

# FCC Test Report

## (Class II Permissive Change)

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	Apr. 23, 2015
Issued Date	May. 22, 2015
Report No.	1540502R-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: May. 22, 2015

Report No.: 1540502R-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 C63.4: 2009, ANSI C63.10: 2009
Test Result	Complied

Documented By : Leven Huang  
(Senior Adm. Specialist / Leven Huang )

Tested By : Andy Lin  
( Engineer / Andy Lin )

Approved By : Vincent Lin  
( Director / Vincent Lin )

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## 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) / $\pi$ /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
7	WALSIN	RFMTA331240IMAB701	Dipole Antenna	3.0dBi for 2.4 GHz
8	WALSIN	RFMTA331230IMAB701	Dipole Antenna	3.21dBi for 2.4 GHz
9	WALSIN	RFDPA870933IMLB301	Dipole Antenna	1.32dBi 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, no.2 and no.3 has divided into with core / without core, only worst case is shown in the report.
4. Module 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 U21	Macronix	WINBOND
DDR U22	ESMT	ETRON
64pin connector J300,J301	Xinya	Xisheng
u.fl CON1,CON2	IPEX	ELECTRIC CONNECTOR
Bead for Supply Noise Filter FB602	BLM15EG121SN1D (MURATA)	BLM15PX121SN1D (MURATA)
Regulator IC U801	EMP8130-12VN05NRR (ESMT)	XC6228D122VR-G (TOREX)
INDUCTOR RF L917	MLG0603Q0N2CT000 SMD(TDK)	MLG0603W0N2CT000 SMD(TDK)

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.
8. This is to request a Class II permissive change for FCC ID: ZQO-CY92024C originally granted on 07/10/2014. The major change filed under this application is:

Change #1: Addition three new antennas, the antenna type is the same, the antenna gain is higher than the original application.

Antenna Part No.
RFMTA331240IMAB701
RFMTA331230IMAB701
RFDPA870933IMLB301

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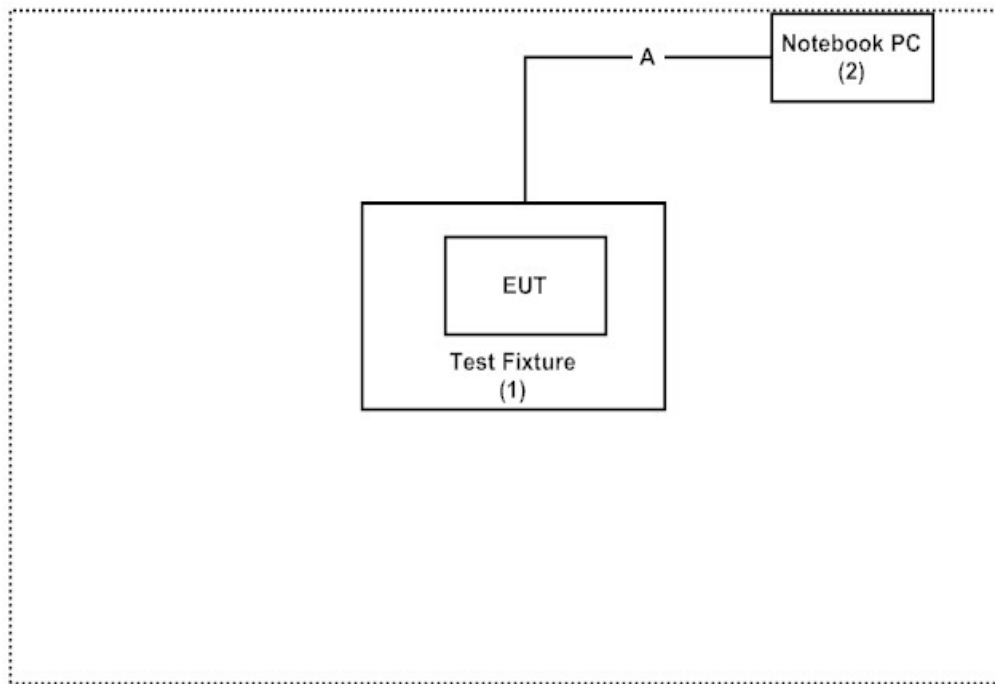
**1.3. Tested System Details**

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

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 The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
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FCC Accreditation Number: TW1014



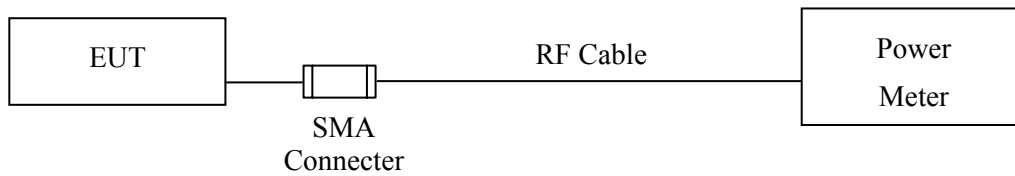
**2. Peak Power Output**

**2.1. Test Equipment**

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2015
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.

**2.2. Test Setup**



**2.3. Limit**

The maximum peak power shall be less 1Watt.

