FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-GEN AND RSS-210
CERTIFICATION TEST REPORT

FOR

BROADCOM BLUETOOTH MODULE

MODEL NUMBER: BCM92046MD

FCC ID: QDS-BRCM1029
IC #: 4324A-BRCM1029

REPORT NUMBER: 07U11199-1C

ISSUE DATE: AUGUST 28, 2007

PREPARED FOR
BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

PREPARED BY
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	August 9, 2007	Initial Issue	Hsin Fu Shih
B	August 10, 2007	Corrected some typos	Hsin Fu Shih
C	August 28, 2007	1. Re-tested TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ 2. Updated test set up photo with new adaptor and USB cable	Hsin Fu Shih

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: BROADCOM BLUETOOTH MODULE

MODEL: BCM92046MD

SERIAL NUMBER: 1059229

DATE TESTED: July 24 ~ August 3, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED
RSS-GEN ISSUE 1	NO NON-COMPLIANCE NOTED
RSS-210 ISSUE 6 ANNEX 8	NO NON-COMPLIANCE NOTED

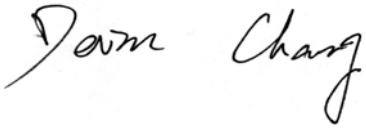
Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

HSIN FU SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DEVIN CHANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN, RSS-210, and RSS-212.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver 2.1 version with EDR.

The radio module is manufactured by BROADCOM CORPORATION.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

GFSK 2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402 - 2480	3.69	2.34

QPSK 2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402 - 2480	5.15	3.27

8PSK 2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402 - 2480	5.47	3.52

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB antenna, with a maximum gain of 3.36 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Broadcom Blue Tool l version 0.9.9.6.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2441 MHz.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	Dell	Inspiron 0000	CN-901014-70166-57K-01JT	DOC
AC Adapter	Dell	PA-1600-06D1	CN-0F9710-71615-56H-5118	DOC

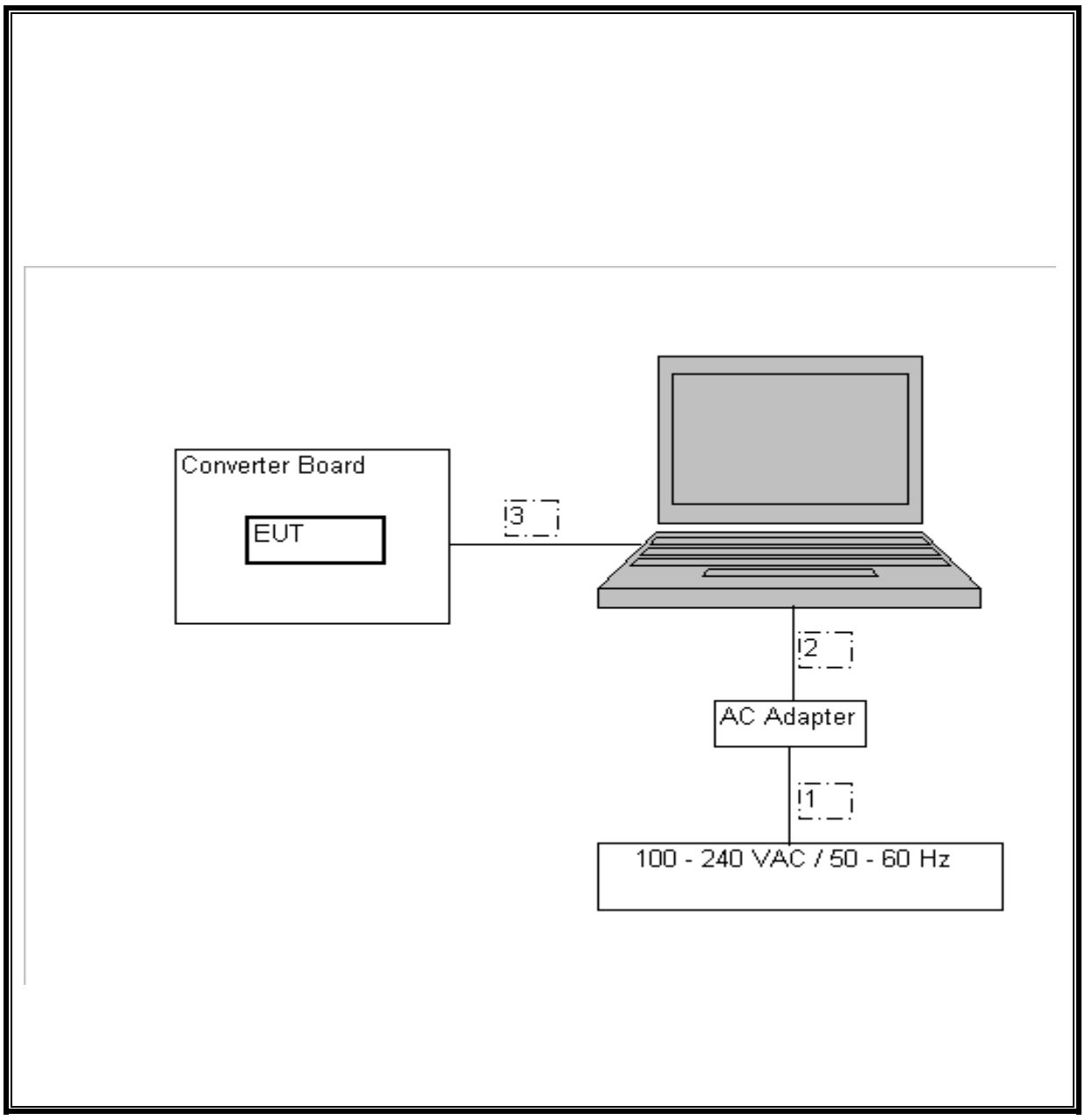
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US115	Unshielded	1.5m	N/A
2	DC	1	DC	Unshielded	1.5m	N/A
3	USB	1	USB	Shielded	1.0m	N/A

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/2/2007
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/2/2007
Spectrum Analyzer 9KHz ~ 26.5 GHz	Agilent / HP	E4407B	MY41444592	10/6/2007
RF Filter Section	Agilent / HP	85420E	3705A00256	6/12/2008
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	6/12/2008
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	4/15/2008
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00561	10/30/2007
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A0022704	8/13/2007
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	5/9/2008
4.0 High Pass Filter	Micro Tronics	HPM13351	3	N/A
2.4 - 2.5 Band Reject Filter	Micro Tronics	N/A	1	N/A
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	MY43360112	5/7/2008

7. LIMITS AND RESULTS

7.1. ANTENNA PORT CHANNEL TESTS

7.1.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 20 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

No non-compliance noted:

GFSK

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	951.5
Middle	2441	946.8
High	2480	949.5

QPSK

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	1380
Middle	2441	1378
High	2480	1387

8PSK

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	1352
Middle	2441	1356
High	2480	1368

7.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

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. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

GFSK Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.8747
Middle	2441	0.8721
High	2480	0.8725

QPSK Mode

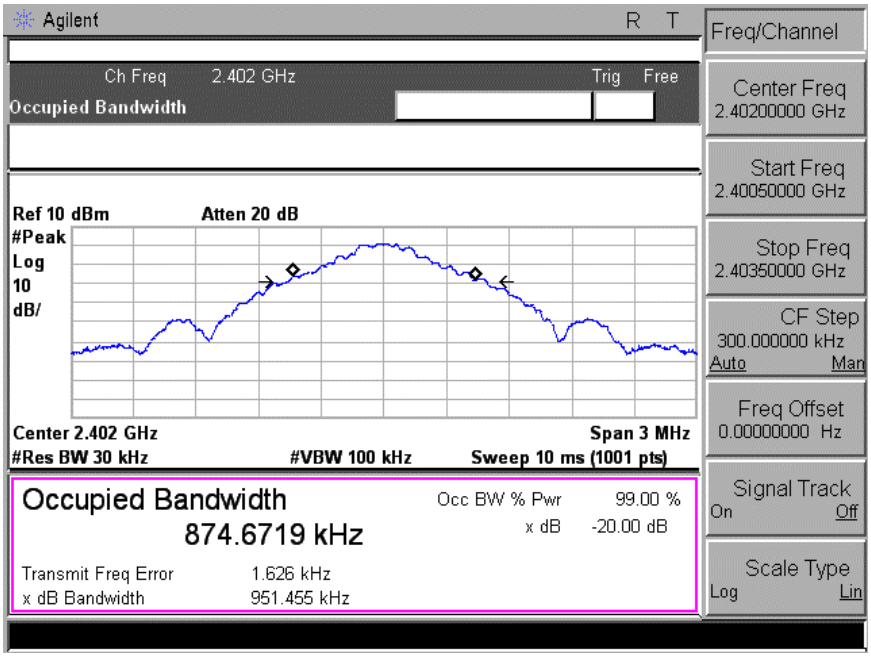
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.2185
Middle	2441	1.2283
High	2480	1.2446

8PSK Mode

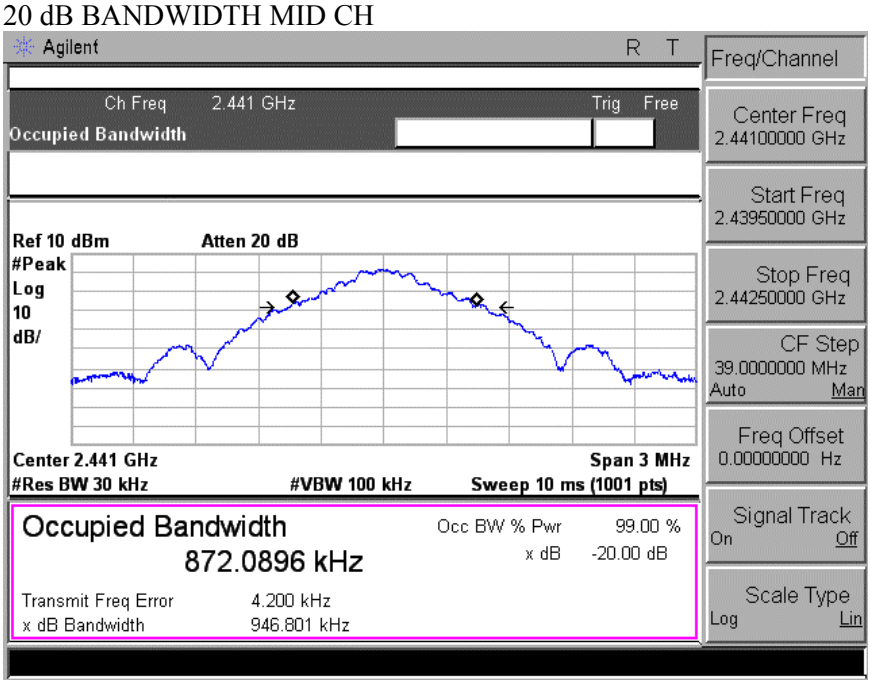
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.2202
Middle	2441	1.2302
High	2480	1.2437

