

# FCC Test Report

Product Name	Network Media Module
Model No.	CY920-24C
FCC ID.	ZQO-CY92024C

Applicant	MICROCHIP TECHNOLOGY INC.
Address	2355 West Chandler Blvd.Chandler, Arizona, USA 85224-6199

Date of Receipt	Jun. 04, 2014
Issued Date	Jun. 26, 2014
Report No.	1460175R-RFUSP26V00-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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# Test Report

Issued Date: Jun. 26, 2014

Report No.: 1460175R-RFUSP26V00-A



Product Name	Network Media Module
Applicant	MICROCHIP TECHNOLOGY INC.
Address	2355 West Chandler Blvd. Chandler, Arizona, USA 85224-6199
Manufacturer	(1) Lite-On Technology (Changzhou) Co., Ltd. (2) Lite-On Network Communication (Dongguan) Limited
Model No.	CY920-24C
FCC ID.	ZQO-CY92024C
EUT Rated Voltage	DC 3.3V
EUT Test Voltage	AC 120V/ 60Hz
Trade Name	Network Media Module
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2014 ANSI C63.10: 2009
Test Result	Complied

Documented By

:

A handwritten signature in blue ink that appears to read "Leven Huang".

(Senior Adm. Specialist / Leven Huang )

Tested By

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A handwritten signature in blue ink that appears to read "Jack Hsu".

( Engineer / Jack Hsu )

Approved By

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( Director / Vincent Lin )

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

Attachment 3: Pretest Data

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Network Media Module
Trade Name	Network Media Module
Model No.	CY920-24C
FCC ID.	ZQO-CY92024C
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	Dipole Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

### Antenna List:

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	WALSIN	PI_RFDPA870920IMLB301_V01	Dipole Antenna	1.84dBi for 2.4 GHz
2	WALSIN	PI_RFDPA870930IMLB301_V01	Dipole Antenna	1.10dBi for 2.4 GHz
3	WALSIN	RFDPA870930IMAB301	Dipole Antenna	1.20dBi for 2.4 GHz
4	WALSIN	RFDPA870945IMAB301	Dipole Antenna	1.16dBi for 2.4 GHz
5	WALSIN	RFDPA870900SBAB801 + RFCBA100630SA6B301	Dipole Antenna	0.7dBi for 2.4 GHz
6	WALSIN	RFDPA870900SBAB801 + RFCBA100645SA6B301	Dipole Antenna	0.1dBi 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

## Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

## Note:

1. The EUT is a Network Media Module with a built-in WLAN Transceiver and Bluetooth Transceiver, this report is for Bluetooth
2. Module contains two antenna ports, measurements only in worst case is shown in the report.
3. Antenna no.1 and no.2 has divided into with core / without core, only worst case is shown in the report.
4. Module's DDR / FLASH/antenna connector/64 pin connector includes 2nd Source, the test item conducted emission and 30MHz – 1GHz radiated emission are tested at two modules (see report attachment 3) , brand differences are as follows:

	main source	2nd source
Flash	Macronix	WINBOND
DDR	ESMT	ERTON
64pin connector	Xinya	Xisheng
u.fl	IPEX	ELECTRIC CONNECTOR

5. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
6. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
7. Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through pre-testing, to produce emissions similar to those for 3Mb/s.

Test Mode	Mode 1: Transmit - 1Mbps (GFSK) Mode 2: Transmit - 3Mbps (8DPSK)
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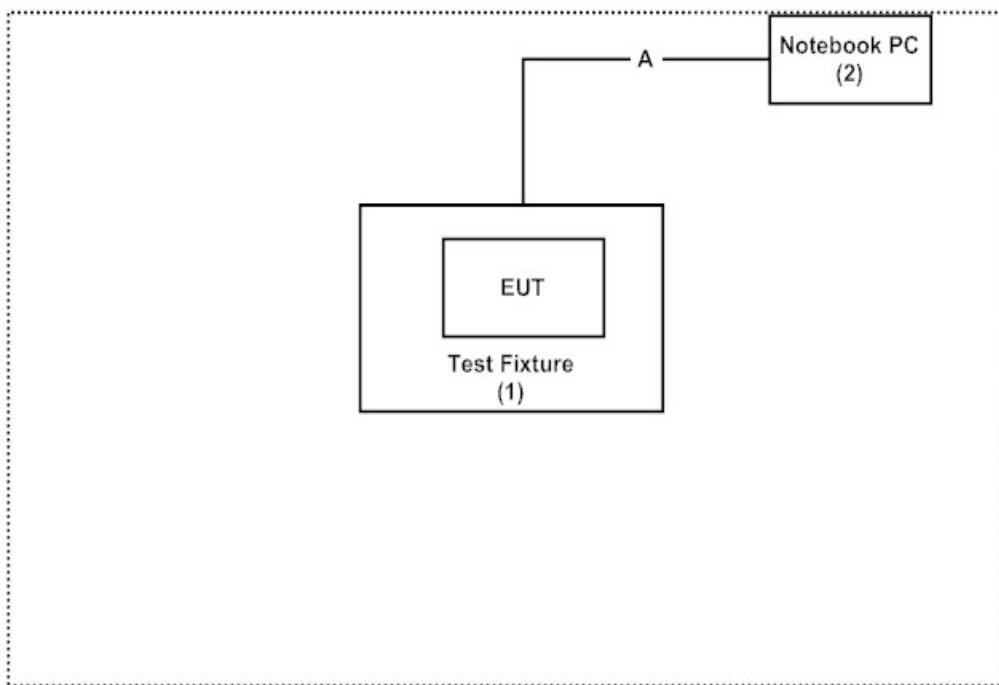
### 1.3. Tested System Details

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	Liteon	N/A	N/A	N/A
2 Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m

Signal Cable Type	Signal cable Description
A USB to RS-232 Cable	Shielded, 1.5m

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute “Hyper Terminal v5.1” program on the Notebook PC.
- (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	30-65
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:  
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FCC Accreditation Number: TW1014

## 2. Conducted Emission

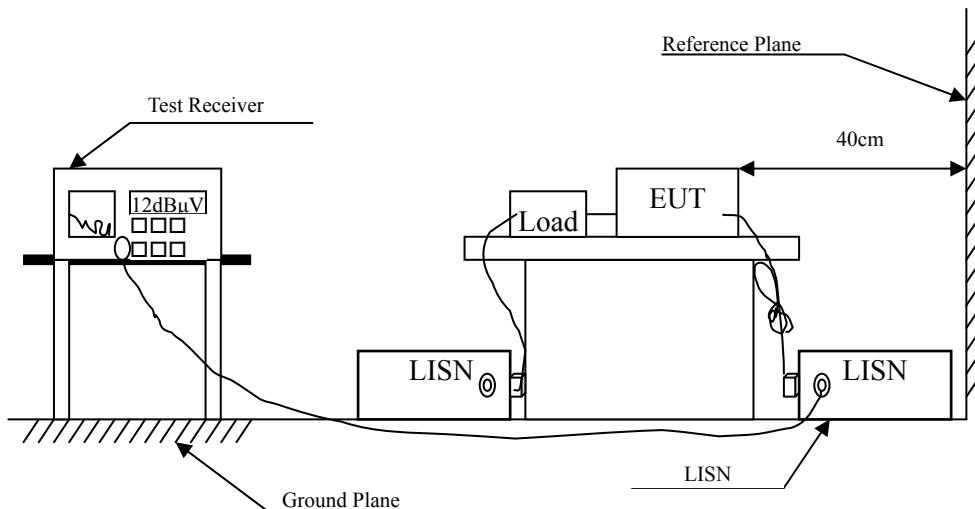
### 2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2013	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2014	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2014	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2014	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2014	
	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 (dB $\mu$ V) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

### 2.4. Test Procedure

The EUT and Peripherals 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 refer 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 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.

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

### 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Network Media Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency MHz	Correct Factor	Reading Level dB	Measurement Level dB $\mu$ V	Margin dB	Limit dB $\mu$ V
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.154	9.790	51.360	61.150	-4.736	65.886
0.177	9.790	44.530	54.320	-10.909	65.229
0.193	9.790	44.730	54.520	-10.251	64.771
0.224	9.790	39.330	49.120	-14.766	63.886
0.287	9.790	31.970	41.760	-20.326	62.086
0.673	9.790	26.900	36.690	-19.310	56.000
<b>Average</b>					
0.154	9.790	38.950	48.740	-7.146	55.886
0.177	9.790	30.200	39.990	-15.239	55.229
0.193	9.790	31.440	41.230	-13.541	54.771
0.224	9.790	25.760	35.550	-18.336	53.886
0.287	9.790	18.290	28.080	-24.006	52.086
0.673	9.790	15.890	25.680	-20.320	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

Product : Network Media Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB $\mu$ V	dB $\mu$ V	dB	dB $\mu$ V
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.158	9.770	49.570	59.340	-6.431	65.771
0.170	9.770	45.550	55.320	-10.109	65.429
0.201	9.770	42.260	52.030	-12.513	64.543
0.244	9.770	36.330	46.100	-17.214	63.314
0.310	9.770	29.190	38.960	-22.469	61.429
0.662	9.770	35.670	45.440	-10.560	56.000
<b>Average</b>					
0.158	9.770	36.560	46.330	-9.441	55.771
0.170	9.770	31.050	40.820	-14.609	55.429
0.201	9.770	28.300	38.070	-16.473	54.543
0.244	9.770	23.250	33.020	-20.294	53.314
0.310	9.770	15.660	25.430	-25.999	51.429
0.662	9.770	26.750	36.520	-9.480	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

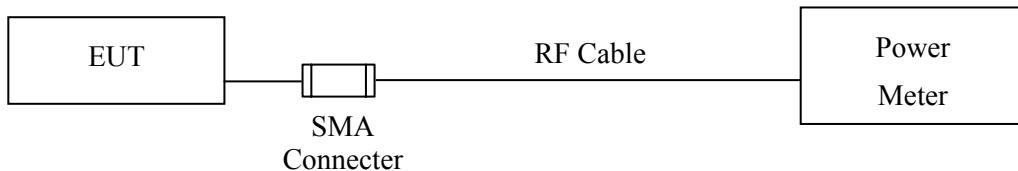
### 3. Peak Power Output

#### 3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2014
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2014

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

#### 3.2. Test Setup



#### 3.3. Limit

The maximum peak power shall be less 1Watt.

#### 3.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

#### 3.5. Uncertainty

± 1.27 dB

### 3.6. Test Result of Peak Power Output

Product : Network Media Module  
Test Item : Peak Power Output  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	2.20	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.35	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.03	1 Watt= 30 dBm	Pass

Product : Network Media Module  
Test Item : Peak Power Output  
Test Site : No.3 OATS  
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	1.60	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.28	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.46	1 Watt= 30 dBm	Pass

## 4. Radiated Emission

### 4.1. Test Equipment

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

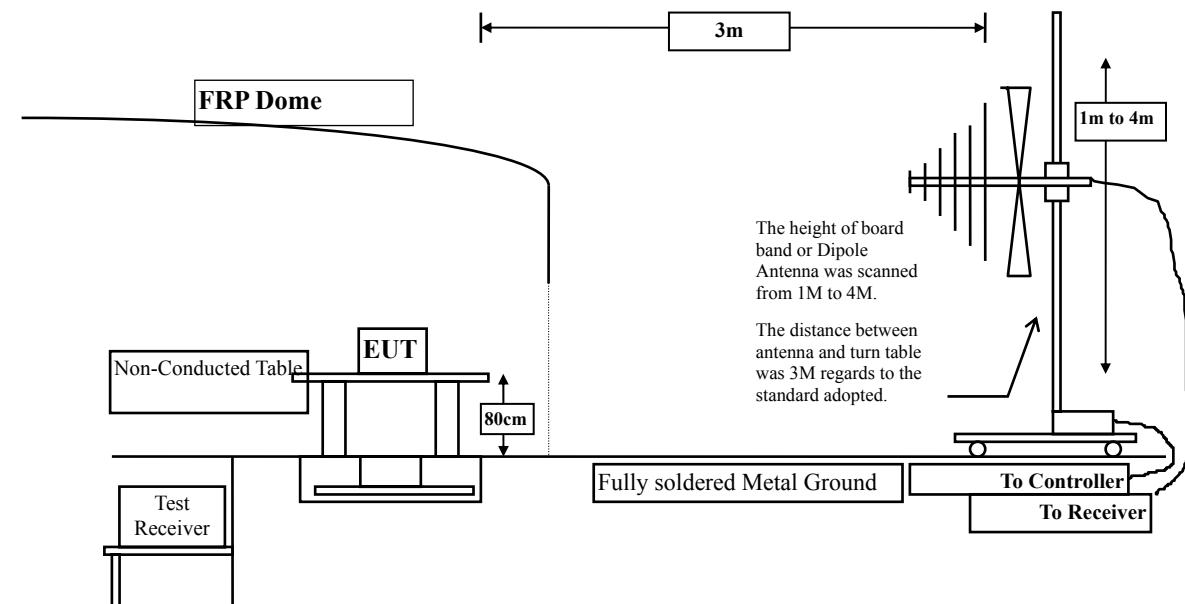
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X Loop Antenna		Teseq	HLA6120 / 26739	Jul., 2013
	X Bilog Antenna		Schaffner Chase	CBL6112B/2673	Sep., 2013
	X Horn Antenna		Schwarzbeck	BBHA9120D/D305	Sep., 2013
	X Horn Antenna		Schwarzbeck	BBHA9170/208	Jul., 2013
	X Pre-Amplifier		Agilent	8447D/2944A09549	Sep., 2013
	X Spectrum Analyzer		Agilent	E4407B / US39440758	May, 2014
	X Test Receiver		R & S	ESCS 30/ 825442/018	Sep., 2013
	X Coaxial Cable		QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	X Controller		QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch		Anritsu	MP59B/6200265729	N/A

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

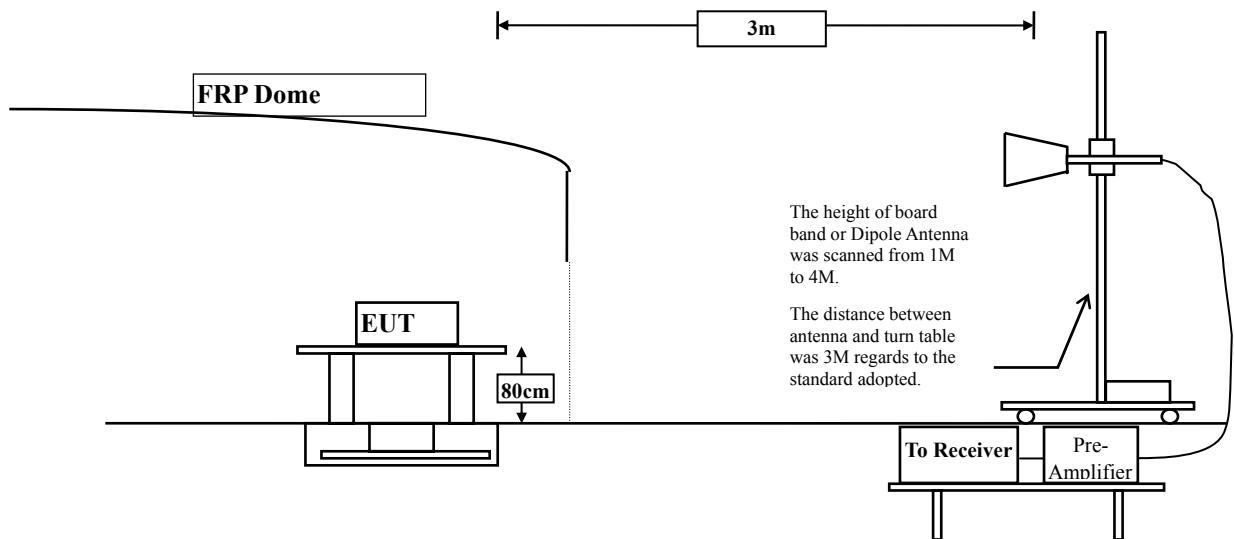
2. The test instruments marked by “X” are used to measure the final test results.

