

**FCC PART 15 SUBPART C TEST REPORT FCC PART 15.247
&
IC TEST REPORT RSS-210**

Report Reference No...... : **A1210096032-1**

FCC ID : **YH5-BTKB01**

IC : **8012A-BTKB01**

Compiled by

(position+printed name+signature)..: File administrators Tony Li

Supervised by

(position+printed name+signature)..: Technique principal Robin Fang

Approved by

(position+printed name+signature)..: Manager James Wu

Date of issue.....: Nov 02, 2012

Representative Laboratory Name ..: Shenzhen CTL Electron Technology Co., Ltd.

Address: Room 405, The 3# of 4th Building, Zhuguang No.2 Industrial District, Xili Town, Nanshan, Shenzhen, China

Testing Laboratory Name: Bontek Compliance Testing Laboratory Ltd

Address: 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

Applicant's name.....: **Kobian Canada INC.**

Address: 560 Denison Street, Unit 5, Markham, Ontario, L3R 2M8, Canada

Test specification:

Standard: **FCC Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System

IC RSS-210

IC RSS-Gen issue 3

TRF Originator.....: Shenzhen CTL Electron Technology Co., Ltd.

Master TRF.....: Dated 2012-06

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Test item description: BLUETOOTH KEYBOARD CASE

Trade Mark: /

Model/Type reference.....: HS-ANX7FKBCS

Listed Models: HS-IPADCASE2-3IN1, HS-PBCASE-3IN1, HS-GXY10CASE3IN1, HS-IPAD2KBCS, HS-MXCASE-3IN1

Operation Frequency: From 2402MHz to 2480MHz

Modulation Type: GFSK, 8DPSK

Result.....: **Positive**

TEST REPORT

Test Report No. : A1210096032-1	Nov 02, 2012
	Date of issue

Equipment under Test : BLUETOOTH KEYBOARD CASE

Model /Type : HS-ANX7FKBCS

Listed Models : HS-IPADCASE2-3IN1, HS-PBCASE-3IN1,
HS-GXY10CASE3IN1, HS-IPAD2KBCS, HS-MXCASE-3IN1

Applicant : **Kobian Canada INC.**

Address : 560 Denison Street, Unit 5, Markham, Ontario, L3R
2M8, Canada

Manufacturer : **Reborn Science & Technology Co., Ltd.**

Address : 1712, Hongfa Central Building, Baoan Center, Shenzhen,
China

Test Result according to the standards on page 4:	Positive
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

<u>1.</u>	<u>TEST STANDARDS</u>	<u>4</u>
<u>2.</u>	<u>SUMMARY</u>	<u>5</u>
2.1.	General Remarks	5
2.2.	Equipment Under Test	5
2.3.	Short description of the Equipment under Test (EUT)	5
2.4.	EUT operation mode	5
2.5.	Configuration of Test System	6
2.6.	Related Submittal(s) / Grant (s)	6
2.7.	Modifications	6
2.8.	NOTE	6
<u>3.</u>	<u>TEST ENVIRONMENT.....</u>	<u>7</u>
3.1.	Address of the test laboratory	7
3.2.	Test Facility	7
3.3.	Environmental conditions	7
3.4.	Test Description	7
3.5.	Statement of the measurement uncertainty	8
3.6.	Equipments Used during the Test	8
<u>4.</u>	<u>TEST CONDITIONS AND RESULTS.....</u>	<u>9</u>
4.1.	AC Power Conducted Emission(Not Applicable)	9
4.2.	Radiated Emission	10
4.3.	Maximum Peak Output Power	21
4.4.	20dB Bandwidth	25
4.5.	Band Edge	29
4.6.	Frequency Separation	40
4.7.	Number of hopping frequency	42
4.8.	Time Of Occupancy(Dwell Time)	45
4.9.	Receiver spurious Emissions(<i>Not For FCC Review</i>)	52
4.10.	Antenna Requirement	57
<u>5.</u>	<u>TEST SETUP PHOTOS OF THE EUT</u>	<u>58</u>
<u>6.</u>	<u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u>	<u>59</u>

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

RSS-210 Issue 8 December 2010 : Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

RSS-Gen Issue 3 December 2010 :General Requirements and Information for the Certification of Radio Apparatus

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Oct 25,2012
Testing commenced on	:	Oct 25,2012
Testing concluded on	:	Nov 02, 2012

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

Internal Battery 3.7V

2.3. Short description of the Equipment under Test (EUT)

2.4GHz (BLUETOOTH KEYBOARD CASE)

For more details, refer to the user's manual of the EUT.

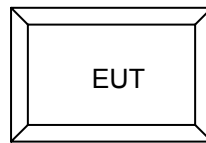
Serial number: Prototype

2.4. EUT operation mode

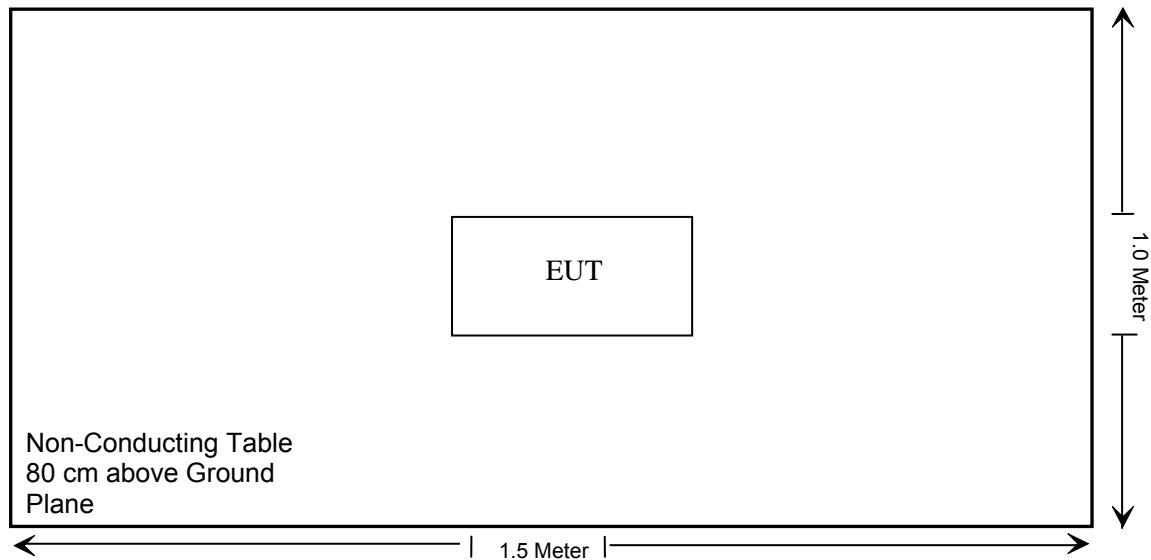
The EUT has been tested under typical operating condition. There are EDR (Enhanced Data Rate) and BDR (Basic Data Rate) mode. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 79 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel.

Frequency Range:	2400-2483.5MHz
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Antenna:	PCB Antenna

2.5. Configuration of Test System



Block Diagram of Test Setup



2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID:YH5-BTKB01** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and **IC: 8012A-BTKB01** filing to comply with RSS-210.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. NOTE

1. The functions of the EUT are listed as below:

	Test Standards	Reference Report
Bluetooth	FCC Part 15 Subpart C (Section 15.247) & RSS-210	A1210096032-1
Bluetooth	MPE report	A1210096032-2
USB Port	FCC Part 15 Subpart B	A1210096032-3

2. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
EUT	√	—	—	—

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Bontek Compliance Testing Laboratory Ltd
1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 7631A

The 3m alternate test site of Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on March, 2008.

FCC-Registration No.: 338263

Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 24, 2008.

CNAS-Lab Code: L3923

Bontek Compliance Testing Laboratory Ltd has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Mar 22, 2012. Valid time is until Mar 21, 2015.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

3.4. Test Description

FCC PART 15 15.247 & RSS-210 & RSS-Gen			
FCC Part 15.207	RSS-GEN	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	RSS-210 8.1	6dB Bandwidth(FCC)/ 20dB Bandwidth(IC)	PASS
FCC Part 15.247(d)	RSS-210 8.1	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	RSS-210 8.4	Maximum Peak Output Power	PASS
FCC Part 15.247(a)(1)(iii)	RSS-210 8.1	Number of hopping frequency& Time of Occupancy	PASS
FCC Part 15.247(a)(1)	RSS-210 8.1	Frequency Separation	PASS
FCC Part 15.109/ 15.205/ 15.209	RSS-GEN	Radiated Emissions	PASS
FCC Part 15.247(d)	RSS-210 8.5	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	RSS-GEN	Antenna Requirement	PASS
FCC Part 1.1307 (b)	RSS-102	MPE Evaluation	PASS
N/A	RSS-Gen	Receiver Spurious Emissions	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Bontek Compliance Testing Laboratory Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Bontek Compliance Testing Laboratory Ltd is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

3.6. Equipments Used during the Test

Maximum Peak Output Power / Frequency Separation / 20dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission/ Number of hopping frequency/ Time of Occupancy

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	AGILENT	E4407B	MY44210779	2012/4/23

Radiated Emission

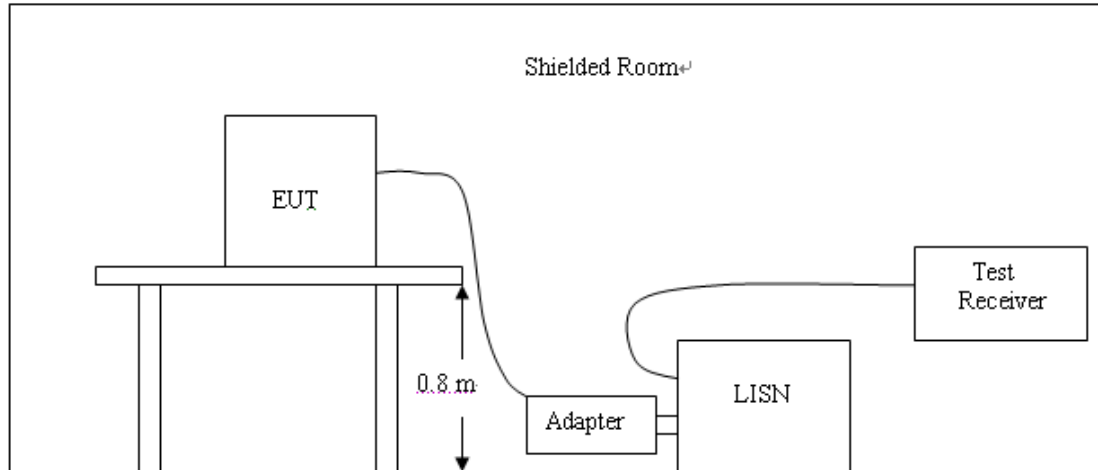
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2012/4/23
2	EMI TEST SOFTWARE	Audix	Z3	N/A	----
3	HORN ANTENNA	Rohde&Schwarz	HF906	100039	2012/4/23
4	Amplifer	Sonoma	310N	E009-13	2012/4/23
5	JS amplifier	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2012/4/23
6	High pass filter	Compliance Direction systems	BSU-6	34202	2012/4/23
7	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	470	2012/4/23
8	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2012/4/23
9	HORN ANTENNA	ShwarzBeck	9120D	1011	2012/4/23
10	TURNTABLE	MATURO	TT2.0	----	2012/4/23
11	ANTENNA MAST	MATURO	TAM-4.0-P	----	2012/4/23

The Calibration Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission(Not Applicable)

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2009
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
- 4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

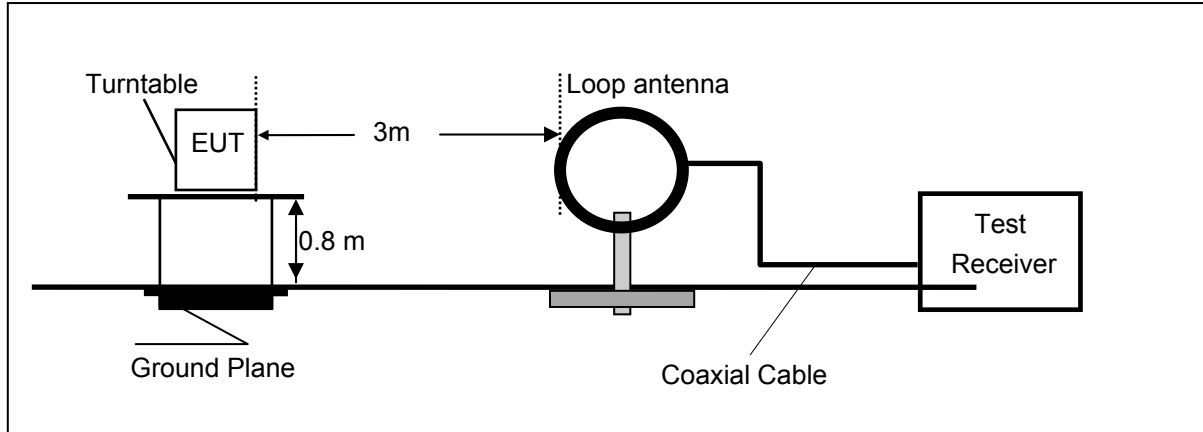
Not applicable to this device (The product powered by battery).

4.2. Radiated Emission

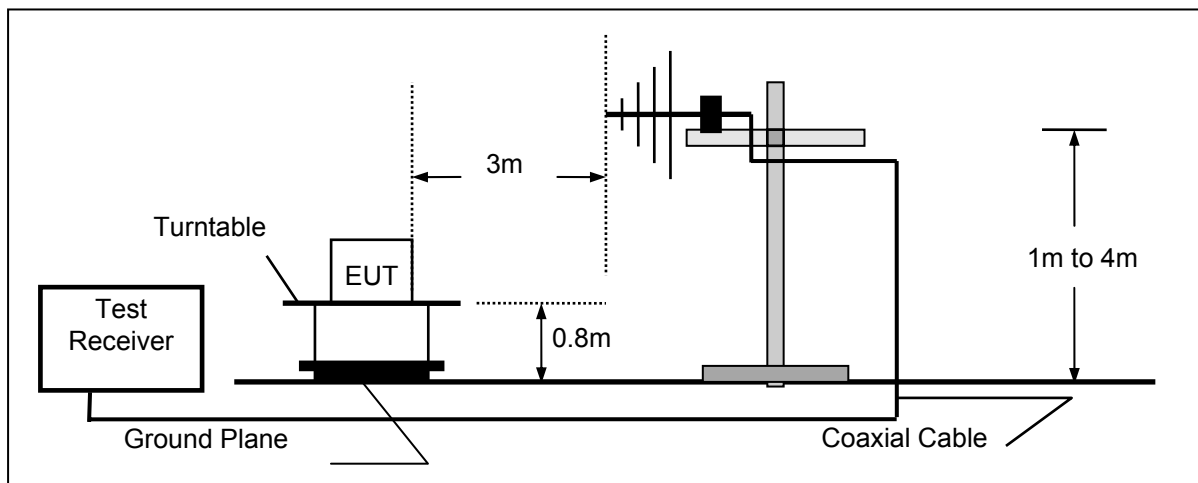
TEST CONFIGURATION

Radiated Emission Test Set-Up

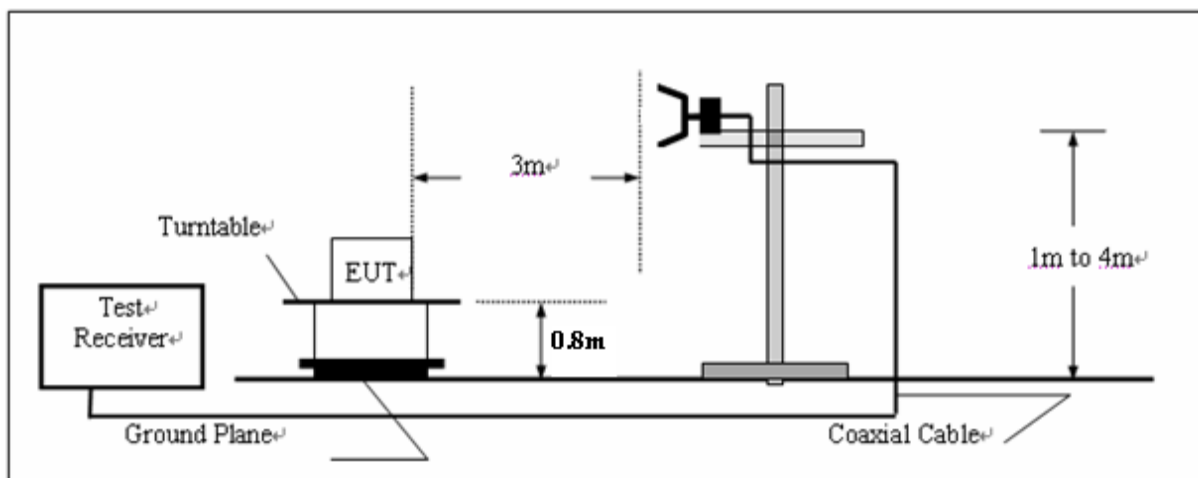
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. the fundamental frequency is 2400-2483.5MHz, So the radiation emissions frequency range were tested from 30MHz to 25GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

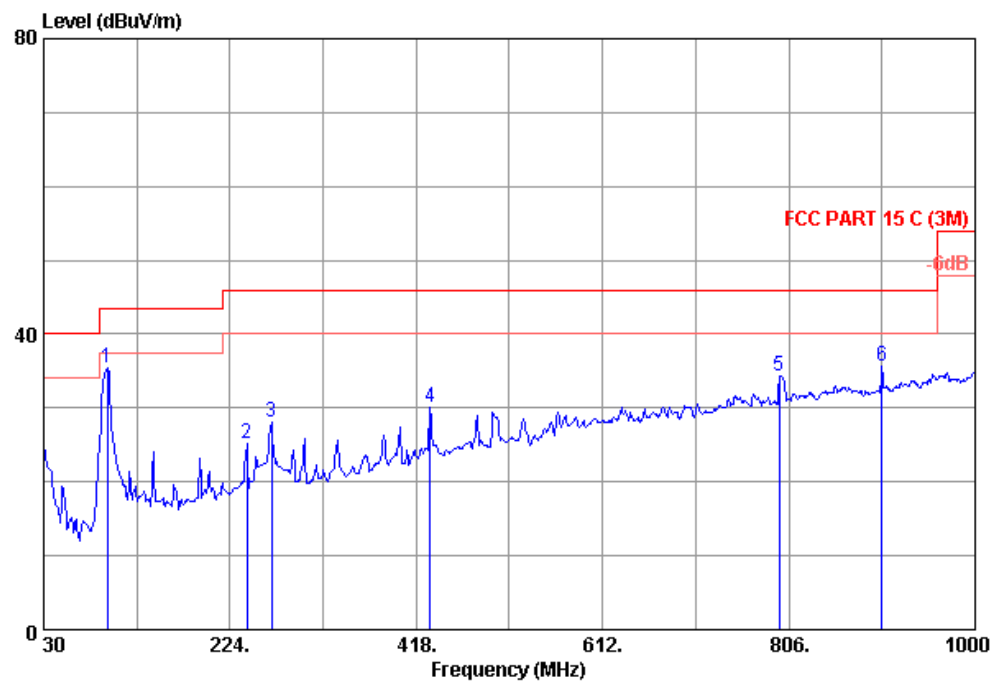
Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

RADIATION LIMIT

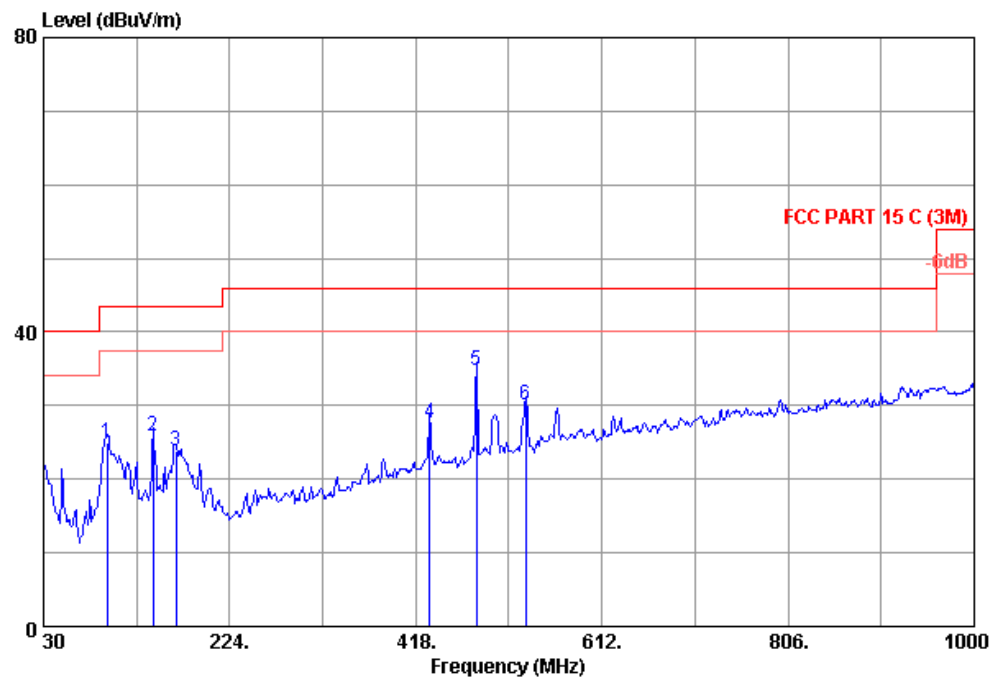
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS**For 30MHz to 1000MHz (TX mode)**

No.	Freq. (MHz)	Ant.	Cable	Emission				
		Factor (dB/m)	Loss (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	95.960	9.84	1.09	24.43	35.36	43.50	8.14	QP
2	241.460	11.93	2.09	11.26	25.28	46.00	20.72	QP
3	267.650	13.50	2.28	12.25	28.03	46.00	17.97	QP
4	432.550	17.42	3.12	9.65	30.19	46.00	15.81	QP
5	796.300	22.04	4.88	7.40	34.32	46.00	11.68	QP
6	903.000	22.89	5.21	7.50	35.60	46.00	10.40	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

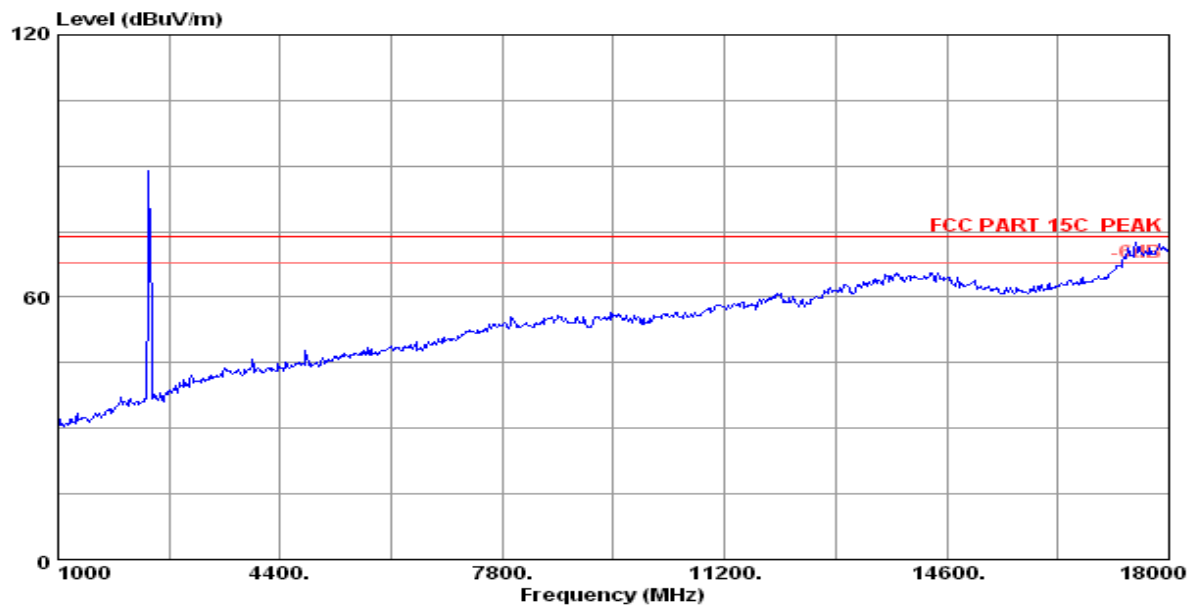


No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	95.960	9.84	1.09	14.10	25.03	43.50	18.47	QP
2	144.460	11.92	1.14	12.85	25.91	43.50	17.59	QP
3	167.740	10.40	1.34	12.08	23.82	43.50	19.68	QP
4	432.550	17.42	3.12	7.11	27.65	46.00	18.35	QP
5	481.050	18.11	3.43	13.28	34.82	46.00	11.18	QP
6	532.460	18.27	3.73	8.19	30.19	46.00	15.81	QP

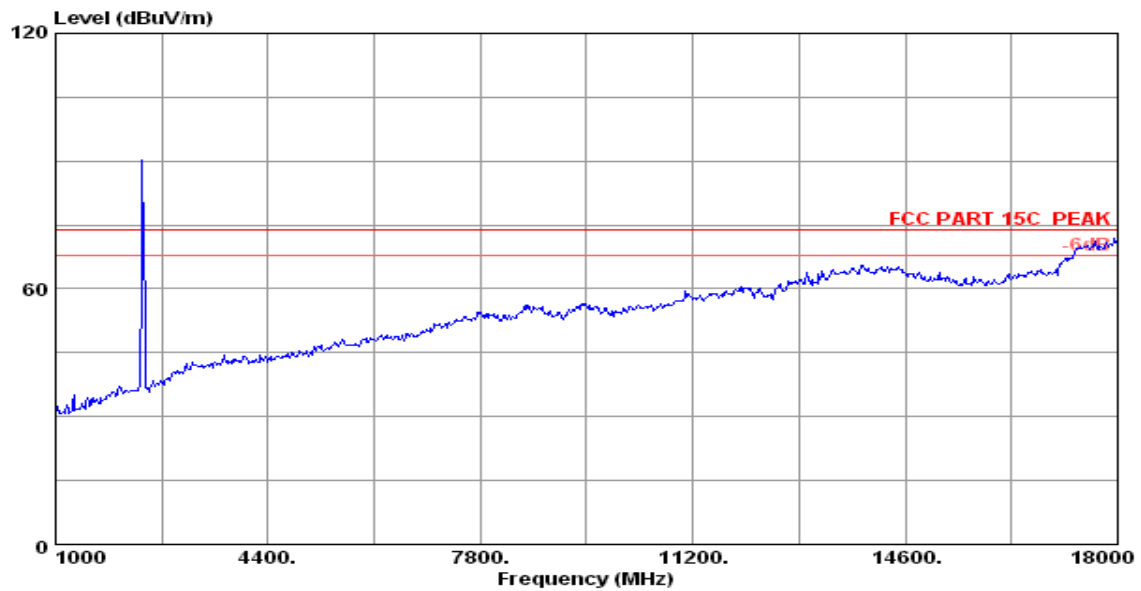
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Above 1G

