

FCC RF Test Report

APPLICANT : Brightstar Coporation
EQUIPMENT : GSM mobile phone
BRAND NAME : Avvio
MODEL NAME : Avvio SN52S/SN52
MARKETING NAME : Avvio SN52S/SN52
FCC ID : WVBASN52
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Sep. 12, 2012 and completely tested on Oct. 15, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR291206B	Rev. 01	Initial issue of report	Oct. 15, 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 5.46 dB at 900.147 MHz
3.6	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 9.60 dB at 0.360 MHz
3.7	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Brightstar Coporation

9725 NW 117th Ave., Miami, Florida, United States

1.2 Manufacturer

Shanghai Huaqin Telecom Technology Co., Ltd

Building 12, 399 Keyuan Road, Pudong district, Shanghai, China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	GSM mobile phone
Brand Name	Avvio
MODEL NAME / MARKETING NAME	Avvio SN52S/SN52
FCC ID	WVBASN52
EUT supports Radios application	GSM/GPRS/WLAN 11bgn/Bluetooth 3.0 EDR
HW Version	V298_MB_V1.0
SW Version	ZV298PAC_057A_V0_0_1
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 : 5.38 dBm (0.0035 W) 802.11g : 11.98 dBm (0.0158 W) 802.11n HT20 : 12.71 dBm (0.0187 W)
Antenna Type	PIFA Antenna with gain -3.00 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 (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH01-KS	CO01-KS	03CH01-KS	149928/4086E-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 v02
- ♦ 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.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	P08S	QDS-BRCM1030	N/A	AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Nokia	BH-106	QTLBH-106	N/A	N/A

2 Test Configuration of Equipment Under Test

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

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

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

2.1 Carrier Frequency Channel

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

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and antenna configurations as following table and the highest power data rates were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	5.38	5.34	4.35	4.97
CH 06	2437 MHz	4.76	4.8	3.48	4.24
CH 11	2462 MHz	4.28	4.23	3.12	3.89

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	11.54	11.34	11.98	11.1	11.76	11.24	10.87	11.6
CH 06	2437 MHz	10.89	9.79	10.46	9.7	10.48	10.57	10.46	9.92
CH 11	2462 MHz	10.26	9.34	10.36	9.52	10.39	10.33	9.61	9.8

Channel	Frequency	2.4GHz 802.11n HT20 RF Power (dBm)							
		OFDM Data Rate							
		MCS=0	MCS=1	MCS=2	MCS=3	MCS=4	MCS=5	MCS=6	MCS=7
CH 01	2412 MHz	11.8	11.72	12.1	11.69	11.61	11.62	12.71	11.67
CH 06	2437 MHz	10.8	11.02	11.51	11.05	10.94	10.86	11.7	11.04
CH 11	2462 MHz	10.7	10.53	10.99	10.47	10.45	10.49	11.11	10.56

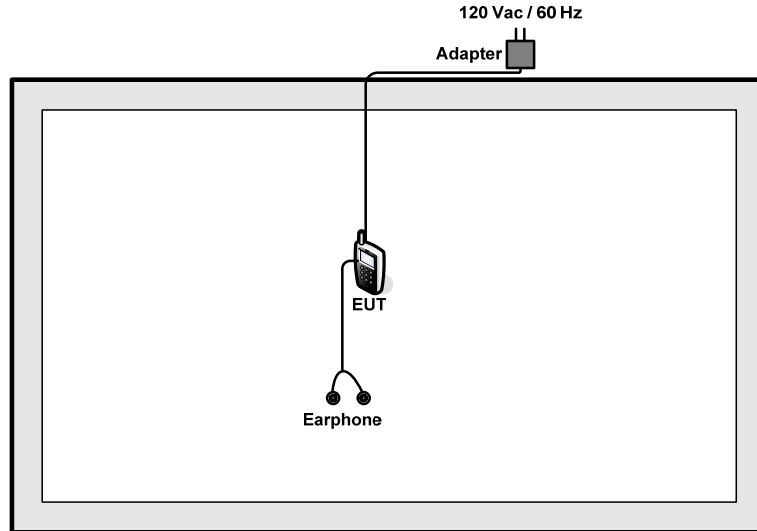
2.3 Test Mode

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

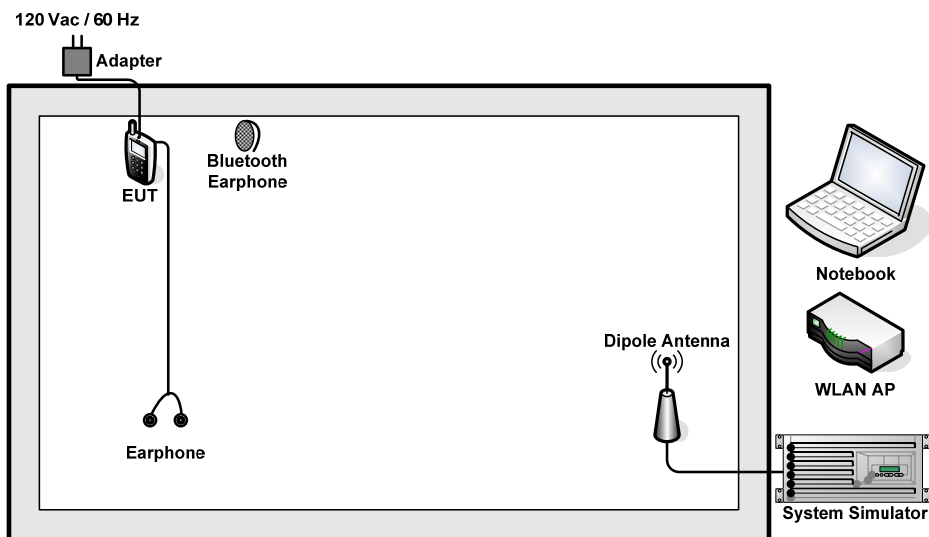
Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
	Conducted Band EDGE	802.11b	1 Mbps	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 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone			

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 RF Utility

For WLAN function, key in “* #510818 #” on the EUT directly. Then, the EUT will get into the engineering modes to contact with WLAN AP 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.

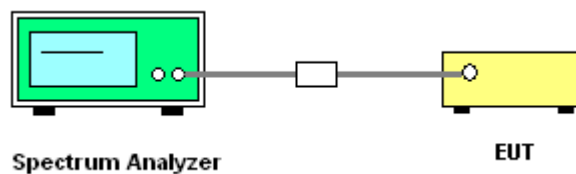
3.1.2 Measuring Instruments

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. 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) $\geq 3 * RBW$. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.

3.1.4 Test Setup



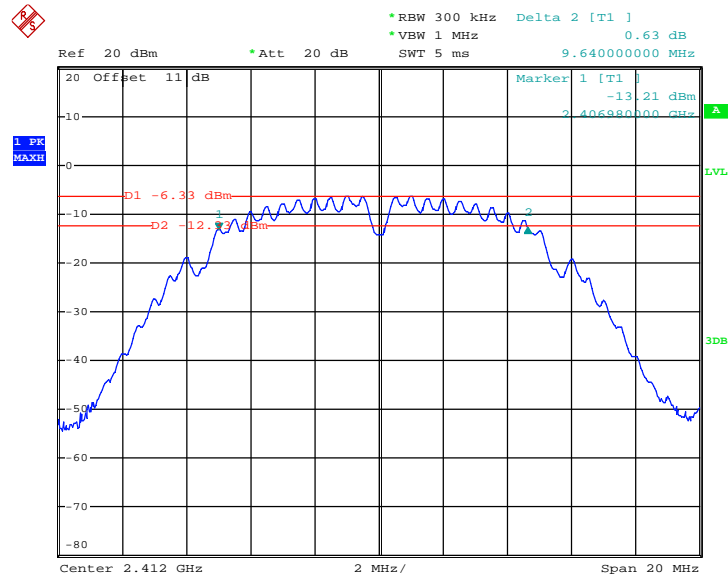


3.1.5 Test Result of 6dB Bandwidth

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

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	9.64	0.5	Pass
06	2437	9.24	0.5	Pass
11	2462	9.24	0.5	Pass

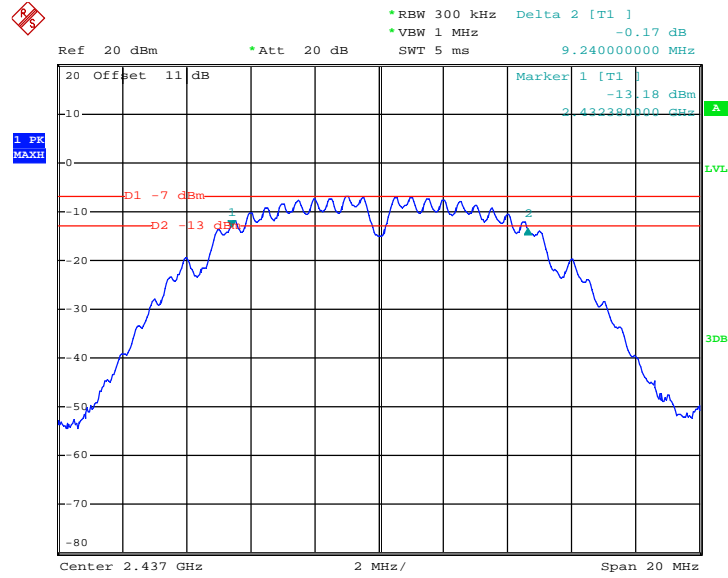
6 dB Bandwidth Plot on 802.11b Channel 01



Date: 29.SEP.2012 00:12:28

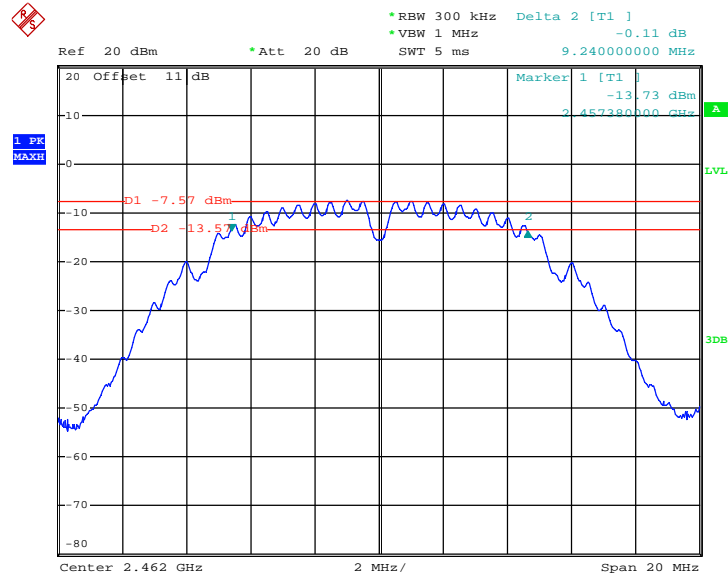


6 dB Bandwidth Plot on 802.11b Channel 06



Date: 29.SEP.2012 00:16:32

6 dB Bandwidth Plot on 802.11b Channel 11



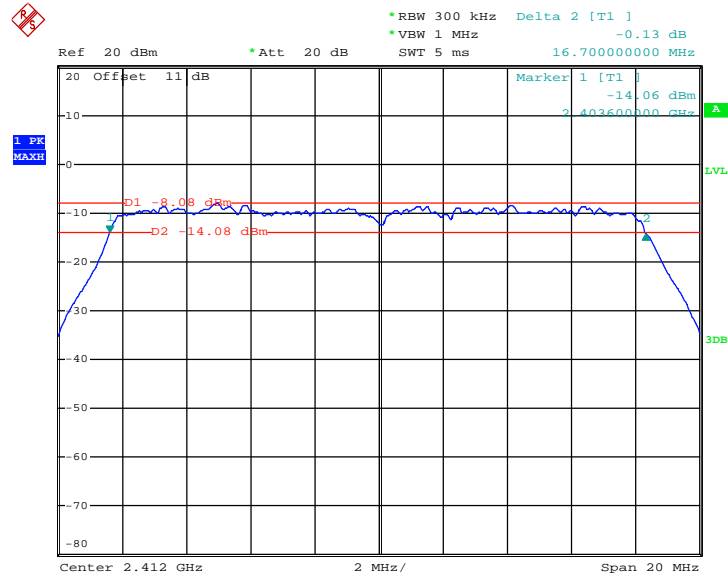
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Test Mode :	802.11g	Temperature :	24~26°C
Test Engineer :	Blithe Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.70	0.5	Pass
06	2437	16.68	0.5	Pass
11	2462	16.72	0.5	Pass

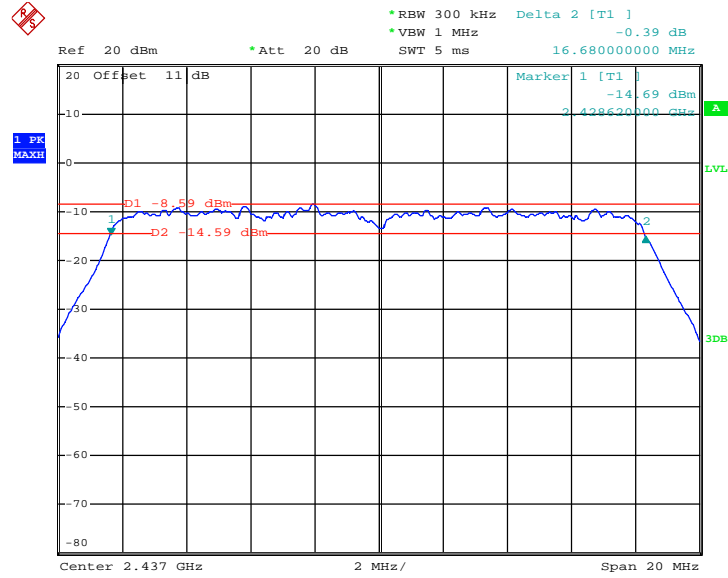
6 dB Bandwidth Plot on 802.11g Channel 01



