

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: Bluetooth Wireless Headset
Brand Name: SouthWing
Model Name: BOROM#, # is 0 to 9
Model Difference: Different models with different casings
FCC ID: RGPBOROM
Report No.: EF/2007/B0001
Issue Date: Nov. 20, 2007
FCC Rule Part: §15.247
Prepared for: SouthWing
C/ Avila, 48-50, 08005 Barcelona, Spain
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: SouthWing
C/ Avila, 48-50, 08005 Barcelona, SPAIN

Equipment Under Test: Bluetooth Wireless Headset

Brand Name: SouthWing

FCC ID Number: RGPBOROM

Model No.: BOROM#, # is 0 to 9

Model Difference: Different models with different casings

File Number: EF/2007/B0001

Date of test: Nov. 01, 2007 ~ Nov. 20, 2007

Date of EUT Received: Nov. 01, 2007

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. 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

Nov. 20, 2007

Bondi Liu/Engineer

Prepared By:



Date

Nov. 20, 2007

Elisa Chen/Asst. Supervisor

Approved By:



Date

Nov. 20, 2007

Vincent Su/Manager

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FCC ID: RGPBOROM

Report No EF/2007/B0001

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Version

Version No.	Date
00	Nov. 20, 2007

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1. GENERAL INFORMATION

1.1. Product Description

The SouthWing, Model: BOROM#, # is 0 to 9 is Bluetooth Wireless Headset.

The EUT is compliance with Bluetooth Standard revision 2.0. + EDR.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402 – 2480MHz, 79 channels
- B). Rated output power: 4.41dBm Peak
- C). Modulation type: Frequency Hopping Spread Spectrum (FHSS) (GFSK, 8DPSK, $\pi/4$ DQPSK)

D). Antenna Designation: Chip Antenna, 2dBi, Non-User Replaceable (Fixed)

E). Power Supply : 3.7Vdc re-chargeable battery or
5Vdc from AC/DC adaptor, model: NW28-0500150 and DSA-0051-03 FUS or
12V from car charger, model: GS-32(DC12V)

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

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

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.

1.4. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. Site No. 1(3 & 10 meters) Registration Number: 94644, 3m Semi-Anechoic chamber FCC Registration Number: 236194 and Canada Registration Number: 4620A-1.

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 according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

2.4. Configuration of Tested System

Fig. 2-1 Radiated Emission Test Setup

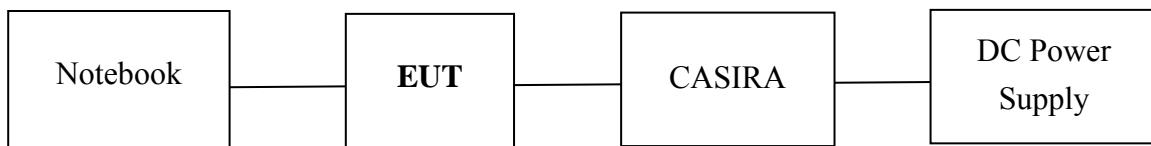


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	Compaq	Presario 2100	CNF345Q1R	Un-shield	Un-shield
2.	CASIRA	CSR	BCES301199/1	8836310305	Un-shield	Un-shield
3.	DC Power Supply	Topward	3303A	715856	Un-shield	Un-shield

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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	Compliant
§15.247(c)	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 GFSK, 8DPSK, $\pi/4$ DQPSK type modulations were chosen for 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.
EMC Analyzer	HP	8594EM	3624A00203	09/02/2007	09/03/2008
EMI Test Receiver	R&S	ESCS30	828985/004	06/09/2007	06/10/2008
Transient Limiter	HP	11947A	3107A02062	09/02/2007	09/03/2008
LISN	Rolf-Heine	NNB-2/16Z	99012	12/31/2006	12/30/2007
LISN	Rolf-Heine	NNB-2/16Z	99013	12/24/2006	12/23/2007
Coaxial Cables	N/A	No. 3, 4	N/A	12/01/2006	12/01/2007

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.

Both adaptor and car charger are tested and the worst case of adaptor NW28-0500150 is reported.

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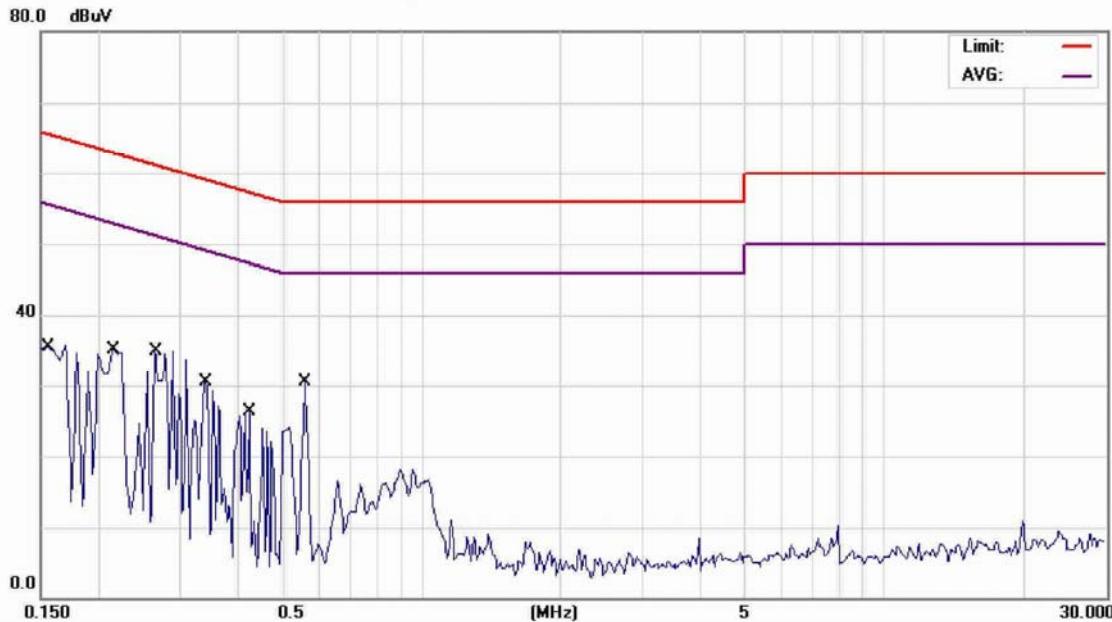
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Charge Mode		Test Date:	Nov. 02, 2007
Temperature:	26 °C	Humidity:	64 %	Test By: Bondi

Conducted Emission Measurement

File :EC-2007-A0003

Data :#6



Site SGS CONDUCTED #1

 Phase: **L1**

Temperature: 24 °C

Limit: CISPR22 Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60 %

EUT: Bluetooth Wireless Headset

Distance:

Air Pressure: hpa

M/N: BOROM#, # is 0 to 9

Note: Charge mode

No.	Mk.	Freq.	Reading	Factor	Measure-	Limit	Over		
			Level		ment		dB	Detector	Comment
			MHz	dBuV	dB	dBuV	dB		
1		0.1550	34.41	1.07	35.48	65.73	-30.25	QP	
2		0.2150	35.15	0.02	35.17	63.01	-27.84	QP	
3		0.2650	34.94	0.02	34.96	61.27	-26.31	QP	
4		0.3400	30.57	0.02	30.59	59.20	-28.61	QP	
5		0.4250	26.27	0.02	26.29	57.35	-31.06	QP	
6	*	0.5600	30.43	0.02	30.45	56.00	-25.55	QP	

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AC POWER LINE CONDUCTED EMISSION TEST DATA

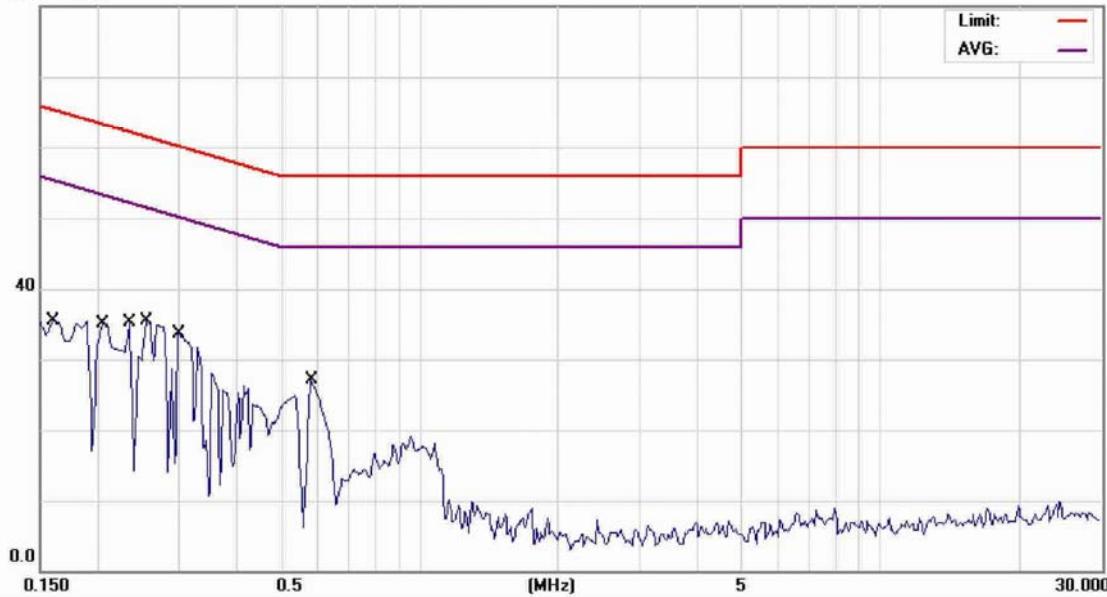
Operation Mode:	Charge Mode		Test Date:	Nov. 02, 2007
Temperature:	26 °C	Humidity:	64 %	Test By:

Conducted Emission Measurement

File :EC-2007-A0003

Data :#7

80.0 dBuV



Site SGS CONDUCTED #1

Phase: **N**

Temperature: 24 °C

Limit: CISPR22 Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60 %

EUT: Bluetooth Wireless Headset

Distance:

Air Pressure: hpa

M/N: BOROM#, # is 0 to 9

Note: Charge mode

No.	Mk.	Freq.	Reading	Factor	Measure-	Limit	Over		
			Level		ment		dBuV	dB	Detector
1		0.1600	35.48	0.00	35.48	65.46	-29.98	QP	
2		0.2050	35.07	0.02	35.09	63.41	-28.32	QP	
3		0.2350	35.34	0.02	35.36	62.27	-26.91	QP	
4	*	0.2550	35.51	0.02	35.53	61.59	-26.06	QP	
5		0.3000	33.73	0.02	33.75	60.24	-26.49	QP	
6		0.5800	27.00	0.02	27.02	56.00	-28.98	QP	

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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 = 1/3MHz)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.3. Measurement Result

GFSK Mode

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	3.24	0.10	3.34	0.00216	1
2441.00	3.73	0.10	3.83	0.00242	1
2480.00	4.31	0.10	4.41	0.00276	1

$\pi/4$ DQPSK Mode

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	1.53	0.10	1.63	0.00146	1
2441.00	1.88	0.10	1.98	0.00158	1
2480.00	1.86	0.10	1.96	0.00157	1

8DPSK Mode

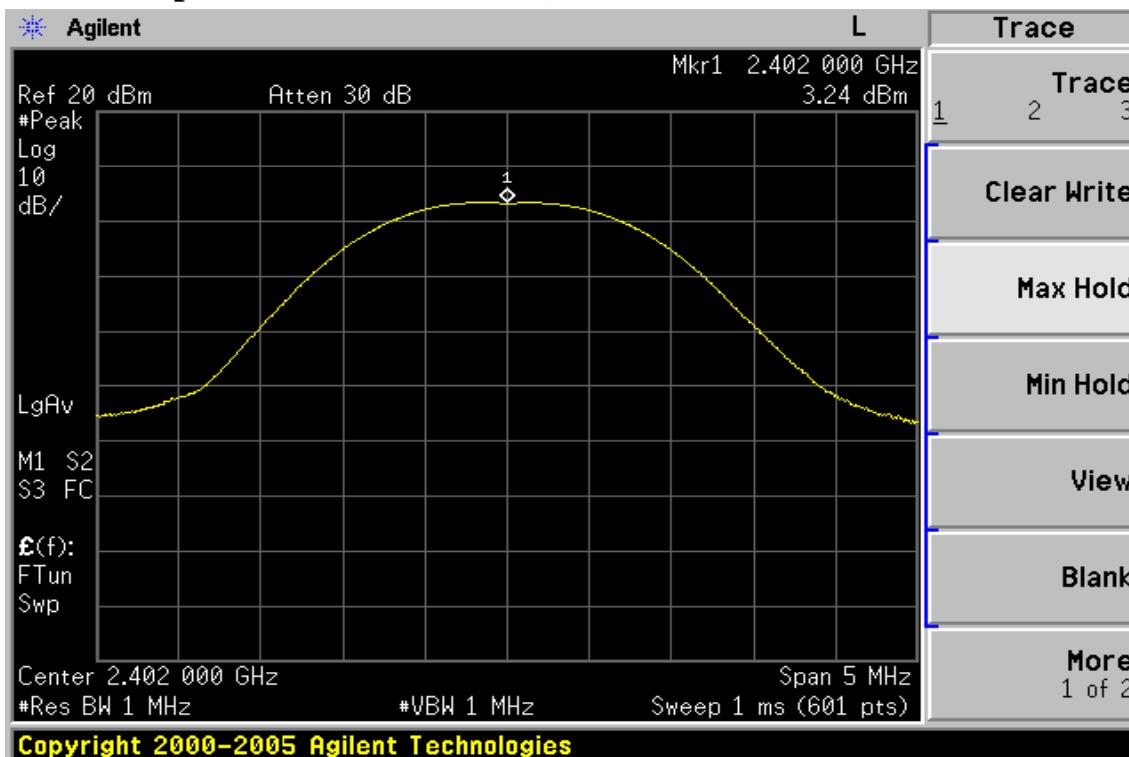
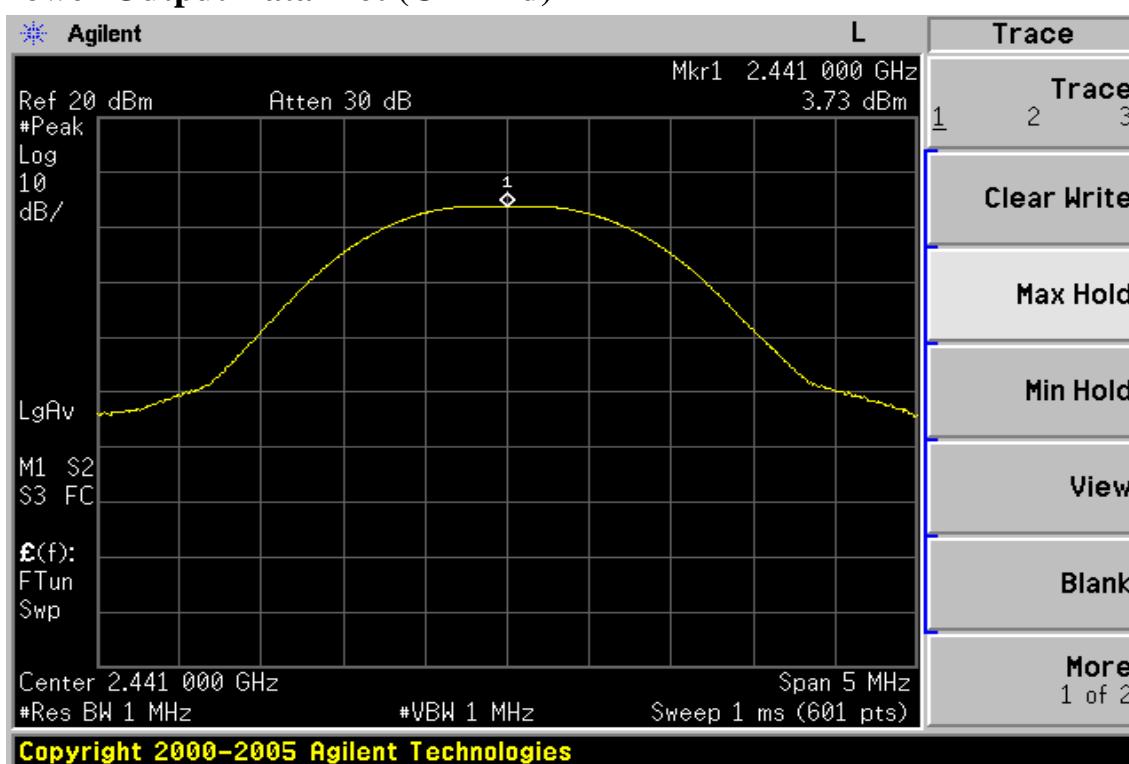
Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	1.79	0.10	1.89	0.00155	1
2441.00	2.20	0.10	2.30	0.00170	1
2480.00	2.22	0.10	2.32	0.00171	1

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6.4. Measurement Equipment Used:

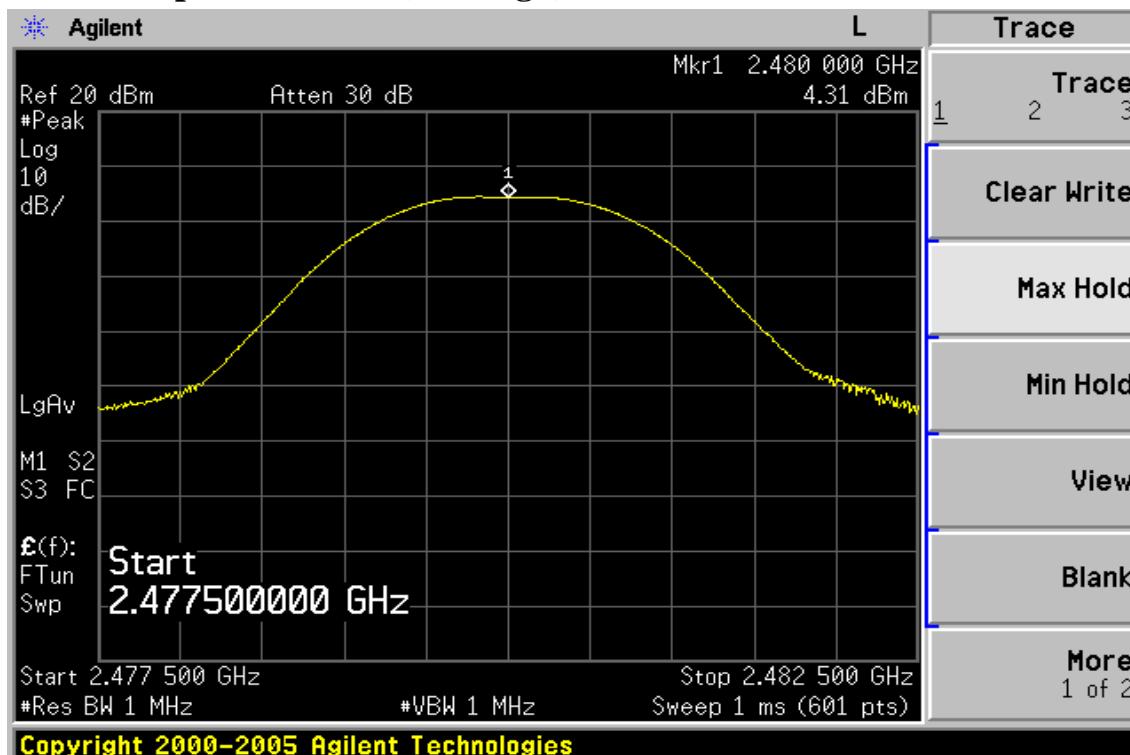
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2006	11/10/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

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GFSK Mode
Peak Power Output Data Plot (CH Low)

Peak Power Output Data Plot (CH Mid)