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

BDR (Low channel)**ANTENNA POLARITY & TEST DISTANCE: VERTICAL 3 M**

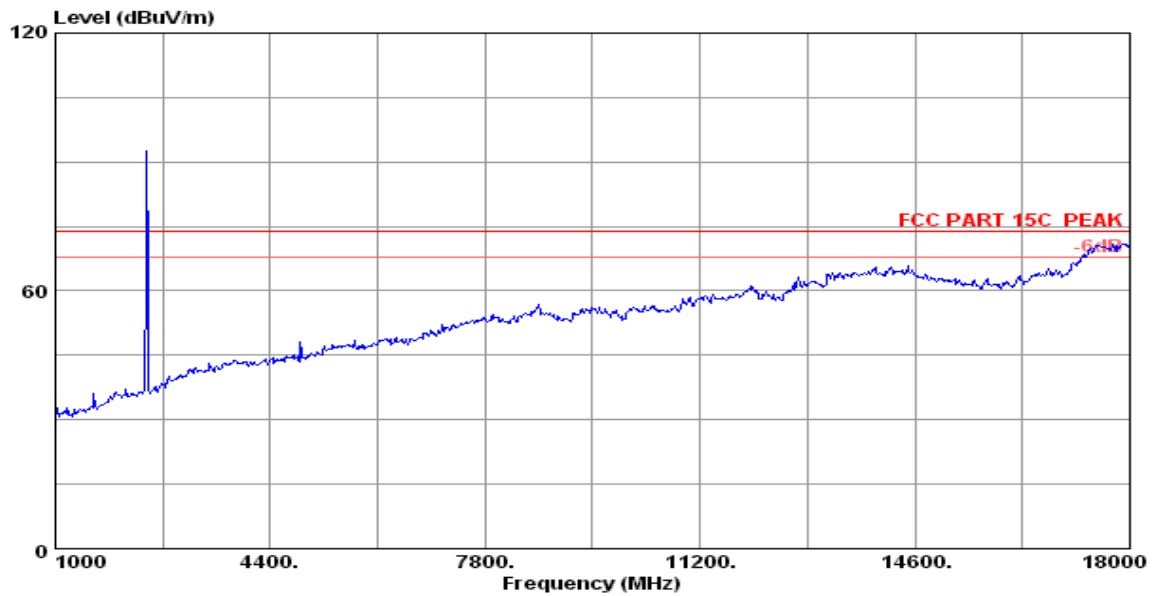
No.	Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2402.00	95.83	PK	---	1.00	25	95.58	29.44	7.43	36.62
2	4804.00	57.09	PK	74.00	1.00	111	47.27	34.30	10.62	35.10
2	4804.00	49.89	AV	54.00	1.00	111	40.07	34.30	10.62	35.10



ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

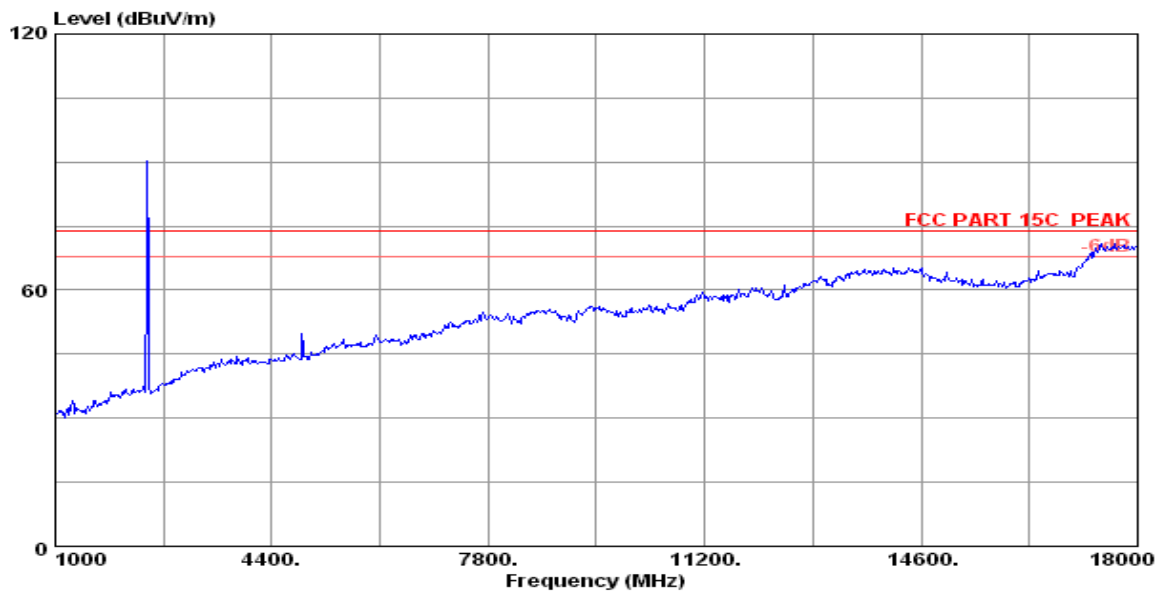
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2402.00	94.75	PK	---	---	1.00	330	94.50	29.44	7.43	36.62
2	4804.00	55.07	PK	74.00	16.91	1.00	154	45.25	34.30	10.62	35.10
2	4804.00	47.87	AV	54.00	4.11	1.00	154	38.05	34.30	10.62	35.10

BDR (middle channel)



ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

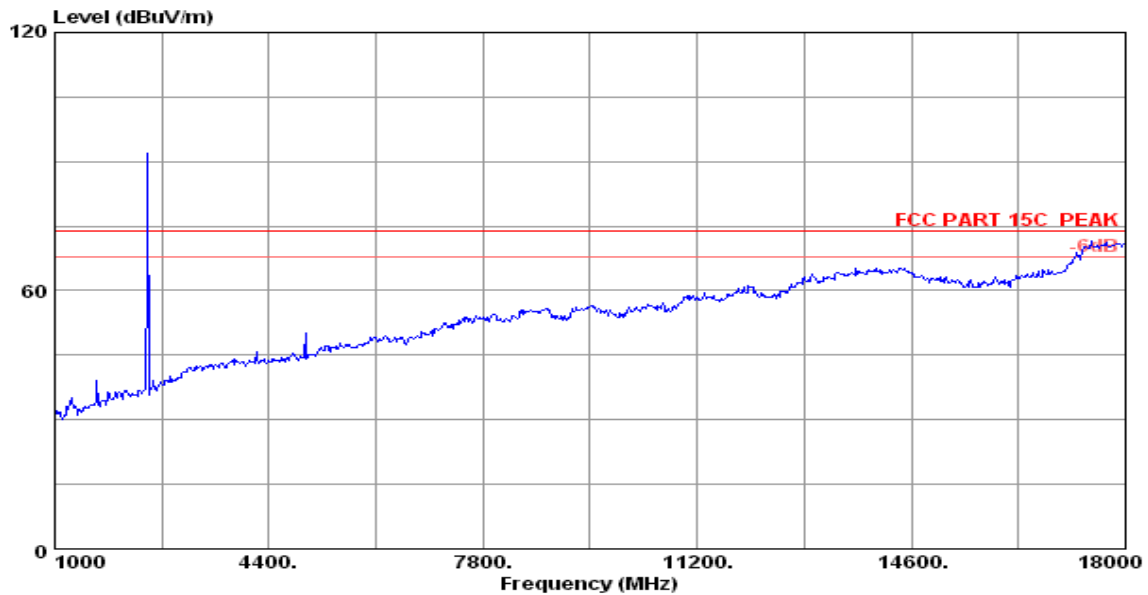
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2441.00	94.41	PK	---	---	1.00	38	94.05	29.47	7.50	36.61
2	4882.00	55.94	PK	74.00	18.06	1.00	285	45.85	34.41	10.71	35.03
2	4882.00	48.74	AV	54.00	5.26	1.00	285	38.65	34.41	10.71	35.03



ANTENNA POLARITY & TEST DISTANCE: VERTICAL 3 M

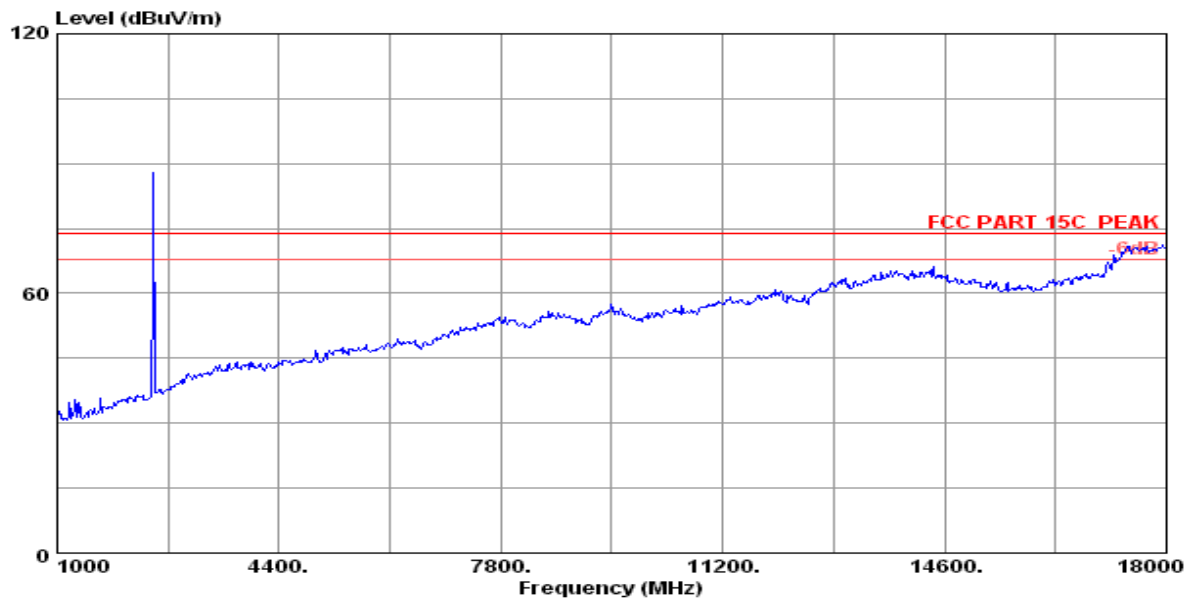
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2441.00	93.76	PK	---	---	1.00	278	93.40	29.47	7.50	36.61
2	4882.00	57.72	PK	74.00	16.28	1.00	165	47.63	34.41	10.71	35.03
2	4882.00	50.49	AV	54.00	3.51	1.00	165	40.40	34.41	10.71	35.03

BDR (High channel)



ANTENNA POLARITY & TEST DISTANCE: VERTICAL 3 M

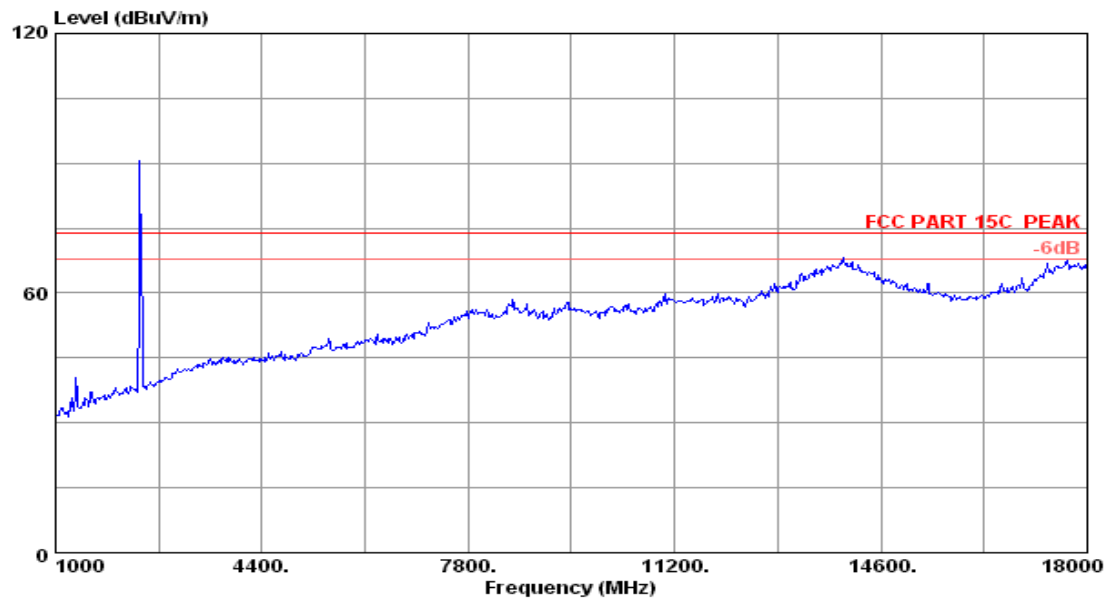
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	1646.00	46.47	PK	54.00	7.53	1.00	333	50.16	27.24	5.99	36.92
2	*2480.00	92.64	PK	---	---	1.00	258	92.17	29.49	7.58	36.60
3	4960.00	58.09	PK	74.00	15.91	1.00	147	47.70	34.54	10.80	34.95
4	4960.00	50.87	AV	54.00	3.13	1.00	147	40.48	34.54	10.80	34.95



ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

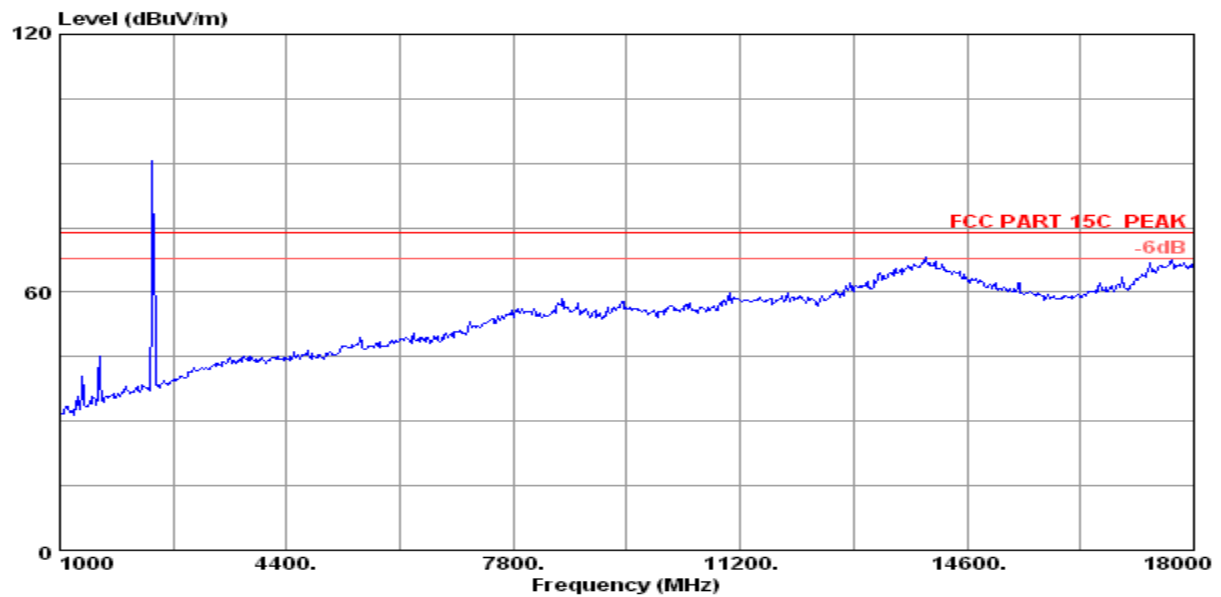
No.	Frequency (MHz)	Emssion Level (dBUV/m)		Limit (dBUV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBUV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2480.00	93.03	PK	---	---	1.00	222	92.56	29.49	7.58	36.60
2	4960.00	57.70	PK	74.00	16.30	1.00	15	47.31	34.54	10.80	34.95
2	4960.00	50.41	AV	54.00	3.59	1.00	15	40.02	34.54	10.80	34.95

EDR (Low channel)



ANTENNA POLARITY & TEST DISTANCE: VERTICAL 3 M

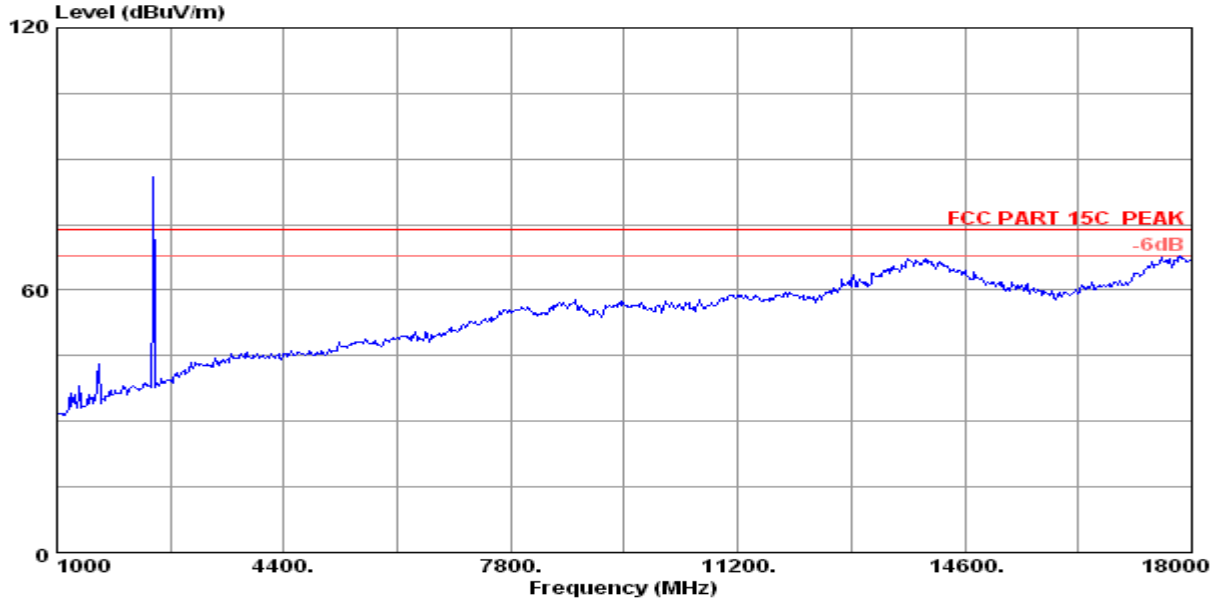
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2402.00	93.14	PK	---	---	1.00	200	91.07	29.44	7.43	36.62
2	4804.00	46.48	PK	54.00	7.52	1.00	157	35.20	34.30	10.62	35.10



ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

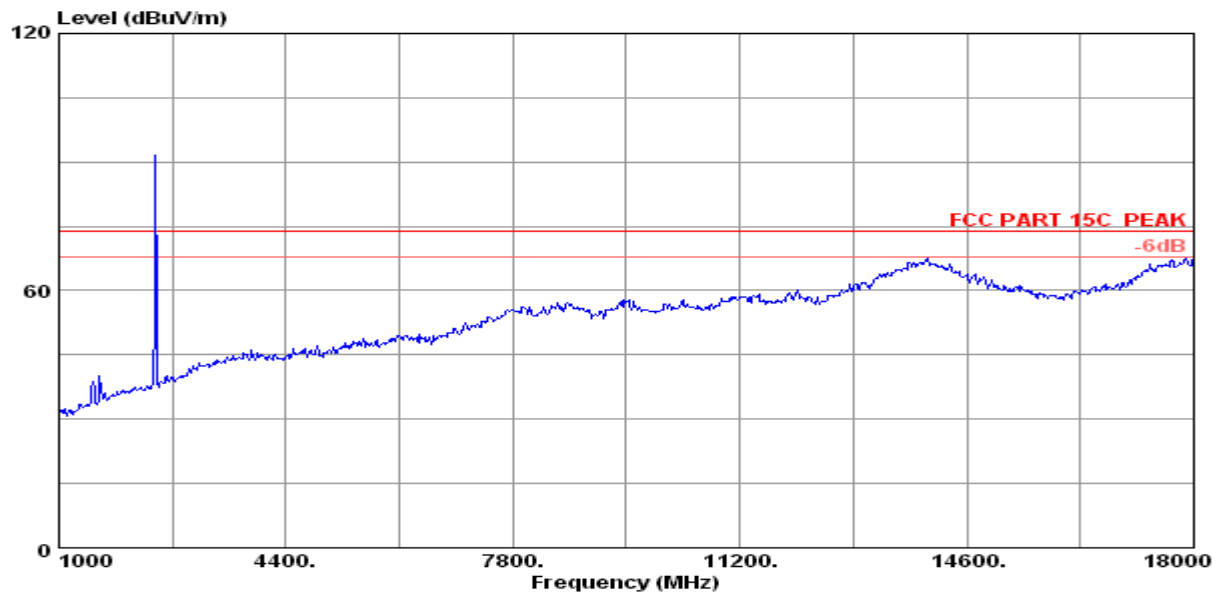
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2402.00	94.03	PK	---	---	1.00	289	92.56	29.44	7.43	36.62
2	4804.00	45.19	PK	54.00	8.81	1.00	136	33.91	34.30	10.62	35.10

EDR (middle channel)



ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

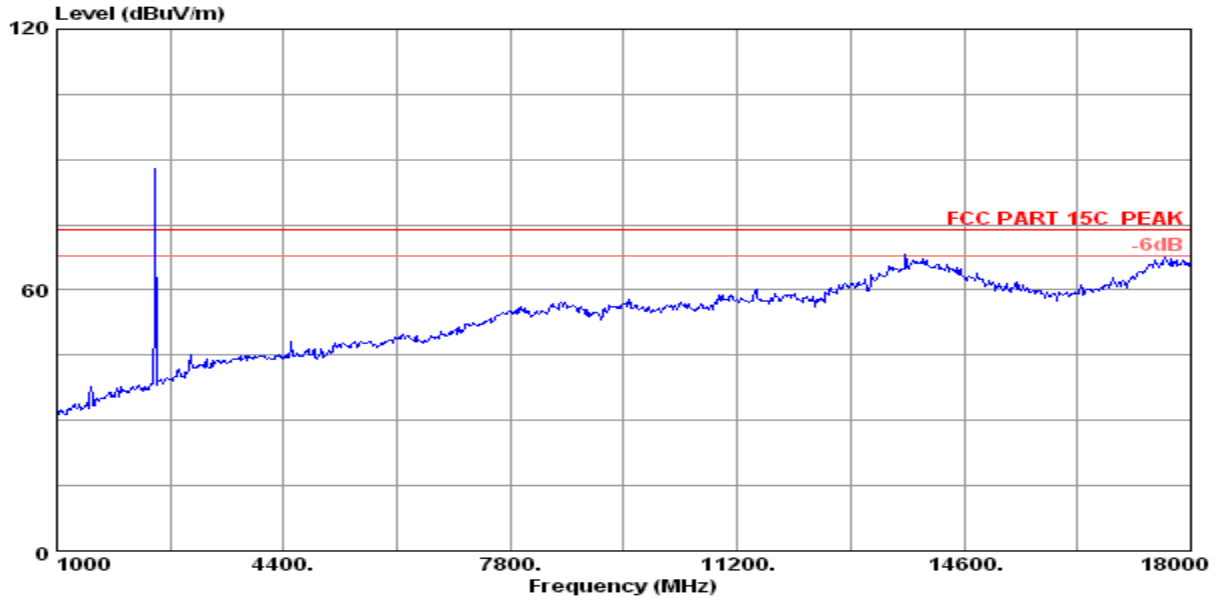
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2441.00	94.99	PK	---	---	1.00	254	92.81	29.47	7.50	36.61
2	4882.00	45.08	PK	54.00	8.92	1.00	177	33.59	34.41	10.71	35.03



ANTENNA POLARITY & TEST DISTANCE: VERTICAL 3 M

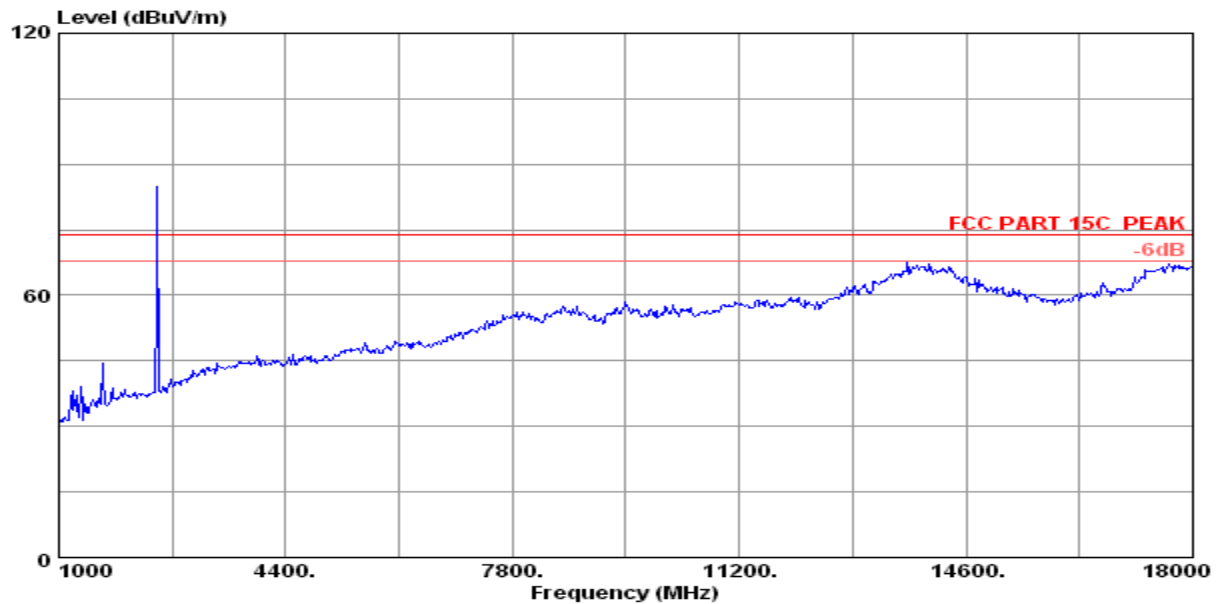
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2441.00	94.74	PK	---	---	1.00	360	92.56	29.47	7.50	36.61
2	4882.00	47.08	PK	54.00	6.92	1.00	360	35.59	34.41	10.71	35.03

