

FC

Test Report

Product Name	Home Controller
Model No	C4-HC800-BL, SCH-CONTROL-800
FCC ID.	R33C4HC800

Applicant	Control4 corporation
Address	11734 South Election Road, Suite 200 Salt Lake City, Utah 84020

Date of Receipt	Nov. 14, 2011
Issue Date	Dec. 20, 2011
Report No.	11B334R-RFUSP42V01-A
Report Version	V1.0

The test results relate only to the samples tested.

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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Issue Date: Dec. 20, 2011

Report No.: 11B334R-RFUSP42V01-A


Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name	Home Controller
Applicant	Control4 corporation
Address	11734 South Election Road, Suite 200 Salt Lake City, Utah 84020
Manufacturer	Lite-On Technology Corp.
Model No.	C4-HC800-BL, SCH-CONTROL-800
EUT Rated Voltage	AC 100-240V, 50/60Hz
EUT Test Voltage	AC 120V/ 60Hz
Trade Name	Control4, Cisco
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010 ANSI C63.4: 2003
Test Result	Complied



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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Home Controller
Trade Name	Control4, Cisco
Model No.	C4-HC800-BL, SCH-CONTROL-800
FCC ID.	R33C4HC800
Frequency Range	2405~2475MHz
Channel Separation	5 MHz
Channel Number	15
Type of Modulation	OQPSK
Antenna Type	Dielectric Patch Antenna / Dipole Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
Power Adapter (1)	MFR: FSP, M/N: FSP065-RAC Input: AC 100-240V, 1.5A, 50-60Hz Output: DC 19V $\approx$ 3.42A Cable Out: Non-Shielded, 1.6m, with one ferrite core bonded.
Power Adapter (2)	MFR: Seasonic, M/N: SSA-0651D-19 Input: AC 100-240V, 2A, 50/60Hz Output: DC 19V / 3.43A Cable Out: Non-Shielded, 1.2m, with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	CIROCOMM	03A153040379240	Dielectric Patch antenna	-5 dBi for 2.4 GHz
2	CIROCOMM	03N15G4V0Wh0140	Dipole Antenna	2 dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel:

Channel Frequency Channel Frequency Channel Frequency Channel Frequency

Channel 01: 2405MHz Channel 02: 2410MHz Channel 03: 2415 MHz Channel 04: 2420 MHz

Channel 05: 2425MHz Channel 06: 2430MHz Channel 07: 2435 MHz Channel 08: 2440 MHz

Channel 09: 2445 MHz Channel 10: 2450 MHz Channel 11: 2455 MHz Channel 12: 2460 MHz

Channel 13: 2465MHz Channel 14: 2470 MHz Channel 15: 2475 MHz

Note:

1. The EUT is a Home Controller with a built-in 2.4GHz Zigbee transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample for the purpose of demonstrating compliance of 2.4GHz transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
4. The different of each model is shown as below:

Model name	Trade Name
C4-HC800-BL	Control4
SCH-CONTROL-800	Cisco

Test Mode:	Mode 1: Transmit
------------	------------------

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 Monitor	SONY	KDL-20S4000	1510355	Non-Shielded, 1.8m
2 Monitor	DELL	U2410	CN-0J257M-728-01I-04PL	Non-Shielded, 1.8m
3 Cambridge SoundWorks	Creative	S80130	AM01303200000941	Non-Shielded, 1.9m
4 SATA HDD	Onnto	ST-M10	A01926-F03-0010	Non-Shielded, 1.8m With Core*1
5 USB Mouse	Logitech	M-U0003	LZ024HR	N/A
6 Modem	ACEEX	DM-1414	0102027553	Non-Shielded, 1.8m
7 iPod nano	Apple	A1236	YM827ENKY0P	N/A
8 Microphone & Earphone	Ergotech	ET-E201	N/A	N/A
9 Modem	ACEEX	DM-1414	0102027559	Non-Shielded, 1.8m
10 Notebook PC	DELL	D630	00144-023-351-283	Non-Shielded, 0.8m

Test Mode: Dielectric Patch Antenna

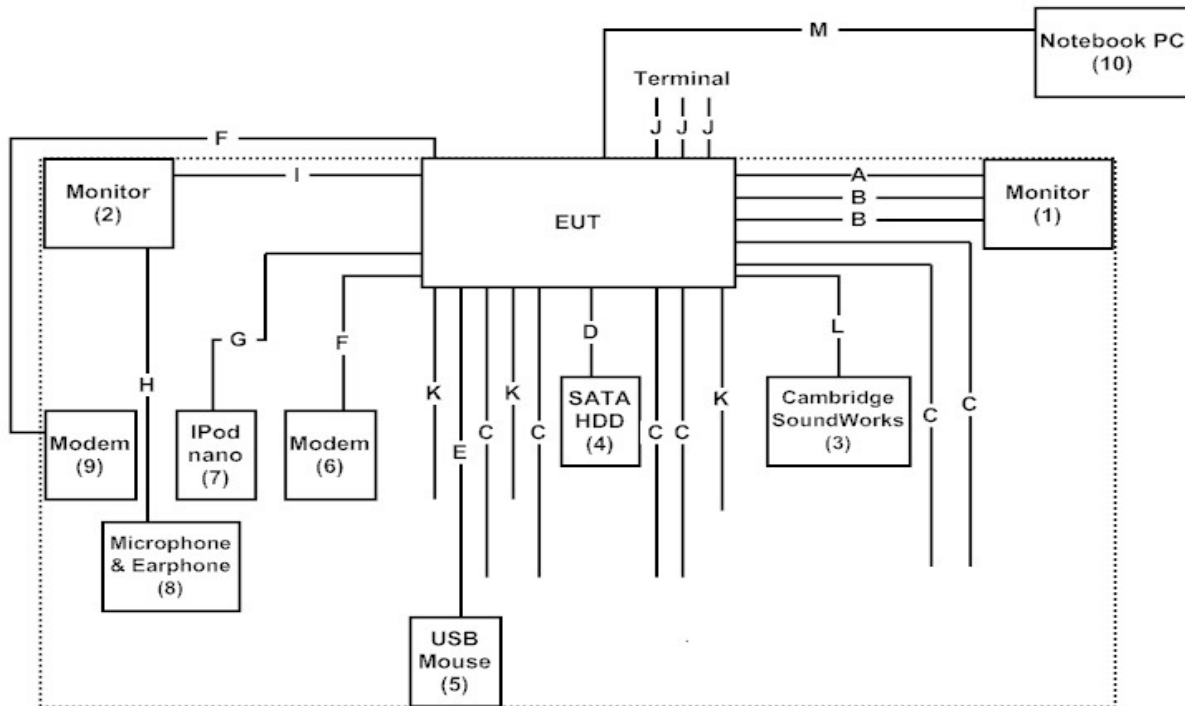
Signal Cable Type	Signal cable Description
A YPbPr Cable	Non-Shielded, 1.5m
B RCA Cable	Non-Shielded, 1.5m, two PCS.
C IR Cable	Non-Shielded, 3.0m, six PCS.
D e-SATA Cable	Shielded, 1.2m
E USB Mouse Cable	Shielded, 1.8m
F RS-232 Cable	Shielded, 1.5m, two PCS.
G Audio Cable	Non-Shielded, 1.6m
H Microphone & Earphone Cable	Non-Shielded, 1.6m
I HDMI Cable	Shielded, 1.8m
J Terminal Cable	Non-Shielded, 0.1m, three PCS.
K Antenna Cable	Non-Shielded, 3.0m, three PCS.
L SPIDF Cable	Shielded, 1.2m
M LAN Cable	Non-Shielded, 3.0m

Test Mode: Dipole Antenna

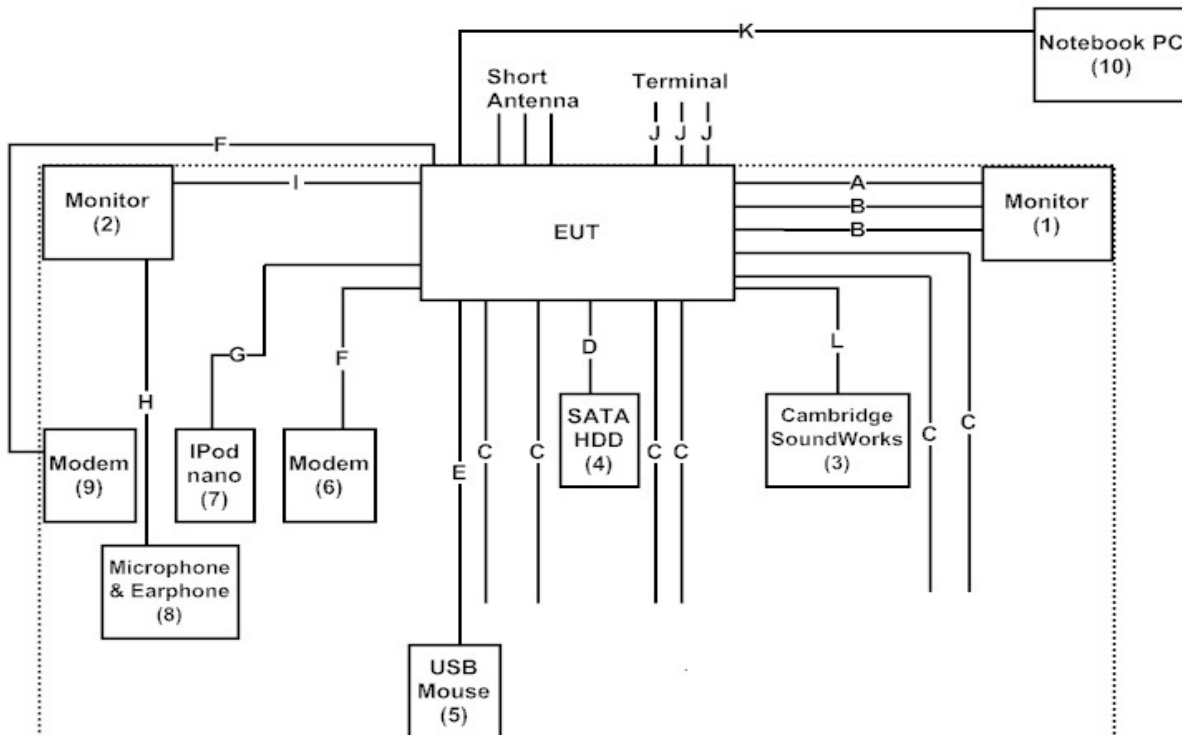
Signal Cable Type		Connection Diagram
A	YPbPr Cable	Non-Shielded, 1.5m
B	RCA Cable	Non-Shielded, 1.5m, two PCS.
C	IR Cable	Non-Shielded, 3.0m, six PCS.
D	e-SATA Cable	Shielded, 1.2m
E	USB Mouse Cable	Shielded, 1.8m
F	RS-232 Cable	Shielded, 1.5m, two PCS.
G	Audio Cable	Non-Shielded, 1.6m
H	Microphone & Earphone Cable	Non-Shielded, 1.6m
I	HDMI Cable	Shielded, 1.8m
J	Terminal Cable	Non-Shielded, 0.1m, three PCS.
K	LAN Cable	Non-Shielded, 3.0m
L	SPIDF Cable	Shielded, 1.2m

1.4. Configuration of Tested System

Dielectric Patch Antenna



Dipole Antenna



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Execute “GNOME Terminal (Ver.2.30.2) exe” on the Notebook.
- (3) Configure the test mode, the test channel to start the continuous transmit
- (4) 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://tw.quietek.com/tw/emc/accreditations/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

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Accreditation on NVLAP
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FCC Accreditation Number: TW1014



