

FCC RF Test Report

APPLICANT : HTC Corporation
EQUIPMENT : Smartphone
MODEL NAME : 0P9O110
FCC ID : NM80P9O110
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Feb. 17, 2014 and testing was completed on Apr. 01, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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.



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 EUT 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	15
3.3 Power Spectral Density Measurement	18
3.4 Conducted Band Edges and Spurious Emission Measurement	20
3.5 Radiated Band Edges and Spurious Emission Measurement	30
3.6 AC Conducted Emission Measurement	47
3.7 Antenna Requirements	51
4 LIST OF MEASURING EQUIPMENT	52
5 UNCERTAINTY OF EVALUATION	53



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR421125C	Rev. 01	Initial issue of report	Apr. 23, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.93 dB at 2483.65 MHz for Average
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.80 dB at 0.190 MHz
3.7	15.203 & 15.247(b)	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	0P9O110
FCC ID	NM80P9O110
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/WLAN 11b/g/n(HT20) Bluetooth v3.0+HS/ v4.0-LE
Sample 1	EUT with LCM 1, Camera Front, Camera Back, Battery 1
Sample 2	EUT with LCM 2, Camera Front, Camera Back, Battery 2
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 (Peak) Output Power to Antenna	802.11b : 21.04 dBm (0.1271 W) 802.11g : 22.02 dBm (0.1592 W) 802.11n HT20 : 22.13 dBm (0.1633 W)
Antenna Type	PIFA Antenna with gain -0.5 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 Registration No.
	TH02-HY	CO05-HY	03CH08-HY
			636805

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 C63.4-2003

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 (Z plane) were recorded in this report.

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

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

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-

2.2 Pre-Scanned RF Power

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

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	18.25	18.11	18.24	18.22

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)	12.94	12.93	12.92	12.90	12.87	12.89	12.89	12.88

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	12.95	12.89	12.94	12.90	12.82	12.91	12.93	12.92

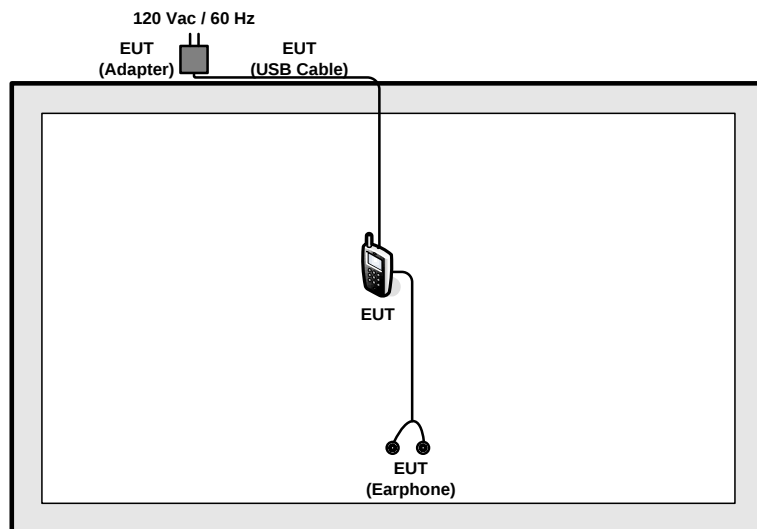
2.3 Test Mode

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

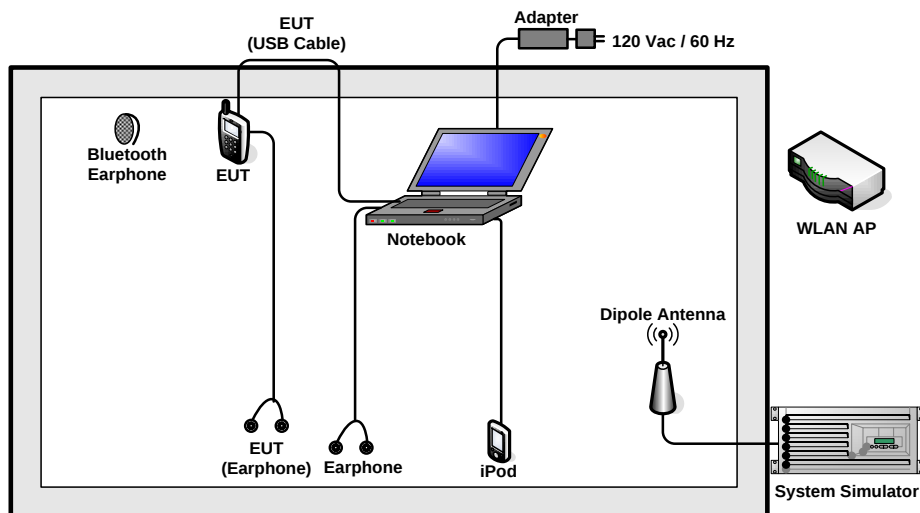
Test Cases				
Conducted TCs	Test Items	Mode	Data Rate	Test Channel
	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	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
AC Conducted Emission	Mode 1 : GSM900 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone 1 + USB Cable 2 (Data Link with Notebook) + Front Camera for Sample 1			
Remark: For Radiated Test Cases, The tests were performance with Adapter 1, Earphone 1, USB Cable 1 and Sample 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.	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	Unshielded, 1.8 m
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	iPod Earphone	Apple	A1285	FCC DoC	Shielded, 1.2 m	N/A

2.6 EUT Operation Test Setup

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

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



2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 15.1 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 15.1 + 10 = 25.1 \text{ (dB)}\end{aligned}$$

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.

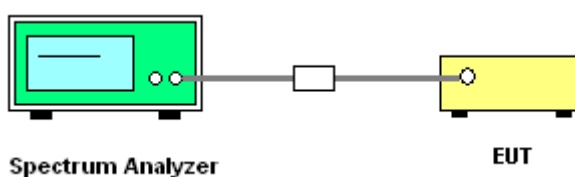
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

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

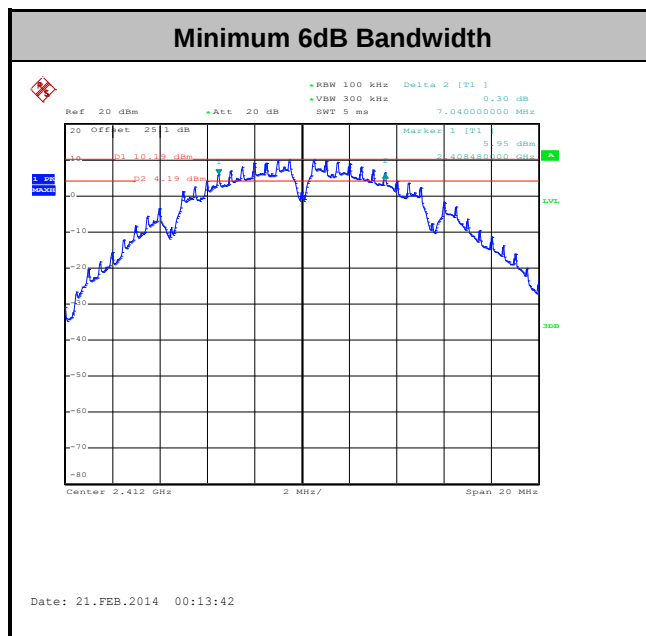
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Test Band :	2.4GHz	Temperature :	21~25℃
Test Engineer :	Osolemio Chang	Relative Humidity :	51~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	7.04	0.5	Pass
11b	1Mbps	1	6	2437	7.08	0.5	Pass
11b	1Mbps	1	11	2462	7.56	0.5	Pass
11g	6Mbps	1	1	2412	16.30	0.5	Pass
11g	6Mbps	1	6	2437	16.34	0.5	Pass
11g	6Mbps	1	11	2462	16.36	0.5	Pass
HT20	MCS0	1	1	2412	17.32	0.5	Pass
HT20	MCS0	1	6	2437	17.56	0.5	Pass
HT20	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.

