FCC RF Test Report

APPLICANT	:	**Brightstar Corporation**
EQUIPMENT	:	**Mobile phone**
BRAND NAME	:	**Avvio**
MODEL NAME	:	**Avvio L600**
FCC ID	:	**WVBAL600X**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**

The product was received on Feb. 05, 2015 and testing was completed on Mar. 12, 2015. 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.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
2353

SPORTON INTERNATIONAL (SHENZHEN) INC.
1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR520505C	Rev. 01	Initial issue of report	Mar. 31, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 12.02 dB at 2483.720 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 3.94 dB at 0.430 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 L600
FCC ID	WVBAL600X
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth v3.0+ EDR/ Bluetooth v4.0 LE
HW Version	M316B
SW Version	AVVIO_L600_V1_0_1
EUT Stage	Pre-Production

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 subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 17.30 dBm (0.0537 W) 802.11g : 21.29 dBm (0.1346 W) 802.11n HT20 : 20.31 dBm (0.1074 W) 802.11n HT40 : 21.33 dBm (0.1358 W)
Antenna Type	802.11b/g/n : Internal Antenna with gain -1 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.**
	03CH01-SZ	831040

Note: The test site complies with ANSI C63.4 2009 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 v03r02
- 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. FCC permits the use of the 1.5 meter table as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. 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 (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

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 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

2.4GHz 802.11b RF Output Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412 MHz	15.69	CH 06	17.04	17.22	17.28
CH 06	2437 MHz	**17.30**				
CH 11	2462 MHz	17.08				

2.4GHz 802.11g RF Output Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412 MHz	18.78	CH 06	21.26	21.25	21.18	21.15	21.18	21.15	21.21
CH 06	2437 MHz	**21.29**								
CH 11	2462 MHz	20.54								

2.4GHz 802.11n HT20 RF Output Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412 MHz	18.89	CH 06	19.78	19.89	20.12	19.92	20.28	20.26	20.25
CH 06	2437 MHz	**20.31**								
CH 11	2462 MHz	20.12								

2.4GHz 802.11n HT40 RF Output Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422 MHz	19.75	CH 06	20.22	20.27	20.35	20.57	21.25	21.28	21.26
CH 06	2437 MHz	**21.33**								
CH 09	2452 MHz	20.04								

2.3 Test Mode

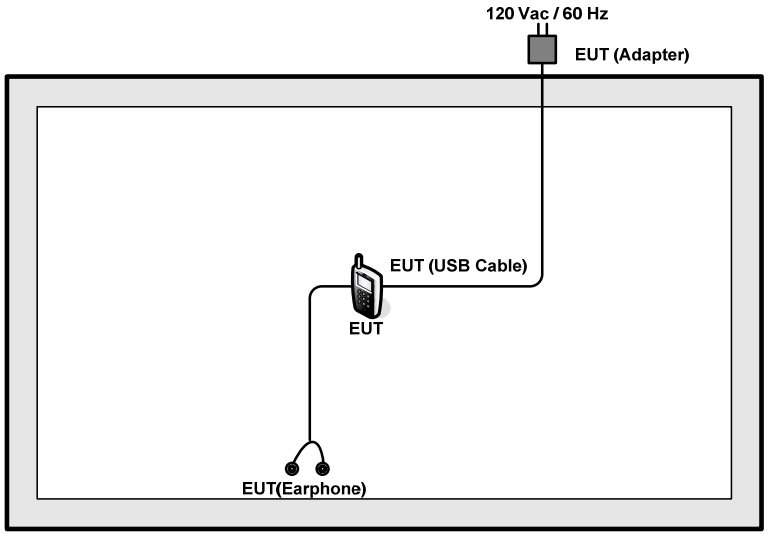
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

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

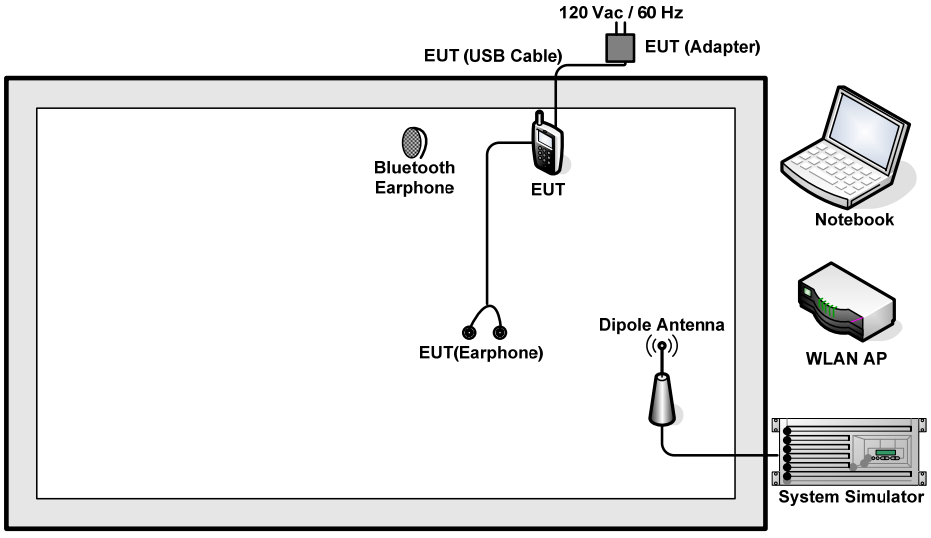
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone
Remark: For radiated test cases, the tests were performance with adapter, earphone and USB cable.	

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 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	CMW 500	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-815	KA2IR815A1	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-108	PYAHS-107W	N/A	N/A
5.	SD Card	SanDisk	4G Class 4	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

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

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

2.7 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 dB and 10dB attenuator.

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

= 5 + 10 = 15 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

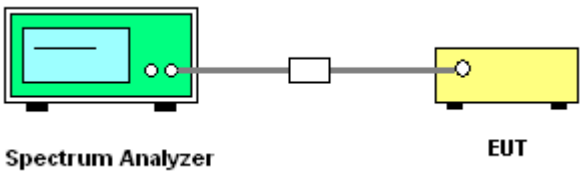
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

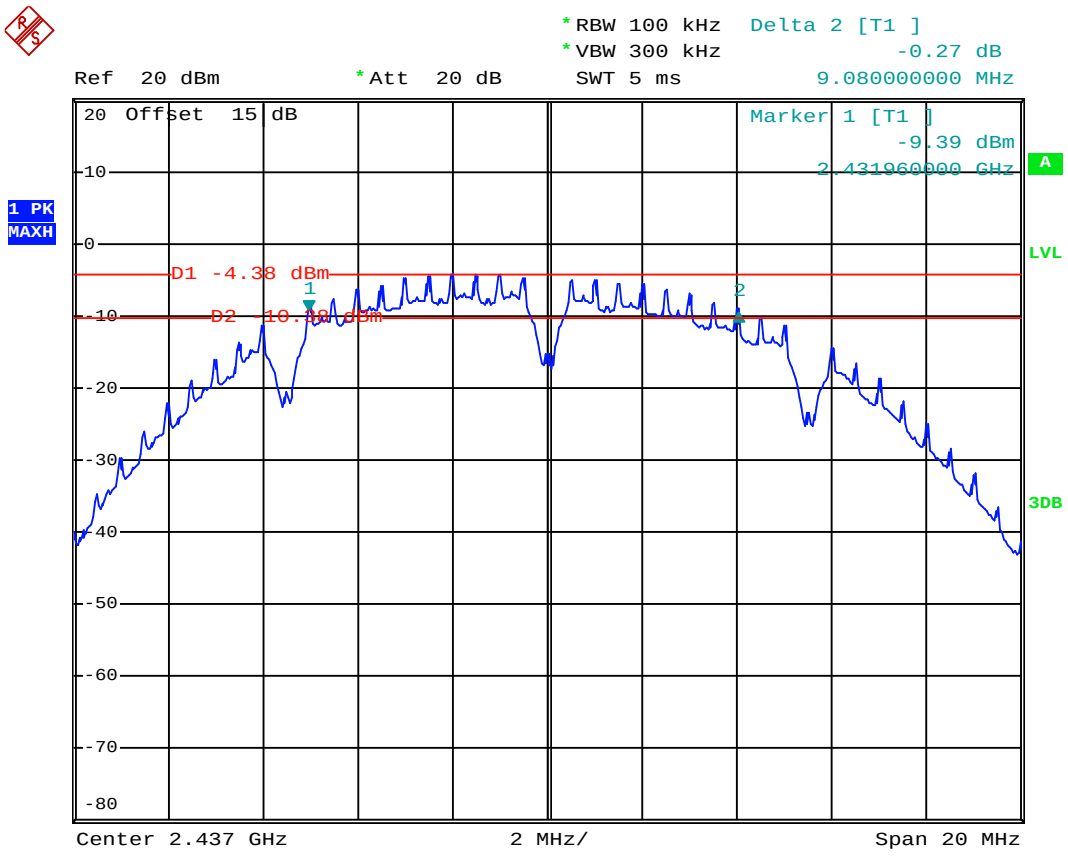
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A of this test report.

Minimum 6dB Bandwidth



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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

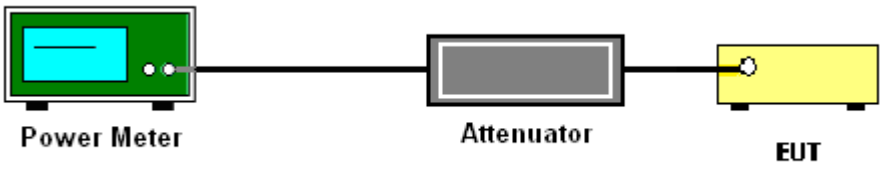
3.2.2 Measuring Instruments

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 v03r02.
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

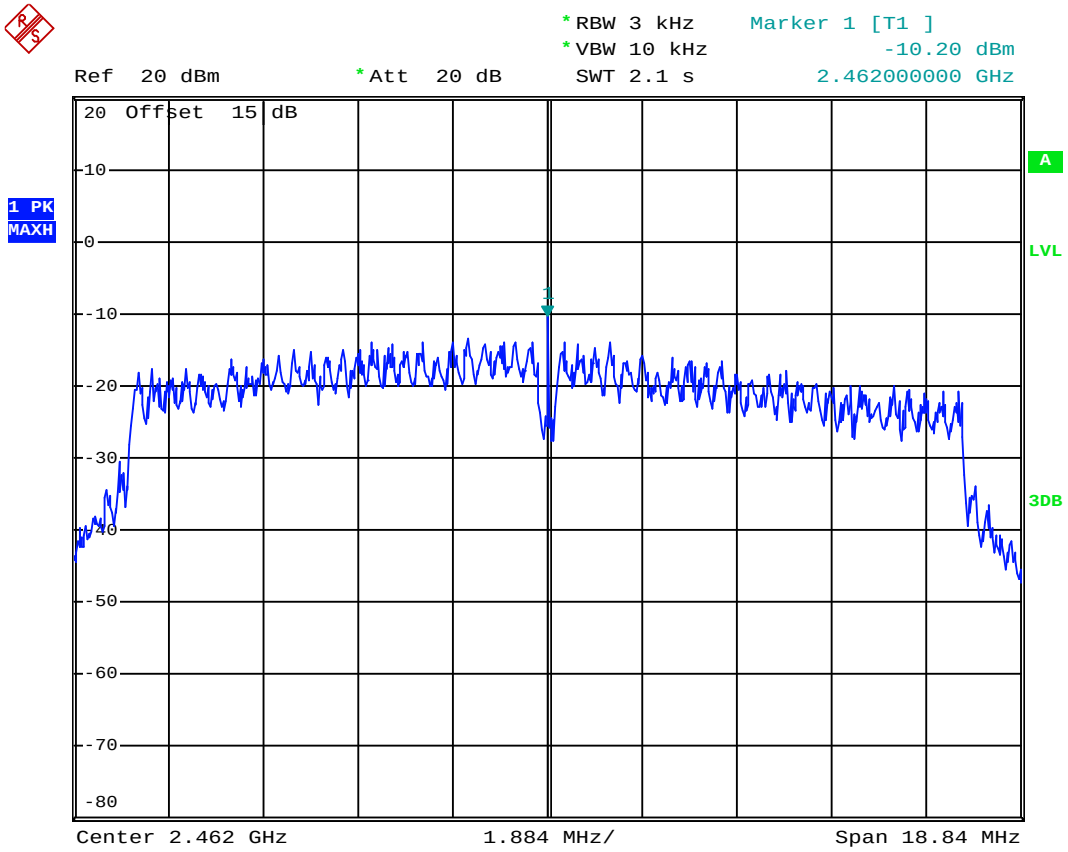
1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r02
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum 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)



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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).

