FCC Test Report

Product Name	modlet gateway
Model No	TE1211M
FCC ID.	Y38TE1211M

Applicant	ThinkEco Inc.
Address	494 8th Avenue, PH floor, New York, NY, United States, 10001

Date of Receipt	May 28, 2013
Issue Date	Aug. 08, 2013
Report No.	138044R-RFUSP42V01
Report Version	V1.0

Test Report Certification

Issue Date: Aug. 08, 2013
Report No.: 138044R-RFUSP42V01

Product Name	modlet gateway
Applicant	ThinkEco Inc.
Address	494 8th Avenue, PH floor, New York, NY, United States, 10001
Manufacturer	DONG GUAN G-COM COMPUTER CO., LTD.
Model No.	TE1211M
EUT Rated Voltage	AC 100-240V/50-60Hz
EUT Test Voltage	AC 120V/ 60Hz
Trade Name	ThinkEco Inc.
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009
Test Result	Complied

The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by TAF any agency of the U.S. Government

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Approved By :
(Manager / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	modlet gateway
Trade Name	ThinkEco Inc.
Model No.	TE1211M
FCC ID.	Y38TE1211M
Frequency Range	2405~2475MHz
Channel Separation	5 MHz
Channel Number	15
Type of Modulation	OQPSK
Antenna Type	PCB Antenna
Antenna Gain	Refer to the table “Antenna List”
RJ45 Cable	Non-Shielded, 2.0m
Power Adapter	MFR: APD, M/N: WA-18Q12FU Input: AC 100-240V~ 50-60Hz, 0.5A Max. Output: DC 12V, 1.5A Cable Out: Non-shielded, 1.5m, with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MAG. LAYERS	PCA-5015-2G4C2-A1	PCB Antenna	2.69dBi 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 modlet gateway 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

Test Mode:	Mode 1: Transmit

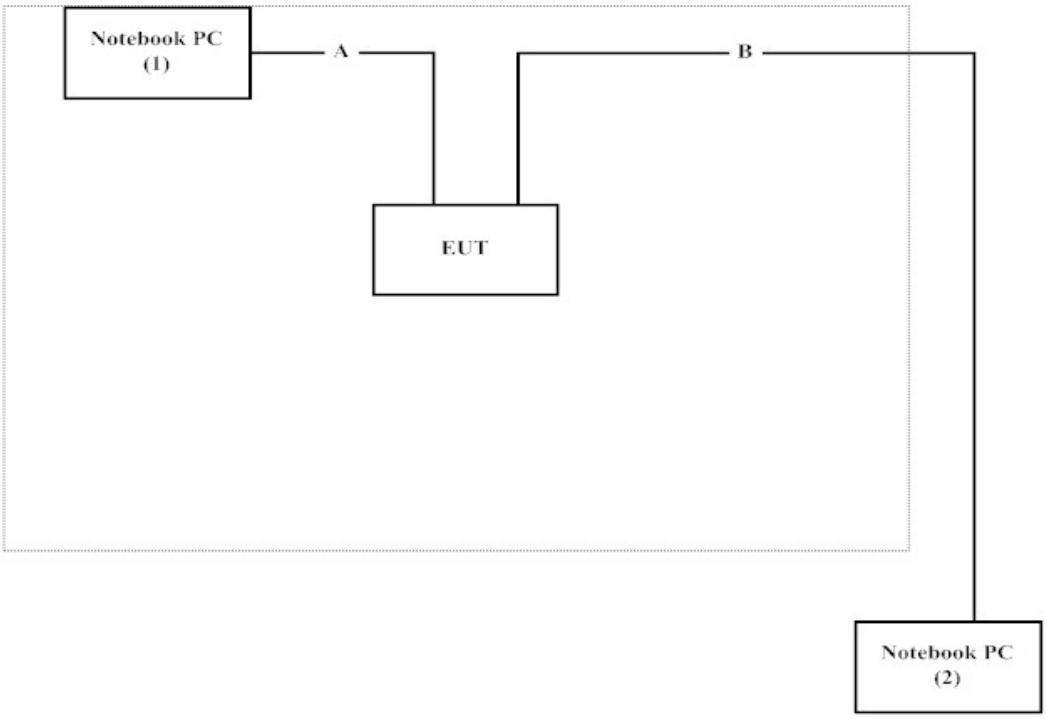
1.3. Tested System Details

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	Notebook PC	ASUS	S1300	24NP035390	Non-Shielded, 1.8m
2	Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description
A	RJ45 Cable	Non-Shielded, 2.0m
B	RJ45 Cable	Non-Shielded, 1.0m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in section 1.4.

(2) Execute “Putty.exe V0.62” on the Notebook PC.

(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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FCC Accreditation Number: TW1014

2. Conducted Emission

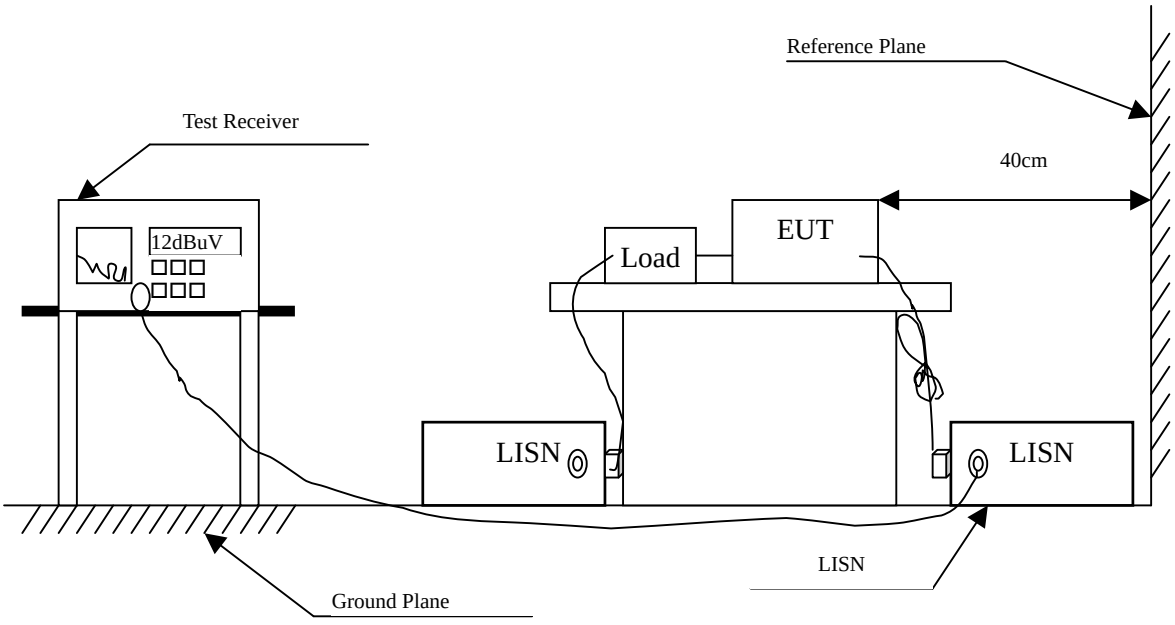
2.1. Test Equipment

	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., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	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 : modlet gateway
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.158	9.547	33.670	43.217	-22.554	65.771
0.255	9.581	26.310	35.891	-27.109	63.000
0.463	9.591	33.380	42.971	-14.086	57.057
0.584	9.596	23.740	33.336	-22.664	56.000
0.916	9.601	22.550	32.151	-23.849	56.000
14.767	10.150	20.200	30.350	-29.650	60.000
Average					
0.158	9.547	23.870	33.417	-22.354	55.771
0.255	9.581	12.960	22.541	-30.459	53.000
0.463	9.591	23.840	33.431	-13.626	47.057
0.584	9.596	12.630	22.226	-23.774	46.000
0.916	9.601	11.000	20.601	-25.399	46.000
14.767	10.150	12.340	22.490	-27.510	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 : modlet gateway
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.162	9.587	32.070	41.657	-24.000	65.657
0.224	9.592	24.820	34.412	-29.474	63.886
0.263	9.602	25.200	34.802	-27.969	62.771
0.322	9.604	19.470	29.074	-32.012	61.086
0.466	9.601	30.490	40.091	-16.880	56.971
1.384	9.653	17.510	27.163	-28.837	56.000
Average					
0.162	9.587	20.340	29.927	-25.730	55.657
0.224	9.592	11.180	20.772	-33.114	53.886
0.263	9.602	12.790	22.392	-30.379	52.771
0.322	9.604	6.290	15.894	-35.192	51.086
0.466	9.601	20.450	30.051	-16.920	46.971
1.384	9.653	7.860	17.513	-28.487	46.000

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

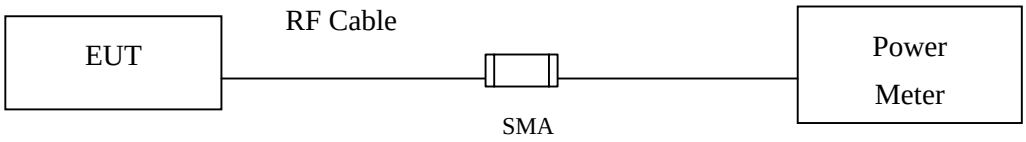
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2013
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2013

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

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 KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : modlet gateway
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	2405.00	2.77	<30dBm	Pass
08	2440.00	2.78	<30dBm	Pass
15	2475.00	2.71	<30dBm	Pass

Note:
1. Peak Power Output Value =Reading value on Spectrum Analyzer + cable loss

4. Radiated Emission

4.1. Test Equipment

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

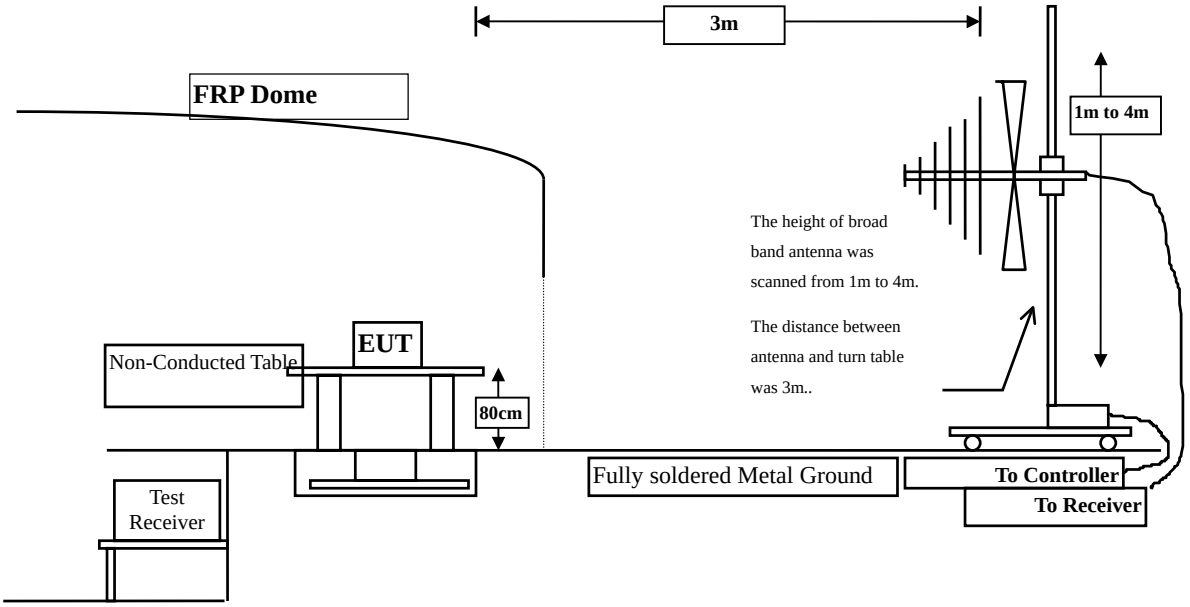
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2012
	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	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.

