FCC RF Test Report

APPLICANT	:	Bullitt Group
EQUIPMENT	:	Smart Phone
BRAND NAME	:	CAT
MODEL NAME	:	B15
FCC ID	:	ZL5B15AWS
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Dec. 26, 2012 and completely tested on May 28, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

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

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR2D2653-01B	Rev. 01	Initial issue of report	Jul. 18, 2013
FR2D2653-01B	Rev. 02	Changing Product Equality Declaration	Jul. 19, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-210 A8.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	RSS-210 A8.4	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges	≤ 20dBc	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.43 dB at 2389.38 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 7.30 dB at 0.374 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

Remark: FCC ID ZL5B15AWS WLAN/BT RF circuit design is the same as FCC ID ZL5B15 granted on 2013/02/19, except the differences referring to the Product Equality Declaration in Appendix C. Based on the similarity between two FCC IDs, the Conducted and Radiation test data of FCC ID ZL5B15 granted on 2013/02/19 is referred in this report to show the compliance of the FCC ID ZL5B15AWS.

1 General Description

1.1 Applicant

Bullitt Group
No. 4, The Aquarium, King Street, Reading, RG1 2AN United Kingdom

1.2 Manufacturer

Compal Communications (Nanjing) Co. Ltd.
No.68-2 Suyuan Road, Nanjing Export, Processing Zone(South Area), P.R. China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	CAT
Model Name	B15
FCC ID	ZL5B15AWS
EUT supports Radios application	GSM/EGPRS/WCDMA/HSDPA WLAN 11bgn / Bluetooth 2.1/3.0
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum Output Power to Antenna	802.11b : 17.09 dBm (0.0512 W) 802.11g : 22.62 dBm (0.1828 W) 802.11n HT20 : 22.53 dBm (0.1791 W) 802.11n HT40 : 22.58 dBm (0.1811 W)
Antenna Type	802.11b/g/n : PIFA Antenna type with gain 1.73 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 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH06-HY	722060/4086B-1

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

1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ANSI C63.10-2009

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

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

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	**17.09**	17.06	16.72	16.78

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)	**22.62**	22.49	22.34	22.42	22.33	22.38	22.35	22.37

2.4GHz 802.11n HT20 mode									
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	400GI	22.48	22.33	22.28	22.21	22.29	22.26	22.32	22.23
	800GI	**22.53**	22.31	22.19	22.22	22.25	22.21	22.15	22.15

2.4GHz 802.11n HT40 mode									
Data Rate (MHz)		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	400GI	22.57	21.48	21.24	21.35	21.33	21.17	21.04	21.13
	800GI	**22.58**	22.12	22.03	21.67	21.32	21.18	21.11	21.13

2.3 Test Mode

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

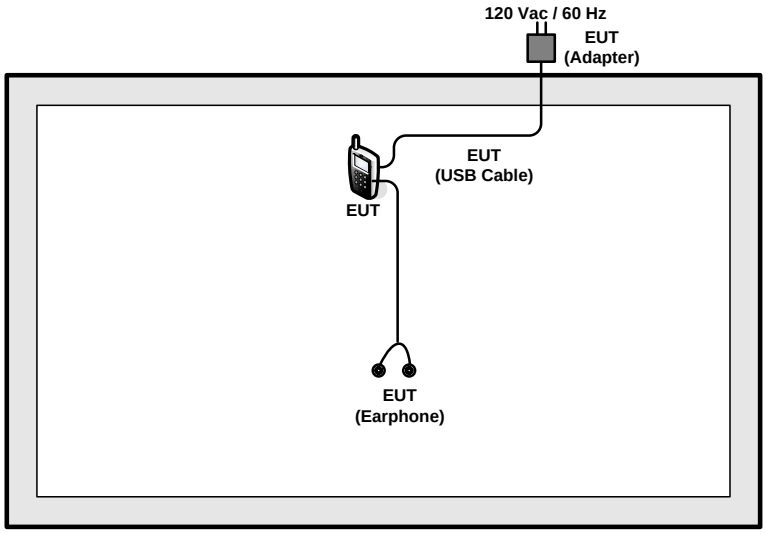
<2.4GHz>

Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	6.5 Mbps	1/11
		802.11n HT40	13.5 Mbps	3/9
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	6.5 Mbps	1/11
		802.11n HT40	13.5 Mbps	3/9
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9

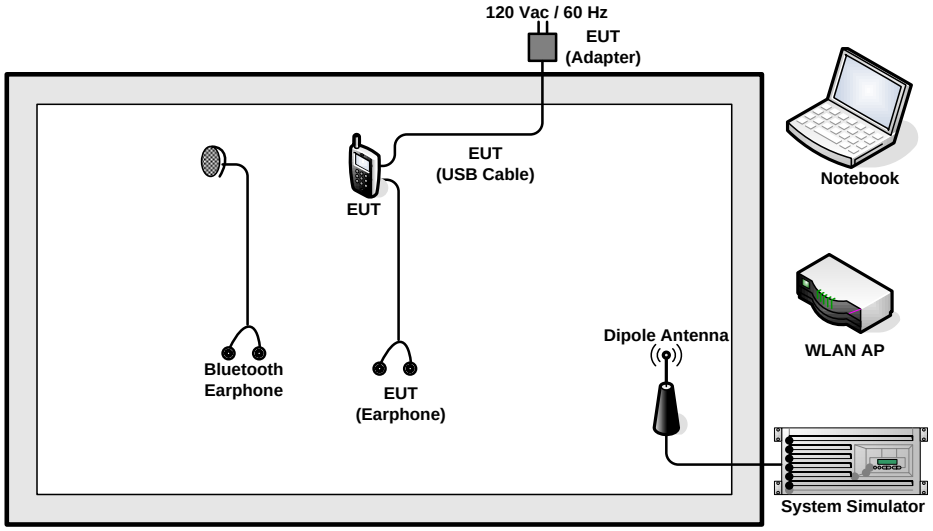
Test Cases	
AC Conducted Emission	Mode 1 :WCDMA Band V Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 2 + Battery + USB Cable (Charging from Adapter)
Remark: All the Radiation tests were performance with Earphone 1.	

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
8.	MicroSD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

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 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.

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

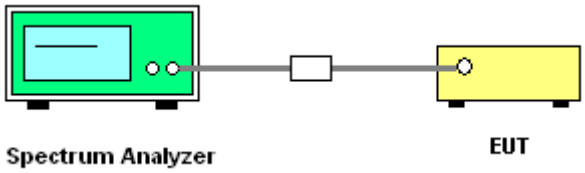
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

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

3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

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

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	9.04	0.5	Pass
06	2437	9.04	0.5	Pass
11	2462	9.04	0.5	Pass

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

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.40	0.5	Pass
06	2437	16.44	0.5	Pass
11	2462	16.40	0.5	Pass

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

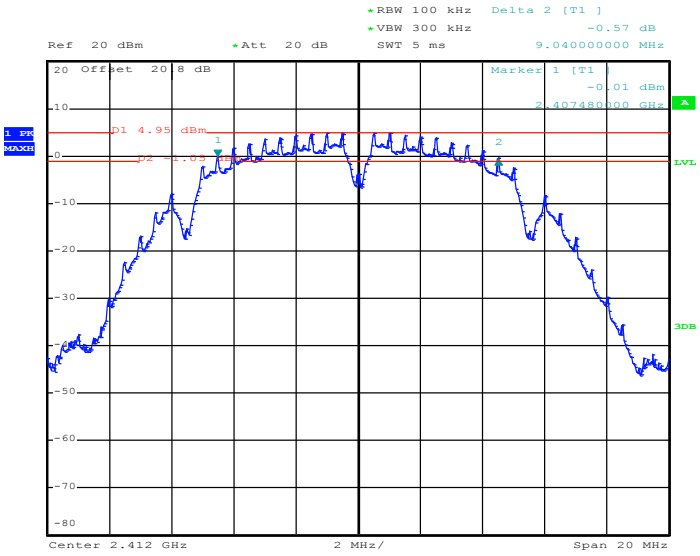
Channel	Frequency (MHz)	2.4GHz 802.11n HT20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.60	0.5	Pass
06	2437	17.68	0.5	Pass
11	2462	17.60	0.5	Pass

Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT40 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
03	2422	35.92	0.5	Pass
06	2437	35.68	0.5	Pass
09	2452	35.68	0.5	Pass

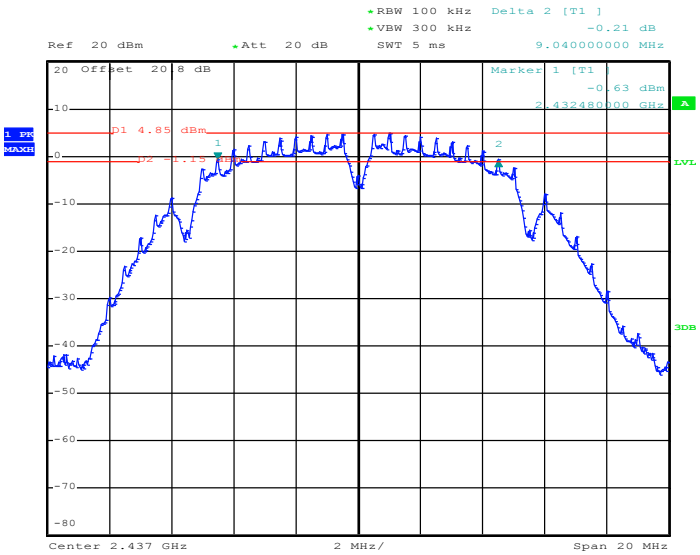
3.1.6 Test Result of 6dB Bandwidth Plots

