71	27.16	4.82	35.07	150	56	P	V
		2387.805	37.48	-16.52	54	40.35	27.29	4.86	35.02	150	56	A	V
	*	2412	78.44	-	-	81.23	27.33	4.88	35	150	56	P	V
	*	2412	76.08	-	-	78.87	27.33	4.88	35	150	56	A	V
802.11b CH 06 2437MHz		2360.4	48.21	-25.79	74	51.22	27.22	4.82	35.05	247	333	P	H
		2389.8	37.5	-16.5	54	40.35	27.29	4.86	35	247	333	A	H
	*	2437	87.32	-	-	90.01	27.4	4.88	34.97	247	333	P	H
	*	2437	83.98	-	-	86.67	27.4	4.88	34.97	247	333	A	H
		2486.35	48.45	-25.55	74	51	27.47	4.9	34.92	247	333	P	H
		2489.85	37.96	-16.04	54	40.46	27.5	4.92	34.92	247	333	A	H
		2386.02	47.92	-26.08	74	50.79	27.29	4.86	35.02	154	25	P	V
		2387.84	37.45	-16.55	54	40.32	27.29	4.86	35.02	154	25	A	V
	*	2437	76.92	-	-	79.61	27.4	4.88	34.97	154	25	P	V
	*	2437	74.46	-	-	77.15	27.4	4.88	34.97	154	25	A	V
		2490.48	49.01	-24.99	74	51.51	27.5	4.92	34.92	154	25	P	V
		2498.11	37.89	-16.11	54	40.37	27.5	4.92	34.9	154	25	A	V

802.11b CH 11 2462MHz	*	2462	87.1	-	-	89.72	27.43	4.9	34.95	227	357	P	H
	*	2462	84.88	-	-	87.5	27.43	4.9	34.95	227	357	A	H
		2483.92	49.31	-24.69	74	51.86	27.47	4.9	34.92	227	357	P	H
		2488.28	40.25	-13.75	54	42.75	27.5	4.92	34.92	227	357	A	H
	*	2462	77.52	-	-	80.14	27.43	4.9	34.95	155	291	P	V
	*	2462	75.1	-	-	77.72	27.43	4.9	34.95	155	291	A	V
		2496.72	49.48	-24.52	74	51.96	27.5	4.92	34.9	155	291	P	V
		2488.96	38.11	-15.89	54	40.61	27.5	4.92	34.92	155	291	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	46.66	-27.34	74	65.52	32.56	6.97	58.39	250	0	P	H
		4824	44.45	-29.55	74	63.31	32.56	6.97	58.39	250	0	P	V
802.11b CH 06 2437MHz		4874	45.49	-28.51	74	64.5	32.66	6.99	58.66	250	0	P	H
		7311	48.53	-25.47	74	60.56	37.66	8.93	58.62	174	100	P	H
		4874	45.23	-28.77	74	64.24	32.66	6.99	58.66	250	0	P	V
		7311	50.19	-23.81	74	62.22	37.66	8.93	58.62	174	100	P	V
802.11b CH 11 2462MHz		4924	44.22	-29.78	74	62.98	32.76	7	58.52	150	347	P	H
		7386	49.66	-24.34	74	61.37	37.68	9.15	58.54	150	274	P	H
		4924	43.24	-30.76	74	62	32.76	7	58.52	150	347	P	V
		7386	49.96	-24.04	74	61.67	37.68	9.15	58.54	150	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.8	49.54	-24.46	74	52.39	27.29	4.86	35	236	337	P	H
		2389.695	39.17	-14.83	54	42.04	27.29	4.86	35.02	236	337	A	H
	*	2412	86.44	-	-	89.23	27.33	4.88	35	236	337	P	H
	*	2412	79.35	-	-	82.14	27.33	4.88	35	236	337	A	H
		2379.3	48.07	-25.93	74	50.97	27.26	4.86	35.02	250	316	P	V
		2385.495	38.44	-15.56	54	41.34	27.26	4.86	35.02	250	316	A	V
	*	2412	80.41	-	-	83.2	27.33	4.88	35	250	316	P	V
	*	2412	73.03	-	-	75.82	27.33	4.88	35	250	316	A	V
802.11g CH 06 2437MHz		2357.74	49.24	-24.76	74	52.25	27.22	4.82	35.05	244	352	P	H
		2381.4	38.95	-15.05	54	41.85	27.26	4.86	35.02	244	352	A	H
	*	2437	86.44	-	-	89.13	27.4	4.88	34.97	244	352	P	H
	*	2437	80.06	-	-	82.75	27.4	4.88	34.97	244	352	A	H
		2495.24	49.65	-24.35	74	52.13	27.5	4.92	34.9	244	352	P	H
		2492.44	39.48	-14.52	54	41.96	27.5	4.92	34.9	244	352	A	H
		2378.18	48.44	-25.56	74	51.34	27.26	4.86	35.02	222	21	P	V
		2360.26	38.72	-15.28	54	41.73	27.22	4.82	35.05	222	21	A	V
	*	2437	81.12	-	-	83.81	27.4	4.88	34.97	222	21	P	V
	*	2437	74.58	-	-	77.27	27.4	4.88	34.97	222	21	A	V
		2486.98	48.64	-25.36	74	51.19	27.47	4.9	34.92	222	21	P	V
		2499.79	39.08	-14.92	54	41.56	27.5	4.92	34.9	222	21	A	V