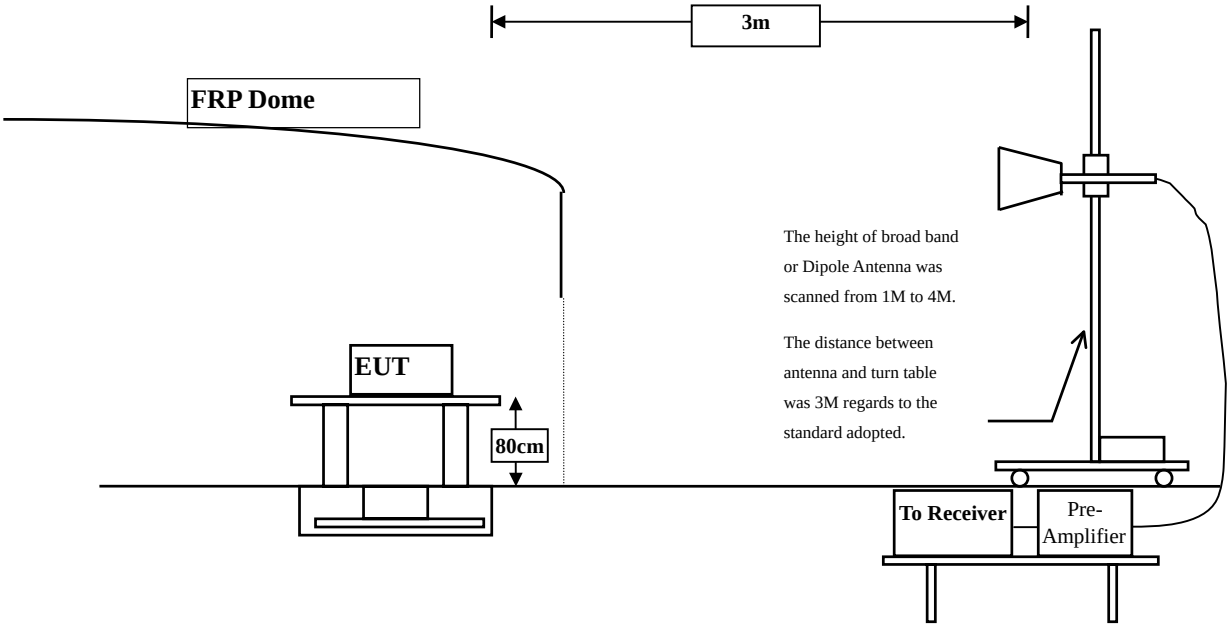
2. The test instruments marked with “X” are used to measure the final test results.

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	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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 KDB 558074 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 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~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 form 9KHz - 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 : modlet gateway
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405Hz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4810.000	3.323	37.880	41.203	-32.797	74.000
7215.000	10.289	42.190	52.480	-21.520	74.000
9620.000	13.595	35.900	49.496	-24.504	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4810.000	6.591	37.810	44.401	-29.599	74.000
7215.000	11.151	37.750	48.902	-25.098	74.000
9620.000	14.014	36.390	50.405	-23.595	74.000
Average Detector:					

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 : modlet gateway
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2440Hz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4880.000	3.010	37.070	40.080	-33.920	74.000
7320.000	11.833	38.200	50.034	-23.966	74.000
9760.000	12.580	37.350	49.931	-24.069	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4880.000	5.738	36.790	42.528	-31.472	74.000
7320.000	12.703	35.760	48.463	-25.537	74.000
9760.000	13.052	37.640	50.692	-23.308	74.000
Average Detector:					
--					

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 : modlet gateway
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2475Hz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4950.000	2.789	37.250	40.038	-33.962	74.000
7425.000	12.425	36.770	49.195	-24.805	74.000
9900.000	13.328	37.390	50.718	-23.282	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4950.000	35.734	37.600	43.148	-30.852	74.000
7425.000	40.817	35.690	49.095	-24.905	74.000
9900.000	41.836	37.480	51.401	-22.599	74.000
Average Detector:					
--					

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 : modlet gateway
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2440Hz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
103.720	-6.751	26.599	19.847	-23.653	43.500
470.380	1.226	23.120	24.346	-21.654	46.000
600.360	3.977	22.802	26.779	-19.221	46.000
745.860	3.308	26.149	29.457	-16.543	46.000
829.280	6.344	23.443	29.787	-16.213	46.000
961.200	6.450	24.652	31.102	-22.898	54.000
Vertical					
84.320	-4.484	34.218	29.734	-10.266	40.000
371.440	-2.737	25.947	23.210	-22.790	46.000
509.180	-0.158	23.725	23.567	-22.433	46.000
683.780	1.968	23.725	25.693	-20.307	46.000
806.000	3.908	23.698	27.606	-18.394	46.000
937.920	6.076	22.840	28.916	-17.084	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.
8. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF antenna conducted test

5.1. Test Equipment

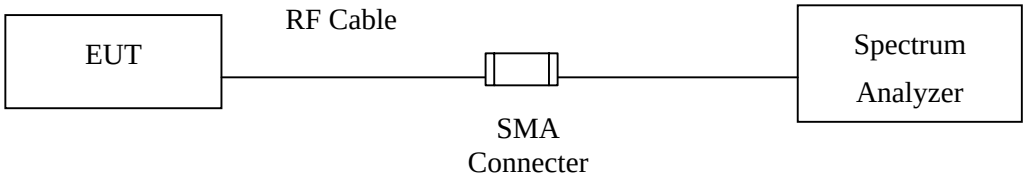
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

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 KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