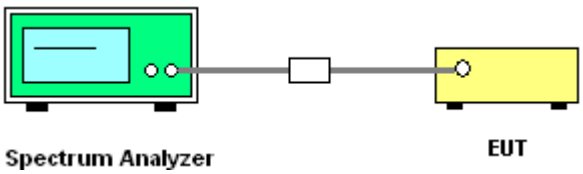
3.4.2 Measuring Instruments

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 v03r02.
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

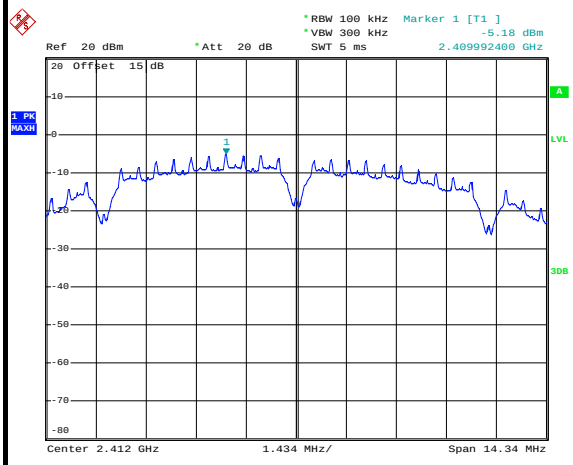


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

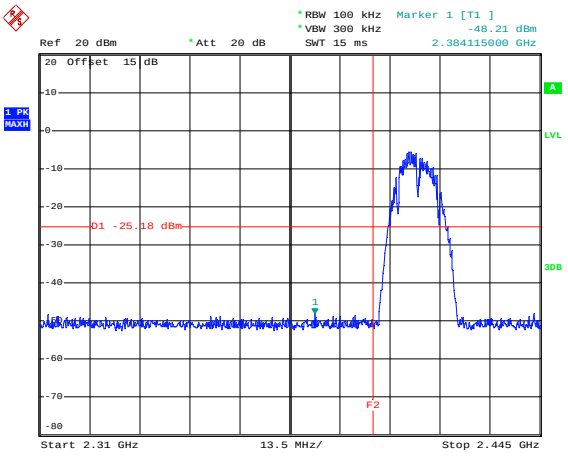
WLAN 802.11b Channel 01

100kHz PSD reference Level



Date: 11.MAR.2015 18:57:21

Low Channel Plot



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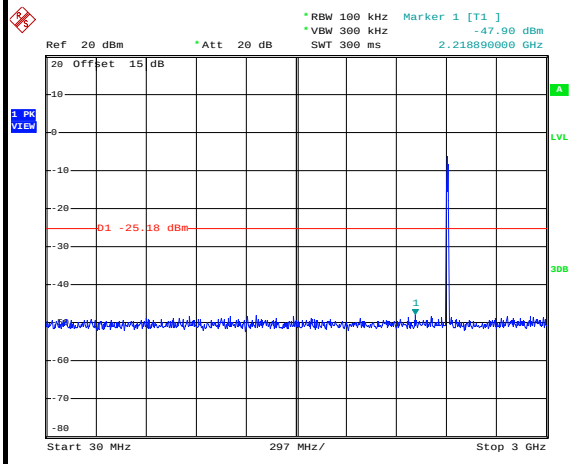
Spurious Emission 30MHz~3GHz



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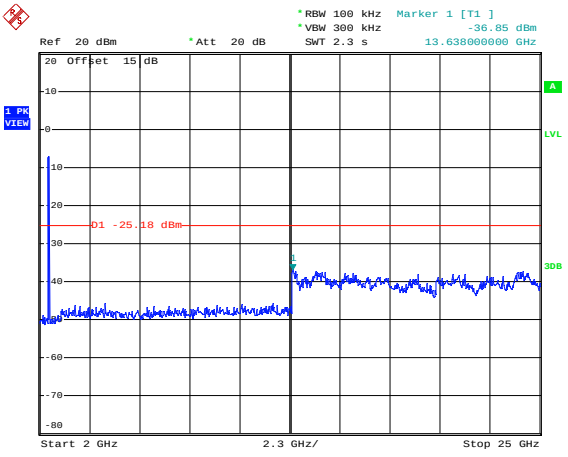
Spurious Emission 2GHz~25GHz

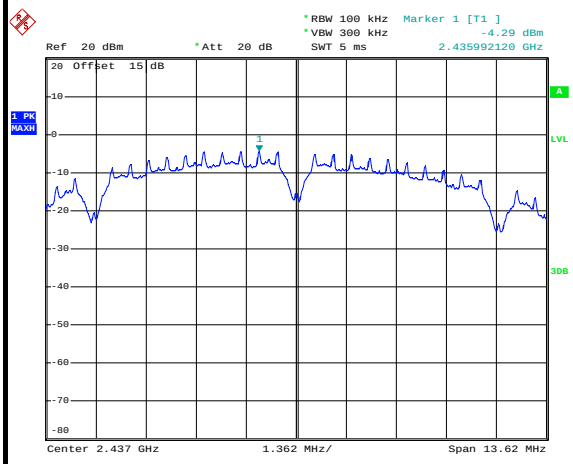


Date: 11.MAR.2015 18:58:19

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

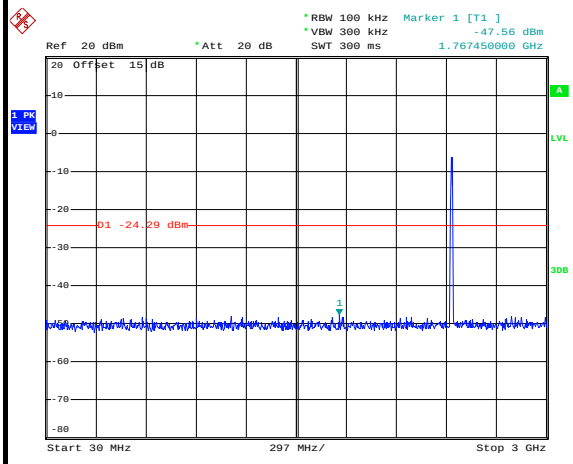
WLAN 802.11b Channel 06

100kHz PSD reference Level



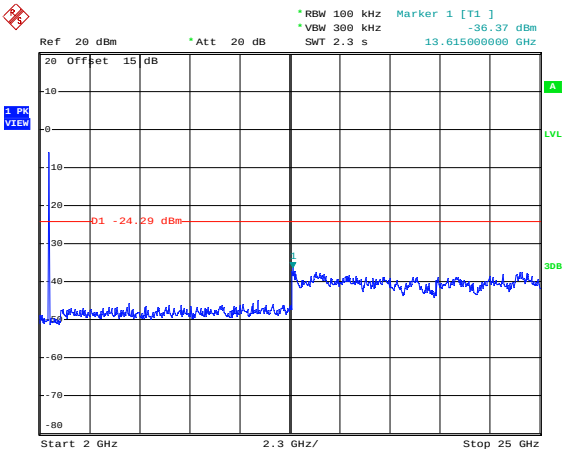
Date: 11.MAR.2015 19:02:03

Spurious Emission 30MHz~3GHz



Date: 11.MAR.2015 19:02:33

Spurious Emission 2GHz~25GHz

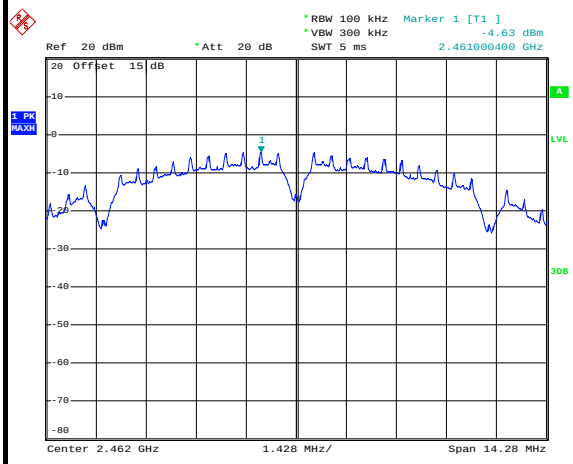


Date: 11.MAR.2015 19:02:50

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

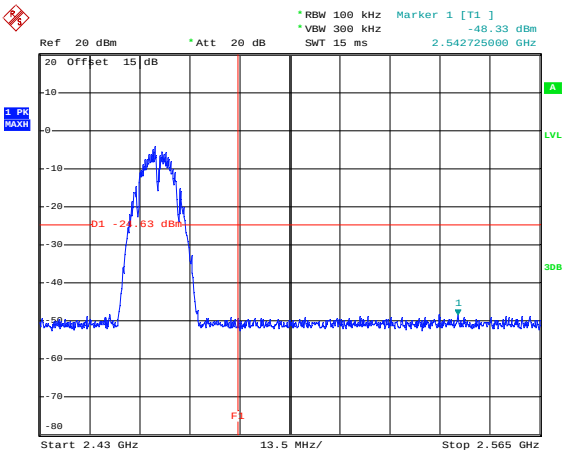
WLAN 802.11b Channel 11

100kHz PSD reference Level



Date: 11.MAR.2015 19:06:07

High Channel Plot



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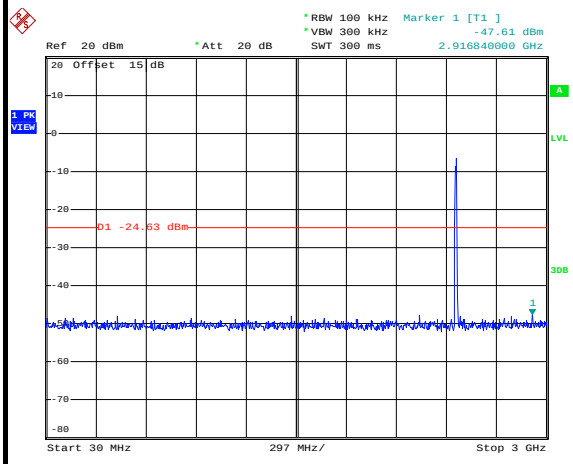
Spurious Emission 30MHz~3GHz



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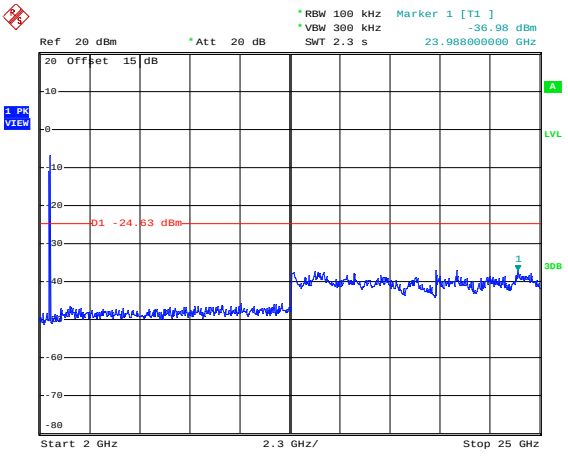
Spurious Emission 2GHz~25GHz

