

FCC RF Test Report

APPLICANT : HTC Corporation
EQUIPMENT : Smartphone
MODEL NAME : 0P3Z111
FCC ID : NM80P3Z111
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jul. 02, 2013 and completely tested on Jul. 19, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the 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.

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FCC ID : NM80P3Z111

Page Number : 1 of 60

Report Issued Date : Aug. 14, 2013

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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 Feature of Equipment Under Test 5

 1.4 Product Specification of Equipment Under Test 5

 1.5 Modification of EUT 6

 1.6 Testing Site 6

 1.7 Applied Standards 6

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST 7

 2.1 Carrier Frequency Channel 7

 2.2 Pre-Scanned RF Power 8

 2.3 Test Mode 9

 2.4 Connection Diagram of Test System 10

 2.5 Support Unit used in test configuration and system 11

 2.6 Description of RF Function Operation Test Setup 11

 2.7 Measurement Results Explanation Example 12

3 TEST RESULT 13

 3.1 6dB Bandwidth Measurement 13

 3.2 Output Power Measurement 16

 3.3 Power Spectral Density Measurement 19

 3.4 Conducted Band Edges and Spurious Emission Measurement 22

 3.5 Radiated Band Edges and Spurious Emission Measurement 32

 3.6 AC Conducted Emission Measurement 54

 3.7 Antenna Requirements 58

4 LIST OF MEASURING EQUIPMENT 59

5 UNCERTAINTY OF EVALUATION 60



SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-210 A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	RSS-210 A8.4	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.52 dB at 30.000 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 8.90 dB at 0.198 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

HTC Corporation

No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan.

1.2 Manufacturer

HTC Corporation

No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan.

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Smartphone
Model Name	0P3Z111
FCC ID	NM80P3Z111
Sample 1	EUT with LCM 1, Camera Front, and Camera Back 1
Sample 2	EUT with LCM 2, Camera Front, and Camera Back 2
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA WLAN 11bgn / Bluetooth 2.1/3.0/4.0LE
HW Version	EVT
SW Version	0.97.10000.1
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum Output Power to Antenna	802.11b : 19.36 dBm (0.0863 W) 802.11g : 20.08 dBm (0.1019 W) 802.11n HT20 : 19.99 dBm (0.0998 W)
Antenna Type	PIFA Antenna type with gain 1.20 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 Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH06-HY	722060/4086B-1

Note: The test site complies with ANSI C63.4 2003 requirement.

1.7 Applied 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 v03r01
- ♦ 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. 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 for Sample 1 and X plane for Sample 2) 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 the highest data rates of peak 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)	19.36	19.34	19.31	19.35

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)	20.08	19.61	19.88	19.69	20.05	20.03	19.96	19.99

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	19.99	19.62	19.85	19.84	19.85	19.83	19.98	19.88

Remark: All the test data for each data rate were verified, but only the worst case was reported.



2.3 Test Mode

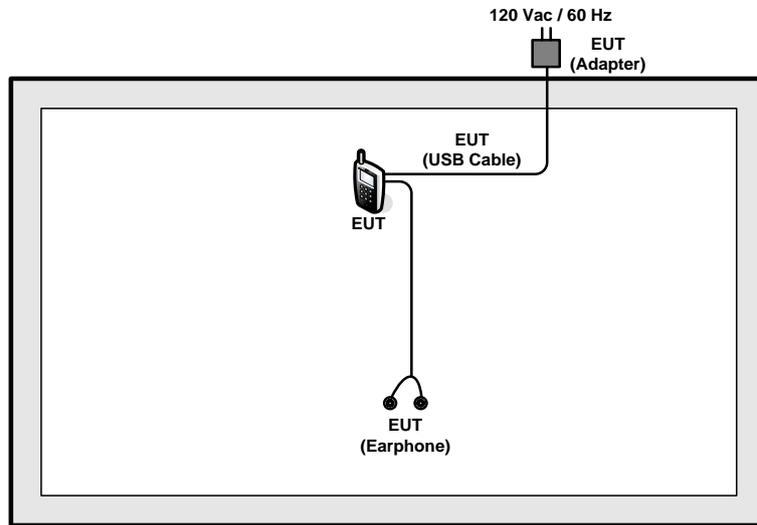
Final results of test modes, data rates and test channels are shown as following table.

<2.4GHz>

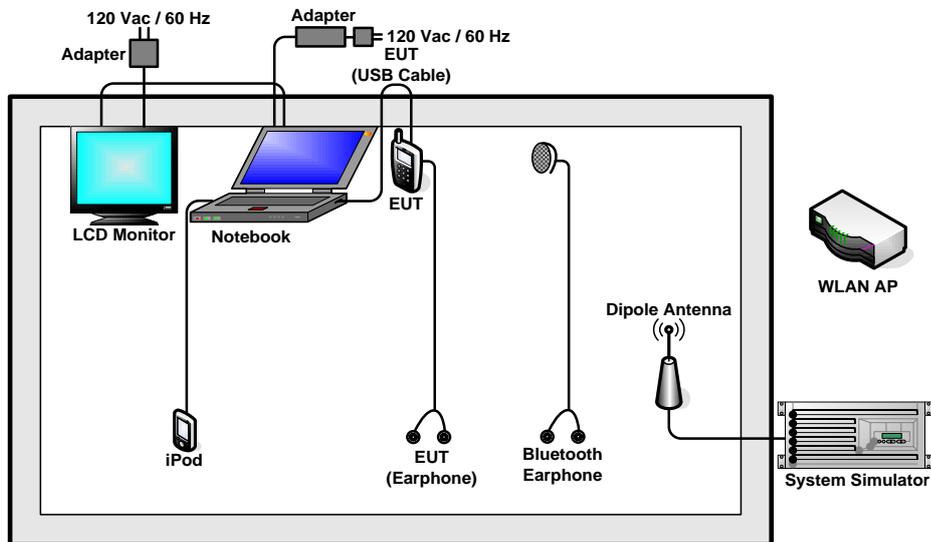
Test Cases					
	Test Items	Mode	Data Rate	Test Channel	Test Sample
Conducted TCs	6dB and 99% BW Power Spectral Density	802.11b	1 Mbps	1/6/11	-
		802.11g	6 Mbps	1/6/11	-
		802.11n HT20	6.5 Mbps	1/6/11	-
	Output Power	802.11b	1 Mbps	1/6/11	-
		802.11g	6 Mbps	1/6/11	-
		802.11n HT20	6.5 Mbps	1/6/11	-
	Conducted Band Edge	802.11b	1 Mbps	1/11	-
		802.11g	6 Mbps	1/11	-
		802.11n HT20	6.5 Mbps	1/11	-
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11	-
		802.11g	6 Mbps	1/6/11	-
		802.11n HT20	6.5 Mbps	1/6/11	-
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11	Sample 1
		802.11g	6 Mbps	1/11	Sample 1
		802.11n HT20	6.5 Mbps	1/11	Sample 1
				1	Sample 2
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11	Sample 1
		802.11g	6 Mbps	1/6/11	Sample 1
		802.11n HT20	6.5 Mbps	1/6/11	Sample 1
				1	Sample 2
AC Conducted Emission	Mode 1 :GSM850 Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 1 + Battery 1 + USB Cable 1 (Data Link with Notebook) for Sample 1 Mode 2 :GSM850 Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 1 + Battery 1 + USB Cable 1 (Data Link with Notebook) for Sample 2				
Remark: 1. The worst case of conducted emission is mode 2; only the test data of it was reported. 2. For Radiated Test Cases, The tests were performance with Adapter 1, Battery 1, Earphone 1, and USB Cable 1.					

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.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
6.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
7.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
8.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

2.6 Description of RF Function Operation Test Setup

For WLAN function, programmed RF utility, "QRCT" installed in the notebook make the EUT provides 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 Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

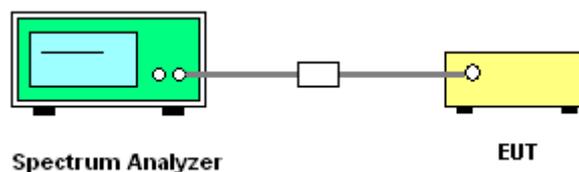
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup





3.1.5 Test Result of 6dB Occupied Bandwidth

Test Band :	2.4GHz	Temperature :	24~26°C
Test Engineer :	Alex Lee and Bill Kuo	Relative Humidity :	50~53%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	10.10	0.5	Pass
11b	1Mbps	1	6	2437	10.13	0.5	Pass
11b	1Mbps	1	11	2462	10.10	0.5	Pass
11g	6Mbps	1	1	2412	16.29	0.5	Pass
11g	6Mbps	1	6	2437	16.28	0.5	Pass
11g	6Mbps	1	11	2462	16.30	0.5	Pass
HT20	MCS0	1	1	2412	17.04	0.5	Pass
HT20	MCS0	1	6	2437	17.28	0.5	Pass
HT20	MCS0	1	11	2462	17.05	0.5	Pass

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.

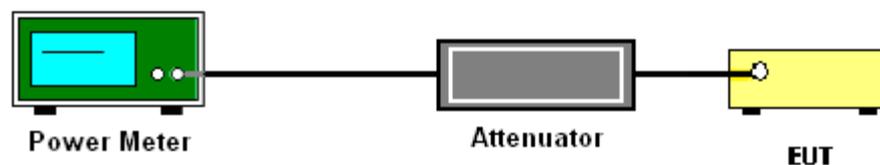
3.2.2 Measuring Instruments

See list of measuring instruments 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 v03r01.
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

Test Mode :	2.4GHz	Temperature :	24~26°C
Test Engineer :	Alex Lee and Bill Kuo	Relative Humidity :	50~53%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	19.28	30	1.20	Pass
11b	1Mbps	1	6	2437	19.36	30	1.20	Pass
11b	1Mbps	1	11	2462	19.32	30	1.20	Pass
11g	6Mbps	1	1	2412	20.08	30	1.20	Pass
11g	6Mbps	1	6	2437	20.05	30	1.20	Pass
11g	6Mbps	1	11	2462	19.94	30	1.20	Pass
HT20	MCS0	1	1	2412	19.99	30	1.20	Pass
HT20	MCS0	1	6	2437	19.83	30	1.20	Pass
HT20	MCS0	1	11	2462	19.85	30	1.20	Pass

Note: Measured power (dBm) has offset with cable loss.