EDR (High channel)



ANTENNA POLARITY & TEST DISTANCE: VERTICAL 3 M

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2480.00	93.97	PK	---	---	1.00	94	91.58	29.49	7.58	36.60
2	4960.00	46.55	PK	54.00	7.45	1.00	28	34.85	34.54	10.80	34.95



ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

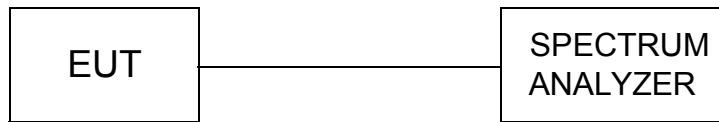
No.	Frequency (MHz)	Emssion Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBUV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)
1	*2480.00	93.31 PK	---	---	1.00	360	90.92	29.49	7.58	36.60
2	4960.00	45.49 PK	54.00	8.51	1.00	313	33.79	34.54	10.80	34.95

REMARKS:

1. Emission level (dBUV/m) = Raw Value (dBUV) + Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. The other emission levels were very low against the limit.
3. Margin value = Limit value - Emission level.
4. The limit value is defined as per 15.247
5. " * " : Fundamental frequency
6. The average measurement was not performed when the peak measured data under the limit of average detection.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

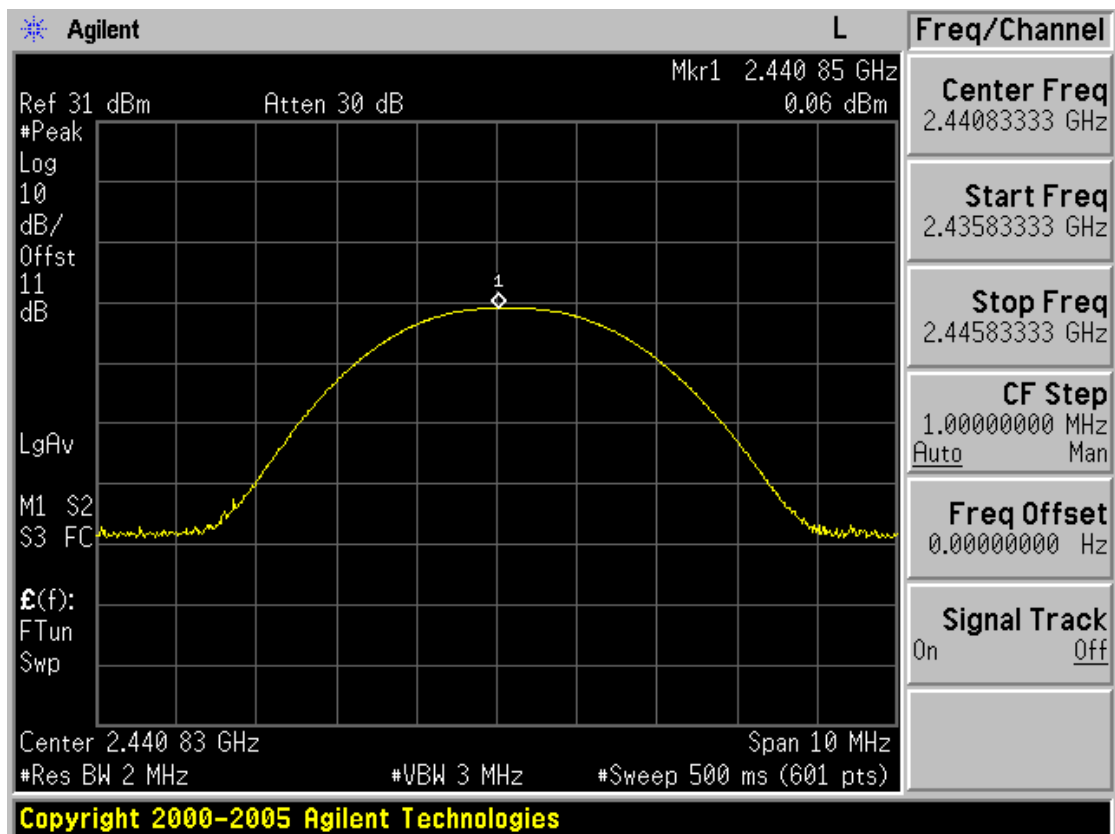
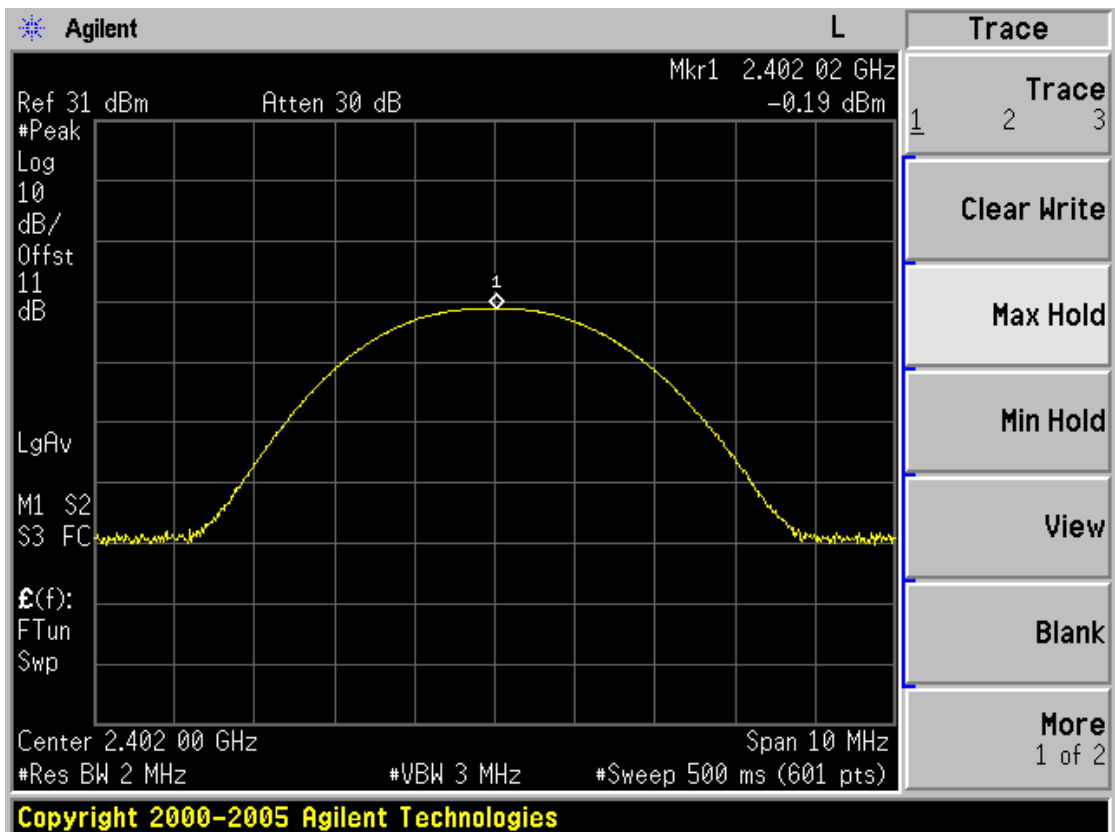
BDR Mode:

Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
2402	0.06	30	PASS
2441	-0.19	30	PASS
2480	-0.34	30	PASS

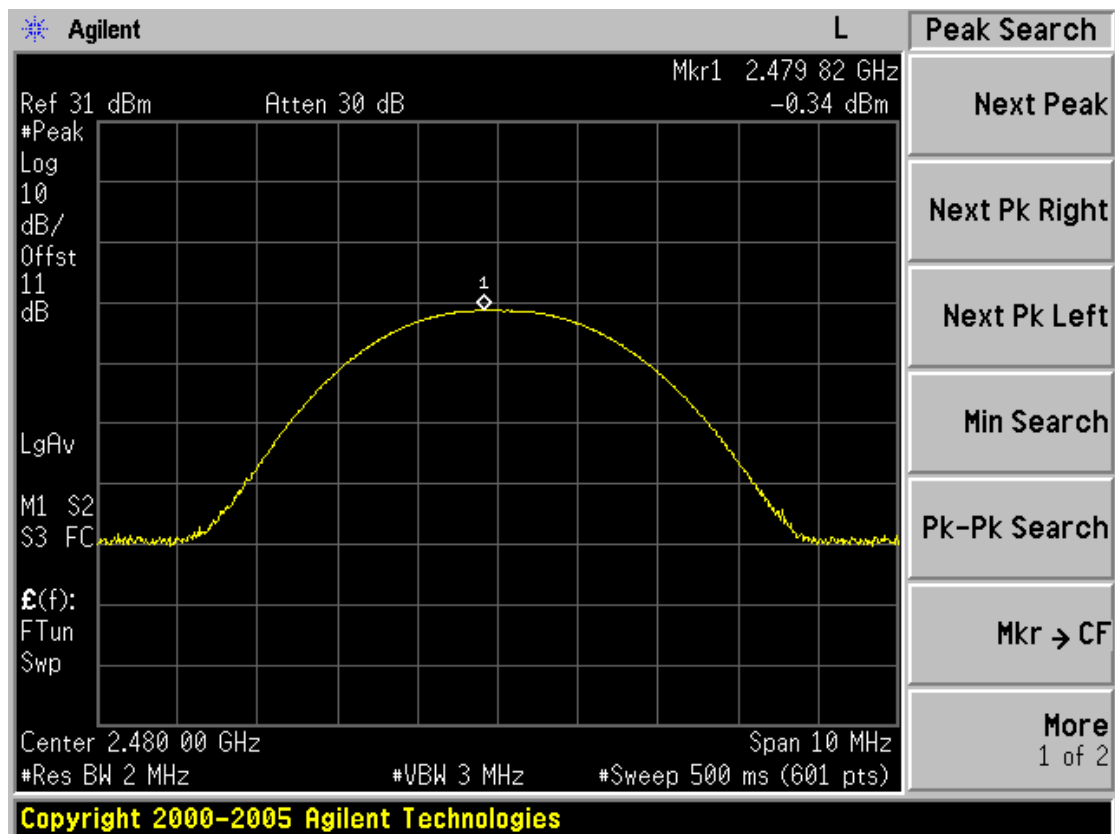
EDR Mode:

Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
2402	-1.66	30	PASS
2441	-1.27	30	PASS
2480	-0.92	30	PASS

Note: The test results including the cable lose.

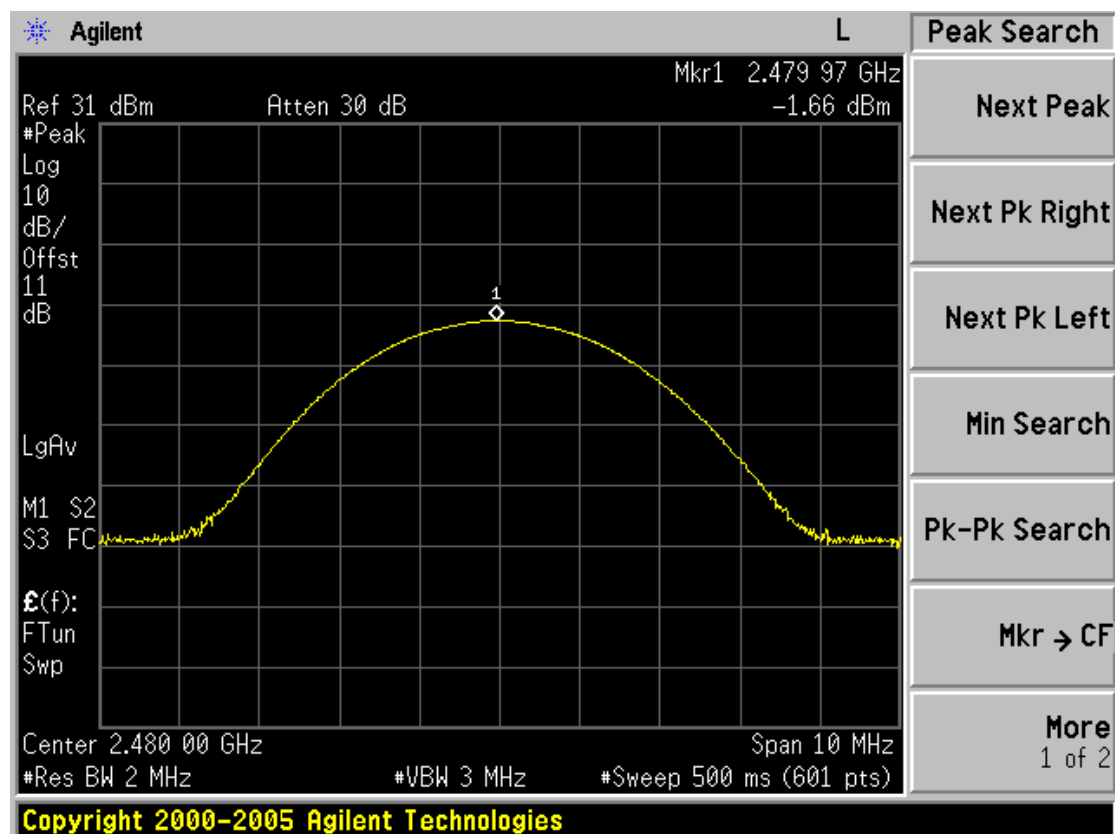
BDR Mode:**Low channel****Middle channel**

High channel

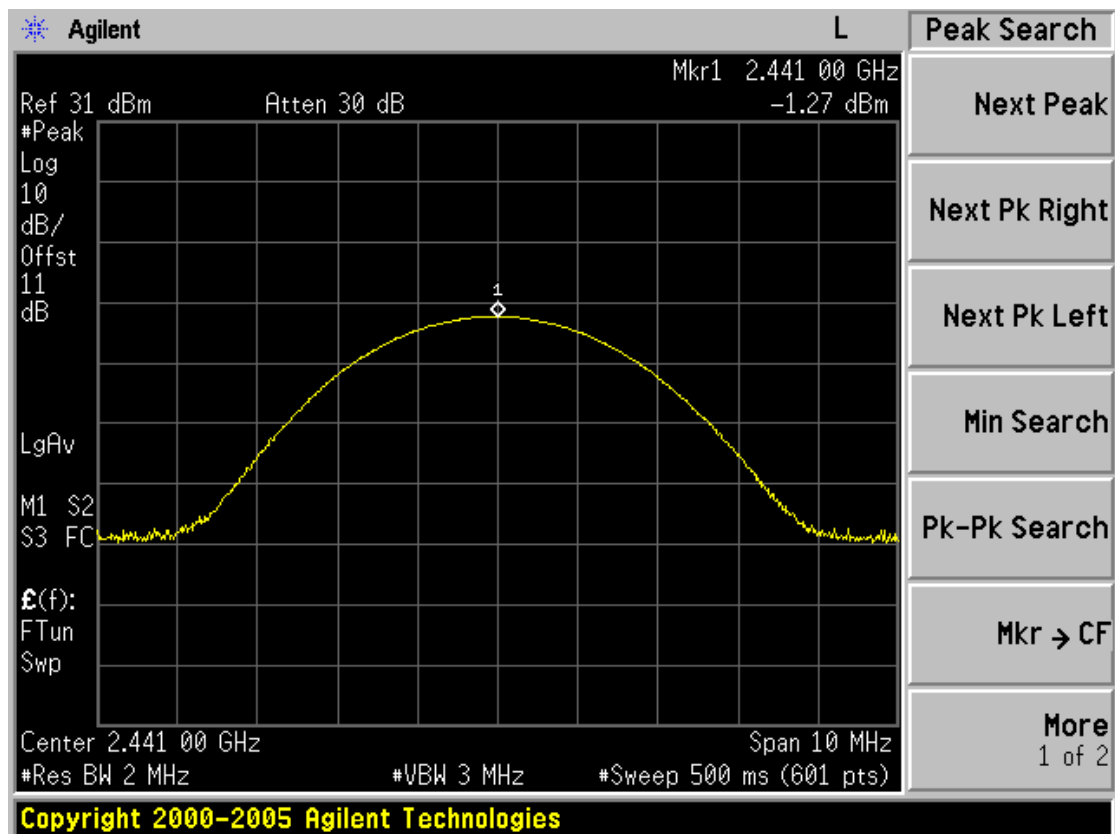


EDR Mode:

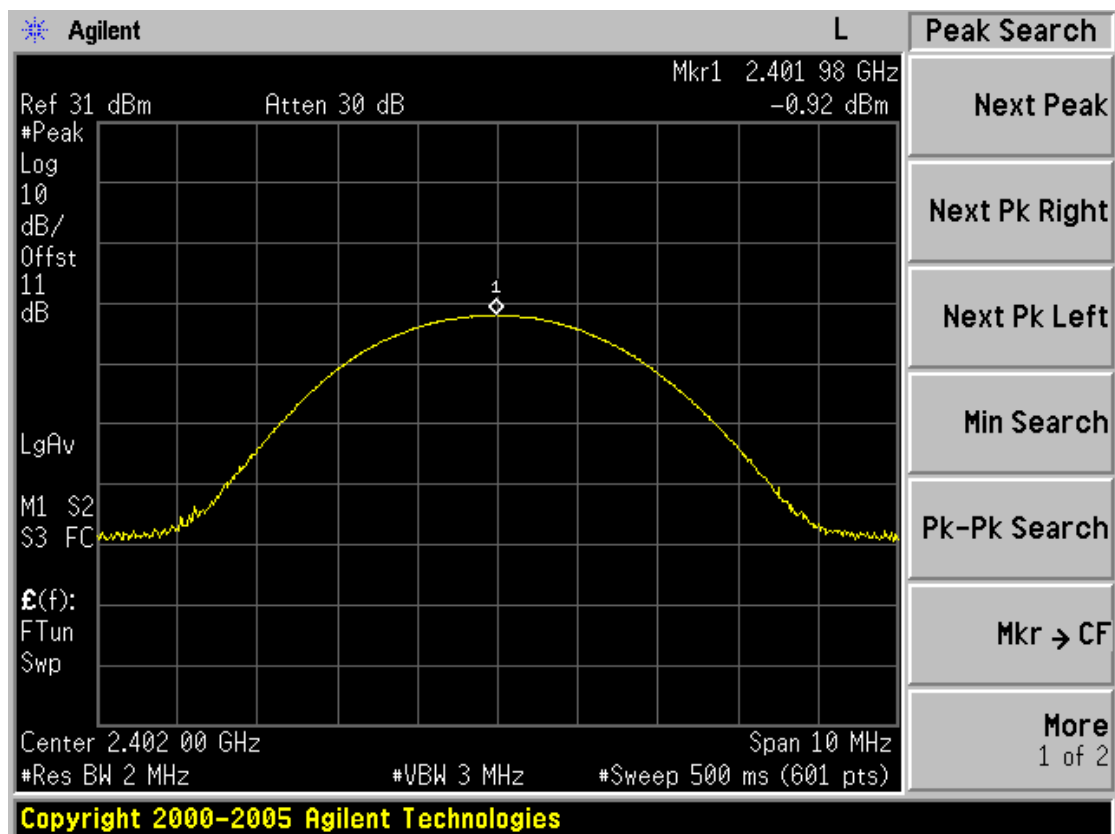
Low channel



Middle channel

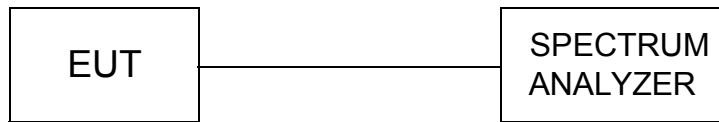


High channel



4.4. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwidth.

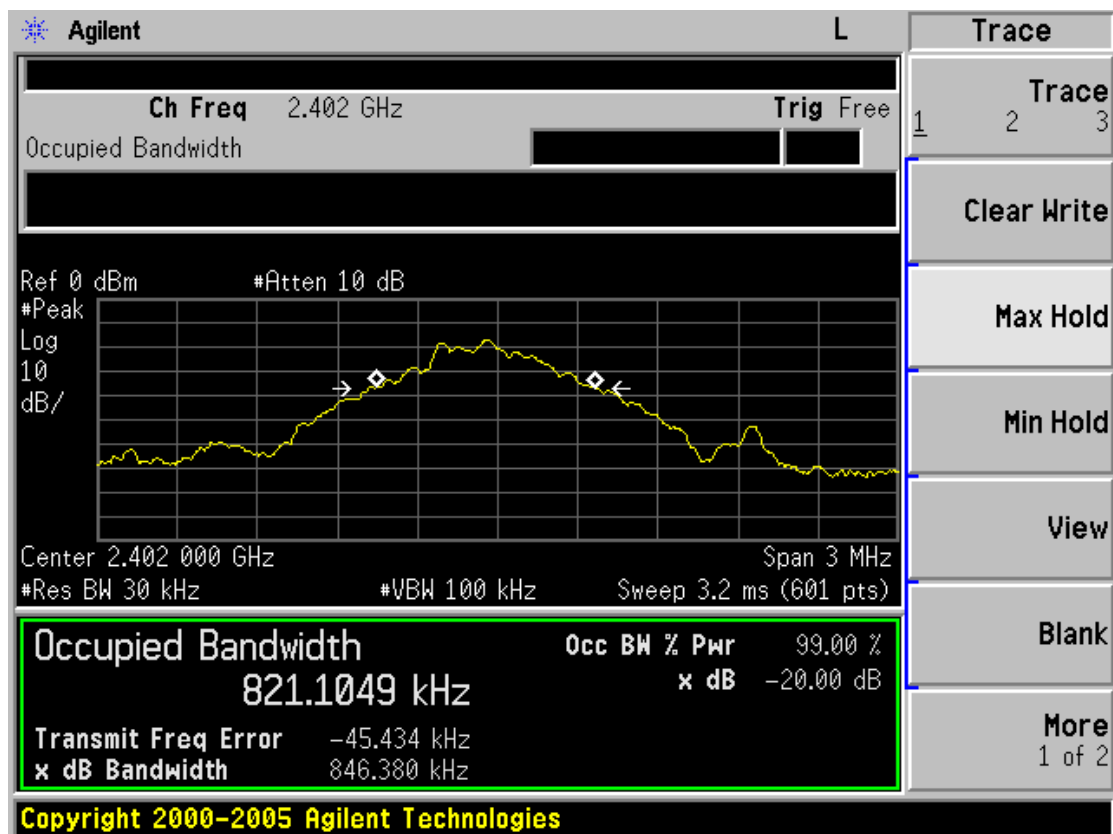
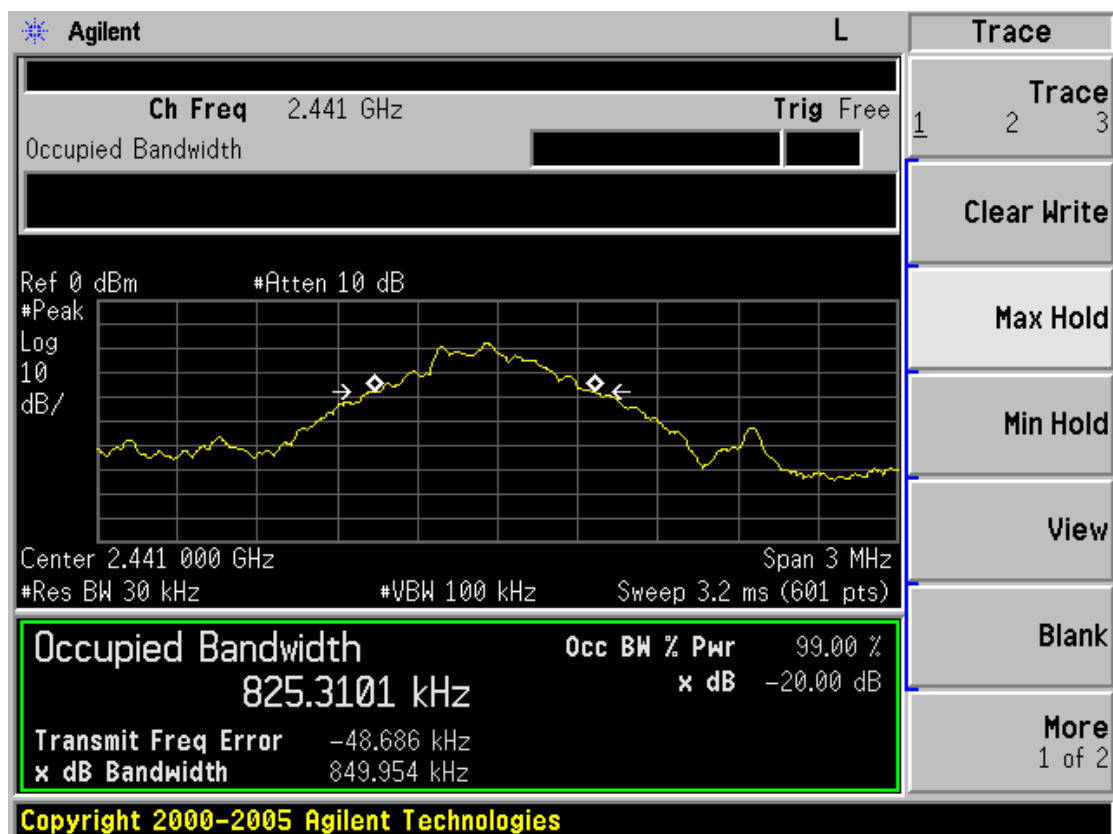
TEST RESULTS

