



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Personal computer

Model:

PCG-51311L, PCG-51411L

Trade Name: SONY

Issued to

Sony Corporation

1-7-1 Konan Minato-ku Tokyo 108-0075 Japan

Issued by

Compliance Certification Services Inc.

**No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan (R.O.C.)**

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service@ccsrf.com



Testing Laboratory
1309



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1. TEST RESULT CERTIFICATION

Applicant: Sony Corporation
1-7-1 Konan Minato-ku Tokyo 108-0075 Japan

Equipment Under Test: Personal computer

Trade Name: SONY

Model: PCG-51311L, PCG-51411L

Date of Test: March 21 ~ April 3, 2010

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	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:

Reviewed by:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Gina Lo
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Personal computer
Trade Name	SONY
Model Number	PCG-51311L, PCG-51411L
Model Discrepancy	All the specification and layout are identical except they come with different model numbers for marketing purposes.
Power Adapter	<p>1. Power Adapter</p> <p>a) Brand Name/ Description: SONY / VGP-AC19V43 I/P: 100-240V, 1.6A, 50-60Hz O/P: 19.5V, 3.3A</p> <p>b) Brand Name / Description: SONY / VGP-AC19V39 I/P: 100-240V, 1A, 50-60Hz O/P: 19.5V, 2A</p> <p>c) Brand Name / Description: SONY / VGP-AC19V44 I/P: 100-240V, 1.6A, 50-60Hz O/P: 19.5V, 3.3A</p> <p>d) Brand Name / Description: SONY / VGP-AC19V48 I/P: 100-240V, 1.5A, 50-60Hz O/P: 19.5V, 3.3A</p> <p>e) Brand Name / Description: SONY / VGP-AC19V49 I/P: 100-240V, 1.5A, 50-60Hz O/P: 19.5V, 3.3A</p> <p>f) Brand Name / Description: SONY / VGP-AC19V40 I/P: 100-240V, 1A, 50-60Hz O/P: 19.5V, 2A</p> <p>g) Brand Name / Description: SONY / VGP-AC19V47 I/P: 100-240V, 0.75A, 50-60Hz O/P: 19.5V, 2A</p> <p>2. Li-ion Battery:</p> <p>a) Trade Name / Description SONY / VGP-BPL21 Rating: 10.8V, 7500mAh, 81Wh</p> <p>b) Trade Name / Description SONY / VGP-BPS21A Rating: 10.8V, 5000mAh, 54Wh</p>



Frequency Range	2402 ~ 2480 MHz
Transmit Power	4.92 dBm
Modulation Technique 2.0 V	GFSK for 1Mbps; $\pi/4$ -DQPSK for 2Mbps; 8DPSK for 3Mbps
Transmit Data Rate 2.0 V	1, 2, 3Mbps
Number of Channels	79 Channels
Antenna Designation	1. Monopole Antenna / Gain: 0.98dBi 2. PIFA Antenna / Gain: 1.75dBi

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: AK8PCG51311L 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 and FCC CFR 47 Part 15.207, 15.209 and 15.247.

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.

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.



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: PCG-51311L) comes with seven power adaptors, two batteries for sale. After the preliminary test, the EUT with power adapter (Model: VGP-AC19V39) and battery (VGP-BPS21A) was found to emit the worst emissions and therefore had been tested under operating condition.

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

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

The worst case data rate is determined as the data rate with highest output power.

After verification, all tests were carried out 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 only.

During the preliminary test, GFSK, $\pi/4$ -QPSK & 8DPSK with DH1 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 testing only as listed below:

Tested Channel	Modulation Type	Packet Type	Date 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	03/03/2011
Power Meter	Agilent	E4416A	GB41291611	06/28/2010
Power Sensor	Agilent	E9327A	US40441097	06/28/2010

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/09/2010
Test Receiver	Rohde&Schwarz	ESCI	100064	11/28/2010
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	08/10/2010
Horn-Antenna	TRC	HA-1301A	01	08/10/2010
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/26/2011
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	10/17/2010 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	R&S	ESHS30	828144/003	12/06/2010
LISN	EMCO	3825/2	9106-1809	05/03/2010
LISN	SCHAFFNER	NNB 41	03/10013	12/03/2010
ISN	FCC	FCC-TLISN-T4-02	20395	06/21/2010
ISN	FCC	FCC-TLISN-T8-02	20168	04/05/2011
Test S/W	LABVIEW (V 6.1)			



4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/-1.1559
3M Semi Anechoic Chamber / 30M~200M	+/-3.9944
3M Semi Anechoic Chamber / 200M~1000M	+/-3.9285
3M Semi Anechoic Chamber / 1G~8G	+/-2.4734
3M Semi Anechoic Chamber / 8G~18G	+/-2.4878
3M Semi Anechoic Chamber / 18G~26G	+/-2.6215
3M Semi Anechoic Chamber / 26G~40G	+/-2.8603

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 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.	LCD Monitor	DELL	2408WFPb	CN-OG293H-74261-95M-1K GS	FCC DoC	Shielded, 1.8m with 2 cores	Unshielded, 1.8m
2.	USB Mouse	HP	M-UAL-96	570580-001	FCC DoC	Shielded, 1.8m	N/A
3.	Multimedia Headset	Labtec	Axis-301	N/A	FCC DoC	Unshielded, 1.8m x 2	N/A
4.	320GB 2.5" HDD	Seagate	9ZA2MG-500	2GE2NB00	FCC DoC	Shielded, 1.8m	N/A
5.	320GB 2.5" HDD	Seagate	9ZA2MG-500	2GE3NHGE	FCC DoC	Shielded, 1.8m	N/A
6.	USB 2.0 External HDD	TeraSyS	F12-UF(COMBO)	A0100215-420014	FCC DoC	Shielded, 1.8m	N/A
7.	Bluetooth Tester (Remote)	Anritsu	MT8852B	750013	N/A	N/A	Unshielded, 1.8m

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.*



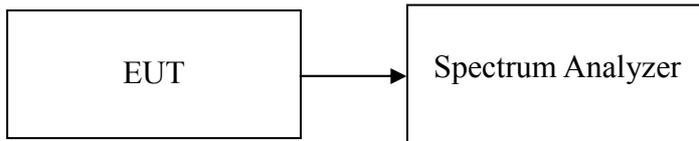
7. FCC PART 15.247 REQUIREMENTS

7.120 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	0.921
Mid	2441	0.925
High	2480	0.925

For 8DPSK / DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.270
Mid	2441	1.265
High	2480	1.265



Test Plot

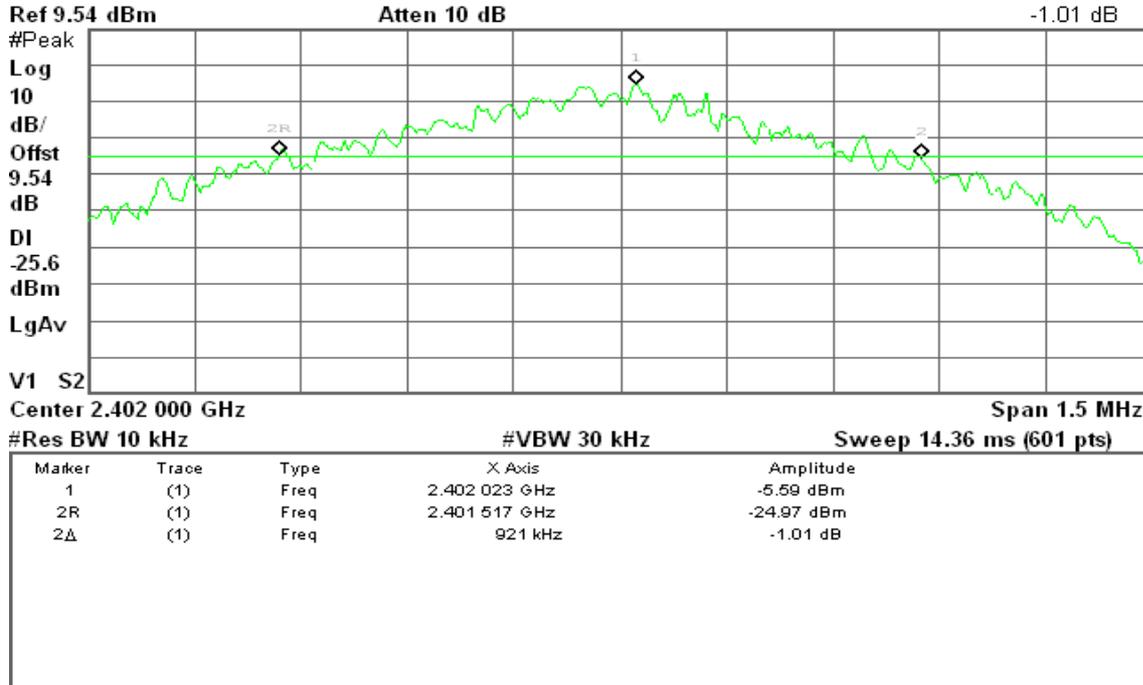
For GFSK / DH5

20dB Bandwidth (CH Low)

Agilent 09:33:54 Mar 26, 2010

R T

Δ Mkr2 921 kHz
-1.01 dB

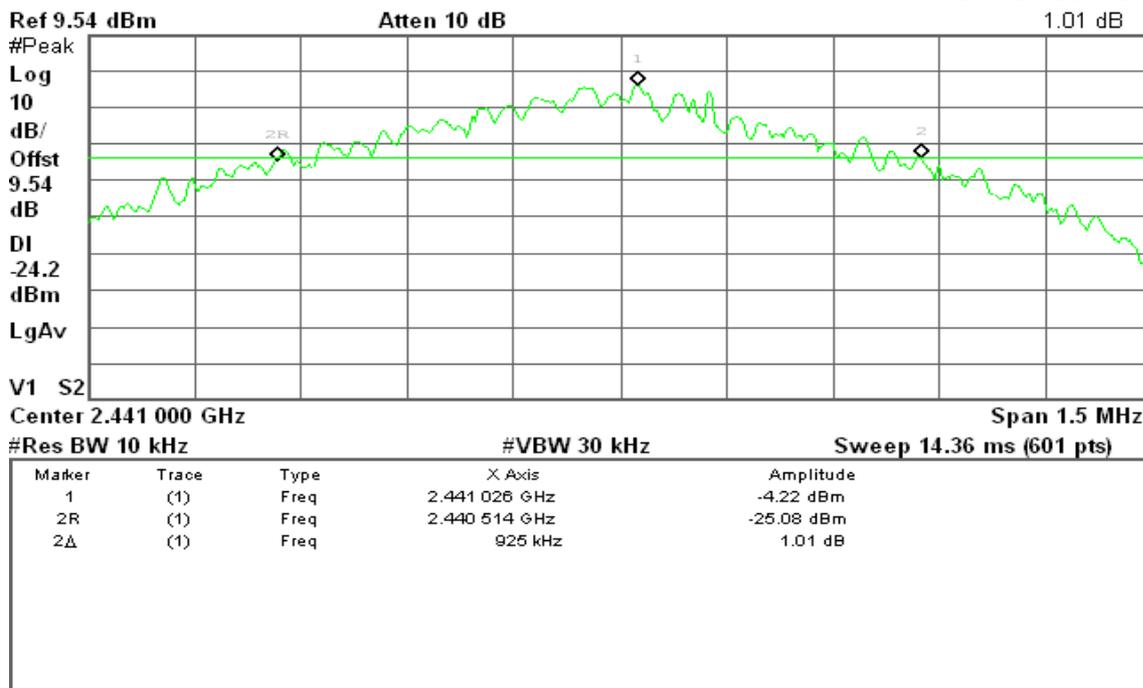


20dB Bandwidth (CH Mid)

Agilent 09:35:53 Mar 26, 2010

R T

Δ Mkr2 925 kHz
1.01 dB



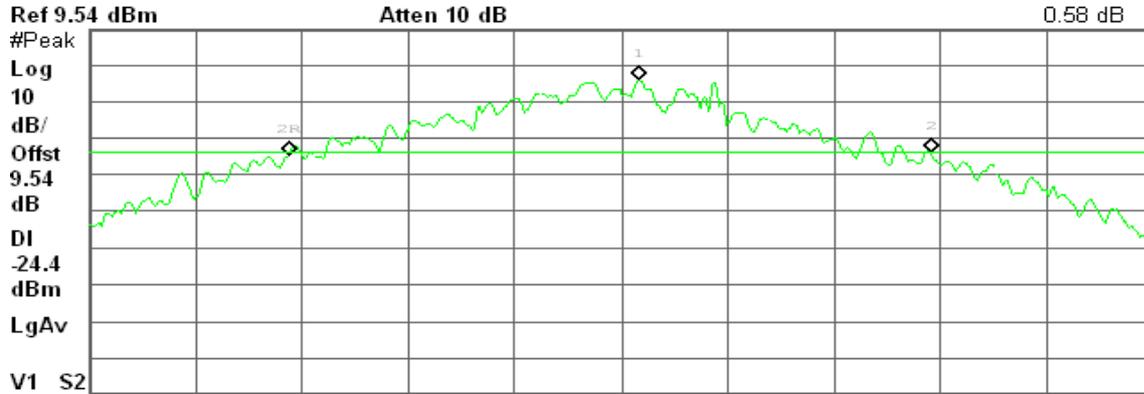


20dB Bandwidth (CH High)

Agilent 09:36:41 Mar 26, 2010

R T

Δ Mkr2 925 kHz
0.58 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	2.480 026 GHz	-4.44 dBm
2R	(1)	Freq	2.479 516 GHz	-25.02 dBm
2Δ	(1)	Freq	925 kHz	0.58 dB



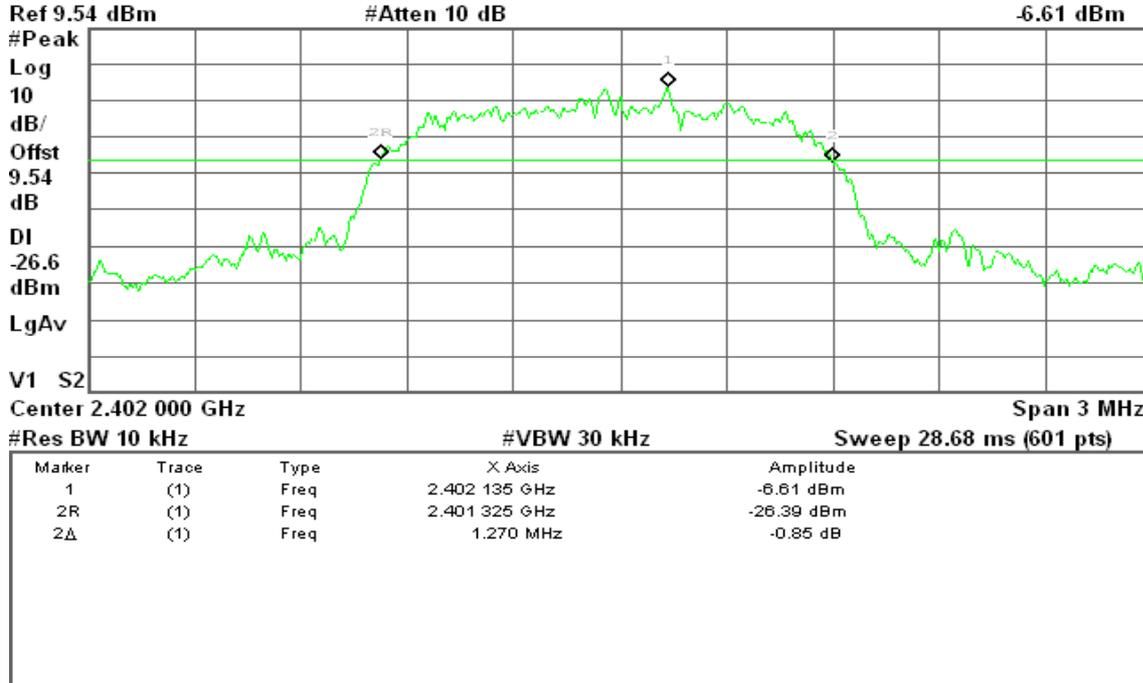
For 8DPSK / DH5

20dB Bandwidth (CH Low)

Agilent 10:20:46 Mar 26, 2010

R T

Mkr1 2.402 135 GHz

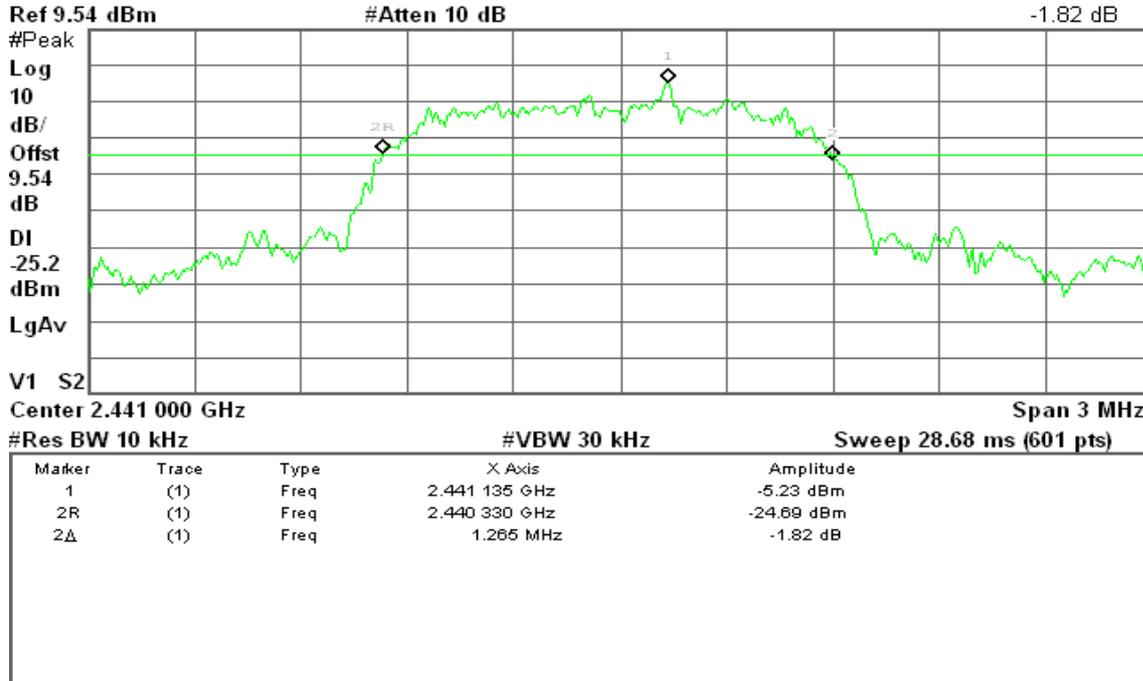


20dB Bandwidth (CH Mid)

Agilent 10:21:26 Mar 26, 2010

R T

Δ Mkr2 1.265 MHz





20dB Bandwidth (CH High)

Agilent 10:22:31 Mar 26, 2010

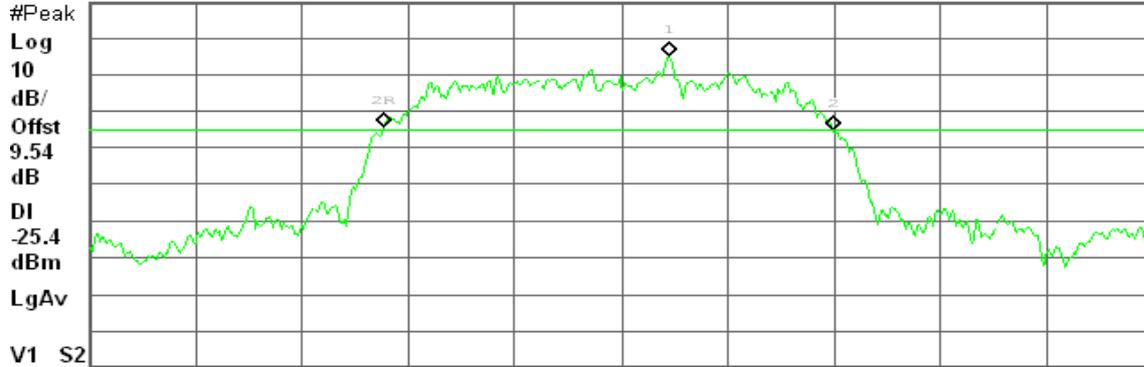
R T

Δ Mkr2 1.265 MHz

-0.86 dB

Ref 9.54 dBm

#Atten 10 dB



Center 2.480 000 GHz

Span 3 MHz

#Res BW 10 kHz

#VBW 30 kHz

Sweep 28.68 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 135 GHz	-5.37 dBm
2R	(1)	Freq	2.479 330 GHz	-24.84 dBm
2Δ	(1)	Freq	1.265 MHz	-0.86 dB



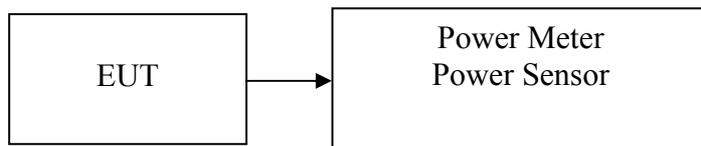
7.2 PEAK POWER

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.

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	0.46	0.00111	0.125	PASS
Mid	2441	1.85	0.00153		PASS
High	2480	1.70	0.00148		PASS

For 8DPSK / DH5

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	3.64	0.00231	0.125	PASS
Mid	2441	4.92	0.00310		PASS
High	2480	4.71	0.00296		PASS

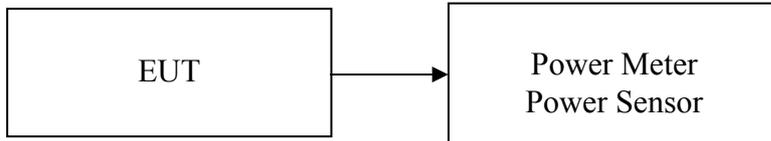


7.3 AVERAGE POWER

LIMIT

None; for reporting purposes only.

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)
Low	2402	-0.95	0.00080
Mid	2441	0.48	0.00112
High	2480	0.33	0.00108

For 8DPSK / DH5

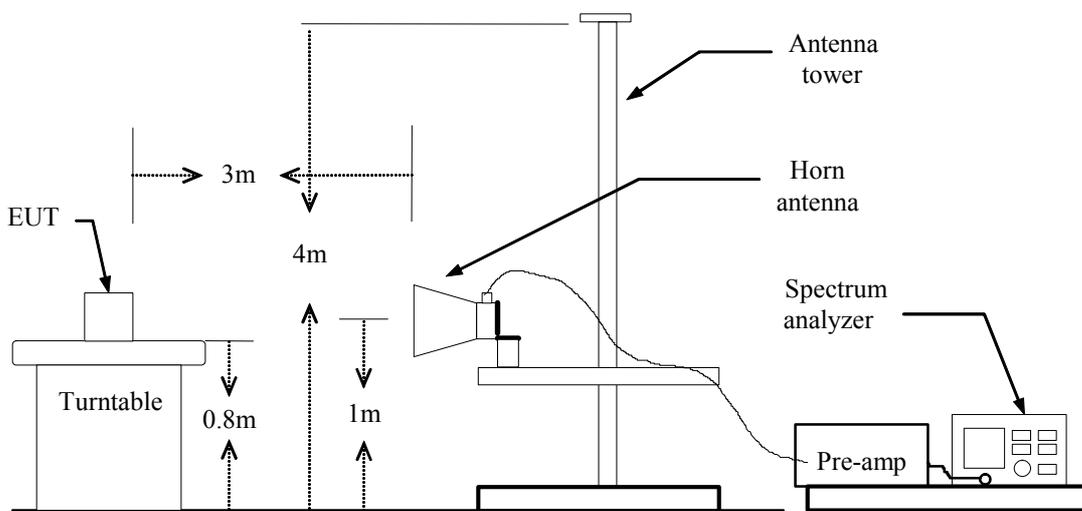
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2402	-0.91	0.00081
Mid	2441	0.51	0.00112
High	2480	0.37	0.00109

7.4 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)).

