FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

HANDHELD TERMINAL

MODEL NUMBER: IT-3100M53E2, IT-3100M54E2, IT-3100M55E2, IT-3100M56E2

FCC ID: BBQIT3100V2
IC: 2388F-IT3100V2

REPORT NUMBER: 10J13417-2, Revision A

ISSUE DATE: OCTOBER 19, 2010

Prepared for
CASIO COMPUTER CO., LTD
6-2 HON-MACHI 1-CHOME
SHIBUYA-KU
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/13/10	Initial Issue	F. Ibrahim
A	10/19/10	Updated test equipment list	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CASIO COMPUTER CO., LTD
6-2 HON-MACHI 1-CHOME
SHIBUYA-KU
TOKYO, 151-8543, JAPAN

EUT DESCRIPTION: HANDHELD TERMINAL

MODEL: IT-3100M53E2, IT-3100M54E2, IT-3100M55E2, IT-3100M56E2

TESTED MODEL: IT-3100M55E2

SERIAL NUMBER: 00039-446-750-079, 00039-446-750-081

DATE TESTED: SEPTEMBER 20-23, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL 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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Handheld Terminal with Bluetooth transceiver.

The radio module is manufactured by Murata Manufacturing Co., Ltd.

5.2. ACCESSORY AND MODEL DIFFERENCES

The EUT model IT-3100M55E2 with HA-B61IO was chosen as a representative of the following models for testing since it represents the worst-case scenario. The table below shows the model differences:

*: Model tested

Model Number	Magnetic Card Reader	CMOS Imager
IT-3100M53E2	No	No
IT- 3100M54E2	Yes	No
IT- 3100M55E2*	Yes	Yes
IT- 3100M56E2	No	Yes

ACCESSORIES

The EUT has the following accessories:

Product name	Manufacturer	Model name
Bridge Satellite Cradle	Casio	HA-B61IO
AC Adapter	Casio	AD-S42120B
Cradle-type Battery Charger	Casio	HA-B30CHG
AC Adapter	Casio	AD-S42120B

5.3. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	0.01	1.00
2402 - 2480	Enhanced 8PSK	2.00	1.58

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an IFA antenna, with a maximum gain of -0.35 dBi.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was BTRadioTest CE5.0.

5.6. WORST-CASE CONFIGURATION AND MODE

The fundamental was measured in three different orientations X, Y and Z to find worst-case orientation, and it was found that Z orientation is worst-case; therefore final testing for radiated emissions was performed with EUT in Z orientation.

The worst-case channel is determined as the channel with the highest output power, radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to the channel with highest output power.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Bridge Satellite Cradle	CASIO	HA-B61IO	N/A
AC/DC Adapter	CASIO	AD-S42120B	N/A

