

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT****INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT  
AND INDUSTRY CANADA RSS-210**

OF

**Product Name:** Mono Bluetooth Headset

**Brand Name:** FreeHand By Plantronics

**Model Name:** FreeHand 100

**Model Difference:** N/A

**IC:** 457A-FH100

**FCC ID:** AL8-FH100

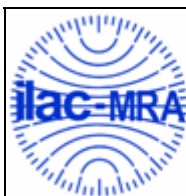
**Report No.:** EF/2010/10003~4

**Issue Date:** Feb. 01, 2010

**Rule Part:** §15.247, Cat: DSS  
RSS-210 issue 7:2007, Annex 8

**Prepared for:** Plantronics, Inc.  
345 Encinal Street, Santa Cruz, CA95060 USA

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



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## CERTIFICATION OF COMPLIANCE

**Applicant:** Plantronics, Inc.  
345 Encinal Street, Santa Cruz, CA95060 USA

**Product Name:** Mono Bluetooth Headset

**Brand Name:** FreeHand By Plantronics

**IC:** 457A-FH100

**FCC ID:** AL8-FH100

**Model No.:** FreeHand 100

**Model Difference:** N/A

**File Number:** EF/2010/10003~4

**Date of test:** Jan. 22, 2010~ Feb. 01, 2010

**Date of EUT Received:** Jan. 22, 2010

**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 RSS-Gen. issue 2:2007, 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 15C:2007, §15.247 and RSS-210 issue 7: 2007 Annex 8.

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

**Test By:**

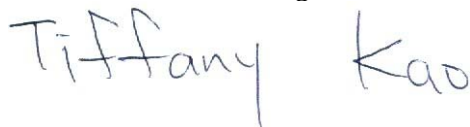


**Date:**

Feb. 01, 2010

*Bondi Liu / Engineer*

**Prepared By:**

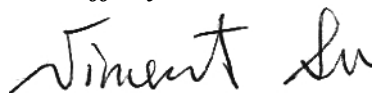


**Date:**

Feb. 01, 2010

*Tiffany Kao / Clerk*

**Approved By:**



**Date:**

Feb. 01, 2010

*Vincent Su / Manager*

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## Version

Version No.	Date	Description
00	Feb. 01, 2010	Initial creation of document

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## 1. GENERAL INFORMATION

### 1.1. Product Description

General:

Product Name:	Mono Bluetooth Headset	
Brand Name:	FreeHand By Plantronics	
Model Name:	FreeHand 100	
Model Difference:	N/A	
Hardware Version:	R3	
Software Version:	V02.02.00	
Power Supply:	3.7 Vdc re-chargeable battery or 5Vdc by AC/DC power adapter	
	Battery:	Model: SP041230AB, Supplier: LISHEN
	Adapter:	Model: SSA-5W-05 US 050018F, Supplier: SUNSTRONG

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Bluetooth:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	<input type="checkbox"/> V1.1 (GFSK) <input type="checkbox"/> V1.2 (GFSK) <input type="checkbox"/> V2.0 (GFSK) <input checked="" type="checkbox"/> V2.0 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK) <input type="checkbox"/> V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	0.96 dBm
Dwell Time:	$\leq 0.4s$
Operating Mode:	Point-to-Point
Antenna Designation:	Printed Antenna, -5.77dBi.
Type of Emission:	1M20FXD

This report applies for Bluetooth.

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## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: AL8-FH100** filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules. And **IC: 457A-FH100** filing to comply with Industry Canada RSS-210 issue 7: 2007 Annex 8.

## 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2007. Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4. 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. 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-1.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. 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.

## 1.5. Special Accessories

Not available for this EUT intended for grant.

## 1.6. 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 tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

### 2.3. Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7, 13 of ANSI C63.4-2003 and RSS-Gen:2007. 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 placed on a 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 of ANSI C63.4-2003.

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## 2.4. Configuration of Tested System

**Fig. 2-1 Configuration of Tested System (Fixed channel)**



**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.
1.	NoteBook IBM		T43	L3LHHN6
2.	Develop Kit	N/A	N/A	N/A
3.	Bluetooth Software	Bluesuite 1.22	CSR	Version 1.22

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### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)/ RSS-Gen §7.2.2	AC Power line Conducted Emission	Compliant
§15.247(b)(1)/ RSS-210 issue 7,§A8.4(2)	Peak Output Power	Compliant
§15.247(d) RSS-210 issue 7,§A8.5	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(c) RSS-Gen §7.2.3 RSS-210 issue 7,§A2.9	TX/RX Spurious Emission	Compliant
§15.247(a)(1)/ RSS-210 issue 7,§A8.1(b)	Frequency Separation	Compliant
§15.247(b)(1)/ RSS-210 issue 7,§A8.1(d)	Number of hopping frequency Com	pliant
§15.247(a)(1)(ii)/ RSS-210 issue 7,§A8.1(d)	Time of Occupancy	Compliant
§15.247/ RSS-210 issue 7,§A8.2(b)	Peak Power Density	Compliant
§15.247(a)(1) RSS210 issue ,§A8.1(b)	20dB Bandwidth & 99% Power Bandwidth	Compliant
§15.203, §15.247(c)/ RSS-GEN 7.1.4, RSS-210 issue 7,§A8.4	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 highest data rate are chosen for full testing.

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## 5. AC POWER LINE CONDUCTED EMISSION TEST

### 5.1. Standard Applicable:

According to §15.207 and RSS-Gen §7.2.2, frequency range 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

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

### 5.2. Measurement Equipment Used:

AC Power Line Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	828985/004	09/16/2009	09/15/2010
LISN Rolf-Heine		NNB-2/16Z	99012	02/02/2009	02/01/2010
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	02/02/2009	02/01/ 2010
Coaxial Cables	N/A	WK CE Cable	N/A	10/30/2009	10/29/ 2010

### 5.3. EUT Setup:

- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
- The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- The LISN was connected with 120Vac/60Hz power source.

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#### 5.4. 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.

#### 5.5. 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.

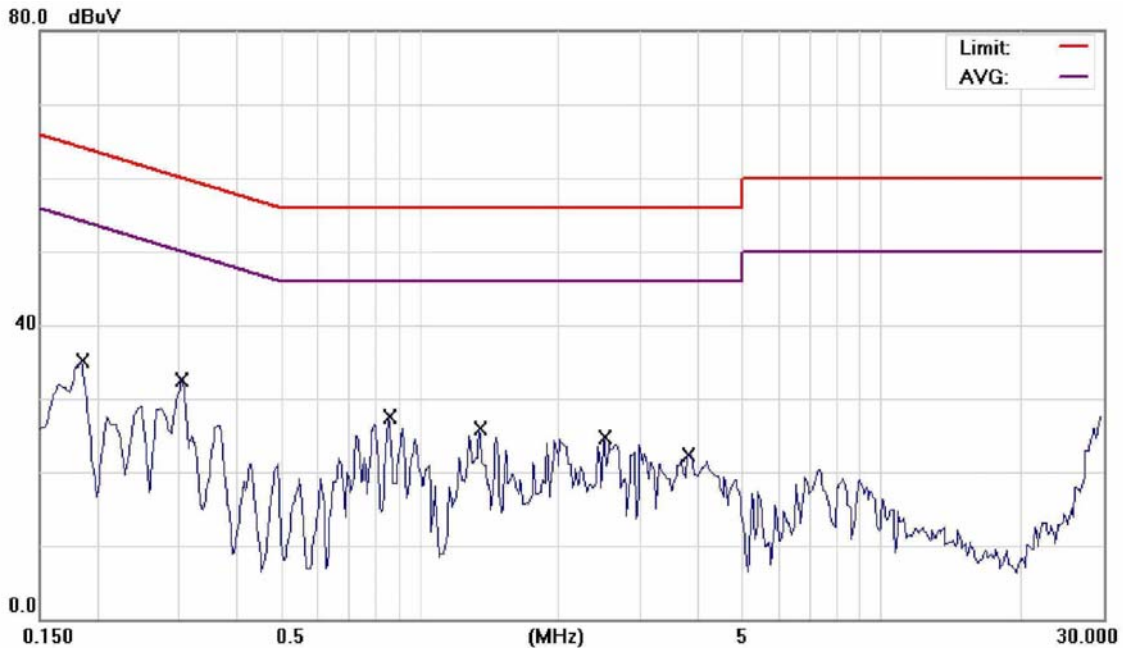
Note: Refer to next page for measurement data and plots.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Bluetooth Mode	Test Date:	Jan. 27, 2010
Temperature:	24 °C	Humidity:	56 %
		Test By:	Bondi



Site: SGS CONDUCTED #1	Phase: <b>L1</b>	Temperature: 23 °C
Limit: CISPR22/11/EN55022 Class B (QP)	Power: AC 120V/60Hz	Humidity: 56 %
EUT: <b>Mono Bluetooth Headset</b>		
M/N: <b>FreeHand 100</b>		
Note: ADAPTER Charger+BT Mode		

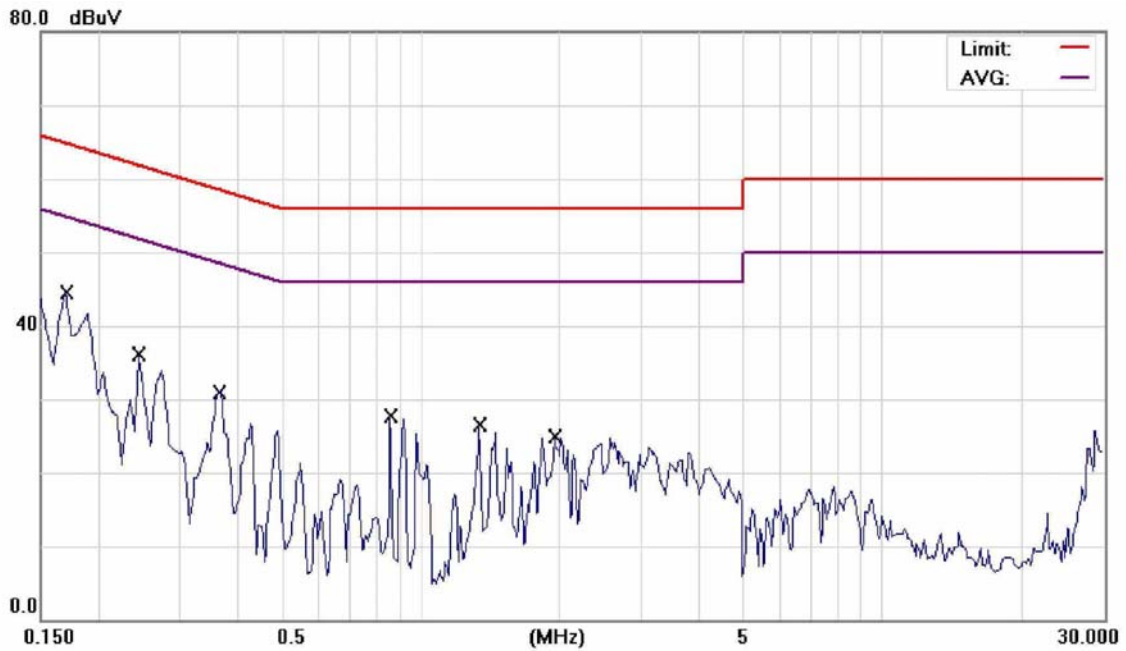
No.	Mk.	Freq.	Reading Level	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1850	35.05	0.14	35.19	64.26	-29.07	QP	
2	*	0.3050	32.48	0.10	32.58	60.11	-27.53	QP	
3		0.8600	27.51	0.08	27.59	56.00	-28.41	QP	
4		1.3500	25.72	0.10	25.82	56.00	-30.18	QP	
5		2.5100	24.52	0.14	24.66	56.00	-31.34	QP	
6		3.8100	22.12	0.15	22.27	56.00	-33.73	QP	

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Site: SGS CONDUCTED #1      Phase: **L2**      Temperature: 23 °C  
 Limit: CISPR22/11/EN55022 Class B (QP)      Power: AC 120V/60Hz      Humidity: 56 %  
 EUT: **Mono Bluetooth Headset**  
 M/N: **FreeHand 100**  
 Note: ADAPTER Charger+BT Mode

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1700	44.35	0.09	44.44	64.96	-20.52	QP	
2		0.2450	36.08	0.07	36.15	61.92	-25.77	QP	
3		0.3650	30.82	0.05	30.87	58.61	-27.74	QP	
4		0.8600	27.59	0.05	27.64	56.00	-28.36	QP	
5		1.3400	26.40	0.07	26.47	56.00	-29.53	QP	
6		1.9500	24.91	0.09	25.00	56.00	-31.00	QP	

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## 6. PEAK OUTPUT POWER MEASUREMENT

### 6.1. Standard Applicable:

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

According to RSS-210 issue 7,§A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

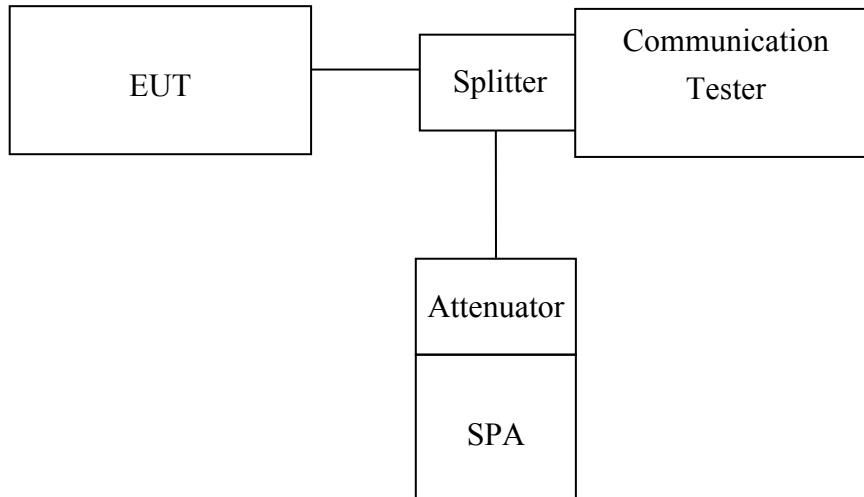
### 6.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360 126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/23/2010	01/22/ 2012
DC Block	Agilent	BLK-18	1554 52	07/05/2009	07/04/2010
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2010	01/04/ 2011
Attenuator Mini-Circuit		BW-S6W5	001	07/05/2009	07/04/ 2010
Attenuator Mini-Circuit		BW-S10W5	001	07/05/2009	07/04/ 2010
Attenuator Mini-Circuit		BW-S20W5	001	07/05/2009	07/04/ 2010
Splitter Agilent		11636B	N/A	07/05/2009	07/04/ 2010

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### 6.3. Test Set-up:



### 6.4. 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. (RBW= >20dB bandwidth , VBW= >=RBW)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

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## 6.5. Measurement Result:

### BDR mode:

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.42	0.00	0.42	0.00110	1
2441.00	0.44	0.00	0.44	0.00111	1
2480.00	0.42	0.00	0.42	0.00110	1

*\*Note: offset 0.1dB*

### EDR mode:

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.67	0.00	0.67	0.00117	1
2441.00	0.59	0.00	0.59	0.00115	1
2480.00	0.96	0.00	0.96	0.00125	1

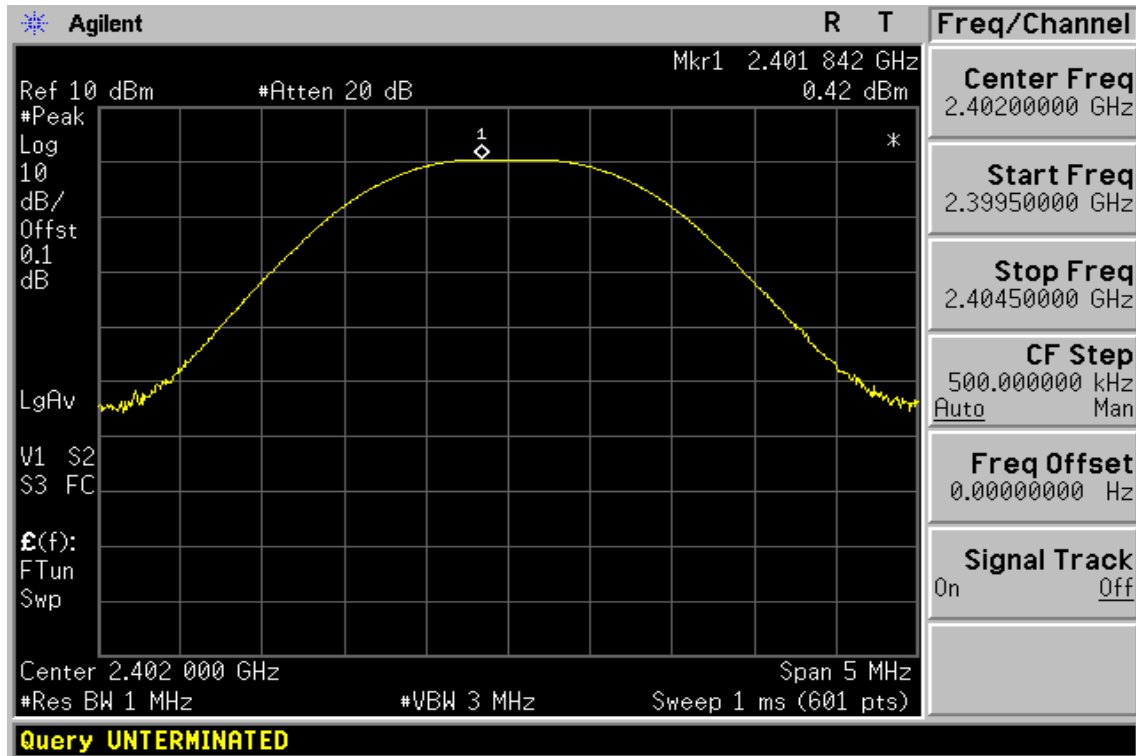
*\*Note: offset 0.1dB*

Note: Refer to next page for plots.

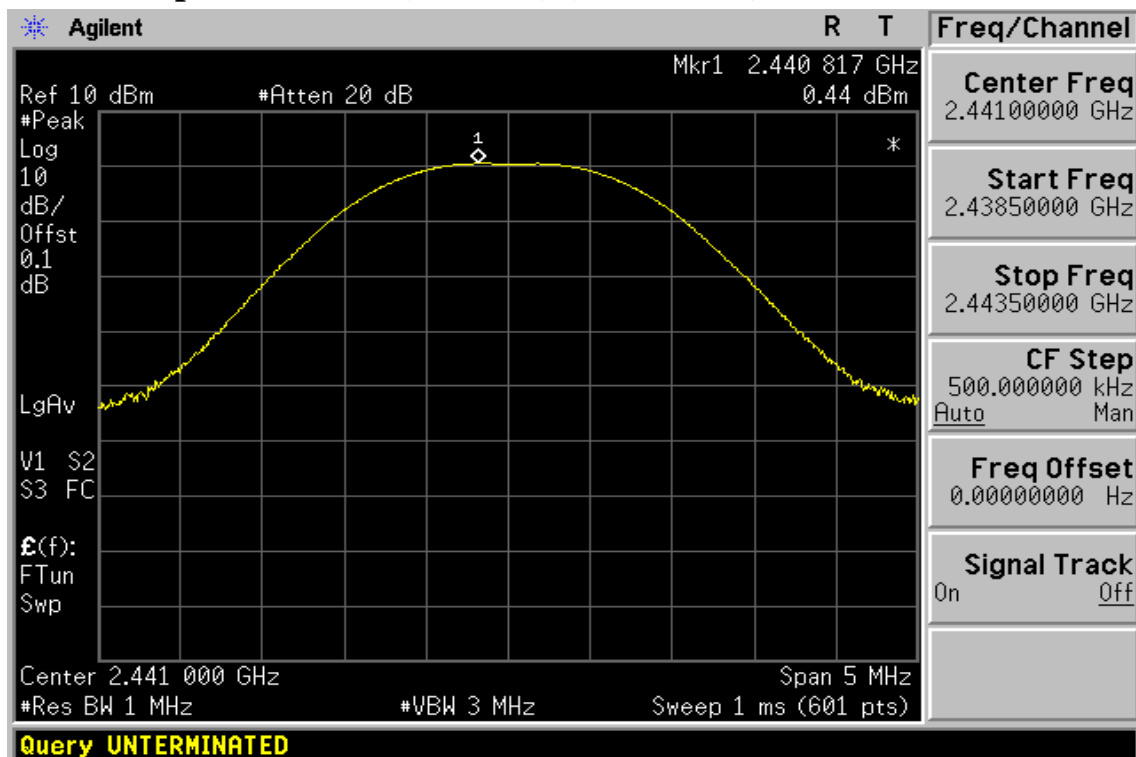
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### Peak Power Output Data Plot (CH Low) (BDR mode)