**2.4. 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.

**2.5. Uncertainty**

± 1.27 dB

**2.6. 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	2.21	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.33	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.02	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	1.58	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.30	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.43	1 Watt= 30 dBm	Pass

**3. Radiated Emission**

**3.1. Test Equipment**

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

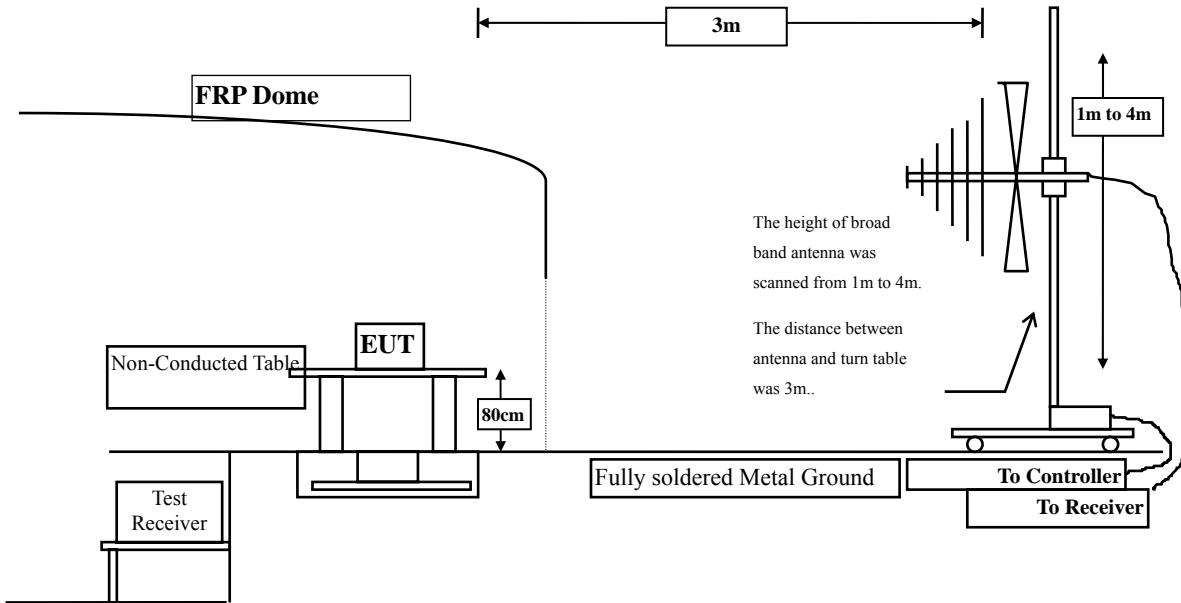
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2014
	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2014
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2014
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2014
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2015
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2014
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2015
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A	

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2014
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2015
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2014
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2014
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2014

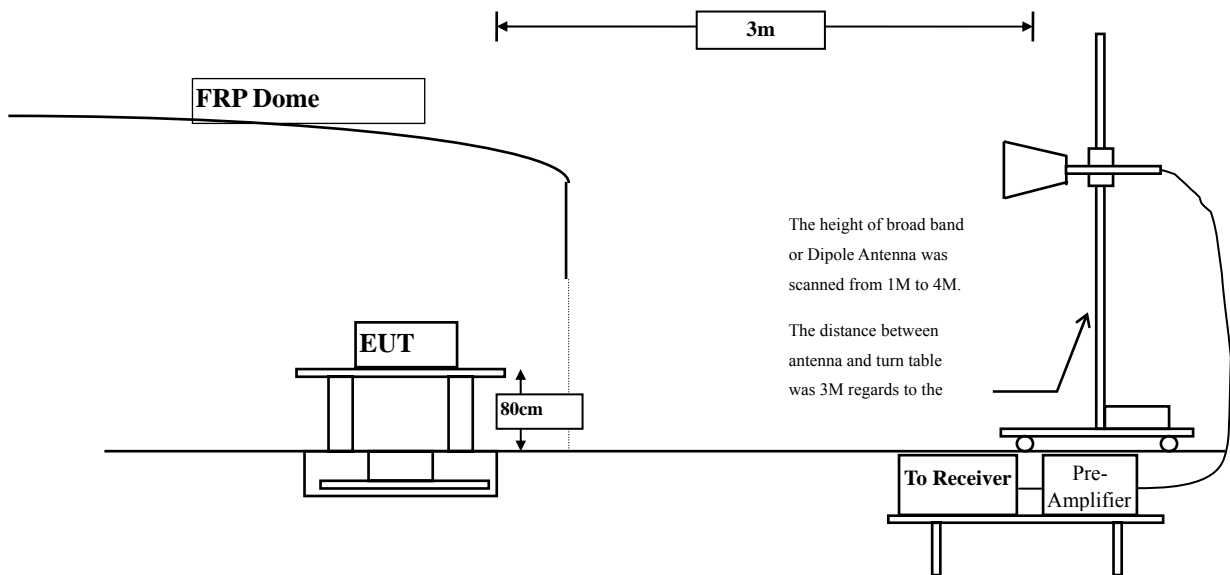
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



**3.3. 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.

<b>FCC Part 15 Subpart C Paragraph 15.209 Limits</b>		
Frequency MHz	uV/m @3m	dBµV/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 (dBµV) = 20 log 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.

**3.4. 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 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 form 9kHz - 10th Harmonic of fundamental was investigated.

**3.5. Uncertainty**

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

### 3.6. 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	40.333	43.660	-30.340	74.000
7206.000	10.136	37.484	47.620	-26.380	74.000
9608.000	13.706	37.614	51.320	-22.680	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4804.000	6.638	41.483	48.120	-25.880	74.000
7206.000	11.005	38.105	49.110	-24.890	74.000
9608.000	14.103	36.587	50.690	-23.310	74.000
<b>Average 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 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>					
4882.000	3.001	38.919	41.920	-32.080	74.000
7323.000	11.846	36.419	48.266	-25.734	74.000
9764.000	12.563	37.537	50.100	-23.900	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4882.000	5.713	39.926	45.640	-28.360	74.000
7323.000	12.727	35.460	48.188	-25.812	74.000
9764.000	13.028	36.662	49.690	-24.310	74.000
<b>Average 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)(2480MHz)

