

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

Product Name: Silver Smart

Marketing Name: MOTOSMART Me

Brand Name: Motorola

Type Name: M0D4C

Model No.: XT303 (GPPD:3404)

Model Difference: N/A

FCC ID: IHDT56NX1

Report No.: EH/2012/50042

Issue Date: Jun. 18, 2012

FCC Rule Part: §15.247, Cat: DSS

Prepared for: Motorola Mobility Inc.
9 F., No.9, Songgao Rd., Taipei 110, Taiwan,
R.O.C.

Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No. 134, Wu Kung Rd., Wuku Industrial Zone,
Taipei County, Taiwan



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VERIFICATION OF COMPLIANCE

Applicant: Motorola Mobility Inc.
9F., No.9, Songgao Rd., Taipei 110, Taiwan, R.O.C.

Product Name: Silver Smart

Marketing Name: MOTOSMART Me

Brand Name: Motorola

Type Name: M0D4C

FCC ID: IHDT56NX1

Model No.: XT303(GPPD:3404)

Model Difference: N/A

File Number: EH/2012/50042

Date of test: May. 30, 2012 ~ Jun. 15, 2012

Date of EUT Received: May. 30, 2012

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Test By:

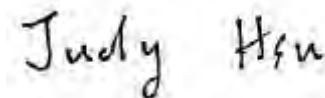


Date:

Jun. 18, 2012

Jimmy Liu / Engineer

Prepared By:

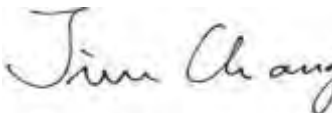


Date:

Jun. 18, 2012

Judy Hsu / Clerk

Approved By:



Date:

Jun. 18, 2012

Jim Chang / Supervisor

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Version

Version No.	Date	Description
00	Jun. 18, 2012	Initial creation of document

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1. GENERAL INFORMATION

General:

Product Name:	Silver Smart	
Marketing Name:	MOTOSMART Me	
Brand Name:	Motorola	
Type Name:	M0D4C	
Model No.:	XT303(GPPD:3404)	
Model Difference:	N/A	
Data Cable (USB):	Model No.: SKN6378A, Supplier: Motorola	
Simple Hands-free (SHF):	Model No.: SJYN0760A, Supplier: Motorola	
Hardware Version:	P2	
Software Version:	SILVERS_W_07.0B.01R_S	
Power Supply:	3.7Vdc form Li-Ion battery or 5.1Vdc form adapter	
	Adaptor:	Model No.: SPN5513B(FMP5504A) Supplier: Motorola
	Battery:	Model No.: BF5X Supplier: Motorola

Bluetooth:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	V3.0 +HS
Channel number:	79 channels
Modulation type:	GFSK+ π /4DQPSK+8DPSK
Transmit Power:	7.23 dBm (Peak)
Dwell Time:	\leq 0.4s
Operating Mode:	Point-to-Point
Antenna Designation:	Embedded inverted-F antenna, -0.57 dBi

This test report applies for Bluetooth function.

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

This submittal(s) (test report) is intended for **FCC ID: IHDT56NX1** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

1.2. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 00-705

1.3. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.4. Special Accessories

Not available for this EUT intended for grant.

1.5. Equipment Modifications

Not available for this EUT intended for grant.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4: 2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4: 2003.

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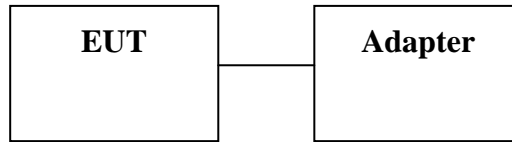
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2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Remote Side

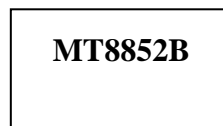


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Set	Anritsu	MT8852B	6k00006107	Un-shielding	Un-shielding

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3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)(1)	20dB Bandwidth	Compliant
§15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) (f)	Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	Time of Occupancy	Compliant
§15.203, §15.247(b)(4)(i)	Antenna Requirement	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz) 、mid (2441MHz) and high (2480MHz) with worst case BDR mode is chosen for full testing.

5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: 3.37dB
	180MHz -417MHz: 3.19dB
	0.417GHz-1GHz: 3.19dB
	1GHz - 18GHz: 4.04dB
	18GHz - 40GHz: 4.04dB

Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: 4.22dB
	167MHz -500MHz: 3.44dB
	0.5GHz-1GHz: 3.39dB
	1GHz - 18GHz: 4.08dB
	18GHz - 40GHz: 4.08dB

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6. CONDUCTED EMISSION TEST

6.1. Standard Applicable

According to §15.207, frequency within 150KHz to 30MHz shall not exceed the limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4: 2003.
2. The EUT was plug-in the AC/DC Power adapter. The host system was placed on the center of the back edge on the test table. The peripherals was placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The spacing between the peripherals was 10 centimeters.
4. External I/O cables were draped along the edge of the test table and bundle when necessary.
5. The host system was connected with 120Vac/60Hz power source.

6.3. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

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6.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2011	09/22/2012
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2012	03/22/2013
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2012	03/22/2013
Coaxial Cables	N/A	WK CE Cable	N/A	01/04/2011	01/03/2013

6.5. Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Result: Refer to next page for measurement data and plots.

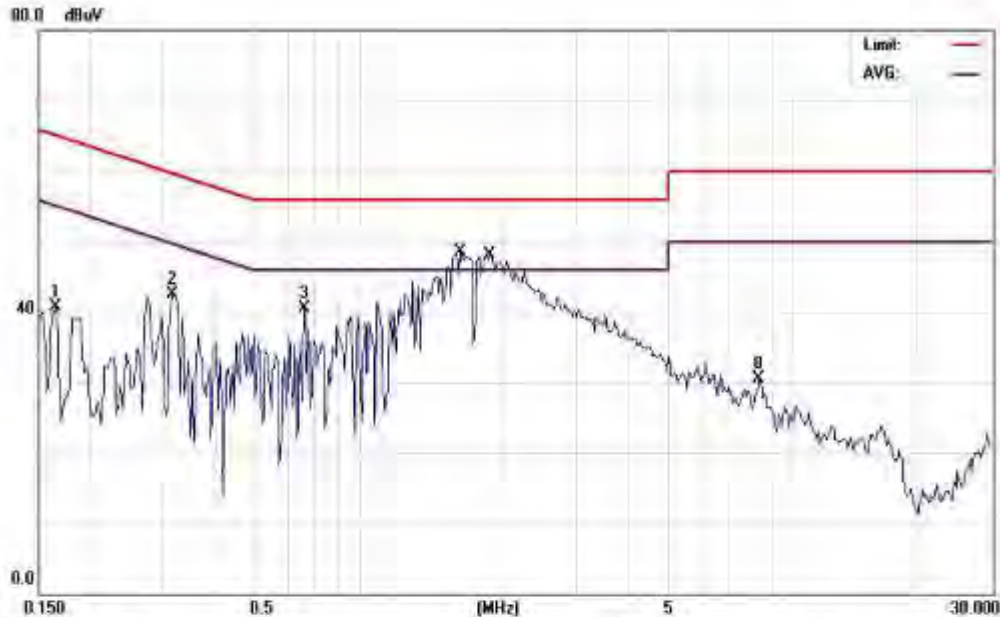
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Jun. 14, 2012
Temperature:	26 °C	Humidity:	60 %	Test By:	Jimmy



Site: ConductionRoom Phase: L1 Temperature: 26 °C
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60%
 EUT: Silver Smart Distance:
 MN: XT303/3404
 Mode: Operation Mode
 Note:

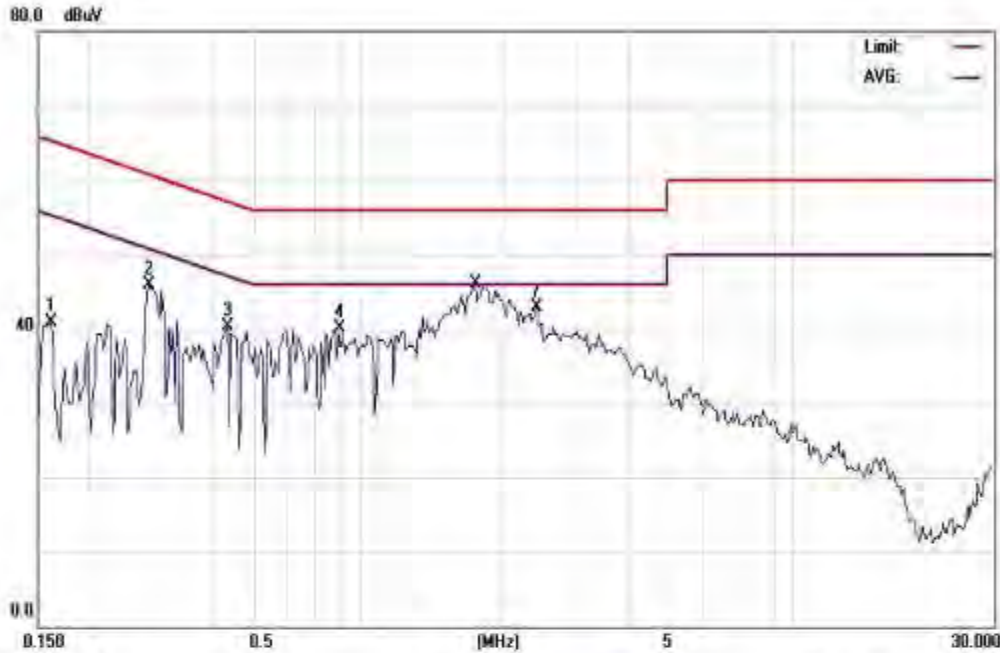
No.	Mk.	Freq. MHz	Reading Level dBμV	Correct Factor dB	Measure- ment dBμV	Limit dBμV	Over dB	Detector	Comment
1		0.1656	40.48	0.23	40.71	65.18	-24.47	peak	
2		0.3181	42.20	0.21	42.41	59.76	-17.35	peak	
3		0.6603	40.19	0.22	40.41	56.00	-15.59	peak	
4	*	1.5824	43.49	0.24	43.73	56.00	-12.27	QP	
5		1.5824	27.98	0.24	28.22	46.00	-17.78	AVG	
6		1.8437	41.23	0.25	41.48	56.00	-14.52	QP	
7		1.8437	25.28	0.25	25.53	46.00	-20.47	AVG	
8		8.3196	30.12	0.39	30.51	60.00	-29.49	peak	

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Site: ConductionRoom Phase: **N** Temperature: 25 °C
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60%
 EUT: Silver Smart Distance:
 MN: XT303/3404
 Mode: Operation Mode
 Note:

No.	Mk.	Freq. MHz	Reading Level dBμV	Correct Factor dB	Measure- ment dBμV	Limit dBμV	Over dB	Detector	Comment
1		0.1617	40.61	0.33	40.94	65.38	-24.44	peak	
2		0.2790	45.51	0.32	45.83	60.85	-15.02	peak	
3		0.4315	39.97	0.34	40.31	57.22	-16.91	peak	
4		0.8011	39.78	0.32	40.10	56.00	-15.90	peak	
5		1.7139	40.02	0.33	40.35	56.00	-15.65	QP	
6		1.7139	30.43	0.33	30.76	46.00	-15.24	AVG	
7	*	2.4003	42.64	0.33	42.97	56.00	-13.03	peak	

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7. PEAK OUTPUT POWER MEASUREMENT

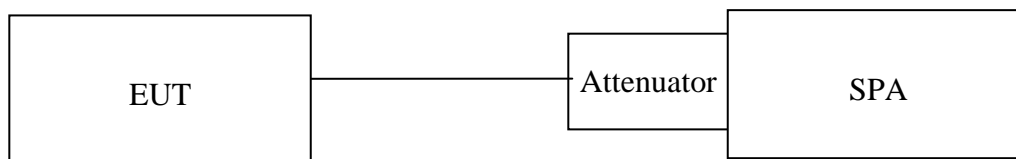
7.1. Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

7.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Sensor	Anritsu	ML2495A	1005007	02/08/2012	02/07/2014
Power Meter	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/17/2012	03/16/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2012	02/27/2013
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2012	01/04/2013
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
Splitter	Agilent	11636B	N/A	02/28/2012	02/27/2013

7.3. Test Set-up:



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7.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max peak function, >20dB bandwidth, >=RBW)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

7.5. Measurement Result

BDR mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	6.81	6.81	0.00480	1
2441.00	6.99	6.99	0.00500	1
2480.00	7.23	7.23	0.00528	1

EDR mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	6.39	6.39	0.00436	0.125
2441.00	6.48	6.48	0.00445	0.125
2480.00	6.70	6.70	0.00468	0.125

**Note: offset 7dB*

Note: Refer to next page for plots.