2. Conducted Emission

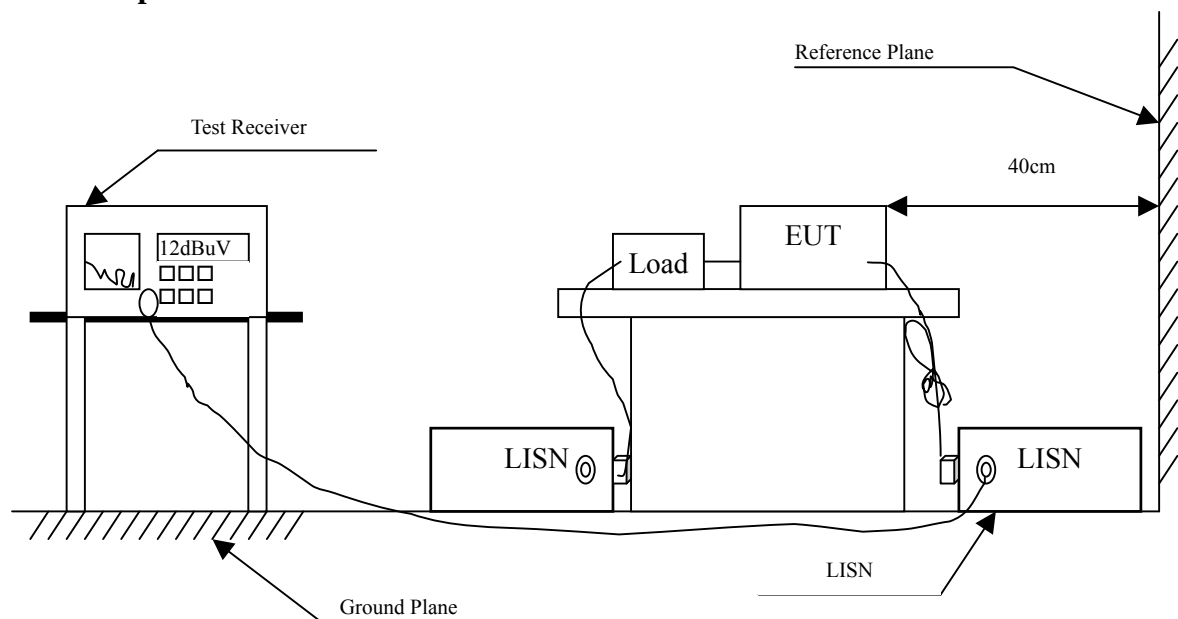
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2011	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2011	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2011	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2011	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2011	
	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 C63.4: 2003 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 : Home Controller
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmit (Seasonic/ SSA-0651D-19)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.173	9.840	33.640	43.480	-21.863	65.343
0.220	9.840	27.910	37.750	-26.250	64.000
0.431	9.840	40.050	49.890	-8.081	57.971
4.076	9.870	13.330	23.200	-32.800	56.000
12.228	10.060	14.580	24.640	-35.360	60.000
25.181	10.150	22.540	32.690	-27.310	60.000
Average					
0.173	9.840	21.660	31.500	-23.843	55.343
0.220	9.840	25.500	35.340	-18.660	54.000
0.431	9.840	29.900	39.740	-8.231	47.971
4.076	9.870	3.450	13.320	-32.680	46.000
12.228	10.060	9.540	19.600	-30.400	50.000
25.181	10.150	17.500	27.650	-22.350	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 : Home Controller
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmit (Seasonic/ SSA-0651D-19)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.177	9.840	33.520	43.360	-21.869	65.229
0.224	9.840	29.920	39.760	-24.126	63.886
0.470	9.840	40.840	50.680	-6.177	56.857
1.755	9.852	20.790	30.642	-25.358	56.000
4.142	9.870	13.560	23.430	-32.570	56.000
12.240	10.130	18.480	28.610	-31.390	60.000
Average					
0.177	9.840	24.130	33.970	-21.259	55.229
0.224	9.840	29.320	39.160	-14.726	53.886
0.470	9.840	29.690	39.530	-7.327	46.857
1.755	9.852	16.550	26.402	-19.598	46.000
4.142	9.870	4.680	14.550	-31.450	46.000
12.240	10.130	14.820	24.950	-25.050	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 : Home Controller
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmit (FSP/ FSP065-RAC)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.193	9.840	37.750	47.590	-17.181	64.771
0.298	9.840	28.950	38.790	-22.981	61.771
0.482	9.840	39.050	48.890	-7.624	56.514
0.685	9.840	36.390	46.230	-9.770	56.000
1.724	9.860	29.410	39.270	-16.730	56.000
8.689	9.984	25.330	35.314	-24.686	60.000
Average					
0.193	9.840	26.000	35.840	-18.931	54.771
0.298	9.840	17.440	27.280	-24.491	51.771
0.482	9.840	30.290	40.130	-6.384	46.514
0.685	9.840	21.530	31.370	-14.630	46.000
1.724	9.860	12.310	22.170	-23.830	46.000
8.689	9.984	20.420	30.404	-19.596	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 : Home Controller
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmit (FSP/ FSP065-RAC)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.193	9.840	40.340	50.180	-14.591	64.771
0.302	9.840	27.810	37.650	-24.007	61.657
0.490	9.840	38.180	48.020	-8.266	56.286
0.716	9.840	35.820	45.660	-10.340	56.000
2.134	9.860	27.350	37.210	-18.790	56.000
8.548	10.011	23.700	33.711	-26.289	60.000
Average					
0.193	9.840	25.860	35.700	-19.071	54.771
0.302	9.840	11.850	21.690	-29.967	51.657
0.490	9.840	29.690	39.530	-6.756	46.286
0.716	9.840	22.700	32.540	-13.460	46.000
2.134	9.860	11.600	21.460	-24.540	46.000
8.548	10.011	17.620	27.631	-22.369	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

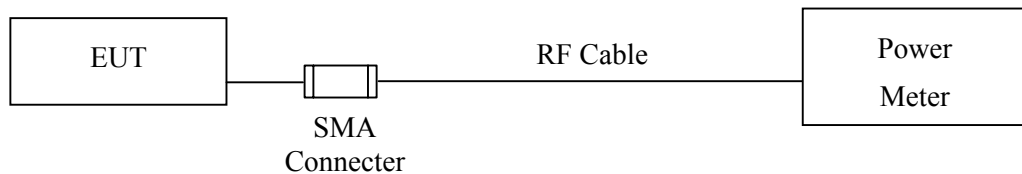
3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2011
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2011

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

3.2. Test Setup

Conducted Measurement



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 Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Home Controller
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
01	2405	19.69	<30dBm	Pass
08	2440	19.21	<30dBm	Pass
15	2475	18.5	<30dBm	Pass

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

4. Radiated Emission

4.1. Test Equipment

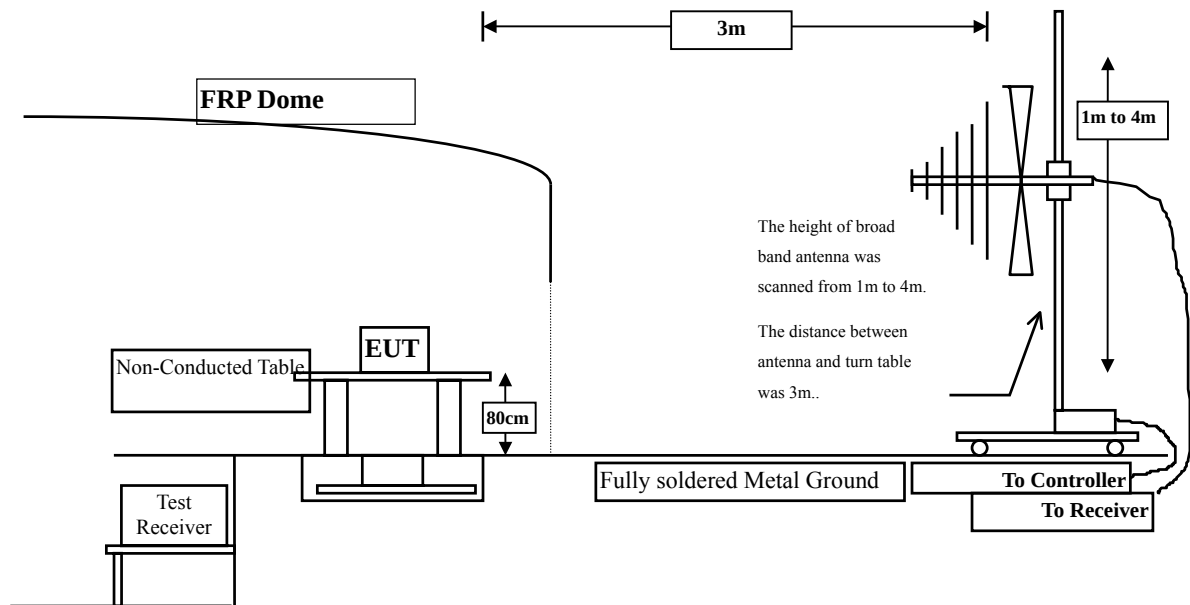
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM 0906076	Sep., 2011
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

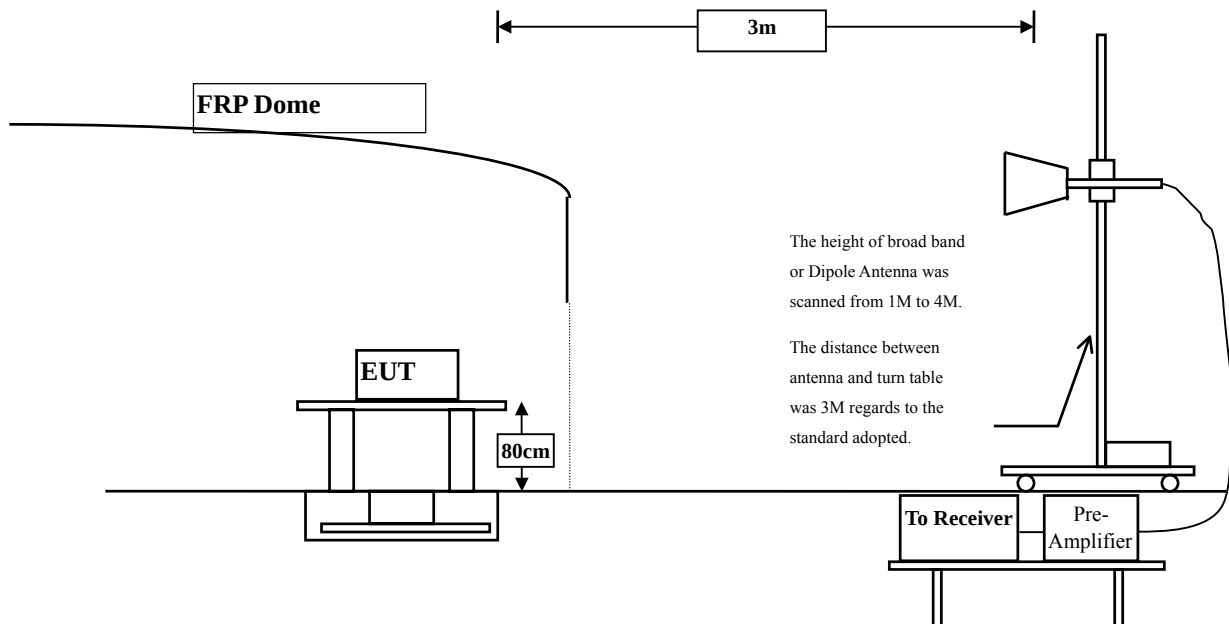
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

