

FCC RF Test Report

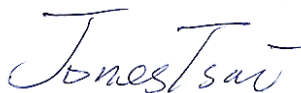
APPLICANT : LG Electronics Inc.
EQUIPMENT : Mobile Phone
BRAND NAME : LG
MODEL NAME : LG-D802, LG-D802T, LG-D802a
FCC ID : ZNFD802
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jun. 21, 2013 and completely tested on Jul. 25, 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.

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

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : ZNFD802

Page Number : 1 of 59

Report Issued Date : Jul. 29, 2013

Report Version : Rev. 01



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 5

 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 11

3 TEST RESULT 12

 3.1 6dB Bandwidth Measurement 12

 3.2 Output Power Measurement 15

 3.3 Power Spectral Density Measurement 18

 3.4 Conducted Band Edges and Spurious Emission Measurement 21

 3.5 Radiated Band Edges and Spurious Emission Measurement 34

 3.6 AC Conducted Emission Measurement 53

 3.7 Antenna Requirements 57

4 LIST OF MEASURING EQUIPMENT 58

5 UNCERTAINTY OF EVALUATION 59

APPENDIX A. SETUP PHOTOGRAPHS

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 9.65 dB at 36.750 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 13.60 dB at 0.440 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

LG Electronics Inc.
60-39, Kasan-dong, Kumchon-gu, Seoul 135-801, Korea

1.2 Manufacturer

LG Electronics Inc.
60-39, Kasan-dong, Kumchon-gu, Seoul 135-801, Korea

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	LG
Model Name	LG-D802, LG-D802T, LG-D802a
FCC ID	ZNFD802
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/ WLAN 2.4GHz 802.11b/g/n/ac, WLAN 5GHz 802.11a/n/ac/ Bluetooth 3.0/4.0+LE/NFC
HW Version	Rev.d
SW Version	D80207a
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum Output Power to Antenna	802.11b : 18.96 dBm (0.0787 W) 802.11g : 21.83 dBm (0.1524 W) 802.11n HT20 : 22.11 dBm (0.1626 W) 802.11ac VHT20: 21.26 dBm (0.1337 W)
Antenna Type	PIFA Antenna with gain -1.99 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

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 (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 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)	18.96	18.95	18.88	18.92

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)	21.83	21.81	21.82	21.78	21.56	21.53	21.42	21.16

2.4GHz 802.11n HT20 mode									
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	400GI	22.10	21.99	21.88	22.07	21.94	21.87	21.78	21.76
	800GI	22.11	22.05	22.07	22.10	21.99	21.95	22.10	22.02

2.4GHz 802.11ac VHT20 mode										
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
Peak Power (dBm)	400GI	21.04	20.89	20.74	20.88	20.92	20.76	20.81	20.98	20.80
	800GI	21.26	21.12	21.04	21.16	21.05	21.05	21.04	21.15	21.15



2.3 Test Mode

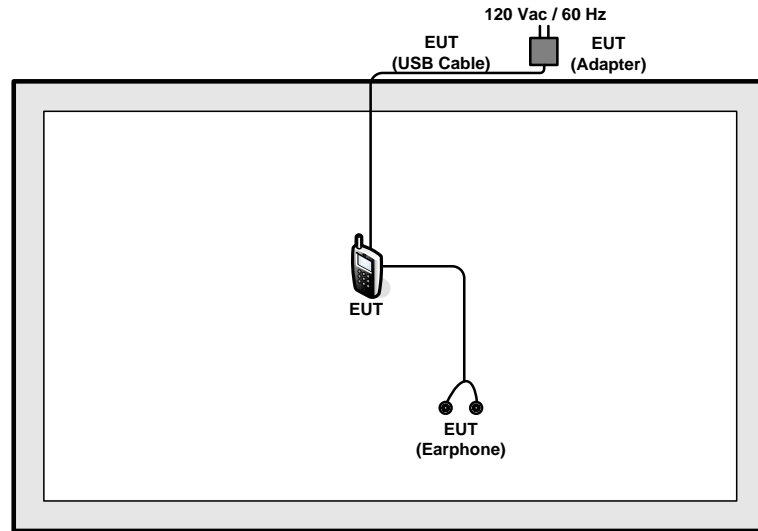
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11ac VHT20	MCS0	1/6/11
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11ac VHT20	MCS0	1/6/11
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
		802.11ac VHT20	MCS0	1/11
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11ac VHT20	MCS0	1/6/11
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11

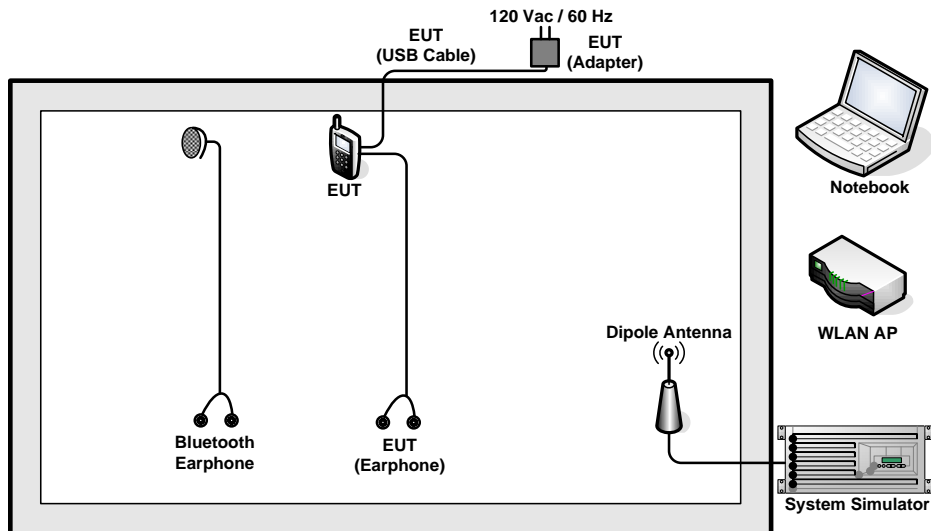
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4GHz) Link + USB Cable (Charging from Adapter) + Earphone + MP3

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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	SonyEricsson	MW600	PY700A2029	N/A	N/A

2.6 Description of RF Function Operation Test Setup

For WLAN RF test items, an engineering test program (SW D80206d) was provided and enabled to make EUT continuous transmit/receive.

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.

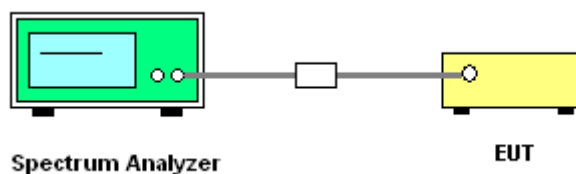
3.1.2 Measuring Instruments

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

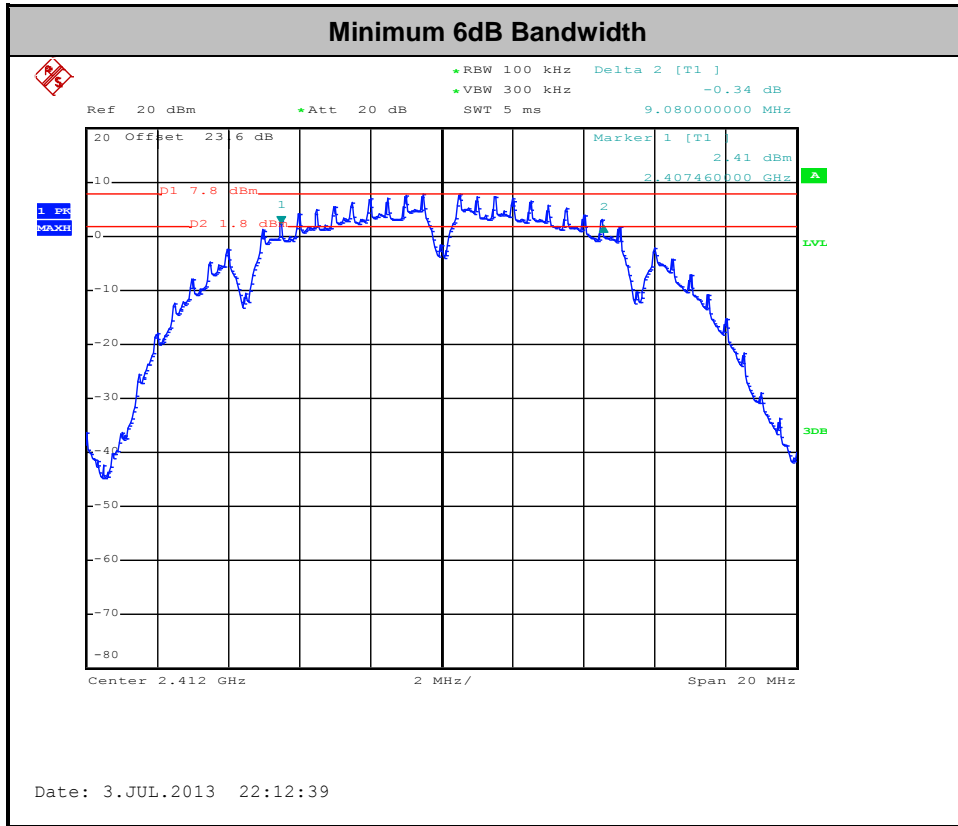




3.1.5 Test Result of 6dB Occupied Bandwidth

Test Band :	2.4GHz	Temperature :	24-26°C
Test Engineer :	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	9.08	0.5	Pass
11b	1Mbps	1	6	2437	9.52	0.5	Pass
11b	1Mbps	1	11	2462	9.56	0.5	Pass
11g	6Mbps	1	1	2412	16.32	0.5	Pass
11g	6Mbps	1	6	2437	16.32	0.5	Pass
11g	6Mbps	1	11	2462	16.34	0.5	Pass
HT20	MCS0	1	1	2412	17.56	0.5	Pass
HT20	MCS0	1	6	2437	17.60	0.5	Pass
HT20	MCS0	1	11	2462	17.56	0.5	Pass
VHT20	MCS0	1	1	2412	17.56	0.5	Pass
VHT20	MCS0	1	6	2437	17.60	0.5	Pass
VHT20	MCS0	1	11	2462	17.56	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.

