

FCC RF Test Report

APPLICANT : ASUSTeK COMPUTER INC.
EQUIPMENT : ASUS Phone
BRAND NAME : ASUS
MODEL NAME : ASUS_Z00XS
MARKETING NAME : ZX551ML
FCC ID : MSQZ00XS
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jul. 23, 2015 and testing was completed on Sep. 01, 2015. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-328-4978
FCC ID : MSQZ00XS

Page Number : 1 of 39
Report Issued Date : Sep. 25, 2015
Report Version : Rev. 01
Report Template No.: BU5-FR15CWL Version 1.0



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test	5
1.4 Product Specification subjective to this standard	6
1.5 Modification of EUT	6
1.6 Testing Location	6
1.7 Applicable Standards	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Carrier Frequency Channel	8
2.2 Pre-Scanned RF Power	9
2.3 Test Mode	10
2.4 Connection Diagram of Test System	11
2.5 Support Unit used in test configuration and system	12
2.6 EUT Operation Test Setup	12
2.7 Measurement Results Explanation Example	12
3 TEST RESULT	13
3.1 6dB and 99% Bandwidth Measurement	13
3.2 Output Power Measurement	15
3.3 Power Spectral Density Measurement	17
3.4 Conducted Band Edges and Spurious Emission Measurement	19
3.5 Radiated Band Edges and Spurious Emission Measurement	29
3.6 AC Conducted Emission Measurement	33
3.7 Antenna Requirements	37
4 LIST OF MEASURING EQUIPMENT	38
5 UNCERTAINTY OF EVALUATION	39
APPENDIX A. CONDUCTED TEST RESULTS	
APPENDIX B. RADIATED TEST RESULTS	
APPENDIX C. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR561105-02C	Rev. 01	Initial issue of report	Sep. 25, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	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 6.47 dB at 38.370 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.10 dB at 13.558 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

ASUSTeK COMPUTER INC.

4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.2 Manufacturer

ASUSTeK COMPUTER INC.

4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	ASUS Phone
Brand Name	ASUS
Model Name	ASUS_Z00XS
Marketing Name	ZX551ML
FCC ID	MSQZ00XS
Sample 1	EUT in black
Sample 2	EUT in white
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/NFC WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth v4.0 EDR/LE
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. All tests are performed on sample 1.

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 : 18.24 dBm (0.0667 W) 802.11g : 22.04 dBm (0.1600 W) 802.11n HT20 : 21.95 dBm (0.1567 W)
99% Occupied Bandwidth	802.11b : 11.70MHz 802.11g : 18.00MHz 802.11n HT20 : 18.95MHz
Antenna Type	PIFA Antenna type with gain -3.62 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

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2009 requirement.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH10-HY	

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 v03r03
- ♦ ANSI C63.10-2009

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.



2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

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 mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	18.06	18.03	18.22	18.24

2.4GHz 802.11g mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	21.03	20.95	20.88	20.92	21.95	21.99	22.01	22.04

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	20.25	20.23	20.14	21.72	21.81	21.87	21.92	21.95



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.

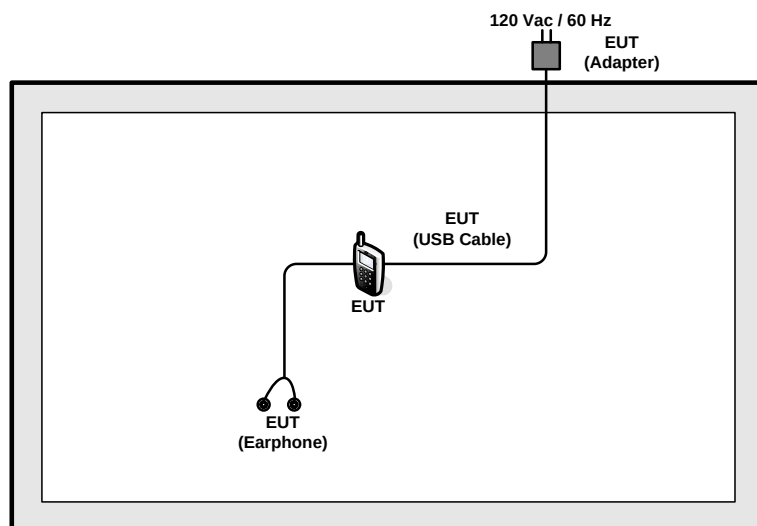
<2.4GHz>

Modulation	Data Rate
802.11b	11 Mbps
802.11g	54 Mbps
802.11n HT20	MCS7

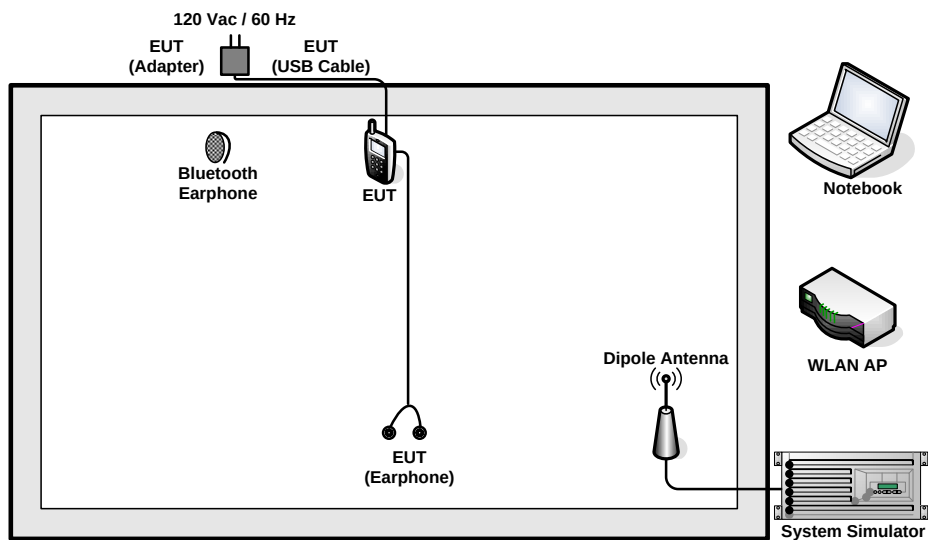
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Link + Bluetooth Link + WLAN (2.4GHz) Link + NFC On + Earphone + SD Card + USB Cable (Charging from Adapter)

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	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
6.	NFC Card	Metro Taipei	Easy Card	N/A	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, "WifiTest" installed in the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

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 4.2 dB and 10dB attenuator.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\
 &= 4.2 + 10 = 14.2 \text{ (dB)}
 \end{aligned}$$

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.

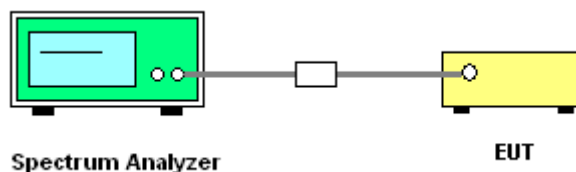
3.1.2 Measuring Instruments

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 v03r03.
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.

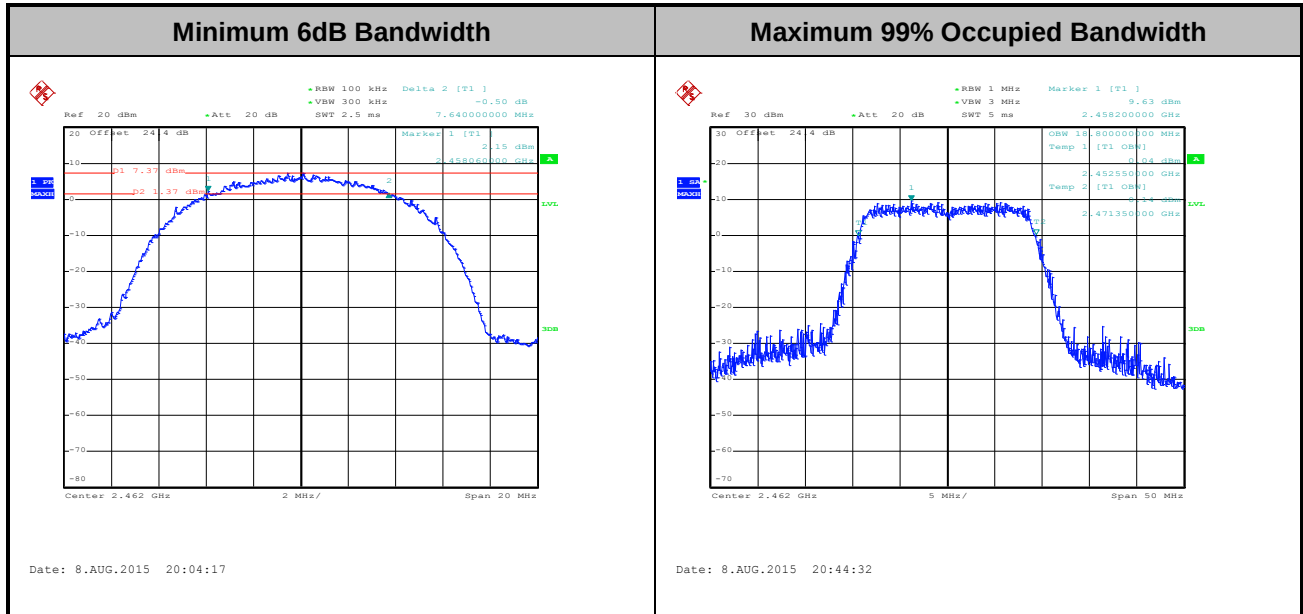
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A of this test report.



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.