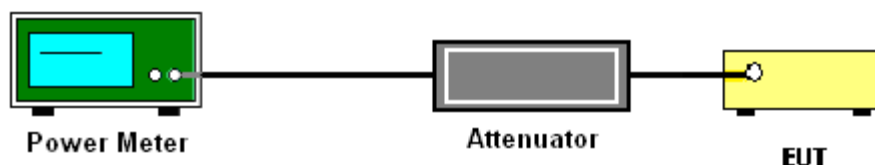
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance 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 :	21~25°C
Test Engineer :	Osolemio Chang	Relative Humidity :	51~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	20.32	30	-0.5	Pass
11b	1Mbps	1	6	2437	21.04	30	-0.5	Pass
11b	1Mbps	1	11	2462	20.51	30	-0.5	Pass
11g	6Mbps	1	1	2412	21.79	30	-0.5	Pass
11g	6Mbps	1	6	2437	22.02	30	-0.5	Pass
11g	6Mbps	1	11	2462	21.05	30	-0.5	Pass
HT20	MCS0	1	1	2412	22.02	30	-0.5	Pass
HT20	MCS0	1	6	2437	22.13	30	-0.5	Pass
HT20	MCS0	1	11	2462	21.43	30	-0.5	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 :	21~25°C
Test Engineer :	Osolemio Chang	Relative Humidity :	51~54%

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	0.10	17.42	30	-0.5	Pass
11b	1Mbps	1	6	2437	0.10	18.25	30	-0.5	Pass
11b	1Mbps	1	11	2462	0.10	17.80	30	-0.5	Pass
11g	6Mbps	1	1	2412	0.60	12.77	30	-0.5	Pass
11g	6Mbps	1	6	2437	0.60	12.94	30	-0.5	Pass
11g	6Mbps	1	11	2462	0.60	12.31	30	-0.5	Pass
HT20	MCS0	1	1	2412	0.63	12.80	30	-0.5	Pass
HT20	MCS0	1	6	2437	0.63	12.95	30	-0.5	Pass
HT20	MCS0	1	11	2462	0.63	12.32	30	-0.5	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.

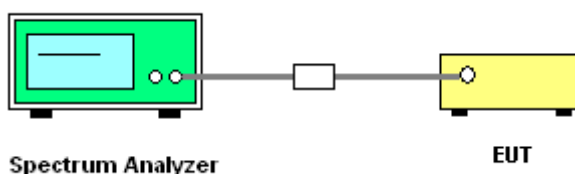
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance 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

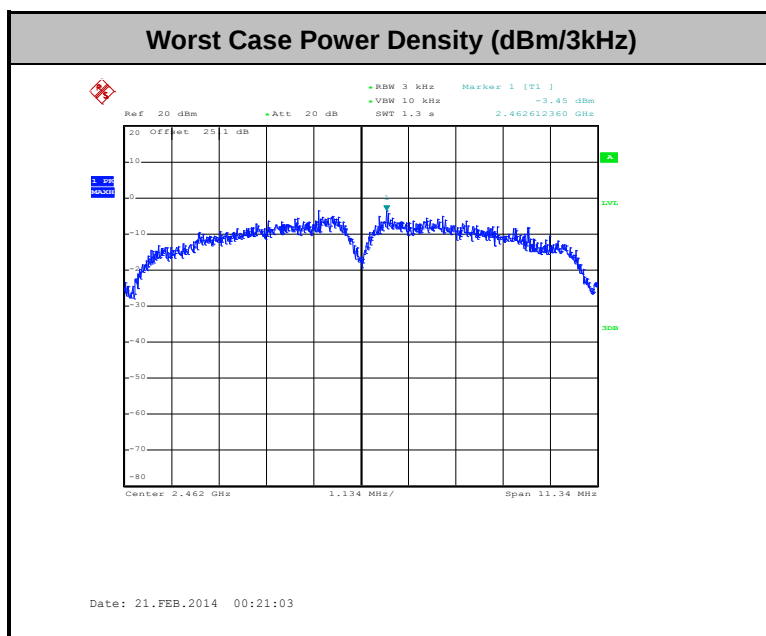


3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	21~25°C
Test Engineer :	Osolemio Chang	Relative Humidity :	51~54%

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	-4.13	8	-0.5	Pass
11b	1Mbps	1	6	2437	-3.80	8	-0.5	Pass
11b	1Mbps	1	11	2462	-3.45	8	-0.5	Pass
11g	6Mbps	1	1	2412	-12.46	8	-0.5	Pass
11g	6Mbps	1	6	2437	-11.84	8	-0.5	Pass
11g	6Mbps	1	11	2462	-11.68	8	-0.5	Pass
HT20	MCS0	1	1	2412	-13.08	8	-0.5	Pass
HT20	MCS0	1	6	2437	-11.68	8	-0.5	Pass
HT20	MCS0	1	11	2462	-11.83	8	-0.5	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).

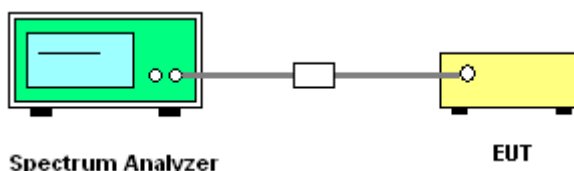
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

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



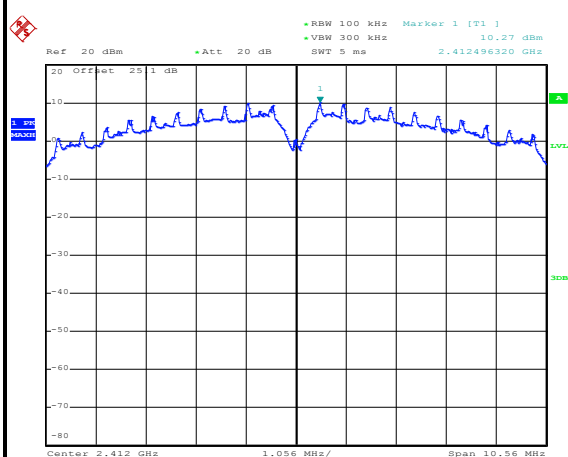


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Osolemio Chang

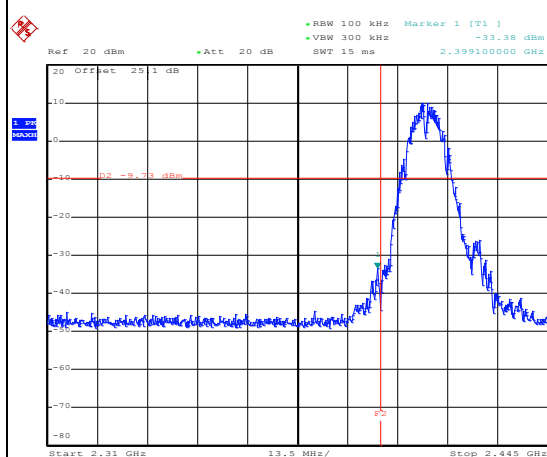
WLAN 802.11b Channel 01

100kHz PSD reference Level



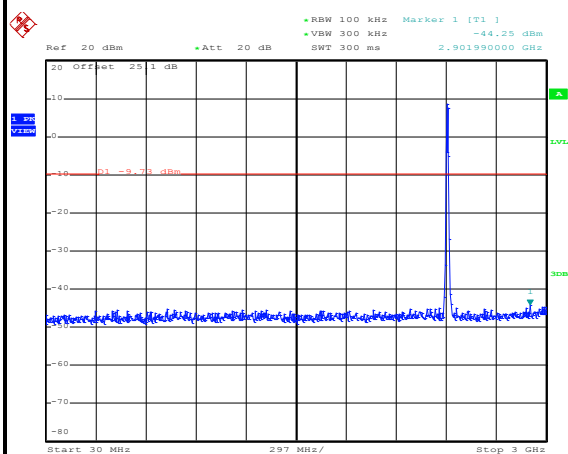
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Low Channel Plot



