Shenzhen Huatongwei International Inspection Co., Ltd.
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CNASL1225

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**TRE1208011002 R/C: 88054**
FCC ID.....:	**YAMX1PU1**
Compiled by (position+printed name+signature)..:	File administrators Tim Zhang
Supervised by (position+printed name+signature)..:	Test Engineer Eric Zhang
Approved by (position+printed name+signature)..:	Manager Wenliang Li
Date of issue.....:	Sep 17, 2012
Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address .....:	Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Applicant's name.....:	**Hytera Communications Corporation Ltd.**
Address .....:	HYT Tower,Hi-Tech Industrial Park North,Nanshan District,Shenzhen China.518057
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**
TRF Originator.....:	Shenzhen Huatongwei International Inspection CO., Ltd
Master TRF.....:	Dated 2006-06

Test item description .....:	Digital Portable Radio
Trade Mark .....:	Hytera
Manufacturer .....:	**Hytera Communications Corporation Ltd.**
Model/Type reference.....:	X1p U(1)
Listed Models .....:	/
Ratings .....:	DC 7.40 V
Operation Frequency .....:	From 2402MHz to 2480MHz
Modulation .....:	FHSS (GFSK & 8DPSK)
Result.....:	**Positive**

T E S T R E P O R T

Test Report No. :	TRE1208011002	Sep 17, 2012 Date of issue

Equipment under Test	:	Digital Portable Radio
Model /Type	:	X1p U(1)
Listed Models	:	/
Applicant	:	**Hytera Communications Corporation Ltd.**
Address	:	HYT Tower,Hi-Tech Industrial Park North,Nanshan District,Shenzhen China.518057
Manufacturer	:	**Hytera Communications Corporation Ltd.**
Address	:	HYT Tower,Hi-Tech Industrial Park North,Nanshan District,Shenzhen China.518057

Test Result according to the standards on page 4:	**Positive**

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

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

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Nov 10, 2011
Testing commenced on	:	Nov 10, 2011
Testing concluded on	:	Sep 17, 2012

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC7.4V from battery

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

400-470 MHz U frequency band Digital Portable Radio with GPS and bluetooth function (X1p U(1)).

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 Bluetooth tools software to control the EUT for staying in continous 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:	2402-2480MHz
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Antenna:	PIFA Antenna

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

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

This submittal(s) (test report) is intended for **FCC ID: YAMX1EU1** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. NOTE

1. The EUT is is a U frequency band (400-470MHz) Digital Portable Radio with GPS and Bluetooth function,The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio	FCC Part 90	TRE1208011001
Bluetooth	FCC Part 15 Subpart C (Section15.247)	TRE1208011002

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

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

3. The EUT provides one completed transmitter and receiver.

Modulation Mode	TX Function
Bluetooth	1TX

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

3.2. Test Facility

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

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., 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: August 02, 2007. Valid time is until Feb 28, 2015.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept 30, 2013.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., 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 662850, Renewal date June 01, 2015.

IC-Registration No.: 5377

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377 on Jan 25, 2011. Valid time is until Jan 24, 2014

ACA

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

NEMKO-Aut. No.: ELA125

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025:2005 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10; the Authorization is valid through July 07, 2013.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: December 20, 2009. Valid time is until December 19, 2013.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: December 20, 2009. Valid time is until December 19, 2013.

DNV

Shenzhen Huatongwei International Inspection Co Ltd has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025(2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug 24, 2013..

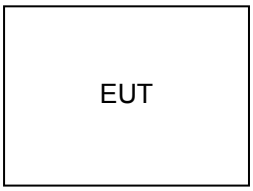
3.3. Environmental conditions

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

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

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



3.5. Test Description

FCC PART 15		
FCC Part 15.207	AC Power Conducted Emission	N/A
FCC Part 15.247(a)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency	PASS
FCC Part 15.247(a)(1)(iii)	Time of Occupancy	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

Remark: 1 The measurement uncertainty is not included in the test result.
2 The radio was off when charging according to user manual.

3.6. 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 Shenzhen Huatongwei International Inspection Co., 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 Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	150 Hz	(1)
Transmitter power conducted	0.30 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 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)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

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

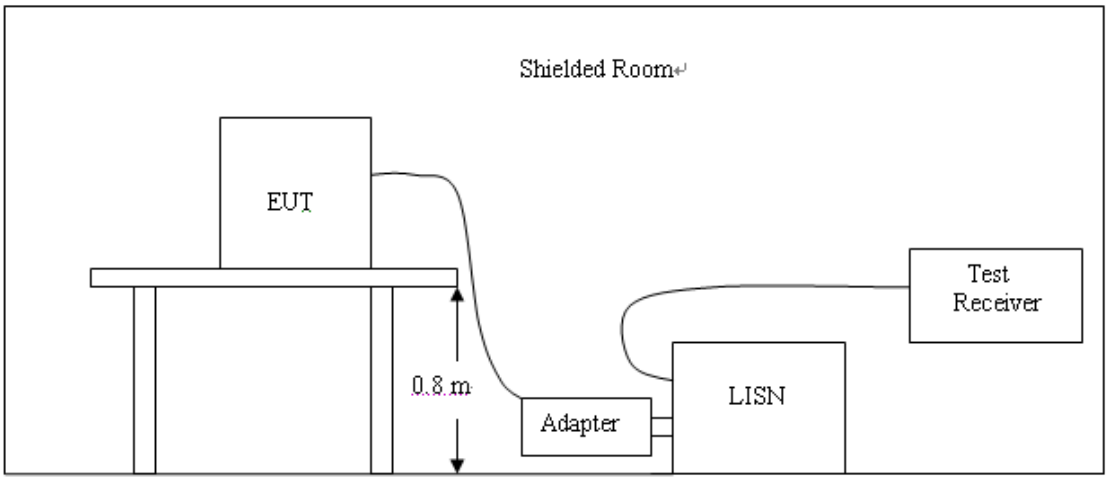
3.7. Equipments Used during the Test

Test euquipments					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2011/10/23
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2011/10/23
3	Spectrum Analyzer	AGILENT	E4407B	MY44210775	2011/10/23
4	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2011/10/23
5	TURNTABLE	ETS	2088	2149	2011/10/23
6	ANTENNA MAST	ETS	2075	2346	2011/10/23
7	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2011/10/23
8	HORN ANTENNA	ROHDE &SCHWARZ	HF906	100039	2011/10/23
9	Amplifer	Sonoma	310N	E009-13	2011/10/23
10	JS amplifer	ROHDE &SCHWARZ	JS4-00101800-28-5A	F201504	2011/10/23
11	High pass filter	Compliance Direction systems	BSU-6	34202	2011/10/23
12	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100106	2011/10/23
13	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2011/10/23
14	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2011/10/23
15	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2011/10/23
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2011/10/23
17	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2011/10/23
18	HORN ANTENNA	ShwarzBeck	9120D	1012	2011/10/23
19	ANTENNA MAST	MATURO	TAM-4.0-P	----	2011/10/23
20	TURNTABLE	MATURO	TT2.0	----	2011/10/23
21	Amplifer	Compliance Direction systems	PAP1-4060	120	2011/10/23
22	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2011/10/23

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission(Not applicable to this device)

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

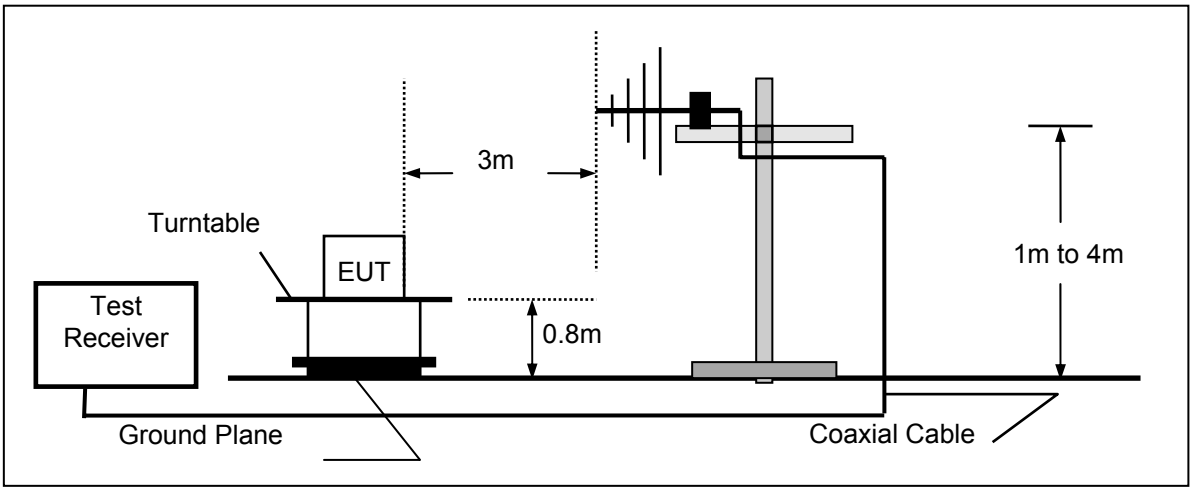
TEST RESULTS

Not applicable to this device(The radio was off when charging)

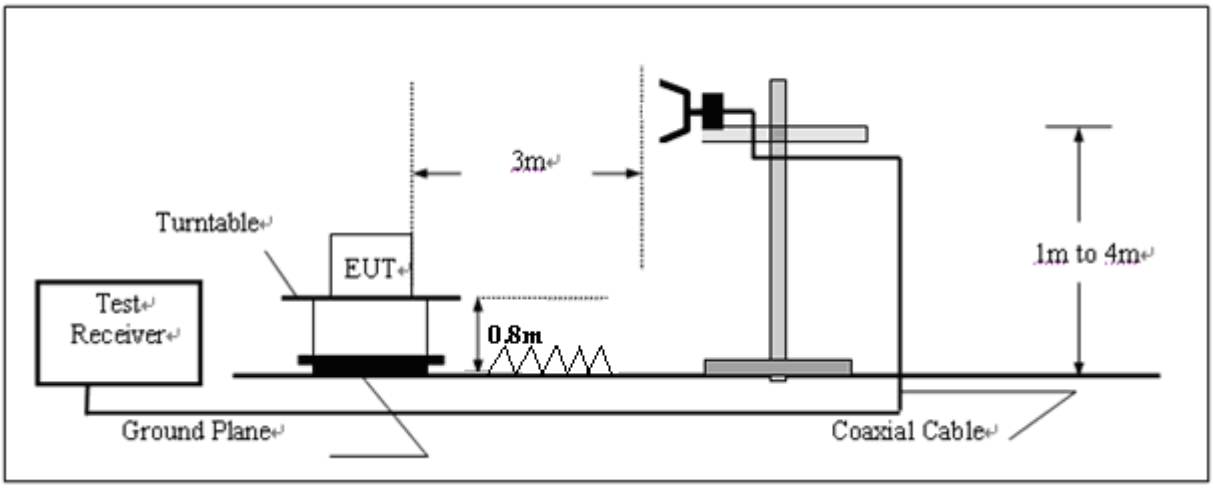
4.2. Radiated Emission

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.

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

Transd=AF +CL-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 the100kHz bandwidth within the band that contains the highest level of desired power.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(30)+40	30
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 9KHz to 30MHz

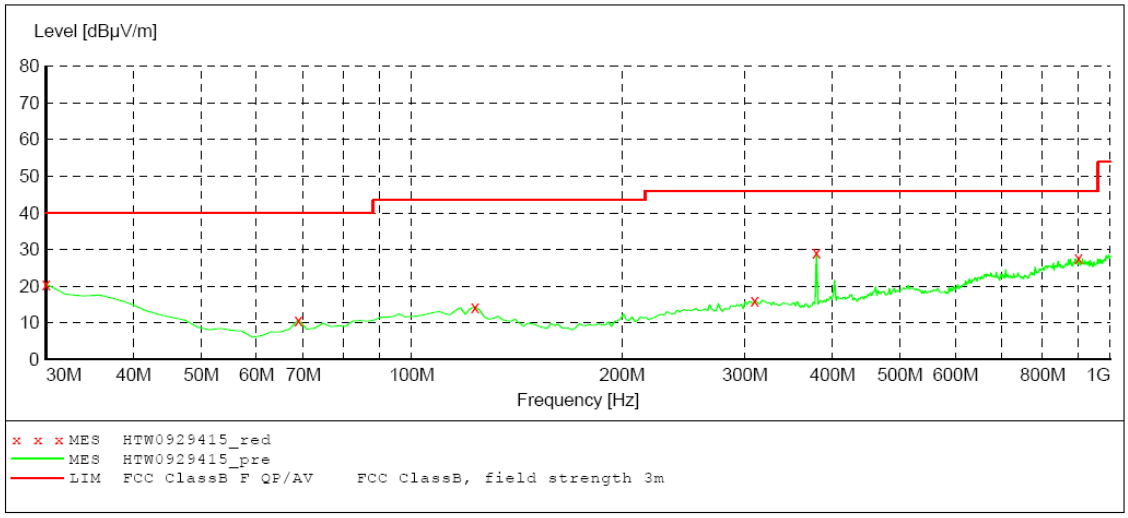
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
0.66	47.28	71.21	23.93	QP	Pass
1.69	43.75	63.05	19.30	QP	Pass
16.22	40.62	69.54	28.92	QP	Pass
27.30	42.96	69.54	26.58	QP	Pass

TEST RESULTS

For 30MHz to 1000MHz

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	120 kHz	HL562 201106



MEASUREMENT RESULT: "HTW0929415_red"

9/09/2012 10:05AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	20.60	-11.1	40.0	19.4	Peak	100.0	102.00	VERTICAL
68.877756	10.90	-23.4	40.0	29.1	Peak	100.0	93.00	VERTICAL
123.306613	14.40	-19.5	43.5	29.1	Peak	100.0	182.00	VERTICAL
309.919840	16.00	-16.5	46.0	30.0	Peak	100.0	168.00	VERTICAL
379.899800	29.20	-16.8	46.0	16.8	Peak	100.0	213.00	VERTICAL
900.861723	27.80	-7.3	46.0	18.2	Peak	100.0	261.00	VERTICAL

REMARKS：

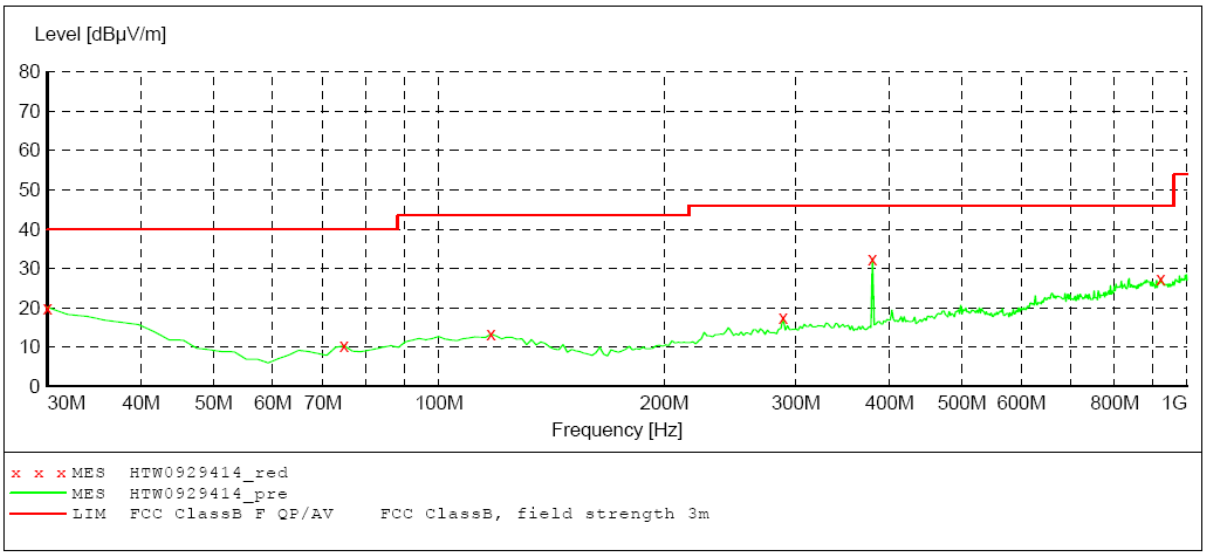
1. ＊Undetectable
2. The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz
3.The Transd=Cabel loss +Antenna factor -pre-amplifier factor
4. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos. The worst case data is recorded in the report.

SWEEP TABLE: "test (30M-1G)"

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	120 kHz	HL562 201106



MEASUREMENT RESULT: "HTW0929414_red"

9/09/2012 10:03AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	20.10	-11.1	40.0	19.9	Peak	100.0	282.00	HORIZONTAL
74.709419	10.40	-22.5	40.0	29.6	Peak	100.0	344.00	HORIZONTAL
117.474950	13.40	-19.4	43.5	30.1	Peak	100.0	24.00	HORIZONTAL
288.537074	17.60	-17.8	46.0	28.4	Peak	100.0	36.00	HORIZONTAL
379.899800	32.60	-16.8	46.0	13.4	Peak	100.0	277.00	HORIZONTAL
922.244489	27.50	-7.2	46.0	18.5	Peak	100.0	53.00	HORIZONTAL

REMARKS：

1. ＊Undetectable

2. The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

3.The Transd=Cabel loss +Antenna factor -pre-amplifier factor

4. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos. The worst case data is recorded in the report.

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.

Low 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	Correction Factor (dB/m)
1	*2402.00	93.08	PK			1.00	175	96.25	28.3	4.90	36.6	-3.40
1	*2402.00	83.24	AV			1.00	175	86.85	28.3	4.90	36.6	-3.40
2	4804.00	41.39	PK	74.00	32.61	1.00	256	37.64	32.7	7.00	36.5	3.20
2	4804.00	--	AV	54.00	--	1.00	256	--	32.7	7.00	36.5	3.20
3	7206.00	46.76	PK	74.00	27.24	1.00	136	37.22	35.8	8.90	35.3	9.40
3	7206.00	--	AV	54.00	--	1.00	136	--	35.8	8.90	35.3	9.40
4	12020.41	53.96	PK	74.00	20.04	1.00	215	37.14	38.0	11.30	32.7	16.6
4	12020.41	--	AV	54.00	--	1.00	215	---	38.0	11.30	32.7	16.6

ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	Correction Factor (dB/m)
1	*2402.00	95.68	PK			1.00 V	124	98.85	28.3	4.90	36.6	-3.40
1	*2402.00	85.75	AV			1.00 V	124	89.36	28.3	4.90	36.6	-3.40
2	4804.00	44.18	PK	74.00	29.82	1.00 V	339	40.43	32.7	7.00	36.5	3.20
2	4804.00	--	AV	54.00	--	1.00 V	339	--	32.7	7.00	36.5	3.20
3	7206.00	45.62	PK	74.00	28.38	1.00 V	340	36.08	35.8	8.90	35.3	9.40
3	7206.00	--	AV	54.00	--	1.00 V	340	--	35.8	8.90	35.3	9.40
4	12020.41	49.75	PK	74.00	24.25	1.00	20	32.93	38.0	11.30	32.7	16.6
4	12020.41	--	AV	54.00	--	1.00 V	20	--	38.0	11.30	32.7	16.6

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	Correction Factor (dB/m)
1	*2441.00	95.11	PK			1.00	153	98.28	28.3	5.10	36.6	-3.20
1	*2441.00	84.41	AV			1.00	153	88.02	28.3	5.10	36.6	-3.20
2	4882.00	47.00	PK	74.00	27.00	1.00	202	43.05	32.3	7.60	36.5	3.40
2	4882.00	--	AV	54.00	--	1.00	202	--	32.3	7.60	36.5	3.40
3	7323.00	47.55	PK	74.00	26.45	1.00	355	38.01	36.1	8.60	35.3	9.40
3	7323.00	--	AV	54.00	--	1.00	355	--	36.1	8.60	35.3	9.40
4	12020.41	49.84	PK	74.00	24.16	1.00	28	33.02	38.0	11.30	32.7	16.6
4	12020.41	--	AV	54.00	--	1.00	28	--	38.0	11.30	32.7	16.6

ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	Correction Factor (dB/m)
1	*2441.00	95.86	PK			1.00	121	99.03	28.3	5.10	36.6	-3.20
1	*2441.00	85.27	AV			1.00	121	88.88	28.3	5.10	36.6	-3.20
2	4882.00	44.29	PK	74.00	29.71	1.00	97	40.34	32.3	7.60	36.5	3.40
2	4882.00	--	AV	54.00	--	1.00	97	--	32.3	7.60	36.5	3.40
3	7323.00	45.55	PK	74.00	28.45	1.00	288	36.01	36.1	8.60	35.3	9.40
3	7323.00	--	AV	54.00	--	1.00	288	--	36.1	8.60	35.3	9.40
4	12020.41	50.74	PK	74.00	23.26	1.00	89	33.92	38.0	11.30	32.7	16.6
4	12020.41	--	AV	54.00	--	1.00	89	--	38.0	11.30	32.7	16.6

High channel

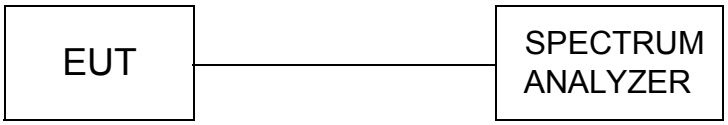
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	*2480.00	91.38	PK			1.00	156	94.55	28.2	5.10	36.6	-3.30
1	*2480.00	80.58	AV			1.00	156	84.19	28.2	5.10	36.6	-3.30
2	4960.00	43.23	PK	74.00	30.77	1.00	198	38.88	33.0	7.00	36.2	3.80
2	4960.00	--	AV	54.00	--	1.00	198	--	33.0	7.00	36.2	3.80
3	7340.00	43.8	PK	74.00	30.20	1.00	90	34.26	36.2	8.50	35.3	9.40
3	7340.00	--	AV	54.00	--	1.00	90	--	36.2	8.50	35.3	9.40
4	12020.41	50.08	PK	74.00	23.92	1.00	124	33.26	38.0	11.30	32.7	16.6
4	12020.41	--	AV	54.00	--	1.00	124	--	38.0	11.30	32.7	16.6

ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	Correction Factor (dB/m)
1	*2480.00	94.15	PK			1.00 V	125	97.32	28.2	5.10	36.6	-3.30
1	*2480.00	86.32	AV			1.00 V	125	89.93	28.2	5.10	36.6	-3.30
2	4960.00	44.08	PK	74.00	29.92	1.00 V	96	39.73	36.2	8.50	35.3	3.80
2	4960.00	--	AV	54.00	--	1.00 V	96	--	36.2	8.50	35.3	3.80
3	7340.00	46.42	PK	74.00	27.58	1.00 V	35	36.88	37.4	10.10	34.8	9.40
3	7340.00	--	AV	54.00	--	1.00 V	35	--	37.4	10.10	34.8	9.40
4	12020.41	51.06	PK	74.00	22.94	1.00 V	37	34.24	38.0	11.30	32.7	16.6
4	12020.41	--	AV	54.00	--	1.00 V	37	--	38.0	11.30	32.7	16.6

REMARKS: 1. The other emission levels were very low against the limit.
2. The limit value is defined as per 15.247
3. The worst test mode is BDR mode and the data is recorded. 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. Set the RBW=3MHz VBW=3MHz.

