FCC RF Test Report

APPLICANT	:	CT Asia
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	BLU
MODEL NAME	:	ENERGY X PLUS
FCC ID	:	YHLBLUENERGYXPS
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on May 29, 2015 and testing was completed on Jun. 17, 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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR552904C	Rev. 01	Initial issue of report	Jun. 25, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	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 2.19 dB at 2388.480 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 3.00 dB at 0.530 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

CT Asia
Unit1309-11, 13th Floor 9 Wing Hong Street Cheung Sha Wan Kowloon, Hong Kong

1.2 Manufacturer

Shanghai Huaqin Telecom Technology Co., LTD.
NO.1 Building, 399 Keyuan Road, Zhangjiang Hi-Tech Park, Pudong New Area, Shanghai, China 201203

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	BLU
Model Name	ENERGY X PLUS
FCC ID	YHLBLUENERGYXPS
EUT supports Radios application	GSM/GPRS/WCDMA/HSPA/HSPA+(Downlink Only)/ WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
IMEI Code	Conducted: 860331029985338/860331029985239 Radiation: 860331029985353/860331029985254 Conduction: 860331029985544/860331029985543
HW Version	AW1500_MB_PCB_V3.0
SW Version	BLU_ZAW1500U_V03_GENERIC
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 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 : 15.82 dBm (0.0382 W) 802.11g : 21.87 dBm (0.1538 W) 802.11n HT20 : 21.84 dBm (0.1528 W) 802.11n HT40 : 22.47 dBm (0.1766 W)
99% Occupied Bandwidth	802.11b : 12.35MHz 802.11g : 17.75MHz 802.11n HT20 : 18.55MHz 802.11n HT40 : 36.60MHz
Antenna Type	802.11b/g/n : Chip Antenna with gain 1.50 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 (Y 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	15.66	CH 11	15.63	15.61	15.57
CH 06	2437 MHz	15.78				
CH 11	2462 MHz	**15.82**				

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	21.67	CH 11	21.76	21.74	21.56	21.67	21.39	21.27	21.21
CH 06	2437 MHz	21.74								
CH 11	2462 MHz	**21.87**								

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	21.64	CH 11	21.57	21.53	21.44	21.47	21.43	21.37	21.32
CH 06	2437 MHz	21.73								
CH 11	2462 MHz	**21.84**								

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	22.31	CH 09	21.13	21.06	21.03	21.08	20.98	21.05	21.04
CH 06	2437 MHz	22.38								
CH 09	2452 MHz	**22.47**								

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.

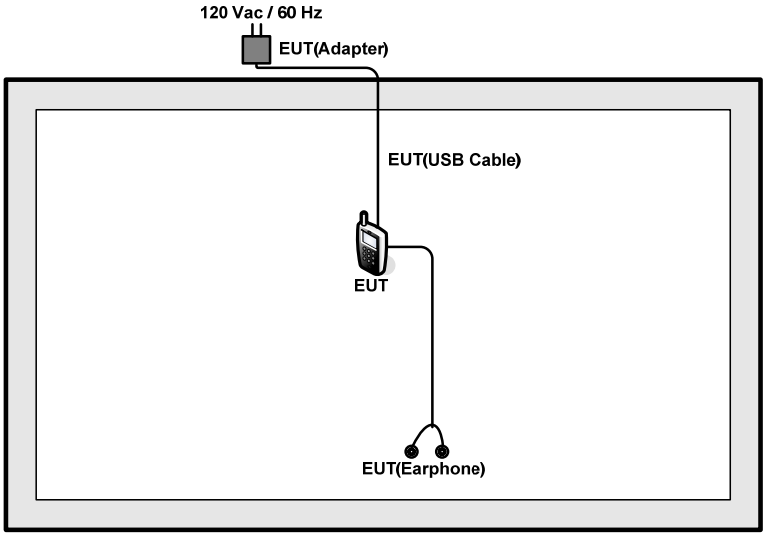
<2.4GHz>

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

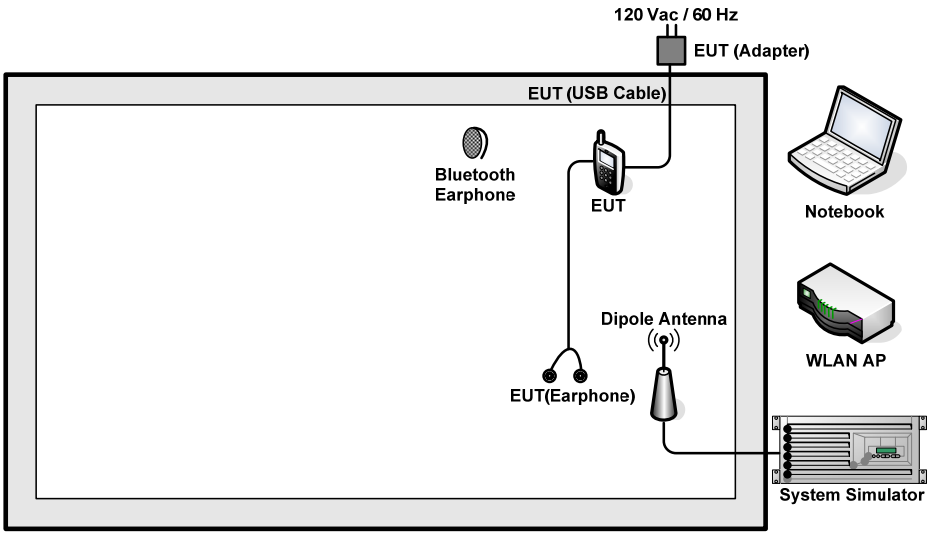
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter) + SIM1
Remark: For Radiated test cases, the tests were performed with adapter, earphone and USB cable.	

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	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Nokia	BH-108	PYAHS-107W	N/A	N/A
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the 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 and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

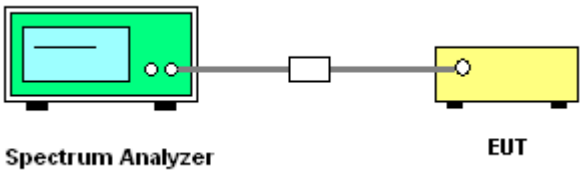
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

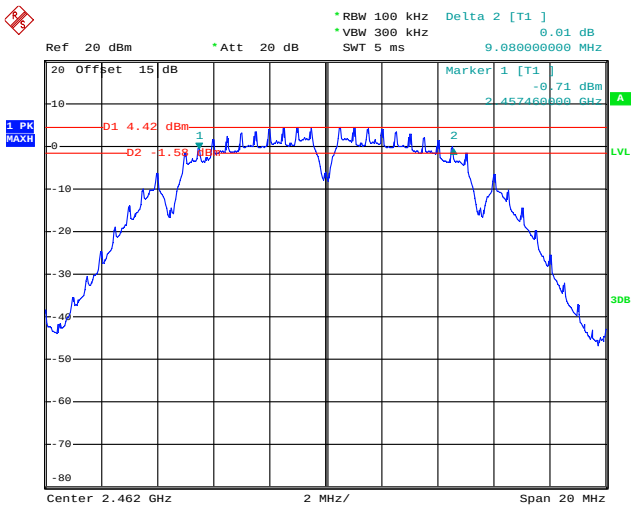
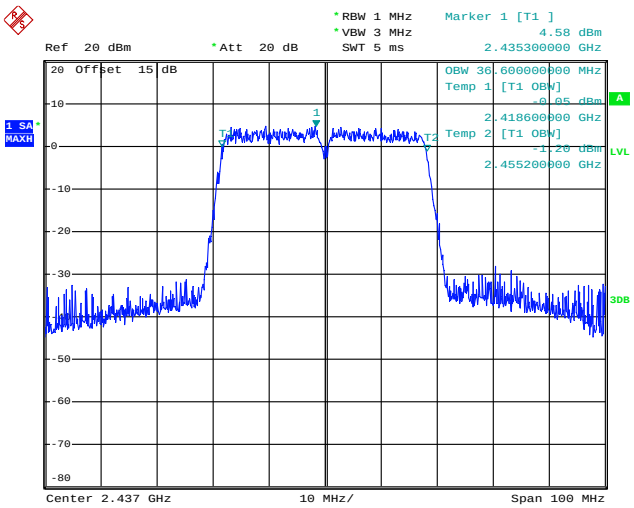
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit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

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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.

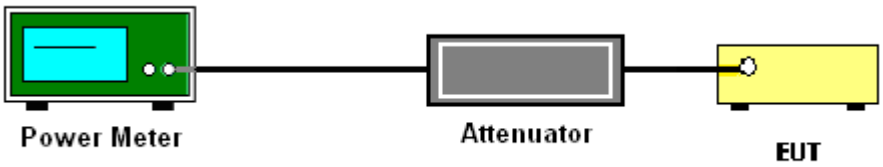
3.2.2 Measuring Instruments

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.

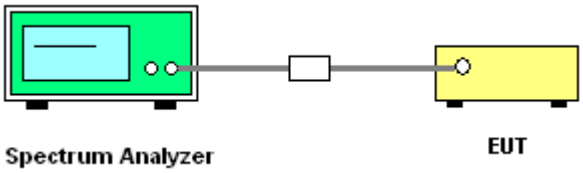
3.3.2 Measuring Instruments

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.

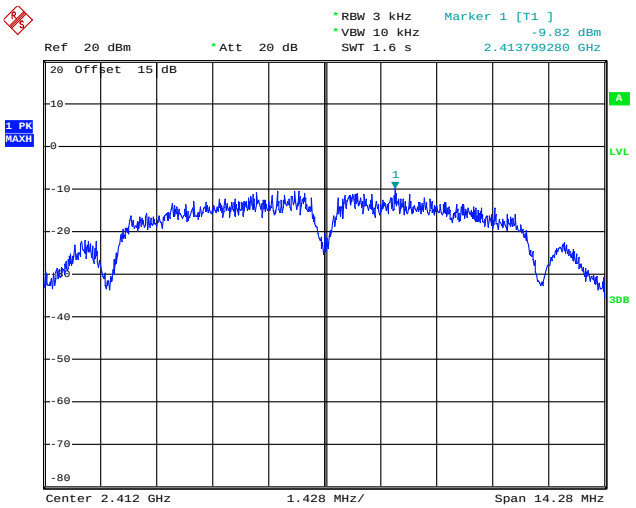
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.

Worst Case Power Density (dBm/3kHz)



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).

