

FC

Test Report

Product Name	802.11B/G/N SDIO Module with Antenna Connectors
Model No	ARGOX-SDM-802.11 BGN
FCC ID.	NBF-SDMN

Applicant	Argox Information Co.,Ltd.
Address	7F,NO.126,Lane 235,Pao-Chiao Rd., Hsin Tien, Taipei, Taiwan

Date of Receipt	Dec. 26, 2012
Issue Date	Jan. 17, 2013
Report No.	131012R-RFUSP28V01
Report Version	V1.0



The test results relate only to the samples tested.
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Test Report Certification

Issue Date: Jan. 17, 2013

Report No.: 131012R-RFUSP28V01


Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name	802.11B/G/N SDIO Module with Antenna Connectors
Applicant	Argox Information Co.,Ltd.
Address	7F,NO.126,Lane 235,Pao-Chiao Rd., Hsin Tien, Taipei, Taiwan
Manufacturer	Argox Information Co.,Ltd.
Model No.	ARGOX-SDM-802.11 BGN
FCC ID.	NBF-SDMN
EUT Rated Voltage	DC 3.3V
EUT Test Voltage	AC 120V/60Hz
Trade Name	ARGOX
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009
Test Result	Complied

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	802.11B/G/N SDIO Module with Antenna Connectors
Trade Name	ARGOX
Model No.	ARGOX-SDM-802.11 BGN
FCC ID.	NBF-SDMN
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW
Number of Channels	802.11b/g/n-20MHz: 11
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 72.2Mbps
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

No.	Model Number	Antenna		Scan tech
1	PA-6030	(1) AQ060WIPI01+A	(2) 69-70002-001	N/A
2	PT-9130-1-1	(1) 69-70003-006	(2) 69-70003-001	Laser
	PT-9230-1-1	(1) 69-70003-006	(2) 69-70003-001	2D
3	PT-9132-0-0	ALB120-052020-150052		Laser
	PT-9232-0-0	ALB120-052020-150052		2D

Note : There are different host on No1,No2&No3 which individual to evaluated exposure value on this report.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Ji-Haw	69-70002-001	PIFA	3.48 dBi for 2.4 GHz
2	Ji-Haw	69-70003-001	PIFA	3.23 dBi for 2.4 GHz
3	LYNwave	ALB120-052020-150052	PIFA	2.70 dBi for 2.4 GHz
4	Wgt	AQ060WIPI01+A	PIFA	4.36 dBi for 2.4 GHz
5	Aristotle Enterprises	69-70003-006	PIFA	3.40 dBi for 2.4 GHz

Note: 1. The antenna of EUT is conform to FCC 15.203.

2. Only the higher gain antenna was tested and recorded in this report.

802.11b/g/n-20MHz Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

Note:

1. The EUT is a 802.11B/G/N SDIO Module with Antenna Connectors with a built-in WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps 、 802.11g is 6Mbps 、 802.11n(20M-BW) is 7.2Mbps)
4. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode:	Mode 1: Transmit (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

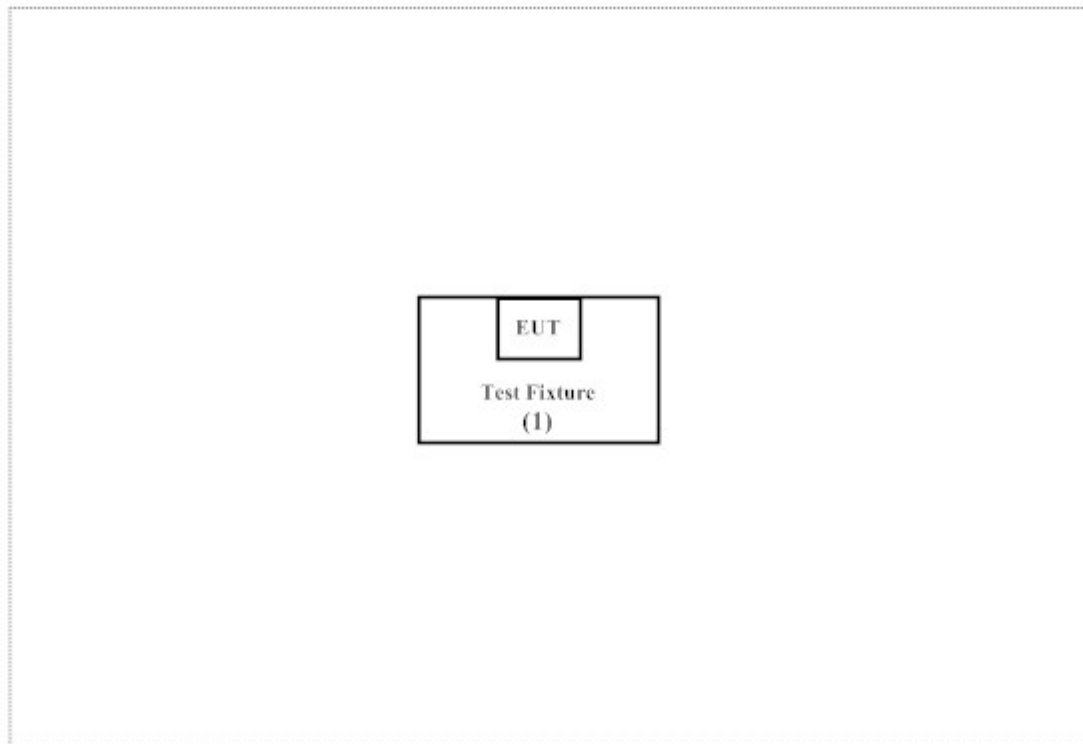
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Test Fixture	ARGOX	PA-6030	N/A	N/A

Signal Cable Type	Signal cable Description
	N/A

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute software on the EUT.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous Transmit.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from

Quietek Corporation's Web Site: <http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site:

<http://www.quietek.com/>

Site Description: File on
 Federal Communications Commission
 FCC Engineering Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046
 Registration Number: 92195

Accreditation on NVLAP
 NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation
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 E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

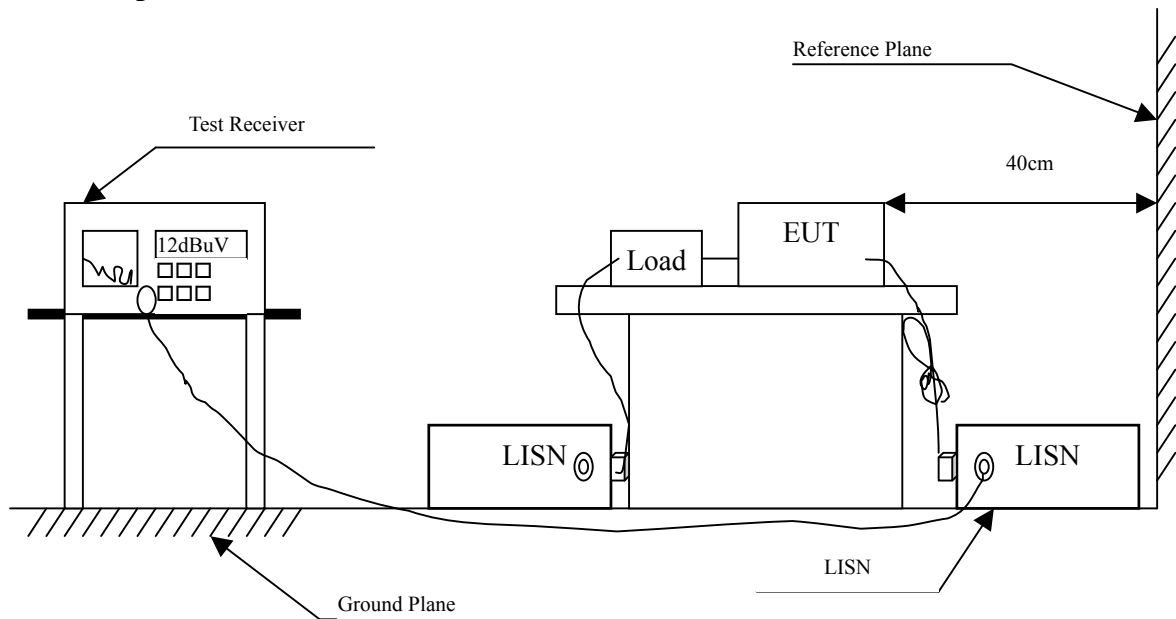
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2012	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2012	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2012	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2012	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.201	9.830	25.120	34.950	-29.593	64.543
0.236	9.830	23.630	33.460	-30.083	63.543
0.322	9.830	17.700	27.530	-33.556	61.086
0.662	9.830	39.360	49.190	-6.810	56.000
0.685	9.830	35.110	44.940	-11.060	56.000
8.435	9.952	14.900	24.852	-35.148	60.000
Average					
0.201	9.830	13.380	23.210	-31.333	54.543
0.236	9.830	16.430	26.260	-27.283	53.543
0.322	9.830	14.370	24.200	-26.886	51.086
0.662	9.830	27.520	37.350	-8.650	46.000
0.685	9.830	25.760	35.590	-10.410	46.000
8.435	9.952	11.820	21.772	-28.228	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.189	9.830	30.650	40.480	-24.406	64.886
0.252	9.830	22.380	32.210	-30.876	63.086
0.283	9.831	18.750	28.581	-33.619	62.200
0.607	9.840	27.020	36.860	-19.140	56.000
0.677	9.840	26.990	36.830	-19.170	56.000
8.572	10.005	14.500	24.505	-35.495	60.000
Average					
0.189	9.830	20.080	29.910	-24.976	54.886
0.252	9.830	16.960	26.790	-26.296	53.086
0.283	9.831	12.560	22.391	-29.809	52.200
0.607	9.840	17.960	27.800	-18.200	46.000
0.677	9.840	18.490	28.330	-17.670	46.000
8.572	10.005	10.320	20.325	-29.675	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2012
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2012

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Chain A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	15.02	-	-	-	17.76	<30dBm	Pass
06	2437	14.12	14.08	14.03	13.89	16.89	<30dBm	Pass
11	2462	16.66	-	-	-	19.48	<30dBm	Pass

Note: Peak Power Output Value = Reading value on peak power meter + cable loss

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Chain A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	14.45	-	-	-	-	-	-	-	22.32	<30dBm	Pass
06	2437	15.58	15.4	15.12	14.87	14.23	13.88	13.42	12.9	23.22	<30dBm	Pass
11	2462	14.11	-	-	-	-	-	-	-	22.61	<30dBm	Pass

Note: Peak Power Output Value = Reading value on peak power meter + cable loss

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Chain A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2			
		Measurement Level (dBm)										
01	2412	14.3	-	-	-	-	-	-	-	22.42	<30dBm	Pass
06	2437	15.48	15.09	14.76	14.3	13.92	13.67	13.11	12.91	23.25	<30dBm	Pass
11	2462	14.11	-	-	-	-	-	-	-	22.74	<30dBm	Pass

Note: Peak Power Output Value = Reading value on peak power meter + cable loss

4. Radiated Emission

4.1. Test Equipment

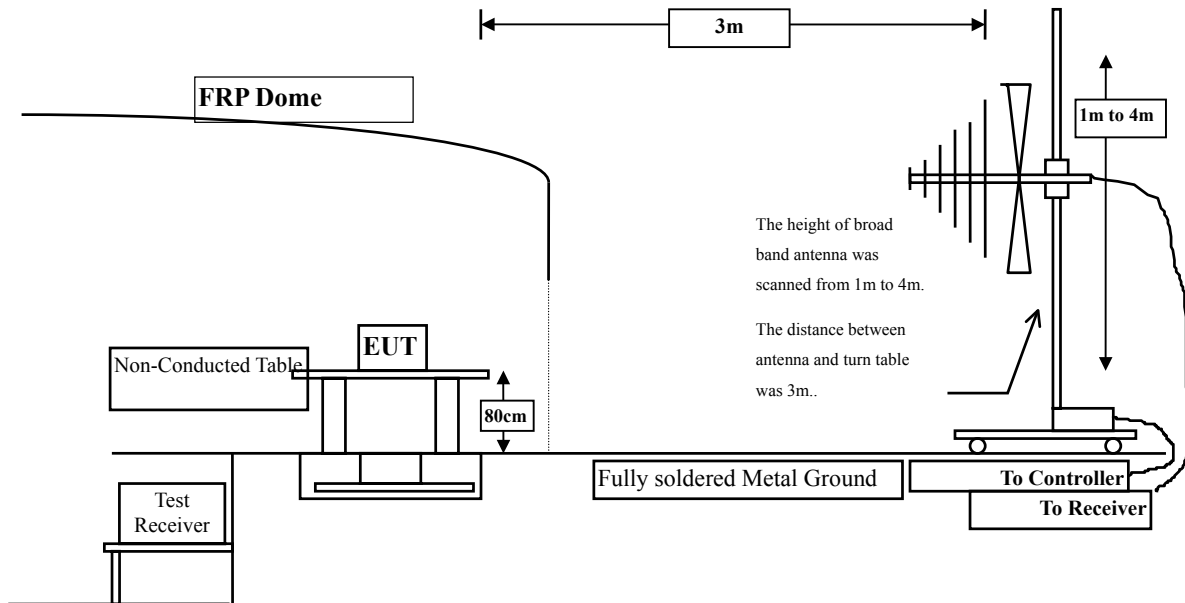
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2012
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2012
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