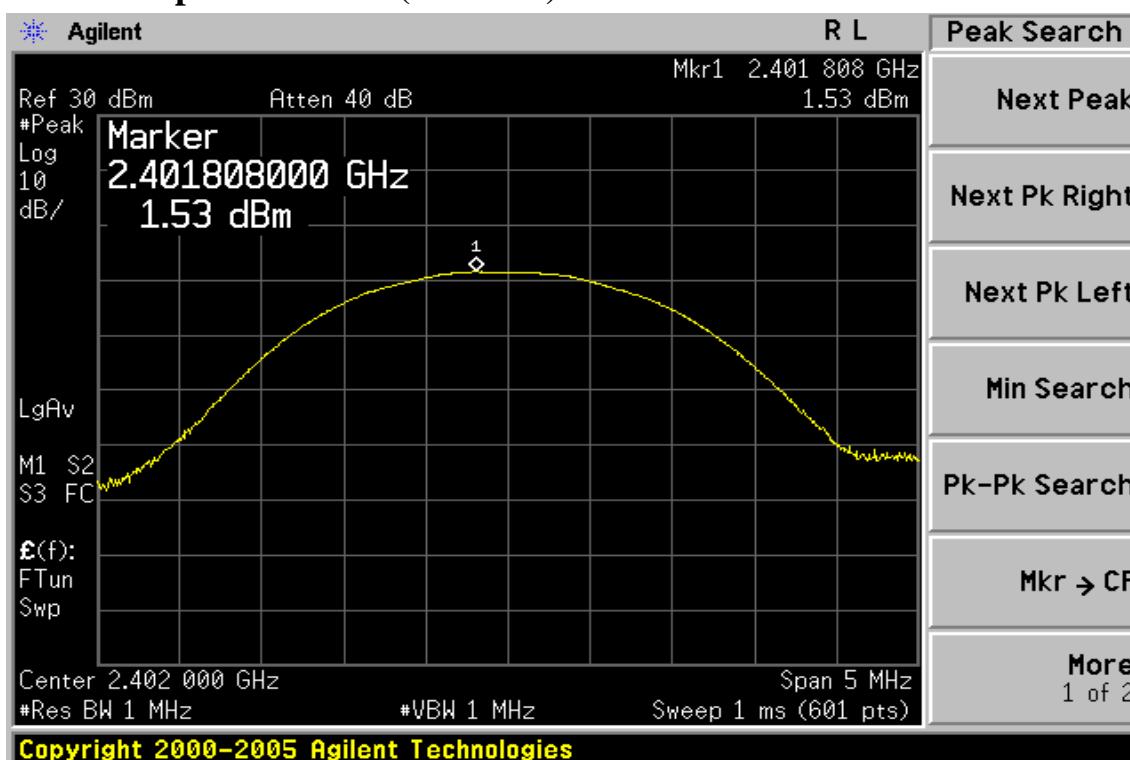
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Peak Power Output Data Plot (CH High)



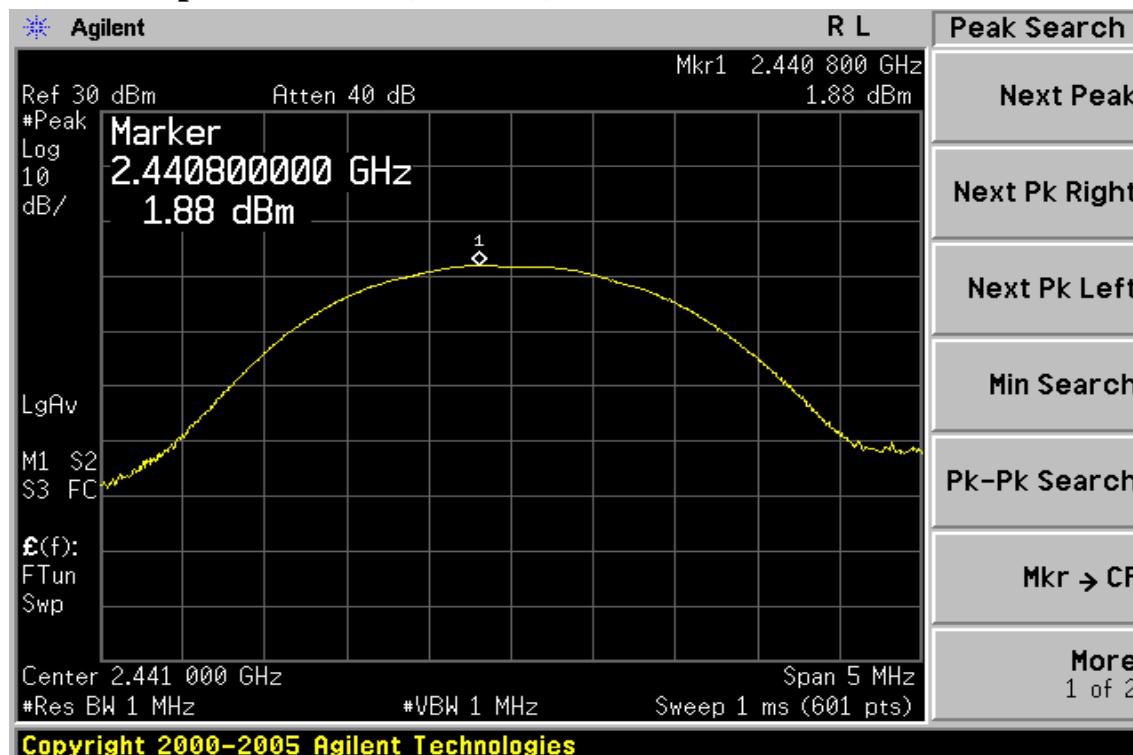
$\pi/4$ DQPSK Mode

Peak Power Output Data Plot (CH Low)

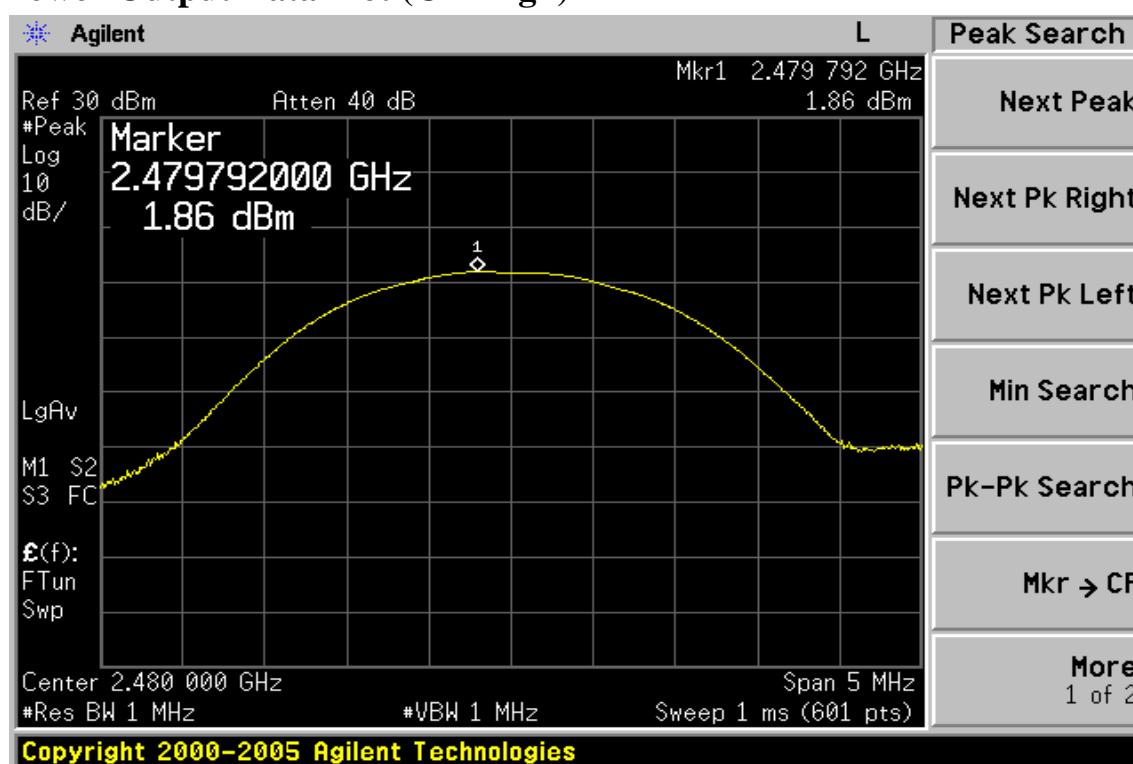


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Peak Power Output Data Plot (CH Mid)



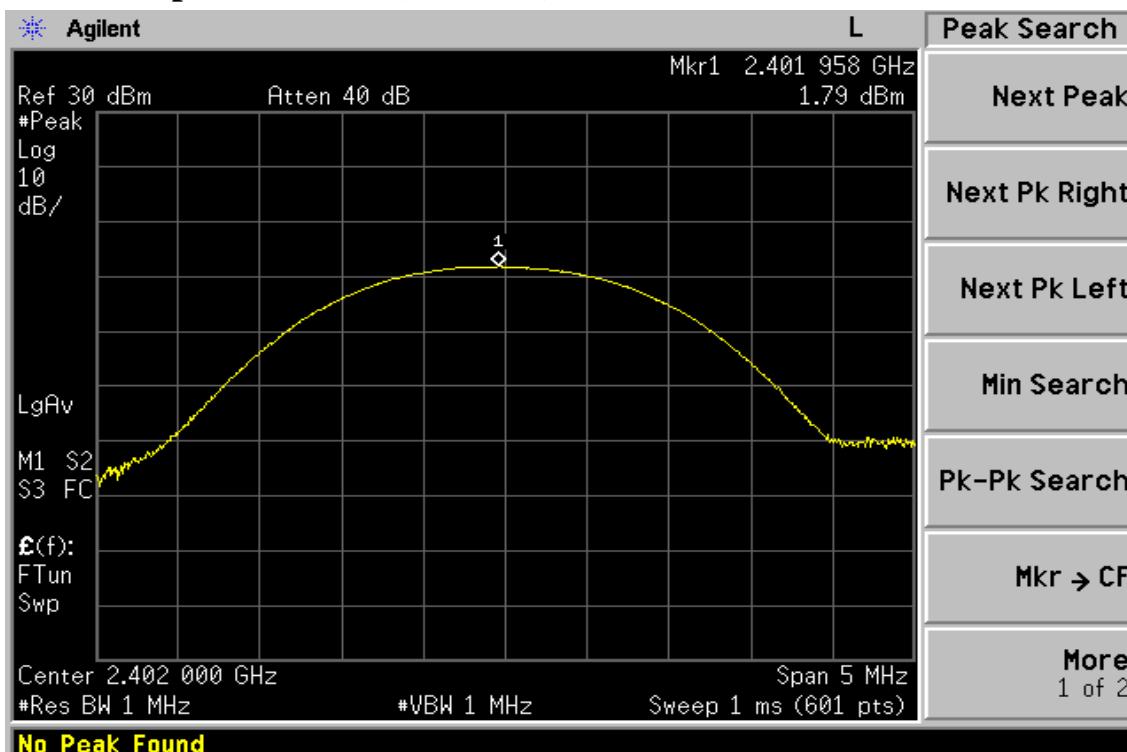
Peak Power Output Data Plot (CH High)



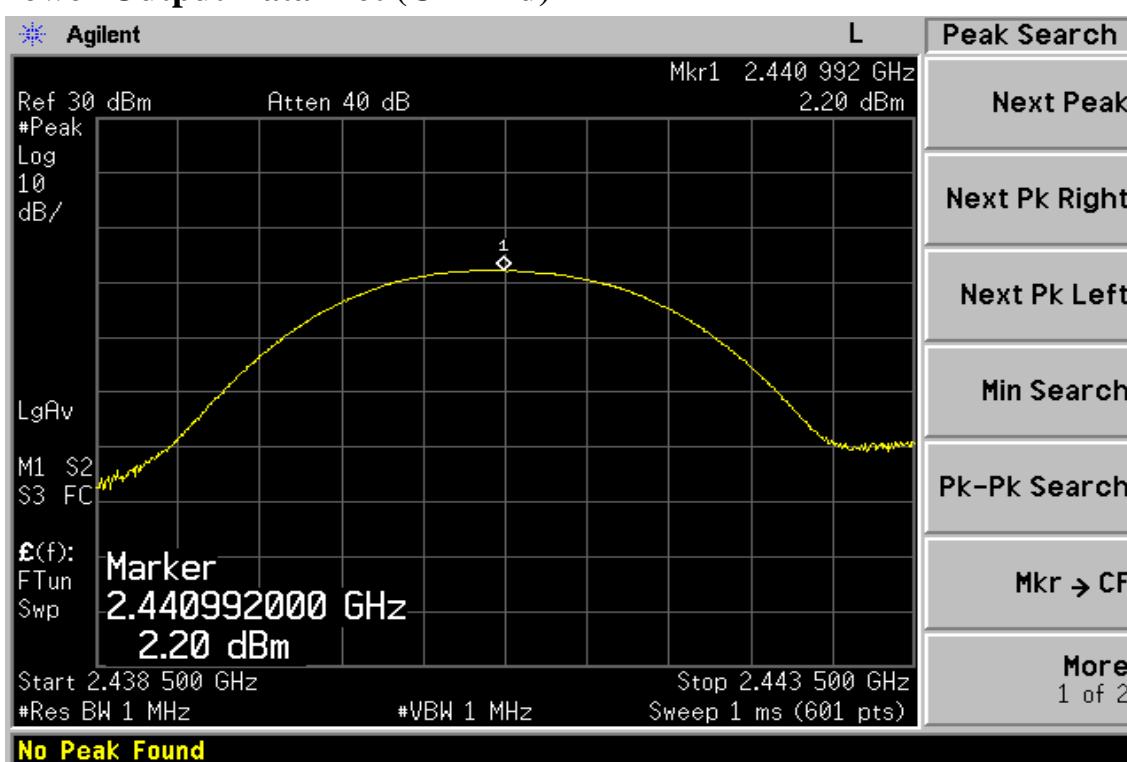
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8DPSK Mode

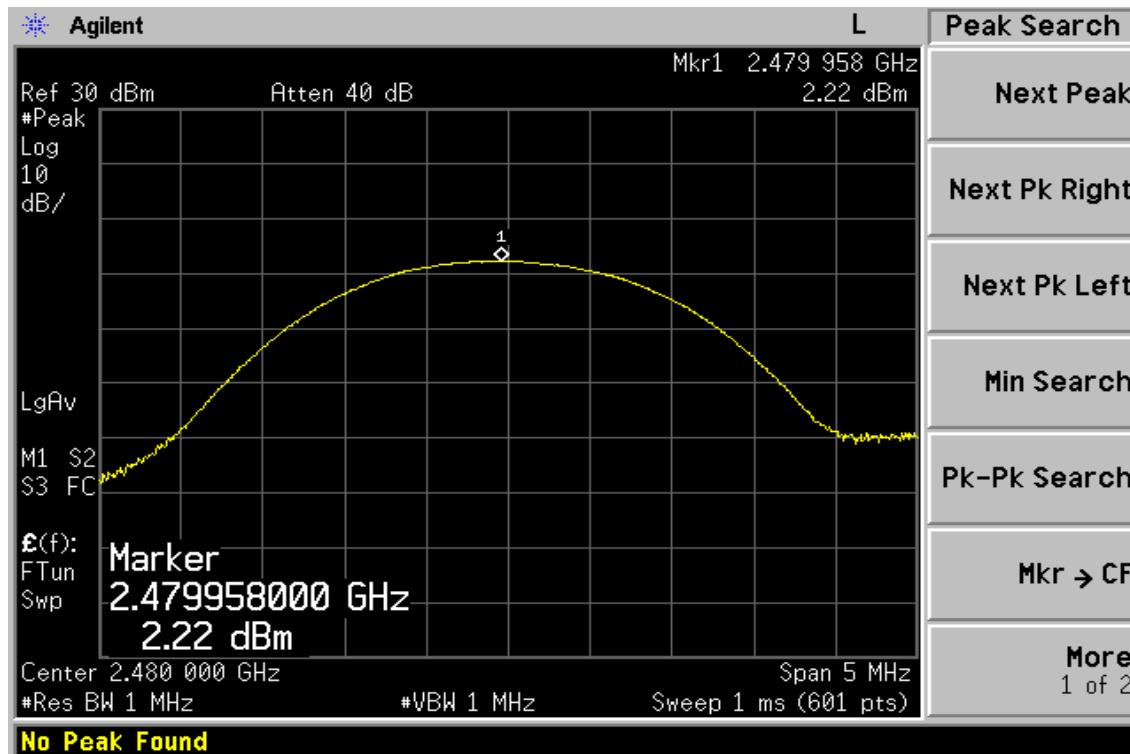
Peak Power Output Data Plot (CH Low)



Peak Power Output Data Plot (CH Mid)



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Peak Power Output Data Plot (CH High)

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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

GFSK Mode

CH	Bandwidth (MHz)
Lower	0.949
Mid	0.948
Higher	0.947

$\pi/4$ DQPSK Mode

CH	Bandwidth (MHz)	2/3*Bandwidth (MHz)
Lower	1.236	0.824
Mid	1.240	0.826
Higher	1.237	0.824

