FCC RF Test Report

APPLICANT	:	Barnes&Noble.com
EQUIPMENT	:	eBook
BRAND NAME	:	Nook
MODEL NAME	:	BNTV400
FCC ID	:	XHHBNTV400-A
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Aug. 09, 2012 and completely tested on Oct. 02, 2012. 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:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

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

TABLE OF CONTENTS

REVISION HISTORY 3

SUMMARY OF TEST RESULT 4

1 GENERAL DESCRIPTION 5

1.1 Applicant 5

1.2 Feature of Equipment Under Test 5

1.3 Testing Site 7

1.4 Applied Standards 7

1.5 Ancillary Equipment List 7

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST 8

2.1 Carrier Frequency Channel 8

2.2 Pre-Scanned RF Power 9

2.3 Test Mode 10

2.4 Connection Diagram of Test System 11

2.5 RF Utility 11

3 TEST RESULT 12

3.1 6dB and 99% Bandwidth Measurement 12

3.2 Output Power Measurement 25

3.3 Power Spectral Density Measurement 28

3.4 Conducted Band Edges and Spurious Emission Measurement 35

3.5 Radiated Emission Measurement 48

3.6 AC Conducted Emission Measurement 67

3.7 Antenna Requirements 71

4 LIST OF MEASURING EQUIPMENT 72

5 UNCERTAINTY OF EVALUATION 73

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR280906B	Rev. 01	Initial issue of report	Oct. 12, 2012

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	Gen 4.6.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)	A8.4	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	A8.2(b)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	A8.5	Conducted Band Edges	≤ 20dBc	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	A8.5	Radiated Band Edges	15.209(a) & 15.247(d)	Pass	-
			Radiated Spurious Emission		Pass	Under limit 3.93 dB at 14472.000 MHz
3.6	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 8.70 dB at 0.470 MHz
3.7	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Barnes&Noble.com
76 Ninth Avenue, 9th Floor, New York, NY 10011

1.2 Feature of Equipment Under Test

Product Feature	
Equipment	eBook
Brand Name	Nook
Model Name	BNTV400
FCC ID	XHHBNTV400-A
Sample A	SKU 3: 3022960041994111
Sample B	SKU 4: 3023020046204130
Sample C	SKU 5: 3022950040664102
Sample D	SKU 5: 3022950037324101
EUT supports Radios application	WLAN 11bgn / Bluetooth
HW Version	EVT2
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.

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 : 19.01 dBm (0.0796 W) 802.11g : 23.88 dBm (0.2443 W) 802.11n HT20 : 23.23 dBm (0.2104 W)
99% Occupied Bandwidth	802.11b : 14.00MHz 802.11g : 17.95MHz 802.11n HT20 : 18.95MHz
Antenna Type	Printed Antenna with gain -0.16 dBi
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

	Sample A	Sample B
PCBA SKU #	SKU 3	SKU 4
Model Number	BNTV400	BNTV400
CPU	OMAP 1.3 GHz	OMAP 1.3 GHz
Memory	1GB DDR2 for PoP @ 533 Mhz	1GB DDR2 for PoP @ 533 Mhz
eMMC/Managed NAND Flash	8GB	8GB
Wilreless	Combo, Wlan 802.11b/g/n, Bluetooth 2.1+EDR	Combo, Wlan 802.11b/g/n, Bluetooth 2.1+EDR
Battery	Li-Ion Rechargeable Battery	Li-Ion Rechargeable Battery
Display Module	7" LCM	7" LCM
Touch Controller	yes	yes

	Sample C	Sample D
PCBA SKU #	SKU 5	SKU 5
Model Number	BNTV400	BNTV400
CPU	OMAP 1.3 GHz	OMAP 1.3 GHz
Memory	1GB DDR2 for PoP @ 533 Mhz	1GB DDR2 for PoP @ 533 Mhz
eMMC/Managed NAND Flash	16GB	16GB
Wilreless	Combo, Wlan 802.11b/g/n, Bluetooth 2.1+EDR	Combo, Wlan 802.11b/g/n, Bluetooth 2.1+EDR
Battery	Li-Ion Rechargeable Battery	Li-Ion Rechargeable Battery
Display Module	7" LCM	7" LCM
Touch Controller	yes	yes

1.3 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

1.4 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 v01
- FCC TCB Workshop 2012, April
- ANSI C63.4-2003 and ANSI C63.10-2009
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3

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.

1.5 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-605	KA2DIR605B1	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
3.	iPod Earphone	Apple	N/A	FCC DoC	Unshielded, 1.0 m	N/A
4.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

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. Final Output Power equals to Measured Output Power adds the duty factor.

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	19.01	18.99	18.65	18.78

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)	23.88	23.84	23.78	23.77	23.85	23.72	23.63	23.57

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	23.33	23.3	23.22	23.06	22.97	23.25	22.96	22.83

2.3 Test Mode

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

Test Cases				
	Test Items	**Mode**	**Data Rate**	**Test Channel**
Conducted TCs	**6dB and 99% BW Power Spectral Density**	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
	Output Power	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
	Conducted Band EDGE	**802.11b**	**1 Mbps**	**1/11**
		802.11g	**6 Mbps**	**1/11**
		802.11n HT20	**6.5 Mbps**	**1/11**
	Conducted Spurious Emission	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
Radiated TCs	**Radiated Band EDGE**	**802.11b**	**1 Mbps**	**1/11**
		802.11g	**6 Mbps**	**1/11**
		802.11n HT20	**6.5 Mbps**	**1/11**
	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**
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN Link + H Pattern + TC +USB Cable (Charging from Adapter 1) for Sample C			

Remark:

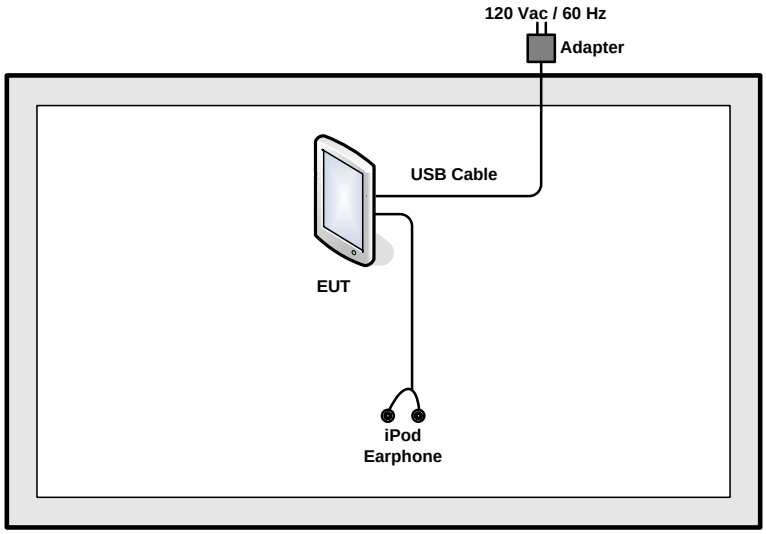
1. TC stands for Test Configuration, and consists of iPod earphone and SD card.

2. Manufacturer of Adapter 1 is Foxlink and Manufacturer of Adapter 2 is APD.

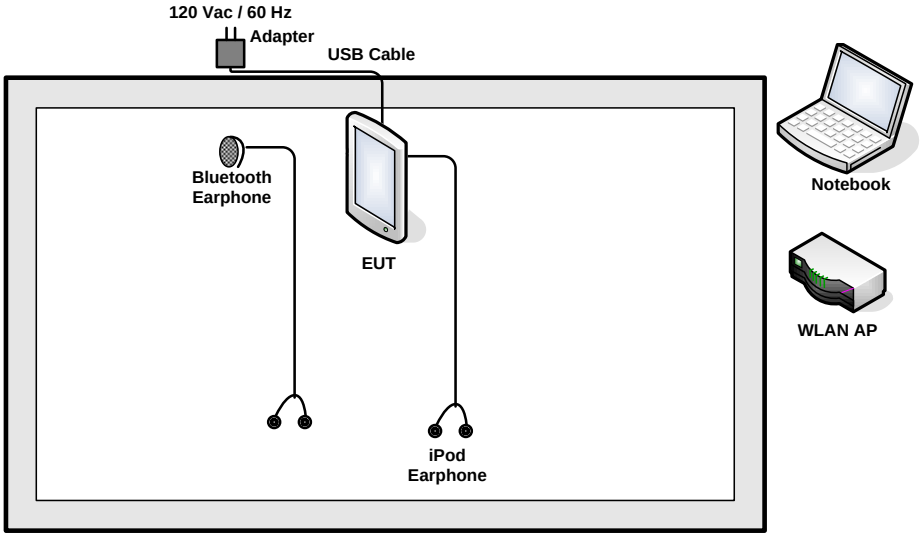
3. For radiated TCs, the test was performance with Adapter 2.

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 RF Utility

For WLAN function, programmed RF utility, “ADB” installed in the notebook make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

3 Test Result

3.1 6dB and 99% 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 D01 DTS Meas. Guidance and TCB Workshop 2012, April.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable. 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) = 1-5% of the emission bandwidth (EBW).Set the Video bandwidth (VBW) ≥ 3 * RBW. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.

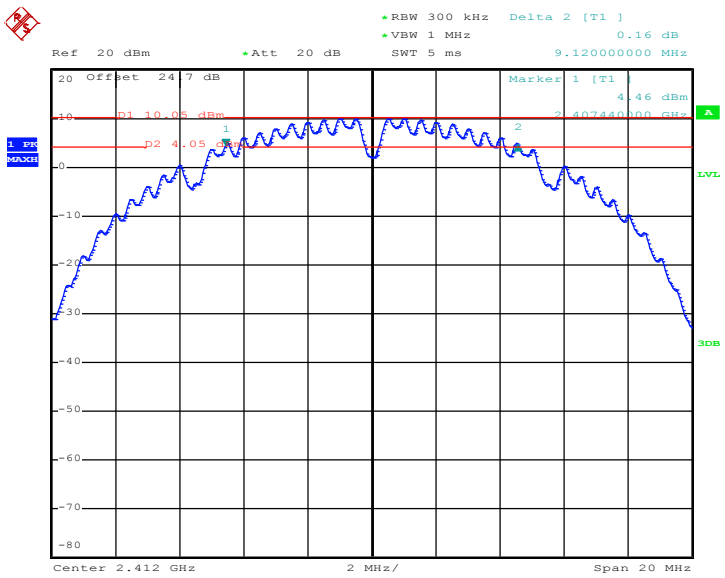
3.1.4 Test Setup

3.1.5 Test Result of 6dB Bandwidth

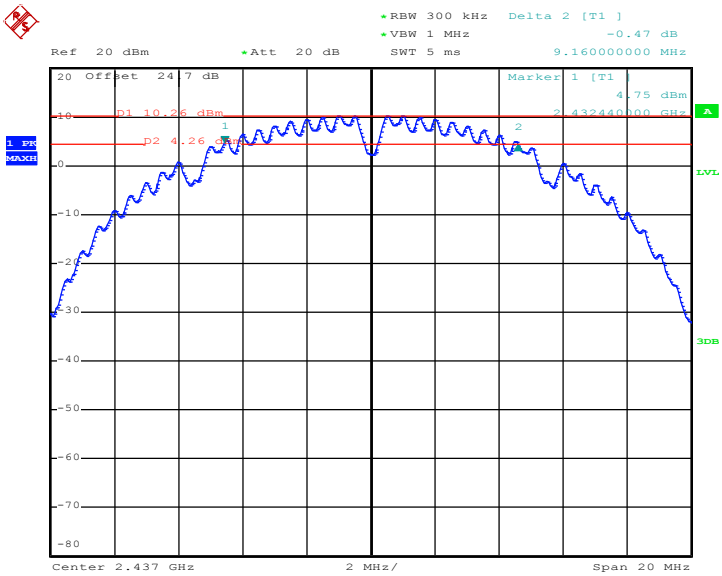
Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	9.12	0.5	Pass
06	2437	9.16	0.5	Pass
11	2462	9.16	0.5	Pass

6 dB Bandwidth Plot on 802.11b Channel 01

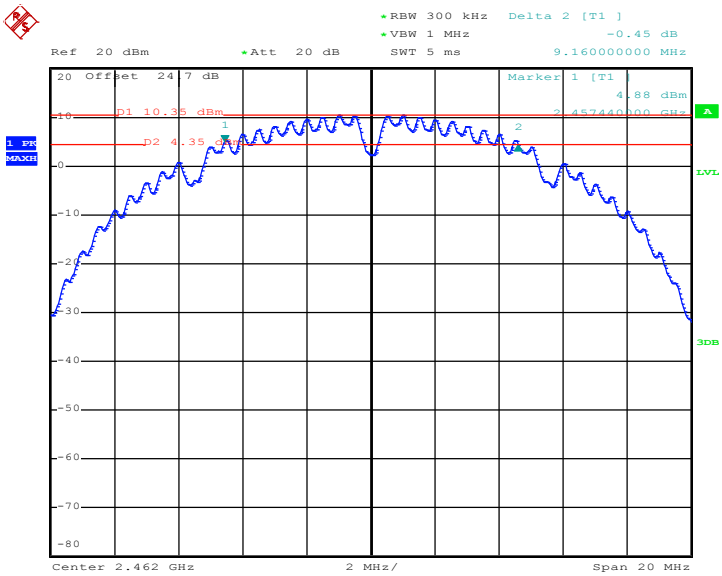


6 dB Bandwidth Plot on 802.11b Channel 06



Date: 31.AUG.2012 20:03:44

6 dB Bandwidth Plot on 802.11b Channel 11

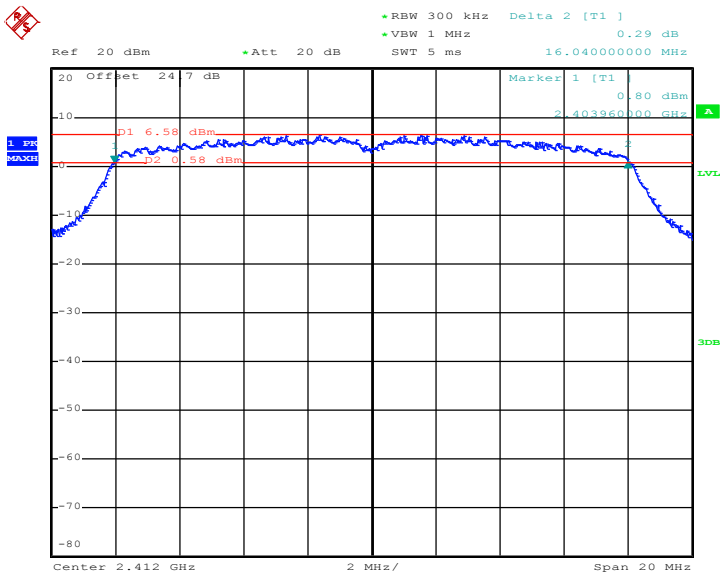


Date: 31.AUG.2012 20:07:26

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

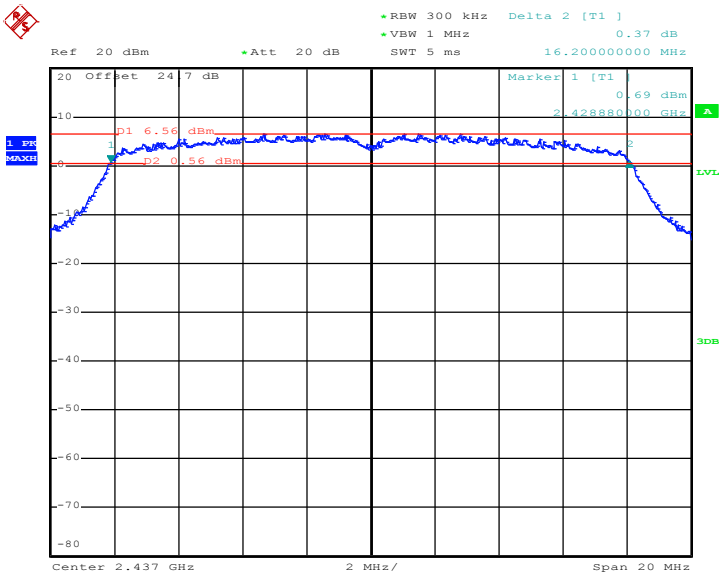
Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.04	0.5	Pass
06	2437	16.20	0.5	Pass
11	2462	16.16	0.5	Pass

