

## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

### INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** Wireless Cradle  
**Brand Name:** unitech  
**Model No.:** MS084  
**Model Difference:** N/A  
**FCC ID:** HLEMS840BC  
**Report No.:** ER/2011/80017  
**Issue Date:** Sep. 01, 2011  
**FCC Rule Part:** §15.247, Cat: DSS  
**Prepared for:** unitech electronics co., ltd.  
5F, No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien  
Dist., New Taipei City, Taiwan  
**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:** unitech electronics co., ltd.  
5F, No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City,  
Taiwan

**Product Name:** Wireless Cradle

**FCC ID:** HLEMS840BC

**Brand Name:** unitech

**Model No.:** MS084

**Model Difference:** N/A

**File Number:** ER/2011/80017

**Date of test:** Aug. 17, 2011 ~ Aug. 31, 2011

**Date of EUT Received:** Aug. 17, 2011

### 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:*

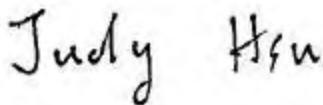


*Date:*

Sep. 01, 2011

*Eric Su / Asst. Supervisor*

*Prepared By:*



*Date:*

Sep. 01, 2011

*Judy Hsu / General Admin.*

*Approved By:*



*Date:*

Sep. 01, 2011

*Jim Chang / Supervisor*

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## Version

Version No.	Date	Description
00	Sep. 01, 2011	Initial creation of document

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## 1. GENERAL INFORMATION

### 1.1. Product Description

#### General:

Product Name:	Wireless Cradle	
Brand Name:	unitech	
Model No.:	MS084	
Model Difference:	N/A	
Power Supply	5 Vdc by AC/DC power adapter	
	Adapter:	Model No.: 3A-066WP05, Supplier: ENG

#### Bluetooth:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)
Channel number:	79 channels
Transmit Power:	7.33 dBm (Peak)
Modulation type:	Frequency Hopping Spread Spectrum
Antenna Designation:	Monopole Antenna, 2.0dBi
Type of Emission:	1M26GXD

The EUT is compliance with Bluetooth 2.1 with EDR.

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

This submittal(s) (test report) is intended for FCC ID: **HLEMS840BC** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 1.3. 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

## 1.4. 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. 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.

## 1.5. 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 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 placed on a 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 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 and Subclause 8.3.1.2 of ANSI C63.4: 2003 and DA 00-705.

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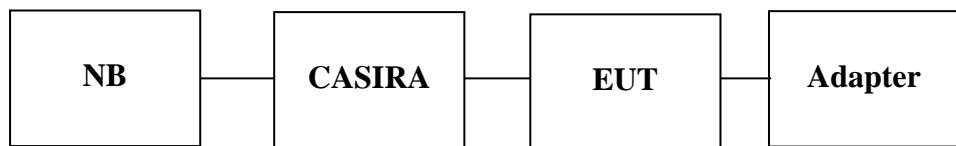
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## 2.4. Configuration of Tested System

**Fig. 2-1 AC Power line and Radiated Emission Configuration**



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

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.
1.	Notebook	DELL	D505	20995915456
2.	CASIRA	CSR	BCES301199/1	7383070403
3.	Test Software	CSR	BLUETST 3	N/A

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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)	20dB Bandwidth	No Limit
§15.247I	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
§15.247	Peak Power Density	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 mode is programmed.

Channel Low, Mid and High with highest rated data rate were chosen for full testing.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) for Bluetooth Transmitter for channel Low, Mid and High , the worst case EDR mode and DH5 data rate will be worst case.

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## 5. CONDUCTED EMISSION TEST

### 5.1. 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.

### 5.2. 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.

### 5.3. 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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#### 5.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	828985/004	09/23/2010	09/22/2012
LISN	Rolf-Heine	NNB-2/16Z	99012	03/31/2011	03/30/2012
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/31/2011	03/30/2012
Coaxial Cables	N/A	WK CE Cable	N/A	11/28/2010	11/27/2011

#### 5.5. Measurement Result

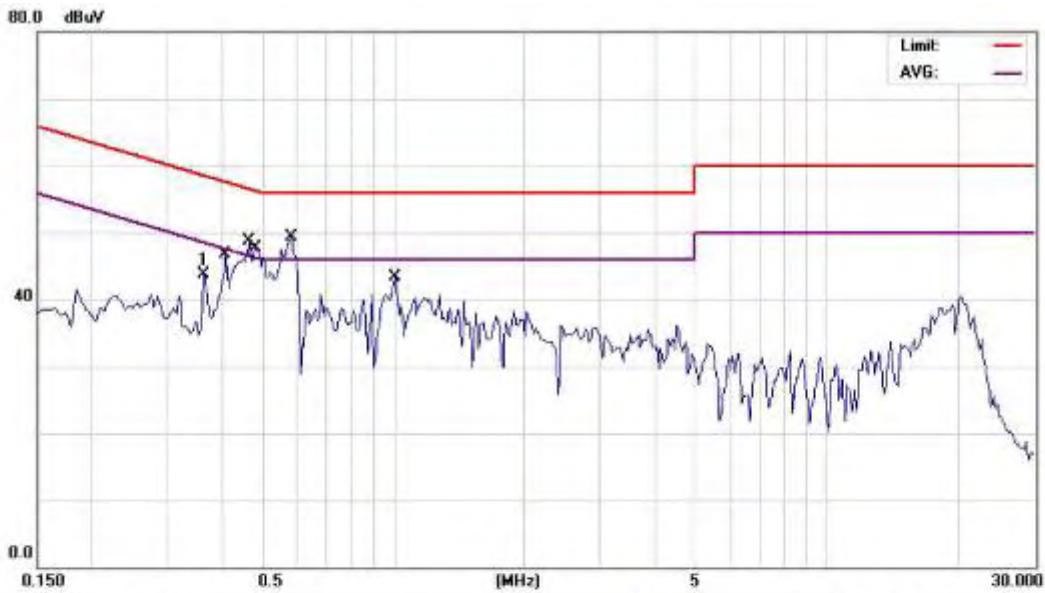
The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Bluetooth Mode	Test Date:	Aug. 30, 2011
		Test By:	Eric



Site: SGS CONDUCTED #1 Phase: **L1** Temperature: 23 °C  
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 61%  
EUT: Cradle Distance: Air Pressure: hPa  
MN: MS840B  
Note: BT

No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over					
							MHz	dBuV	dB	dBuV	dB	Detector
1		0.3650	43.63	0.12	43.75	58.61	-14.86	56.00	-14.86	56.00	peak	
2		0.4094	40.47	0.12	40.59	57.66	-17.07	56.00	-17.07	56.00	QP	
3		0.4101	28.91	0.12	29.03	47.65	-18.62	46.00	-18.62	46.00	AVG	
4		0.4658	43.73	0.12	43.85	56.59	-12.74	56.00	-12.74	56.00	QP	
5		0.4658	32.43	0.12	32.55	46.59	-14.04	46.00	-14.04	46.00	AVG	
6		0.4810	43.40	0.12	43.52	56.32	-12.80	56.00	-12.80	56.00	QP	
7		0.4810	31.97	0.12	32.09	46.32	-14.23	46.00	-14.23	46.00	AVG	
8 *		0.5802	46.06	0.12	46.18	56.00	-9.82	56.00	-9.82	56.00	QP	
9		0.5802	34.24	0.12	34.36	46.00	-11.64	46.00	-11.64	46.00	AVG	
10		1.0045	38.08	0.11	38.19	56.00	-17.81	56.00	-17.81	56.00	QP	
11		1.0045	26.46	0.11	26.57	46.00	-19.43	46.00	-19.43	46.00	AVG	

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Site: SGS CONDUCTED #1 Phase: **N** Temperature: 23 °C  
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 61%  
EUT: Cradle Distance: Air Pressure: hPa  
MN: MS840B  
Note: BT

No.	Mk.	Freq.	Reading	Factor	Measure-	Limit	Over	Detector	Comment
			Level		ment				
1		0.2250	40.87	0.16	41.03	62.63	-21.60	peak	
2		0.4613	37.75	0.16	37.91	56.67	-18.76	QP	
3		0.4613	27.25	0.16	27.41	46.67	-19.26	AVG	
4		0.4859	37.56	0.16	37.72	56.24	-18.52	QP	
5		0.4859	26.73	0.16	26.89	46.24	-19.35	AVG	
6		0.5073	35.87	0.16	36.03	56.00	-19.97	QP	
7		0.5073	25.24	0.16	25.40	46.00	-20.60	AVG	
8		0.5887	39.35	0.16	39.51	56.00	-16.49	QP	
9		0.5887	28.38	0.16	28.54	46.00	-17.46	AVG	
10	*	0.6400	40.46	0.16	40.62	56.00	-15.38	peak	

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## 6. PEAK OUTPUT POWER MEASUREMENT

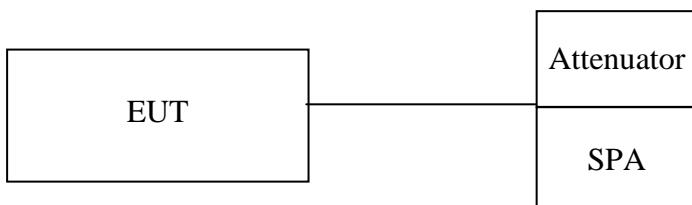
### 6.1. Standard Applicable

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.

### 6.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Sensor	Anritsu	MA2411B	917032	01/21/2010	01/20/2012
Power Meter	Anritsu	ML2495A	1005007	02/17/2010	02/16/2012
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/25/2011	01/24/2012
DC Block	Agilent	BLK-18	155452	07/05/2011	07/04/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S6W5	001	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S10W5	001	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S20W5	001	01/05/2011	01/04/2012
Splitter	Agilent	11636B	N/A	01/05/2011	01/04/2012

### 6.3. Test Set-up:



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#### 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. (BDR model: max peak RBW/VBW = 1MHz, EDR model: max peak RBW = 1.5MHz VBW = 5MHz)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

#### 6.5. Measurement Result

##### BDR Mode

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402	4.24	0	4.24	0.002655	1
2441	6.38	0	6.38	0.004345	1
2480	5.88	0	5.88	0.003873	1

##### EDR Mode

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402	5.93	0	5.93	0.003917	1
2441	7.33	0	7.33	0.005408	1
2480	6.95	0	6.95	0.004955	1

*offset: 0.5dB*

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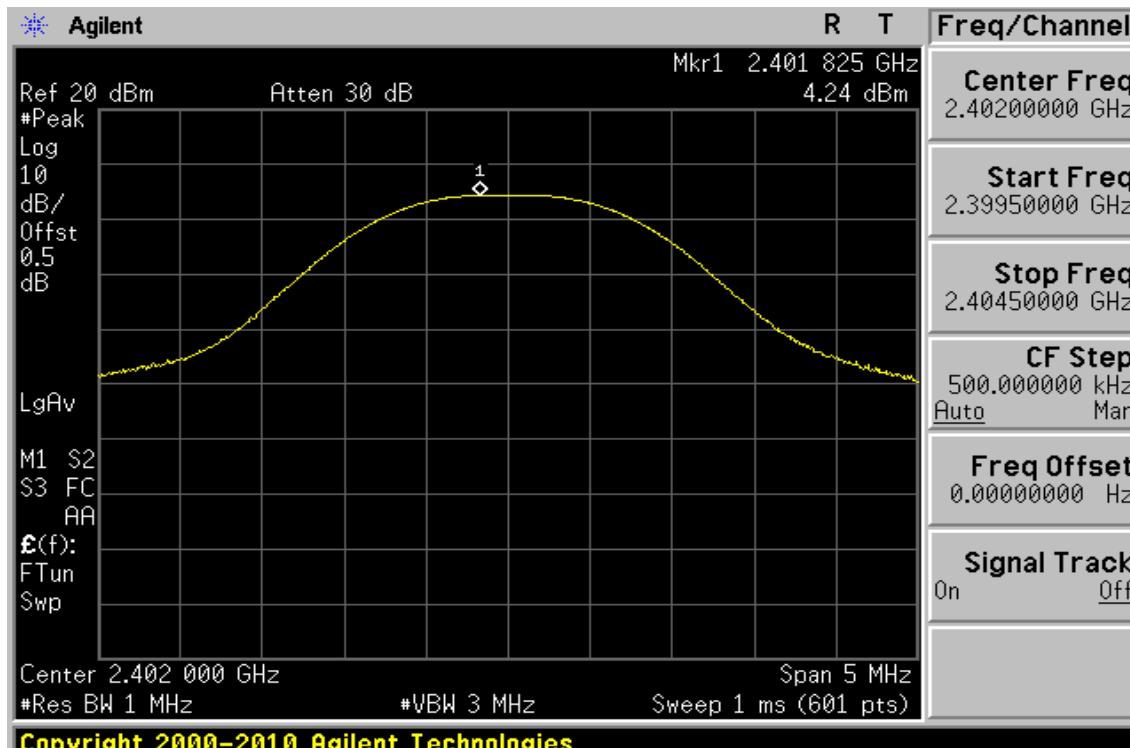
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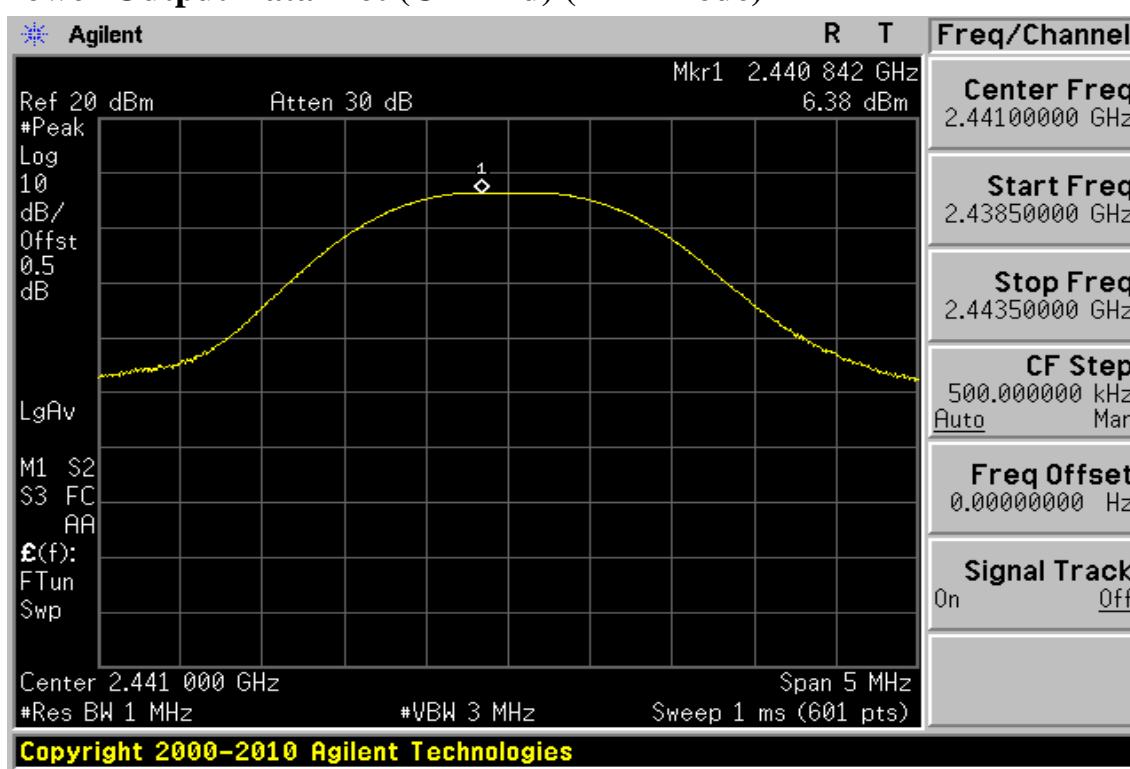
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## Peak Power Output Data Plot (CH Low) (BDR mode)