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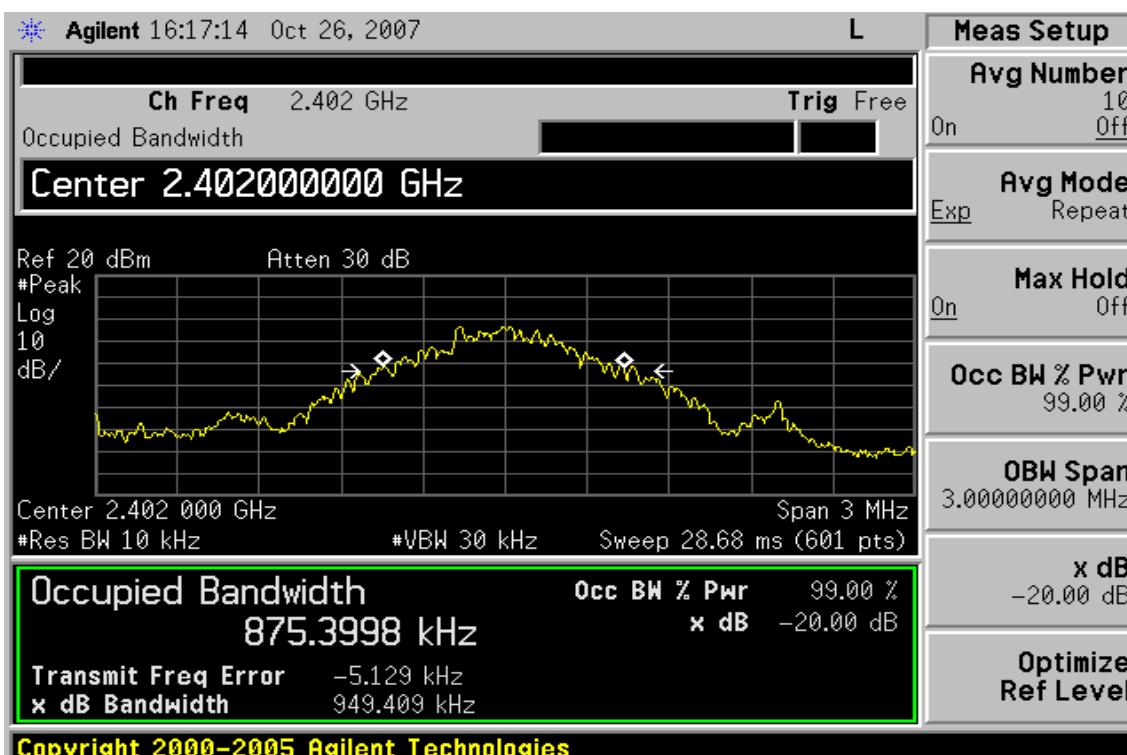
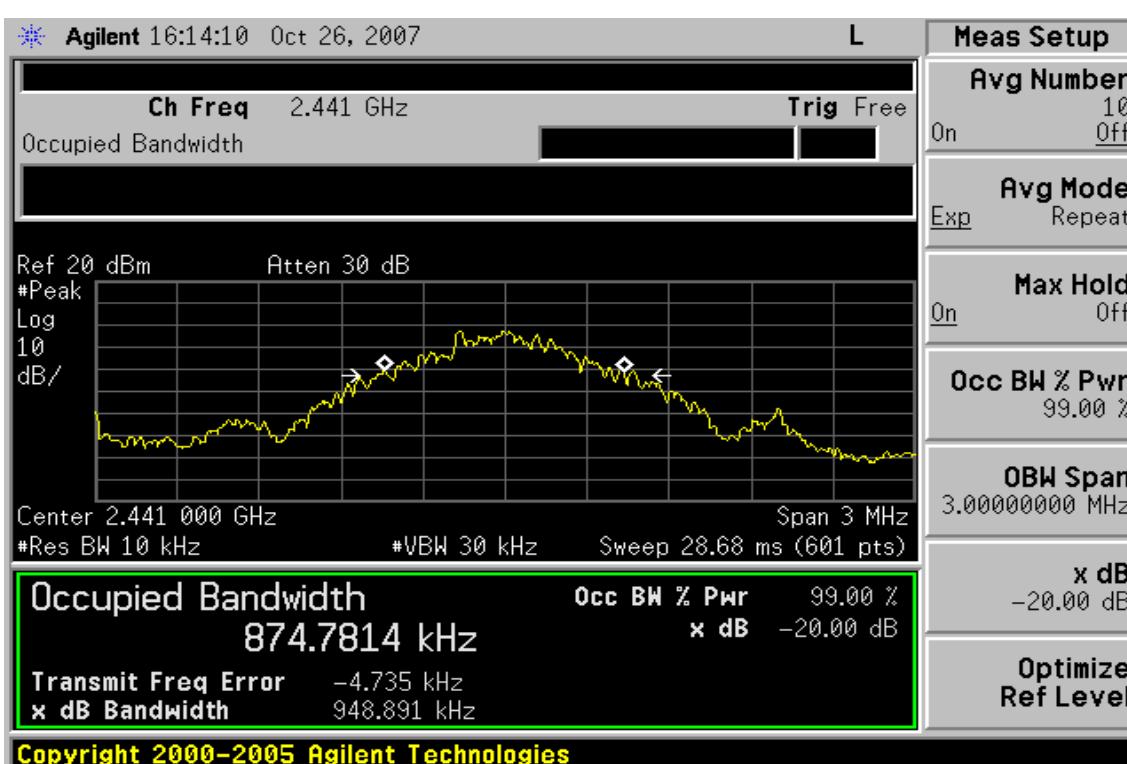
8DPSK Mode

CH	Bandwidth (MHz)	2/3*Bandwidth (MHz)
Lower	1.260	0.840
Mid	1.258	0.838
Higher	1.261	0.840

7.4. Measurement Equipment Used:

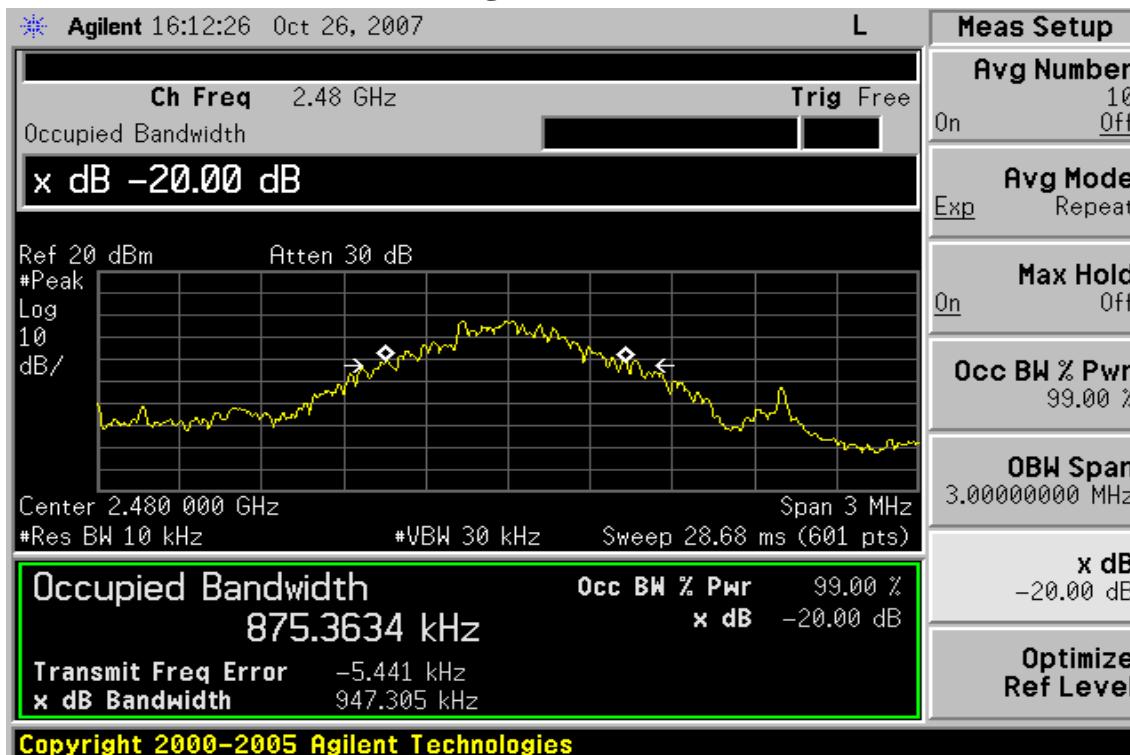
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2006	11/10/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

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GFSK Mode
20dB Band Width Test Data CH-Low

20dB Band Width Test Data CH-Mid


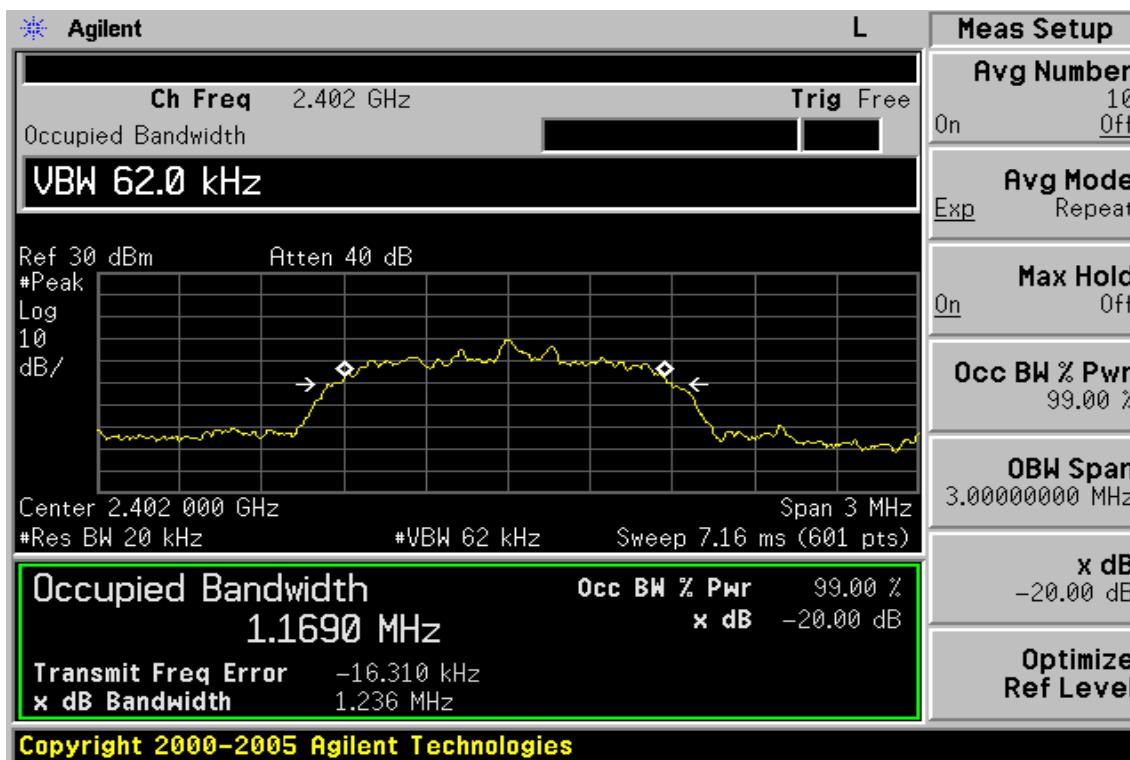
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20dB Band Width Test Data CH-High



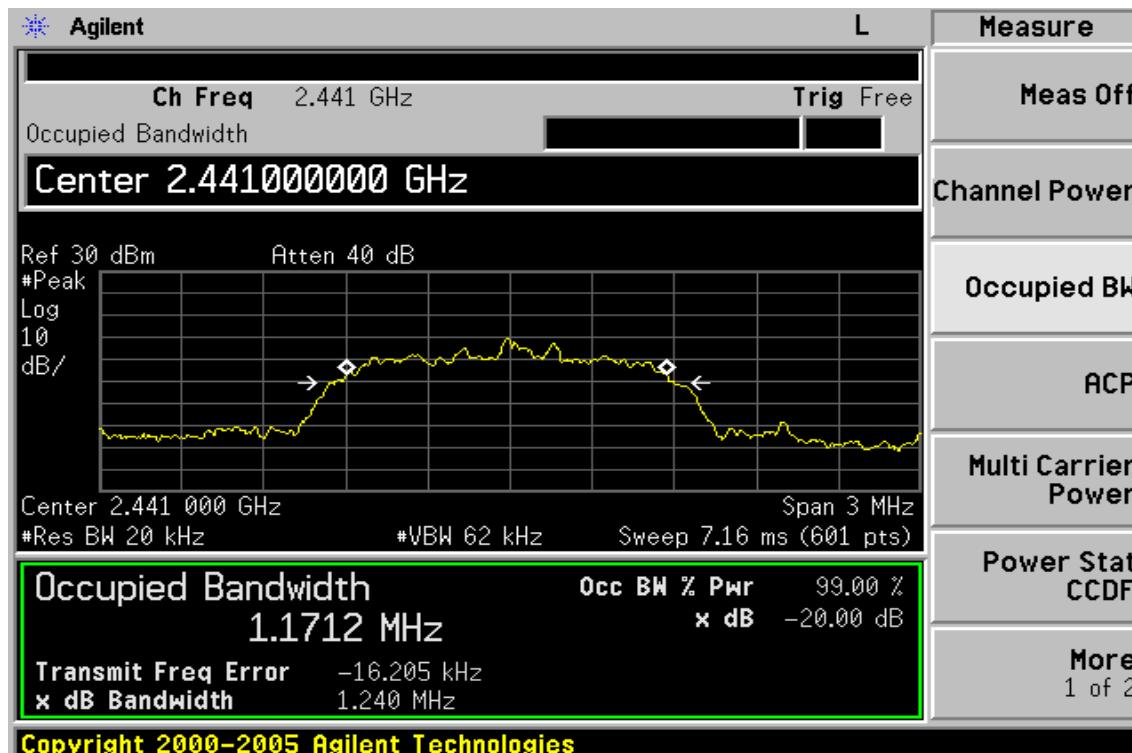
$\pi/4$ DQPSK Mode

20dB Band Width Test Data CH-Low

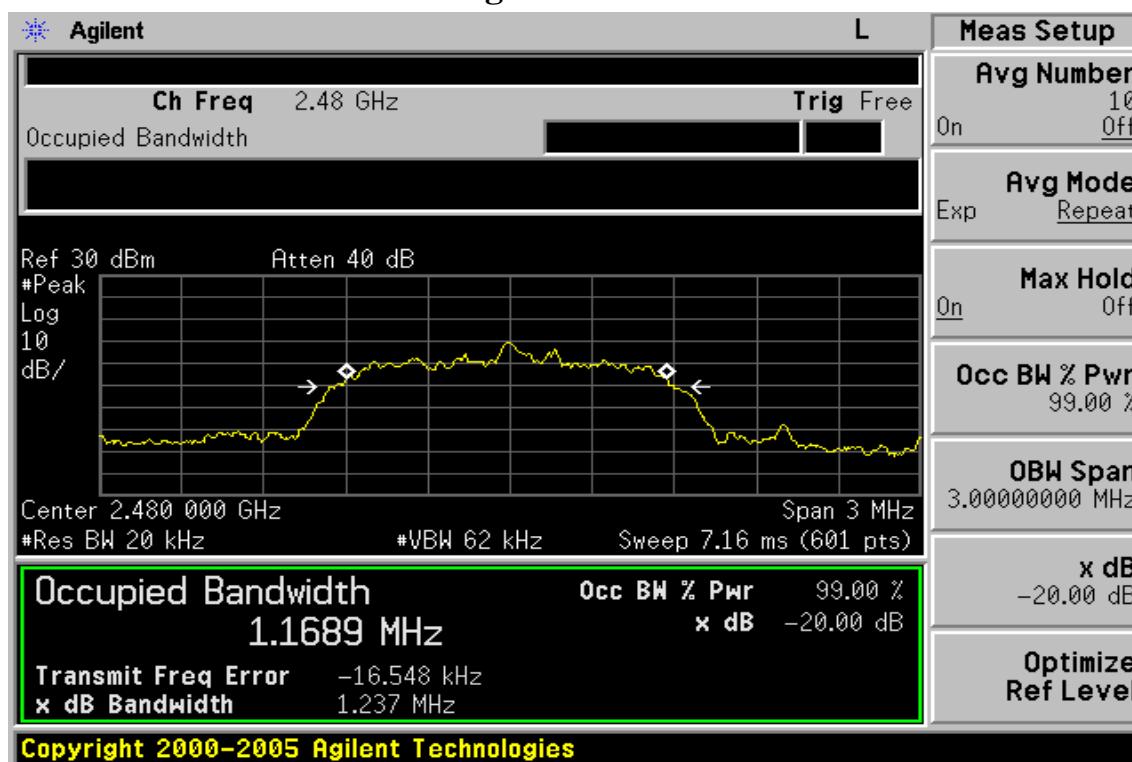


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20dB Band Width Test Data CH-Mid



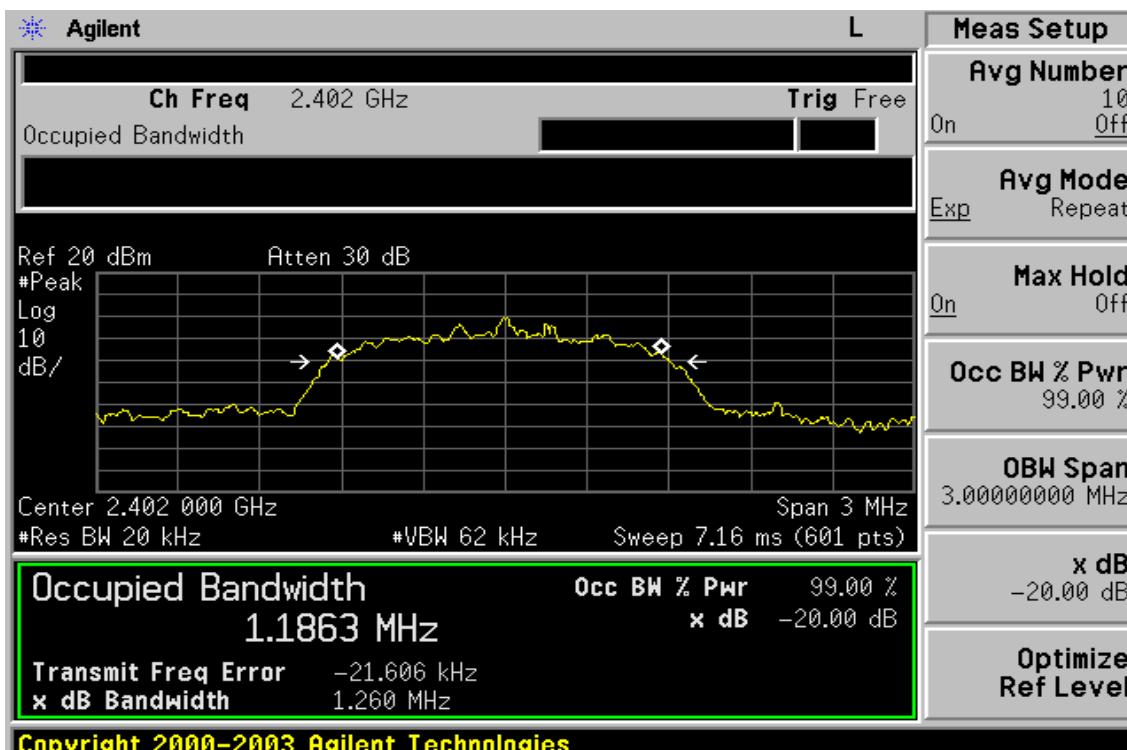
20dB Band Width Test Data CH-High



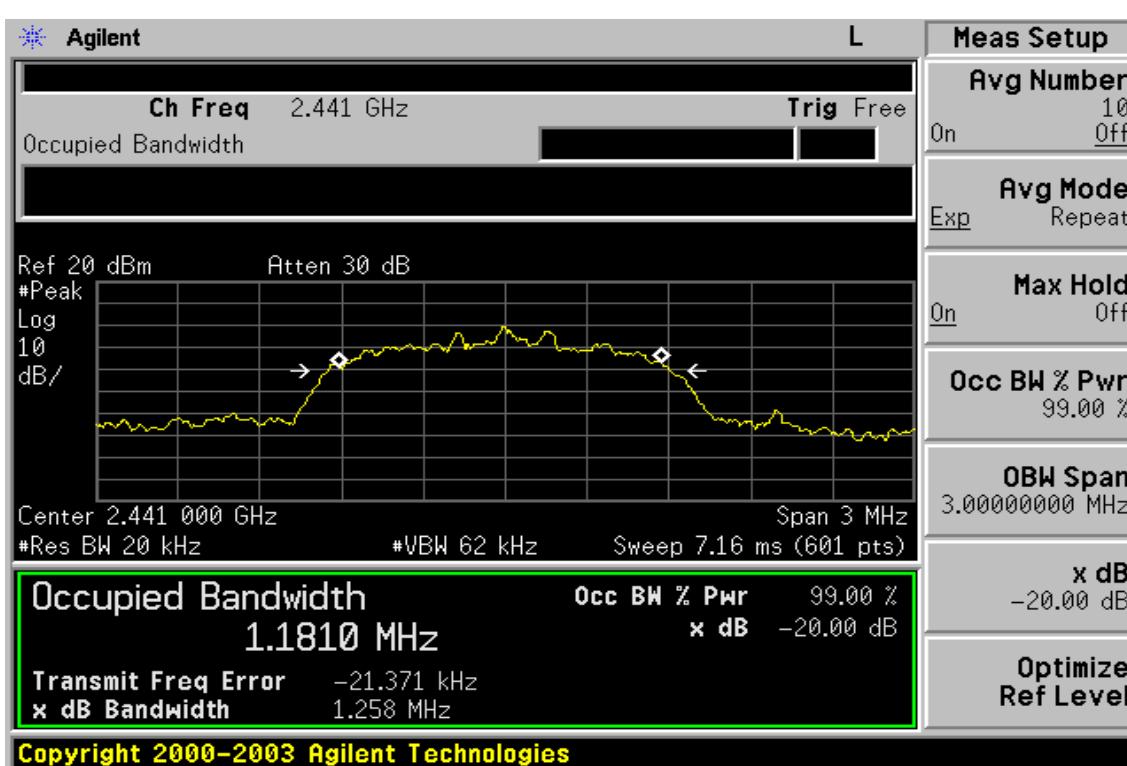
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8DPSK Mode