6 dB Bandwidth Plot on 802.11b Channel 01



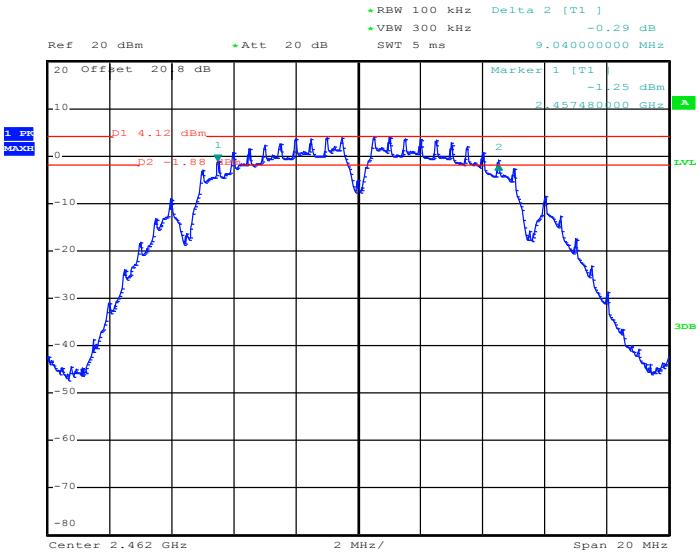
Date: 18.JAN.2013 22:35:20

6 dB Bandwidth Plot on 802.11b Channel 06



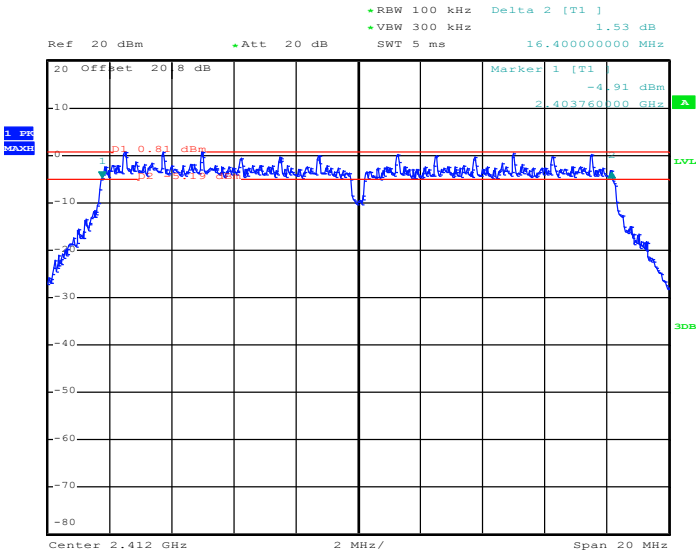
Date: 18.JAN.2013 22:39:54

6 dB Bandwidth Plot on 802.11b Channel 11



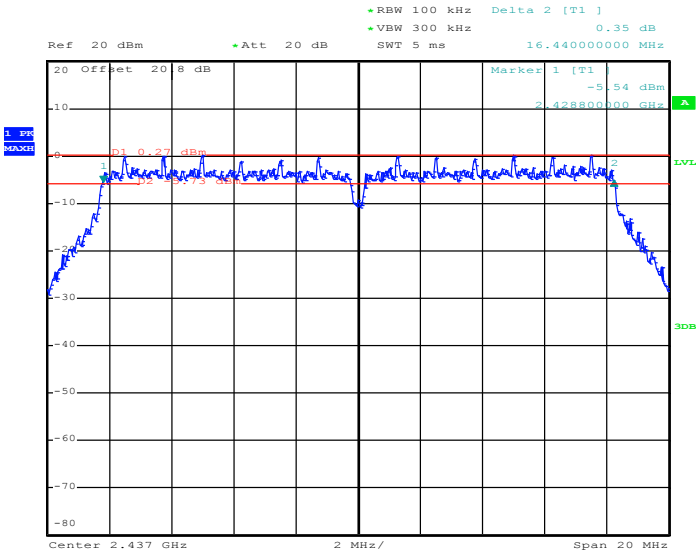
Date: 18.JAN.2013 22:42:55

6 dB Bandwidth Plot on 802.11g Channel 01



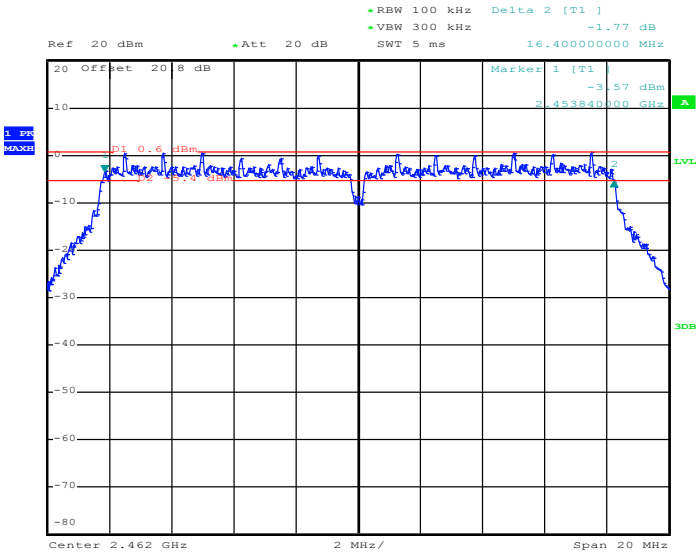
Date: 18.JAN.2013 22:52:26

6 dB Bandwidth Plot on 802.11g Channel 06



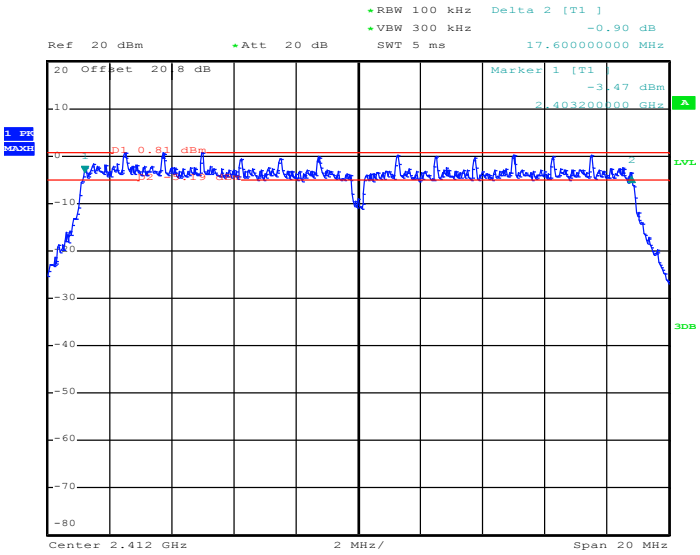
Date: 18.JAN.2013 22:49:44

6 dB Bandwidth Plot on 802.11g Channel 11



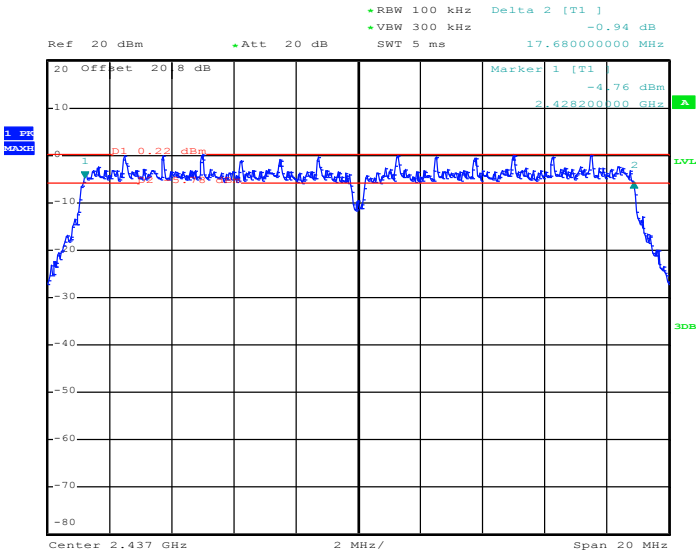
Date: 18.JAN.2013 22:47:02

6 dB Bandwidth Plot on 2.4GHz 802.11n HT20 Channel 01



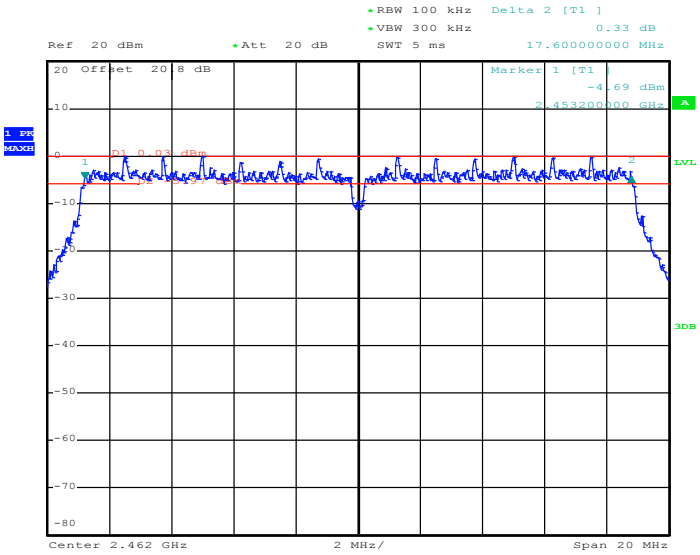
Date: 18.JAN.2013 22:55:11

6 dB Bandwidth Plot on 2.4GHz 802.11n HT20 Channel 06



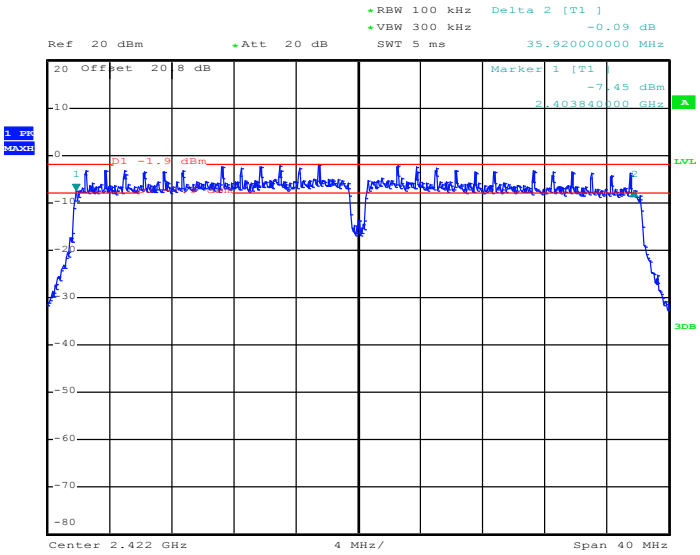
Date: 18.JAN.2013 22:57:48

6 dB Bandwidth Plot on 2.4GHz 802.11n HT20 Channel 11



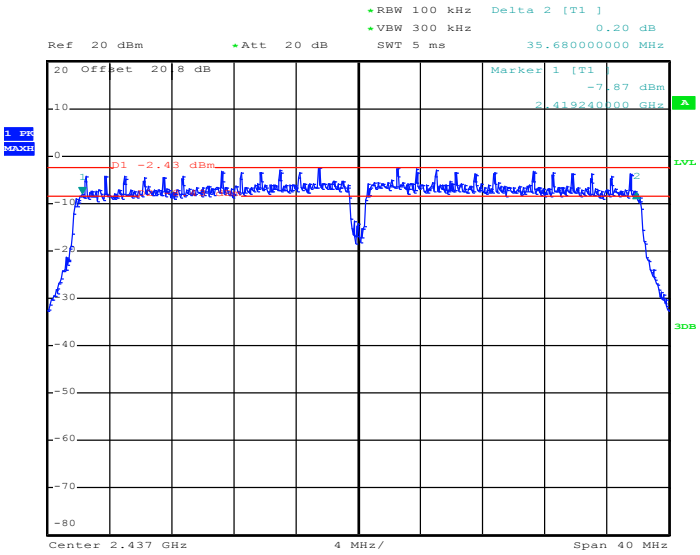
Date: 18.JAN.2013 23:01:09

6 dB Bandwidth Plot on 2.4GHz 802.11n HT40 Channel 03



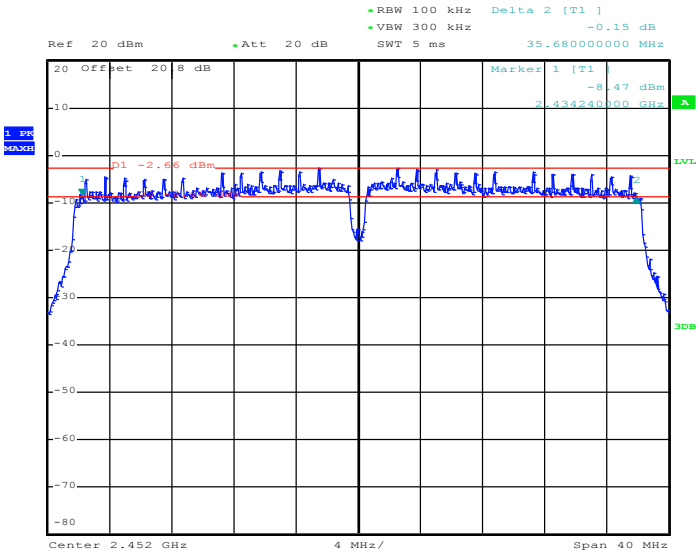
Date: 18.JAN.2013 23:13:30

6 dB Bandwidth Plot on 2.4GHz 802.11n HT40 Channel 06



Date: 18.JAN.2013 23:08:54

6 dB Bandwidth Plot on 2.4GHz 802.11n HT40 Channel 09



Date: 18.JAN.2013 23:05:26

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the Antenna exceeds 6dBi.

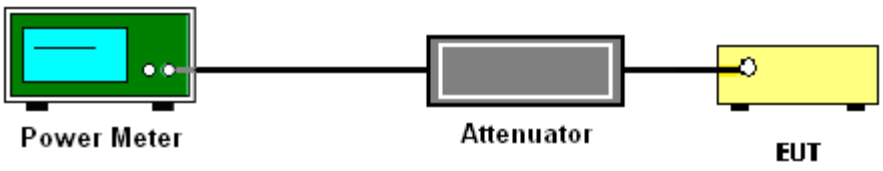
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the 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. 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 :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	17.08	30	Pass
06	2437	17.09	30	Pass
11	2462	17.07	30	Pass

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

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	22.59	30	Pass
06	2437	22.58	30	Pass
11	2462	22.62	30	Pass

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

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	22.44	30	Pass
06	2437	22.36	30	Pass
11	2462	22.53	30	Pass

Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT40 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
03	2422	22.55	30	Pass
06	2437	22.58	30	Pass
09	2452	22.25	30	Pass

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%
Duty Cycle:	98.59%	Duty Factor:	0.06dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	13.69
06	2437	13.78
11	2462	13.68

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%
Duty Cycle:	92.72%	Duty Factor:	0.33dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	12.12
06	2437	12.09
11	2462	12.17

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%
Duty Cycle:	92.61%	Duty Factor:	0.33dB

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Average Output Power (dBm)
01	2412	11.99
06	2437	11.97
11	2462	12.24

Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%
Duty Cycle:	85.83%	Duty Factor:	0.66dB

Channel	Frequency (MHz)	2.4GHz 802.11n HT40 Average Output Power (dBm)
03	2422	11.71
06	2437	12.02
09	2452	11.55

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

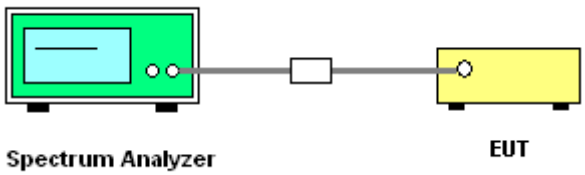
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	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	4.85	-9.81	8	Pass
06	2437	4.78	-9.29	8	Pass
11	2462	3.77	-10.06	8	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	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	0.75	-13.23	8	Pass
06	2437	0.14	-12.87	8	Pass
11	2462	0.52	-12.44	8	Pass

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

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Power Density		Max. Limits (dBm/3kHz)	Pass/Fail
		PSD/100kHz (dBm)	PSD/3kHz (dBm)		
01	2412	0.72	-13.07	8	Pass
06	2437	-0.03	-13.42	8	Pass
11	2462	-0.06	-14.01	8	Pass

Test Mode :	802.11n HT40	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

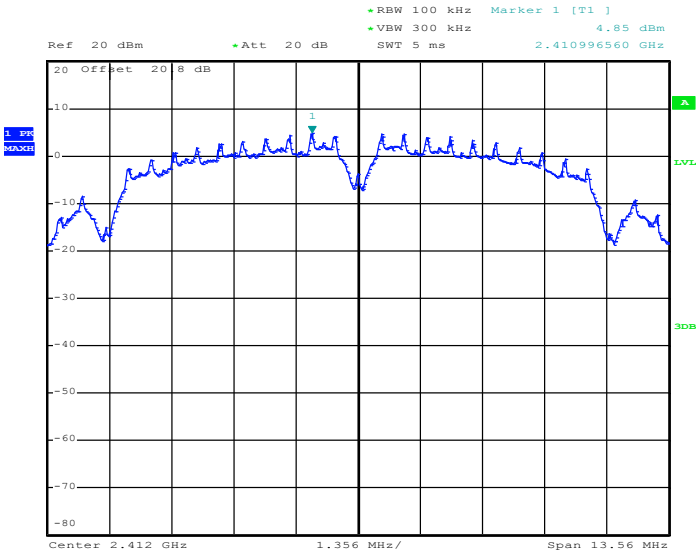
Channel	Frequency (MHz)	2.4GHz 802.11n HT40 Power Density		Max. Limits (dBm/3kHz)	Pass/Fail
		PSD/100kHz (dBm)	PSD/3kHz (dBm)		
03	2422	-2.04	-17.08	8	Pass
06	2437	-2.42	-16.25	8	Pass
09	2452	-2.66	-17.78	8	Pass

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.*

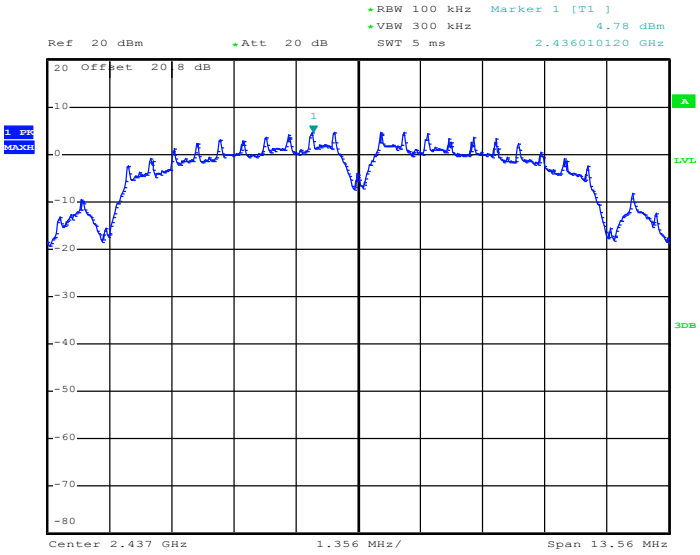
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on 802.11b Channel 01