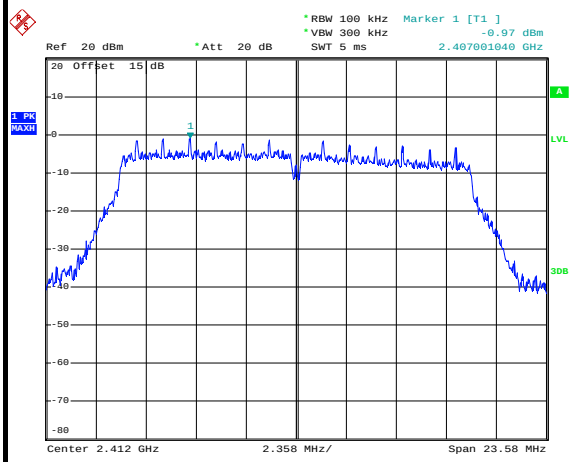


Date: 11.MAR.2015 19:07:15

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

WLAN 802.11g Channel 01

100kHz PSD reference Level



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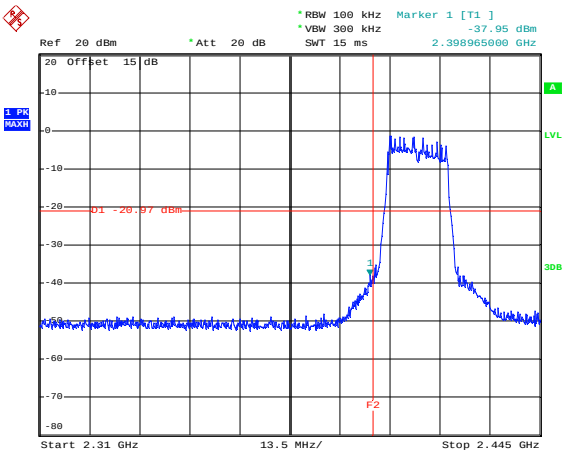
Low Channel Plot



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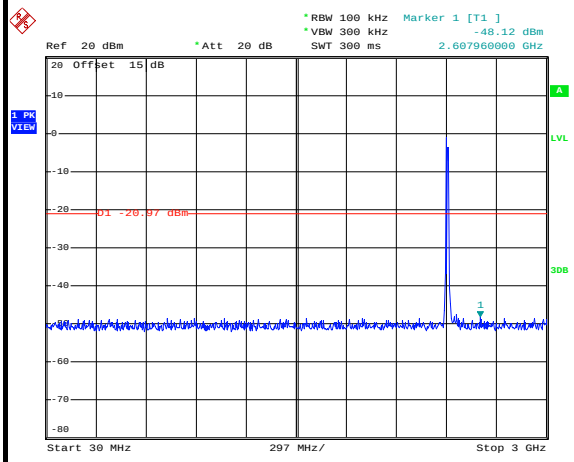
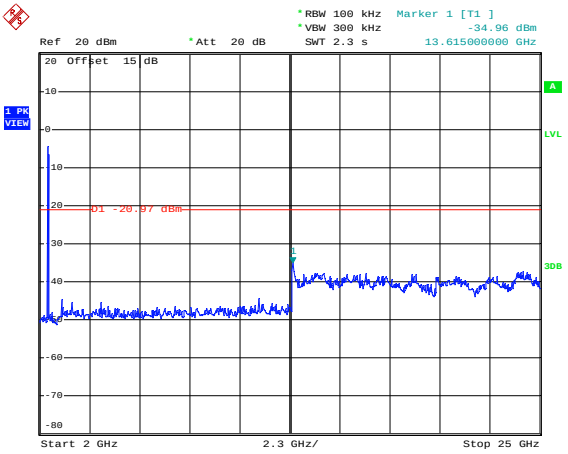
Spurious Emission 30MHz~3GHz



Date: 11.FEB.2015 22:44:48

Spurious Emission 2GHz~25GHz

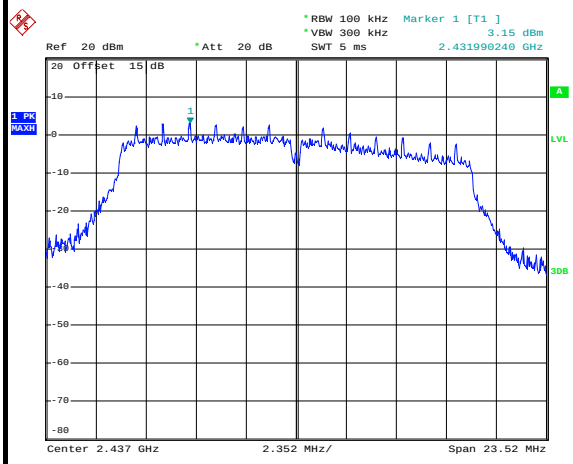


Date: 11.FEB.2015 22:45:05

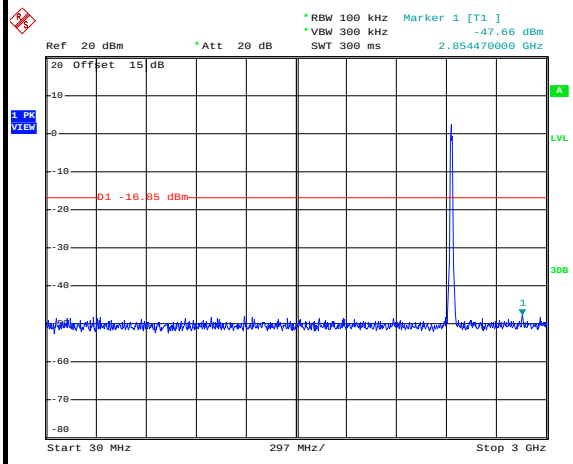
Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Mygai Cai

WLAN 802.11g Channel 06

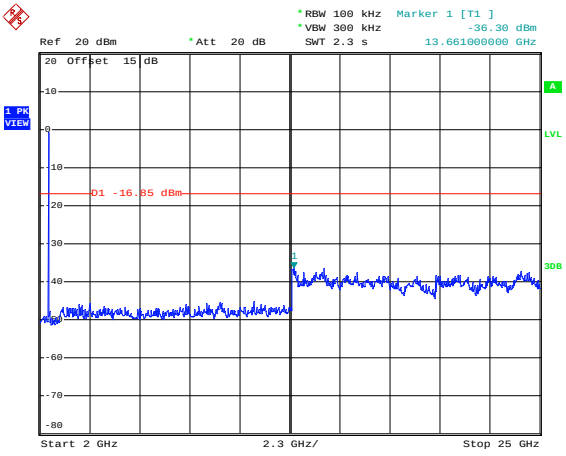
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



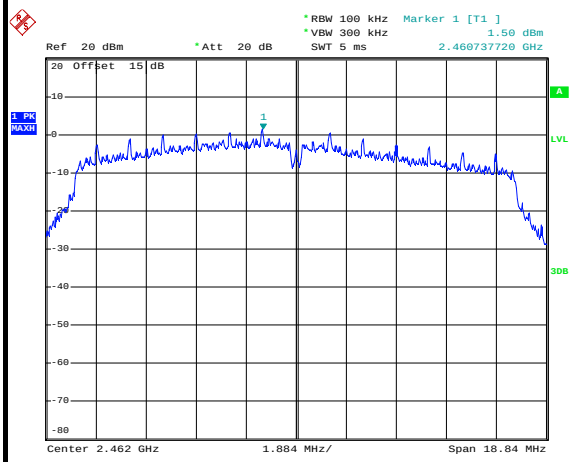
Spurious Emission 2GHz~25GHz



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

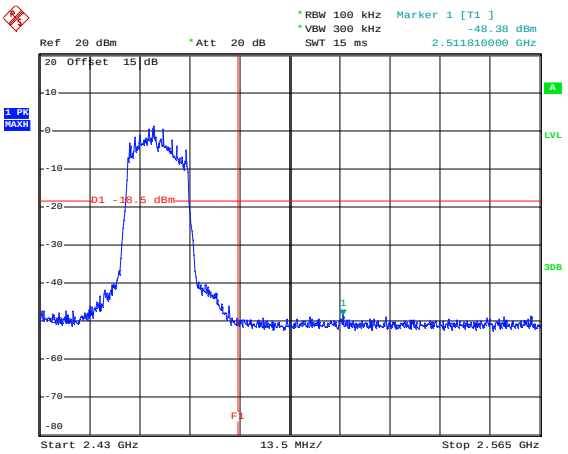
WLAN 802.11g Channel 11

100kHz PSD reference Level



Date: 11.FEB.2015 23:01:36

High Channel Plot



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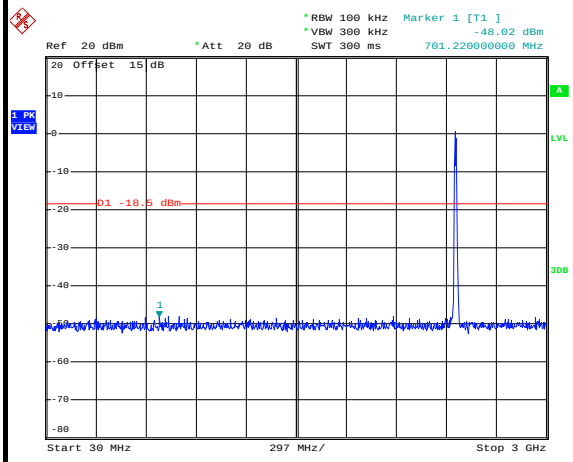
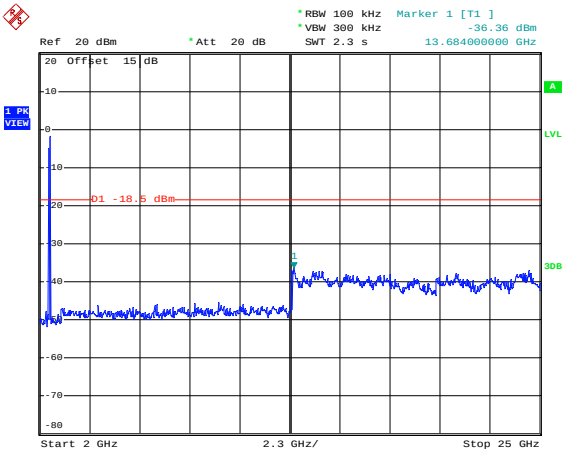
Spurious Emission 30MHz~3GHz



Date: 11.FEB.2015 23:06:38

Spurious Emission 2GHz~25GHz

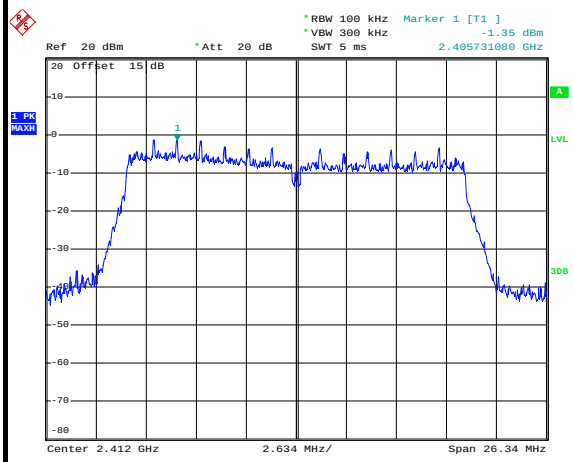


Date: 11.FEB.2015 23:06:56

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Mygai Cai

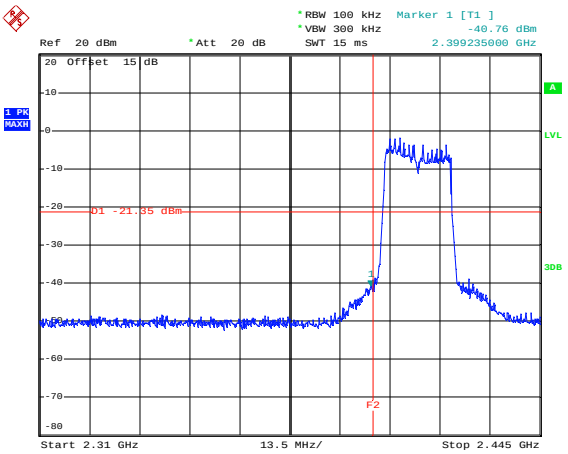
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