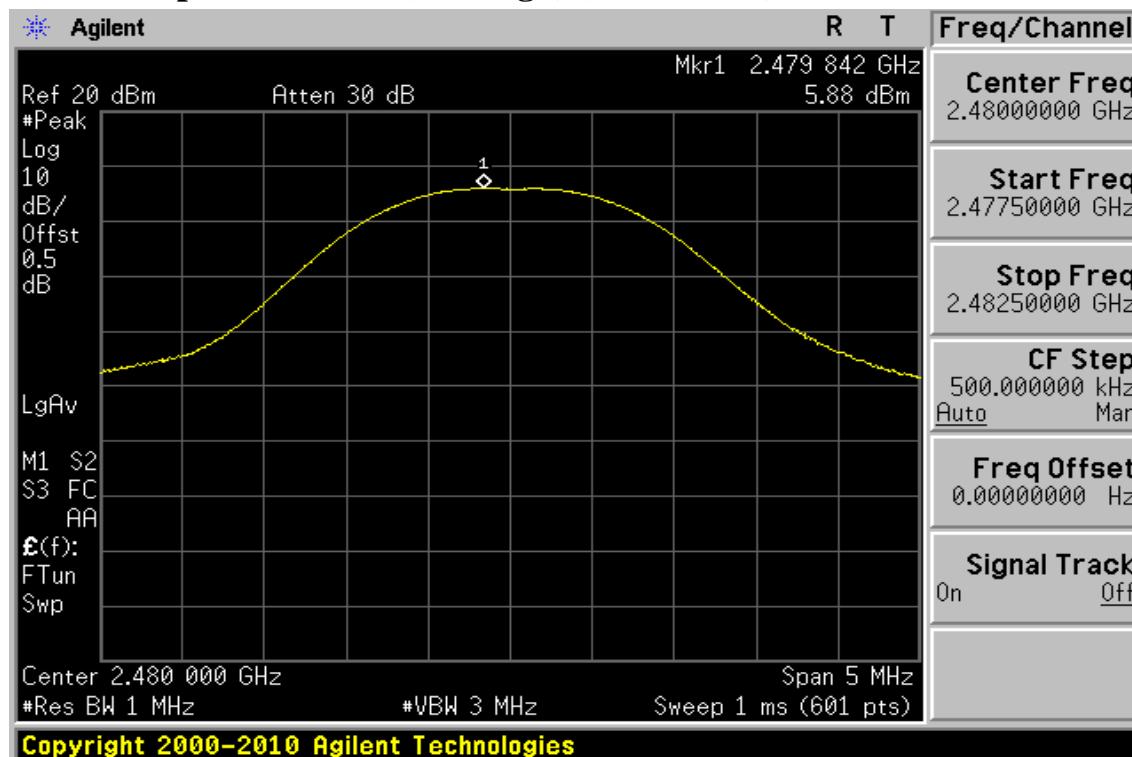


## Peak Power Output Data Plot (CH Mid) (BDR mode)



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

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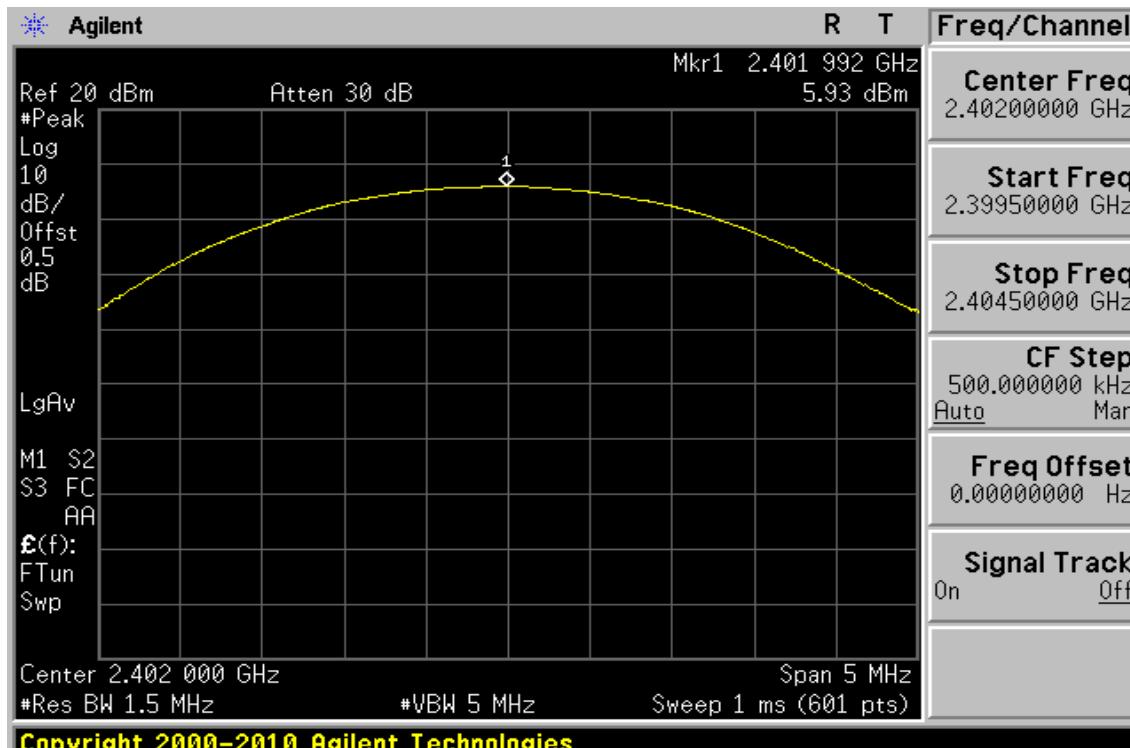
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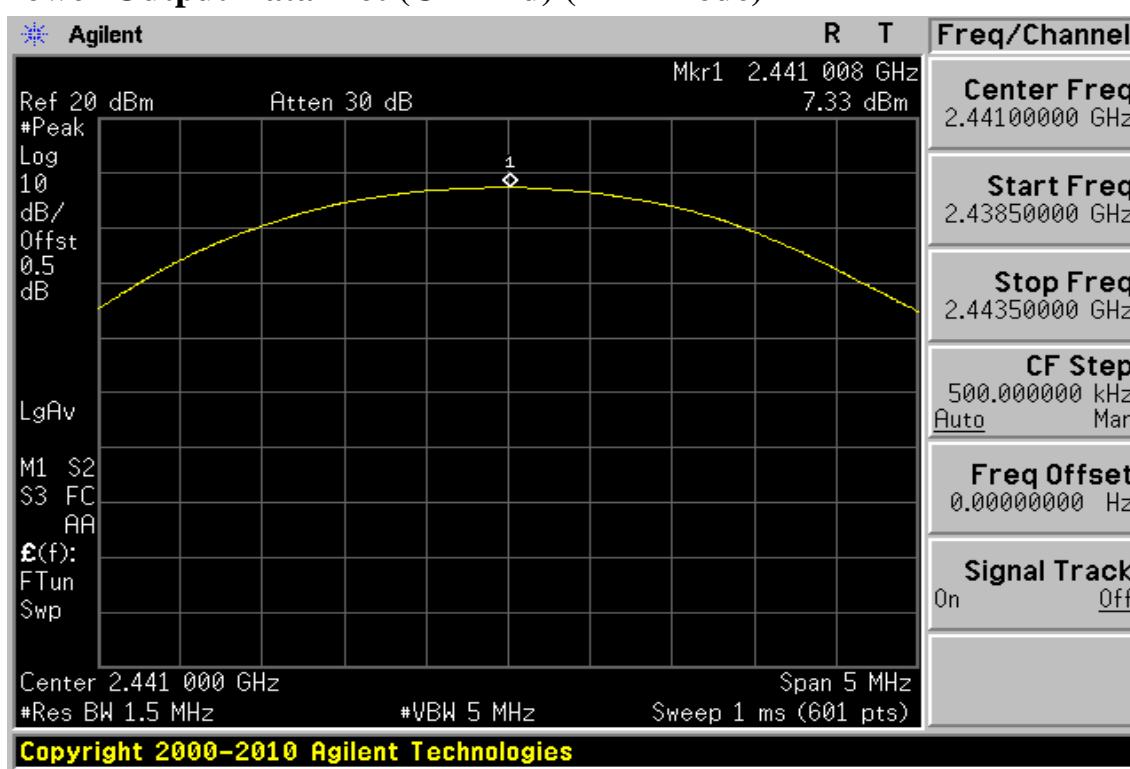
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### Peak Power Output Data Plot (CH Low) (EDR mode)

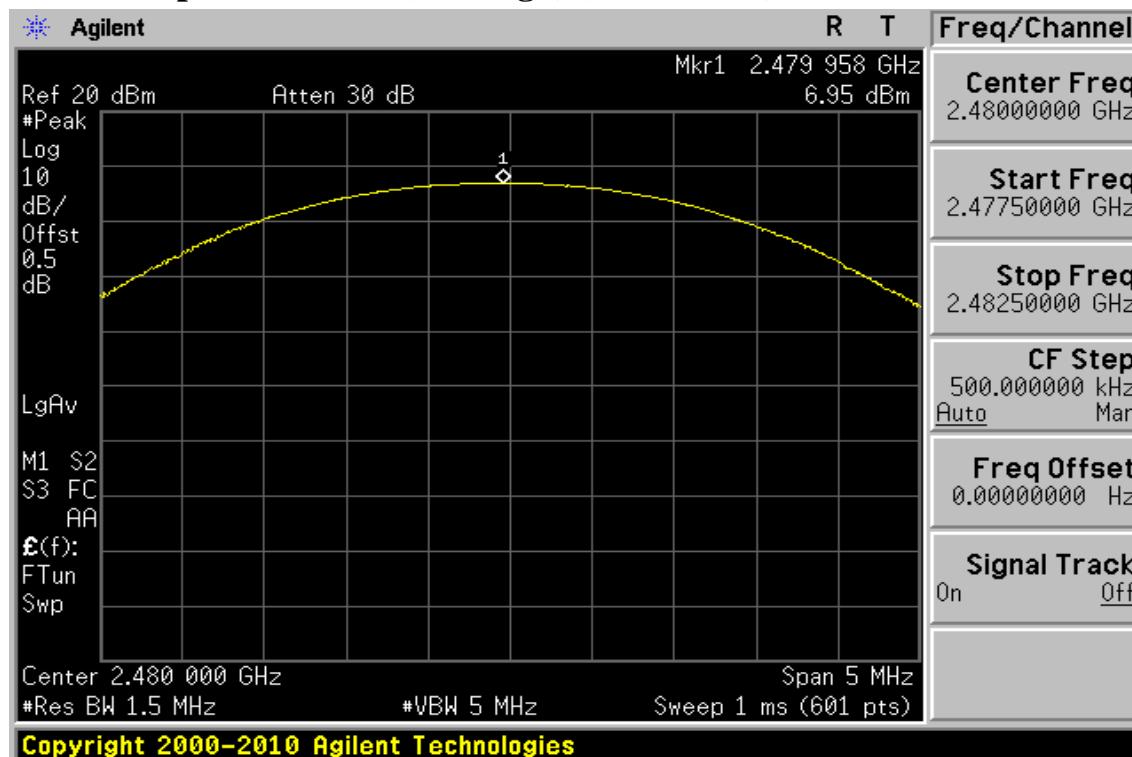


### Peak Power Output Data Plot (CH Mid) (EDR mode)



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**Peak Power Output Data Plot (CH High) (EDR mode)****Copyright 2000-2010 Agilent Technologies**

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## 7. 20dB BAND WIDTH

### 7.1. Standard Applicable

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

### 7.2. Measurement Equipment Used

Refer to section 6.2 for details.

### 7.3. Test Set-up

Refer to section 6.3 for details.

### 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 the spectrum analyzer as RBW > 1 % of Bandwidth., VBW > RBW, 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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## 7.5. Measurement Result:

### BDR Mode

CH	Bandwidth (MHz)
Lower	0.932
Mid	0.933
Higher	0.932

### EDR Mode

CH	Bandwidth (MHz)
Lower	1.258
Mid	1.257
Higher	1.262

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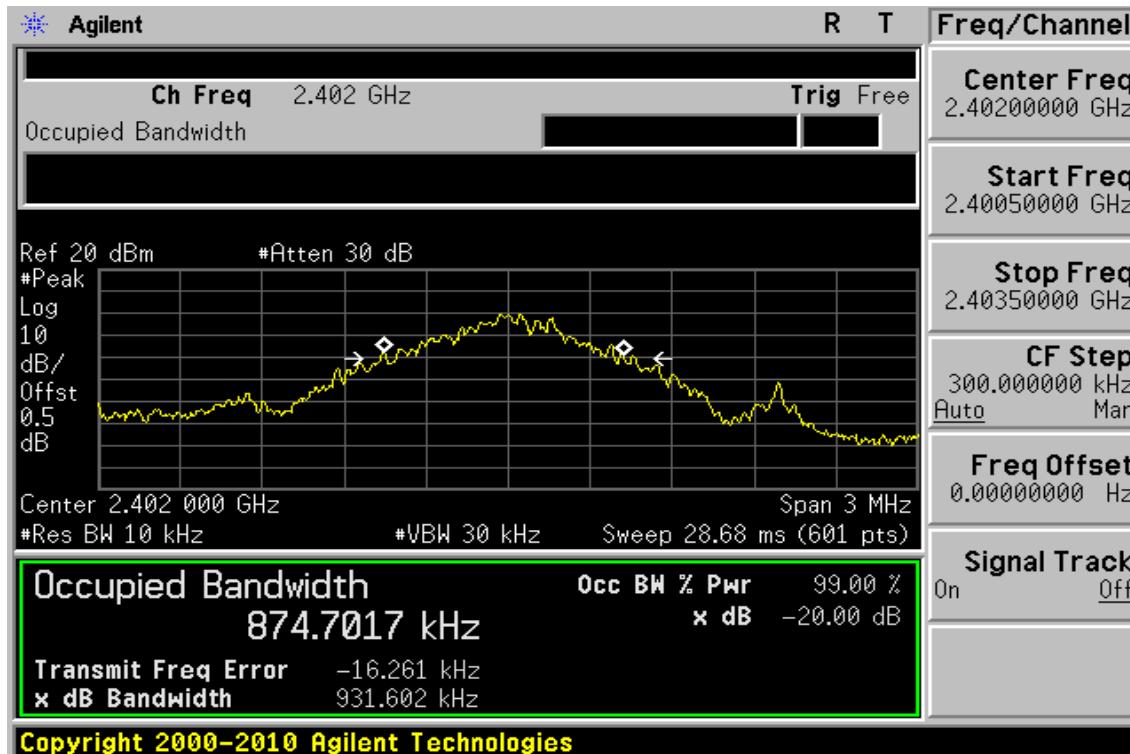
t (886-2) 2299-3279

f (886-2) 2298-0488

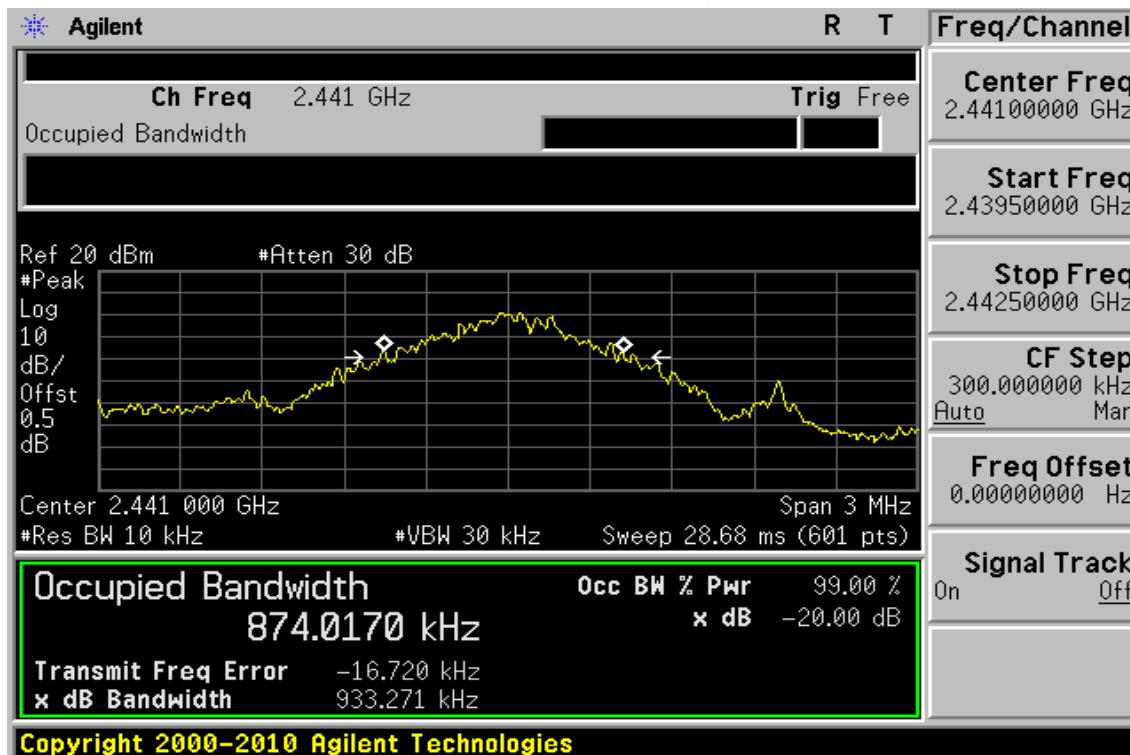
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## 20dB Band Width Test Data CH-Low (BDR mode)

