

FCC RF Test Report

APPLICANT : Power Quotient International Co., Ltd.
EQUIPMENT : Air Hard Drive
BRAND NAME : PQI
MODEL NAME : A300V
FCC ID : A4S-6W31
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jun. 19, 2012 and completely tested on Jul. 24, 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 / Manager



SPORTON INTERNATIONAL INC.

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



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Testing Site	6
1.5 Applied Standards	6
1.6 Ancillary Equipment List	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	7
2.1 Carrier Frequency Channel	7
2.2 Pre-Scanned RF Power	7
2.3 Test Mode	8
2.4 Connection Diagram of Test System	9
2.5 RF Utility	9
3 TEST RESULT	10
3.1 6dB Bandwidth Measurement	10
3.2 Output Power Measurement	17
3.3 Power Spectral Density Measurement	20
3.4 Conducted Band Edges and Spurious Emission Measurement	27
3.5 Radiated Emission Measurement	40
3.6 AC Conducted Emission Measurement	57
3.7 Antenna Requirements	61
4 LIST OF MEASURING EQUIPMENT	62
5 UNCERTAINTY OF EVALUATION	63
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR261903	Rev. 01	Initial issue of report	Aug. 20, 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	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	A8.4	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	A8.5	Conducted Band Edges	$\leq 20\text{dBc}$	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 0.08 dB at 4924.000 MHz
3.6	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 14.40 dB at 0.198 MHz
3.7	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Power Quotient International Co., Ltd.

8F., No. 49, Sec. 4, Jhongyang Rd., Tu Cheng Dist., New Taipei City 23675, Taiwan

1.2 Manufacturer

Tech-Lin's Electronics Corp.

5F., No. 778, Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Air Hard Drive
Brand Name	PQI
Model Name	A300V
FCC ID	A4S-6W31
Sample 1	EUT with TS 750G HD
Sample 2	EUT with WD 750G HD
Sample 3	EUT with SG 750G HD
EUT supports Radios application	WLAN 11bgn
HW Version	V2R1
SW Version	14
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 : 17.38 dBm (0.0547 W) 802.11g : 21.36 dBm (0.1368 W) 802.11n HT-20 : 21.36 dBm (0.1368 W)
Antenna Type	Chip Antenna with gain 0.36 dBi
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH05-HY	722060/4086B-1

1.5 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
- ♦ 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.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

2 Test Configuration of Equipment Under Test

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 as below table and the highest power data rates (11b, 11g, 11n HT-20 modes) were chosen for full test in the following sections to demonstrate compliance to the FCC limit line. .

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	17.38	17.34	17.36	17.35

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)	20.33	20.34	20.35	20.55	20.93	20.94	21.03	21.36

2.4GHz 802.11n HT-20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	20.26	20.43	20.48	20.45	20.45	20.43	21.13	21.36

2.3 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 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), radiated emission (30 MHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

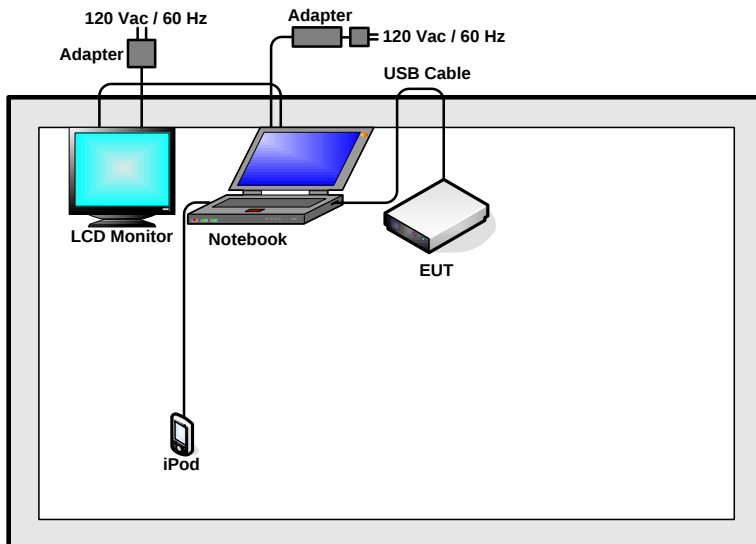
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases (Y plane) and recorded in this report.

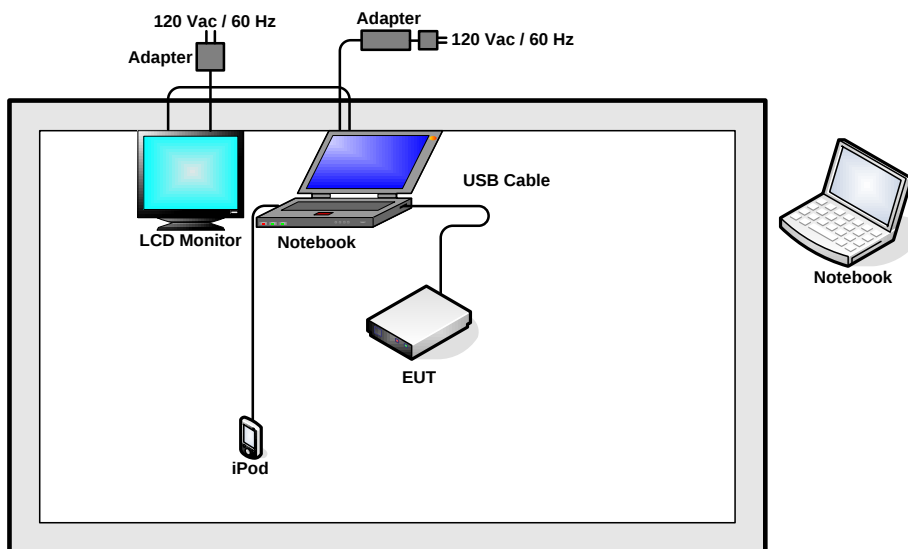
Test Cases				
Test Item	802.11b (Modulation : DSSS) 802.11g/n (Modulation : OFDM)			
Conducted TCs	Test Mode	802.11b	802.11g	802.11n HT-20
	CH01	1	4	7
	CH06	2	5	8
	CH11	3	6	9
Radiated TCs	Test Mode	802.11b	802.11g	802.11n HT-20
	CH01	1	4	7
	CH06	2	5	8
	CH11	3	6	9
AC Conducted Emission	Mode 1 : WLAN Link + RJ-45 Link + USB Cable (Charging from Notebook) + Battery for Sample 1			
Remark: All the cases of conducted and radiation were only for Sample 1.				

2.4 Connection Diagram of Test System

<WLAN Tx>



<AC Conducted Emission>



2.5 RF Utility

For WLAN function, programmed RF utility, "artgui.exe" 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 Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

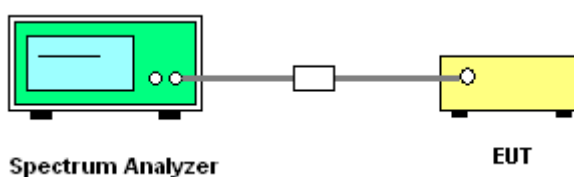
3.1.2 Measuring Instruments

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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 1-5% of the emission bandwidth (EBW). Set the Video bandwidth (VBW) $\geq 3 * RBW$. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

3.1.4 Test Setup

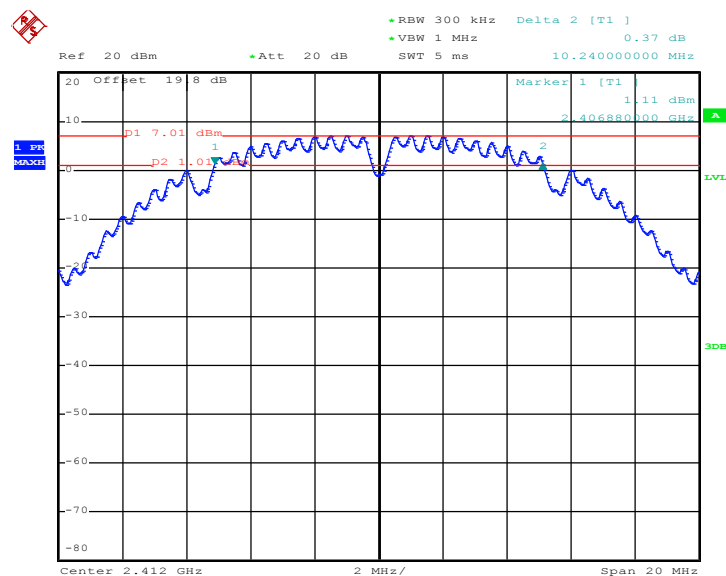


3.1.5 Test Result of 6dB Bandwidth

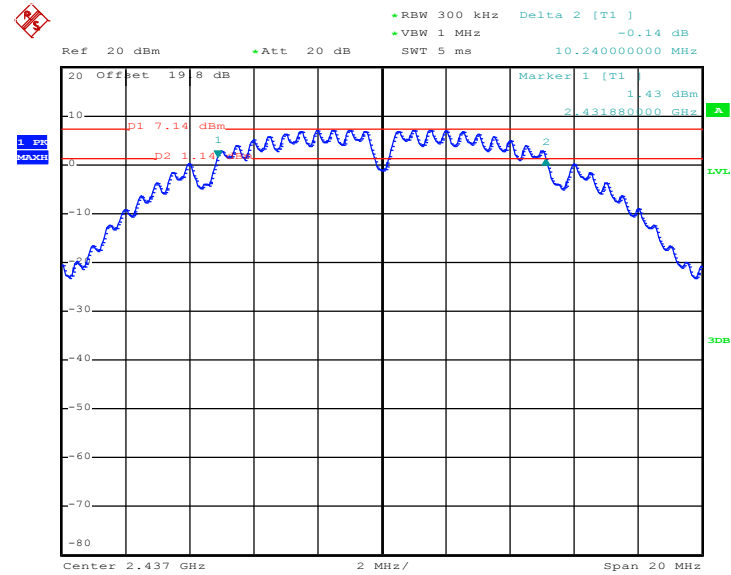
Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Reece Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	10.24	0.5	Pass
06	2437	10.24	0.5	Pass
11	2462	10.24	0.5	Pass

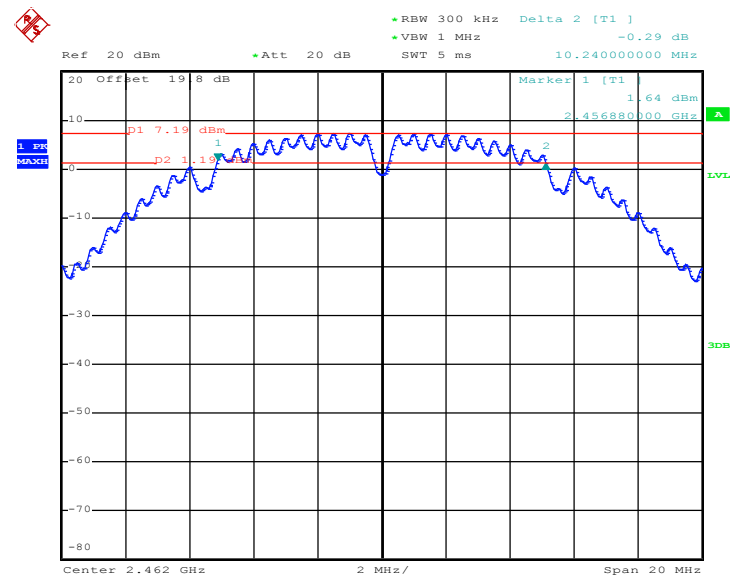
6 dB Bandwidth Plot on 802.11b Channel 01