### 4.2. Test Setup

Below 1GHz



Above 1GHz



#### 4.3. Limits

##### ➤ General Radiated Emission 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 Limits		
Frequency MHz	uV/m @3m	dB $\mu$ V/m@3m
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:
1. RF Voltage (dB $\mu$ V) =  $20 \log_{10}$  RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

#### 4.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 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.

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 on the Final Measurement.

The measurement frequency range from 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 : Network Media Module  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2402MHz)

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4804.000	3.327	37.870	41.197	-32.803	74.000
7206.000	10.136	36.980	47.116	-26.884	74.000
9608.000	13.706	36.080	49.786	-24.214	74.000
<b>Average</b>					
<b>Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4804.000	6.638	42.350	48.987	-25.013	74.000
7206.000	11.005	39.320	50.325	-23.675	74.000
9608.000	14.103	35.800	49.903	-24.097	74.000
<b>Average</b>					
<b>Detector:</b>					
--					

##### 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 : Network Media Module  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB $\mu$ V	dB $\mu$ V/m	dB	dB $\mu$ V/m

### Horizontal

**Peak Detector:**

4882.000	3.001	37.470	40.471	-33.529	74.000
7323.000	11.846	35.650	47.497	-26.503	74.000
9764.000	12.563	36.560	49.123	-24.877	74.000

**Average**

**Detector:**

--

### Vertical

**Peak Detector:**

4882.000	5.713	40.320	46.034	-27.966	74.000
7323.000	12.727	37.930	50.658	-23.342	74.000
9764.000	13.028	36.530	49.558	-24.442	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 : Network Media Module  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2480MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB $\mu$ V	dB $\mu$ V/m	dB	dB $\mu$ V/m

### Horizontal

**Peak Detector:**

4960.000	2.760	37.120	39.880	-34.120	74.000
7440.000	12.567	34.820	47.386	-26.614	74.000
9920.000	13.456	35.960	49.416	-24.584	74.000

**Average**

**Detector:**

--

### Vertical

**Peak Detector:**

4960.000	5.557	41.220	46.777	-27.223	74.000
7440.000	13.426	36.900	50.325	-23.675	74.000
9920.000	13.958	36.090	50.048	-23.952	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 : Network Media Module  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)(2402MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB $\mu$ V	dB $\mu$ V/m	dB	dB $\mu$ V/m

### Horizontal

**Peak Detector:**

4804.000	3.327	37.630	40.957	-33.043	74.000
7206.000	10.136	36.520	46.656	-27.344	74.000
9608.000	13.706	35.980	49.686	-24.314	74.000

**Average**

**Detector:**

--

### Vertical

**Peak Detector:**

4804.000	6.638	41.940	48.577	-25.423	74.000
7206.000	11.005	37.190	48.195	-25.805	74.000
9608.000	14.103	36.010	50.113	-23.887	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 : Network Media Module  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency MHz	Correct Factor	Reading Level dB	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
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**Horizontal****Peak Detector:**

4882.000	3.001	37.750	40.751	-33.249	74.000
7323.000	11.846	36.050	47.897	-26.103	74.000
9764.000	12.563	36.460	49.023	-24.977	74.000

**Average****Detector:**

--

**Vertical****Peak Detector:**

4882.000	5.713	40.090	45.804	-28.196	74.000
7323.000	12.727	37.490	50.218	-23.782	74.000
9764.000	13.028	36.290	49.318	-24.682	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 : Network Media Module  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB $\mu$ V	dB $\mu$ V/m	dB	dB $\mu$ V/m

**Horizontal****Peak Detector:**

4960.000	2.760	38.190	40.950	-33.050	74.000
7440.000	12.567	35.040	47.606	-26.394	74.000
9920.000	13.456	36.480	49.936	-24.064	74.000

**Average****Detector:**

--

**Vertical****Peak Detector:**

4960.000	5.557	40.010	45.567	-28.433	74.000
7440.000	13.426	35.570	48.995	-25.005	74.000
9920.000	13.958	36.270	50.228	-23.772	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 : Network Media Module  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Horizontal</b>					
165.800	-9.915	43.874	33.959	-9.541	43.500
301.600	-4.465	40.842	36.377	-9.623	46.000
480.080	1.870	38.047	39.917	-6.083	46.000
604.240	4.289	34.703	38.993	-7.007	46.000
800.180	6.417	32.657	39.074	-6.926	46.000
961.200	6.810	33.239	40.049	-13.951	54.000
<b>Vertical</b>					
113.420	-3.709	40.814	37.105	-6.395	43.500
231.760	-6.457	42.263	35.806	-10.194	46.000
398.600	-2.371	33.792	31.421	-14.579	46.000
540.220	2.169	34.846	37.015	-8.985	46.000
687.660	2.292	36.121	38.413	-7.587	46.000
870.020	-0.398	40.422	40.024	-5.976	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.

Product : Network Media Module  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB $\mu$ V	dB $\mu$ V/m	dB	dB $\mu$ V/m
<b>Horizontal</b>					
113.420	-7.449	40.814	33.365	-10.135	43.500
288.020	-5.557	42.486	36.929	-9.071	46.000
480.080	1.870	38.047	39.917	-6.083	46.000
658.560	1.892	37.005	38.897	-7.103	46.000
815.700	6.451	31.557	38.008	-7.992	46.000
932.100	7.270	31.279	38.549	-7.451	46.000
<b>Vertical</b>					
113.420	-3.709	40.814	37.105	-6.395	43.500
165.800	-4.665	43.874	39.209	-4.291	43.500
301.600	-3.985	40.842	36.857	-9.143	46.000
513.060	0.436	35.539	35.975	-10.025	46.000
689.600	2.302	36.228	38.530	-7.470	46.000
870.020	-0.398	40.422	40.024	-5.976	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.

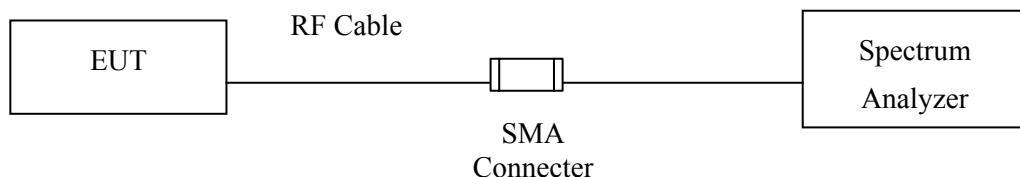
## 5. RF Antenna Conducted Test

### 5.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

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

### 5.2. Test Setup



### 5.3. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 5.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

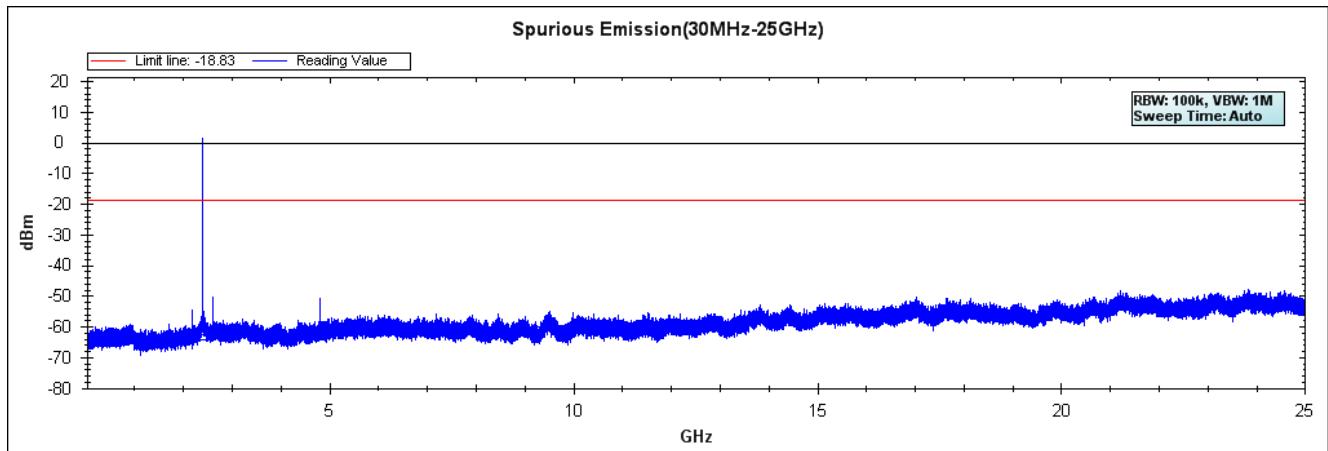
### 5.5. Uncertainty

± 150Hz

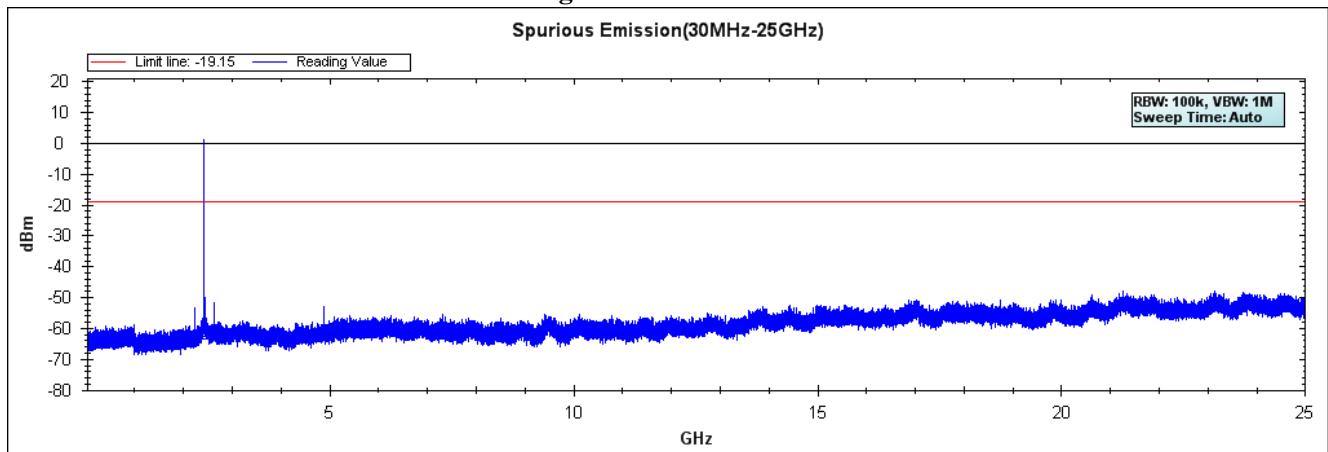
## 5.6. Test Result of RF Antenna Conducted Test

Product : Network Media Module  
 Test Item : RF Antenna Conducted Test  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

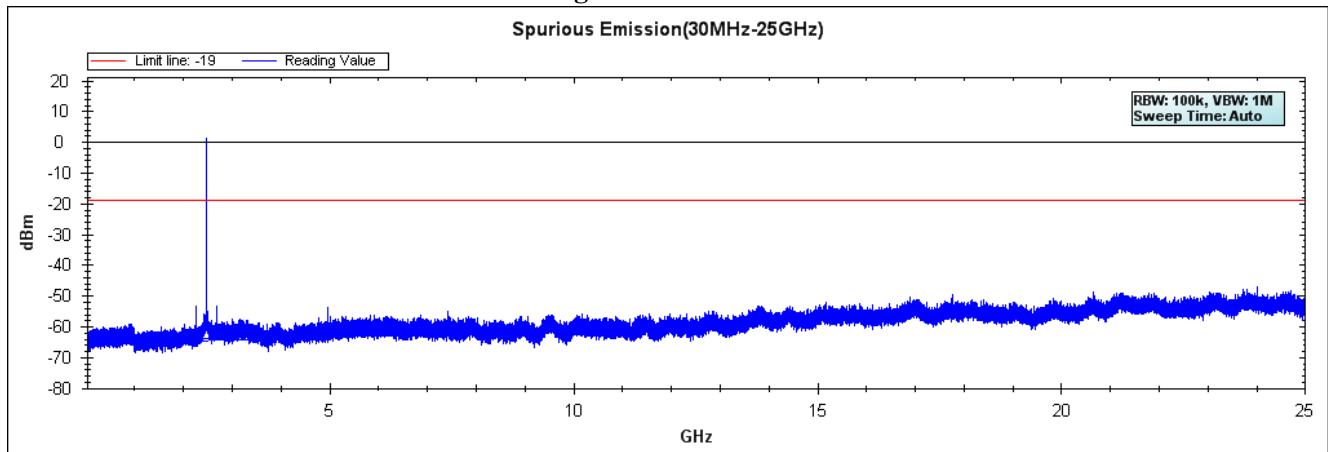
**Figure Channel 00:**



**Figure Channel 39:**



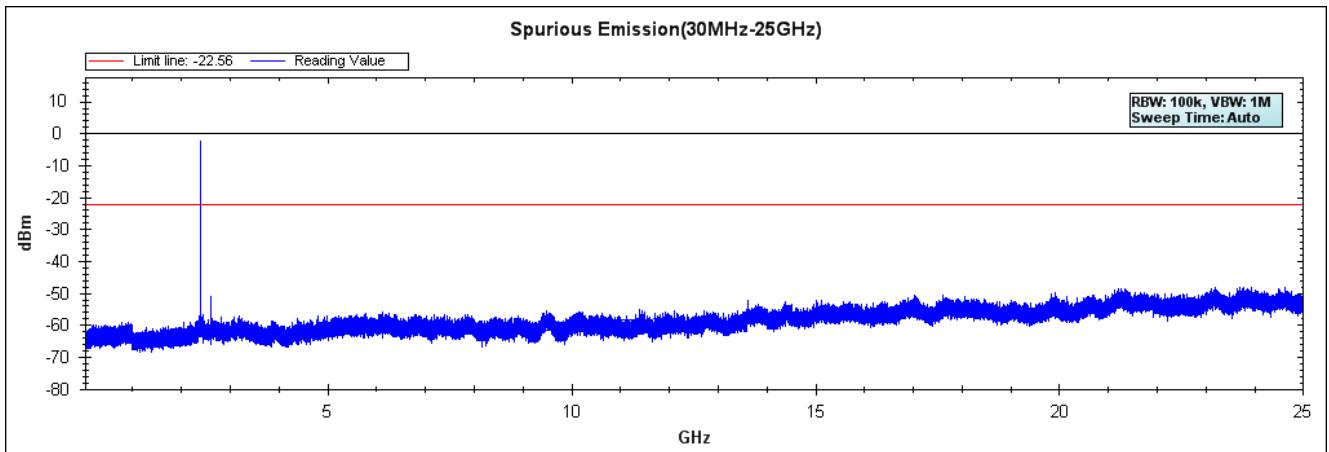
**Figure Channel 78:**



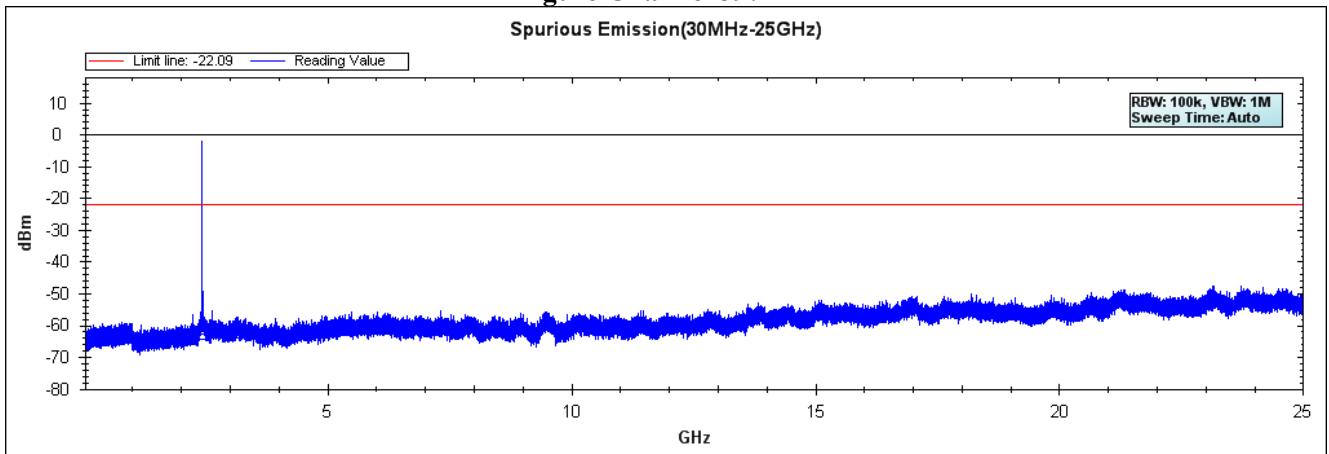
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Network Media Module  
 Test Item : RF Antenna Conducted Test  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