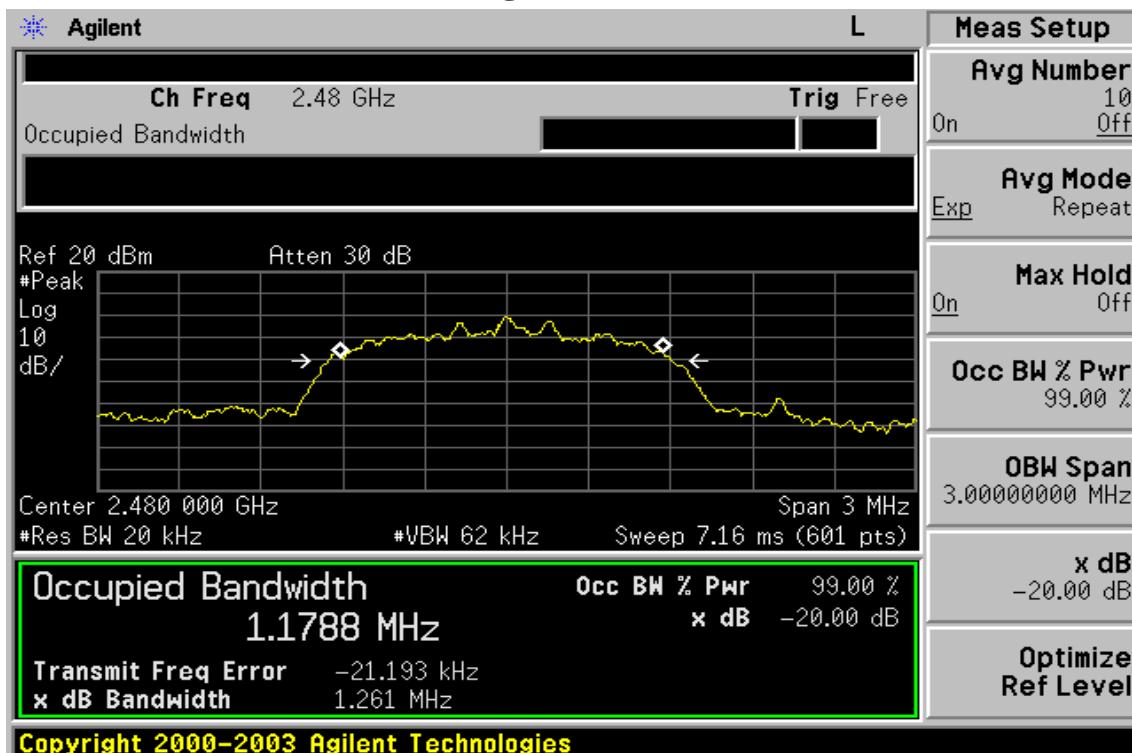
20dB Band Width Test Data CH-Low



20dB Band Width Test Data CH-Mid



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20dB Band Width Test Data CH-High

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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:

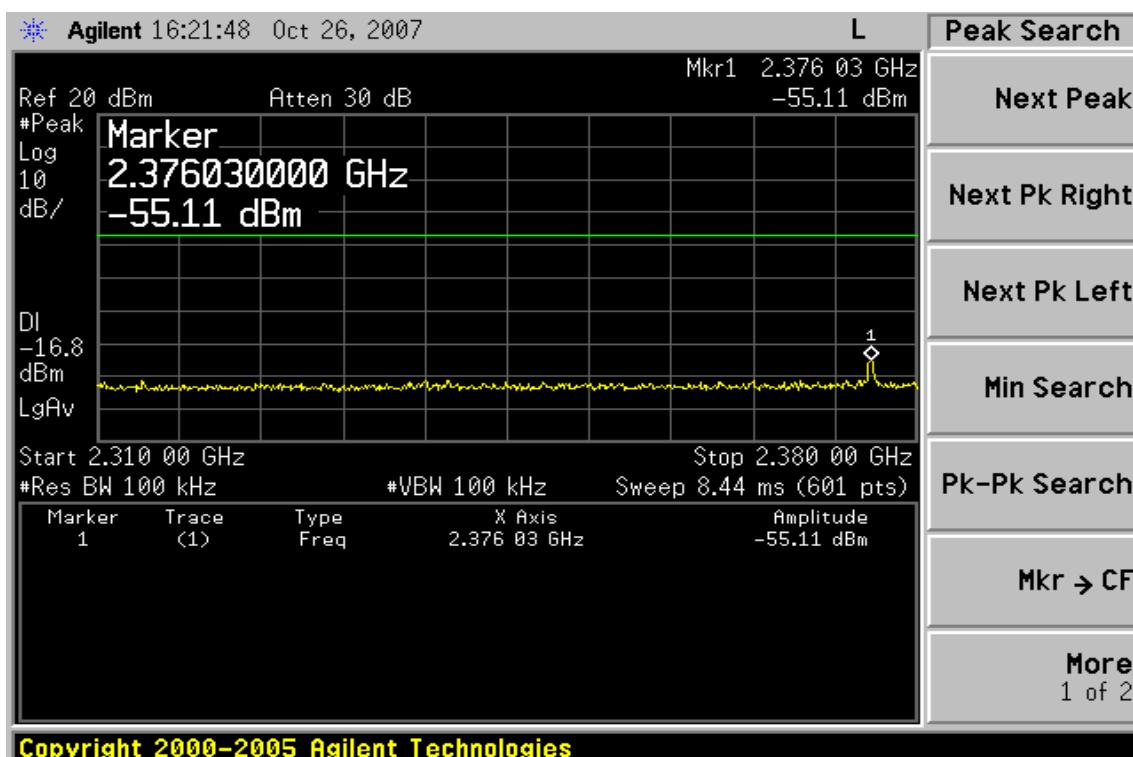
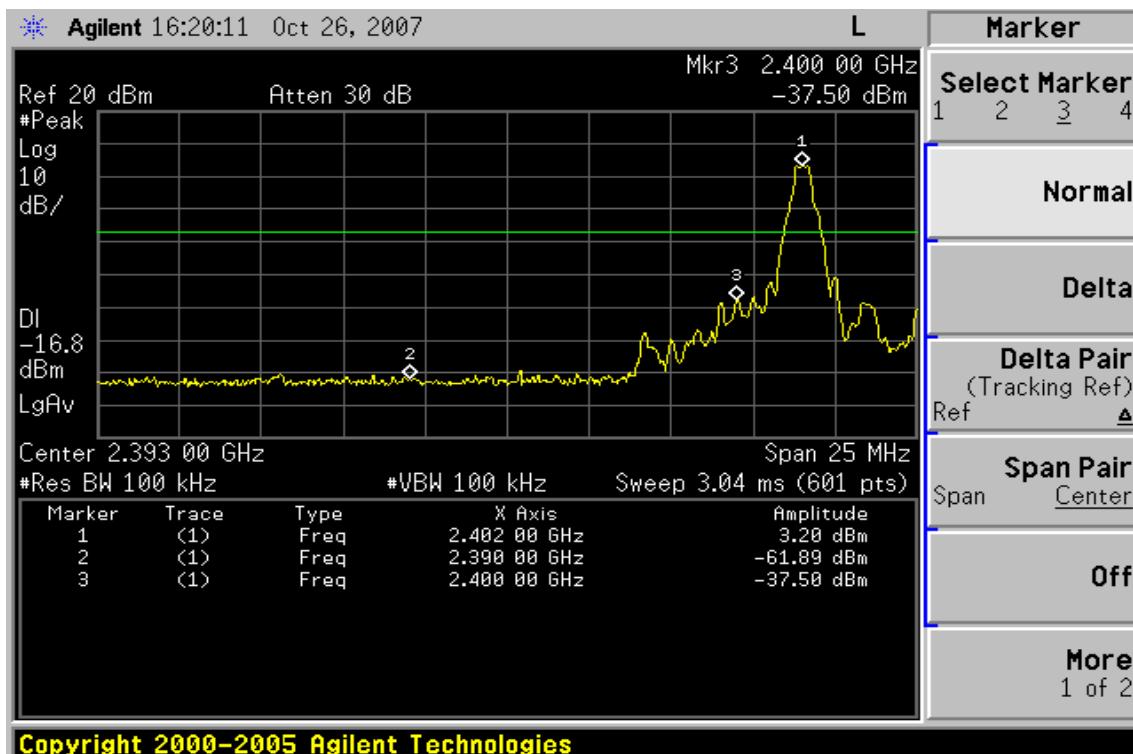
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2007	11/10/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

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

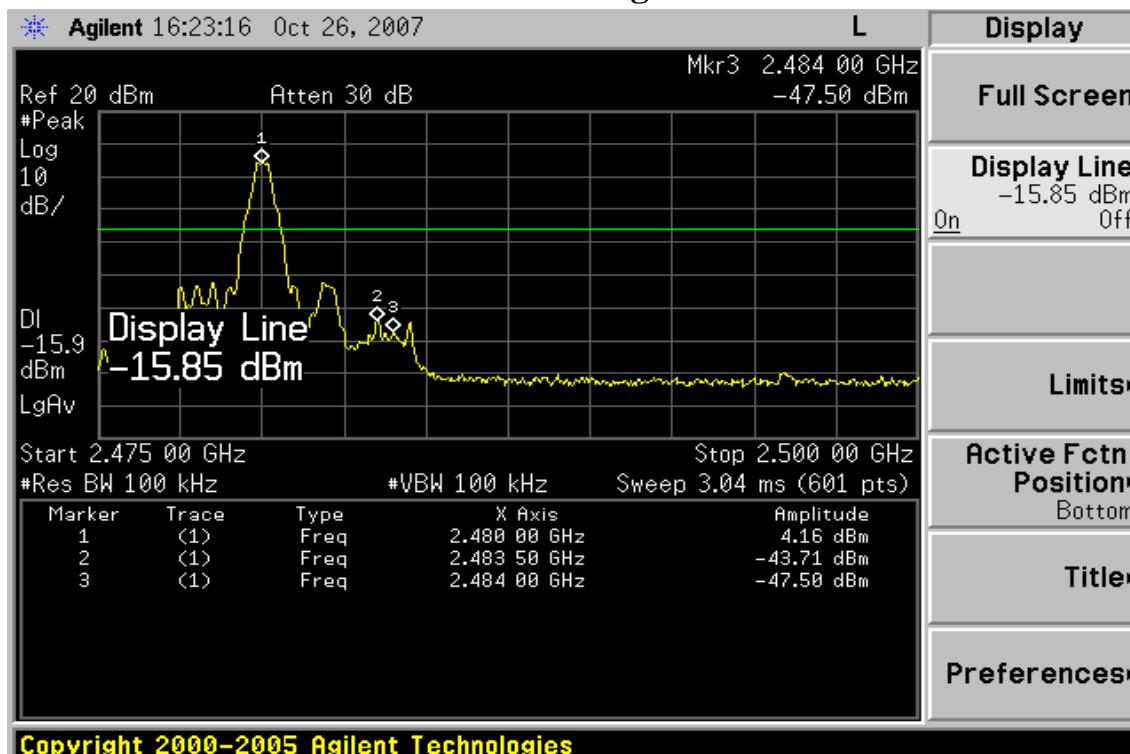
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The worst mode: GFSK mode

Conducted Emission: Test Data CH-Low



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Conducted Emission: Test Data CH-High

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台灣檢驗科技股份有限公司 t (886-2) 2299-3939 f (886-2) 2298-2698 www.sgs.com.tw

Radiated Emission: worst mode, GFSK

Operation Mode	TX CH Low	Test Date	Nov. 01, 2007
Fundamental Frequency	2402 MHz	Test By	Bondi
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)	Margin (dB)			
2390.0	33.62	---		-1.39	32.23	---	74.00	54.00	-21.77	Peak		

Operation Mode	TX CH Low	Test Date	Nov. 01, 2007
Fundamental Frequency	2402 MHz	Test By	Bondi
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)	Margin (dB)			
2390.0	33.77	---		-1.39	32.38	---	74.00	54.00	-21.62	Peak		

Remark :

- (1) Datas 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 mode, GFSK

Operation Mode	TX CH High	Test Date	Nov. 01, 2007
Fundamental Frequency	2480 MHz	Test By	Bondi
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)			
2483.5	41.54	----	-0.92	40.62	----	74.00	54.00	-13.38 Peak
2484.0	39.18	----	-0.92	38.26	----	74.00	54.00	-15.74 Peak

Operation Mode	TX CH High	Test Date	Nov. 01, 2007
Fundamental Frequency	2480 MHz	Test By	Bondi
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)			
2483.5	39.82	----	-0.92	38.90	----	74.00	54.00	-15.10 Peak
2484.0	37.65	----	-0.92	36.73	----	74.00	54.00	-17.27 Peak

Remark :

- (1) Datas 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 o.
- (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.

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.

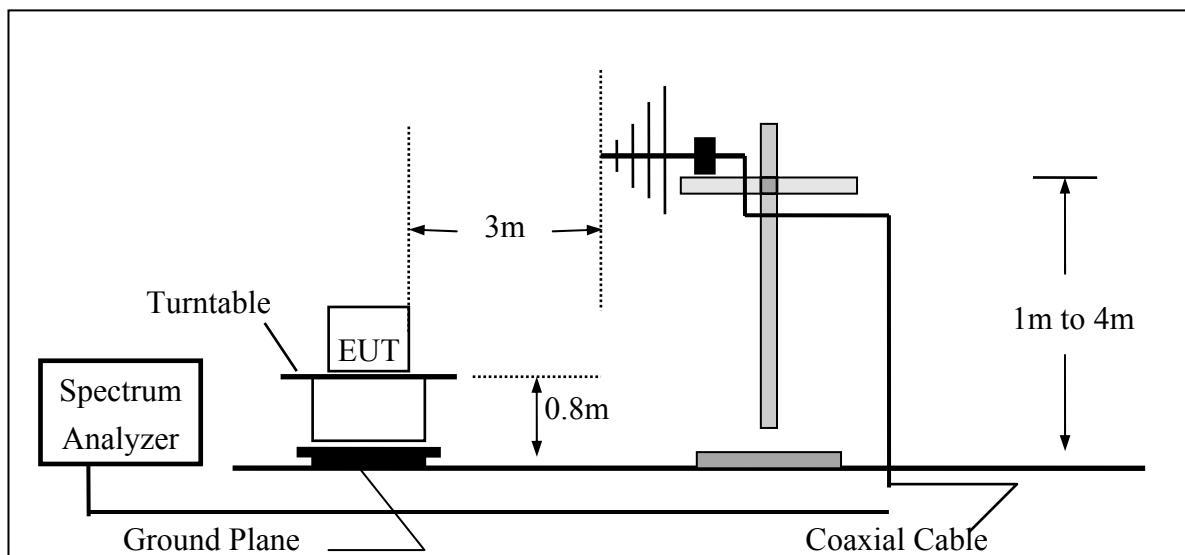
9.3. Measurement Procedure

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. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

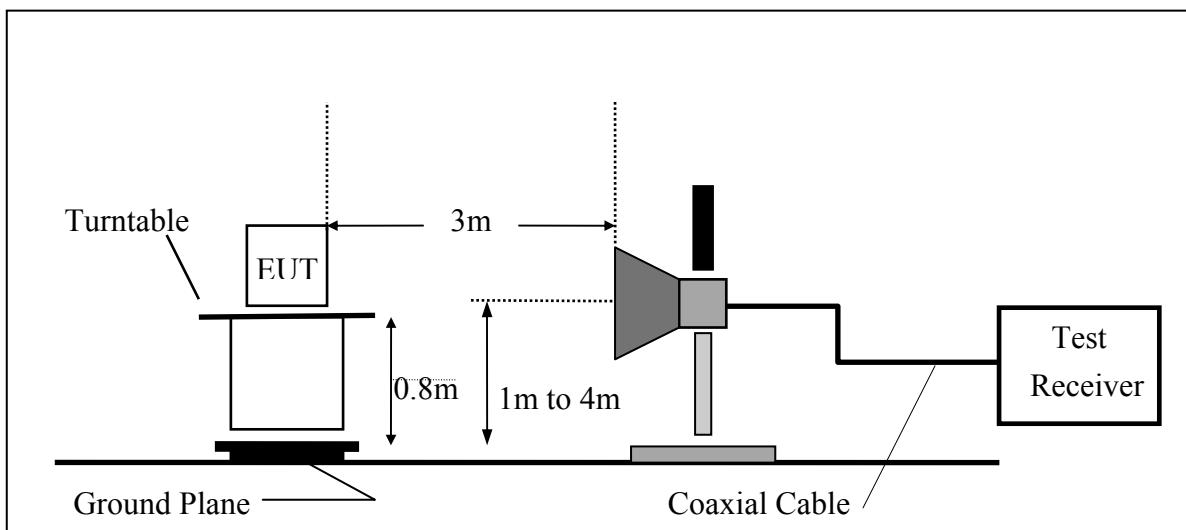
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9.4. Test SET-UP (Block Diagram of Configuration)

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



(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	05/27/2007	05/26/2008
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2007	08/26/2008
Bi-log Antenna	SCHWAZBECK	VULB9163	152	06/03/2007	06/02/2008
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2007	08/15/2008
Horn antenna	Schwarzbeck	BBHA 9170	184/185	07/04/2007	07/03/2008
Pre-Amplifier	HP	8447D	2944A09469	07/19/2007	07/18/2008
Pre-Amplifier	HP	8494B	3008A00578	02/26/2007	02/25/2008
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	10/09/2007	10/08/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2007	10/08/2008
Site NSA	SGS	966 chamber	N/A	11/17/2007	11/16/2008

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	

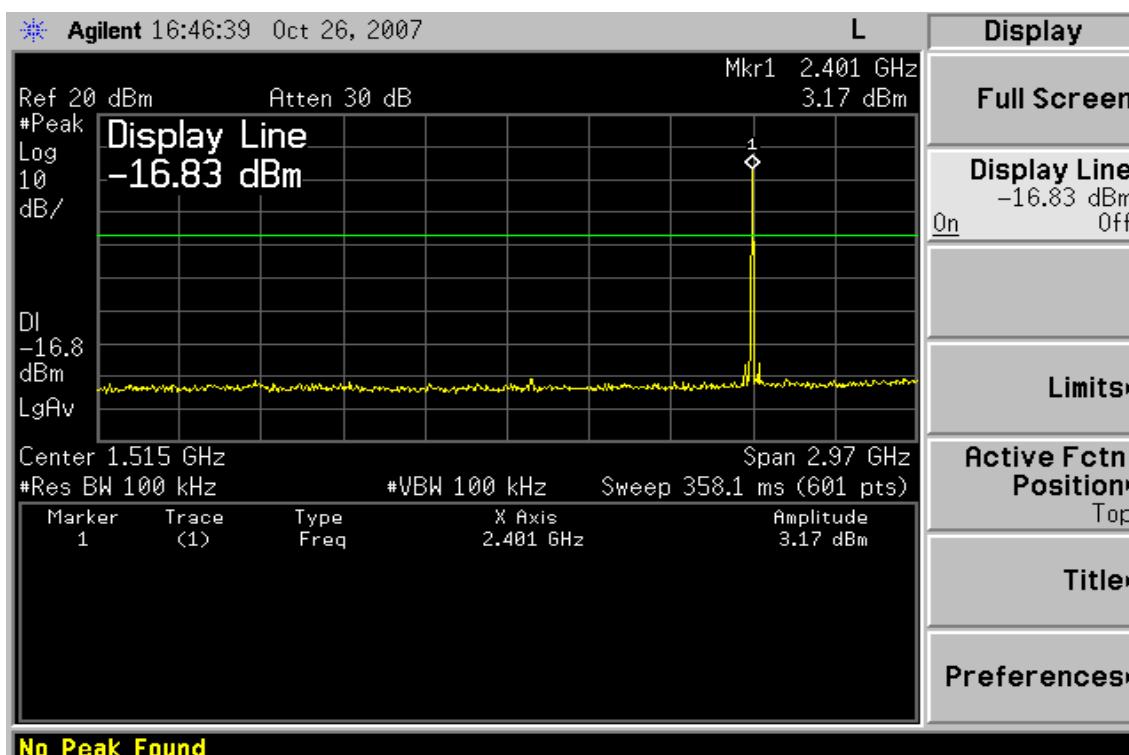
9.7. Measurement Result

Refer to attach tabular data sheets.