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>					
4960.000	2.760	38.510	41.270	-32.730	74.000
7440.000	12.567	35.664	48.230	-25.770	74.000
9920.000	13.456	36.204	49.660	-24.340	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4960.000	5.557	40.133	45.690	-28.310	74.000
7440.000	13.426	34.835	48.260	-25.740	74.000
9920.000	13.958	35.862	49.820	-24.180	74.000
<b>Average 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 2: Transmit - 3Mbps (8DPSK)(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	38.963	42.290	-31.710	74.000
7206.000	10.136	36.384	46.520	-27.480	74.000
9608.000	13.706	37.514	51.220	-22.780	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4804.000	6.638	40.753	47.390	-26.610	74.000
7206.000	11.005	37.235	48.240	-25.760	74.000
9608.000	14.103	36.117	50.220	-23.780	74.000
<b>Average 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 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV/m	Margin dB	Limit dBμV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4882.000	3.001	38.219	41.220	-32.780	74.000
7323.000	11.846	35.293	47.140	-26.860	74.000
9764.000	12.563	36.637	49.200	-24.800	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4882.000	5.713	37.576	43.290	-30.710	74.000
7323.000	12.727	35.662	48.390	-25.610	74.000
9764.000	13.028	36.552	49.580	-24.420	74.000
<b>Average 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 2: Transmit - 3Mbps (8DPSK) (2480MHz)

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>					
4960.000	2.760	40.390	43.150	-30.850	74.000
7440.000	12.567	35.604	48.170	-25.830	74.000
9920.000	13.456	38.234	51.690	-22.310	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4960.000	5.557	37.613	43.170	-30.830	74.000
7440.000	13.426	36.125	49.550	-24.450	74.000
9920.000	13.958	36.256	50.214	-23.786	74.000
<b>Average 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 : 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>					
249.220	-6.014	32.446	26.432	-19.568	46.000
462.620	1.172	22.130	23.302	-22.698	46.000
596.480	4.017	21.468	25.485	-20.515	46.000
767.200	4.235	26.624	30.859	-15.141	46.000
856.440	6.382	23.868	30.250	-15.750	46.000
961.200	6.450	25.988	32.438	-21.562	54.000
<b>Vertical</b>					
340.400	-3.899	30.847	26.948	-19.052	46.000
501.420	-0.795	22.484	21.689	-24.311	46.000
602.300	-2.333	19.951	17.618	-28.382	46.000
720.640	-0.099	26.074	25.975	-20.025	46.000
840.920	2.961	24.192	27.153	-18.847	46.000
951.500	6.621	27.780	34.401	-11.599	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 MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV/m	Margin dB	Limit dBμV/m
<b>Horizontal</b>					
144.460	-10.377	34.173	23.796	-19.704	43.500
334.580	-3.901	35.019	31.118	-14.882	46.000
528.580	1.848	27.672	29.520	-16.480	46.000
648.860	2.038	20.877	22.915	-23.085	46.000
804.060	5.027	20.289	25.316	-20.684	46.000
935.980	6.421	25.798	32.219	-13.781	46.000
<b>Vertical</b>					
103.220	-0.118	22.458	22.340	-21.160	43.500
249.220	-7.634	29.304	21.670	-24.330	46.000
336.520	-4.630	32.426	27.796	-18.204	46.000
528.580	-0.462	26.067	25.605	-20.395	46.000
745.860	1.828	27.024	28.852	-17.148	46.000
939.860	6.450	20.111	26.561	-19.439	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.

4. Band Edge

4.1. 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., 2015

**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., 2014
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2014
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2014
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2015
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2014
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2015
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

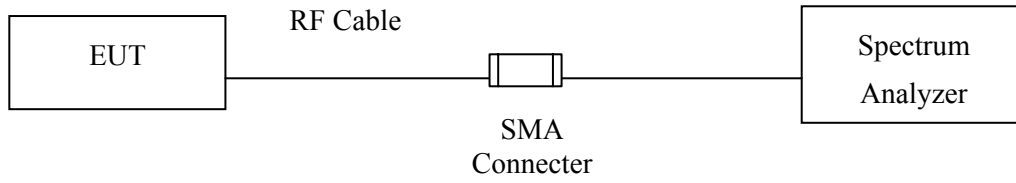
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2014
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2015
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2014
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2014
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2014

- 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.