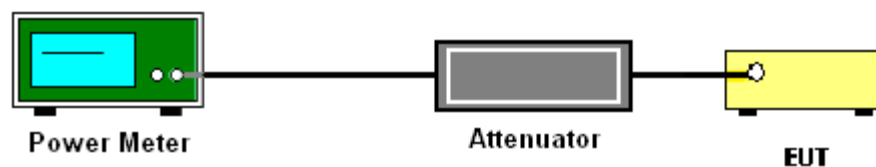
3.2.2 Measuring Instruments

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 :	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	18.84	30	-1.99	Pass
11b	1Mbps	1	6	2437	18.73	30	-1.99	Pass
11b	1Mbps	1	11	2462	18.96	30	-1.99	Pass
11g	6Mbps	1	1	2412	21.83	30	-1.99	Pass
11g	6Mbps	1	6	2437	21.81	30	-1.99	Pass
11g	6Mbps	1	11	2462	21.58	30	-1.99	Pass
HT20	MCS0	1	1	2412	22.11	30	-1.99	Pass
HT20	MCS0	1	6	2437	21.78	30	-1.99	Pass
HT20	MCS0	1	11	2462	21.77	30	-1.99	Pass
VHT20	MCS0	1	1	2412	21.04	30	-1.99	Pass
VHT20	MCS0	1	6	2437	20.89	30	-1.99	Pass
VHT20	MCS0	1	11	2462	21.26	30	-1.99	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 :	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	0.04	15.79	30	-1.99	Pass
11b	1Mbps	1	6	2437	0.04	15.68	30	-1.99	Pass
11b	1Mbps	1	11	2462	0.04	15.91	30	-1.99	Pass
11g	6Mbps	1	1	2412	0.23	12.35	30	-1.99	Pass
11g	6Mbps	1	6	2437	0.23	12.10	30	-1.99	Pass
11g	6Mbps	1	11	2462	0.23	12.08	30	-1.99	Pass
HT20	MCS0	1	1	2412	0.22	12.05	30	-1.99	Pass
HT20	MCS0	1	6	2437	0.22	11.94	30	-1.99	Pass
HT20	MCS0	1	11	2462	0.22	11.93	30	-1.99	Pass
VHT20	MCS0	1	1	2412	0.22	11.01	30	-1.99	Pass
VHT20	MCS0	1	6	2437	0.22	11.03	30	-1.99	Pass
VHT20	MCS0	1	11	2462	0.22	11.05	30	-1.99	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.

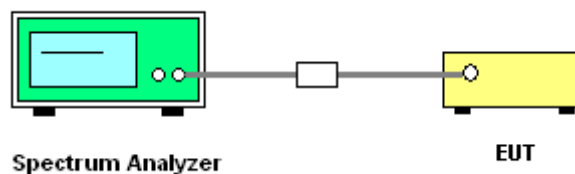
3.3.2 Measuring Instruments

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



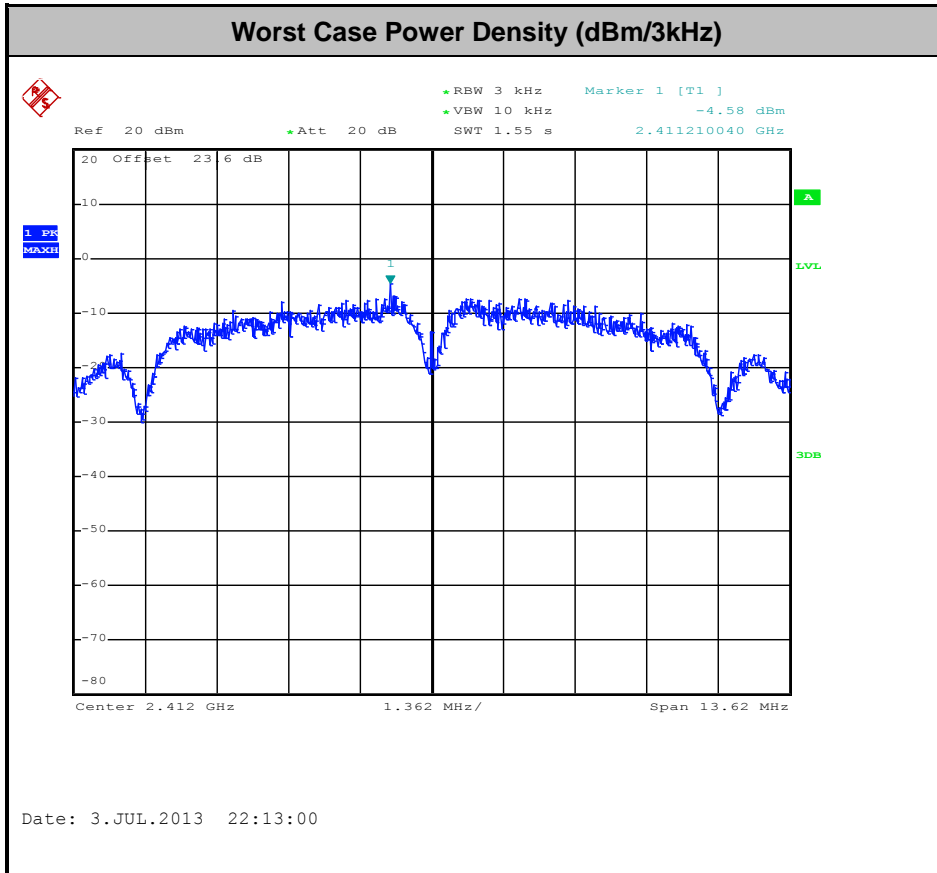


3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	24-26°C
Test Engineer :	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	-4.58	8	-1.99	Pass
11b	1Mbps	1	6	2437	-6.81	8	-1.99	Pass
11b	1Mbps	1	11	2462	-6.54	8	-1.99	Pass
11g	6Mbps	1	1	2412	-13.33	8	-1.99	Pass
11g	6Mbps	1	6	2437	-13.43	8	-1.99	Pass
11g	6Mbps	1	11	2462	-13.88	8	-1.99	Pass
HT20	MCS0	1	1	2412	-13.46	8	-1.99	Pass
HT20	MCS0	1	6	2437	-12.79	8	-1.99	Pass
HT20	MCS0	1	11	2462	-13.83	8	-1.99	Pass
VHT20	MCS0	1	1	2412	-15.94	8	-1.99	Pass
VHT20	MCS0	1	6	2437	-15.14	8	-1.99	Pass
VHT20	MCS0	1	11	2462	-14.94	8	-1.99	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).

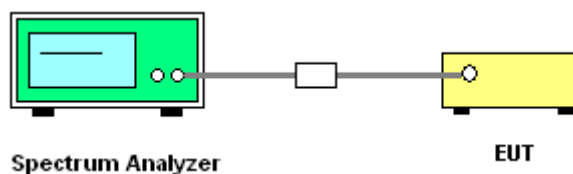
3.4.2 Measuring Instruments

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.

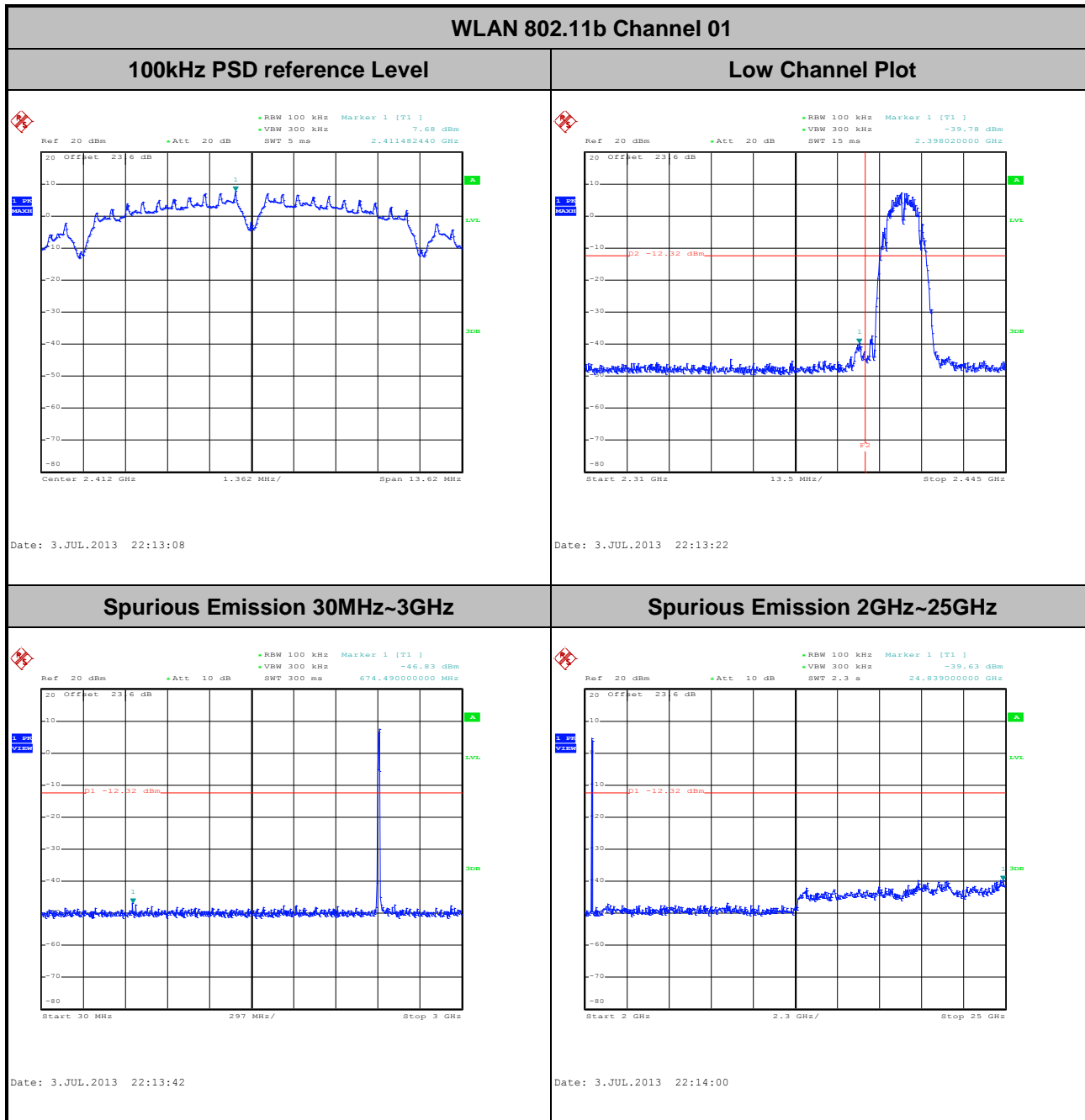
3.4.4 Test Setup





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 :	Bill Kuo

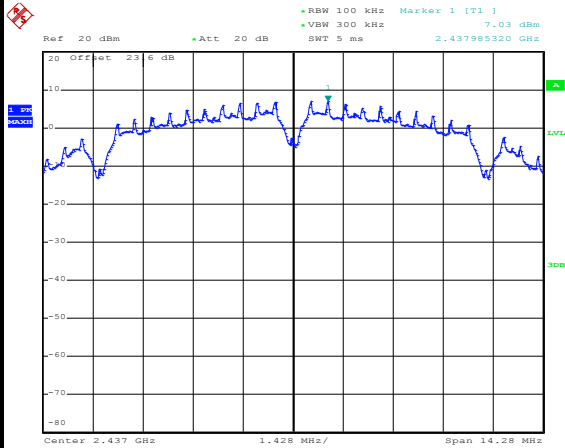




Test Mode :	802.11b	Temperature :	24-26°C
Test Band :	2.4GHz Mid	Relative Humidity :	50-53%
Test Channel :	06	Test Engineer :	Bill Kuo