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 C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 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 C63.4:2003 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 measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2405MHz) (Dielectric Patch antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4810.000	0.532	51.340	51.872	-22.128	74.000
7215.000	7.411	48.800	56.211	-17.789	74.000
9620.000	8.282	44.380	52.662	-21.338	74.000
Horizontal					
Average Detector:					
4810.000	0.532	42.240	42.772	-11.228	54.000
7215.000	7.411	37.950	45.361	-8.639	54.000
9620.000	8.282	32.570	40.852	-13.148	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2405MHz) (Dielectric Patch antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4810.000	0.927	55.610	56.537	-17.463	74.000
7215.000	7.895	50.510	58.405	-15.595	74.000
9620.000	8.760	46.910	55.670	-18.330	74.000
Vertical					
Average Detector:					
4810.000	0.927	47.100	48.027	-5.973	54.000
7215.000	7.895	39.740	47.635	-6.365	54.000
9620.000	8.760	36.020	44.780	-9.220	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 : Home Controller
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2440MHz) (Dielectric Patch antenna)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4880.000	0.038	50.830	50.868	-23.132	74.000
7320.000	7.699	47.850	55.549	-18.451	74.000
9760.000	7.665	44.400	52.065	-21.935	74.000
Horizontal					
Average Detector:					
4880.000	0.038	40.680	40.718	-13.282	54.000
7320.000	7.699	36.700	44.399	-9.601	54.000
9760.000	7.665	33.100	40.765	-13.235	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz) (Dielectric Patch antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4880.000	0.499	52.950	53.449	-20.551	74.000
7320.000	8.303	49.680	57.983	-16.017	74.000
9760.000	8.299	45.930	54.230	-19.770	74.000
Vertical					
Average Detector:					
4880.000	0.499	43.460	43.959	-10.041	54.000
7320.000	8.303	38.890	47.193	-6.807	54.000
9760.000	8.299	34.640	42.940	-11.060	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2475MHz) (Dielectric Patch antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4950.000	0.483	47.370	47.853	-26.147	74.000
7425.000	9.225	42.910	52.136	-21.864	74.000
9900.000	8.163	41.120	49.282	-24.718	74.000
Horizontal					
Average Detector:					
7425.000	9.225	31.320	40.545	-13.455	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2475MHz) (Dielectric Patch antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4950.000	1.243	49.280	50.523	-23.477	74.000
7425.000	9.225	45.230	54.456	-19.544	74.000
9900.000	9.202	40.930	50.131	-23.869	74.000
Vertical					
Average Detector:					
4950.000	1.243	38.170	39.413	-14.587	54.000
7425.000	9.225	33.990	43.216	-10.784	54.000
9900.000	9.202	27.800	37.001	-16.999	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 : Home Controller
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405MHz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4810.000	0.532	50.390	50.922	-23.078	74.000
7215.000	7.411	47.860	55.271	-18.729	74.000
9620.000	8.282	43.220	51.502	-22.498	74.000
Horizontal					
Average Detector:					
4810.000	0.532	40.630	41.162	-12.838	54.000
7215.000	7.411	36.820	44.231	-9.769	54.000
9620.000	8.282	30.650	38.932	-15.068	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2405MHz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4810.000	0.927	56.170	57.097	-16.903	74.000
7215.000	7.895	51.510	59.405	-14.595	74.000
9620.000	8.760	44.540	53.300	-20.700	74.000
Vertical					
Average Detector:					
4810.000	0.927	47.900	48.827	-5.173	54.000
7215.000	7.895	40.690	48.585	-5.415	54.000
9620.000	8.760	33.450	42.210	-11.790	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4880.000	0.038	49.670	49.708	-24.292	74.000
7320.000	7.699	46.230	53.929	-20.071	74.000
9760.000	7.665	40.730	48.395	-25.605	74.000
Horizontal					
Average Detector:					
7320.000	7.699	35.130	42.829	-11.171	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4880.000	0.499	56.090	56.589	-17.411	74.000
7320.000	8.303	48.600	56.903	-17.097	74.000
9760.000	8.299	40.100	48.400	-25.600	74.000
Vertical					
Average Detector:					
4880.000	0.499	47.430	47.929	-6.071	54.000
7320.000	8.303	37.500	45.803	-8.197	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2475MHz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4950.000	0.483	49.200	49.683	-24.317	74.000
7425.000	9.225	43.620	52.846	-21.154	74.000
9900.000	8.163	39.770	47.932	-26.068	74.000
Horizontal					
Average Detector:					
7425.000	9.225	31.350	40.575	-13.425	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 : Home Controller
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2475MHz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4950.000	1.243	56.730	57.973	-16.027	74.000
7425.000	9.225	44.300	53.526	-20.474	74.000
9900.000	9.202	40.020	49.221	-24.779	74.000
Vertical					
Average Detector:					
4950.000	1.243	47.820	49.063	-4.937	54.000
7425.000	9.225	32.640	41.866	-12.134	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 : Home Controller
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Normal Operation (Seasonic/ SSA-0651D-19)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
120.230	-9.799	40.672	30.873	-12.627	43.500
233.250	-8.552	39.723	31.171	-14.829	46.000
250.000	-5.922	42.293	36.371	-9.629	46.000
366.500	-1.273	35.902	34.630	-11.370	46.000
500.000	0.076	35.933	36.010	-9.990	46.000
750.000	3.360	31.702	35.062	-10.938	46.000
Vertical					
110.530	-0.610	35.661	35.051	-8.449	43.500
144.000	-6.259	40.449	34.190	-9.310	43.500
192.000	-10.137	42.618	32.480	-11.020	43.500
250.000	-7.517	47.516	39.998	-6.002	46.000
500.000	-0.813	38.855	38.042	-7.958	46.000
750.000	2.553	35.708	38.261	-7.739	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.

Product : Home Controller
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Normal Operation (FSP/ FSP065-RAC)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
119.130	-9.596	39.528	29.932	-13.568	43.500
233.250	-8.552	39.832	31.280	-14.720	46.000
250.000	-5.922	42.193	36.271	-9.729	46.000
366.500	-1.273	36.101	34.829	-11.171	46.000
456.000	-0.418	34.275	33.857	-12.143	46.000
500.000	0.076	35.638	35.715	-10.285	46.000
750.000	3.360	30.903	34.263	-11.737	46.000
Vertical					
110.560	-0.621	35.573	34.952	-8.548	43.500
144.000	-6.259	40.427	34.168	-9.332	43.500
174.470	-8.328	37.730	29.402	-14.098	43.500
192.000	-10.137	42.217	32.079	-11.421	43.500
250.000	-7.517	47.816	40.298	-5.702	46.000
456.000	-5.024	41.095	36.071	-9.929	46.000
510.000	-0.096	38.584	38.488	-7.512	46.000
750.000	2.553	35.506	38.059	-7.941	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.

Product : Home Controller
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2440Hz) (Dielectric Patch antenna)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
150.280	-7.870	41.374	33.504	-9.996	43.500
371.440	0.860	31.478	32.338	-13.662	46.000
431.580	0.757	33.208	33.965	-12.035	46.000
854.500	7.380	28.866	36.246	-9.754	46.000
932.100	7.270	29.625	36.895	-9.105	46.000
998.060	8.838	31.872	40.710	-13.290	54.000
Vertical					
144.460	-5.503	38.864	33.361	-10.139	43.500
181.320	-1.910	35.664	33.754	-9.746	43.500
295.780	-4.687	38.449	33.762	-12.238	46.000
497.540	-0.713	31.596	30.883	-15.117	46.000
862.260	-0.263	31.089	30.826	-15.174	46.000
924.340	3.149	31.271	34.420	-11.580	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.

Product : Home Controller
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440Hz) (Dipole antenna)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
39.700	-3.625	36.901	33.276	-6.724	40.000
121.180	-7.289	37.865	30.576	-12.924	43.500
515.000	3.191	32.904	36.095	-9.905	46.000
854.500	7.380	29.066	36.446	-9.554	46.000
928.220	7.230	28.478	35.708	-10.292	46.000
998.060	8.838	32.524	41.362	-12.638	54.000
Vertical					
119.240	-3.571	41.167	37.597	-5.903	43.500
177.440	-1.248	37.396	36.148	-7.352	43.500
315.180	-4.108	34.346	30.238	-15.762	46.000
503.360	-0.086	30.724	30.638	-15.362	46.000
924.340	3.149	31.812	34.961	-11.039	46.000
998.060	-1.242	34.897	33.655	-20.345	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.

5. RF antenna conducted test

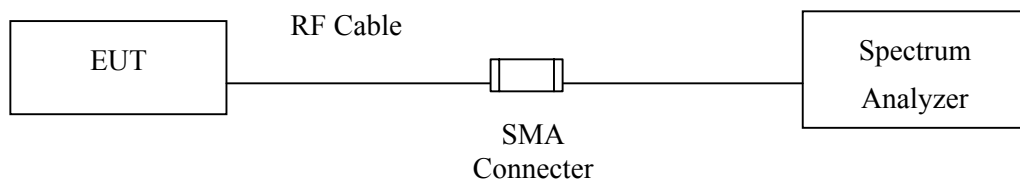
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

- 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 Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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

5.5. Uncertainty

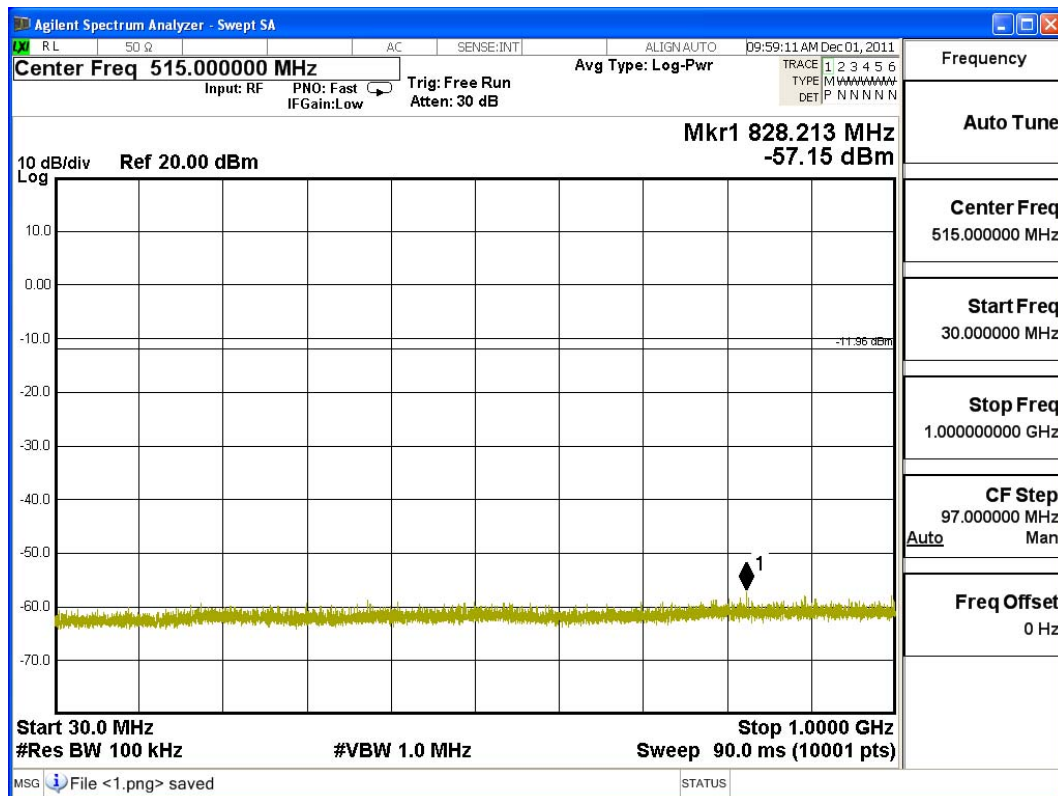
The measurement uncertainty

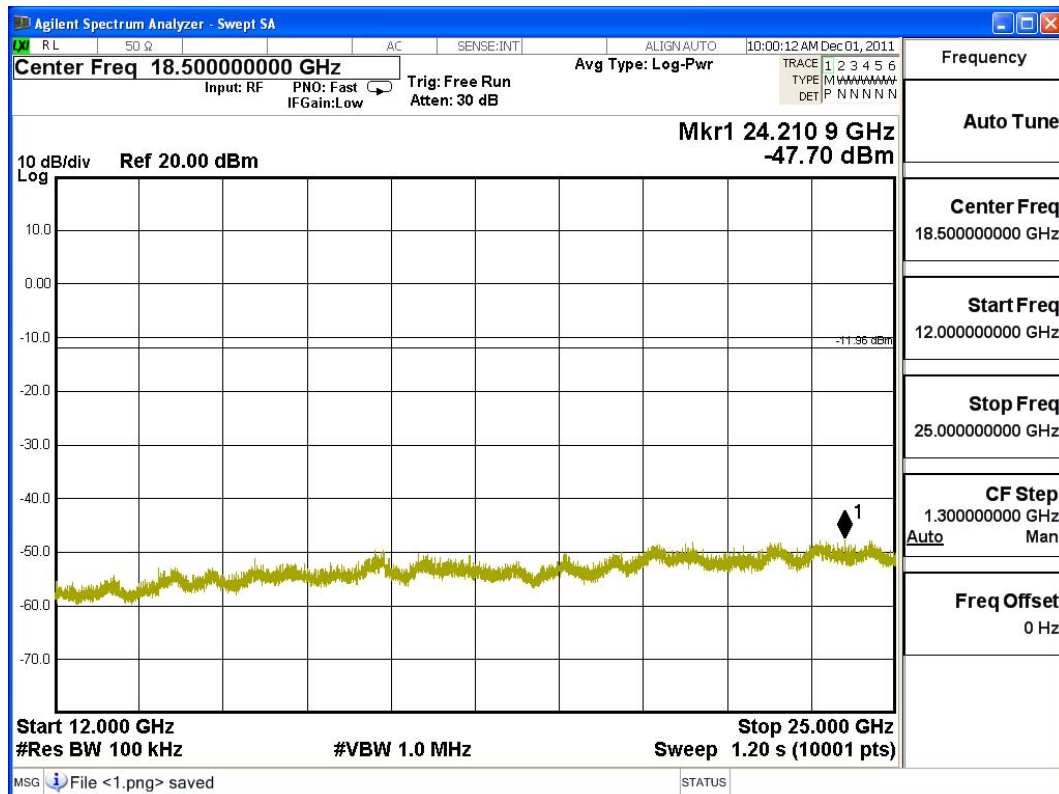
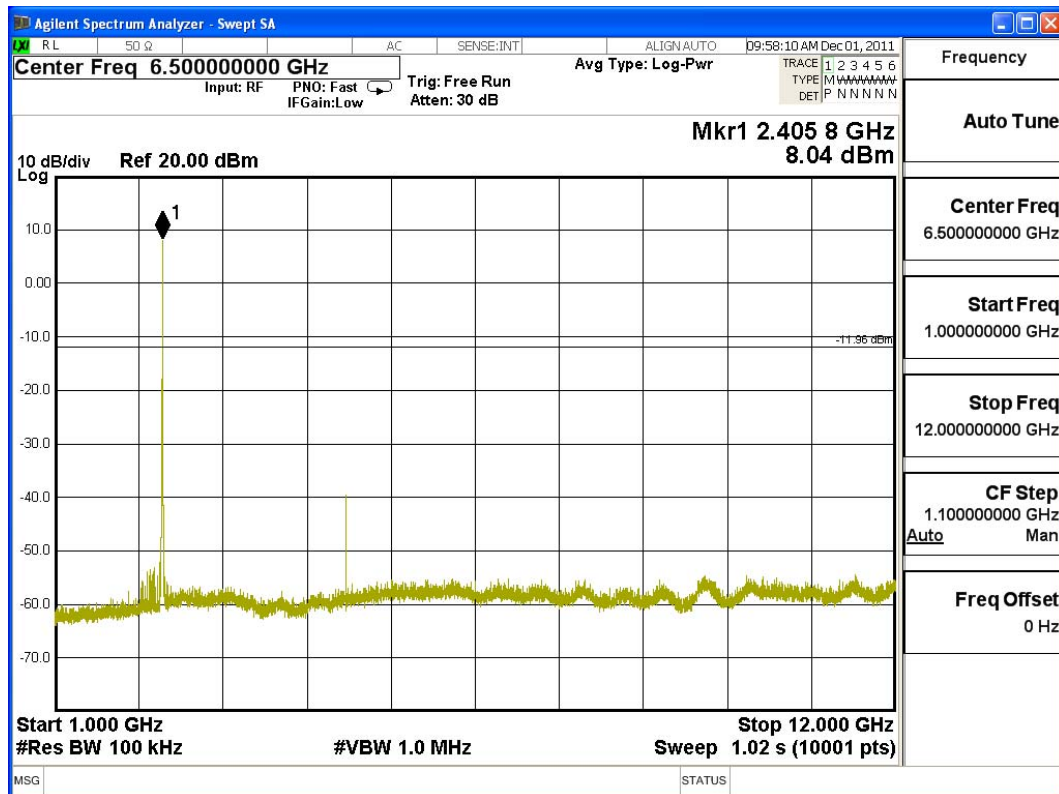
Conducted is defined as $\pm 1.27\text{dB}$