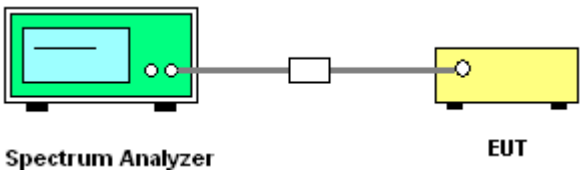
3.4.2 Measuring Instruments

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

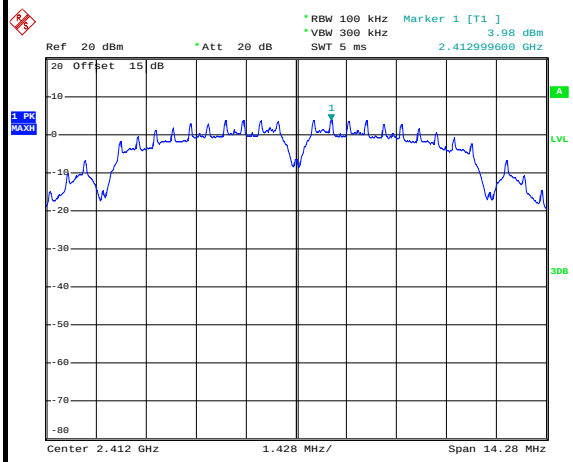


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

WLAN 802.11b Channel 01

100kHz PSD reference Level



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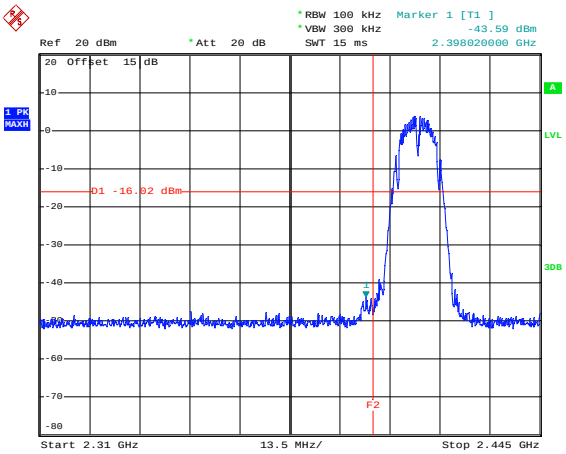
Low Channel Plot



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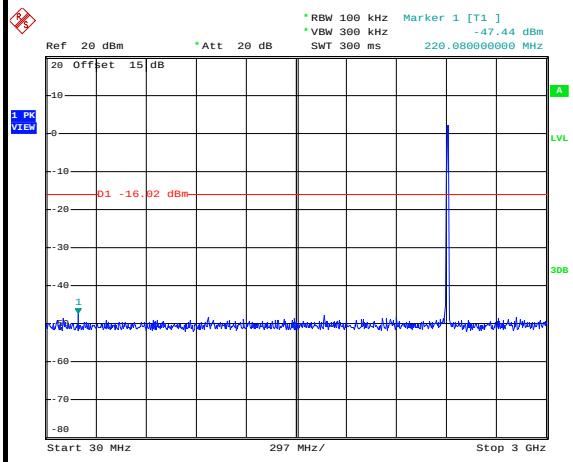
Spurious Emission 30MHz~3GHz



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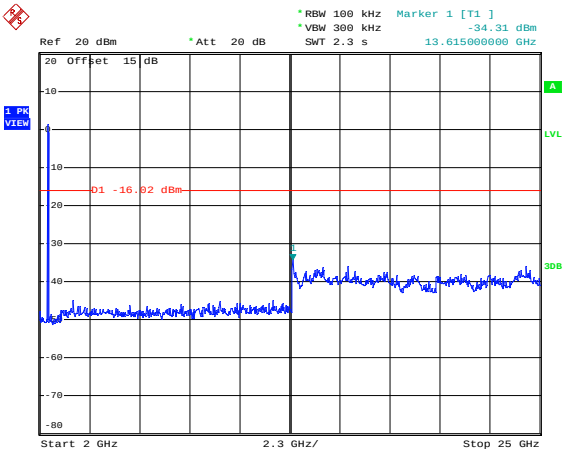
Spurious Emission 2GHz~25GHz

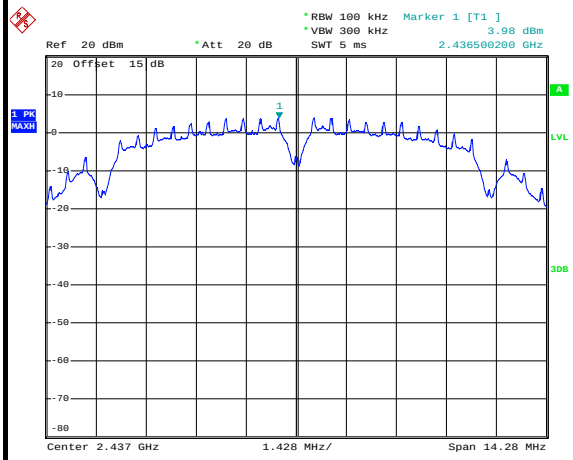


Date: 8.JUN.2015 15:50:03

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

WLAN 802.11b Channel 06

100kHz PSD reference Level



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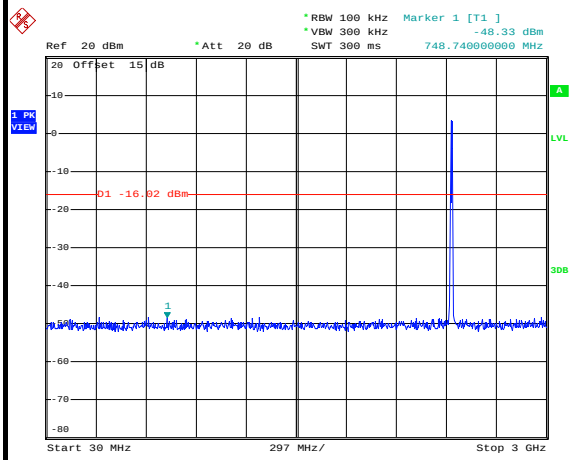
Spurious Emission 30MHz~3GHz



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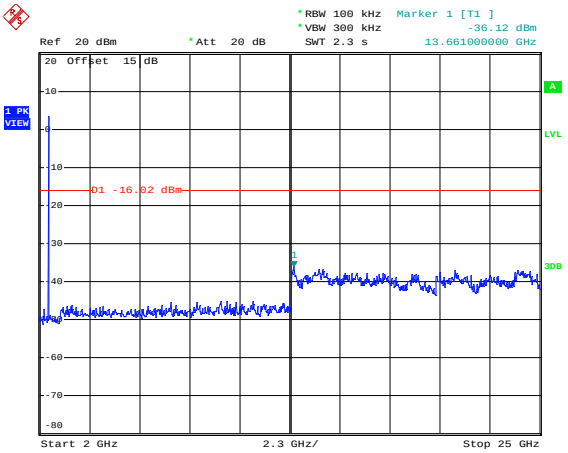
Spurious Emission 2GHz~25GHz

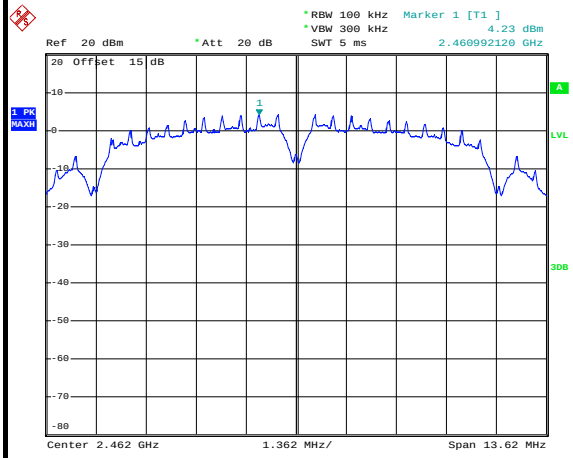


Date: 8.JUN.2015 16:01:42

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

WLAN 802.11b Channel 11

100kHz PSD reference Level



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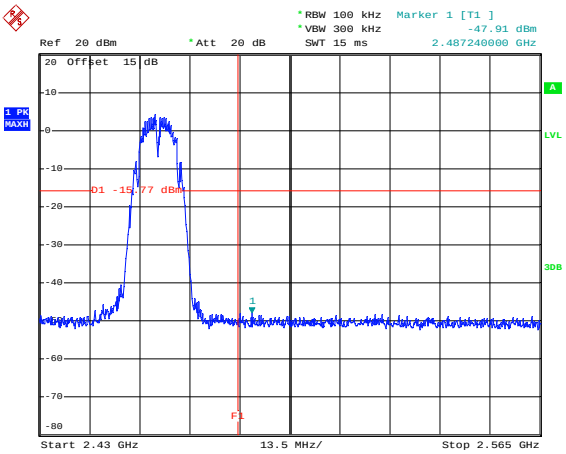
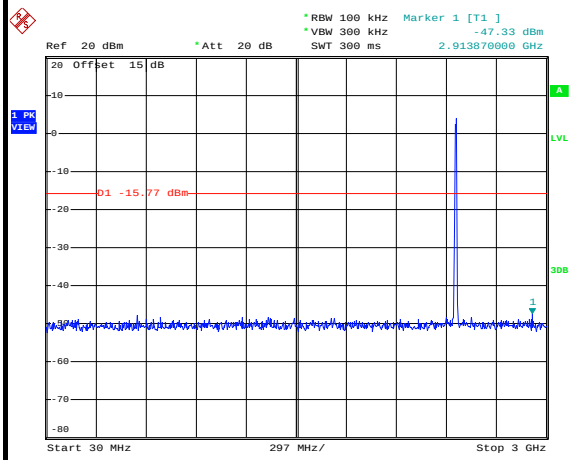
High Channel Plot