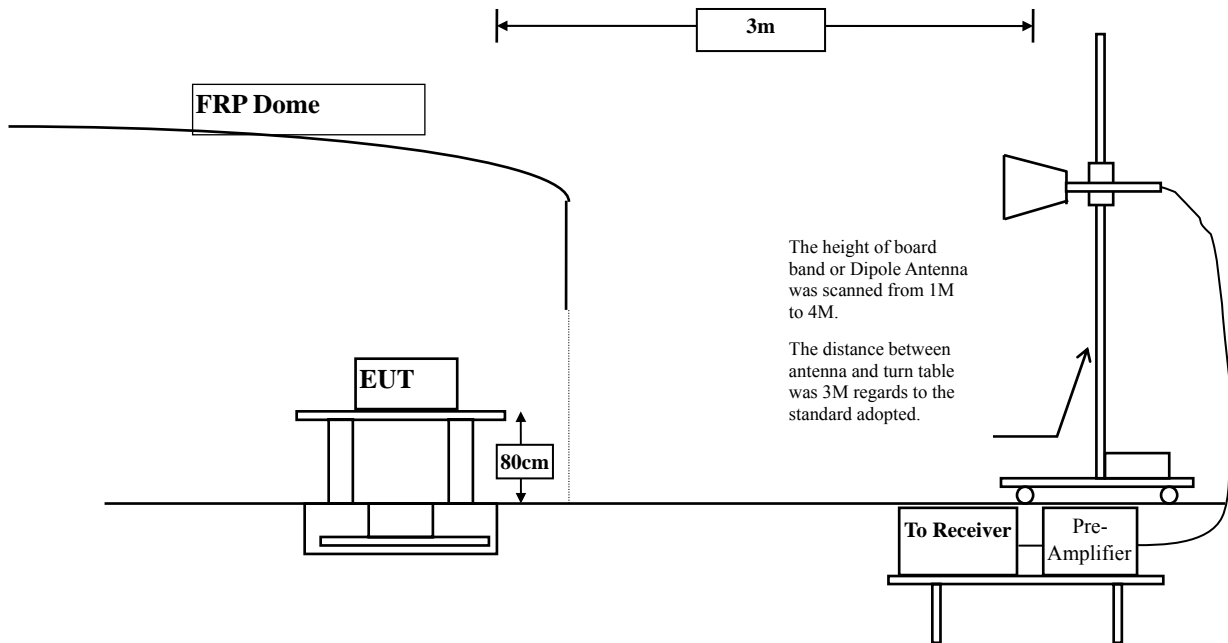
**4.2. Test Setup**

**RF Conducted Measurement**



**RF Radiated Measurement:**

Above 1GHz



**4.3. 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)).

**4.4. Test Procedure**

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 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 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.

**4.5. Uncertainty**

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

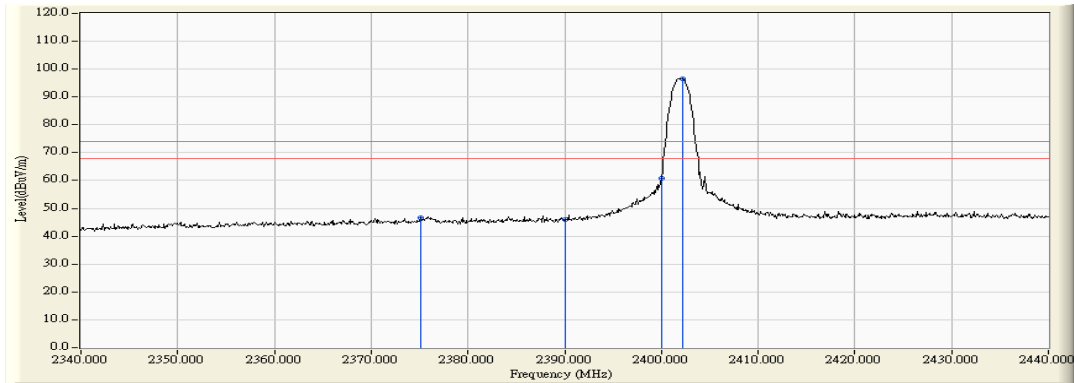
**4.6. Test Result of Band Edge**

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

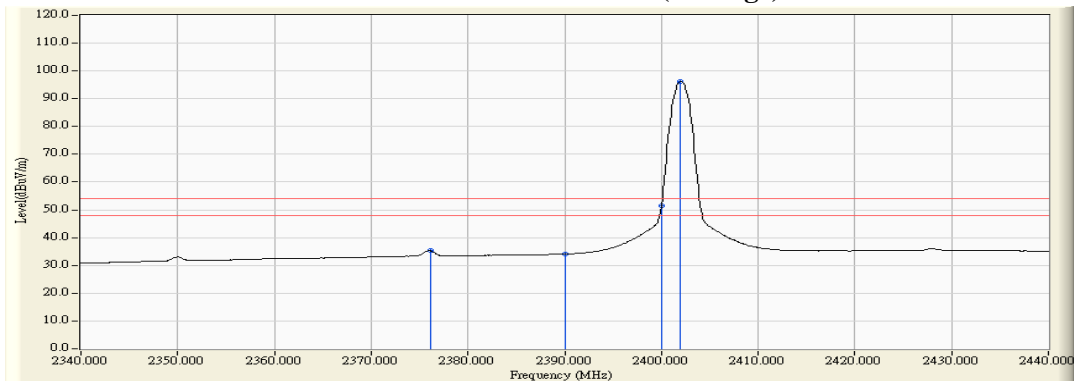
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2375.100	-1.189	47.965	46.776	74.00	54.00	Pass
00 (Peak)	2390.000	-1.131	47.004	45.873	74.00	54.00	Pass
00 (Peak)	2400.000	-1.084	61.930	60.847	--	--	--
00 (Peak)	2402.200	-1.072	97.742	96.671	--	--	--
00 (Average)	2376.100	-1.186	36.478	35.293	74.00	54.00	Pass
00 (Average)	2390.000	-1.131	35.257	34.126	74.00	54.00	Pass
00 (Average)	2400.000	-1.084	52.542	51.459	--	--	--
00 (Average)	2402.000	-1.073	97.221	96.149	--	--	--

**Figure Channel 00: Horizontal (Peak)**



**Figure Channel 00: Horizontal (Average)**



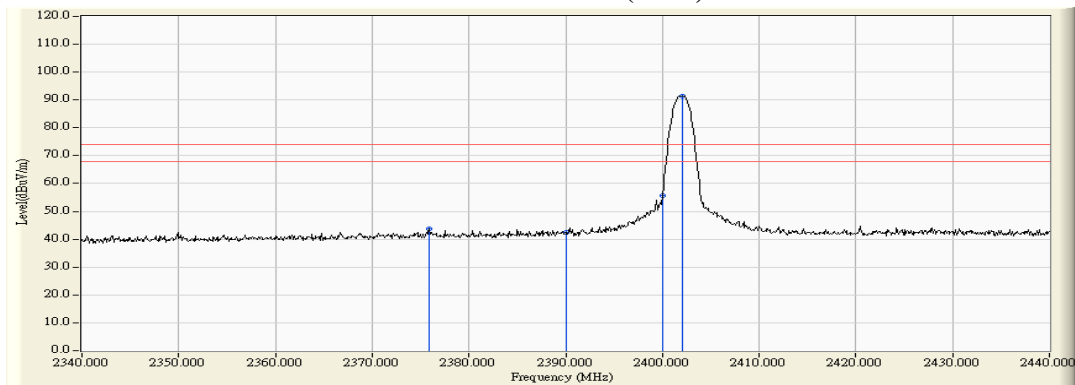
- Note: 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.  
 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.  
 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.  
 4. “ \* ”, means this data is the worst emission level.  
 5. Measurement Level = Reading Level + Correct Factor.  
 6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