5.6. Test Result of RF antenna conducted test

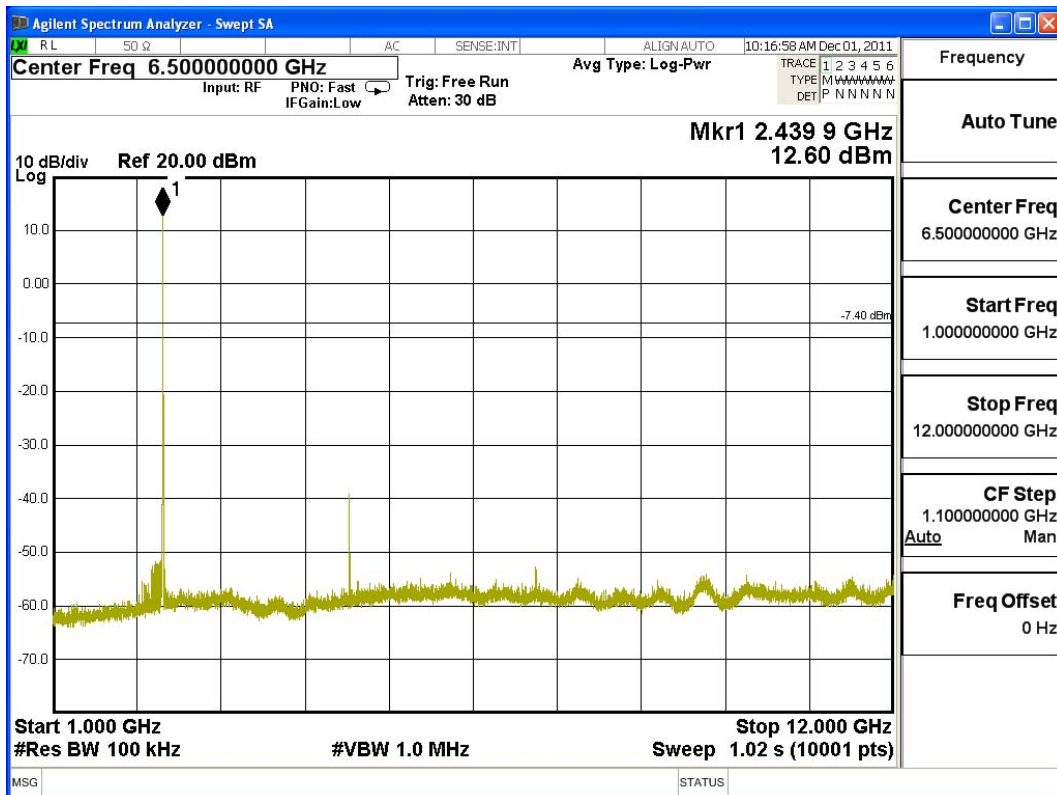
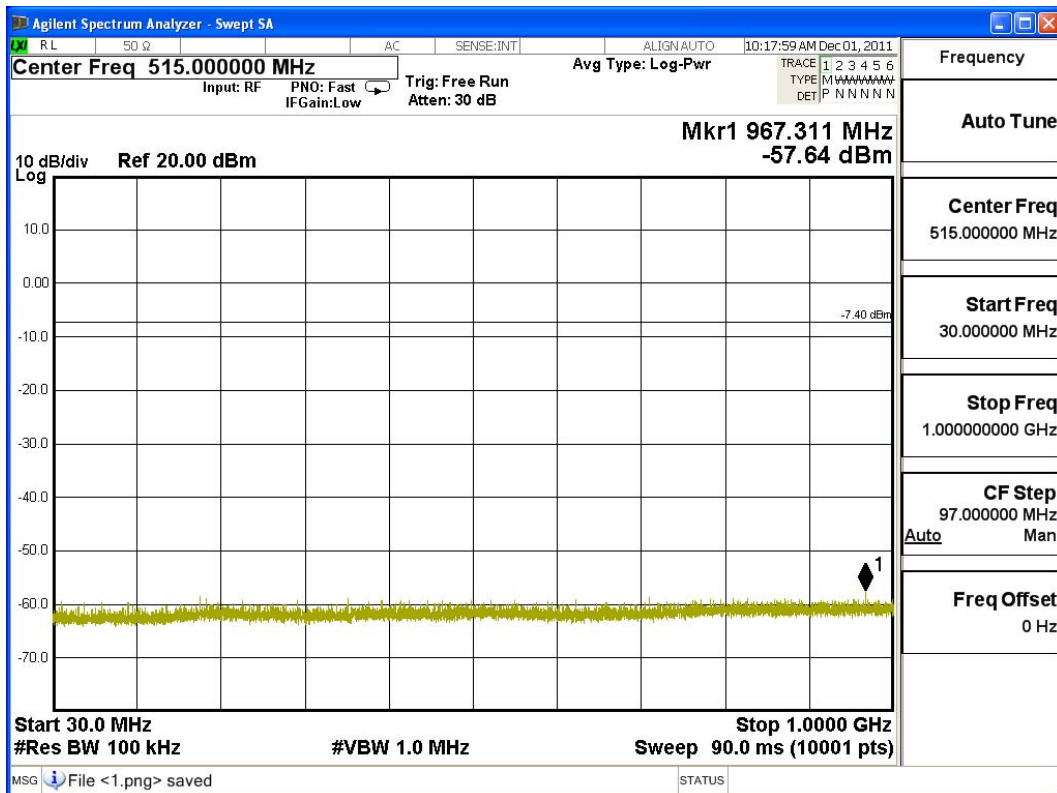
Product : Home Controller
 Test Item : RF antenna conducted test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

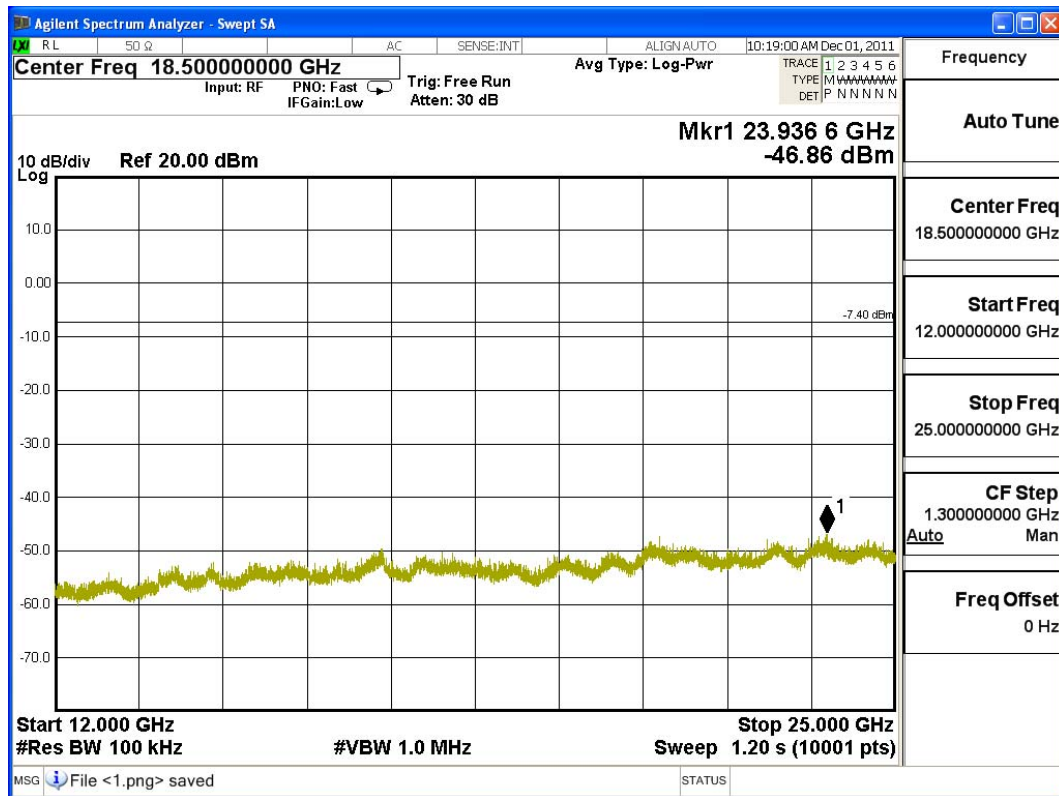
Channel 01(2405MHz)