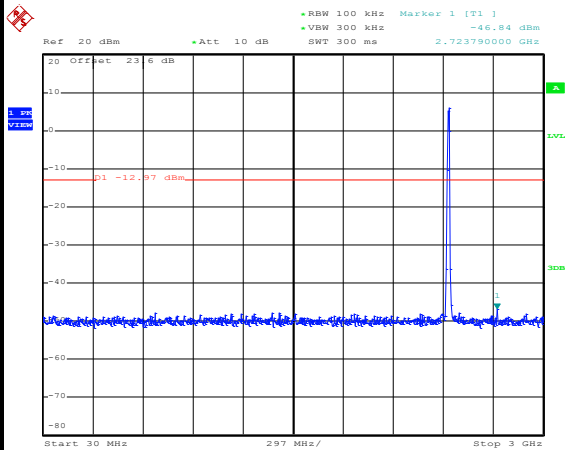
WLAN 802.11b Channel 06

100kHz PSD reference Level



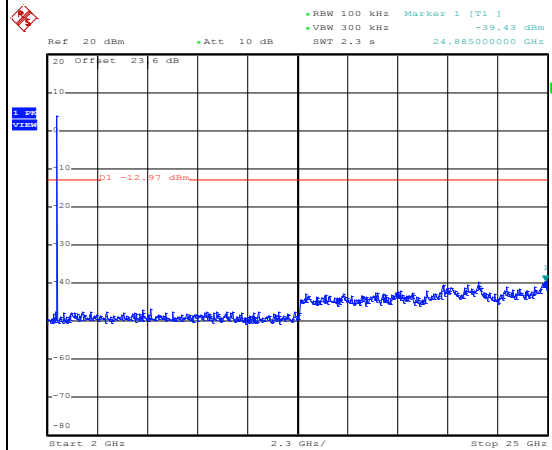
Date: 3.JUL.2013 22:15:46

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:16:06

Spurious Emission 2GHz~25GHz



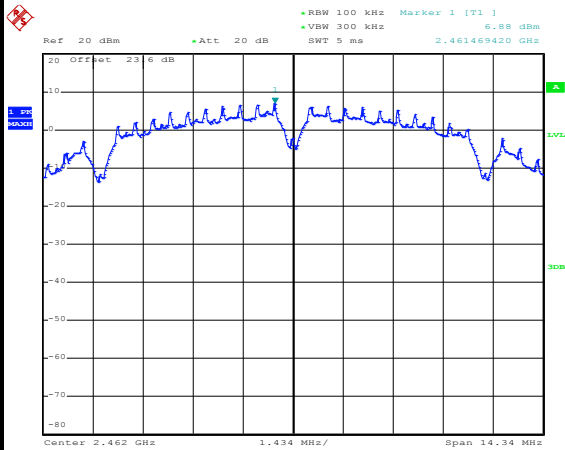
Date: 3.JUL.2013 22:16:25



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

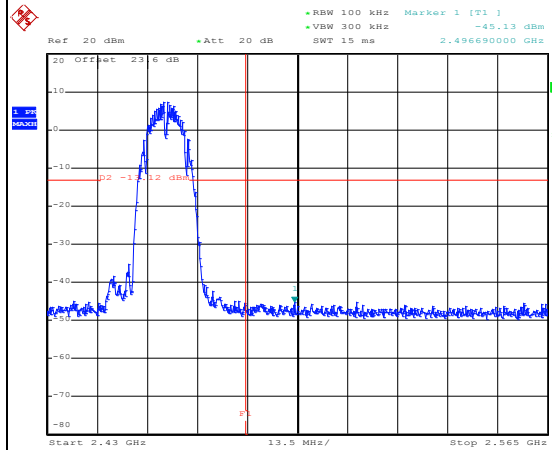
WLAN 802.11b Channel 11

100kHz PSD reference Level



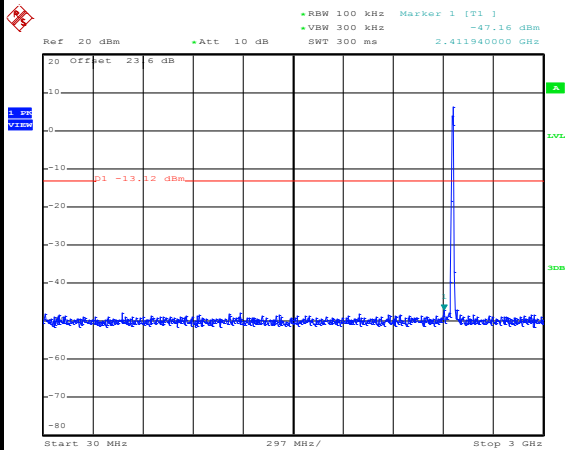
Date: 3.JUL.2013 22:18:26

High Channel Plot



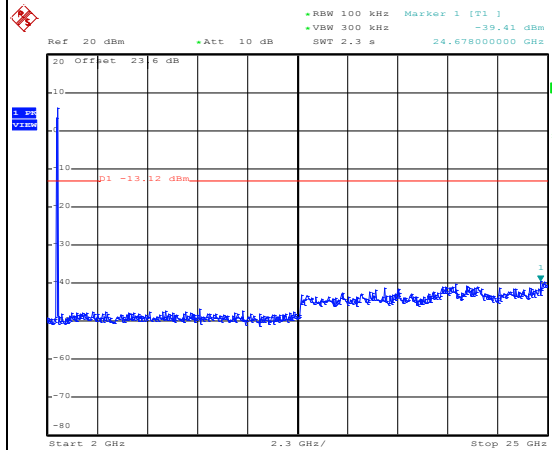
Date: 3.JUL.2013 22:18:40

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:18:59

Spurious Emission 2GHz~25GHz



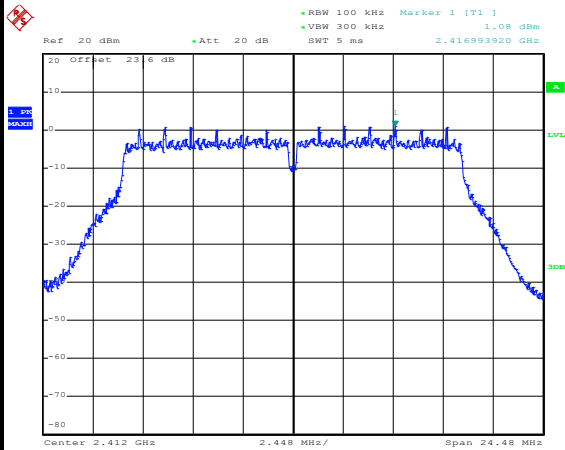
Date: 3.JUL.2013 22:19:18



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

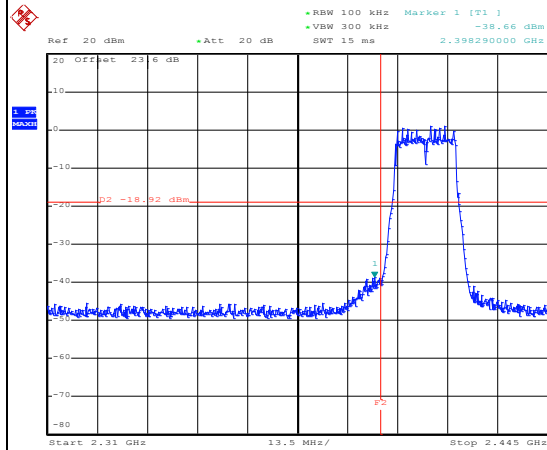
WLAN 802.11g Channel 01

100kHz PSD reference Level



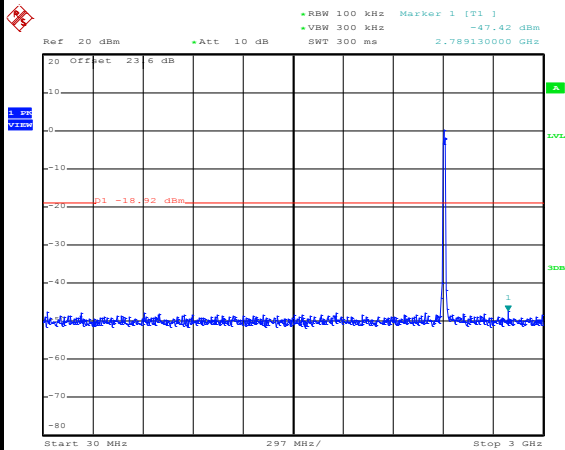
Date: 3.JUL.2013 22:26:12

Low Channel Plot



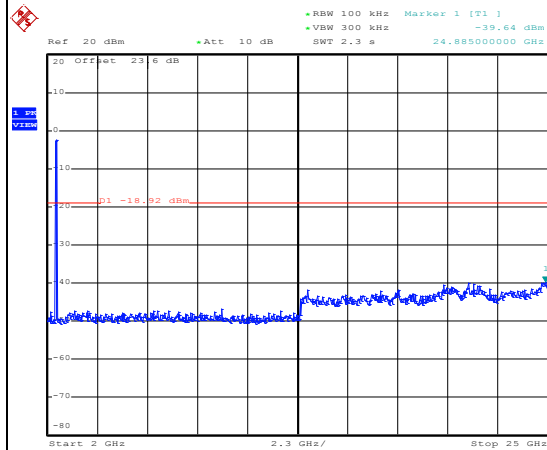
Date: 3.JUL.2013 22:26:26

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:26:45

Spurious Emission 2GHz~25GHz



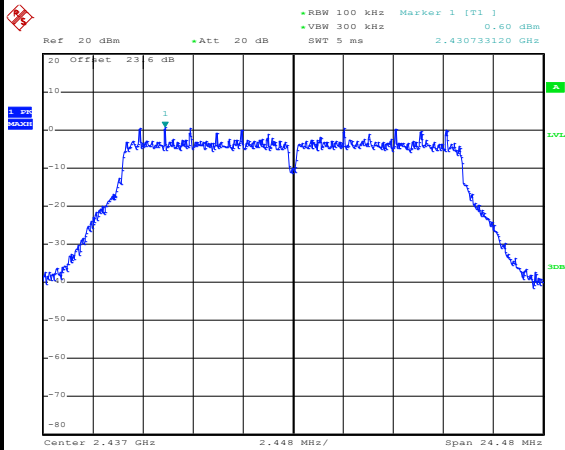
Date: 3.JUL.2013 22:27:04



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

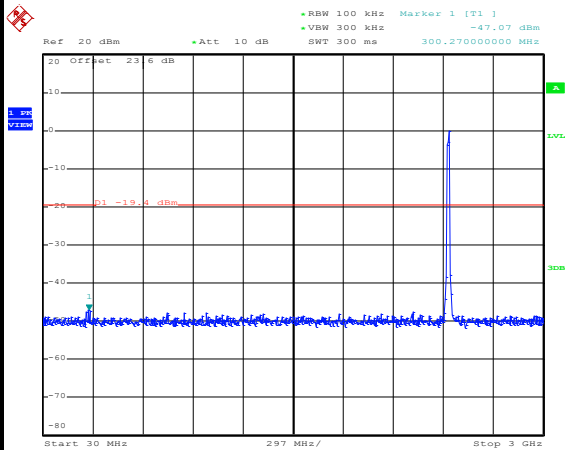
WLAN 802.11g Channel 06

