

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

**Product Name:** SUPERTOOTH BTMOTOF4

**Brand Name:** SUPERTOOTH

**Model Name:** BTMOTOF4

**Model Difference:** N/A

**FCC ID:** QVNBTMOTOF4

**Report No.:** EF/2008/C0002

**Issue Date:** Jan. 12, 2009

**FCC Rule Part:** §15.247

**Prepared for:** Euro Communication Equipements SAS  
 Route de Foix 11500 Nebias, Quillan, France

**Prepared by:** SGS Taiwan Ltd.  
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## VERIFICATION OF COMPLIANCE

**Applicant:** Euro Communication Equipements SAS  
Route de Foix 11500 Nebias, Quillan, France

**Equipment Under Test:** SUPERTOOTH BTMOTOF4

**Brand Name:** SUPERTOOTH

**Model No.:** BTMOTOF4

**Model Difference:** N/A

**FCC ID:** QVNBTMOTOF4

**File Number:** EF/2008/C0002

**Date of test:** Dec. 03, 2008 ~ Jan. 12, 2009

**Date of EUT Received:** Dec. 03, 2008

**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.

<b>Test By:</b>		<b>Date:</b>	Jan. 12, 2009
	_____ <i>Brian Chang / Engineer</i>		_____
<b>Prepared By:</b>		<b>Date:</b>	Jan. 12, 2009
	_____ <i>Gigi Yeh / Clerk</i>		_____
<b>Approved By:</b>		<b>Date:</b>	Jan. 12, 2009
	_____ <i>Vincent Su / Manager</i>		_____

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### Version

Version No.	Date	Description
00	Jan. 12, 2009	Initial creation of document

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## 1. GENERAL INFORMATION

### General:

Product Name	SUPERTOOTH BTMOTOF4
Brand Name	SUPERTOOTH
Model Name	BTMOTOF4
Model Difference	N/A
Power Supply	3.7Vdc re-chargeable battery or 5Vdc form AC adapter, model: KSCFB0500070W1US
Hardware Version:	V1
Software Version:	R1

### Bluetooth:

Bluetooth Version	<input type="checkbox"/> V1.1 (GFSK) <input type="checkbox"/> V1.2 (GFSK) <input type="checkbox"/> V2.0 (GFSK) <input type="checkbox"/> V2.0 + EDR (GFSK + 1/4DQPSK + 8DPSK) <input checked="" type="checkbox"/> V2.1 + EDR (GFSK + 8DPSK)
Frequency Range	2402 – 2480MHz
Channel number	79 channels max. / AFH mode: 20 channels
Rated Power	7 dBm (Peak)
Modulation type	Frequency Hopping Spread Spectrum
Antenna Designation	PIFA Antenna / 2.5dBi.

The EUT is compliance with Bluetooth 2.1 Standard.

This report applies for Bluetooth.

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

This submittal(s) (test report) is intended for FCC ID: **QVNBTMOTOF4** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

### 1.2. Test Methodology

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

### 1.3. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: 236194, Canada Registration Number: 4620A-1

### 1.4. Special Accessories

Not available for this EUT intended for grant.

### 1.5. Equipment Modifications

Not available for this EUT intended for grant.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

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

### 2.2. EUT Exercise

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

### 2.3. Test Procedure

#### 2.3.1 Conducted Emissions

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

#### 2.3.2 Radiated Emissions

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

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## 2.4. Configuration of Tested System

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

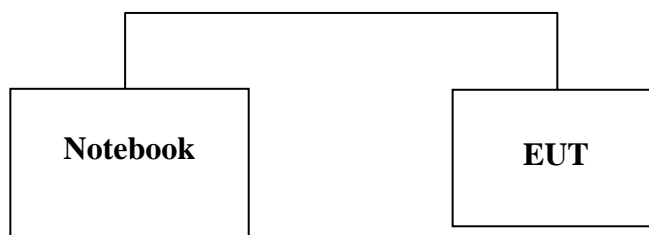


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Notebook	IBM	T43	L3LHHN6	Shielded	Un-shielded
2	BT Software	N/A	BT Test	N/A	N/A	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 and receiving mode is programmed.

Channel low (2402MHz) 、mid (2441MHz) and high (2480MHz) with highest data rate are chosen for full testing.

The Radiated Spurious Emission was performed at X. Y. and Z. axle. The worst case Y axle was reported.

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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 110Vac/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:

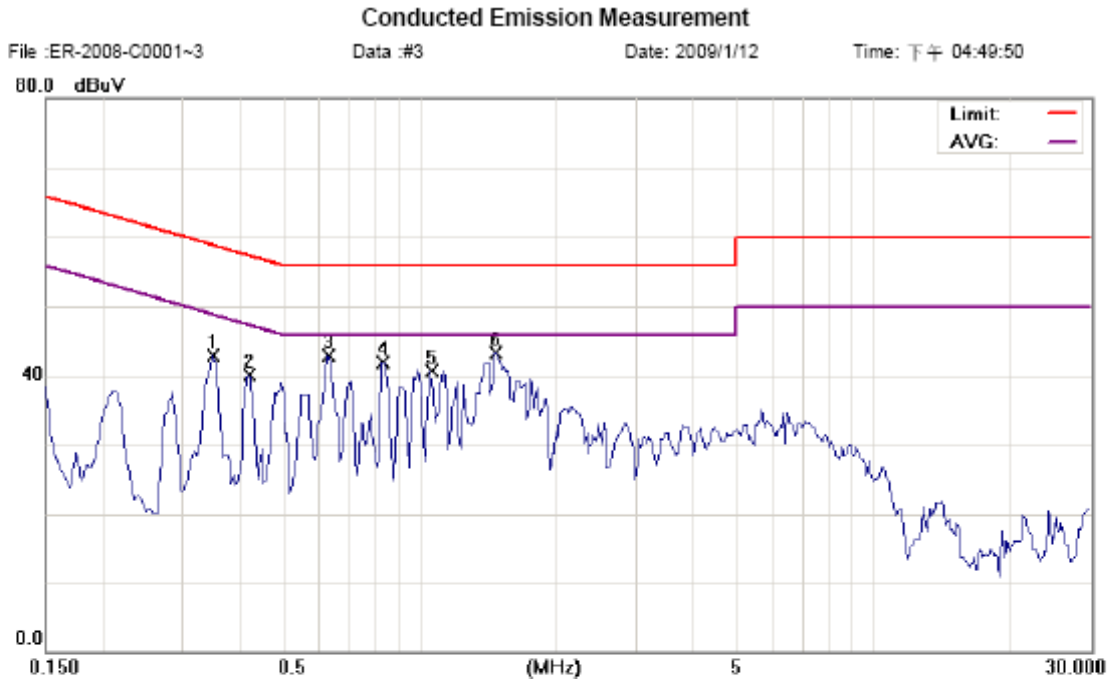
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	828985/004	09/15/2007	09/14/2008
LISN	Rolf-Heine	NNB-2/16Z	99012	02/18/2008	02/17/2009
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	02/18/2008	02/17/2009
Coaxial Cables	N/A	WK CE Cable	N/A	10/30/2007	10/29/2008

#### 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.

### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Bluetooth Operating		Test Date:	Jan. 12, 2009	
Temperature:	23	Humidity:	69%	Test By:	Brian



Site: SGS CONDUCTED #1	Phase: <b>L1</b>	Temperature: 23 °C
Limit: CISPR22/11 Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 59 %
EUT: SUPERTOOTH BTMOTOF4	Distance:	Air Pressure: hpa
M/N: BTMOTOF4		
Note: Charger Mode		

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.3500	42.80	0.11	42.91	58.96	-16.05	peak	
2		0.4200	40.00	0.08	40.08	57.45	-17.37	peak	
3		0.6300	42.79	0.05	42.84	56.00	-13.16	peak	
4		0.8300	41.94	0.05	41.99	56.00	-14.01	peak	
5		1.0600	40.76	0.04	40.80	56.00	-15.20	peak	
6	*	1.4700	43.21	0.04	43.25	56.00	-12.75	peak	

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Conducted Emission Measurement

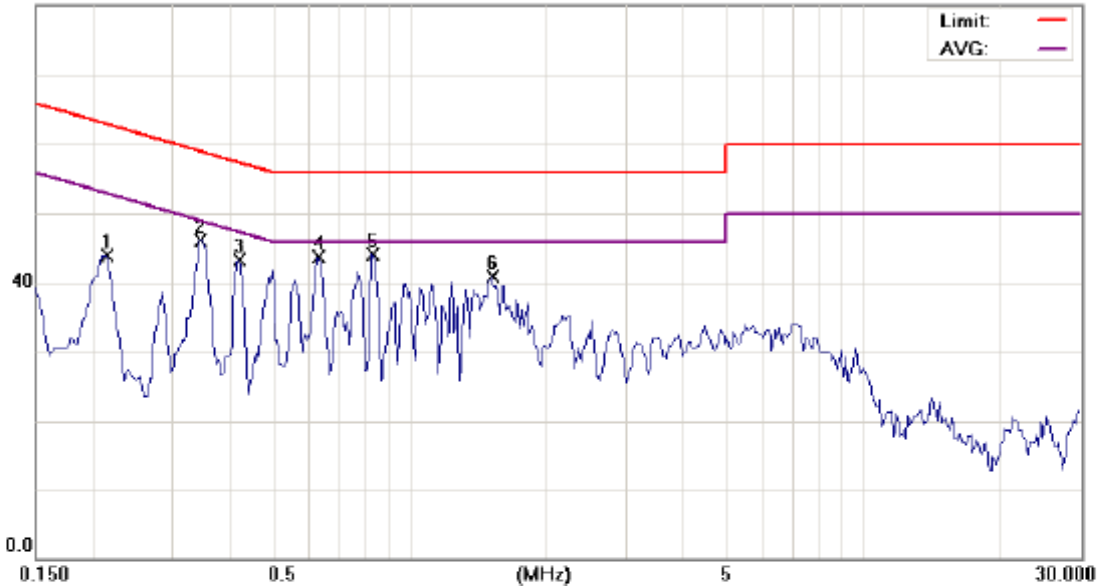
File :ER-2008-C0001~3

Data :#1

Date: 2009/1/12

Time: 下午 04:45:01

00.0 dBuV



Site SGS CONDUCTED #1

Phase: N

Temperature: 23 °C

Limit: CISPR22/11 Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 59 %

EUT: SUPERTOOTH BTMOTOF4

Distance:

Air Pressure: hpa

MN: BTMOTOF4

Note: Charger Mode

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2150	43.74	0.14	43.88	63.01	-19.13	peak	
2		0.3450	46.06	0.10	46.16	59.08	-12.92	peak	
3		0.4200	43.22	0.07	43.29	57.45	-14.16	peak	
4		0.6300	43.59	0.04	43.63	56.00	-12.37	peak	
5	*	0.8300	44.01	0.04	44.05	56.00	-11.95	peak	
6		1.5200	40.79	0.03	40.82	56.00	-15.18	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 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. (Channel power function, RBW, VBW = 1MHz)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

### 6.3. Measurement Result

BDR mode:

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	6.97	0.00	6.97	0.00498	1
2441.00	6.51	0.00	6.51	0.00448	1
2480.00	7.00	0.00	7.00	0.00501	1

EDR mode:

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	6.38	0.00	6.38	0.00435	0.125
2441.00	5.79	0.00	5.79	0.00379	0.125
2480.00	5.72	0.00	5.72	0.00373	0.125

**NOTE: offset: 0.5dB**

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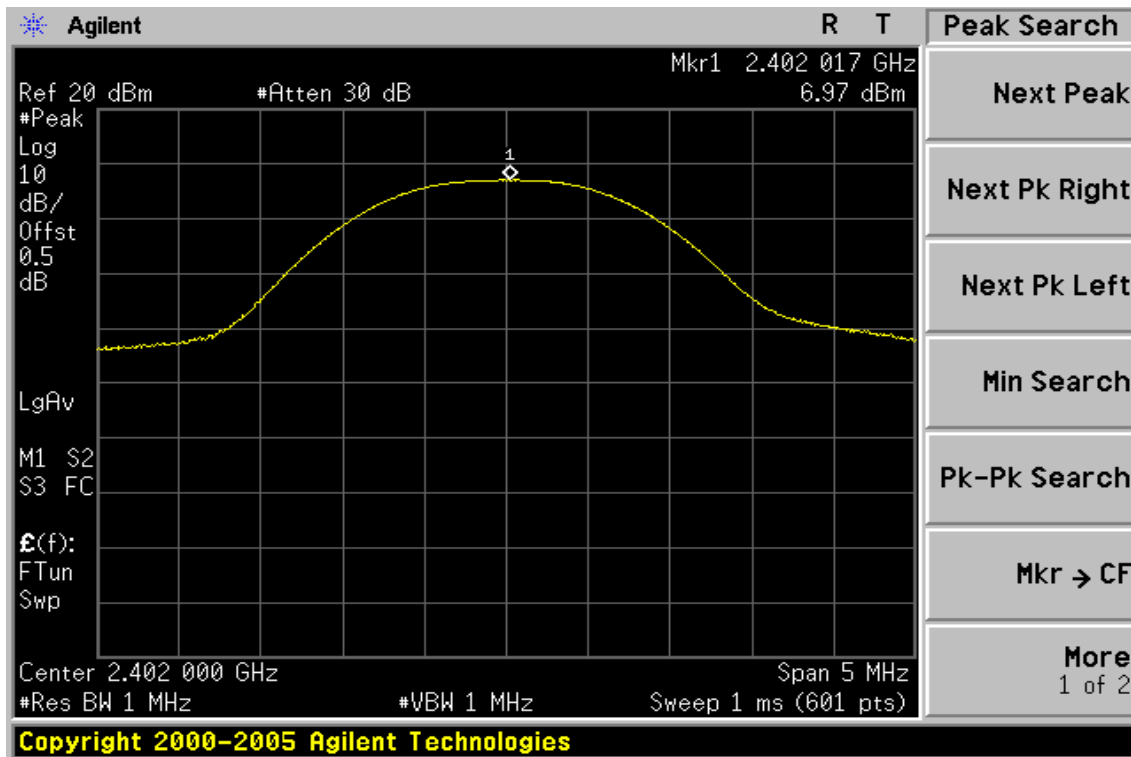
#### 6.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2008	01/04/2009
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009

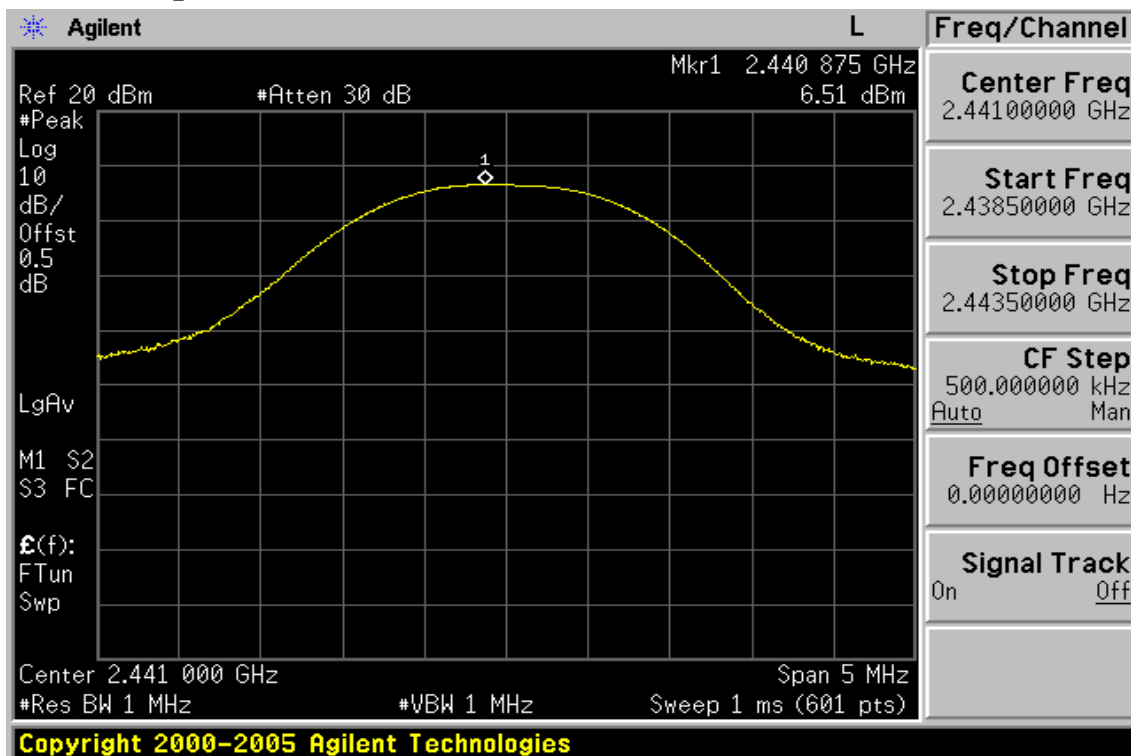
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### Peak Power Output Data Plot (CH Low) (BDR mode)