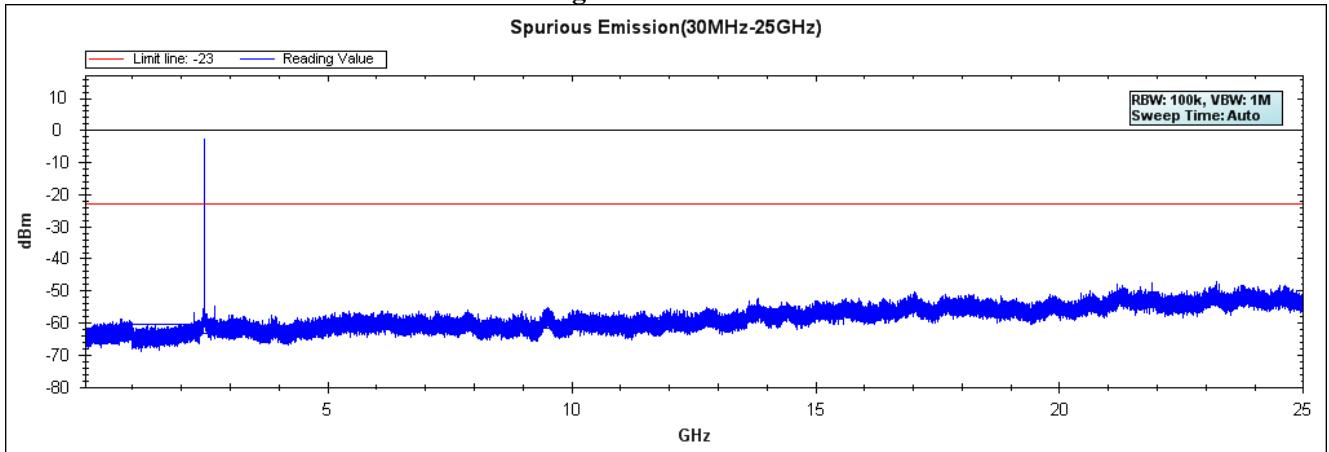
**Figure Channel 00:**



**Figure Channel 39:**



**Figure Channel 78:**



Note: The above test pattern is synthesized by multiple of the frequency range.

## 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, 2014
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

#### RF Radiated Measurement:

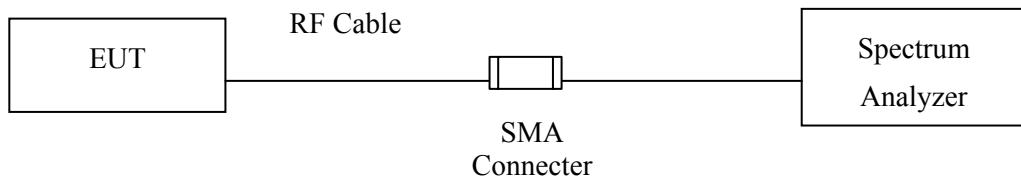
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2013
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2013
	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2013
	X Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2013
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2014
	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2013
	X Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	X Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

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

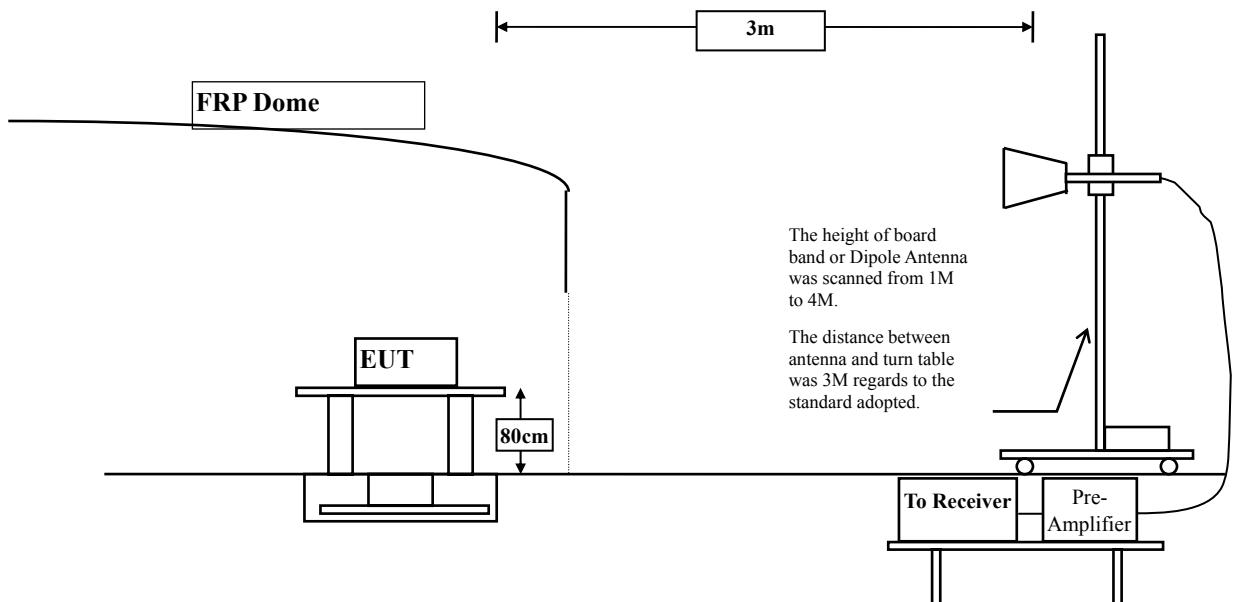
## 6.2. Test Setup

### RF Conducted Measurement



### RF Radiated Measurement:

Above 1GHz



### 6.3. Limit

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)).

### 6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

### 6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

## 6.6. Test Result of Band Edge

Product : Network Media Module  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dB $\mu$ V]	Emission Level [dB $\mu$ V/m]	Detector
Horizontal	2402	31.572	59.565	91.137	Peak
Horizontal	2402	31.573	59.100	90.674	Average
Vertical	2402	30.917	65.273	96.190	Peak
Vertical	2402	30.917	64.839	95.756	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 (dB $\mu$ V/m)	$\Delta$ (dB)	Band Edge Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Detector
Horizontal	2378.4	91.137	47.83	43.307	74.000	Peak
Horizontal	2376	90.674	60.05	30.624	54.000	Average
Vertical	2378.4	96.190	47.83	48.360	74.000	Peak
Vertical	2376	95.756	60.05	35.706	54.000	Average

Note:

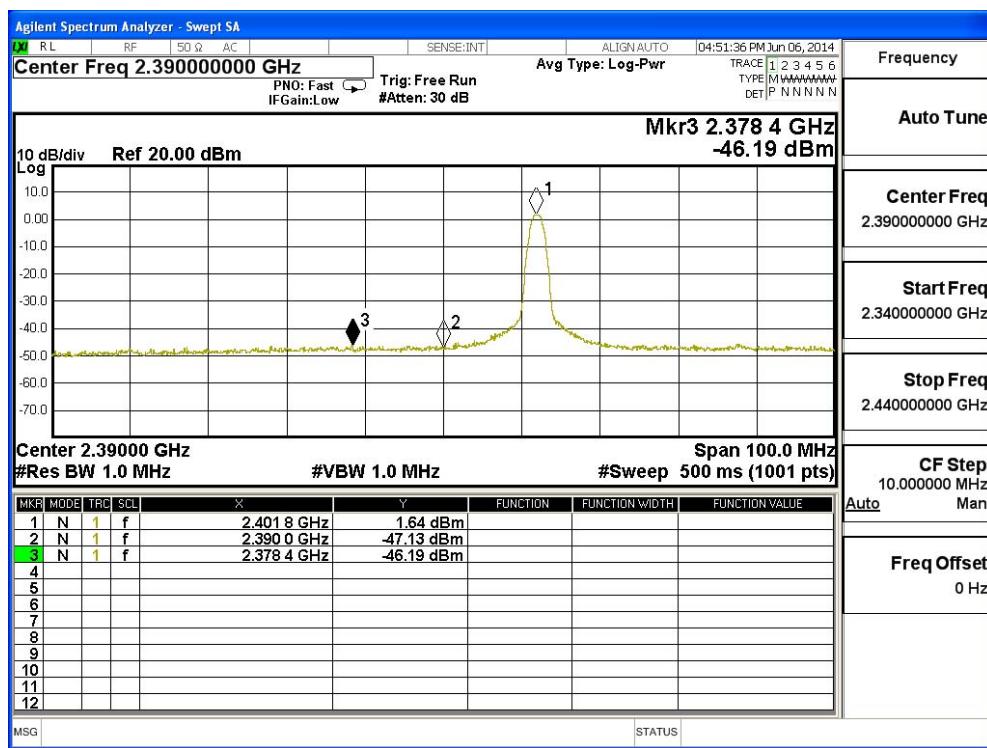
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

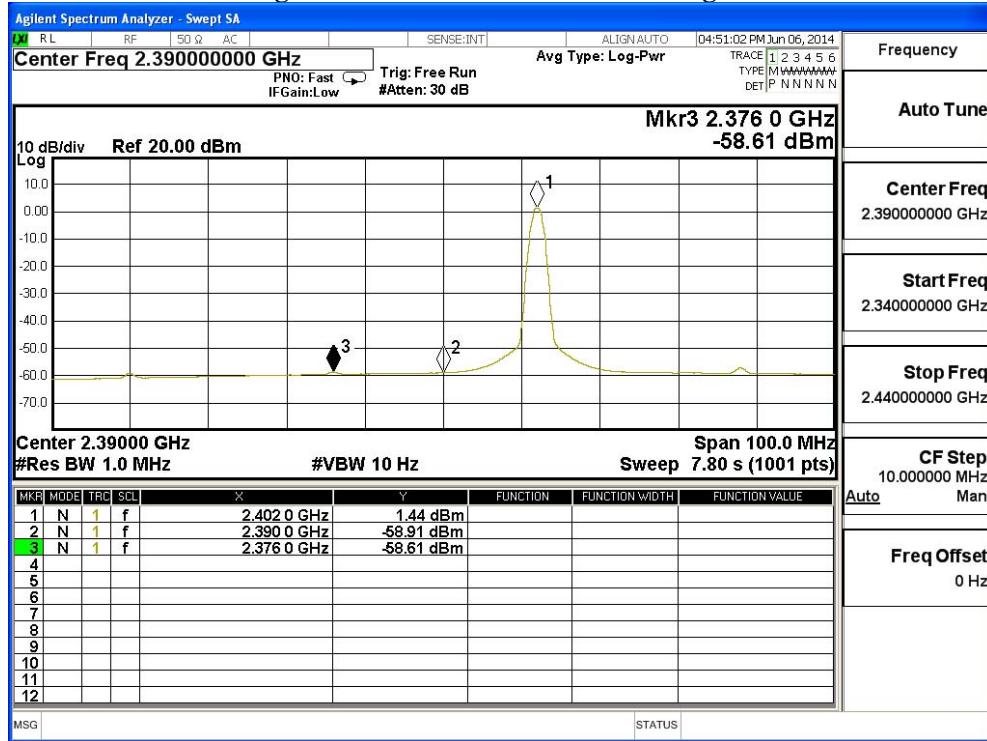
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



Product : Network Media Module  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dB $\mu$ V]	Emission Level [dB( $\mu$ V/m)]	Detector
Horizontal	2480	32.157	56.986	89.142	Peak
Horizontal	2480	32.155	56.472	88.627	Average
Vertical	2480	31.410	62.425	93.835	Peak
Vertical	2480	31.411	61.971	93.382	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 ( $\text{dB}\mu\text{V}/\text{m}$ )	$\Delta$ (dB)	Band Edge Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ )	Limit ( $\text{dB}\mu\text{V}/\text{m}$ )	Detector
Horizontal	2483.9	89.142	41.08	48.062	74.000	Peak
Horizontal	2483.5	88.627	52.86	35.767	54.000	Average
Vertical	2483.9	93.835	41.08	52.755	74.000	Peak
Vertical	2483.5	93.382	52.86	40.522	54.000	Average

Note:

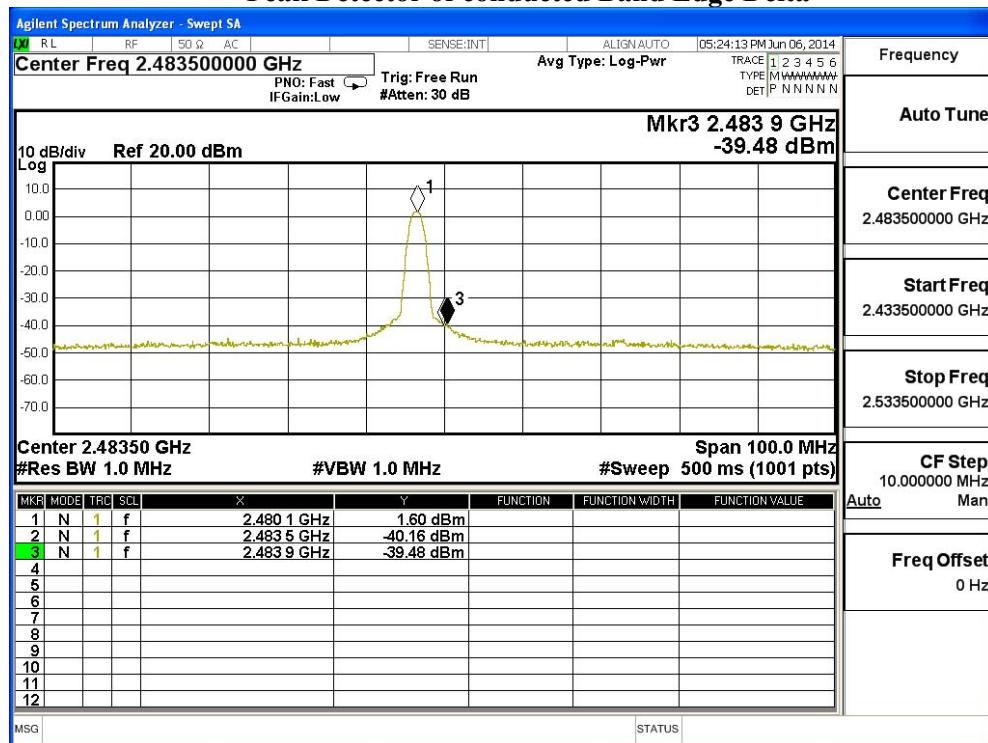
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