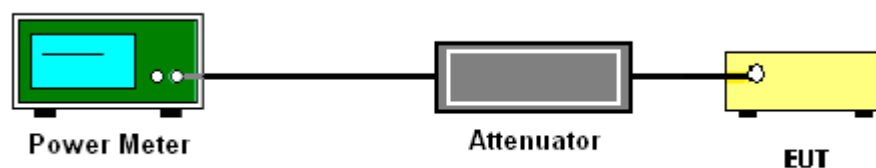
3.2.2 Measuring Instruments

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 v03r03.
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.

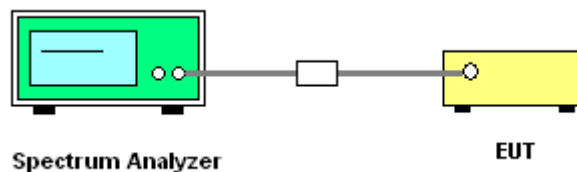
3.3.2 Measuring Instruments

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 v03r03
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.

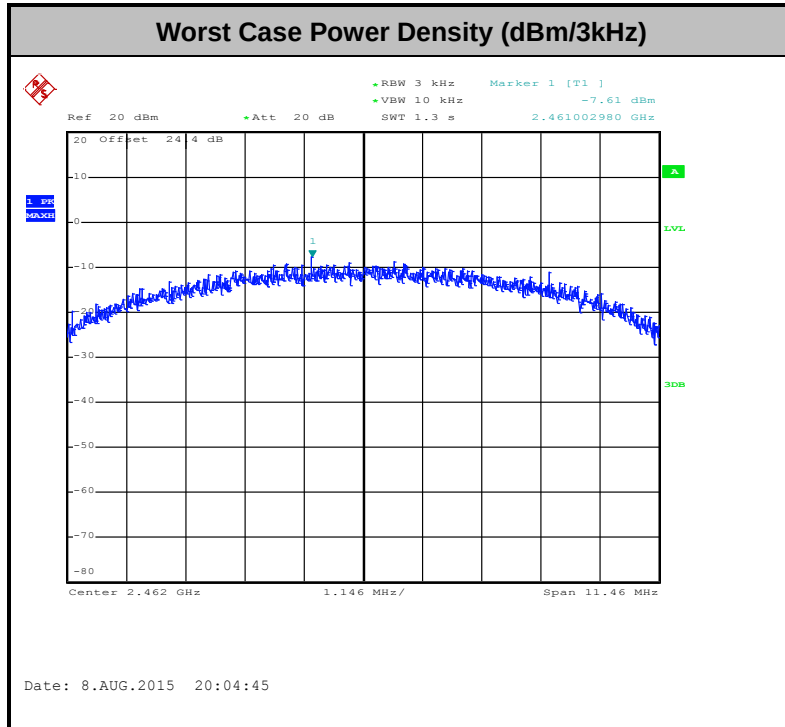
3.3.4 Test Setup





3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.



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).

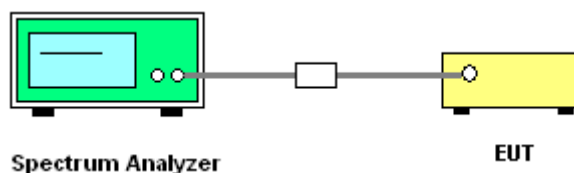
3.4.2 Measuring Instruments

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 v03r03.
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.

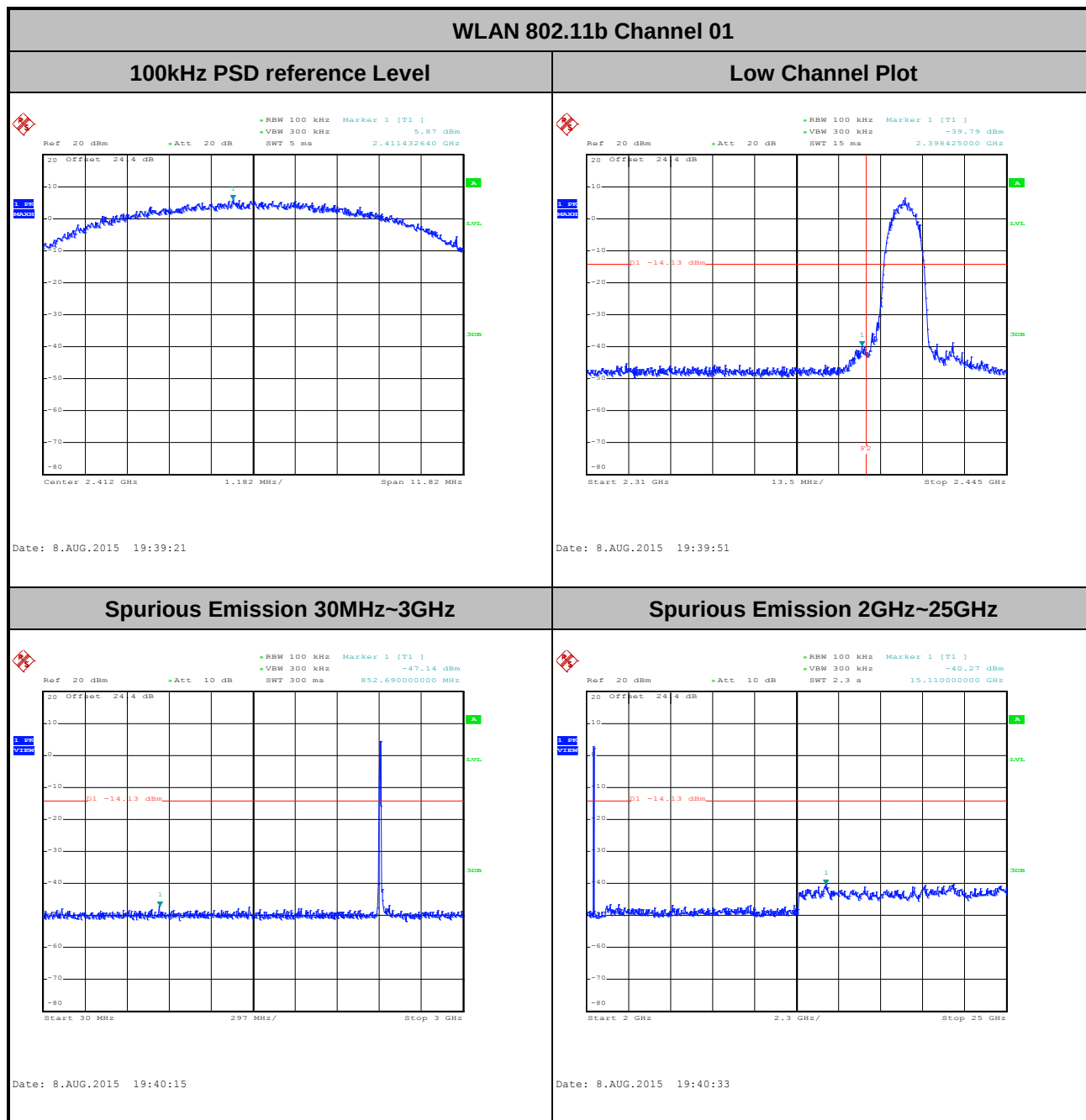
3.4.4 Test Setup





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 :	48~51%
Test Channel :	01	Test Engineer :	Osolemio Chang

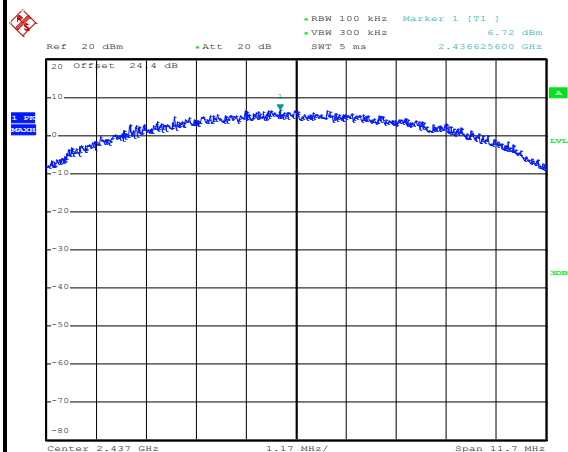




Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	48~51%
Test Channel :	06	Test Engineer :	Osolemio Chang