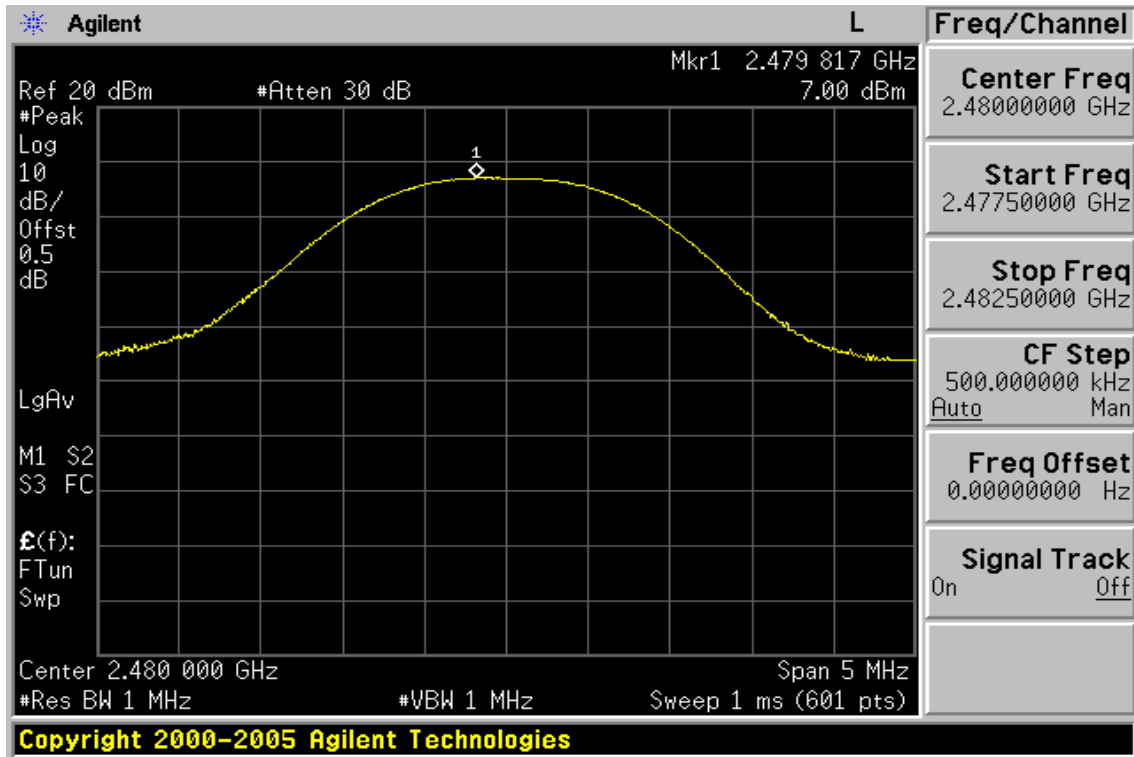
### Peak Power Output Data Plot (CH Mid) (BDR mode)



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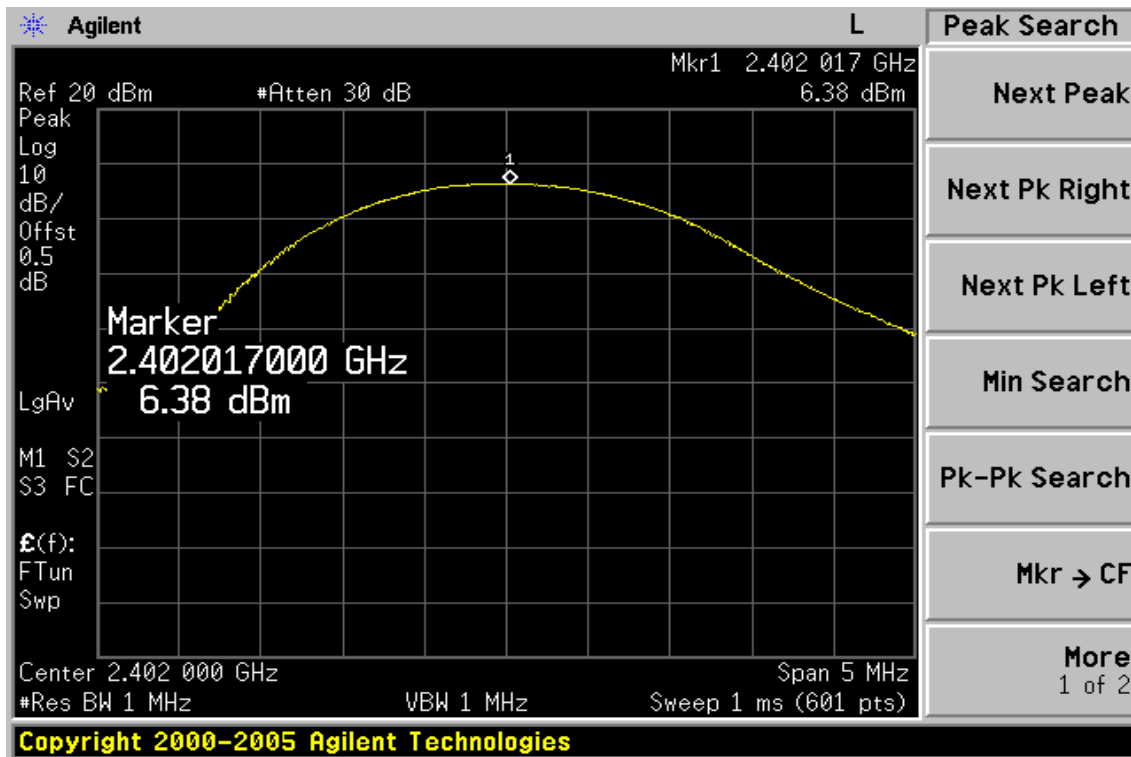
**Peak Power Output Data Plot (CH High) (BDR mode)**



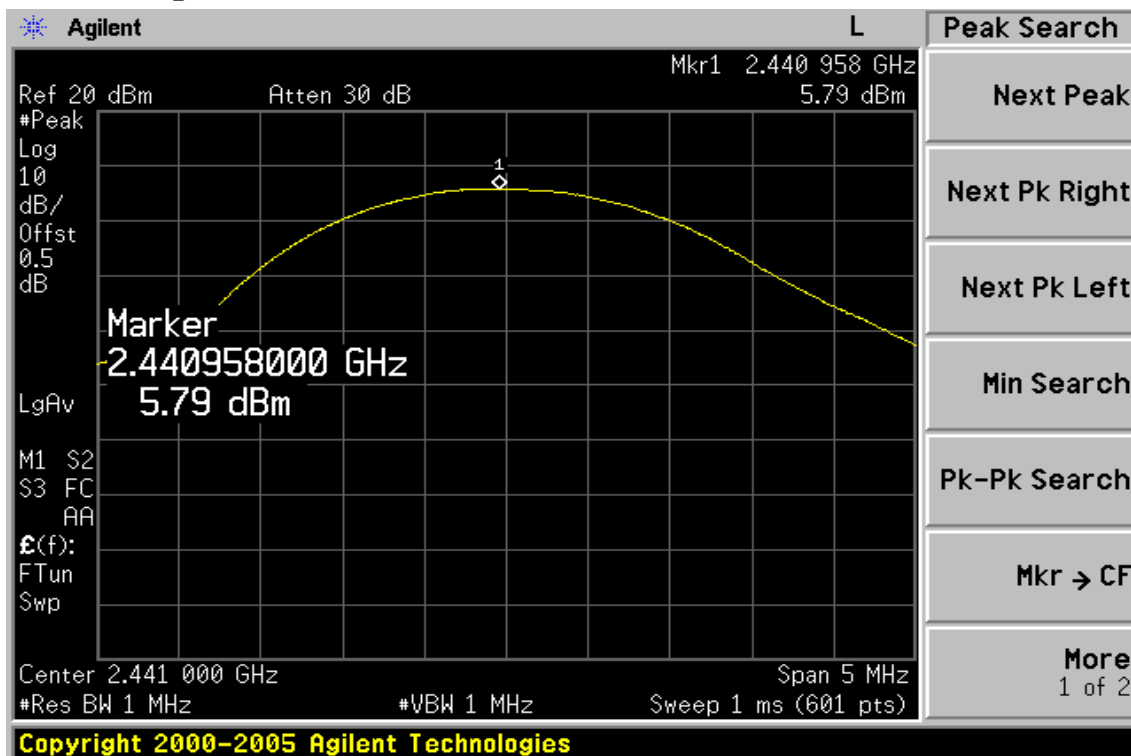
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**Peak Power Output Data Plot (CH Low) (EDR mode)**



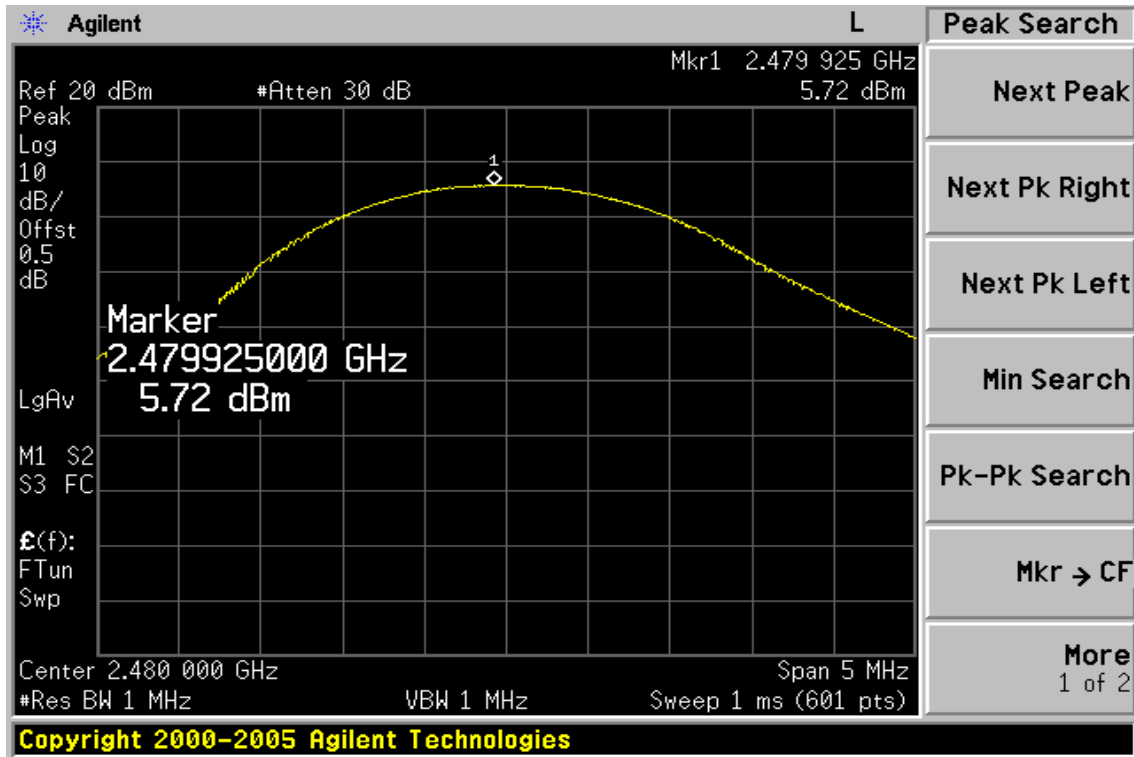
**Peak Power Output Data Plot (CH Mid) (EDR mode)**



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



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## 7. 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 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.

### 7.3. Measurement Result

BDR mode:

CH	20dB Bandwidth (MHz)
Lower	0.925
Mid	0.931
Higher	0.933

EDR mode:

CH	20dB Bandwidth (MHz)	2/3 *20dB Bandwidth (MHz)
Lower	1.313	0.875
Mid	1.336	0.891
Higher	1.313	0.875

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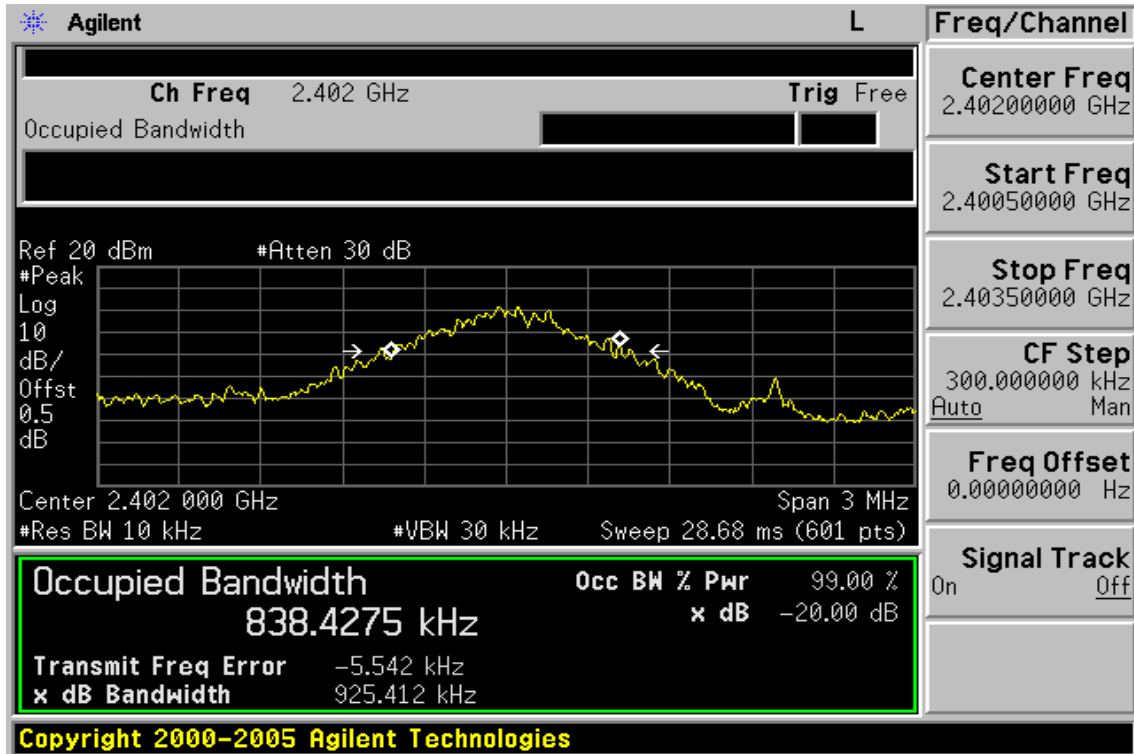
**7.4. Measurement Equipment Used:**

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009

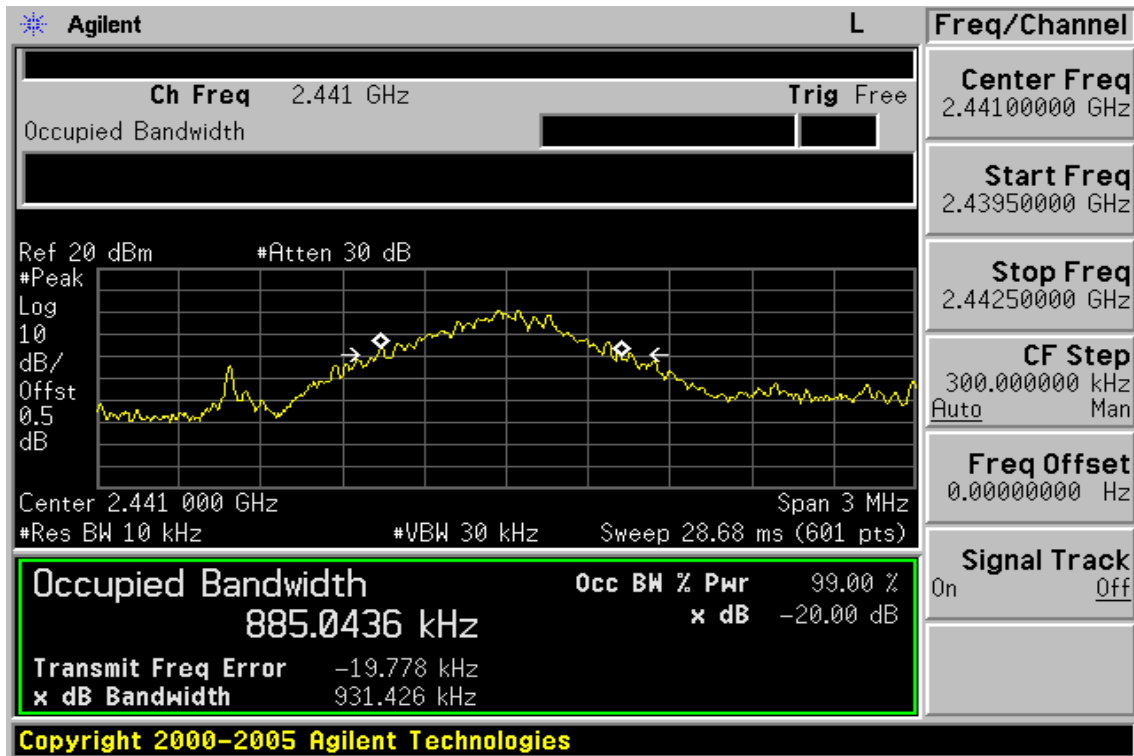
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### 20dB Band Width Test Data CH-Low (BDR mode)