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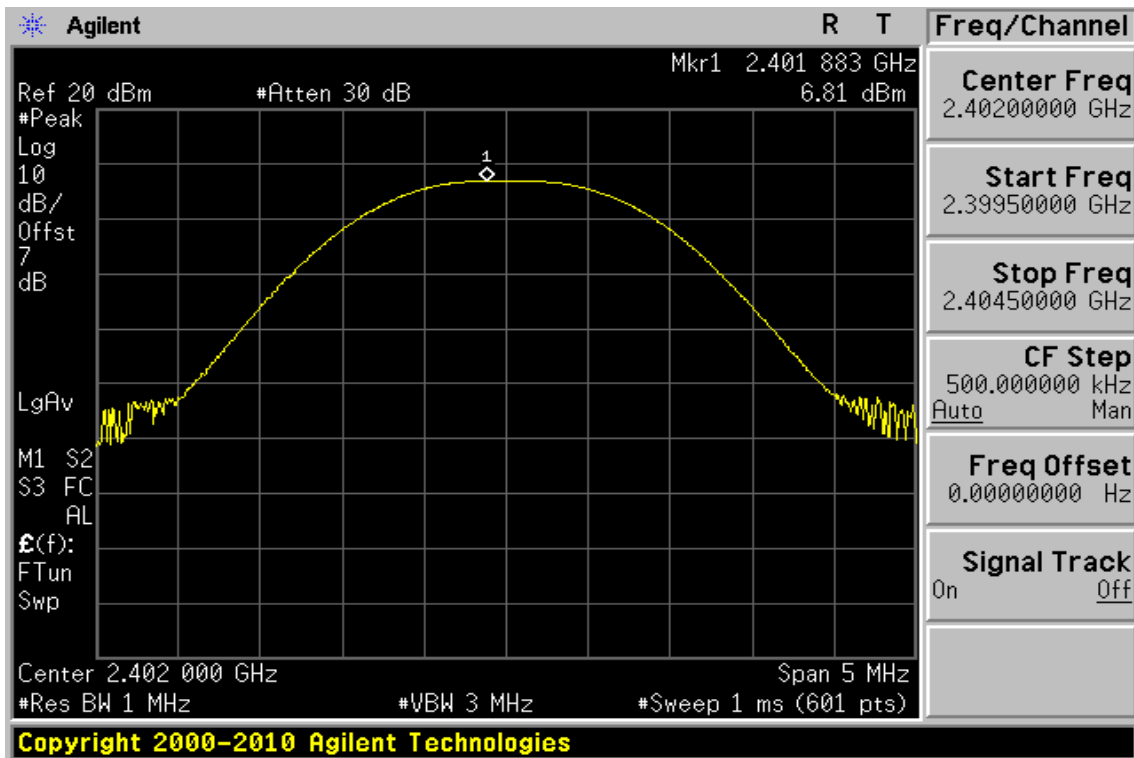
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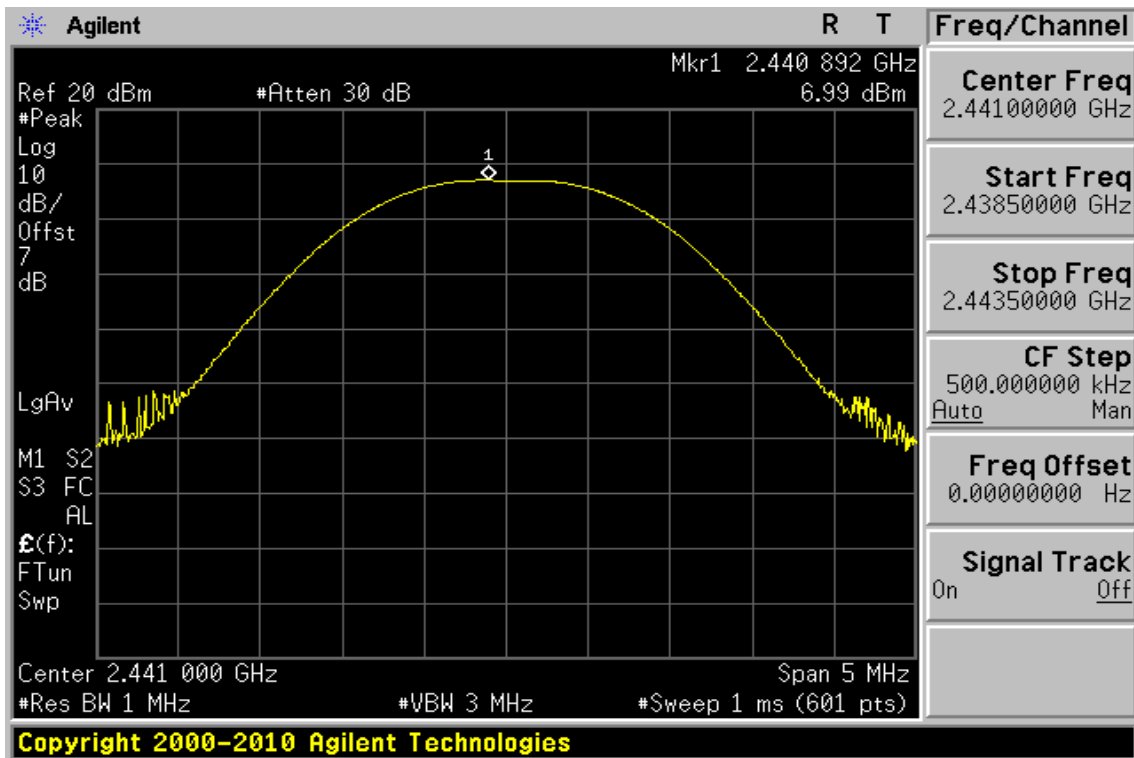
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Peak Power Output Data Plot (CH Low) (BDR mode)



Peak Power Output Data Plot (CH Mid) (BDR mode)



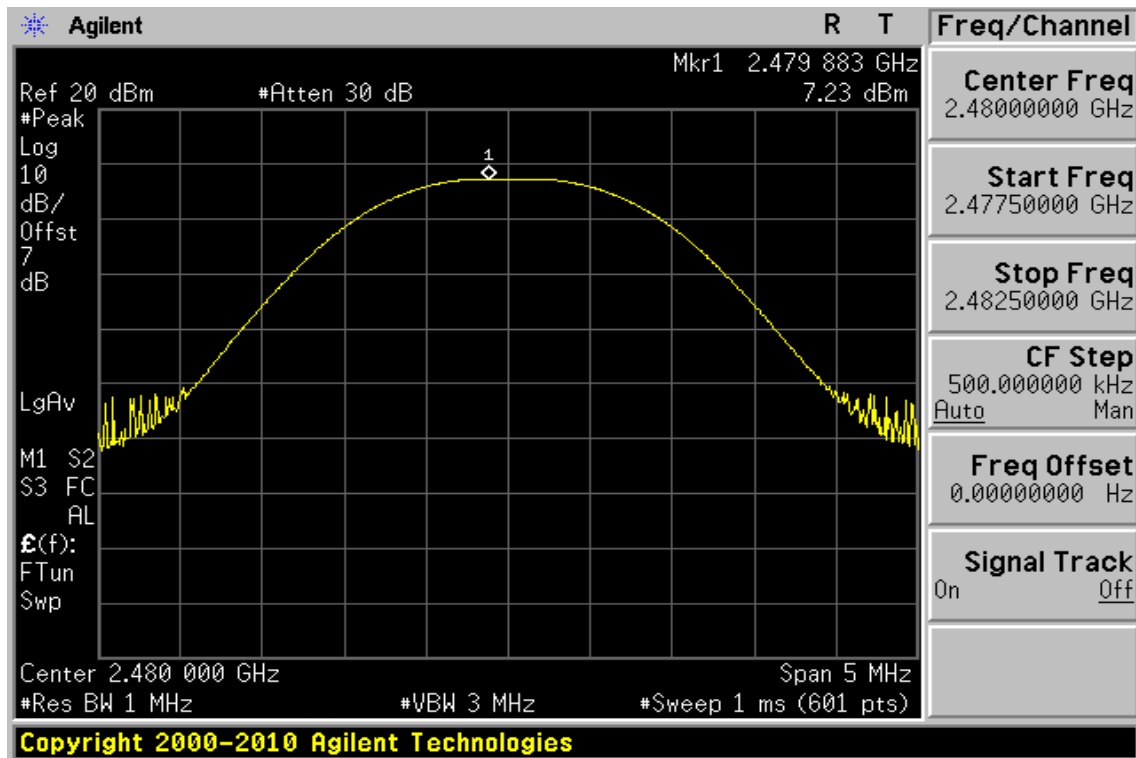
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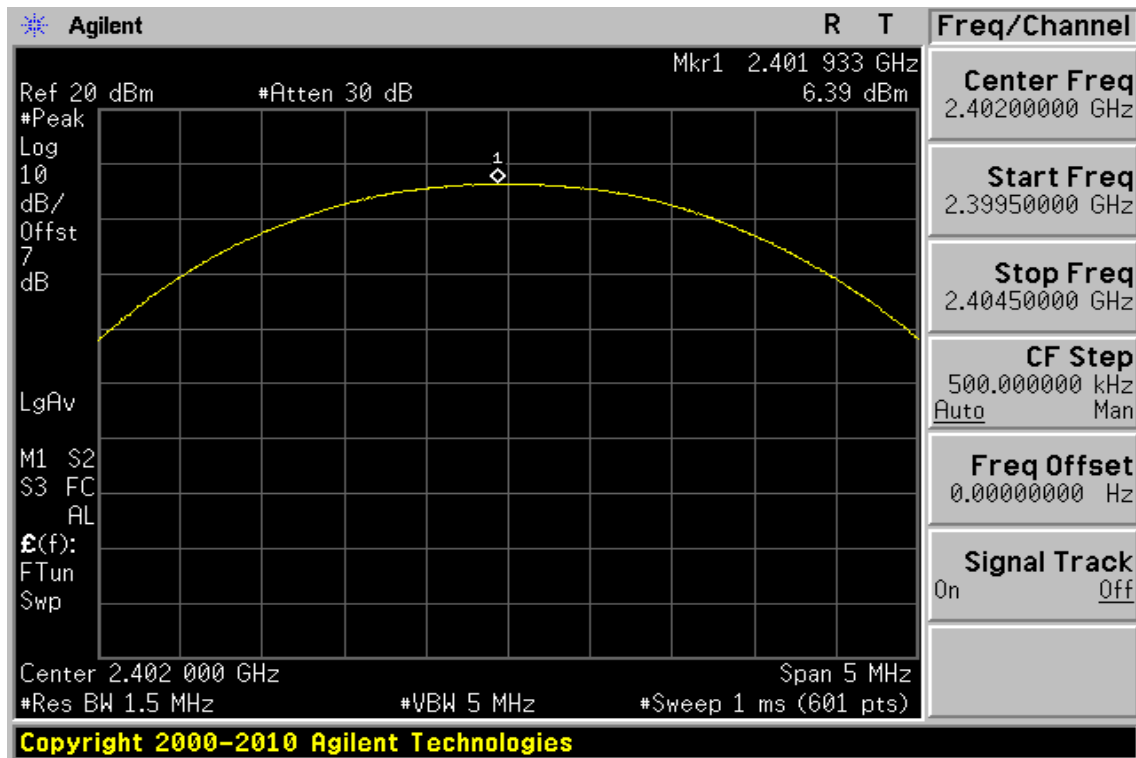
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Peak Power Output Data Plot (CH High) (BDR mode)



Peak Power Output Data Plot (CH Low) (EDR mode)



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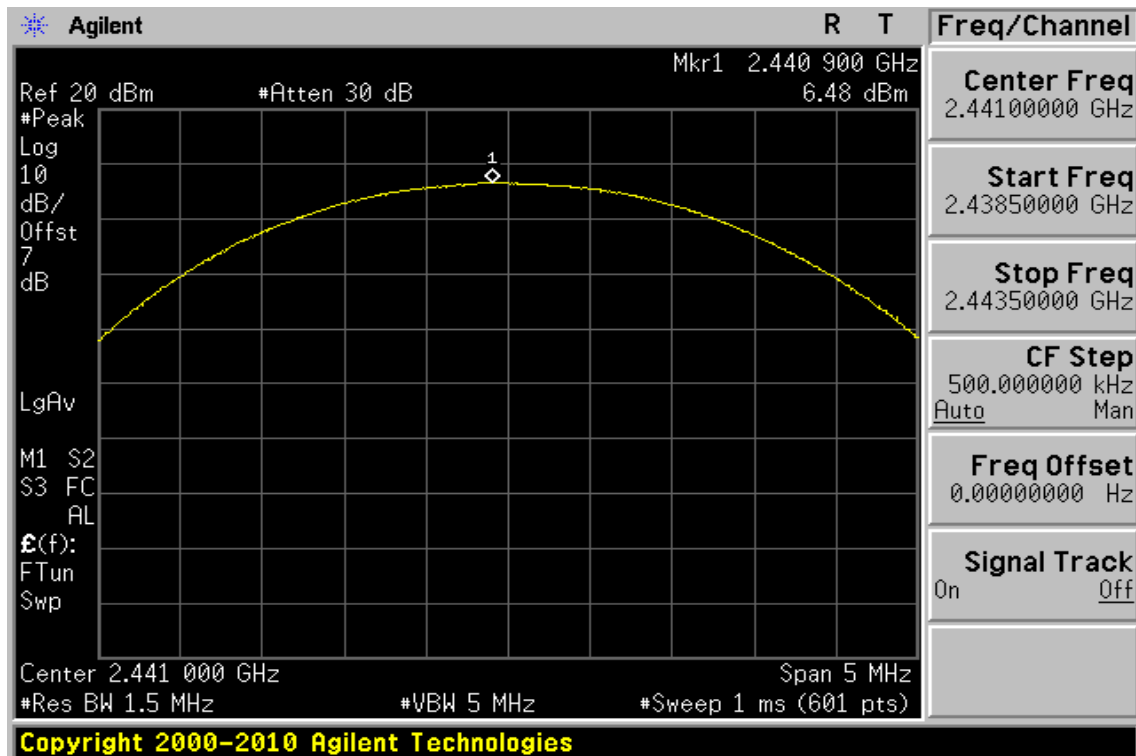
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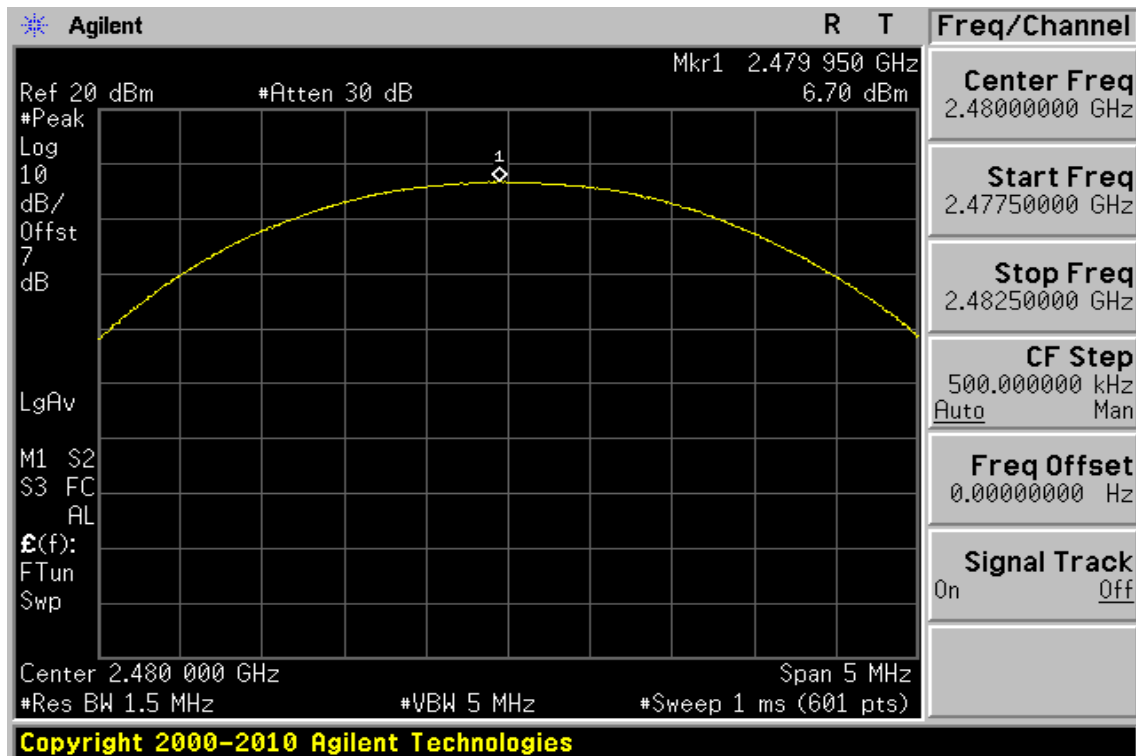
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Peak Power Output Data Plot (CH Mid) (EDR mode)



Peak Power Output Data Plot (CH High) (EDR mode)



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8. 20dB BAND WIDTH

8.1. Standard Applicable

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

8.2. Measurement Equipment Used

Refer to section 7.2 for details.