802.11g CH 11 2462MHz	*	2462	86.63	-	-	89.25	27.43	4.9	34.95	250	335	P	H
	*	2462	78.98	-	-	81.6	27.43	4.9	34.95	250	335	A	H
		2484.52	49.63	-24.37	74	52.18	27.47	4.9	34.92	250	335	P	H
		2483.56	39.47	-14.53	54	42.02	27.47	4.9	34.92	250	335	A	H
	*	2462	77.85	-	-	80.47	27.43	4.9	34.95	181	61	P	V
	*	2462	70.54	-	-	73.16	27.43	4.9	34.95	181	61	A	V
		2499.48	48.74	-25.26	74	51.22	27.5	4.92	34.9	181	61	P	V
		2496.12	38.97	-15.03	54	41.45	27.5	4.92	34.9	181	61	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	44.06	-29.94	74	62.92	32.56	6.97	58.39	150	360	P	H
		4824	42.12	-31.88	74	60.98	32.56	6.97	58.39	150	0	P	V
802.11g CH 06 2437MHz		4874	43.06	-30.94	74	62.07	32.66	6.99	58.66	150	360	P	H
		7311	49.46	-24.54	74	61.49	37.66	8.93	58.62	150	0	P	H
		4874	42.97	-31.03	74	61.98	32.66	6.99	58.66	150	0	P	V
		7311	49.15	-24.85	74	61.18	37.66	8.93	58.62	150	0	P	V
802.11g CH 11 2462MHz		4924	41.16	-32.84	74	59.92	32.76	7	58.52	150	360	P	H
		7386	48.24	-25.76	74	59.95	37.68	9.15	58.54	150	0	P	H
		4924	40.83	-33.17	74	59.59	32.76	7	58.52	150	0	P	V
		7386	49.11	-24.89	74	60.82	37.68	9.15	58.54	150	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)
		2389.905	53.78	-20.22	74	56.63	27.29	4.86	35	233	338	P	H
		2389.905	40.15	-13.85	54	43	27.29	4.86	35	233	338	A	H
802.11n	*	2412	86.39	-	-	89.18	27.33	4.88	35	233	338	P	H
HT20	*	2412	79.35	-	-	82.14	27.33	4.88	35	233	338	A	H
CH 01		2350.11	48.47	-25.53	74	51.51	27.19	4.82	35.05	174	26	P	V
2412MHz		2360.82	38.36	-15.64	54	41.37	27.22	4.82	35.05	174	26	A	V
	*	2412	78.27	-	-	81.06	27.33	4.88	35	174	26	P	V
	*	2412	70.41	-	-	73.2	27.33	4.88	35	174	26	A	V
		2384.9	49.36	-24.64	74	52.26	27.26	4.86	35.02	235	340	P	H
		2374.96	38.55	-15.45	54	41.45	27.26	4.86	35.02	235	340	A	H
	*	2437	85.34	-	-	88.03	27.4	4.88	34.97	235	340	P	H
	*	2437	78.49	-	-	81.18	27.4	4.88	34.97	235	340	A	H
802.11n		2499.44	48.78	-25.22	74	51.26	27.5	4.92	34.9	235	340	P	H
HT20		2485.3	38.93	-15.07	54	41.48	27.47	4.9	34.92	235	340	A	H
CH 06		2337.72	48.48	-25.52	74	51.54	27.19	4.82	35.07	175	9	P	V
2437MHz		2370.62	38.3	-15.7	54	41.2	27.26	4.86	35.02	175	9	A	V
	*	2437	80.4	-	-	83.09	27.4	4.88	34.97	175	9	P	V
	*	2437	73.74	-	-	76.43	27.4	4.88	34.97	175	9	A	V
		2499.23	48.65	-25.35	74	51.13	27.5	4.92	34.9	175	9	P	V
		2493.84	38.91	-15.09	54	41.39	27.5	4.92	34.9	175	9	A	V