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	2.809	30	PASS
2441	2.336	30	PASS
2480	2.661	30	PASS

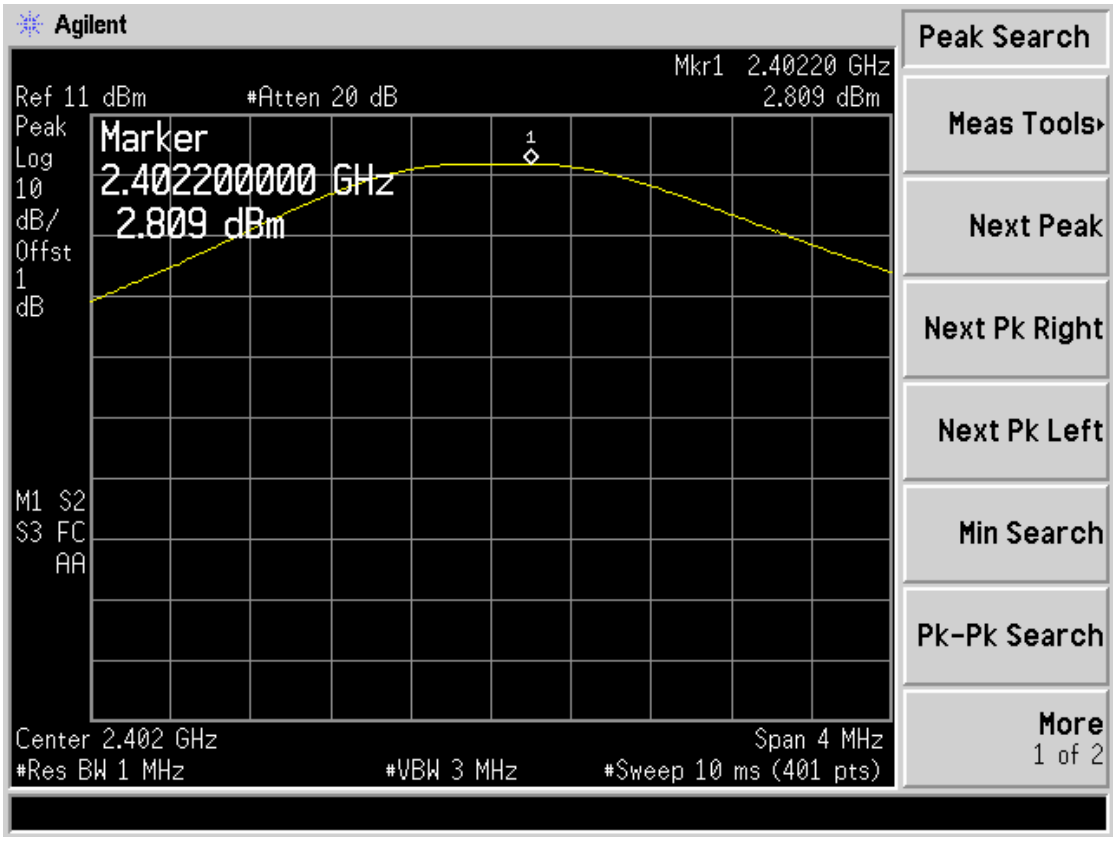
EDR Mode:

Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
2402	1.753	30	PASS
2441	1.325	30	PASS
2480	1.669	30	PASS

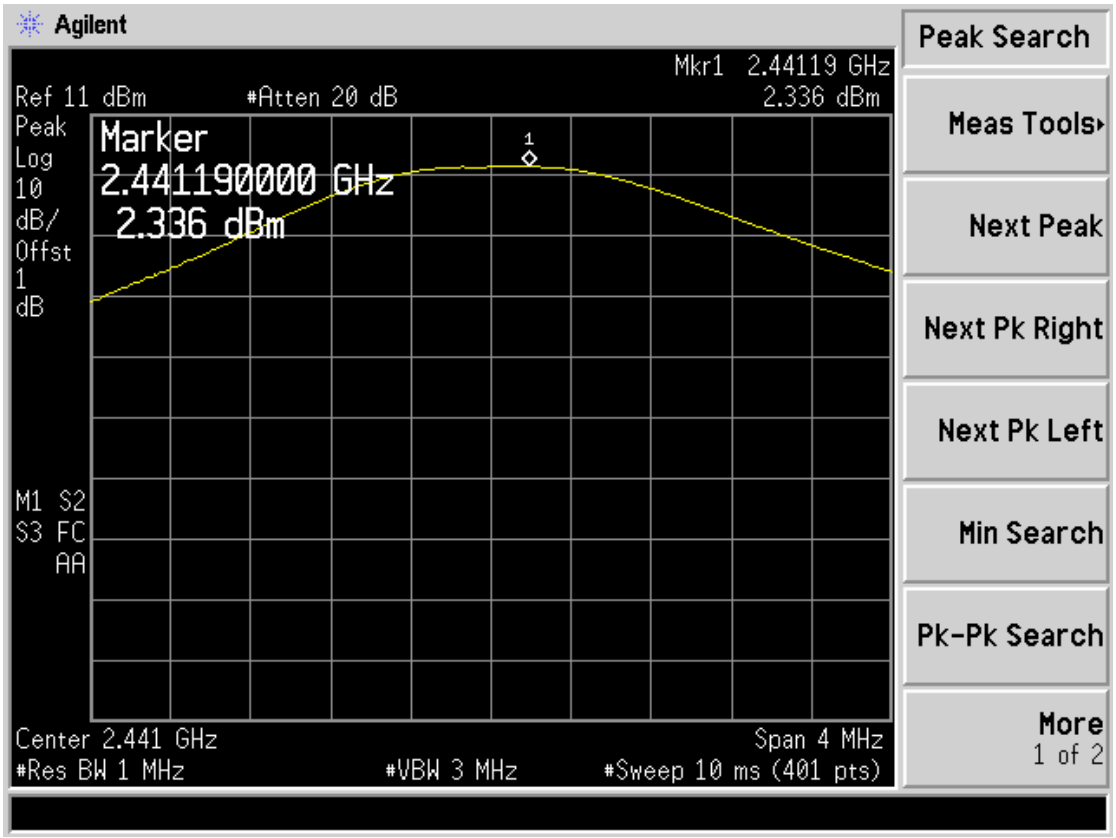
Note: The test results including the cable lose.

BDR Mode:

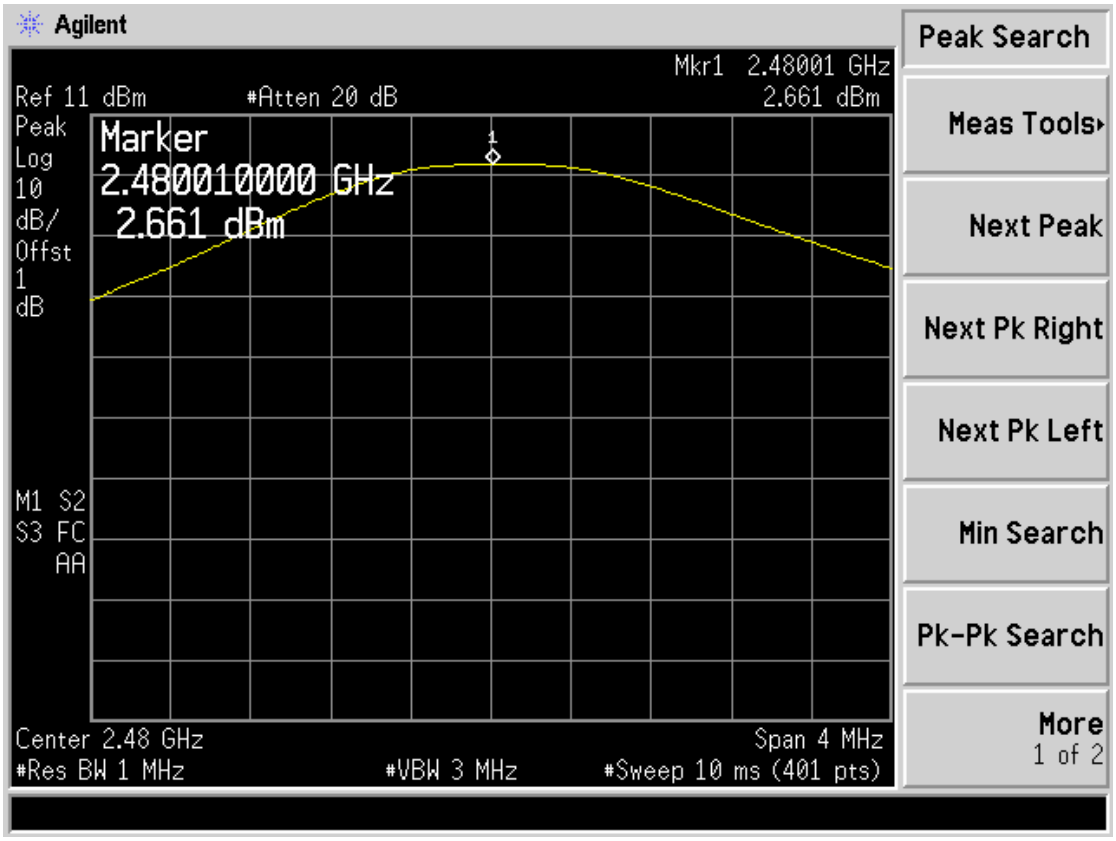
Low channel



Middle channel

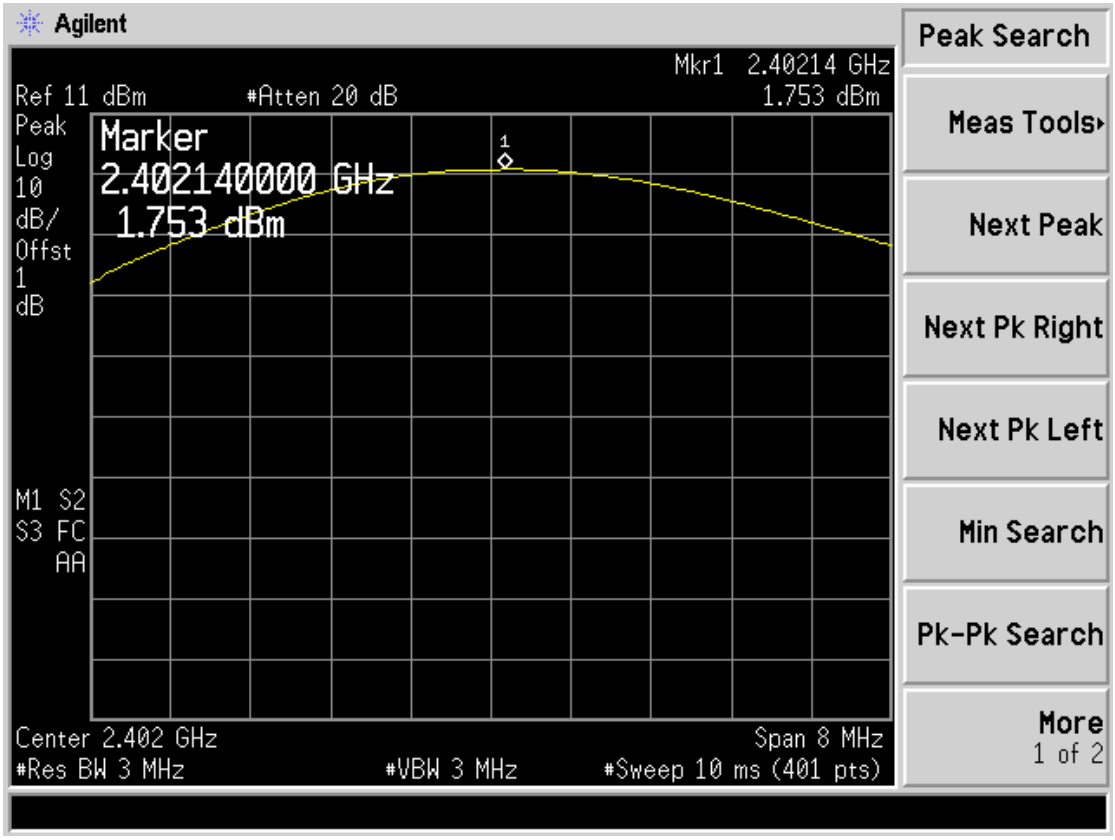


High channel

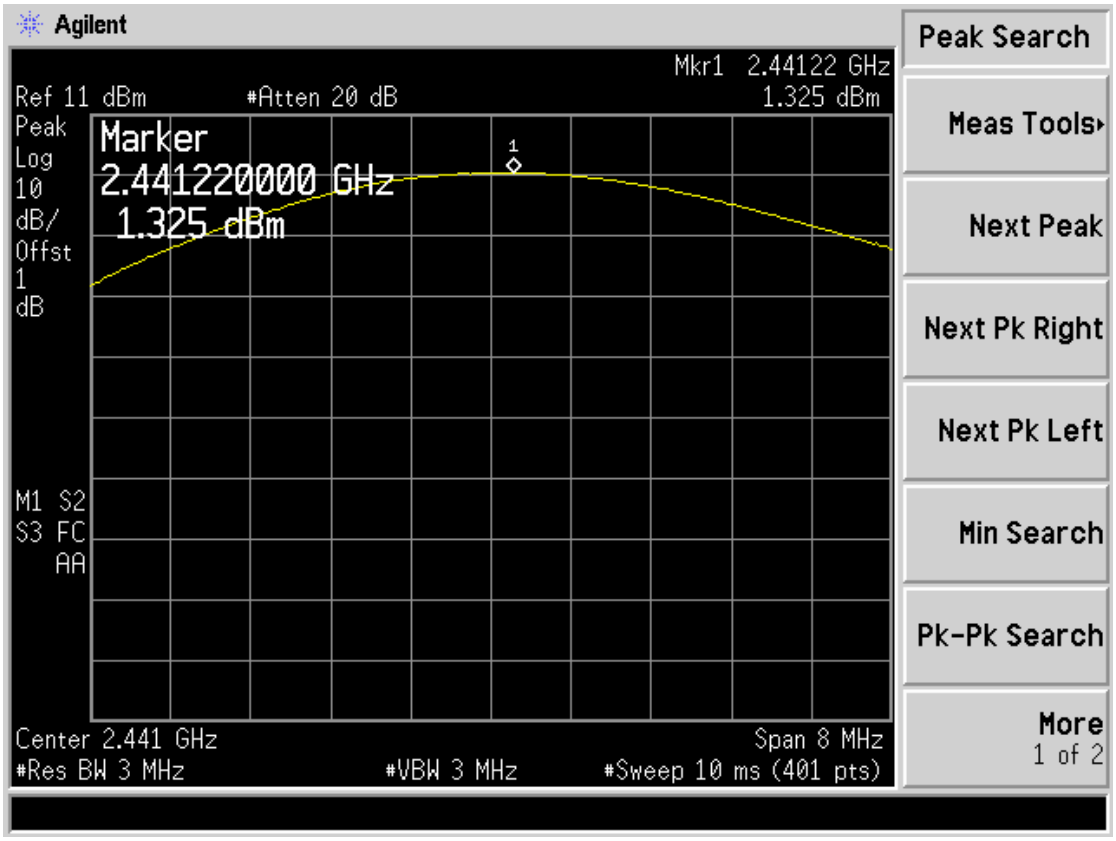


EDR Mode:

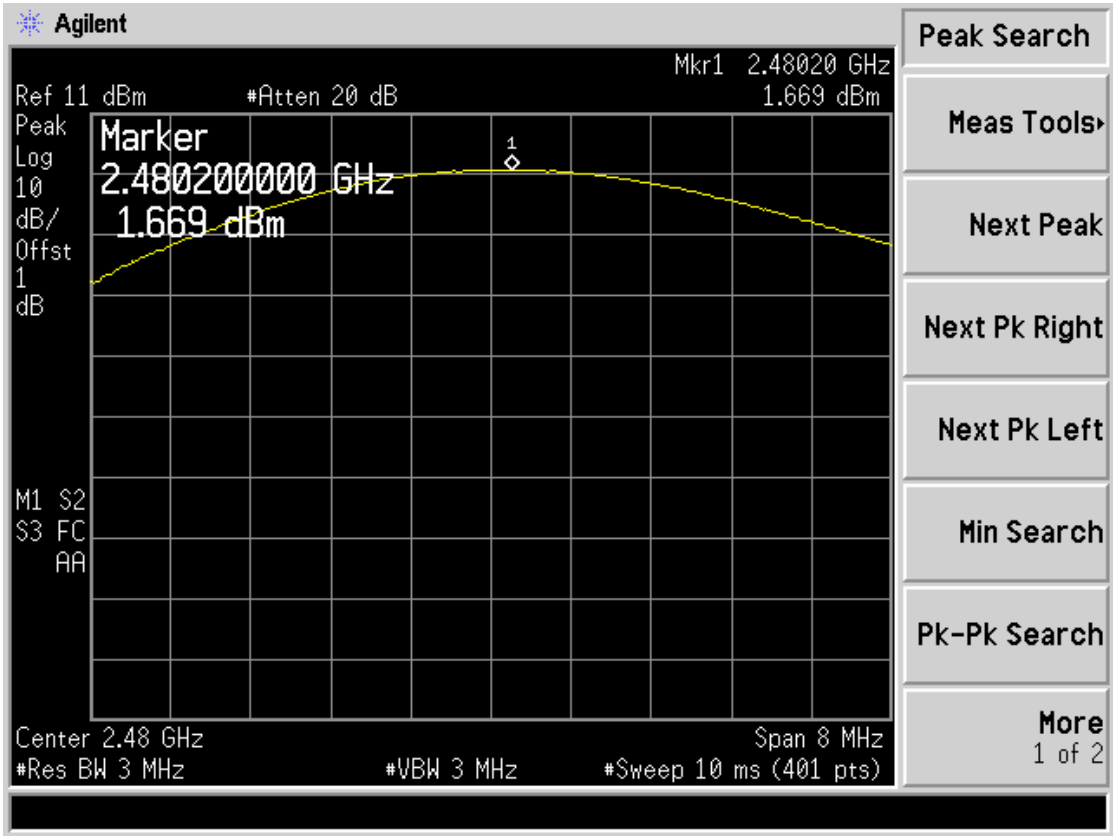
Low channel



Middle channel

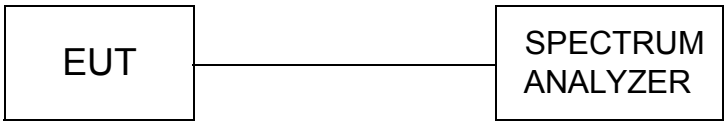


High channel



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 with30 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 bandwith.

