



**FCC 47 CFR PART 15 SUBPART C &
INDUSTRY CANADA RSS-210**

TEST REPORT

For

Bluetooth Mono Headset

Model: H520, H520, H525

Trade Name: Motorola

Issued to

Motorola Inc.

Mobile Devices 600 N. U.S. Highway 45 Libertyville Illinois 60048-5343

Issued by

Compliance Certification Services Inc.

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Testing Laboratory
1309



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1. TEST RESULT CERTIFICATION

Applicant: Motorola Inc.
Mobile Devices 600 N. U.S. Highway 45 Libertyville
Illinois 60048-5343

Equipment Under Test: Bluetooth Mono Headset

Trade Name: Motorola

Model: H520, H520, H525

Date of Test: May 25 ~ June 27, 2009

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C & INDUSTRY CANADA RSS-210	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. 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 the requirements of FCC Rules Part 15.207, 15.209, 15.247.

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

Approved by:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Gina Lo
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Bluetooth Mono Headset		
Trade Name	Motorola		
Model Number	H520, H520, H525		
Model Discrepancy	The EUT comes with three different external colors, please refer to the external photos for reference.		
	Model Number	Model Discrepancy	
	H520	Red/Smoke gray	
	H520	Black/ Smoke gray	
	H525	Silver / Smoke gray	
Power Supply	1. VDC from Power Adapter 2. Battery: Model: ECP507220 Rating: 3.7V		
Power Adapter Manufacturer	Motorola	S/N	SPN5334A
Power Adapter Power Rating	For SPN5334A I/P: 100-240VAC, 50-60Hz, 0.15A O/P: 5.0V, 550mA		
Frequency Range	2402 ~ 2480 MHz		
Transmit Power	4.38 dBm		
Modulation Technique	GFSK for 1Mbps; $\pi/4$ -DQPSK for 2Mbps; 8DPSK for 3Mbps		
Transmit Data Rate	1, 2, 3Mbps		
Number of Channels	79 Channels		
Antenna Specification	Gain: 2.7 dBi		
Antenna Designation	PCB Antenna		

Remark:

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **IHDP6KN1** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2003 and FCC CFR 47 Part 15.207, 15.209 and 15.247, RSS-GEN Issue 2, and RSS-210 Issue 7.

3.1 EUT CONFIGURATION

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

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C, RSS-GEN Issue 2, and RSS-210 Issue 7.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable 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 maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT (model: H520) had been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests carried out are with the worst-case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid mode only.

During the preliminary test, GFSK, $\pi/4$ -QPSK & 8DPSK with DH5 were pre-tested and found that 8DPSK emits the highest output power. Then the tests were carried on with DH1 compare to DH3 & DH5 and found that 8DPSK with DH5 emit the highest output power, and therefore had been tested under operating condition.

Following channels were selected for the radiated emission and conducted emissions testing only as listed below:

Tested Channel	Modulation Type	Packet Type	Data Rate
Low, Mid, High	GFSK	DH 5	1
Low, Mid, High	8DPSK	DH 5	3



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	02/23/2010
Power Meter	Agilent	E4416A	GB41291611	04/05/2010
Power Sensor	Agilent	E9327A	US40441097	06/05/2010

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/29/2009
Switch Controller	TRC	Switch Controller	SC94050010	05/02/2010
4 Port Switch	TRC	4 Port Switch	SC94050020	05/02/2010
Loop Antenna	EMCO	6502	8905/2356	05/28/2010
Horn-Antenna	TRC	HA-0502	06	06/03/2010
Horn-Antenna	TRC	HA-0801	04	06/18/2010
Horn-Antenna	TRC	HA-1201A	01	08/11/2009
Horn-Antenna	TRC	HA-1301A	01	08/11/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/27/2010
Loop Antenna	EMCO	6502	8905/2356	05/28/2010
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC MRA: TW1039 IC: 2324G-1 / -2	10/17/2009 11/04/2010
Test S/W	LABVIEW (V 6.1)			

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESHS30	828144/003	11/25/2009
Two-Line V-Network 9kHz-30MHz	Schaffner	NNB41	03/10013	06/10/2010
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/08/2010
Test S/W	LABVIEW (V 6.1)			



4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 2.81
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	+/-3.7046
3M Semi Anechoic Chamber / Above 1GHz	+/-3.0958

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.

**5.4 TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	DELL	PP19L	GK102 A00	QDS-BRCM1021	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



7. APPLICABLE RULES

RSS-210 §2 General Certification Requirements and Specifications

RSS-210 §2.1 Frequency Stability

When the carrier frequency stability is not specified, it need not be tested, provided that the carrier frequency is chosen such that the fundamental modulation products (meaning the nominal bandwidth) lie totally within the bands listed in Tables 2, 3, 4 and 5 and do not fall into any restricted band listed in Table 1. Due account shall be taken of carrier frequency drift as a result of aging, temperature, humidity, and supply voltage variations when using frequencies near the band edges.

RSS-210 §2.2 Restricted Bands and Unwanted Emission Frequencies

Restricted bands, identified in Table 1, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy, and some government uses. Except where otherwise indicated, the following restrictions apply:

- (a) Fundamental components of modulation of LPDs shall not fall within the restricted bands of Table 1.
- (b) Unwanted emissions falling into restricted bands of Table 1 shall meet Tables 2 and 3 limits. It should also be noted that unwanted emissions falling in non-restricted bands do not need to be suppressed to a level lower than the Table 2 and 3 limits.
- (c) Unwanted emissions not falling within restricted frequency bands may also use the limits specified in the applicable annex.

RSS-210 §2.3 Licence-exempt Receivers

Category I licence-exempt receivers are required to have their spurious emissions comply with Section 7.2.3 of RSS-Gen.

RSS-210 §2.6 General Field Strength Limits

Tables 2 and 3 show the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this RSS. Transmitters whose wanted emissions are also within the limits shown in Tables 2 and 3 may operate in any of the frequency bands of Tables 2 and 3, other than the restricted bands of Table 1 and the TV bands, and shall be certified under RSS-210. (Note: Devices operating below 490 kHz all of whose emissions are at least 40 dB below the limit given in Table 3 are Category II devices subject to RSS-310.) Unwanted emissions of transmitters and receivers are permitted to fall into Table 1 and TV frequencies but intentional emissions are prohibited. See the note of Table 2 for further details.

**RSS-210 §2.7 Tables****RSS-210 Table 1: Restricted Frequency Bands** ^(Note)

MHz	MHz	MHz	MHz	GHz
0.090-0.110	8.37625-8.38675	--	1718.8-1722.2	9.0-9.2
--	8.41425-8.41475	156.52475-156.52525	2200-2300	9.3-9.5
2.1735-2.1905	12.29-12.293	156.7-156.9	2310-2390	10.6-12.7
3.020-3.026	12.51975-12.52025	--	--	13.25-13.4
4.125-4.128	12.57675-12.57725	--	2655-2900	14.47-14.5
4.17725-4.17775	13.36-13.41	240-285	3260-3267	15.35-16.2
4.20725-4.20775	16.42-16.423	322-335.4	3332-3339	17.7-21.4
5.677-5.683	16.69475-16.69525	399.9-410	3345.8-3358	22.01-23.12
6.215-6.218	16.80425-16.80475	608-614	3500-4400	23.6-24.0
6.26775-6.26825	25.5-25.67	960-1427	4500-5150	31.2-31.8
6.31175-6.31225	37.5-38.25	1435-1626.5	5350-5460	36.43-36.5
8.291-8.294	73-74.6; 74.8-75.2	1645.5-1646.5	7250-7750	Above 38.6
8.362-8.366	108-138	1660-1710	8025-8500	

Note: Certain frequency bands listed in Table 2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as RSS-310.

RSS-210 Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz ^(Note)

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Note: Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

**RSS-210 Table 3: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)**

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in Hz)	300
490-1.705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

RSS-210 §Annex 8: Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands

This section applies to systems that employ frequency hopping (FH) and digital modulation technology in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. Systems in these bands may employ frequency hopping, digital modulation and or a combination (hybrid) of both techniques.

A frequency hopping system that synchronizes with another or several other systems (to avoid frequency collision among them) via off-air sensing or via connecting cables is not hopping randomly and therefore is not in compliance with RSS-210.

RSS-210 §A8.2 Digital Modulation Systems

These include systems employing digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to all three bands.

RSS-210 §A8.4 Transmitter Output Power and e.i.r.p. Requirements

(2) For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4W.

(4) For systems employing digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum peak conducted power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen)

(5) Point-to-point systems in the bands 2400-2483.5 MHz and 5725-5850 MHz are permitted to have an e.i.r.p. higher than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be allowed to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to- point systems.

Note: “Fixed, point-to-point operation”, excludes point-to-multipoint systems, omnidirectional applications and multiple co-located transmitters transmitting the same information.

**RSS-210 §A8.5 Out-of-band Emissions**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

RSS-Gen §2 General Information

Unless otherwise indicated, radiocommunications equipment is subject to licensing pursuant to subsection 4(1) of the *Radiocommunication Act*.

RSS-Gen §2.1.2 Category II Equipment

Category II equipment comprises radio devices where a standard has been prescribed but for which a TAC is not required, that is, equipment certification by Industry Canada or a Certification Body (CB) is not required (certification exempt), pursuant to subsection 4(3) of the *Radiocommunication Act*. The manufacturer or importer shall nevertheless ensure that the standards are complied with. A test report shall be available on request and the device shall be properly labelled.

RSS-Gen §2.2 Receivers

Radiocommunication receivers are defined as Category I equipment or Category II equipment by the characteristics outlined below.

RSS-Gen §2.2.1 Category I Equipment Receivers

A receiver is classified as Category I equipment if it meets one of the following conditions:

- (a) is a stand-alone receiver that is tunable to any frequency in the band 30-960 MHz;
- (b) is a receiver that is associated with Category I transmitters; or
- (c) is a scanner receiver.

Except for scanner receivers, which have their own RSSs, Category I receivers shall comply with the limits for receiver spurious emissions set out in Section 6 of this RSS-Gen, and shall be certified under the RSS applicable to the transmitter type with which the receiver is associated or designed to operate (NOT under RSS-Gen).



RSS-Gen §2.2.2 Category II Equipment Receivers

A receiver is classified as Category II equipment if it is not meeting the conditions of Section 2.2.1.

RSS-Gen §2.2.3 Licence-exempt Receivers

Paging receivers, “receive-only” earth stations operating with satellites approved by Industry Canada, and stand-alone receivers which are exempted from licensing, can be classified as either Category I or Category II. These receivers shall comply with the requirements of RSS-210 or RSS-310, respectively.

RSS-Gen §2.3 Licence-exempt Low-power Radiocommunication Devices (LPDs)

Licence-exempt low-power radiocommunication devices are devices which have intentional and unwanted emissions of very low signal levels such that they can co-exist with licensed radio services. LPDs are required to operate on a “**no-interference no-protection**” basis (i.e. they may not cause radio interference and cannot claim protection from interference). The requirements for LPDs are generally described in Section 7.

RSS-Gen §5.5 Exposure of Humans to RF Fields

Before equipment certification is granted, the applicable requirements of RSS-102 shall be met.

RSS-Gen §6 Receiver Spurious Emission Standard

The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

RSS-Gen Table 1 - Spurious Emission Limits for Receivers

Frequency (MHz)	Field Strength microvolts/m at 3 metres
30-88	100
88-216	150
216-960	200
Above 960	500

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

**RSS-Gen §7.1.4 Transmitter Antenna**

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

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

RSS-Gen §7.2.2 Transmitter and Receiver AC Power Lines Conducted Emission Limits

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

RSS-Gen Table 2 – AC Power Lines Conducted Emission Limits

Frequency Range (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

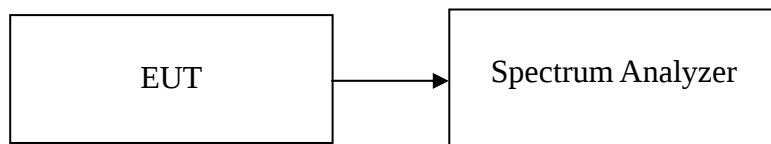
**Decreases with the logarithm of the frequency.*



8. FCC PART 15.247 REQUIREMENTS & RSS 210 REQUIREMENTS

8.1 99% BANDWIDTH

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

Test Data

For GFSK / DH5

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.8490
Mid	2441	0.8577
High	2480	0.8515

For 8DPSK / DH5

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.1883
Mid	2441	1.1951
High	2480	1.1845



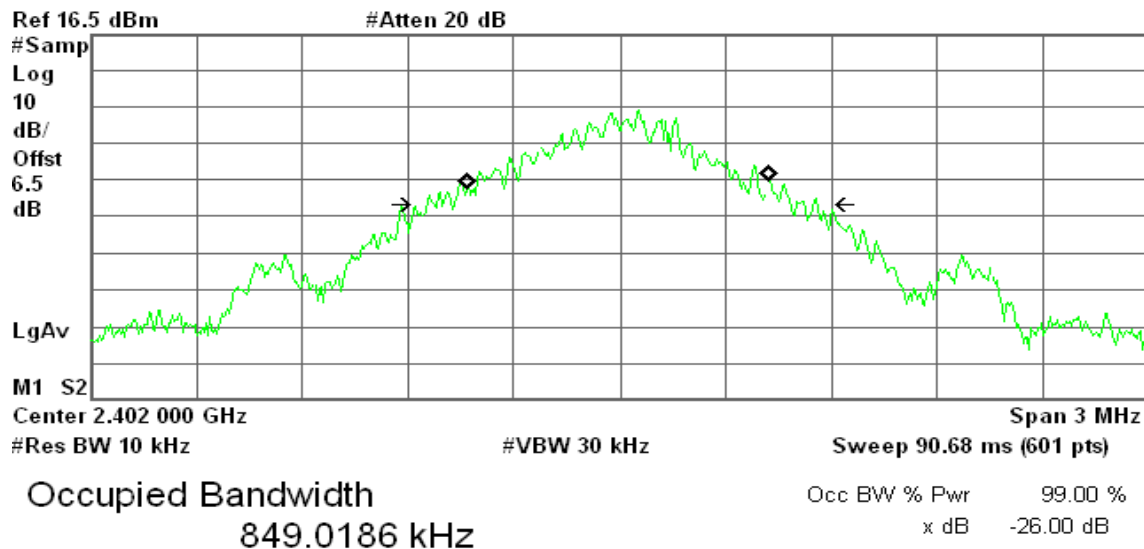
Test Plot

For GFSK / DH5

99% Bandwidth (CH Low)

* Agilent 13:38:20 May 25, 2009

R T

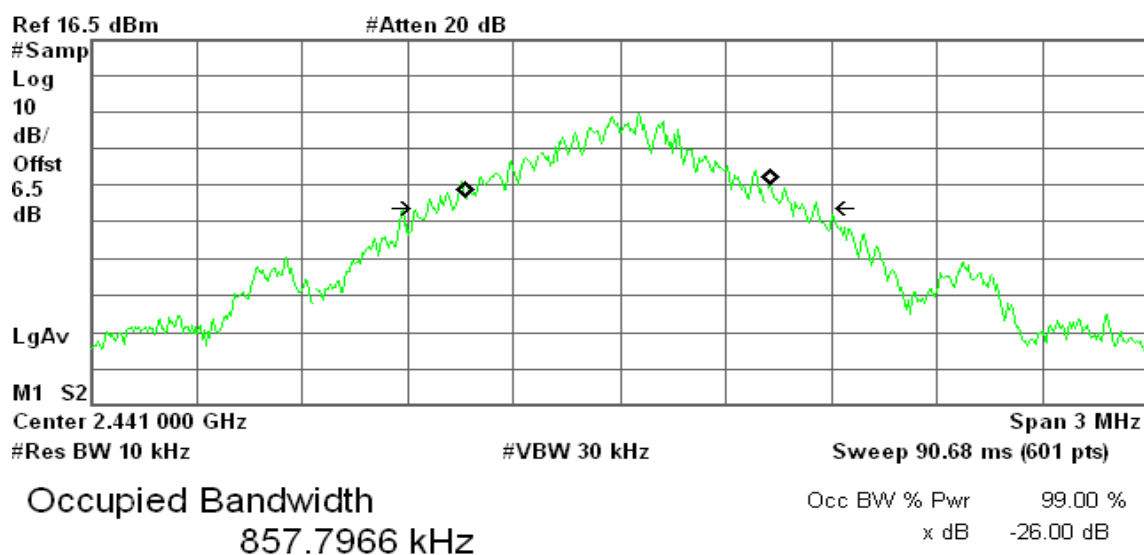


Transmit Freq Error -4.815 kHz
x dB Bandwidth 1.101 MHz*

99% Bandwidth (CH Mid)

* Agilent 13:37:55 May 25, 2009

R T

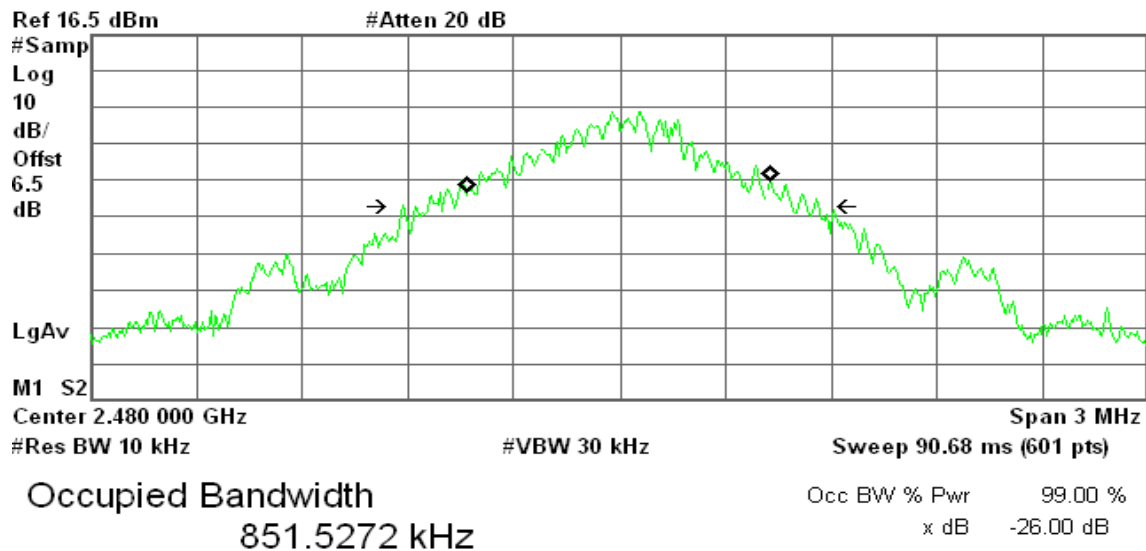


Transmit Freq Error -4.996 kHz
x dB Bandwidth 1.100 MHz*

**99% Bandwidth (CH High)**

* Agilent 13:36:55 May 25, 2009

R T

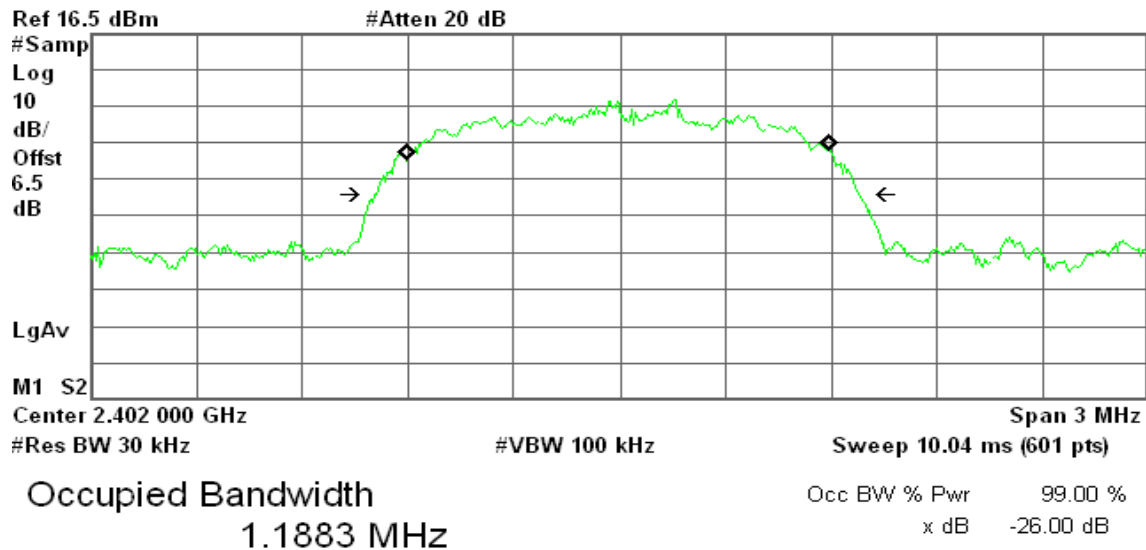


Transmit Freq Error -2.125 kHz
x dB Bandwidth 1.178 MHz*

For 8DPSK / DH5**99% Bandwidth (CH Low)**

* Agilent 13:34:57 May 25, 2009

R T

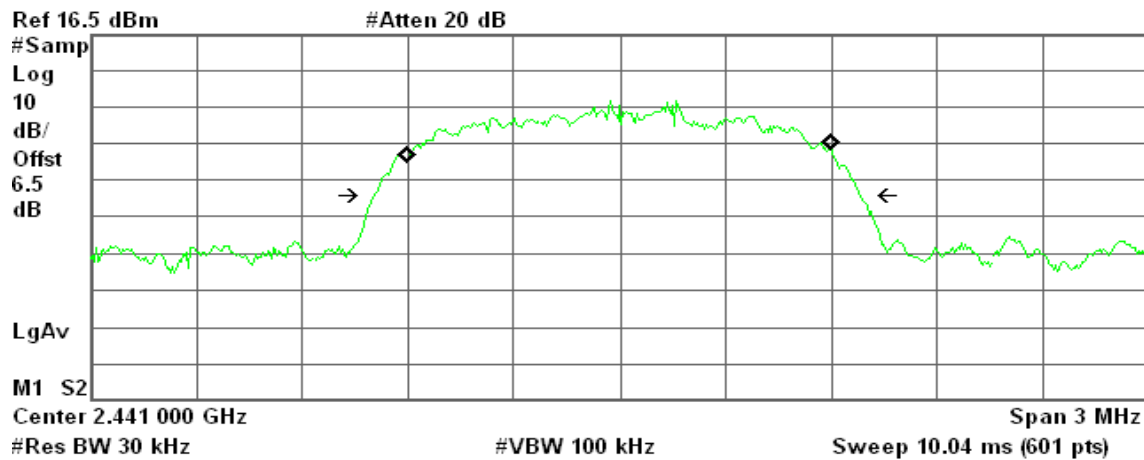


Transmit Freq Error -3.435 kHz
x dB Bandwidth 1.370 MHz*

**99% Bandwidth (CH Mid)**

* Agilent 13:35:14 May 25, 2009

R T



Occupied Bandwidth
1.1951 MHz

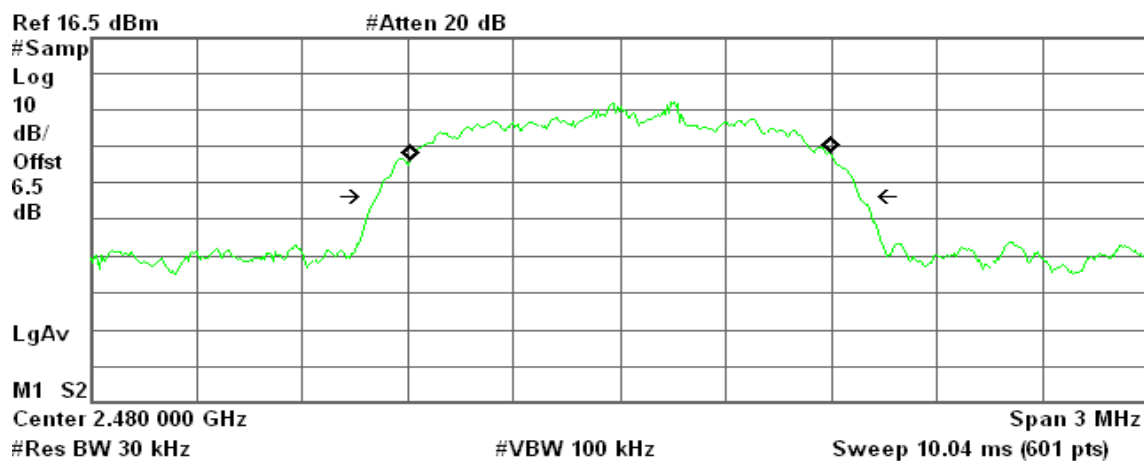
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -3.625 kHz
x dB Bandwidth 1.379 MHz*

99% Bandwidth (CH High)

* Agilent 13:36:02 May 25, 2009

R T



Occupied Bandwidth
1.1845 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.457 kHz
x dB Bandwidth 1.372 MHz*

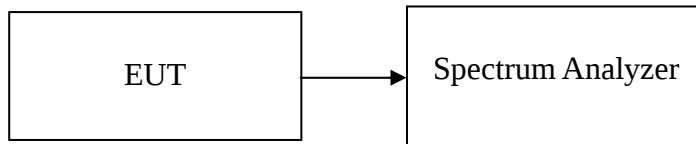


8.2 20 DB BANDWIDTH

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the 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, VBW = 30kHz, Span = 1.5MHz, Sweep = auto.
4. Mark the peak frequency and 20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted.