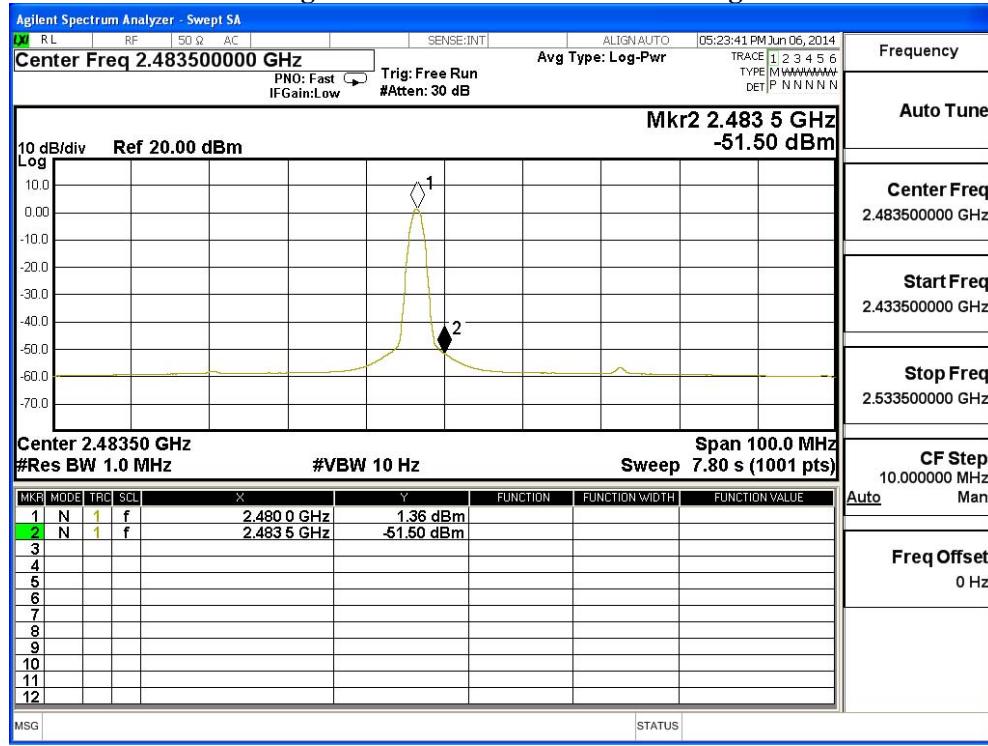
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



Product : Network Media Module  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dB $\mu$ V]	Emission Level [dB $\mu$ V/m]	Detector
Horizontal	2402	31.573	58.098	89.672	Peak
Horizontal	2402	31.573	55.351	86.925	Average
Vertical	2402	30.917	63.671	94.588	Peak
Vertical	2402	30.917	60.977	91.894	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 (dB $\mu$ V/m)	$\Delta$ (dB)	Band Edge Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Detector
Horizontal	2385.4	89.672	47.47	42.202	74.000	Peak
Horizontal	2390	86.925	58.09	28.835	54.000	Average
Vertical	2385.4	94.588	47.47	47.118	74.000	Peak
Vertical	2390	91.894	58.09	33.804	54.000	Average

Note:

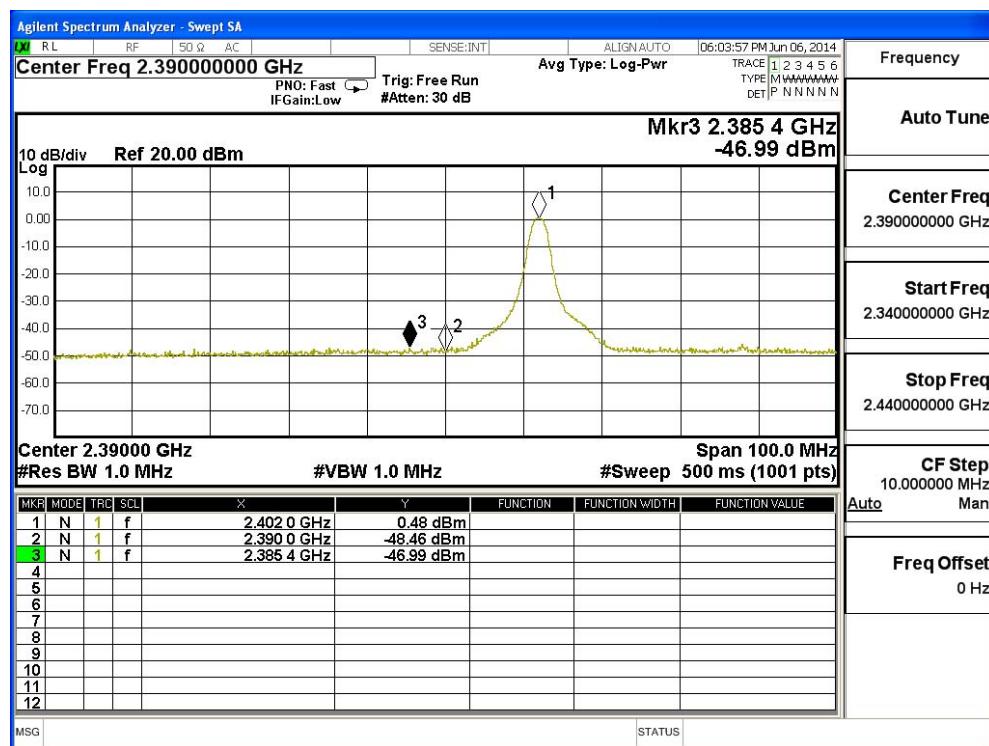
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

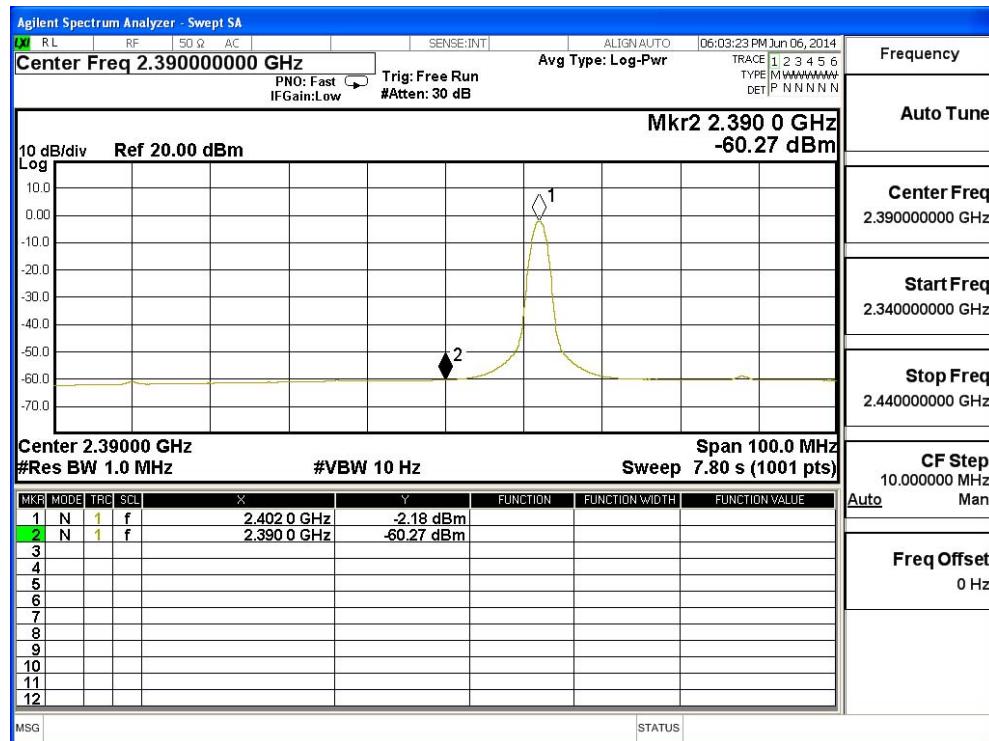
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



Product : Network Media Module  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dB μV]	Emission Level [dB(uV/m)]	Detector
Horizontal	2480	32.155	56.826	88.981	Peak
Horizontal	2480	32.155	53.597	85.752	Average
Vertical	2480	31.411	62.321	93.732	Peak
Vertical	2480	31.413	59.045	90.458	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 (dBμV/m)	Δ (dB)	Band Edge Field Strength (dBμV/m)	Limit (dBμV/m)	Detector
Horizontal	2483.6	88.981	35.42	53.561	74.000	Peak
Horizontal	2483.5	85.752	49.52	36.232	54.000	Average
Vertical	2483.6	93.732	35.42	58.312	74.000	Peak
Vertical	2483.5	90.458	49.52	40.938	54.000	Average

Note:

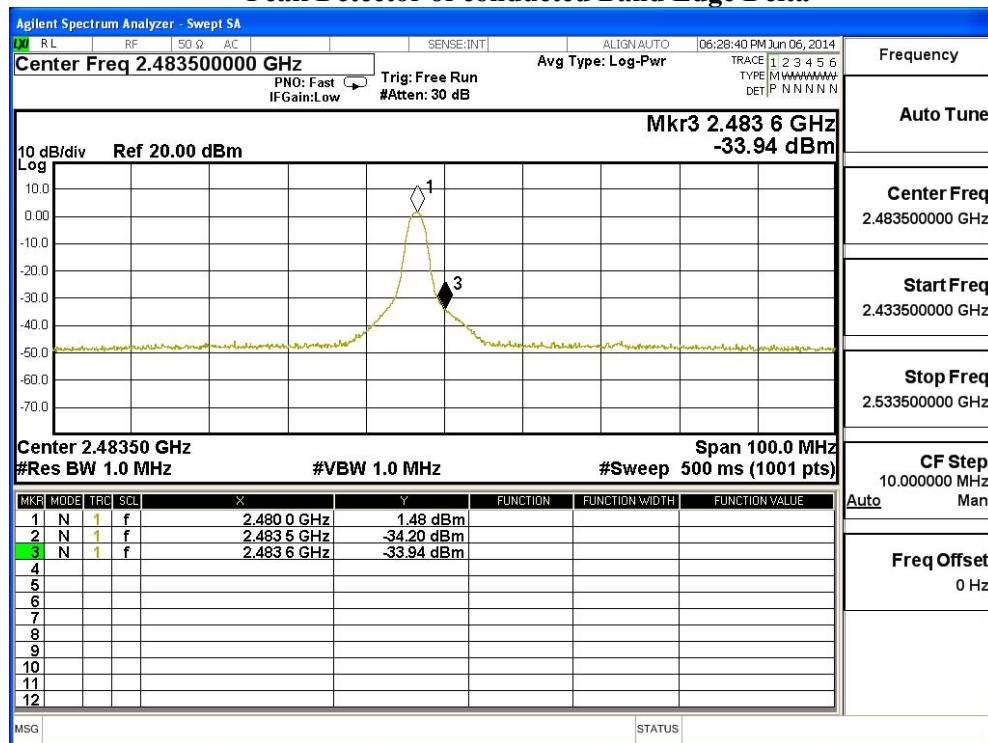
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

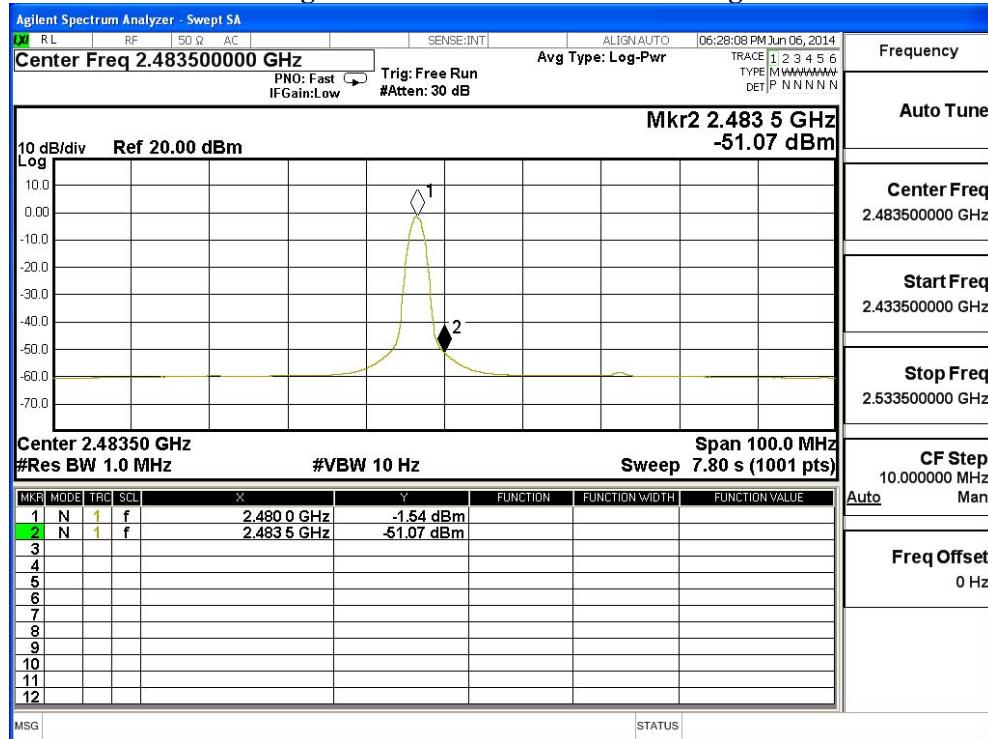
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



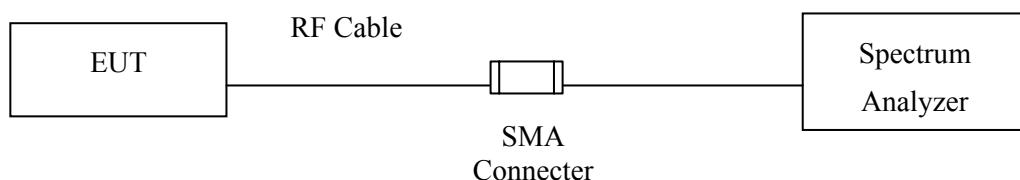
## 7. Channel Number

### 7.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

Note: 1. All equipments 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. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

### 7.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

### 7.5. Uncertainty

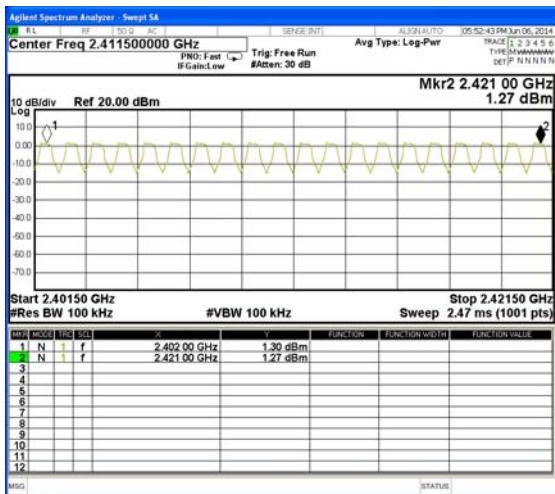
N/A

## 7.6. Test Result of Channel Number

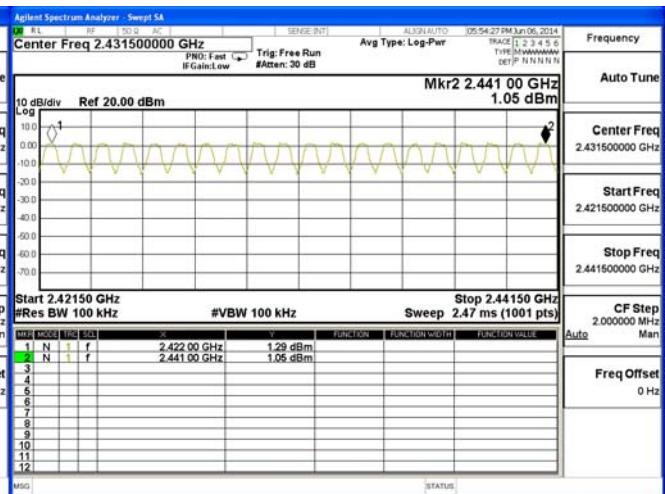
Product : Network Media Module  
 Test Item : Channel Number  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