TEST RESULTS

BDR Mode:

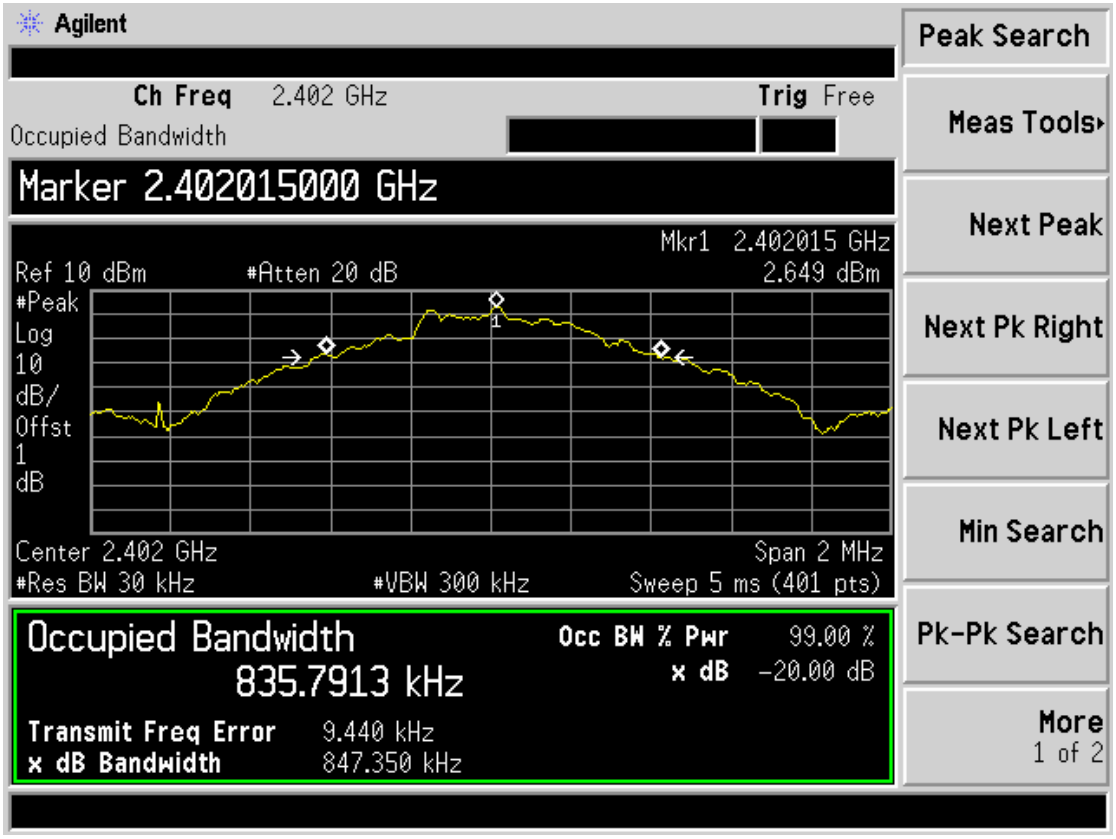
CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	LIMIT (MHz)	PASS/FAIL
2402	0.847	/	PASS
2441	0.848	/	PASS
2480	0.850	/	PASS

EDR Mode:

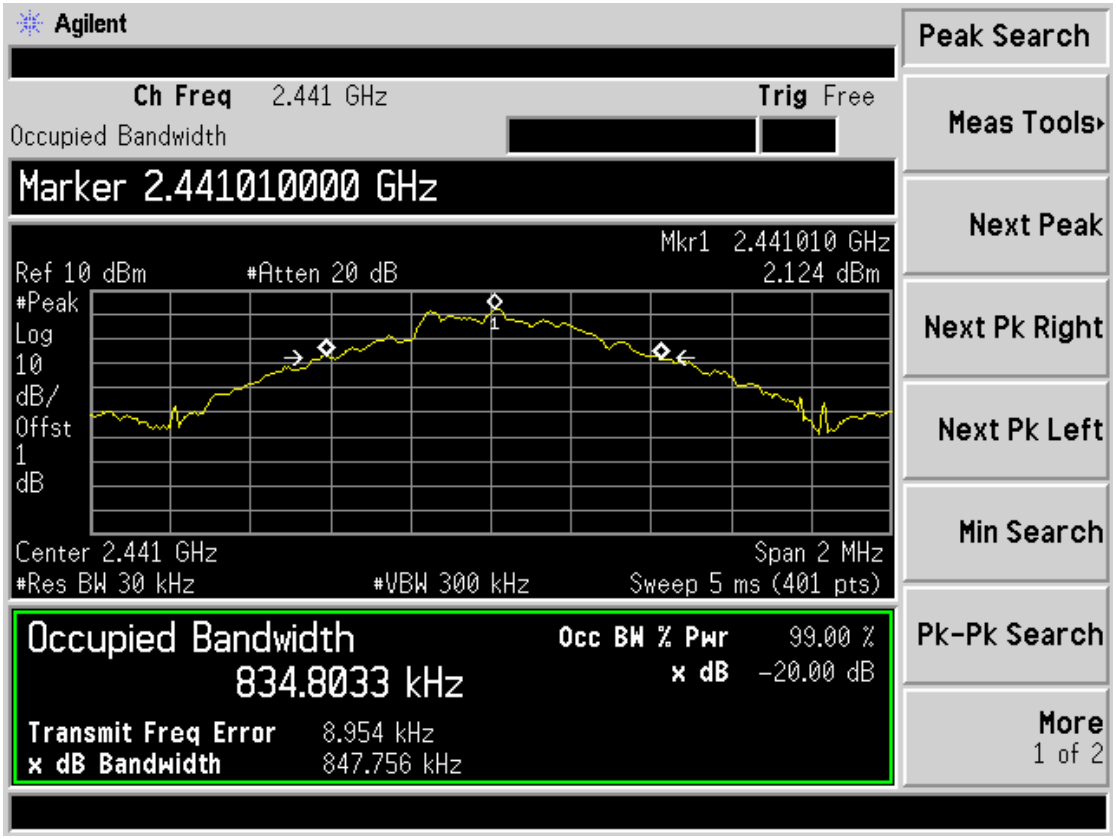
CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	LIMIT (MHz)	PASS/FAIL
2402	1.219	/	PASS
2441	1.220	/	PASS
2480	1.216	/	PASS

Photos of 20dB Bandwidth Measurement(BDR Mode)

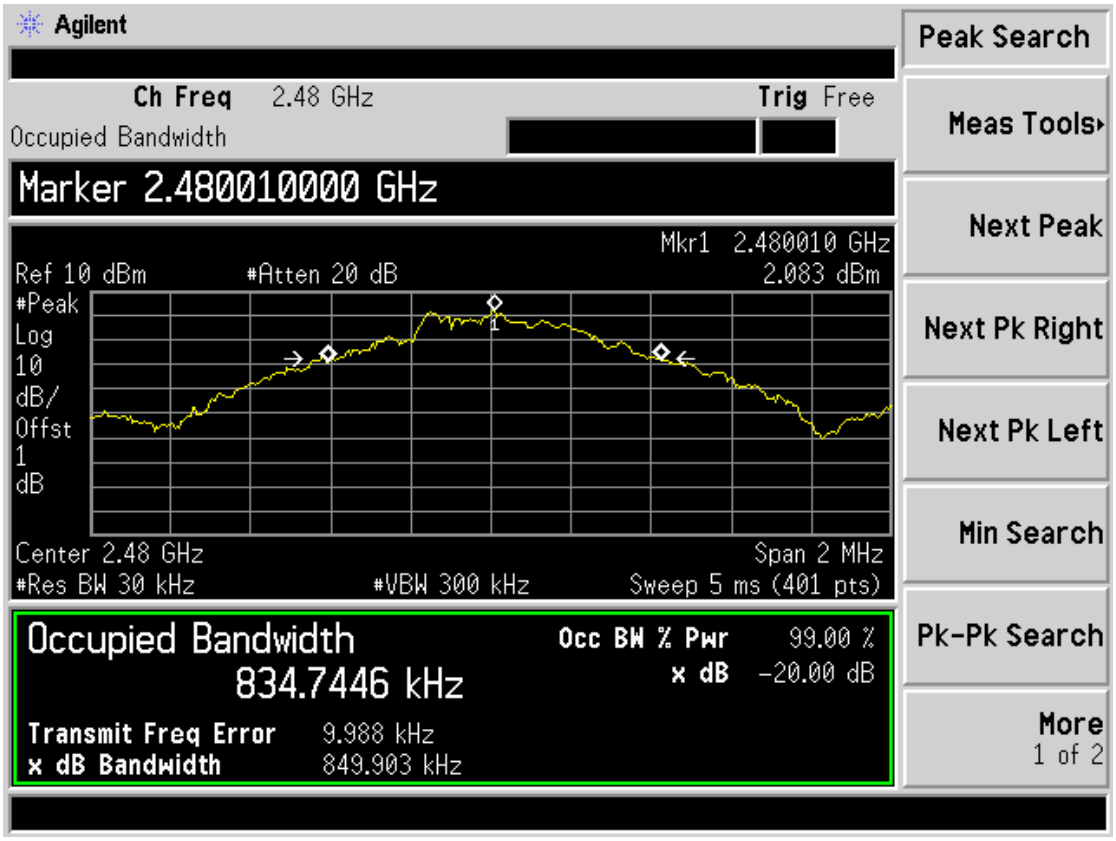
Low Channel



Middle Channel

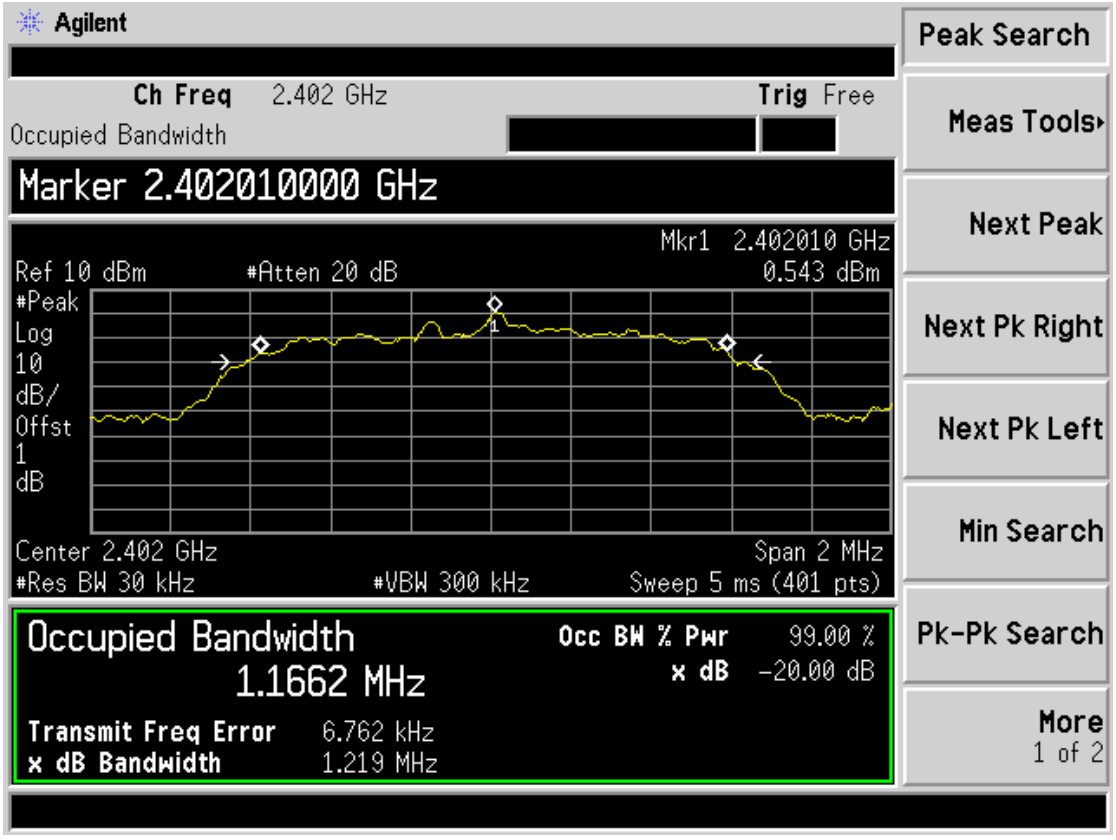


High Channel

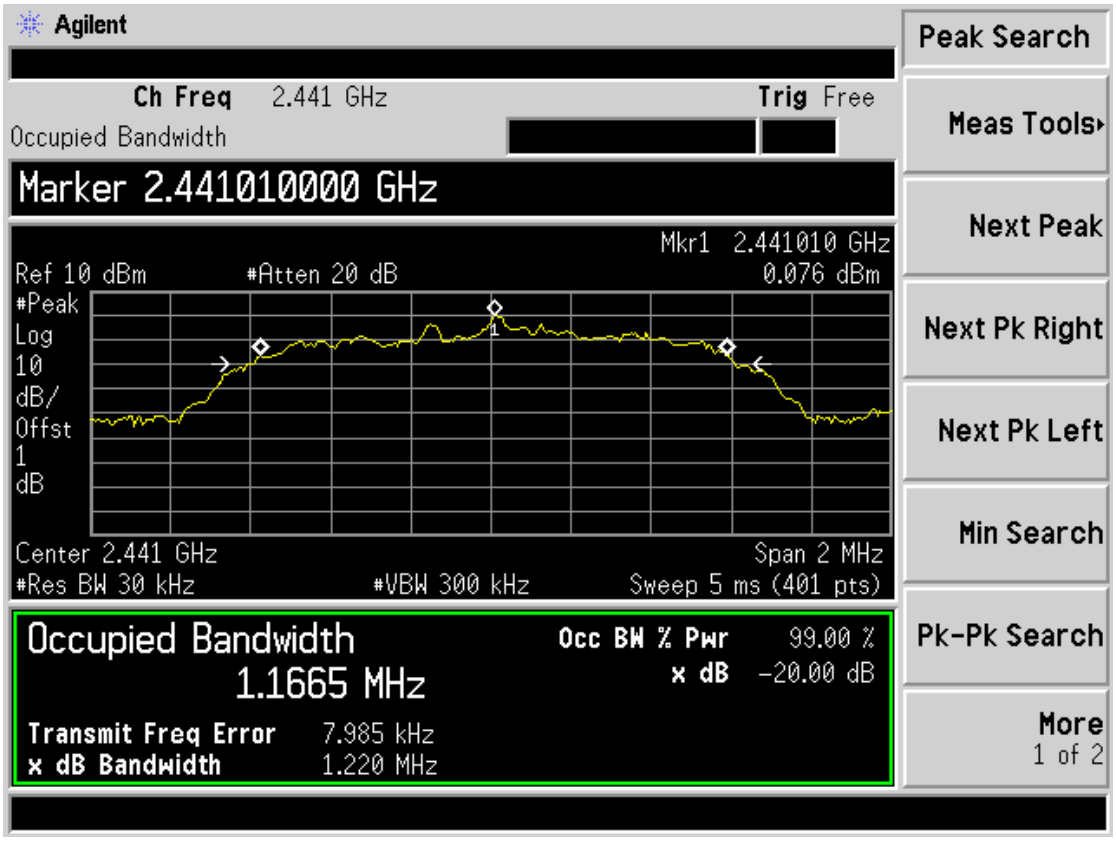


Photos of 20dB Bandwidth Measurement(EDR Mode)

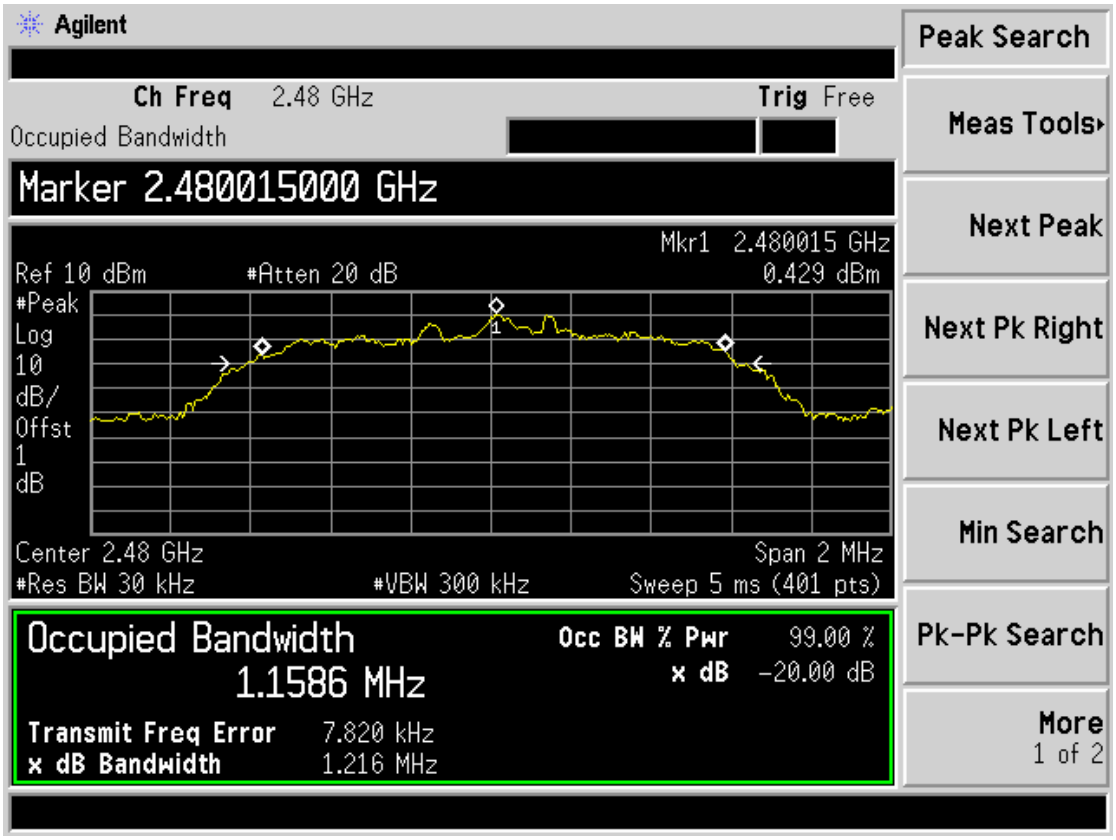
Low Channel



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.

LIMIT

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)

TEST RESULTS

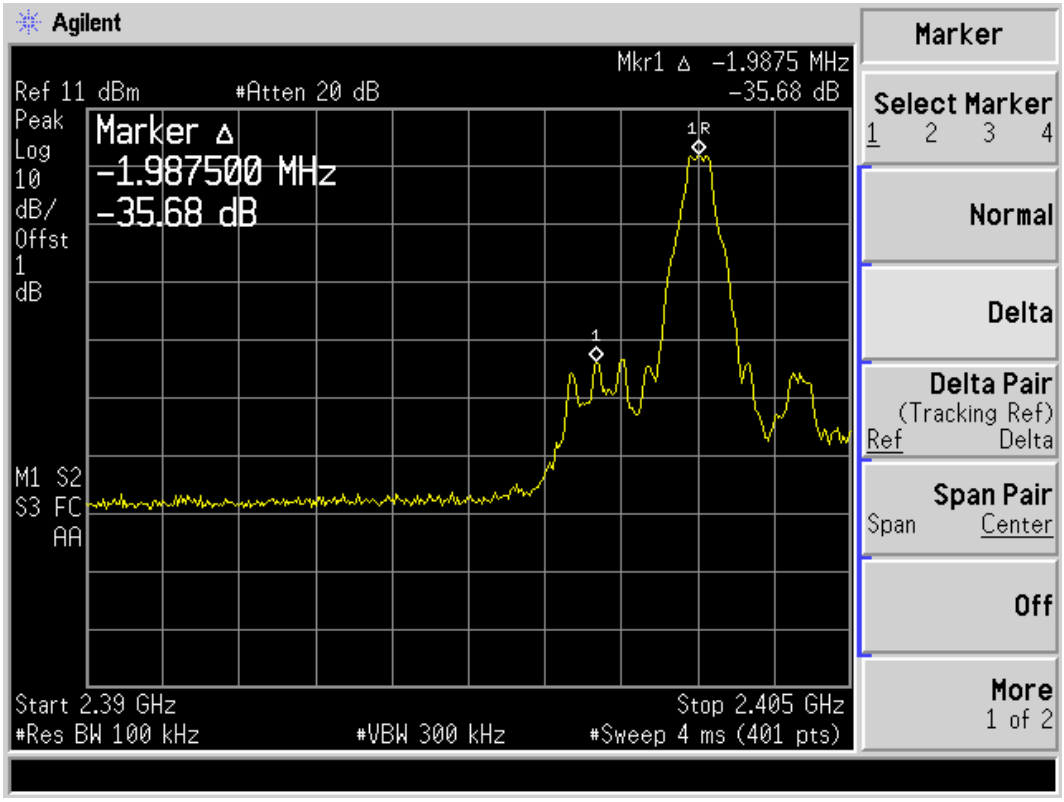
Both radiated and conducted band edge were measurement BDR and EDR mode,recording worst case(BDR mode) in test report

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Polari-zation
Out of left side band					
2390.00	58.69	74	15.31	PK	Horizontal
2390.00	46.64	54	7.36	AV	Horizontal
2390.00	58.11	74	15.89	PK	Vertical
2390.00	49.04	54	4.96	AV	Vertical
Out of right side band					
2483.50	56.26	74	17.74	PK	Horizontal
2483.50	46.66	54	7.34	AV	Horizontal
2483.50	57.74	74	16.26	PK	Vertical
2483.50	47.64	54	6.36	AV	Vertical

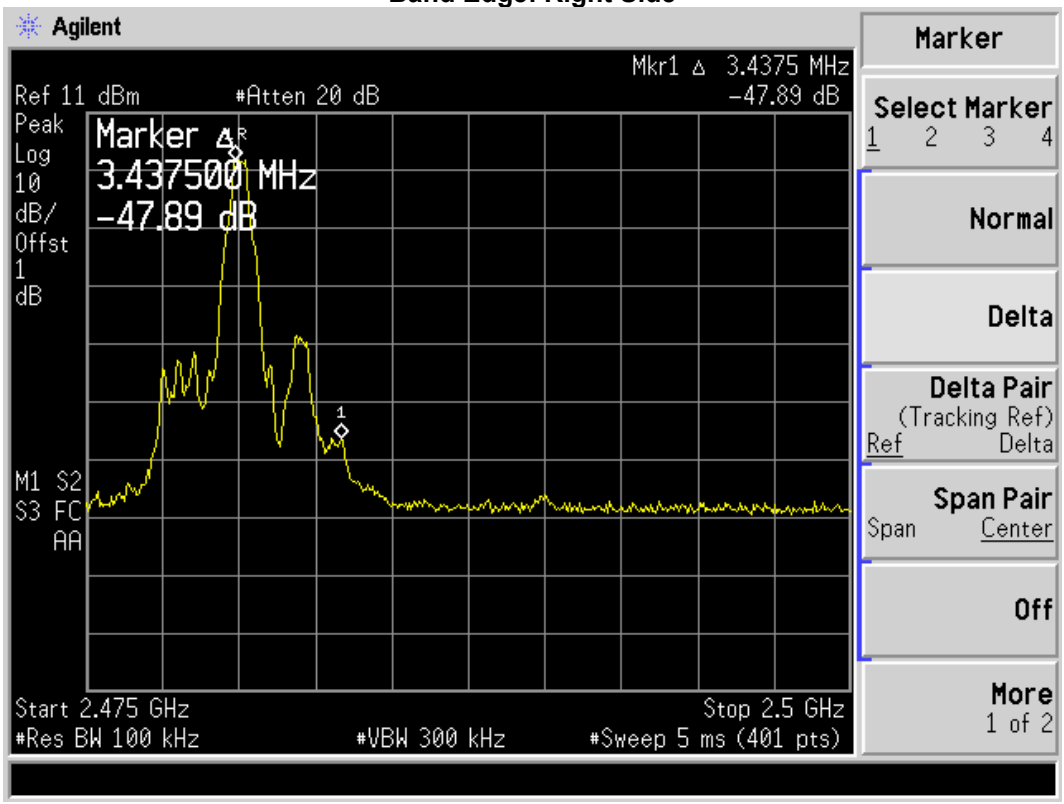
Photos of Conducted Band Edge Measurement（BDR Mode）

Frequency	Delta peak to band emission	Limit(dBc)
2400MHz	35.68	20
2483.5MHz	47.89	20

Band Edge: Left Side

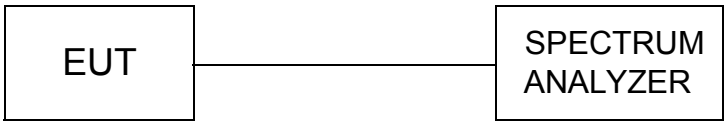


Band Edge: Right Side



4.6. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength , and mwasure frequeny range from 30MHz to 25GHz.