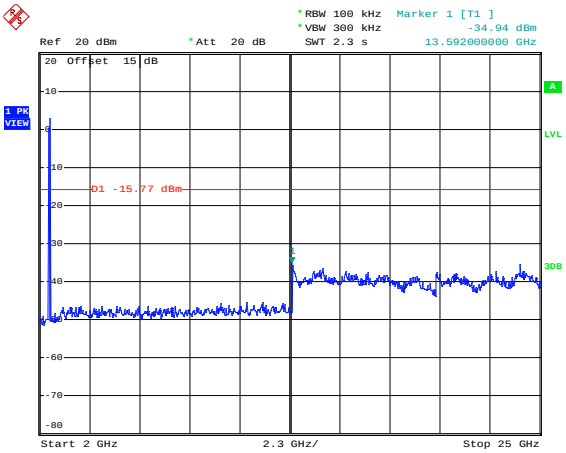
Date: 8.JUN.2015 16:08:51

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 16:09:21

Spurious Emission 2GHz~25GHz

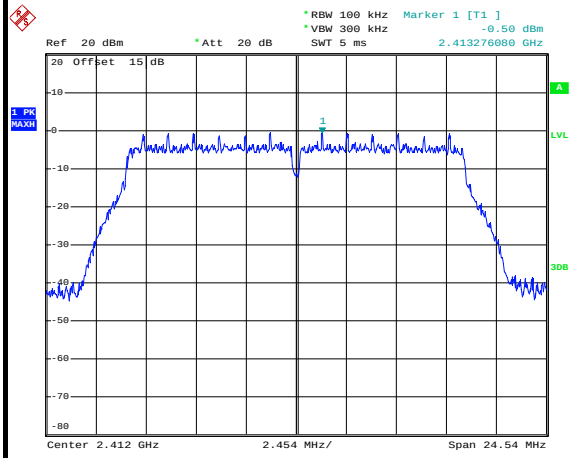


Date: 8.JUN.2015 16:09:38

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

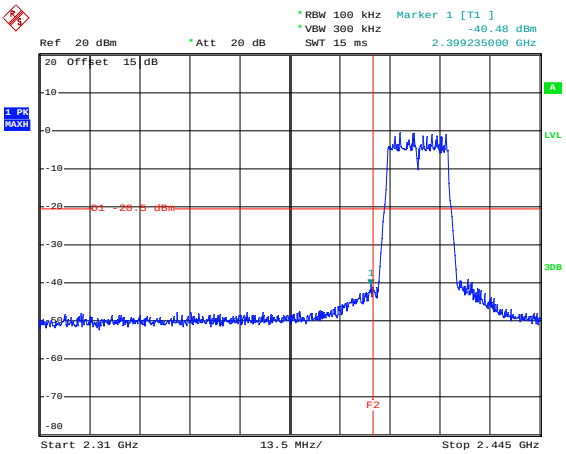
WLAN 802.11g Channel 01

100kHz PSD reference Level



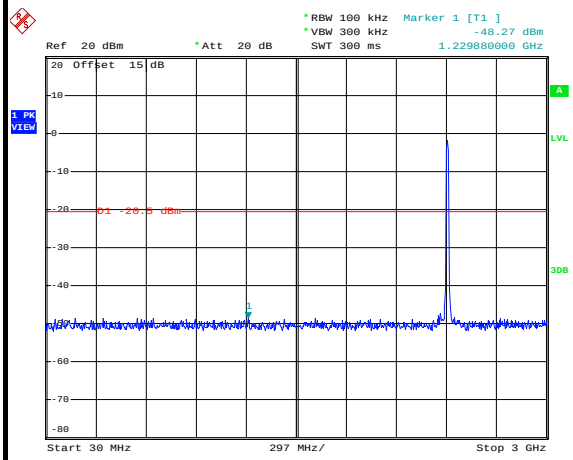
Date: 8.JUN.2015 16:46:36

Low Channel Plot



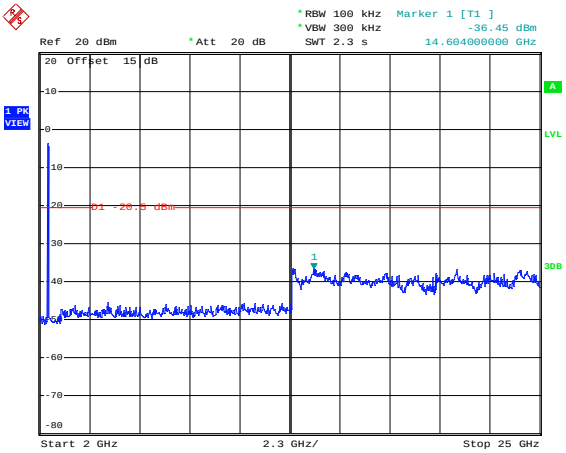
Date: 8.JUN.2015 16:48:53

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 16:49:19

Spurious Emission 2GHz~25GHz

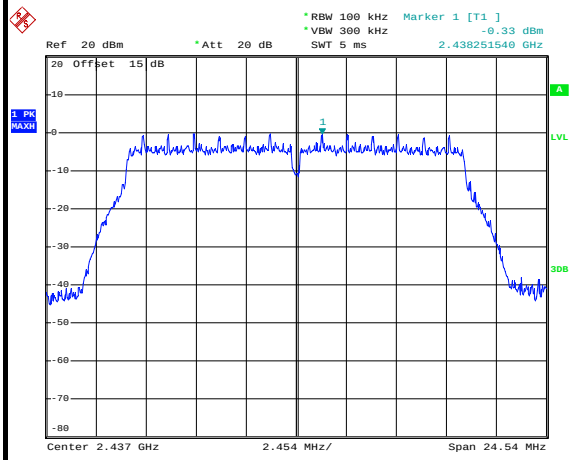


Date: 8.JUN.2015 16:49:37

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

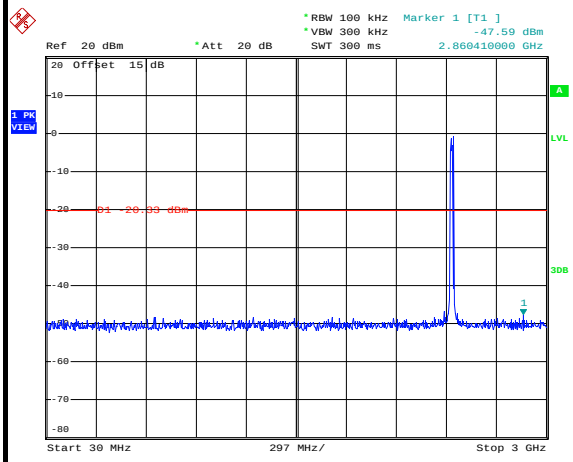
WLAN 802.11g Channel 06

100kHz PSD reference Level



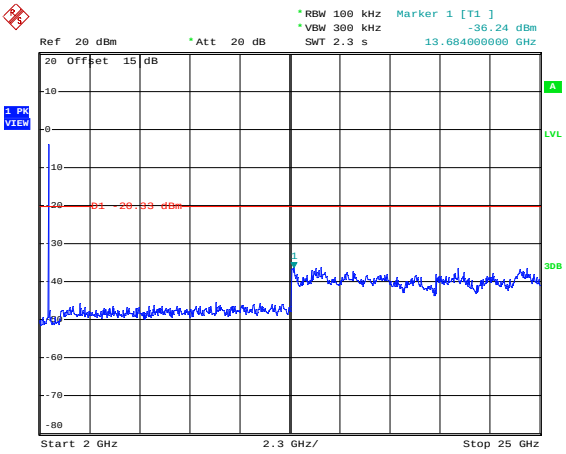
Date: 8.JUN.2015 16:58:22

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 16:59:56

Spurious Emission 2GHz~25GHz

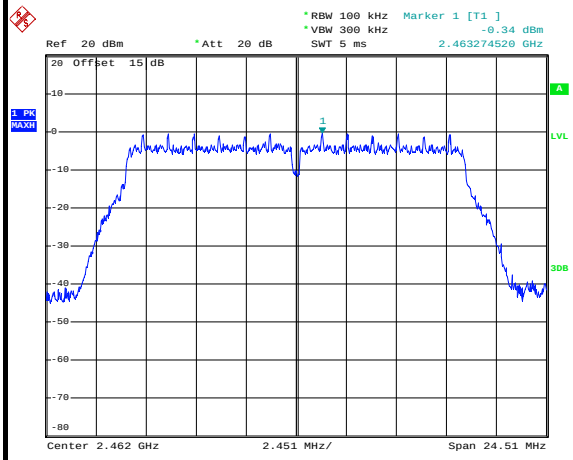


Date: 8.JUN.2015 17:00:14

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

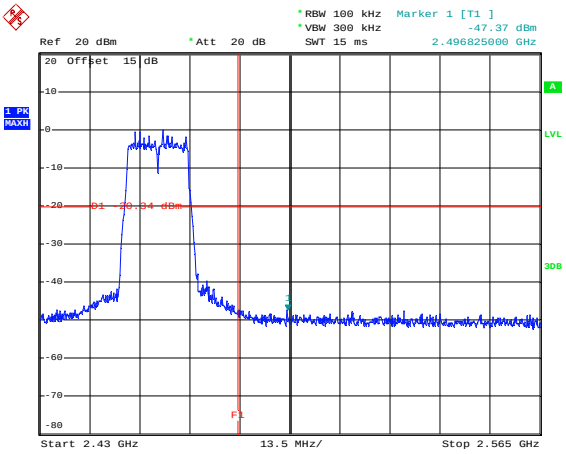
WLAN 802.11g Channel 11

100kHz PSD reference Level



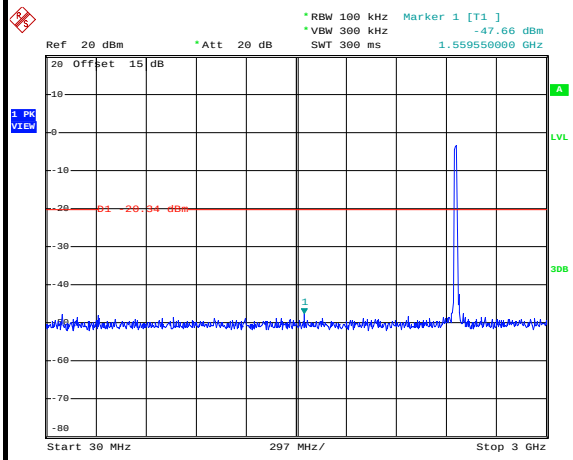
Date: 8.JUN.2015 17:05:01

High Channel Plot



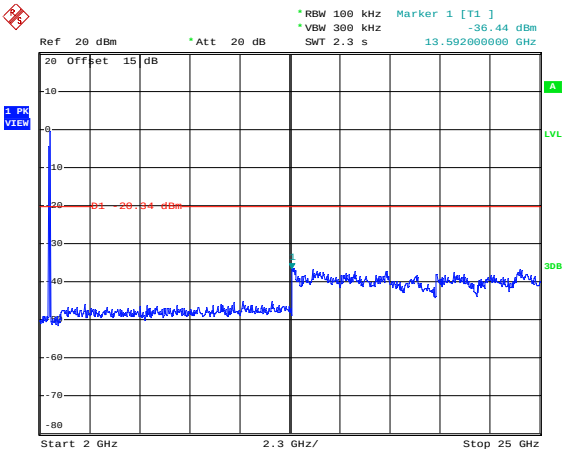
Date: 8.JUN.2015 17:08:40

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 17:10:07

Spurious Emission 2GHz~25GHz

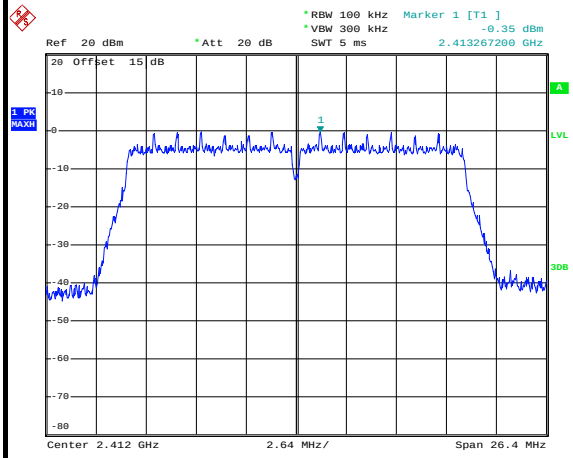


Date: 8.JUN.2015 17:10:25

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

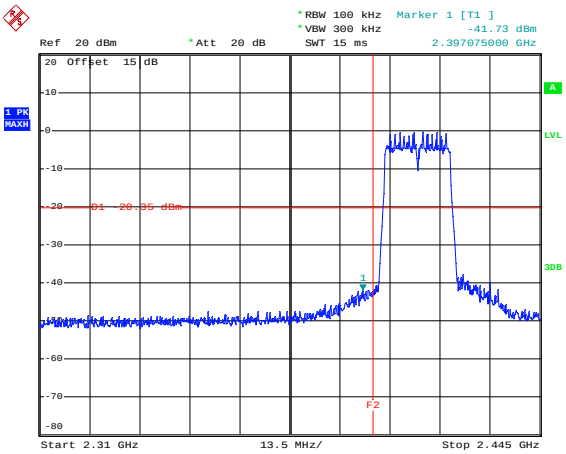
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