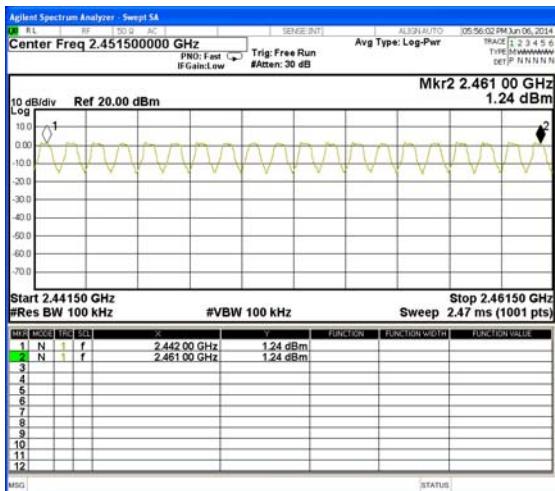
### 2402-2421MHz



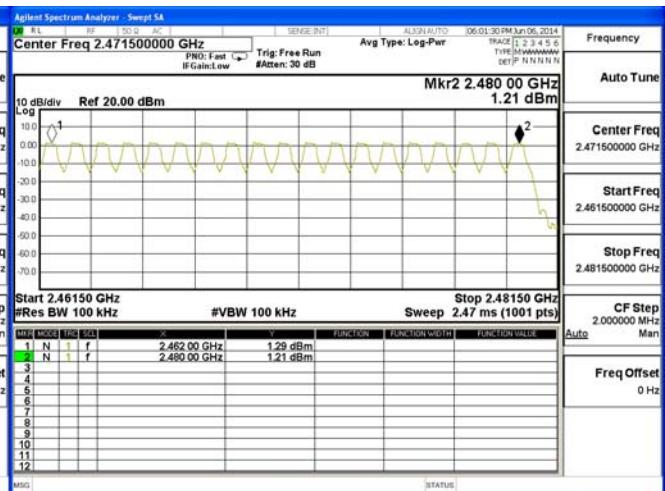
### 2422-2441MHz



### 2442-2461MHz



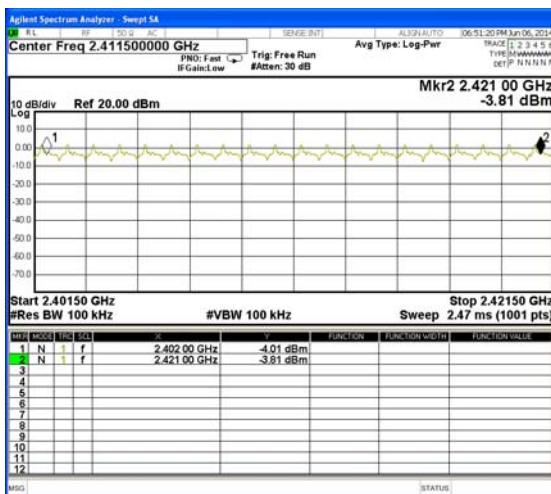
### 2462-2480MHz



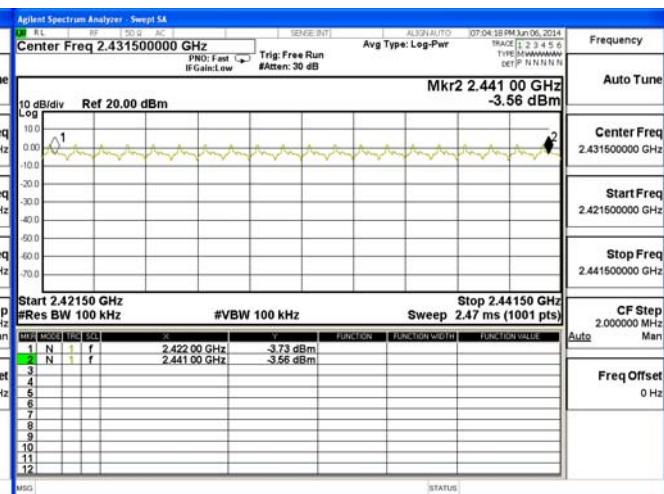
Product : Network Media Module  
 Test Item : Channel Number  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

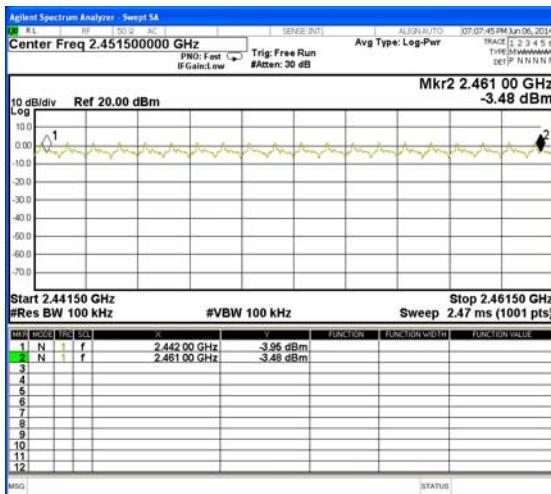
### 2402-2421MHz



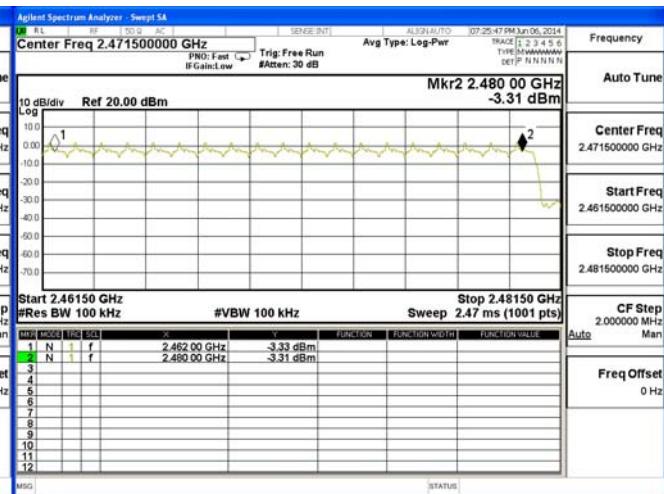
### 2422-2441MHz



### 2442-2461MHz



### 2462-2480MHz



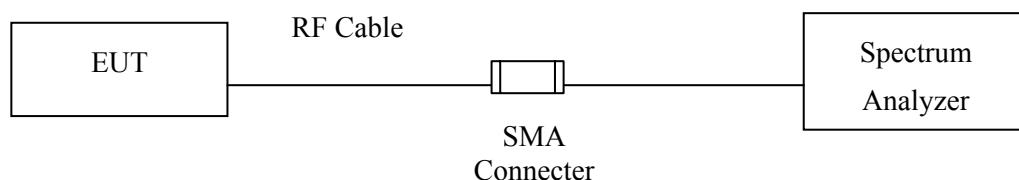
## 8. Channel Separation

### 8.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

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

### 8.2. Test Setup



### 8.3. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### 8.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

### 8.5. Uncertainty

± 150Hz

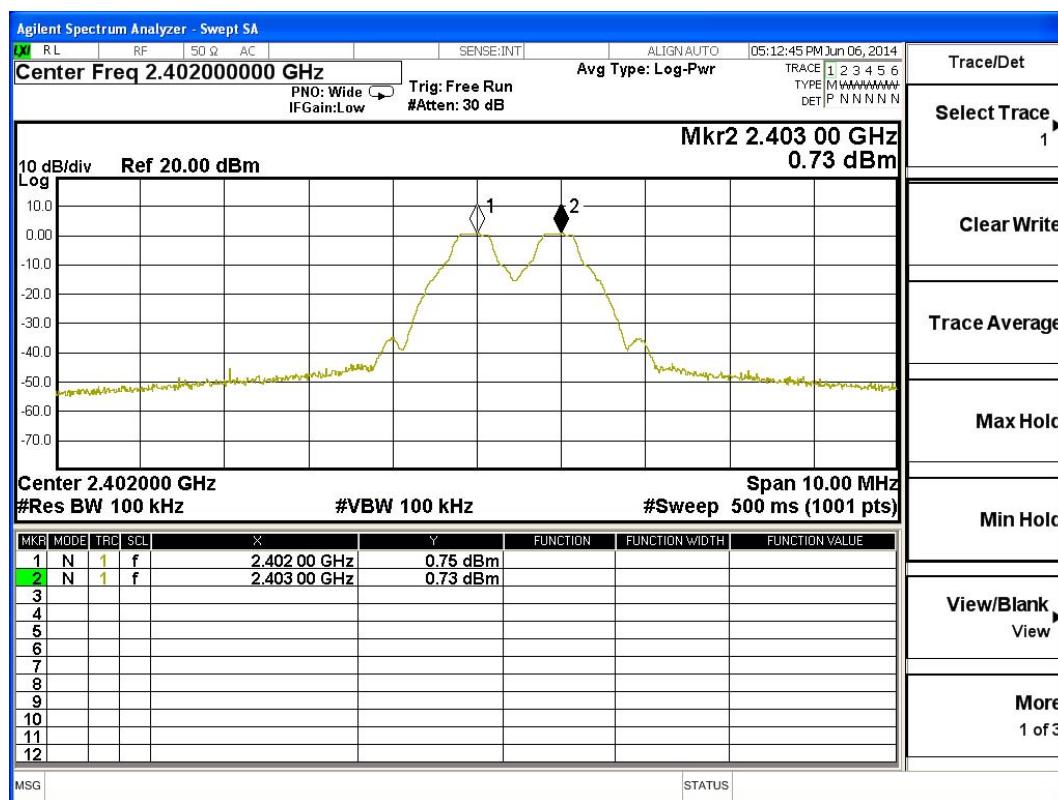
## 8.6. Test Result of Channel Separation

Product : Network Media Module  
 Test Item : Channel Separation  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

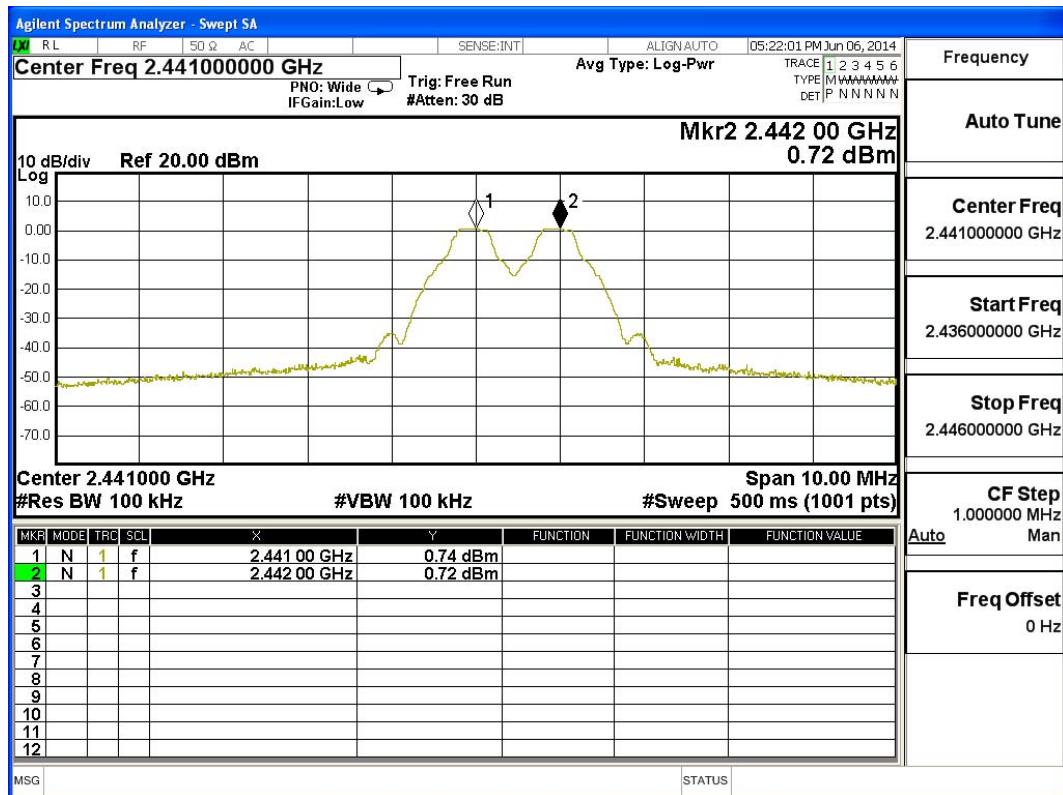
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	760.0	Pass
39	2441	1000	>25 kHz	766.7	Pass
78	2480	1000	>25 kHz	760.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