6 dB Bandwidth Plot on 802.11g Channel 01



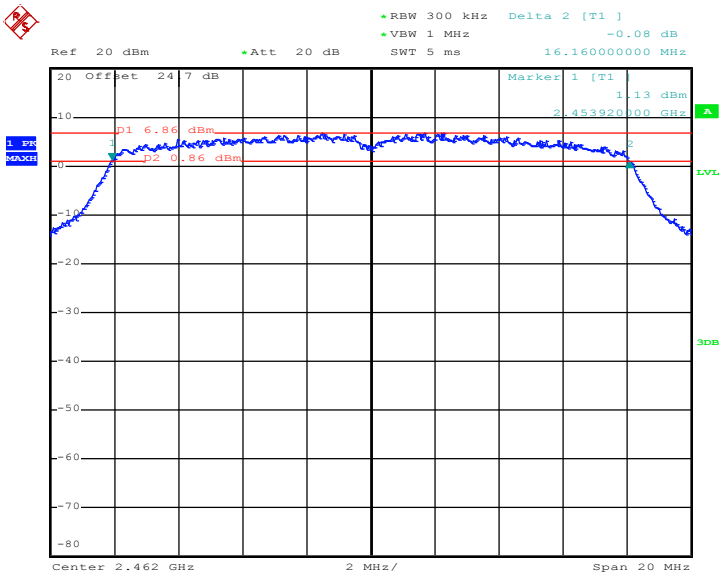
Date: 31.AUG.2012 20:17:32

6 dB Bandwidth Plot on 802.11g Channel 06



Date: 31.AUG.2012 20:14:30

6 dB Bandwidth Plot on 802.11g Channel 11

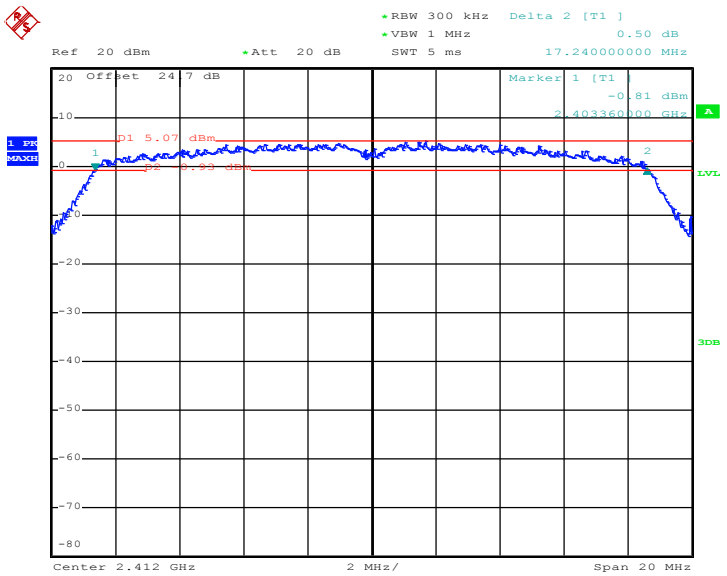


Date: 31.AUG.2012 20:11:04

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

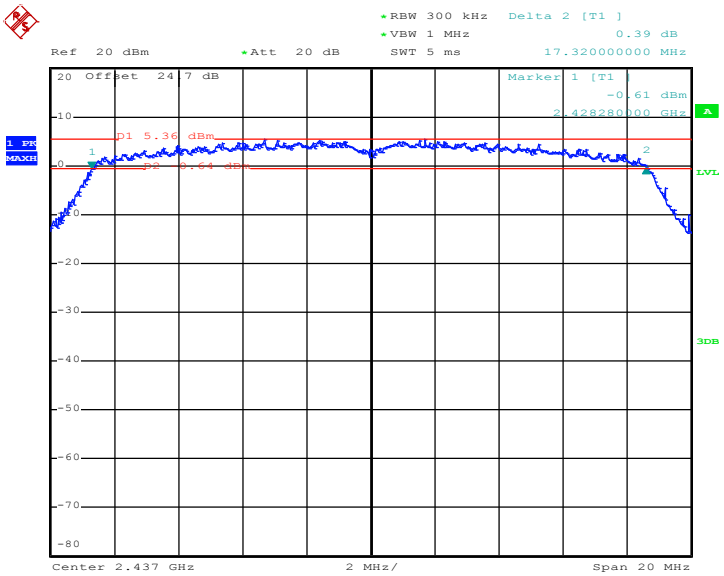
Channel	Frequency (MHz)	2.4GHz 802.11n HT20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.24	0.5	Pass
06	2437	17.32	0.5	Pass
11	2462	17.32	0.5	Pass

6 dB Bandwidth Plot on 802.11n HT20 Channel 01



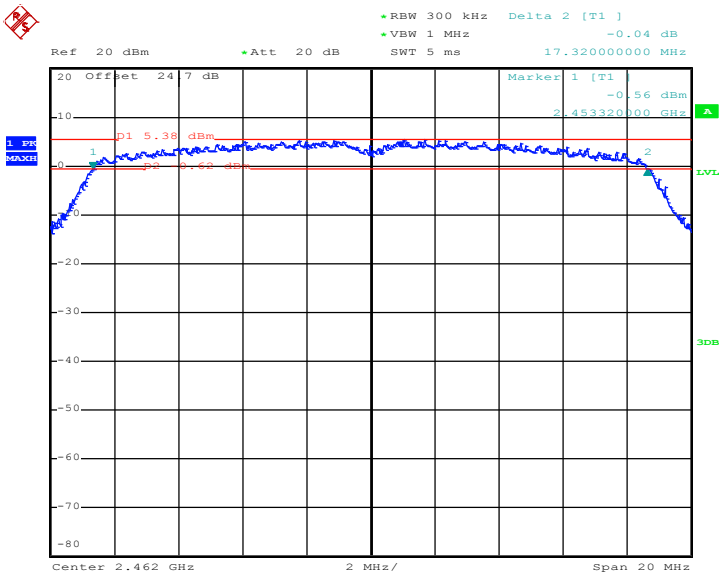
Date: 31.AUG.2012 20:21:36

6 dB Bandwidth Plot on 802.11n HT20 Channel 06



Date: 31.AUG.2012 20:24:34

6 dB Bandwidth Plot on 802.11n HT20 Channel 11



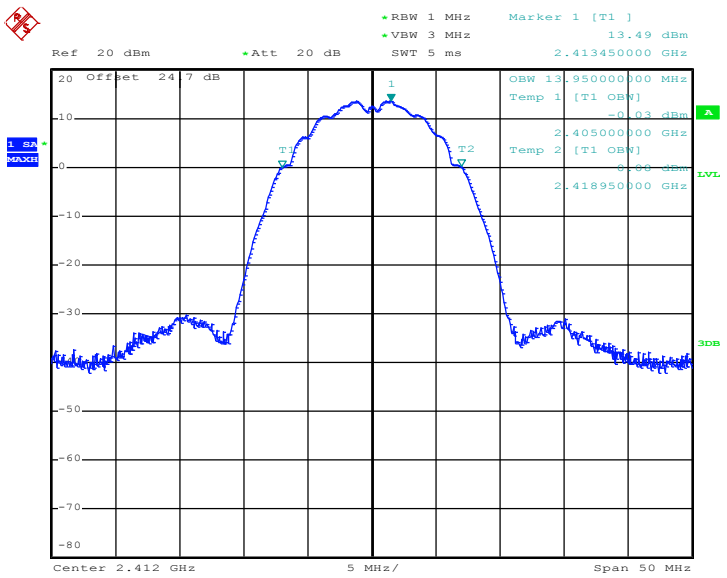
Date: 31.AUG.2012 20:27:18

3.1.6 Test Result of 99% Occupied Bandwidth

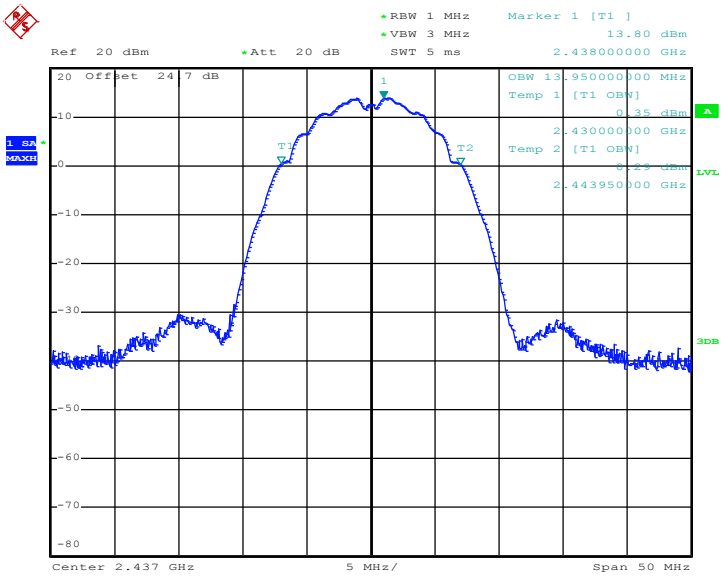
Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	802.11b 99% Occupied Bandwidth (MHz)	Pass/Fail
01	2412	13.95	Pass
06	2437	13.95	Pass
11	2462	14.00	Pass

99% Occupied Bandwidth Plot on 802.11b Channel 01

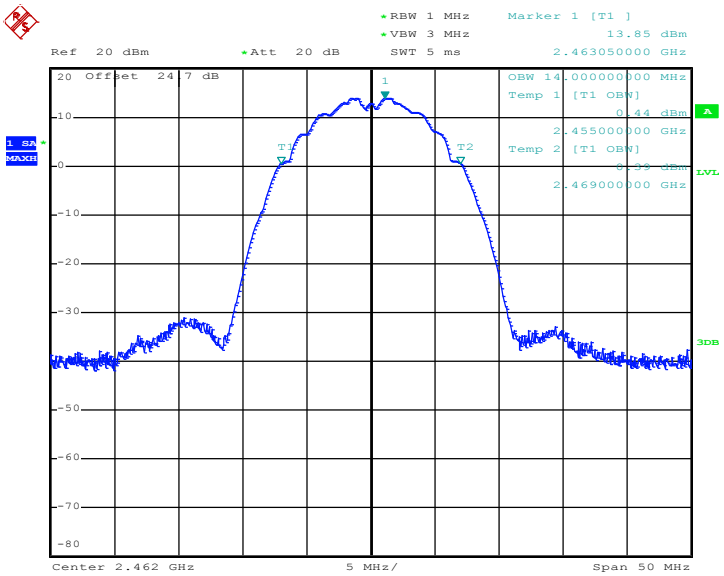


99% Occupied Bandwidth Plot on 802.11b Channel 06



Date: 31.AUG.2012 20:05:41

99% Occupied Bandwidth Plot on 802.11b Channel 11

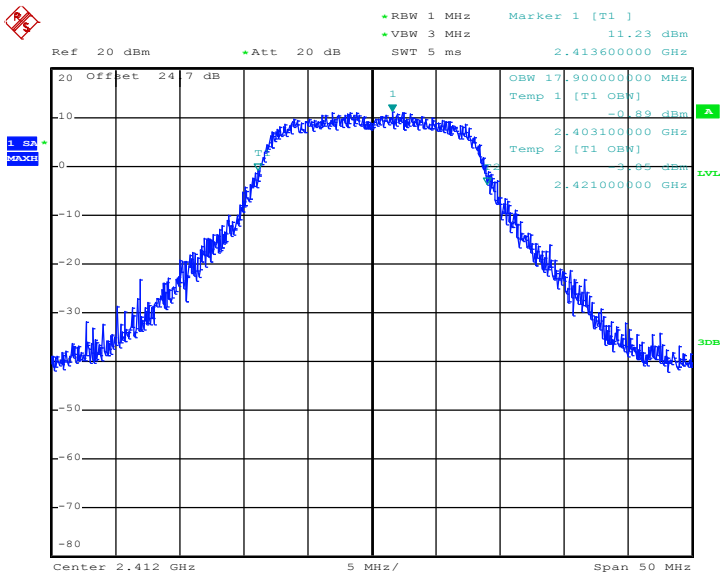


Date: 31.AUG.2012 20:08:55

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

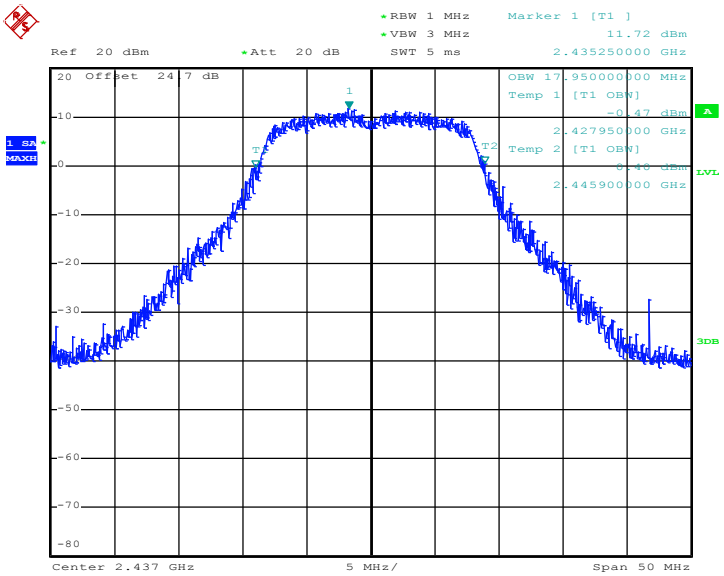
Channel	Frequency (MHz)	802.11g 99% Occupied Bandwidth (MHz)	Pass/Fail
01	2412	17.90	Pass
06	2437	17.95	Pass
11	2462	17.85	Pass