GFSK Mode

20 dB BANDWIDTH LOW CH

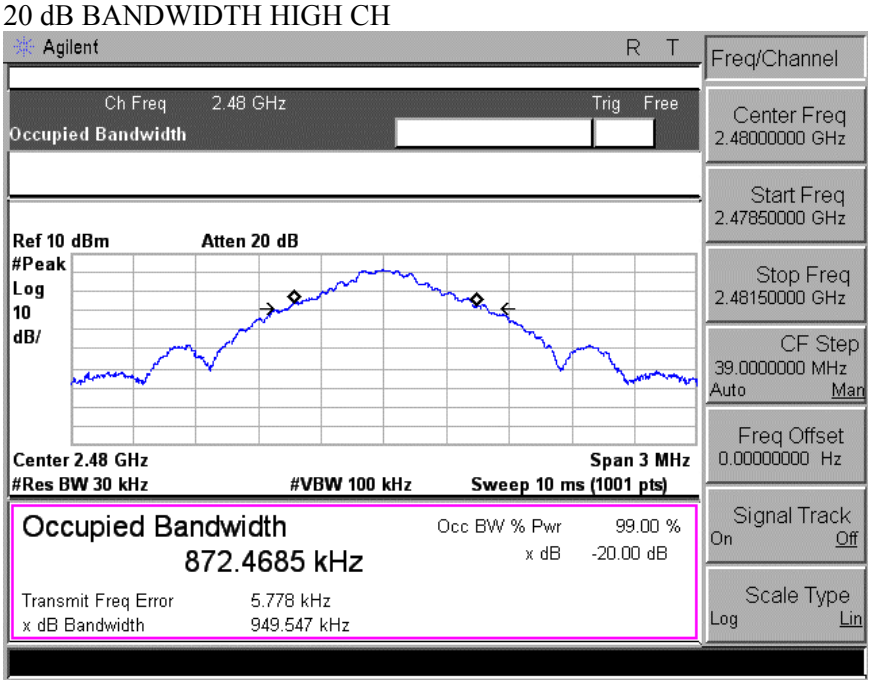


20 dB BANDWIDTH MID CH



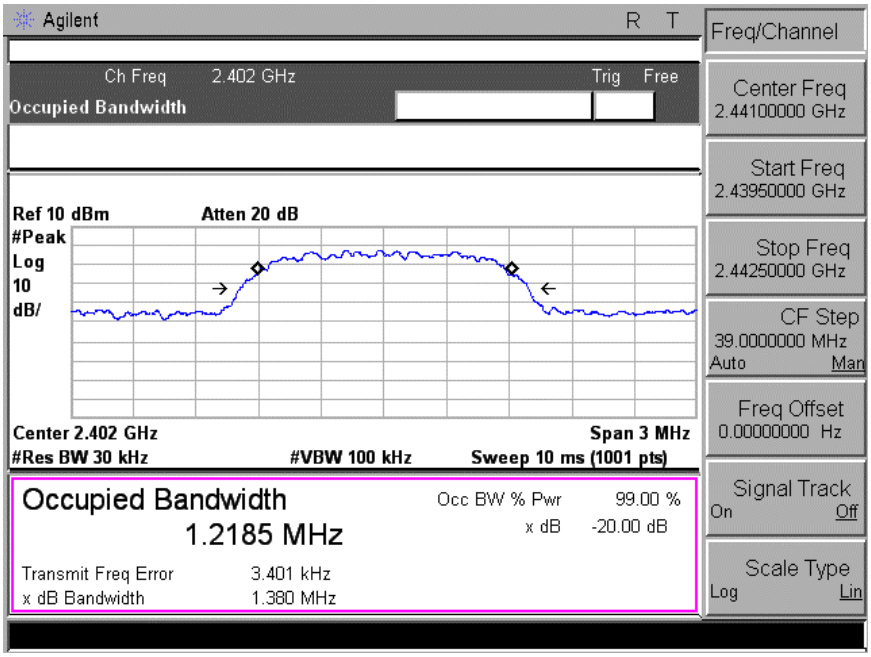
GFSK Mode

20 dB BANDWIDTH HIGH CH

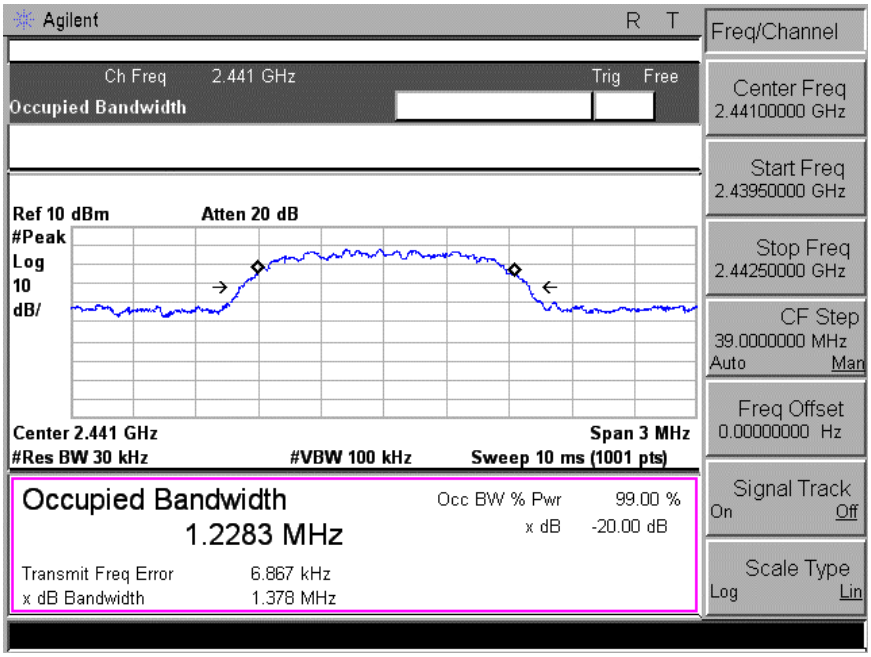


QPSK Mode

20 dB BANDWIDTH LOW CH

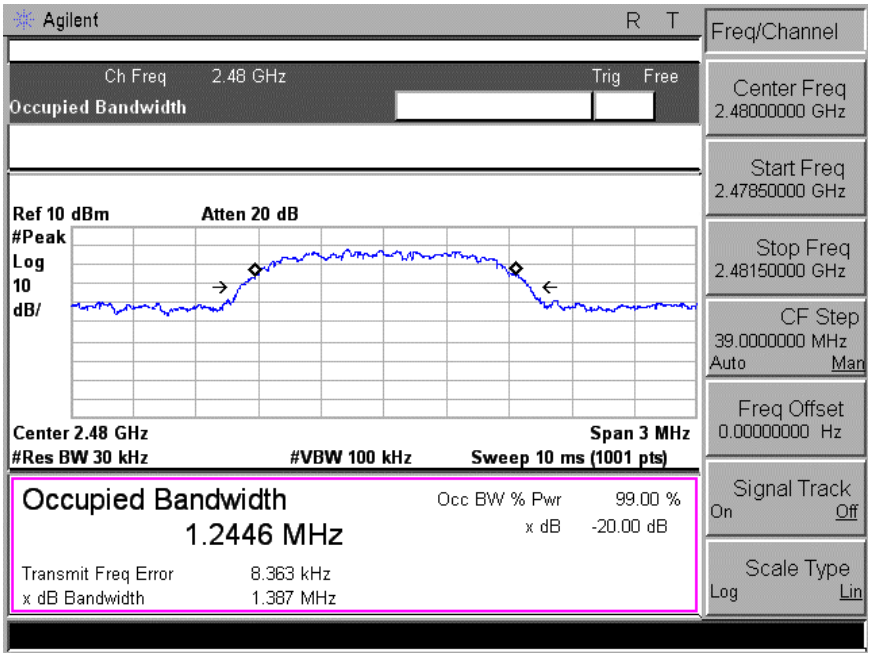


20 dB BANDWIDTH MID CH



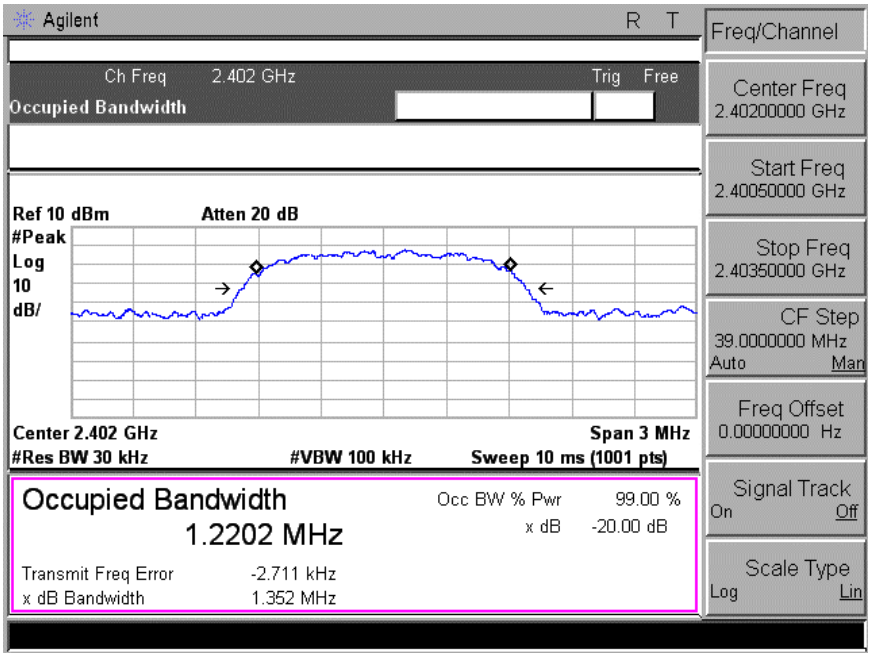
QPSK Mode

20 dB BANDWIDTH HIGH CH

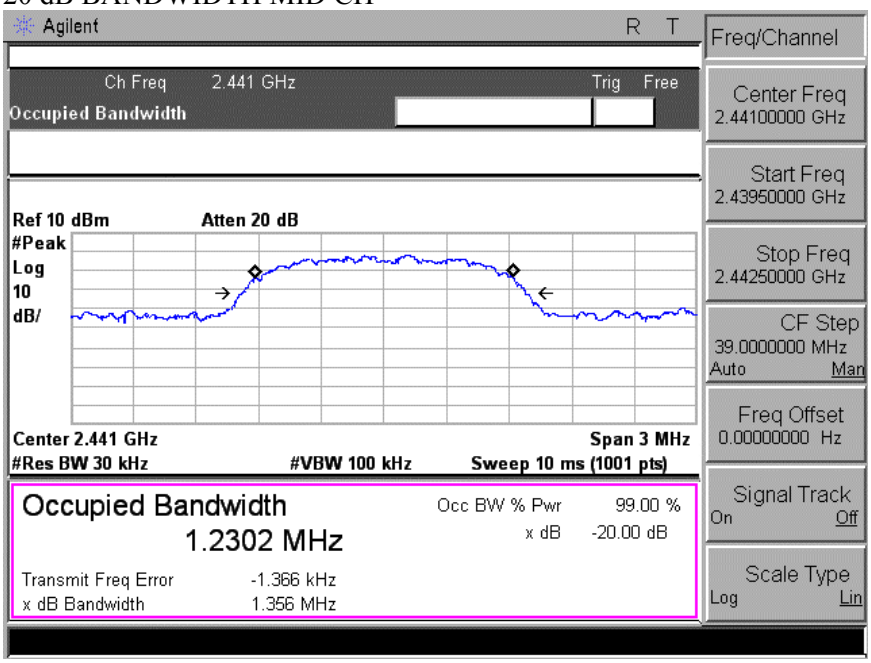


8PSK Mode

20 dB BANDWIDTH LOW CH

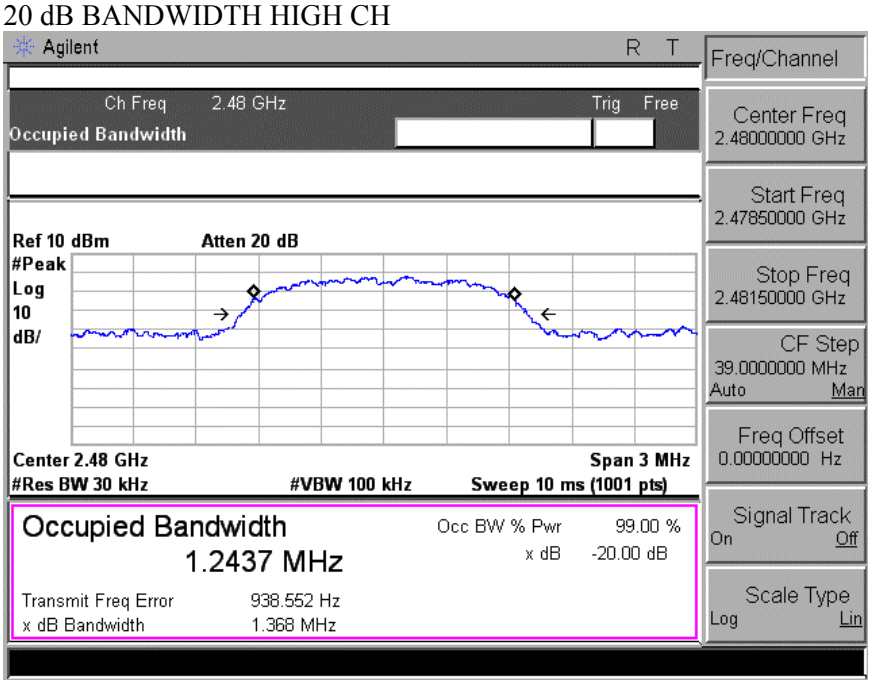


20 dB BANDWIDTH MID CH



8PSK Mode

20 dB BANDWIDTH HIGH CH



7.1.3. HOPPING FREQUENCY SEPARATION

LIMIT

§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 PROCEDURE

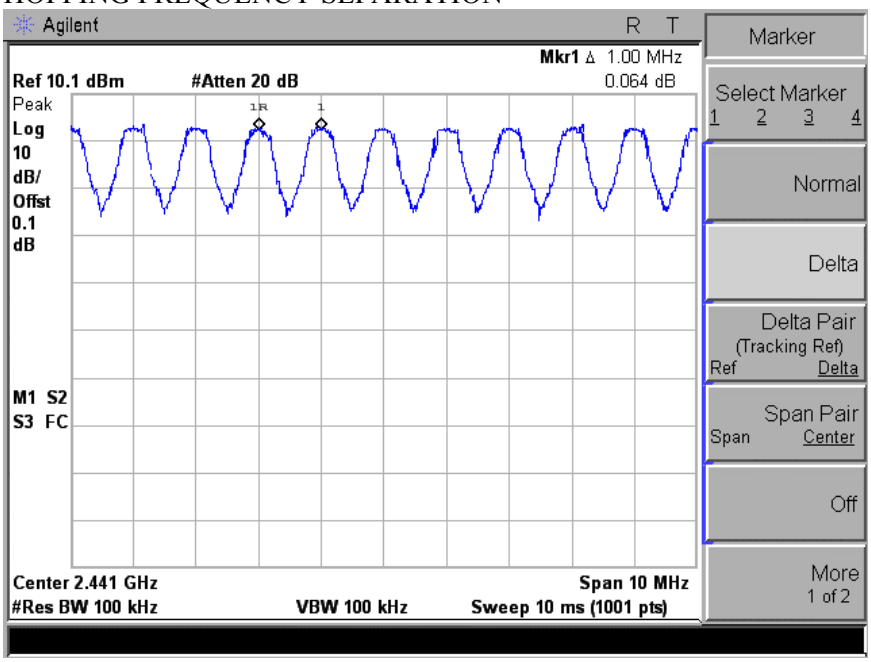
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

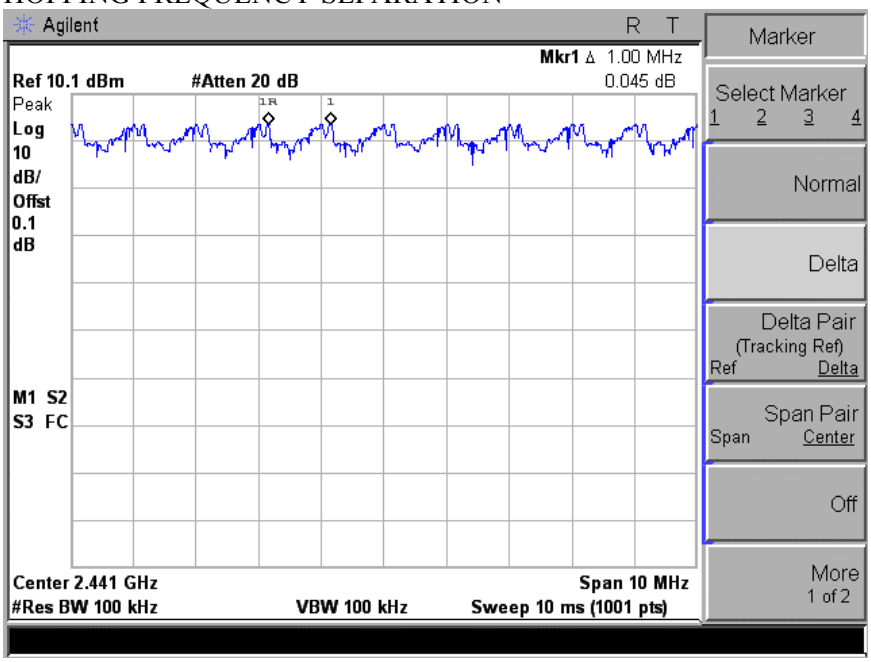
GFSK

HOPPING FREQUENCY SEPARATION



8PSK

HOPPING FREQUENCY SEPARATION



7.1.4. NUMBER OF HOPPING CHANNELS

LIMIT

§15.247 (a) (1) (iii) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1 % of the span. The analyzer is set to Max Hold.

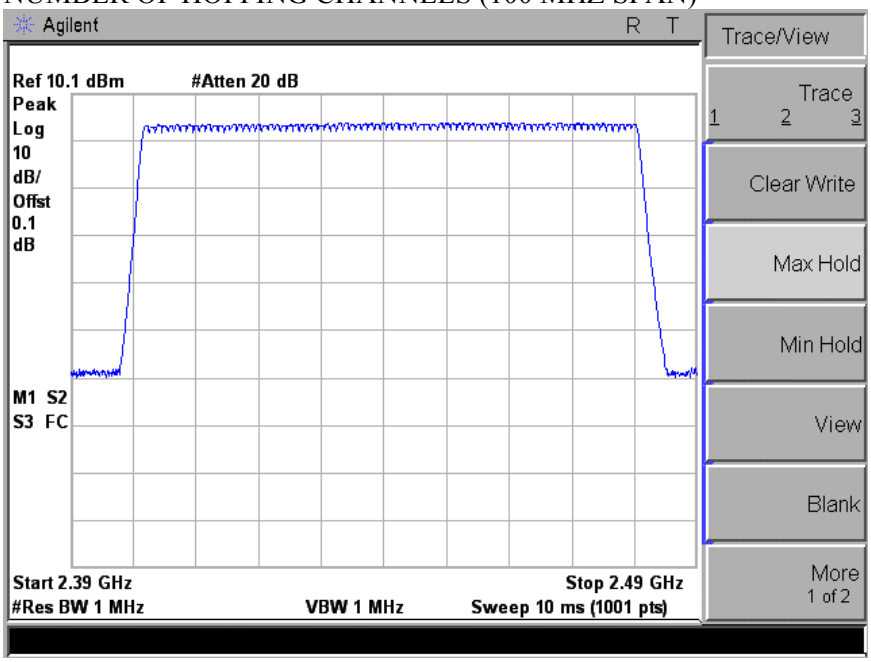
RESULTS

No non-compliance noted:

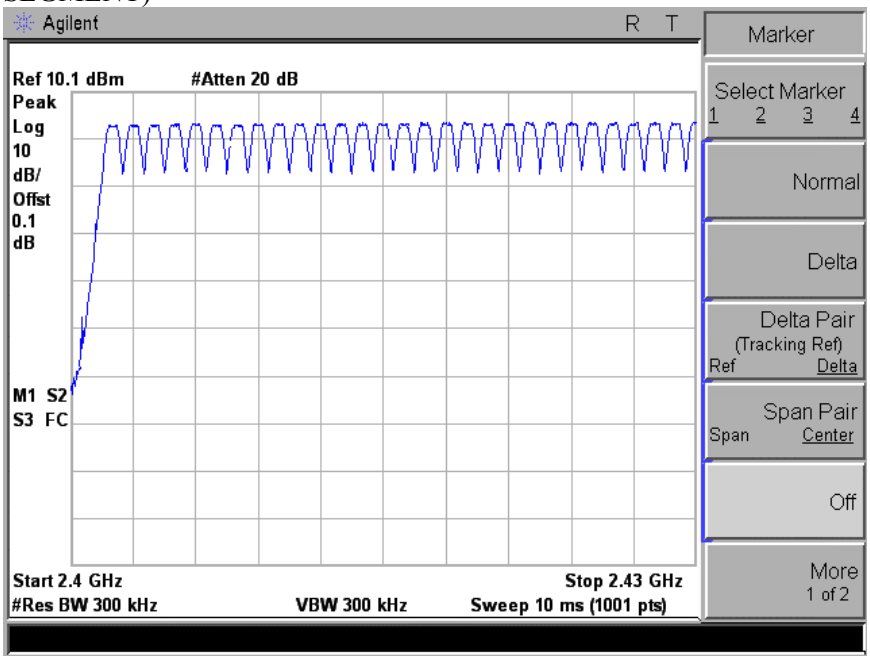
79 Channels observed.

GFSK

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)

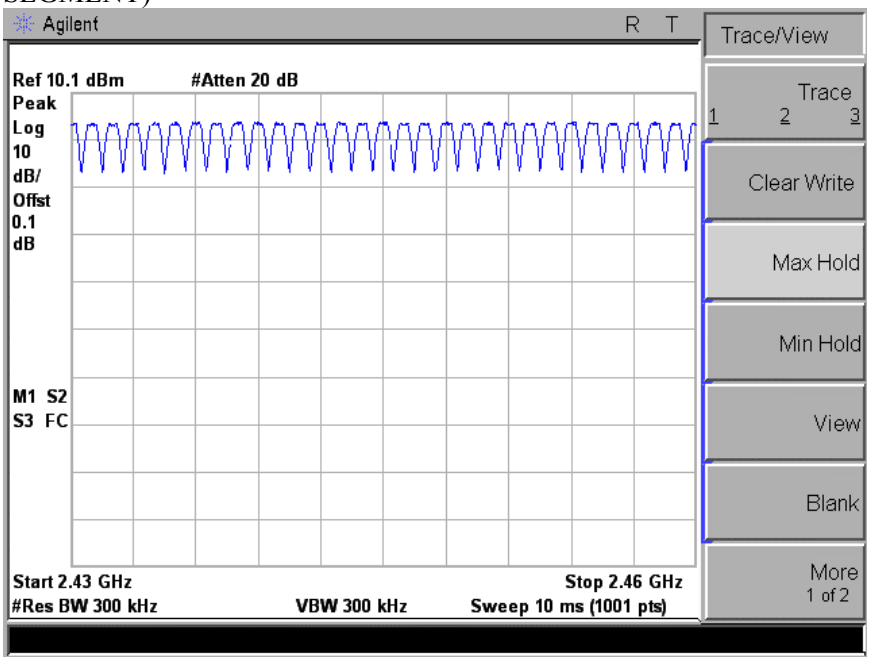


NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)

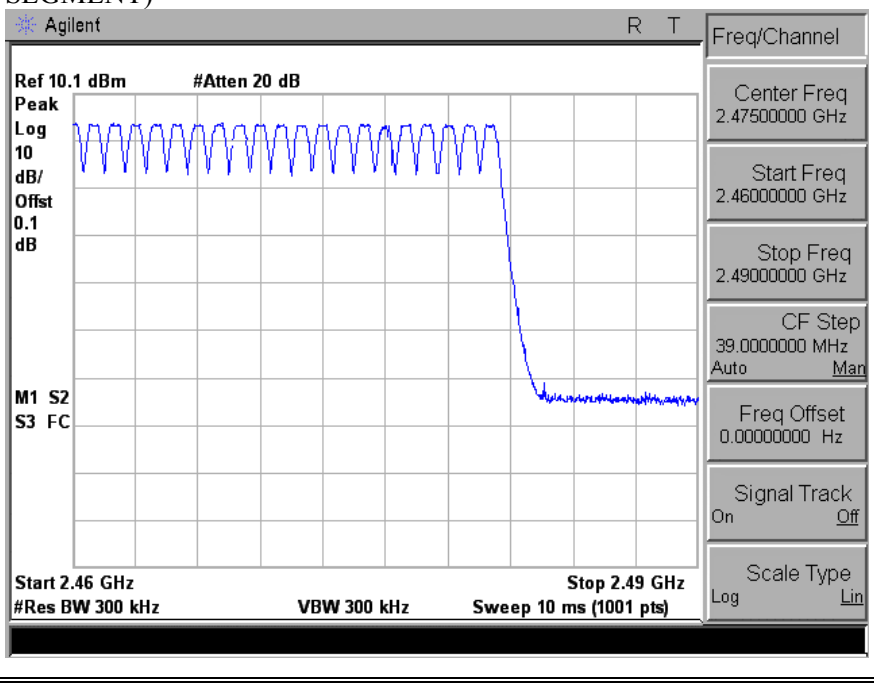


GFSK

NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)

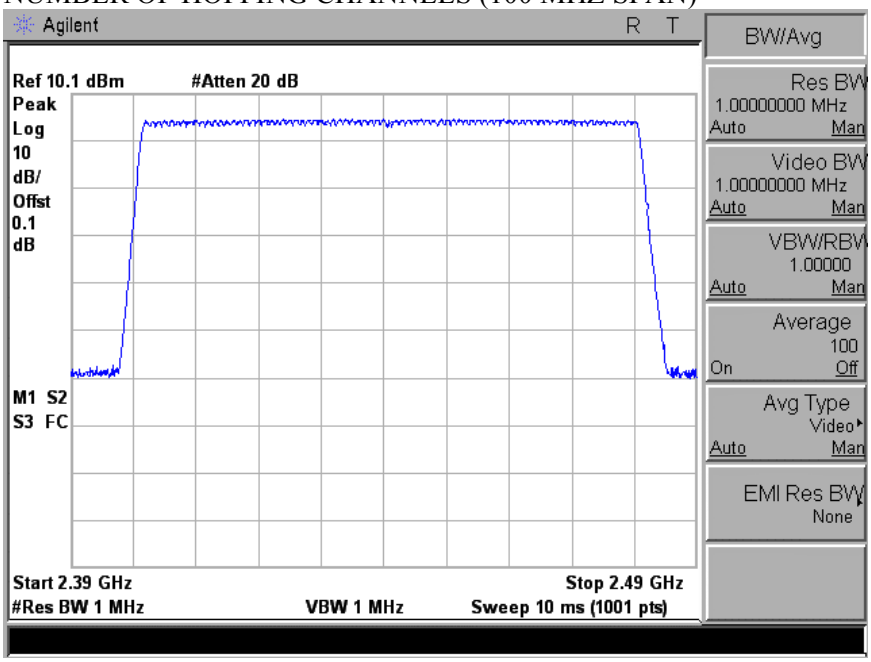


NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)

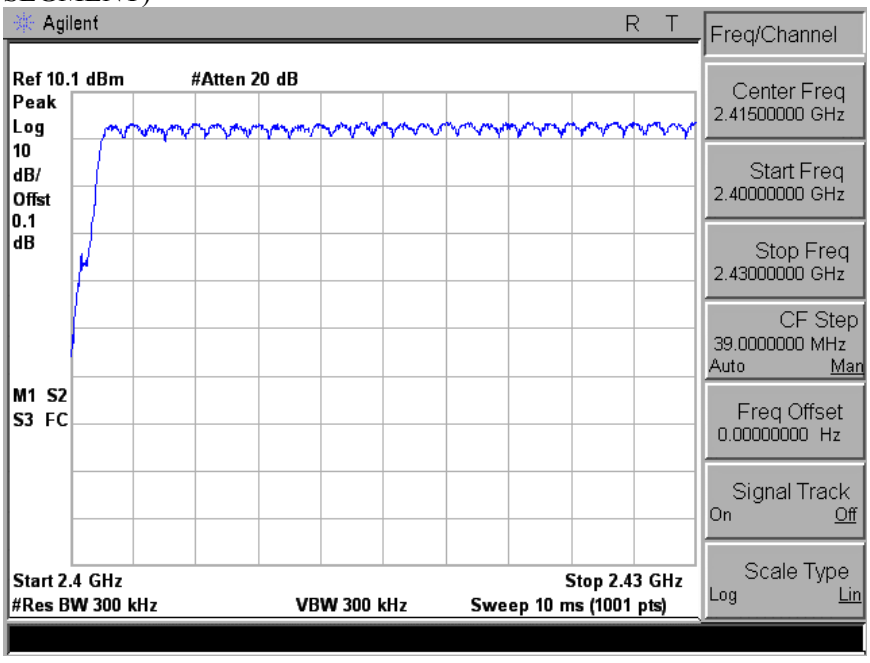


8PSK

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)

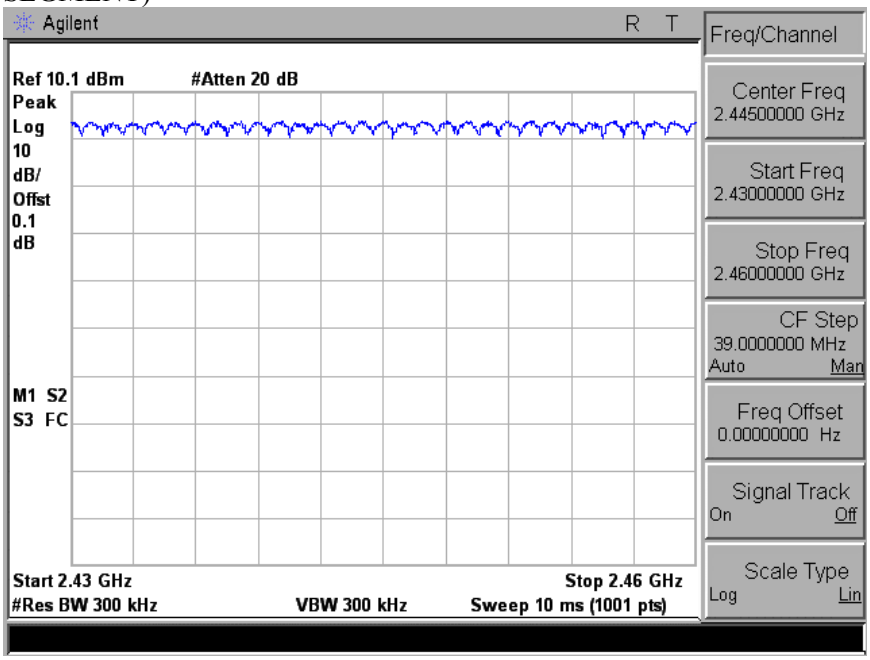


NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)

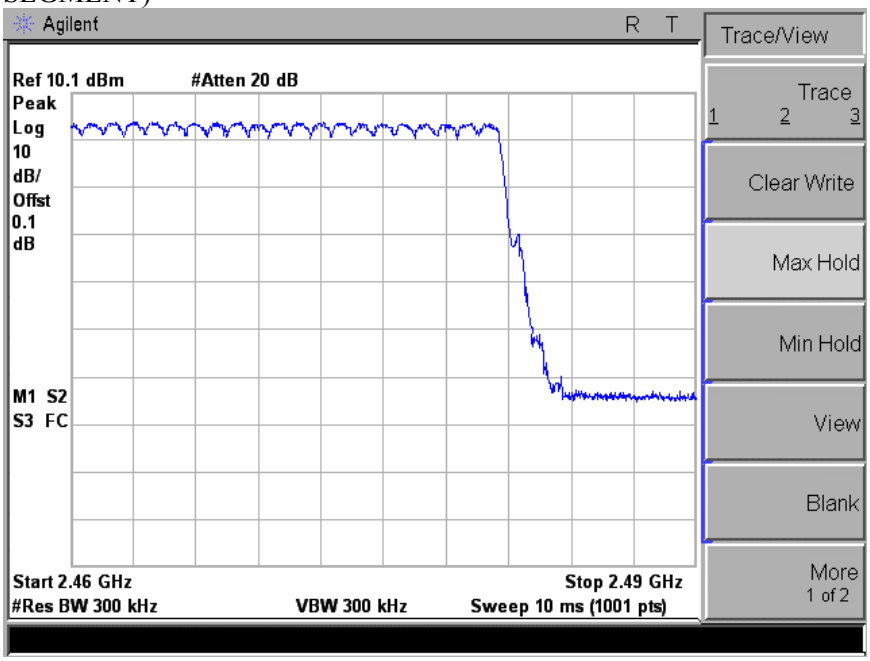


8PSK

NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.1.5. AVERAGE TIME OF OCCUPANCY

LIMIT

§15.247 (a) (1) (iii) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels. 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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

No non-compliance noted:

GFSK

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.37	31	0.115	0.4	0.285
DH3	1.61	17	0.274	0.4	0.126
DH5	2.88	12	0.346	0.4	0.054