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

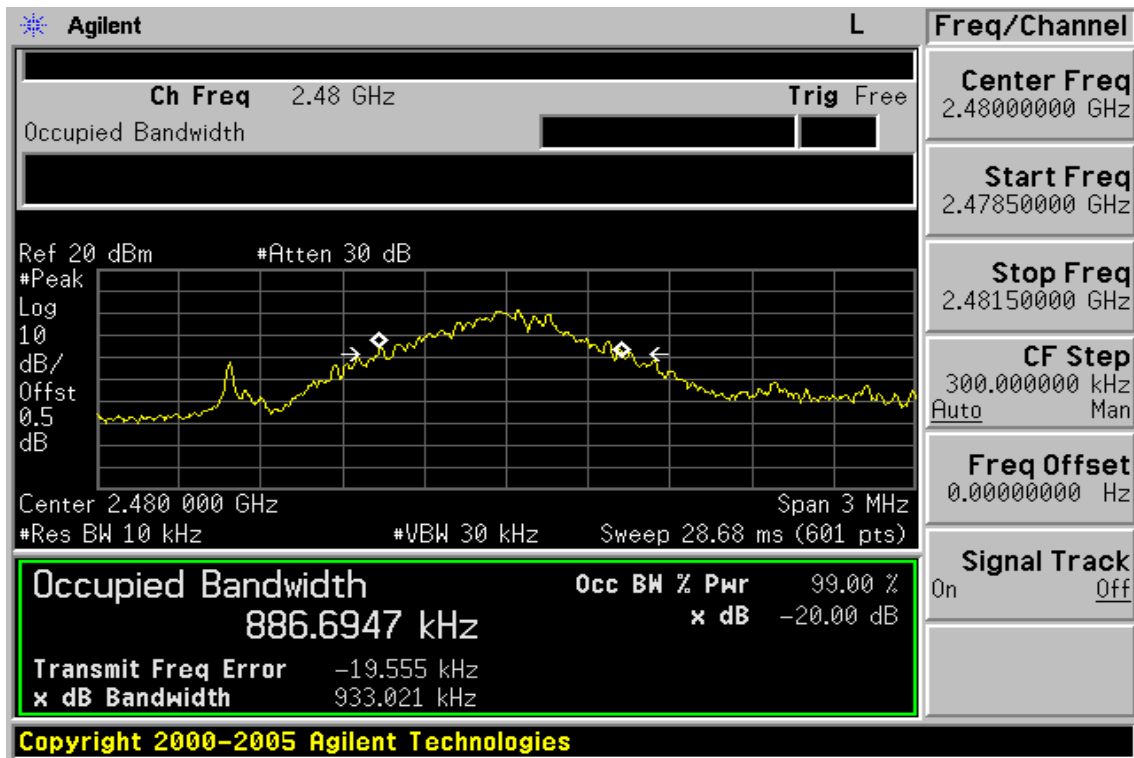


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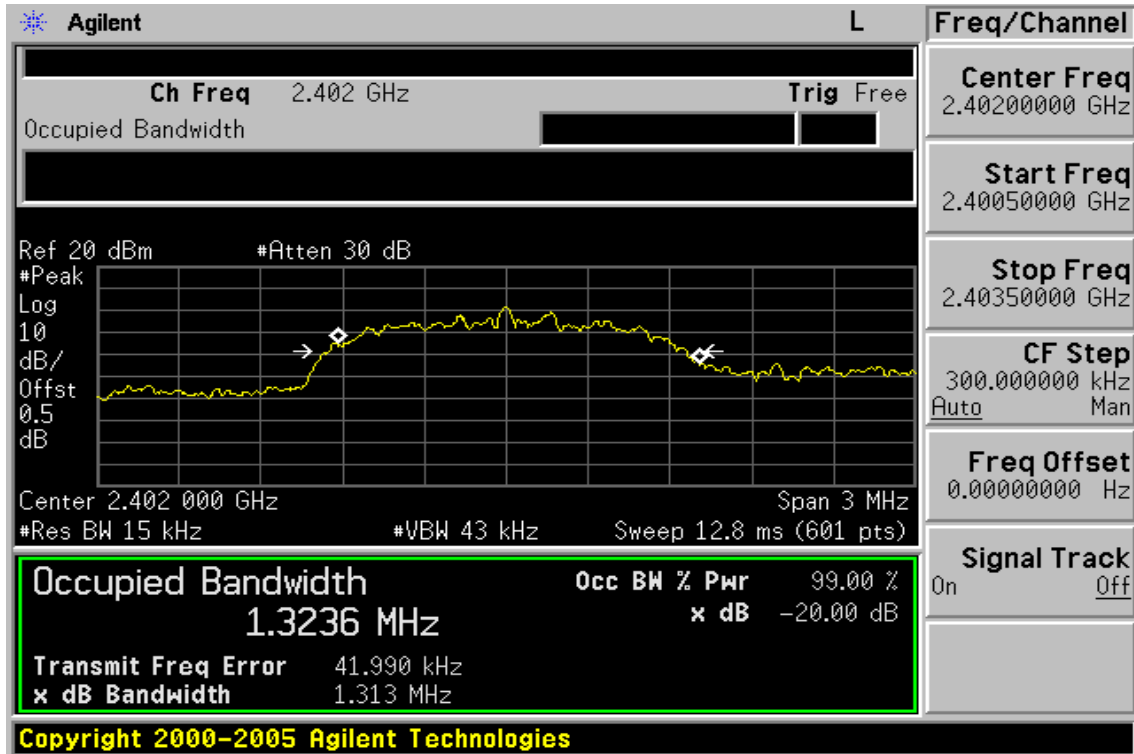
### 20dB Band Width Test Data CH-High (BDR mode)



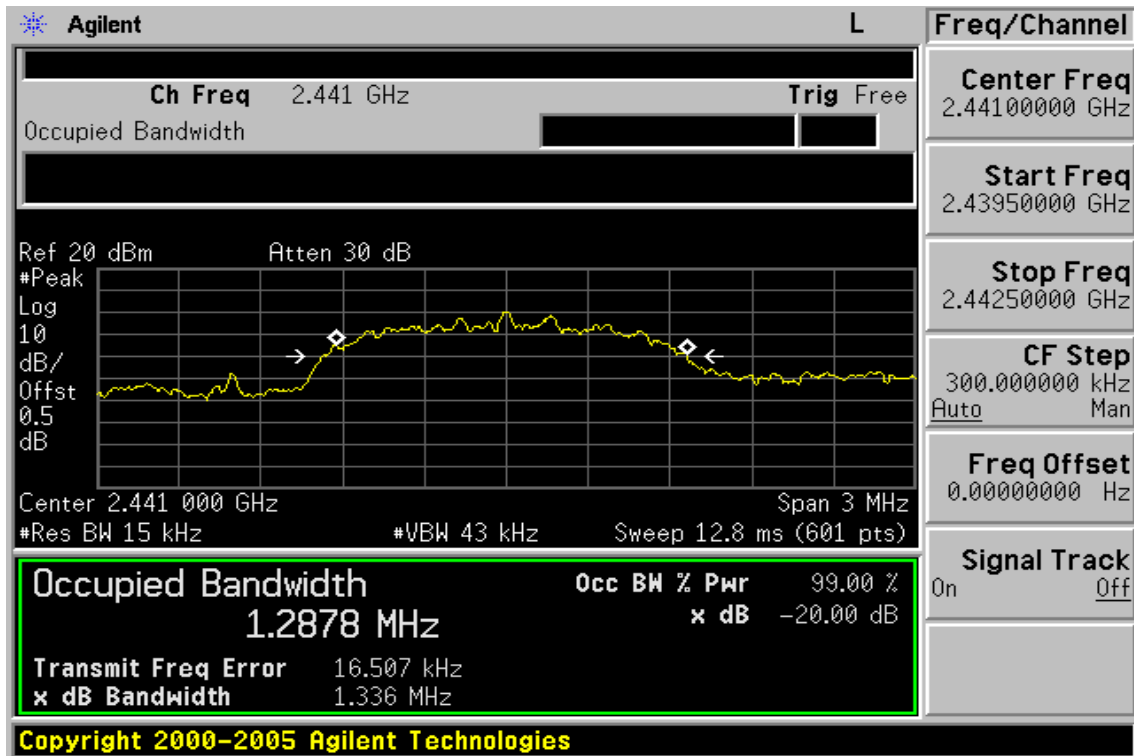
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**20dB Band Width Test Data CH-Low (EDR mode)**

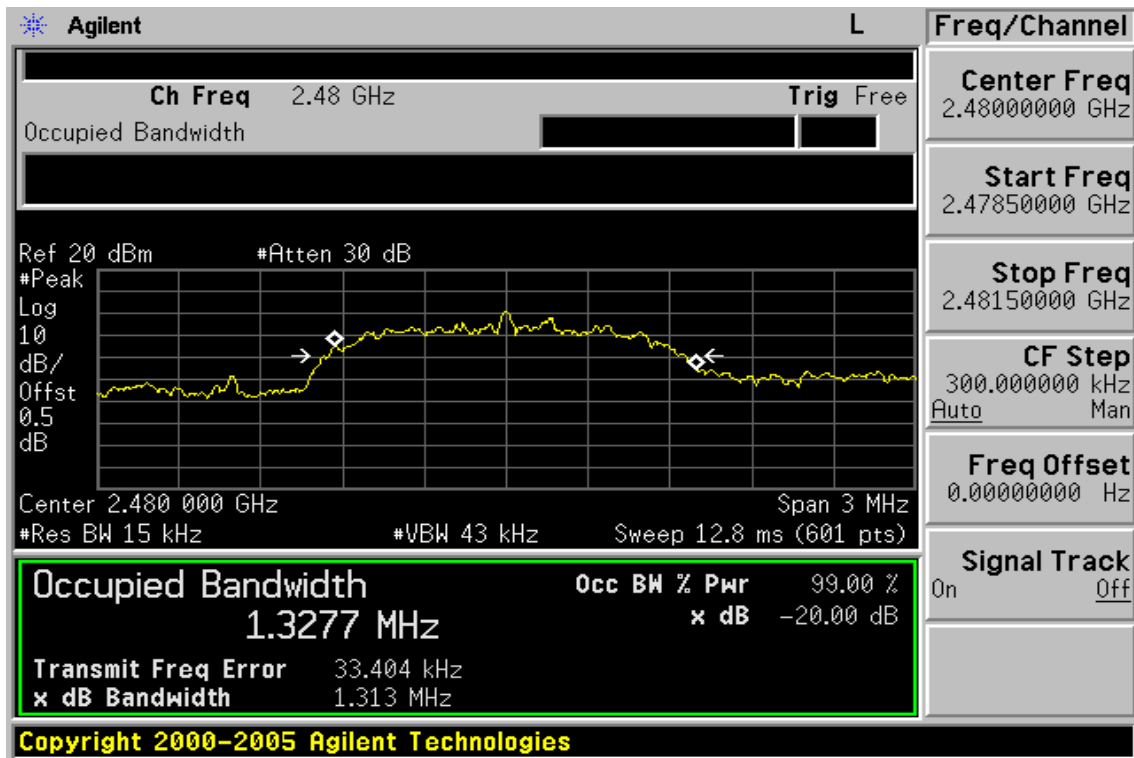


**20dB Band Width Test Data CH-Mid (EDR mode)**



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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 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.

### 8.3. Measurement Result

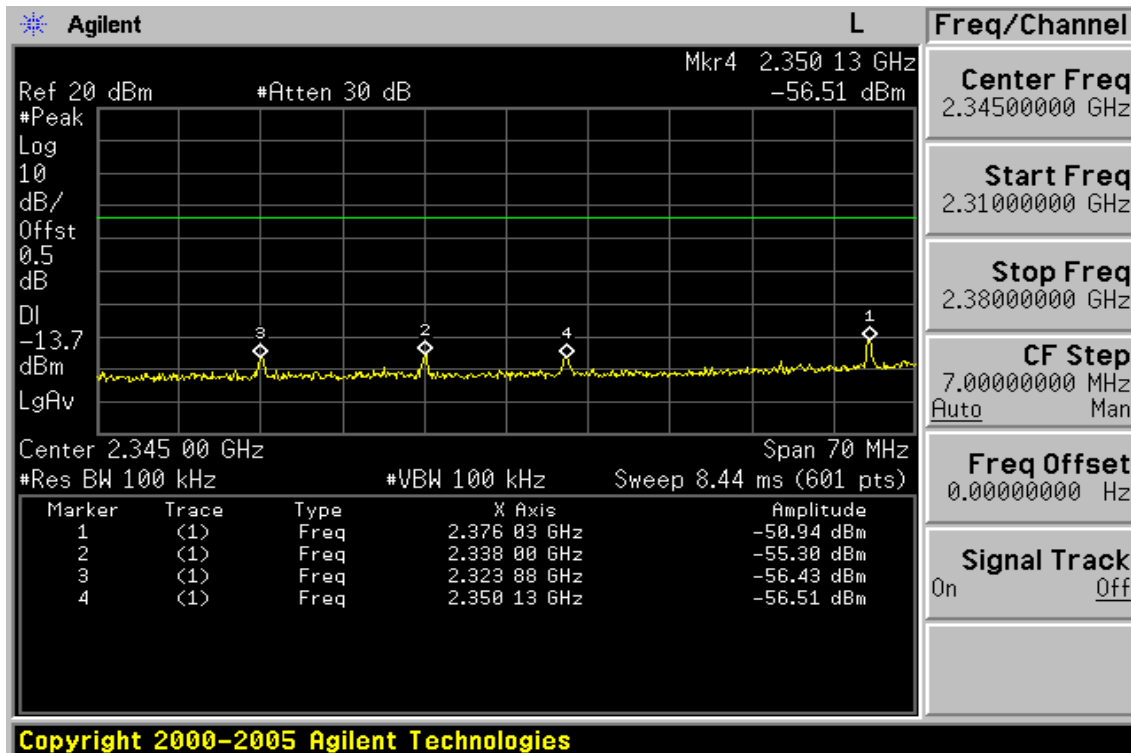
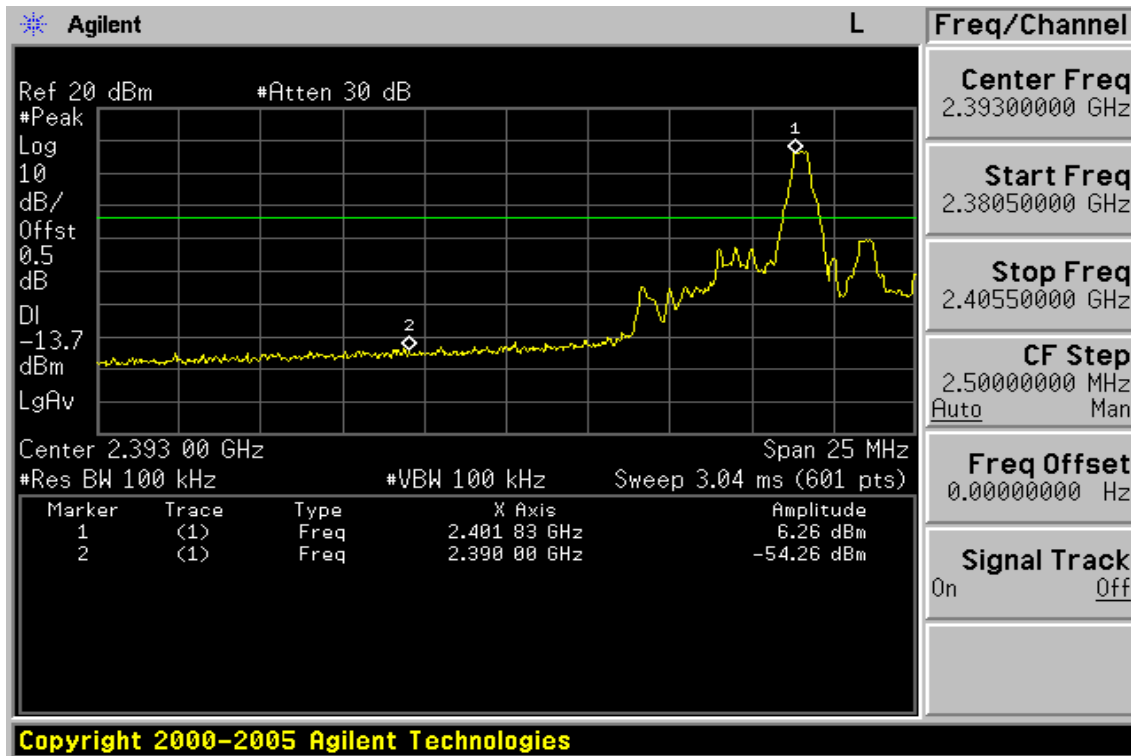
Refer to attach spectrum analyzer data chart.

### 8.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009

Note: Measurement Equipment for radiated emission refers to section 9.