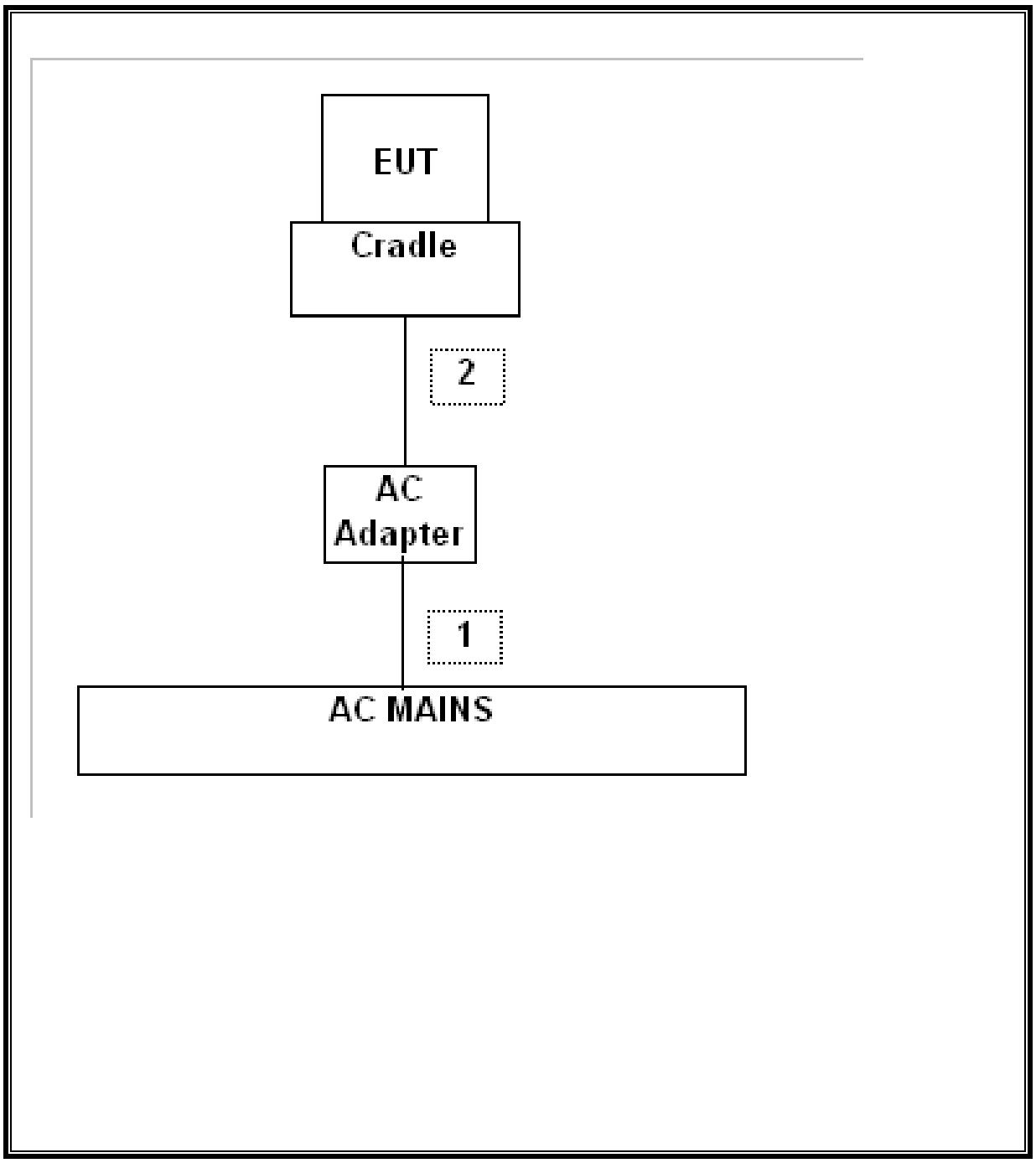
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC Input	1	AC	Un-Shielded	1.5m	N/A
2	DC Input	1	DC	Un-Shielded	1.5m	Ferrite at cradle end.

SETUP DIAGRAM FOR RADIATED TESTS

Stand-alone EUT.

SETUP DIAGRAM FOR LINE CONDUCTION 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**	**Asset**	**Cal Due**
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	7/10/2011
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	7/11/2011
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	5/05/2011
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	5/06/2011
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	11/05/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	08/04/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	07/29/11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/18/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