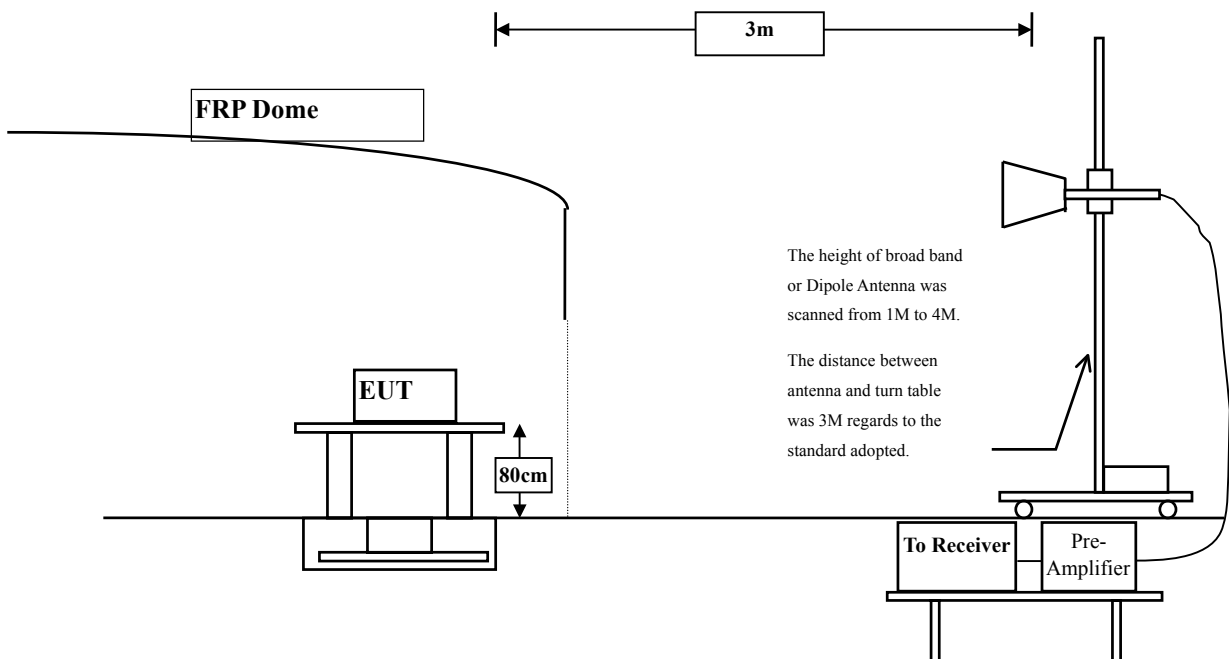
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The frequency range from 30MHz to 10th harmonics is checked.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	38.110	41.371	-32.629	74.000
7236.000	10.650	44.520	55.170	-18.830	74.000
9648.000	13.337	36.330	49.666	-24.334	74.000
Average Detector:					
7236.000	10.650	37.680	48.330	-5.670	54.000
Vertical					
Peak Detector:					
4824.000	6.421	37.690	44.111	-29.889	74.000
7236.000	11.495	46.090	57.585	-16.415	74.000
9648.000	13.807	37.080	50.886	-23.114	74.000
Average Detector:					
7236.000	11.495	40.030	51.525	-2.475	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	38.030	41.067	-32.933	74.000
7311.000	11.795	46.960	58.754	-15.246	74.000
9748.000	12.635	37.750	50.385	-23.615	74.000
Average Detector:					
7311.000	11.795	41.220	53.014	-0.986	54.000
Vertical					
Peak Detector:					
4874.000	5.812	38.740	44.551	-29.449	74.000
7311.000	12.630	46.030	58.659	-15.341	74.000
9748.000	13.126	37.380	50.506	-23.494	74.000
Average Detector:					
7311.000	12.630	40.210	52.839	-1.161	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	37.550	40.407	-33.593	74.000
7386.000	12.127	43.230	55.358	-18.642	74.000
9848.000	12.852	39.130	51.983	-22.017	74.000
Average Detector:					
7386.000	12.127	35.720	47.848	-6.152	54.000
Vertical					
Peak Detector:					
4924.000	5.521	37.190	42.710	-31.290	74.000
7386.000	13.254	44.860	58.114	-15.886	74.000
9848.000	13.367	36.980	50.347	-23.653	74.000
Average Detector:					
7386.000	13.254	38.530	51.784	-2.216	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	37.580	40.841	-33.159	74.000
7236.000	10.650	48.610	59.260	-14.740	74.000
9648.000	13.337	36.830	50.166	-23.834	74.000
Average Detector:					
7236.000	10.650	33.400	44.050	-9.950	54.000
Vertical					
Peak Detector:					
4824.000	6.421	37.510	43.931	-30.069	74.000
7236.000	11.495	48.770	60.265	-13.735	74.000
9648.000	13.807	36.890	50.696	-23.304	74.000
Average Detector:					
7236.000	11.495	33.280	44.775	-9.225	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	37.070	40.107	-33.893	74.000
7311.000	11.795	49.270	61.064	-12.936	74.000
9748.000	12.635	36.700	49.335	-24.665	74.000
Average Detector:					
7311.000	11.795	33.440	45.234	-8.766	54.000
Peak Detector:					
4874.000	5.812	36.920	42.731	-31.269	74.000
7311.000	12.630	49.690	62.319	-11.681	74.000
9748.000	13.126	36.560	49.686	-24.314	74.000
Average Detector:					
7311.000	12.630	33.430	46.059	-7.941	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	37.220	40.077	-33.923	74.000
7386.000	12.127	44.400	56.528	-17.472	74.000
9848.000	12.852	37.450	50.303	-23.697	74.000
Average Detector:					
7386.000	12.127	28.580	40.708	-13.292	54.000
Vertical					
Peak Detector:					
4924.000	5.521	36.790	42.310	-31.690	74.000
7386.000	13.254	44.660	57.914	-16.086	74.000
9848.000	13.367	37.050	50.417	-23.583	74.000
Average Detector:					
7386.000	13.254	29.080	42.334	-11.666	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	37.450	40.711	-33.289	74.000
7236.000	10.650	47.580	58.230	-15.770	74.000
9648.000	13.337	38.120	51.456	-22.544	74.000
Average Detector:					
7236.000	10.650	29.330	39.980	-14.020	54.000
Vertical					
Peak Detector:					
4824.000	6.421	37.060	43.481	-30.519	74.000
7236.000	11.495	49.490	60.985	-13.015	74.000
9648.000	13.807	36.400	50.206	-23.794	74.000
Average Detector:					
7236.000	11.495	32.170	43.665	-10.335	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBUV	Measurement Level dBUV/m	Margin dB	Limit dBUV/m
Horizontal					
Peak Detector:					
4874.000	3.038	36.760	39.797	-34.203	74.000
7311.000	11.795	49.260	61.054	-12.946	74.000
9748.000	12.635	37.570	50.205	-23.795	74.000
Average Detector:					
7311.000	11.795	32.300	44.094	-9.906	54.000
Vertical					
Peak Detector:					
4874.000	5.812	37.930	43.741	-30.259	74.000
7311.000	12.630	49.840	62.469	-11.531	74.000
9748.000	13.126	36.830	49.956	-24.044	74.000
Average Detector:					
7311.000	12.630	32.720	45.349	-8.651	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	37.530	40.387	-33.613	74.000
7386.000	13.254	45.540	58.794	4.794	74.000
9848.000	12.852	36.880	49.733	-24.267	74.000
Average Detector:					
7386.000	12.127	28.020	40.148	-13.852	54.000
Vertical					
Peak Detector:					
4924.000	5.521	37.410	42.930	-31.070	74.000
7386.000	13.254	45.430	58.684	-15.316	74.000
9848.000	13.367	38.170	51.537	-22.463	74.000
Average Detector:					
7386.000	13.254	27.940	41.194	-12.806	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)(2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
41.640	-3.949	34.380	30.431	-9.569	40.000
359.800	-1.680	29.567	27.887	-18.113	46.000
431.580	-2.099	29.096	26.997	-19.003	46.000
544.100	3.512	25.496	29.008	-16.992	46.000
745.860	3.308	26.714	30.022	-15.978	46.000
910.760	6.164	23.733	29.898	-16.102	46.000
Vertical					
61.040	-4.316	35.329	31.013	-8.987	40.000
142.520	-6.267	34.407	28.140	-15.360	43.500
383.080	-2.184	29.530	27.346	-18.654	46.000
544.100	-0.688	24.551	23.863	-22.137	46.000
823.460	3.462	23.777	27.240	-18.760	46.000
968.960	8.191	23.429	31.620	-22.380	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)(2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
39.700	-3.616	34.978	31.362	-8.638	40.000
148.340	-10.254	30.104	19.850	-23.650	43.500
251.160	-5.745	27.753	22.008	-23.992	46.000
383.080	-1.164	31.526	30.362	-15.638	46.000
431.580	-2.099	29.757	27.658	-18.342	46.000
697.360	3.171	38.021	41.192	-4.808	46.000
Vertical					
55.220	-4.699	36.221	31.522	-8.478	40.000
383.080	-2.184	30.398	28.214	-17.786	46.000
544.100	-0.688	24.390	23.702	-22.298	46.000
699.300	0.695	32.463	33.158	-12.842	46.000
819.580	3.319	23.161	26.481	-19.519	46.000
967.020	8.071	22.703	30.774	-23.226	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
39.700	-3.616	33.859	30.243	-9.757	40.000
154.160	-10.091	33.605	23.514	-19.986	43.500
383.080	-1.164	29.968	28.804	-17.196	46.000
551.860	2.714	23.850	26.564	-19.436	46.000
701.240	2.668	37.427	40.095	-5.905	46.000
858.380	5.972	24.385	30.357	-15.643	46.000
Vertical					
55.220	-4.699	36.377	31.678	-8.322	40.000
156.100	-6.201	31.967	25.765	-17.735	43.500
383.080	-2.184	29.372	27.188	-18.812	46.000
515.000	-1.090	25.781	24.691	-21.309	46.000
697.360	1.311	32.778	34.089	-11.911	46.000
922.400	5.534	23.515	29.049	-16.951	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

5. RF antenna conducted test

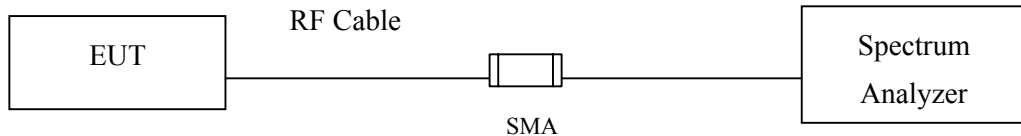
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

5.2. Test Setup

RF antenna Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, 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) (see Section 15.205(c)).

