FCC Test Report

for

iWallet

Trade Name	**:**	**iWallet**
Model Number	**:**	**SC-5144, LC-5245, LC-5346, FG-2425, FG-2431, FG-2429, FG-2427, FG-2426, FG-2432, FG-2430, FG-2428**
FCC ID	**:**	**X3O-SC5144LC5FG24**
Report Number	**:**	**RF- U070-1001-065**
Date of Receipt	**:**	**Jan. 5, 2010**
Date of Report	**:**	**Feb. 2, 2010**

Prepared for

iWallet Corporation

7968 Arjons Drive, uite D, San Diego CA 92126, USA

Prepared by

Central Research Technology Co.

EMC Test Laboratory

No.11, Lane41, Fushuen St., Jungshan Chiu, Taipei, Taiwan, 104, R.O.C.

NVLAP LAB CODE 200575-0

Verification of Compliance

Equipment under Test	**: iWallet**
Trade Name	**: iWallet**
Model No.	**: SC-5144, LC-5245, LC-5346, FG-2425, FG-2431, FG-2429, FG-2427, FG-2426, FG-2432, FG-2430, FG-2428**
FCC ID	**: X3O-SC5144LC5FG24**
Manufacturer	**: Super Wong Industrial Co. Ltd.**
Applicant	**: iWallet Corporation**
Address	**: 7968 Arjons Drive, uite D, San Diego CA 92126, USA**
Applicable Standards	**: 47 CFR part 15, Subpart C**
Date of Testing	**: Jan. 8~12, 2010**
Deviation	**: N/A**
Condition of Test Sample	**: Prototype**

We, **Central Research Technology Co**., hereby certify that one sample of the designated product was tested in our facility during the period mentioned above. The test records, data evaluation and Equipment Under Test (EUT) configurations shown in the present report are true and accurate representation of the measurements of the sample's RF characteristics under the conditions herein specified.

The test results show that the EUT as described in the present report is in compliance with the requirements set forth in the standards mentioned above and apply to the tested sample identified in the present report only. The test report shall not be reproduced, except in its entirety, without the written approval of Central Research Technology Co.

PREPARED BY : Cathy Chen , **DATE :** Feb. 2, 2010
(Cathy Chen/ Technical Manager)

APPROVED BY : J. Y. Shih , **DATE :** Feb. 2, 2010
(Tsun-Yu Shih/General Manager)

Contents

1 General Description

1.1 General Description of EUT

Equipment under Test	:	iWallet
Model No.	:	SC-5144, LC-5245, LC-5346, FG-2425, FG-2431, FG-2429, FG-2427, FG-2426, FG-2432, FG-2430, FG-2428
Power in	:	Power supplied by rechargeable battery
Test Voltage	:	Power supplied by rechargeable battery
Manufacturer	:	Super Wong Industrial Co. Ltd.
Channel Numbers	:	79
Frequency Range	:	2402~2480MHz
Modulation	:	GFSK
Antenna Spec	:	PIFA type -11.75dBi
Function Description	:	

The EUT contains a bluetooth V1.2 function is used to transmit both control command and data. Please refer to the user's manual for the details.

Perform the function of EUT continuously by executing the test program supplied by manufacturer.

The average power is 11.39dBm less than 24.58mW, so SAR is not require.

1.2 Test Methodology

For this EUT, both conducted and radiated emissions were performed according to the procrdures illustrated in ANSI C63.4:2003 and other required measurements were illustrated in separate sections of this test report for detail.

Since the EUT is considered a potable unit, it was pre-tested on the positioned of each 3 axis. There for only the test data of the worse case- X axiz was used for Radiated test.

1.3 Applied standards

(1) Conduction Emission Requirement

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

(2) Radiated Emission Requirement

For intentional device, according to §15.209, the general requirement of field strength of radiated emissions from intentional radiator at a distance of 3 meters shall not exceed the below table.

Frequency (MHz)	Measurement Distance (m)	Field Strength (uV/m)	Field Strength (dBuV/m)
30 – 88	3	100	40.0
88 – 216	3	150	43.5
216 – 960	3	200	46.0
960 – 1610	3	500	54.0
above 1610	3	500	54.0

Note 1- The lower limit shall apply at the transition frequency.

(3) Hopping Channel Carrier Frequencies Separation and 20dB Bandwidth

According to 15.247(a)(1), 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.

(4) Dwell Time on Each Channel

According to 15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

(5) Maximun Peak Output Power

According to 15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

(6) 100kHz Bandedge

According to 15.247(c), 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 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).

(7) Restricted Band

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
[2]1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

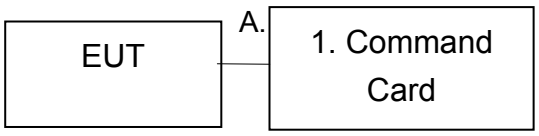
[2] Above 38.6

1.4 The Support Units :

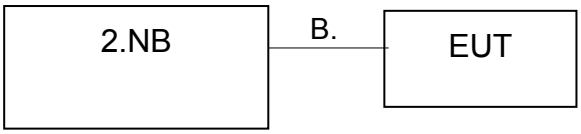
No.	Unit	Model No./ Serial No.	Trade Name	Power Cord	Supported by lab.
1.	Command card	maotek		V	
2.	Notebook	TECRA M3 PTM30T-01Z005/ 45031877H	TOSHIBA	V	V

1.5 Layout of Setup

Use mode



Recharged mode(for conducted emission measurement)



Connecting Cables :

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
A	Command line	1m					
B	Mini USB	1.8m	V			V	

Justification :

For both conducted and radiated emission below 1GHz, the system was configured for typical fashion as a customer could normal use it. The peripherals other than EUT was connected in normally standing by situation. Measurement was performed under the conduction that a computer program was excited to simulate data communication of EUT, and the transmission rate was setup maximum allowed by EUT.

For line conducted emission, only measurement of TX/RX operated, for the digital circuits portion also function normally whenever TX or RX is operated. For radiated emission, measurement of radiated emission from digital circuit is performed with channel 0, Channel 39 and channel 78 by transmitting mode.

1.6 Test Capability

Test Facility

The test facility used for evaluating the conformance of the EUT with each standard in the present report meets what required in CISPR16-1-4, CISPR16-2-3 and ANSI C63.4.

Test Room	Type of Test Room	Descriptions
TR1	10m semi-anechoic chamber (23m×14m×9m)	Complying with the NSA requirements in documents CISPR 22 and ANSI C63.4. For the radiated emission measurement.
TR11	3m semi-anechoic chamber (9m × 6m × 6m)	
TR13	Test Site	For the RF conducted emission measurement.
TR5	Shielding Room (8m×5m×4m)	For the conducted emission measurement.

Test Laboratory Competence Information

Central Research Technology Co. has been accredited / filed / authorized by the agencies listed in the following table.

Certificate	Nation	Agency	Code	Mark
Accreditation Certificate	USA	NVLAP	200575-0	ISO/IEC 17025
	R.O.C. (Taiwan)	TAF	0905	ISO/IEC 17025
	R.O.C. (Taiwan)	BSMI	SL2-IN-E-0033, SL2-IS-E-0033, SL2-R1/R2-E-0033, SL2-A1-E-0033	ISO/IEC 17025
Site Filing Document	USA	FCC	474046, TW1053	Test facility list & NSA Data
	Canada	IC	4699A-1,-2,-3	Test facility list & NSA Data
	Japan	VCCI	R-1527,C-1609,T-131,T-1441 ,G-10	Test facility list & NSA Data
Authorization Certificate	Germany	TUV	10021687-2008	ISO/IEC 17025
	Norway	Nemko	ELA212	ISO/IEC 17025

The copy of each certificate can be downloaded from our web site: www.crc-lab.com

1.7 Measurement Uncertainty

The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than U_{cispr} in table 1 of CISPR 16-4-2.

Test Item	Measurement Uncertainty	
Peak Output Power	1.1dB	
Radiated Emission: (30MHz~200MHz)	Horizontal 2.8dB；Vertical 3.5 dB	
Radiated Emission: (200MHz~1GHz)	Horizontal 3.4dB；Vertical 2.8dB	
Radiated Emission: (1GHz~18GHz)	Horizontal 2.5dB；Vertical 2.4dB	
Radiated Emission: (18GHz~26.5GHz)	Horizontal 4.0dB；Vertical 3.9dB	
Line Conducted Emission	ESH2-Z5	3.1dB
	ENV 4200	3.8dB

2 Maximum Peak Output Power

Result: Pass

2.1 Applied standard

According to 15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Filed strength tranfers to peak output power is as below：

$$P = \frac{(ExD)^2}{30 \times G}$$

Note:
P : output power (W)
E : Field strength (V/m)
D : measurement distance = 3m
G : EUT antenna gain = -11.75dBi

Transfer:
P(dBm) = E(dBuV/m) – 90 + 20log3 – 10log30 – (–11.75)
= E(dBuV/m) – 90 + 9.54 – 14.77 – (–11.75)
= E(dBuV/m) – 83.48

2.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	E4407B/ MY45106795	2009/3/19	2010/3/18
Antenna	EMCO	3117/57416	2009/3/3	2010/3/2
PRE-AMPLIFIER	MITEQ	AFS6-02001800-35 -10P-6/949196	2009/9/11	2010/09/10
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2009/6/30	2010/6/29

Note:
1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
1MHz	3MHz	Peak	Maxhold	

Climatic Condition

Ambient Temperature：24℃ Relative Humidity : 54%

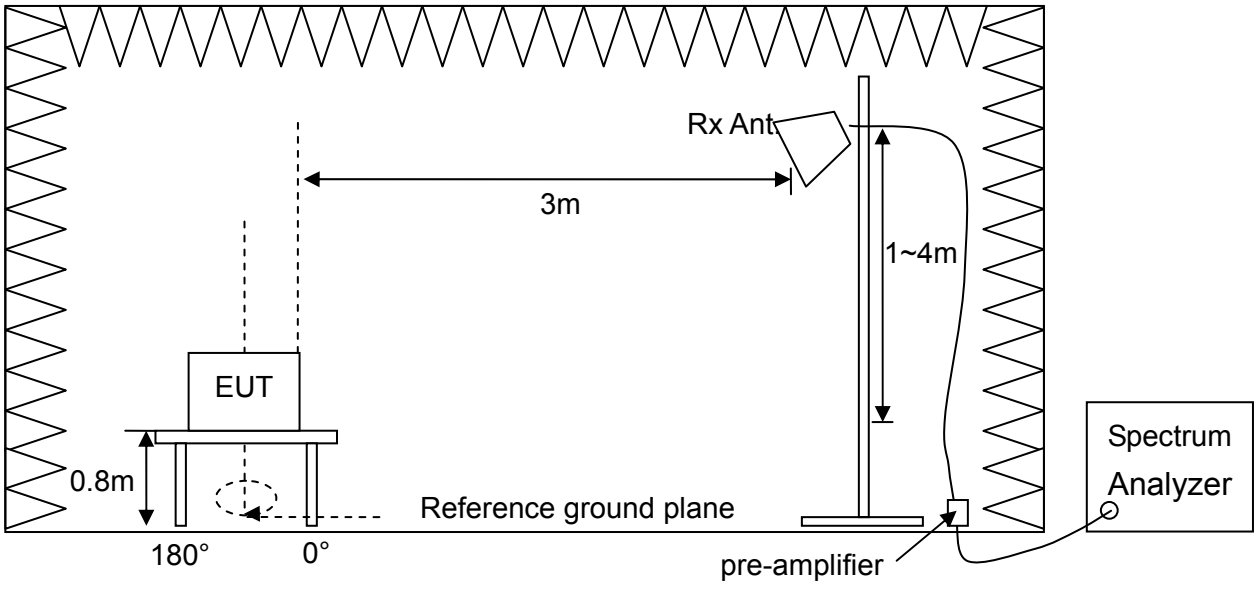
2.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. A software provided by client enabled the EUT to transmit data at low, middle and high channel frequencies individually.

c. According to FCC Public Notice DA00-705, Span = approximately 5 times the 20 dB bandwidth RBW > the 20 dB bandwidth, VBW ≥ RBW to measure the peak output power and compare with the required limit.

2.4 Test configuration



2.5 Test Data

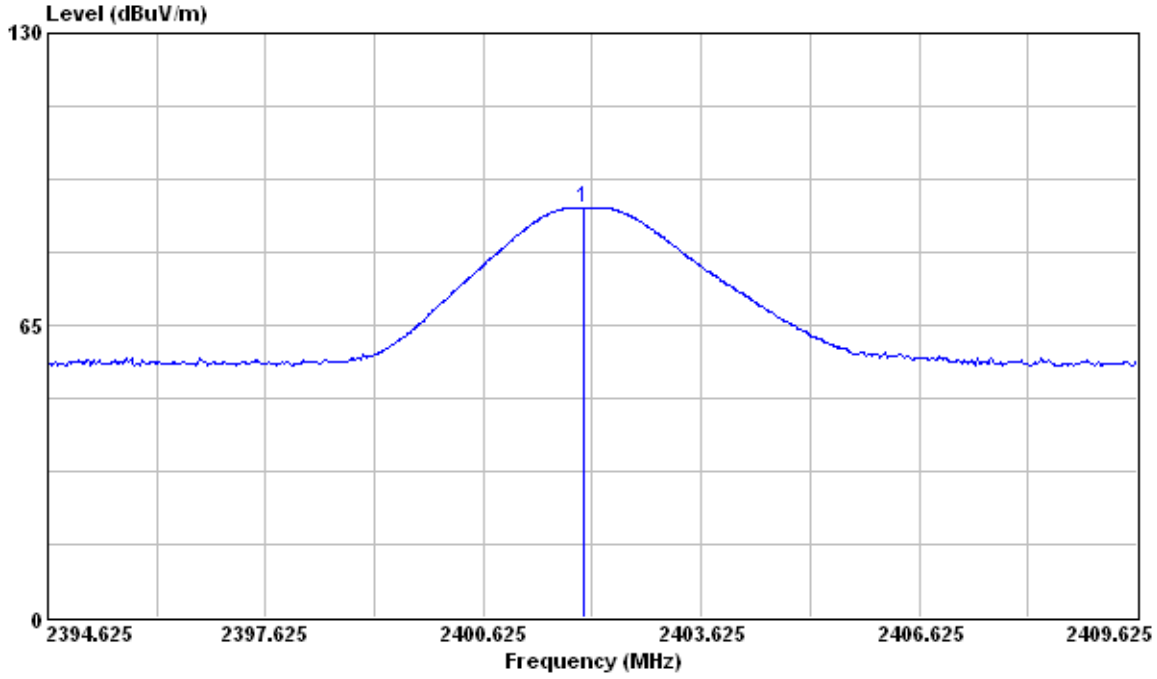
Test Mode : Continuous Transmitting **Tester : Bill**

Operating Frequency (MHz)	Polarization	Reading Data (dBuV)	Correction Factor (dB/m)	Emission (dBuV/m)	Peak output power (dBm)	Limit (dBm)	Margin (dB)
2402	Vertical	85.91	5.33	91.24	7.76	30	22.24
2402	Horizontal	89.72	5.33	95.05	11.57	30	18.43
2441	Vertical	87.50	5.32	92.82	9.34	30	20.66
2441	Horizontal	91.99	5.32	97.31	13.83	30	16.17
2480	Vertical	89.65	5.31	94.96	11.48	30	18.52
2480	Horizontal	92.50	5.31	97.81	14.33	30	15.67

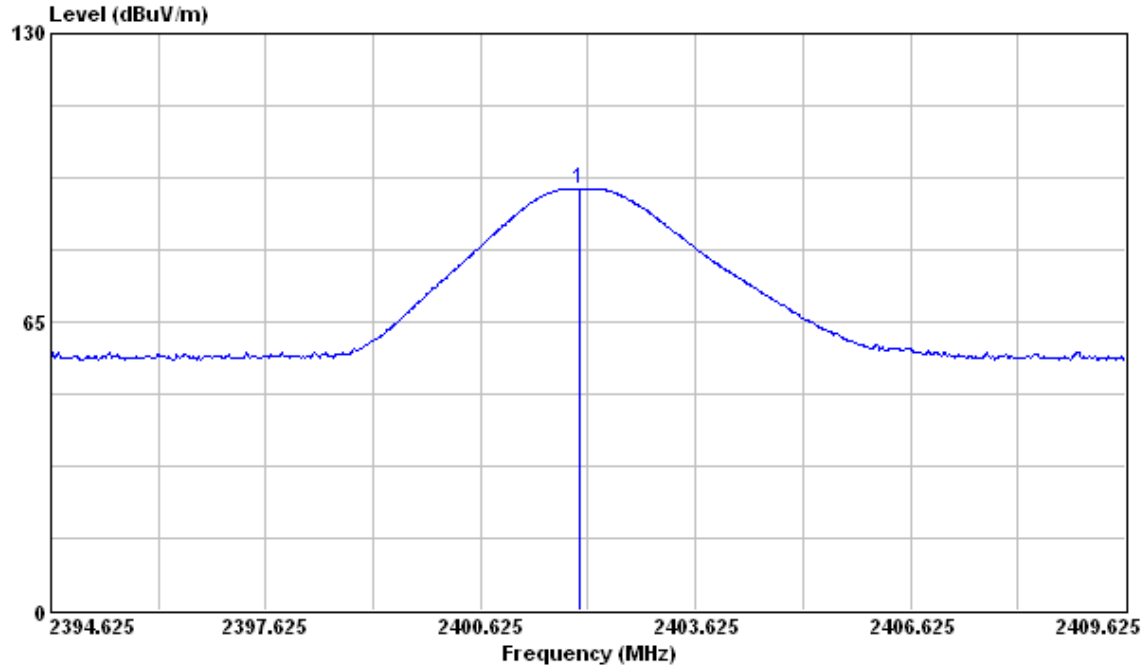
Note:

1. Correction Factor (dB) = Antenna factor + Cable Loss - pre-amplifier
2. Emission (dBm) = Reading Data + Correction Factor
3. Peak output power (dBm) = Emission – 83.48(see section 2.2)
4. Margin (dB) = Limit – Peak output power