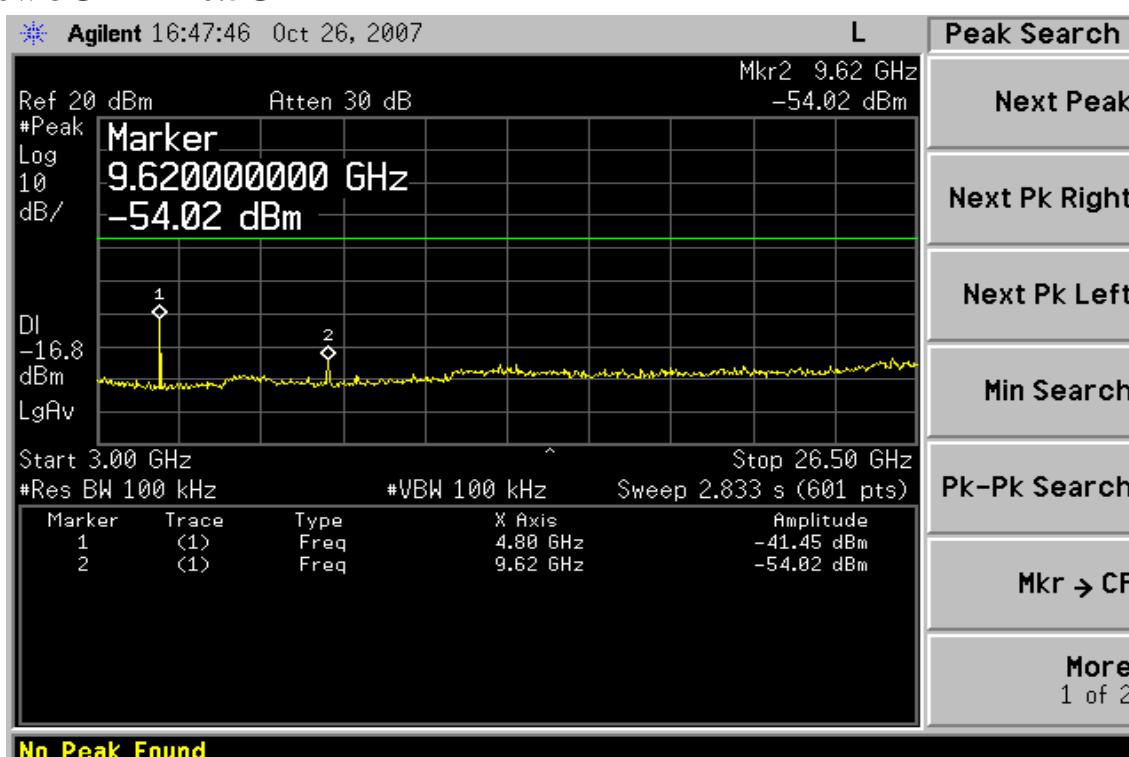
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Conducted Spurious Emission Measurement Result, worst mode, GFSK

Ch Low 30MHz – 3GHz

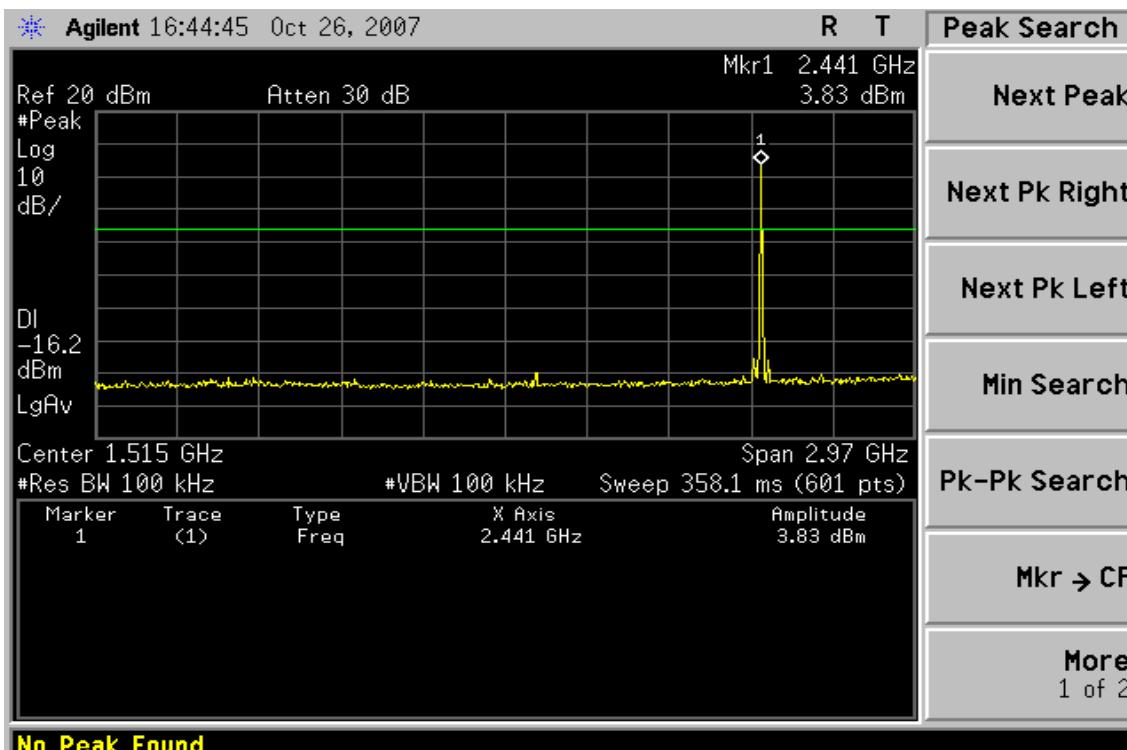


Ch Low 3GHz – 26.5GHz

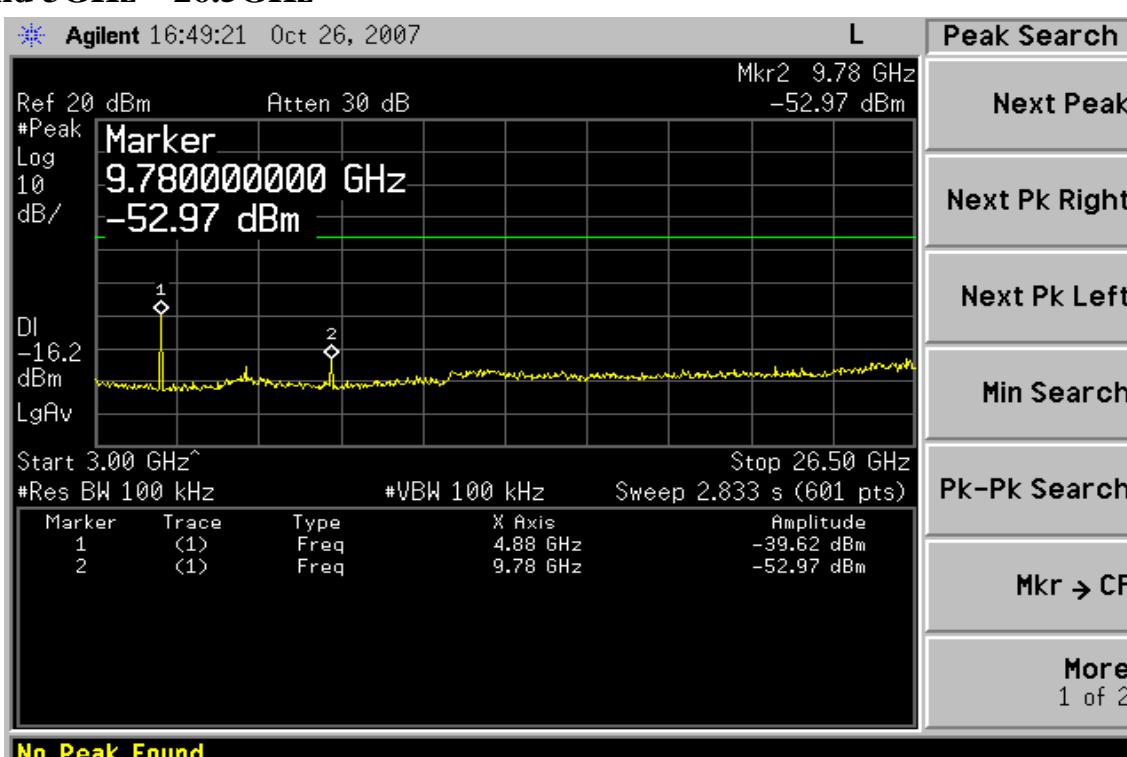


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Ch Mid 30MHz – 3GHz

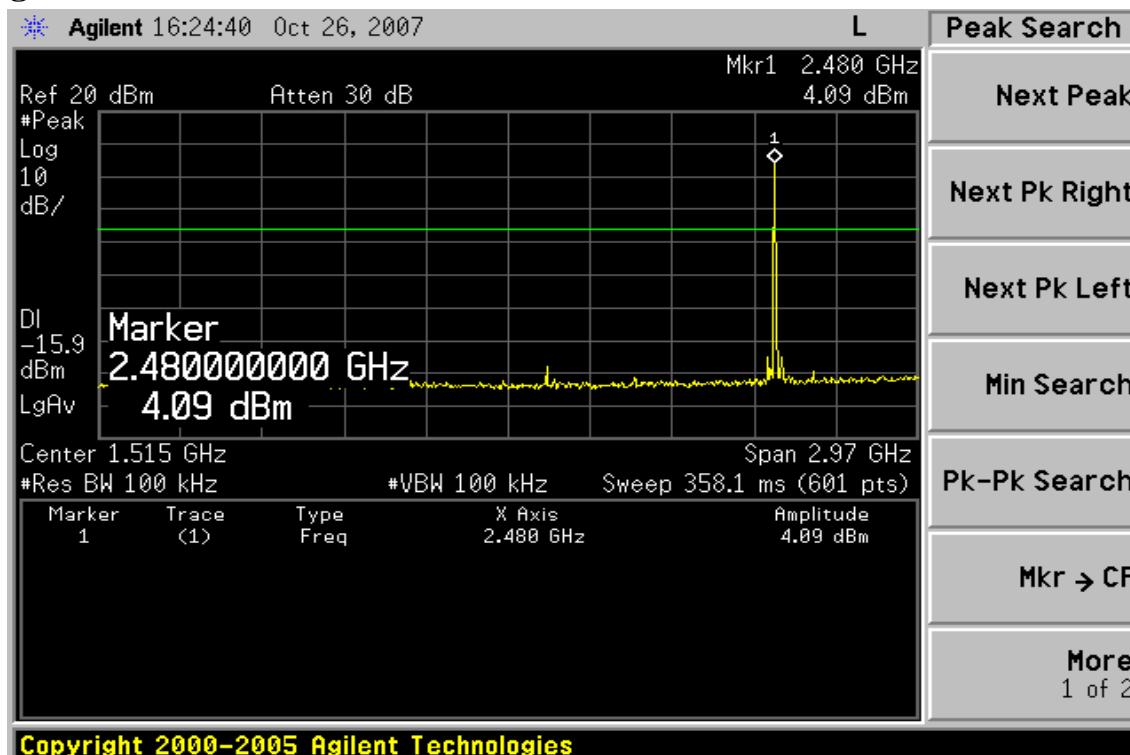


Ch Mid 3GHz – 26.5GHz

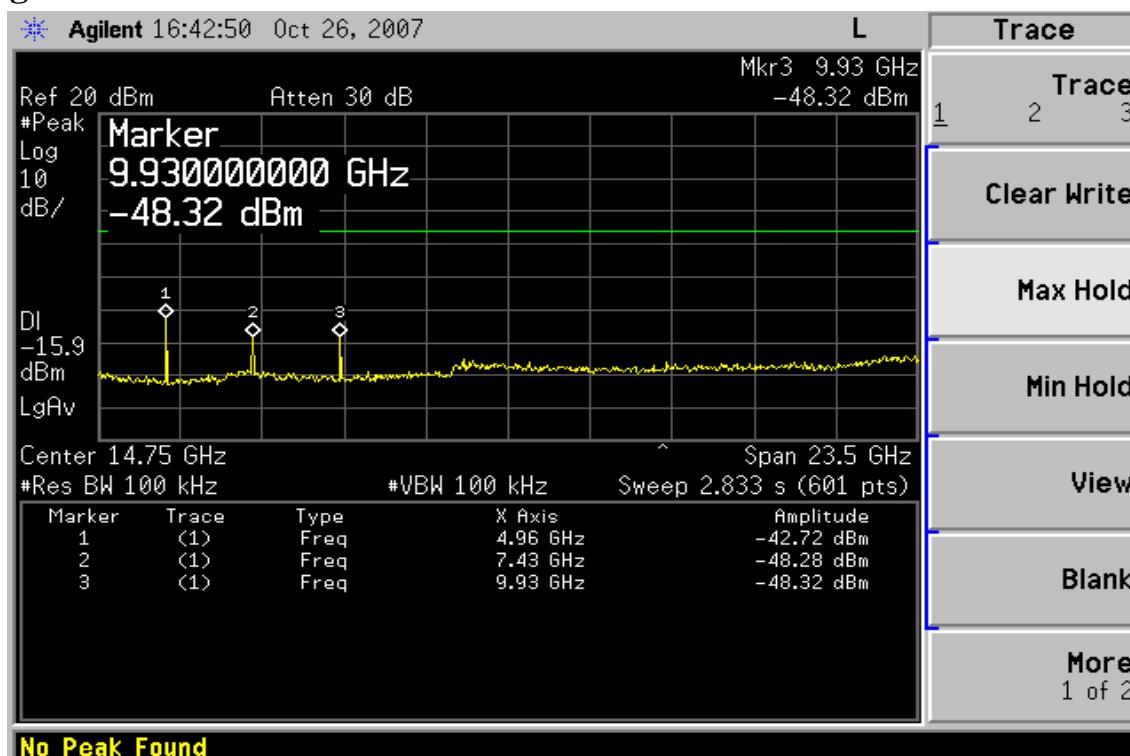


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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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Radiated Spurious Emission Measurement Result (below 1GHz) , worst mode, GFSK

Operation Mode	TX CH Low	Test Date	Nov. 01, 2007
Fundamental Frequency	2402MHz	Test By	Bondi
Temperature	25 °C	Pol	Ver./Hor.
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
92.08	V	Peak	47.35	-17.38	29.97	43.50	-13.53
196.84	V	Peak	41.40	-15.51	25.89	43.50	-17.61
232.73	V	Peak	40.71	-14.37	26.34	46.00	-19.66
458.74	V	Peak	40.50	-8.61	31.89	46.00	-14.11
92.08	H	Peak	47.21	-17.38	29.83	43.50	-13.67
101.78	H	Peak	45.04	-16.87	28.17	43.50	-15.33
232.73	H	Peak	34.87	-14.37	20.50	46.00	-25.50
460.68	H	Peak	35.24	-8.61	26.63	46.00	-19.37
623.64	H	Peak	33.76	-5.51	28.25	46.00	-17.75

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 Datas 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) , worst mode, GFSK

Operation Mode	TX CH Mid	Test Date	Nov. 01, 2007
Fundamental Frequency	2441MHz	Test By	Bondi
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
92.08	V	Peak	47.59	-17.38	30.21	43.50	-13.29
164.83	V	Peak	36.36	-13.70	22.66	43.50	-20.84
232.73	V	Peak	39.63	-14.37	25.26	46.00	-20.74
431.58	V	Peak	37.03	-9.09	27.94	46.00	-18.06
623.64	V	Peak	33.60	-5.51	28.09	46.00	-17.91
92.08	H	Peak	45.35	-17.38	27.97	43.50	-15.53
164.83	H	Peak	40.51	-13.69	26.82	43.50	-16.68
196.84	H	Peak	42.18	-15.51	26.67	43.50	-16.83
232.73	H	Peak	46.99	-14.37	32.62	46.00	-13.38
455.83	H	Peak	40.90	-8.61	32.29	46.00	-13.71
623.64	H	Peak	38.62	-5.51	33.11	46.00	-12.89

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 Datas 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) , worst mode, GFSK

Operation Mode	TX CH High	Test Date	Nov. 01, 2007
Fundamental Frequency	2480MHz	Test By	Bondi
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
92.08	V	Peak	45.49	-17.38	28.11	43.50	-15.39
153.19	V	Peak	33.02	-13.00	20.02	43.50	-23.48
201.69	V	Peak	34.88	-15.55	19.33	43.50	-24.17
366.59	V	Peak	35.17	-11.17	24.00	46.00	-22.00
453.89	V	Peak	34.77	-8.60	26.17	46.00	-19.83
528.58	V	Peak	35.23	-8.02	27.21	46.00	-18.79
96.93	H	Peak	44.70	-17.16	27.54	43.50	-15.96
167.74	H	Peak	37.33	-13.85	23.48	43.50	-20.02
196.84	H	Peak	41.33	-15.51	25.82	43.50	-17.68
460.68	H	Peak	39.12	-8.61	30.51	46.00	-15.49
543.13	H	Peak	39.23	-7.74	31.49	46.00	-14.51
623.64	H	Peak	38.60	-5.51	33.09	46.00	-12.91

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 Datas 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) , worst mode, GFSK

Operation Mode	TX CH Low	Test Date	Nov. 01, 2007
Fundamental Frequency	2402 MHz	Test By	Bondi
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV	Actual FS			Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	
1598.0	42.89	--	-5.48	37.41	--	74.00	54.00	-16.59 Peak
4796.0	51.31	39.62	5.99	57.30	45.61	74.00	54.00	-8.39 Peak
4804.0	----							
7206.0	----							
9608.0	----							
12010.0	----							
14412.0	----							
16814.0	----							
19216.0	----							
21618.0	----							
24020.0	----							

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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) , worst mode, GFSK

Operation Mode	TX CH Low	Test Date	Nov. 01, 2007
Fundamental Frequency	2402 MHz	Test By	Bondi
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)		
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)				
1598.0	45.31	--	-5.48	39.83	--	74.00	54.00	-14.17	Peak
4796.0	56.13	42.03	5.99	62.12	48.02	74.00	54.00	-5.98	AV
4804.0	----								
7206.0	----								
9608.0	----								
12010.0	----								
14412.0	----								
16814.0	----								
19216.0	----								
21618.0	----								
24020.0	----								

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas 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) , worst mode, GFSK

Operation Mode TX CH Mid Test Date Nov. 01, 2007
Fundamental Frequency 2441 MHz Test By Bondi
Temperature 25 °C Pol Ver
Humidity 65 %

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
1630.5	44.11	--	-5.26	38.85	--	74.00	54.00	-15.15 Peak
4882.0	58.84	43.21	6.17	65.01	49.38	74.00	54.00	-4.62 AV
7323.0	----							
9764.0	----							
12205.0	----							
14646.0	----							
17087.0	----							
19528.0	----							
21969.0	----							
24410.0	----							

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency ◎
- (2) Datas 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) , worst mode, GFSK

Operation Mode	TX CH Mid	Test Date	Nov. 01, 2007
Fundamental Frequency	2441 MHz	Test By	Bondi
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	
1630.5	42.48	--	-5.26	37.22	--	74.00	54.00 -16.78 Peak
4882.0	54.72	44.56	6.17	60.89	50.73	74.00	54.00 -3.27 AV
7323.0	----						
9764.0	----						
12205.0	----						
14646.0	----						
17087.0	----						
19528.0	----						
21969.0	----						
24410.0	----						