Date: 27.SEP.2012 03:31:12

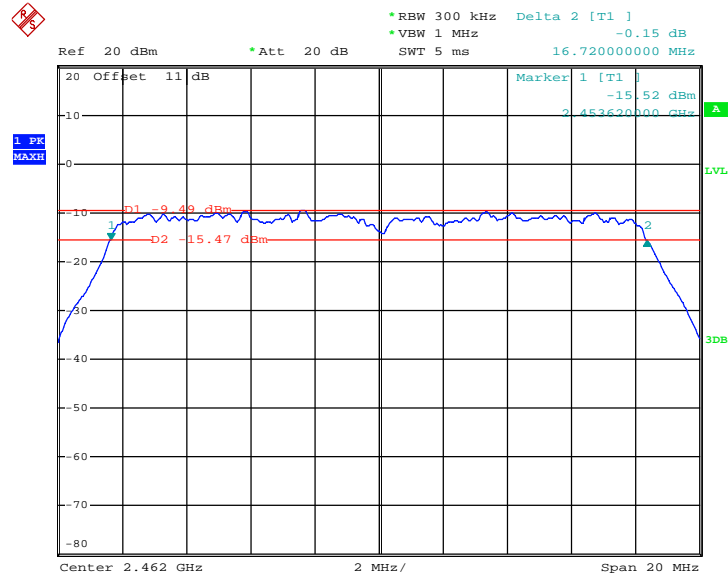


6 dB Bandwidth Plot on 802.11g Channel 06



Date: 27.SEP.2012 03:34:43

6 dB Bandwidth Plot on 802.11g Channel 11



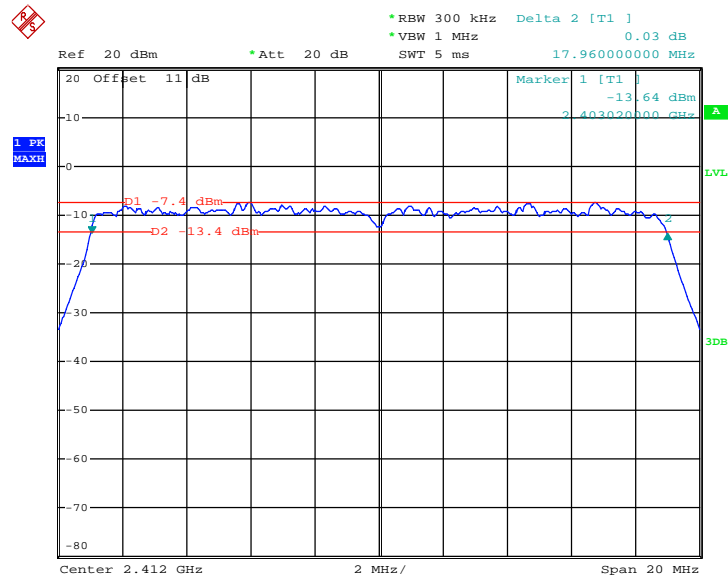
Date: 27.SEP.2012 03:37:32



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Blithe Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.96	0.5	Pass
06	2437	17.92	0.5	Pass
11	2462	17.94	0.5	Pass

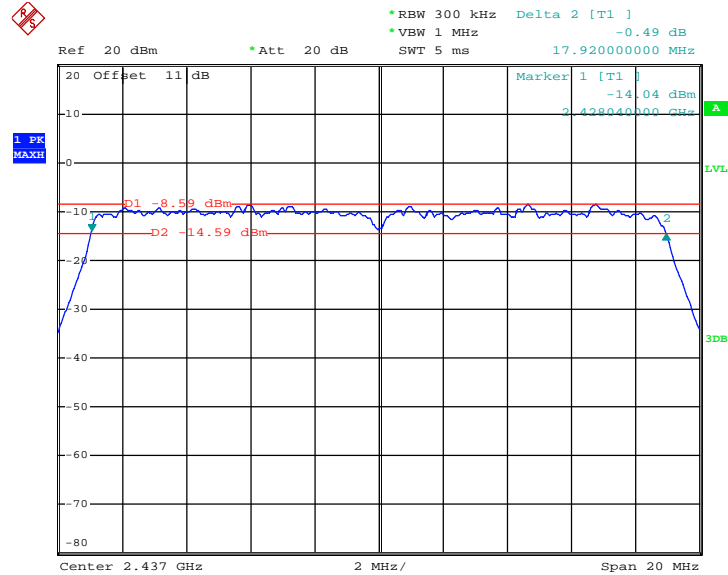
6 dB Bandwidth Plot on 802.11n HT20 Channel 01



Date: 27.SEP.2012 03:44:05

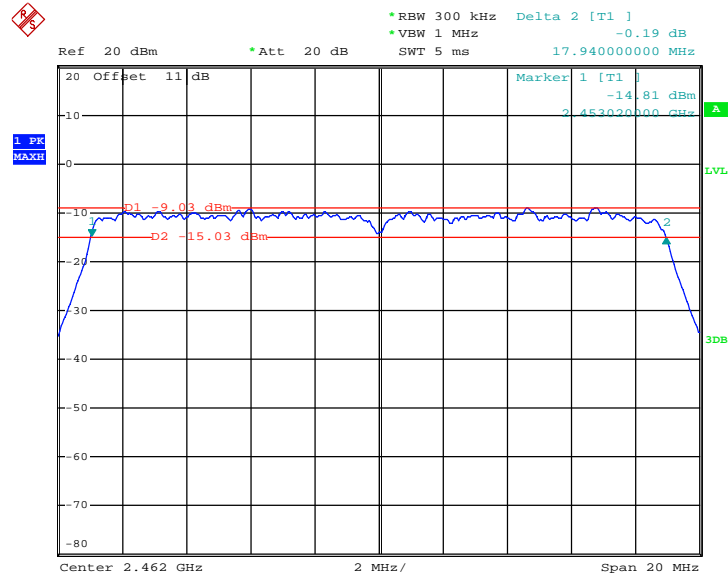


6 dB Bandwidth Plot on 802.11n HT20 Channel 06



Date: 27.SEP.2012 03:47:40

6 dB Bandwidth Plot on 802.11n HT20 Channel 11



Date: 27.SEP.2012 03:56:51

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.

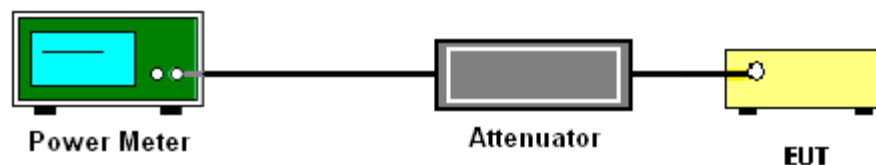
3.2.2 Measuring Instruments

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 v01r02.
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 :	Blithe Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	5.38	30	Pass
06	2437	4.76	30	Pass
11	2462	4.28	30	Pass

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

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	11.98	30	Pass
06	2437	10.46	30	Pass
11	2462	10.36	30	Pass

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Blithe Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	12.71	30	Pass
06	2437	11.7	30	Pass
11	2462	11.11	30	Pass



3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26
Test Engineer :	Blithe Li	Relative Humidity :	50~53
Duty Cycle:	100%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	1.90
06	2437	1.28
11	2462	0.75

Test Mode :	802.11g	Temperature :	24~26
Test Engineer :	Blithe Li	Relative Humidity :	50~53
Duty Cycle:	100%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	2.30
06	2437	0.85
11	2462	0.81

Test Mode :	802.11n HT20	Temperature :	24~26
Test Engineer :	Blithe Li	Relative Humidity :	50~53
Duty Cycle:	100%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)
01	2412	2.62
06	2437	1.92
11	2462	1.79

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.

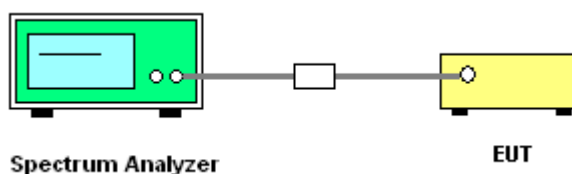
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 9.1 Option 1 of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
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) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Record the measurement data derived from spectrum analyzer.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

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

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	-8.34	-28.29	8	Pass
06	2437	-9.05	-29.05	8	Pass
11	2462	-9.64	-29.30	8	Pass

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

Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	-13.86	-27.93	8	Pass
06	2437	-14.95	-28.68	8	Pass
11	2462	-15.53	-29.64	8	Pass

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Blithe Li	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT20 Power Density		Max. Limits (dBm)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	-12.82	-26.26	8	Pass
06	2437	-13.31	-26.68	8	Pass
11	2462	-13.92	-27.49	8	Pass

Note:

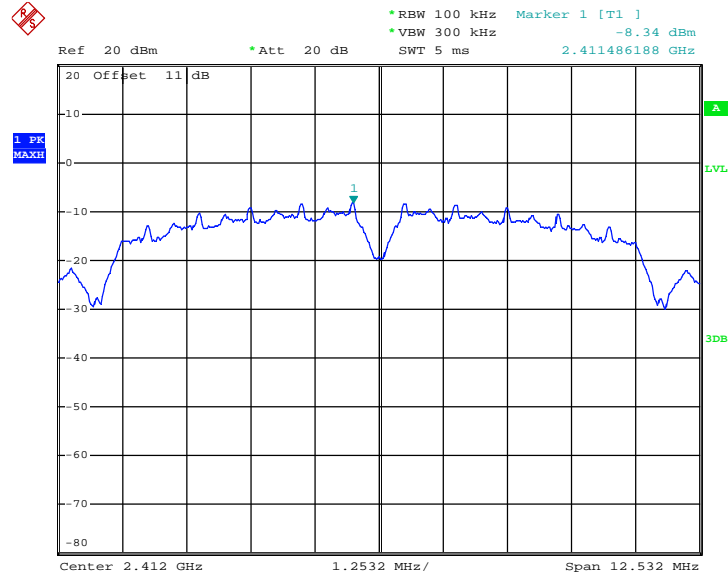
1. Measured power density (dBm) has offset with cable loss.
2. Measured power density (dBm)/ 100KHz is for 20dBc reference only