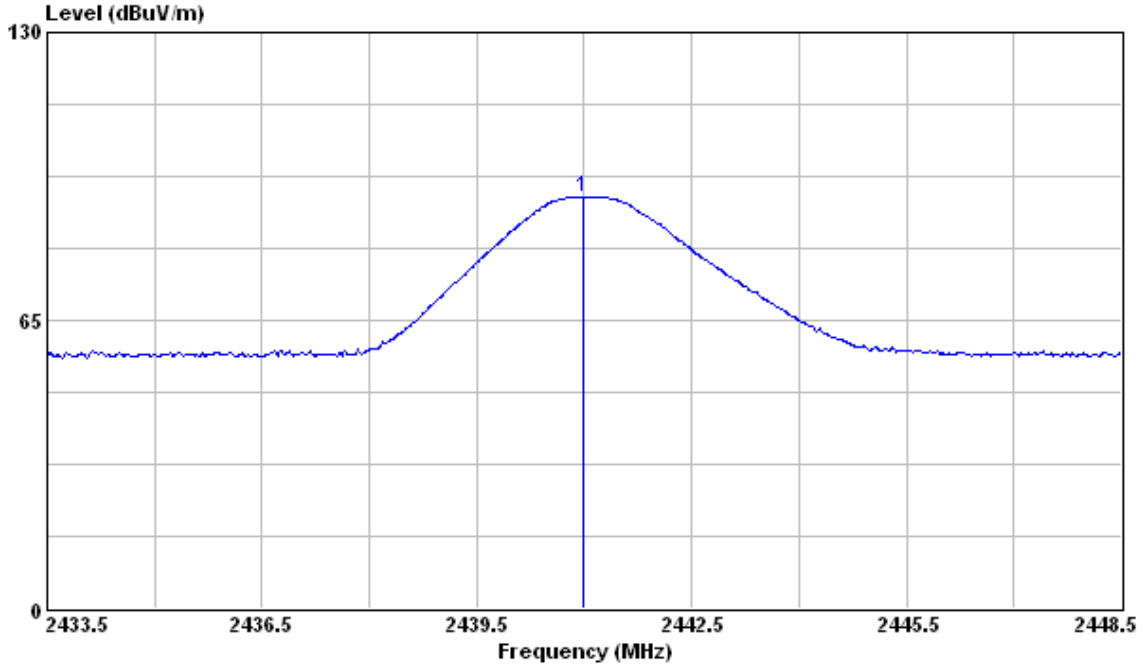
Low Channel (2402MHz)- Vertical



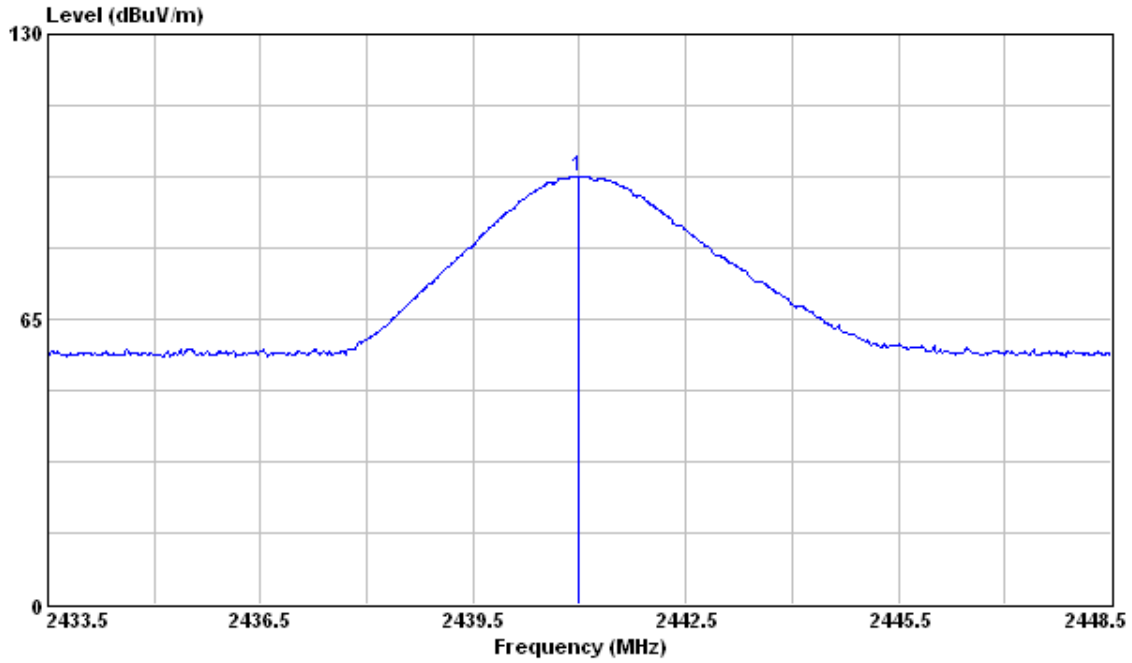
Low Channel (2402MHz)- Horizontal



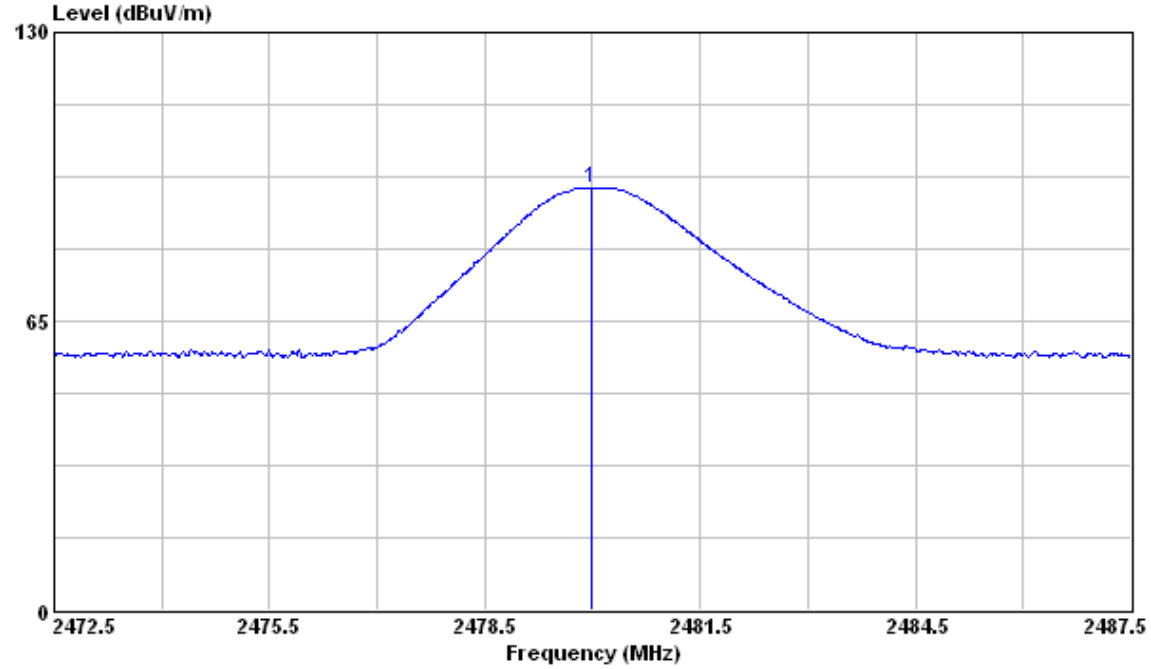
MiddleChannel (2441MHz)- Vertical



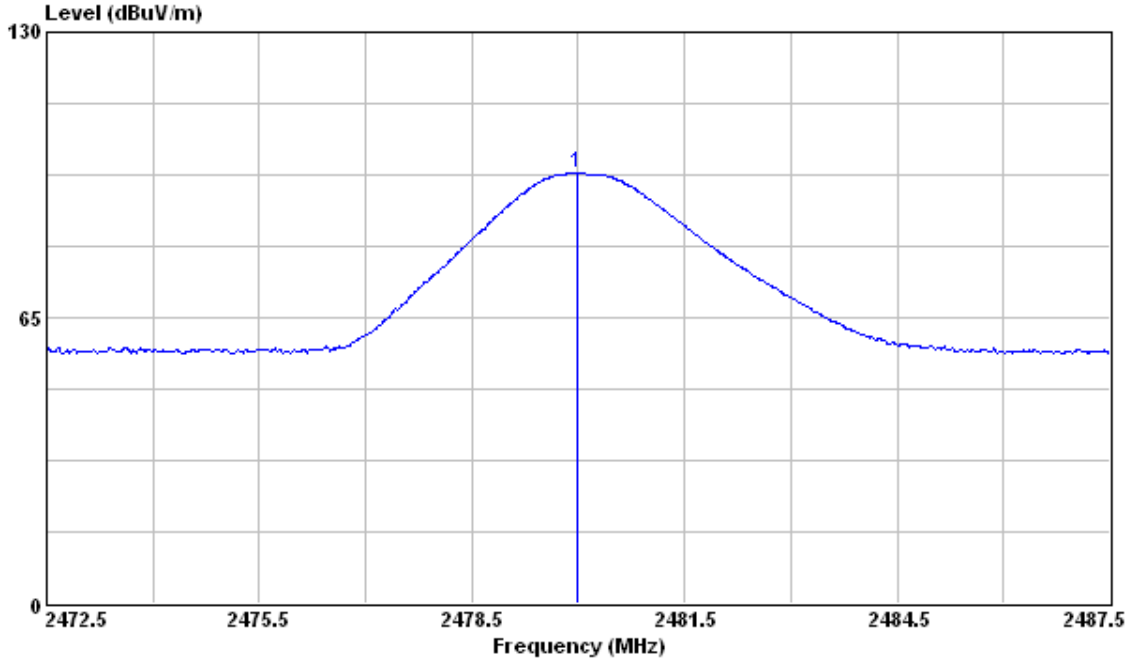
MiddleChannel (2441MHz)- Horizontal



High Channel (2480MHz)- Vertical



High Channel (2480MHz)- Horizontal



3 Band Edge

Result: Pass

3.1 Applied standard

According to 15.247(c),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 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).

3.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	E4407B/ MY45106795	2009/3/19	2010/3/18
Antenna	EMCO	3117/57416	2009/3/3	2010/3/2
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2009/6/30	2010/6/29
PRE-AMPLIFIER	MITEQ	AFS6-02001800-35-10P-6/949196	2009/9/11	2010/09/10

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.
3. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
100kHz	100kHz	Peak	Maxhold	100kHz Bandedge
1MHz	3MHz	Peak	Maxhold	Bandedge Peak
1MHz	10Hz	Peak	Maxhold	Bandedge Average

Climatic Condition

Ambient Temperature：24℃ Relative Humidity : 54%

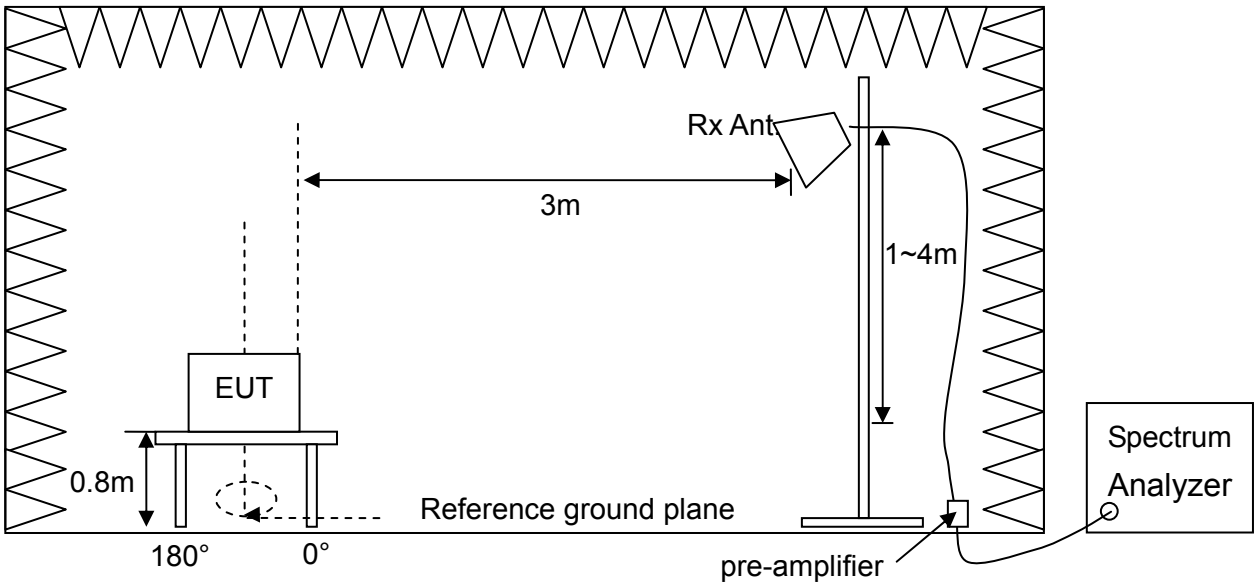
3.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. A software provided by client enabled the EUT to transmit data at at lowest and highest channel frequencies individually.

c. According FCC Public Notice DA00-705, Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, RBW ≥ 1% of the span , VBW ≥ RBW, to measure the band edge and compare with the required limit.

3.4 Test configuration



3.5 Test Data

100kHz Bandedge Measurement

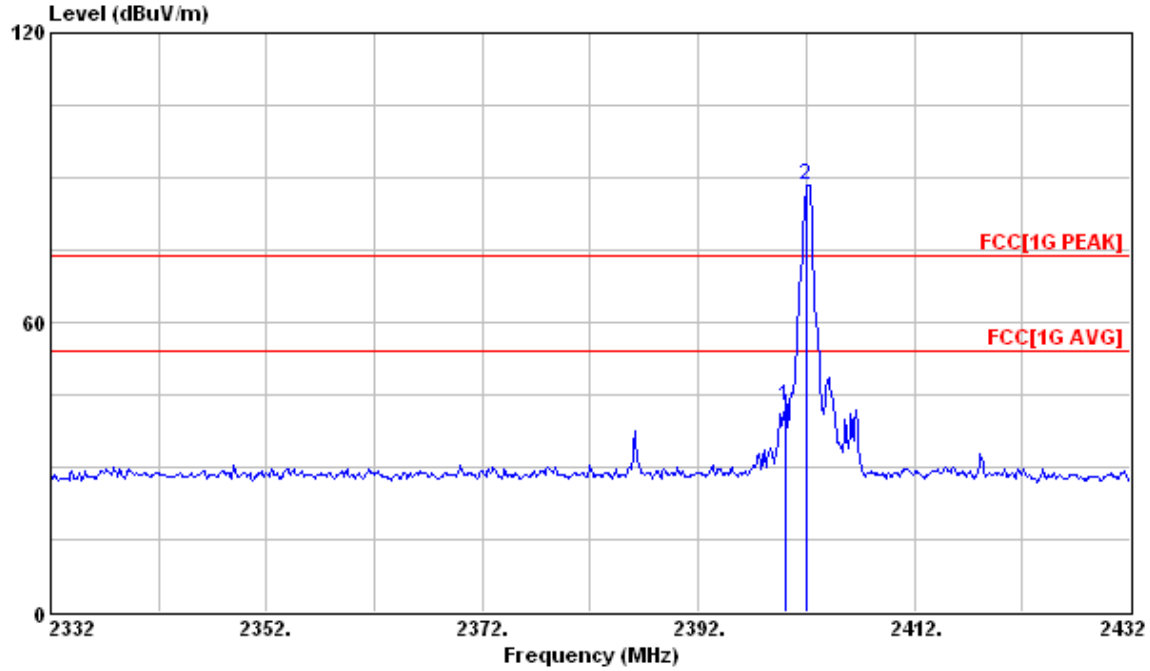
Test Mode : Continuous Transmitting **Tester : Bill**

Operating Frequency (MHz)	Antenna Polarization	Frequency (MHz)	Main Frequency Emission Data (dBuV/m)	Bandedge Emission Data (dBuV/m)	attenuation (dB)	Limit (dB)	Margin (dB)
2402	V	2400	88.42	42.82	45.6	20	25.6
2402	H	2400	90.62	47.07	43.55	20	23.55
2480	V	2483.5	89.46	40.83	48.63	20	28.63
2480	H	2483.5	90.86	41.00	49.86	20	29.86

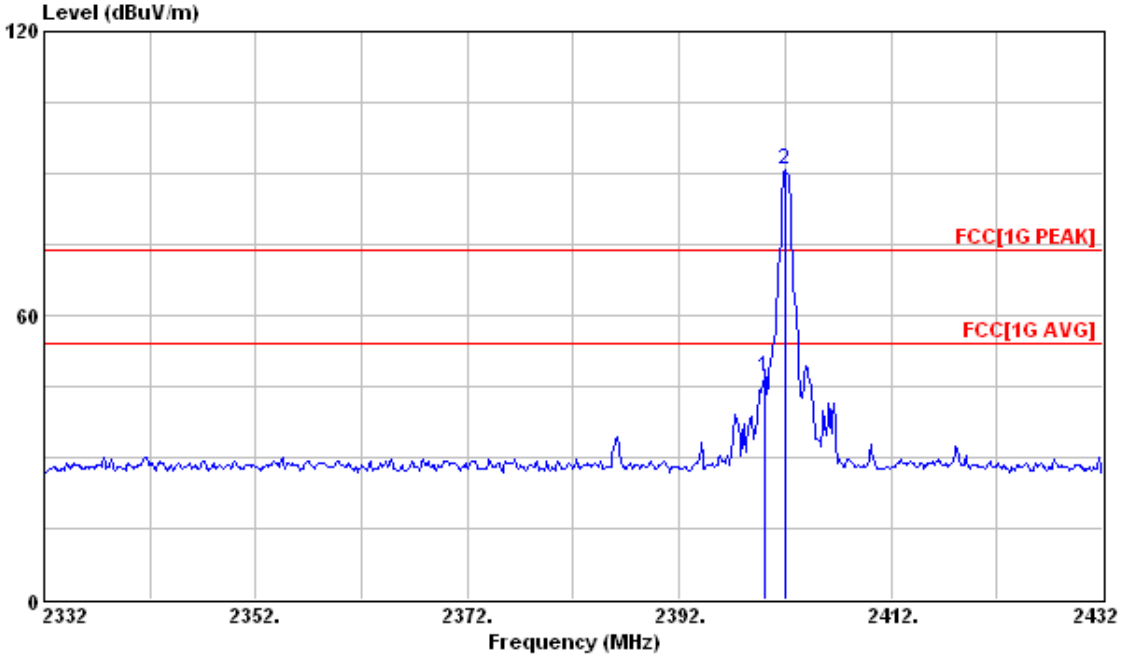
Note:

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Pre-amplifier
2. Attenuation (dB) = Main Frequency Emission Data - Bandedge Emission Data
3. Margin(dB) = Limit – Attenuation
4. "*" : The emission is too low to be measured.

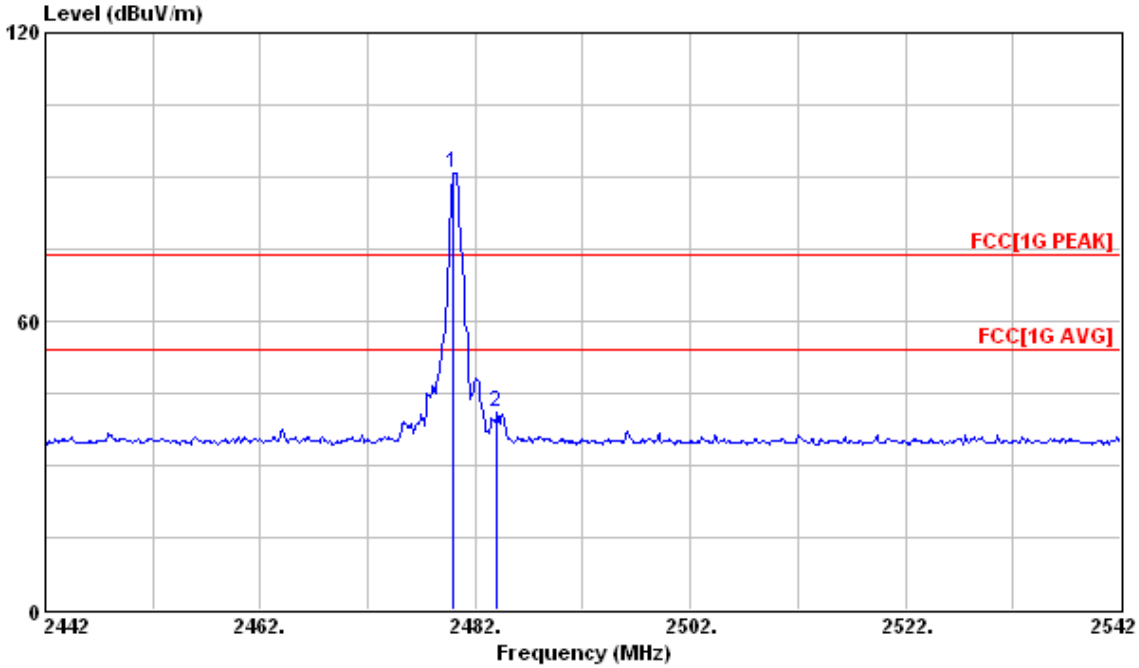
Low Channel (2402MHz) - Vertical



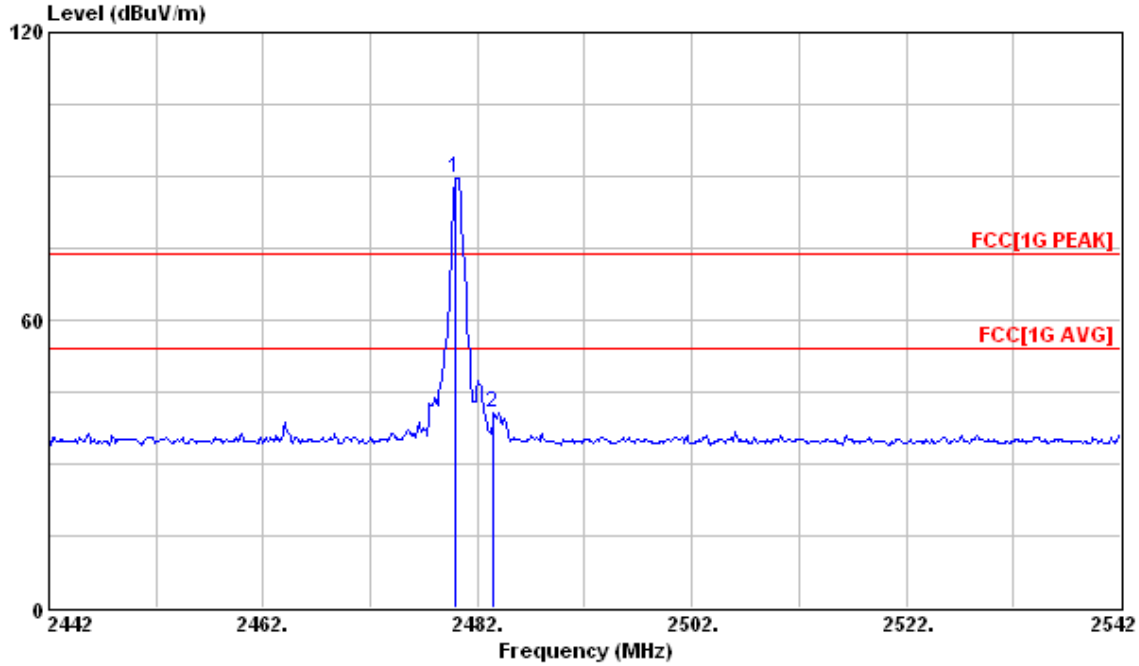
Low Channel (2402MHz) - Horizontal



High Channel (2480MHz) - Vertical



High Channel (2480MHz) - Horizontal



Radiated Measurement

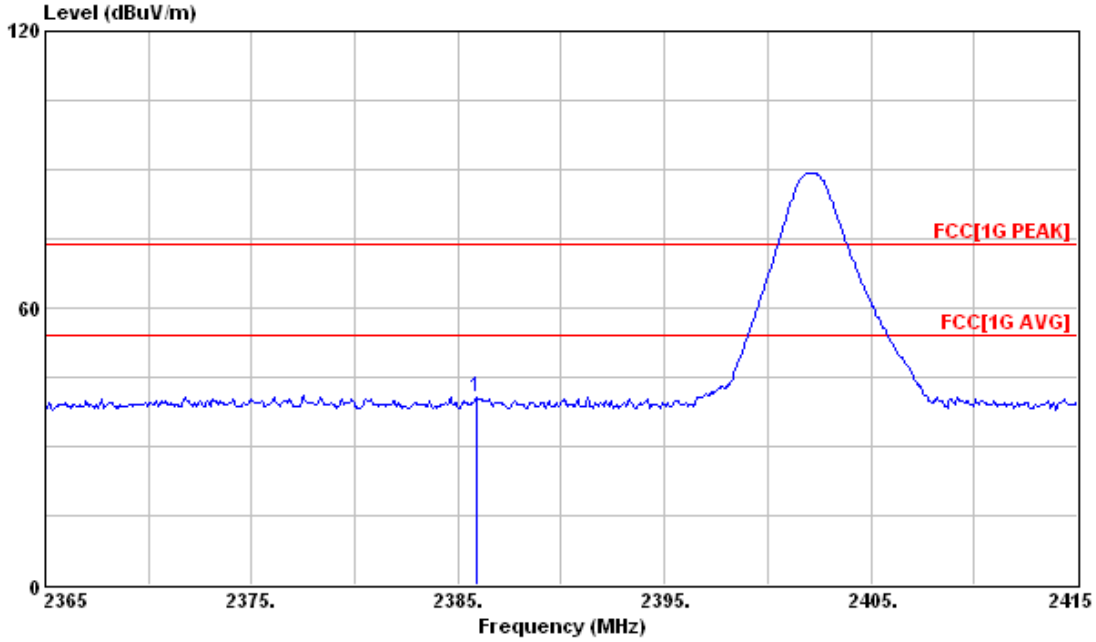
Test Mode : Continuous Transmitting **Tester : Bill**

Operating Frequency (MHz)	Antenna Polarization	Frequency (MHz)	Reading Data (dBuV)		Correction Factor (dB/m)	Emission (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
			PK.	AV.		PK.	AV.	PK.	AV.	PK.	AV.
2402	V	2385.90	68.90	57.72	-28.42	40.48	29.30	74.00	54.00	33.52	24.70
2402	H	2386.13	69.91	59.18	-28.42	41.49	30.76	74.00	54.00	32.51	23.24
2480	V	2483.5	86.89	80.68	-28.40	58.49	52.28	74.00	54.00	15.51	1.72
2480	H	2483.5	87.38	81.23	-28.40	58.98	52.83	74.00	54.00	15.02	1.17

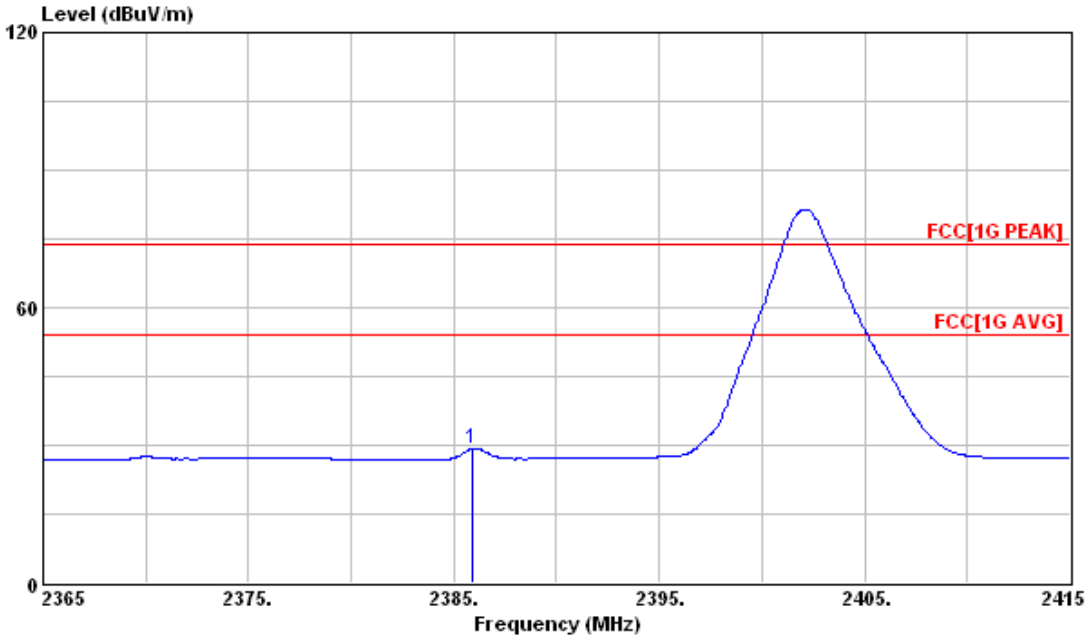
Note:

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Pre-amplifier
2. Emission (dBuV/m) = Reading Data + Correction Factor
3. Margin(dB) = Limit – Emission
4. “*” : The emission is too low to be measured.