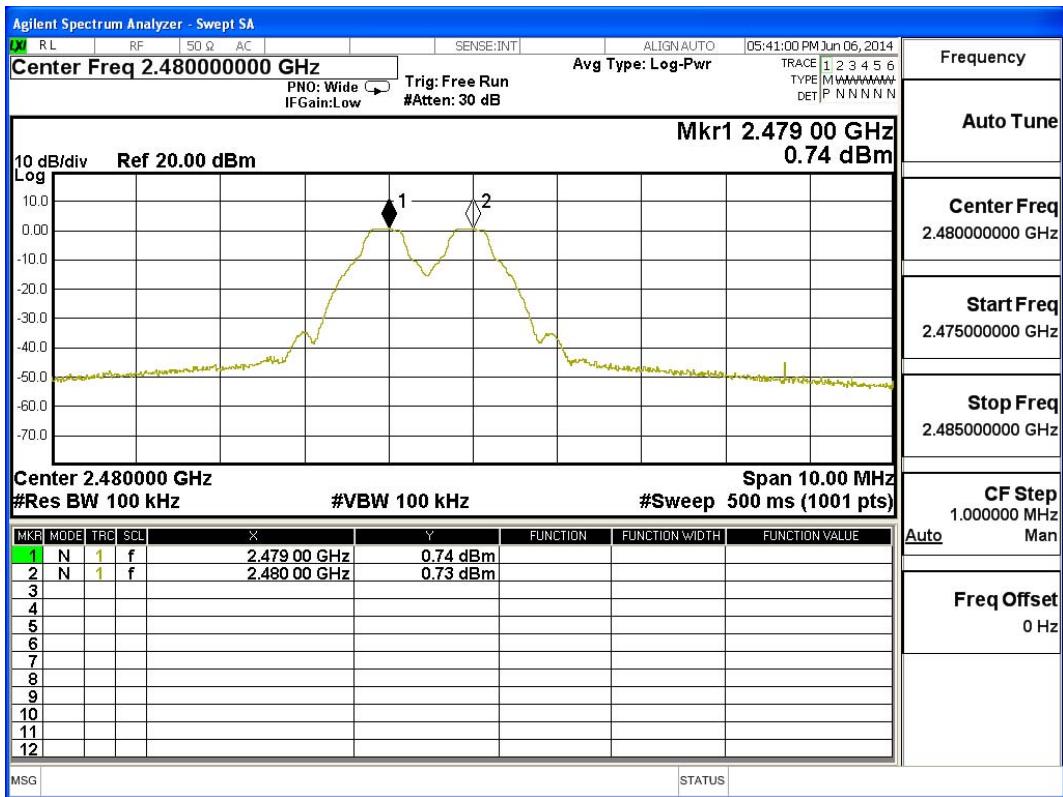
Channel 00 2402MHz



## Channel 39 2441MHz



## Channel 78 2480 MHz

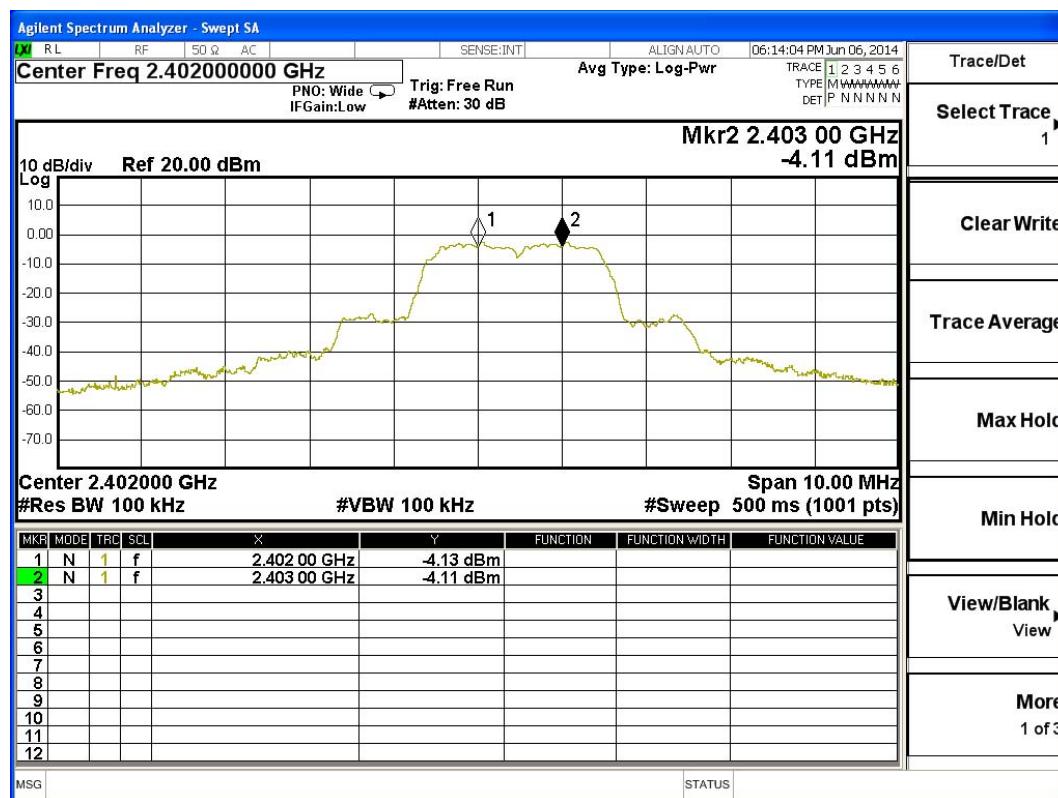


Product : Network Media Module  
 Test Item : Channel Separation  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

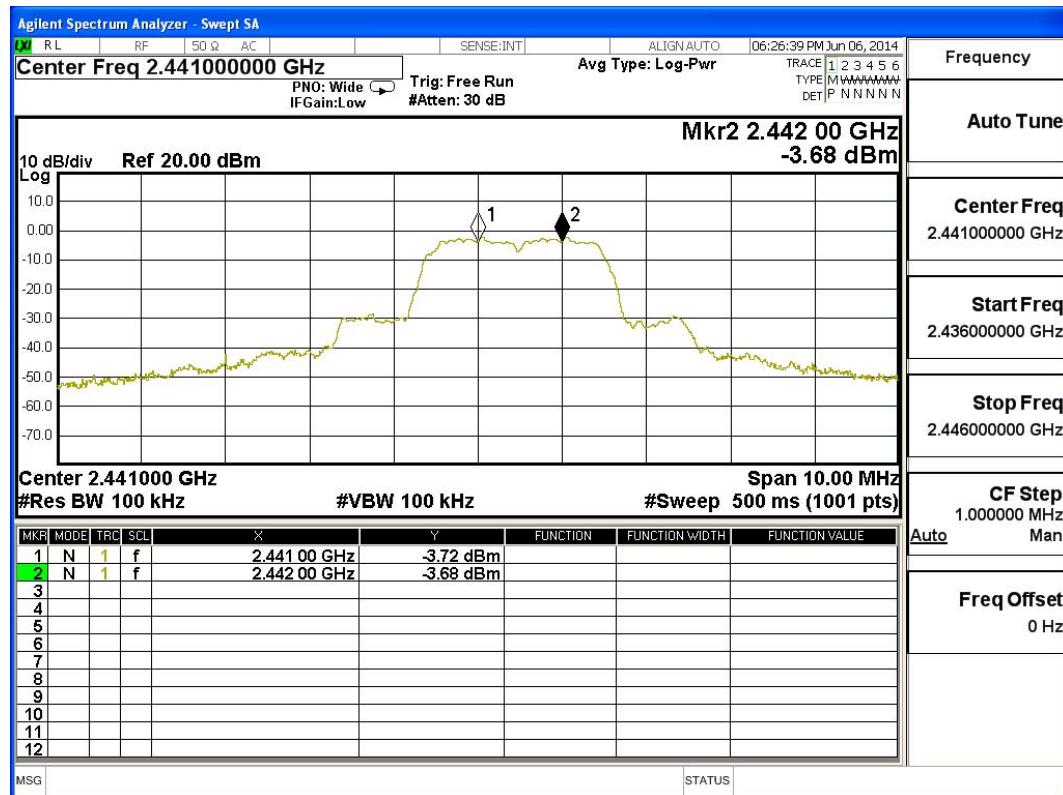
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	973.3	Pass
39	2441	1000	>25 kHz	966.7	Pass
78	2480	1000	>25 kHz	953.3	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

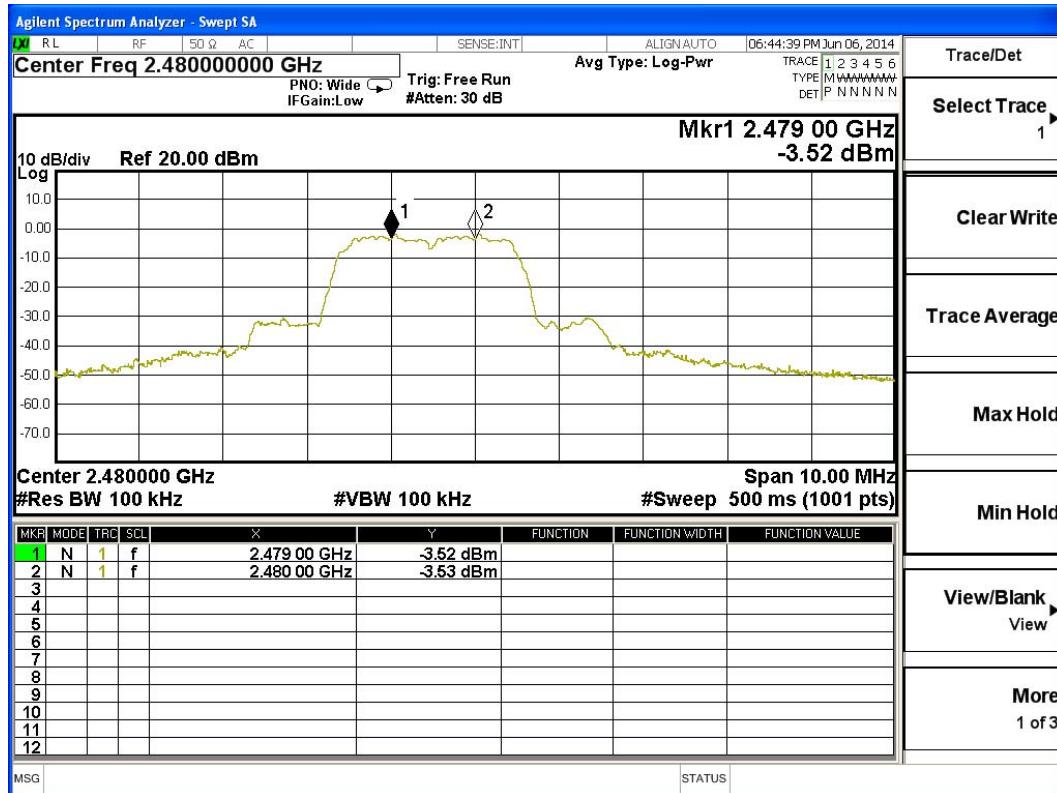
### Channel 00 2402MHz



## Channel 39 2441MHz



## Channel 78 2480 MHz



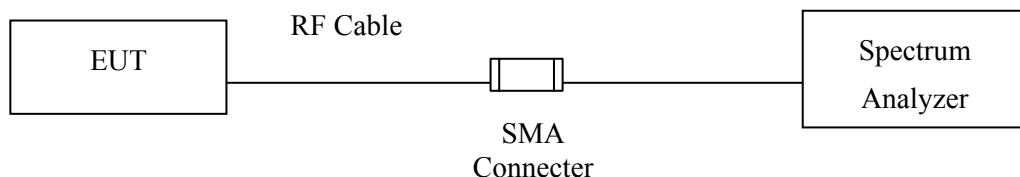
## 9. Dwell Time

### 9.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

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

### 9.2. Test Setup



### 9.3. Limit

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

### 9.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

### 9.5. Uncertainty

± 25msec

## 9.6. Test Result of Dwell Time

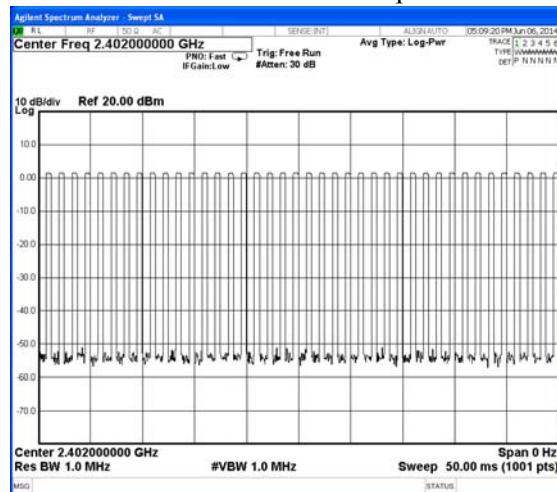
Product : Network Media Module  
 Test Item : Dwell Time  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (Channel 00,39,78 -DH5)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	0.400	39	50	0.31	0.125	0.4	Pass
2441	0.410	40	50	0.33	0.131	0.4	Pass
2480	0.410	39	50	0.32	0.128	0.4	Pass

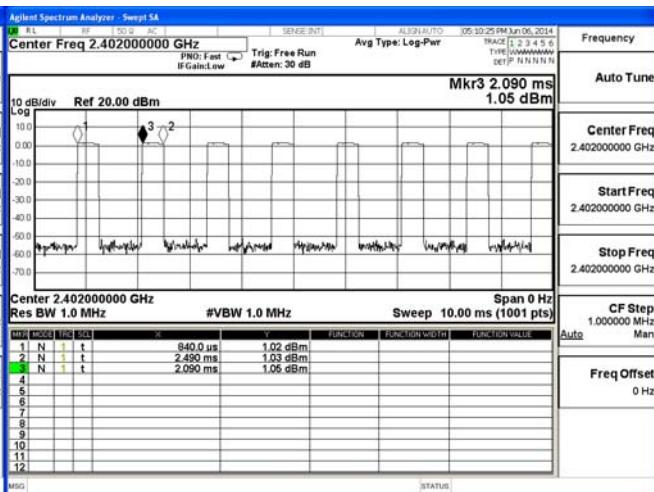
Duty cycle = ((Time slot length(ms)\*Hopping of Number) / Sweep time (ms))

Dwell time = (Duty cycle / 79) \* (79\*0.4)

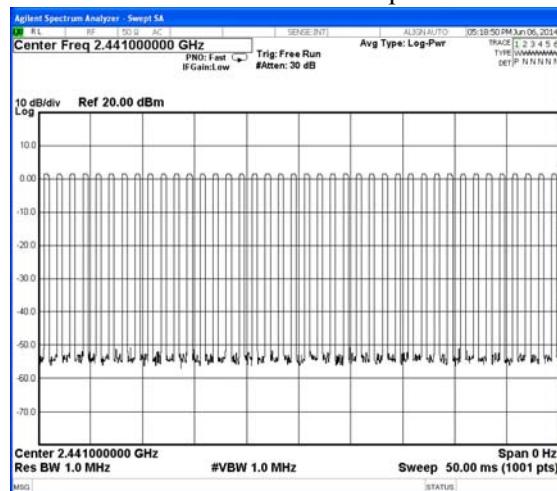
CH 00 Time Interval between hops



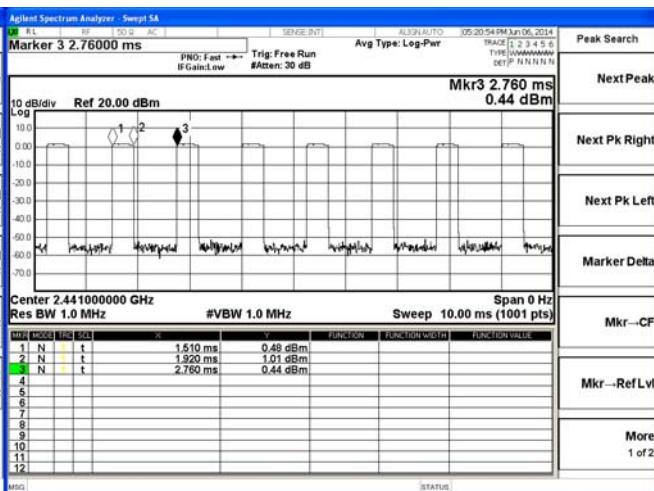
CH 00 Transmission Time



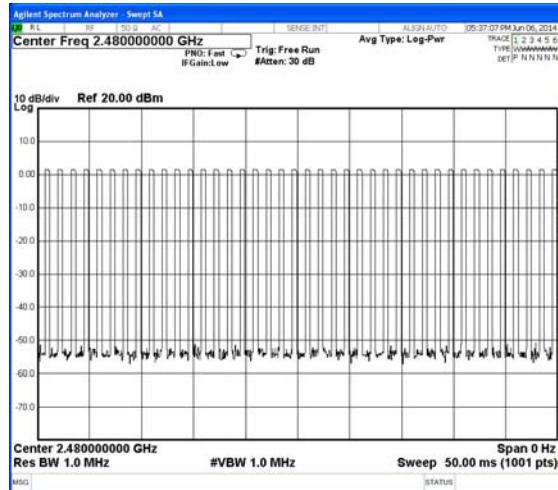
CH39 Time Interval between hops



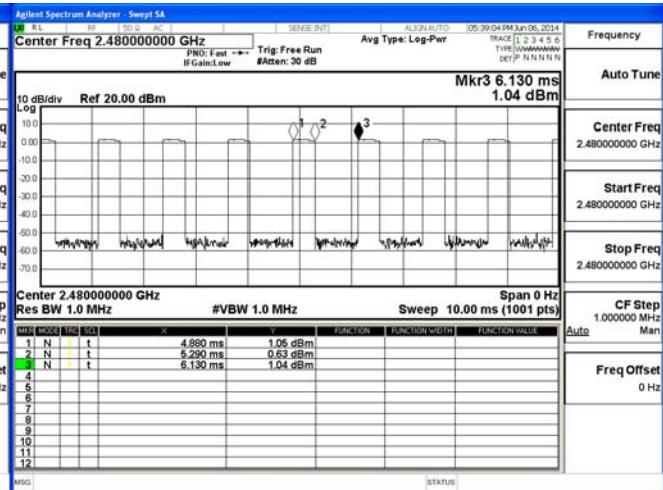
CH 39 Transmission Time



## CH 78 Time Interval between hops



## CH 78 Transmission Time



Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.