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

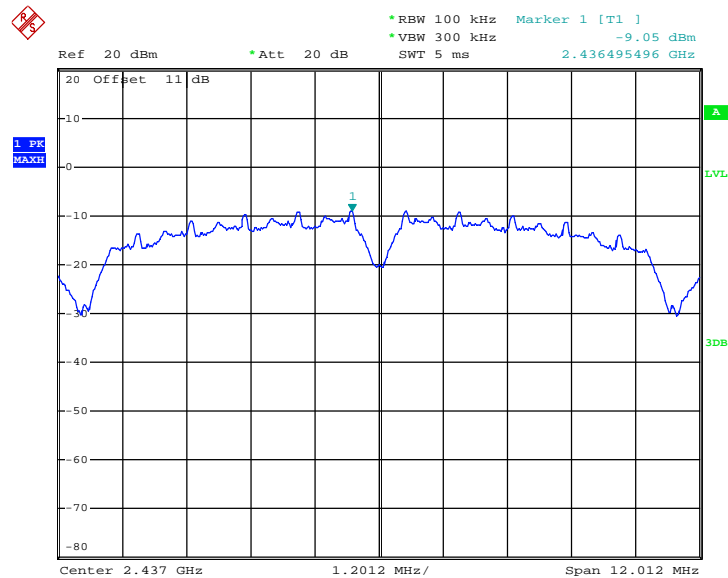
<802.11b>

PSD 100KHz Plot on 802.11b Channel 01



Date: 29.SEP.2012 00:12:51

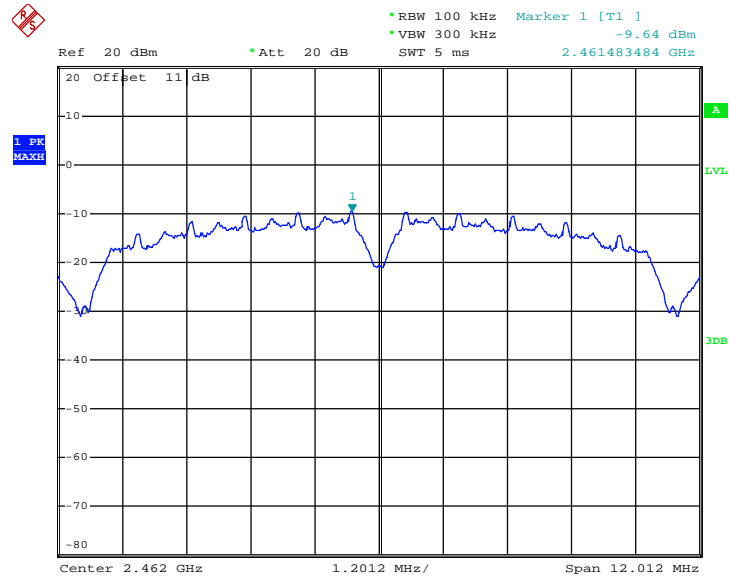
PSD 100KHz Plot on 802.11b Channel 06



Date: 29.SEP.2012 00:16:56



PSD 100KHz Plot on 802.11b Channel 11

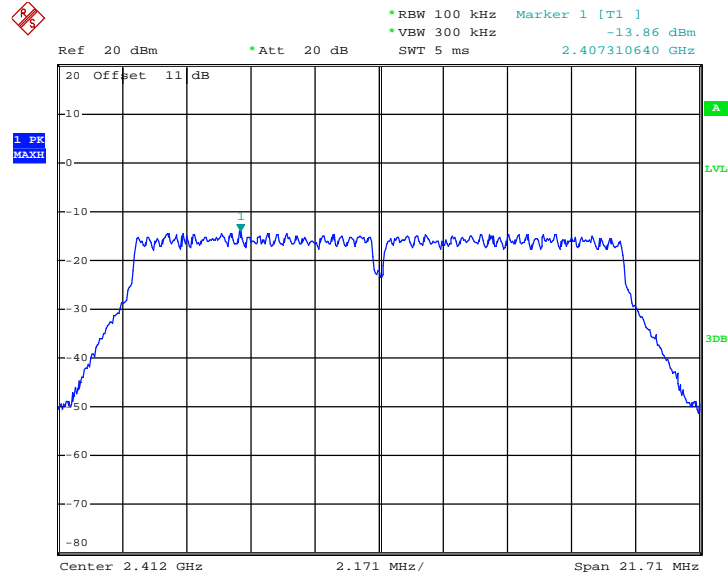


Date: 29.SEP.2012 00:19:52



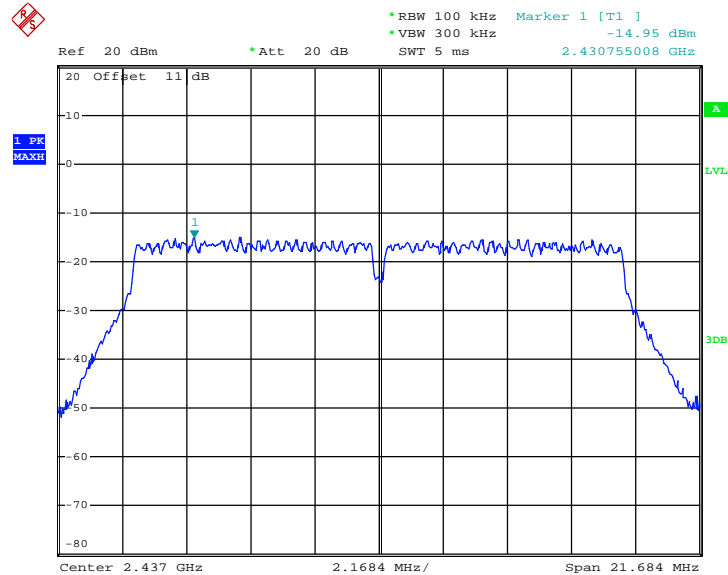
<802.11g>

PSD 100KHz Plot on 802.11g Channel 01



Date: 27.SEP.2012 03:31:41

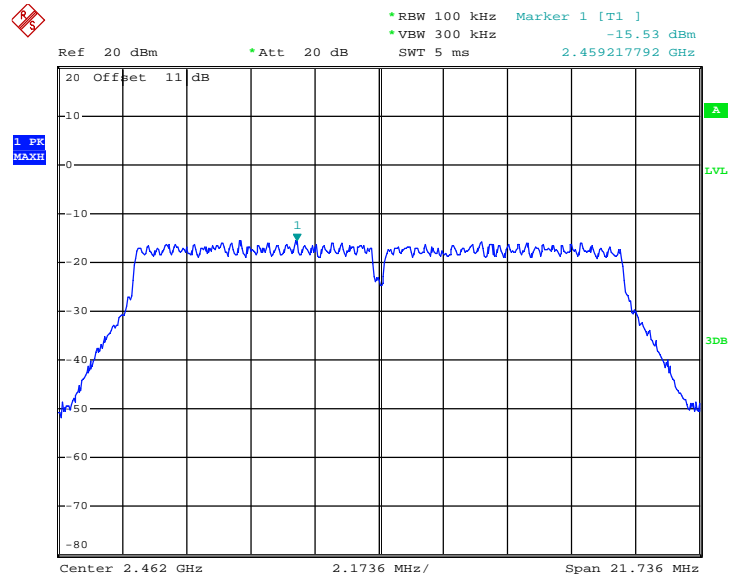
PSD 100KHz Plot on 802.11g Channel 06



Date: 27.SEP.2012 03:35:06



PSD 100KHz Plot on 802.11g Channel 11

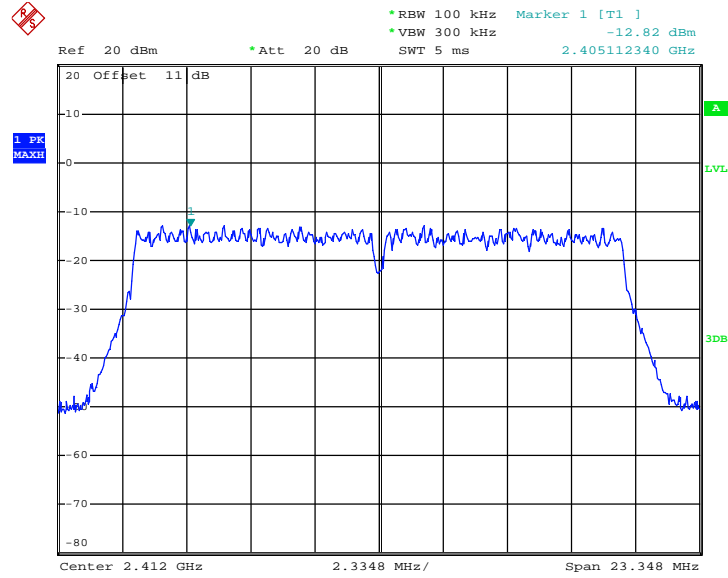


Date: 27.SEP.2012 03:37:54



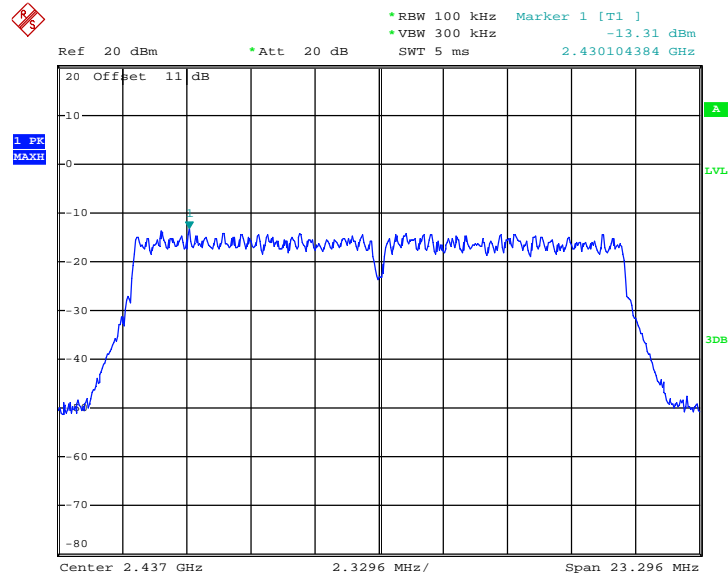
<2.4GHz 802.11n HT-20>

PSD 100KHz Plot on 2.4G 802.11n HT20 Channel 01



Date: 27.SEP.2012 03:44:30

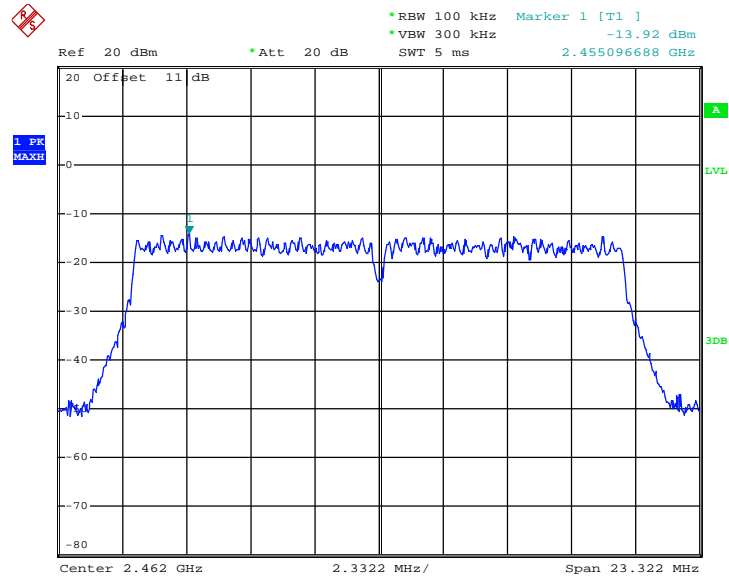
PSD 100KHz Plot on 2.4G 802.11n HT20 Channel 06