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 Monopole antenna

For GFSK / DH5

Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

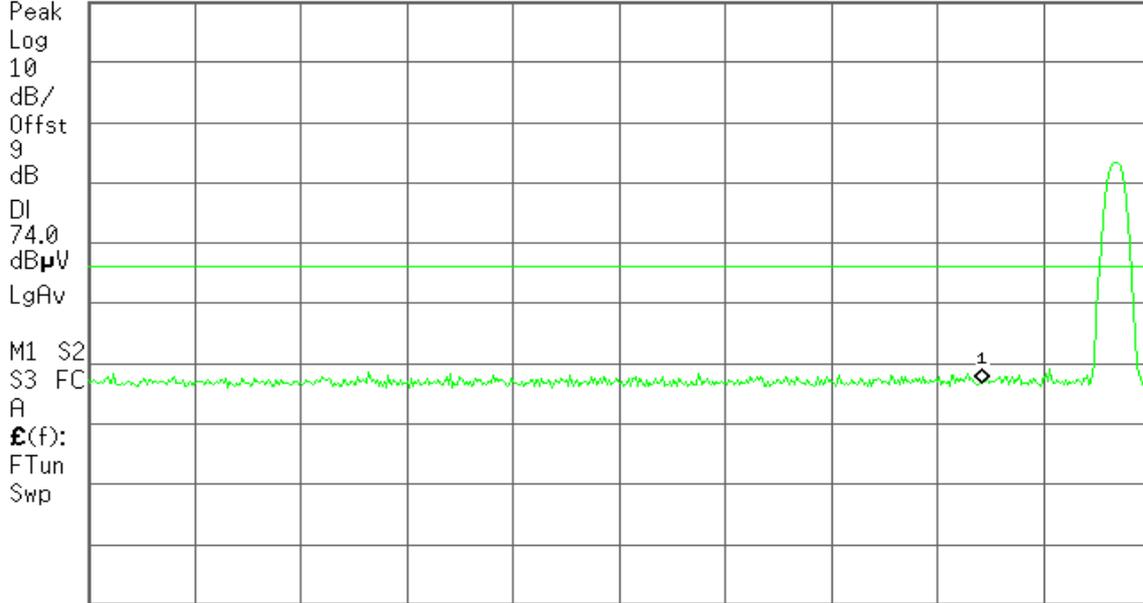
Agilent 21:55:59 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
54.74 dBµV

Ref 118 dBµV

#Atten 12 dB



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Vertical

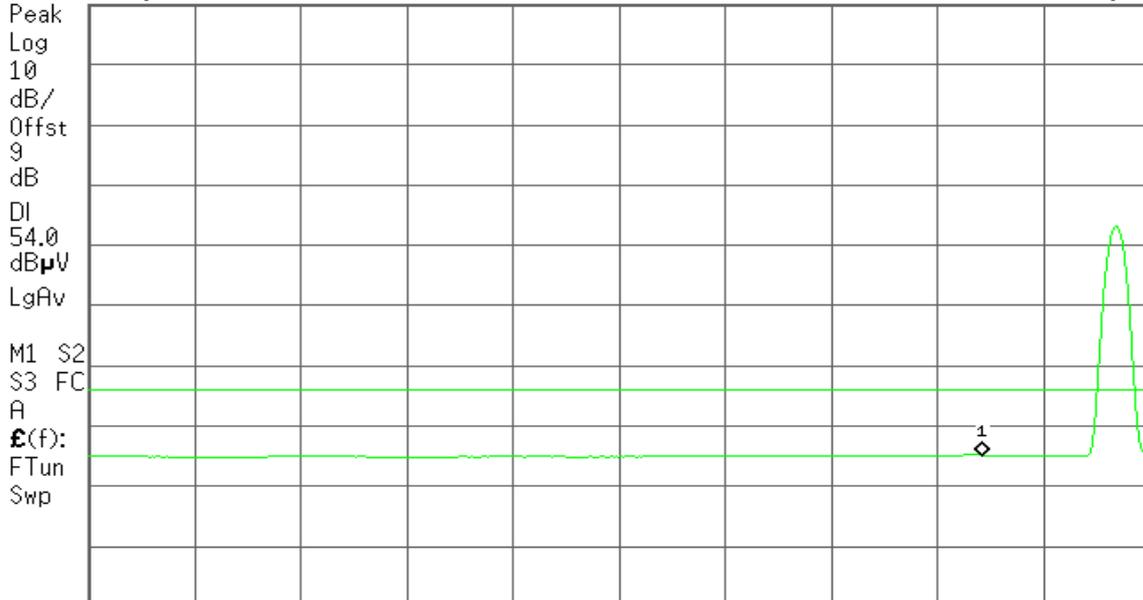
Agilent 21:56:14 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
43.16 dBµV

Ref 118 dBµV

#Atten 12 dB



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 7.408 s (601 pts)



Detector mode: Peak

Polarity: Horizontal

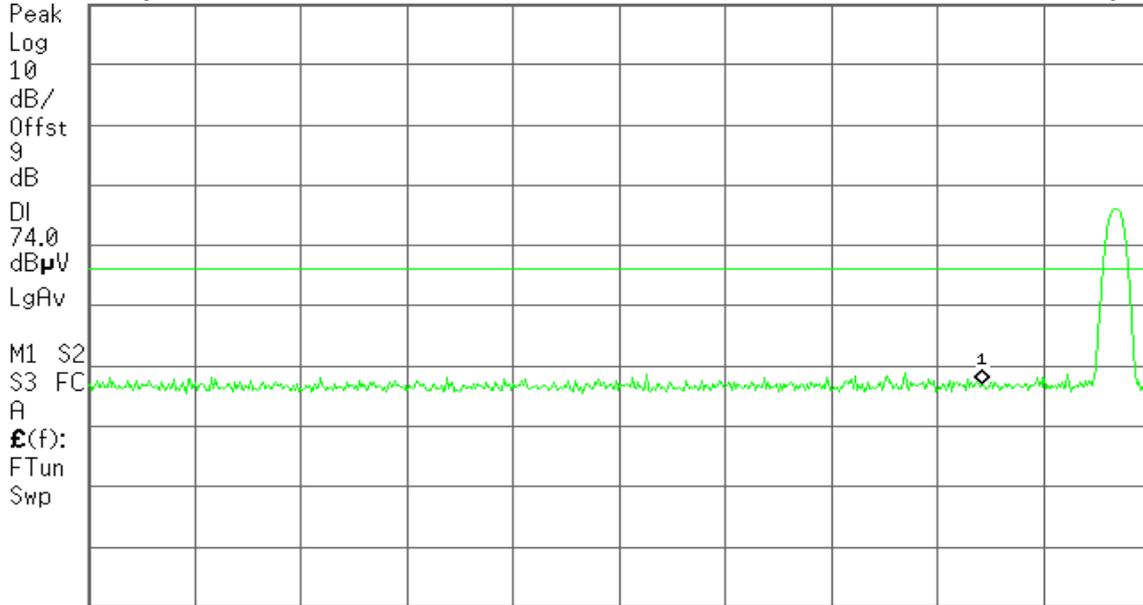
Agilent 22:04:20 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
55.04 dBµV

Ref 118 dBµV

#Atten 12 dB



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

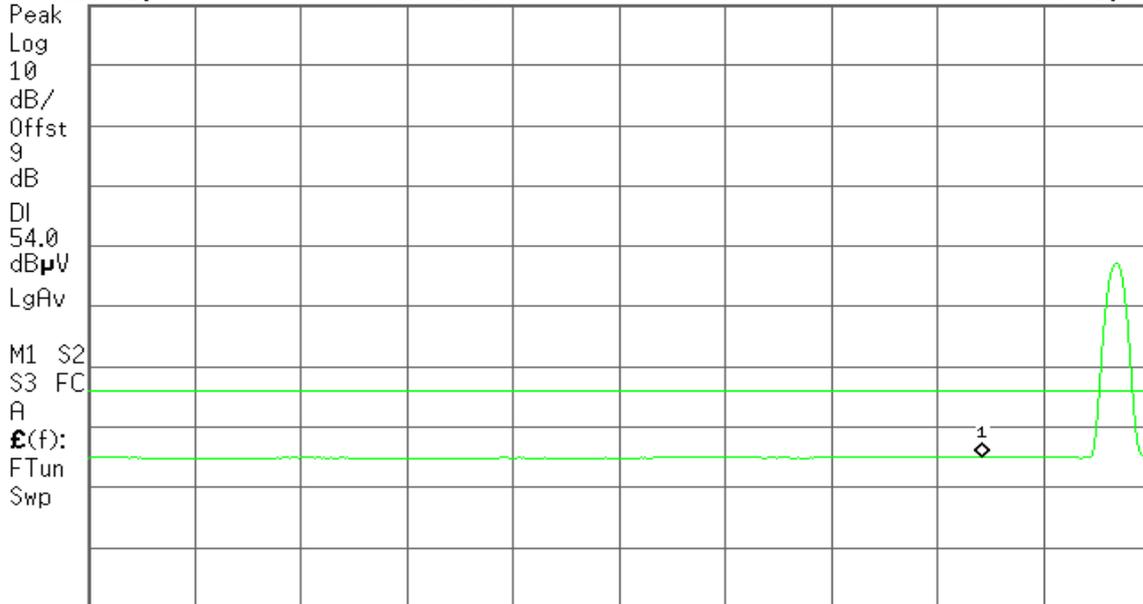
Agilent 22:04:08 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
43.03 dBµV

Ref 118 dBµV

#Atten 12 dB



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 7.408 s (601 pts)



Band Edges (CH High)

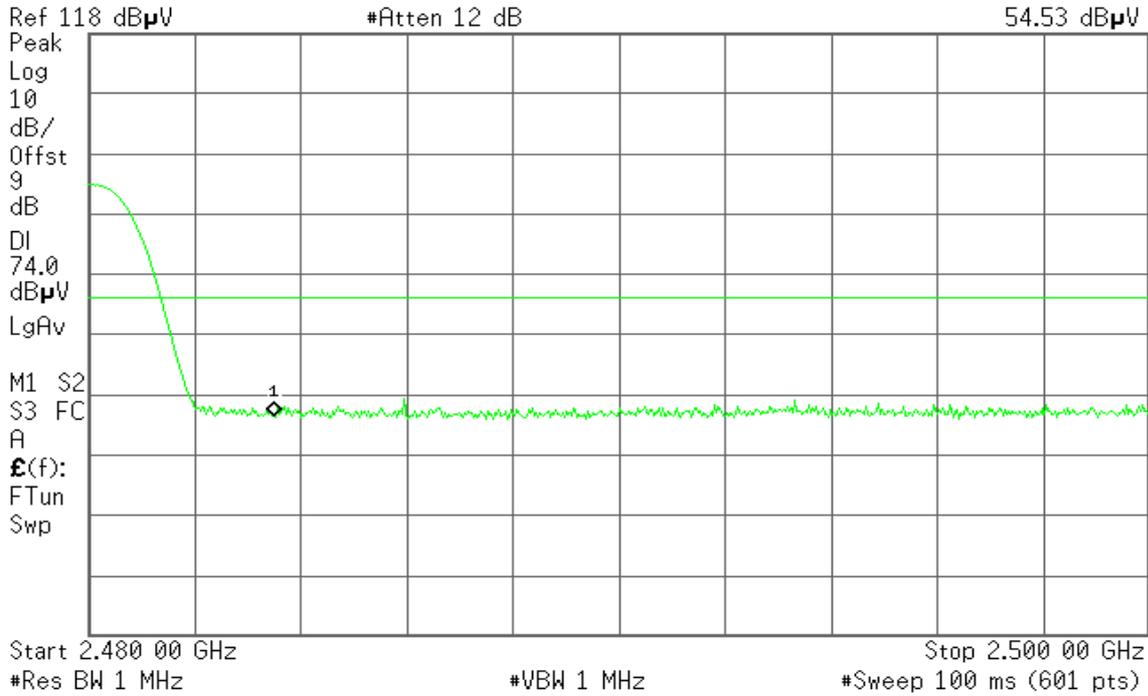
Detector mode: Peak

Polarity: Vertical

Agilent 22:19:02 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
54.53 dB μ V



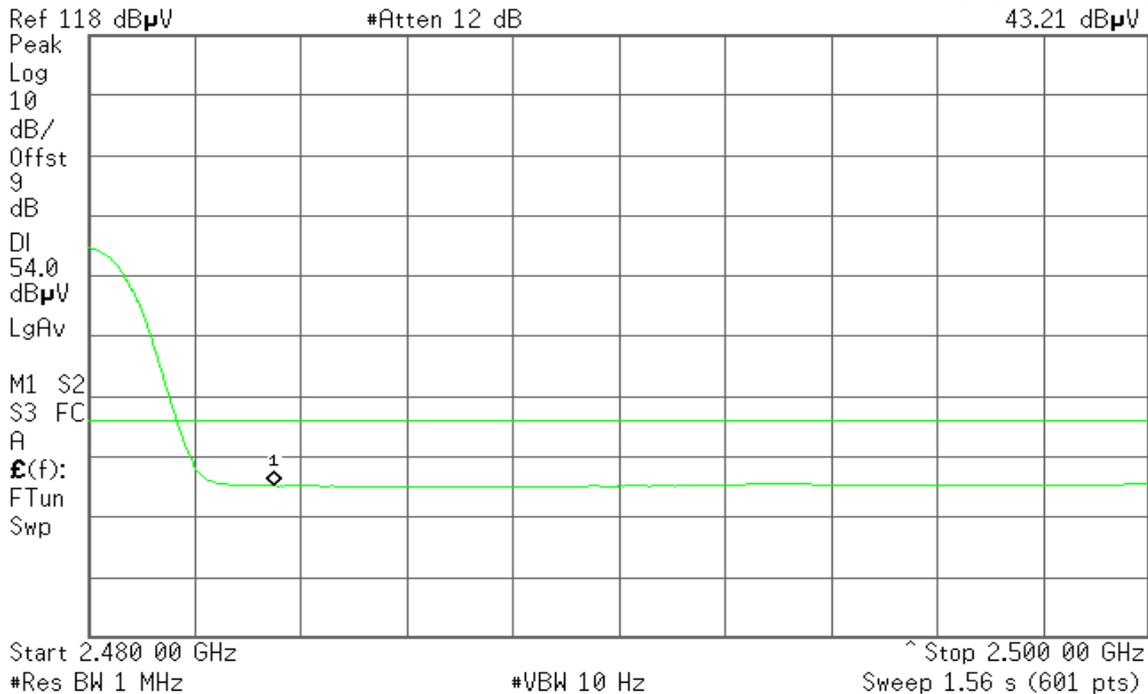
Detector mode: Average

Polarity: Vertical

Agilent 22:18:50 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
43.21 dB μ V





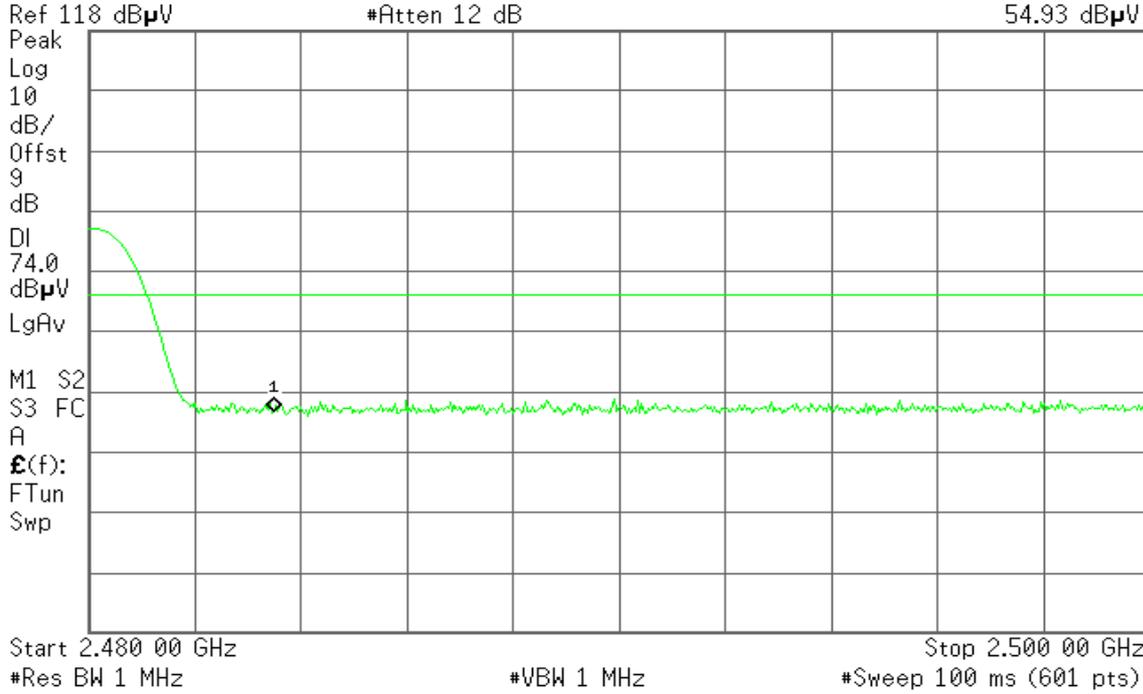
Detector mode: Peak

Polarity: Horizontal

Agilent 22:12:27 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
54.93 dBμV



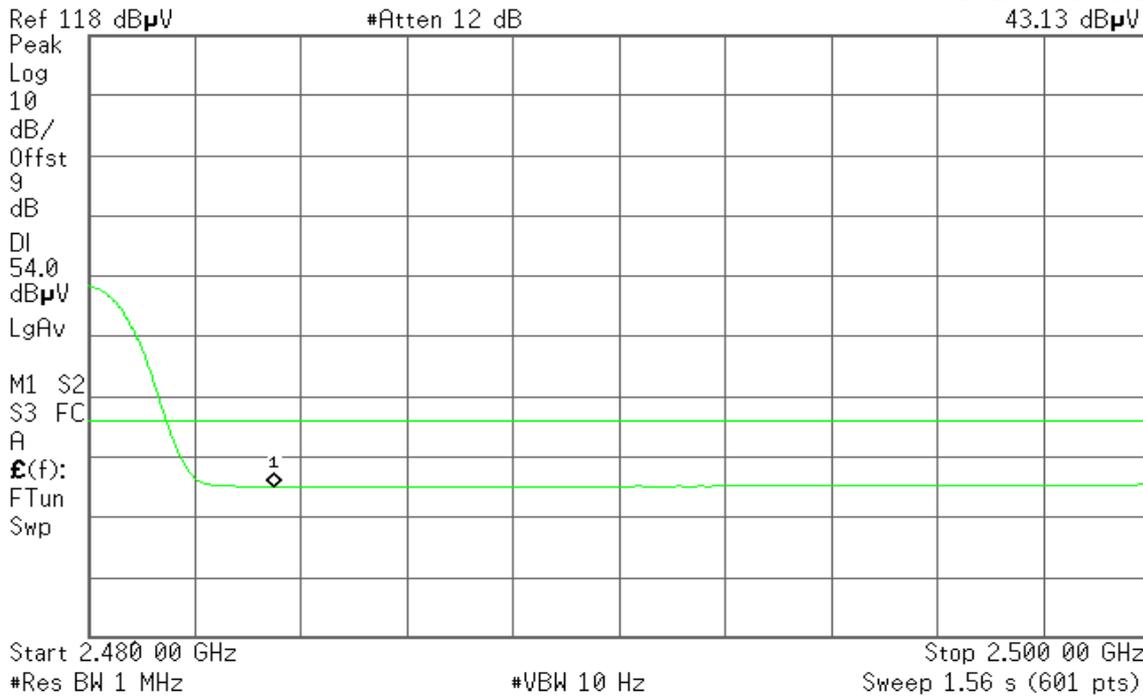
Detector mode: Average

Polarity: Horizontal

Agilent 22:12:47 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
43.13 dBμV





For 8DPSK / DH5

Band Edges (CH Low)

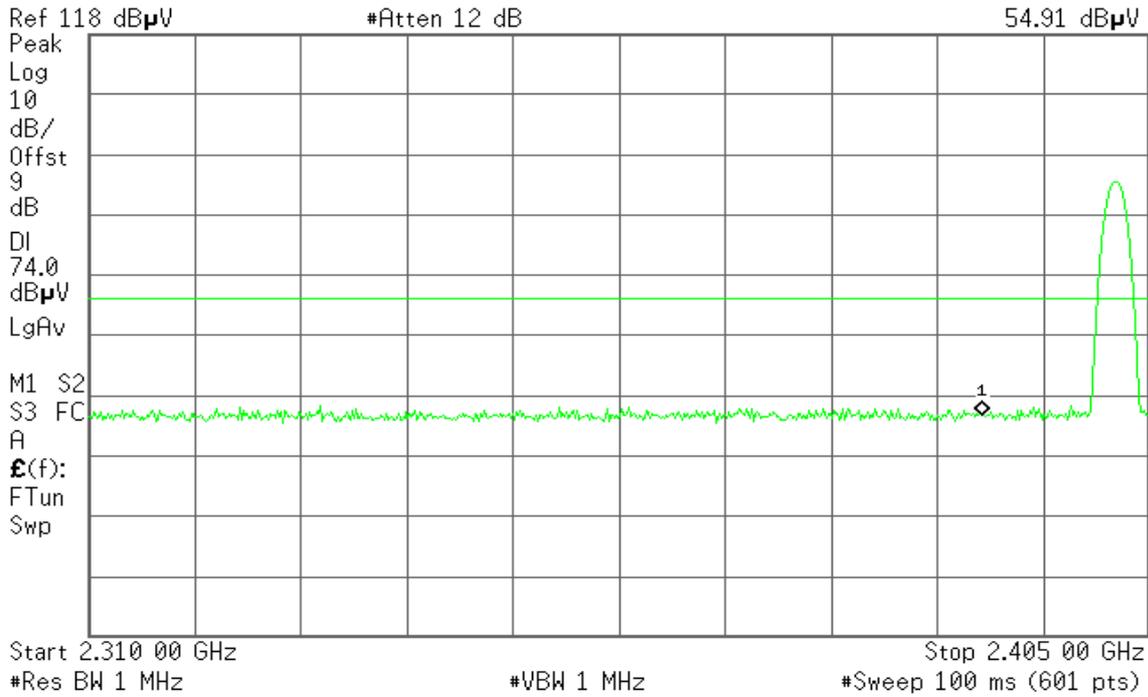
Detector mode: Peak

Polarity: Vertical

Agilent 21:57:09 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
54.91 dBµV



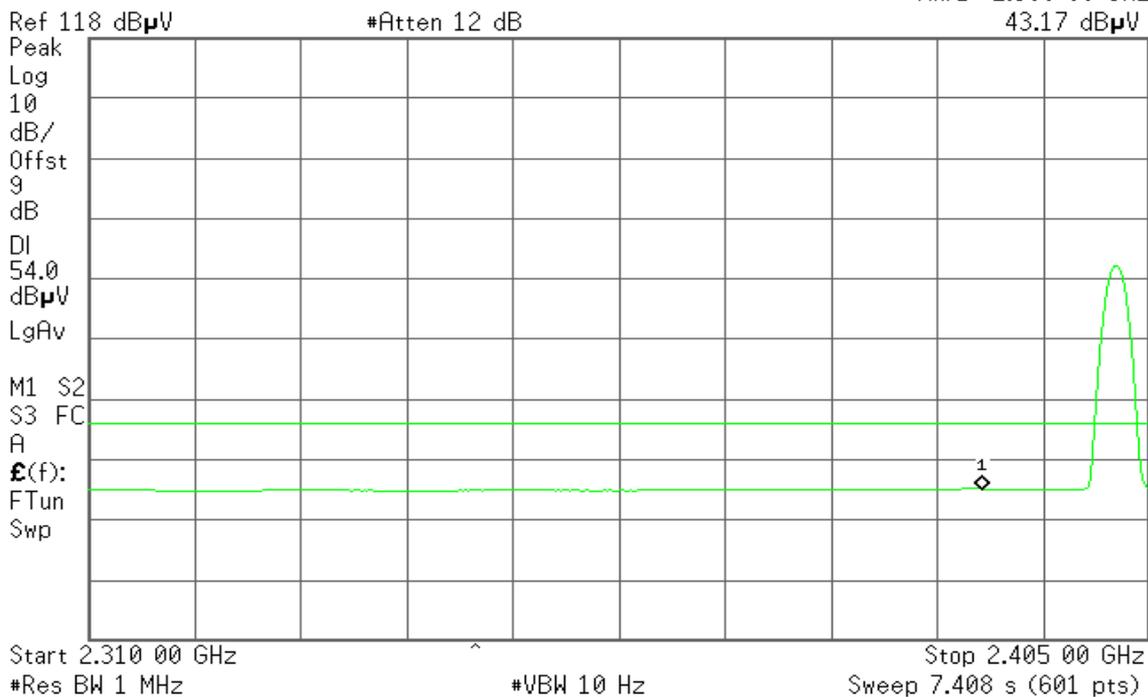
Detector mode: Average

Polarity: Vertical

Agilent 21:56:58 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
43.17 dBµV





Detector mode: Peak

Polarity: Horizontal

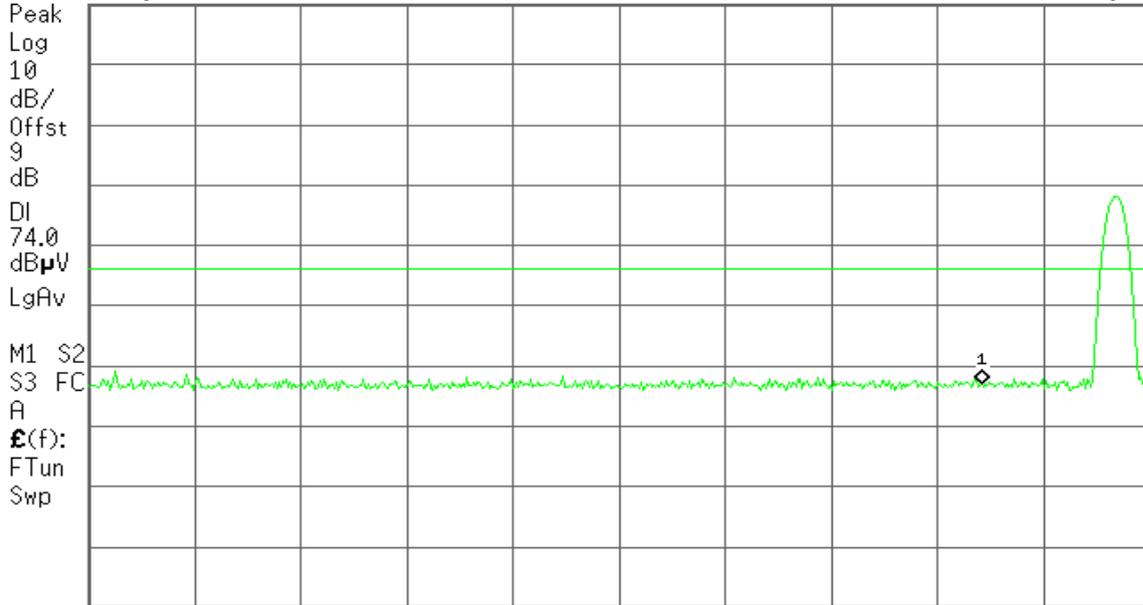
Agilent 22:02:44 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
55.16 dBμV

Ref 118 dBμV

#Atten 12 dB



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

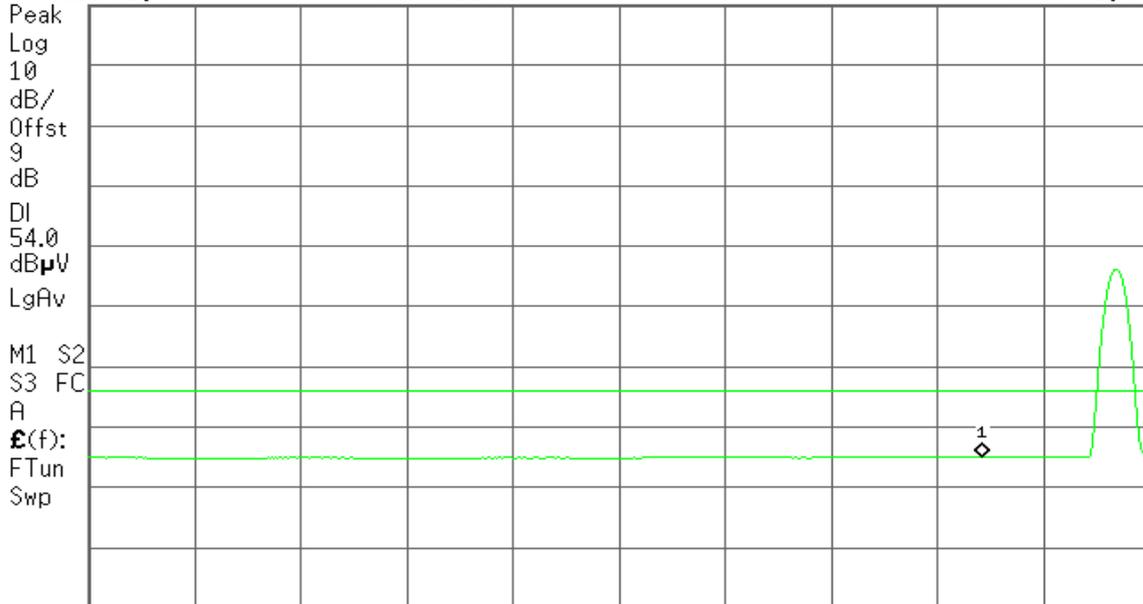
Agilent 22:03:09 Mar 21, 2010

R T

Mkr1 2.390 00 GHz
43.08 dBμV

Ref 118 dBμV

#Atten 12 dB



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 7.408 s (601 pts)