99% Occupied Bandwidth Plot on 802.11g Channel 01



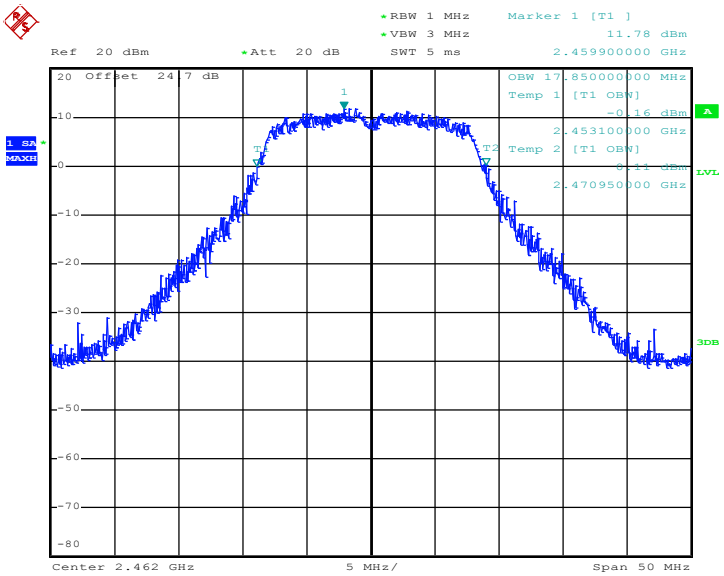
Date: 31.AUG.2012 20:19:05

99% Occupied Bandwidth Plot on 802.11g Channel 06



Date: 31.AUG.2012 20:15:47

99% Occupied Bandwidth Plot on 802.11g Channel 11

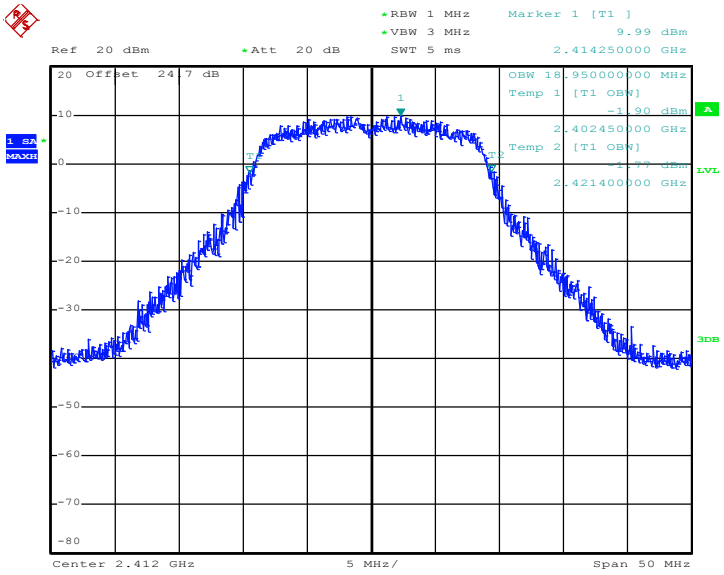


Date: 31.AUG.2012 20:12:39

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

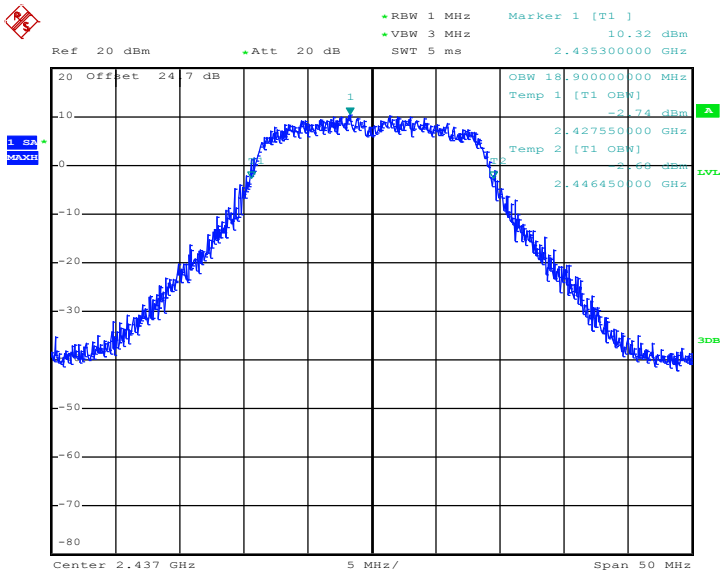
Channel	Frequency (MHz)	2.4GHz 802.11n HT20 99% Occupied Bandwidth (MHz)	Pass/Fail
01	2412	18.95	Pass
06	2437	18.90	Pass
11	2462	18.95	Pass

99% Occupied Bandwidth Plot 802.11n HT20 Channel 01



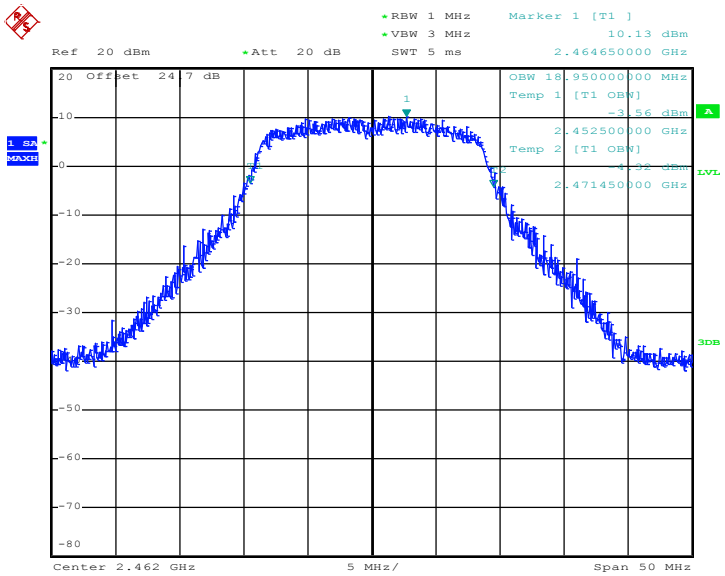
Date: 31.AUG.2012 20:23:07

99% Occupied Bandwidth Plot 802.11n HT20 Channel 06



Date: 31.AUG.2012 20:25:41

99% Occupied Bandwidth Plot 802.11n HT20 Channel 11



Date: 31.AUG.2012 20:29:02

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.

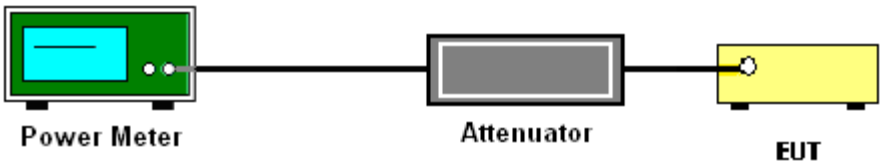
3.2.2 Measuring Instruments

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 and TCB Workshop 2012, April.
2. The RF output of EUT was connected to the power meter by a low loss cable
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 :	52~55%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	19.01	30	Pass
06	2437	18.40	30	Pass
11	2462	17.99	30	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	23.32	30	Pass
06	2437	23.52	30	Pass
11	2462	23.88	30	Pass

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	22.55	30	Pass
06	2437	23.05	30	Pass
11	2462	23.33	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 :	52~55
Duty Cycle:	100%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	16.79
06	2437	16.07
11	2462	15.76

Test Mode :	802.11g	Temperature :	24~26
Test Engineer :	Bill Kuo	Relative Humidity :	52~55
Duty Cycle:	97.76%	Duty Factor:	0.10dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	13.51
06	2437	13.79
11	2462	14.06

Test Mode :	802.11n HT20	Temperature :	24~26
Test Engineer :	Bill Kuo	Relative Humidity :	52~55
Duty Cycle:	97.37%	Duty Factor:	0.12dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)
01	2412	12.37
06	2437	12.70
11	2462	12.81

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.

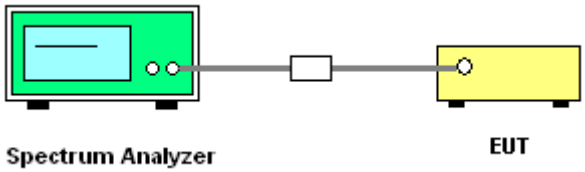
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 5.3.1 (Peak PSD) of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance and TCB Workshop 2012, April.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable. 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. Video bandwidth (VBW) >= 300 KHz In order to make an accurate measurement, set the span to 5-30% greater than Emission Bandwidth (EBW)
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 in any 100 kHz band segment within the fundamental EBW.
6. Record the measurement data derived from spectrum analyzer.
7. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (3 kHz/100 kHz = -15.2 dB).

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

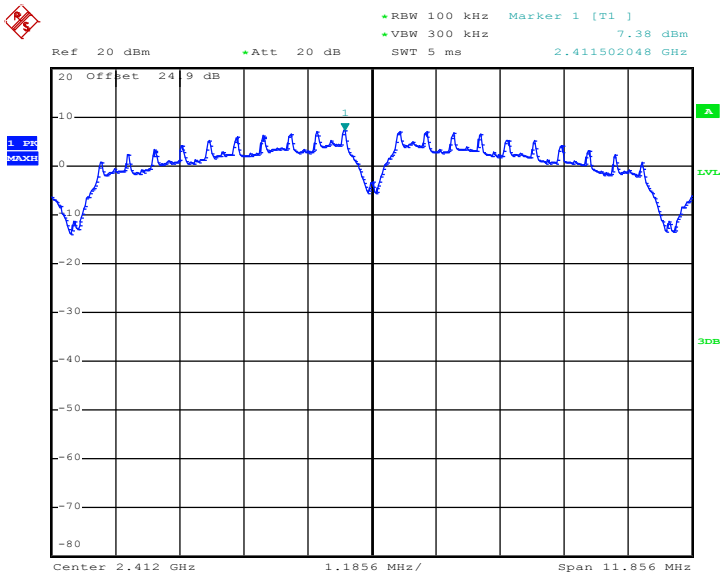
Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	7.38	-7.82	8	Pass
06	2437	6.32	-8.88	8	Pass
11	2462	5.51	-9.69	8	Pass

Note:

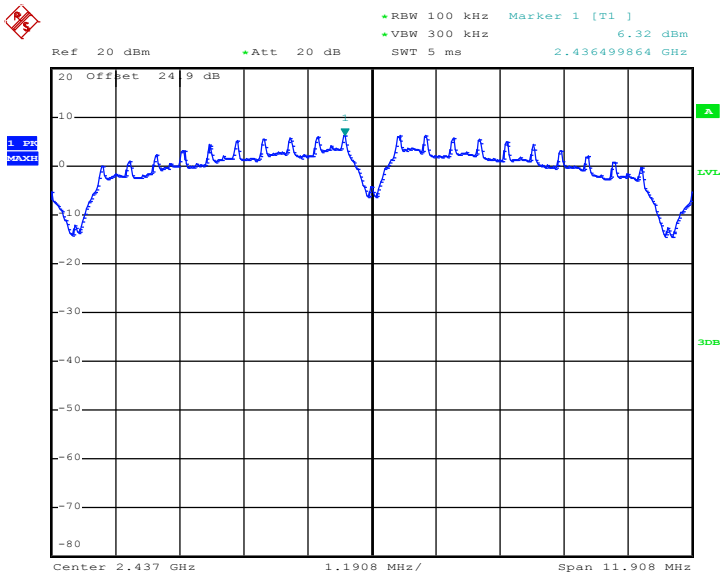
1. *Measured power density (dBm) has offset with cable loss.*
2. *BWCF (dB) = 10 log (3k/100k) = -15.2 dB*
3. *Power Density/ 3kHz (dBm)= Measured power density/ 100KHz (dBm) + BWCF (dB)*

PSD Plot on 802.11b Channel 01



292614-1002 15C PSD 802.11b 2412 (ch01)
Date: 2.OCT.2012 16:07:01

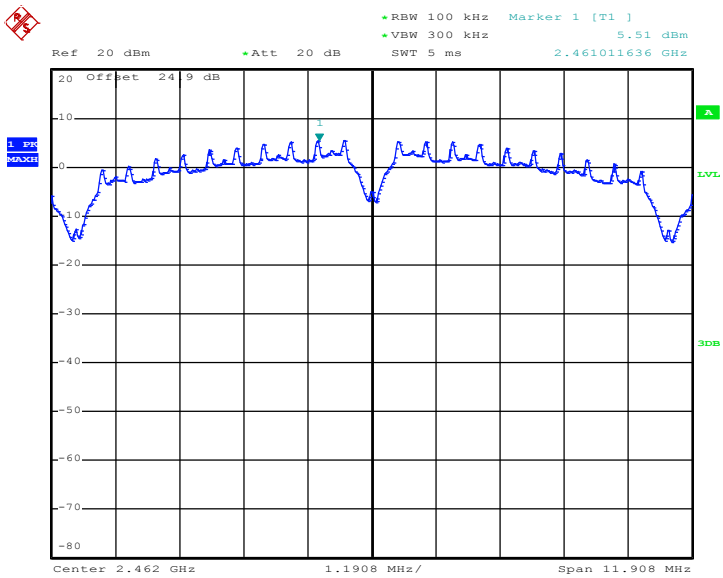
PSD Plot on 802.11b Channel 06



292614-1002 15C PSD 802.11b 2437 (ch06)