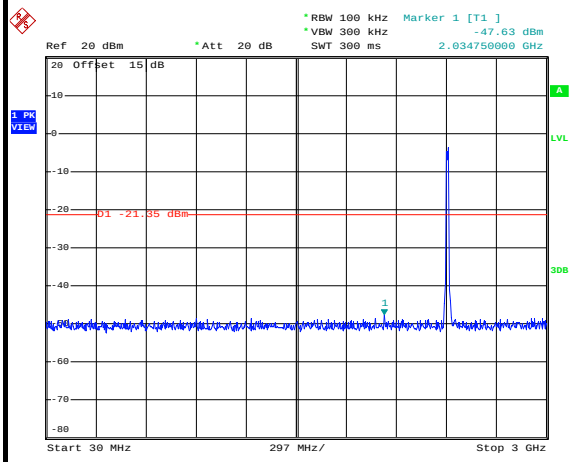
Date: 11.FEB.2015 23:35:35

Low Channel Plot



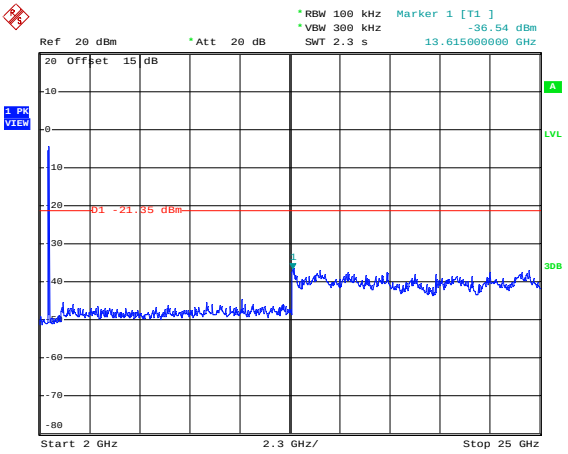
Date: 11.FEB.2015 23:46:43

Spurious Emission 30MHz~3GHz



Date: 11.FEB.2015 23:36:36

Spurious Emission 2GHz~25GHz

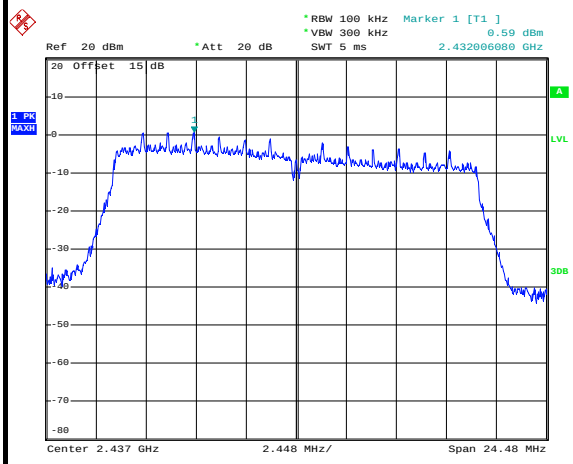


Date: 11.FEB.2015 23:36:53

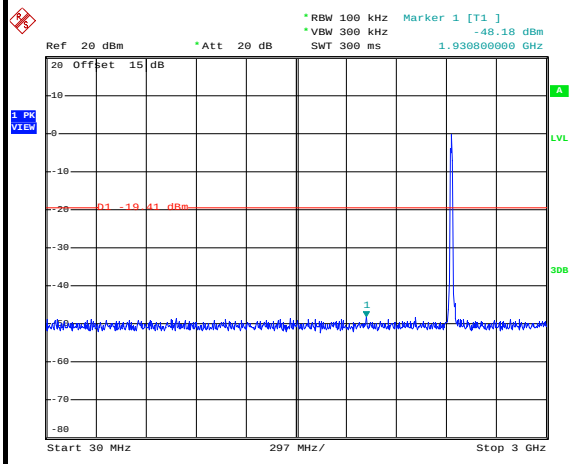
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Mygai Cai

WLAN 802.11n HT20 Channel 06

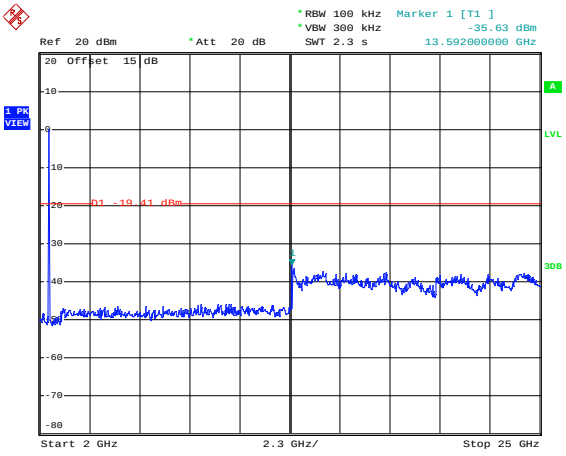
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



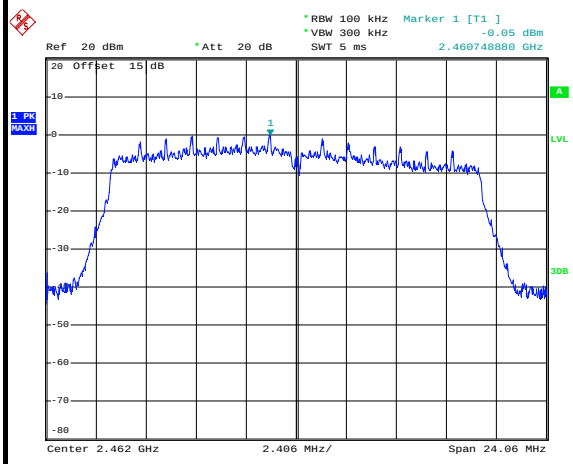
Spurious Emission 2GHz~25GHz



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

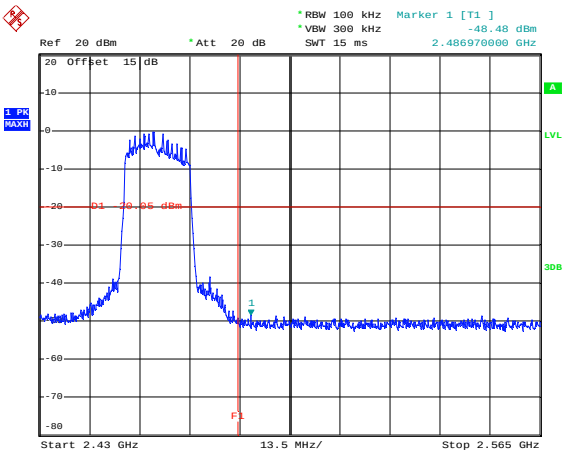
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



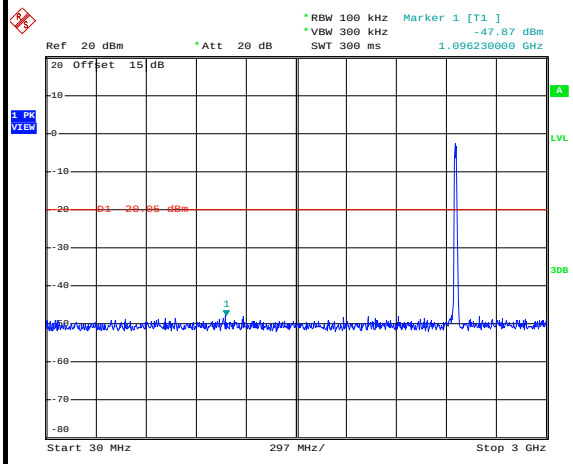
Date: 12.FEB.2015 00:06:02

High Channel Plot



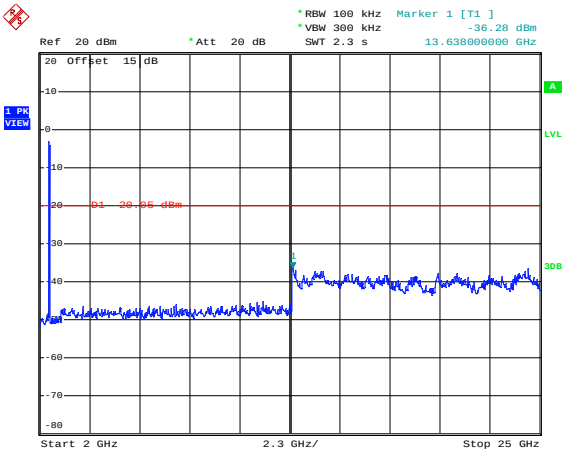
Date: 12.FEB.2015 00:08:43

Spurious Emission 30MHz~3GHz



Date: 12.FEB.2015 00:11:57

Spurious Emission 2GHz~25GHz

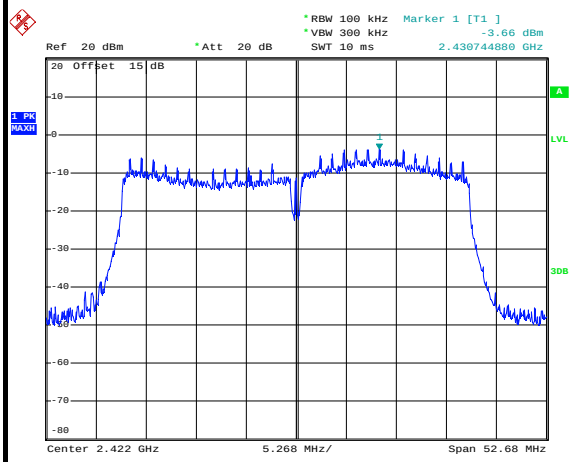


Date: 12.FEB.2015 00:12:14

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

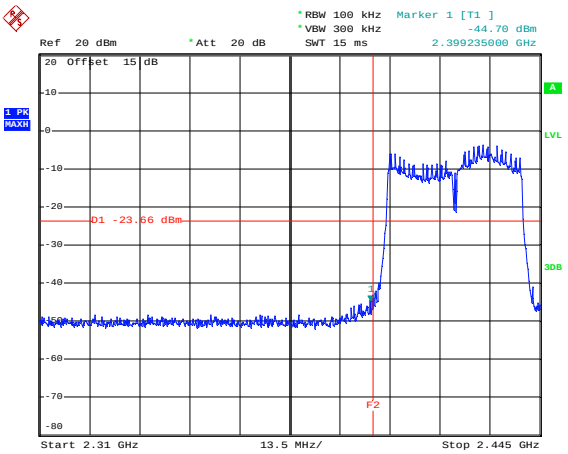
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



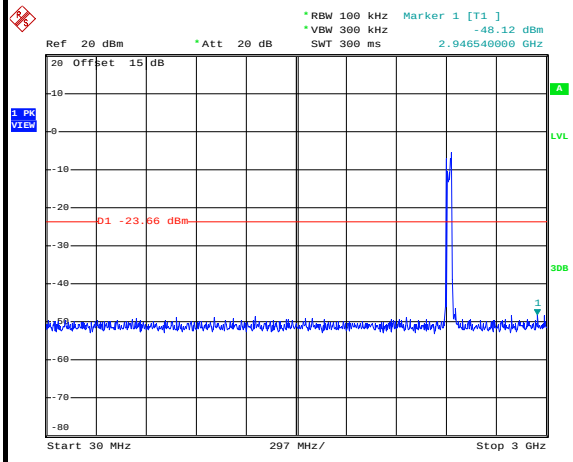
Date: 12.FEB.2015 00:19:14

Low Channel Plot



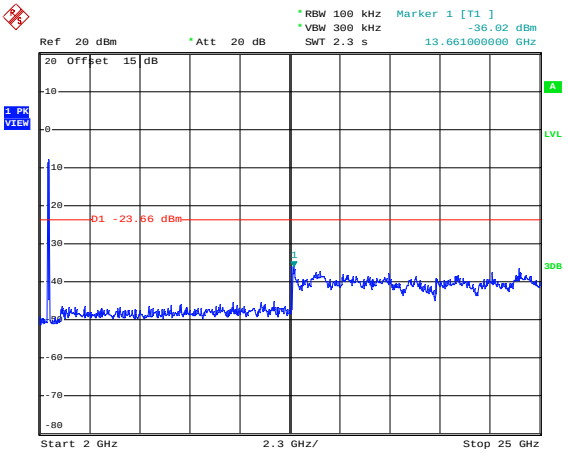
Date: 12.FEB.2015 00:23:13

Spurious Emission 30MHz~3GHz



Date: 12.FEB.2015 00:24:34

Spurious Emission 2GHz~25GHz

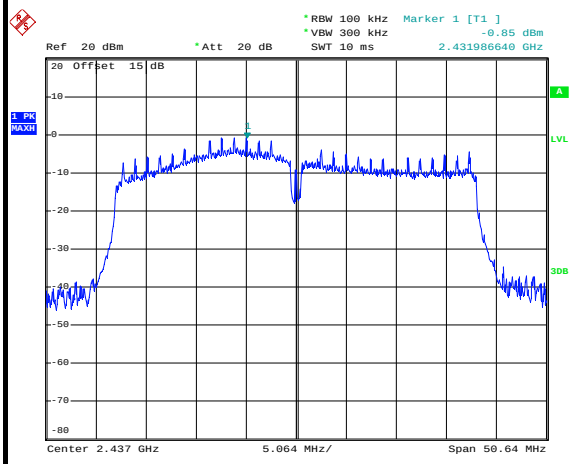


Date: 12.FEB.2015 00:23:53

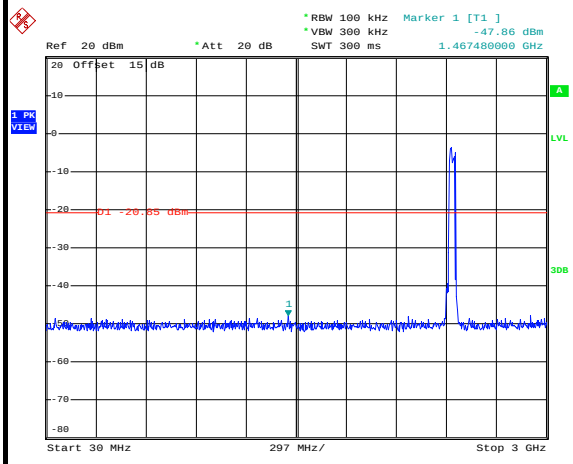
Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Mygai Cai