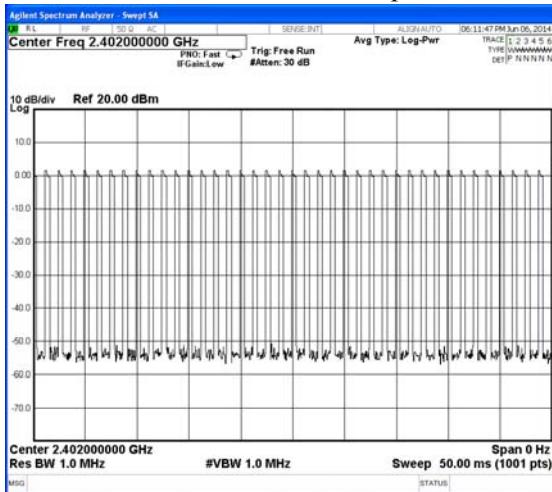
Product : Network Media Module  
 Test Item : Dwell Time  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (Channel 00,39,78 –DH5)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	0.420	40	50	0.34	0.134	0.4	Pass
2441	0.410	40	50	0.33	0.131	0.4	Pass
2480	0.420	40	50	0.34	0.134	0.4	Pass

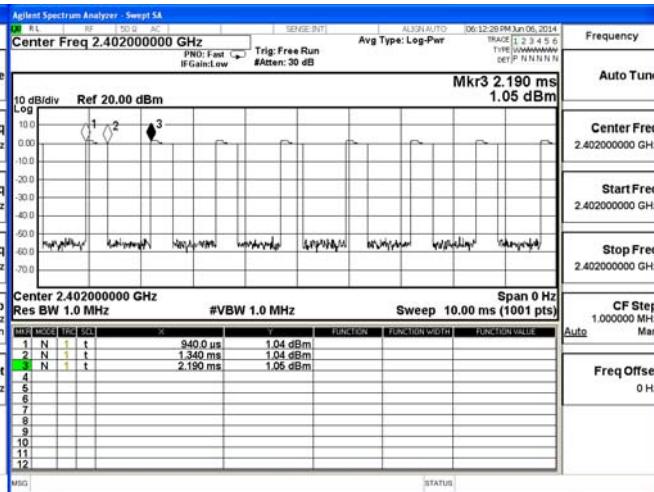
Duty cycle =((Time slot length(ms)\*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) \* (79\*0.4)

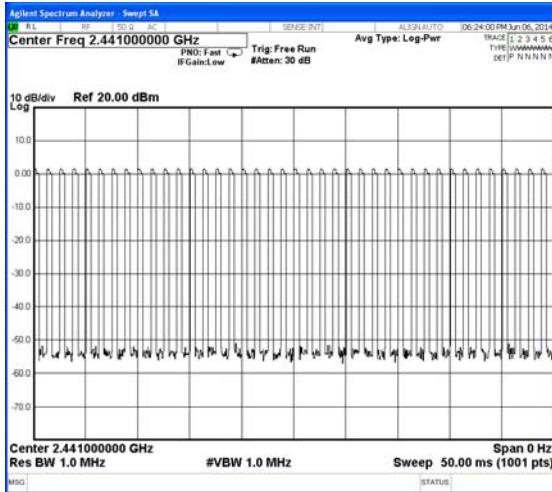
#### CH 00 Time Interval between hops



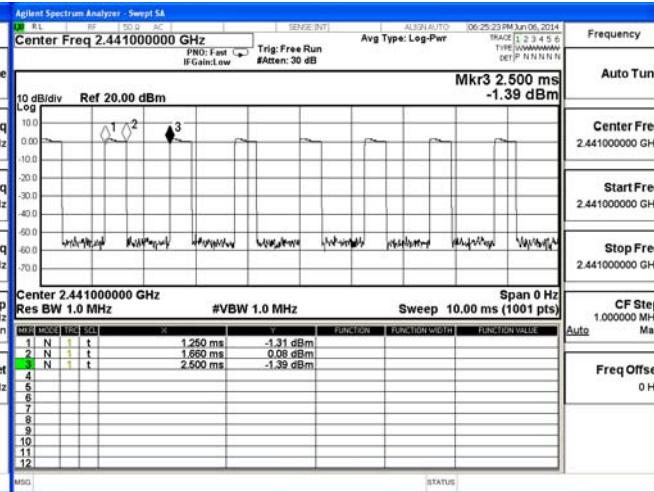
#### CH 00 Transmission Time



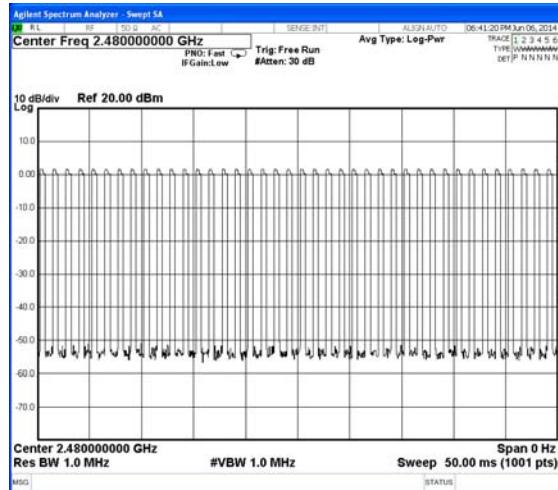
#### CH39 Time Interval between hops



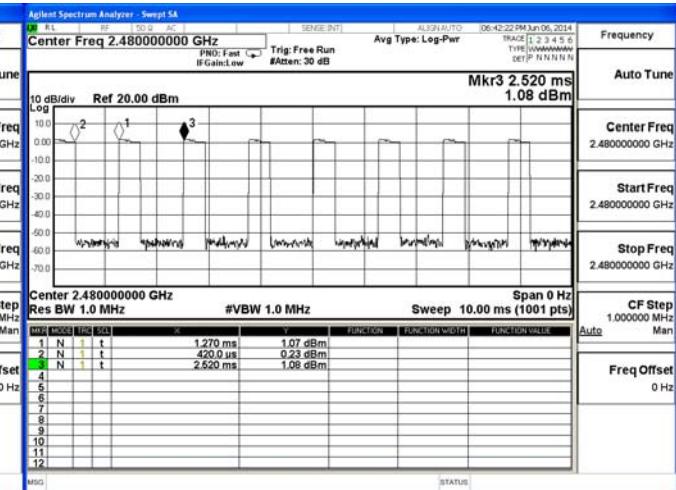
#### CH 39Transmission Time



## CH 78 Time Interval between hops



## CH 78 Transmission Time



Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.

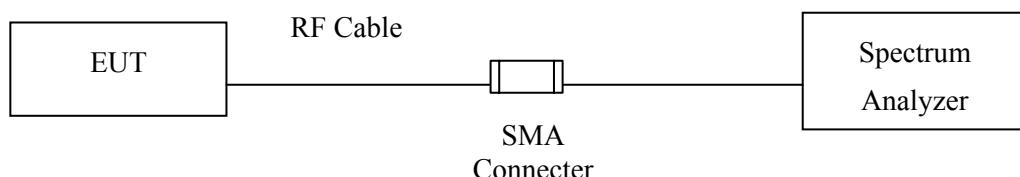
## 10. Occupied Bandwidth

### 10.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

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

### 10.2. Test Setup



### 10.3. Limits

N/A

### 10.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

### 10.5. Uncertainty

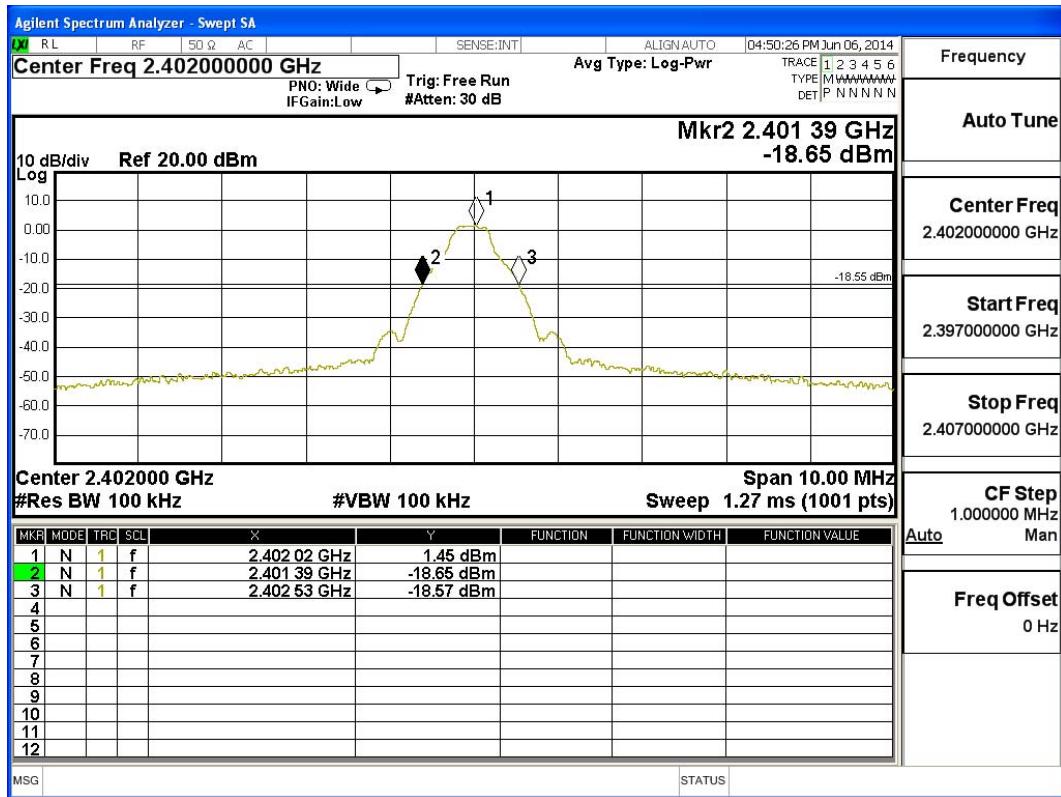
± 150Hz

## 10.6. Test Result of Occupied Bandwidth

Product : Network Media Module  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1140	--	NA

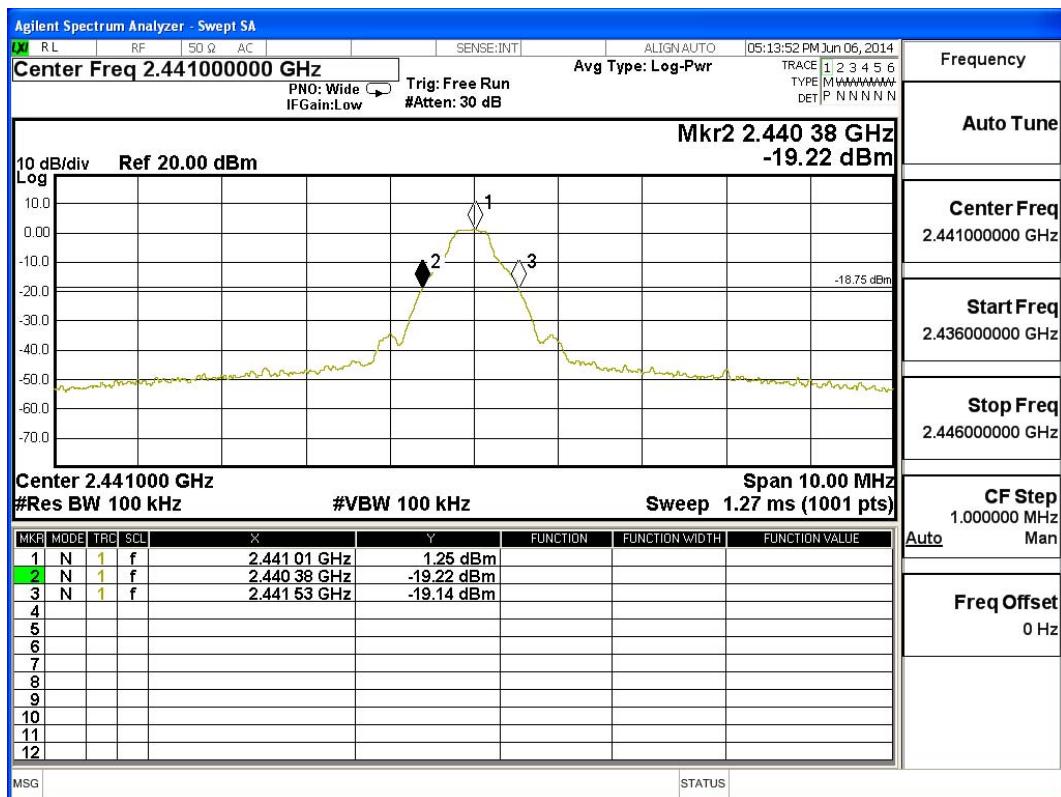
**Figure Channel 00:**



Product : Network Media Module  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1150	--	NA

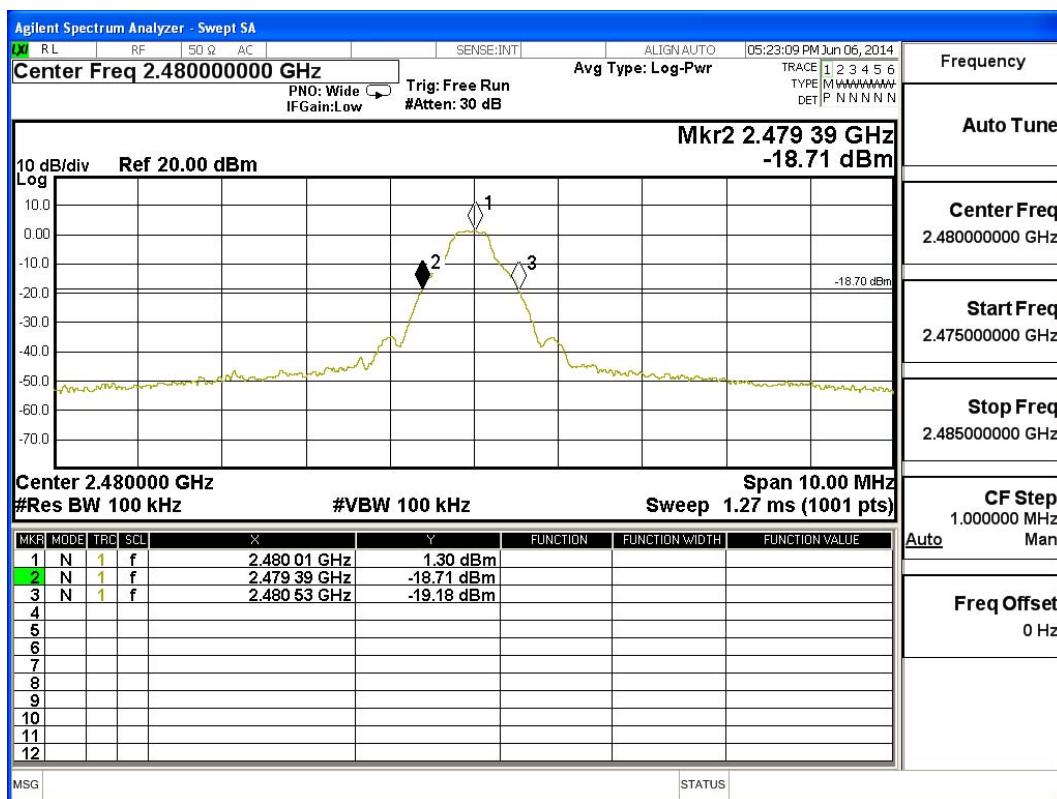
**Figure Channel 39:**



Product : Network Media Module  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1140	--	NA