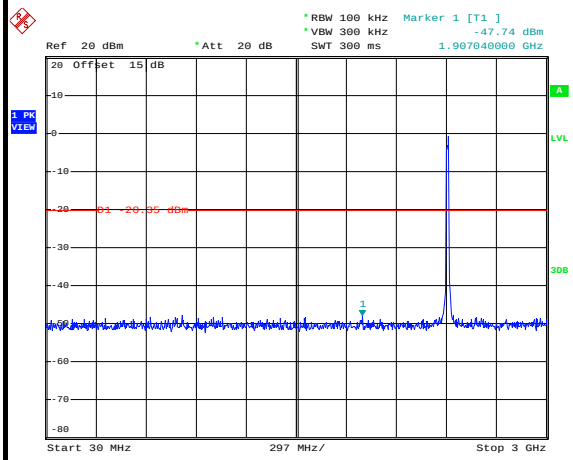
Date: 8.JUN.2015 17:17:31

Low Channel Plot



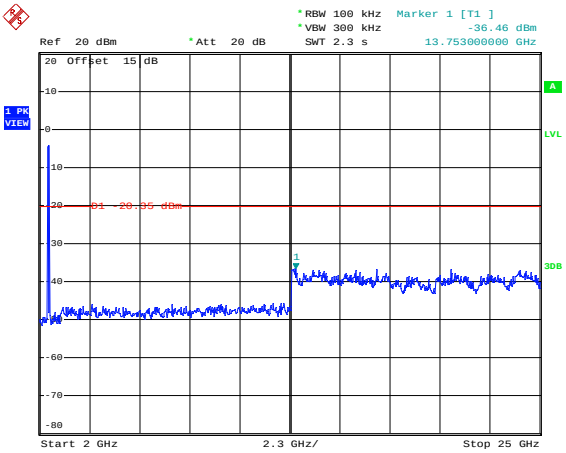
Date: 8.JUN.2015 17:18:13

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 17:19:08

Spurious Emission 2GHz~25GHz

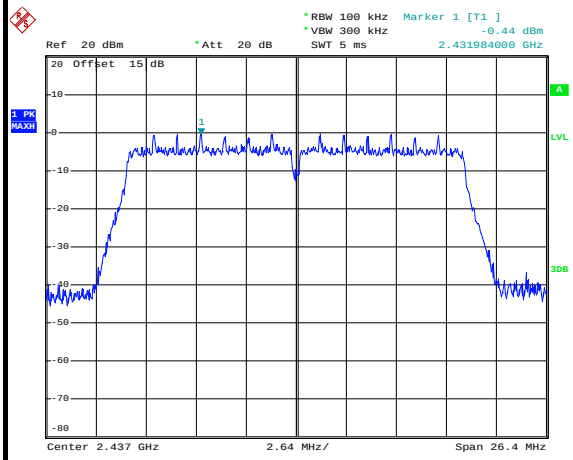


Date: 8.JUN.2015 17:19:26

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

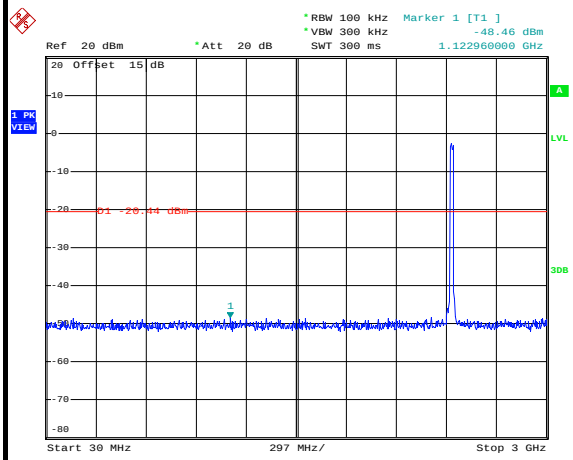
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



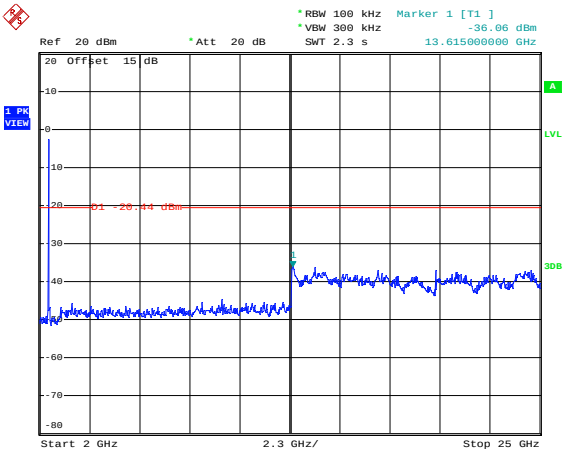
Date: 8.JUN.2015 17:24:35

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 17:28:33

Spurious Emission 2GHz~25GHz

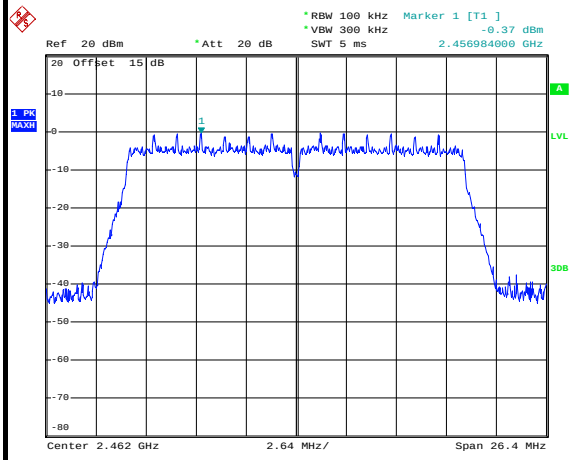


Date: 8.JUN.2015 17:28:51

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

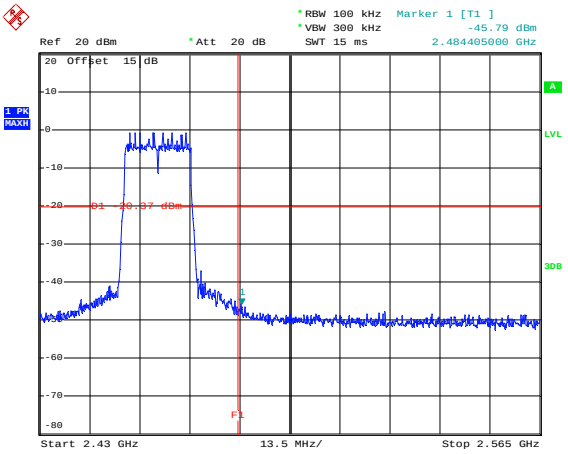
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



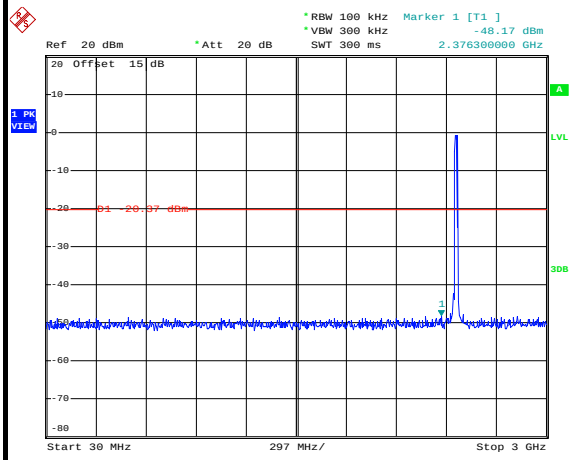
Date: 8.JUN.2015 17:35:23

High Channel Plot



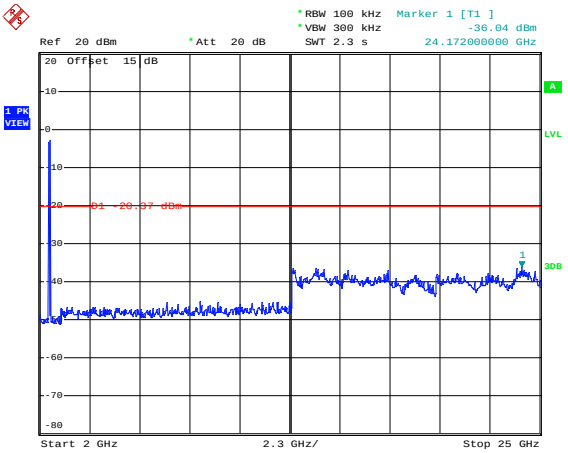
Date: 8.JUN.2015 17:36:11

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 17:36:53

Spurious Emission 2GHz~25GHz

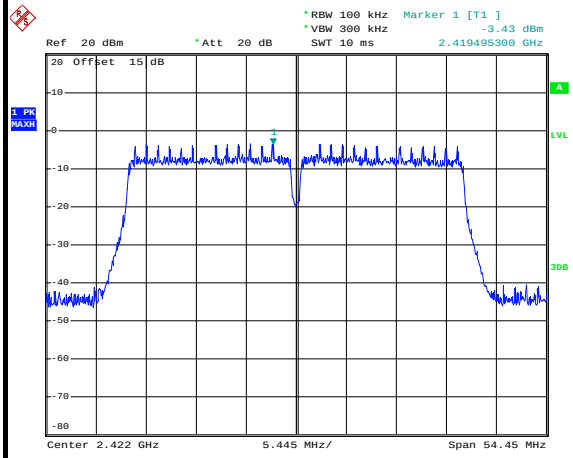


Date: 8.JUN.2015 17:37:11

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

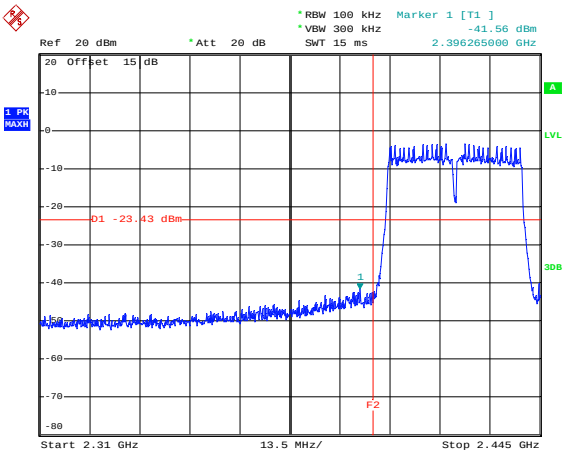
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



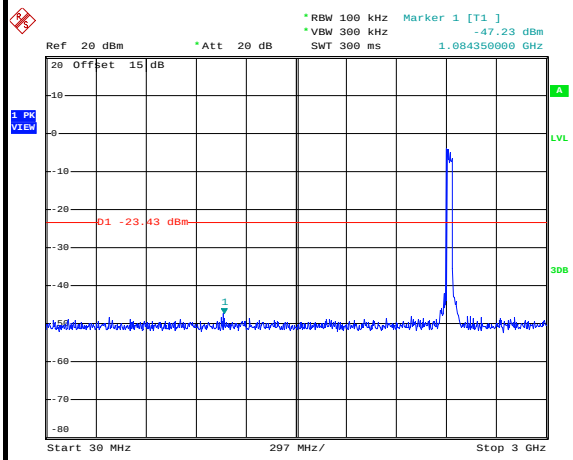
Date: 8.JUN.2015 17:44:57

Low Channel Plot



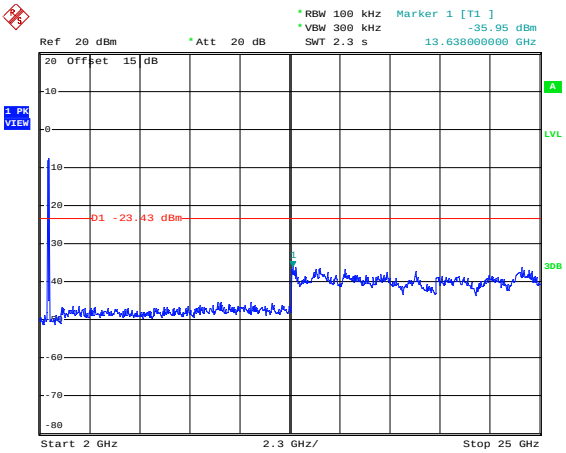
Date: 8.JUN.2015 17:45:40

Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 17:52:24

Spurious Emission 2GHz~25GHz

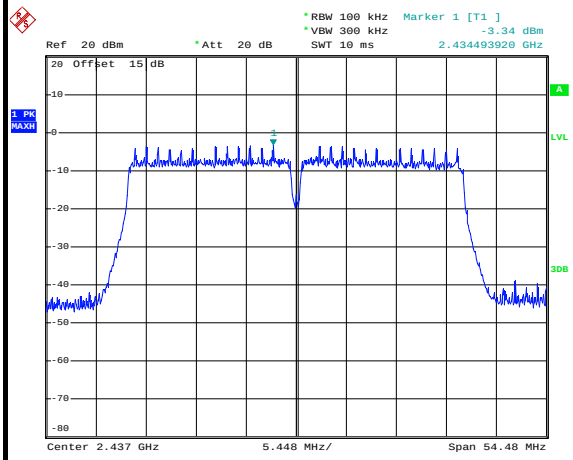


Date: 8.JUN.2015 17:50:42

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

WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



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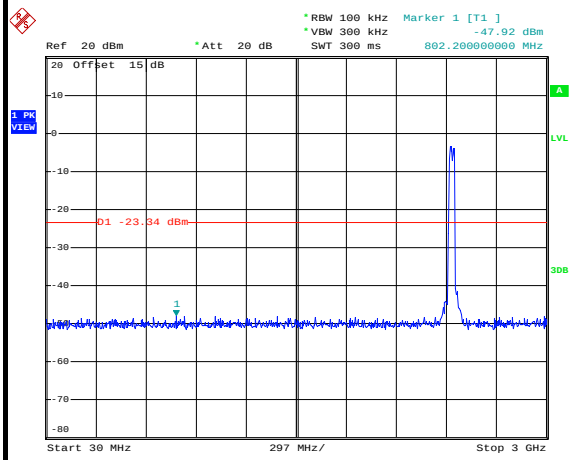
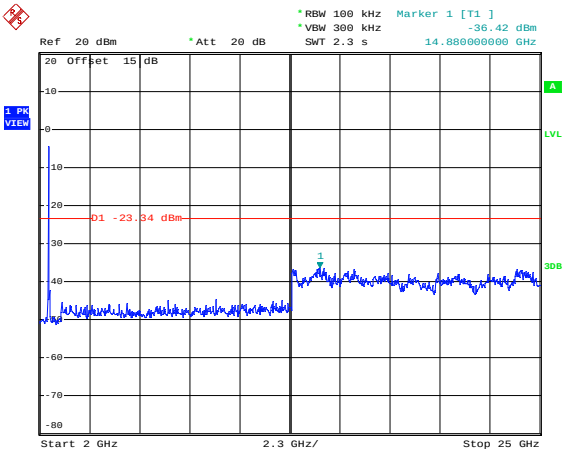
Spurious Emission 30MHz~3GHz