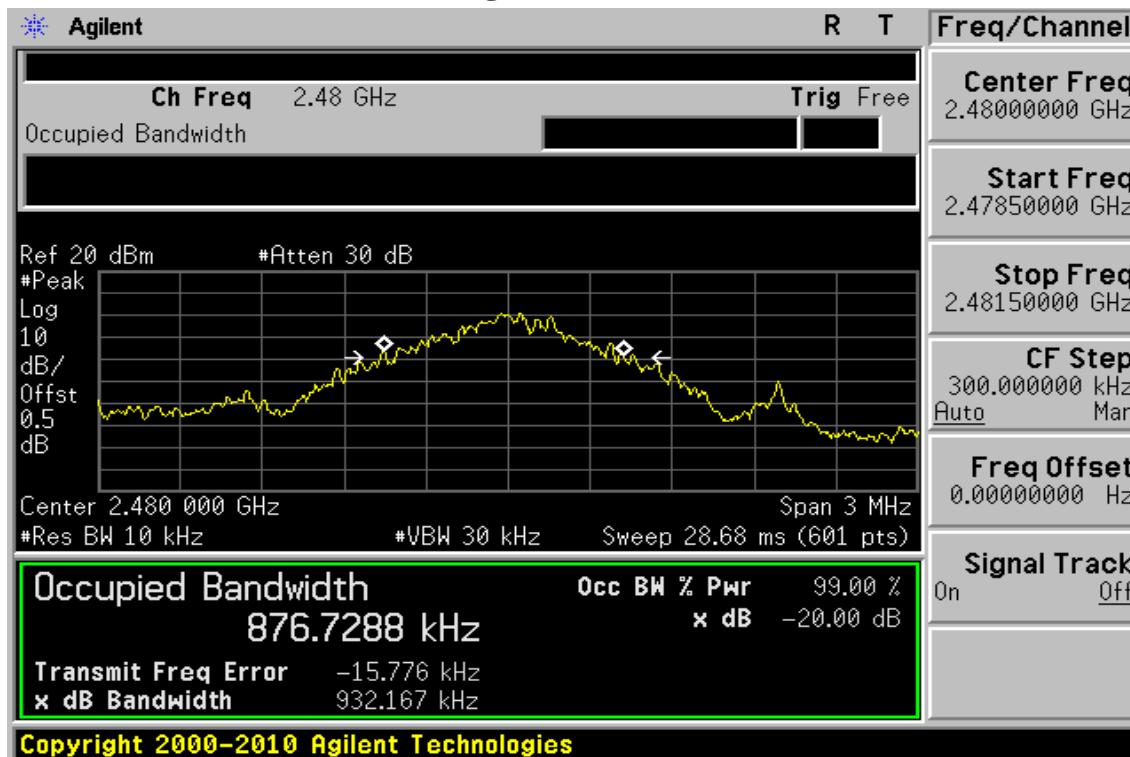


## 20dB Band Width Test Data CH-Mid (BDR mode)



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**20dB Band Width Test Data CH-High (BDR mode)**

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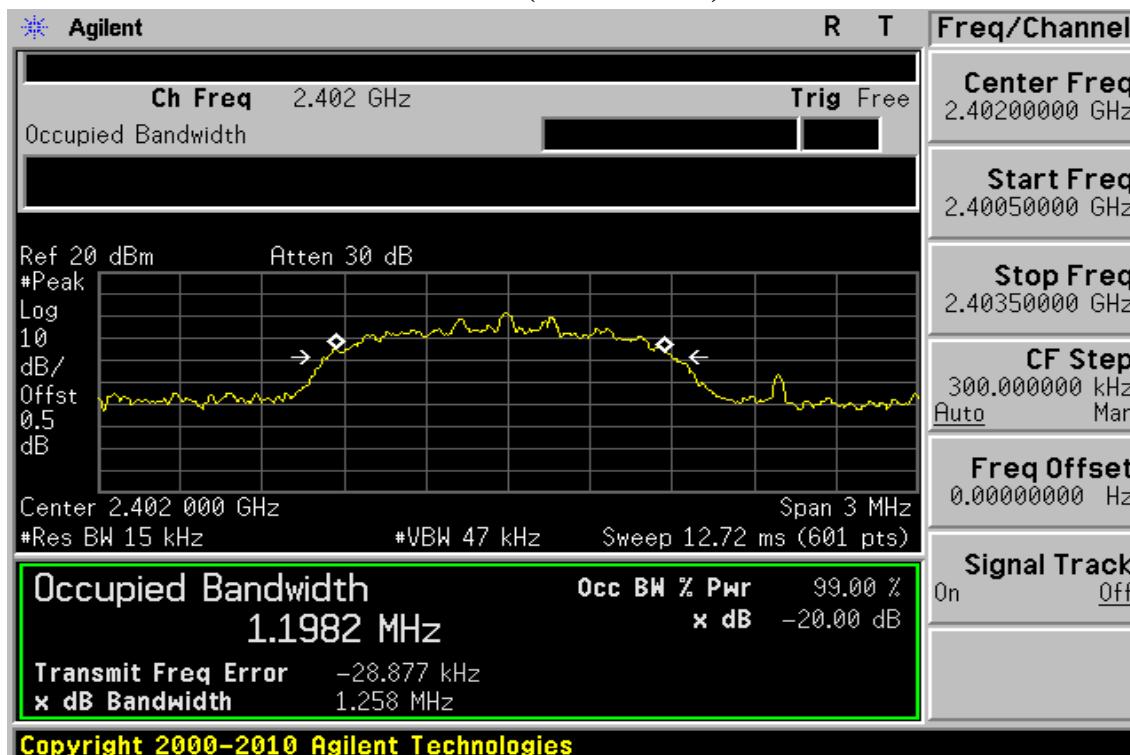
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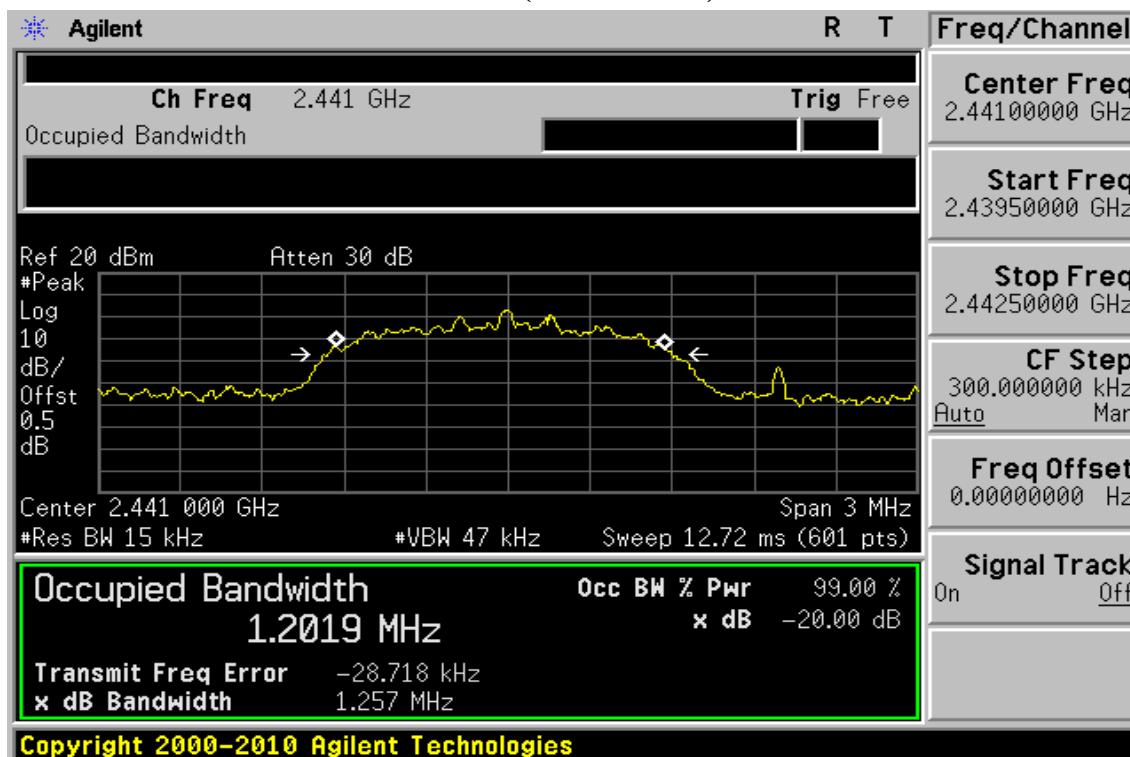
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## 20dB Band Width Test Data CH-Low (EDR mode)

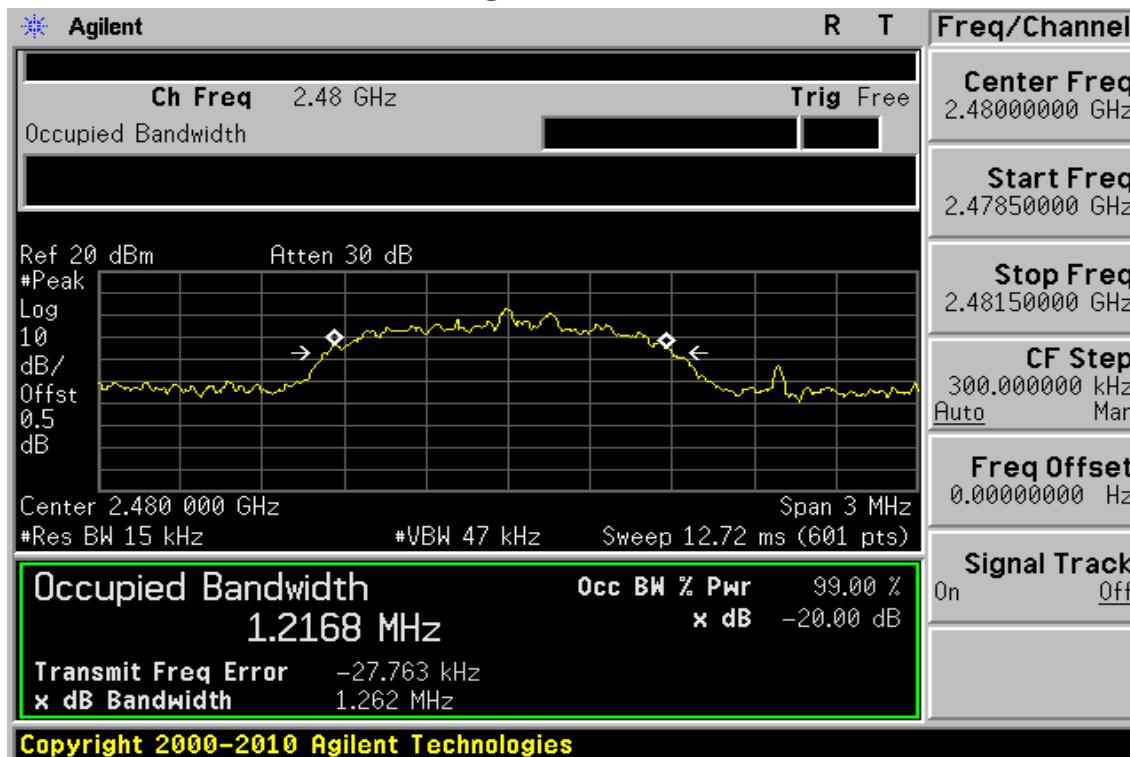


## 20dB Band Width Test Data CH-Mid (EDR mode)



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**20dB Band Width Test Data CH-High (EDR mode)**

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## 8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 8.1. Standard Applicable

According to §15.247(c), 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).

### 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:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	03/30/2011	03/29/2012
Bilog Antenna	SCHWAZBECK	VULB9160	3136	11/19/2010	11/18/2011
Horn antenna	SCHWAZBECK	BBHA 9120D	309/320	01/22/2010	01/21/2012
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2010	11/27/2011
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2011	01/04/2012
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
DC Block	Agilent	BLK-18	155452	01/05/2011	01/04/2012
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	01/05/2011	01/04/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2011	01/04/2012
3m Site	SGS	966 chamber	N/A	09/06/2010	09/05/2011

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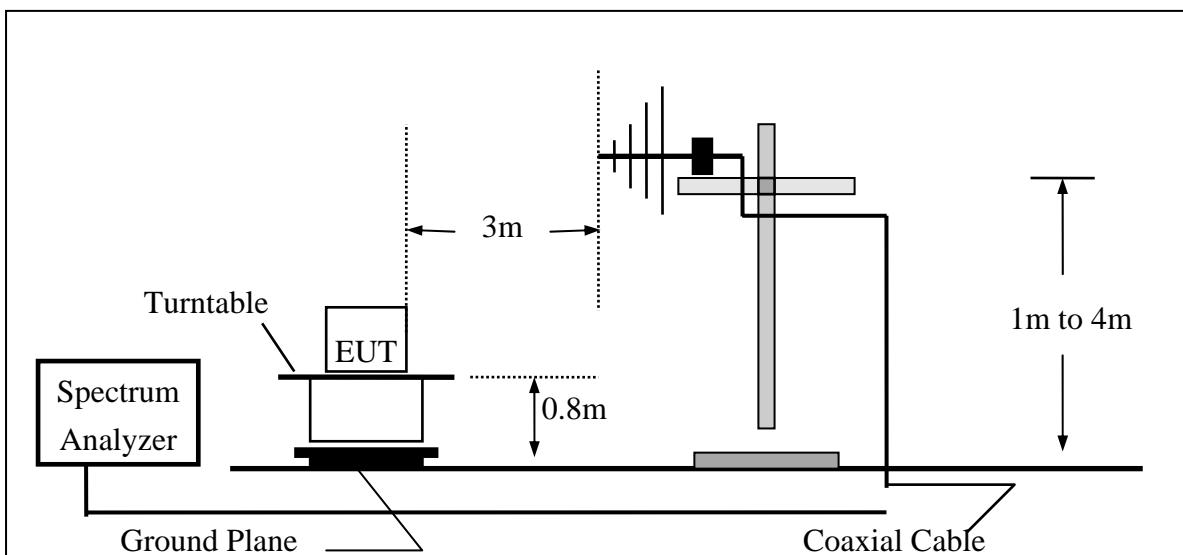
### 8.3. Test SET-UP:

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

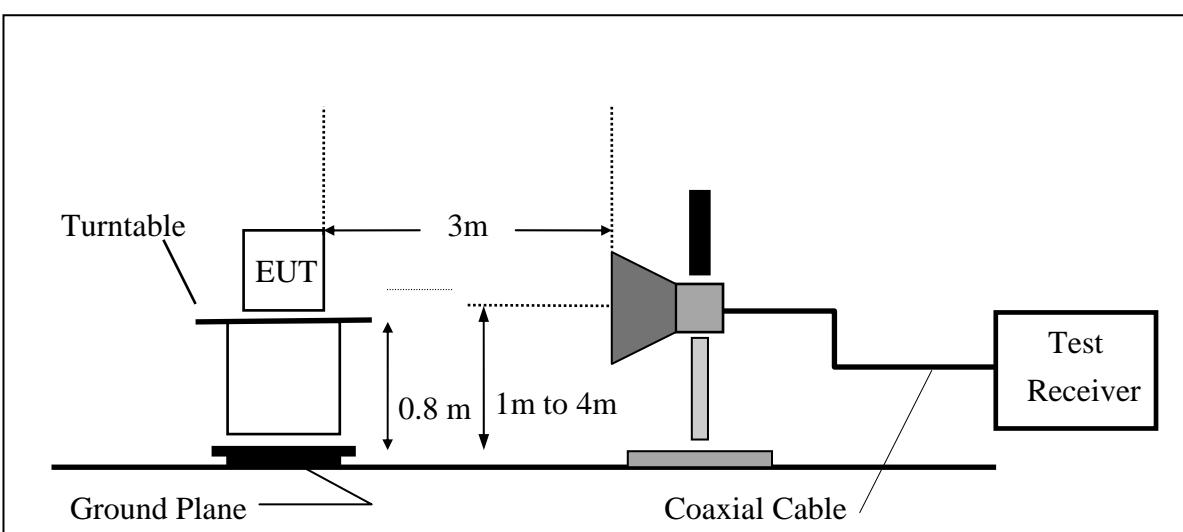
Refer to section 6.3 for details.