802.11n HT20 CH 11 2462MHz	*	2462	85.71	-	-	88.33	27.43	4.9	34.95	247	334	P	H
	*	2462	78.89	-	-	81.51	27.43	4.9	34.95	247	334	A	H
		2483.76	51.91	-22.09	74	54.46	27.47	4.9	34.92	247	334	P	H
		2484.32	41.44	-12.56	54	43.99	27.47	4.9	34.92	247	334	A	H
	*	2462	80.07	-	-	82.69	27.43	4.9	34.95	162	21	P	V
	*	2462	72.48	-	-	75.1	27.43	4.9	34.95	162	21	A	V
		2498.56	48.73	-25.27	74	51.21	27.5	4.92	34.9	162	21	P	V
		2483.72	39.6	-14.4	54	42.15	27.47	4.9	34.92	162	21	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	46.47	-27.53	74	65.33	32.56	6.97	58.39	250	0	P	H
		4824	44.34	-29.66	74	63.2	32.56	6.97	58.39	250	0	P	V
802.11n HT20 CH 06 2437MHz		4874	43.54	-30.46	74	62.55	32.66	6.99	58.66	154	360	P	H
		7311	47.93	-26.07	74	59.96	37.66	8.93	58.62	150	0	P	H
		4874	42.09	-31.91	74	61.1	32.66	6.99	58.66	150	0	P	V
		7311	49.74	-24.26	74	61.77	37.66	8.93	58.62	150	0	P	V
802.11n HT20 CH 11 2462MHz		4924	42.81	-31.19	74	61.57	32.76	7	58.52	250	0	P	H
		7386	48.47	-25.53	74	60.18	37.68	9.15	58.54	150	0	P	H
		4924	41.98	-32.02	74	60.74	32.76	7	58.52	150	0	P	V
		7386	49.26	-24.74	74	60.97	37.68	9.15	58.54	150	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 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)
802.11n HT40 CH 03 2422MHz		2388.4	53.46	-20.54	74	56.33	27.29	4.86	35.02	201	13	P	H
		2387.98	42.04	-11.96	54	44.91	27.29	4.86	35.02	201	13	A	H
	*	2422	83.85	-	-	86.58	27.36	4.88	34.97	201	13	P	H
	*	2422	74.88	-	-	77.61	27.36	4.88	34.97	201	13	A	H
		2496.71	48.91	-25.09	74	51.39	27.5	4.92	34.9	201	13	P	H
		2487.82	39.44	-14.56	54	41.96	27.5	4.9	34.92	201	13	A	H
		2387.28	50.31	-23.69	74	53.18	27.29	4.86	35.02	150	284	P	V
		2387.98	39.89	-14.11	54	42.76	27.29	4.86	35.02	150	284	A	V
	*	2422	75.66	-	-	78.39	27.36	4.88	34.97	150	284	P	V
	*	2422	68.99	-	-	71.72	27.36	4.88	34.97	150	284	A	V
		2495.38	48.33	-25.67	74	50.81	27.5	4.92	34.9	150	284	P	V
		2493.28	39.62	-14.38	54	42.1	27.5	4.92	34.9	150	284	A	V
802.11n HT40 CH 06 2437MHz		2368.8	48.36	-25.64	74	51.26	27.26	4.86	35.02	250	340	P	H
		2389.94	39.24	-14.76	54	42.09	27.29	4.86	35	250	340	A	H
	*	2437	84.3	-	-	86.99	27.4	4.88	34.97	250	340	P	H
	*	2437	76.79	-	-	79.48	27.4	4.88	34.97	250	340	A	H
		2484.46	48.79	-25.21	74	51.34	27.47	4.9	34.92	250	340	P	H
		2487.96	39.59	-14.41	54	42.11	27.5	4.9	34.92	250	340	A	H
		2344.86	48.45	-25.55	74	51.49	27.19	4.82	35.05	177	360	P	V
		2388.82	39.16	-14.84	54	42.03	27.29	4.86	35.02	177	360	A	V
	*	2437	77.74	-	-	80.43	27.4	4.88	34.97	177	360	P	V
	*	2437	70.7	-	-	73.39	27.4	4.88	34.97	177	360	A	V
		2493.21	48.76	-25.24	74	51.24	27.5	4.92	34.9	177	360	P	V
		2499.51	39.59	-14.41	54	42.07	27.5	4.92	34.9	177	360	A	V

