

FCC RF Test Report

APPLICANT : Cellon Communications Technology Co., Ltd.
EQUIPMENT : GSM/GPRS/EDGE(Downlink Only)
850/900/1800/1900 UMTS900/2100 mobile phone
BRAND NAME : Claro / Digicel / ekt / enspire / 2degrees / Movistar
MODEL NAME : C8646, 8646
MARKETING NAME : 8646, C8646, 8646CA, 8646EN, 8646CO, 8646GT,
8646CL, 8646TL, 8646NZ
FCC ID : T38C8646
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on May 14, 2013 and completely tested on May 23, 2013. We, SPORTON INTERNATIONAL (SHENZHEN) 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL (SHENZHEN) INC.

No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.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 Testing Site.....	6
1.6 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 RF Utility	11
2.7 Measurement Results Explanation Example.....	12
3 TEST RESULT.....	13
3.1 6dB Bandwidth Measurement	13
3.2 Output Power Measurement.....	20
3.3 Power Spectral Density Measurement	23
3.4 Conducted Band Edges and Spurious Emission Measurement	37
3.5 Radiated Band Edges and Spurious Emission Measurement	50
3.6 AC Conducted Emission Measurement.....	68
3.7 Antenna Requirements.....	72
4 LIST OF MEASURING EQUIPMENT	73
5 UNCERTAINTY OF EVALUATION.....	74
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR351403B	Rev. 01	Initial issue of report	May 28, 2013

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	15.209(a) & 15.247(d)	Pass	Under limit 3.01 dB at 2389.470 MHz
		Radiated Spurious Emission			
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.78 dB at 0.370 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Cellon Communications Technology Co., Ltd.

11f, Skyworth C Buuilding, Gaoxin S.Ave.1., Hi-Tech Industrial Park, Nanshan. Shenzhen

1.2 Manufacturer

Cellon Communications Technology Co., Ltd.

11f, Skyworth C Buuilding, Gaoxin S.Ave.1., Hi-Tech Industrial Park, Nanshan. Shenzhen

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	GSM/GPRS/EDGE(Downlink Only) 850/900/1800/1900 UMTS900/2100 mobile phone
Brand Name	Claro / Digicel / ekt / enspire / 2degrees / Movistar
Model Name	C8646, 8646
Marketing Name	8646, C8646, 8646CA, 8646EN, 8646CO, 8646GT, 8646CL, 8646TL, 8646NZ
FCC ID	T38C8646
EUT supports Radios application	GSM/GPRS/ WLAN 11bgn/Bluetooth EDR
HW Version	P2
SW Version	C8646_Latam_Digicel_00.15
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 Frequency Range	2412 MHz ~ 2462 MHz
Number of Channels	11
Carrier Frequency of Each Channel	2412+(n-1)*5 MHz; n=1~11
Maximum Output Power to Antenna	802.11b : 15.46 dBm (0.0352 W) 802.11g : 19.51 dBm (0.0893 W) 802.11n HT20 : 19.11 dBm (0.0815 W)
Antenna Type	PIFA Antenna type with gain 2.00 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.			
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755- 3320-2398			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH01-SZ	CO01-SZ	03CH01-SZ	831040/4086F-1

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

1.6 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 antenna configurations as following table and the highest power data rates were chosen for full test in the following tables.

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	14.78	14.71	14.62	14.91
CH 06	2437 MHz	15.12	15.06	15.09	15.22
CH 11	2462 MHz	15.11	15.29	15.41	15.46

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	18.19	17.98	18.02	18.15	18.35	18.42	18.65	18.6
CH 06	2437 MHz	18.11	17.92	18.06	18.18	18.21	18.34	18.47	18.37
CH 11	2462 MHz	18.98	18.51	18.48	18.73	18.91	19.05	19.13	19.51

Channel	Frequency	2.4GHz 802.11n HT20 RF Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412 MHz	17.52	17.06	17.32	17.41	17.45	17.51	18.41	17.87
CH 06	2437 MHz	17.57	17.25	17.33	17.53	17.77	17.92	18.71	18.39
CH 11	2462 MHz	17.92	17.63	17.73	17.92	18.16	18.32	18.98	19.11

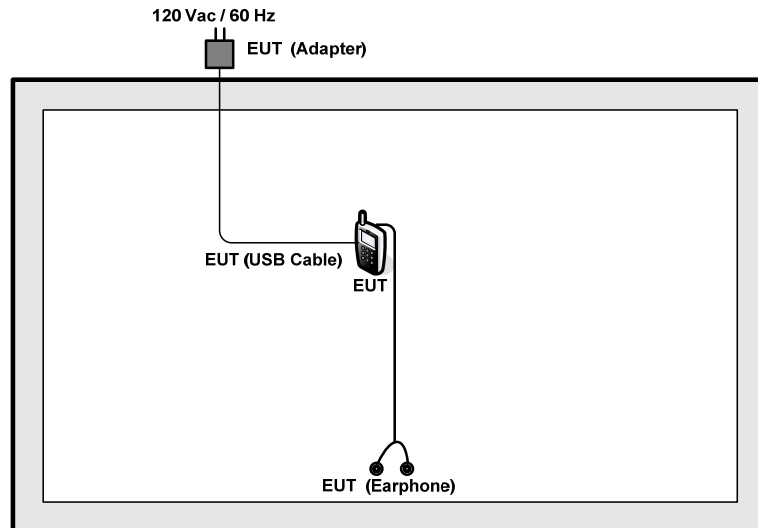
2.3 Test Mode

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

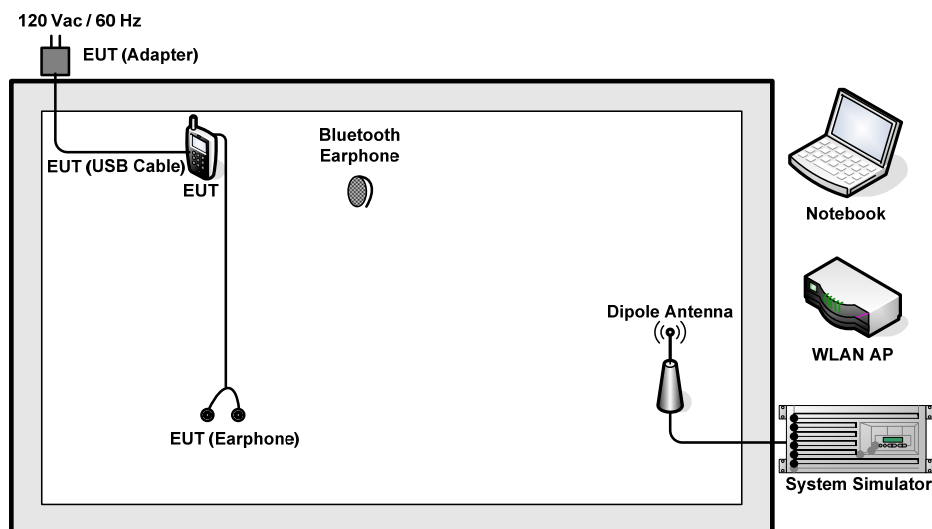
Test Cases				
Conducted TCs	Test Items	Mode	Data Rate	Test Channel
	6dB BW Power Spectral Density	802.11b	11 Mbps	1/6/11
		802.11g	54 Mbps	1/6/11
		802.11n HT20	65 Mbps	1/6/11
	Output Power	802.11b	11 Mbps	1/6/11
		802.11g	54 Mbps	1/6/11
		802.11n HT20	65 Mbps	1/6/11
	Conducted Band Edge	802.11b	11 Mbps	1/11
		802.11g	54 Mbps	1/11
		802.11n HT20	65 Mbps	1/11
	Conducted Spurious Emission	802.11b	11 Mbps	1/6/11
		802.11g	54 Mbps	1/6/11
		802.11n HT20	65 Mbps	1/6/11
Radiated TCs	Radiated Band Edge	802.11b	11 Mbps	1/11
		802.11g	54 Mbps	1/11
		802.11n HT20	65 Mbps	1/11
	Radiated Spurious Emission	802.11b	11 Mbps	1/6/11
		802.11g	54 Mbps	1/6/11
		802.11n HT20	65 Mbps	1/6/11
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone			

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	Agilent	E5515C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	TOPWORD	3303DR	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-612	N/A	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	P08S	QDS-BRCM1030	N/A	AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Nokia	BH-108	N/A	N/A	N/A

2.6 RF Utility

For WLAN function, key in “* # 3646633 #” on the EUT directly. Then, the EUT will get into the engineering modes to contact with WLAN AP for continuous transmitting and receiving signals.

2.7 Measurement Results Explanation Example

For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and 10dB attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and 10dB attenuator factor.

Offset = RF cable loss + attenuator factor.

Following table shows an offset computation example with cable loss 7.5 dB.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 7.5 + 10 = 17.5 \text{ (dB)}\end{aligned}$$

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.

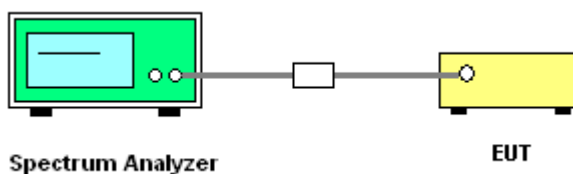
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB 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) = 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

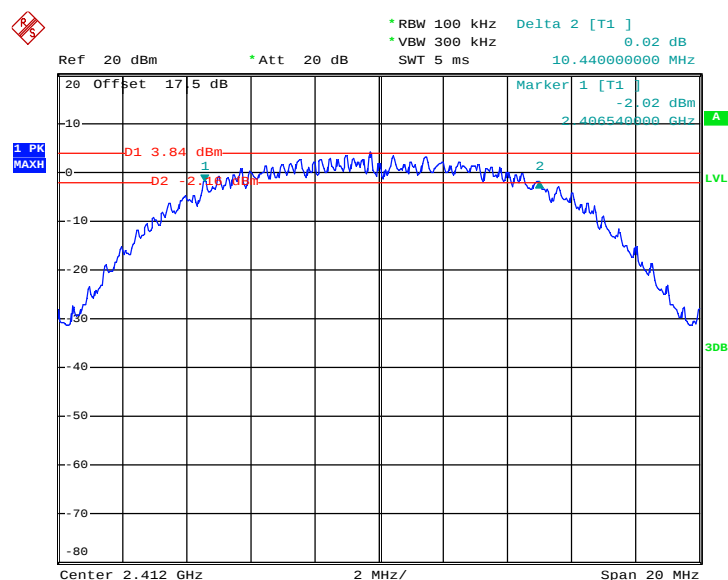


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

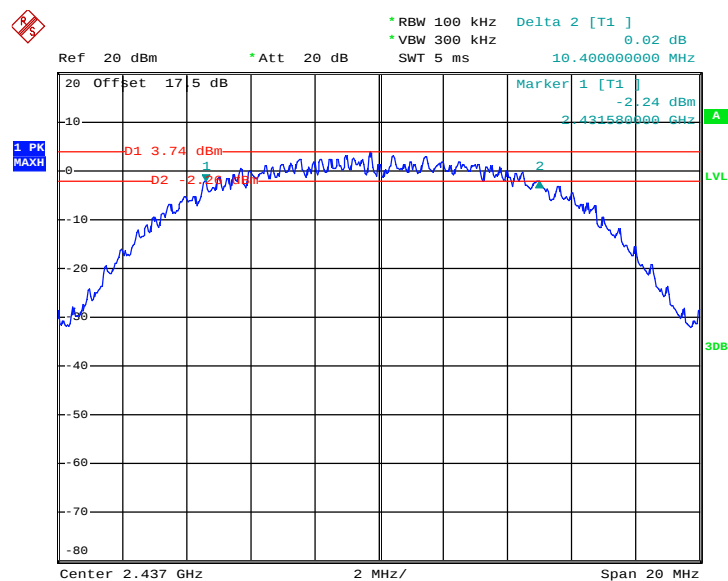
Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	10.44	0.5	Pass
06	2437	10.40	0.5	Pass
11	2462	10.00	0.5	Pass

6 dB Bandwidth Plot on 802.11b Channel 01



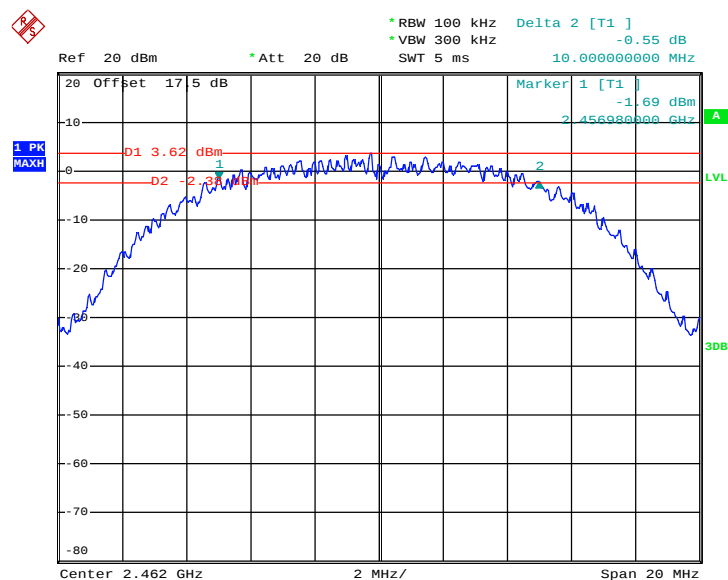
Date: 20.MAY.2013 23:15:20

6 dB Bandwidth Plot on 802.11b Channel 06



Date: 20.MAY.2013 23:20:26

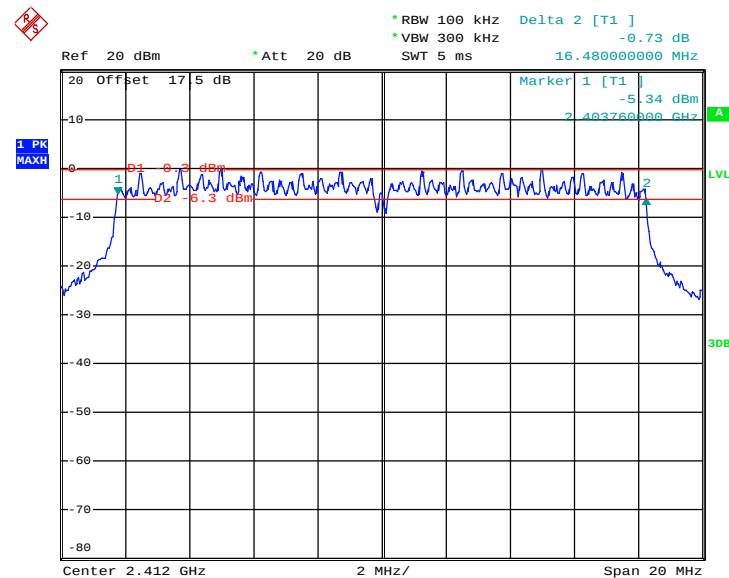
6 dB Bandwidth Plot on 802.11b Channel 11