LIMIT

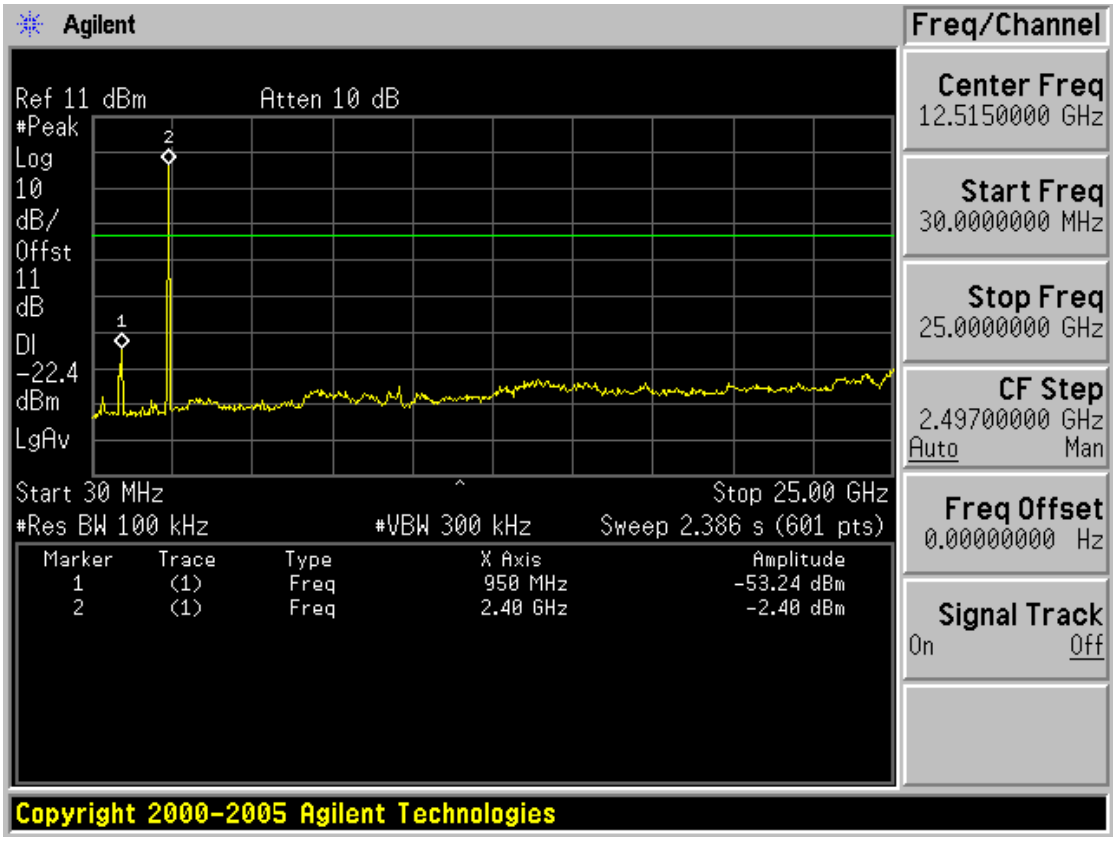
1. Below -20dB of the highest emission level in operating band.

2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

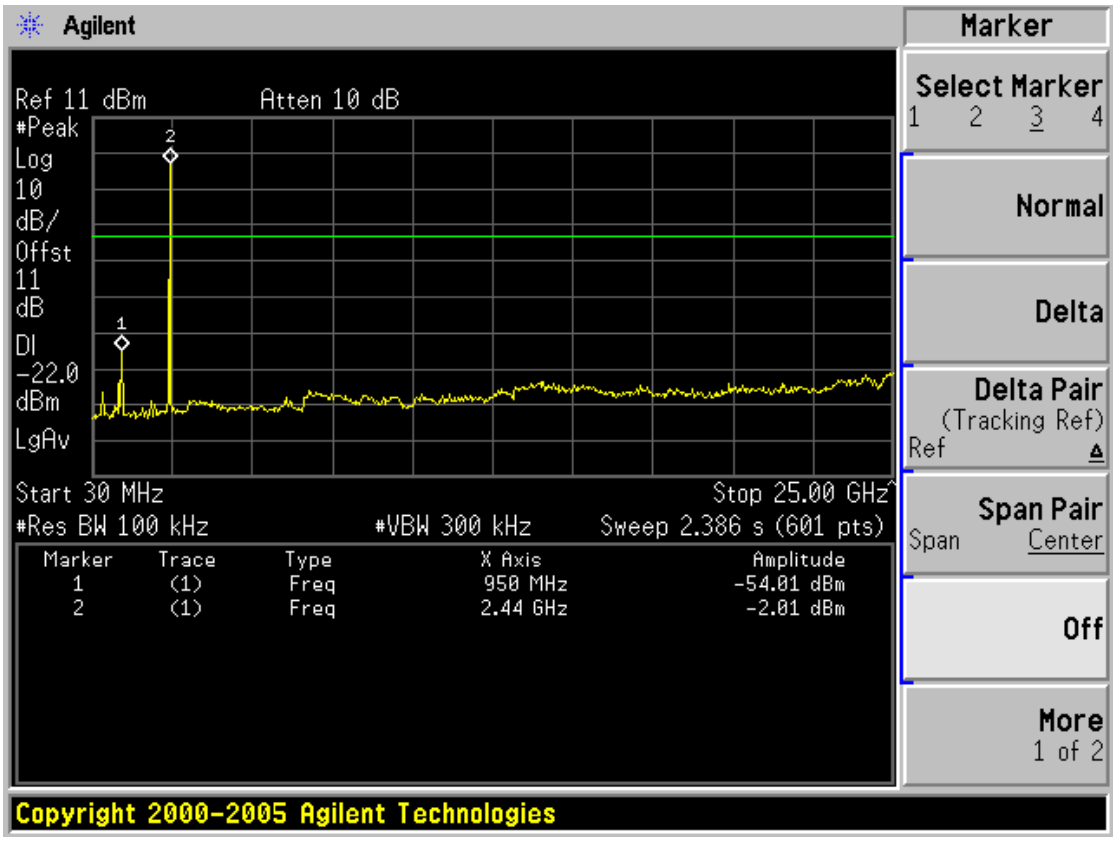
TEST RESULTS

Photos of Spurious RF Conducted Emission Measurement（BDR Mode）

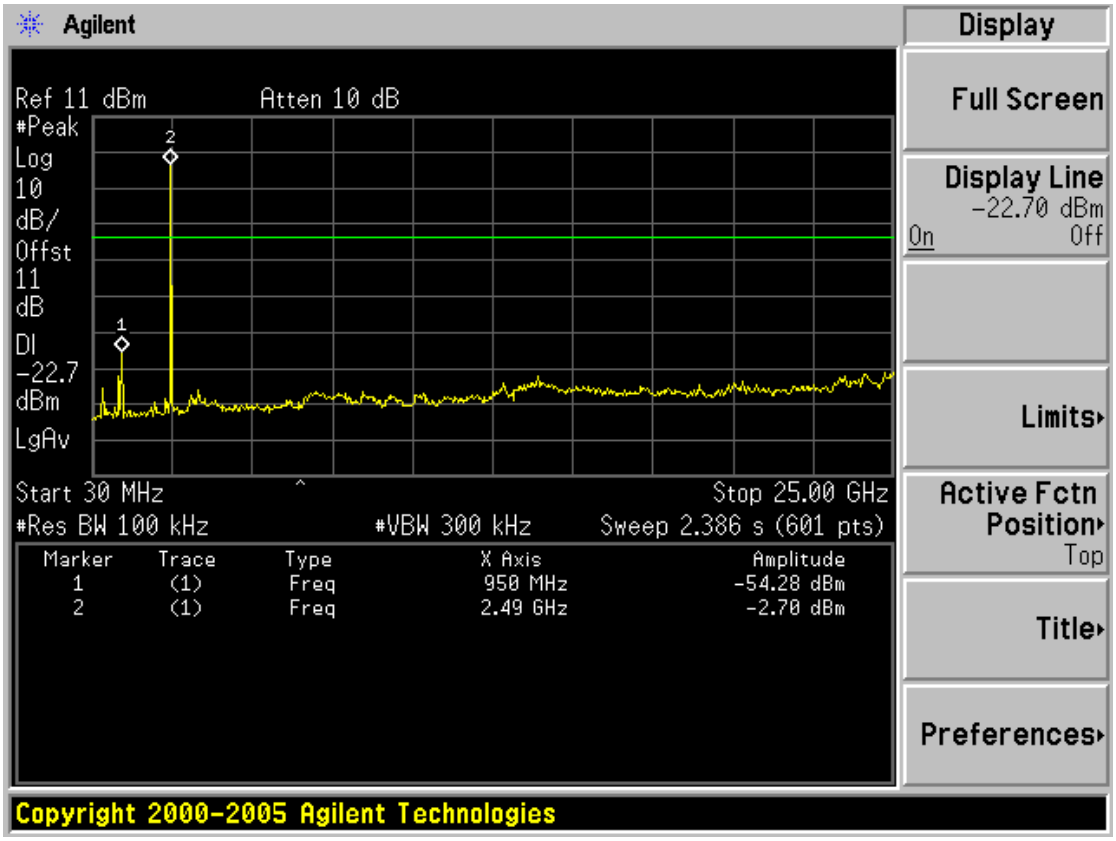
Low channel



Middle channel

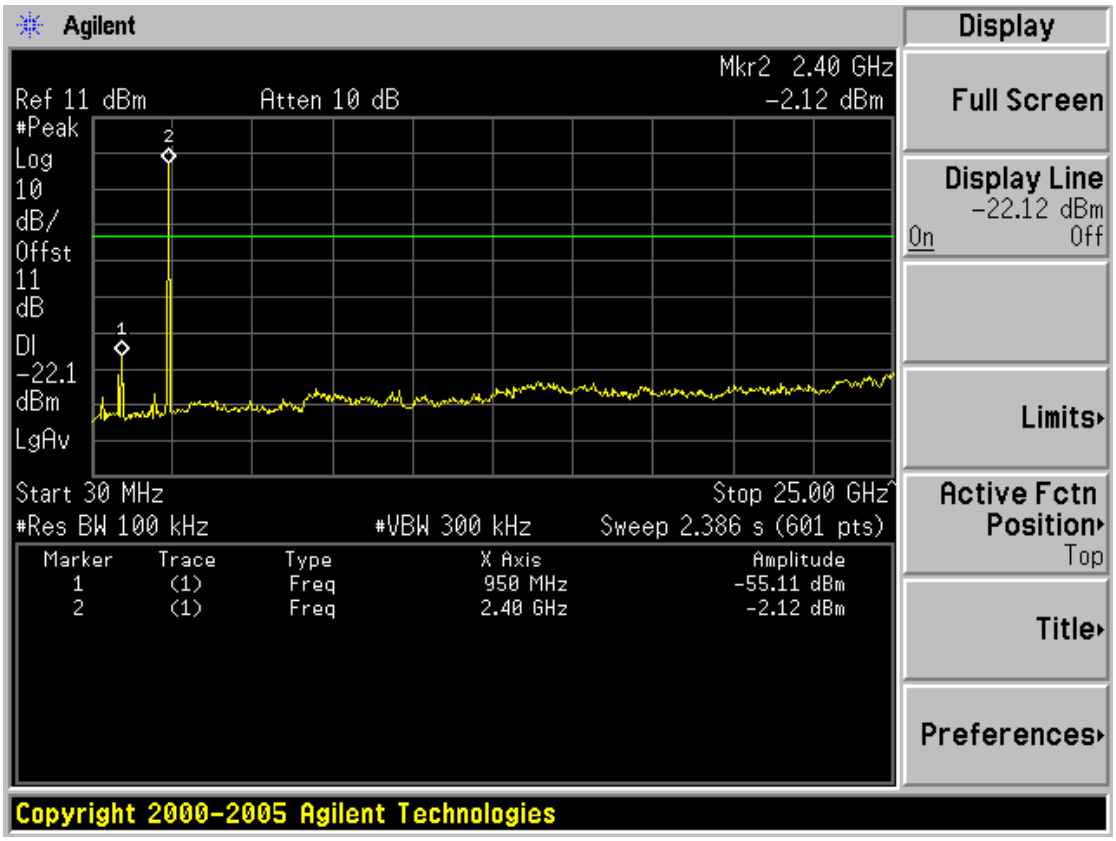


High channel

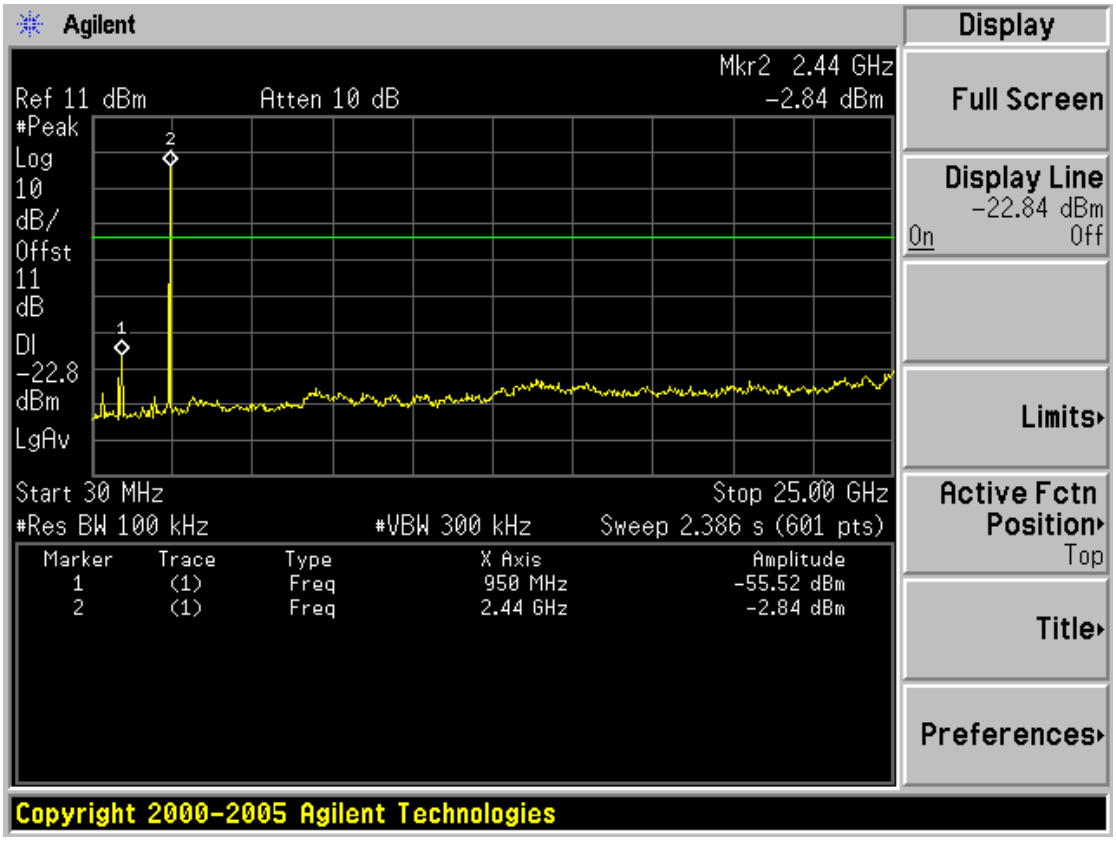


Photos of Spurious RF Conducted Emission Measurement（EDR Mode）

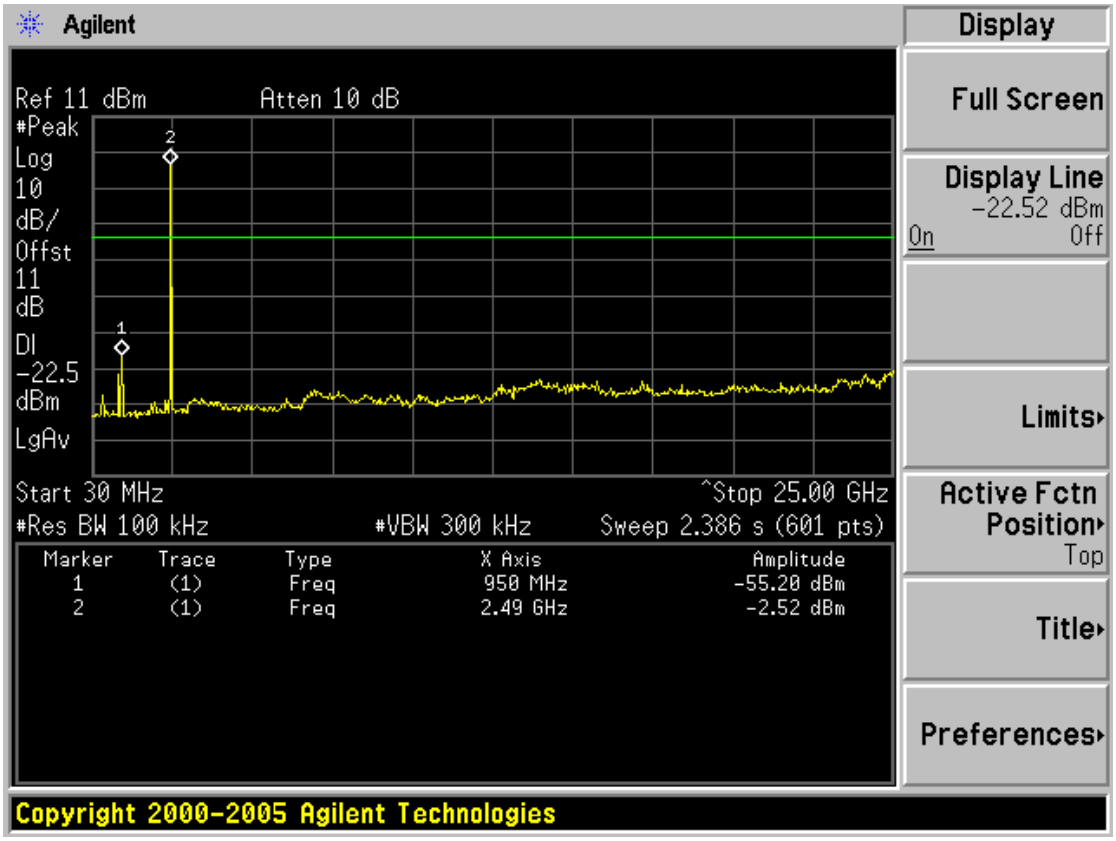
Low channel



Middle channel

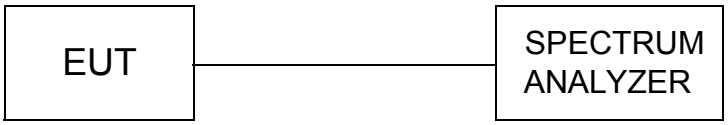


High channel



4.7. 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 with30 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*20dB bandwidth of the hopping channel, whichever is greater.