5.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Uncertainty

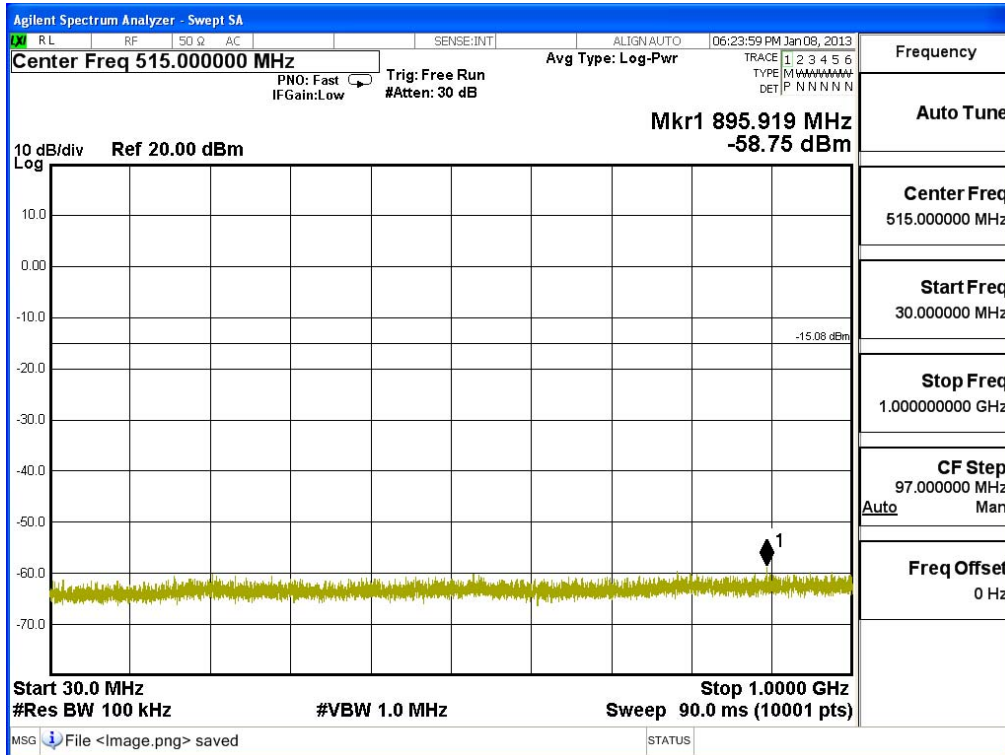
The measurement uncertainty

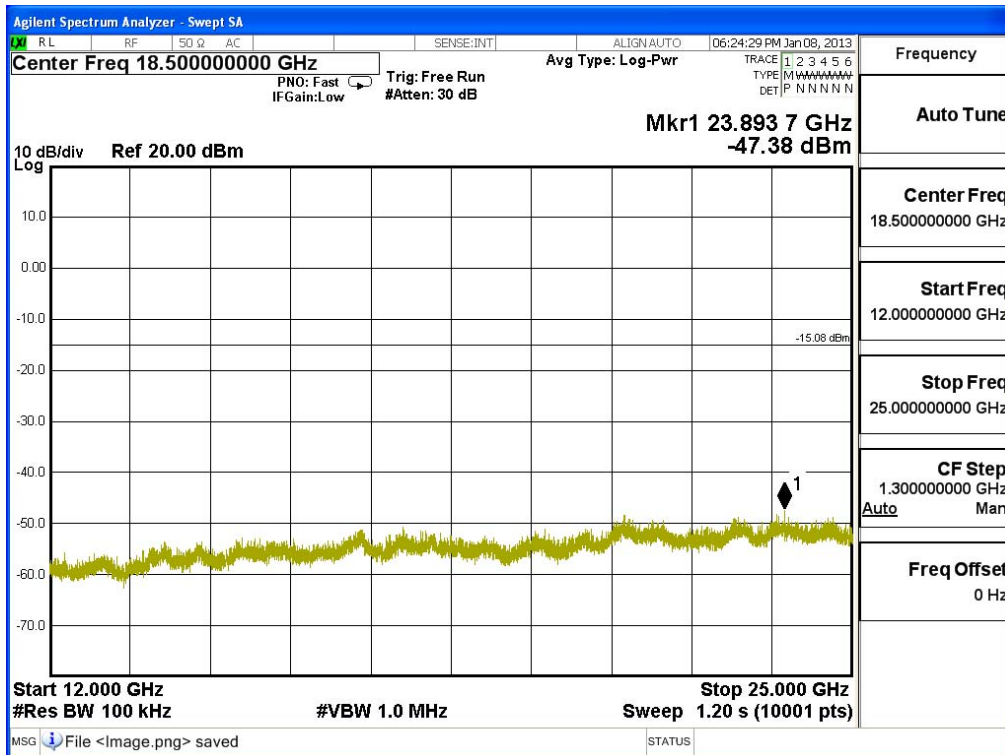
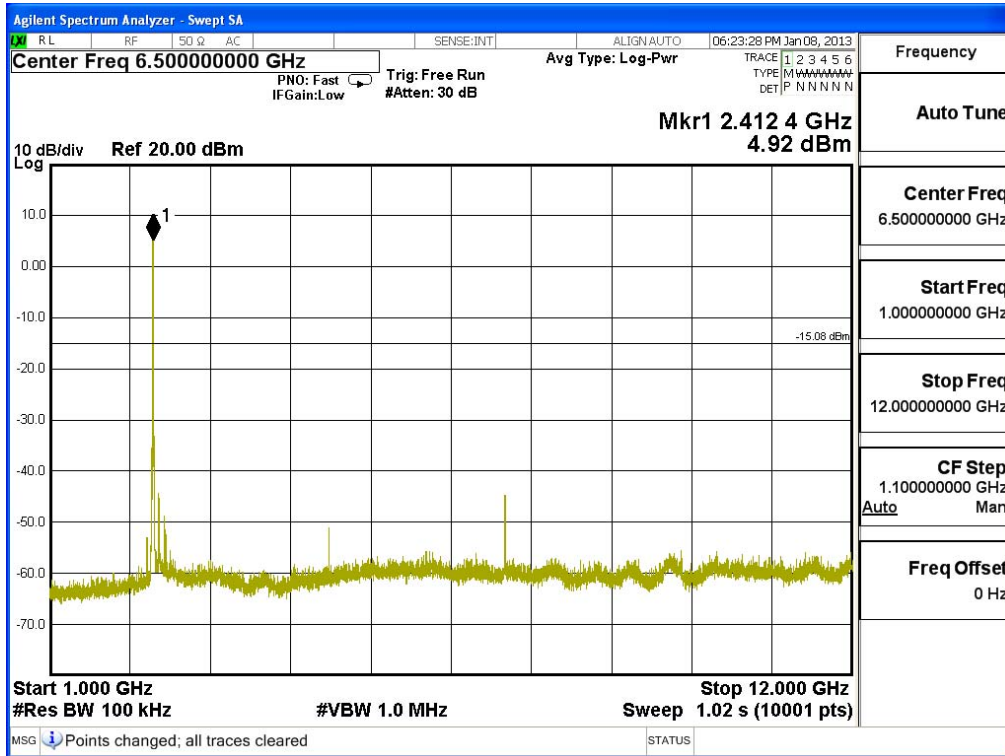
Conducted is defined as $\pm 1.27\text{dB}$

5.6. Test Result of RF antenna conducted test

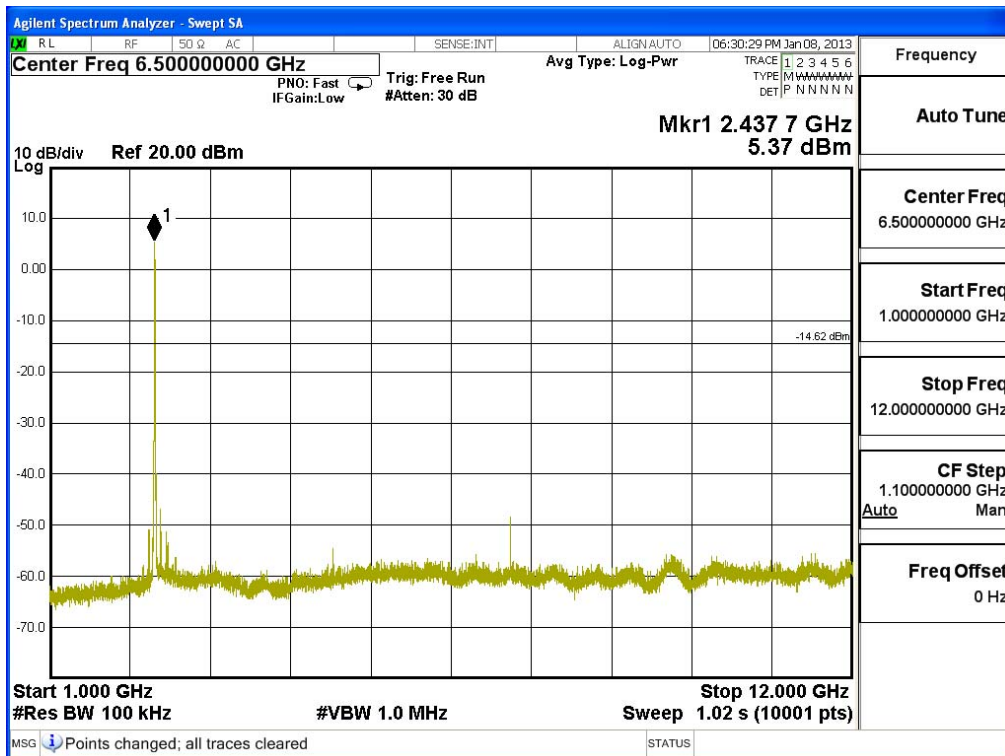
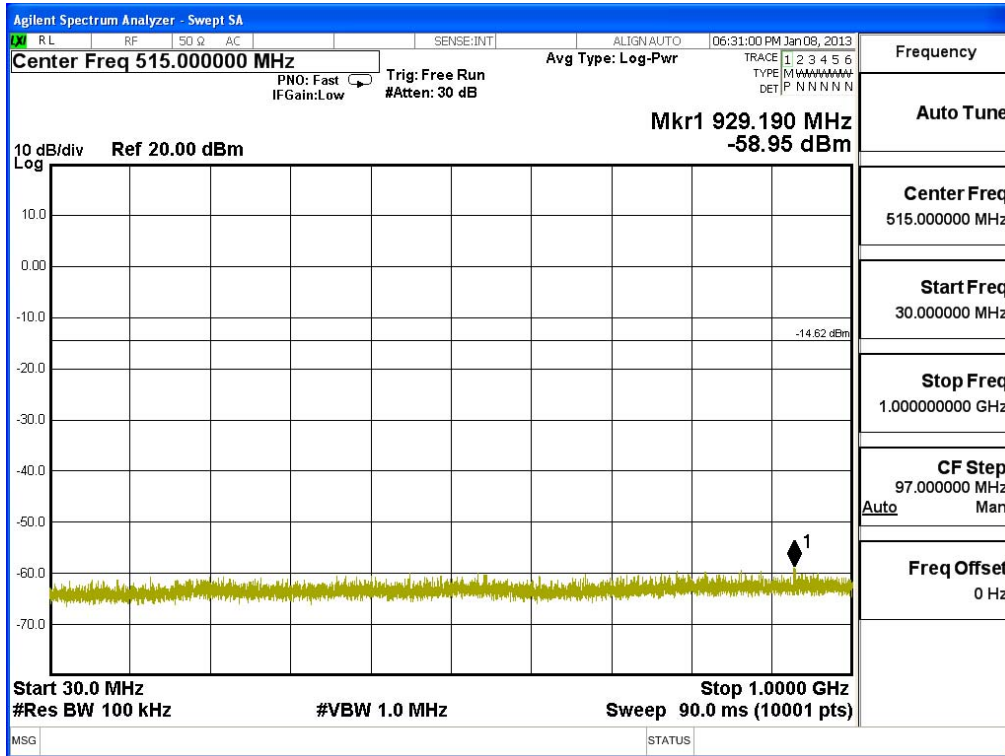
Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : RF antenna conducted test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

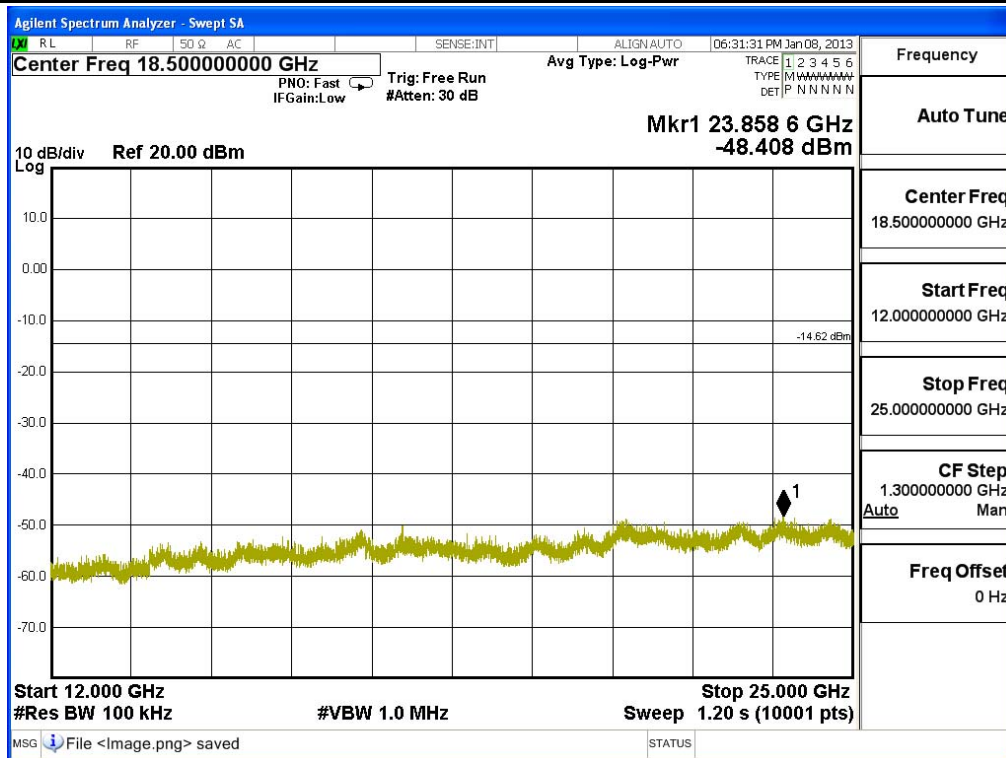
Channel 01 (2412MHz)