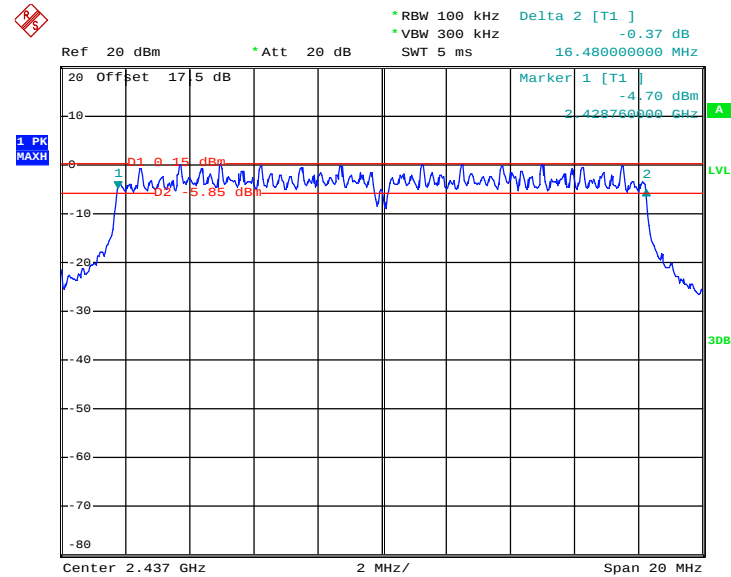
Date: 20.MAY.2013 23:35:18

Test Mode :	802.11g	Temperature :	24~26°C
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

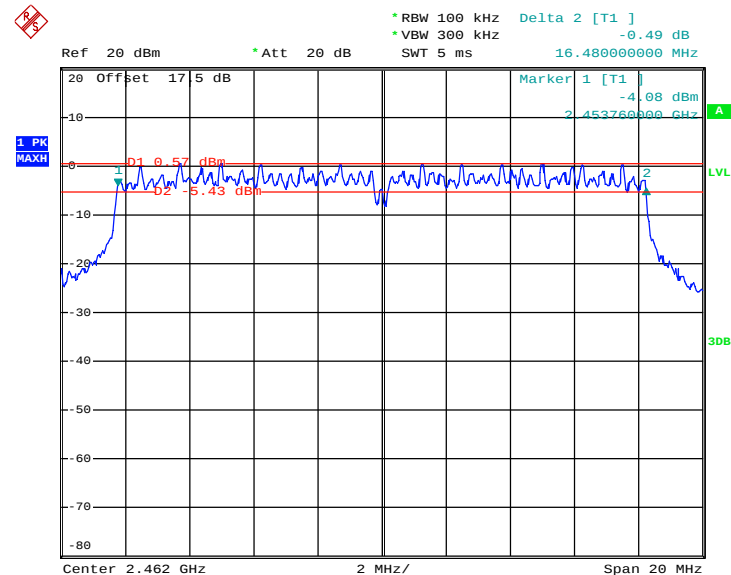
Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.48	0.5	Pass
06	2437	16.48	0.5	Pass
11	2462	16.48	0.5	Pass

6 dB Bandwidth Plot on 802.11g Channel 01


Date: 20.MAY.2013 23:43:00

6 dB Bandwidth Plot on 802.11g Channel 06


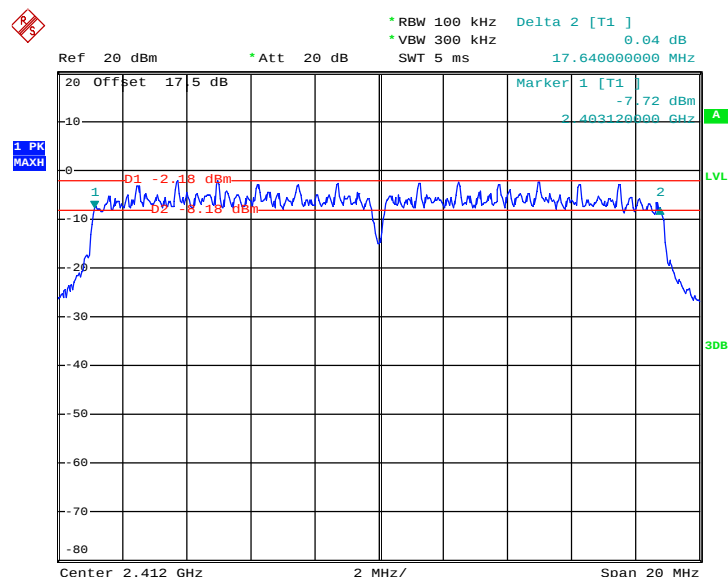
Date: 20.MAY.2013 23:49:50

6 dB Bandwidth Plot on 802.11g Channel 11


Date: 20.MAY.2013 23:54:59

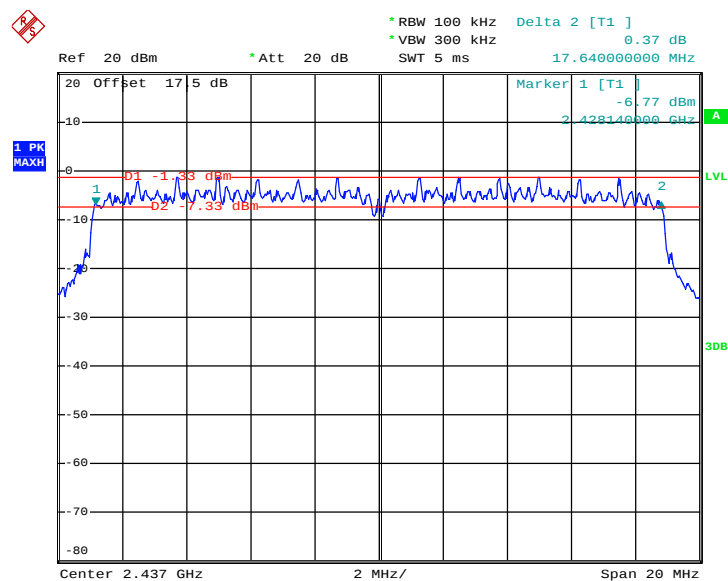
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.64	0.5	Pass
06	2437	17.64	0.5	Pass
11	2462	17.68	0.5	Pass

6 dB Bandwidth Plot on 802.11n HT20 Channel 01


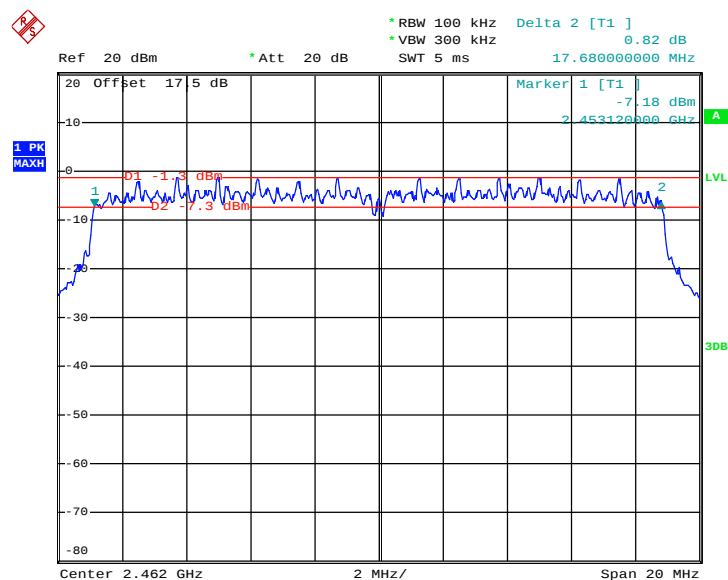
Date: 21.MAY.2013 00:01:19

6 dB Bandwidth Plot on 802.11n HT20 Channel 06



Date: 21.MAY.2013 00:06:10

6 dB Bandwidth Plot on 802.11n HT20 Channel 11



Date: 21.MAY.2013 00:12:03

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.

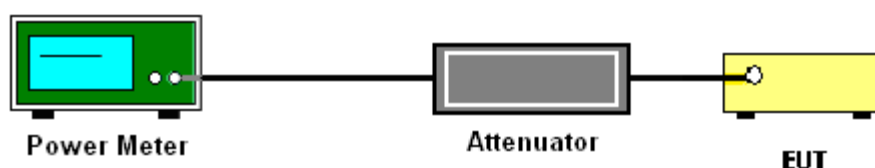
3.2.2 Measuring Instruments

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 D01 DTS 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 :	802.11b	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	14.91	30	Pass
06	2437	15.22	30	Pass
11	2462	15.46	30	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	18.60	30	Pass
06	2437	18.37	30	Pass
11	2462	19.51	30	Pass

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	17.87	30	Pass
06	2437	18.39	30	Pass
11	2462	19.11	30	Pass

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%
Duty Cycle:	97.61%	Duty Factor:	0.10dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	12.73
06	2437	13.01
11	2462	13.29

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%
Duty Cycle:	88.57%	Duty Factor:	0.53dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	10.28
06	2437	9.88
11	2462	11.15

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%
Duty Cycle:	87.79%	Duty Factor:	0.57dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)
01	2412	8.79
06	2437	9.32
11	2462	9.62

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.

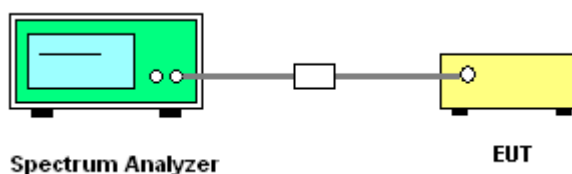
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Option 1 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 :	802.11b	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	3.95	-10.06	8	Pass
06	2437	3.61	-10.42	8	Pass
11	2462	3.59	-10.51	8	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	-0.38	-9.94	8	Pass
06	2437	-0.02	-10.26	8	Pass
11	2462	0.41	-9.63	8	Pass

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

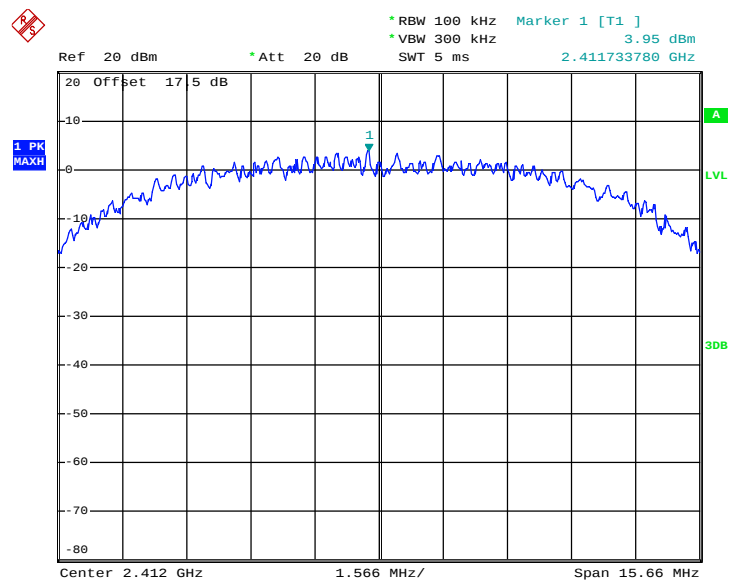
Channel	Frequency (MHz)	802.11n HT20 Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	-2.34	-16.99	8	Pass
06	2437	-1.43	-9.95	8	Pass
11	2462	-1.40	-10.05	8	Pass

Note:

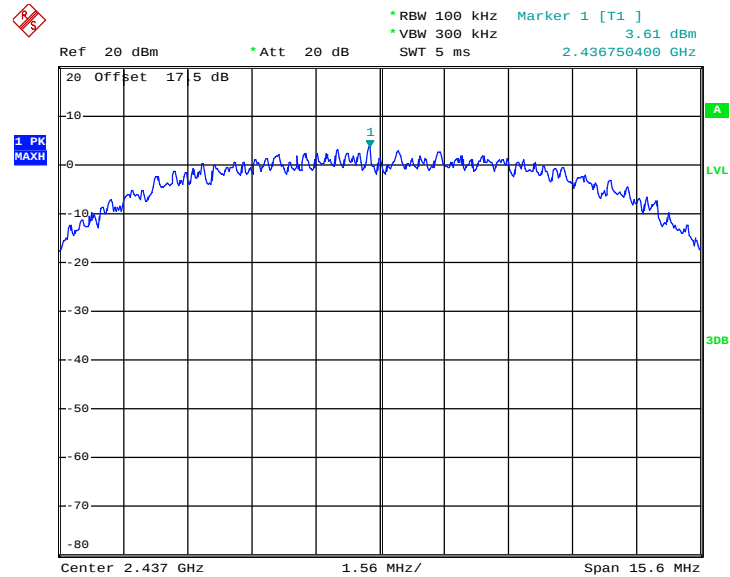
1. Measured power density (dBm) has offset with cable loss.
2. The Measured power density (dBm)/ 100KHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.