Date: 18.JUL.2012 00:36:07

6 dB Bandwidth Plot on 802.11b Channel 06


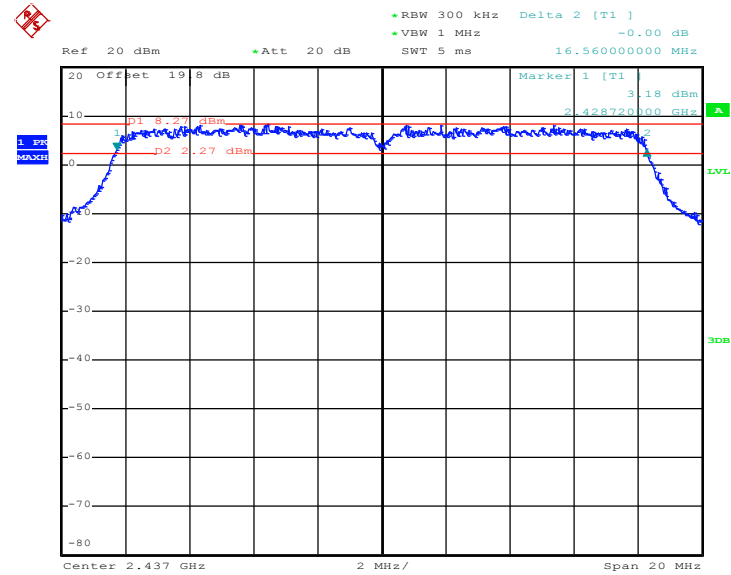
Date: 18.JUL.2012 00:40:18

6 dB Bandwidth Plot on 802.11b Channel 11


Date: 18.JUL.2012 00:42:54

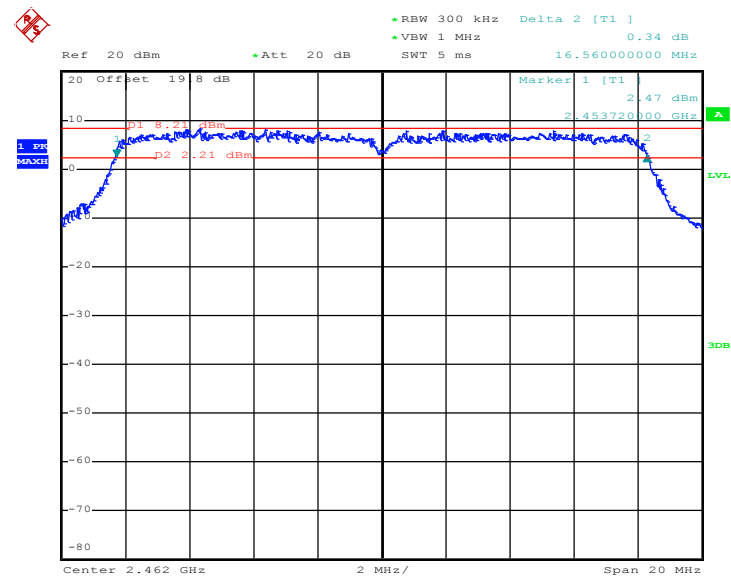


6 dB Bandwidth Plot on 802.11g Channel 06



Date: 18.JUL.2012 00:51:51

6 dB Bandwidth Plot on 802.11g Channel 11



Date: 18.JUL.2012 00:48:19

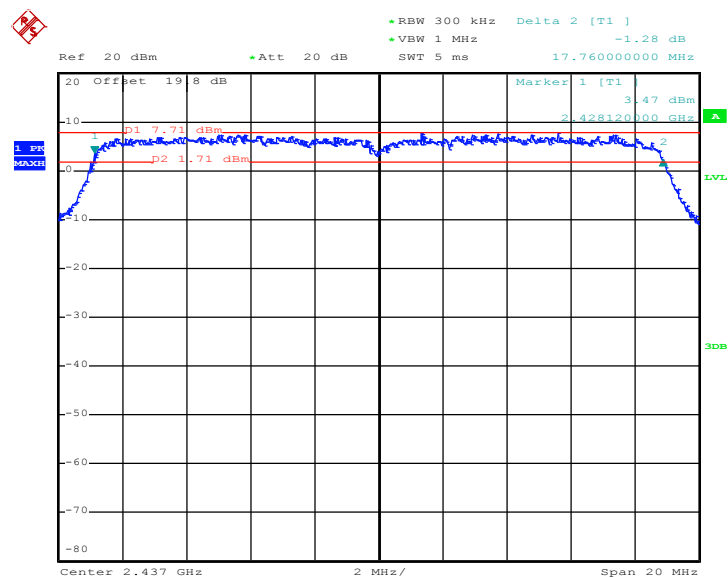


Channel	Frequency (MHz)	2.4GHz 802.11n HT-20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.72	0.5	Pass
06	2437	17.76	0.5	Pass
11	2462	17.84	0.5	Pass

Date: 18.JUL.2012 00:58:51

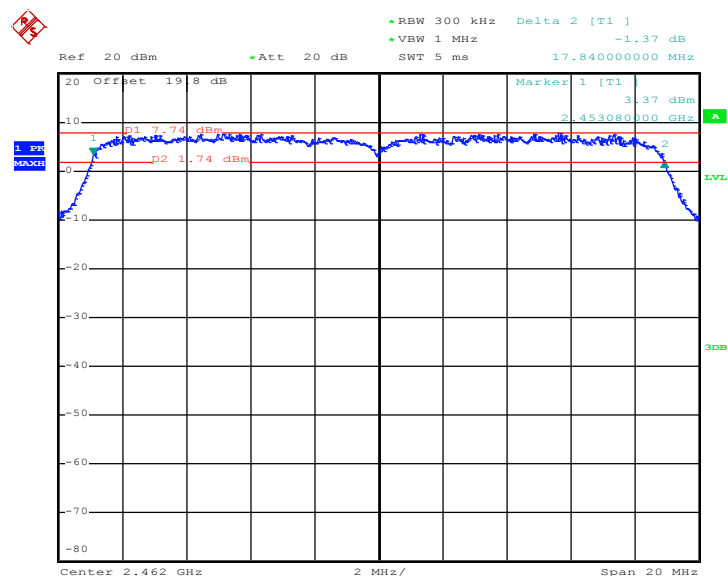


6 dB Bandwidth Plot on 802.11n HT-20 Channel 06



Date: 18.JUL.2012 01:05:43

6 dB Bandwidth Plot on 802.11n HT-20 Channel 11



Date: 18.JUL.2012 01:11:09

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.

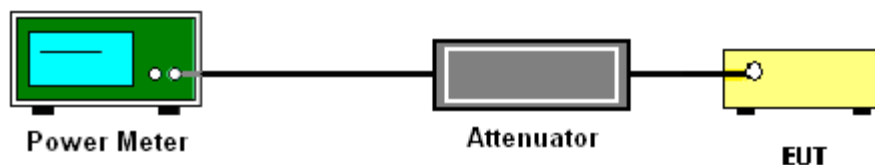
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure 7.2.1.3 Option 3(peak power meter method) of FCC KDB No. 558074 DTS Meas. Guidance DR01.
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°C
Test Engineer :	Reece Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	16.70	30	Pass
06	2437	17.38	30	Pass
11	2462	15.86	30	Pass

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

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	19.72	30	Pass
06	2437	21.36	30	Pass
11	2462	18.46	30	Pass

Test Mode :	802.11n HT-20	Temperature :	24~26°C
Test Engineer :	Reece Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT-20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	19.25	30	Pass
06	2437	21.36	30	Pass
11	2462	18.21	30	Pass

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26
Test Engineer :	Reece Li	Relative Humidity :	50~53
Duty Cycle:	100.00%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	14.61
06	2437	15.45
11	2462	13.62

Test Mode :	802.11g	Temperature :	24~26
Test Engineer :	Reece Li	Relative Humidity :	50~53
Duty Cycle:	91.67%	Duty Factor:	0.38dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	12.40
06	2437	15.34
11	2462	9.02

Test Mode :	802.11n HT-20	Temperature :	24~26
Test Engineer :	Reece Li	Relative Humidity :	50~53
Duty Cycle:	91.16%	Duty Factor:	0.40dB

Channel	Frequency (MHz)	802.11n HT-20 Average Output Power (dBm)
01	2412	11.49
06	2437	15.61
11	2462	8.84

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.

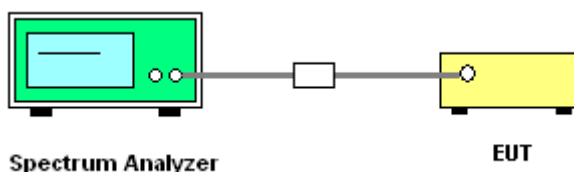
3.3.2 Measuring Instruments

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. Record the measurement data derived from spectrum analyzer.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 KHz. Video bandwidth (VBW) $\geq$ 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. 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 $BWCF = 10\log(3\text{ kHz}/100\text{ kHz} = -15.2\text{ dB})$.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

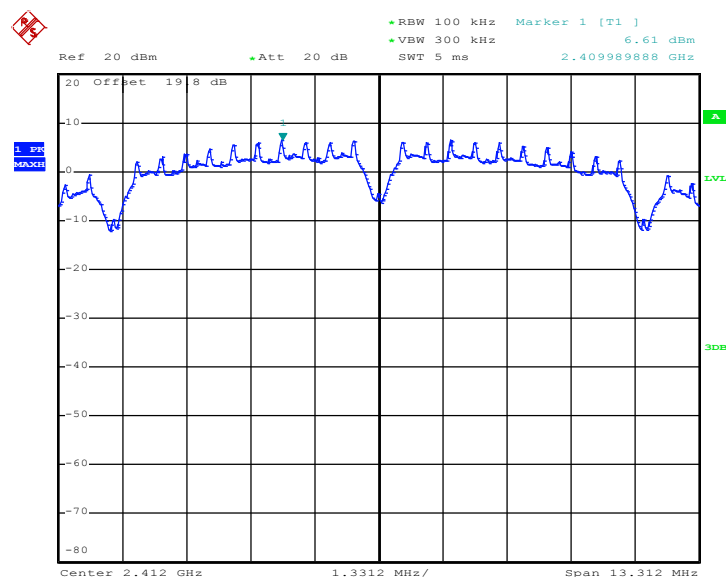
Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Reece Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	6.61	-8.59	8	Pass
06	2437	6.61	-8.59	8	Pass
11	2462	6.63	-8.57	8	Pass

Note:

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

PSD Plot on 802.11b Channel 01



Date: 18.JUL.2012 00:36:26



Ref 20 dBm Att 20 dB RBW 100 kHz VBW 300 kHz SWT 5 ms Marker 1 [T1] 6.61 dBm 2.435495744 GHz