3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	2.4GHz	Temperature :	24~26°C
Test Engineer :	Alex Lee and Bill Kuo	Relative Humidity :	50~53%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	0.00	17.33	30	1.20	Pass
11b	1Mbps	1	6	2437	0.00	17.34	30	1.20	Pass
11b	1Mbps	1	11	2462	0.00	17.27	30	1.20	Pass
11g	6Mbps	1	1	2412	0.06	11.25	30	1.20	Pass
11g	6Mbps	1	6	2437	0.06	11.17	30	1.20	Pass
11g	6Mbps	1	11	2462	0.06	10.81	30	1.20	Pass
HT20	MCS0	1	1	2412	0.09	11.31	30	1.20	Pass
HT20	MCS0	1	6	2437	0.09	10.75	30	1.20	Pass
HT20	MCS0	1	11	2462	0.09	10.86	30	1.20	Pass

Note: Measured power (dBm) has offset with cable loss and duty factor.

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.

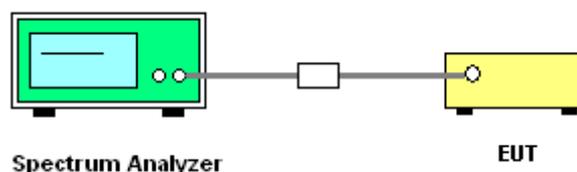
3.3.2 Measuring Instruments

See list of measuring instruments 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 v03r01
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



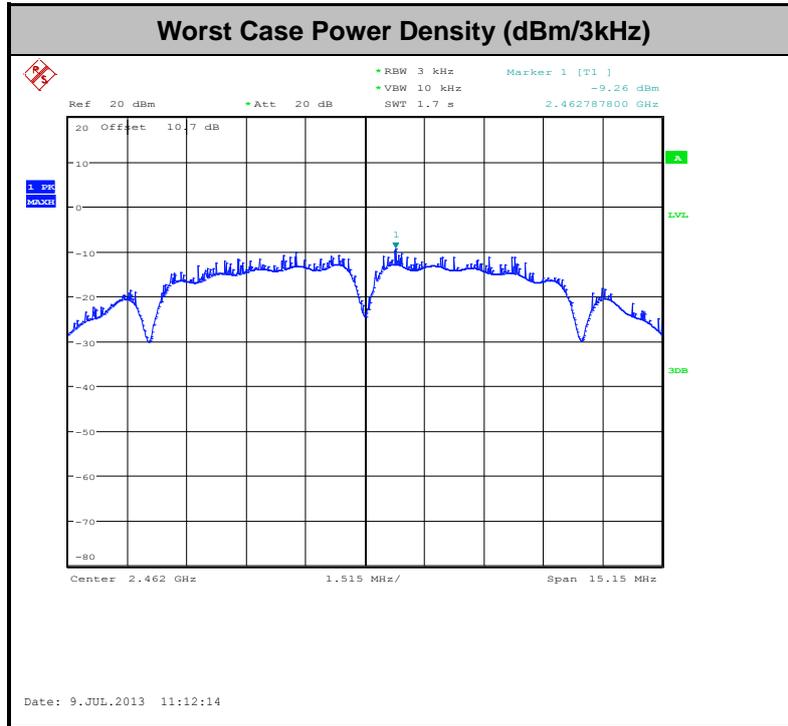


3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	24~26°C
Test Engineer :	Alex Lee and Bill Kuo	Relative Humidity :	50~53%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Peak Power Density (dBm/3kHz)	Max. Limits (dBm/3kHz)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	-10.00	8	1.20	Pass
11b	1Mbps	1	6	2437	-9.81	8	1.20	Pass
11b	1Mbps	1	11	2462	-9.26	8	1.20	Pass
11g	6Mbps	1	1	2412	-16.65	8	1.20	Pass
11g	6Mbps	1	6	2437	-16.91	8	1.20	Pass
11g	6Mbps	1	11	2462	-16.43	8	1.20	Pass
HT20	MCS0	1	1	2412	-15.66	8	1.20	Pass
HT20	MCS0	1	6	2437	-15.47	8	1.20	Pass
HT20	MCS0	1	11	2462	-17.00	8	1.20	Pass

Note: Measured power density (dBm) has offset with cable loss.



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).

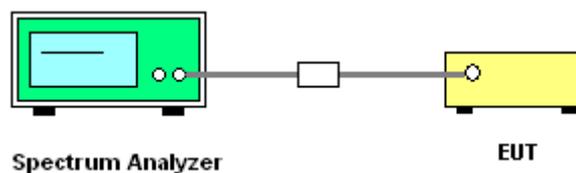
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
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.

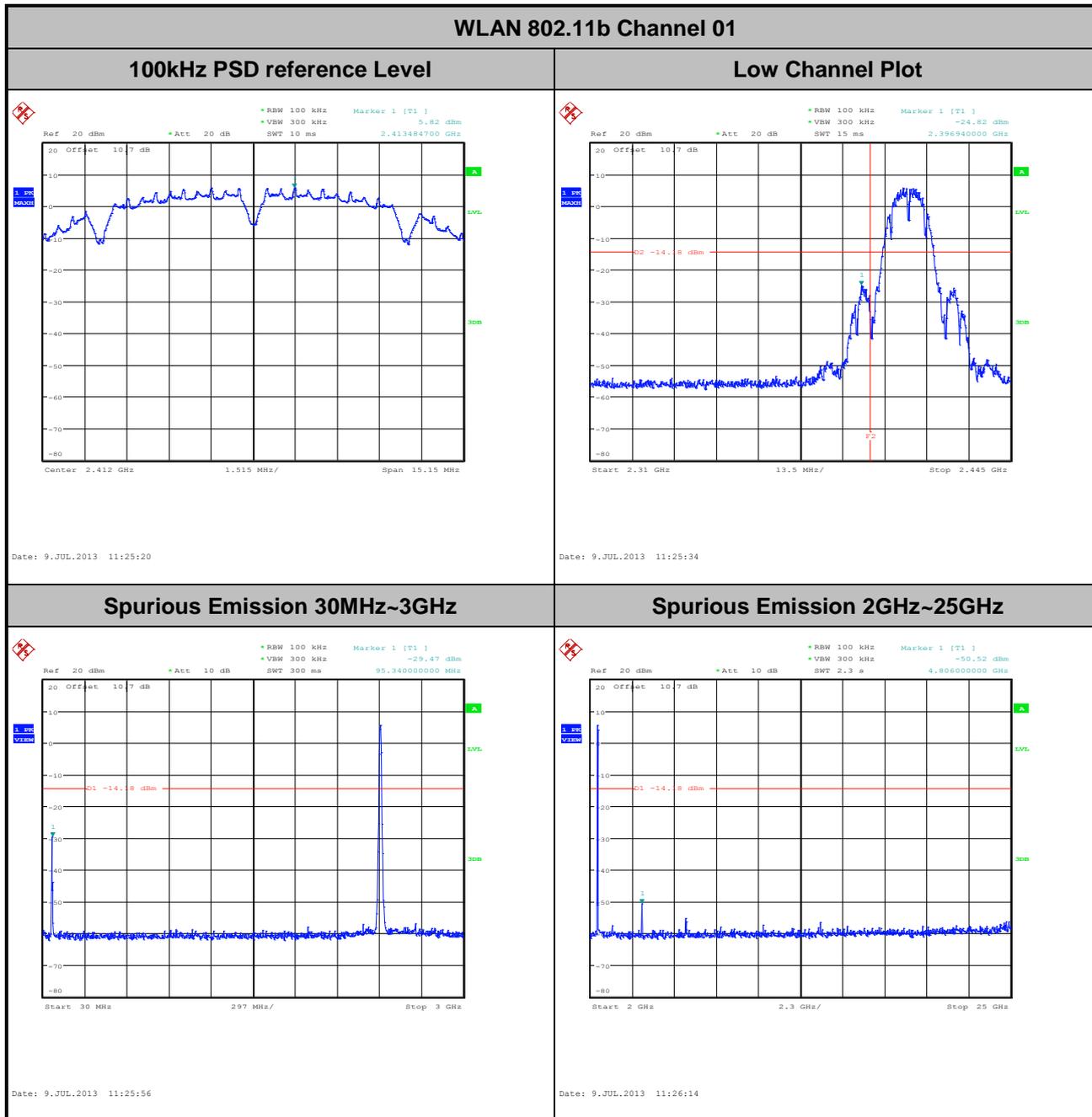
3.4.4 Test Setup





2.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Alex Lee and Bill Kuo

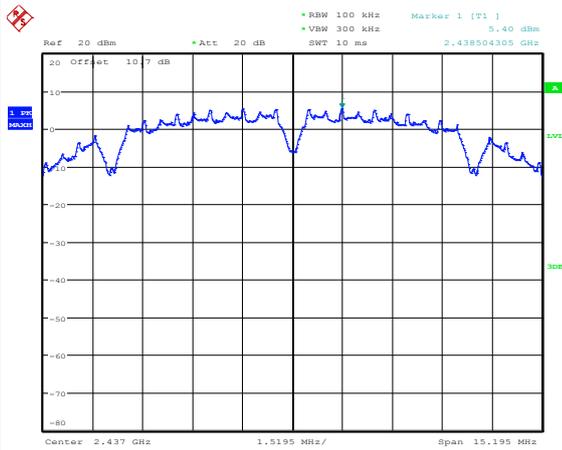




Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11b Channel 06

100kHz PSD reference Level

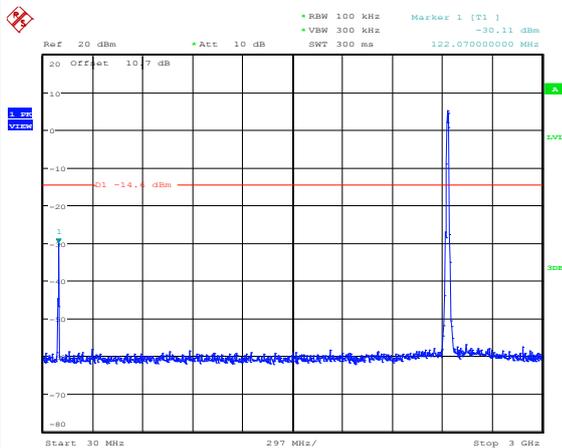


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Mid Channel Plot

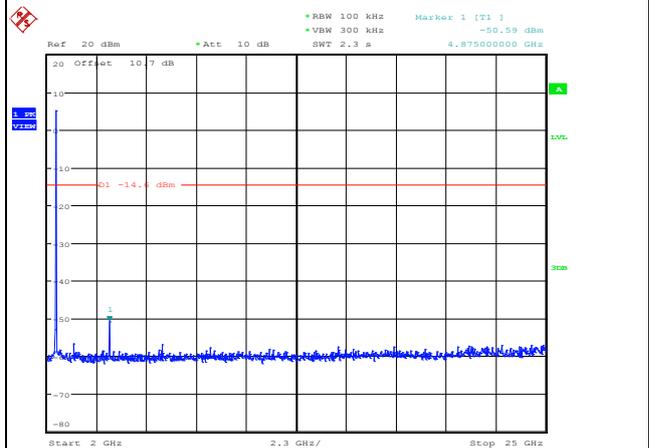


Spurious Emission 30MHz~3GHz



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Spurious Emission 2GHz~25GHz