Date: 2.OCT.2012 16:09:47

PSD Plot on 802.11b Channel 11



292614-1002 15C PSD 802.11b 2462 (ch11)

Date: 2.OCT.2012 16:12:46

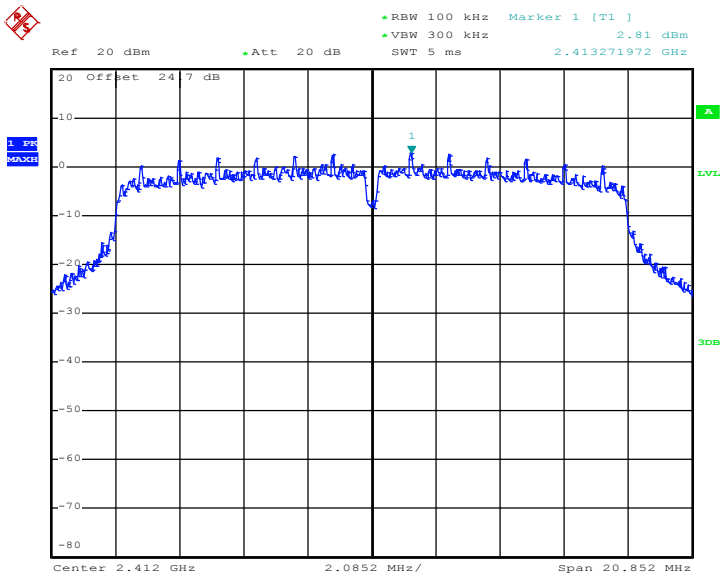
Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	2.81	-12.39	8	Pass
06	2437	2.96	-12.24	8	Pass
11	2462	3.21	-11.99	8	Pass

Note:

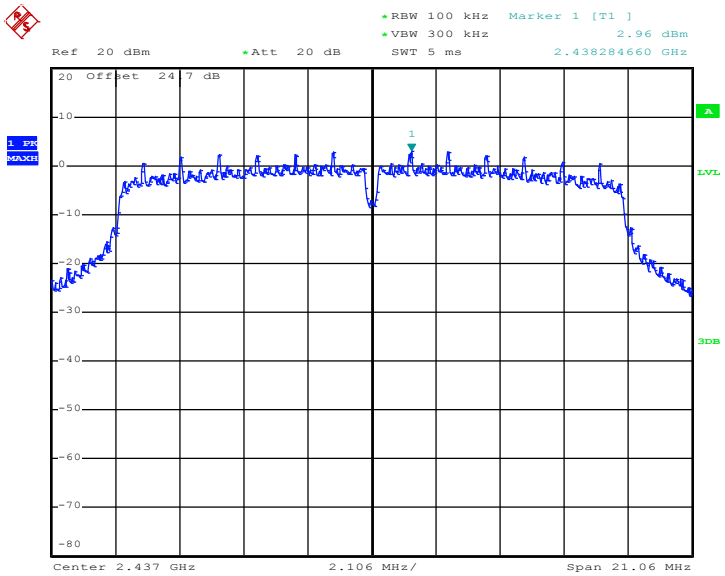
1. *Measured power density (dBm) has offset with cable loss.*
2. *BWCF (dB) = 10 log (3k/100k) = -15.2 dB*
3. *Power Density/ 3KHz (dBm)= Measured power density/ 100KHz (dBm) + BWCF (dB)*

PSD Plot on 802.11g Channel 01



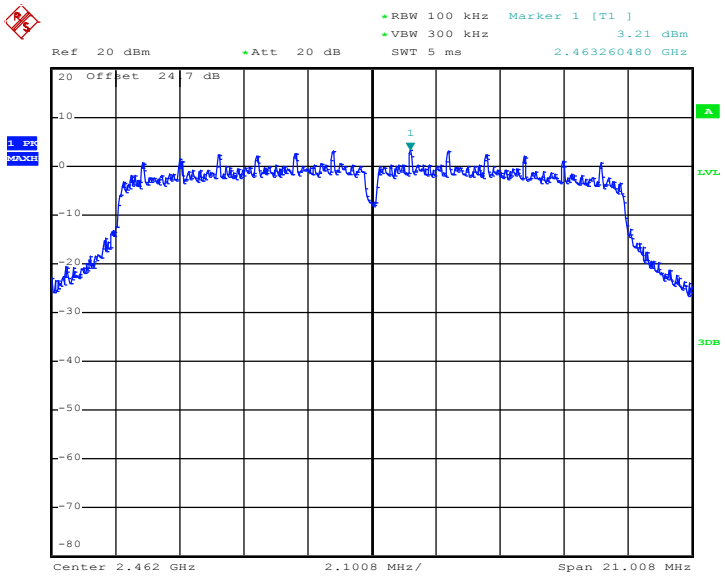
Date: 31.AUG.2012 20:17:51

PSD Plot on 802.11g Channel 06



Date: 31.AUG.2012 20:14:58

PSD Plot on 802.11g Channel 11



Date: 31.AUG.2012 20:11:31

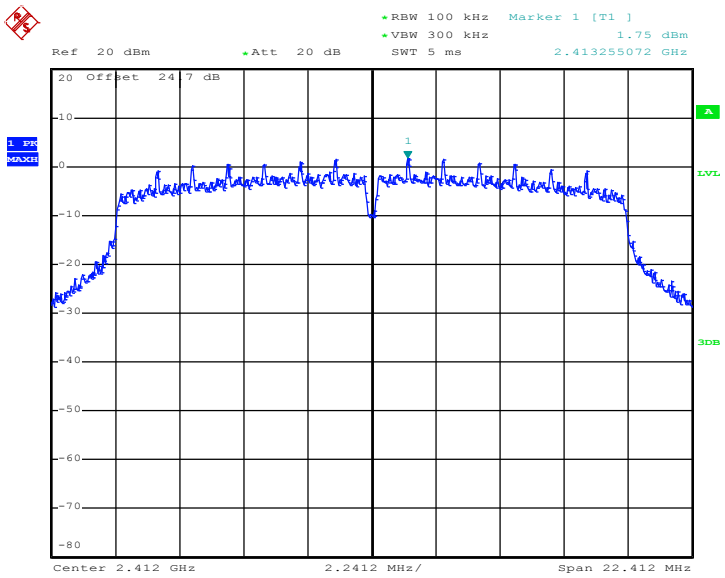
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	52~55%

Channel	Frequency (MHz)	802.11n HT20 Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	1.75	-13.45	8	Pass
06	2437	2.02	-13.18	8	Pass
11	2462	2.19	-13.01	8	Pass

Note:

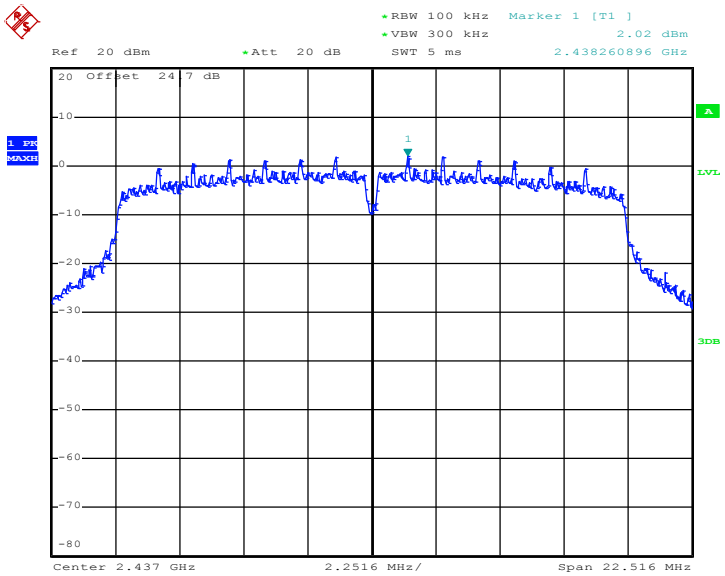
1. *Measured power density (dBm) has offset with cable loss.*
2. *BWCF (dB) = 10 log (3k/100k) = -15.2 dB*
3. *Power Density/ 3KHz (dBm)= Measured power density/ 100KHz (dBm) + BWCF (dB)*

PSD Plot on 802.11n HT20 Channel 01



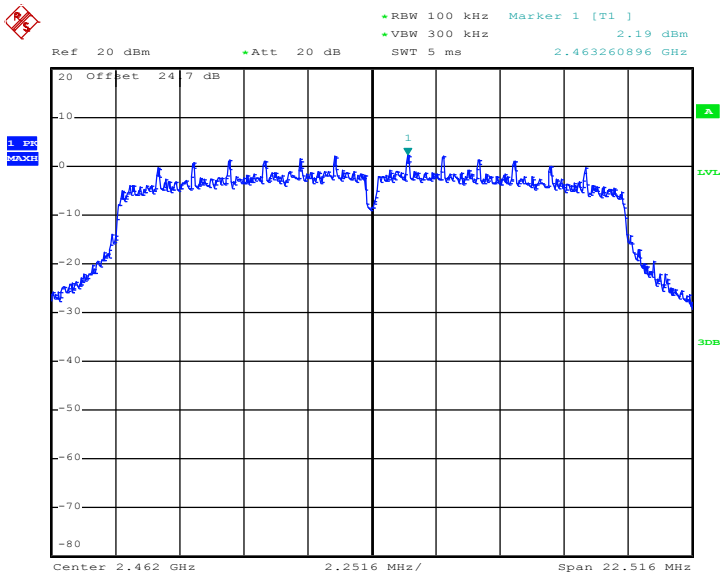
Date: 31.AUG.2012 20:22:05

PSD Plot on 802.11n HT20 Channel 06



Date: 31.AUG.2012 20:24:53

PSD Plot on 802.11n HT20 Channel 11



Date: 31.AUG.2012 20:27:45

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).

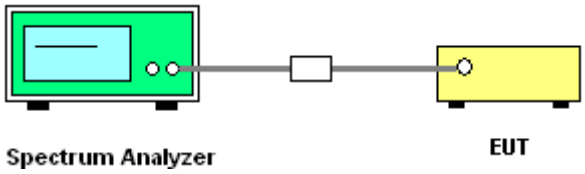
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows the guidelines in the Measurement Procedure of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance and TCB Workshop 2012, April.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. 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.
4. Measure and record the results in the test report.

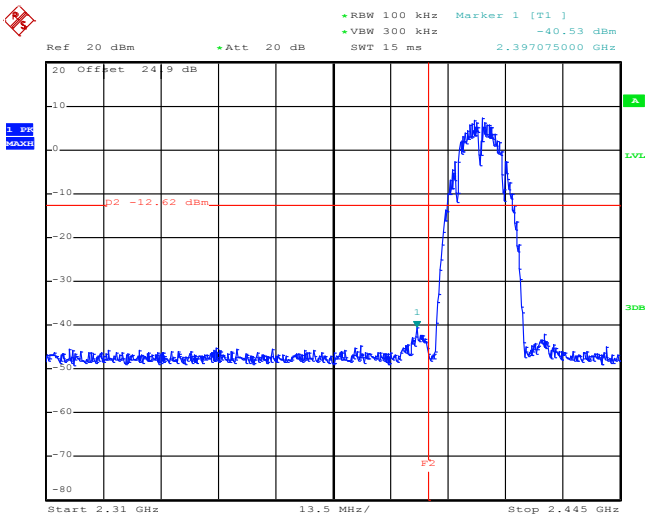
3.4.4 Test Setup



3.4.5 Test Plots of Conducted Band Edges

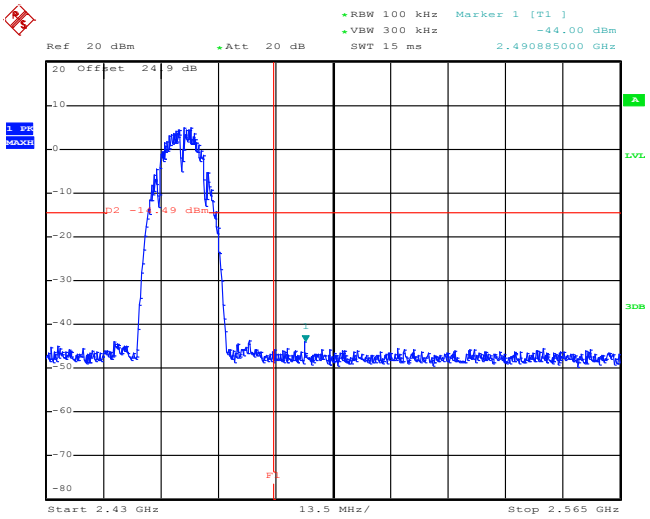
Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	Low and High	**Relative Humidity :**	52~55%
Test Channel :	01 and 11	**Test Engineer :**	Bill Kuo

Low Band Edge Plot on 802.11b Channel 01



292614-1002 15C BandEdge 802.11b 2412 (ch01)
Date: 2.OCT.2012 16:07:16

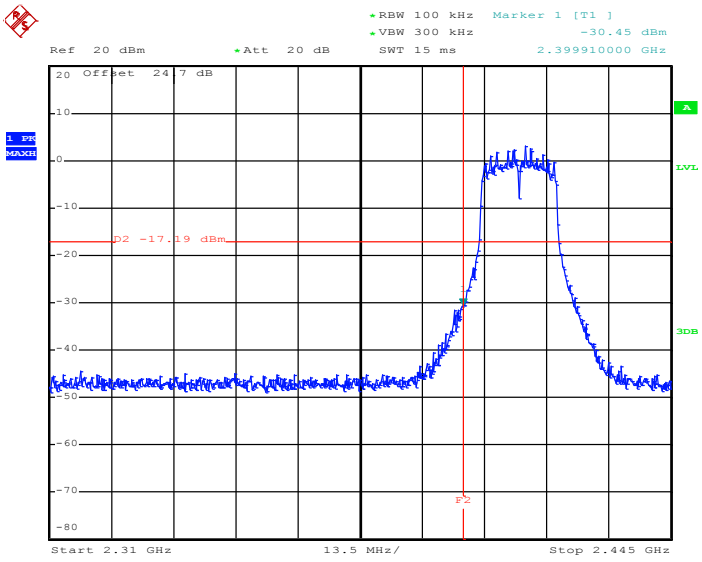
High Band Edge Plot on 802.11b Channel 11