802.11n HT40 CH 09 2452MHz		2336.04	48.54	-25.46	74	51.6	27.19	4.82	35.07	246	338	P	H
		2346.54	39.29	-14.71	54	42.33	27.19	4.82	35.05	246	338	A	H
	*	2452	84.02	-	-	86.67	27.4	4.9	34.95	246	338	P	H
	*	2452	77.27	-	-	79.92	27.4	4.9	34.95	246	338	A	H
		2486.49	54.71	-19.29	74	57.26	27.47	4.9	34.92	246	338	P	H
		2484.46	41.35	-12.65	54	43.9	27.47	4.9	34.92	246	338	A	H
		2365.58	48.47	-25.53	74	51.45	27.22	4.82	35.02	179	58	P	V
		2374.82	39.23	-14.77	54	42.13	27.26	4.86	35.02	179	58	A	V
	*	2452	76.06	-	-	78.71	27.4	4.9	34.95	179	58	P	V
	*	2452	69.03	-	-	71.68	27.4	4.9	34.95	179	58	A	V
		2486.49	49.5	-24.5	74	52.05	27.47	4.9	34.92	179	58	P	V
		2483.5	39.9	-14.1	54	42.45	27.47	4.9	34.92	179	58	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4844	41.55	-32.45	74	60.47	32.59	6.97	58.48	250	0	P	H
HT40		7266	49.04	-24.96	74	60.96	37.66	8.95	58.53	150	0	P	H
CH 03		4844	41.17	-32.83	74	60.09	32.59	6.97	58.48	150	0	P	V
2422MHz		7266	48.91	-25.09	74	60.83	37.66	8.95	58.53	150	0	P	V
802.11n		4874	40.98	-33.02	74	59.99	32.66	6.99	58.66	250	0	P	H
HT40		7311	47.49	-26.51	74	59.52	37.66	8.93	58.62	150	0	P	H
CH 06		4874	41.13	-32.87	74	60.14	32.66	6.99	58.66	150	0	P	V
2437MHz		7311	48.88	-25.12	74	60.91	37.66	8.93	58.62	150	0	P	V
802.11n		4904	40.44	-33.56	74	59.35	32.73	7	58.64	250	0	P	H
HT40		7356	47.65	-26.35	74	59.51	37.67	9.04	58.57	150	0	P	H
CH 09		4904	41.36	-32.64	74	60.27	32.73	7	58.64	150	0	P	V
2452MHz		7356	48.38	-25.62	74	60.24	37.67	9.04	58.57	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT40 LF		30	27.87	-12.13	40	32.05	26.6	1	31.78	167	231	P	H
		152.22	27.67	-15.83	43.5	40.04	17.51	1.53	31.41	-	-	P	H
		182.29	25.26	-18.24	43.5	38.89	16.11	1.57	31.31	-	-	P	H
		392.78	24.82	-21.18	46	31.23	22.72	2.12	31.25	-	-	P	H
		443.22	25.56	-20.44	46	30.23	24.31	2.22	31.2	-	-	P	H
		847.71	32.09	-13.91	46	32.29	28.07	2.99	31.26	-	-	P	H
		30	32.01	-7.99	40	36.19	26.6	1	31.78	100	319	P	V
		165.8	24.71	-18.79	43.5	37.66	16.88	1.53	31.36	-	-	P	V
		299.66	22.07	-23.93	46	32.96	18.5	1.94	31.33	-	-	P	V
		471.35	27.83	-18.17	46	33	23.7	2.31	31.18	-	-	P	V
		741.98	31.19	-14.81	46	32.65	26.92	2.85	31.23	-	-	P	V
		948.59	32.21	-13.79	46	31.44	28.89	3.15	31.27	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