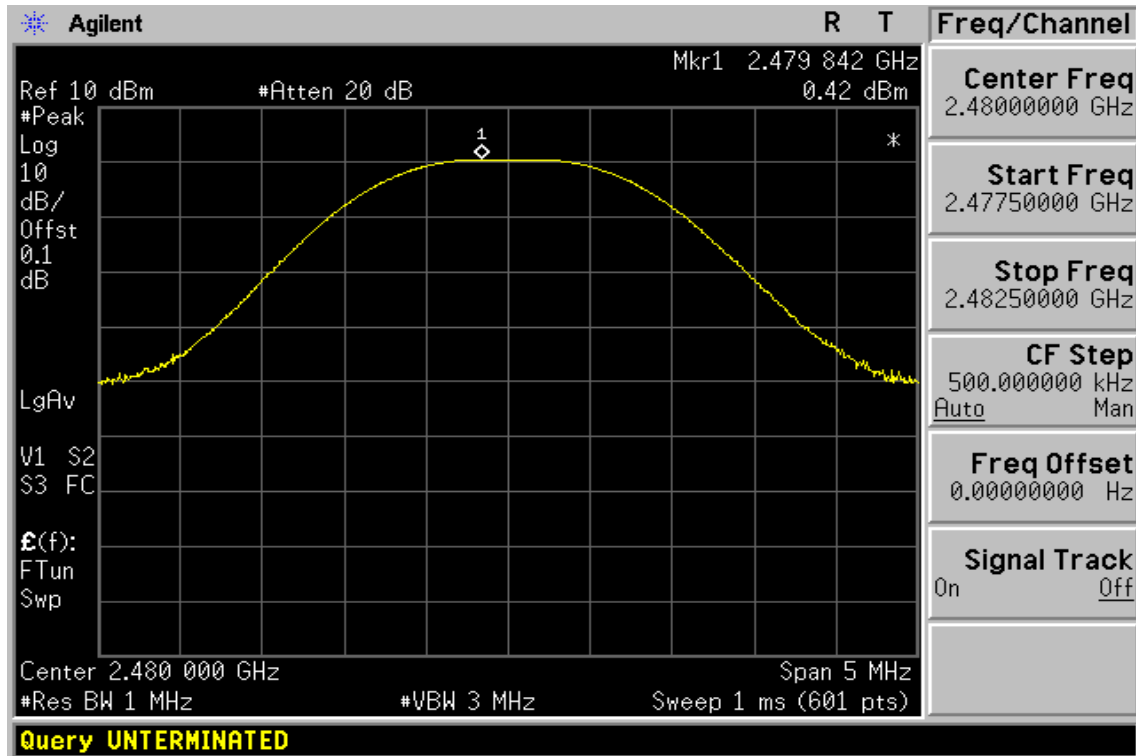
### Peak Power Output Data Plot (CH Mid) (BDR mode)



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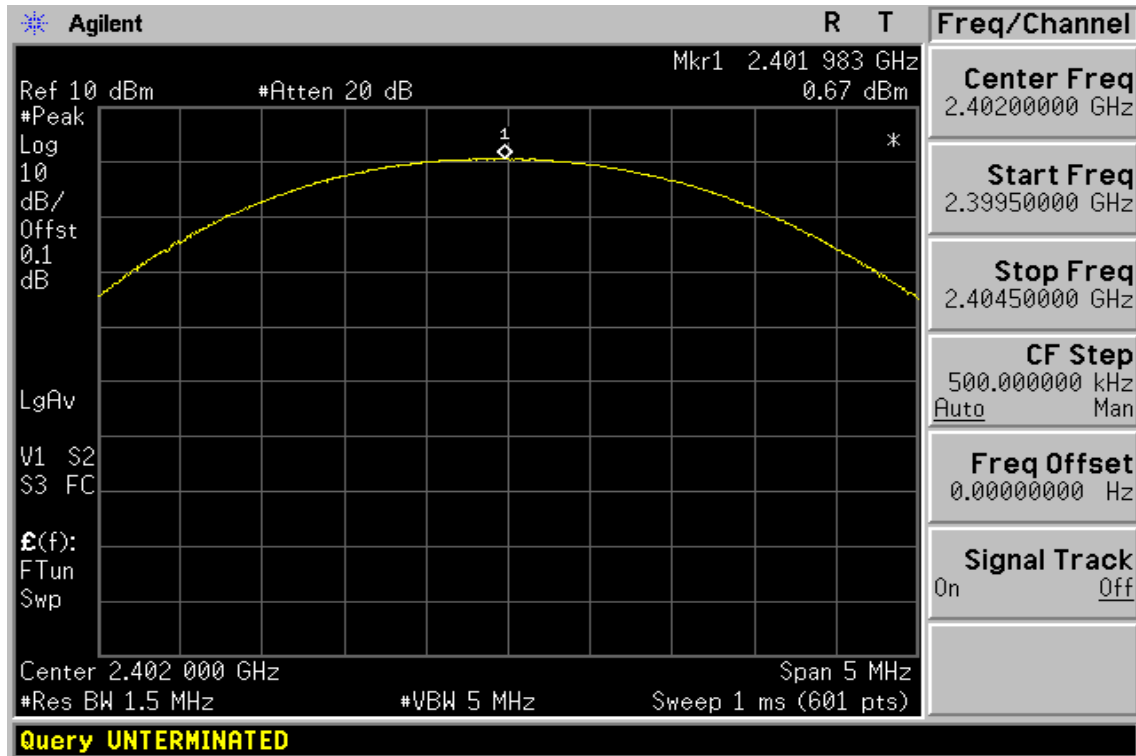
### Peak Power Output Data Plot (CH High) (BDR mode)



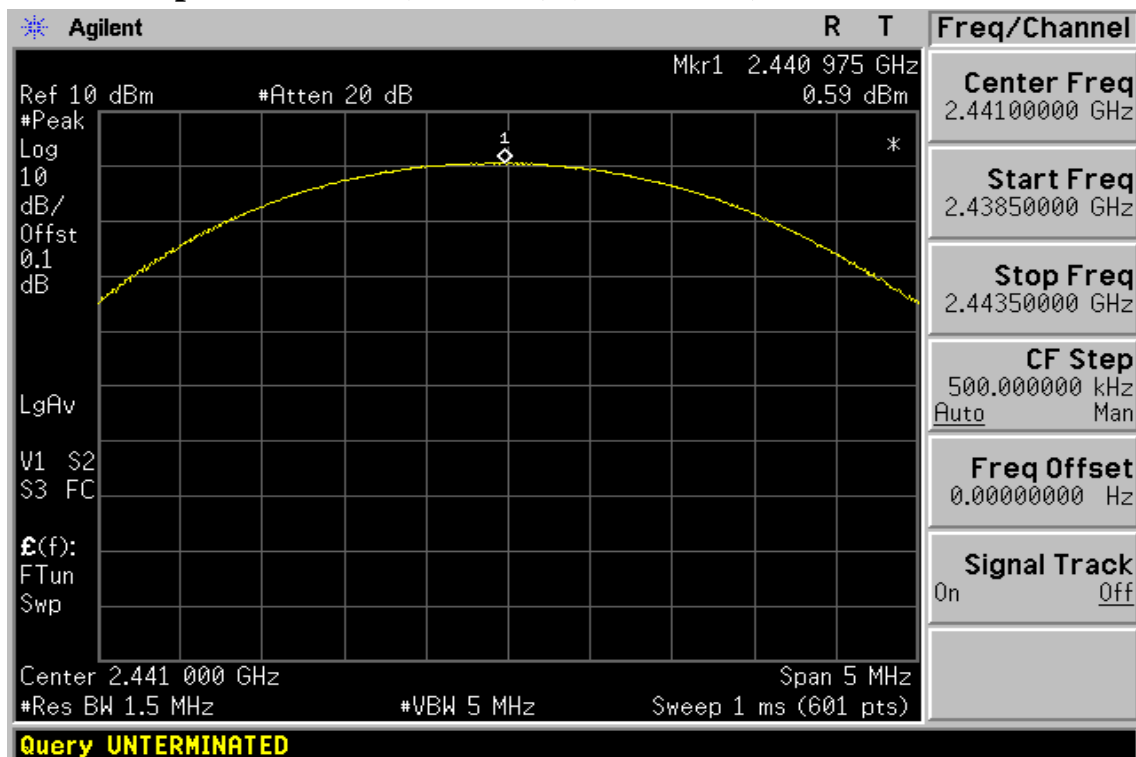
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### Peak Power Output Data Plot (CH Low) (EDR mode)



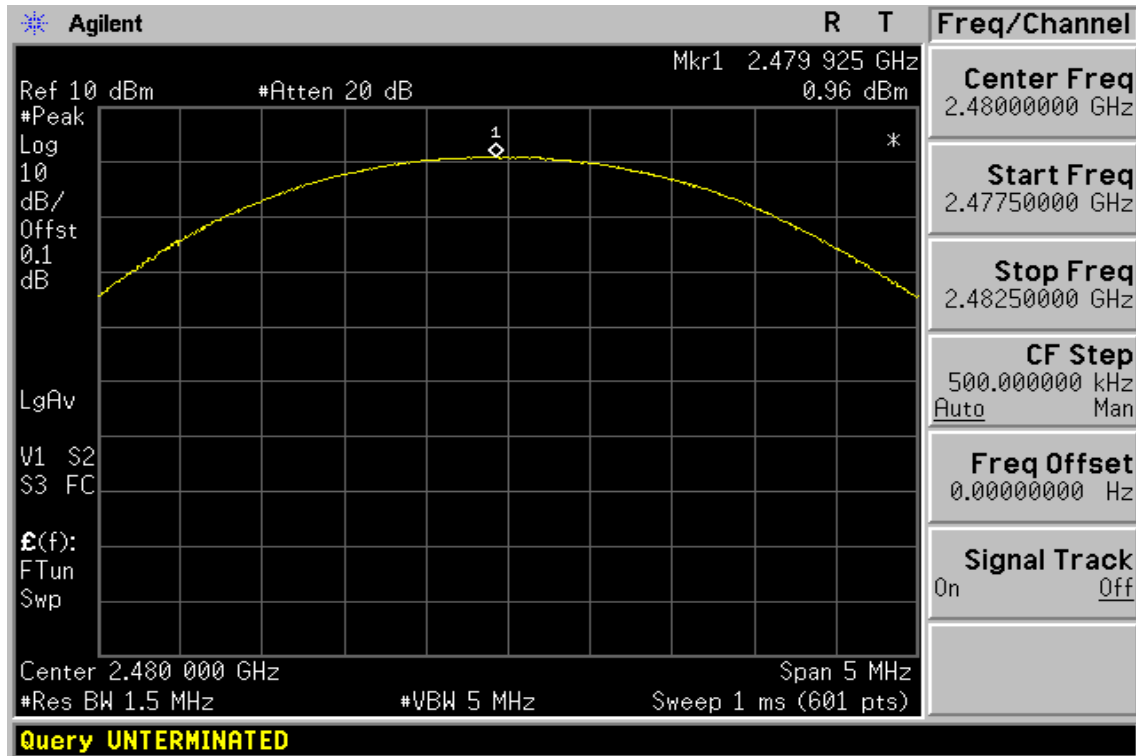
### Peak Power Output Data Plot (CH Mid) (EDR mode)



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



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## 7. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 7.1. Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of 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).

According to RSS-210 issue 7, §A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

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## 7.2. Measurement Equipment Used:

### 7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

### 7.2.2. Radiated emission:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	02/12/2009	02/11/ 2010
Loop antenna	MESSTEC	FLA30	03/10086	07/08/2009	07/07/ 2011
Bilog Antenna	SCHWAZBECK	VULB9160	9160-3136	11/15/ 2009	11/14/2010
Horn antenna	SCHWAZBECK	BBHA 9120D	9120D-673	05/09/ 2008	05/08/2010
Pre-Amplifier Agilent		8447D	1937A02834	11/30/2009	11/29/ 2010
Pre-Amplifier Agilent		8449B	3008A01973	01/05/2010	01/04/ 2011
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	SUCOFLEX 104PEA-10M	10m	01/05/2010	01/04/ 2011
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2010	01/04/ 2011
3m Site	SGS	966 chamber	N/A	11/08/2009	11/09/2010

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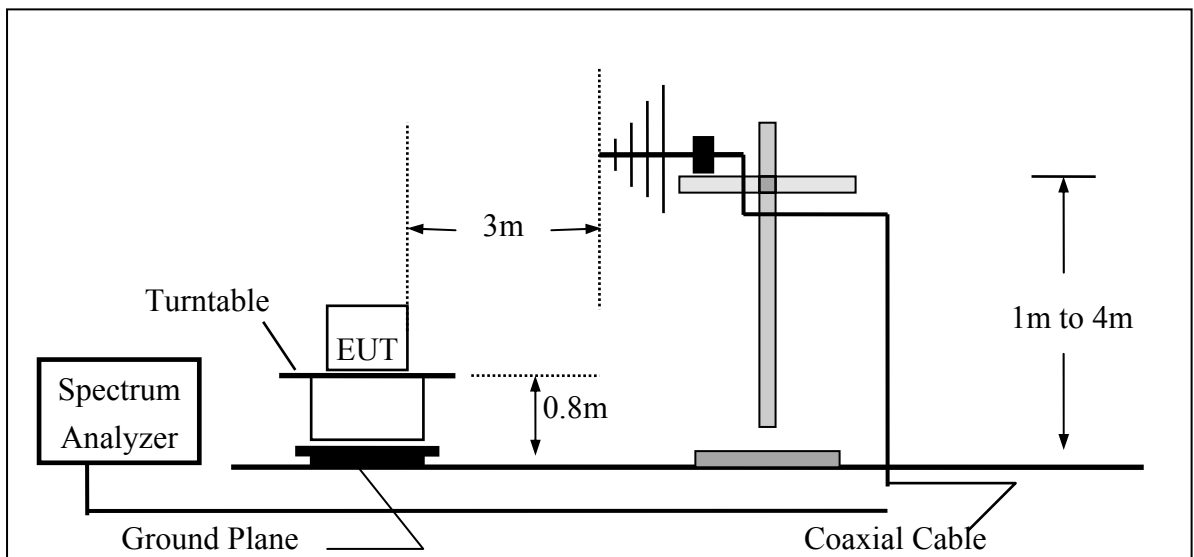
### 7.3. Test SET-UP:

#### 7.3.1. Conducted Emission at antenna port:

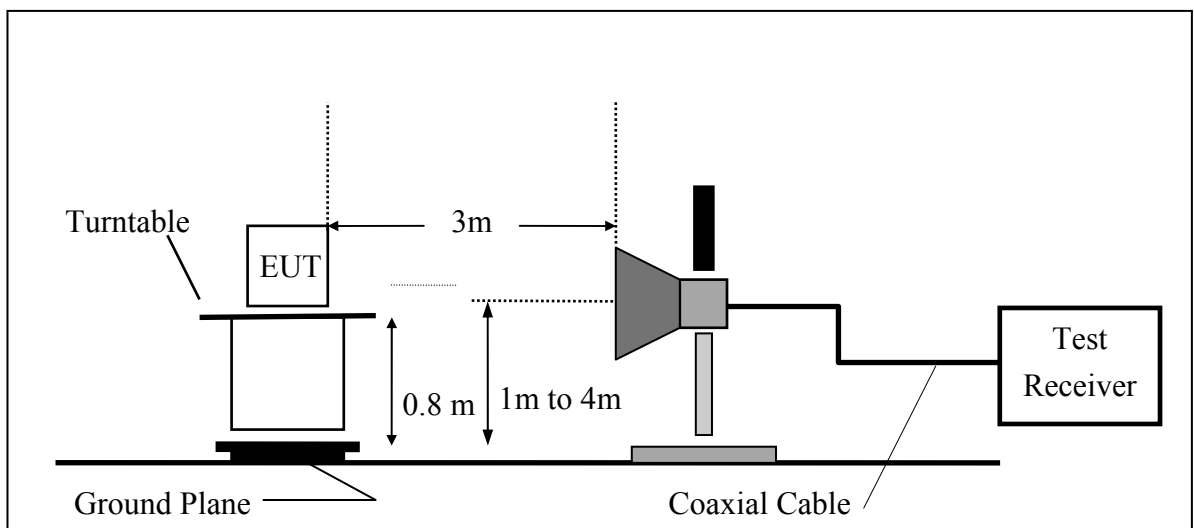
Refer to section 6.3 for details.

#### 7.3.2. 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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#### 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 spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, 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.

#### 7.5. 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	

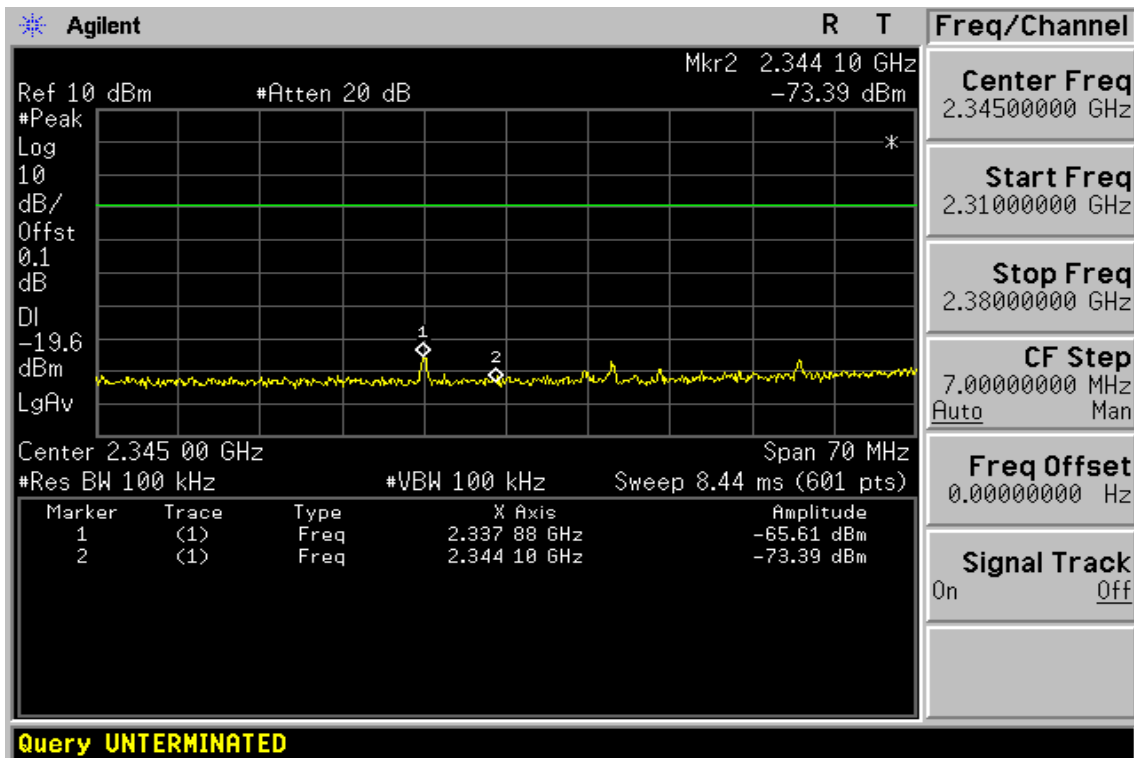
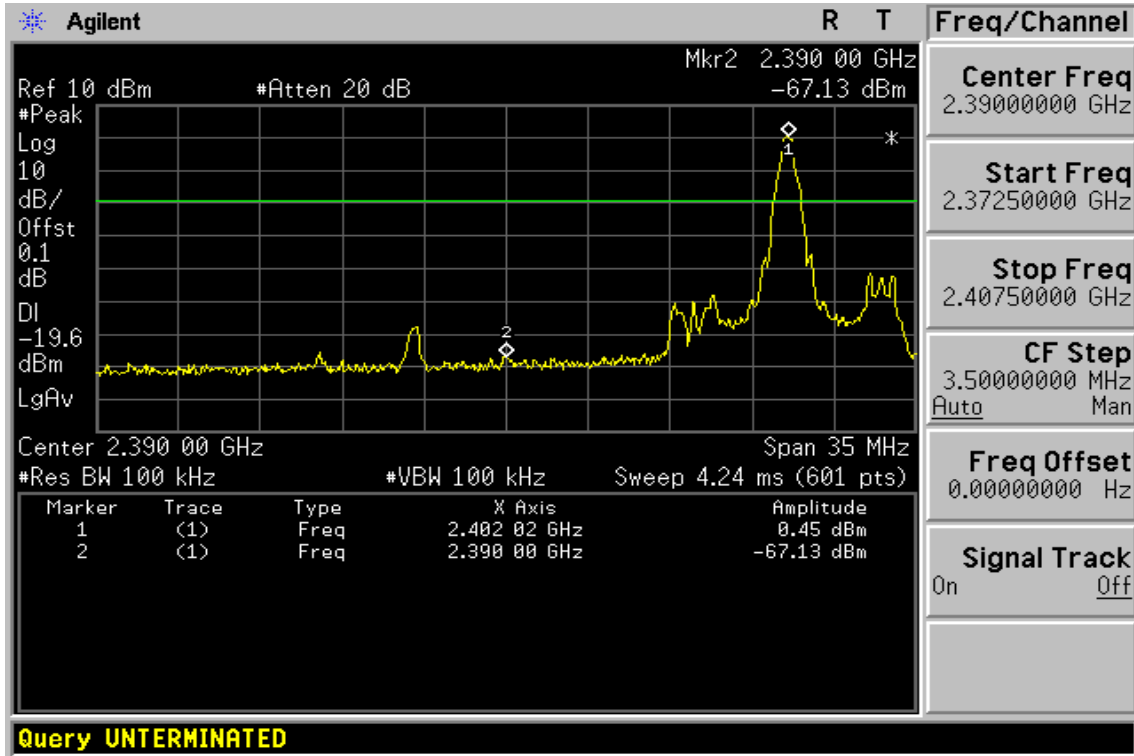
#### 7.6. Measurement Result:

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

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**BDR Mode**  
**Band Edges Test Data CH-Low**