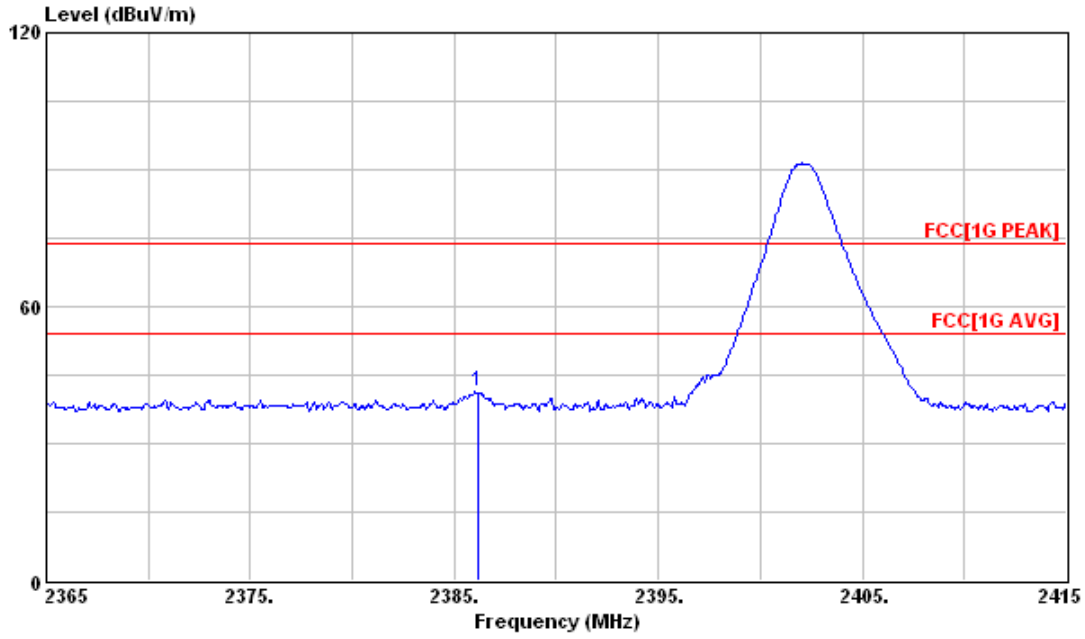
Low Channel (2402MHz), V Polarization – PK.



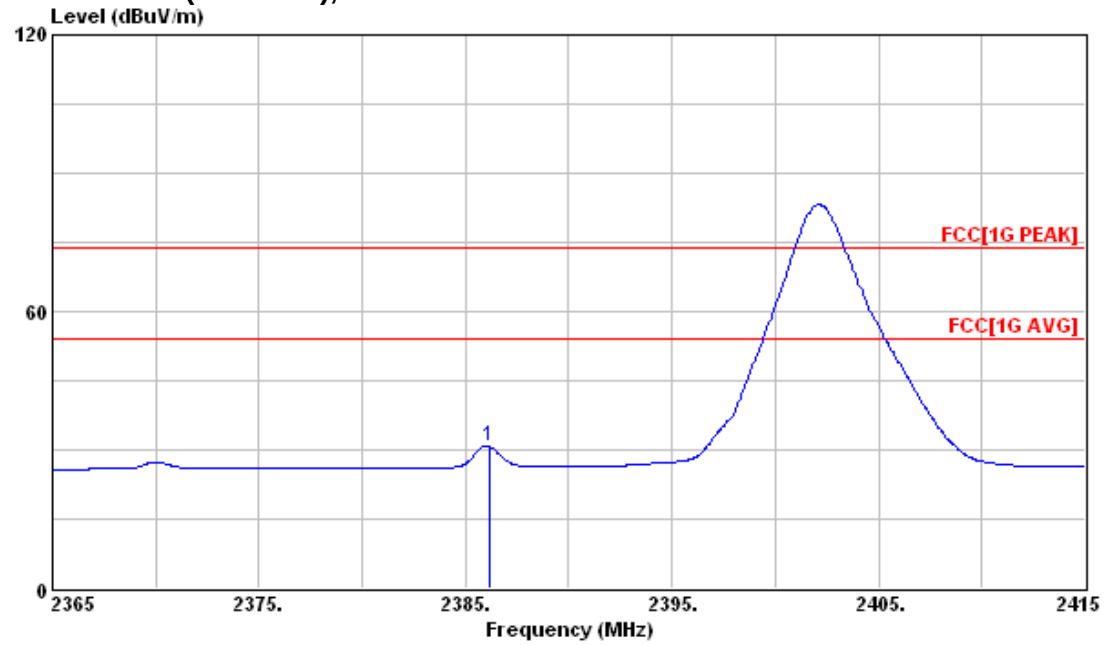
Low Channel (2402MHz), V Polarization – AV.



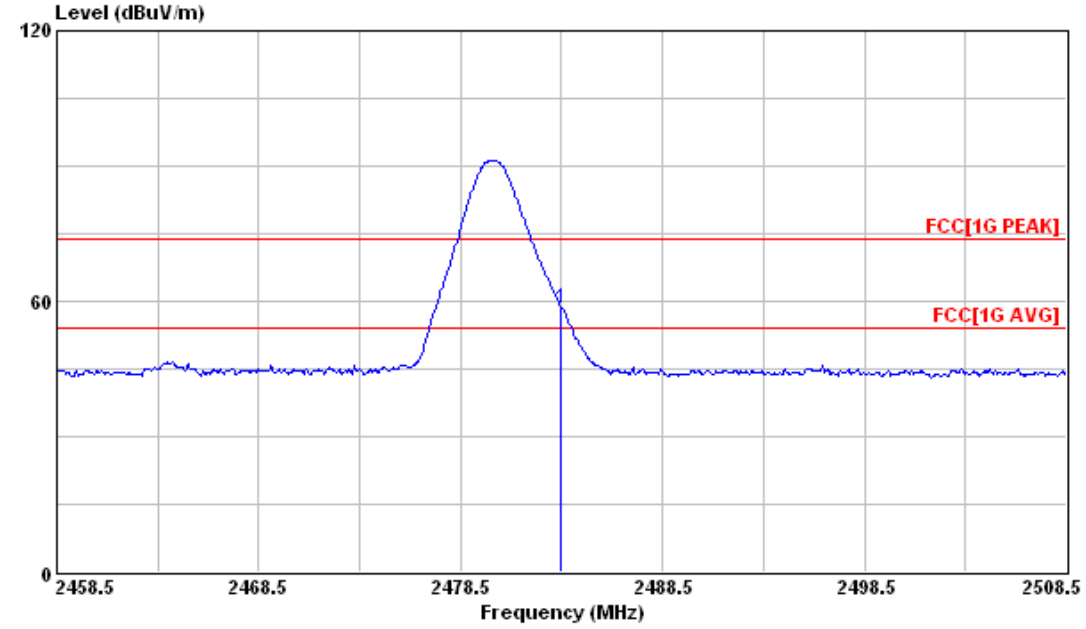
Low Channel (2402MHz), H Polarization – PK.



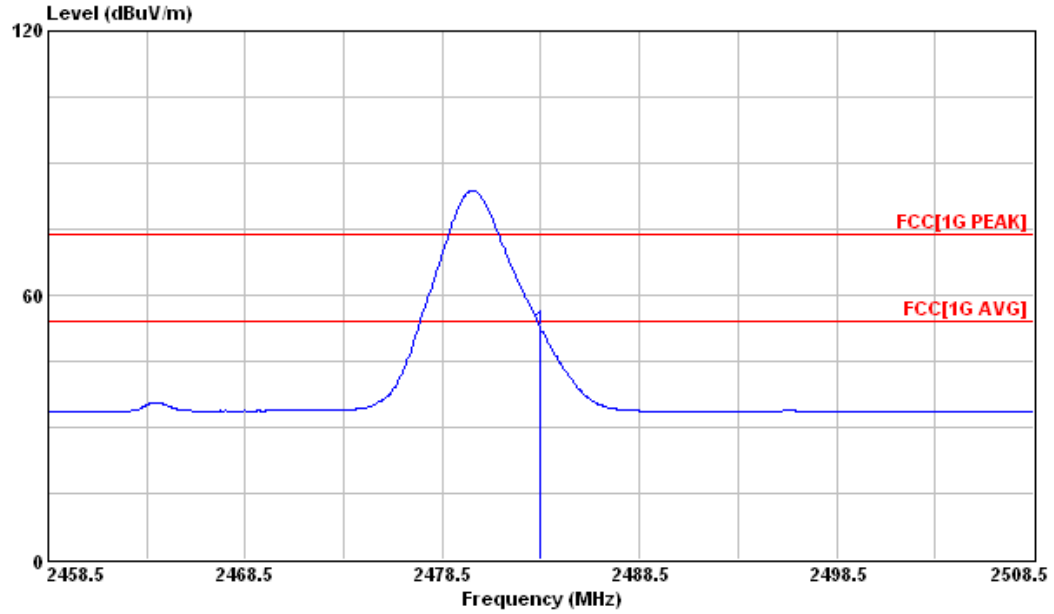
Low Channel (2402MHz), H Polarization – AV.



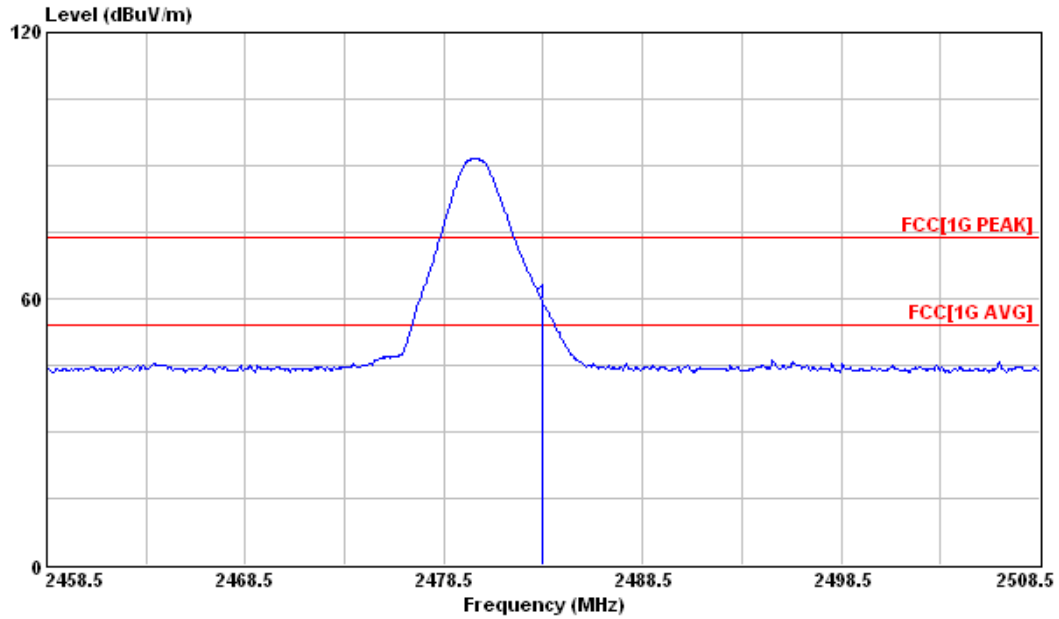
High Channel (2480MHz), V Polarization – PK.



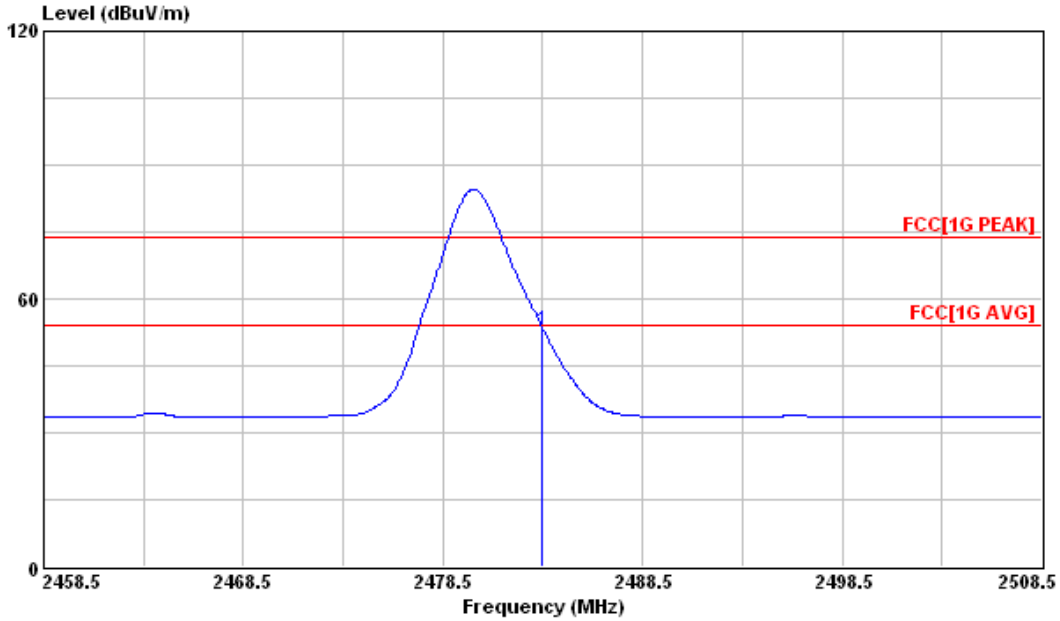
High Channel (2480MHz), V Polarization – AV.



High Channel (2480MHz), H Polarization – PK.



High Channel (2480MHz), H Polarization – AV.



4 Hopping Channel Carrier Frequencies Spacing

Result: Pass

4.1 Applied standard

According to 15.247(a)(1), 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.

4.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No. /Serial No.	Last Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	E4405B/ MY45106706	2009/3/25	2010/3/24
Chamber	NA	TR13	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
10kHz	30kHz	Peak	Maxhold	20dB Bandwidth
100kHz	300kHz	Peak	Maxhold	Carrier Spacing

Climatic Condition

Ambient Temperature：22℃ Relative Humidity :60%

4.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

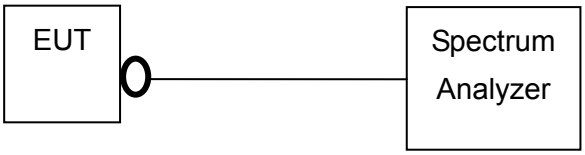
b. A software provided by client enabled the EUT to transmit data at lowest, middle and highest channel frequencies individually.

c. Measurement the 20dB bandwidth and compare with 25kHz to determine the required carrier frequency spacing.

d. According to FCC Public Notice DA00-705, Span = approximately 2 to 3 times the 20 dB bandwidth, RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW to measure 20dB bandwidth

e. According to FCC Public Notice DA00-705, Span = wide enough to capture the peaks of two adjacent channels , Resolution Bandwidth (RBW) ≥ 1% of the span, Video Bandwidth (VBW) ≥ RBW to measure frequency spacing and compare with the required limit.

4.4 Test configuration



4.5 Test Data

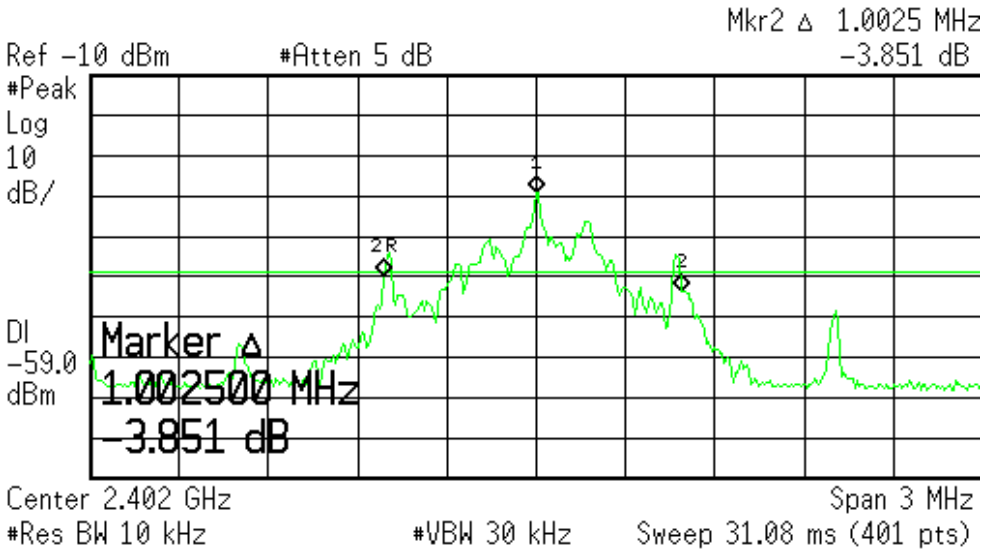
20dB bandwidth

Test Mode : Continuous Transmitting **Tester : Bill**

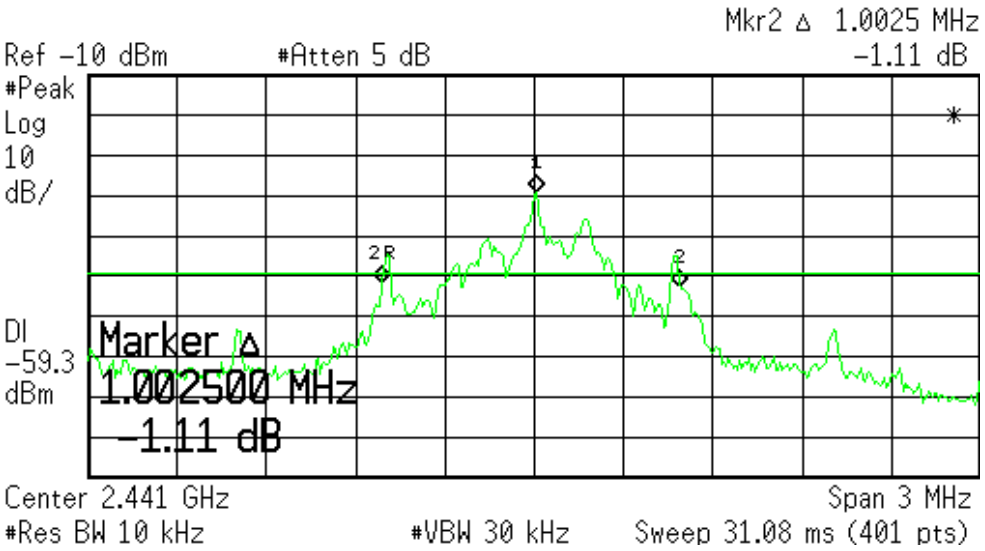
Operating Frequency (MHz)	20dB Bandwidth (kHz)
2402	1002.5
2441	1002.5
2480	1002.5

Measured 20dB bandwidth is 1002.5 kHz. According to 15.247(a)(1), hopping channel carrier frequencies spacing should be greater than 1002.5kHz.

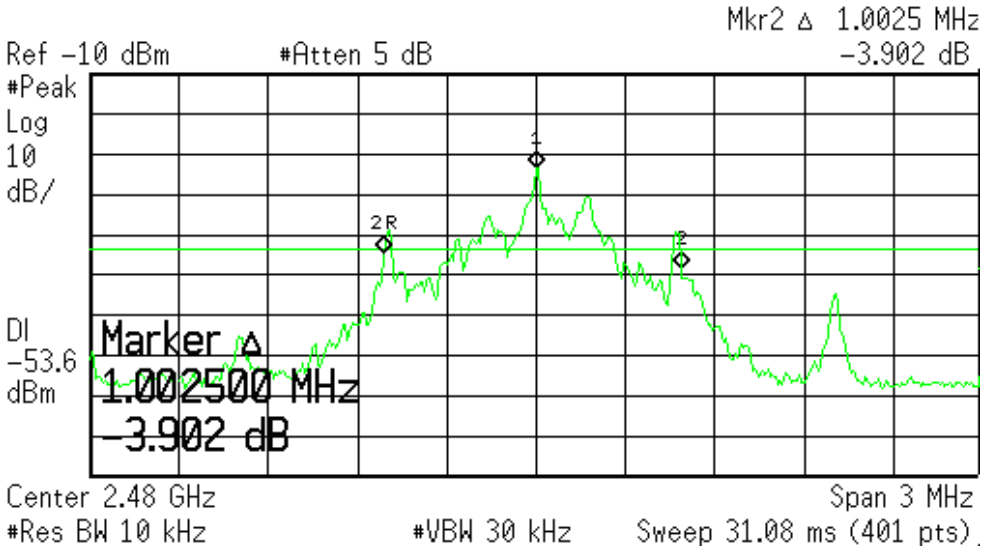
Low Channel (2402MHz)



Middle Channel (2441MHz)



High Channel (2480MHz)

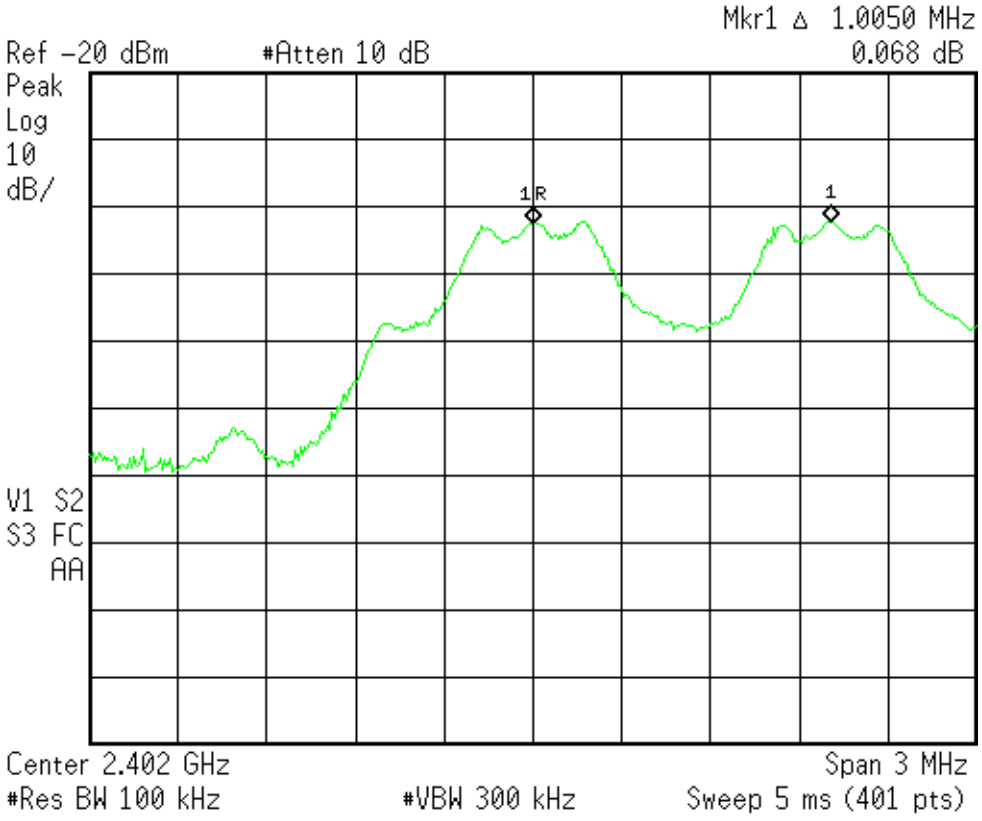


Hopping Channel Carrier Frequencies spacing

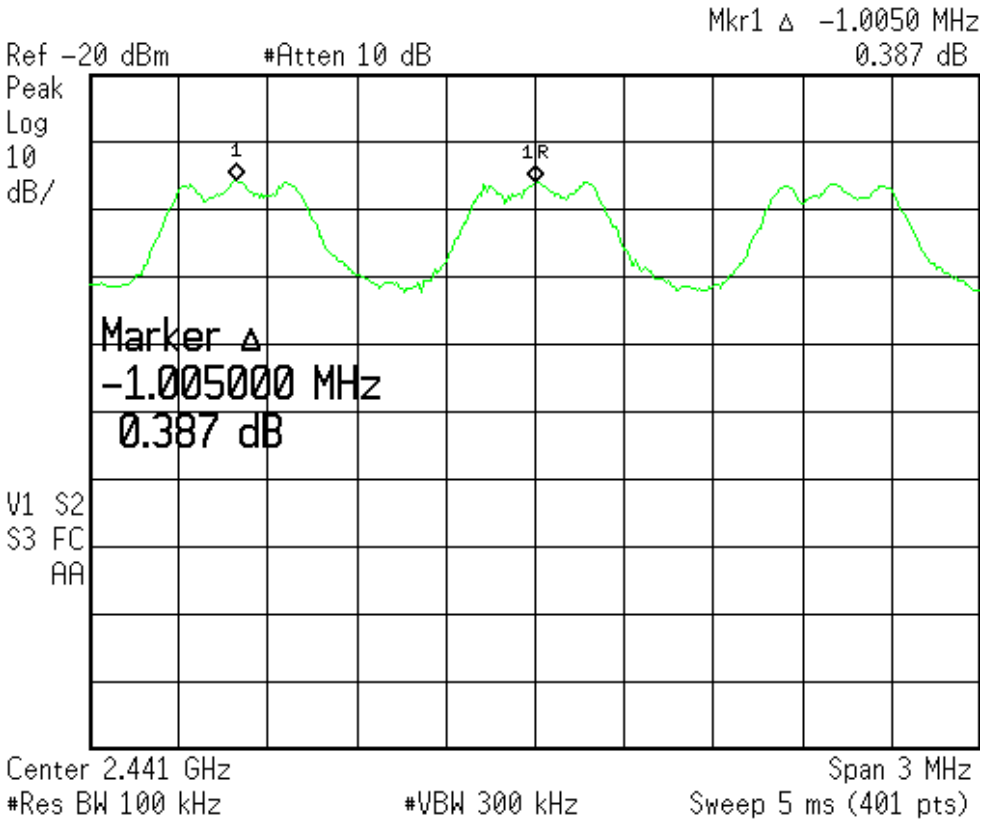
Test Mode : Continuous Transmitting **Tester :** Bill