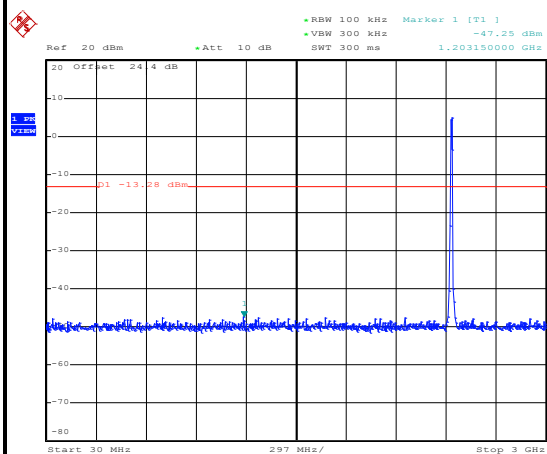
WLAN 802.11b Channel 06

100kHz PSD reference Level



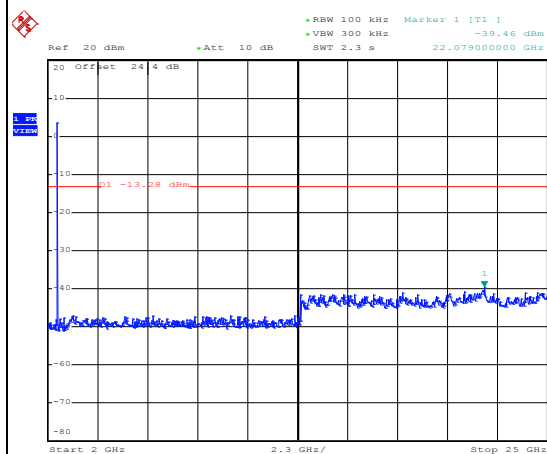
Date: 8.AUG.2015 19:56:59

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 19:58:15

Spurious Emission 2GHz~25GHz



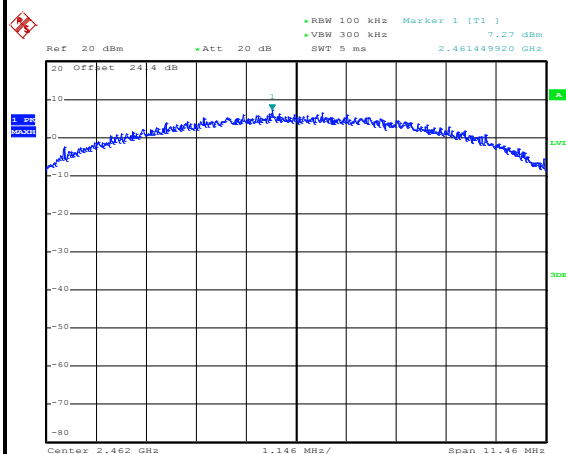
Date: 8.AUG.2015 19:58:33



Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz High	Relative Humidity :	48~51%
Test Channel :	11	Test Engineer :	Osolemio Chang

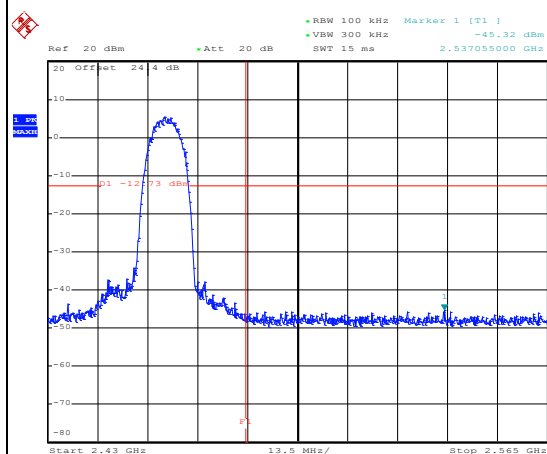
WLAN 802.11b Channel 11

100kHz PSD reference Level



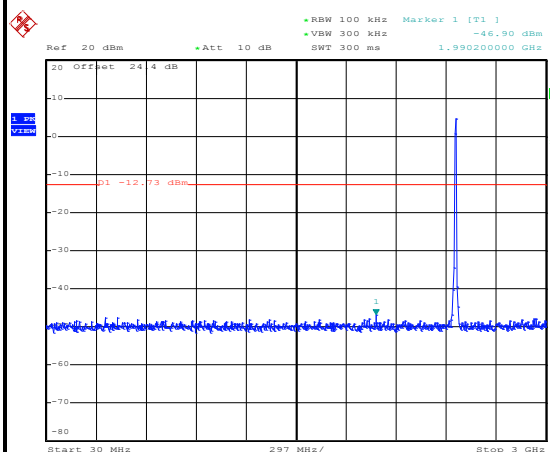
Date: 8.AUG.2015 20:05:30

High Channel Plot



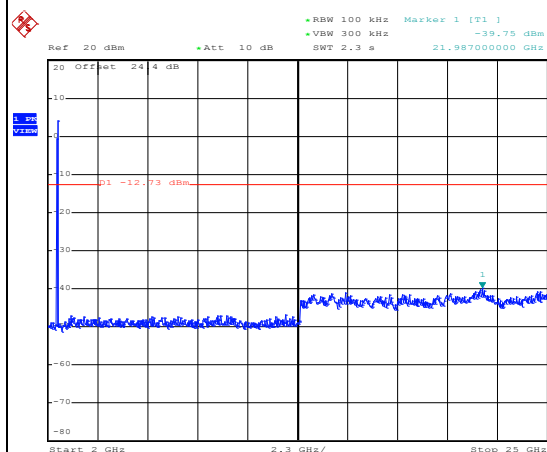
Date: 8.AUG.2015 20:06:09

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:07:11

Spurious Emission 2GHz~25GHz



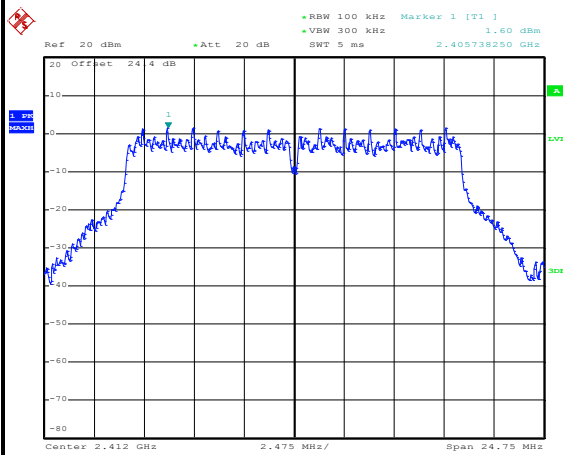
Date: 8.AUG.2015 20:07:29



Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz Low	Relative Humidity :	48~51%
Test Channel :	01	Test Engineer :	Osolemio Chang

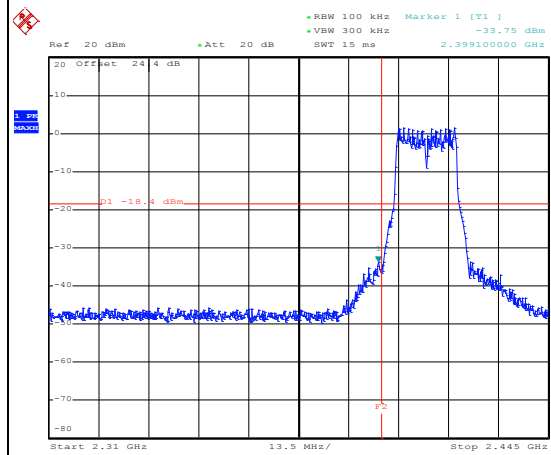
WLAN 802.11g Channel 01

100kHz PSD reference Level



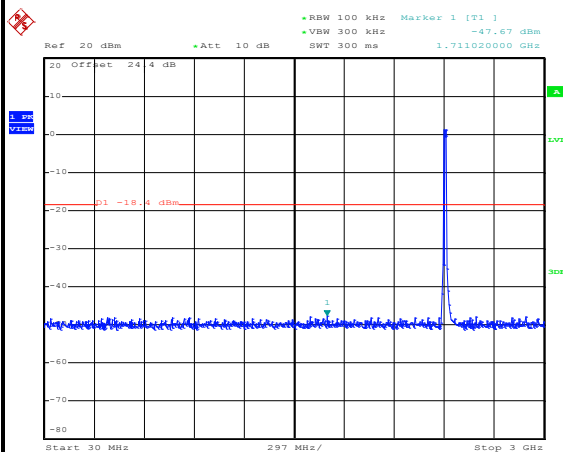
Date: 8.AUG.2015 20:11:28

Low Channel Plot



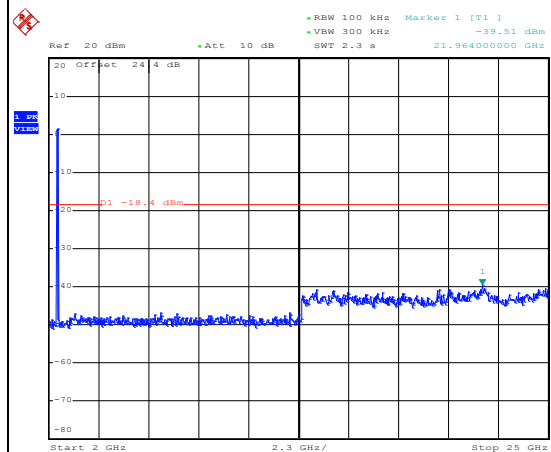
Date: 8.AUG.2015 20:12:12

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:12:36

Spurious Emission 2GHz~25GHz



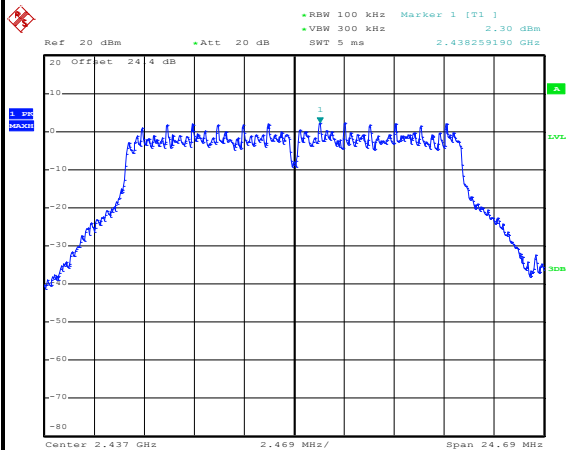
Date: 8.AUG.2015 20:12:54



Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	48~51%
Test Channel :	06	Test Engineer :	Osolemio Chang