20 Offset 19.8 dB

1.5% MARGIN

3dB

Center 2.437 GHz 1.3312 MHz/ Span 13.312 MHz

Date: 18.JUL.2012 00:40:39

Ref 20 dBm Att 20 dB RBW 100 kHz VBW 300 kHz Marker 1 [T1] 6.63 dBm 2.460495744 GHz

20 Offset 19.8 dB

1.3312 MHz

Center 2.462 GHz 1.3312 MHz/ Span 13.312 MHz

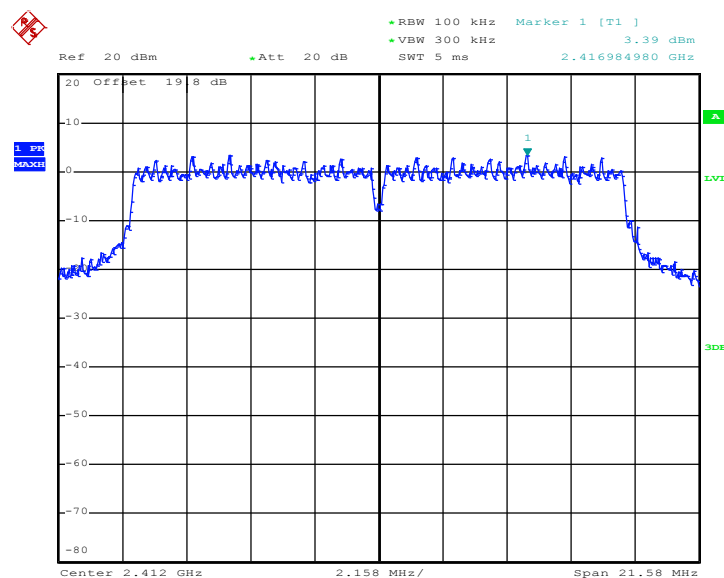
Date: 18.JUL.2012 00:43:12

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

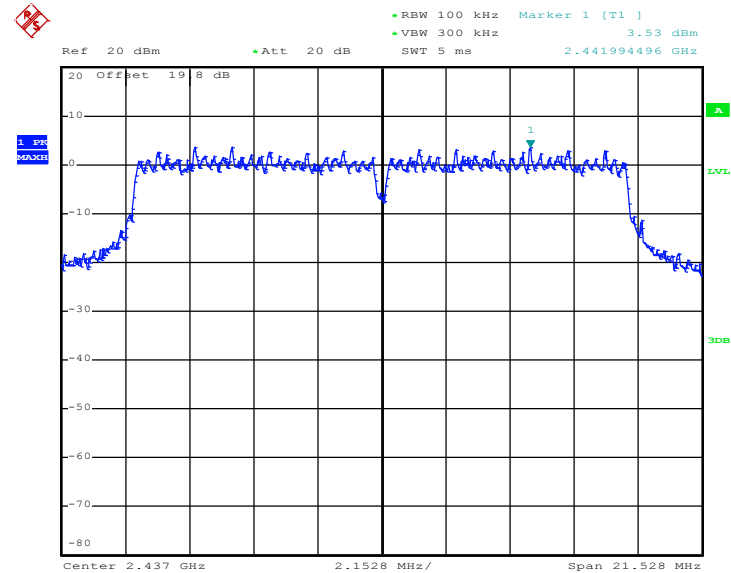
Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	3.39	-11.81	8	Pass
06	2437	3.53	-11.67	8	Pass
11	2462	3.68	-11.52	8	Pass

Note:

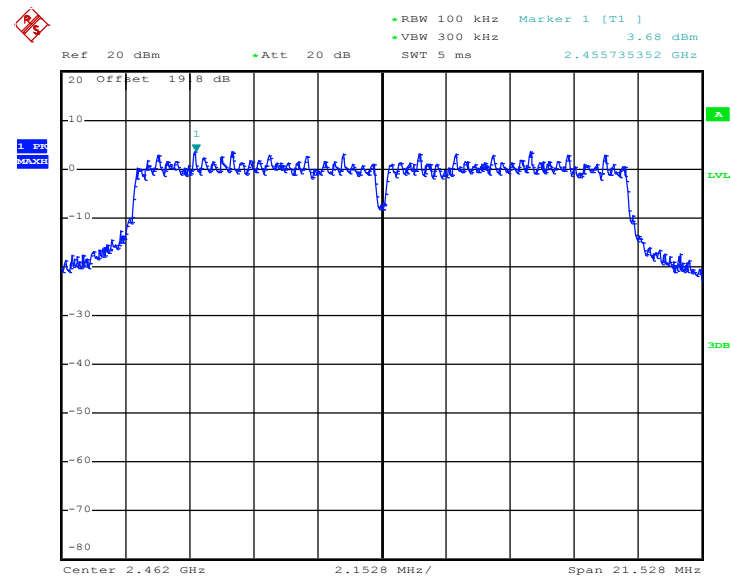
1. Measured power density (dBm) has offset with cable loss.
2. $BWCF (dB) = 10 \log (3k/100k) = -15.2 \text{ dB}$
3. $\text{Power Density/ 3KHz (dBm)} = \text{Measured power density/ 100KHz (dBm)} + BWCF (dB)$

PSD Plot on 802.11g Channel 01


Date: 18.JUL.2012 00:55:20

PSD Plot on 802.11g Channel 06


Date: 18.JUL.2012 00:52:10

PSD Plot on 802.11g Channel 11


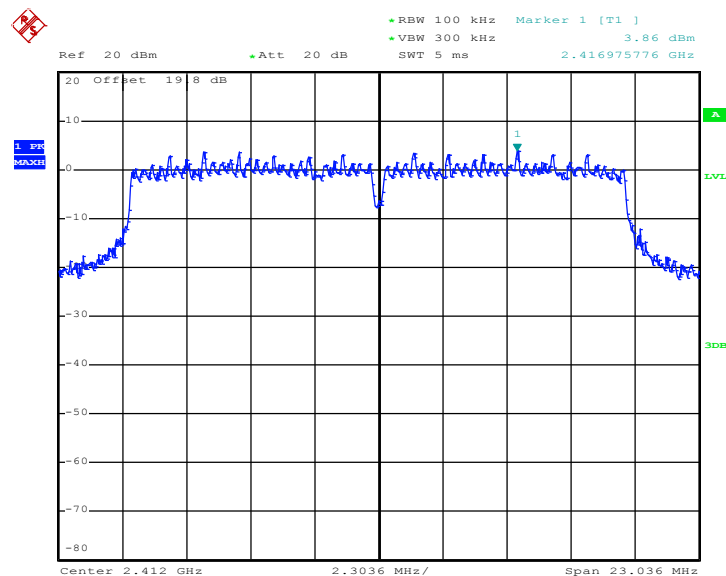
Date: 18.JUL.2012 00:48:38

Test Mode :	802.11n HT-20	Temperature :	24~26°C
Test Engineer :	Reece Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT-20 Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	3.86	-11.34	8	Pass
06	2437	3.44	-11.76	8	Pass
11	2462	3.48	-11.72	8	Pass

Note:

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

PSD Plot on 802.11n HT-20 Channel 01


Date: 18.JUL.2012 00:59:12

[illegible]

Date: 18.JUL.2012 01:06:04

Ref 20 dBm Att 20 dB SWT 5 ms 2.455714968 GHz

Marker 1 [T1] 3.48 dBm

1.9% MOD

Center 2.462 GHz 2.3192 MHz/ Span 23.192 MHz

Date: 18.JUL.2012 01:11:28

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).

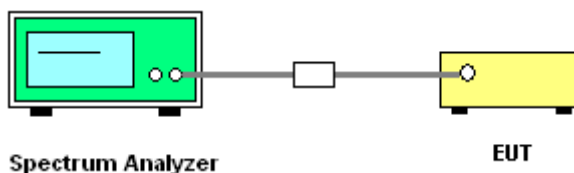
3.4.2 Measuring Instruments

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 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.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure and record the results in the test report.

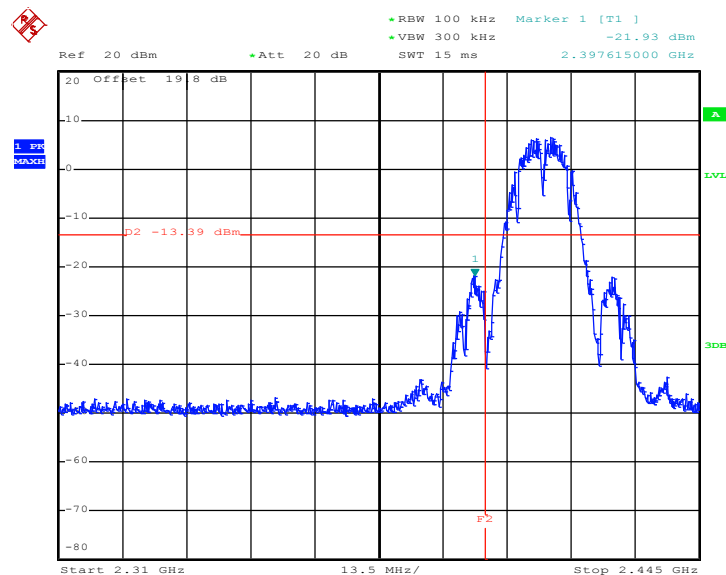
3.4.4 Test Setup



3.4.5 Test Plots of Conducted Band Edges

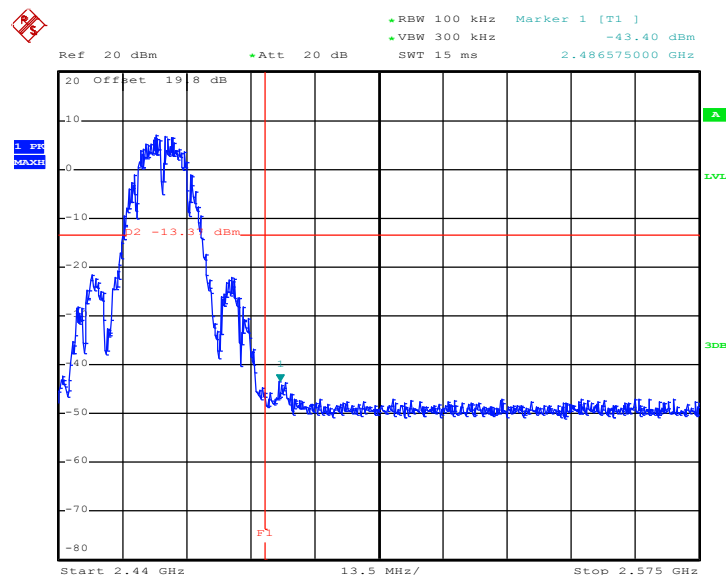
Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Reece Li