Date: 27.SEP.2012 03:48:37



PSD 100KHz Plot on 2.4G 802.11n HT20 Channel 11



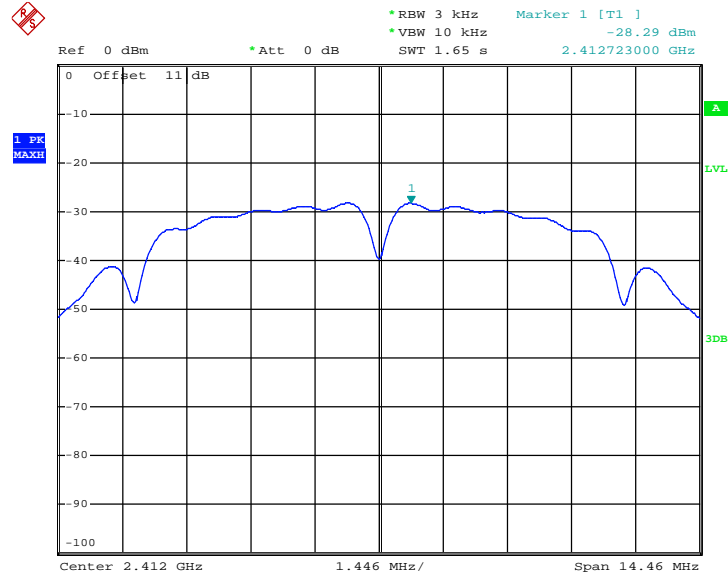
Date: 27.SEP.2012 03:57:25



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

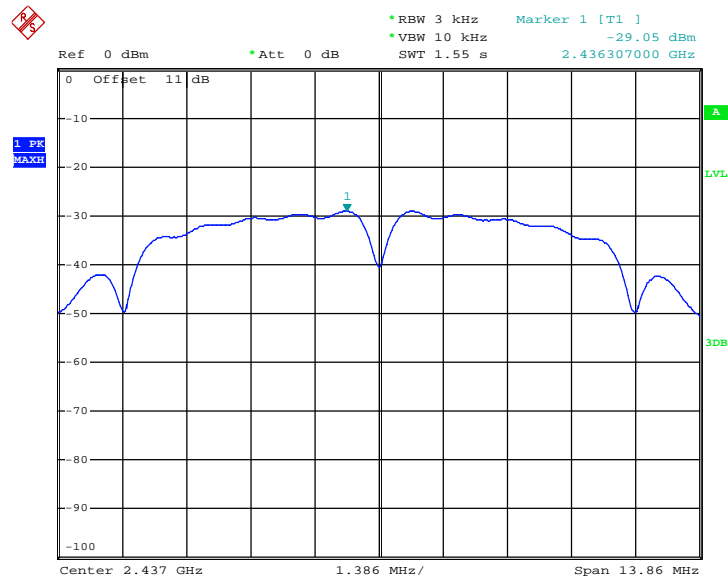
<802.11b>

PSD 3KHz Plot on 802.11b Channel 01



Date: 15.OCT.2012 00:43:20

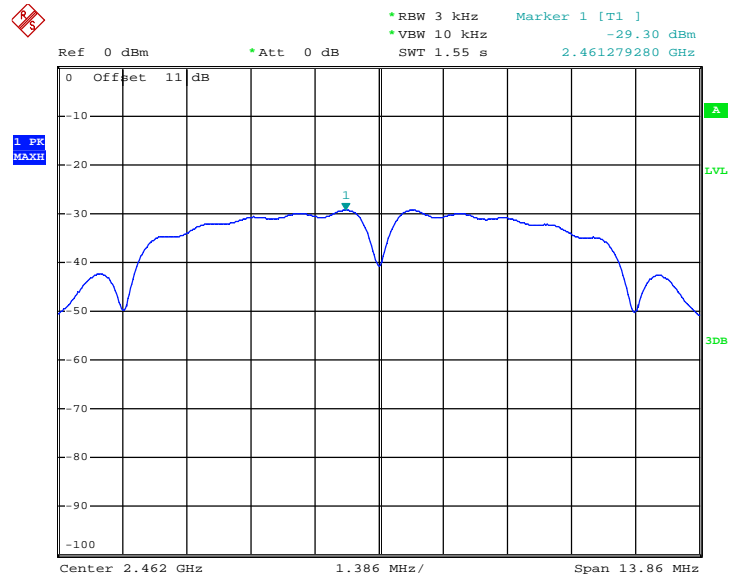
PSD 3KHz Plot on 802.11b Channel 06



Date: 15.OCT.2012 00:44:07



PSD 3KHz Plot on 802.11b Channel 11

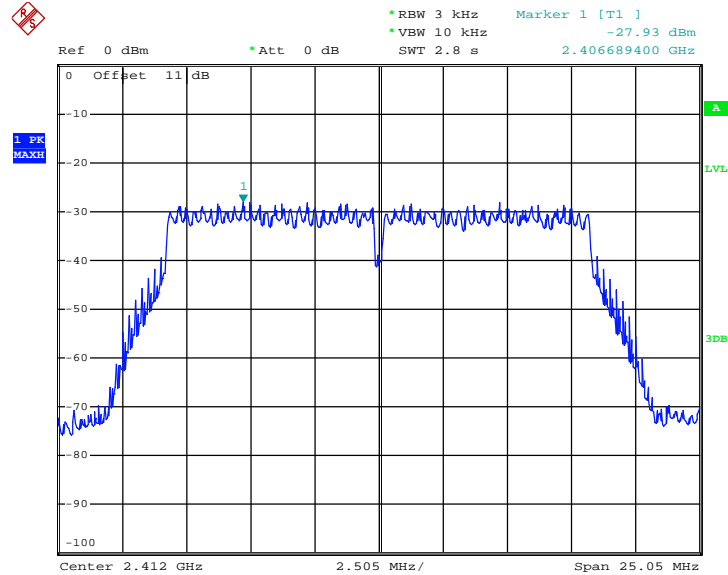


Date: 15.OCT.2012 00:44:44



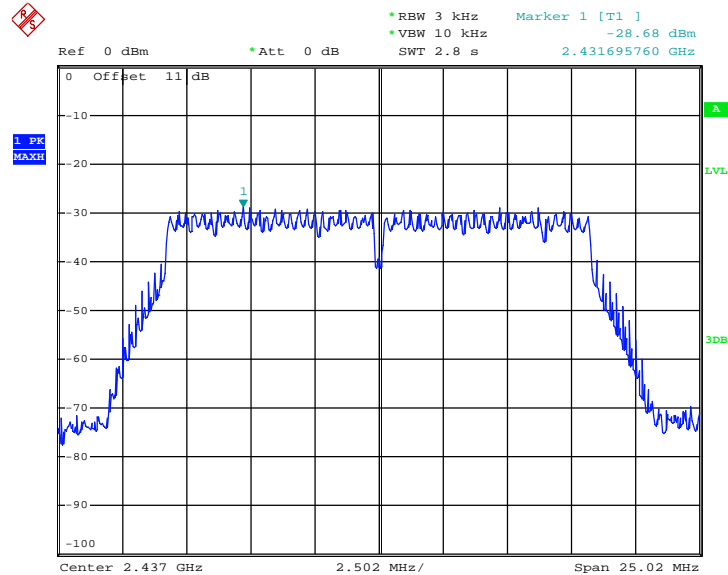
<802.11g>

PSD 3KHz Plot on 802.11g Channel 01



Date: 15.OCT.2012 00:48:33

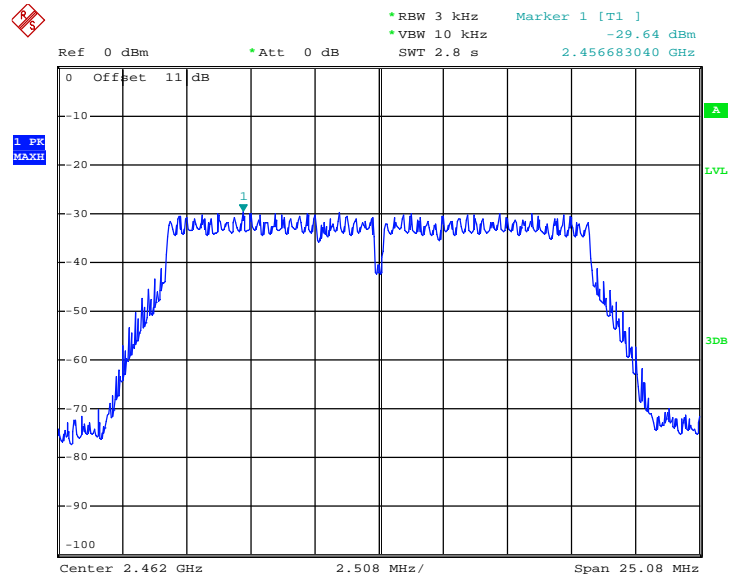
PSD 3KHz Plot on 802.11g Channel 06



Date: 15.OCT.2012 00:47:41



PSD 3KHz Plot on 802.11g Channel 11

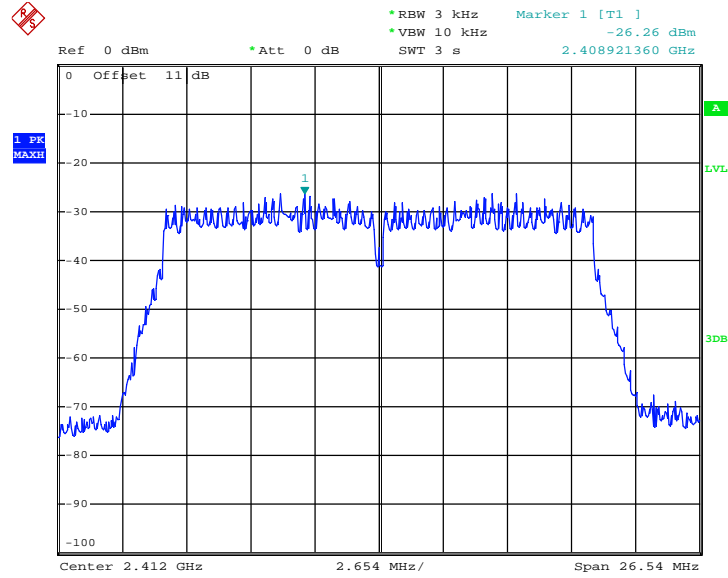


Date: 15.OCT.2012 00:46:15



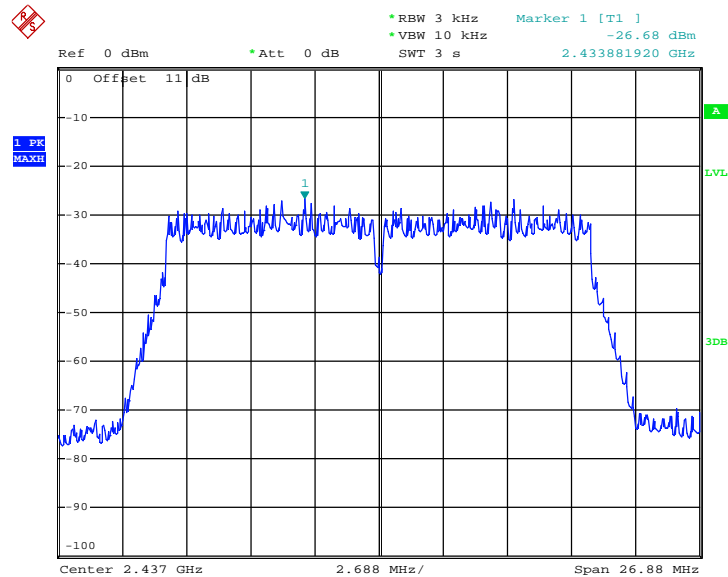
<2.4GHz 802.11n HT-20>

PSD 3KHz Plot on 2.4G 802.11n HT20 Channel 01



Date: 15.OCT.2012 00:49:29

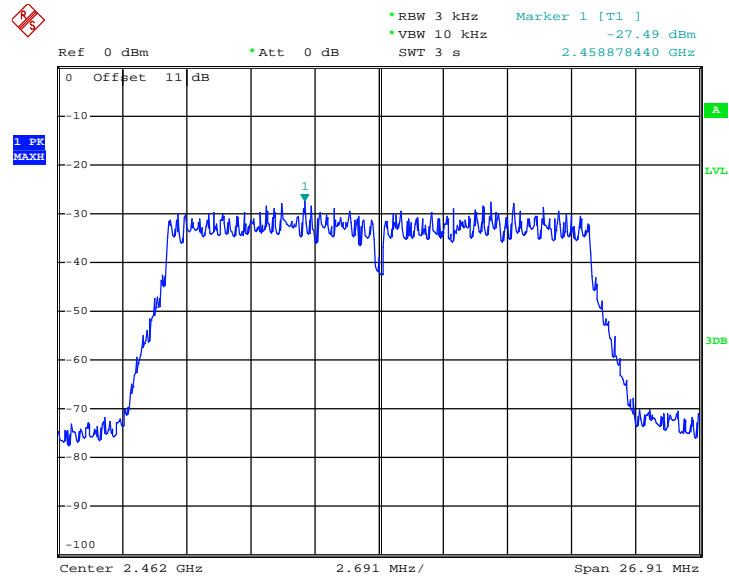
PSD 3KHz Plot on 2.4G 802.11n HT20 Channel 06



Date: 15.OCT.2012 00:50:08



PSD 3KHz Plot on 2.4G 802.11n HT20 Channel 11



Date: 15.OCT.2012 00:50:54

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).

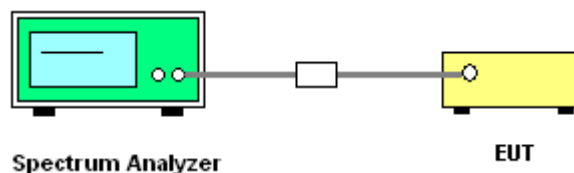
3.4.2 Measuring Instruments

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

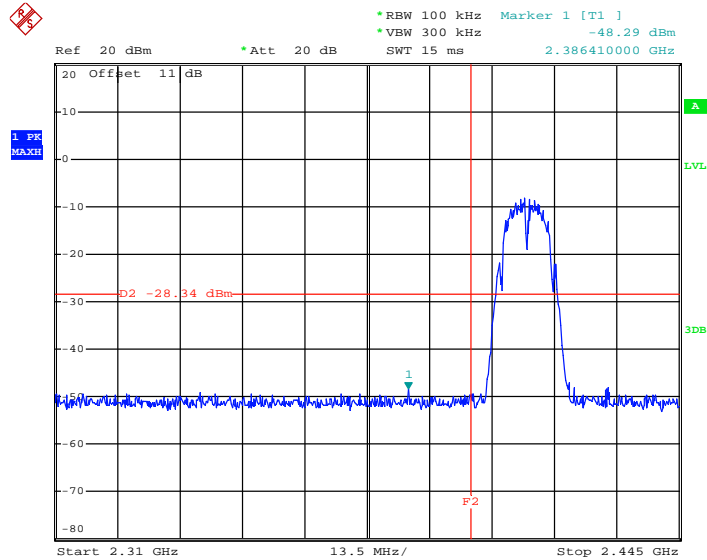




3.4.5 Test Plots of Conducted Band Edges

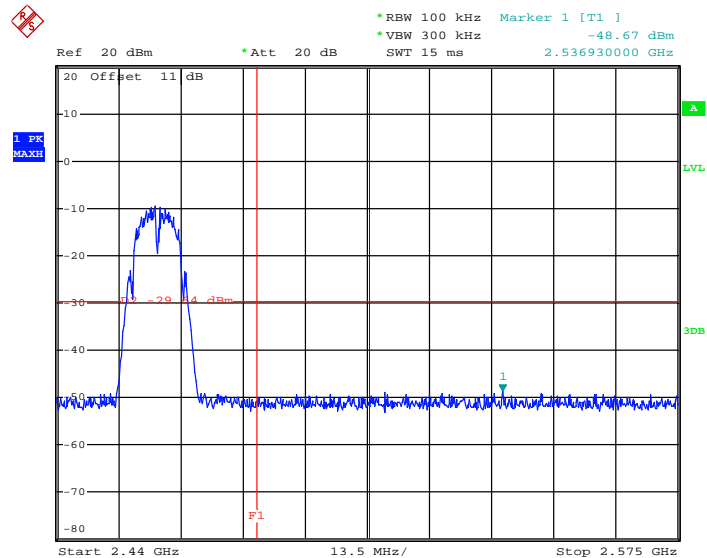
Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Blithe Li

Low Band Edge Plot on 802.11b Channel 01



Date: 29.SEP.2012 00:13:09

High Band Edge Plot on 802.11b Channel 11

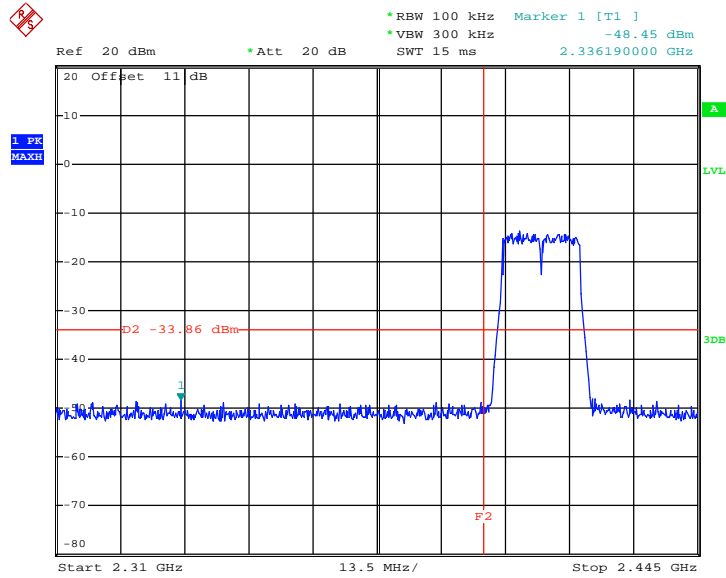


Date: 29.SEP.2012 00:20:08



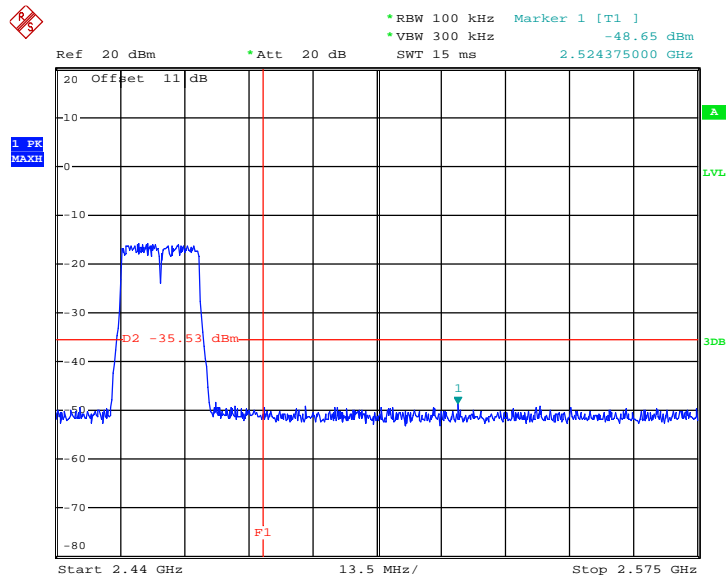
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Blithe Li

Low Band Edge Plot on 802.11g Channel 01



Date: 27.SEP.2012 03:32:03

High Band Edge Plot on 802.11g Channel 11

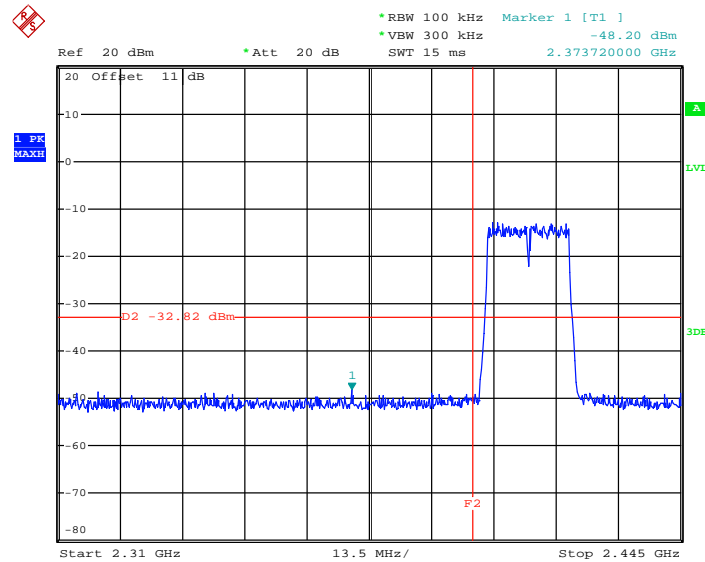


Date: 27.SEP.2012 03:38:11



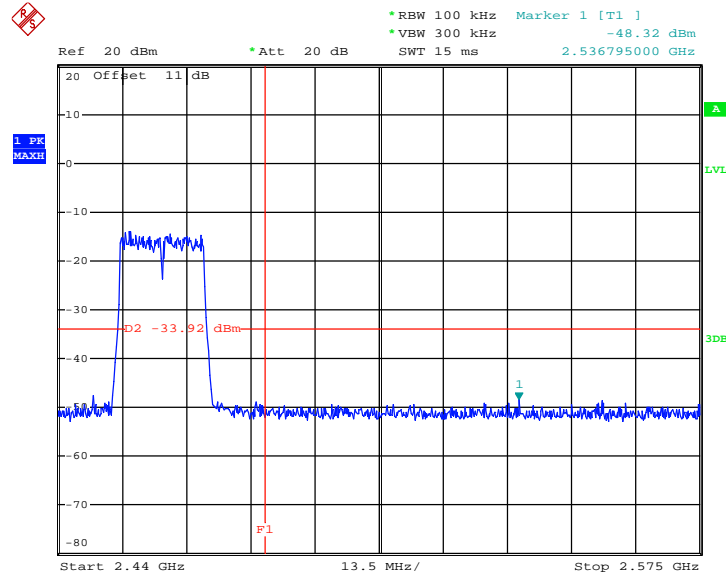
Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Blithe Li

Low Band Edge Plot on 802.11n HT20 Channel 01



Date: 27.SEP.2012 03:45:16

High Band Edge Plot on 802.11n HT20 Channel 11



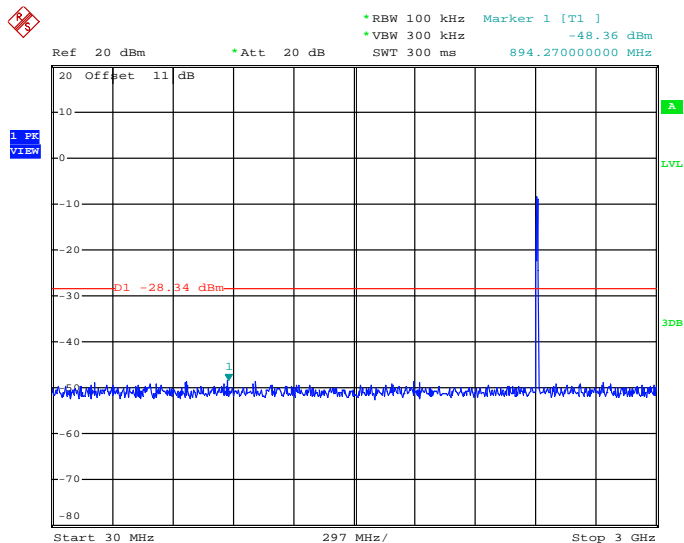
Date: 27.SEP.2012 03:58:00

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 :	Blithe Li

802.11b 30 MHz~3 GHz

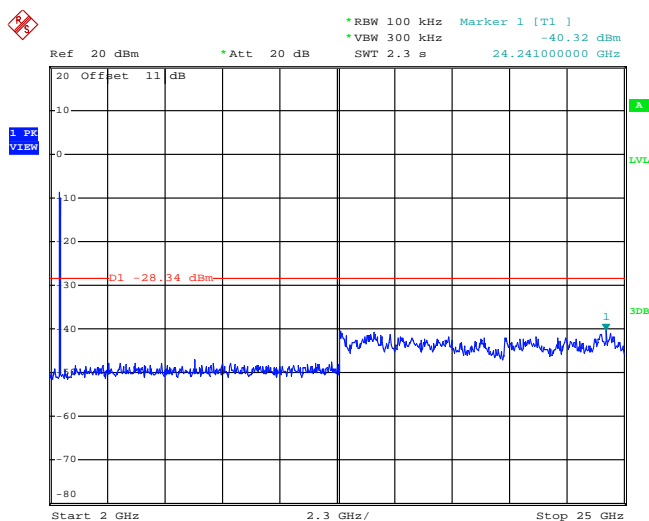
Conducted Spurious Emission Plot on Channel 01