8.3. Test Set-up

Refer to section 7.3 for details.

8.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Span= 3MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

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8.5. Measurement Result:

BDR mode

CH	Bandwidth (kHz)
Lower	927.440
Mid	926.136
Higher	926.630

EDR mode

CH	Bandwidth (MHz)	2/3 Bandwidth (MHz)
Lower	1.250	0.833
Mid	1.273	0.849
Higher	1.256	0.837

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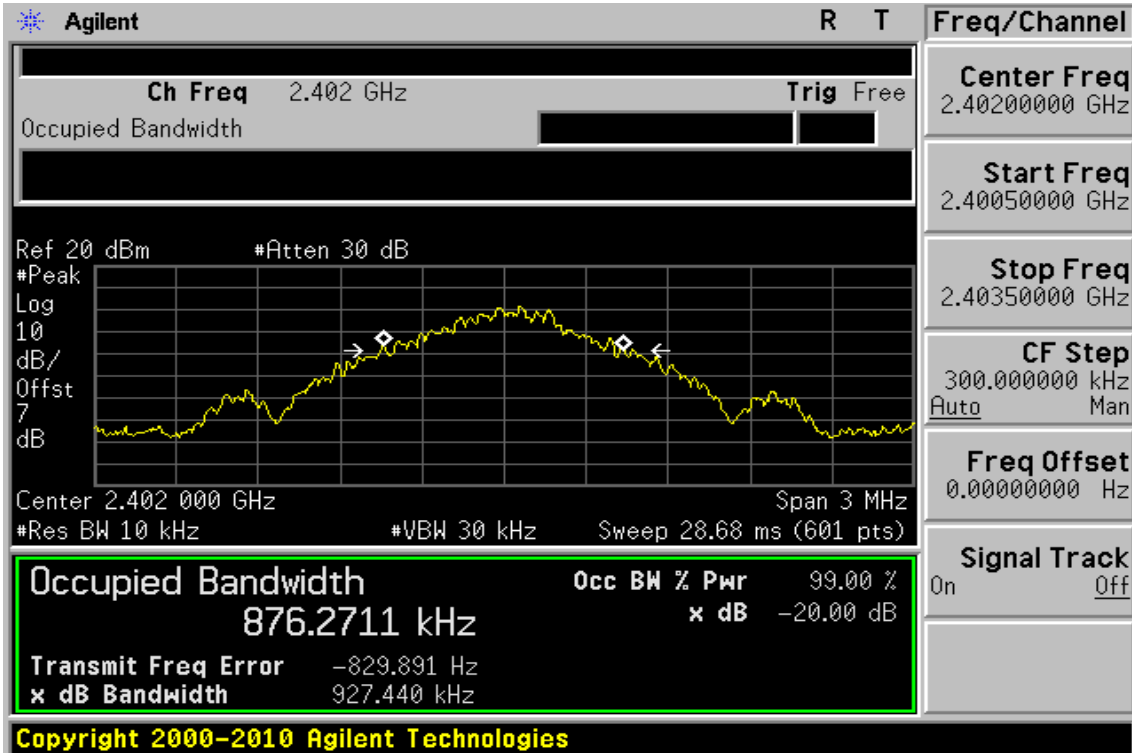
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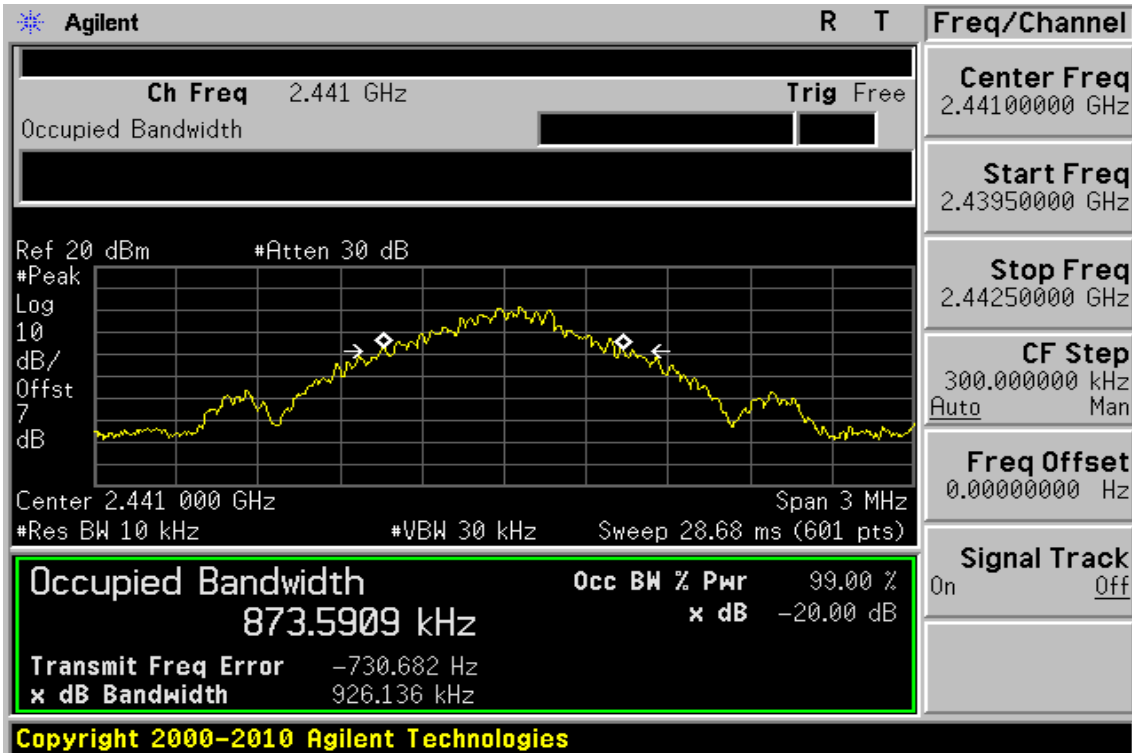
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BDR Mode

20dB Bandwidth Test Data CH-Low



20dB Bandwidth Test Data CH-Mid



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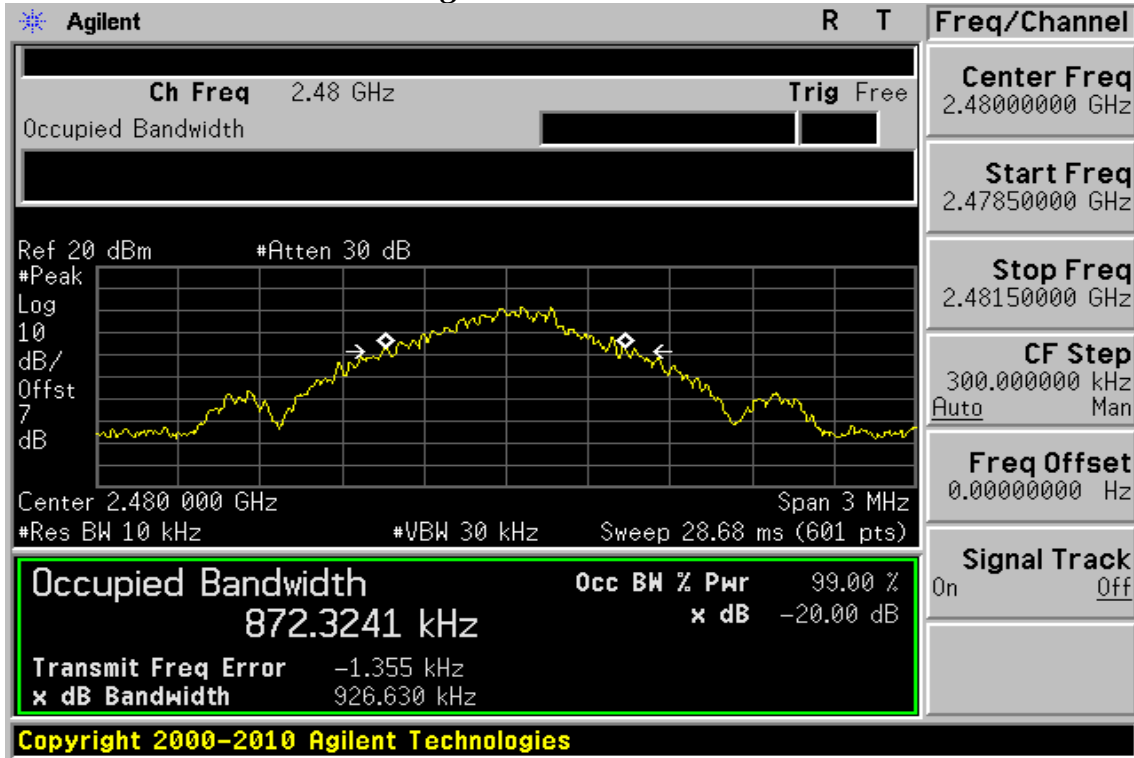
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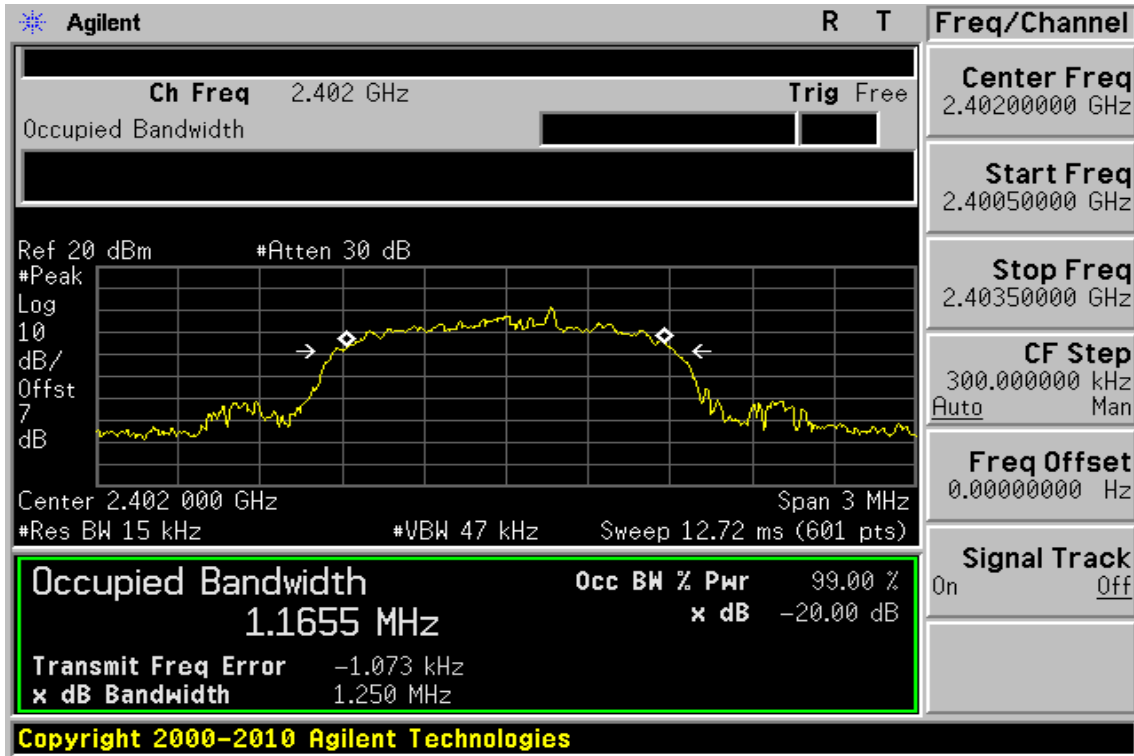
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20dB Bandwidth Test Data CH-High