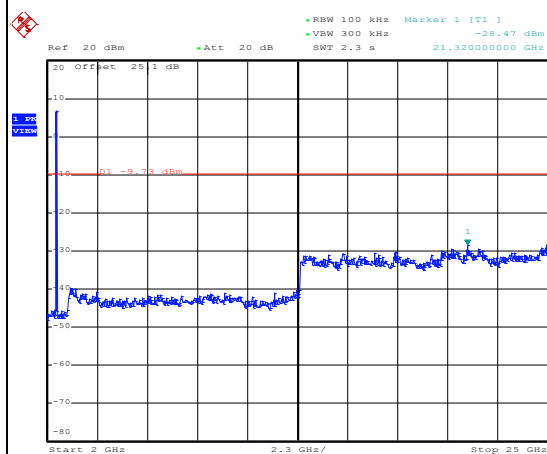
Date: 21.FEB.2014 00:14:25

Spurious Emission 30MHz~3GHz



Date: 21.FEB.2014 00:14:44

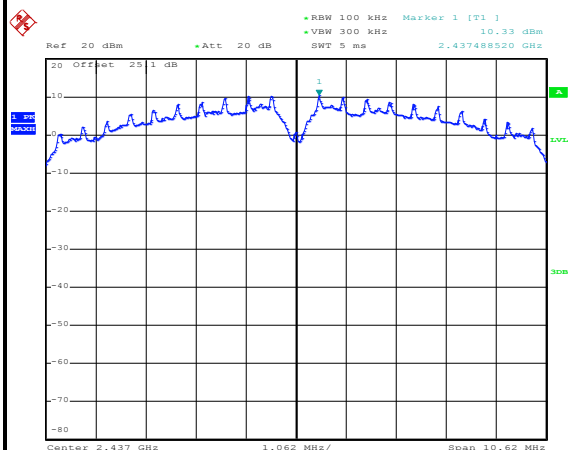
Spurious Emission 2GHz~25GHz



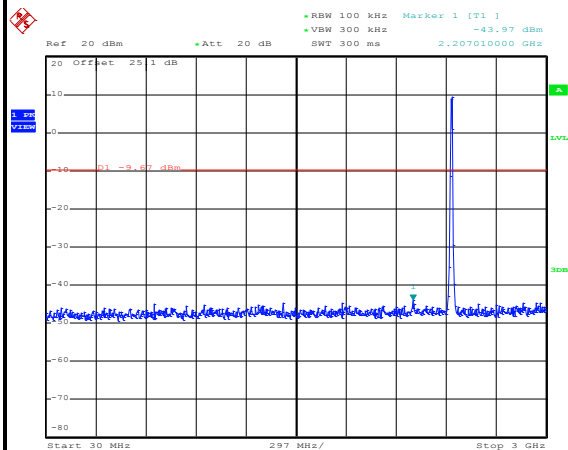
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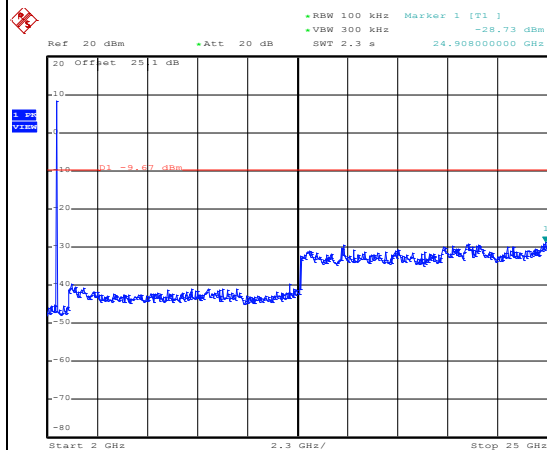
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Osolemio Chang

WLAN 802.11b Channel 06**100kHz PSD reference Level**

Date: 21.FEB.2014 00:17:51

Spurious Emission 30MHz~3GHz

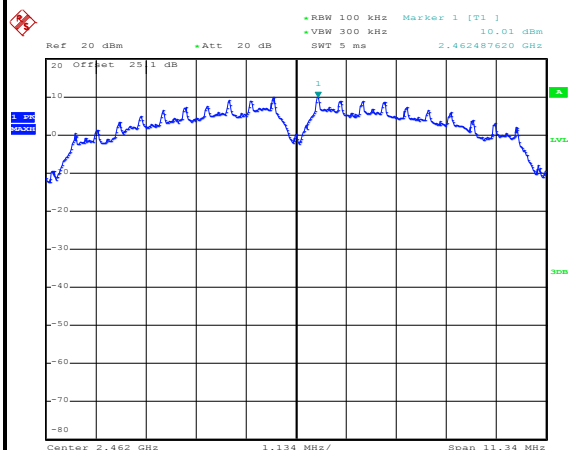
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Spurious Emission 2GHz~25GHz

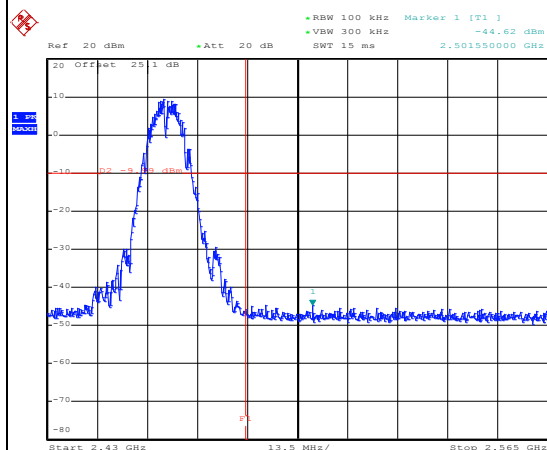
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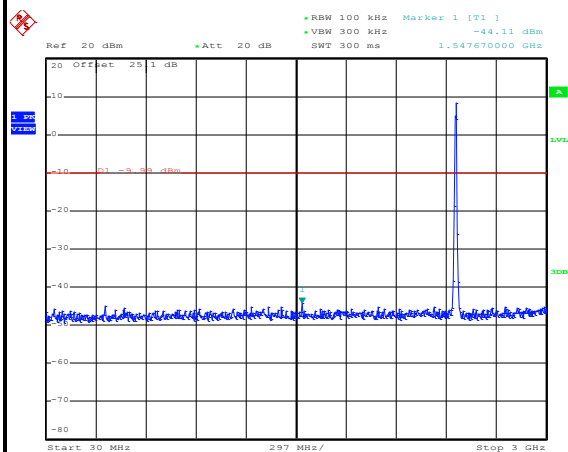
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Osolemio Chang

WLAN 802.11b Channel 11**100kHz PSD reference Level**

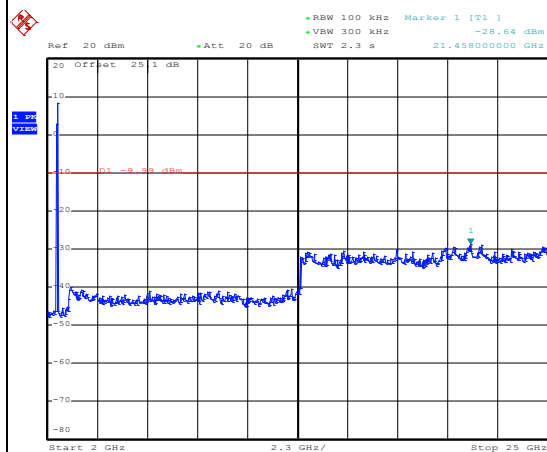
Date: 21.FEB.2014 00:21:12

High Channel Plot

Date: 21.FEB.2014 00:21:26

Spurious Emission 30MHz~3GHz

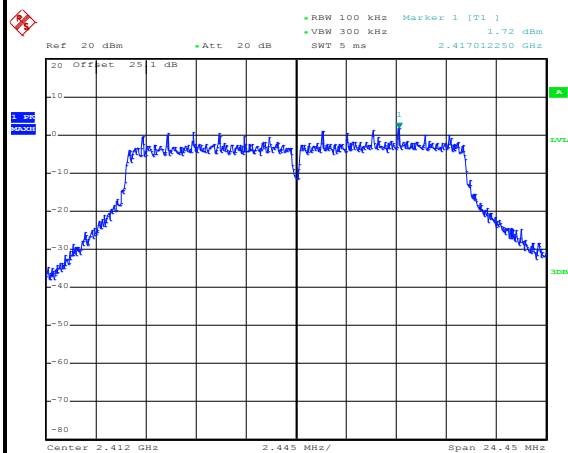
Date: 21.FEB.2014 00:22:56

Spurious Emission 2GHz~25GHz

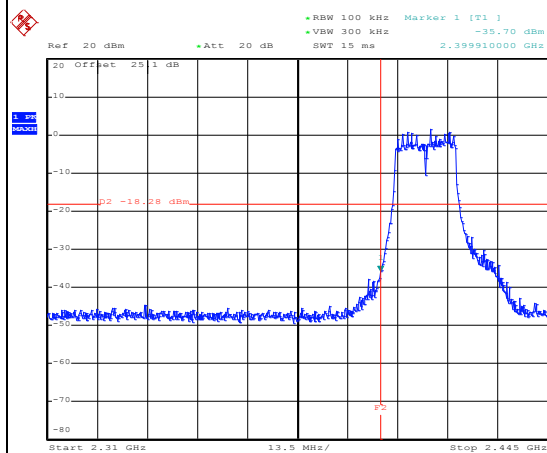
Date: 21.FEB.2014 00:23:14



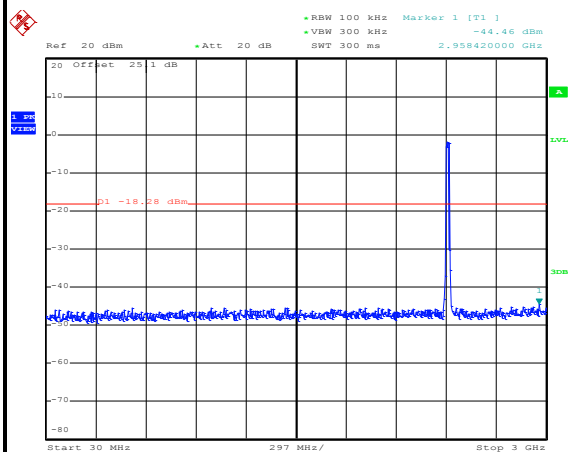
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Osolemio Chang