TEST RESULTS

BDR Mode:

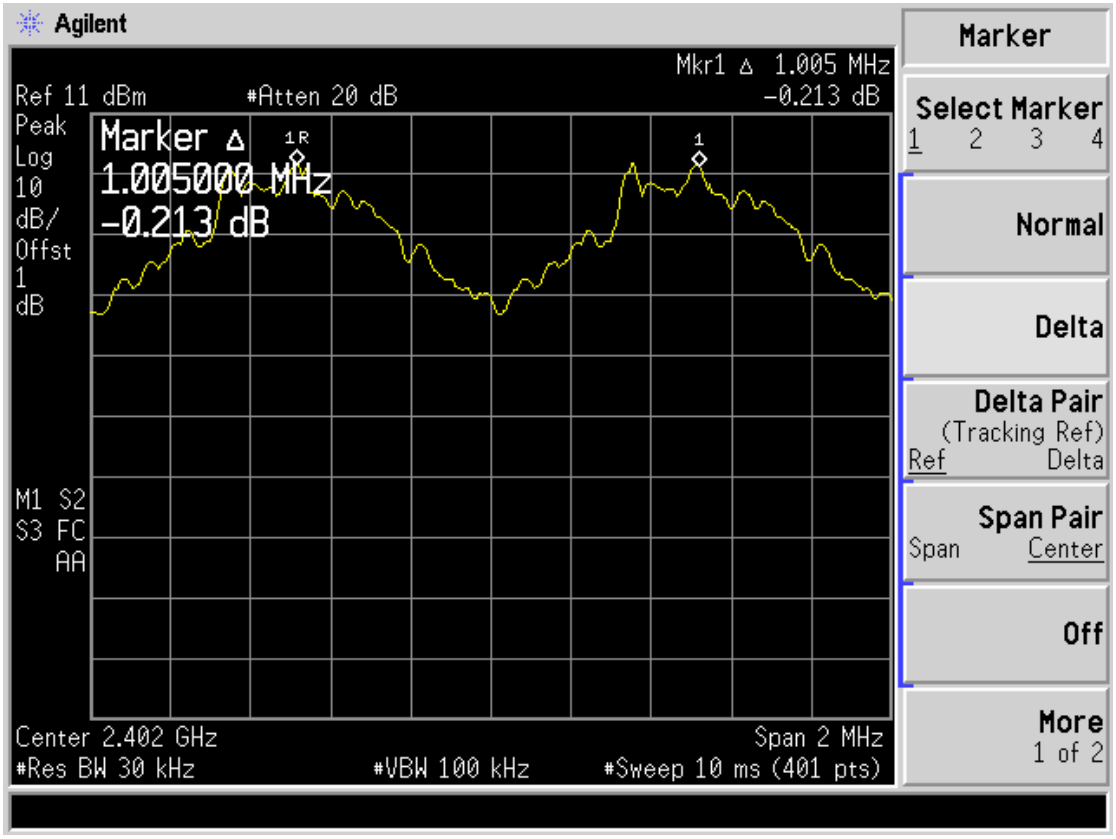
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.005	25KHz or 2/3*20dB bandwidth	Pass
Adjacency Channel	2403			
Mid Channel	2441	1.005	25KHz or 2/3*20dB bandwidth	Pass
Adjacency Channel	2442			
High Channel	2479	1.005	25KHz or 2/3*20dB bandwidth	Pass
Adjacency Channel	2480			

EDR Mode:

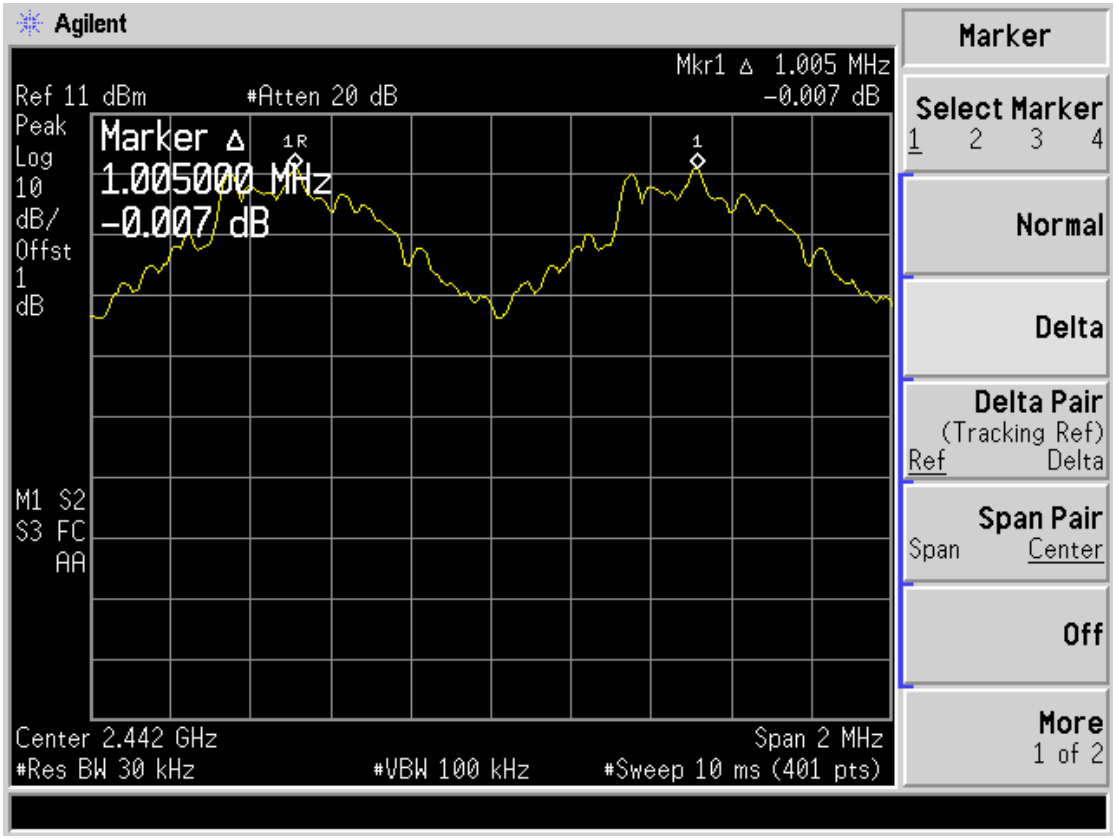
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.005	25KHz or 2/3*20dB bandwidth	Pass
Adjacency Channel	2403			
Mid Channel	2441	1.005	25KHz or 2/3*20dB bandwidth	Pass
Adjacency Channel	2442			
High Channel	2479	1.005	25KHz or 2/3*20dB bandwidth	Pass
Adjacency Channel	2480			

Photos of Frequency separation Measurement(BDR Mode)

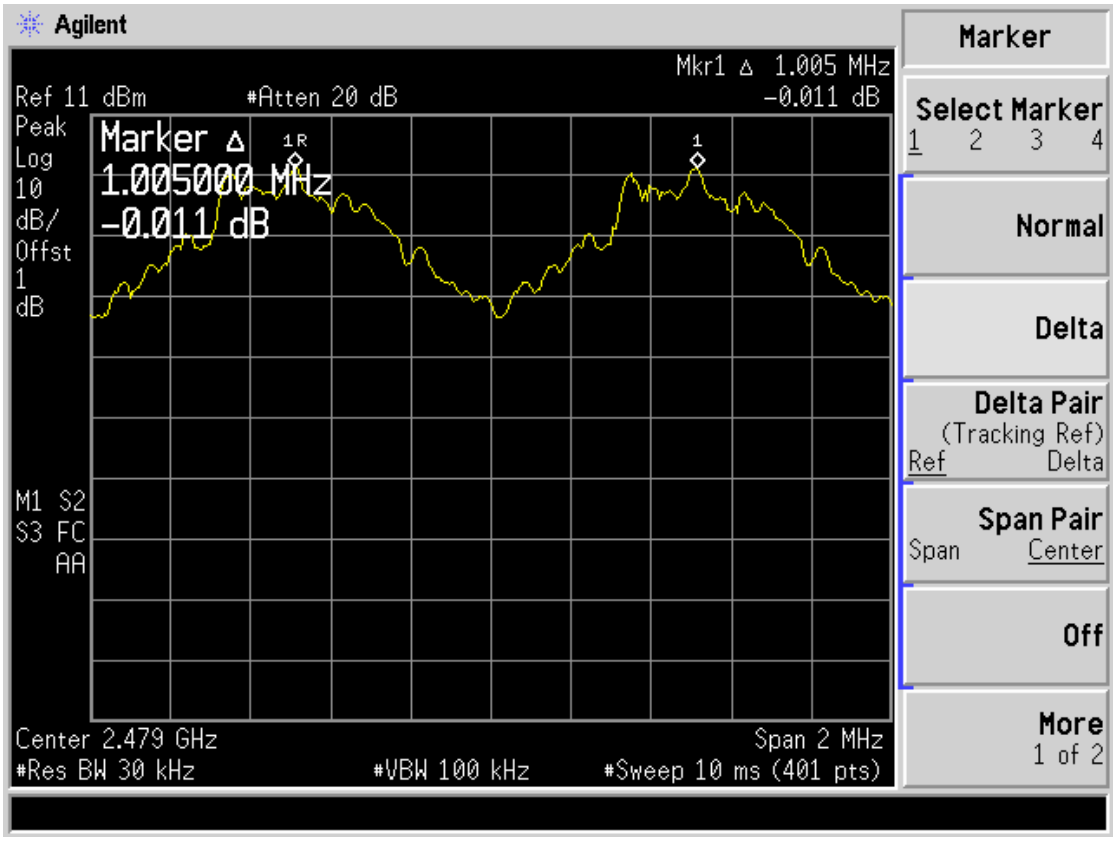
Low channel



Middle channel

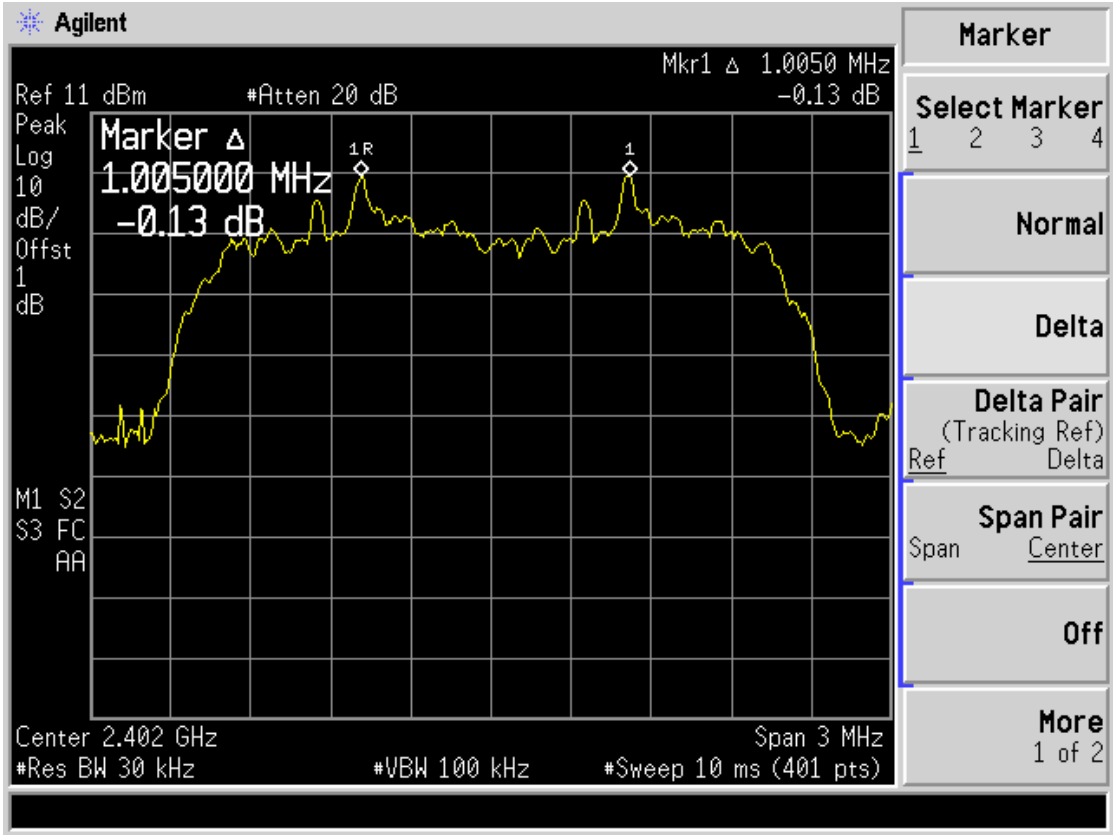


High channel

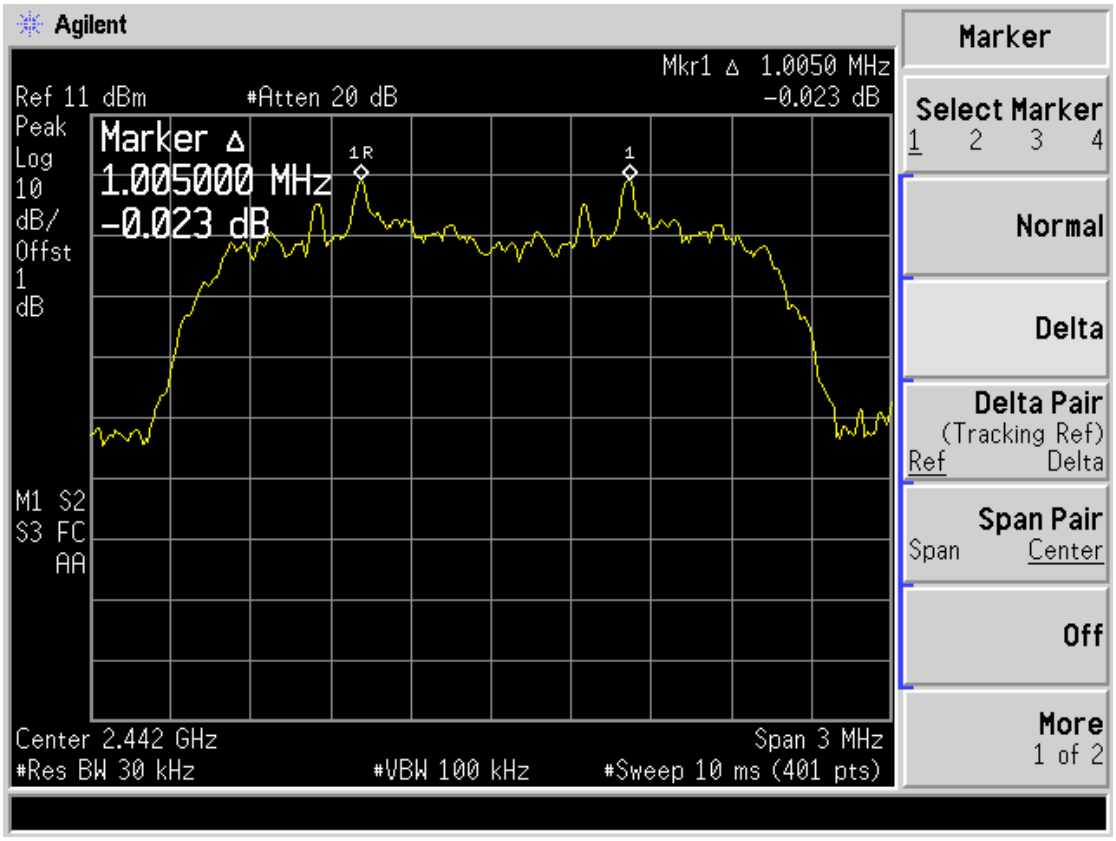


Photos of Frequency separation Measurement(EDR Mode)

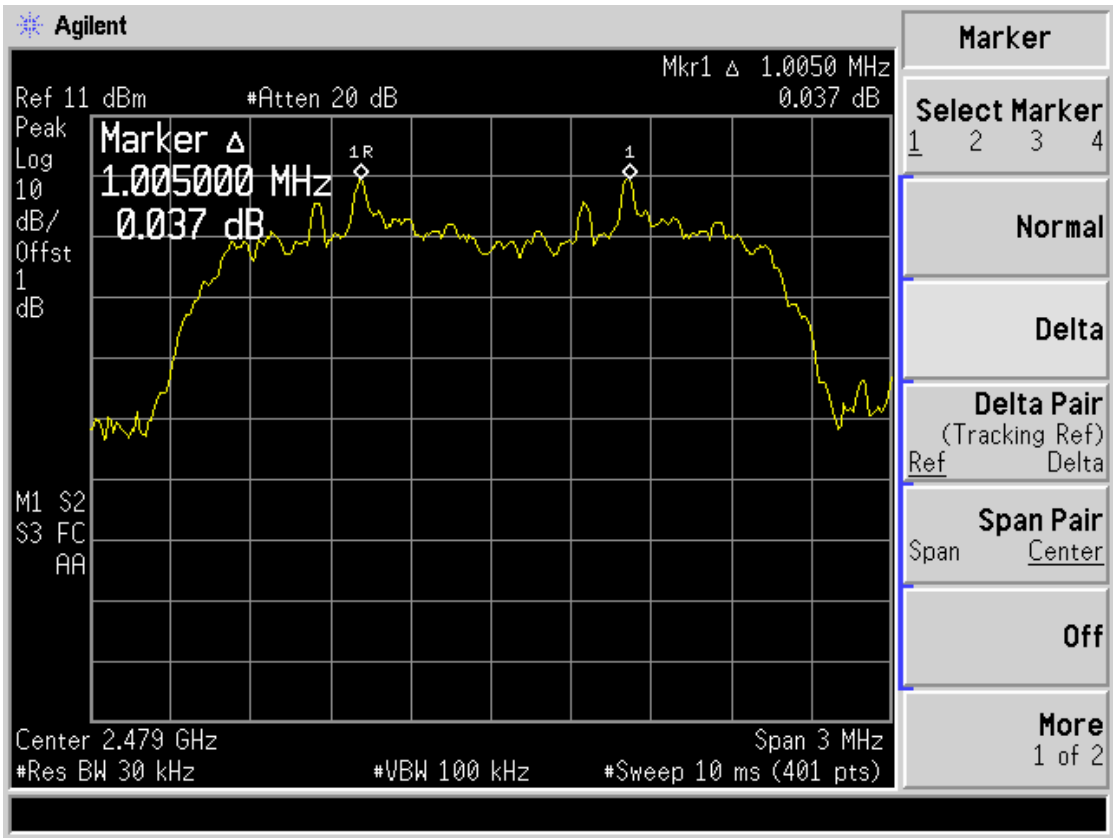
Low channel



Middle channel

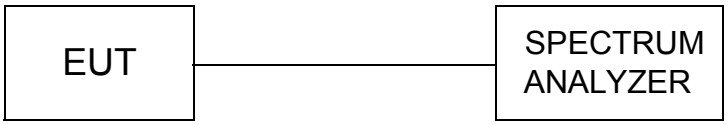


High channel



4.8. 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 100 KHz RBW and 300KHz VBW.