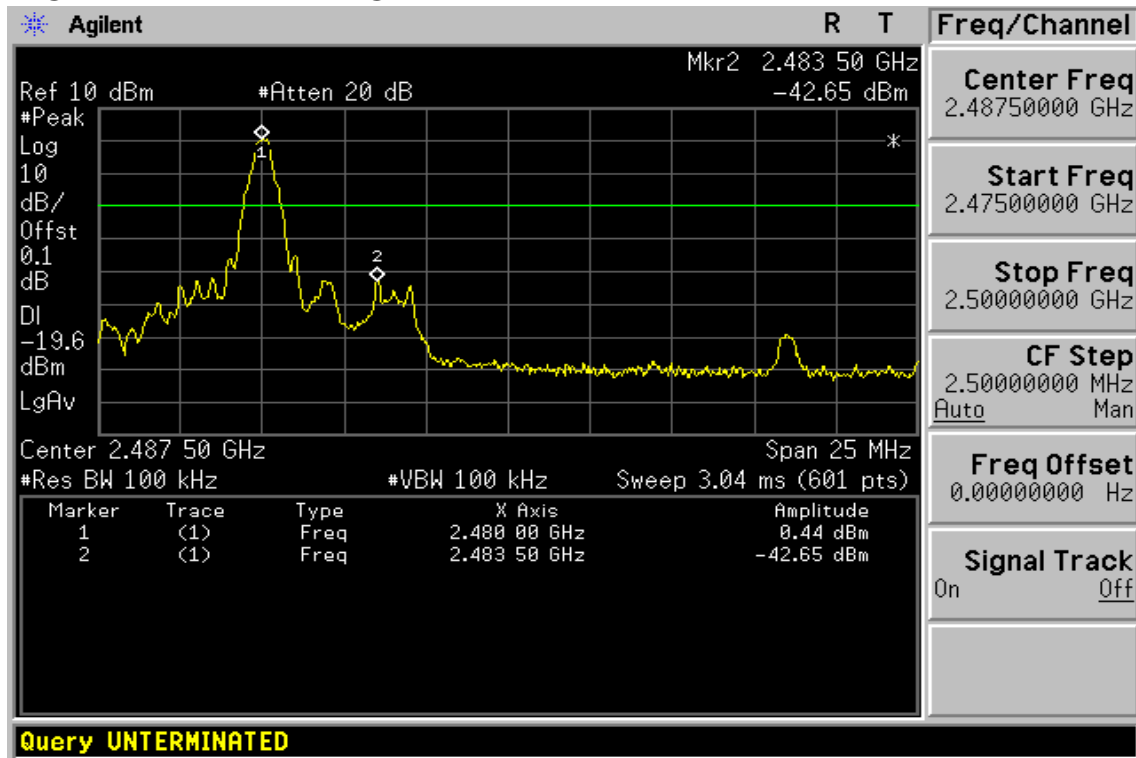


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**Band Edges Test Data CH-High**



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**Radiated Emission: (BDR mode)**

Operation Mode TX CH Low  
Fundamental Frequency 2402 MHz  
Temperature 25 °C Pol  
Humidity 65 %

Test Date Jan. 27, 2010  
Test By Bondi  
Ver.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2337.88	52.86	---	-11.02	41.84	---	74.00	54.00	-12.16	Peak
2344.10	52.91	---	-10.98	41.93	---	74.00	54.00	-12.07	Peak
2390.00	54.79	---	-10.76	44.03	---	74.00	54.00	-9.97	Peak

Operation Mode TX CH Low  
Fundamental Frequency 2402 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Jan. 27, 2010  
Test By Bondi  
Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2337.88	52.53	---	-11.02	41.51	---	74.00	54.00	-12.49	Peak
2344.10	53.73	---	-10.98	42.75	---	74.00	54.00	-11.25	Peak
2390.00	54.13	---	-10.76	43.37	---	74.00	54.00	-10.63	Peak

Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency a bove 1000MHz were made with an instrum ent using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Emission:**

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol Ver.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.50	65.56	49.27	-10.46	55.10	38.81	74.00	54.00	-15.19	AV

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol Hor.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.50	70.00	51.76	-10.46	59.54	41.30	74.00	54.00	-12.70	AV

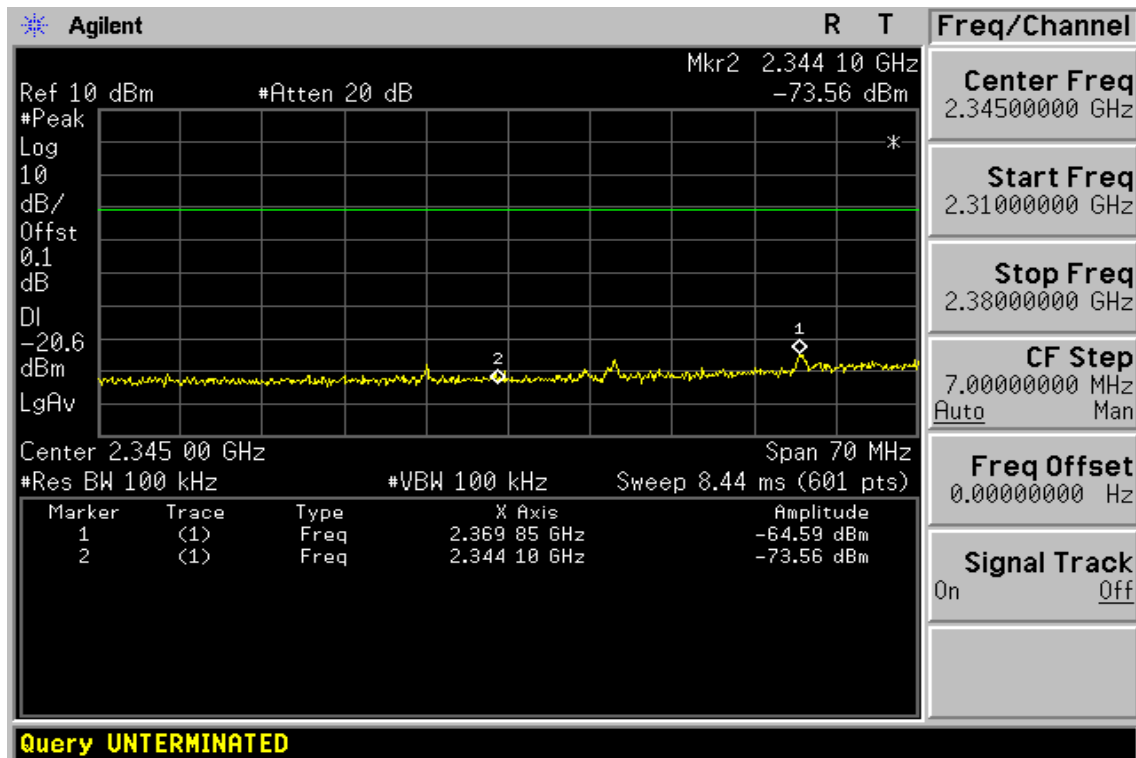
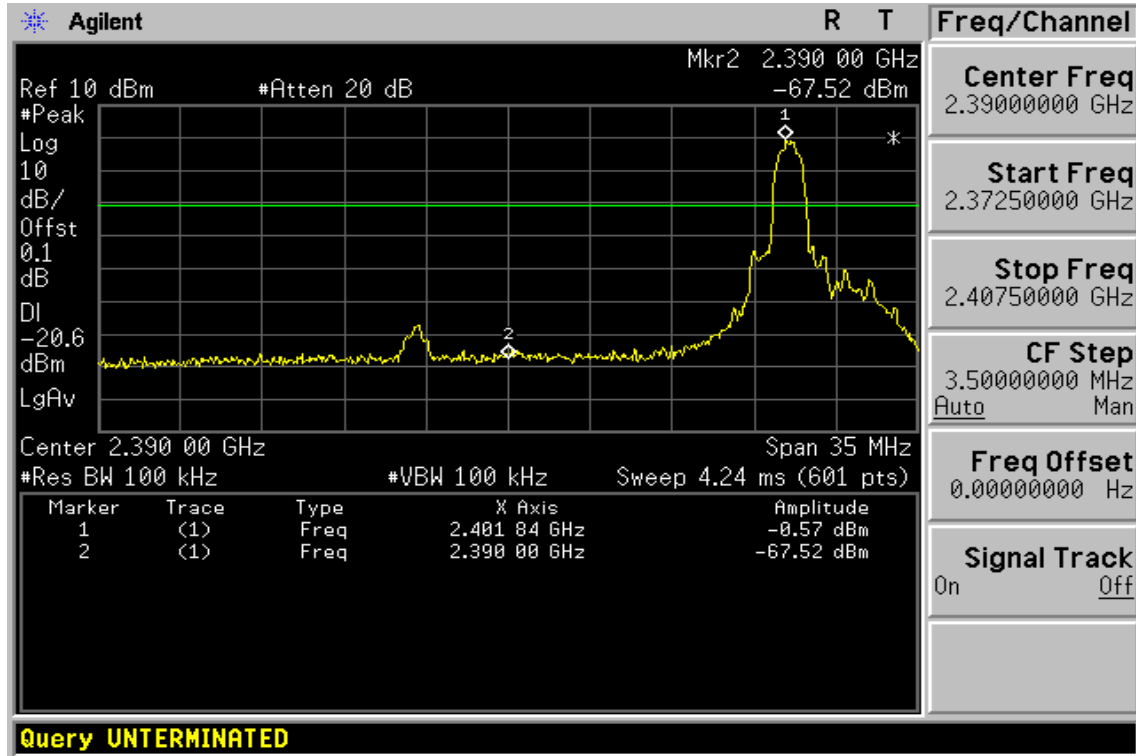
Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**EDR Mode**  
**Band Edges Test Data CH-Low**

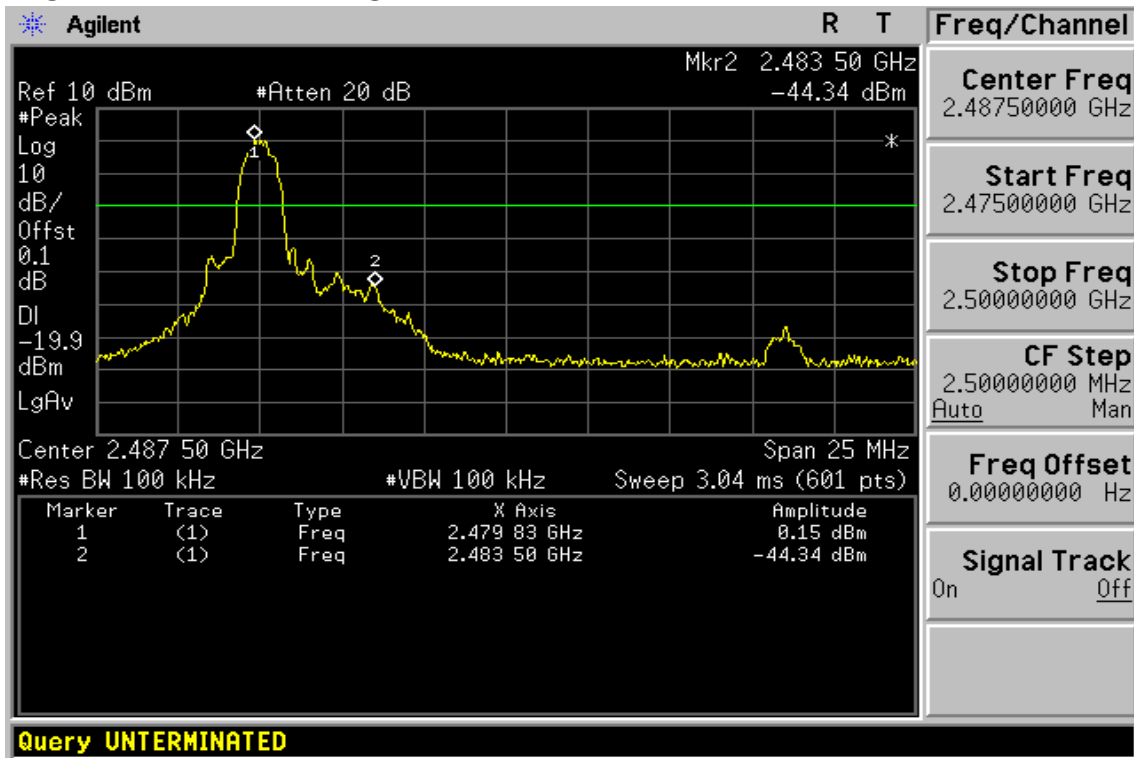


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**Band Edges Test Data CH-High**



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**Radiated Emission:**

Operation Mode TX CH Low  
Fundamental Frequency 2402 MHz  
Temperature 25 °C Pol  
Humidity 65 %

Test Date Jan. 27, 2010  
Test By Bondi  
Ver.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2344.10	53.14	---	-10.98	42.16	---	74.00	54.00	-11.84	Peak
2369.85	53.19	---	-10.82	42.37	---	74.00	54.00	-11.63	Peak
2390.00	53.86	---	-10.76	43.10	---	74.00	54.00	-10.90	Peak

Operation Mode TX CH Low  
Fundamental Frequency 2402 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Jan. 27, 2010  
Test By Bondi  
Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2344.10	52.52	---	-10.98	41.54	---	74.00	54.00	-12.46	Peak
2369.85	53.86	---	-10.82	43.04	---	74.00	54.00	-10.96	Peak
2390.00	54.24	---	-10.76	43.48	---	74.00	54.00	-10.52	Peak

Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency a bove 1000MHz were m ade with an instrum ent using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Emission:**

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol Ver.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.50	66.89	57.38	-10.46	56.43	46.92	74.00	54.00	-7.08	AV

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol Hor.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.50	77.33	61.34	-10.46	66.87	50.88	74.00	54.00	-3.12	AV

**Remark :**

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 8. SPURIOUS EMISSION TEST

### 8.1. 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.

According to RSS-Gen §7.2.3 and RSS-210 issue 7, §A2.9, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

### 8.2. Measurement Equipment Used:

#### 8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 8.2.2. Radiated emission:

Refer to section 7.2 for details.

### 8.3. Test SET-UP:

#### 8.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

#### 8.3.2. Radiated emission:

Refer to section 7.3 for details.

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#### 8.4. 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.

#### 8.5. 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	

#### 8.6. Measurement Result:

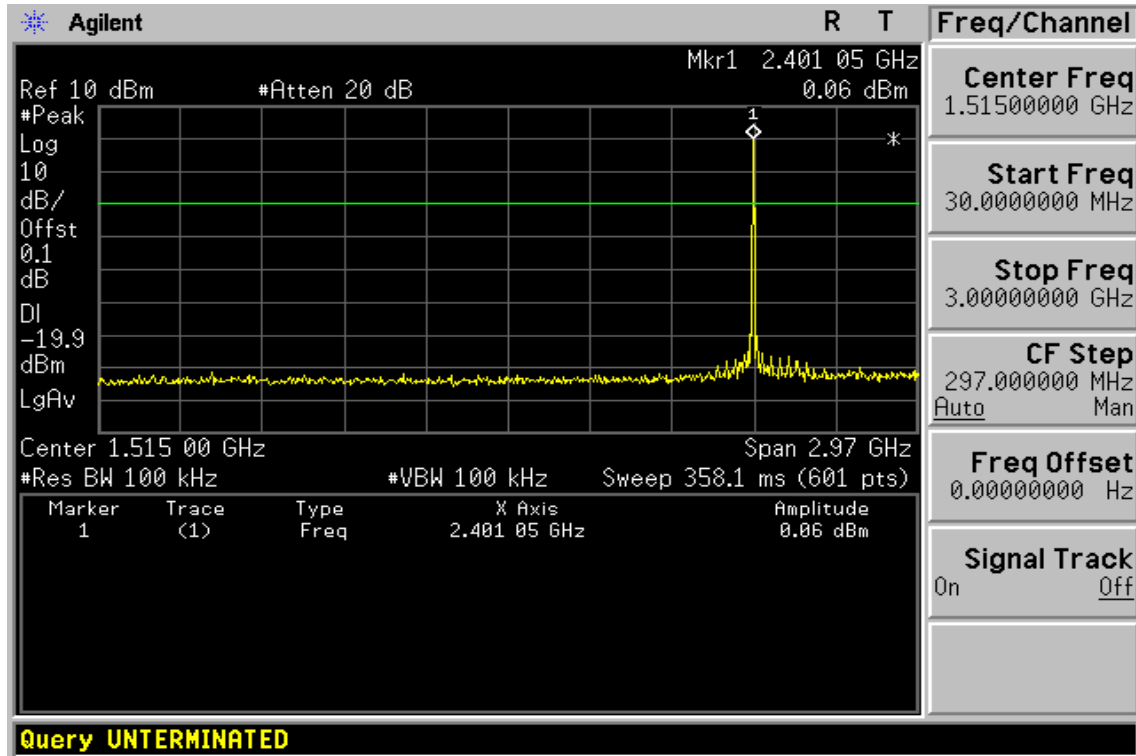
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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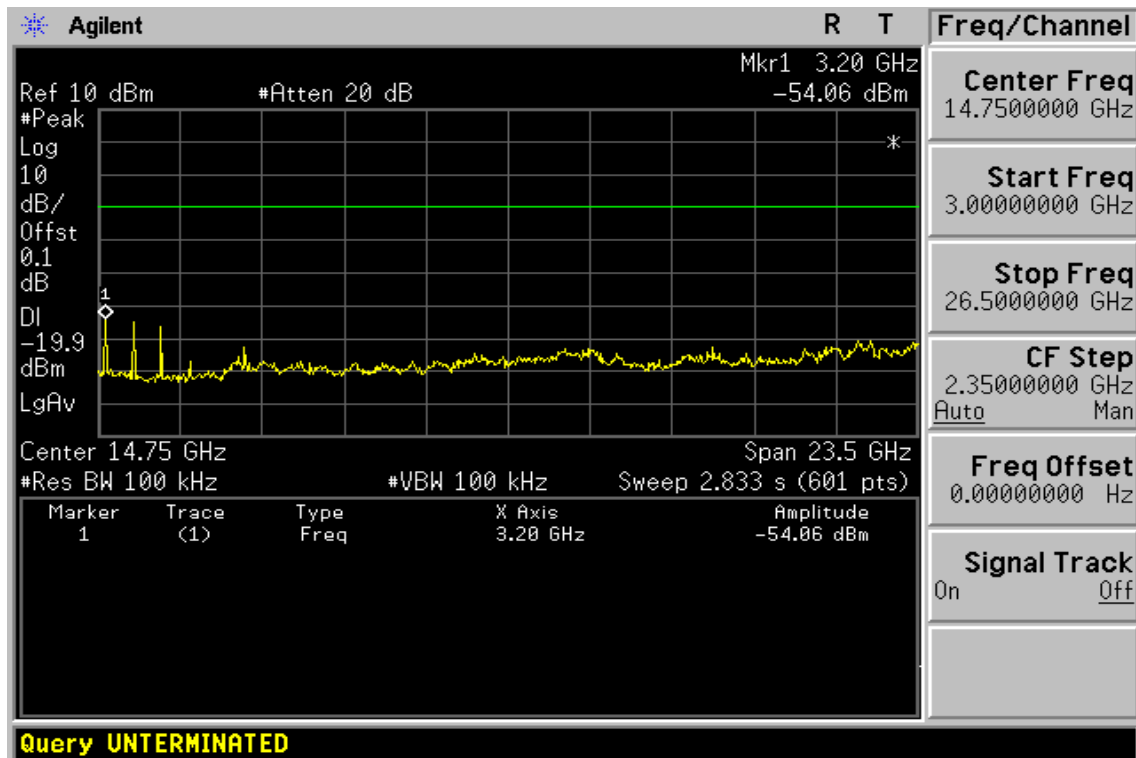
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**BDR Mode Conducted Spurious Emission Measurement Result**  
**Ch Low 30MHz – 3GHz**



**Ch Low 3GHz – 26.5GHz**

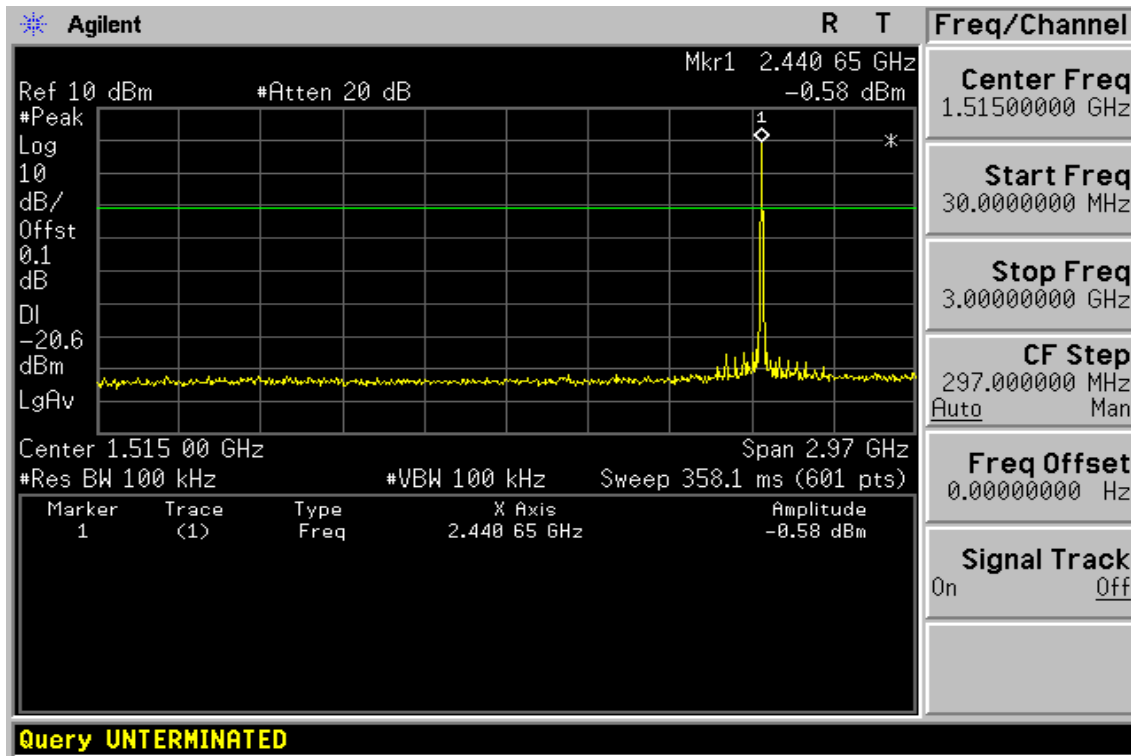


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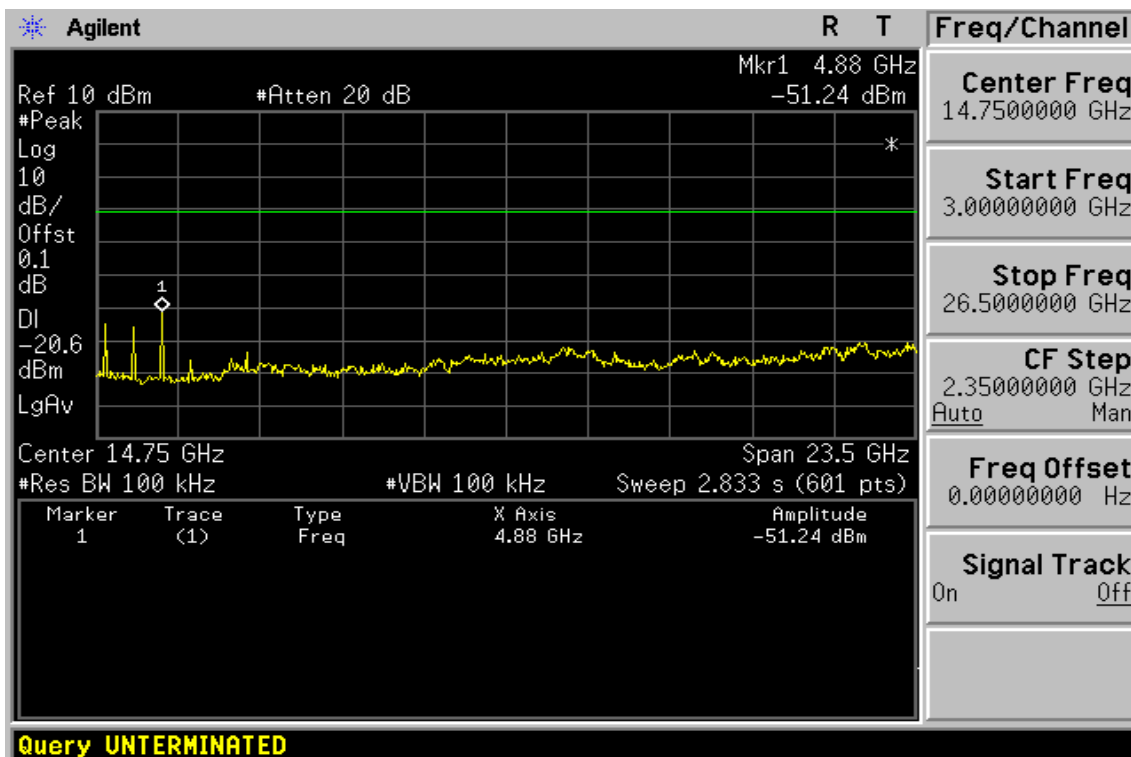
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### Ch Mid 30MHz – 3GHz