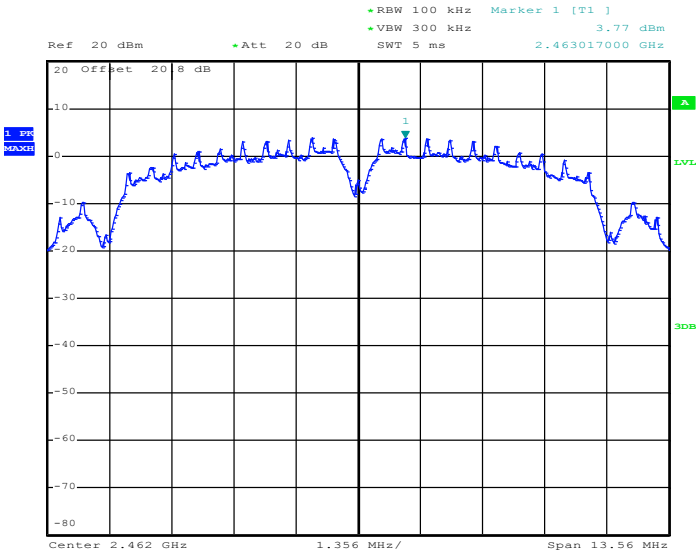
Date: 18.JAN.2013 22:35:52

PSD 100kHz Plot on 802.11b Channel 06



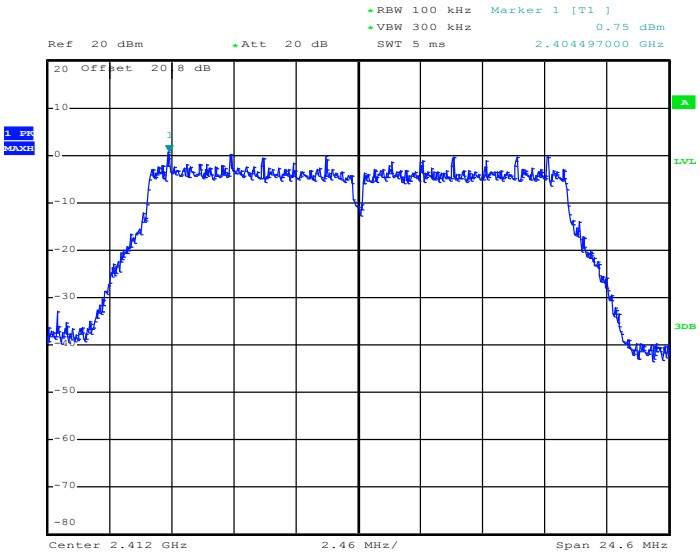
Date: 18.JAN.2013 22:40:25

PSD 100kHz Plot on 802.11b Channel 11



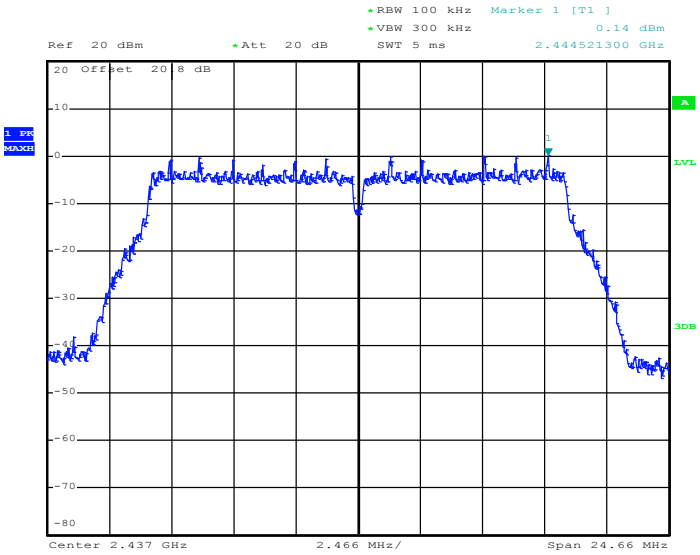
Date: 18.JAN.2013 22:43:27

PSD 100kHz Plot on 802.11g Channel 01



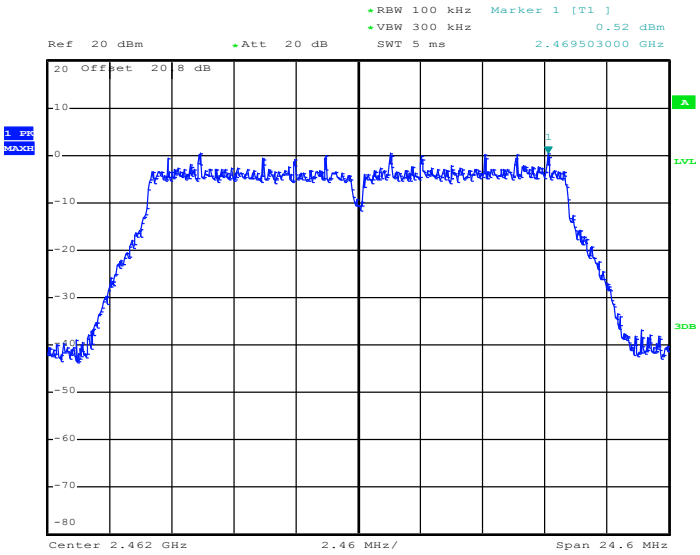
Date: 18.JAN.2013 22:52:58

PSD 100kHz Plot 802.11g Channel 06



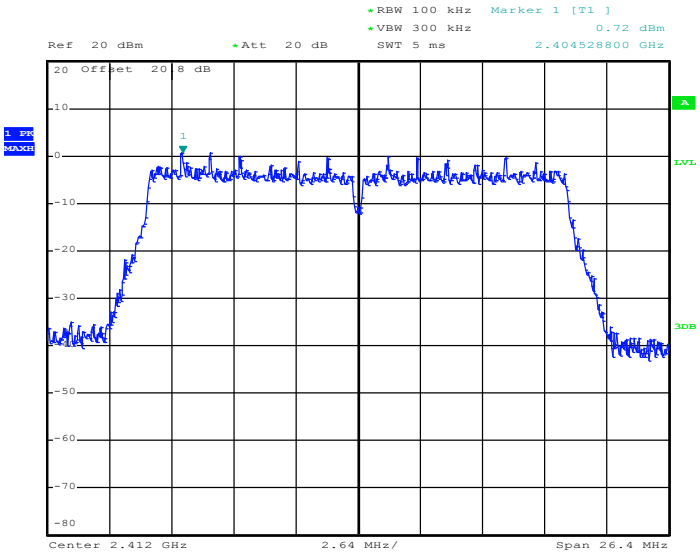
Date: 18.JAN.2013 22:50:16

PSD 100kHz Plot 802.11g Channel 11



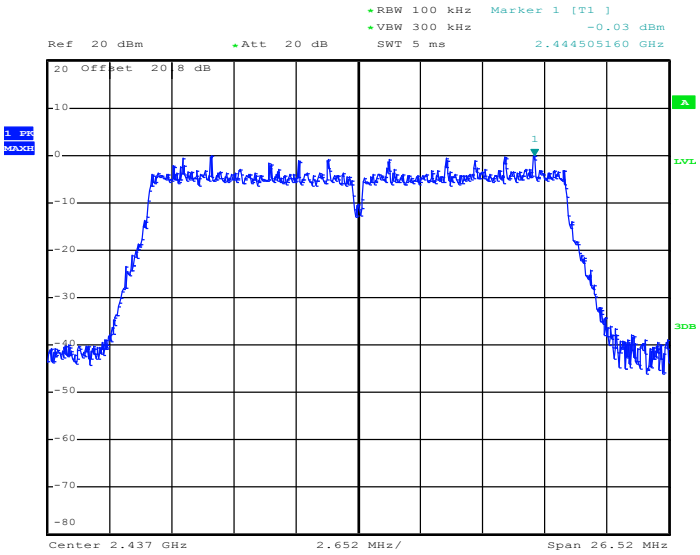
Date: 18.JAN.2013 22:47:34

PSD 100kHz Plot on 2.4GHz 802.11n HT20 Channel 01



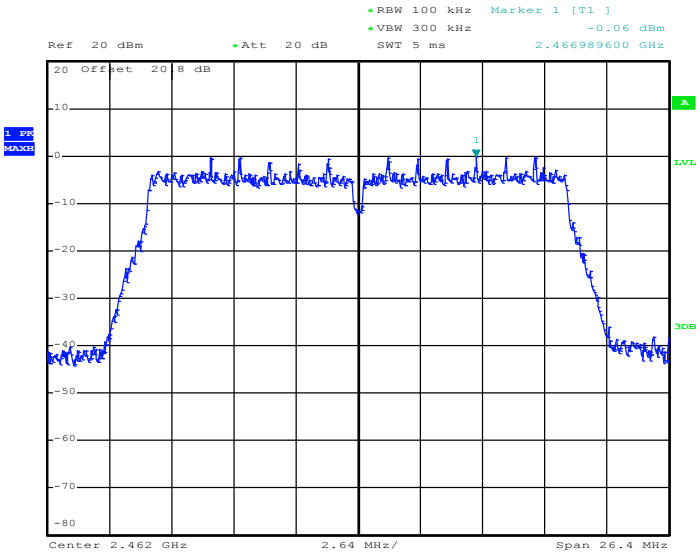
Date: 18.JAN.2013 22:55:44

PSD 100kHz Plot on 2.4GHz 802.11n HT20 Channel 06



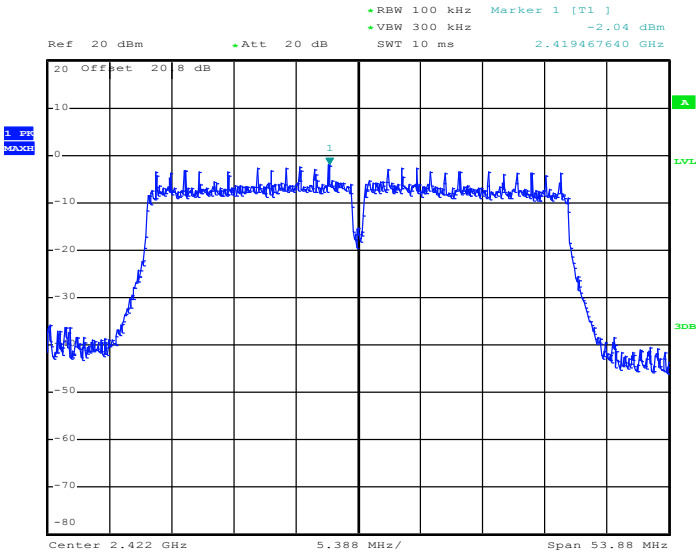
Date: 18.JAN.2013 22:58:21

PSD 100kHz Plot on 2.4GHz 802.11n HT20 Channel 11



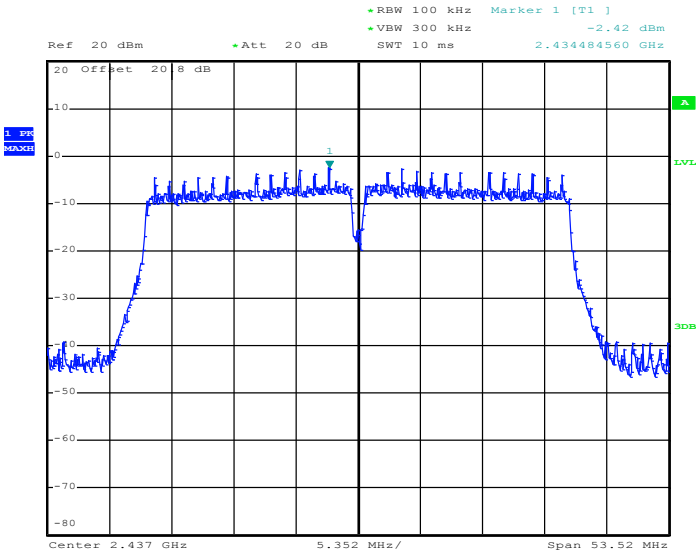
Date: 18.JAN.2013 23:01:42

PSD 100kHz Plot on 2.4GHz 802.11n HT40 Channel 03



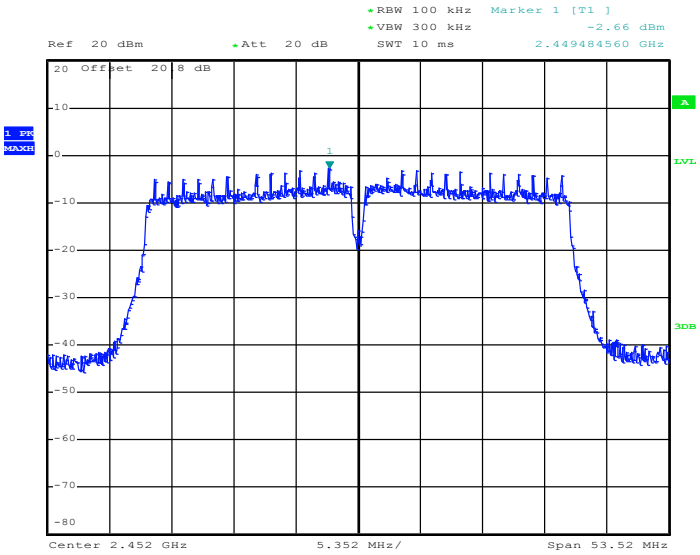
Date: 18.JAN.2013 23:14:06

PSD 100kHz Plot on 2.4GHz 802.11n HT40 Channel 06



Date: 18.JAN.2013 23:09:30

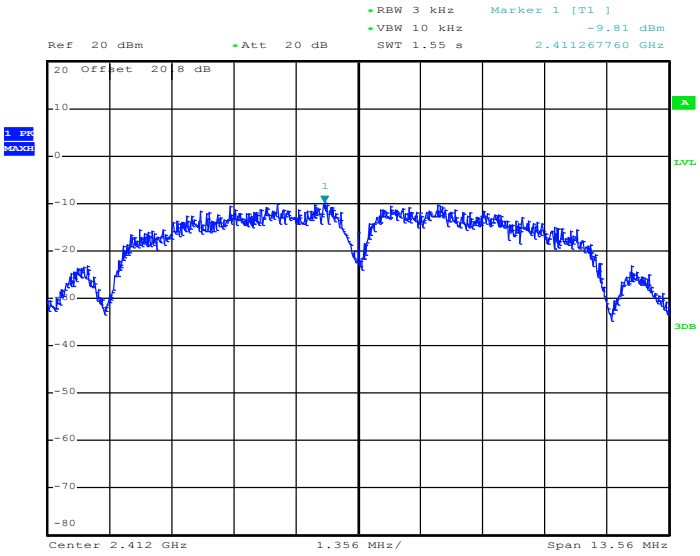
PSD 100kHz Plot on 2.4GHz 802.11n HT40 Channel 09



Date: 18.JAN.2013 23:06:02

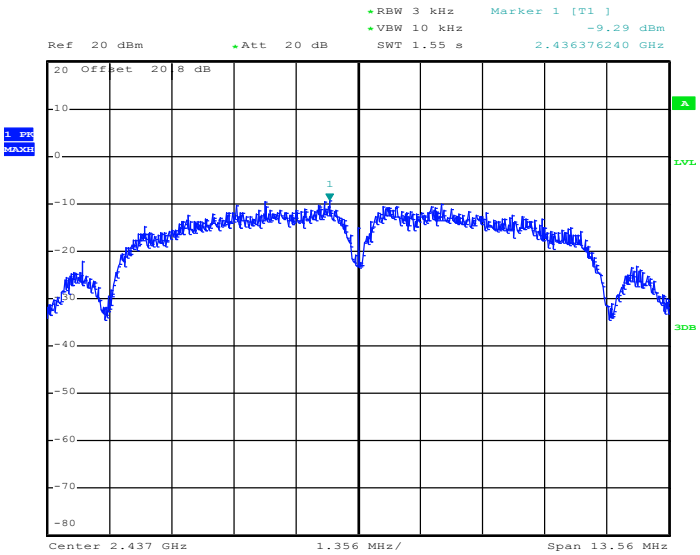
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on 802.11b Channel 01