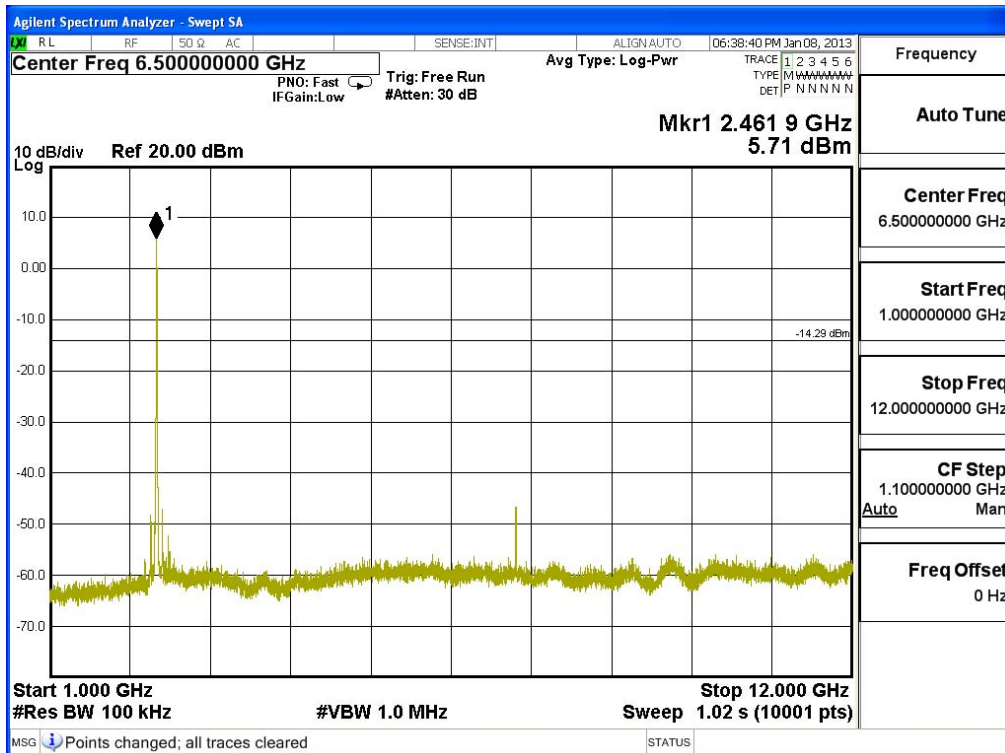
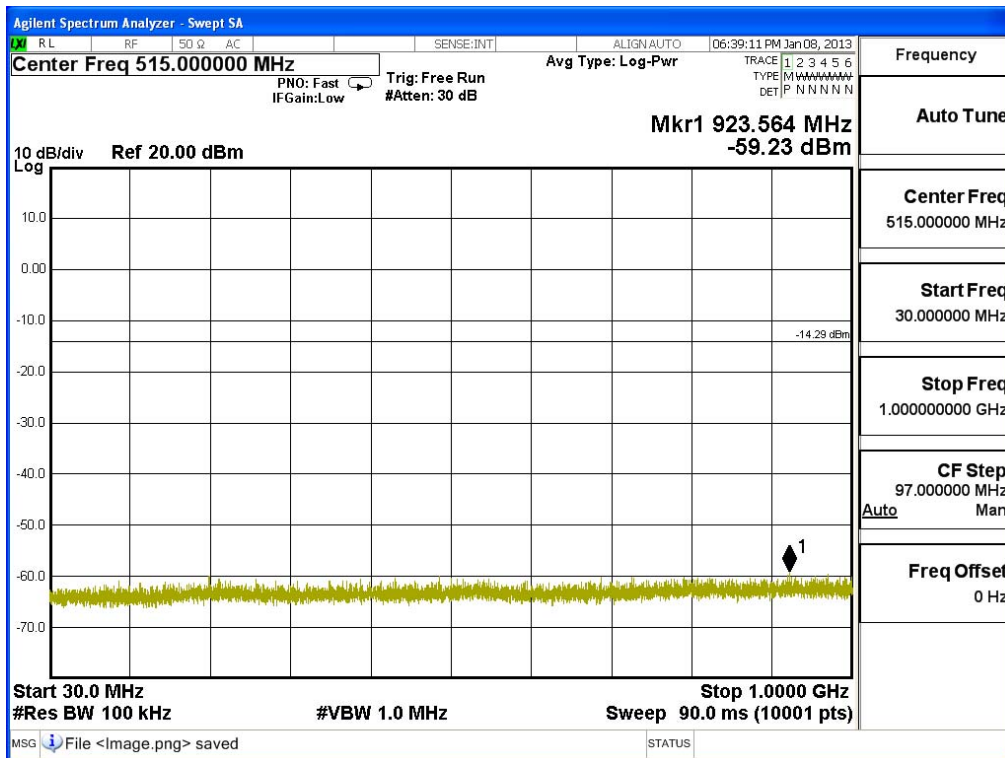


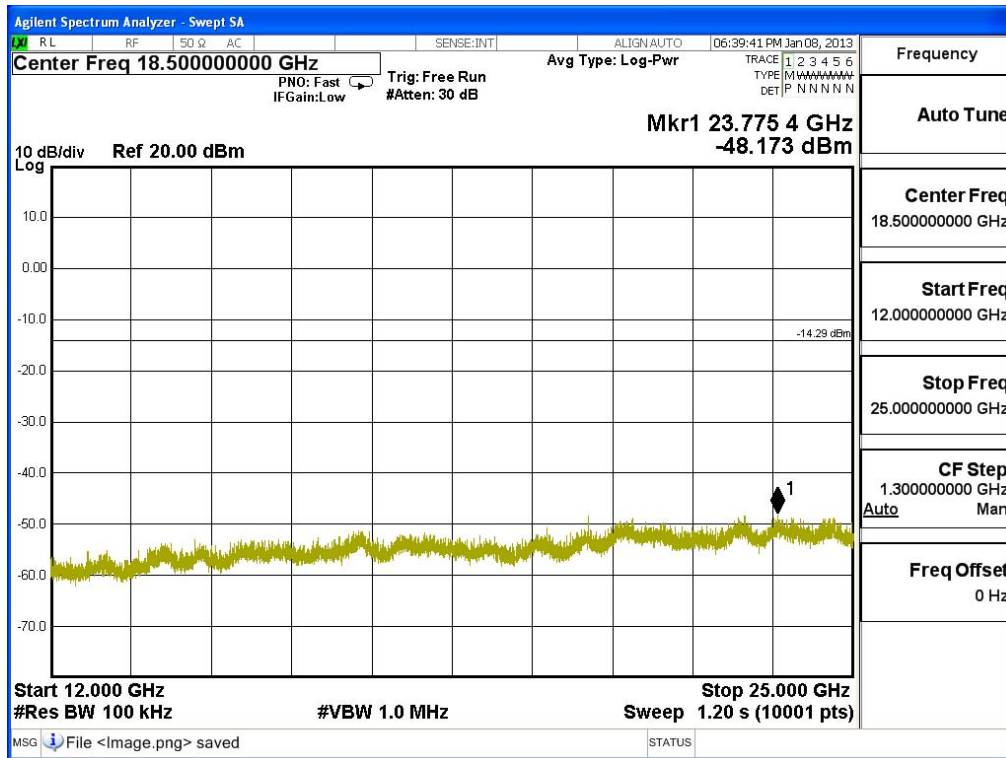
Channel 06 (2437MHz)





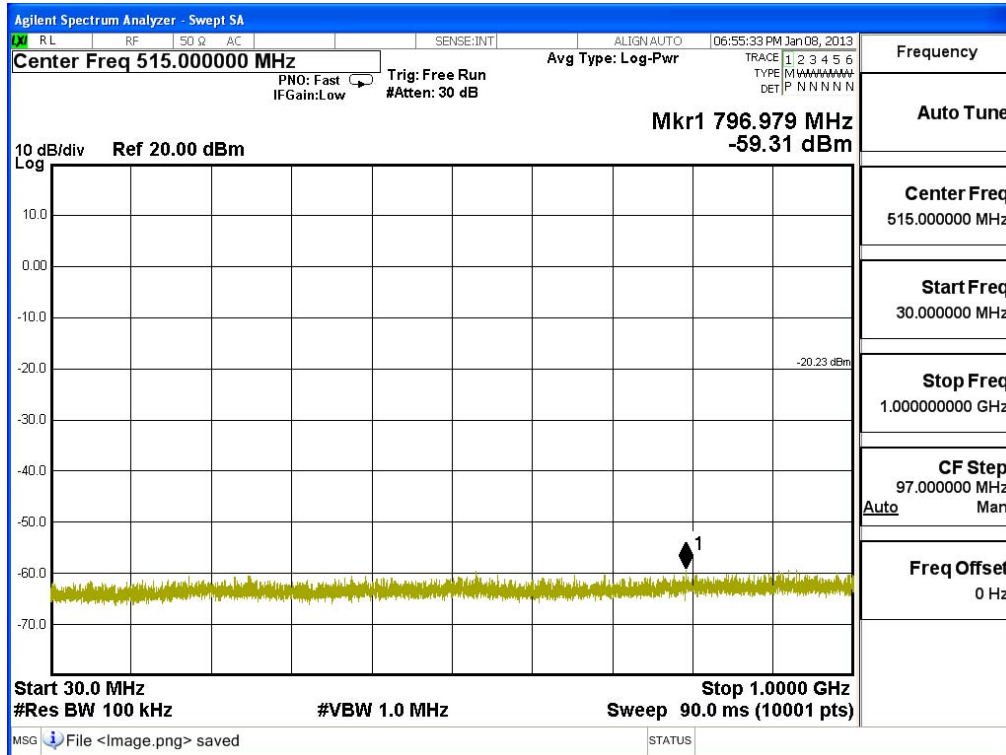
Channel 11 (2462MHz)

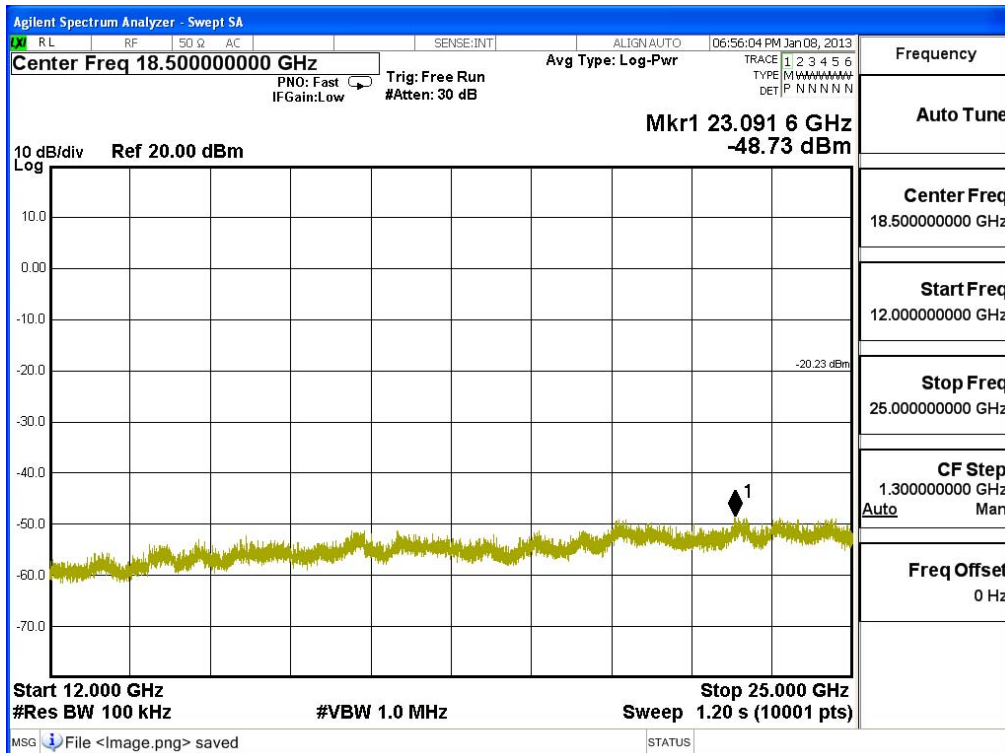
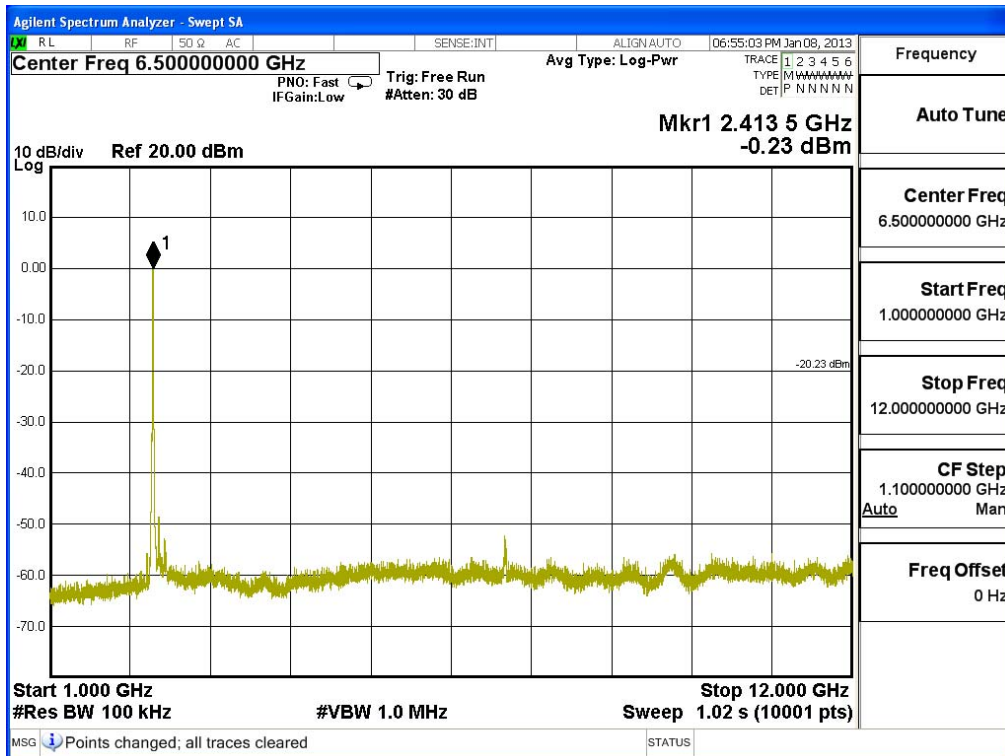