Operating Frequency (MHz)	Carrier Spacing (kHz)	Limit (kHz)	Margin (kHz)
2402	1005	1002.5	2.5
2441	1005	1002.5	2.5
2480	1005	1002.5	2.5

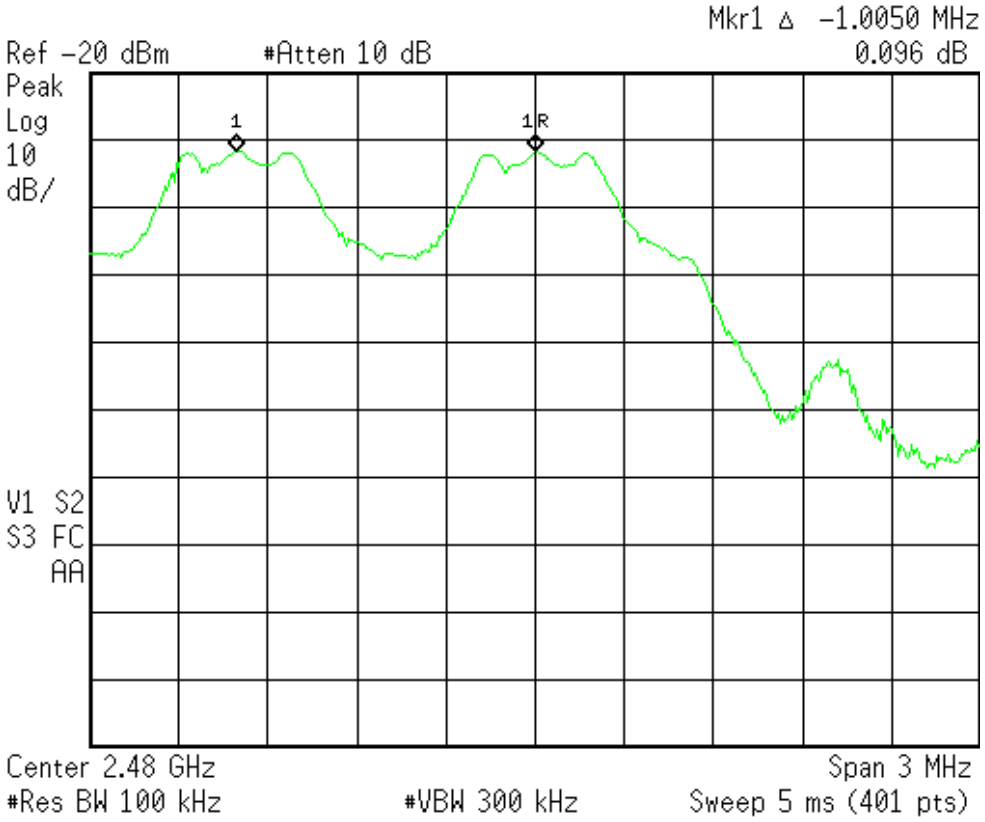
Low Channel (2402MHz)



Middle Channel (2441MHz)



High Channel (2480MHz)



5 Number of Hopping Channels

Result: 79 Hopping Channels

5.1 Applied standard

According to 15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

5.2 Test Instruments

See section 4.2

Instrument Setting

RBW	VBW	Detector	Trace	Comment
100kHz	300kHz	Peak	Maxhold	

Climatic Condition

Ambient Temperature：22℃ Relative Humidity :60%

5.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. A software provided by client enabled the EUT to transmit data at all channels.

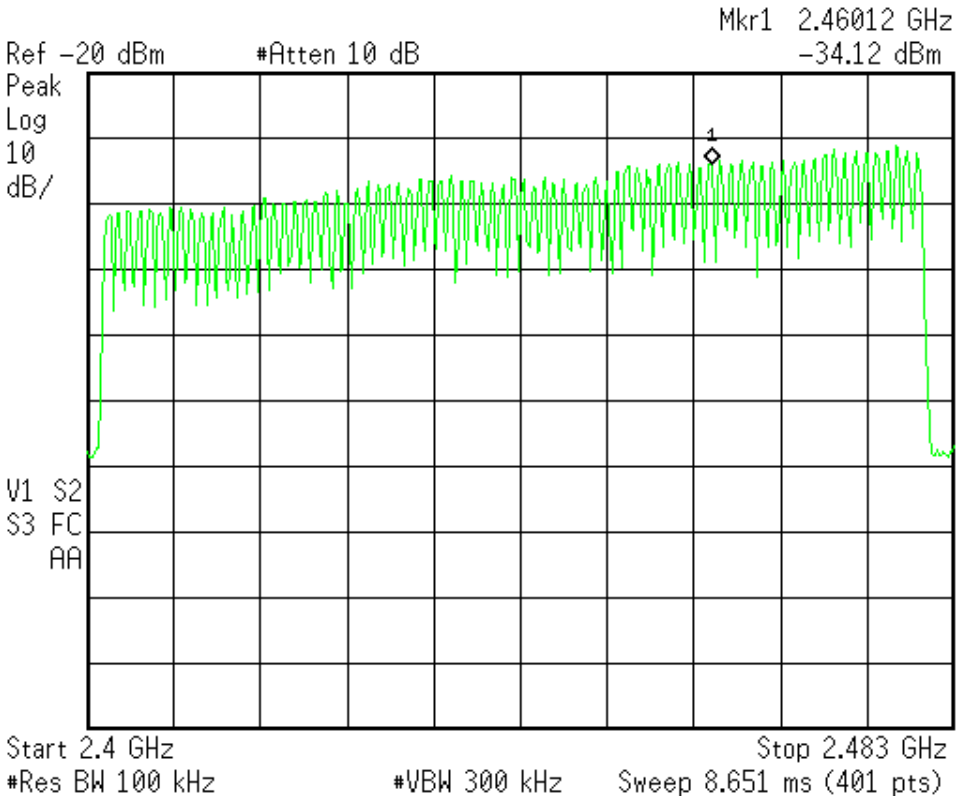
c. According to FCC Public Notice DA00-705, Span = the frequency band of operation , RBW ≥ 1% of the span , VBW ≥ RBW to measure number of hopping channels and compare with the required limit.

5.4 Test configuration

See section 4.4.

5.5 Test Data

Test Mode : Continuous Transmitting **Tester :** Bill



6 Radiated Emission

Result: Pass

6.1 Applied standard

According to 15.247(c),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 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).

6.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ESCI/100019	2009/11/30	2010/11/29
Spectrum Analyzer	Agilent	E4407B/ MY45106795	2009/3/19	2010/3/18
Broadband Antenna	EMCO	3142C/52088	2009/7/22	2010/7/21
Antenna	EMCO	3117/57408	2009/3/3	2010/3/2
Antenna	EMCO	3116/58959	2008/2/14	2010/2/2
PRE-AMPLIFIER	MITEQ	AFS6-02001800-35-10P-6/949196	2009/9/11	2010/09/10
Pre-amplifier	MITEQ	JS4-00101800-28-10P/1498978	2009/11/9	2010/11/8
Pre-amplifier	Mini Circuit	ZKL-2/004	2009/2/10	2010/2/9
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2009/6/30	2010/6/29

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.
3. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
120kHz	N/A	Quasi-Peak	Maxhold	Below 1GHz
1MHz	3MHz	Peak	Maxhold	Above 1GHz, Average
1MHz	10Hz	Peak	Maxhold	Above 1GHz, Peak

Climatic Condition

Ambient Temperature：24℃ Relative Humidity :53%

6.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. A software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

c. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.

d. The EUT was set 3m away from the interference receiving antenna.

e. Rapidly sweep the signal in the test frequency range by using the spectrum through the Maximum-peak detector.

f. According to FCC Public Notice DA00-705 to set the spectrum analyzer.

g. Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 to 4 meters above the reference ground plane continuously to determine at least six frequencies associated with higher emission levels and record them.

h. The beamwidth of receiving horn antenna should keep covering EUT when the receiving horn antenna height varied.

i. Then measure each frequency found from step f. by using the spectrum with rotating the EUT and positioning the receiving antenna height to determine the maximum level.

j. For measurement of frequency below 1000MHz, set the receiver detector to be Quasi-Peak per CISPR 16-1 to find out the maximum level occurred.

k. For measurement of frequency above 1000MHz, set the spectrum detector to be Peak or Average to find out the maximum level occurred, if any.

l. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.

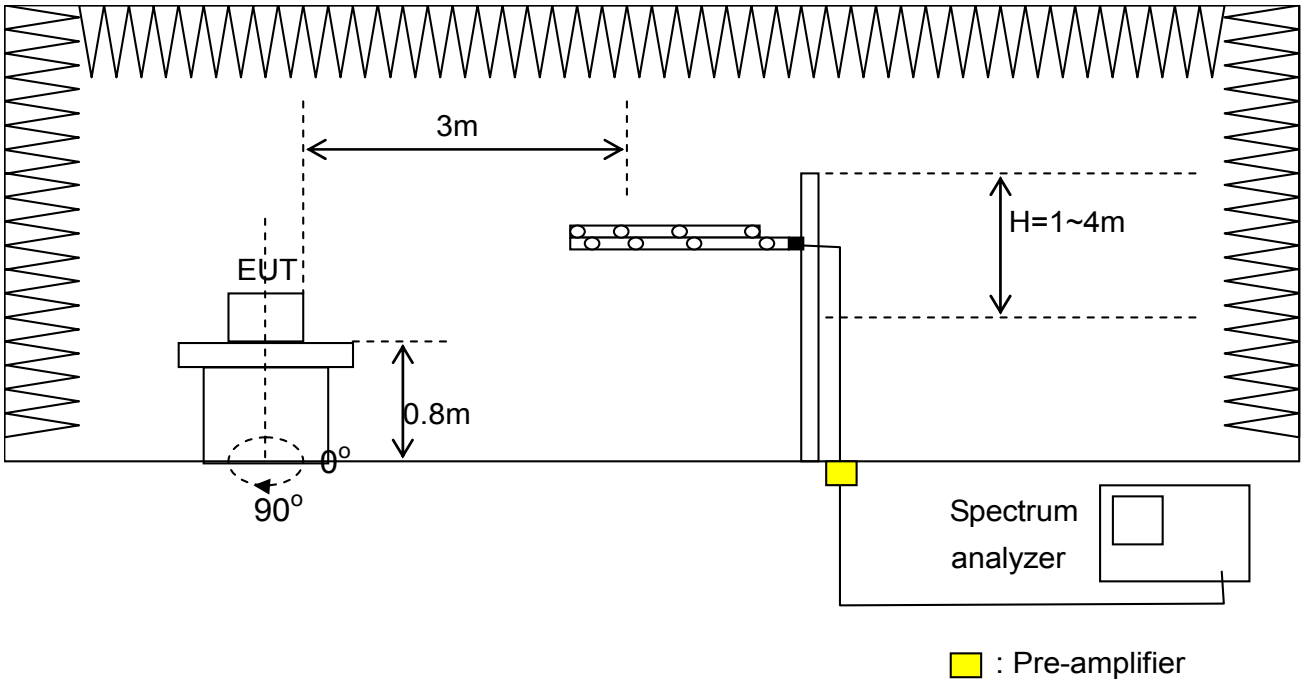
m. Change the receiving antenna to another polarization to measure radiated emission by following step e. to k. again.

n. If the peak emission level below 1000MHz measured from step j. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.

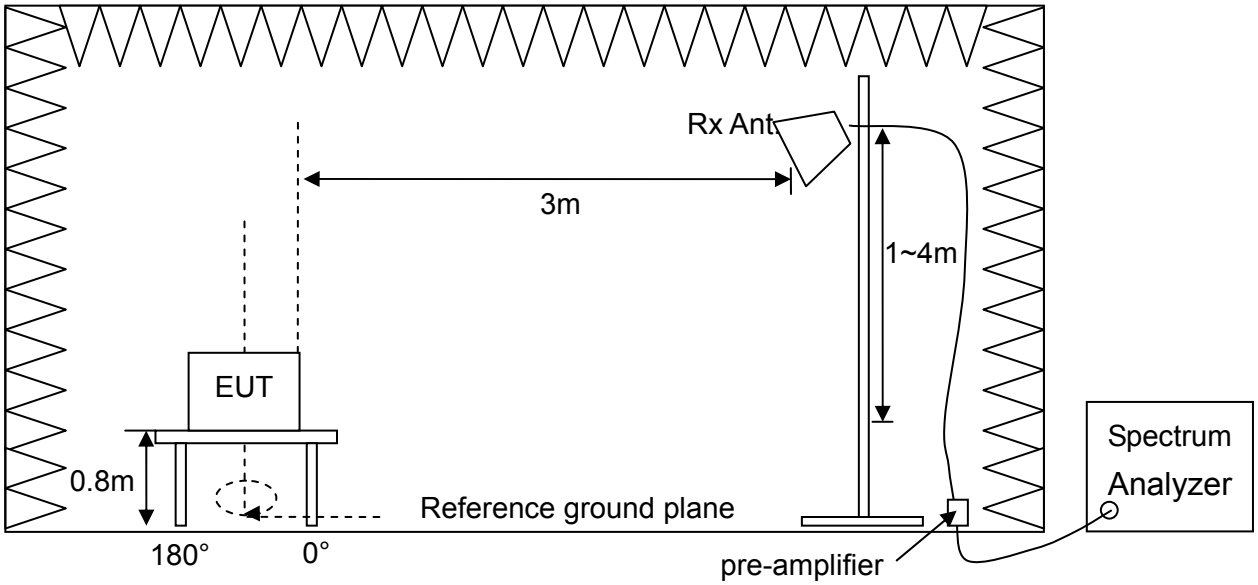
o. If the peak emission level above 1000MHz measured from step k. is 20dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate A.V. value will be measured and presented.

6.4 Test configuration

Below 1GHz



Above 1GHz



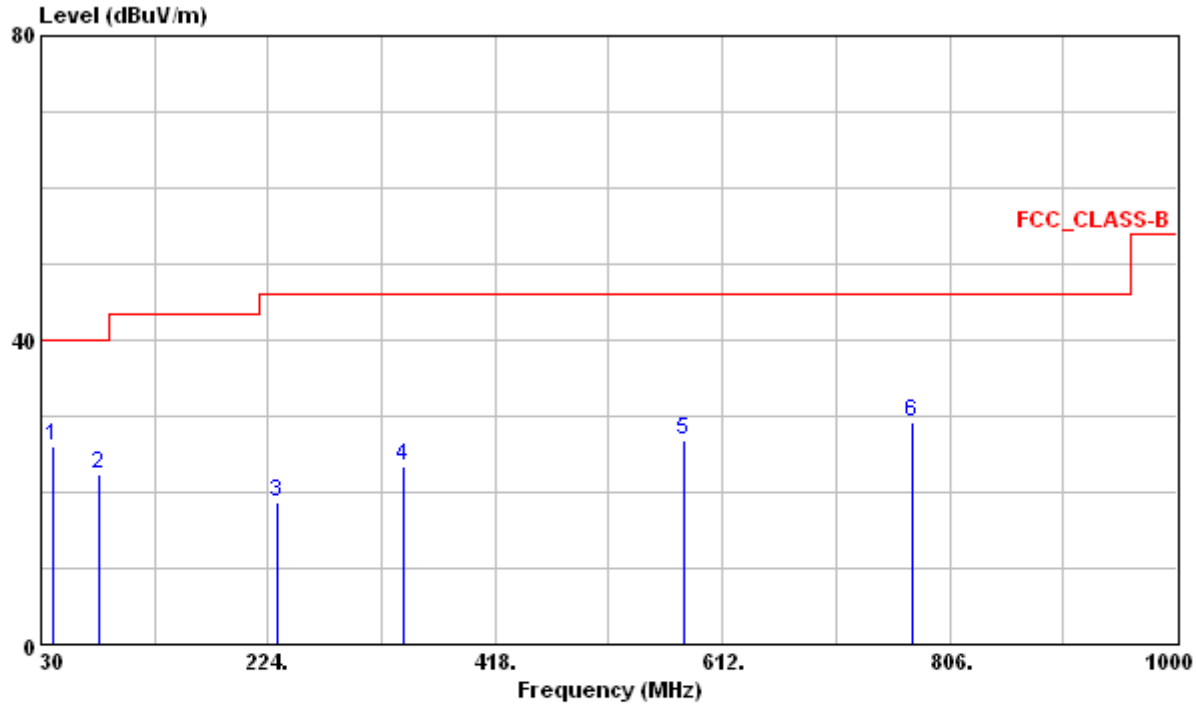
6.5 Test Data

Radiated Emission Measurement below 1000MHz

Test Mode : **Channel 0(2402MHz), Continuous Transmitting**

Test Distance : 3m **Tester** : Bill

Polarization : Vertical **Frequency Range** : 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	40.530	26.13	40.68	-14.55	40.00	-13.87	100	51	VERTICAL	QP
2	79.140	22.40	42.64	-20.24	40.00	-17.60	---	---	VERTICAL	Peak
3	232.230	18.71	33.22	-14.51	46.00	-27.29	---	---	VERTICAL	Peak
4	339.900	23.38	34.09	-10.71	46.00	-22.62	---	---	VERTICAL	Peak
5	580.000	26.96	31.88	-4.92	46.00	-19.04	---	---	VERTICAL	Peak
6	774.600	29.15	31.58	-2.43	46.00	-16.85	---	---	VERTICAL	Peak

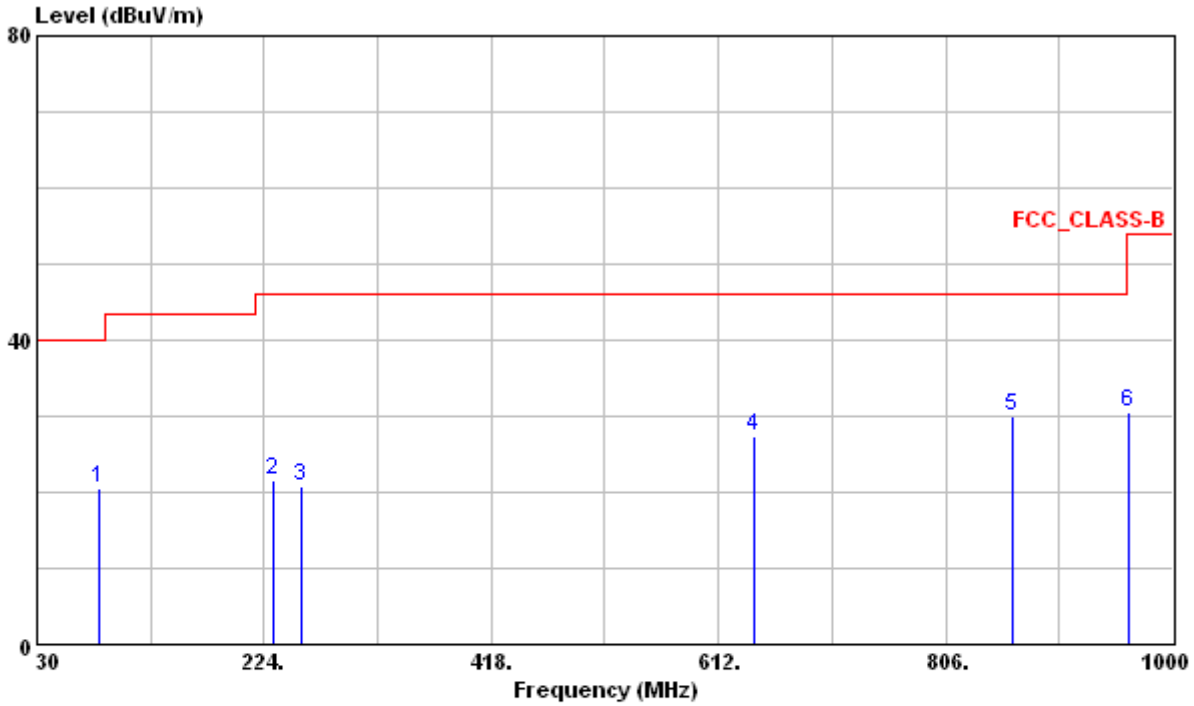
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Mode : **Channel 0(2402MHz), Continuous Transmitting**

Test Distance : 3m **Tester** : Bill

Polarization : Horizontal **Frequency Range** : 30MHz~1000MHz

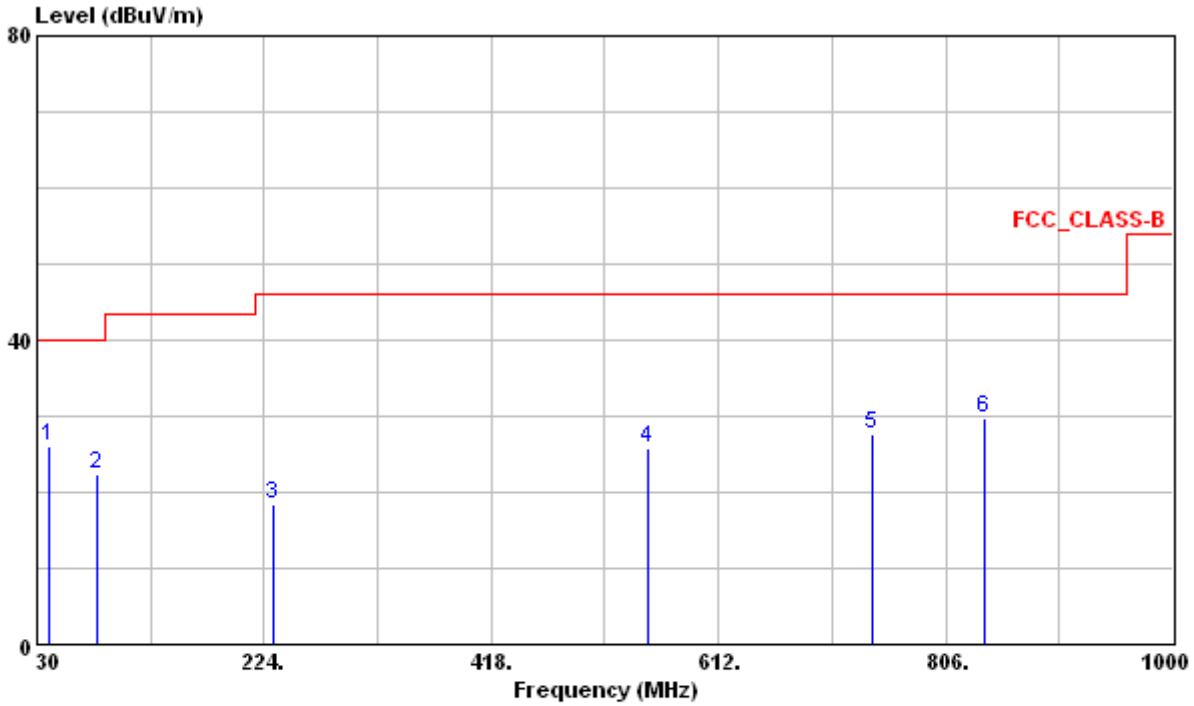


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	82.650	20.64	40.69	-20.05	40.00	-19.36	161	108	HORIZONTAL	QP
2	232.230	21.58	36.09	-14.51	46.00	-24.42	---	---	HORIZONTAL	Peak
3	256.530	20.75	34.41	-13.66	46.00	-25.25	---	---	HORIZONTAL	Peak
4	641.600	27.28	31.66	-4.38	46.00	-18.72	---	---	HORIZONTAL	Peak
5	862.800	29.91	31.00	-1.09	46.00	-16.09	---	---	HORIZONTAL	Peak
6	962.900	30.44	30.60	-0.16	54.00	-23.56	---	---	HORIZONTAL	Peak

Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Mode	**: Channel 39(2441MHz), Continuous Transmitting**		
Test Distance	**:** 3m	**Tester**	**:** Bill
Polarization	**:** Vertical	**Frequency Range**	**:** 30MHz~1000MHz

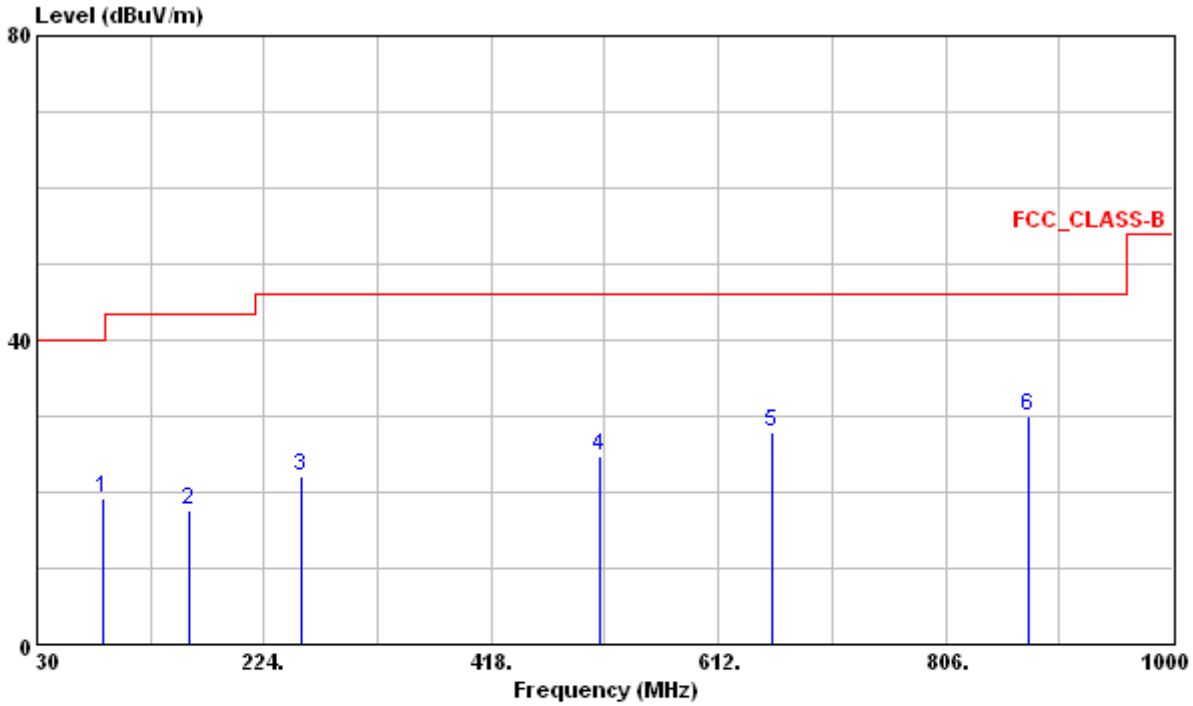


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1 @	40.530	25.94	40.49	-14.55	40.00	-14.06	100	48	VERTICAL	QP
2	81.300	22.25	42.41	-20.16	40.00	-17.75	---	---	VERTICAL	Peak
3	232.230	18.31	32.82	-14.51	46.00	-27.69	---	---	VERTICAL	Peak
4	552.000	25.74	31.16	-5.42	46.00	-20.26	---	---	VERTICAL	Peak
5	743.100	27.55	30.28	-2.73	46.00	-18.45	---	---	VERTICAL	Peak
6	839.700	29.84	31.31	-1.47	46.00	-16.16	---	---	VERTICAL	Peak

Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Mode	**: Channel 39(2441MHz), Continuous Transmitting**		
Test Distance	**:** 3m	**Tester**	**:** Bill
Polarization	**:** Horizontal	**Frequency Range**	**:** 30MHz~1000MHz

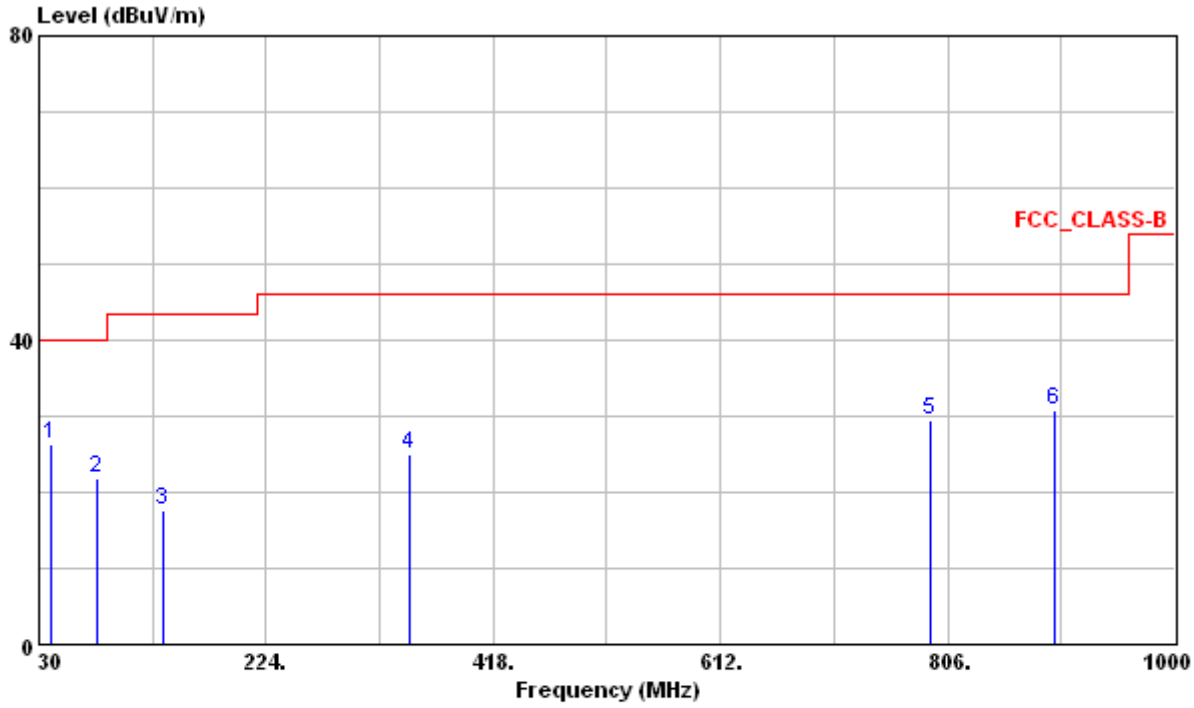


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	85.890	19.34	39.12	-19.78	40.00	-20.66	160	111	HORIZONTAL	QP
2	160.410	17.73	34.99	-17.26	43.50	-25.77	---	---	HORIZONTAL	Peak
3	256.530	21.99	35.65	-13.66	46.00	-24.01	---	---	HORIZONTAL	Peak
4	510.000	24.62	31.38	-6.76	46.00	-21.38	---	---	HORIZONTAL	Peak
5	657.700	27.99	32.11	-4.12	46.00	-18.01	---	---	HORIZONTAL	Peak
6	876.800	29.90	30.73	-0.83	46.00	-16.10	---	---	HORIZONTAL	Peak

Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model	**: Channel 78(2480MHz), Continuous Transmitting**		
Test Distance	**:** 3m	**Tester**	**:** Bill
Polarization	**:** Vertical	**Frequency Range**	**:** 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1 @	40.530	26.21	40.76	-14.55	40.00	-13.79	100	66	VERTICAL	QP
2	79.950	21.83	42.09	-20.26	40.00	-18.17	---	---	VERTICAL	Peak
3	135.300	17.66	36.82	-19.16	43.50	-25.84	---	---	VERTICAL	Peak
4	346.900	25.04	35.52	-10.48	46.00	-20.96	---	---	VERTICAL	Peak
5	790.700	29.36	31.61	-2.25	46.00	-16.64	---	---	VERTICAL	Peak
6	897.800	30.84	31.31	-0.47	46.00	-15.16	---	---	VERTICAL	Peak

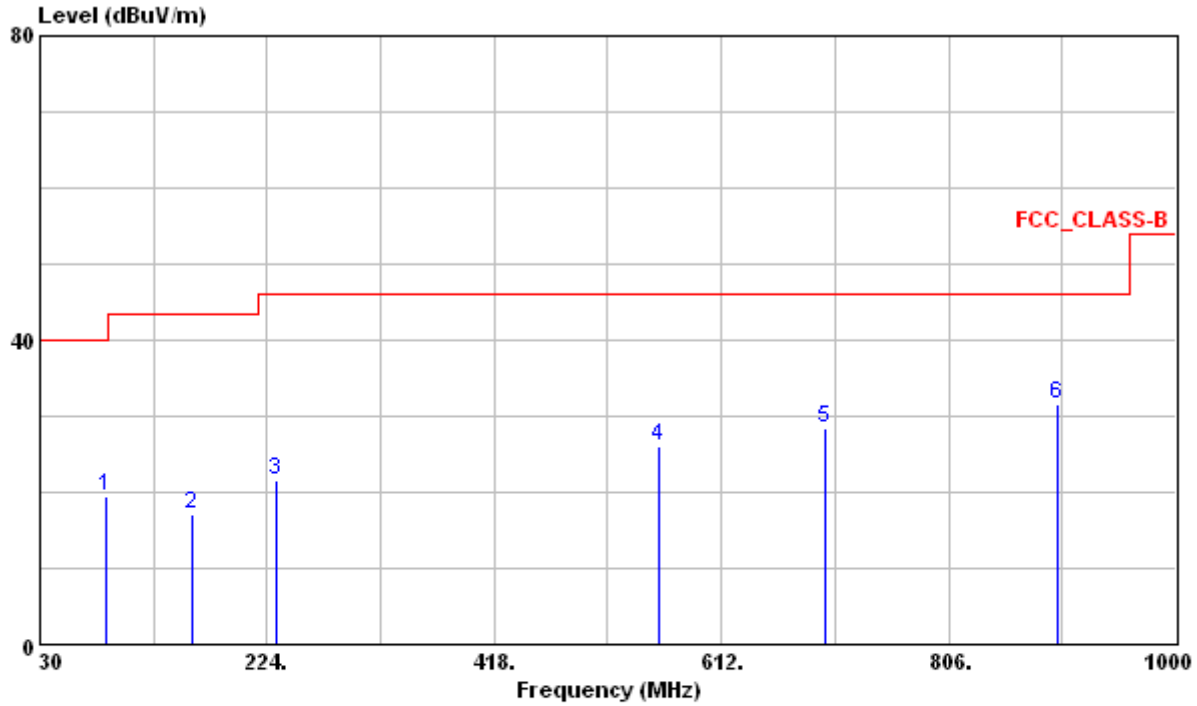
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model : **Channel 78(2480MHz), Continuous Transmitting**

Test Distance : 3m **Tester** : Bill

Polarization : Horizontal **Frequency Range** : 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	85.890	19.45	39.23	-19.78	40.00	-20.55	158	160	HORIZONTAL	QP
2	160.410	17.11	34.37	-17.26	43.50	-26.39	---	---	HORIZONTAL	Peak
3	232.230	21.61	36.12	-14.51	46.00	-24.39	---	---	HORIZONTAL	Peak
4	559.000	25.96	31.26	-5.30	46.00	-20.04	---	---	HORIZONTAL	Peak
5	701.100	28.41	31.32	-2.91	46.00	-17.59	---	---	HORIZONTAL	Peak
6	899.200	31.71	32.15	-0.44	46.00	-14.29	---	---	HORIZONTAL	Peak

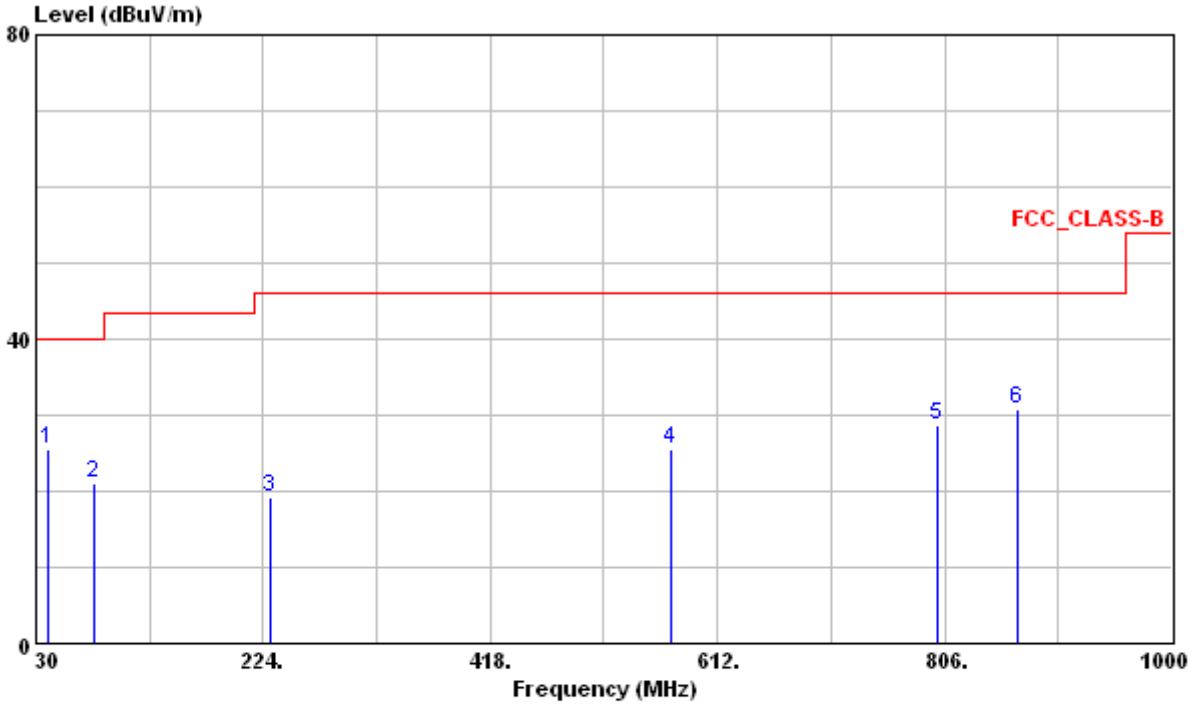
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model **: Channel 0(2402MHz), Continuous Receiving**

Test Distance **:** 3m **Tester** **:** Bill

Antenna Polarization: Vertical **Frequency Range :** 30MHz~1000MHz

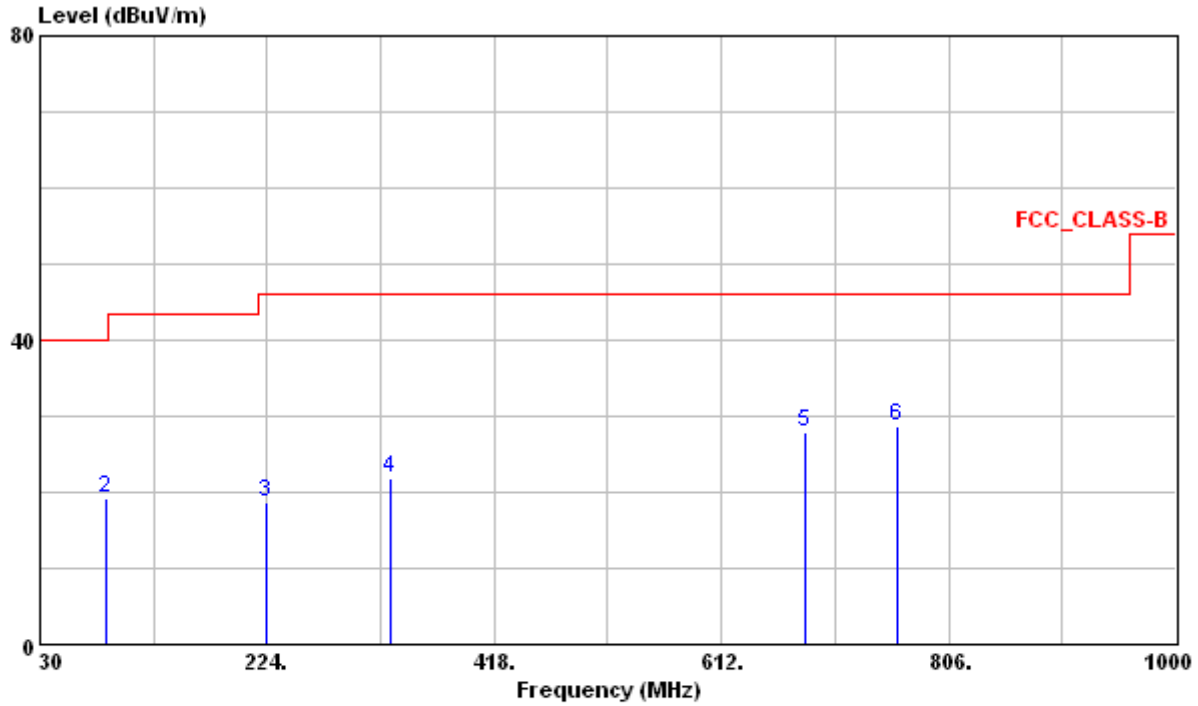


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1 @	40.530	25.54	40.09	-14.55	40.00	-14.46	100	0	VERTICAL	QP
2	79.140	21.04	41.28	-20.24	40.00	-18.96	---	---	VERTICAL	Peak
3	230.880	19.15	33.71	-14.56	46.00	-26.85	---	---	VERTICAL	Peak
4	573.000	25.65	30.69	-5.04	46.00	-20.35	---	---	VERTICAL	Peak
5	799.800	28.75	30.89	-2.14	46.00	-17.25	---	---	VERTICAL	Peak
6	867.700	30.80	31.79	-0.99	46.00	-15.20	---	---	VERTICAL	Peak

Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Mode	**: Channel 0(2402MHz), Continuous Receiving**				
Test Distance	**:** 3m	**Tester**	**:** Bill		
Polarization	**:** Horizontal	**Frequency Range**	**:** 30MHz~1000MHz		



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	30.540	21.41	30.61	-9.20	40.00	-18.59	---	---	HORIZONTAL	Peak
2	85.890	19.33	39.11	-19.78	40.00	-20.67	121	45	HORIZONTAL	QP
3	224.130	18.76	33.67	-14.91	46.00	-27.24	---	---	HORIZONTAL	Peak
4	329.400	21.88	32.96	-11.08	46.00	-24.12	---	---	HORIZONTAL	Peak
5	683.600	28.00	31.38	-3.38	46.00	-18.00	---	---	HORIZONTAL	Peak
6	762.700	28.57	31.13	-2.56	46.00	-17.43	---	---	HORIZONTAL	Peak

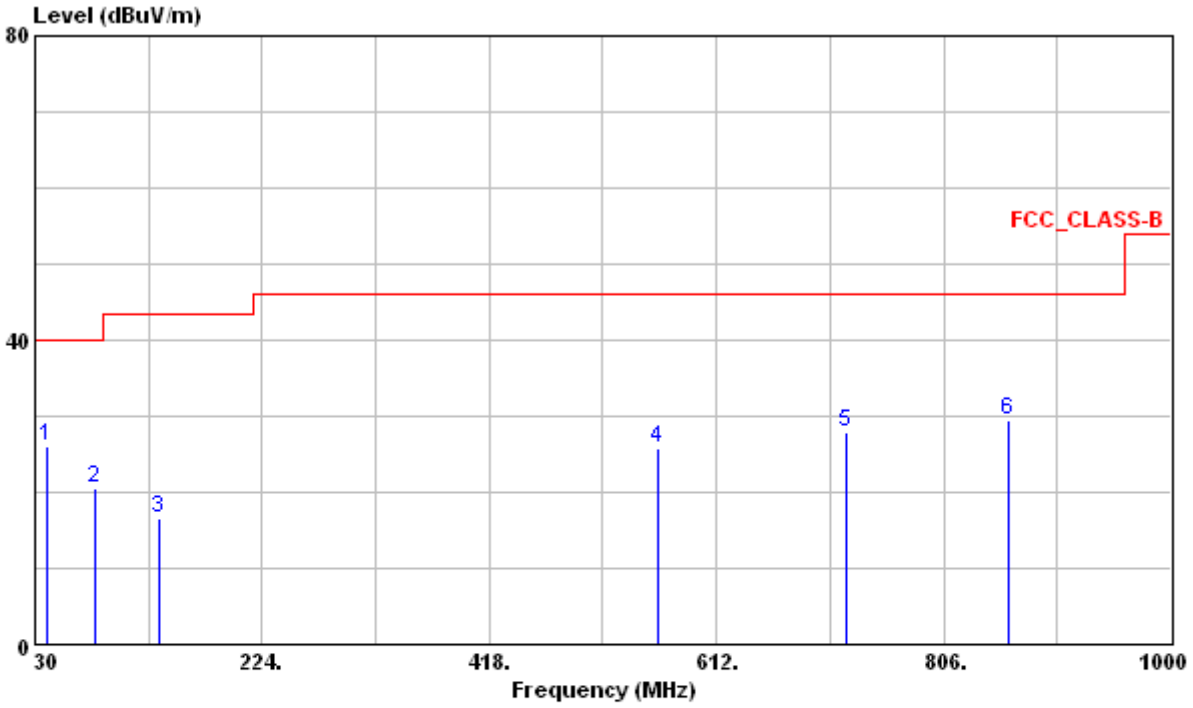
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model **: Channel 39(2441MHz), Continuous Receiving**

Test Distance **:** 3m **Tester** **:** Bill

Antenna Polarization: Vertical **Frequency Range :** 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1 @	40.530	25.94	40.49	-14.55	40.00	-14.06	100	322	VERTICAL	QP
2	81.840	20.53	40.63	-20.10	40.00	-19.47	---	---	VERTICAL	Peak
3	136.110	16.49	35.61	-19.12	43.50	-27.01	---	---	VERTICAL	Peak
4	562.500	25.88	31.11	-5.23	46.00	-20.12	---	---	VERTICAL	Peak
5	722.100	27.78	30.61	-2.83	46.00	-18.22	---	---	VERTICAL	Peak
6	860.700	29.43	30.55	-1.12	46.00	-16.57	---	---	VERTICAL	Peak