LIMIT

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

TEST RESULTS

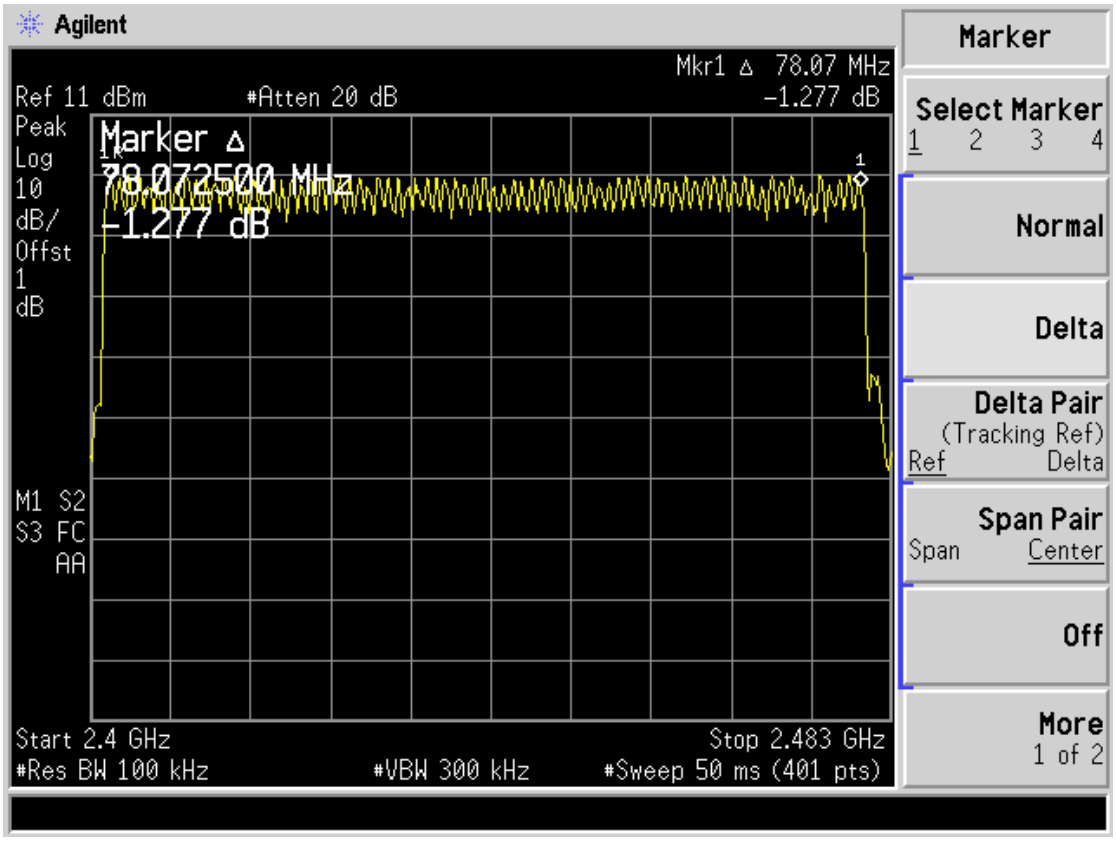
BDR Mode:

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

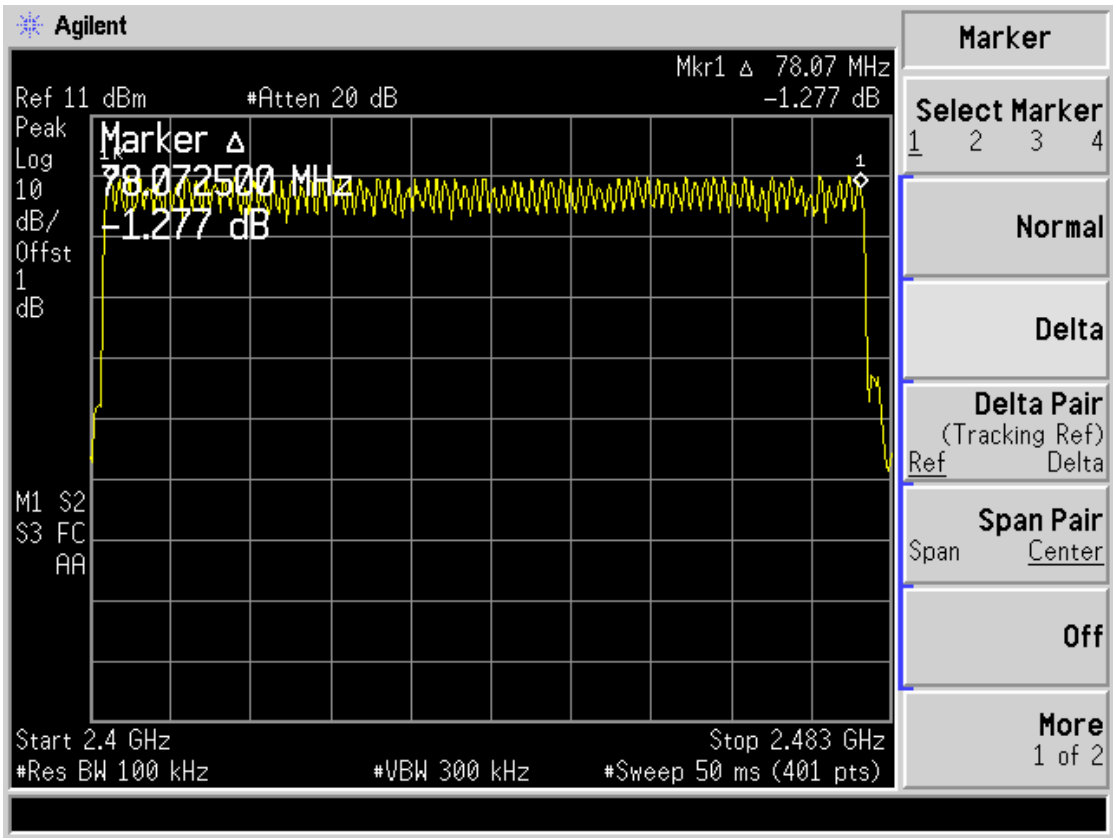
EDR Mode:

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

Photos of Number of hopping channel Measurement(BDR Mode)

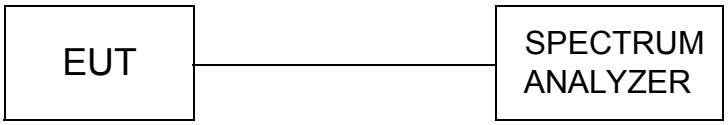


Photos of Number of hopping channel Measurement(BDR Mode)



4.9. 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:

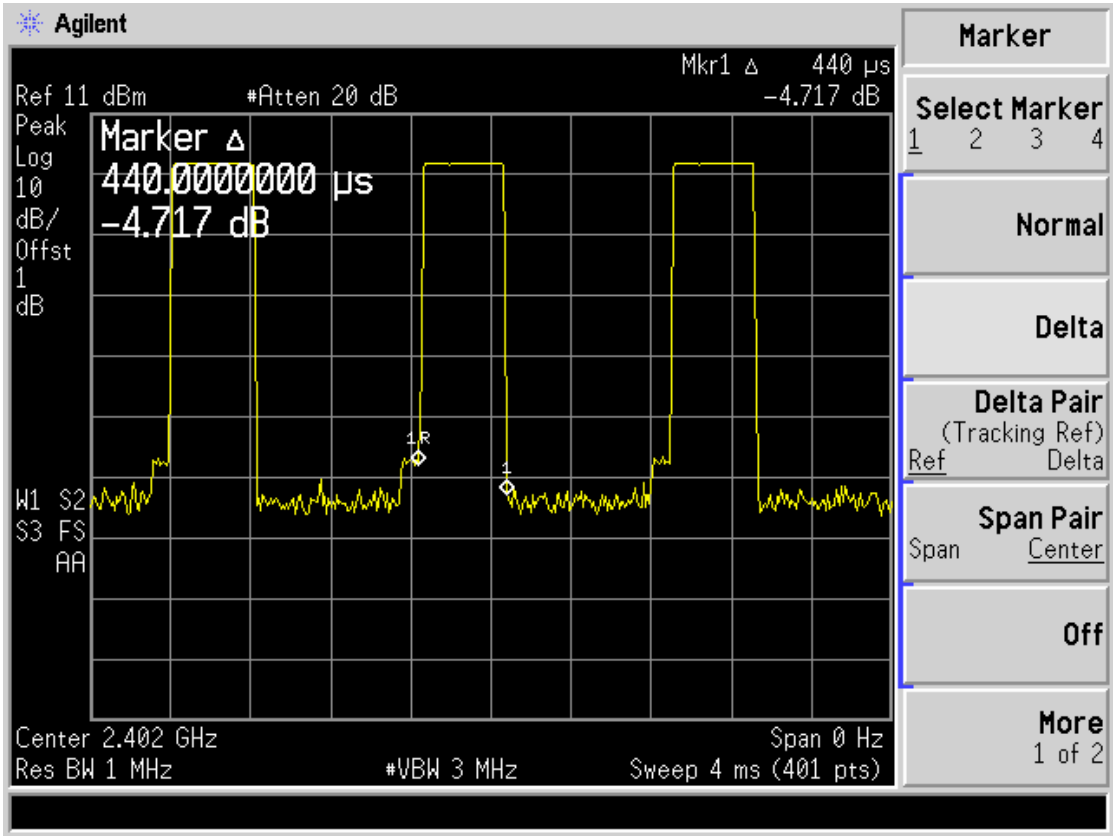
Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Low	0.440	0.1408	0.4	Pass
	Middle	0.440	0.1408	0.4	Pass
	High	0.440	0.1408	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Low	1.7125	0.2740	0.4	Pass
	Middle	1.7000	0.2720	0.4	Pass
	High	1.7000	0.2720	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Low	2.975	0.3173	0.4	Pass
	Middle	2.975	0.3173	0.4	Pass
	High	2.975	0.3173	0.4	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

EDR Mode:

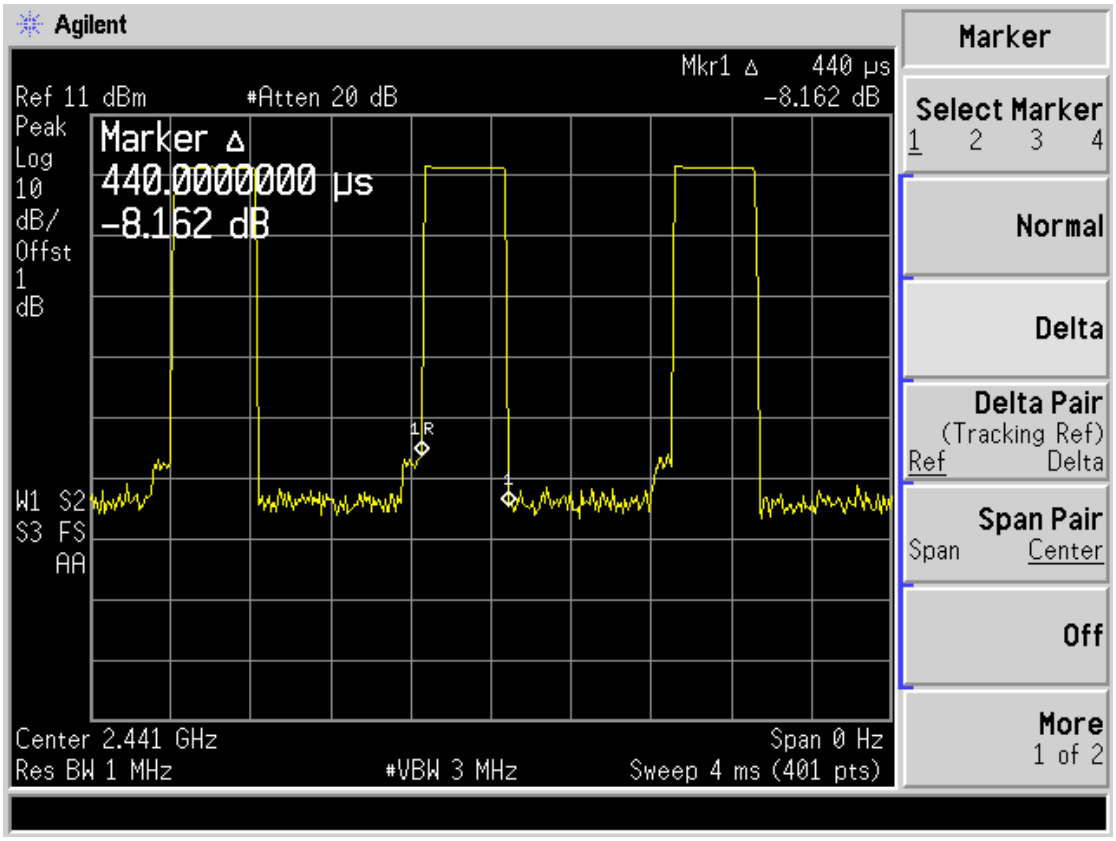
Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Low	0.450	0.1440	0.4	Pass
	Middle	0.450	0.1440	0.4	Pass
	High	0.450	0.1440	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Low	1.2125	0.1940	0.4	Pass
	Middle	1.2125	0.1940	0.4	Pass
	High	1.2125	0.1940	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Low	2.975	0.3173	0.4	Pass
	Middle	2.975	0.3173	0.4	Pass
	High	3.000	0.3200	0.4	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

Photos of Dwel time Measurement(BDR)