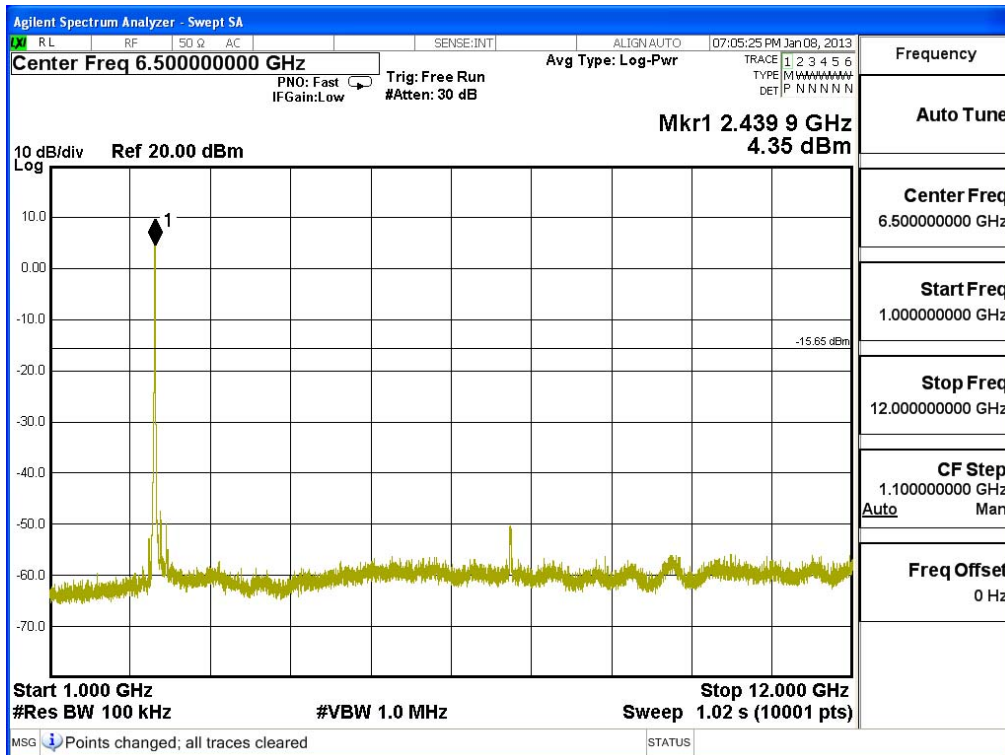
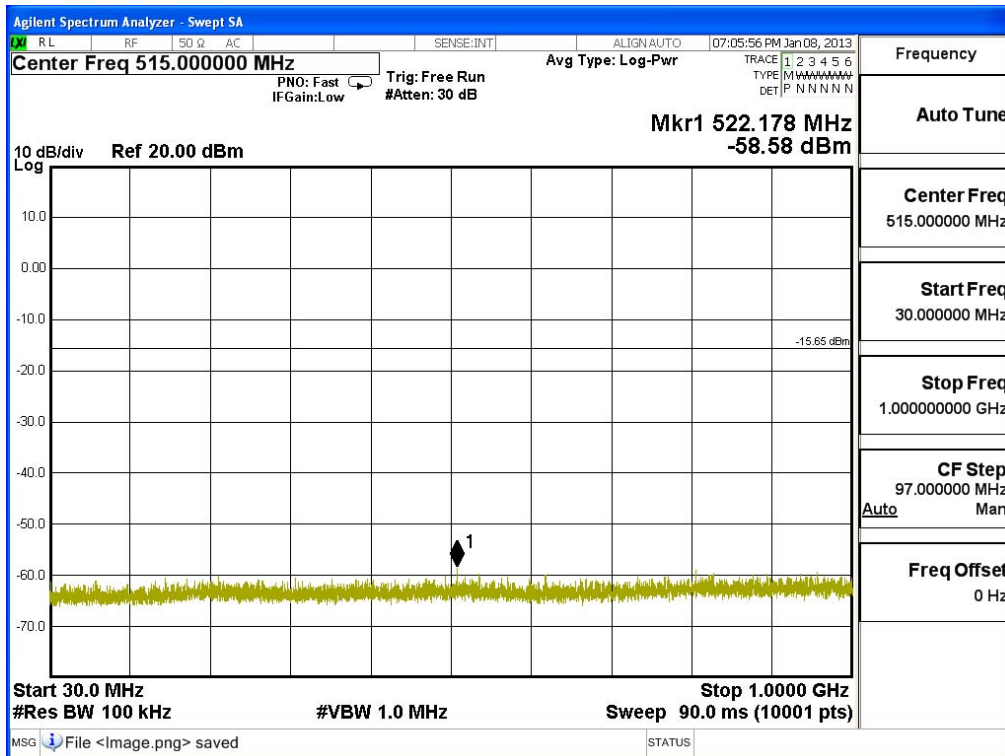
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 Test Item : RF Antenna Conducted Spurious
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

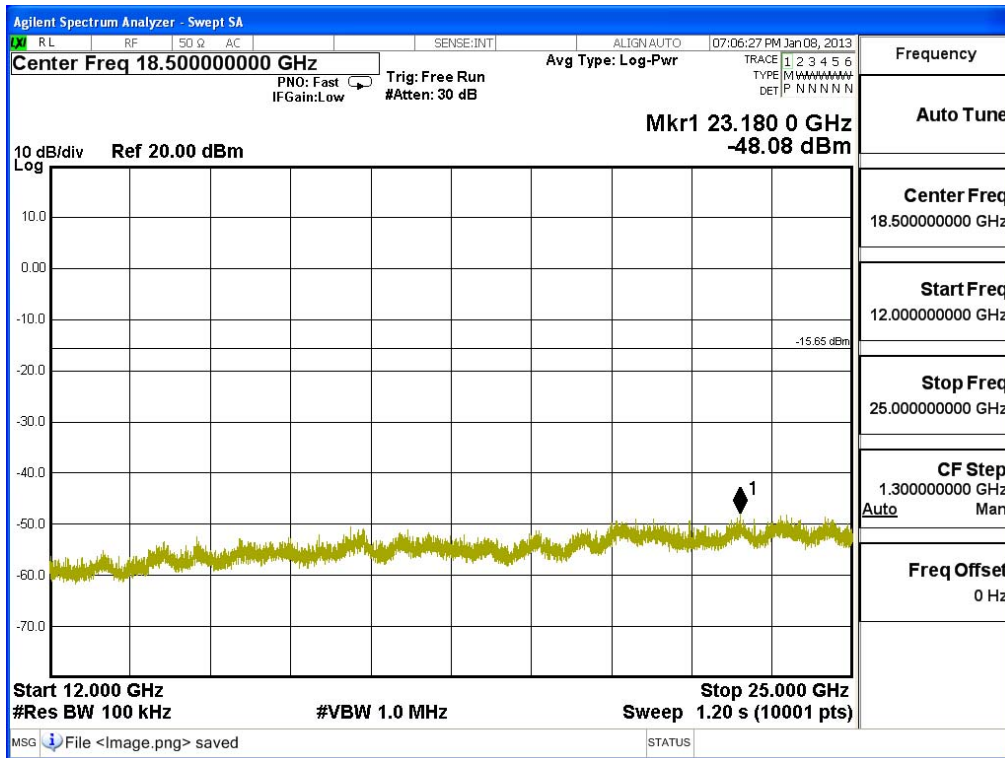
Channel 01 (2412MHz)



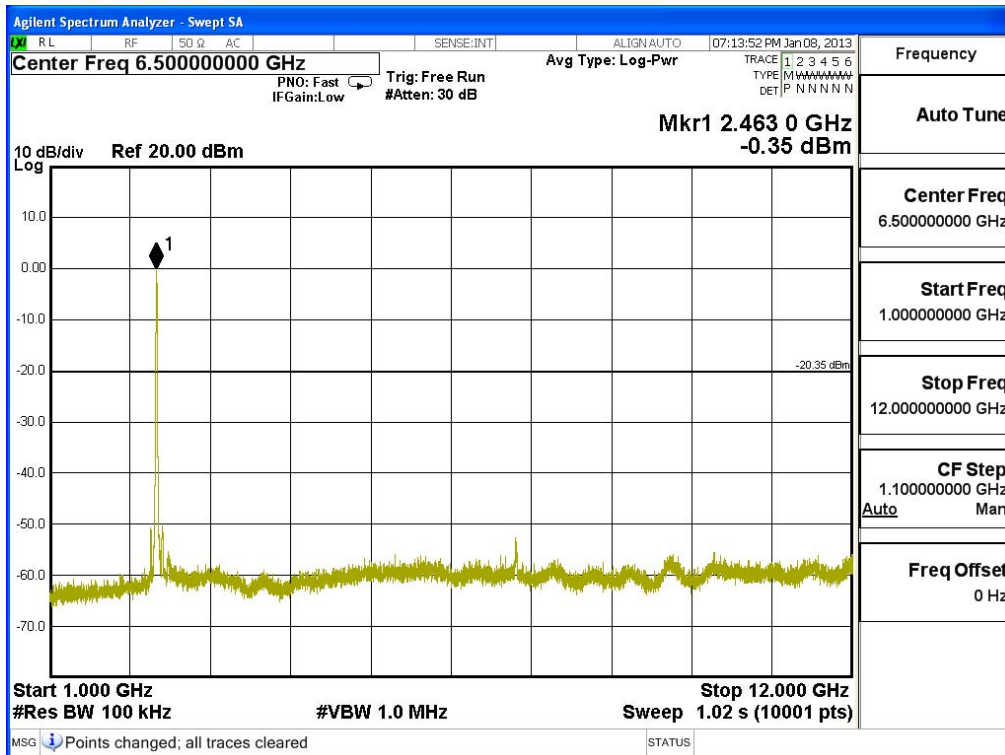
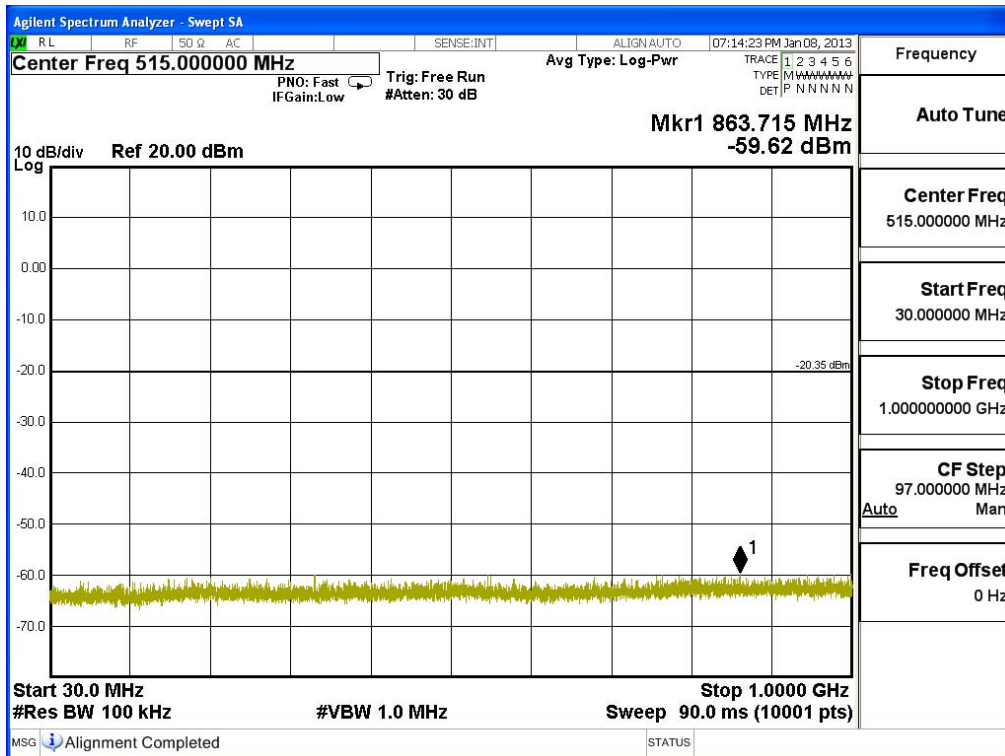


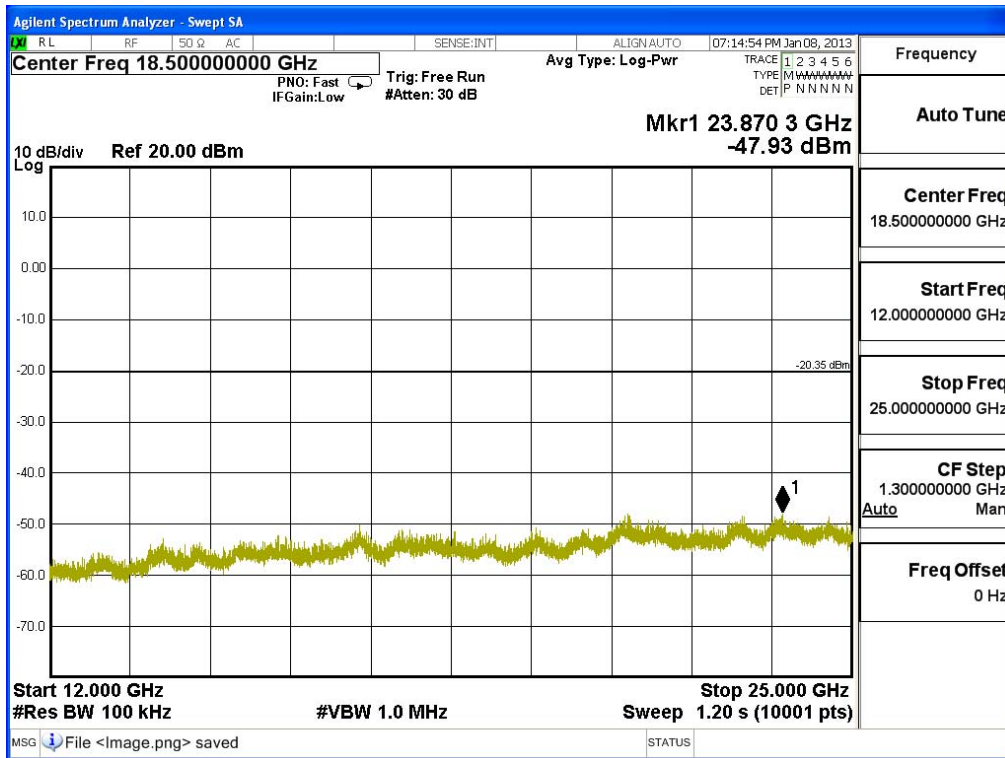
Channel 06 (2437MHz)