3.3.6 Test Result of Power Spectral Density Plots (100kHz)

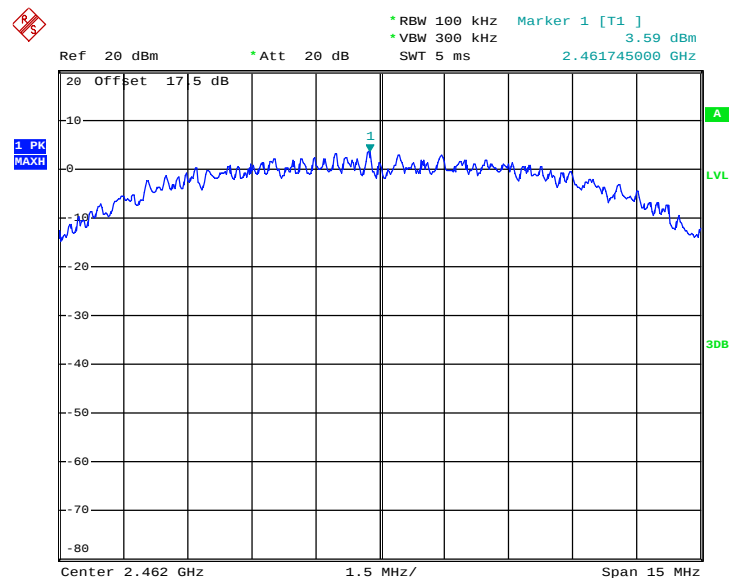
PSD 100kHz Plot on 802.11b Channel 01



Date: 20.MAY.2013 23:16:03

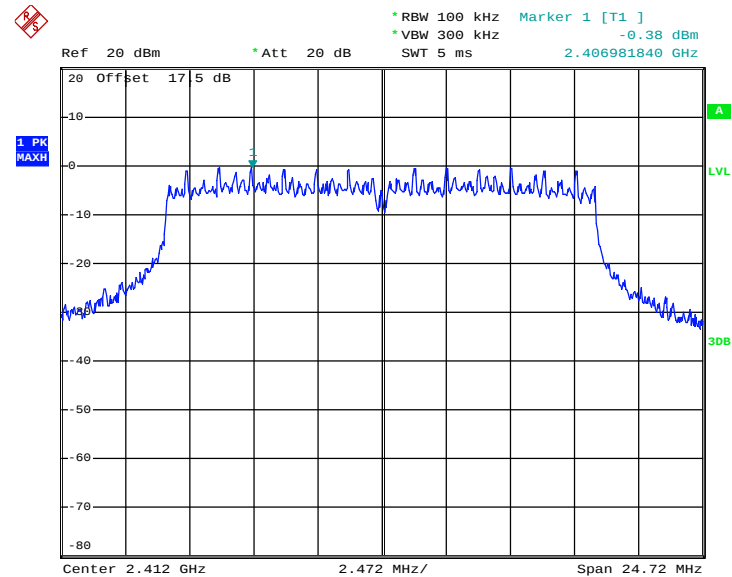
PSD 100kHz Plot on 802.11b Channel 06


Date: 20.MAY.2013 23:21:13

PSD 100kHz Plot on 802.11b Channel 11


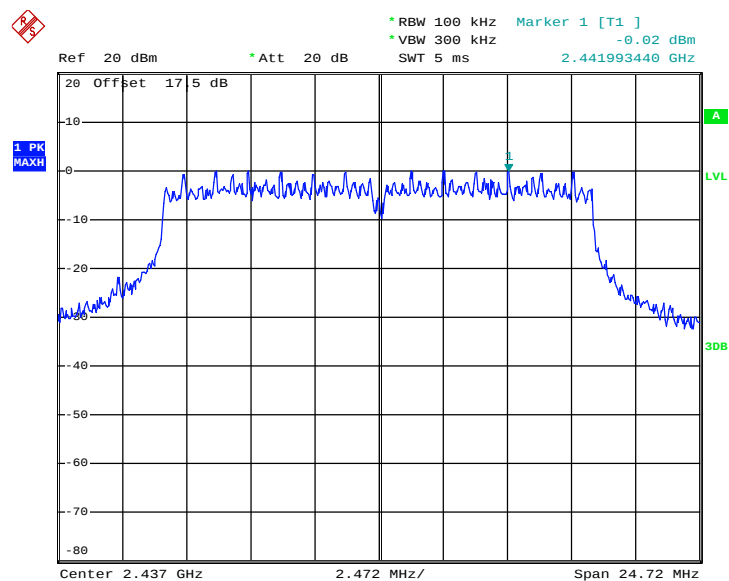
Date: 20.MAY.2013 23:36:12

PSD 100kHz Plot on 802.11g Channel 01



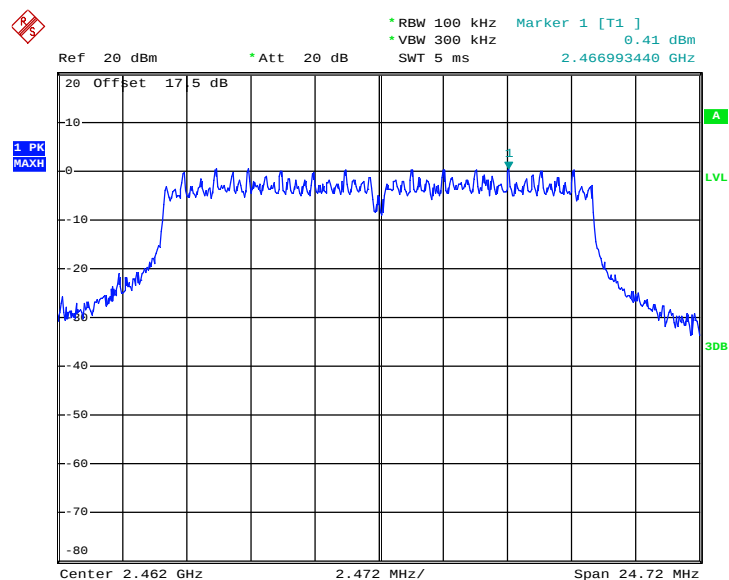
Date: 20.MAY.2013 23:44:56

PSD 100kHz Plot on 802.11g Channel 06



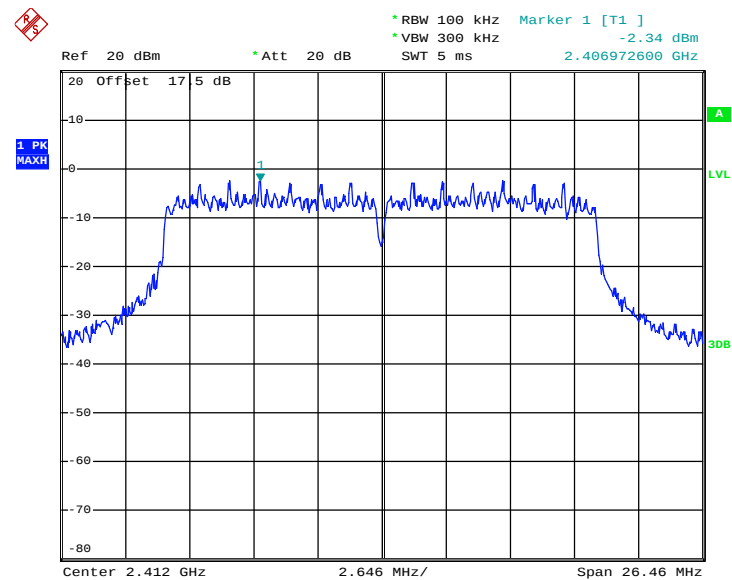
Date: 20.MAY.2013 23:50:42

PSD 100kHz Plot on 802.11g Channel 11

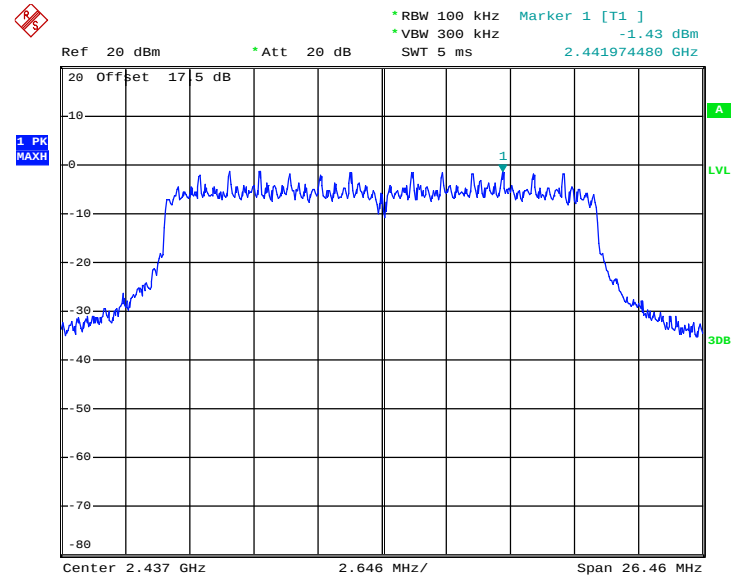


Date: 20.MAY.2013 23:55:48

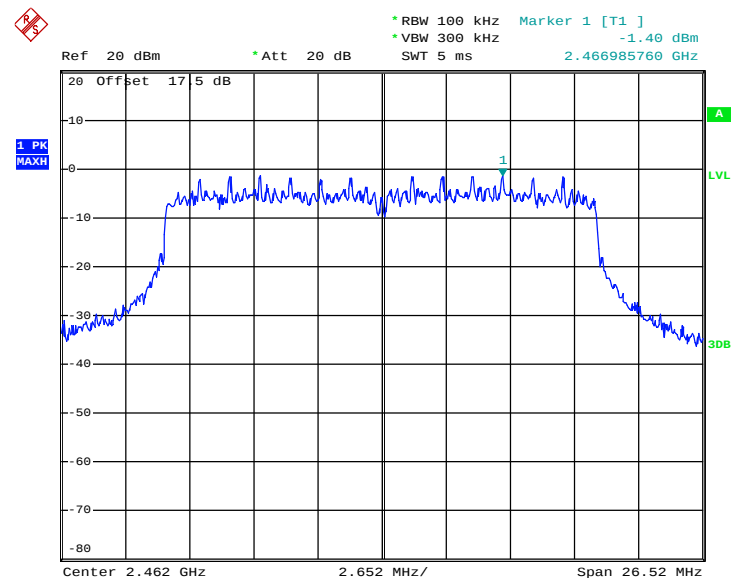
PSD 100kHz Plot on 802.11n HT20 Channel 01