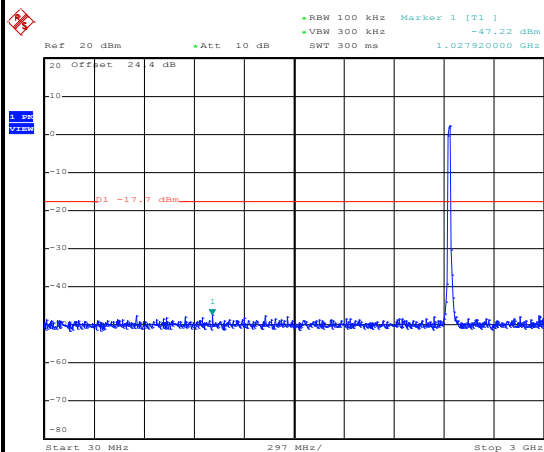
WLAN 802.11g Channel 06

100kHz PSD reference Level



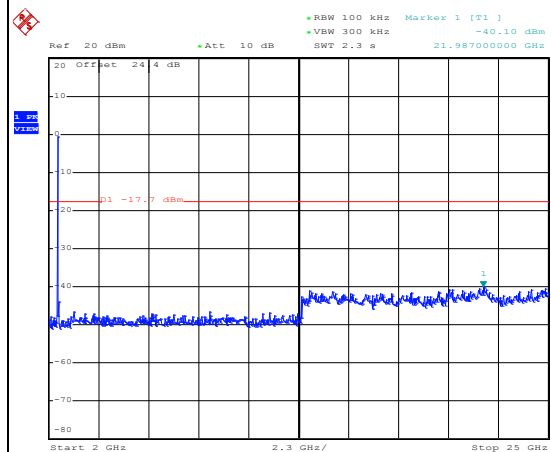
Date: 8.AUG.2015 20:16:06

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:17:11

Spurious Emission 2GHz~25GHz



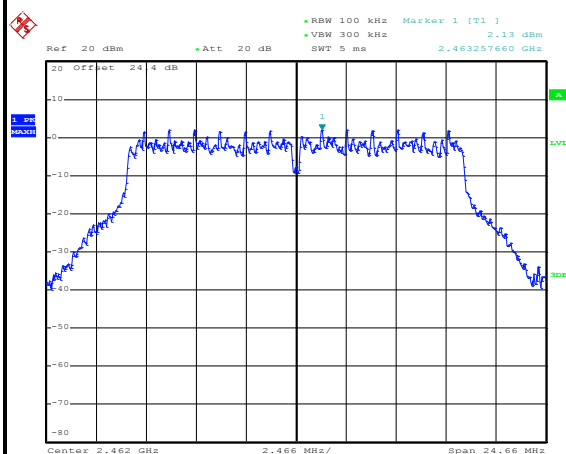
Date: 8.AUG.2015 20:17:28



Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz High	Relative Humidity :	48~51%
Test Channel :	11	Test Engineer :	Osolemio Chang

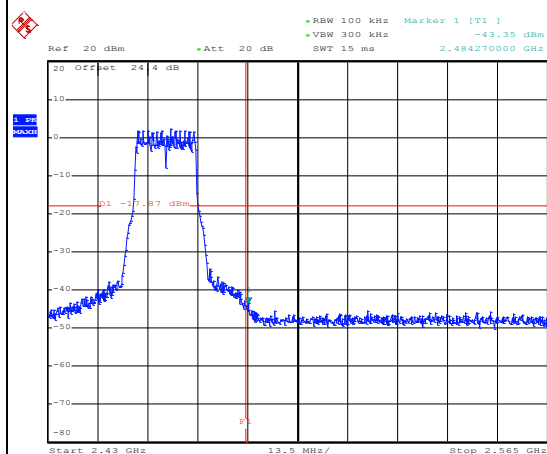
WLAN 802.11g Channel 11

100kHz PSD reference Level



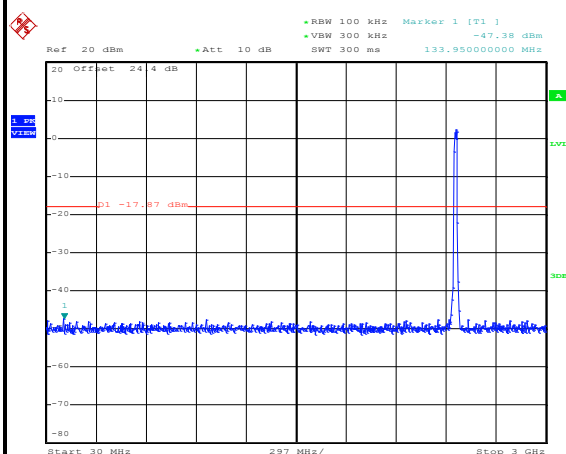
Date: 8.AUG.2015 20:20:47

High Channel Plot



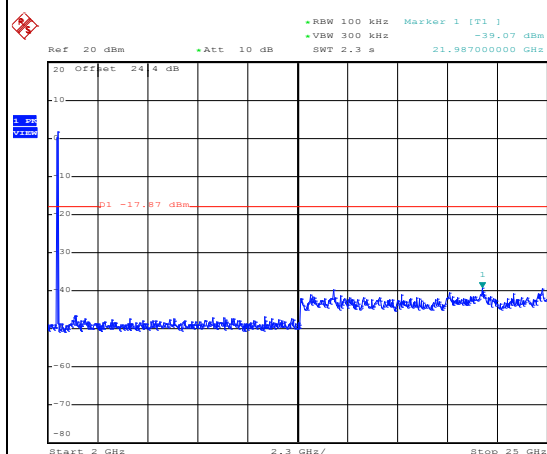
Date: 8.AUG.2015 20:22:02

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:22:27

Spurious Emission 2GHz~25GHz



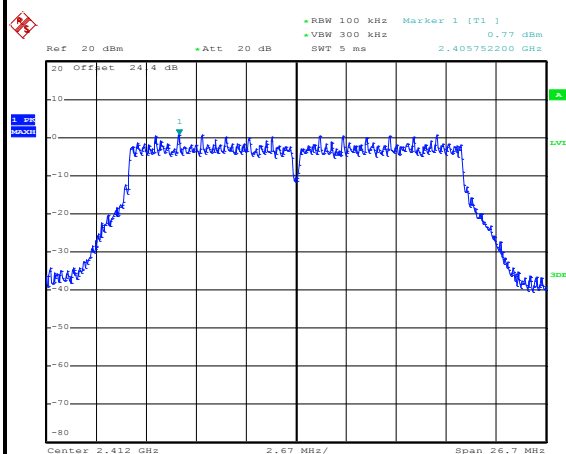
Date: 8.AUG.2015 20:22:44



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz Low	Relative Humidity :	48~51%
Test Channel :	01	Test Engineer :	Osolemio Chang

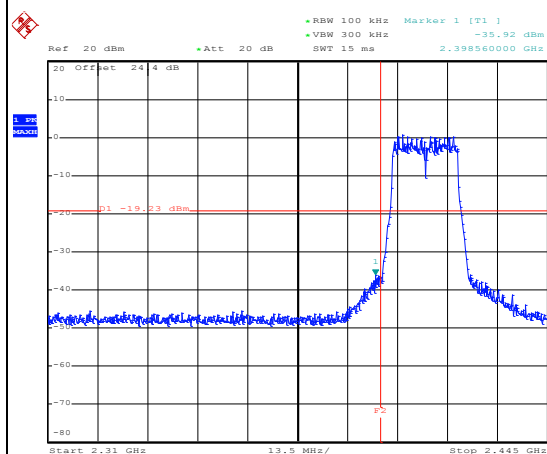
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



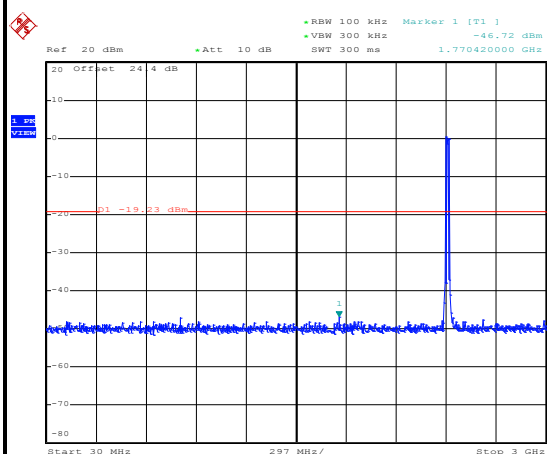
Date: 8.AUG.2015 20:26:25

Low Channel Plot



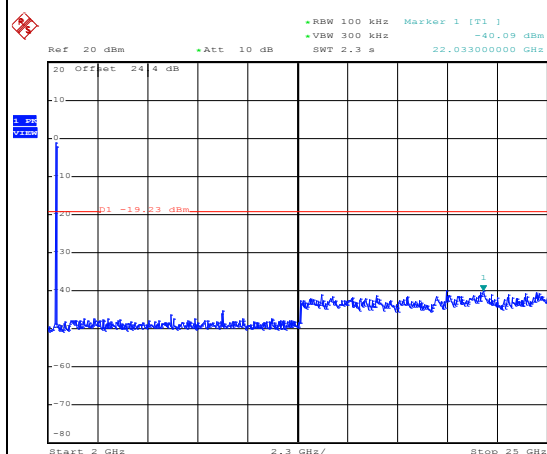
Date: 8.AUG.2015 20:27:06

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:28:31

Spurious Emission 2GHz~25GHz



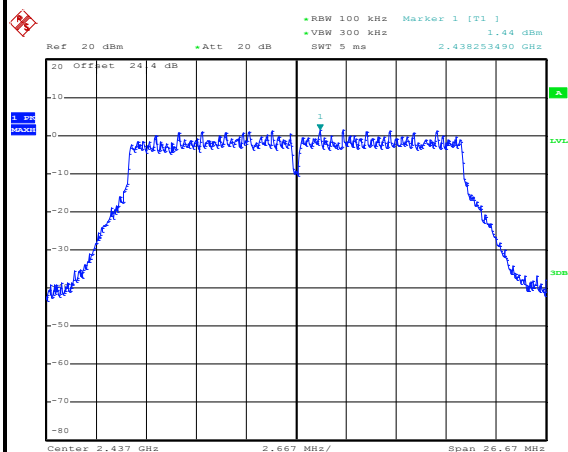
Date: 8.AUG.2015 20:28:48



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	48~51%
Test Channel :	06	Test Engineer :	Osolemio Chang