Band Edges (CH High)

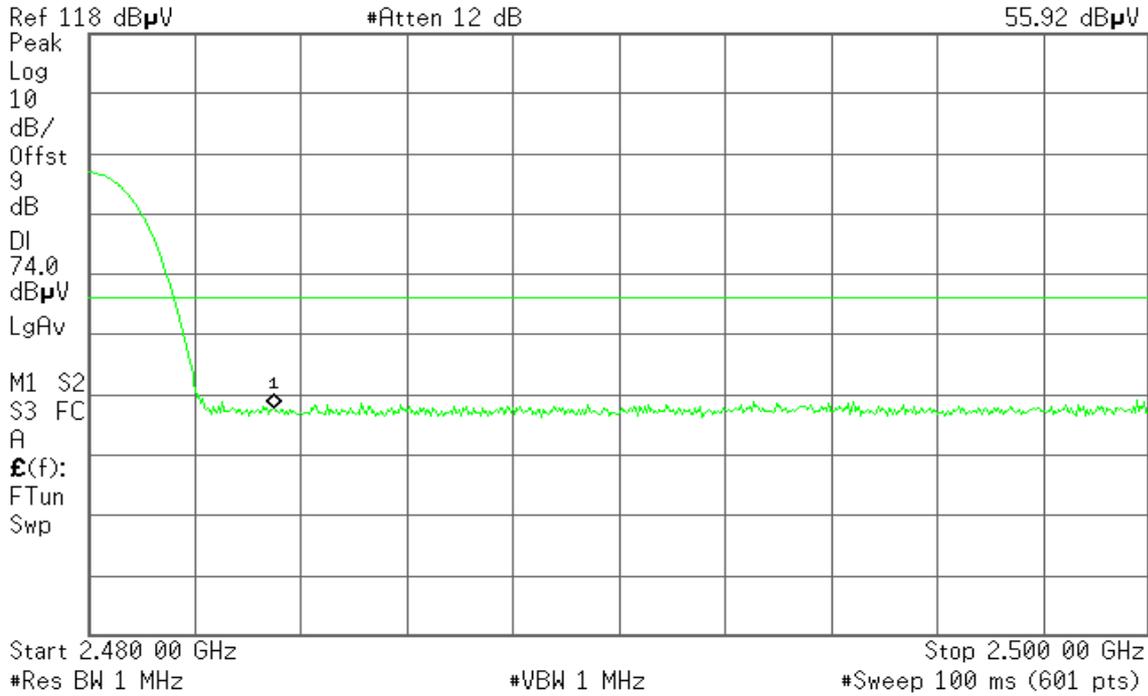
Detector mode: Peak

Polarity: Vertical

Agilent 22:18:14 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
55.92 dB μ V



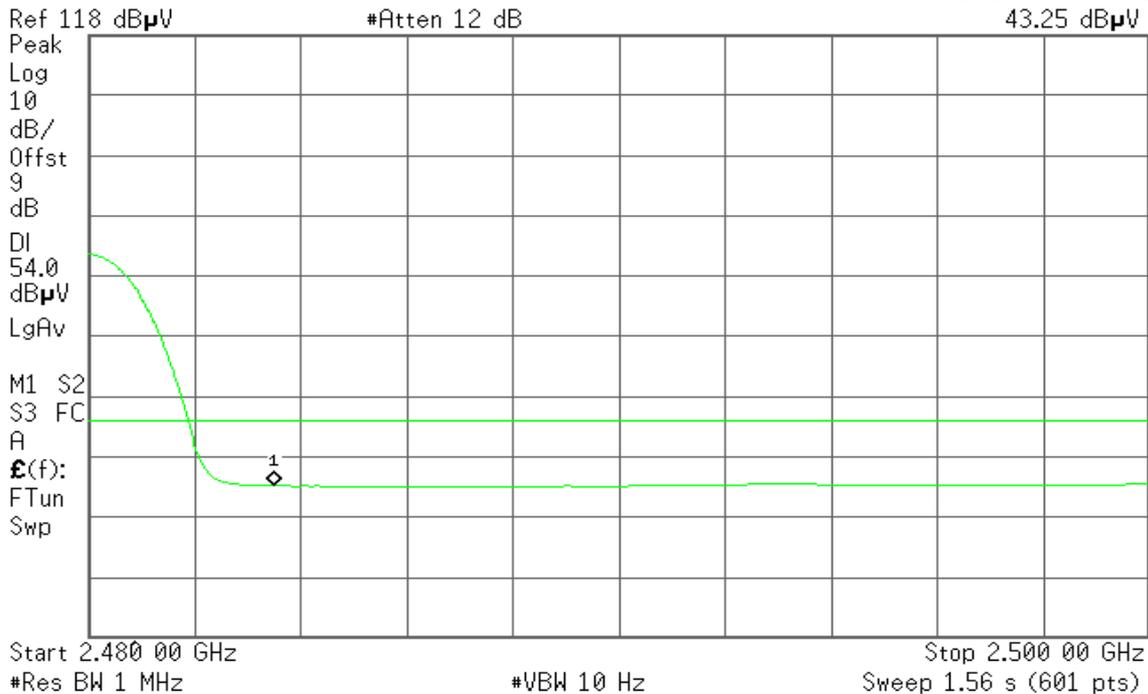
Detector mode: Average

Polarity: Vertical

Agilent 22:18:25 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
43.25 dB μ V





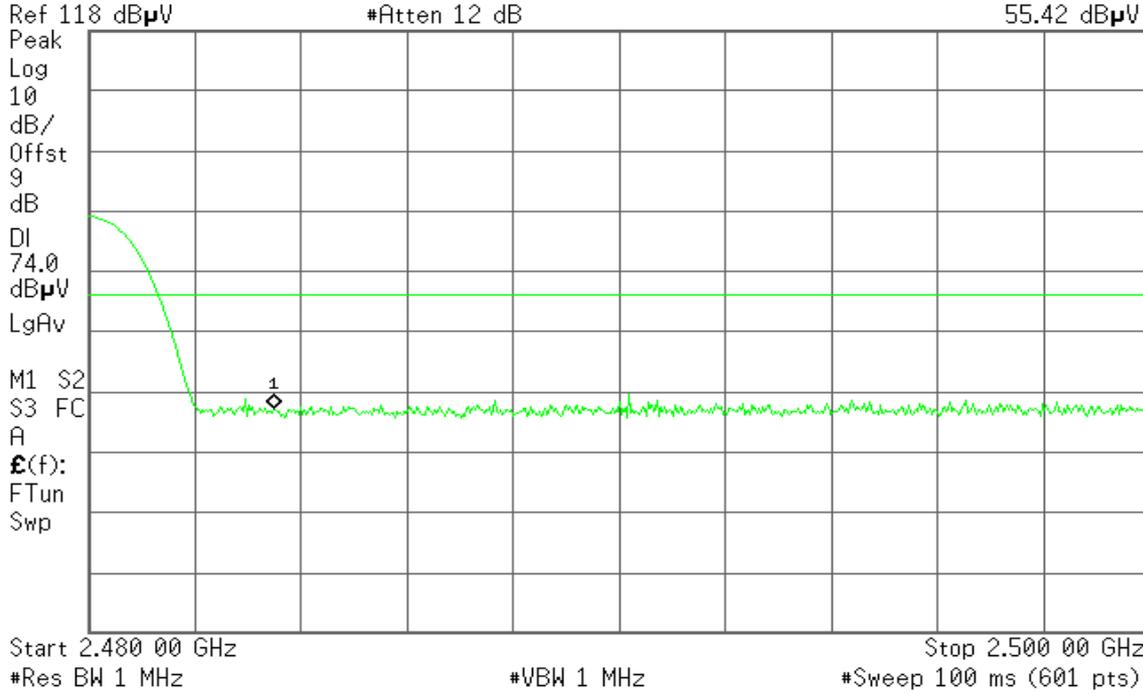
Detector mode: Peak

Polarity: Horizontal

Agilent 22:13:20 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
55.42 dBμV



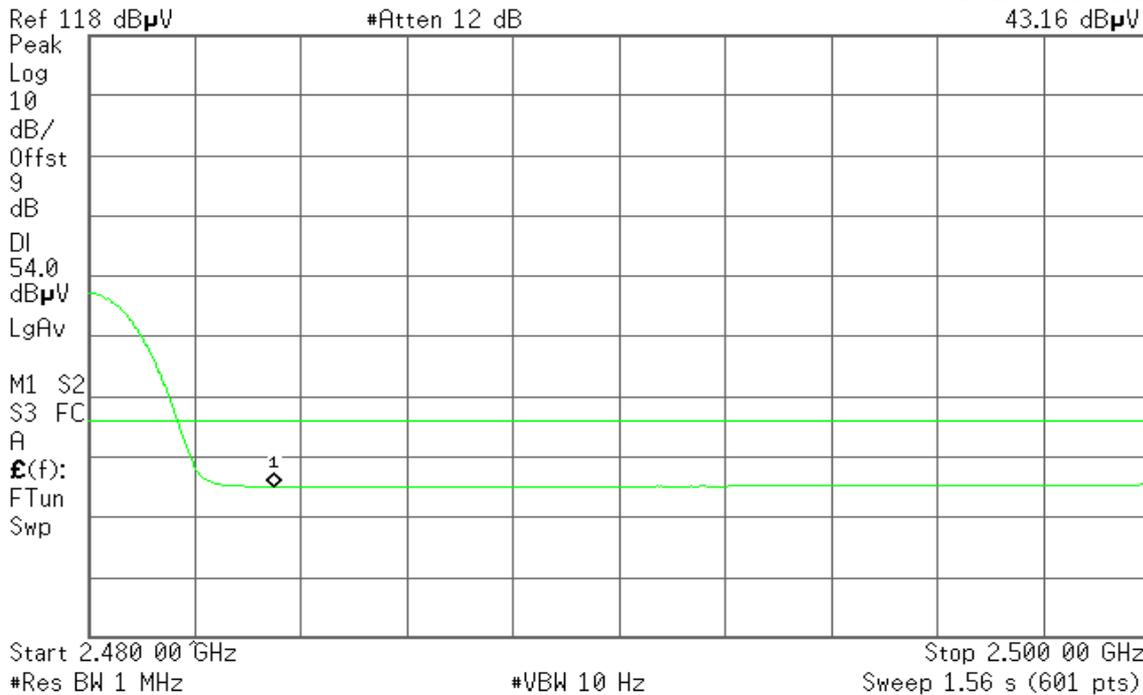
Detector mode: Average

Polarity: Horizontal

Agilent 22:13:08 Mar 21, 2010

R T

Mkr1 2.483 50 GHz
43.16 dBμV





For PIFA antenna

For GFSK / DH5

Band Edges (CH Low)

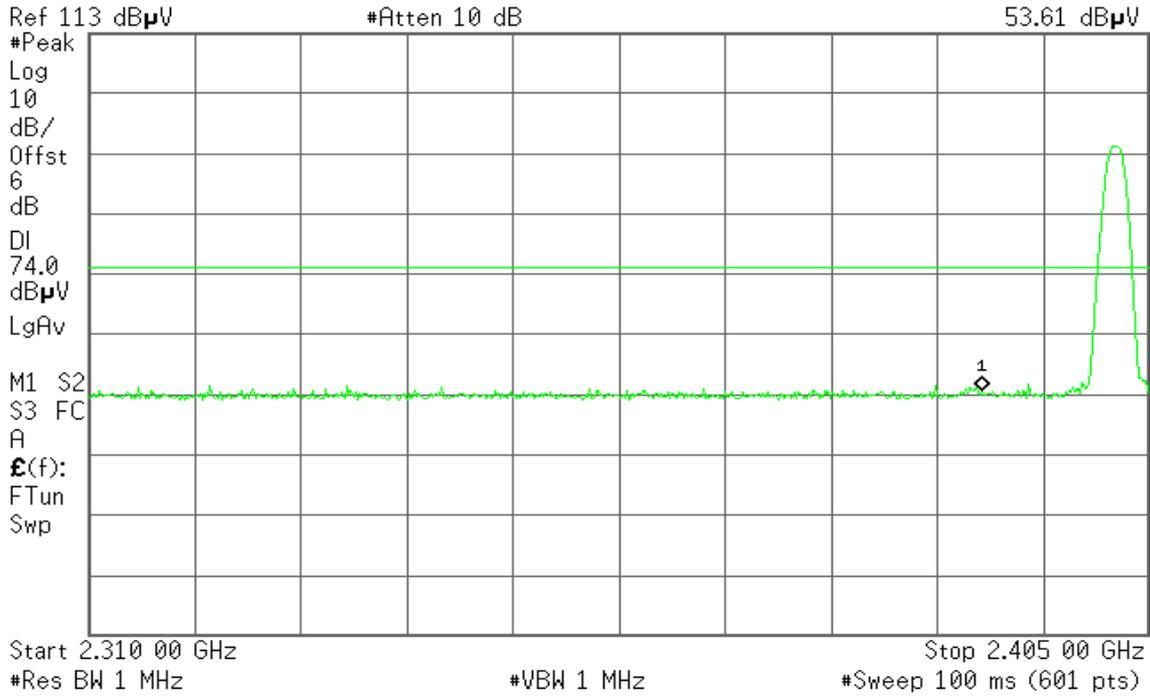
Detector mode: Peak

Polarity: Vertical

Agilent 23:28:45 Apr 1, 2010

R T

Mkr1 2.390 00 GHz
53.61 dBµV



Detector mode: Average

Polarity: Vertical

Agilent 23:29:17 Apr 1, 2010

R T

Mkr1 2.390 00 GHz
40.24 dBµV





Detector mode: Peak

Polarity: Horizontal

Agilent 23:39:09 Apr 1, 2010

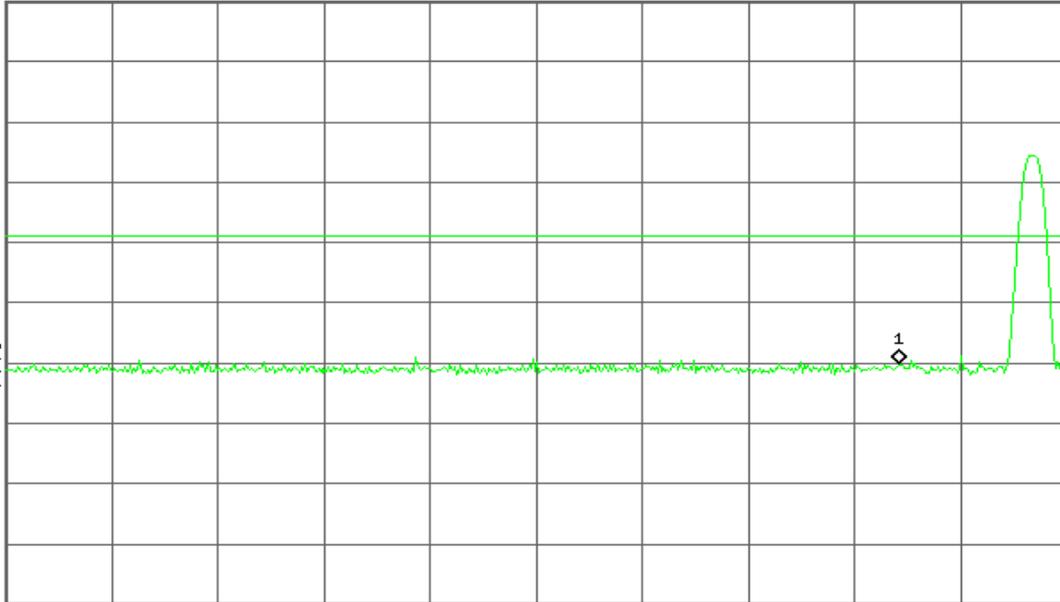
R T

Mkr1 2.390 00 GHz
52.96 dBµV

Ref 113 dBµV

#Atten 10 dB

#Peak
Log
10
dB/
Offst
6
dB
DI
74.0
dBµV
LgAv
M1 S2
S3 FC
A
£(f):
FTun
Swp



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 23:38:41 Apr 1, 2010

R T

Mkr1 2.390 00 GHz
39.98 dBµV

Ref 113 dBµV

#Atten 10 dB

#Peak
Log
10
dB/
Offst
6
dB
DI
54.0
dBµV
LgAv
M1 S2
S3 FC
A
£(f):
FTun
Swp



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 7.408 s (601 pts)



Band Edges (CH High)

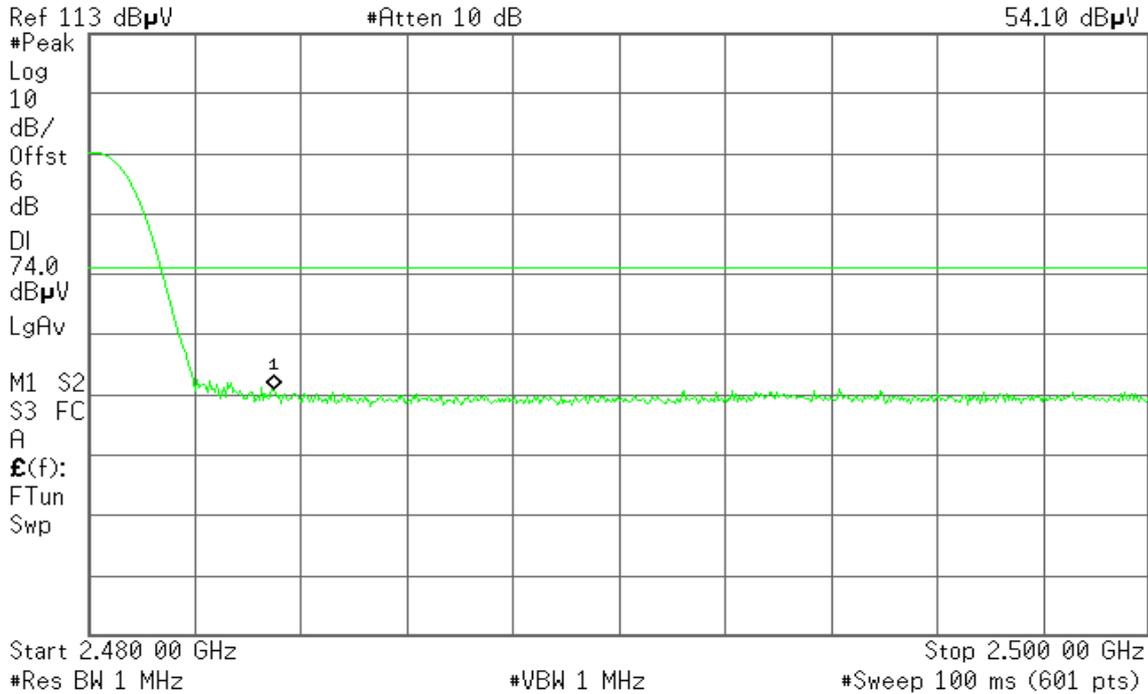
Detector mode: Peak

Polarity: Vertical

Agilent 23:53:48 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
54.10 dBμV



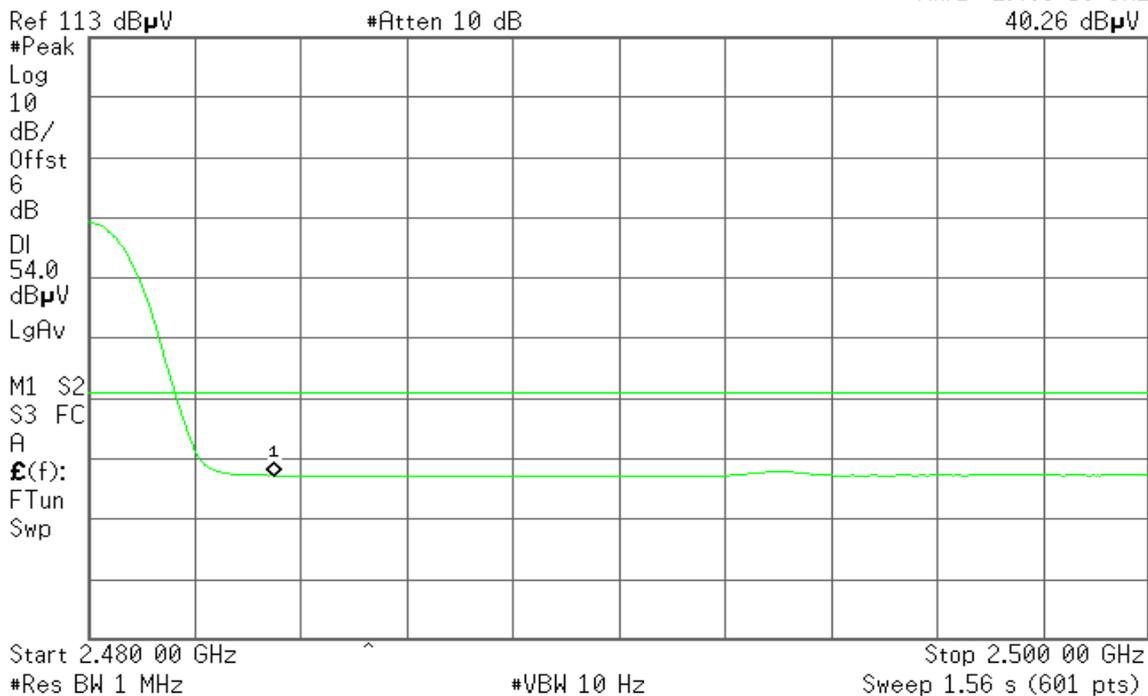
Detector mode: Average

Polarity: Vertical

Agilent 23:53:16 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
40.26 dBμV





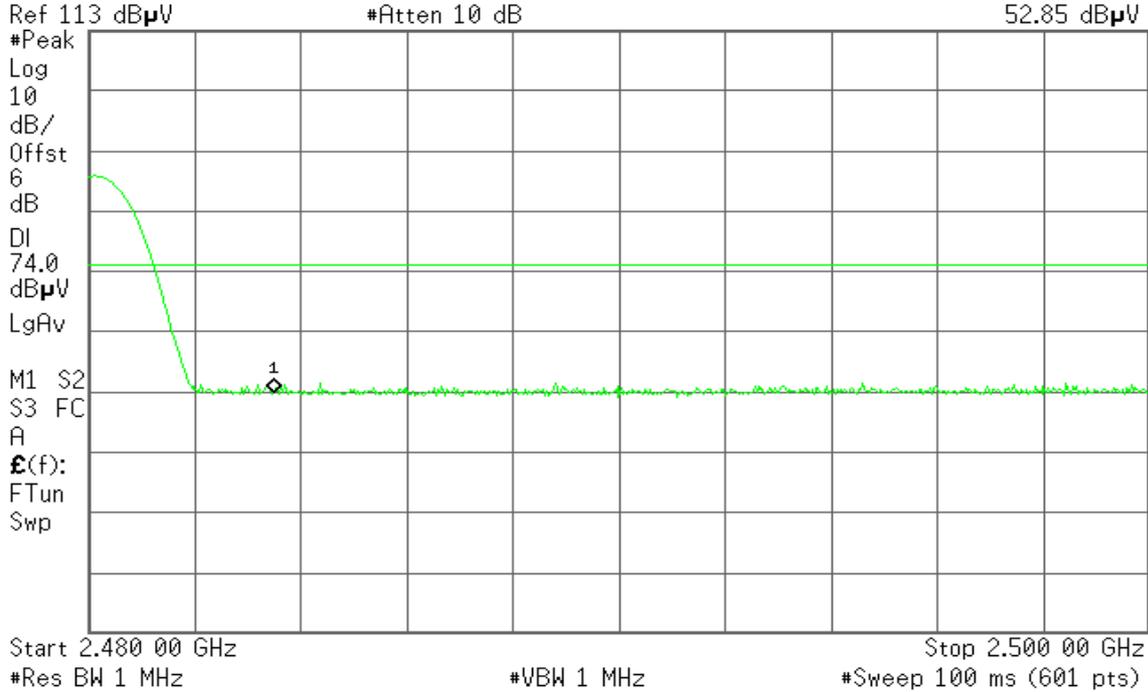
Detector mode: Peak

Polarity: Horizontal

Agilent 23:45:06 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
52.85 dBµV



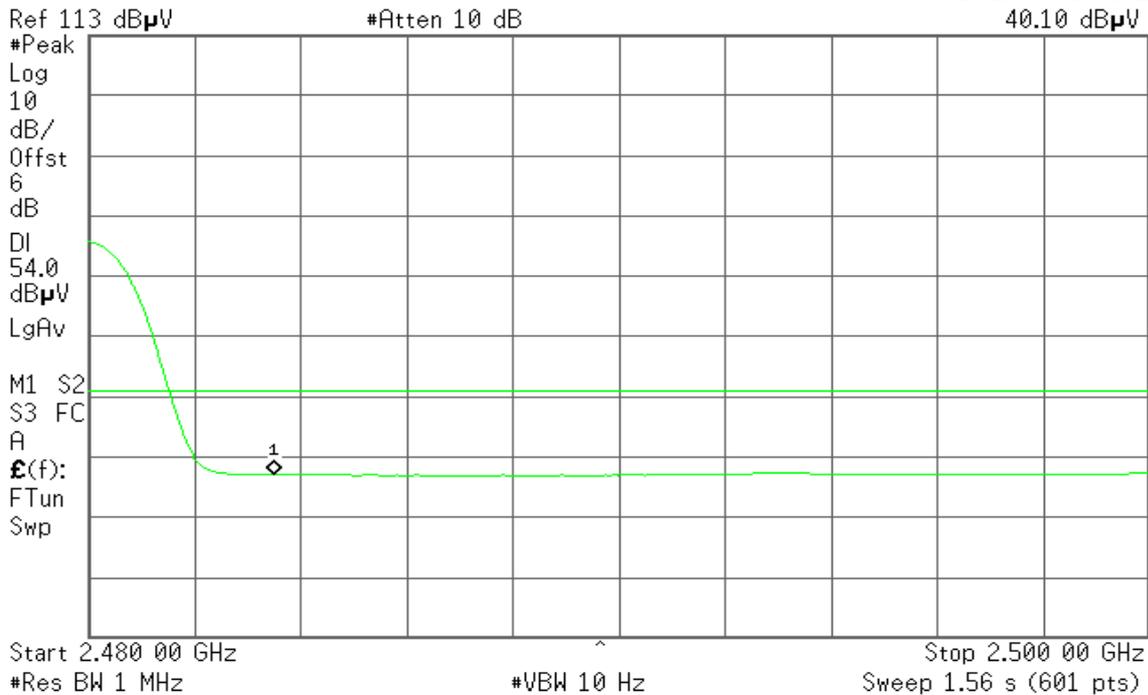
Detector mode: Average

Polarity: Horizontal

Agilent 23:45:33 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
40.10 dBµV