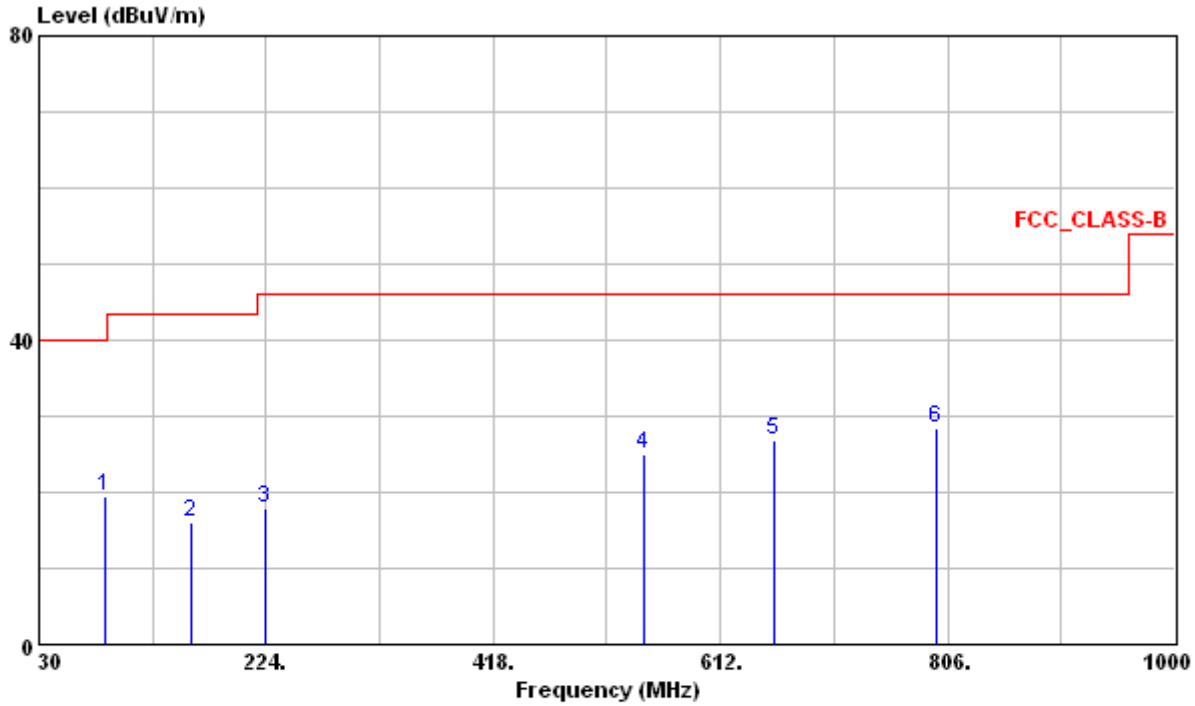
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model **: Channel 39(2441MHz), Continuous Receiving**

Test Distance **:** 3m **Tester** **:** Bill I

Antenna Polarization: Horizontal **Frequency Range :** 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	85.890	19.38	39.16	-19.78	40.00	-20.62	166	68	HORIZONTAL	QP
2	160.410	15.99	33.25	-17.26	43.50	-27.51	---	---	HORIZONTAL	Peak
3	224.130	18.00	32.91	-14.91	46.00	-28.00	---	---	HORIZONTAL	Peak
4	546.400	24.93	30.50	-5.57	46.00	-21.07	---	---	HORIZONTAL	Peak
5	657.700	26.95	31.07	-4.12	46.00	-19.05	---	---	HORIZONTAL	Peak
6	796.300	28.52	30.71	-2.19	46.00	-17.48	---	---	HORIZONTAL	Peak

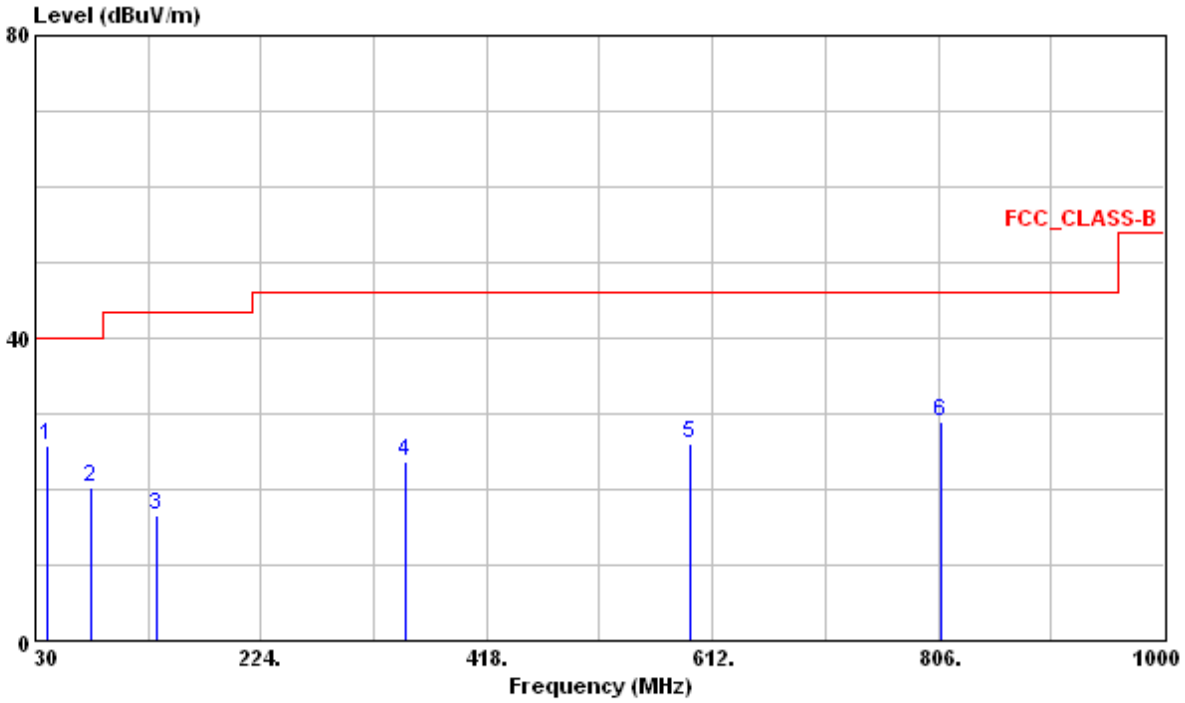
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model **: Channel 78(2480MHz), Continuous Receiving**

Test Distance **:** 3m **Tester** **:** Bill

Antenna Polarization: Vertical **Frequency Range :** 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1 @	40.530	25.77	40.32	-14.55	40.00	-14.23	100	60	VERTICAL	QP
2	77.250	20.23	40.45	-20.22	40.00	-19.77	---	---	VERTICAL	Peak
3	133.950	16.57	35.78	-19.21	43.50	-26.93	---	---	VERTICAL	Peak
4	348.300	23.63	34.06	-10.43	46.00	-22.37	---	---	VERTICAL	Peak
5	592.600	26.05	30.74	-4.69	46.00	-19.95	---	---	VERTICAL	Peak
6	808.200	28.90	30.91	-2.01	46.00	-17.10	---	---	VERTICAL	Peak

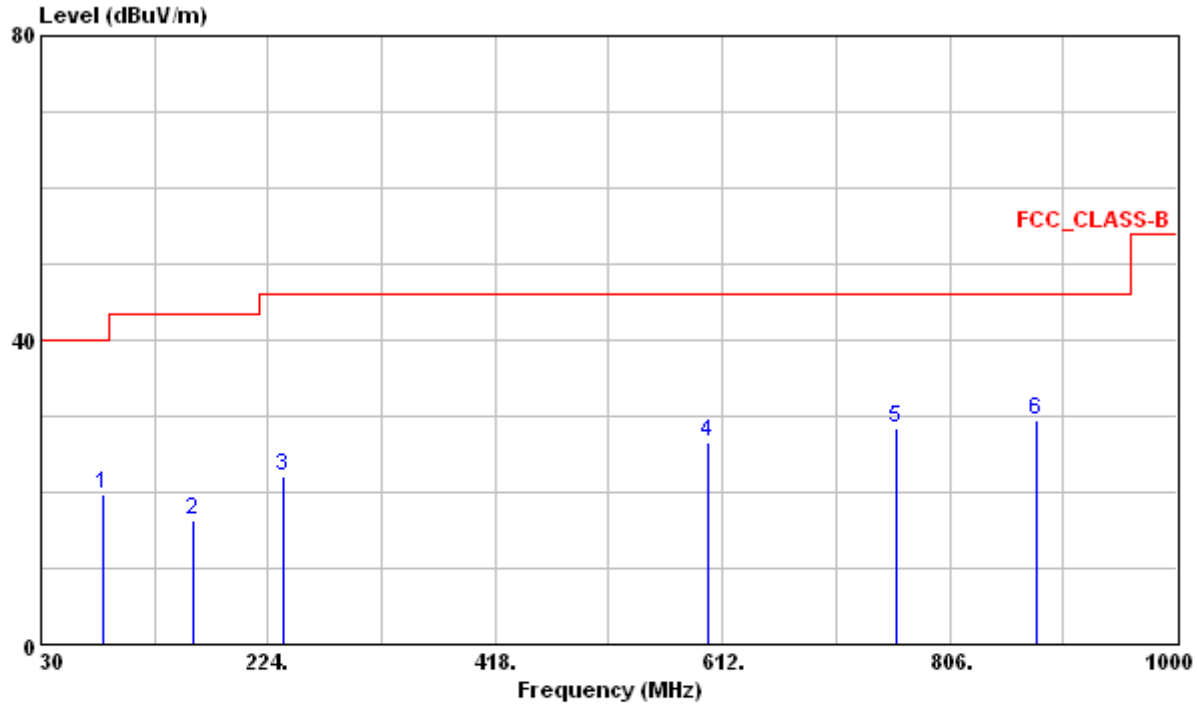
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Test Model : **Channel 78(2480MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization: Horizontal **Frequency Range :** 30MHz~1000MHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	82.300	19.73	39.81	-20.08	40.00	-20.27	200	14	HORIZONTAL	QP
2	160.410	16.31	33.57	-17.26	43.50	-27.19	---	---	HORIZONTAL	Peak
3	236.280	22.12	36.49	-14.37	46.00	-23.88	---	---	HORIZONTAL	Peak
4	599.600	26.61	31.18	-4.57	46.00	-19.39	---	---	HORIZONTAL	Peak
5	760.600	28.36	30.95	-2.59	46.00	-17.64	---	---	HORIZONTAL	Peak
6	880.300	29.40	30.18	-0.78	46.00	-16.60	---	---	HORIZONTAL	Peak

Note：

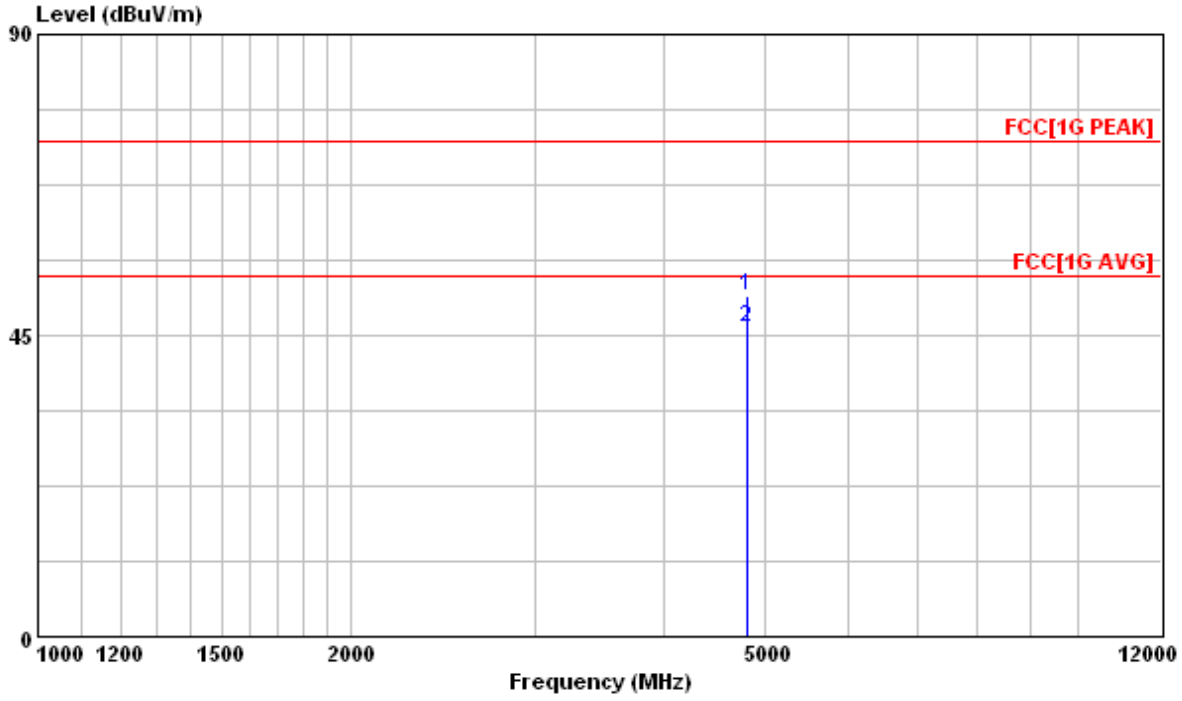
1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

Radiated Emission Measurement above 1000MHz

Test Model : **Channel 0(2402MHz), Continuous Transmitting**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Vertical **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4803.813	51.01	77.44	-26.43	74.00	-22.99	139	179	VERTICAL	Peak
2 @	4803.813	46.17	72.60	-26.43	54.00	-7.83	139	179	VERTICAL	Average

Note:

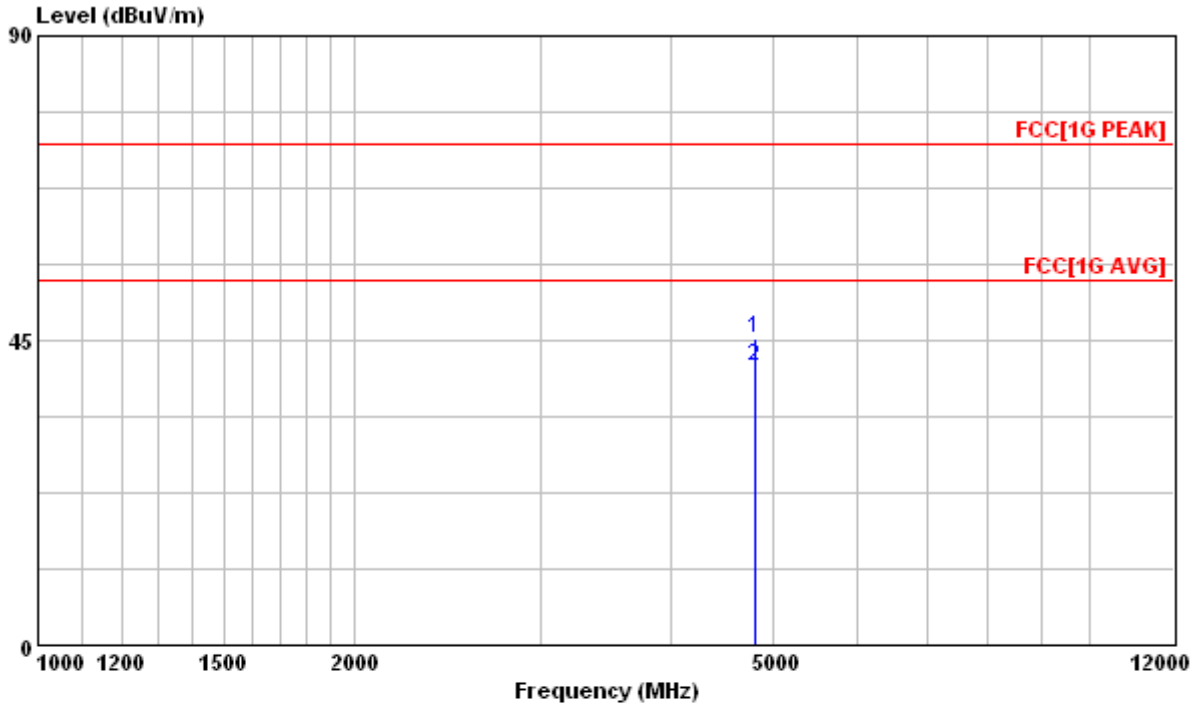
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 0(2402MHz), Continuous Transmitting**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Horizontal **Frequency Range** :1GHz~25GHz



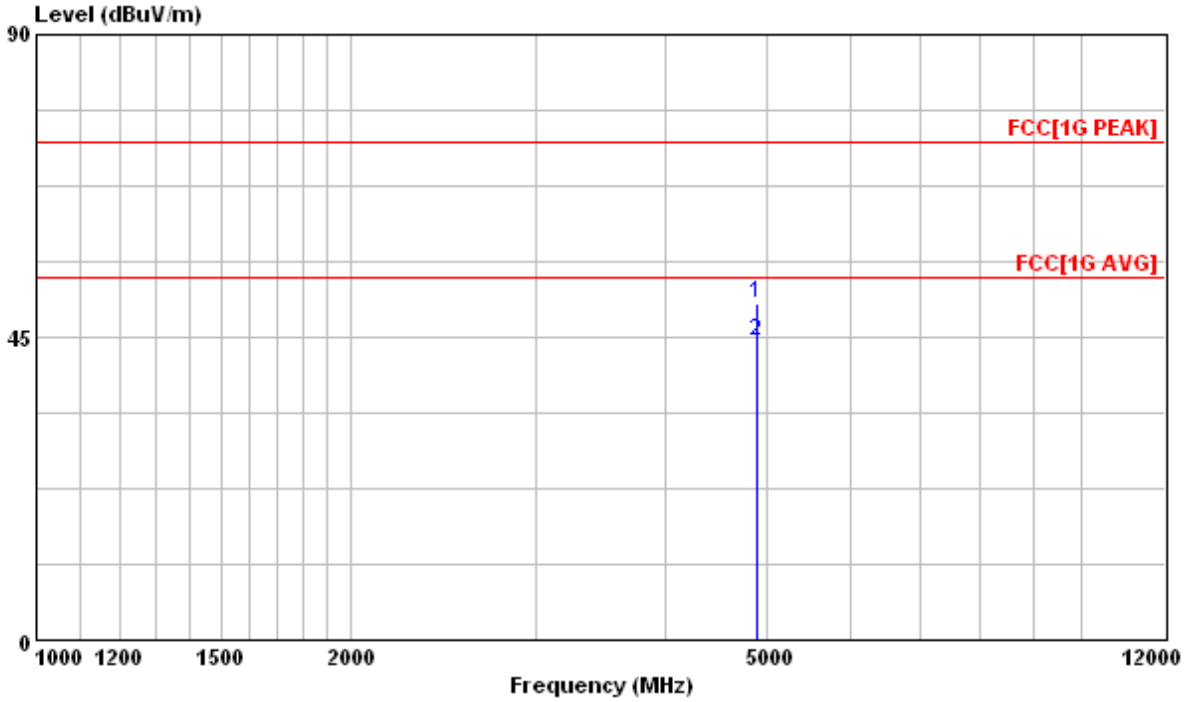
	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4803.962	45.36	71.79	-26.43	74.00	-28.64	114	20	HORIZONTAL	Peak
2 @	4803.962	41.29	67.72	-26.43	54.00	-12.71	114	20	HORIZONTAL	Average

Note:

1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 39(2441MHz), Continuous Transmitting**
Test Distance : 3m **Tester** : Bill
Antenna Polarization : Vertical **Frequency Range** :1GHz~25GHz



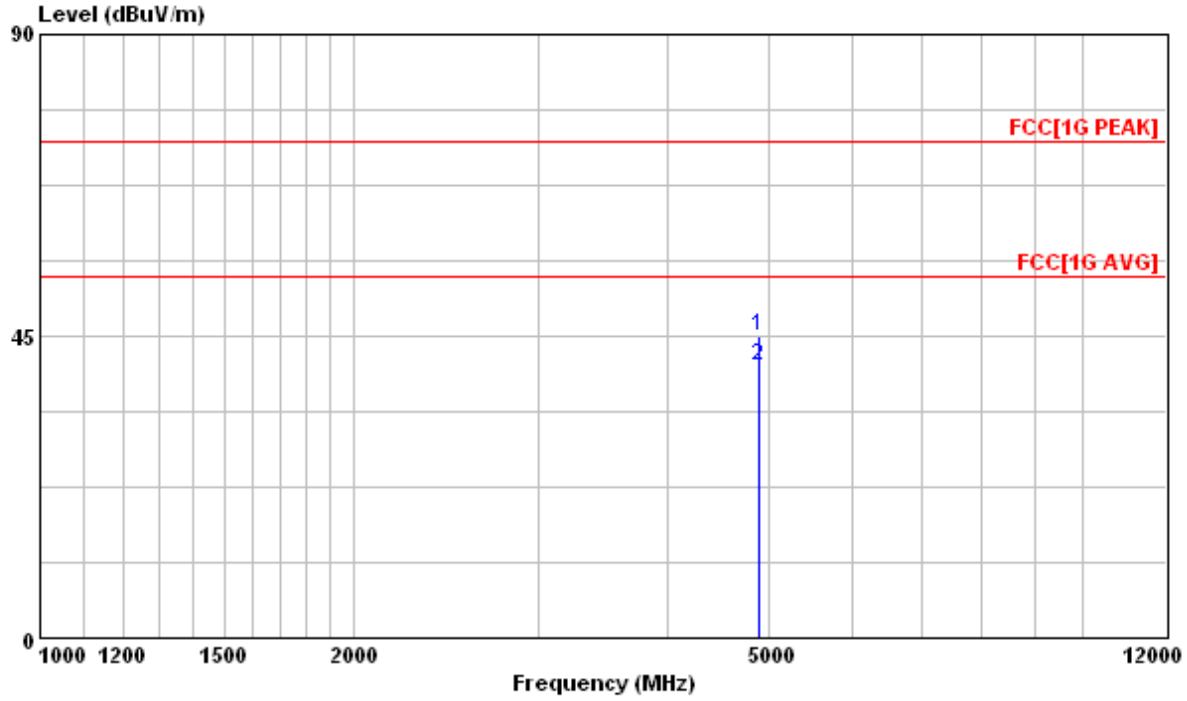
	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4881.962	50.18	76.47	-26.29	74.00	-23.82	112	181	VERTICAL	Peak
2 @	4881.962	44.39	70.68	-26.29	54.00	-9.61	112	181	VERTICAL	Average

Note:

1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 39(2441MHz), Continuous Transmitting**
Test Distance : 3m **Tester** : Bill
Antenna Polarization : Horizontal **Frequency Range** :1GHz~25GHz