EDR Mode

20dB Bandwidth Test Data CH-Low



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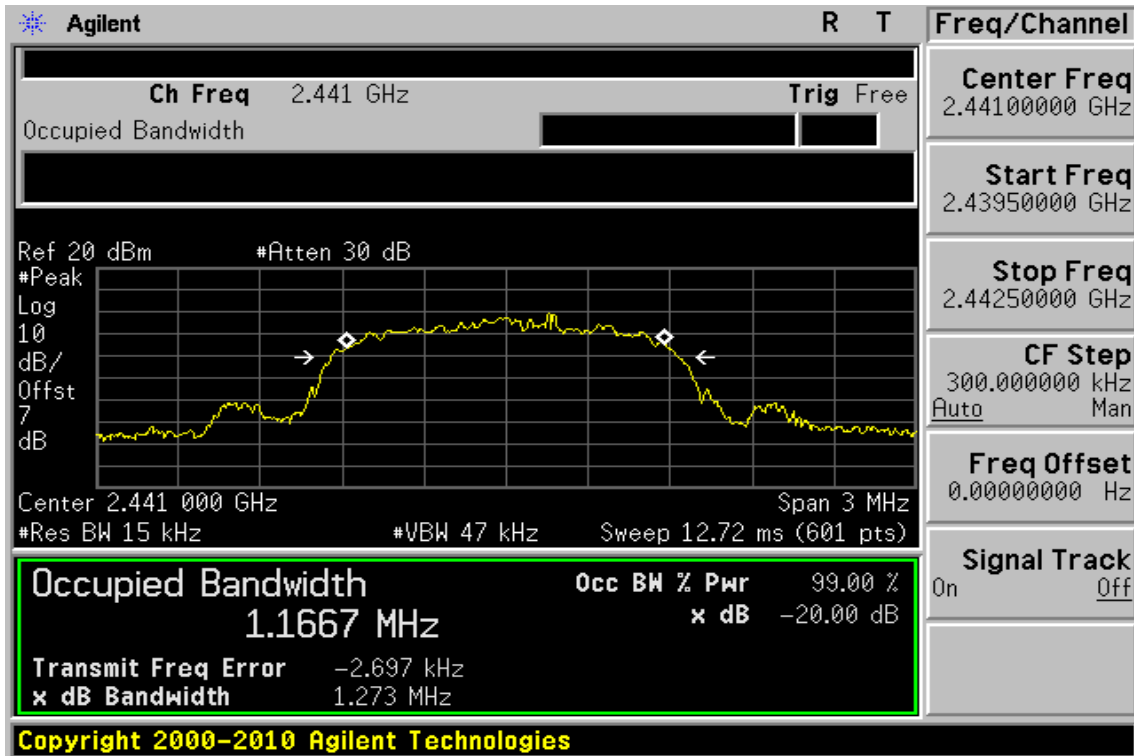
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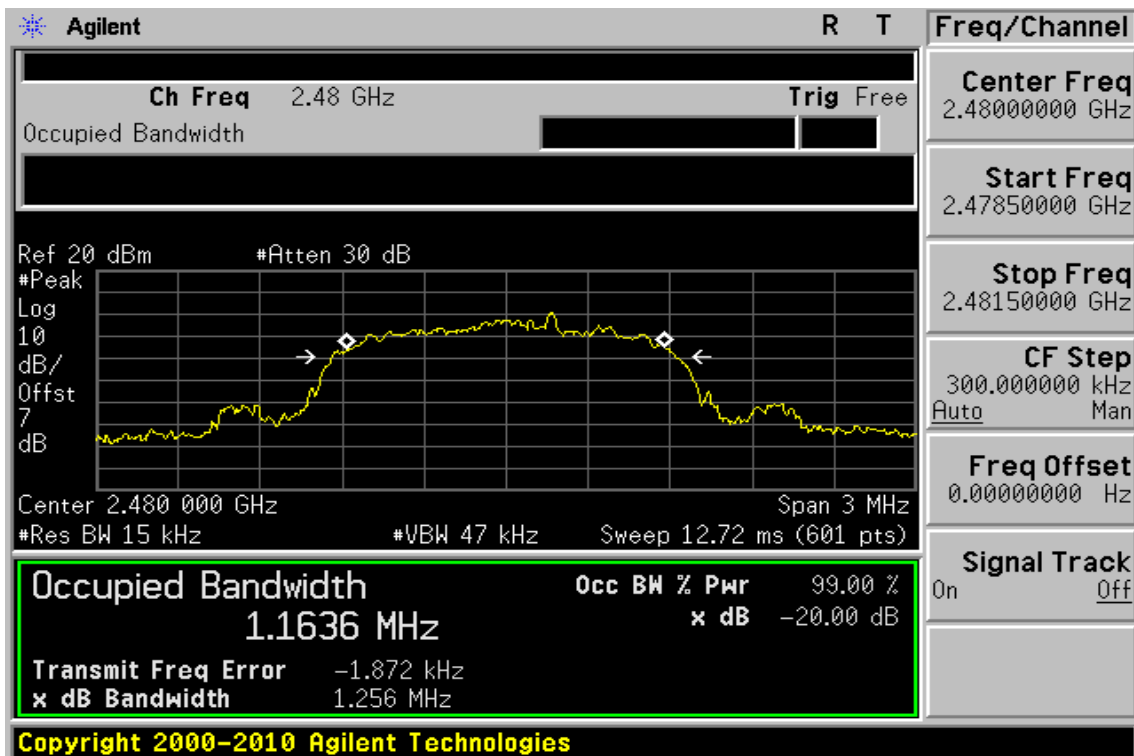
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20dB Bandwidth Test Data CH-Mid



20dB Bandwidth Test Data CH-High



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9. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

9.1. Standard Applicable

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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 the desired power, 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).

9.2. Measurement Equipment Used

9.2.1. Conducted Emission at antenna port:

Refer to section 7.2 for details.

9.2.2. Radiated emission:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100759	05/20/2011	05/19/2013
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/15/2011	02/14/2013
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2012	01/03/2013
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2012	01/03/2013
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/28/2012	02/28/2013
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2012	02/27/2013
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/04/2012	01/03/2013
3m Site NSA	SGS	966 chamber	N/A	07/15/2011	07/14/2012

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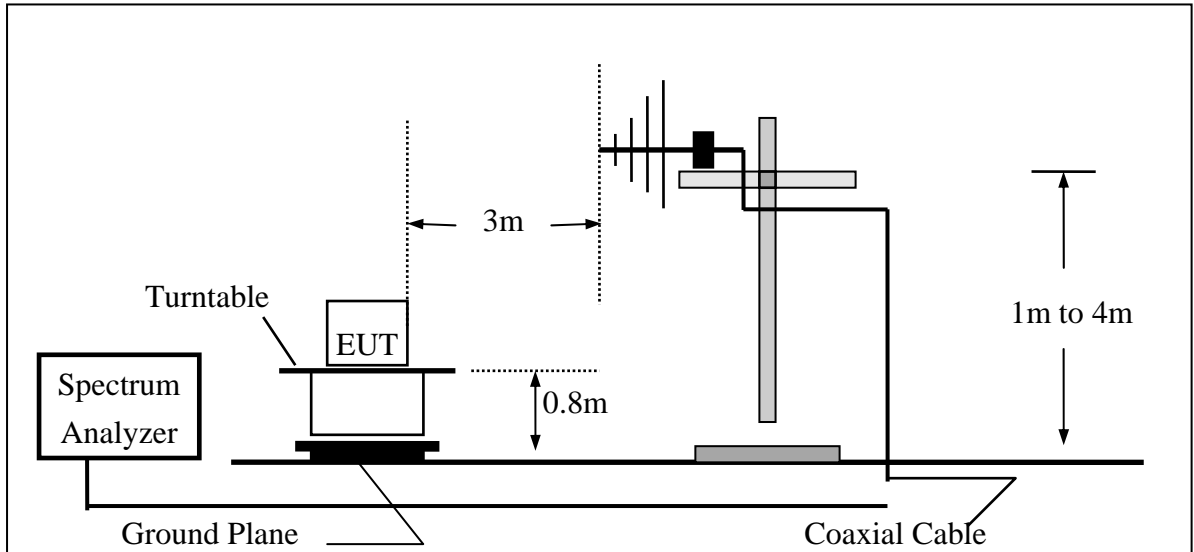
9.3. Test SET-UP:

9.3.1. Conducted Emission at antenna port:

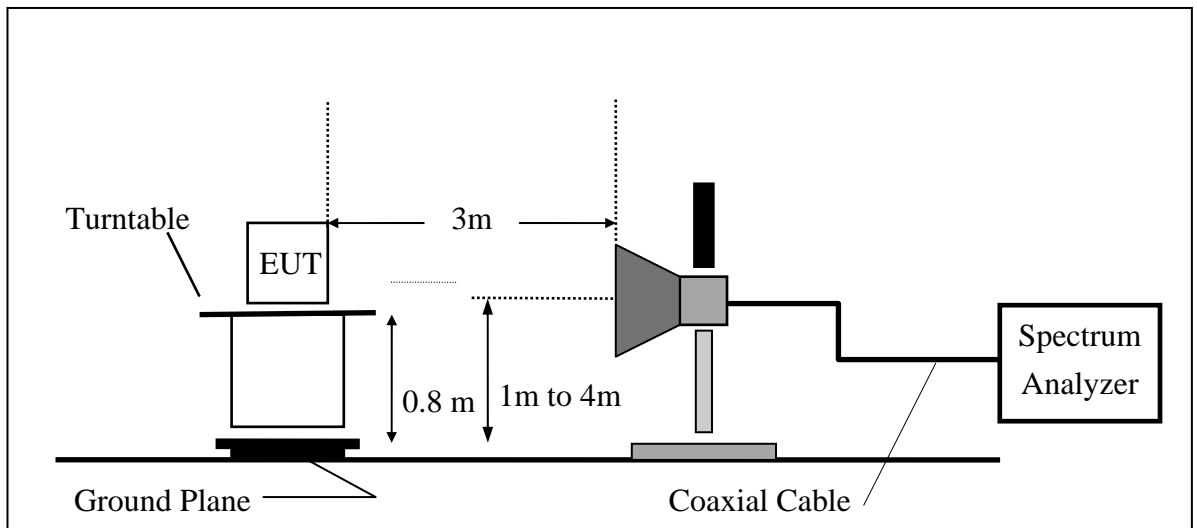
Refer to section 7.3 for details.

9.3.2. Radiated emission:

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



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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9.4. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.
7. Radiated Emission refer to section 9.

9.5. 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	

9.6. Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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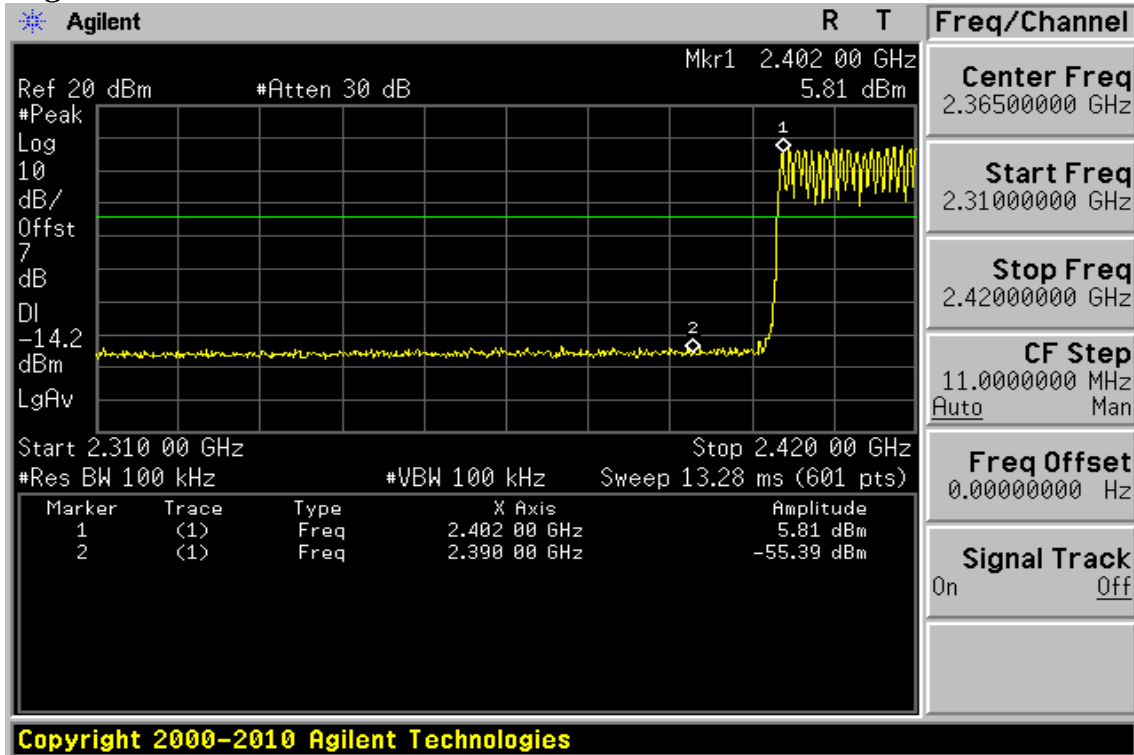
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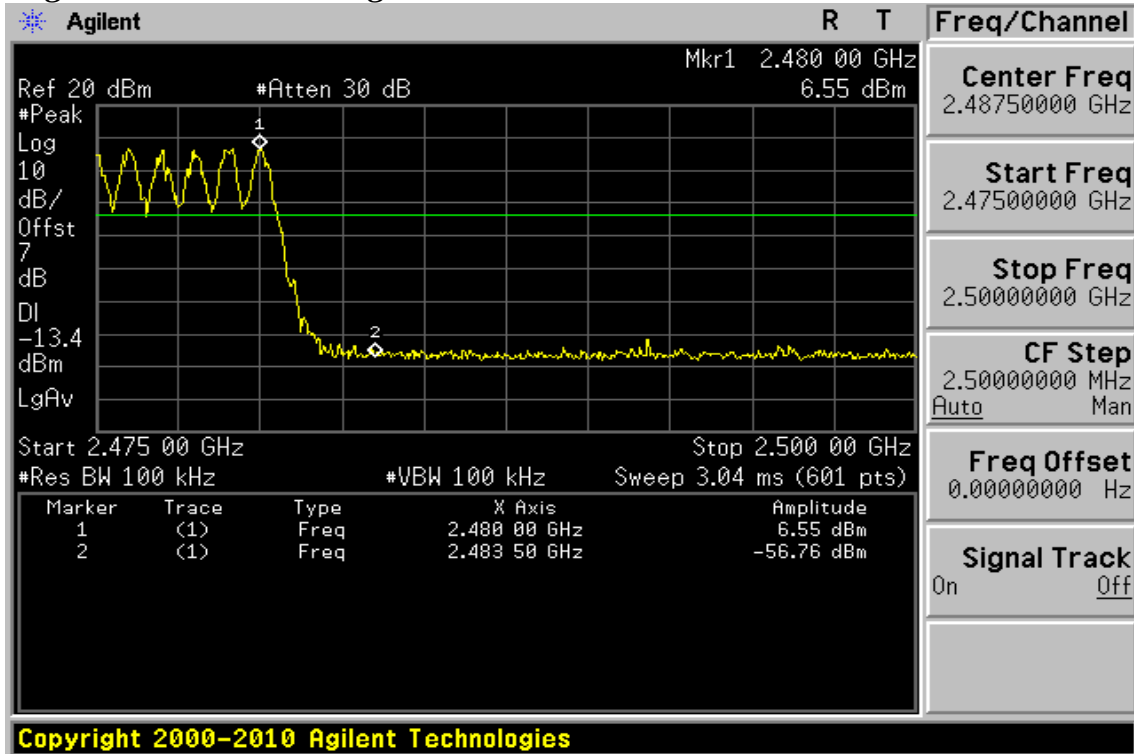
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BDR Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Radiated Emission: (BDR mode)

Operation Band	:BDR	Test Date	:2012-06-14
Fundamental Frequency	:2402 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Safe Margin dB
2390.00	E	Average	31.19	4.68	35.87	54.00	-18.13
2390.00	E	Peak	41.23	4.68	45.91	74.00	-28.09

Operation Band	:BDR	Test Date	:2012-06-14
Fundamental Frequency	:2402 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Safe Margin dB
2390.00	E	Average	31.32	5.30	36.62	54.00	-17.38
2390.00	E	Peak	42.79	5.30	48.09	74.00	-25.91

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Operation Band	:BDR	Test Date	:2012-06-14
Fundamental Frequency	:2480 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2483.50	E	Average	31.23	5.26	36.49	54.00	-17.51
2483.50	E	Peak	41.77	5.26	47.03	74.00	-26.97