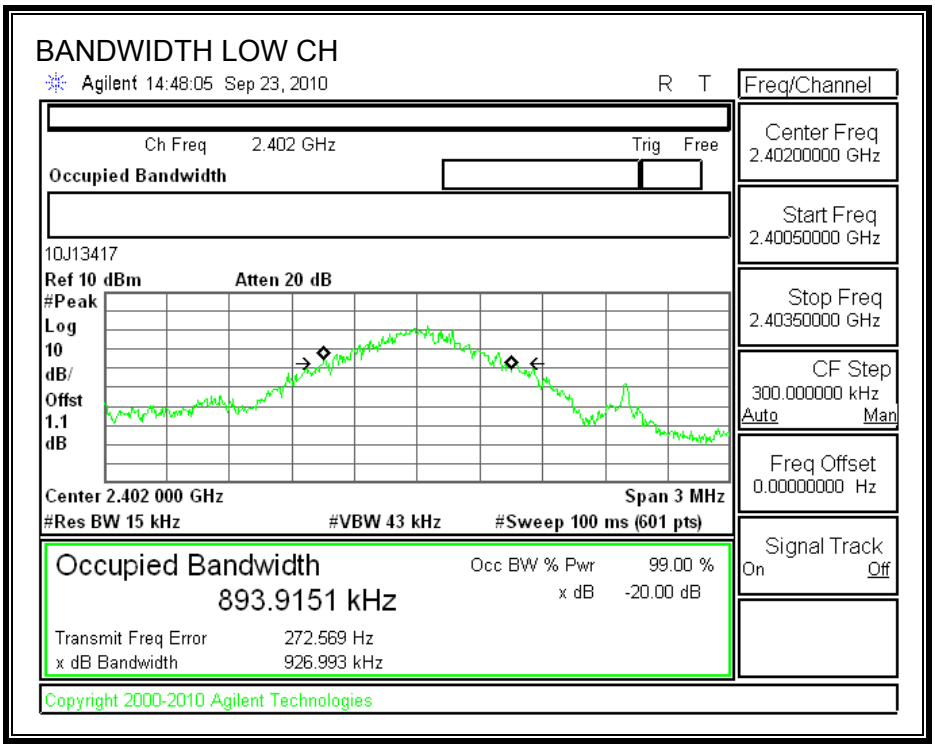
TEST PROCEDURE

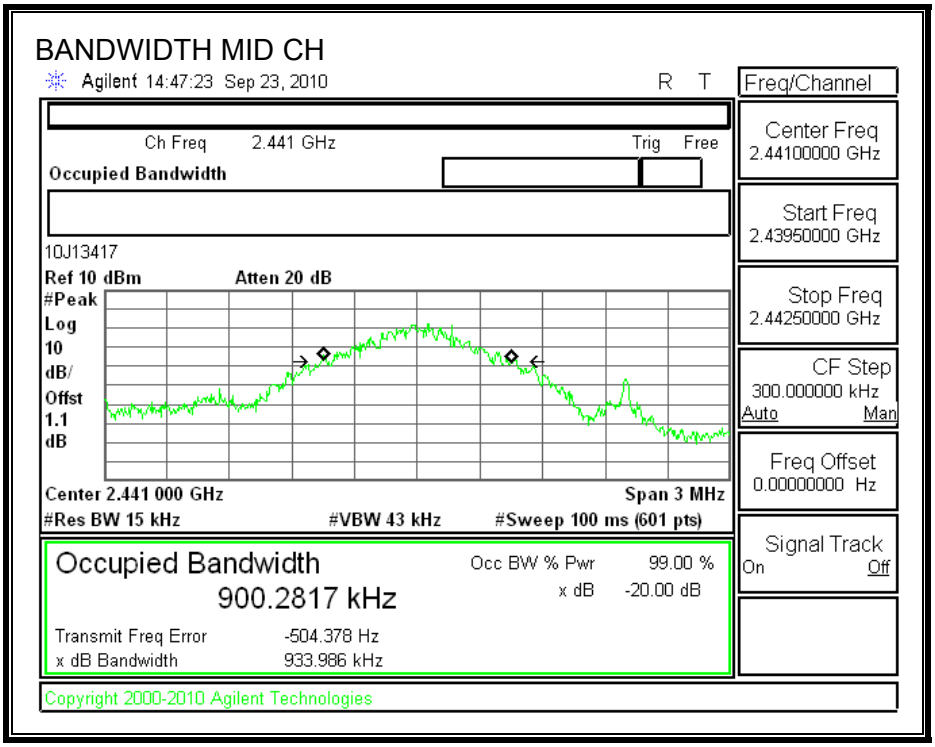
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