BDR Mode:

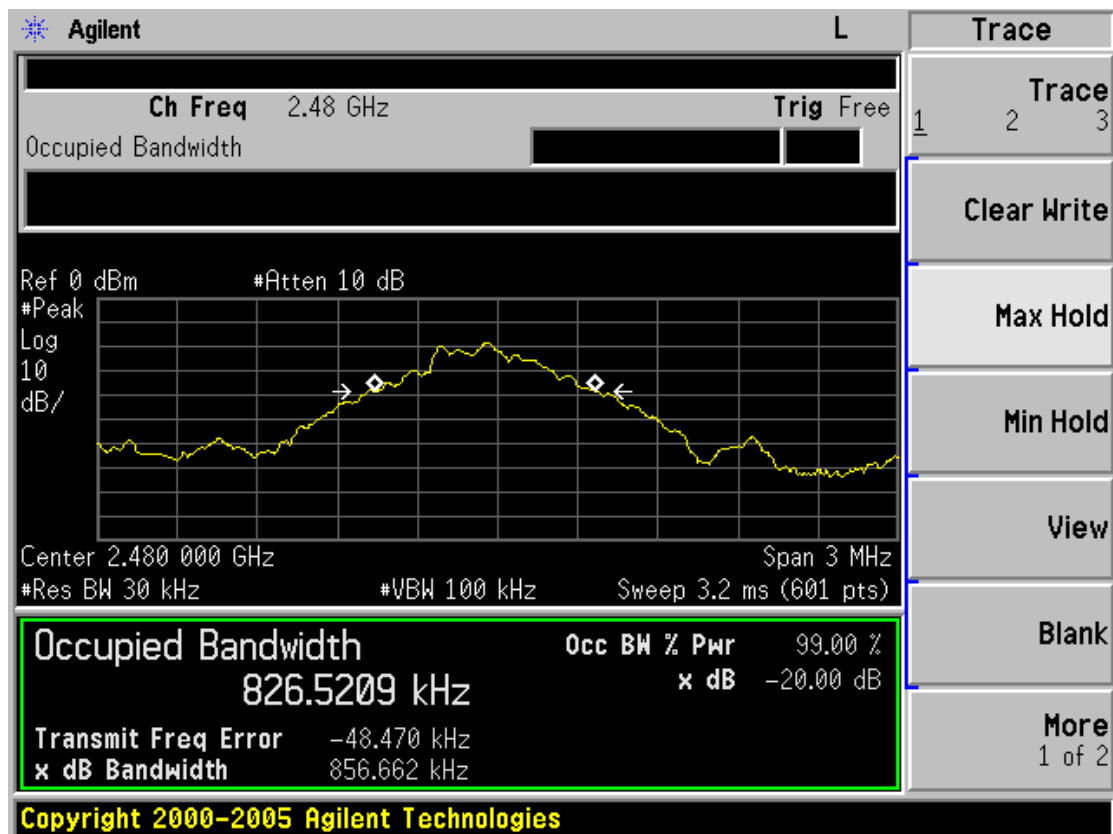
CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	LIMIT (MHz)	PASS/FAIL
2402	0.846	/	PASS
2441	0.850	/	PASS
2480	0.857	/	PASS

EDR Mode:

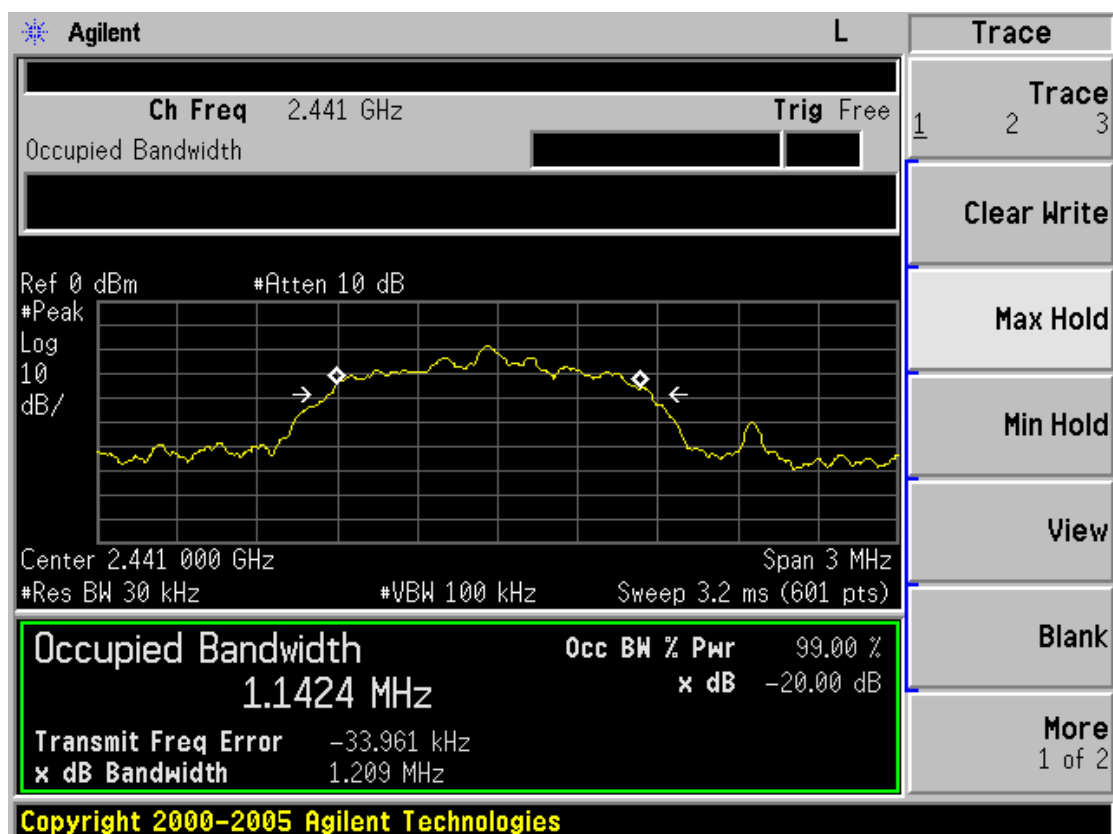
CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	LIMIT (MHz)	PASS/FAIL
2402	1.209	/	PASS
2441	1.202	/	PASS
2480	1.207	/	PASS

Photos of 20dB Bandwidth Measurement(BDR Mode)**Low Channel****Middle Channel**

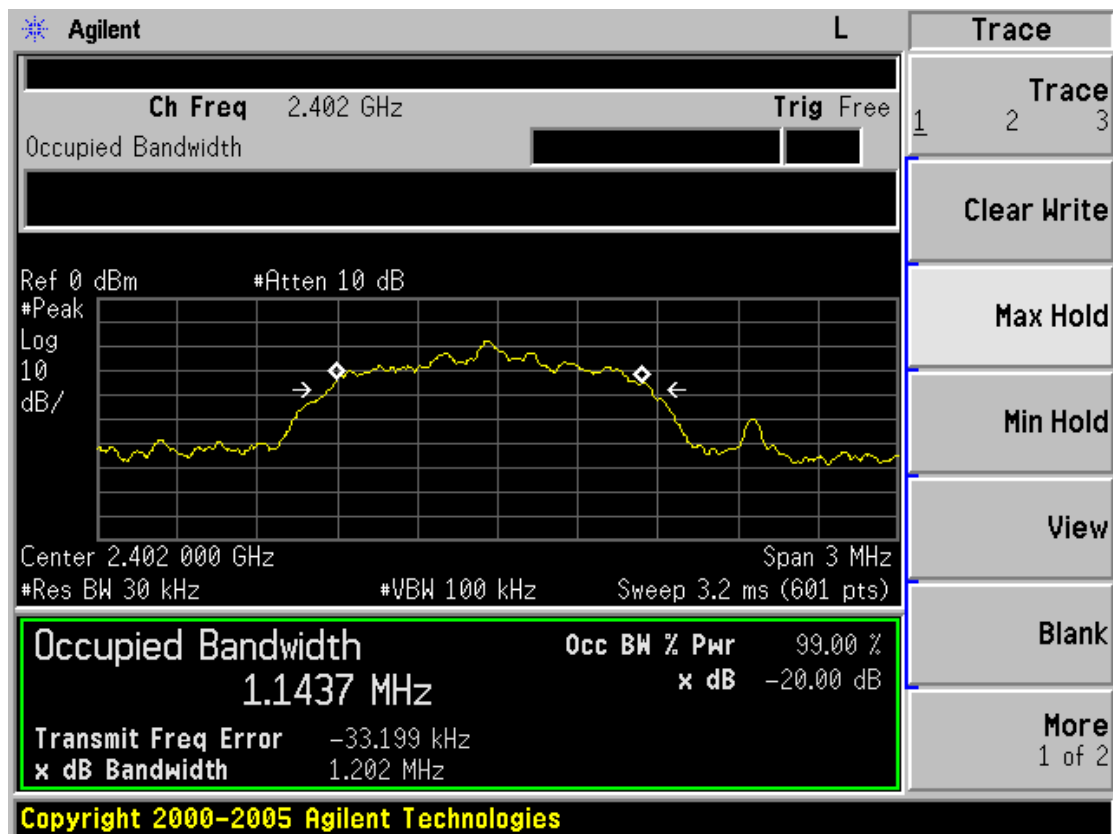
High Channel

Photos of 20dB Bandwidth Measurement(EDR Mode)

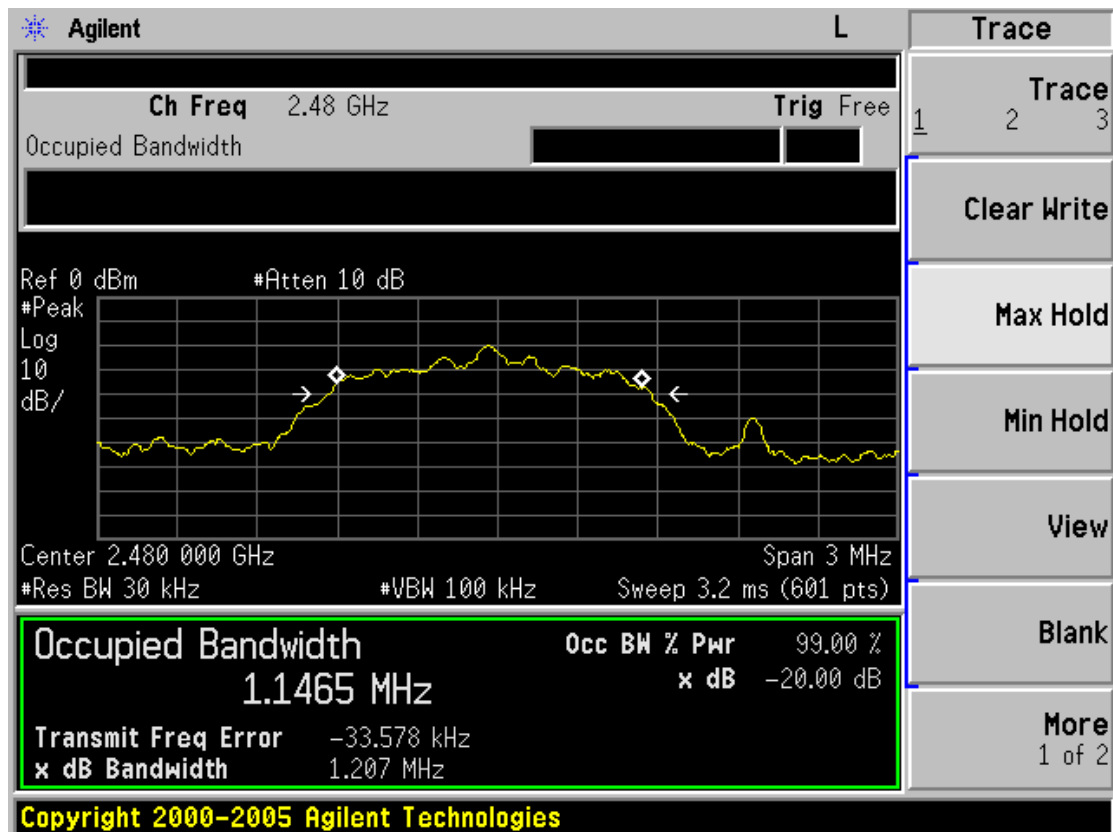
Low Channel



Middle Channel



High Channel



4.5. Band Edge

Applicable Standard

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

TEST RESULTS

Conducted Band Edge Measurement

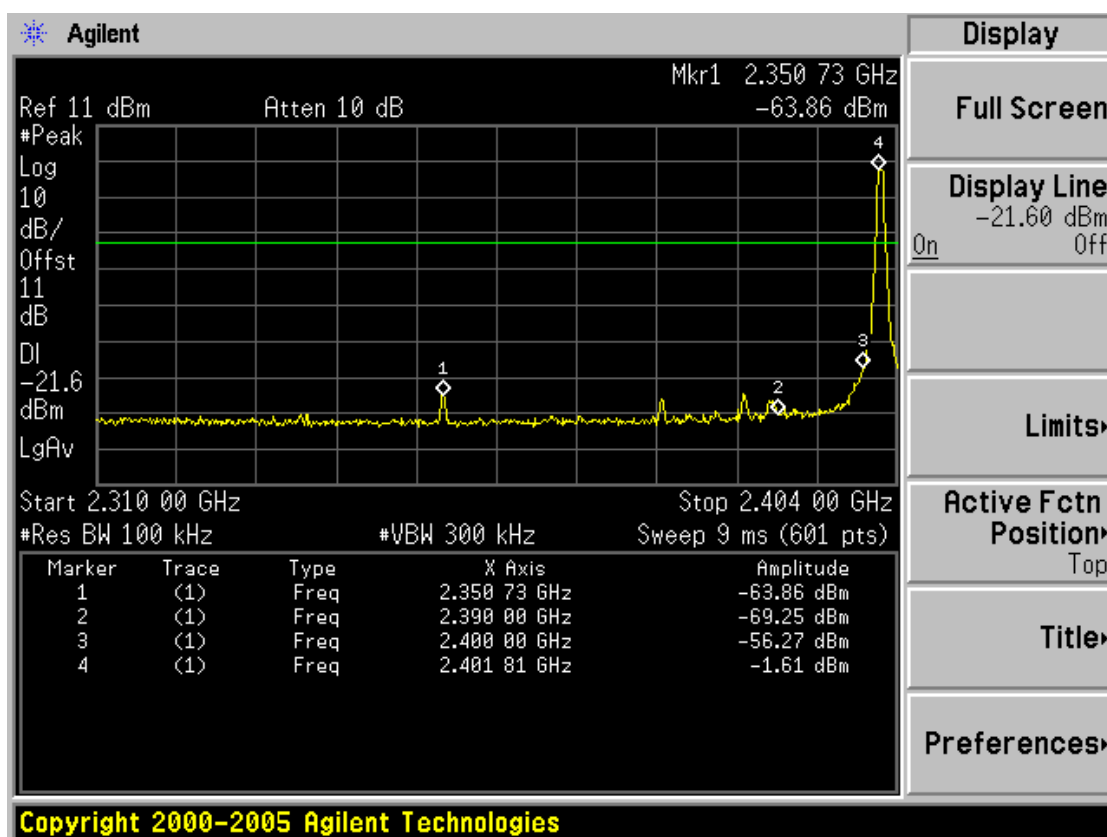
Photos of Band Edge Measurement (BDR Mode)

Frequency	Delta peak to band emission	Limit(dBc)
2400.0MHz	54.66	20
2483.5MHz	61.88	20

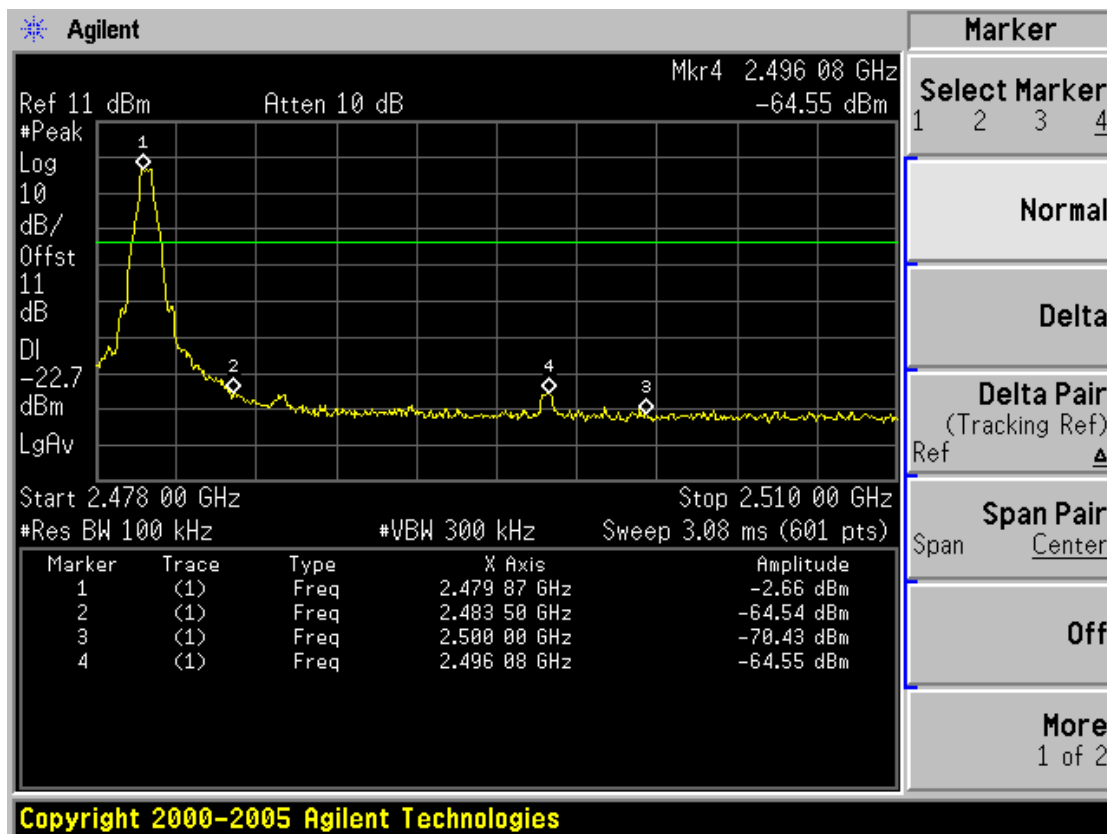
Photos of Band Edge Measurement (EDR Mode)

Frequency	Delta peak to band emission	Limit(dBc)
2400.0MHz	55.44	20
2483.5MHz	61.90	20

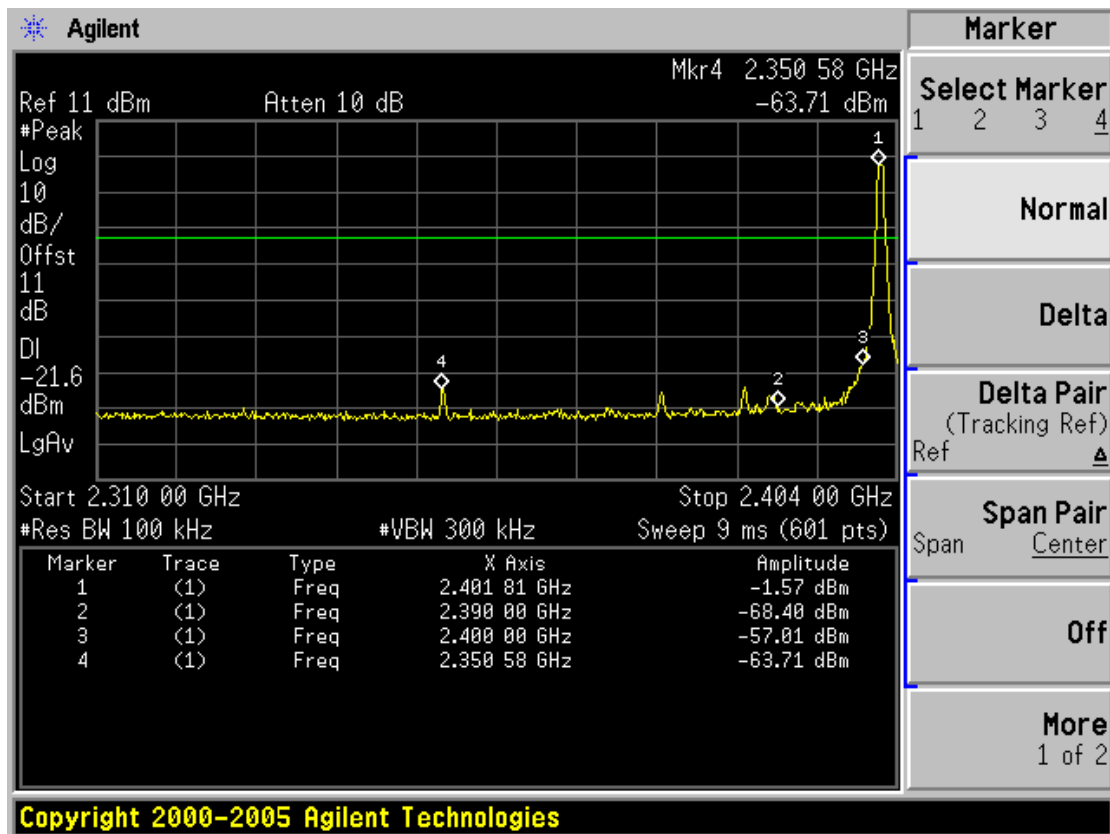
Band Edge: Left Side (BDR)



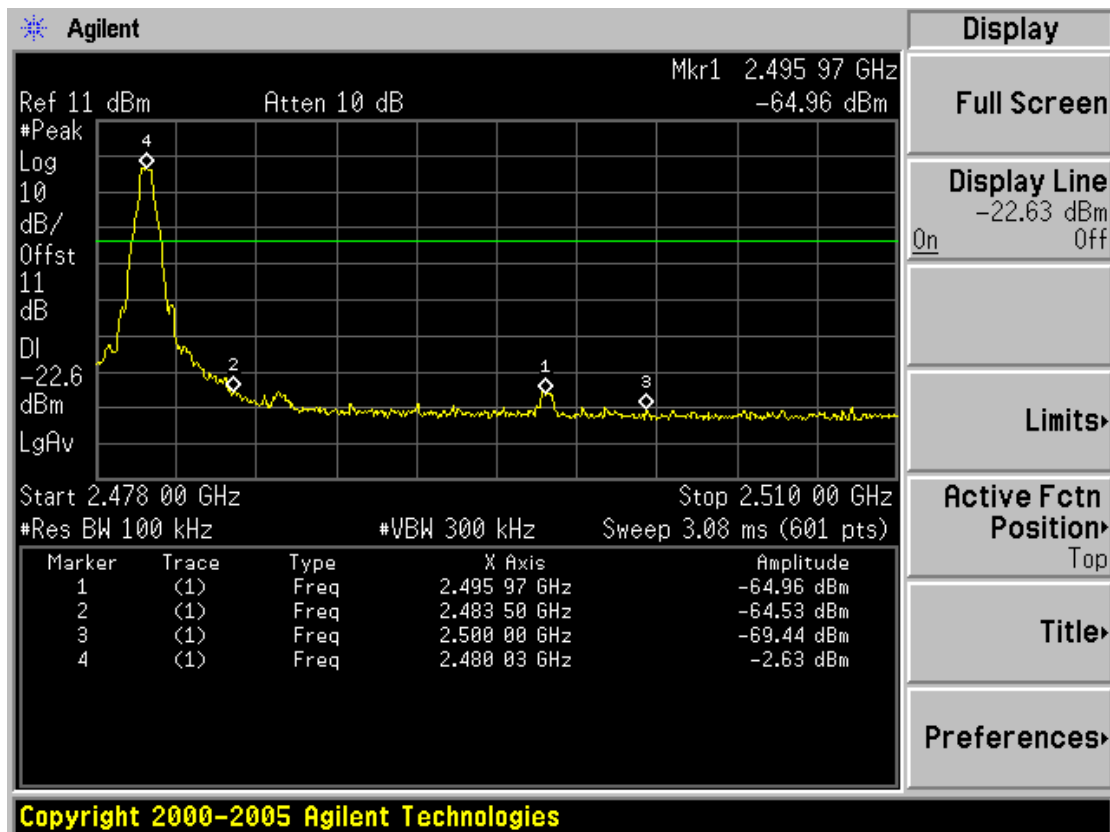
Band Edge: Right Side (BDR)

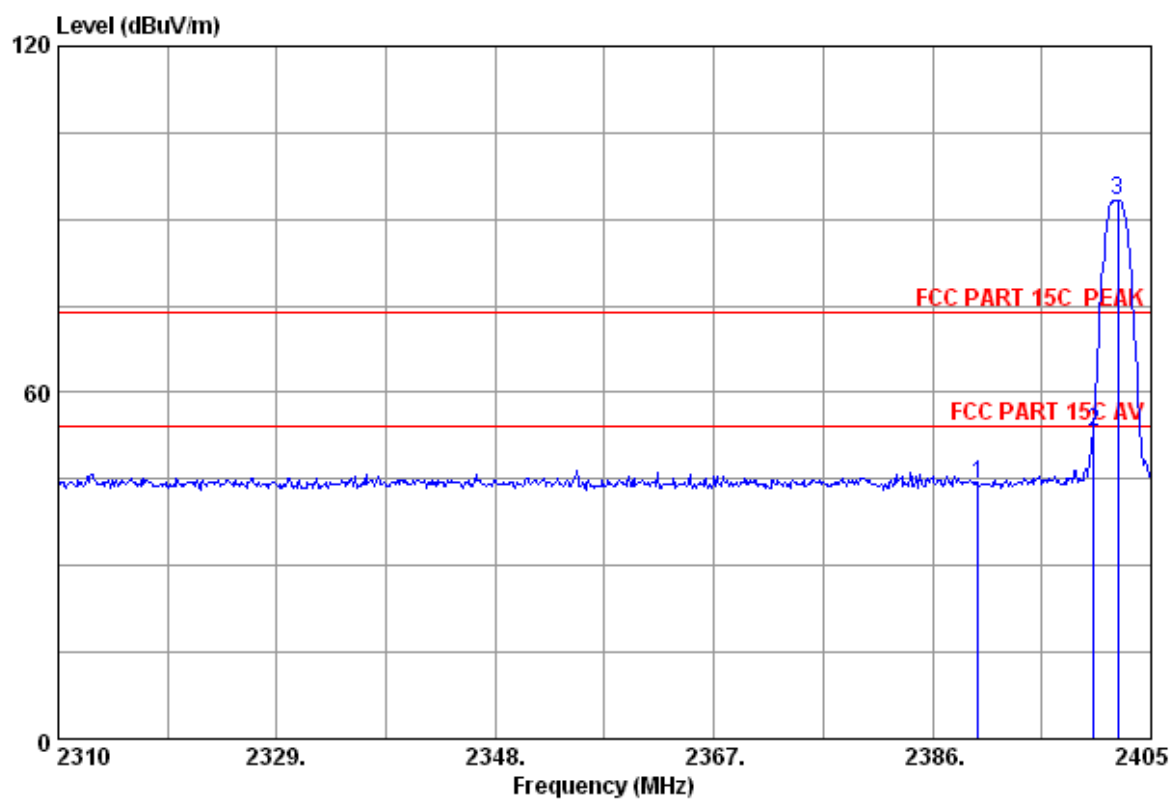


Band Edge: Left Side (EDR)