Low Band Edge Plot on 802.11b Channel 01



Date: 18.JUL.2012 00:37:22

High Band Edge Plot on 802.11b Channel 11



Date: 18.JUL.2012 00:43:26



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

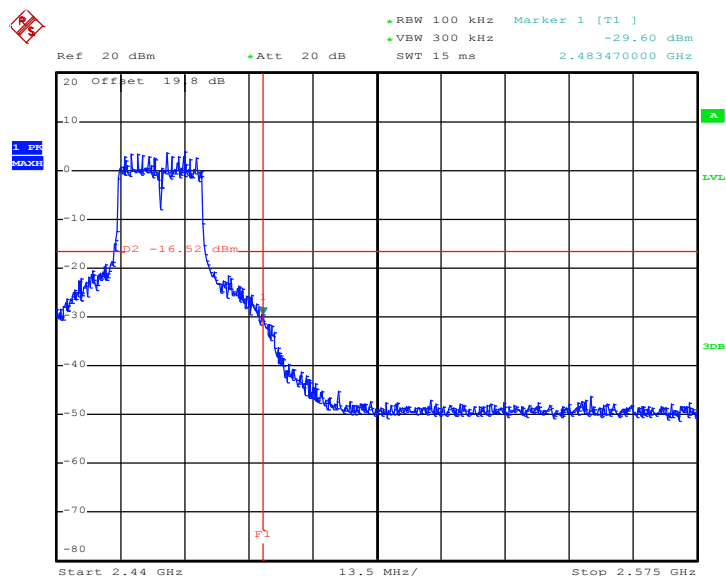




Test Mode :	802.11n HT-20	Temperature :	24~26℃
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Reece Li

[illegible]

High Band Edge Plot on 802.11n HT-20 Channel 11



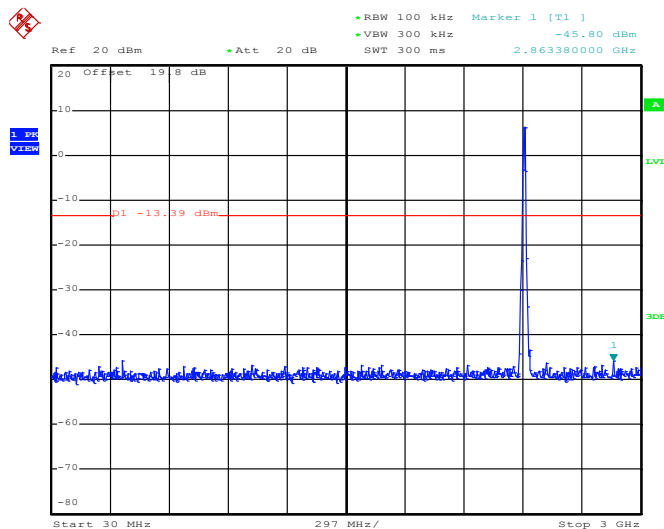
Date: 18.JUL.2012 01:11:42

3.4.6 Test Plots of Spurious Emission

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

802.11b 30 MHz~3 GHz

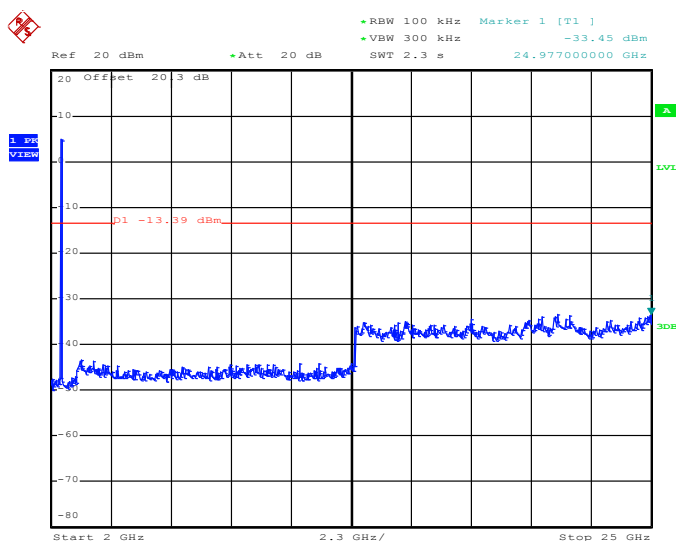
Conducted Spurious Emission Plot on Channel 01



Date: 18.JUL.2012 00:38:00

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 01

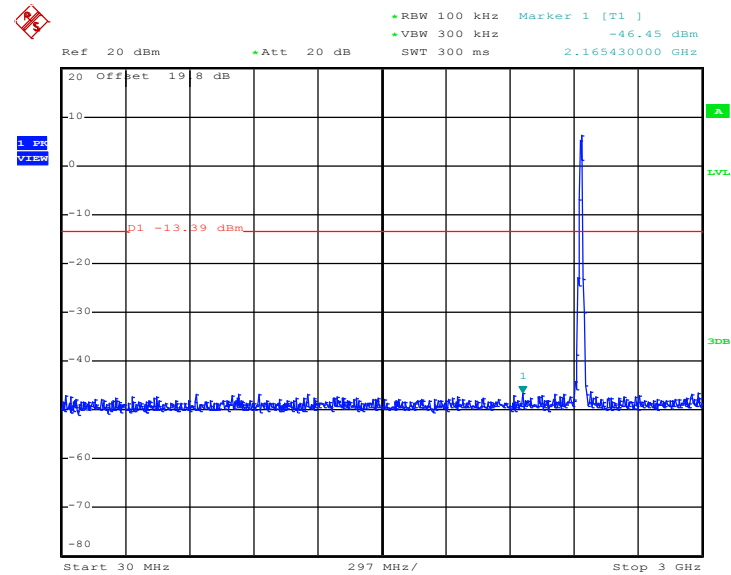


Date: 18.JUL.2012 00:38:17



802.11b 30 MHz~3 GHz

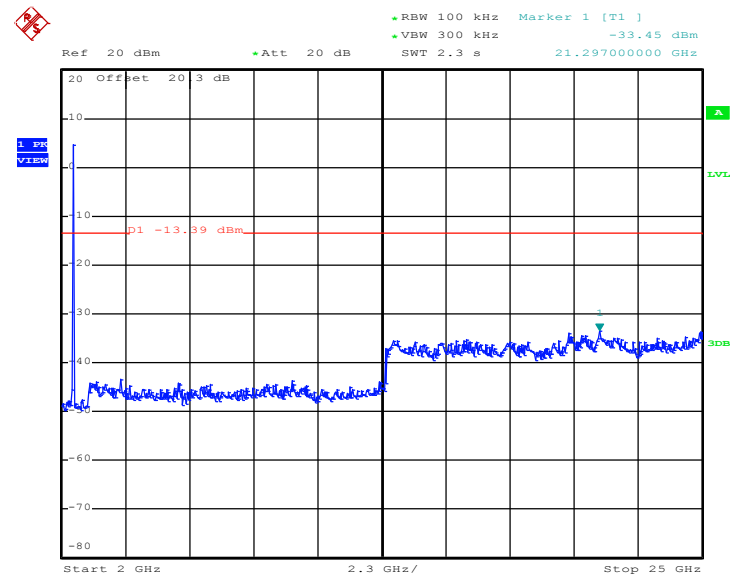
Conducted Spurious Emission Plot on Channel 06



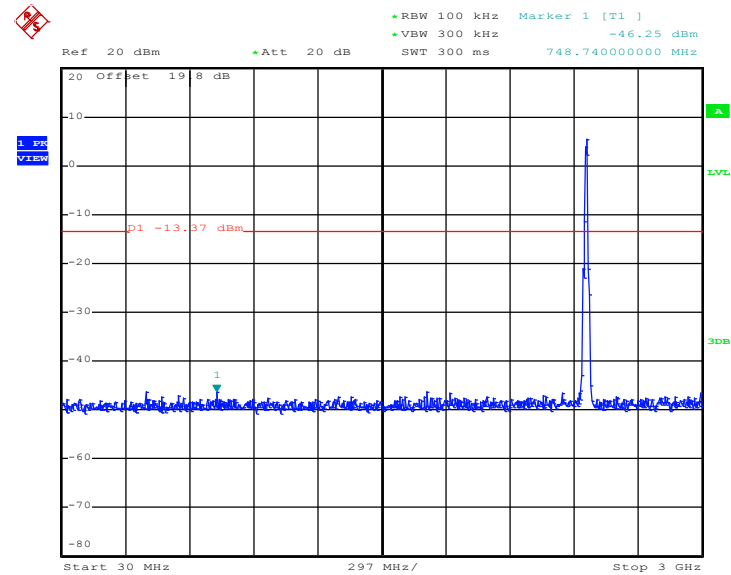
Date: 18.JUL.2012 00:41:00

802.11b 2 GHz~25 GHz

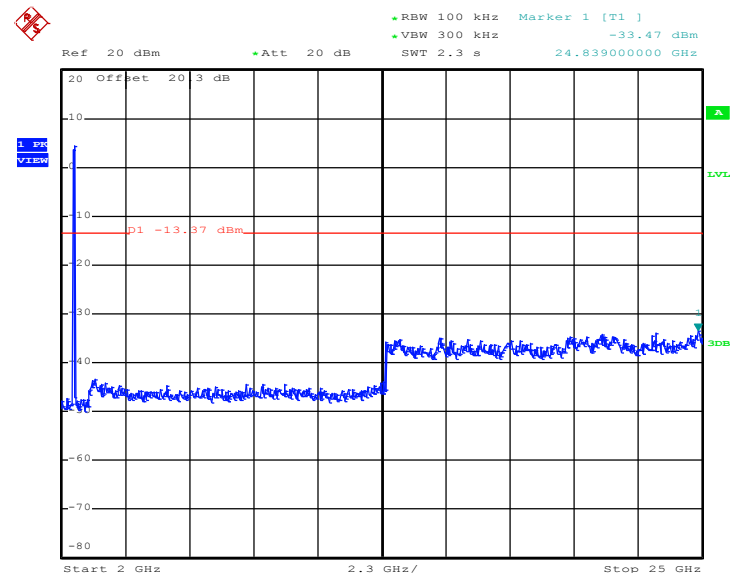
Conducted Spurious Emission Plot on Channel 06



Date: 18.JUL.2012 00:41:18

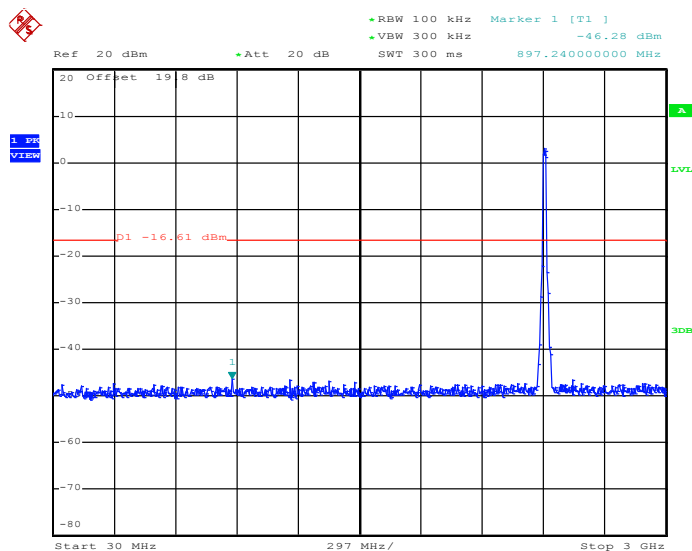
802.11b 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 18.JUL.2012 00:43:51