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

5.5. Uncertainty

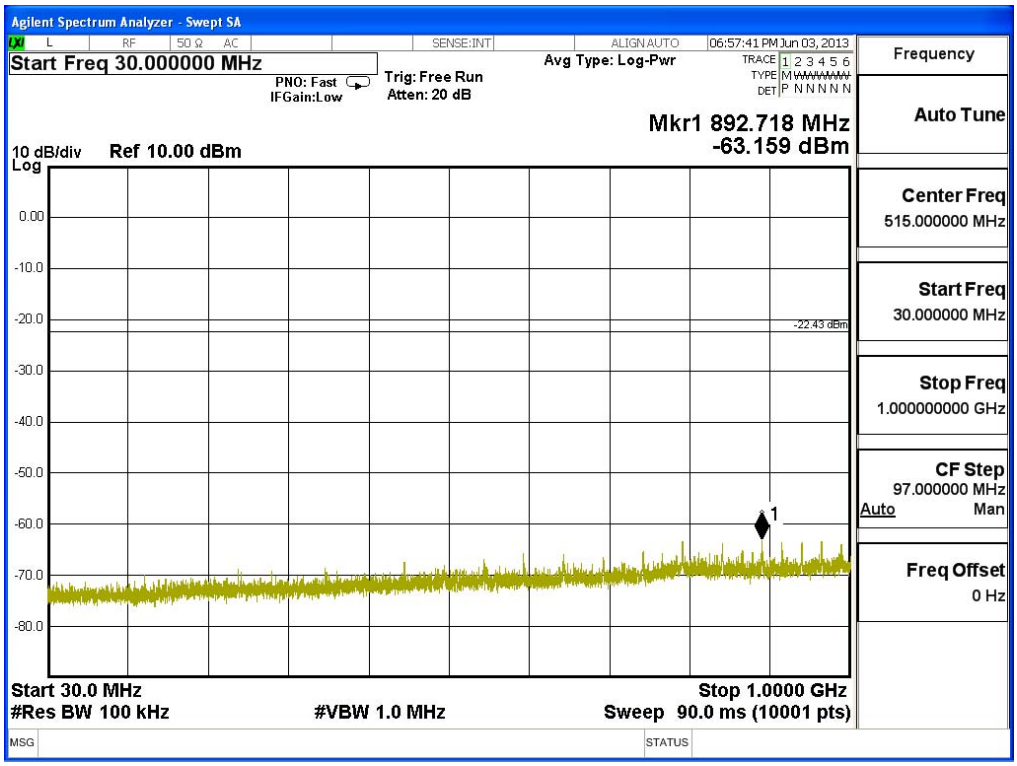
The measurement uncertainty

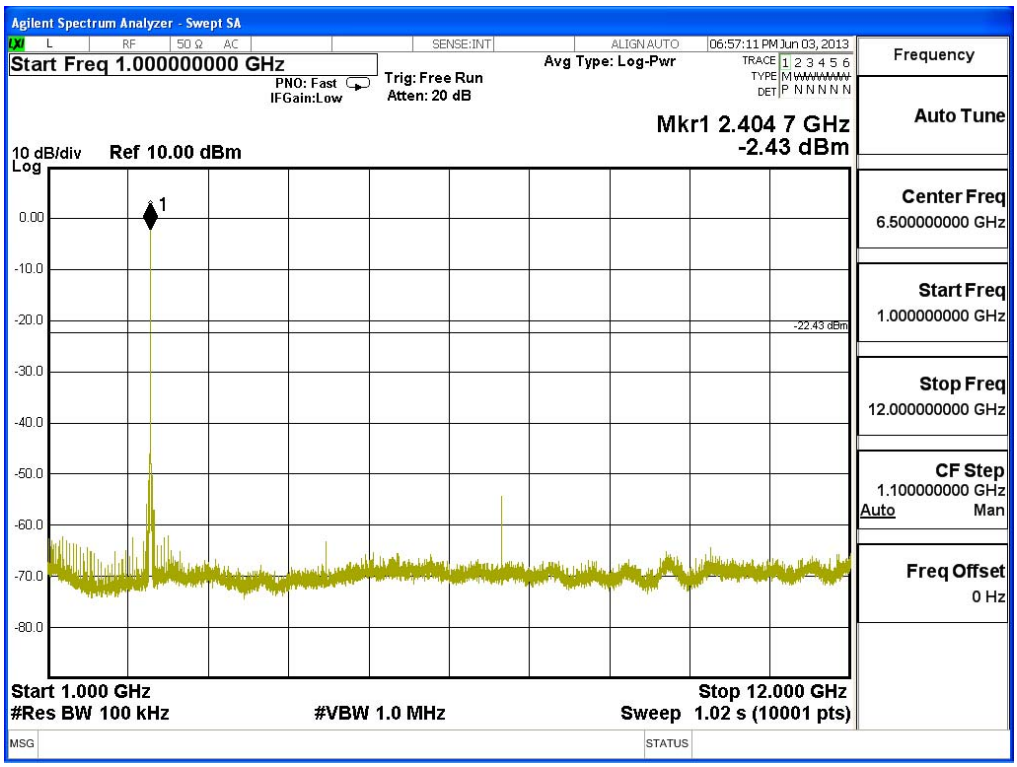
Conducted is defined as ± 1.27dB

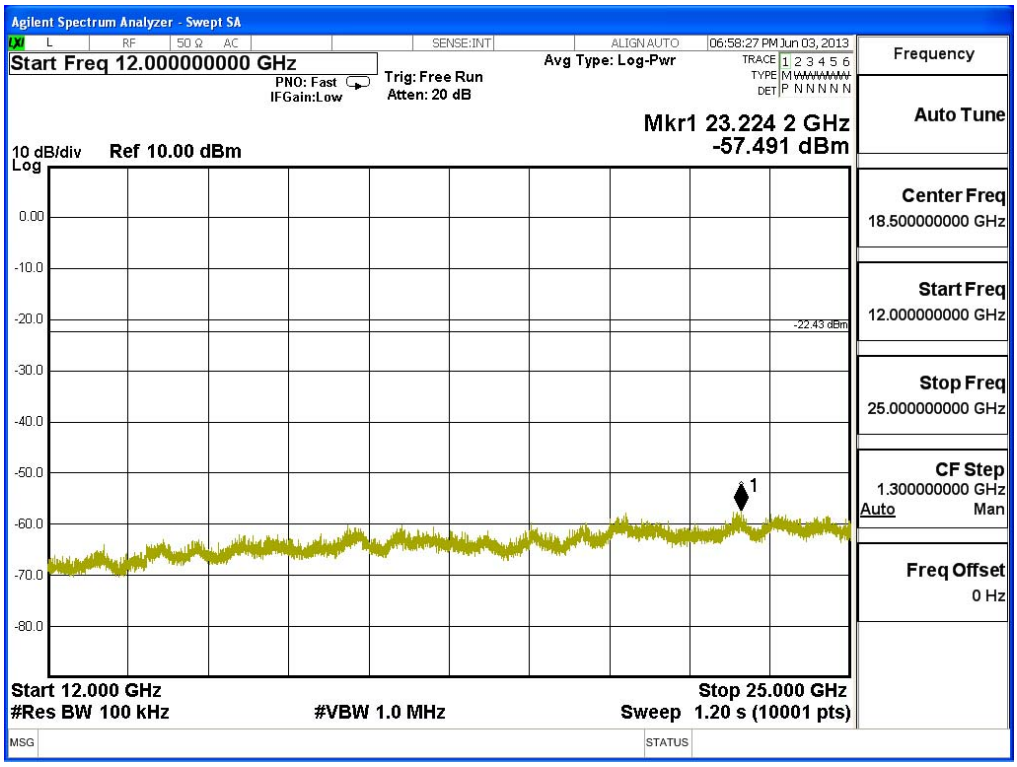
5.6. Test Result of RF antenna conducted test

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

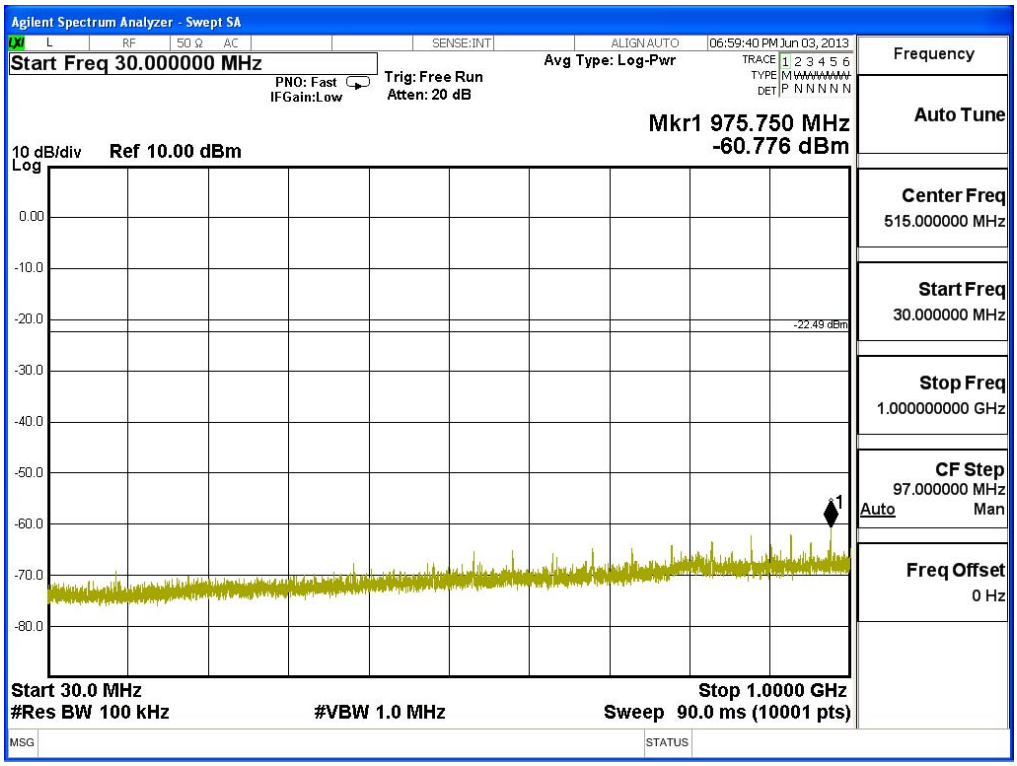
Channel 01(2405Hz)