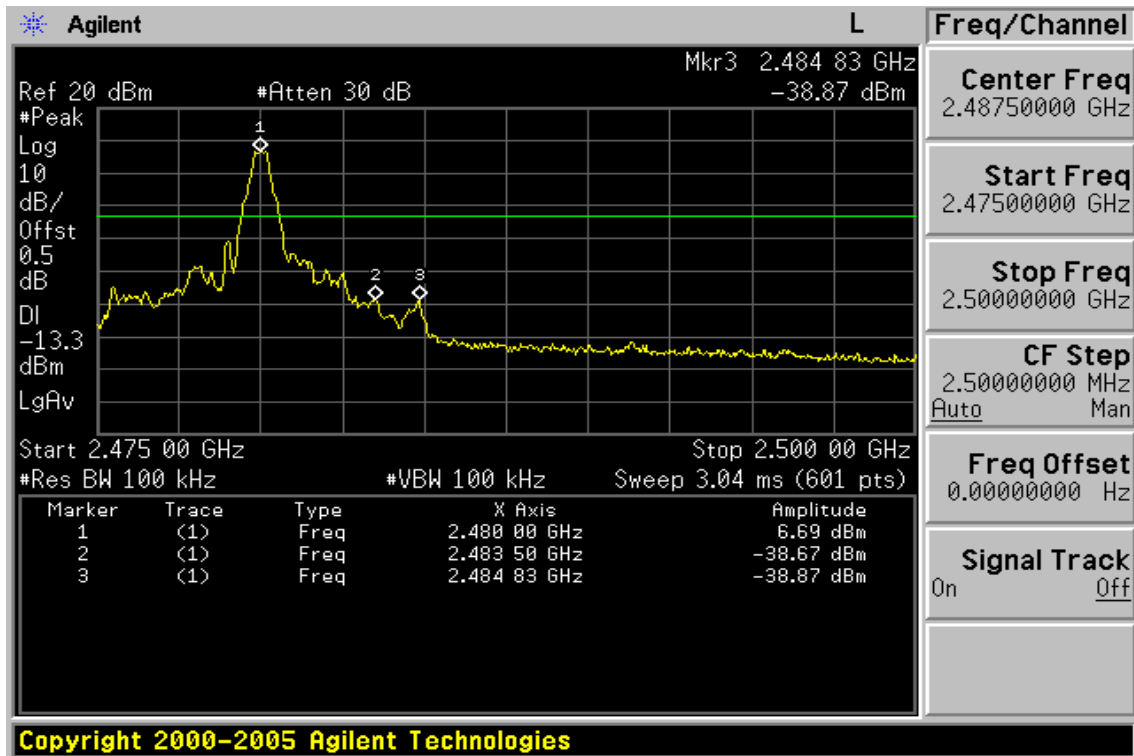
**Conducted Emission: Test Data CH-Low (BDR mode)**



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## Conducted Emission: Test Data CH-High



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**Radiated Emission: (BDR mode)**

Operation Mode	TX CH Low	Test Date	Jan. 10, 2009
Fundamental Frequency	2402 MHz	Test By	Brian
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)		
2390.00	49.04	---	-10.76	38.28	---	74.00	54.00	-15.72	Peak

Operation Mode	TX CH Low	Test Date	Jan. 10, 2009
Fundamental Frequency	2402 MHz	Test By	Brian
Temperature	25	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)		
2390.00	51.96	---	-10.76	41.20	---	74.00	54.00	-12.80	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 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: (BDR mode)**

Operation Mode	TX CH High	Test Date	Jan. 10, 2009
Fundamental Frequency	2480 MHz	Test By	Brian
Temperature	25	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	58.01	---	-10.46	47.55	---	74.00	54.00	-6.45	Peak

Operation Mode	TX CH High	Test Date	Jan. 10, 2009
Fundamental Frequency	2480 MHz	Test By	Brian
Temperature	25	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	61.32	---	-10.46	50.86	---	74.00	54.00	-3.14	Peak

Remark :

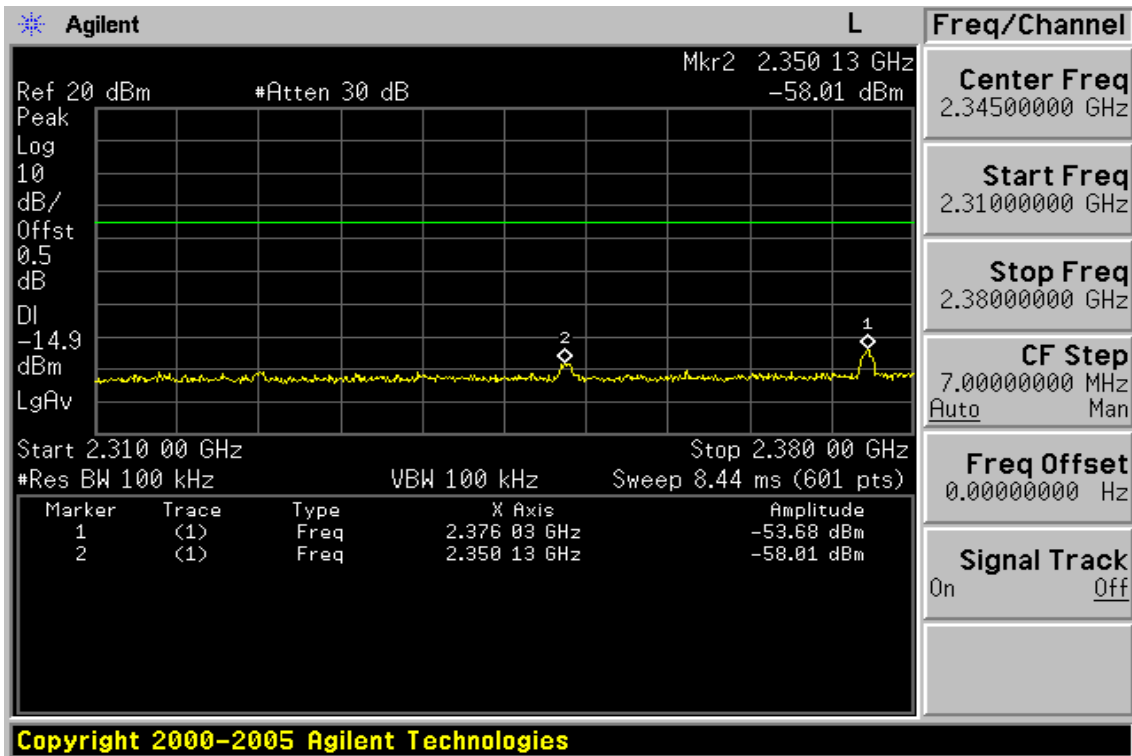
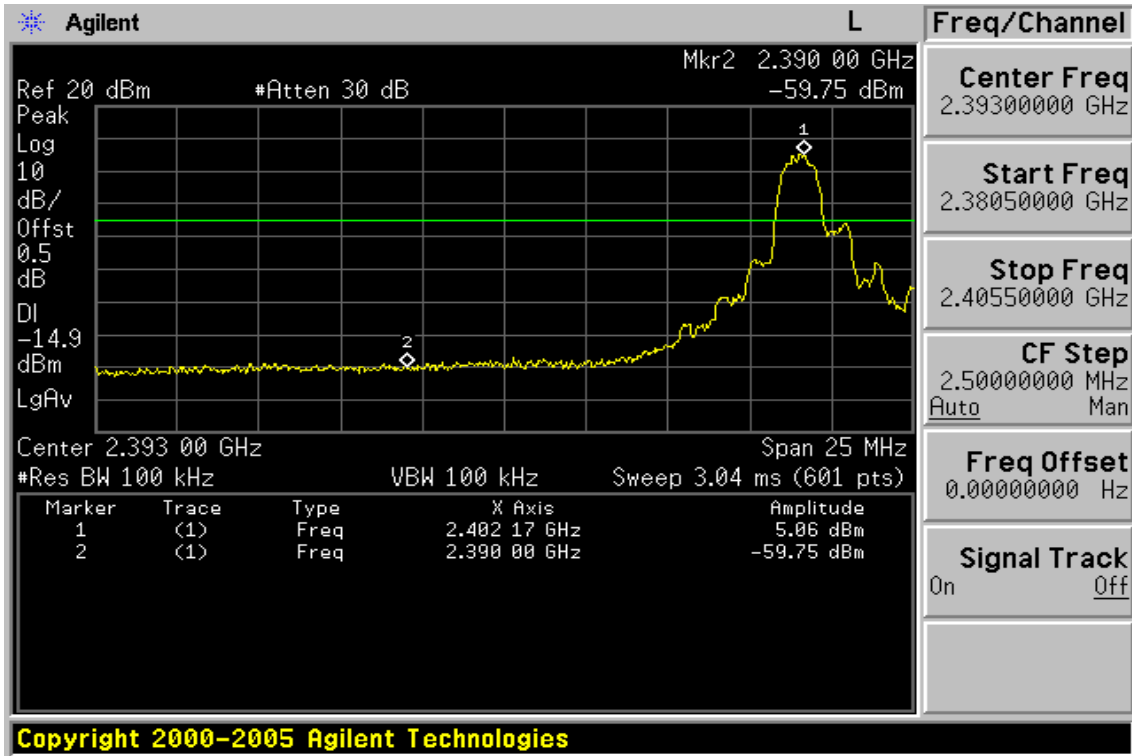
- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with 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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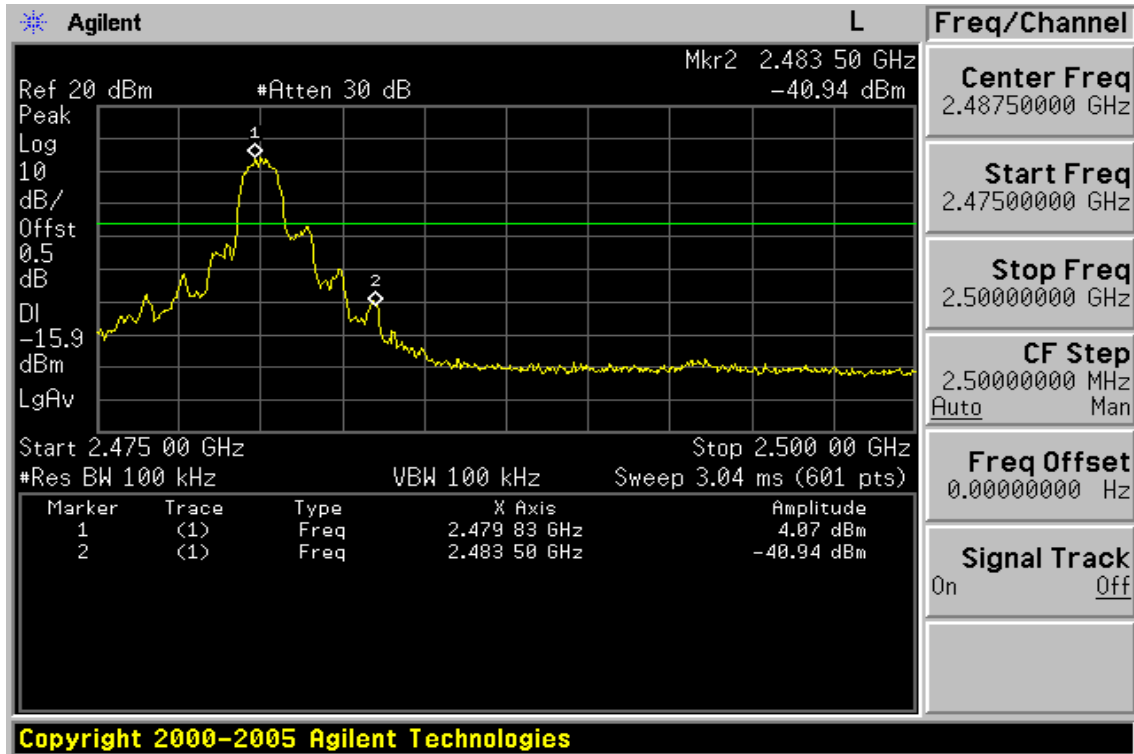
**Conducted Emission: Test Data CH-Low (EDR mode)**



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### Conducted Emission: Test Data CH-High



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**Radiated Emission: (EDR mode)**

Operation Mode	TX CH Low	Test Date	Jan. 10, 2009
Fundamental Frequency	2402 MHz	Test By	Brian
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)		
2390.00	48.37	---	-10.76	37.61	---	74.00	54.00	-16.39	Peak

Operation Mode	TX CH Low	Test Date	Jan. 10, 2009
Fundamental Frequency	2402 MHz	Test By	Brian
Temperature	25	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)		
2390.00	50.63	---	-10.76	39.87	---	74.00	54.00	-14.13	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 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: (EDR mode)**

Operation Mode	TX CH High	Test Date	Jan. 10, 2009
Fundamental Frequency	2480 MHz	Test By	Brian
Temperature	25	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	58.58	---	-10.46	48.12	---	74.00	54.00	-5.88	Peak

Operation Mode	TX CH High	Test Date	Jan. 10, 2009
Fundamental Frequency	2480 MHz	Test By	Brian
Temperature	25	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	62.23	---	-10.46	51.77	---	74.00	54.00	-2.23	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 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. EUT Setup

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4: 2003.
2. The EUT was put in the front of the test table. The peripherals was placed on the side of the host 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 PC system was connected with 110Vac/60Hz power source.

### 9.3. Measurement Procedure

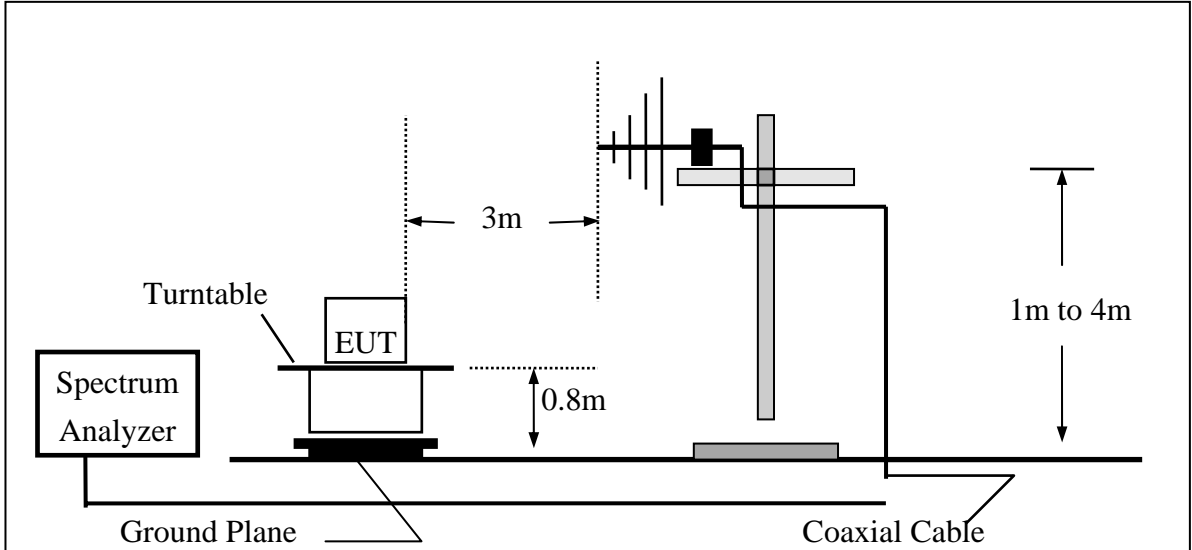
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures 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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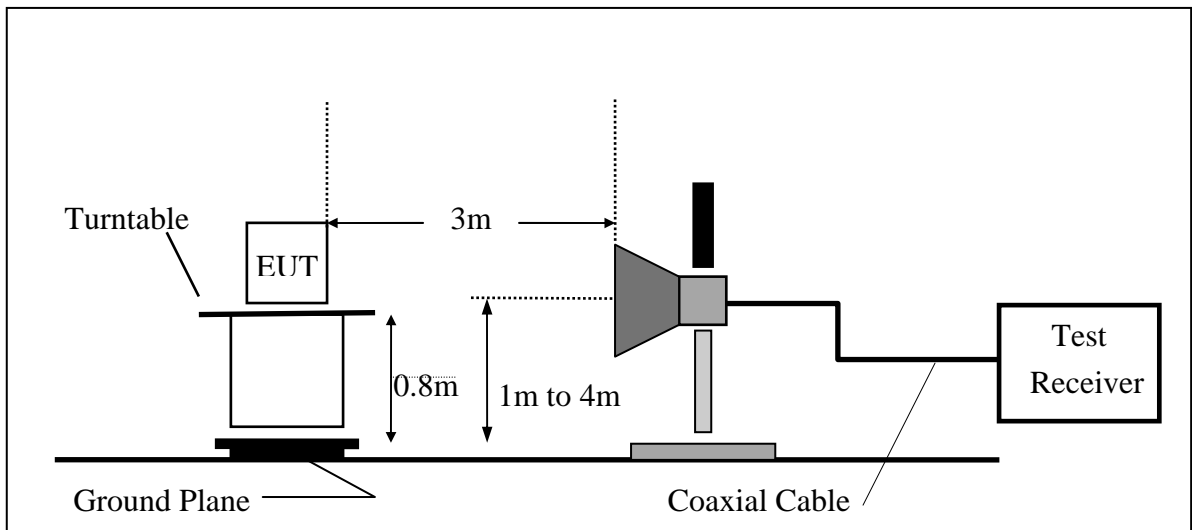
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**9.4. Test SET-UP (Block Diagram of Configuration)**