Date: 21.MAY.2013 00:02:03

PSD 100kHz Plot on 802.11n HT20 Channel 06


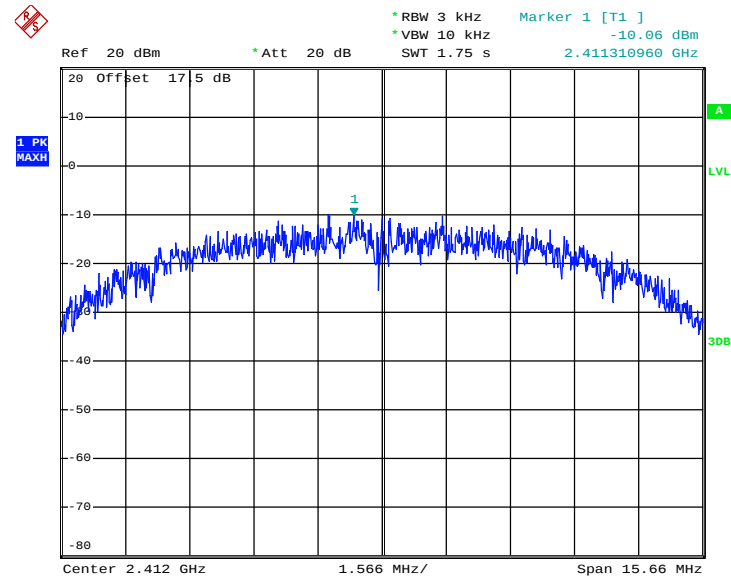
Date: 21.MAY.2013 00:07:23

PSD 100kHz Plot on 802.11n HT20 Channel 11


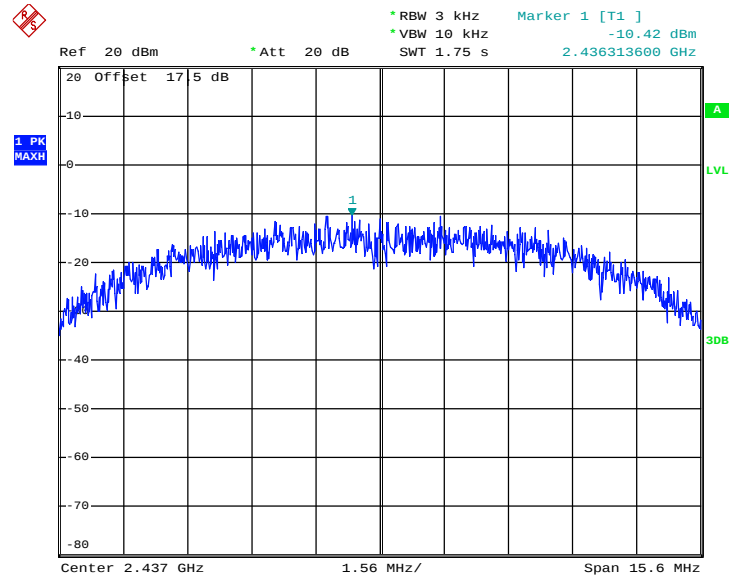
Date: 21.MAY.2013 00:12:47

3.3.7 Test Result of Power Spectral Density Plots (3kHz)

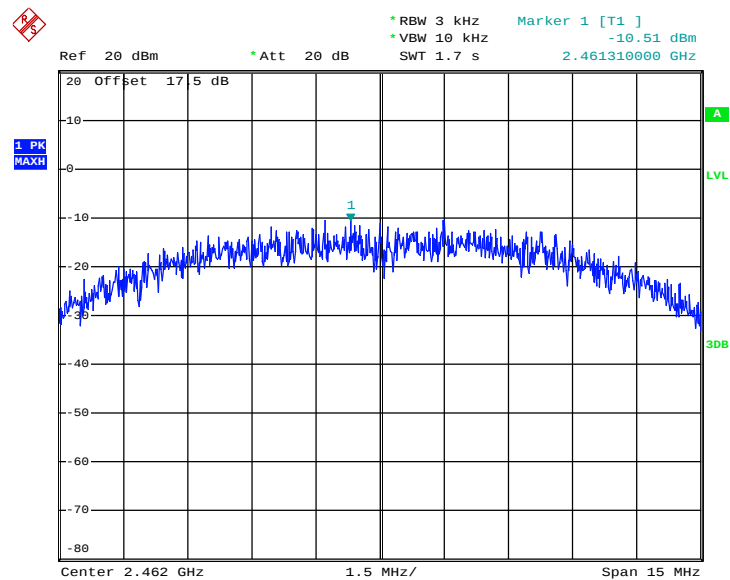
PSD 3kHz Plot on 802.11b Channel 01



Date: 20.MAY.2013 23:15:46

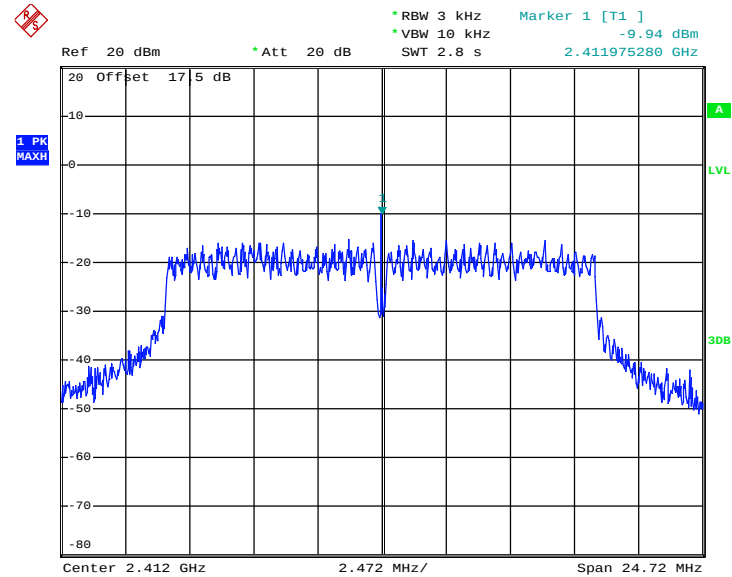
PSD 3kHz Plot on 802.11b Channel 06


Date: 20.MAY.2013 23:20:52

PSD 3kHz Plot on 802.11b Channel 11


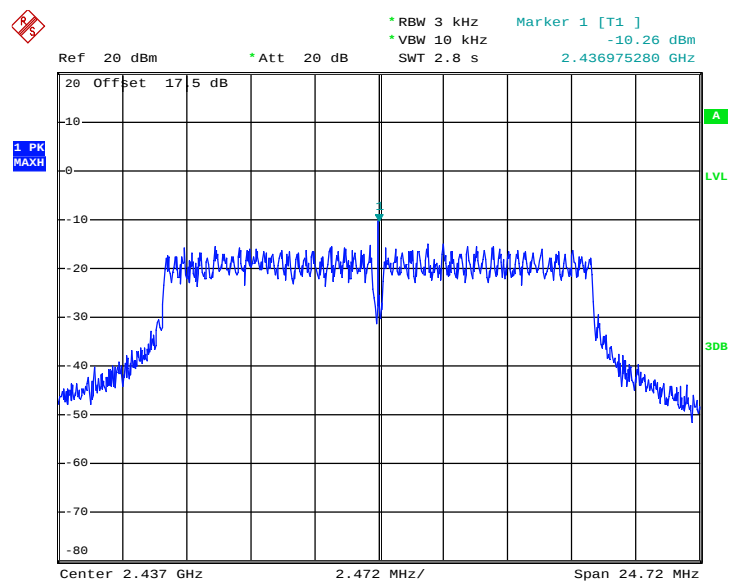
Date: 20.MAY.2013 23:35:43

PSD 3kHz Plot on 802.11g Channel 01



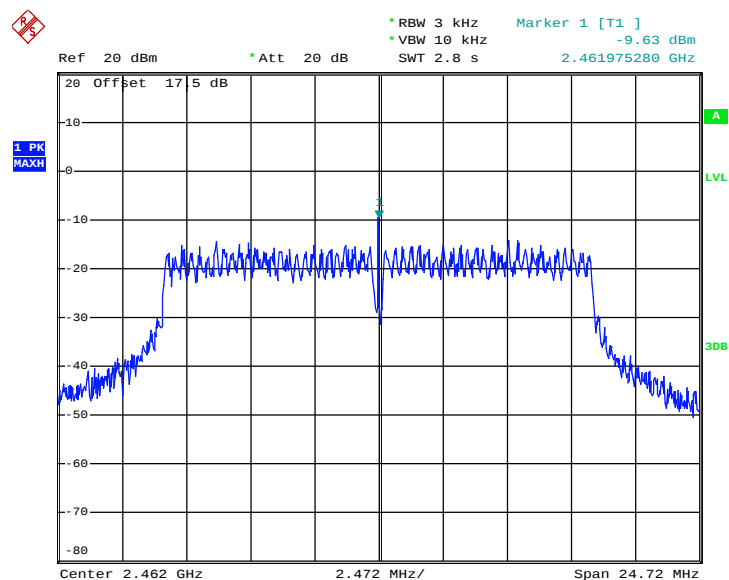
Date: 20.MAY.2013 23:43:30

PSD 3kHz Plot on 802.11g Channel 06



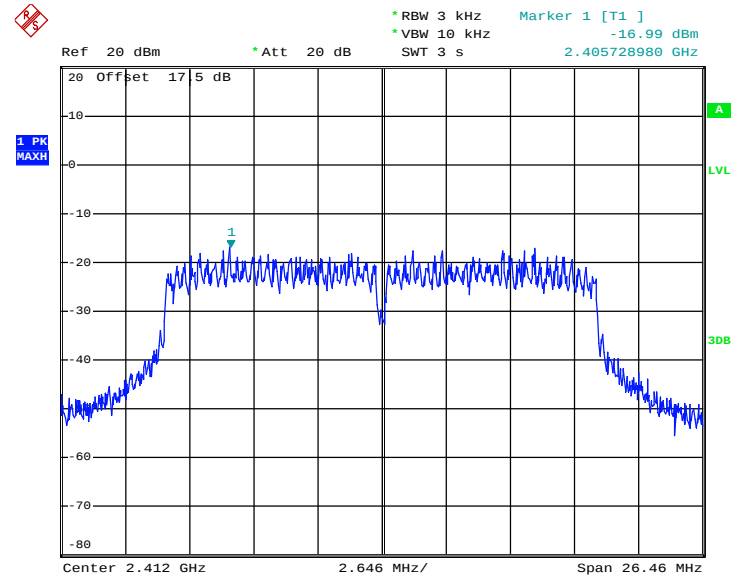
Date: 20.MAY.2013 23:50:19

PSD 3kHz Plot on 802.11g Channel 11

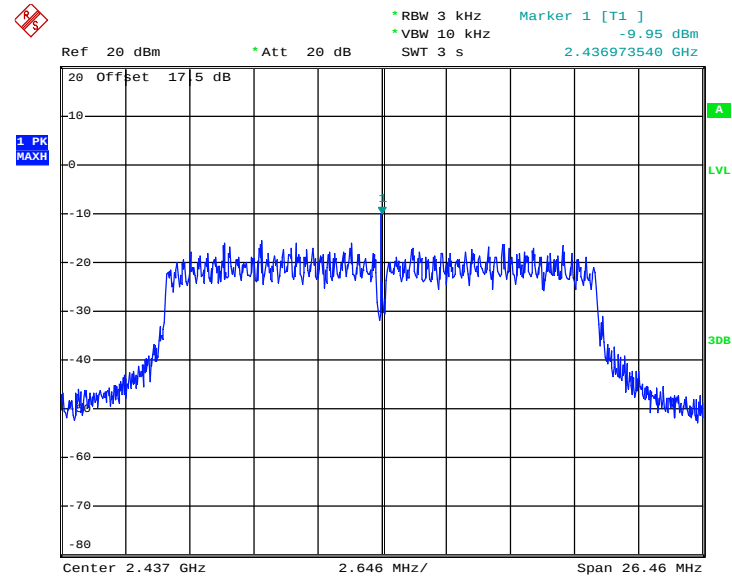


Date: 20.MAY.2013 23:55:30

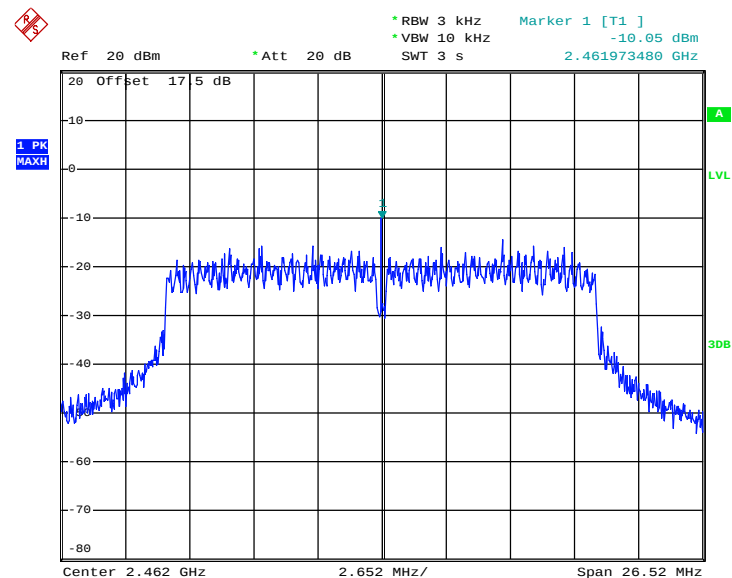
PSD 3kHz Plot on 802.11n HT20 Channel 01



Date: 21.MAY.2013 00:01:48

PSD 3kHz Plot on 802.11n HT20 Channel 06


Date: 21.MAY.2013 00:07:05

PSD 3kHz Plot on 802.11n HT20 Channel 11


Date: 21.MAY.2013 00:12:32

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).

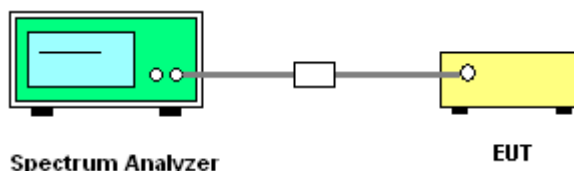
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB 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. The attenuation is set to 30dB, when maximum conducted output power procedure is used.
5. Measure and record the results in the test report.

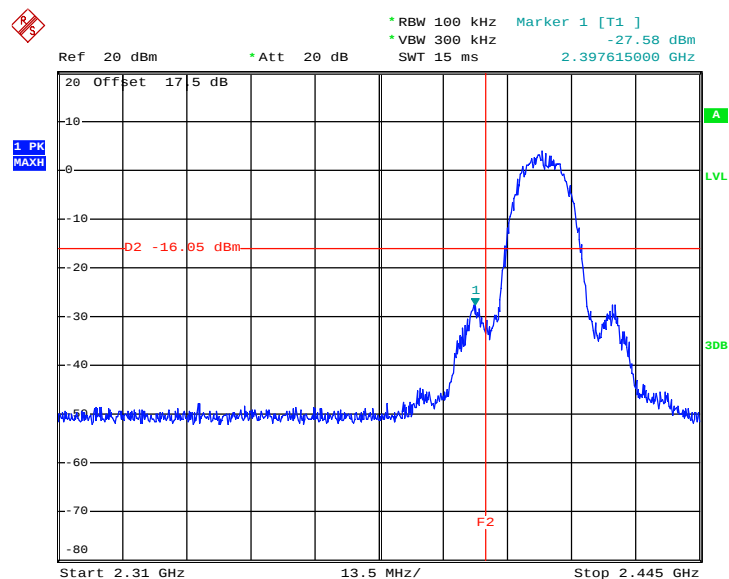
3.4.4 Test Setup



3.4.5 Test Plots of Conducted Band Edges

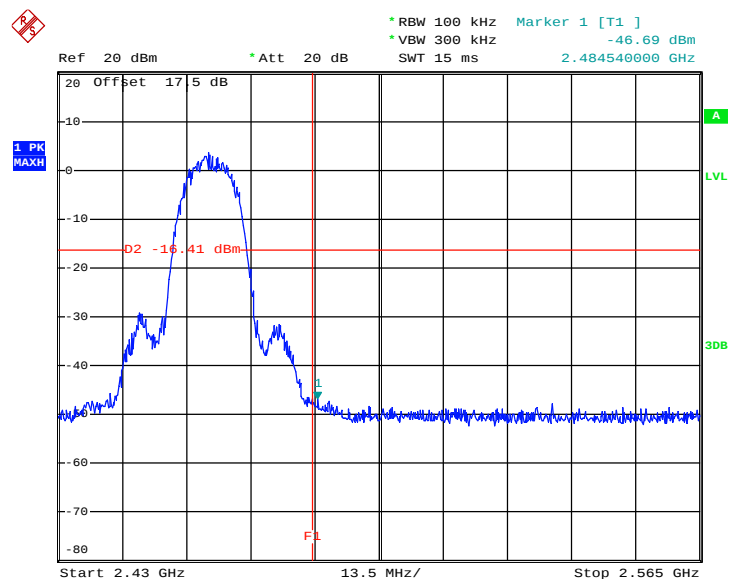
Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Fly Liang

Low Band Edge Plot on 802.11b Channel 01



Date: 20.MAY.2013 23:16:26

High Band Edge Plot on 802.11b Channel 11

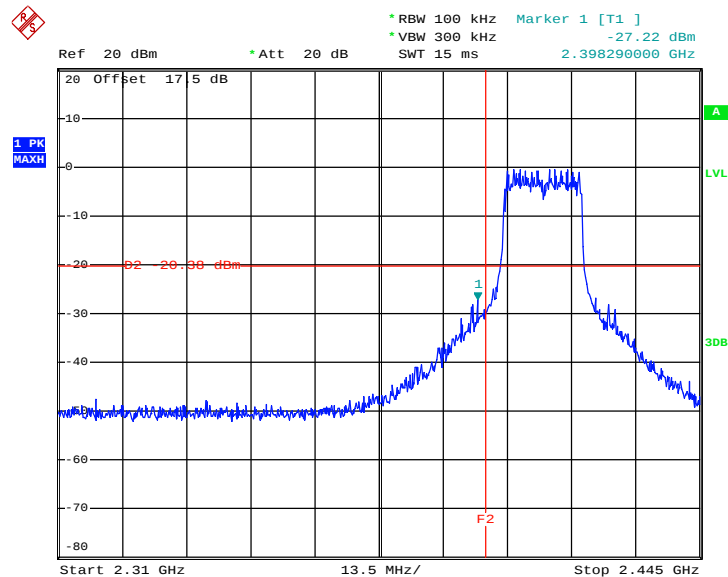


Date: 20.MAY.2013 23:36:39



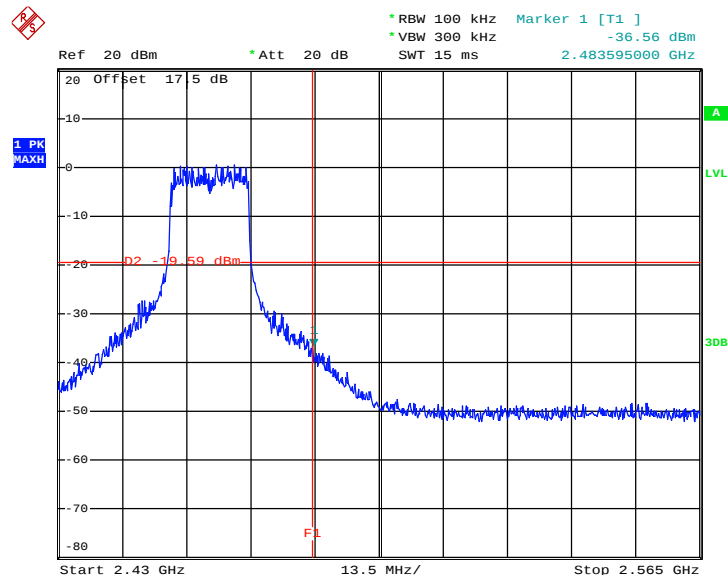
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Fly Liang