8PSK

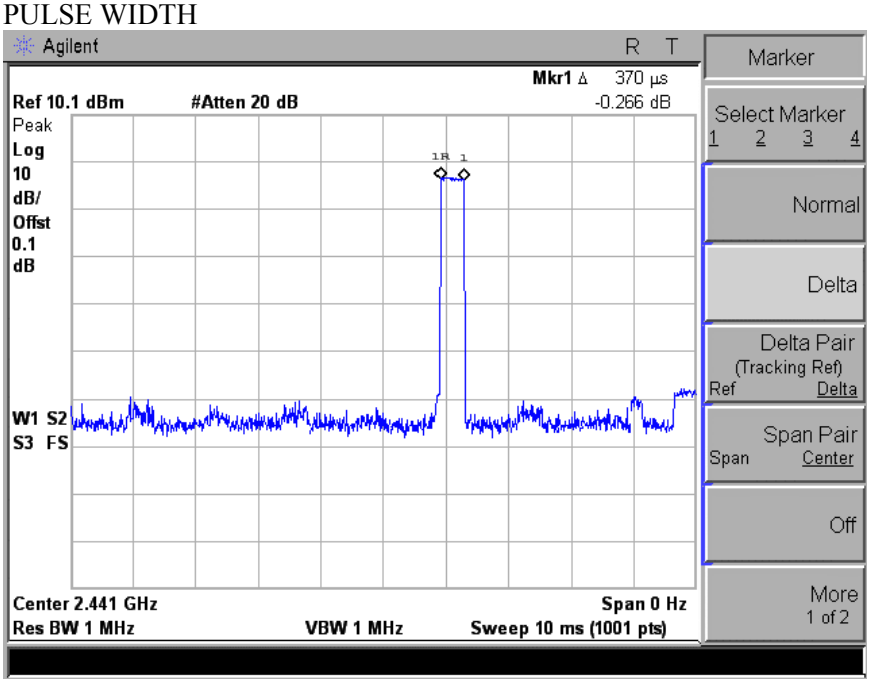
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.39	32	0.125	0.4	0.275
DH3	1.62	18	0.292	0.4	0.108
DH5	2.86	11	0.315	0.4	0.085