(A) Radiated Emission Test Set-Up, Frequency Below 1GHz



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



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**9.5. Measurement Equipment Used:**

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2007	07/03/2009
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Bilog Antenna	SCHWAZBECK	VULB9160	9160-3158	11/29/2007	11/28/2008
Horn antenna	Schwarzbeck	BBHA 9120D	9120D-673	05/09/2008	05/10/2010
Horn antenna	Schwarzbeck	BBHA 9170	184/185	12/31/2007	12/30/2008
Pre-Amplifier	HP	8447F	3113A06892	01/05/2009	01/04/2010
Pre-Amplifier	HP	8449B	3008A01973	01/05/2009	01/04/2010
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	01/05/2009	01/04/2010
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2009	01/04/2010

**9.6. 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:

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

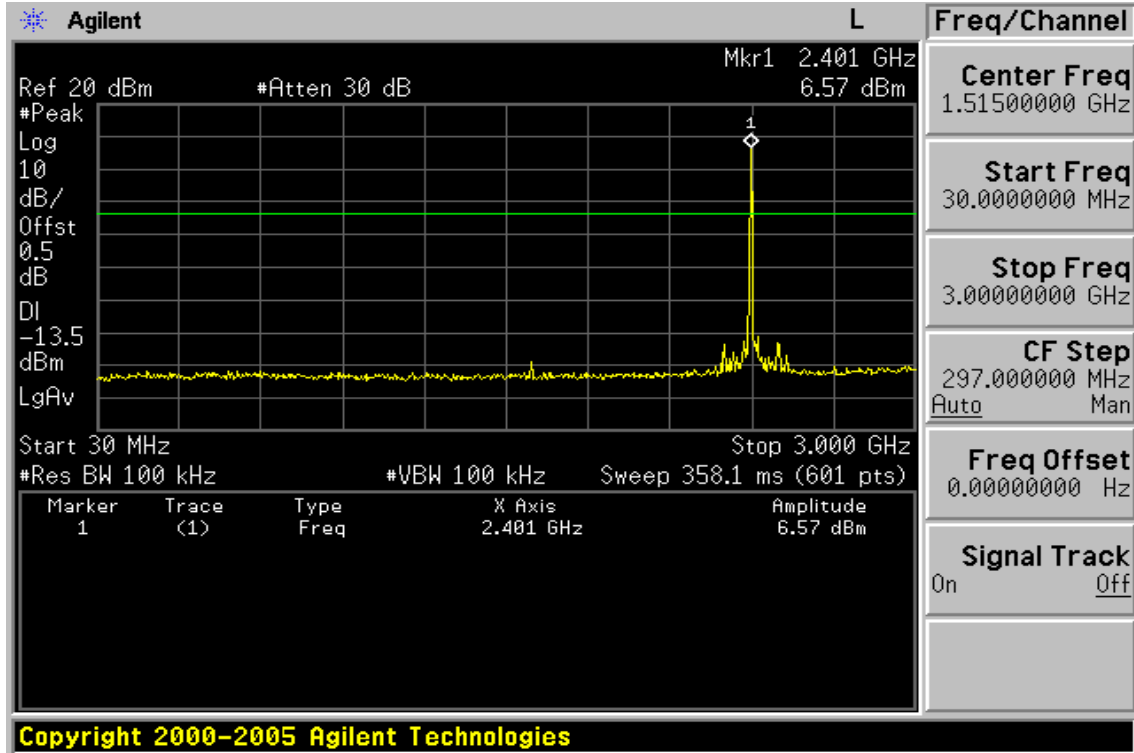
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

**9.7. Measurement Result**

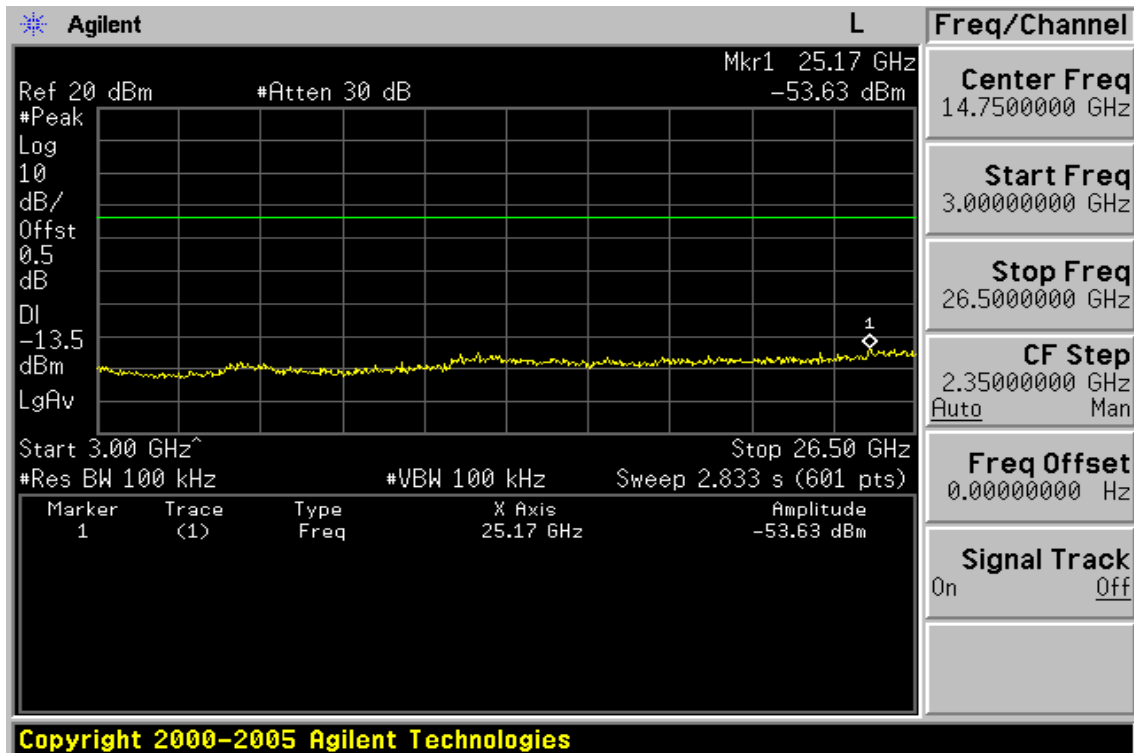
Refer to attach tabular data sheets.

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



**Ch Low 3GHz – 26.5GHz**

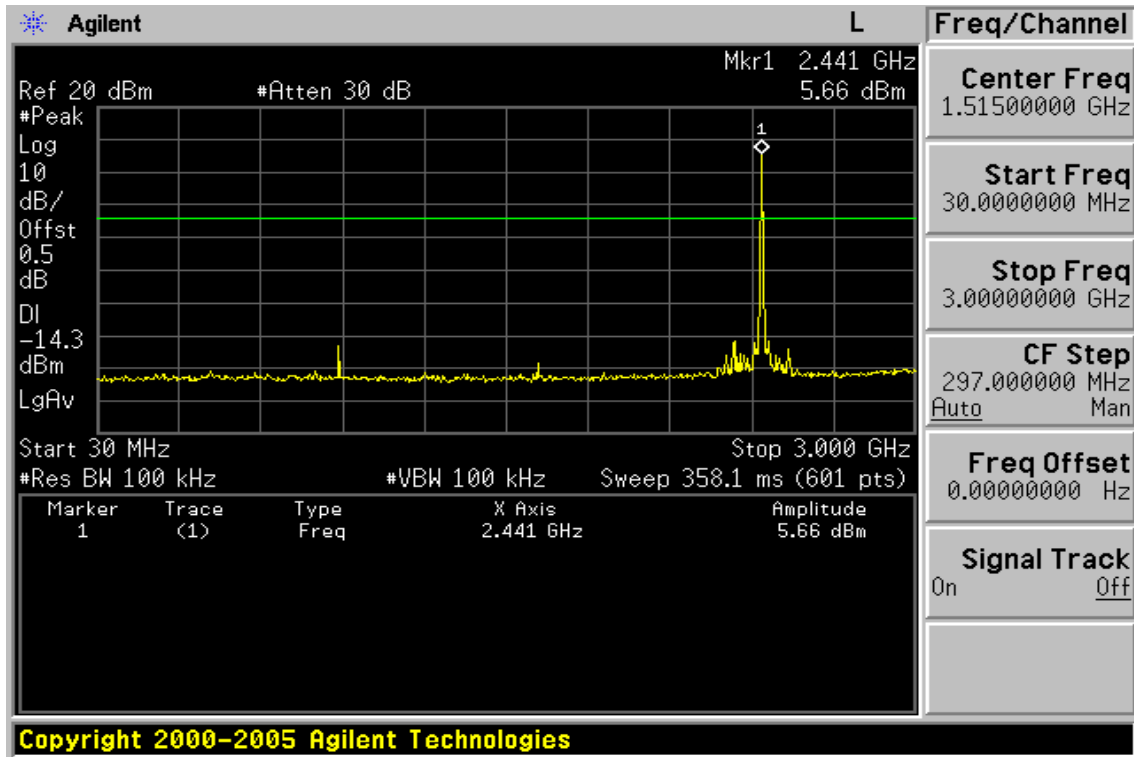


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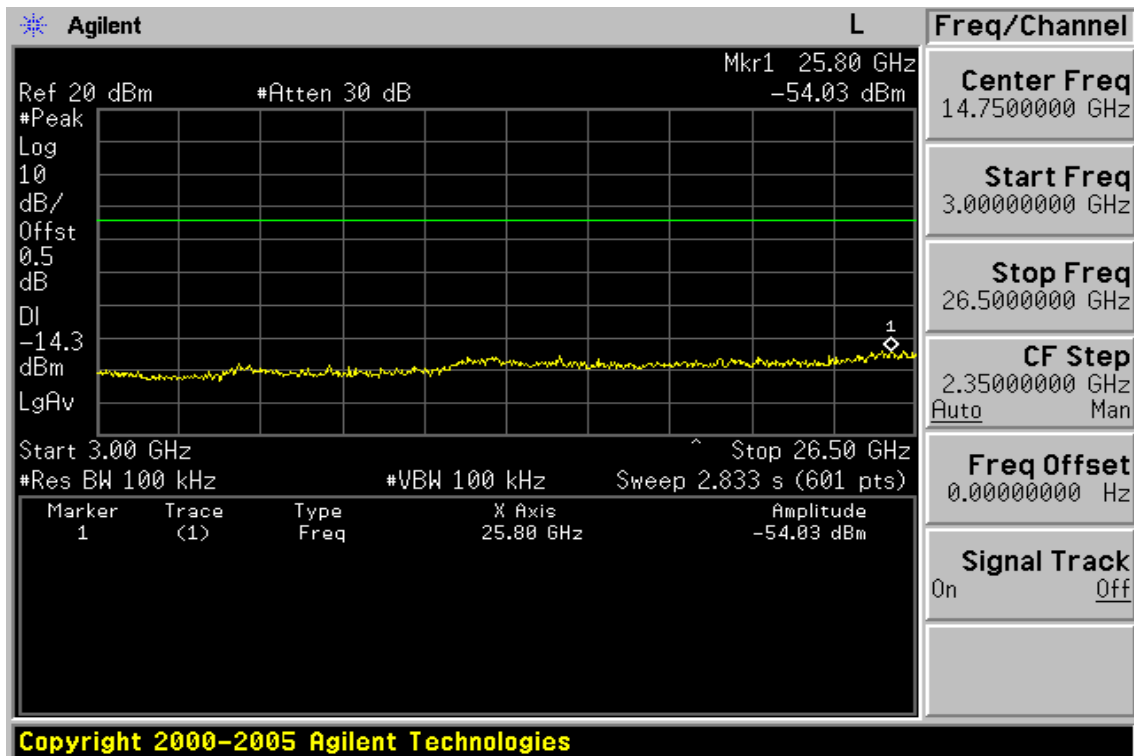
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### Ch Mid 30MHz – 3GHz



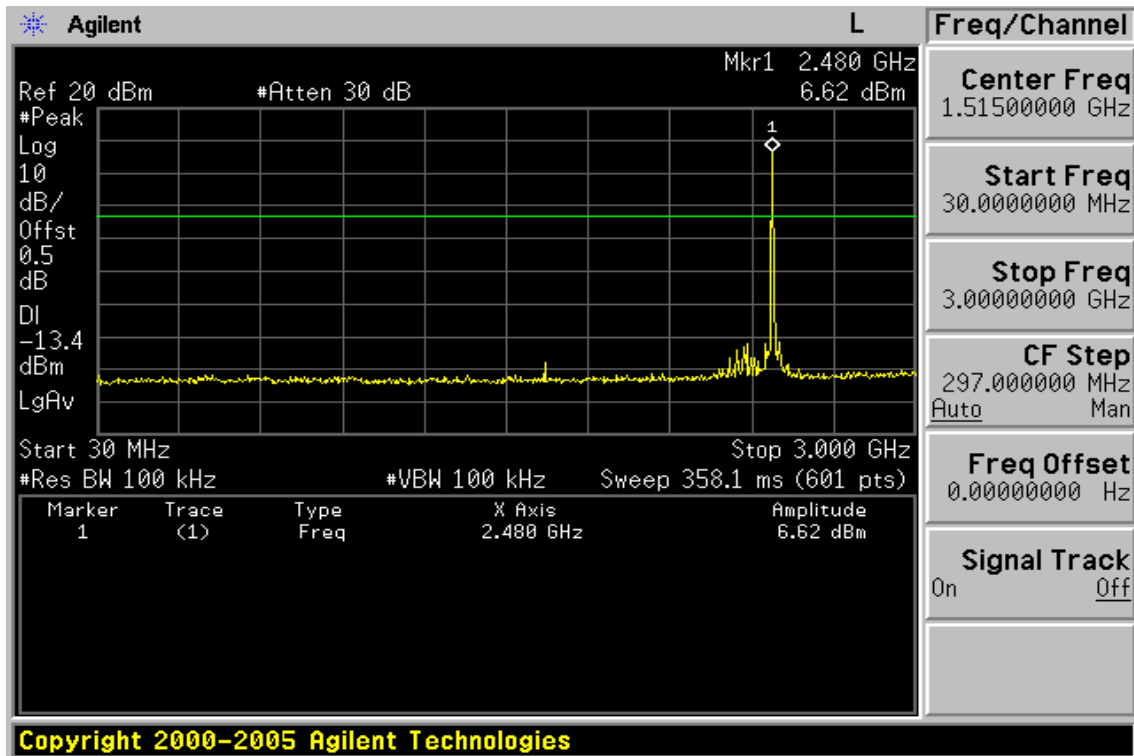
### Ch Mid 3GHz – 26.5GHz



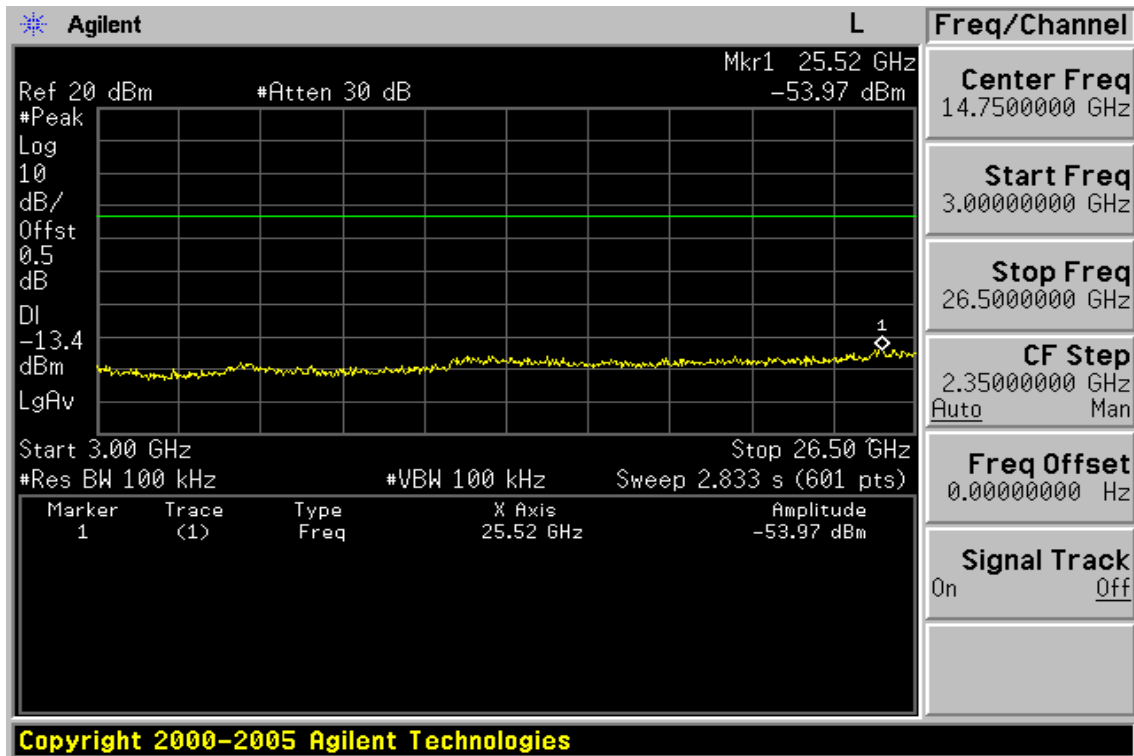
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### Ch High 30MHz – 3GHz