#### 8.3.2. Radiated emission:

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



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



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#### 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 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. Radiated Emission refer to section 9.

#### 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:

$$\mathbf{FS = RA + AF + CL - AG}$$

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

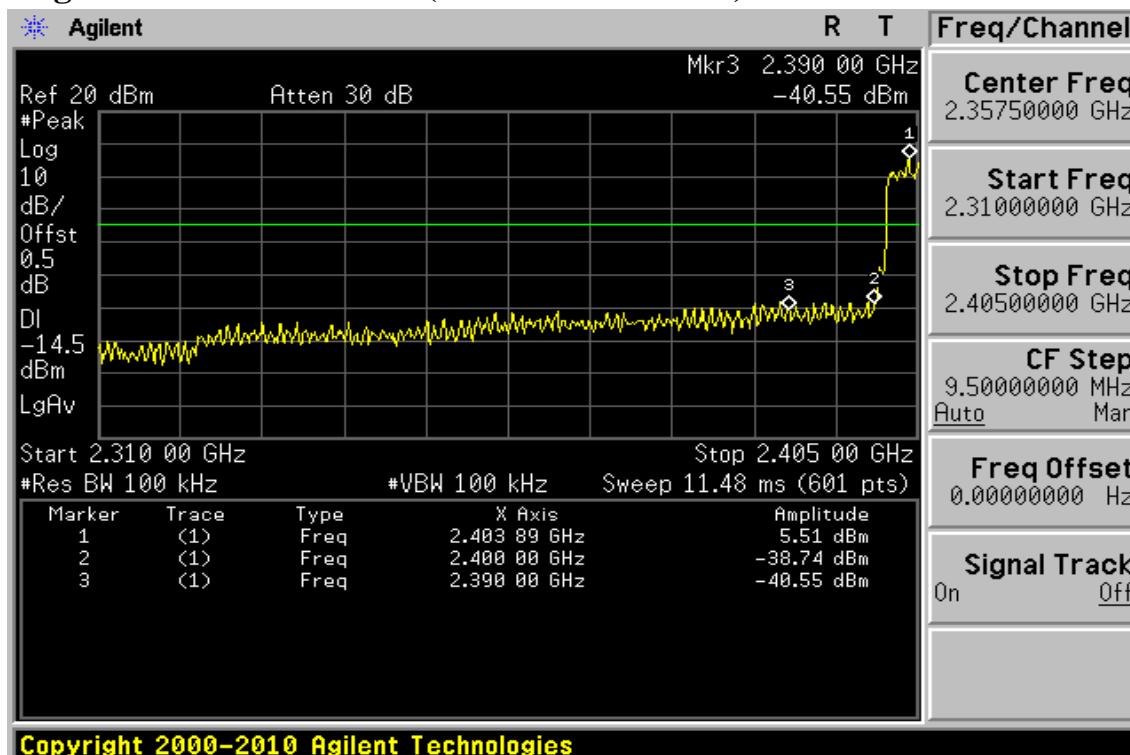
#### 8.6. Measurement Result

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

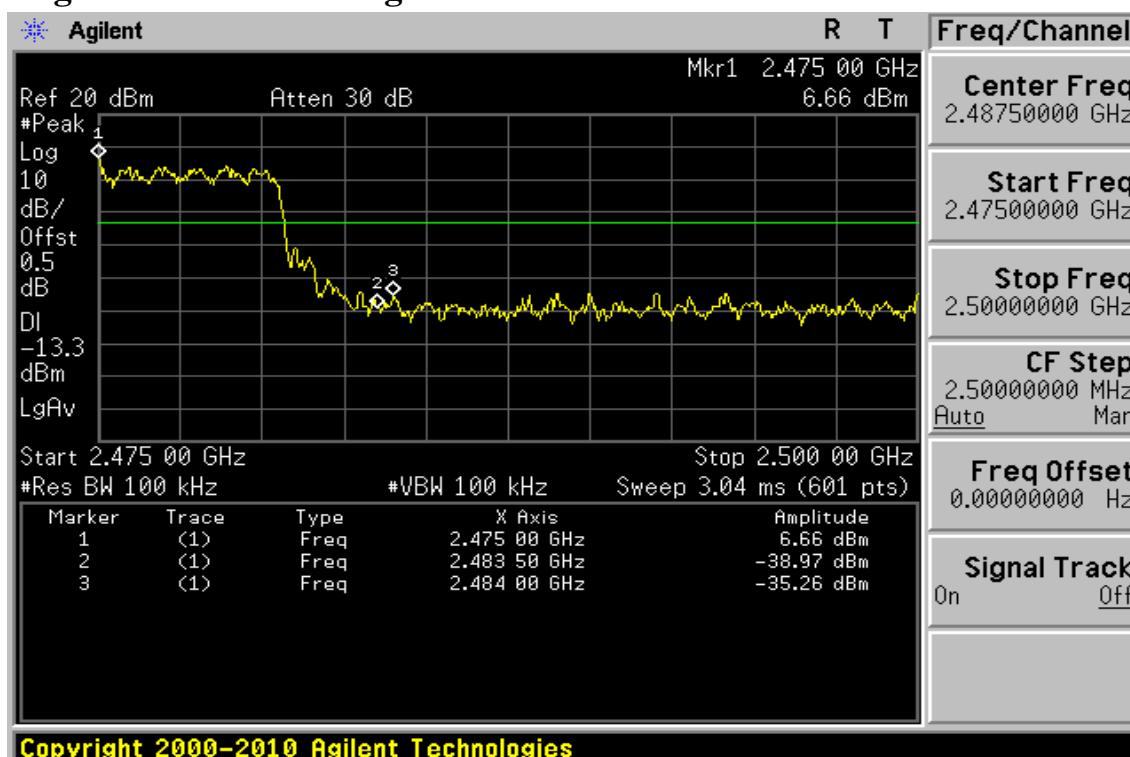
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## Band Edges Test Data CH-Low (Worst: EDR mode)



## Band Edges Test Data CH-High



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**Radiated Emission: (Worst: EDR mode)**

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

Test Date Aug. 30, 2011  
Test By Eric  
Pol Ver.

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)			
2390.00	62.58	39.70	-0.67	61.91	39.03	74.00	54.00	-14.97 Av.

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

Test Date Aug. 30, 2011  
Test By Eric  
Pol Hor.

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)			
2390.00	60.07	36.33	-0.67	59.40	35.66	74.00	54.00	-18.34 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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**Radiated Emission: (Worst: EDR mode)**

Operation Mode TX CH High  
 Fundamental Frequency 2480 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date Aug. 30, 2011  
 Test By Eric  
 Pol Ver.

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
2483.50	68.43	39.33	-0.52	67.91	38.81	74.00	54.00	-15.19 Av.

Operation Mode TX CH High  
 Fundamental Frequency 2480 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date Aug. 30, 2011  
 Test By Eric  
 Pol Hor.

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
2483.50	62.57	37.62	-0.52	62.05	37.10	74.00	54.00	-16.90 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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## 9. SPURIOUS RADIATED EMISSION TEST

### 9.1. 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.

### 9.2. Measurement Equipment Used:

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

Refer to section 6.2 for details.

#### 9.2.2. Radiated emission:

Refer to section 8.2 for details.

### 9.3. Test SET-UP:

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

Refer to section 6.3 for details.

#### 9.3.2. Radiated emission:

Refer to section 8.3 for details.

### 9.4. 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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## 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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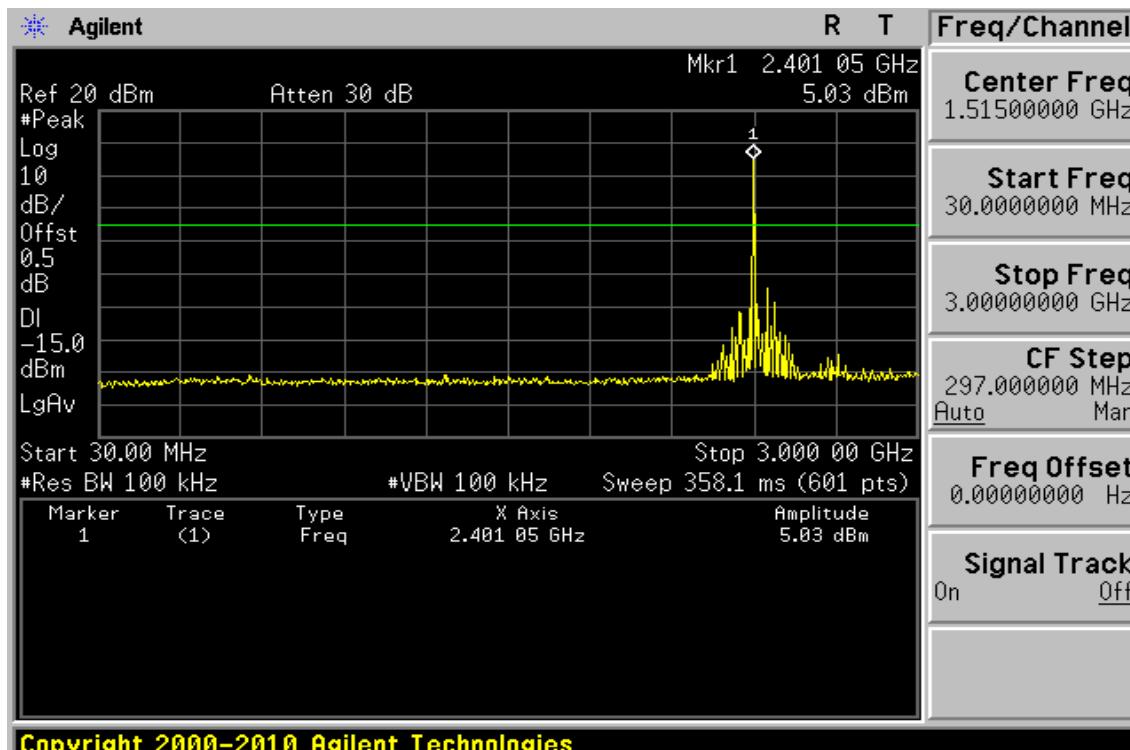
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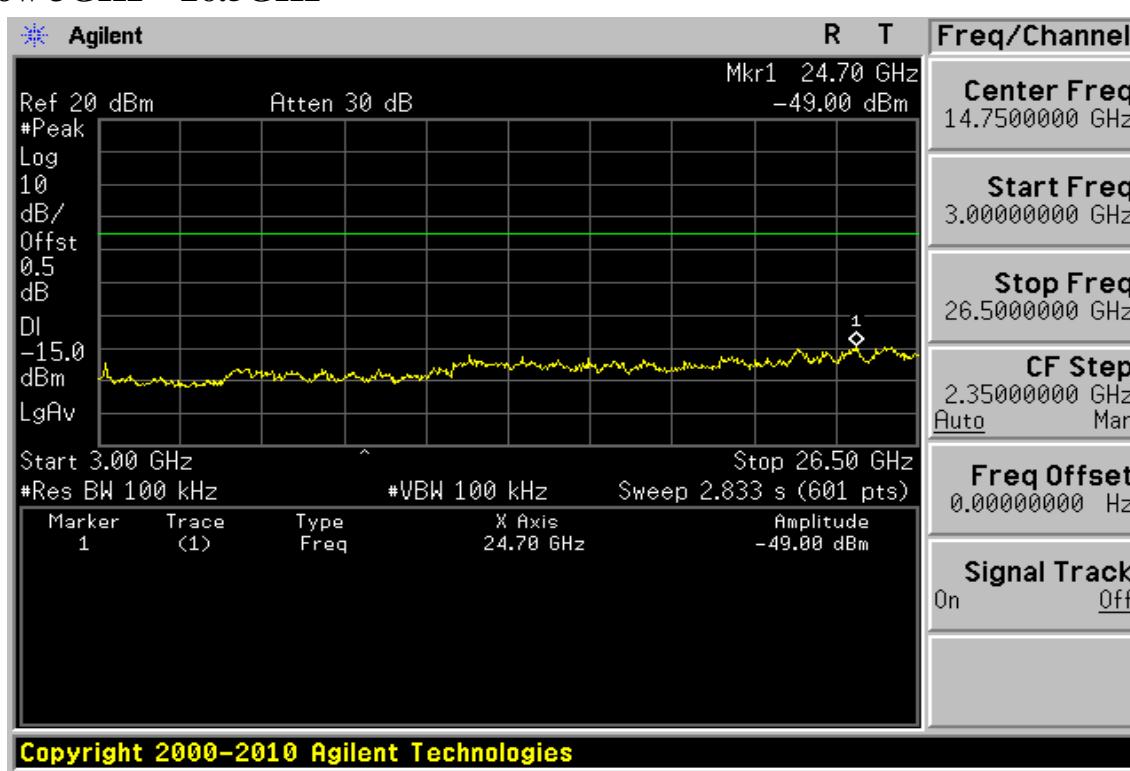
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## Conducted Spurious Emission Measurement Result (Worst: EDR mode)