For 8DPSK / DH5

Band Edges (CH Low)

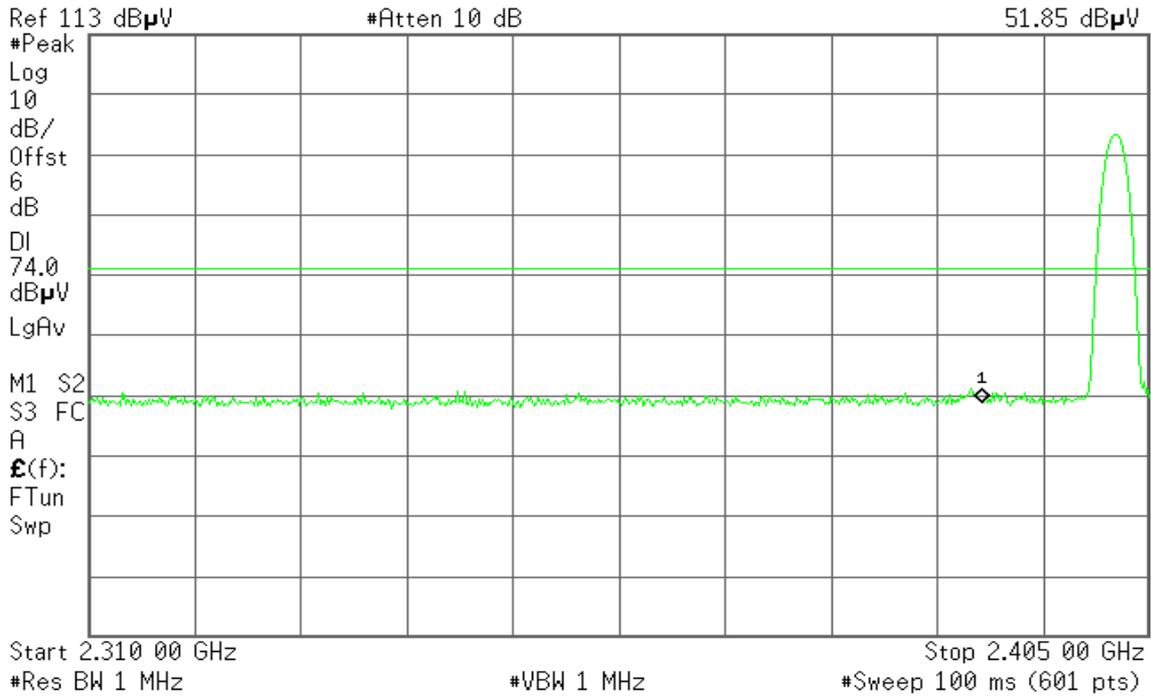
Detector mode: Peak

Polarity: Vertical

Agilent 23:31:13 Apr 1, 2010

R T

Mkr1 2.390 00 GHz
51.85 dBμV



Detector mode: Average

Polarity: Vertical

Agilent 23:30:41 Apr 1, 2010

R T

Mkr1 2.390 00 GHz
40.29 dBμV





Detector mode: Peak

Polarity: Horizontal

Agilent 23:36:47 Apr 1, 2010

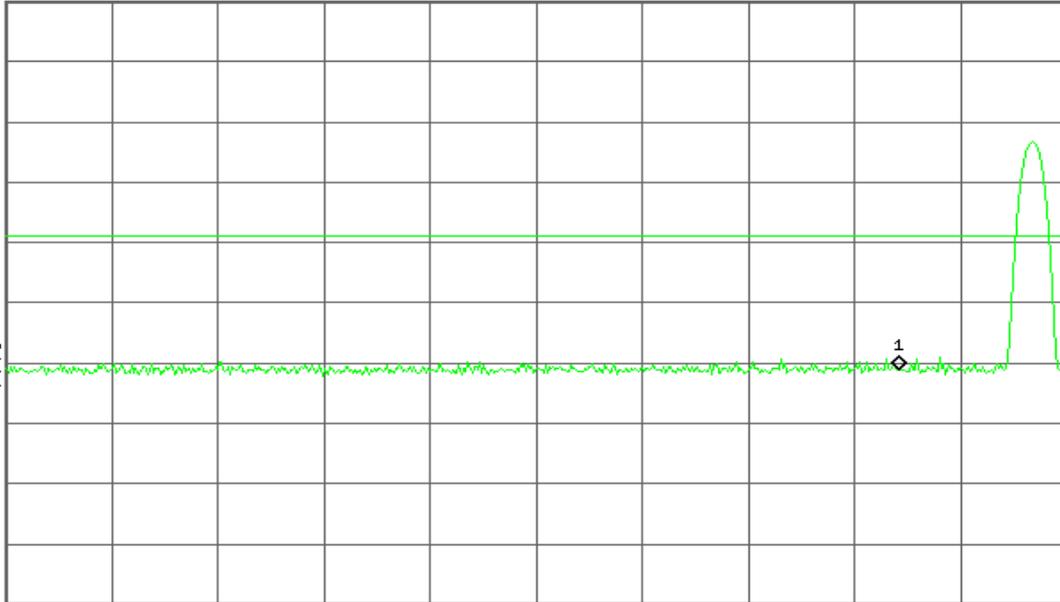
R T

Mkr1 2.390 00 GHz
51.97 dBµV

Ref 113 dBµV

#Atten 10 dB

#Peak
Log
10
dB/
Offst
6
dB
DI
74.0
dBµV
LgAv
M1 S2
S3 FC
A
£(f):
FTun
Swp



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 23:37:34 Apr 1, 2010

R T

Mkr1 2.390 00 GHz
40.05 dBµV

Ref 113 dBµV

#Atten 10 dB

#Peak
Log
10
dB/
Offst
6
dB
DI
54.0
dBµV
LgAv
M1 S2
S3 FC
A
£(f):
FTun
Swp



Start 2.310 00 GHz

Stop 2.405 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 7.408 s (601 pts)



Band Edges (CH High)

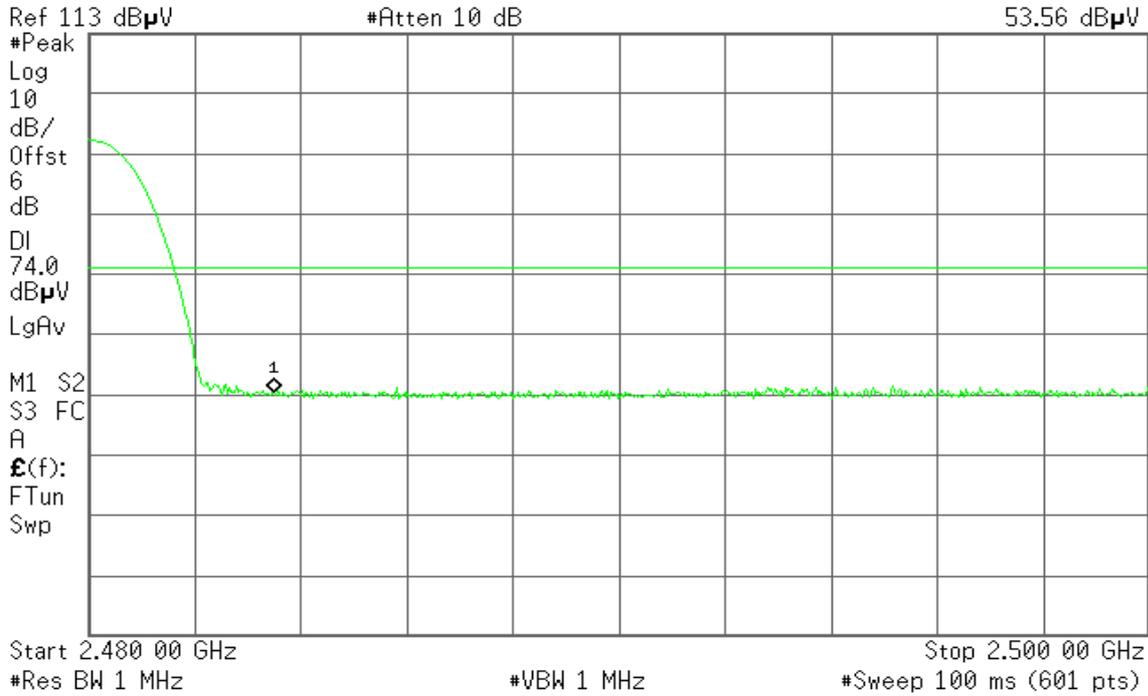
Detector mode: Peak

Polarity: Vertical

Agilent 23:52:10 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
53.56 dB μ V



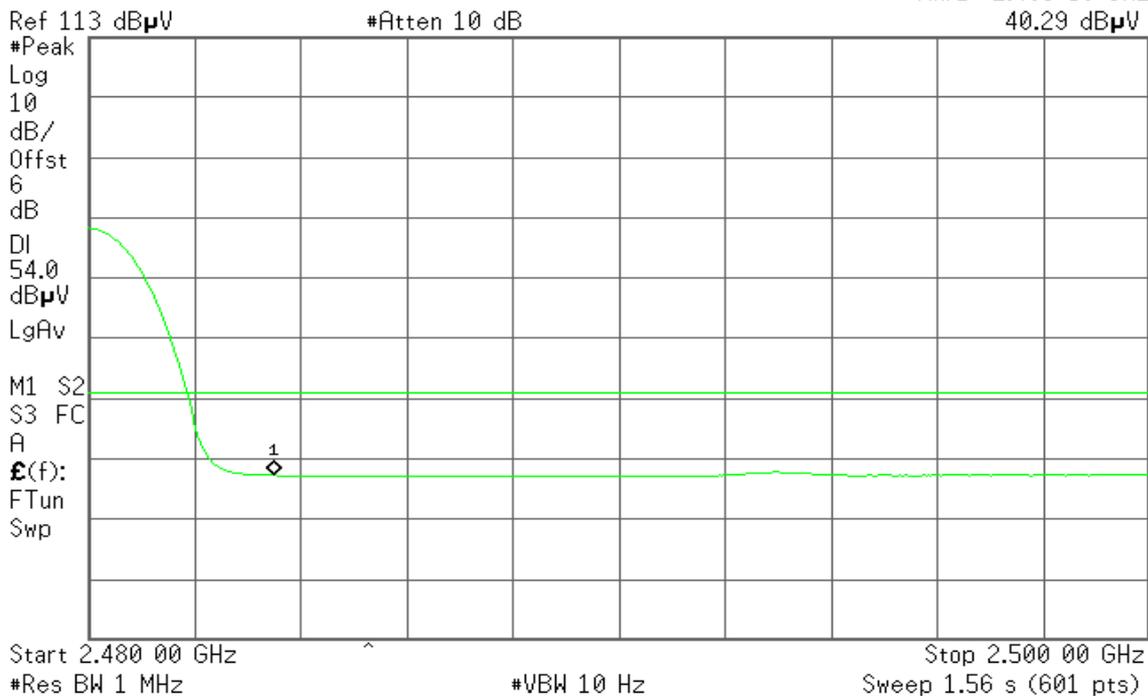
Detector mode: Average

Polarity: Vertical

Agilent 23:52:36 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
40.29 dB μ V





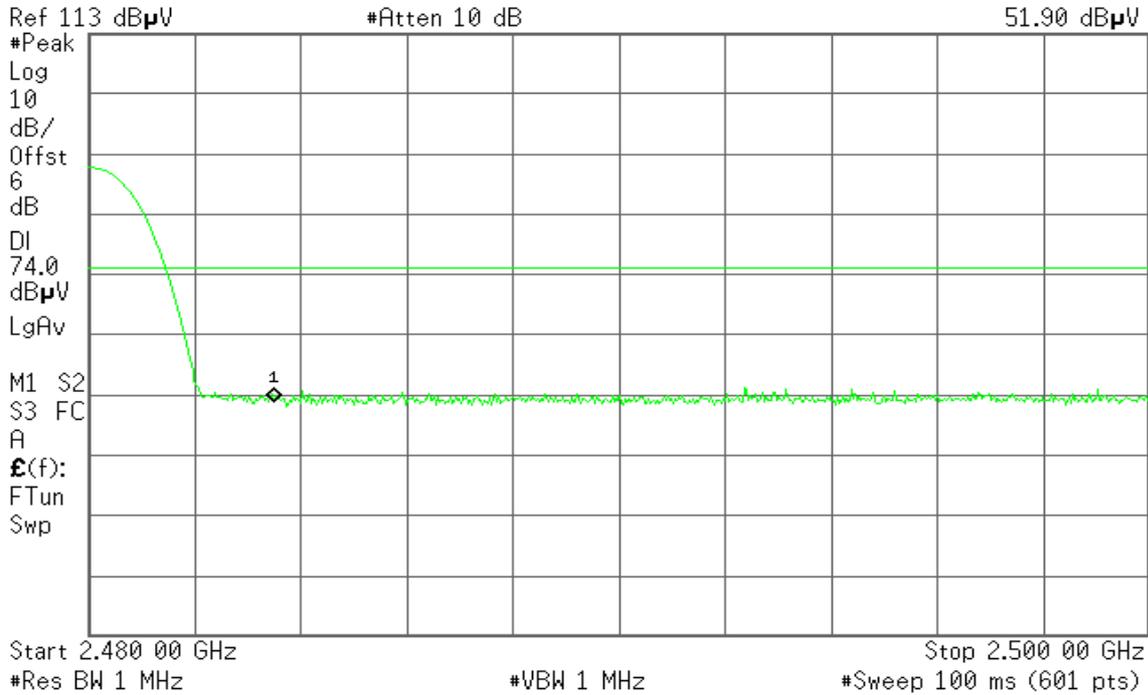
Detector mode: Peak

Polarity: Horizontal

Agilent 23:46:47 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
51.90 dBµV



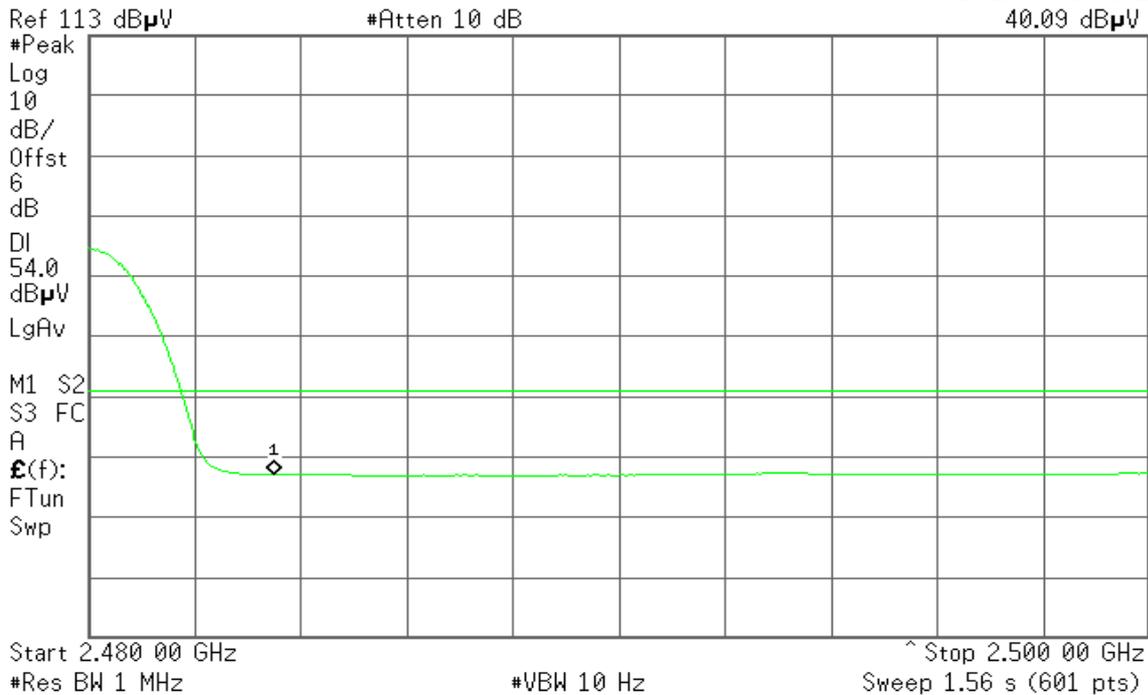
Detector mode: Average

Polarity: Horizontal

Agilent 23:46:17 Apr 1, 2010

R T

Mkr1 2.483 50 GHz
40.09 dBµV



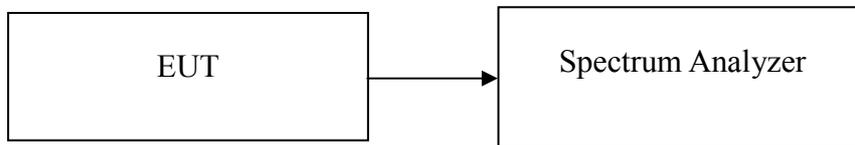


7.5 PEAK POWER SPECTRAL DENSITY

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.

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	-11.36	8.00	PASS
Mid	2441	-9.99		PASS
High	2480	-10.16		PASS

For 8DPSK / DH5

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2402	-14.77	8.00	PASS
Mid	2441	-13.37		PASS
High	2480	-13.56		PASS



Test Plot

For GFSK / DH5

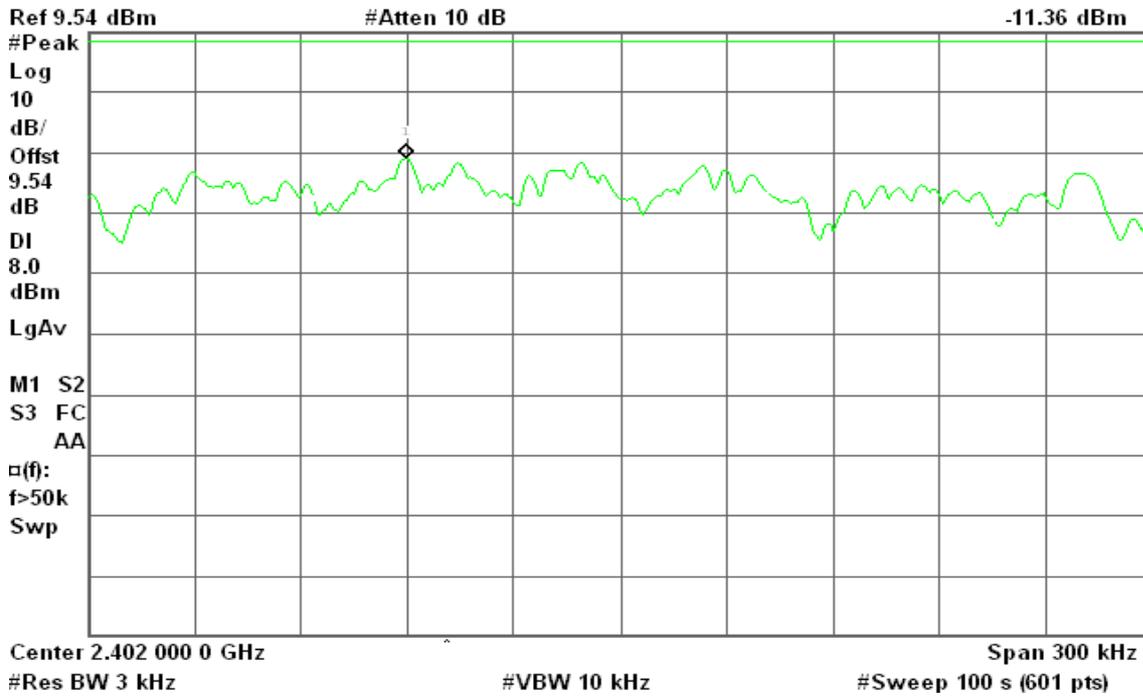
PPSD (CH Low)

Agilent 10:01:17 Mar 26, 2010

R T

Mkr1 2.401 939 4 GHz

-11.36 dBm



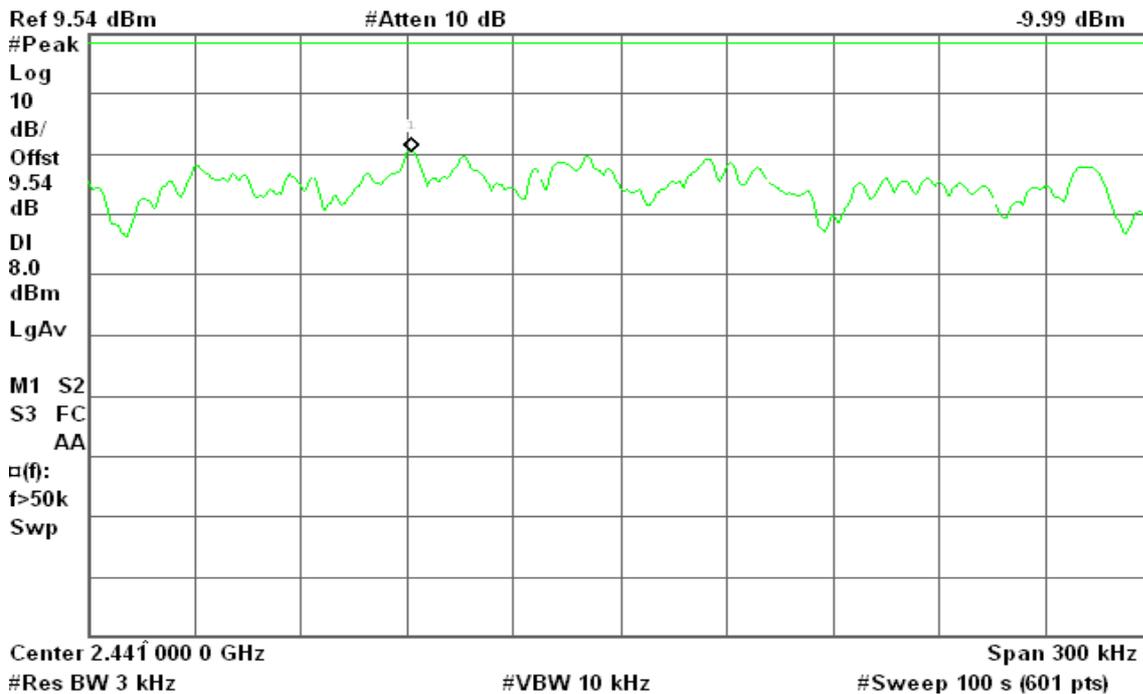
PPSD (CH Mid)

Agilent 10:03:17 Mar 26, 2010

R T

Mkr1 2.440 941 4 GHz

-9.99 dBm





PPSD (CH High)

Agilent 10:05:52 Mar 26, 2010

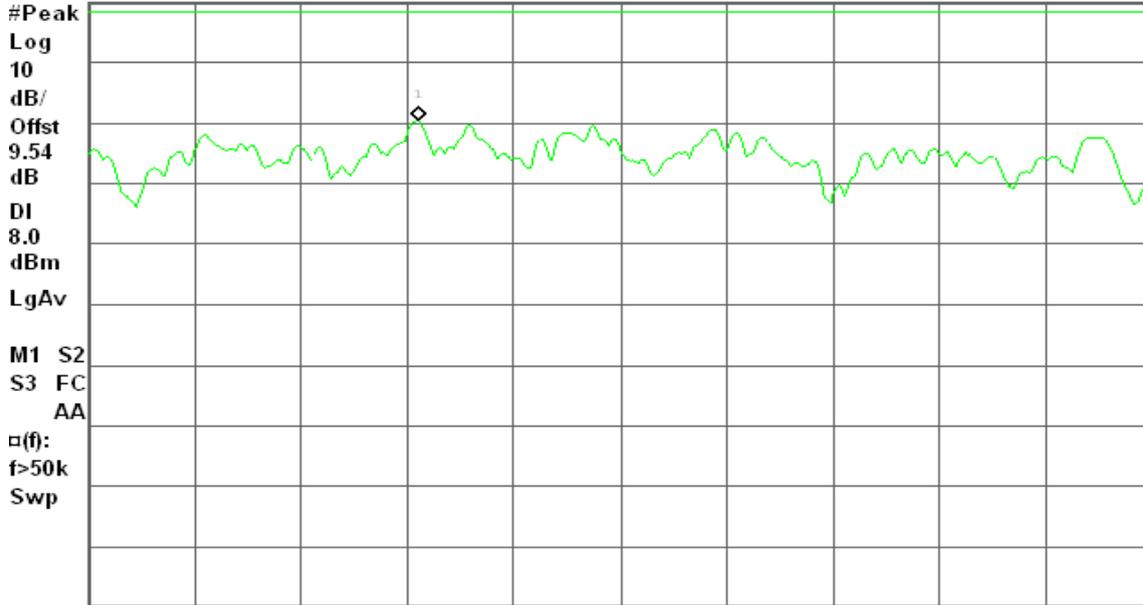
R T

Mkr1 2.479 943 2 GHz

-10.16 dBm

Ref 9.54 dBm

#Atten 10 dB



Center 2.480 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



For 8DPSK / DH5

PPSD (CH Low)