Date: 29.SEP.2012 00:13:35

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 01

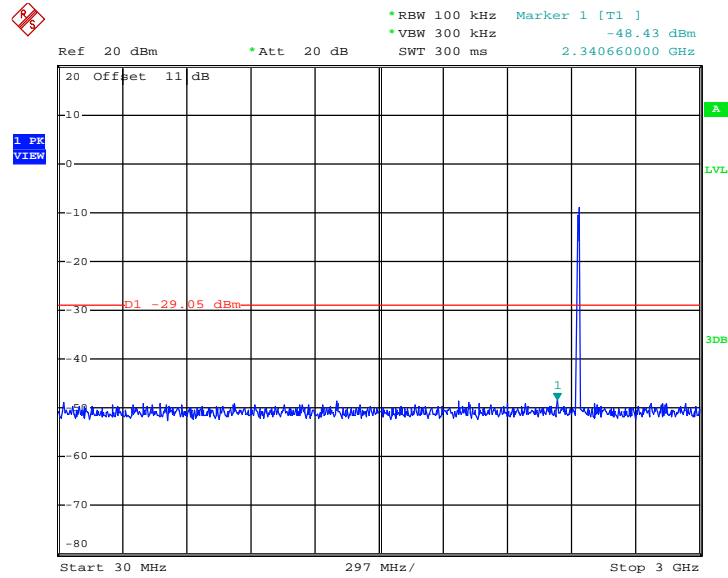


Date: 29.SEP.2012 00:13:53



802.11b 30 MHz~3 GHz

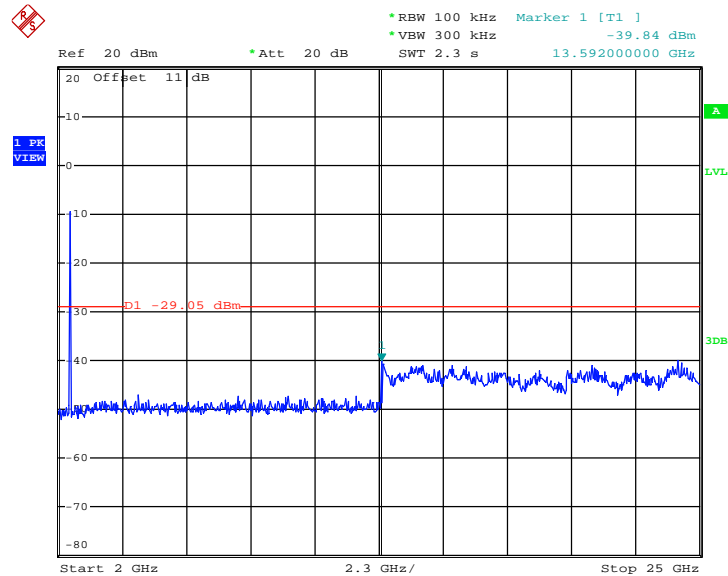
Conducted Spurious Emission Plot on Channel 06



Date: 29.SEP.2012 00:17:27

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 06

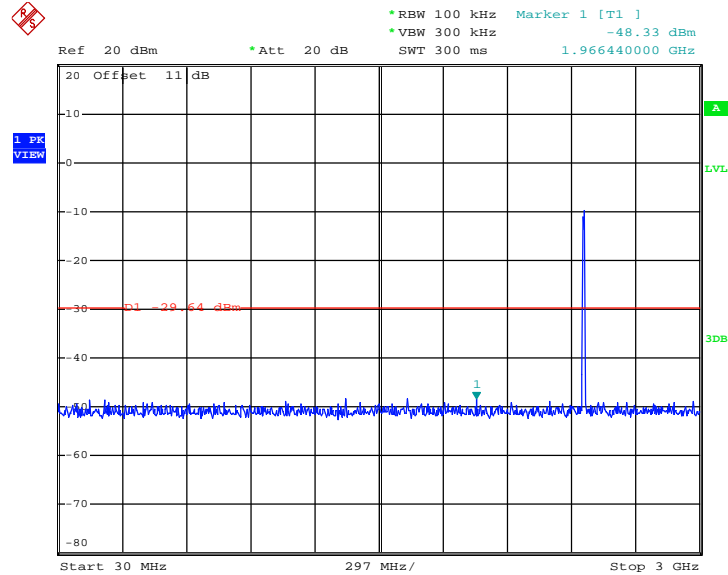


Date: 29.SEP.2012 00:17:45



802.11b 30 MHz~3 GHz

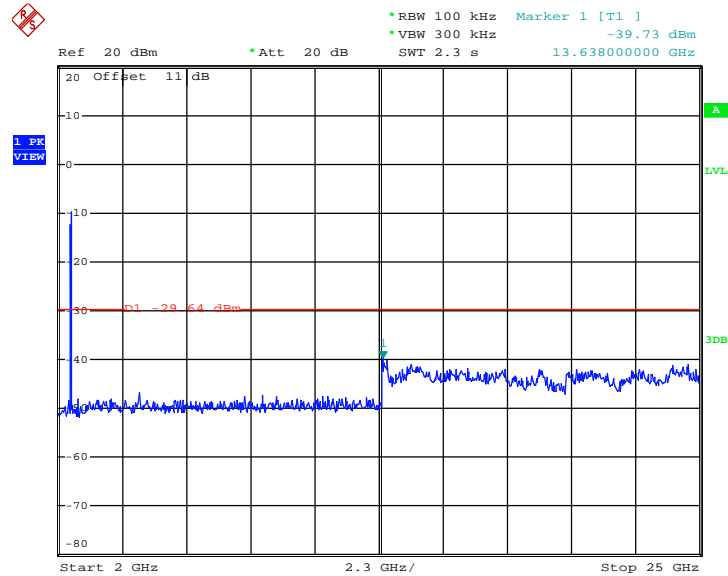
Conducted Spurious Emission Plot on Channel 11



Date: 29.SEP.2012 00:20:29

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



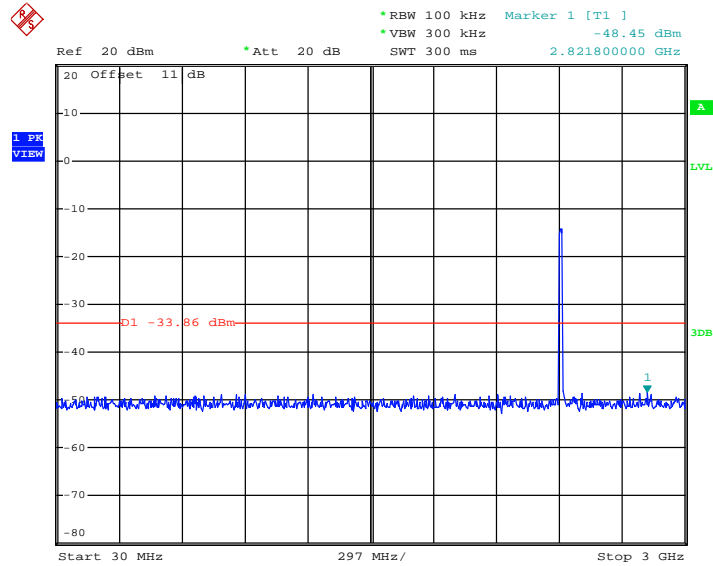
Date: 29.SEP.2012 00:20:47



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 :	Blithe Li

802.11g 30 MHz~3 GHz

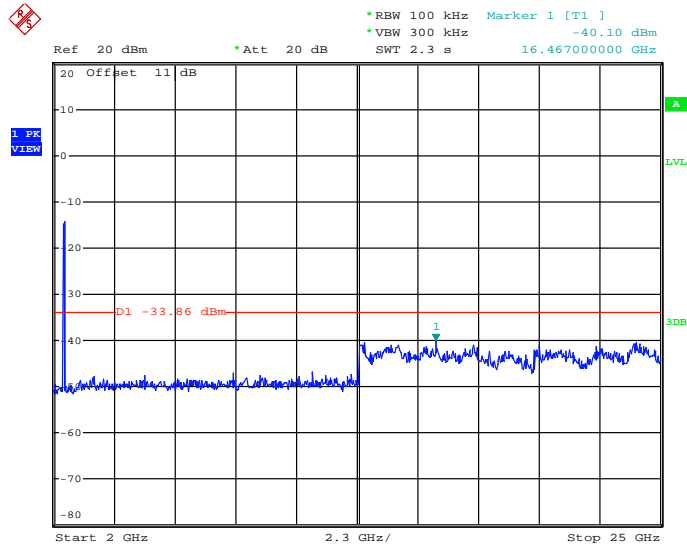
Conducted Spurious Emission Plot on Channel 01



Date: 27.SEP.2012 03:32:34

802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 01

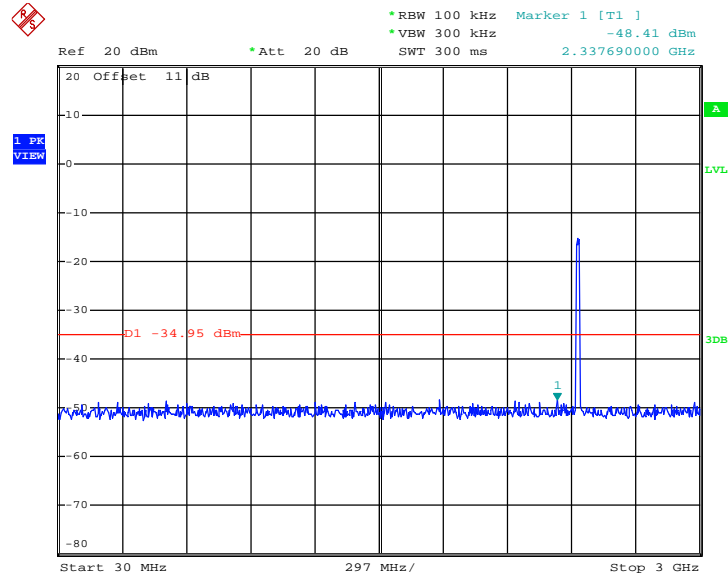


Date: 27.SEP.2012 03:32:52



802.11g 30 MHz~3 GHz

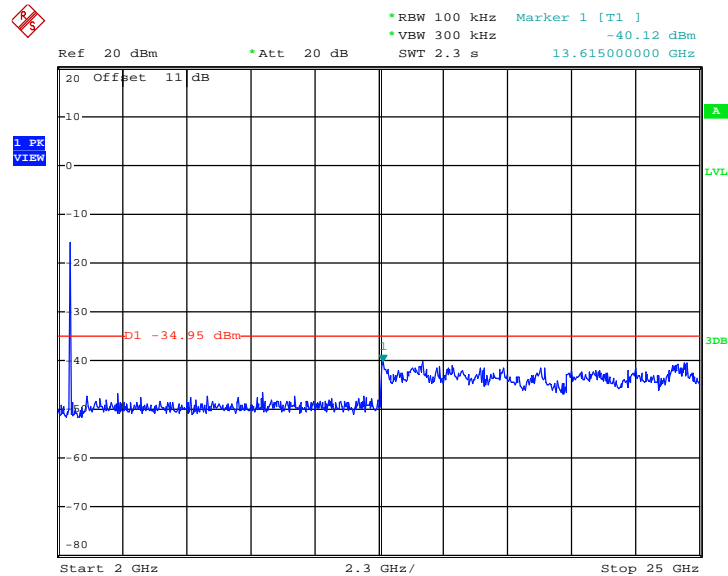
Conducted Spurious Emission Plot on Channel 06



Date: 27.SEP.2012 03:35:31

802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 06

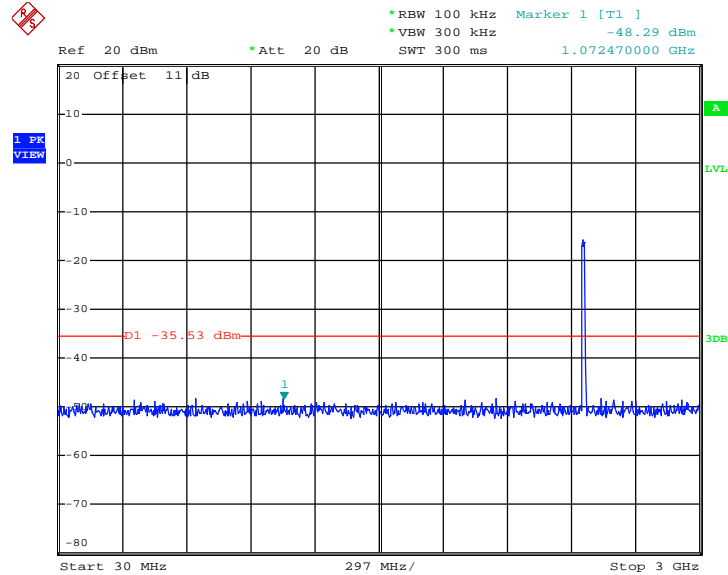


Date: 27.SEP.2012 03:35:49



802.11g 30 MHz~3 GHz

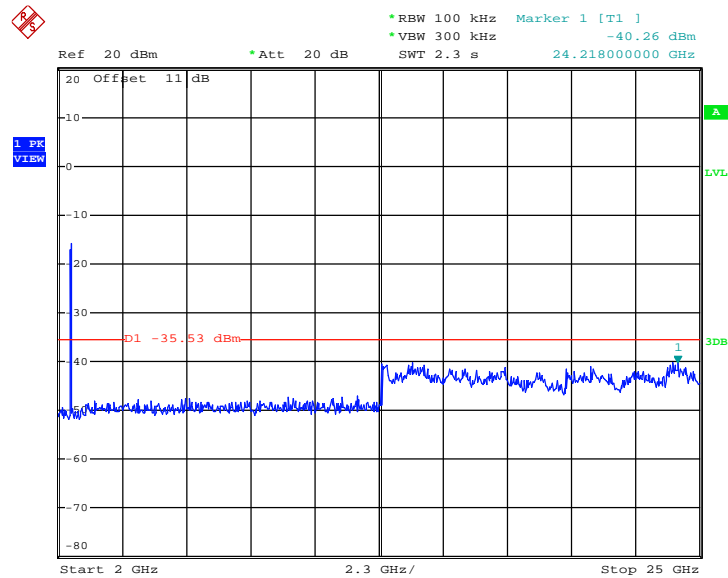
Conducted Spurious Emission Plot on Channel 11