Date: 8.JUN.2015 18:01:40

Spurious Emission 2GHz~25GHz

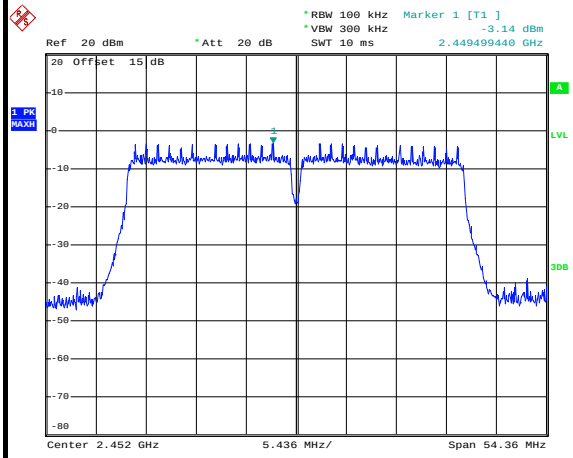


Date: 8.JUN.2015 18:00:07

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

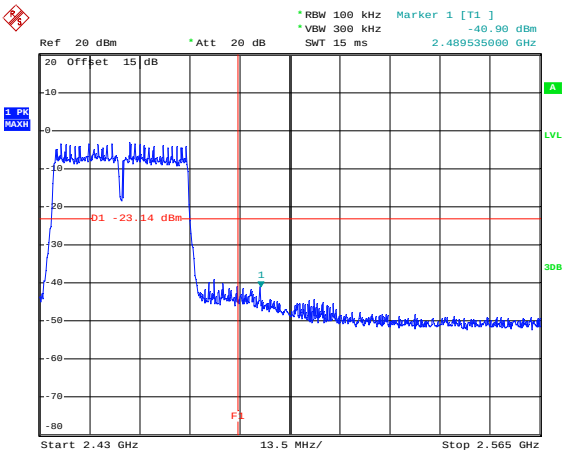
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



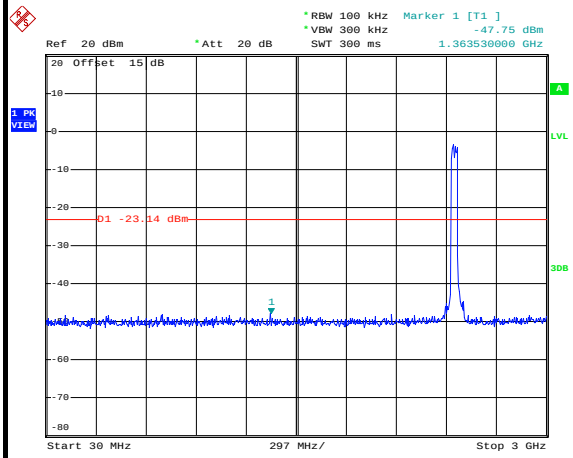
Date: 8.JUN.2015 18:08:28

High Channel Plot



Date: 8.JUN.2015 18:09:20

Spurious Emission 30MHz~3GHz



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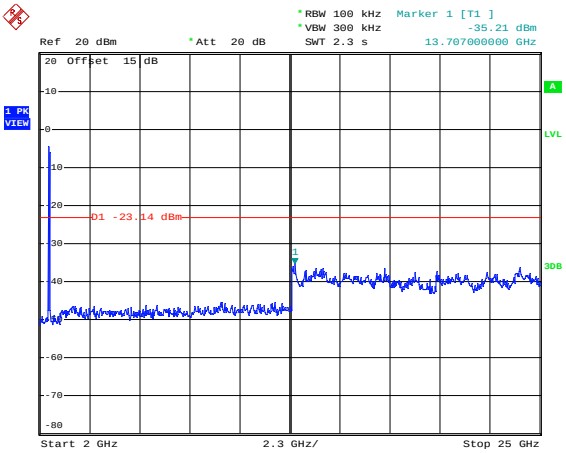
Spurious Emission 2GHz~25GHz



Date: 8.JUN.2015 18:12:01

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.

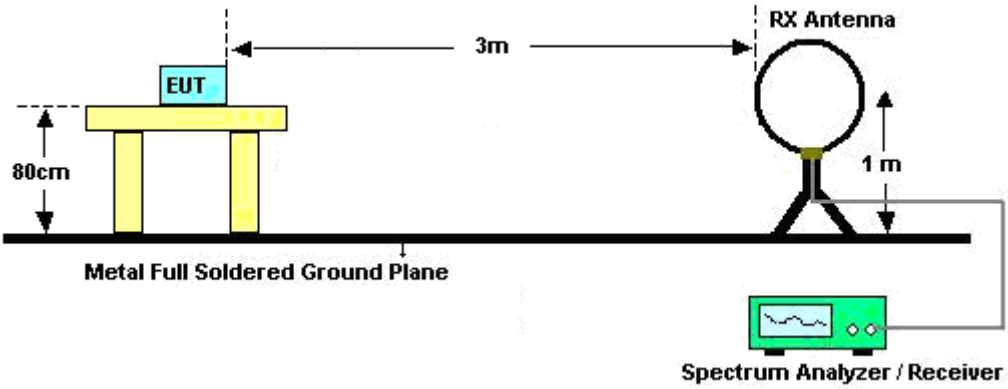
3.5.3 Test Procedures

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.

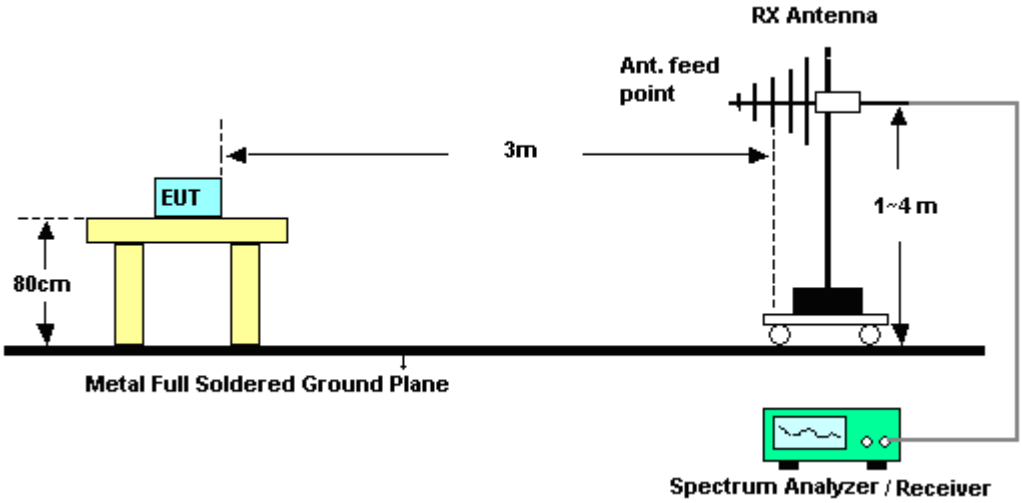
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	98.25	-	-	10Hz
802.11g	89.17	1.40	0.71	1kHz
2.4GHz 802.11n HT20	88.28	1.30	0.77	1kHz
2.4GHz 802.11n HT40	79.08	0.63	1.59	3kHz

3.5.4 Test Setup

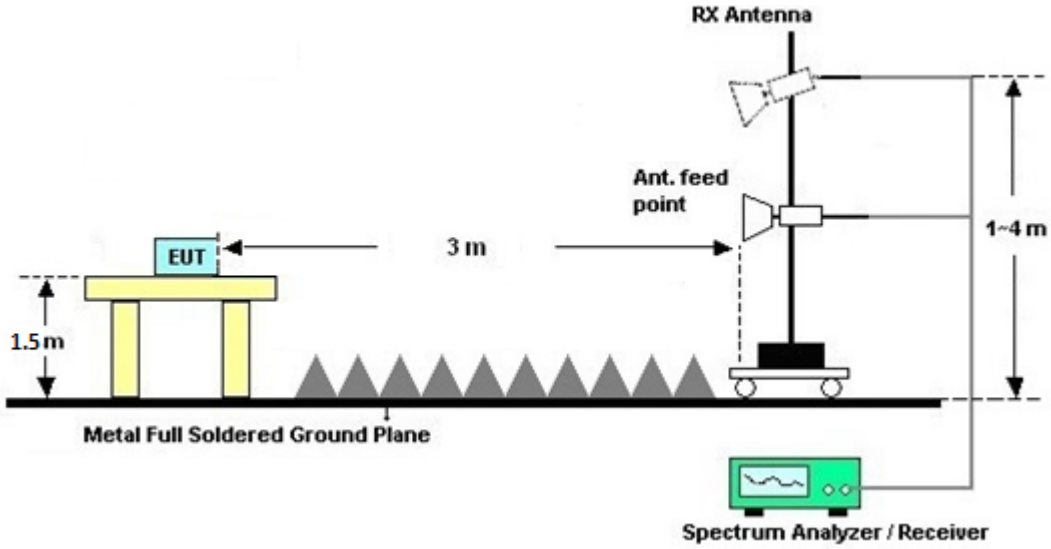
For radiated emissions below 30MHz



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.