Operation Band	:BDR	Test Date	:2012-06-14
Fundamental Frequency	:2480 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2483.50	E	Average	31.38	6.29	37.67	54.00	-16.33
2483.50	E	Peak	42.96	6.29	49.25	74.00	-24.75

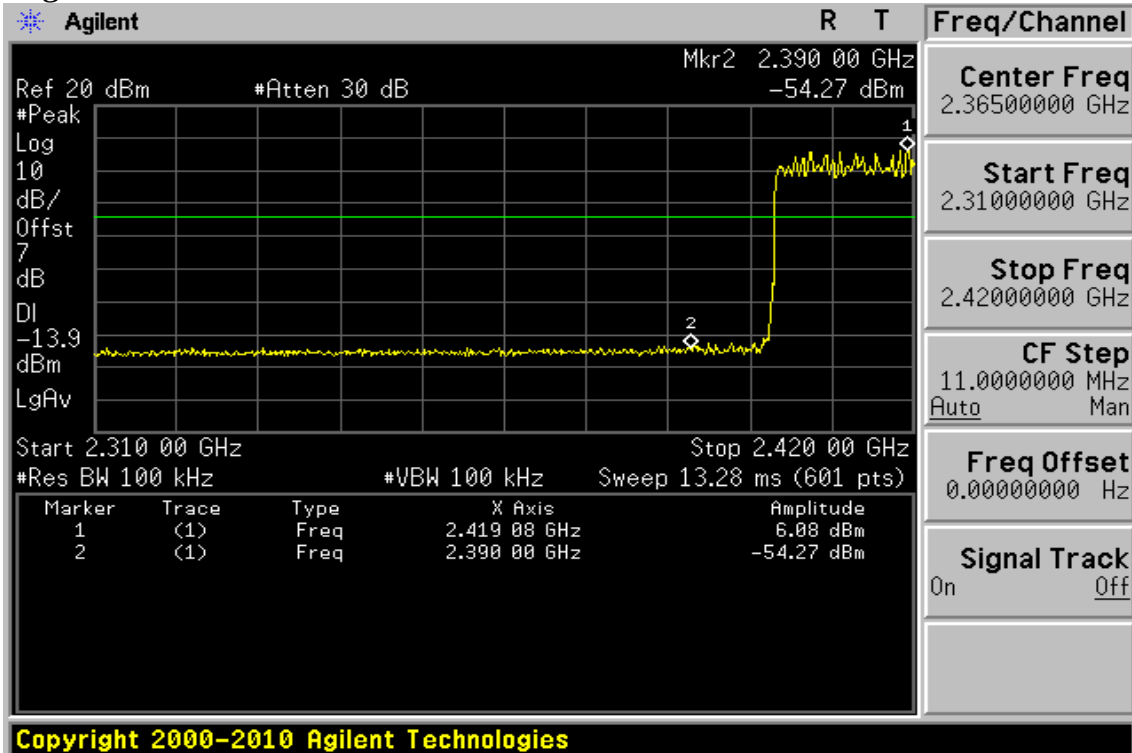
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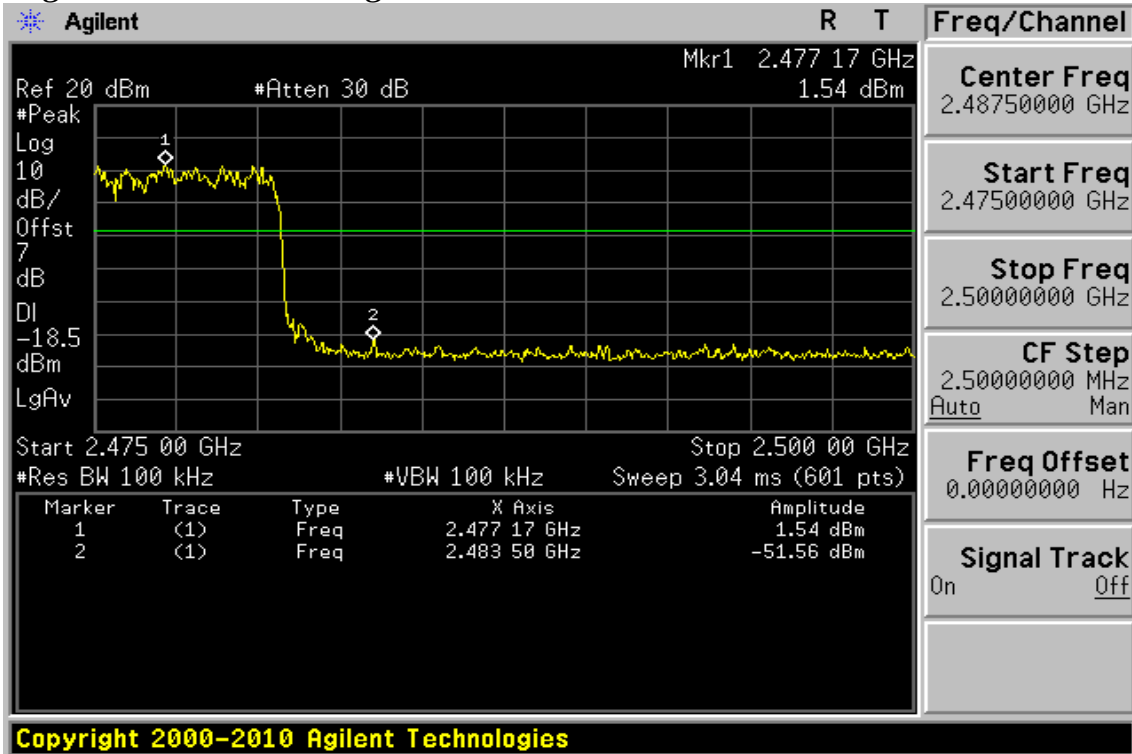
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EDR Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Radiated Emission: (EDR mode)

Operation Band	:EDR	Test Date	:2012-06-14
Fundamental Frequency	:2402 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2390.00	E	Average	31.55	4.68	36.23	54.00	-17.77
2390.00	E	Peak	41.58	4.68	46.26	74.00	-27.74

Operation Band	:EDR	Test Date	:2012-06-14
Fundamental Frequency	:2402 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2390.00	E	Average	31.28	5.30	36.58	54.00	-17.42
2390.00	E	Peak	43.38	5.30	48.68	74.00	-25.32

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Operation Band	:EDR	Test Date	:2012-06-14
Fundamental Frequency	:2480 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2483.50	E	Average	31.42	5.26	36.68	54.00	-17.32
2483.50	E	Peak	43.10	5.26	48.36	74.00	-25.64

Operation Band	:EDR	Test Date	:2012-06-14
Fundamental Frequency	:2480 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:Bandedge	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
2483.50	E	Average	31.71	6.29	38.00	54.00	-16.00
2483.50	E	Peak	41.63	6.29	47.92	74.00	-26.08

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10. SPURIOUS RADIATED EMISSION TEST

10.1. Standard Applicable

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

10.2. Measurement Equipment Used:

10.2.1. Conducted Emission at antenna port:

Refer to section 7.2 for details.

10.2.2. Radiated emission:

Refer to section 9.2.2 for details.

10.3. Test SET-UP:

10.3.1. Conducted Emission at antenna port:

Refer to section 7.3 for details.

10.3.2. Radiated emission:

Refer to section 9.3.2 for details.

10.4. Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

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Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 100K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz
4. Via Software, combine 5 spans of frequency range into one plot

10.5. 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	

10.6. Measurement Result:

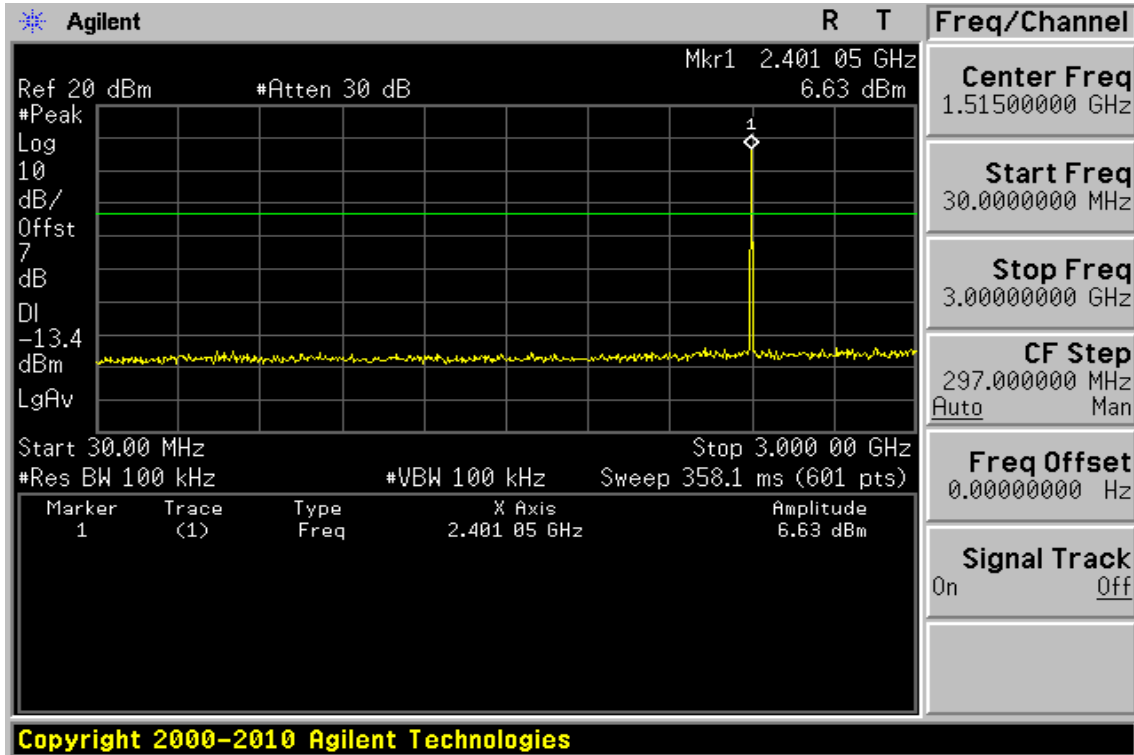
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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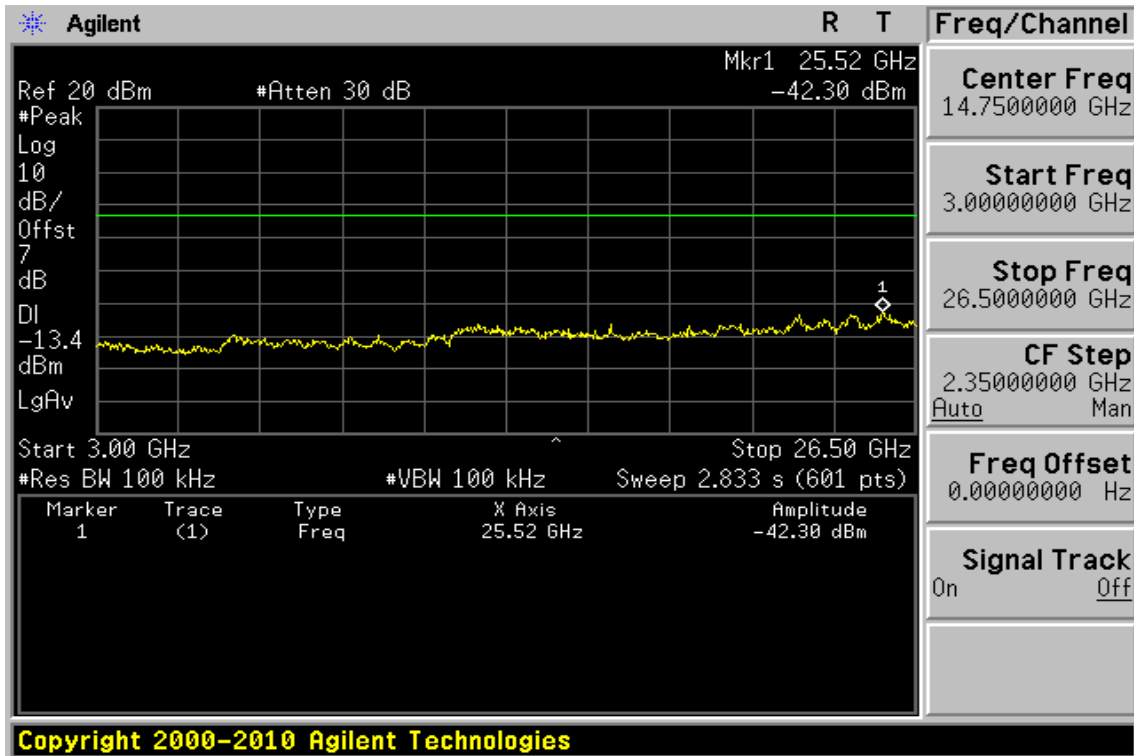
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BDR Mode Conducted Spurious Emission Measurement Result
Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz



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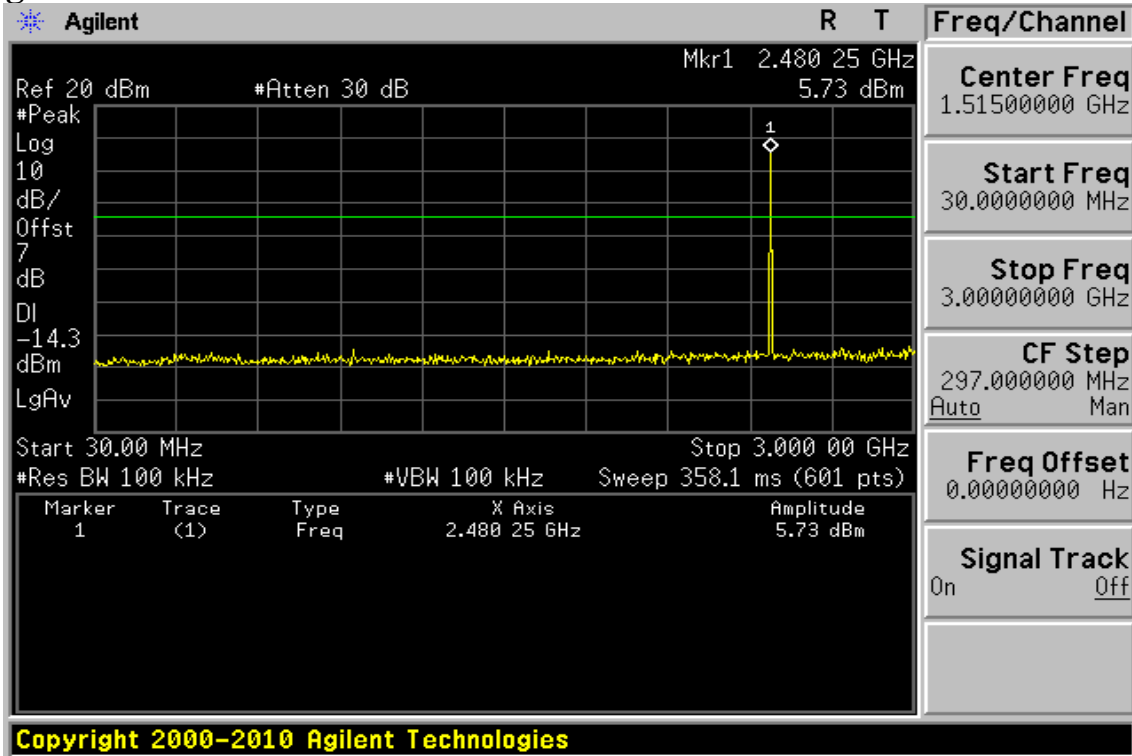
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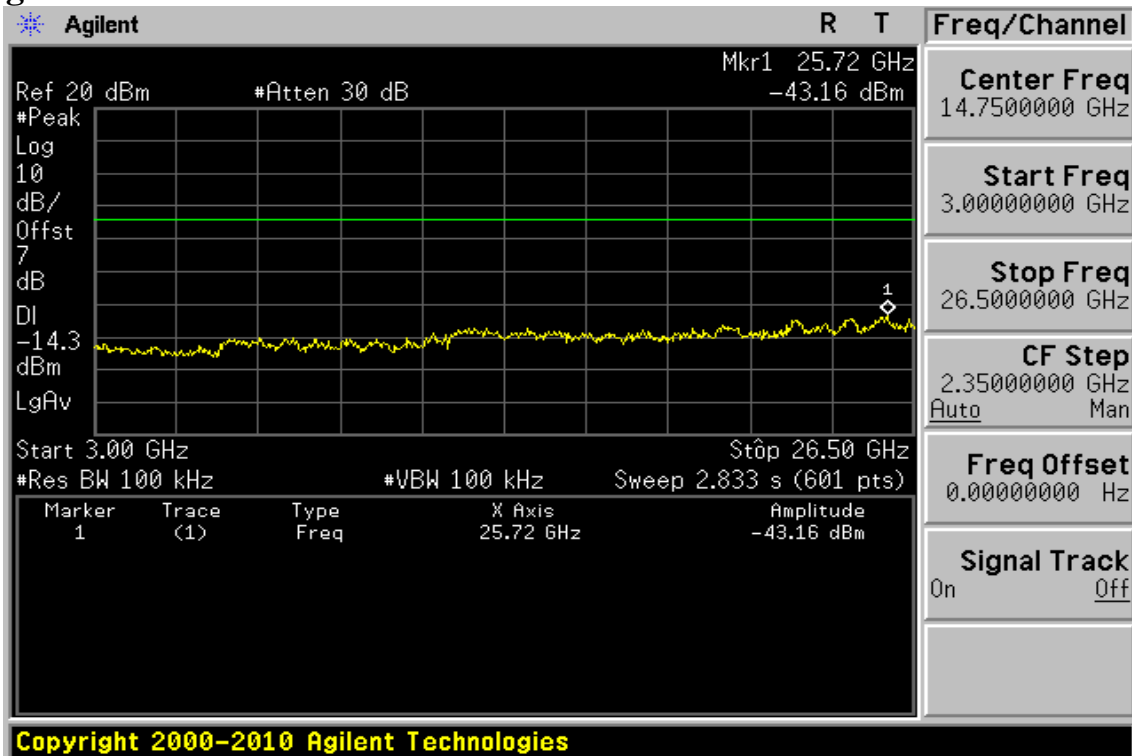
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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Radiated Spurious Emission Measurement Result (Worst BDR mode)

Operation Band	:BDR	Test Date	:2012-06-12
Fundamental Frequency	:2402 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
39.70	S	Peak	46.29	-13.47	32.82	40.00	-7.18
118.27	S	Peak	32.17	-14.76	17.41	43.50	-26.09
276.38	S	Peak	27.43	-13.16	14.27	46.00	-31.73
363.68	S	Peak	27.54	-11.50	16.04	46.00	-29.96
588.72	S	Peak	27.93	-7.79	20.14	46.00	-25.86
664.38	S	Peak	28.16	-6.30	21.86	46.00	-24.14
4804.00	H	Peak	33.68	9.65	43.33	74.00	-30.67
7206.00	H	---					
9608.00	H	---					
12010.00	H	---					
14412.00	H	---					
16814.00	H	---					
19216.00	H	---					
21618.00	H	---					
24020.00	H	---					

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Operation Band	:BDR	Test Date	:2012-06-12
Fundamental Frequency	:2402 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
45.52	S	Peak	29.02	-13.82	15.20	40.00	-24.80
143.49	S	Peak	27.84	-12.82	15.02	43.50	-28.48
245.34	S	Peak	30.69	-14.09	16.60	46.00	-29.40
363.68	S	Peak	29.18	-11.50	17.68	46.00	-28.32
577.08	S	Peak	27.93	-8.05	19.88	46.00	-26.12
699.30	S	Peak	27.28	-5.76	21.52	46.00	-24.48
4804.00	H	Peak	34.86	9.69	44.55	74.00	-29.45
7206.00	H	---					
9608.00	H	---					
12010.00	H	---					
14412.00	H	---					
16814.00	H	---					
19216.00	H	---					
21618.00	H	---					
24020.00	H	---					

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Operation Band	:BDR	Test Date	:2012-06-12
Fundamental Frequency	:2441 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
40.67	S	Peak	46.30	-13.48	32.82	40.00	-7.18
119.24	S	Peak	34.09	-14.62	19.47	43.50	-24.03
227.88	S	Peak	31.53	-14.65	16.88	46.00	-29.12
363.68	S	Peak	28.90	-11.50	17.40	46.00	-28.60
595.51	S	Peak	28.64	-7.66	20.98	46.00	-25.02
691.54	S	Peak	28.40	-5.86	22.54	46.00	-23.46
4882.00	H	Peak	35.27	10.16	45.43	74.00	-28.57
7323.00	H	---					
9764.00	H	---					
12205.00	H	---					
14646.00	H	---					
17087.00	H	---					
19528.00	H	---					
21969.00	H	---					
24410.00	H	---					

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Operation Band	:BDR	Test Date	:2012-06-12
Fundamental Frequency	:2441 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
44.55	S	Peak	29.54	-13.76	15.78	40.00	-24.22
111.48	S	Peak	30.61	-15.56	15.05	43.50	-28.45
227.88	S	Peak	35.35	-14.65	20.70	46.00	-25.30
363.68	S	Peak	28.11	-11.50	16.61	46.00	-29.39
586.78	S	Peak	28.88	-7.84	21.04	46.00	-24.96
672.14	S	Peak	27.39	-6.16	21.23	46.00	-24.77
4882.00	H	Peak	34.50	10.11	44.61	74.00	-29.39
7323.00	H	---					
9764.00	H	---					
12205.00	H	---					
14646.00	H	---					
17087.00	H	---					
19528.00	H	---					
21969.00	H	---					
24410.00	H	---					

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Operation Band	:BDR	Test Date	:2012-06-12
Fundamental Frequency	:2480 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
40.67	S	Peak	47.03	-13.48	33.55	40.00	-6.45
118.27	S	Peak	33.58	-14.76	18.82	43.50	-24.68
232.73	S	Peak	31.61	-14.42	17.19	46.00	-28.81
393.75	S	Peak	26.96	-11.13	15.83	46.00	-30.17
583.87	S	Peak	27.55	-7.90	19.65	46.00	-26.35
693.48	S	Peak	27.77	-5.84	21.93	46.00	-24.07
4960.00	H	Peak	33.75	10.03	43.78	74.00	-30.22
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

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Operation Band	:BDR	Test Date	:2012-06-12
Fundamental Frequency	:2480 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Jimmy
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
41.64	S	Peak	32.00	-13.56	18.44	40.00	-21.56
157.07	S	Peak	26.90	-12.29	14.61	43.50	-28.89
239.52	S	Peak	31.37	-14.21	17.16	46.00	-28.84
363.68	S	Peak	27.82	-11.50	16.32	46.00	-29.68
597.45	S	Peak	27.46	-7.61	19.85	46.00	-26.15
695.42	S	Peak	27.32	-5.81	21.51	46.00	-24.49
4960.00	H	Peak	34.70	9.88	44.58	74.00	-29.42
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

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11. FREQUENCY SEPARATION

11.1. Standard Applicable

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.

11.2. Measurement Equipment Used:

Refer to section 7.2 for details.

11.3. Test Set-up:

Refer to section 7.3 for details.

11.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

11.5. Measurement Result:

Channel separation (MHz)	Limit	Result
1	$\geq 25\text{KHz}$ or $2/3$ times 20dB bandwidth	PASS

Note: Refer to next page for plots.

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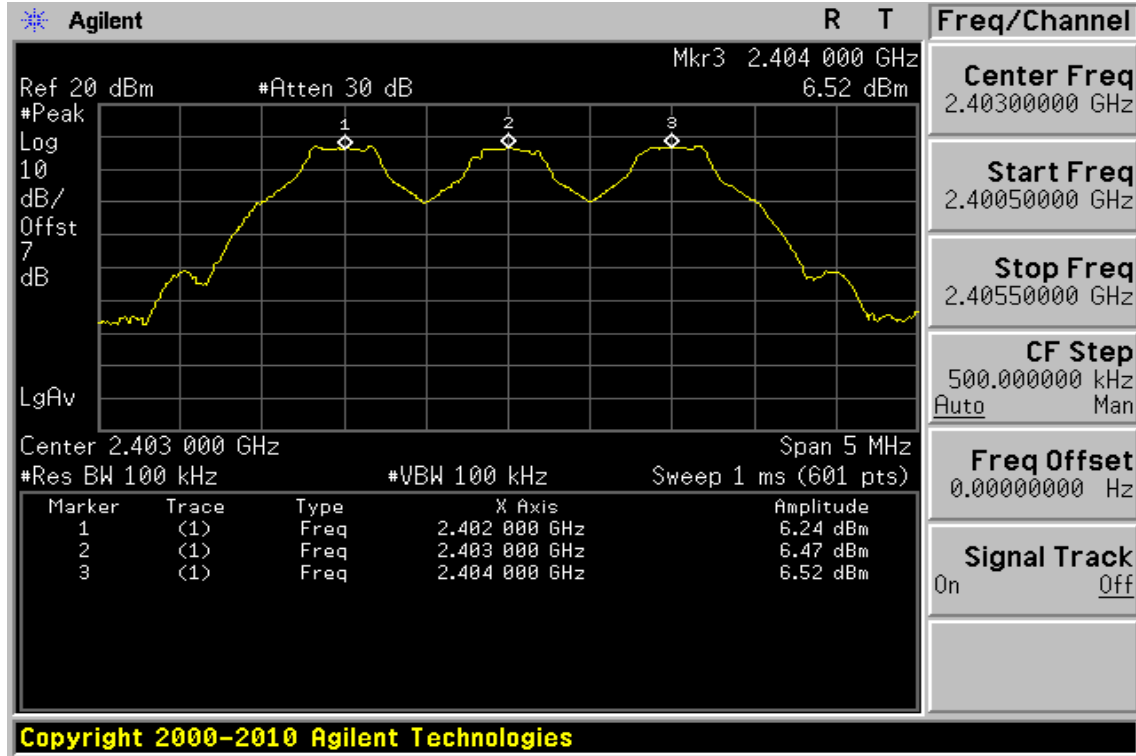
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Frequency Separation Test Data



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12. NUMBER OF HOPPING FREQUENCY

12.1. Standard Applicable

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

12.2. Measurement Equipment Used:

Refer to section 7.2 for details.

12.3. Test Set-up:

Refer to section 7.3 for details.

12.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW=430KHz,, VBW=1MHz.
5. Max hold, view and count how many channel in the band.

12.5. Measurement Result:

Note: Refer to next page for plots.