Test Data

For GFSK / DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	0.884
Mid	2441	0.882
High	2480	0.918

For 8DPSK / DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.273
Mid	2441	1.271
High	2480	1.271

**Test Plot****For GFSK / DH5****20dB Bandwidth (CH Low)**

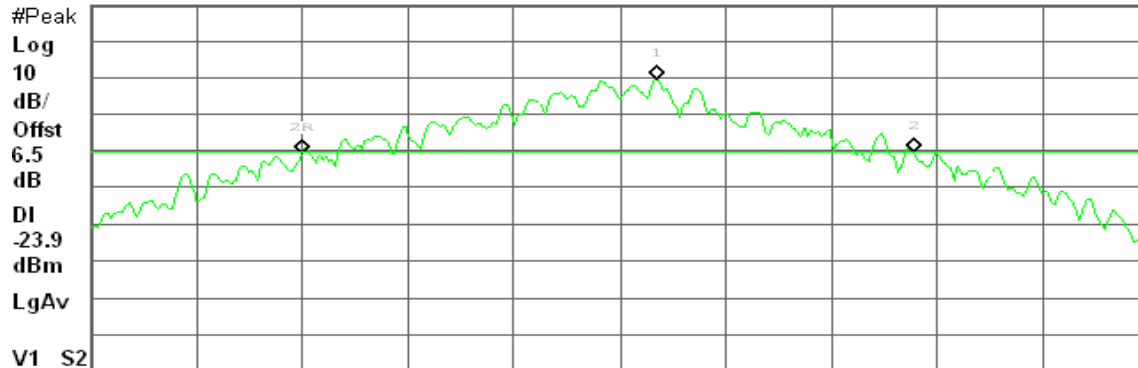
✱ Agilent 13:18:38 May 25, 2009

R T

Δ Mkr2 884 kHz
0.12 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.402 000 GHz

Span 1.5 MHz

#Res BW 10 kHz

#VBW 30 kHz

Sweep 14.36 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 054 GHz	-3.85 dBm
2R	(1)	Freq	2.401 547 GHz	-24.06 dBm
2Δ	(1)	Freq	884 kHz	0.12 dB

20dB Bandwidth (CH Mid)

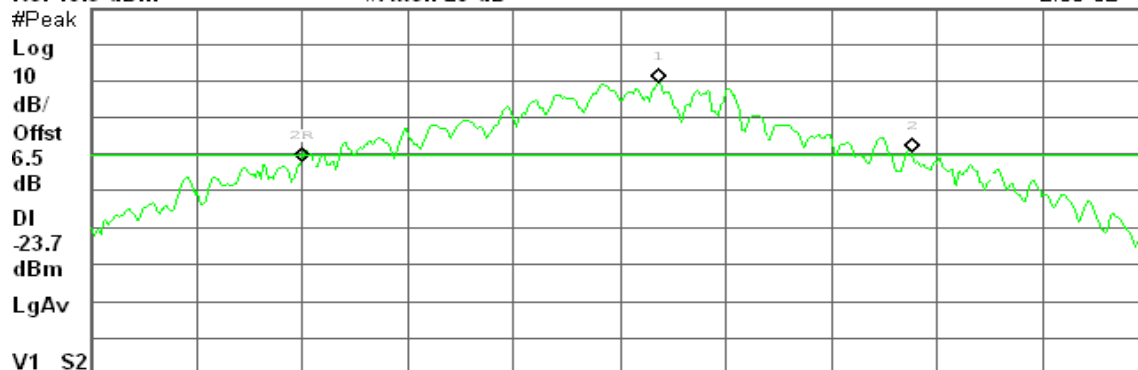
✱ Agilent 13:19:19 May 25, 2009

R T

Δ Mkr2 882 kHz
2.36 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.441 000 GHz

Span 1.5 MHz

#Res BW 10 kHz

#VBW 30 kHz

Sweep 14.36 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.441 056 GHz	-3.70 dBm
2R	(1)	Freq	2.440 546 GHz	-25.35 dBm
2Δ	(1)	Freq	882 kHz	2.36 dB

**20dB Bandwidth (CH High)**

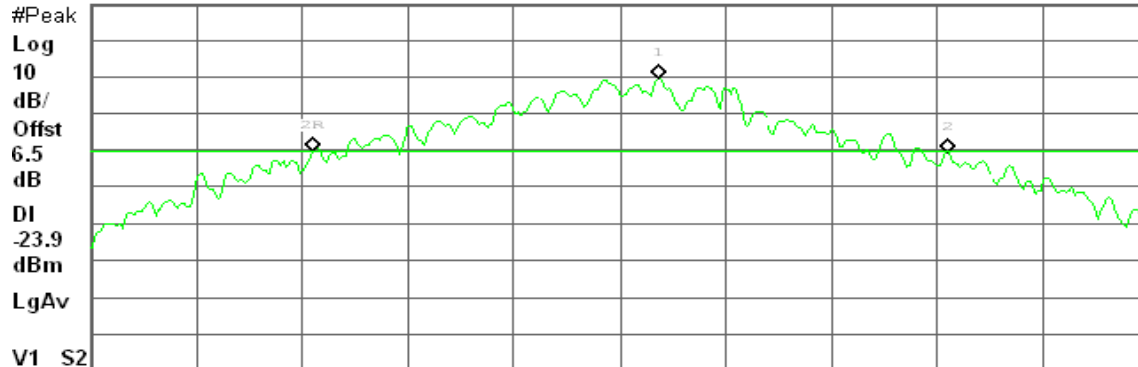
* Agilent 13:20:43 May 25, 2009

R T

 Δ Mkr2 918 kHz
-0.27 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.480 000 GHz

Span 1.5 MHz

#Res BW 10 kHz

#VBW 30 kHz

Sweep 14.36 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 056 GHz	-3.89 dBm
2R	(1)	Freq	2.479 550 GHz	-23.95 dBm
2Δ	(1)	Freq	918 kHz	-0.27 dB

For 8DPSK / DH5**20dB Bandwidth (CH Low)**

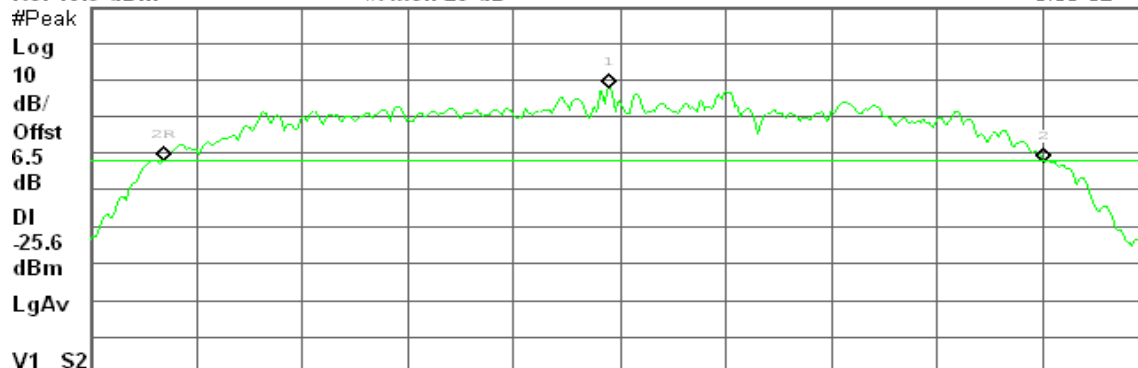
* Agilent 13:24:31 May 25, 2009

R T

 Δ Mkr2 1.273 MHz
-0.53 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.402 000 GHz

Span 1.5 MHz

#Res BW 10 kHz

#VBW 30 kHz

Sweep 14.36 ms (601 pts)

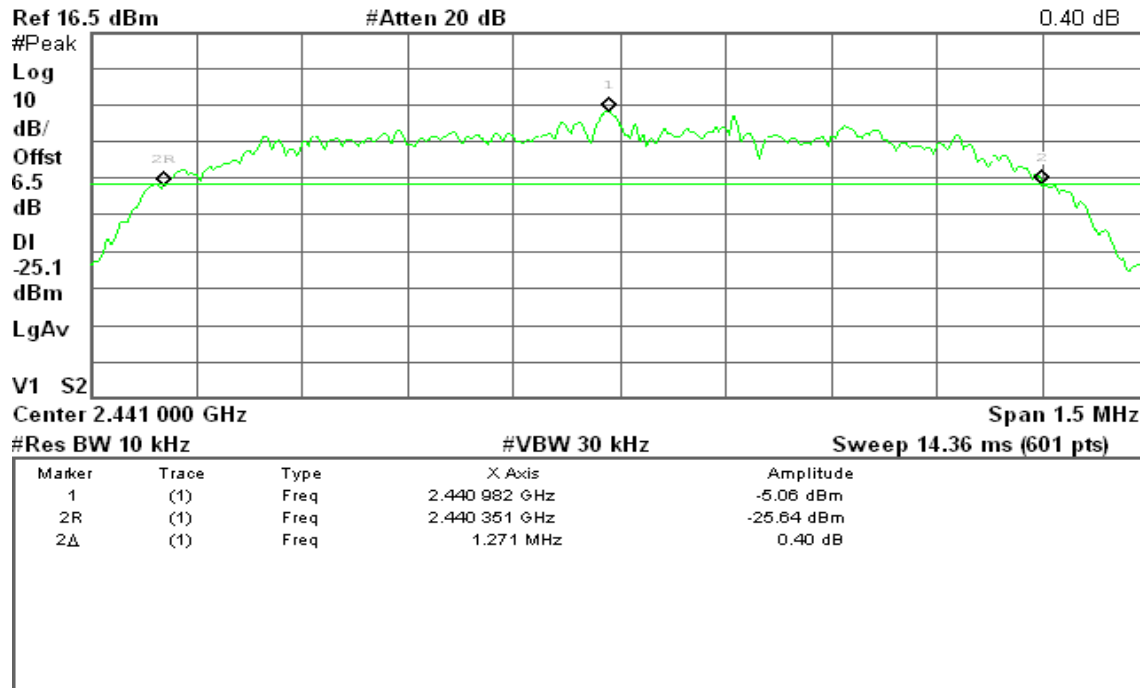
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.401 982 GHz	-5.62 dBm
2R	(1)	Freq	2.401 351 GHz	-25.60 dBm
2Δ	(1)	Freq	1.273 MHz	-0.53 dB



20dB Bandwidth (CH Mid)

* Agilent 13:23:22 May 25, 2009

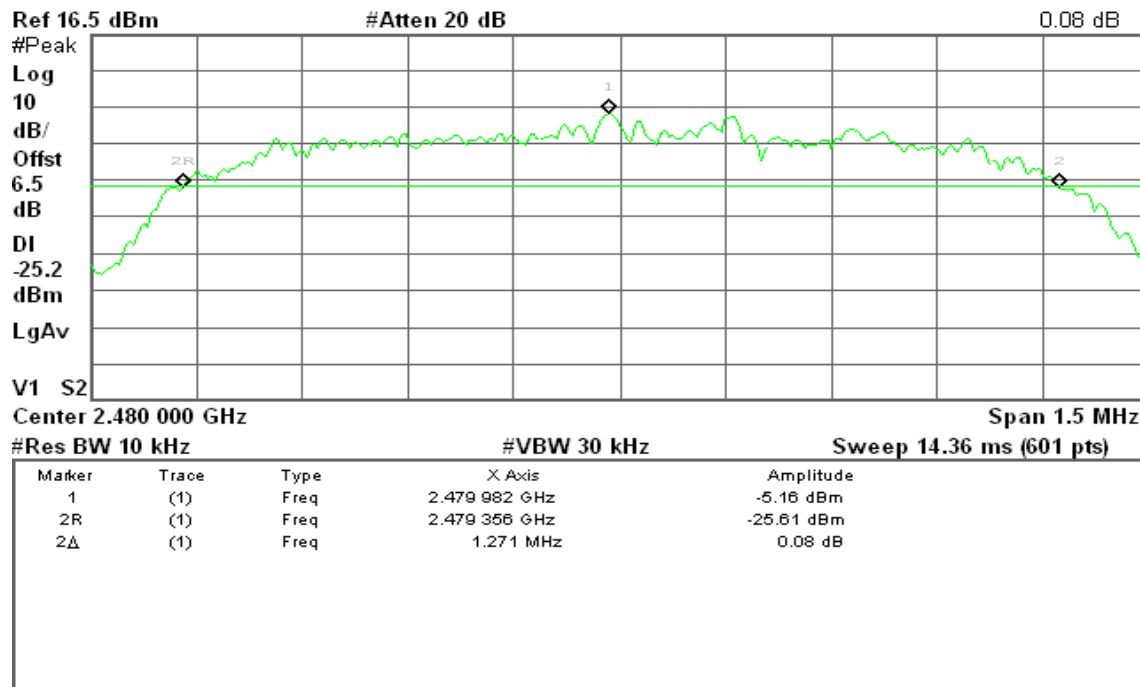
R T

 Δ Mkr2 1.271 MHz

20dB Bandwidth (CH High)

* Agilent 13:22:26 May 25, 2009

R T

 Δ Mkr2 1.271 MHz



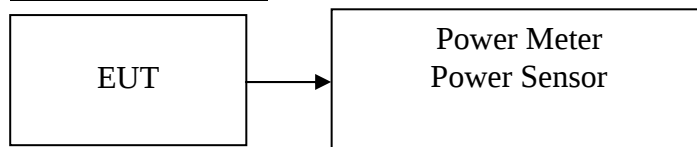
8.3 PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
3. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
4. According to RSS-210 §A8.4(4), for systems employing digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum peak conducted power shall not exceed 1 W.
According to RSS-210 §A8.1 (2) frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

TEST RESULTS

No non-compliance noted.

**Test Data****For GFSK / DH5**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	1.72	0.00149	0.125	PASS
Mid	2441	1.76	0.00150		PASS
High	2480	1.63	0.00146		PASS

For 8DPSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	4.33	0.00271	0.125	PASS
Mid	2441	4.38	0.00274		PASS
High	2480	4.21	0.00264		PASS

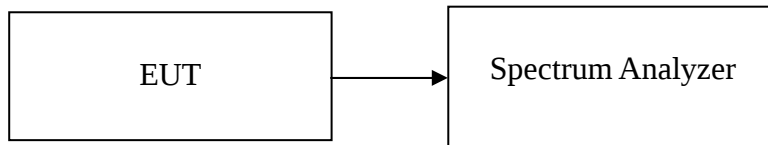


8.4 AVERAGE POWER

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the average power detection.

TEST RESULTS

No non-compliance noted.

Test Data

For GFSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2402	0.35	0.00108
Mid	2441	0.48	0.00112
High	2480	0.30	0.00107

For 8DPSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2402	0.37	0.00109
Mid	2441	0.52	0.00113
High	2480	0.32	0.00108

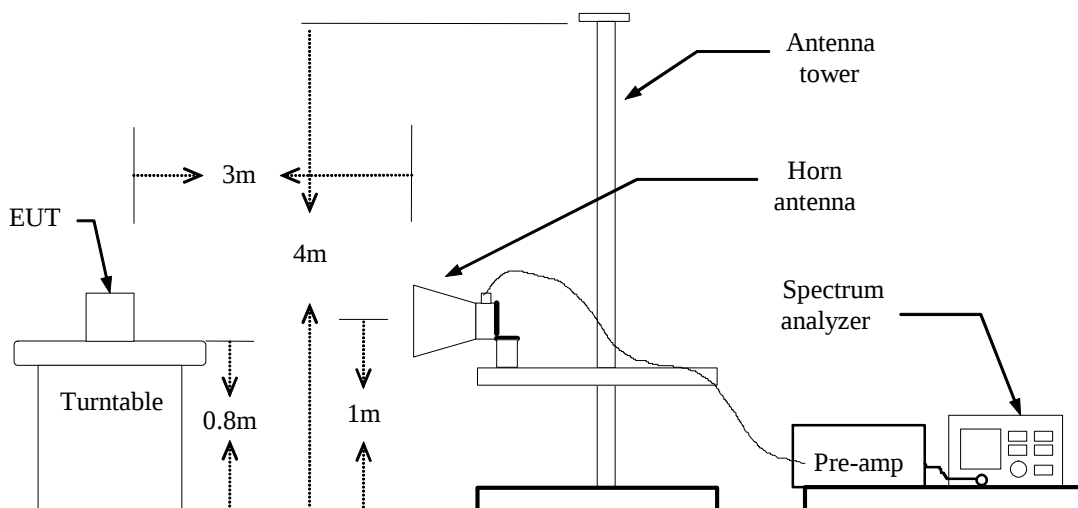
8.5 BAND EDGES MEASUREMENT

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (see Section 15.205(c)).

According to RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

Test Configuration



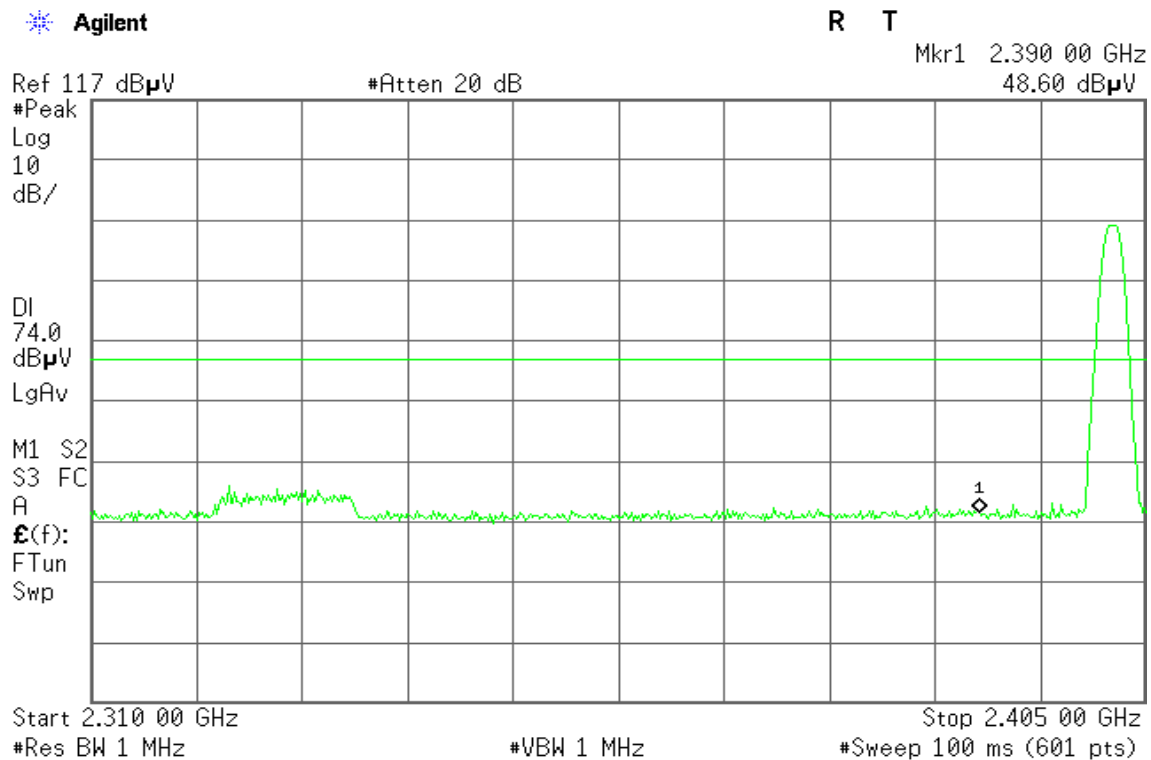
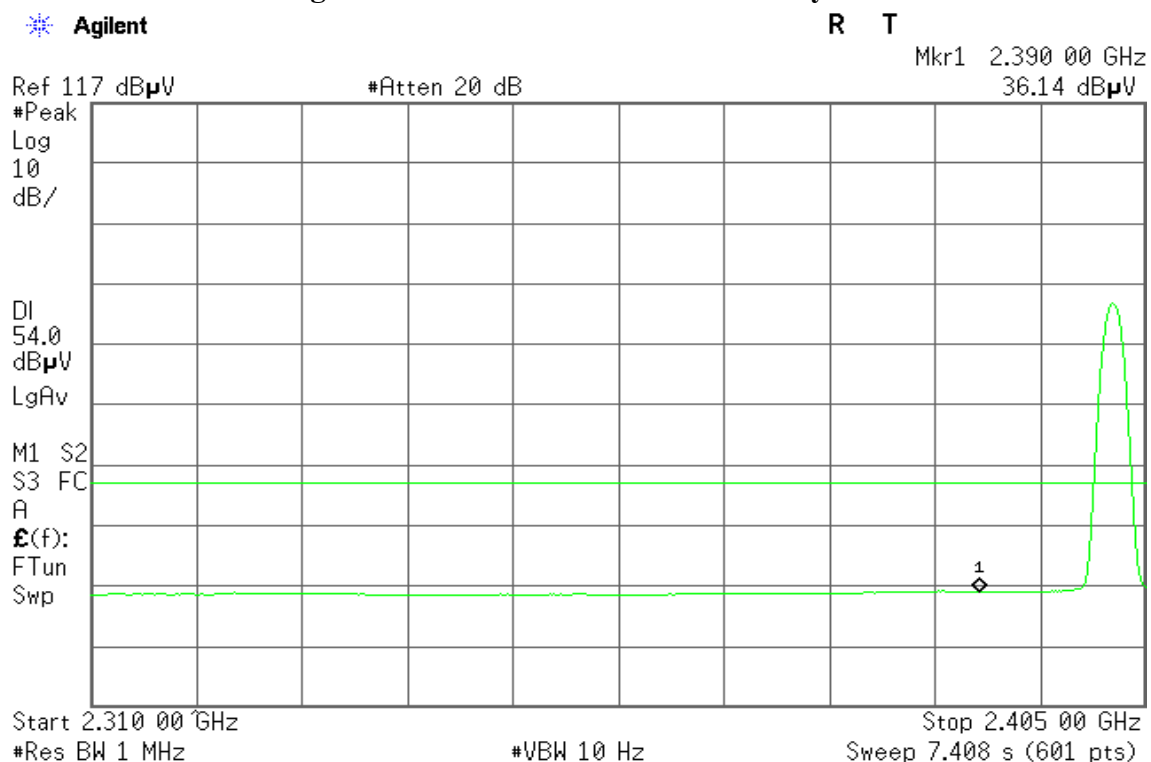


TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

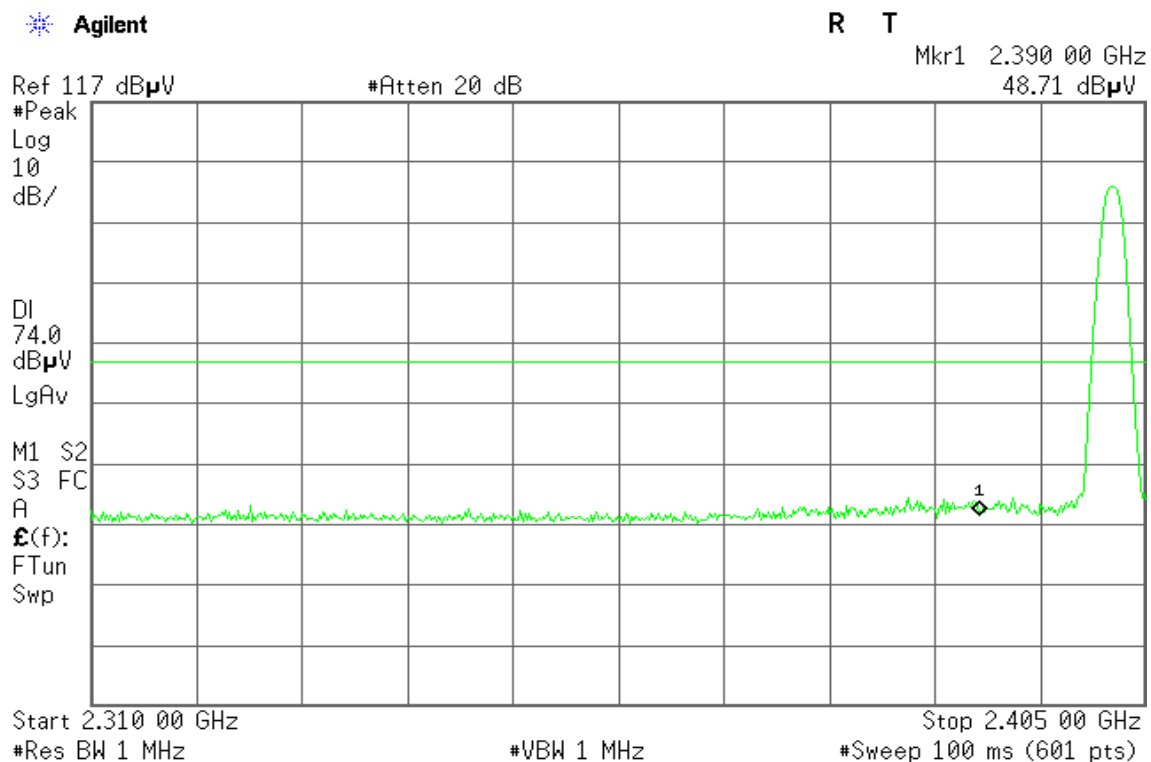
Refer to attach spectrum analyzer data chart.