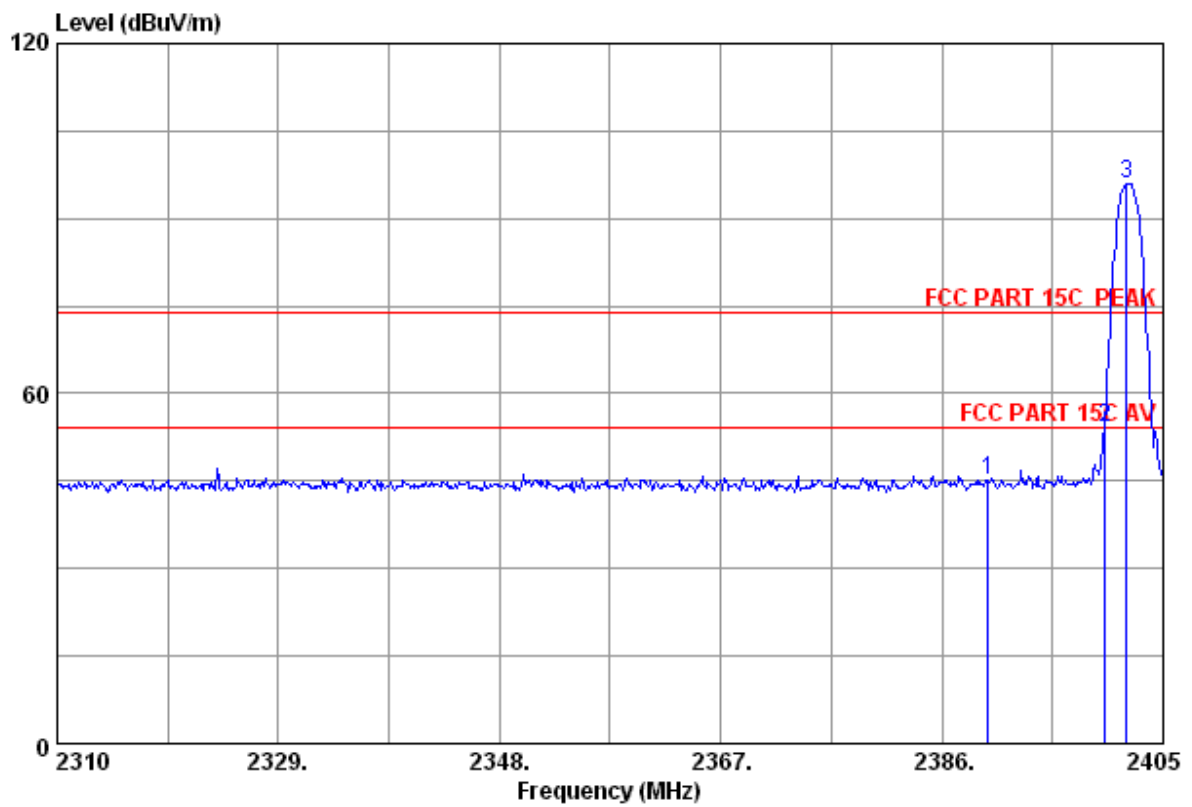


Band Edge: Right Side (EDR)

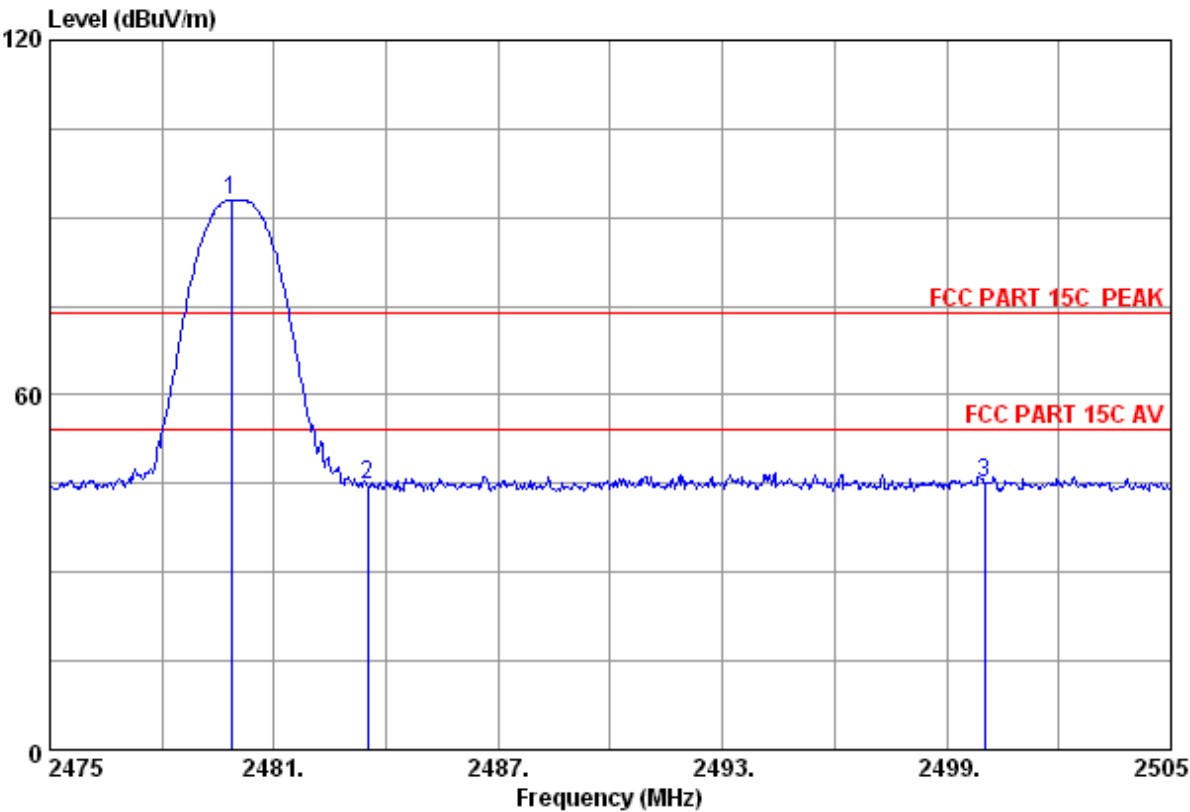


Radiated Band Edge Measurement**Photos of Band Edge Measurement (BDR Mode)**

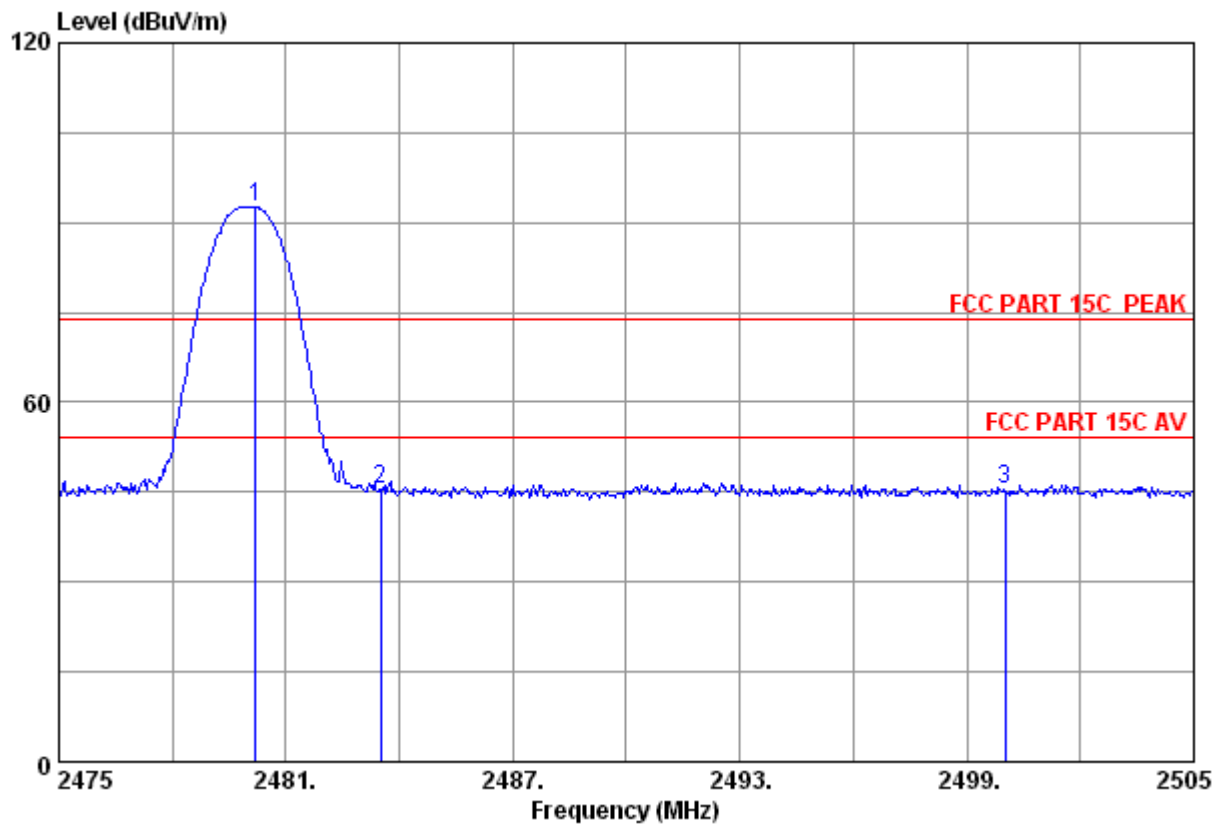
Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
2390.00	44.19	54	9.81	PK	Vertical
2400.00	53.09	54	0.91	PK	Vertical
2402.00	93.39	---	---	PK	Vertical



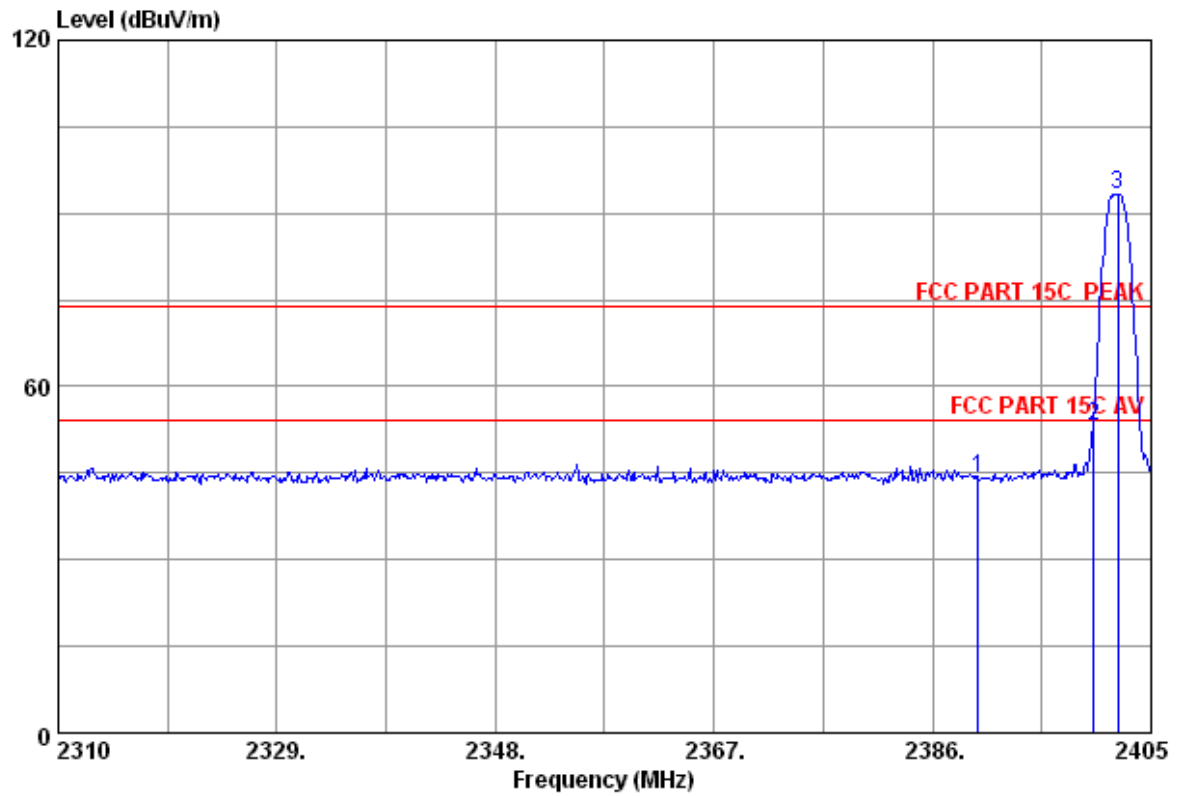
Frequency (MHz)	Corrected Reading (dBUV/m)@3m	FCC Limit (dBUV/m) @3m	Margin (dB)	Detector	Polarization
2390.00	45.02	54	8.98	PK	Horizontal
2400.00	54.16	74	19.84	PK	Horizontal
2400.00	45.32	54	8.68	AV	Horizontal
2402.00	95.86	---	---	PK	Horizontal



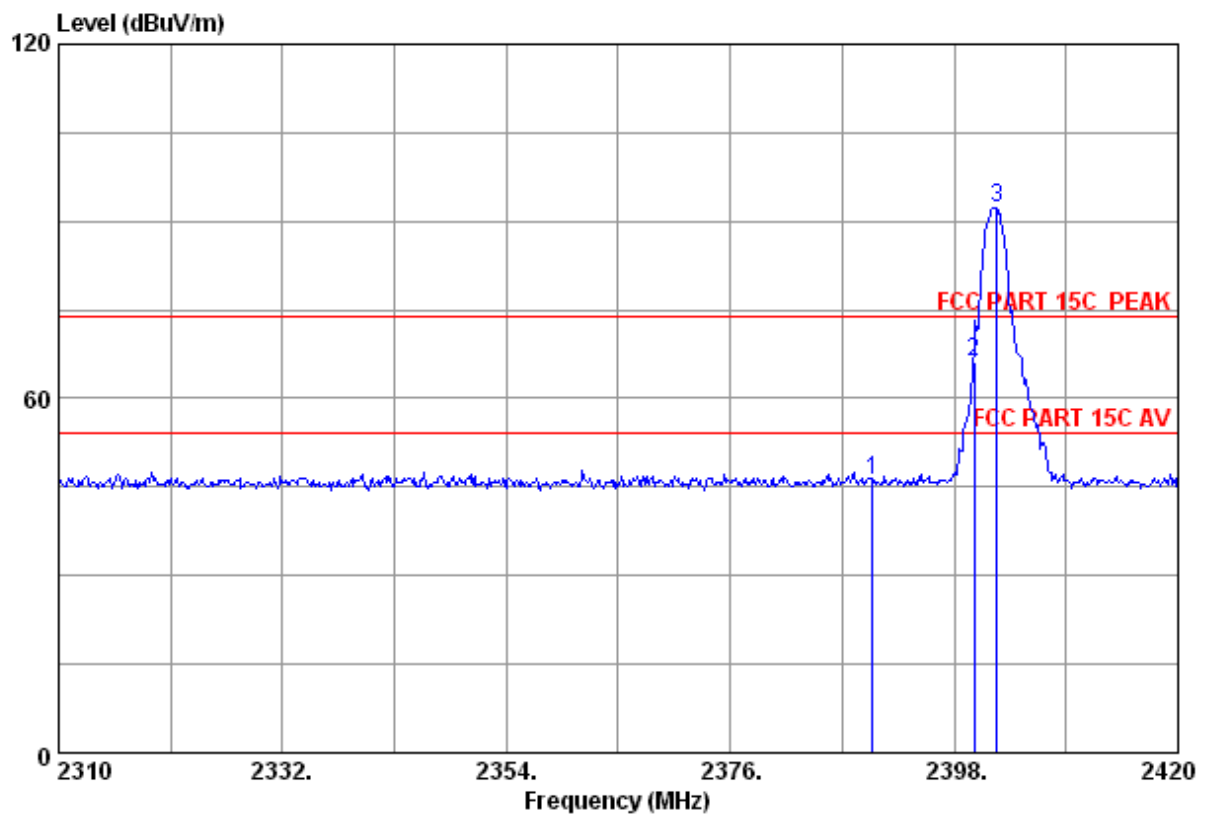
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Polarization
2480.00	93.01	---	---	PK	Horizontal
2483.50	44.68	54	9.32	PK	Horizontal
2500.00	44.99	54	9.01	PK	Horizontal



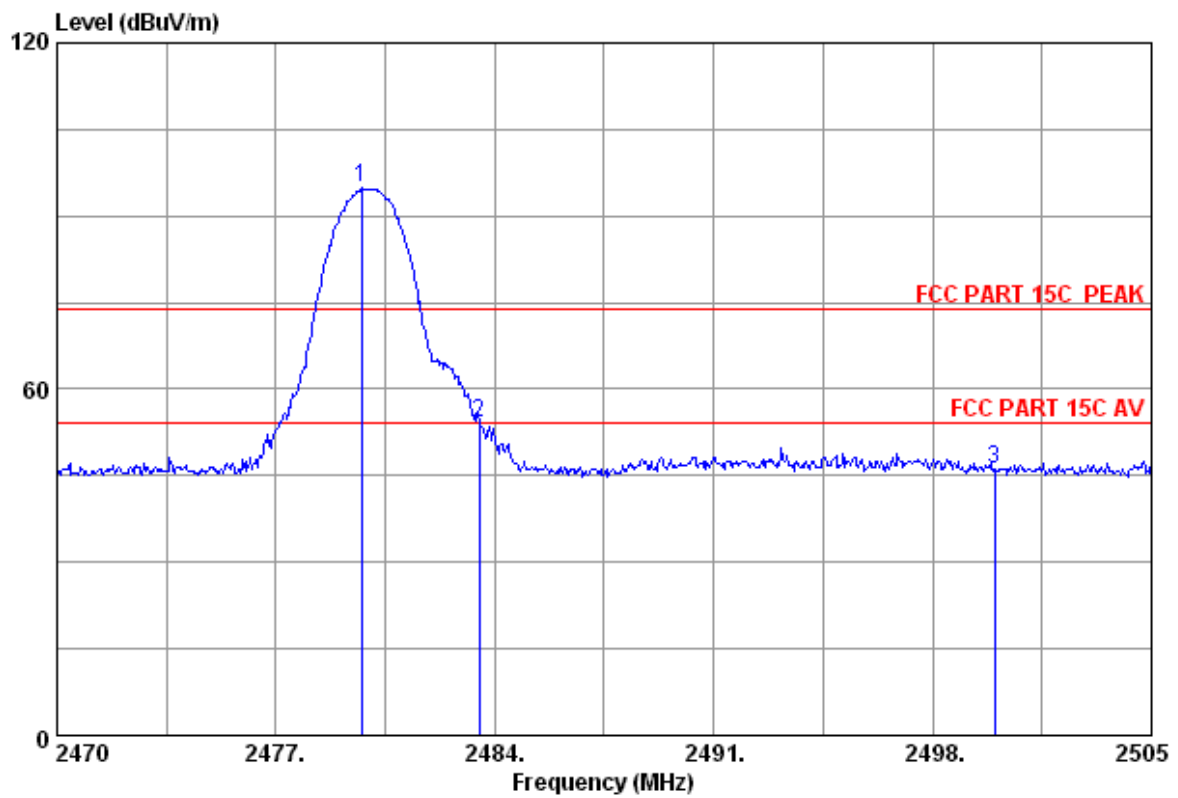
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Polarization
2480.00	92.56	---	---	PK	Vertical
2483.50	45.33	54	8.67	PK	Vertical
2500.00	45.37	54	8.63	PK	Vertical

Photos of Band Edge Measurement (EDR Mode)

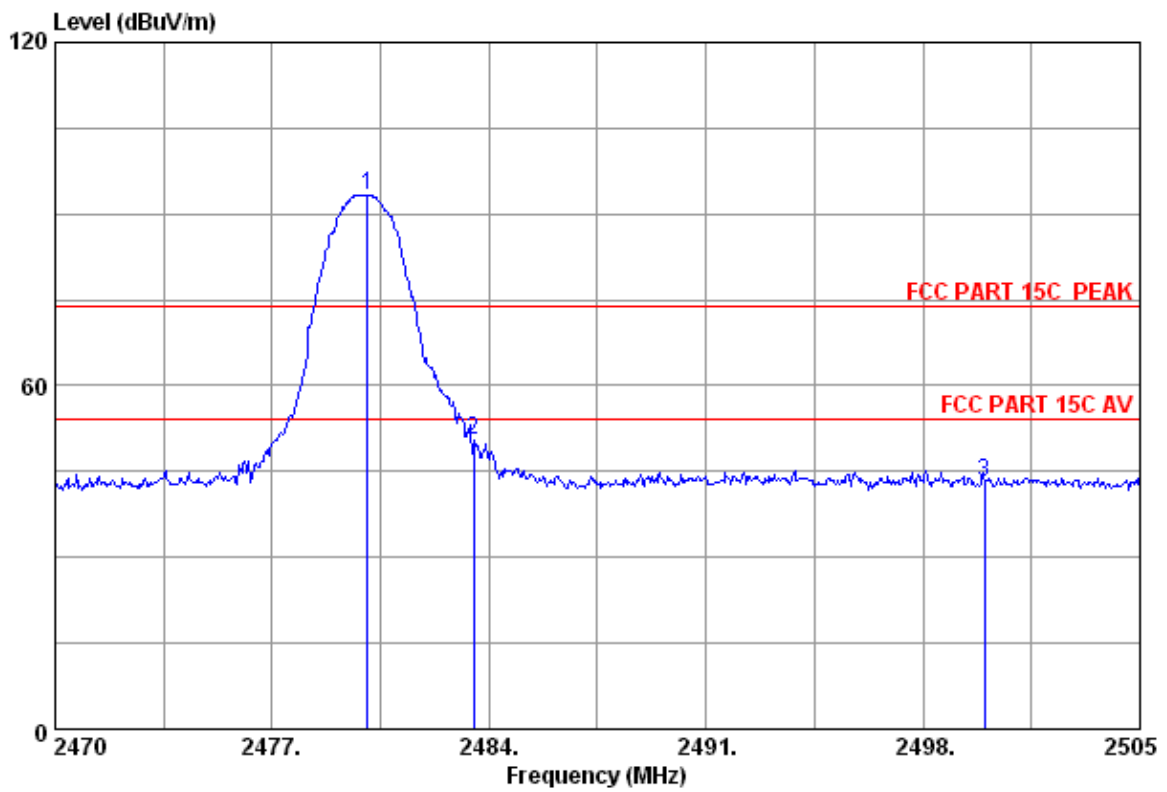
Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
2390.00	44.19	54	9.81	PK	Vertical
2400.00	53.09	54	0.91	PK	Vertical
2402.00	93.39	---	---	PK	Vertical



Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
2390.00	46.27	54	7.73	PK	Horizontal
2400.00	66.26	74	7.74	PK	Horizontal
2400.00	51.00	54	3.00	AV	Horizontal
2402.00	92.30	---	---	PK	Horizontal



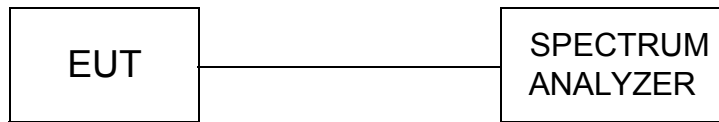
Frequency (MHz)	Corrected Reading (dBUV/m)@3m	FCC Limit (dBUV/m) @3m	Margin (dB)	Detector	Polarization
2480.00	94.81	---	---	PK	Horizontal
2483.50	54.06	74	19.94	PK	Horizontal
2483.50	44.98	54	9.02	AV	Horizontal
2500.00	46.28	54	7.72	PK	Horizontal



Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
2480.00	93.39	---	---	PK	Vertical
2483.50	50.39	54	3.61	PK	Vertical
2500.00	43.20	54	10.80	PK	Vertical

4.6. Frequency Separation

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100KHz VBW.

LIMIT

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the $2/3 \times 20\text{dB}$ bandwidth of the hopping channel, whichever is greater.