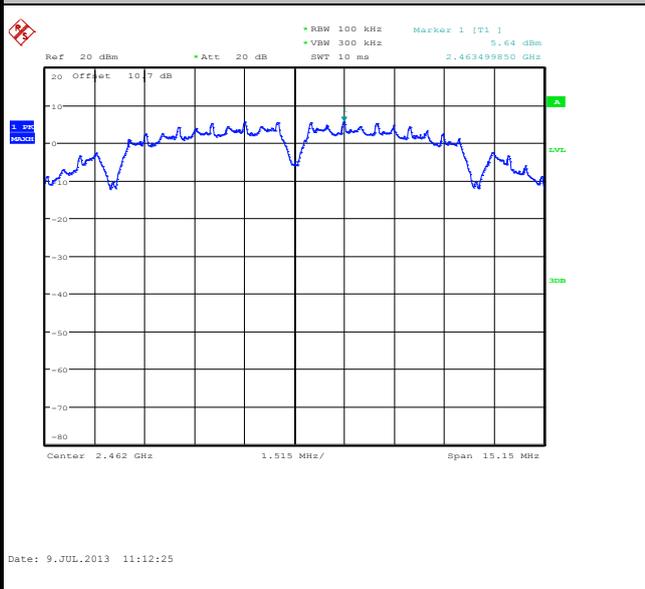
Date: 9.JUL.2013 11:09:17



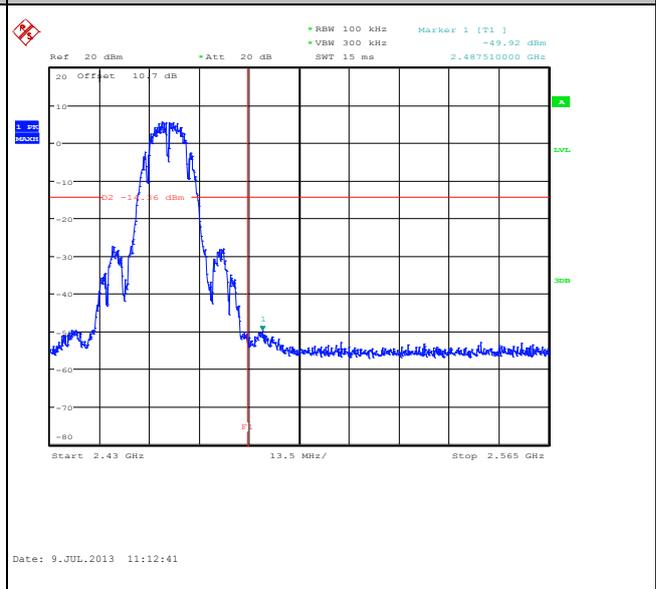
Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11b Channel 11

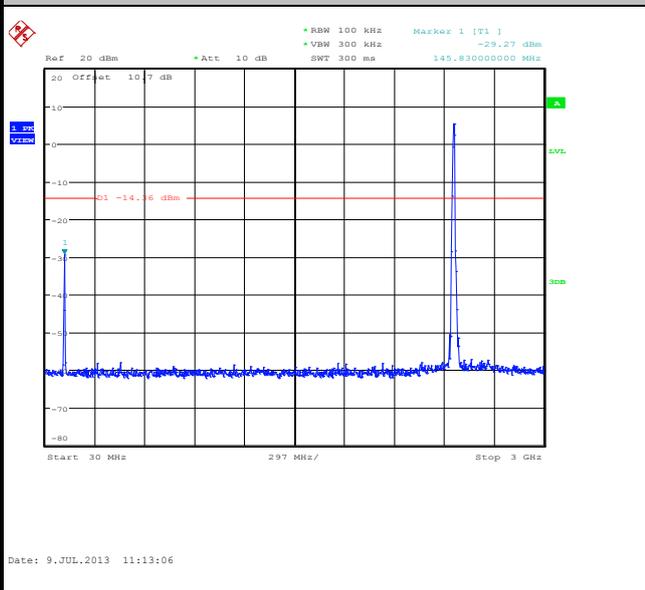
100kHz PSD reference Level



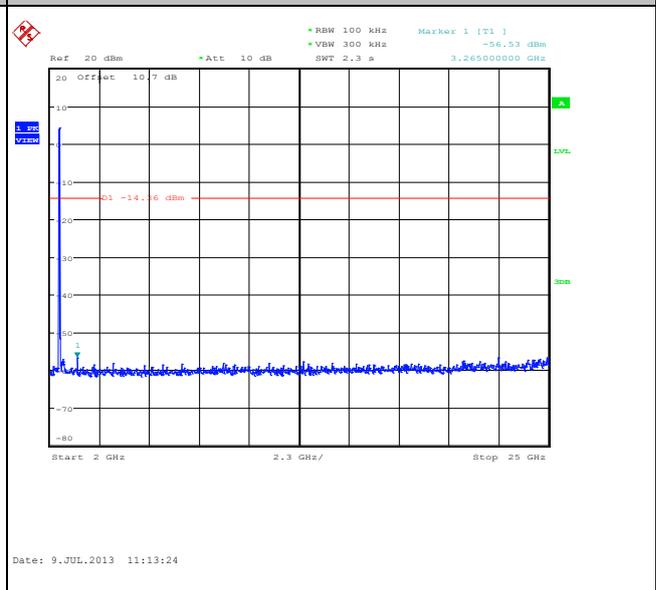
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

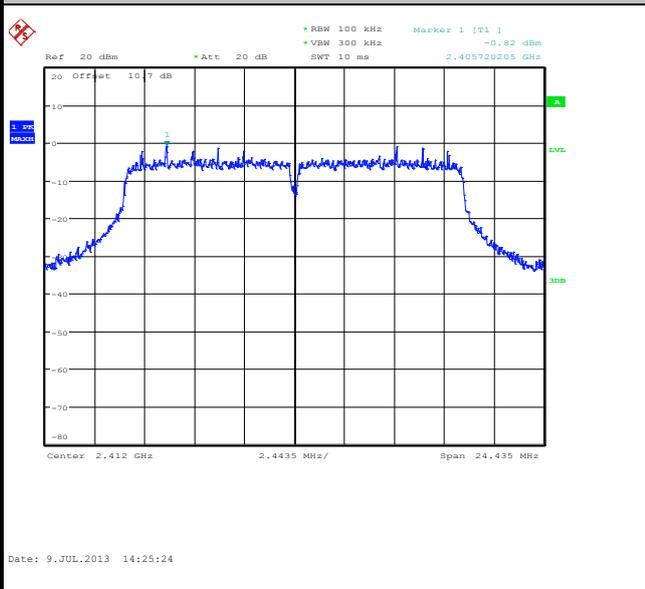




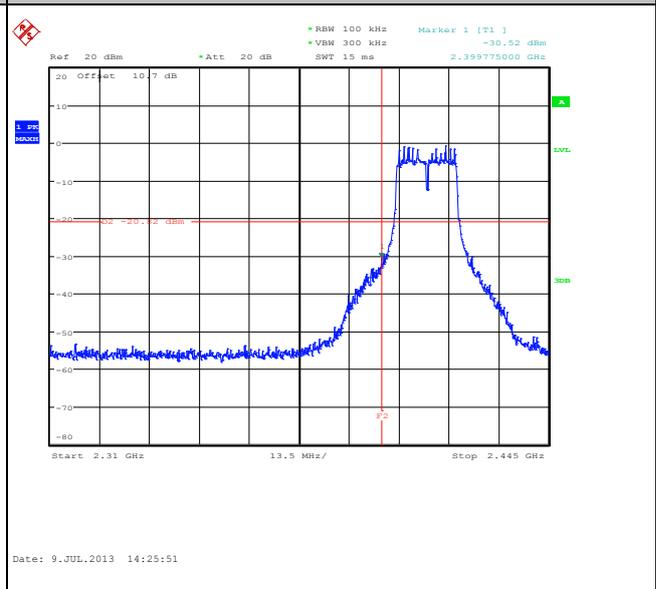
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11g Channel 01

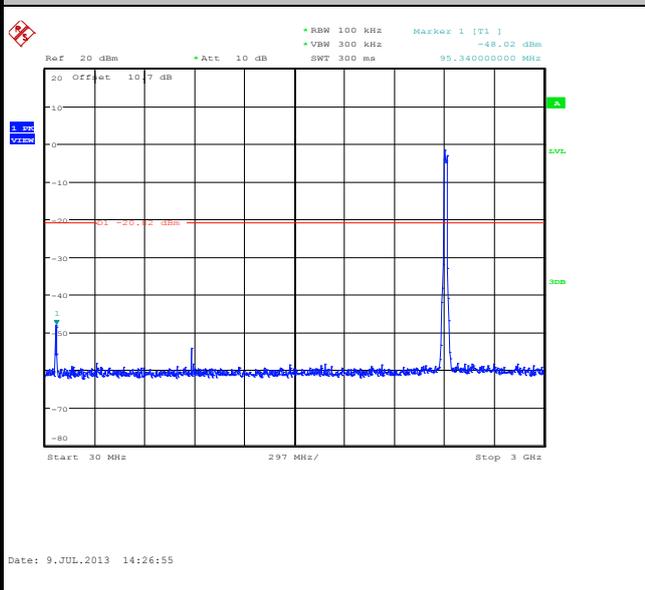
100kHz PSD reference Level



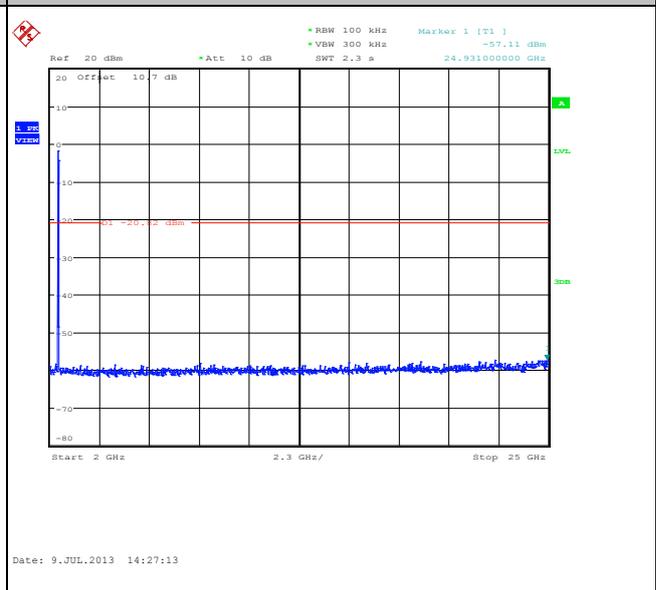
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz





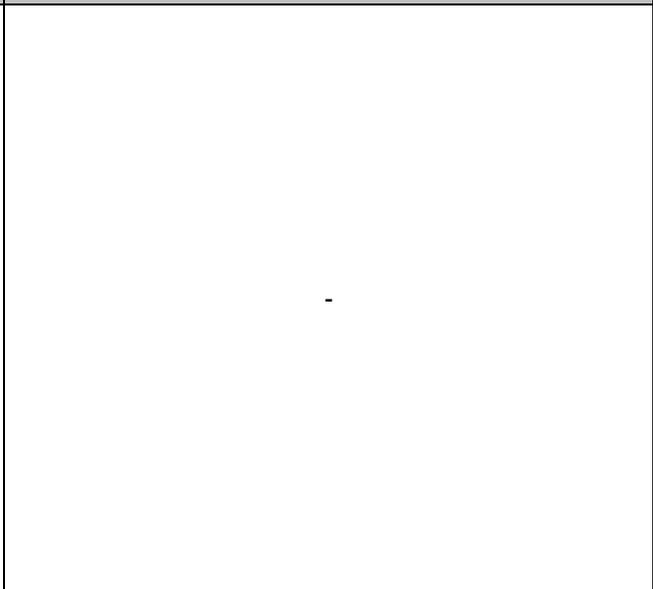
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11g Channel 06

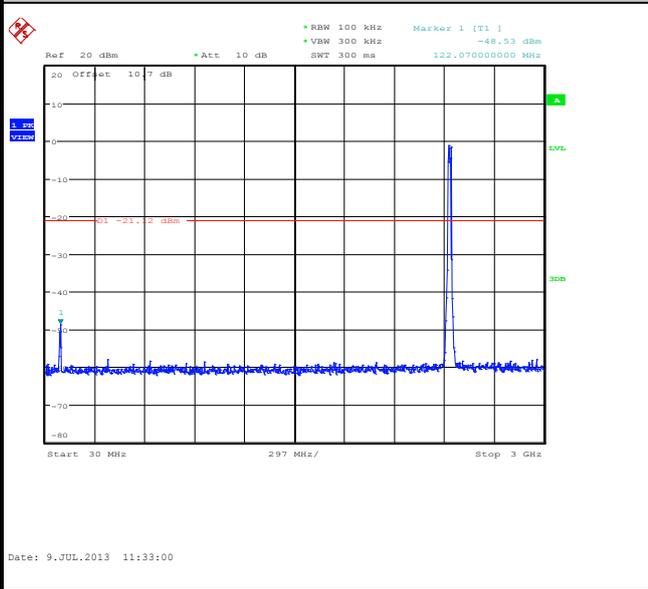
100kHz PSD reference Level



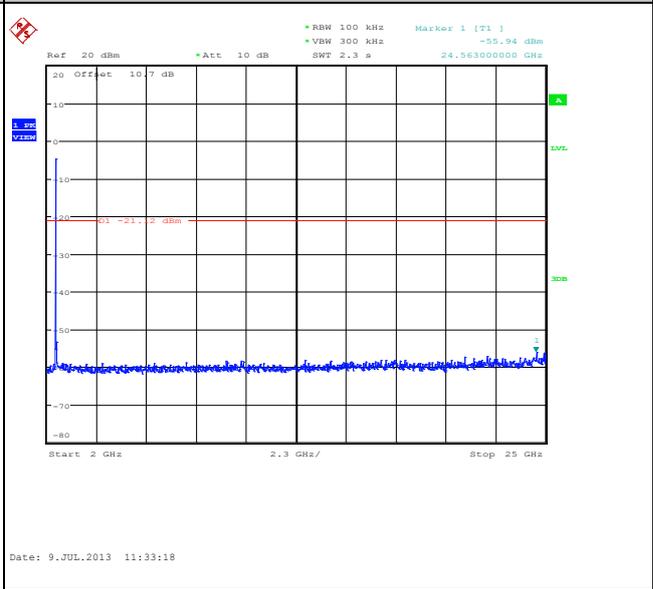
Mid Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

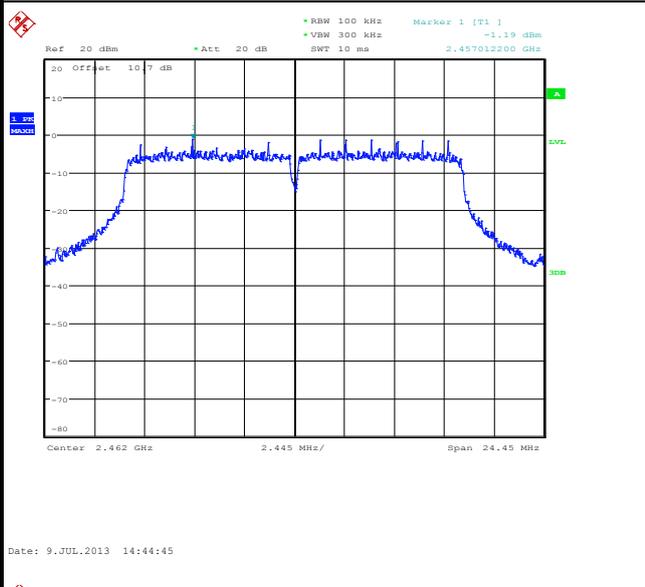




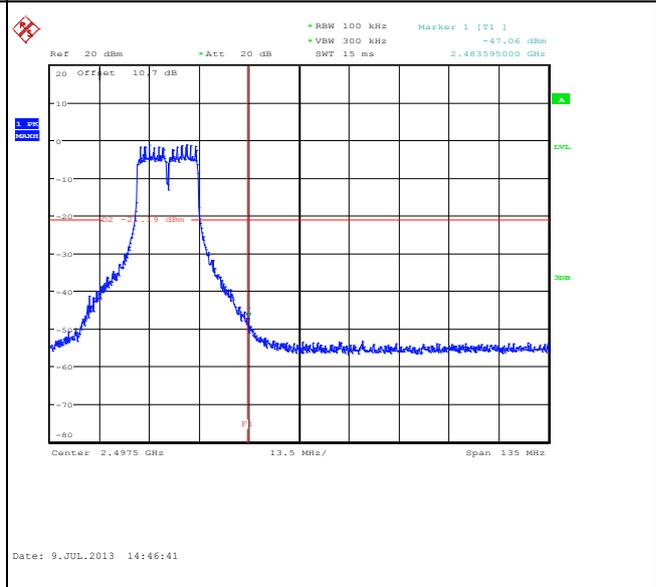
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11g Channel 11

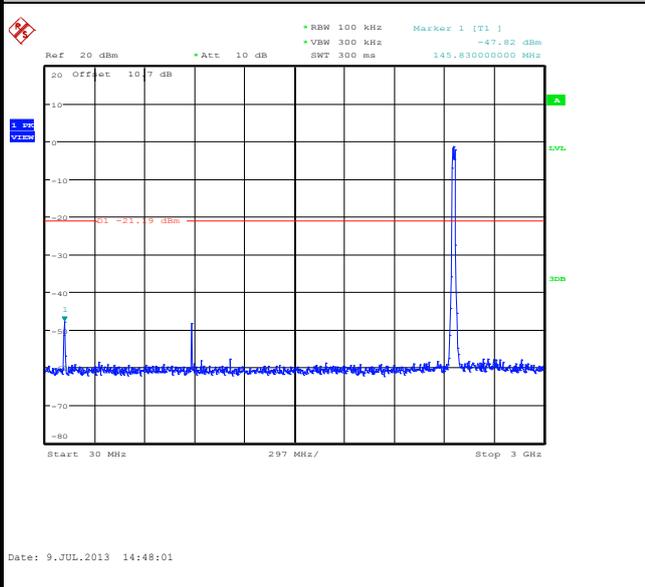
100kHz PSD reference Level



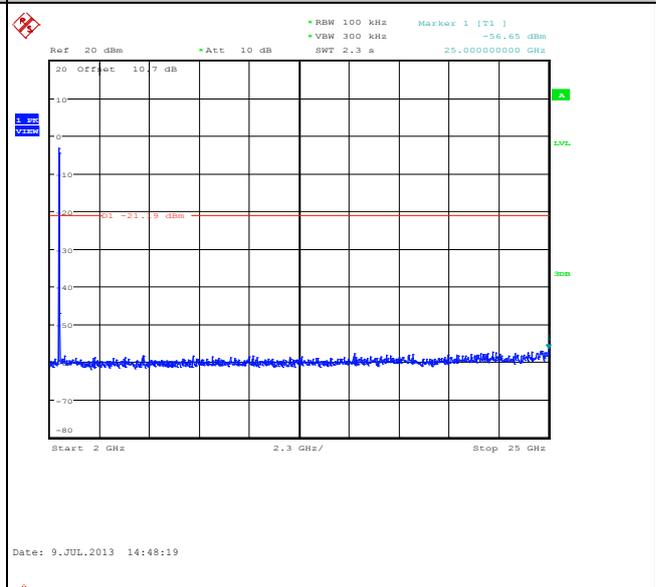
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz





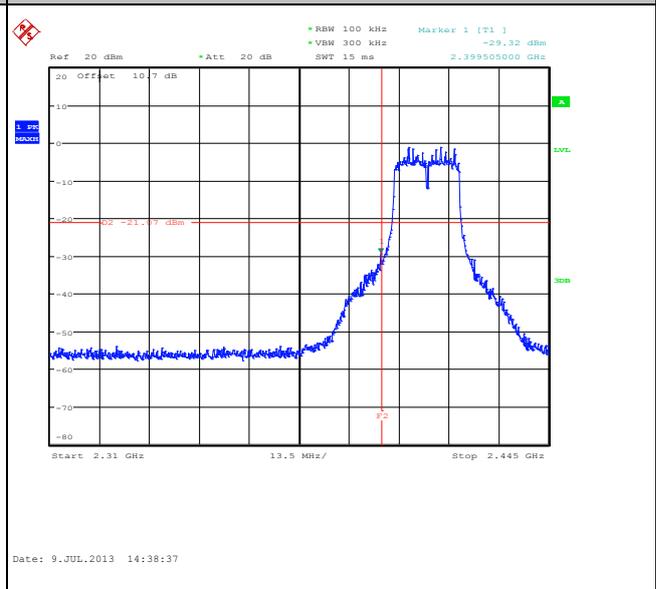
Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz Low	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11n HT20 Channel 01