GFSK-DH1

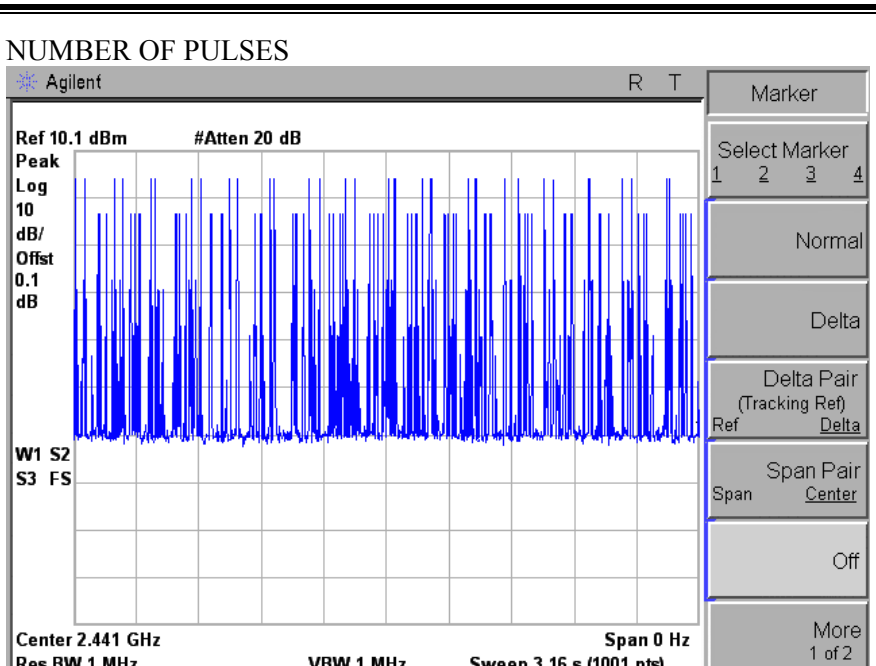
PULSE WIDTH

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIODS

PULSE WIDTH

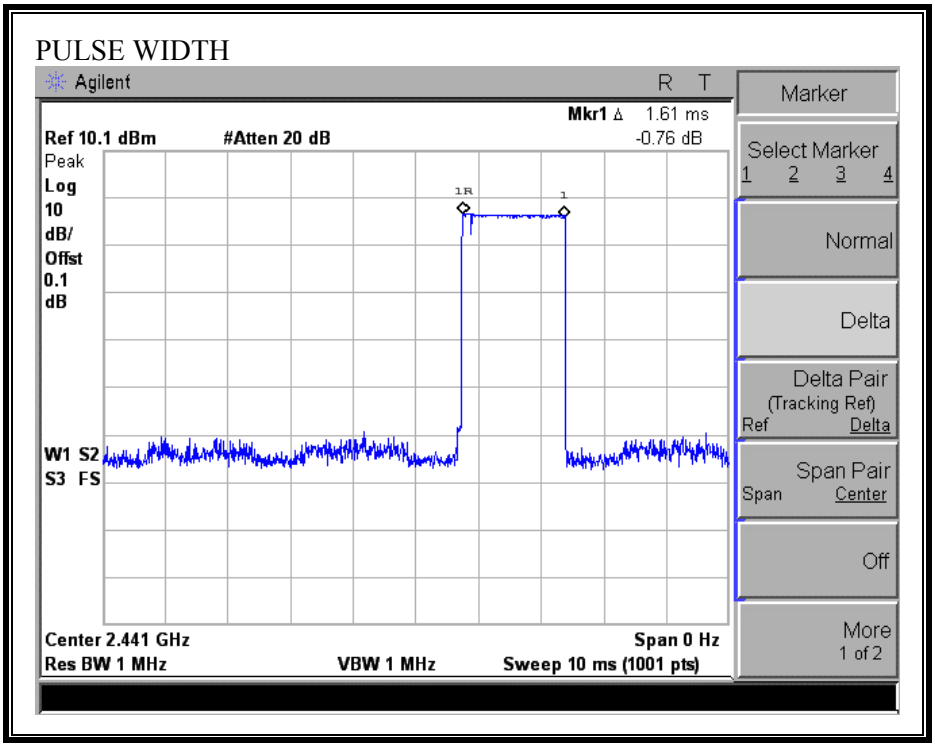


NUMBER OF PULSES

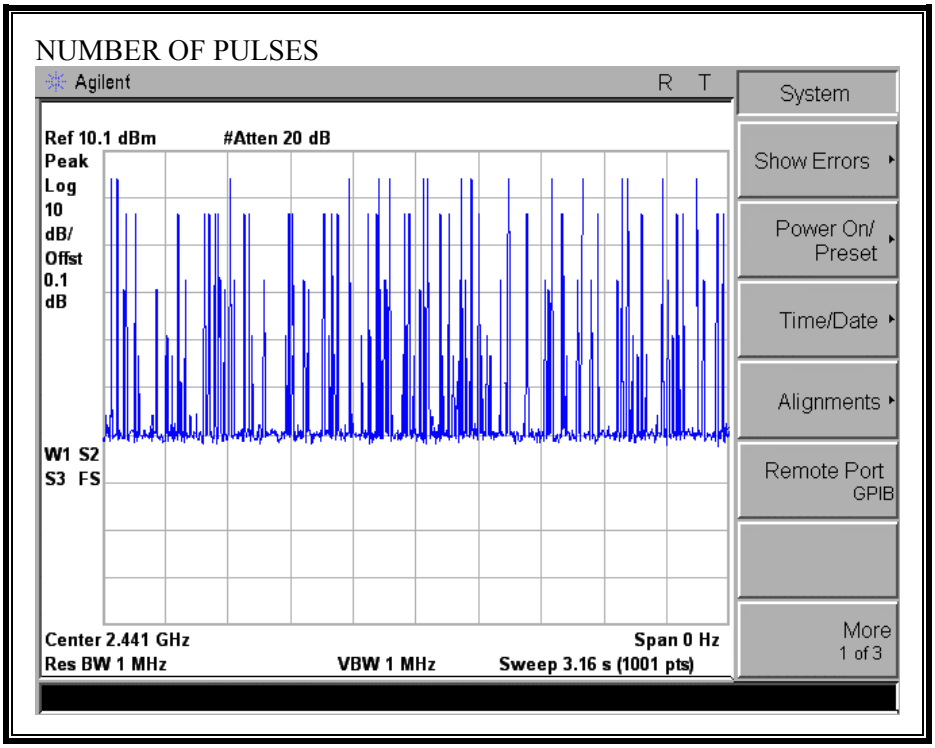


GFSK-DH3

PULSE WIDTH

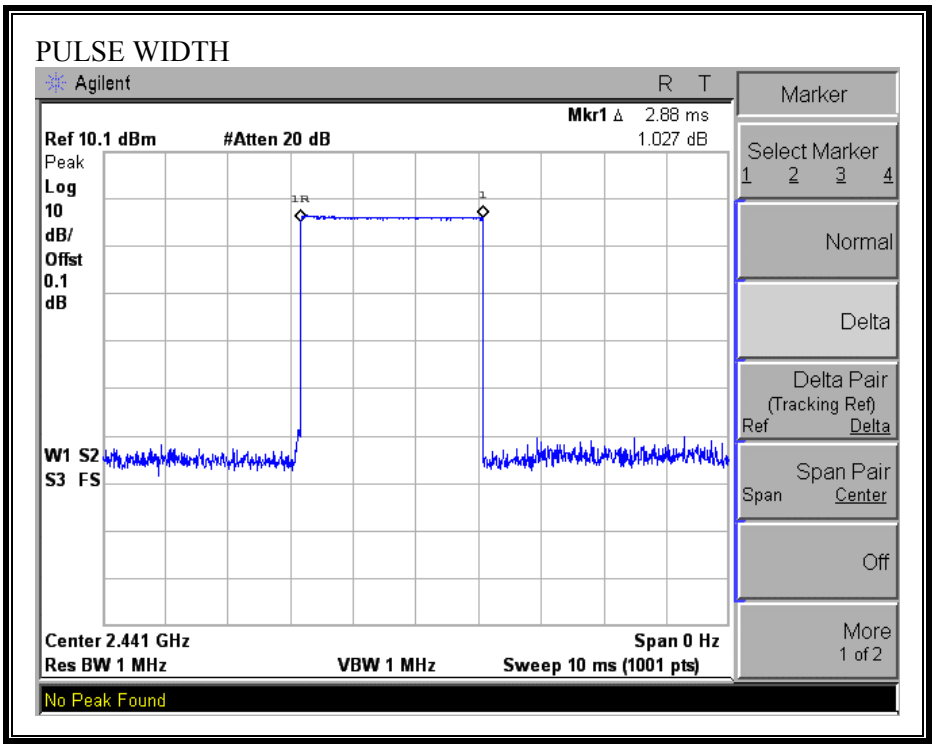


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

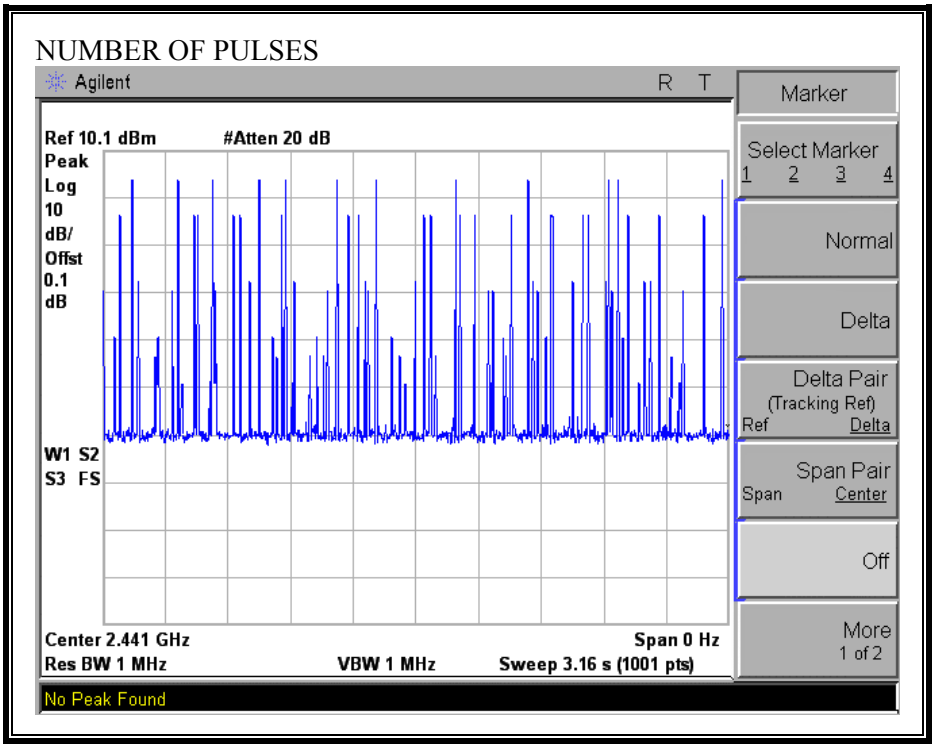


GFSK-DH5

PULSE WIDTH

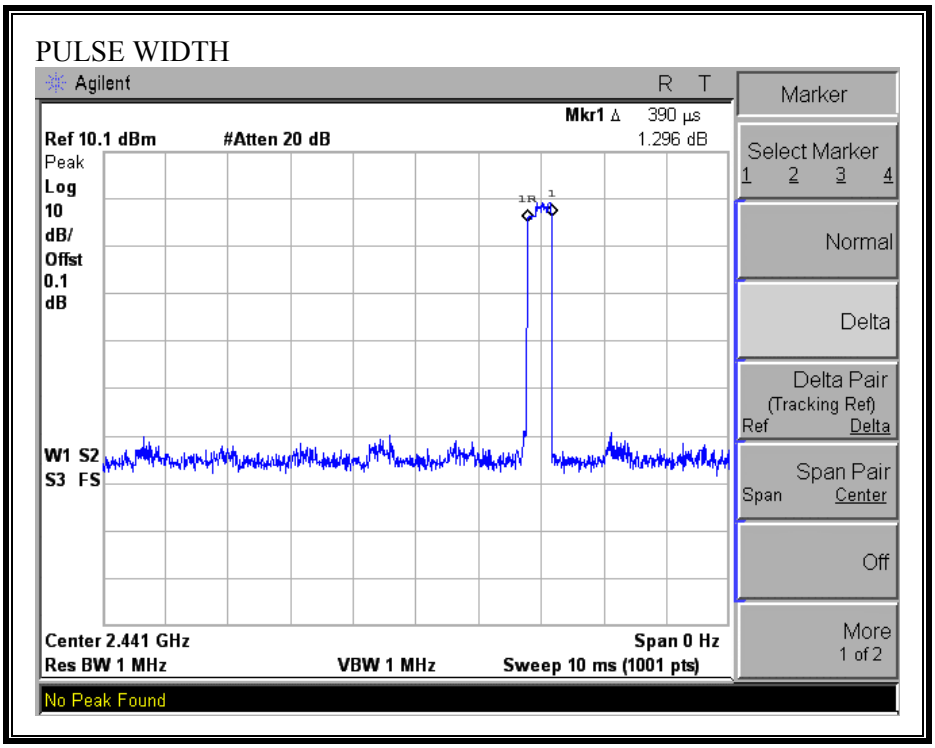


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

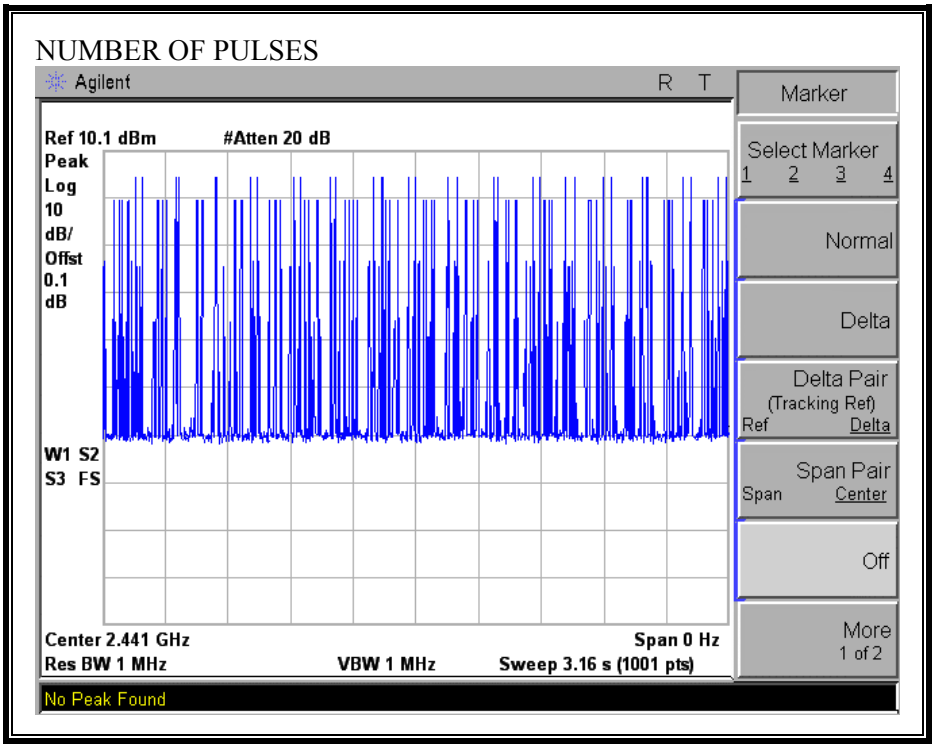


8PSK-DH1

PULSE WIDTH

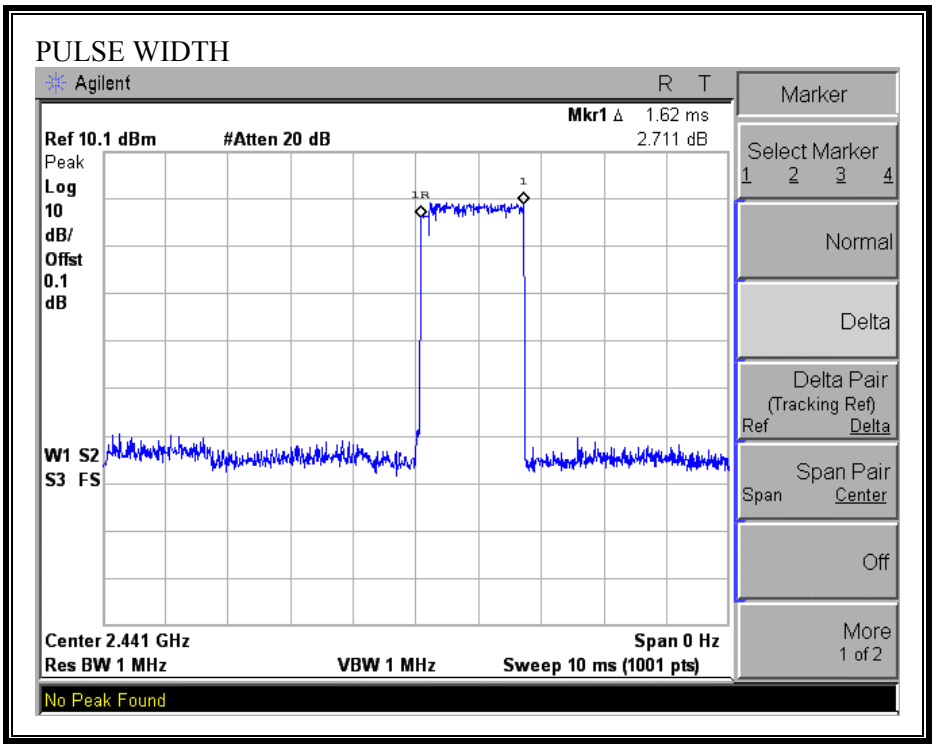


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

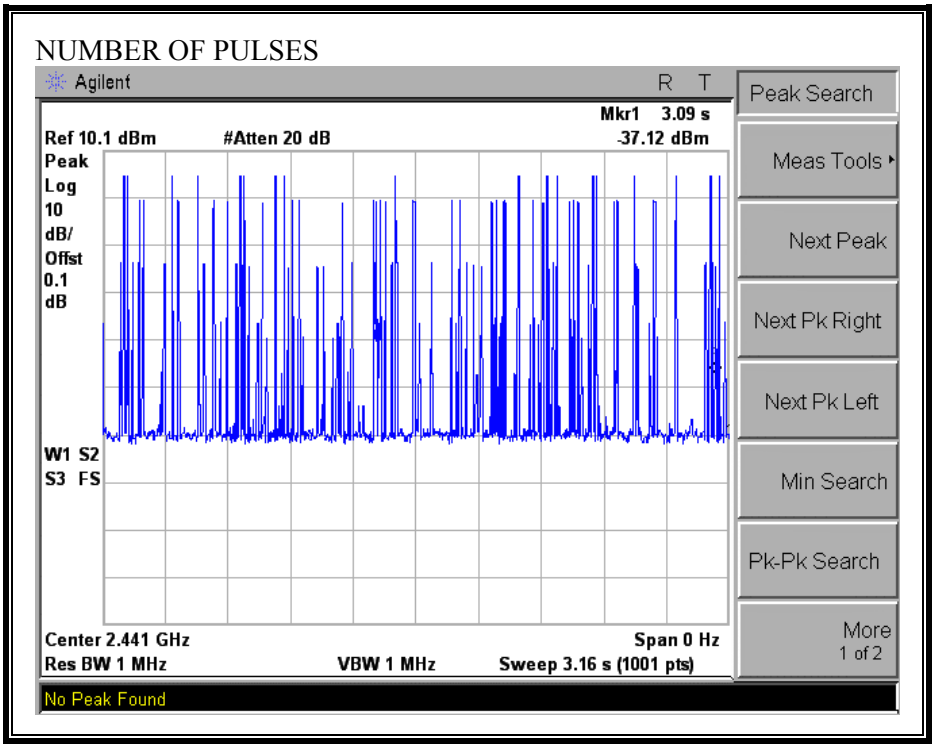


8PSK-DH3

PULSE WIDTH

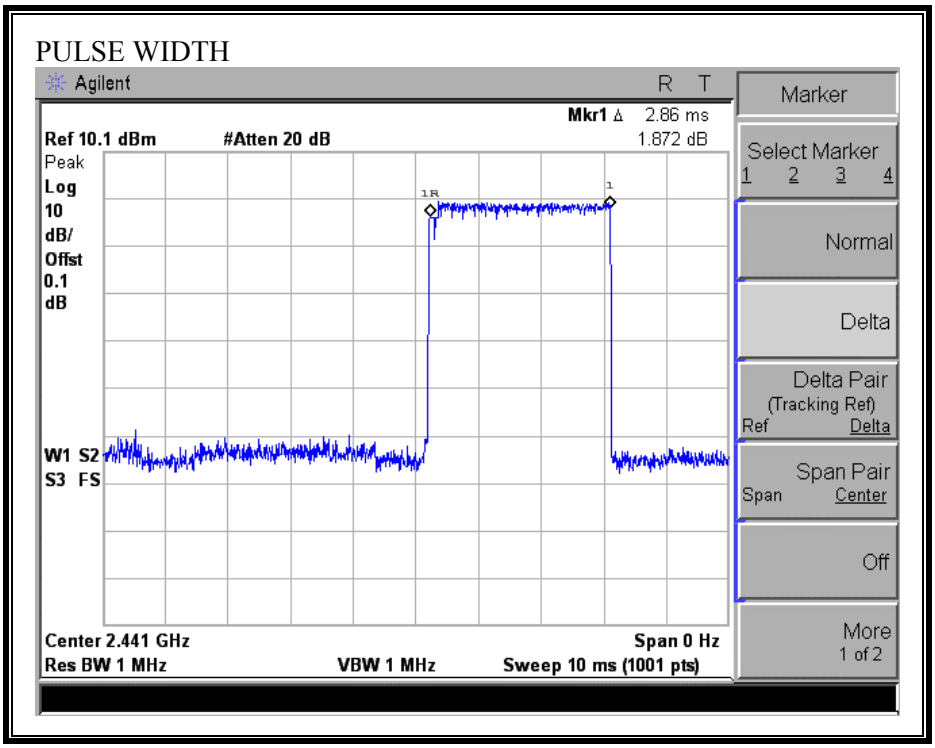


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

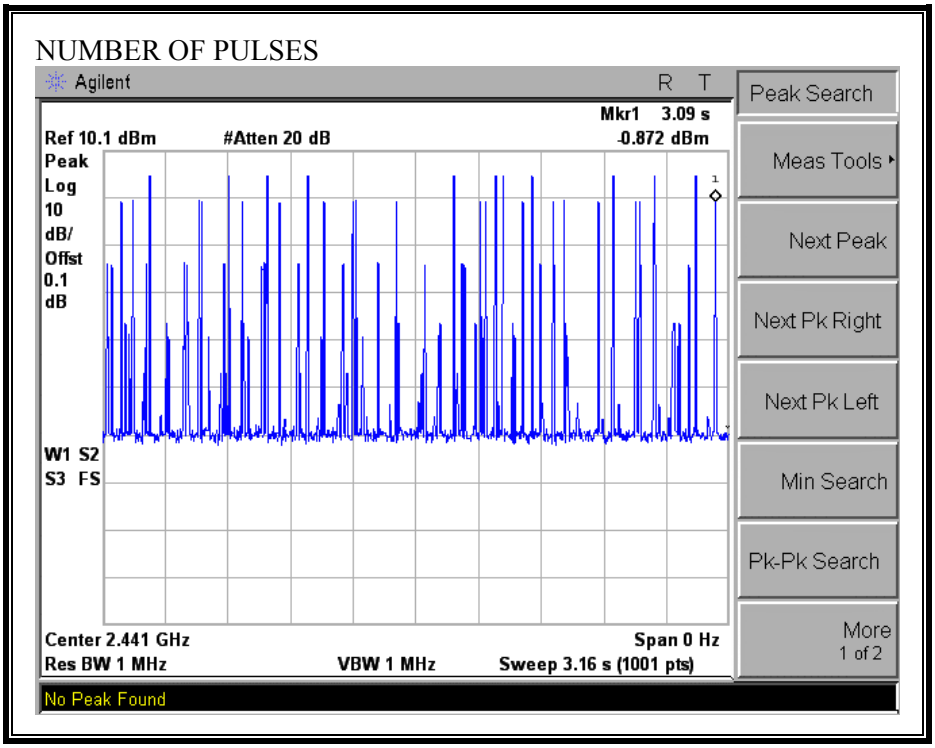


8PSK-DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.6. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (1) (1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

§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.

The maximum antenna gain is 3.36 dBi, therefore the limit is 21 dBm (0.125 watts).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

No non-compliance noted:

GFSK

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.25	21	-17.75
Middle	2441	3.69	21	-17.31
High	2480	3.58	21	-17.42

QPSK

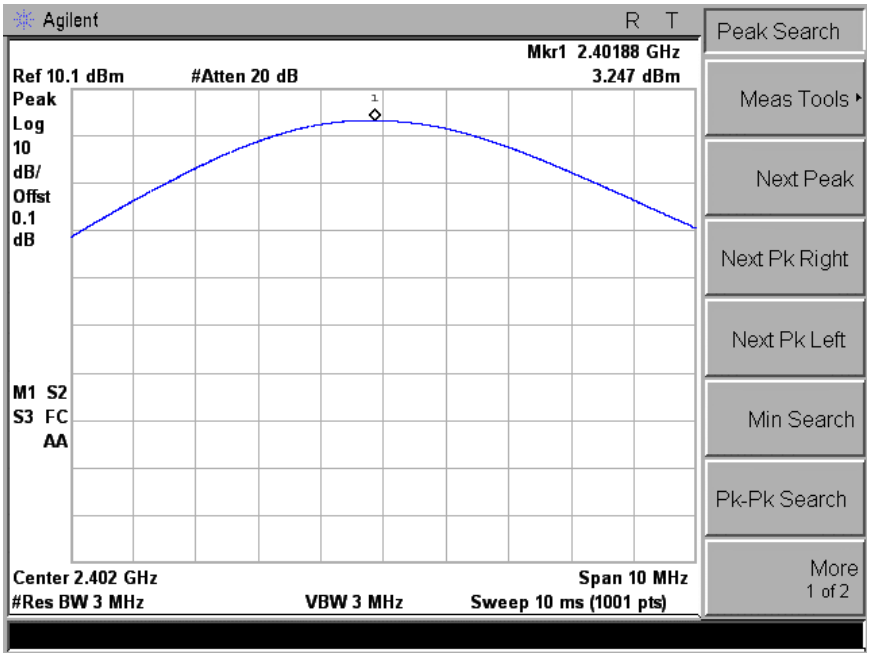
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.88	21	-16.12
Middle	2441	5.15	21	-15.85
High	2480	4.86	21	-16.14

8PSK

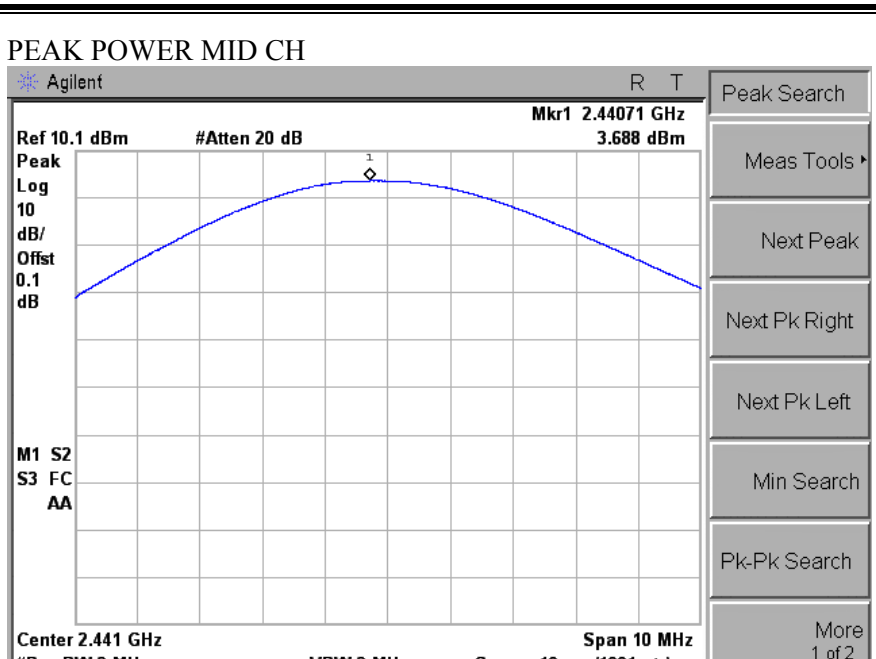
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.21	21	-15.79
Middle	2441	5.47	21	-15.53
High	2480	5.18	21	-15.82

Peak Output Power for GFSK

PEAK POWER LOW CH

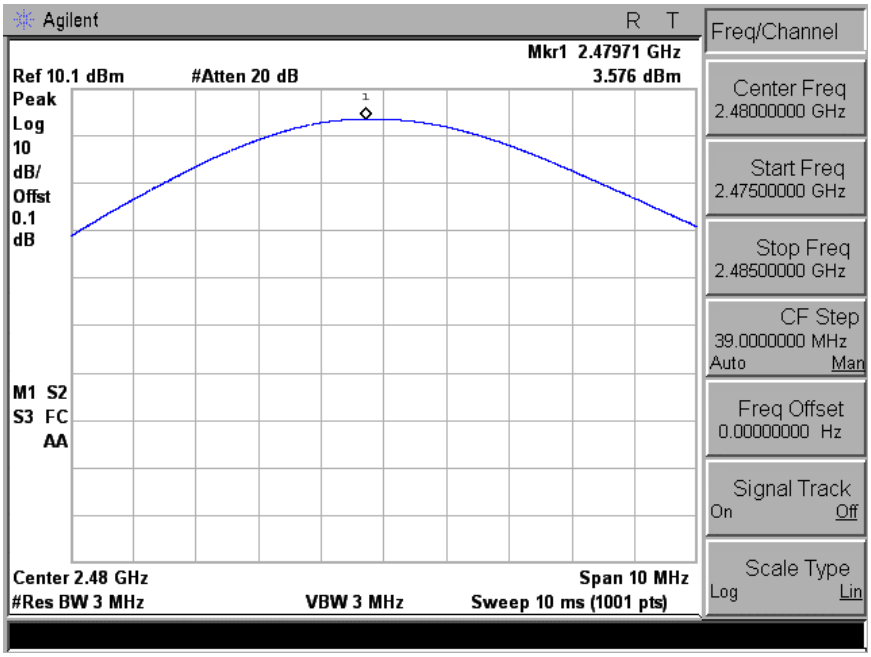


PEAK POWER MID CH



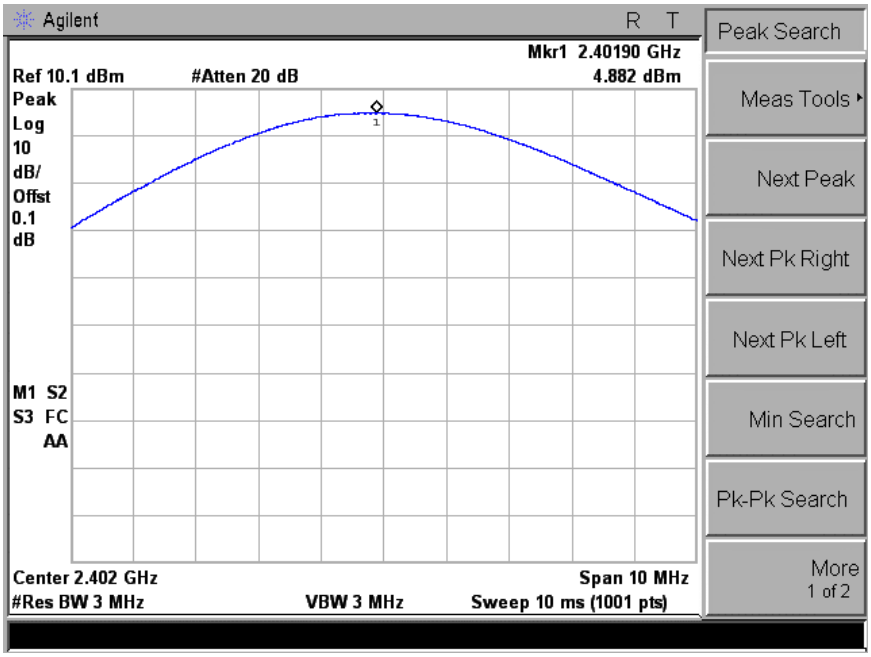
Peak Output Power for GFSK

PEAK POWER HIGH CH

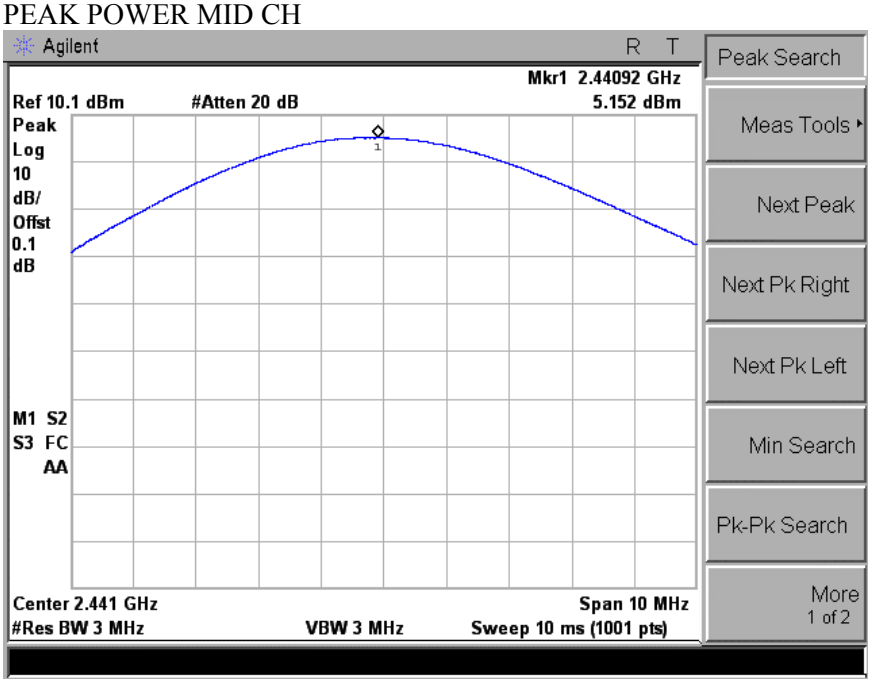


Peak Output Power for QPSK

PEAK POWER LOW CH

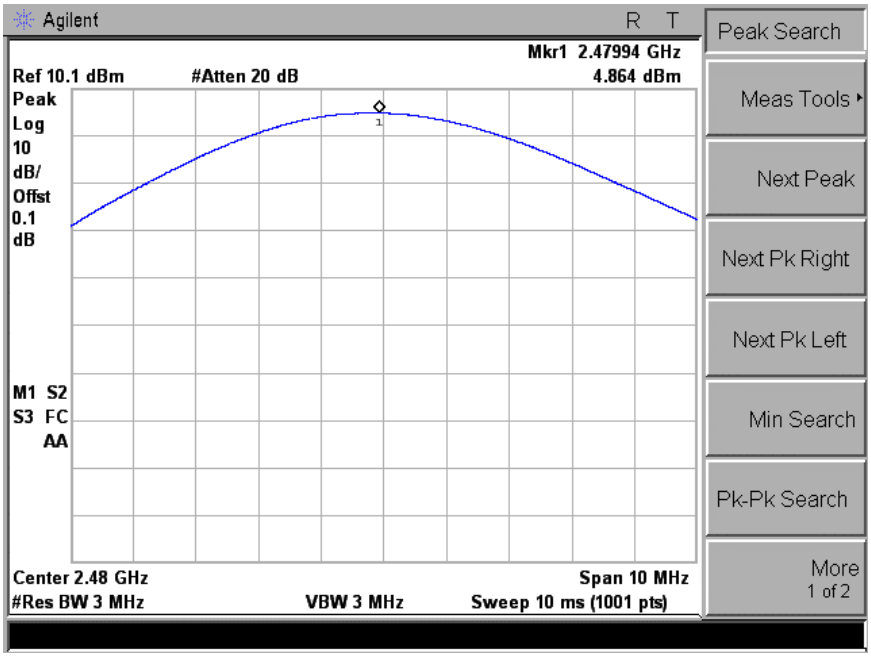


PEAK POWER MID CH



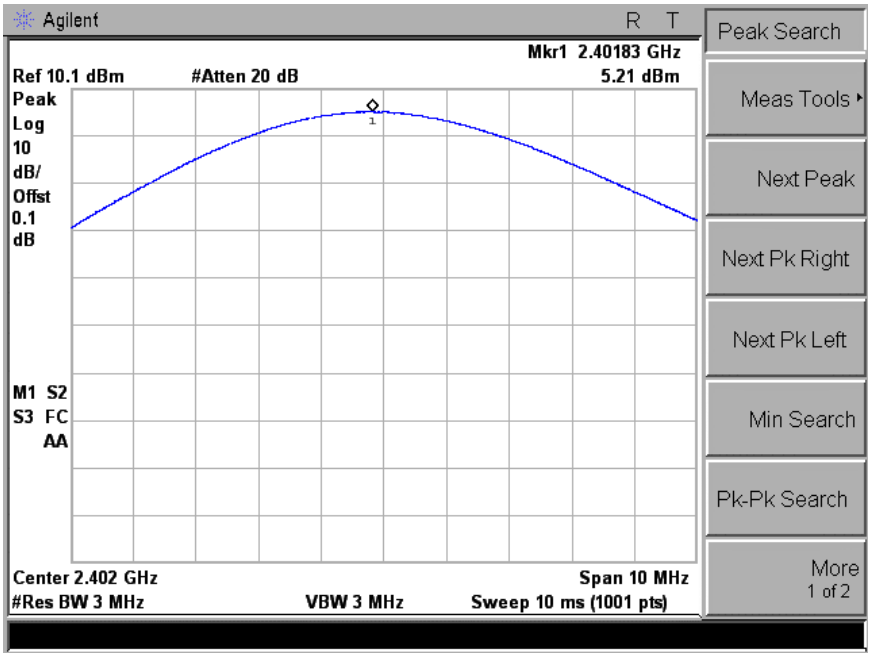
Peak Output Power for QPSK

PEAK POWER HIGH CH

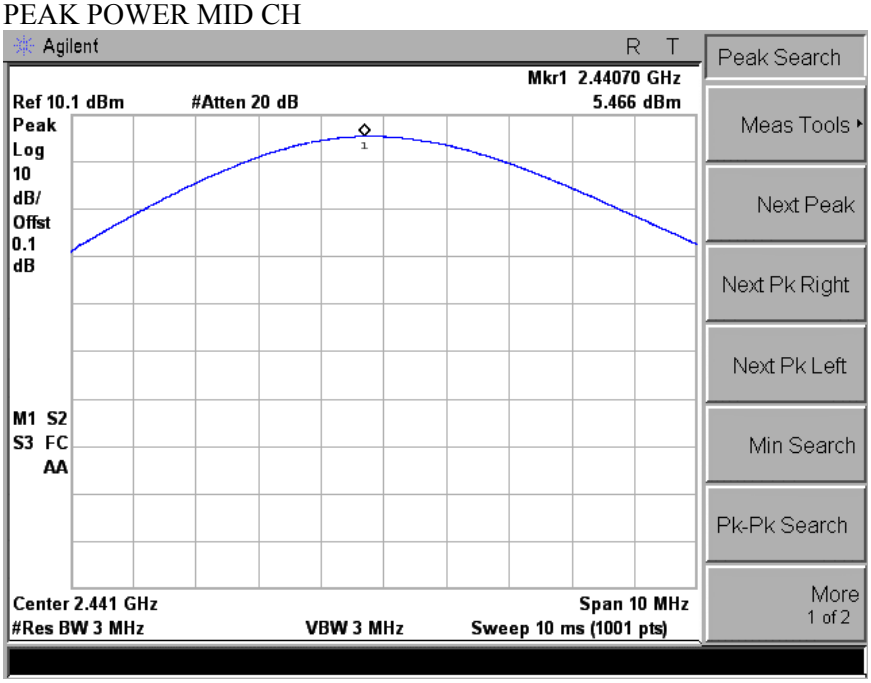


Peak Output Power for 8PSK

PEAK POWER LOW CH

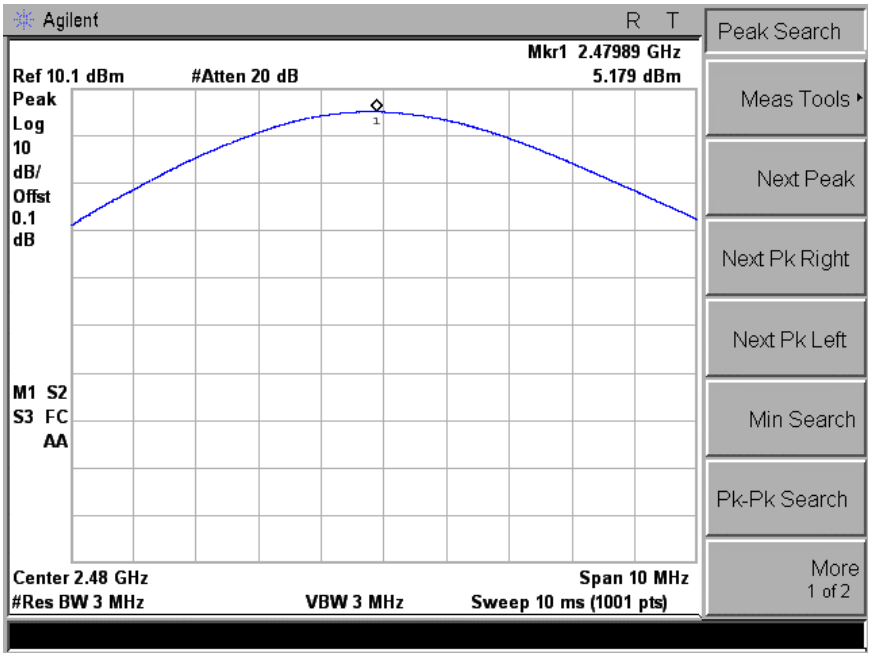


PEAK POWER MID CH



Peak Output Power for 8PSK

PEAK POWER HIGH CH



7.1.7. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

GFSK

MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
20.0	3.69	3.36	0.001

8PSK

MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
20.0	5.47	3.36	0.002

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band 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. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c)).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