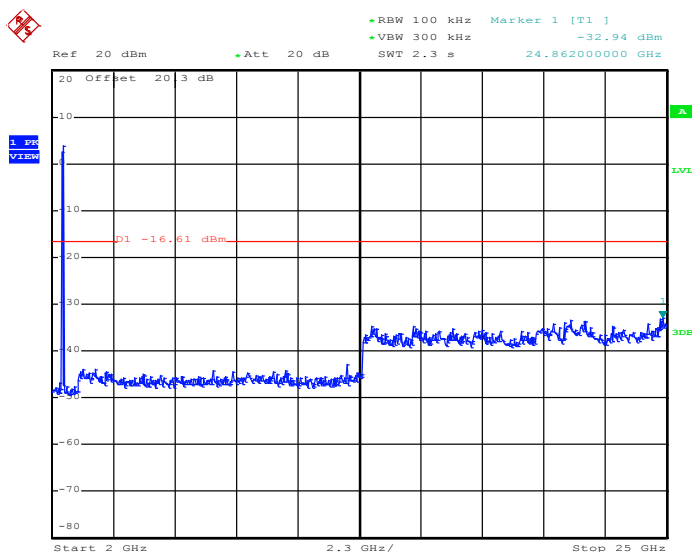
802.11b 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 18.JUL.2012 00:44:09

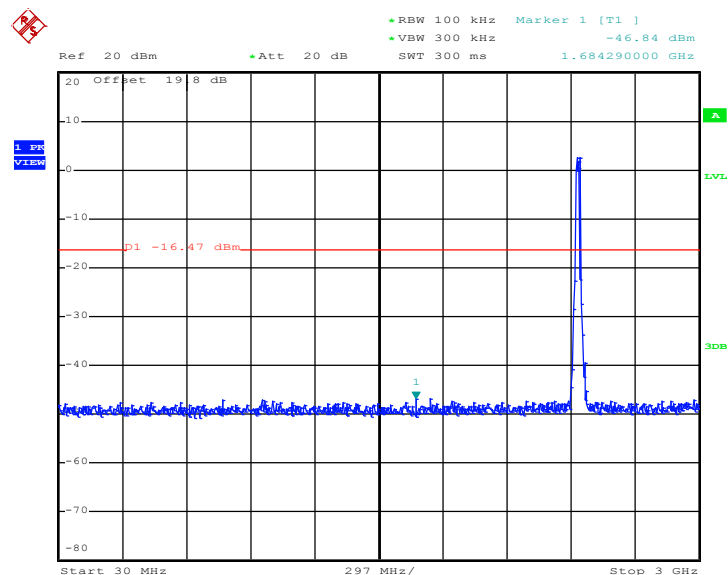
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Reece Li

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


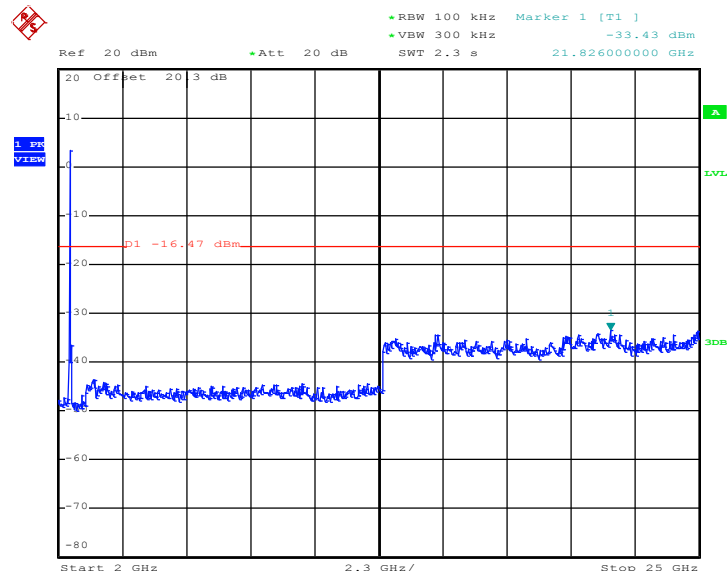
Date: 18.JUL.2012 00:56:08

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


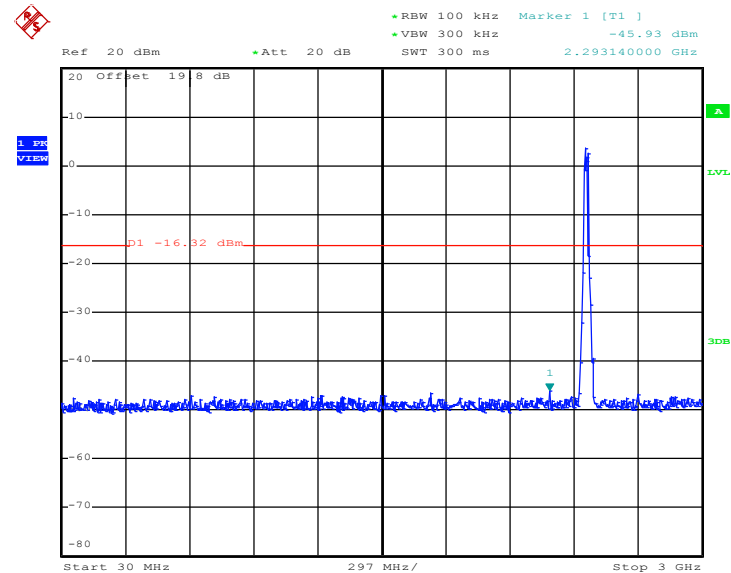
Date: 18.JUL.2012 00:56:25

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


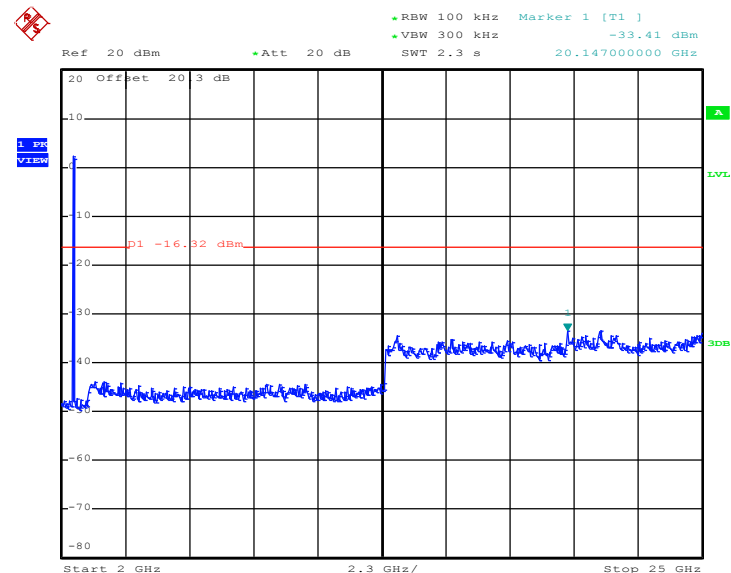
Date: 18.JUL.2012 00:52:30

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


Date: 18.JUL.2012 00:52:47

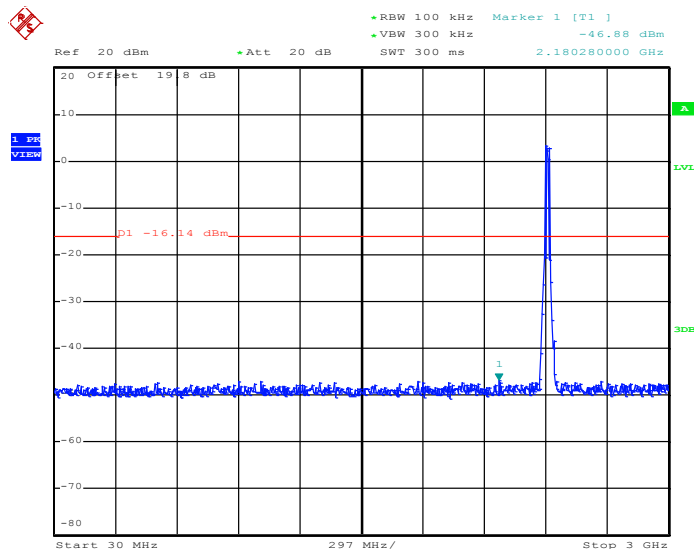
802.11g 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 18.JUL.2012 00:49:16

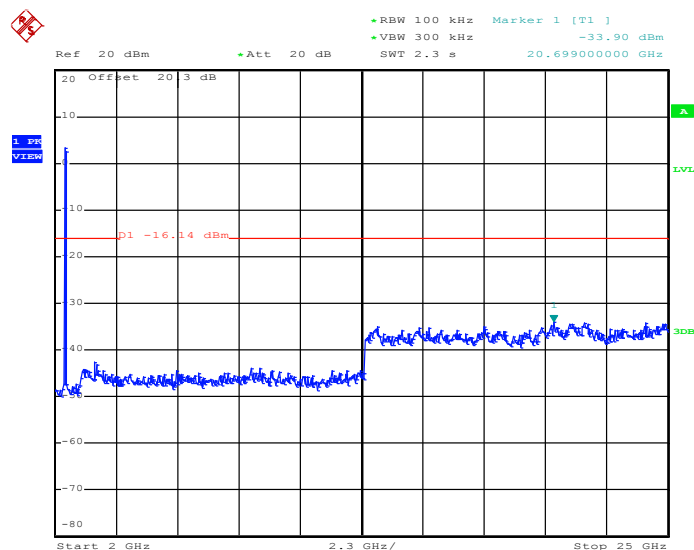
802.11g 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 18.JUL.2012 00:49:33

Test Mode :	802.11n HT-20	Temperature :	24~26°C
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Reece Li

802.11n HT-20 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 01


Date: 18.JUL.2012 00:59:47

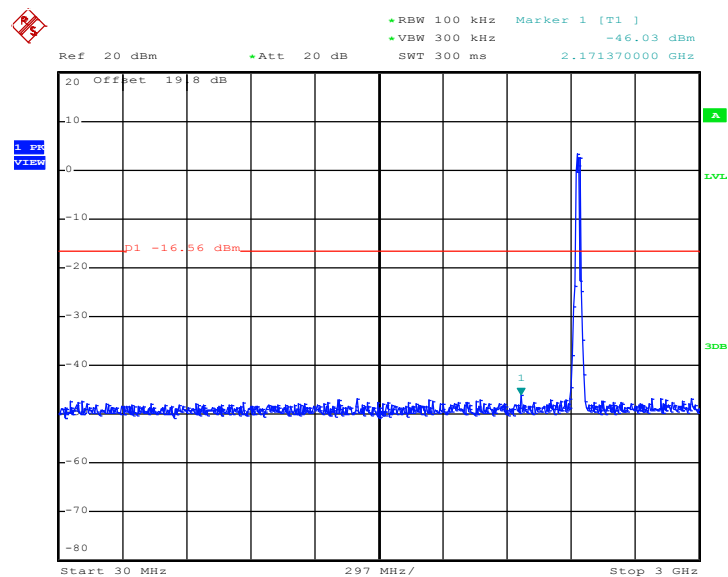
802.11n HT-20 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 01