Low Band Edge Plot on 802.11g Channel 01



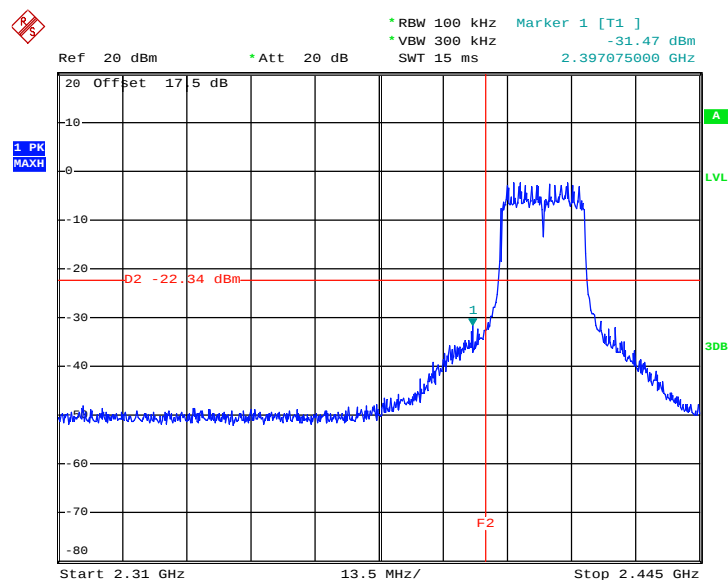
Date: 20.MAY.2013 23:45:33

High Band Edge Plot on 802.11g Channel 11

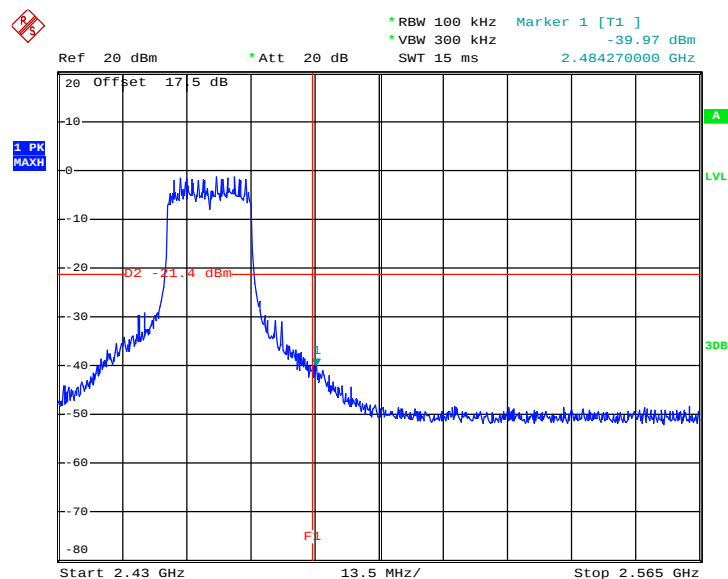


Date: 20.MAY.2013 23:56:21

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Fly Liang

Low Band Edge Plot on 802.11n HT20 Channel 01


Date: 21.MAY.2013 00:02:49

High Band Edge Plot on 802.11n HT20 Channel 11


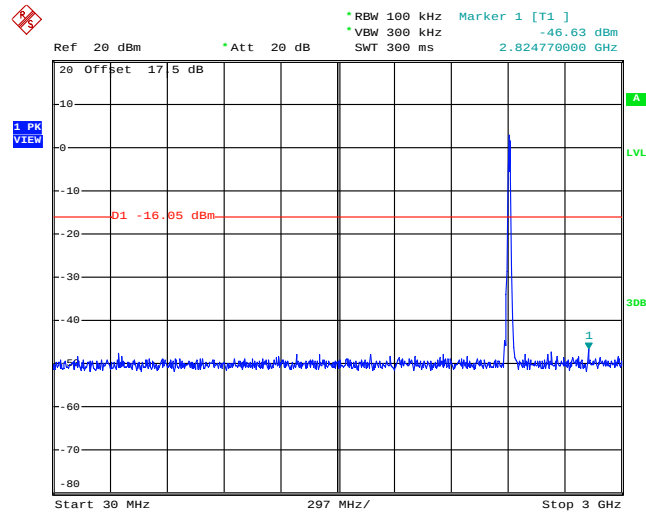
Date: 21.MAY.2013 00:13:22

3.4.6 Test Plots of Spurious Emission

Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Fly Liang

802.11b 30 MHz~3 GHz

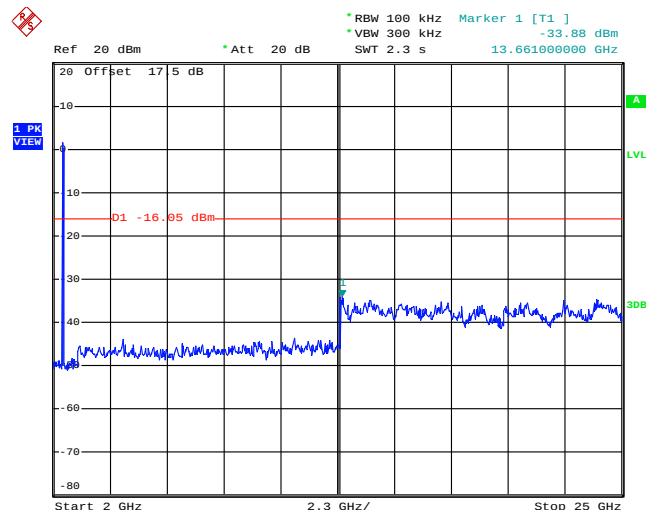
Conducted Spurious Emission Plot on Channel 01



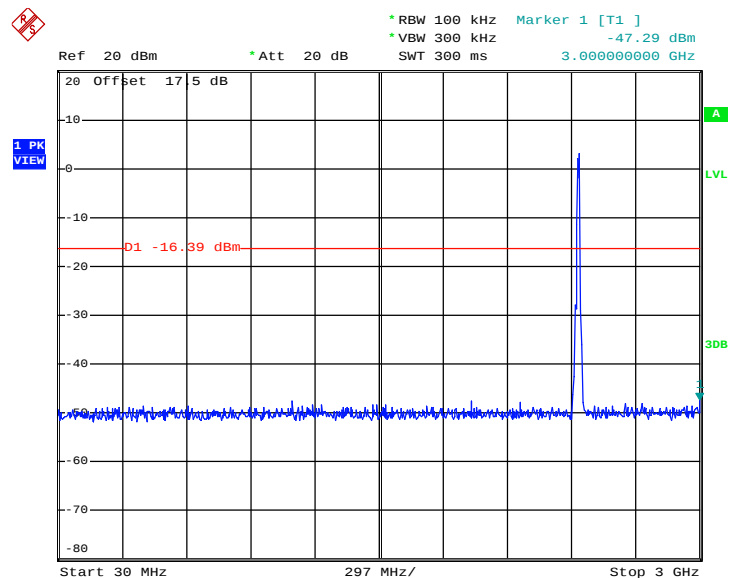
Date: 20.MAY.2013 23:17:04

802.11b 2 GHz~25 GHz

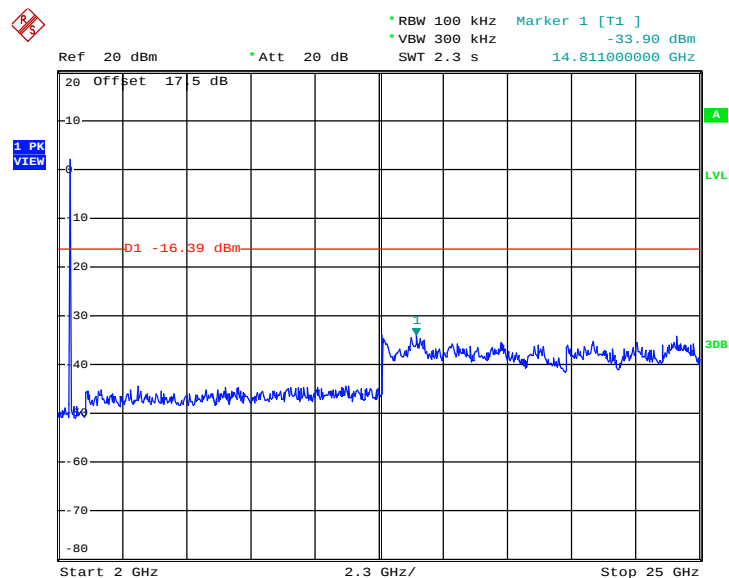
Conducted Spurious Emission Plot on Channel 01



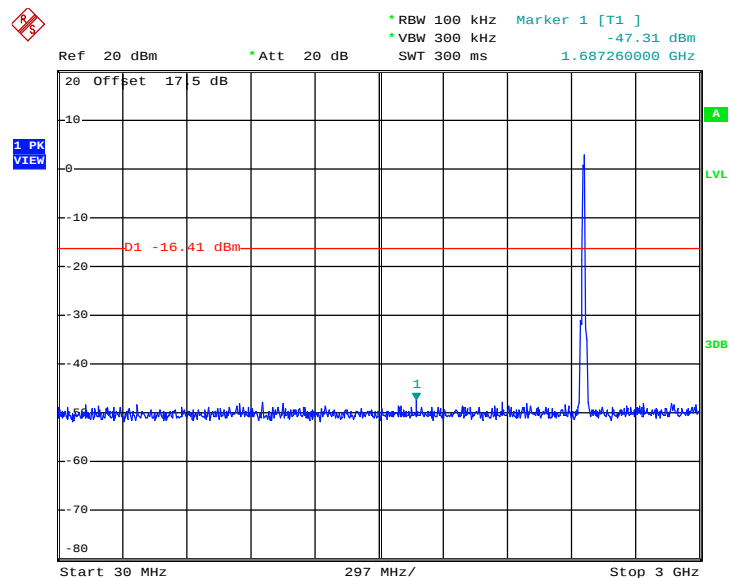
Date: 20.MAY.2013 23:17:22

802.11b 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 06


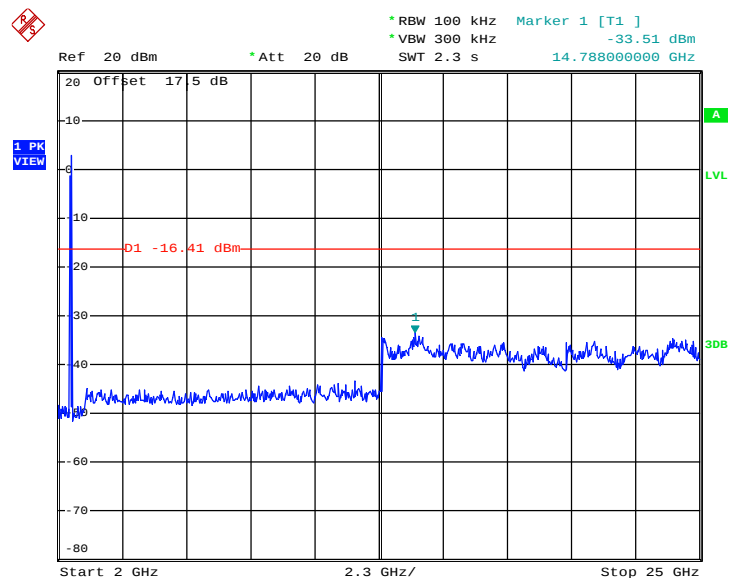
Date: 20.MAY.2013 23:21:41

802.11b 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 20.MAY.2013 23:22:00

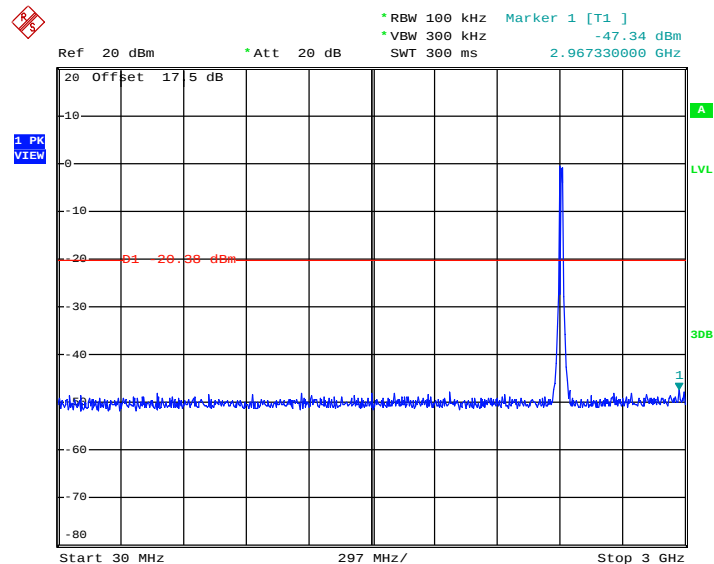
802.11b 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 20.MAY.2013 23:37:36

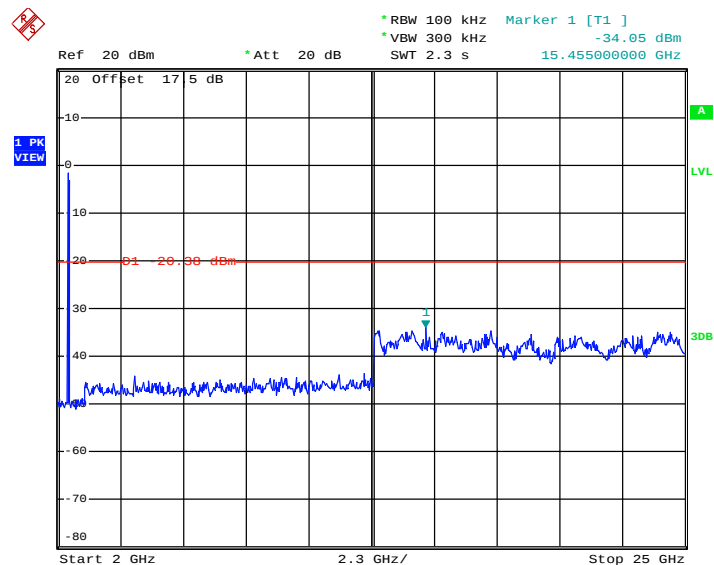
802.11b 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 20.MAY.2013 23:37:55

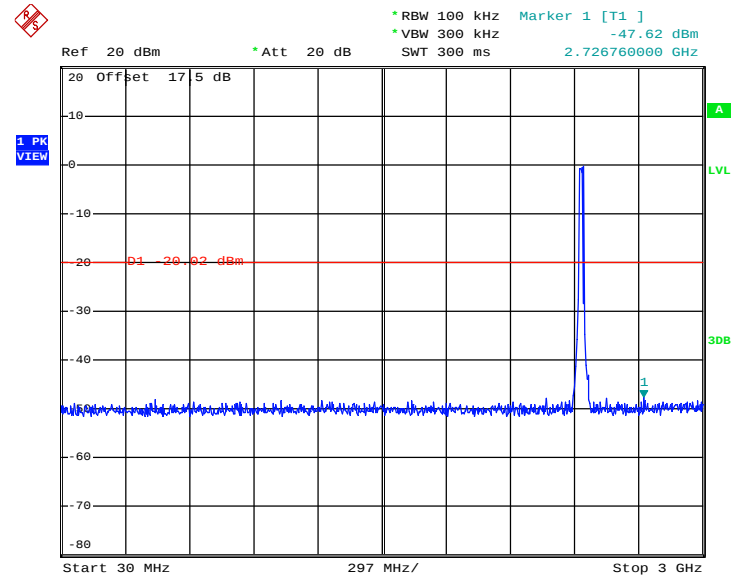
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Fly Liang