Date: 27.SEP.2012 03:38:31

802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



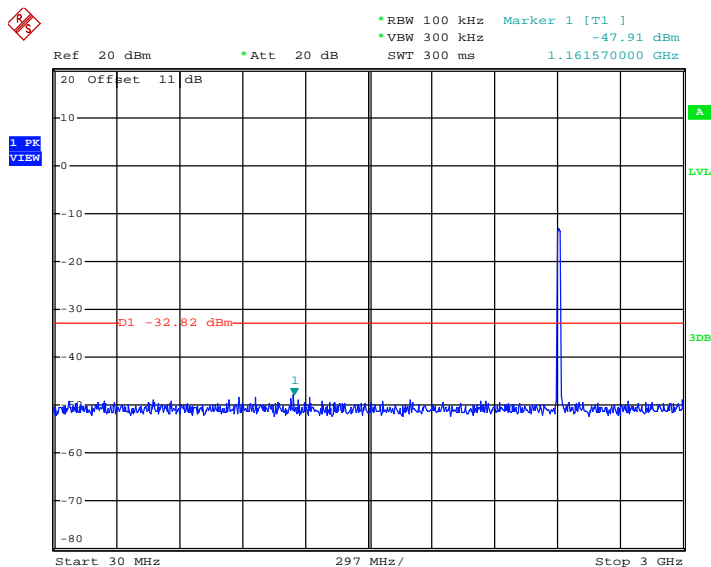
Date: 27.SEP.2012 03:38:49



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

802.11n HT20 30 MHz~3 GHz

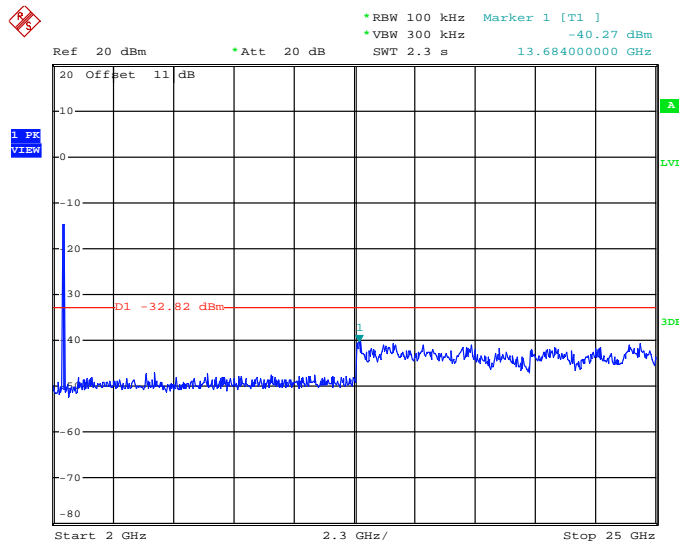
Conducted Spurious Emission Plot on Channel 01



Date: 27.SEP.2012 03:45:40

802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 01

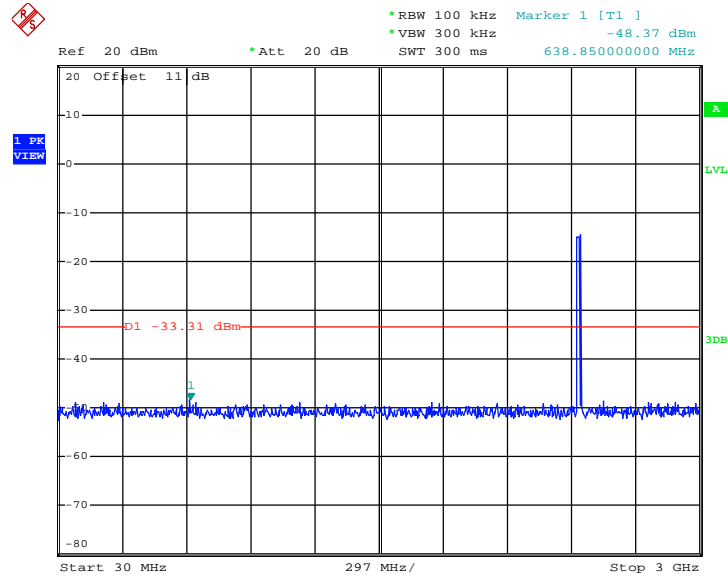


Date: 27.SEP.2012 03:45:58



802.11n HT20 30 MHz~3 GHz

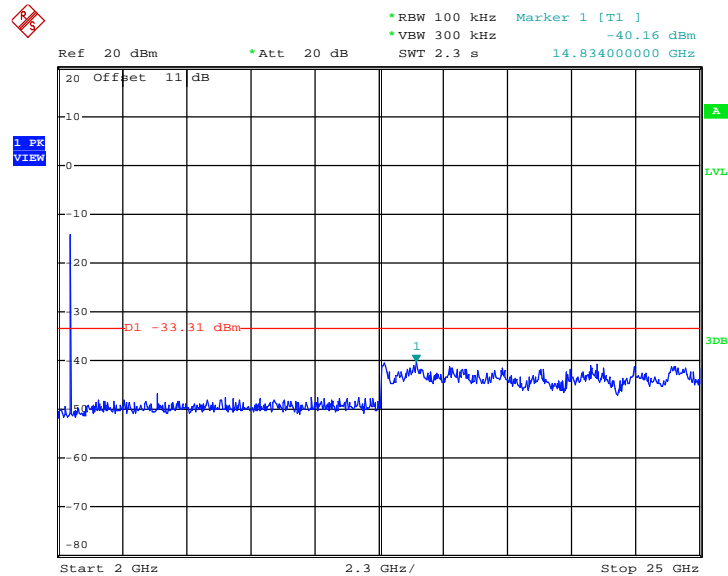
Conducted Spurious Emission Plot on Channel 06



Date: 27.SEP.2012 03:50:13

802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 06

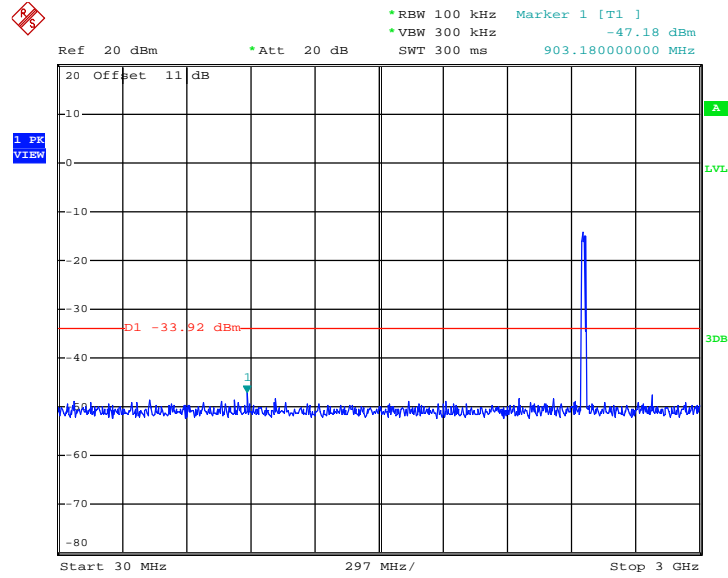


Date: 27.SEP.2012 03:50:31



802.11n HT20 30 MHz~3 GHz

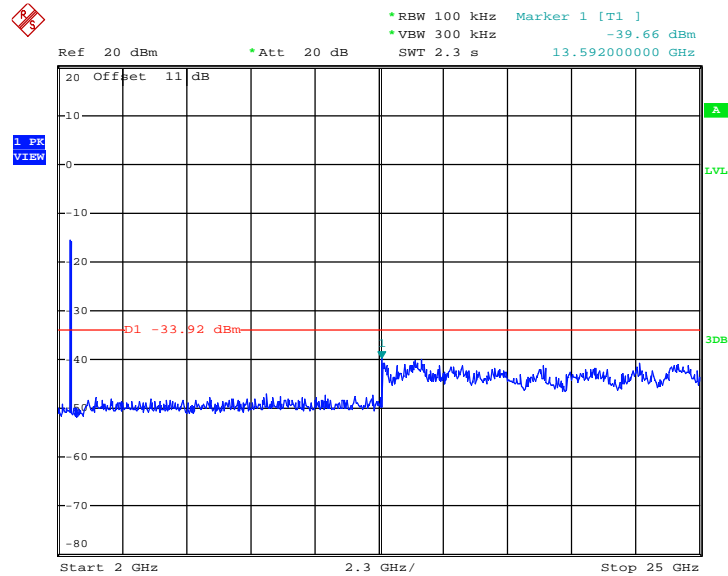
Conducted Spurious Emission Plot on Channel 11



Date: 27.SEP.2012 03:58:23

802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



Date: 27.SEP.2012 03:58:41



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

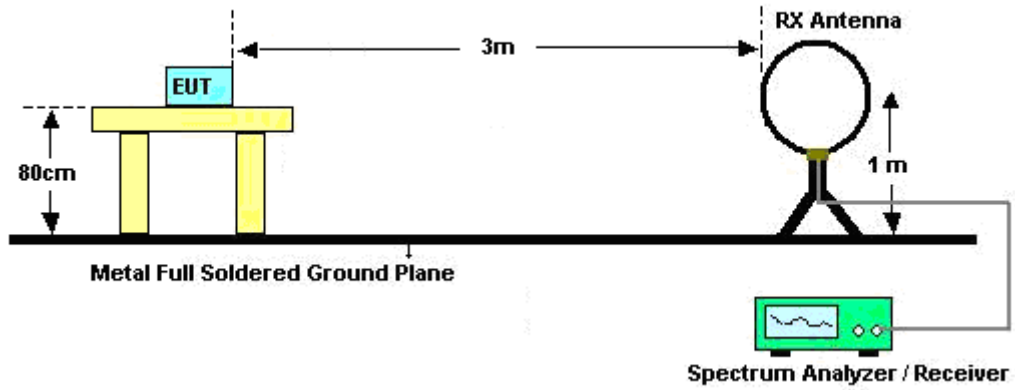
1. The testing follows TCB Workshop 2012, April and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test site requirement. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) 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. Set to the maximum power setting and enable the EUT transmit continuously.
5. 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, $VBW = 3$ MHz for $f \geq 1$ GHz for Peak measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent while maintaining all of the other instrument settings for Average measurement.

Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	100.00	-	-	10Hz
2.4G 802.11n HT20	100.00	-	-	10Hz

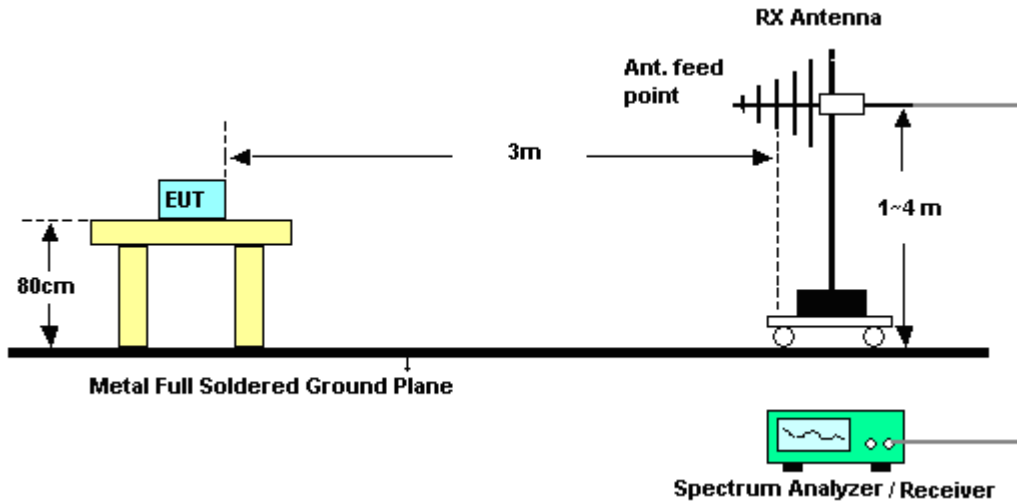
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. If the emission level of the EUT measured by the peak detector is more than 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be reported by using the quasi-peak detector.

3.5.4 Test Setup

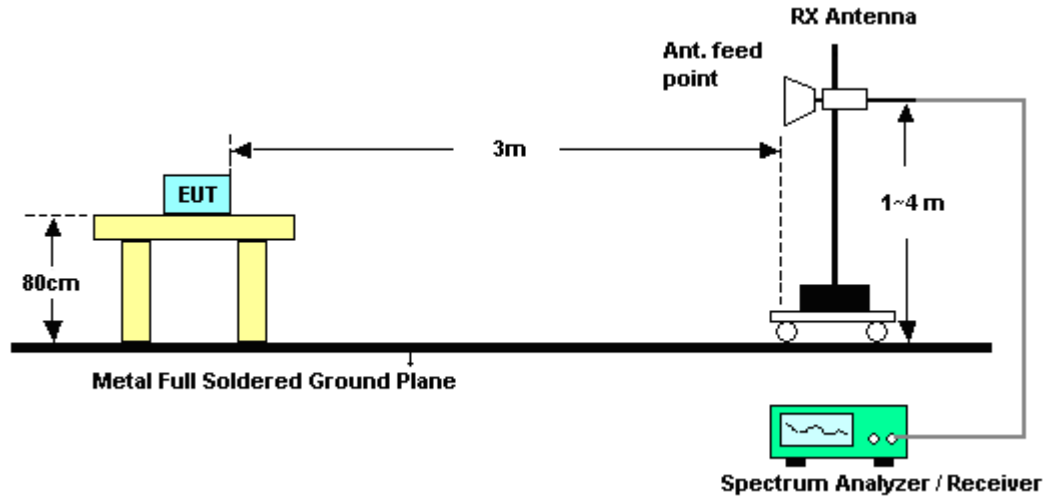
For radiated emissions below 30MHz



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 :	21~22°C
Test Band :	Low	Relative Humidity :	46~47%
Test Channel :	01	Test Engineer :	Chenmy Cheng

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
2389.47	53.99	-20.01	74	45.98	32.86	4.23	29.08	115	248	Peak
2389.65	40.01	-13.99	54	32	32.86	4.23	29.08	200	12	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
2340.6	53.82	-20.18	74	46.01	32.78	4.2	29.17	177	243	Peak
2389.92	39.82	-14.18	54	31.81	32.86	4.23	29.08	189	347	Average

Test Mode :	802.11b	Temperature :	21~22°C
Test Band :	High	Relative Humidity :	46~47%
Test Channel :	11	Test Engineer :	Chenmy Cheng

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
2490.38	54.25	-19.75	74	45.9	33.05	4.3	29	144	237	Peak
2483.5	40.03	-13.97	54	31.73	33.01	4.29	29	200	12	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.74	53.93	-20.07	74	45.63	33.01	4.29	29	113	349	Peak
2486.6	39.71	-14.29	54	31.41	33.01	4.29	29	100	34	Average