Date: 18.JUL.2012 01:00:04



802.11n HT-20 30 MHz~3 GHz

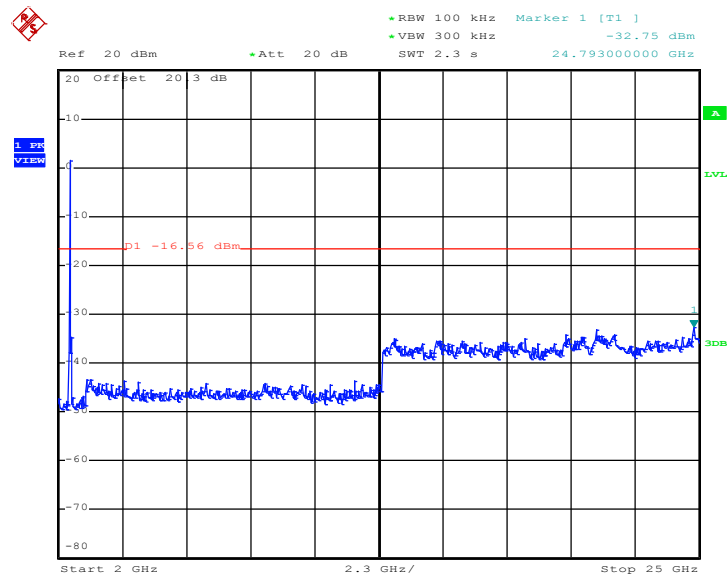
Conducted Spurious Emission Plot on Channel 06



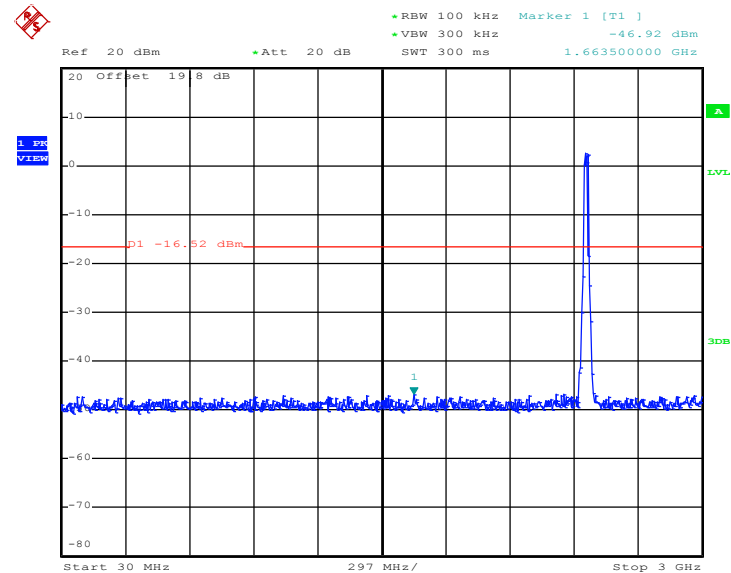
Date: 18.JUL.2012 01:06:25

802.11n HT-20 2 GHz~25 GHz

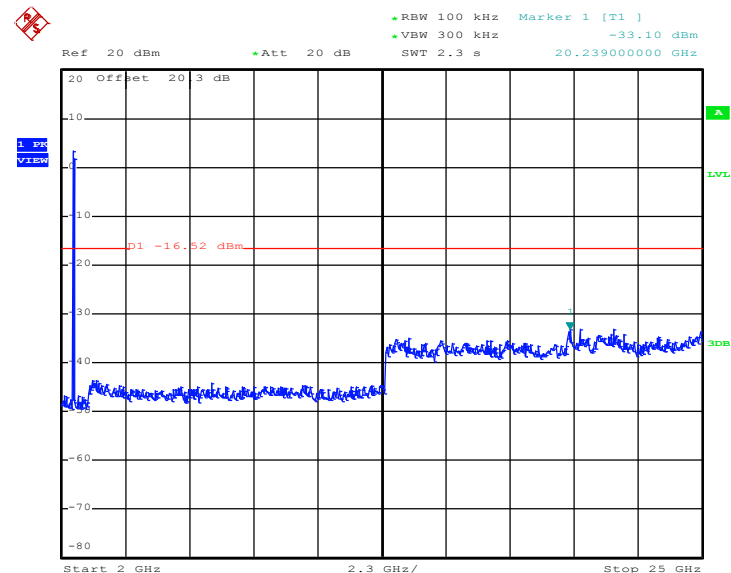
Conducted Spurious Emission Plot on Channel 06



Date: 18.JUL.2012 01:06:43

802.11n HT-20 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 18.JUL.2012 01:12:41

802.11n HT-20 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 18.JUL.2012 01:12:58

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

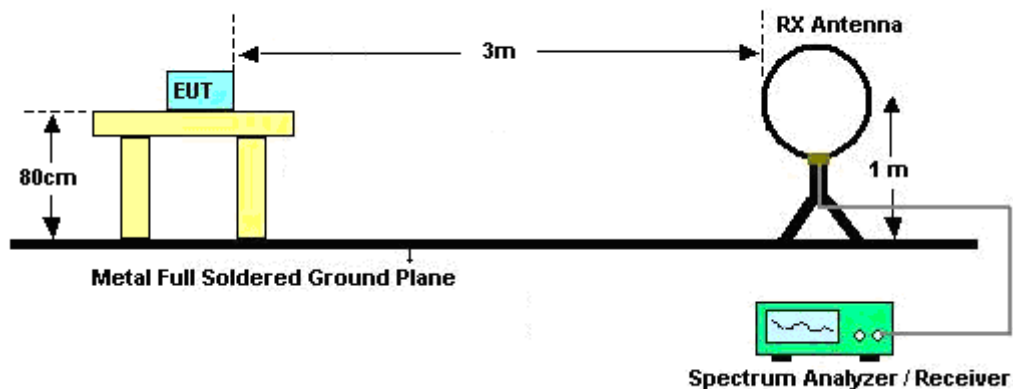
See list of measuring instruments of this test report.

3.5.3 Test Procedures

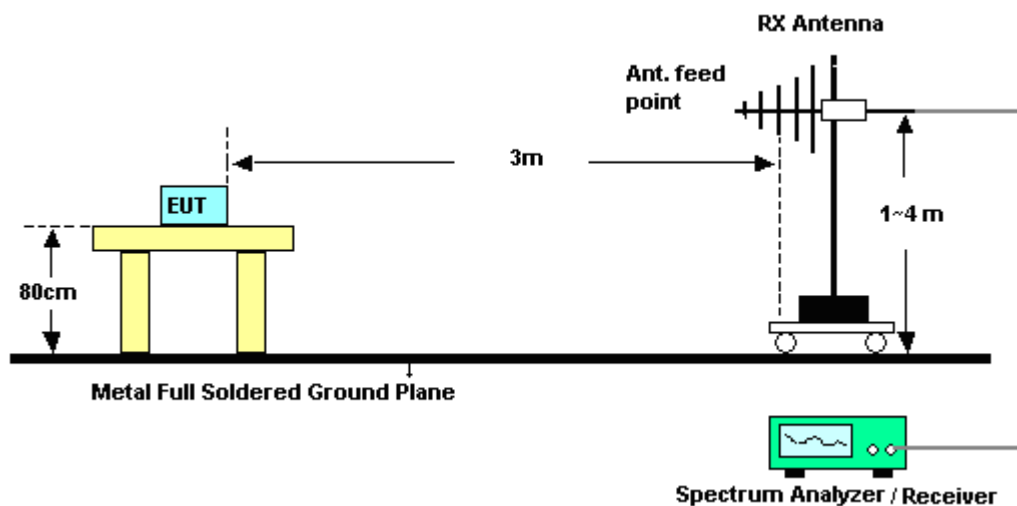
1. The testing follows TCB Workshop 2012, April and fulfills ANSI C63.4-2003 test site requirement. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving Antenna, which was mounted on the top of a variable height Antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest radiation.
5. Use the following spectrum analyzer settings:
6. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 KHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for Peak measurement, and then set VBW=10Hz, while maintaining all of the other instrument settings for Average measurement.
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
8. If the emission level of the EUT measured by the peak detector is more than 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

3.5.4 Test Setup

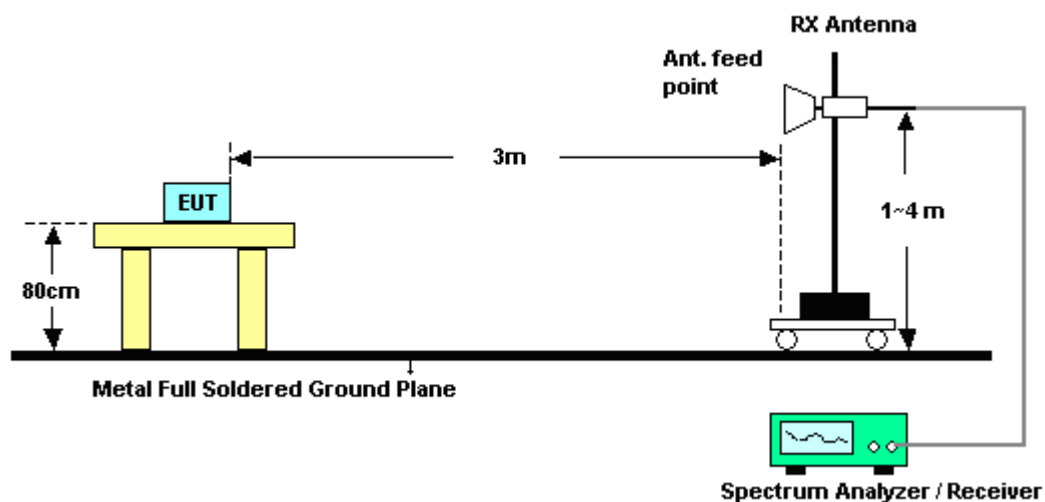
For radiated emissions below 30MHz



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 :	24~25°C
Test Band :	Low	Relative Humidity :	52~53%
Test Channel :	01	Test Engineer :	David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	57.21	-16.79	74	56.47	32.02	4.58	35.86	121	312	Peak
2386.68	45.2	-8.8	54	44.48	32.02	4.58	35.88	121	312	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	56.2	-17.8	74	55.46	32.02	4.58	35.86	100	238	Peak
2390	43.02	-10.98	54	42.28	32.02	4.58	35.86	100	238	Average

Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	52~53%
Test Channel :	11	Test Engineer :	David Yang

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
2483.54	58.07	-15.93	74	57.15	32.09	4.64	35.81	117	301	Peak
2487.66	45.46	-8.54	54	44.53	32.1	4.64	35.81	117	301	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
2483.78	56.92	-17.08	74	56	32.09	4.64	35.81	100	264	Peak
2483.62	44.38	-9.62	54	43.46	32.09	4.64	35.81	100	264	Average

Test Mode :	802.11g	Temperature :	24~25℃
Test Band :	Low	Relative Humidity :	52~53%
Test Channel :	01	Test Engineer :	David Yang

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	72.69	-1.31	74	71.95	32.02	4.58	35.86	122	312	Peak
2390	49.74	-4.26	54	49	32.02	4.58	35.86	122	312	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	70.89	-3.11	74	70.15	32.02	4.58	35.86	100	238	Peak
2390	48.53	-5.47	54	47.79	32.02	4.58	35.86	100	238	Average

Test Mode :	802.11g	Temperature :	24~25℃
Test Band :	High	Relative Humidity :	52~53%
Test Channel :	11	Test Engineer :	David Yang