### Ch Low 30MHz – 3GHz



### Ch Low 3GHz – 26.5GHz



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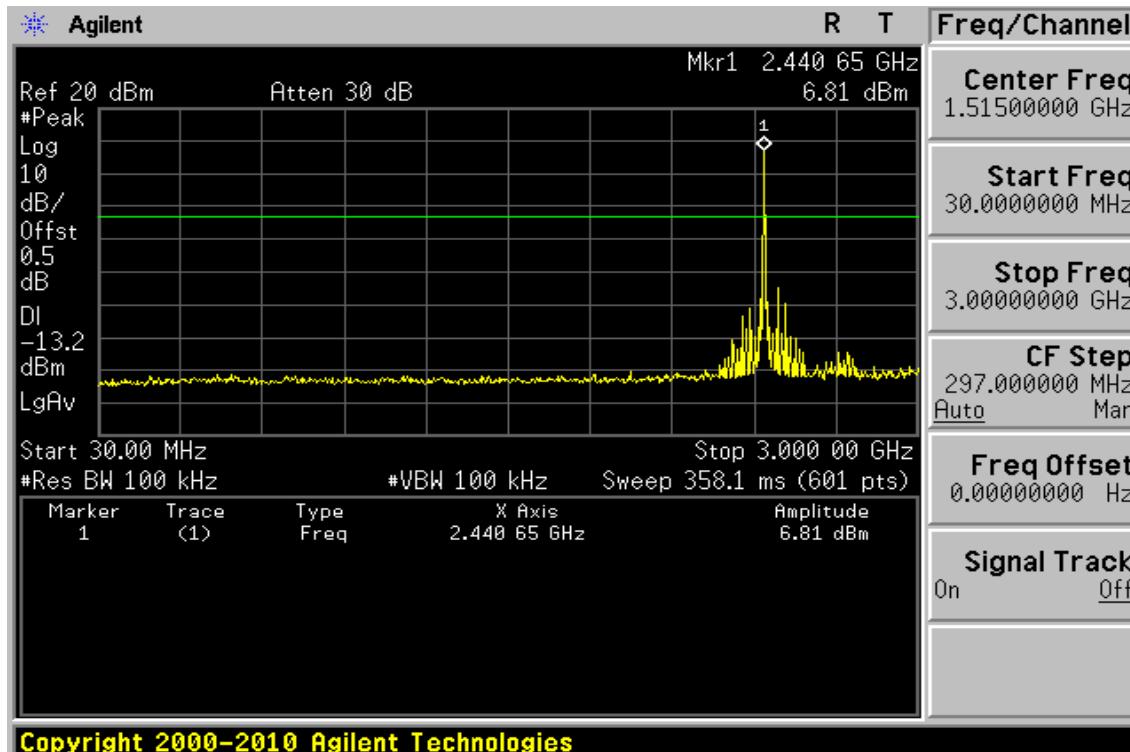
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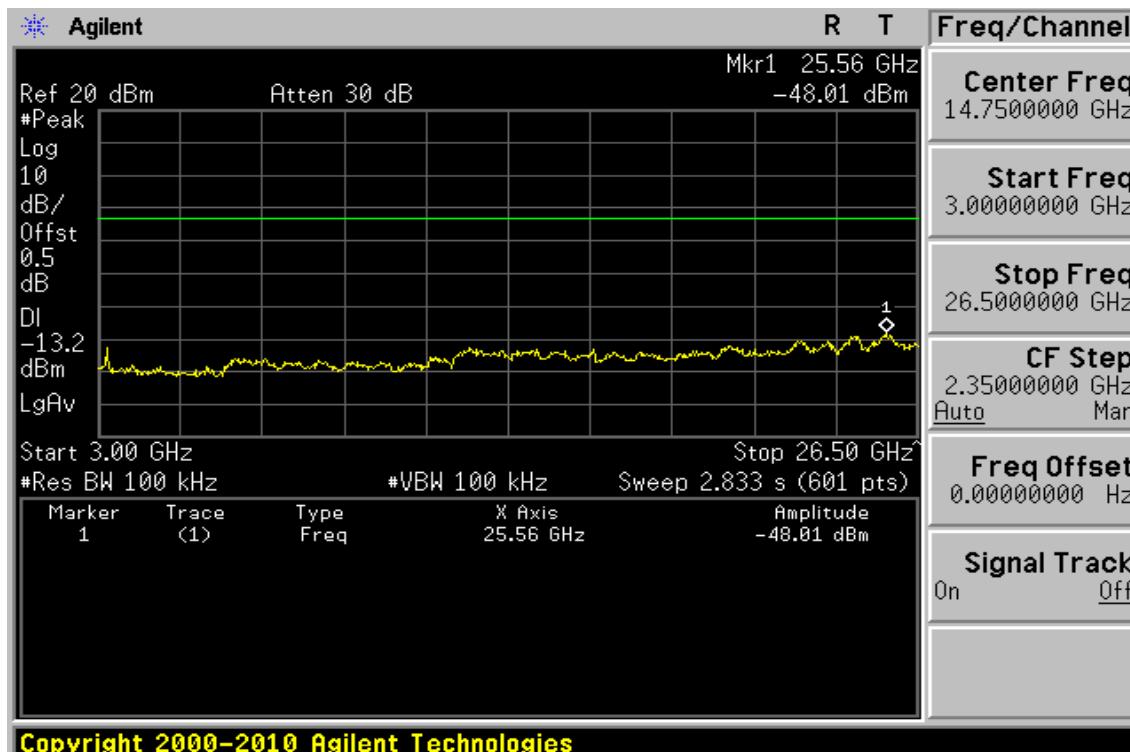
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## Ch Mid 30MHz – 3GHz



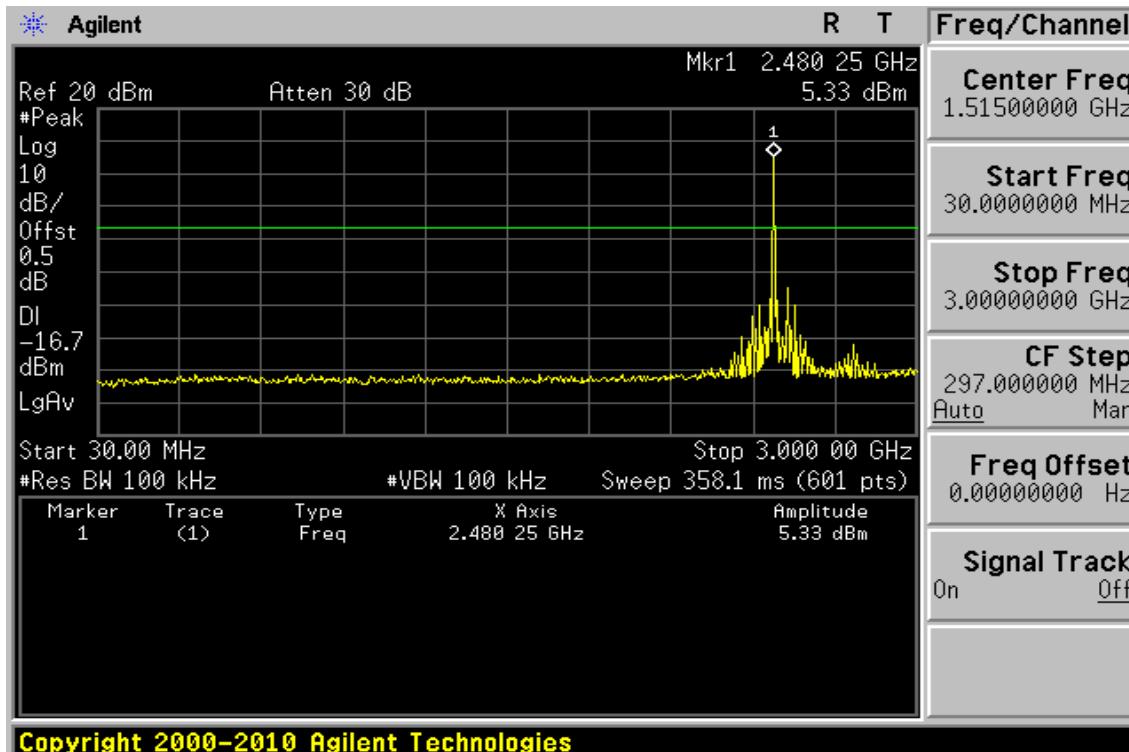
## Ch Mid 3GHz – 26.5GHz



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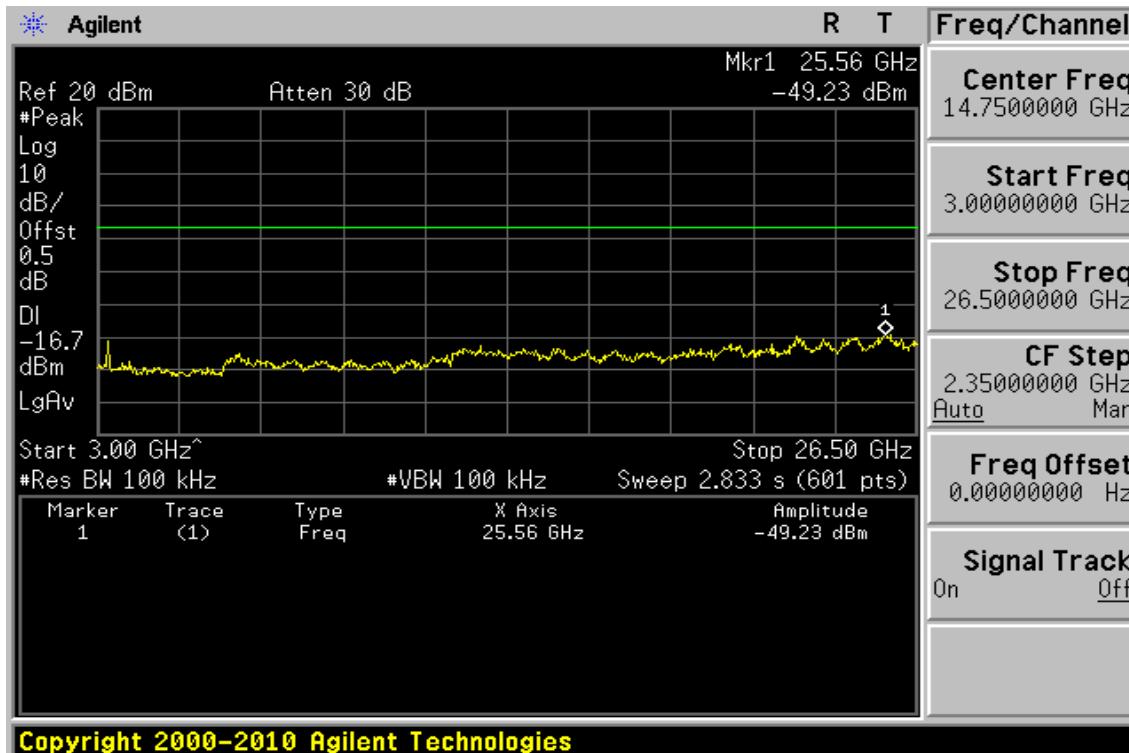
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## Ch High 30MHz – 3GHz



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## 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	Aug. 30, 2011
Fundamental Frequency	2402MHz	Test By	Eric
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)
62.98	V	Peak	42.60	-15.27	27.33	40.00	-12.67
87.23	V	Peak	46.88	-17.52	29.36	40.00	-10.64
335.55	V	Peak	32.71	-11.82	20.89	46.00	-25.11
495.60	V	Peak	38.17	-9.21	28.96	46.00	-17.04
751.68	V	Peak	36.94	-4.31	32.63	46.00	-13.37
911.73	V	Peak	34.41	-2.09	32.32	46.00	-13.68
89.17	H	Peak	42.54	-17.48	25.06	43.50	-18.44
117.30	H	Peak	40.80	-14.83	25.97	43.50	-17.53
304.51	H	Peak	42.38	-12.32	30.06	46.00	-15.94
495.60	H	Peak	33.98	-9.21	24.77	46.00	-21.23
751.68	H	Peak	40.38	-4.31	36.07	46.00	-9.93
847.71	H	Peak	37.39	-3.23	34.16	46.00	-11.84

**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	Aug. 30, 2011
Fundamental Frequency	2441MHz	Test By	Eric
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)
47.46	V	Peak	43.90	-13.85	30.05	40.00	-9.95
88.20	V	Peak	48.54	-17.52	31.02	43.50	-12.48
335.55	V	Peak	31.72	-11.82	19.90	46.00	-26.10
495.60	V	Peak	38.23	-9.21	29.02	46.00	-16.98
751.68	V	Peak	37.03	-4.31	32.72	46.00	-13.28
911.73	V	Peak	34.21	-2.09	32.12	46.00	-13.88
87.23	H	Peak	42.81	-17.52	25.29	40.00	-14.71
119.24	H	Peak	42.14	-14.63	27.51	43.50	-15.99
303.54	H	Peak	41.92	-12.37	29.55	46.00	-16.45
495.60	H	Peak	35.42	-9.21	26.21	46.00	-19.79
751.68	H	Peak	41.48	-4.31	37.17	46.00	-8.83
911.73	H	Peak	35.45	-2.09	33.36	46.00	-12.64

**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	Aug. 30, 2011
Fundamental Frequency	2480MHz	Test By	Eric
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)
46.49	V	Peak	43.57	-13.76	29.81	40.00	-10.19
85.29	V	Peak	49.42	-17.55	31.87	40.00	-8.13
335.55	V	Peak	32.65	-11.82	20.83	46.00	-25.17
495.60	V	Peak	37.94	-9.21	28.73	46.00	-17.27
751.68	V	Peak	37.41	-4.31	33.10	46.00	-12.90
911.73	V	Peak	34.87	-2.09	32.78	46.00	-13.22
88.20	H	Peak	42.81	-17.52	25.29	43.50	-18.21
118.27	H	Peak	42.42	-14.63	27.79	43.50	-15.71
303.54	H	Peak	42.32	-12.37	29.95	46.00	-16.05
495.60	H	Peak	34.61	-9.21	25.40	46.00	-20.60
751.68	H	Peak	41.37	-4.31	37.06	46.00	-8.94
911.73	H	Peak	35.94	-2.09	33.85	46.00	-12.15

**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	Aug. 30, 2011
Fundamental Frequency	2402 MHz	Test By	Eric
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV		Actual FS		Peak	AV		Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
1331.5	49.20	---	-4.41	44.79	---	74.00	54.00	-9.21	Peak	
1604.5	48.32	---	-4.33	43.99	---	74.00	54.00	-10.01	Peak	
4804.0	52.60	41.74	5.25	57.85	46.99	74.00	54.00	-7.01	Av.	
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 Aug. 30, 2011  
Fundamental Frequency 2402 MHz Test By Eric  
Temperature 25 °C Pol Hor.  
Humidity 65 %

Freq. (MHz)	Peak	AV		Actual FS		Peak	AV		Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
1331.5	44.13	---	-4.41	39.72	---	74.00	54.00	-14.28	Peak	
1604.5	56.59	55.96	-4.33	52.26	51.63	74.00	54.00	-2.37	Av.	
4804.0	48.21	39.46	5.25	53.46	44.71	74.00	54.00	-9.29	Av.	
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	Aug. 30, 2011
Fundamental Frequency	2441 MHz	Test By	Eric
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV		Actual FS		Peak	AV		Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
1331.5	49.44	---	-4.41	45.03	---	74.00	54.00	-8.97	Peak	
1630.5	47.71	---	-4.44	43.27	---	74.00	54.00	-10.73	Peak	
4882.0	56.44	46.72	5.43	61.87	52.15	74.00	54.00	-1.85	Av.	
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	Aug. 30, 2011
Fundamental Frequency	2441 MHz	Test By	Eric
Temperature	25 °C	Pol	Hor.
Humidity	65 %		

Freq. (MHz)	Peak	AV		Actual FS		Peak	AV		Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
1331.5	43.92	---	-4.41	39.51	---	74.00	54.00	-14.49	Peak	
1630.5	55.79	55.74	-4.44	51.35	51.30	74.00	54.00	-2.70	Av.	
4882.0	50.77	44.68	5.43	56.20	50.11	74.00	54.00	-3.89	Av.	
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	Aug. 30, 2011
Fundamental Frequency	2480 MHz	Test By	Eric
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV		Actual FS		Peak	AV		Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
1331.5	48.95	---	-4.41	44.54	---	74.00	54.00	-9.46	Peak	
1656.5	48.50	---	-4.61	43.89	---	74.00	54.00	-10.11	Peak	
4960.0	58.32	47.30	5.62	63.94	52.92	74.00	54.00	-1.08	Av.	
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	Aug. 30, 2011
Fundamental Frequency	2480 MHz	Test By	Eric
Temperature	25 °C	Pol	Hor.
Humidity	65 %		

Freq. (MHz)	Peak	AV		Actual FS		Peak	AV		Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
1331.5	44.53	---	-4.41	40.12	---	74.00	54.00	-13.88	Peak	
1656.5	48.03	---	-4.61	43.42	---	74.00	54.00	-10.58	Peak	
4960.0	51.27	43.74	5.62	56.89	49.36	74.00	54.00	-4.64	Av.	
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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## 10. FREQUENCY SEPARATION

### 10.1. 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\*20dB bandwidth of the hopping channel, whichever is greater.