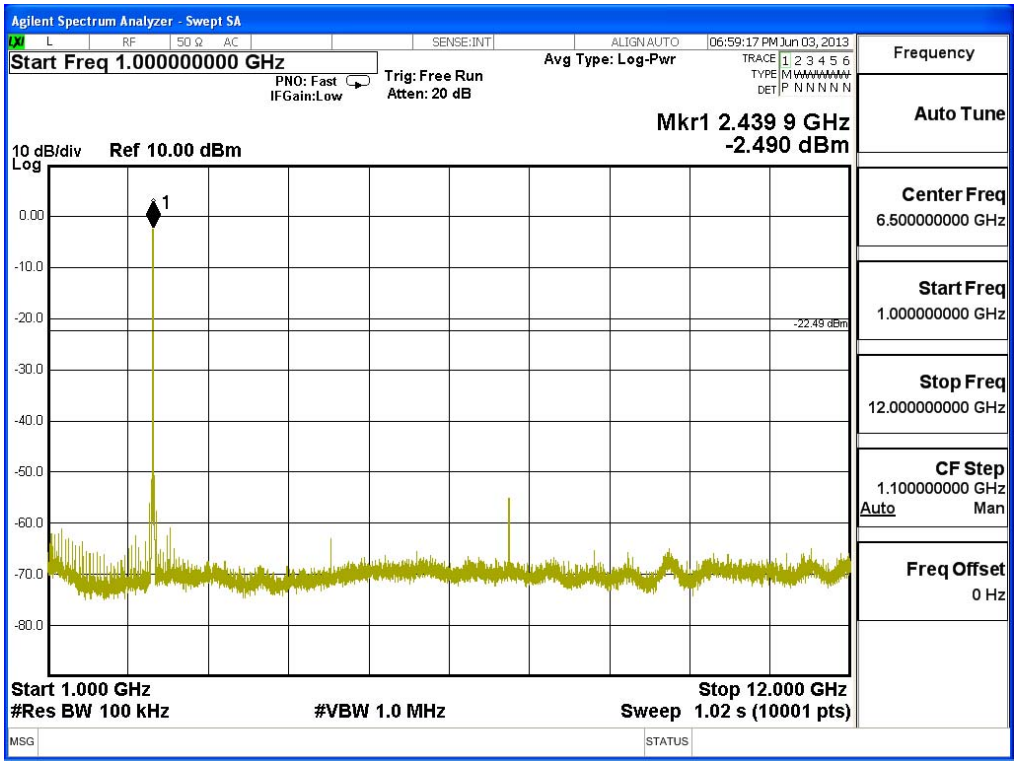


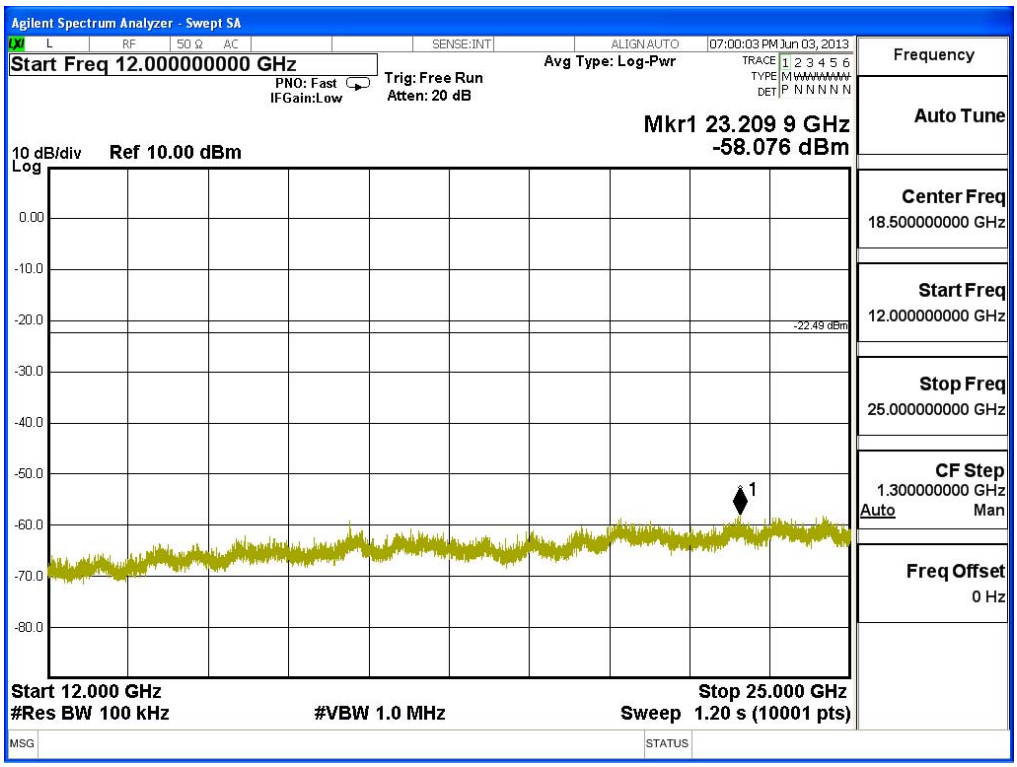

Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
06:57:11 PM Jun 03, 2013
Mkr1 2.404 7 GHz
-2.43 dBm
10 dB/div
Log
Ref 10.00 dBm
-22.43 dBm
Start 1.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 12.000 GHz
Sweep 1.02 s (10001 pts)
Frequency
Auto Tune
Center Freq
6.500000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
12.000000000 GHz
CF Step
1.100000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
Start Freq 12.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
06:58:27 PM Jun 03, 2013
Mkr1 23.224 2 GHz
-57.491 dBm
10 dB/div
Log
Ref 10.00 dBm
-22.43 dBm
Start 12.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 25.000 GHz
Sweep 1.20 s (10001 pts)
Frequency
Auto Tune
Center Freq
18.500000000 GHz
Start Freq
12.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.300000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

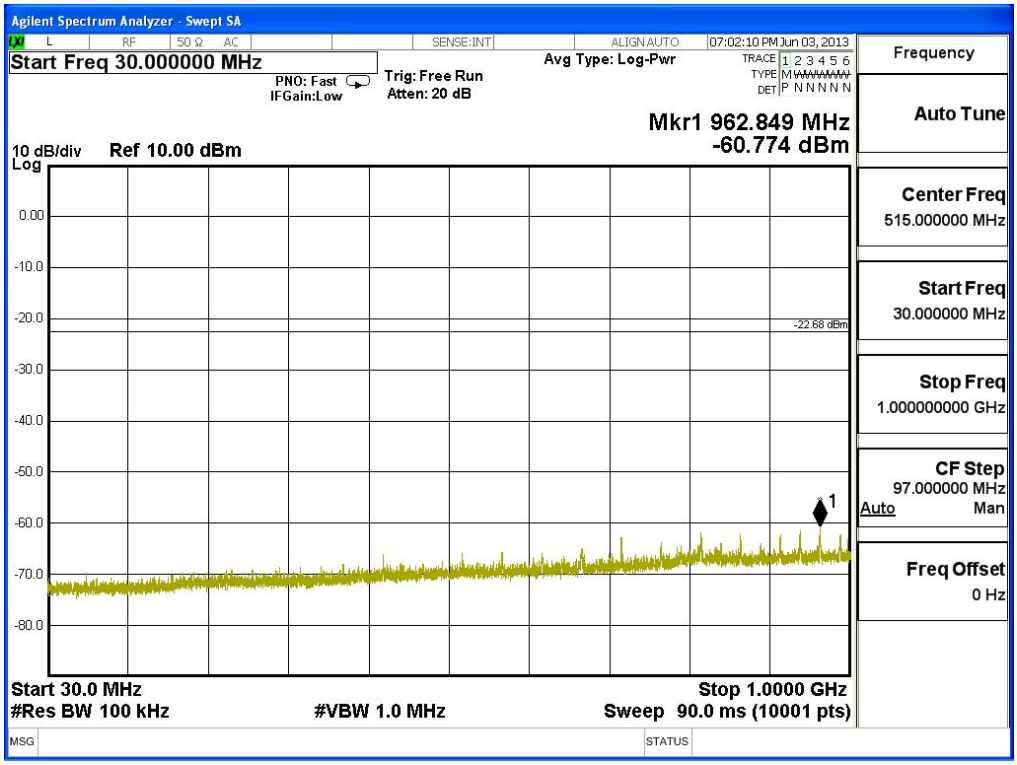
Channel 08 (2440MHz)

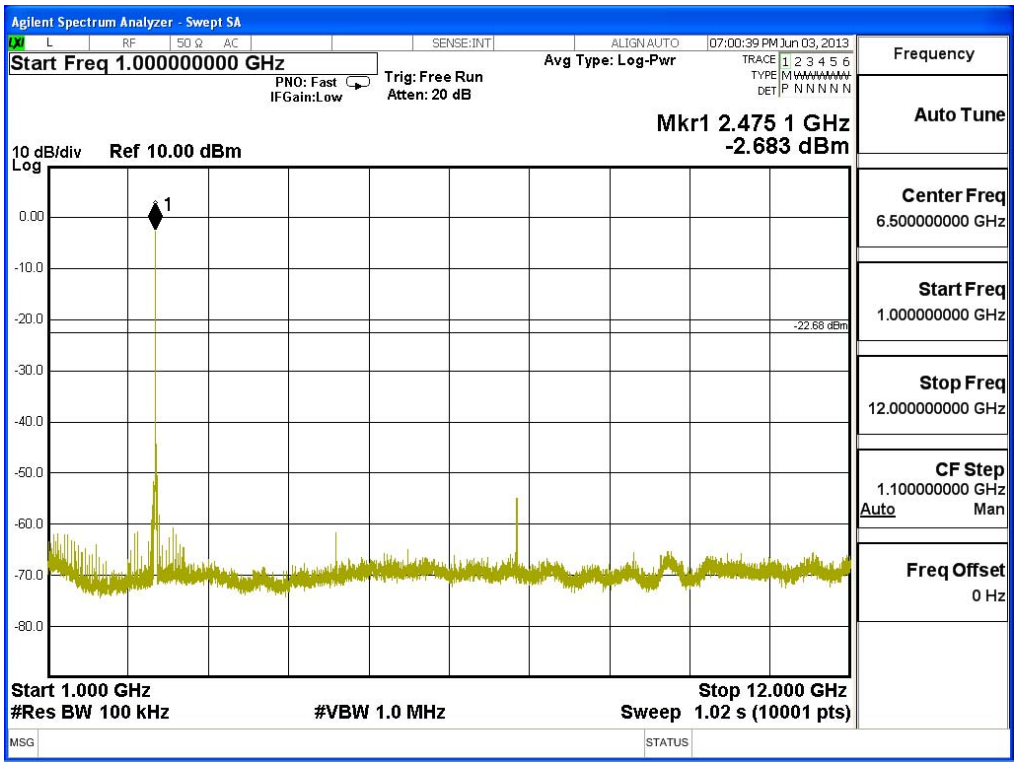


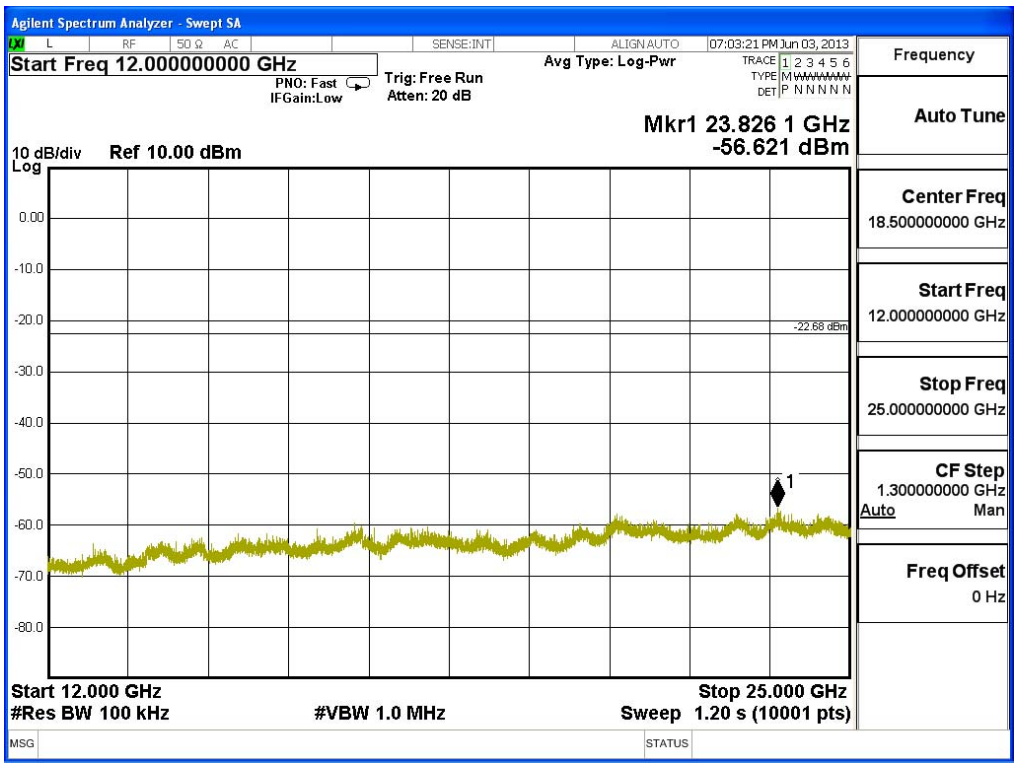



Agilent Spectrum Analyzer - Swept SA
Start Freq 12.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
07:00:03 PM Jun 03, 2013
Mkr1 23.209 9 GHz
-58.076 dBm
10 dB/div
Log
Ref 10.00 dBm
-22.49 dBm
Start 12.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 25.000 GHz
Sweep 1.20 s (10001 pts)
Frequency
Auto Tune
Center Freq
18.500000000 GHz
Start Freq
12.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.300000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

Channel 15 (2475MHz)






Agilent Spectrum Analyzer - Swept SA
Start Freq 12.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
07:03:21 PM Jun 03, 2013
Mkr1 23.826 1 GHz
-56.621 dBm
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-22.68 dBm
Start 12.000 GHz
#Res BW 100 kHz
#VBW 1.0 MHz
Stop 25.000 GHz
Sweep 1.20 s (10001 pts)
Frequency
Auto Tune
Center Freq
18.500000000 GHz
Start Freq
12.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.300000000 GHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