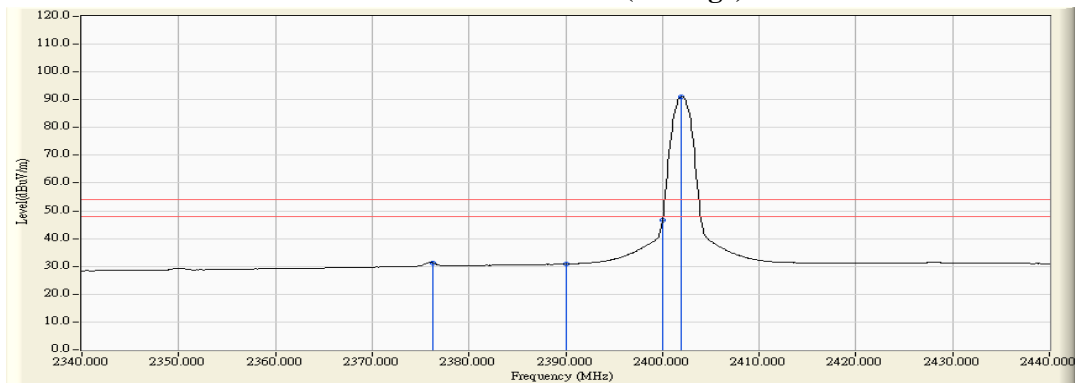
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2375.900	-1.660	45.428	43.769	74.00	54.00	Pass
00 (Peak)	2390.000	-1.725	44.308	42.583	74.00	54.00	Pass
00 (Peak)	2400.000	-1.733	57.394	55.662	--	--	--
00 (Peak)	2402.100	-1.729	93.140	91.411	--	--	--
00 (Average)	2376.300	-1.662	32.925	31.264	74.00	54.00	Pass
00 (Average)	2390.000	-1.725	32.599	30.874	74.00	54.00	Pass
00 (Average)	2400.000	-1.733	48.329	46.597	--	--	--
00 (Average)	2402.000	-1.729	92.922	91.193	--	--	--

**Figure Channel 00: Vertical (Peak)**



**Figure Channel 00: Vertical (Average)**



Note:

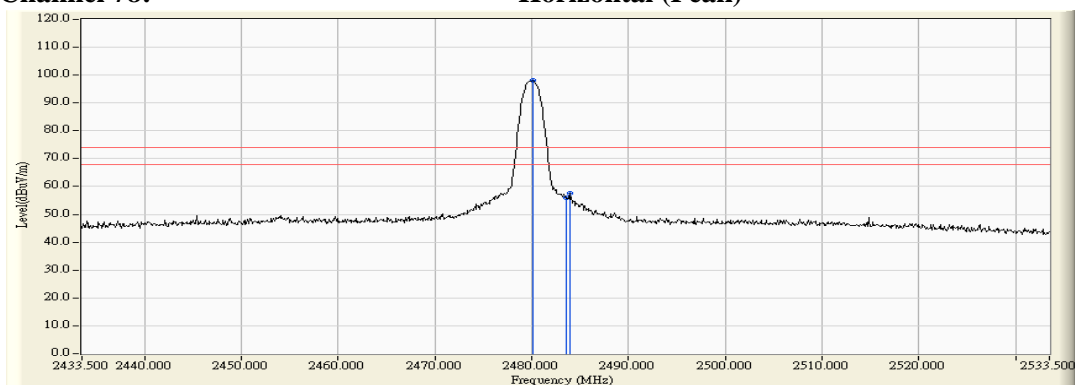
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

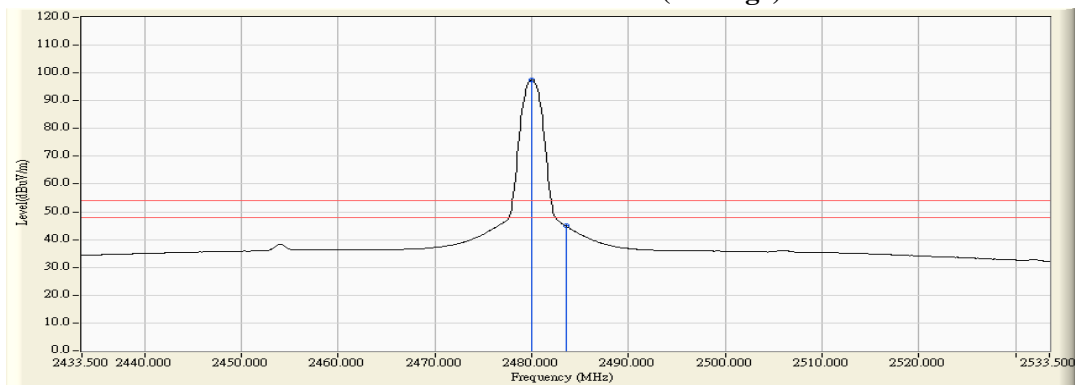
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.100	-0.580	98.562	97.982	--	--	--
78 (Peak)	2483.500	-0.558	56.689	56.131	74.00	54.00	Pass
78 (Peak)	2483.900	-0.555	58.273	57.717	74.00	54.00	Pass
78 (Average)	2480.000	-0.581	98.204	97.623	--	--	--
78 (Average)	2483.500	-0.558	45.488	44.930	74.00	54.00	Pass