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency ◎
- (2) Datas 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) , worst mode, GFSK

Operation Mode	TX CH High	Test Date	Nov. 01, 2007
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	(dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
1643.5	40.32	---	-5.22	35.10	---	74.00	54.00 -18.90 Peak
4960.0	61.30	43.67	6.36	67.66	50.03	74.00	54.00 -3.97 AV
7440.0	----						
9920.0	----						
12400.0	----						
14880.0	----						
17360.0	----						
19840.0	----						
22320.0	----						
24800.0	----						

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency °
- (2) Datas 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) , worst mode, GFSK

Operation Mode	TX CH High	Test Date	Nov. 01, 2007
Fundamental Frequency	2480 MHz	Test By	Bondi
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	
1643.5	44.01	---	-5.22	38.79	---	74.00	54.00 -15.21 Peak
4960.0	62.98	45.69	6.36	69.34	52.05	74.00	54.00 -1.95 AV
5790.5	----						
7440.0	----						
9920.0	----						
12400.0	----						
14880.0	----						
17360.0	----						
19840.0	----						
22320.0	----						
24800.0	----						

Remark :

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency ◎
- (2) Datas 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 20dB 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

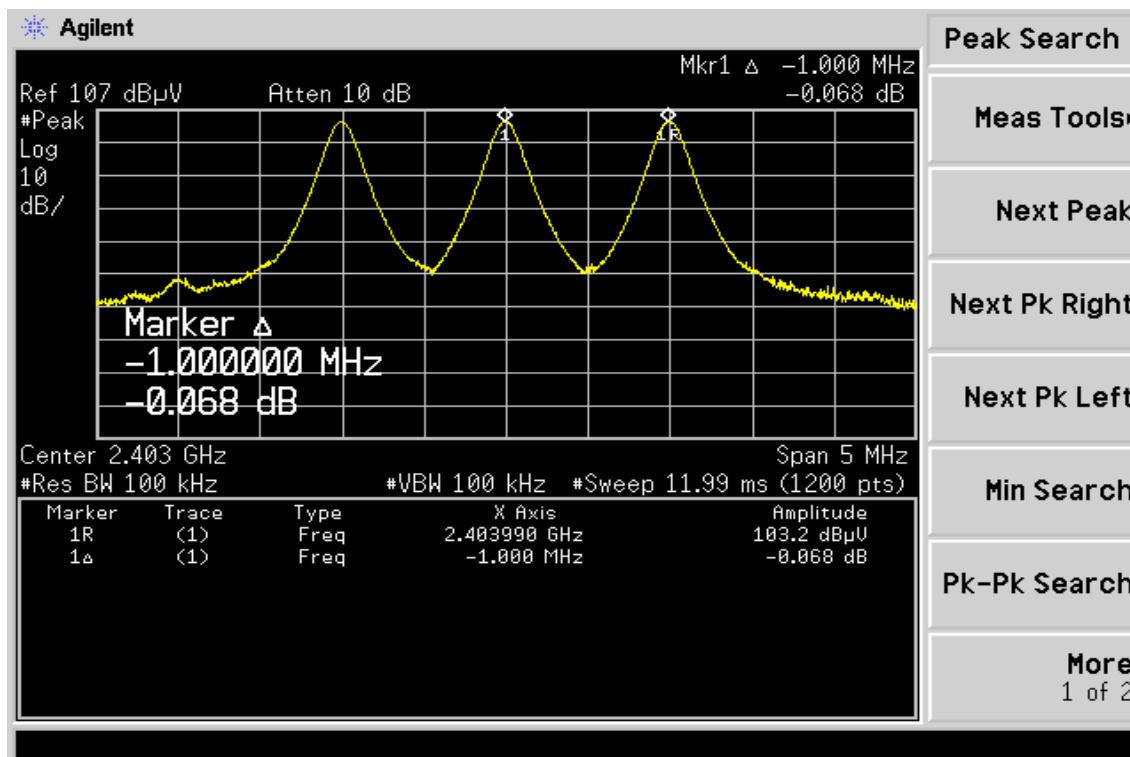
Channel separation	Limit	Result
MHz	kHz	
1	>=25KHz or 2/3*20 dB bandwidth	PASS

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	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2007	11/10/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

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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

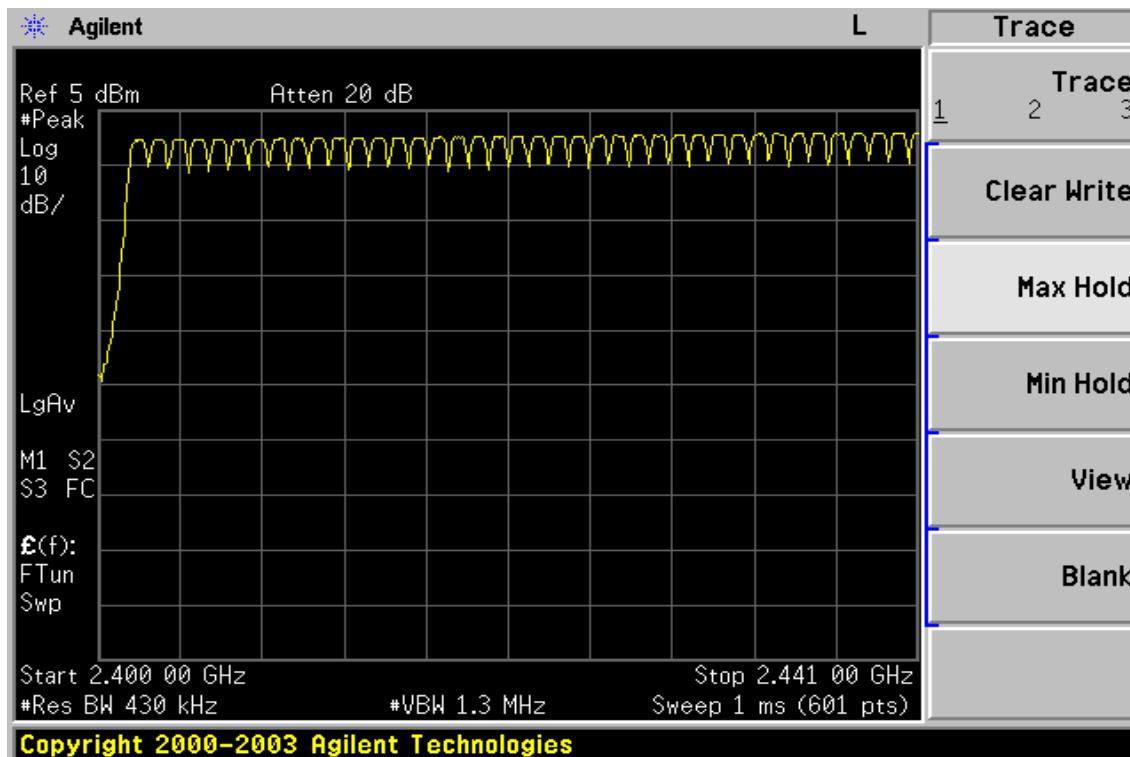
11.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2007	11/10/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

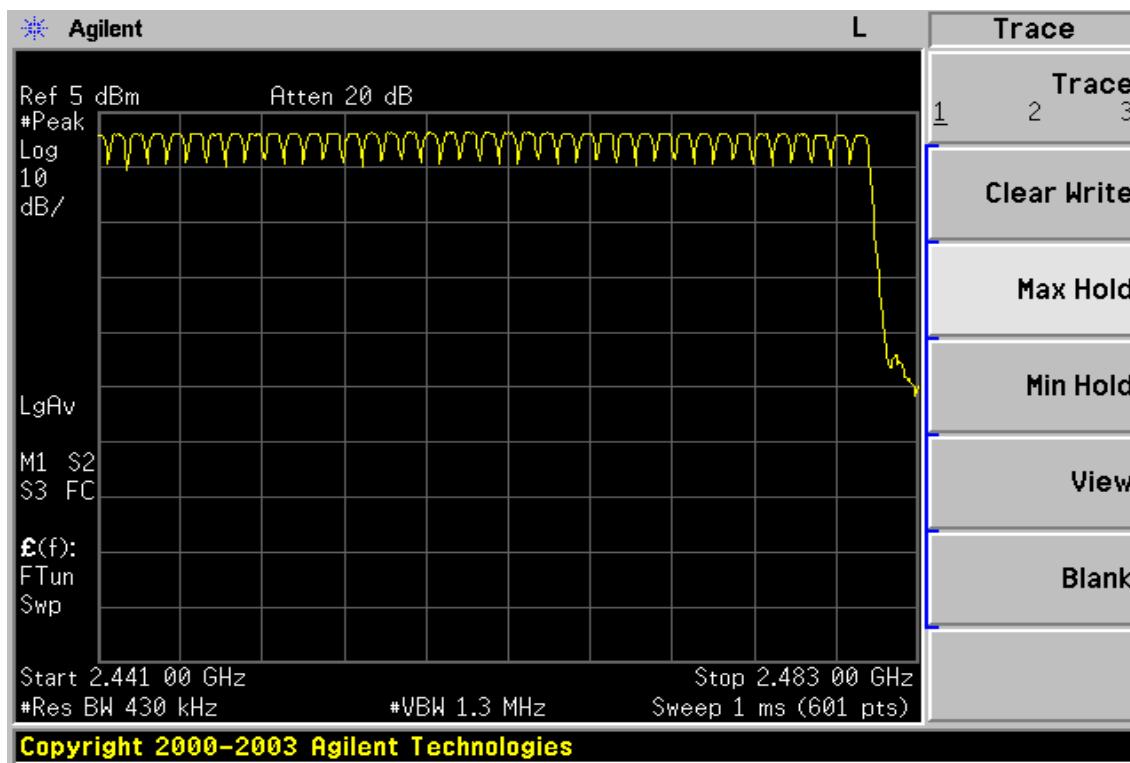
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Channel Number

2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



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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

The dwell time of 0.312 s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:

Dwell time = time slot length * hop rate / number of hopping channels *30s

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

CH Low: DH1 time slot = 0.405 (ms) * (1600/(1*79)) * 31.6 = 259.2 (ms)
DH3 time slot = 1.675 (ms) * (1600/(3*79)) * 31.6 = 357.3 (ms)
DH5 time slot = 2.925 (ms) * (1600/(5*79)) * 31.6 = 374.4 (ms)

CH Mid: DH1 time slot = 0.405 (ms) * (1600/(1*79)) * 31.6 = 259.2 (ms)
DH3 time slot = 1.675 (ms) * (1600/(3*79)) * 31.6 = 357.3 (ms)
DH5 time slot = 2.906 (ms) * (1600/(5*79)) * 31.6 = 372.0 (ms)

CH High: DH1 time slot = 0.416 (ms) * (1600/(1*79)) * 31.6 = 266.2 (ms)
DH3 time slot = 1.662 (ms) * (1600/(3*79)) * 31.6 = 354.6 (ms)
DH5 time slot = 2.906 (ms) * (1600/(5*79)) * 31.6 = 372.0 (ms)

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12.4. Measurement Equipment Used:

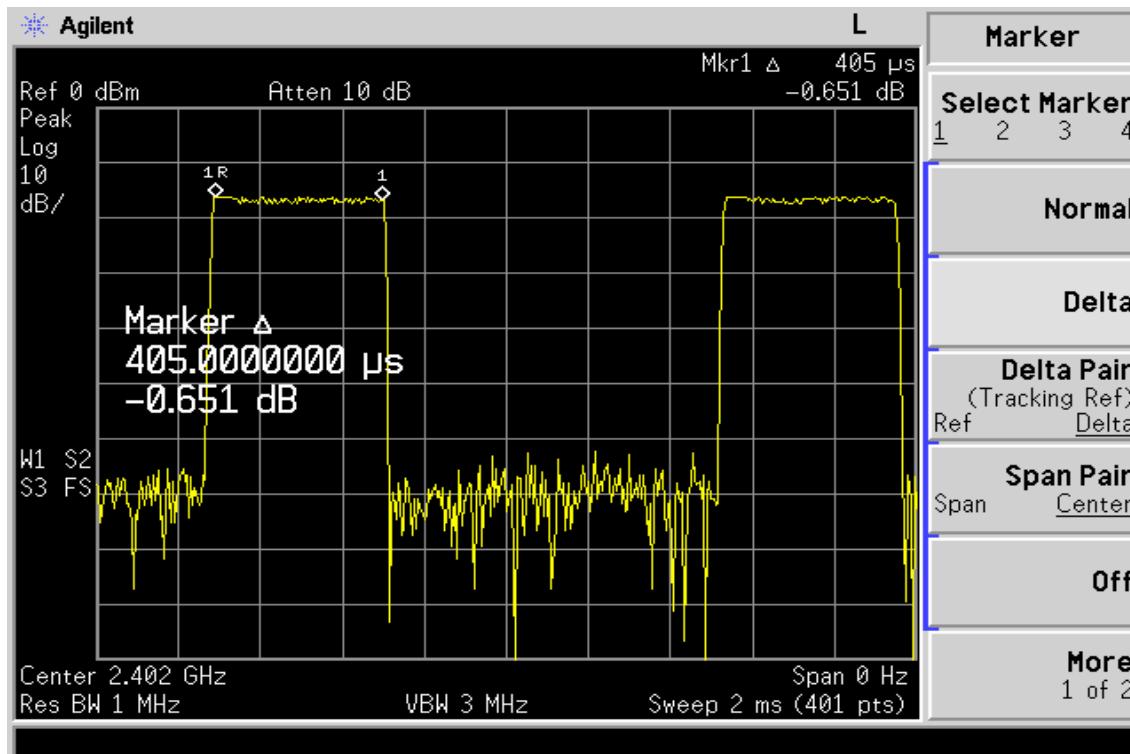
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2007	11/10/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

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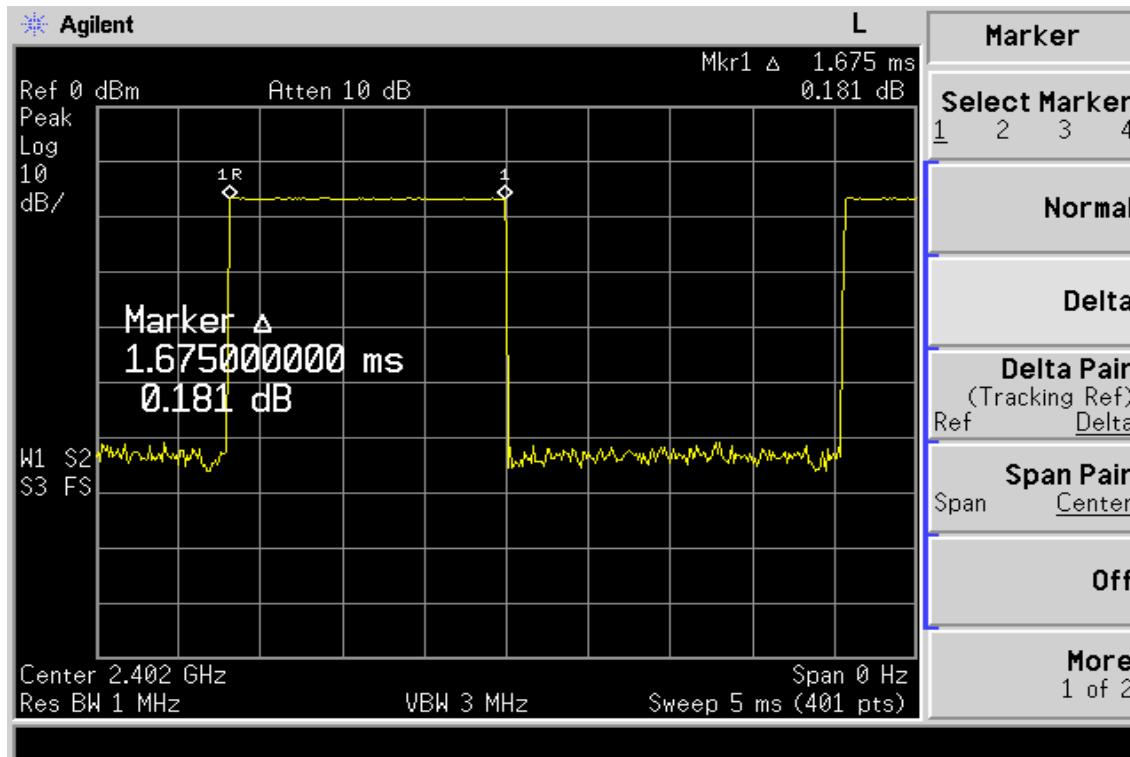
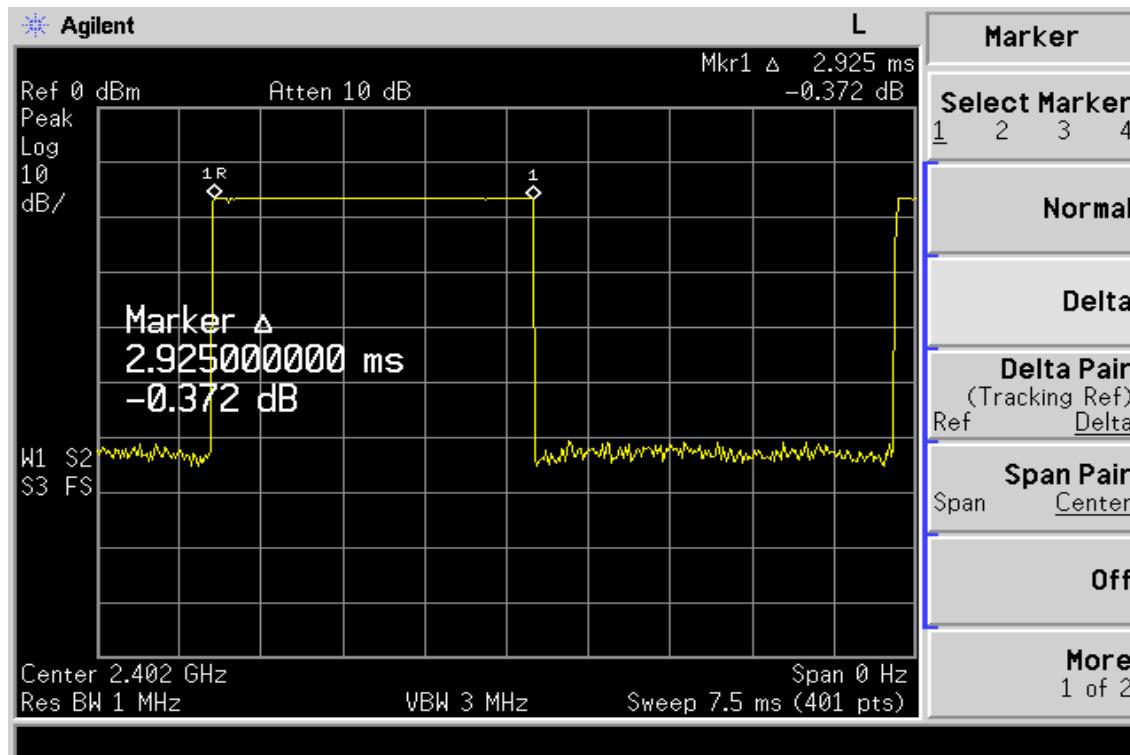
Dwell Time Test Data