**For GFSK / DH5****Band Edges (CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



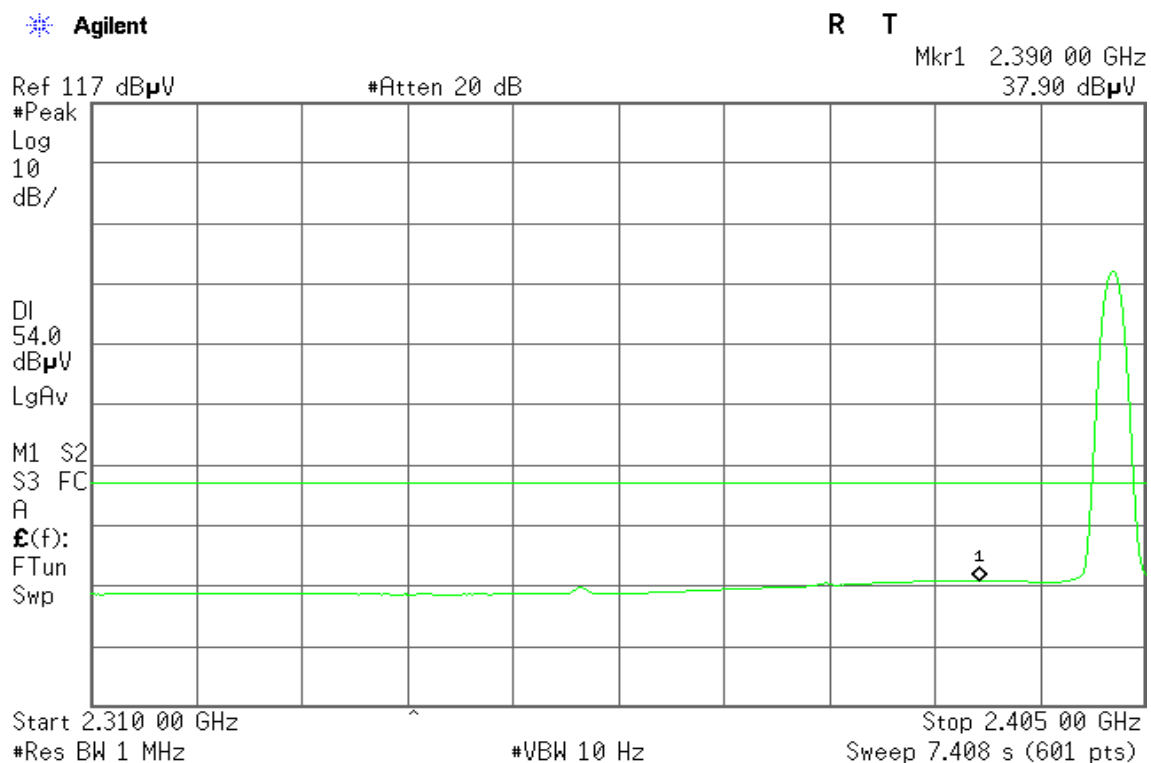
Detector mode: Peak

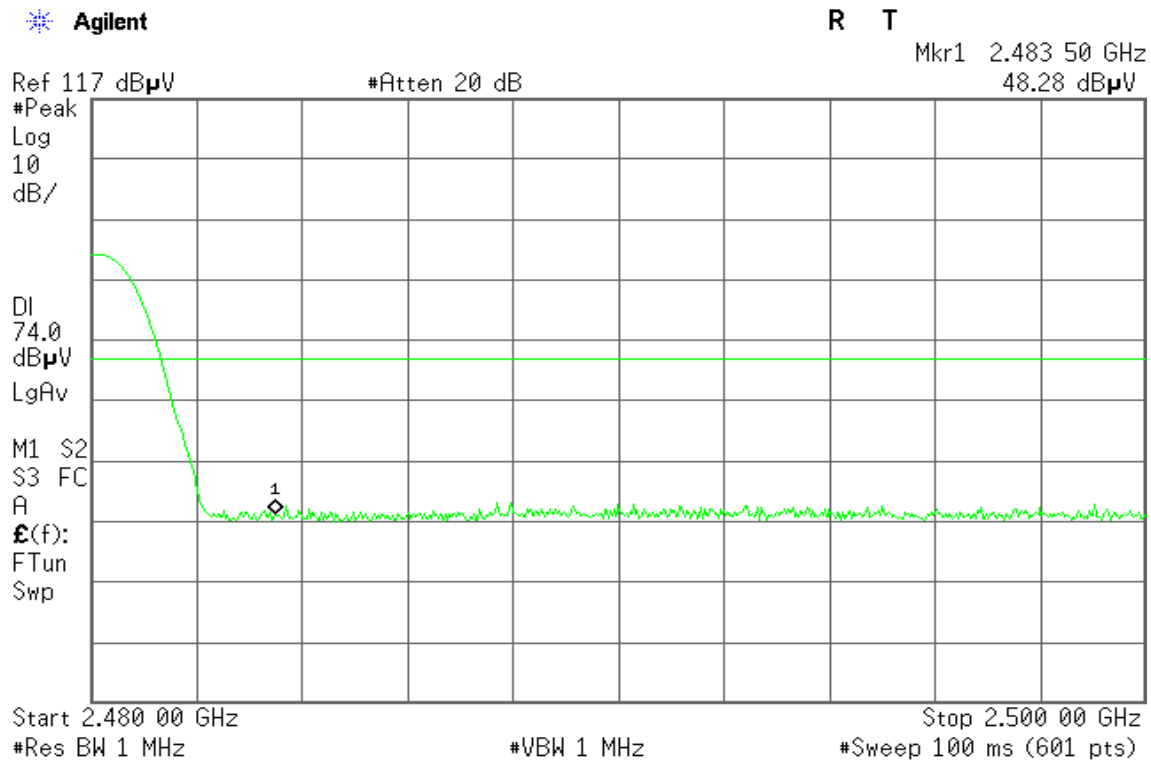
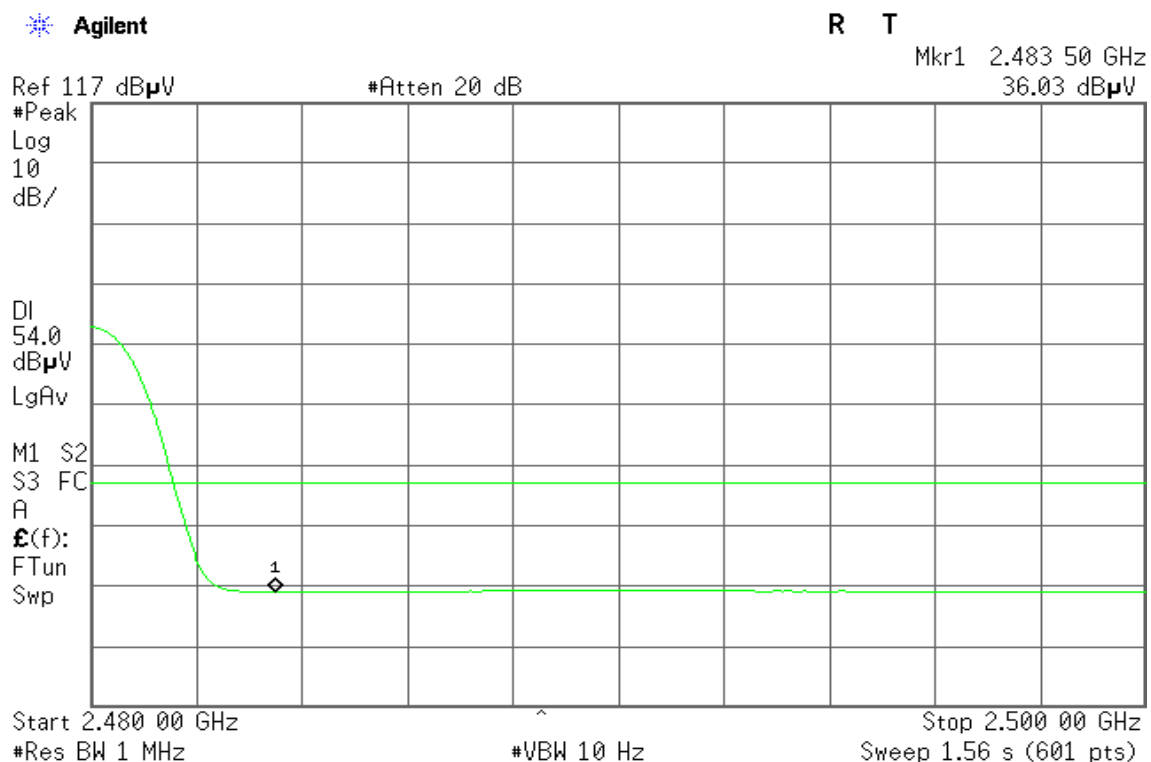
Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

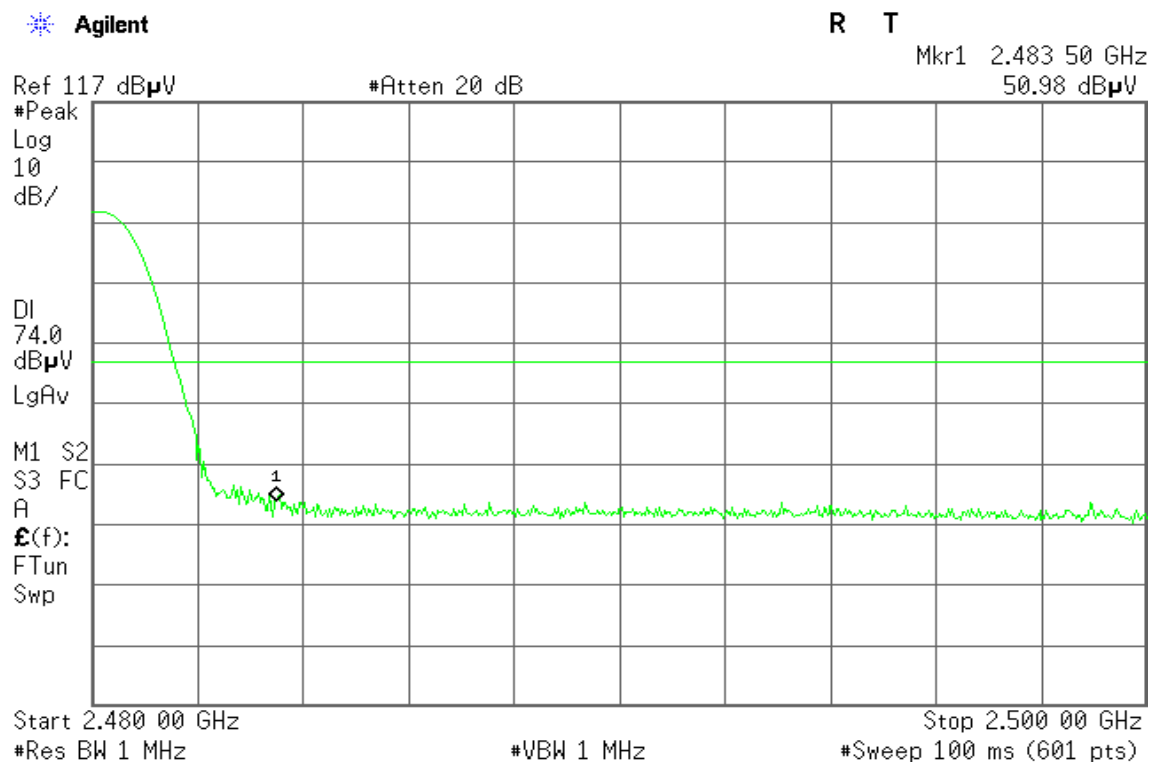


**Band Edges (CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



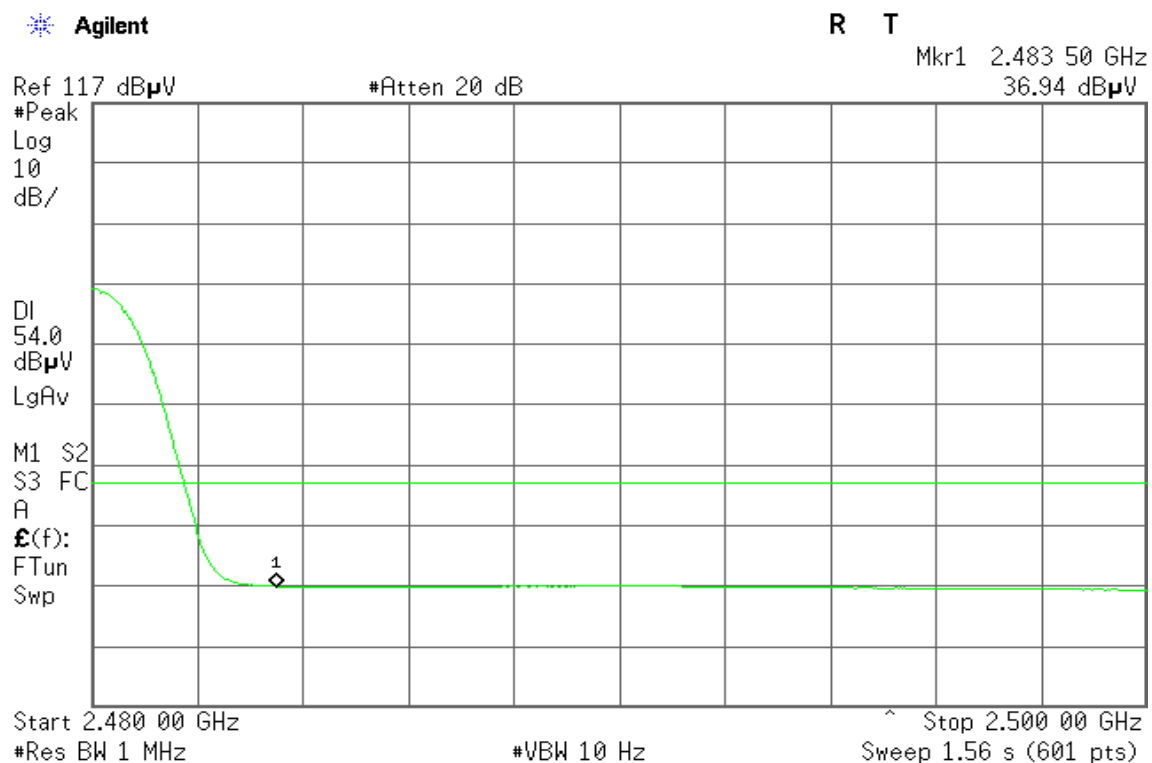
Detector mode: Peak

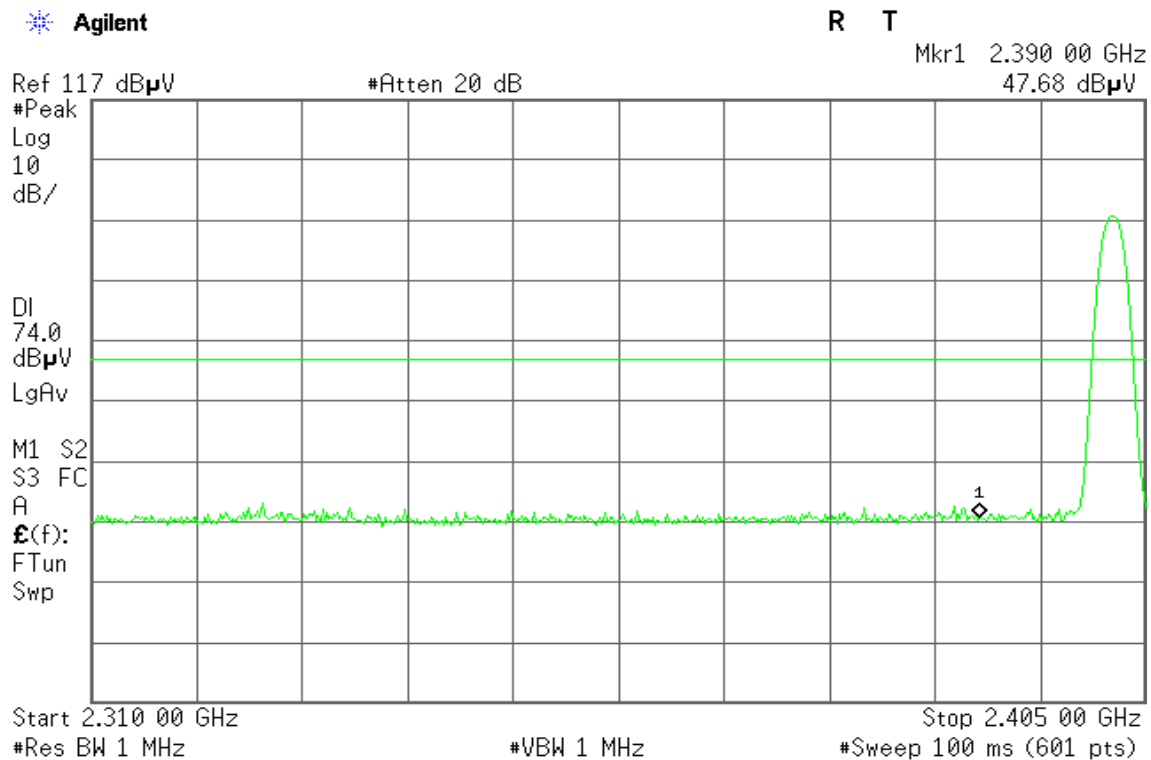
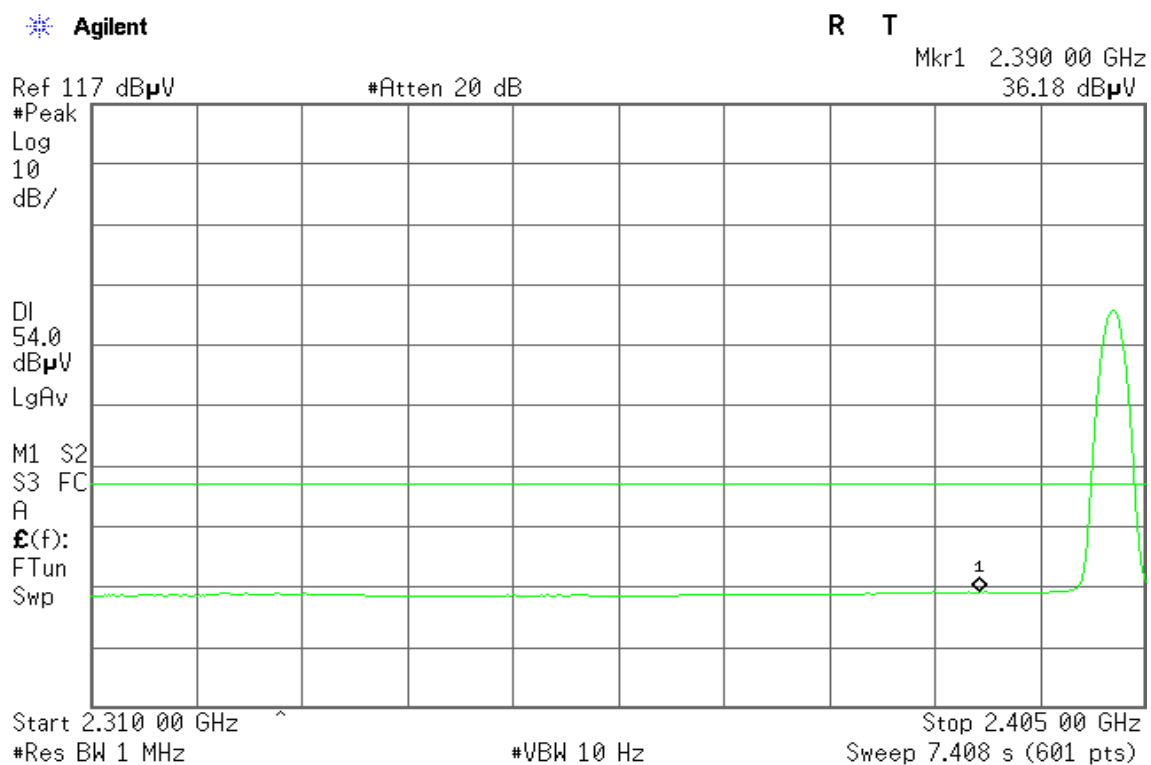
Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