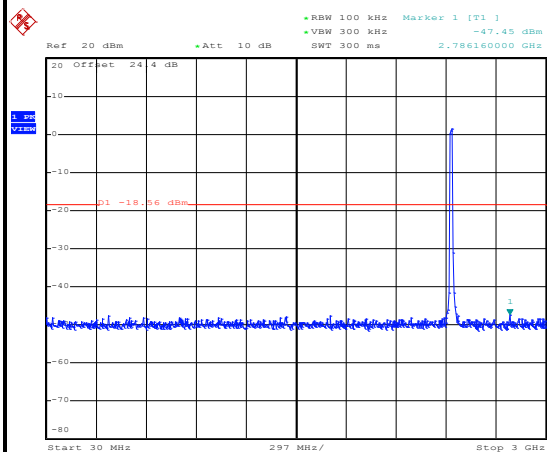
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



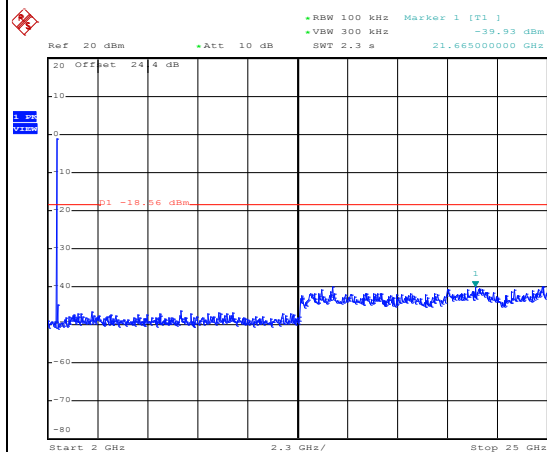
Date: 8.AUG.2015 20:34:27

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:35:56

Spurious Emission 2GHz~25GHz



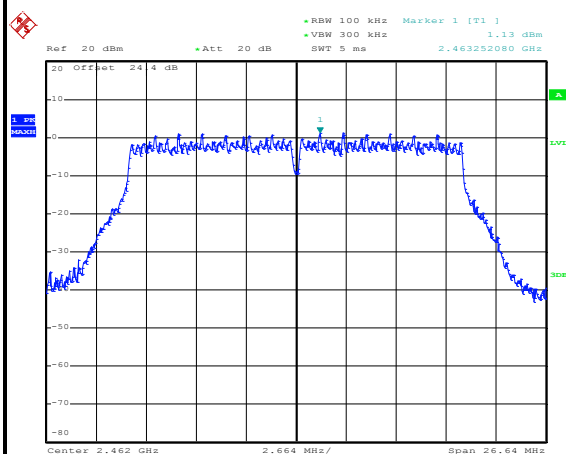
Date: 8.AUG.2015 20:36:13



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz High	Relative Humidity :	48~51%
Test Channel :	11	Test Engineer :	Osolemio Chang

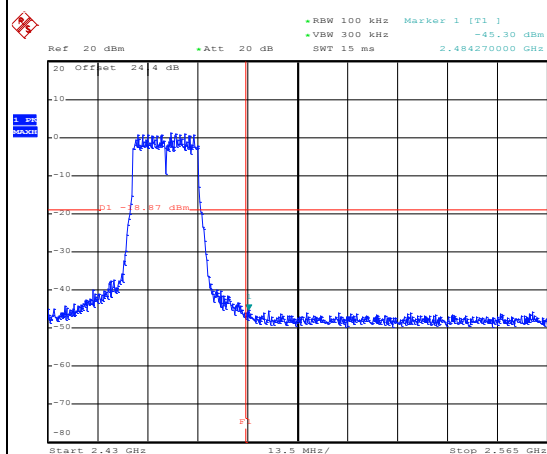
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



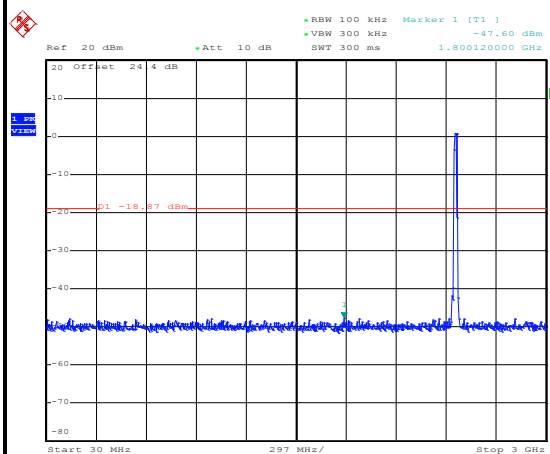
Date: 8.AUG.2015 20:41:06

High Channel Plot



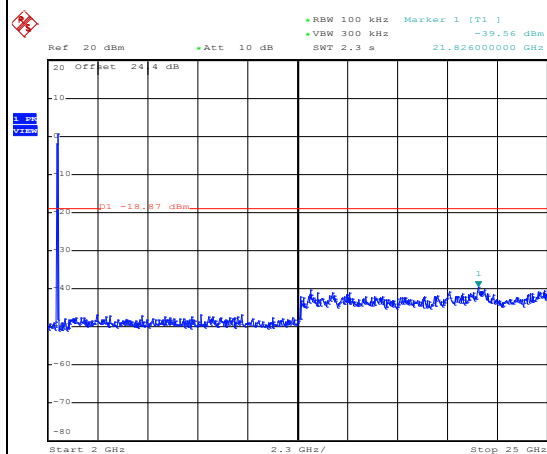
Date: 8.AUG.2015 20:43:06

Spurious Emission 30MHz~3GHz



Date: 8.AUG.2015 20:43:46

Spurious Emission 2GHz~25GHz



Date: 8.AUG.2015 20:44:04



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 v03r03.
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 $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

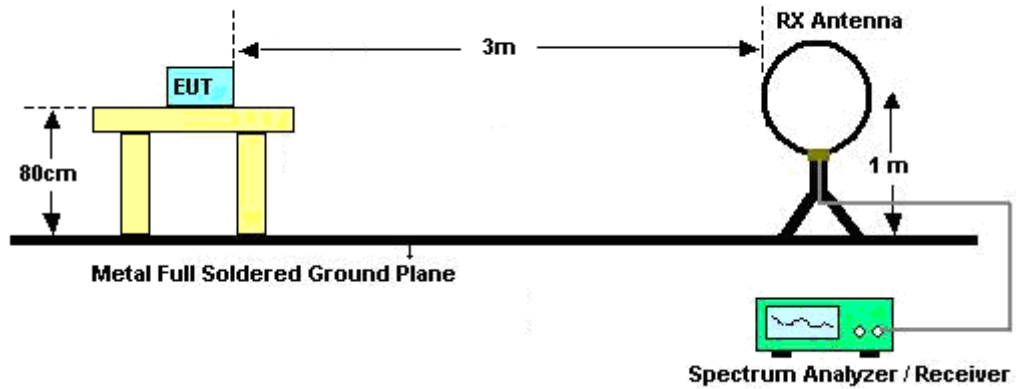
For average measurement:

 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, 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.

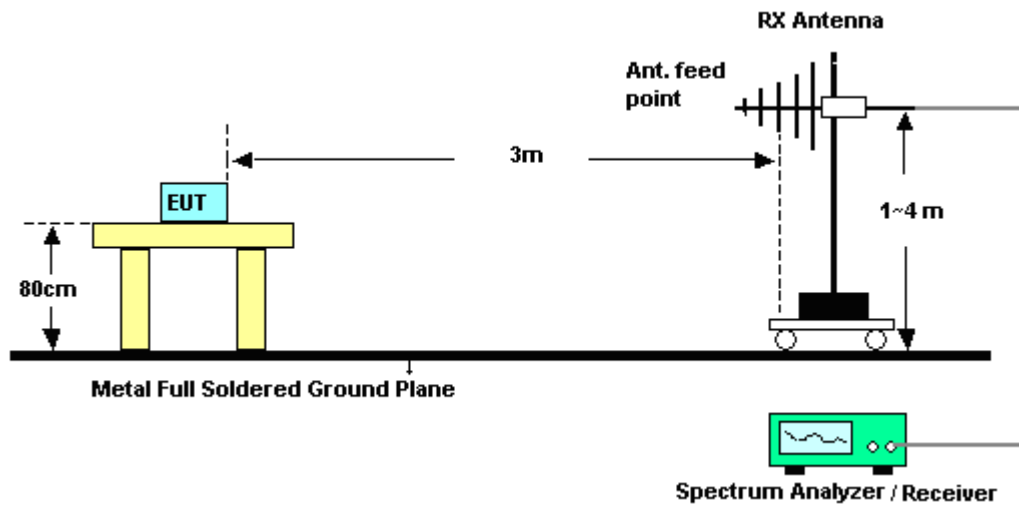
Band	Duty Cycle(%)	T(μ s)	1/T(kHz)	VBW Setting
802.11b	98.86	-	-	10Hz
802.11g	92.21	1420	0.70	1kHz
2.4GHz 802.11n HT20	93.33	1344	0.74	1kHz