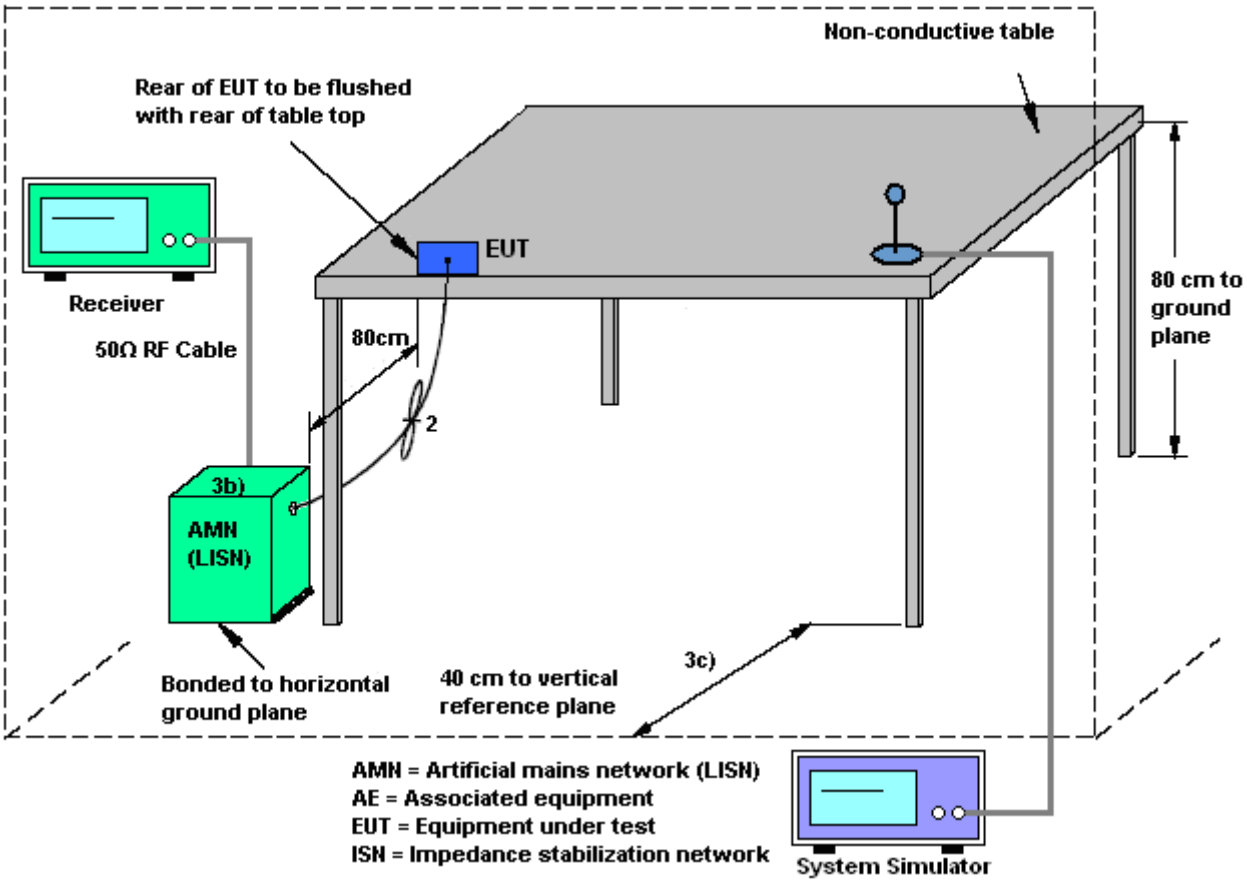
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

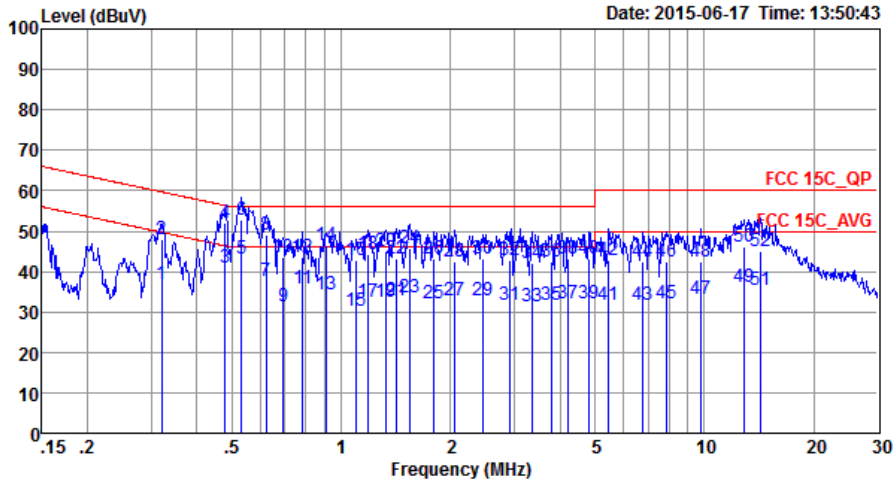
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other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

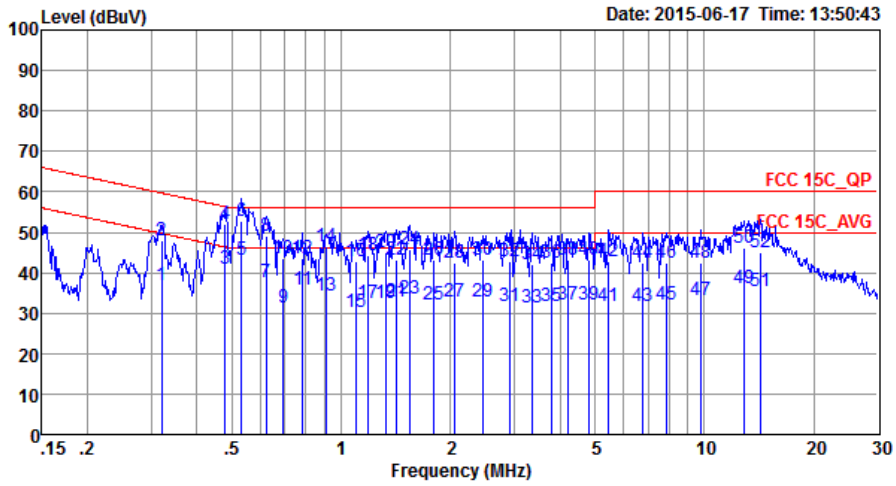
Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Jacky Yang	**Relative Humidity :**	41~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter) + SIM1		



Site : CO01-SZ
Condition: FCC 15C QP LISN L 20150304 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.32	36.76	-12.95	49.71	26.01	0.56	10.19	Average
2		0.32	48.06	-11.65	59.71	37.31	0.56	10.19	QP
3		0.48	41.00	-5.36	46.36	30.19	0.65	10.16	Average
4		0.48	52.00	-4.36	56.36	41.19	0.65	10.16	QP
5	*	0.53	43.00	-3.00	46.00	32.20	0.65	10.15	Average
6		0.53	52.90	-3.10	56.00	42.10	0.65	10.15	QP
7		0.62	37.54	-8.46	46.00	26.80	0.59	10.15	Average
8		0.62	49.04	-6.96	56.00	38.30	0.59	10.15	QP
9		0.69	31.39	-14.61	46.00	20.70	0.54	10.15	Average
10		0.69	43.49	-12.51	56.00	32.80	0.54	10.15	QP
11		0.78	35.88	-10.12	46.00	25.20	0.53	10.15	Average
12		0.78	43.58	-12.42	56.00	32.90	0.53	10.15	QP
13		0.91	34.37	-11.63	46.00	23.70	0.52	10.15	Average
14		0.91	46.37	-9.63	56.00	35.70	0.52	10.15	QP
15		1.10	30.16	-15.84	46.00	19.50	0.50	10.16	Average
16		1.10	42.76	-13.24	56.00	32.10	0.50	10.16	QP
17		1.19	32.46	-13.54	46.00	21.80	0.50	10.16	Average
18		1.19	44.26	-11.74	56.00	33.60	0.50	10.16	QP
19		1.33	32.66	-13.34	46.00	22.00	0.49	10.17	Average
20		1.33	44.86	-11.14	56.00	34.20	0.49	10.17	QP
21		1.42	32.95	-13.05	46.00	22.30	0.48	10.17	Average
22		1.42	43.05	-12.95	56.00	32.40	0.48	10.17	QP
23		1.55	33.75	-12.25	46.00	23.10	0.48	10.17	Average
24		1.55	45.75	-10.25	56.00	35.10	0.48	10.17	QP
25		1.80	32.25	-13.75	46.00	21.60	0.47	10.18	Average
26		1.80	43.25	-12.75	56.00	32.60	0.47	10.18	QP
27		2.04	32.96	-13.04	46.00	22.30	0.47	10.19	Average
28		2.04	42.56	-13.44	56.00	31.90	0.47	10.19	QP
29		2.45	32.70	-13.30	46.00	22.00	0.50	10.20	Average

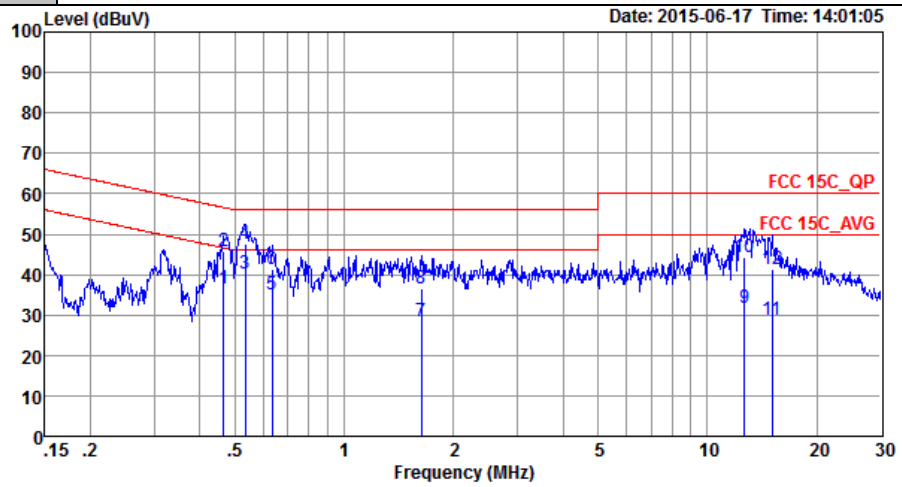
Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Jacky Yang	**Relative Humidity :**	41~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter) + SIM1		



Site : CO01-SZ
Condition: FCC 15C QP LISN_L_20150304 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
30	2.45	43.10	-12.90	56.00	32.40	0.50	10.20	QP
31	2.90	31.65	-14.35	46.00	20.90	0.54	10.21	Average
32	2.90	42.95	-13.05	56.00	32.20	0.54	10.21	QP
33	3.35	31.49	-14.51	46.00	20.70	0.57	10.22	Average
34	3.35	42.19	-13.81	56.00	31.40	0.57	10.22	QP
35	3.78	31.62	-14.38	46.00	20.80	0.60	10.22	Average
36	3.78	42.42	-13.58	56.00	31.60	0.60	10.22	QP
37	4.20	32.05	-13.95	46.00	21.20	0.62	10.23	Average
38	4.20	43.25	-12.75	56.00	32.40	0.62	10.23	QP
39	4.82	32.27	-13.73	46.00	21.40	0.63	10.24	Average
40	4.82	43.07	-12.93	56.00	32.20	0.63	10.24	QP
41	5.45	31.90	-18.10	50.00	21.00	0.65	10.25	Average
42	5.45	42.80	-17.20	60.00	31.90	0.65	10.25	QP
43	6.77	31.75	-18.25	50.00	20.81	0.67	10.27	Average
44	6.77	42.55	-17.45	60.00	31.61	0.67	10.27	QP
45	7.85	32.23	-17.77	50.00	21.30	0.64	10.29	Average
46	7.85	42.53	-17.47	60.00	31.60	0.64	10.29	QP
47	9.76	33.07	-16.93	50.00	22.20	0.55	10.32	Average
48	9.76	42.37	-17.63	60.00	31.50	0.55	10.32	QP
49	12.92	36.14	-13.86	50.00	25.00	0.69	10.45	Average
50	12.92	46.04	-13.96	60.00	34.90	0.69	10.45	QP
51	14.29	35.56	-14.44	50.00	24.30	0.75	10.51	Average
52	14.29	44.96	-15.04	60.00	33.70	0.75	10.51	QP