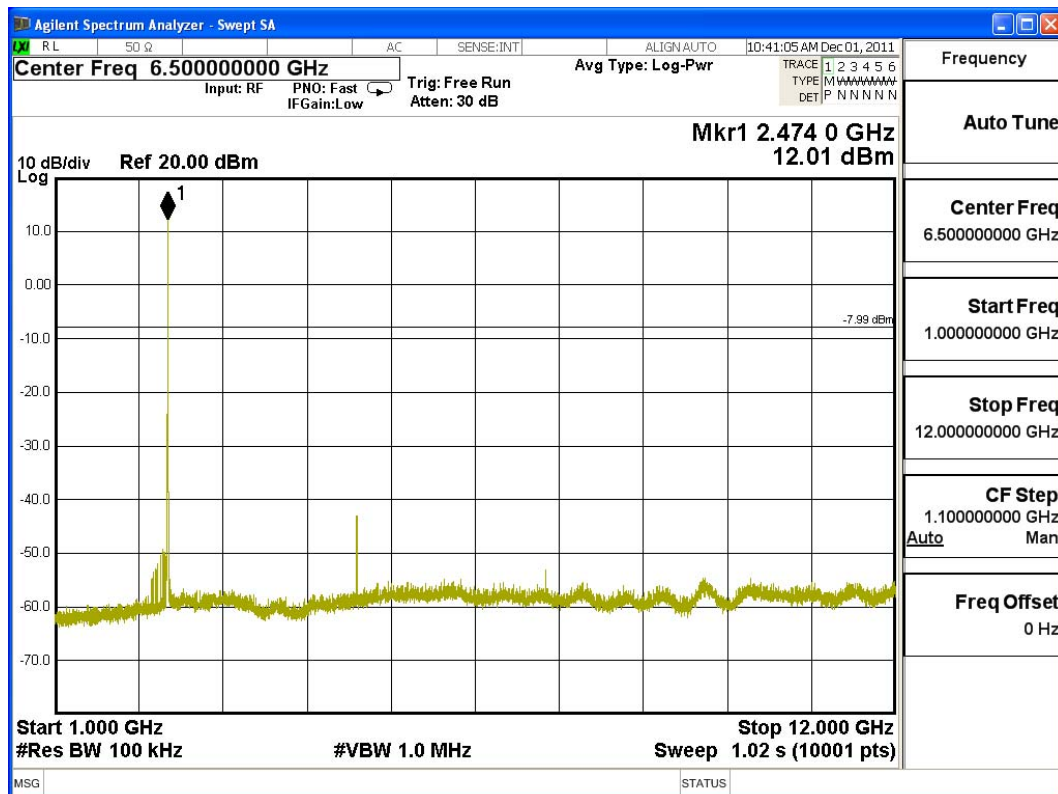
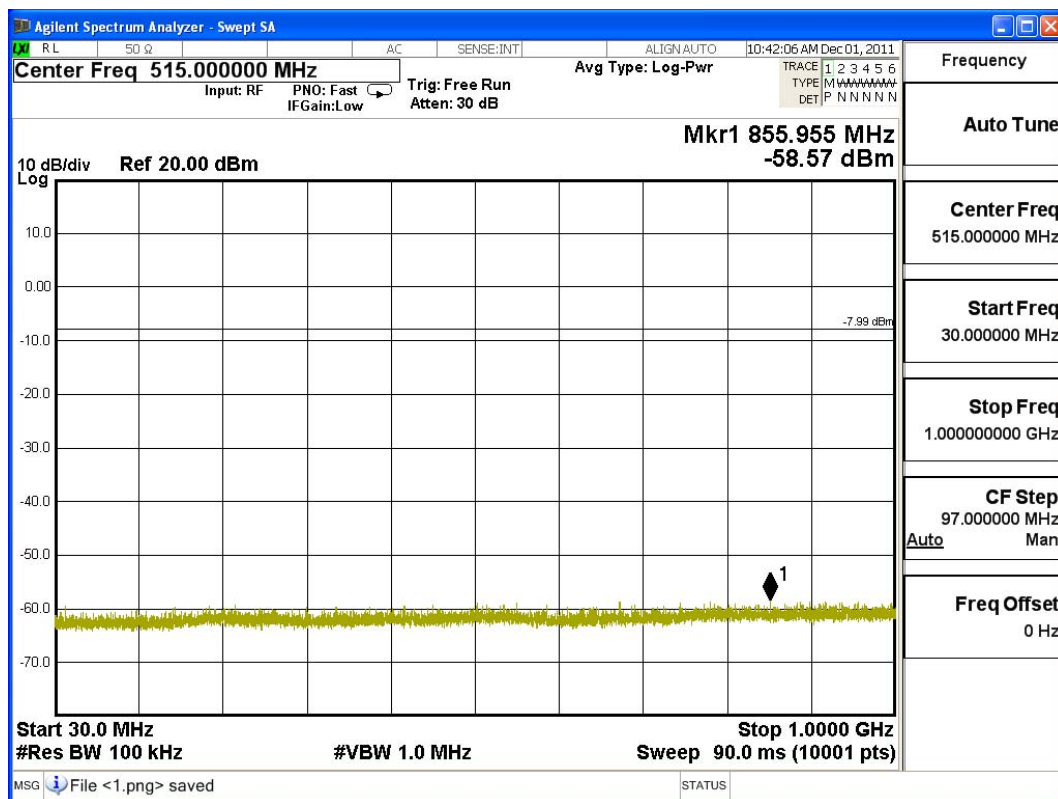


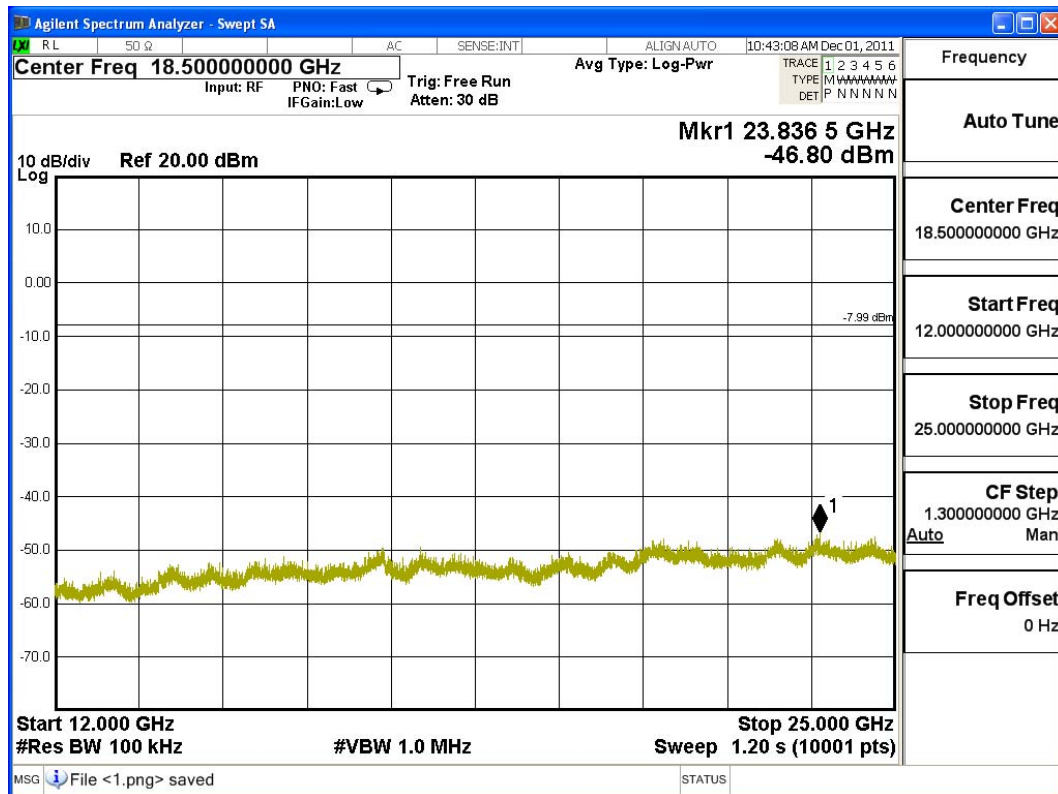
Channel 08 (2440MHz)





Channel 15 (2475MHz)





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, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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:

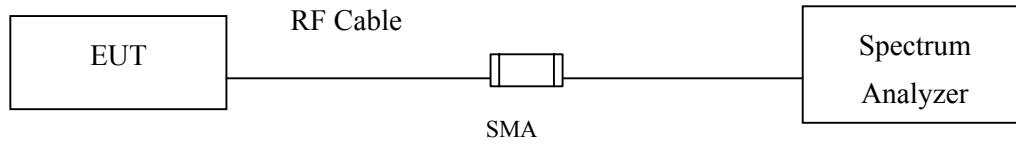
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

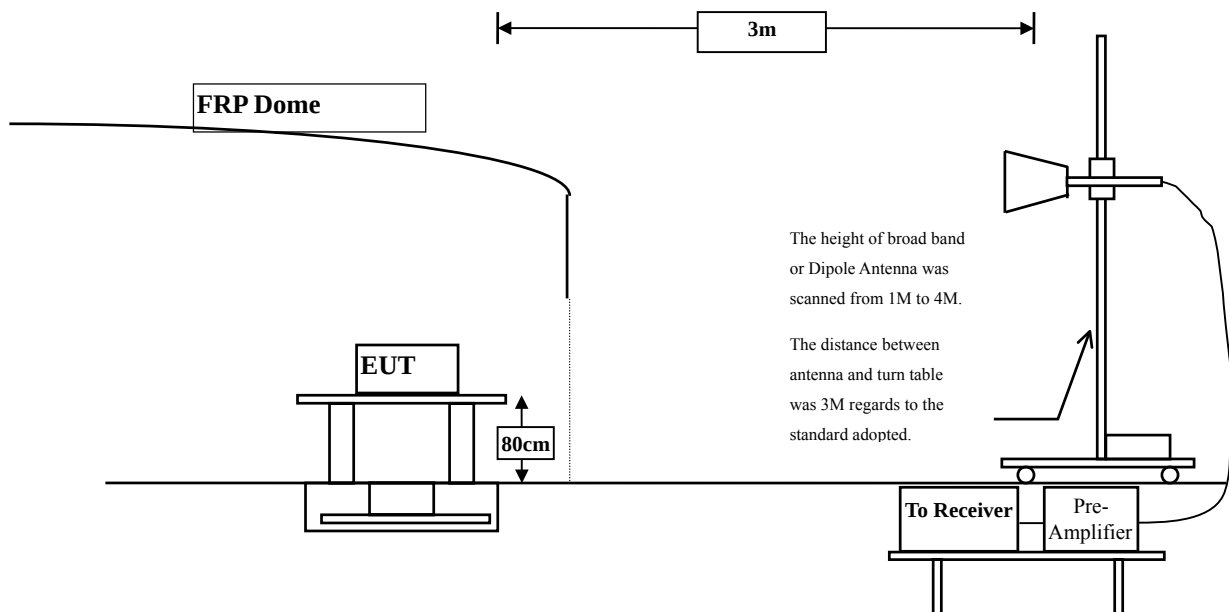
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by “X” are used to measure the final test results.

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 C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 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 C63.4:2003 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : Home Controller
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (Dielectric Patch antenna)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2405	31.593	80.26	111.853	Peak
Horizontal	2405	31.593	71.139	102.732	Average
Vertical	2405	30.926	77.83	108.756	Peak
Vertical	2405	30.926	68.67	99.596	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)	Detector
Horizontal	2389.6	111.853	53.45	58.403	Peak
Horizontal	2390	102.732	63.48	39.252	Average
Vertical	2389.6	108.756	53.45	55.306	Peak
Vertical	2390	99.596	63.48	36.116	Average

Note:

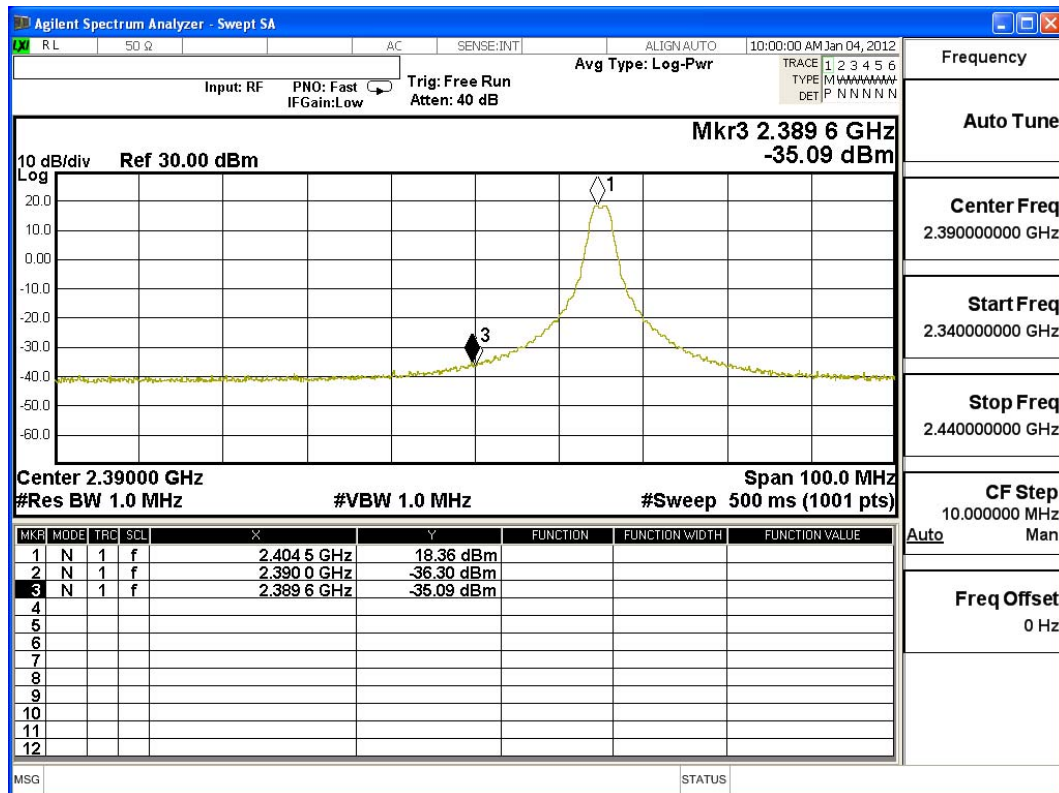
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