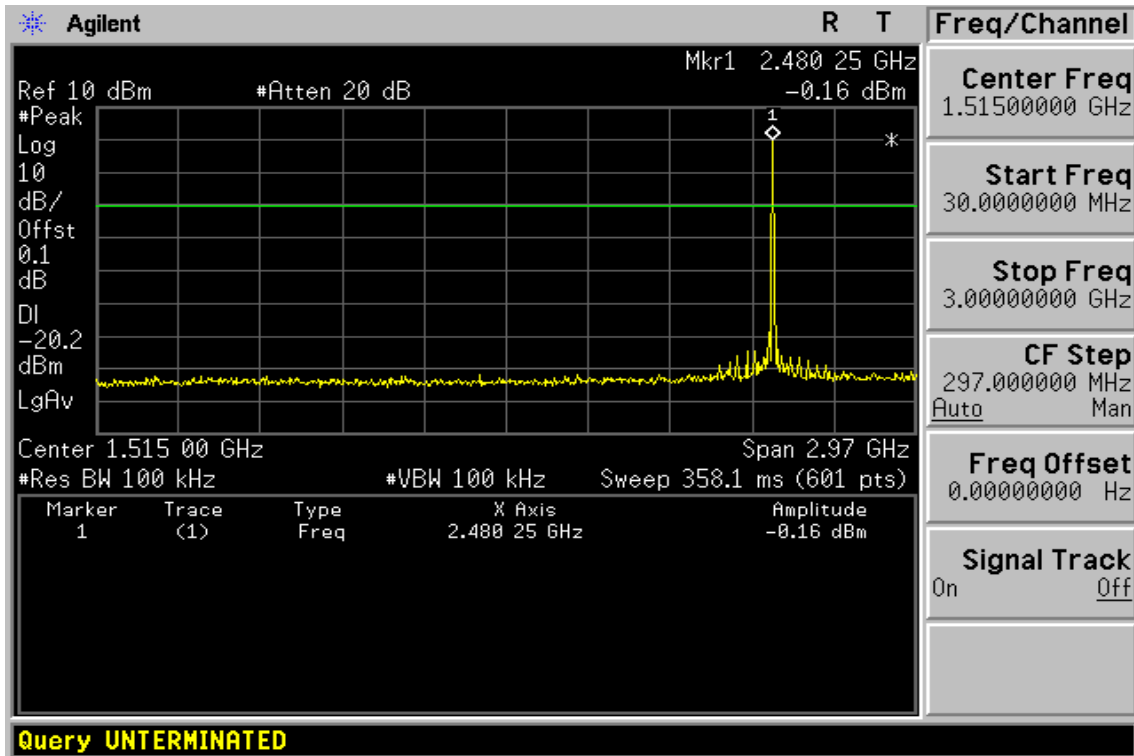
### Ch Mid 3GHz – 26.5GHz



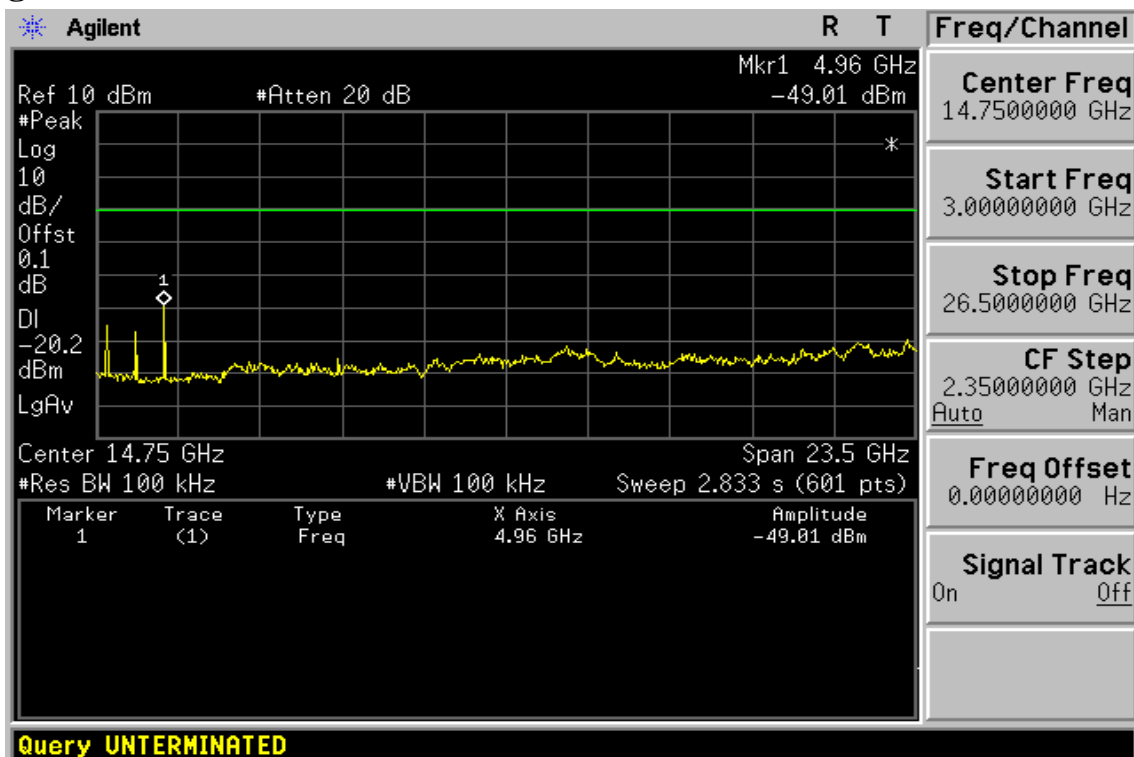
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### Ch High 30MHz – 3GHz



### Ch High 3GHz – 26.5GHz

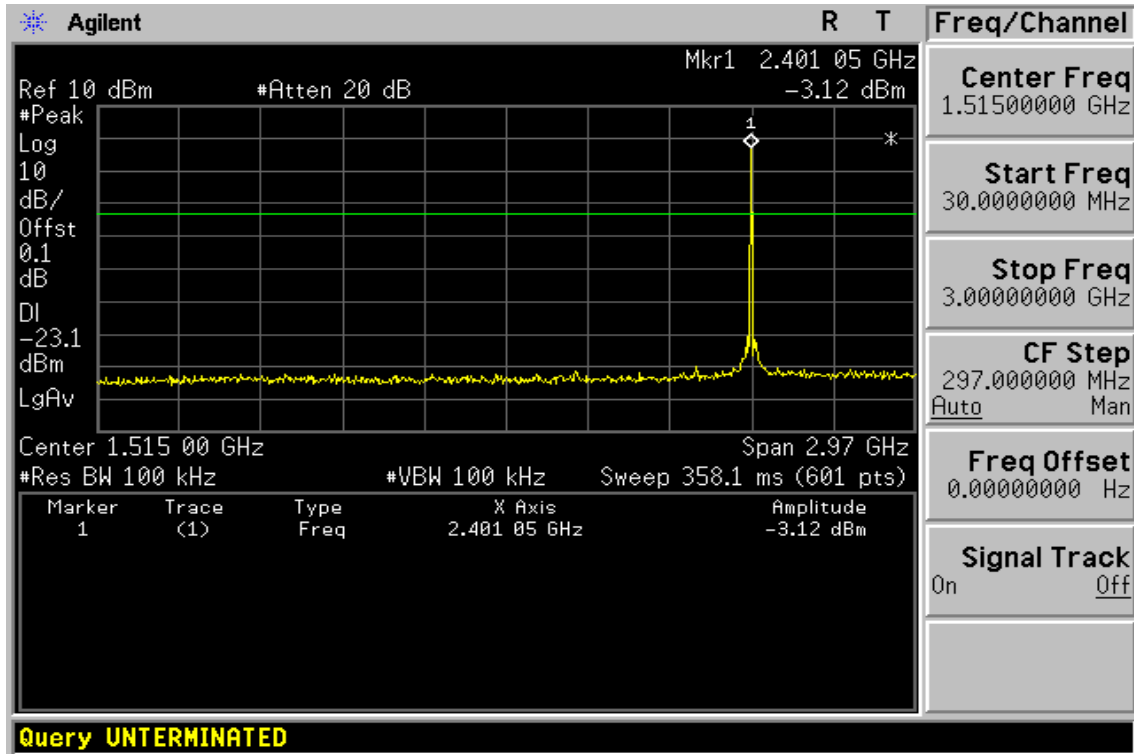


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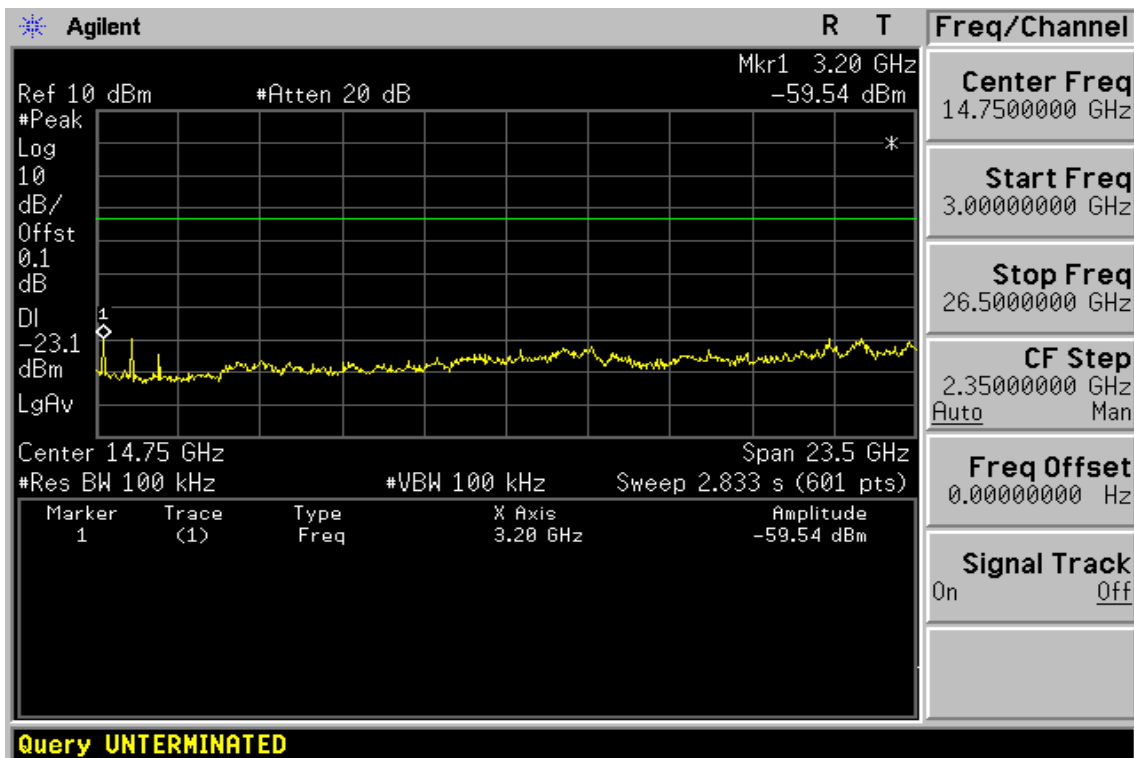
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**Conducted Spurious Emission Measurement Result (EDR mode)**  
**Ch Low 30MHz – 3GHz**



**Ch Low 3GHz – 26.5GHz**

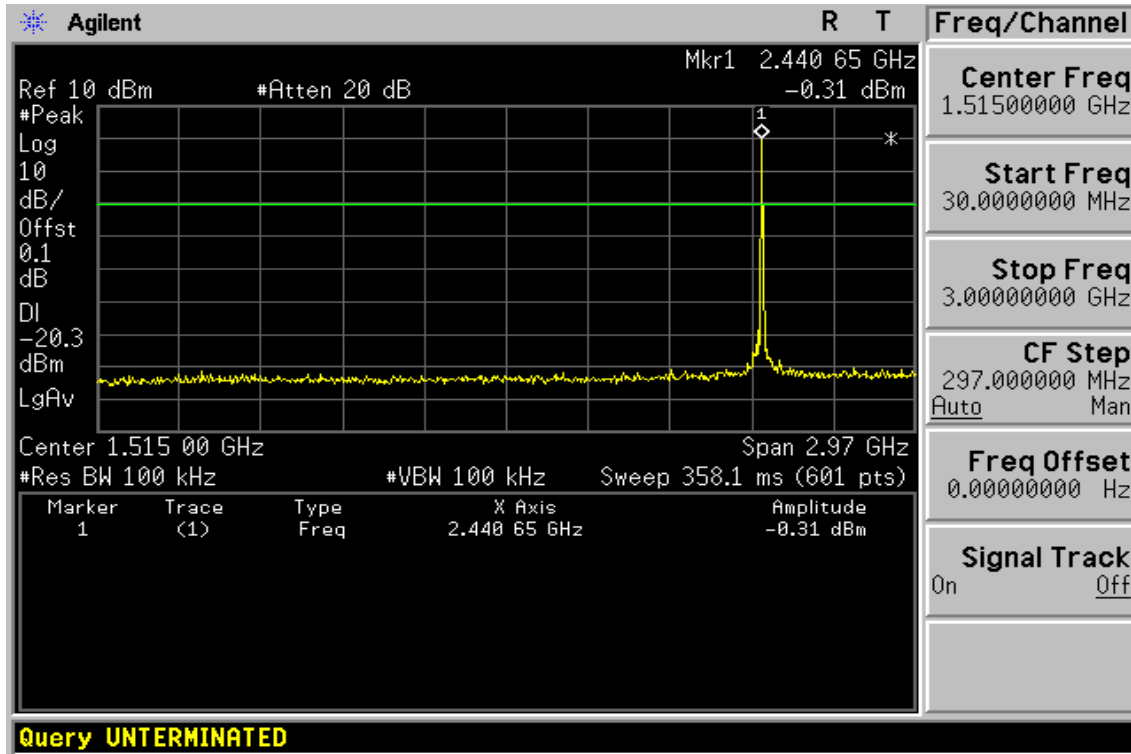


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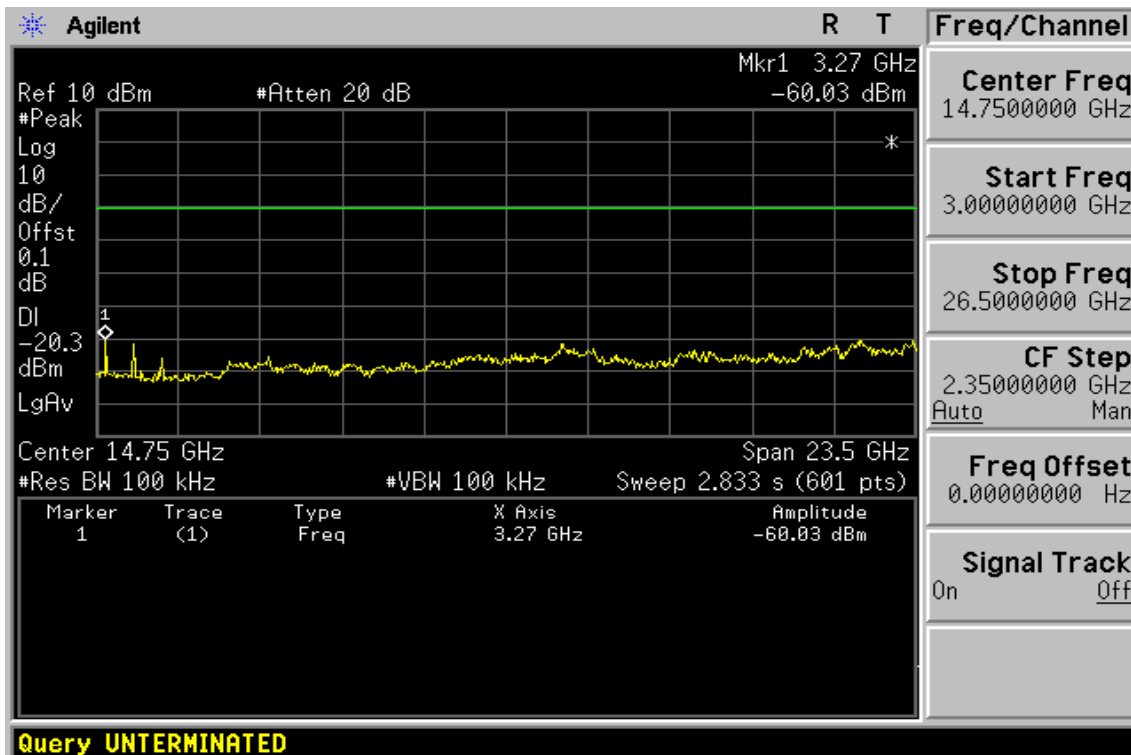
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Ch Mid 30MHz – 3GHz



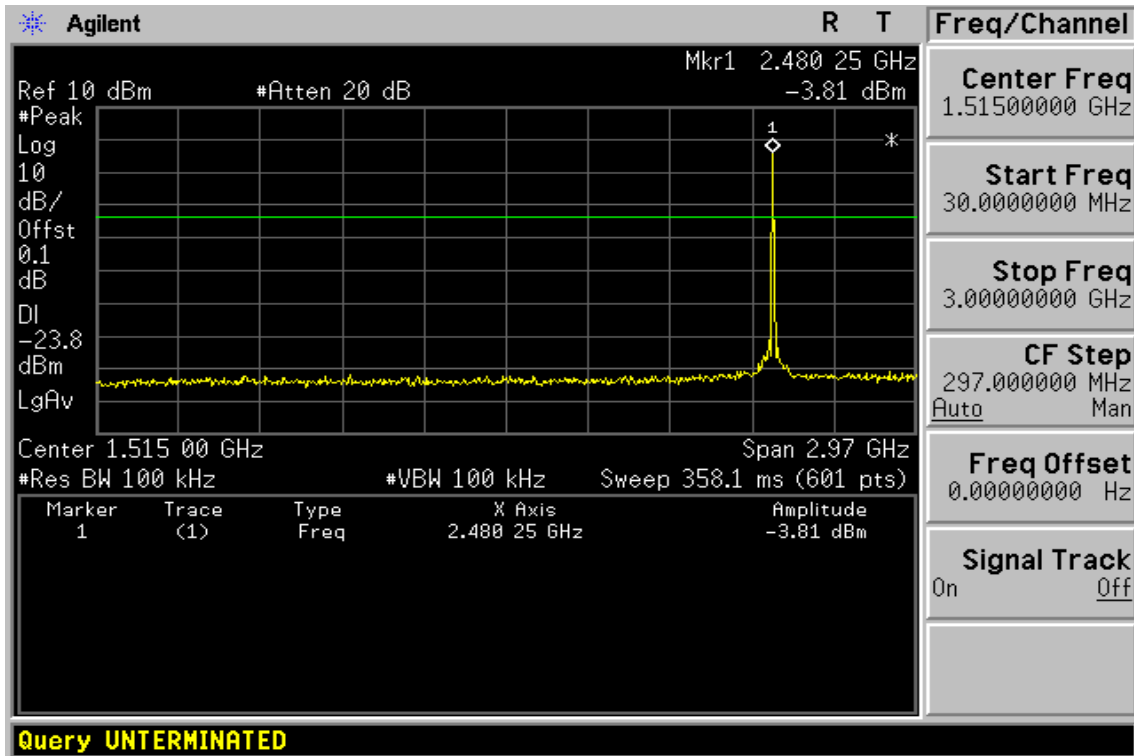
Ch Mid 3GHz – 26.5GHz



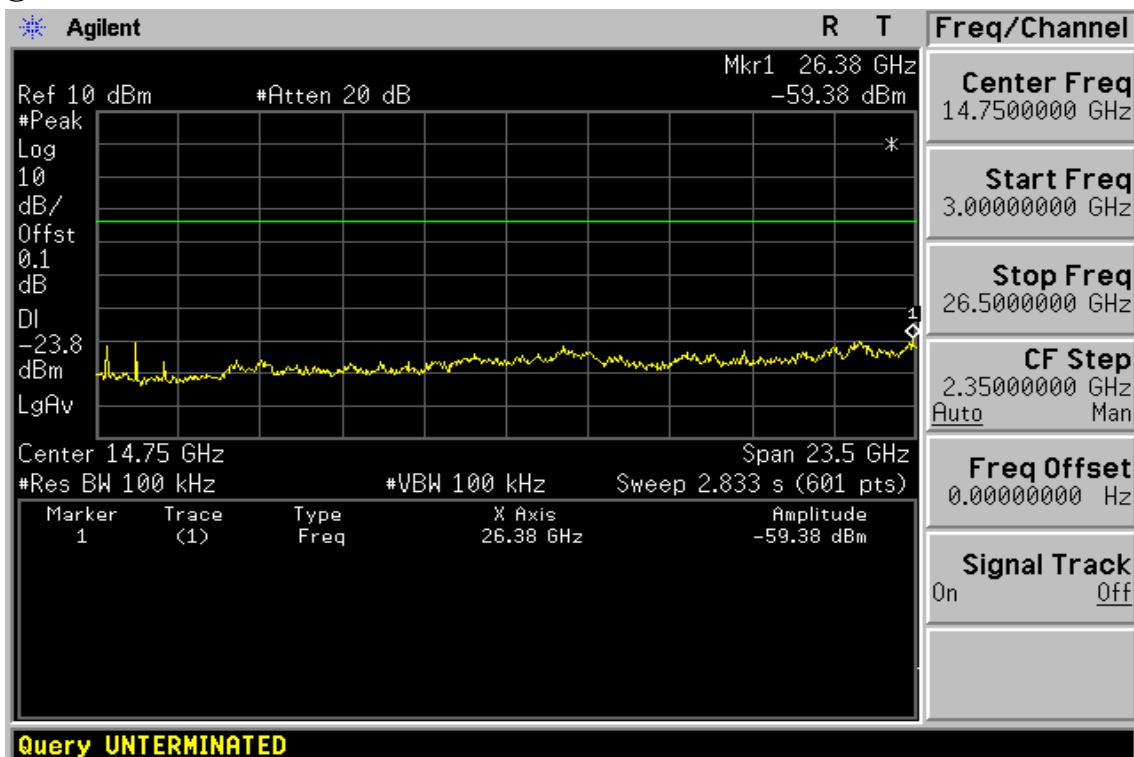
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### Ch High 30MHz – 3GHz