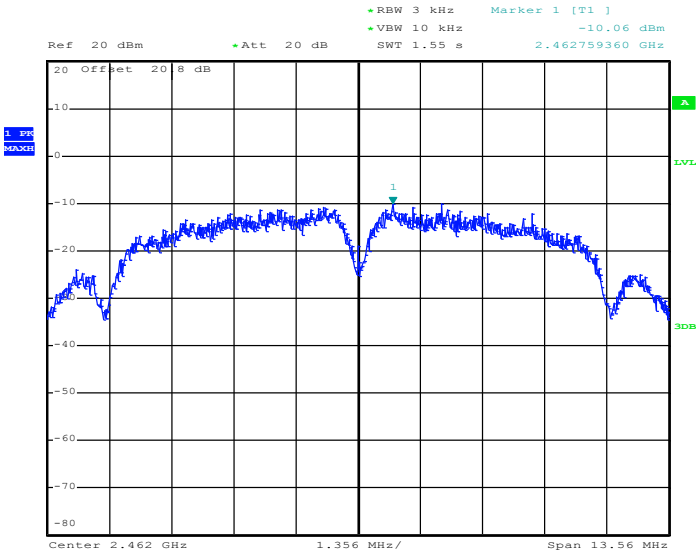
Date: 18.JAN.2013 22:35:40

PSD 3kHz Plot on 802.11b Channel 06



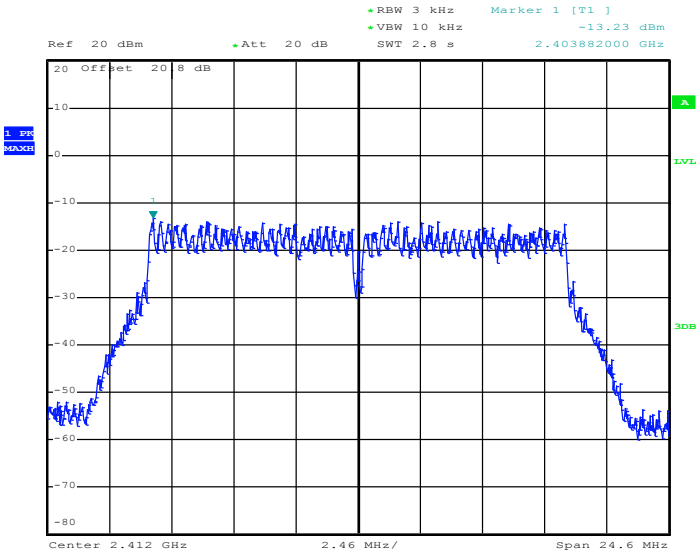
Date: 18.JAN.2013 22:40:13

PSD 3kHz Plot on 802.11b Channel 11



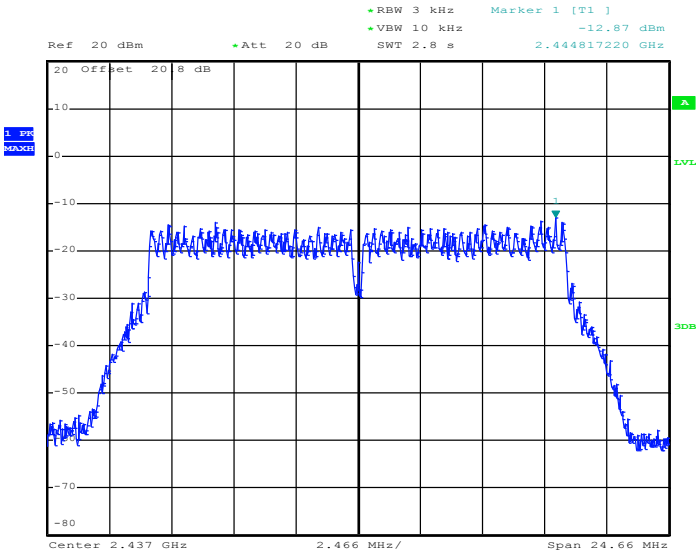
Date: 18.JAN.2013 22:43:14

PSD 3kHz Plot on 802.11g Channel 01



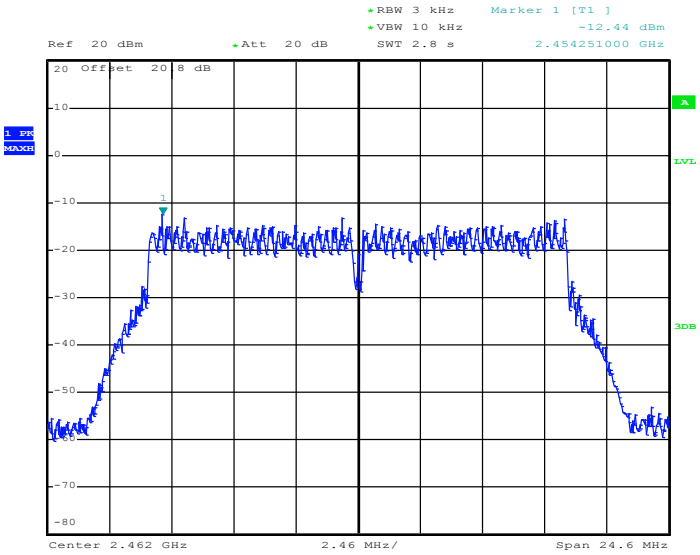
Date: 18.JAN.2013 22:52:46

PSD 3kHz Plot on 802.11g Channel 06



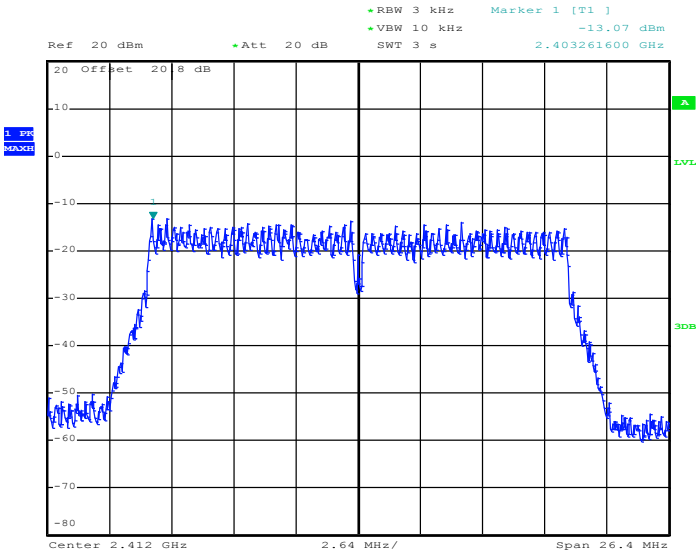
Date: 18.JAN.2013 22:50:04

PSD 3kHz Plot on 802.11g Channel 11



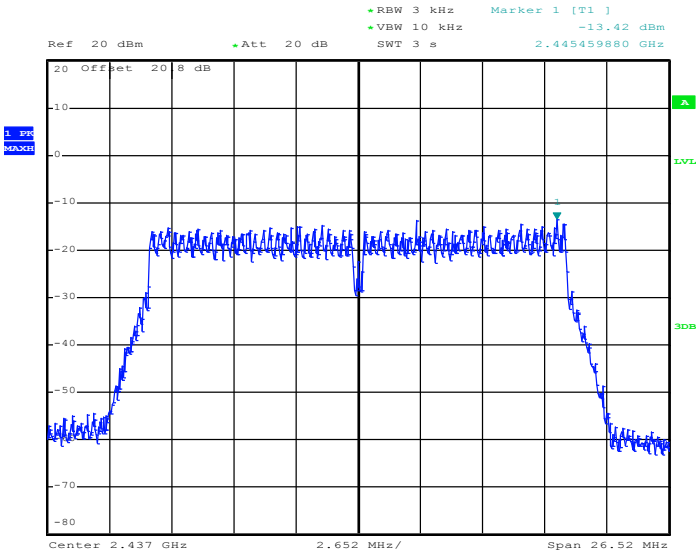
Date: 18.JAN.2013 22:47:22

PSD 3kHz Plot on 2.4GHz 802.11n HT20 Channel 01



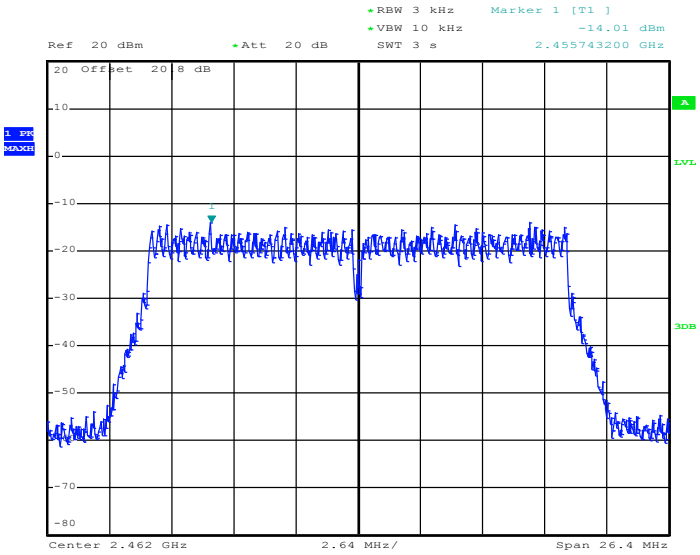
Date: 18.JAN.2013 22:55:31

PSD 3kHz Plot on 2.4GHz 802.11n HT20 Channel 06



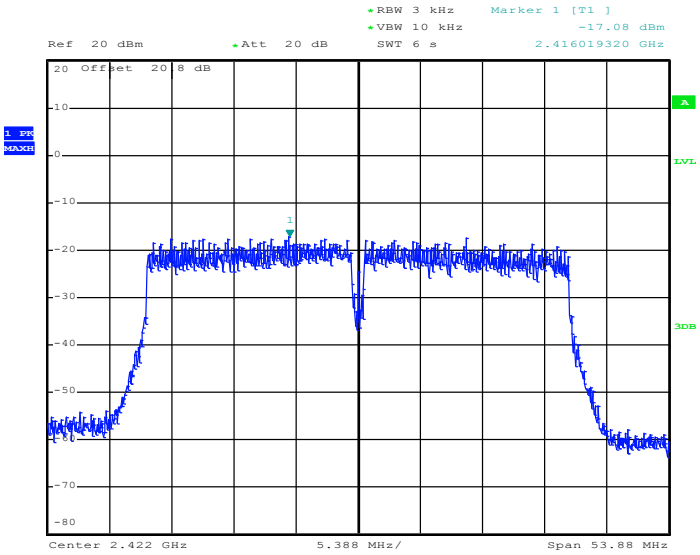
Date: 18.JAN.2013 22:58:09

PSD 3kHz Plot on 2.4GHz 802.11n HT20 Channel 11



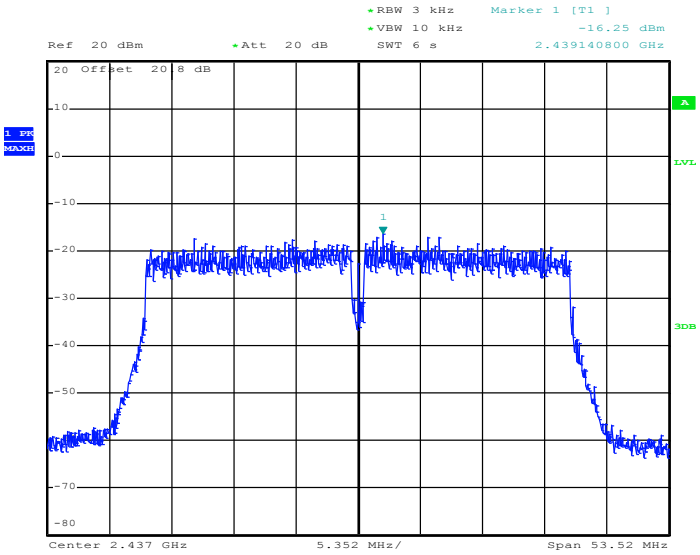
Date: 18.JAN.2013 23:01:30

PSD 3kHz Plot on 2.4GHz 802.11n HT40 Channel 03



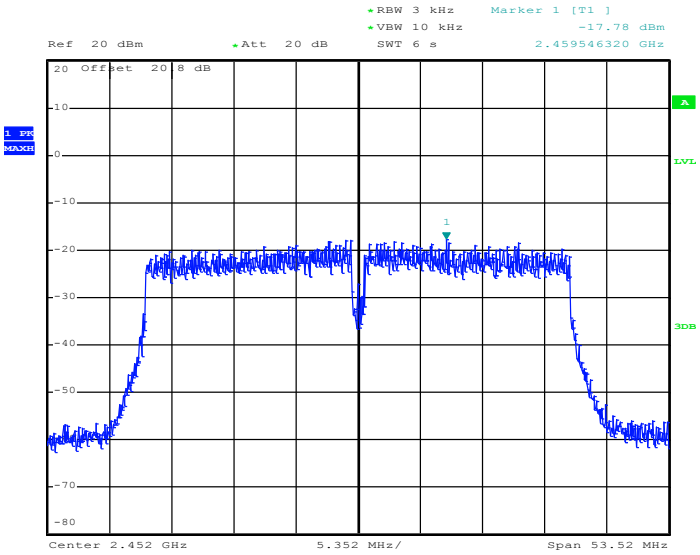
Date: 18.JAN.2013 23:13:53

PSD 3kHz Plot on 2.4GHz 802.11n HT40 Channel 06



Date: 18.JAN.2013 23:09:18

PSD 3kHz Plot on 2.4GHz 802.11n HT40 Channel 09



Date: 18.JAN.2013 23:05:50

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

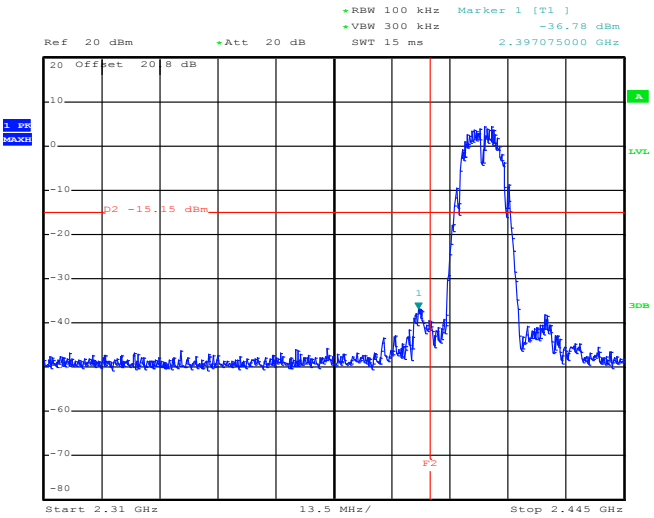
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

3.4.6 Test Result of Conducted Spurious at Band Edges

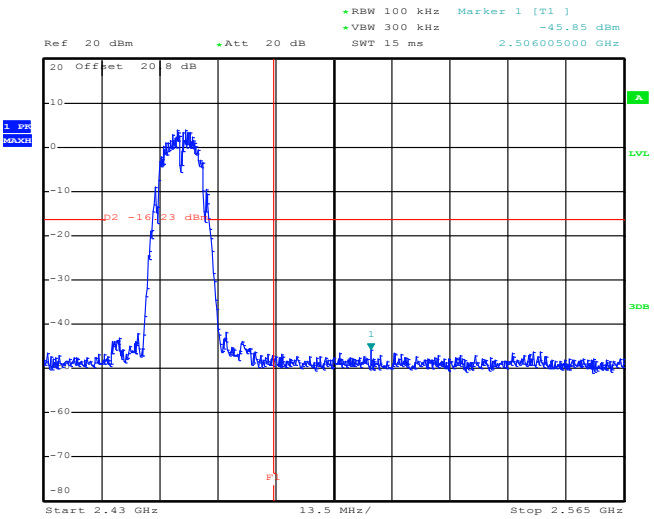
Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	Low and High	**Relative Humidity :**	50~53%
Test Channel :	01 and 11	**Test Engineer :**	Bill Kuo

Low Band Edge Plot on 802.11b Channel 01



Date: 18.JAN.2013 22:36:07

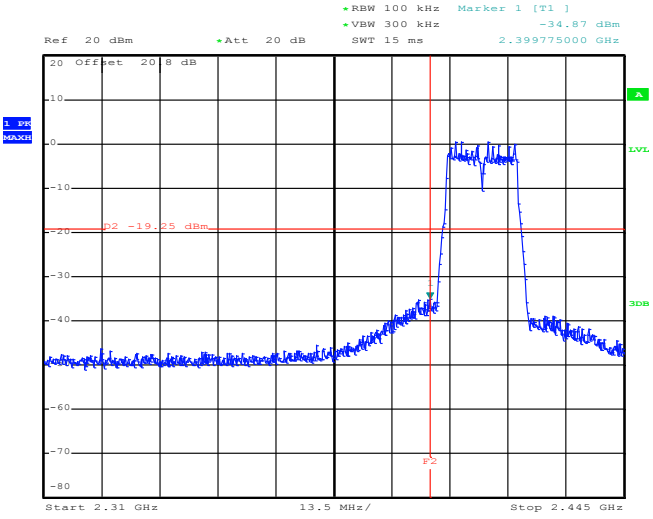
High Band Edge Plot on 802.11b Channel 11



Date: 18.JAN.2013 22:43:42

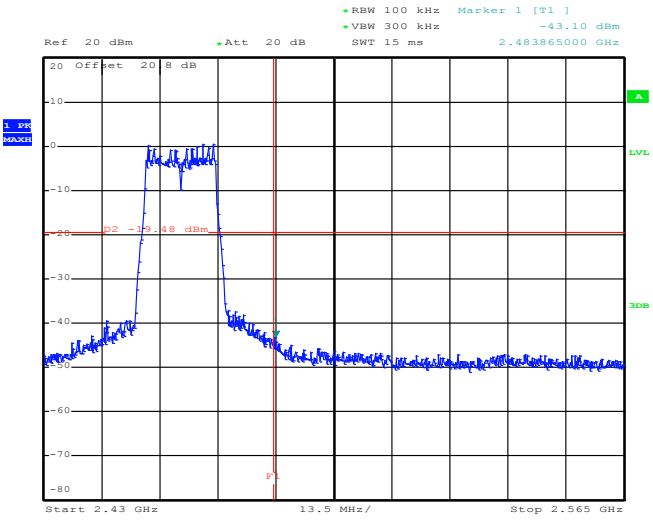
Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Bill Kuo

Low Band Edge Plot on 802.11g Channel 01



Date: 18.JAN.2013 22:53:13

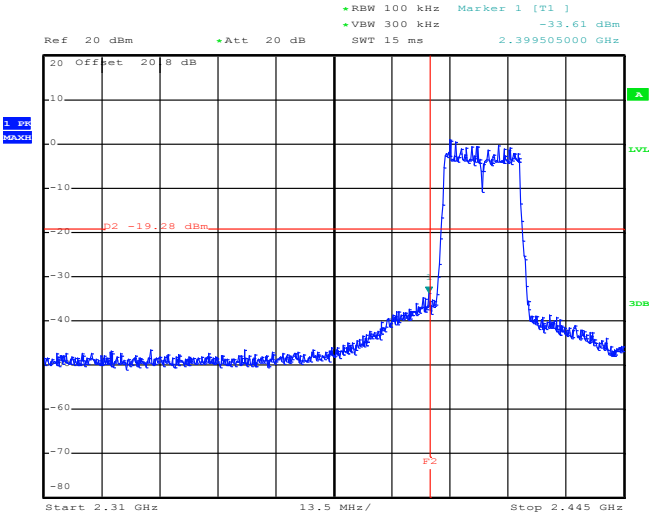
High Band Edge Plot on 802.11g Channel 11



Date: 18.JAN.2013 22:47:49

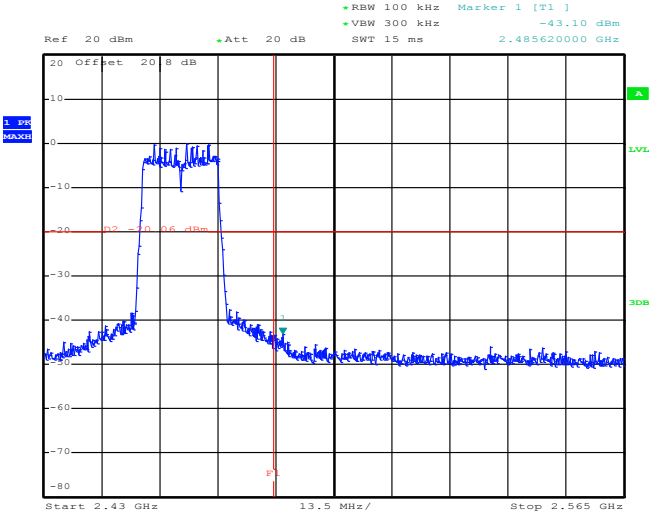
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Bill Kuo

Low Band Edge Plot on 2.4GHz 802.11n HT20 Channel 01



Date: 18.JAN.2013 22:55:59

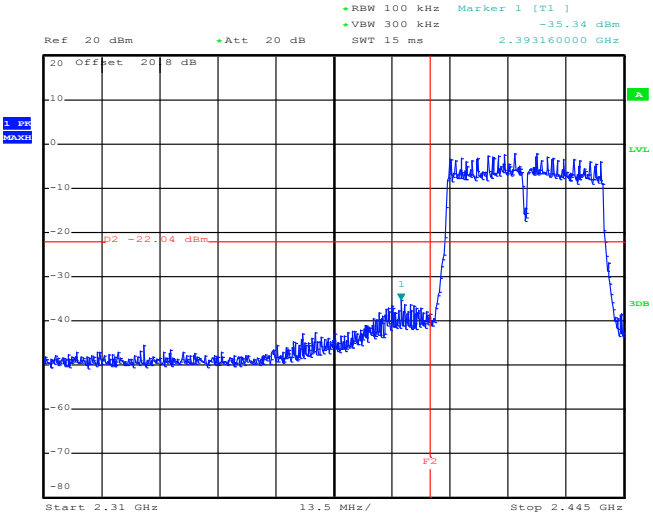
High Band Edge Plot on 2.4GHz 802.11n HT20 Channel 11