100kHz PSD reference Level



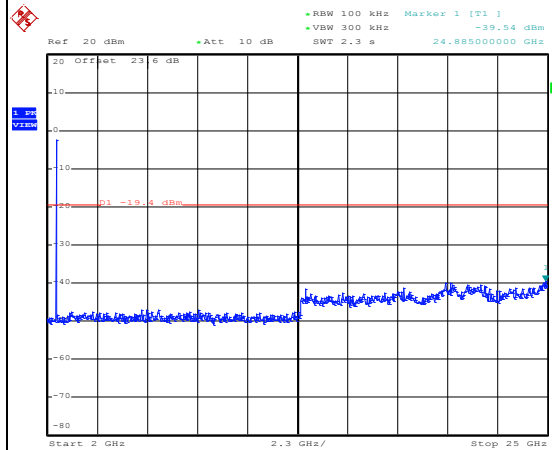
Date: 3.JUL.2013 22:23:58

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:24:17

Spurious Emission 2GHz~25GHz



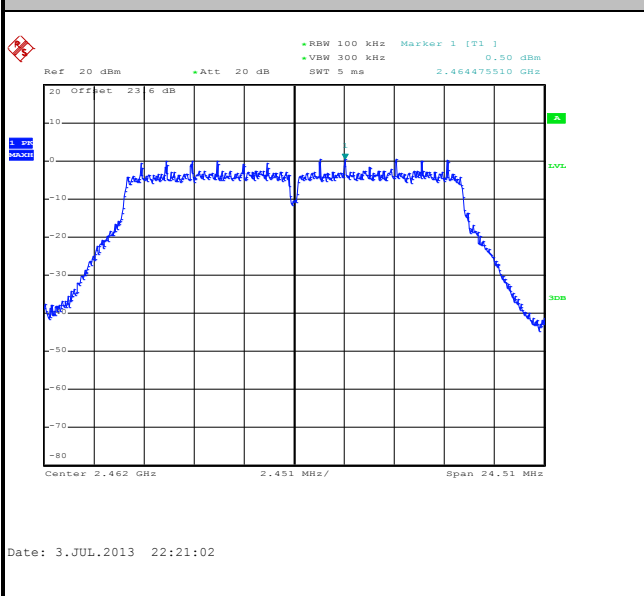
Date: 3.JUL.2013 22:24:36



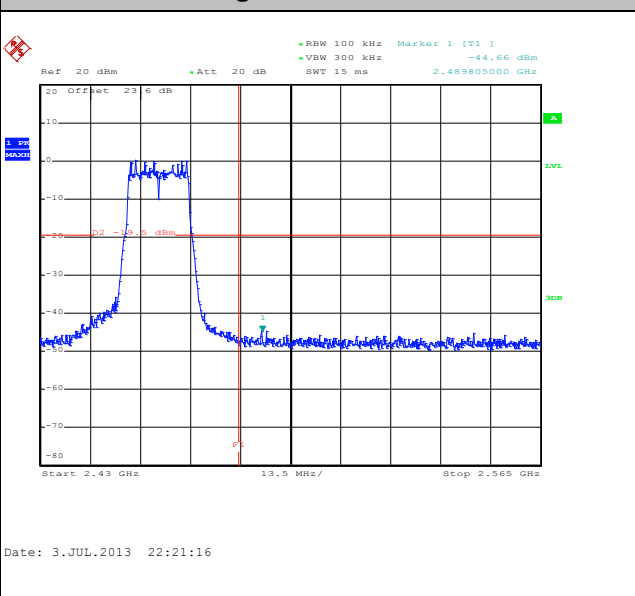
Test Mode :	802.11g	Temperature :	24-26°C
Test Band :	2.4GHz High	Relative Humidity :	50-53%
Test Channel :	11	Test Engineer :	Bill Kuo

WLAN 802.11g Channel 11

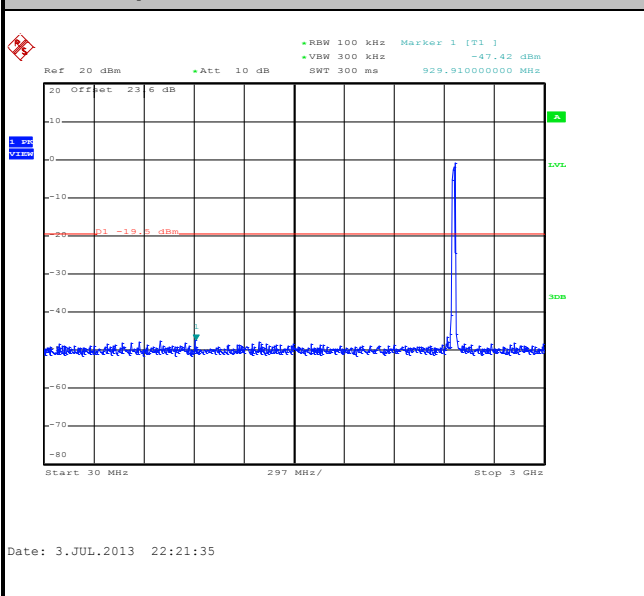
100kHz PSD reference Level



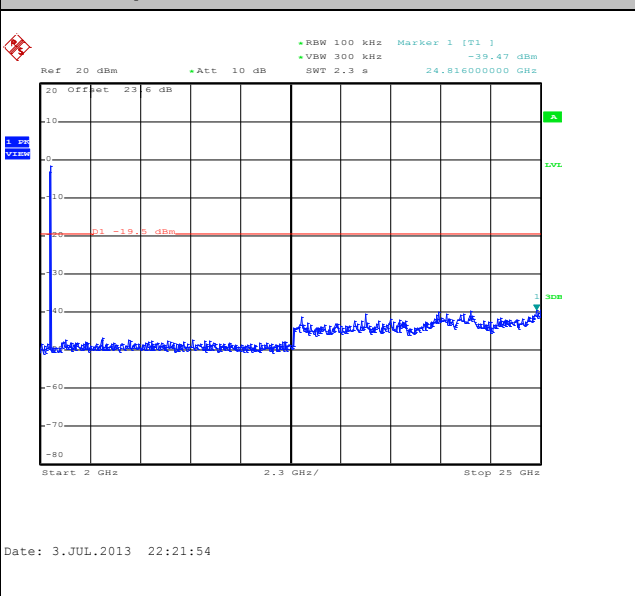
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

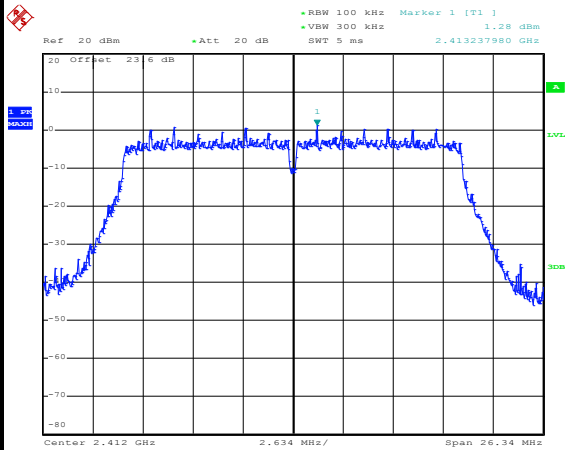




Test Mode :	802.11n HT20	Temperature :	24-26°C
Test Band :	2.4GHz Low	Relative Humidity :	50-53%
Test Channel :	01	Test Engineer :	Bill Kuo

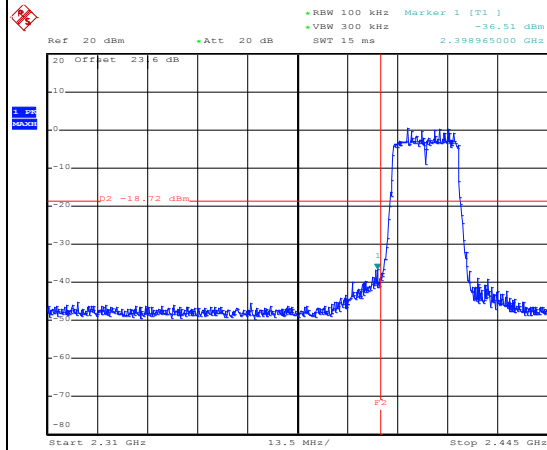
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



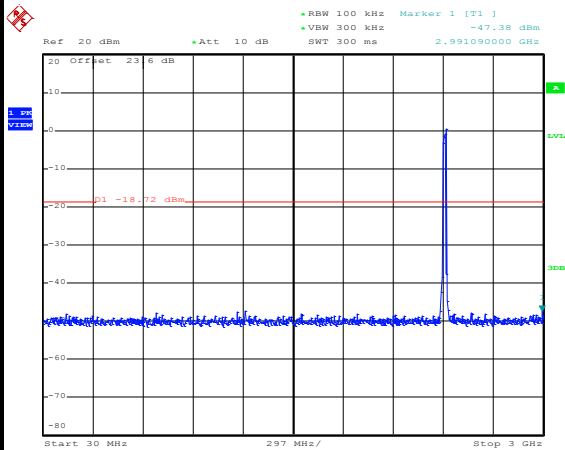
Date: 3.JUL.2013 22:28:41

Low Channel Plot



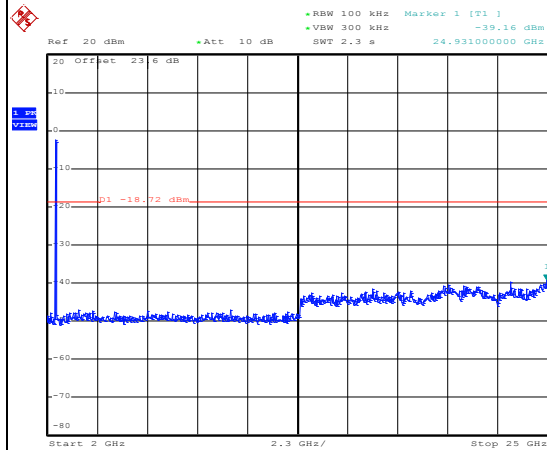
Date: 3.JUL.2013 22:28:55

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:29:14

Spurious Emission 2GHz~25GHz



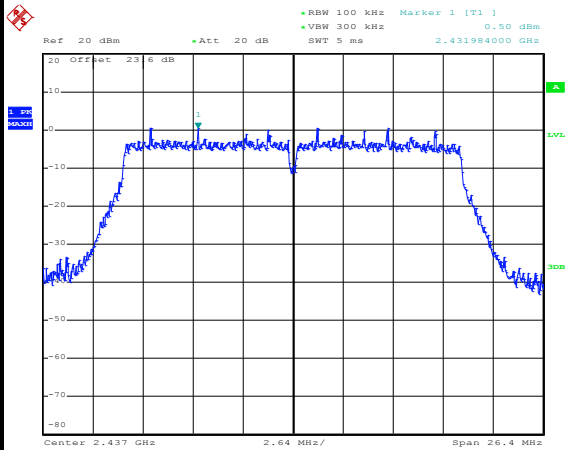
Date: 3.JUL.2013 22:29:33



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

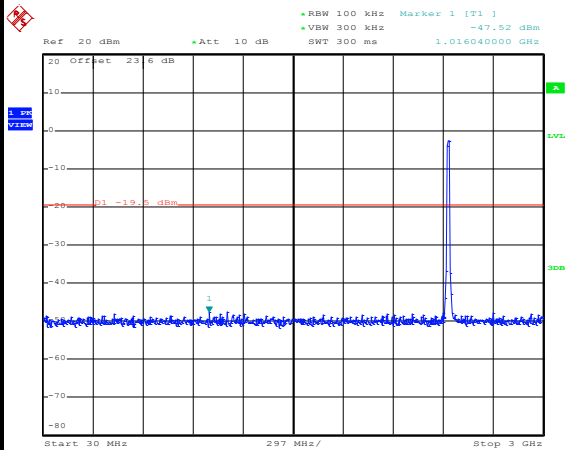
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