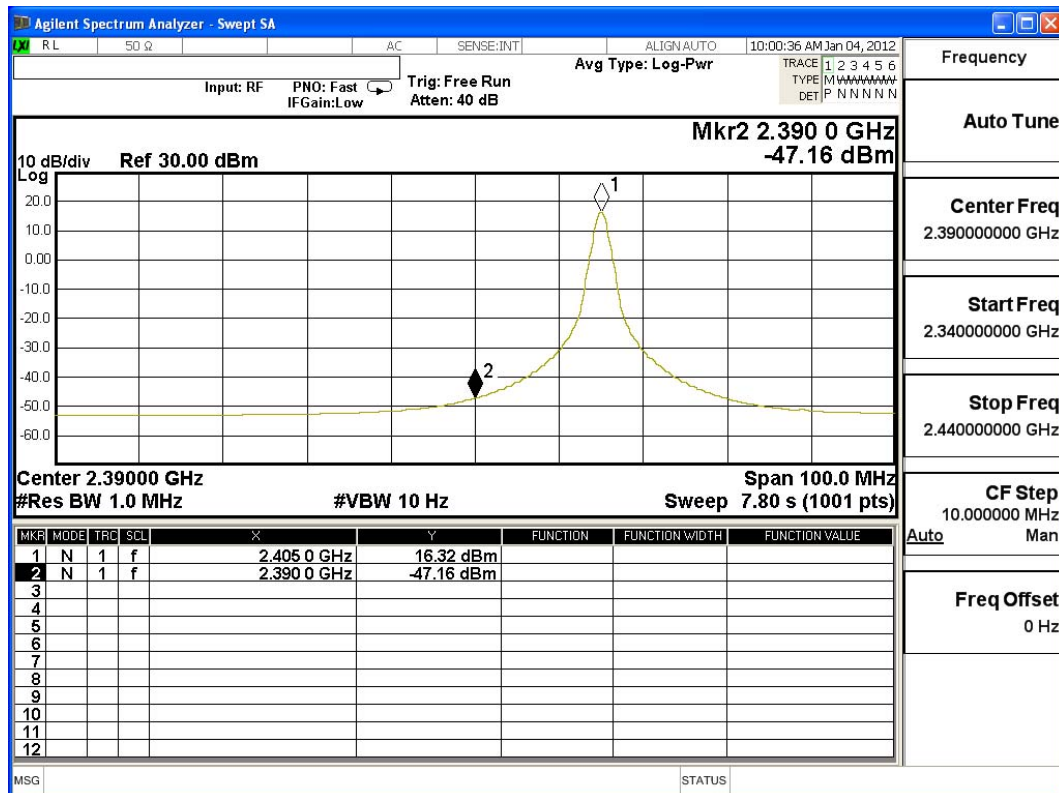
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Home Controller
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (Dielectric Patch antenna)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2475	32.118	74.27	106.388	Peak
Horizontal	2475	32.118	71.83	103.948	Average
Vertical	2475	31.378	78.74	110.118	Peak
Vertical	2475	31.378	76.3	107.678	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)	Detector
Horizontal	2483.6	106.388	45.84	60.548	Peak
Horizontal	2483.5	103.948	55.07	48.878	Average
Vertical	2483.6	110.118	45.84	64.278	Peak
Vertical	2483.5	107.678	55.07	52.608	Average

Note:

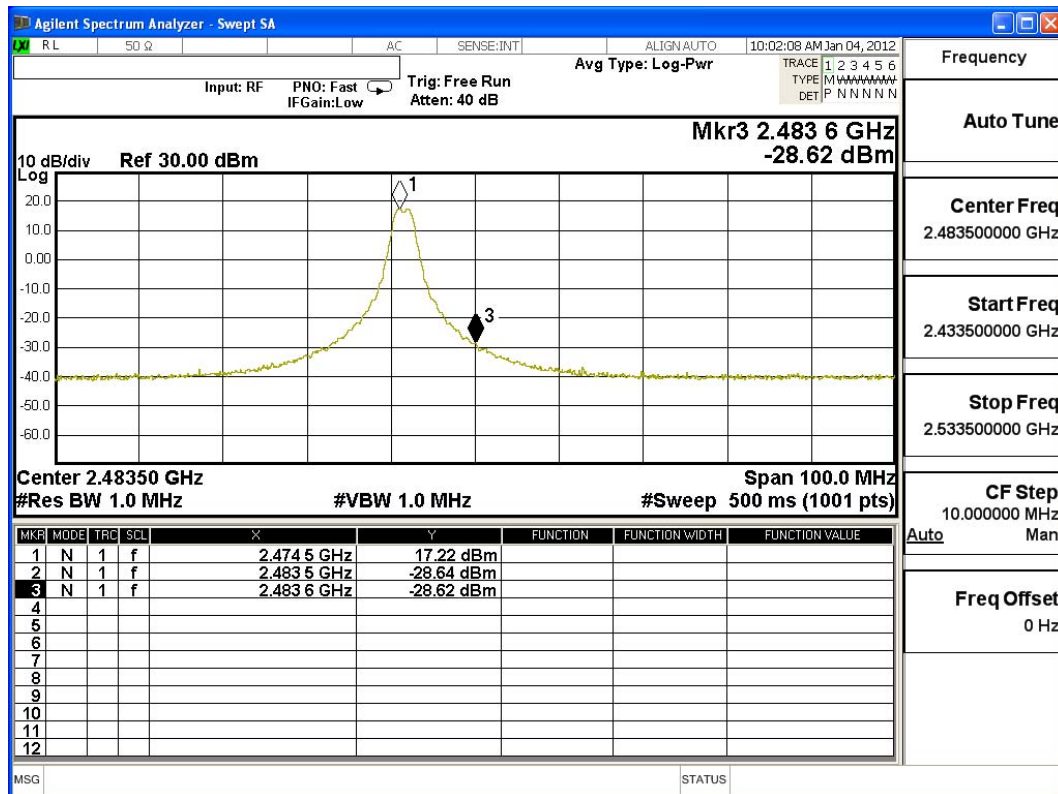
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

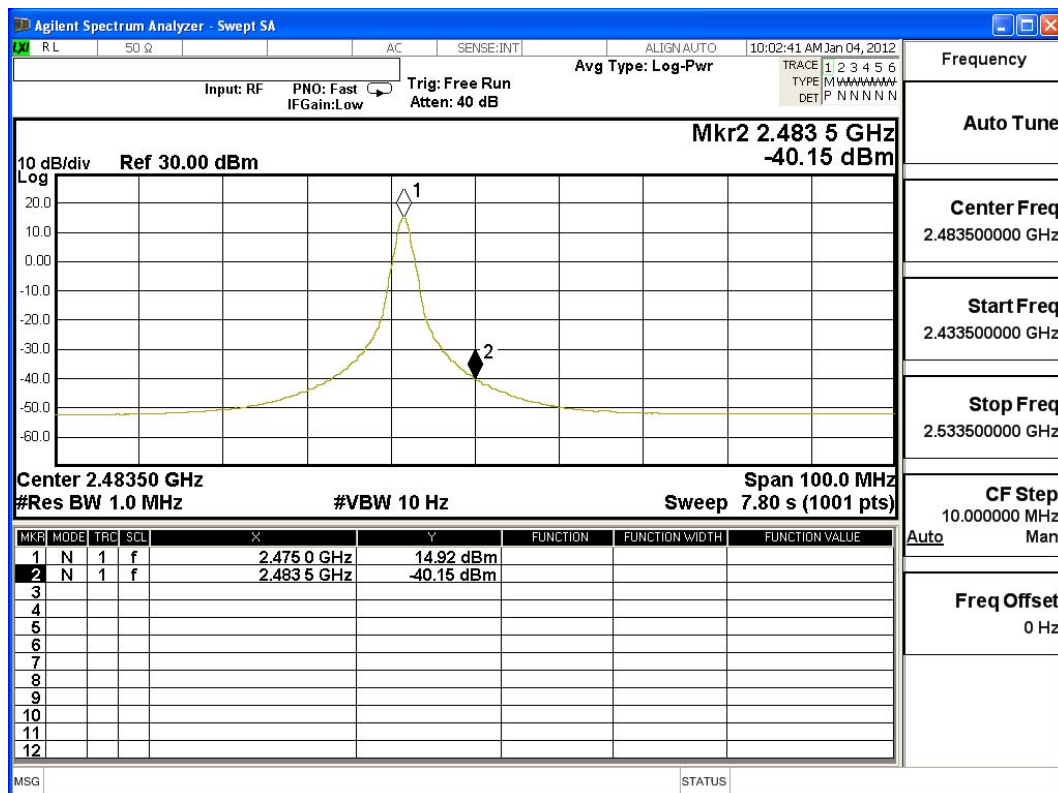
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Home Controller
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (Dipole antenna)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2405	31.593	83.19	114.783	Peak
Horizontal	2405	31.593	80.95	112.543	Average
Vertical	2405	30.926	88.74	119.666	Peak
Vertical	2405	30.926	86.39	117.316	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)	Detector
Horizontal	2389.6	114.783	53.45	61.333	Peak
Horizontal	2390	112.543	63.48	49.063	Average
Vertical	2389.6	119.666	53.45	66.216	Peak
Vertical	2390	117.316	63.48	53.836	Average

Note:

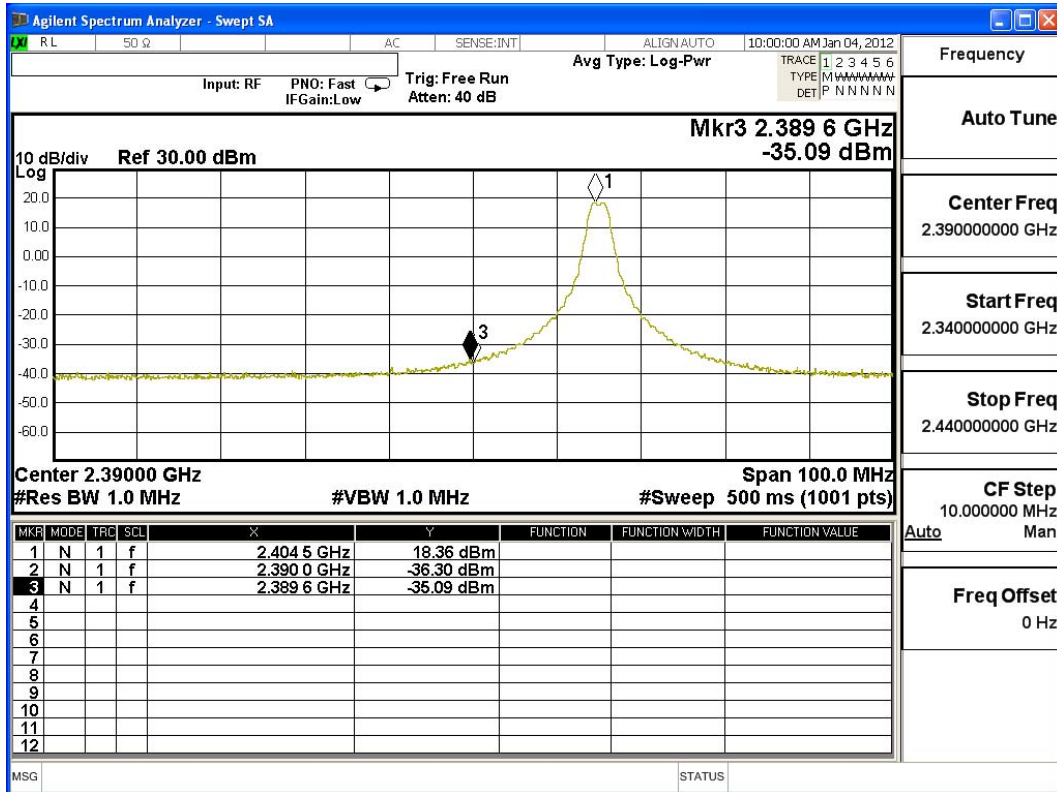
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