Test Mode :	802.11g	Temperature :	21~22°C
Test Band :	Low	Relative Humidity :	46~47%
Test Channel :	01	Test Engineer :	Chenmy Cheng

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
2353.47	53.53	-20.47	74	45.65	32.81	4.21	29.14	144	300	Peak
2390	40.66	-13.34	54	32.65	32.86	4.23	29.08	100	300	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
2374.89	53.45	-20.55	74	45.5	32.83	4.22	29.1	120	241	Peak
2390	39.76	-14.24	54	31.75	32.86	4.23	29.08	100	318	Average

Test Mode :	802.11g	Temperature :	21~22°C
Test Band :	High	Relative Humidity :	46~47%
Test Channel :	11	Test Engineer :	Chenmy Cheng

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
2486.92	55.23	-18.77	74	46.93	33.01	4.29	29	113	246	Peak
2483.5	40.86	-13.14	54	32.56	33.01	4.29	29	111	240	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
2487.74	53.99	-20.01	74	45.65	33.05	4.29	29	200	154	Peak
2484.04	39.76	-14.24	54	31.46	33.01	4.29	29	112	360	Average



Test Mode :	802.11n HT20	Temperature :	21~22°C
Test Band :	Low	Relative Humidity :	46~47%
Test Channel :	01	Test Engineer :	Chenmy Cheng

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
2333.49	53.99	-20.01	74	46.21	32.76	4.2	29.18	100	112	Peak
2390	40.36	-13.64	54	32.35	32.86	4.23	29.08	100	108	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
2348.88	55.14	-18.86	74	47.3	32.78	4.21	29.15	100	69	Peak
2389.839	40.09	-13.91	54	32.08	32.86	4.23	29.08	100	61	Average

Test Mode :	802.11n HT20	Temperature :	21~22°C
Test Band :	High	Relative Humidity :	46~47%
Test Channel :	11	Test Engineer :	Chenmy Cheng

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
2483.72	55.57	-18.43	74	47.27	33.01	4.29	29	100	16	Peak
2483.52	41.22	-12.78	54	32.92	33.01	4.29	29	100	15	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2485.82	54.05	-19.95	74	45.75	33.01	4.29	29	100	256	Peak
2483.64	40.71	-13.29	54	32.41	33.01	4.29	29	100	259	Average



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

Test Mode :	802.11b	Temperature :	21~22°C
Test Channel :	01	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.51	20.56	-19.44	40	33.86	16.55	0.24	30.09	-	-	Peak
159.784	23.28	-20.22	43.5	43.09	9.6	0.53	29.94	-	-	Peak
324.456	22.84	-23.16	46	38.26	13.75	0.77	29.94	-	-	Peak
584.79	30.34	-15.66	46	40.36	18.57	1.05	29.64	-	-	Peak
900.147	40.03	-5.97	46	47.76	20.45	1.3	29.48	100	181	Peak
948.761	29.17	-16.83	46	36.65	20.73	1.33	29.54	-	-	Peak
2412	94.06	-	-	85.98	32.89	4.24	29.05	186	0	Average
2412	100.25	-	-	92.17	32.89	4.24	29.05	186	0	Peak

Test Mode :	802.11b	Temperature :	21~22°C
Test Channel :	01	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.071	25.29	-14.71	40	37.83	17.29	0.25	30.08	-	-	Peak
34.156	22.73	-17.27	40	37.03	15.56	0.23	30.09	-	-	Peak
88.652	21.39	-22.11	43.5	42.71	8.3	0.38	30	-	-	Peak
226.099	21.94	-24.06	46	40.66	10.59	0.63	29.94	-	-	Peak
900.147	39.7	-6.3	46	47.43	20.45	1.3	29.48	100	291	Peak
948.761	30.02	-15.98	46	37.5	20.73	1.33	29.54	-	-	Peak
2412	91.32	-	-	83.24	32.89	4.24	29.05	200	49	Average
2412	96.63	-	-	88.55	32.89	4.24	29.05	200	49	Peak



Test Mode :	802.11b	Temperature :	21~22°C
Test Channel :	06	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
165.487	23.4	-20.1	43.5	43.42	9.36	0.54	29.92	-	-	Peak
285.978	23.22	-22.78	46	39.68	12.78	0.71	29.95	-	-	Peak
319.937	26.18	-19.82	46	41.82	13.55	0.76	29.95	-	-	Peak
578.67	26.31	-19.69	46	36.35	18.56	1.04	29.64	-	-	Peak
900.147	39.68	-6.32	46	47.41	20.45	1.3	29.48	100	156	Peak
948.761	29.47	-16.53	46	36.95	20.73	1.33	29.54	-	-	Peak
2437	95.23	-	-	87.06	32.95	4.25	29.03	127	8	Average
2437	99.9	-	-	91.73	32.95	4.25	29.03	127	8	Peak

Test Mode :	802.11b	Temperature :	21~22°C
Test Channel :	06	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
31.843	23.69	-16.31	40	36.99	16.55	0.24	30.09	-	-	Peak
41.567	22.25	-17.75	40	41.12	10.95	0.26	30.08	-	-	Peak
92.462	22.04	-21.46	43.5	42.28	9.35	0.39	29.98	-	-	Peak
582.743	25.43	-20.57	46	35.45	18.57	1.05	29.64	-	-	Peak
900.147	37.7	-8.3	46	45.43	20.45	1.3	29.48	100	161	Peak
948.761	29.67	-16.33	46	37.15	20.73	1.33	29.54	-	-	Peak
2437	91.21	-	-	83.04	32.95	4.25	29.03	100	328	Average
2437	95.88	-	-	87.71	32.95	4.25	29.03	100	328	Peak



Test Mode :	802.11b	Temperature :	21~22°C
Test Channel :	11	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2462 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
30.317	21.69	-18.31	40	33.51	18	0.26	30.08	-	-	Peak
89.905	27.21	-16.29	43.5	47.91	8.9	0.39	29.99	-	-	Peak
154.279	23.1	-20.4	43.5	42.7	9.84	0.52	29.96	-	-	Peak
578.67	26.06	-19.94	46	36.1	18.56	1.04	29.64	-	-	Peak
900.147	39.73	-6.27	46	47.46	20.45	1.3	29.48	100	235	Peak
952.094	30.99	-15.01	46	38.46	20.74	1.33	29.54	-	-	Peak
2462	95.34	-	-	87.1	32.98	4.27	29.01	121	30	Average
2462	100.45	-	-	92.21	32.98	4.27	29.01	121	30	Peak

Test Mode :	802.11b	Temperature :	21~22°C
Test Channel :	11	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2462 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
31.289	24.71	-15.29	40	37.25	17.29	0.25	30.08	-	-	Peak
34.517	23.24	-16.76	40	38	15.1	0.23	30.09	-	-	Peak
91.175	21.49	-22.01	43.5	41.97	9.12	0.39	29.99	-	-	Peak
582.743	26.85	-19.15	46	36.87	18.57	1.05	29.64	-	-	Peak
900.147	39	-7	46	46.73	20.45	1.3	29.48	100	36	Peak
952.094	31.25	-14.75	46	38.72	20.74	1.33	29.54	-	-	Peak
2462	91.62	-	-	83.38	32.98	4.27	29.01	166	21	Average
2462	96.27	-	-	88.03	32.98	4.27	29.01	166	21	Peak



Test Mode :	802.11g	Temperature :	21~22°C
Test Channel :	01	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
53.693	22.04	-17.96	40	45.08	6.8	0.29	30.13	-	-	Peak
98.142	28.93	-14.57	43.5	48.34	10.15	0.41	29.97	-	-	Peak
164.33	22.95	-20.55	43.5	42.9	9.44	0.54	29.93	-	-	Peak
578.67	27.9	-18.1	46	37.94	18.56	1.04	29.64	-	-	Peak
900.147	37.92	-8.08	46	45.65	20.45	1.3	29.48	100	189	Peak
948.761	28.43	-17.57	46	35.91	20.73	1.33	29.54	-	-	Peak
2412	87.9	-	-	79.82	32.89	4.24	29.05	100	312	Average
2412	98.01	-	-	89.93	32.89	4.24	29.05	100	312	Peak

Test Mode :	802.11g	Temperature :	21~22°C
Test Channel :	01	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.289	24.52	-15.48	40	37.06	17.29	0.25	30.08	-	-	Peak
42.154	22.04	-17.96	40	41.39	10.48	0.26	30.09	-	-	Peak
93.113	21.34	-22.16	43.5	41.41	9.51	0.4	29.98	-	-	Peak
226.099	23.25	-22.75	46	41.97	10.59	0.63	29.94	-	-	Peak
900.147	38.62	-7.38	46	46.35	20.45	1.3	29.48	100	95	Peak
938.833	30.6	-15.4	46	38.12	20.68	1.33	29.53	-	-	Peak
2412	84.64	-	-	76.56	32.89	4.24	29.05	100	306	Average
2412	96.63	-	-	88.55	32.89	4.24	29.05	100	306	Peak



Test Mode :	802.11g	Temperature :	21~22°C
Test Channel :	06	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
30.853	20.56	-19.44	40	33.1	17.29	0.25	30.08	-	-	Peak
44.587	18.9	-21.1	40	39.16	9.6	0.27	30.13	-	-	Peak
95.093	26.19	-17.31	43.5	45.96	9.8	0.4	29.97	-	-	Peak
163.182	23.51	-19.99	43.5	43.42	9.49	0.53	29.93	-	-	Peak
881.407	38.45	-7.55	46	46.23	20.47	1.29	29.54	100	90	Peak
948.761	28.05	-17.95	46	35.53	20.73	1.33	29.54	-	-	Peak
2437	87.07	-	-	78.9	32.95	4.25	29.03	183	360	Average
2437	99.54	-	-	91.37	32.95	4.25	29.03	183	360	Peak

Test Mode :	802.11g	Temperature :	21~22°C
Test Channel :	06	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
32.749	23.19	-16.81	40	37	16.04	0.24	30.09	-	-	Peak
41.132	22.05	-17.95	40	40.21	11.64	0.25	30.05	-	-	Peak
78.689	19.37	-20.63	40	42.73	6.34	0.35	30.05	-	-	Peak
92.462	21.59	-21.91	43.5	41.83	9.35	0.39	29.98	-	-	Peak
900.147	35.18	-10.82	46	42.91	20.45	1.3	29.48	100	183	Peak
952.094	29.99	-16.01	46	37.46	20.74	1.33	29.54	-	-	Peak
2437	82.39	-	-	74.22	32.95	4.25	29.03	171	29	Average
2437	94.45	-	-	86.28	32.95	4.25	29.03	171	29	Peak



Test Mode :	802.11g	Temperature :	21~22°C
Test Channel :	11	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2462 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
30.638	20.17	-19.83	40	32.71	17.29	0.25	30.08	-	-	Peak
75.977	21.42	-18.58	40	45.2	5.93	0.35	30.06	-	-	Peak
95.427	19.5	-24	43.5	39.27	9.8	0.4	29.97	-	-	Peak
167.237	25.81	-17.69	43.5	45.88	9.31	0.54	29.92	-	-	Peak
881.407	38.35	-7.65	46	46.13	20.47	1.29	29.54	100	201	Peak
948.761	27.92	-18.08	46	35.4	20.73	1.33	29.54	-	-	Peak
2462	87.87	-	-	79.63	32.98	4.27	29.01	100	181	Average
2462	100.24	-	-	92	32.98	4.27	29.01	100	181	Peak

Test Mode :	802.11g	Temperature :	21~22°C
Test Channel :	11	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2462 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
31.399	24.01	-15.99	40	36.55	17.29	0.25	30.08	-	-	Peak
35.005	23.12	-16.88	40	37.88	15.1	0.23	30.09	-	-	Peak
42.007	22.32	-17.68	40	41.19	10.95	0.26	30.08	-	-	Peak
92.462	21.86	-21.64	43.5	42.1	9.35	0.39	29.98	-	-	Peak
900.147	40.54	-5.46	46	48.27	20.45	1.3	29.48	100	122	Peak
952.094	31.11	-14.89	46	38.58	20.74	1.33	29.54	-	-	Peak
2462	83.56	-	-	75.32	32.98	4.27	29.01	116	0	Average
2462	96.01	-	-	87.77	32.98	4.27	29.01	116	0	Peak



Test Mode :	802.11n-HT20	Temperature :	21~22°C
Test Channel :	01	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.51	19.7	-20.3	40	33	16.55	0.24	30.09	-	-	Peak
96.775	20.43	-23.07	43.5	39.97	10.03	0.4	29.97	-	-	Peak
169.599	25.64	-17.86	43.5	45.81	9.2	0.54	29.91	-	-	Peak
586.844	30.93	-15.07	46	40.93	18.58	1.05	29.63	-	-	Peak
900.147	34.18	-11.82	46	41.91	20.45	1.3	29.48	100	187	Peak
938.833	27.52	-18.48	46	35.04	20.68	1.33	29.53	-	-	Peak
2412	89.96	-	-	81.88	32.89	4.24	29.05	160	44	Average
2412	102.06	-	-	93.98	32.89	4.24	29.05	160	44	Peak

Test Mode :	802.11n-HT20	Temperature :	21~22°C
Test Channel :	01	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.18	24.29	-15.71	40	36.83	17.29	0.25	30.08	-	-	Peak
54.452	30.1	-9.9	40	53.45	6.49	0.29	30.13	-	-	Peak
88.964	22.5	-21	43.5	43.49	8.61	0.39	29.99	-	-	Peak
584.79	25.62	-20.38	46	35.64	18.57	1.05	29.64	-	-	Peak
900.147	36.17	-9.83	46	43.9	20.45	1.3	29.48	100	265	Peak
952.094	30.5	-15.5	46	37.97	20.74	1.33	29.54	-	-	Peak
2412	86.22	-	-	78.14	32.89	4.24	29.05	100	65	Average
2412	98.24	-	-	90.16	32.89	4.24	29.05	100	65	Peak



Test Mode :	802.11n-HT20	Temperature :	21~22°C
Test Channel :	06	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
38.888	25.59	-14.41	40	42.4	12.98	0.25	30.04	-	-	Peak
94.098	19.81	-23.69	43.5	39.73	9.66	0.4	29.98	-	-	Peak
166.068	26.03	-17.47	43.5	46.05	9.36	0.54	29.92	-	-	Peak
578.67	31.2	-14.8	46	41.24	18.56	1.04	29.64	-	-	Peak
900.147	32.66	-13.34	46	40.39	20.45	1.3	29.48	100	229	Peak
952.094	28.96	-17.04	46	36.43	20.74	1.33	29.54	-	-	Peak
2437	86.73	-	-	78.56	32.95	4.25	29.03	100	65	Average
2437	98.38	-	-	90.21	32.95	4.25	29.03	100	65	Peak