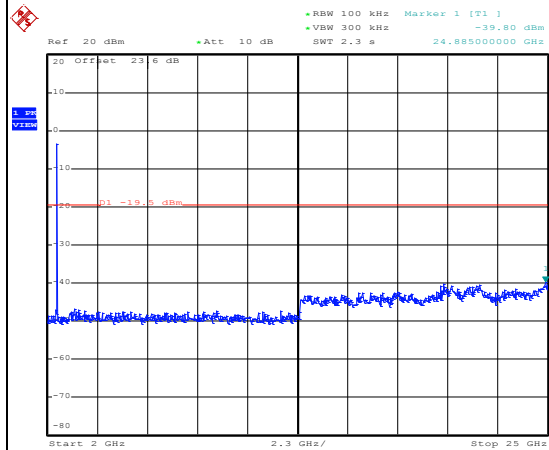
Date: 3.JUL.2013 22:31:24

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:31:44

Spurious Emission 2GHz~25GHz



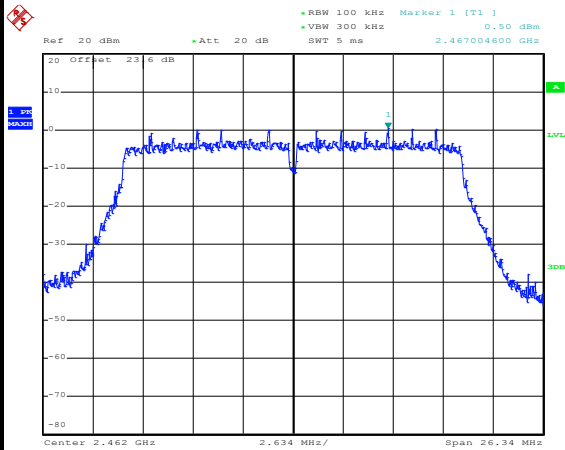
Date: 3.JUL.2013 22:32:02



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

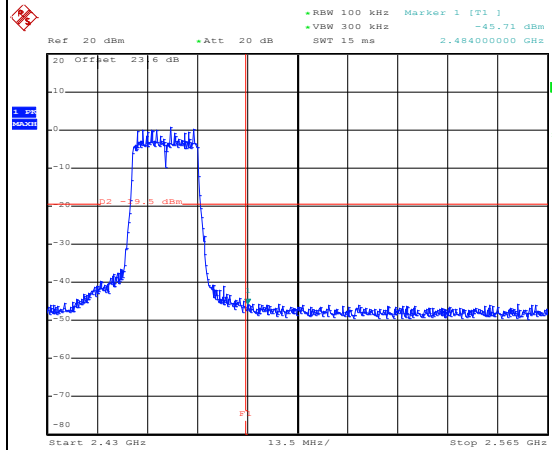
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



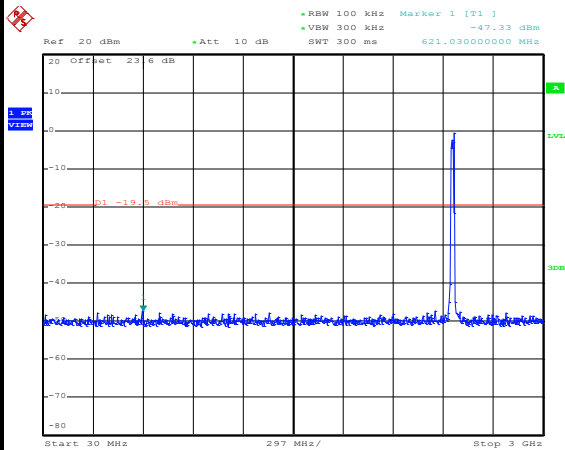
Date: 3.JUL.2013 22:33:55

High Channel Plot



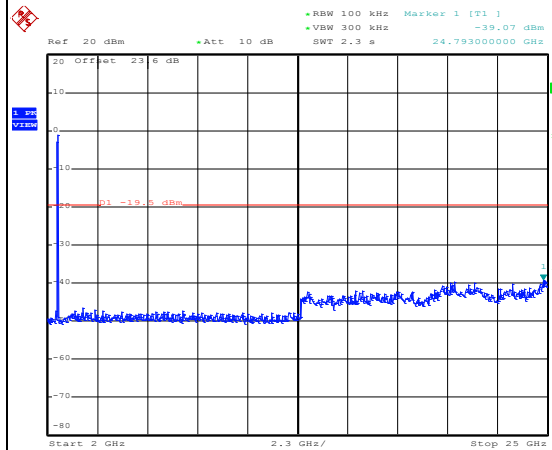
Date: 3.JUL.2013 22:34:09

Spurious Emission 30MHz~3GHz



Date: 3.JUL.2013 22:34:28

Spurious Emission 2GHz~25GHz



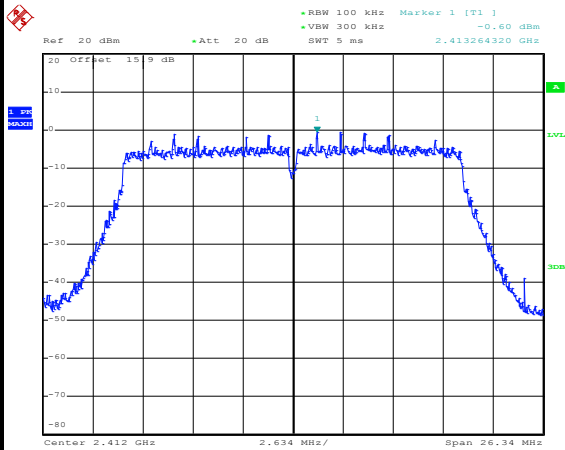
Date: 3.JUL.2013 22:34:46



Test Mode :	802.11ac VHT20	Temperature :	24-26°C
Test Band :	2.4GHz Low	Relative Humidity :	50-53%
Test Channel :	01	Test Engineer :	Bill Kuo

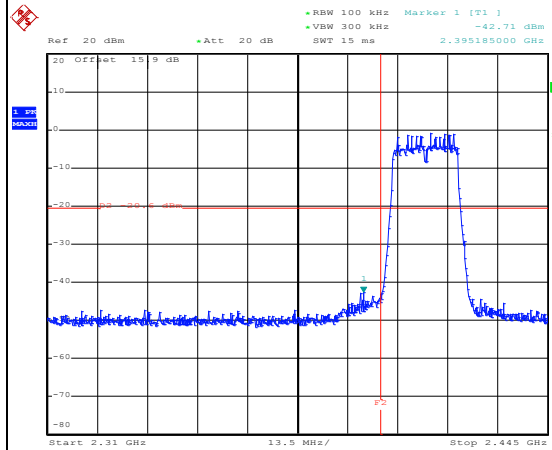
WLAN 802.11ac VHT20 Channel 01

100kHz PSD reference Level



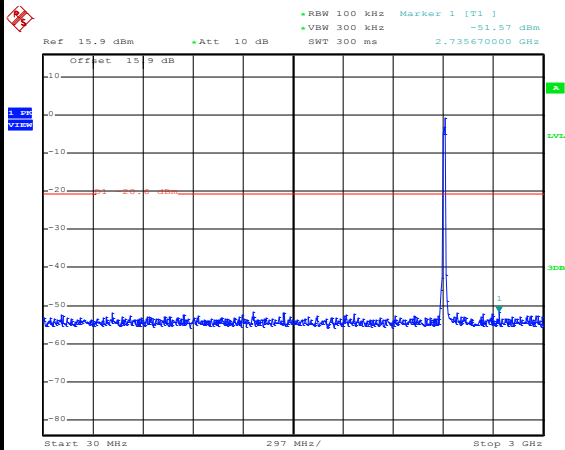
Date: 25.JUL.2013 20:40:33

Low Channel Plot



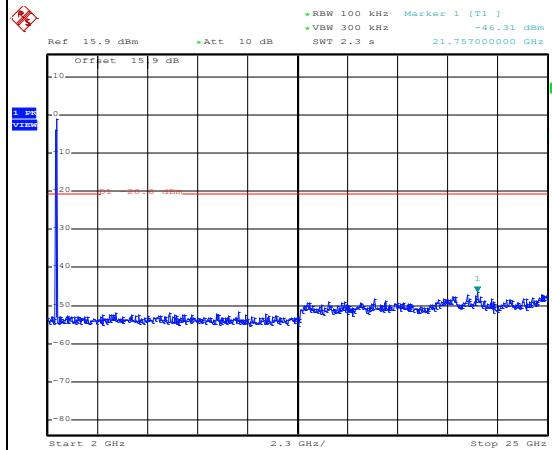
Date: 25.JUL.2013 20:40:46

Spurious Emission 30MHz~3GHz



Date: 25.JUL.2013 20:41:06

Spurious Emission 2GHz~25GHz



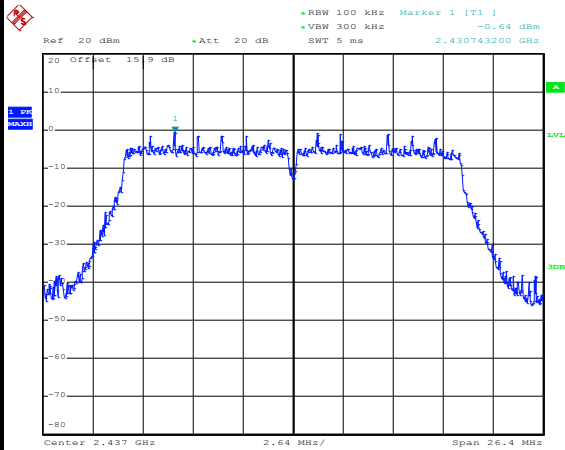
Date: 25.JUL.2013 20:41:24



Test Mode :	802.11ac VHT20	Temperature :	24-26°C
Test Band :	2.4GHz Mid	Relative Humidity :	50-53%
Test Channel :	06	Test Engineer :	Bill Kuo