292614-1002 15C BandEdge 802.11b 2462 (ch11)
Date: 2.OCT.2012 16:14:28

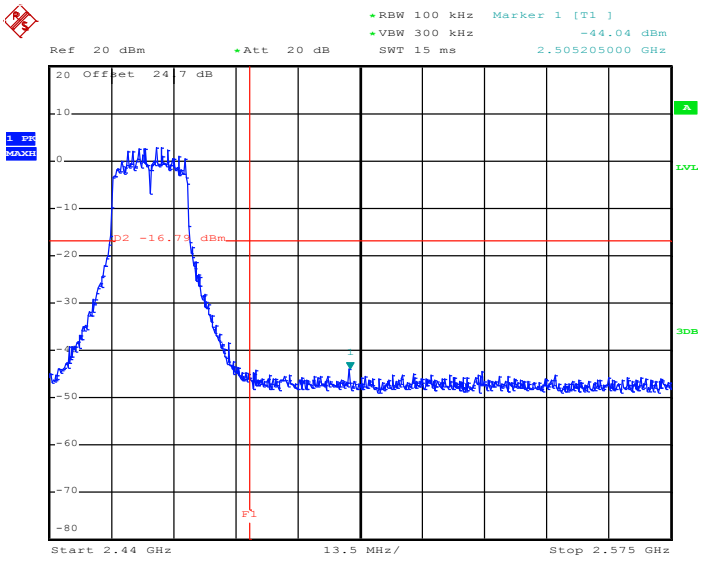
Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	Low and High	**Relative Humidity :**	52~55%
Test Channel :	01 and 11	**Test Engineer :**	Bill Kuo

Low Band Edge Plot on 802.11g Channel 01



Date: 31.AUG.2012 20:18:05

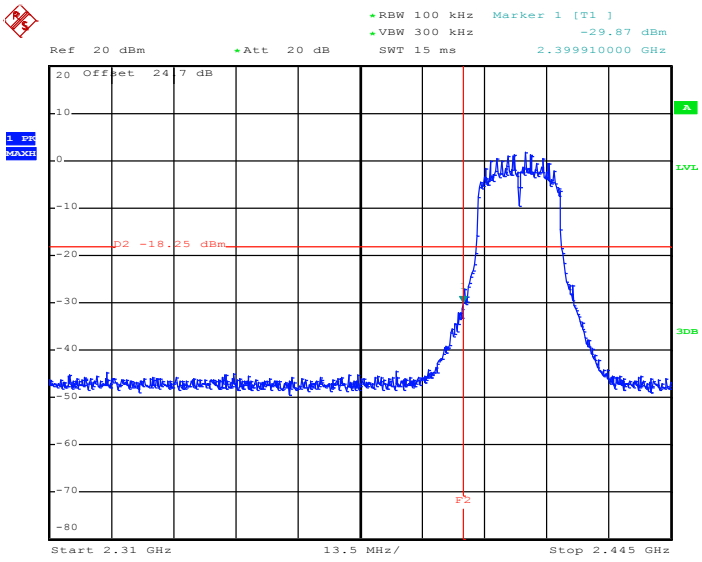
High Band Edge Plot on 802.11g Channel 11



Date: 31.AUG.2012 20:11:46

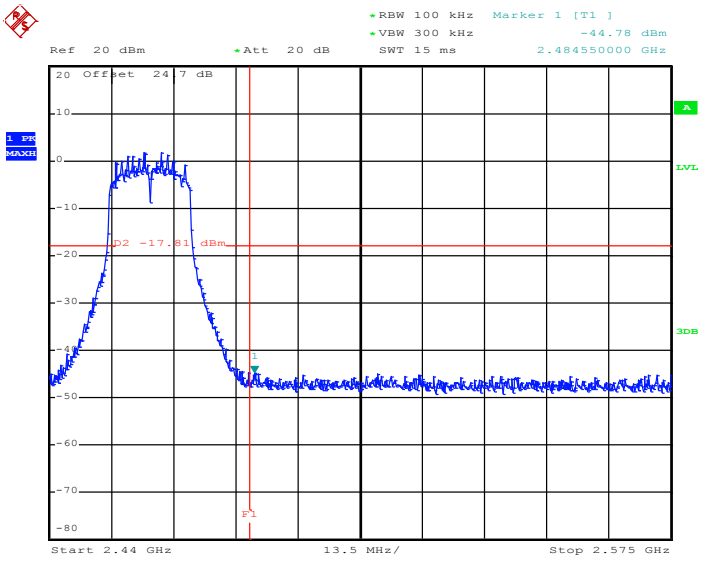
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	Low and High	Relative Humidity :	52~55%
Test Channel :	01 and 11	Test Engineer :	Bill Kuo

Low Band Edge Plot on 802.11n HT20 Channel 01



Date: 31.AUG.2012 20:22:18

High Band Edge Plot on 802.11n HT20 Channel 11



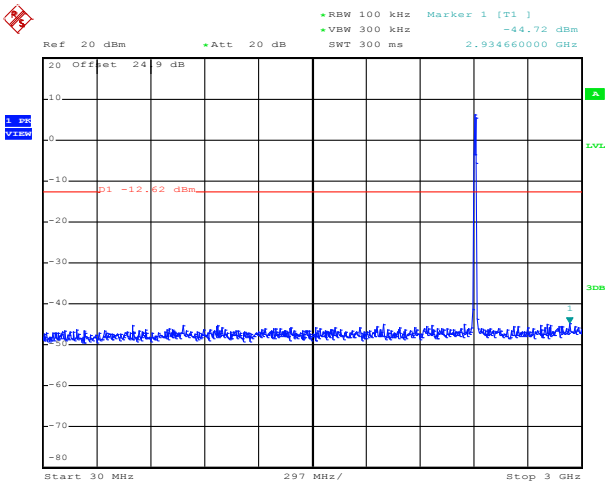
Date: 31.AUG.2012 20:28:01

3.4.6 Test Plots of Spurious Emission

Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	**Relative Humidity :**	52~55%
Test Channel :	01, 06, 11	**Test Engineer :**	Bill Kuo

802.11b 30 MHz~3 GHz

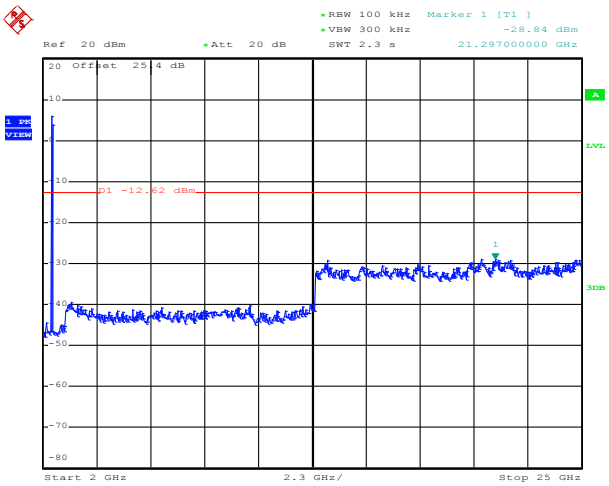
Conducted Spurious Emission Plot on Channel 01



292614-1002 15C Spurious 802.11b 2412 (ch01)
Date: 2.OCT.2012 16:07:36

802.11b 2 GHz~25 GHz

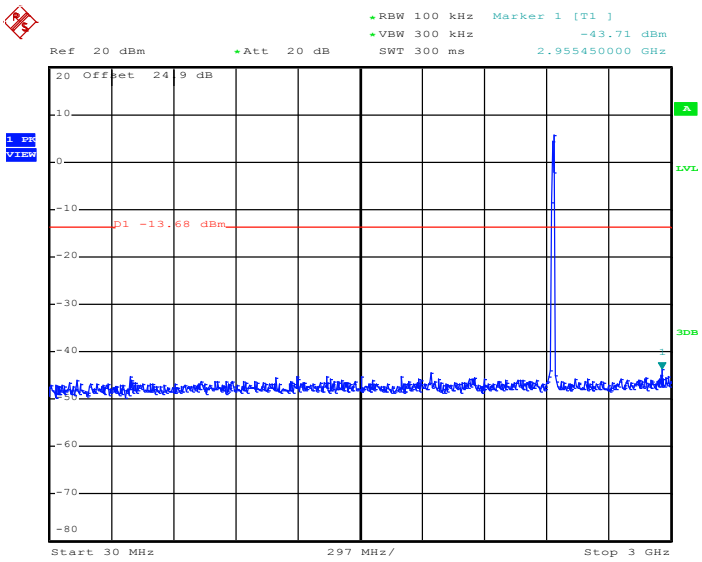
Conducted Spurious Emission Plot on Channel 01



292614-1002 15C Spurious 802.11b 2412 (ch01)
Date: 2.OCT.2012 16:07:53

802.11b 30 MHz~3 GHz

Conducted Spurious Emission Plot on Channel 06

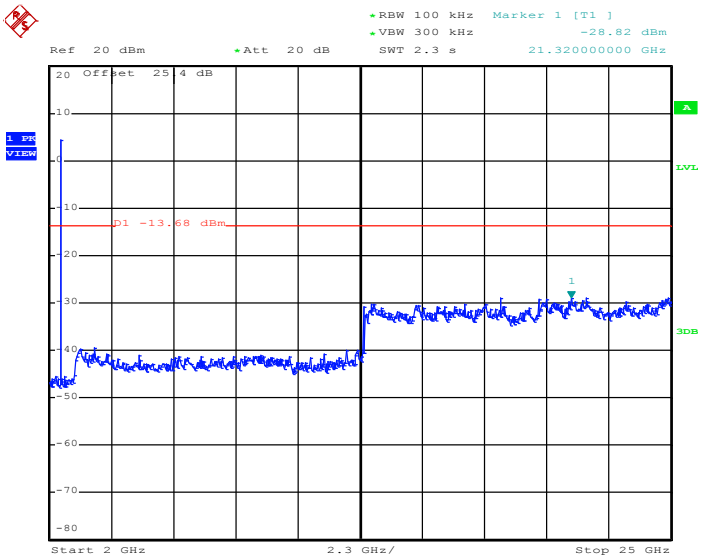


292614-1002 15C Spurious 802.11b 2437 (ch06)

Date: 2.OCT.2012 16:10:11

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 06

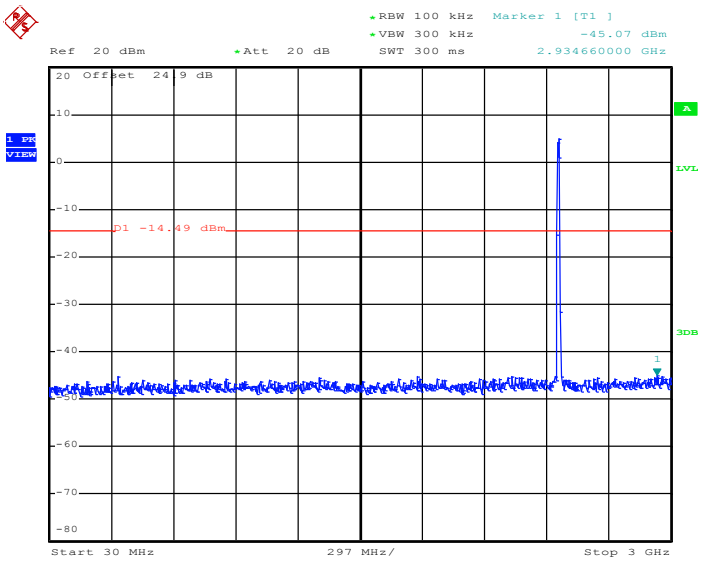


292614-1002 15C Spurious 802.11b 2437 (ch06)

Date: 2.OCT.2012 16:10:28

802.11b 30 MHz~3 GHz

Conducted Spurious Emission Plot on Channel 11

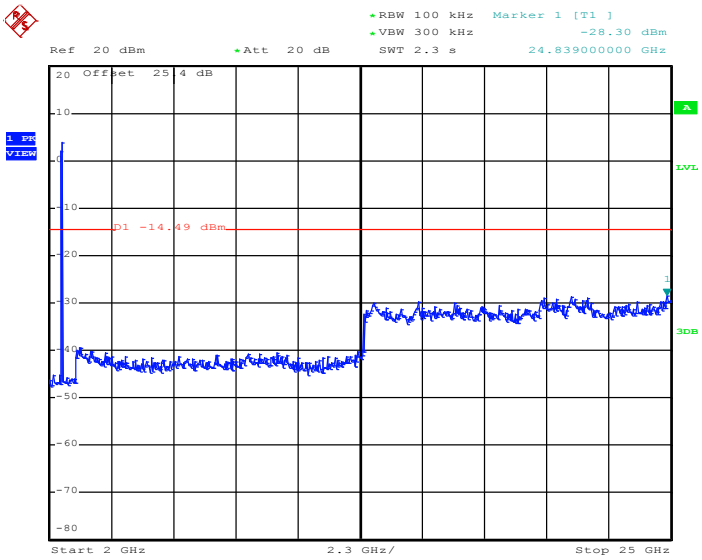


292614-1002 15C Spurious 802.11b 2462 (ch11)

Date: 2.OCT.2012 16:14:51

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



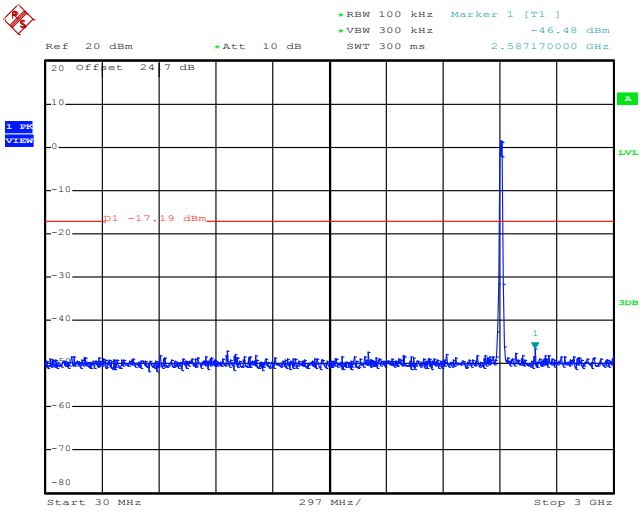
292614-1002 15C Spurious 802.11b 2462 (ch11)