### Ch High 3GHz – 26.5GHz



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

Operation Mode	TX CH Low	Test Date	Dec. 25, 2008
Fundamental Frequency	2402MHz	Test By	Brian
Temperature	25	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	58.20	-26.67	31.53	40.00	-8.47
85.29	V	Peak	58.35	-30.75	27.60	40.00	-12.40
128.94	V	Peak	52.77	-28.27	24.50	43.50	-19.00
85.29	H	Peak	51.29	-30.75	20.54	40.00	-19.46
128.94	H	Peak	55.26	-28.27	26.99	43.50	-16.51
159.98	H	Peak	50.23	-26.66	23.57	43.50	-19.93

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	Dec. 25, 2008
Fundamental Frequency	2441MHz	Test By	Brian
Temperature	25	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	57.21	-26.67	30.54	40.00	-9.46
85.29	V	Peak	58.35	-30.75	27.60	40.00	-12.40
128.94	V	Peak	53.58	-28.27	25.31	43.50	-18.19
85.29	H	Peak	51.37	-30.75	20.62	40.00	-19.38
159.98	H	Peak	51.85	-26.99	24.86	43.50	-18.64
449.04	H	Peak	51.38	-25.00	26.38	46.00	-19.62

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	Dec. 25, 2008
Fundamental Frequency	2480MHz	Test By	Brian
Temperature	25	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	57.52	-26.67	30.85	40.00	-9.15
85.29	V	Peak	59.02	-30.75	28.27	40.00	-11.73
128.94	V	Peak	50.27	-28.27	22.00	43.50	-21.50
85.29	H	Peak	51.51	-30.75	20.76	40.00	-19.24
159.98	H	Peak	52.85	-26.99	25.86	43.50	-17.64
184.23	H	Peak	53.39	-30.00	23.39	43.50	-20.11

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	Dec. 25, 2008
Fundamental Frequency	2402 MHz	Test By	Brian
Temperature	25	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)	
1598.0	48.65	--	-13.95	34.70	--	74.00	54.00	-19.30
4804.0	47.87	--	-6.01	41.86	--	74.00	54.00	-12.14
7206.0	44.32	--	1.57	45.89	--	74.00	54.00	-8.11
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	Dec. 25, 2008
Fundamental Frequency	2402 MHz	Test By	Brian
Temperature	25	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)	
1598.0	54.65	--	-13.95	40.70	--	74.00	54.00	-13.30
4804.0	51.65	--	-6.01	45.64	--	74.00	54.00	-8.36
7206.0	48.32	--	1.57	49.89	--	74.00	54.00	-4.11
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	Dec. 25, 2008
Fundamental Frequency	2441 MHz	Test By	Brian
Temperature	25	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)	
1630.5	49.50	--	-13.80	35.70	--	74.00	54.00	-18.30
4882.0	45.70	--	-5.93	39.77	--	74.00	54.00	-14.23
7323.0	44.20	--	1.76	45.96	--	74.00	54.00	-8.04
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	Dec. 25, 2008
Fundamental Frequency	2441 MHz	Test By	Brian
Temperature	25	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)	
1630.5	53.91	--	-13.80	40.11	--	74.00	54.00	-13.89
4882.0	46.28	--	-5.93	40.35	--	74.00	54.00	-13.65
7323.0	45.69	--	1.76	47.45	--	74.00	54.00	-6.55
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	Dec. 25, 2008
Fundamental Frequency	2480 MHz	Test By	Brian
Temperature	25	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)	
1643.5	47.88	--	-13.76	34.12	--	74.00	54.00	-19.88
4960.0	44.63	--	-5.87	38.76	--	74.00	54.00	-15.24
7440.0	41.87	--	2.05	43.92	--	74.00	54.00	-10.08
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	Dec. 25, 2008
Fundamental Frequency	2480 MHz	Test By	Brian
Temperature	25	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)	
1643.5	55.18	--	-13.76	41.42	--	74.00	54.00	-12.58
4960.0	44.95	--	-5.87	39.08	--	74.00	54.00	-14.92
7440.0	42.17	--	2.02	44.19	--	74.00	54.00	-9.81
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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## 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  $2/3 * 20\text{dB}$  bandwidth of the hopping channel, whichever is greater.

### 10.2. 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 5 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

### 10.3. Measurement Result

Channel separation	Limit	Result
MHz	kHz	
1	$\geq 25\text{KHz}$ or $2/3 * 20\text{ dB bandwidth}(0.891\text{MHz})$	PASS

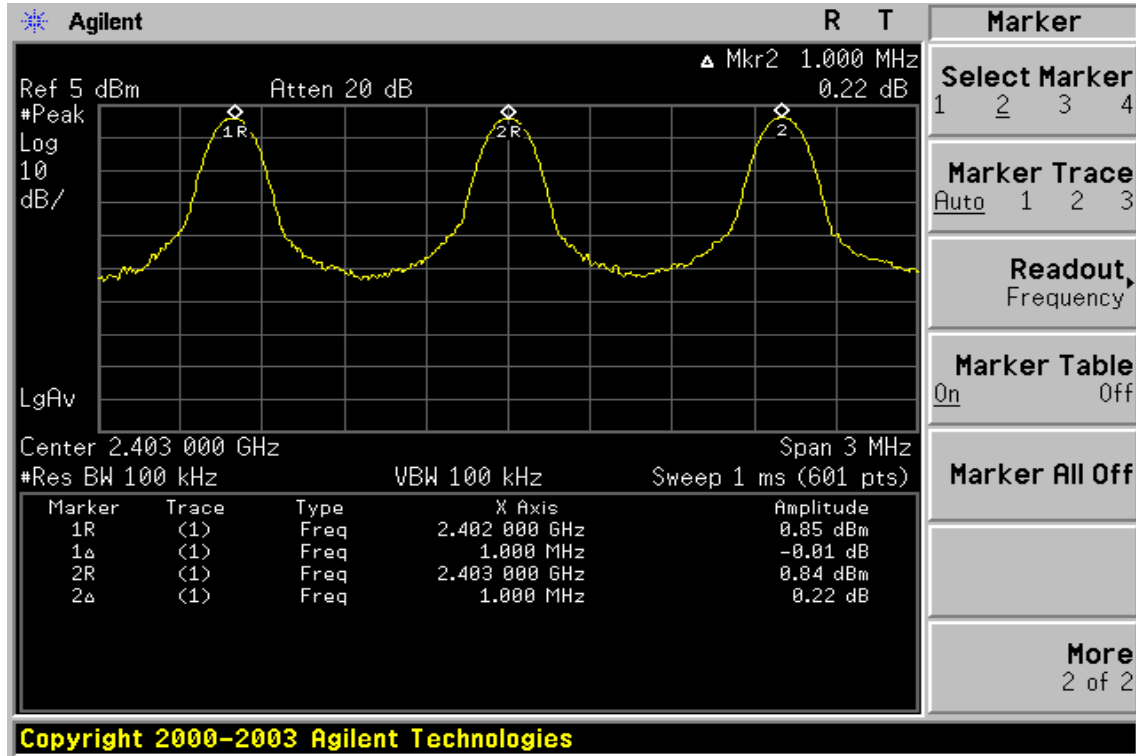
### 10.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	02/13/2008	02/12/2009
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009

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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 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=100KHz,
5. Max hold, view and count how many channel in the band.

### 11.3. Measurement Result

Total No of hopping channel	Limit (CH)	Measurement result (CH)	Result
	15	79	Pass
AFH hopping channel	15	20	Pass

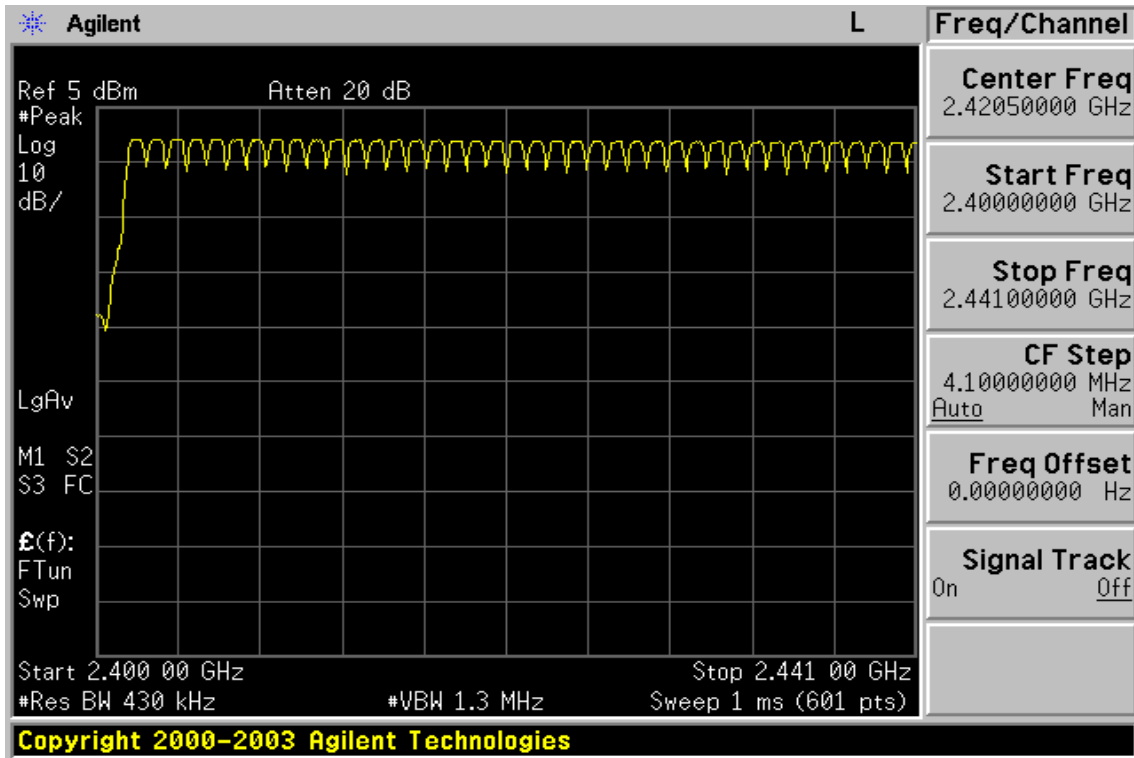
### 11.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	02/13/2008	02/12/2009
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009
Radio Communication Analyzer	ANRITSU	MT8852B	6K8852B	03/21/2008	03/20/2009

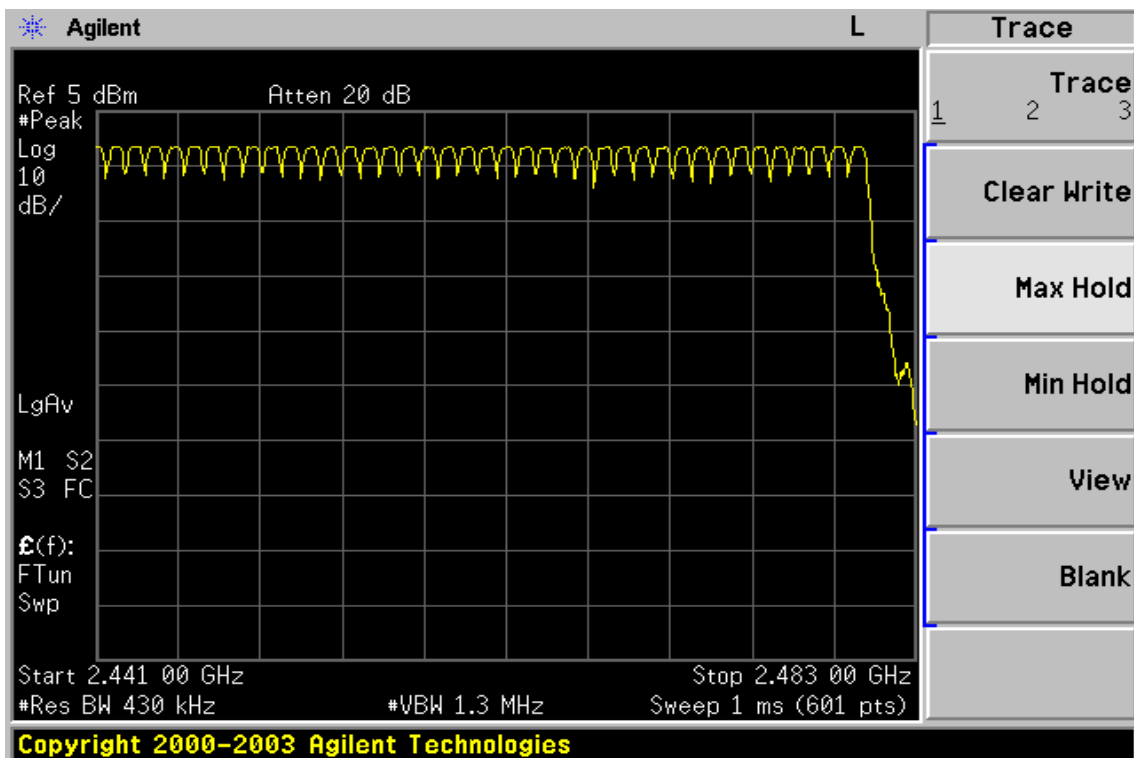
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Channel Number

2.4 GHz – 2.441GHz



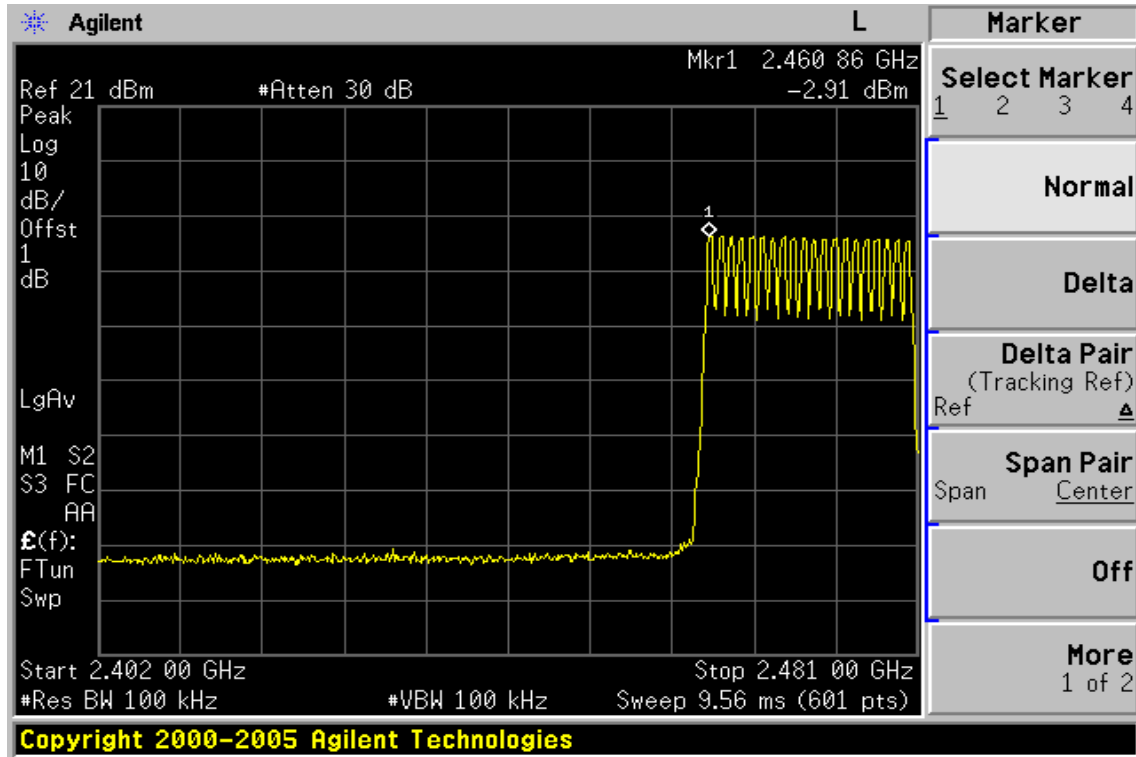
2.441 GHz – 2.4835GHz



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### AFH Channel Number



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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 Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Span = 0Hz , Adjust Sweep = 30s.
5. Repeat above procedures until all frequency measured were complete.