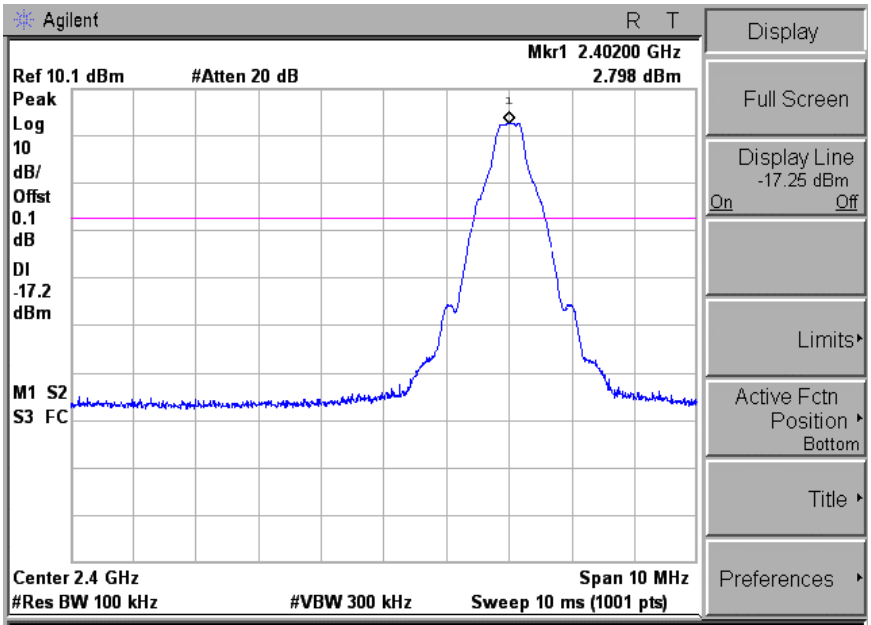
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

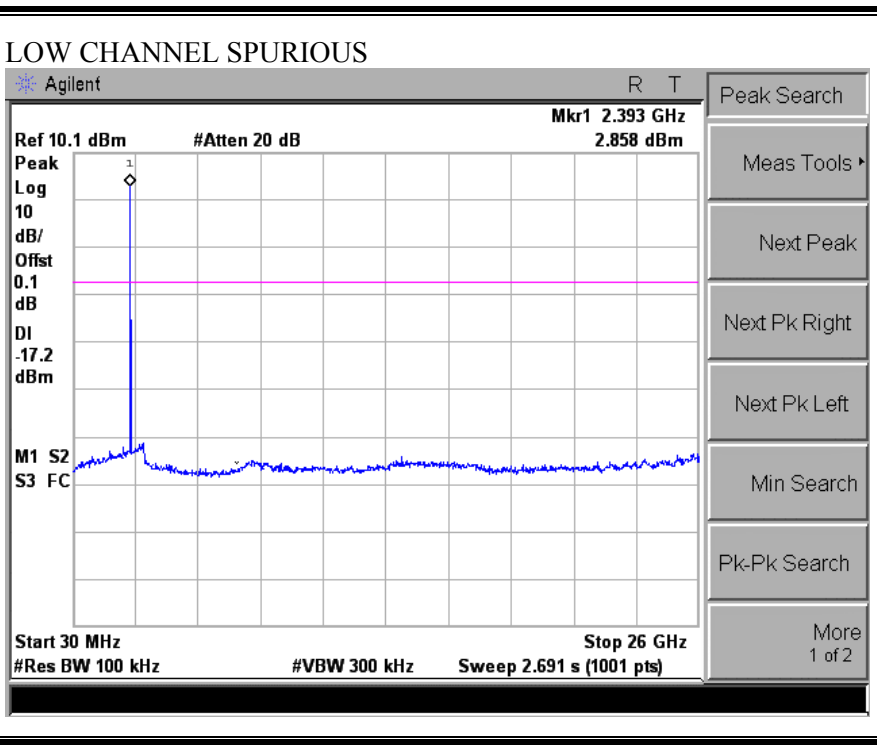
No non-compliance noted:

CONDUCTED SPURIOUS EMISSIONS, LOW CHANNEL for GFSK Mode

LOW CHANNEL BANDEDGE

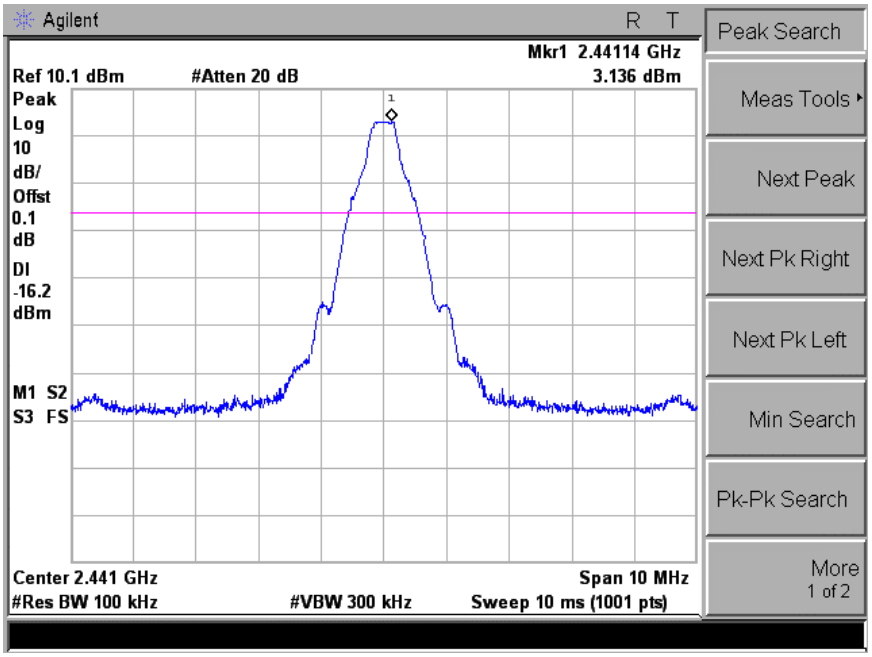


LOW CHANNEL SPURIOUS

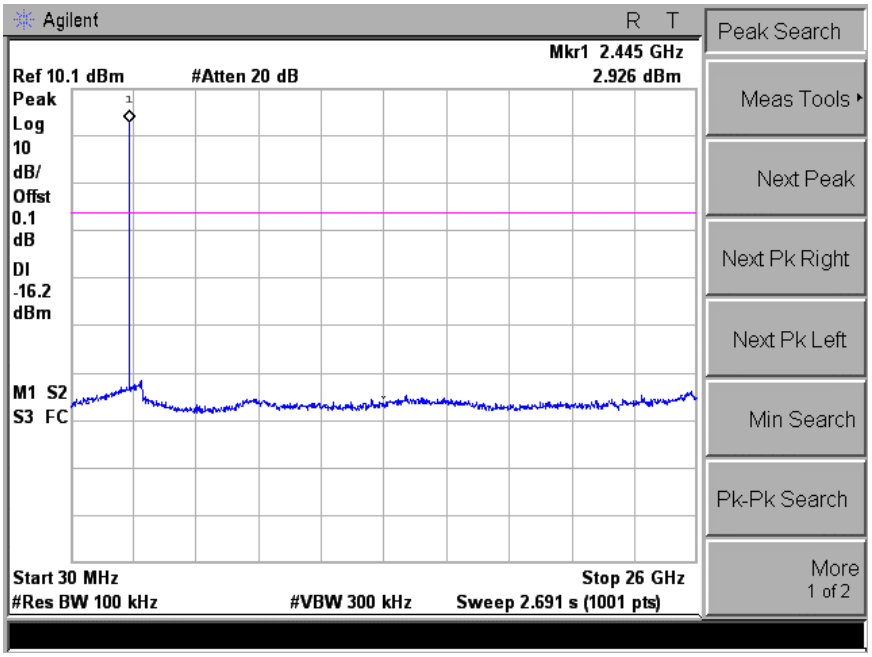


CONDUCTED SPURIOUS EMISSIONS, MID CHANNEL for GFSK Mode

MID CHANNEL REFERENCE

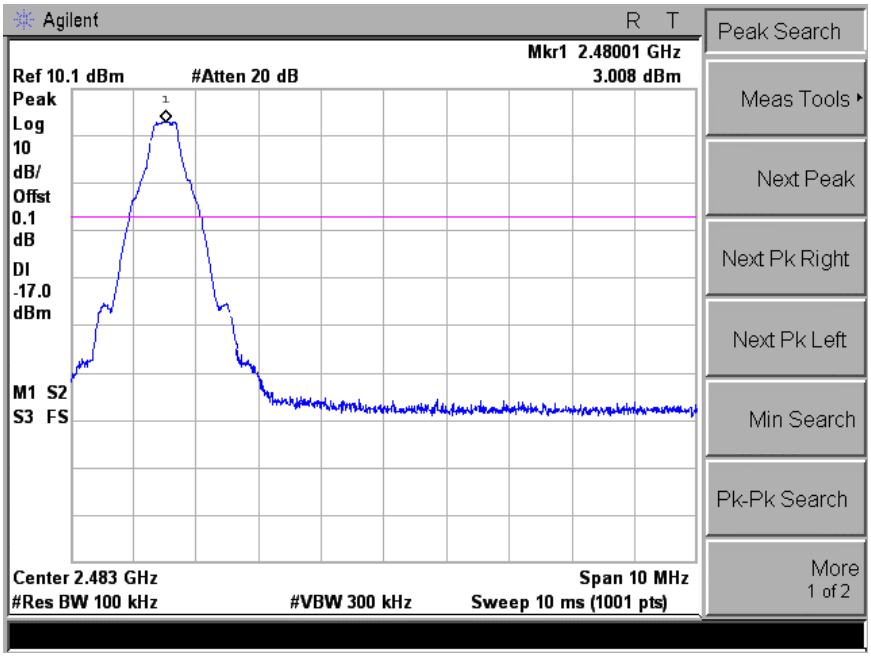


MID CHANNEL SPURIOUS

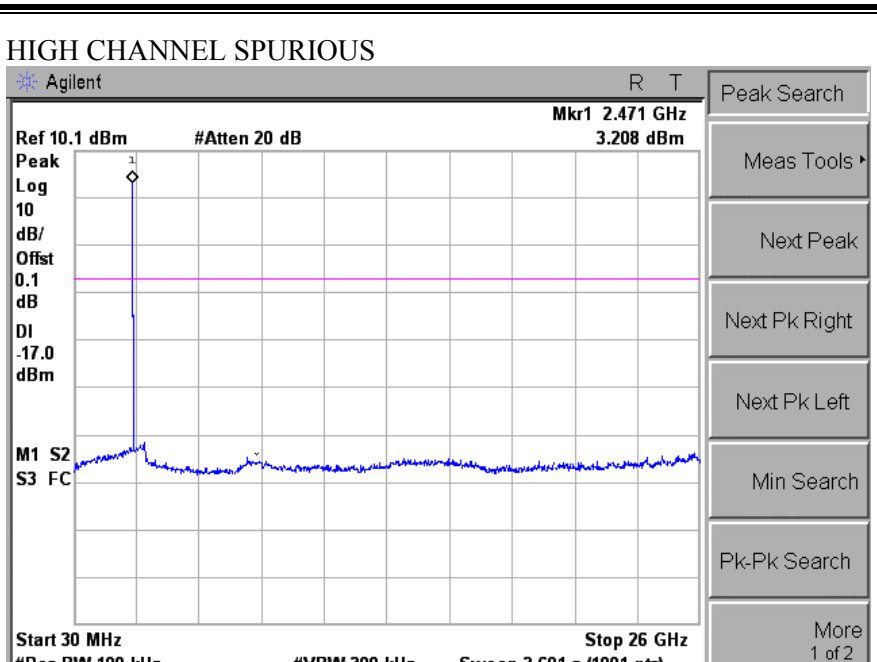


CONDUCTED SPURIOUS EMISSIONS, HIGH CHANNEL for GFSK Mode

HIGH CHANNEL BANDEDGE

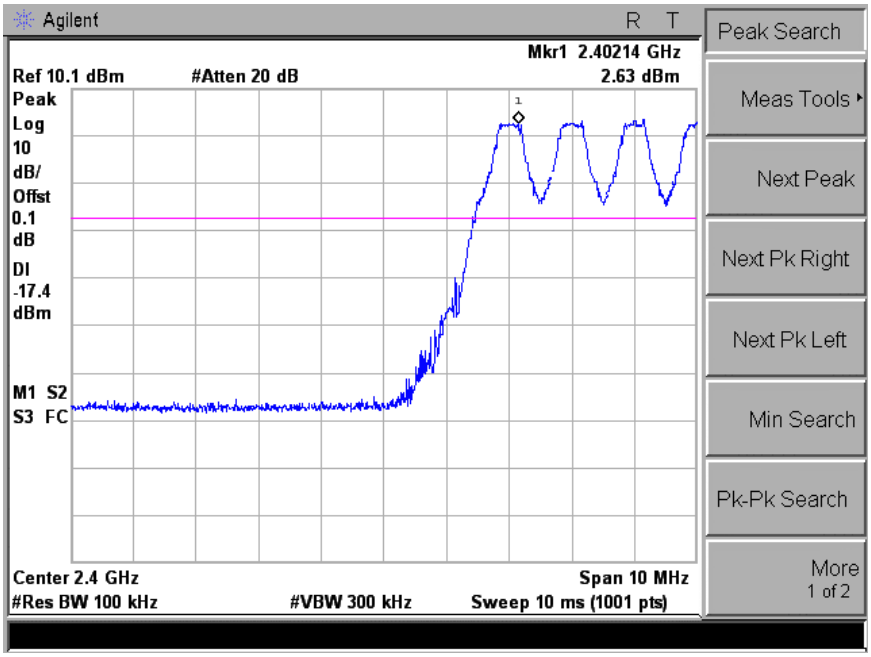


HIGH CHANNEL SPURIOUS

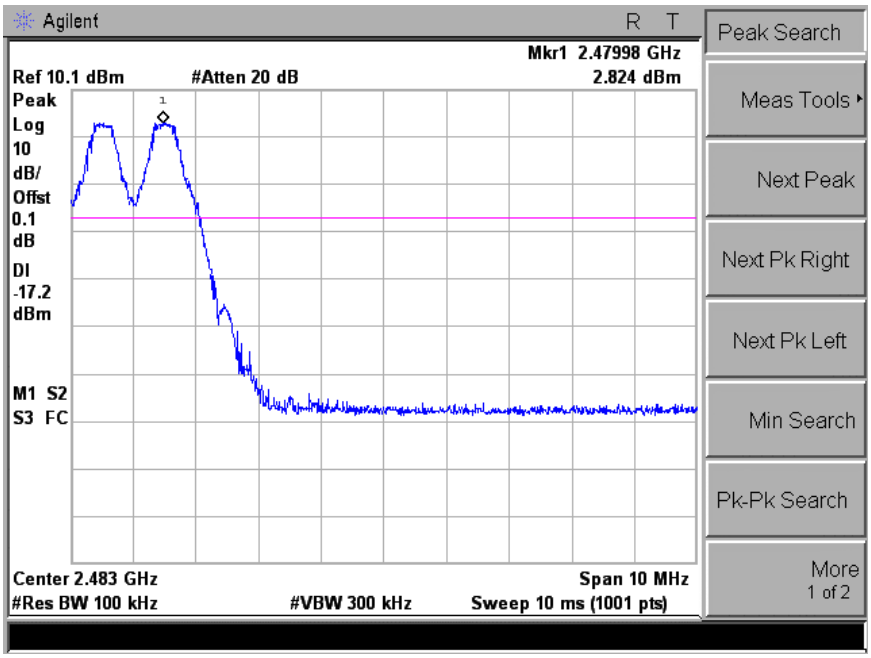


CONDUCTED SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON for GFSK Mode

LOW BANDEDGE WITH HOPPING ON

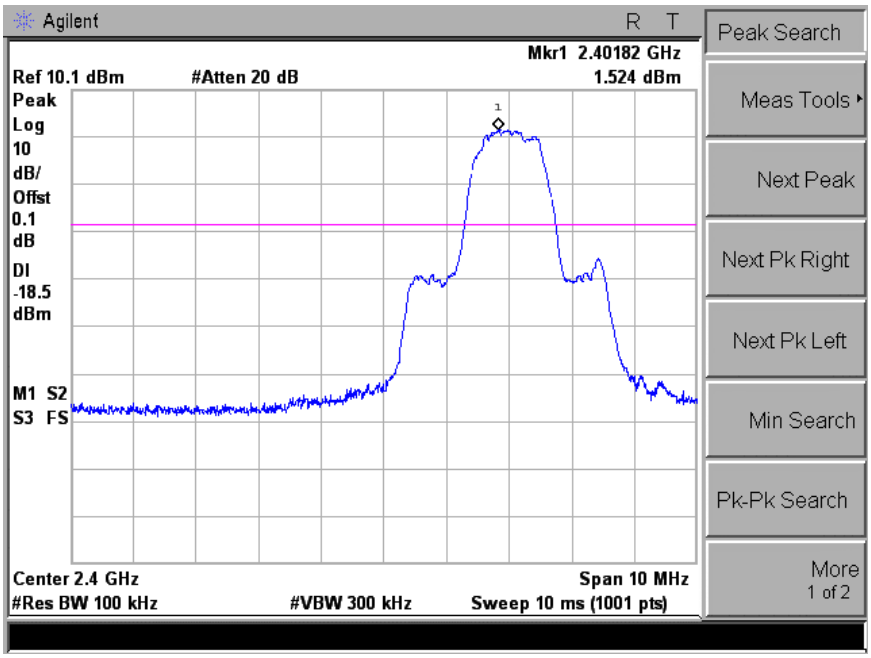


HIGH BANDEDGE WITH HOPPING ON

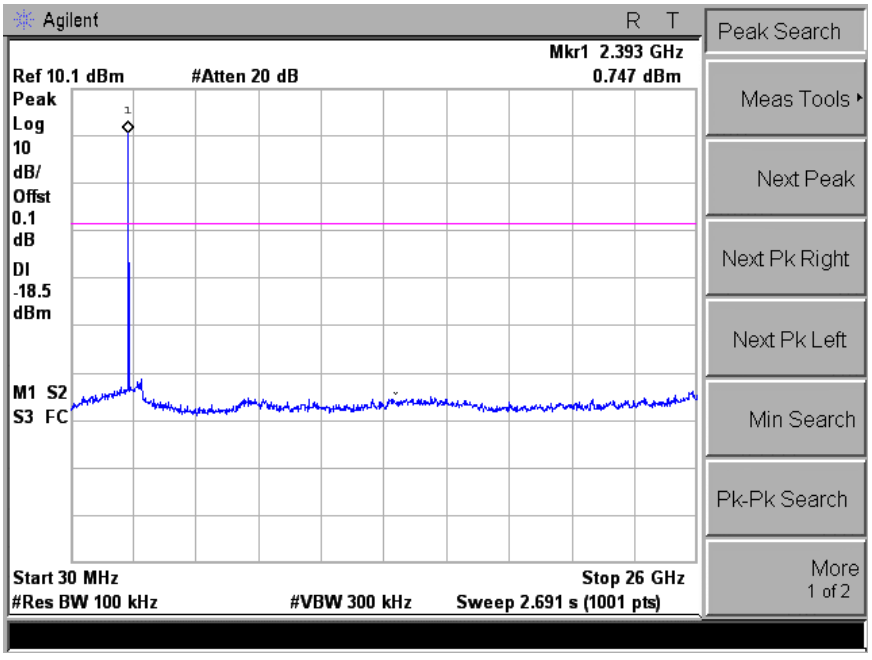


CONDUCTED SPURIOUS EMISSIONS, LOW CHANNEL for 8PSK Mode

LOW CHANNEL BANDEDGE

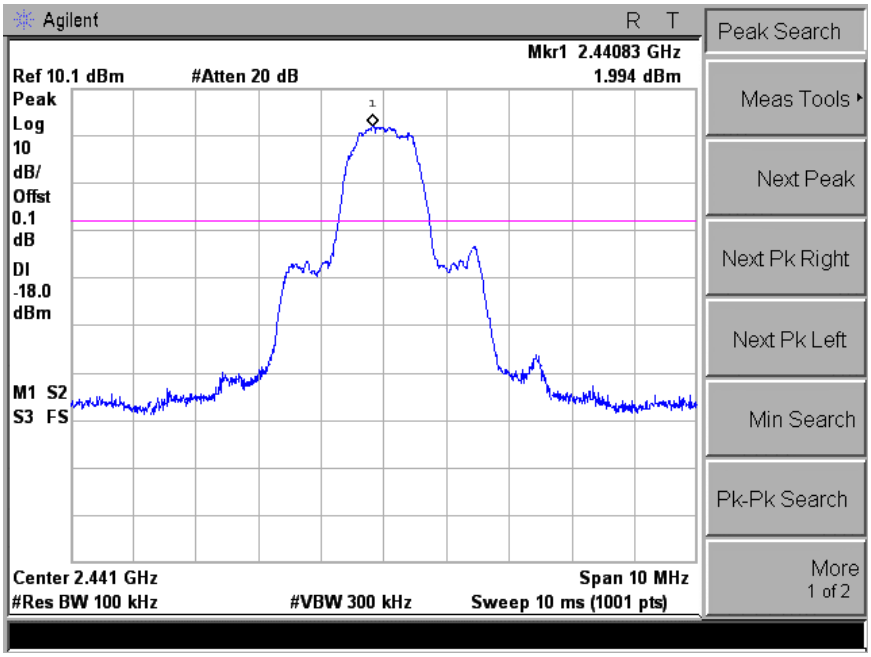


LOW CHANNEL SPURIOUS

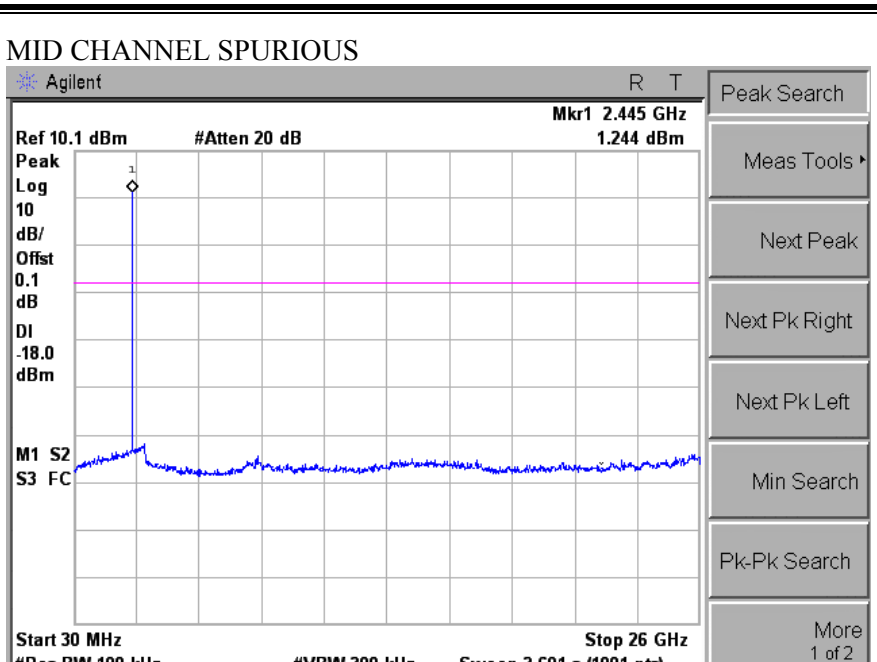


CONDUCTED SPURIOUS EMISSIONS, MID CHANNEL for 8PSK

MID CHANNEL REFERENCE

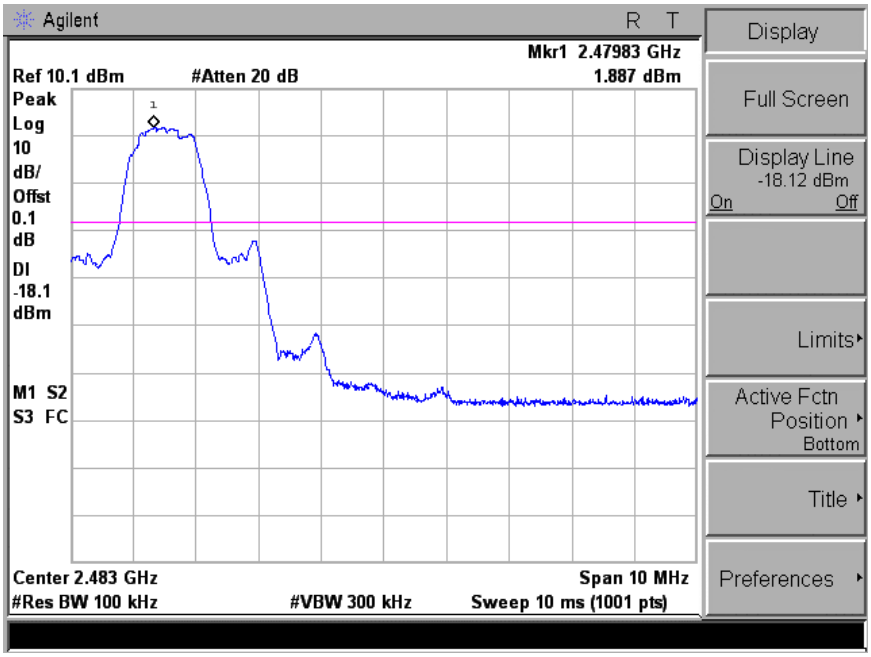


MID CHANNEL SPURIOUS

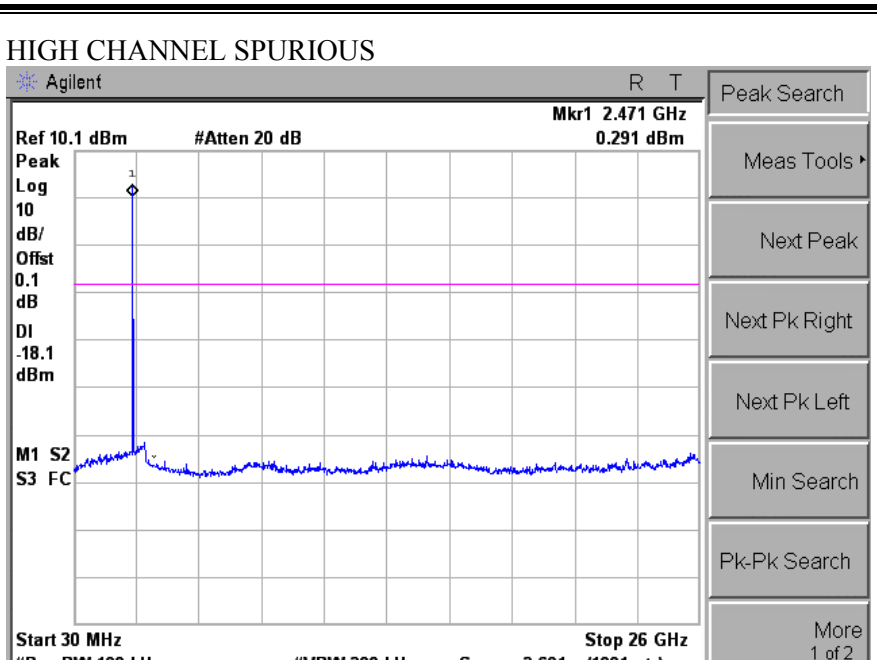


CONDUCTED SPURIOUS EMISSIONS, HIGH CHANNEL for 8PSK Mode

HIGH CHANNEL BANDEDGE

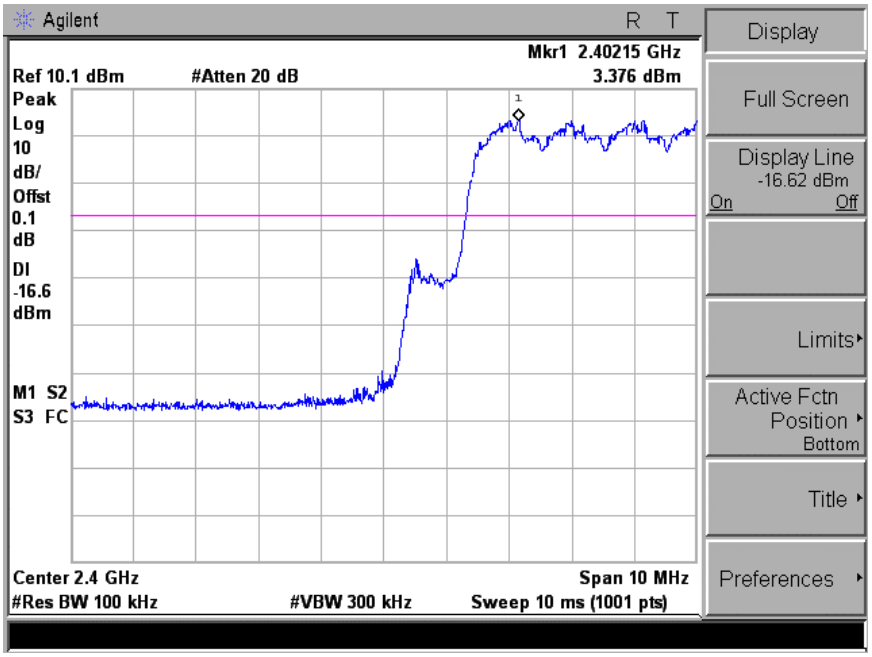


HIGH CHANNEL SPURIOUS

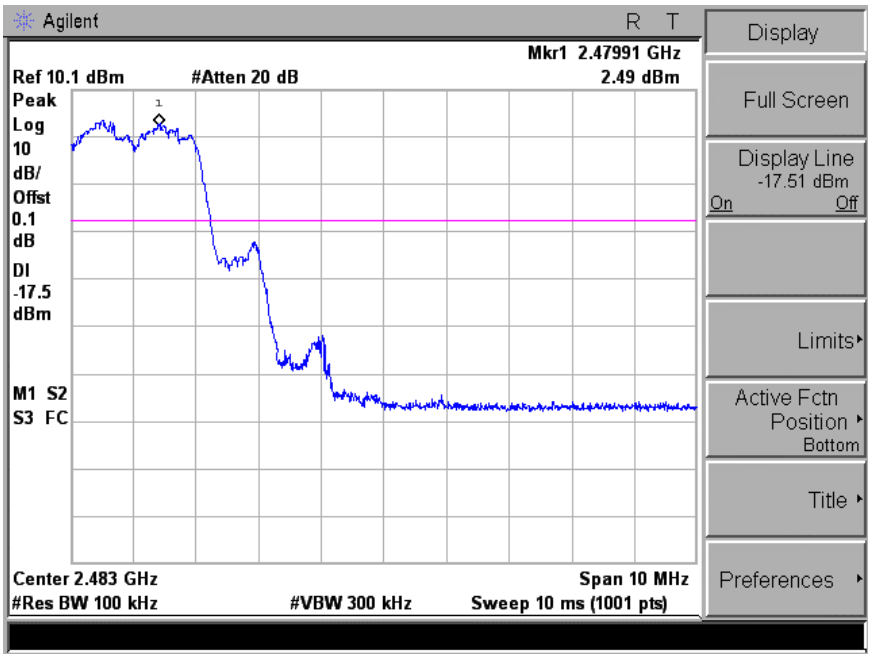


CONDUCTED SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON for 8PSK Mode

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

§15.205 (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.

§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 (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** 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.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

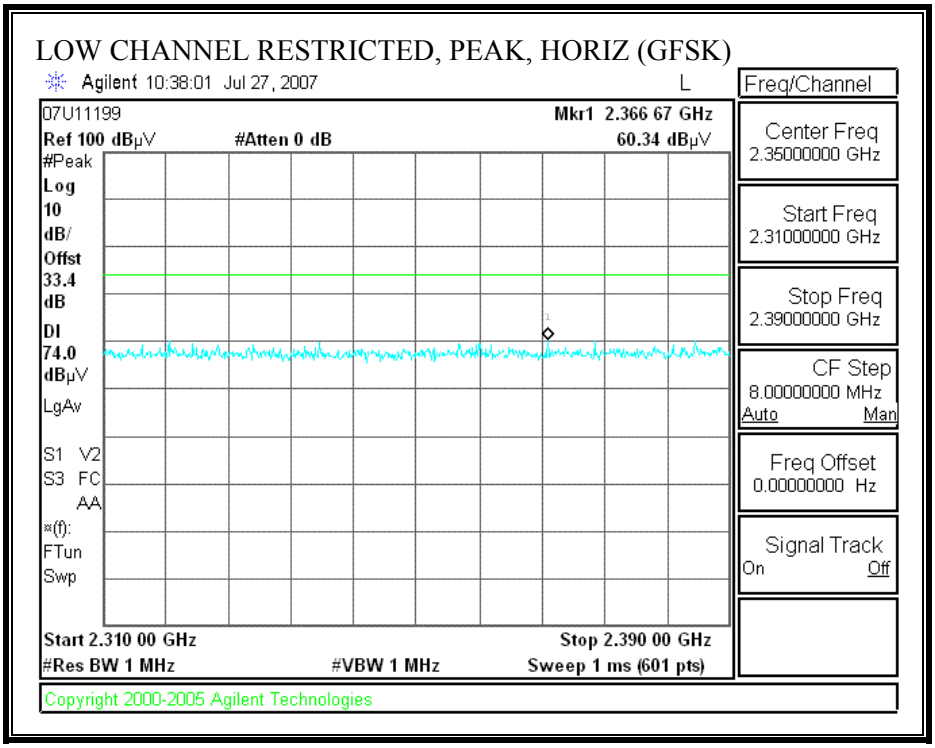
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

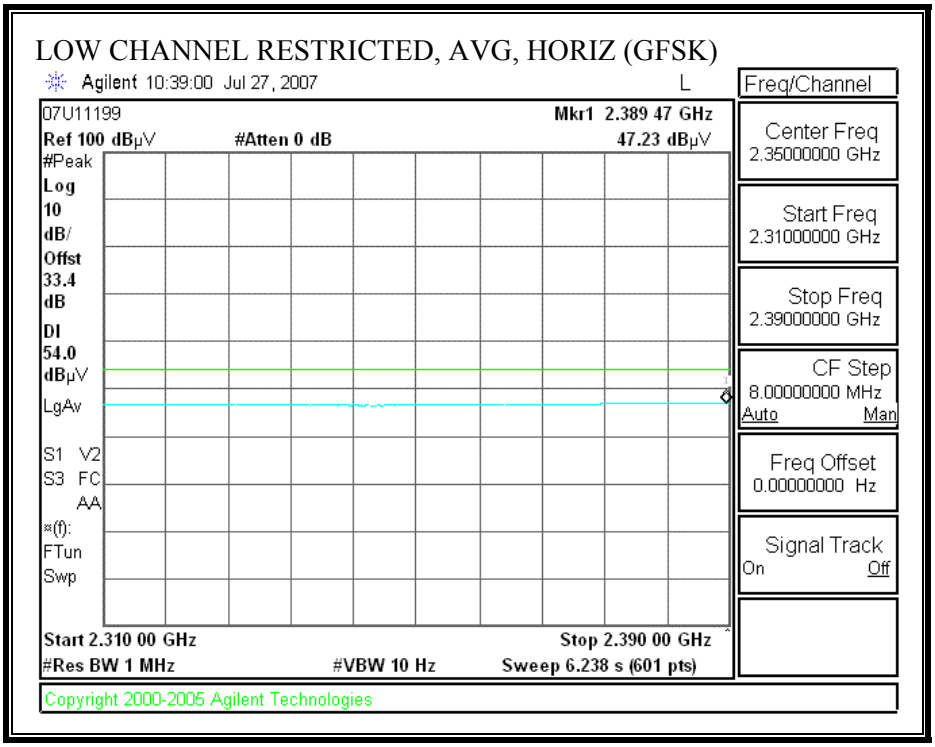
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

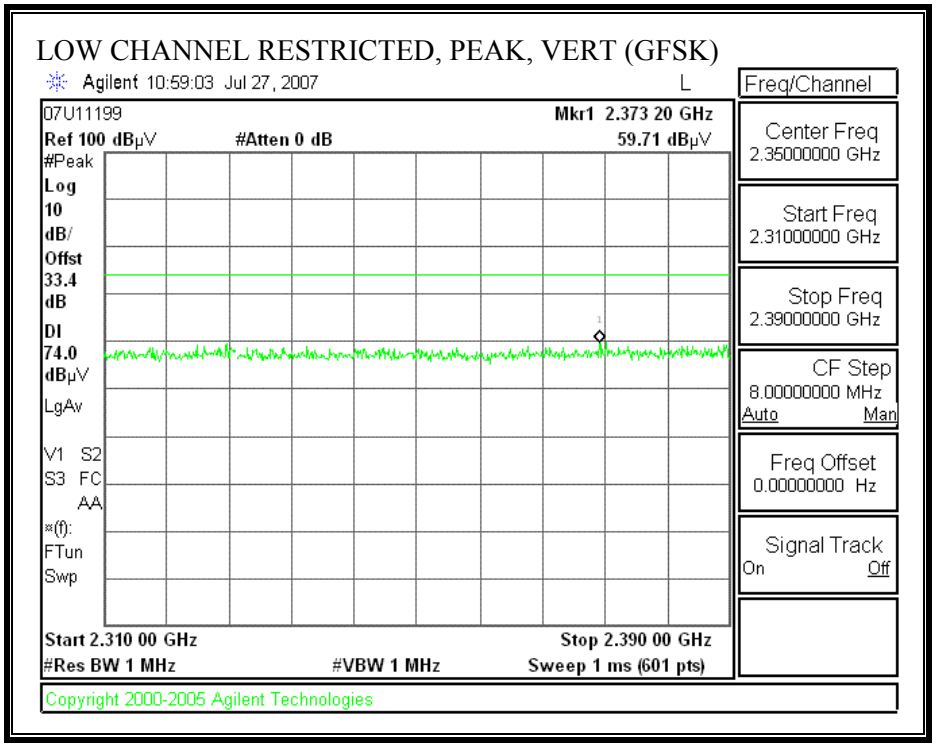
7.2.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

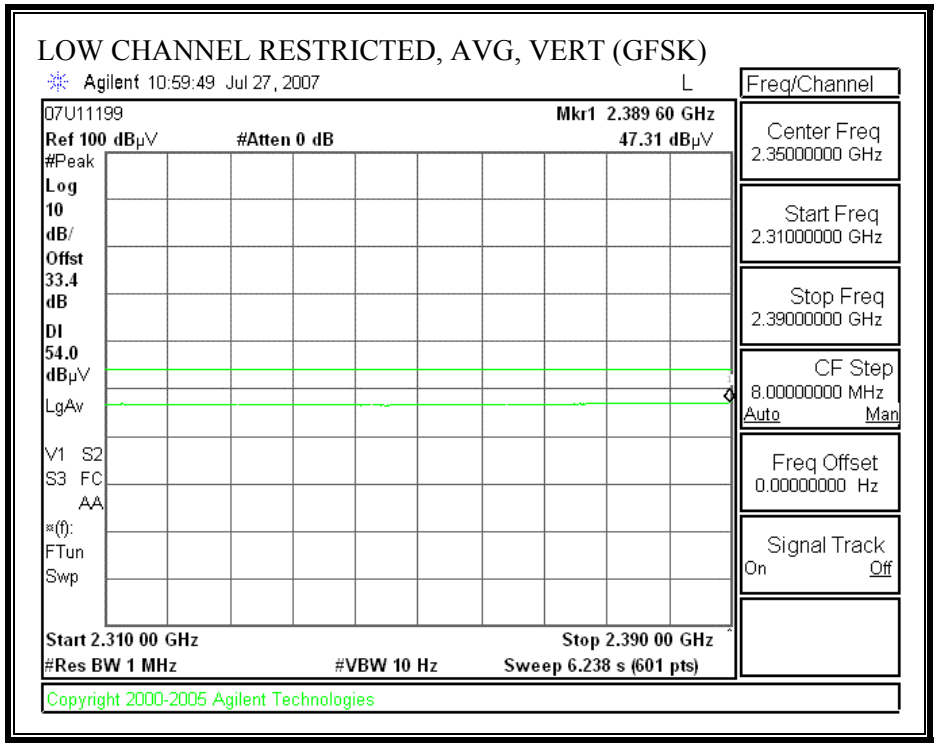
RESTRICTED BANDEDGE (LOW CHANNEL GFSK, HORIZONTAL)





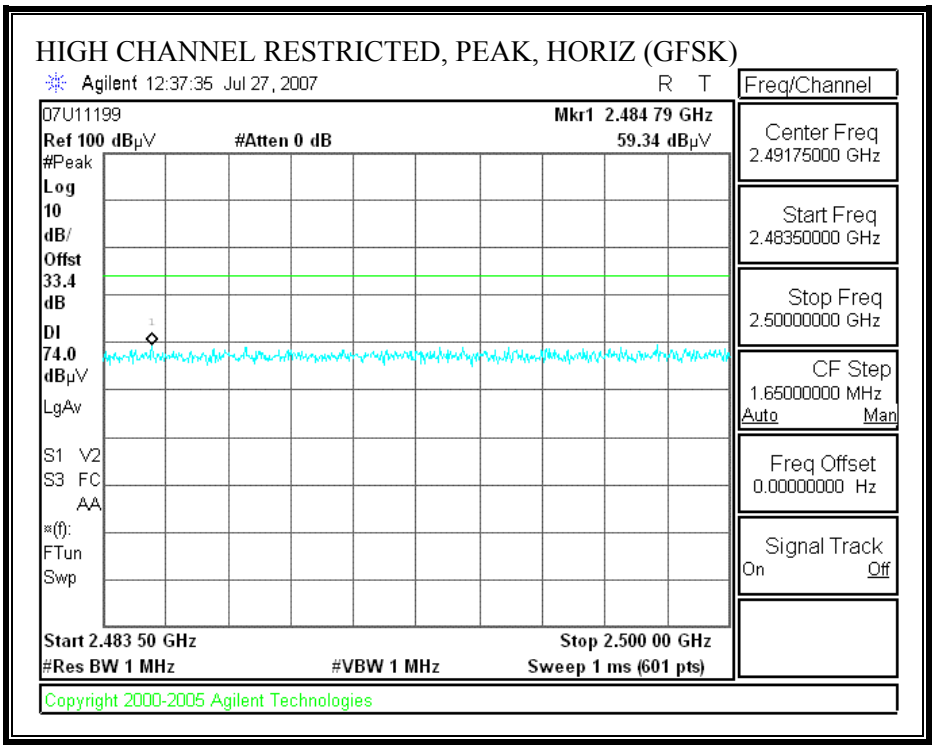
RESTRICTED BANDEDGE (LOW CHANNEL GFSK , VERTICAL)



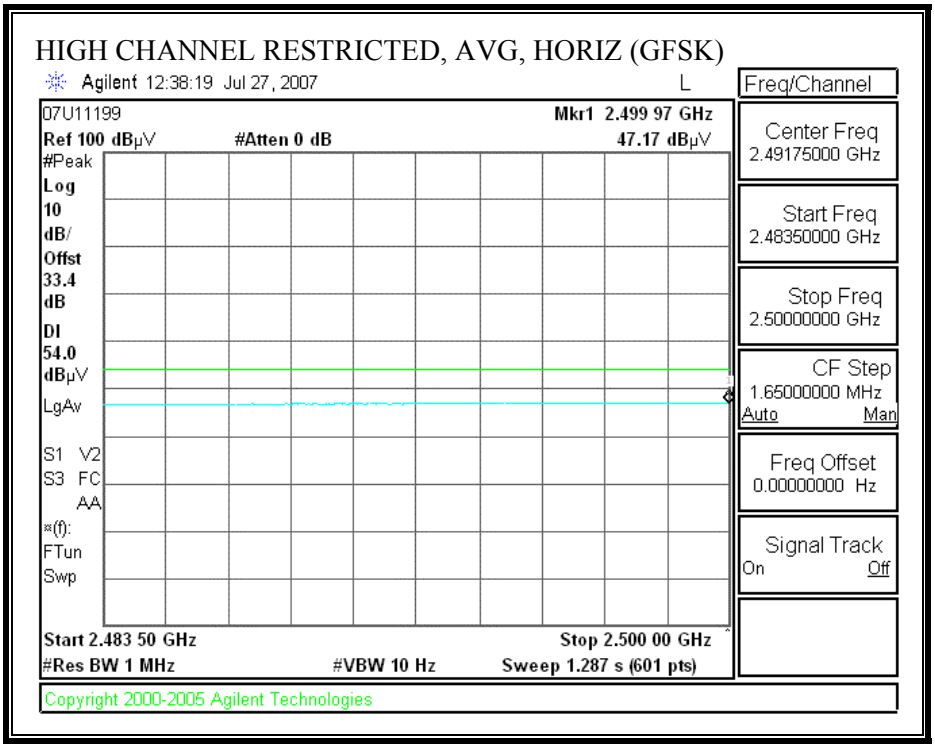


RESTRICTED BANDEDGE (HIGH CHANNEL GFSK , HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ (GFSK)