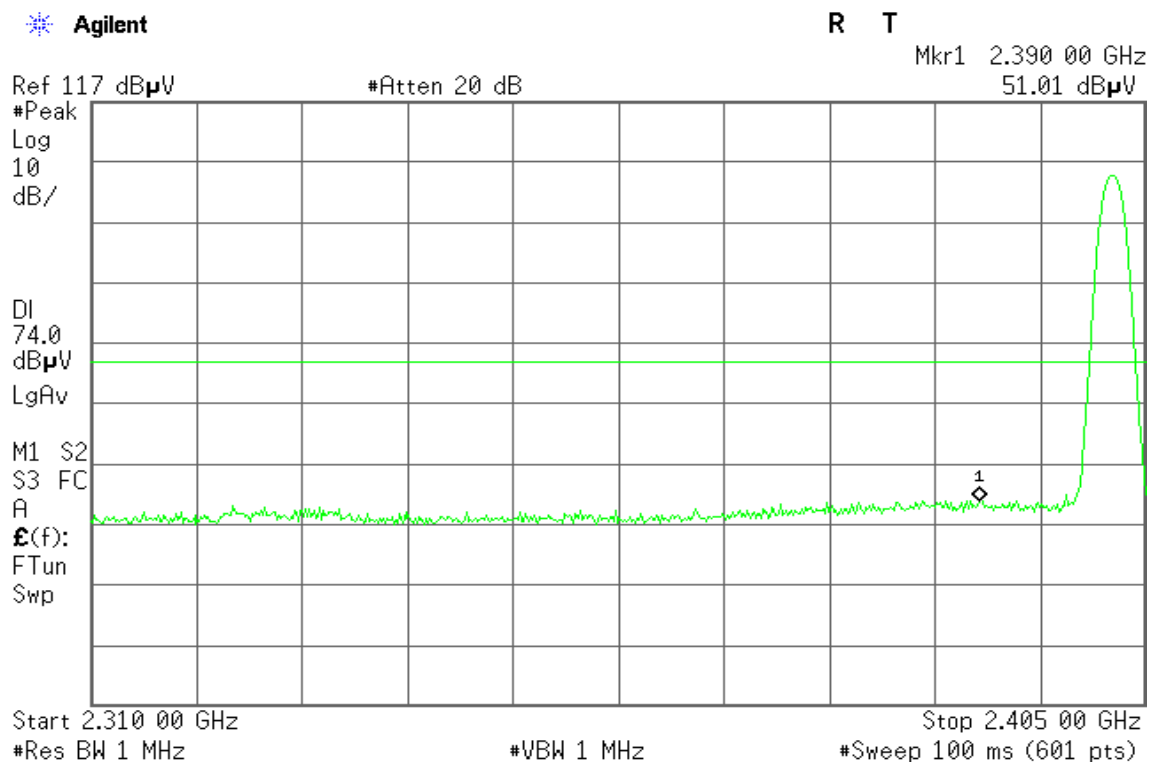


**For 8DPSK / DH5****Band Edges (CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



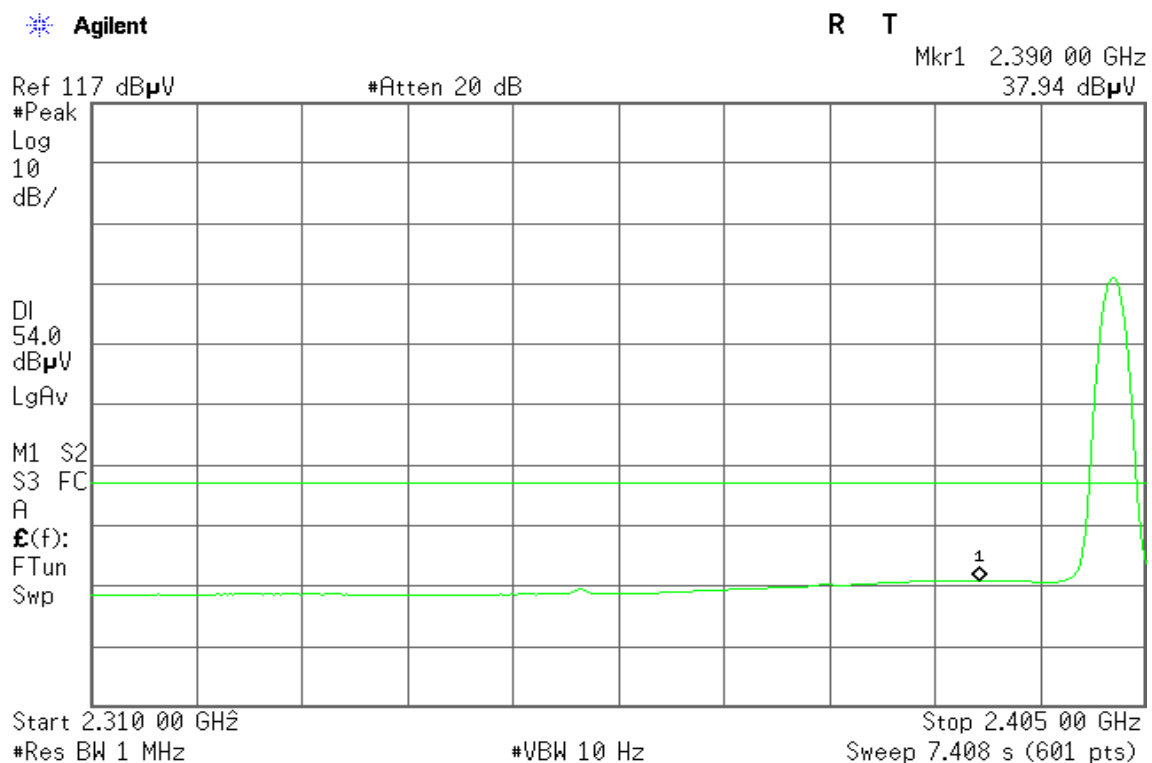
Detector mode: Peak

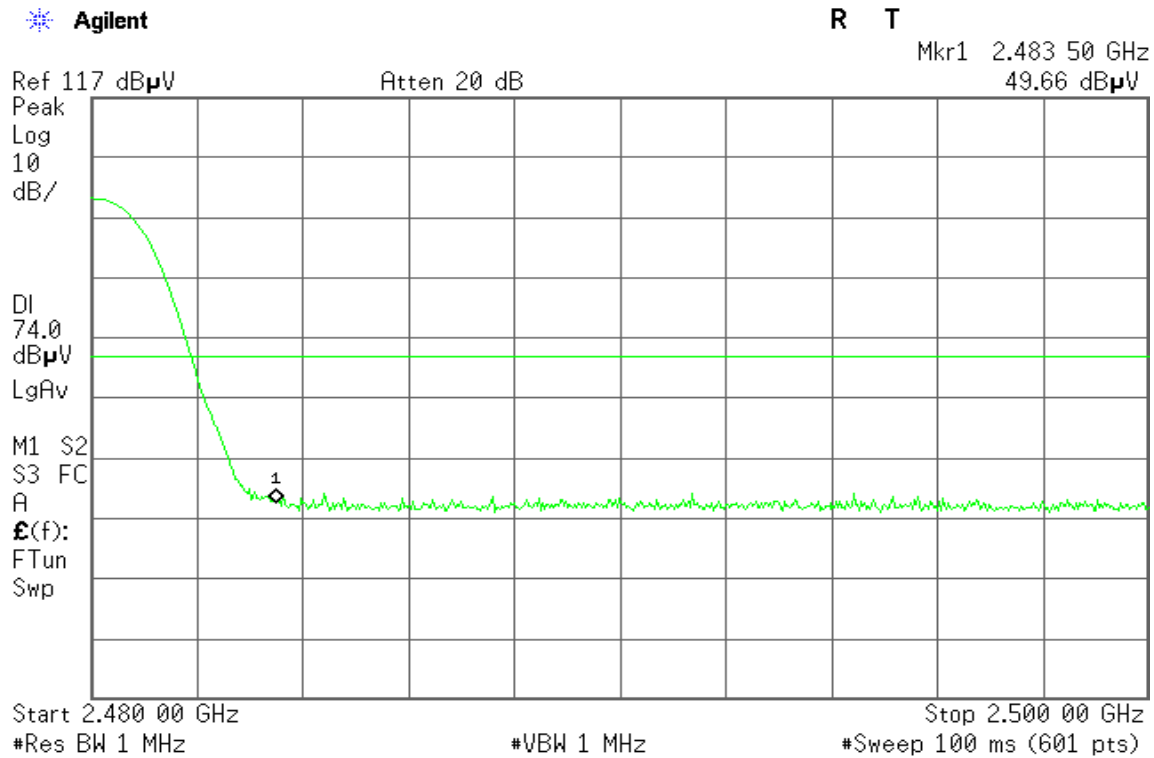
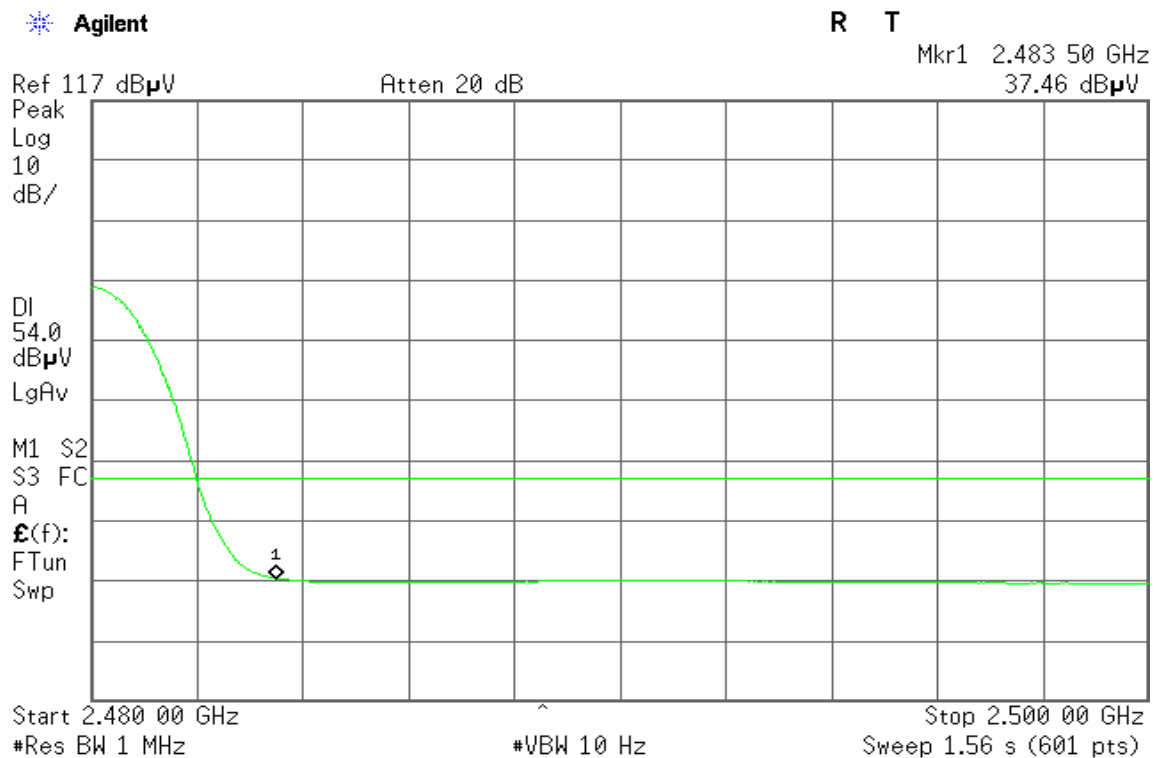
Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

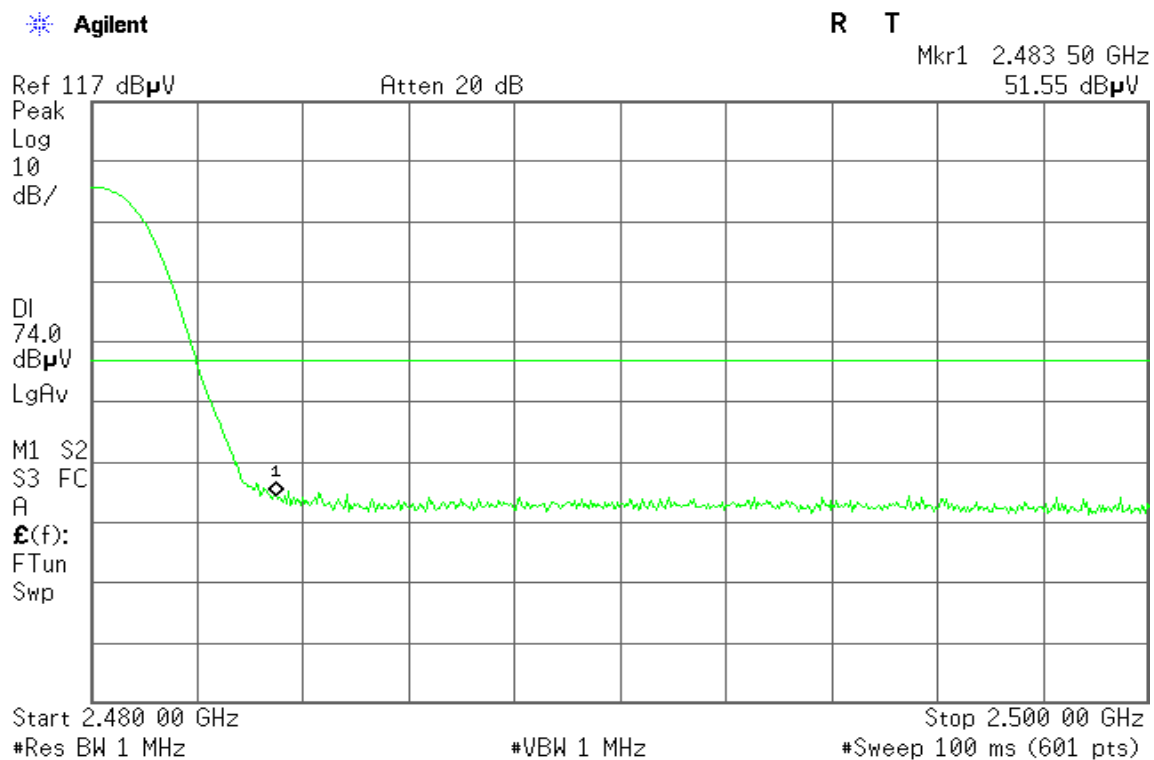


**Band Edges (CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



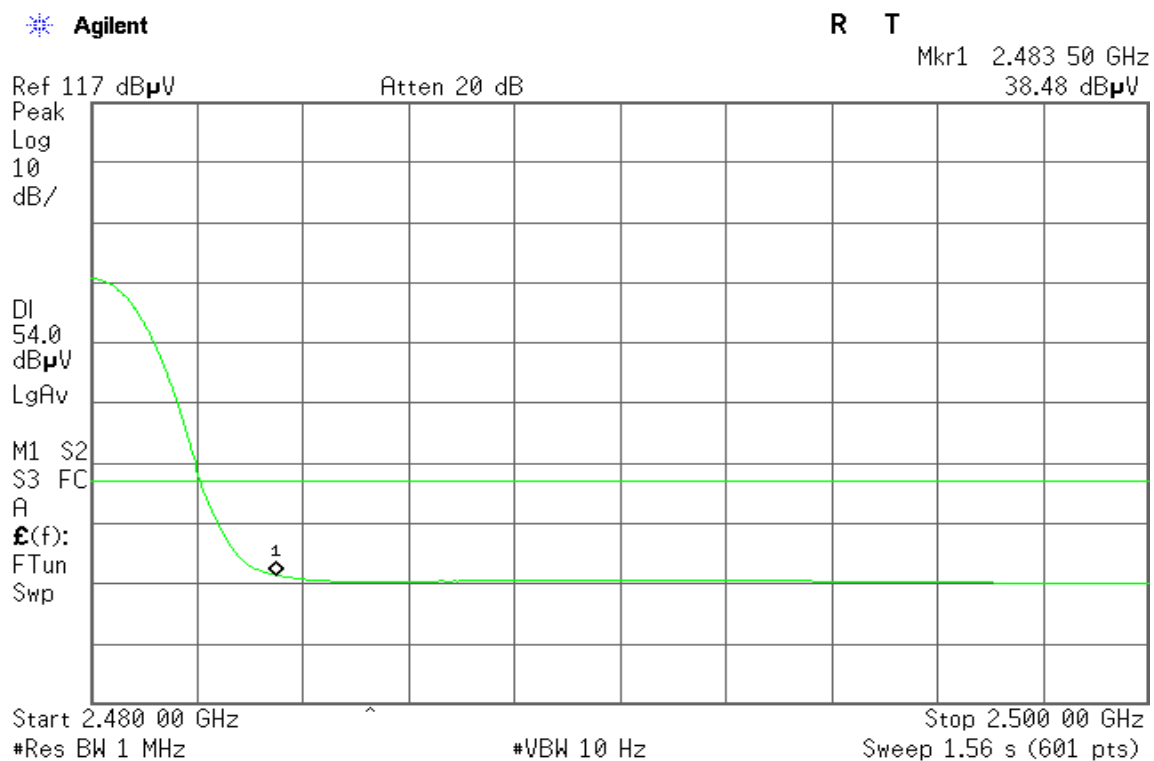
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



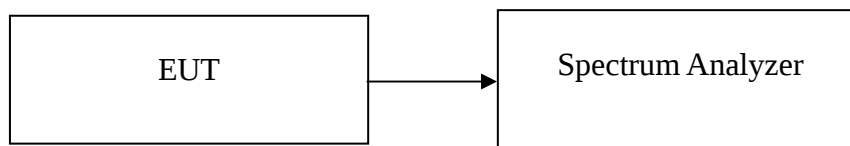


8.6 PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.
3. According to RSS-210 §A8.2, the transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration. This power spectral density shall be determined in accordance with the provisions of Section A8.4 below. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Configuration



TEST 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 the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted

**Test Data****For GFSK / DH5**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2402	-9.02	8.00	PASS
Mid	2441	-8.82		PASS
High	2480	-9.06		PASS

For 8DPSK / DH5

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2402	-13.04	8.00	PASS
Mid	2441	-12.88		PASS
High	2480	-13.21		PASS



Test Plot

For GFSK / DH5

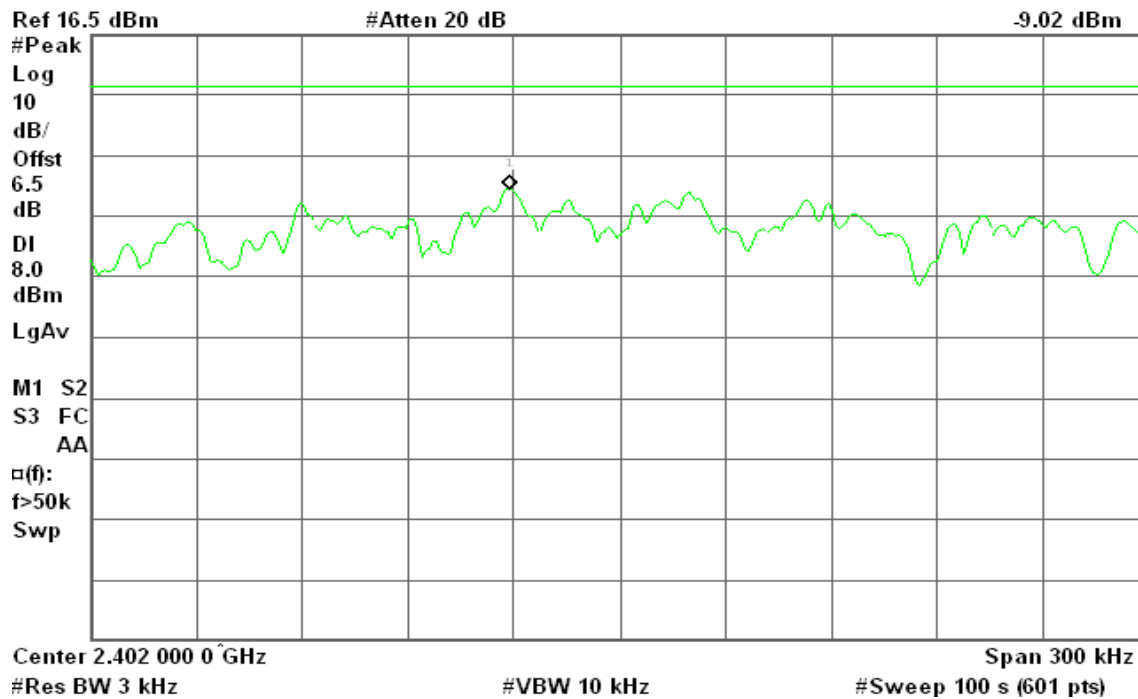
PPSD (CH Low)

Agilent 14:09:52 May 25, 2009

R T

Mkr1 2.401 968 9 GHz

-9.02 dBm



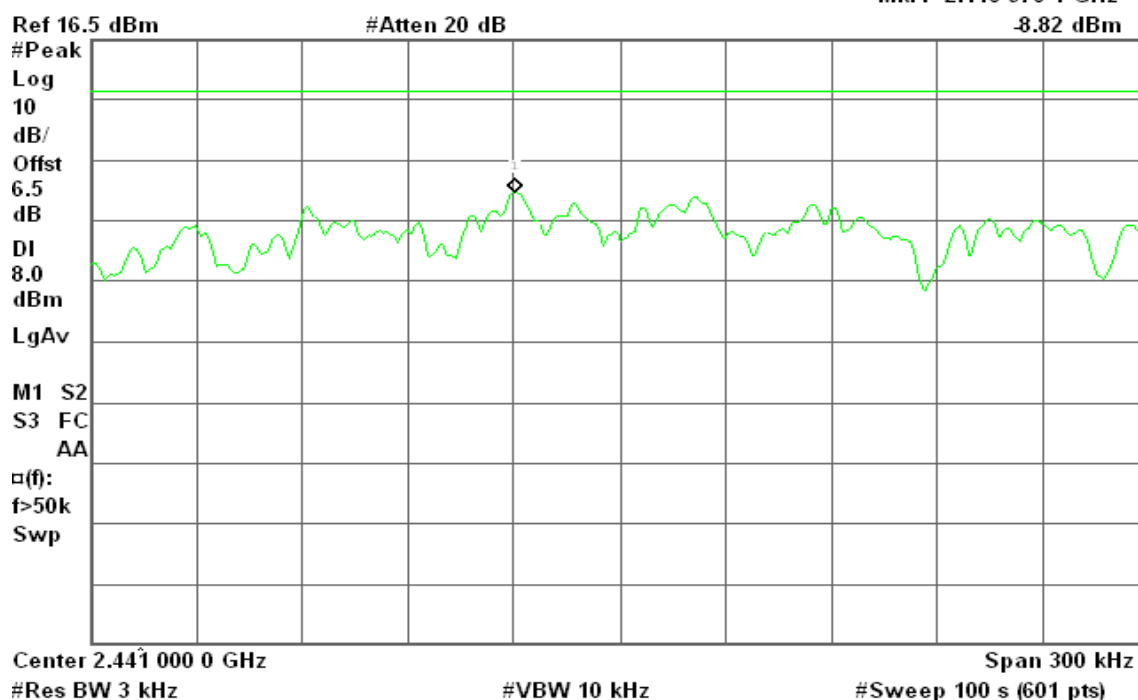
PPSD (CH Mid)

Agilent 14:11:51 May 25, 2009

R T

Mkr1 2.440 970 4 GHz

-8.82 dBm





PPSD (CH High)

* Agilent 14:13:56 May 25, 2009

R T

Mkr1 2.479 972 9 GHz

-9.06 dBm

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

DI

8.0

dBm

LgAv

M1 S2

S3 FC

AA

□(f):

f>50k

Swp

Center 2.480 000 0 GHz

#Res BW 3 kHz

#VBW 10 kHz

Span 300 kHz

#Sweep 100 s (601 pts)

For 8DPSK / DH5

PPSD (CH Low)

* Agilent 14:20:40 May 25, 2009

R T

Mkr1 2.401 982 9 GHz

-13.04 dBm

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

DI

8.0

dBm

LgAv

M1 S2

S3 FC

AA

□(f):

f>50k

Swp

Center 2.402 000 0 GHz

#Res BW 3 kHz

#VBW 10 kHz

Span 300 kHz

#Sweep 100 s (601 pts)



PPSD (CH Mid)

* Agilent 14:18:28 May 25, 2009

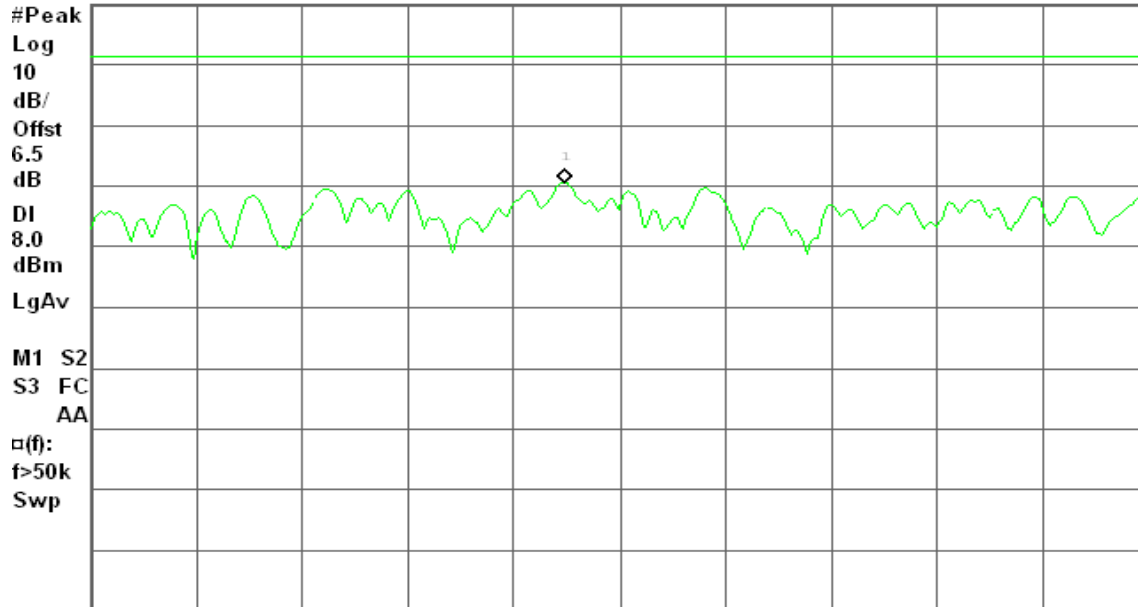
R T

Mkr1 2.440 984 4 GHz

-12.88 dBm

Ref 16.5 dBm

#Atten 20 dB



Center 2.441 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

PPSD (CH High)

* Agilent 14:16:31 May 25, 2009

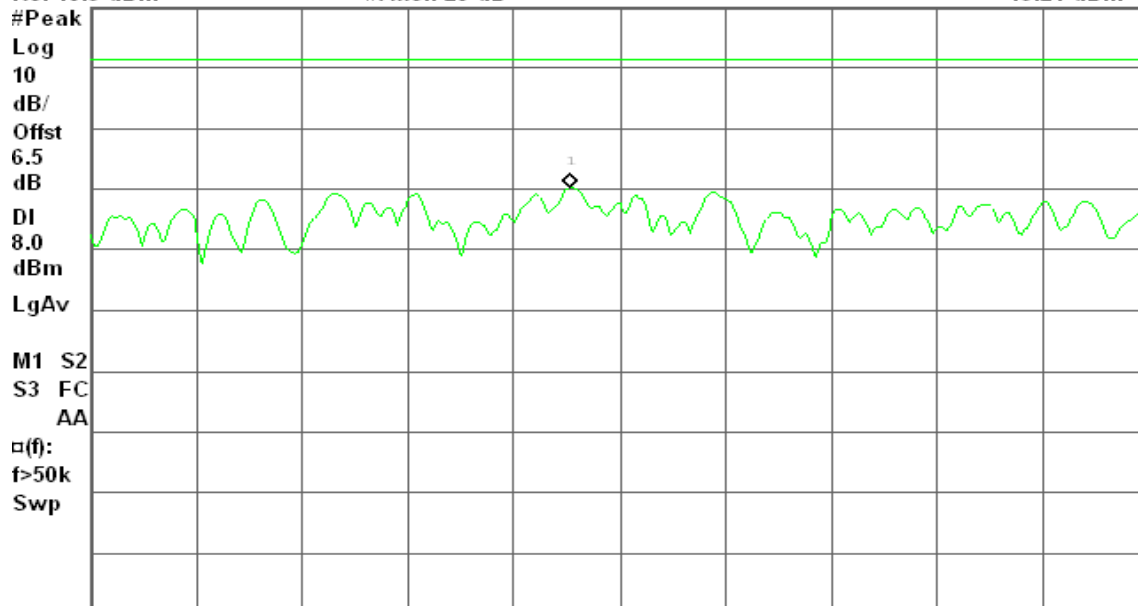
R T

Mkr1 2.479 985 9 GHz

-13.21 dBm

Ref 16.5 dBm

#Atten 20 dB



Center 2.480 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



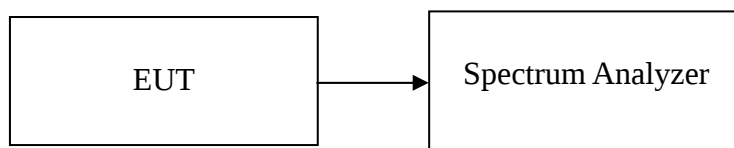
8.7 FREQUENCY SEPARATION

LIMIT

According to §15.247(a)(1) & RSS-210 §A8.1 (b), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

According to RSS-210 §A8.1 (2) frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W.