WLAN 802.11g Channel 01**100kHz PSD reference Level**

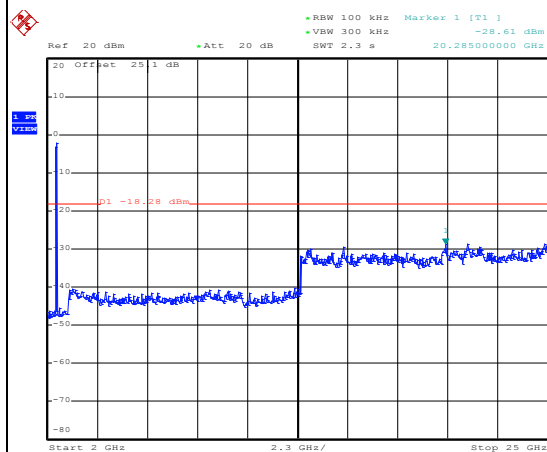
Date: 21.FEB.2014 00:26:18

Low Channel Plot

Date: 21.FEB.2014 00:28:30

Spurious Emission 30MHz~3GHz

Date: 21.FEB.2014 00:26:51

Spurious Emission 2GHz~25GHz

Date: 21.FEB.2014 00:27:09



WLAN 802.11g Channel 06	
100kHz PSD reference Level	

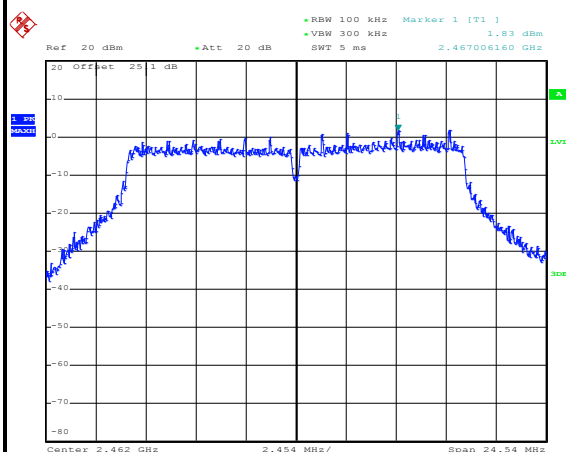




Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Osolemio Chang

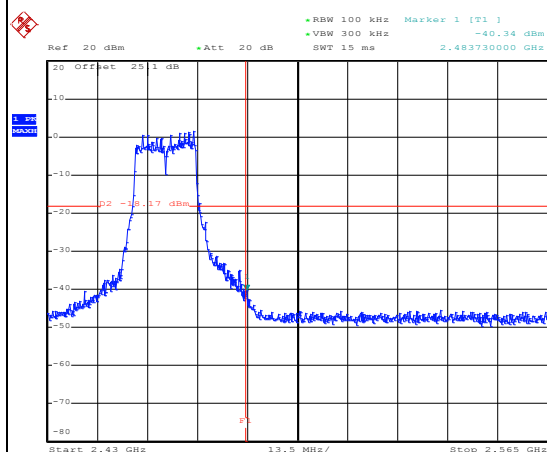
WLAN 802.11g Channel 11

100kHz PSD reference Level



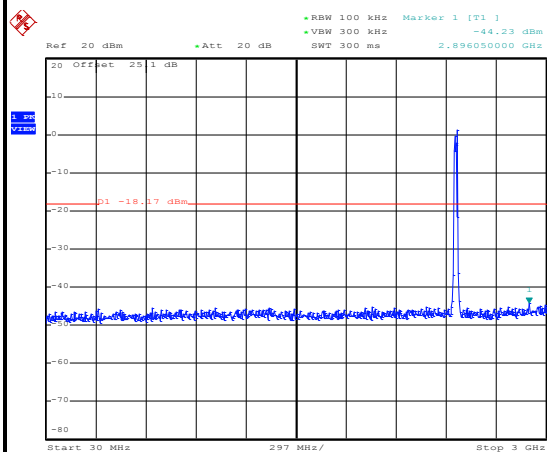
Date: 21.FEB.2014 00:34:40

High Channel Plot



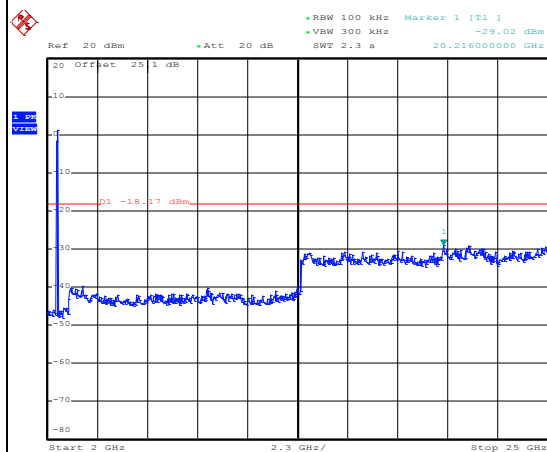
Date: 21.FEB.2014 00:34:54

Spurious Emission 30MHz~3GHz



Date: 21.FEB.2014 00:35:13

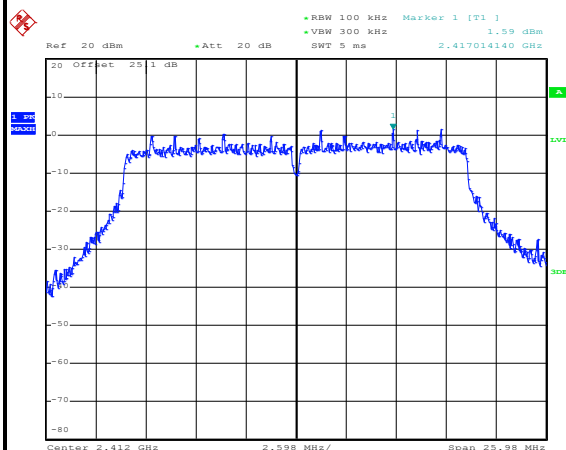
Spurious Emission 2GHz~25GHz



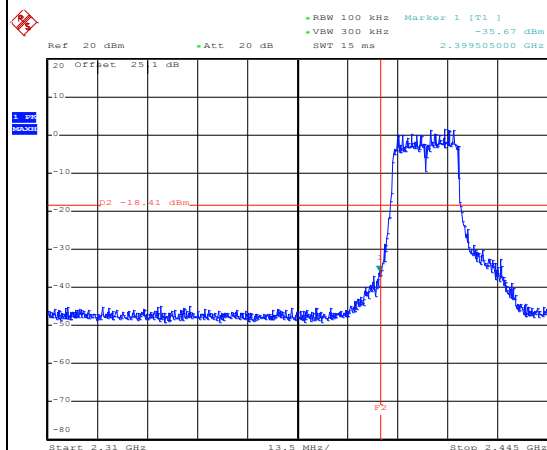
Date: 21.FEB.2014 00:35:32



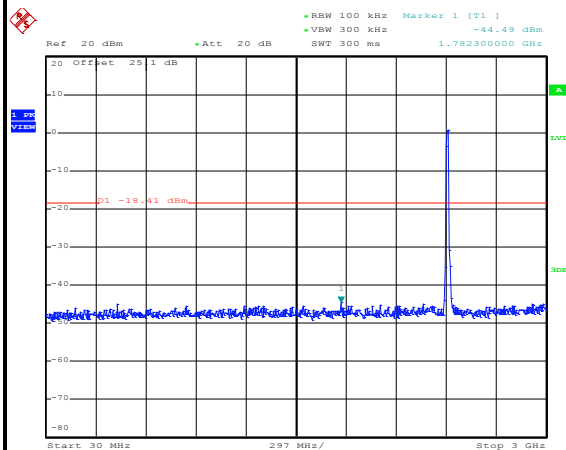
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Osolemio Chang