6. Band Edge

6.1. Test Equipment

RF Radiated Measurement:

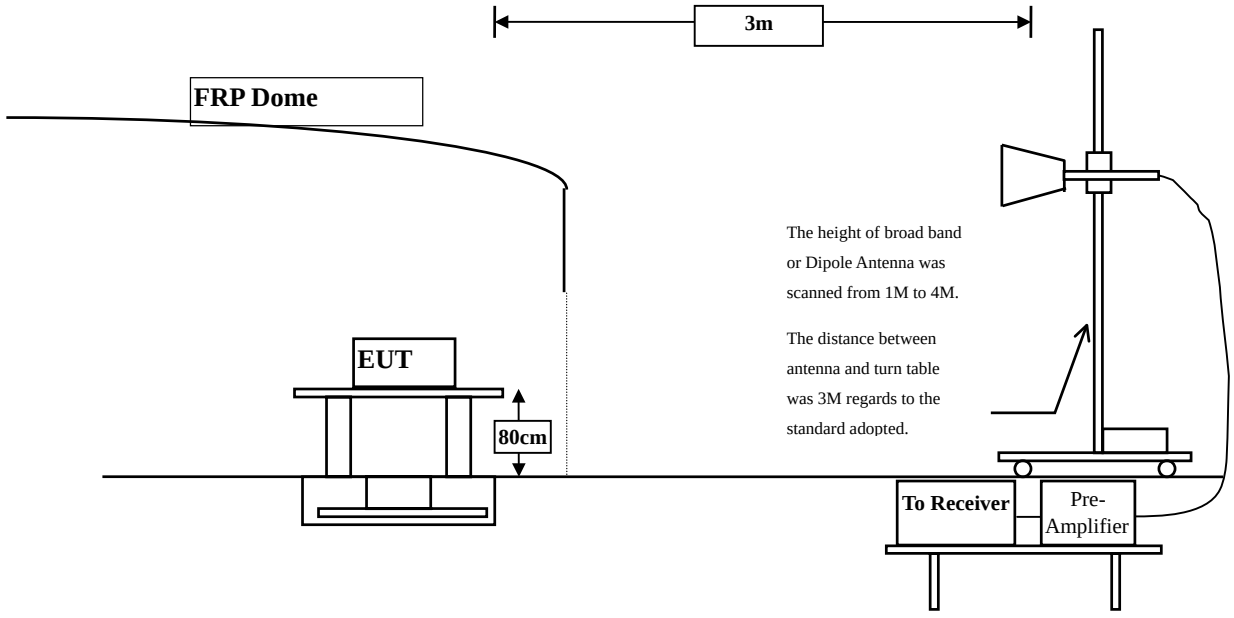
The following test equipments are used during the band edge tests:

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
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	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 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 KDB 558074 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

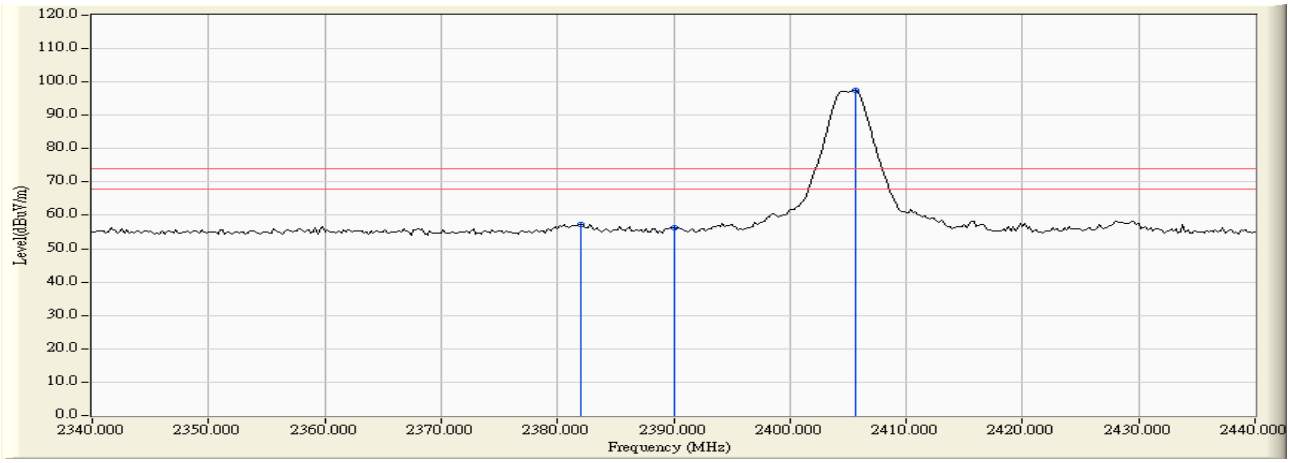
6.6. Test Result of Band Edge

Product : modlet gateway
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405MHz)

RF Radiated Measurement (Horizontal):

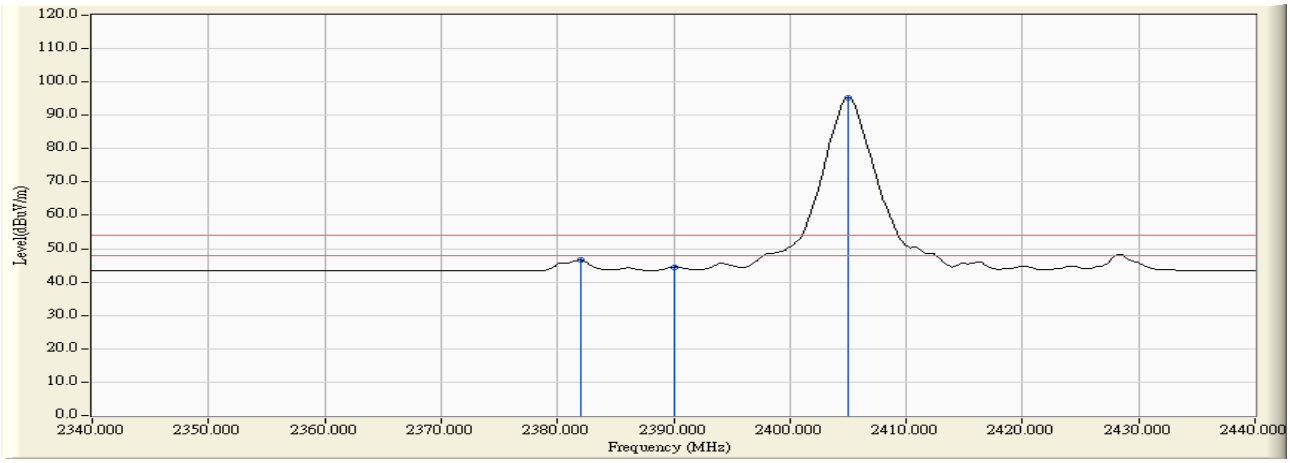
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
01 (Peak)	2382.000	31.478	25.804	57.282	-16.718	74.000	Pass
01 (Peak)	2390.000	31.509	24.790	56.299	-17.701	74.000	Pass
01 (Peak)	2405.600	31.596	65.815	97.411	--	--	--
01 (Average)	2382.000	31.478	15.072	46.550	-7.450	54.000	Pass
01 (Average)	2390.000	31.509	13.046	44.555	-9.445	54.000	Pass
01 (Average)	2405.000	31.593	63.627	95.220	--	--	--

Figure Channel 01: Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 01: Horizontal (Average)



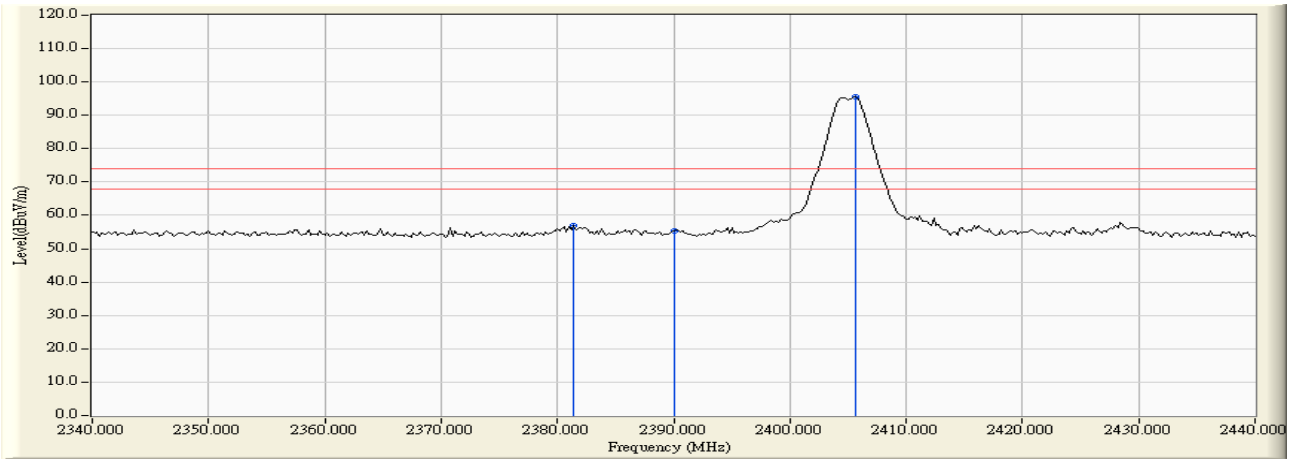
Note: RBW=1MHz, VBW=10Hz, Sweep=Auto

Product : modlet gateway
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405MHz)

RF Radiated Measurement (Vertical):