### 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 center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz/100KHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

### 10.5. Measurement Result:

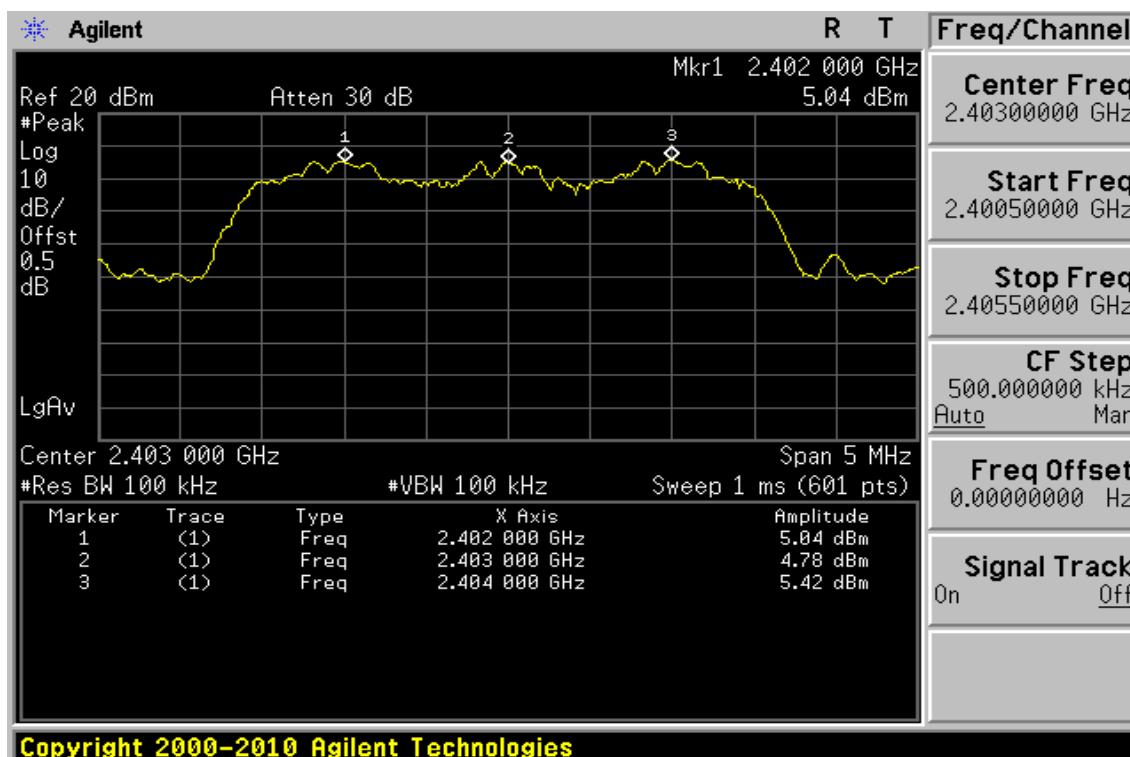
Channel separation (MHz)	Limit	Result
1	$\geq 25\text{KHz}$ or 2/3 times 20dB bandwidth	PASS

Note: Refer to next page for plots.

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## Frequency Separation Test Data



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## 11. NUMBER OF HOPPING FREQUENCY

### 11.1. 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.

### 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 spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=430KHz/1.3MHz,
5. Max hold, view and count how many channel in the band.

### 11.5. Measurement Result:

Note: Refer to next page for plots.

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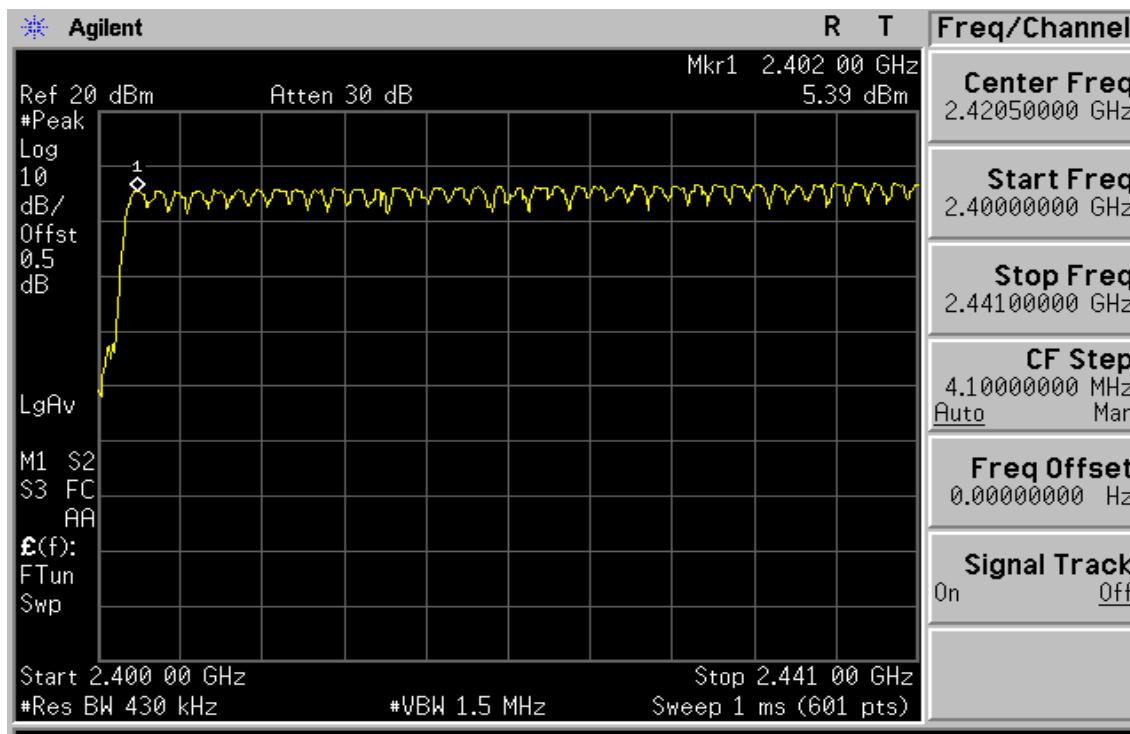
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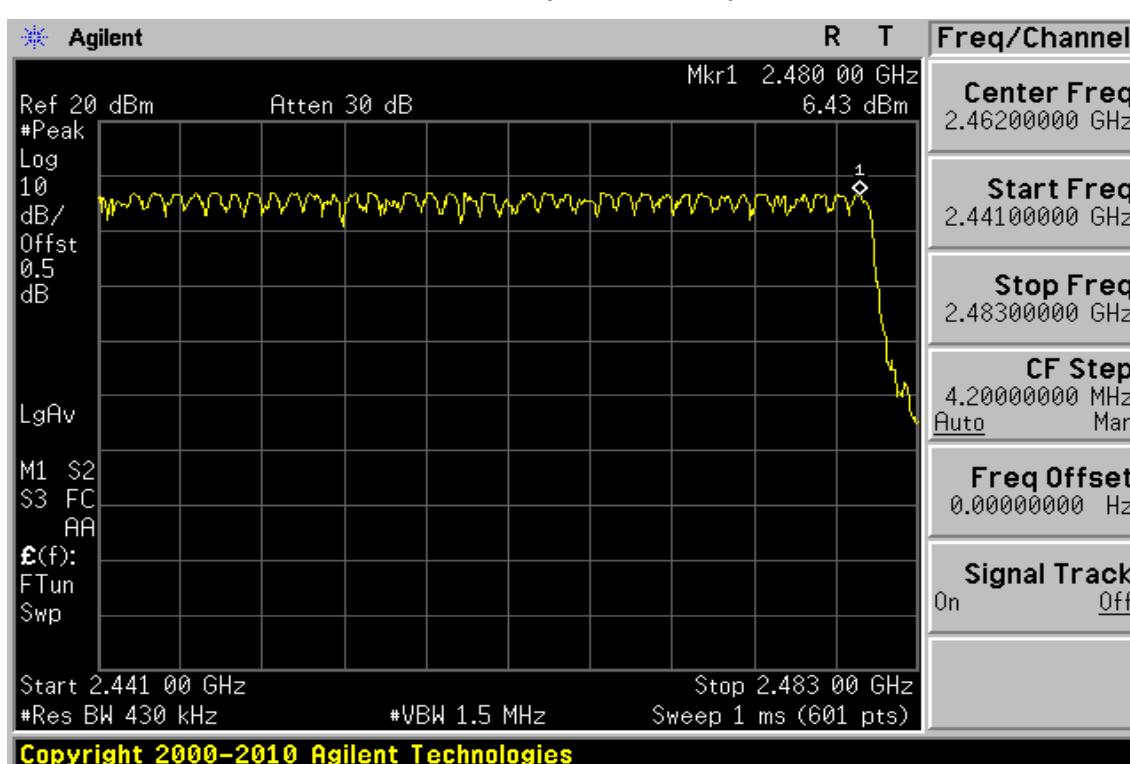
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## Channel Number

**2.4 GHz – 2.441GHz**



**2.441 GHz – 2.4835GHz**



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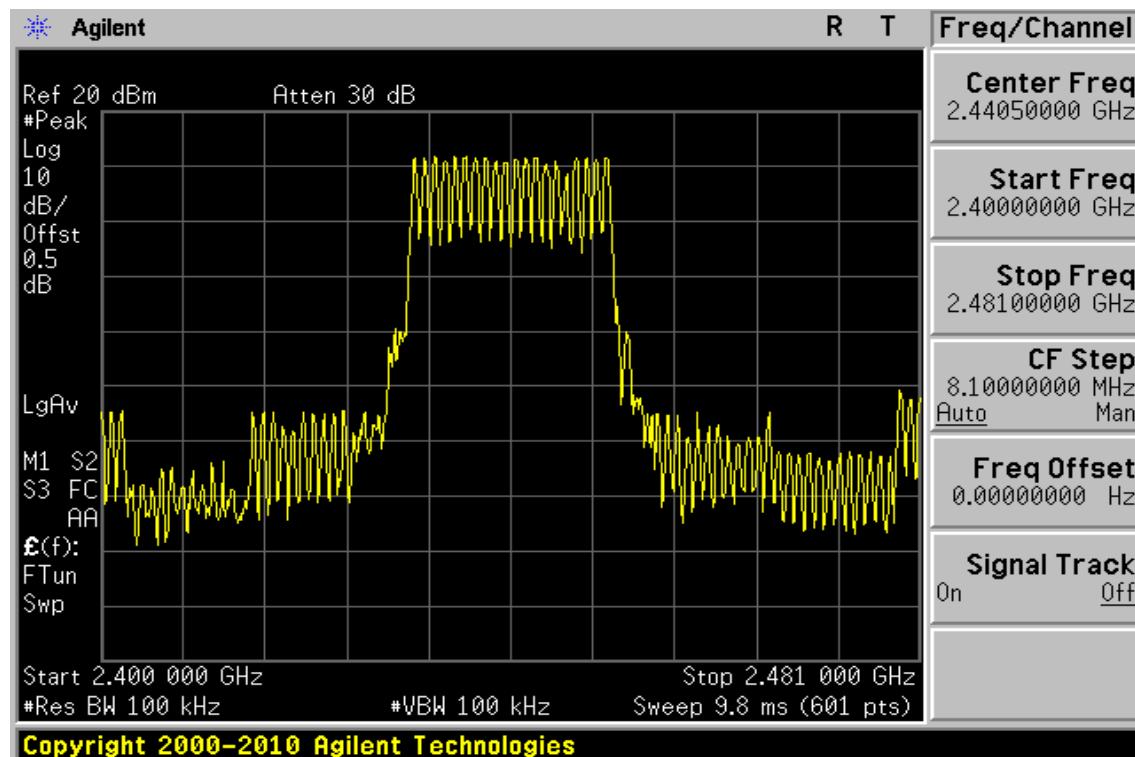
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## 12. TIME OF OCCUPANCY (DWELL TIME)

### 12.1. 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.

### 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 center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=1MHz/1MHz, Span = 0Hz , Adjust Sweep = 2ms-5ms.
5. Repeat above procedures until all frequency measured were complete.

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## 12.5. Measurement Result

A period time =  $0.4 \text{ (ms)} * 79 = 31.6 \text{ (s)}$

CH Low      DH1 time slot =  $0.393 \text{ (ms)} * (1600/2/79) * 31.6 = 125.76 \text{ (ms)}$   
DH3 time slot =  $1.633 \text{ (ms)} * (1600/4/79) * 31.6 = 261.28 \text{ (ms)}$   
DH5 time slot =  $1.633 \text{ (ms)} * (1600/6/79) * 31.6 = 174.19 \text{ (ms)}$

CH Mid      DH1 time slot =  $0.393 \text{ (ms)} * (1600/2/79) * 31.6 = 125.76 \text{ (ms)}$   
DH3 time slot =  $1.633 \text{ (ms)} * (1600/4/79) * 31.6 = 261.28 \text{ (ms)}$   
DH5 time slot =  $1.633 \text{ (ms)} * (1600/6/79) * 31.6 = 174.19 \text{ (ms)}$

CH High      DH1 time slot =  $0.393 \text{ (ms)} * (1600/2/79) * 31.6 = 125.76 \text{ (ms)}$   
DH3 time slot =  $1.633 \text{ (ms)} * (1600/4/79) * 31.6 = 261.28 \text{ (ms)}$   
DH5 time slot =  $1.633 \text{ (ms)} * (1600/6/79) * 31.6 = 174.19 \text{ (ms)}$

Note: Refer to next page for plots.