Agilent 10:37:54 Mar 26, 2010

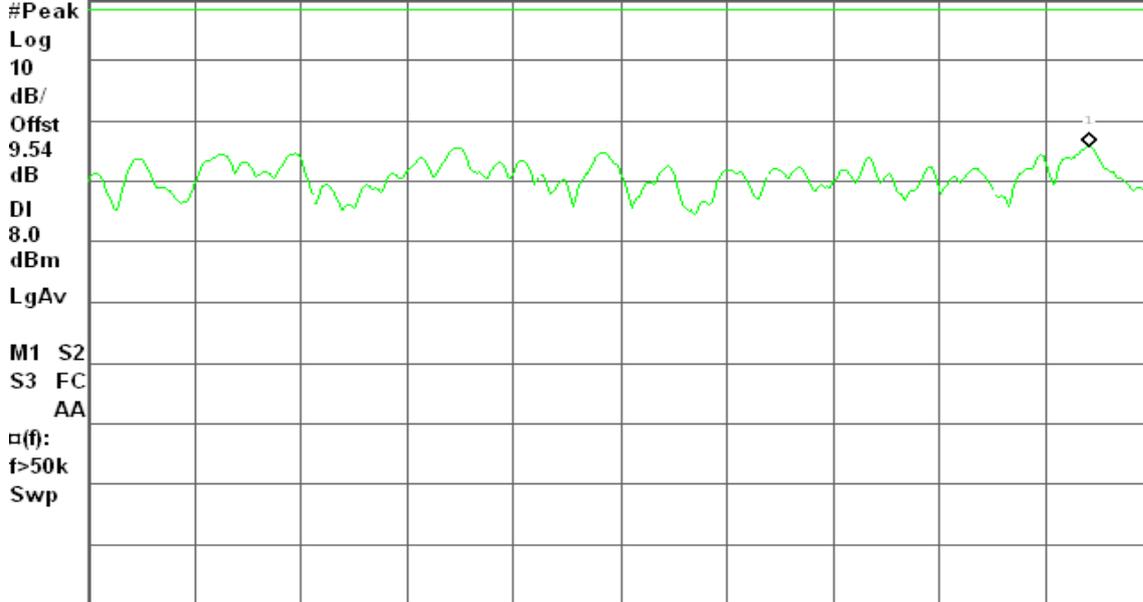
R T

Mkr1 2.402 133 5 GHz

-14.77 dBm

Ref 9.54 dBm

#Atten 10 dB



Center 2.402 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

PPSD (CH Mid)

Agilent 10:40:32 Mar 26, 2010

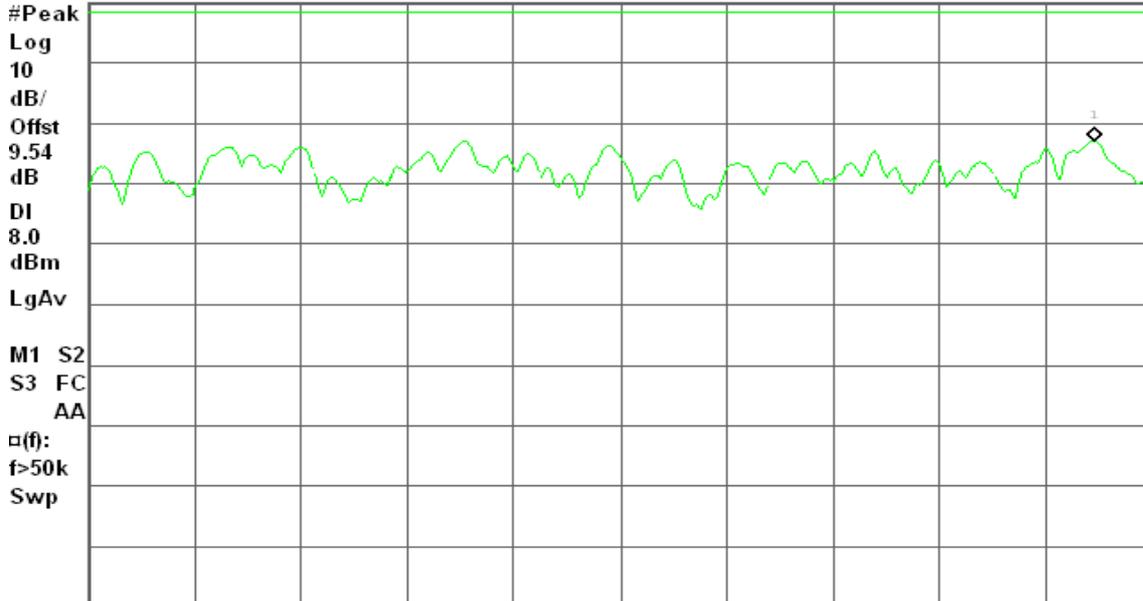
R T

Mkr1 2.441 135 0 GHz

-13.37 dBm

Ref 9.54 dBm

#Atten 10 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 10:43:32 Mar 26, 2010

R T

Mkr1 2.480 136 6 GHz

-13.56 dBm

Ref 9.54 dBm

#Atten 10 dB

#Peak

Log

10

dB/

Offst

9.54

dB

D1

8.0

dBm

LgAv

M1 S2

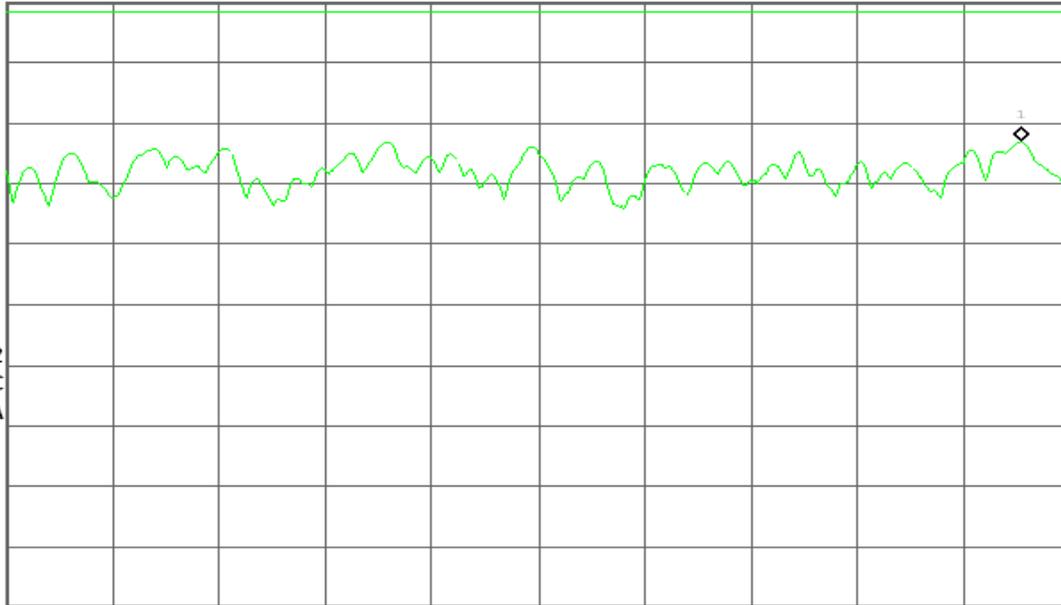
S3 FC

AA

□(f):

f>50k

Swp



Center 2.480 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

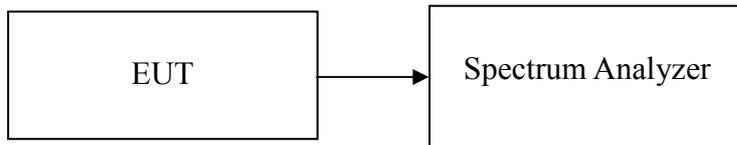
#Sweep 100 s (601 pts)

7.6 FREQUENCY SEPARATION

LIMIT

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.

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	616.66	>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	846.66	>two-thirds of the 20 dB bandwidth	Pass



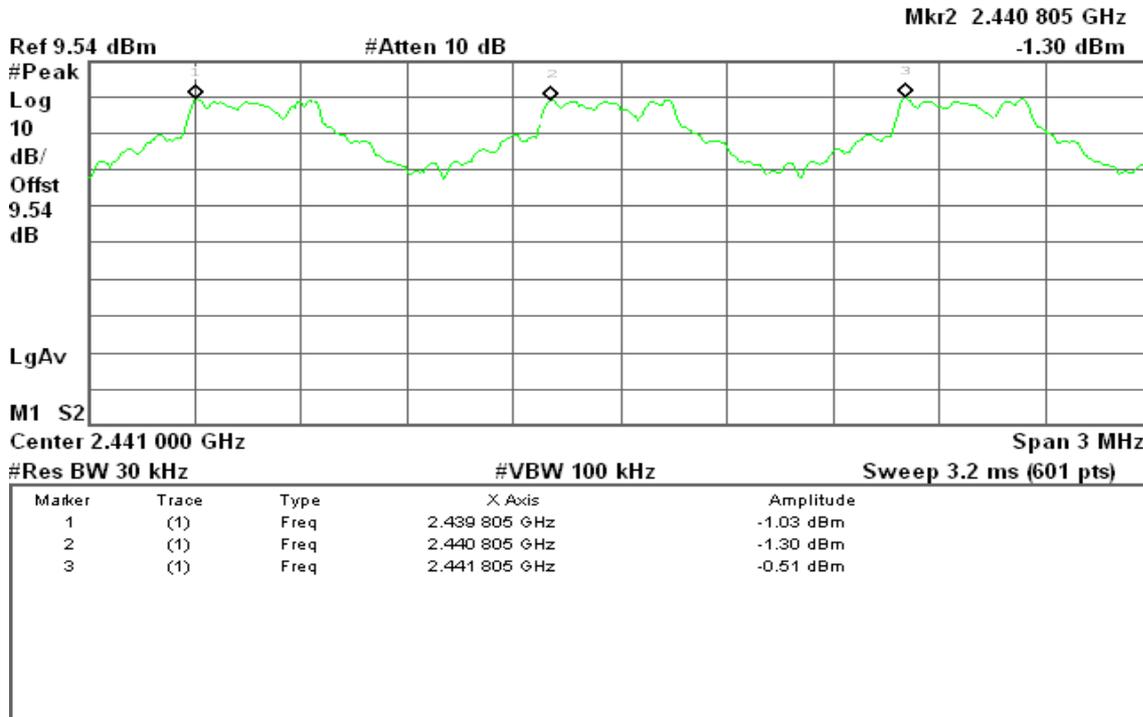
Test Plot

For GFSK / DH5

Measurement of Channel Separation

Agilent 10:19:05 Mar 26, 2010

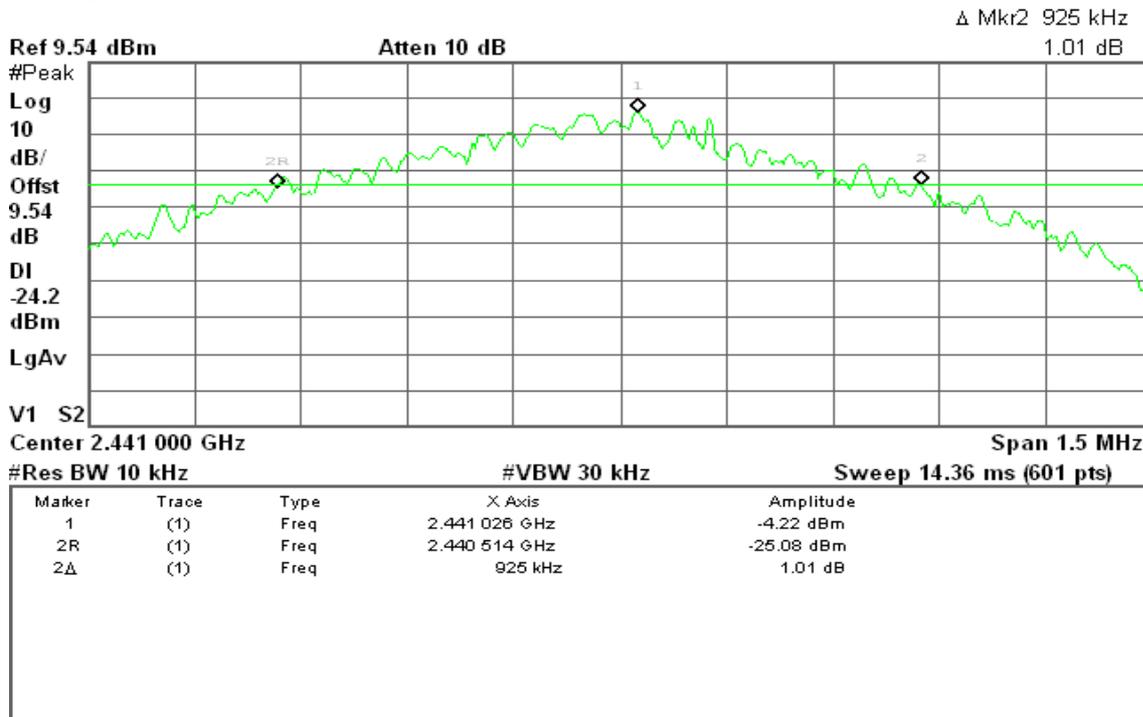
R T



Measurement of 20dB Bandwidth

Agilent 09:35:53 Mar 26, 2010

R T





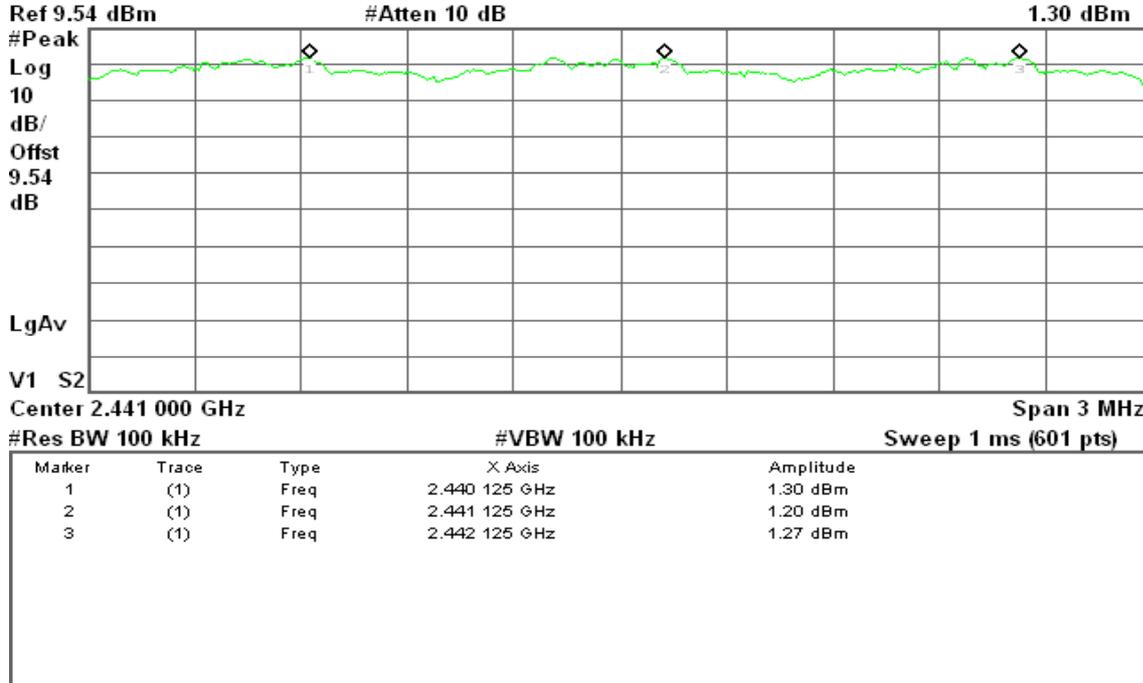
For 8DPSK / DH5

Measurement of Channel Separation

Agilent 10:48:46 Mar 26, 2010

R T

Mkr1 2.440 125 GHz

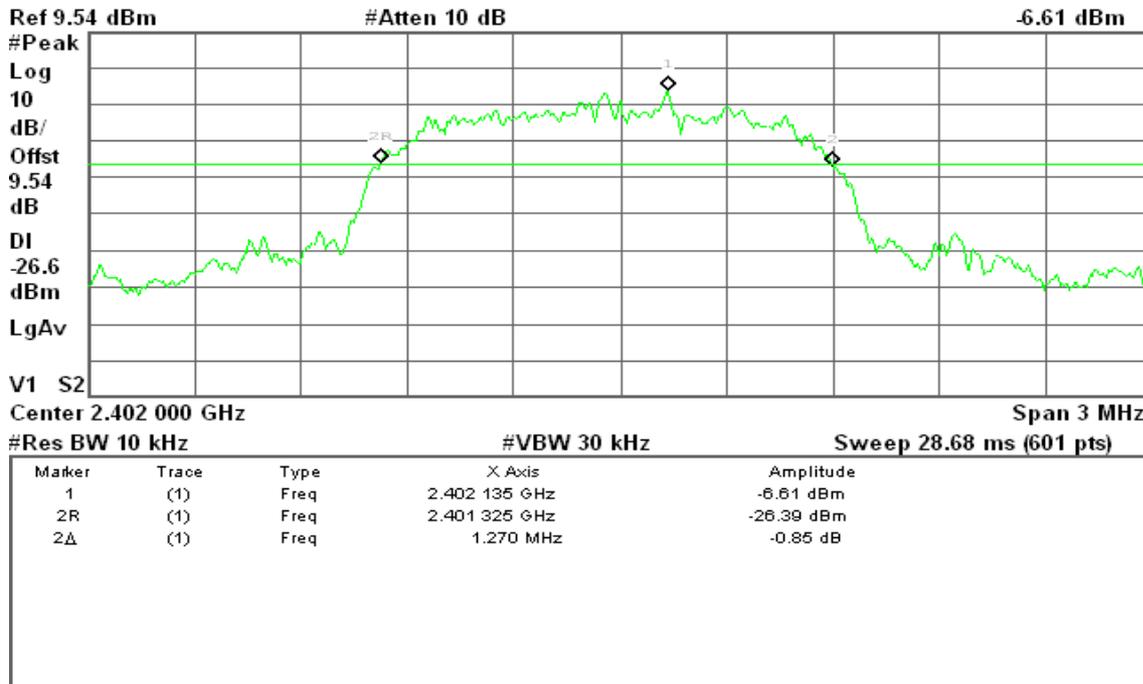


Measurement of 20dB Bandwidth

Agilent 10:20:46 Mar 26, 2010

R T

Mkr1 2.402 135 GHz



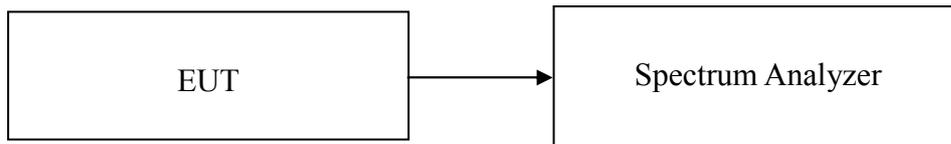


7.7 NUMBER OF HOPPING FREQUENCY

LIMIT

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.

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

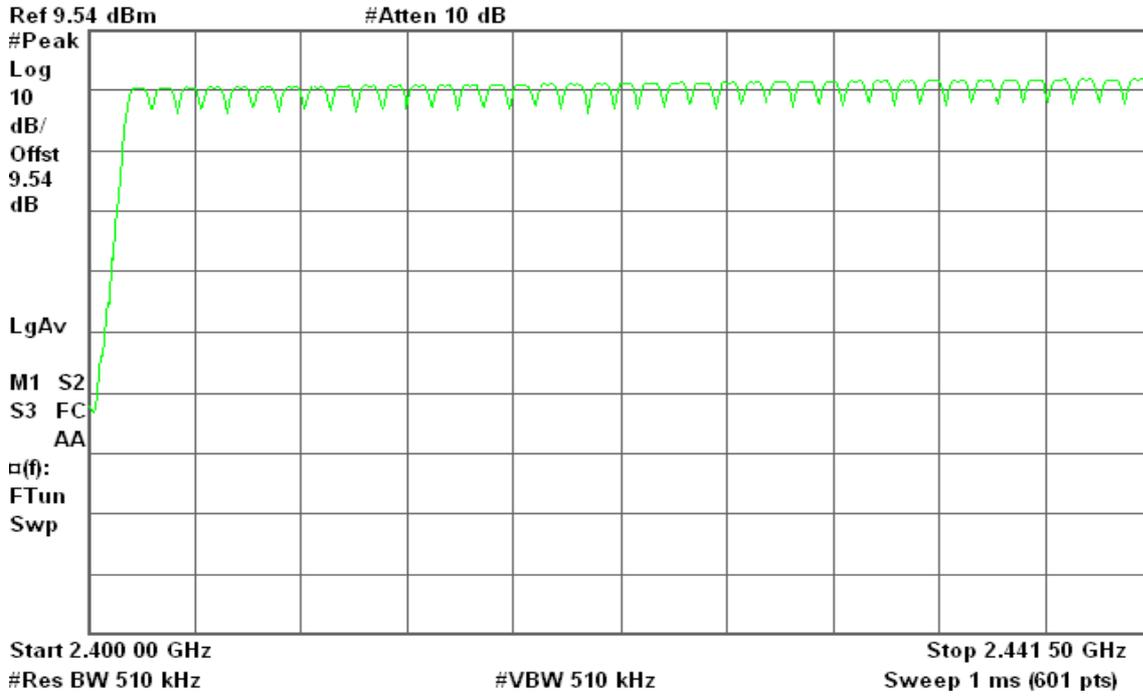
For GFSK

Channel Number

2.4 GHz – 2.4415 GHz

Agilent 09:57:23 Mar 26, 2010

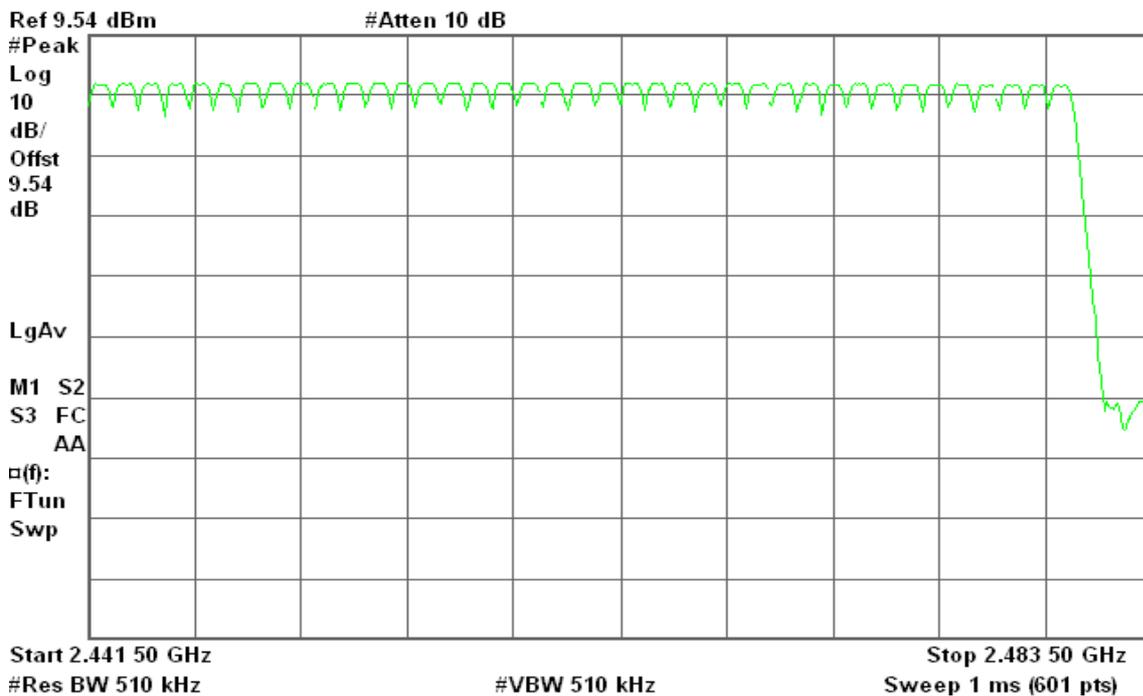
R T



2.4415 GHz – 2.4835 GHz

Agilent 09:57:48 Mar 26, 2010

R T





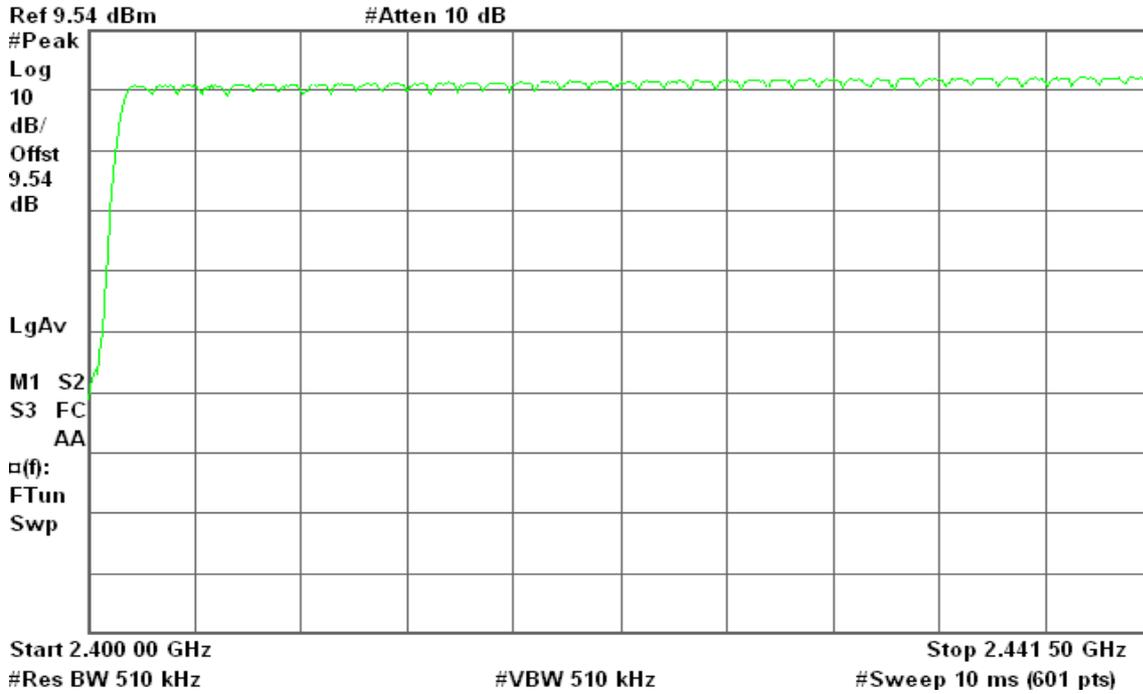
For 8DPSK

Channel Number

2.4 GHz – 2.4415 GHz

Agilent 10:33:50 Mar 26, 2010

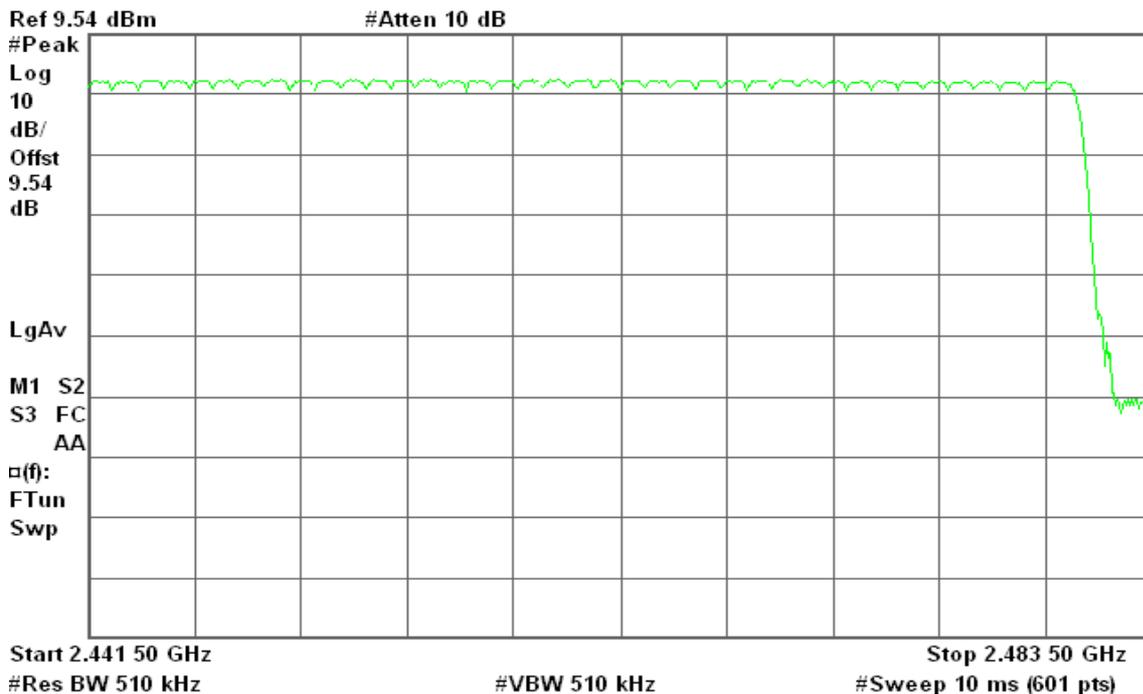
R T



2.4415 GHz – 2.4835 GHz

Agilent 10:34:21 Mar 26, 2010

R T

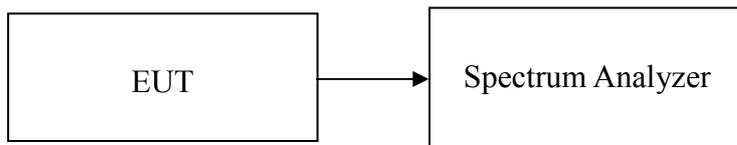


7.8 TIME OF OCCUPANCY (D WELL TIME)

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.