CH-Low

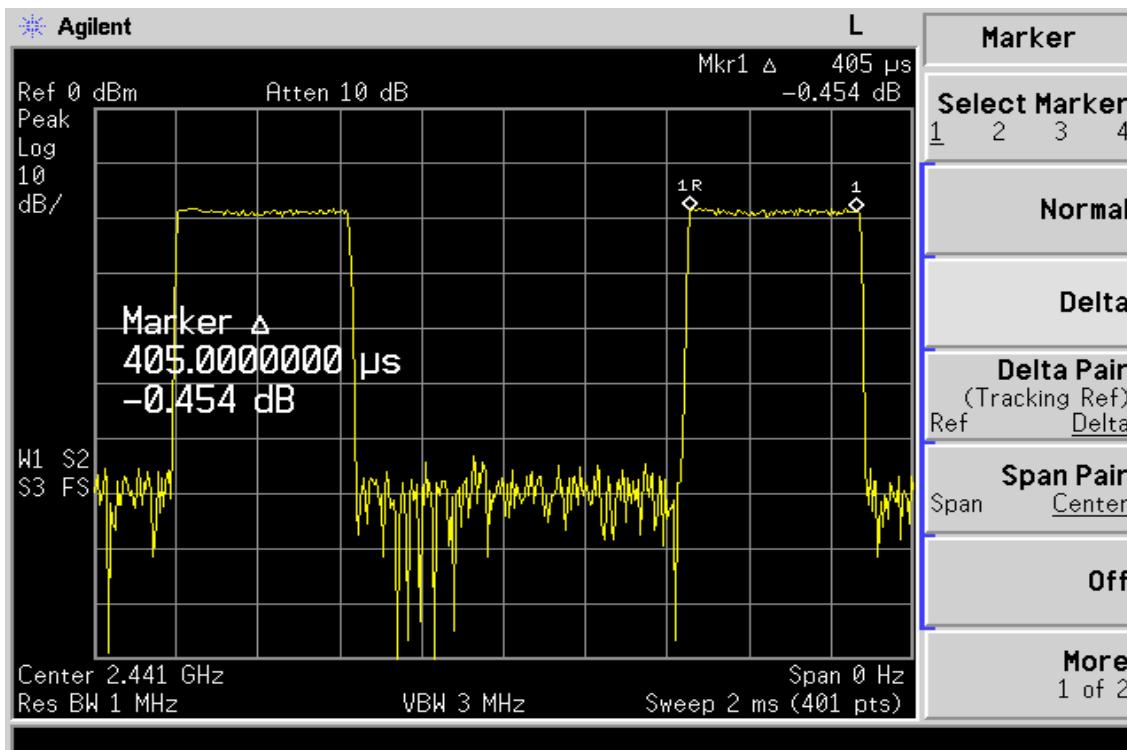
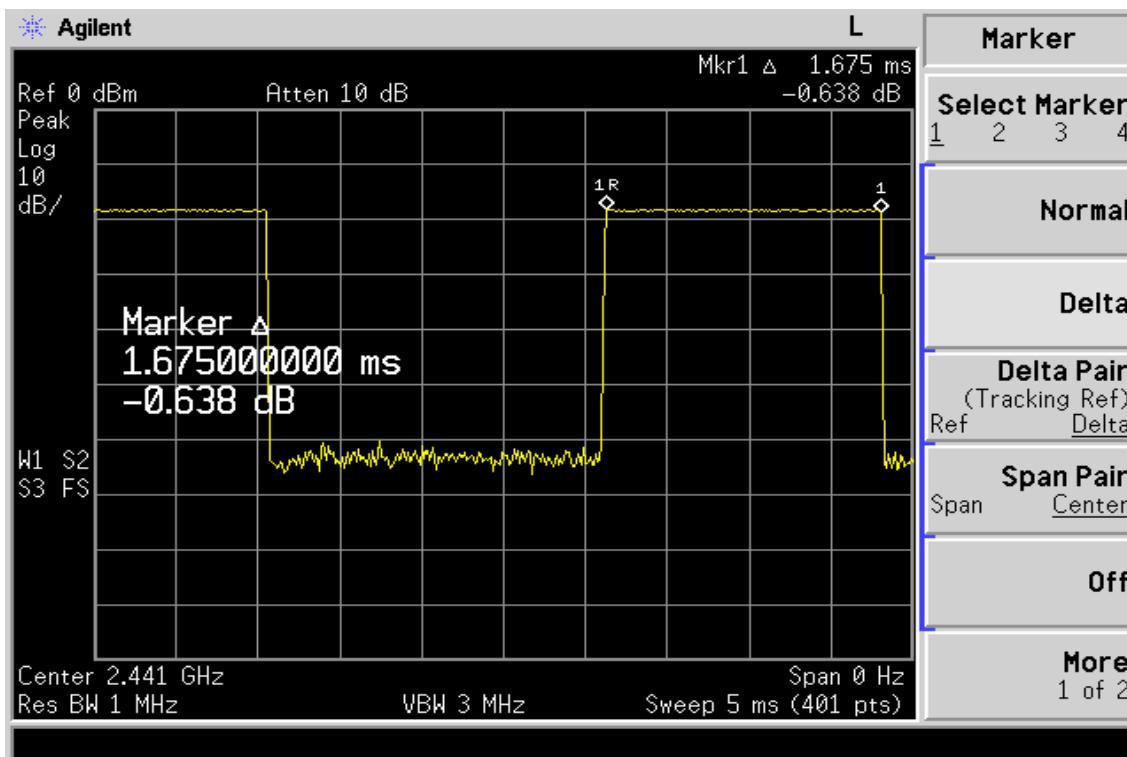
DH1



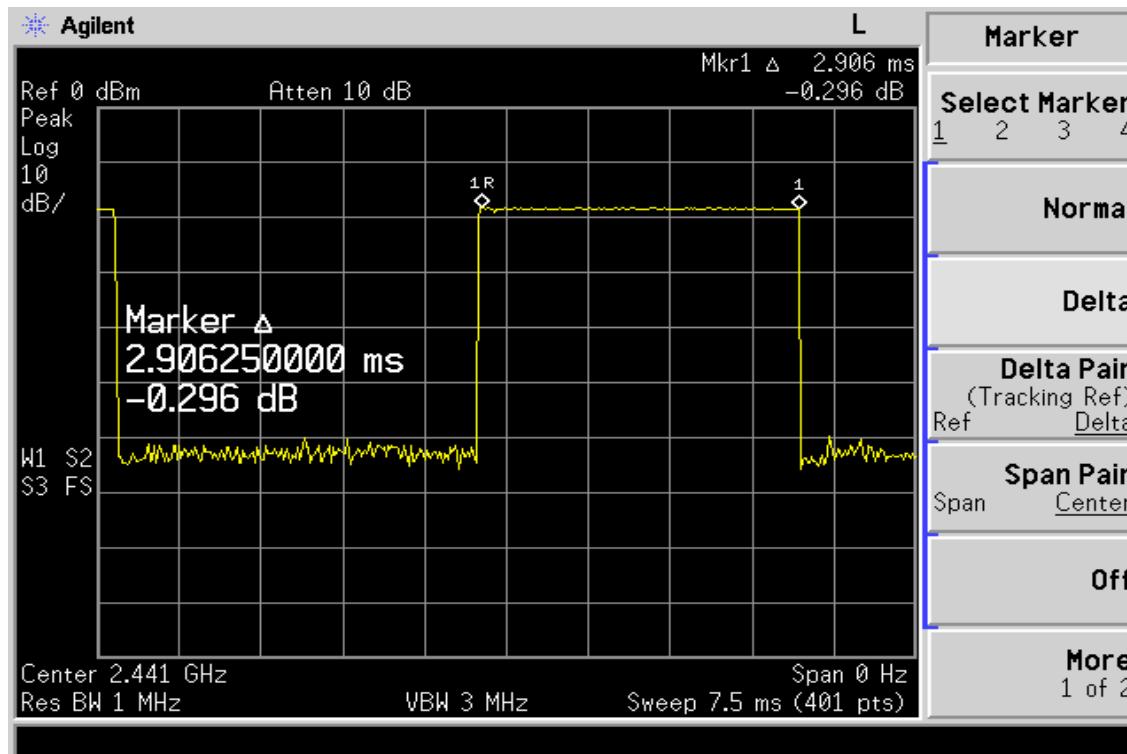
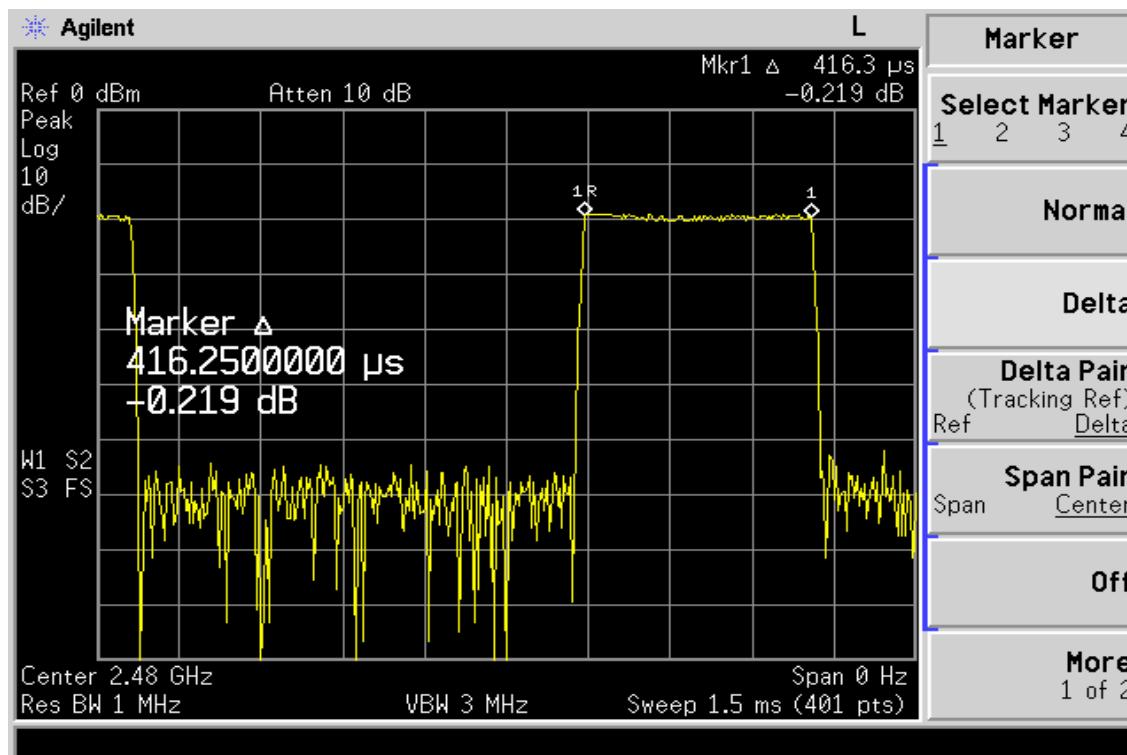
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DH3

DH5


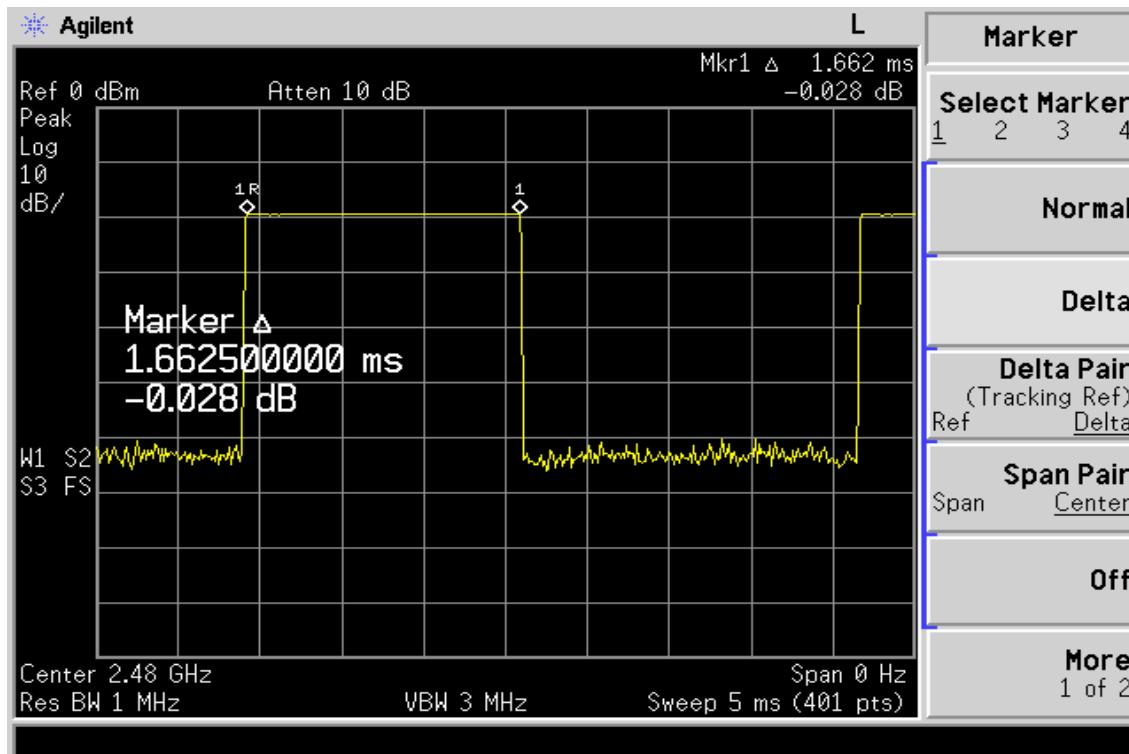
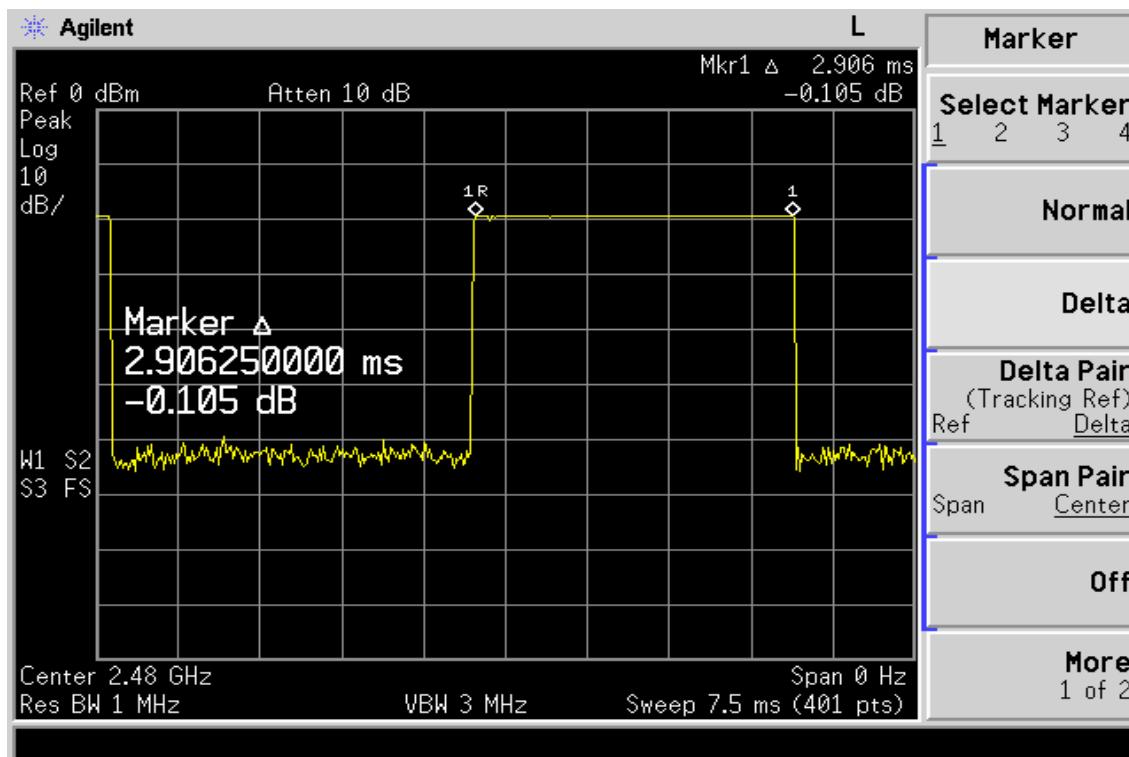
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CH-Mid
DH1

DH3


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DH5

CH-High
DH1


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DH3

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 = 1.5MHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

13.3. Measurement Result

GFSK Mode

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-8.79	0.10	-8.69	8
Mid	-8.23	0.10	-8.13	8
High	-8.14	0.10	-8.04	8

8DPSK Mode

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-11.79	0.10	-11.69	8
Mid	-11.01	0.10	-10.91	8
High	-11.25	0.10	-11.15	8

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$\pi/4$ DQPSK Mode

CH	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
Low	-10.85	0.10	-10.75	8
Mid	-10.12	0.10	-10.02	8
High	-10.12	0.10	-10.02	8

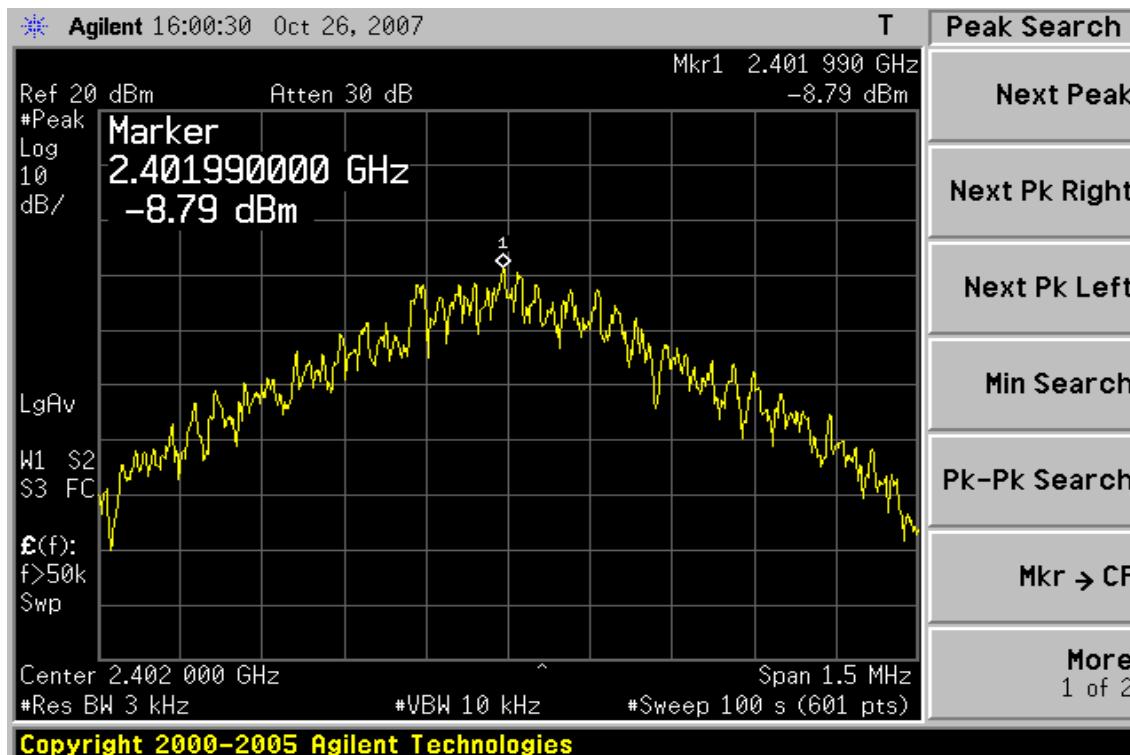
13.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2007	03/28/2008
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2007	06/29/2008
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2007	11/10/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S10W5	N/A	10/07/2007	10/06/2008
Attenuator	Mini-Circuit	BW-S6W5	N/A	10/07/2007	10/06/2008
Splitter	Mini-Circuit	ZFSC-2-10G	N/A	10/07/2007	10/06/2008