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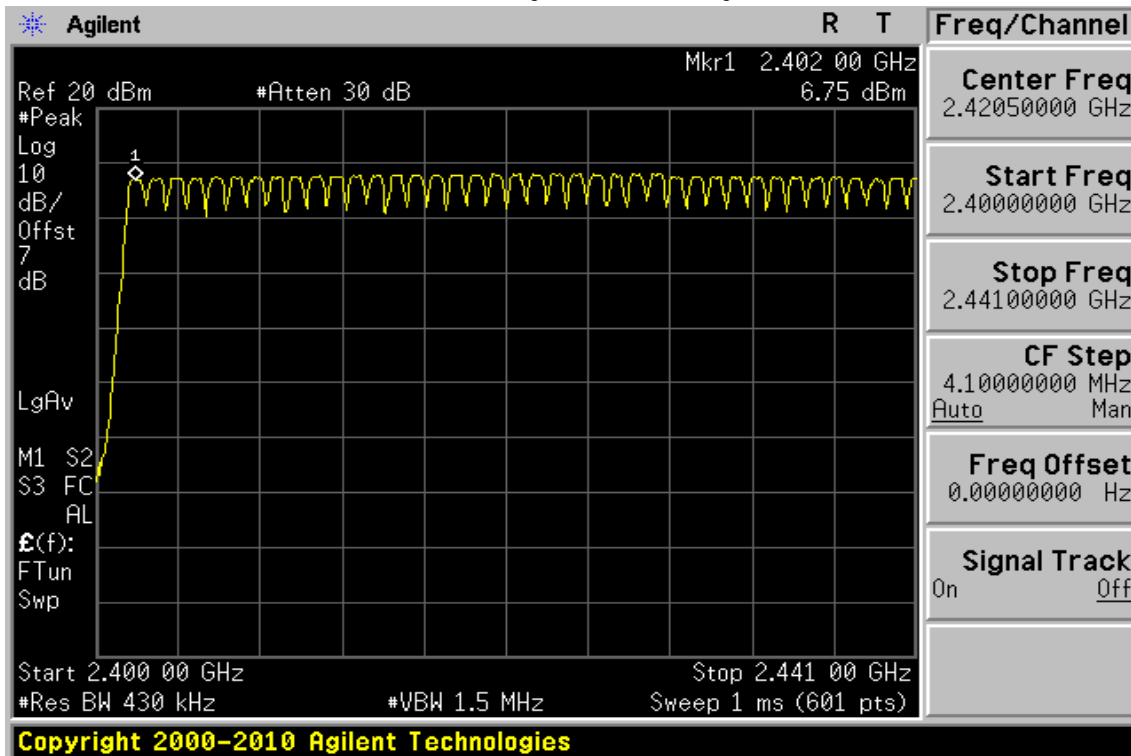
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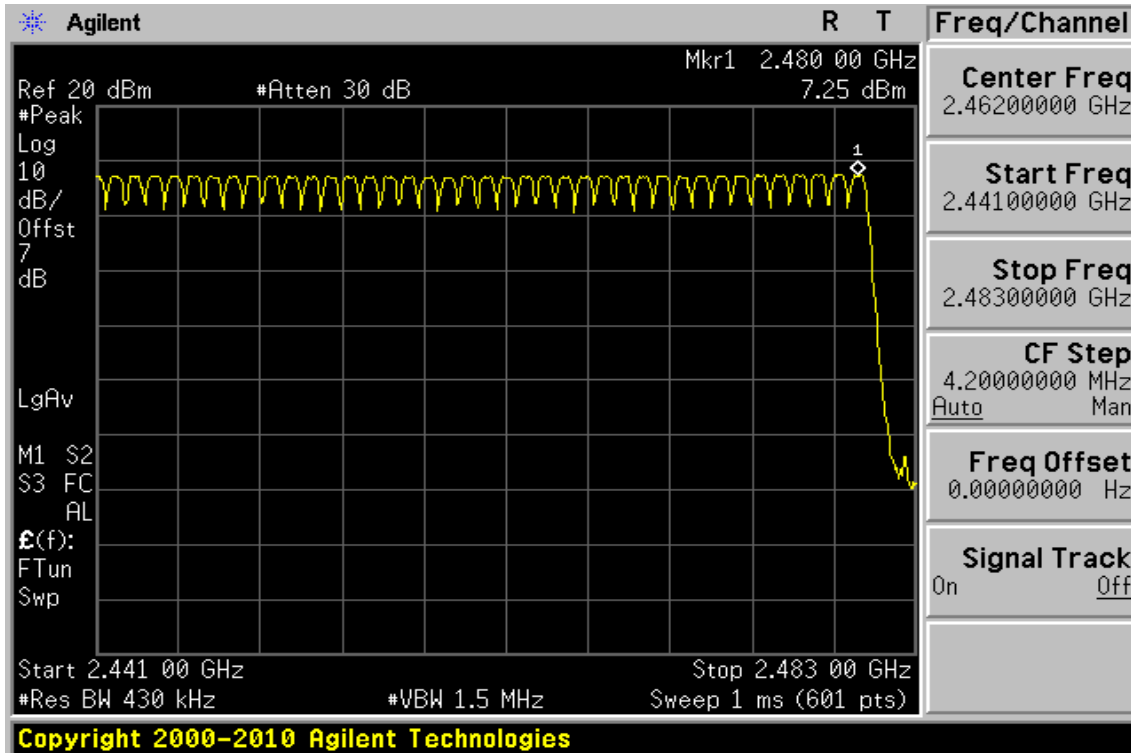
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Channel Number

2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



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13. TIME OF OCCUPANCY (DWELL TIME)

13.1. Standard Applicable

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

13.2. Measurement Equipment Used:

Refer to section 7.2 for details.

13.3. Test Set-up:

Refer to section 7.3 for details.

13.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Span = 0Hz , Adjust Sweep = 2~7ms.
5. Repeat above procedures until all frequency measured were complete.

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13.5. Measurement Result

A period time = 0.4 (sec) * 79 = 31.6 (s)

CH Low: DH1 time slot = 0.367 (ms) * (1600/(2*79)) * 31.6 = 117.34 (ms)

DH3 time slot = 1.617 (ms) * (1600/(4*79)) * 31.6 = 258.72 (ms)

DH5 time slot = 2.870 (ms) * (1600/(6*79)) * 31.6 = 306.13 (ms)

CH Mid: DH1 time slot = 0.367 (ms) * (1600/(2*79)) * 31.6 = 117.34 (ms)

DH3 time slot = 1.617 (ms) * (1600/(4*79)) * 31.6 = 258.72 (ms)

DH5 time slot = 2.870 (ms) * (1600/(6*79)) * 31.6 = 306.13 (ms)

CH High: DH1 time slot = 0.367 (ms) * (1600/(2*79)) * 31.6 = 117.34 (ms)

DH3 time slot = 1.617 (ms) * (1600/(4*79)) * 31.6 = 258.72 (ms)

DH5 time slot = 2.870 (ms) * (1600/(6*79)) * 31.6 = 306.13 (ms)

Note: Refer to next page for plots.

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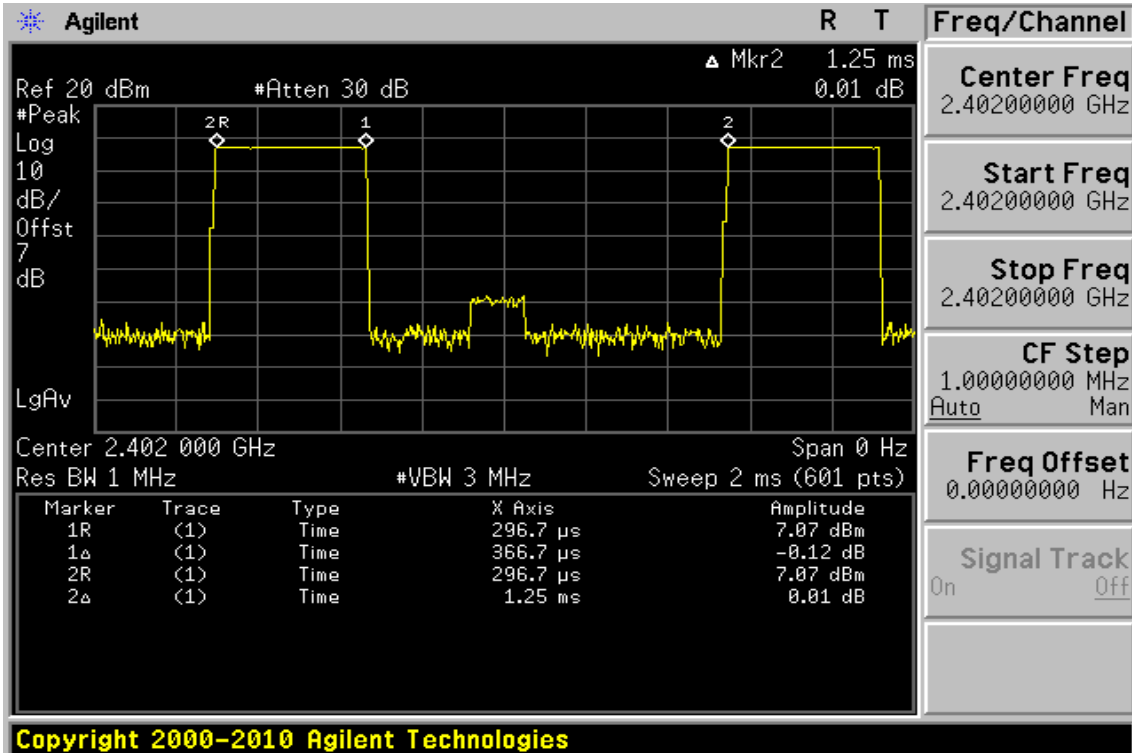
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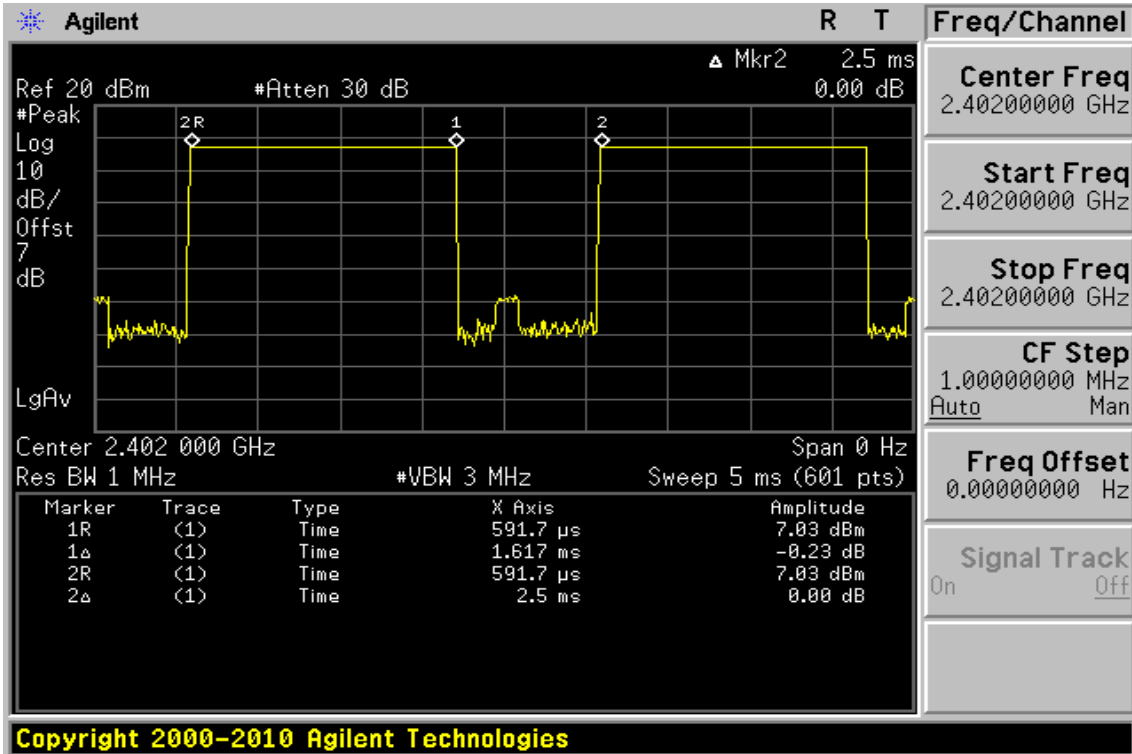
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CH-Low

DH1



DH3



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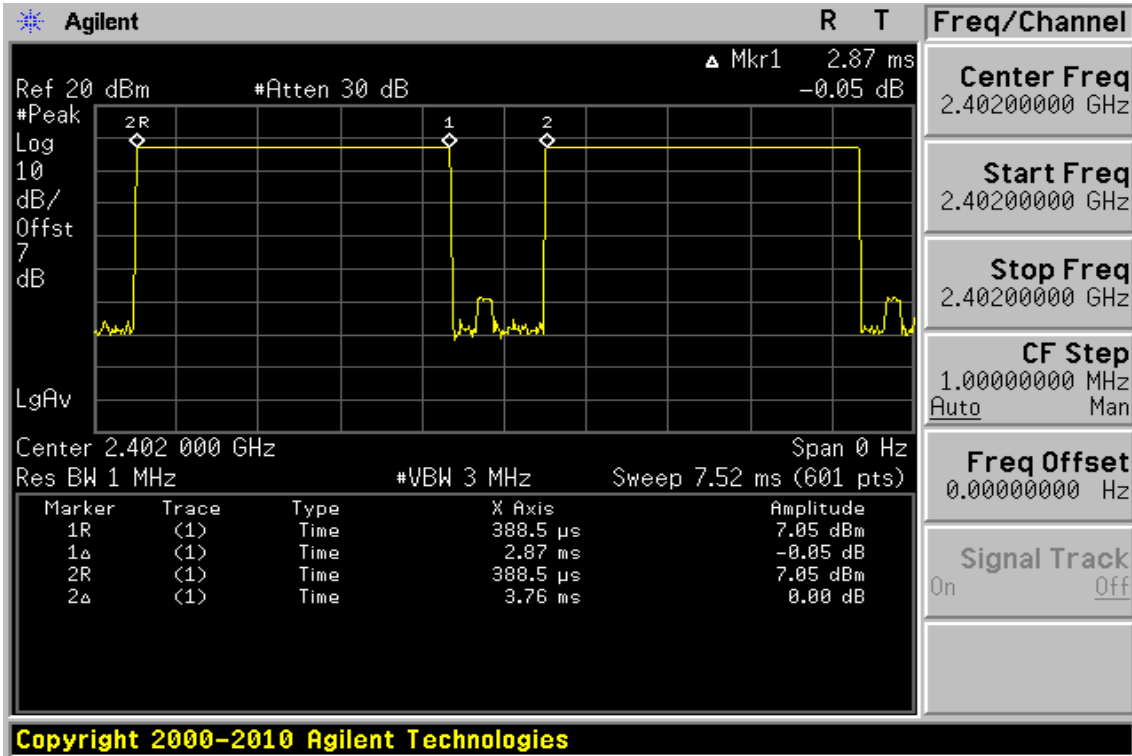
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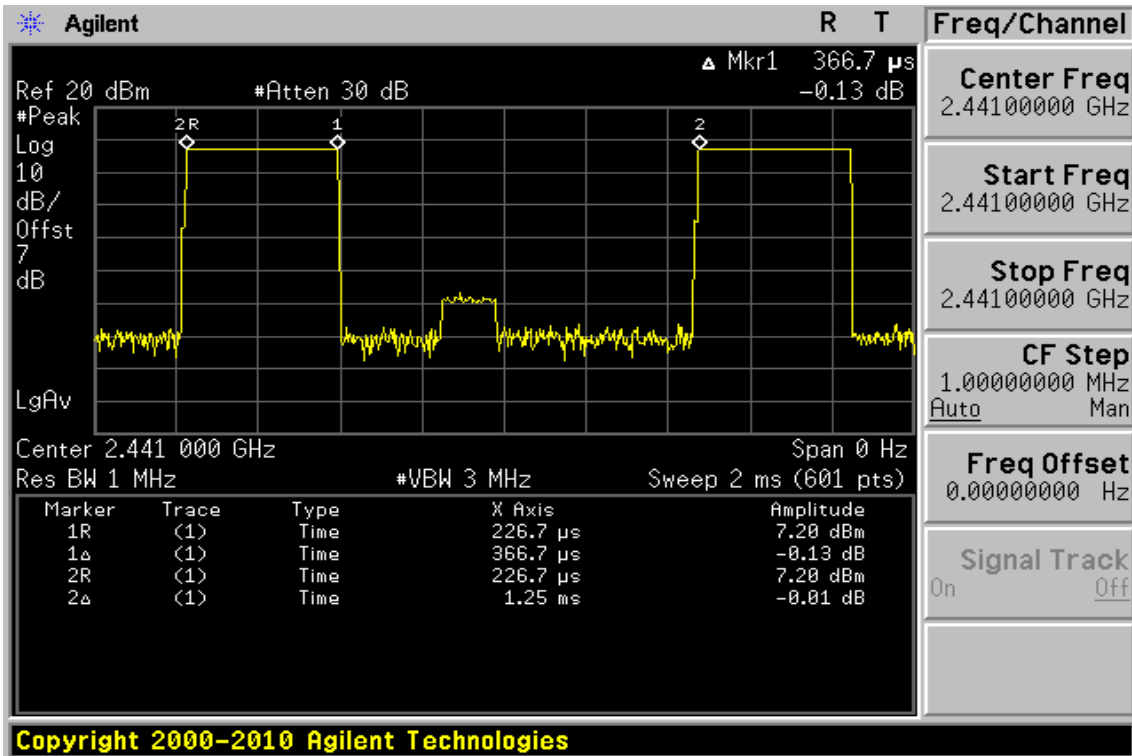
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DH5