Date: 18.JAN.2013 23:03:08

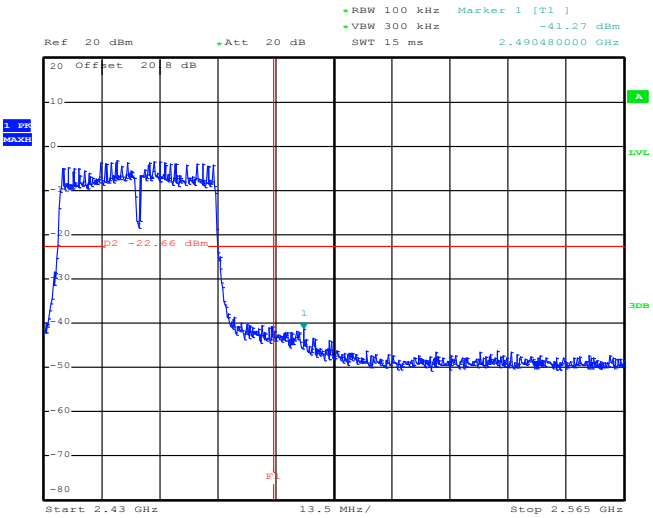
Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	Low and High	**Relative Humidity :**	50~53%
Test Channel :	03 and 09	**Test Engineer :**	Bill Kuo

Low Band Edge Plot on 2.4GHz 802.11n HT40 Channel 03



Date: 18.JAN.2013 23:14:21

High Band Edge Plot on 2.4GHz 802.11n HT40 Channel 09



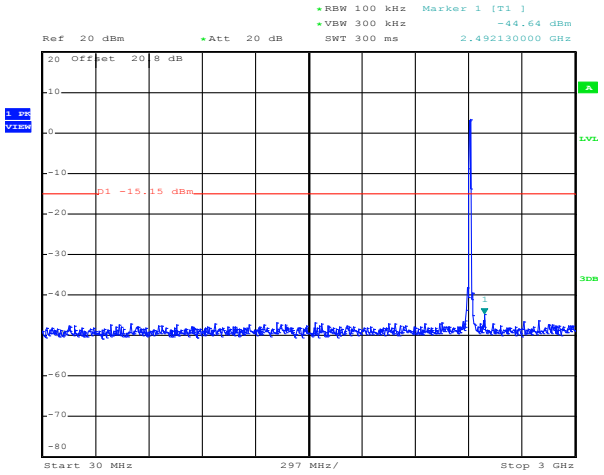
Date: 18.JAN.2013 23:06:17

3.4.7 Test Result of Conducted Spurious Emission

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

802.11b 30 MHz~3 GHz

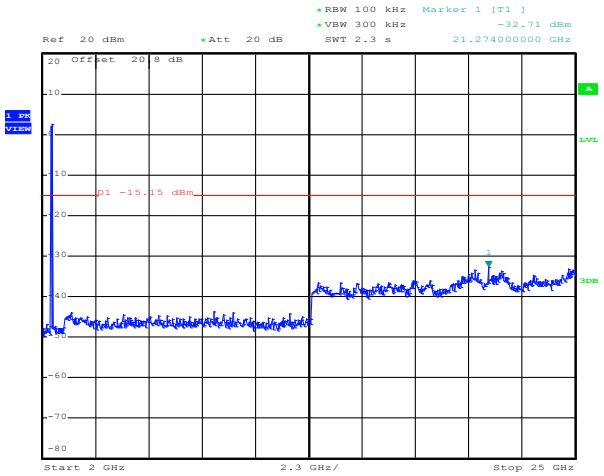
Conducted Spurious Emission Plot on Channel 01



Date: 18.JAN.2013 22:38:32

802.11b 2 GHz~25 GHz

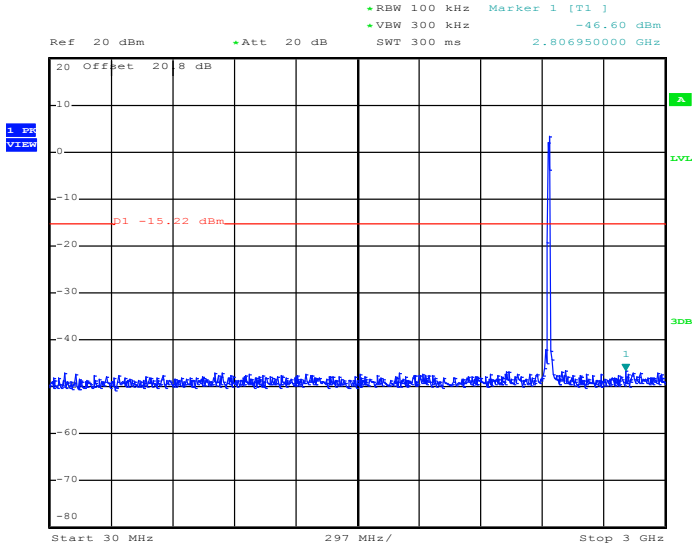
Conducted Spurious Emission Plot on Channel 01



Date: 18.JAN.2013 22:38:50

802.11b 30 MHz~3 GHz

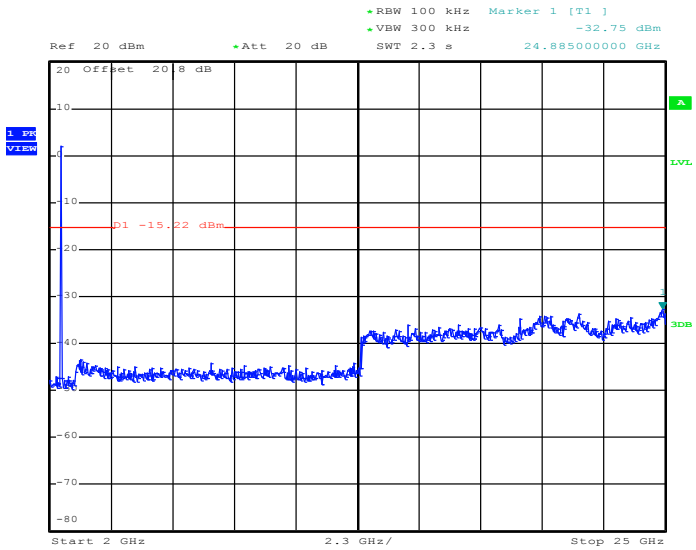
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 22:41:35

802.11b 2 GHz~25 GHz

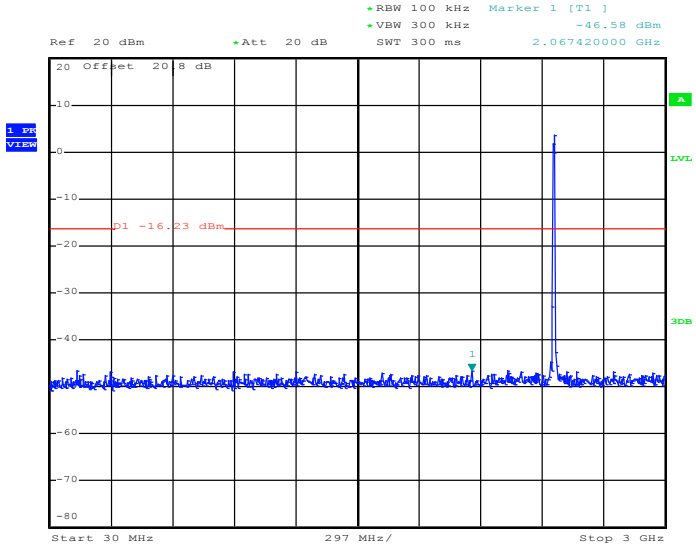
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 22:41:53

802.11b 30 MHz~3 GHz

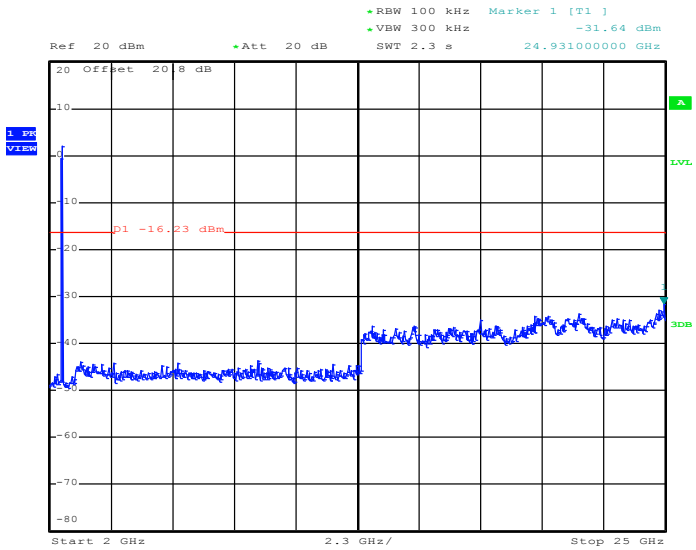
Conducted Spurious Emission Plot on Channel 11



Date: 18.JAN.2013 22:44:48

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

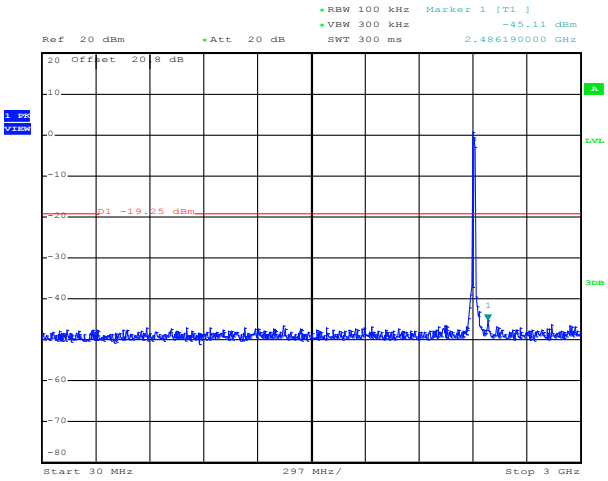


Date: 18.JAN.2013 22:45:06

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

802.11g 30 MHz~3 GHz

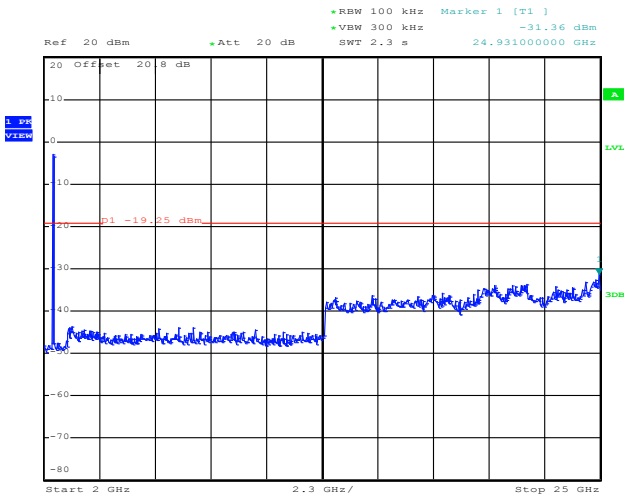
Conducted Spurious Emission Plot on Channel 01



Date: 18.JAN.2013 22:53:31

802.11g 2 GHz~25 GHz

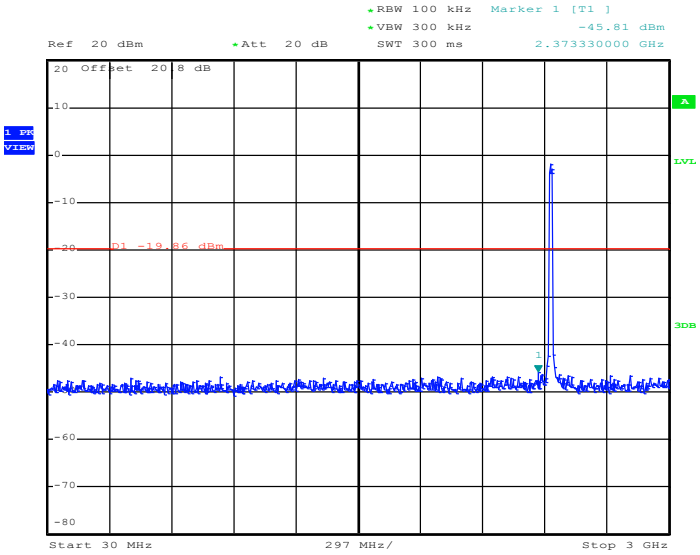
Conducted Spurious Emission Plot on Channel 01



Date: 18.JAN.2013 22:53:48

802.11g 30 MHz~3 GHz

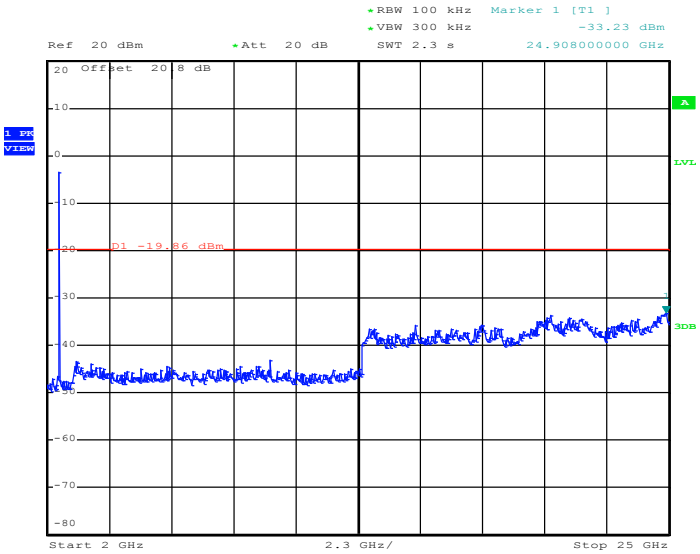
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 22:50:37

802.11g 2 GHz~25 GHz

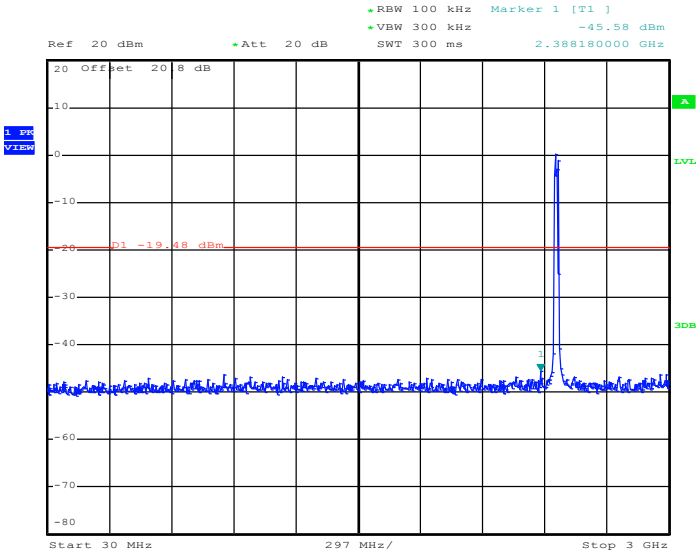
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 22:50:55

802.11g 30 MHz~3 GHz

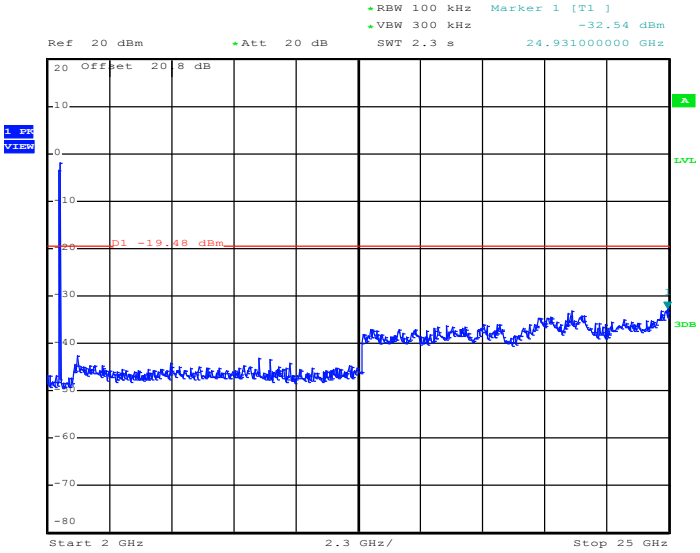
Conducted Spurious Emission Plot on Channel 11