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 Data

For GFSK

DH 1

CH Low: $0.3833 * (1600/2)/79 * 31.6 = 122.7$ (ms)

CH Mid: $0.3833 * (1600/2)/79 * 31.6 = 122.7$ (ms)

CH High: $0.3833 * (1600/2)/79 * 31.6 = 122.7$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.3833	122.7	31.60	400.00	PASS
Mid	0.3833	122.7	31.60		PASS
High	0.3833	122.7	31.60		PASS

DH 3

CH Low: $1.650 * (1600/4)/79 * 31.6 = 264.0$ (ms)

CH Mid: $1.650 * (1600/4)/79 * 31.6 = 264.0$ (ms)

CH High: $1.633 * (1600/4)/79 * 31.6 = 261.3$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.650	264.0	31.60	400.00	PASS
Mid	1.650	264.0	31.60		PASS
High	1.633	261.3	31.60		PASS

DH 5

CH Low: $2.883 * (1600/6)/79 * 31.6 = 307.5$ (ms)

CH Mid: $2.900 * (1600/6)/79 * 31.6 = 309.3$ (ms)

CH High: $2.883 * (1600/6)/79 * 31.6 = 307.5$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.883	307.5	31.60	400.00	PASS
Mid	2.900	309.3	31.60		PASS
High	2.883	307.5	31.60		PASS



Test Plot
For GFSK

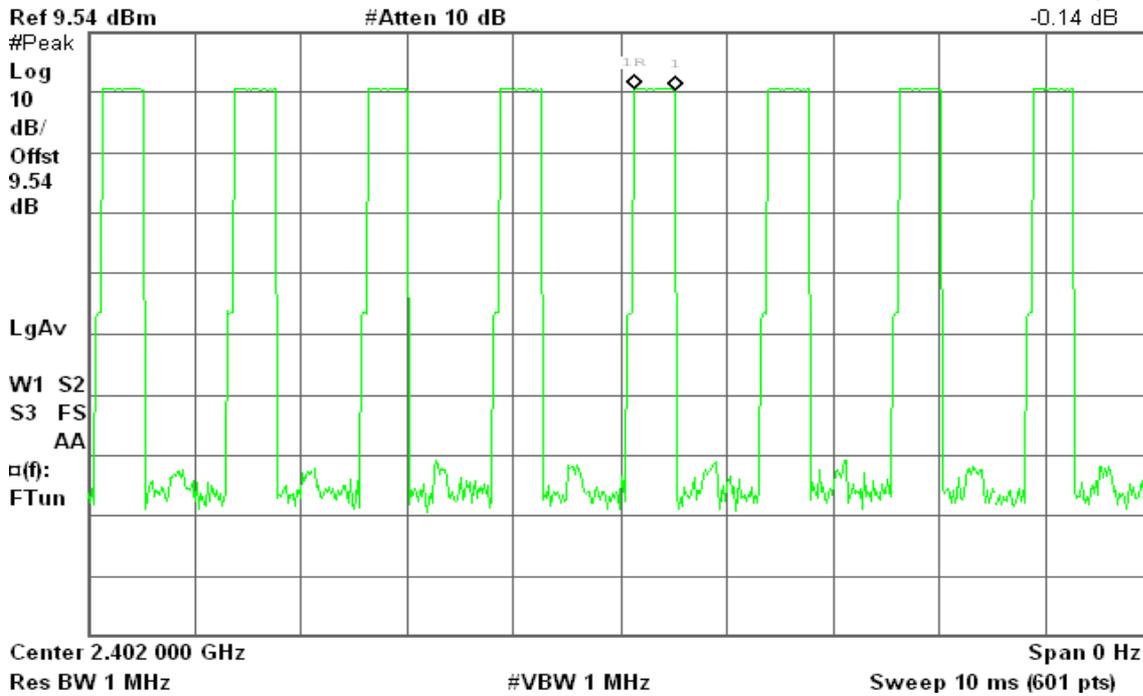
DH 1

CH Low

Agilent 09:51:03 Mar 26, 2010

R T

Delta Mkr1 383.3 us
-0.14 dB

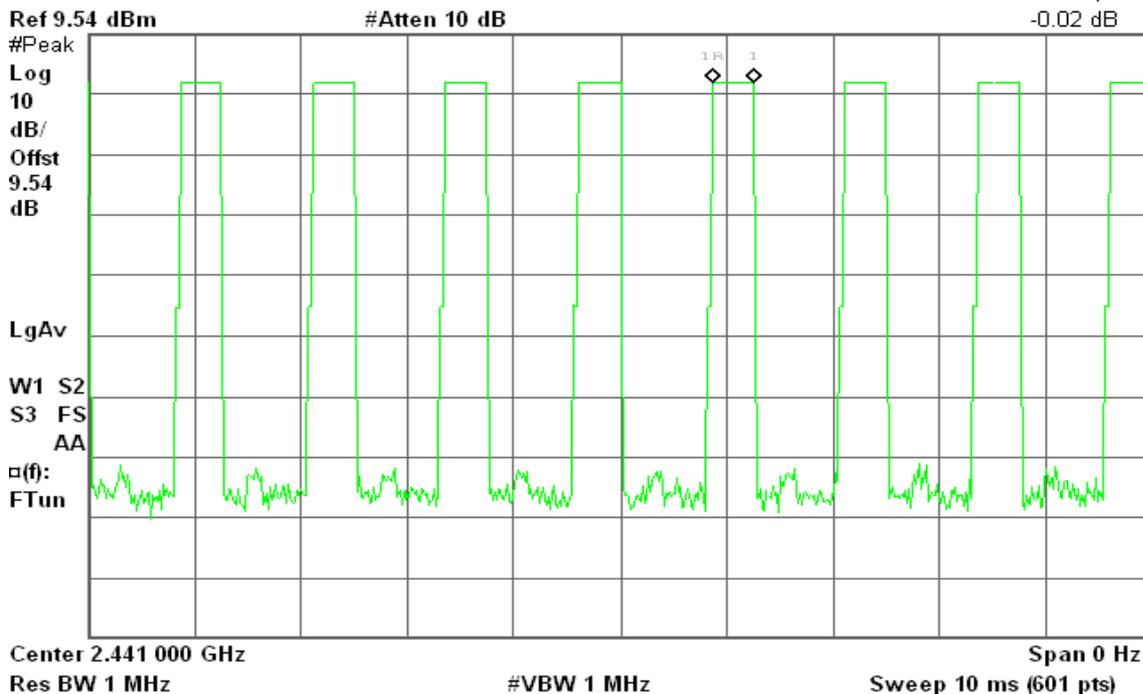


CH Mid

Agilent 09:53:49 Mar 26, 2010

R T

Delta Mkr1 383.3 us
-0.02 dB



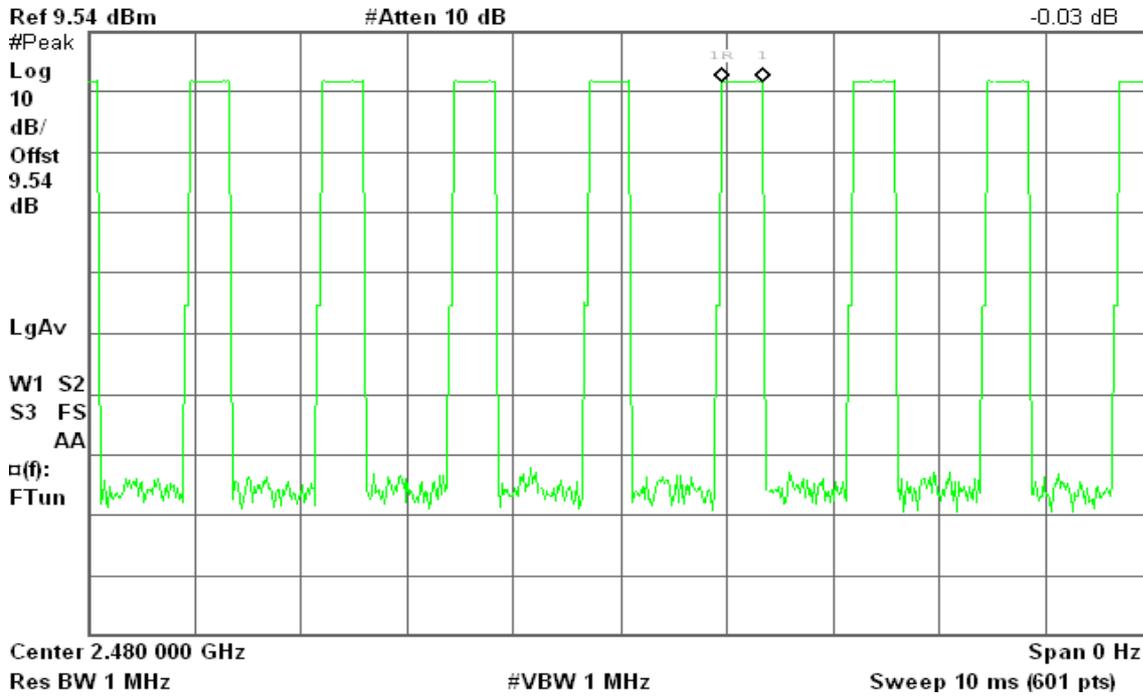


CH High

Agilent 09:55:17 Mar 26, 2010

R T

Δ Mkr1 383.3 μs
-0.03 dB



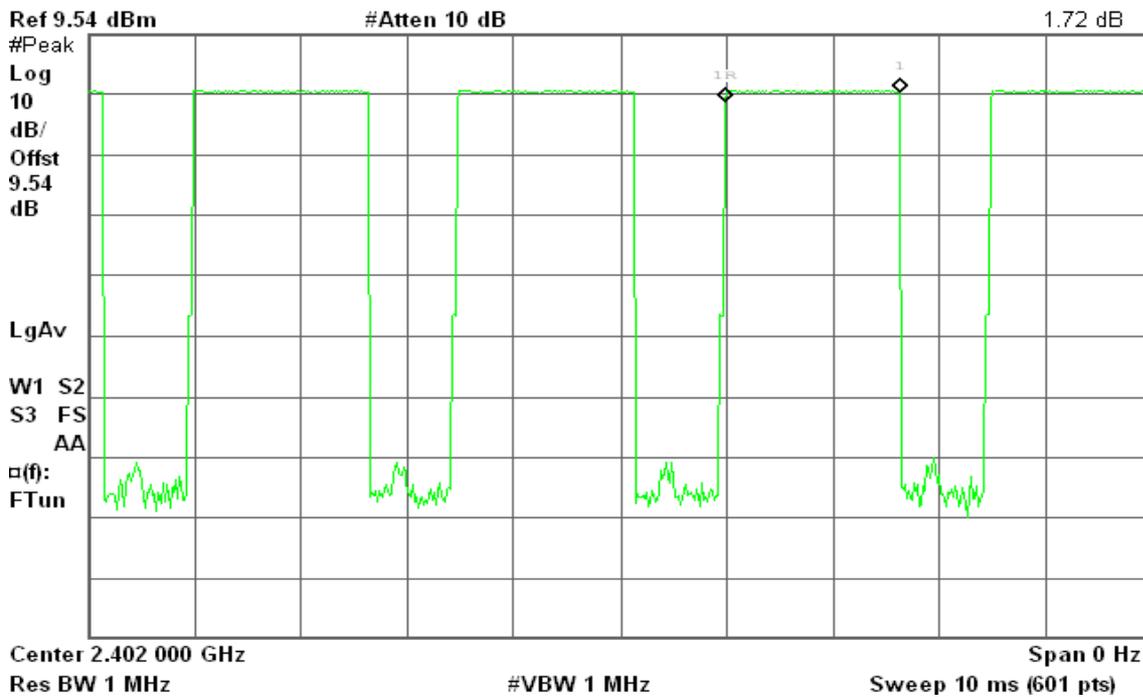
DH 3

CH Low

Agilent 09:51:42 Mar 26, 2010

R T

Δ Mkr1 1.65 ms
1.72 dB



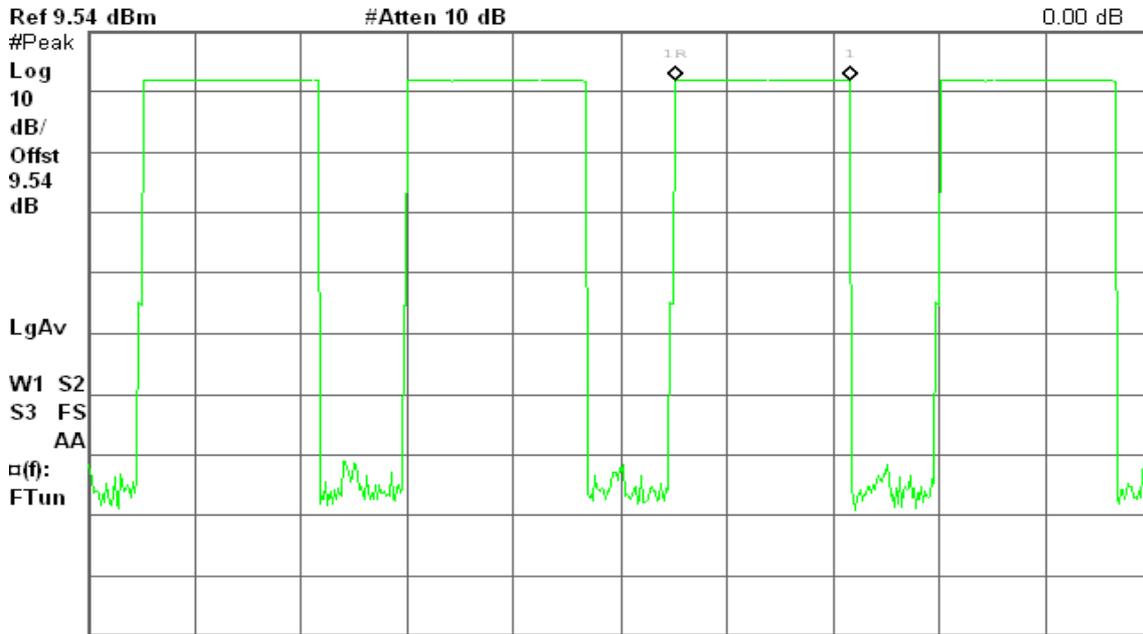


CH Mid

Agilent 09:54:08 Mar 26, 2010

R T

Δ Mkr1 1.65 ms
0.00 dB



Center 2.441 000 GHz

Res BW 1 MHz

#VBW 1 MHz

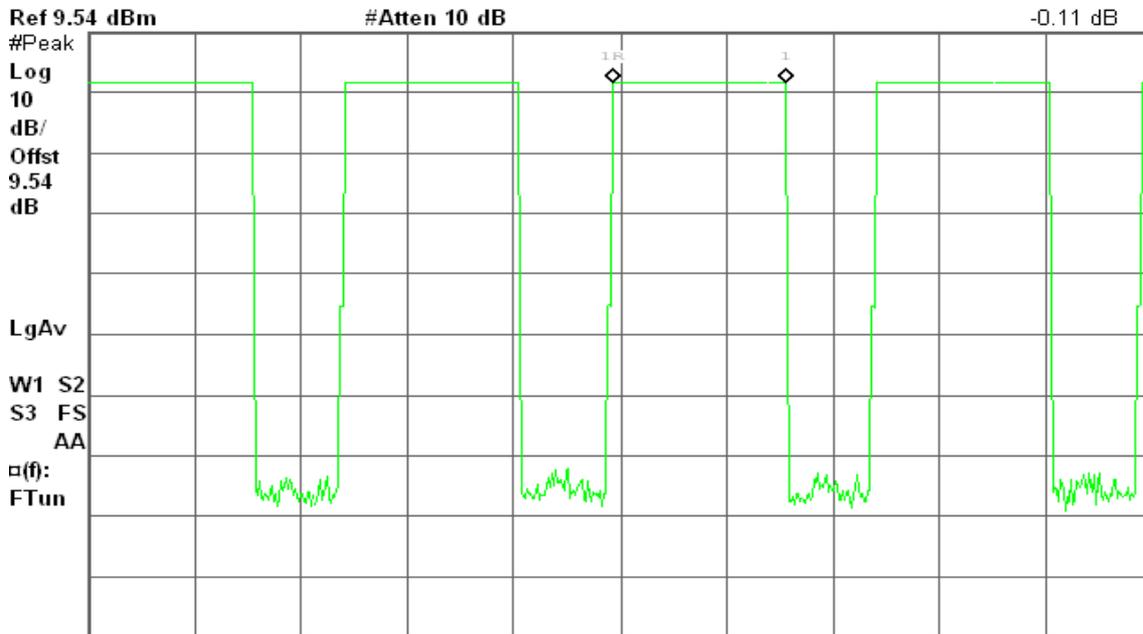
Span 0 Hz
Sweep 10 ms (601 pts)

CH High

Agilent 09:55:40 Mar 26, 2010

R T

Δ Mkr1 1.633 ms
-0.11 dB



Center 2.480 000 GHz

Res BW 1 MHz

#VBW 1 MHz

Span 0 Hz
Sweep 10 ms (601 pts)



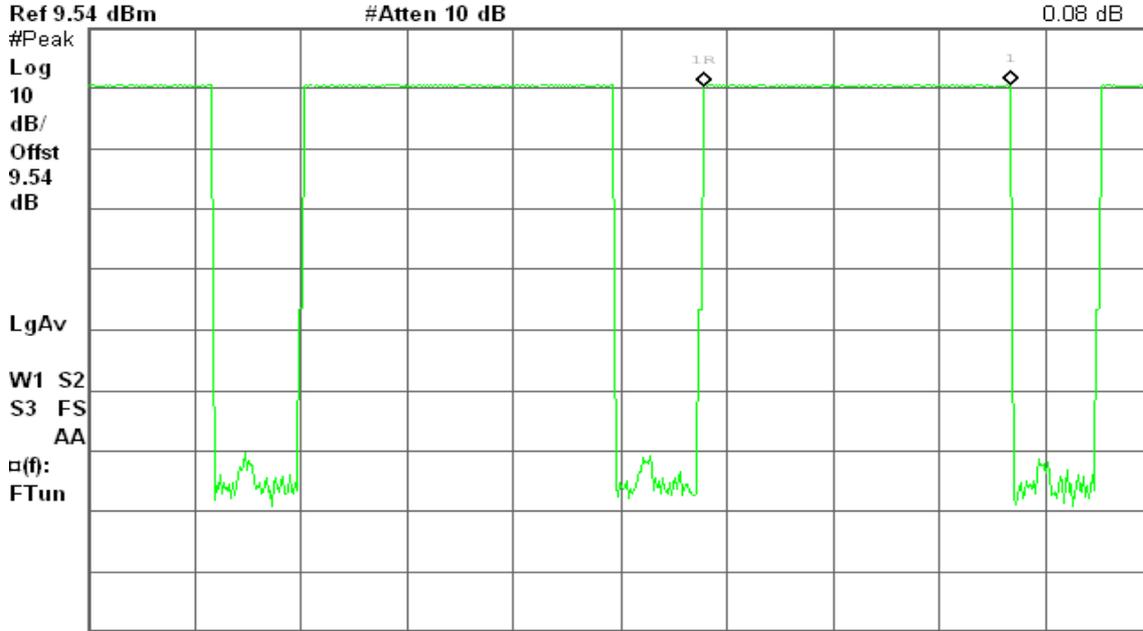
DH 5

CH Low

Agilent 09:52:58 Mar 26, 2010

R T

Δ Mkr1 2.883 ms
0.08 dB



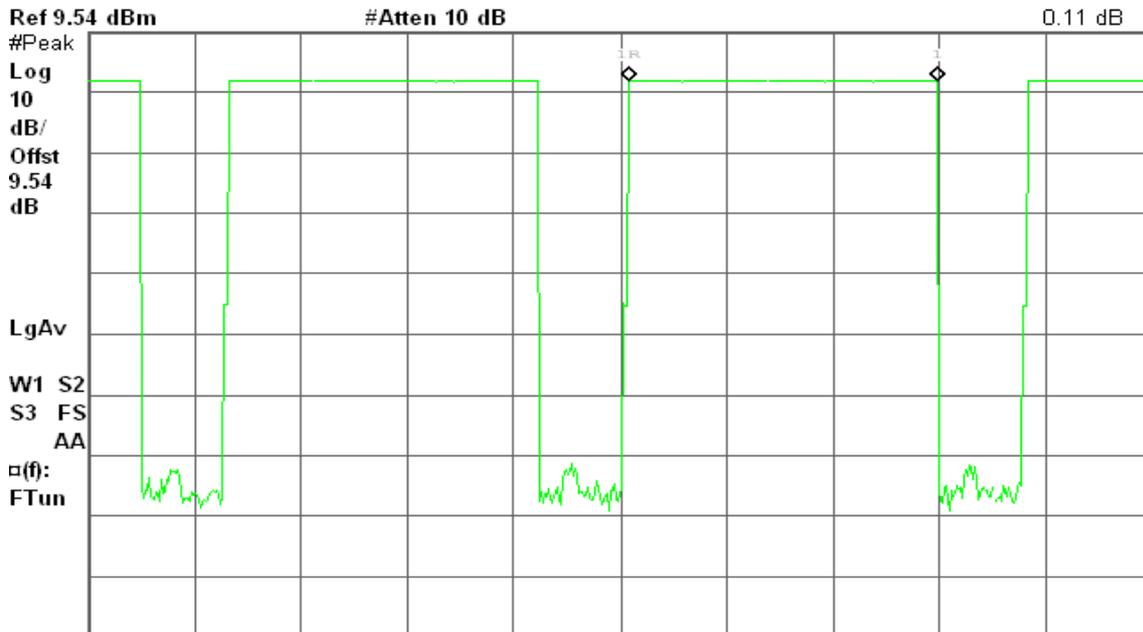
Center 2.402 000 GHz Span 0 Hz
Res BW 1 MHz #VBW 1 MHz Sweep 10 ms (601 pts)

CH Mid

Agilent 09:54:39 Mar 26, 2010

R T

Δ Mkr1 2.9 ms
0.11 dB



Center 2.441 000 GHz Span 0 Hz
Res BW 1 MHz #VBW 1 MHz Sweep 10 ms (601 pts)

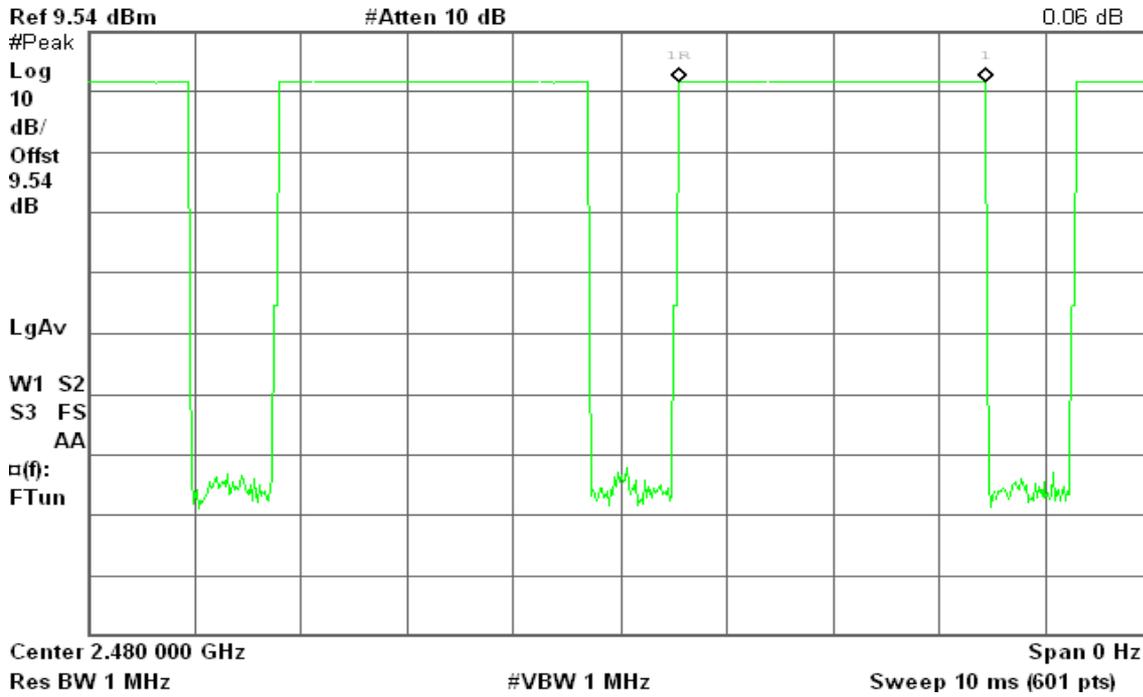


CH High

Agilent 09:56:02 Mar 26, 2010

R T

Δ Mkr1 2.883 ms
0.06 dB





Test Data

For 8DPSK

DH 1

CH Low: $0.3833 * (1600/2)/79 * 31.6 = 122.7$ (ms)