WLAN 802.11n HT40 Channel 06

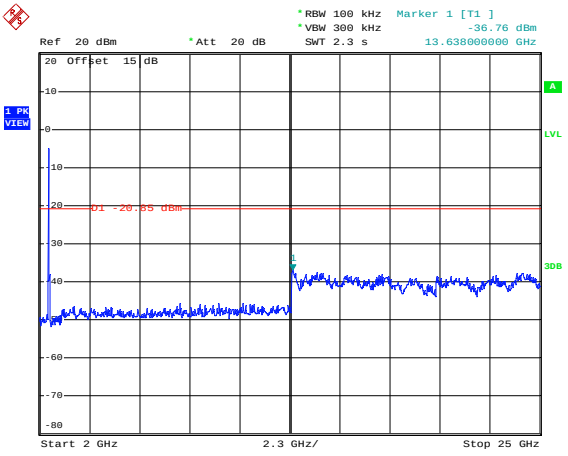
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



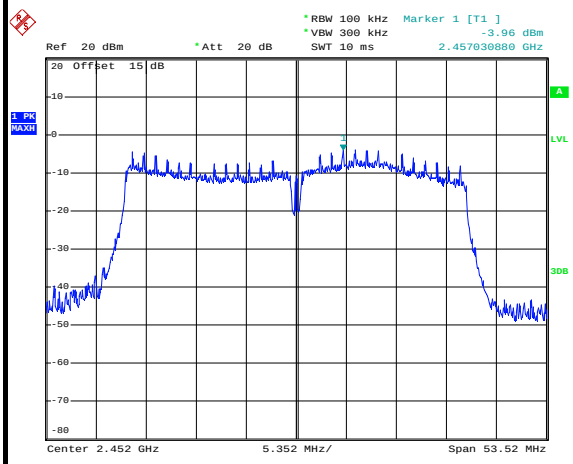
Spurious Emission 2GHz~25GHz



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

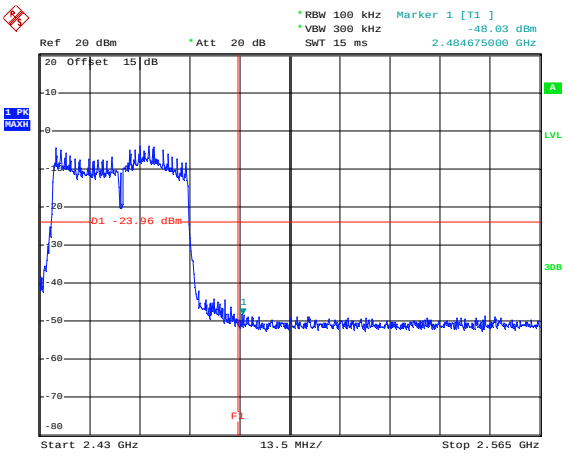
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



Date: 12.FEB.2015 00:32:09

High Channel Plot



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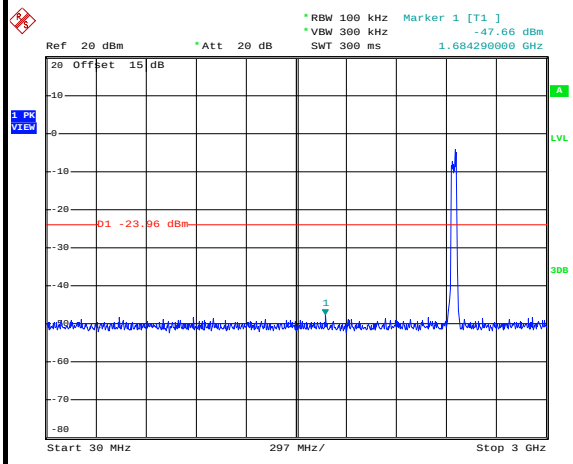
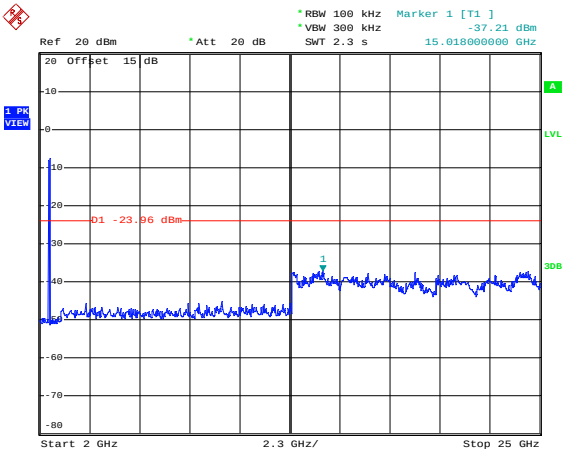
Spurious Emission 30MHz~3GHz



Date: 12.FEB.2015 00:33:23

Spurious Emission 2GHz~25GHz



Date: 12.FEB.2015 00:33:41

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.

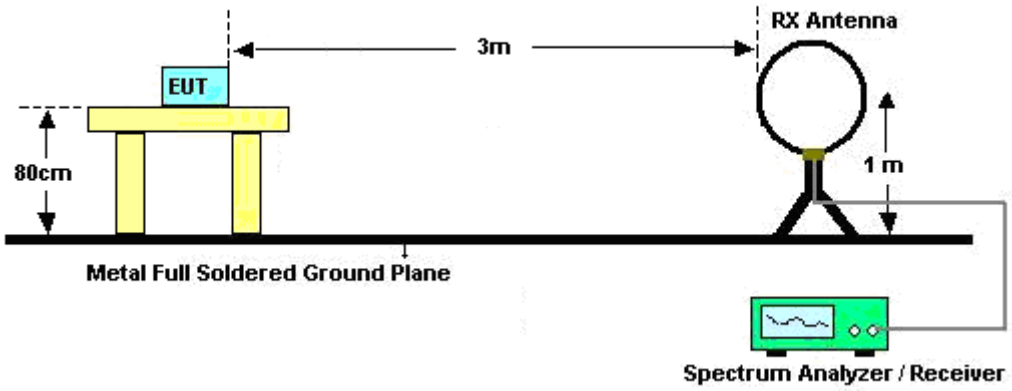
3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r02.
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.

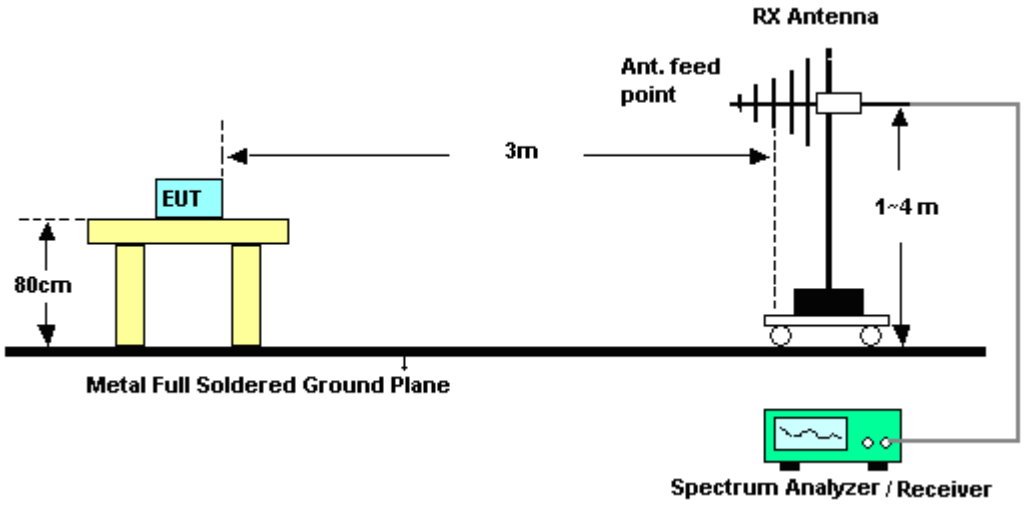
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.674	8.4	0.119	300Hz
802.11g	89.313	1.404	0.712	1kHz
2.4GHz 802.11n HT20	88.500	1.316	0.760	1kHz
2.4GHz 802.11n HT40	80.049	0.658	1.520	3kHz

3.5.4 Test Setup

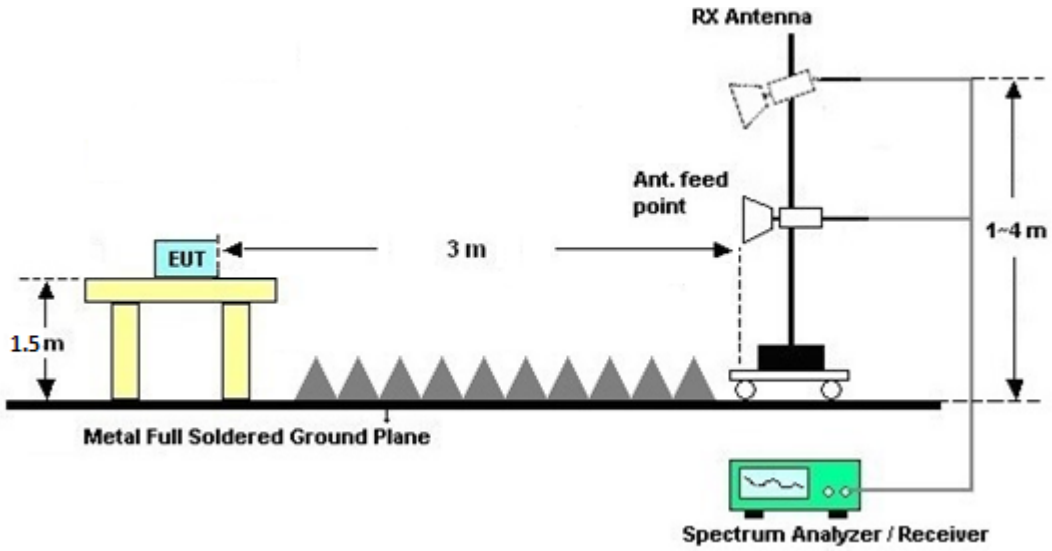
For radiated emissions below 30MHz



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 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.