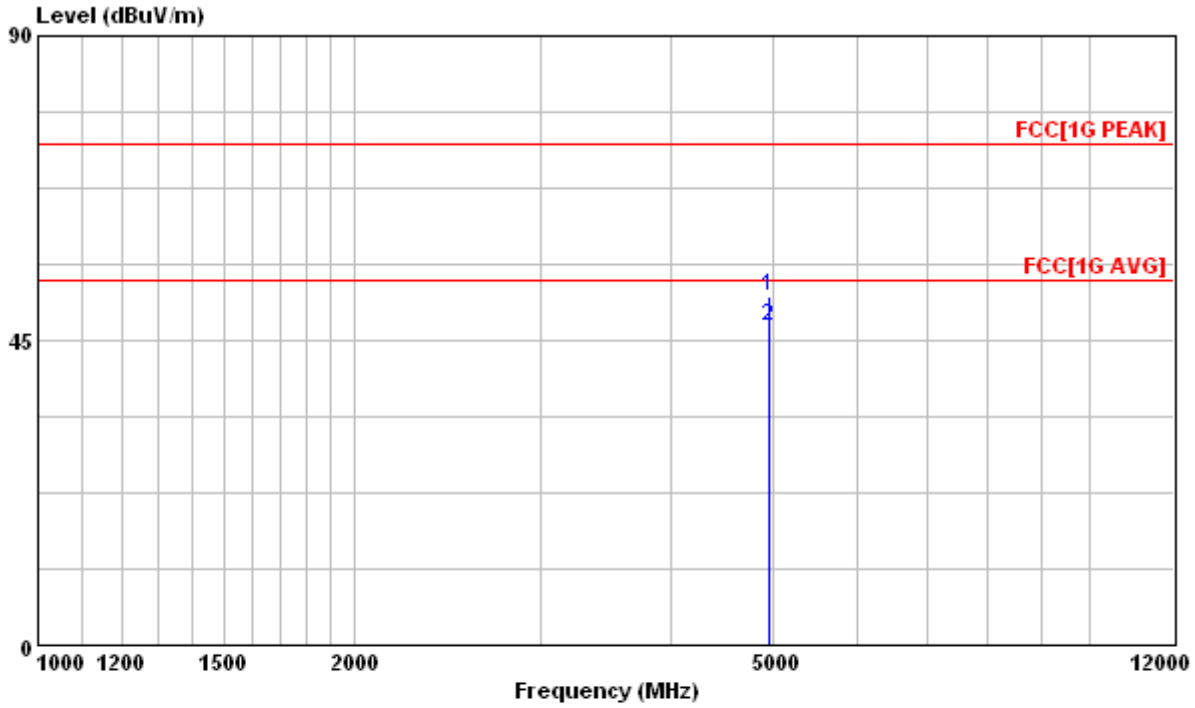
	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4882.098	44.94	71.23	-26.29	74.00	-29.06	132	36	HORIZONTAL	Peak
2	4882.098	40.69	66.98	-26.29	54.00	-13.31	132	36	HORIZONTAL	Average

Note:

1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 78(2480MHz), Continuous Transmitting**
Test Distance : 3m **Tester** : Bill
Antenna Polarization : Vertical **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4959.850	51.49	77.73	-26.24	74.00	-22.51	102	89	VERTICAL	Peak
2 @	4959.850	47.22	73.46	-26.24	54.00	-6.78	102	89	VERTICAL	Average

Note:

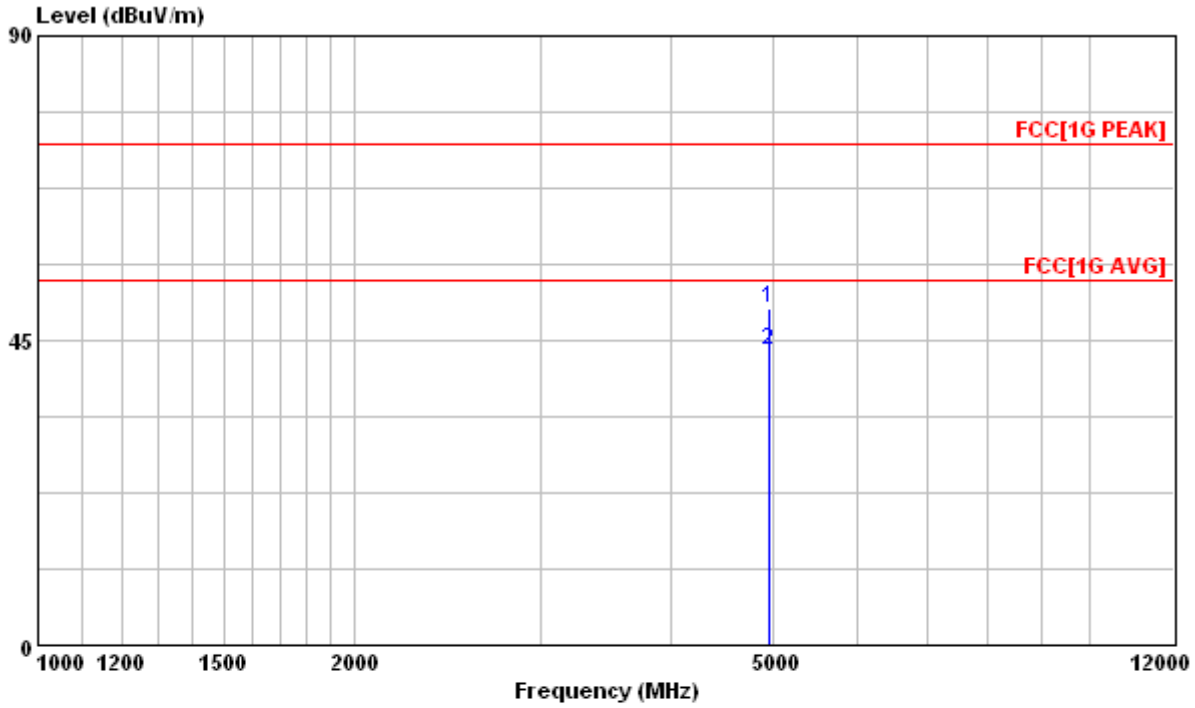
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 78(2480MHz), Continuous Transmitting**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Horizontal **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4959.775	49.73	75.97	-26.24	74.00	-24.27	137	48	HORIZONTAL	Peak
2 @	4959.775	43.60	69.84	-26.24	54.00	-10.40	137	48	HORIZONTAL	Average

Note:

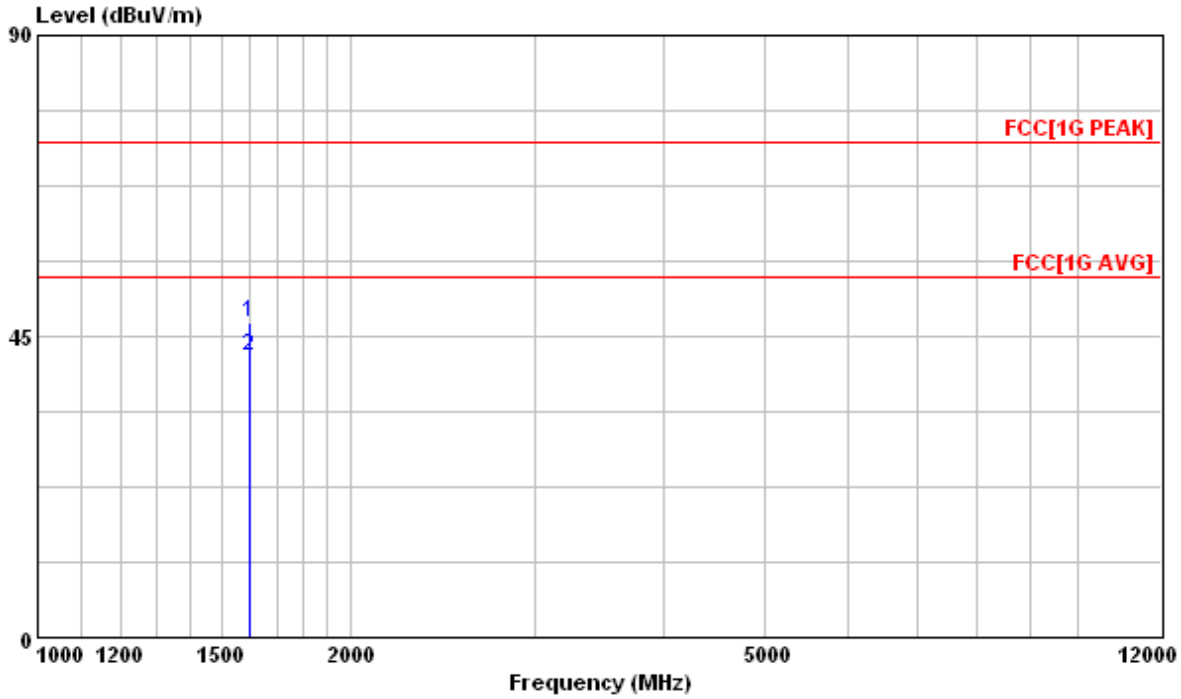
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 0(2402MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Vertical **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1600.325	47.12	80.02	-32.90	74.00	-26.88	169	180	VERTICAL	Peak
2 @	1600.325	41.90	74.80	-32.90	54.00	-12.10	169	180	VERTICAL	Average

Note:

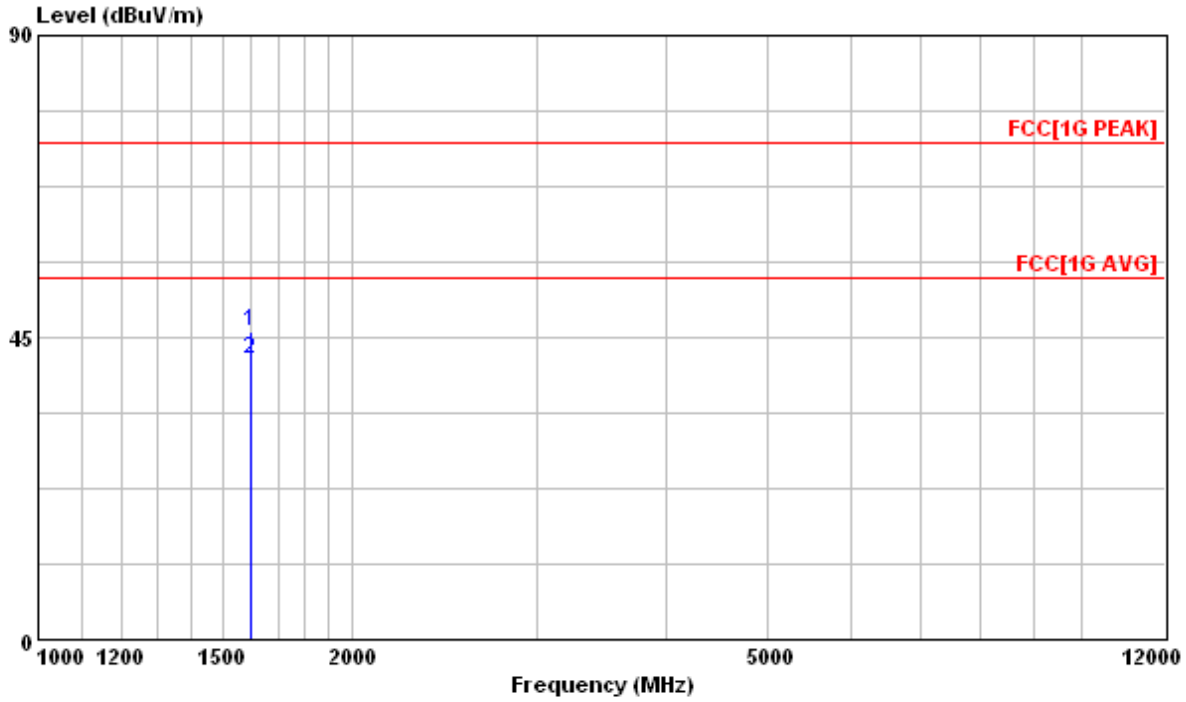
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 0(2402MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Horizontal **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1600.537	45.97	78.87	-32.90	74.00	-28.03	109	101	HORIZONTAL	Peak
2 @	1600.537	41.88	74.78	-32.90	54.00	-12.12	109	101	HORIZONTAL	Average

Note:

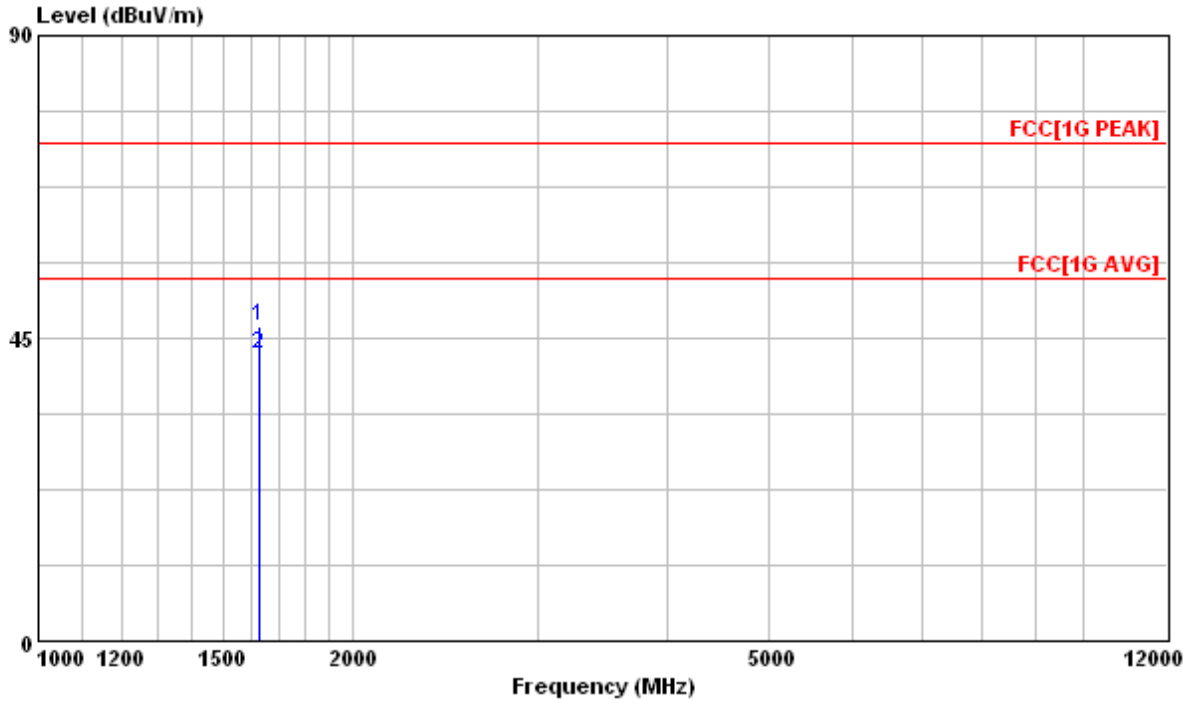
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 39(2441MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Vertical **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1626.450	46.90	79.53	-32.63	74.00	-27.10	123	194	VERTICAL	Peak
2 @	1626.450	42.58	75.21	-32.63	54.00	-11.42	123	194	VERTICAL	Average

Note:

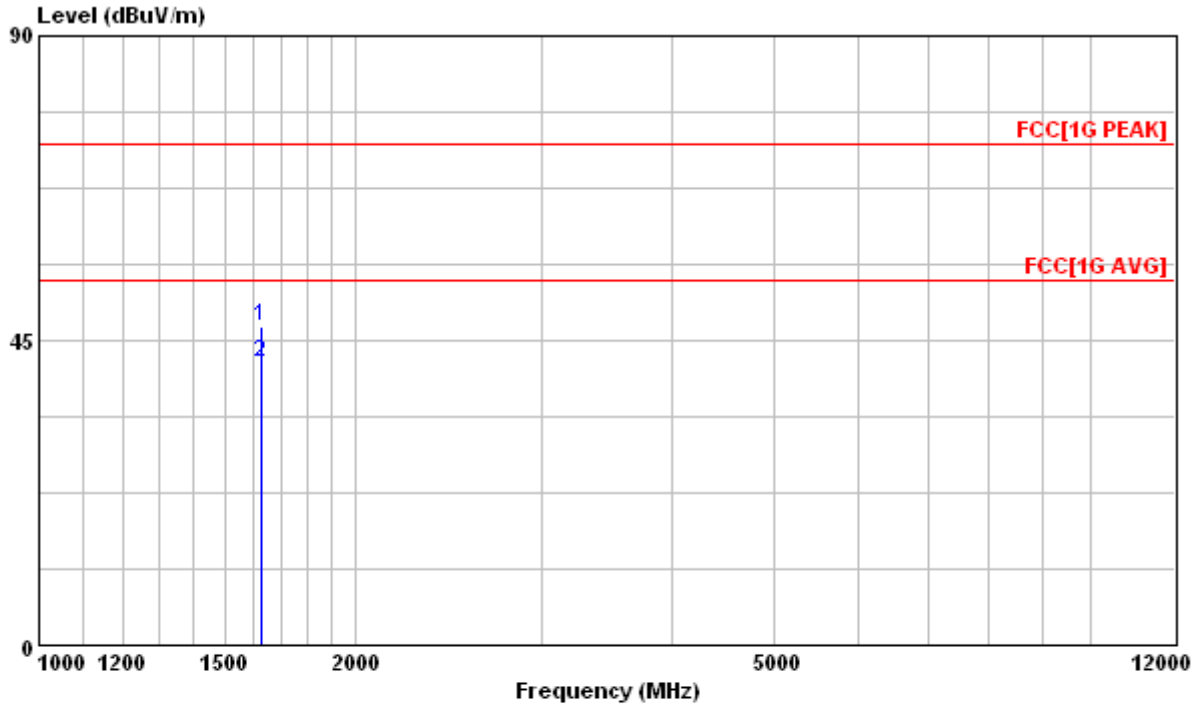
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 39(2441MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Horizontal **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1626.355	46.96	79.59	-32.63	74.00	-27.04	138	91	HORIZONTAL	Peak
2	1626.355	41.75	74.38	-32.63	54.00	-12.25	138	91	HORIZONTAL	Average

Note:

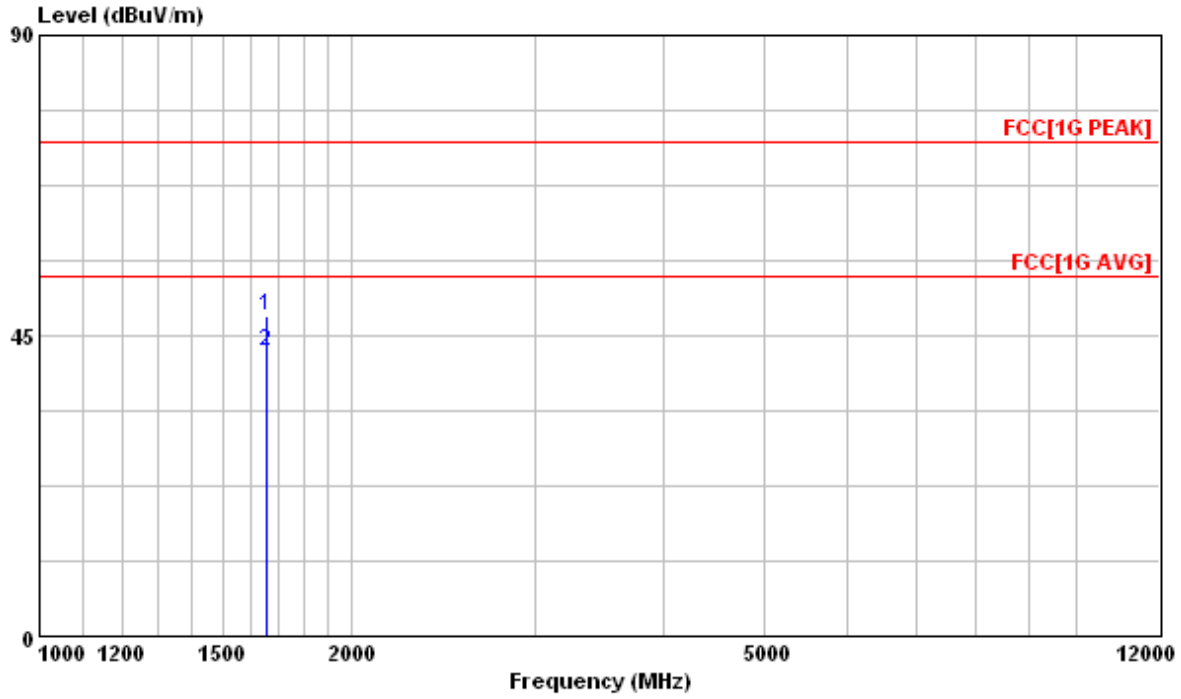
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 78(2480MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Vertical **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1652.425	47.94	80.30	-32.36	74.00	-26.06	128	187	VERTICAL	Peak
2 @	1652.425	42.61	74.97	-32.36	54.00	-11.39	128	187	VERTICAL	Average

Note:

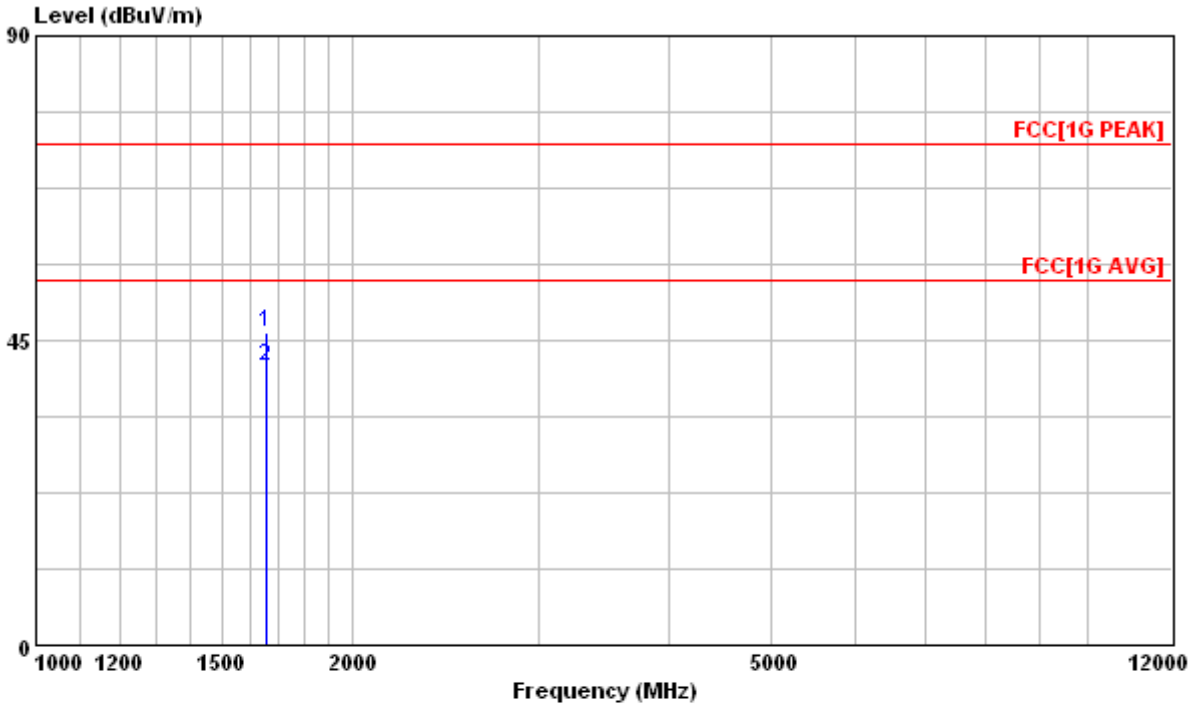
1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

Test Model : **Channel 78(2480MHz), Continuous Receiving**

Test Distance : 3m **Tester** : Bill

Antenna Polarization : Horizontal **Frequency Range** :1GHz~25GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1652.275	46.11	78.47	-32.36	74.00	-27.89	100	23	HORIZONTAL	Peak
2	1652.275	41.19	73.55	-32.36	54.00	-12.81	100	23	HORIZONTAL	Average

Note:

1. Emission Level (dBuV/m) = Reading Value + Correction Factor.
2. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier.
3. PK. and AV. are abbreviation of peak and average respectively.

No signal can be detected from 12GHz to 25GHz, so the graphs are omitted above 12GHz.

7 Dwell Time

Result: Pass

7.1 Applied standard

According to 15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

7.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	E4405B/ MY45106706	2009/3/25	2010/3/24
Chamber	NA	TR13	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR: No Calibration Required.

Instrument Setting

RBW	VBW	Span	Detector	Comment
1MHz	3MHz	0Hz	Peak	

Climatic Condition

Ambient Temperature：22℃ Relative Humidity :60%

7.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

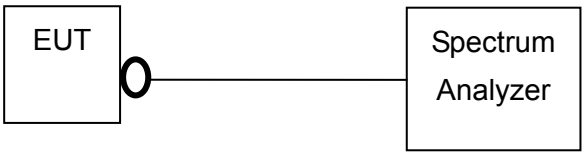
b. A software provided by client enabled the EUT to transmit data with the same packet type.

c. According to FCC Public Notice DA00-705, Span = zero span, RBW = 1 MHz, VBW ≥ RBW to measure the single packet duration time

d. Change the transmitting packet type amd repeat the step b.

e. Calculate the dwell time and compare with the required limit.