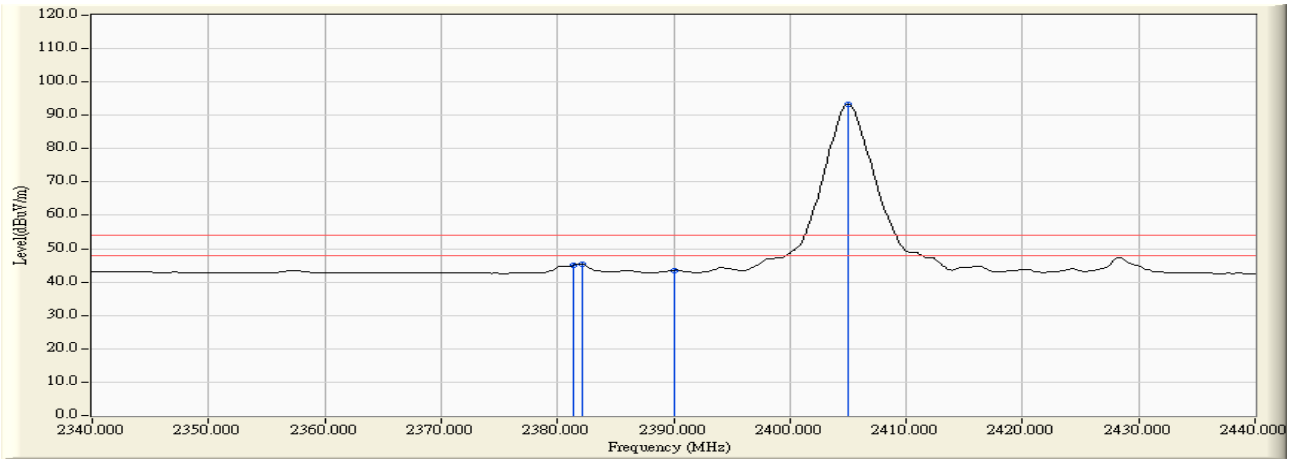
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
01 (Peak)	2381.400	30.955	26.007	56.962	-17.038	74.000	Pass
01 (Peak)	2390.000	30.915	24.325	55.240	-18.760	74.000	Pass
01 (Peak)	2405.600	30.927	64.480	95.407	--	--	--
01 (Average)	2381.400	30.955	14.162	45.117	-8.883	54.000	Pass
01 (Average)	2382.200	30.951	14.348	45.299	-8.701	54.000	Pass
01 (Average)	2390.000	30.915	12.677	43.592	-10.408	54.000	Pass
01 (Average)	2405.000	30.926	62.293	93.219	--	--	--

Figure Channel 01: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 01: Vertical (Average)



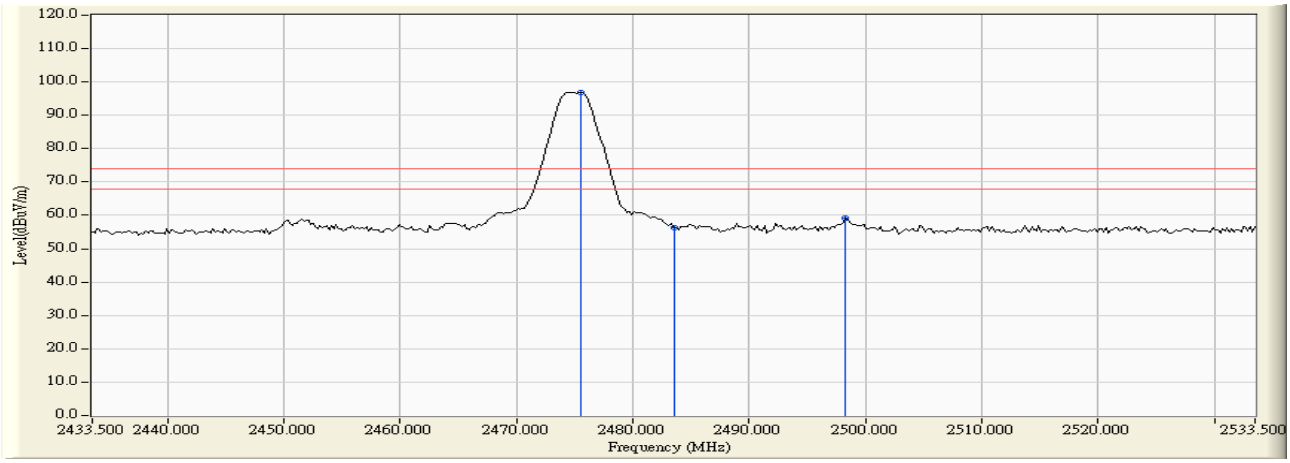
Note: RBW=1MHz, VBW=10Hz, Sweep=Auto

Product : modlet gateway
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2475MHz)

RF Radiated Measurement (Horizontal):

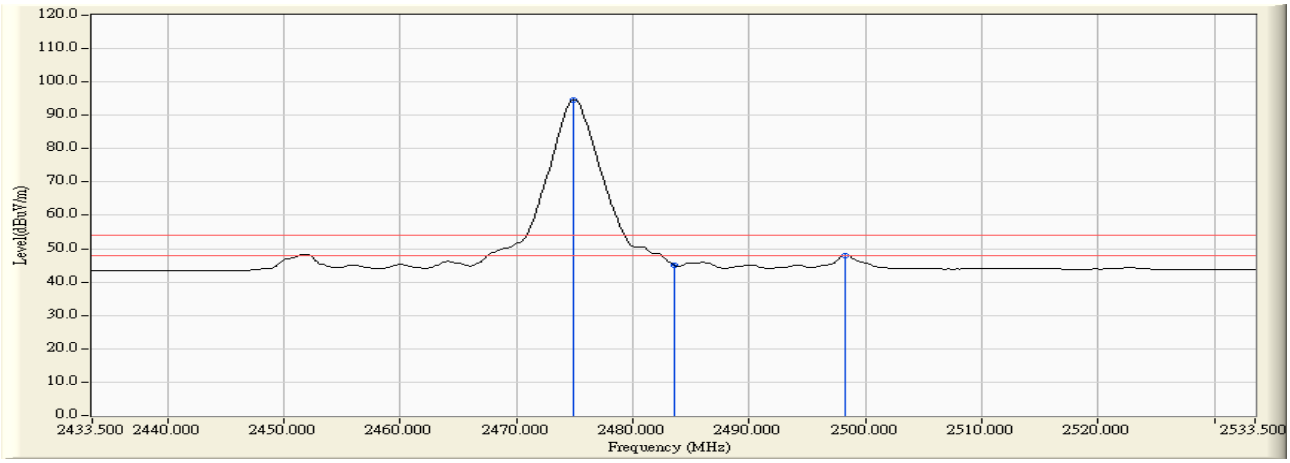
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
15 (Peak)	2475.500	32.121	64.830	96.951	--	--	--
15 (Peak)	2483.500	32.182	24.072	56.254	-17.746	74.000	Pass
15 (Peak)	2498.300	32.273	26.802	59.075	-14.925	74.000	Pass
15 (Average)	2474.900	32.117	62.612	94.729	--	--	--
15 (Average)	2483.500	32.182	12.962	45.144	-8.856	54.000	Pass
15 (Average)	2498.300	32.273	15.652	47.925	-6.075	54.000	Pass

Figure Channel 15: Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 15: Horizontal (Average)



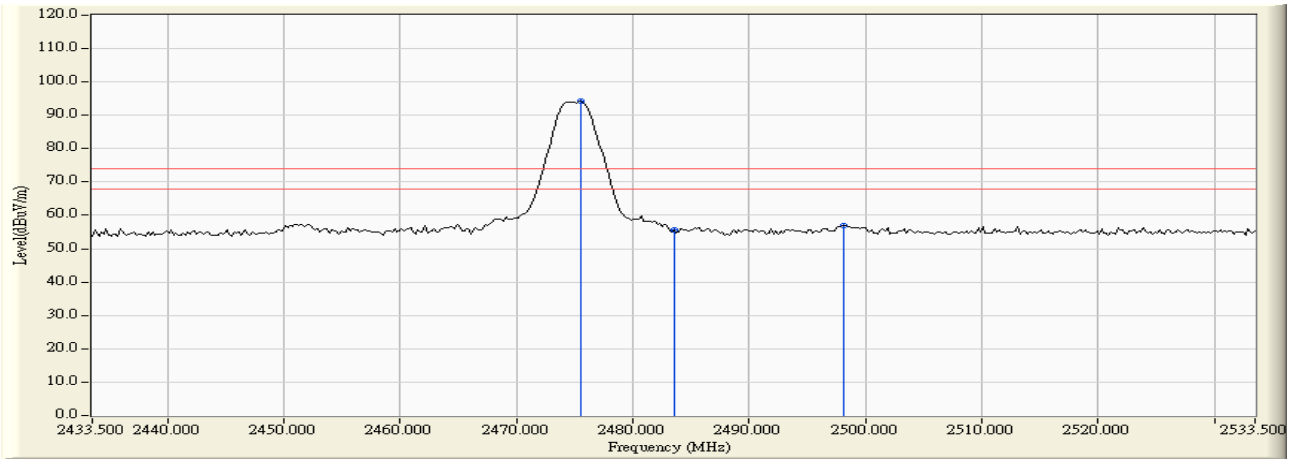
Note: RBW=1MHz, VBW=10Hz, Sweep=Auto

Product : modlet gateway
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2475MHz)

RF Radiated Measurement (Vertical):

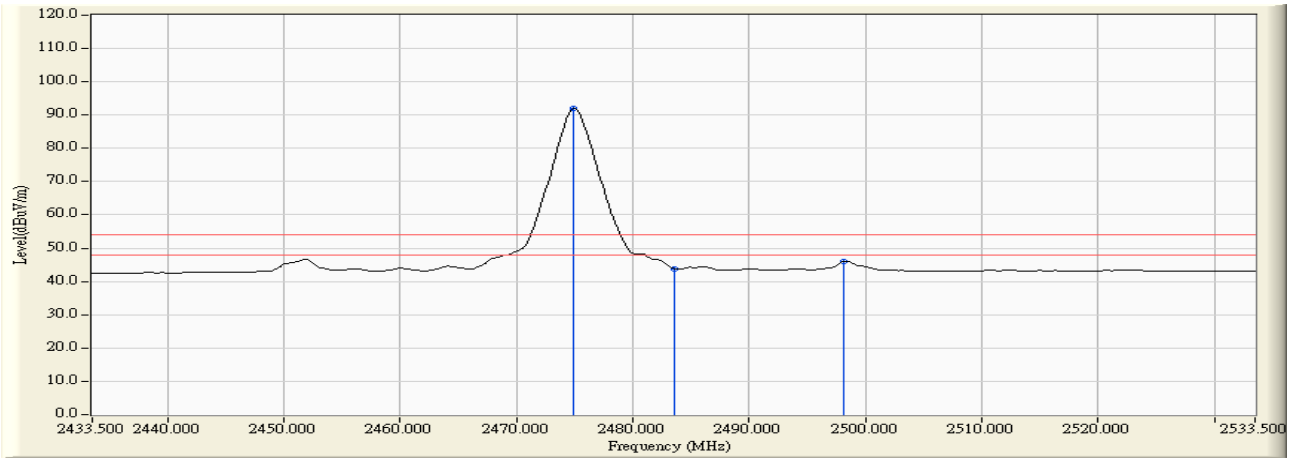
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
15 (Peak)	2475.500	31.381	62.751	94.132	--	--	--
15 (Peak)	2483.500	31.435	24.139	55.574	-18.426	54.000	Pass
15 (Peak)	2498.100	31.524	25.344	56.868	-17.132	54.000	Pass
15 (Average)	2474.900	31.378	60.508	91.885	--	--	--
15 (Average)	2483.500	31.435	12.475	43.910	-10.090	54.000	Pass
15 (Average)	2498.100	31.524	14.519	46.043	-7.957	54.000	Pass