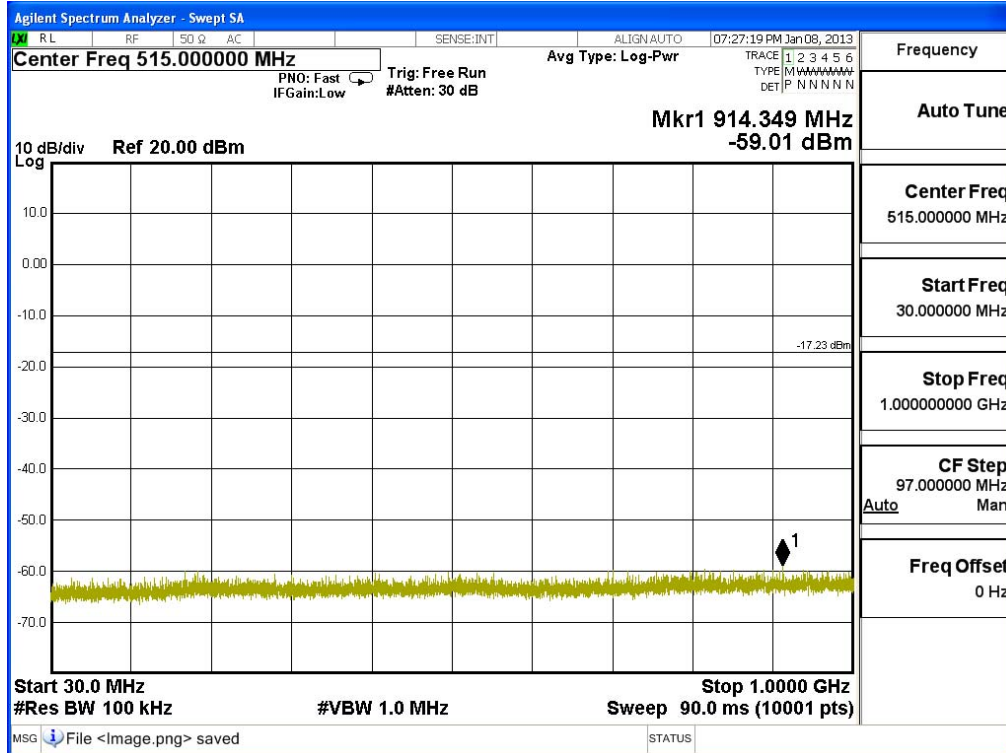
Channel 11 (2462MHz)

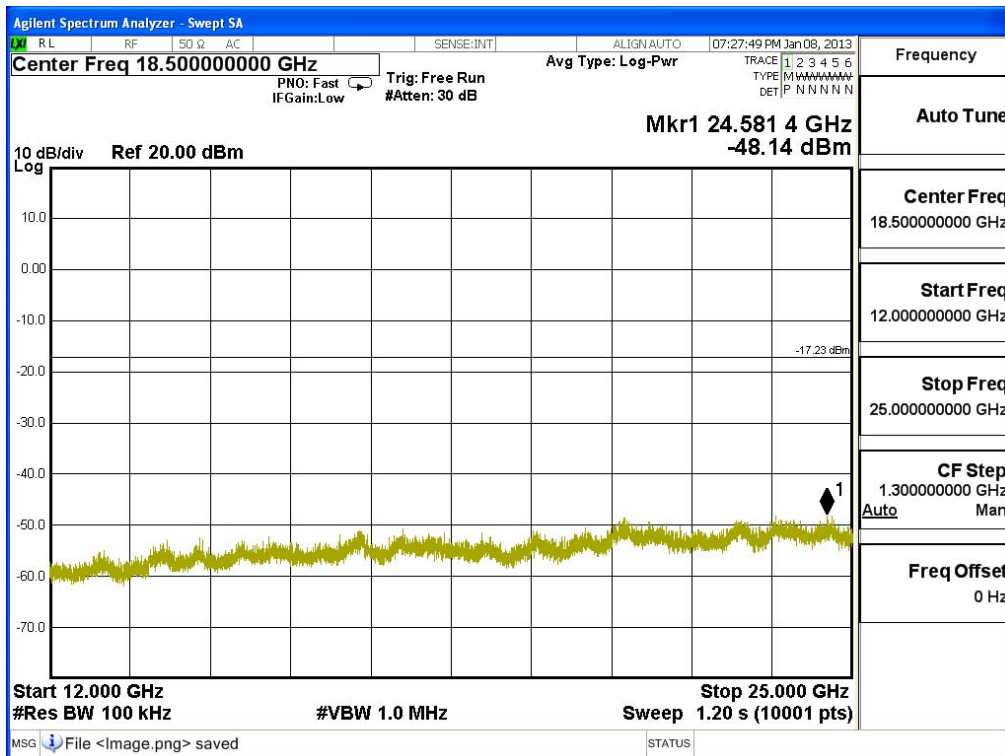
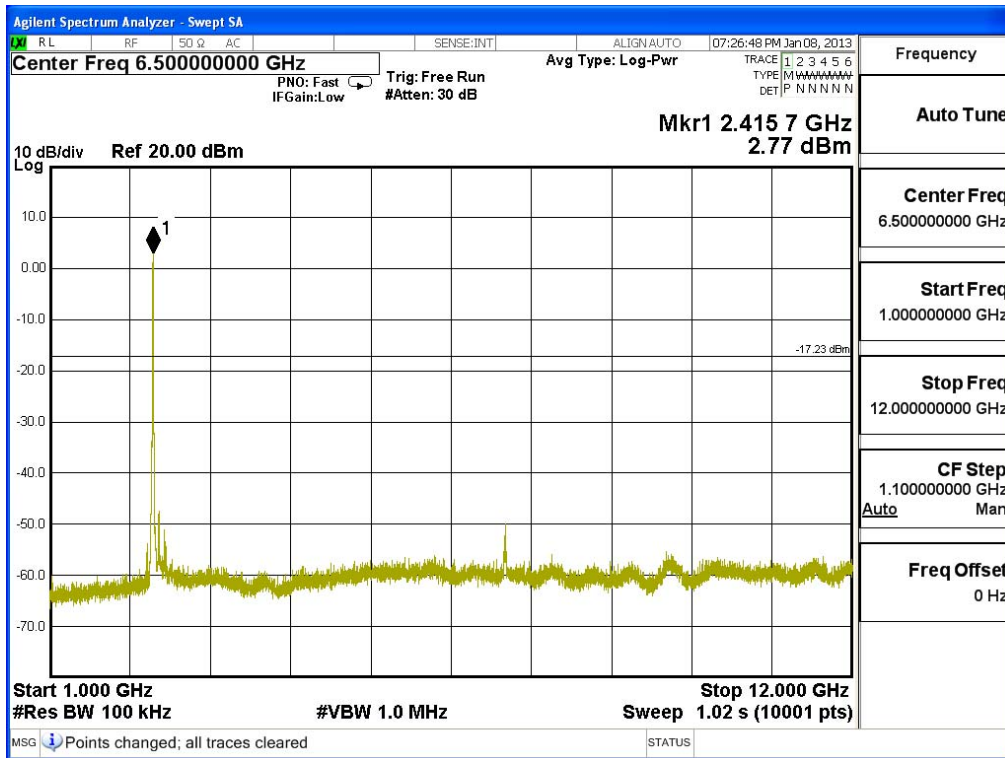




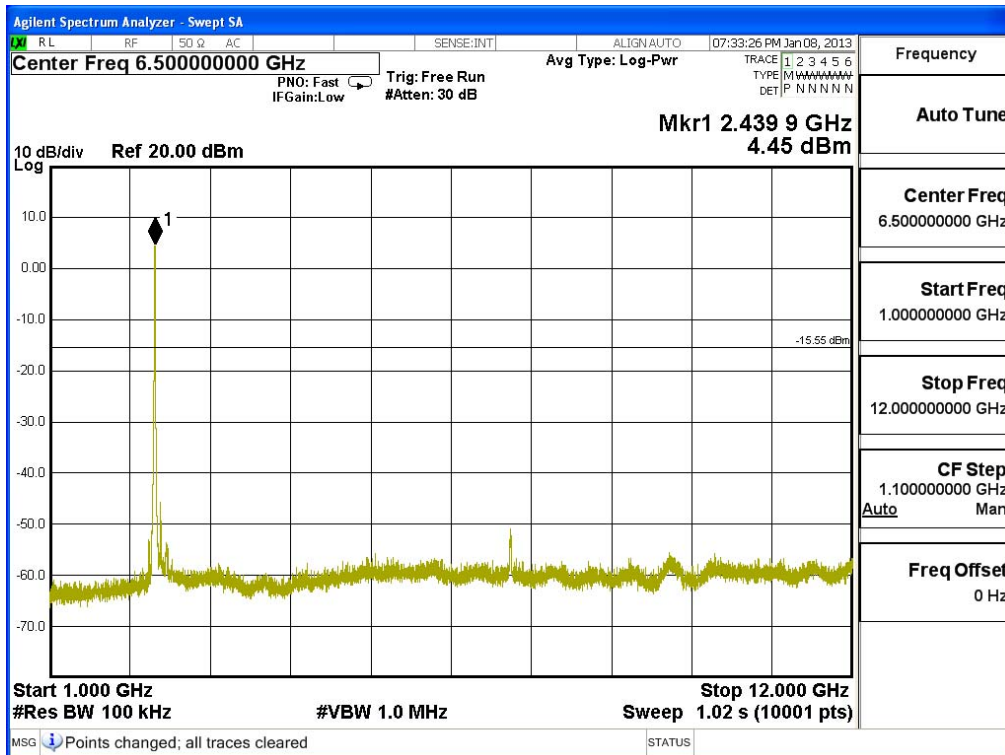
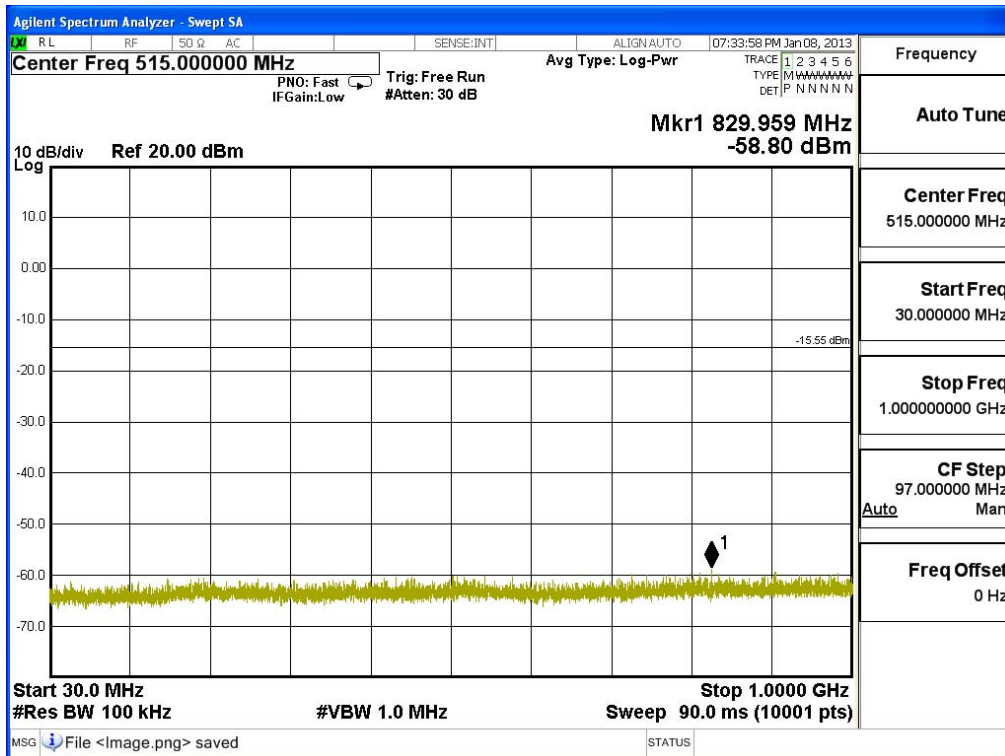
Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : RF Antenna Conducted Spurious
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