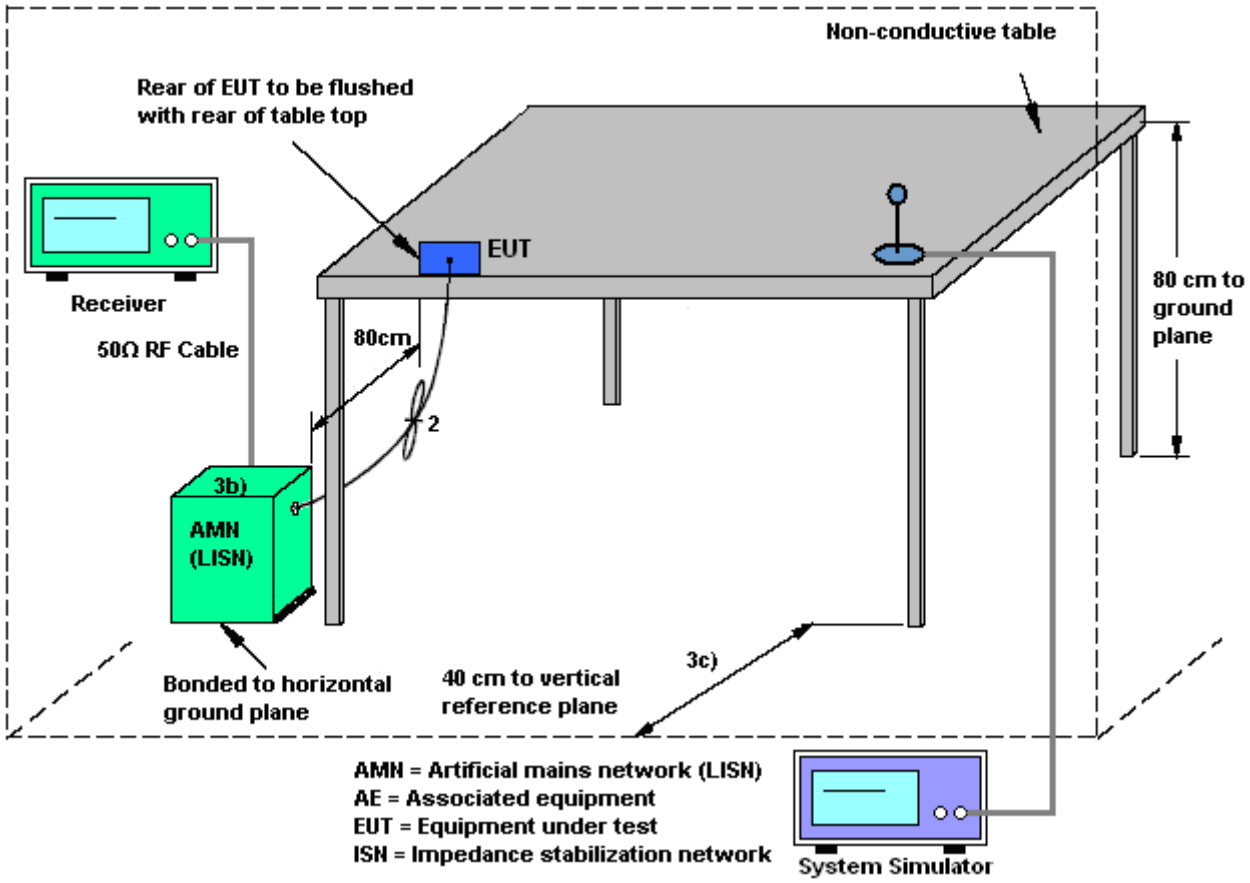
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

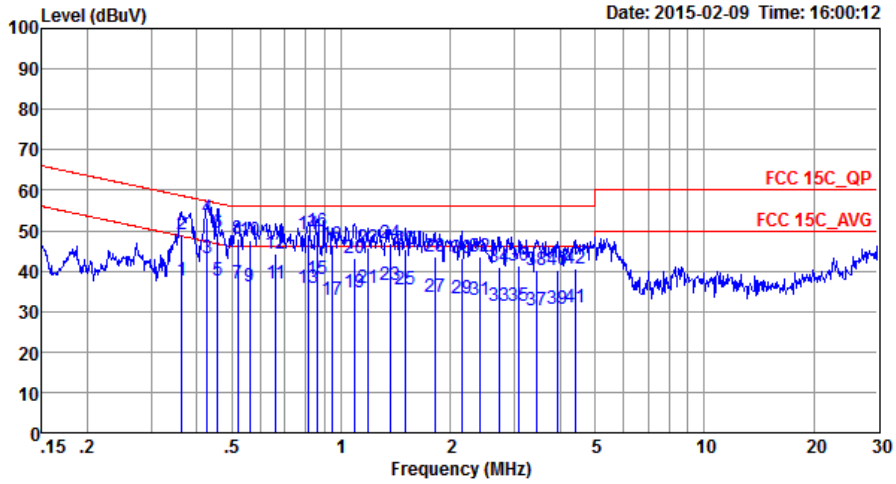
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other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

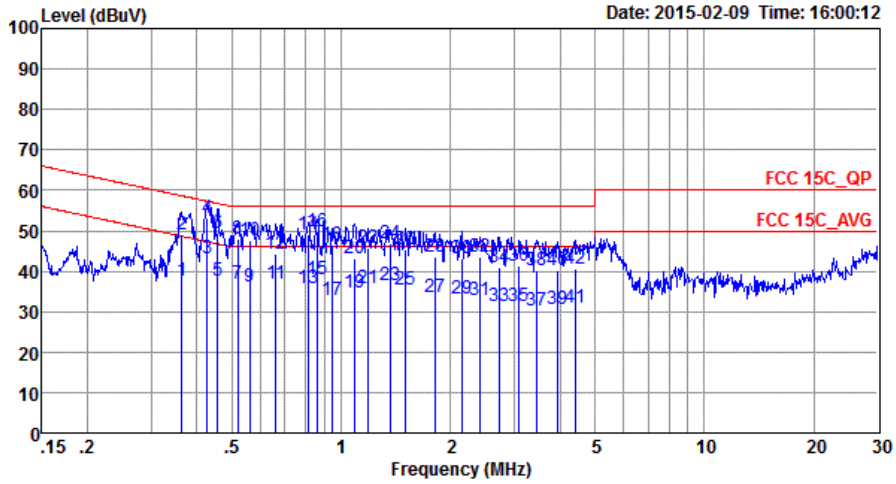
Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Ji Huang	Relative Humidity :	42~43%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_L_20140304 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.36	37.65	-11.00	48.65	27.20	0.27	10.18	Average
2		0.36	49.05	-9.60	58.65	38.60	0.27	10.18	QP
3	*	0.43	43.35	-3.94	47.29	32.90	0.29	10.16	Average
4		0.43	53.25	-4.04	57.29	42.80	0.29	10.16	QP
5		0.46	37.65	-9.11	46.76	27.20	0.29	10.16	Average
6		0.46	49.35	-7.41	56.76	38.90	0.29	10.16	QP
7		0.52	36.74	-9.26	46.00	26.29	0.29	10.16	Average
8		0.52	47.84	-8.16	56.00	37.39	0.29	10.16	QP
9		0.56	36.01	-9.99	46.00	25.60	0.26	10.15	Average
10		0.56	47.71	-8.29	56.00	37.30	0.26	10.15	QP
11		0.66	36.75	-9.25	46.00	26.40	0.20	10.15	Average
12		0.66	44.25	-11.75	56.00	33.90	0.20	10.15	QP
13		0.81	35.86	-10.14	46.00	25.50	0.21	10.15	Average
14		0.81	49.16	-6.84	56.00	38.80	0.21	10.15	QP
15		0.86	38.08	-7.92	46.00	27.70	0.23	10.15	Average
16		0.86	49.68	-6.32	56.00	39.30	0.23	10.15	QP
17		0.94	32.90	-13.10	46.00	22.50	0.25	10.15	Average
18		0.94	46.50	-9.50	56.00	36.10	0.25	10.15	QP
19		1.09	34.81	-11.19	46.00	24.40	0.26	10.15	Average
20		1.09	43.21	-12.79	56.00	32.80	0.26	10.15	QP

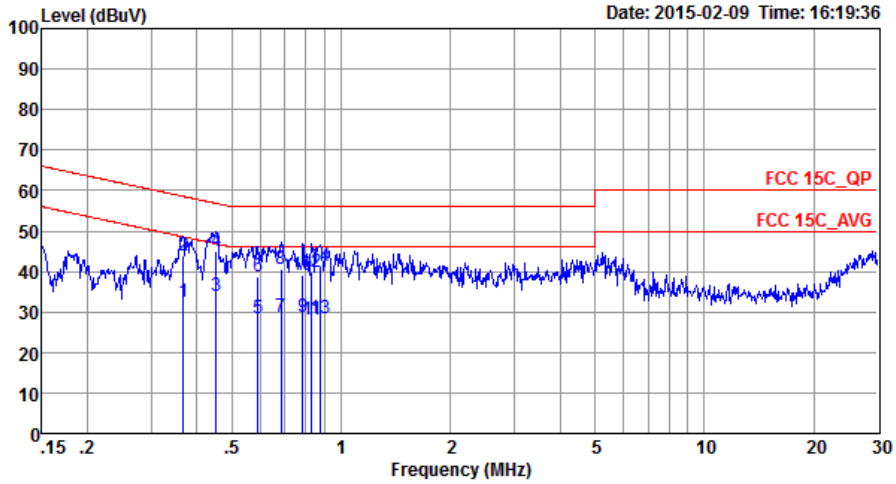
Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Ji Huang	Relative Humidity :	42~43%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_L_20140304 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
21	1.18	35.91	-10.09	46.00	25.50	0.25	10.16	Average
22	1.18	45.81	-10.19	56.00	35.40	0.25	10.16	QP
23	1.37	36.71	-9.29	46.00	26.30	0.24	10.17	Average
24	1.37	47.01	-8.99	56.00	36.60	0.24	10.17	QP
25	1.50	35.41	-10.59	46.00	25.00	0.24	10.17	Average
26	1.50	45.21	-10.79	56.00	34.80	0.24	10.17	QP
27	1.81	33.51	-12.49	46.00	23.10	0.23	10.18	Average
28	1.81	43.61	-12.39	56.00	33.20	0.23	10.18	QP
29	2.14	33.13	-12.87	46.00	22.70	0.24	10.19	Average
30	2.14	43.03	-12.97	56.00	32.60	0.24	10.19	QP
31	2.41	32.86	-13.14	46.00	22.40	0.26	10.20	Average
32	2.41	43.36	-12.64	56.00	32.90	0.26	10.20	QP
33	2.74	31.20	-14.80	46.00	20.70	0.29	10.21	Average
34	2.74	41.00	-15.00	56.00	30.50	0.29	10.21	QP
35	3.09	31.33	-14.67	46.00	20.80	0.32	10.21	Average
36	3.09	41.43	-14.57	56.00	30.90	0.32	10.21	QP
37	3.45	30.16	-15.84	46.00	19.60	0.34	10.22	Average
38	3.45	40.26	-15.74	56.00	29.70	0.34	10.22	QP
39	3.94	30.50	-15.50	46.00	19.90	0.37	10.23	Average
40	3.94	40.20	-15.80	56.00	29.60	0.37	10.23	QP
41	4.41	30.93	-15.07	46.00	20.31	0.39	10.23	Average
42	4.41	40.43	-15.57	56.00	29.81	0.39	10.23	QP

Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Ji Huang	Relative Humidity :	42~43%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_N_20140304 NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.37	32.36	-16.20	48.56	21.80	0.38	10.18	Average
2		0.37	43.96	-14.60	58.56	33.40	0.38	10.18	QP
3		0.45	33.86	-12.99	46.85	23.30	0.40	10.16	Average
4	*	0.45	44.86	-11.99	56.85	34.30	0.40	10.16	QP
5		0.59	28.38	-17.62	46.00	17.90	0.33	10.15	Average
6		0.59	38.58	-17.42	56.00	28.10	0.33	10.15	QP
7		0.68	28.61	-17.39	46.00	18.20	0.26	10.15	Average
8		0.68	40.51	-15.49	56.00	30.10	0.26	10.15	QP
9		0.78	28.83	-17.17	46.00	18.40	0.28	10.15	Average
10		0.78	39.23	-16.77	56.00	28.80	0.28	10.15	QP
11		0.83	27.94	-18.06	46.00	17.50	0.29	10.15	Average
12		0.83	39.84	-16.16	56.00	29.40	0.29	10.15	QP
13		0.88	28.25	-17.75	46.00	17.80	0.30	10.15	Average
14		0.88	41.45	-14.55	56.00	31.00	0.30	10.15	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	FSP30	101400	9kHz~30GHz	Jan. 28, 2015	Feb. 11, 2015~ Mar. 11, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	10Hz~40GHz	Jan. 28, 2015	Feb. 11, 2015~ Mar. 11, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Power Sensor	Anritsu	MA2411B	1207253	0.3GHz~40GHz	Jan. 28, 2015	Feb. 11, 2015~ Mar. 11, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
EMI TEST Receiver	R&S	ESCI7	100768	9kHz~3GHz	May 04, 2014	Mar. 12, 2015	May 03, 2015	Radiation (03CH01-SZ)
Spectrum Analyzer	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2014	Mar. 12, 2015	May 25, 2015	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 09, 2014	Mar. 12, 2015	May 08, 2015	Radiation (03CH01-SZ)
Bilog Antenna	TESEQ	CBL 6112D	37877	30MHz~2GHz	Oct. 15, 2014	Mar. 12, 2015	Oct. 14, 2015	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 15, 2014	Mar. 12, 2015	Oct. 14, 2015	Radiation (03CH01-SZ)
Double Ridged Horn Antenna	COM-POWER	AH-840	101073	18GHz~40GHz	Jun. 09, 2014	Mar. 12, 2015	Jun. 08, 2015	Radiation (03CH01-SZ)
Amplifier	com-power	PA-103A	161069	1~1000MHz	May 04, 2014	Mar. 12, 2015	May 03, 2015	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 08, 2014	Mar. 12, 2015	May 07, 2015	Radiation (03CH01-SZ)
AC Source	Chroma	61601ACSOURCE	616010002470	100Vac~240Vac	NCR	Mar. 12, 2015	NCR	Radiation (03CH01-SZ)
Turn Table	EM Electronics	EM 1000	N/A	0~360 degree	NCR	Mar. 12, 2015	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM Electronics	EM 1000	N/A	1 m~4 m	NCR	Mar. 12, 2015	NCR	Radiation (03CH01-SZ)
EMI TEST Receiver	R&S	ESCI7	100768	9kHz~3GHz	May 04, 2014	Feb. 09, 2015	May 03, 2015	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Feb. 02, 2015	Feb. 09, 2015	Feb. 01, 2016	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Feb. 02, 2015	Feb. 09, 2015	Feb. 01, 2016	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Sep. 29, 2014	Feb. 09, 2015	Sep. 28, 2015	Conduction (CO01-SZ)

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))	**3.9dB**

Appendix A. Conducted Test Results

Report Number : FR520505C

Test Engineer:	Mygai Cai	Temperature:	21~25	℃
Test Date:	2015/3/11	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	14.15	9.56	0.50	Pass
11b	1Mbps	1	6	2437	13.90	9.08	0.50	Pass
11b	1Mbps	1	11	2462	13.65	9.52	0.50	Pass
11g	6Mbps	1	1	2412	17.85	15.72	0.50	Pass
11g	6Mbps	1	6	2437	17.40	15.68	0.50	Pass
11g	6Mbps	1	11	2462	16.90	12.56	0.50	Pass
HT20	MCS0	1	1	2412	18.65	17.56	0.50	Pass
HT20	MCS0	1	6	2437	18.35	16.32	0.50	Pass
HT20	MCS0	1	11	2462	18.10	16.04	0.50	Pass
HT40	MCS0	1	3	2422	36.50	35.12	0.50	Pass
HT40	MCS0	1	6	2437	35.80	33.76	0.50	Pass
HT40	MCS0	1	9	2452	36.50	35.68	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	15.69	30.00	-1.00	14.69	36.00	Pass
11b	1Mbps	1	6	2437	17.30	30.00	-1.00	16.30	36.00	Pass
11b	1Mbps	1	11	2462	17.08	30.00	-1.00	16.08	36.00	Pass
11g	6Mbps	1	1	2412	18.78	30.00	-1.00	17.78	36.00	Pass
11g	6Mbps	1	6	2437	21.29	30.00	-1.00	20.29	36.00	Pass
11g	6Mbps	1	11	2462	20.54	30.00	-1.00	19.54	36.00	Pass
HT20	MCS0	1	1	2412	18.89	30.00	-1.00	17.89	36.00	Pass
HT20	MCS0	1	6	2437	20.31	30.00	-1.00	19.31	36.00	Pass
HT20	MCS0	1	11	2462	20.12	30.00	-1.00	19.12	36.00	Pass
HT40	MCS0	1	3	2422	19.75	30.00	-1.00	18.75	36.00	Pass
HT40	MCS0	1	6	2437	21.33	30.00	-1.00	20.33	36.00	Pass
HT40	MCS0	1	9	2452	20.04	30.00	-1.00	19.04	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.10	12.77
11b	1Mbps	1	6	2437	0.10	14.38
11b	1Mbps	1	11	2462	0.10	14.14
11g	6Mbps	1	1	2412	0.49	9.57
11g	6Mbps	1	6	2437	0.49	12.97
11g	6Mbps	1	11	2462	0.49	11.25
HT20	MCS0	1	1	2412	0.53	8.90
HT20	MCS0	1	6	2437	0.53	10.48
HT20	MCS0	1	11	2462	0.53	10.32
HT40	MCS0	1	3	2422	0.97	8.84
HT40	MCS0	1	6	2437	0.97	11.23
HT40	MCS0	1	9	2452	0.97	9.48

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	-19.71	-1.00	8.00	Pass
11b	1Mbps	1	6	2437	-18.64	-1.00	8.00	Pass
11b	1Mbps	1	11	2462	-18.81	-1.00	8.00	Pass
11g	6Mbps	1	1	2412	-13.85	-1.00	8.00	Pass
11g	6Mbps	1	6	2437	-10.44	-1.00	8.00	Pass
11g	6Mbps	1	11	2462	-10.20	-1.00	8.00	Pass
HT20	MCS0	1	1	2412	-14.72	-1.00	8.00	Pass
HT20	MCS0	1	6	2437	-12.03	-1.00	8.00	Pass
HT20	MCS0	1	11	2462	-10.91	-1.00	8.00	Pass
HT40	MCS0	1	3	2422	-13.09	-1.00	8.00	Pass
HT40	MCS0	1	6	2437	-12.32	-1.00	8.00	Pass
HT40	MCS0	1	9	2452	-15.07	-1.00	8.00	Pass

Appendix B. Radiated Spurious Emission

15C 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		2327.19	51.04	-22.96	74	39.19	32.53	8.43	29.11	136	336	P	H
		2361.21	39.52	-14.48	54	27.63	32.56	8.51	29.18	136	336	A	H
	*	2412	96.81	-	-	84.84	32.61	8.6	29.24	136	336	P	H
	*	2412	94.22	-	-	82.25	32.61	8.6	29.24	136	336	A	H
		2377.68	50.94	-23.06	74	39.07	32.58	8.51	29.22	188	169	P	V
		2360.49	39.46	-14.54	54	27.57	32.56	8.51	29.18	188	169	A	V
	*	2412	92.54	-	-	80.57	32.61	8.6	29.24	188	169	P	V
	*	2412	90.52	-	-	78.55	32.61	8.6	29.24	188	169	A	V
802.11b CH 06 2437MHz		2366.07	51.08	-22.92	74	39.19	32.56	8.51	29.18	168	332	P	H
		2363.28	39.55	-14.45	54	27.66	32.56	8.51	29.18	168	332	A	H
	*	2437	98.71	-	-	86.57	32.65	8.69	29.2	168	332	P	H
	*	2437	96.52	-	-	84.38	32.65	8.69	29.2	168	332	A	H
		2498.64	51.28	-22.72	74	38.94	32.7	8.78	29.14	168	332	P	H
		2485.24	39.77	-14.23	54	27.47	32.68	8.78	29.16	168	332	A	H
		2362.11	51.03	-22.97	74	39.14	32.56	8.51	29.18	105	236	P	V
		2360.94	39.5	-14.5	54	27.61	32.56	8.51	29.18	105	236	A	V
	*	2437	93.59	-	-	81.45	32.65	8.69	29.2	105	236	P	V
	*	2437	91.32	-	-	79.18	32.65	8.69	29.2	105	236	A	V
		2485.92	51.75	-22.25	74	39.45	32.68	8.78	29.16	105	236	P	V
		2489.32	39.65	-14.35	54	27.31	32.7	8.78	29.14	105	236	A	V

802.11b CH 11 2462MHz	*	2462	100.81	-	-	88.63	32.67	8.69	29.18	170	290	P	H
	*	2462	98.63	-	-	86.45	32.67	8.69	29.18	170	290	A	H
		2490.28	50.8	-23.2	74	38.46	32.7	8.78	29.14	170	290	P	H
		2484.2	39.89	-14.11	54	27.59	32.68	8.78	29.16	170	290	A	H
	*	2462	95.04	-	-	82.86	32.67	8.69	29.18	143	301	P	V
	*	2462	92.82	-	-	80.64	32.67	8.69	29.18	143	301	A	V
		2493.96	50.66	-23.34	74	38.32	32.7	8.78	29.14	143	301	P	V
		2488.64	39.75	-14.25	54	27.41	32.7	8.78	29.14	143	301	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 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		4824	50.91	-23.09	74	54.39	34.4	12.86	50.74	110	360	P	H
		4824	42.08	-31.92	74	45.56	34.4	12.86	50.74	110	360	P	V
802.11b CH 06 2437MHz		4874	40.87	-33.13	74	44.1	34.43	12.92	50.58	100	360	P	H
		7311	44.86	-29.14	74	44.81	36.22	14.71	50.88	174	100	P	H
		4874	42	-32	74	45.23	34.43	12.92	50.58	100	360	P	V
		7311	44.49	-29.51	74	44.44	36.22	14.71	50.88	174	100	P	V
802.11b CH 11 2462MHz		4924	43.29	-30.71	74	46.21	34.46	13.04	50.42	146	347	P	H
		7386	44.29	-29.71	74	44.16	36.26	14.75	50.88	145	274	P	H
		4924	42.44	-31.56	74	45.36	34.46	13.04	50.42	146	347	P	V
		7386	43.29	-30.71	74	43.16	36.26	14.75	50.88	145	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (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)
802.11g CH 01 2412MHz		2323.59	51.04	-22.96	74	39.19	32.53	8.43	29.11	196	55	P	H
		2362.83	40.02	-13.98	54	28.13	32.56	8.51	29.18	196	55	A	H
	*	2412	97.9	-	-	85.93	32.61	8.6	29.24	196	55	P	H
	*	2412	90.01	-	-	78.04	32.61	8.6	29.24	196	55	A	H
		2382.36	51.27	-22.73	74	39.4	32.58	8.51	29.22	100	262	P	V
		2360.94	40.04	-13.96	54	28.15	32.56	8.51	29.18	100	262	A	V
	*	2412	92.97	-	-	81	32.61	8.6	29.24	100	262	P	V
	*	2412	85.49	-	-	73.52	32.61	8.6	29.24	100	262	A	V
802.11g CH 06 2437MHz		2342.67	50.66	-23.34	74	38.84	32.54	8.43	29.15	195	58	P	H
		2359.95	40	-14	54	28.11	32.56	8.51	29.18	195	58	A	H
	*	2437	102.08	-	-	89.94	32.65	8.69	29.2	195	58	P	H
	*	2437	93.84	-	-	81.7	32.65	8.69	29.2	195	58	A	H
		2496.88	52.41	-21.59	74	40.07	32.7	8.78	29.14	195	58	P	H
		2483.8	40.26	-13.74	54	27.96	32.68	8.78	29.16	195	58	A	H
		2362.2	50.74	-23.26	74	38.85	32.56	8.51	29.18	171	103	P	V
		2362.38	40.07	-13.93	54	28.18	32.56	8.51	29.18	171	103	A	V
	*	2437	100.31	-	-	88.17	32.65	8.69	29.2	171	103	P	V
	*	2437	92.32	-	-	80.18	32.65	8.69	29.2	171	103	A	V
		2494.68	51.53	-22.47	74	39.19	32.7	8.78	29.14	171	103	P	V
		2486.36	40.34	-13.66	54	28.04	32.68	8.78	29.16	171	103	A	V