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

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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

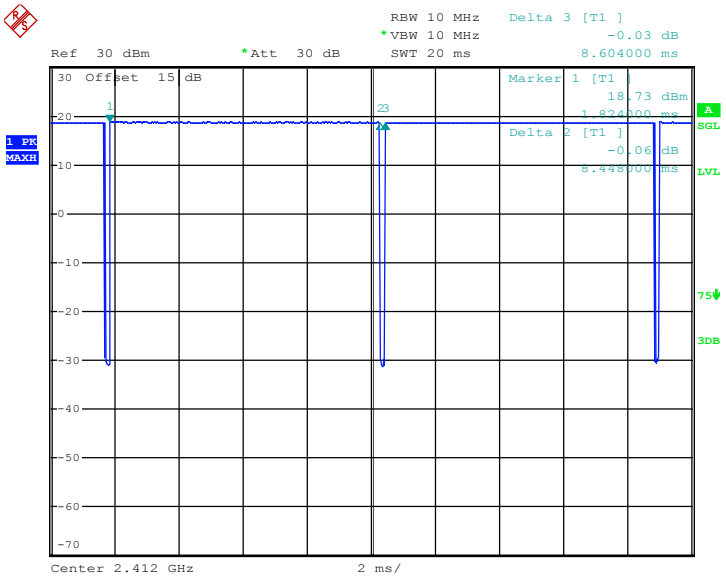
= -10.46(dB)

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

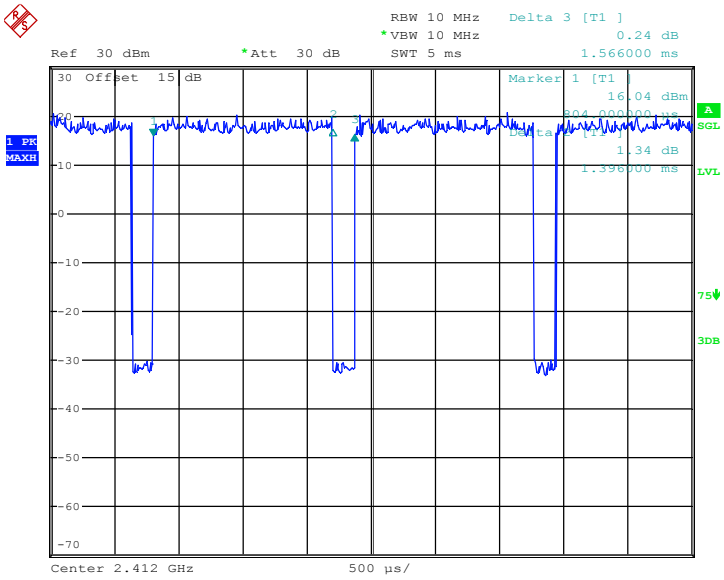
Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11b	98.19	-	-	10Hz
1	802.11g	89.14	1.396	0.716	1KHz
1	802.11n HT20	88.48	1.306	0.77	1KHz
1	802.11n HT40	79.32	0.652	1.532	3KHz