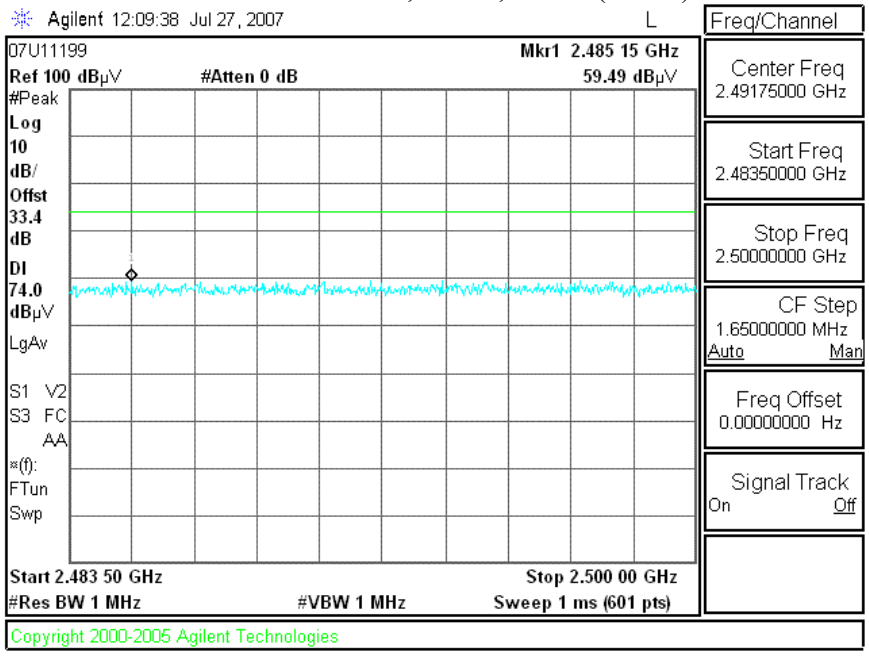


HIGH CHANNEL RESTRICTED, AVG, HORIZ (GFSK)

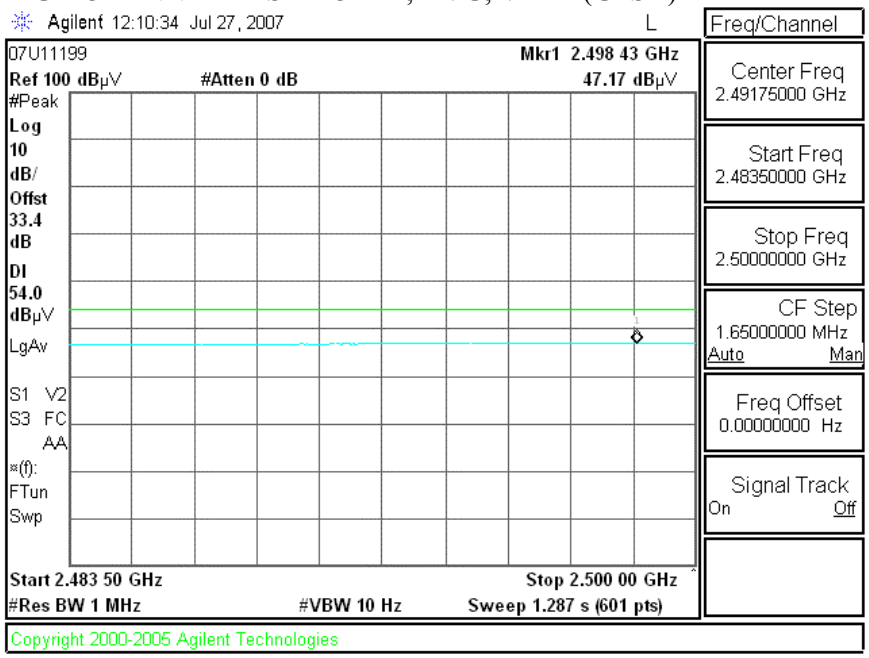


RESTRICTED BANDEDGE (HIGH CHANNEL GFSK, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT (GFSK)



HIGH CHANNEL RESTRICTED, AVG, VERT (GFSK)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
Project #: 07U11199
Date: 7/27/2007
Test Engineer: Can Ming Chung
Configuration: Laptop with EUT
Mode: TX, GFSK

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A005(			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

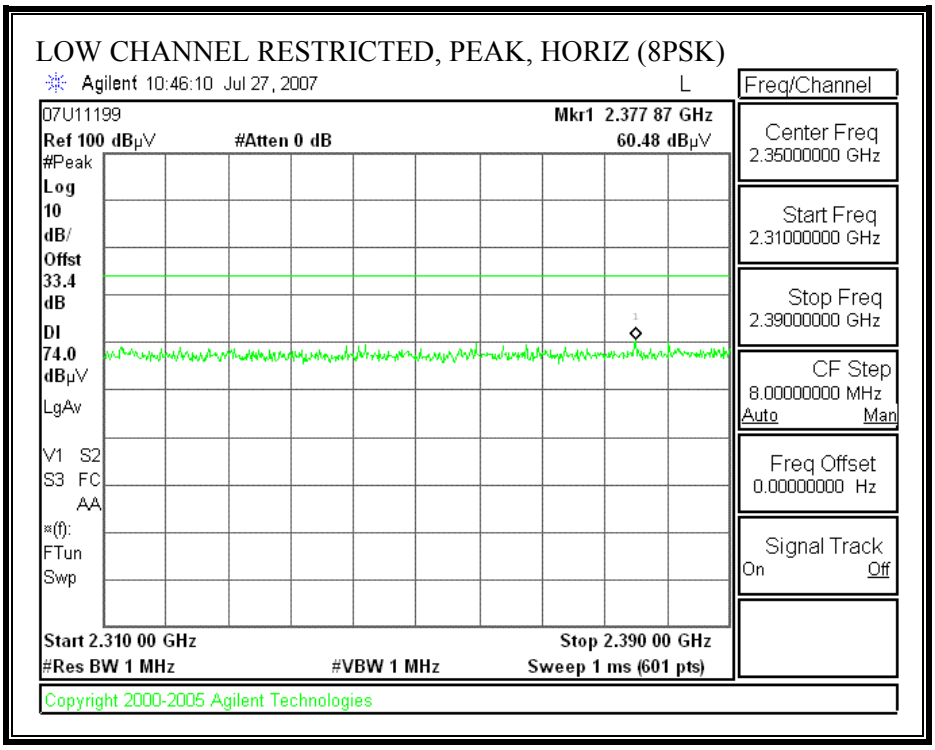
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

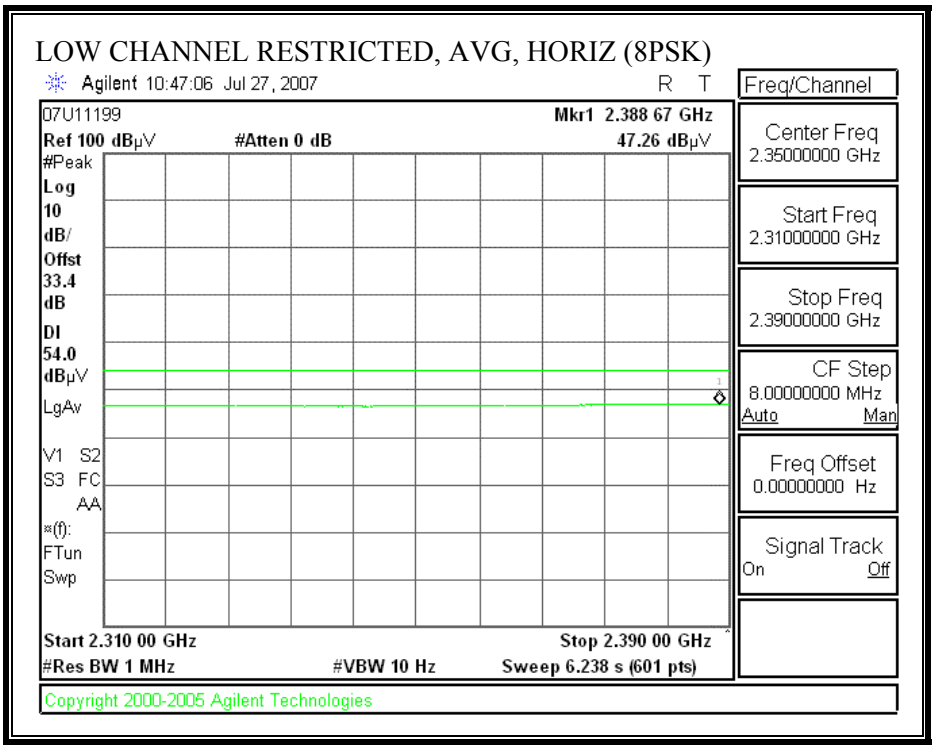
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
4.789	3.0	43.2	30.2	33.3	6.9	-34.8	0.0	0.0	48.4	35.5	74	54	-25.6	-18.5	V
7.234	3.0	44.4	31.1	34.9	8.4	-34.7	0.0	0.0	53.1	39.8	74	54	-20.9	-14.2	V
4.817	3.0	44.3	31.7	33.3	6.9	-34.8	0.0	0.0	49.6	37.0	74	54	-24.4	-17.0	H
7.219	3.0	43.6	30.9	34.9	8.4	-34.7	0.0	0.0	52.2	39.5	74	54	-21.8	-14.5	H
Mid Ch															
4.872	3.0	43.8	30.5	33.4	6.9	-34.9	0.0	0.0	49.2	35.9	74	54	-24.8	-18.1	V
7.467	3.0	42.6	29.4	35.1	8.5	-34.6	0.0	0.0	51.5	38.3	74	54	-22.5	-15.7	V
4.885	3.0	42.6	29.8	33.4	6.9	-34.9	0.0	0.0	48.0	35.2	74	54	-26.0	-18.8	H
7.524	3.0	43.1	30.8	35.1	8.5	-34.6	0.0	0.0	52.1	39.8	74	54	-21.9	-14.2	H
High Ch															
4.963	3.0	43.3	29.8	33.4	7.0	-34.9	0.0	0.0	48.8	35.3	74	54	-25.2	-18.7	V
7.438	3.0	42.8	29.7	35.1	8.5	-34.6	0.0	0.0	51.7	38.5	74	54	-22.3	-15.5	V
4.958	3.0	43.0	29.7	33.4	7.0	-34.9	0.0	0.0	48.6	35.3	74	54	-25.4	-18.7	H
7.441	3.0	44.1	30.7	35.1	8.5	-34.6	0.0	0.0	53.0	39.6	74	54	-21.0	-14.4	H

Rev. 4.12.7

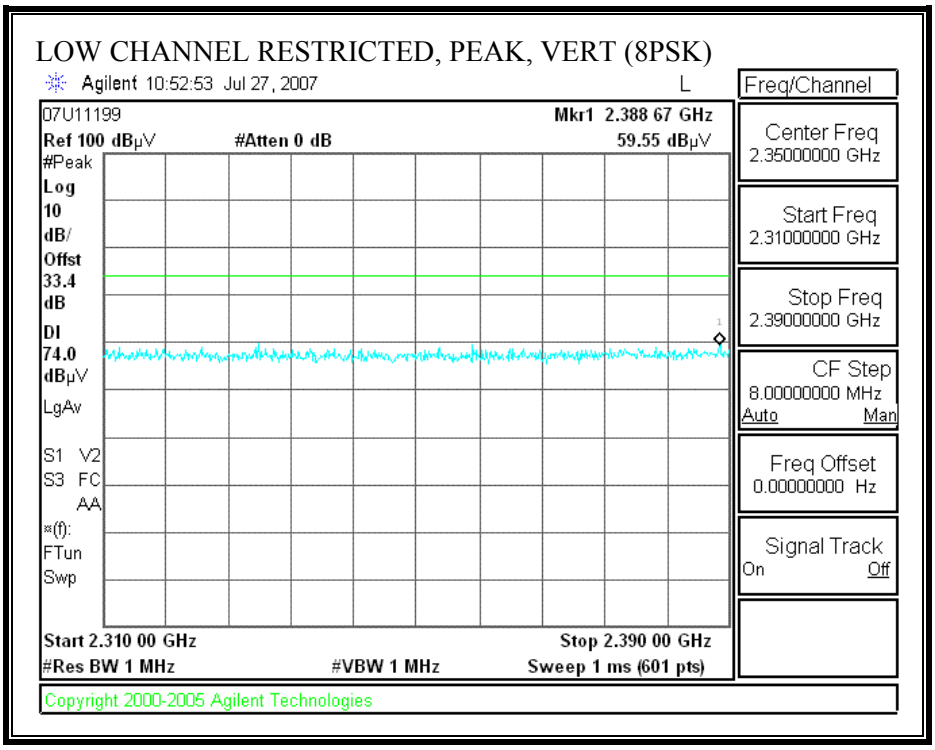
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

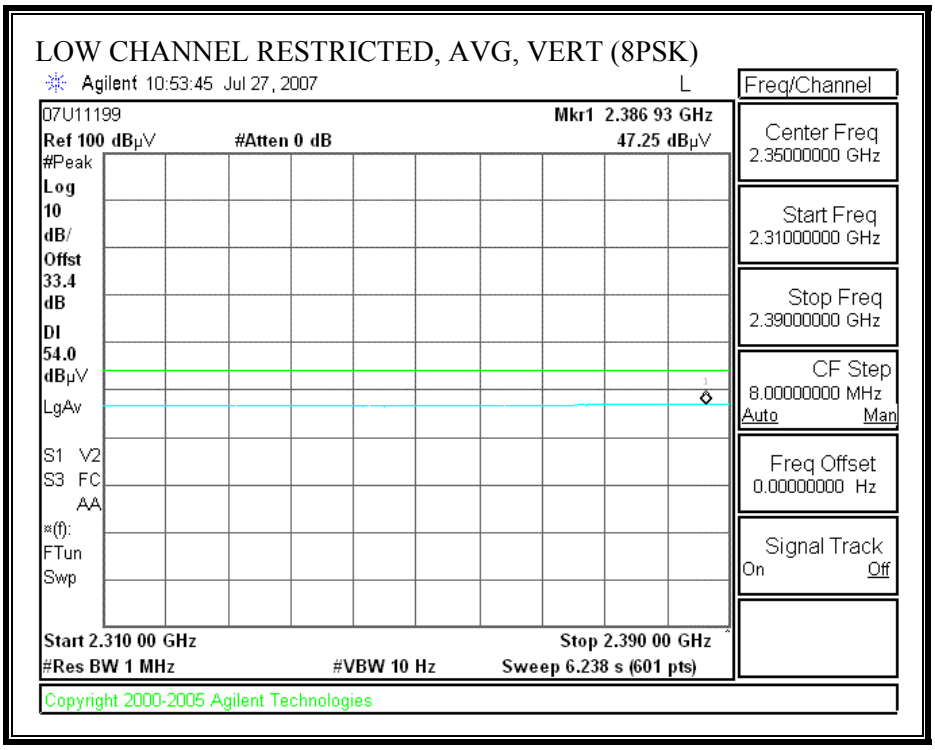
RESTRICTED BANDEDGE (LOW CHANNEL 8PSK, HORIZONTAL)





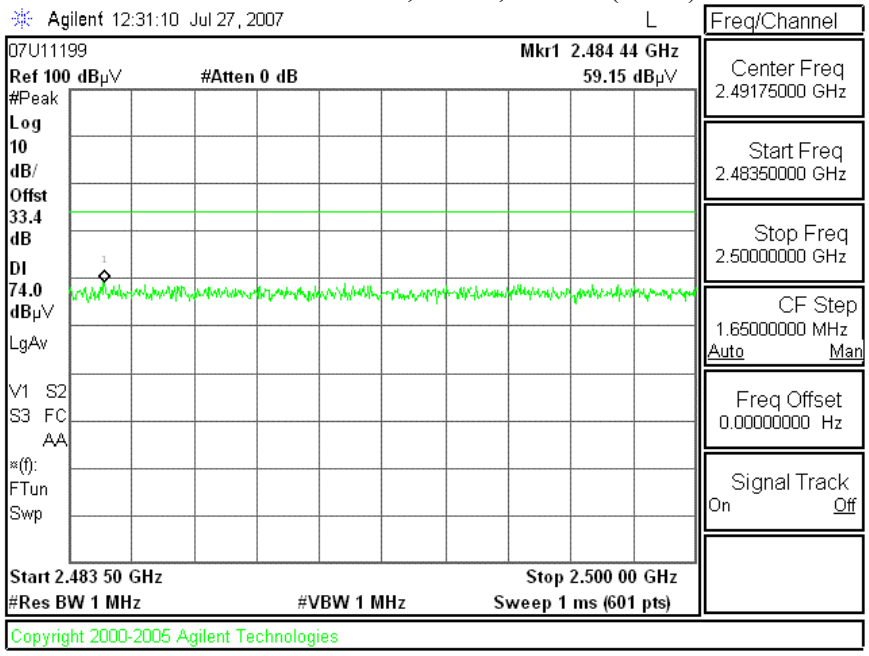
RESTRICTED BANDEDGE (LOW CHANNEL 8PSK , VERTICAL)



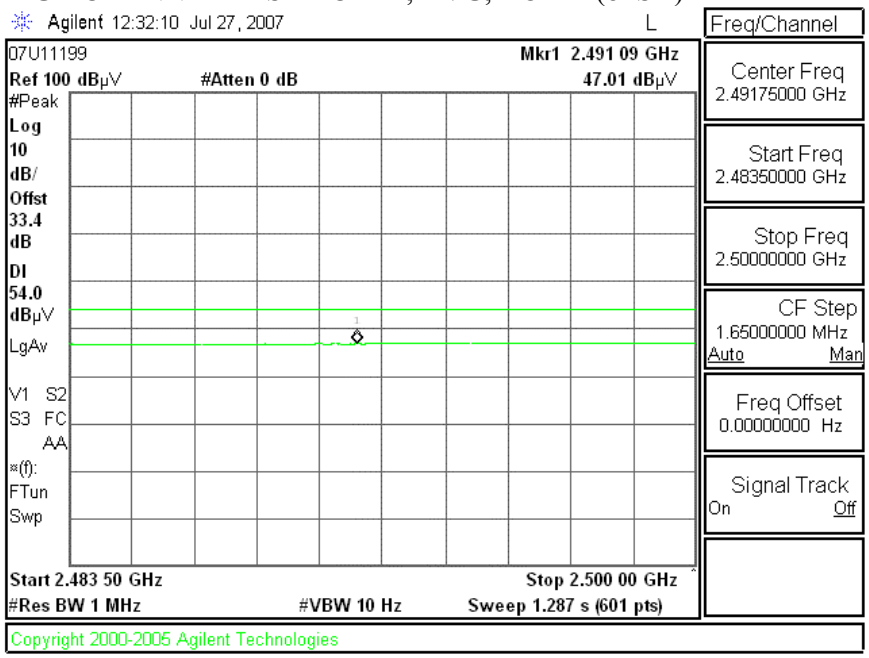


RESTRICTED BANDEDGE (HIGH CHANNEL 8PSK, HORIZONTAL)

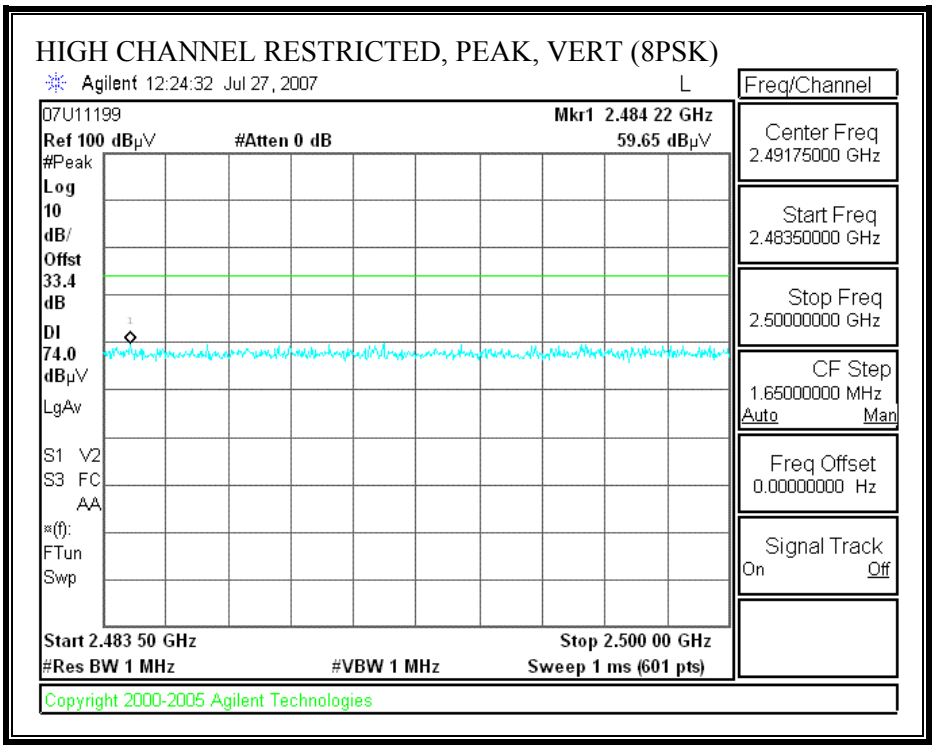
HIGH CHANNEL RESTRICTED, PEAK, HORIZ (8PSK)