7.4 Test configuration



7.5 Test Data

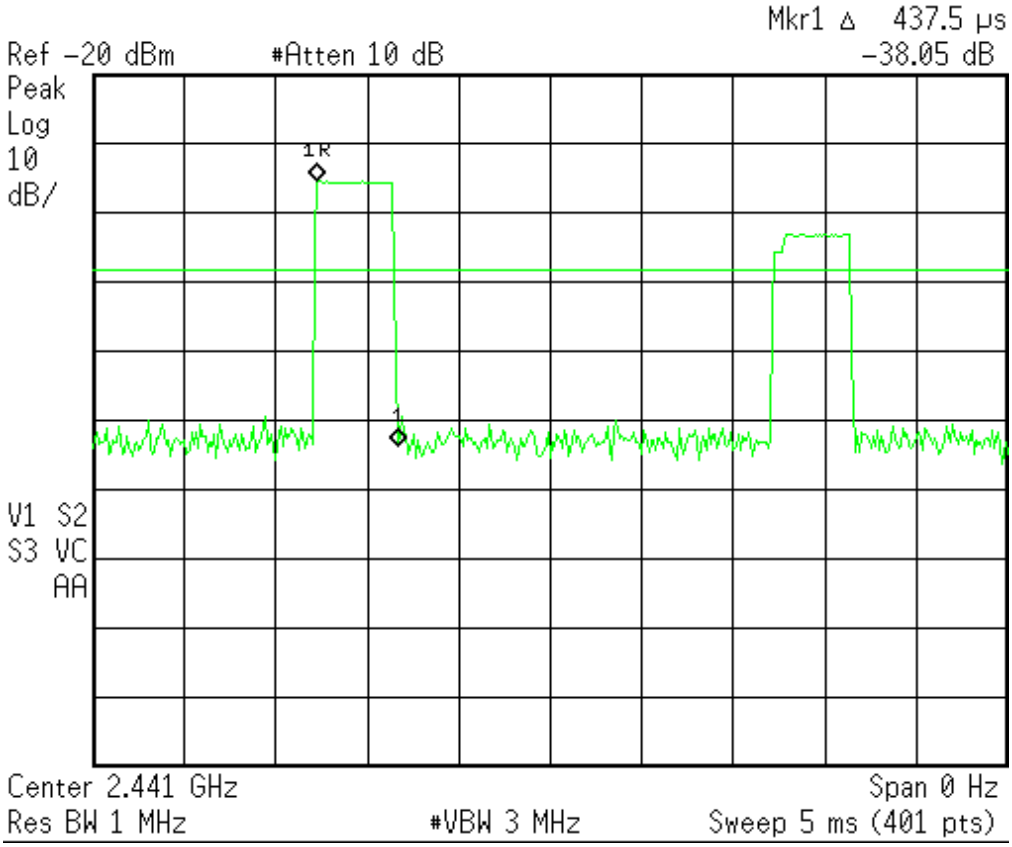
Test Mode : Continuous Transmitting **Tester :** Bill

Operating Frequency (MHz)	Data Type	Single Packet Duration Time (ms)	Hopping Repetition Rate (1/s)	Dwell Time (ms)	Limit (ms)	Margin (ms)
2441	DH1	0.44	10.13	140.85	400	259.15
2441	DH3	1.73	5.06	276.62	400	123.38
2441	DH5	3.08	3.38	328.97	400	71.03

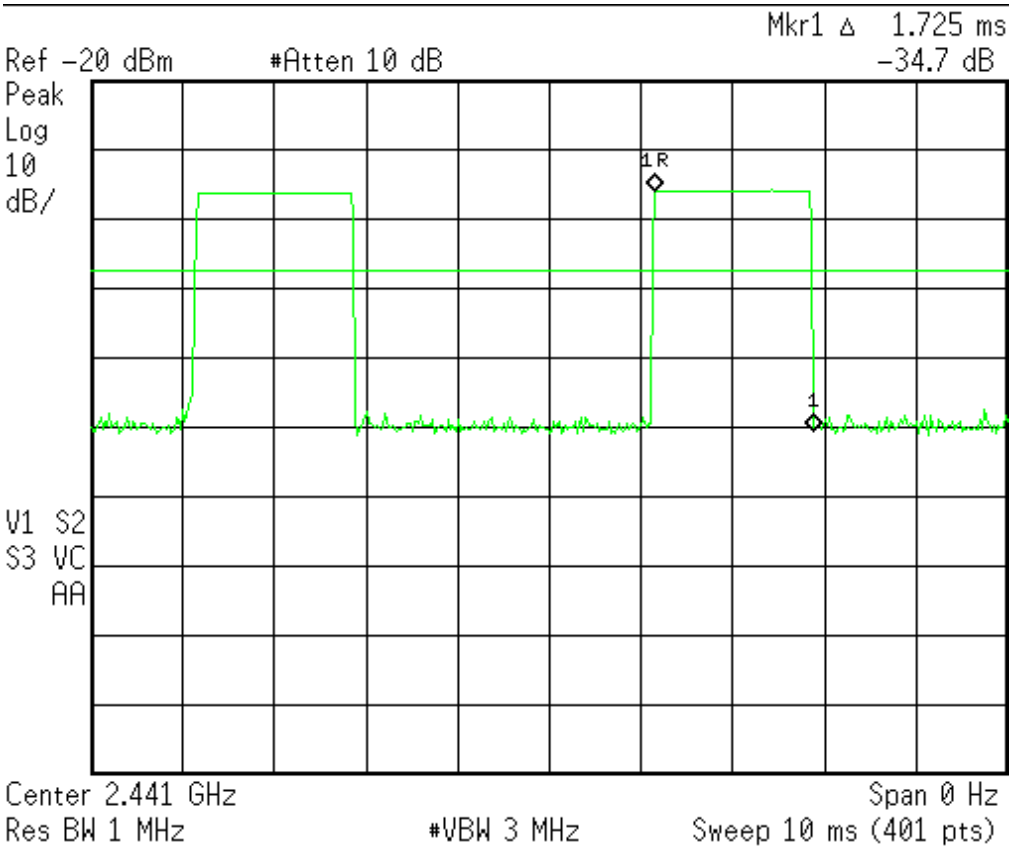
Note:

1. Hopping Cycle(second) = 79 X 0.4 = 31.6
2. Hopping Repetition Rate(1/s) :DH1=1600/79/2=10.13 ; DH1600/79/4=5.06
   DH5=1600/79/6=3.38
3. Dwell Time (ms) = Single Packet Duration Time X Hopping repetition Rate X Hopping Cycle
4. Margin (ms) = Limit – Dwell Time

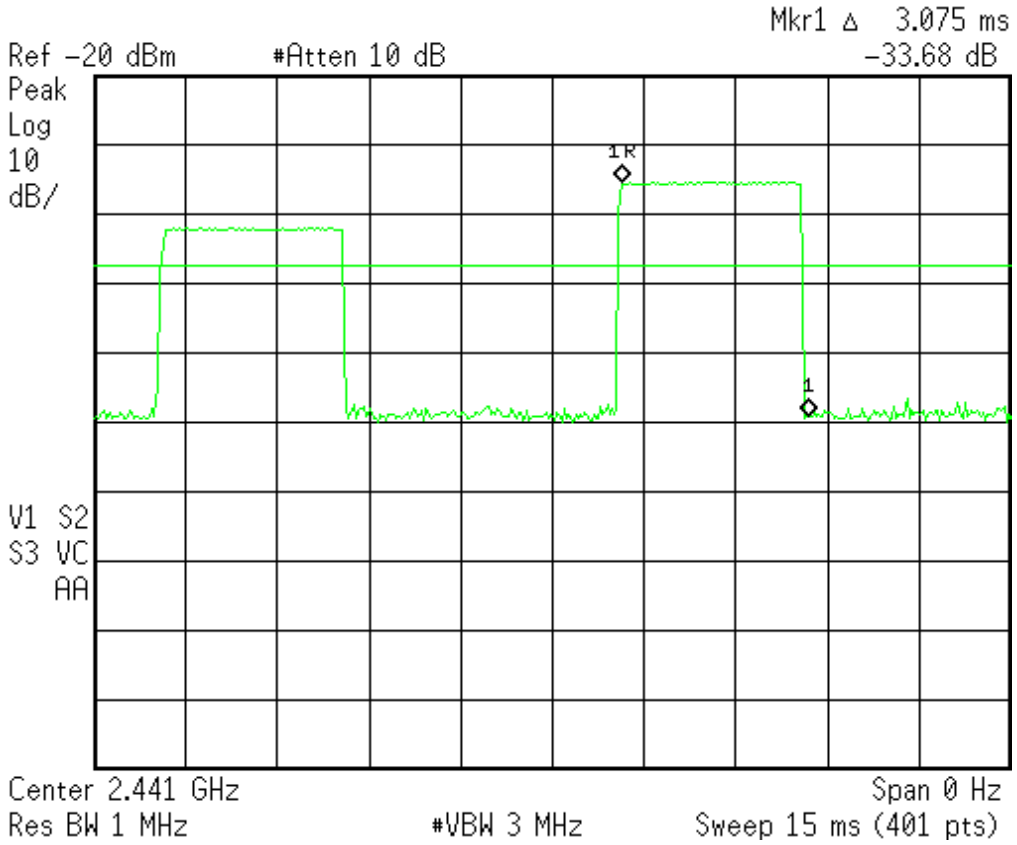
DH1


Mkr1 Δ 437.5 µs
Ref -20 dBm
#Atten 10 dB
-38.05 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 VC
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 3 MHz
Sweep 5 ms (401 pts)

DH3


Mkr1 Δ 1.725 ms
Ref -20 dBm
#Atten 10 dB
-34.7 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 VC
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (401 pts)

DH5


Mkr1 Δ 3.075 ms
Ref -20 dBm
#Atten 10 dB
-33.68 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 VC
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 3 MHz
Sweep 15 ms (401 pts)

8 Conducted Emission Measurement

Result: Pass

8.1 Applied standard

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

8.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ESCS 30/836858/021	2009/1/13	2010/1/12
LISN	R&S	ESH2-Z5/836613/001	2009/8/14	2010/8/13
2nd LISN	R&S	ENV4200/833209/010	2009/1/13	2010/1/12
50Ω terminator	N/A	N/A/001	2009/8/26	2010/8/25
RF Switch	N/A	RSU28/338965/002	2009/3/3	2010/3/2
RF Cable	N/A	N/A/C0052 ~ 56	2009/3/3	2010/3/2
Test Software	Audix	e3/Ver. 5.4.219.f	NCR	NCR
shielded room	ETS LINDGREN	TR5/15353-F	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

Instrument Setting

IF BW	Measurement Time	Detector	Trace	Comment
9kHz	1 second	Quasi-Peak / Average	Maxhold	

Climatic Condition

Ambient Temperature：24℃; Relative Humidity : 53%

8.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. If the EUT is tabletop equipment, it was placed on a non-conducted table with a height of 0.8 meters above the reference ground plane and 0.4 meters from the conducting wall of the shielded room. Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane.

c. Connect the EUT's power source to the appropriate power mains through the LISN.

d. All the other peripherals are connected to the 2nd LISN, if any.

e. The LISN was placed 0.8 meters from the EUT and at least 0.8 meters from other units and other metal planes.

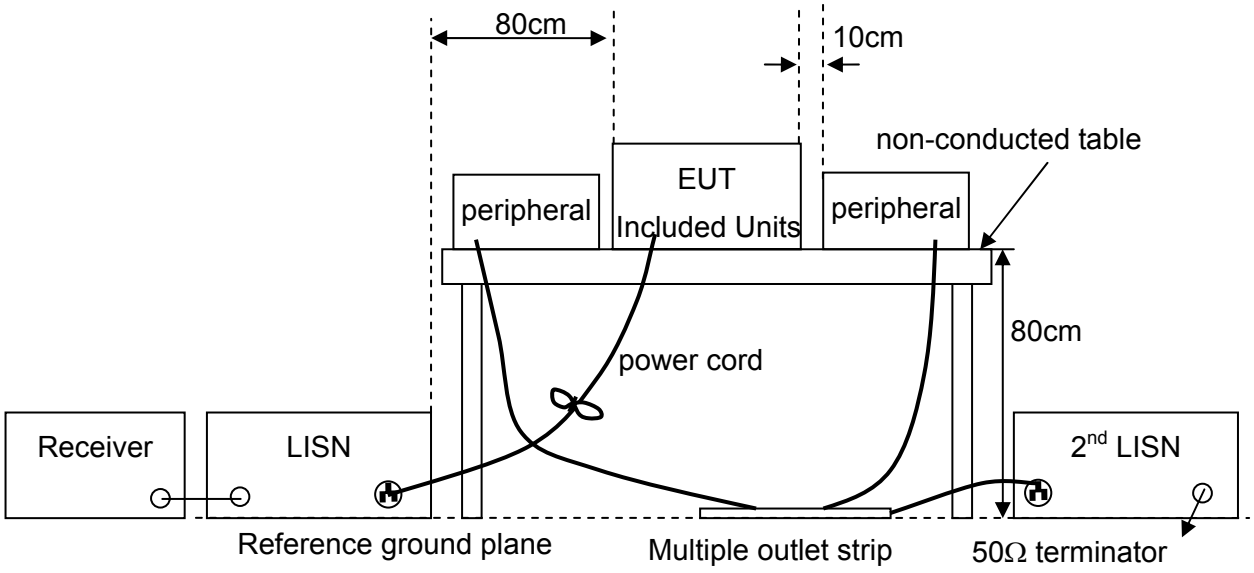
f. Measure the conducted emissions on each power line (Neutral Line and Line 1 – Hot side) of the EUT's power source by using the test receiver connected to the coupling RF output port of LISN.

g. Rapidly scan the signal from 150kHz to 30MHz by using the receiver through the Maximum-Peak detector to determine those frequencies associated with higher emission levels for each measured line.

h. Then measure the maximum level of conducted disturbance for each frequency found from step g. by using the receiver through the Quasi-Peak and Average detectors per CISPR 16-1.

i. Record the level for each frequency and compare with the required limit.

8.4 Test configuration

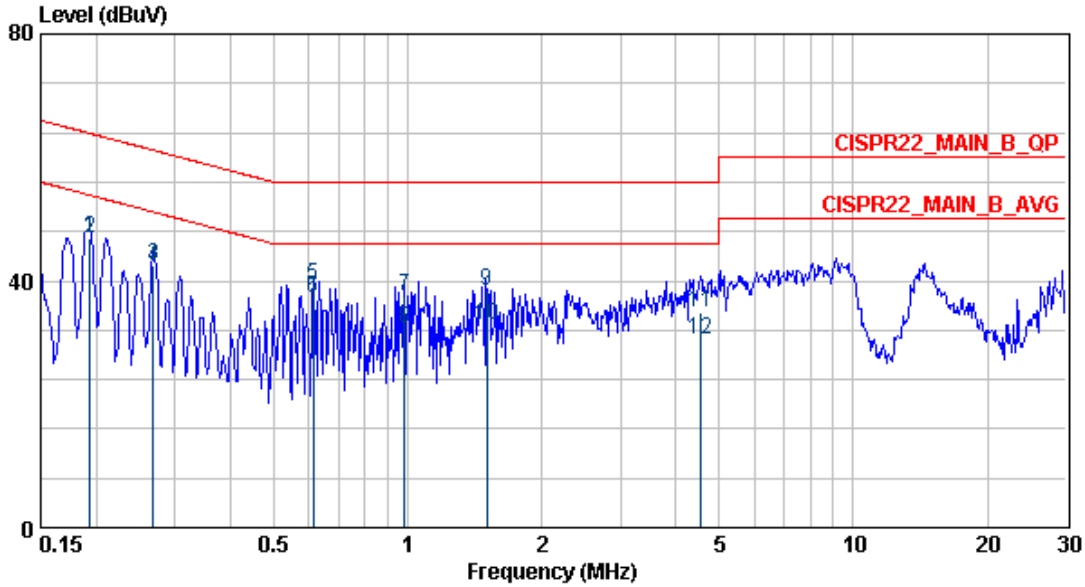


8.5 Test Data

Test Mode : **Continuous Transmitting, 2402MHz, Recharged mode**

Frequency Range : 150kHz~30MHz **Phase** : Line

Tester : CDC

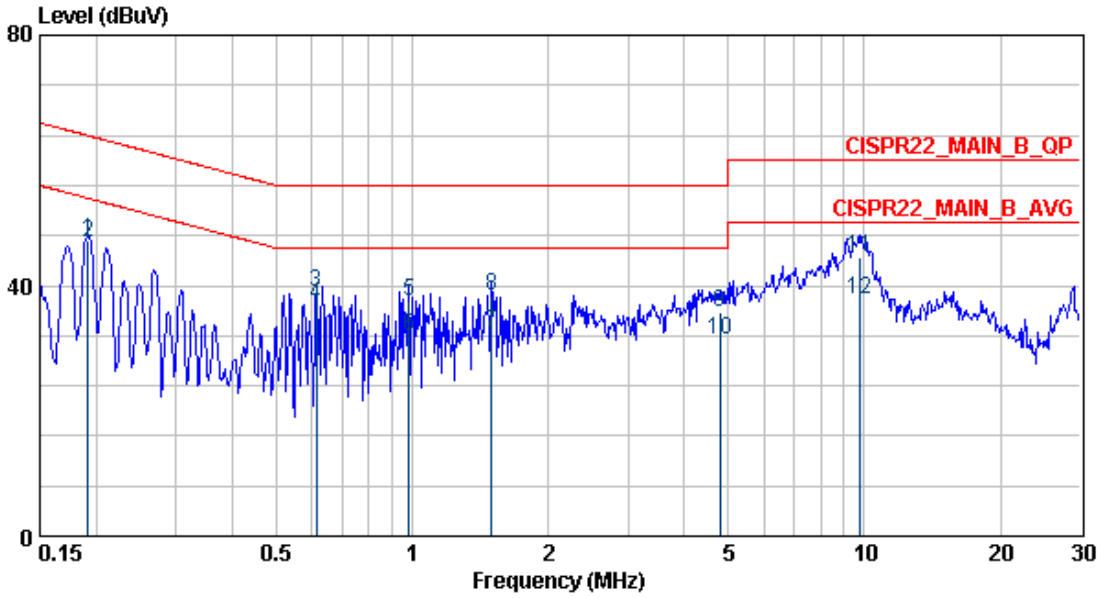


	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Ant Pos	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	cm		
1	0.19	47.01	0.15	46.86	63.89	-16.88	---	LINE	QP
2	0.19	46.97	0.15	46.82	53.89	-6.92	---	LINE	AVERAGE
3	0.27	42.53	0.16	42.37	61.16	-18.63	---	LINE	QP
4	0.27	42.22	0.16	42.06	51.16	-8.94	---	LINE	AVERAGE
5	0.61	39.30	0.17	39.13	56.00	-16.70	---	LINE	QP
6	0.61	37.29	0.17	37.12	46.00	-8.71	---	LINE	AVERAGE
7	0.98	37.55	0.20	37.35	56.00	-18.45	---	LINE	QP
8	0.98	32.12	0.20	31.92	46.00	-13.88	---	LINE	AVERAGE
9	1.50	38.48	0.22	38.26	56.00	-17.52	---	LINE	QP
10	1.50	32.93	0.22	32.71	46.00	-13.07	---	LINE	AVERAGE
11	4.53	34.77	0.42	34.35	56.00	-21.23	---	LINE	QP
12	4.53	30.39	0.42	29.97	46.00	-15.61	---	LINE	AVERAGE

Note:

1. Emission Level = Reading Data + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. P.K., Q.P. and AV. are abbreviation of peak, quasi-peak and average respectively.

Test Mode : **Continuous Transmitting, 2402MHz, Recharged mode**
Frequency Range : 150kHz~30MHz **Phase** : Neutral
Tester : CDC



	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Ant Pos	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	cm		
1 @	0.19	47.04	0.16	46.88	53.95	-6.91	---	NEUTRAL	AVERAGE
2	0.19	46.92	0.16	46.76	63.95	-17.03	---	NEUTRAL	QP
3	0.61	39.07	0.18	38.89	56.00	-16.93	---	NEUTRAL	QP
4	0.61	37.00	0.18	36.82	46.00	-9.00	---	NEUTRAL	AVERAGE
5	0.98	37.53	0.22	37.31	56.00	-18.47	---	NEUTRAL	QP
6	0.98	31.87	0.22	31.65	46.00	-14.13	---	NEUTRAL	AVERAGE
7	1.50	32.61	0.24	32.37	46.00	-13.39	---	NEUTRAL	AVERAGE
8	1.50	38.30	0.24	38.06	56.00	-17.70	---	NEUTRAL	QP
9	4.80	35.80	0.45	35.35	56.00	-20.20	---	NEUTRAL	QP
10	4.80	31.26	0.45	30.81	46.00	-14.74	---	NEUTRAL	AVERAGE
11	9.76	44.55	0.77	43.78	60.00	-15.45	---	NEUTRAL	QP
12	9.76	37.74	0.77	36.97	50.00	-12.26	---	NEUTRAL	AVERAGE

Note:

1. Emission Level = Reading Data + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. P.K., Q.P. and AV. are abbreviation of peak, quasi-peak and average respectively.

9 Antenna Requirement

9.1 Applied standard

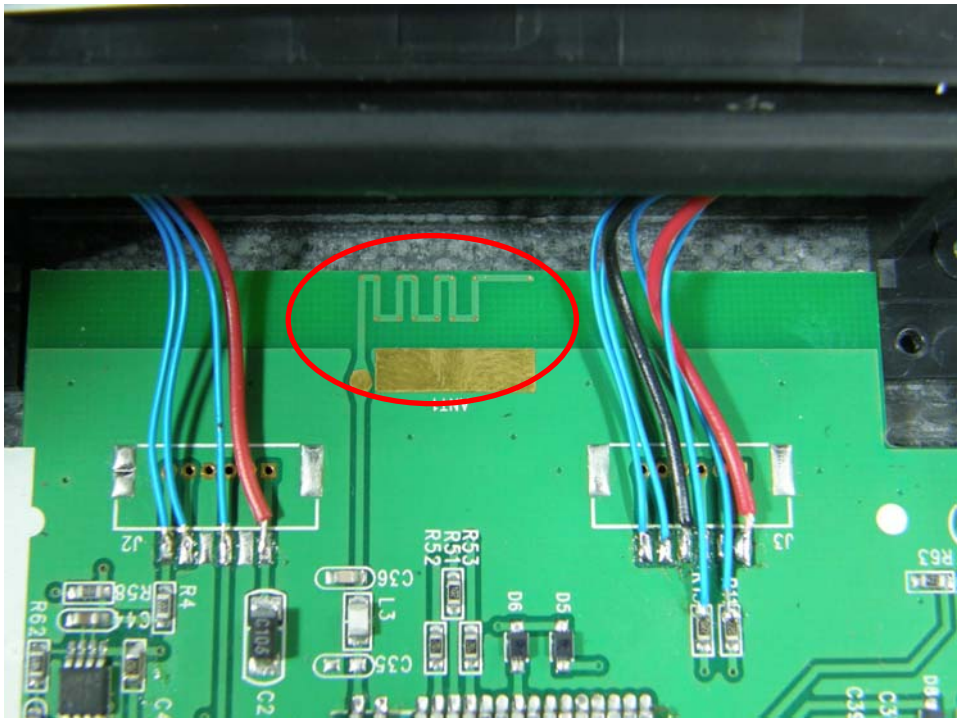
According to 15.247(4), The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi

9.2 Antenna Information

This antenna's relative information as follow:

Brand	Model	Frequency Range (MHz)	Gain (dBi)	Comment
iWallet	N/A	2400 ~ 2483.5	-11.75	

Antenna Position:



9.3 Result

Gain of the antenn is less than 6dBi.