### Ch High 3GHz – 26.5GHz



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**Radiated Spurious Emission Measurement Result (below 1GHz) (EDR mode)**

Operation Mode	TX CH Low	Test Date	Jan. 27, 2010
Fundamental Frequency	2402MHz	Test By	Bondi
Temperature	25 °C	Pol Ver./Hor.	
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
58.13	V	Peak	56.86	-26.67	30.19	40.00	-9.81
85.29	V	Peak	53.66	-30.75	22.91	40.00	-17.09
101.78	V	Peak	56.20	-30.29	25.91	43.50	-17.59
286.08	V	Peak	51.25	-28.84	22.41	46.00	-23.59
434.49	V	Peak	51.83	-25.24	26.59	46.00	-19.41
528.58	V	Peak	51.87	-24.16	27.71	46.00	-18.29
38.73	H	Peak	49.07	-25.85	23.22	40.00	-16.78
85.29	H	Peak	52.74	-30.75	21.99	40.00	-18.01
101.78	H	Peak	51.46	-30.29	21.17	43.50	-22.33
286.08	H	Peak	49.07	-28.84	20.23	46.00	-25.77
449.04	H	Peak	53.56	-25.00	28.56	46.00	-17.44
516.94	H	Peak	53.78	-24.37	29.41	46.00	-16.59

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz ◦
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	Jan. 27, 2010
Fundamental Frequency	2441MHz	Test By	Bondi
Temperature	25 °C	Pol Ver./Hor.	
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
58.13	V	Peak	56.90	-26.67	30.23	40.00	-9.77
101.78	V	Peak	55.36	-30.29	25.07	43.50	-18.43
242.43	V	Peak	48.07	-29.87	18.20	46.00	-27.80
284.14	V	Peak	51.34	-28.89	22.45	46.00	-23.55
429.64	V	Peak	52.31	-25.34	26.97	46.00	-19.03
521.79	V	Peak	52.36	-24.30	28.06	46.00	-17.94
33.88	H	Peak	48.71	-26.00	22.71	40.00	-17.29
85.29	H	Peak	53.24	-30.75	22.49	40.00	-17.51
101.78	H	Peak	52.95	-30.29	22.66	43.50	-20.84
288.99	H	Peak	48.66	-28.76	19.90	46.00	-26.10
446.13	H	Peak	53.75	-25.10	28.65	46.00	-17.35
541.19	H	Peak	53.03	-23.97	29.06	46.00	-16.94

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz ◦
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480MHz	Test By	Bondi
Temperature	25 °C	Pol Ver./Hor.	
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
58.13	V	Peak	56.49	-26.67	29.82	40.00	-10.18
101.78	V	Peak	55.88	-30.29	25.59	43.50	-17.91
242.43	V	Peak	48.75	-29.87	18.88	46.00	-27.12
284.14	V	Peak	51.19	-28.89	22.30	46.00	-23.70
446.13	V	Peak	52.18	-25.10	27.08	46.00	-18.92
531.49	V	Peak	51.34	-24.13	27.21	46.00	-18.79
33.88	H	Peak	48.54	-26.00	22.54	40.00	-17.46
85.29	H	Peak	52.19	-30.75	21.44	40.00	-18.56
101.78	H	Peak	51.17	-30.29	20.88	43.50	-22.62
288.99	H	Peak	49.48	-28.76	20.72	46.00	-25.28
441.28	H	Peak	53.99	-25.20	28.79	46.00	-17.21
523.73	H	Peak	53.26	-24.26	29.00	46.00	-17.00

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz ◦
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Low	Test Date	Jan. 27, 2010
Fundamental Frequency	2402 MHz	Test By	Bondi
Temperature	25 °C	Pol Ver.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4796.0	48.45	---	-6.01	42.44	---	74.00	54.00	-11.56	Peak
7206.0	----					74.00	54.00		
9608.0	----					74.00	54.00		
12010.0	----					74.00	54.00		
14412.0	----					74.00	54.00		
16814.0	----					74.00	54.00		
19216.0	----					74.00	54.00		
21618.0	----					74.00	54.00		
24020.0	----					74.00	54.00		

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Low	Test Date	Jan. 27, 2010
Fundamental Frequency	2402 MHz	Test By	Bondi
Temperature	25 °C	Pol Hor.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4796.0	49.12	---	-6.01	43.11	---	74.00	54.00	-10.89	Peak
7206.0	----					74.00	54.00		
9608.0	----					74.00	54.00		
12010.0	----					74.00	54.00		
14412.0	----					74.00	54.00		
16814.0	----					74.00	54.00		
19216.0	----					74.00	54.00		
21618.0	----					74.00	54.00		
24020.0	----					74.00	54.00		

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	Jan. 27, 2010
Fundamental Frequency	2441 MHz	Test By	Bondi
Temperature	25 °C	Pol Ver.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4880.5	41.42	---	-5.93	35.49	---	74.00	54.00	-18.51	Peak
7323.0	----					74.00	54.00		
9764.0	----					74.00	54.00		
12205.0	----					74.00	54.00		
14646.0	----					74.00	54.00		
17087.0	----					74.00	54.00		
19528.0	----					74.00	54.00		
21969.0	----					74.00	54.00		
24410.0	----					74.00	54.00		

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	Jan. 27, 2010
Fundamental Frequency	2441 MHz	Test By	Bondi
Temperature	25 °C	Pol Hor.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4880.5	45.81	---	-5.93	39.88	---	74.00	54.00	-14.12	Peak
7323.0	----					74.00	54.00		
9764.0	----					74.00	54.00		
12205.0	----					74.00	54.00		
14646.0	----					74.00	54.00		
17087.0	----					74.00	54.00		
19528.0	----					74.00	54.00		
21969.0	----					74.00	54.00		
24410.0	----					74.00	54.00		

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol Ver.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4133.0	44.89	---	-8.26	36.63	---	74.00	54.00	-17.37	Peak
7440.0	----					74.00	54.00		
9920.0	----					74.00	54.00		
12400.0	----					74.00	54.00		
14880.0	----					74.00	54.00		
17360.0	----					74.00	54.00		
19840.0	----					74.00	54.00		
22320.0	----					74.00	54.00		
24800.0	----					74.00	54.00		

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

Operation Mode	TX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol Hor.	
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4133.0	46.43	---	-8.26	38.17	---	74.00	54.00	-15.83	Peak
7440.0	----					74.00	54.00		
9920.0	----					74.00	54.00		
12400.0	----					74.00	54.00		
14880.0	----					74.00	54.00		
17360.0	----					74.00	54.00		
19840.0	----					74.00	54.00		
22320.0	----					74.00	54.00		
24800.0	----					74.00	54.00		

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	RX CH Low	Test Date	Jan. 27, 2010
Fundamental Frequency	2402MHz	Test By	Bondi
Temperature	25 °C Pol		Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
58.13	V	Peak	57.56	-26.67	30.89	40.00	-9.11
85.29	V	Peak	55.24	-30.75	24.49	40.00	-15.51
101.78	V	Peak	54.18	-30.29	23.89	43.50	-19.61
286.08	V	Peak	49.30	-28.84	20.46	46.00	-25.54
439.34	V	Peak	53.02	-25.25	27.77	46.00	-18.23
518.88	V	Peak	52.08	-24.33	27.75	46.00	-18.25
33.88	H	Peak	49.81	-26.00	23.81	40.00	-16.19
85.29	H	Peak	52.73	-30.75	21.98	40.00	-18.02
101.78	H	Peak	53.67	-30.29	23.38	43.50	-20.12
284.14	H	Peak	47.12	-28.89	18.23	46.00	-27.77
441.28	H	Peak	54.93	-25.20	29.73	46.00	-16.27
516.94	H	Peak	53.08	-24.37	28.71	46.00	-17.29

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	RX CH Mid	Test Date	Jan. 27, 2010
Fundamental Frequency	2441MHz	Test By	Bondi
Temperature	25°C Pol		Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
58.13	V	Peak	57.31	-26.67	30.64	40.00	-9.36
101.78	V	Peak	55.35	-30.29	25.06	43.50	-18.44
159.98	V	Peak	44.40	-26.99	17.41	43.50	-26.09
284.14	V	Peak	48.78	-28.89	19.89	46.00	-26.11
450.98	V	Peak	52.09	-24.98	27.11	46.00	-18.89
541.19	V	Peak	51.85	-23.97	27.88	46.00	-18.12
33.88	H	Peak	49.42	-26.00	23.42	40.00	-16.58
85.29	H	Peak	52.69	-30.75	21.94	40.00	-18.06
104.69	H	Peak	55.24	-29.90	25.34	43.50	-18.16
284.14	H	Peak	47.59	-28.89	18.70	46.00	-27.30
473.29	H	Peak	54.71	-25.01	29.70	46.00	-16.30
521.79	H	Peak	53.73	-24.30	29.43	46.00	-16.57

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	RX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480MHz	Test By	Bondi
Temperature	25 °C Pol		Ver./Hor
Humidity	65%		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
33.88	V	Peak	52.02	-26.00	26.02	40.00	-13.98
58.13	V	Peak	57.16	-26.67	30.49	40.00	-9.51
101.78	V	Peak	55.45	-30.29	25.16	43.50	-18.34
284.14	V	Peak	49.16	-28.89	20.27	46.00	-25.73
449.04	V	Peak	51.96	-25.00	26.96	46.00	-19.04
516.94	V	Peak	51.57	-24.37	27.20	46.00	-18.80
38.73	H	Peak	48.83	-25.85	22.98	40.00	-17.02
85.29	H	Peak	53.14	-30.75	22.39	40.00	-17.61
101.78	H	Peak	53.34	-30.29	23.05	43.50	-20.45
284.14	H	Peak	47.28	-28.89	18.39	46.00	-27.61
431.58	H	Peak	55.00	-25.29	29.71	46.00	-16.29
507.24	H	Peak	54.11	-24.64	29.47	46.00	-16.53

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	RX CH Low	Test Date	Jan. 27, 2010
Fundamental Frequency	2402 MHz	Test By	Bondi
Temperature	25°C Pol		Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	
2391.0	47.79	---	-10.76	37.03	---	74.00	54.00	-16.97 Peak
4804.0	----					74.00	54.00	
7206.0	----					74.00	54.00	
9608.0	----					74.00	54.00	
12010.0	----					74.00	54.00	
14412.0	----					74.00	54.00	

Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column
- (4) Spectrum Peak Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

Operation Mode	RX CH Low	Test Date	Jan. 27, 2010
Fundamental Frequency	2402 MHz	Test By	Bondi
Temperature	25 °C Pol		Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2391.0	49.03	---	-10.76	39.17	---	74.00	54.00	-14.83	Peak
4804.0	----					74.00	54.00		
7206.0	----					74.00	54.00		
9608.0	----					74.00	54.00		
12010.0	----					74.00	54.00		
14412.0	----					74.00	54.00		

Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column
- (4) Spectrum Peak Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

Operation Mode	RX CH Mid	Test Date	Jan. 27, 2010
Fundamental Frequency	2441 MHz	Test By	Bondi
Temperature	25 °C Pol		Ver
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	
2443.0	48.32	---	-10.59	37.73	---	74.00	54.00	-16.27 Peak
4882.0	----					74.00	54.00	
7323.0	----					74.00	54.00	
9764.0	----					74.00	54.00	
12205.0	----					74.00	54.00	
14646.0	----					74.00	54.00	

Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column
- (4) Spectrum Peak Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

Operation Mode	RX CH Mid	Test Date	Jan. 27, 2010
Fundamental Frequency	2441 MHz	Test By	Bondi
Temperature	25 °C Pol		Hor
Humidity	65%		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)		
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
2443.0	51.38	---	-10.59	40.7	9	---	74.00	54.00	-13.21	Peak
4882.0	----						74.00	54.00		
7323.0	----						74.00	54.00		
9764.0	----						74.00	54.00		
12205.0	----						74.00	54.00		
14646.0	----						74.00	54.00		

Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column
- (4) Spectrum Peak Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

Operation Mode	RX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C Pol		Ver
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	
2475.0	48.68	---	-10.46	38.22	---	74.00	54.00	-15.78 Peak
4960.0	----					74.00	54.00	
7440.0	----					74.00	54.00	
9920.0	----					74.00	54.00	
12400.0	----					74.00	54.00	
14880.0	----					74.00	54.00	

Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column
- (4) Spectrum Peak Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz)**

Operation Mode	RX CH High	Test Date	Jan. 27, 2010
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C Pol		Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	
2475.5	51.69	---	-10.46	41.23	---	74.00	54.00	-12.77 Peak
4960.0	----					74.00	54.00	
7440.0	----					74.00	54.00	
9920.0	----					74.00	54.00	
12400.0	----					74.00	54.00	
14880.0	----					74.00	54.00	

Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column
- (4) Spectrum Peak Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting : 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 9. FREQUENCY SEPARATION

### 9.1. Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

According to RSS 210 issue 6, A8.1(b), frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

### 9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 9.3. Test Set-up:

Refer to section 6.3 for details.

### 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 = 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.

### 9.5. Measurement Result:

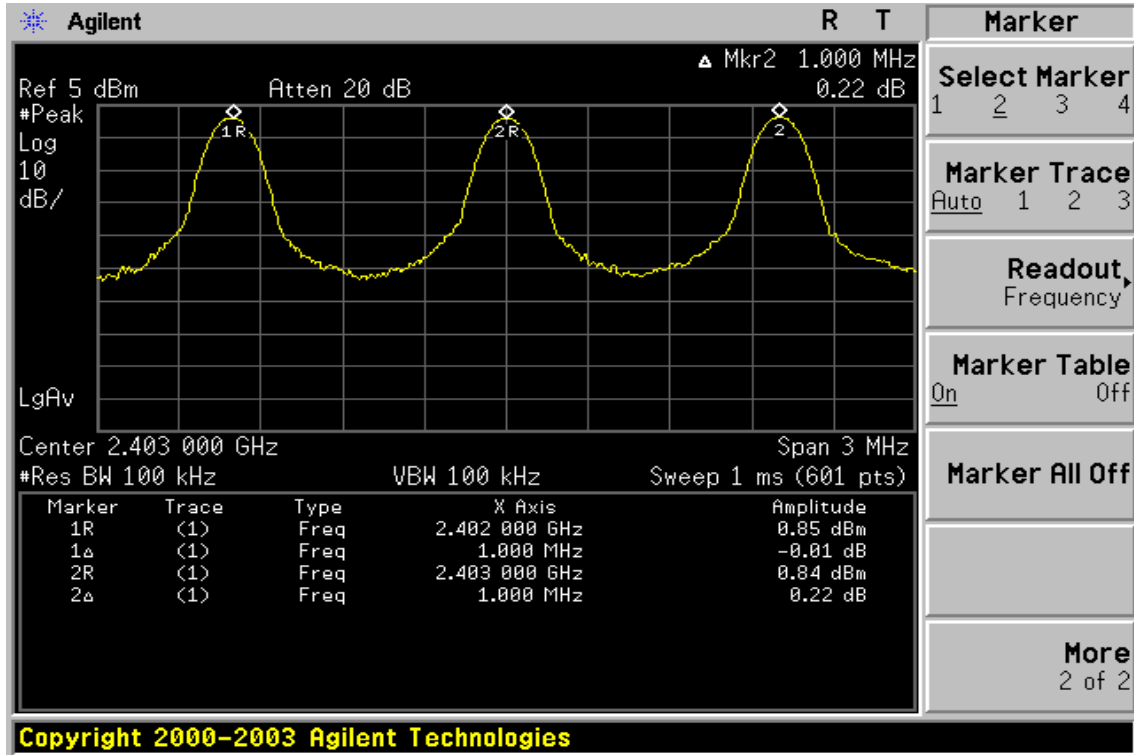
Channel separation (MHz)	Limit	Result
1	$\geq 25\text{KHz}$ or 2/3 times 20 dB bandwidth	PASS

Note: Refer to next page for plots.

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### Frequency Separation Test Data



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## 10. NUMBER OF HOPPING FREQUENCY

### 10.1. Standard Applicable:

According to §15.247(b)(1), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 75 hopping frequencies.

According to RSS-210 issue 7, §A8.1(d), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

### 10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 10.3. Test Set-up:

Refer to section 6.3 for details.

### 10.4. 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=1.3MHz,
5. Max hold, view and count how many channel in the band.

### 10.5. Measurement Result:

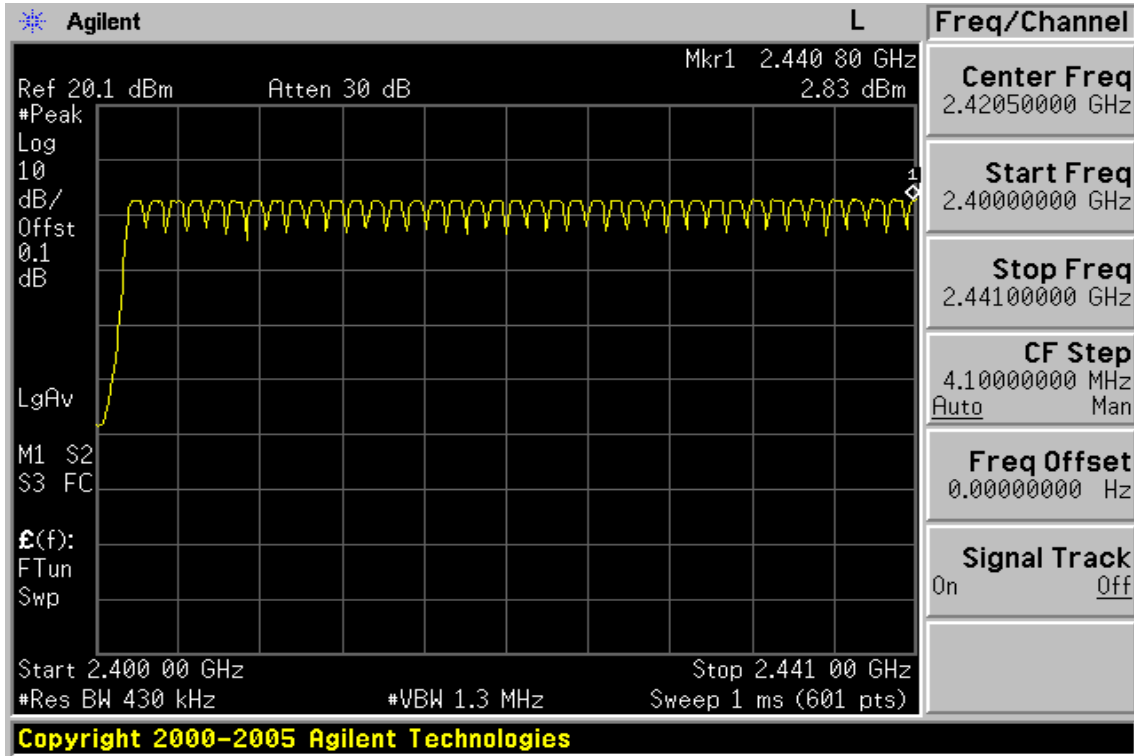
Note: Refer to next page for plots.