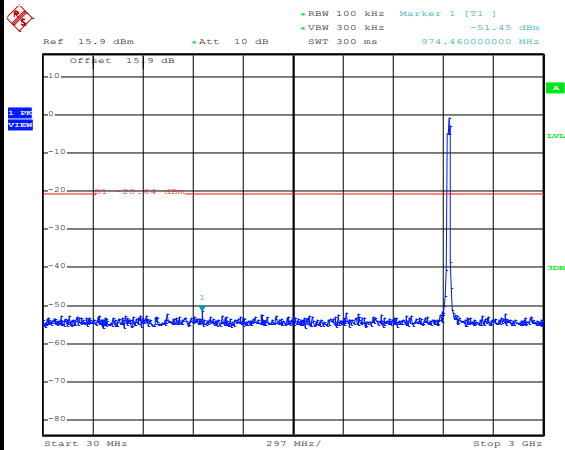
WLAN 802.11ac VHT20 Channel 06

100kHz PSD reference Level



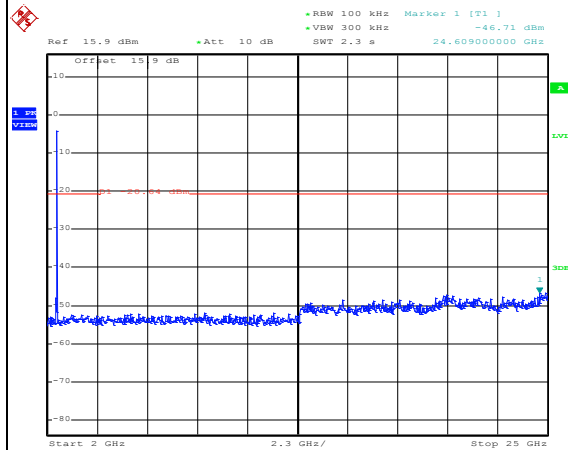
Date: 25.JUL.2013 20:44:49

Spurious Emission 30MHz~3GHz



Date: 25.JUL.2013 20:45:09

Spurious Emission 2GHz~25GHz



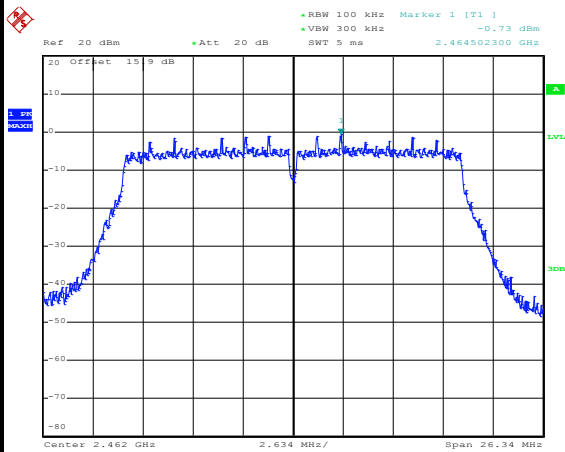
Date: 25.JUL.2013 20:45:27



Test Mode :	802.11ac VHT20	Temperature :	24-26°C
Test Band :	2.4GHz High	Relative Humidity :	50-53%
Test Channel :	11	Test Engineer :	Bill Kuo

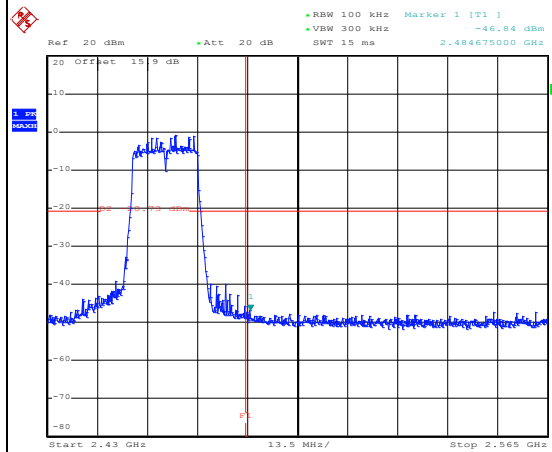
WLAN 802.11ac VHT20 Channel 11

100kHz PSD reference Level



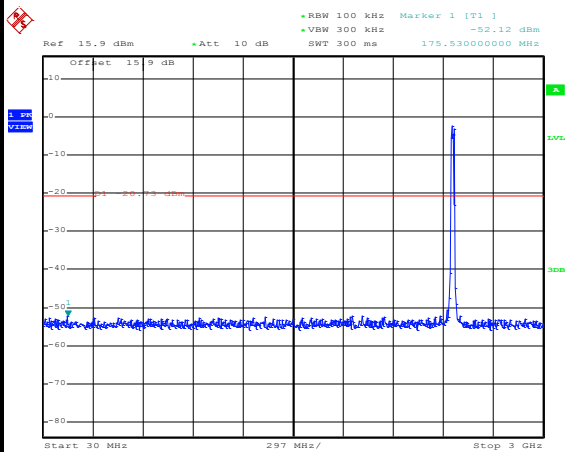
Date: 25.JUL.2013 20:49:14

High Channel Plot



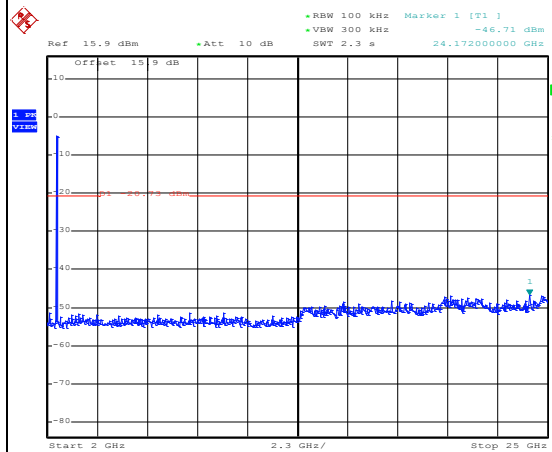
Date: 25.JUL.2013 20:49:28

Spurious Emission 30MHz~3GHz



Date: 25.JUL.2013 20:49:47

Spurious Emission 2GHz~25GHz



Date: 25.JUL.2013 20:50:06

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

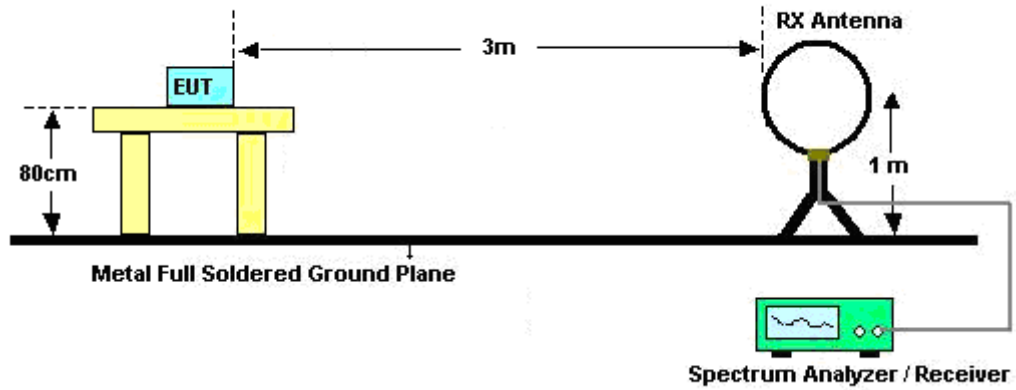
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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	99.11	-	-	10Hz
802.11g	94.95	2070.00	0.48	1kHz
2.4GHz 802.11n HT20	95.05	1920.00	0.52	1kHz

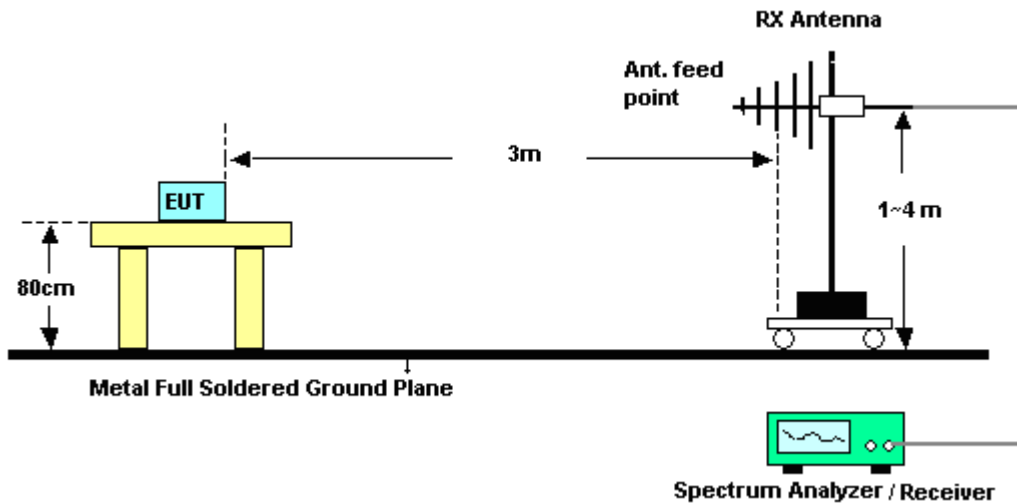
Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

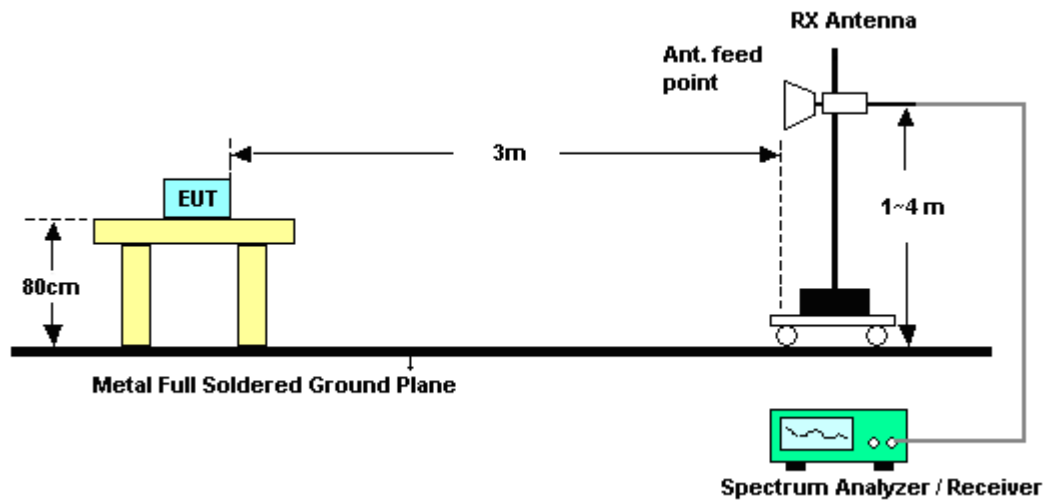
For radiated emissions below 30MHz



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

Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	David Ke

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
2383.44	52.53	-21.47	74	48.08	32.33	6.45	34.33	171	28	Peak
2386.41	41.35	-12.65	54	36.87	32.36	6.45	34.33	171	28	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
2381.64	50.66	-23.34	74	46.21	32.33	6.45	34.33	176	302	Peak
2383.71	38.68	-15.32	54	34.23	32.33	6.45	34.33	176	302	Average

Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	David Ke

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
2488.06	54.22	-19.78	74	49.43	32.5	6.59	34.3	200	24	Peak
2487.37	43.29	-10.71	54	38.52	32.48	6.59	34.3	200	24	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
2487.52	51.53	-22.47	74	46.74	32.5	6.59	34.3	200	310	Peak
2487.58	39.99	-14.01	54	35.2	32.5	6.59	34.3	200	310	Average



Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	David Ke

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
2389.92	60.43	-13.57	74	55.95	32.36	6.45	34.33	173	30	Peak
2390	42.87	-11.13	54	38.39	32.36	6.45	34.33	173	30	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
2389.11	54.9	-19.1	74	50.42	32.36	6.45	34.33	118	298	Peak
2390	39.59	-14.41	54	35.11	32.36	6.45	34.33	118	298	Average

Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	David Ke

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
2486.44	59.61	-14.39	74	54.84	32.48	6.59	34.3	200	22	Peak
2483.5	42.63	-11.37	54	37.86	32.48	6.59	34.3	200	22	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
2487.82	54.26	-19.74	74	49.47	32.5	6.59	34.3	200	308	Peak
2483.62	39.58	-14.42	54	34.81	32.48	6.59	34.3	200	308	Average



Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	David Ke

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
2387.31	64.22	-9.78	74	59.74	32.36	6.45	34.33	200	28	Peak
2389.92	43.11	-10.89	54	38.63	32.36	6.45	34.33	200	28	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
2387.4	64.14	-9.86	74	59.66	32.36	6.45	34.33	120	311	Peak
2390	41.02	-12.98	54	36.54	32.36	6.45	34.33	120	311	Average

Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	David Ke

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
2486.65	63.49	-10.51	74	58.72	32.48	6.59	34.3	200	23	Peak
2483.65	43.35	-10.65	54	38.58	32.48	6.59	34.3	200	23	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
2484.19	60.71	-13.29	74	55.94	32.48	6.59	34.3	199	309	Peak
2484.07	39.92	-14.08	54	35.15	32.48	6.59	34.3	199	309	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.

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	David Ke	Polarization :	Horizontal
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. For example, 107.48 dBµV/m - 20dB = 87.48dBµV/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
2414	102.8	-	-	98.26	32.38	6.49	34.33	171	28	Average
2414	107.48	-	-	102.94	32.38	6.49	34.33	171	28	Peak
4824	49.04	-24.96	74	59.59	34.87	10.17	55.59	100	0	Peak
7236	50.61	-36.87	87.48	59.92	36.15	10.96	56.42	100	0	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	David Ke	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
2414	97.69	-	-	93.15	32.38	6.49	34.33	176	302	Average
2414	102.59	-	-	98.05	32.38	6.49	34.33	176	302	Peak
4824	48.11	-25.89	74	58.66	34.87	10.17	55.59	100	0	Peak
7236	50.7	-31.89	82.59	60.01	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	David Ke	Polarization :	Horizontal
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	100.81	-	-	96.21	32.4	6.52	34.32	200	24	Average
2436	106.06	-	-	101.46	32.4	6.52	34.32	200	24	Peak
4875	48.69	-25.31	74	59.34	34.85	10.18	55.68	100	0	Peak
7311	49.75	-24.25	74	58.95	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	David Ke	Polarization :	Vertical
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	96.76	-	-	92.13	32.43	6.52	34.32	174	305	Average
2438	101.81	-	-	97.18	32.43	6.52	34.32	174	305	Peak
4875	48.99	-25.01	74	59.64	34.85	10.18	55.68	100	0	Peak
7311	50.39	-23.61	74	59.59	36.14	10.94	56.28	100	0	Peak



Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	David Ke	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
36.75	25.68	-14.32	40	42.18	14.58	0.71	31.79	166	207	Peak
62.94	20.43	-19.57	40	45.17	6.14	0.89	31.77	-	-	Peak
281.1	23.24	-22.76	46	40.31	12.82	1.84	31.73	-	-	Peak
410.6	20.67	-25.33	46	34.08	16.2	2.22	31.83	-	-	Peak
686.4	20.77	-25.23	46	31	18.93	2.87	32.03	-	-	Peak
931.4	23.63	-22.37	46	30.8	20.71	3.36	31.24	-	-	Peak
2464	101.37	-	-	96.67	32.45	6.56	34.31	200	24	Average
2464	106.36	-	-	101.66	32.45	6.56	34.31	200	24	Peak
4923	48.47	-25.53	74	59.22	34.83	10.2	55.78	100	0	Peak
7386	50.81	-23.19	74	59.88	36.12	10.92	56.11	100	0	Peak



Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	David Ke	Polarization :	Vertical
Remark :	1. 2462 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
36.75	24.21	-15.79	40	40.71	14.58	0.71	31.79	100	33	Peak
46.2	23.05	-16.95	40	44.19	9.87	0.77	31.78	-	-	Peak
77.25	22.9	-17.1	40	46.93	6.75	0.98	31.76	-	-	Peak
429.5	18.32	-27.68	46	31.41	16.5	2.26	31.85	-	-	Peak
622	21.31	-24.69	46	31.46	19.12	2.78	32.05	-	-	Peak
828.5	22.01	-23.99	46	30.6	20.08	3.16	31.83	-	-	Peak
2462	95.75	-	-	91.05	32.45	6.56	34.31	200	310	Average
2462	101.06	-	-	96.36	32.45	6.56	34.31	200	310	Peak
4923	48.81	-25.19	74	59.56	34.83	10.2	55.78	100	0	Peak
7386	50.47	-23.53	74	59.54	36.12	10.92	56.11	100	0	Peak



Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	David Ke	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
36.75	25.61	-14.39	40	42.11	14.58	0.71	31.79	167	284	Peak
62.94	20.47	-19.53	40	45.21	6.14	0.89	31.77	-	-	Peak
211.44	23.57	-19.93	43.5	44.64	9.10	1.58	31.75	-	-	Peak
408.5	20.68	-25.32	46	34.19	16.11	2.21	31.83	-	-	Peak
672.4	21.1	-24.90	46	31.21	19.08	2.84	32.03	-	-	Peak
837.6	22.16	-23.84	46	30.58	20.18	3.19	31.79	-	-	Peak
2410	93.78	-	-	89.24	32.38	6.49	34.33	173	30	Average
2410	104.12	-	-	99.58	32.38	6.49	34.33	173	30	Peak
4824	47.83	-26.17	74	58.38	34.87	10.17	55.59	100	0	Peak
7236	49.79	-34.33	84.12	59.1	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	David Ke	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
36.75	30.35	-9.65	40	46.85	14.58	0.71	31.79	100	344	Peak
60.24	21.66	-18.34	40	46.66	5.9	0.87	31.77	-	-	Peak
76.44	23.22	-16.78	40	47.31	6.7	0.97	31.76	-	-	Peak
459.6	19.61	-26.39	46	32.17	17	2.33	31.89	-	-	Peak
625.5	21.13	-24.87	46	31.24	19.15	2.79	32.05	-	-	Peak
858.6	22.82	-23.18	46	30.91	20.36	3.25	31.7	-	-	Peak
2414	89.11	-	-	84.57	32.38	6.49	34.33	118	298	Average
2414	99.59	-	-	95.05	32.38	6.49	34.33	118	298	Peak
4824	47.58	-26.42	74	58.13	34.87	10.17	55.59	100	0	Peak
7236	48.76	-30.83	79.59	58.07	36.15	10.96	56.42	100	0	Peak



Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	93.64	-	-	89	32.43	6.52	34.31	200	26	Average
2438	104.46	-	-	99.82	32.43	6.52	34.31	200	26	Peak
4875	47.98	-26.02	74	58.63	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 :	24~25°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	88.35	-	-	83.75	32.4	6.52	34.32	200	310	Average
2436	98.35	-	-	93.75	32.4	6.52	34.32	200	310	Peak
4875	47.95	-26.05	74	58.6	34.85	10.18	55.68	100	0	Peak
7311	50.47	-23.53	74	59.67	36.14	10.94	56.28	100	0	Peak



Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	93.89	-	-	89.19	32.45	6.56	34.31	200	22	Average
2463	104.6	-	-	99.9	32.45	6.56	34.31	200	22	Peak
4923	47.35	-26.65	74	58.1	34.83	10.2	55.78	100	0	Peak
7386	49.52	-24.48	74	58.59	36.12	10.92	56.11	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	88.88	-	-	84.18	32.45	6.56	34.31	200	308	Average
2460	99.56	-	-	94.86	32.45	6.56	34.31	200	308	Peak
4923	46.94	-27.06	74	57.69	34.83	10.2	55.78	100	0	Peak
7386	50.15	-23.85	74	59.22	36.12	10.92	56.11	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	David Ke	Polarization :	Horizontal
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
36.75	23.14	-16.86	40	39.64	14.58	0.71	31.79	144	231	Peak
62.94	20.59	-19.41	40	45.33	6.14	0.89	31.77	-	-	Peak
281.1	23.29	-22.71	46	40.36	12.82	1.84	31.73	-	-	Peak
412	20.52	-25.48	46	33.87	16.26	2.22	31.83	-	-	Peak
643	20.84	-25.16	46	30.88	19.2	2.8	32.04	-	-	Peak
779.5	21.65	-24.35	46	30.75	19.8	3.06	31.96	-	-	Peak
2414	93.5	-	-	88.96	32.38	6.49	34.33	200	28	Average
2414	103.8	-	-	99.26	32.38	6.49	34.33	200	28	Peak
4824	47.27	-26.73	74	57.82	34.87	10.17	55.59	100	0	Peak
7236	49.32	-34.48	83.8	58.63	36.15	10.96	56.42	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	David Ke	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
36.48	26.92	-13.08	40	43.42	14.58	0.71	31.79	103	61	Peak
61.86	22.13	-17.87	40	46.95	6.06	0.89	31.77	-	-	Peak
76.44	23.72	-16.28	40	47.81	6.7	0.97	31.76	-	-	Peak
398	18.48	-27.52	46	32.5	15.62	2.18	31.82	-	-	Peak
571.6	20.57	-25.43	46	31.04	18.91	2.64	32.02	-	-	Peak
749.4	22.51	-23.49	46	31.65	19.8	3.05	31.99	-	-	Peak
2414	89.43	-	-	84.88	32.38	6.49	34.32	120	311	Average
2414	100.05	-	-	95.5	32.38	6.49	34.32	120	311	Peak
4824	47.88	-26.12	74	58.43	34.87	10.17	55.59	100	0	Peak
7236	48.91	-31.14	80.05	58.22	36.15	10.96	56.42	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	92.99	-	-	88.36	32.43	6.52	34.32	200	24	Average
2438	103.67	-	-	99.04	32.43	6.52	34.32	200	24	Peak
4875	47.56	-26.44	74	58.21	34.85	10.18	55.68	100	0	Peak
7311	48.98	-25.02	74	58.18	36.14	10.94	56.28	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	88.23	-	-	83.63	32.4	6.52	34.32	200	307	Average
2436	98.63	-	-	94.03	32.4	6.52	34.32	200	307	Peak
4875	47.64	-26.36	74	58.29	34.85	10.18	55.68	100	0	Peak
7311	48.97	-25.03	74	58.17	36.14	10.94	56.28	100	0	Peak