802.11g 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 01


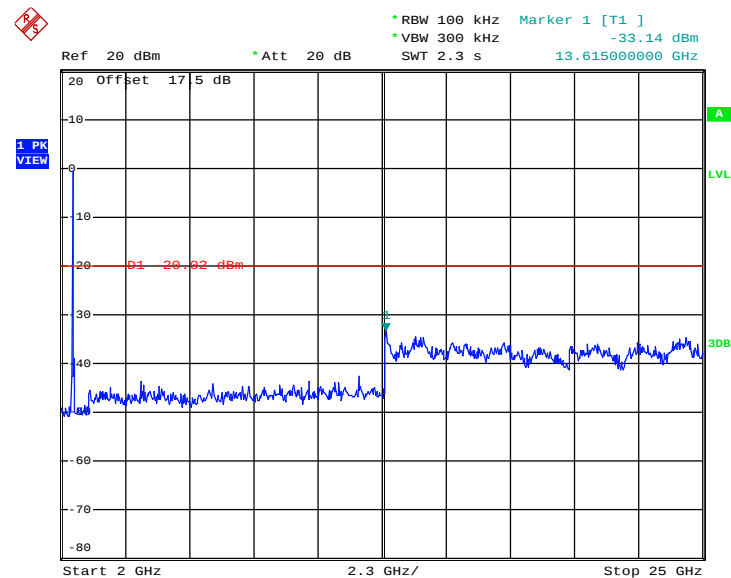
Date: 20.MAY.2013 23:46:05

802.11g 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 01


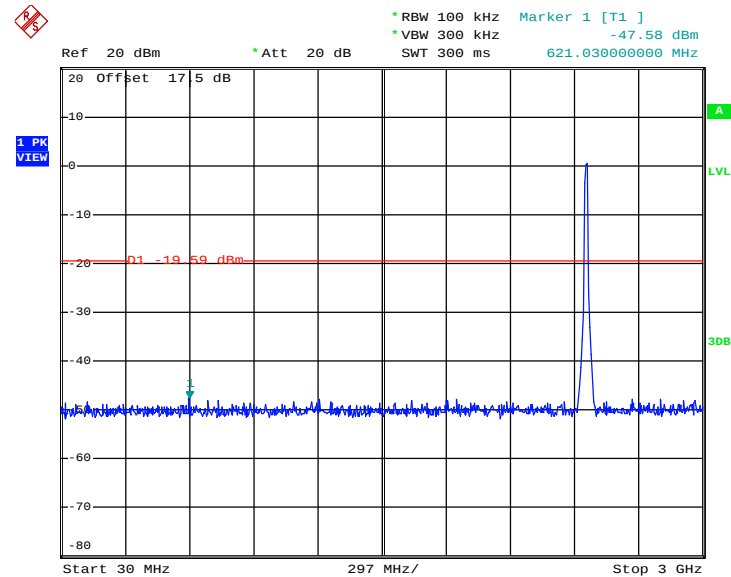
Date: 20.MAY.2013 23:46:24

802.11g 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 06


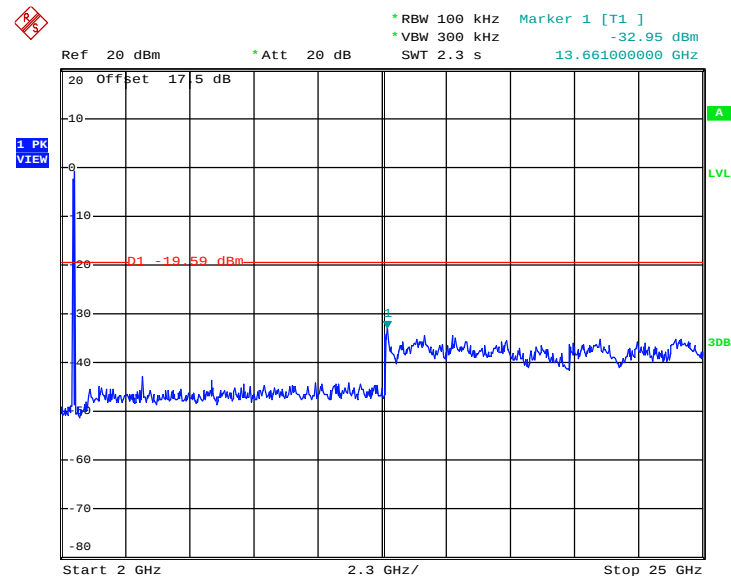
Date: 20.MAY.2013 23:51:14

802.11g 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 20.MAY.2013 23:51:33

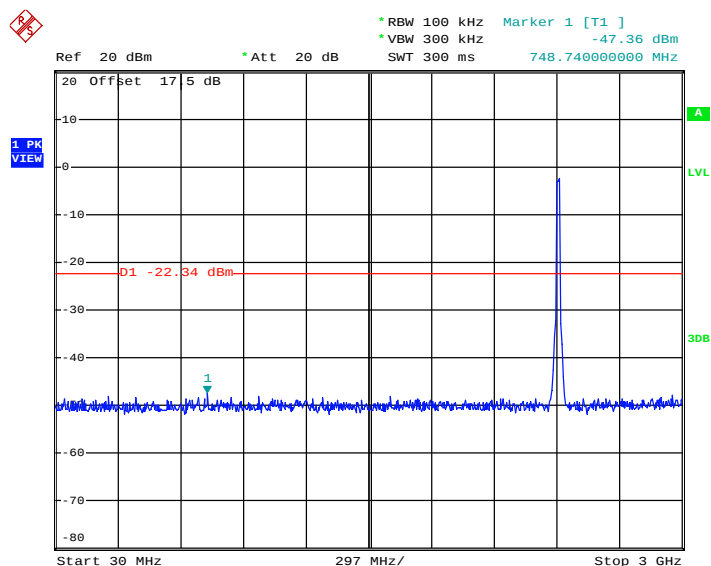
802.11g 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 20.MAY.2013 23:56:53

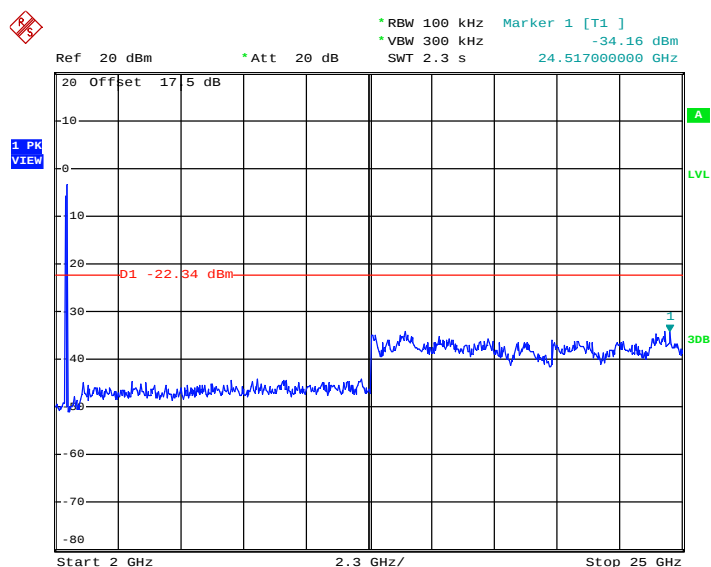
802.11g 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 20.MAY.2013 23:57:12

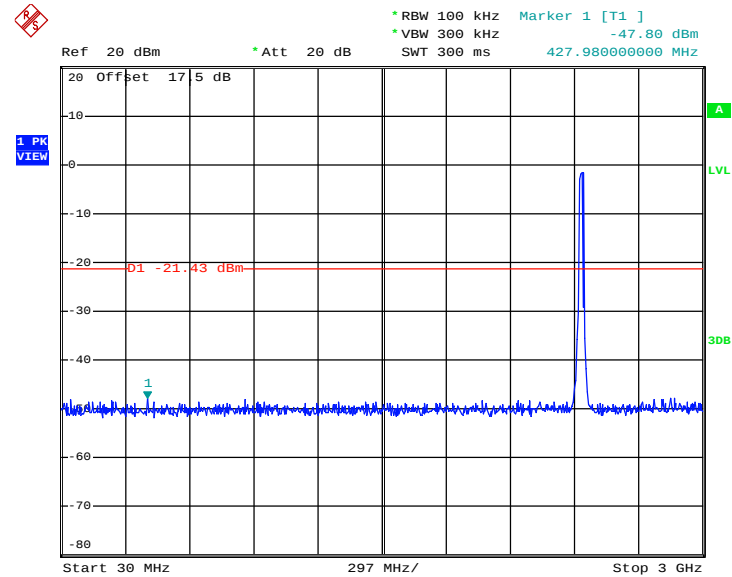
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Fly Liang

802.11n HT20 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 01


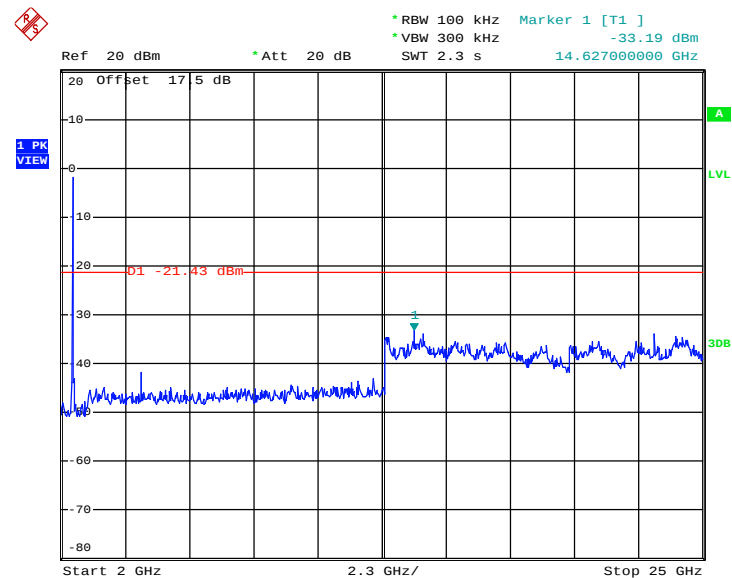
Date: 21.MAY.2013 00:03:15

802.11n HT20 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 01


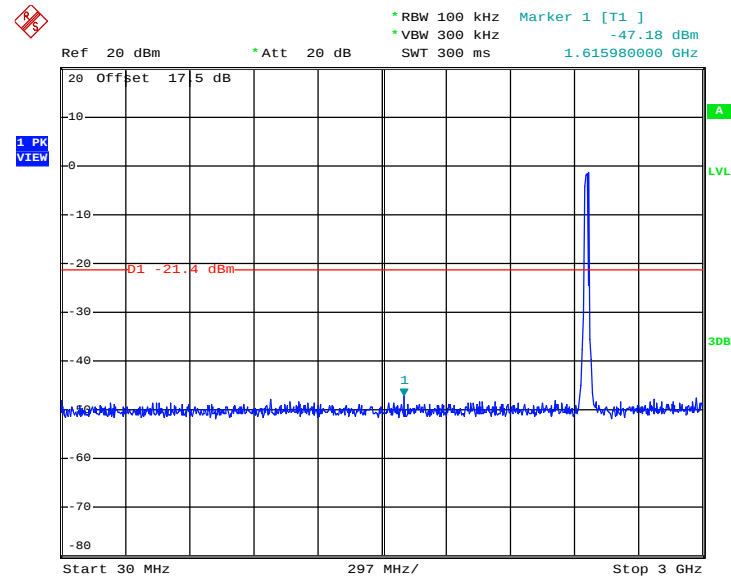
Date: 21.MAY.2013 00:03:33

802.11n HT20 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 06


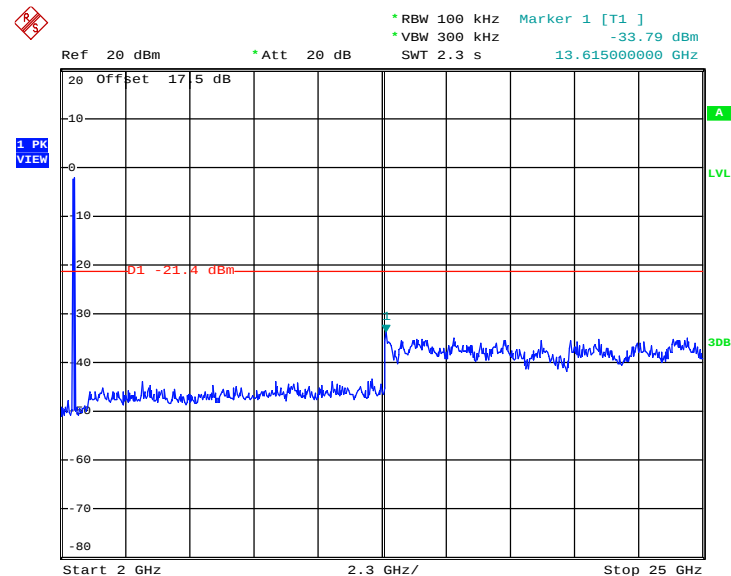
Date: 21.MAY.2013 00:08:08

802.11n HT20 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 21.MAY.2013 00:08:26

802.11n HT20 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 21.MAY.2013 00:14:05

802.11n HT20 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 21.MAY.2013 00:14:24

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

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:

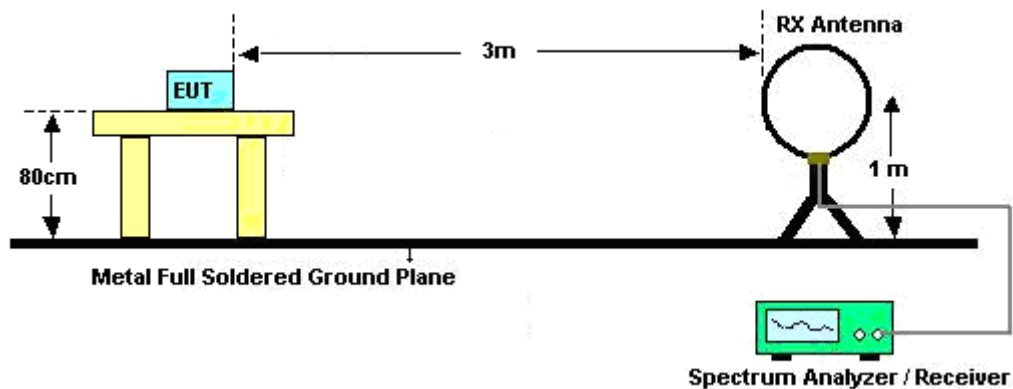
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
802.11b	97.612	1.308	0.765	1Khz
802.11g	88.571	0.248	4.032	10Khz
802.11n HT20	87.786	0.230	4.348	10Khz