Date: 18.JAN.2013 22:48:07

802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

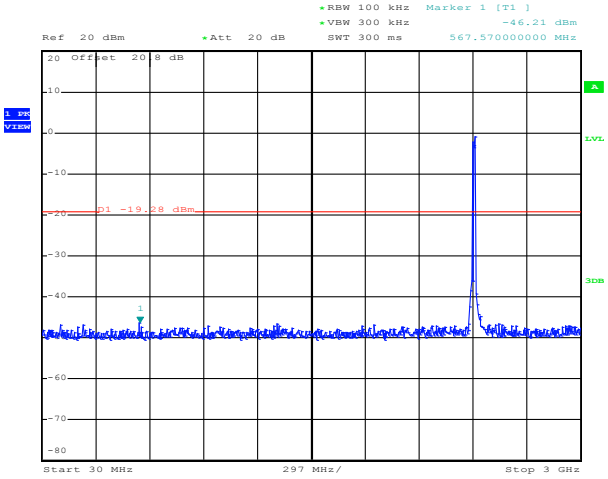


Date: 18.JAN.2013 22:48:24

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 :	Bill Kuo

2.4GHz 802.11n HT20 30 MHz~3 GHz

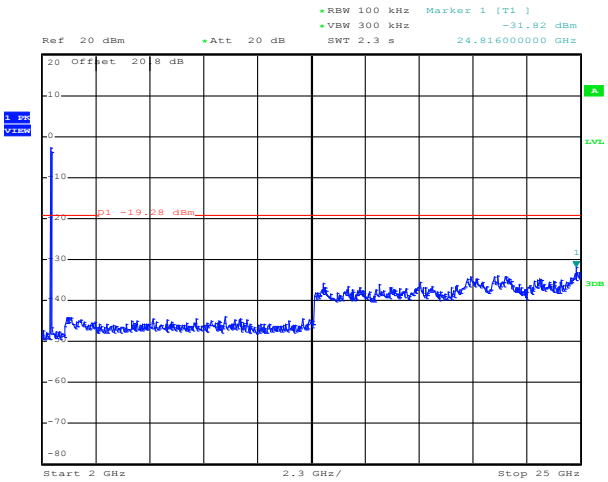
Conducted Spurious Emission Plot on Channel 01



Date: 18.JAN.2013 22:56:17

2.4GHz 802.11n HT20 2 GHz~25 GHz

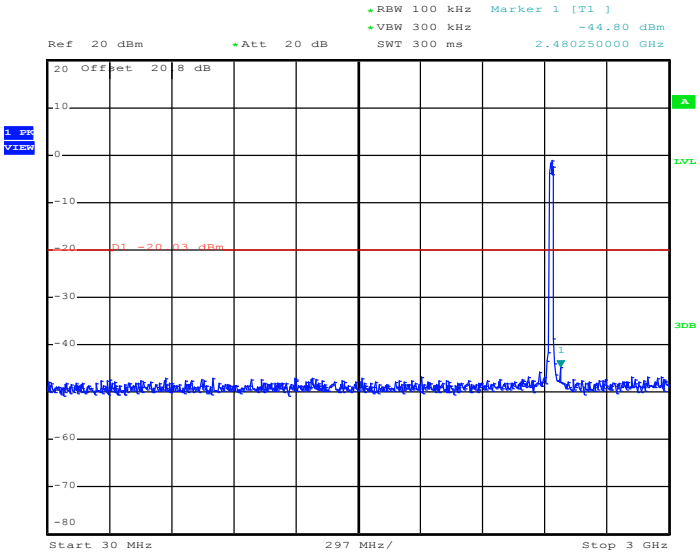
Conducted Spurious Emission Plot on Channel 01



Date: 18.JAN.2013 22:56:34

2.4GHz 802.11n HT20 30 MHz~3 GHz

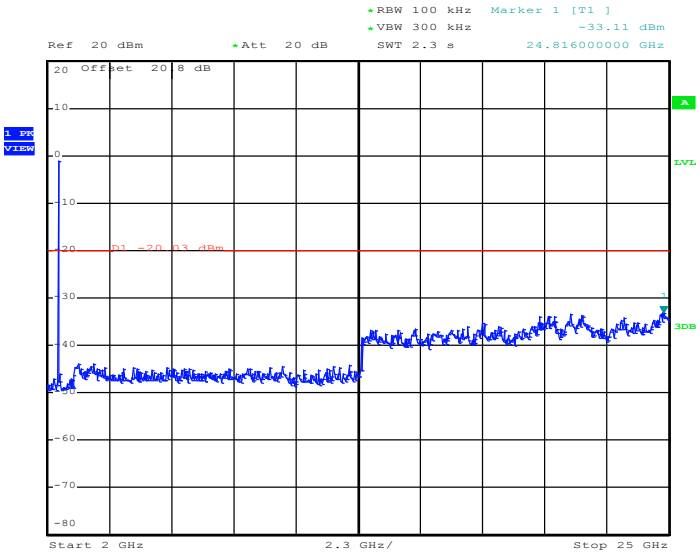
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 22:58:42

2.4GHz 802.11n HT20 2 GHz~25 GHz

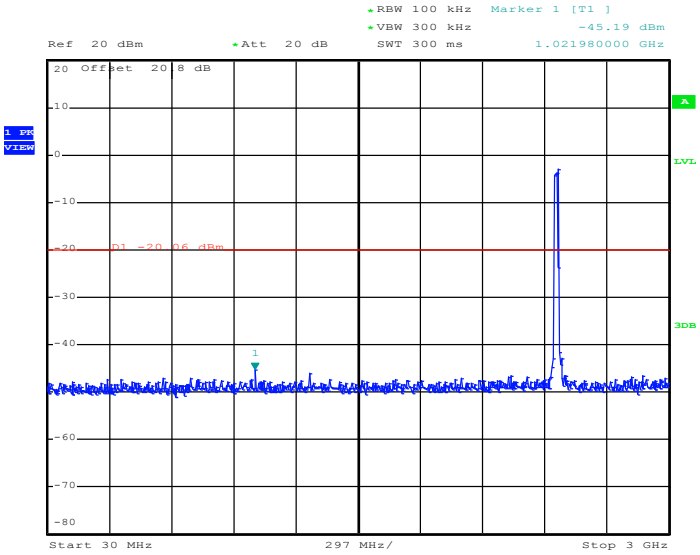
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 22:58:59

2.4GHz 802.11n HT20 30 MHz~3 GHz

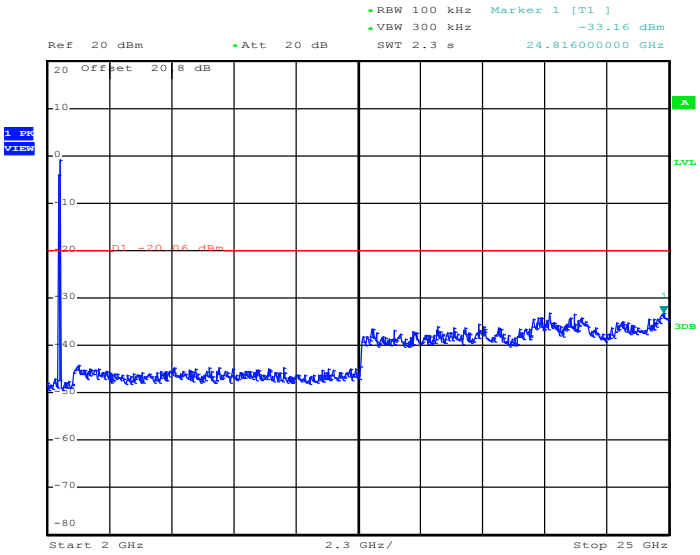
Conducted Spurious Emission Plot on Channel 11



Date: 18.JAN.2013 23:02:15

2.4GHz 802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

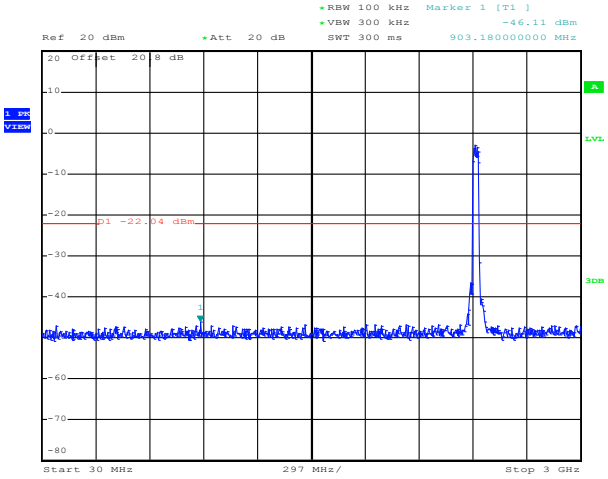


Date: 18.JAN.2013 23:02:32

Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	**Relative Humidity :**	50~53%
Test Channel :	03, 06, 09	**Test Engineer :**	Bill Kuo

2.4GHz 802.11n HT40 30 MHz~3 GHz

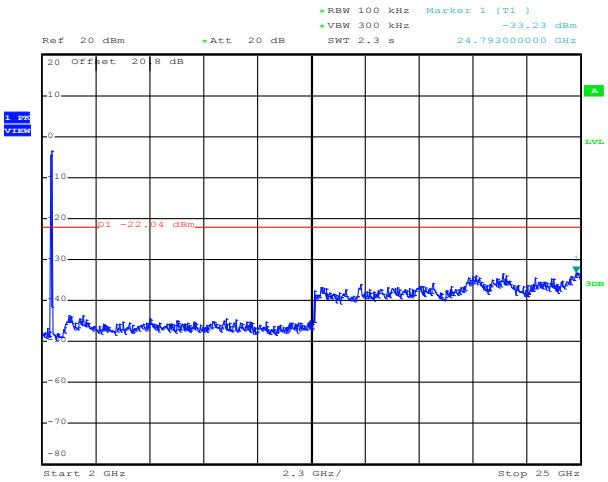
Conducted Spurious Emission Plot on Channel 03



Date: 18.JAN.2013 23:14:39

2.4GHz 802.11n HT40 2 GHz~25 GHz

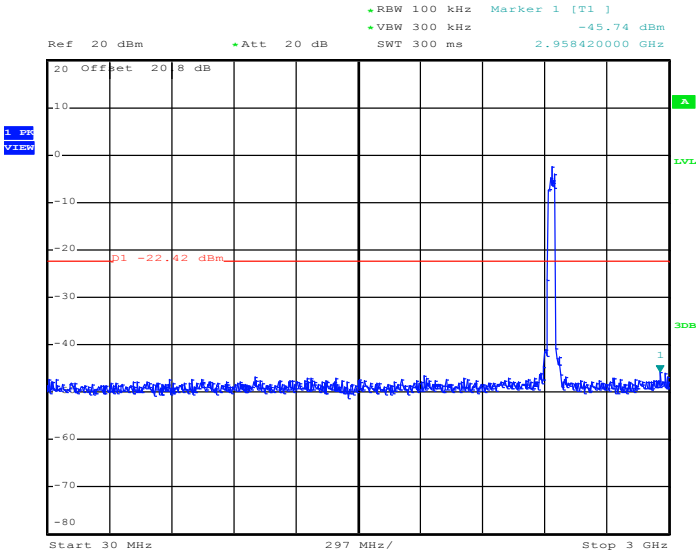
Conducted Spurious Emission Plot on Channel 03



Date: 18.JAN.2013 23:14:56

2.4GHz 802.11n HT40 30 MHz~3 GHz

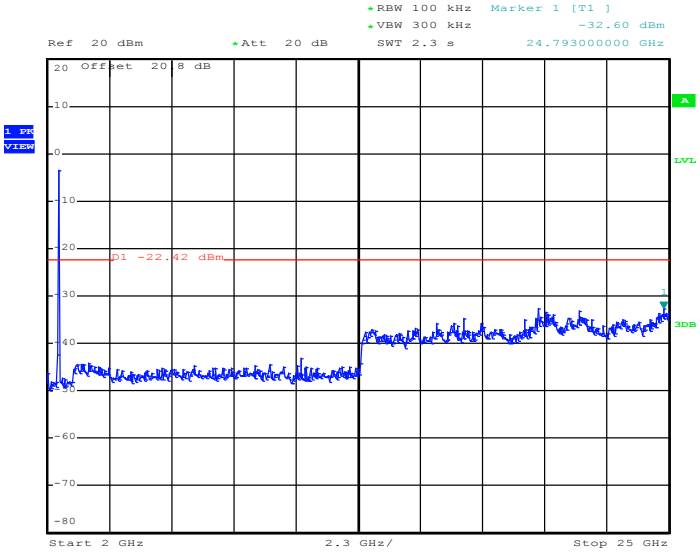
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 23:10:45

2.4GHz 802.11n HT40 2 GHz~25 GHz

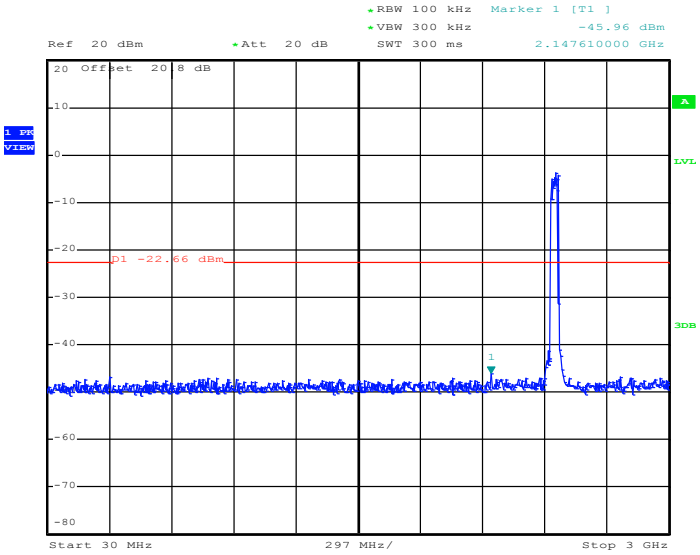
Conducted Spurious Emission Plot on Channel 06



Date: 18.JAN.2013 23:11:03

2.4GHz 802.11n HT40 30 MHz~3 GHz

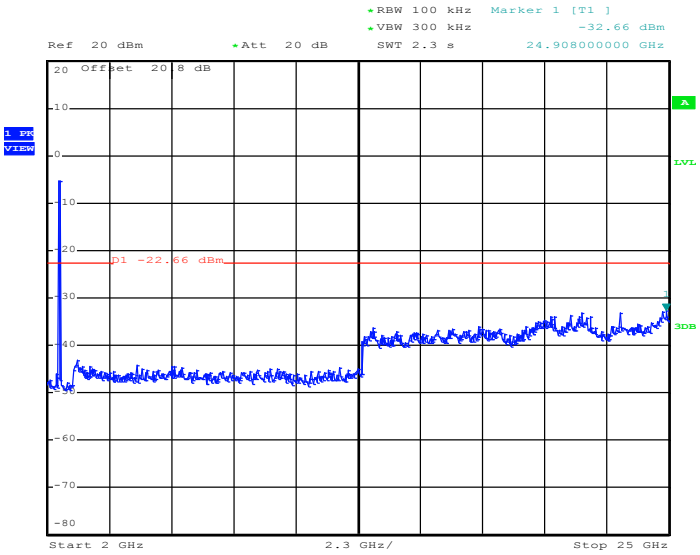
Conducted Spurious Emission Plot on Channel 09



Date: 18.JAN.2013 23:06:35

2.4GHz 802.11n HT40 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 09



Date: 18.JAN.2013 23:06:53

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

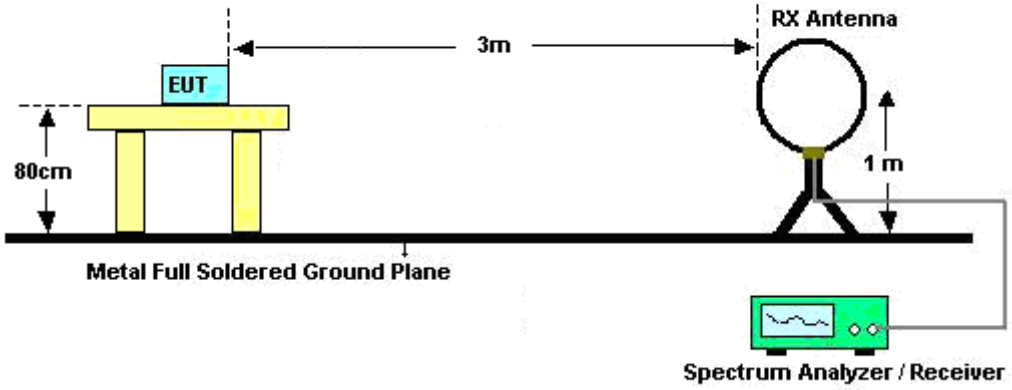
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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(us)	1/T(kHz)	VBW Setting
802.11b	98.59	-	-	10Hz
802.11g	92.72	1400	0.714	1kHz
2.4GHz 802.11n HT20	92.61	1304	0.767	1kHz
2.4GHz 802.11n HT40	85.83	654	1.529	3kHz