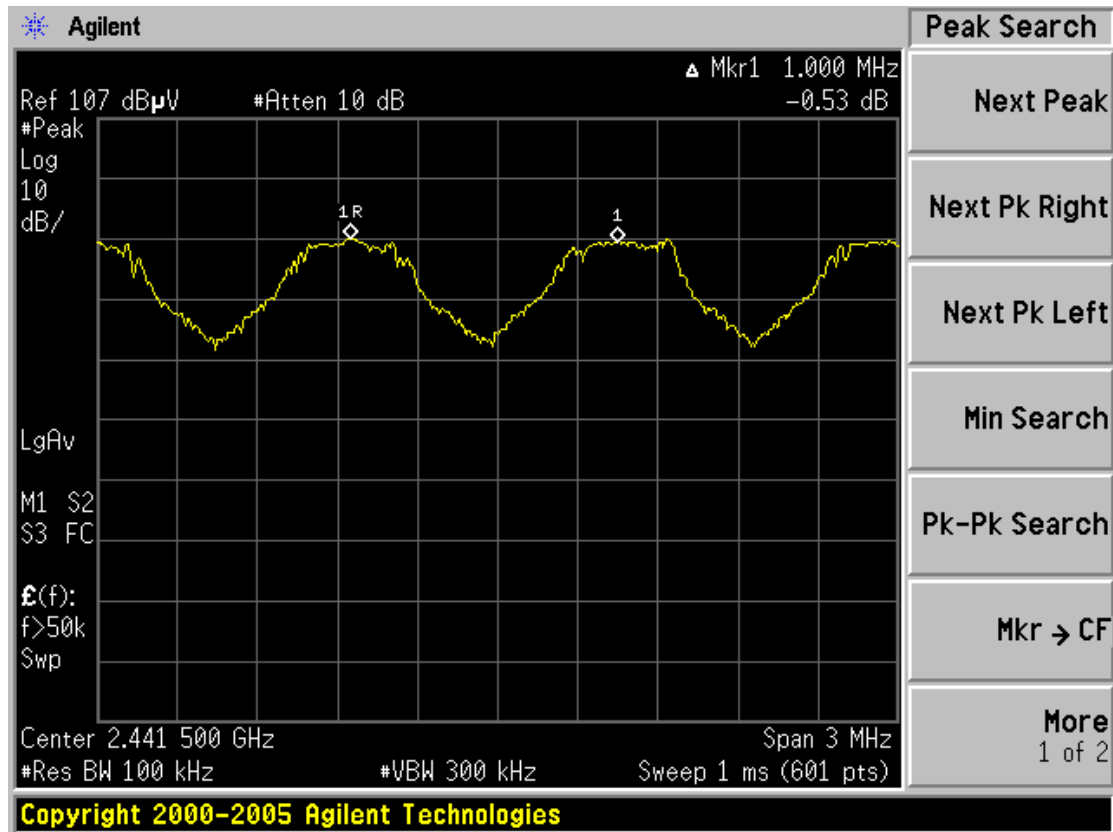
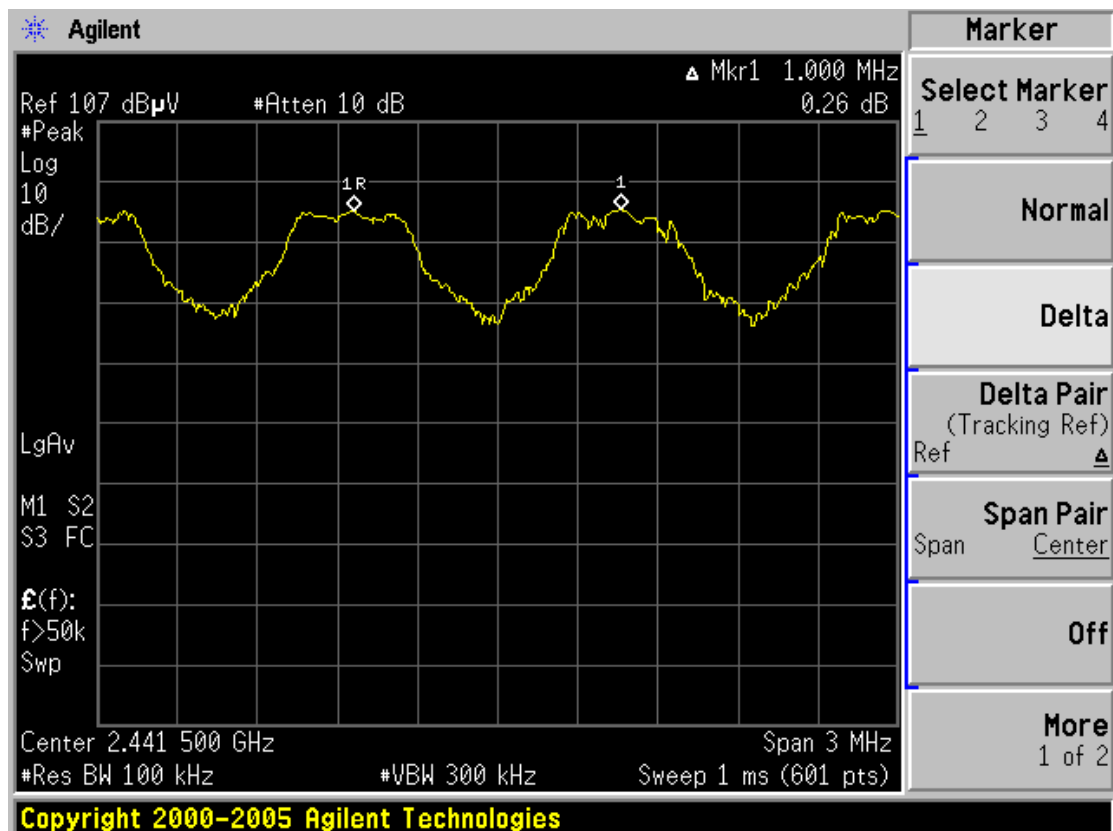
TEST RESULTS

BDR Mode:

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Mid Channel	2441	1.000	25KHz or $2/3 \times 20\text{dB}$ bandwidth(0.568MHz)	Pass
Adjacency Channel	2440			

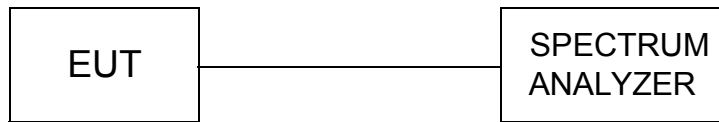
EDR Mode:

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Mid Channel	2441	1.000	25KHz or $2/3 \times 20\text{dB}$ bandwidth(0.819MHz)	Pass
Adjacency Channel	2440			

Photos of Frequency separation Measurement(BDR Mode)**Photos of Frequency separation Measurement(EDR Mode)**

4.7. Number of hopping frequency

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set spectrum analyzer start 2400MHz to 2483.5MHz with 30 KHz RBW and 100KHz VBW.

LIMIT

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

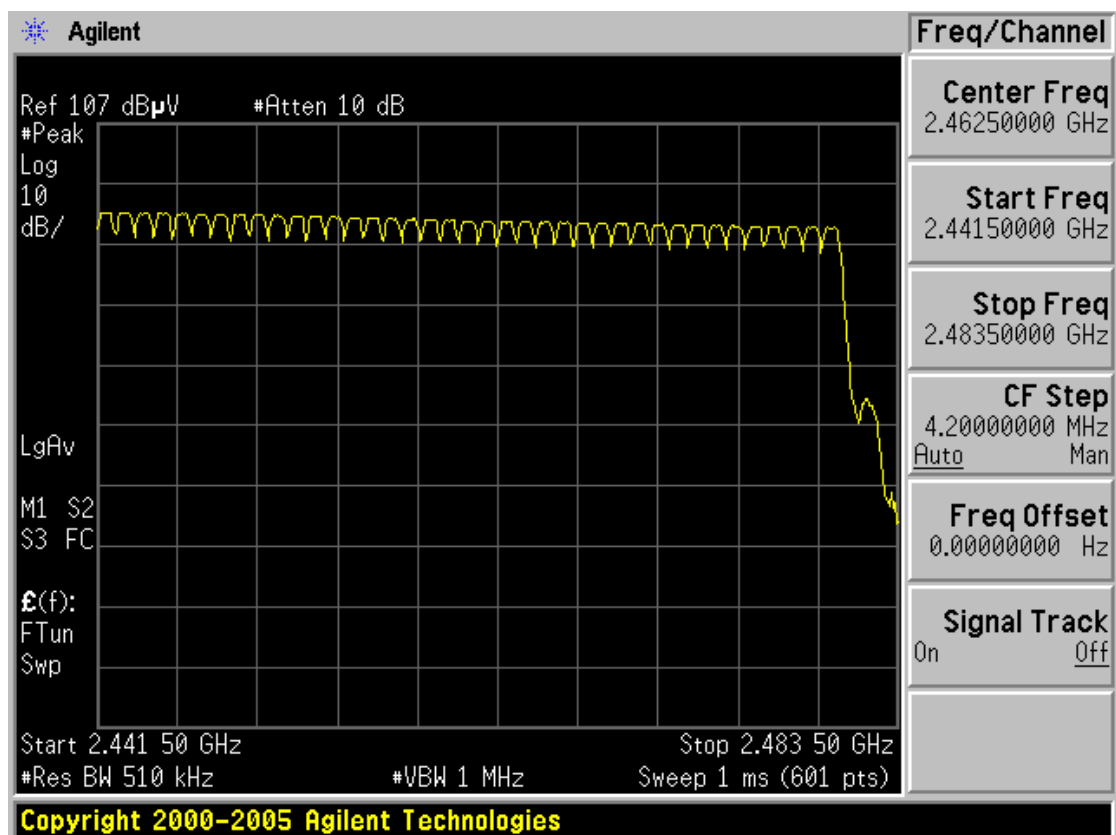
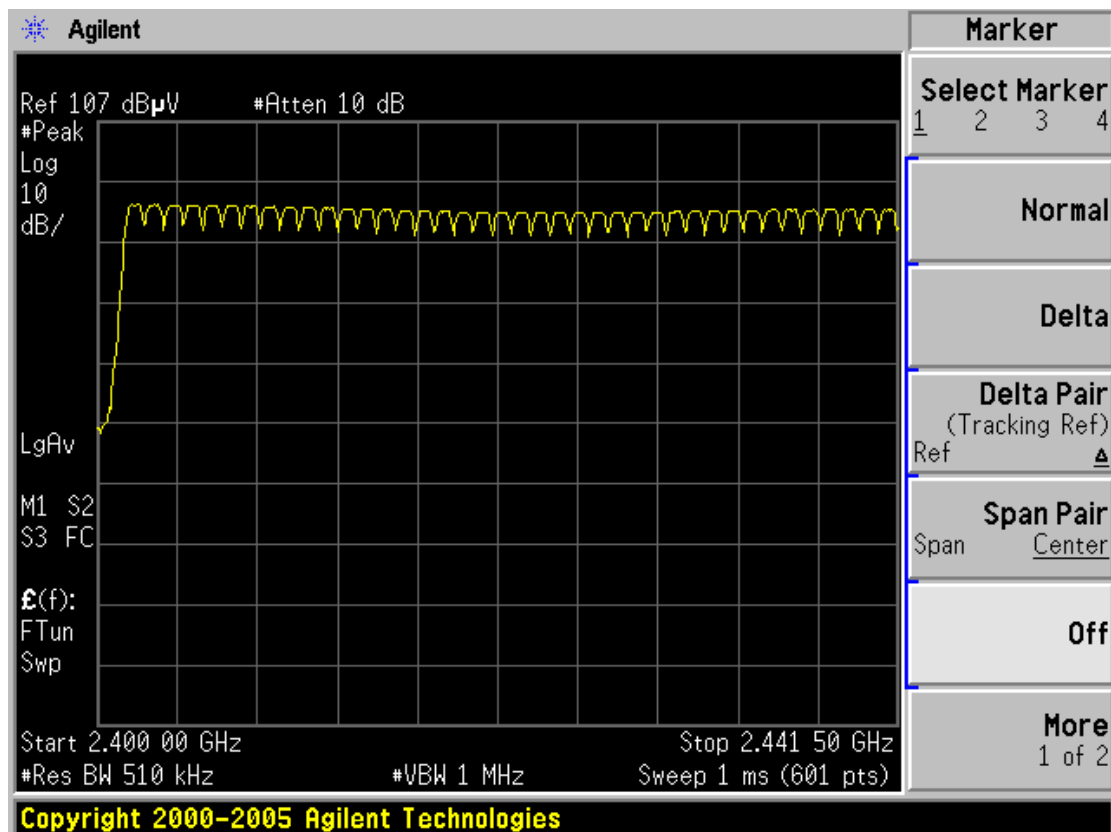
TEST RESULTS

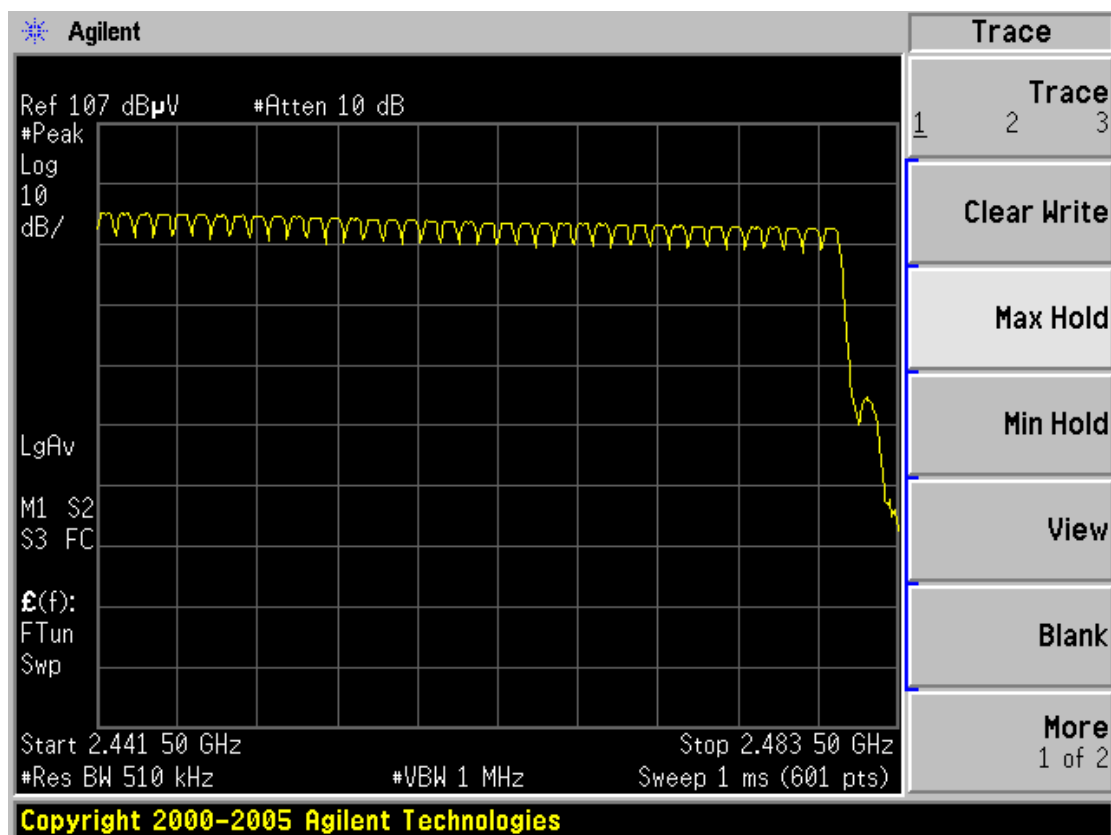
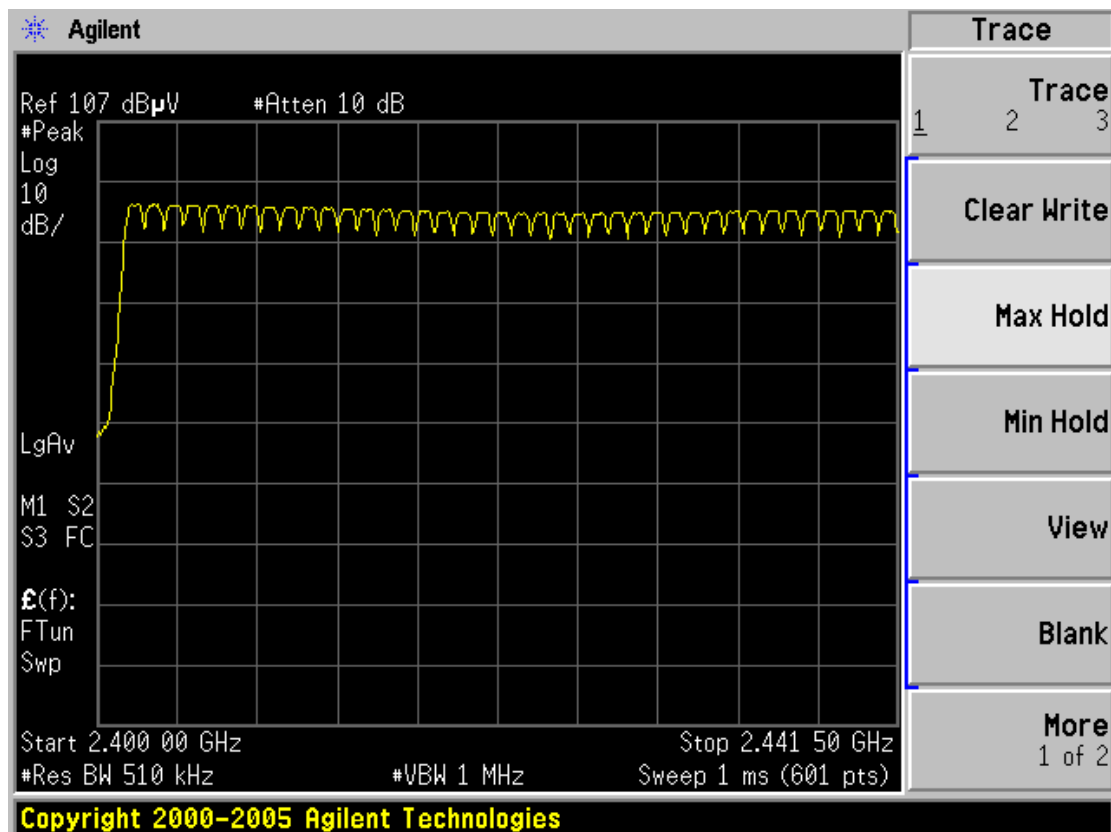
BDR Mode:

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

EDR Mode:

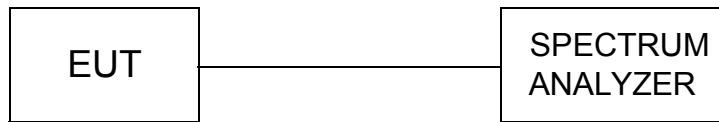
Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

Photos of Number of hopping channel Measurement(BDR Mode)

Photos of Number of hopping channel Measurement(EDR Mode)

4.8. Time Of Occupancy(Dwell Time)

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 3MHz VBW, Span 0Hz.

LIMIT

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

TEST RESULTS

BDR Mode:

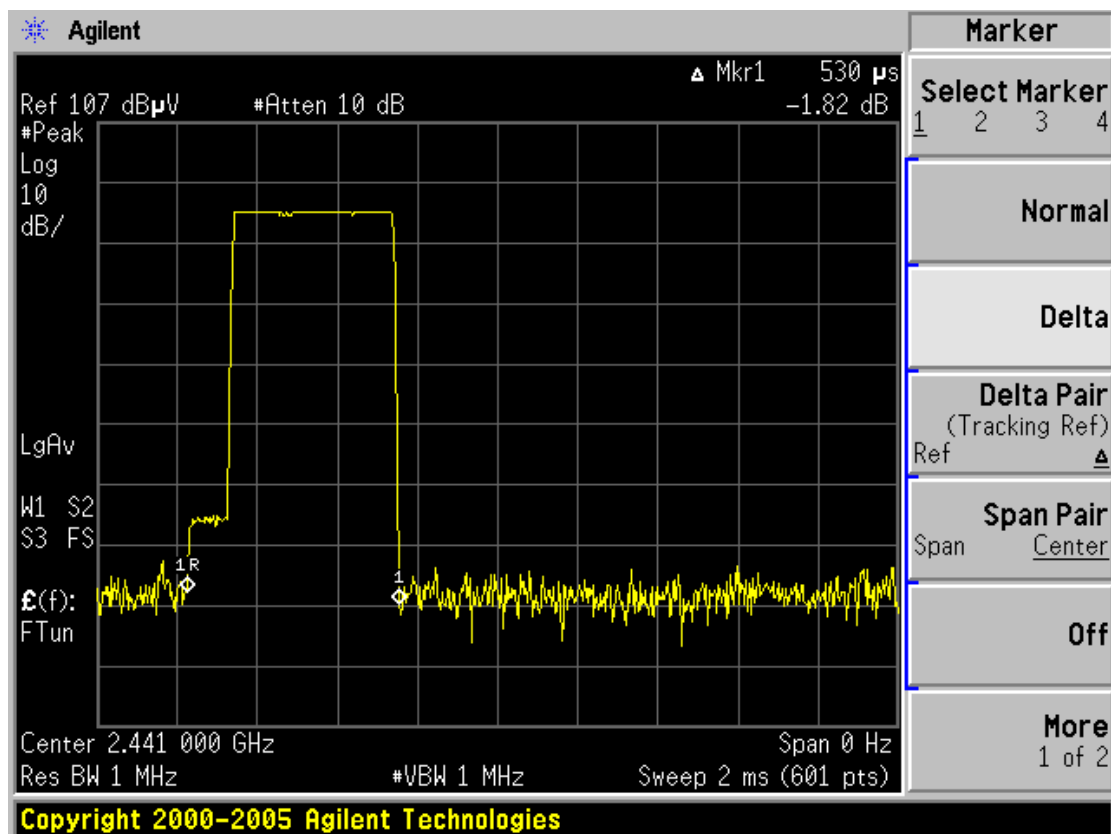
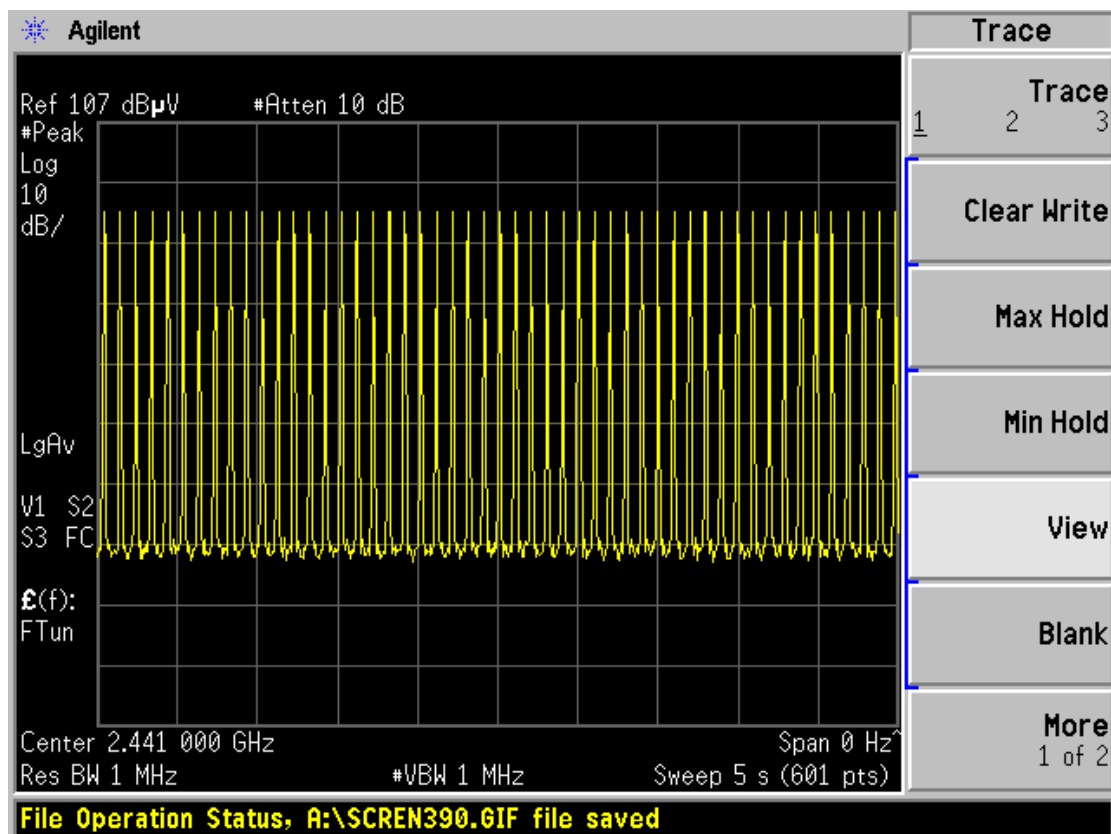
Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Middle	0.530	0.1696	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Middle	1.792	0.2867	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Middle	2.950	0.3179	0.3145	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

EDR Mode:

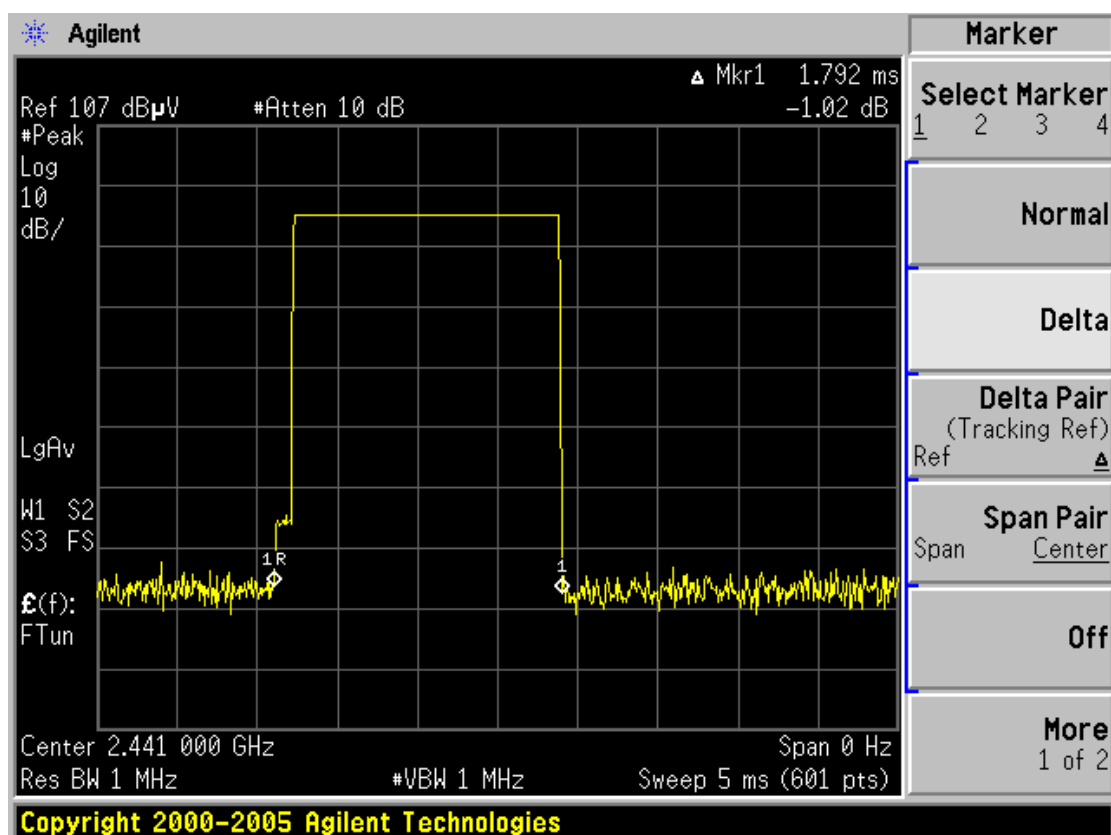
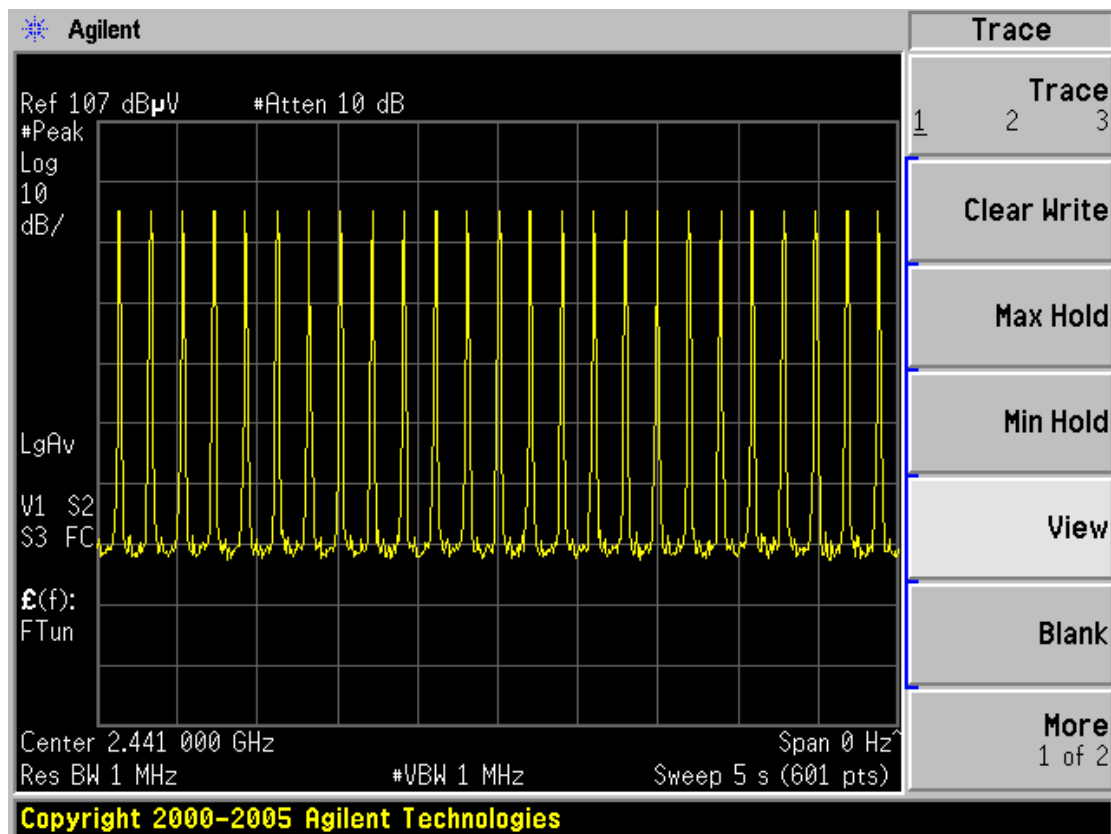
Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Middle	0.440	0.1408	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Middle	1.700	0.2720	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Middle	3.050	0.3253	0.4	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

Photos of Dwell time Measurement(BDR)

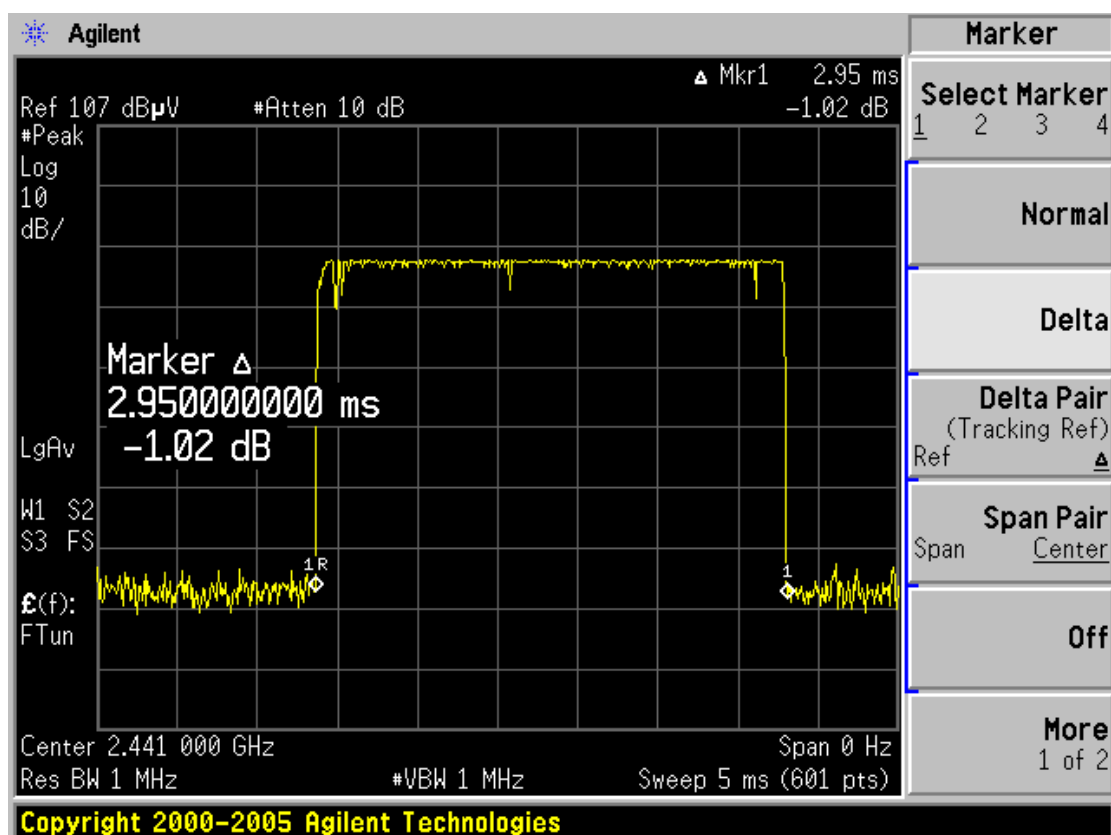
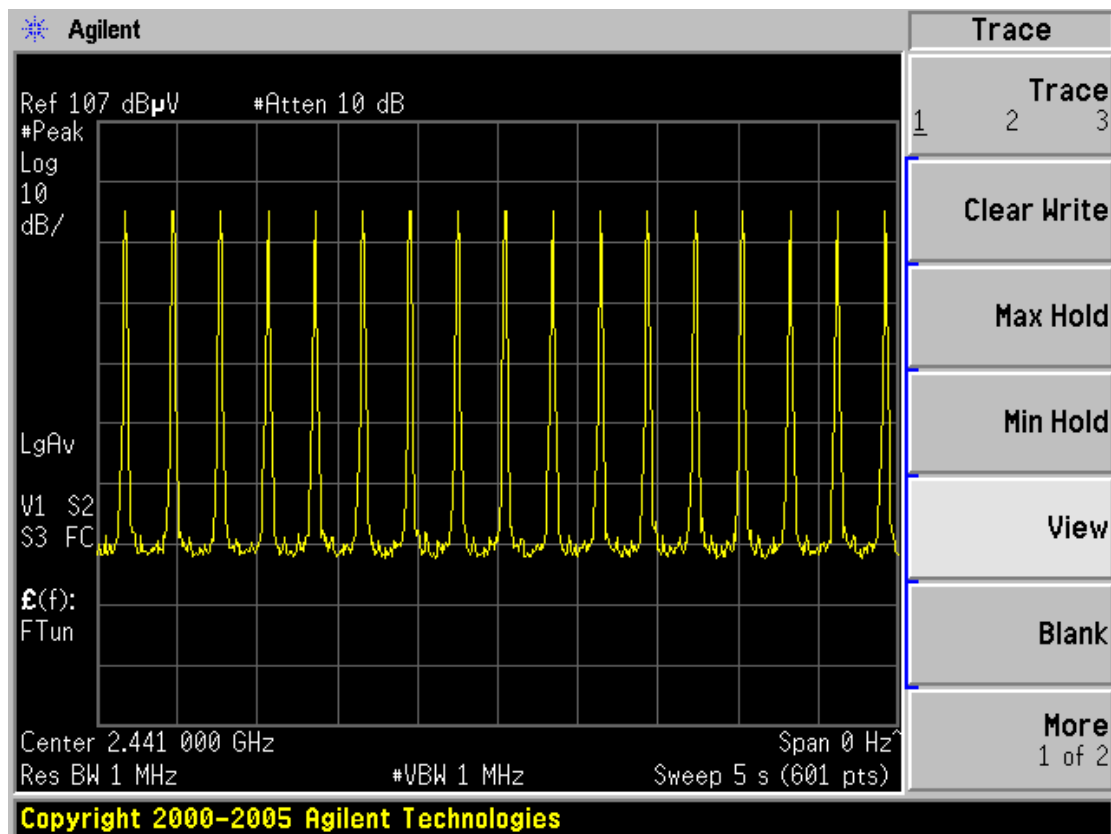
DH1



DH3

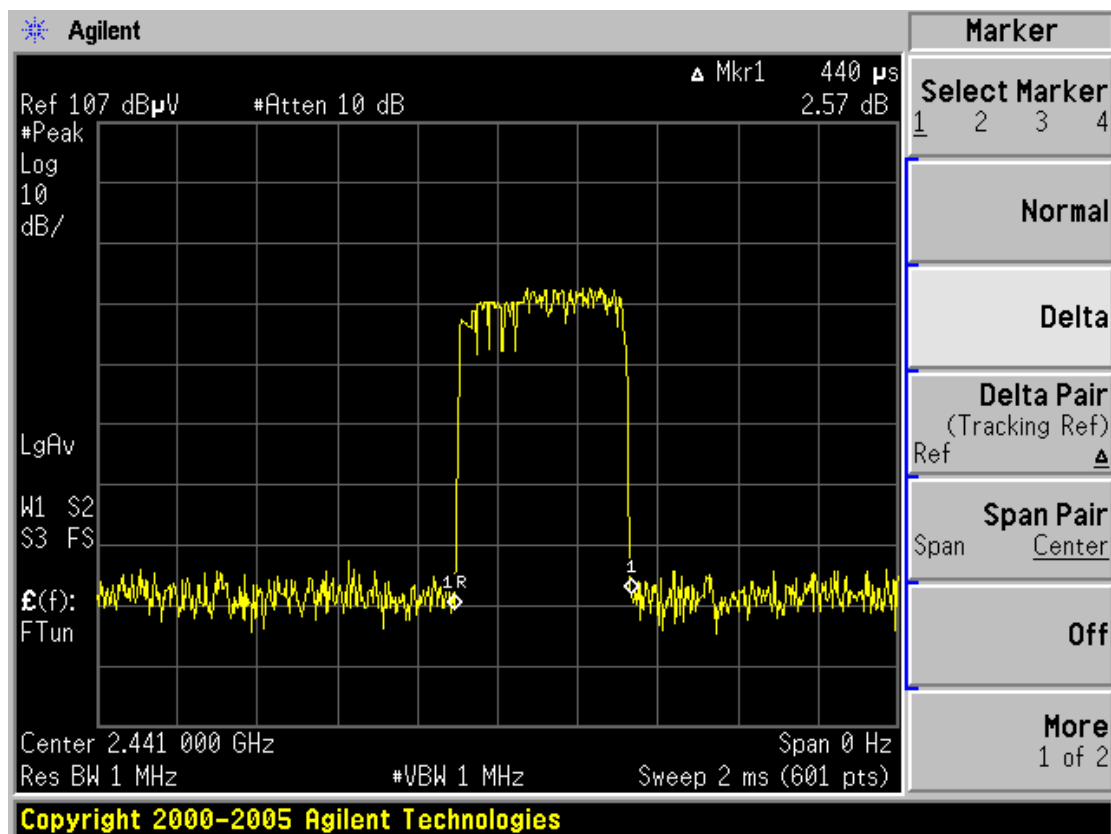
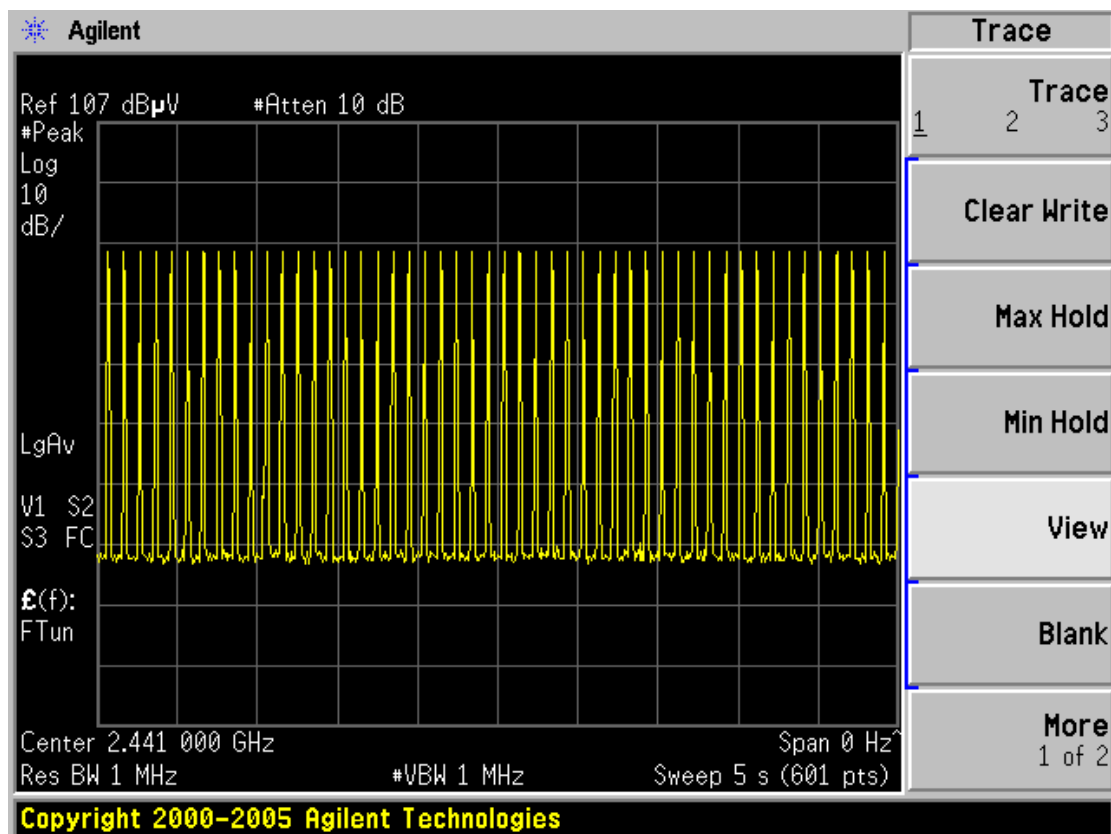


DH5

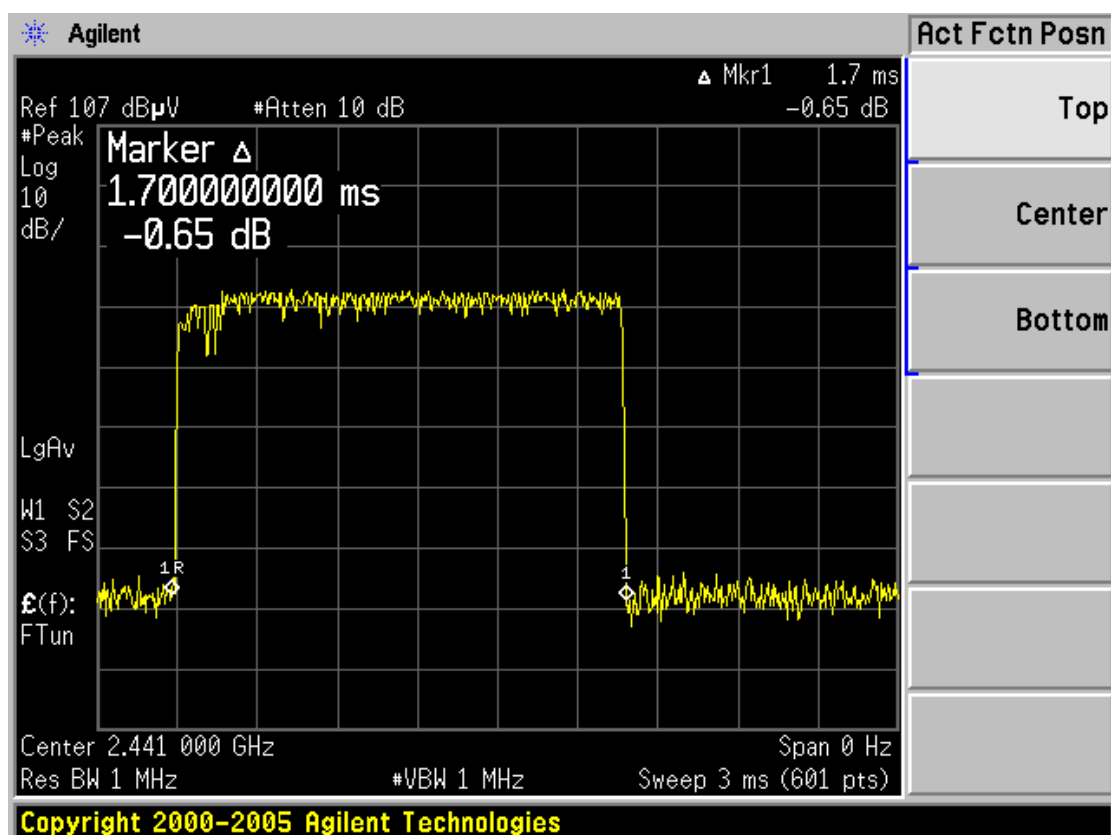
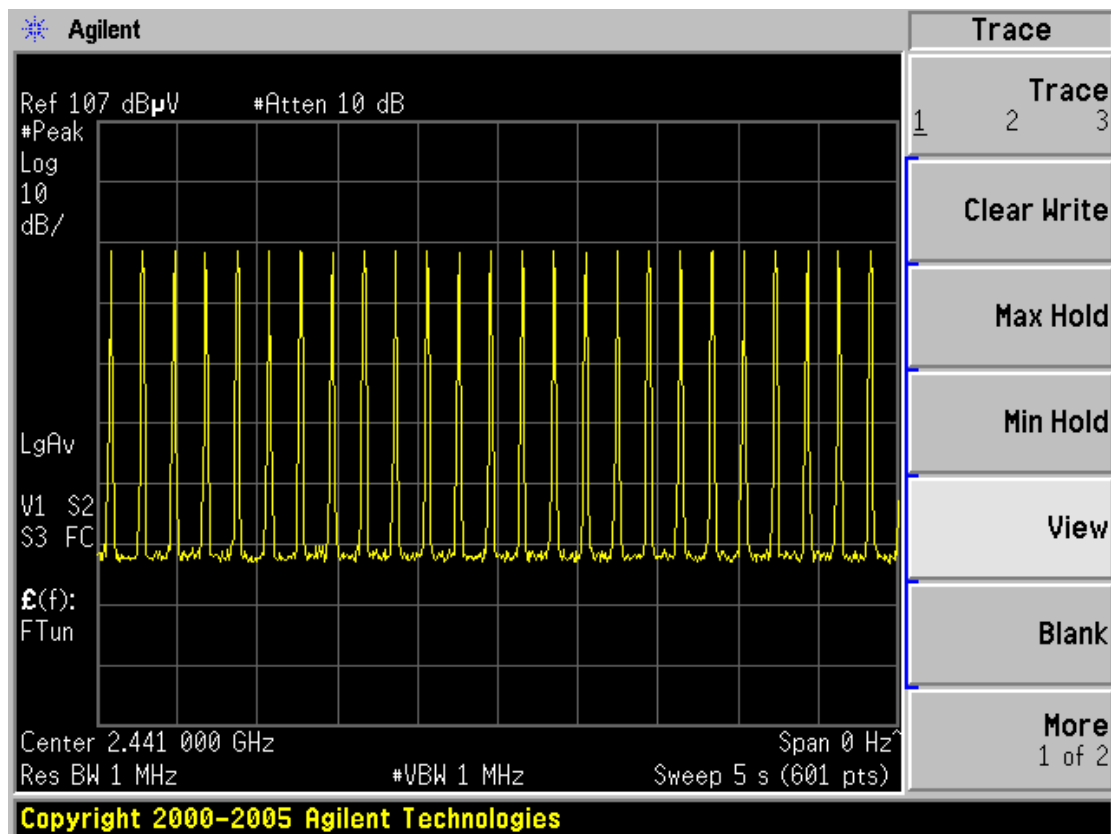


Photos of Dwell time Measurement(EDR)

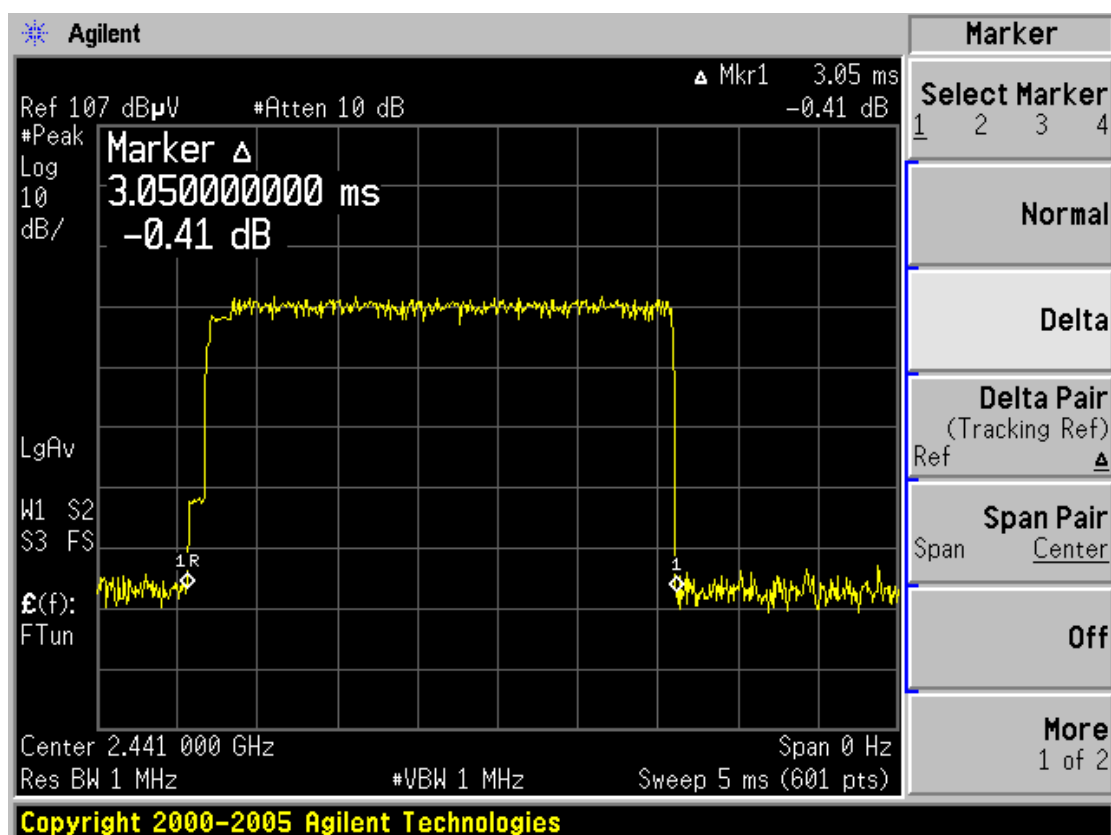
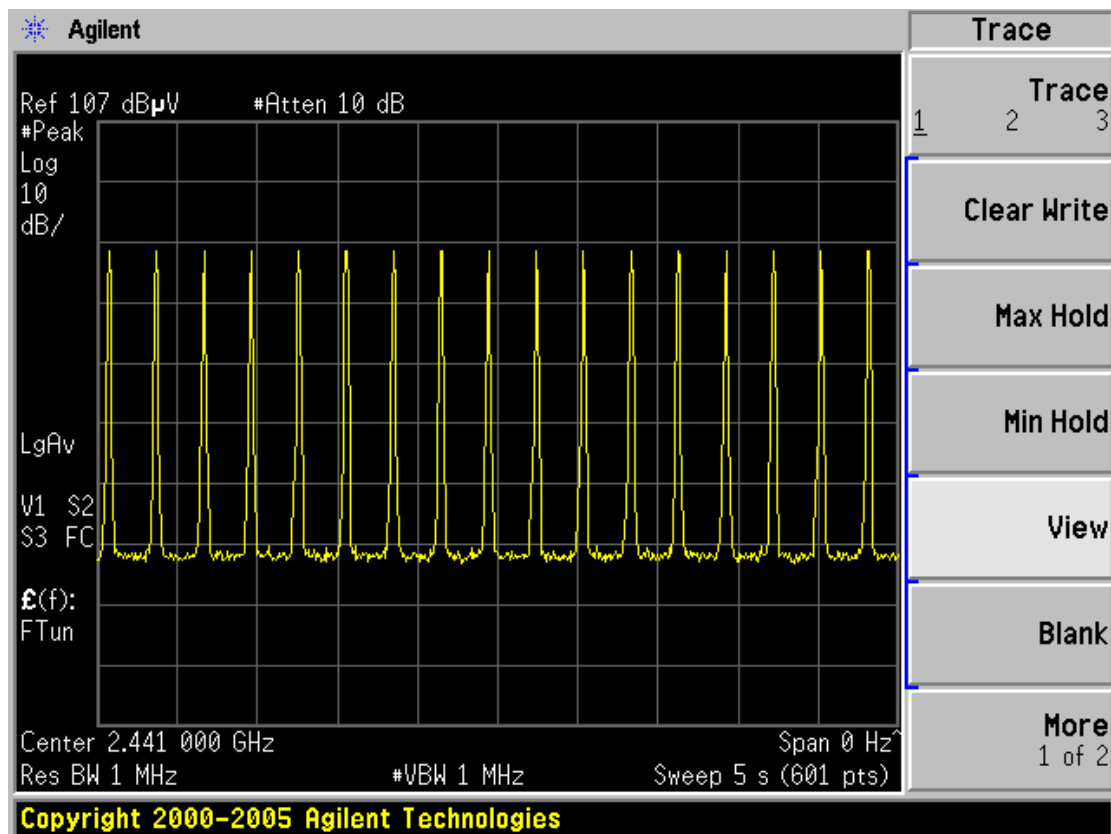
DH1