Test Configuration



TEST 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 = 30kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
5. Max hold, mark 3 peaks of hopping channel and record the 3 peaks frequency.

TEST RESULTS

No non-compliance noted

**Test Data****For GFSK / DH5**

Channel Separation (MHz)	two-thirds of the 20 dB bandwidth	Channel Separation Limit	Result
1.00	612	two-thirds of the 20 dB bandwidth	Pass

For 8DPSK / DH5

Channel Separation (MHz)	two-thirds of the 20 dB bandwidth	Channel Separation Limit	Result
1.00	848	two-thirds of the 20 dB bandwidth	Pass



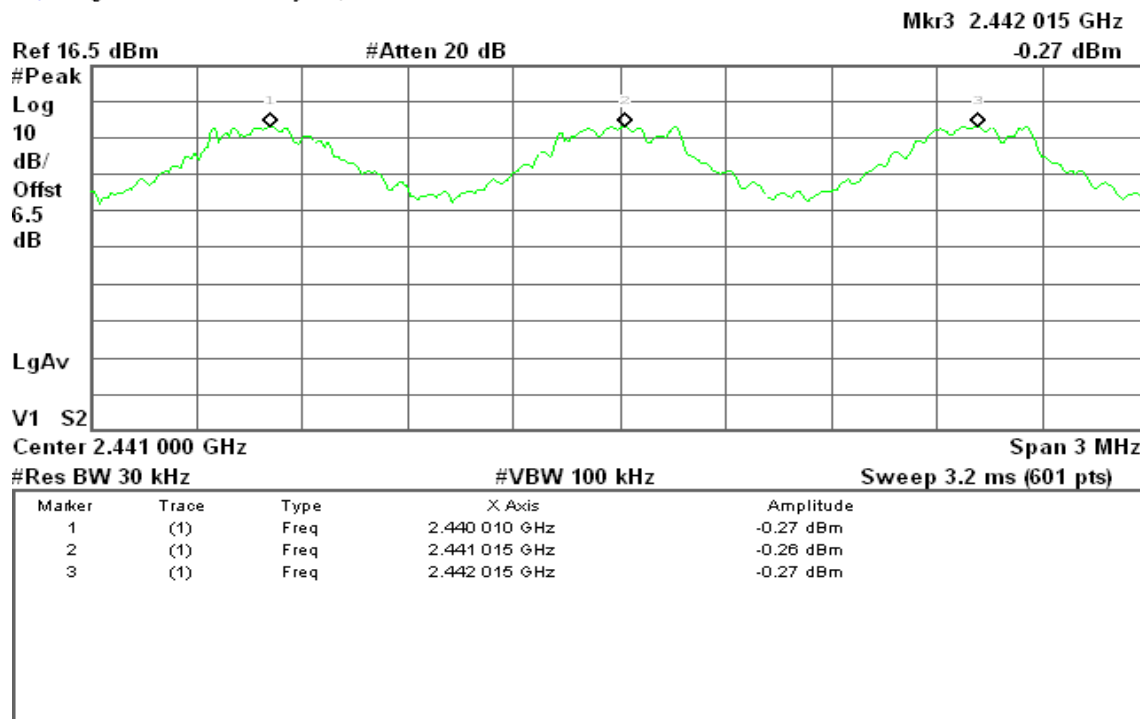
Test Plot

For GFSK / DH5

Measurement of Channel Separation

* Agilent 13:17:08 May 25, 2009

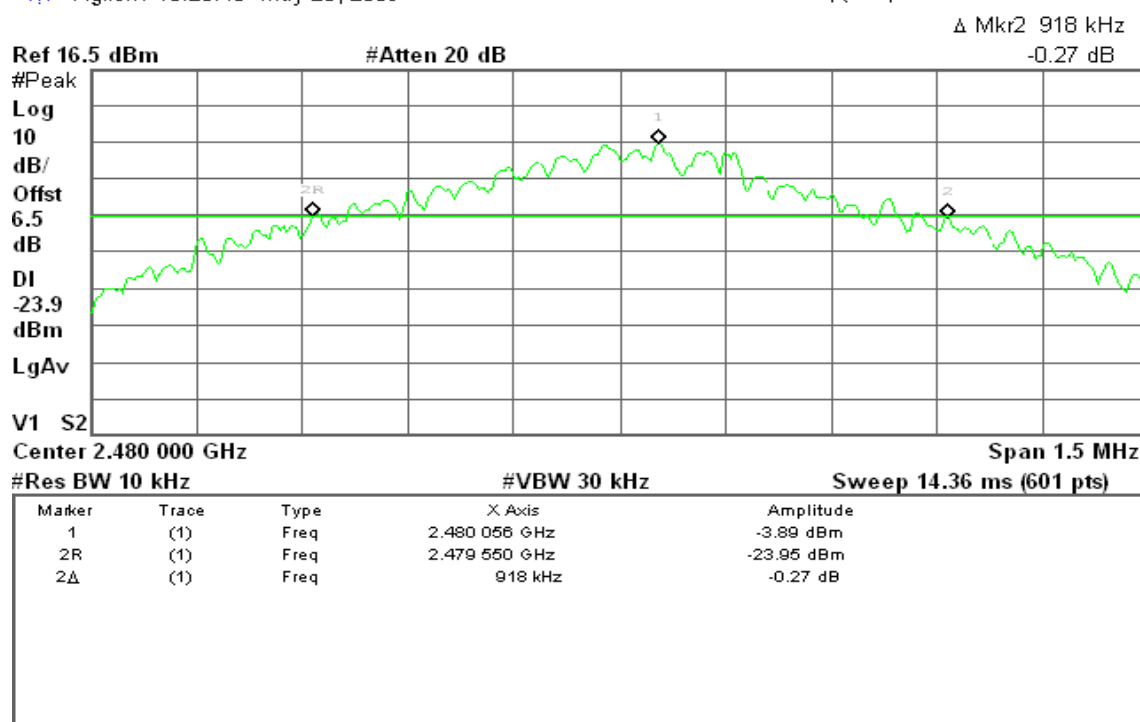
R T



Measurement of 20dB Bandwidth

* Agilent 13:20:43 May 25, 2009

R T



**For 8DPSK / DH5****Measurement of Channel Separation**

* Agilent 13:15:19 May 25, 2009

R T

Mkr3 2.442 155 GHz

Ref 16.5 dBm

#Atten 20 dB

-0.41 dBm

#Peak

Log

10

dB/

Offst

6.5

dB

LgAv

V1 S2

Center 2.441 000 GHz

Span 3 MHz

#Res BW 30 kHz

#VBW 100 kHz

Sweep 3.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.440 135 GHz	-0.79 dBm
2	(1)	Freq	2.441 155 GHz	-0.38 dBm
3	(1)	Freq	2.442 155 GHz	-0.41 dBm

Measurement of 20dB Bandwidth

* Agilent 13:24:31 May 25, 2009

R T

Δ Mkr2 1.273 MHz

Ref 16.5 dBm

#Atten 20 dB

-0.53 dB

#Peak

Log

10

dB/

Offst

6.5

dB

DI

-25.6

dBm

LgAv

V1 S2

Center 2.402 000 GHz

Span 1.5 MHz

#Res BW 10 kHz

#VBW 30 kHz

Sweep 14.36 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.401 982 GHz	-5.62 dBm
2R	(1)	Freq	2.401 351 GHz	-25.60 dBm
2Δ	(1)	Freq	1.273 MHz	-0.53 dB



8.8 NUMBER OF HOPPING FREQUENCY

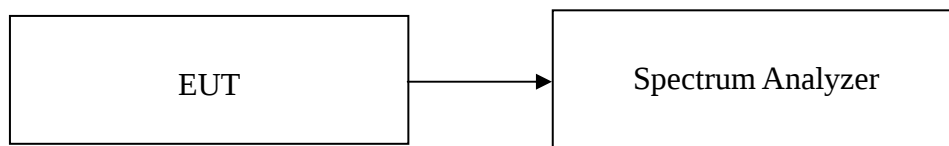
LIMIT

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

According to §15.247(a)(1)(iii) & RSS-210 §A8.1(4), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

According to RSS-210 §A8.1(4), frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels.

Test Configuration



TEST 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 = 2441.5MHz, Sweep = auto and Start=2441.5MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=510kHz.
5. Max hold, view and count how many channel in the band.

TEST RESULTS

No non-compliance noted

Test Data

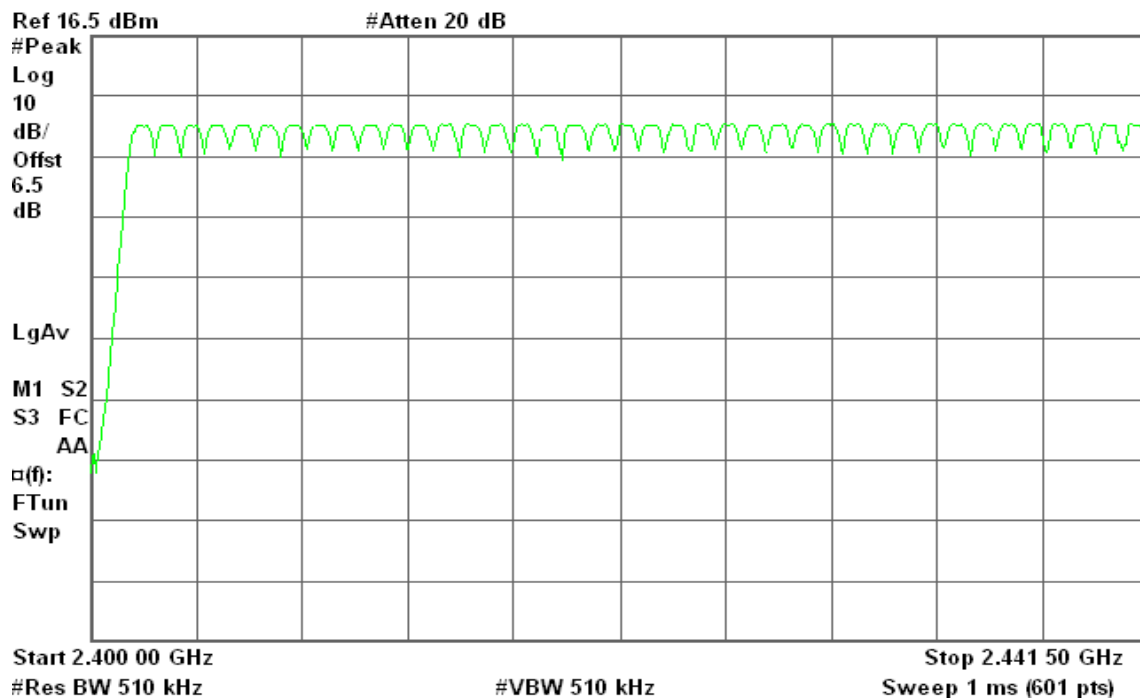
For GFSK / 8DPSK

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

**Test Plot****For GFSK****Channel Number****2.4 GHz – 2.4415 GHz**

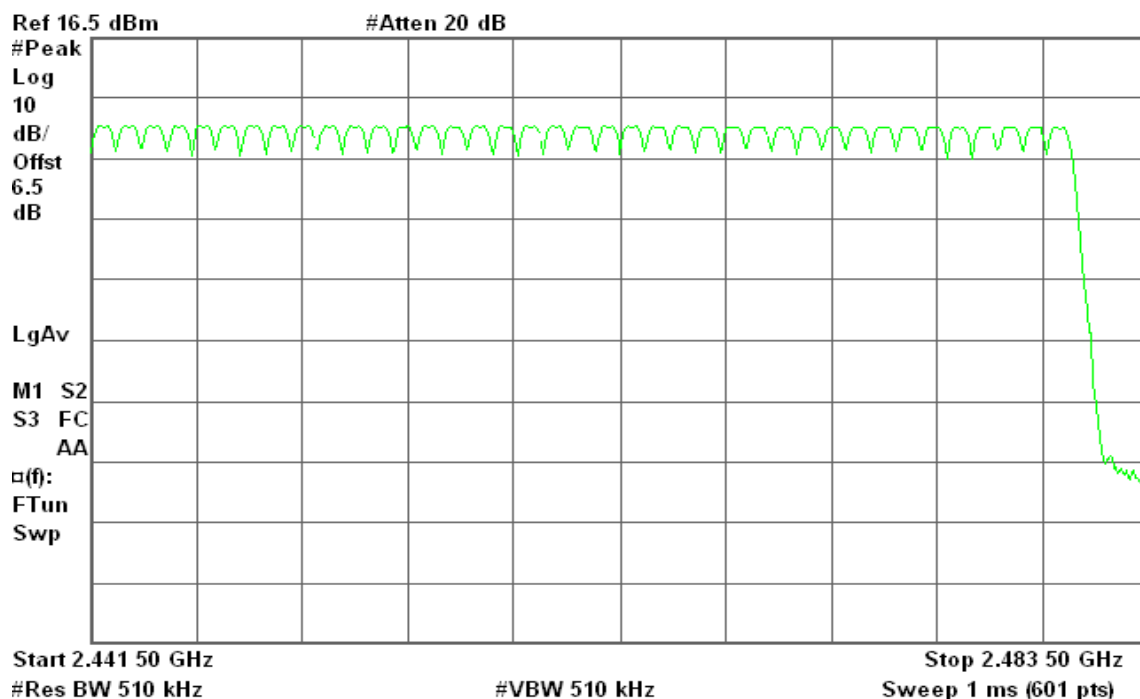
* Agilent 14:06:42 May 25, 2009

R T

**2.4415 GHz – 2.4835 GHz**

* Agilent 14:06:18 May 25, 2009

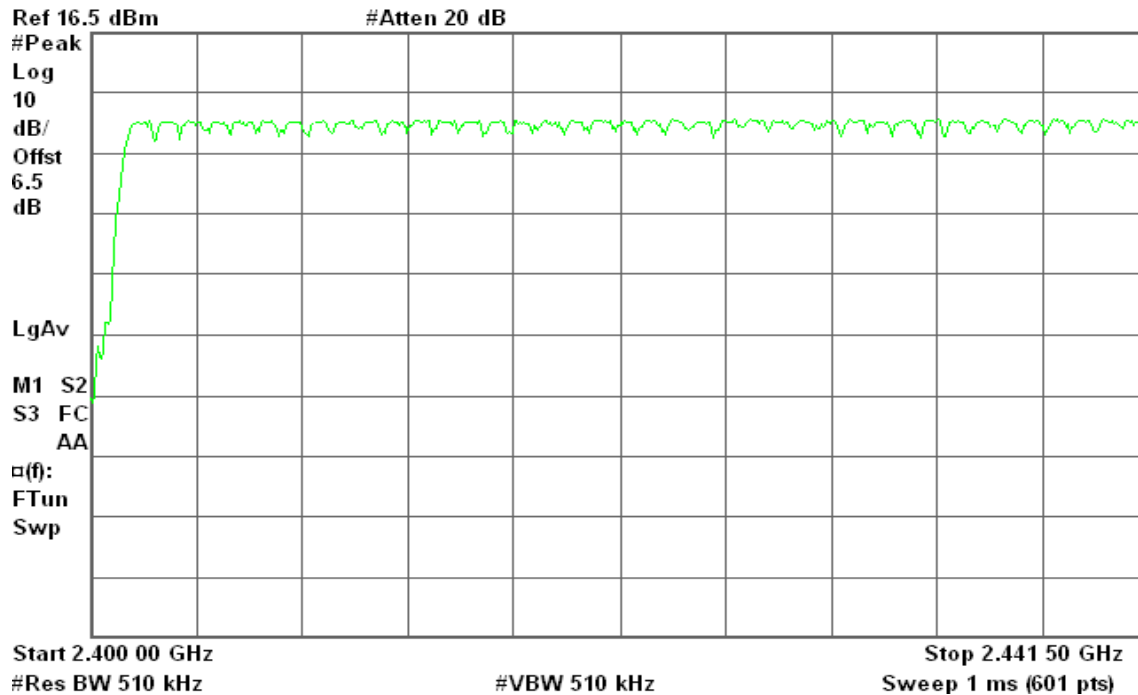
R T



**For 8DPSK****Channel Number****2.4 GHz – 2.4415 GHz**

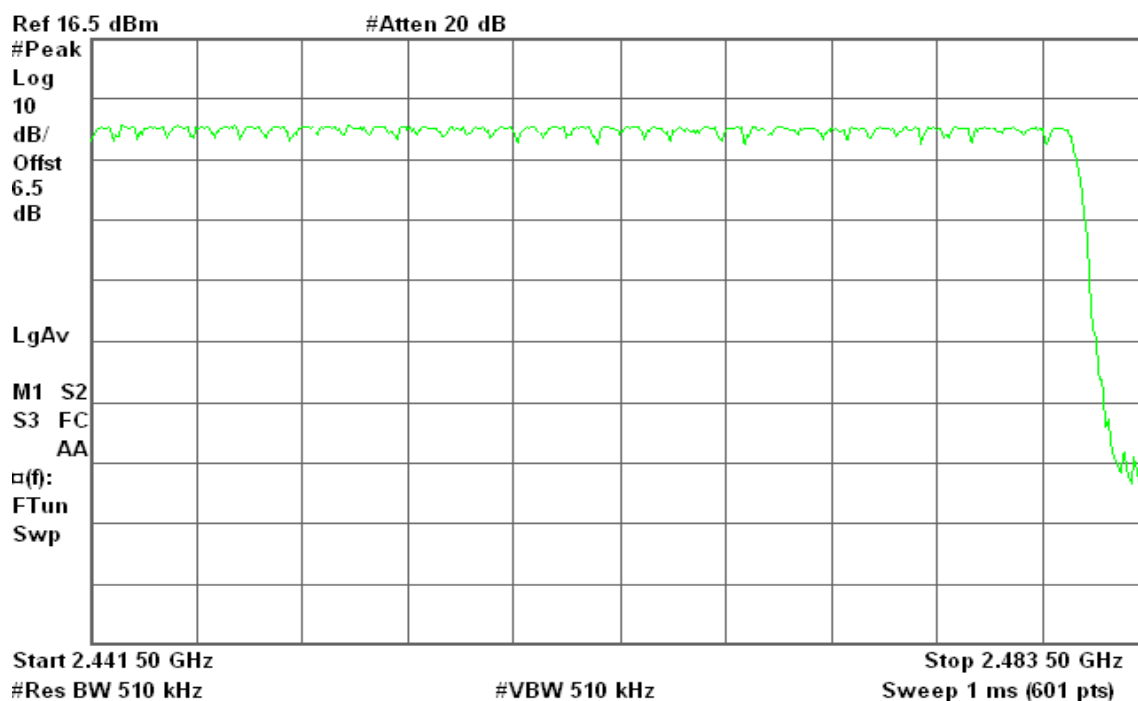
* Agilent 13:57:28 May 25, 2009

R T

**2.4415 GHz – 2.4835 GHz**

* Agilent 13:58:43 May 25, 2009

R T





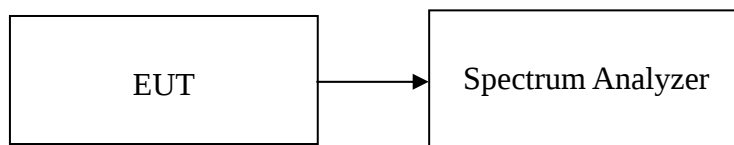
8.9 TIME OF OCCUPANCY (DWELL TIME)

LIMIT

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

According to RSS-210 §A8.1(4), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

Test Configuration



TEST PROCEDURE

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

TEST RESULTS

No non-compliance noted.