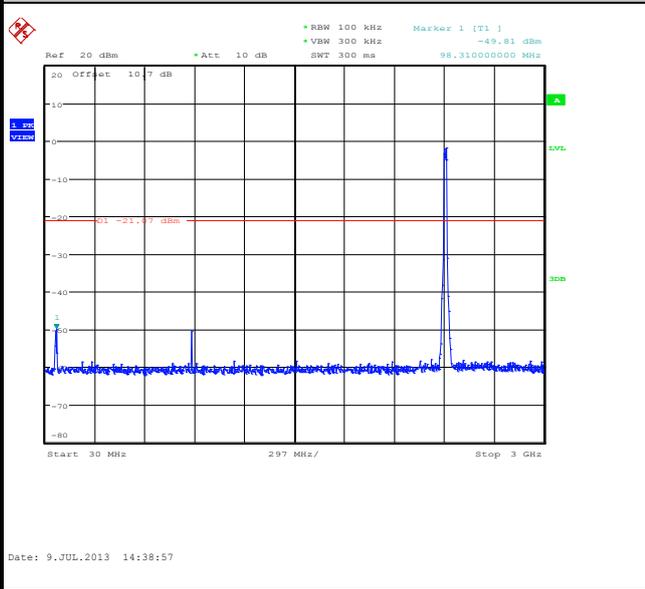
100kHz PSD reference Level



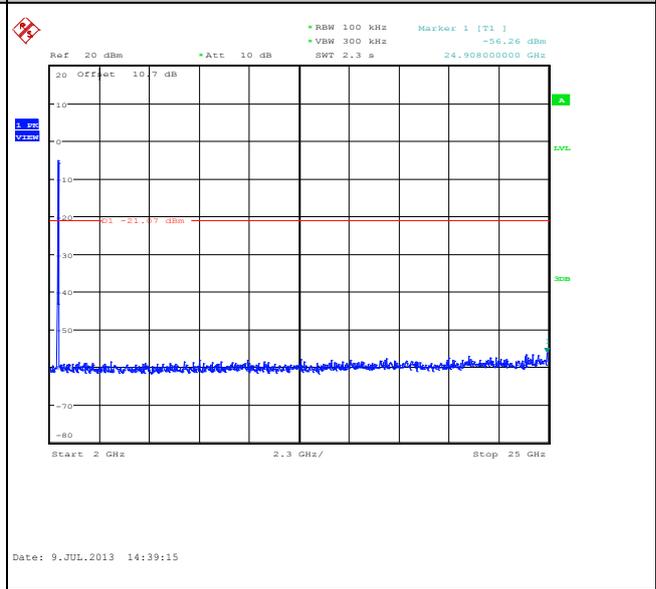
Low Channel Plot



Spurious Emission 30MHz~3GHz

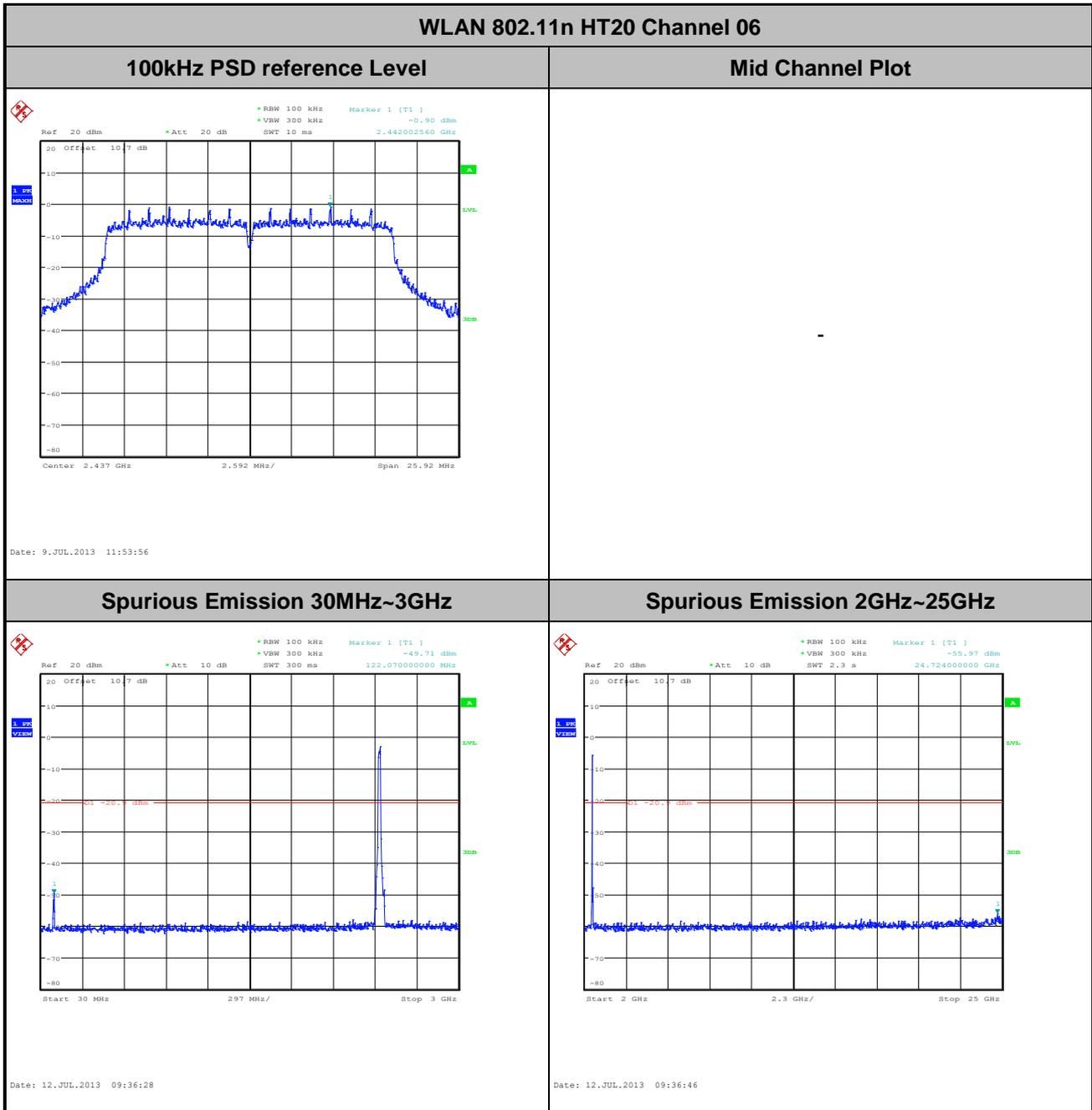


Spurious Emission 2GHz~25GHz





Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Alex Lee and Bill Kuo

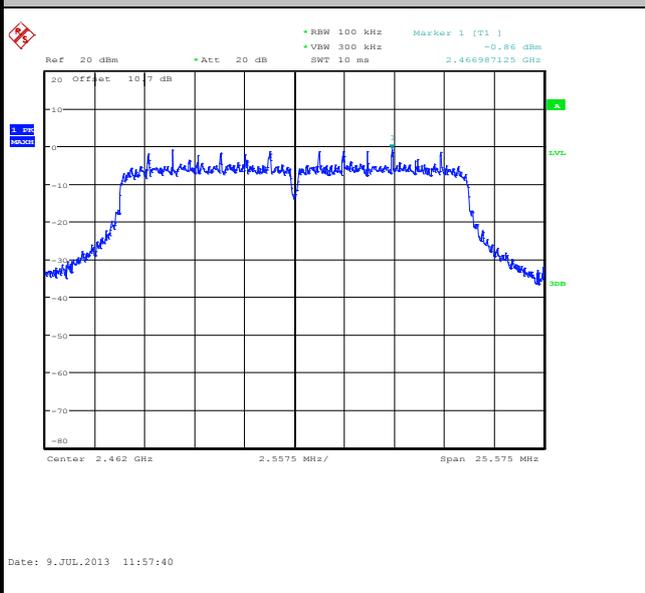




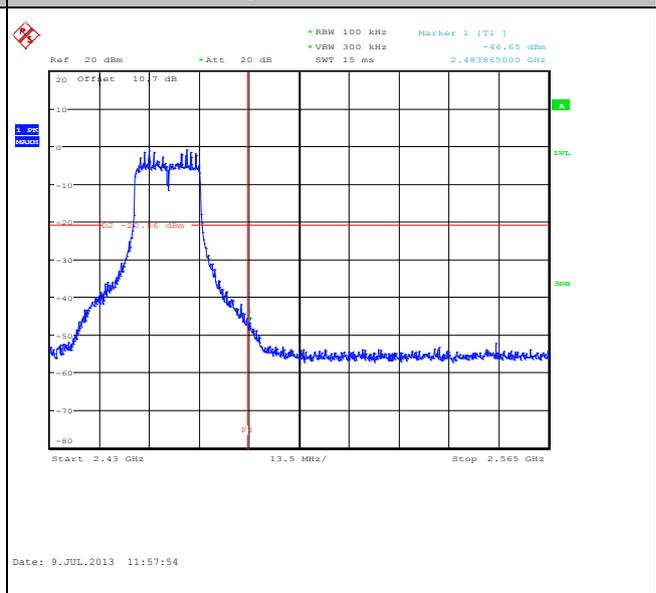
Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz High	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Alex Lee and Bill Kuo

WLAN 802.11n HT20 Channel 11

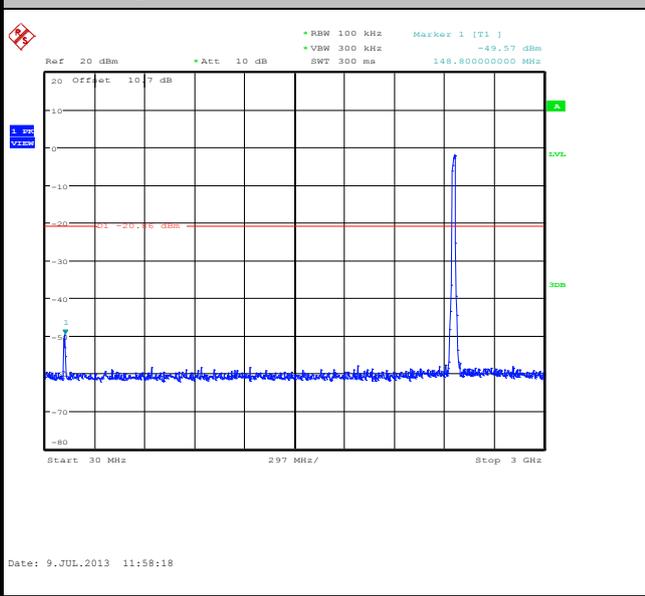
100kHz PSD reference Level



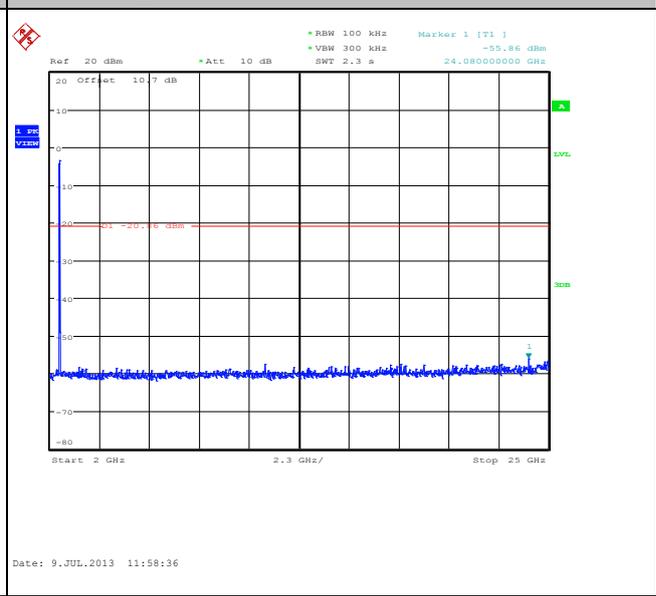
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.