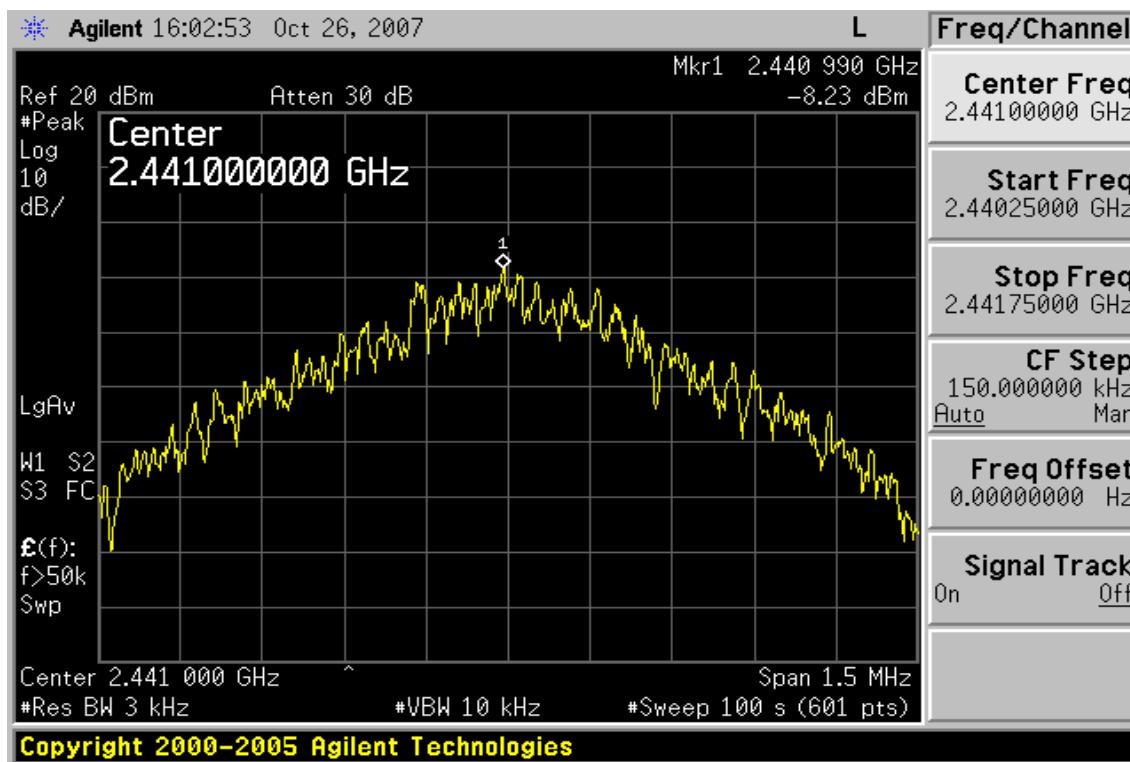
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GFSK Mode

Power Spectral Density Test Plot (CH-Low)

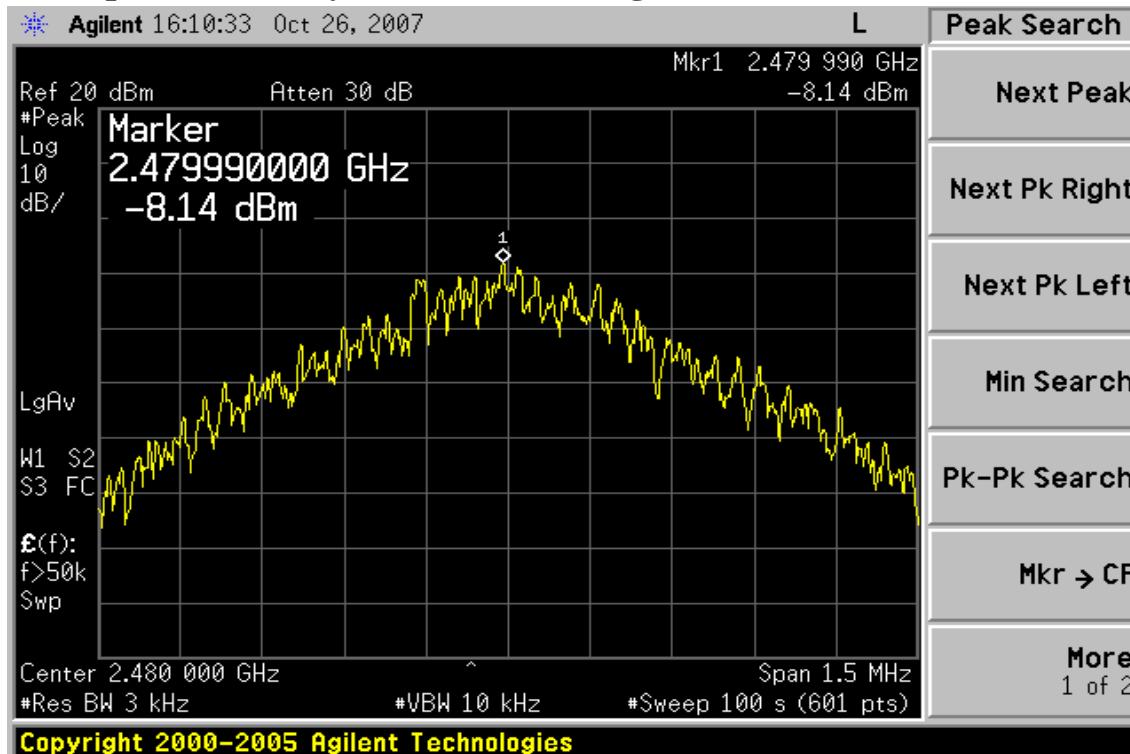


Power Spectral Density Test Plot (CH-Mid)



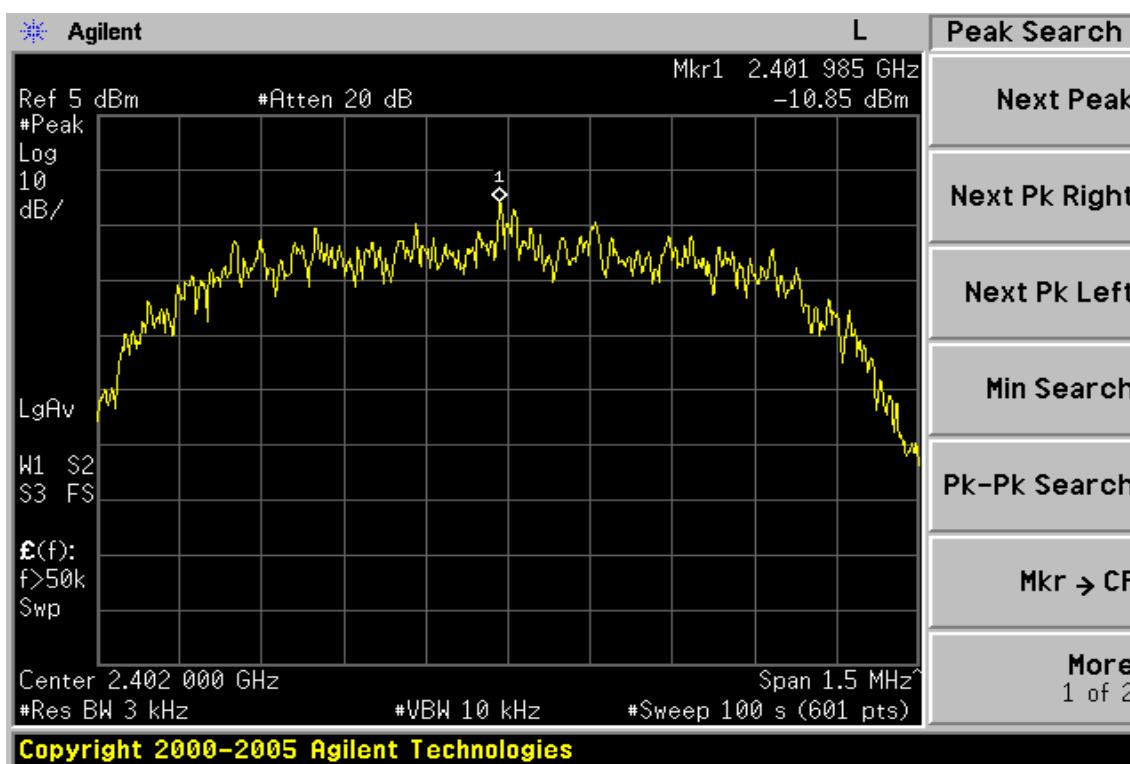
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Power Spectral Density Test Plot (CH-High)



$\pi/4$ DQPSK Mode

Power Spectral Density Test Plot (CH-Low)

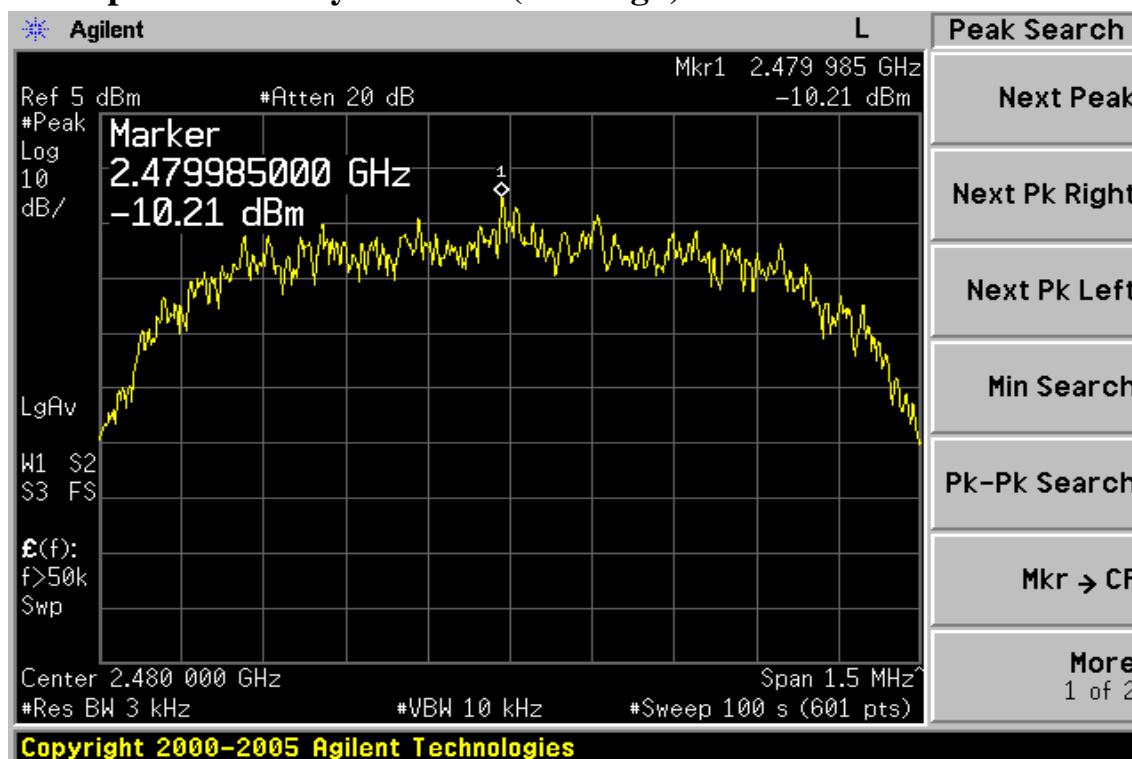


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Power Spectral Density Test Plot (CH-Mid)



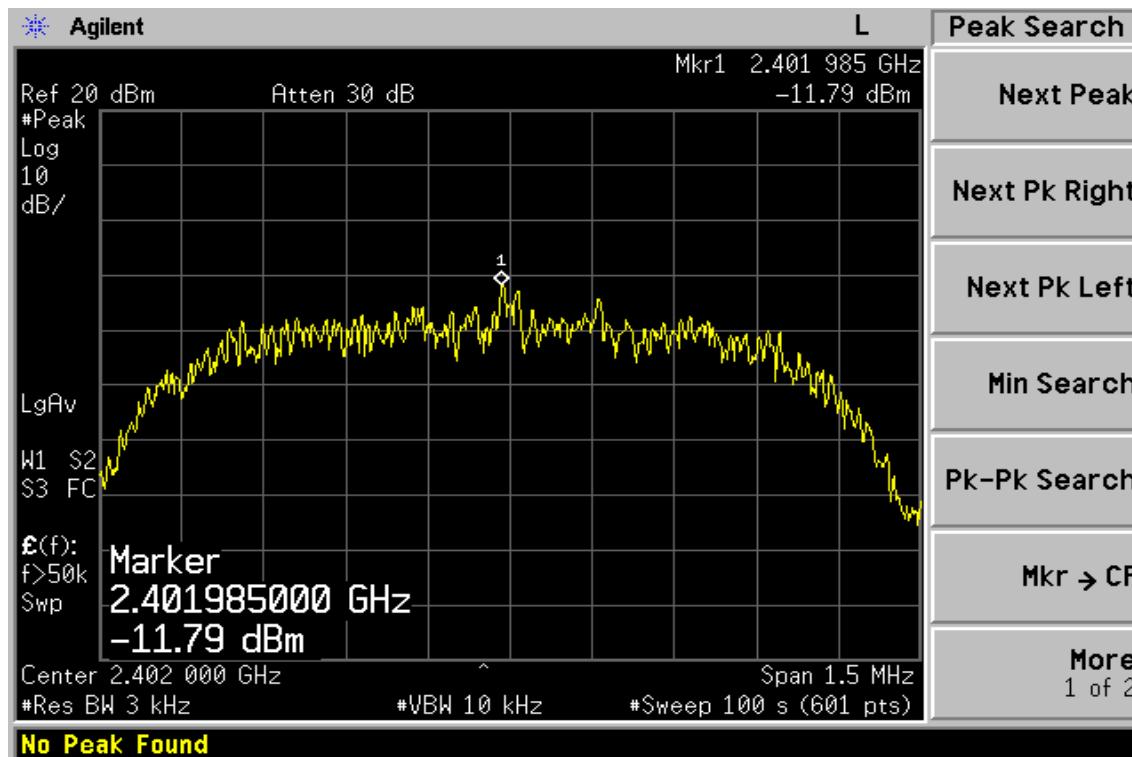
Power Spectral Density Test Plot (CH-High)



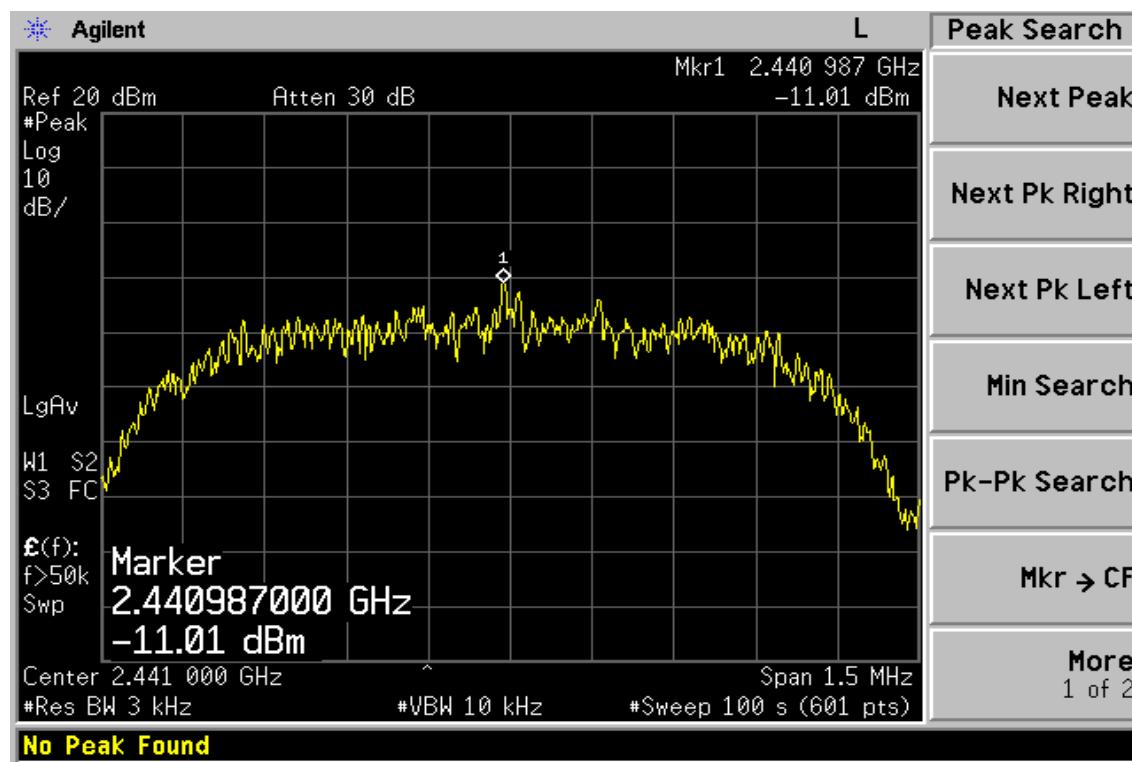
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8DPSK Mode

Power Spectral Density Test Plot (CH-Low)

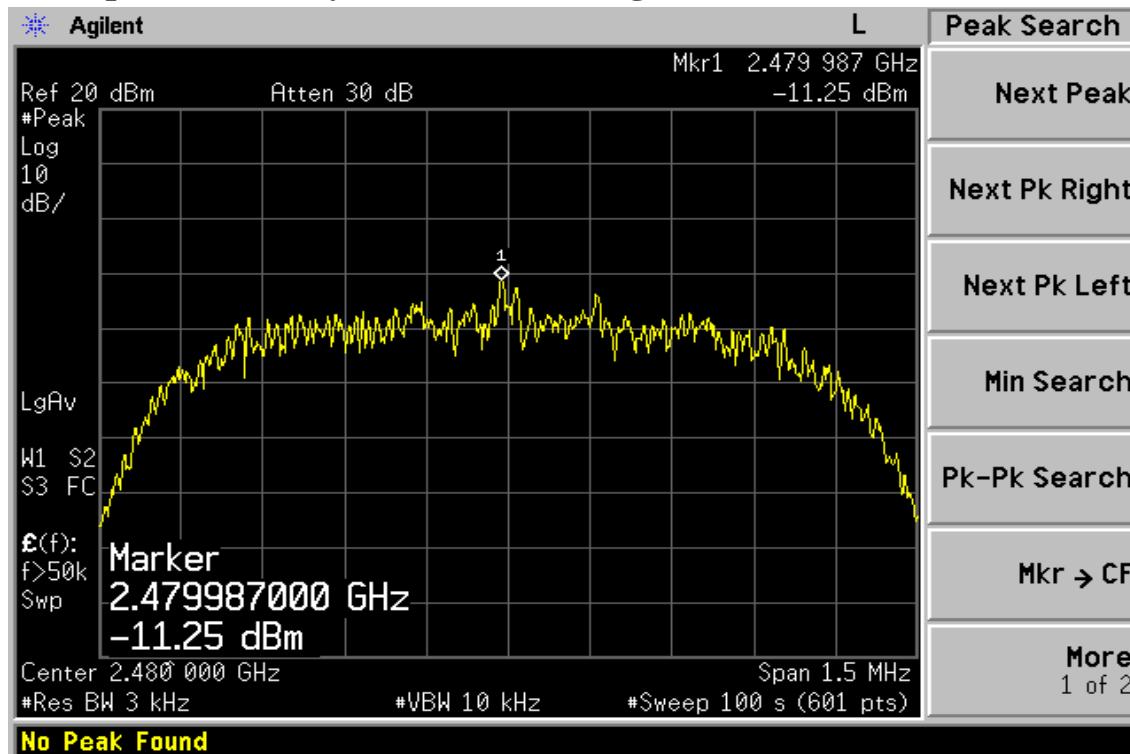


Power Spectral Density Test Plot (CH-Mid)



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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 2dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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