3.5.4 Test Setup

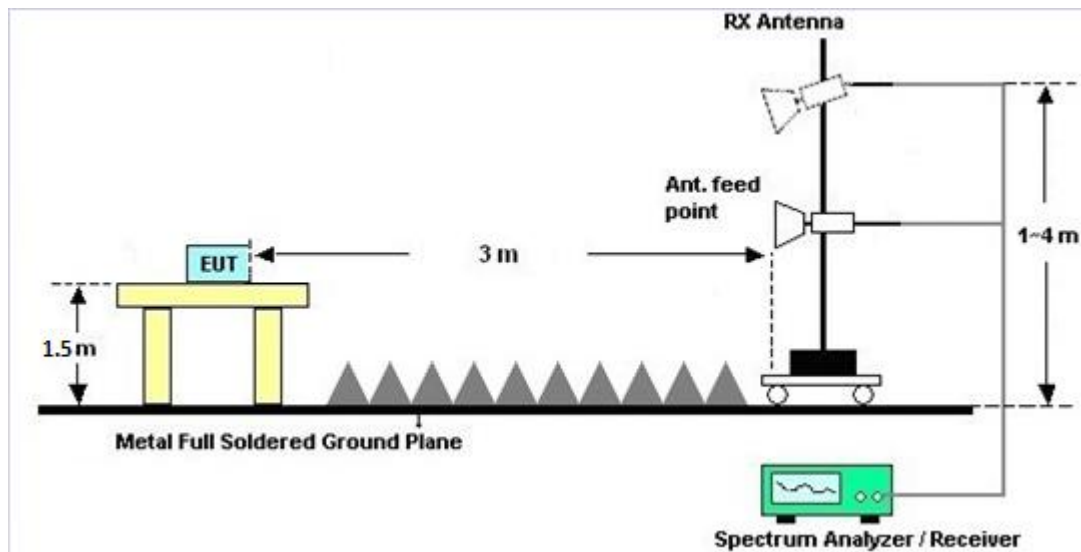
For radiated emissions below 30MHz



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 (dB μ V)	
	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.

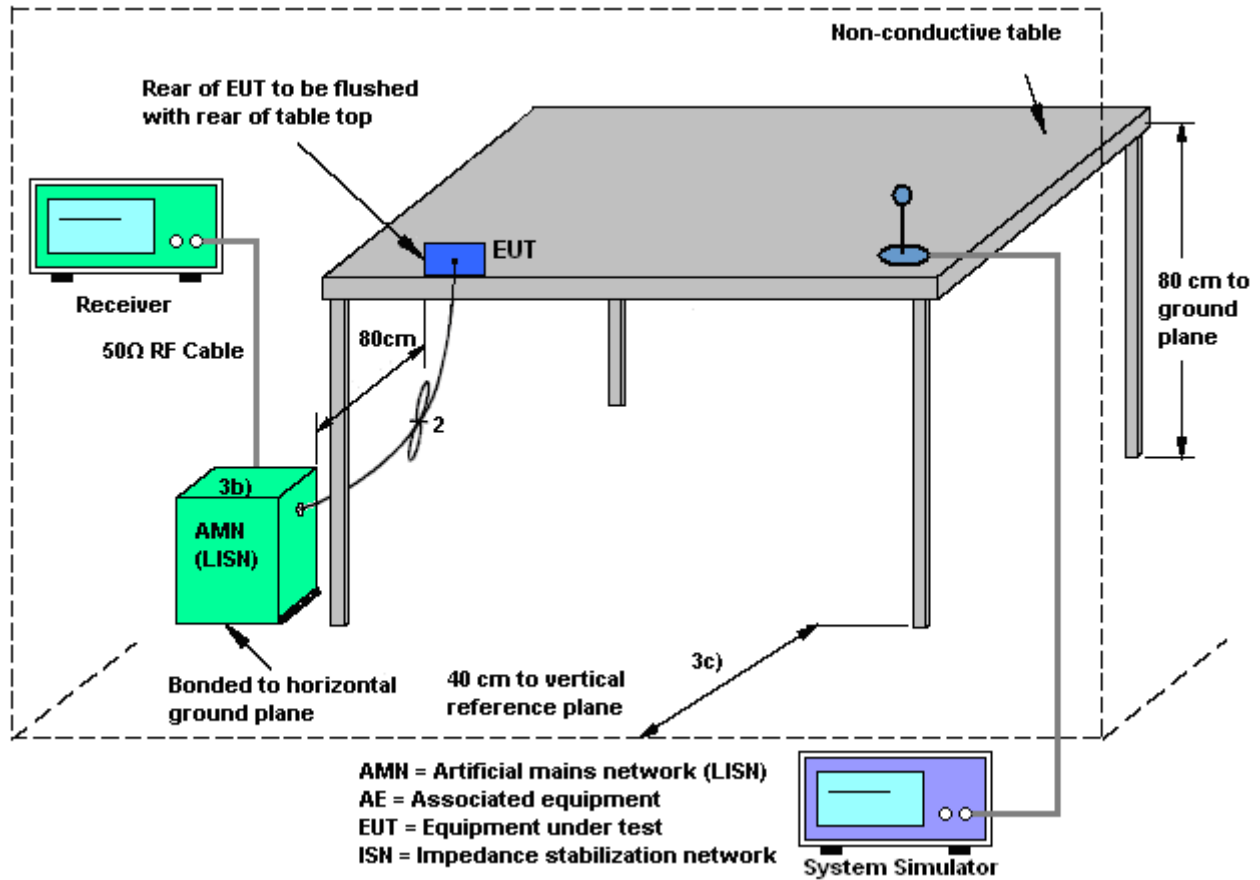
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

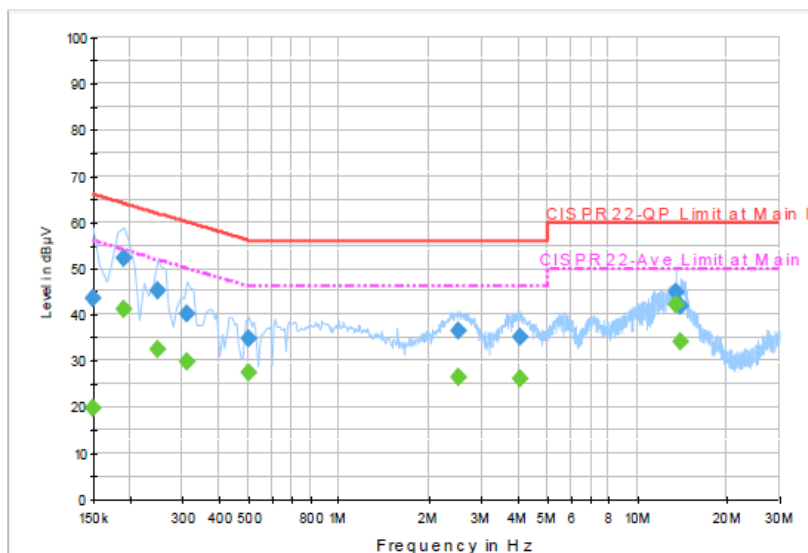
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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 :	26~27°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	56~57%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Link + Bluetooth Link + WLAN (2.4GHz) Link + NFC On + Earphone + SD Card + USB Cable (Charging from Adapter)		



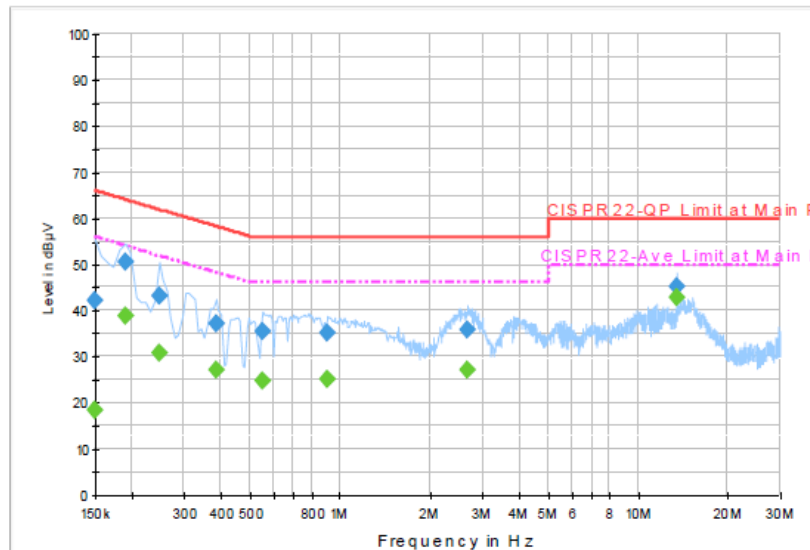
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	43.5	Off	L1	19.5	22.5	66.0
0.190000	52.2	Off	L1	19.5	11.8	64.0
0.246000	45.1	Off	L1	19.5	16.8	61.9
0.310000	40.0	Off	L1	19.5	20.0	60.0
0.502000	34.6	Off	L1	19.4	21.4	56.0
2.518000	36.6	Off	L1	19.7	19.4	56.0
4.046000	35.2	Off	L1	19.7	20.8	56.0
13.558000	44.8	Off	L1	19.9	15.2	60.0
14.078000	41.7	Off	L1	19.9	18.3	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	19.8	Off	L1	19.5	36.2	56.0
0.190000	41.0	Off	L1	19.5	13.0	54.0
0.246000	32.3	Off	L1	19.5	19.6	51.9
0.310000	29.9	Off	L1	19.5	20.1	50.0
0.502000	27.4	Off	L1	19.4	18.6	46.0
2.518000	26.4	Off	L1	19.7	19.6	46.0
4.046000	26.0	Off	L1	19.7	20.0	46.0
13.558000	42.3	Off	L1	19.9	7.7	50.0
14.078000	34.1	Off	L1	19.9	15.9	50.0