**Test Data****For GFSK****DH 1**CH Low: $0.3833 * (1600/2)/79 * 31.6 = 122.656 \text{ (ms)}$ CH Mid: $0.3833 * (1600/2)/79 * 31.6 = 122.656 \text{ (ms)}$ CH High: $0.3833 * (1600/2)/79 * 31.6 = 122.656 \text{ (ms)}$

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.3833	122.656	31.60	400.00	PASS
Mid	0.3833	122.656	31.60		PASS
High	0.3833	122.656	31.60		PASS

DH 3CH Low: $1.633 * (1600/4)/79 * 31.6 = 261.280 \text{ (ms)}$ CH Mid: $1.633 * (1600/4)/79 * 31.6 = 261.280 \text{ (ms)}$ CH High: $1.633 * (1600/4)/79 * 31.6 = 261.280 \text{ (ms)}$

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.633	261.280	31.60	400.00	PASS
Mid	1.633	261.280	31.60		PASS
High	1.633	261.280	31.60		PASS

DH 5CH Low: $2.883 * (1600/6)/79 * 31.6 = 307.520 \text{ (ms)}$ CH Mid: $2.883 * (1600/6)/79 * 31.6 = 307.520 \text{ (ms)}$ CH High: $2.883 * (1600/6)/79 * 31.6 = 307.520 \text{ (ms)}$

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.883	307.520	31.60	400.00	PASS
Mid	2.883	307.520	31.60		PASS
High	2.883	307.520	31.60		PASS

**Test Plot****For GFSK****DH 1****CH Low**

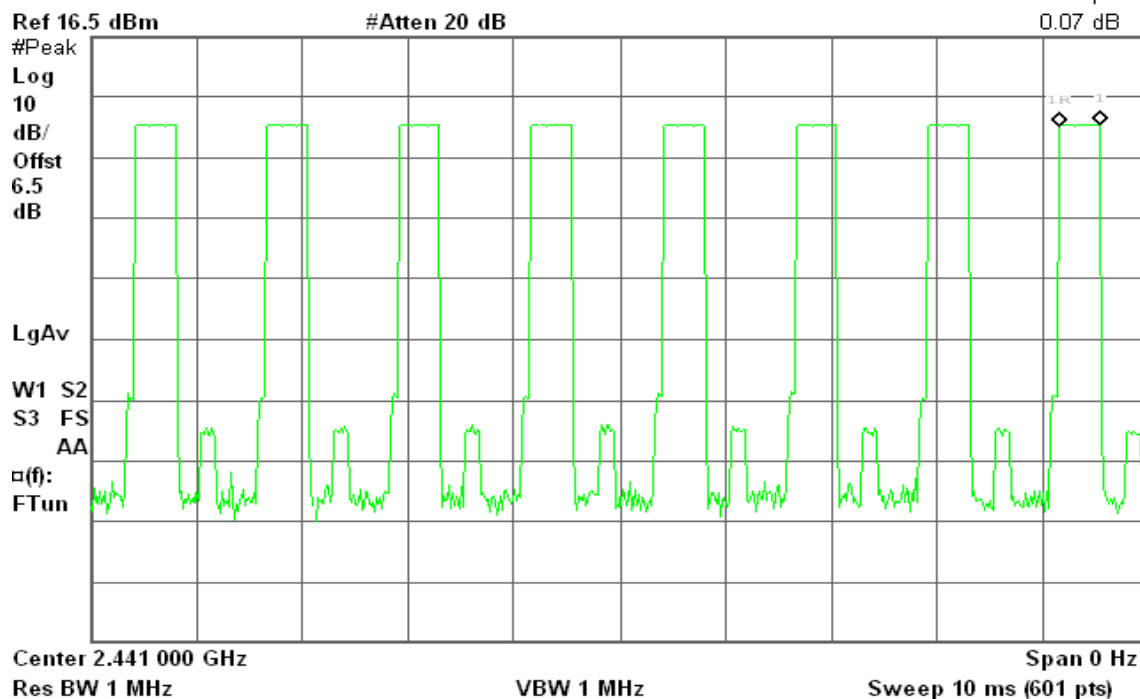
* Agilent 13:46:54 May 25, 2009

R T

 Δ Mkr1 383.3 μ s
-0.01 dB**CH Mid**

* Agilent 13:47:28 May 25, 2009

R T

 Δ Mkr1 383.3 μ s
0.07 dB



CH High

* Agilent 13:49:17 May 25, 2009

R T

 Δ Mkr1 383.3 μ s
0.02 dB

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

LgAv

W1 S2

S3 FS

AA

 $\square(f)$:

FTun

Center 2.480 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

DH 3

CH Low

* Agilent 13:46:17 May 25, 2009

R T

 Δ Mkr1 1.633 ms
0.06 dB

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

LgAv

W1 S2

S3 FS

AA

 $\square(f)$:

FTun

Center 2.402 000 0 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)



CH Mid

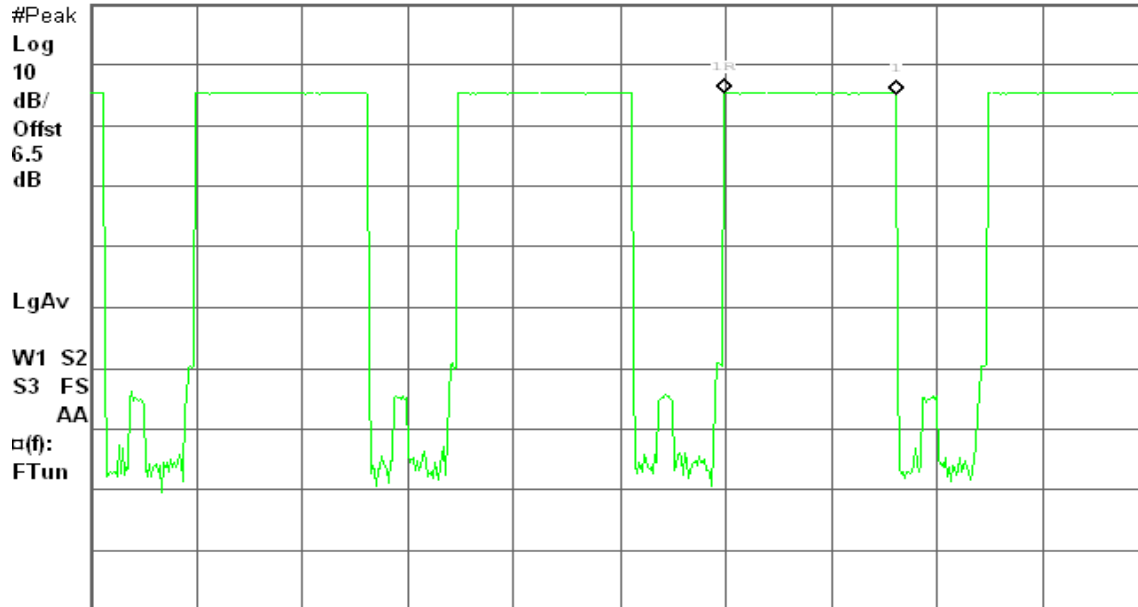
* Agilent 13:47:53 May 25, 2009

R T

 Δ Mkr1 1.633 ms
-0.09 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.441 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

CH High

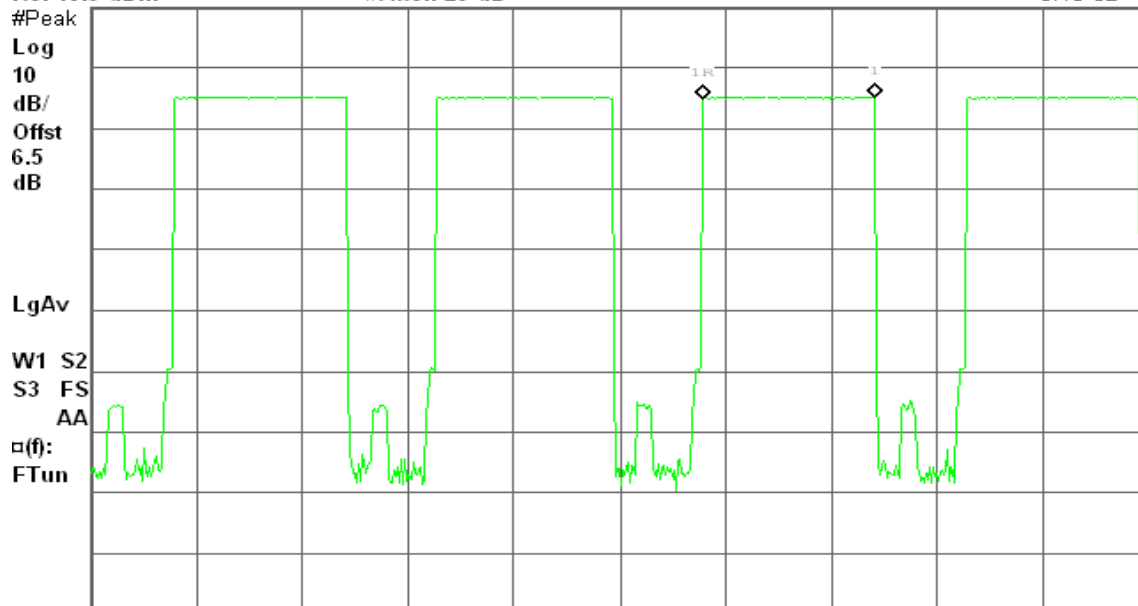
* Agilent 13:49:40 May 25, 2009

R T

 Δ Mkr1 1.633 ms
0.18 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.480 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

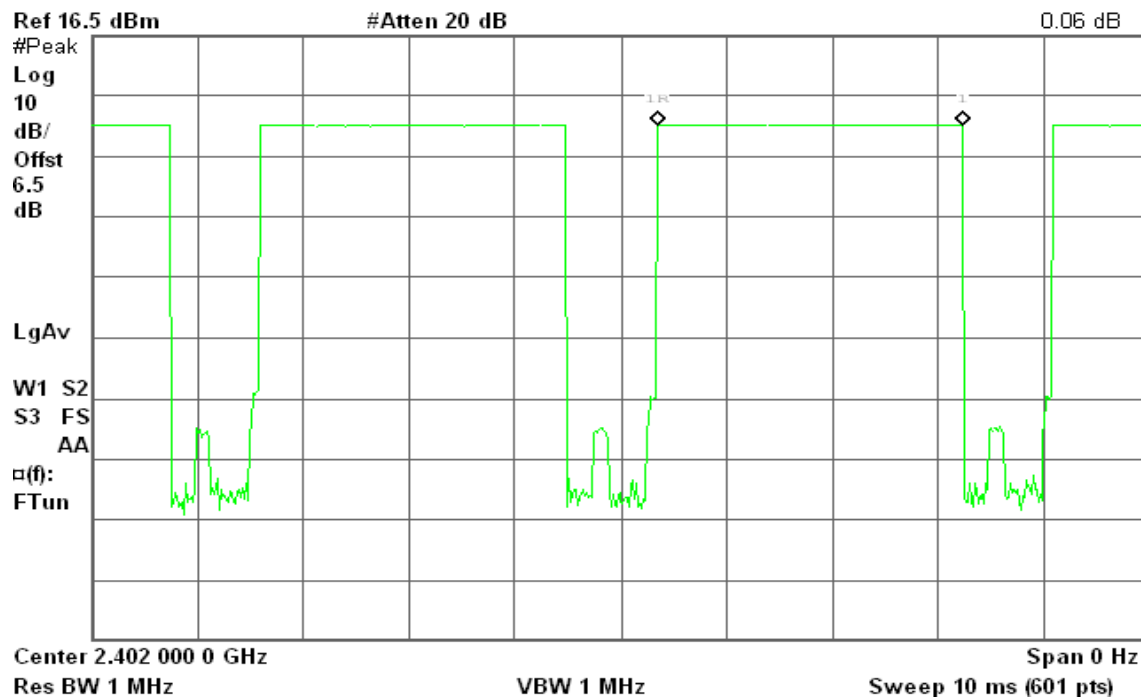
**DH 5****CH Low**

* Agilent 13:45:29 May 25, 2009

R T

 Δ Mkr1 2.883 ms

0.06 dB

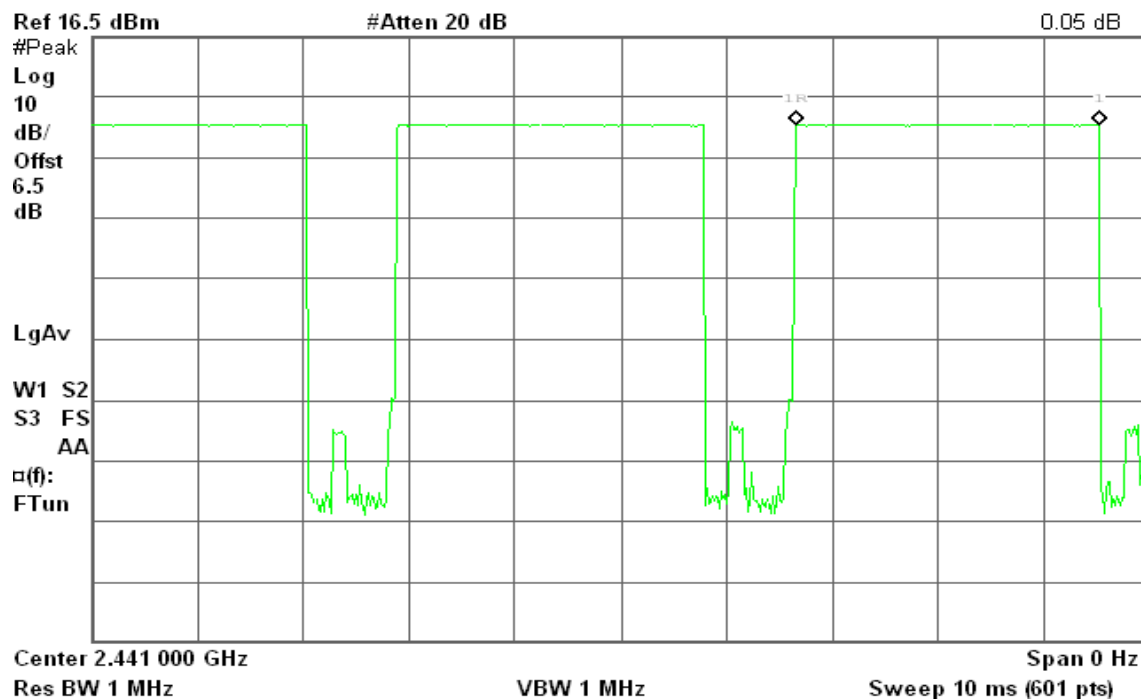
**CH Mid**

* Agilent 13:48:15 May 25, 2009

R T

 Δ Mkr1 2.883 ms

0.05 dB





CH High

Agilent 13:48:51 May 25, 2009

R T

Δ Mkr1 2.883 ms

0.17 dB

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offset

6.5

dB

LgAv

W1 S2

S3 FS

AA

□(f):

FTun

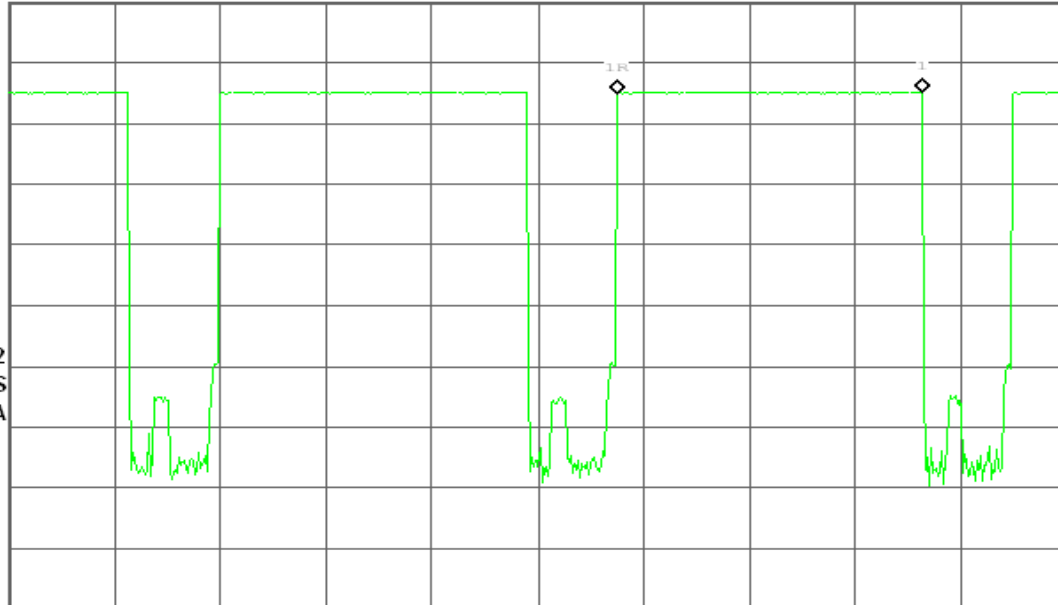
Center 2.480 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)



**Test Data****For 8DPSK****DH 1**CH Low: $0.3833 * (1600/2)/79 * 31.6 = 122.656 \text{ (ms)}$ CH Mid: $0.3833 * (1600/2)/79 * 31.6 = 122.656 \text{ (ms)}$ CH High: $0.4000 * (1600/2)/79 * 31.6 = 128.000 \text{ (ms)}$

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.3833	122.656	31.60	400.00	PASS
Mid	0.3833	122.656	31.60		PASS
High	0.4000	128.000	31.60		PASS

DH 3CH Low: $1.633 * (1600/4)/79 * 31.6 = 261.280 \text{ (ms)}$ CH Mid: $1.633 * (1600/4)/79 * 31.6 = 261.280 \text{ (ms)}$ CH High: $1.650 * (1600/4)/79 * 31.6 = 264.000 \text{ (ms)}$

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.633	261.280	31.60	400.00	PASS
Mid	1.633	261.280	31.60		PASS
High	1.650	264.000	31.60		PASS

DH 5CH Low: $2.883 * (1600/6)/79 * 31.6 = 307.520 \text{ (ms)}$ CH Mid: $2.883 * (1600/6)/79 * 31.6 = 307.520 \text{ (ms)}$ CH High: $2.883 * (1600/6)/79 * 31.6 = 307.520 \text{ (ms)}$

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.883	307.520	31.60	400.00	PASS
Mid	2.883	307.520	31.60		PASS
High	2.883	307.520	31.60		PASS



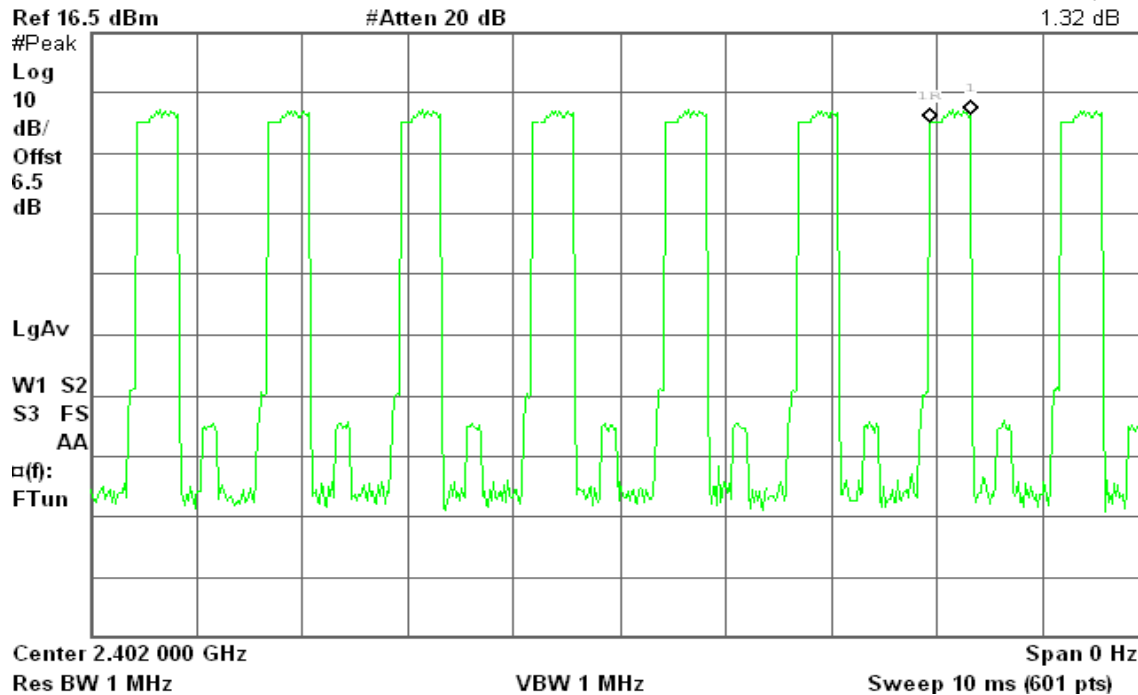
For 8DPSK

DH 1

CH Low

* Agilent 13:56:05 May 25, 2009

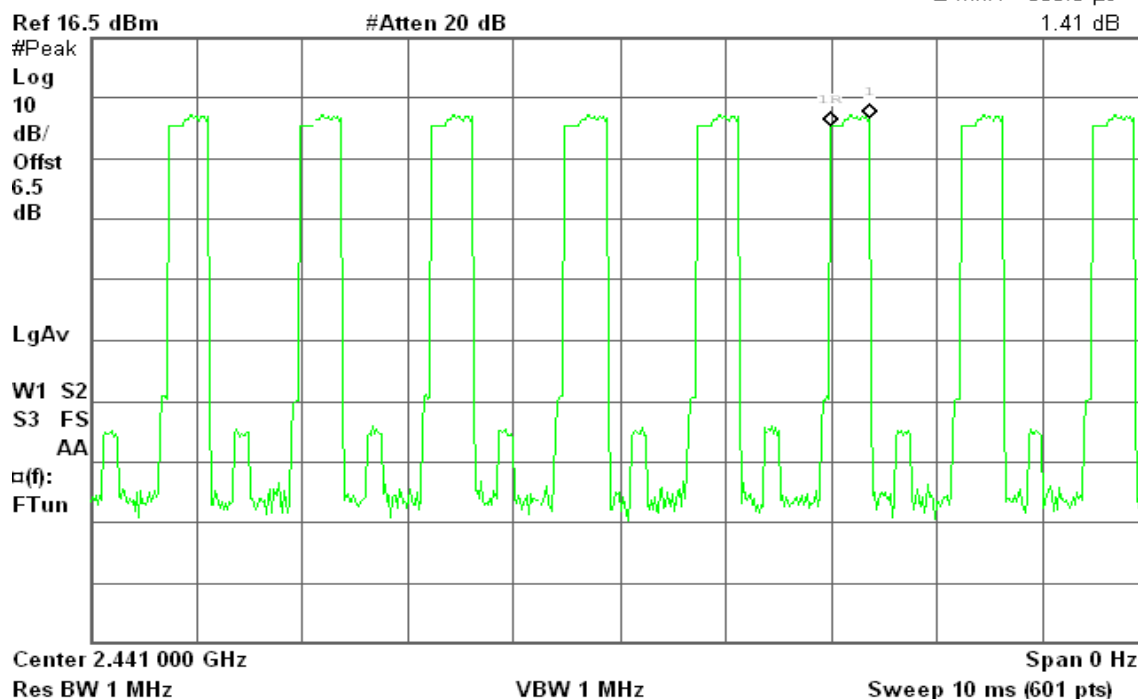
R T

 Δ Mkr1 383.3 μ s
1.32 dB

CH Mid

* Agilent 13:52:26 May 25, 2009

R T

 Δ Mkr1 383.3 μ s
1.41 dB

**CH High**

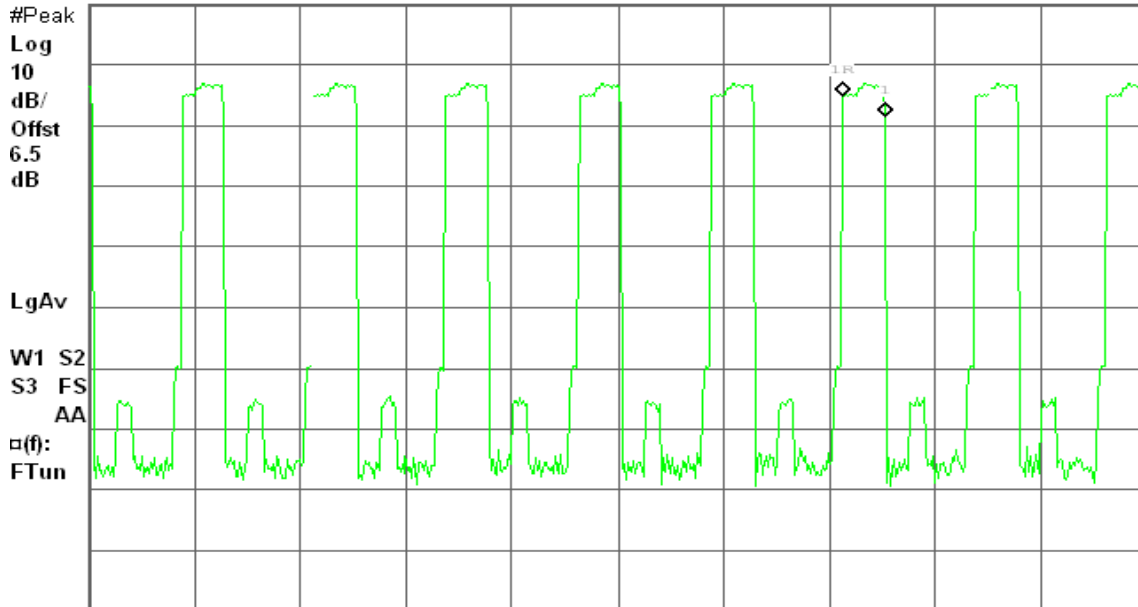
* Agilent 13:50:40 May 25, 2009

R T

 Δ Mkr1 400 μ s
-3.57 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.480 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