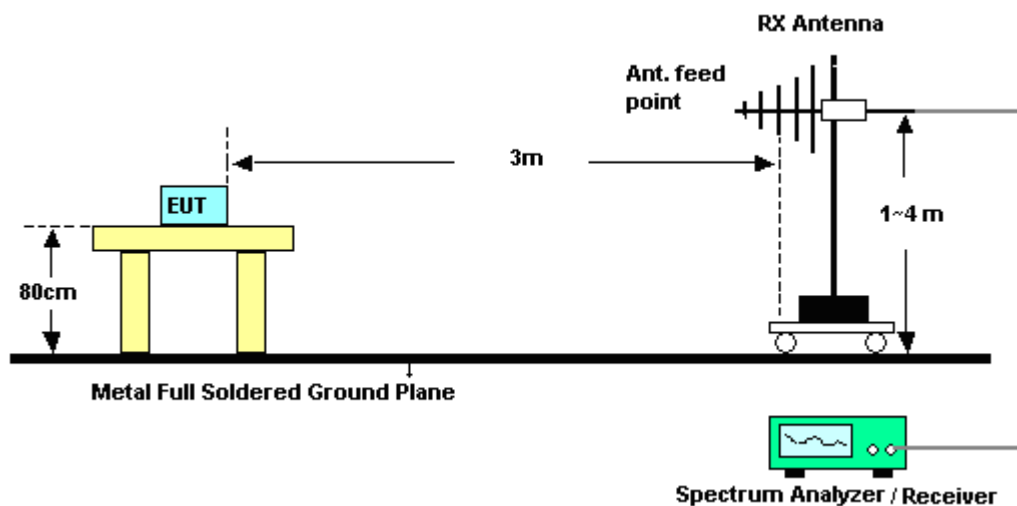
Note: For average measurement with duty cycle $< 98\%$, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

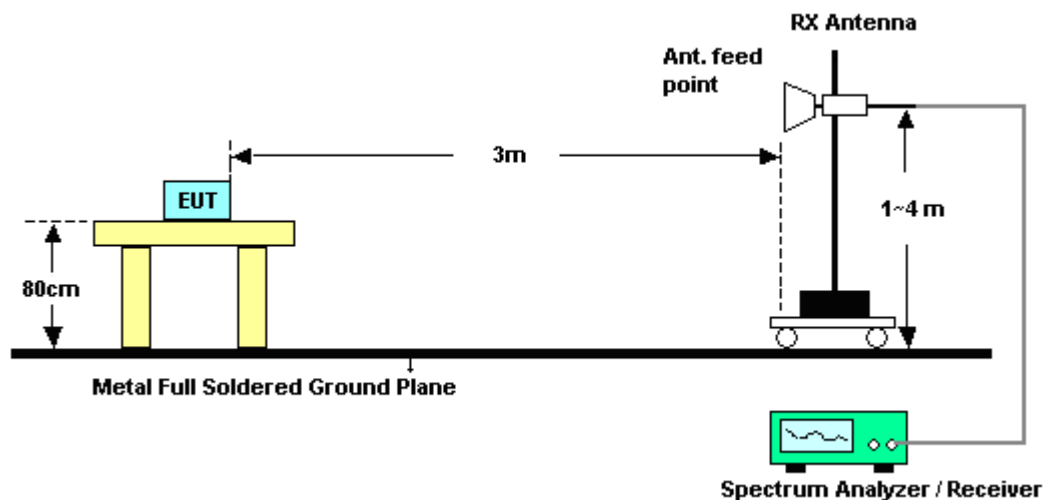
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emission (9 KHz ~ 30 MHz)

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 Band Edges

Test Mode :	802.11b	Temperature :	24~25℃
Test Band :	Low	Relative Humidity :	57~58%
Test Channel :	01	Test Engineer :	Robin Luo

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
2387.49	51.21	-22.79	74	44.44	32.14	4.42	29.79	100	32	Peak
2386.86	40.64	-13.36	54	33.87	32.14	4.42	29.79	100	33	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	49.68	-24.32	74	42.91	32.14	4.42	29.79	107	239	Peak
2386.95	38.92	-15.08	54	32.15	32.14	4.42	29.79	107	239	Average

Test Mode :	802.11b	Temperature :	24~25℃
Test Band :	High	Relative Humidity :	57~58%
Test Channel :	11	Test Engineer :	Robin Luo

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
2484.01	49.84	-24.16	74	42.86	32.27	4.47	29.76	183	0	Peak
2483.5	38.66	-15.34	54	31.68	32.27	4.47	29.76	183	0	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
2483.86	49.56	-24.44	74	42.58	32.27	4.47	29.76	100	334	Peak
2483.59	38.73	-15.27	54	31.75	32.27	4.47	29.76	100	334	Average



Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	Low	Relative Humidity :	57~58%
Test Channel :	01	Test Engineer :	Robin Luo

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	61.51	-12.49	74	54.73	32.14	4.42	29.78	190	360	Peak
2389.74	46.87	-7.13	54	40.1	32.14	4.42	29.79	190	360	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	64.73	-9.27	74	57.95	32.14	4.42	29.78	100	44	Peak
2389.56	50.42	-3.58	54	43.65	32.14	4.42	29.79	100	44	Average

Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	57~58%
Test Channel :	11	Test Engineer :	Robin Luo

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	62.28	-11.72	74	55.3	32.27	4.47	29.76	100	43	Peak
2483.56	46.03	-7.97	54	39.05	32.27	4.47	29.76	100	43	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
2484.52	63.57	-10.43	74	56.59	32.27	4.47	29.76	100	252	Peak
2483.68	48	-6	54	41.02	32.27	4.47	29.76	100	252	Average



Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	Low	Relative Humidity :	57~58%
Test Channel :	01	Test Engineer :	Robin Luo

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	65.96	-8.04	74	59.18	32.14	4.42	29.78	100	282	Peak
2389.47	50.99	-3.01	54	44.22	32.14	4.42	29.79	100	282	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
2389.92	62.93	-11.07	74	56.15	32.14	4.42	29.78	106	248	Peak
2389.92	48.61	-5.39	54	41.83	32.14	4.42	29.78	106	248	Average

Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	57~58%
Test Channel :	11	Test Engineer :	Robin Luo

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
2484.49	60.67	-13.33	74	53.69	32.27	4.47	29.76	100	352	Peak
2483.83	45.82	-8.18	54	38.84	32.27	4.47	29.76	100	352	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
2483.95	61.49	-12.51	74	54.51	32.27	4.47	29.76	106	241	Peak
2483.68	47.53	-6.47	54	40.55	32.27	4.47	29.76	106	241	Average

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

Note: Below 1GHz for radiated emission measurement, pre-scanned all test modes and only choose the worst case mode was recorded in the report.

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 102.15dBuV/m - 20dB = 82.15dBuV/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
2399	65.89	-16.26	82.15	59.11	32.14	4.42	29.78	100	32	Peak
2412	102.15	-	-	95.32	32.17	4.44	29.78	100	32	Peak
2412	93.82	-	-	86.99	32.17	4.44	29.78	100	32	Average
4824	53.57	-20.43	74	43.28	33.68	5.95	29.34	100	147	Peak
4824	42.78	-11.22	54	32.49	33.68	5.95	29.34	100	147	Average
7236	46.53	-35.62	82.15	31.7	35.29	7.58	28.04	200	21	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 4. 2399 MHz and 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 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
2399	64.82	-16.14	80.96	58.04	32.14	4.42	29.78	107	239	Peak
2412	100.96	-	-	94.13	32.17	4.44	29.78	107	239	Peak
2412	92.23	-	-	85.4	32.17	4.44	29.78	107	239	Average
4824	53.15	-20.85	74	42.86	33.68	5.95	29.34	200	56	Peak
4824	41.78	-12.22	54	31.49	33.68	5.95	29.34	200	56	Average
7236	49.65	-31.31	80.96	34.82	35.29	7.58	28.04	100	109	Peak

Test Mode :	802.11b	Temperature :	24~25℃
Test Channel :	06	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	1. 2437 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
2437	100.45	-	-	93.55	32.22	4.45	29.77	100	254	Peak
2437	90.1	-	-	83.2	32.22	4.45	29.77	100	254	Average
4874	51.49	-22.51	74	41.01	33.8	6.02	29.34	100	114	Peak
4874	40.59	-13.41	54	30.11	33.8	6.02	29.34	100	114	Average
7311	50.31	-23.69	74	35.18	35.31	7.8	27.98	122	36	Peak

Test Mode :	802.11b	Temperature :	24~25℃
Test Channel :	06	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	1. 2437 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
2437	100.43	-	-	93.53	32.22	4.45	29.77	100	339	Peak
2437	91.59	-	-	84.69	32.22	4.45	29.77	100	339	Average
4874	52.12	-21.88	74	41.64	33.8	6.02	29.34	117	360	Peak
4874	43.64	-10.36	54	33.16	33.8	6.02	29.34	117	360	Average
7311	50.26	-23.74	74	35.13	35.31	7.8	27.98	100	122	Peak

Test Mode :	802.11b	Temperature :	24~25℃
Test Channel :	11	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	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	100.7	-	-	93.75	32.24	4.47	29.76	183	0	Peak
2462	93.95	-	-	87	32.24	4.47	29.76	183	0	Average
4924	50.87	-23.13	74	40.2	33.92	6.1	29.35	100	236	Peak
4924	40.77	-13.23	54	30.1	33.92	6.1	29.35	100	236	Average
7386	49.51	-24.49	74	33.94	35.35	8.12	27.9	100	113	Peak

Test Mode :	802.11b	Temperature :	24~25℃
Test Channel :	11	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	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	99.64	-	-	92.69	32.24	4.47	29.76	100	334	Peak
2462	88.95	-	-	82	32.24	4.47	29.76	100	334	Average
4924	51.67	-22.33	74	41	33.92	6.1	29.35	110	236	Peak
4924	42.77	-11.23	54	32.1	33.92	6.1	29.35	110	236	Average
7386	49.65	-24.35	74	34.08	35.35	8.12	27.9	100	109	Peak

Test Mode :	802.11g	Temperature :	24~25℃
Test Channel :	01	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 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
2399	67.55	-11.46	79.01	60.77	32.14	4.42	29.78	190	360	Peak
2412	99.01	-	-	92.18	32.17	4.44	29.78	190	360	Peak
2412	88.63	-	-	81.8	32.17	4.44	29.78	190	360	Average
4824	53.73	-20.27	74	43.44	33.68	5.95	29.34	100	283	Peak
4824	45.04	-8.96	54	34.75	33.68	5.95	29.34	100	283	Average
7236	49.51	-29.5	79.01	34.68	35.29	7.58	28.04	100	113	Peak

Test Mode :	802.11g	Temperature :	24~25℃
Test Channel :	01	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 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
2399	70.63	-7.89	78.52	63.85	32.14	4.42	29.78	100	44	Peak
2412	98.52	-	-	91.69	32.17	4.44	29.78	100	44	Peak
2412	87.68	-	-	80.85	32.17	4.44	29.78	100	44	Average
4824	54.55	-19.45	74	44.26	33.68	5.95	29.34	110	343	Peak
4824	47.77	-6.23	54	37.48	33.68	5.95	29.34	110	343	Average
7236	49.65	-28.87	78.52	34.82	35.29	7.58	28.04	100	109	Peak

Test Mode :	802.11g	Temperature :	24~25℃
Test Channel :	06	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	1. 2437 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
2437	101.24	-	-	94.34	32.22	4.45	29.77	100	146	Peak
2437	89.99	-	-	83.09	32.22	4.45	29.77	100	146	Average
4874	53.45	-20.55	74	42.97	33.8	6.02	29.34	100	114	Peak
4874	42.11	-11.89	54	31.63	33.8	6.02	29.34	100	114	Average
7311	50.31	-23.69	74	35.18	35.31	7.8	27.98	122	36	Peak

Test Mode :	802.11g	Temperature :	24~25℃
Test Channel :	06	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	1. 2437 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
2437	100.29	-	-	93.39	32.22	4.45	29.77	100	10	Peak
2437	89.55	-	-	82.65	32.22	4.45	29.77	100	10	Average
4874	54.2	-19.8	74	43.72	33.8	6.02	29.34	200	58	Peak
4874	41.46	-12.54	54	30.98	33.8	6.02	29.34	200	58	Average
7311	50.26	-23.74	74	35.13	35.31	7.8	27.98	100	122	Peak

Test Mode :	802.11g	Temperature :	24~25℃
Test Channel :	11	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	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	99.07	-	-	92.12	32.24	4.47	29.76	100	43	Peak
2462	89.69	-	-	82.74	32.24	4.47	29.76	100	43	Average
4924	50.87	-23.13	74	40.2	33.92	6.1	29.35	100	236	Peak
4924	40.77	-13.23	54	30.1	33.92	6.1	29.35	100	236	Average
7386	50.93	-23.07	74	35.36	35.35	8.12	27.9	100	245	Peak

Test Mode :	802.11g	Temperature :	24~25℃
Test Channel :	11	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	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	98.91	-	-	91.96	32.24	4.47	29.76	100	252	Peak
2462	89.52	-	-	82.57	32.24	4.47	29.76	100	252	Average
4924	51.67	-22.33	74	41	33.92	6.1	29.35	110	236	Peak
4924	42.77	-11.23	54	32.1	33.92	6.1	29.35	110	236	Average
7386	50.02	-23.98	74	34.45	35.35	8.12	27.9	200	221	Peak

Test Mode :	802.11n HT20	Temperature :	24~25℃
Test Channel :	01	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 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
40.67	14.46	-25.54	40	34.04	10.1	0.86	30.54	-	-	Peak
94.02	17.83	-25.67	43.5	37.13	10.2	1.15	30.65	-	-	Peak
105.66	25.41	-18.09	43.5	43.08	11.8	1.18	30.65	133	226	Peak
132.82	19.53	-23.97	43.5	36.6	12.25	1.24	30.56	-	-	Peak
232.73	19.4	-26.6	46	36.82	11.2	1.6	30.22	-	-	Peak
800.18	27.5	-18.5	46	33.31	20.5	2.62	28.93	-	-	Peak
2399	72.77	-4.27	77.04	65.99	32.14	4.42	29.78	100	282	Peak
2412	97.04	-	-	90.21	32.17	4.44	29.78	100	282	Peak
2412	87.25	-	-	80.42	32.17	4.44	29.78	100	282	Average
4824	50.81	-23.19	74	40.52	33.68	5.95	29.34	100	125	Peak
4824	40.38	-13.62	54	30.09	33.68	5.95	29.34	100	125	Average
7236	49.19	-27.85	77.04	34.36	35.29	7.58	28.04	200	113	Peak