Date: 2.OCT.2012 16:15:09

Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	52~55%
Test Channel :	01, 06, 11	Test Engineer :	Bill Kuo

802.11g 30 MHz~3 GHz

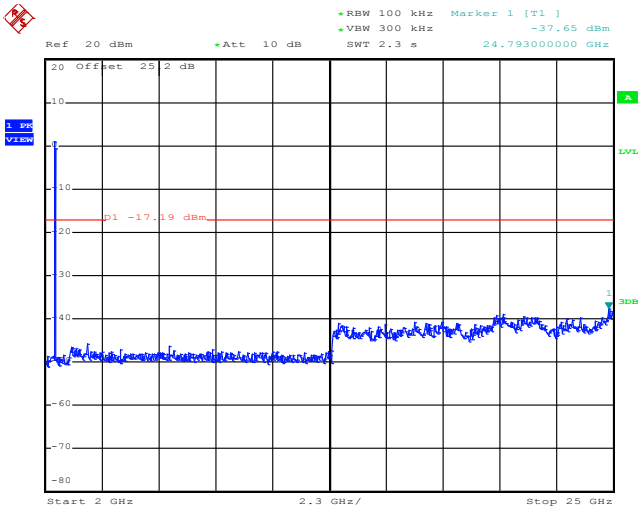
Conducted Spurious Emission Plot on Channel 01



Date: 31.AUG.2012 20:18:26

802.11g 2 GHz~25 GHz

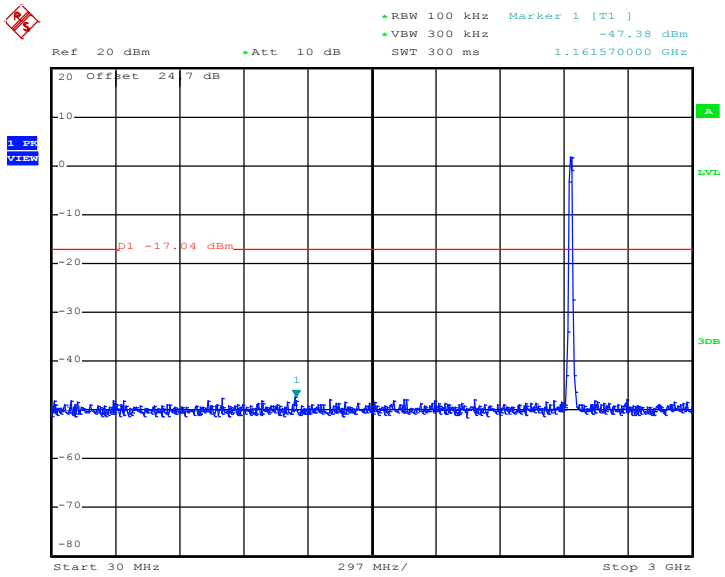
Conducted Spurious Emission Plot on Channel 01



Date: 31.AUG.2012 20:18:44

802.11g 30 MHz~3 GHz

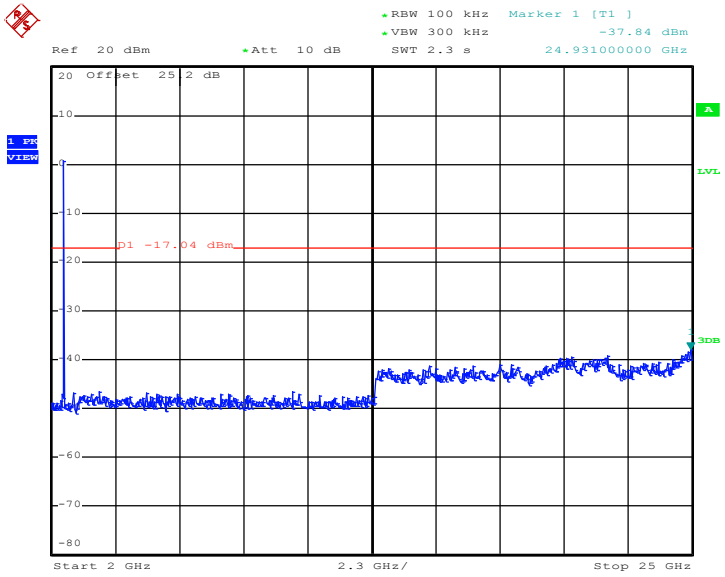
Conducted Spurious Emission Plot on Channel 06



Date: 31.AUG.2012 20:15:19

802.11g 2 GHz~25 GHz

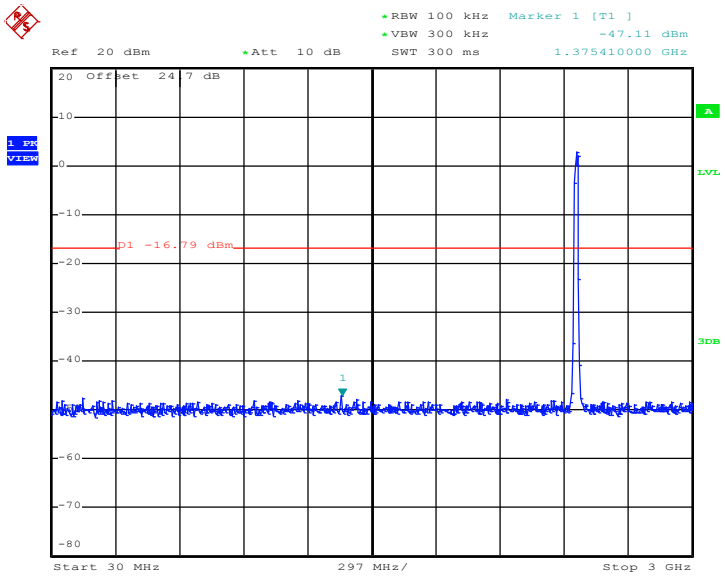
Conducted Spurious Emission Plot on Channel 06



Date: 31.AUG.2012 20:15:36

802.11g 30 MHz~3 GHz

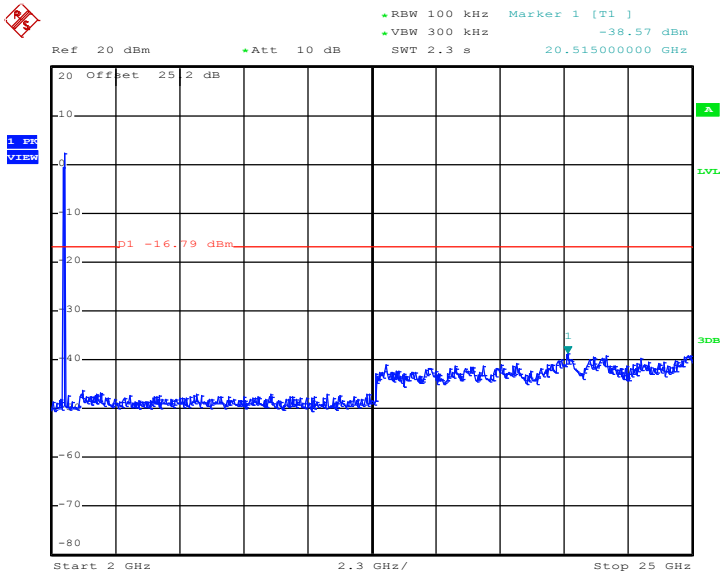
Conducted Spurious Emission Plot on Channel 11



Date: 31.AUG.2012 20:12:06

802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

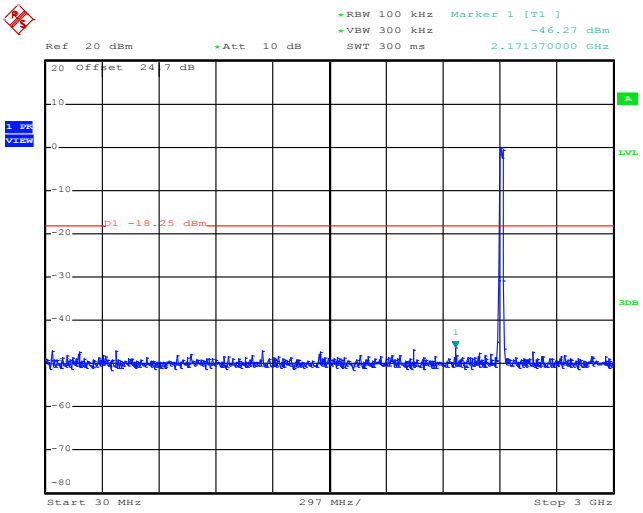


Date: 31.AUG.2012 20:12:24

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	52~55%
Test Channel :	01, 06, 11	Test Engineer :	Bill Kuo

802.11n HT20 30 MHz~3 GHz

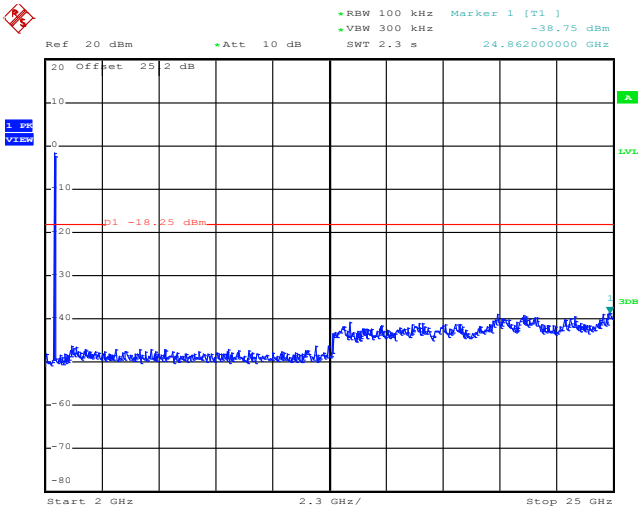
Conducted Spurious Emission Plot on Channel 01



Date: 31.AUG.2012 20:22:39

802.11n HT20 2 GHz~25 GHz

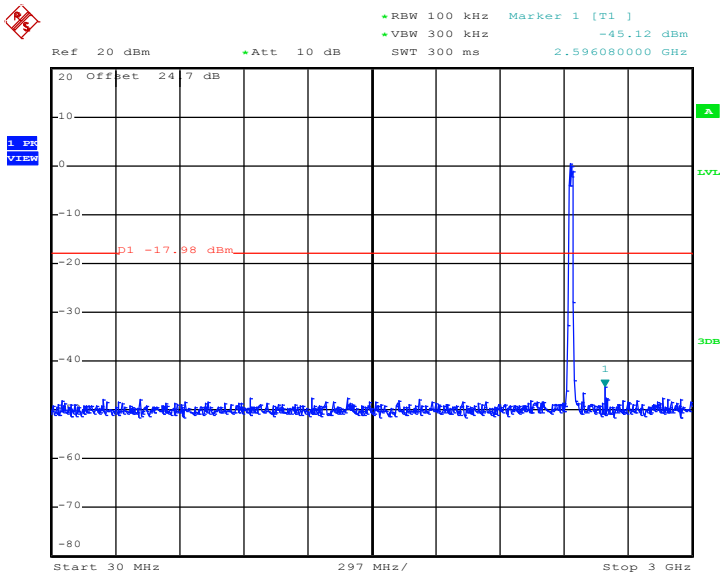
Conducted Spurious Emission Plot on Channel 01



Date: 31.AUG.2012 20:22:56

802.11n HT20 30 MHz~3 GHz

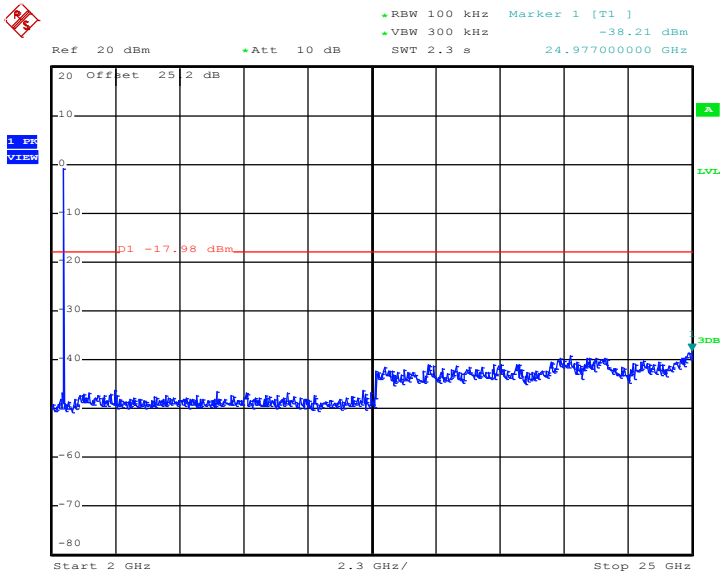
Conducted Spurious Emission Plot on Channel 06



Date: 31.AUG.2012 20:25:12

802.11n HT20 2 GHz~25 GHz

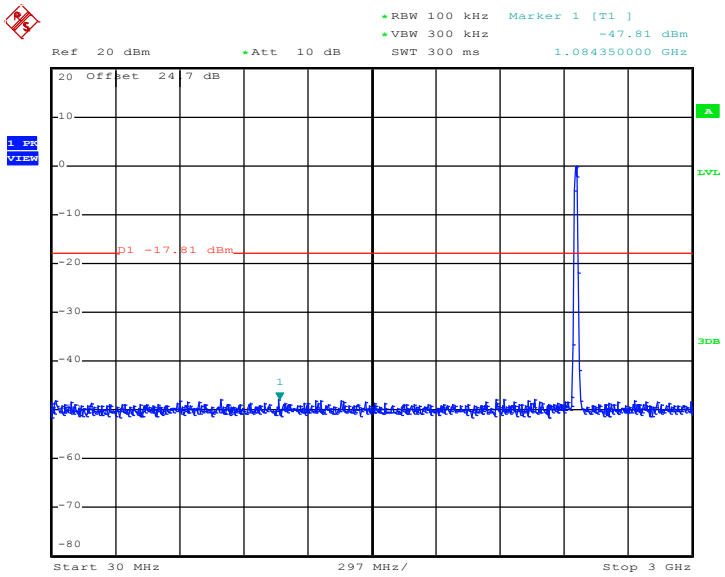
Conducted Spurious Emission Plot on Channel 06