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
2483.52	73.73	-0.27	74	72.81	32.09	4.64	35.81	116	299	Peak
2483.5	48.94	-5.06	54	48.02	32.09	4.64	35.81	116	299	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
2483.9	72.22	-1.78	74	71.3	32.09	4.64	35.81	100	261	Peak
2483.5	48.21	-5.79	54	47.29	32.09	4.64	35.81	100	261	Average



Test Mode :	802.11n HT-20	Temperature :	24~25°C
Test Band :	Low	Relative Humidity :	52~53%
Test Channel :	01	Test Engineer :	David Yang

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
2389.29	71.89	-2.11	74	71.17	32.02	4.58	35.88	120	299	Peak
2390	49.21	-4.79	54	48.47	32.02	4.58	35.86	120	299	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	70.82	-3.18	74	70.08	32.02	4.58	35.86	100	239	Peak
2390	48.26	-5.74	54	47.52	32.02	4.58	35.86	100	239	Average

Test Mode :	802.11n HT-20	Temperature :	24~25°C
Test Band :	High	Relative Humidity :	52~53%
Test Channel :	11	Test Engineer :	David Yang

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
2484.02	73.76	-0.24	74	72.84	32.09	4.64	35.81	113	301	Peak
2483.5	50.94	-3.06	54	50.02	32.09	4.64	35.81	113	301	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
2483.72	73.57	-0.43	74	72.65	32.09	4.64	35.81	100	262	Peak
2483.5	50.7	-3.3	54	49.78	32.09	4.64	35.81	100	262	Average

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

Test Mode :	802.11b	Temperature :	24~25℃
Test Channel :	01	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band, and there's limit line are 20dB below the highest emission level. For example, 107.68 dBuV/m - 20dB = 87.68 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	102.64	-	-	101.88	32.03	4.59	35.86	121	312	Average
2412	107.68	-	-	106.92	32.03	4.59	35.86	121	312	Peak
3000	50.96	-36.72	87.68	71.06	32.8	5.46	58.36	100	0	Peak
4824	52.29	-1.71	54	70.97	33.83	6.51	59.02	100	93	Average
4824	54.25	-19.75	74	72.93	33.83	6.51	59.02	100	93	Peak
6000	51.02	-36.66	87.68	64.66	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11b	Temperature :	24~25℃
Test Channel :	01	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	101.36	-	-	100.6	32.03	4.59	35.86	100	238	Average
2412	106.29	-	-	105.53	32.03	4.59	35.86	100	238	Peak
3000	50.84	-35.45	86.29	70.94	32.8	5.46	58.36	100	0	Peak
4824	53.63	-0.37	54	72.31	33.83	6.51	59.02	100	159	Average
4824	55.04	-18.96	74	73.72	33.83	6.51	59.02	100	159	Peak
6000	52.86	-33.43	86.29	66.5	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2437 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	102.16	-	-	101.33	32.06	4.61	35.84	116	298	Average
2437	106.97	-	-	106.14	32.06	4.61	35.84	116	298	Peak
4874	51.61	-2.39	54	70.14	33.82	6.53	58.88	100	276	Average
4874	53.49	-20.51	74	72.02	33.82	6.53	58.88	100	276	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2437 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	101.59	-	-	100.76	32.06	4.61	35.84	100	240	Average
2437	106.62	-	-	105.79	32.06	4.61	35.84	100	240	Peak
4874	52.93	-1.07	54	71.46	33.82	6.53	58.88	101	355	Average
4874	54.59	-19.41	74	73.12	33.82	6.53	58.88	101	355	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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
31.35	20.9	-19.1	40	32.71	19.12	0.71	31.64	-	-	Peak
119.1	17.95	-25.55	43.5	36.31	11.8	1.2	31.36	-	-	Peak
257.34	15.02	-30.98	46	30.79	13.51	1.68	30.96	-	-	Peak
400.1	25.3	-20.7	46	38.47	16.03	2.01	31.21	-	-	Peak
554.8	20.27	-25.73	46	28.88	20.05	2.34	31	-	-	Peak
799.8	28.34	-17.66	46	33.22	22.1	2.83	29.81	145	269	Peak
2462	104.19	-	-	103.33	32.07	4.62	35.83	117	301	Average
2462	109.17	-	-	108.31	32.07	4.62	35.83	117	301	Peak
3000	50.23	-38.94	89.17	70.33	32.8	5.46	58.36	100	0	Peak
4924	49.29	-4.71	54	67.66	33.81	6.56	58.74	100	9	Average
4924	51.53	-22.47	74	69.9	33.81	6.56	58.74	100	9	Peak
6000	51.18	-37.99	89.17	64.82	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11b	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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
32.97	24.15	-15.85	40	37.3	17.76	0.72	31.63	-	-	Peak
38.64	29.6	-10.4	40	46.53	13.92	0.75	31.6	100	311	Peak
66.72	16.67	-23.33	40	41.25	6.06	0.89	31.53	-	-	Peak
344.8	21.11	-24.89	46	36.04	14.3	1.89	31.12	-	-	Peak
400.1	22.08	-23.92	46	35.25	16.03	2.01	31.21	-	-	Peak
774.6	24.57	-21.43	46	29.63	22.15	2.79	30	-	-	Peak
2462	102.7	-	-	101.84	32.07	4.62	35.83	100	264	Average
2462	107.65	-	-	106.79	32.07	4.62	35.83	100	264	Peak
3000	51.43	-36.22	87.65	71.53	32.8	5.46	58.36	100	0	Peak
4924	53.92	-0.08	54	72.29	33.81	6.56	58.74	100	353	Average
4924	54.74	-19.26	74	73.11	33.81	6.56	58.74	100	353	Peak
6000	51.9	-35.75	87.65	65.54	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	91.7	-	-	90.94	32.03	4.59	35.86	122	312	Average
2412	108.55	-	-	107.79	32.03	4.59	35.86	122	312	Peak
3000	51.07	-37.48	88.55	71.17	32.8	5.46	58.36	100	0	Peak
4824	48.97	-25.03	74	67.65	33.83	6.51	59.02	100	0	Peak
6000	50.66	-37.89	88.55	64.3	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	90.33	-	-	89.57	32.03	4.59	35.86	100	238	Average
2412	106.97	-	-	106.21	32.03	4.59	35.86	100	238	Peak
3000	51.67	-35.3	86.97	71.77	32.8	5.46	58.36	100	0	Peak
4824	50.58	-23.42	74	69.26	33.83	6.51	59.02	100	0	Peak
6000	52.46	-34.51	86.97	66.1	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	95.6	-	-	94.77	32.06	4.61	35.84	118	314	Average
2437	112.06	-	-	111.23	32.06	4.61	35.84	118	314	Peak
3000	50.89	-41.17	92.06	70.99	32.8	5.46	58.36	100	0	Peak
4874	41.25	-12.75	54	59.78	33.82	6.53	58.88	139	93	Average
4874	52.95	-21.05	74	71.48	33.82	6.53	58.88	139	93	Peak
6000	50.77	-41.29	92.06	64.41	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	94.45	-	-	93.62	32.06	4.61	35.84	100	243	Average
2437	111.31	-	-	110.48	32.06	4.61	35.84	100	243	Peak
3000	50.88	-40.43	91.31	70.98	32.8	5.46	58.36	100	0	Peak
4874	42.7	-11.3	54	61.23	33.82	6.53	58.88	100	360	Average
4874	57.32	-16.68	74	75.85	33.82	6.53	58.88	100	360	Peak
6000	51.43	-39.88	91.31	65.07	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	92.72	-	-	91.86	32.07	4.62	35.83	116	299	Average
2462	108.86	-	-	108	32.07	4.62	35.83	116	299	Peak
3000	50.3	-38.56	88.86	70.4	32.8	5.46	58.36	100	0	Peak
4924	44.46	-29.54	74	62.84	33.81	6.55	58.74	100	0	Peak
6000	50.95	-37.91	88.86	64.59	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11g	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	90.57	-	-	89.71	32.07	4.62	35.83	100	261	Average
2462	106.9	-	-	106.04	32.07	4.62	35.83	100	261	Peak
3000	50.81	-36.09	86.9	70.91	32.8	5.46	58.36	100	0	Peak
4924	49.64	-24.36	74	68.01	33.81	6.56	58.74	100	0	Peak
6000	51.75	-35.15	86.9	65.39	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11n-HT20	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	89.41	-	-	88.65	32.03	4.59	35.86	120	299	Average
2412	106.52	-	-	105.76	32.03	4.59	35.86	120	299	Peak
3000	51.36	-35.16	86.52	71.46	32.8	5.46	58.36	100	0	Peak
4824	47.38	-26.62	74	66.06	33.83	6.51	59.02	100	0	Peak
6000	50.81	-35.71	86.52	64.45	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11n-HT20	Temperature :	24~25°C
Test Channel :	01	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	88.64	-	-	87.88	32.03	4.59	35.86	100	239	Average
2412	106.03	-	-	105.27	32.03	4.59	35.86	100	239	Peak
3000	51.33	-34.7	86.03	71.43	32.8	5.46	58.36	100	0	Peak
4824	49.47	-24.53	74	68.15	33.83	6.51	59.02	100	0	Peak
6000	51.6	-34.43	86.03	65.24	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11n-HT20	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	94.44	-	-	93.61	32.06	4.61	35.84	117	300	Average
2437	111.39	-	-	110.56	32.06	4.61	35.84	117	300	Peak
3000	51.11	-40.28	91.39	71.21	32.8	5.46	58.36	100	0	Peak
4874	41.54	-12.46	54	60.07	33.82	6.53	58.88	111	102	Average
4874	52.74	-21.26	74	71.27	33.82	6.53	58.88	111	102	Peak
6000	51.12	-40.27	91.39	64.76	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11n-HT20	Temperature :	24~25°C
Test Channel :	06	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	93.26	-	-	92.43	32.06	4.61	35.84	100	244	Average
2437	110.62	-	-	109.79	32.06	4.61	35.84	100	244	Peak
3000	50.86	-39.76	90.62	70.96	32.8	5.46	58.36	100	0	Peak
4874	42.22	-11.78	54	60.75	33.82	6.53	58.88	100	5	Average
4874	56.92	-17.08	74	75.44	33.82	6.54	58.88	100	5	Peak
6000	51.47	-39.15	90.62	65.11	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11n-HT20	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	91.11	-	-	90.25	32.07	4.62	35.83	113	301	Average
2462	108.3	-	-	107.44	32.07	4.62	35.83	113	301	Peak
3000	50.33	-37.97	88.3	70.43	32.8	5.46	58.36	100	0	Peak
4924	44.67	-29.33	74	63.09	33.82	6.55	58.79	100	0	Peak
6000	51.71	-36.59	88.3	65.35	35.1	7.44	56.18	100	0	Peak

Test Mode :	802.11n-HT20	Temperature :	24~25°C
Test Channel :	11	Relative Humidity :	52~53%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. 3000 MHz and 6000 MHz are not within a restricted band.		