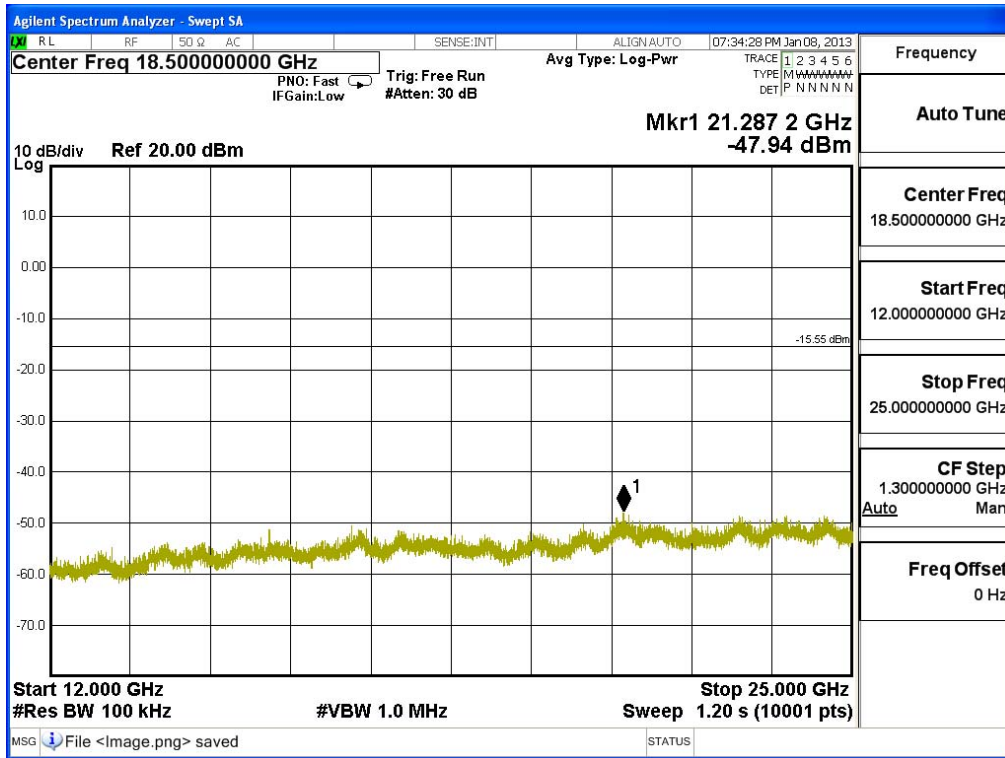
Channel 01 (2412MHz)



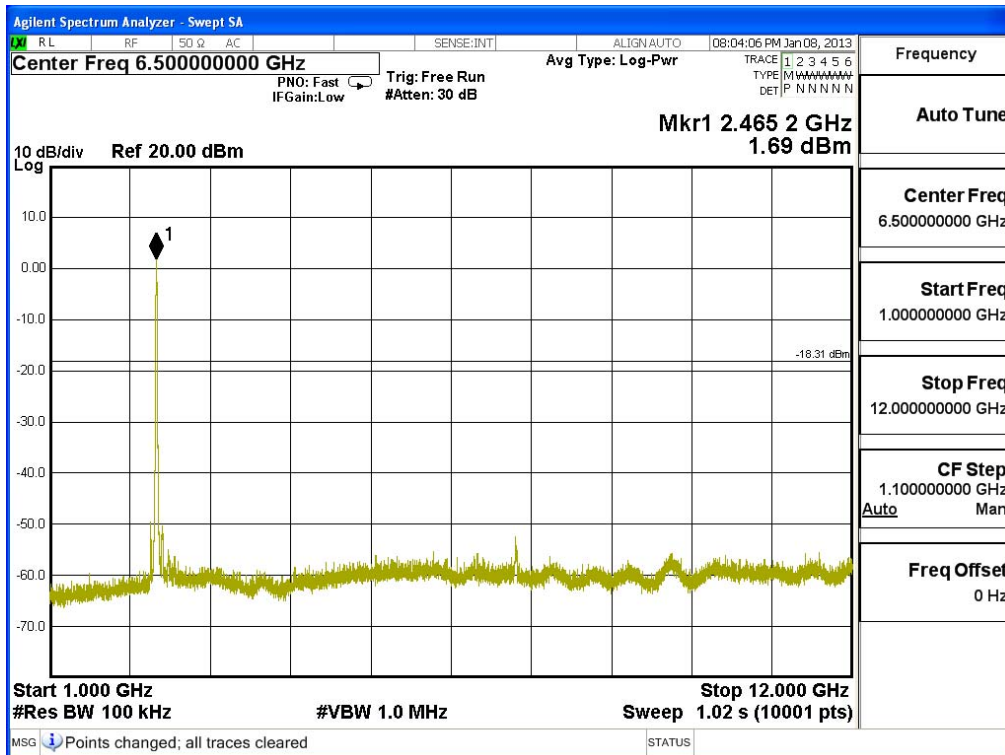
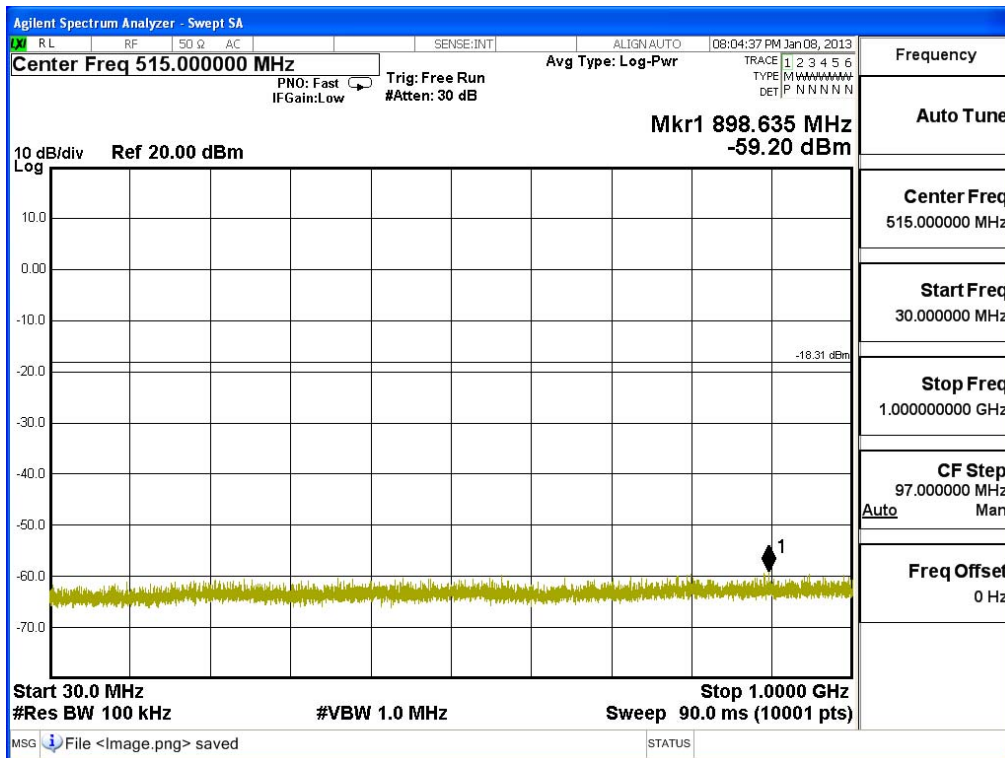


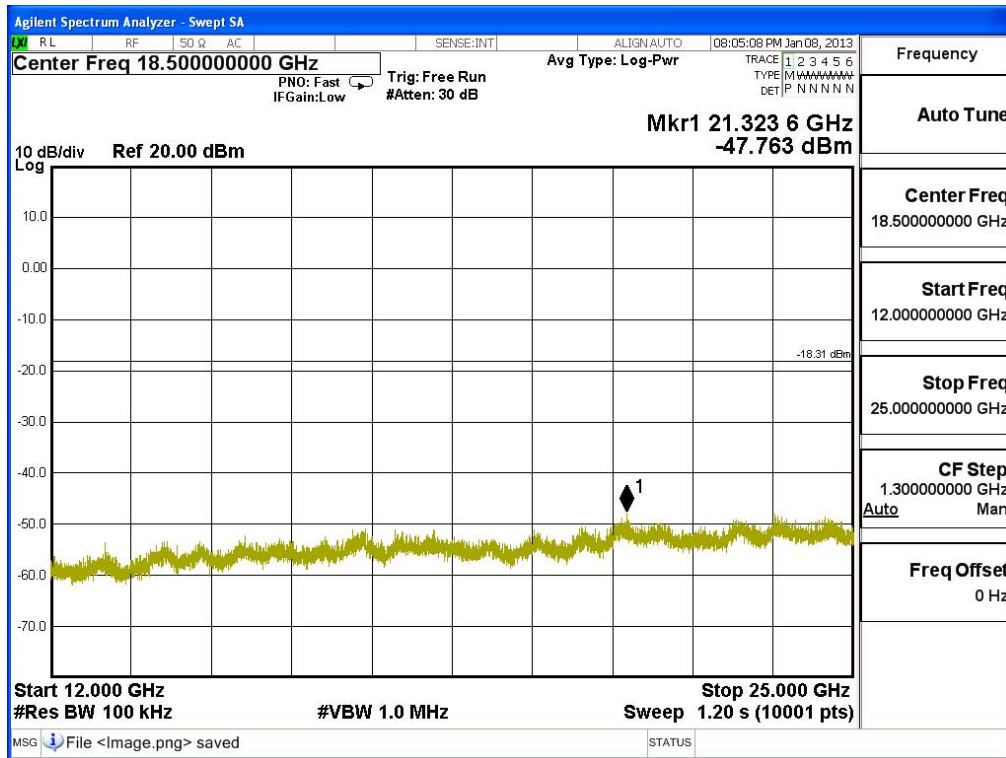
Channel 06 (2437MHz)





Channel 11 (2462MHz)





6. Band Edge

6.1. Test Equipment

RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

RF Radiated Measurement:

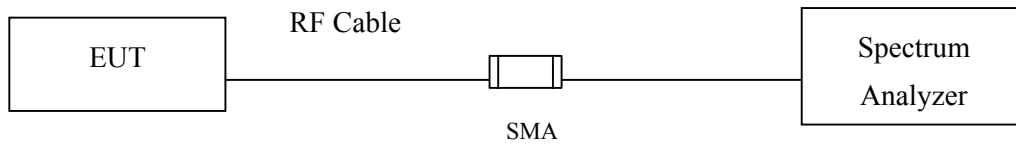
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2012
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2012
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

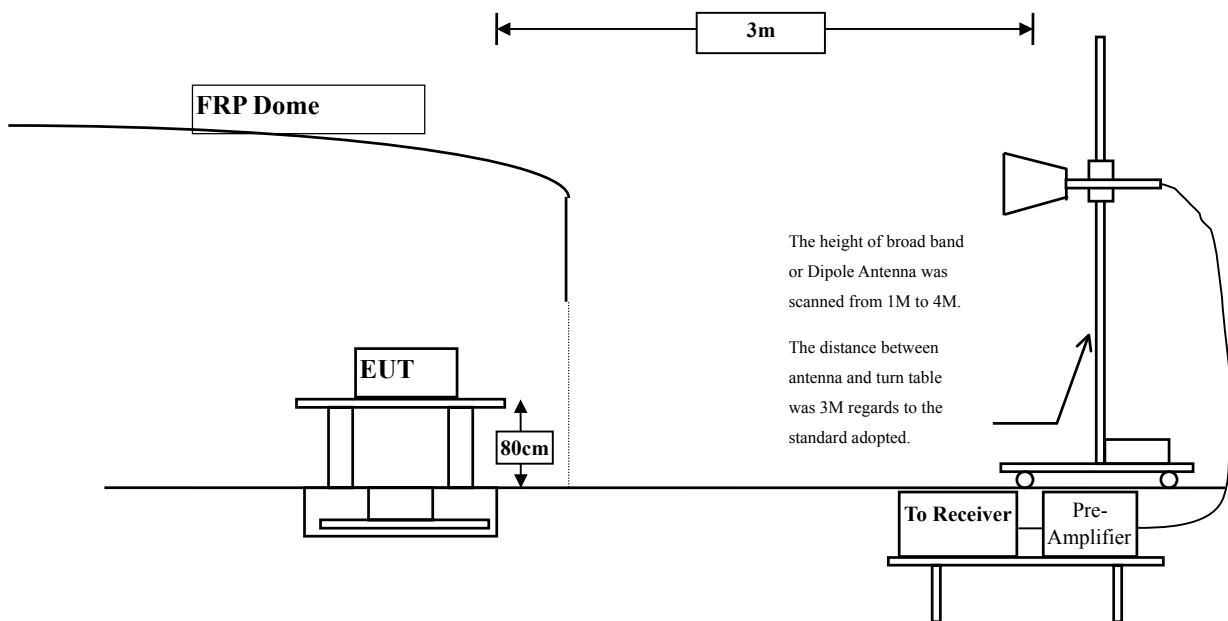
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2009 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	76.03	107.668	Peak
Horizontal	2412	31.639	71.56	103.198	Average
Vertical	2412	30.95	74.31	105.259	Peak
Vertical	2412	30.95	69.95	100.899	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2390	107.668	52.62	55.048	74.000	Peak
Horizontal	2387.1	103.198	58.35	44.848	54.000	Average
Vertical	2390	105.259	52.62	52.639	74.000	Peak
Vertical	2387.1	100.899	58.35	42.549	54.000	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