**Figure Channel 78: Horizontal (Peak)**



**Figure Channel 78: Horizontal (Average)**



Note:

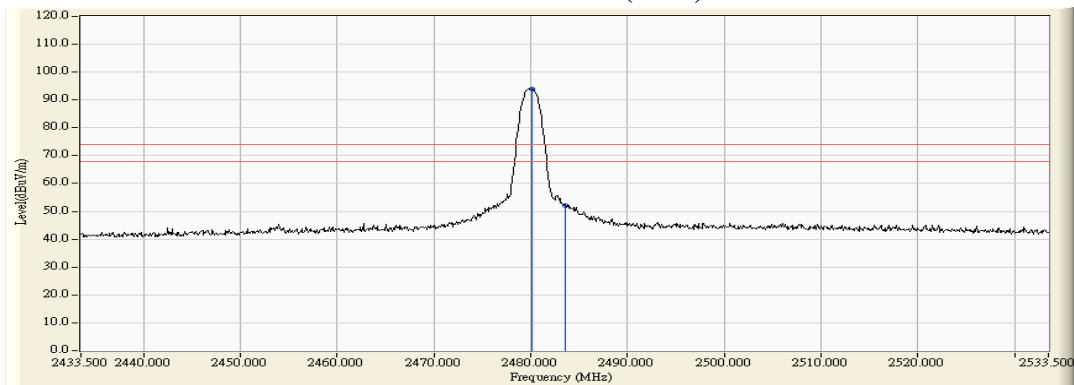
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

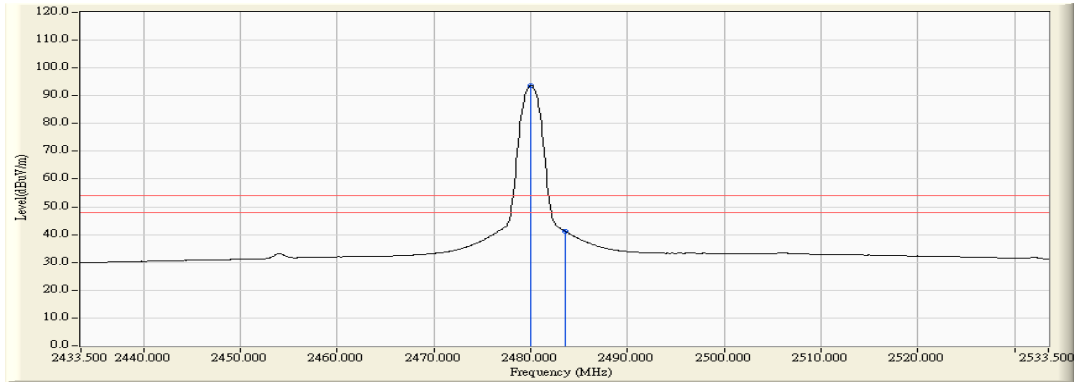
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBUV)	Emission Level (dBUV/m)	Peak Limit (dBUV/m)	Average Limit (dBUV/m)	Result
78 (Peak)	2480.100	-1.324	95.260	93.936	--	--	--
78 (Peak)	2483.500	-1.305	53.396	52.091	74.00	54.00	Pass
78 (Average)	2480.000	-1.324	95.028	93.704	--	--	--
78 (Average)	2483.500	-1.305	42.635	41.330	74.00	54.00	Pass

**Figure Channel 78: Vertical (Peak)**



**Figure Channel 78: Vertical (Average)**



Note:

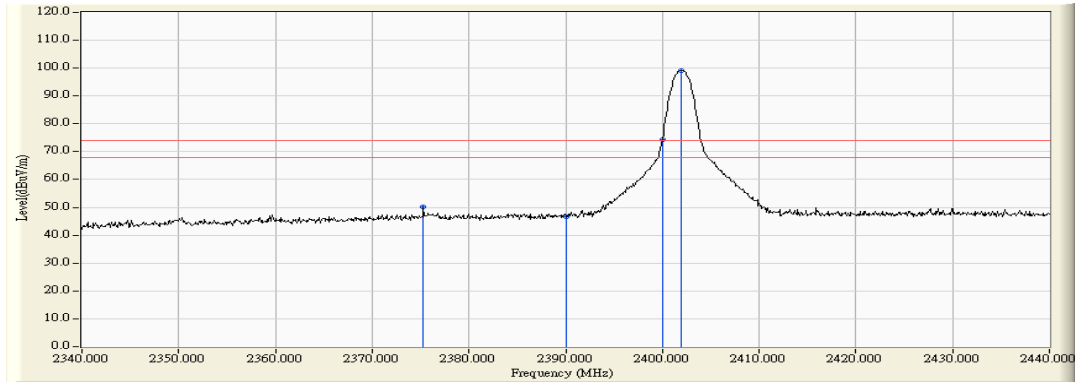
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