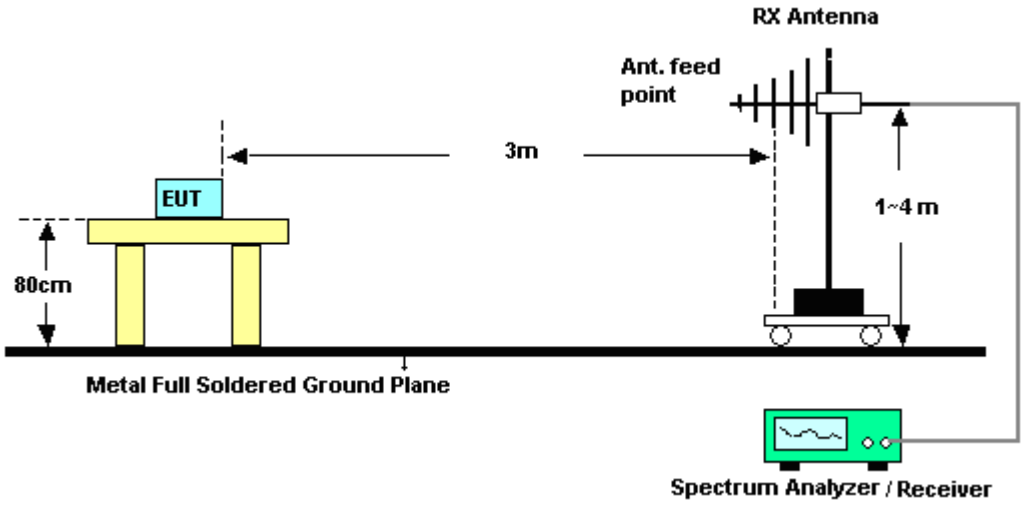
Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

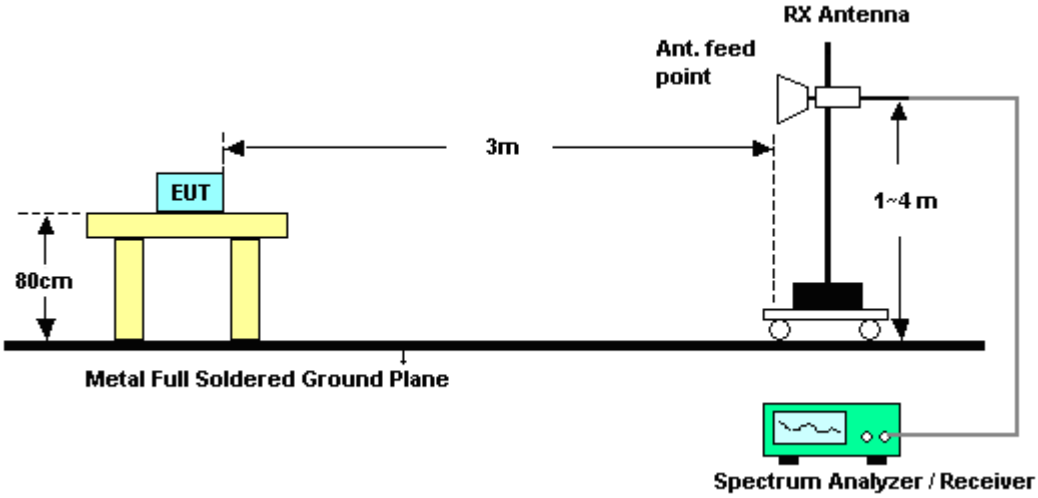
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated 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 Band Edges

Test Mode :	802.11b	**Temperature :**	23~24°C
Test Band :	Low	**Relative Humidity :**	47~49%
Test Channel :	01	**Test Engineer :**	Kai Wang and Timberland Lin

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2390	53.85	-20.15	74	49.6	32.36	6.45	34.56	101	354	Peak
2390	42.95	-11.05	54	38.7	32.36	6.45	34.56	101	354	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2389.83	51.18	-22.82	74	46.93	32.36	6.45	34.56	102	68	Peak
2390	39.17	-14.83	54	34.92	32.36	6.45	34.56	102	68	Average

Test Mode :	802.11b	**Temperature :**	23~24°C
Test Band :	High	**Relative Humidity :**	47~49%
Test Channel :	11	**Test Engineer :**	Kai Wang and Timberland Lin

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	52.44	-21.56	74	47.92	32.48	6.59	34.55	100	43	Peak
2483.5	42.4	-11.6	54	37.88	32.48	6.59	34.55	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**
2485.48	50.78	-23.22	74	46.26	32.48	6.59	34.55	106	79	Peak
2483.5	39.71	-14.29	54	35.19	32.48	6.59	34.55	106	79	Average

Test Mode :	802.11g	Temperature :	23~24°C
Test Band :	Low	Relative Humidity :	47~49%
Test Channel :	01	Test Engineer :	Kai Wang and Timberland Lin

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
2389.02	67.58	-6.42	74	63.33	32.36	6.45	34.56	187	3	Peak
2390	50.76	-3.24	54	46.51	32.36	6.45	34.56	187	3	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
2385.24	66.04	-7.96	74	61.82	32.33	6.45	34.56	199	66	Peak
2390	47.46	-6.54	54	43.21	32.36	6.45	34.56	199	66	Average

Test Mode :	802.11g	Temperature :	23~24°C
Test Band :	High	Relative Humidity :	47~49%
Test Channel :	11	Test Engineer :	Kai Wang and Timberland Lin

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
2484.67	64.79	-9.21	74	60.27	32.48	6.59	34.55	183	2	Peak
2483.74	48.74	-5.26	54	44.22	32.48	6.59	34.55	183	2	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
2488.87	61.7	-12.3	74	57.16	32.5	6.59	34.55	133	49	Peak
2483.56	45.83	-8.17	54	41.31	32.48	6.59	34.55	133	49	Average

Test Mode :	802.11n HT20	Temperature :	23~24°C
Test Band :	Low	Relative Humidity :	47~49%
Test Channel :	01	Test Engineer :	Kai Wang and Timberland Lin

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
2387.58	67	-7	74	62.75	32.36	6.45	34.56	100	45	Peak
2390	47.45	-6.55	54	43.2	32.36	6.45	34.56	100	45	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2381.28	64.23	-9.77	74	60.01	32.33	6.45	34.56	103	113	Peak
2390	41.1	-12.9	54	36.85	32.36	6.45	34.56	103	113	Average

Test Mode :	802.11n HT20	Temperature :	23~24°C
Test Band :	High	Relative Humidity :	47~49%
Test Channel :	11	Test Engineer :	Kai Wang and Timberland Lin

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
2484.31	65.46	-8.54	74	60.94	32.48	6.59	34.55	100	355	Peak
2483.5	46.91	-7.09	54	42.39	32.48	6.59	34.55	100	355	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	58.65	-15.35	74	54.13	32.48	6.59	34.55	103	113	Peak
2483.68	42.84	-11.16	54	38.32	32.48	6.59	34.55	103	113	Average

Test Mode :	802.11n HT40	Temperature :	23~24°C
Test Band :	Low	Relative Humidity :	47~49%
Test Channel :	03	Test Engineer :	Kai Wang and Timberland Lin

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	69.91	-4.09	74	65.66	32.36	6.45	34.56	100	48	Peak
2389.56	47.56	-6.44	54	43.31	32.36	6.45	34.56	100	48	Average
2486.02	54.09	-19.91	74	49.57	32.48	6.59	34.55	100	48	Peak
2484.79	39.53	-14.47	54	35.01	32.48	6.59	34.55	100	48	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	67.71	-6.29	74	63.46	32.36	6.45	34.56	103	321	Peak
2389.47	45.94	-8.06	54	41.69	32.36	6.45	34.56	103	321	Average
2491.45	50.62	-23.38	74	46.08	32.5	6.59	34.55	103	321	Peak
2495.8	37.37	-16.63	54	32.83	32.5	6.59	34.55	103	321	Average

Test Mode :	802.11n HT40	Temperature :	23~24°C
Test Band :	High	Relative Humidity :	47~49%
Test Channel :	09	Test Engineer :	Kai Wang and Timberland Lin

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
2389.74	56.08	-17.92	74	51.83	32.36	6.45	34.56	100	353	Peak
2389.56	40.47	-13.53	54	36.22	32.36	6.45	34.56	100	353	Average
2483.5	64.4	-9.6	74	59.88	32.48	6.59	34.55	100	353	Peak
2483.53	49.86	-4.14	54	45.34	32.48	6.59	34.55	100	353	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	50.73	-23.27	74	46.48	32.36	6.45	34.56	100	319	Peak
2388.12	37.3	-16.7	54	33.05	32.36	6.45	34.56	100	319	Average
2483.86	59.12	-14.88	74	54.6	32.48	6.59	34.55	100	319	Peak
2483.71	44.9	-9.1	54	40.38	32.48	6.59	34.55	100	319	Average

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

Test Mode :	802.11b	**Temperature :**	23~24°C
Test Channel :	01	**Relative Humidity :**	47~49%
Test Engineer :	Kai Wang and Timberland Lin	**Polarization :**	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. 2397.3 MHz and 7236 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 105.02 dBµV/m - 20dB = 85.02 dBµV/m.		

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
2397.3	64.57	-20.45	85.02	60.32	32.36	6.45	34.56	101	354	Peak
2414	99.6	-	-	95.29	32.38	6.49	34.56	101	354	Average
2414	105.02	-	-	100.71	32.38	6.49	34.56	101	354	Peak
4824	47.96	-6.04	54	58.51	34.87	10.17	55.59	100	3	Average
4824	52.29	-21.71	74	62.84	34.87	10.17	55.59	100	3	Peak
7236	48.74	-36.28	85.02	58.05	36.15	10.96	56.42	100	0	Peak

Test Mode :	802.11b	Temperature :	23~24°C
Test Channel :	01	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2398.56 MHz and 7236 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

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
2398.56	60.8	-20.46	81.26	56.55	32.36	6.45	34.56	102	68	Peak
2410	95.9	-	-	91.59	32.38	6.49	34.56	102	68	Average
2410	101.26	-	-	96.95	32.38	6.49	34.56	102	68	Peak
4824	46.54	-7.46	54	57.09	34.87	10.17	55.59	100	1	Average
4824	51.97	-22.03	74	62.52	34.87	10.17	55.59	100	1	Peak
7236	48.28	-32.98	81.26	57.59	36.15	10.96	56.42	100	0	Peak

Test Mode :	802.11b	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	100.01	-	-	95.62	32.43	6.52	34.56	100	41	Average
2439	105.08	-	-	100.69	32.43	6.52	34.56	100	41	Peak
4875	48.1	-5.9	54	58.75	34.85	10.18	55.68	100	4	Average
4875	52.44	-21.56	74	63.09	34.85	10.18	55.68	100	4	Peak
7311	49.41	-24.59	74	58.61	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11b	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	98.04	-	-	93.65	32.43	6.52	34.56	101	82	Average
2438	103.36	-	-	98.97	32.43	6.52	34.56	101	82	Peak
4875	45.64	-8.36	54	56.29	34.85	10.18	55.68	100	1	Average
4875	51.05	-22.95	74	61.7	34.85	10.18	55.68	100	1	Peak
7311	49.33	-24.67	74	58.53	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11b	Temperature :	23~24°C
Test Channel :	11	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	97.6	-	-	93.15	32.45	6.56	34.56	100	43	Average
2462	103.26	-	-	98.81	32.45	6.56	34.56	100	43	Peak
4926	47.01	-6.99	54	57.75	34.83	10.21	55.78	100	360	Average
4926	51.3	-22.7	74	62.05	34.83	10.2	55.78	100	360	Peak
7386	49.43	-24.57	74	58.5	36.12	10.92	56.11	100	0	Peak

Test Mode :	802.11b	Temperature :	23~24°C
Test Channel :	11	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	96.51	-	-	92.06	32.45	6.56	34.56	106	79	Average
2464	101.98	-	-	97.53	32.45	6.56	34.56	106	79	Peak
4926	45.51	-8.49	54	56.25	34.83	10.21	55.78	100	2	Average
4926	50.8	-23.2	74	61.54	34.83	10.21	55.78	100	2	Peak
7386	49.57	-24.43	74	58.64	36.12	10.92	56.11	100	0	Peak

Test Mode :	802.11g	Temperature :	23~24°C
Test Channel :	01	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Horizontal
Remark :	1. 2411 MHz is fundamental signal which can be ignored. 2. 2395.86 MHz and 7236 MHz are 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	24.08	-15.92	40	36.3	18.9	0.6	31.72	125	39	Peak
51.06	22.22	-17.78	40	45.27	7.88	0.77	31.7	-	-	Peak
171.75	25.05	-18.45	43.5	45.47	9.72	1.53	31.67	-	-	Peak
399.4	17.38	-28.62	46	31.28	15.7	2.19	31.79	-	-	Peak
648.6	18.88	-27.12	46	28.83	19.2	2.82	31.97	-	-	Peak
940.5	19.96	-26.04	46	27	20.81	3.36	31.21	-	-	Peak
2395.86	72.51	-16.84	89.35	68.26	32.36	6.45	34.56	187	3	Peak
2411	99.36	-	-	95.05	32.38	6.49	34.56	187	3	Average
2411	109.35	-	-	105.04	32.38	6.49	34.56	187	3	Peak
4824	47.87	-26.13	74	58.42	34.87	10.17	55.59	100	0	Peak
7236	48.07	-41.28	89.35	57.38	36.15	10.96	56.42	100	0	Peak

Test Mode :	802.11g	Temperature :	23~24°C
Test Channel :	01	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2398.11 MHz and 7236 MHz are 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
30.27	31.19	-8.81	40	43.41	18.9	0.6	31.72	-	-	Peak
57.27	33.17	-6.83	40	57.72	6.32	0.81	31.68	100	139	Peak
108.84	17.71	-25.79	43.5	36.33	11.94	1.15	31.71	-	-	Peak
410.6	15.19	-30.81	46	28.59	16.2	2.21	31.81	-	-	Peak
676.6	17.98	-28.02	46	28.09	19.03	2.85	31.99	-	-	Peak
898.5	19.56	-26.44	46	27.3	20.58	3.29	31.61	-	-	Peak
2398.11	69.91	-15.12	85.03	65.66	32.36	6.45	34.56	199	66	Peak
2410	94.87	-	-	90.56	32.38	6.49	34.56	199	66	Average
2410	105.03	-	-	100.72	32.38	6.49	34.56	199	66	Peak
4824	48.54	-25.46	74	59.09	34.87	10.17	55.59	100	0	Peak
7236	48.07	-36.96	85.03	57.38	36.15	10.96	56.42	100	0	Peak

Test Mode :	802.11g	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	99.5	-	-	95.11	32.43	6.52	34.56	181	8	Average
2438	109.44	-	-	105.05	32.43	6.52	34.56	181	8	Peak
4875	48.57	-25.43	74	59.22	34.85	10.18	55.68	100	0	Peak
7311	48.34	-25.66	74	57.54	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11g	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	94.6	-	-	90.24	32.4	6.52	34.56	106	87	Average
2436	104.8	-	-	100.44	32.4	6.52	34.56	106	87	Peak
4875	47.99	-26.01	74	58.64	34.85	10.18	55.68	100	0	Peak
7311	48.52	-25.48	74	57.72	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11g	Temperature :	23~24°C
Test Channel :	11	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Horizontal
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	98.91	-	-	94.46	32.45	6.56	34.56	183	2	Average
2464	109.04	-	-	104.59	32.45	6.56	34.56	183	2	Peak
4926	49.12	-24.88	74	59.86	34.83	10.21	55.78	100	0	Peak
7386	49.5	-24.5	74	58.57	36.12	10.92	56.11	100	0	Peak