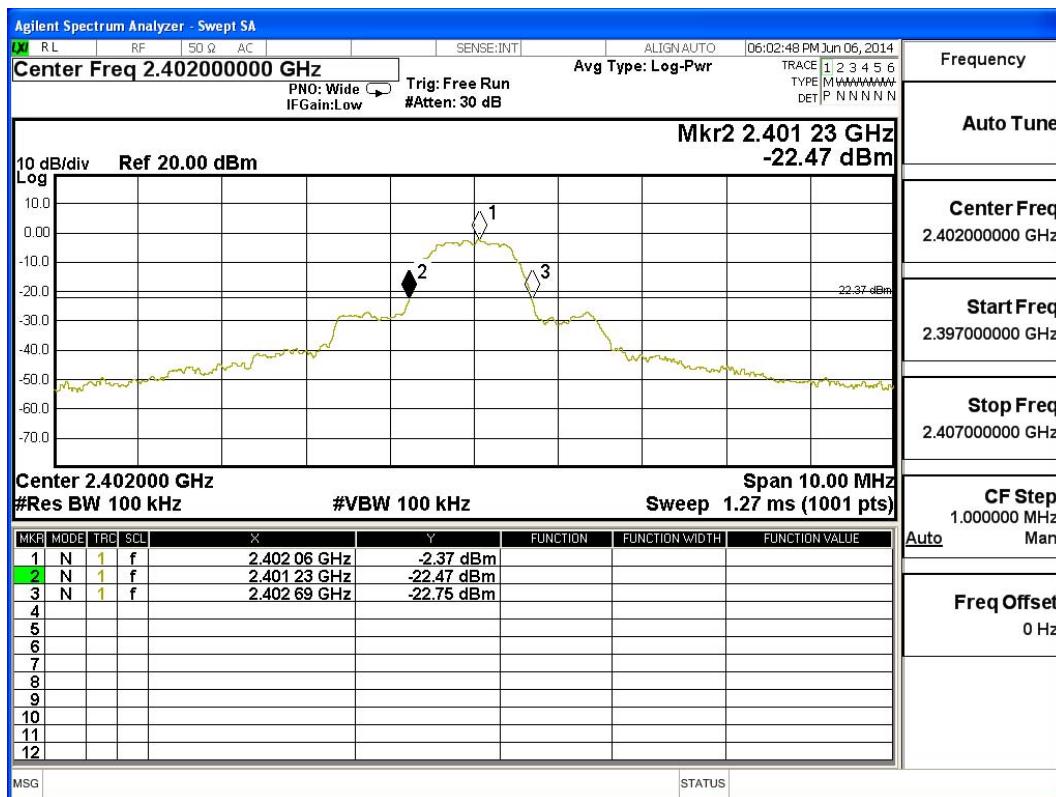
**Figure Channel 78:**



Product : Network Media Module  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1460	--	NA

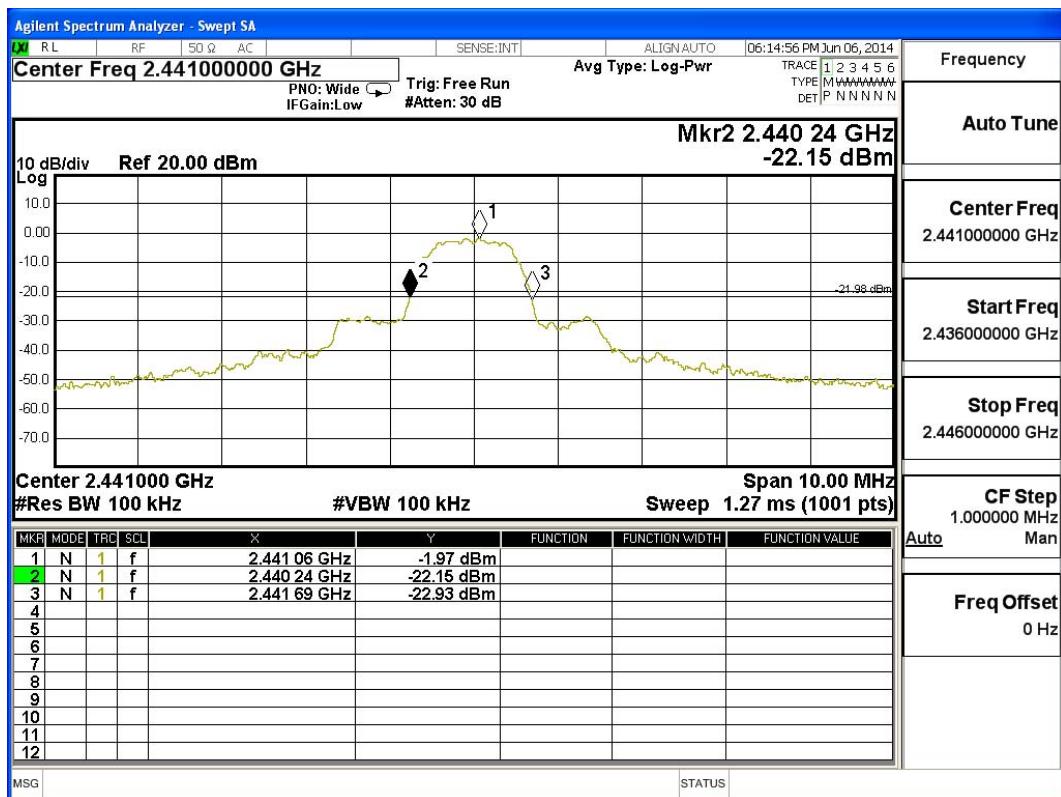
**Figure Channel 00:**



Product : Network Media Module  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1450	--	NA

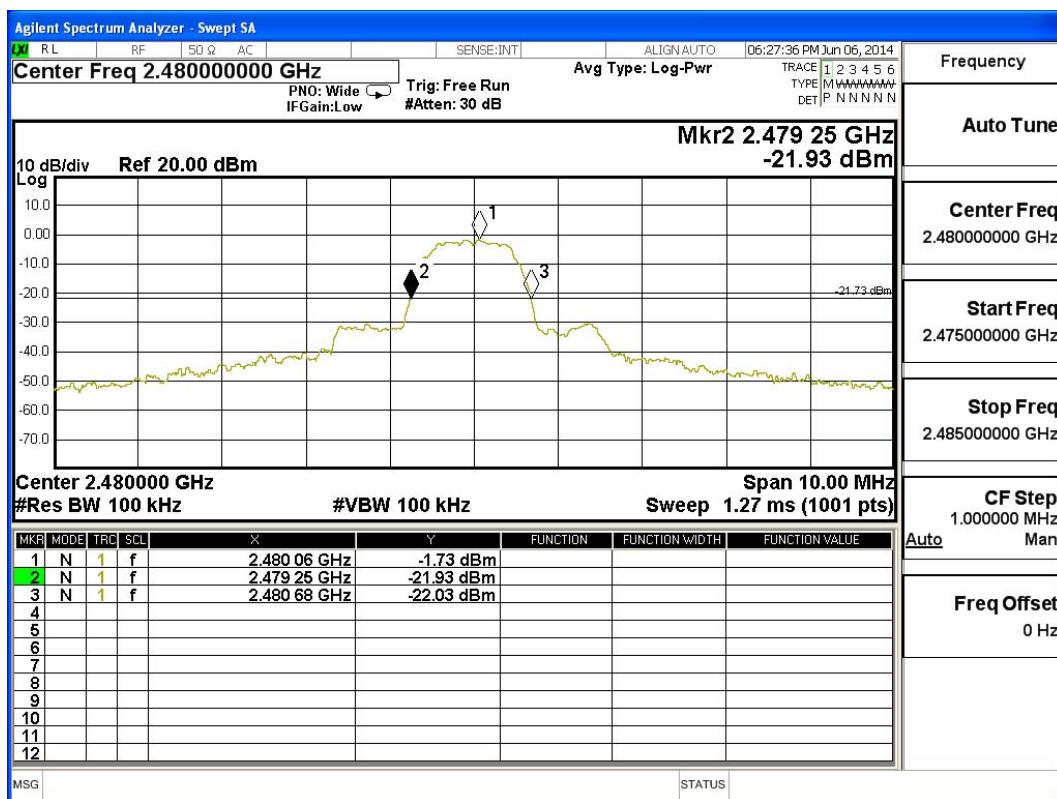
**Figure Channel 39:**



Product : Network Media Module  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)(2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1430	--	NA

**Figure Channel 78:**



**11. EMI Reduction Method During Compliance Testing**

No modification was made during testing.

## Attachment 3: Pretest Data

### Attachment 3 : Pretest Data

Product : Network Media Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Transmit - 3Mbps (8DPSK) (2441MHz)  
               (DDR / ESMT ; FLASH/ MXIC)

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V	Margin dB	Limit dB $\mu$ V
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.154	9.790	51.360	61.150	-4.736	65.886
0.177	9.790	44.530	54.320	-10.909	65.229
0.193	9.790	44.730	54.520	-10.251	64.771
0.224	9.790	39.330	49.120	-14.766	63.886
0.287	9.790	31.970	41.760	-20.326	62.086
0.673	9.790	26.900	36.690	-19.310	56.000
<b>Average</b>					
0.154	9.790	38.950	48.740	-7.146	55.886
0.177	9.790	30.200	39.990	-15.239	55.229
0.193	9.790	31.440	41.230	-13.541	54.771
0.224	9.790	25.760	35.550	-18.336	53.886
0.287	9.790	18.290	28.080	-24.006	52.086
0.673	9.790	15.890	25.680	-20.320	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

Product : Network Media Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Transmit - 3Mbps (8DPSK) (2441MHz)  
               (DDR / ESMT ; FLASH/ MXIC)

Frequency MHz	Correct Factor dB	Reading Level dBµV	Measurement Level dBµV	Margin dB	Limit dBµV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.158	9.770	49.570	59.340	-6.431	65.771
0.170	9.770	45.550	55.320	-10.109	65.429
0.201	9.770	42.260	52.030	-12.513	64.543
0.244	9.770	36.330	46.100	-17.214	63.314
0.310	9.770	29.190	38.960	-22.469	61.429
0.662	9.770	35.670	45.440	-10.560	56.000
<b>Average</b>					
0.158	9.770	36.560	46.330	-9.441	55.771
0.170	9.770	31.050	40.820	-14.609	55.429
0.201	9.770	28.300	38.070	-16.473	54.543
0.244	9.770	23.250	33.020	-20.294	53.314
0.310	9.770	15.660	25.430	-25.999	51.429
0.662	9.770	26.750	36.520	-9.480	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

Product : Network Media Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Transmit - 3Mbps (8DPSK) (2441MHz)  
               (DDR / EtronTech ; FLASH/ Winbond)

Frequency MHz	Correct Factor dB	Reading Level dBµV	Measurement Level dBµV	Margin dB	Limit dBµV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.162	9.657	27.860	37.517	-28.140	65.657
0.177	9.653	36.340	45.993	-19.236	65.229
0.185	9.651	36.130	45.781	-19.219	65.000
0.263	9.654	25.490	35.144	-27.627	62.771
0.361	9.659	27.420	37.079	-22.892	59.971
13.138	10.039	30.380	40.419	-19.581	60.000
Average					
0.162	9.657	8.700	18.357	-37.300	55.657
0.177	9.653	20.210	29.863	-25.366	55.229
0.185	9.651	20.890	30.541	-24.459	55.000
0.263	9.654	12.360	22.014	-30.757	52.771
0.361	9.659	19.990	29.649	-20.322	49.971
13.138	10.039	26.860	36.899	-13.101	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 : Network Media Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Transmit - 3Mbps (8DPSK) (2441MHz)  
               (DDR / EtronTech ; FLASH/ Winbond)

Frequency MHz	Correct Factor dB	Reading Level dBµV	Measurement Level dBµV	Margin dB	Limit dBµV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.185	9.660	35.570	45.230	-19.770	65.000
0.201	9.660	30.400	40.060	-24.483	64.543
0.216	9.661	29.670	39.331	-24.783	64.114
0.244	9.663	24.210	33.873	-29.441	63.314
0.384	9.660	23.850	33.510	-25.804	59.314
<b>13.142</b>	<b>10.069</b>	<b>31.740</b>	<b>41.809</b>	<b>-18.191</b>	<b>60.000</b>
Average					
0.185	9.660	19.810	29.470	-25.530	55.000
0.201	9.660	11.590	21.250	-33.293	54.543
0.216	9.661	13.500	23.161	-30.953	54.114
0.244	9.663	4.370	14.033	-39.281	53.314
0.384	9.660	8.970	18.630	-30.684	49.314
<b>13.142</b>	<b>10.069</b>	<b>29.150</b>	<b>39.219</b>	<b>-10.781</b>	<b>50.000</b>

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 : Network Media Module  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Transmit - 3Mbps (8DPSK) (2441MHz)  
              (DDR / ESMT ; FLASH/ MXIC)

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Horizontal</b>					
113.420	-7.449	40.814	33.365	-10.135	43.500
288.020	-5.557	42.486	36.929	-9.071	46.000
480.080	1.870	38.047	39.917	-6.083	46.000
658.560	1.892	37.005	38.897	-7.103	46.000
815.700	6.451	31.557	38.008	-7.992	46.000
932.100	7.270	31.279	38.549	-7.451	46.000
<b>Vertical</b>					
113.420	-3.709	40.814	37.105	-6.395	43.500
165.800	-4.665	43.874	39.209	-4.291	43.500
301.600	-3.985	40.842	36.857	-9.143	46.000
513.060	0.436	35.539	35.975	-10.025	46.000
689.600	2.302	36.228	38.530	-7.470	46.000
870.020	-0.398	40.422	40.024	-5.976	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.

Product : Network Media Module  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Transmit - 3Mbps (8DPSK) (2441MHz)  
               (DDR / EtronTech ; FLASH/ Winbond)

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Horizontal</b>					
142.520	-7.627	35.776	28.149	-15.351	43.500
309.360	-4.463	32.556	28.093	-17.907	46.000
532.460	3.099	31.417	34.516	-11.484	46.000
643.040	1.110	31.367	32.477	-13.523	46.000
788.540	6.144	31.647	37.791	-8.209	46.000
910.760	6.484	31.633	38.117	-7.883	46.000
<b>Vertical</b>					
146.400	-5.456	35.121	29.665	-13.835	43.500
315.180	-4.108	31.117	27.009	-18.991	46.000
505.300	0.056	31.485	31.541	-14.459	46.000
612.000	1.943	31.697	33.639	-12.361	46.000
807.940	3.361	31.697	35.058	-10.942	46.000
965.080	3.832	34.249	38.081	-15.919	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.
8. No emission found between lowest internal used/generated frequency to 30MHz.