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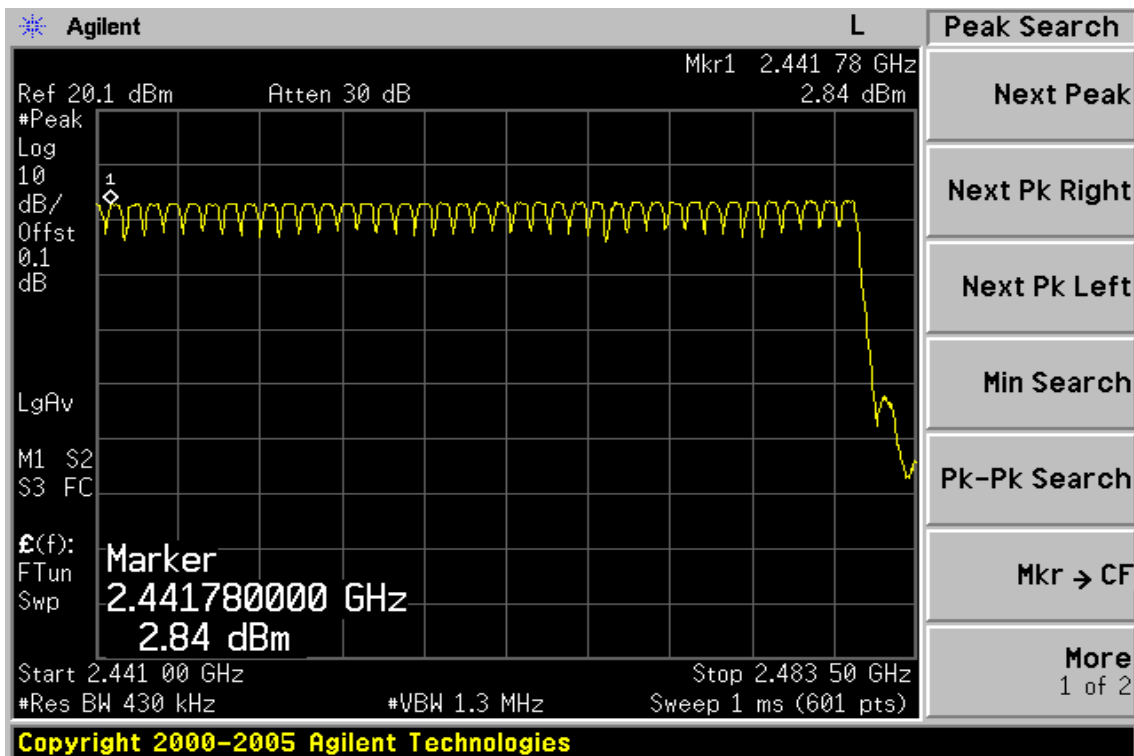
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**Channel Number**  
**2.4 GHz – 2.441GHz**



**2.441 GHz – 2.4835GHz**



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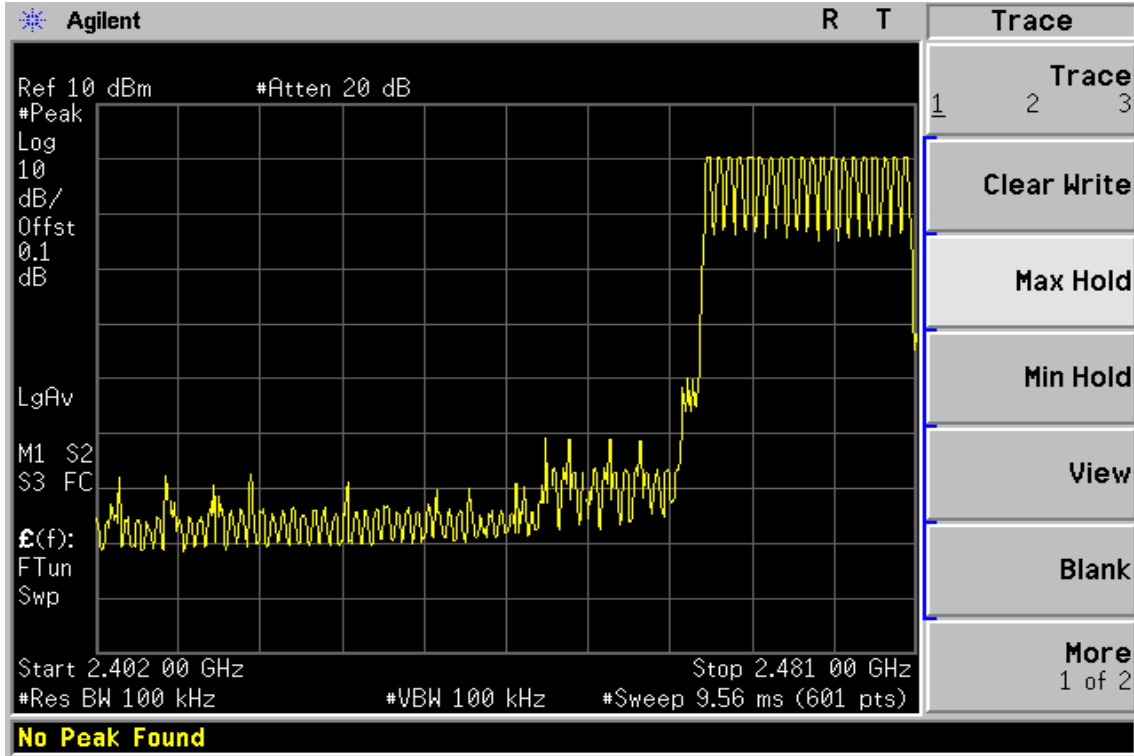
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## 11. TIME OF OCCUPANCY (DWELL TIME)

### 11.1. 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.

According to RSS-210 issue 7, §A8.1(d), Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

### 11.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 11.3. Test Set-up:

Refer to section 6.3 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 = operating frequency.
4. Set the spectrum analyzer as RBW=1KHz, VBW=3MHz, Span = 0Hz , Adjust Sweep = 15ms.
5. Repeat above procedures until all frequency measured were complete.

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### 11.5. Measurement Result:

A period time = 0.4 (ms) \* 79 = 31.6 (s)

CH Low: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

CH Mid: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

CH High: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

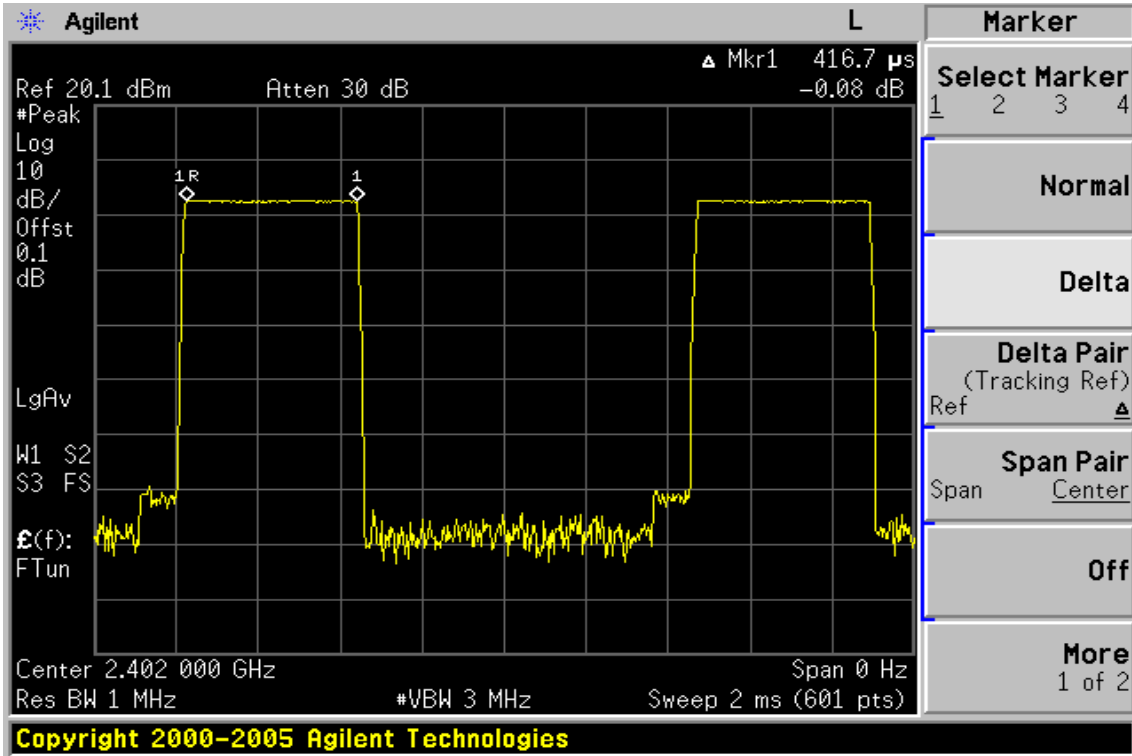
DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

Note: Refer to next page for plots.

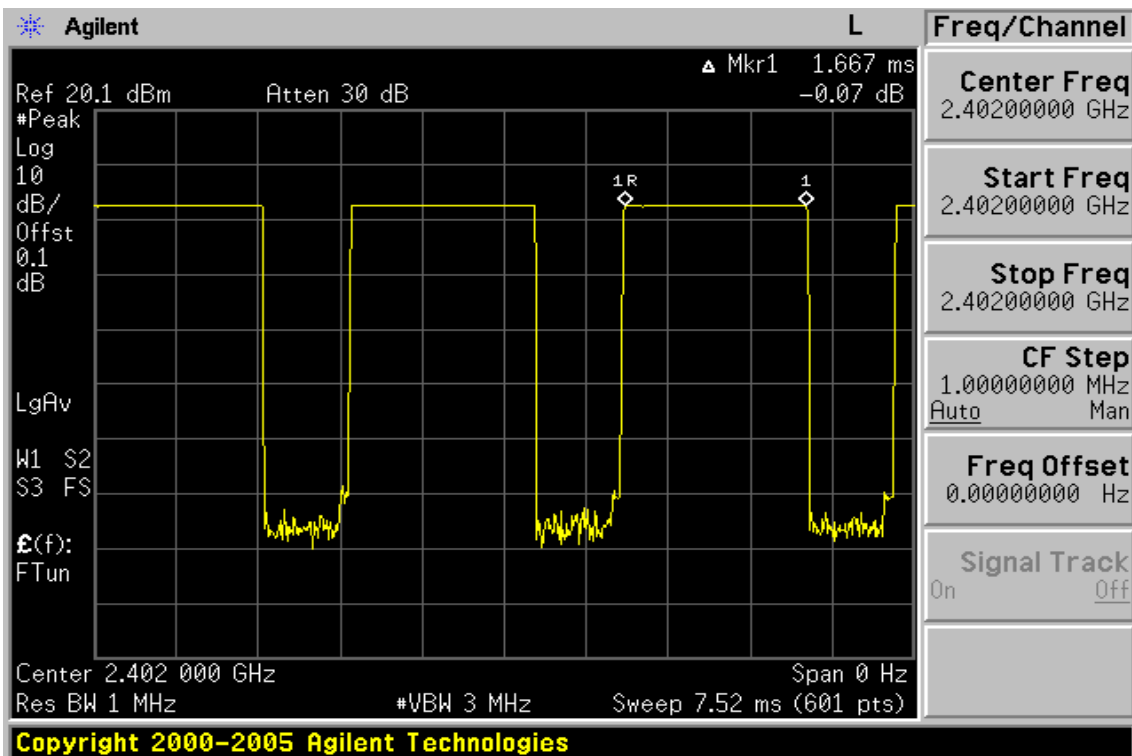
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**CH-Low**  
**DH1**



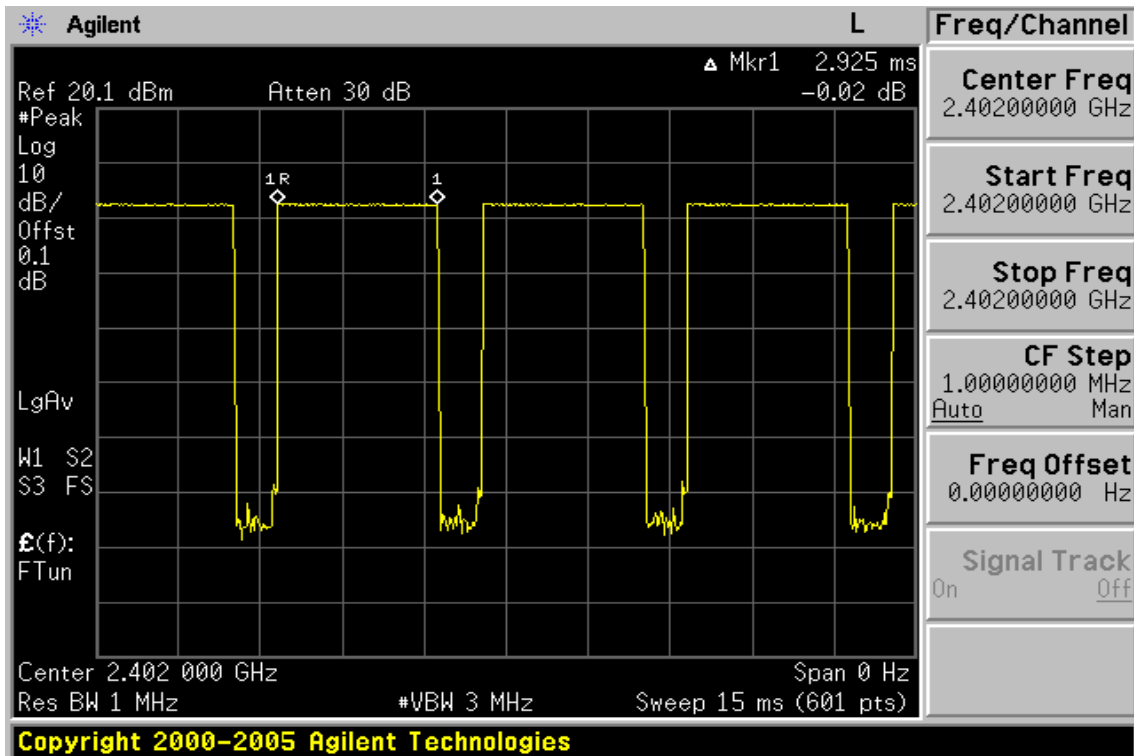
**DH3**



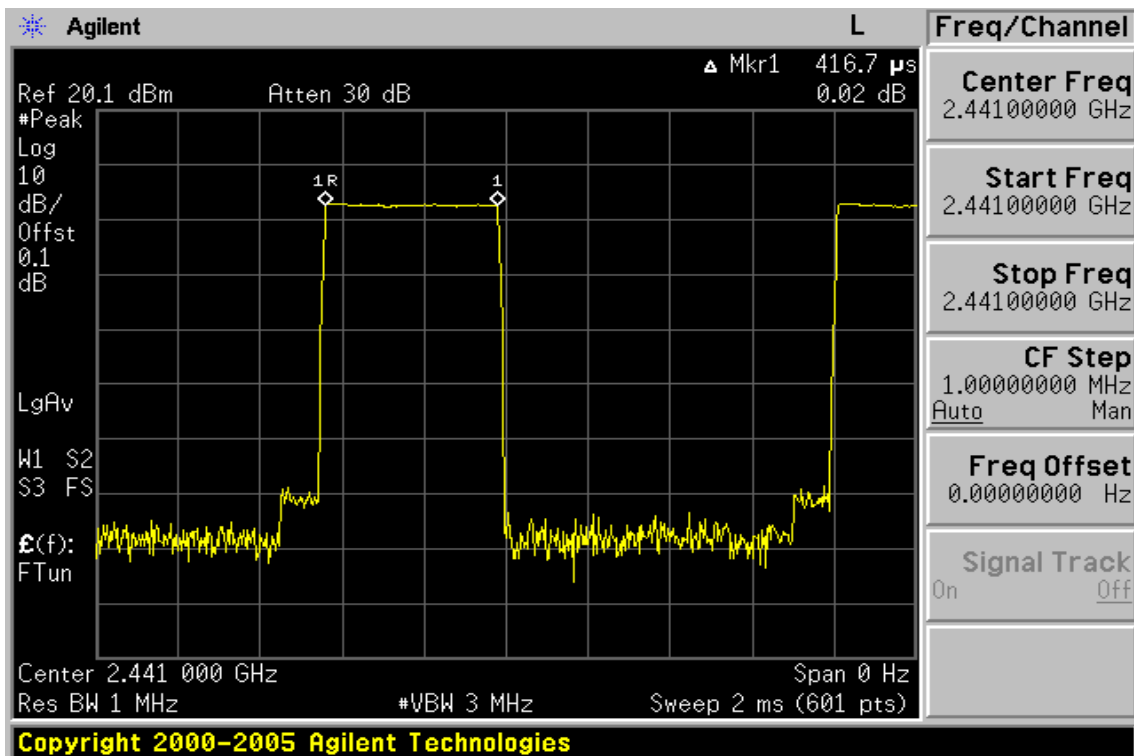
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**DH5**



**CH-Mid**  
**DH1**

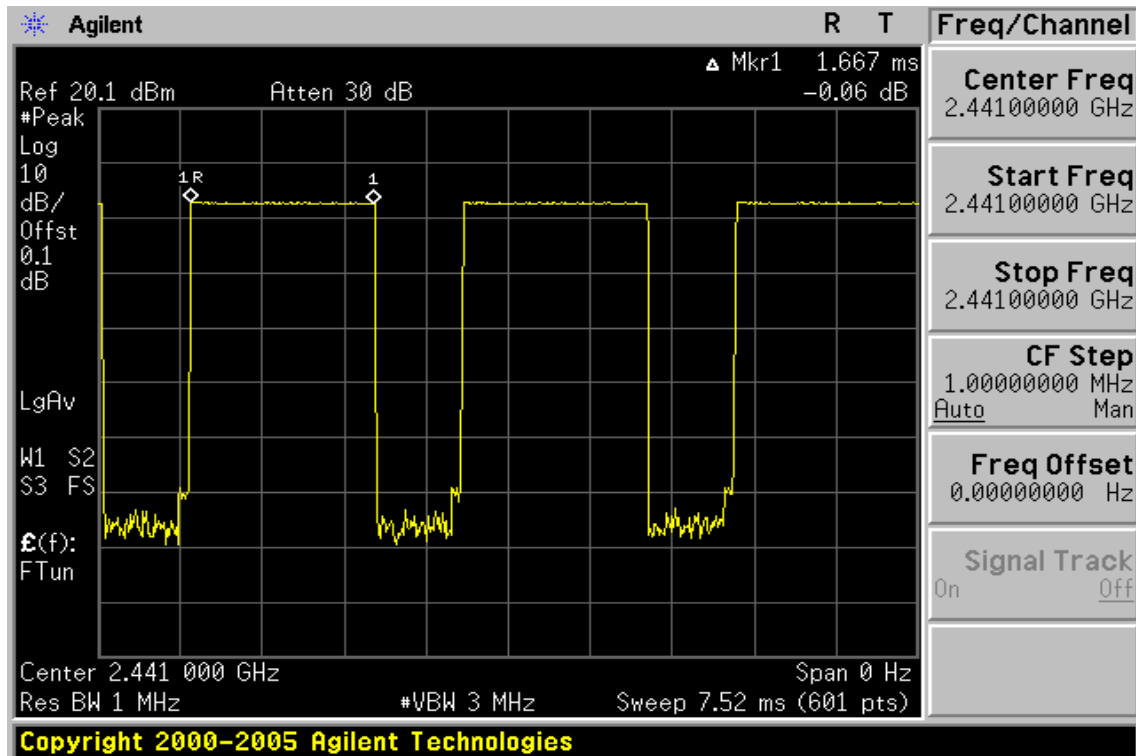


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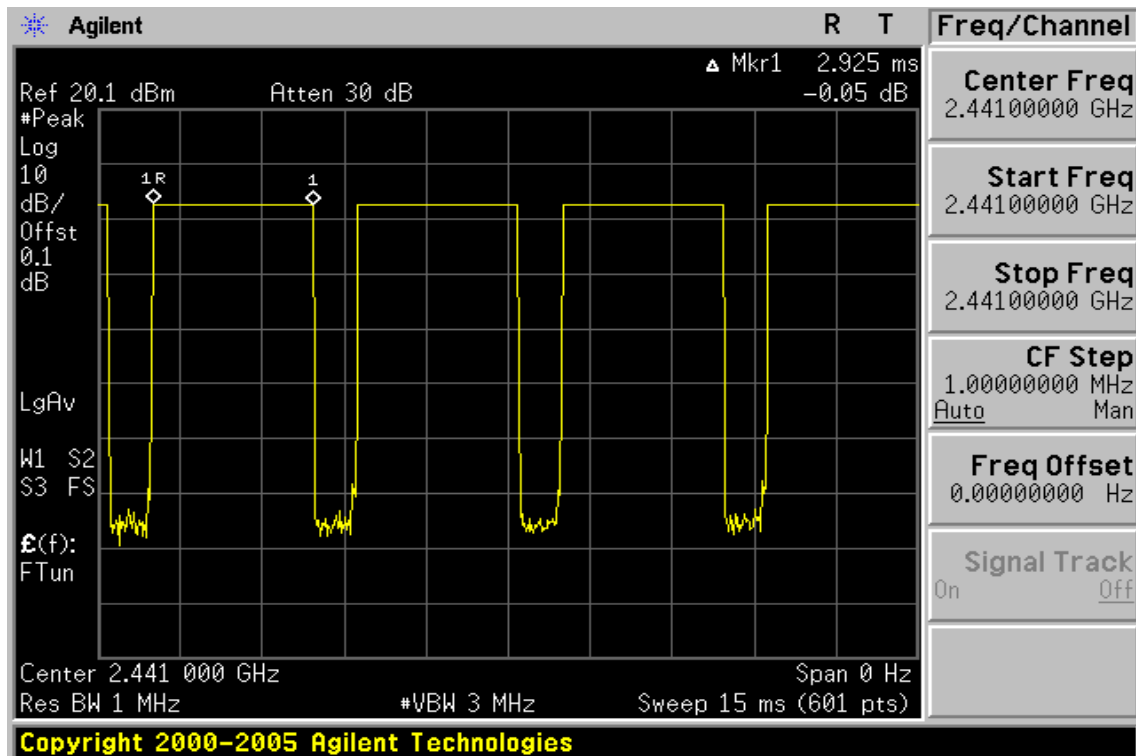
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### DH3