Figure Channel 15: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 15: Vertical (Average)



Note: RBW=1MHz, VBW=10Hz, Sweep=Auto

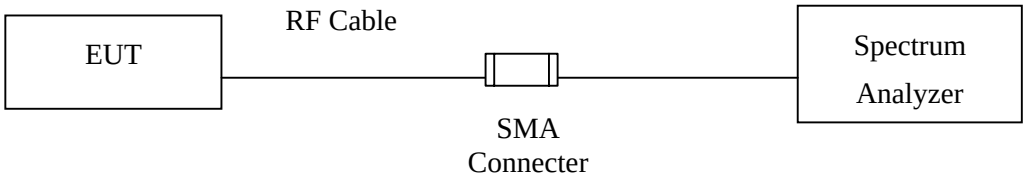
7. Occupied Bandwidth

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

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 C63.10, 2009; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

7.5. Uncertainty

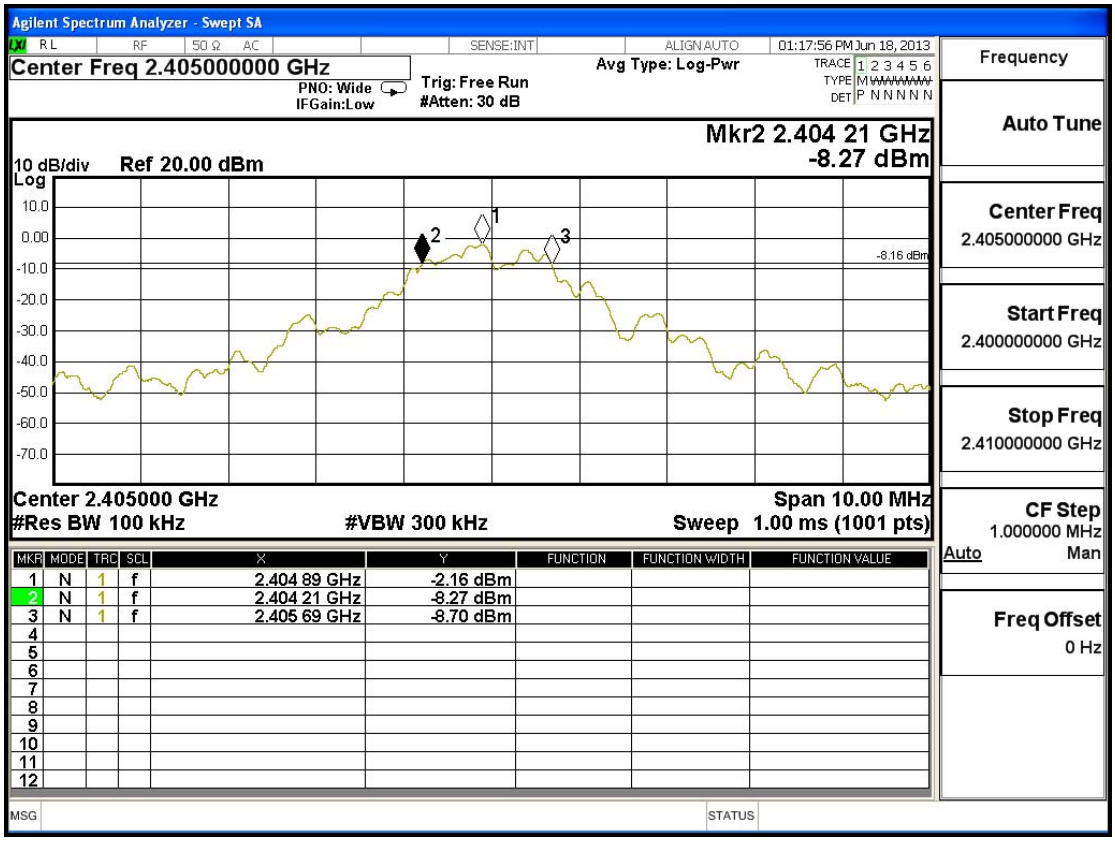
± 150Hz

7.6. Test Result of Occupied Bandwidth

Product : modlet gateway
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	14800	>500	Pass

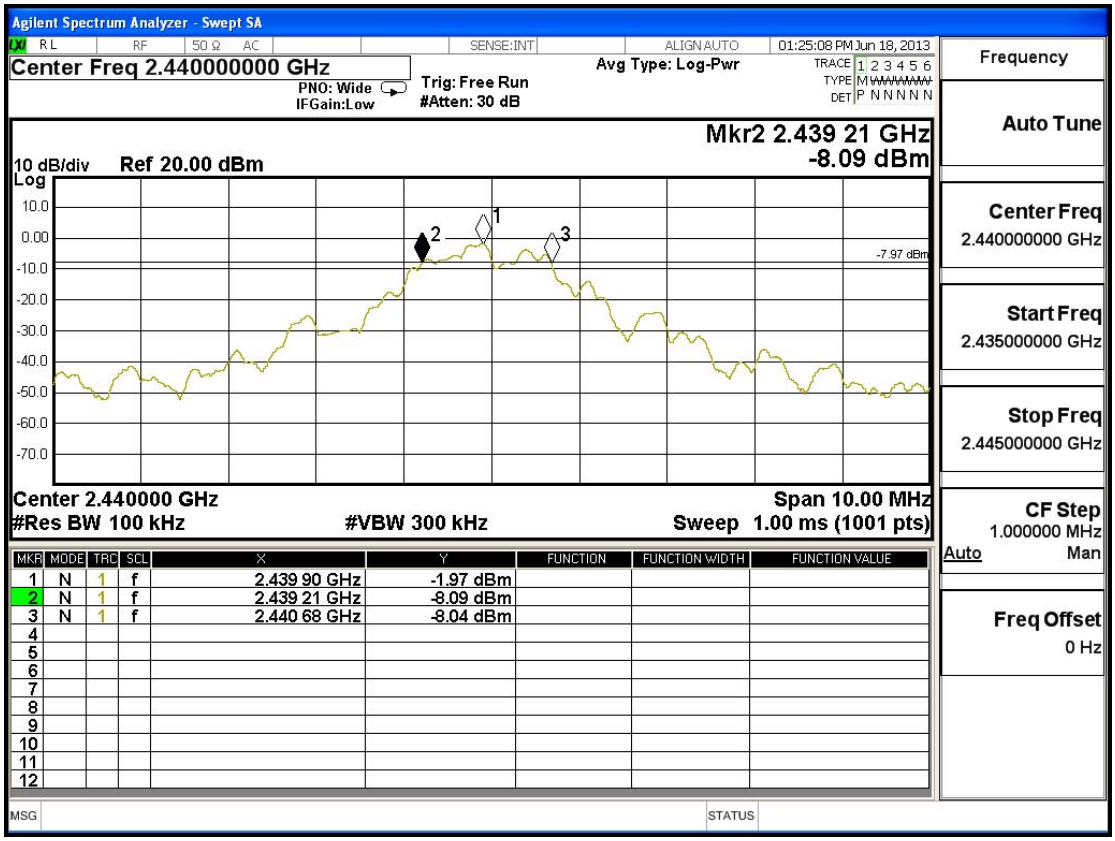
Figure Channel 01:



Product : modlet gateway
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	14700	>500	Pass

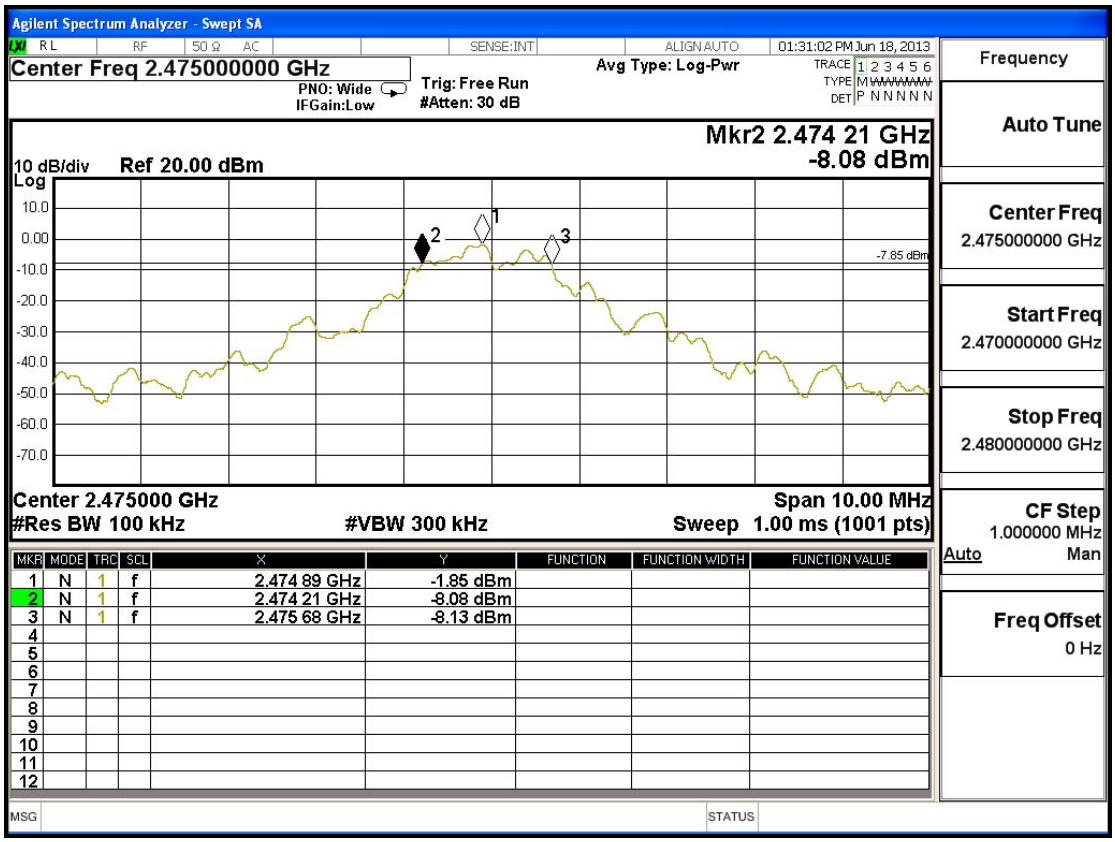
Figure Channel 08:



Product : modlet gateway
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	14700	>500	Pass

Figure Channel 15:



8. Power Density

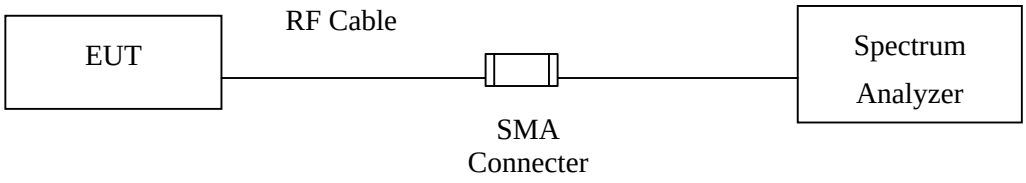
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note: 1. All equipments are calibrated every one year.