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	89.93	-	-	89.07	32.07	4.62	35.83	100	262	Average
2462	106.62	-	-	105.76	32.07	4.62	35.83	100	262	Peak
3000	50.48	-36.14	86.62	70.58	32.8	5.46	58.36	100	0	Peak
4924	47.59	-26.41	74	65.97	33.81	6.55	58.74	100	0	Peak
6000	52.65	-33.97	86.62	66.29	35.1	7.44	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 (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.

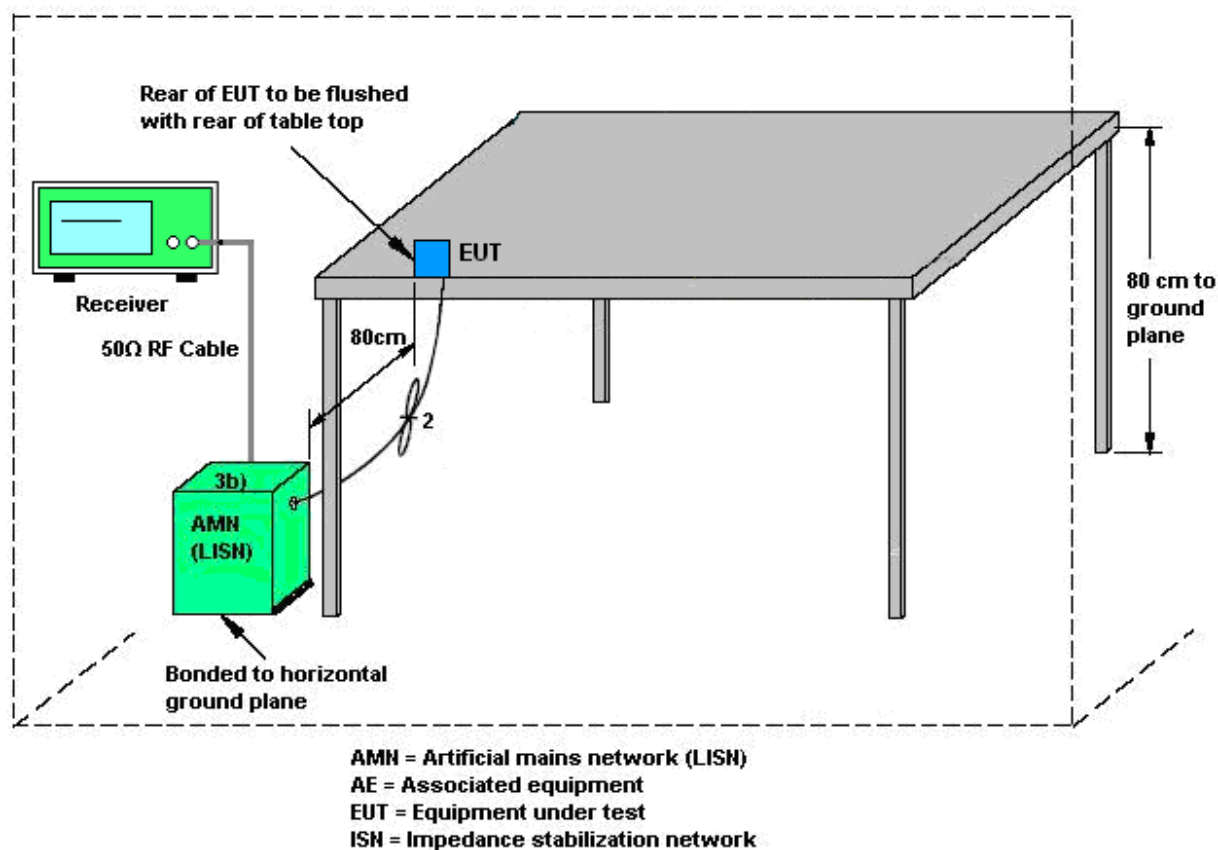
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

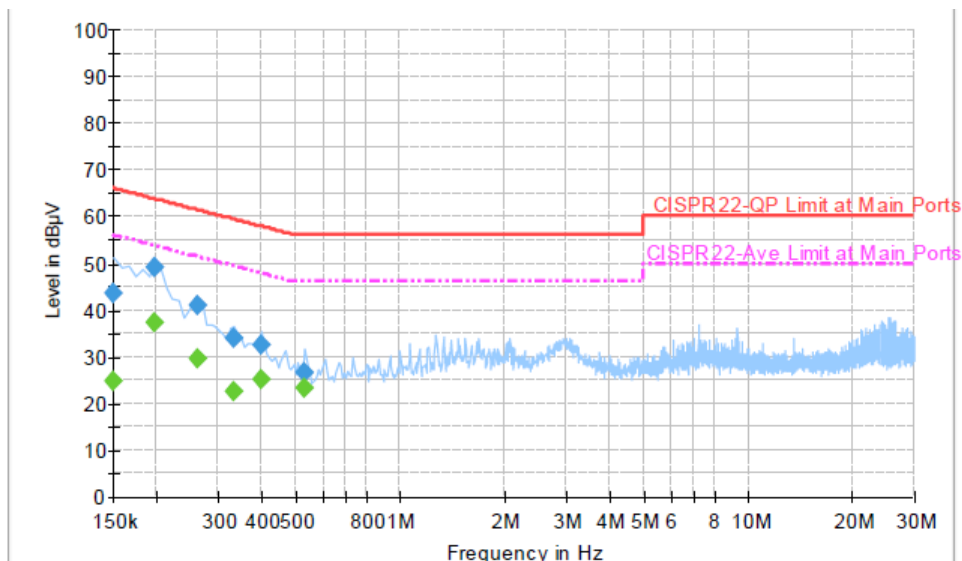
1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 KHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + RJ-45 Link + USB Cable (Charging from Notebook) + Battery for Sample 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



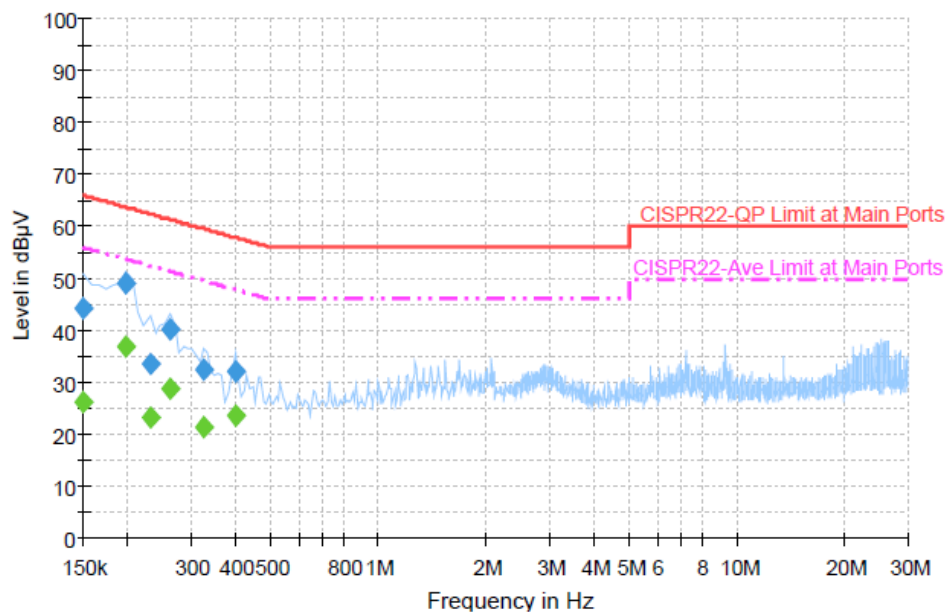
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	43.4	Off	L1	19.4	22.6	66.0
0.198000	49.3	Off	L1	19.3	14.4	63.7
0.262000	40.9	Off	L1	19.4	20.5	61.4
0.334000	33.8	Off	L1	19.4	25.6	59.4
0.398000	32.6	Off	L1	19.5	25.3	57.9
0.534000	26.7	Off	L1	19.4	29.3	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	24.6	Off	L1	19.4	31.4	56.0
0.198000	37.1	Off	L1	19.3	16.6	53.7
0.262000	29.5	Off	L1	19.4	21.9	51.4
0.334000	22.6	Off	L1	19.4	26.8	49.4
0.398000	25.0	Off	L1	19.5	22.9	47.9
0.534000	23.4	Off	L1	19.4	22.6	46.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + RJ-45 Link + USB Cable (Charging from Notebook) + Battery for Sample 1		
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)
0.150000	44.2	Off	N	19.4	21.8	66.0
0.198000	49.2	Off	N	19.3	14.5	63.7
0.230000	33.6	Off	N	19.4	28.8	62.4
0.262000	40.4	Off	N	19.4	21.0	61.4
0.326000	32.3	Off	N	19.4	27.3	59.6
0.398000	32.1	Off	N	19.5	25.8	57.9

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	26.3	Off	N	19.4	29.7	56.0
0.198000	36.8	Off	N	19.3	16.9	53.7
0.230000	23.3	Off	N	19.4	29.1	52.4
0.262000	28.7	Off	N	19.4	22.7	51.4
0.326000	21.5	Off	N	19.4	28.1	49.6
0.398000	23.4	Off	N	19.5	24.5	47.9

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	Jul. 02, 2012 ~ Jul. 18, 2012	Jun. 05, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 18, 2011	Jul. 02, 2012 ~ Jul. 18, 2012	Sep. 17, 2012	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 18, 2011	Jul. 02, 2012 ~ Jul. 18, 2012	Sep. 17, 2012	Conducted (TH02-HY)
Spectrum Analyzer	R&S	ESU26	100390	20Hz ~ 26.5GHz	Dec. 22, 2011	Jul. 23, 2012 ~ Jul. 24, 2012	Dec. 21, 2012	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 2GHz	Oct. 22, 2011	Jul. 23, 2012 ~ Jul. 24, 2012	Oct. 21, 2012	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 ~ 360 degree	N/A	Jul. 23, 2012 ~ Jul. 24, 2012	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m ~ 4 m	N/A	Jul. 23, 2012 ~ Jul. 24, 2012	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	66584	1GHz ~ 18GHz	Aug. 04, 2011	Jul. 23, 2012 ~ Jul. 24, 2012	Aug. 03, 2012	Radiation (03CH05-HY)
Pre Amplifier	COM-POWER	PA-103A	161075	10Hz ~ 1000MHz Gain:32dB	Feb. 27, 2012	Jul. 23, 2012 ~ Jul. 24, 2012	Feb. 26, 2013	Radiation (03CH05-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-10P	159087	1GHz~18GHz	Feb. 27, 2012	Jul. 23, 2012 ~ Jul. 24, 2012	Feb. 26, 2013	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz~26.5GHz	Aug. 30, 2011	Jul. 23, 2012 ~ Jul. 24, 2012	Aug. 29, 2012	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917025 1	15GHz ~ 40GHz	Oct. 21, 2011	Jul. 23, 2012 ~ Jul. 24, 2012	Oct. 20, 2012	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 23, 2012 ~ Jul. 24, 2012	Jul. 28, 2012	Radiation (03CH05-HY)
EMI Test Receiver	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Oct. 27, 2011	Jul. 06, 2012	Oct. 26, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Jul. 06, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Jul. 06, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000 W	N/A	N/A	N/A	Jul. 06, 2012	N/A	Conduction (CO05-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
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.72
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP261903 as below.