DH 3**CH Low**

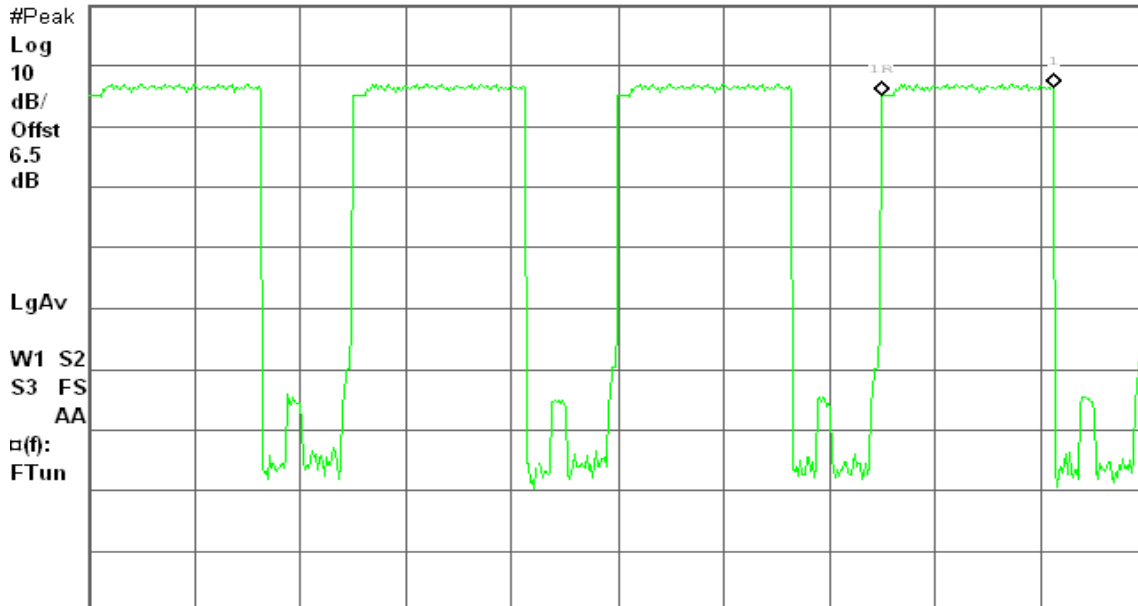
* Agilent 13:55:19 May 25, 2009

R T

 Δ Mkr1 1.633 ms
1.18 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.402 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)



CH Mid

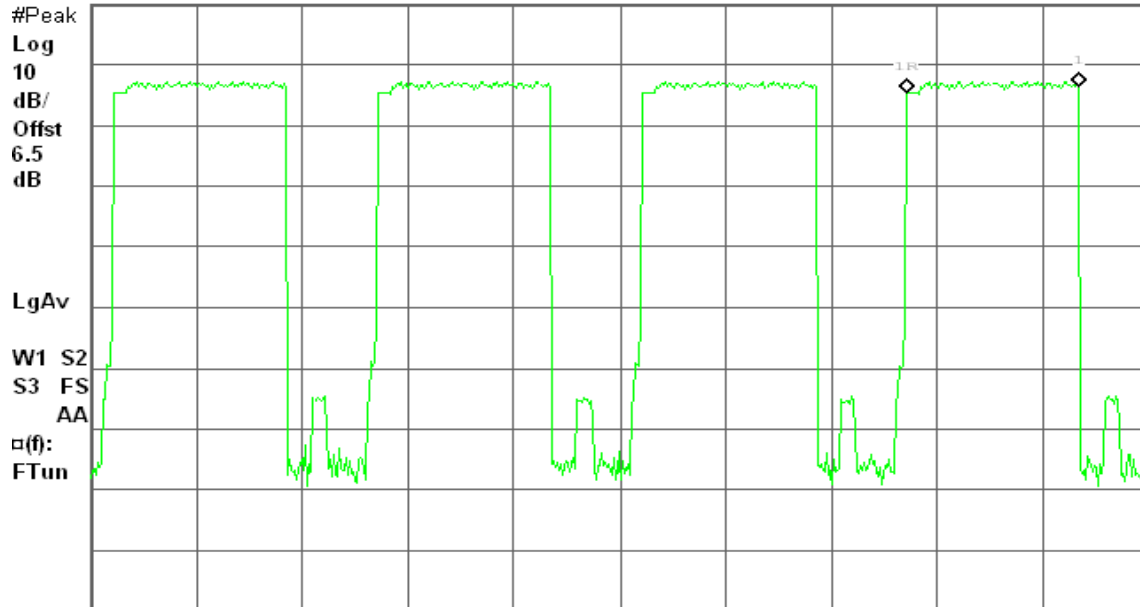
* Agilent 13:54:20 May 25, 2009

R T

 Δ Mkr1 1.633 ms
1.22 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.441 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

CH High

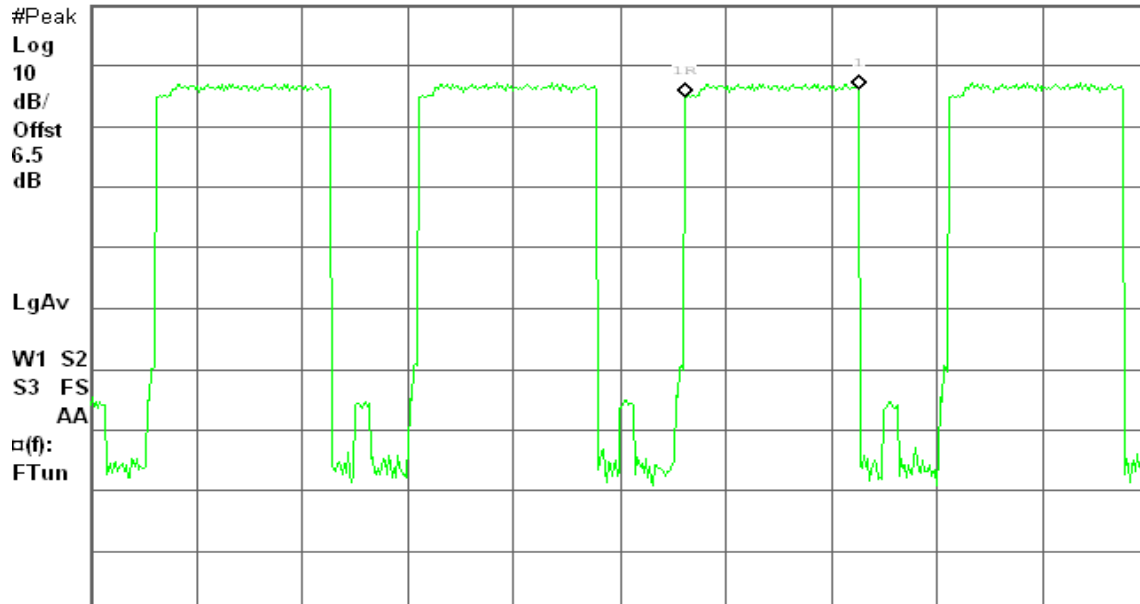
* Agilent 13:51:02 May 25, 2009

R T

 Δ Mkr1 1.65 ms
1.14 dB

Ref 16.5 dBm

#Atten 20 dB



Center 2.480 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

**DH 5****CH Low**

✱ Agilent 13:55:42 May 25, 2009

R T

Δ Mkr1 2.883 ms

1.08 dB

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

LgAv

W1 S2

S3 FS

AA

□(f):

FTun

Center 2.402 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)

CH Mid

✱ Agilent 13:51:55 May 25, 2009

R T

Δ Mkr1 2.883 ms

1.05 dB

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

LgAv

W1 S2

S3 FS

AA

□(f):

FTun

Center 2.441 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)



CH High

Agilent 13:51:22 May 25, 2009

R T

Δ Mkr1 2.883 ms
0.99 dB

Ref 16.5 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

6.5

dB

LgAv

W1 S2

S3 FS

AA

□(f):

FTun

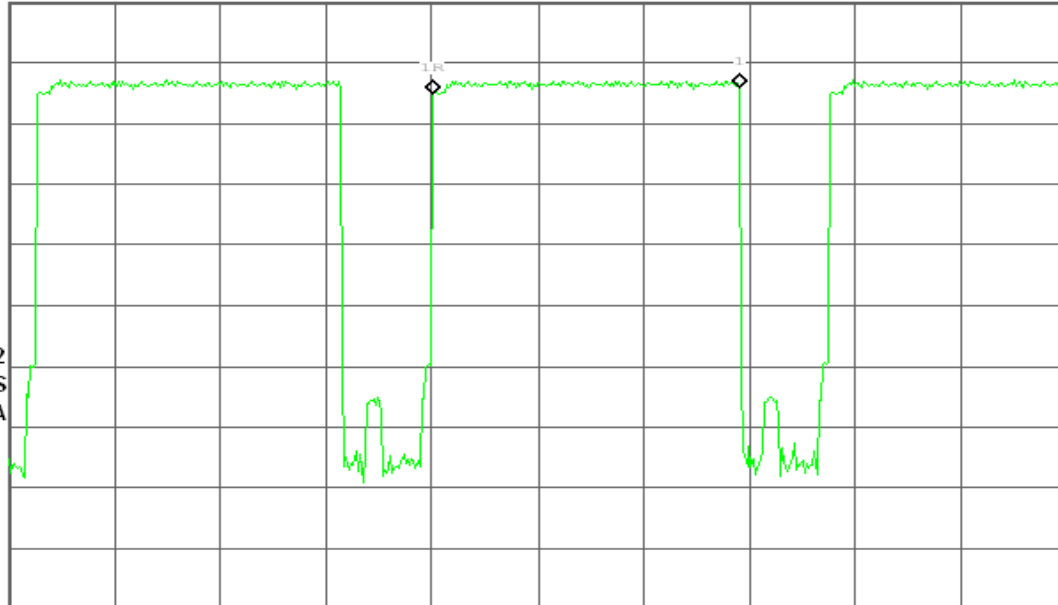
Center 2.480 000 GHz

Res BW 1 MHz

VBW 1 MHz

Span 0 Hz

Sweep 10 ms (601 pts)





8.10 SPURIOUS EMISSIONS

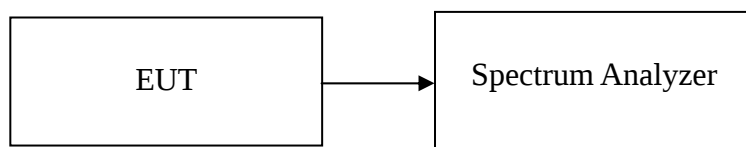
8.10.1 Conducted Measurement

LIMIT

According to §15.247(d) & RSS-210 §A8.5, 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (see Section 15.205(c)).

According to RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted



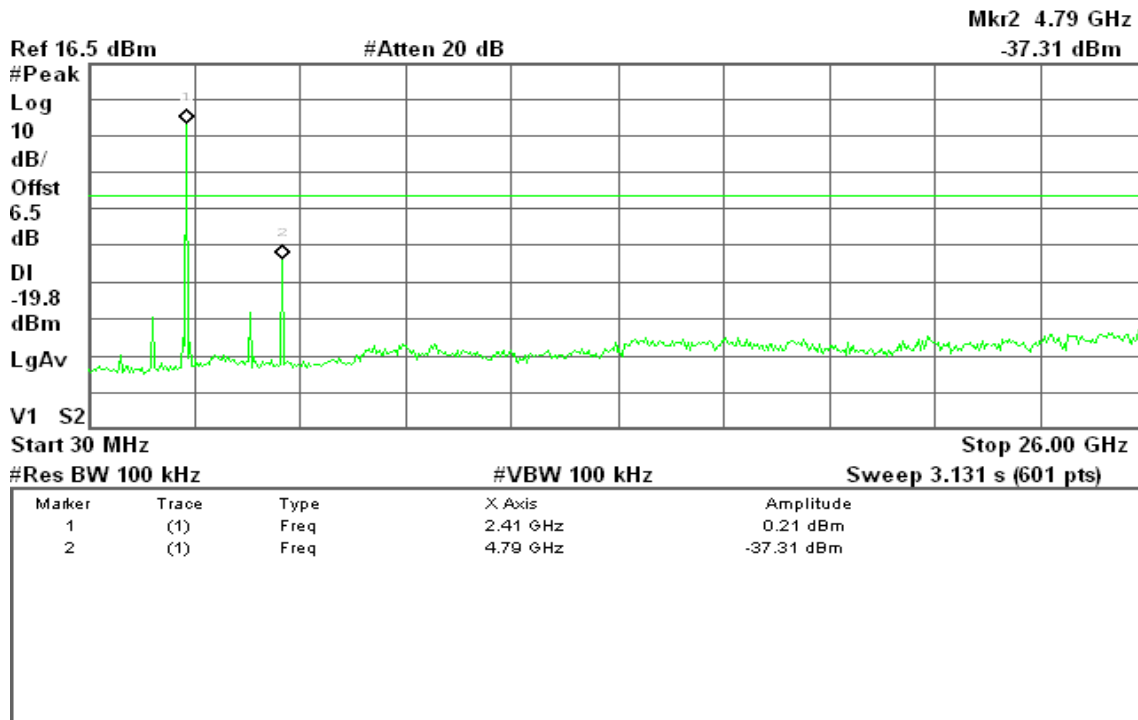
Test Plot

For GFSK / DH5

CH Low

* Agilent 14:26:27 May 25, 2009

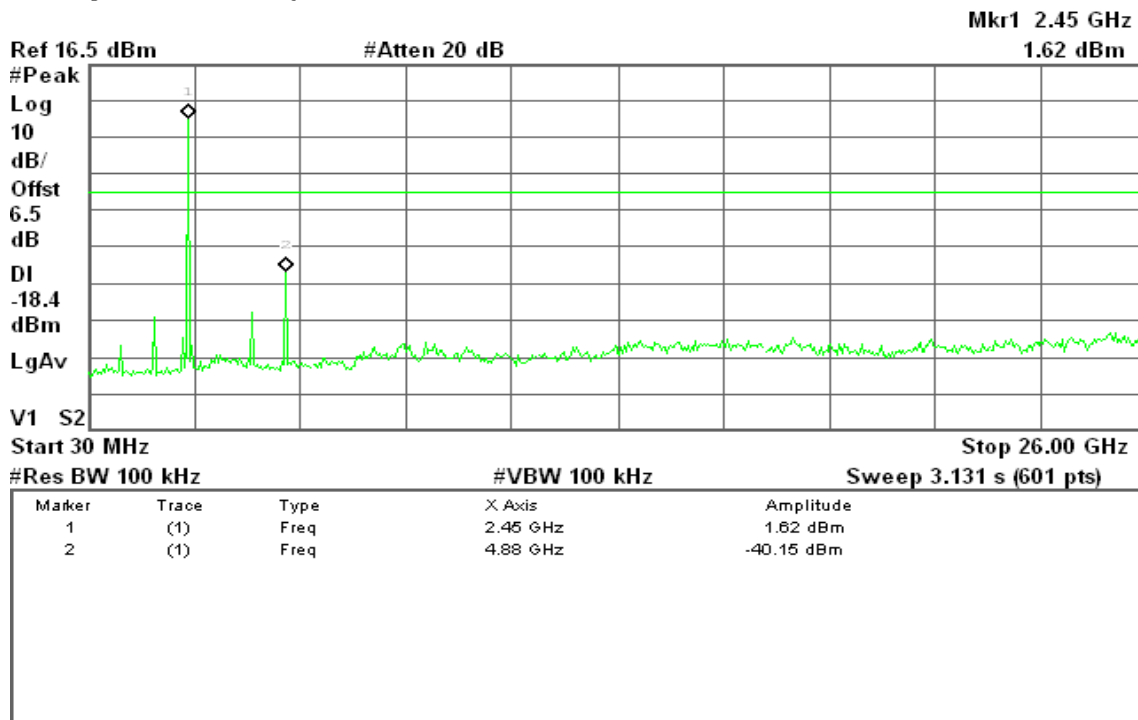
R T



CH Mid

* Agilent 14:25:41 May 25, 2009

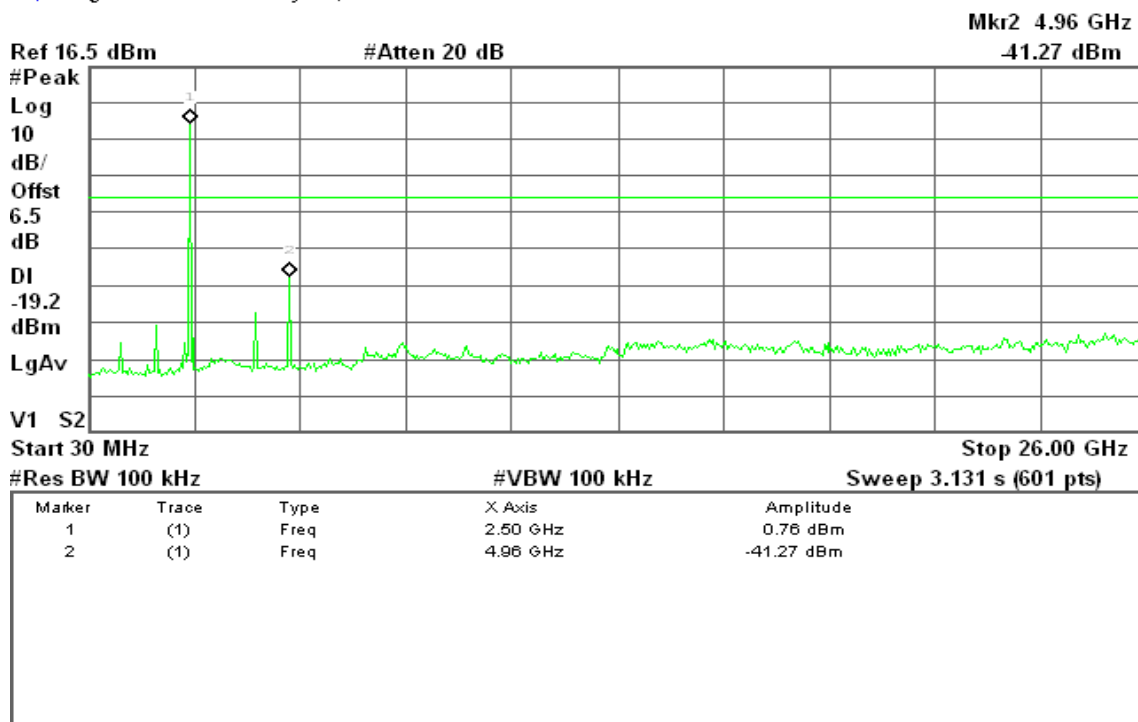
R T



**CH High**

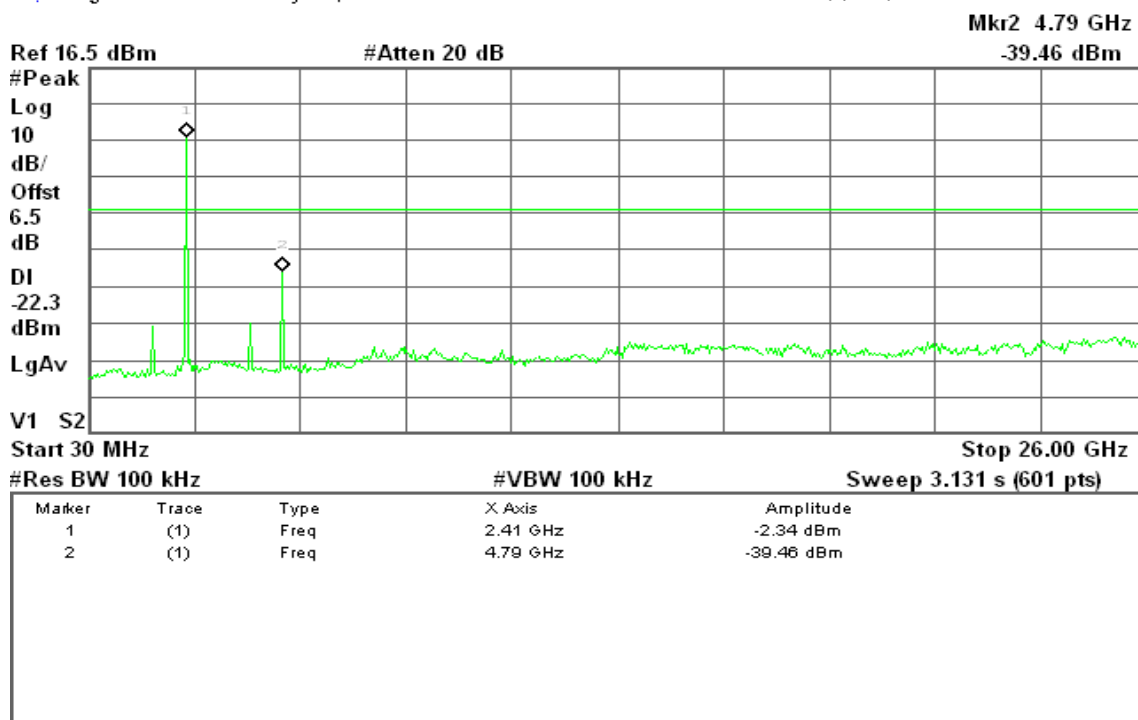
* Agilent 14:25:01 May 25, 2009

R T

**For 8DPSK / DH5****CH Low**

* Agilent 14:22:23 May 25, 2009

R T

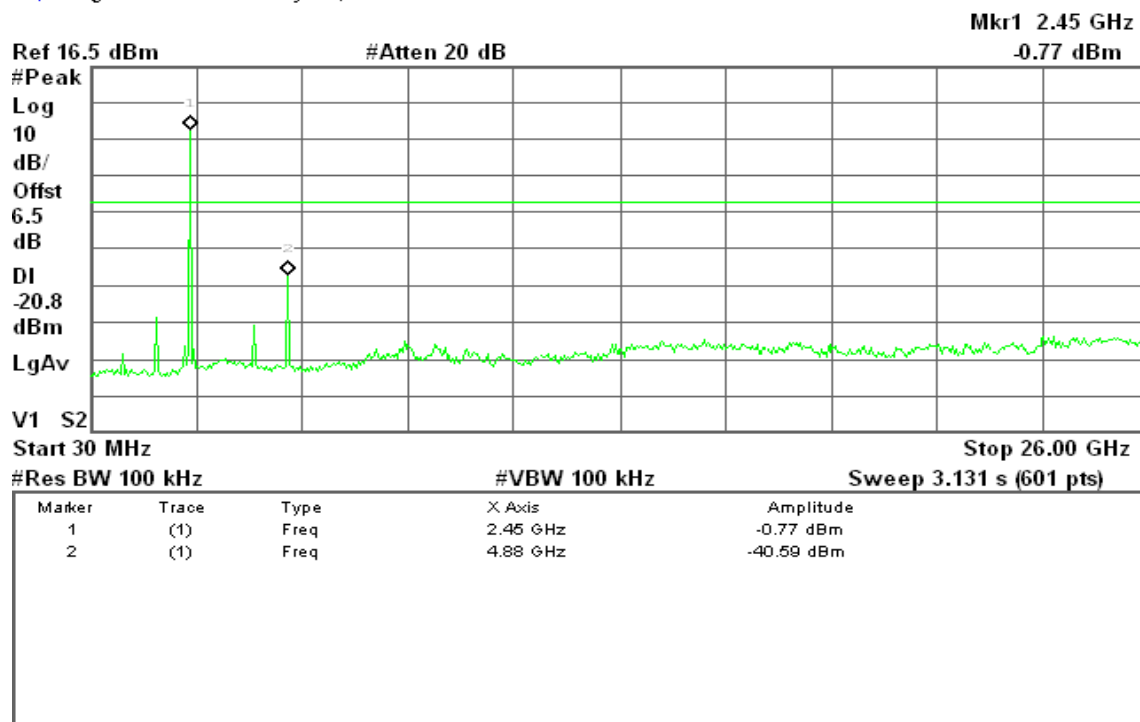




CH Mid

* Agilent 14:29:30 May 25, 2009

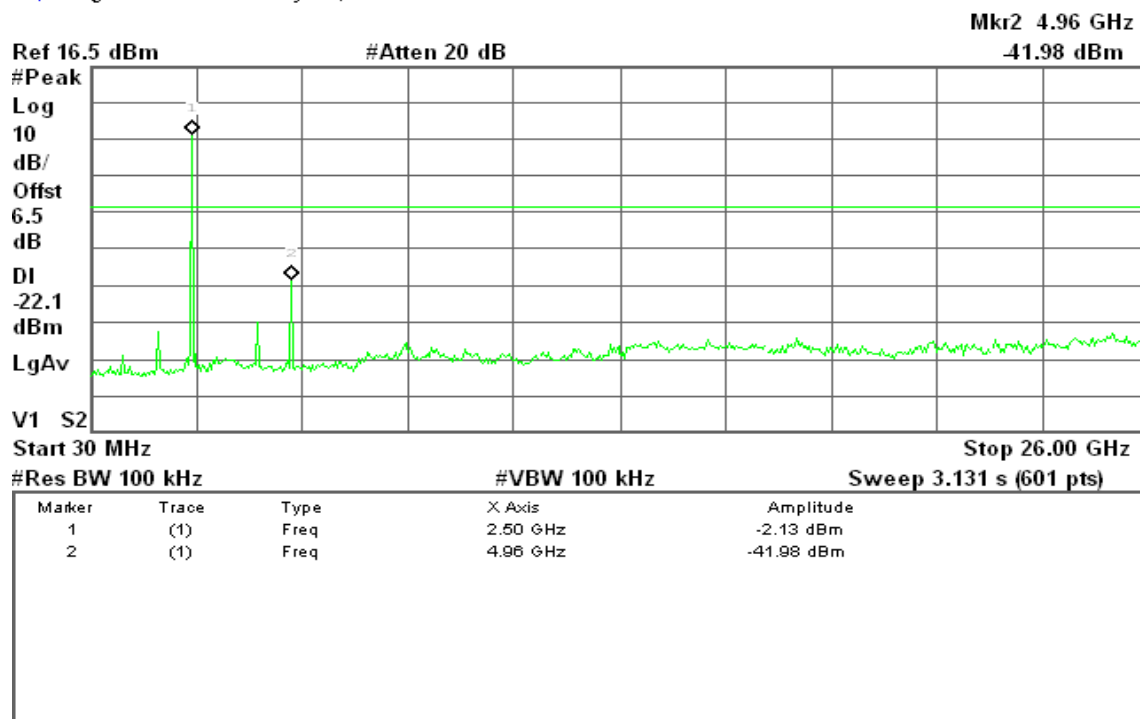
R T



CH High

* Agilent 14:28:46 May 25, 2009

R T





8.10.2 Radiated Emissions

LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. According to §RSS-210 Clause 2.6 (Transmitter) and IC RSS-GEN Clause 6 (Receiver), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