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Jacky Yang	**Relative Humidity :**	41~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter) + SIM1		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_N_20150304 NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.47	36.65	-9.93	46.58	25.90	0.59	10.16	Average
2		0.47	45.85	-10.73	56.58	35.10	0.59	10.16	QP
3	*	0.53	40.15	-5.85	46.00	29.40	0.60	10.15	Average
4		0.53	47.45	-8.55	56.00	36.70	0.60	10.15	QP
5		0.63	35.12	-10.88	46.00	24.40	0.57	10.15	Average
6		0.63	41.42	-14.58	56.00	30.70	0.57	10.15	QP
7		1.63	28.24	-17.76	46.00	17.49	0.57	10.18	Average
8		1.63	36.44	-19.56	56.00	25.69	0.57	10.18	QP
9		12.65	31.73	-18.27	50.00	20.58	0.71	10.44	Average
10		12.65	44.45	-15.55	60.00	33.30	0.71	10.44	QP
11		15.07	28.64	-21.36	50.00	17.40	0.71	10.53	Average
12		15.07	41.34	-18.66	60.00	30.10	0.71	10.53	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~40GHz	Jan. 28, 2015	Jun. 08, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Jan. 28, 2015	Jun. 08, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Jan. 28, 2015	Jun. 08, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 25, 2015	Jun. 04, 2015	May 24, 2016	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz; Max 30dBm	Sep. 25, 2014	Jun. 04, 2015	Sep. 24, 2015	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 06, 2015	Jun. 04, 2015	May 05, 2016	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz~2GHz	Nov. 07, 2014	Jun. 04, 2015	Nov. 06, 2015	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Oct. 15, 2014	Jun. 04, 2015	Oct. 14, 2015	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101073	18GHz~40GHz	Jun. 09, 2014	Jun. 04, 2015	Jun. 08, 2015	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz / 30 dB	Jan. 28, 2015	Jun. 04, 2015	Jan. 27, 2016	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 05, 2015	Jun. 04, 2015	May 04, 2016	Radiation (03CH01-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 28, 2015	Jun. 04, 2015	Jan. 27, 2016	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jun. 04, 2015	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 04, 2015	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jun. 04, 2015	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESCI7	100724	9kHz~3GHz	Jan. 28, 2015	Jun. 01, 2015~ Jun. 17, 2015	Jan. 27, 2016	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	103892	9kHz~30MHz	Feb. 02, 2015	Jun. 01, 2015~ Jun. 17, 2015	Feb. 01, 2016	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	AN3016	16850	9kHz~30MHz	Feb. 02, 2015	Jun. 01, 2015~ Jun. 17, 2015	Feb. 01, 2016	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Sep. 29, 2014	Jun. 01, 2015~ Jun. 17, 2015	Sep. 28, 2015	Conduction (CO01-SZ)
Pulse Limiter	COM-POWER	LIT-153 Transient Limiter	53139	150kHz~30MHz	Oct. 24, 2014	Jun. 01, 2015~ Jun. 17, 2015	Oct. 23, 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 : FR552904C

Test Engineer:	Tiny You	Temperature:	24~26	°C
Test Date:	2015/6/8	Relative Humidity:	50~53	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	12.35	9.52	0.50	Pass
11b	1Mbps	1	6	2437	12.35	9.52	0.50	Pass
11b	1Mbps	1	11	2462	12.35	9.08	0.50	Pass
11g	6Mbps	1	1	2412	17.75	16.36	0.50	Pass
11g	6Mbps	1	6	2437	17.75	16.36	0.50	Pass
11g	6Mbps	1	11	2462	17.75	16.34	0.50	Pass
HT20	MCS0	1	1	2412	18.40	17.60	0.50	Pass
HT20	MCS0	1	6	2437	18.50	17.60	0.50	Pass
HT20	MCS0	1	11	2462	18.55	17.60	0.50	Pass
HT40	MCS0	1	3	2422	36.50	36.30	0.50	Pass
HT40	MCS0	1	6	2437	36.60	36.32	0.50	Pass
HT40	MCS0	1	9	2452	36.50	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	15.66	30.00	1.50	17.16	36.00	Pass
11b	1Mbps	1	6	2437	15.78	30.00	1.50	17.28	36.00	Pass
11b	1Mbps	1	11	2462	15.82	30.00	1.50	17.32	36.00	Pass
11g	6Mbps	1	1	2412	21.67	30.00	1.50	23.17	36.00	Pass
11g	6Mbps	1	6	2437	21.74	30.00	1.50	23.24	36.00	Pass
11g	6Mbps	1	11	2462	21.87	30.00	1.50	23.37	36.00	Pass
HT20	MCS0	1	1	2412	21.64	30.00	1.50	23.14	36.00	Pass
HT20	MCS0	1	6	2437	21.73	30.00	1.50	23.23	36.00	Pass
HT20	MCS0	1	11	2462	21.84	30.00	1.50	23.34	36.00	Pass
HT40	MCS0	1	3	2422	22.31	30.00	1.50	23.81	36.00	Pass
HT40	MCS0	1	6	2437	22.38	30.00	1.50	23.88	36.00	Pass
HT40	MCS0	1	9	2452	22.47	30.00	1.50	23.97	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.08	12.61
11b	1Mbps	1	6	2437	0.08	12.76
11b	1Mbps	1	11	2462	0.08	12.79
11g	6Mbps	1	1	2412	0.50	10.78
11g	6Mbps	1	6	2437	0.50	10.81
11g	6Mbps	1	11	2462	0.50	10.86
HT20	MCS0	1	1	2412	0.54	10.77
HT20	MCS0	1	6	2437	0.54	10.81
HT20	MCS0	1	11	2462	0.54	10.85
HT40	MCS0	1	3	2422	1.02	10.73
HT40	MCS0	1	6	2437	1.02	10.80
HT40	MCS0	1	9	2452	1.02	10.84

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-9.82	1.50	8.00	Pass
11b	1Mbps	1	6	2437	-10.60	1.50	8.00	Pass
11b	1Mbps	1	11	2462	-10.39	1.50	8.00	Pass
11g	6Mbps	1	1	2412	-14.09	1.50	8.00	Pass
11g	6Mbps	1	6	2437	-15.02	1.50	8.00	Pass
11g	6Mbps	1	11	2462	-14.38	1.50	8.00	Pass
HT20	MCS0	1	1	2412	-14.87	1.50	8.00	Pass
HT20	MCS0	1	6	2437	-13.69	1.50	8.00	Pass
HT20	MCS0	1	11	2462	-14.40	1.50	8.00	Pass
HT40	MCS0	1	3	2422	-17.53	1.50	8.00	Pass
HT40	MCS0	1	6	2437	-18.32	1.50	8.00	Pass
HT40	MCS0	1	9	2452	-17.51	1.50	8.00	Pass

Appendix B. Radiated Spurious Emission

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant. 1+2	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		2379.21	47.11	-26.89	74	50.15	27.19	4.79	35.02	171	332	P	H
		2382.45	33.98	-20.02	54	37.02	27.19	4.79	35.02	171	332	A	H
	*	2412	98.67	-	-	101.54	27.31	4.82	35	171	332	P	H
	*	2412	93.77	-	-	96.64	27.31	4.82	35	171	332	A	H
		2386.5	46.9	-27.1	74	49.88	27.25	4.79	35.02	184	350	P	V
		2382.63	34.04	-19.96	54	37.08	27.19	4.79	35.02	184	350	A	V
	*	2412	98.1	-	-	100.97	27.31	4.82	35	184	350	P	V
	*	2412	93.17	-	-	96.04	27.31	4.82	35	184	350	A	V
802.11b CH 06 2437MHz		2379.39	44.56	-29.44	74	47.6	27.19	4.79	35.02	150	310	P	H
		2355.99	32.07	-21.93	54	35.25	27.13	4.74	35.05	150	310	A	H
	*	2437	96.57	-	-	99.3	27.42	4.82	34.97	150	310	P	H
	*	2437	91.63	-	-	94.36	27.42	4.82	34.97	150	310	A	H
		2484.16	44.16	-29.84	74	46.69	27.54	4.85	34.92	150	310	P	H
		2488.32	29.4	-24.6	54	31.83	27.6	4.89	34.92	150	310	A	H
		2378.22	43.96	-30.04	74	47	27.19	4.79	35.02	186	350	P	V
		2355.99	31.57	-22.43	54	34.75	27.13	4.74	35.05	186	350	A	V
	*	2437	98.1	-	-	100.83	27.42	4.82	34.97	186	350	P	V
	*	2437	93.2	-	-	95.93	27.42	4.82	34.97	186	350	A	V
		2489.16	43.71	-30.29	74	46.14	27.6	4.89	34.92	186	350	P	V
		2488.4	29.7	-24.3	54	32.13	27.6	4.89	34.92	186	350	A	V

802.11b CH 11 2462MHz	*	2462	97.93	-	-	100.55	27.48	4.85	34.95	178	317	P	H
	*	2462	93.03	-	-	95.65	27.48	4.85	34.95	178	317	A	H
		2493.76	46.67	-27.33	74	49.08	27.6	4.89	34.9	178	317	P	H
		2483.52	31.48	-22.52	54	34.01	27.54	4.85	34.92	178	317	A	H
	*	2462	98.76	-	-	101.38	27.48	4.85	34.95	175	72	P	V
	*	2462	93.91	-	-	96.53	27.48	4.85	34.95	175	72	A	V
		2489.72	45	-29	74	47.43	27.6	4.89	34.92	175	72	P	V
		2483.52	31.49	-22.51	54	34.02	27.54	4.85	34.92	175	72	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 Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		4824	43.33	-30.67	74	63.7	31.05	6.97	58.39	110	360	P	H
		4824	43.84	-30.16	74	64.21	31.05	6.97	58.39	110	360	P	V
802.11b CH 06 2437MHz		4874	42.98	-31.02	74	63.53	31.12	6.99	58.66	100	360	P	H
		7311	45.68	-28.32	74	60.12	35.96	8.22	58.62	174	100	P	H
		4874	42.84	-31.16	74	63.39	31.12	6.99	58.66	100	360	P	V
		7311	44.85	-29.15	74	59.29	35.96	8.22	58.62	174	100	P	V
802.11b CH 11 2462MHz		4924	44.56	-29.44	74	64.89	31.19	7	58.52	146	347	P	H
		7386	44.89	-29.11	74	59.08	36.08	8.27	58.54	145	274	P	H
		4924	44.13	-29.87	74	64.46	31.19	7	58.52	146	347	P	V
		7386	46.25	-27.75	74	60.44	36.08	8.27	58.54	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 Ant. 1+2	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		2388.03	62.25	-11.75	74	65.23	27.25	4.79	35.02	177	308	P	H
		2389.83	41.96	-12.04	54	44.92	27.25	4.79	35	177	308	A	H
	*	2412	100.07	-	-	102.94	27.31	4.82	35	177	308	P	H
	*	2412	89.4	-	-	92.27	27.31	4.82	35	177	308	A	H
		2389.02	60.22	-13.78	74	63.2	27.25	4.79	35.02	158	19	P	V
		2389.92	38.9	-15.1	54	41.86	27.25	4.79	35	158	19	A	V
	*	2412	97.45	-	-	100.32	27.31	4.82	35	158	19	P	V
	*	2412	87.03	-	-	89.9	27.31	4.82	35	158	19	A	V
802.11g CH 06 2437MHz		2381.55	47.21	-26.79	74	50.25	27.19	4.79	35.02	202	212	P	H
		2356.98	35.03	-18.97	54	38.21	27.13	4.74	35.05	202	212	A	H
	*	2437	99.14	-	-	101.87	27.42	4.82	34.97	202	212	P	H
	*	2437	88.38	-	-	91.11	27.42	4.82	34.97	202	212	A	H
		2486.76	46.5	-27.5	74	49.03	27.54	4.85	34.92	202	212	P	H
		2484.28	32.42	-21.58	54	34.95	27.54	4.85	34.92	202	212	A	H
		2357.07	47.15	-26.85	74	50.33	27.13	4.74	35.05	150	74	P	V
		2357.16	35.49	-18.51	54	38.67	27.13	4.74	35.05	150	74	A	V
	*	2437	99.21	-	-	101.94	27.42	4.82	34.97	150	74	P	V
	*	2437	88.44	-	-	91.17	27.42	4.82	34.97	150	74	A	V
		2483.72	46.84	-27.16	74	49.37	27.54	4.85	34.92	150	74	P	V
		2485.24	32.17	-21.83	54	34.7	27.54	4.85	34.92	150	74	A	V