CH-Mid

DH1



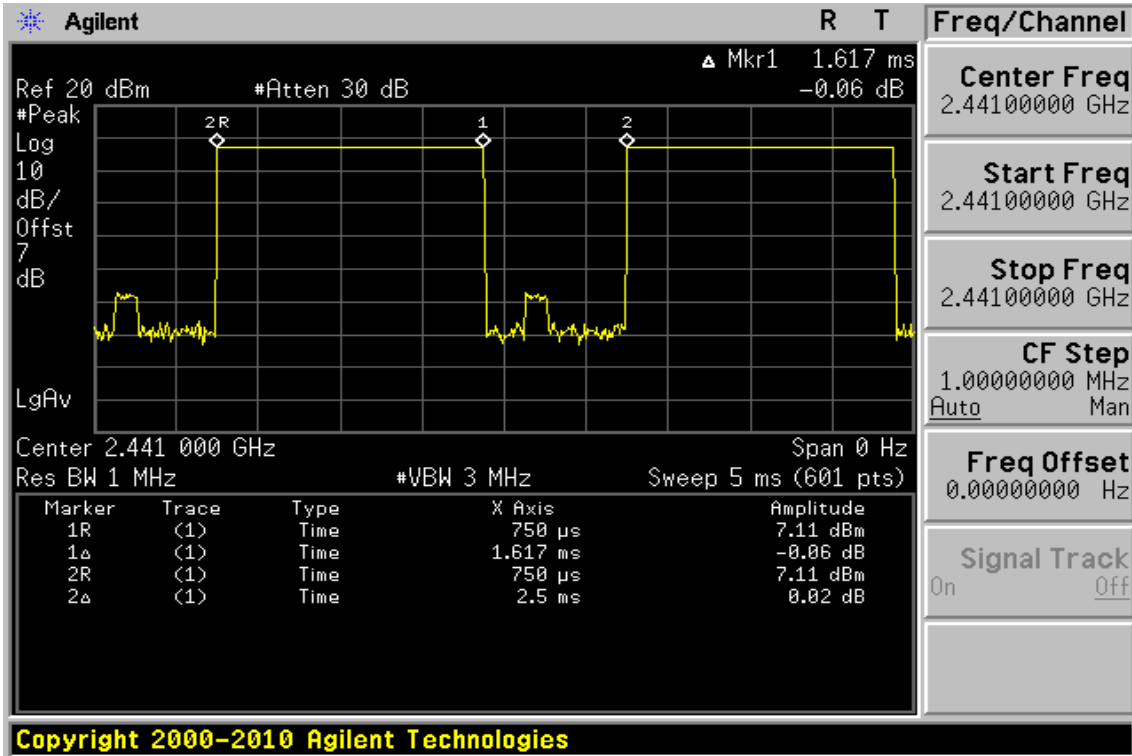
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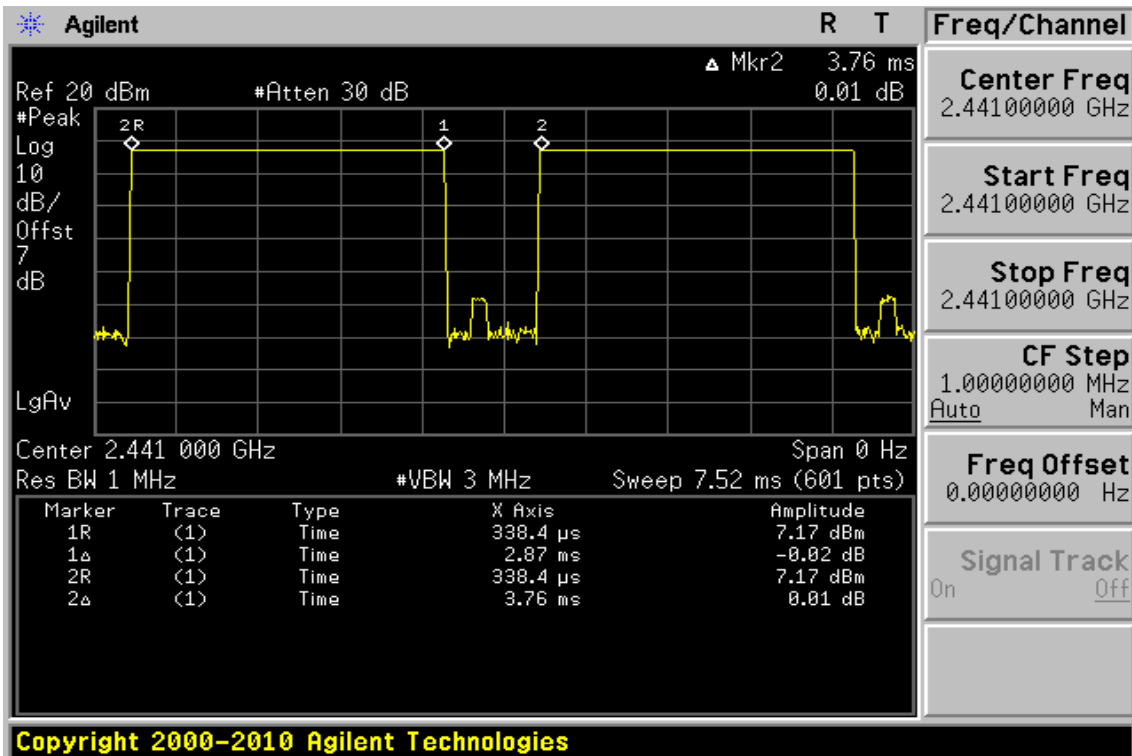
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DH3



DH5



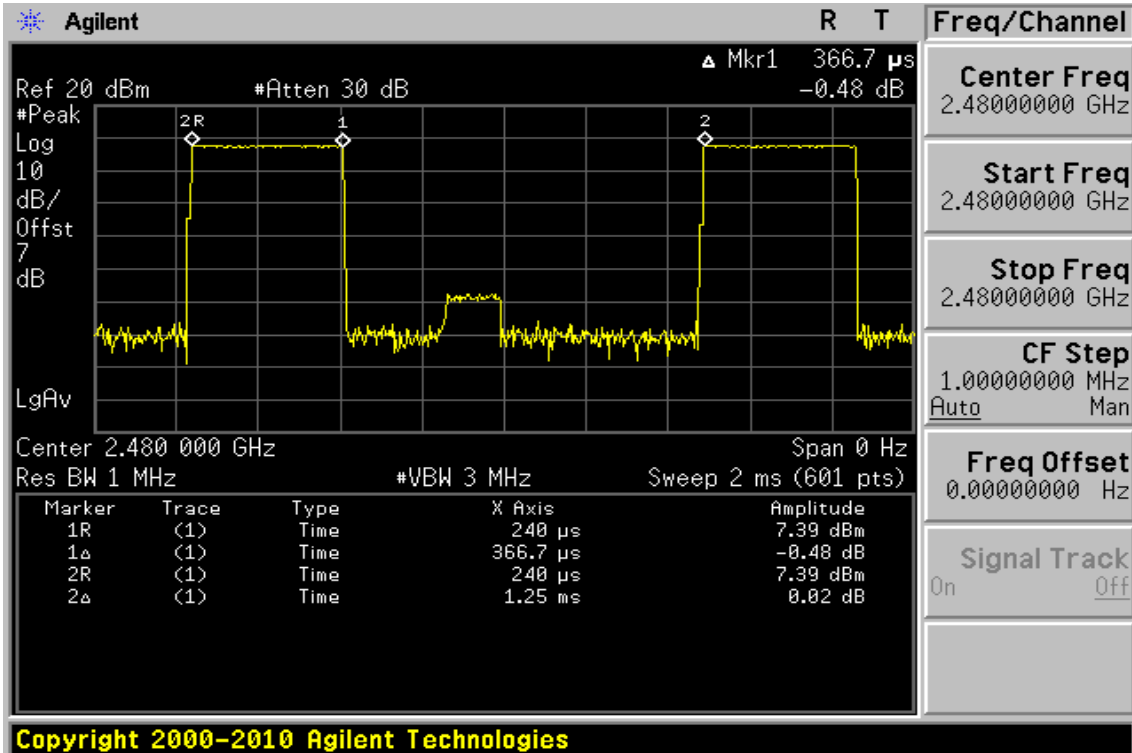
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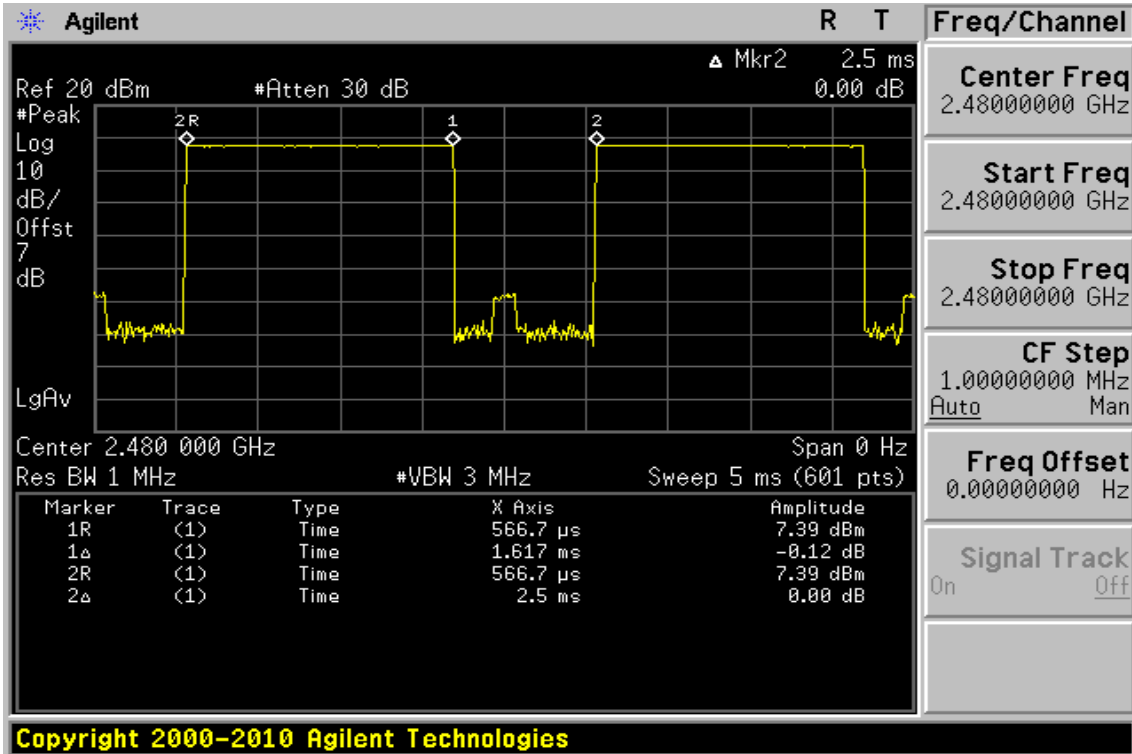
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CH-High DH1



DH3



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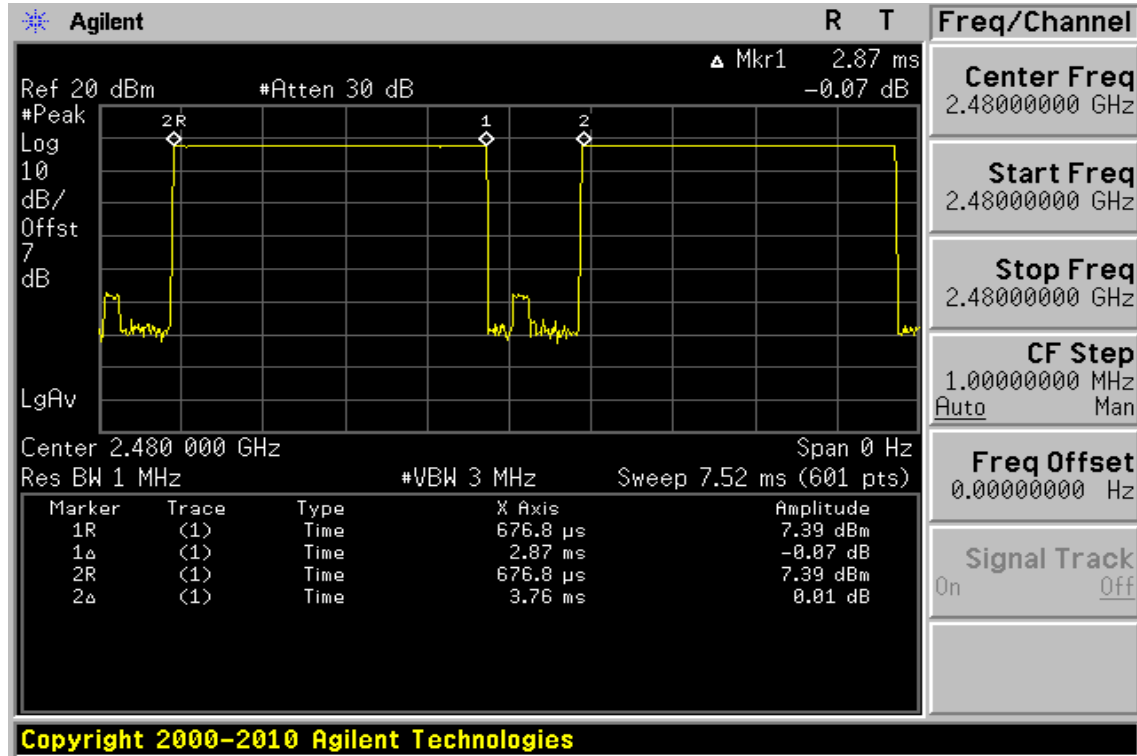
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DH5



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14. ANTENNA REQUIREMENT

14.1. Standard Applicable

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

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

14.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is -0.57 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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