Date: 31.AUG.2012 20:25:30

802.11n HT20 30 MHz~3 GHz

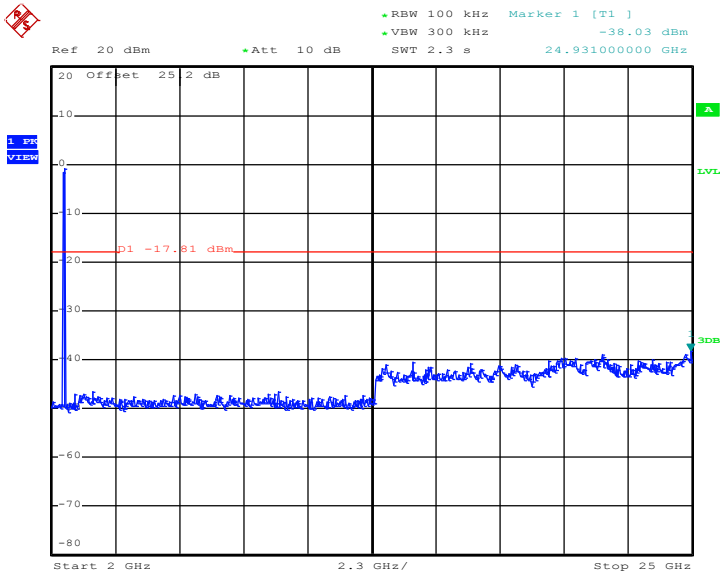
Conducted Spurious Emission Plot on Channel 11



Date: 31.AUG.2012 20:28:29

802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



Date: 31.AUG.2012 20:28:47

3.5 Radiated Emission Measurement

3.5.1 Limit of Radiated 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

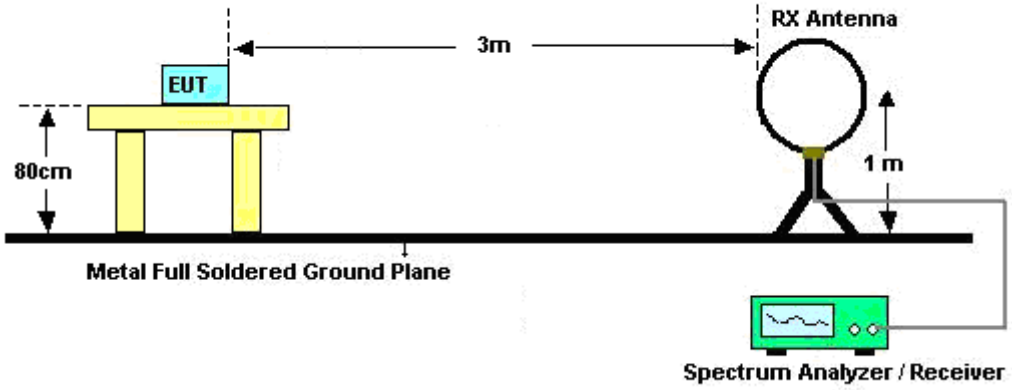
1. The testing follows the guidelines in ANSI C63. 10-2009
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 ≥ 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(ms)	1/T(KHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	97.76	1.401	0.714	1KHz
802.11n HT20	97.37	1.303	0.767	1KHz

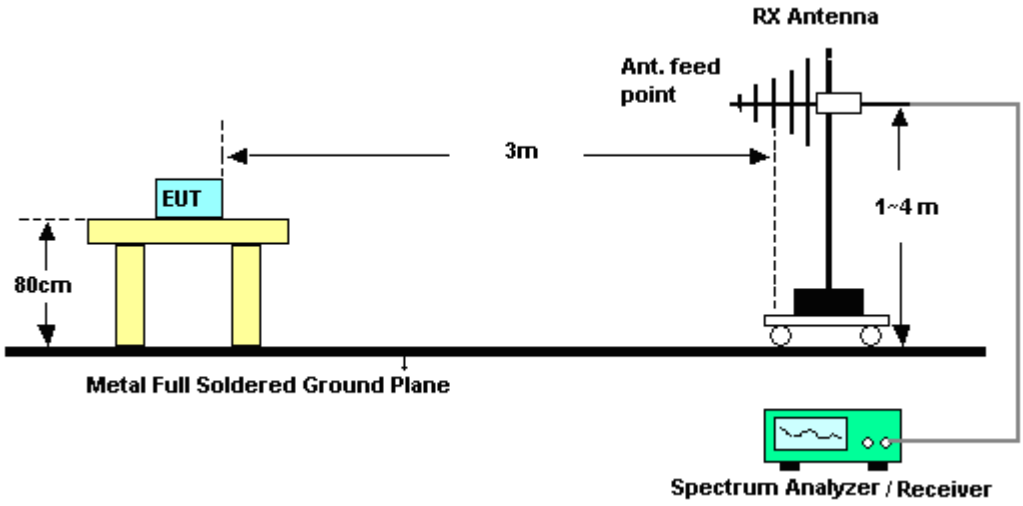
Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

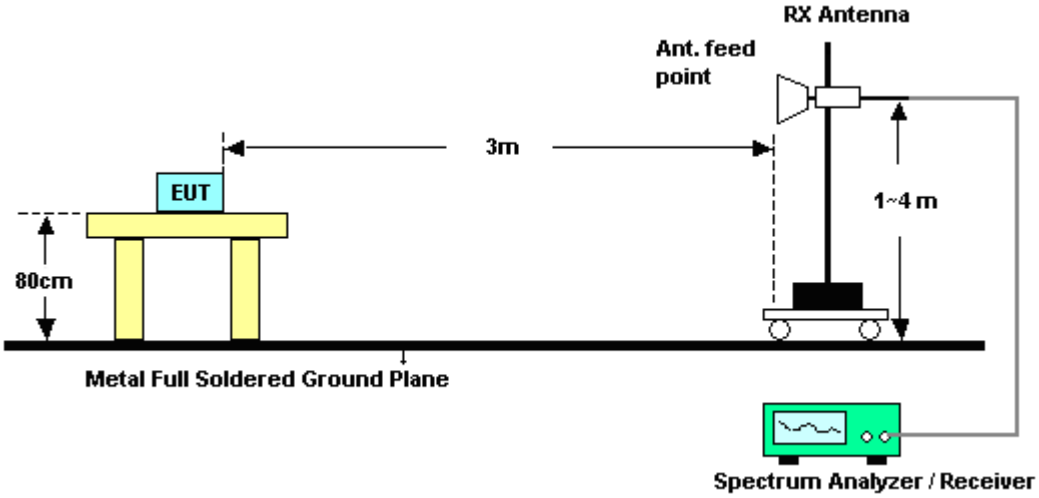
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Emissions (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 :**	27~28℃
Test Band :	Low	**Relative Humidity :**	49~50%
Test Channel :	01	**Test Engineer :**	Timberland

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**
2388.48	62.31	-11.69	74	58.06	32.36	6.45	34.56	111	49	Peak
2387.31	47.01	-6.99	54	42.76	32.36	6.45	34.56	111	49	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**
2388.93	54.16	-19.84	74	49.91	32.36	6.45	34.56	100	265	Peak
2387.13	44.89	-9.11	54	40.64	32.36	6.45	34.56	100	265	Average

Test Mode :	802.11b	**Temperature :**	27~28℃
Test Band :	High	**Relative Humidity :**	49~50%
Test Channel :	11	**Test Engineer :**	Timberland

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2489.82	55.7	-18.3	74	51.16	32.5	6.59	34.55	104	320	Peak
2490.1	44.45	-9.55	54	39.91	32.5	6.59	34.55	104	320	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**
2489.74	54.79	-19.21	74	50.25	32.5	6.59	34.55	125	281	Peak
2490.24	44.5	-9.5	54	39.96	32.5	6.59	34.55	125	281	Average

Test Mode :	802.11g	Temperature :	27~28℃
Test Band :	Low	Relative Humidity :	49~50%
Test Channel :	01	Test Engineer :	Timberland

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
2388.21	68.48	-5.52	74	64.23	32.36	6.45	34.56	109	316	Peak
2390	49.13	-4.87	54	44.88	32.36	6.45	34.56	109	316	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
2389.02	65.44	-8.56	74	61.19	32.36	6.45	34.56	100	250	Peak
2389.83	45.98	-8.02	54	41.73	32.36	6.45	34.56	100	250	Average

Test Mode :	802.11g	Temperature :	27~28℃
Test Band :	High	Relative Humidity :	49~50%
Test Channel :	11	Test Engineer :	Timberland

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
2485.32	61.06	-12.94	74	56.54	32.48	6.59	34.55	109	317	Peak
2483.66	44.89	-9.11	54	40.37	32.48	6.59	34.55	109	317	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
2483.6	60.49	-13.51	74	55.97	32.48	6.59	34.55	100	90	Peak
2483.5	43.86	-10.14	54	39.34	32.48	6.59	34.55	100	90	Average

Test Mode :	802.11n HT20	Temperature :	27~28℃
Test Band :	Low	Relative Humidity :	49~50%
Test Channel :	01	Test Engineer :	Timberland

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.2	62.01	-11.99	74	57.76	32.36	6.45	34.56	111	315	Peak
2390	47.1	-6.9	54	42.85	32.36	6.45	34.56	111	315	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	61.5	-12.5	74	57.25	32.36	6.45	34.56	100	270	Peak
2390	46.58	-7.42	54	42.33	32.36	6.45	34.56	100	270	Average

Test Mode :	802.11n HT20	Temperature :	27~28℃
Test Band :	High	Relative Humidity :	49~50%
Test Channel :	11	Test Engineer :	Timberland

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2486.1	60.92	-13.08	74	56.4	32.48	6.59	34.55	200	327	Peak
2483.72	45.27	-8.73	54	40.75	32.48	6.59	34.55	200	327	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
2483.88	59.06	-14.94	74	54.54	32.48	6.59	34.55	100	93	Peak
2483.5	43.93	-10.07	54	39.41	32.48	6.59	34.55	100	93	Average

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

Test Mode :	802.11b	Temperature :	27~28℃
Test Channel :	01	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	109.05	-	-	104.74	32.38	6.49	34.56	111	49	Average
2412	113.12	-	-	108.81	32.38	6.49	34.56	111	49	Peak

Test Mode :	802.11b	Temperature :	27~28℃
Test Channel :	01	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 9648 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 111.43 dBuV/m - 20dB = 91.43 dBuV/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
2412	107.47	-	-	103.16	32.38	6.49	34.56	100	265	Average
2412	111.43	-	-	107.12	32.38	6.49	34.56	100	265	Peak
9648	52.88	-38.55	91.43	61.41	36.92	10.56	56.01	100	0	Peak
12060	49.09	-4.91	54	51.89	39.26	11.34	53.4	104	342	Average
12060	54.77	-19.23	74	57.57	39.26	11.34	53.4	104	342	Peak
14472	50.07	-3.93	54	51	39.75	11.47	52.15	100	310	Average
14472	56.01	-17.99	74	56.94	39.75	11.47	52.15	100	310	Peak

Test Mode :	802.11b	Temperature :	27~28℃
Test Channel :	06	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

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
39.45	19.4	-20.6	40	37.46	12.7	0.74	31.5	-	-	Peak
190.65	21.8	-21.7	43.5	42.66	8.92	1.49	31.27	-	-	Peak
262.74	18.89	-27.11	46	34.76	13.46	1.8	31.13	-	-	Peak
375.6	21.66	-24.34	46	35.75	14.9	2.12	31.11	-	-	Peak
595.4	22.46	-23.54	46	32.86	18.8	2.75	31.95	-	-	Peak
800.5	26.93	-19.07	46	35.84	20	3.06	31.97	100	109	Peak
2437	108.55	-	-	104.16	32.43	6.52	34.56	104	334	Average
2437	112.55	-	-	108.16	32.43	6.52	34.56	104	334	Peak

Test Mode :	802.11b	Temperature :	27~28℃
Test Channel :	06	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. 14622 MHz is 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
37.56	23.14	-16.86	40	40.34	13.58	0.72	31.5	103	229	Peak
66.45	19.22	-20.78	40	43.44	6.28	0.92	31.42	-	-	Peak
190.65	20.47	-23.03	43.5	41.33	8.92	1.49	31.27	-	-	Peak
371.4	23.29	-22.71	46	37.44	14.82	2.12	31.09	-	-	Peak
556.2	21.53	-24.47	46	31.04	19.1	2.57	31.18	-	-	Peak
767.6	23.39	-22.61	46	31.67	19.9	3.05	31.23	-	-	Peak
2437	107.67	-	-	103.28	32.43	6.52	34.56	100	300	Average
2437	111.73	-	-	107.34	32.43	6.52	34.56	100	300	Peak
12185	49.5	-4.5	54	52.03	39.35	11.35	53.23	112	315	Average
12185	57.36	-16.64	74	59.89	39.35	11.35	53.23	112	315	Peak
14622	58.16	-33.57	91.73	59.12	39.89	11.63	52.48	100	0	Peak

Test Mode :	802.11b	Temperature :	27~28℃
Test Channel :	11	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

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	109.2	-	-	104.75	32.45	6.56	34.56	104	320	Average
2462	113.25	-	-	108.8	32.45	6.56	34.56	104	320	Peak

Test Mode :	802.11b	Temperature :	27~28℃
Test Channel :	11	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 14772 MHz is 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
2462	108.13	-	-	103.68	32.45	6.56	34.56	125	281	Average
2462	112.41	-	-	107.96	32.45	6.56	34.56	125	281	Peak
12310	49.74	-4.26	54	52	39.45	11.36	53.07	120	347	Average
12310	55.41	-18.59	74	57.67	39.45	11.36	53.07	120	347	Peak
14772	55.41	-37	92.41	56.48	40.01	11.76	52.84	100	0	Peak

Test Mode :	802.11g	Temperature :	27~28℃
Test Channel :	01	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	102.27	-	-	97.96	32.38	6.49	34.56	109	316	Average
2412	112.06	-	-	107.75	32.38	6.49	34.56	109	316	Peak

Test Mode :	802.11g	Temperature :	27~28℃
Test Channel :	01	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	99.46	-	-	95.15	32.38	6.49	34.56	100	250	Average
2412	110.05	-	-	105.74	32.38	6.49	34.56	100	250	Peak

Test Mode :	802.11g	Temperature :	27~28℃
Test Channel :	06	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