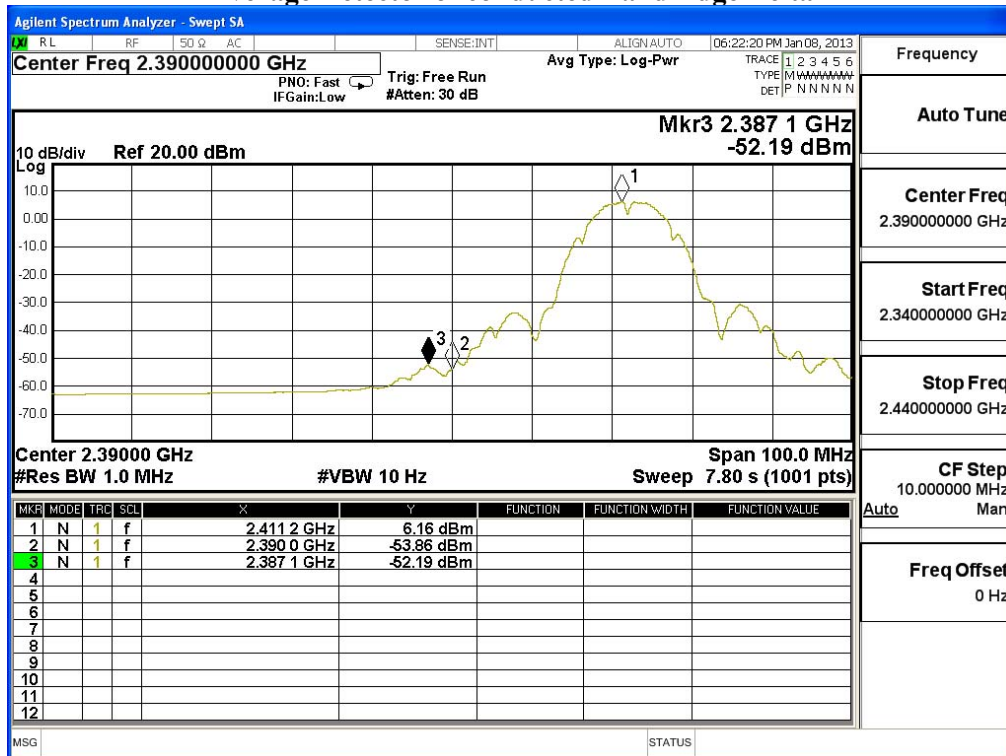
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	74.72	106.739	Peak
Horizontal	2462	32.019	70.33	102.349	Average
Vertical	2462	31.29	72.19	103.48	Peak
Vertical	2462	31.29	67.95	99.24	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2487.3	106.739	50.63	56.109	74.000	Peak
Horizontal	2483.5	102.349	53.19	49.159	54.000	Average
Vertical	2487.3	103.48	50.63	52.85	74.000	Peak
Vertical	2483.5	99.24	53.19	46.05	54.000	Average

Note:

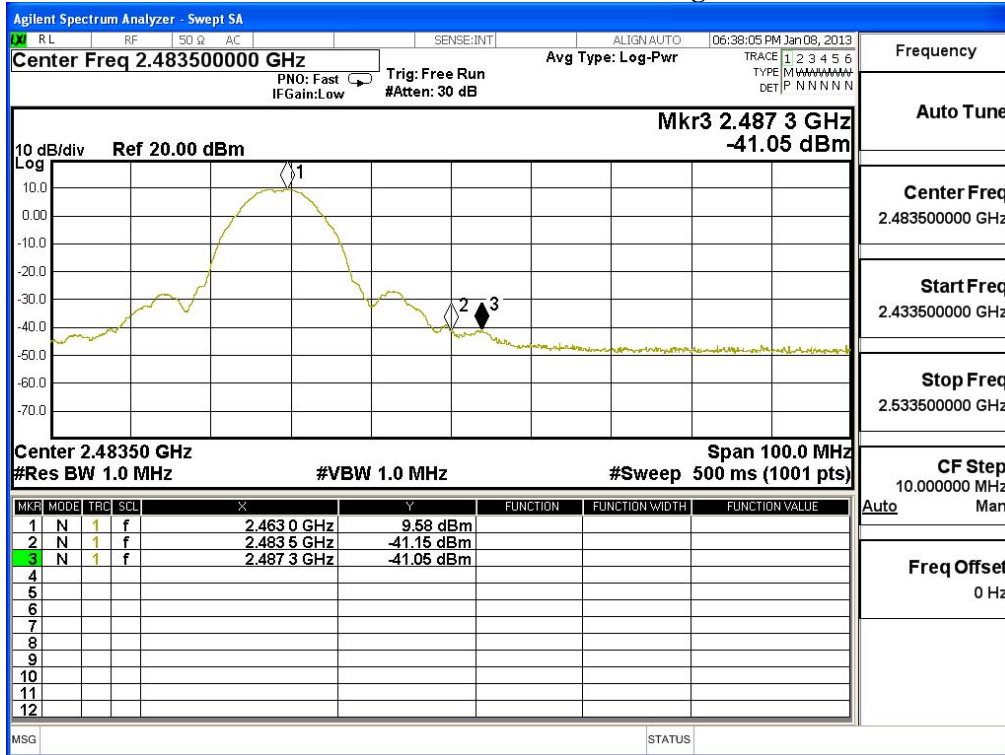
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

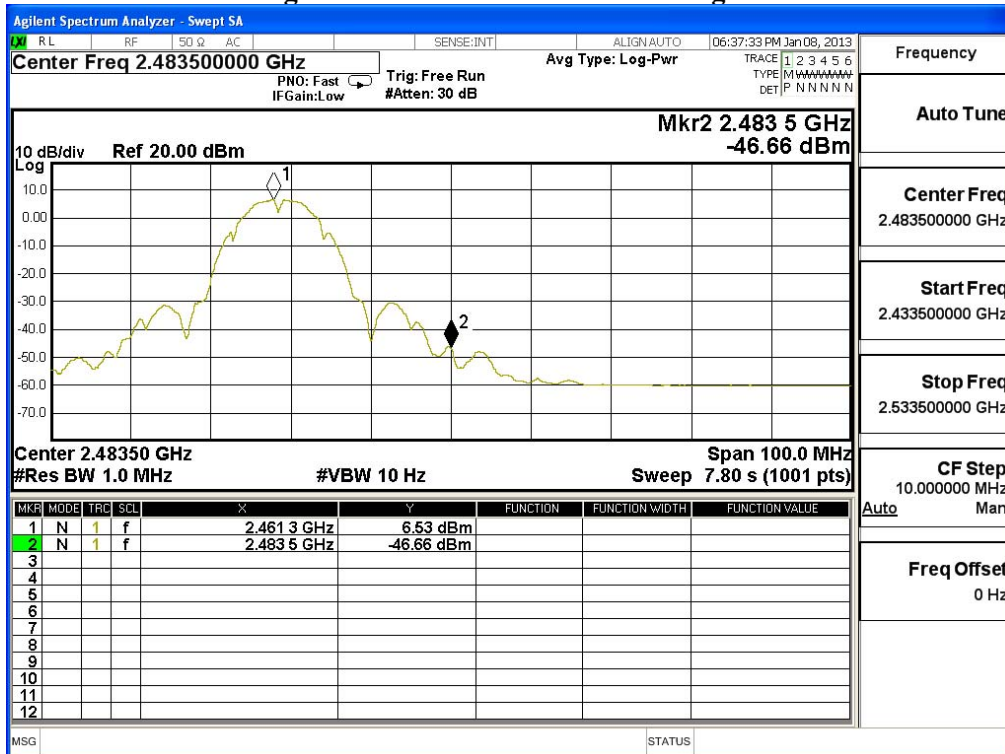
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : 802.11B/G/N SDIO Module with Antenna Connectors
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	76.3	107.938	Peak
Horizontal	2412	31.639	63.2	94.838	Average
Vertical	2412	30.95	74.42	105.369	Peak
Vertical	2412	30.95	61.61	92.559	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2389.9	107.938	39.15	68.788	74.000	Peak
Horizontal	2390	94.838	44.47	50.368	54.000	Average
Vertical	2389.9	105.369	39.15	66.219	74.000	Peak
Vertical	2390	92.559	44.47	48.089	54.000	Average

Note:

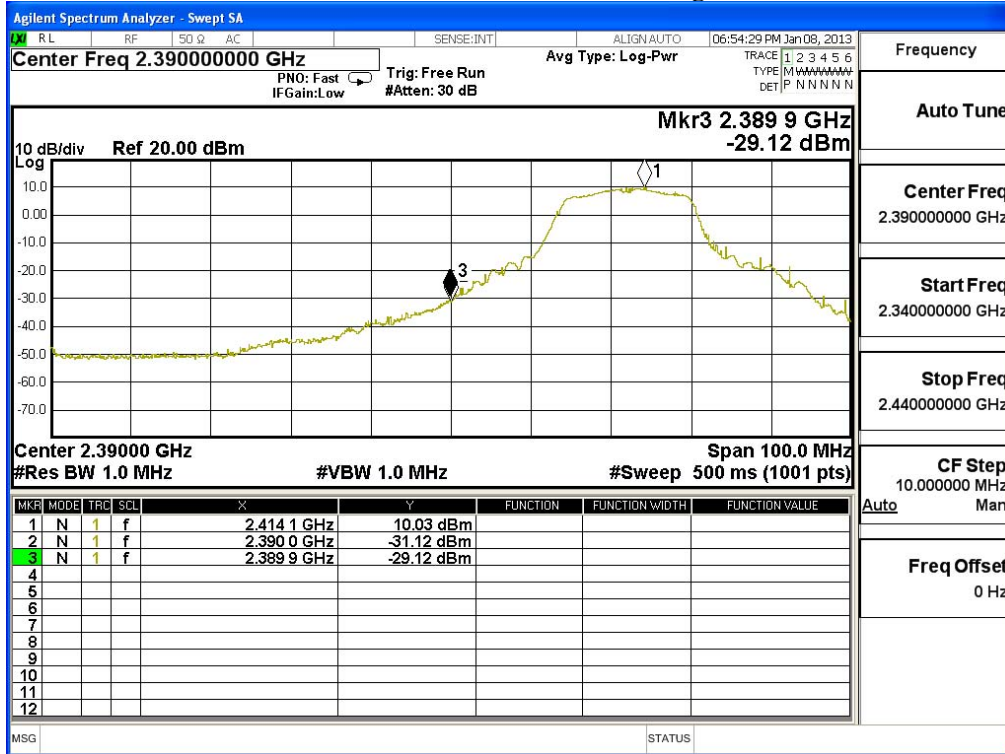
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

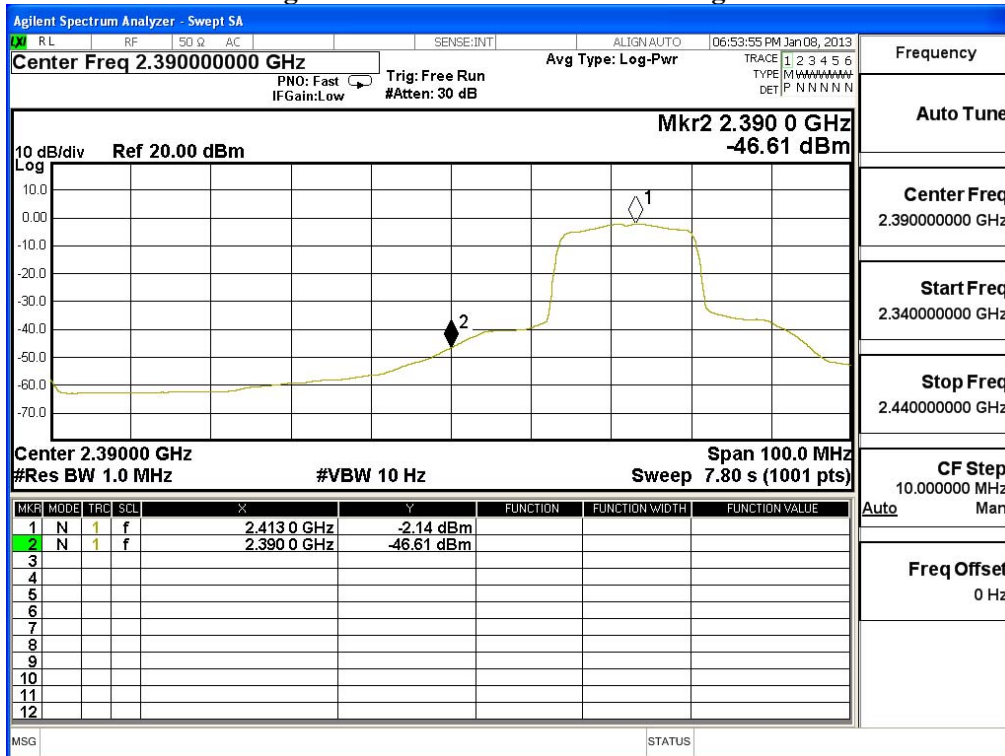
Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Frequency	
Auto Tune	
Center Freq	2.390000000 GHz
Start Freq	2.340000000 GHz
Stop Freq	2.440000000 GHz
CF Step	10.000000 MHz
Auto	Man
Freq Offset	0 Hz

Average Detector of conducted Band Edge Delta



Frequency	
Auto Tune	
Center Freq	2.390000000 GHz
Start Freq	2.340000000 GHz
Stop Freq	2.440000000 GHz
CF Step	10.000000 MHz
Auto	Man
Freq Offset	0 Hz