3.5.3 Test Procedures

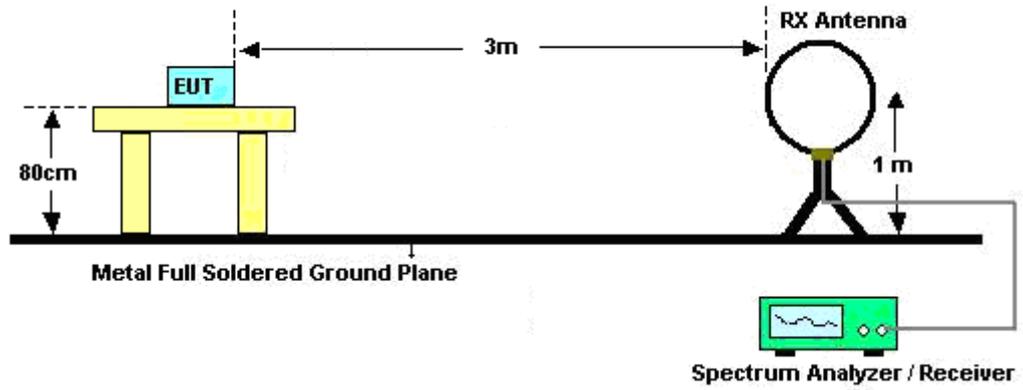
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter 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(μs)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	98.57	-	-	10Hz
2.4GHz 802.11n HT20	97.96	1920.00	0.52	1kHz

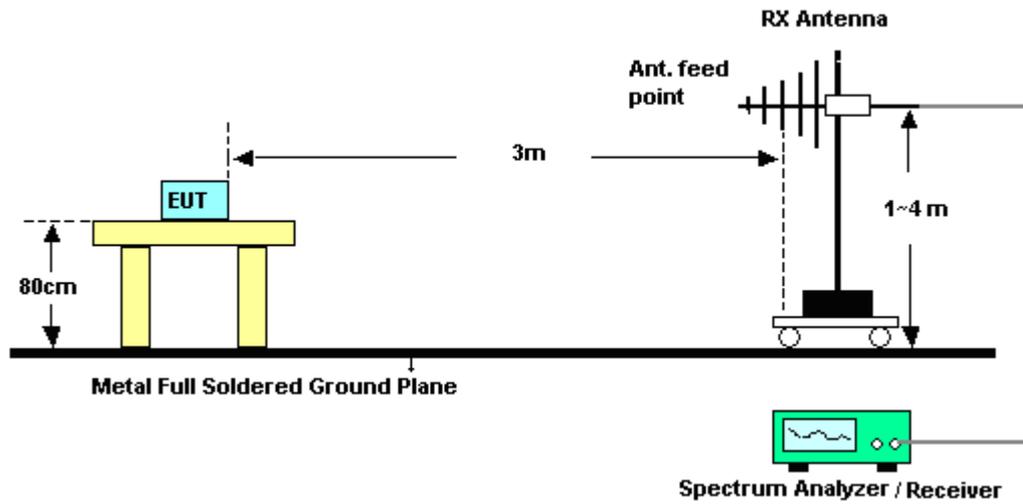
Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

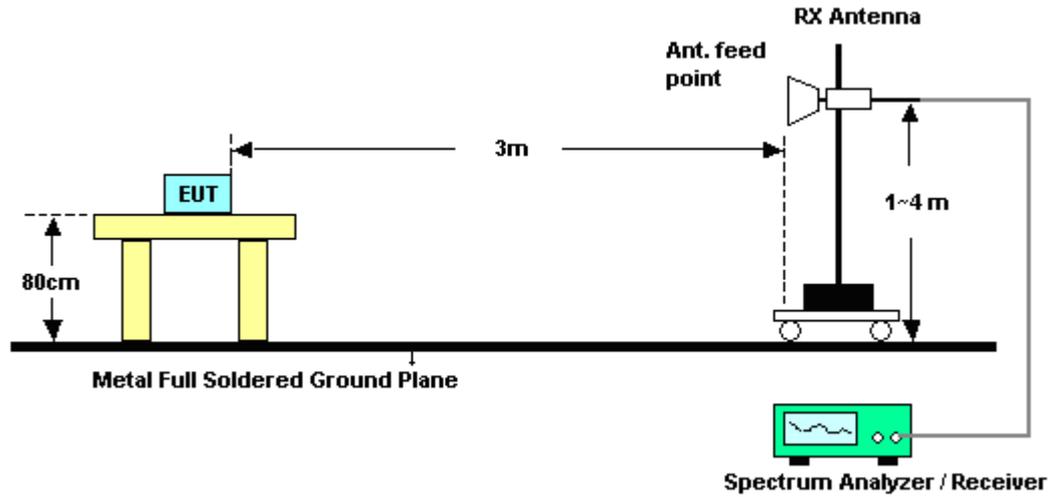
For radiated emissions below 30MHz



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

<Sample 1>

Test Mode :	802.11b	Temperature :	23~25°C
Test Band :	Low	Relative Humidity :	44~46%
Test Channel :	01	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2385.96	54.83	-19.17	74	50.35	32.36	6.45	34.33	104	167	Peak
2387.22	45.38	-8.62	54	40.9	32.36	6.45	34.33	104	167	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	53.26	-20.74	74	48.78	32.36	6.45	34.33	102	40	Peak
2387.04	42.97	-11.03	54	38.49	32.36	6.45	34.33	102	40	Average

Test Mode :	802.11b	Temperature :	23~25°C
Test Band :	High	Relative Humidity :	44~46%
Test Channel :	11	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2489.02	55.12	-18.88	74	50.33	32.5	6.59	34.3	100	172	Peak
2487.37	44.76	-9.24	54	39.99	32.48	6.59	34.3	100	172	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2487.67	51.16	-22.84	74	46.37	32.5	6.59	34.3	100	332	Peak
2487.13	40.3	-13.7	54	35.53	32.48	6.59	34.3	100	332	Average



Test Mode :	802.11g	Temperature :	23~25°C
Test Band :	Low	Relative Humidity :	44~46%
Test Channel :	01	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	64.64	-9.36	74	60.16	32.36	6.45	34.33	100	60	Peak
2390	45.83	-8.17	54	41.35	32.36	6.45	34.33	100	60	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	62.35	-11.65	74	57.87	32.36	6.45	34.33	100	359	Peak
2390	44.43	-9.57	54	39.95	32.36	6.45	34.33	100	359	Average

Test Mode :	802.11g	Temperature :	23~25°C
Test Band :	High	Relative Humidity :	44~46%
Test Channel :	11	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	63.99	-10.01	74	59.22	32.48	6.59	34.3	102	180	Peak
2483.5	45.48	-8.52	54	40.71	32.48	6.59	34.3	102	180	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.53	60.77	-13.23	74	56	32.48	6.59	34.3	100	23	Peak
2483.5	43.98	-10.02	54	39.21	32.48	6.59	34.3	100	23	Average



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Band :	Low	Relative Humidity :	44~46%
Test Channel :	01	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	68.59	-5.41	74	64.11	32.36	6.45	34.33	100	59	Peak
2390	48.9	-5.1	54	44.42	32.36	6.45	34.33	100	59	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	67.01	-6.99	74	62.53	32.36	6.45	34.33	100	359	Peak
2390	45.67	-8.33	54	41.19	32.36	6.45	34.33	100	359	Average

Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Band :	High	Relative Humidity :	44~46%
Test Channel :	11	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.56	64.93	-9.07	74	60.16	32.48	6.59	34.3	100	58	Peak
2483.5	47.19	-6.81	54	42.42	32.48	6.59	34.3	100	58	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.98	61.13	-12.87	74	56.36	32.48	6.59	34.3	102	174	Peak
2483.5	44.21	-9.79	54	39.44	32.48	6.59	34.3	102	174	Average



<Sample 2>

Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Band :	Low	Relative Humidity :	44~46%
Test Channel :	01	Test Engineer :	Hayden Wu and David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	69.71	-4.29	74	65.23	32.36	6.45	34.33	200	252	Peak
2390	48.62	-5.38	54	44.14	32.36	6.45	34.33	200	252	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	67.55	-6.45	74	63.07	32.36	6.45	34.33	100	355	Peak
2390	47.51	-6.49	54	43.03	32.36	6.45	34.33	100	355	Average



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

Note: Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

<Sample 1>

Test Mode :	802.11b	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2413 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 109.51 dBμV/m-20dB = 89.51 dBμV/m. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
36.75	27.73	-12.27	40	44.23	14.58	0.71	31.79	123	154	Peak
117.75	24.8	-18.7	43.5	42.89	12.46	1.2	31.75	-	-	Peak
213.6	24.51	-18.99	43.5	45.57	9.1	1.59	31.75	-	-	Peak
303.5	18.06	-27.94	46	34.59	13.27	1.92	31.72	-	-	Peak
548.5	20.73	-25.27	46	31.11	19.07	2.54	31.99	-	-	Peak
788.6	22.39	-23.61	46	31.49	19.8	3.06	31.96	-	-	Peak
2413	104.41	-	-	99.87	32.38	6.49	34.33	104	167	Average
2413	109.51	-	-	104.97	32.38	6.49	34.33	104	167	Peak
4824	48.45	-25.55	74	59	34.87	10.17	55.59	100	0	Peak
7236	49.86	-39.65	89.51	59.17	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11b	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	4. 2413 MHz is fundamental signal which can be ignored. 5. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 6. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	36.48	-3.52	40	48.74	18.9	0.64	31.8	100	321	Peak
46.2	29.86	-10.14	40	51	9.87	0.77	31.78	-	-	Peak
106.95	24.39	-19.11	43.5	43.19	11.82	1.13	31.75	-	-	Peak
541.5	23.23	-22.77	46	33.85	18.83	2.53	31.98	-	-	Peak
839	24.23	-21.77	46	32.64	20.19	3.19	31.79	-	-	Peak
900.6	25.84	-20.16	46	33.39	20.6	3.37	31.52	-	-	Peak
2413	102.17	-	-	97.63	32.38	6.49	34.33	102	40	Average
2413	106.7	-	-	102.16	32.38	6.49	34.33	102	40	Peak
4824	48.39	-25.61	74	58.94	34.87	10.17	55.59	100	0	Peak
7236	49	-37.7	86.7	58.31	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11b	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	103.78	-	-	99.15	32.43	6.52	34.32	100	23	Average
2438	109.2	-	-	104.57	32.43	6.52	34.32	100	23	Peak
4875	48.12	-25.88	74	58.77	34.85	10.18	55.68	100	0	Peak
7311	49.71	-24.29	74	58.91	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11b	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2436 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2436	101.02	-	-	96.42	32.4	6.52	34.32	100	329	Average
2436	106.4	-	-	101.8	32.4	6.52	34.32	100	329	Peak
4875	48.3	-25.7	74	58.95	34.85	10.18	55.68	100	0	Peak
7311	49.54	-24.46	74	58.74	36.14	10.94	56.28	100	0	Peak