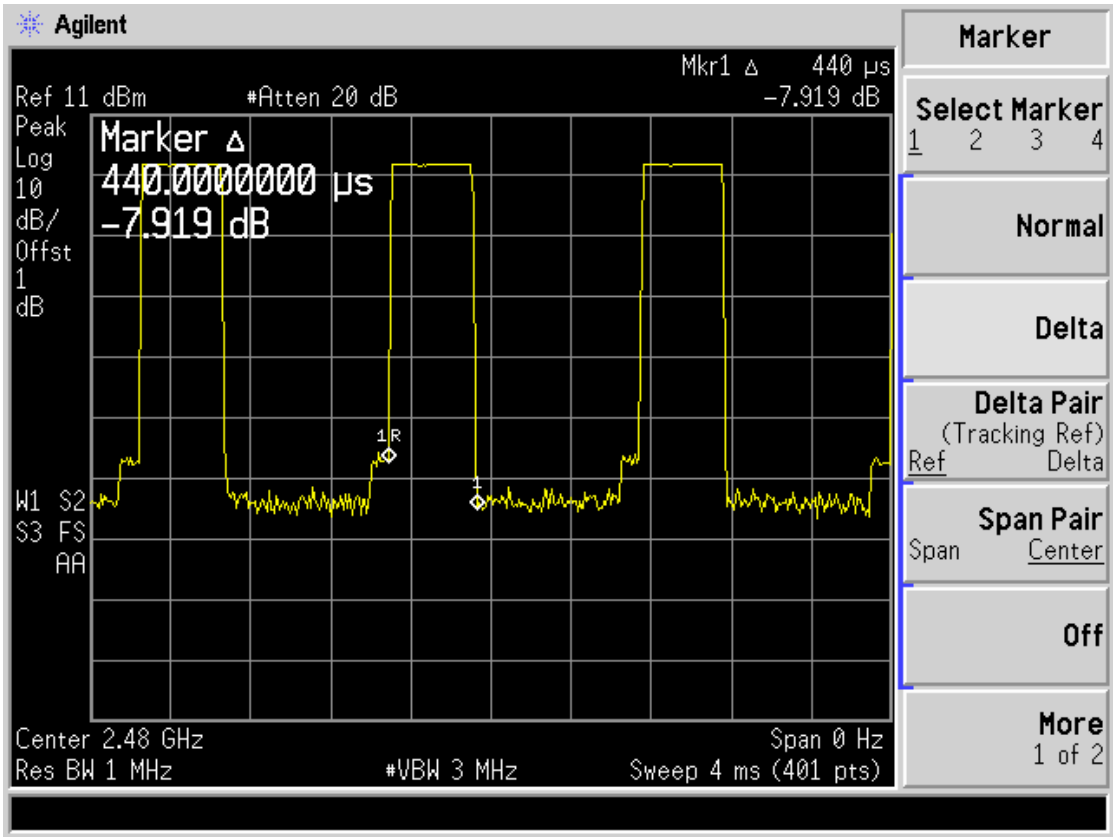
DH1-Low channel



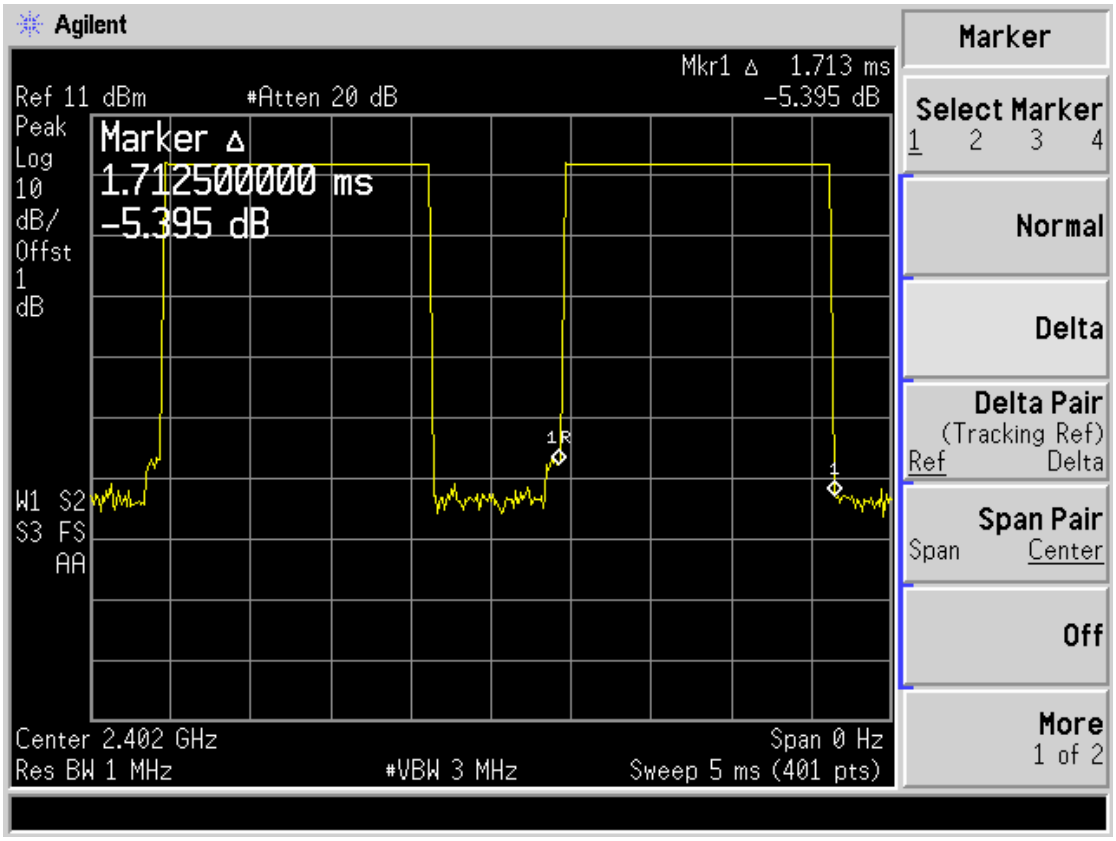
DH1-Middle channel



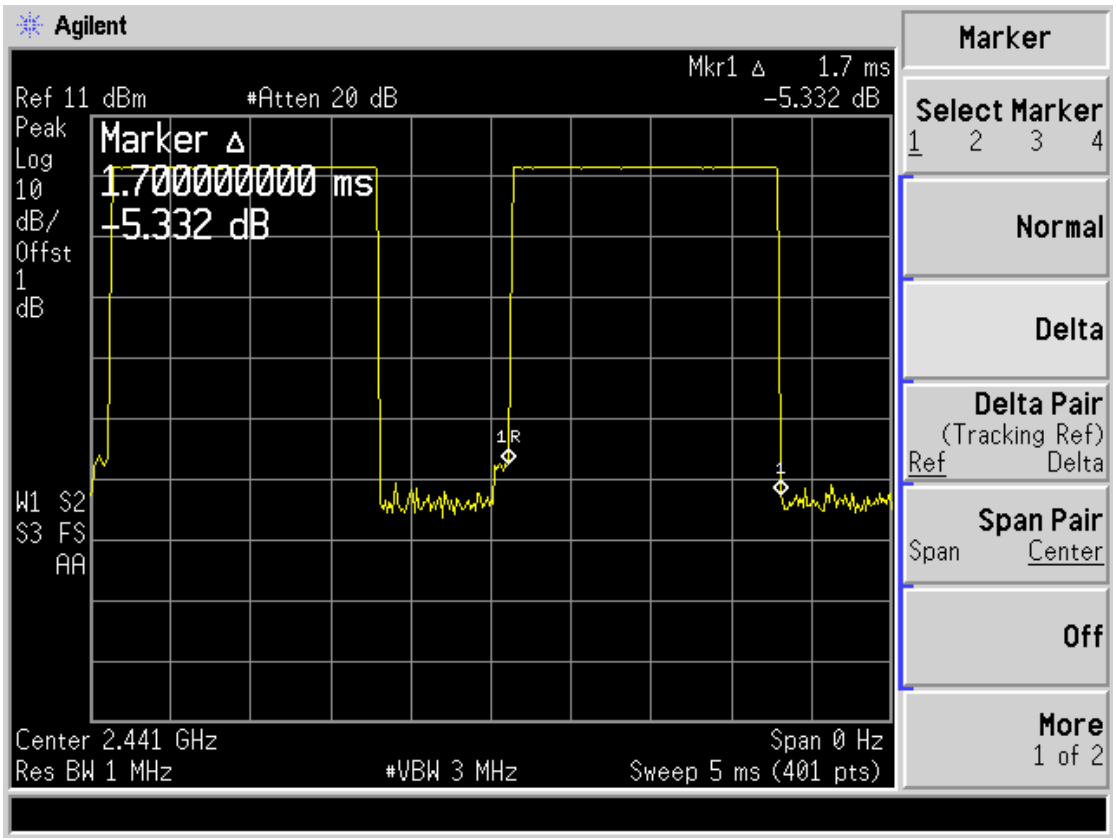
DH1-High channel



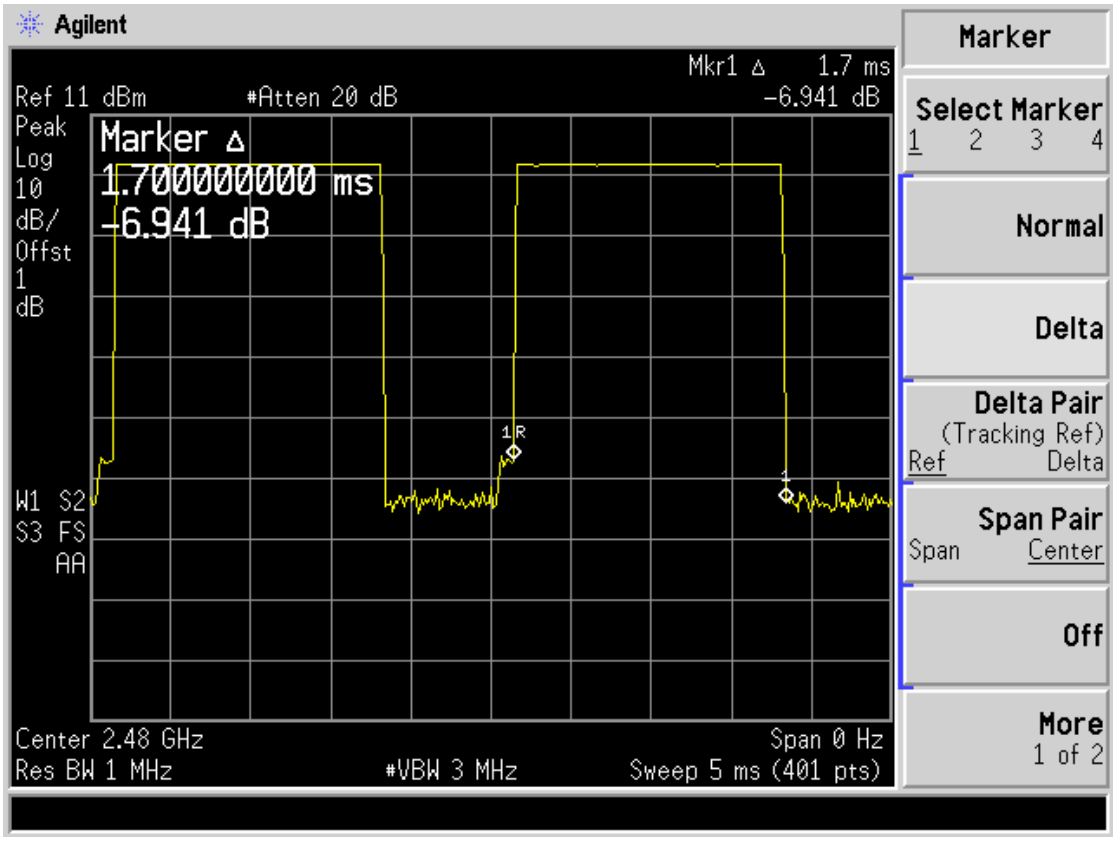
DH3-Low channel



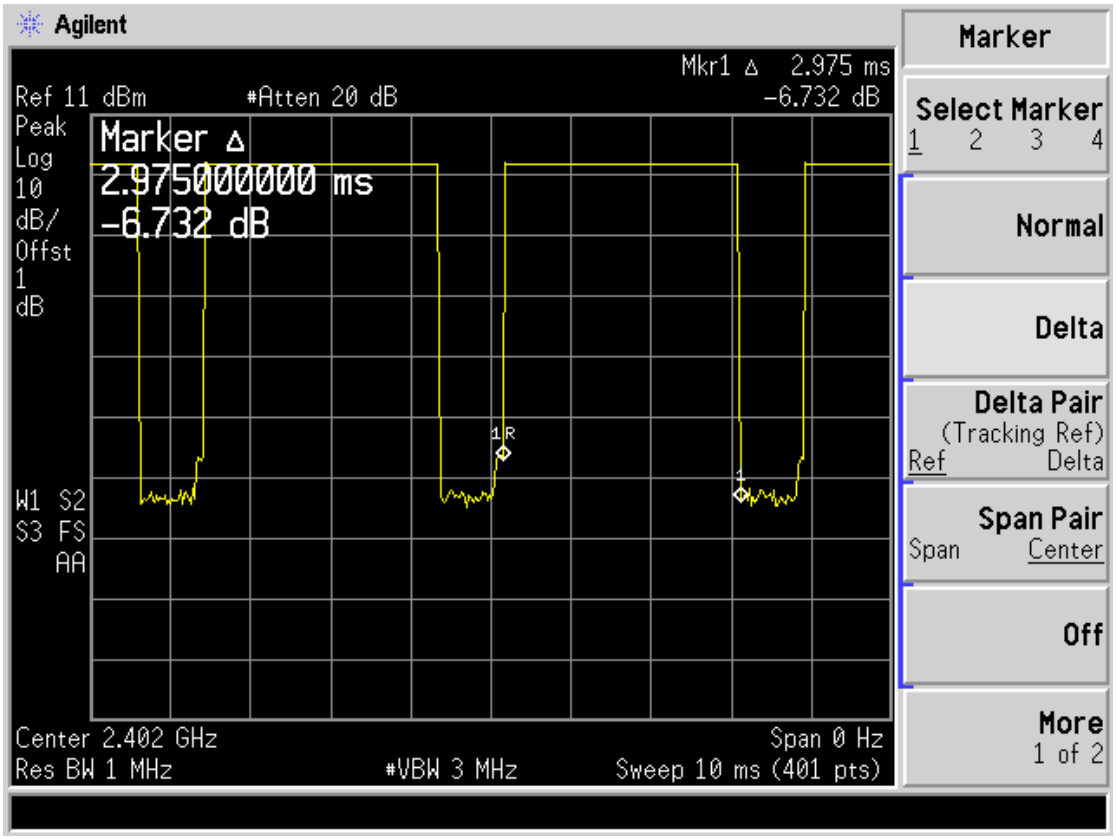
DH3-Middle channel



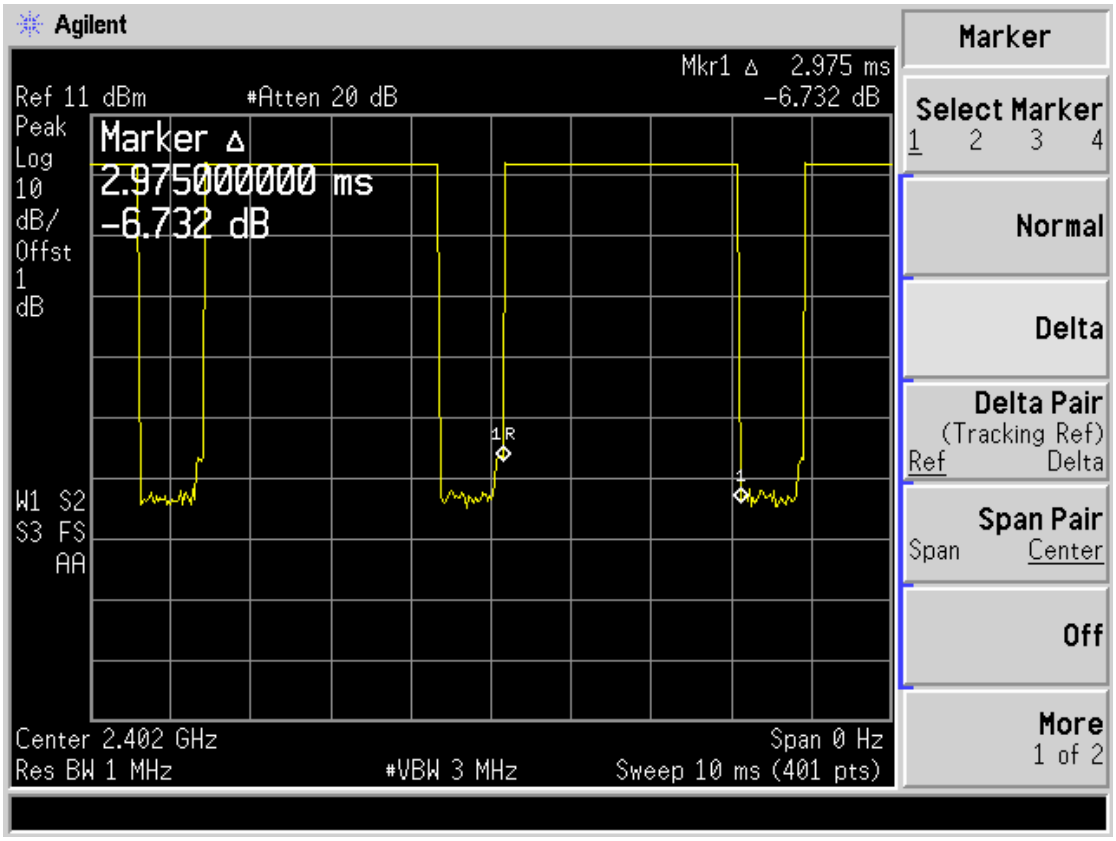
DH3-High channel



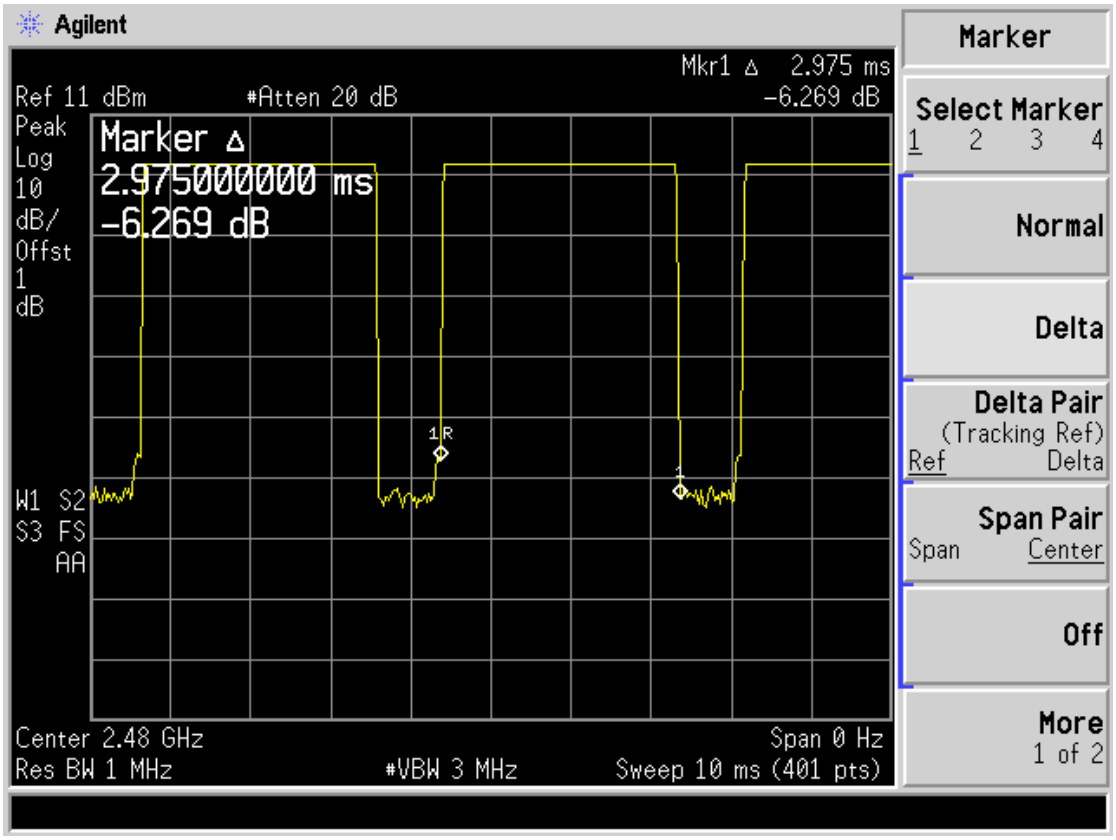
DH5-Low channel



DH5-Middle channel

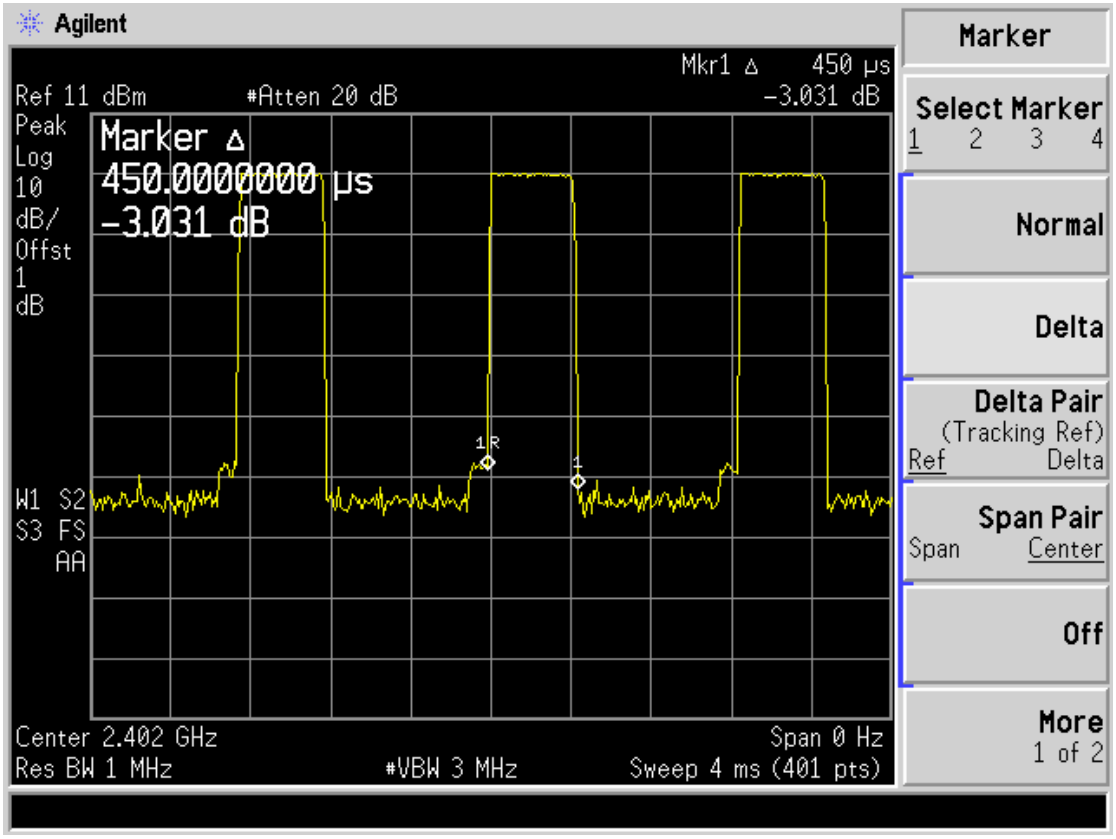


DH5-High channel

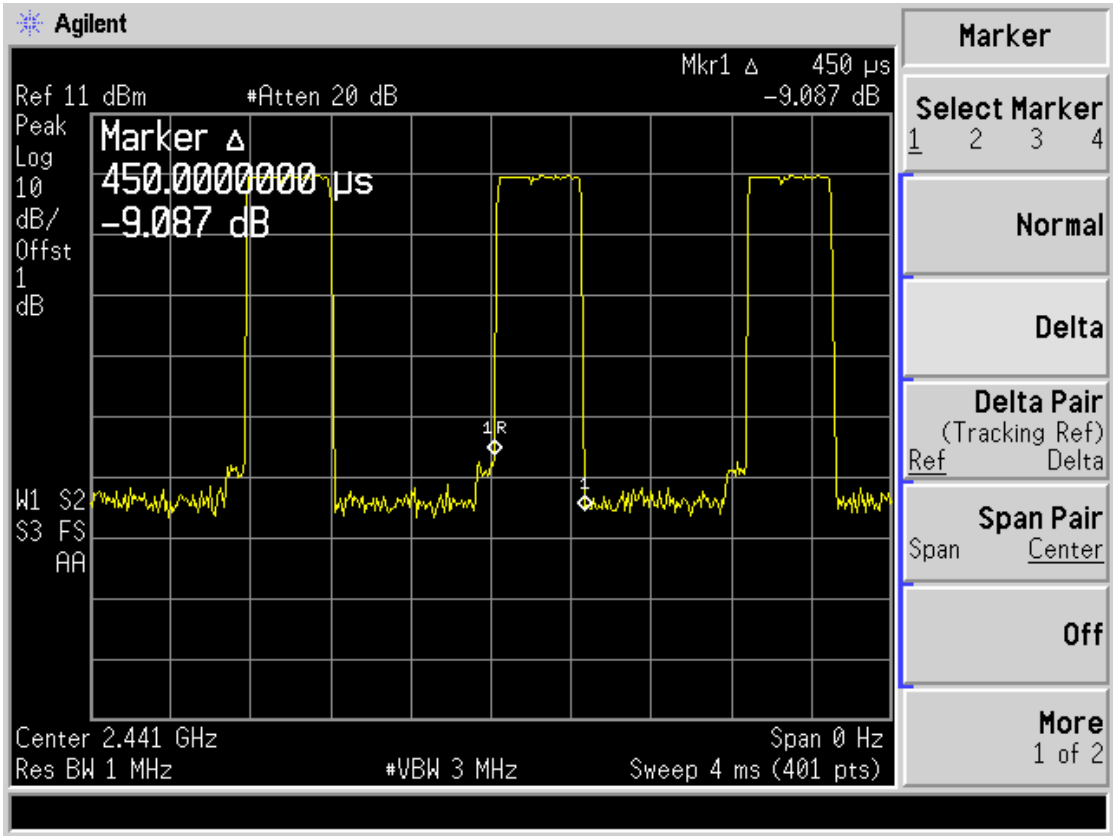


Photos of Dwel time Measurement(EDR)