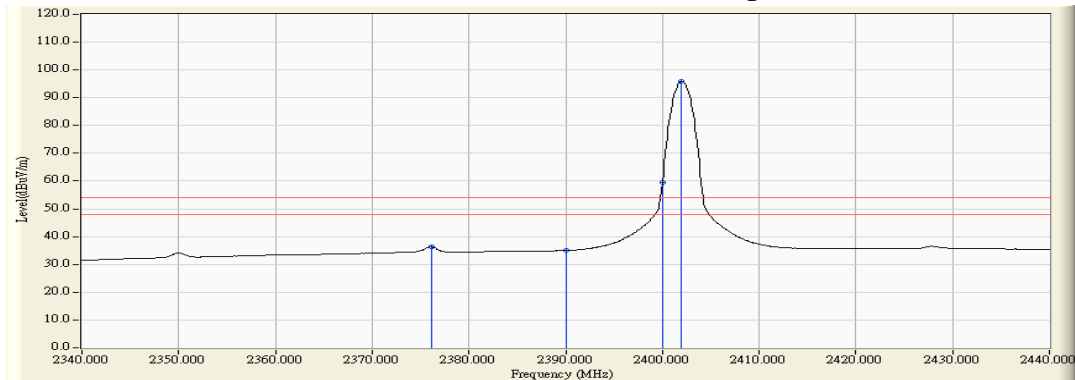
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2375.300	-1.188	51.443	50.255	74.00	54.00	Pass
00 (Peak)	2390.000	-1.131	47.705	46.574	74.00	54.00	Pass
00 (Peak)	2400.000	-1.084	75.548	74.465	--	--	--
00 (Peak)	2402.000	-1.073	100.203	99.131	--	--	--
00 (Average)	2376.100	-1.186	37.492	36.307	74.00	54.00	Pass
00 (Average)	2390.000	-1.131	36.134	35.003	74.00	54.00	Pass
00 (Average)	2400.000	-1.084	60.630	59.547	--	--	--
00 (Average)	2402.000	-1.073	96.841	95.769	--	--	--

**Figure Channel 00: Horizontal (Peak)**



**Figure Channel 00: Horizontal (Average)**



Note:

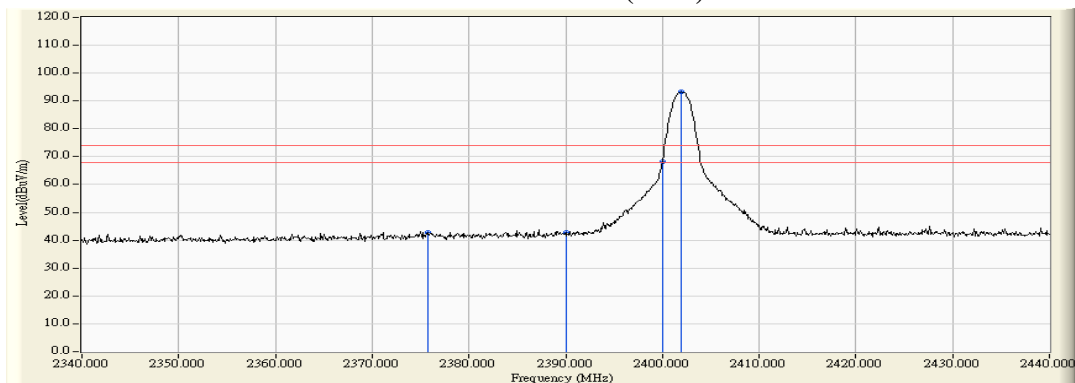
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

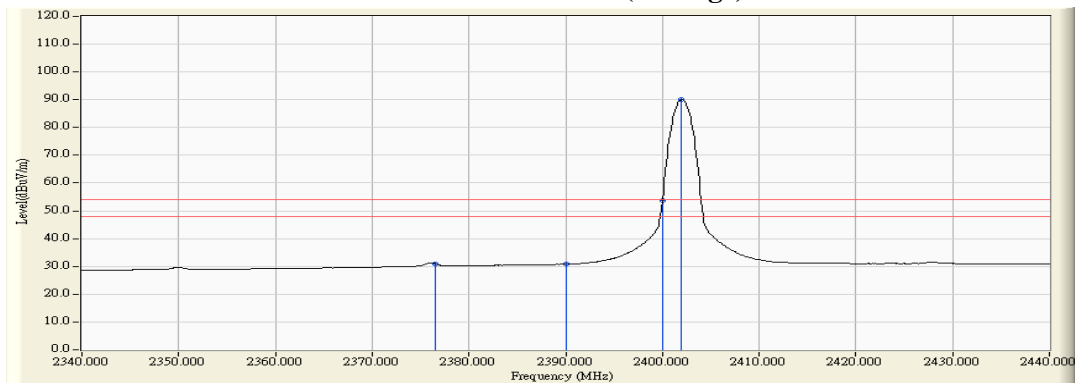
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2375.700	-1.658	44.466	42.808	74.00	54.00	Pass
00 (Peak)	2390.000	-1.725	44.378	42.653	74.00	54.00	Pass
00 (Peak)	2400.000	-1.733	70.015	68.283	--	--	--
00 (Peak)	2402.000	-1.729	94.926	93.197	--	--	--
00 (Average)	2376.500	-1.663	32.629	30.967	74.00	54.00	Pass
00 (Average)	2390.000	-1.725	32.547	30.822	74.00	54.00	Pass
00 (Average)	2400.000	-1.733	55.509	53.777	--	--	--
00 (Average)	2402.000	-1.729	91.677	89.948	--	--	--

**Figure Channel 00: Vertical (Peak)**



**Figure Channel 00: Vertical (Average)**



Note:

1. All readings 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. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

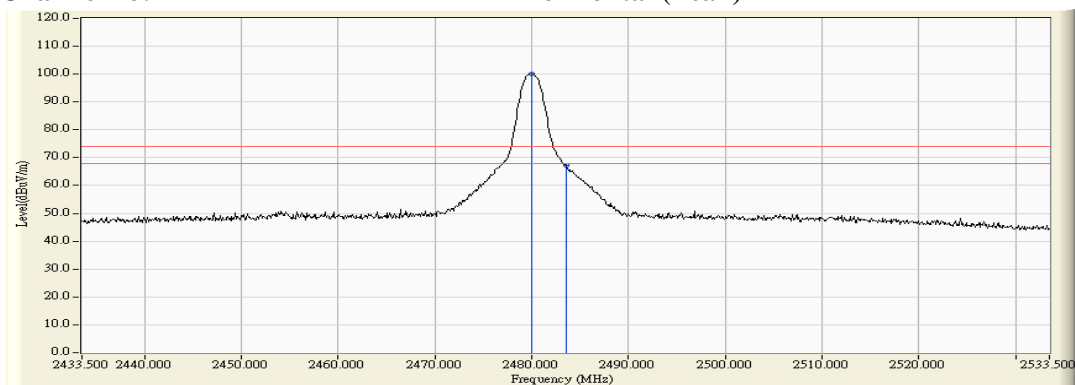


Product : Network Media Module  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