Test Mode :	802.11g	Temperature :	23~24°C
Test Channel :	11	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2463 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2463	93.7	-	-	89.25	32.45	6.56	34.56	133	49	Average
2463	104.16	-	-	99.71	32.45	6.56	34.56	133	49	Peak
4926	47.36	-26.64	74	58.1	34.83	10.21	55.78	100	0	Peak
7386	50.2	-23.8	74	59.27	36.12	10.92	56.11	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT20	Temperature :	23~24°C
Test Channel :	01	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. 2399.19 MHz and 7236 MHz are 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
2399.19	74.8	-11.11	85.91	70.55	32.36	6.45	34.56	100	45	Peak
2414	95.68	-	-	91.37	32.38	6.49	34.56	100	45	Average
2414	105.91	-	-	101.6	32.38	6.49	34.56	100	45	Peak
4824	48.47	-25.53	74	59.02	34.87	10.17	55.59	100	0	Peak
7236	49.58	-36.33	85.91	58.89	36.15	10.96	56.42	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT20	Temperature :	23~24°C
Test Channel :	01	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2398.38 MHz and 7236 MHz are 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
2398.38	67.91	-14.27	82.18	63.66	32.36	6.45	34.56	103	113	Peak
2410	91.63	-	-	87.32	32.38	6.49	34.56	103	113	Average
2410	102.18	-	-	97.87	32.38	6.49	34.56	103	113	Peak
4824	47.81	-26.19	74	58.36	34.87	10.17	55.59	100	0	Peak
7236	48.76	-33.42	82.18	58.07	36.15	10.96	56.42	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT20	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	95.02	-	-	90.63	32.43	6.52	34.56	100	354	Average
2439	104.7	-	-	100.31	32.43	6.52	34.56	100	354	Peak
4875	50.89	-23.11	74	61.54	34.85	10.18	55.68	100	0	Peak
7311	50.48	-23.52	74	59.68	36.14	10.94	56.28	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT20	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
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	91.17	-	-	86.78	32.43	6.52	34.56	103	114	Average
2439	101.11	-	-	96.72	32.43	6.52	34.56	103	114	Peak
4875	47.79	-26.21	74	58.44	34.85	10.18	55.68	100	0	Peak
7311	49.58	-24.42	74	58.78	36.14	10.94	56.28	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT20	Temperature :	23~24°C
Test Channel :	11	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	95.07	-	-	90.62	32.45	6.56	34.56	100	355	Average
2460	105.07	-	-	100.62	32.45	6.56	34.56	100	355	Peak
4926	47.81	-26.19	74	58.55	34.83	10.21	55.78	100	0	Peak
7386	49.09	-24.91	74	58.16	36.12	10.92	56.11	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT20	Temperature :	23~24°C
Test Channel :	11	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	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	90.66	-	-	86.21	32.45	6.56	34.56	103	113	Average
2464	101.37	-	-	96.92	32.45	6.56	34.56	103	113	Peak
4926	47.88	-26.12	74	58.62	34.83	10.21	55.78	100	0	Peak
7386	49.21	-24.79	74	58.28	36.12	10.92	56.11	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT40	Temperature :	23~24°C
Test Channel :	03	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Horizontal
Remark :	1. 2420 MHz is fundamental signal which can be ignored. 2. 2394.51 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
2394.51	71.2	-11.59	82.79	66.95	32.36	6.45	34.56	100	48	Peak
2420	92.18	-	-	87.85	32.4	6.49	34.56	100	48	Average
2420	102.79	-	-	98.46	32.4	6.49	34.56	100	48	Peak
4845	47.95	-26.05	74	58.54	34.86	10.17	55.62	100	0	Peak
7266	48.69	-25.31	74	57.95	36.14	10.95	56.35	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT40	Temperature :	23~24°C
Test Channel :	03	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2420 MHz is fundamental signal which can be ignored. 2. 2393.25 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
2393.25	67.9	-9.69	77.59	63.65	32.36	6.45	34.56	103	321	Peak
2420	87.56	-	-	83.23	32.4	6.49	34.56	103	321	Average
2420	97.59	-	-	93.26	32.4	6.49	34.56	103	321	Peak
4845	47.91	-26.09	74	58.5	34.86	10.17	55.62	100	0	Peak
7266	47.6	-26.4	74	56.86	36.14	10.95	56.35	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT40	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Horizontal
Remark :	1. 2440 MHz is fundamental signal which can be ignored. 2. 2399.46 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
2399.46	66.49	-16.3	82.79	62.24	32.36	6.45	34.56	100	45	Peak
2440	93.07	-	-	88.68	32.43	6.52	34.56	100	45	Average
2440	102.79	-	-	98.4	32.43	6.52	34.56	100	45	Peak
4875	48.58	-25.42	74	59.23	34.85	10.18	55.68	100	0	Peak
7311	48.85	-25.15	74	58.05	36.14	10.94	56.28	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT40	Temperature :	23~24°C
Test Channel :	06	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. 2399.46 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
2399.46	62.02	-17.45	79.47	57.77	32.36	6.45	34.56	103	82	Peak
2439	89.65	-	-	85.26	32.43	6.52	34.56	103	82	Average
2439	99.47	-	-	95.08	32.43	6.52	34.56	103	82	Peak
4875	48.16	-25.84	74	58.81	34.85	10.18	55.68	100	0	Peak
7311	48.85	-25.15	74	58.05	36.14	10.94	56.28	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT40	Temperature :	23~24°C
Test Channel :	09	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Horizontal
Remark :	1. 2454 MHz is fundamental signal which can be ignored. 2. 2396.67 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
2396.67	61.36	-19.89	81.25	57.11	32.36	6.45	34.56	100	353	Peak
2454	91.82	-	-	87.37	32.45	6.56	34.56	100	353	Average
2454	101.25	-	-	96.8	32.45	6.56	34.56	100	353	Peak
4905	48.4	-25.6	74	59.11	34.83	10.2	55.74	100	0	Peak
7356	49.79	-24.21	74	58.92	36.13	10.92	56.18	100	0	Peak

Test Mode :	2.4GHz 802.11n-HT40	Temperature :	23~24°C
Test Channel :	09	Relative Humidity :	47~49%
Test Engineer :	Kai Wang and Timberland Lin	Polarization :	Vertical
Remark :	1. 2452 MHz is fundamental signal which can be ignored. 2. 2398.2 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
2398.2	56.03	-20.77	76.8	51.78	32.36	6.45	34.56	100	319	Peak
2452	87.06	-	-	82.67	32.43	6.52	34.56	100	319	Average
2452	96.8	-	-	92.41	32.43	6.52	34.56	100	319	Peak
4905	47.73	-26.27	74	58.44	34.83	10.2	55.74	100	0	Peak
7356	50.56	-23.44	74	59.69	36.13	10.92	56.18	100	0	Peak

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

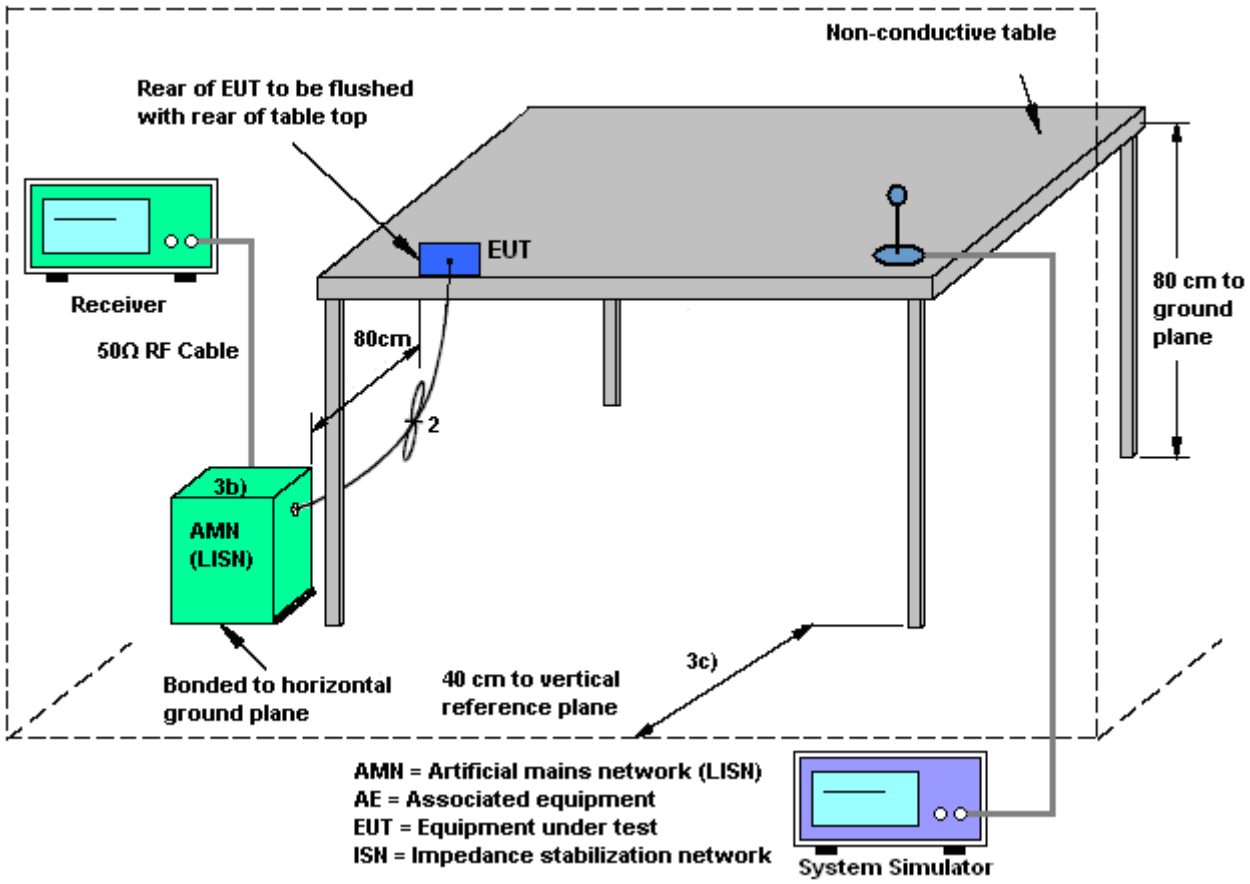
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

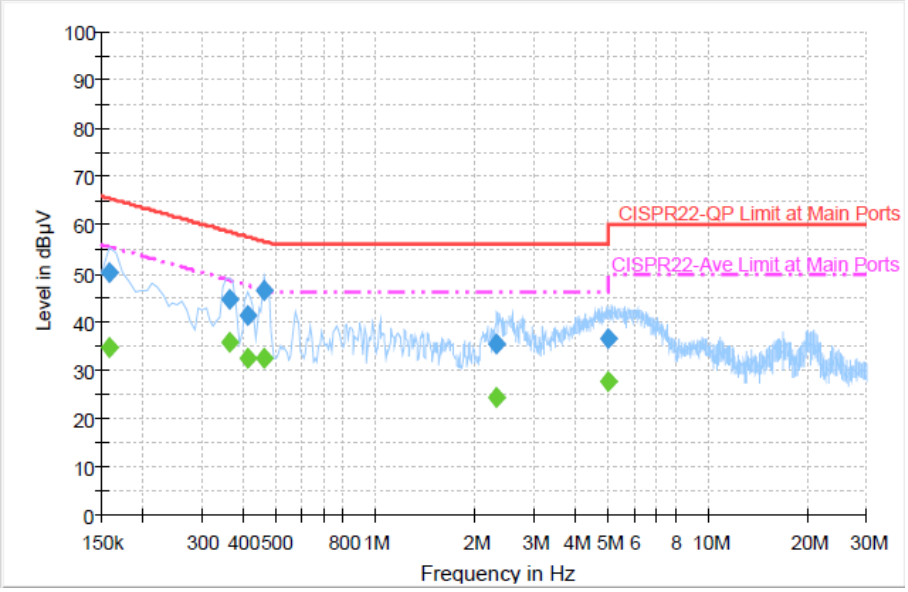
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Slash Huang	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 2 + Battery + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



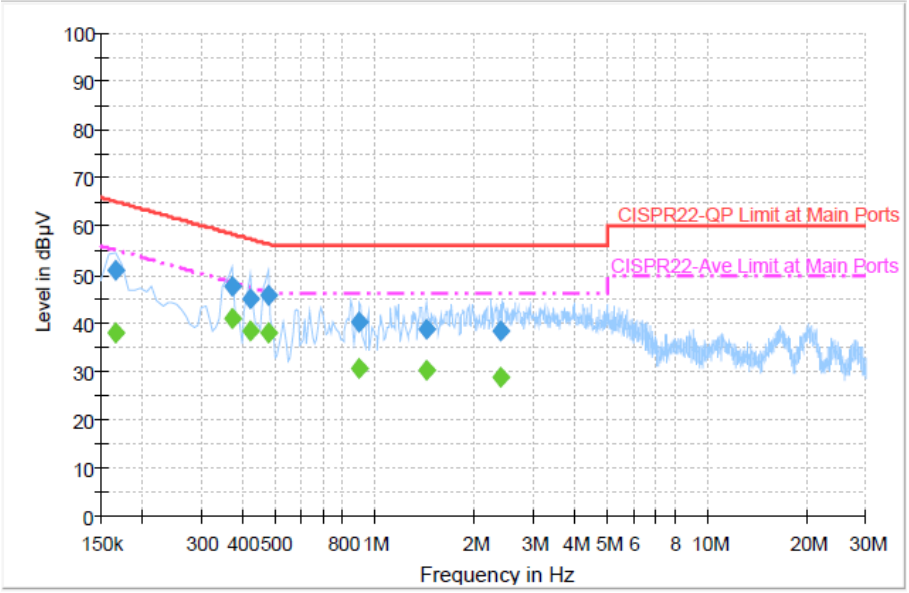
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	50.3	Off	L1	19.3	15.3	65.6
0.366000	44.8	Off	L1	19.4	13.8	58.6
0.414000	41.2	Off	L1	19.4	16.4	57.6
0.462000	46.5	Off	L1	19.3	10.2	56.7
2.318000	35.4	Off	L1	19.6	20.6	56.0
5.038000	36.6	Off	L1	19.6	23.4	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	34.5	Off	L1	19.3	21.1	55.6
0.366000	35.9	Off	L1	19.4	12.7	48.6
0.414000	32.5	Off	L1	19.4	15.1	47.6
0.462000	32.5	Off	L1	19.3	14.2	46.7
2.318000	24.2	Off	L1	19.6	21.8	46.0
5.038000	27.7	Off	L1	19.6	22.3	50.0

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Slash Huang	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN Link + MPEG4 + Earphone 2 + Battery + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	51.0	Off	N	19.4	14.2	65.2
0.374000	47.5	Off	N	19.4	10.9	58.4
0.422000	45.0	Off	N	19.4	12.4	57.4
0.478000	45.7	Off	N	19.4	10.7	56.4
0.902000	40.2	Off	N	19.5	15.8	56.0
1.430000	38.9	Off	N	19.5	17.1	56.0
2.398000	38.3	Off	N	19.7	17.7	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	38.0	Off	N	19.4	17.2	55.2
0.374000	41.1	Off	N	19.4	7.3	48.4
0.422000	38.2	Off	N	19.4	9.2	47.4
0.478000	38.2	Off	N	19.4	8.2	46.4
0.902000	30.7	Off	N	19.5	15.3	46.0
1.430000	30.1	Off	N	19.5	15.9	46.0
2.398000	28.8	Off	N	19.7	17.2	46.0

3.7 Antenna Requirements

3.7.1 Standard Applicable

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

3.7.2 Antenna Connected Construction

Non-standard connector used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Jan. 17, 2013 ~ Jan. 18, 2013	Jun. 05, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Sep. 08, 2012	Jan. 17, 2013 ~ Jan. 18, 2013	Sep. 07, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Sep. 08, 2012	Jan. 17, 2013 ~ Jan. 18, 2013	Sep. 07, 2013	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz – 2.75GHz	Nov. 13, 2012	May 28, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	May 28, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	May 28, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	May 28, 2013	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP30	101352	9kHz~30GHz	Nov. 07, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Nov. 06, 2013	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9kHz ~ 26.5GHz	Nov. 26, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Nov. 25, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/0003	20MHz ~ 1000MHz	May 04, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	May 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Jul. 31, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	COM-POWER	AH-118	071025	1GHz~18GHz	Aug. 09, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Aug. 08, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9kHz ~ 1GHz	Apr. 11, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159087	1GHz~18GHz	Feb. 27, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Feb. 26, 2013	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9kHz ~ 30MHz	Jul. 03, 2012	Jan. 22, 2013 ~ Jan. 23, 2013	Jul. 02, 2013	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0 - 360 degree	N/A	Jan. 22, 2013 ~ Jan. 23, 2013	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1 m ~ 4 m	N/A	Jan. 22, 2013 ~ Jan. 23, 2013	N/A	Radiation (03CH06-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**

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

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

Appendix A. Photographs of EUT

Please refer to Sporton report number EP2D2653-01 as below.

Appendix C. Product Equality Declaration

Bullitt Group

No. 4, The Aquarium, King Street, Reading RG1 2AN, United Kingdom
Tel: +44 (0) 7818 413 871 ; Fax: +44 (0) 7818 413 871

Federal Communications Commission
Authorization and Evaluation Division
1435 Oakland Mills Road
Columbia, MD 21046

To whom it may concern:

The differences between devices FCC ID: ZL5B15 and FCC ID: ZL5B15AWS are outlined as below.

- Antenna design is the same.
- PCB: DDR1 change to DDR2 memory (Layout modification)
- PCB: Add HAC inductor at receiver for HAC t-coil (Layout modification, A case modification)
- PCB: Add WCDMA Band 4 hardware.
- PCB: Introduce some 2nd source passive components
- Assembly: LCM module change new driver IC (FPC layout modification), module outline is the same as FCC ID ZL5B15.
  (SW change new LCM driver and HW add one GPIO for auto configuration new/old LCM..)
- Add 2nd source earphone

Based on the similarity between two FCC IDs, we hereby request permission to use Part 15C/22H/24E test data of FCC ID: ZL5B15 granted on 2013/02/19, verifying the worst cases found in ZL5B15 on ZL5B15AWS, to show the compliance of FCC ID ZL5B15AWS regarding Part 15C/22H/24E requirements. As for Part 27, the RF and SAR assessment will be fully tested in accordance with Part 27 and SAR requirements.

Sincerely,

Richard Wharton
rwharton@bullitt-group.com