DH3



DH5



4.9. Receiver spurious Emissions(Not For FCC Review)

TEST APPLICABLE

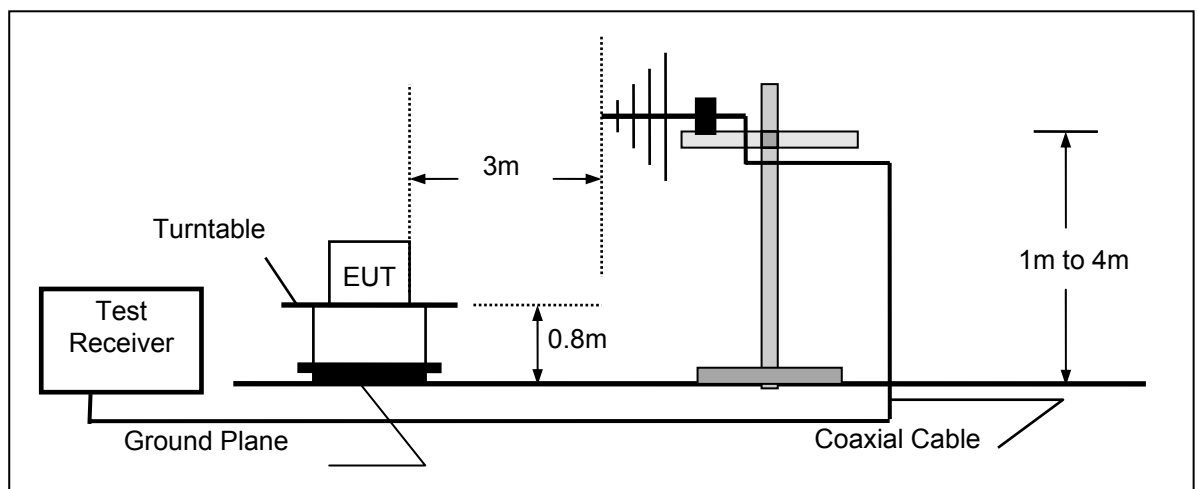
The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

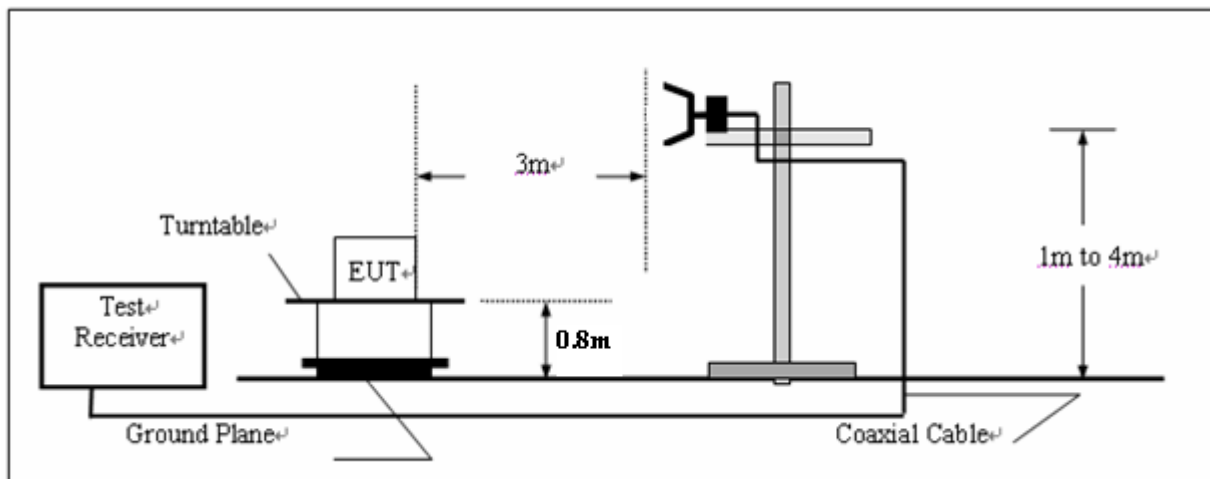
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

TEST CONFIGURATION

(A) Radiated Emission Test Set-Up, Frequency below 1000MHz



(B) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
- 3 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4 Repeat above procedures until all frequency measurements have been completed.

RECEIVER RADIATED SPOUIOUS LIMIT

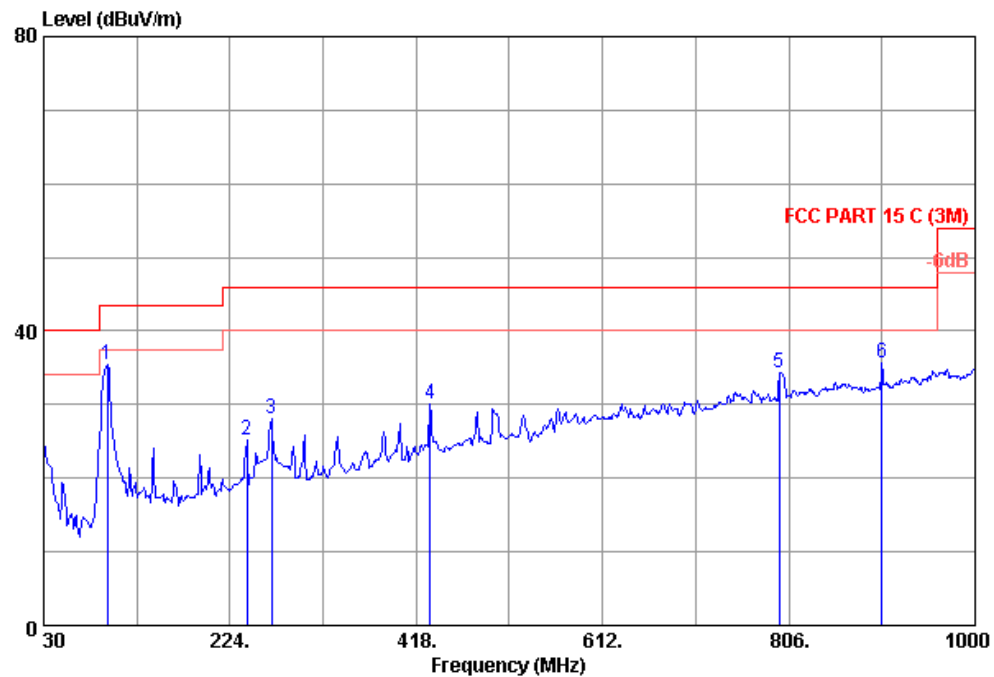
For unintentional device, according to § 15.109(a) and RSS-Gen, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

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

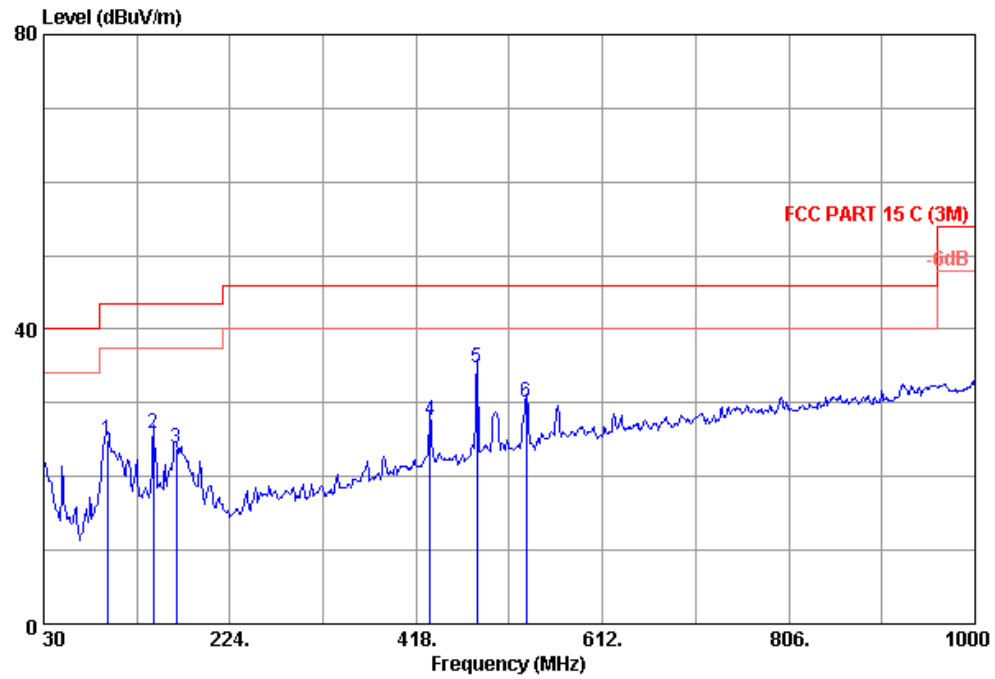
TEST RESULTS

The Radiated Measurement are performed to the four channels (the high channel, the middle channel and the low channel), the datum recorded below is the worst case for each channel separation;and the EUT shall be scanned from 30 MHz to the 5th harmonic of the highest oscillator frequency in the digital devices or 1 GHz whichever is higher.

TEST RESULTS**Below 1GHz**

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	95.960	9.84	1.09	24.43	35.36	43.50	8.14	QP
2	241.460	11.93	2.09	11.26	25.28	46.00	20.72	QP
3	267.650	13.50	2.28	12.25	28.03	46.00	17.97	QP
4	432.550	17.42	3.12	9.65	30.19	46.00	15.81	QP
5	796.300	22.04	4.88	7.40	34.32	46.00	11.68	QP
6	903.000	22.89	5.21	7.50	35.60	46.00	10.40	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	95.960	9.84	1.09	14.10	25.03	43.50	18.47	QP
2	144.460	11.92	1.14	12.85	25.91	43.50	17.59	QP
3	167.740	10.40	1.34	12.08	23.82	43.50	19.68	QP
4	432.550	17.42	3.12	7.11	27.65	46.00	18.35	QP
5	481.050	18.11	3.43	13.28	34.82	46.00	11.18	QP
6	532.460	18.27	3.73	8.19	30.19	46.00	15.81	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

*Within measurement uncertainty.

Note: we tested receiver spurious Emissions below 1GHz of BDR and EDR mode, we recored the worst case data at BDR mode. please see above.

Above 1GHz (Test Mode: BDR Receiving mode):

Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	IC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
4598.52	43.96	54	10.04	PK	Horizontal
18000.00	62.59	74	11.41	PK	Horizontal
18000.00	52.23	54	1.77	AV	Horizontal
5299.66	45.26	54	8.74	PK	Vertical
18000.00	63.02	74	10.98	PK	Vertical
18000.00	52.78	54	1.22	AV	Vertical

Above 1GHz (Test Mode: EDR Receiving mode):

Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	IC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
3689.14	43.00	54	11.00	PK	Horizontal
18000.00	62.65	74	11.35	PK	Horizontal
18000.00	52.88	54	1.12	AV	Horizontal
6500.47	50.25	54	3.75	PK	Vertical
18000.00	63.00	74	11.00	PK	Vertical
18000.00	52.55	54	1.45	AV	Vertical

*Within measurement uncertainty.

4.10. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

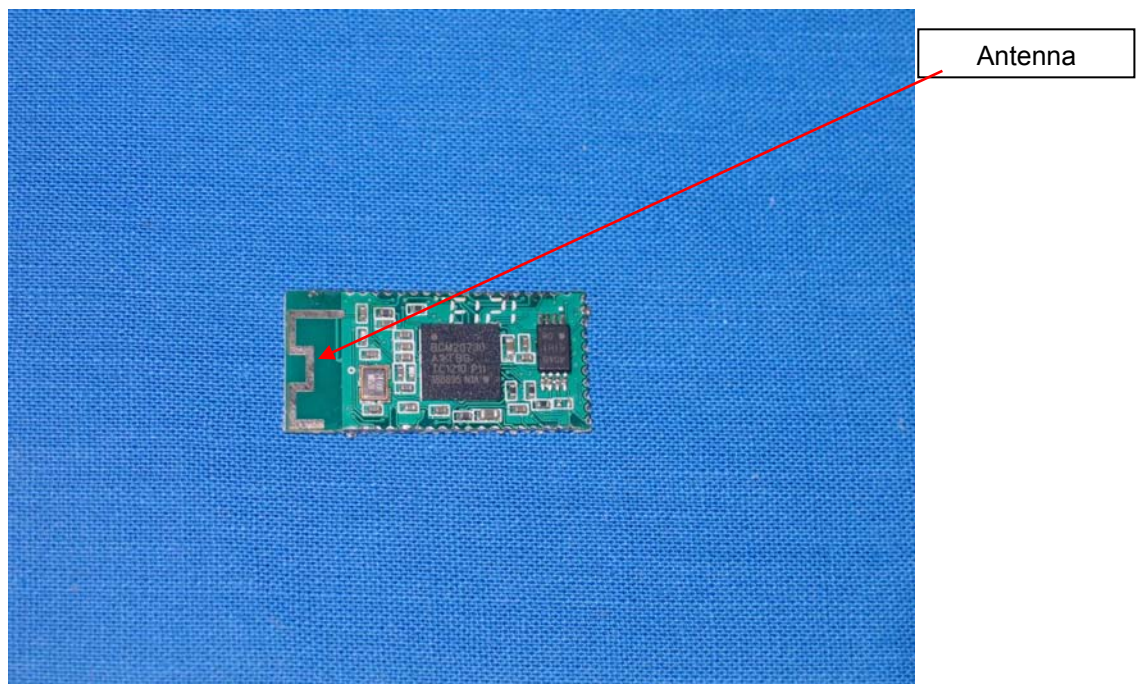
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

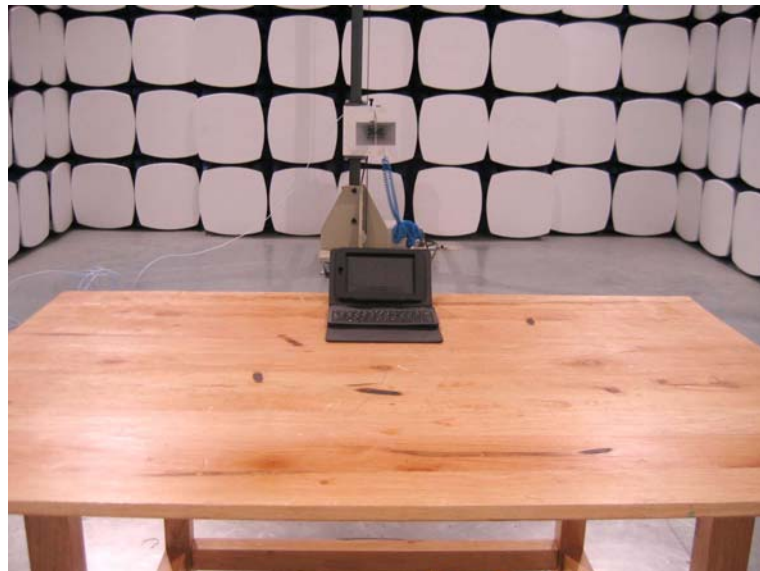
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is a PCB Antenna .The maximum Gain of the antenna only 1dBi. Detail please see the photos as following:



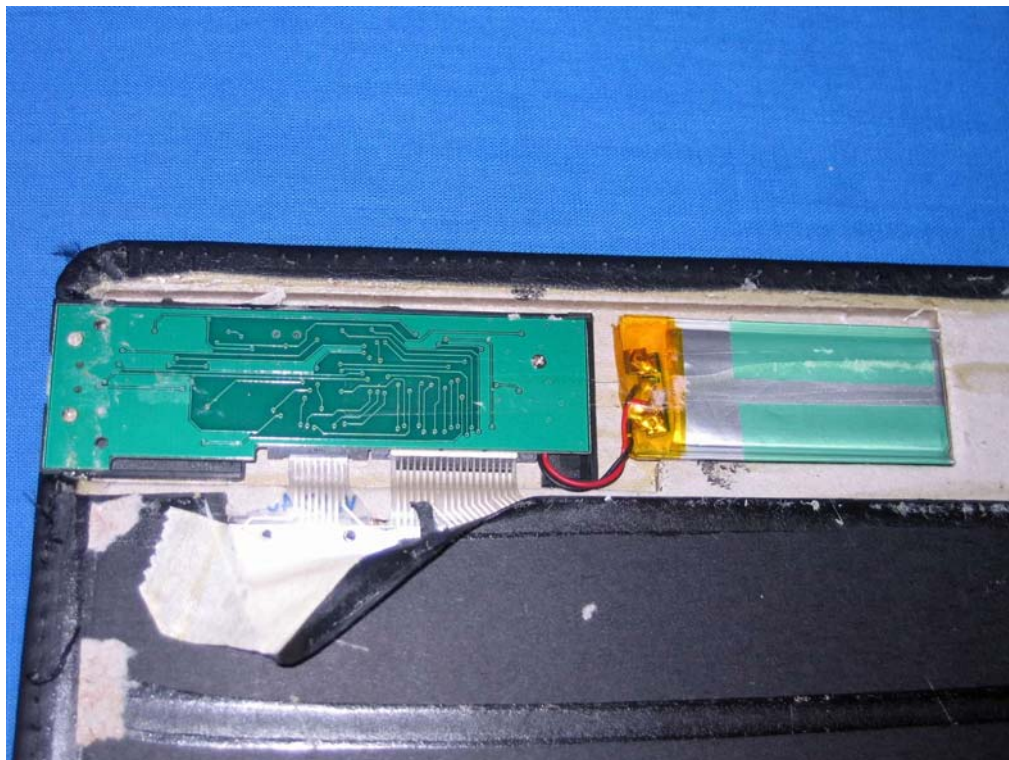
5. Test Setup Photos of the EUT

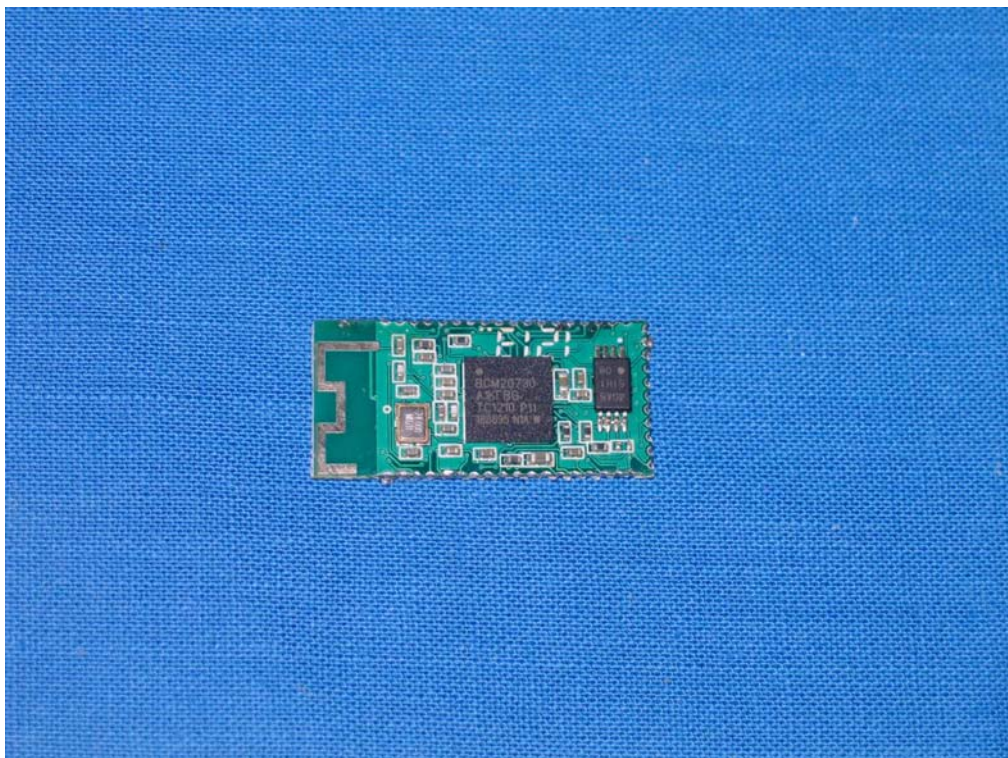
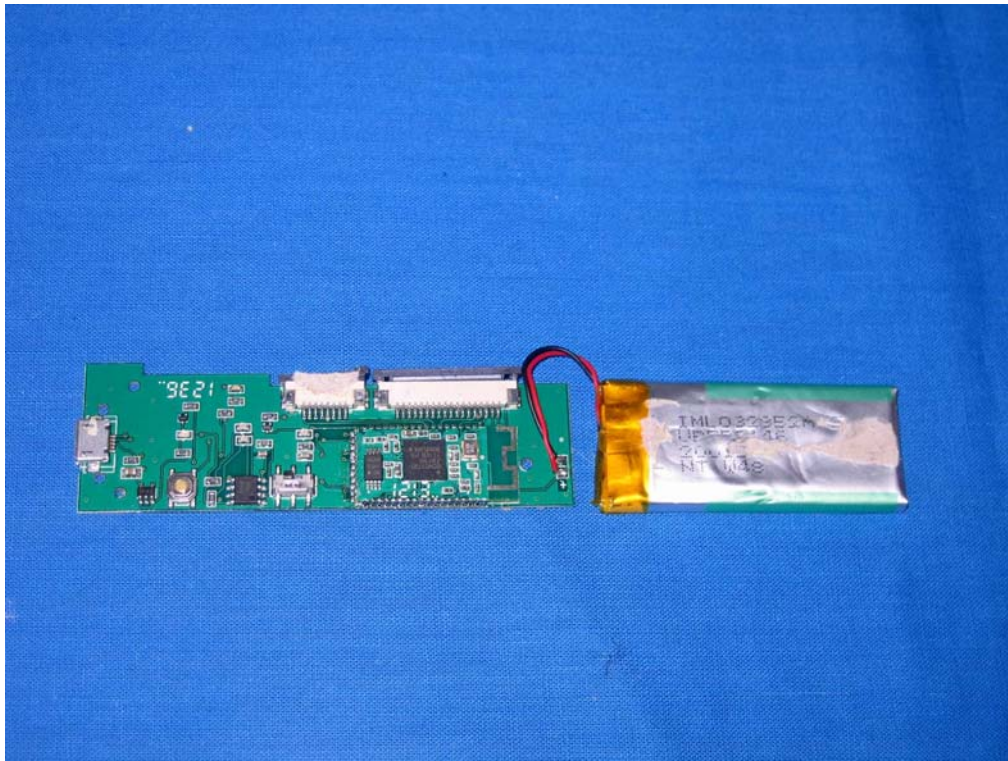


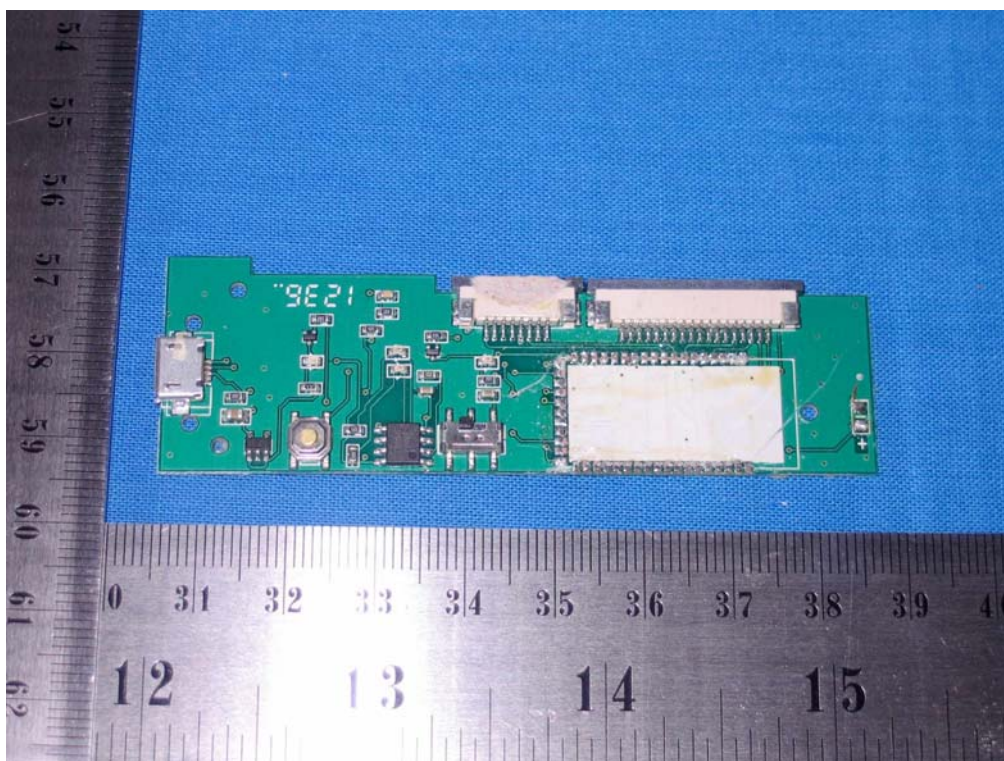
6. External and Internal Photos of the EUT

External Photos



Internal Photos





.....End of Report.....