802.11g CH 11 2462MHz	*	2462	100.53	-	-	88.35	32.67	8.69	29.18	189	59	P	H
	*	2462	92.48	-	-	80.3	32.67	8.69	29.18	189	59	A	H
		2490.04	50.97	-23.03	74	38.63	32.7	8.78	29.14	189	59	P	H
		2485.2	40.74	-13.26	54	28.44	32.68	8.78	29.16	189	59	A	H
	*	2462	94.65	-	-	82.47	32.67	8.69	29.18	100	173	P	V
	*	2462	86.95	-	-	74.77	32.67	8.69	29.18	100	173	A	V
		2484.12	51.33	-22.67	74	39.03	32.68	8.78	29.16	100	173	P	V
		2485.32	40.19	-13.81	54	27.89	32.68	8.78	29.16	100	173	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 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)
802.11g CH 01 2412MHz		4824	41.43	-32.57	74	44.91	34.4	12.86	50.74	110	360	P	H
		4824	40.43	-33.57	74	43.91	34.4	12.86	50.74	110	360	P	V
802.11g CH 06 2437MHz		4874	41.25	-32.75	74	44.48	34.43	12.92	50.58	100	360	P	H
		7311	44.73	-29.27	74	44.68	36.22	14.71	50.88	174	100	P	H
		4874	40.43	-33.57	74	43.66	34.43	12.92	50.58	100	360	P	V
		7311	44.24	-29.76	74	44.19	36.22	14.71	50.88	174	100	P	V
802.11g CH 11 2462MHz		4924	42.31	-31.69	74	45.23	34.46	13.04	50.42	146	347	P	H
		7386	43.89	-30.11	74	43.76	36.26	14.75	50.88	145	274	P	H
		4924	42.25	-31.75	74	45.17	34.46	13.04	50.42	146	347	P	V
		7386	43.76	-30.24	74	43.63	36.26	14.75	50.88	145	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (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)
802.11n HT20 CH 01 2412MHz		2362.11	50.83	-23.17	74	38.94	32.56	8.51	29.18	197	62	P	H
		2389.92	40.14	-13.86	54	28.2	32.6	8.6	29.26	197	62	A	H
	*	2412	97.93	-	-	85.96	32.61	8.6	29.24	197	62	P	H
	*	2412	90.25	-	-	78.28	32.61	8.6	29.24	197	62	A	H
		2362.83	50.6	-23.4	74	38.71	32.56	8.51	29.18	187	113	P	V
		2359.77	40.05	-13.95	54	28.16	32.56	8.51	29.18	187	113	A	V
	*	2412	94.11	-	-	82.14	32.61	8.6	29.24	187	113	P	V
	*	2412	86.68	-	-	74.71	32.61	8.6	29.24	187	113	A	V
802.11n HT20 CH 06 2437MHz		2378.49	51.7	-22.3	74	39.83	32.58	8.51	29.22	105	288	P	H
		2364.45	39.9	-14.1	54	28.01	32.56	8.51	29.18	105	288	A	H
	*	2437	99.03	-	-	86.89	32.65	8.69	29.2	105	288	P	H
	*	2437	91.63	-	-	79.49	32.65	8.69	29.2	105	288	A	H
		2485.52	50.76	-23.24	74	38.46	32.68	8.78	29.16	105	288	P	H
		2486.68	40.44	-13.56	54	28.14	32.68	8.78	29.16	105	288	A	H
		2362.65	51.72	-22.28	74	39.83	32.56	8.51	29.18	100	273	P	V
		2364.72	39.88	-14.12	54	27.99	32.56	8.51	29.18	100	273	A	V
	*	2437	94.1	-	-	81.96	32.65	8.69	29.2	100	273	P	V
	*	2437	86.73	-	-	74.59	32.65	8.69	29.2	100	273	A	V
		2487.68	51.33	-22.67	74	38.99	32.7	8.78	29.14	100	273	P	V
		2491.6	40.08	-13.92	54	27.74	32.7	8.78	29.14	100	273	A	V

802.11n HT20 CH 11 2462MHz	*	2462	99.68	-	-	87.5	32.67	8.69	29.18	163	297	P	H
	*	2462	91.38	-	-	79.2	32.67	8.69	29.18	163	297	A	H
		2487.8	51.31	-22.69	74	38.97	32.7	8.78	29.14	163	297	P	H
		2483.68	40.38	-13.62	54	28.08	32.68	8.78	29.16	163	297	A	H
	*	2462	97.55	-	-	85.37	32.67	8.69	29.18	144	303	P	V
	*	2462	89.1	-	-	76.92	32.67	8.69	29.18	144	303	A	V
		2485	50.83	-23.17	74	38.53	32.68	8.78	29.16	144	303	P	V
		2486.52	40.27	-13.73	54	27.97	32.68	8.78	29.16	144	303	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 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)
802.11n HT20 CH 01 2412MHz		4824	41.34	-32.66	74	44.82	34.4	12.86	50.74	110	360	P	H
		4824	42.41	-31.59	74	45.89	34.4	12.86	50.74	110	360	P	V
802.11n HT20 CH 06 2437MHz		4874	41.61	-32.39	74	44.84	34.43	12.92	50.58	100	360	P	H
		7311	47.07	-26.93	74	47.02	36.22	14.71	50.88	174	100	P	H
		4874	41.34	-32.66	74	44.57	34.43	12.92	50.58	100	360	P	V
		7311	44.37	-29.63	74	44.32	36.22	14.71	50.88	174	100	P	V
802.11n HT20 CH 11 2462MHz		4924	42.33	-31.67	74	45.25	34.46	13.04	50.42	146	347	P	H
		7386	43.96	-30.04	74	43.83	36.26	14.75	50.88	145	274	P	H
		4924	42.33	-31.67	74	45.25	34.46	13.04	50.42	146	347	P	V
		7386	45.21	-28.79	74	45.08	36.26	14.75	50.88	145	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (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)
802.11n HT40 CH 03 2422MHz		2389.74	50.9	-23.1	74	38.96	32.6	8.6	29.26	200	293	P	H
		2313.51	40.56	-13.44	54	28.69	32.51	8.43	29.07	200	293	A	H
	*	2422	96.12	-	-	84.11	32.63	8.6	29.22	200	293	P	H
	*	2422	89.15	-	-	77.14	32.63	8.6	29.22	200	293	A	H
		2489.28	50.95	-23.05	74	38.61	32.7	8.78	29.14	200	293	P	H
		2490.8	41.04	-12.96	54	28.7	32.7	8.78	29.14	200	293	A	H
		2365.89	51.27	-22.73	74	39.38	32.56	8.51	29.18	142	317	P	V
		2358.6	40.61	-13.39	54	28.72	32.56	8.51	29.18	142	317	A	V
	*	2422	91.25	-	-	79.24	32.63	8.6	29.22	142	317	P	V
	*	2422	84.02	-	-	72.01	32.63	8.6	29.22	142	317	A	V
		2490.08	51.18	-22.82	74	38.84	32.7	8.78	29.14	142	317	P	V
		2497.2	40.76	-13.24	54	28.42	32.7	8.78	29.14	142	317	A	V
802.11n HT40 CH 06 2437MHz		2377.59	51.1	-22.9	74	39.23	32.58	8.51	29.22	174	317	P	H
		2360.67	40.74	-13.26	54	28.85	32.56	8.51	29.18	174	317	A	H
	*	2437	96.9	-	-	84.76	32.65	8.69	29.2	174	317	P	H
	*	2437	89.1	-	-	76.96	32.65	8.69	29.2	174	317	A	H
		2484.96	51.24	-22.76	74	38.94	32.68	8.78	29.16	174	317	P	H
		2490.6	41.07	-12.93	54	28.73	32.7	8.78	29.14	174	317	A	H
		2340.06	50.72	-23.28	74	38.9	32.54	8.43	29.15	104	301	P	V
		2375.16	40.67	-13.33	54	28.8	32.58	8.51	29.22	104	301	A	V
	*	2437	94.72	-	-	82.58	32.65	8.69	29.2	104	301	P	V
	*	2437	87.31	-	-	75.17	32.65	8.69	29.2	104	301	A	V
		2495.04	50.97	-23.03	74	38.63	32.7	8.78	29.14	104	301	P	V
		2484.76	41.06	-12.94	54	28.76	32.68	8.78	29.16	104	301	A	V

802.11n HT40 CH 09 2452MHz		2375.52	51.4	-22.6	74	39.53	32.58	8.51	29.22	169	308	P	H
		2374.53	40.97	-13.03	54	29.1	32.58	8.51	29.22	169	308	A	H
	*	2452	98.52	-	-	86.38	32.65	8.69	29.2	169	308	P	H
	*	2452	90.37	-	-	78.23	32.65	8.69	29.2	169	308	A	H
		2485.12	56.41	-17.59	74	44.11	32.68	8.78	29.16	169	308	P	H
		2483.72	41.98	-12.02	54	29.68	32.68	8.78	29.16	169	308	A	H
		2330.7	51.5	-22.5	74	39.65	32.53	8.43	29.11	119	246	P	V
		2356.53	40.8	-13.2	54	28.91	32.56	8.51	29.18	119	246	A	V
	*	2452	92.88	-	-	80.74	32.65	8.69	29.2	119	246	P	V
	*	2452	85	-	-	72.86	32.65	8.69	29.2	119	246	A	V
		2486.24	52.71	-21.29	74	40.41	32.68	8.78	29.16	119	246	P	V
		2490.04	41.17	-12.83	54	28.83	32.7	8.78	29.14	119	246	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 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)
802.11n		4844	43.35	-30.65	74	46.71	34.41	12.92	50.69	100	360	P	H
HT40		7266	45.87	-28.13	74	45.84	36.21	14.7	50.88	200	360	P	H
CH 03		4844	45.21	-28.79	74	48.57	34.41	12.92	50.69	100	360	P	V
2422MHz		7266	45.44	-28.56	74	45.41	36.21	14.7	50.88	200	360	P	V
802.11n		4874	42.7	-31.3	74	45.93	34.43	12.92	50.58	100	163	P	H
HT40		7311	45.73	-28.27	74	45.68	36.22	14.71	50.88	120	360	P	H
CH 06		4874	41.96	-32.04	74	45.19	34.43	12.92	50.58	100	163	P	V
2437MHz		7311	44.13	-29.87	74	44.08	36.22	14.71	50.88	120	360	P	V
802.11n		4904	43.19	-30.81	74	46.23	34.45	12.98	50.47	129	360	P	H
HT40		7356	45.53	-28.47	74	45.44	36.24	14.73	50.88	121	320	P	H
CH 09		4904	43.12	-30.88	74	46.16	34.45	12.98	50.47	129	360	P	V
2452MHz		7356	45.51	-28.49	74	45.42	36.24	14.73	50.88	121	320	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 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		41.64	20.42	-19.58	40	36.54	13.66	0.98	30.76			P	H
		191.99	23.72	-19.78	43.5	40.68	11.56	2.16	30.68			P	H
		430.61	25.66	-20.34	46	35.91	16.63	3.35	30.23			P	H
		500.45	26.66	-19.34	46	33.72	19.4	3.57	30.03			P	H
		718.7	29.94	-16.06	46	34.58	20.71	4.33	29.68			P	H
		766.23	30.09	-15.91	46	33.37	21.75	4.5	29.53	120	50	P	H
		95.96	26.19	-17.31	43.5	44.22	11.22	1.51	30.76			P	V
		232.73	20.79	-25.21	46	36.88	12.12	2.38	30.59			P	V
		468.44	25.76	-20.24	46	34.35	18.13	3.46	30.18			P	V
		607.15	25.78	-20.22	46	31.71	19.74	3.98	29.65			P	V
		766.23	28.96	-17.04	46	32.24	21.75	4.5	29.53			P	V
		900.09	29.56	-16.44	46	32.11	21.6	4.87	29.02	150	80	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 per 15.209(c).
!	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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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