### 12.3. Measurement Result

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

$31.6 \times [\text{duty-cycle}/79] = \text{duty-cycle} \times 0.4 \text{ s}$

LOW:

DH1 Dwell time =  $31.6 * [(405/1250)/79] = 0.1296(\text{s})$

DH3 Dwell time =  $31.6 * [(1675/2500)/79] = 0.268(\text{s})$

DH5 Dwell time =  $31.6 * [(2925/3750)/79] = 0.312 (\text{s})$

MID:

DH1 Dwell time =  $31.6 * [(405/1250)/79] = 0.1296(\text{s})$

DH3 Dwell time =  $31.6 * [(1675/2500)/79] = 0.268(\text{s})$

DH5 Dwell time =  $31.6 * [(2906/3750)/79] = 0.3099 (\text{s})$

HIGH:

DH1 Dwell time =  $31.6 * [(416/1250)/79] = 0.1331(\text{s})$

DH3 Dwell time =  $31.6 * [(1662/2500)/79] = 0.2659(\text{s})$

DH5 Dwell time =  $31.6 * [(2906/3750)/79] = 0.3099(\text{s})$

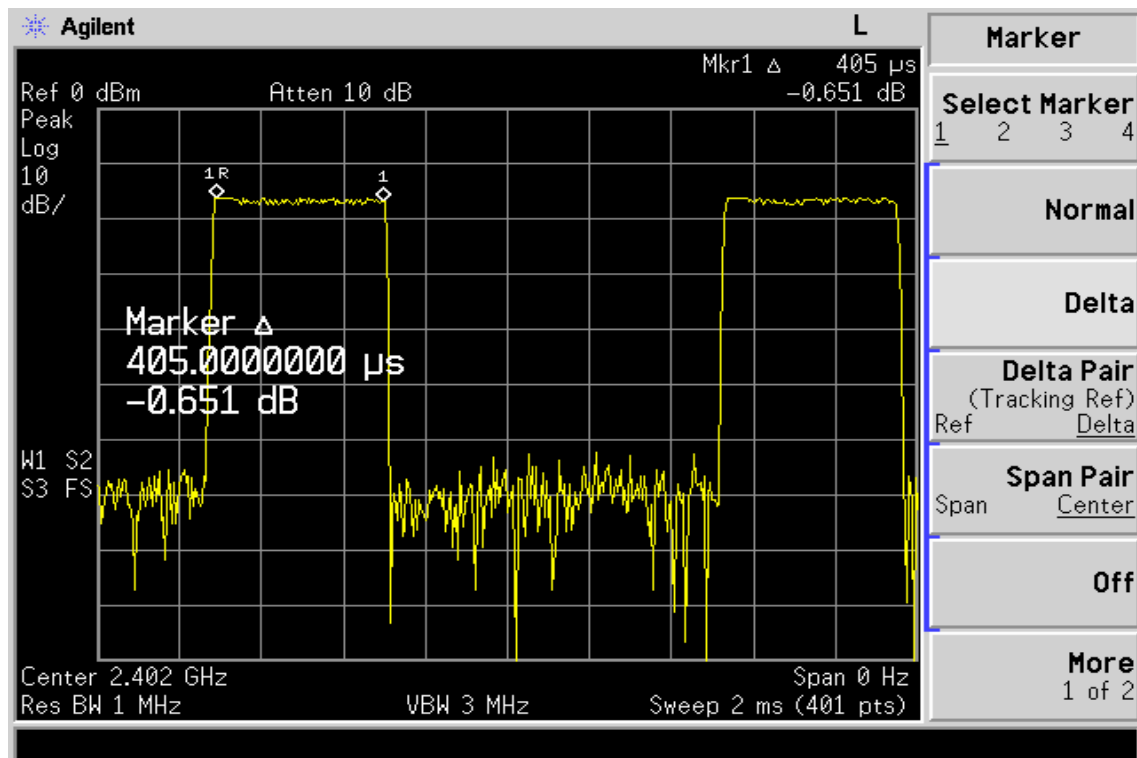
**12.4. Measurement Equipment Used:**

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009

**Dwell Time Test Data**

**CH-Low**

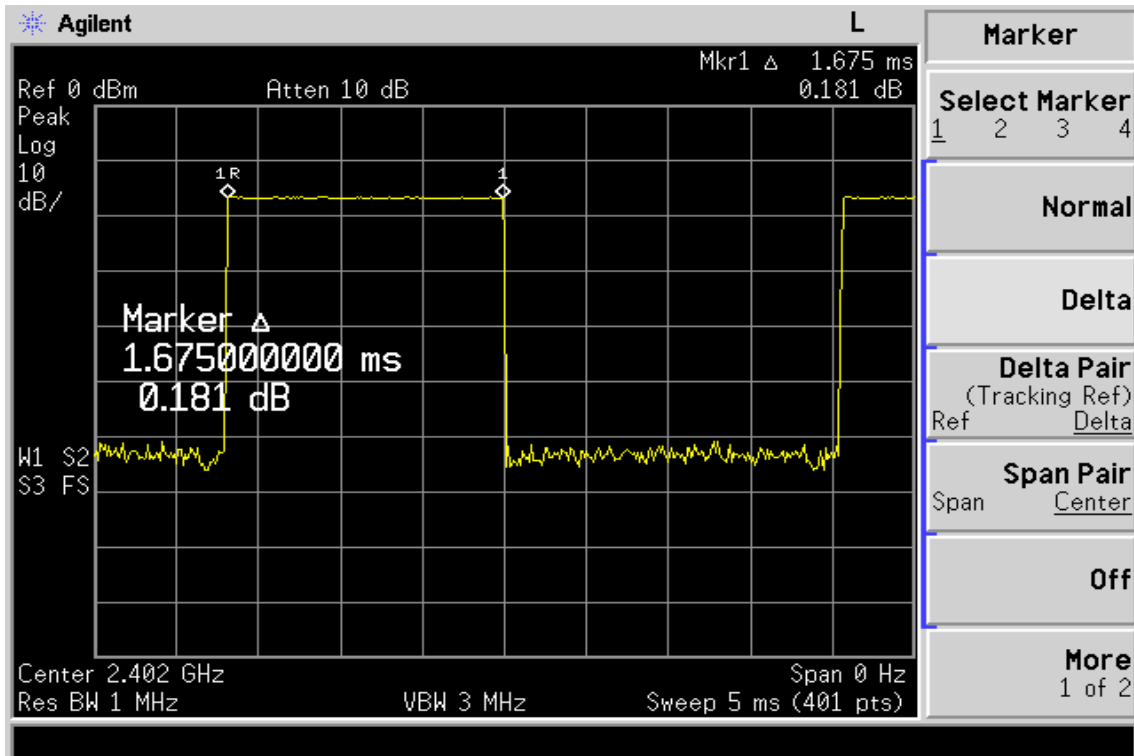
**DH1**



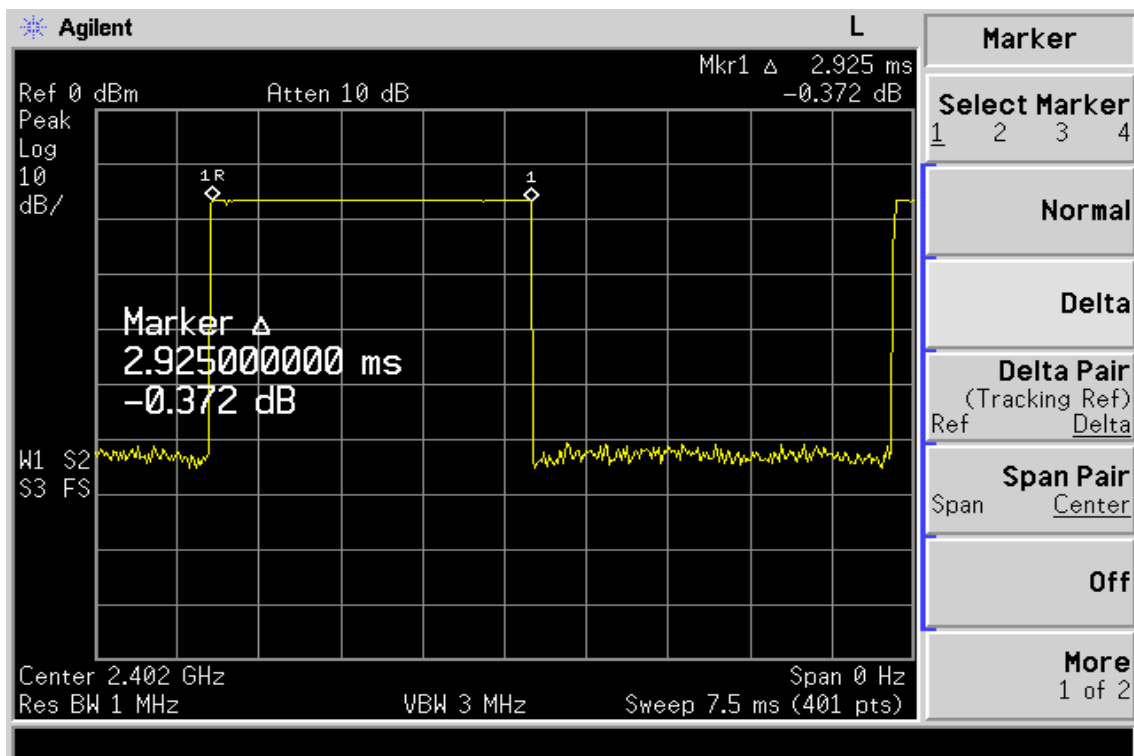
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### DH3



### DH5

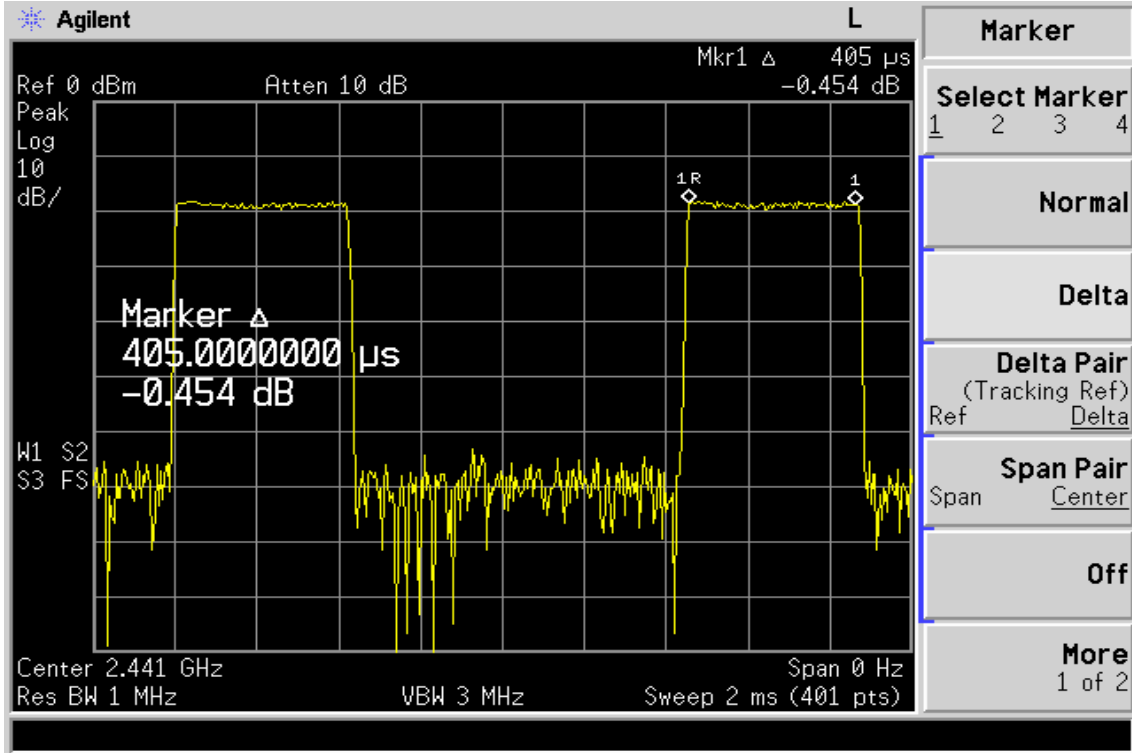


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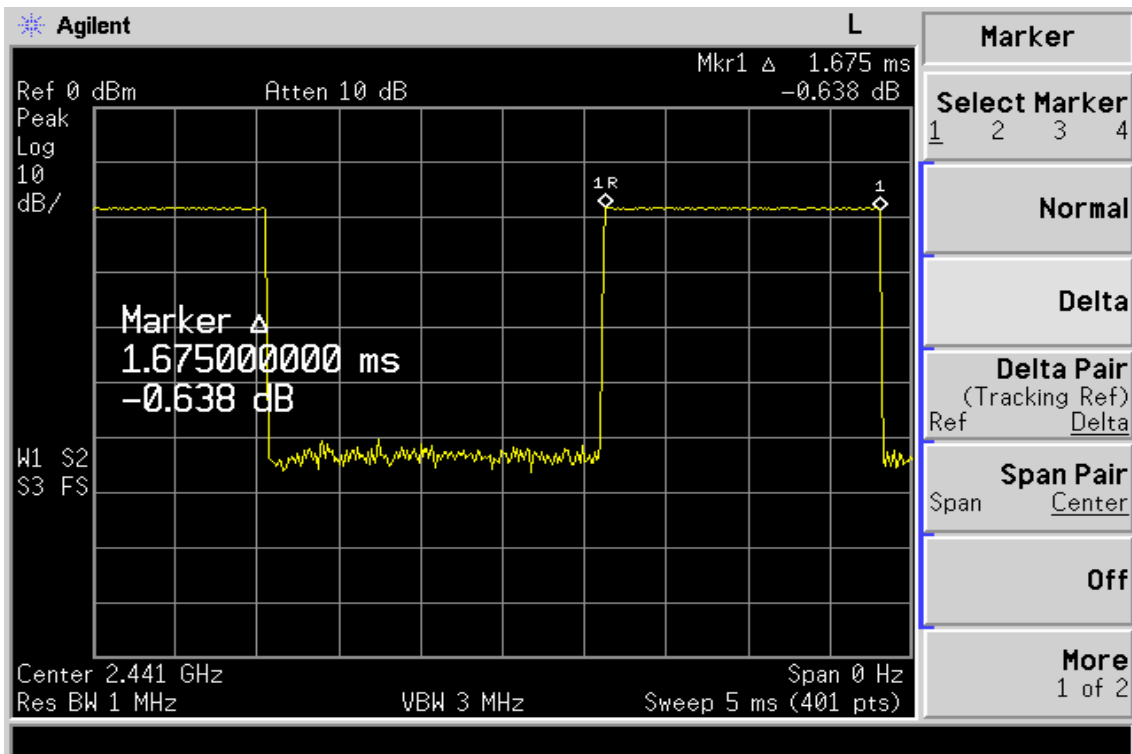
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## CH-Mid