Test Mode :	2.4GHz 802.11n HT20	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	David Ke	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	93.52	-	-	88.82	32.45	6.56	34.31	200	23	Average
2464	104.18	-	-	99.48	32.45	6.56	34.31	200	23	Peak
4923	47.24	-26.76	74	57.99	34.83	10.2	55.78	100	0	Peak
7386	49.27	-24.73	74	58.34	36.12	10.92	56.11	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	David Ke	Polarization :	Vertical
Remark :	1. 2461 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
2461	88.78	-	-	84.08	32.45	6.56	34.31	199	309	Average
2461	99.25	-	-	94.55	32.45	6.56	34.31	199	309	Peak
4923	47.46	-26.54	74	58.21	34.83	10.2	55.78	100	0	Peak
7386	49.09	-24.91	74	58.16	36.12	10.92	56.11	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 (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

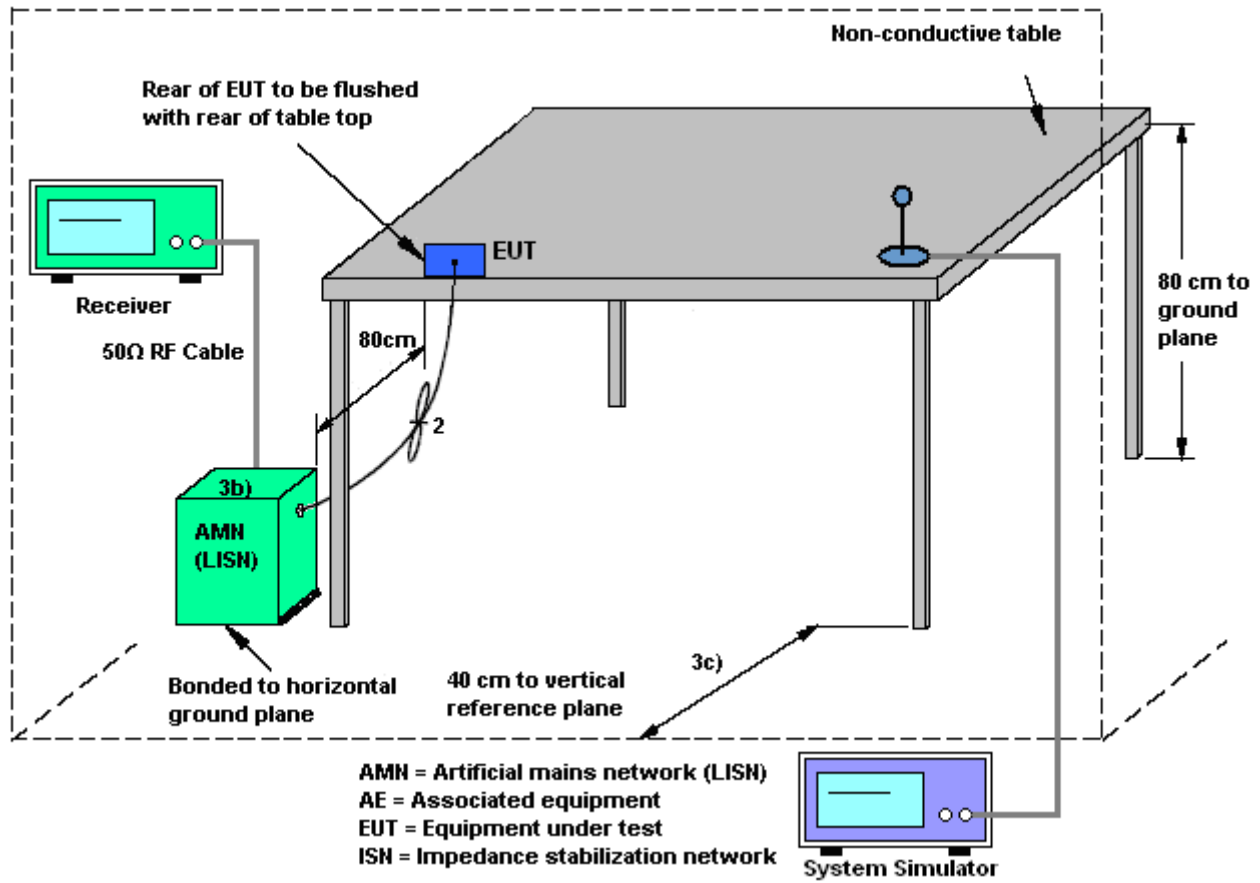
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

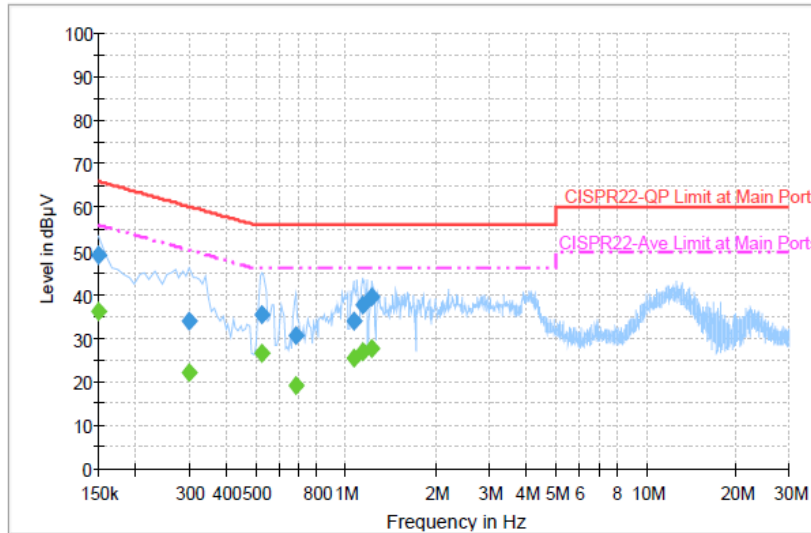
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (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 1	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 (2.4GHz) Link + USB Cable (Charging from Adapter) + Earphone + MP3		



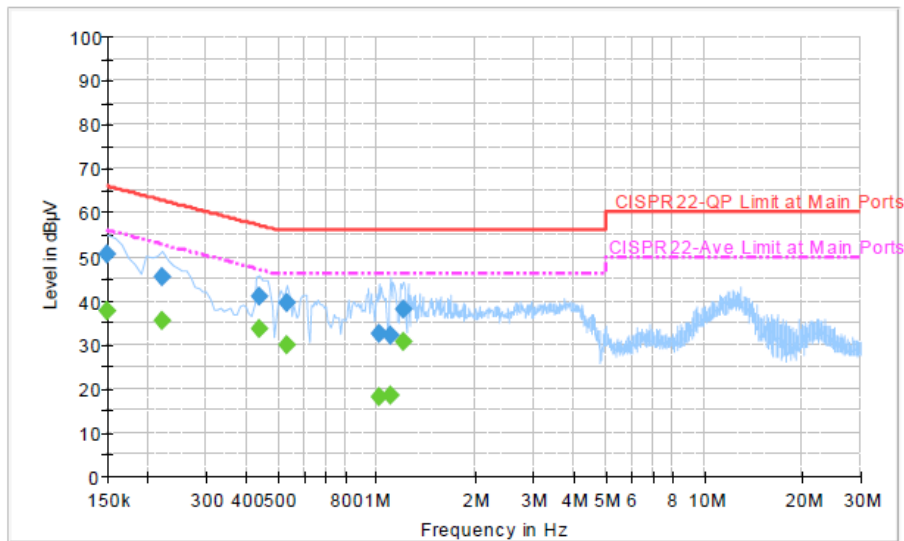
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	49.2	Off	L1	19.4	16.8	66.0
0.302000	33.8	Off	L1	19.3	26.4	60.2
0.526000	35.4	Off	L1	19.4	20.6	56.0
0.686000	30.4	Off	L1	19.5	25.6	56.0
1.062000	34.1	Off	L1	19.4	21.9	56.0
1.134000	37.7	Off	L1	19.4	18.3	56.0
1.222000	39.4	Off	L1	19.5	16.6	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	36.1	Off	L1	19.4	19.9	56.0
0.302000	22.3	Off	L1	19.3	27.9	50.2
0.526000	26.6	Off	L1	19.4	19.4	46.0
0.686000	19.0	Off	L1	19.5	27.0	46.0
1.062000	25.4	Off	L1	19.4	20.6	46.0
1.134000	27.1	Off	L1	19.4	18.9	46.0
1.222000	27.8	Off	L1	19.5	18.2	46.0

Test Mode :	Mode 1	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 (2.4GHz) Link + USB Cable (Charging from Adapter) + Earphone + MP3		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.7	Off	N	19.4	15.3	66.0
0.222000	45.4	Off	N	19.4	17.3	62.7
0.440000	40.9	Off	N	19.4	16.2	57.1
0.534000	39.4	Off	N	19.4	16.6	56.0
1.014000	32.5	Off	N	19.5	23.5	56.0
1.102000	31.9	Off	N	19.5	24.1	56.0
1.206000	37.9	Off	N	19.5	18.1	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.7	Off	N	19.4	18.3	56.0
0.222000	35.4	Off	N	19.4	17.3	52.7
0.440000	33.5	Off	N	19.4	13.6	47.1
0.534000	29.9	Off	N	19.4	16.1	46.0
1.014000	18.0	Off	N	19.5	28.0	46.0
1.102000	18.3	Off	N	19.5	27.7	46.0
1.206000	30.6	Off	N	19.5	15.4	46.0



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 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	Jun. 30, 2013~ Jul. 25, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Sep. 08, 2012	Jun. 30, 2013~ Jul. 25, 2013	Sep. 07, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Sep. 08, 2012	Jun. 30, 2013~ Jul. 25, 2013	Sep. 07, 2013	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 13, 2012	Jul. 03, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Jul. 03, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	Jul. 03, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Jul. 03, 2013	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP30	101352	9kHz~30GHz	Nov. 07, 2012	Jul. 03, 2013~ Jul. 05, 2013	Nov. 06, 2013	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY442110 30	9kHz ~ 26.5GHz	Nov. 26, 2012	Jul. 03, 2013~ Jul. 05, 2013	Nov. 25, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/00 03	20MHz ~ 1000MHz	May 06, 2013	Jul. 03, 2013~ Jul. 05, 2013	May 05, 2014	Radiation (03CH06-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/00 01	9 kHz~30 MHz	Jul. 03, 2012	Jul. 03, 2013~ Jul. 05, 2013	Jul. 03, 2014	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Jul. 03, 2013~ Jul. 05, 2013	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Jul. 03, 2013~ Jul. 05, 2013	Jul. 31, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9kHz ~ 1GHz	Apr. 12, 2013	Jul. 03, 2013~ Jul. 05, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Jul. 03, 2013~ Jul. 05, 2013	Jul. 20, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 251	15GHz ~ 40GHz	Sep. 28, 2012	Jul. 03, 2013~ Jul. 05, 2013	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A019 17	1GHz ~ 26.5GHz	Apr. 12, 2013	Jul. 03, 2013~ Jul. 05, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0 - 360 degree	N/A	Jul. 03, 2013~ Jul. 05, 2013	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208 212	1 m ~ 4 m	N/A	Jul. 03, 2013~ Jul. 05, 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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