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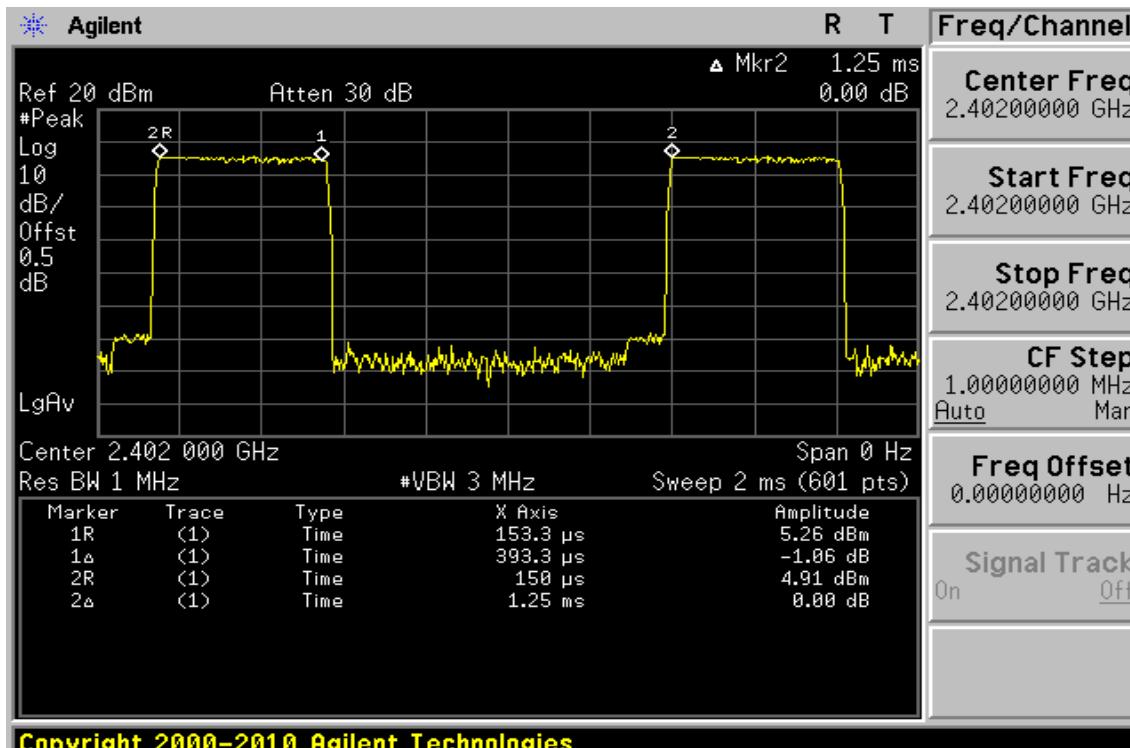
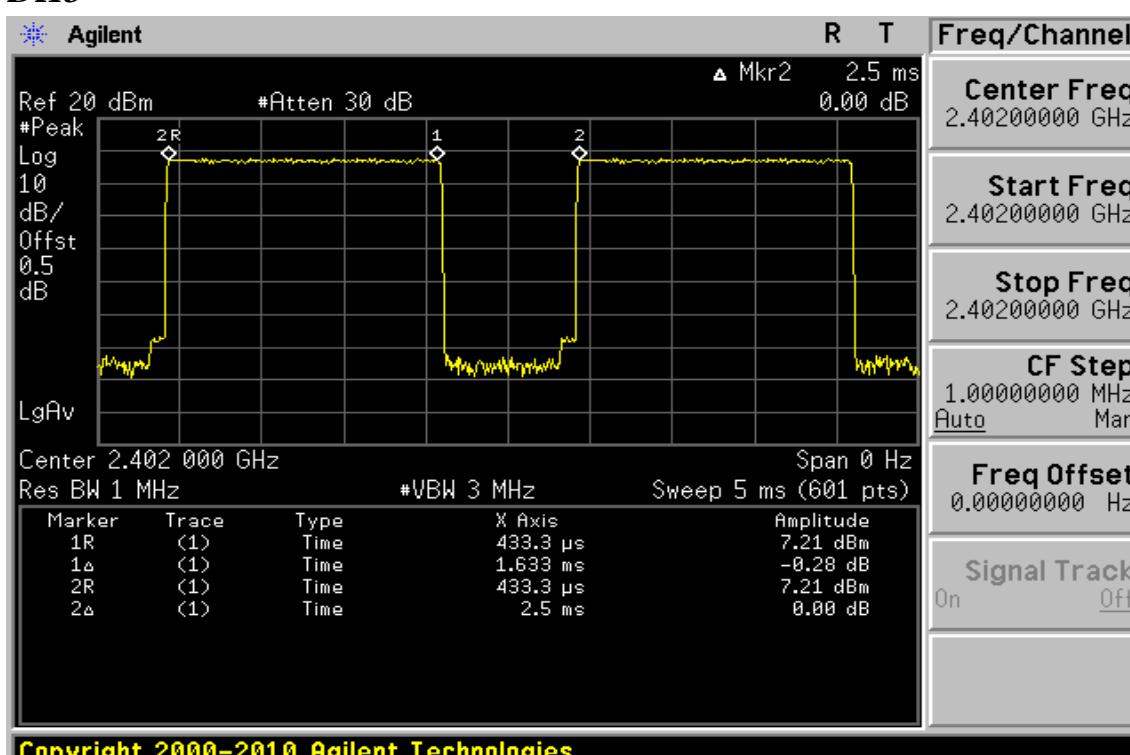
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**CH-Low**
**DH1**

**DH3**


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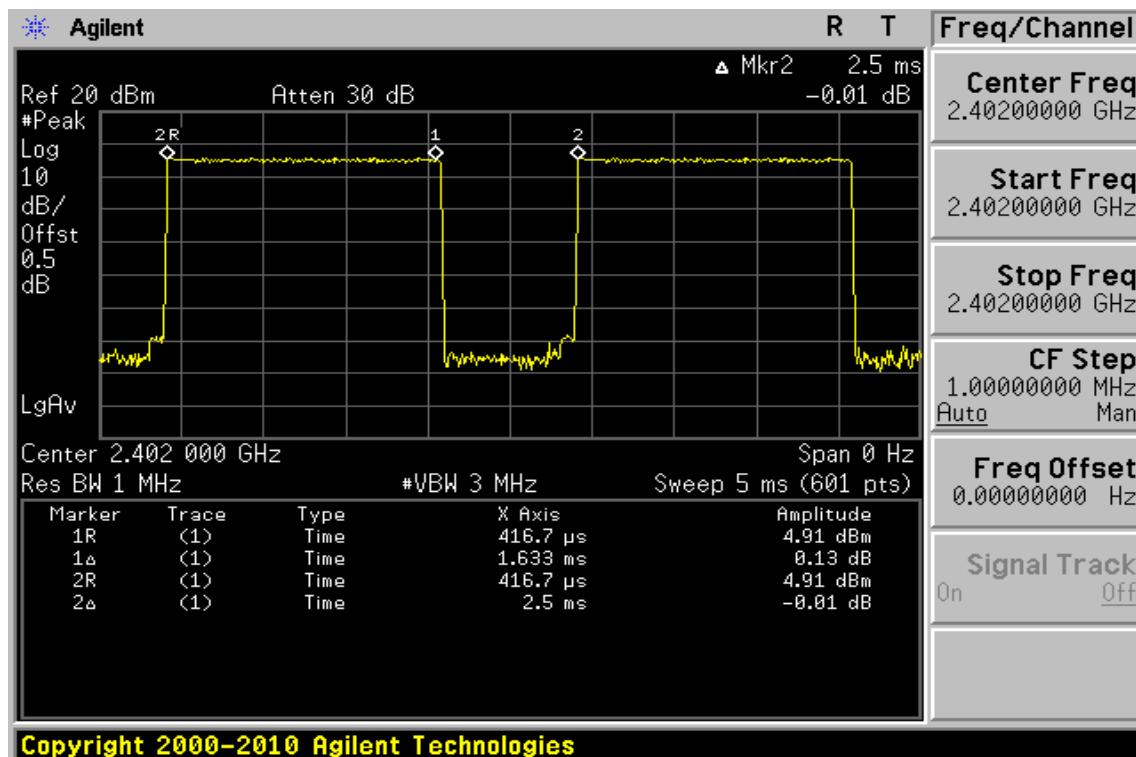
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**DH5**


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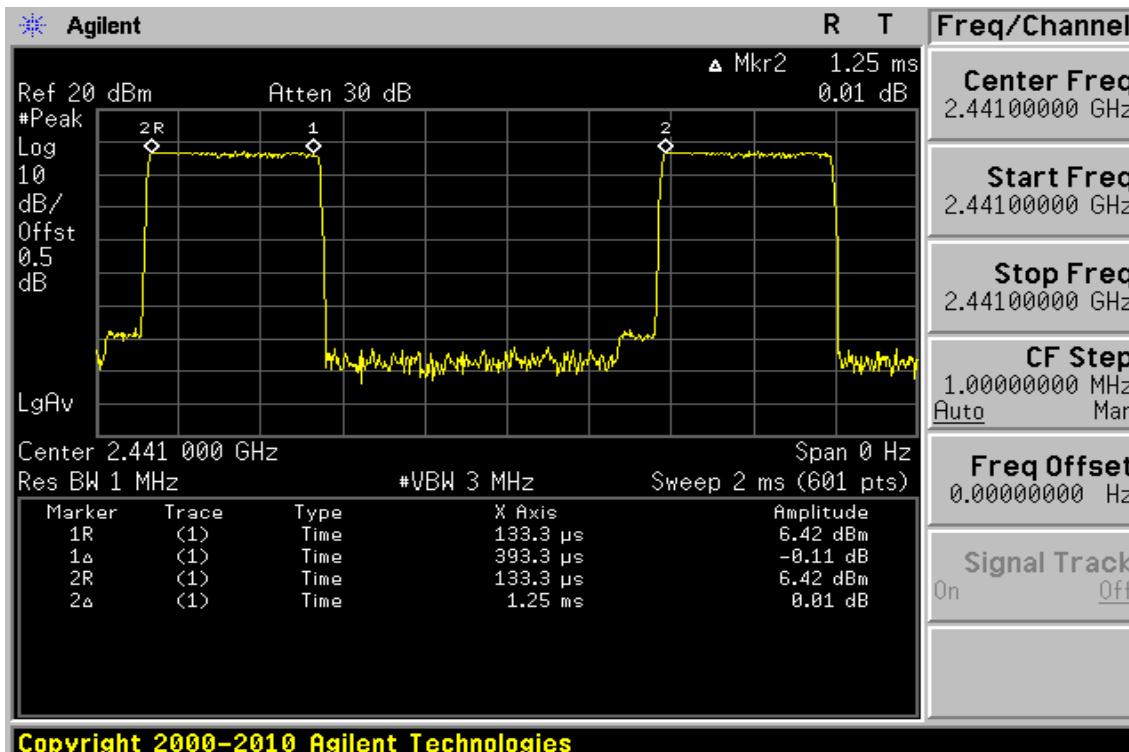
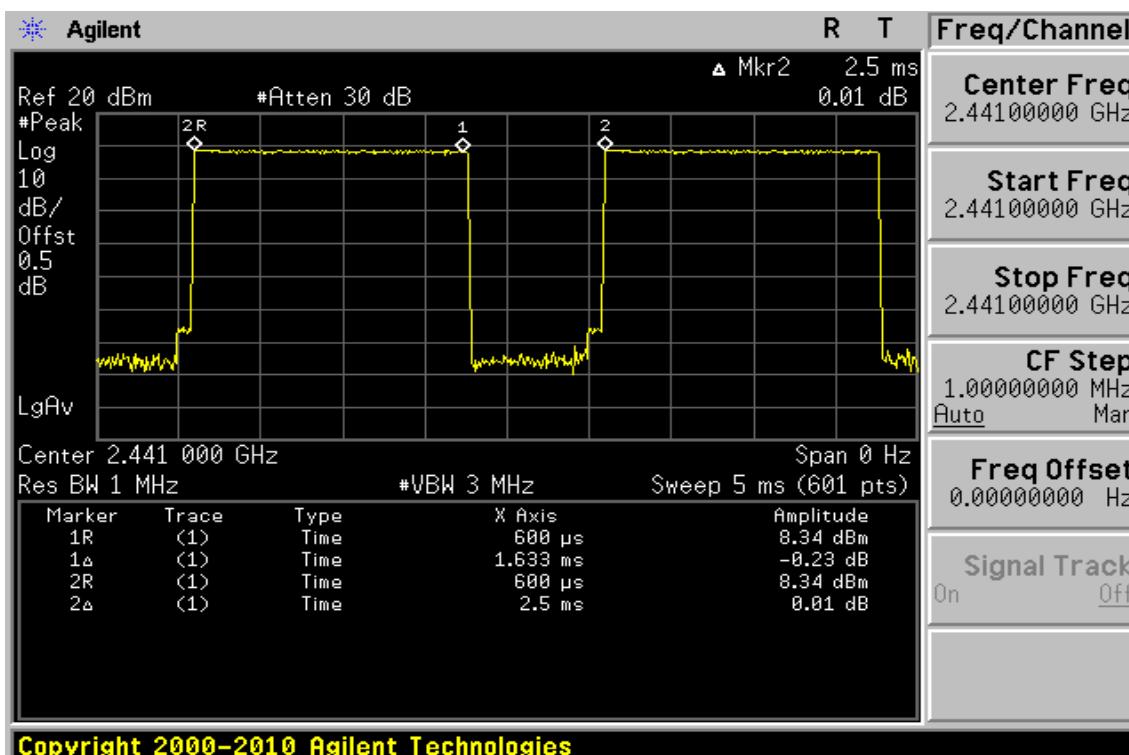
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**CH-Mid**
**DH1**

**DH3**


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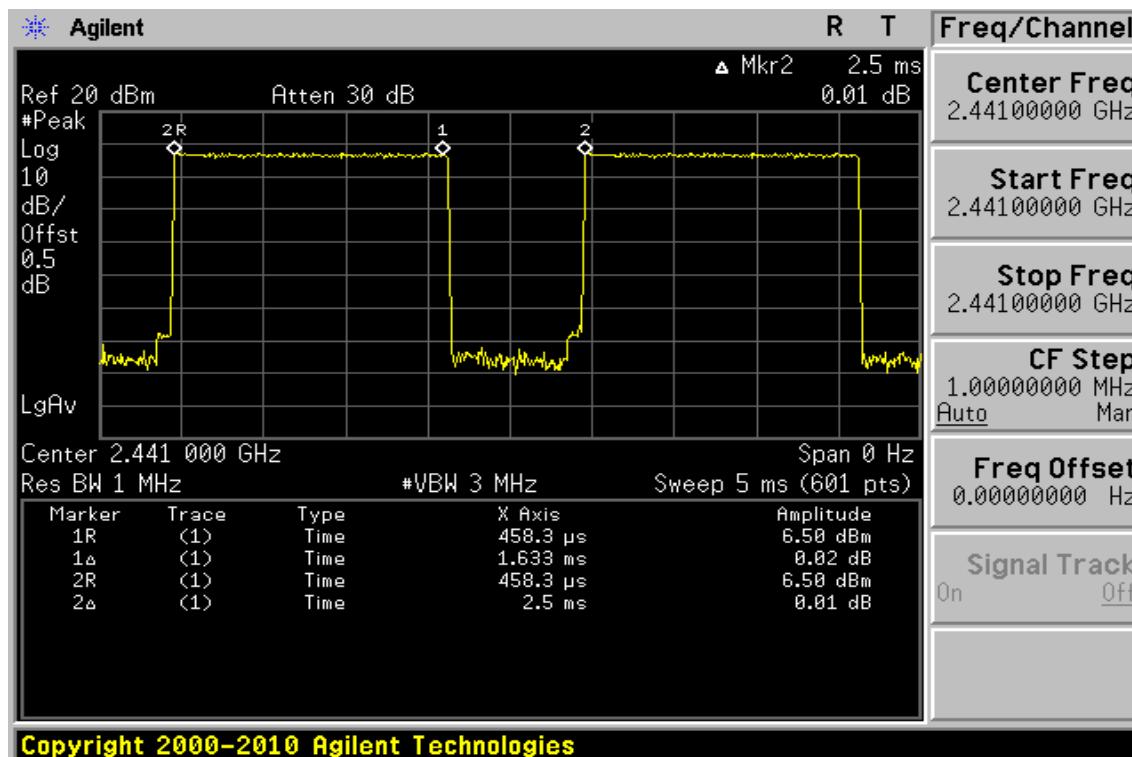
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**DH5**