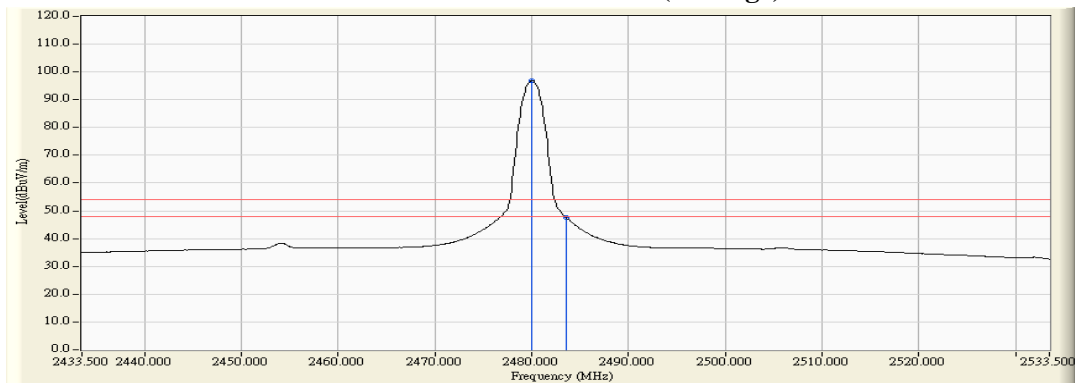
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.000	-0.581	100.753	100.172	--	--	--
78 (Peak)	2483.500	-0.558	67.653	67.095	74.00	54.00	Pass
78 (Average)	2480.000	-0.581	97.471	96.890	--	--	--
78 (Average)	2483.500	-0.558	48.296	47.738	74.00	54.00	Pass

**Figure Channel 78: Horizontal (Peak)**



**Figure Channel 78: Horizontal (Average)**



Note:

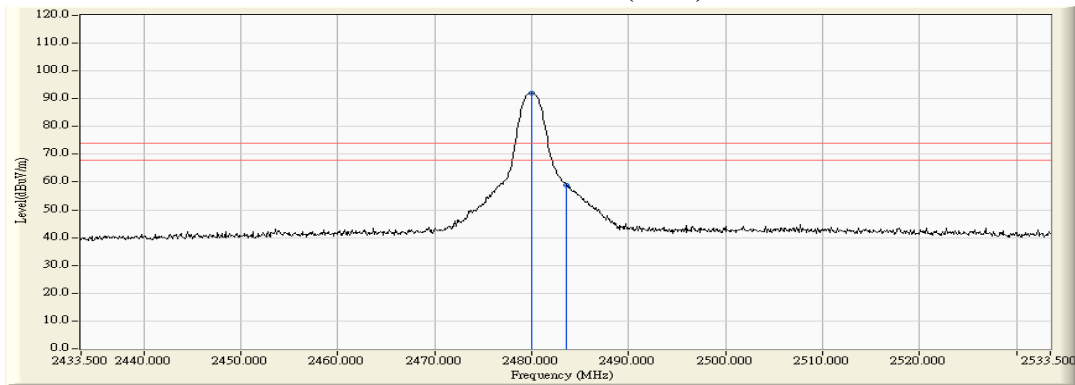
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

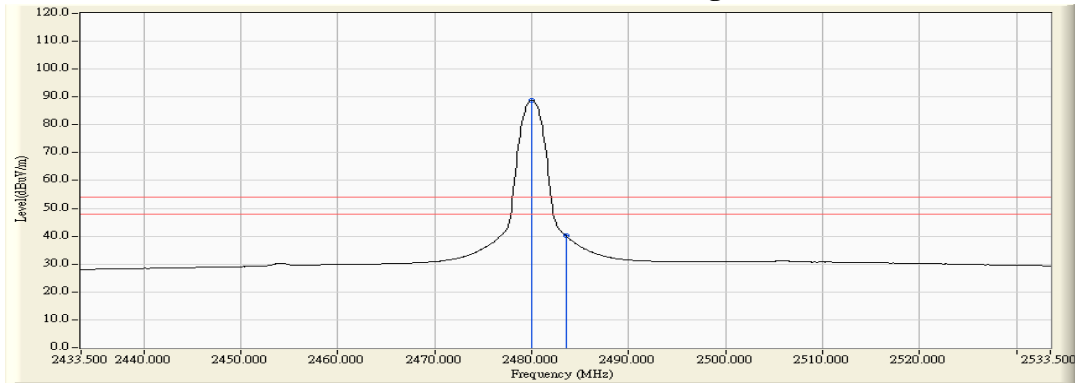
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.000	-1.324	93.411	92.087	--	--	--
78 (Peak)	2483.500	-1.305	60.304	58.999	74.00	54.00	Pass
78 (Average)	2480.000	-1.324	90.205	88.881	--	--	--
78 (Average)	2483.500	-1.305	41.383	40.078	74.00	54.00	Pass

**Figure Channel 78: Vertical (Peak)**



**Figure Channel 78: Vertical (Average)**



Note:

1. All readings 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. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

No modification was made during testing.