Test Mode :	802.11n-HT20	Temperature :	21~22°C
Test Channel :	06	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
30.531	23.93	-16.07	40	36.47	17.29	0.25	30.08	-	-	Peak
35.749	33.15	-6.85	40	48.35	14.65	0.23	30.08	100	151	Peak
41.86	22.27	-17.73	40	41.14	10.95	0.26	30.08	-	-	Peak
94.098	21.22	-22.28	43.5	41.14	9.66	0.4	29.98	-	-	Peak
900.147	36.96	-9.04	46	44.69	20.45	1.3	29.48	-	-	Peak
948.761	29.88	-16.12	46	37.36	20.73	1.33	29.54	-	-	Peak
2437	82.85	-	-	74.68	32.95	4.25	29.03	100	335	Average
2437	95.08	-	-	86.91	32.95	4.25	29.03	100	335	Peak



Test Mode :	802.11n-HT20	Temperature :	21~22°C
Test Channel :	11	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2462 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
32.52	20.31	-19.69	40	34.12	16.04	0.24	30.09	-	-	Peak
56.792	19.57	-20.43	40	43.66	5.75	0.3	30.14	-	-	Peak
164.33	22.62	-20.88	43.5	42.57	9.44	0.54	29.93	-	-	Peak
324.456	23.88	-22.12	46	39.3	13.75	0.77	29.94	-	-	Peak
900.147	35.96	-10.04	46	43.69	20.45	1.3	29.48	100	116	Peak
952.094	29.32	-16.68	46	36.79	20.74	1.33	29.54	-	-	Peak
2462	86.05	-	-	77.81	32.98	4.27	29.01	100	12	Average
2462	97.39	-	-	89.15	32.98	4.27	29.01	100	12	Peak

Test Mode :	802.11n-HT20	Temperature :	21~22°C
Test Channel :	11	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2462 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
31.843	33.59	-6.41	40	46.89	16.55	0.24	30.09	100	0	Peak
41.713	22.5	-17.5	40	41.37	10.95	0.26	30.08	-	-	Peak
54.071	27.77	-12.23	40	51.12	6.49	0.29	30.13	-	-	Peak
88.964	22.01	-21.49	43.5	43	8.61	0.39	29.99	-	-	Peak
900.147	37.23	-8.77	46	44.96	20.45	1.3	29.48	-	-	Peak
952.094	31.44	-14.56	46	38.91	20.74	1.33	29.54	-	-	Peak
2462	84.63	-	-	76.39	32.98	4.27	29.01	100	251	Average
2462	97	-	-	88.76	32.98	4.27	29.01	100	251	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.

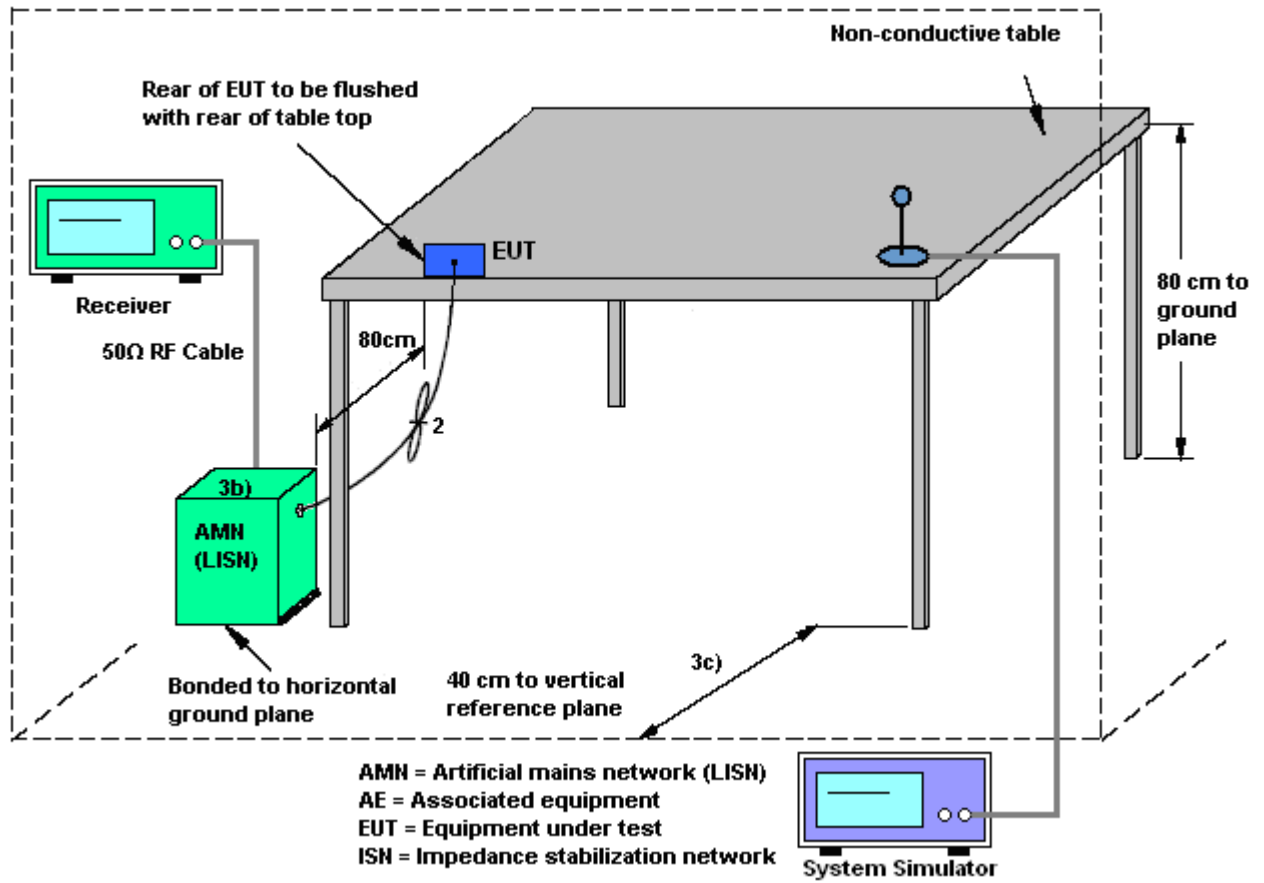
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The testing follows the guidelines in FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
2. ANSI C63.4-2003 and ANSI C63.10-2009.
3. 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.
4. Connect EUT to the power mains through a line impedance stabilization network (LISN).
5. All the support units are connecting to the other LISN.
6. The LISN provides 50 ohm coupling impedance for the measuring instrument.
7. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
8. Both sides of AC line were checked for maximum conducted interference.
9. The frequency range from 150 KHz to 30 MHz was searched.
10. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

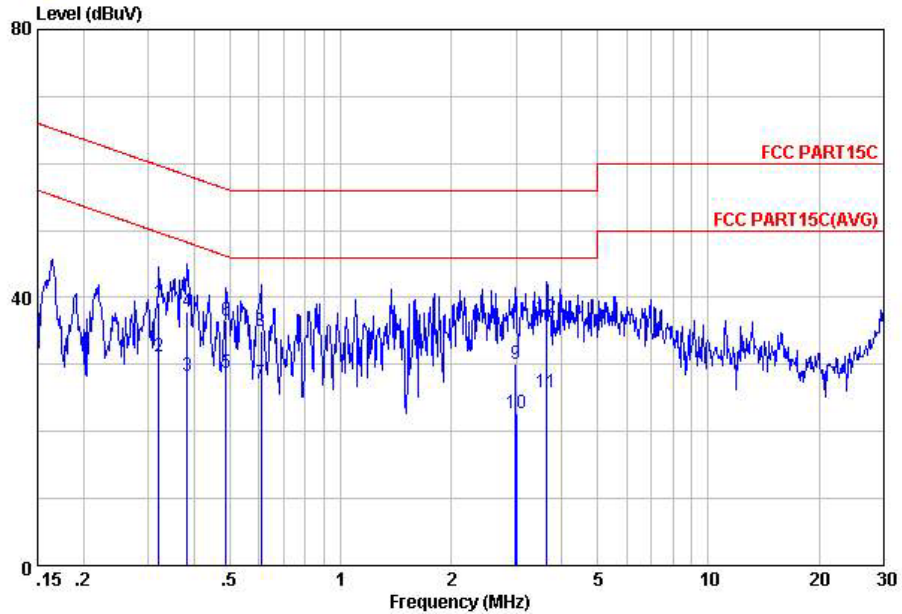
3.6.4 Test Setup





3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	19~20°C
Test Engineer :	Tom Wang	Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



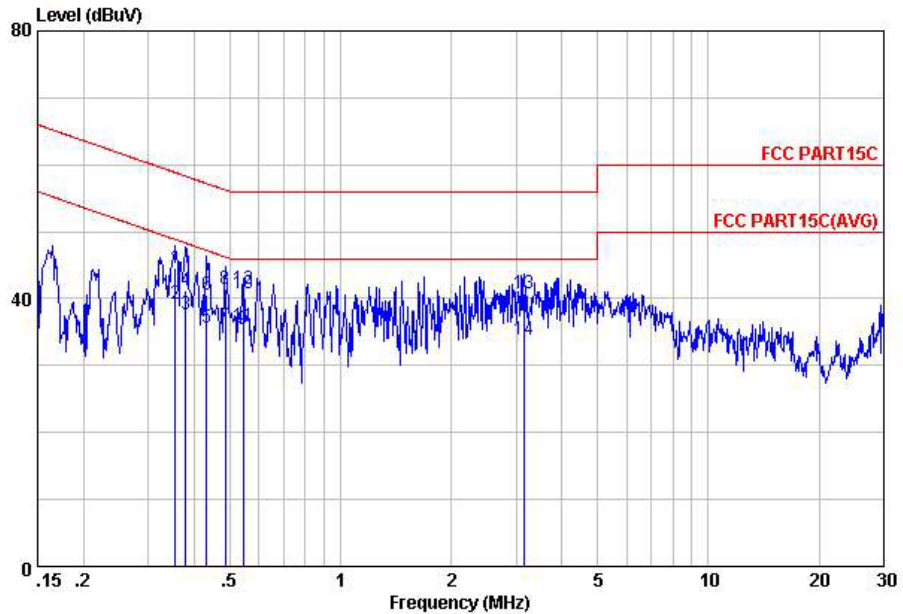
Site : C001-KS
 Condition: FCC PART15C LISN-111230 LINE

mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.32	39.22	-20.49	59.71	28.71	-0.08	10.59	QP
2	0.32	31.22	-18.49	49.71	20.71	-0.08	10.59	Average
3	0.38	28.24	-19.97	48.21	17.70	-0.08	10.62	Average
4	0.38	37.84	-20.37	58.21	27.30	-0.08	10.62	QP
5	0.49	28.64	-17.55	46.19	18.10	-0.08	10.62	Average
6	0.49	36.44	-19.75	56.19	25.90	-0.08	10.62	QP
7	0.61	27.25	-18.75	46.00	16.71	-0.09	10.63	Average
8	0.61	34.95	-21.05	56.00	24.41	-0.09	10.63	QP
9	2.99	30.07	-25.93	56.00	19.41	-0.12	10.78	QP
10	3.00	22.77	-23.23	46.00	12.11	-0.12	10.78	Average
11	3.64	25.89	-20.11	46.00	15.19	-0.12	10.82	Average
12	3.64	36.89	-19.11	56.00	26.19	-0.12	10.82	QP



Test Mode :	Mode 1	Temperature :	19~20°C
Test Engineer :	Tom Wang	Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : C001-KS
 Condition: FCC PART15C LISN-111230 NEUTRAL

mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.36	44.63	-14.20	58.83	34.10	-0.08	10.61	QP
2	0.36	39.23	-9.60	48.83	28.70	-0.08	10.61	Average
3	0.38	37.64	-10.66	48.30	27.11	-0.08	10.61	Average
4	0.38	41.34	-16.96	58.30	30.81	-0.08	10.61	QP
5	0.43	35.74	-11.46	47.20	25.20	-0.08	10.62	Average
6	0.43	40.64	-16.56	57.20	30.10	-0.08	10.62	QP
7	0.49	35.84	-10.39	46.23	25.30	-0.08	10.62	Average
8	0.49	41.54	-14.69	56.23	31.00	-0.08	10.62	QP
9	0.54	35.45	-10.55	46.00	24.90	-0.08	10.63	Average
10	0.54	40.85	-15.15	56.00	30.30	-0.08	10.63	QP
11	0.54	35.85	-10.15	46.00	25.30	-0.08	10.63	Average
12	0.54	41.55	-14.45	56.00	31.00	-0.08	10.63	QP
13	3.16	40.78	-15.22	56.00	30.10	-0.12	10.80	QP
14	3.16	33.88	-12.12	46.00	23.20	-0.12	10.80	Average



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	100319	9kHz~40GHz	Dec. 30, 2011	Sep. 27, 2012~ Oct. 15, 2012`	Dec. 29, 2012	Conducted (TH01-KS)
Power Meter	Agilent	E4416A	MY45101555	N/A	Aug. 22, 2012	Sep. 27, 2012~ Oct. 15, 2012	Aug. 21, 2013	Conducted (TH01-KS)
Power Sensor	Agilent	E9327A	MY44421198	N/A	Aug. 22, 2012	Sep. 27, 2012~ Oct. 15, 2012	Aug. 21, 2013	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 22, 2012	Sep. 27, 2012~ Oct. 15, 2012	Aug. 21, 2013	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Dec. 30, 2011	Sep. 27, 2012~ Oct. 15, 2012	Dec. 29, 2012	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 09, 2011	Oct. 13, 2012	Nov. 08, 2012	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 30, 2011	Oct. 13, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 08, 2011	Oct. 13, 2012	Dec. 07, 2012	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	860004/ 001	9 kHz~30 MHz	Jul. 03, 2012	Oct. 13, 2012	Jul. 02, 2013	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 06, 2012	Oct. 13, 2012	Jan. 05, 2013	Radiation (03CH01-KS)
Amplifier	Wireless	FPA-6592G	060004	30MHz~2GHz	Dec. 30, 2011	Oct. 13, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 30, 2011	Oct. 13, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701023	1GHz~18GHz	Nov. 07, 2011	Oct. 13, 2012	Nov. 06, 2012	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Oct. 12, 2012	Oct. 13, 2012	Oct. 11, 2013	Radiation (03CH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Jun. 01, 2012	Sep. 29, 2012	May 31, 2013	Conduction (CO01-KS)
LISN	MessTec	AN3016	60103	9kHz~30MHz	Dec. 30, 2011	Sep. 29, 2012	Dec. 29, 2012	Conduction (CO01-KS)
LISN	MessTec	AN3016	60105	9kHz~30MHz	Dec. 30, 2011	Sep. 29, 2012	Dec. 29, 2012	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	N/A	Nov. 16, 2011	Sep. 29, 2012	Nov. 15, 2012	Conduction (CO01-KS)
System Simulator	R&S	CMU200	837587/066	2G Full-Band	Dec. 30, 2011	Sep. 29, 2012	Dec. 29, 2012	Conduction (CO01-KS)



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 EP291206 as below.