CH Mid: $0.3833 * (1600/2)/79 * 31.6 = 122.7$ (ms)

CH High: $0.3833 * (1600/2)/79 * 31.6 = 122.7$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.3833	122.7	31.60	400.00	PASS
Mid	0.3833	122.7	31.60		PASS
High	0.3833	122.7	31.60		PASS

DH 3

CH Low: $1.650 * (1600/4)/79 * 31.6 = 264.0$ (ms)

CH Mid: $1.633 * (1600/4)/79 * 31.6 = 261.3$ (ms)

CH High: $1.617 * (1600/4)/79 * 31.6 = 258.7$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.650	264.0	31.60	400.00	PASS
Mid	1.633	261.3	31.60		PASS
High	1.617	258.7	31.60		PASS

DH 5

CH Low: $2.883 * (1600/6)/79 * 31.6 = 307.5$ (ms)

CH Mid: $2.883 * (1600/6)/79 * 31.6 = 307.5$ (ms)

CH High: $2.883 * (1600/6)/79 * 31.6 = 307.5$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.883	307.5	31.60	400.00	PASS
Mid	2.883	307.5	31.60		PASS
High	2.883	307.5	31.60		PASS



For 8DPSK

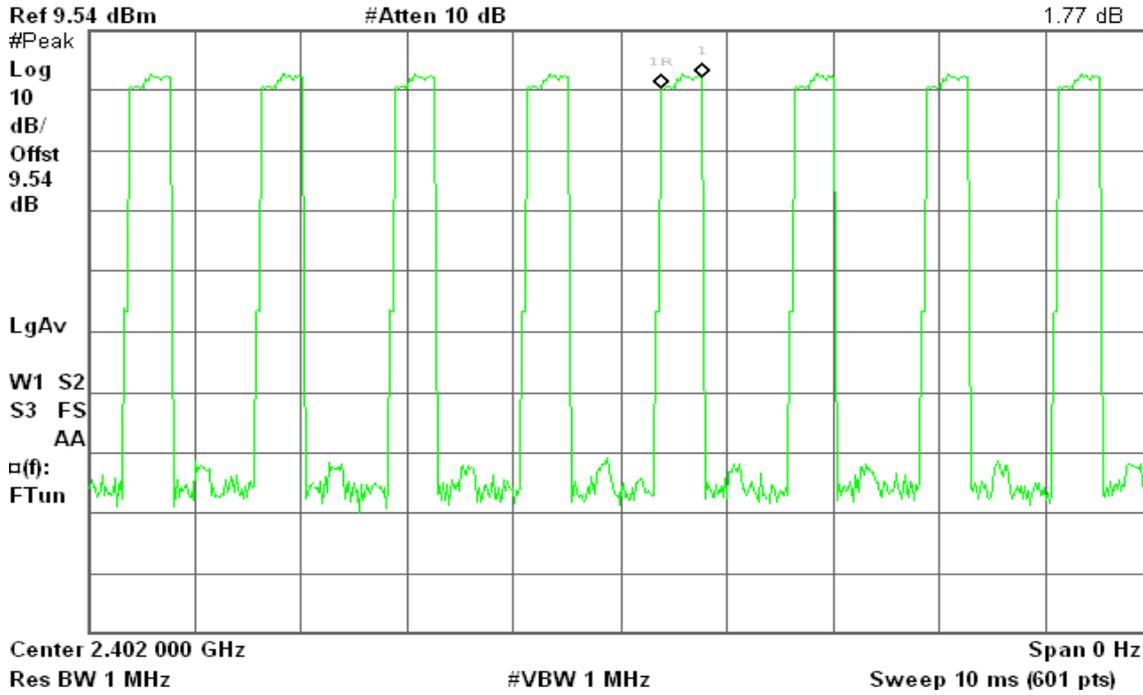
DH 1

CH Low

Agilent 10:28:33 Mar 26, 2010

R T

Δ Mkr1 383.3 μs
1.77 dB

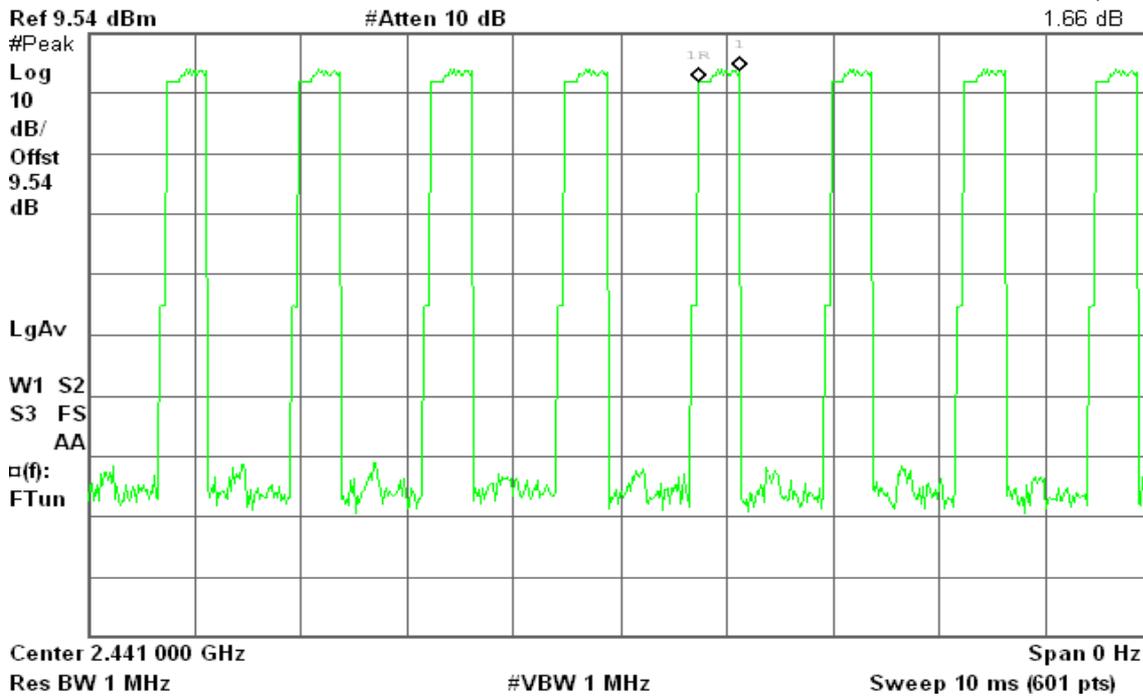


CH Mid

Agilent 10:29:53 Mar 26, 2010

R T

Δ Mkr1 383.3 μs
1.66 dB



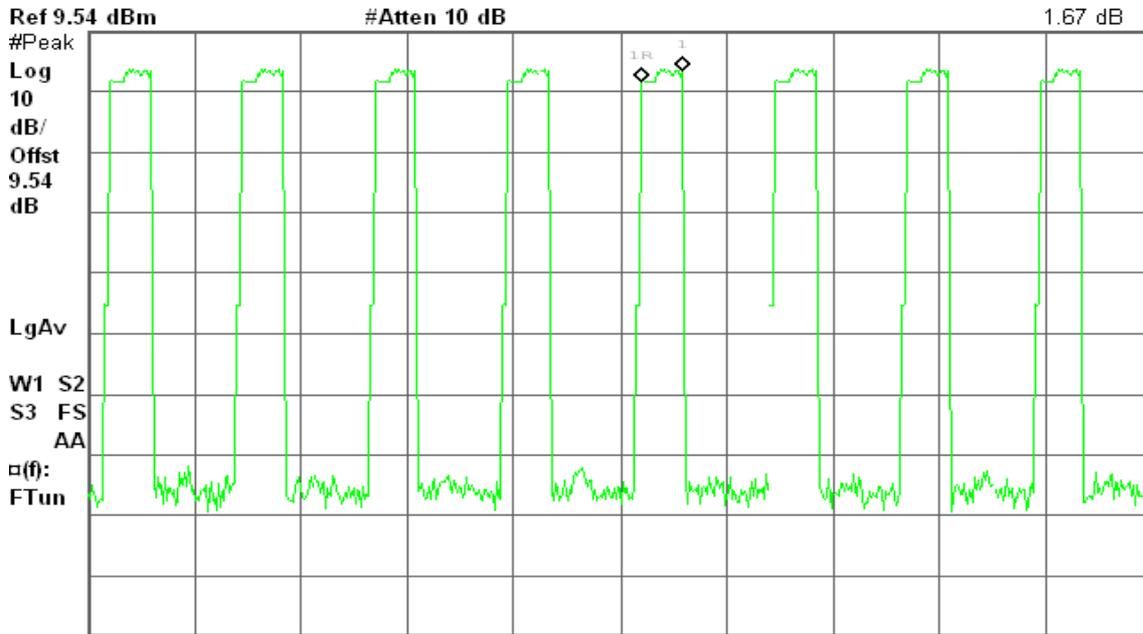


CH High

Agilent 10:31:21 Mar 26, 2010

R T

Δ Mkr1 383.3 μs
1.67 dB



Center 2.480 000 GHz
Res BW 1 MHz

#VBW 1 MHz

Span 0 Hz
Sweep 10 ms (601 pts)

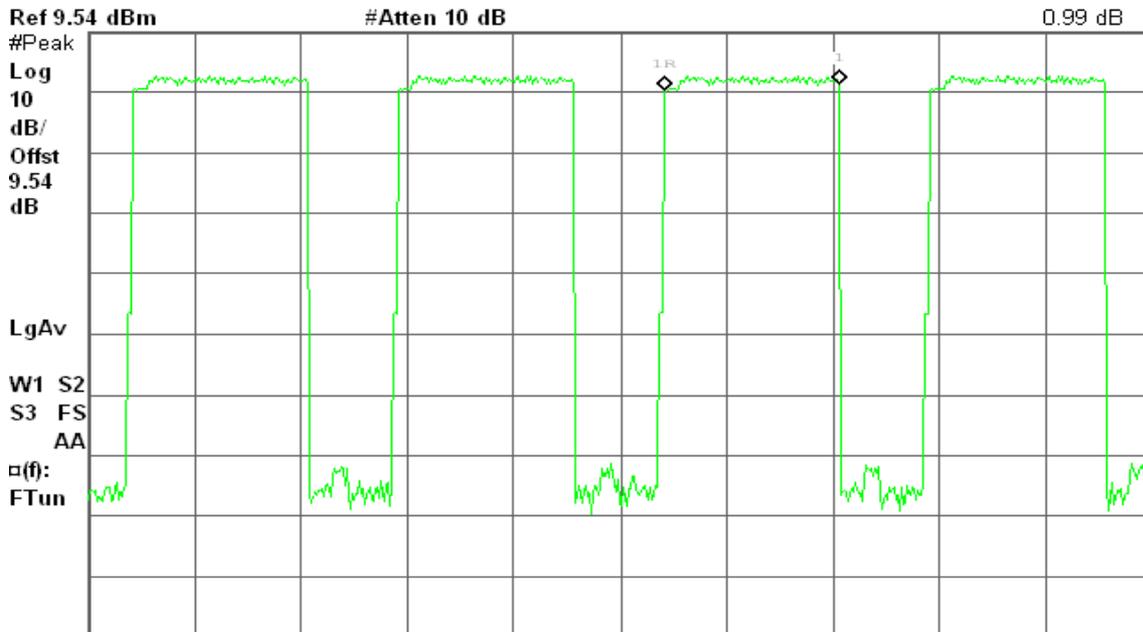
DH 3

CH Low

Agilent 10:28:54 Mar 26, 2010

R T

Δ Mkr1 1.65 ms
0.99 dB



Center 2.402 000 GHz
Res BW 1 MHz

#VBW 1 MHz

Span 0 Hz
Sweep 10 ms (601 pts)

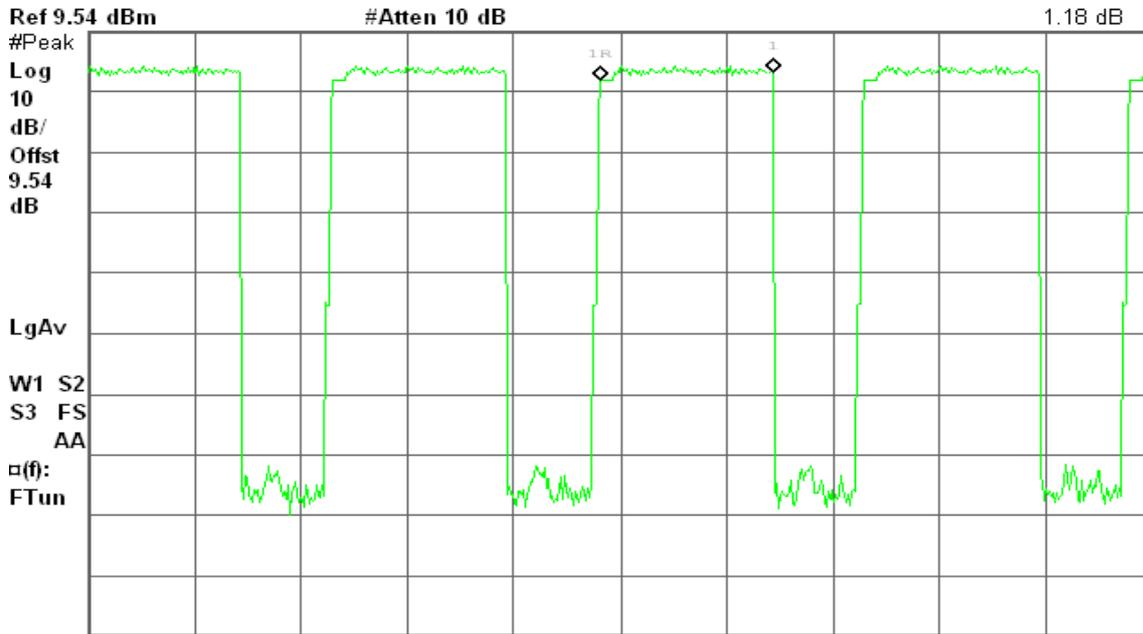


CH Mid

Agilent 10:30:17 Mar 26, 2010

R T

Δ Mkr1 1.633 ms
1.18 dB



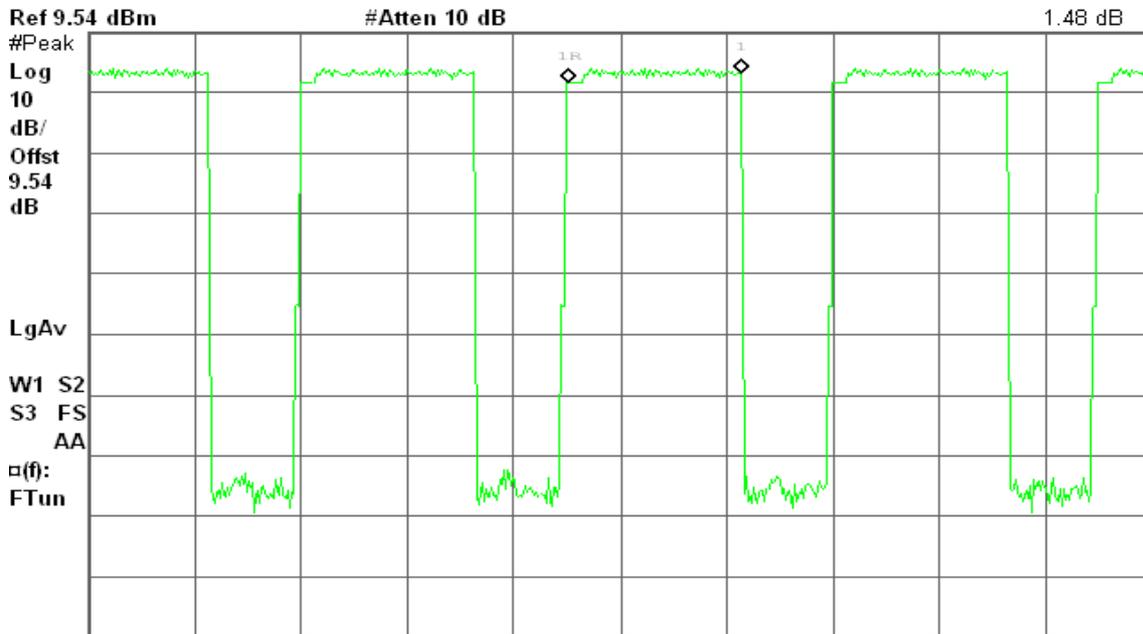
Center 2.441 000 GHz Res BW 1 MHz #VBW 1 MHz Sweep 10 ms (601 pts) Span 0 Hz

CH High

Agilent 10:31:40 Mar 26, 2010

R T

Δ Mkr1 1.617 ms
1.48 dB



Center 2.480 000 GHz Res BW 1 MHz #VBW 1 MHz Sweep 10 ms (601 pts) Span 0 Hz



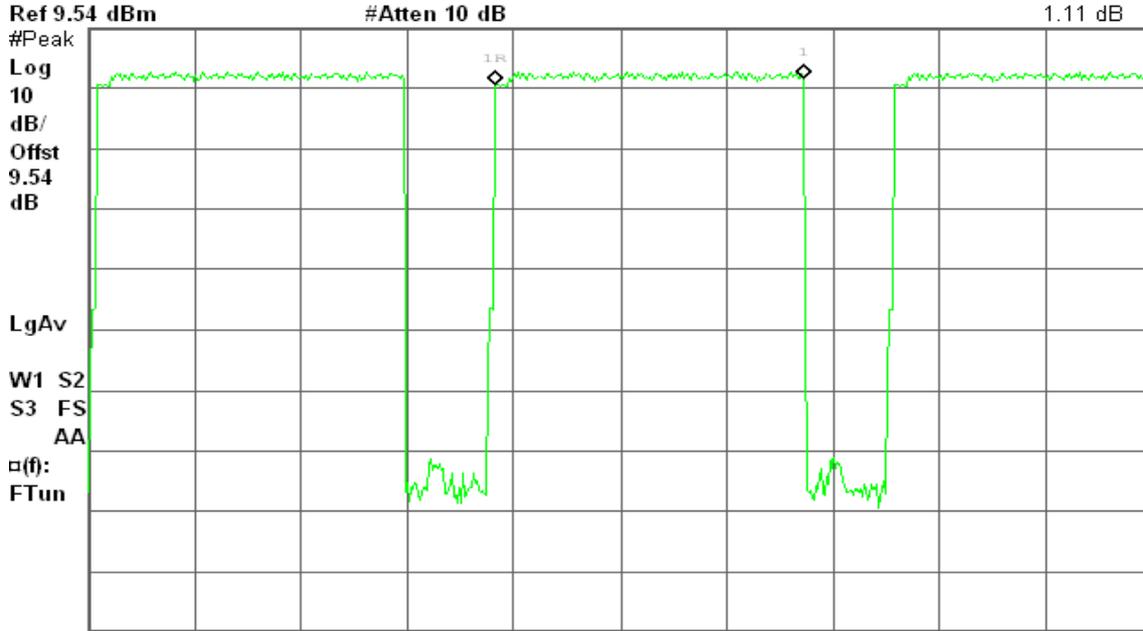
DH 5

CH Low

Agilent 10:29:15 Mar 26, 2010

R T

Δ Mkr1 2.883 ms
1.11 dB



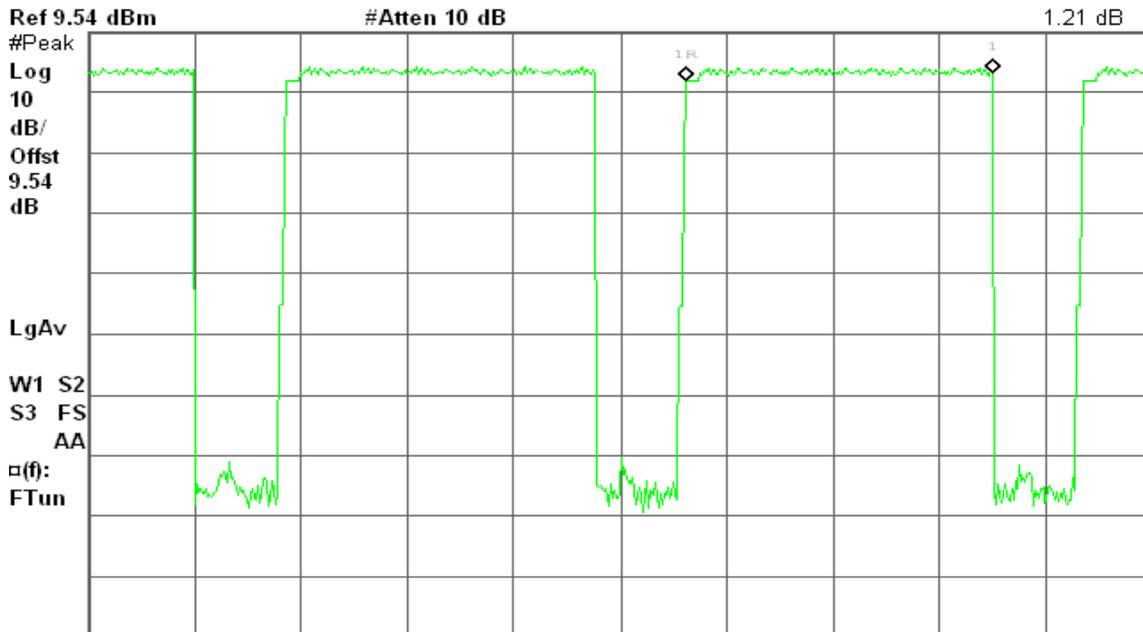
Center 2.402 000 GHz Span 0 Hz
Res BW 1 MHz #VBW 1 MHz Sweep 10 ms (601 pts)

CH Mid

Agilent 10:30:42 Mar 26, 2010

R T

Δ Mkr1 2.883 ms
1.21 dB



Center 2.441 000 GHz Span 0 Hz
Res BW 1 MHz #VBW 1 MHz Sweep 10 ms (601 pts)



CH High

Agilent 10:32:11 Mar 26, 2010

R T

Δ Mkr1 2.883 ms

1.19 dB

Ref 9.54 dBm

#Atten 10 dB

#Peak

Log

10

dB/

Offst

9.54

dB

LgAv

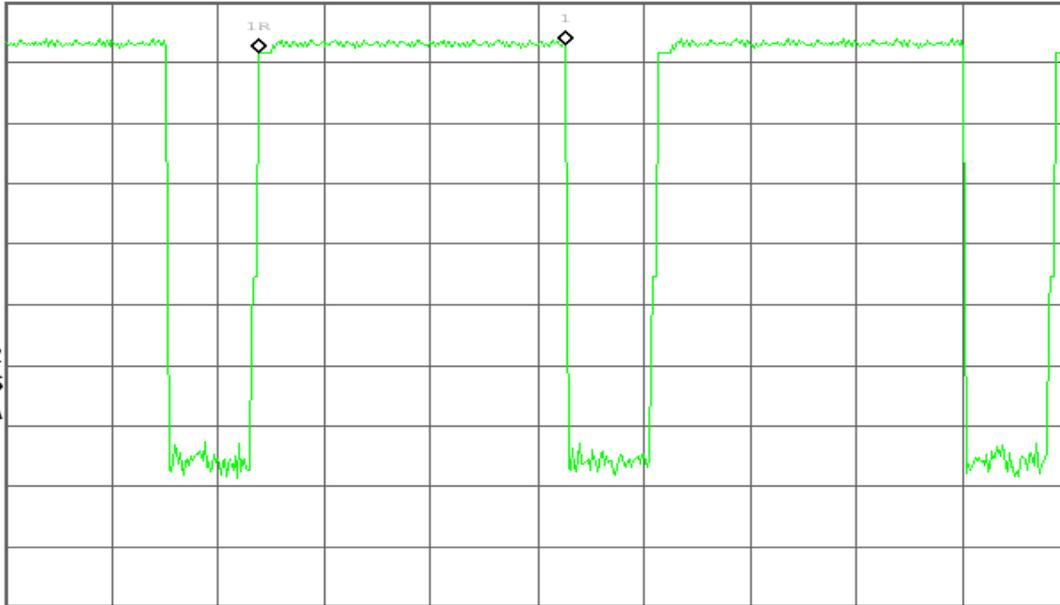
W1 S2

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)