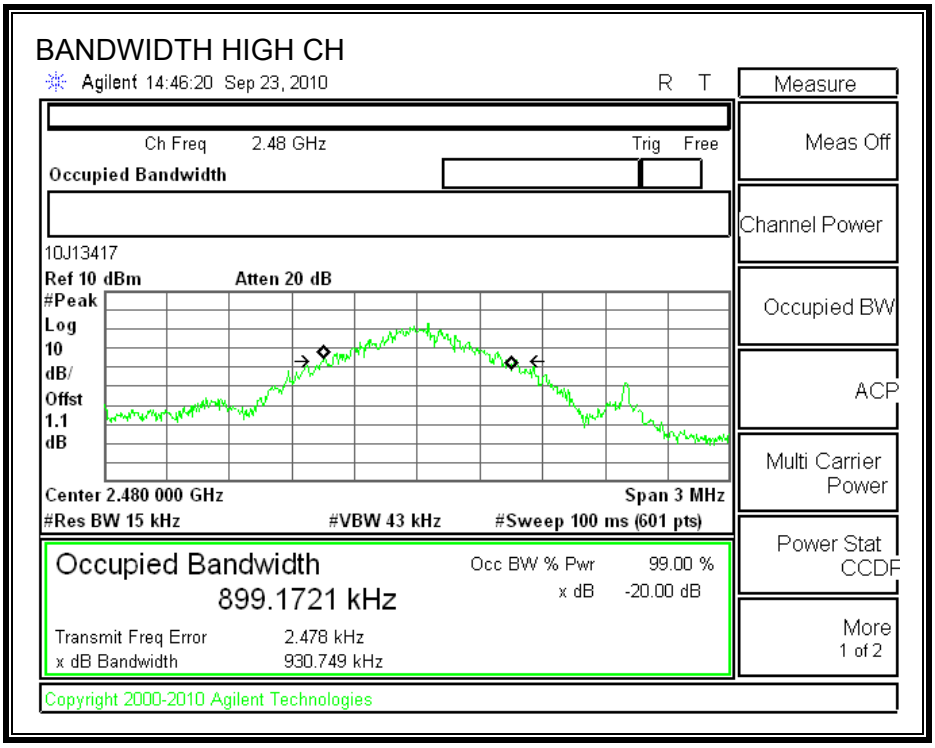
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	926.993	914.0834
Middle	2441	933.986	886.2812
High	2480	930.749	872.2369