Test Mode :	802.11b	Temperature :	23~25°C
Test Channel :	11	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2463 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2463	103.42	-	-	98.72	32.45	6.56	34.31	100	172	Average
2463	108.13	-	-	103.43	32.45	6.56	34.31	100	172	Peak
4923	48.86	-25.14	74	59.61	34.83	10.2	55.78	100	0	Peak
7386	49.06	-24.94	74	58.13	36.12	10.92	56.11	100	0	Peak

Test Mode :	802.11b	Temperature :	23~25°C
Test Channel :	11	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2463 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2463	99.35	-	-	94.65	32.45	6.56	34.31	100	332	Average
2463	104.38	-	-	99.68	32.45	6.56	34.31	100	332	Peak
4923	47.77	-26.23	74	58.52	34.83	10.2	55.78	100	0	Peak
7386	49.14	-24.86	74	58.21	36.12	10.92	56.11	100	0	Peak



Test Mode :	802.11g	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
116.4	25.08	-18.42	43.5	43.16	12.48	1.19	31.75	-	-	Peak
206.85	28.58	-14.92	43.5	49.6	9.17	1.56	31.75	-	-	Peak
223.05	31.29	-14.71	46	51.99	9.4	1.64	31.74	130	224	Peak
310.5	19.35	-26.65	46	35.74	13.4	1.94	31.73	-	-	Peak
583.5	21.21	-24.79	46	31.64	18.92	2.69	32.04	-	-	Peak
900.6	26.84	-19.16	46	34.39	20.6	3.37	31.52	-	-	Peak
2412	93.83	-	-	89.29	32.38	6.49	34.33	100	60	Average
2412	105.32	-	-	100.78	32.38	6.49	34.33	100	60	Peak
4824	48.44	-25.56	74	58.99	34.87	10.17	55.59	100	0	Peak
7236	49.46	-35.86	85.32	58.77	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11g	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
35.94	32.62	-7.38	40	48.67	15.04	0.7	31.79	105	276	Peak
46.2	28.64	-11.36	40	49.78	9.87	0.77	31.78	-	-	Peak
212.25	25.37	-18.13	43.5	46.44	9.1	1.58	31.75	-	-	Peak
545	21.19	-24.81	46	31.69	18.95	2.54	31.99	-	-	Peak
707.4	21.61	-24.39	46	31.68	19.04	2.91	32.02	-	-	Peak
900.6	25.53	-20.47	46	33.08	20.6	3.37	31.52	-	-	Peak
2410	92.72	-	-	88.18	32.38	6.49	34.33	100	359	Average
2410	104.27	-	-	99.73	32.38	6.49	34.33	100	359	Peak
4824	48.44	-25.56	74	58.99	34.87	10.17	55.59	100	0	Peak
7236	49.62	-34.65	84.27	58.93	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11g	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	95.68	-	-	91.05	32.43	6.52	34.32	102	181	Average
2438	107.29	-	-	102.66	32.43	6.52	34.32	102	181	Peak
4874	47.63	-26.37	74	58.28	34.85	10.18	55.68	100	0	Peak
7311	50.12	-23.88	74	59.32	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11g	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2436 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2436	92.14	-	-	87.54	32.4	6.52	34.32	100	3	Average
2436	103.73	-	-	99.13	32.4	6.52	34.32	100	3	Peak
4874	48.16	-25.84	74	58.81	34.85	10.18	55.68	100	0	Peak
7311	49.64	-24.36	74	58.84	36.14	10.94	56.28	100	0	Peak



Test Mode :	802.11g	Temperature :	23~25°C
Test Channel :	11	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	94.85	-	-	90.15	32.45	6.56	34.31	102	180	Average
2460	106.31	-	-	101.61	32.45	6.56	34.31	102	180	Peak
4924	47.96	-26.04	74	58.71	34.83	10.2	55.78	100	0	Peak
7386	49.46	-24.54	74	58.53	36.12	10.92	56.11	100	0	Peak

Test Mode :	802.11g	Temperature :	23~25°C
Test Channel :	11	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	91.88	-	-	87.17	32.45	6.56	34.3	100	23	Average
2464	103.21	-	-	98.5	32.45	6.56	34.3	100	23	Peak
4924	48	-26	74	58.75	34.83	10.2	55.78	100	0	Peak
7386	49.83	-24.17	74	58.9	36.12	10.92	56.11	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
122.34	24.76	-18.74	43.5	42.96	12.32	1.23	31.75	-	-	Peak
163.65	23.48	-20.02	43.5	43.7	10	1.53	31.75	-	-	Peak
223.86	25.06	-20.94	46	45.66	9.5	1.64	31.74	-	-	Peak
536.6	19.85	-26.15	46	30.75	18.55	2.53	31.98	-	-	Peak
756.4	22.3	-23.7	46	31.49	19.74	3.05	31.98	-	-	Peak
900.6	27.31	-18.69	46	34.86	20.6	3.37	31.52	144	245	Peak
2410	94.13	-	-	89.59	32.38	6.49	34.33	100	59	Average
2410	105.74	-	-	101.2	32.38	6.49	34.33	100	59	Peak
4824	47.7	-26.3	74	58.25	34.87	10.17	55.59	100	0	Peak
7236	49.65	-36.09	85.74	58.96	36.15	10.96	56.42	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
35.94	34.39	-5.61	40	50.44	15.04	0.7	31.79	103	92	Peak
46.2	29.12	-10.88	40	50.26	9.87	0.77	31.78	-	-	Peak
56.46	26.94	-13.06	40	51.41	6.46	0.85	31.78	-	-	Peak
538	19.8	-26.2	46	30.58	18.67	2.53	31.98	-	-	Peak
742.4	22.01	-23.99	46	31.34	19.64	3.02	31.99	-	-	Peak
900.6	26.6	-19.4	46	34.15	20.6	3.37	31.52	-	-	Peak
2414	91.69	-	-	87.15	32.38	6.49	34.33	100	359	Average
2414	103.44	-	-	98.9	32.38	6.49	34.33	100	359	Peak
4824	49.01	-24.99	74	59.56	34.87	10.17	55.59	100	0	Peak
7236	49.79	-33.65	83.44	59.1	36.15	10.96	56.42	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	94.45	-	-	89.81	32.43	6.52	34.31	100	59	Average
2438	106.08	-	-	101.44	32.43	6.52	34.31	100	59	Peak
4874	48.17	-25.83	74	58.82	34.85	10.18	55.68	100	0	Peak
7311	49.47	-24.53	74	58.67	36.14	10.94	56.28	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2436 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2436	91.04	-	-	86.44	32.4	6.52	34.32	104	171	Average
2436	103.17	-	-	98.57	32.4	6.52	34.32	104	171	Peak
4874	48.4	-25.6	74	59.05	34.85	10.18	55.68	100	0	Peak
7311	50.64	-23.36	74	59.84	36.14	10.94	56.28	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	11	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	93.96	-	-	89.25	32.45	6.56	34.3	100	58	Average
2464	105.62	-	-	100.91	32.45	6.56	34.3	100	58	Peak
4924	48.5	-25.5	74	59.25	34.83	10.2	55.78	100	0	Peak
7386	49.45	-24.55	74	58.52	36.12	10.92	56.11	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	11	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	90.59	-	-	85.89	32.45	6.56	34.31	102	174	Average
2460	101.9	-	-	97.2	32.45	6.56	34.31	102	174	Peak
4924	48.62	-25.38	74	59.37	34.83	10.2	55.78	100	0	Peak
7386	49.6	-24.4	74	58.67	36.12	10.92	56.11	100	0	Peak



<Sample 2>

Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Horizontal
Remark :	1. 2416 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
36.75	28.68	-11.32	40	45.18	14.58	0.71	31.79	134	187	Peak
115.05	23.3	-20.2	43.5	41.36	12.5	1.19	31.75	-	-	Peak
213.6	25.45	-18.05	43.5	46.51	9.1	1.59	31.75	-	-	Peak
321	20.32	-25.68	46	36.59	13.51	1.96	31.74	-	-	Peak
539.4	19.78	-26.22	46	30.49	18.74	2.53	31.98	-	-	Peak
811	21.92	-24.08	46	30.81	19.91	3.1	31.9	-	-	Peak
2416	95.31	-	-	90.76	32.38	6.49	34.32	200	252	Average
2416	107.01	-	-	102.46	32.38	6.49	34.32	200	252	Peak
4824	47.97	-26.03	74	58.52	34.87	10.17	55.59	100	0	Peak
7236	49.49	-37.52	87.01	58.8	36.15	10.96	56.42	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	23~25°C
Test Channel :	01	Relative Humidity :	44~46%
Test Engineer :	Hayden Wu and David Yang	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	36.14	-3.86	40	48.4	18.9	0.64	31.8	105	341	Peak
46.2	29.9	-10.1	40	51.04	9.87	0.77	31.78	-	-	Peak
202.26	28.79	-14.71	43.5	49.74	9.25	1.55	31.75	-	-	Peak
405	19.8	-26.2	46	33.46	15.97	2.2	31.83	-	-	Peak
637.4	25.22	-20.78	46	35.28	19.2	2.79	32.05	-	-	Peak
832	22.9	-23.1	46	31.43	20.12	3.17	31.82	-	-	Peak
2410	93.55	-	-	89.01	32.38	6.49	34.33	100	355	Average
2410	105.3	-	-	100.76	32.38	6.49	34.33	100	355	Peak
4824	47.69	-26.31	74	58.24	34.87	10.17	55.59	100	0	Peak
7236	49.89	-35.41	85.3	59.2	36.15	10.96	56.42	100	0	Peak

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.