Test Mode :	Mode 1	Temperature :	26~27°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	56~57%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Link + Bluetooth Link + WLAN (2.4GHz) Link + NFC On + Earphone + SD Card + USB Cable (Charging from Adapter)		


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	42.1	Off	N	19.5	23.9	66.0
0.190000	50.6	Off	N	19.5	13.4	64.0
0.246000	43.1	Off	N	19.5	18.8	61.9
0.382000	37.1	Off	N	19.5	21.1	58.2
0.550000	35.6	Off	N	19.4	20.4	56.0
0.910000	35.0	Off	N	19.6	21.0	56.0
2.670000	35.7	Off	N	19.7	20.3	56.0
13.558000	45.0	Off	N	20.0	15.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	18.3	Off	N	19.5	37.7	56.0
0.190000	38.8	Off	N	19.5	15.2	54.0
0.246000	30.9	Off	N	19.5	21.0	51.9
0.382000	27.3	Off	N	19.5	20.9	48.2
0.550000	24.8	Off	N	19.4	21.2	46.0
0.910000	25.1	Off	N	19.6	20.9	46.0
2.670000	27.0	Off	N	19.7	19.0	46.0
13.558000	42.9	Off	N	20.0	7.1	50.0



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
Power Meter	Anritsu	ML2495A	1218006	300MHz~40GHz z	Oct. 18, 2014	Jul. 26, 2015 ~ Aug. 08, 2015	Oct. 17, 2015	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1126017	300MHz~40GHz z	Oct. 18, 2014	Jul. 26, 2015 ~ Aug. 08, 2015	Oct. 17, 2015	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 18, 2015	Jul. 26, 2015 ~ Aug. 08, 2015	Jun. 17, 2016	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890089	1V~20V 0.5A~5A	Jan. 14, 2015	Jul. 26, 2015 ~ Aug. 08, 2015	Jan. 13, 2016	Conducted (TH05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Dec. 01, 2014	Aug. 31, 2015 ~ Sep. 01, 2015	Nov. 30, 2015	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Apr. 20, 2015	Aug. 31, 2015 ~ Sep. 01, 2015	Apr. 19, 2016	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2014	Aug. 31, 2015 ~ Sep. 01, 2015	Dec. 01, 2015	Conduction (CO05-HY)
AC Power Source()	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 31, 2015 ~ Sep. 01, 2015	N/A	Conduction (CO05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz~ 40GHz	Nov. 03, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Nov. 02, 2015	Radiation (03CH10-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	Feb. 02, 2015	Aug. 13, 2015 ~ Aug. 14, 2015	Feb. 01, 2016	Radiation (03CH10-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
EMI Test Receiver	Keysight	N9038A	MY54130085	20Hz ~ 8.4GHz	Nov. 05, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Nov. 04, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Nov. 20, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1902246	1GHz~18GHz	Nov. 25, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Nov. 24, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHz	Oct. 14, 2014	Aug. 13, 2015 ~ Aug. 14, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 13, 2015 ~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	N/A	Aug. 13, 2015 ~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Preamplifier	MITEQ	JS44-180040 00-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Aug. 13, 2015 ~ Aug. 14, 2015	Jun. 01, 2016	Radiation (03CH10-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26
--	------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.90
--	------



Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Osolemio Chang	Temperature:	21~25	°C
Test Date:	2015/07/26 ~ 2015/08/08	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band							
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	11Mbps	1	1	2412	7.88	0.50	Pass
11b	11Mbps	1	6	2437	7.80	0.50	Pass
11b	11Mbps	1	11	2462	7.64	0.50	Pass
11g	54Mbps	1	1	2412	16.50	0.50	Pass
11g	54Mbps	1	6	2437	16.46	0.50	Pass
11g	54Mbps	1	11	2462	16.44	0.50	Pass
HT20	MCS7	1	1	2412	17.80	0.50	Pass
HT20	MCS7	1	6	2437	17.78	0.50	Pass
HT20	MCS7	1	11	2462	17.76	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	11Mbps	1	1	2412	17.75	30.00	-3.62	14.13	36.00	Pass
11b	11Mbps	1	6	2437	18.24	30.00	-3.62	14.62	36.00	Pass
11b	11Mbps	1	11	2462	17.98	30.00	-3.62	14.36	36.00	Pass
11g	54Mbps	1	1	2412	21.57	30.00	-3.62	17.95	36.00	Pass
11g	54Mbps	1	6	2437	22.04	30.00	-3.62	18.42	36.00	Pass
11g	54Mbps	1	11	2462	21.91	30.00	-3.62	18.29	36.00	Pass
HT20	MCS7	1	1	2412	21.16	30.00	-3.62	17.54	36.00	Pass
HT20	MCS7	1	6	2437	21.95	30.00	-3.62	18.33	36.00	Pass
HT20	MCS7	1	11	2462	21.78	30.00	-3.62	18.16	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	11Mbps	1	1	2412	0.48	14.36
11b	11Mbps	1	6	2437	0.48	15.12
11b	11Mbps	1	11	2462	0.48	14.63
11g	54Mbps	1	1	2412	1.93	13.35
11g	54Mbps	1	6	2437	1.93	14.26
11g	54Mbps	1	11	2462	1.93	13.94
HT20	MCS7	1	1	2412	2.06	12.54
HT20	MCS7	1	6	2437	2.06	13.42
HT20	MCS7	1	11	2462	2.06	13.03

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	11Mbps	1	1	2412	-8.82	-3.62	8.00	Pass
11b	11Mbps	1	6	2437	-8.69	-3.62	8.00	Pass
11b	11Mbps	1	11	2462	-7.61	-3.62	8.00	Pass
11g	54Mbps	1	1	2412	-14.74	-3.62	8.00	Pass
11g	54Mbps	1	6	2437	-14.15	-3.62	8.00	Pass
11g	54Mbps	1	11	2462	-14.08	-3.62	8.00	Pass
HT20	MCS7	1	1	2412	-14.17	-3.62	8.00	Pass
HT20	MCS7	1	6	2437	-13.74	-3.62	8.00	Pass
HT20	MCS7	1	11	2462	-14.11	-3.62	8.00	Pass



Appendix B. Radiated Spurious Emission

Test Engineer :	Elvis Chen and Stan Hsieh and Karl Hou	Temperature :	24~25°C
		Relative Humidity :	53~54%

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		2387.49	52.2	-21.8	74	52.82	27.23	5.39	33.24	126	120	P	H
		2390	41.71	-12.29	54	42.31	27.23	5.39	33.22	126	120	A	H
	*	2412	99.28	-	-	99.8	27.28	5.42	33.22	126	120	P	H
	*	2412	96.76	-	-	97.28	27.28	5.42	33.22	126	120	P	H
													H
													H
		2381.73	52.6	-21.4	74	53.26	27.19	5.39	33.24	100	177	P	V
		2390	41.59	-12.41	54	42.19	27.23	5.39	33.22	100	177	A	V
	*	2410	94.96	-	-	95.48	27.28	5.42	33.22	100	177	P	V
	*	2410	92.49	-	-	93.01	27.28	5.42	33.22	100	177	A	V
													V
													V
802.11b CH 06 2437MHz		2330.43	52.86	-21.14	74	53.74	27.05	5.33	33.26	100	118	P	H
		2389.02	41.52	-12.48	54	42.14	27.23	5.39	33.24	100	118	A	H
	*	2438	98.12	-	-	98.54	27.37	5.42	33.21	100	118	P	H
	*	2438	95.61	-	-	96.03	27.37	5.42	33.21	100	118	A	H
		2496.72	52.65	-21.35	74	52.86	27.5	5.46	33.17	100	118	P	H
		2483.72	41.94	-12.06	54	42.2	27.46	5.46	33.18	100	118	A	H
		2313.51	52.7	-21.3	74	53.68	27.01	5.27	33.26	127	178	P	V
		2390	41.52	-12.48	54	42.12	27.23	5.39	33.22	127	178	A	V
	*	2438	93.93	-	-	94.35	27.37	5.42	33.21	127	178	P	V
	*	2438	91.44	-	-	91.86	27.37	5.42	33.21	127	178	A	V
		2490.48	52.83	-21.17	74	53.05	27.5	5.46	33.18	127	178	P	V
		2483.64	41.83	-12.17	54	42.09	27.46	5.46	33.18	127	178	A	V