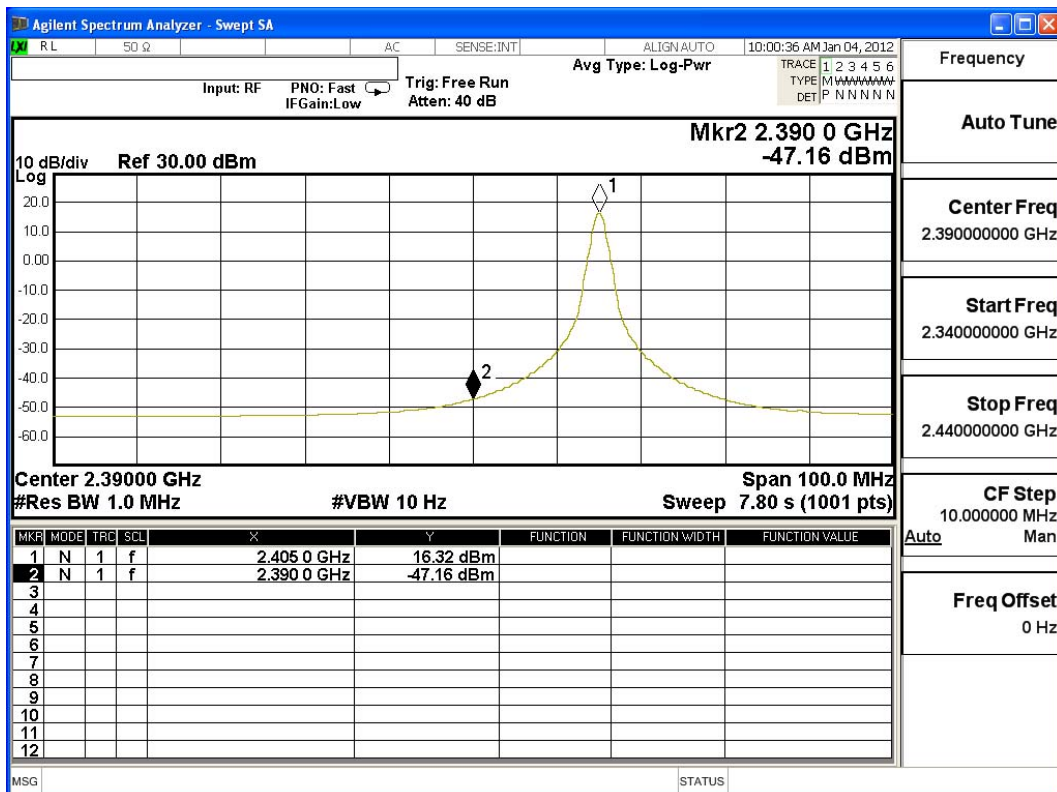
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Home Controller
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (Dipole antenna)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2475	32.118	84.28	116.398	Peak
Horizontal	2475	32.118	81.85	113.968	Average
Vertical	2475	31.378	85.47	116.848	Peak
Vertical	2475	31.378	83.04	114.418	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)	Detector
Horizontal	2483.6	116.398	45.84	70.558	Peak
Horizontal	2483.5	113.968	55.07	58.898	Average
Vertical	2483.6	116.848	45.84	71.008	Peak
Vertical	2483.5	114.418	55.07	59.348	Average

Note:

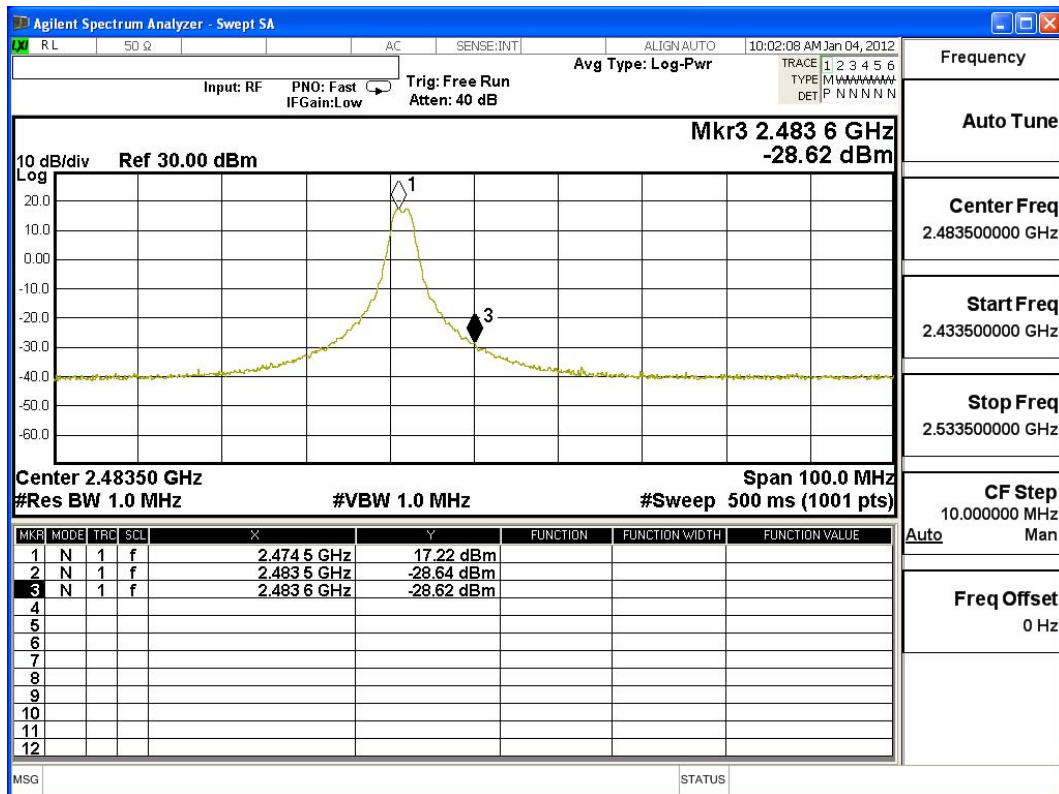
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

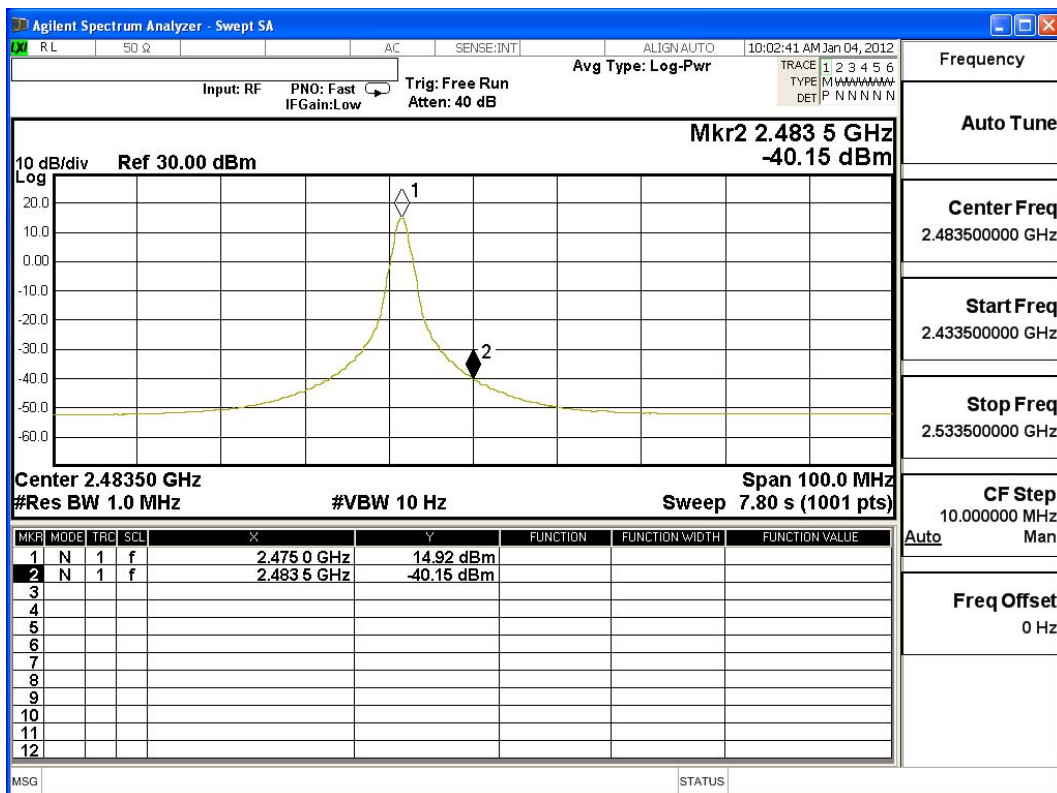
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



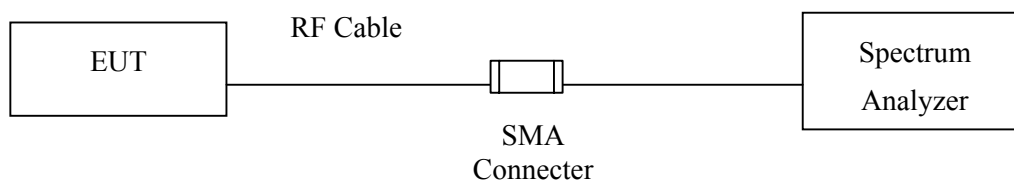
7. Occupied Bandwidth

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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

7.2. Test Setup



7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

7.5. Uncertainty

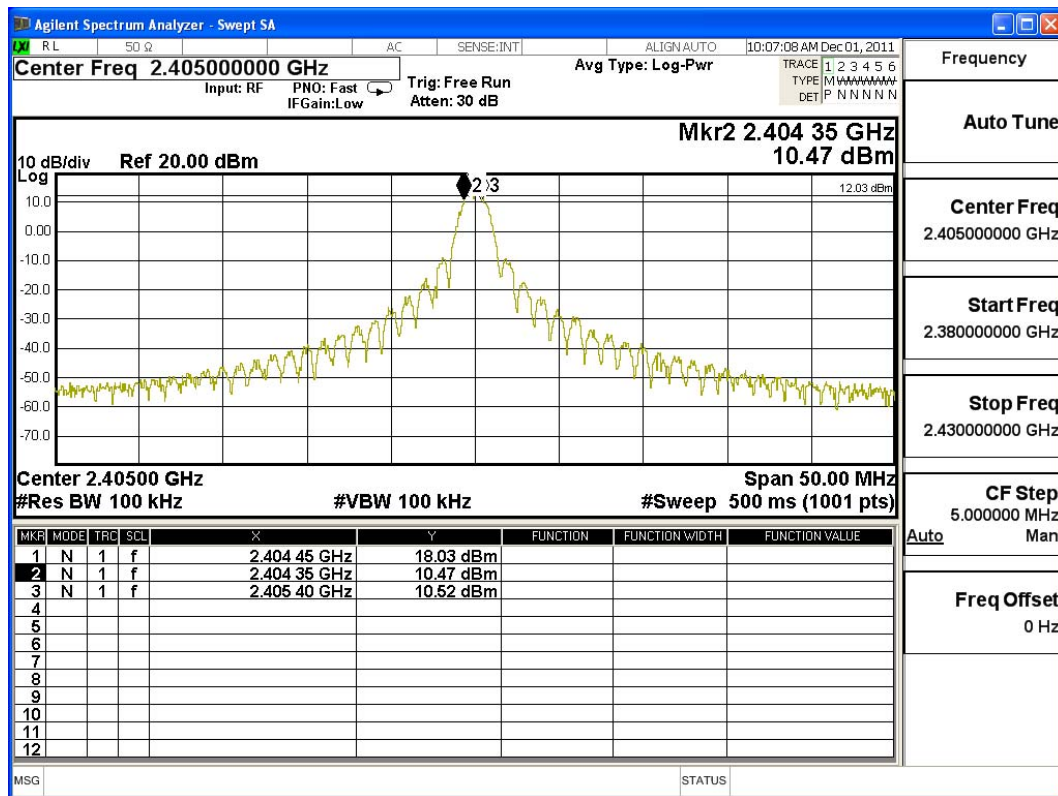
$\pm 150\text{Hz}$

7.6. Test Result of Occupied Bandwidth

Product : Home Controller
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2405MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2405.00	1050	>500	Pass

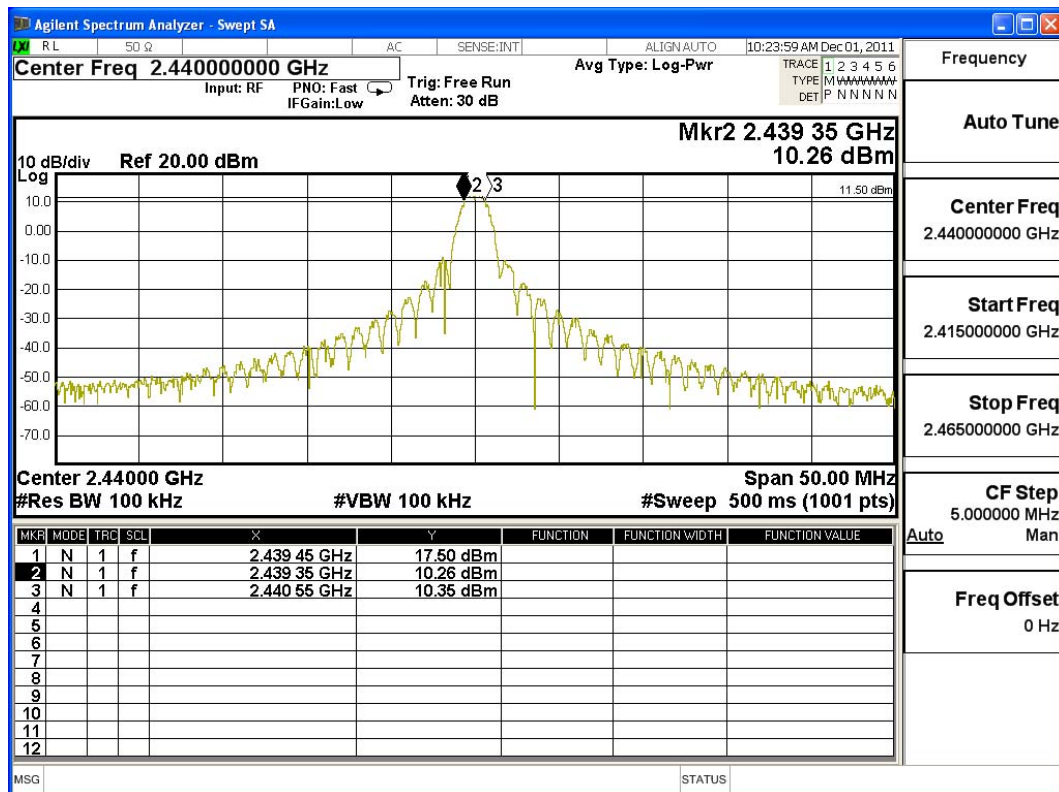
Figure Channel 01:



Product : Home Controller
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
08	2440.00	1200	>500	Pass

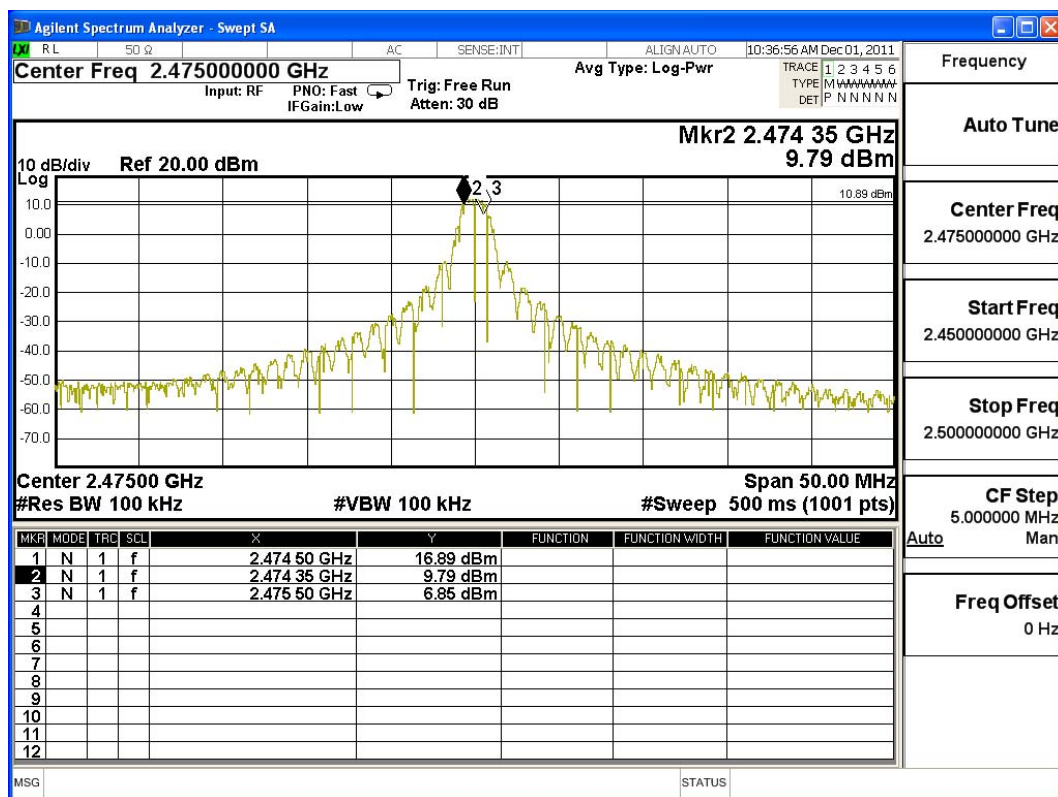
Figure Channel 08:



Product : Home Controller
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2475MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
15	2475.00	1150	>500	Pass

Figure Channel 15:



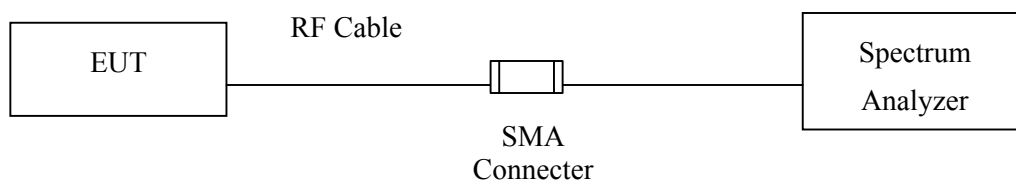
8. Power Density

8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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

8.2. Test Setup



8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

8.5. Uncertainty

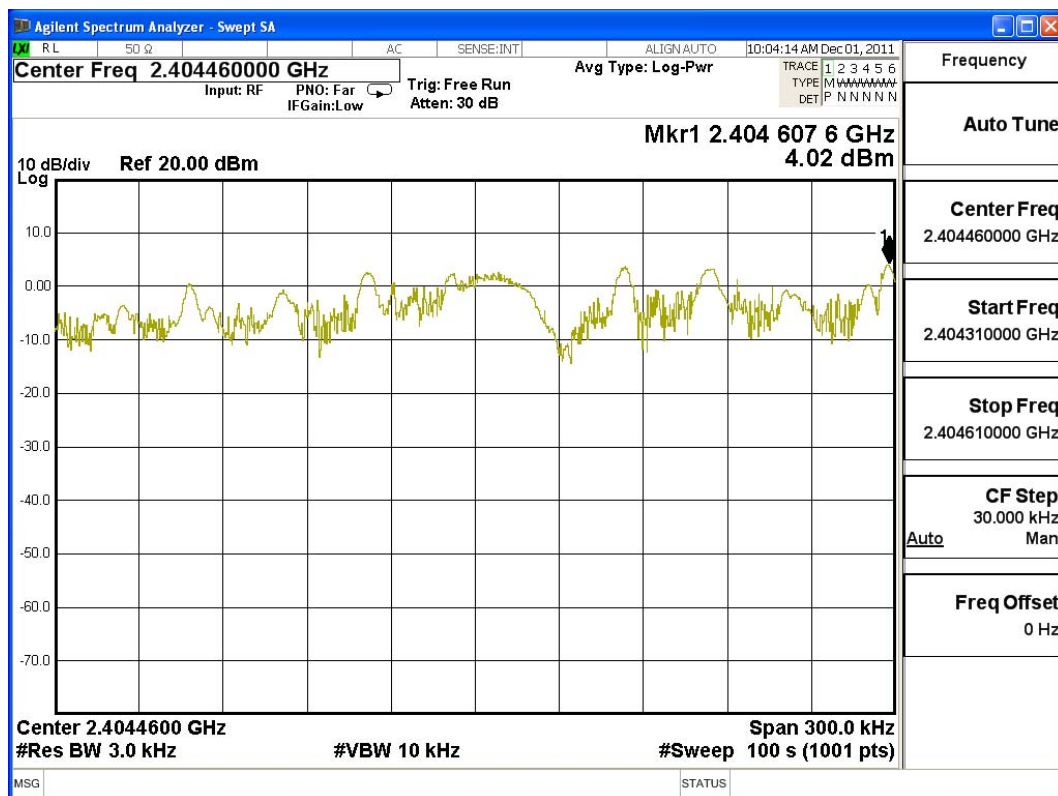
± 1.27 dB

8.6. Test Result of Power Density

Product : Home Controller
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit(2405MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2405.00	4.02	< 8dBm	Pass

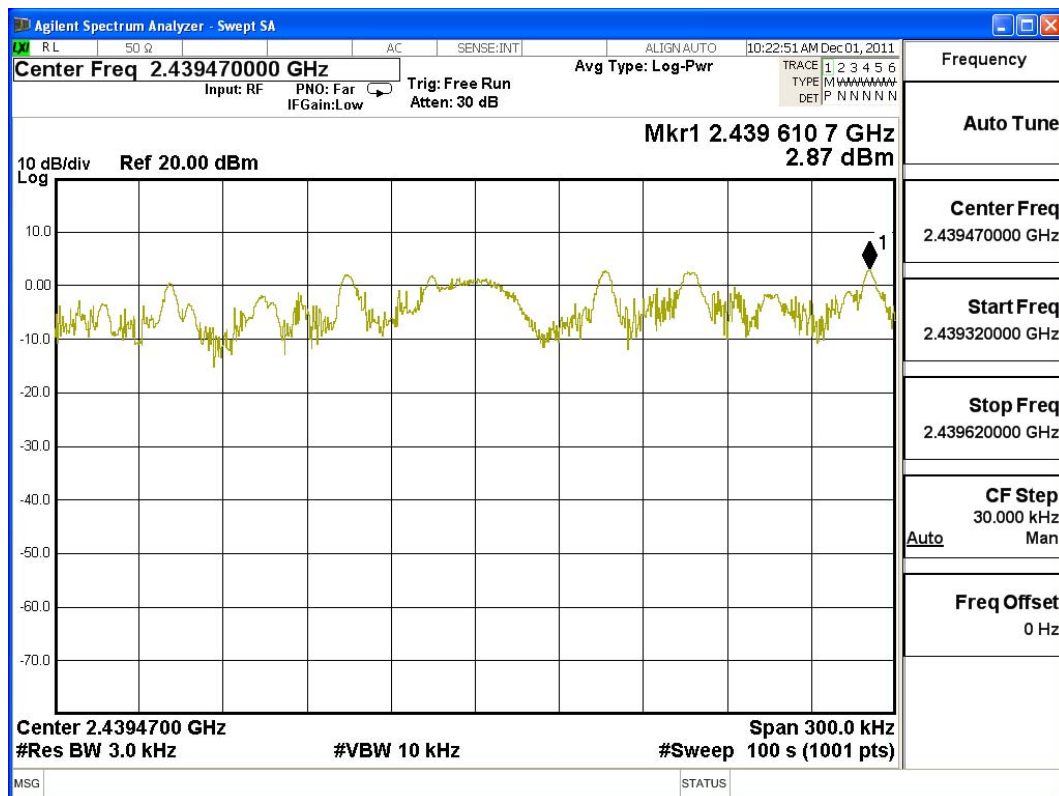
Figure Channel 01:



Product : Home Controller
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
08	2440.00	2.87	< 8dBm	Pass

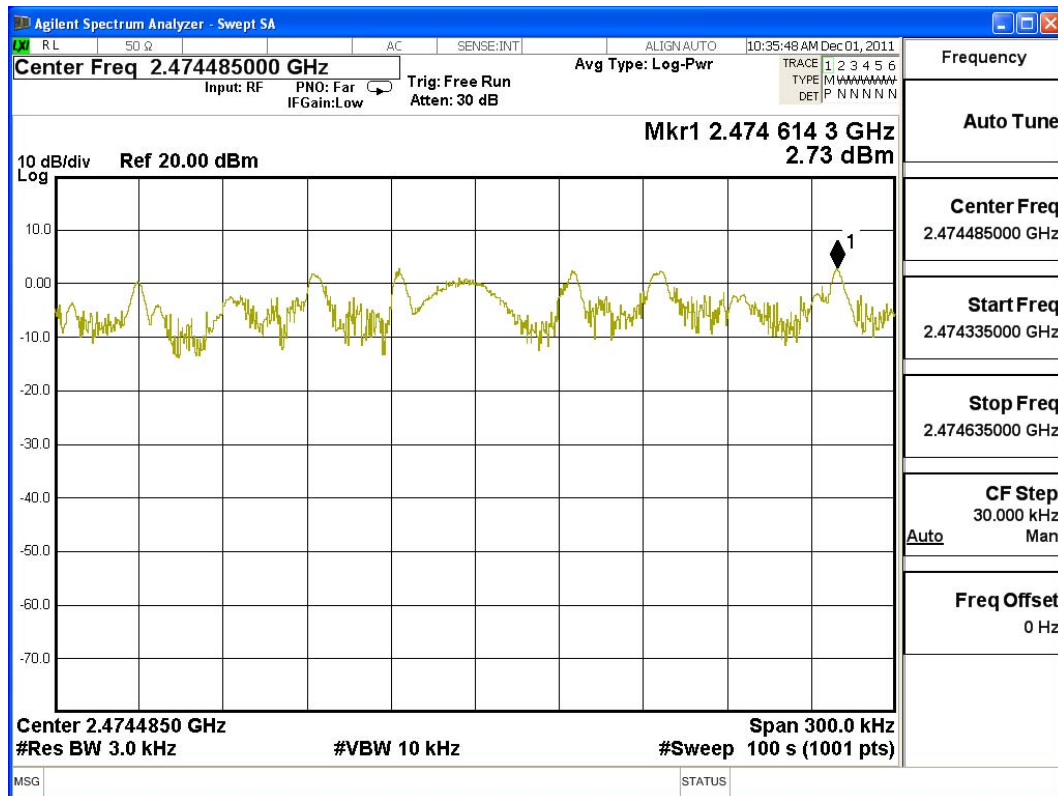
Figure Channel 08:



Product : Home Controller
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2475MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
15	2475.00	2.73	< 8dBm	Pass

Figure Channel 15:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.