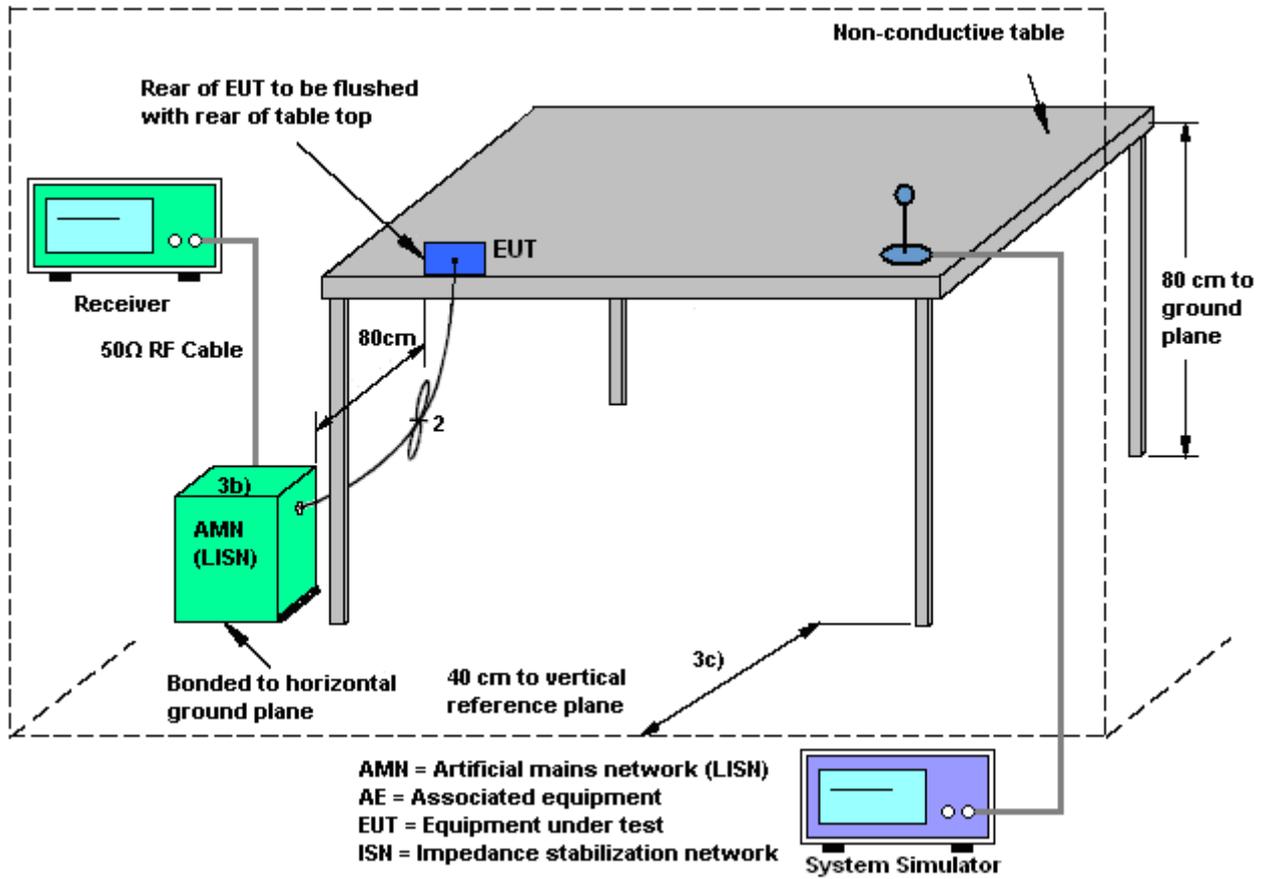
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

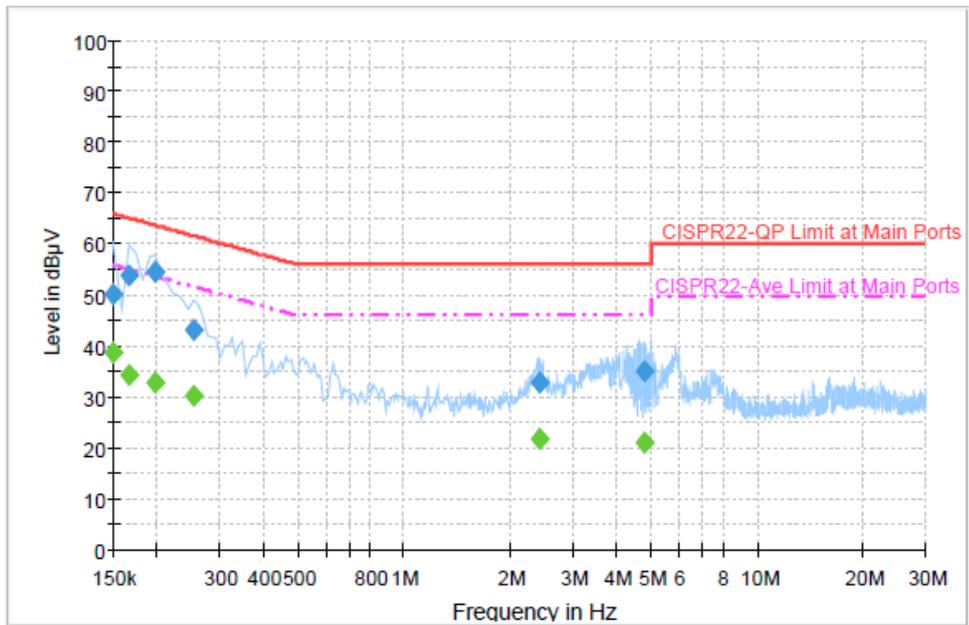
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 2	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 1 + Battery 1 + USB Cable 1 (Data Link with Notebook) for Sample 2		



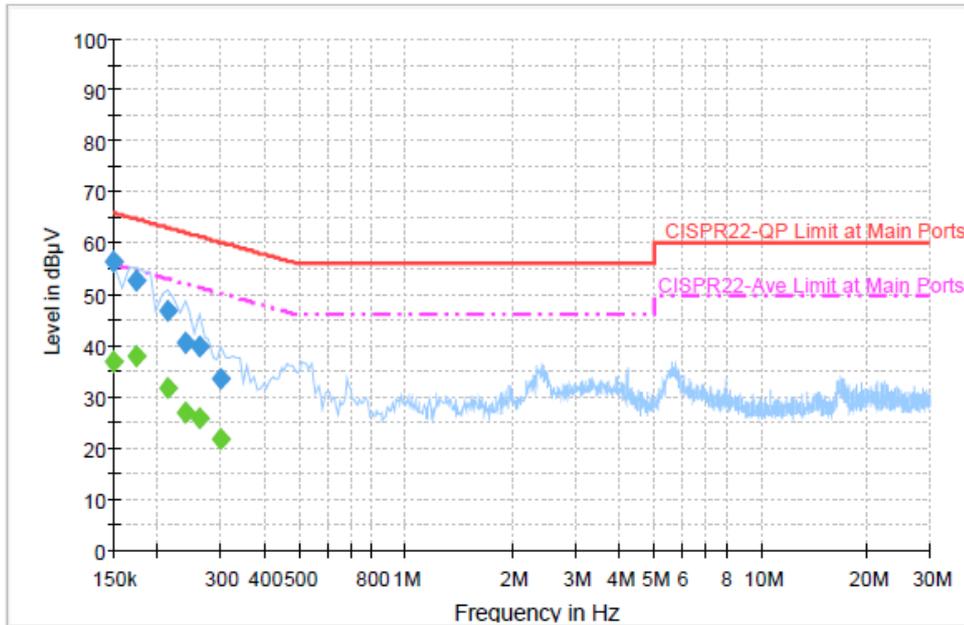
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.3	Off	L1	19.4	15.7	66.0
0.166000	53.7	Off	L1	19.4	11.5	65.2
0.198000	54.8	Off	L1	19.3	8.9	63.7
0.254000	43.4	Off	L1	19.5	18.2	61.6
2.414000	32.9	Off	L1	19.6	23.1	56.0
4.806000	34.9	Off	L1	19.6	21.1	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.8	Off	L1	19.4	17.2	56.0
0.166000	34.5	Off	L1	19.4	20.7	55.2
0.198000	33.0	Off	L1	19.3	20.7	53.7
0.254000	30.1	Off	L1	19.5	21.5	51.6
2.414000	21.7	Off	L1	19.6	24.3	46.0
4.806000	21.0	Off	L1	19.6	25.0	46.0

Test Mode :	Mode 2	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 1 + Battery 1 + USB Cable 1 (Data Link with Notebook) for Sample 2		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	56.3	Off	N	19.4	9.7	66.0
0.174000	52.9	Off	N	19.4	11.9	64.8
0.214000	47.0	Off	N	19.4	16.0	63.0
0.238000	40.6	Off	N	19.5	21.6	62.2
0.262000	39.7	Off	N	19.4	21.7	61.4
0.302000	33.7	Off	N	19.4	26.5	60.2

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.1	Off	N	19.4	18.9	56.0
0.174000	38.0	Off	N	19.4	16.8	54.8
0.214000	31.6	Off	N	19.4	21.4	53.0
0.238000	27.0	Off	N	19.5	25.2	52.2
0.262000	25.7	Off	N	19.4	25.7	51.4
0.302000	21.7	Off	N	19.4	28.5	50.2



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 Connected Construction

Non-standard connector 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	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Jul. 04, 2013 ~ Jul. 12, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Sep. 08, 2012	Jul. 04, 2013 ~ Jul. 12, 2013	Sep. 07, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Sep. 08, 2012	Jul. 04, 2013 ~ Jul. 12, 2013	Sep. 07, 2013	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 13, 2012	Jul. 19, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Jul. 19, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	Jul. 19, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Jul. 19, 2013	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP30	101352	9kHz~30GHz	Nov. 07, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Nov. 06, 2013	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9kHz ~ 26.5GHz	Nov. 26, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Nov. 25, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/0003	20MHz ~ 1000MHz	May 06, 2013	Jul. 12, 2013 ~ Jul. 16, 2013	May 05, 2014	Radiation (03CH06-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MhZ	Jul. 03, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Jul. 03, 2014	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Jul. 31, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9kHz ~ 1GHz	Apr. 12, 2013	Jul. 12, 2013 ~ Jul. 16, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Jul. 20, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Jul. 12, 2013 ~ Jul. 16, 2013	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 12, 2013	Jul. 12, 2013 ~ Jul. 16, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0 - 360 degree	N/A	Jul. 12, 2013 ~ Jul. 16, 2013	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1 m ~ 4 m	N/A	Jul. 12, 2013 ~ Jul. 16, 2013	N/A	Radiation (03CH06-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54
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Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.72
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