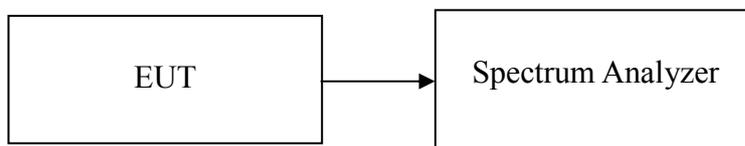
7.9 SPURIOUS EMISSIONS

7.9.1 Conducted 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)).

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



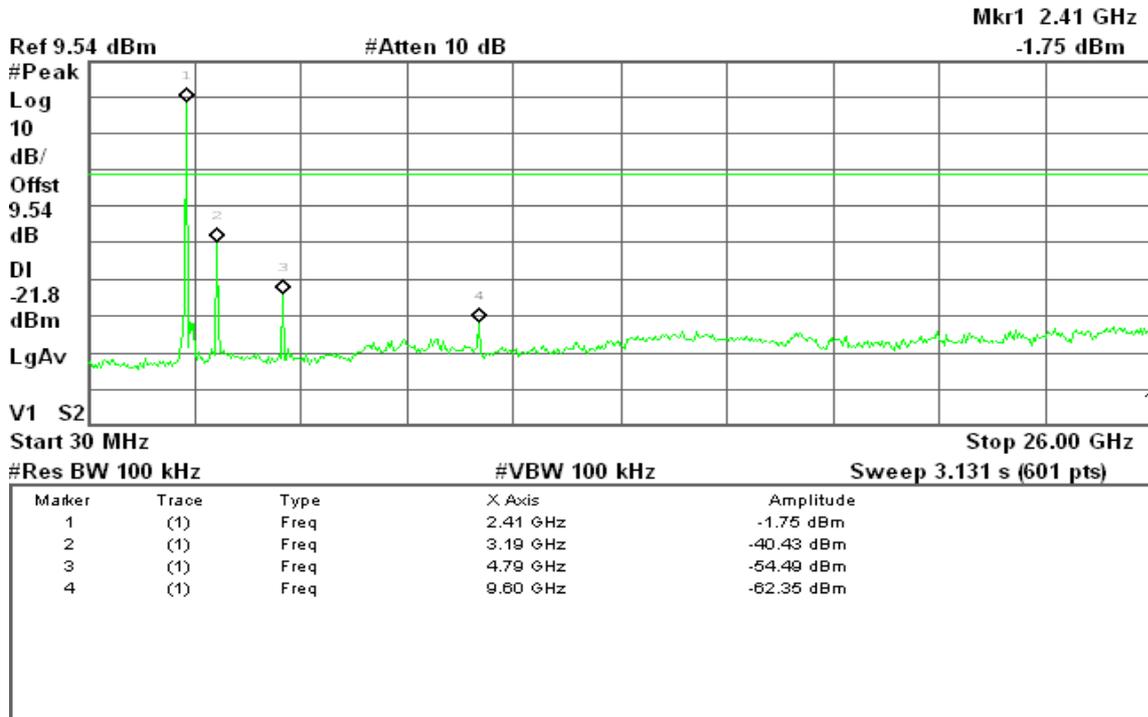
Test Plot

For GFSK / DH5

CH Low

Agilent 10:11:35 Mar 26, 2010

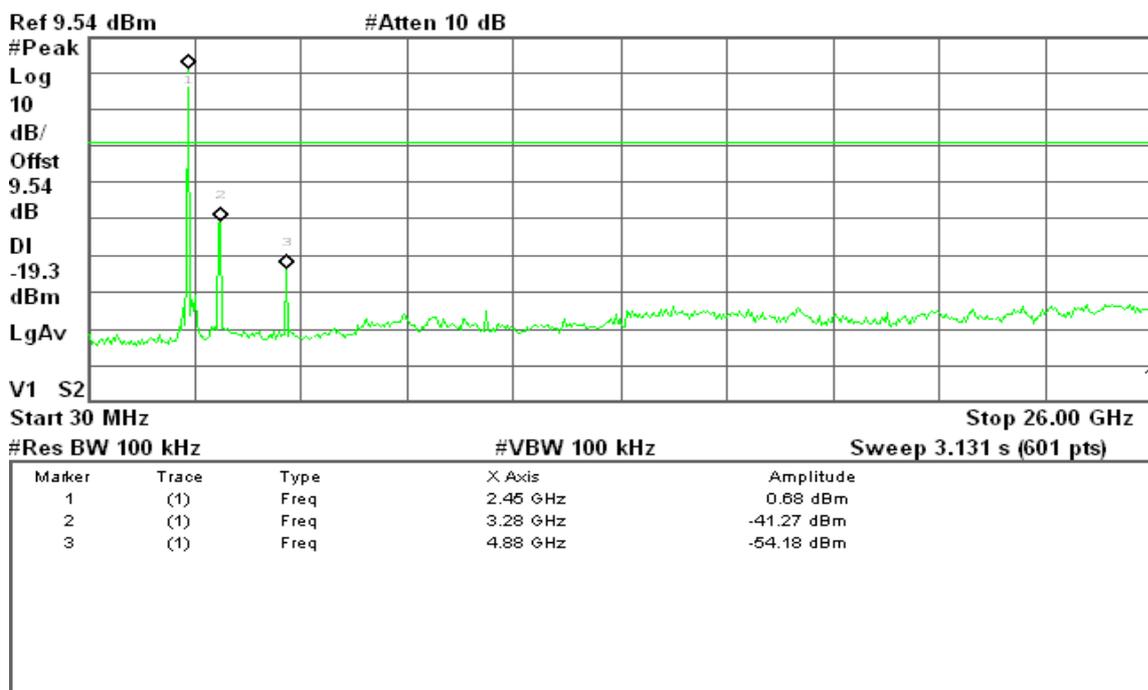
R T



CH Mid

Agilent 10:13:02 Mar 26, 2010

R T



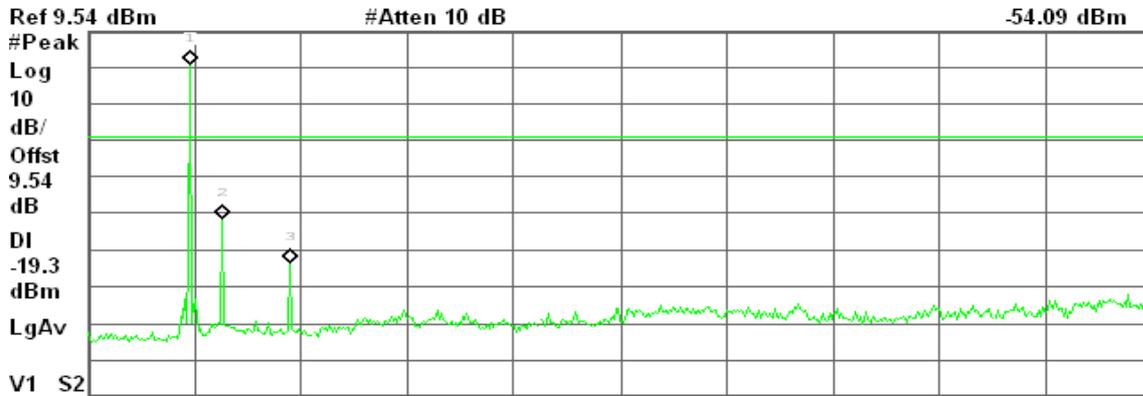


CH High

Agilent 10:08:57 Mar 26, 2010

R T

Mkr3 4.96 GHz
-54.09 dBm



Start 30 MHz Stop 26.00 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.131 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.50 GHz	0.67 dBm
2	(1)	Freq	3.32 GHz	-42.18 dBm
3	(1)	Freq	4.96 GHz	-54.09 dBm



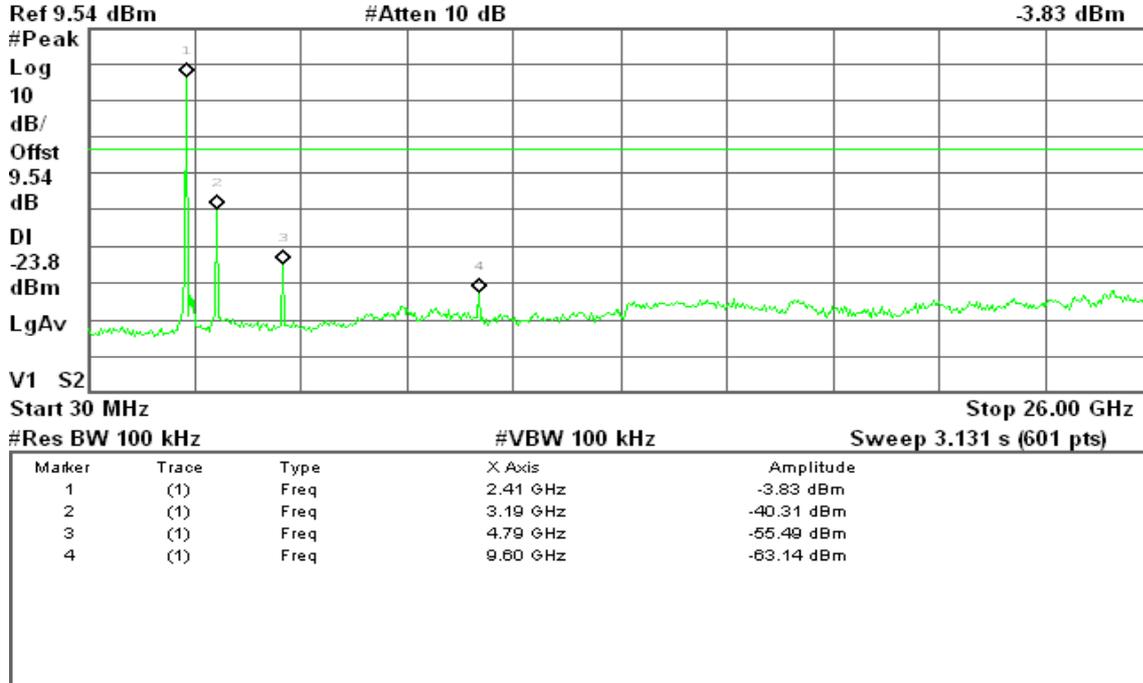
For 8DPSK / DH5

CH Low

Agilent 10:45:37 Mar 26, 2010

R T

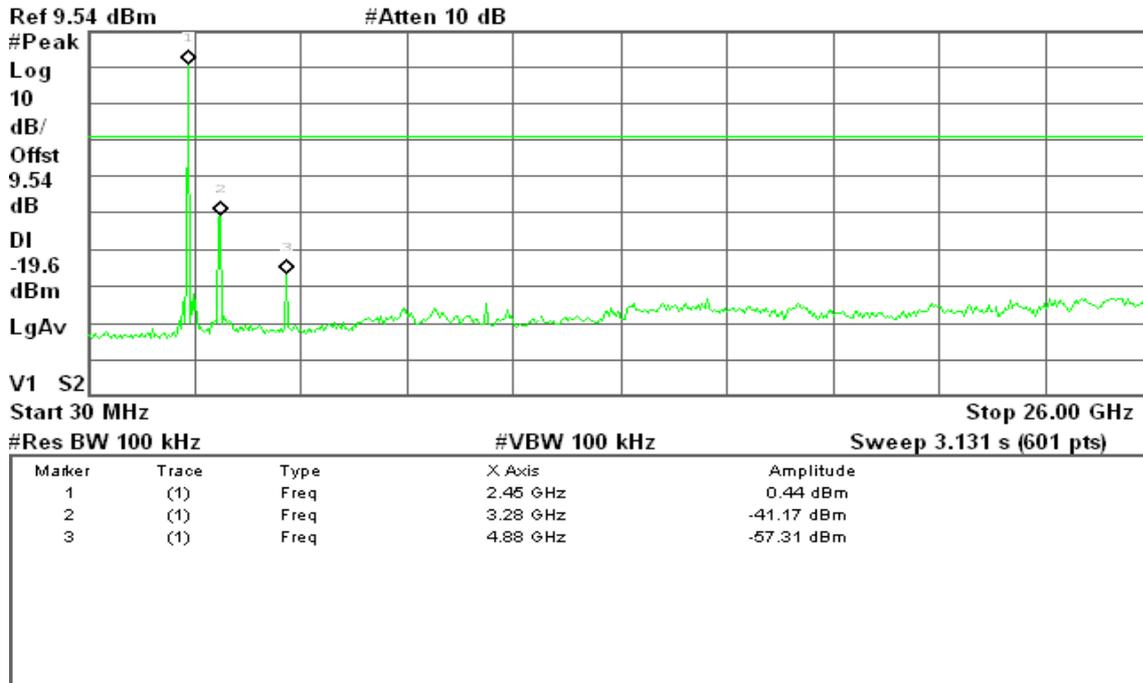
Mkr1 2.41 GHz



CH Mid

Agilent 10:46:45 Mar 26, 2010

R T



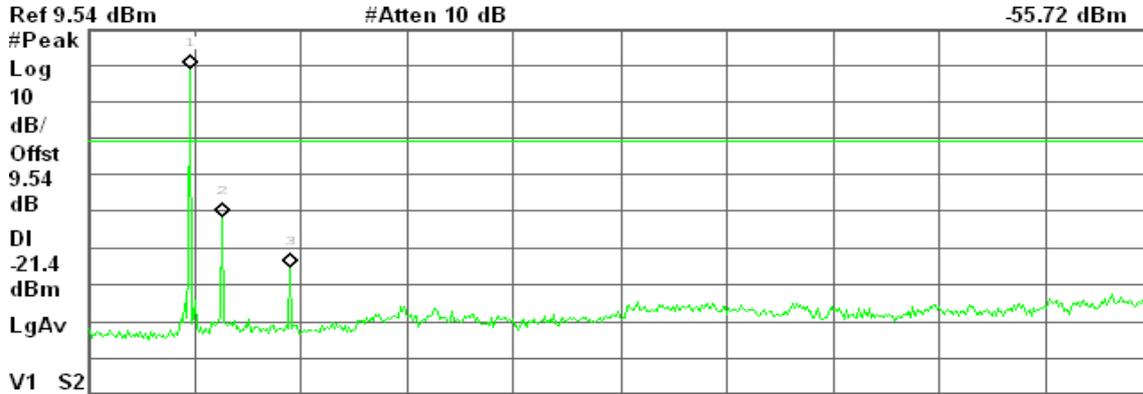


CH High

Agilent 10:44:35 Mar 26, 2010

R T

Mkr3 4.96 GHz



Start 30 MHz

Stop 26.00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.50 GHz	-1.38 dBm
2	(1)	Freq	3.32 GHz	-41.88 dBm
3	(1)	Freq	4.96 GHz	-55.72 dBm



7.9.2 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

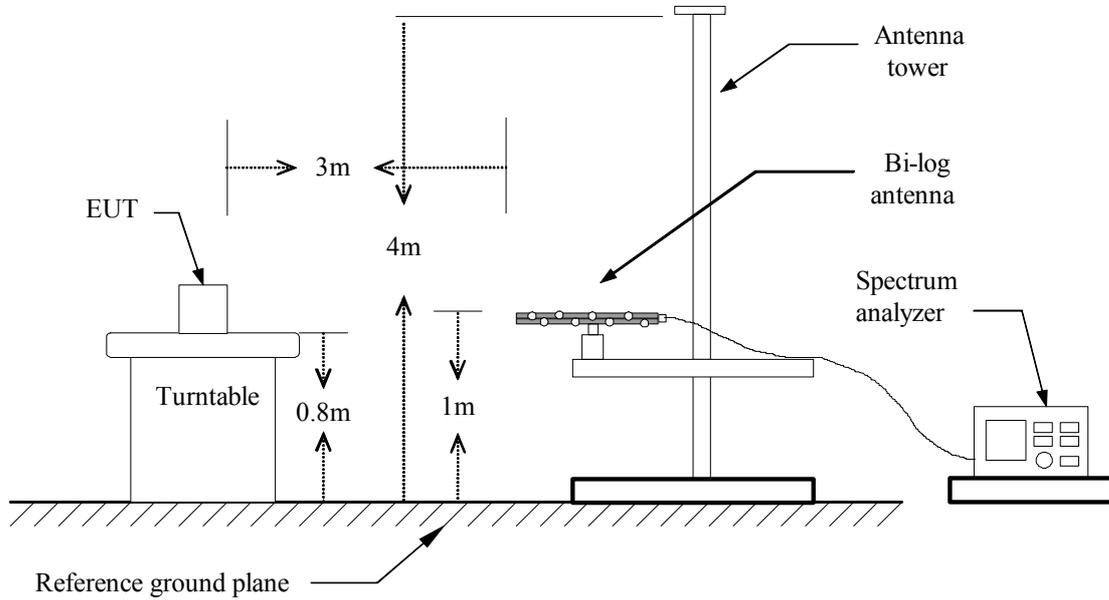
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

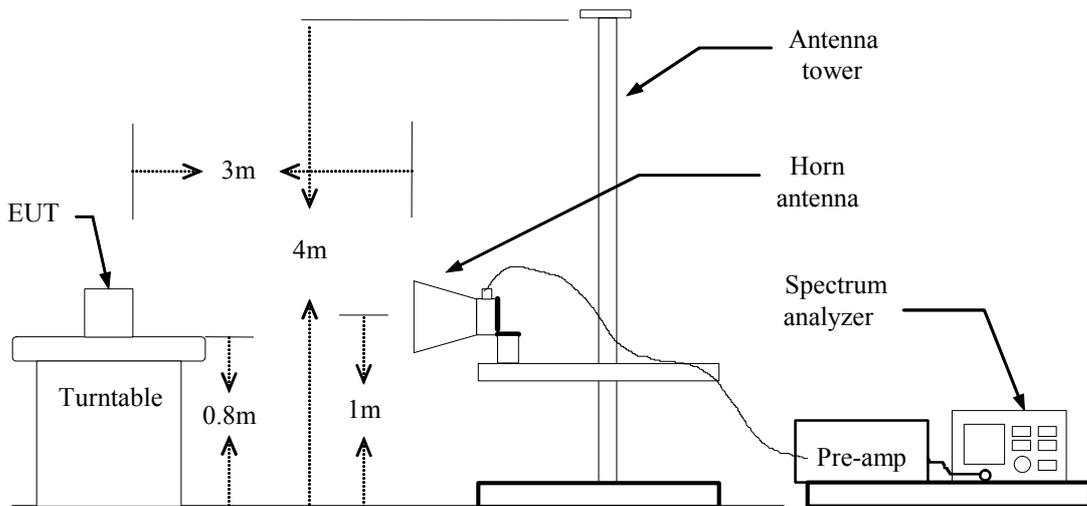
Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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

For Monopole Antenna

Operation Mode: Normal Link

Test Date: March 22, 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
36.47	V	38.87	-6.57	32.30	40.00	-7.70	Peak
96.28	V	46.16	-13.95	32.21	43.50	-11.29	Peak
214.30	V	40.57	-11.03	29.54	43.50	-13.96	Peak
479.43	V	37.05	-5.44	31.61	46.00	-14.39	Peak
647.57	V	31.44	-2.95	28.50	46.00	-17.50	Peak
959.58	V	33.10	0.44	33.55	46.00	-12.45	Peak
96.28	H	47.71	-13.95	33.76	43.50	-9.74	Peak
204.60	H	35.00	-10.28	24.72	43.50	-18.78	Peak
222.38	H	36.94	-11.42	25.51	46.00	-20.49	Peak
253.10	H	35.98	-10.69	25.29	46.00	-20.71	Peak
479.43	H	36.36	-5.44	30.91	46.00	-15.09	Peak
959.58	H	34.50	0.44	34.94	46.00	-11.06	Peak

Remark:

- No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).*
- Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.*
- Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
- 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.*
- Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

**For PIFA Antenna****Operation Mode:** Normal Link**Test Date:** March 22, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % 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
39.70	V	45.72	-9.01	36.71	40.00	-3.29	Peak
249.87	V	40.58	-10.90	29.68	46.00	-16.32	Peak
500.45	V	41.32	-5.14	36.18	46.00	-9.82	Peak
624.93	V	37.21	-3.48	33.73	46.00	-12.27	Peak
749.42	V	37.45	-1.83	35.63	46.00	-10.37	Peak
875.52	V	35.22	-0.73	34.48	46.00	-11.52	Peak
160.95	H	40.93	-10.60	30.33	43.50	-13.17	Peak
249.87	H	42.93	-10.90	32.03	46.00	-13.97	Peak
374.35	H	37.34	-7.58	29.76	46.00	-16.24	Peak
500.45	H	40.50	-5.14	35.36	46.00	-10.64	Peak
749.42	H	40.00	-1.83	38.18	46.00	-7.82	Peak
875.52	H	40.52	-0.73	39.79	46.00	-6.21	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. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



Above 1 GHz

For Monopole Antenna

Operation Mode: TX / GFSK / DH5 / CH Low

Test Date: March 21, 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
1323.33	V	57.78	---	-9.05	48.72	---	74.00	54.00	-5.28	Peak
N/A										
1290.00	H	57.82	---	-9.11	48.72	---	74.00	54.00	-5.28	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 / GFSK / DH5 / CH Mid

Test Date: March 21, 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
1346.67	V	58.10	---	-9.01	49.09	---	74.00	54.00	-4.91	Peak
N/A										
1440.00	H	57.54	---	-8.86	48.68	---	74.00	54.00	-5.32	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 / GFSK / DH5 / CH High

Test Date: March 21, 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
1330.00	V	57.84	---	-9.04	48.80	---	74.00	54.00	-5.20	Peak
3308.33	V	53.00	---	-1.15	51.85	---	74.00	54.00	-2.15	Peak
N/A										
1390.00	H	56.94	---	-8.94	48.00	---	74.00	54.00	-6.00	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: March 21, 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
1376.67	V	57.29	---	-8.96	48.32	---	74.00	54.00	-5.68	Peak
N/A										
1356.67	H	57.16	---	-9.00	48.16	---	74.00	54.00	-5.84	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 Mid

Test Date: March 21, 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
1503.33	V	58.32	---	-8.73	49.59	---	74.00	54.00	-4.41	Peak
3258.33	V	51.06	---	-1.16	49.90	---	74.00	54.00	-4.10	Peak
N/A										
1370.00	H	56.88	---	-8.98	47.90	---	74.00	54.00	-6.10	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: March 21 2010

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % 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
1486.67	V	57.87	---	-8.78	49.09	---	74.00	54.00	-4.91	Peak
3308.33	V	52.48	---	-1.15	51.33	---	74.00	54.00	-2.67	Peak
N/A										
1363.33	H	57.46	---	-8.99	48.48	---	74.00	54.00	-5.52	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).



For PIFA Antenna

Above 1 GHz

Operation Mode: TX / GFSK / DH5 / CH Low

Test Date: April 1, 2010

Temperature: 23°C

Tested by: Wolf Huang

Humidity: 49% 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
4408.33	V	49.83	---	1.14	50.97	---	74.00	54.00	-3.03	Peak
N/A										
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: April 1, 2010

Temperature: 23°C

Tested by: Wolf Huang

Humidity: 49% 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
3200.00	V	50.62	---	-1.17	49.46	---	74.00	54.00	-4.54	Peak
N/A										
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: April 1, 2010

Temperature: 23°C

Tested by: Wolf Huang

Humidity: 49% 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
4800.00	V	59.06	47.00	1.18	60.24	48.18	74.00	54.00	-5.82	AVG
N/A										
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 Mid

Test Date: April 1, 2010

Temperature: 23°C

Tested by: Wolf Huang

Humidity: 49% 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
4883.33	V	49.75	---	1.16	50.90	---	74.00	54.00	-3.10	Peak
N/A										
4883.33	H	49.57	---	1.16	50.72	---	74.00	54.00	-3.28	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: April 1, 2010

Temperature: 23°C

Tested by: Wolf Huang

Humidity: 49% 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
4958.33	V	49.90	---	1.13	51.03	---	74.00	54.00	-2.97	Peak
N/A										
2003.33	H	55.98	43.38	-4.14	51.84	39.24	74.00	54.00	-2.16	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).



7.10 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), 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: April 3, 2010

Temperature: 26°C

Tested by: Lawrence Lee

Humidity: 60% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1770	53.80	36.40	0.20	54.00	36.60	64.63	54.63	-10.63	-18.03	L1
0.2400	45.84	28.64	0.16	46.00	28.80	62.10	52.10	-16.10	-23.30	L1
3.5880	34.60	24.30	0.10	34.70	24.40	56.00	46.00	-21.30	-21.60	L1
4.9920	37.15	26.75	0.15	37.30	26.90	56.00	46.00	-18.70	-19.10	L1
13.2090	37.48	29.88	0.72	38.20	30.60	60.00	50.00	-21.80	-19.40	L1
21.6240	39.81	34.91	0.79	40.60	35.70	60.00	50.00	-19.40	-14.30	L1
0.1770	54.88	36.98	0.22	55.10	37.20	64.63	54.63	-9.53	-17.43	L2
0.2400	46.52	29.42	0.18	46.70	29.60	62.10	52.10	-15.40	-22.50	L2
2.9220	35.09	22.49	0.11	35.20	22.60	56.00	46.00	-20.80	-23.40	L2
3.5880	38.36	25.66	0.14	38.50	25.80	56.00	46.00	-17.50	-20.20	L2
13.5330	37.84	30.84	0.76	38.60	31.60	60.00	50.00	-21.40	-18.40	L2
21.6240	41.46	36.76	0.84	42.30	37.60	60.00	50.00	-17.70	-12.40	L2

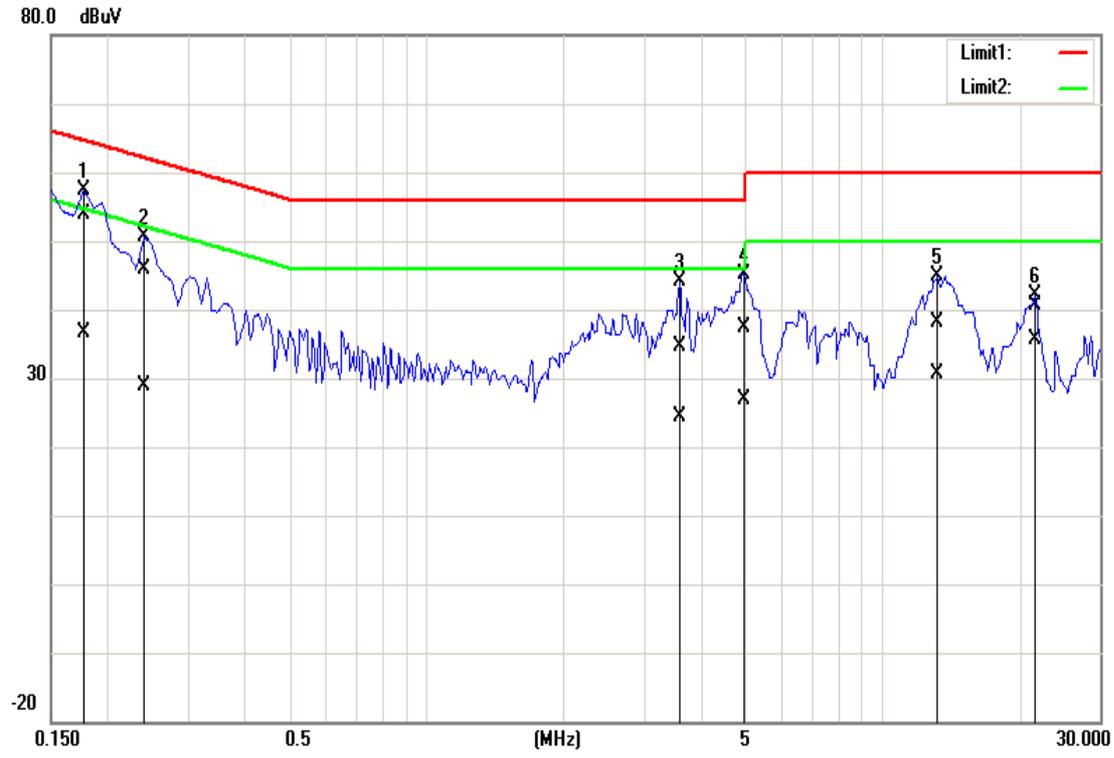
Remark:

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)