802.11g CH 11 2462MHz	*	2462	96.25	-	-	98.87	27.48	4.85	34.95	207	335	P	H
	*	2462	86.11	-	-	88.73	27.48	4.85	34.95	207	335	A	H
		2485.36	63.45	-10.55	74	65.98	27.54	4.85	34.92	207	335	P	H
		2483.56	38.5	-15.5	54	41.03	27.54	4.85	34.92	207	335	A	H
	*	2462	97.13	-	-	99.75	27.48	4.85	34.95	181	10	P	V
	*	2462	86.78	-	-	89.4	27.48	4.85	34.95	181	10	A	V
		2484.08	62.4	-11.6	74	64.93	27.54	4.85	34.92	181	10	P	V
		2483.72	39.78	-14.22	54	42.31	27.54	4.85	34.92	181	10	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 Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		4824	45.17	-28.83	74	65.54	31.05	6.97	58.39	110	360	P	H
		4824	42.91	-31.09	74	63.28	31.05	6.97	58.39	110	360	P	V
802.11g CH 06 2437MHz		4874	43.93	-30.07	74	64.48	31.12	6.99	58.66	100	360	P	H
		7311	45.98	-28.02	74	60.42	35.96	8.22	58.62	174	100	P	H
		4874	42.88	-31.12	74	63.43	31.12	6.99	58.66	100	360	P	V
		7311	45.67	-28.33	74	60.11	35.96	8.22	58.62	174	100	P	V
802.11g CH 11 2462MHz		4924	44.12	-29.88	74	64.45	31.19	7	58.52	146	347	P	H
		7386	45.47	-28.53	74	59.66	36.08	8.27	58.54	145	274	P	H
		4924	43.79	-30.21	74	64.12	31.19	7	58.52	146	347	P	V
		7386	44.6	-29.4	74	58.79	36.08	8.27	58.54	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 Ant. 1+2	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.56	60.76	-13.24	74	63.74	27.25	4.79	35.02	212	290	P	H
		2389.83	41.43	-12.57	54	44.39	27.25	4.79	35	212	290	A	H
	*	2412	96.64	-	-	99.51	27.31	4.82	35	212	290	P	H
	*	2412	86.5	-	-	89.37	27.31	4.82	35	212	290	A	H
		2389.29	62.61	-11.39	74	65.59	27.25	4.79	35.02	188	352	P	V
		2389.92	42.96	-11.04	54	45.92	27.25	4.79	35	188	352	A	V
	*	2412	98.75	-	-	101.62	27.31	4.82	35	188	352	P	V
	*	2412	88.65	-	-	91.52	27.31	4.82	35	188	352	A	V
802.11n HT20 CH 06 2437MHz		2383.62	49.64	-24.36	74	52.68	27.19	4.79	35.02	210	212	P	H
		2357.07	37.57	-16.43	54	40.75	27.13	4.74	35.05	210	212	A	H
	*	2437	98.06	-	-	100.79	27.42	4.82	34.97	210	212	P	H
	*	2437	87.79	-	-	90.52	27.42	4.82	34.97	210	212	A	H
		2485.56	46.23	-27.77	74	48.76	27.54	4.85	34.92	210	212	P	H
		2483.76	32.71	-21.29	54	35.24	27.54	4.85	34.92	210	212	A	H
		2386.32	48.02	-25.98	74	51	27.25	4.79	35.02	208	75	P	V
		2356.89	35.23	-18.77	54	38.41	27.13	4.74	35.05	208	75	A	V
	*	2437	98.36	-	-	101.09	27.42	4.82	34.97	208	75	P	V
	*	2437	87.58	-	-	90.31	27.42	4.82	34.97	208	75	A	V
		2485.76	46.33	-27.67	74	48.86	27.54	4.85	34.92	208	75	P	V
		2483.92	32.84	-21.16	54	35.37	27.54	4.85	34.92	208	75	A	V

802.11n HT20 CH 11 2462MHz	*	2462	97.49	-	-	100.11	27.48	4.85	34.95	166	303	P	H
	*	2462	86.92	-	-	89.54	27.48	4.85	34.95	166	303	A	H
		2484.24	63.53	-10.47	74	66.06	27.54	4.85	34.92	166	303	P	H
		2483.96	40.78	-13.22	54	43.31	27.54	4.85	34.92	166	303	A	H
	*	2462	98.33	-	-	100.95	27.48	4.85	34.95	225	73	P	V
	*	2462	87.13	-	-	89.75	27.48	4.85	34.95	225	73	A	V
		2483.84	64.83	-9.17	74	67.36	27.54	4.85	34.92	225	73	P	V
		2483.84	41.49	-12.51	54	44.02	27.54	4.85	34.92	225	73	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 Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		4824	42.06	-31.94	74	62.43	31.05	6.97	58.39	110	360	P	H
		4824	42.38	-31.62	74	62.75	31.05	6.97	58.39	110	360	P	V
802.11n HT20 CH 06 2437MHz		4874	44.69	-29.31	74	65.24	31.12	6.99	58.66	100	360	P	H
		7311	45.8	-28.2	74	60.24	35.96	8.22	58.62	174	100	P	H
		4874	43.1	-30.9	74	63.65	31.12	6.99	58.66	100	360	P	V
		7311	44.91	-29.09	74	59.35	35.96	8.22	58.62	174	100	P	V
802.11n HT20 CH 11 2462MHz		4924	45.7	-28.3	74	66.03	31.19	7	58.52	146	347	P	H
		7386	46.69	-27.31	74	60.88	36.08	8.27	58.54	145	274	P	H
		4924	43.63	-30.37	74	63.96	31.19	7	58.52	146	347	P	V
		7386	45.61	-28.39	74	59.8	36.08	8.27	58.54	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 Ant. 1+2	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		2388.48	71.81	-2.19	74	74.79	27.25	4.79	35.02	150	309	P	H
		2389.83	47.81	-6.19	54	50.77	27.25	4.79	35	150	309	A	H
	*	2422	97.24	-	-	100.02	27.37	4.82	34.97	150	309	P	H
	*	2422	86.6	-	-	89.38	27.37	4.82	34.97	150	309	A	H
		2485.92	55.67	-18.33	74	58.2	27.54	4.85	34.92	150	309	P	H
		2483.56	35.19	-18.81	54	37.72	27.54	4.85	34.92	150	309	A	H
		2388.84	67.99	-6.01	74	70.97	27.25	4.79	35.02	161	190	P	V
		2389.47	45.85	-8.15	54	48.83	27.25	4.79	35.02	161	190	A	V
	*	2422	95.58	-	-	98.36	27.37	4.82	34.97	161	190	P	V
	*	2422	84.55	-	-	87.33	27.37	4.82	34.97	161	190	A	V
		2483.52	48.94	-25.06	74	51.47	27.54	4.85	34.92	161	190	P	V
		2484.08	32.65	-21.35	54	35.18	27.54	4.85	34.92	161	190	A	V
802.11n HT40 CH 06 2437MHz		2389.83	57.46	-16.54	74	60.42	27.25	4.79	35	150	316	P	H
		2389.02	38.83	-15.17	54	41.81	27.25	4.79	35.02	150	316	A	H
	*	2437	92.97	-	-	95.7	27.42	4.82	34.97	150	316	P	H
	*	2437	82.77	-	-	85.5	27.42	4.82	34.97	150	316	A	H
		2489.88	57.58	-16.42	74	60.01	27.6	4.89	34.92	150	316	P	H
		2483.56	37.95	-16.05	54	40.48	27.54	4.85	34.92	150	316	A	H
		2389.92	58.38	-15.62	74	61.34	27.25	4.79	35	180	63	P	V
		2389.56	39.42	-14.58	54	42.4	27.25	4.79	35.02	180	63	A	V
	*	2437	95.5	-	-	98.23	27.42	4.82	34.97	180	63	P	V
	*	2437	84.61	-	-	87.34	27.42	4.82	34.97	180	63	A	V
		2491.2	57.62	-16.38	74	60.05	27.6	4.89	34.92	180	63	P	V
		2483.68	36.95	-17.05	54	39.48	27.54	4.85	34.92	180	63	A	V

802.11n HT40 CH 09 2452MHz		2379.12	53.51	-20.49	74	56.55	27.19	4.79	35.02	198	315	P	H
		2389.74	36.66	-17.34	54	39.64	27.25	4.79	35.02	198	315	A	H
	*	2452	96.5	-	-	99.18	27.42	4.85	34.95	198	315	P	H
	*	2452	85.71	-	-	88.39	27.42	4.85	34.95	198	315	A	H
		2486.12	67.67	-6.33	74	70.2	27.54	4.85	34.92	198	315	P	H
		2485.84	47.91	-6.09	54	50.44	27.54	4.85	34.92	198	315	A	H
		2381.73	53.85	-20.15	74	56.89	27.19	4.79	35.02	180	72	P	V
		2389.83	36.53	-17.47	54	39.49	27.25	4.79	35	180	72	A	V
	*	2452	95.12	-	-	97.8	27.42	4.85	34.95	180	72	P	V
	*	2452	85.09	-	-	87.77	27.42	4.85	34.95	180	72	A	V
		2485.76	64.61	-9.39	74	67.14	27.54	4.85	34.92	180	72	P	V
		2484.4	44.8	-9.2	54	47.33	27.54	4.85	34.92	180	72	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 Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 03 2422MHz		4844	42.32	-31.68	74	62.76	31.07	6.97	58.48	100	360	P	H
		7266	45.32	-28.68	74	59.75	35.91	8.19	58.53	200	360	P	H
		4844	42.27	-31.73	74	62.71	31.07	6.97	58.48	100	360	P	V
		7266	46.51	-27.49	74	60.94	35.91	8.19	58.53	200	360	P	V
802.11n HT40 CH 06 2437MHz		4874	43.55	-30.45	74	64.1	31.12	6.99	58.66	100	163	P	H
		7311	45.32	-28.68	74	59.76	35.96	8.22	58.62	120	360	P	H
		4874	42.52	-31.48	74	63.07	31.12	6.99	58.66	100	163	P	V
		7311	45.17	-28.83	74	59.61	35.96	8.22	58.62	120	360	P	V
802.11n HT40 CH 09 2452MHz		4904	43.35	-30.65	74	63.82	31.17	7	58.64	129	360	P	H
		7356	45.24	-28.76	74	59.53	36.03	8.25	58.57	121	320	P	H
		4904	42.96	-31.04	74	63.43	31.17	7	58.64	129	360	P	V
		7356	45.98	-28.02	74	60.27	36.03	8.25	58.57	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 Ant. 1+2	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)
2.4GHz 802.11n HT40 LF		44.55	34.06	-5.94	40	55.37	11.08	1	33.39	200	0	P	H
		169.68	24.96	-18.54	43.5	45.88	10.76	1.53	33.21			P	H
		323.91	23.04	-22.96	46	39.62	14.46	1.94	32.98			P	H
		535.37	23.94	-22.06	46	35.61	18.21	2.48	32.36			P	H
		683.78	22.98	-23.02	46	32.82	19.38	2.71	31.93			P	H
		896.21	24.62	-21.38	46	31.72	21.07	3.09	31.26			P	H
		46.49	33.44	-6.56	40	55.47	10.35	1	33.38	100	0	P	V
		87.23	26.59	-13.41	40	48.5	10.34	1.14	33.39			P	V
		323.91	24.77	-21.23	46	41.35	14.46	1.94	32.98			P	V
		432.55	23.03	-22.97	46	36.53	16.96	2.22	32.68			P	V
		521.79	22.55	-23.45	46	34.46	18.09	2.41	32.41			P	V
		954.41	25.1	-20.9	46	31.52	21.48	3.15	31.05			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 Ant. 1+2	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		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”.