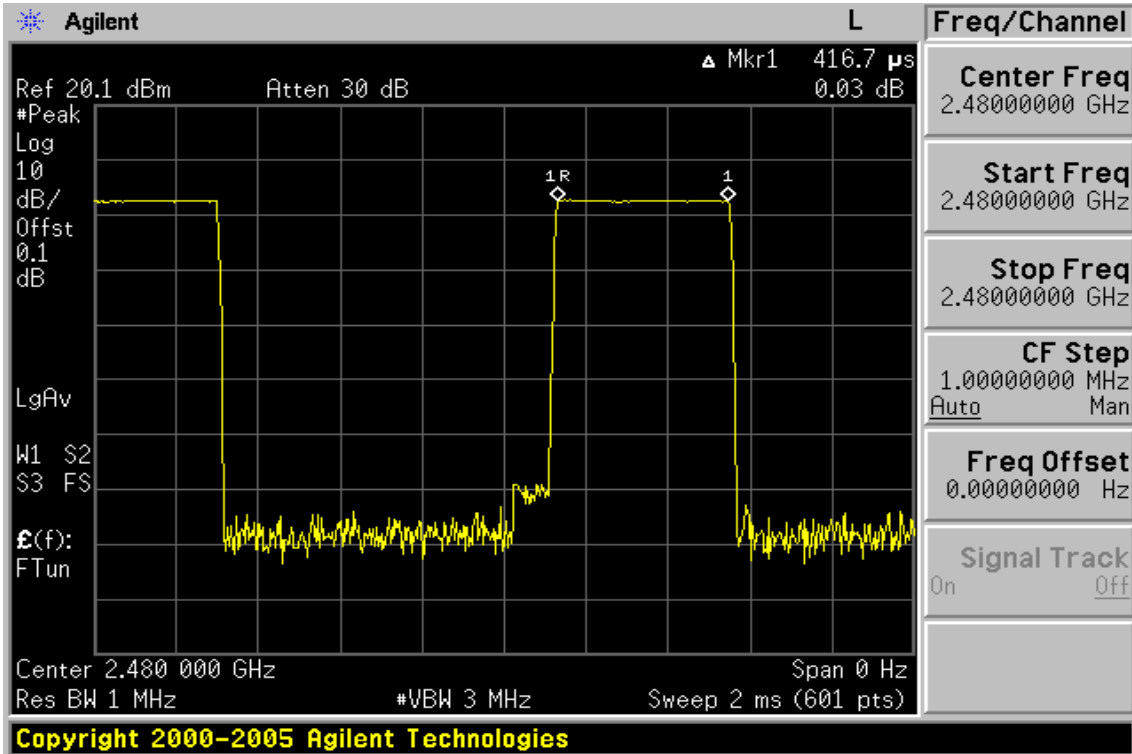
### DH5



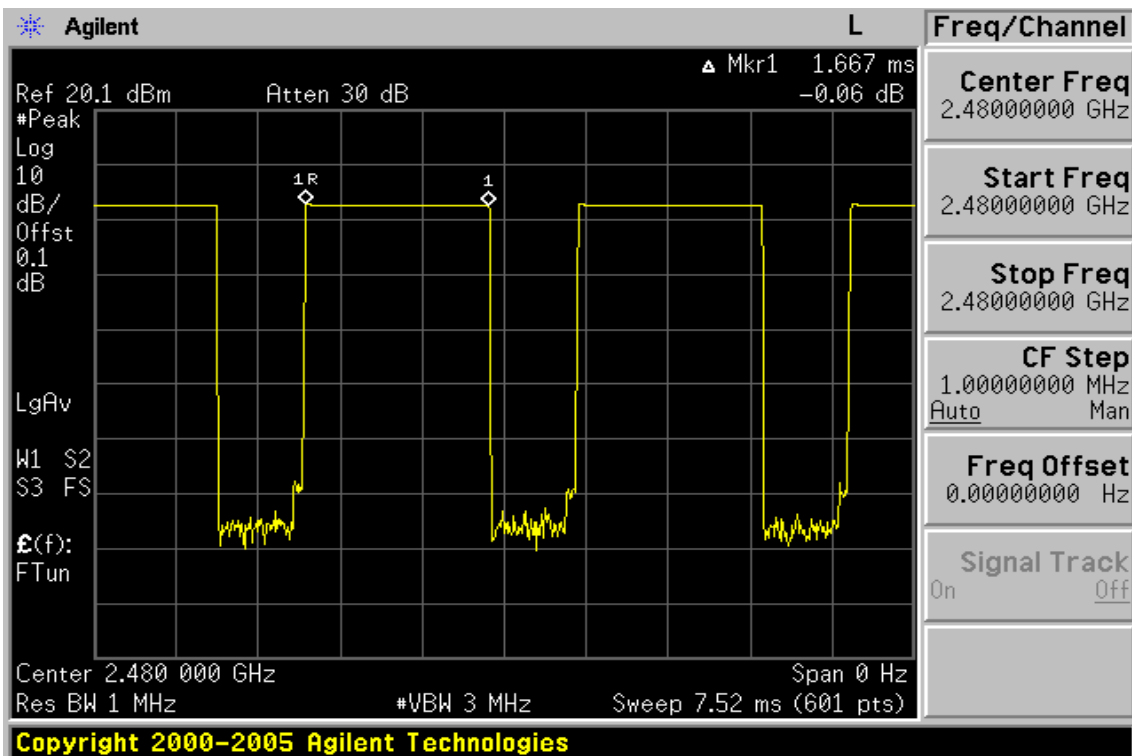
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## CH-High DH1



## DH3



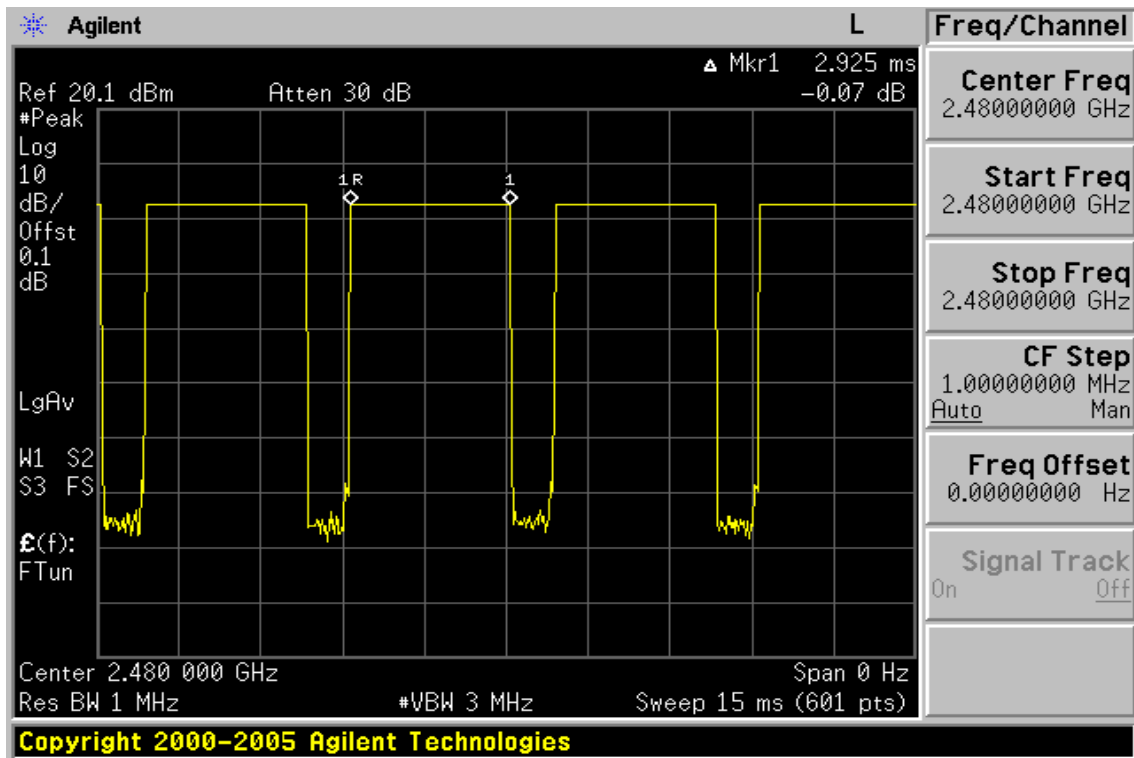
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**DH5**



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## 12. Peak Power Spectral Density

### 12.1. Standard Applicable:

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission.

According to RSS-210 issue 7, §A8.2(b) and §A8.3(2), The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.

### 12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 12.3. Test Set-up:

Refer to section 6.3 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 the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 1.5MHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

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## 12.5. Measurement Result:

### BDR Mode

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-11.19	0.00	-11.19	8
Mid	-11.31	0.00	-11.31	8
High	-11.29	0.00	-11.29	8

### EDR Mode

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-12.55	0.00	-12.55	8
Mid	-13.00	0.00	-13.00	8
High	-13.07	0.00	-13.07	8

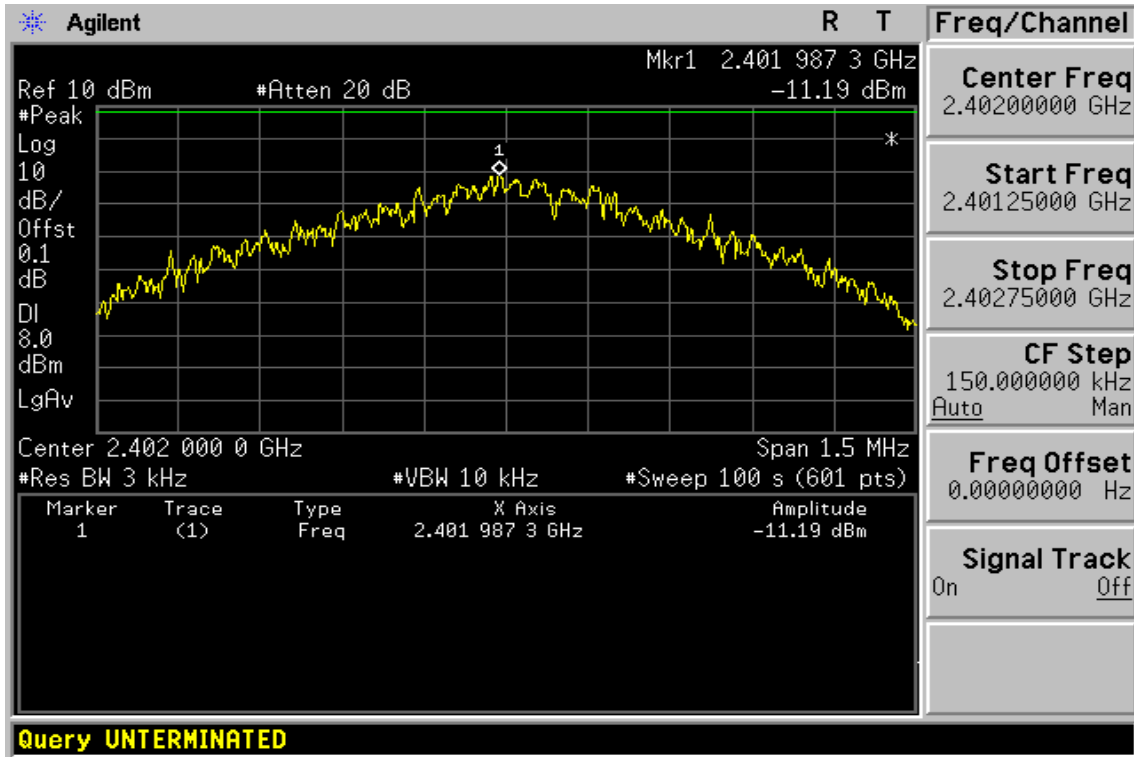
Note: offset 0.1dB for path lose.

Note: Refer to next page for plots.

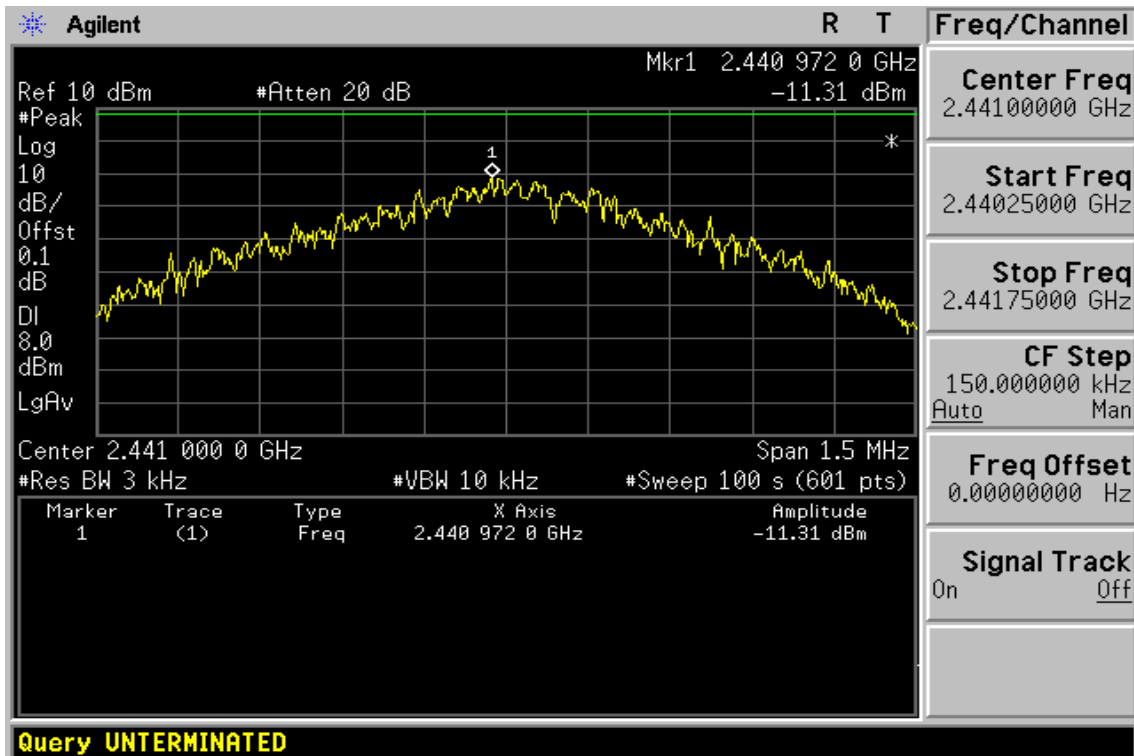
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### Power Spectral Density Test Plot (CH-Low) (BDR)



### Power Spectral Density Test Plot (CH-Mid) (BDR)

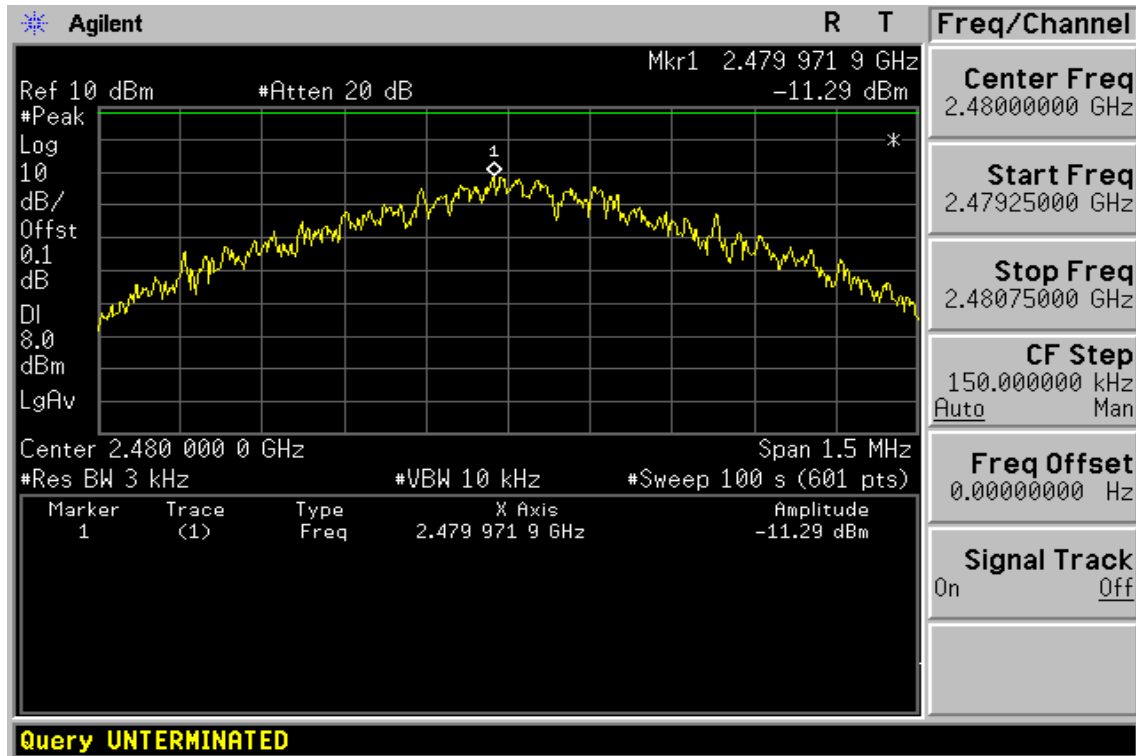


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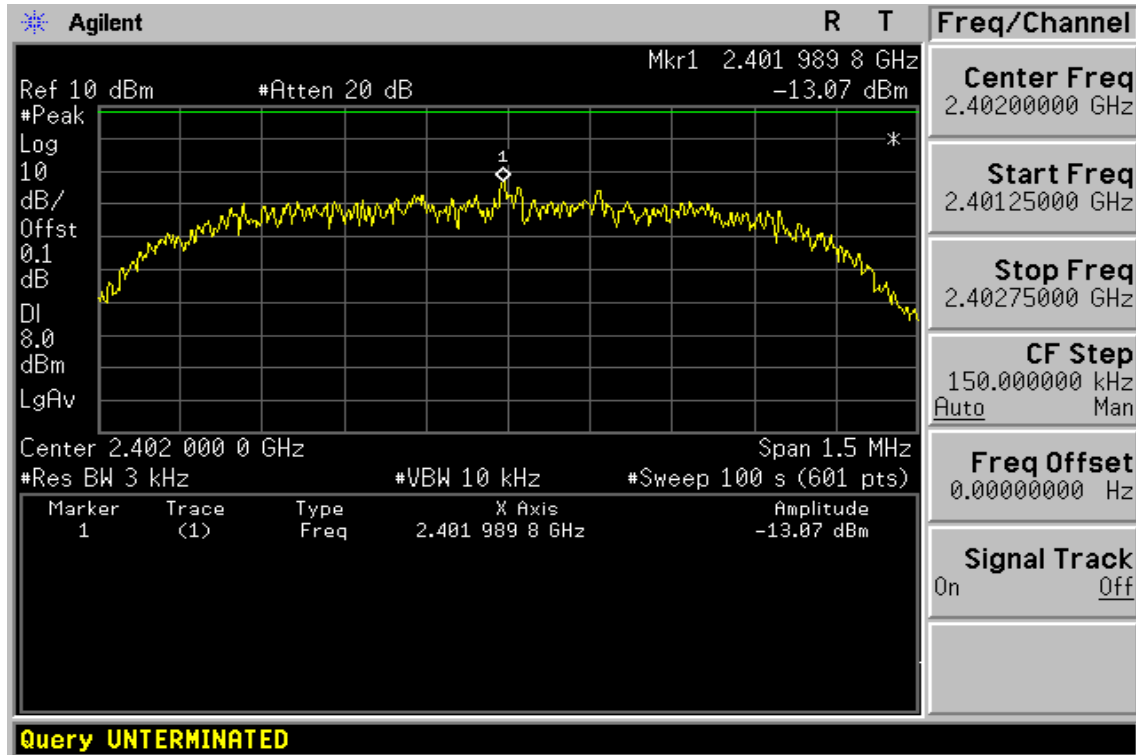
### Power Spectral Density Test Plot (CH-High) (BDR)



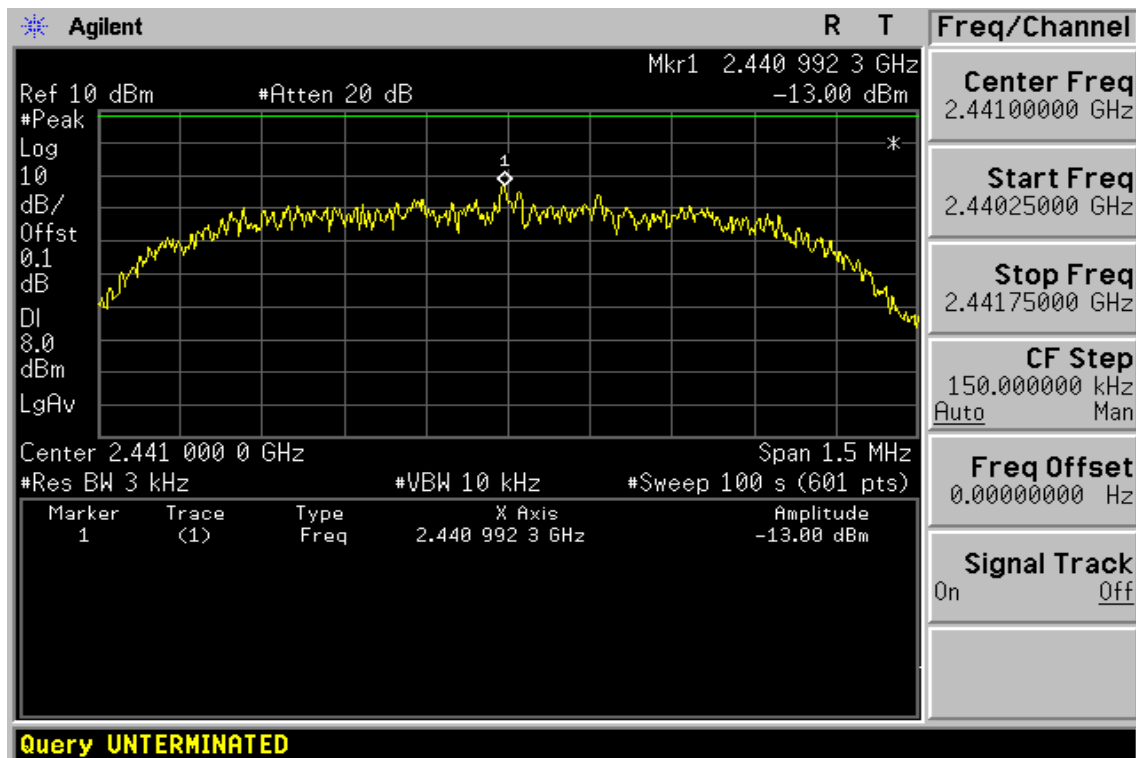
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### Power Spectral Density Test Plot (CH-Low) (EDR)