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
39.45	20.18	-19.82	40	38.24	12.7	0.74	31.5	-	-	Peak
189.84	22.89	-20.61	43.5	43.73	8.9	1.48	31.22	-	-	Peak
241.95	16.8	-29.2	46	34.59	11.6	1.7	31.09	-	-	Peak
375.6	22.16	-23.84	46	36.25	14.9	2.12	31.11	-	-	Peak
543.6	22.22	-23.78	46	32.03	18.82	2.53	31.16	-	-	Peak
800.5	27.46	-18.54	46	36.37	20	3.06	31.97	101	108	Peak
2437	99.99	-	-	95.6	32.43	6.52	34.56	202	320	Average
2437	111.93	-	-	107.54	32.43	6.52	34.56	202	320	Peak

Test Mode :	802.11g	Temperature :	27~28℃
Test Channel :	06	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

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
30.54	22.19	-17.81	40	35.06	18.02	0.65	31.54	-	-	Peak
38.64	23.1	-16.9	40	40.73	13.14	0.73	31.5	122	208	Peak
189.84	20.11	-23.39	43.5	40.95	8.9	1.48	31.22	-	-	Peak
373.5	22.91	-23.09	46	37.03	14.86	2.12	31.1	-	-	Peak
567.4	22.36	-23.64	46	32.31	18.83	2.62	31.4	-	-	Peak
851.6	24.28	-21.72	46	31.3	20.4	3.24	30.66	-	-	Peak
2437	99.73	-	-	95.34	32.43	6.52	34.56	100	304	Average
2437	109.64	-	-	105.25	32.43	6.52	34.56	100	304	Peak

Test Mode :	802.11g	Temperature :	27~28℃
Test Channel :	11	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

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	99.86	-	-	95.41	32.45	6.56	34.56	109	317	Average
2462	109.85	-	-	105.4	32.45	6.56	34.56	109	317	Peak

Test Mode :	802.11g	Temperature :	27~28℃
Test Channel :	11	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

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	98.8	-	-	94.35	32.45	6.56	34.56	100	90	Average
2462	108.73	-	-	104.28	32.45	6.56	34.56	100	90	Peak

Test Mode :	802.11n-HT20	Temperature :	27~28℃
Test Channel :	01	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	100.03	-	-	95.72	32.38	6.49	34.56	111	315	Average
2412	109.88	-	-	105.57	32.38	6.49	34.56	111	315	Peak

Test Mode :	802.11n-HT20	Temperature :	27~28℃
Test Channel :	01	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	97.79	-	-	93.48	32.38	6.49	34.56	100	270	Average
2412	108.38	-	-	104.07	32.38	6.49	34.56	100	270	Peak

Test Mode :	802.11n-HT20	Temperature :	27~28℃
Test Channel :	06	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
38.91	18.93	-21.07	40	36.56	13.14	0.73	31.5	-	-	Peak
189.57	22.32	-21.18	43.5	43.16	8.9	1.48	31.22	-	-	Peak
264.9	17.72	-28.28	46	33.75	13.3	1.8	31.13	-	-	Peak
476.4	21.43	-24.57	46	32.69	17.32	2.31	30.89	-	-	Peak
639.5	21.91	-24.09	46	31.15	19.2	2.79	31.23	-	-	Peak
800.5	25.83	-20.17	46	34.74	20	3.06	31.97	100	86	Peak
2437	99.45	-	-	95.06	32.43	6.52	34.56	109	316	Average
2437	109.67	-	-	105.28	32.43	6.52	34.56	109	316	Peak

Test Mode :	802.11n-HT20	Temperature :	27~28℃
Test Channel :	06	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
38.1	22.54	-17.46	40	39.74	13.58	0.72	31.5	108	301	Peak
55.65	18.92	-21.08	40	42.67	6.9	0.84	31.49	-	-	Peak
179.04	19.45	-24.05	43.5	40.05	9.15	1.47	31.22	-	-	Peak
374.9	22.42	-23.58	46	36.51	14.9	2.12	31.11	-	-	Peak
735.4	23.93	-22.07	46	32.39	19.7	3	31.16	-	-	Peak
844.6	24.41	-21.59	46	31.61	20.35	3.21	30.76	-	-	Peak
2437	97.01	-	-	92.62	32.43	6.52	34.56	100	252	Average
2437	107.56	-	-	103.17	32.43	6.52	34.56	100	252	Peak

Test Mode :	802.11n-HT20	Temperature :	27~28℃
Test Channel :	11	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

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	98.68	-	-	94.23	32.45	6.56	34.56	200	327	Average
2462	108.83	-	-	104.38	32.45	6.56	34.56	200	327	Peak

Test Mode :	802.11n-HT20	Temperature :	27~28℃
Test Channel :	11	Relative Humidity :	49~50%
Test Engineer :	Timberland	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31.		

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	96.25	-	-	91.8	32.45	6.56	34.56	100	93	Average
2462	106.12	-	-	101.67	32.45	6.56	34.56	100	93	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.

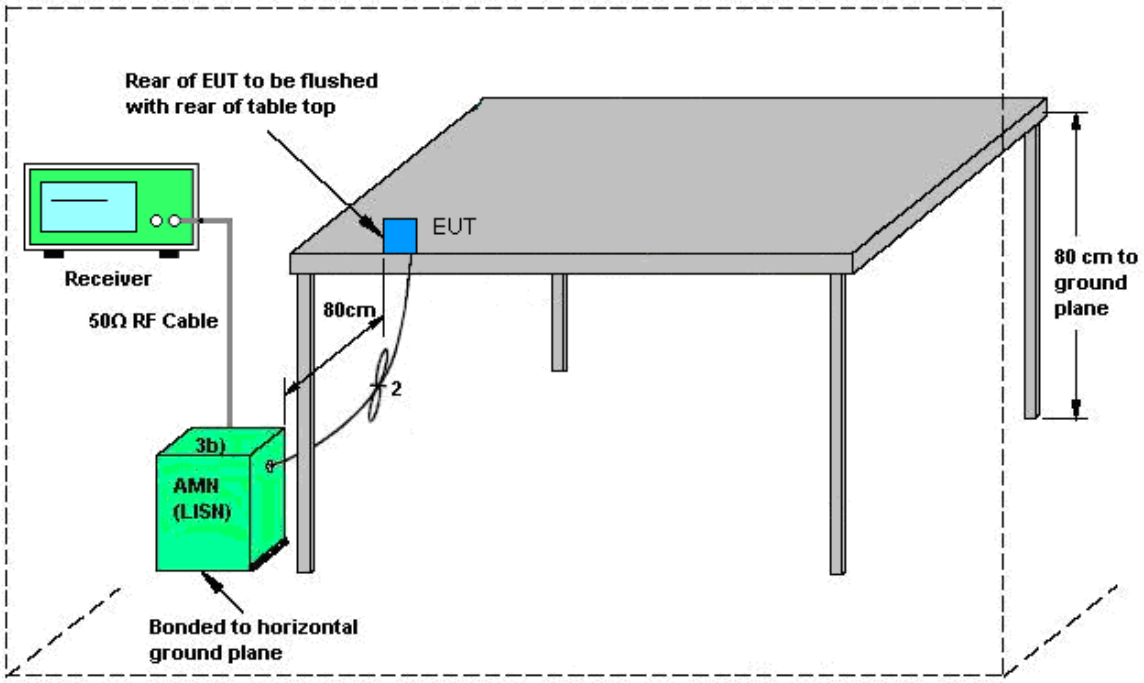
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003 and 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.

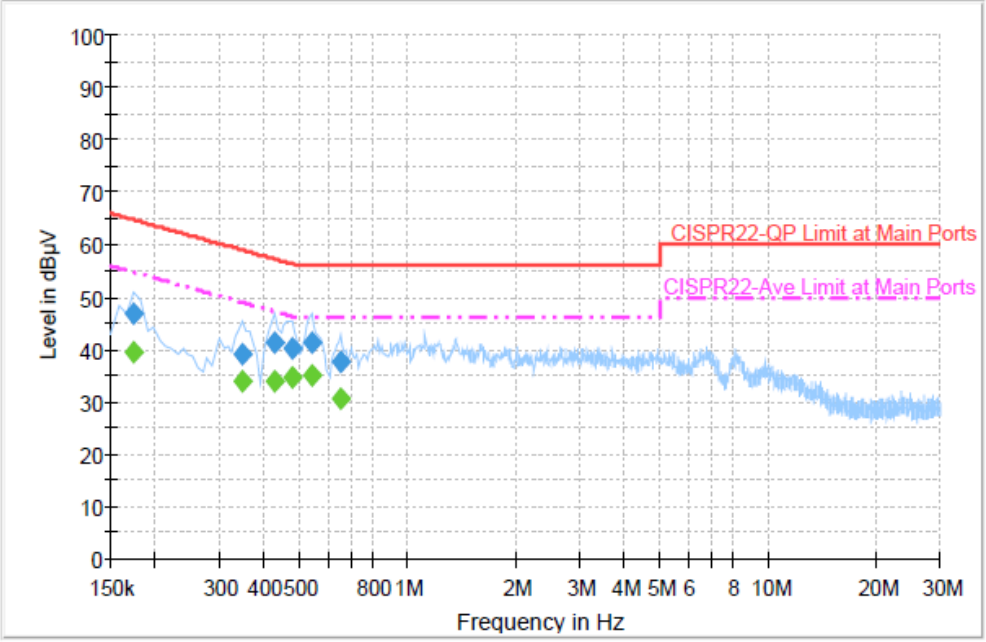
3.6.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

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 :	Bluetooth Link + WLAN Link + H Pattern + TC +USB Cable (Charging from Adapter 1) for Sample C		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



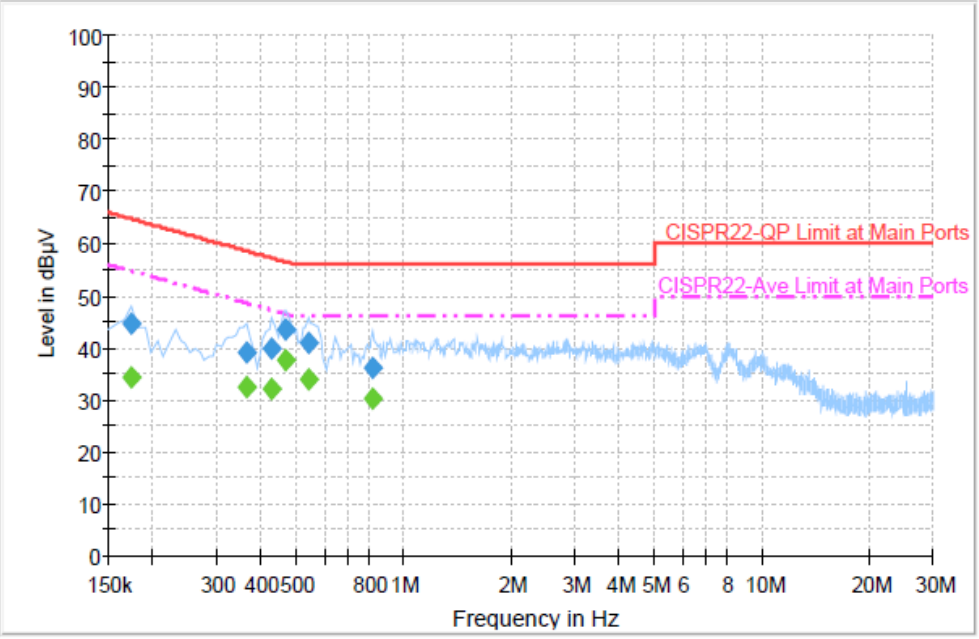
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	46.9	Off	L1	19.3	17.9	64.8
0.350000	39.3	Off	L1	19.3	19.7	59.0
0.430000	41.4	Off	L1	19.4	15.9	57.3
0.478000	40.3	Off	L1	19.5	16.1	56.4
0.542000	41.4	Off	L1	19.4	14.6	56.0
0.654000	37.5	Off	L1	19.4	18.5	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	39.5	Off	L1	19.3	15.3	54.8
0.350000	33.8	Off	L1	19.3	15.2	49.0
0.430000	34.0	Off	L1	19.4	13.3	47.3
0.478000	34.8	Off	L1	19.5	11.6	46.4
0.542000	35.2	Off	L1	19.4	10.8	46.0
0.654000	30.6	Off	L1	19.4	15.4	46.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN Link + H Pattern + TC +USB Cable (Charging from Adapter 1) for Sample C		
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)
0.174000	44.7	Off	N	19.3	20.1	64.8
0.366000	39.0	Off	N	19.4	19.6	58.6
0.430000	40.0	Off	N	19.4	17.3	57.3
0.470000	43.5	Off	N	19.4	13.0	56.5
0.542000	40.8	Off	N	19.4	15.2	56.0
0.822000	36.3	Off	N	19.4	19.7	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	34.4	Off	N	19.3	20.4	54.8
0.366000	32.5	Off	N	19.4	16.1	48.6
0.430000	32.1	Off	N	19.4	15.2	47.3
0.470000	37.8	Off	N	19.4	8.7	46.5
0.542000	34.1	Off	N	19.4	11.9	46.0
0.822000	30.1	Off	N	19.4	15.9	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	Aug. 29, 2012 ~ Oct. 02, 2012	Jun. 05, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1132003	300MHz~40GHz	Aug. 14, 2012	Aug. 29, 2012 ~ Oct. 02, 2012	Aug. 13, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1126017	300MHz~40GHz	Aug. 14, 2012	Aug. 29, 2012 ~ Oct. 02, 2012	Aug. 13, 2013	Conducted (TH02-HY)
EMI Test Receiver	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Oct. 27, 2011	Aug. 29, 2012	Oct. 26, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Aug. 29, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Aug. 29, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Aug. 29, 2012	N/A	Conduction (CO05-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz ~ 26.5GHz	Nov. 23, 2011	Sep. 08, 2012 ~ Sep. 26, 2012	Nov. 22, 2012	Radiation (03CH06-HY)
Spectrum Analyzer	R&S	FSP30	101352	9KHz-30GHz	Nov. 03, 2011	Sep. 08, 2012 ~ Sep. 26, 2012	Nov. 02, 2012	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz ~ 1000MHz	May 04, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	May. 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 22, 2011	Sep. 08, 2012 ~ Sep. 26, 2012	Oct. 21, 2012	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	Jul. 31, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Oct. 20, 2011	Sep. 08, 2012 ~ Sep. 26, 2012	Oct. 19, 2012	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz ~ 1GHz	Apr. 11, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159087	1GHz~18GHz	Feb. 27, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	Feb. 26, 2013	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Sep. 08, 2012 ~ Sep. 26, 2012	Jul. 02, 2014	Radiation (03CH06-HY)

5 Uncertainty of Evaluation

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

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

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

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

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

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