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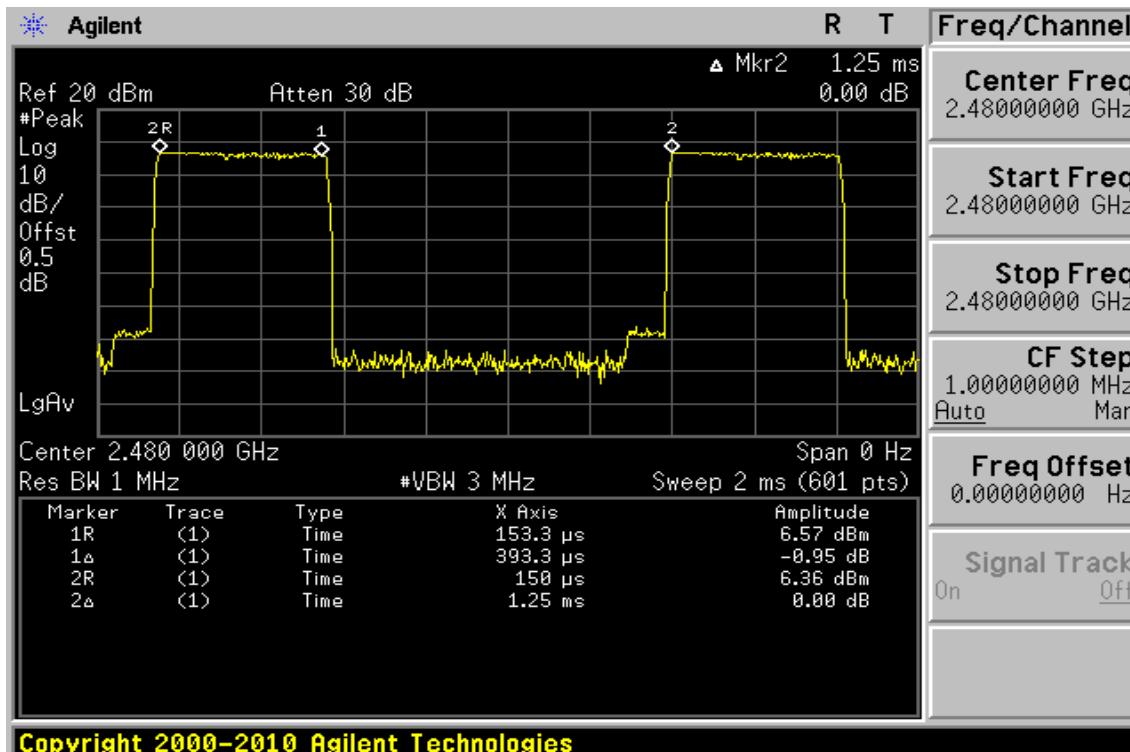
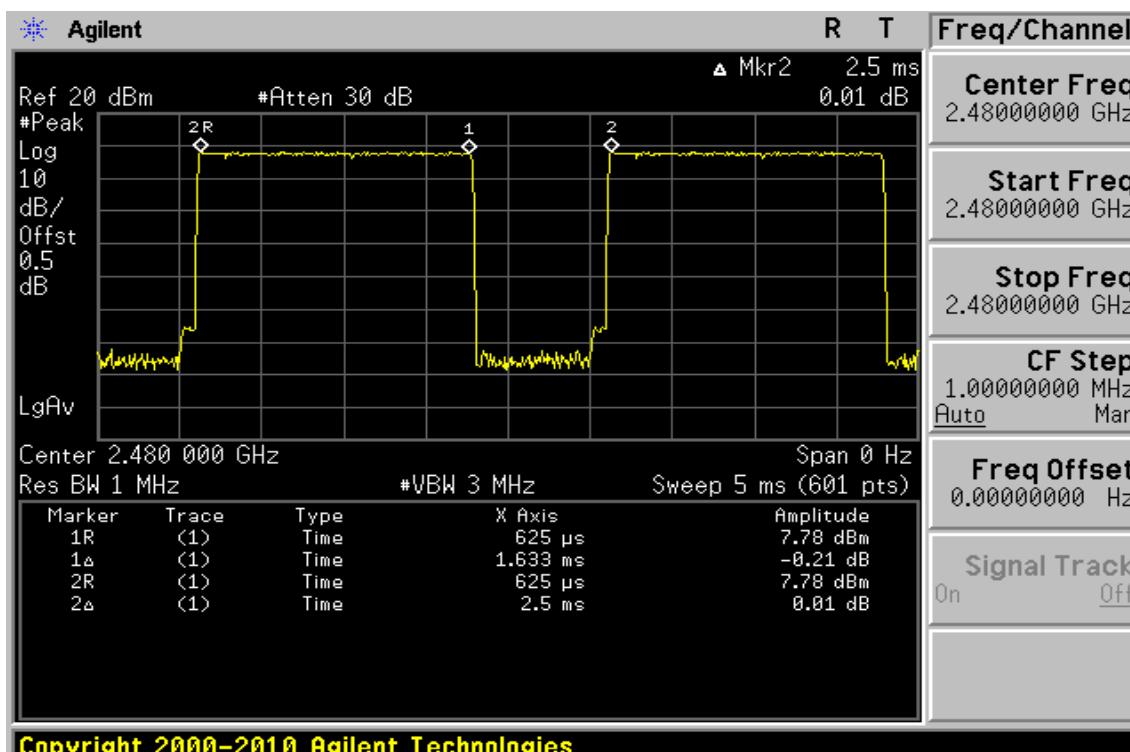
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**CH-High**
**DH1**

**DH3**


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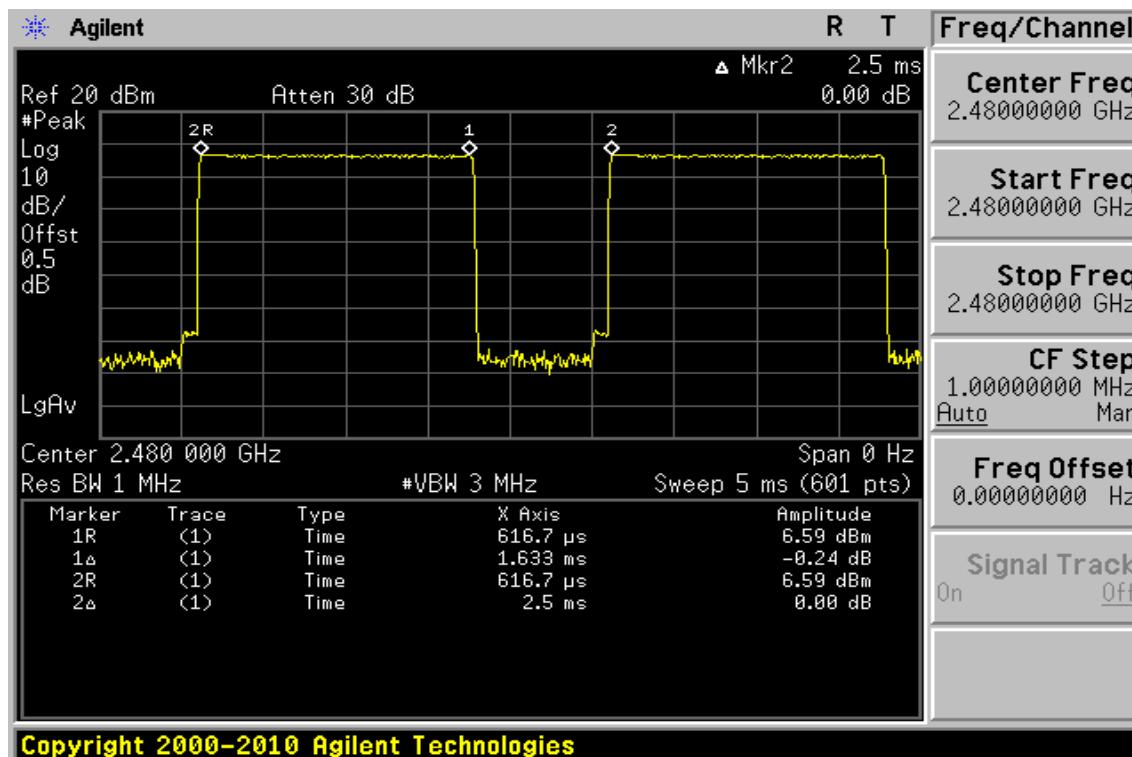
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**DH5**


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## 13. Peak Power Spectral Density

### 13.1. 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.

### 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 = 3KHz, VBW = 10KHz, Span = 1.5MHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

### 13.5. Measurement Result

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-7.26	0.00	-7.26	8
Mid	-6.02	0.00	-6.02	8
High	-6.34	0.00	-6.34	8

*offset 0.5dB*

Note: Refer to next page for plots.

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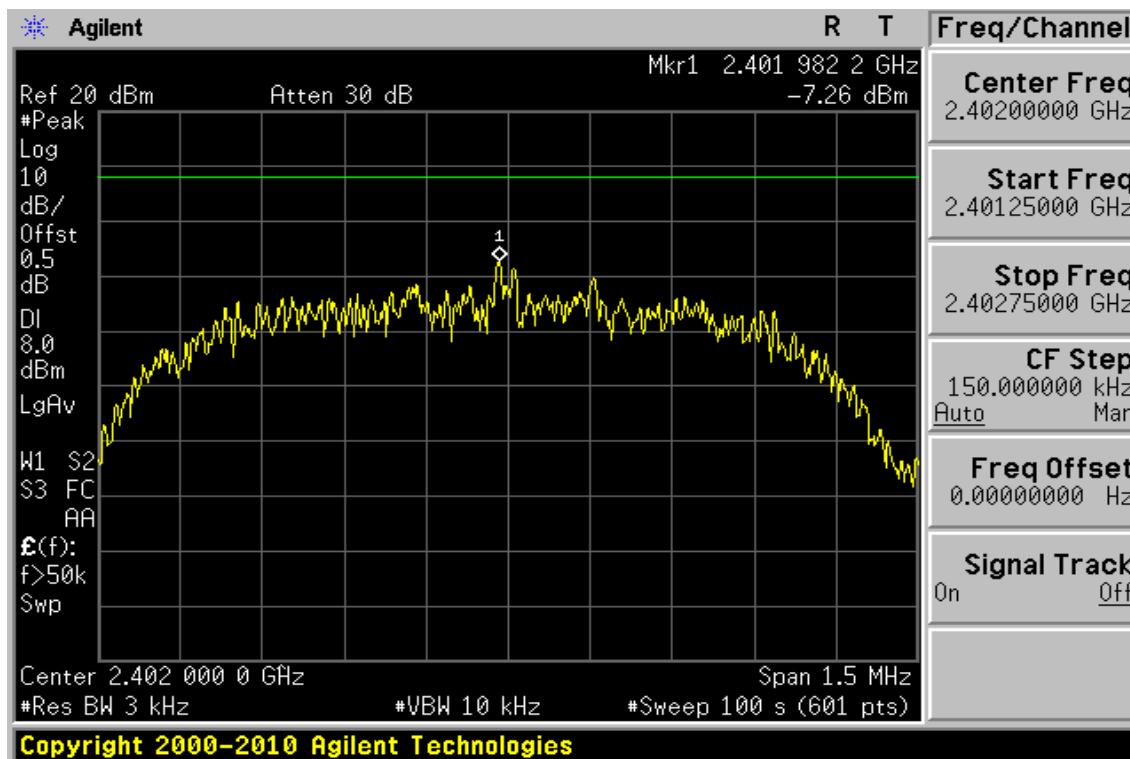
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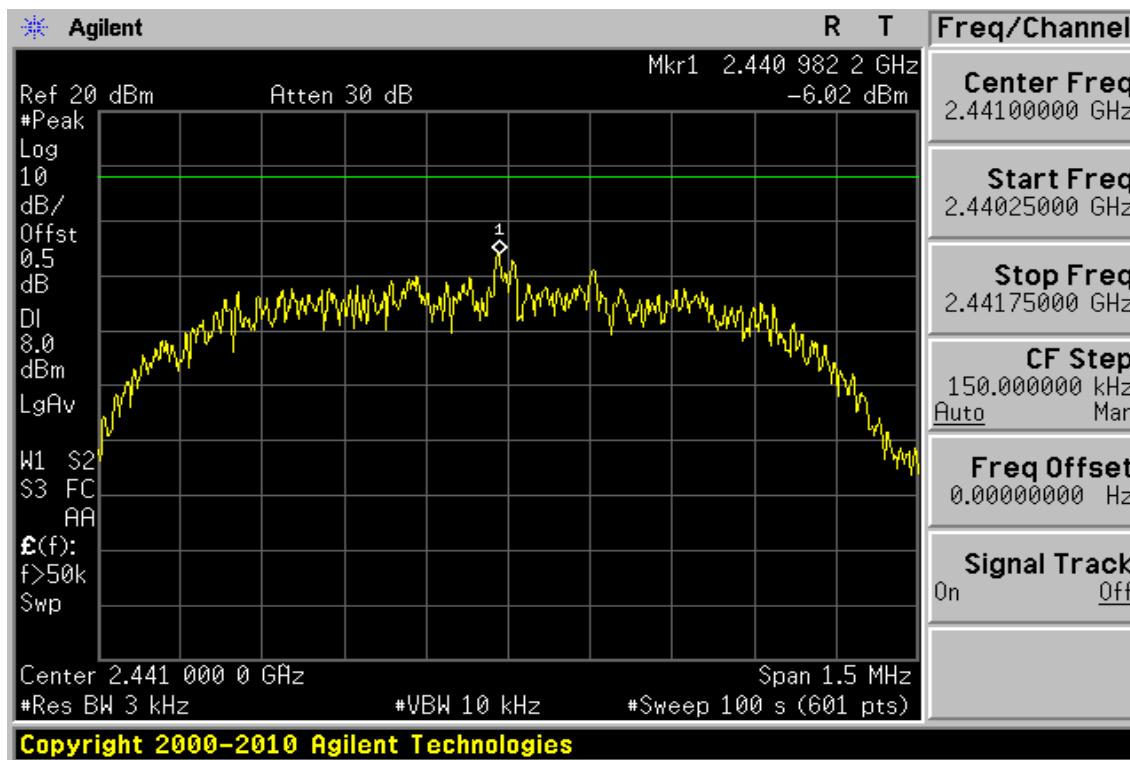
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## Power Spectral Density Test Plot (Worst: EDR mode) (CH-Low)



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



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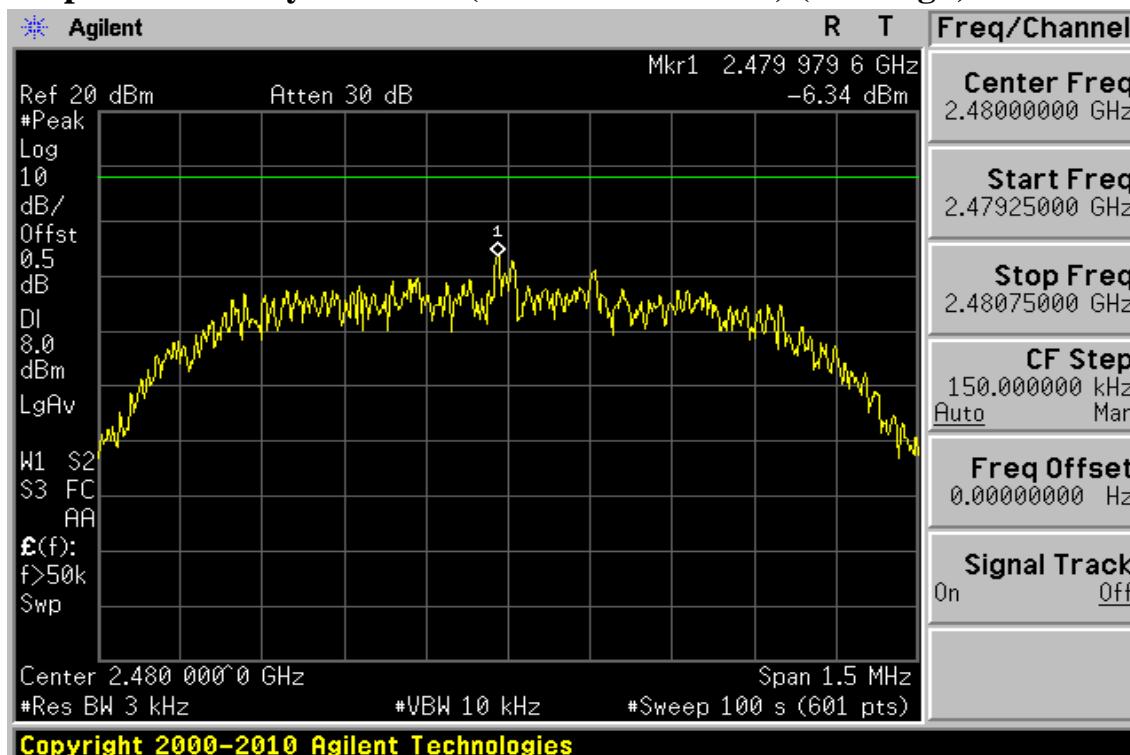
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**Power Spectral Density Test Plot (Worst: EDR mode) (CH-High)**

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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 2.0dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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