802.11b CH 11 2462MHz	*	2463	98.41	-	-	98.76	27.41	5.44	33.2	100	126	P	H
	*	2463	95.36	-	-	95.71	27.41	5.44	33.2	100	126	A	H
		2483.64	54.76	-19.24	74	55.02	27.46	5.46	33.18	100	126	P	H
		2483.52	43.63	-10.37	54	43.89	27.46	5.46	33.18	100	126	A	H
													H
													H
	*	2462	93.62	-	-	93.97	27.41	5.44	33.2	118	180	P	V
	*	2462	90.88	-	-	91.23	27.41	5.44	33.2	118	180	A	V
		2490.44	53.02	-20.98	74	53.24	27.5	5.46	33.18	118	180	P	V
		2483.52	42.28	-11.72	54	42.54	27.46	5.46	33.18	118	180	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	40.98	-33.02	74	62.55	31.46	7.58	60.61	100	0	P	H
													H
													H
													H
		4824	39.75	-34.25	74	61.32	31.46	7.58	60.61	100	0	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	38.73	-35.27	74	59.99	31.56	7.7	60.52	100	0	P	H
		7311	43.36	-30.64	74	58.62	36.18	9.49	60.93	100	0	P	H
													H
													H
		4874	40.27	-33.73	74	61.53	31.56	7.7	60.52	100	0	P	V
		7311	43.6	-30.4	74	58.86	36.18	9.49	60.93	100	0	P	V
													V
													V
802.11b CH 11 2462MHz		4924	39.64	-34.36	74	60.47	31.66	7.93	60.42	100	0	P	H
		7386	43.62	-30.38	74	58.91	36.37	9.53	61.19	100	0	P	H
													H
													H
		4924	42.31	-31.69	74	63.14	31.66	7.93	60.42	100	0	P	V
		7386	42.55	-31.45	74	57.84	36.37	9.53	61.19	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.74	53.9	-20.1	74	54.52	27.23	5.39	33.24	111	121	P	H
		2389.92	43.13	-10.87	54	43.73	27.23	5.39	33.22	111	121	A	H
	*	2414	100.07	-	-	100.59	27.28	5.42	33.22	111	121	P	H
	*	2414	92.74	-	-	93.26	27.28	5.42	33.22	111	121	P	H
													H
													H
		2366.25	52.85	-21.15	74	53.56	27.14	5.39	33.24	100	177	P	V
		2389.92	42.53	-11.47	54	43.13	27.23	5.39	33.22	100	177	A	V
	*	2410	95.96	-	-	96.48	27.28	5.42	33.22	100	177	P	V
	*	2410	88.23	-	-	88.75	27.28	5.42	33.22	100	177	A	V
													V
													V
802.11g CH 06 2437MHz		2389.83	52.99	-21.01	74	53.59	27.23	5.39	33.22	132	119	P	H
		2384.52	42.23	-11.77	54	42.89	27.19	5.39	33.24	132	119	A	H
	*	2439	100.03	-	-	100.45	27.37	5.42	33.21	132	119	P	H
	*	2439	92.71	-	-	93.13	27.37	5.42	33.21	132	119	A	H
		2483.72	52.63	-21.37	74	52.89	27.46	5.46	33.18	132	119	P	H
		2483.84	42.81	-11.19	54	43.07	27.46	5.46	33.18	132	119	A	H
		2313.78	53.28	-20.72	74	54.26	27.01	5.27	33.26	124	180	P	V
		2382.9	42.28	-11.72	54	42.94	27.19	5.39	33.24	124	180	A	V
	*	2439	95.21	-	-	95.63	27.37	5.42	33.21	124	180	P	V
	*	2439	88.18	-	-	88.6	27.37	5.42	33.21	124	180	A	V
		2494.92	52.93	-21.07	74	53.14	27.5	5.46	33.17	124	180	P	V
		2487.72	42.61	-11.39	54	42.83	27.5	5.46	33.18	124	180	A	V



802.11g CH 11 2462MHz	*	2464	102.13	-	-	102.48	27.41	5.44	33.2	100	137	P	H
	*	2464	94.87	-	-	95.22	27.41	5.44	33.2	100	137	A	H
		2483.64	57.69	-16.31	74	57.95	27.46	5.46	33.18	100	137	P	H
		2483.52	47.24	-6.76	54	47.5	27.46	5.46	33.18	100	137	A	H
													H
													H
	*	2464	95.71	-	-	96.06	27.41	5.44	33.2	121	179	P	V
	*	2464	87.92	-	-	88.27	27.41	5.44	33.2	121	179	A	V
		2484.08	52.64	-21.36	74	52.9	27.46	5.46	33.18	121	179	P	V
		2483.6	43.11	-10.89	54	43.37	27.46	5.46	33.18	121	179	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	38.1	-35.9	74	59.67	31.46	7.58	60.61	100	0	P	H
													H
													H
													H
		4824	38.85	-35.15	74	60.42	31.46	7.58	60.61	100	0	P	V
													V
													V
													V
802.11g CH 06 2437MHz		4872	38.88	-35.12	74	60.14	31.56	7.7	60.52	100	0	P	H
		7308	43.82	-30.18	74	59.08	36.18	9.49	60.93	100	0	P	H
													H
													H
		4872	39.66	-34.34	74	60.92	31.56	7.7	60.52	100	0	P	V
		7308	43.67	-30.33	74	58.93	36.18	9.49	60.93	100	0	P	V
													V
													V
802.11g CH 11 2462MHz		4926	39.37	-34.63	74	60.2	31.66	7.93	60.42	100	0	P	H
		7386	42.3	-31.7	74	57.59	36.37	9.53	61.19	100	0	P	H
													H
													H
		4926	39.37	-34.63	74	60.2	31.66	7.93	60.42	100	0	P	V
		7386	43.52	-30.48	74	58.81	36.37	9.53	61.19	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.02	55.68	-18.32	74	56.3	27.23	5.39	33.24	124	115	P	H
		2390	43.46	-10.54	54	44.06	27.23	5.39	33.22	124	115	A	H
	*	2410	98.31	-	-	98.83	27.28	5.42	33.22	124	115	P	H
	*	2410	90.17	-	-	90.69	27.28	5.42	33.22	124	115	A	H
													H
													H
		2383.71	53.29	-20.71	74	53.95	27.19	5.39	33.24	100	177	P	V
		2389.56	42.94	-11.06	54	43.56	27.23	5.39	33.24	100	177	A	V
	*	2410	95.67	-	-	96.19	27.28	5.42	33.22	100	177	P	V
	*	2410	87.69	-	-	88.21	27.28	5.42	33.22	100	177	A	V
													V
													V
802.11n HT20 CH 06 2437MHz		2352.57	52.28	-21.72	74	53.06	27.14	5.33	33.25	138	119	P	H
		2387.67	42.23	-11.77	54	42.85	27.23	5.39	33.24	138	119	A	H
	*	2439	98.88	-	-	99.3	27.37	5.42	33.21	138	119	P	H
	*	2439	91.32	-	-	91.74	27.37	5.42	33.21	138	119	A	H
		2491.2	53.38	-20.62	74	53.6	27.5	5.46	33.18	138	119	P	H
		2483.52	42.7	-11.3	54	42.96	27.46	5.46	33.18	138	119	A	H
		2318.55	52.45	-21.55	74	53.39	27.05	5.27	33.26	126	179	P	V
		2385.51	42.18	-11.82	54	42.8	27.23	5.39	33.24	126	179	A	V
	*	2439	95.41	-	-	95.83	27.37	5.42	33.21	126	179	P	V
	*	2439	87.23	-	-	87.65	27.37	5.42	33.21	126	179	A	V
		2483.8	52.59	-21.41	74	52.85	27.46	5.46	33.18	126	179	P	V
		2485.56	42.77	-11.23	54	43.03	27.46	5.46	33.18	126	179	A	V



802.11n HT20 CH 11 2462MHz	*	2464	101.39	-	-	101.74	27.41	5.44	33.2	111	139	P	H
	*	2464	93.78	-	-	94.13	27.41	5.44	33.2	111	139	A	H
		2483.52	56.92	-17.08	74	57.18	27.46	5.46	33.18	111	139	P	H
		2483.52	46.32	-7.68	54	46.58	27.46	5.46	33.18	111	139	A	H
													H
													H
	*	2464	94.61	-	-	94.96	27.41	5.44	33.2	115	179	P	V
	*	2464	87.15	-	-	87.5	27.41	5.44	33.2	115	179	A	V
		2483.88	53.24	-20.76	74	53.5	27.46	5.46	33.18	115	179	P	V
		2483.52	43.52	-10.48	54	43.78	27.46	5.46	33.18	115	179	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	38.68	-35.32	74	60.25	31.46	7.58	60.61	100	0	P	H
													H
													H
													H
		4824	38.64	-35.36	74	60.21	31.46	7.58	60.61	100	0	P	V
													V
													V
													V
802.11n HT20 CH 06 2437MHz		4872	39.58	-34.42	74	60.84	31.56	7.7	60.52	100	0	P	H
		7308	43.62	-30.38	74	58.88	36.18	9.49	60.93	100	0	P	H
													H
													H
		4872	38.84	-35.16	74	60.1	31.56	7.7	60.52	100	0	P	V
		7308	43.23	-30.77	74	58.49	36.18	9.49	60.93	100	0	P	V
													V
													V
802.11n HT20 CH 11 2462MHz		4926	40.33	-33.67	74	61.16	31.66	7.93	60.42	100	0	P	H
		7386	42.38	-31.62	74	57.67	36.37	9.53	61.19	100	0	P	H
													H
													H
		4926	40.59	-33.41	74	61.42	31.66	7.93	60.42	100	0	P	V
		7386	43.09	-30.91	74	58.38	36.37	9.53	61.19	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11g LF		38.91	23.17	-16.83	40	40.26	15.06	0.65	32.8	105	34	P	H
		103.17	25.87	-17.63	43.5	46.66	10.7	1.14	32.63			P	H
		163.92	22.49	-21.01	43.5	43.15	10.7	1.33	32.69			P	H
		309.8	22.19	-23.81	46	38.98	14.07	1.88	32.74			P	H
		516.3	21.6	-24.4	46	33.85	18.36	2.33	32.94			P	H
		678	21.91	-24.09	46	31.82	20.42	2.67	33			P	H
													H
													H
													H
													H
													H
													H
		38.37	33.53	-6.47	40	50.62	15.06	0.65	32.8	134	89	P	V
		109.38	30.07	-13.43	43.5	50.17	11.4	1.14	32.64			P	V
		145.56	24.92	-18.58	43.5	44.52	11.74	1.33	32.67			P	V
		412.7	22.02	-23.98	46	35.99	16.72	2.16	32.85			P	V
		516.3	24.55	-21.45	46	36.8	18.36	2.33	32.94			P	V
		619.2	23.92	-22.08	46	34.5	19.82	2.62	33.02			P	V
													V
													V
												V	
												V	
												V	
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

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