WLAN 802.11n HT20 Channel 01**100kHz PSD reference Level**

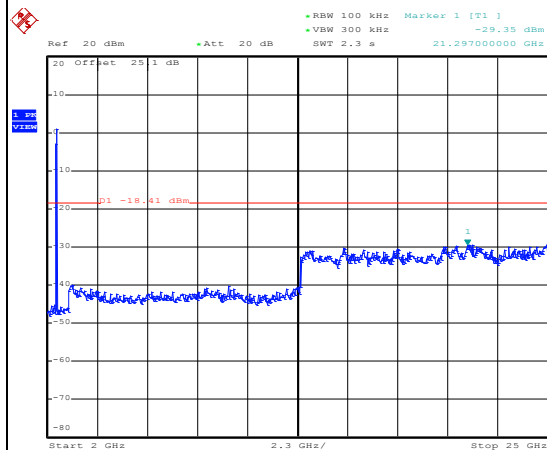
Date: 21.FEB.2014 00:42:26

Low Channel Plot

Date: 21.FEB.2014 00:42:39

Spurious Emission 30MHz~3GHz

Date: 21.FEB.2014 00:42:59

Spurious Emission 2GHz~25GHz

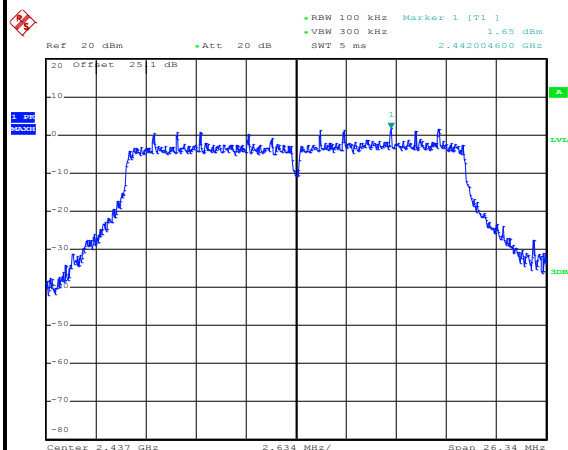
Date: 21.FEB.2014 00:43:17



Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Osolemio Chang

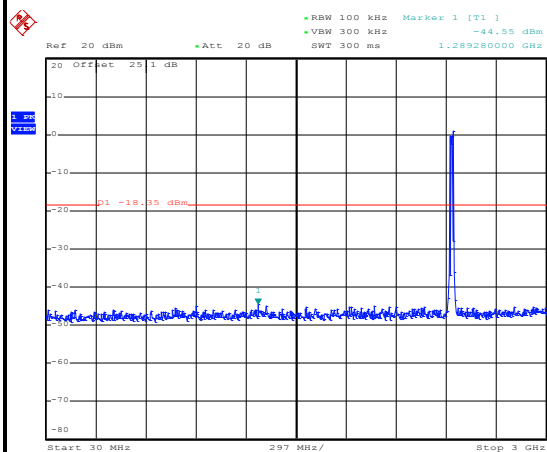
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



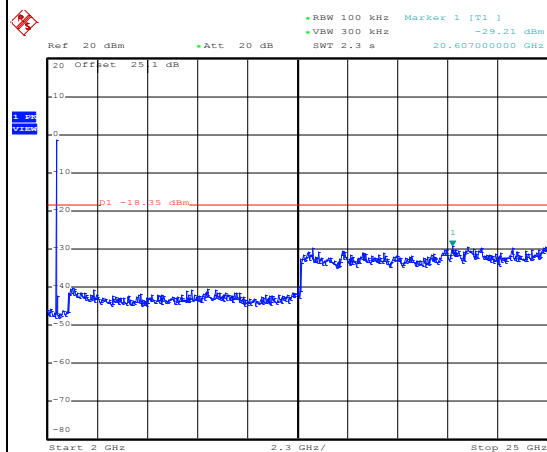
Date: 21.FEB.2014 00:46:47

Spurious Emission 30MHz~3GHz



Date: 21.FEB.2014 00:48:29

Spurious Emission 2GHz~25GHz



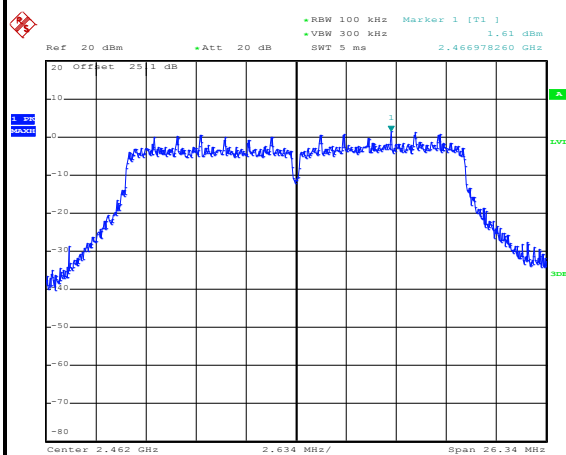
Date: 21.FEB.2014 00:48:47



Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Osolemio Chang

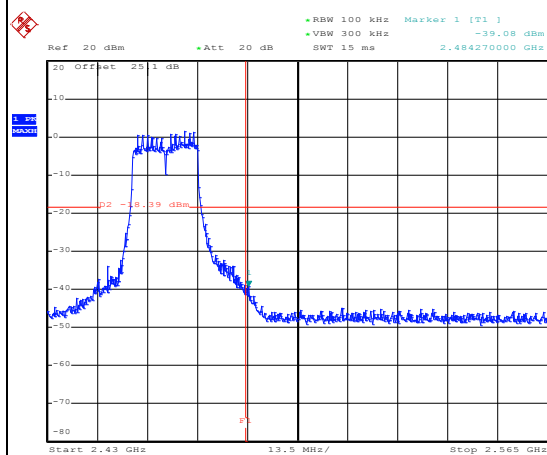
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



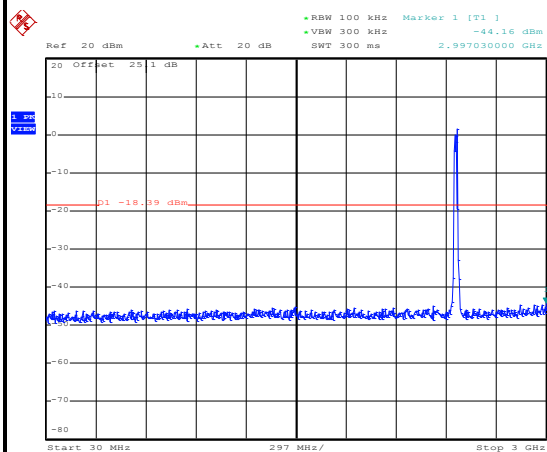
Date: 21.FEB.2014 00:51:34

High Channel Plot



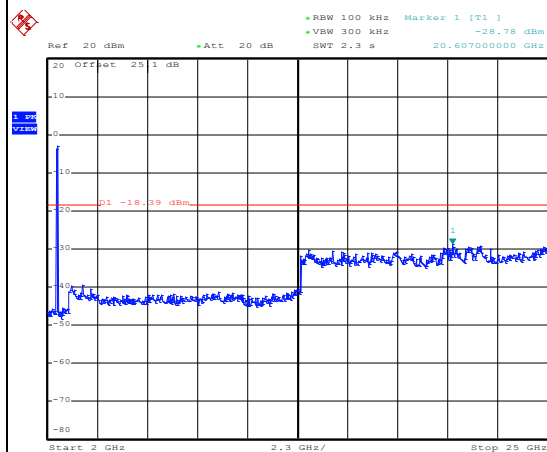
Date: 21.FEB.2014 00:51:47

Spurious Emission 30MHz~3GHz



Date: 21.FEB.2014 00:52:07

Spurious Emission 2GHz~25GHz



Date: 21.FEB.2014 00:52:25

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
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 - Preamplifier Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

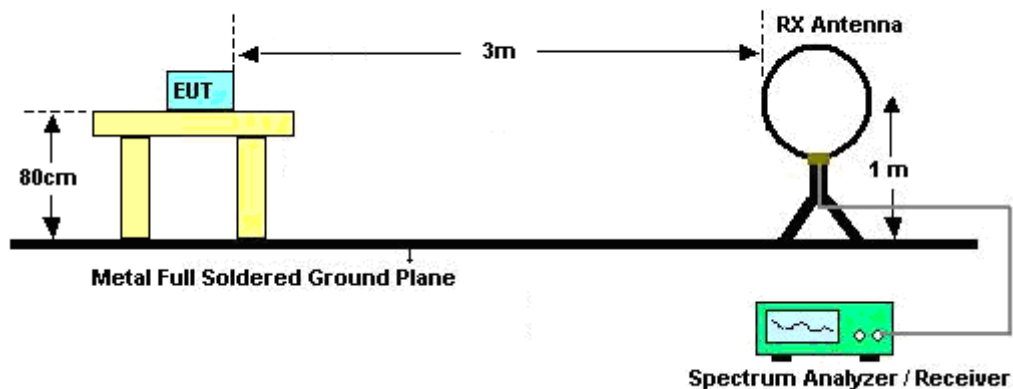
For average measurement:

 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

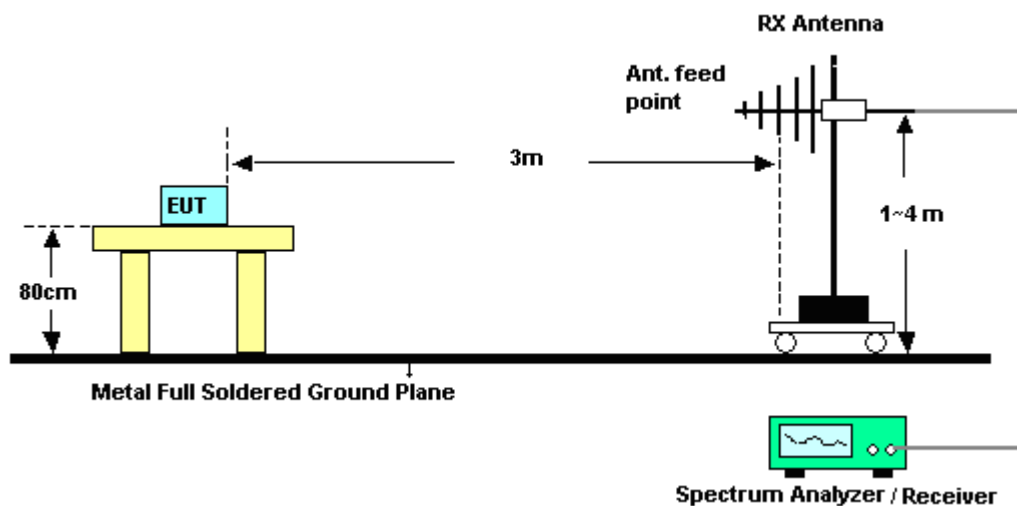
Band	Duty Cycle(%)	T(μ s)	1/T(kHz)	VBW Setting
802.11b	97.64	8280	0.121	300Hz
802.11g	87.18	1360	0.735	1kHz
2.4GHz 802.11n HT20	86.49	1280	0.781	1kHz

3.5.4 Test Setup

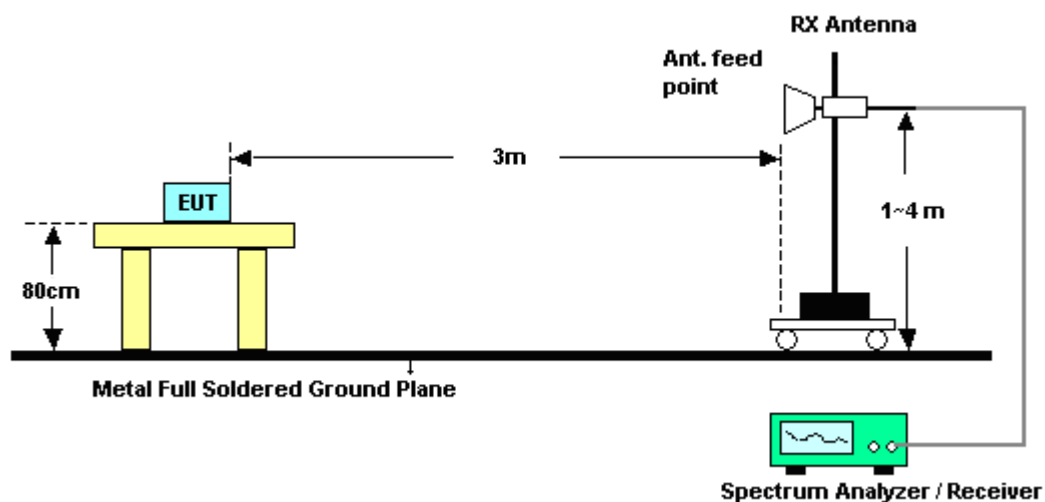
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Test Mode :	802.11b	Temperature :	22~24°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

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
2386.86	52.12	-21.88	74	49.14	32.29	6.22	35.53	136	97	Peak
2387.76	41.99	-12.01	54	39.01	32.29	6.22	35.53	136	97	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	51.23	-22.77	74	48.22	32.29	6.22	35.5	100	69	Peak
2387.67	40.49	-13.51	54	37.51	32.29	6.22	35.53	100	69	Average

Test Mode :	802.11b	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

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
2483.95	54.24	-19.76	74	50.75	32.47	6.45	35.43	198	68	Peak
2483.5	44.33	-9.67	54	40.84	32.47	6.45	35.43	198	68	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
2483.74	51.42	-22.58	74	47.93	32.47	6.45	35.43	100	41	Peak
2483.5	40.45	-13.55	54	36.96	32.47	6.45	35.43	100	41	Average



Test Mode :	802.11g	Temperature :	22~24°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

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
2389.38	62.51	-11.49	74	59.53	32.29	6.22	35.53	109	61	Peak
2390	47.56	-6.44	54	44.55	32.29	6.22	35.5	109	61	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
2389.56	61.03	-12.97	74	58.05	32.29	6.22	35.53	100	221	Peak
2389.74	46.37	-7.63	54	43.39	32.29	6.22	35.53	100	221	Average

Test Mode :	802.11g	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

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
2484.46	70.71	-3.29	74	67.22	32.47	6.45	35.43	108	52	Peak
2483.65	50.07	-3.93	54	46.58	32.47	6.45	35.43	108	52	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
2484.43	64.27	-9.73	74	60.78	32.47	6.45	35.43	100	54	Peak
2483.53	46.79	-7.21	54	43.3	32.47	6.45	35.43	100	54	Average



Test Mode :	802.11n HT20	Temperature :	22~24°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

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
2389.2	65.96	-8.04	74	62.98	32.29	6.22	35.53	135	60	Peak
2389.83	49.37	-4.63	54	46.36	32.29	6.22	35.5	135	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
2389.74	66.12	-7.88	74	63.14	32.29	6.22	35.53	100	144	Peak
2390	46.61	-7.39	54	43.6	32.29	6.22	35.5	100	144	Average

Test Mode :	802.11n HT20	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

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
2483.59	70.03	-3.97	74	66.54	32.47	6.45	35.43	107	23	Peak
2483.5	48.65	-5.35	54	45.16	32.47	6.45	35.43	107	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
2483.74	68.85	-5.15	74	65.36	32.47	6.45	35.43	100	20	Peak
2483.5	47.63	-6.37	54	44.14	32.47	6.45	35.43	100	20	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 :	22~24°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

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
2412	105.26	-	-	102.15	32.33	6.28	35.5	136	97	Average
2412	109.47	-	-	106.36	32.33	6.28	35.5	136	97	Peak
4824	49.44	-4.56	54	65.44	34.9	8.04	58.94	159	65	Average
4824	51.42	-22.58	74	67.42	34.9	8.04	58.94	159	65	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2412 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
2412	102.37	-	-	99.26	32.33	6.28	35.5	100	69	Average
2412	106.96	-	-	103.85	32.33	6.28	35.5	100	69	Peak
4824	49.5	-24.5	74	65.5	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	106.16	-	-	102.94	32.36	6.34	35.48	165	65	Average
2436	110.71	-	-	107.49	32.36	6.34	35.48	165	65	Peak
4875	46.64	-27.36	74	62.47	34.93	8.11	58.87	100	0	Peak
7311	41.65	-32.35	74	53	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	102.63	-	-	99.41	32.36	6.34	35.48	100	170	Average
2436	106.82	-	-	103.6	32.36	6.34	35.48	100	170	Peak
4875	42.28	-31.72	74	58.11	34.93	8.11	58.87	100	0	Peak
7311	41.37	-32.63	74	52.72	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
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
2462	104.25	-	-	100.89	32.43	6.39	35.46	198	68	Average
2462	108.39	-	-	105.03	32.43	6.39	35.46	198	68	Peak
4926	48.7	-25.3	74	64.32	34.96	8.22	58.8	100	0	Peak
7386	42.13	-31.87	74	53.67	36.62	10.45	58.61	100	0	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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
2462	99.58	-	-	96.22	32.43	6.39	35.46	100	41	Average
2462	103.87	-	-	100.51	32.43	6.39	35.46	100	41	Peak
4923	43.27	-30.73	74	58.93	34.96	8.18	58.8	100	0	Peak
7386	42.08	-31.92	74	53.62	36.62	10.45	58.61	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2414 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
2414	97.32	-	-	94.21	32.33	6.28	35.5	109	61	Average
2414	108.43	-	-	105.32	32.33	6.28	35.5	109	61	Peak
4824	46.51	-27.49	74	62.51	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2410 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
2410	93.05	-	-	89.94	32.33	6.28	35.5	100	221	Average
2410	103.69	-	-	100.58	32.33	6.28	35.5	100	221	Peak
4824	42.16	-31.84	74	58.16	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	97.21	-	-	93.95	32.4	6.34	35.48	130	202	Average
2438	107.27	-	-	104.01	32.4	6.34	35.48	130	202	Peak
4875	37.24	-36.76	74	53.07	34.93	8.11	58.87	100	0	Peak
7311	41.85	-32.15	74	53.2	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	93.45	-	-	90.23	32.36	6.34	35.48	117	74	Average
2436	103.77	-	-	100.55	32.36	6.34	35.48	117	74	Peak
4875	39.87	-34.13	74	55.7	34.93	8.11	58.87	100	0	Peak
7311	41.44	-32.56	74	52.79	36.64	10.47	58.46	100	0	Peak



Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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
46.47	31.69	-8.31	40	53.16	9.51	0.8	31.78	100	136	Peak
108.03	24.51	-18.99	43.5	43.86	11.18	1.22	31.75	-	-	Peak
200.91	25.46	-18.04	43.5	46.74	8.83	1.64	31.75	-	-	Peak
563.9	17.01	-28.99	46	27.83	18.44	2.75	32.01	-	-	Peak
658.4	19.24	-26.76	46	29.45	18.87	2.96	32.04	-	-	Peak
967.1	21.4	-32.6	54	27.53	21.17	3.61	30.91	-	-	Peak
2464	94.29	-	-	90.93	32.43	6.39	35.46	108	52	Average
2464	104.62	-	-	101.26	32.43	6.39	35.46	108	52	Peak
4923	40.45	-33.55	74	56.11	34.96	8.18	58.8	100	0	Peak
7386	42.88	-31.12	74	54.42	36.62	10.45	58.61	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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
38.91	33.98	-6.02	40	52.91	12.13	0.73	31.79	100	77	Peak
45.66	38.31	-1.69	40	60.31	8.99	0.79	31.78	100	61	Peak
45.66	35.33	-4.67	40	57.33	8.99	0.79	31.78	100	61	QP
106.68	23.67	-19.83	43.5	44.13	10.08	1.21	31.75	-	-	Peak
658.4	20.53	-25.47	46	30.94	18.67	2.96	32.04	-	-	Peak
816.6	20.86	-25.14	46	29.14	20.3	3.3	31.88	-	-	Peak
910.4	21.09	-24.91	46	28.29	20.73	3.51	31.44	-	-	Peak
2464	88.7	-	-	85.34	32.43	6.39	35.46	100	54	Average
2464	99.21	-	-	95.85	32.43	6.39	35.46	100	54	Peak
4923	39.73	-34.27	74	55.39	34.96	8.18	58.8	100	0	Peak
7386	41.01	-32.99	74	52.55	36.62	10.45	58.61	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2410 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
2410	97.98	-	-	94.87	32.33	6.28	35.5	135	60	Average
2410	108.57	-	-	105.46	32.33	6.28	35.5	135	60	Peak
4824	43.6	-30.4	74	59.6	34.9	8.04	58.94	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2414 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
2414	92.16	-	-	89.05	32.33	6.28	35.5	100	144	Average
2414	102.83	-	-	99.72	32.33	6.28	35.5	100	144	Peak
4824	39.36	-34.64	74	55.36	34.9	8.04	58.94	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2439 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
2439	97.42	-	-	94.16	32.4	6.34	35.48	164	63	Average
2439	107.99	-	-	104.73	32.4	6.34	35.48	164	63	Peak
4875	39.26	-34.74	74	55.09	34.93	8.11	58.87	100	0	Peak
7311	41.54	-32.46	74	52.89	36.64	10.47	58.46	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	92.11	-	-	88.85	32.4	6.34	35.48	100	99	Average
2438	103.43	-	-	100.17	32.4	6.34	35.48	100	99	Peak
4875	39.99	-34.01	74	55.82	34.93	8.11	58.87	100	0	Peak
7311	41.59	-32.41	74	52.94	36.64	10.47	58.46	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	90.46	-	-	87.1	32.43	6.39	35.46	107	23	Average
2460	100.84	-	-	97.48	32.43	6.39	35.46	107	23	Peak
4923	40.85	-33.15	74	56.51	34.96	8.18	58.8	100	0	Peak
7386	41.75	-32.25	74	53.29	36.62	10.45	58.61	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	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	90.31	-	-	86.95	32.43	6.39	35.46	100	20	Average
2464	100.73	-	-	97.37	32.43	6.39	35.46	100	20	Peak
4923	40.46	-33.54	74	56.12	34.96	8.18	58.8	100	0	Peak
7386	42.14	-31.86	74	53.68	36.62	10.45	58.61	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.

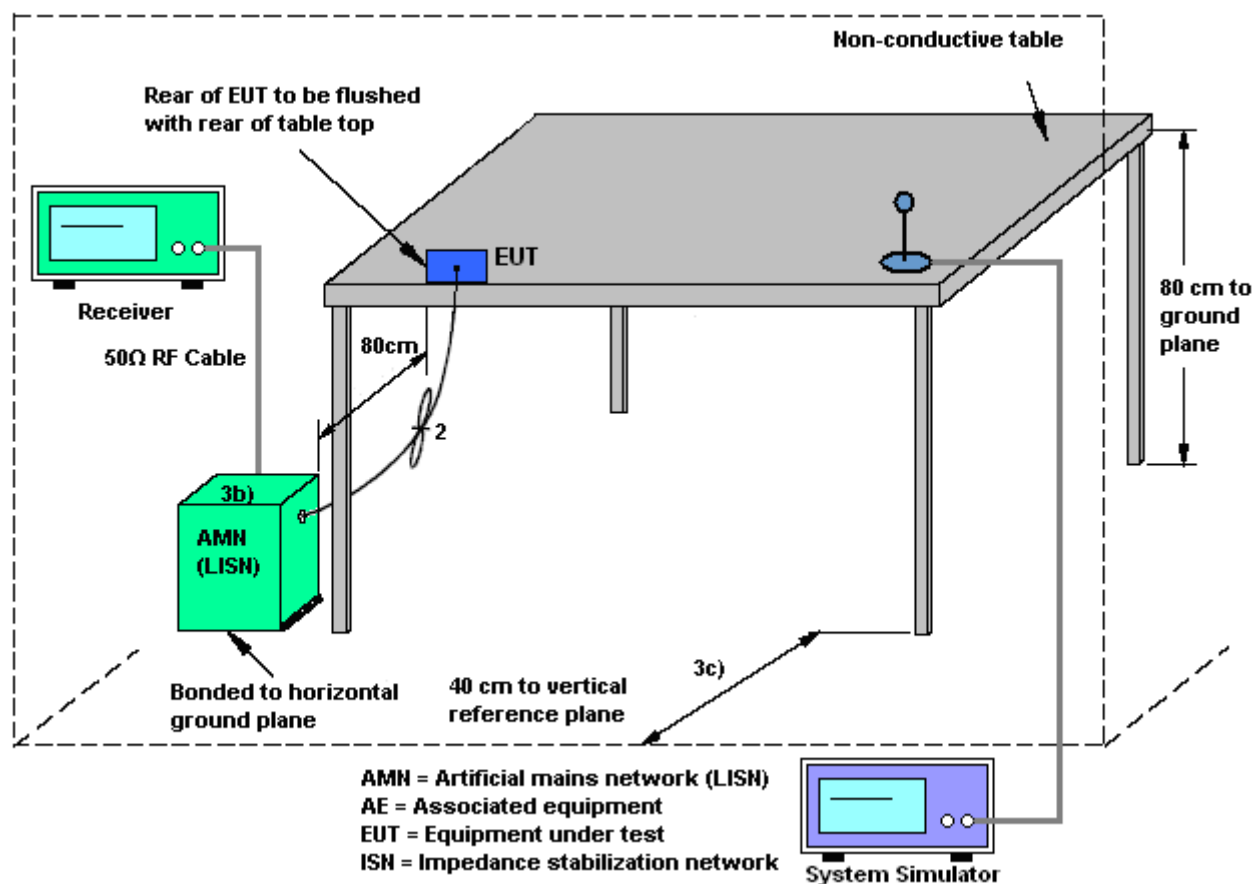
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