1. 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 100kHz bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.5. Uncertainty

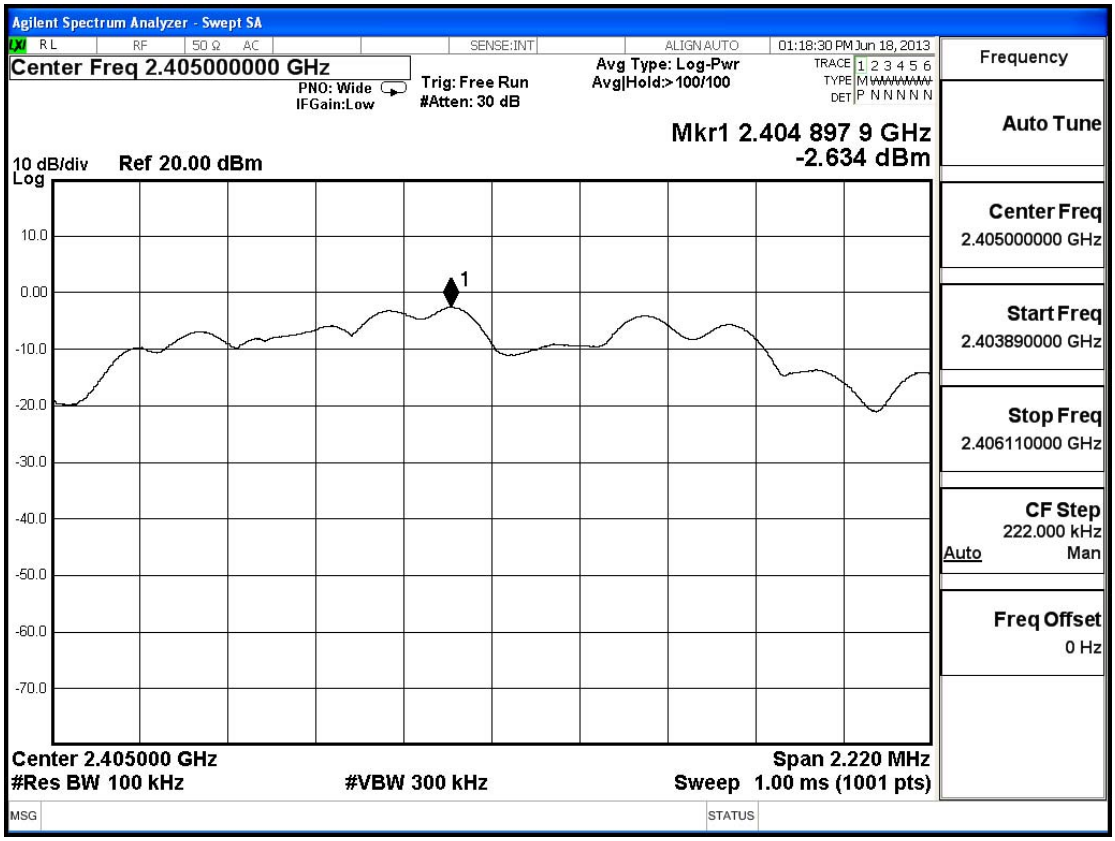
± 1.27 dB

8.6. Test Result of Power Density

Product : modlet gateway
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	-2.634	< 8dBm	Pass

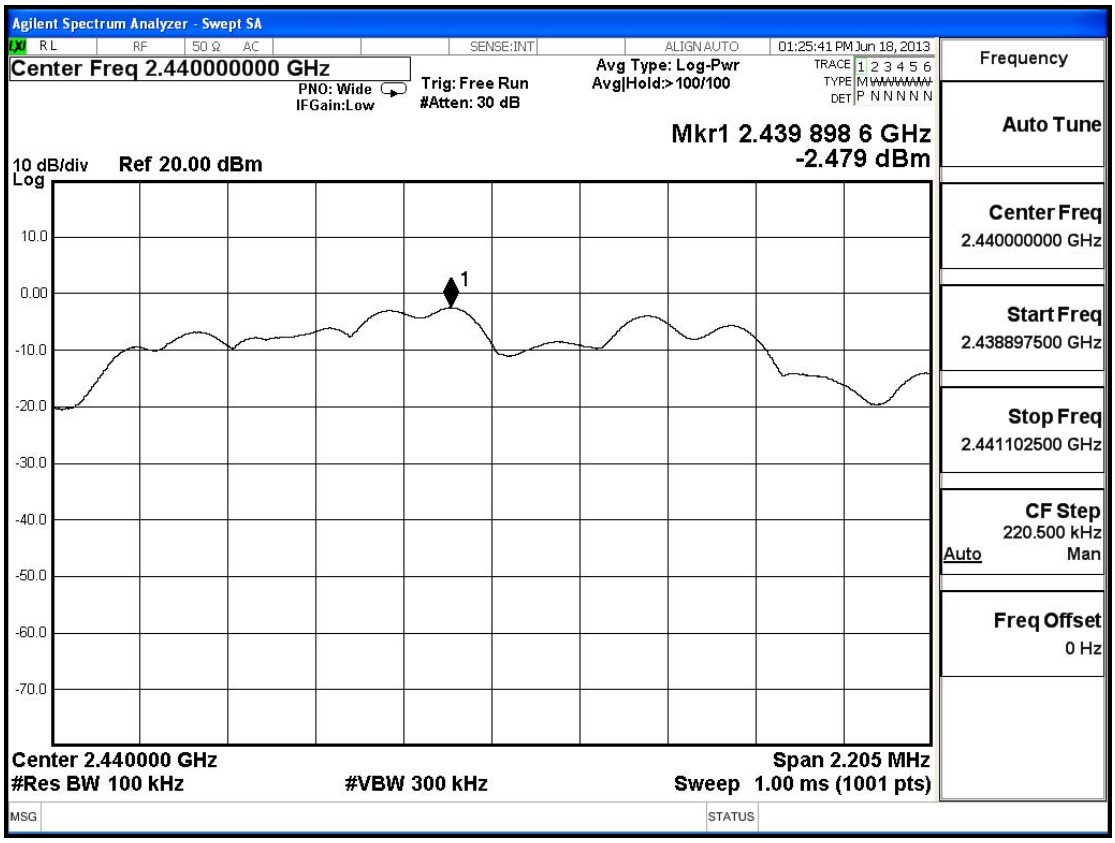
Figure Channel 01:



Product : modlet gateway
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	-2.479	< 8dBm	Pass

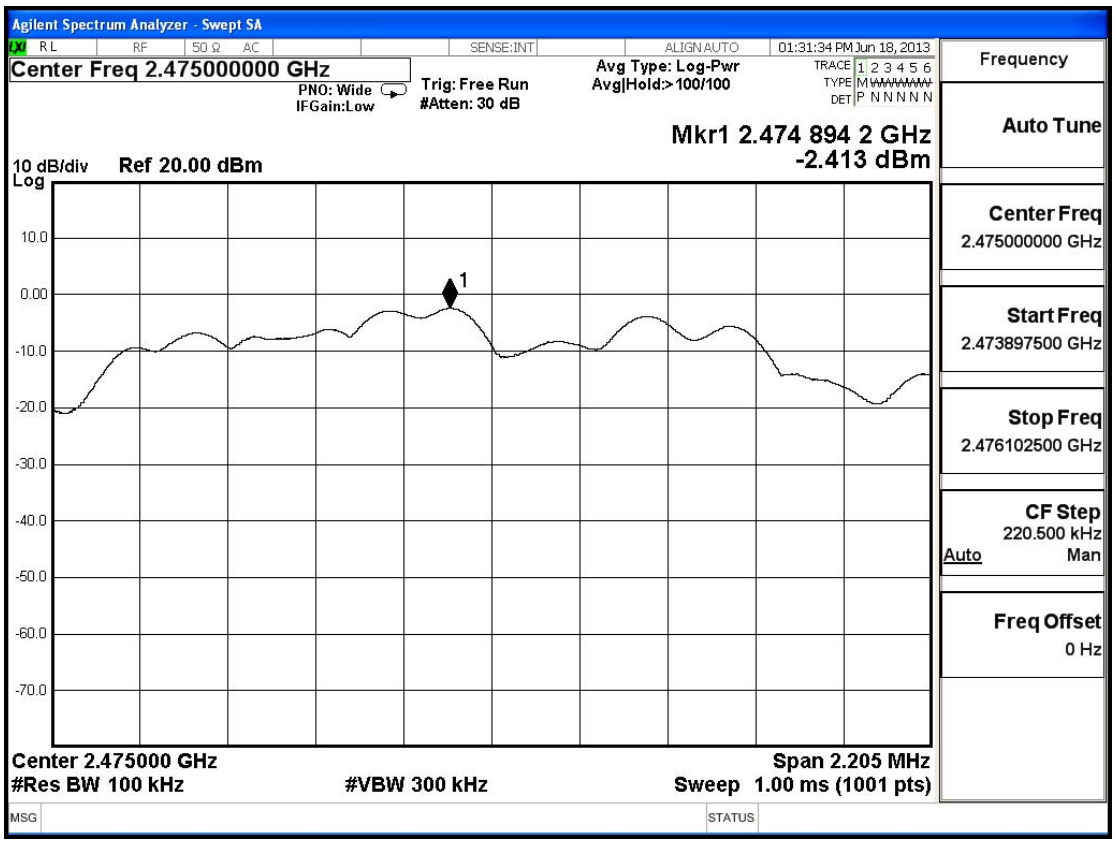
Figure Channel 08:



Product : modlet gateway
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	-2.413	< 8dBm	Pass

Figure Channel 15:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.