### Power Spectral Density Test Plot (CH-Mid) (EDR)

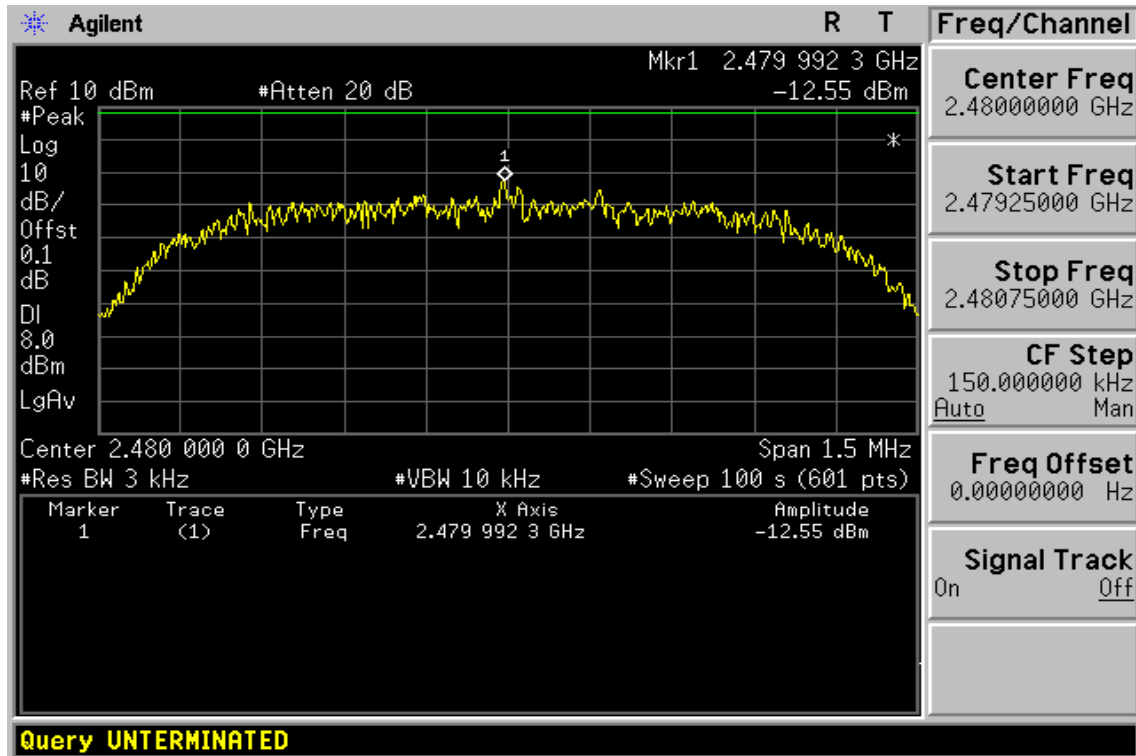


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### Power Spectral Density Test Plot (CH-High) (EDR)



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## 13. 20dB Bandwidth & 99% Bandwidth

### 13.1. Standard Applicable:

According to §15.247(a)(1), and RSS210 A8.1(b) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

### 13.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 13.3. Test Set-up:

Refer to section 6.3 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 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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### 13.5. Measurement Result:

20dB Bandwidth : BDR mode

CH	Bandwidth (kHz)
Lower 932.233	
Mid 929.996	
Higher 931.654	

20dB Bandwidth : EDR mode

CH	Bandwidth (MHz)	2/3 Bandwidth (MHz)
Lower	1.257	0.838
Mid	1.265	0.843
Higher	1.260	0.840

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**99% Bandwidth : BDR Mode**

CH	Bandwidth (kHz)
Lower	885.5969
Mid	872.8778
Higher	875.1519

**99% Bandwidth : EDR Mode**

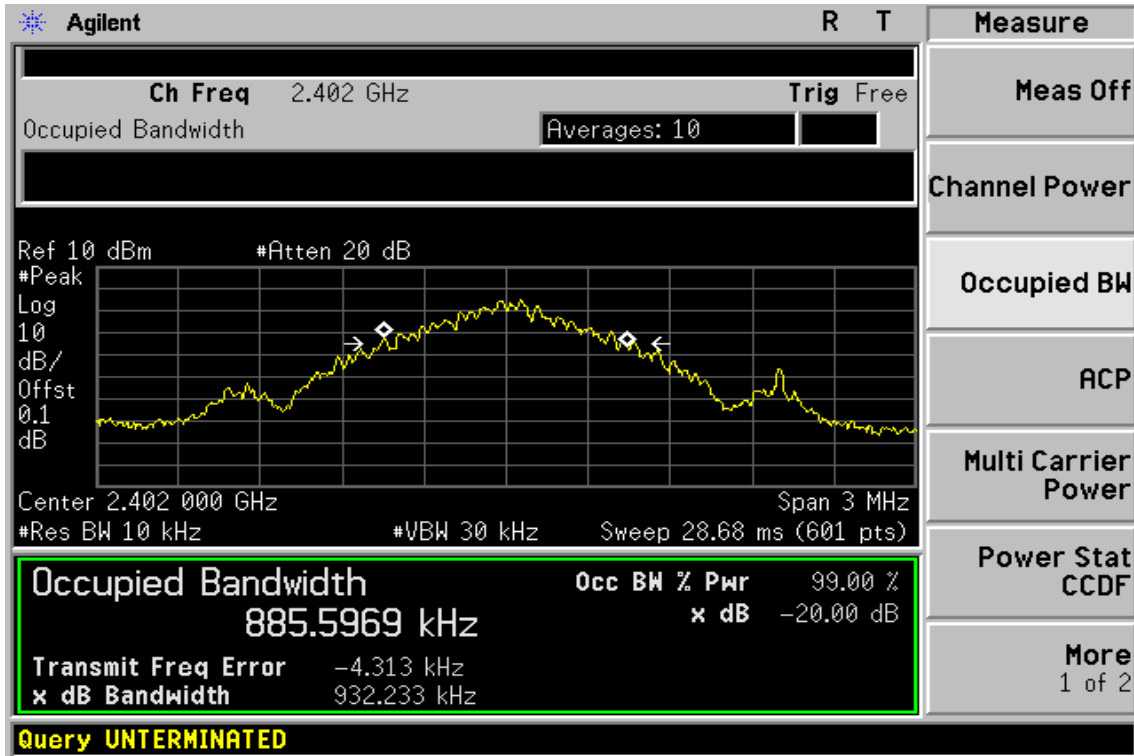
CH	Bandwidth (MHz)
Lower	1.1951
Mid	1.1912
Higher	1.2029

Note: Refer to next page for plots.

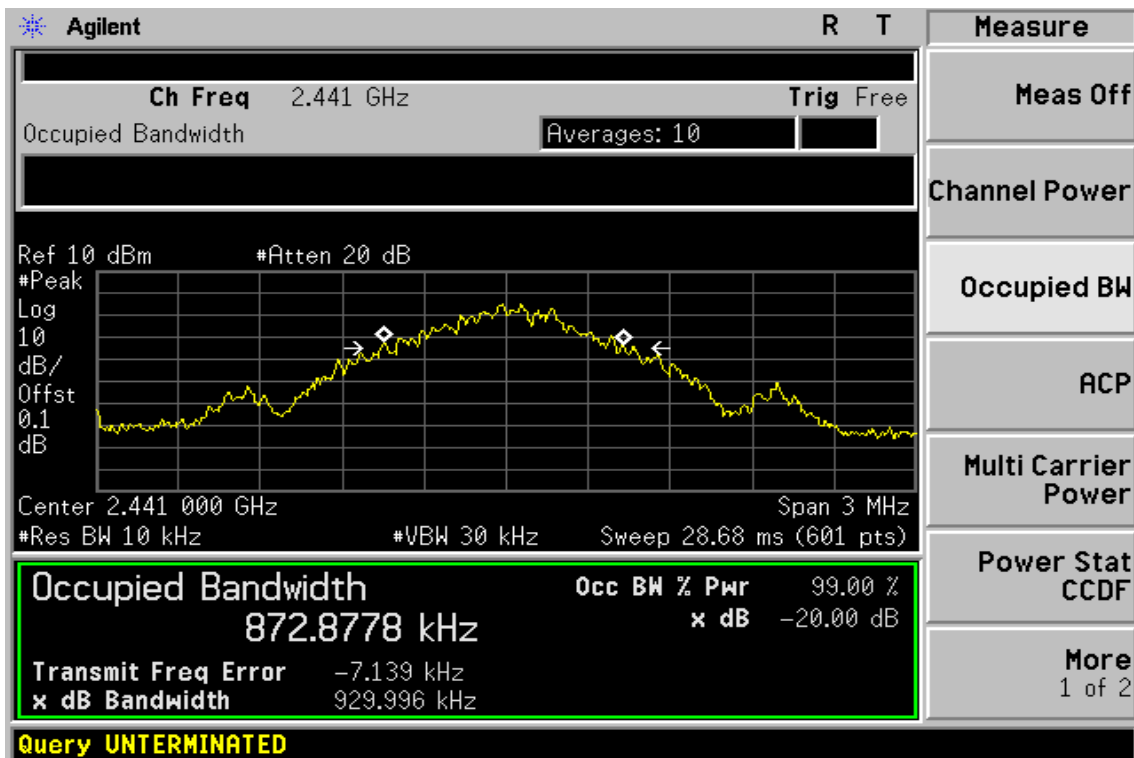
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**BDR Mode**  
**20dB Bandwidth & 99% Bandwidth Test Data CH-Low**



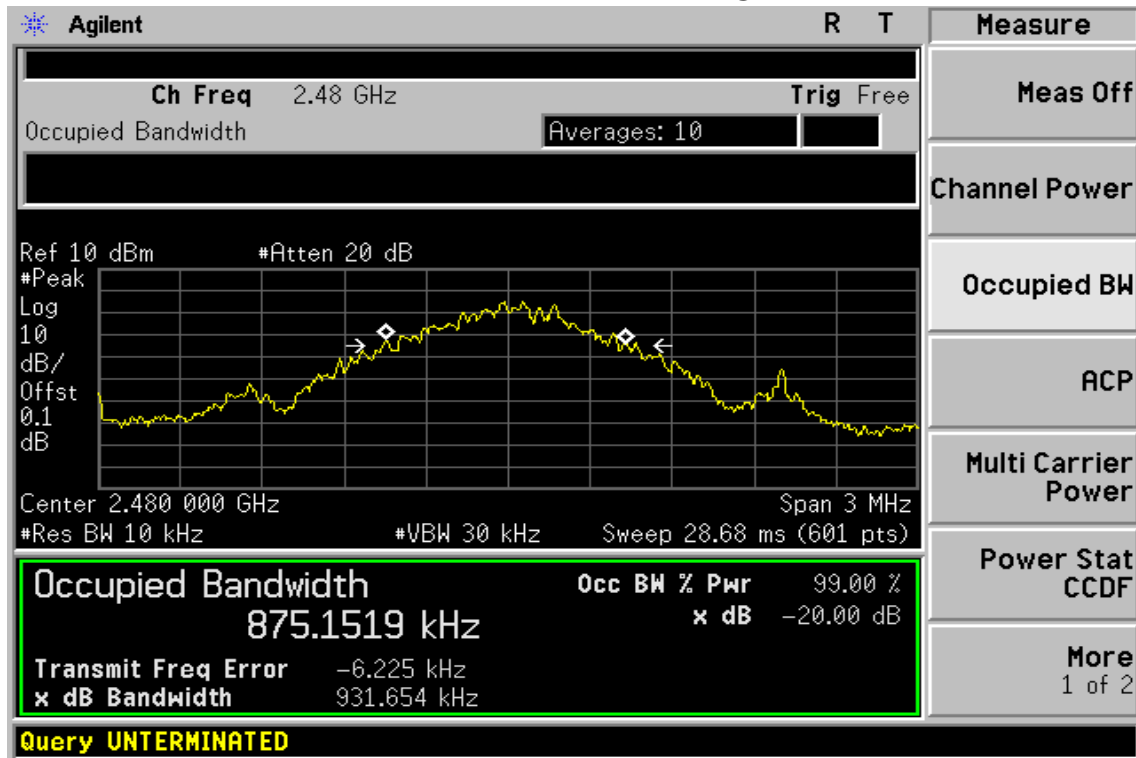
**20dB Bandwidth & 99% Bandwidth Test Data CH-Mid**



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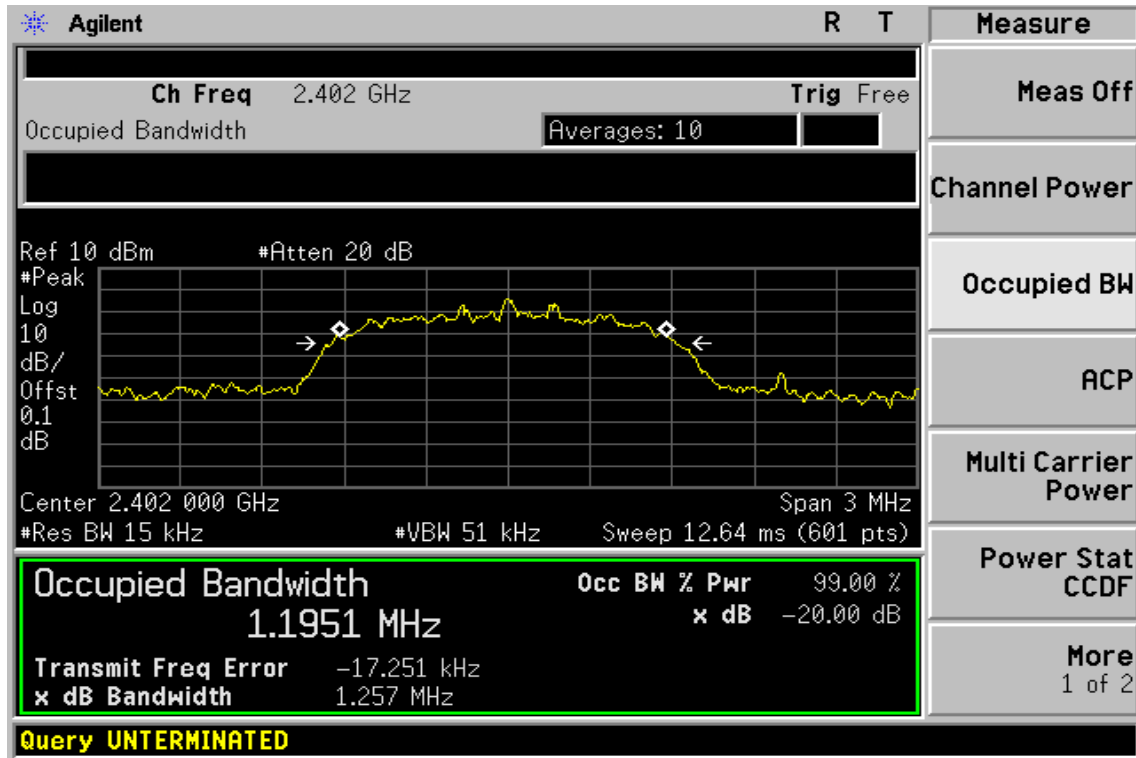
**20dB Bandwidth & 99% Bandwidth Test Data CH-High**



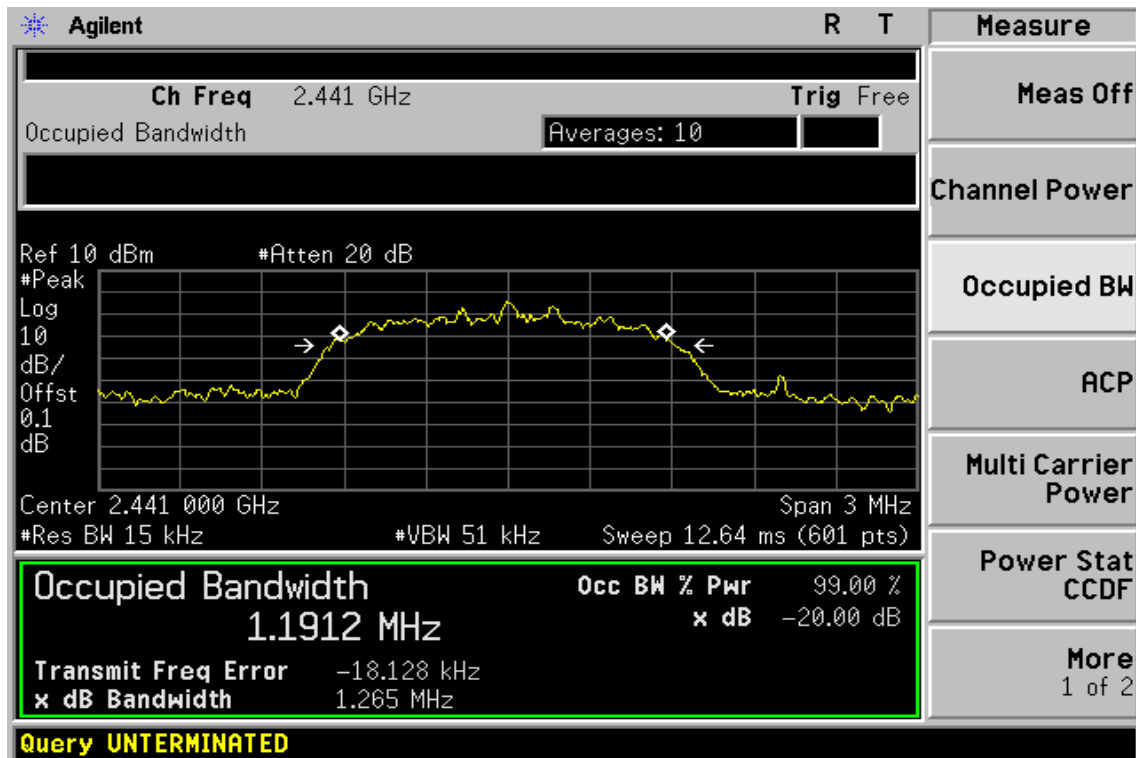
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**EDR Mode**  
**20dB Bandwidth & 99% Bandwidth Test Data CH-Low**



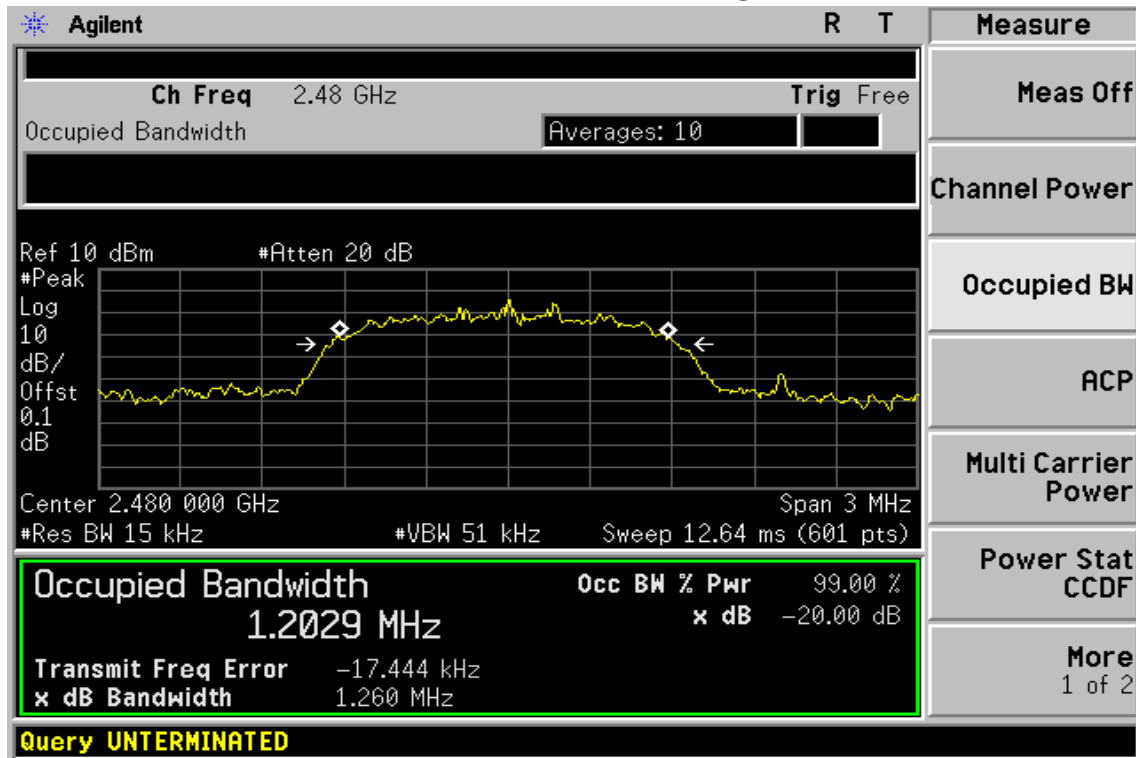
**20dB Bandwidth & 99% Bandwidth Test Data CH-Mid**



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**20dB Bandwidth & 99% Bandwidth Test Data CH-High**



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## 14. ANTENNA REQUIREMENT

### 14.1. Standard Applicable:

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 §15.246(1), 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 6 dBi.

According to RSS-GEN 7.1.4, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

### 14.2. Antenna Connected Construction:

The directional gains of antenna used for transmitting is -5.77dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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## 15. RF EXPOSURE

### 15.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Portable device.

### 15.2 Measurement Result:

This is a portable device and the Max peak output power is 0.96dBm (0.00125 W) lower than low threshold 60/fGHz mW (24.48mW),  $d < 2.5\text{cm}$  in general population category ;

The SAR measurement is not necessary.

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