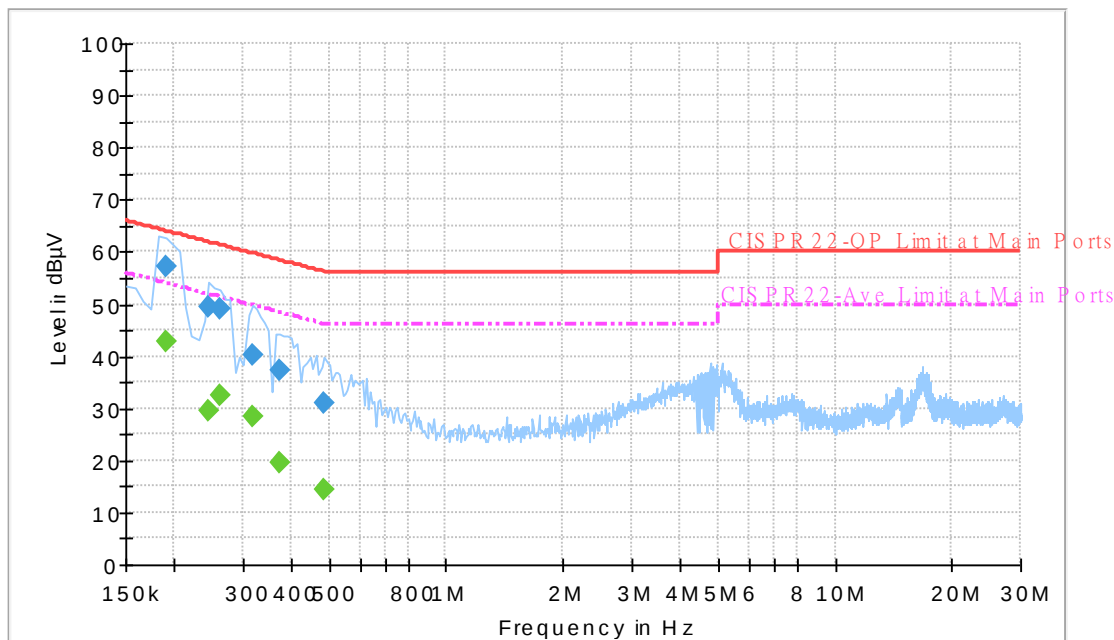
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth 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℃
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM900 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone 1 + USB Cable 2 (Data Link with Notebook) + Front Camera for Sample 1		



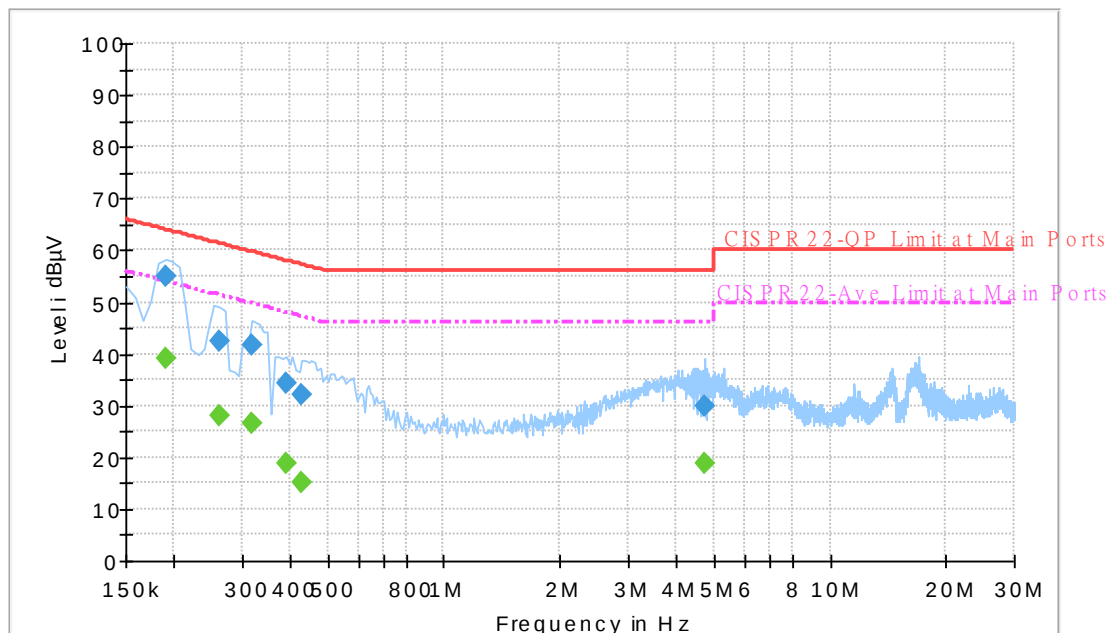
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190000	57.2	Off	L1	19.4	6.8	64.0
0.246000	49.6	Off	L1	19.4	12.3	61.9
0.262000	49.0	Off	L1	19.3	12.4	61.4
0.318000	40.3	Off	L1	19.4	19.5	59.8
0.374000	37.1	Off	L1	19.4	21.3	58.4
0.486000	31.2	Off	L1	19.4	25.0	56.2

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190000	42.7	Off	L1	19.4	11.3	54.0
0.246000	29.6	Off	L1	19.4	22.3	51.9
0.262000	32.3	Off	L1	19.3	19.1	51.4
0.318000	28.4	Off	L1	19.4	21.4	49.8
0.374000	19.7	Off	L1	19.4	28.7	48.4
0.486000	14.4	Off	L1	19.4	31.8	46.2

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM900 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone 1 + USB Cable 2 (Data Link with Notebook) + Front Camera for Sample 1		


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190000	55.1	Off	N	19.4	8.9	64.0
0.262000	42.3	Off	N	19.4	19.1	61.4
0.318000	41.8	Off	N	19.4	18.0	59.8
0.390000	34.5	Off	N	19.3	23.6	58.1
0.430000	32.2	Off	N	19.4	25.1	57.3
4.742000	29.8	Off	N	19.6	26.2	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190000	39.3	Off	N	19.4	14.7	54.0
0.262000	27.9	Off	N	19.4	23.5	51.4
0.318000	26.5	Off	N	19.4	23.3	49.8
0.390000	18.8	Off	N	19.3	29.3	48.1
0.430000	15.0	Off	N	19.4	32.3	47.3
4.742000	18.9	Off	N	19.6	27.1	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 Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Feb. 17, 2014~ Feb. 21, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Jan. 28, 2014	Feb. 17, 2014~ Feb. 21, 2014	Jan. 27, 2015	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Jan. 28, 2014	Feb. 17, 2014~ Feb. 21, 2014	Jan. 27, 2015	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz ~ 26.5GHz	Jan. 15, 2014	Feb. 28, 2014~ Mar. 01, 2014	Jan. 14, 2015	Radiation (03CH08-HY)
Bilog Antenna	Teseq GmbH	CBL6112D	35379	30MHz~2GHz	Oct. 10, 2013	Feb. 28, 2014~ Mar. 01, 2014	Oct. 09, 2014	Radiation (03CH08-HY)
Horn Antenna	ESCO	3117	000143261	1GHz~18GHz	Jan. 16, 2014	Feb. 28, 2014~ Mar. 01, 2014	Jan. 15, 2015	Radiation (03CH08-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz~40GHz	Oct. 03, 2013	Feb. 28, 2014~ Mar. 01, 2014	Oct. 02, 2014	Radiation (03CH08-HY)
Amplifier	SONOMA	310N	187231	9kHz~1GHz	May 15, 2013	Feb. 28, 2014~ Mar. 01, 2014	May 14, 2014	Radiation (03CH08-HY)
Preamplifier	MITEQ	AMF-7D-001 01800-30-10 P	1590074	1GHz~18GHz	Jul. 09, 2013	Feb. 28, 2014~ Mar. 01, 2014	Jul. 08, 2014	Radiation (03CH08-HY)
Pre Amplifier	Agilent	8449B	3008A02665	1GHz~26.5GHz	Sep. 04, 2013	Feb. 28, 2014~ Mar. 01, 2014	Sep. 03, 2014	Radiation (03CH08-HY)
Turn Table	Chaintek	Chaintek 3000	N/A	0~360 Degree	N/A	Feb. 28, 2014~ Mar. 01, 2014	N/A	Radiation (03CH08-HY)
Antenna Mast	MF	MFA520BS	N/A	1m~4m	N/A	Feb. 28, 2014~ Mar. 01, 2014	N/A	Radiation (03CH08-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MHz	Jul. 03, 2012	Feb. 28, 2014~ Mar. 01, 2014	Jul. 03, 2014	Radiation (03CH08-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Apr. 01, 2014	Nov. 14, 2014	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Apr. 01, 2014	Dec. 11, 2014	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Apr. 01, 2014	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Apr. 01, 2014	N/A	Conduction (CO05-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 (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.30
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