Test Mode :	802.11n HT20	Temperature :	24~25℃
Test Channel :	01	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	26.99	-13.01	40	42.51	14.1	0.96	30.58	100	125	Peak
94.99	21.62	-21.88	43.5	40.72	10.4	1.16	30.66	-	-	Peak
104.69	20.67	-22.83	43.5	38.34	11.8	1.18	30.65	-	-	Peak
127.97	17.87	-25.63	43.5	34.84	12.37	1.23	30.57	-	-	Peak
197.81	17.93	-25.57	43.5	37.68	9.15	1.44	30.34	-	-	Peak
259.89	16.97	-29.03	46	31.72	13.7	1.68	30.13	-	-	Peak
2399	69.68	-3.07	72.75	62.9	32.14	4.42	29.78	106	248	Peak
2412	92.75	-	-	85.91	32.17	4.44	29.77	106	248	Peak
2412	82.12	-	-	75.29	32.17	4.44	29.78	106	248	Average
4824	51.4	-22.6	74	41.11	33.68	5.95	29.34	112	306	Peak
4824	43.64	-10.36	54	33.35	33.68	5.95	29.34	112	306	Average
7236	49.5	-23.25	72.75	34.67	35.29	7.58	28.04	122	336	Peak

Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	1. 2437 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
2437	98.23	-	-	91.33	32.22	4.45	29.77	100	0	Peak
2437	88.9	-	-	82	32.22	4.45	29.77	100	0	Average
4874	49.51	-24.49	74	39.03	33.8	6.02	29.34	100	215	Peak
7311	50.31	-23.69	74	35.18	35.31	7.8	27.98	122	36	Peak

Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	1. 2437 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
2437	97.79	-	-	90.89	32.22	4.45	29.77	104	255	Peak
2437	88.19	-	-	81.29	32.22	4.45	29.77	104	255	Average
4874	52.12	-21.88	74	41.64	33.8	6.02	29.34	117	360	Peak
4874	43.64	-10.36	54	33.16	33.8	6.02	29.34	117	360	Average
7311	50.26	-23.74	74	35.13	35.31	7.8	27.98	100	122	Peak

Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	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	95.49	-	-	88.54	32.24	4.47	29.76	100	352	Peak
2462	85.64	-	-	78.69	32.24	4.47	29.76	100	352	Average
4924	49.3	-24.7	74	38.63	33.92	6.1	29.35	100	169	Peak
7386	50.81	-23.19	74	35.24	35.35	8.12	27.9	100	226	Peak

Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	57~58%
Test Engineer :	Robin Luo	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	96.47	-	-	89.52	32.24	4.47	29.76	106	241	Peak
2462	86.74	-	-	79.79	32.24	4.47	29.76	106	241	Average
4924	50.59	-23.41	74	39.92	33.92	6.1	29.35	100	128	Peak
7386	50.02	-23.98	74	34.45	35.35	8.12	27.9	200	221	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 (dBuV)	
	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.

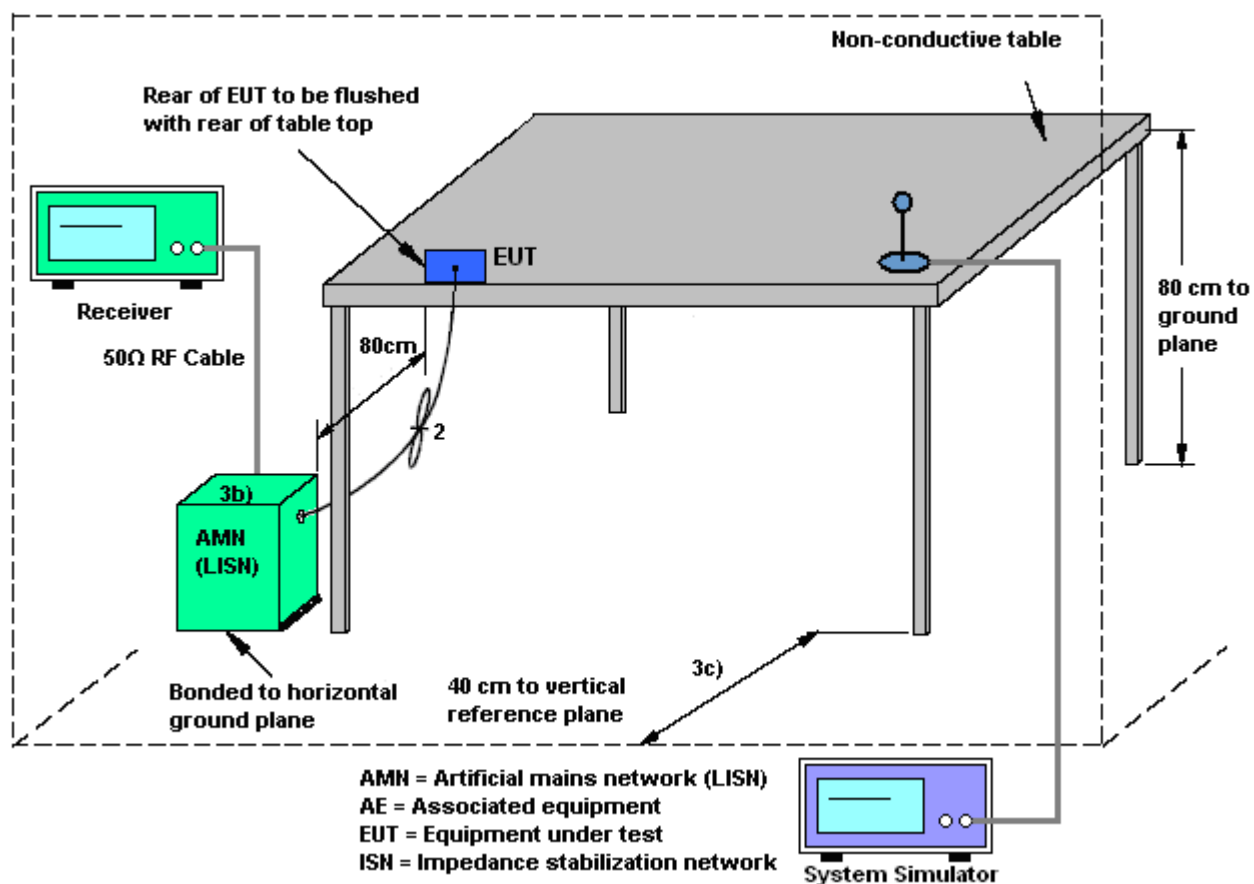
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

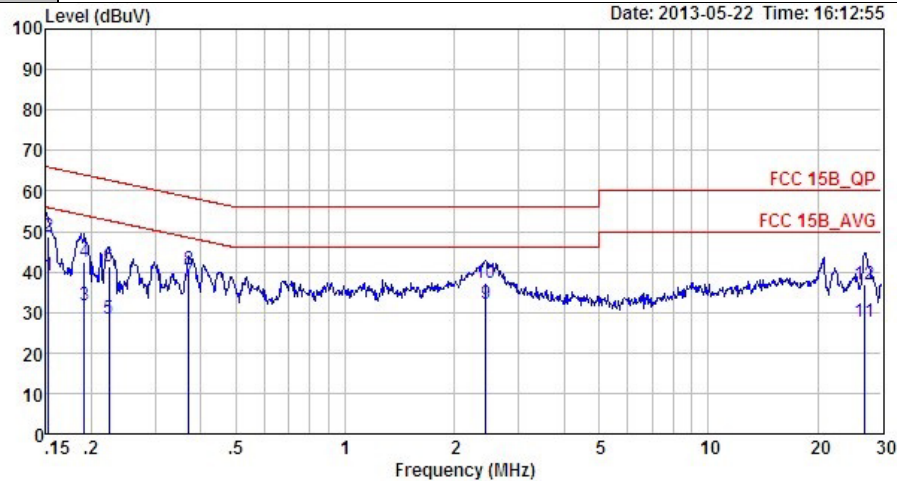
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network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

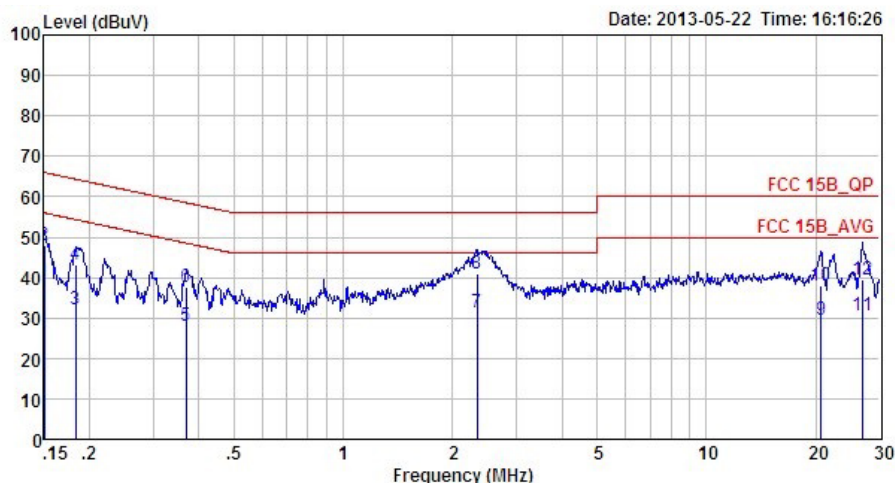
Test Mode :	Mode 1	Temperature :	24~25°C
Test Engineer :	Leo Liao	Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : C001-SZ
Condition: FCC 15B QP LISN_L_2000601 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	39.08	-16.79	55.87	29.00	0.03	10.05	Average
2	0.15	48.78	-17.09	65.87	38.70	0.03	10.05	QP
3	0.19	31.58	-22.40	53.98	21.50	0.03	10.05	Average
4	0.19	42.58	-21.40	63.98	32.50	0.03	10.05	QP
5	0.22	28.48	-24.22	52.70	18.40	0.02	10.06	Average
6	0.22	41.28	-21.42	62.70	31.20	0.02	10.06	QP
7 *	0.37	37.69	-10.78	48.47	27.60	0.02	10.07	Average
8	0.37	40.69	-17.78	58.47	30.60	0.02	10.07	QP
9	2.43	32.11	-13.89	46.00	21.90	0.04	10.17	Average
10	2.43	37.11	-18.89	56.00	26.90	0.04	10.17	QP
11	26.84	27.49	-22.51	50.00	16.50	0.57	10.42	Average
12	26.84	36.99	-23.01	60.00	26.00	0.57	10.42	QP

Test Mode :	Mode 1	Temperature :	24~25°C
Test Engineer :	Leo Liao	Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-SZ
Condition: FCC 15B QP LISN_N_2000601 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	38.97	-17.03	56.00	28.90	0.02	10.05	Average
2	0.15	47.87	-18.13	66.00	37.80	0.02	10.05	QP
3	0.18	32.07	-22.26	54.33	22.00	0.02	10.05	Average
4	0.18	43.27	-21.06	64.33	33.20	0.02	10.05	QP
5	0.37	27.89	-20.63	48.52	17.80	0.02	10.07	Average
6	0.37	37.59	-20.93	58.52	27.50	0.02	10.07	QP
7 *	2.33	31.41	-14.59	46.00	21.20	0.04	10.17	Average
8	2.33	41.01	-14.99	56.00	30.80	0.04	10.17	QP
9	20.70	29.38	-20.62	50.00	18.29	0.53	10.56	Average
10	20.70	37.98	-22.02	60.00	26.89	0.53	10.56	QP
11	26.84	30.71	-19.29	50.00	19.40	0.89	10.42	Average
12	26.84	39.51	-20.49	60.00	28.20	0.89	10.42	QP

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna 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	R&S	FSP30	101400	9kHz~30GHz	Mar. 28, 2013	May. 20, 2013~ May 21, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	N/A	Mar. 28, 2013	May. 20, 2013~ May 21, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Power Sensor	Anritsu	MA2411B	1207253	N/A	Mar. 28, 2013	May. 20, 2013~ May 21, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
DC Power Supply	TOPWORD	3303DR	N/A714621	N/A	Mar. 28, 2013	May. 20, 2013~ May 21, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Thermal Chamber	Hongzhan	LP-150U	HD20120425	N/A	Mar. 28, 2013	May. 20, 2013~ May 21, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
ESCI TEST Receiver	R&S	ESCI	100724	9K-3GHz	Mar. 28, 2013	May 23, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSP30	101362	9kHz~30GHz	Oct. 11, 2012	May 23, 2013	Oct. 10, 2013	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 12, 2012	May 23, 2013	Oct. 11, 2013	Radiation (03CH01-SZ)
Bilog Antenna	SCHAFFNER	CBL6112B	2614	30Mhz~2Ghz	Nov. 03, 2012	May 23, 2013	Nov. 02, 2013	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9K-3000MHz GAIN 30db	Mar. 28, 2013	May 23, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	Mar. 28, 2013	May 23, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
SHF-EHF-Horn	Schwarzbeck	BBHA9170	BBHA9170249	14Ghz~40Ghz	Nov. 23, 2012	May 23, 2013	Nov. 22, 2013	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100321	9KHZ-30MHZ	Oct. 22, 2012	May 23, 2013	Oct. 21, 2013	Radiation (03CH01-SZ)
AC LISN	ETS-LINDGREN	3816/2SH	00103912	0.1MHz~108MHz	Feb. 28, 2013	May 22, 2013	Feb. 27, 2014	Conduction (CO01-SZ)
AC LISN	ETS-LINDGREN	3816/2SH	00103892	0.1MHz~108MHz	Feb. 28, 2013	May 22, 2013	Feb. 27, 2014	Conduction (CO01-SZ)
ESCIO TEST Receiver	R&S	1142.8007.03	100724	9K-3GHz	Mar. 08, 2013	May 22, 2013	Mar. 07, 2014	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891 N/A	N/A	Oct. 12, 2012	May 22, 2013	Oct. 11, 2013	Conduction (CO01-SZ)
System Simulator	Agilent	E5515C	MY47511418	2G/3G Full-Band	Nov. 03, 2012	May 22, 2013	Nov. 02, 2013	Conduction (CO01-SZ)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.54
--	------

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

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

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

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



Appendix A. Photographs of EUT

Please refer to Sporton report number EP351403 as below.