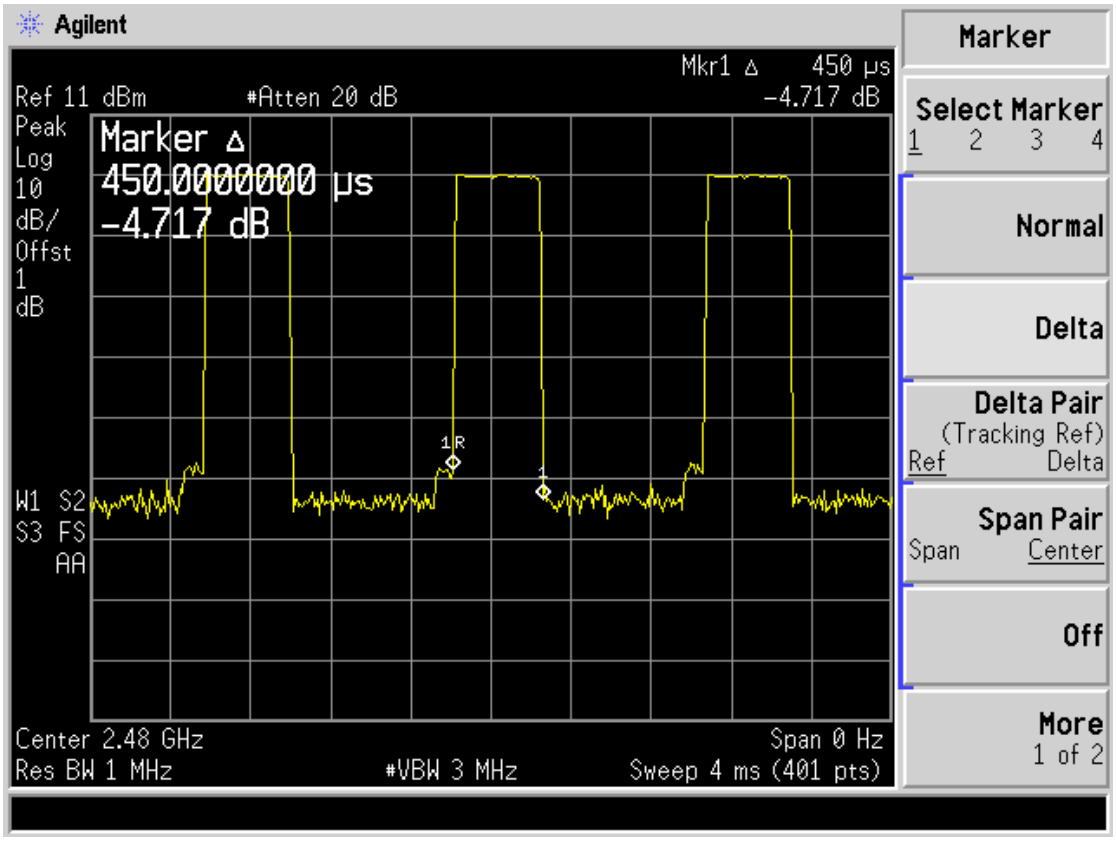
DH1-Low channel



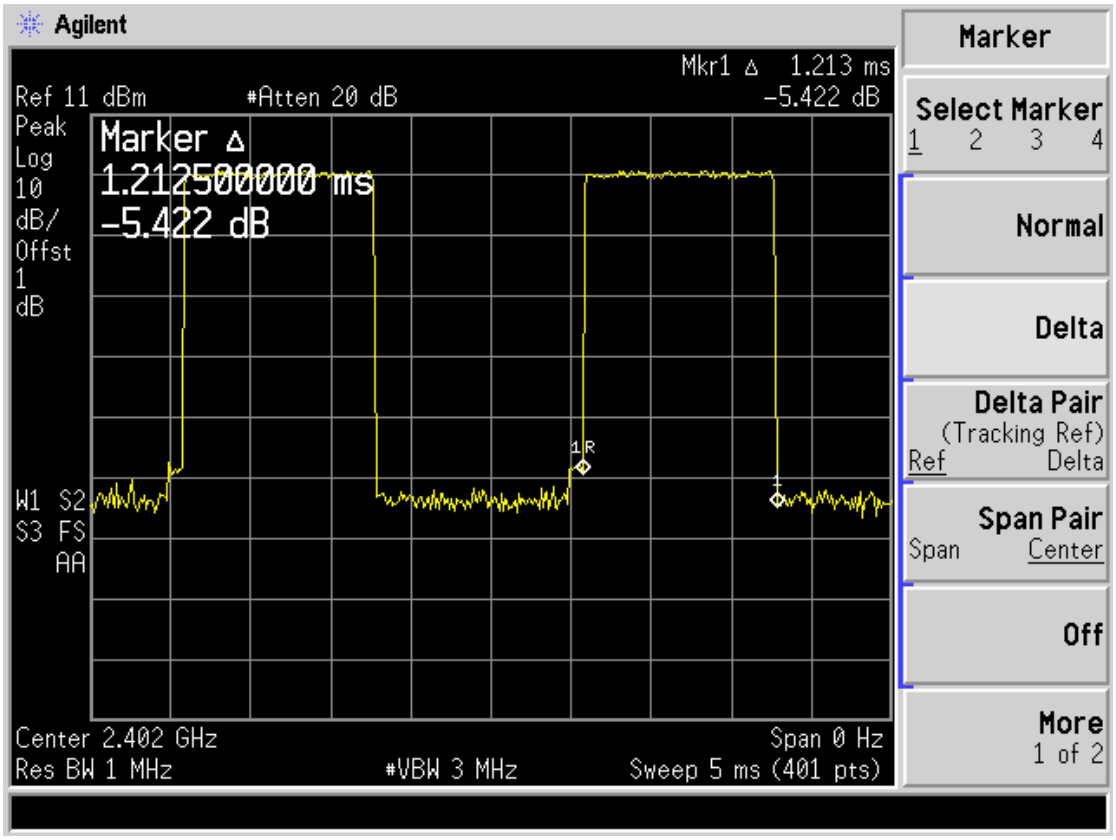
DH1-Middle channel



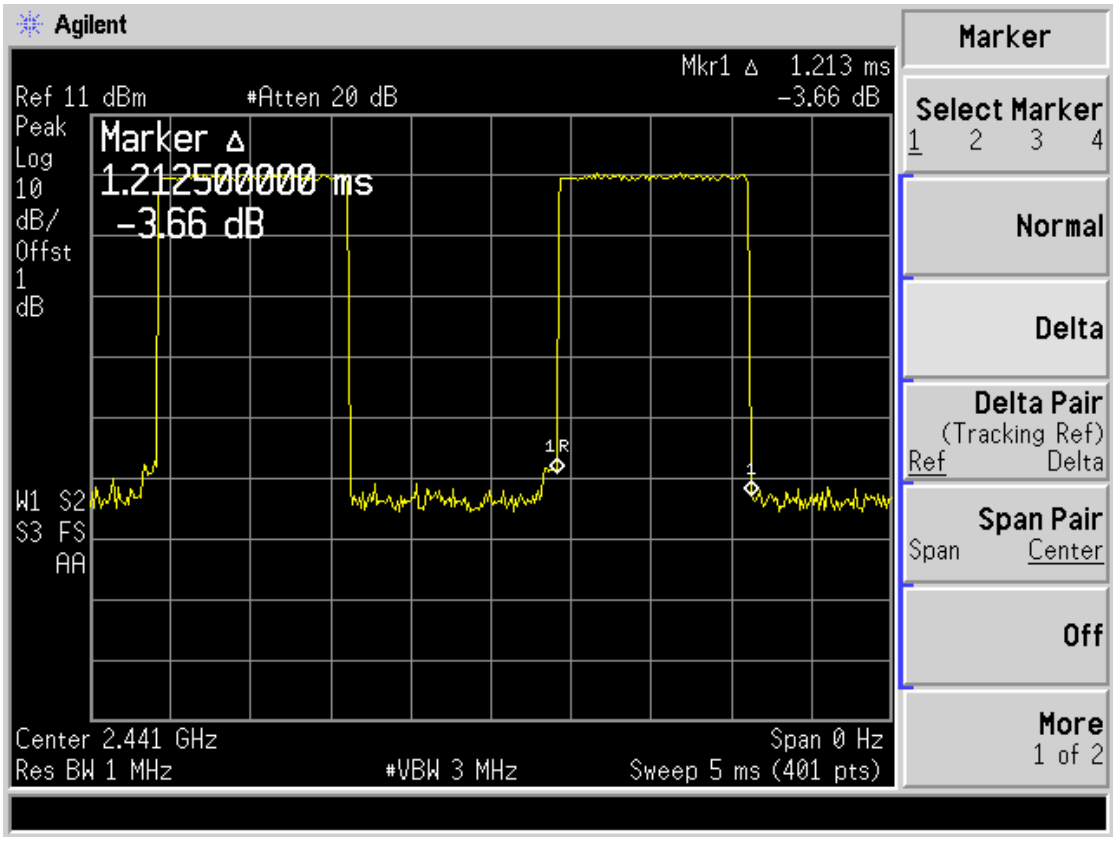
DH1-High channel



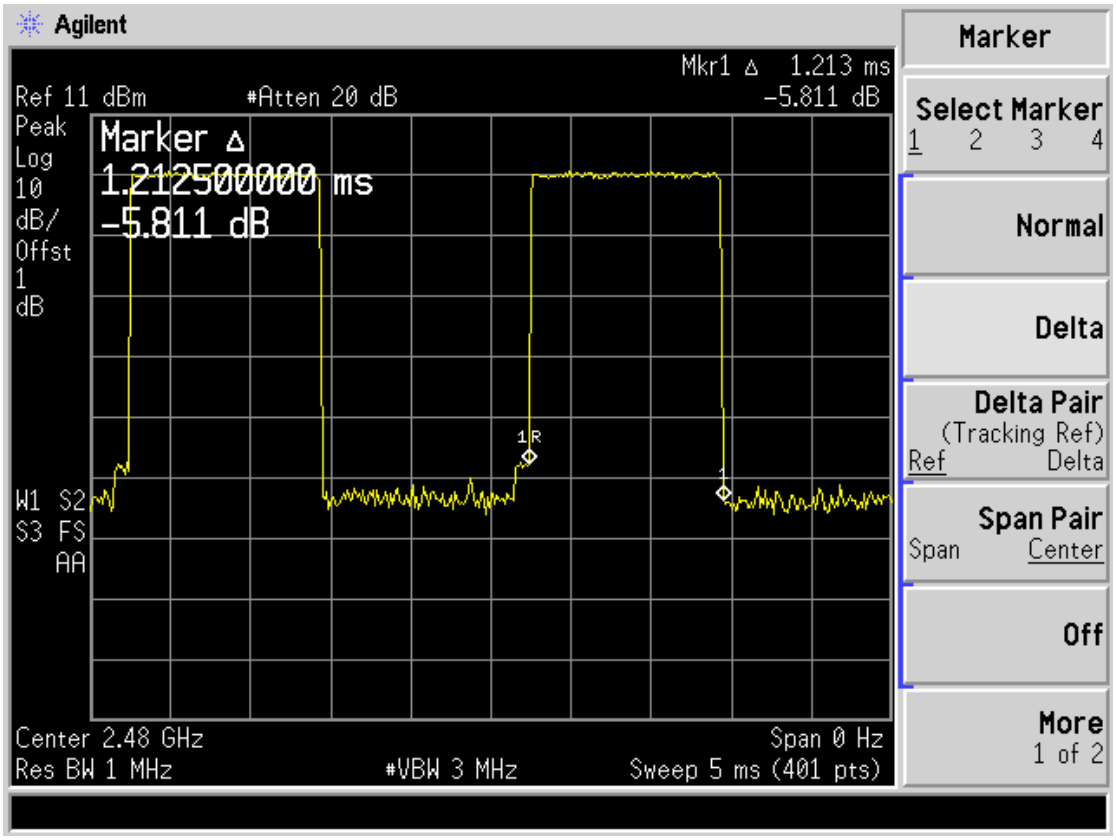
DH3-Low channel



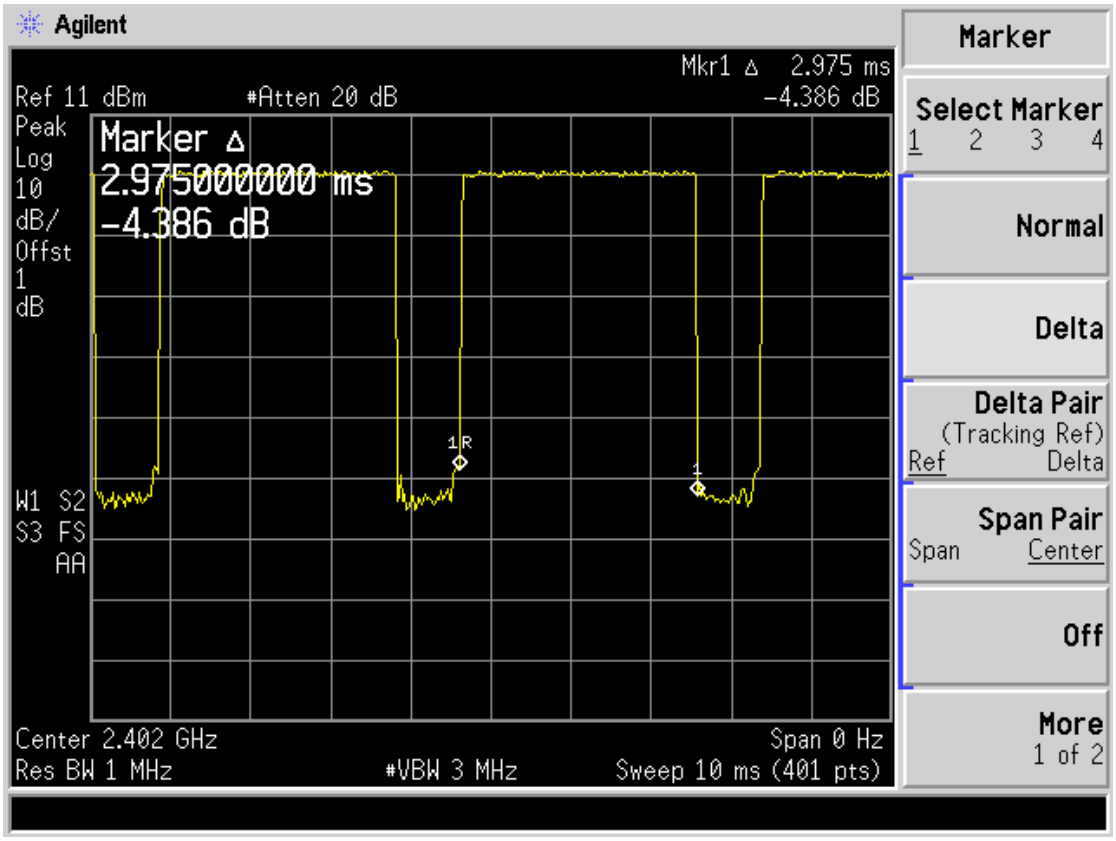
DH3-Middle channel



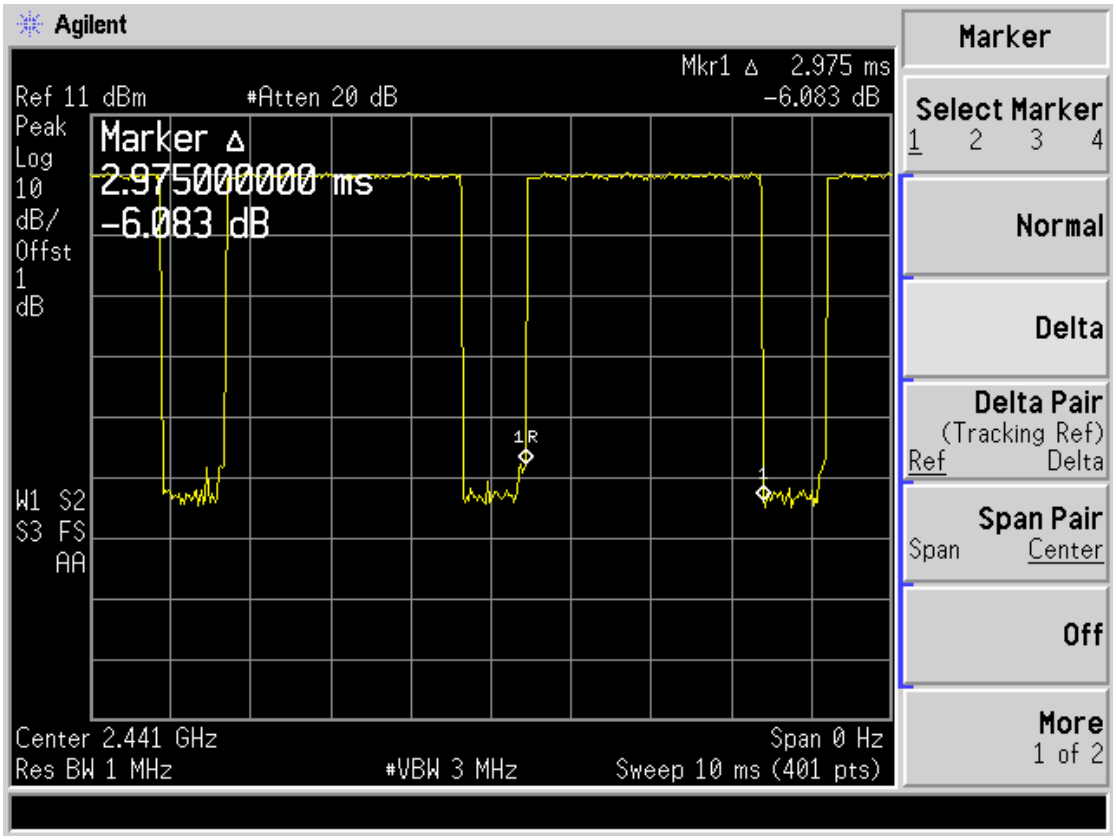
DH3-High channel



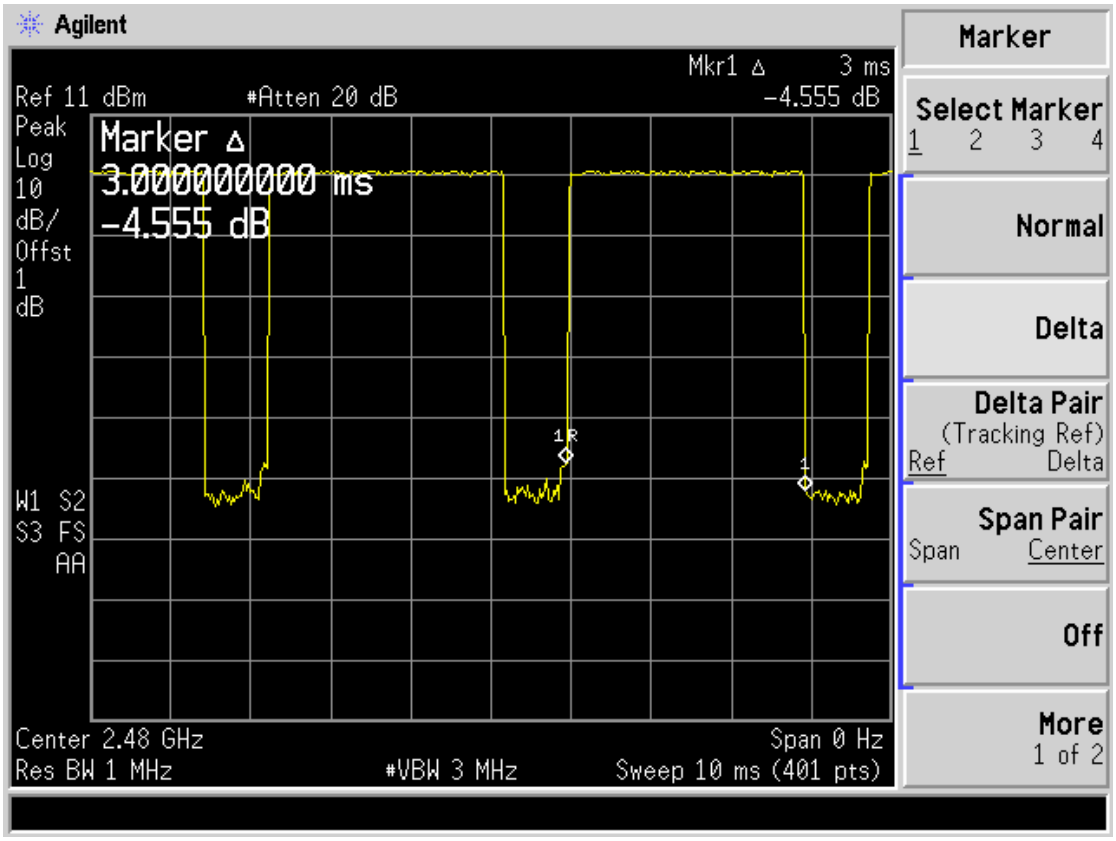
DH5-Low channel



DH5-Middle channel



DH5-High channel



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.

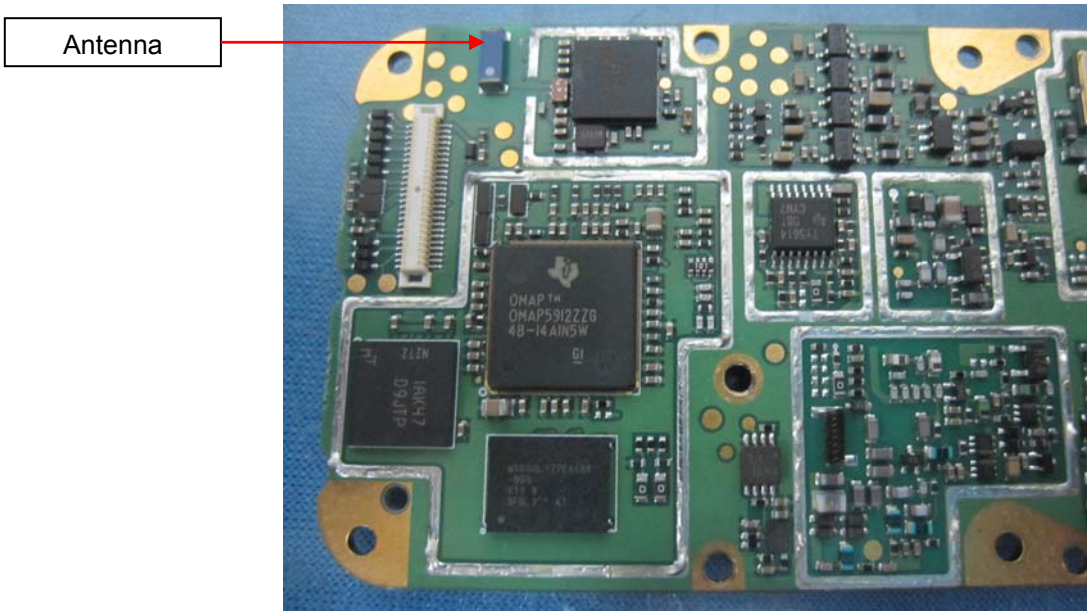
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

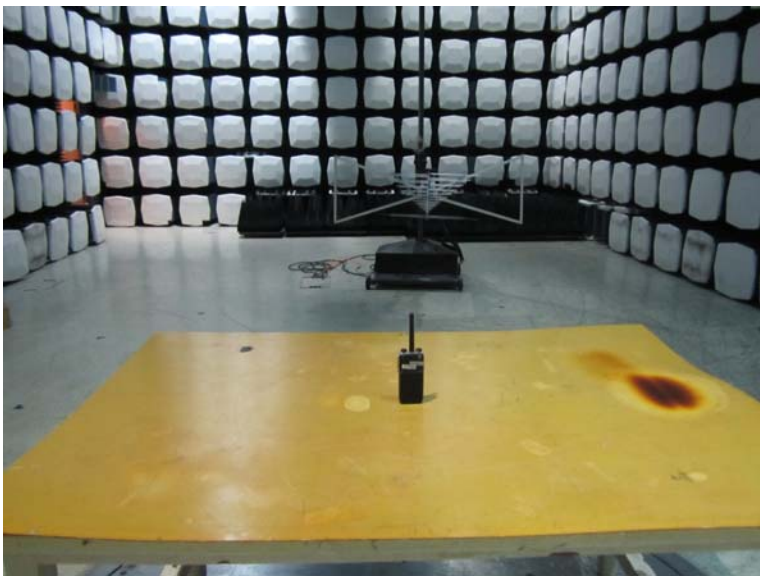
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

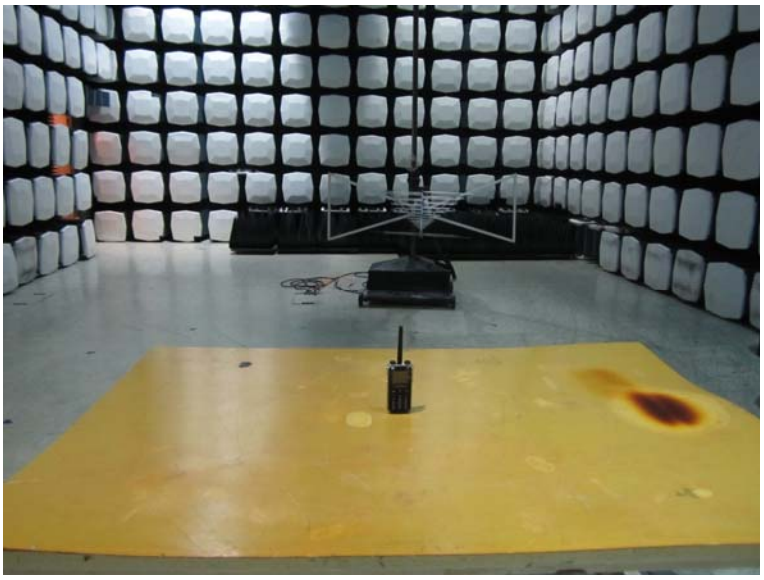
Antenna Connected Construction

The antenna used in this product is a PIFA Antenna .The maximum Gain of the antenna only 0.58dBi. Detial please see the photos as following:



5. Test Setup Photos of the EUT





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