### DH1



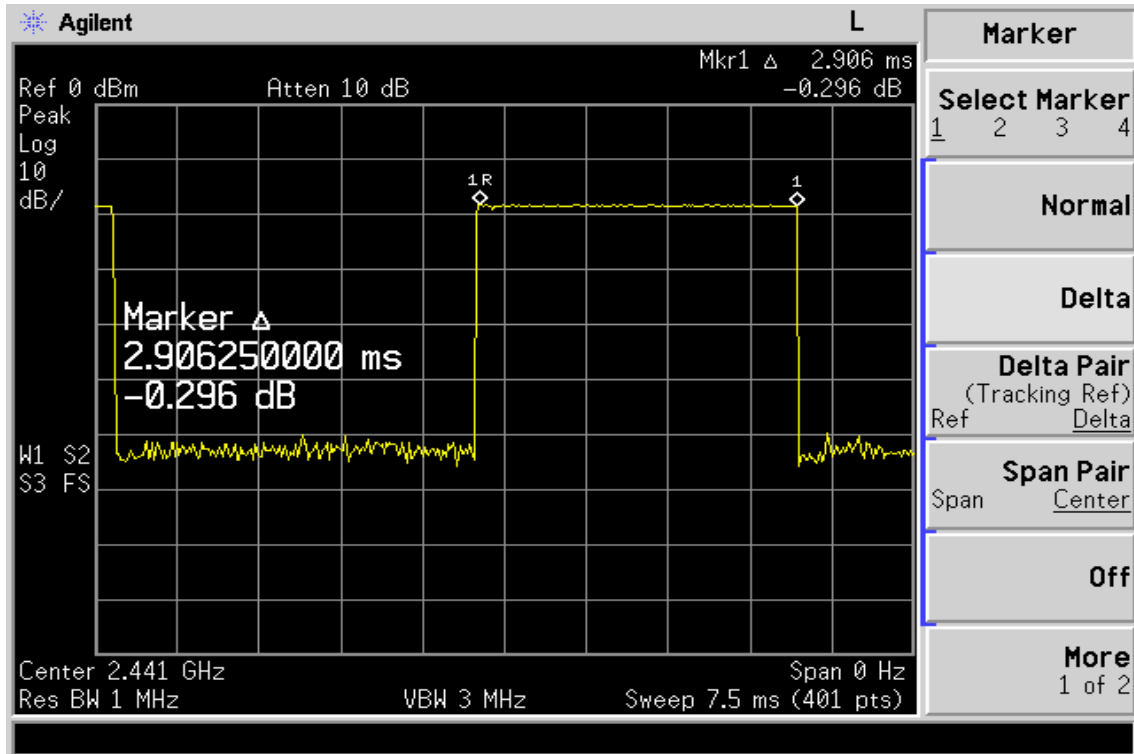
### DH3



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## DH5

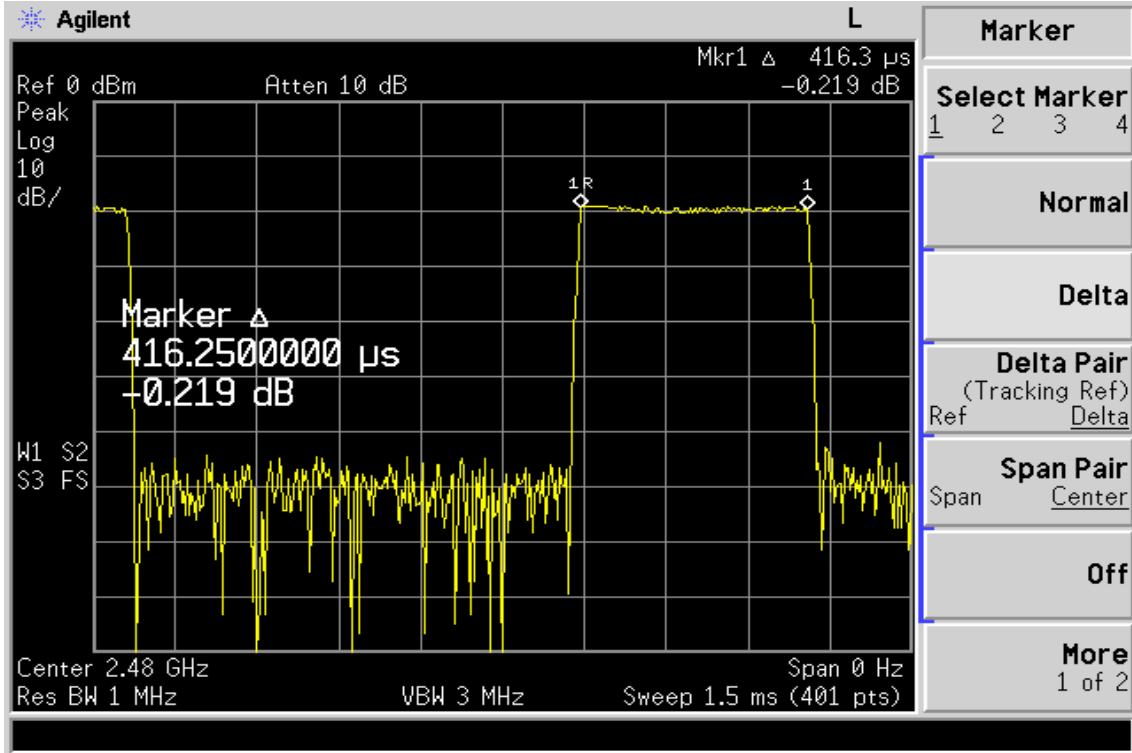


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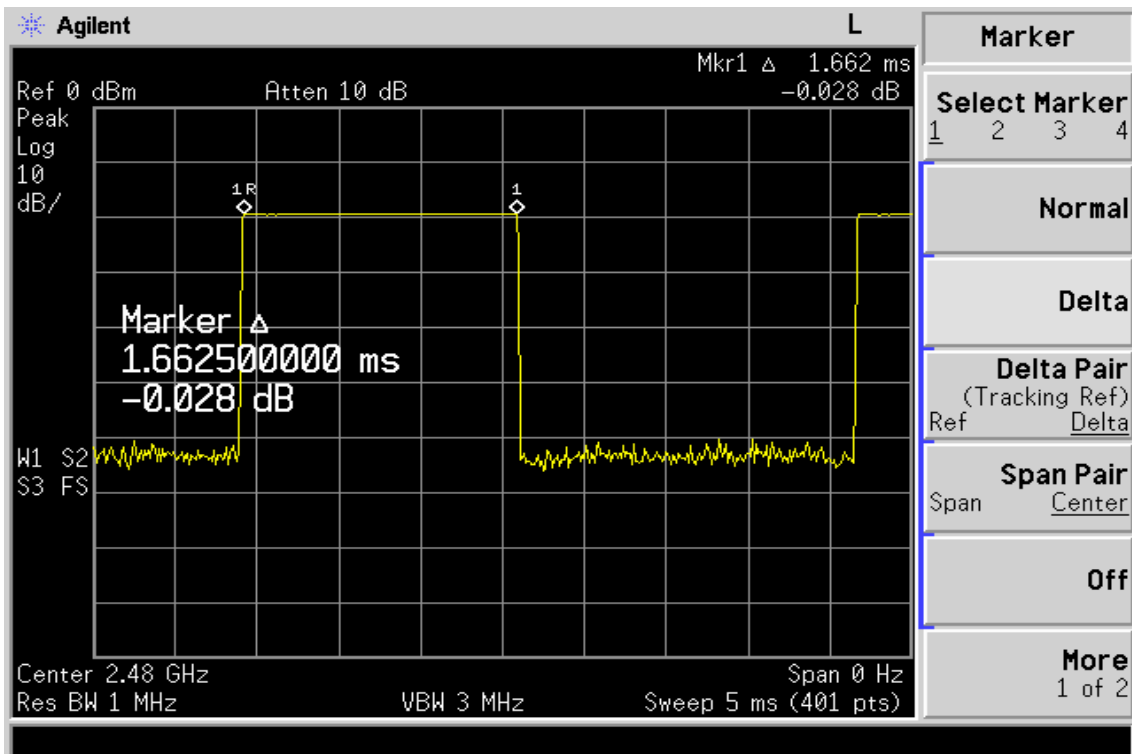
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## CH-High

### DH1



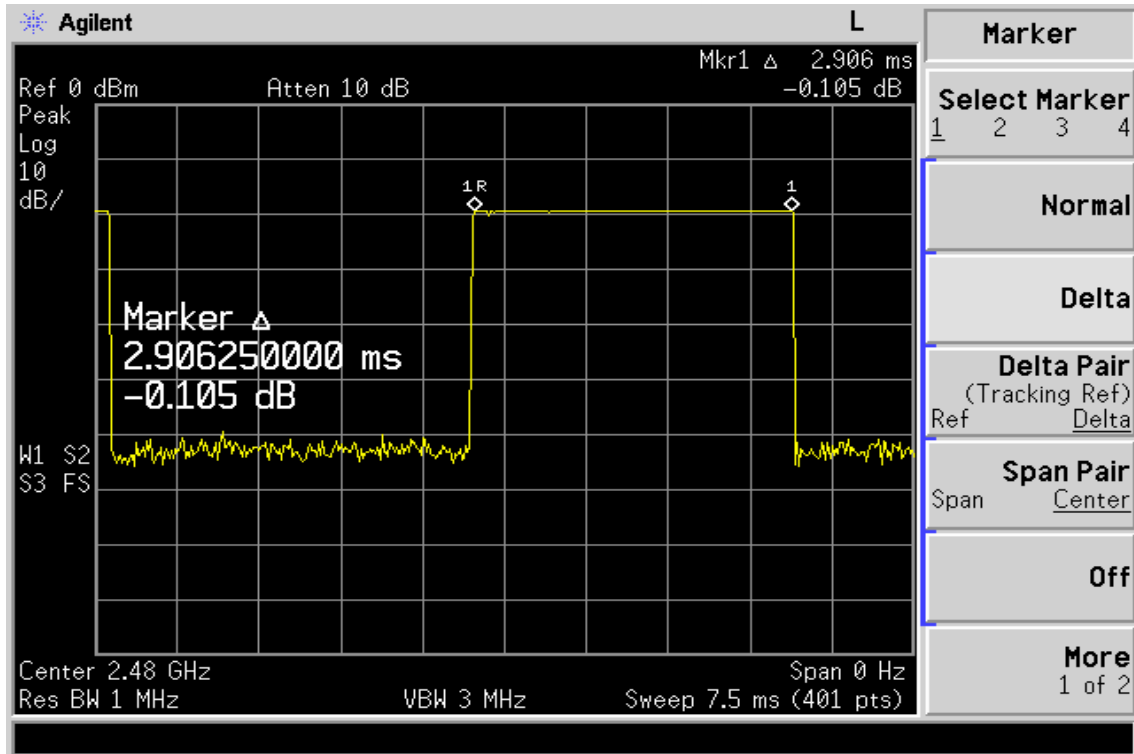
### DH3



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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 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 = 300KHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

#### 13.3. Measurement Result

BDR morde:

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-4.79	0.00	-4.79	8
Mid	-5.57	0.00	-5.57	8
High	-4.78	0.00	-4.78	8

NOTE: offset: 0.5dB

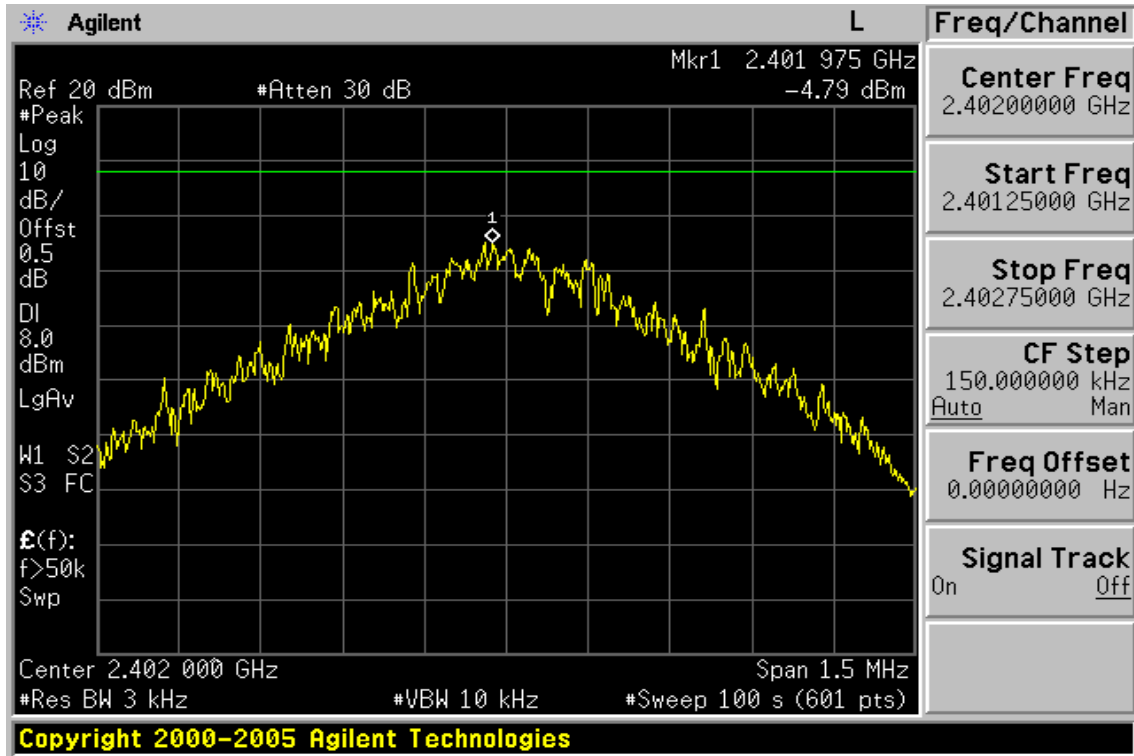
#### 13.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E7405A	US41160416	07/04/2008	07/03/2009
Spectrum Analyzer	R&S	FSP 40	100034	02/22/2008	02/21/2009
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2008	07/04/2009

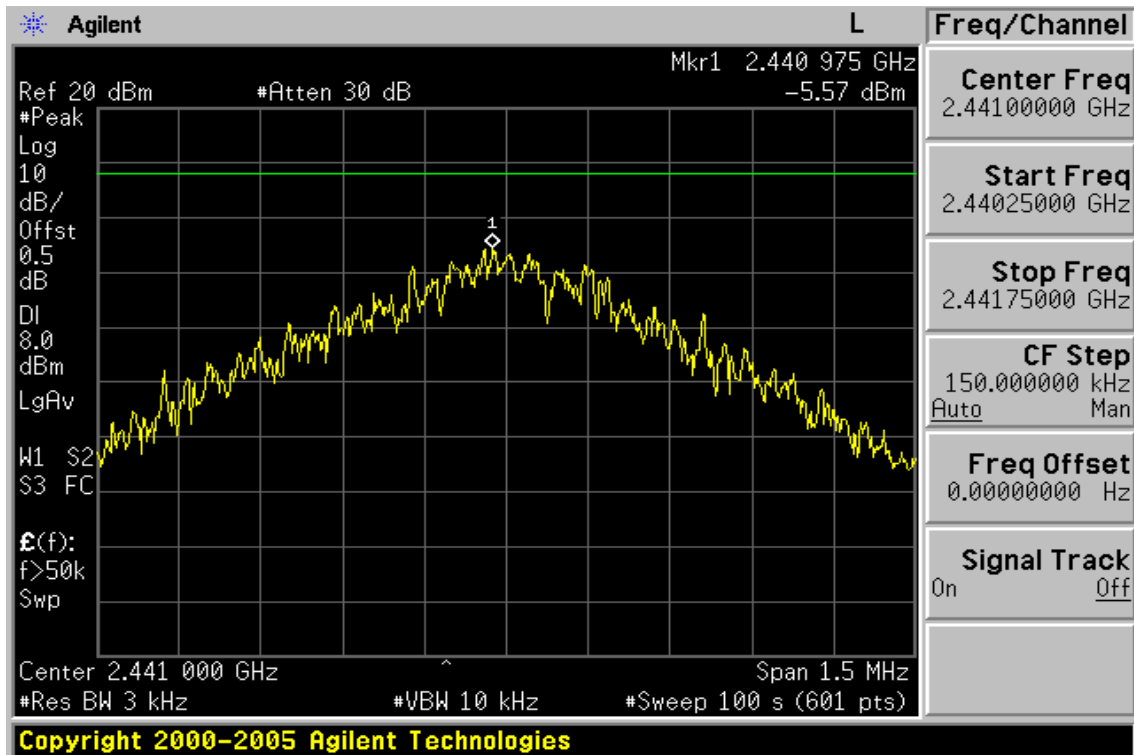
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**Power Spectral Density Test Plot (CH-Low)**



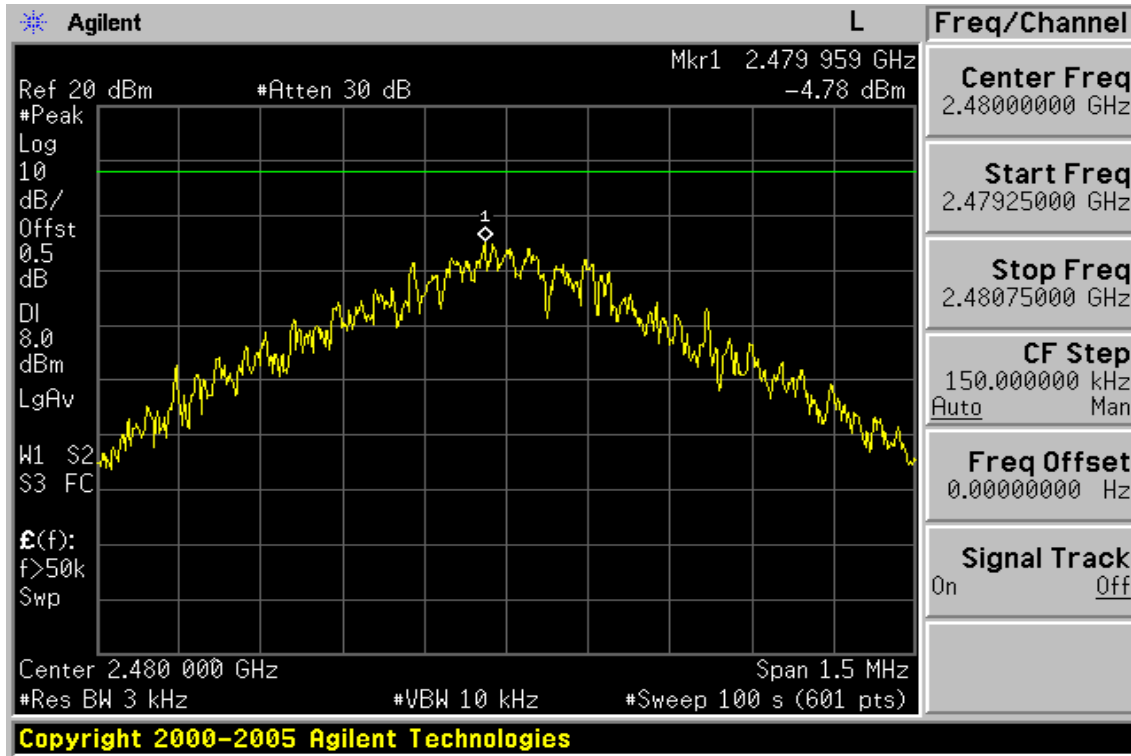
**Power Spectral Density Test Plot (CH-Mid)**



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### Power Spectral Density Test Plot (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 2.5dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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