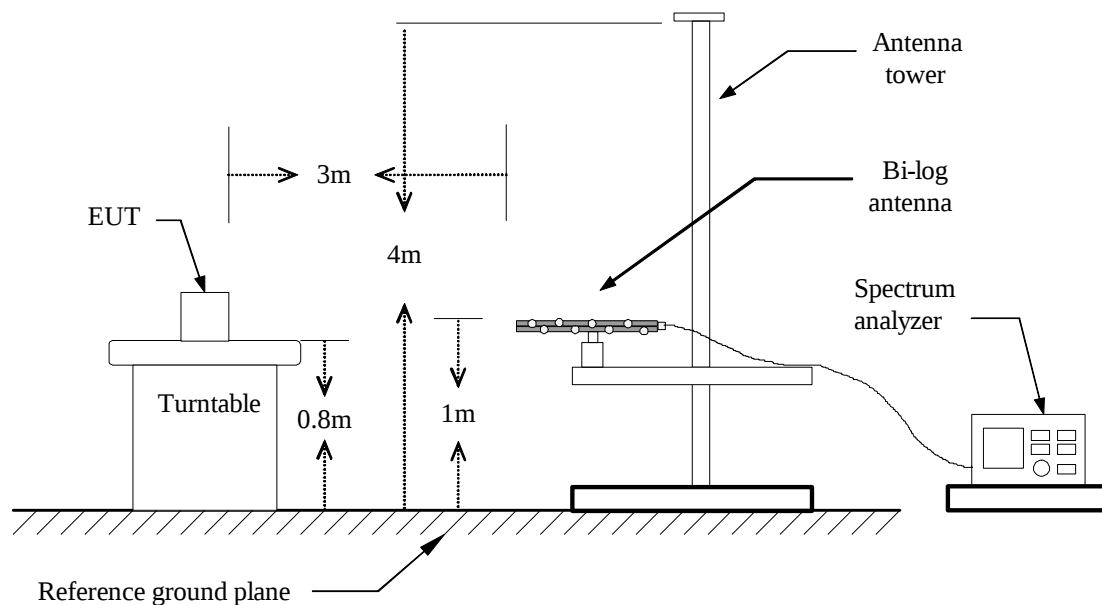
Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

3. In the emission table above, the tighter limit applies at the band edges.

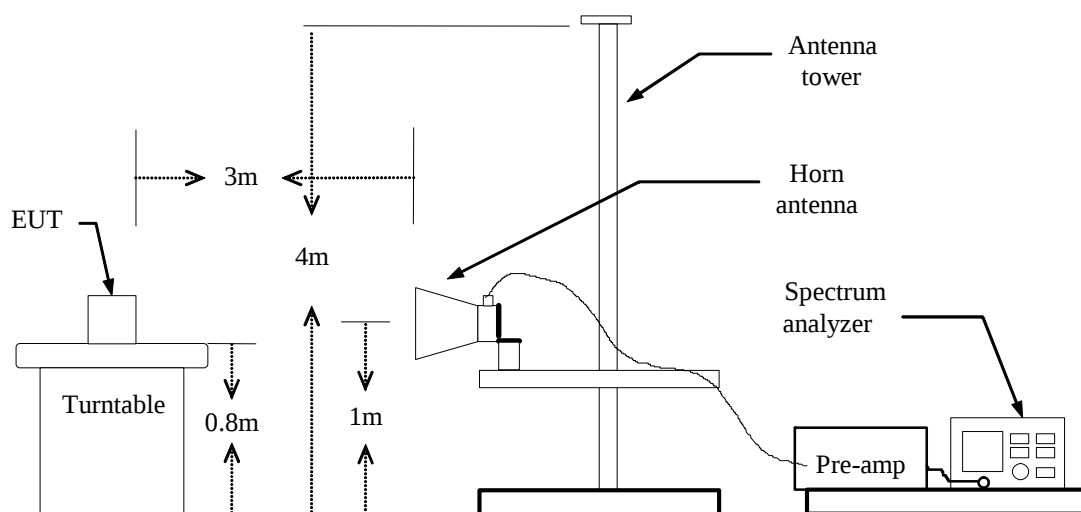
Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



Above 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is 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. Set the spectrum analyzer in the following setting as:
Below 1GHz:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**Below 1 GHz****Operation Mode:** Normal Link**Test Date:** May 25, 2009**Temperature:** 25°C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
33.23	V	39.87	-4.24	35.63	40.00	-4.37	QP
335.55	V	50.72	-8.02	42.70	46.00	-3.30	Peak
432.55	V	42.27	-5.84	36.44	46.00	-9.56	Peak
666.97	V	42.07	-2.20	39.87	46.00	-6.13	QP
725.17	V	38.86	-1.16	37.70	46.00	-8.30	Peak
951.50	V	20.43	2.10	22.53	46.00	-23.47	QP
240.17	H	37.80	-9.83	27.97	46.00	-18.03	Peak
335.55	H	46.45	-8.02	38.43	46.00	-7.57	Peak
432.55	H	38.30	-5.84	32.46	46.00	-13.54	Peak
663.73	H	31.69	-2.22	29.47	46.00	-16.53	Peak
875.52	H	29.36	0.46	29.82	46.00	-16.18	Peak
995.15	H	36.21	2.47	38.68	54.00	-15.32	Peak
240.17	H	37.80	-9.83	27.97	46.00	-18.03	Peak

Remark:

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. $\text{Margin (dB)} = \text{Remark result (dBuV/m)} - \text{Quasi-peak limit (dBuV/m)}$.

**Above 1 GHz****Operation Mode:** TX / GFSK / DH5 / CH Low**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1026.67	V	64.65	40.75	-7.91	56.74	32.84	74.00	54.00	-21.16	AVG
1043.33	V	64.77	40.62	-7.88	56.89	32.74	74.00	54.00	-21.26	AVG
1306.67	V	63.17	38.05	-7.39	55.78	30.66	74.00	54.00	-23.34	AVG
2323.33	V	54.21	38.61	-1.71	52.50	36.90	74.00	54.00	-17.10	AVG
2656.67	V	53.05	---	-1.11	51.94	---	74.00	54.00	-2.06	Peak
4550.00	V	47.85	---	1.11	48.96	---	74.00	54.00	-5.04	Peak
1066.67	H	58.60	---	-7.84	50.77	---	74.00	54.00	-3.23	Peak
4808.33	H	51.70	44.92	1.04	52.74	45.96	74.00	54.00	-18.04	AVG
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / GFSK / DH5 / CH Mid**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1046.67	V	61.66	39.87	-7.87	53.79	32.00	74.00	54.00	-22.00	AVG
1303.33	V	58.46	---	-7.40	51.06	---	74.00	54.00	-2.94	Peak
1330.00	V	57.41	---	-7.35	50.07	---	74.00	54.00	-3.93	Peak
2323.33	V	53.72	38.51	-1.71	52.01	36.80	74.00	54.00	-17.20	AVG
2666.67	V	53.53	38.19	-1.09	52.44	37.10	74.00	54.00	-16.90	AVG
6691.67	V	49.59	35.87	3.37	52.96	39.24	74.00	54.00	-14.76	AVG
1043.33	H	59.02	---	-7.88	51.14	---	74.00	54.00	-2.86	Peak
1093.33	H	57.30	---	-7.79	49.51	---	74.00	54.00	-4.49	Peak
1866.67	H	51.55	---	-3.52	48.02	---	74.00	54.00	-5.98	Peak
4883.33	H	50.41	---	1.02	51.43	---	74.00	54.00	-2.57	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. $\text{Margin (dB)} = \text{Remark result (dBuV/m)} - \text{Average limit (dBuV/m)}$.

**Operation Mode:** TX / GFSK / DH5 / CH High**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1023.33	V	64.90	40.12	-7.92	56.99	32.20	74.00	54.00	-21.80	AVG
1043.33	V	63.02	38.37	-7.88	55.14	30.49	74.00	54.00	-23.51	AVG
1326.67	V	56.68	---	-7.35	49.33	---	74.00	54.00	-4.67	Peak
2323.33	V	54.12	38.61	-1.71	52.41	36.90	74.00	54.00	-17.10	AVG
2656.67	V	53.71	38.22	-1.11	52.60	37.11	74.00	54.00	-16.89	AVG
4108.33	V	49.11	---	0.65	49.76	---	74.00	54.00	-4.24	Peak
1023.33	H	59.30	---	-7.92	51.38	---	74.00	54.00	-2.62	Peak
2403.33	H	52.96	---	-1.58	51.38	---	74.00	54.00	-2.62	Peak
3650.00	H	47.92	---	0.25	48.17	---	74.00	54.00	-5.83	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / 8DPSK / DH5 / CH Low**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1043.33	V	59.83	---	-7.88	51.95	---	74.00	54.00	-2.05	Peak
1073.33	V	58.77	---	-7.82	50.95	---	74.00	54.00	-3.05	Peak
1303.33	V	55.89	---	-7.40	48.49	---	74.00	54.00	-5.51	Peak
2193.33	V	50.84	---	-1.93	48.91	---	74.00	54.00	-5.09	Peak
2323.33	V	54.23	38.56	-1.71	52.52	36.85	74.00	54.00	-17.15	AVG
4716.67	V	48.06	---	1.06	49.12	---	74.00	54.00	-4.88	Peak
1020.00	H	59.34	---	-7.92	51.41	---	74.00	54.00	-2.59	Peak
1050.00	H	57.94	---	-7.87	50.07	---	74.00	54.00	-3.93	Peak
1136.67	H	55.08	---	-7.71	47.38	---	74.00	54.00	-6.62	Peak
1306.67	H	52.13	---	-7.39	44.74	---	74.00	54.00	-9.26	Peak
2326.67	H	51.25	---	-1.71	49.54	---	74.00	54.00	-4.46	Peak
4800.00	H	52.90	44.70	1.04	53.95	45.74	74.00	54.00	-18.26	AVG

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / 8DPSK / DH5 / CH Mid**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1020.00	V	61.01	40.00	-7.92	53.09	32.08	74.00	54.00	-21.92	AVG
1303.33	V	59.51	38.02	-7.40	52.11	30.62	74.00	54.00	-23.38	AVG
1333.33	V	59.69	37.98	-7.34	52.35	30.64	74.00	54.00	-23.36	AVG
2323.33	V	55.26	38.57	-1.71	53.55	36.86	74.00	54.00	-17.14	AVG
2660.00	V	53.00	---	-1.10	51.90	---	74.00	54.00	-2.10	Peak
5225.00	V	48.32	---	1.25	49.57	---	74.00	54.00	-4.43	Peak
1023.33	H	64.53	39.12	-7.92	56.61	31.20	74.00	54.00	-22.80	AVG
2326.67	H	51.32	---	-1.71	49.61	---	74.00	54.00	-4.39	Peak
4883.33	H	49.35	---	1.02	50.37	---	74.00	54.00	-3.63	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / 8DPSK / DH5 / CH High**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1023.33	V	63.36	39.89	-7.92	55.45	31.97	74.00	54.00	-22.03	AVG
1303.33	V	59.24	---	-7.40	51.85	---	74.00	54.00	-2.15	Peak
2330.00	V	54.56	38.54	-1.70	52.85	36.84	74.00	54.00	-17.16	AVG
2663.33	V	53.10	38.21	-1.10	52.00	37.11	74.00	54.00	-16.89	AVG
2910.00	V	51.54	---	-0.61	50.94	---	74.00	54.00	-3.06	Peak
5125.00	V	49.56	---	1.13	50.70	---	74.00	54.00	-3.30	Peak
1046.67	H	54.56	---	-7.87	46.69	---	74.00	54.00	-7.31	Peak
2403.33	H	53.91	38.12	-1.58	52.33	36.54	74.00	54.00	-17.46	AVG
4250.00	H	48.28	---	0.82	49.10	---	74.00	54.00	-4.90	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** RX / CH Mid**Test Date:** May 25, 2009**Temperature:** 25 °C**Tested by:** Nan Tsai**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1303.33	V	54.25	---	-7.40	46.85	---	74.00	54.00	-7.15	Peak
N/A										
5806.67	H	49.80	---	1.99	51.79	---	74.00	54.00	-2.21	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



8.11 POWERLINE CONDUCTED EMISSIONS

According to §15.207(a) & RSS-Gen §7.2.2, except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	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

* Decreases with the logarithm of the frequency.

Test Configuration

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

TEST 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.



TEST RESULTS

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

Test Data

Operation Mode: Normal Link

Test Date: June 27, 2009

Temperature: 22°C

Tested by: Mark Yang

Humidity: 45% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1540	27.48	5.48	0.12	27.60	5.60	65.78	55.78	-38.18	-50.18	L1
0.5200	26.74	7.64	0.06	26.80	7.70	56.00	46.00	-29.20	-38.30	L1
1.5900	20.54	2.54	0.06	20.60	2.60	56.00	46.00	-35.40	-43.40	L1
2.1250	22.54	4.44	0.06	22.60	4.50	56.00	46.00	-33.40	-41.50	L1
2.6700	22.34	3.94	0.06	22.40	4.00	56.00	46.00	-33.60	-42.00	L1
5.3950	21.44	3.14	0.06	21.50	3.20	60.00	50.00	-38.50	-46.80	L1
0.1500	28.35	5.45	0.15	28.50	5.60	66.00	56.00	-37.50	-50.40	L2
0.5150	20.72	0.32	0.08	20.80	0.40	56.00	46.00	-35.20	-45.60	L2
2.1600	16.82	0.02	0.08	16.90	0.10	56.00	46.00	-39.10	-45.90	L2
2.7050	16.22	0.02	0.08	16.30	0.10	56.00	46.00	-39.70	-45.90	L2
8.8650	5.88	-0.02	0.12	6.00	0.10	60.00	50.00	-54.00	-49.90	L2
22.7450	10.46	5.06	0.24	10.70	5.30	60.00	50.00	-49.30	-44.70	L2

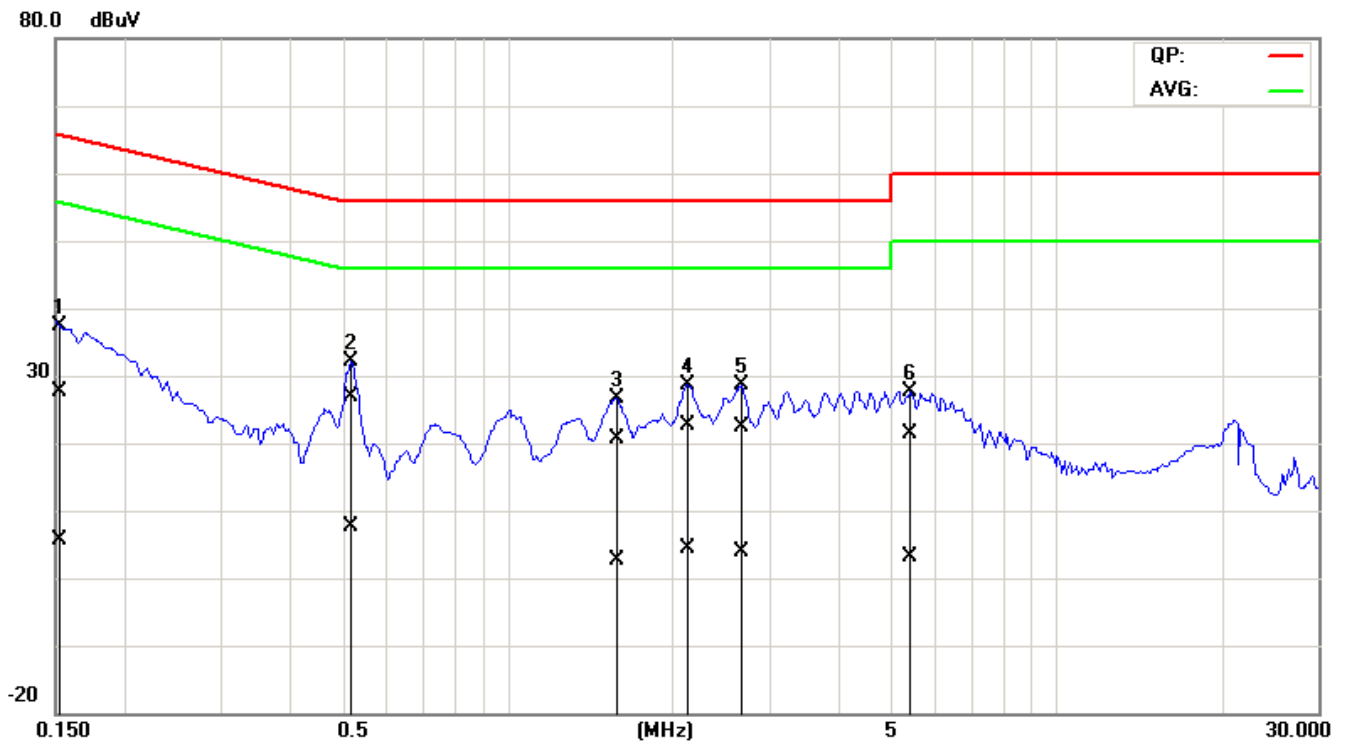
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

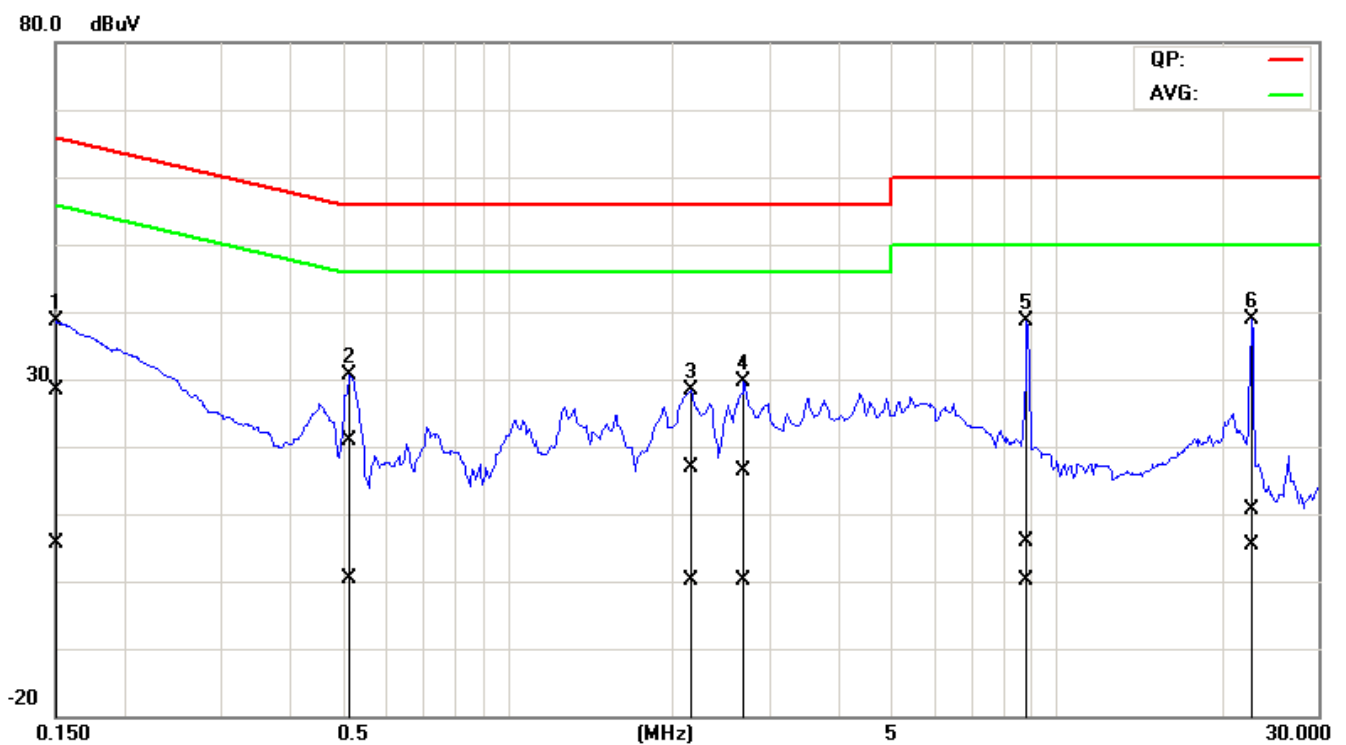


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)





APPENDIX I

RADIO FREQUENCY EXPOSURE

FCC RULES

LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

EUT	Bluetooth Mono Headset
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☒ Others: <u>Bluetooth: 2.402GHz ~ 2.480GHz</u>
Device category	☒ Portable (<20cm separation) ☐ Mobile (>20cm separation) ☐ Others _____
Exposure classification	☐ Occupational/Controlled exposure ($S = 5mW/cm^2$) ☒ General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	4.38dBm (2.74mW)
Antenna gain (Max)	2.7 dBi (Numeric gain: 1.86)
Evaluation applied	☐ MPE Evaluation ☐ SAR Evaluation ☒ N/A*

Remark:

1. The maximum output power is 4.38dBm (2.74mW) at 2441MHz (with 1.86 numeric antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is $1.0 mW/cm^2$ even if the calculation indicates that the power density would be larger.

TEST RESULTS

No non-compliance noted.

(SAR evaluation is not required for the PORTABLE device while its maximum output power is lower than the general population low threshold: $60/f_{(GHz)}=60/2.441=24.58mW$)

MPE EVALUATION

Not applicable.