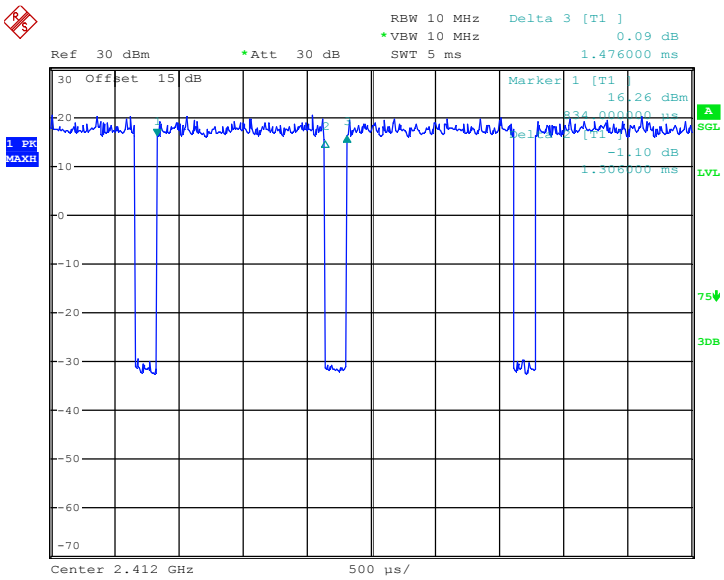
802.11b



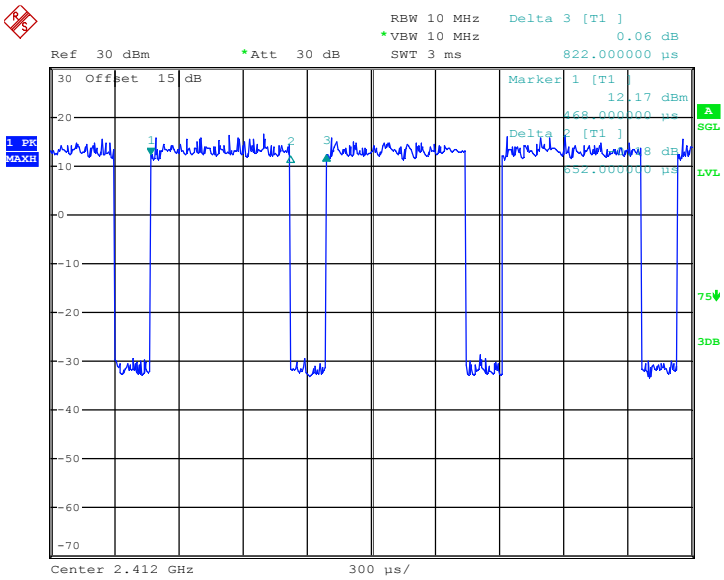
802.11g



802.11n20



802.11n40


RBW 10 MHz
*VBW 10 MHz
SWT 3 ms
Delta 3 [T1]
0.06 dB
822.000000 µs
Ref 30 dBm
*Att 30 dB
30 Offset 15 dB
Marker 1 [T1]
12.17 dBm
868.000000 µs
Delta 2 [T1]
852.000000 µs
1 PK MAXH
A SGL
LVL
75Ω
3DB
Center 2.412 GHz
300 µs/