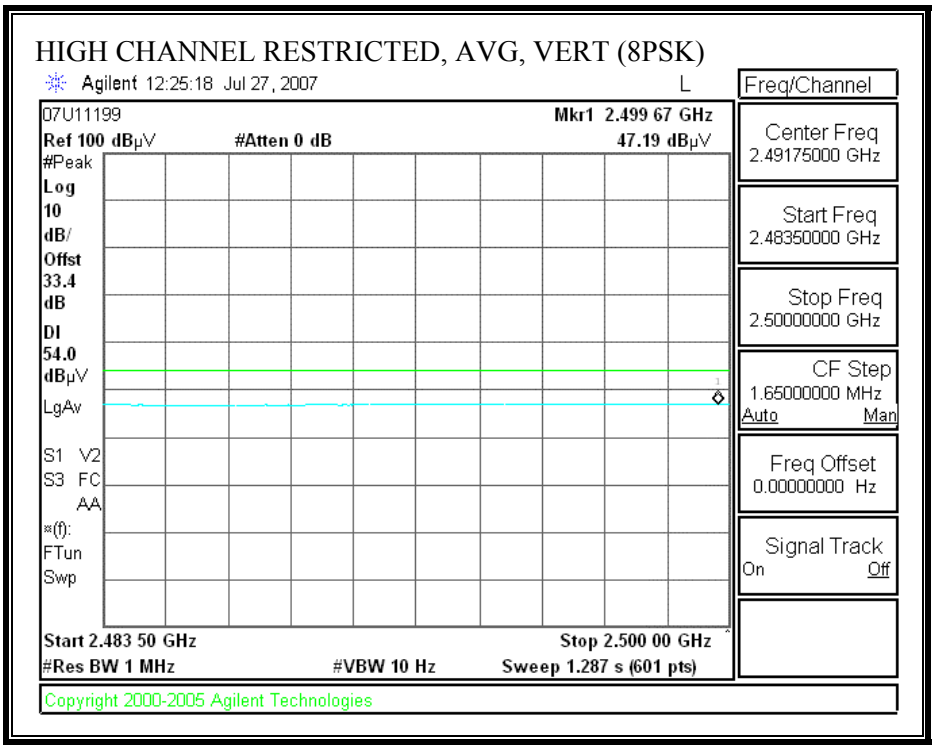


HIGH CHANNEL RESTRICTED, AVG, HORIZ (8PSK)



RESTRICTED BANDEDGE (HIGH CHANNEL 8PSK , VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont B-5m Chamber

Company: Broadcom
Project #: 07U11199
Date: 7/27/2007
Test Engineer: Can Ming Chung
Configuration: Laptop with EUT
Mode: Transmi TX, 8PSK

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A005(			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		Gordon 203134001		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
4.812	3.0	44.3	31.1	33.3	6.9	-34.8	0.0	0.0	49.6	36.4	74	54	-24.4	-17.6	V
7.202	3.0	45.2	32.0	34.9	8.4	-34.7	0.0	0.0	53.9	40.6	74	54	-20.1	-13.4	V
4.806	3.0	45.0	32.8	33.3	6.9	-34.8	0.0	0.0	50.3	38.1	74	54	-23.7	-15.9	H
7.210	3.0	44.7	31.3	34.9	8.4	-34.7	0.0	0.0	53.3	39.9	74	54	-20.7	-14.1	H
Mid Ch															
4.882	3.0	44.8	31.7	33.4	6.9	-34.9	0.0	0.0	50.3	37.1	74	54	-23.7	-16.9	V
7.326	3.0	43.8	30.9	35.0	8.4	-34.7	0.0	0.0	52.5	39.6	74	54	-21.5	-14.4	V
4.877	3.0	43.6	30.4	33.4	6.9	-34.9	0.0	0.0	49.0	35.8	74	54	-25.0	-18.2	H
7.323	3.0	44.0	30.9	35.0	8.4	-34.7	0.0	0.0	52.8	39.7	74	54	-21.2	-14.3	H
High Ch															
4.959	3.0	43.4	31.1	33.4	7.0	-34.9	0.0	0.0	48.9	36.7	74	54	-25.1	-17.3	V
7.443	3.0	44.3	29.9	35.1	8.5	-34.6	0.0	0.0	53.2	38.7	74	54	-20.8	-15.3	V
4.957	3.0	43.3	30.0	33.4	7.0	-34.9	0.0	0.0	48.8	35.6	74	54	-25.2	-18.4	H
7.435	3.0	43.6	30.9	35.1	8.5	-34.6	0.0	0.0	52.5	39.7	74	54	-21.5	-14.3	H

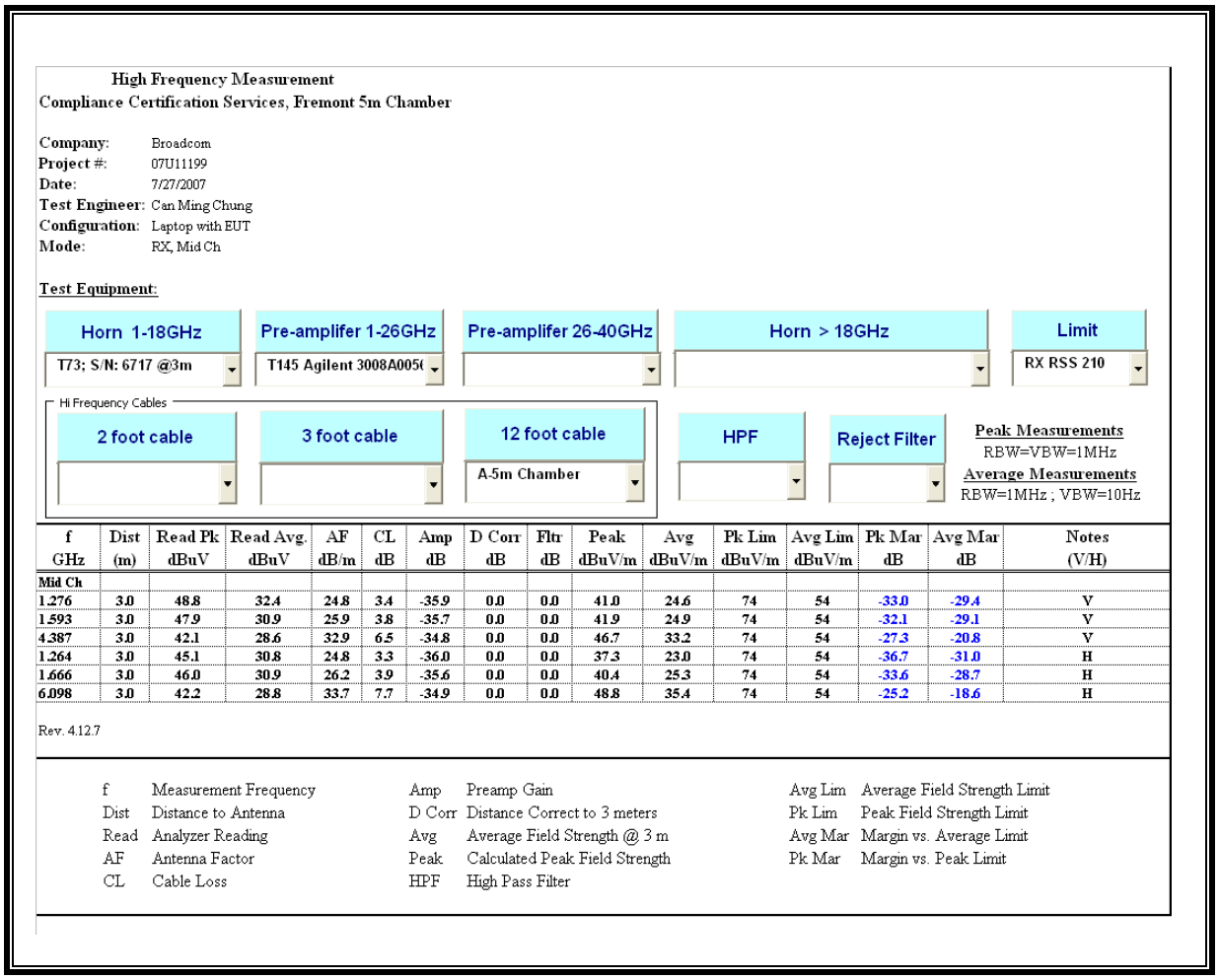
Rev. 5.1.6

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.2.3. RECEIVER ABOVE 1 GHz

RESULTS

No non-compliance noted:



High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
Project #: 07U11199
Date: 7/27/2007
Test Engineer: Can Ming Chung
Configuration: Laptop with EUT
Mode: RX, Mid Ch

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A005(			RX RSS 210

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mid Ch															
1.276	3.0	48.8	32.4	24.8	3.4	-35.9	0.0	0.0	41.0	24.6	74	54	-33.0	-29.4	V
1.593	3.0	47.9	30.9	25.9	3.8	-35.7	0.0	0.0	41.9	24.9	74	54	-32.1	-29.1	V
4.387	3.0	42.1	28.6	32.9	6.5	-34.8	0.0	0.0	46.7	33.2	74	54	-27.3	-20.8	V
1.264	3.0	45.1	30.8	24.8	3.3	-36.0	0.0	0.0	37.3	23.0	74	54	-36.7	-31.0	H
1.666	3.0	46.0	30.9	26.2	3.9	-35.6	0.0	0.0	40.4	25.3	74	54	-33.6	-28.7	H
6.098	3.0	42.2	28.8	33.7	7.7	-34.9	0.0	0.0	48.8	35.4	74	54	-25.2	-18.6	H

Rev. 4.12.7

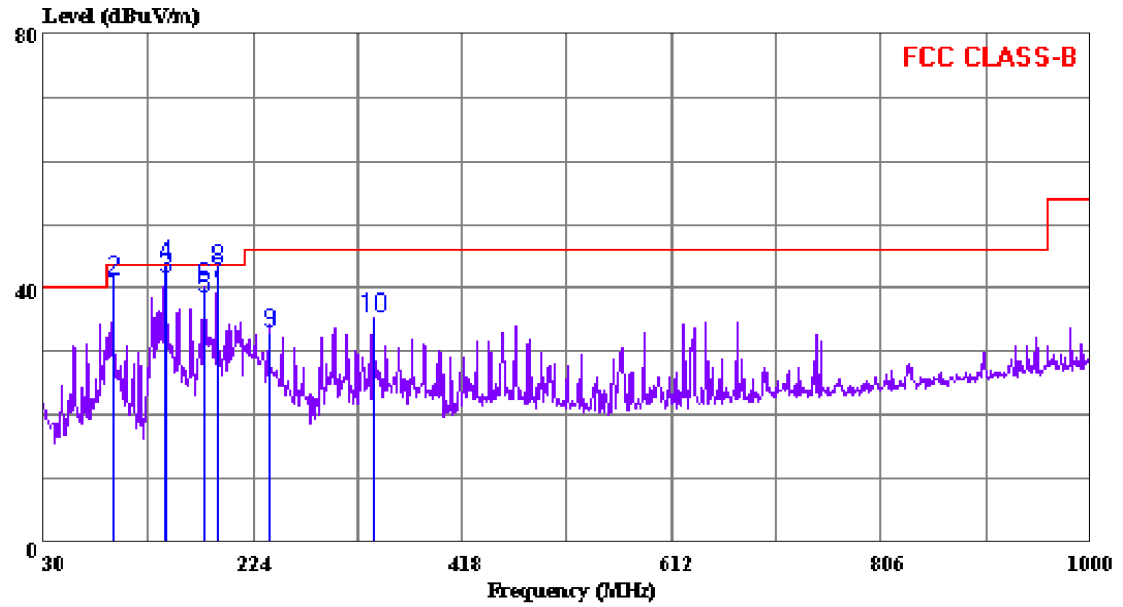
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.2.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

GFSK Mode

HORIZONTAL PLOT



Trace: 5 Ref Trace:

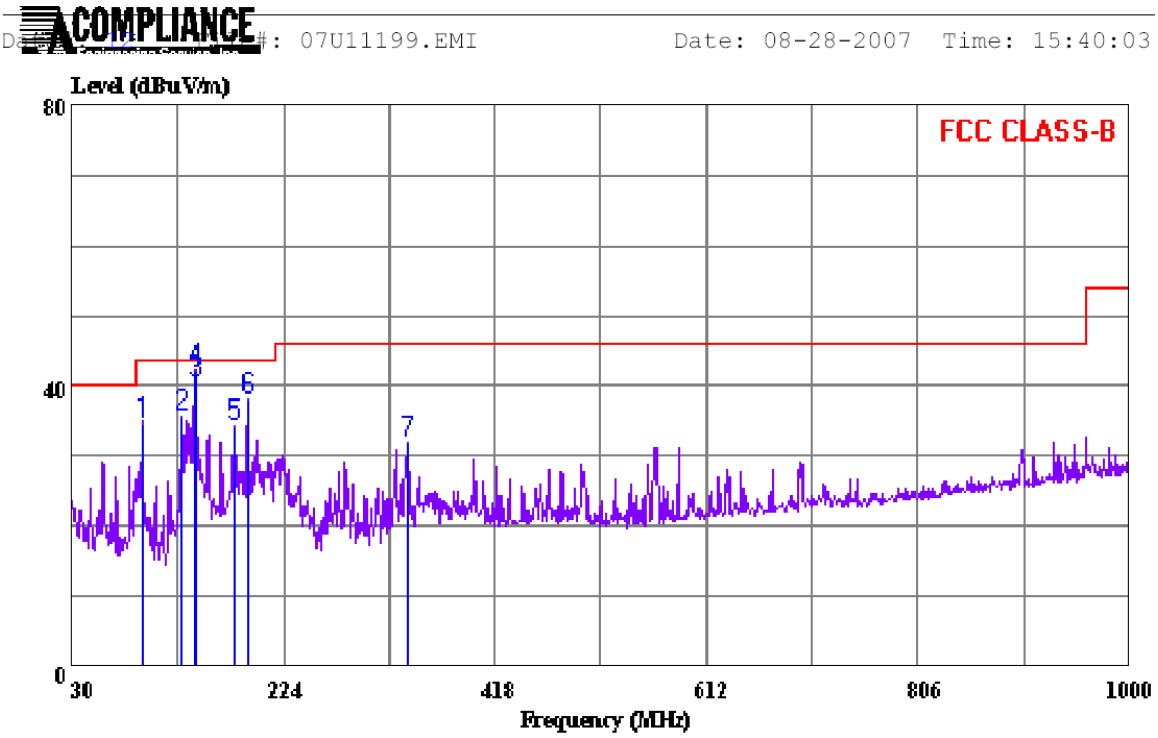
Condition: FCC CLASS-B HORIZONTAL
Engineer: : Devin chang
Company: : Boardcom
Project #: : 07U11199
Test Configuration:: EUT with laptop
Mode of operation: : Tx GFSK mode
Test Target: : FCC Class B

Page: 1

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		94.990	60.30	-22.03	38.27	43.50	-5.23	QP
2		94.990	62.90	-21.79	41.11	43.50	-2.39	Peak
3		142.520	58.60	-16.90	41.70	43.50	-1.80	QP
4	*	142.520	60.70	-16.90	43.80	43.50	0.30	Peak
5		178.410	56.90	-18.51	38.39	43.50	-5.11	QP
6		178.410	58.80	-18.51	40.29	43.50	-3.21	Peak
7		191.020	58.90	-18.14	40.76	43.50	-2.74	QP
8		191.020	61.00	-18.14	42.86	43.50	-0.64	Peak
9		238.550	51.00	-18.18	32.82	46.00	-13.18	Peak
10		335.550	50.40	-14.92	35.48	46.00	-10.52	Peak

8PSK Mode

HORIZONTAL PLOT



Trace: 9 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Engineer: : Devin chang
Company: : Boardcom
Project #: : 07U11199
Test Configuration:: EUT with laptop
Mode of operation: : Tx GFSK Mode
Test Target: : FCC Class B

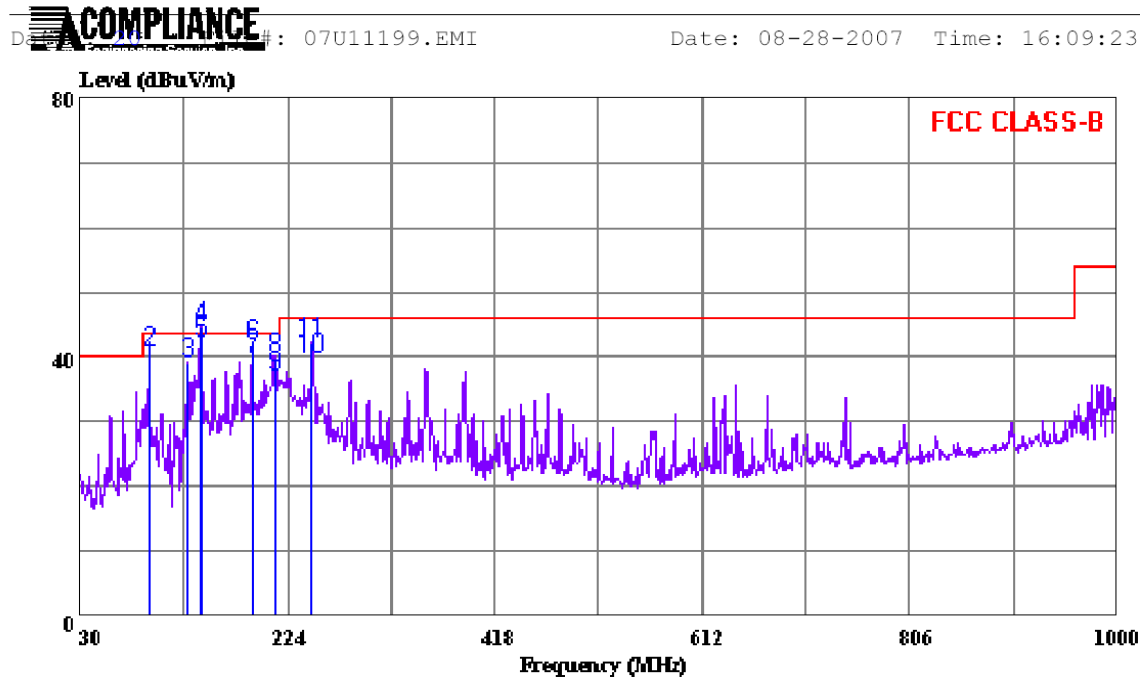
Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	94.020	56.50	-22.03	34.47	43.50	-9.03	Peak
2	130.880	52.20	-16.60	35.60	43.50	-7.90	Peak
3	142.520	57.30	-16.90	40.40	43.50	-3.10	QP
4	142.520	59.20	-16.90	42.30	43.50	-1.20	Peak
5	178.410	52.70	-18.51	34.19	43.50	-9.31	Peak
6	191.020	56.30	-18.14	38.16	43.50	-5.34	Peak
7	337.490	46.50	-14.80	31.70	46.00	-14.30	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

GFSK Mode

VERTICAL PLOT



Trace: 17 Ref Trace:

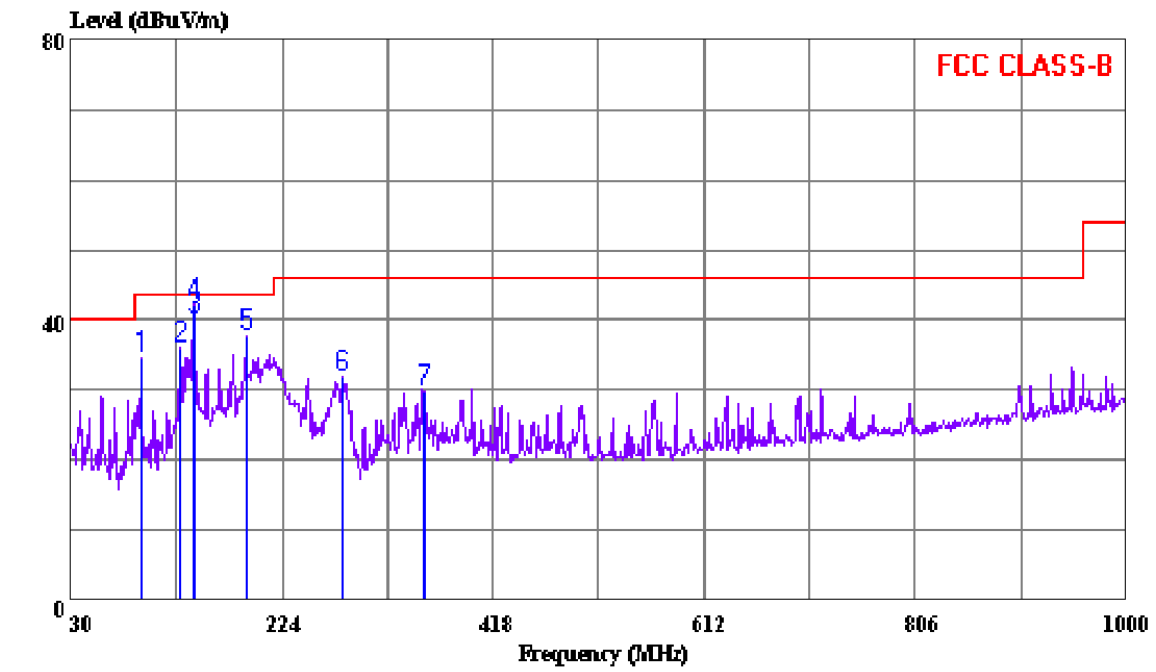
Condition: FCC CLASS-B HORIZONTAL
Engineer: : Devin chang
Company: : Boardcom
Project #: : 07U11199
Test Configuration:: EUT with laptop
Mode of operation: : Tx 8PSK Mode
Test Target: : FCC Class B

Page: 1

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		94.990	60.30	-22.03	38.27	43.50	-5.23	QP
2		94.990	62.60	-21.79	40.81	43.50	-2.69	Peak
3		130.880	55.80	-16.60	39.20	43.50	-4.30	Peak
4	*	142.520	61.50	-16.90	44.60	43.50	1.10	Peak
5		142.520	59.20	-16.90	42.30	43.50	-1.20	QP
6		191.020	60.00	-18.14	41.86	43.50	-1.64	Peak
7		191.020	57.80	-18.14	39.66	43.50	-3.84	QP
8		211.390	58.60	-18.90	39.70	43.50	-3.80	Peak
9		211.390	56.10	-18.90	37.20	43.50	-6.30	QP
10		246.310	57.70	-17.94	39.76	46.00	-6.24	QP
11		246.310	60.10	-17.94	42.16	46.00	-3.84	Peak

8PSF Mode

VERTICAL PLOT



Trace: 13 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Engineer: : Devin chang
Company: : Boardcom
Project #: : 07U11199
Test Configuration:: EUT with laptop
Mode of operation: : Tx 8PSK Mode
Test Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	94.990	56.50	-21.79	34.71	43.50	-8.79	Peak
2	130.880	52.60	-16.60	36.00	43.50	-7.50	Peak
3	142.520	56.90	-16.90	40.00	43.50	-3.50	QP
4	142.520	59.10	-16.90	42.20	43.50	-1.30	Peak
5	191.020	56.00	-18.14	37.86	43.50	-5.64	Peak
6	279.290	48.40	-16.69	31.71	46.00	-14.29	Peak
7	354.950	44.20	-14.46	29.74	46.00	-16.26	Peak