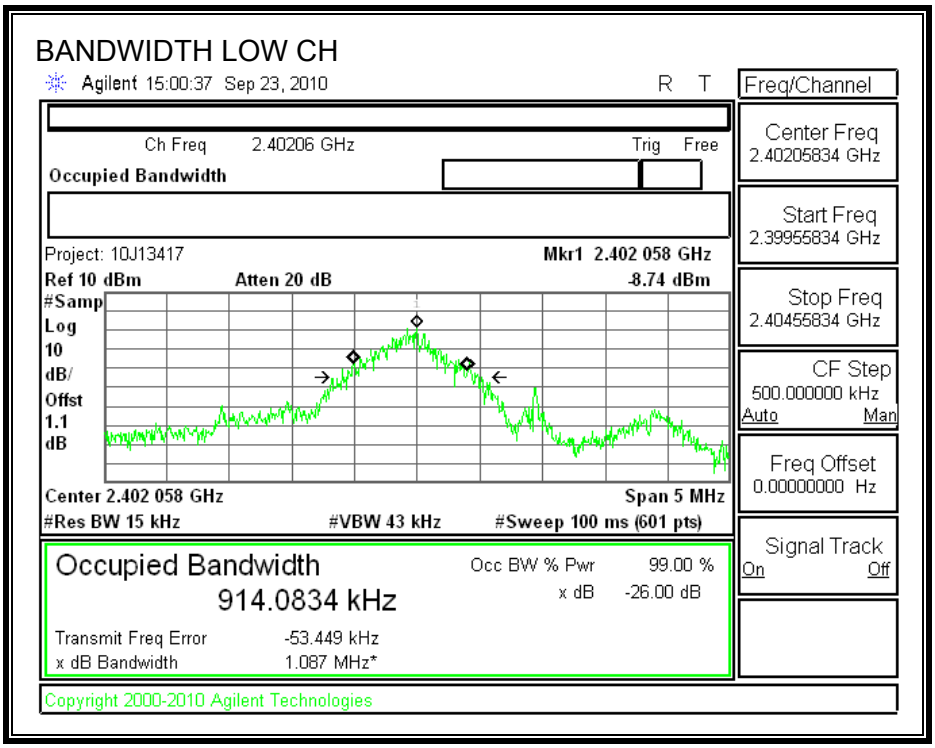
20 dB BANDWIDTH

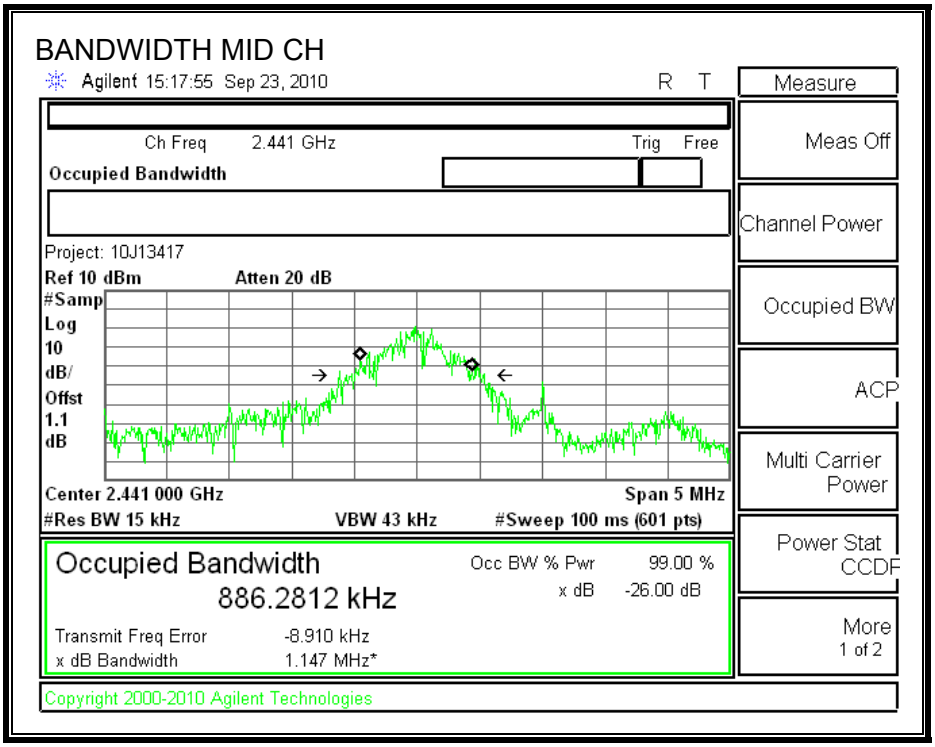


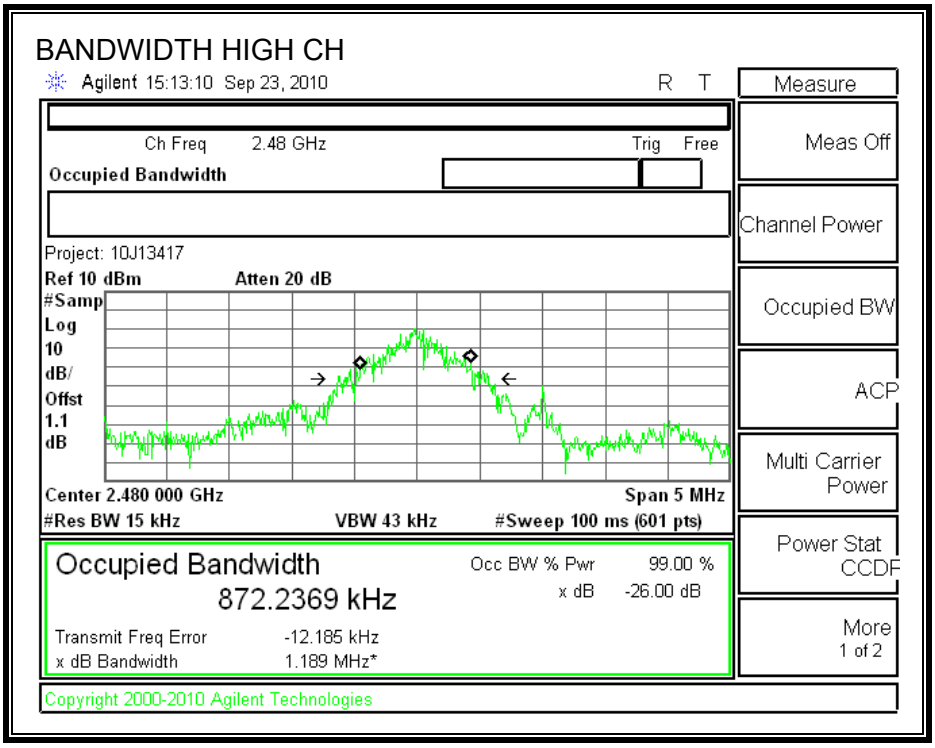




99% BANDWIDTH







7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

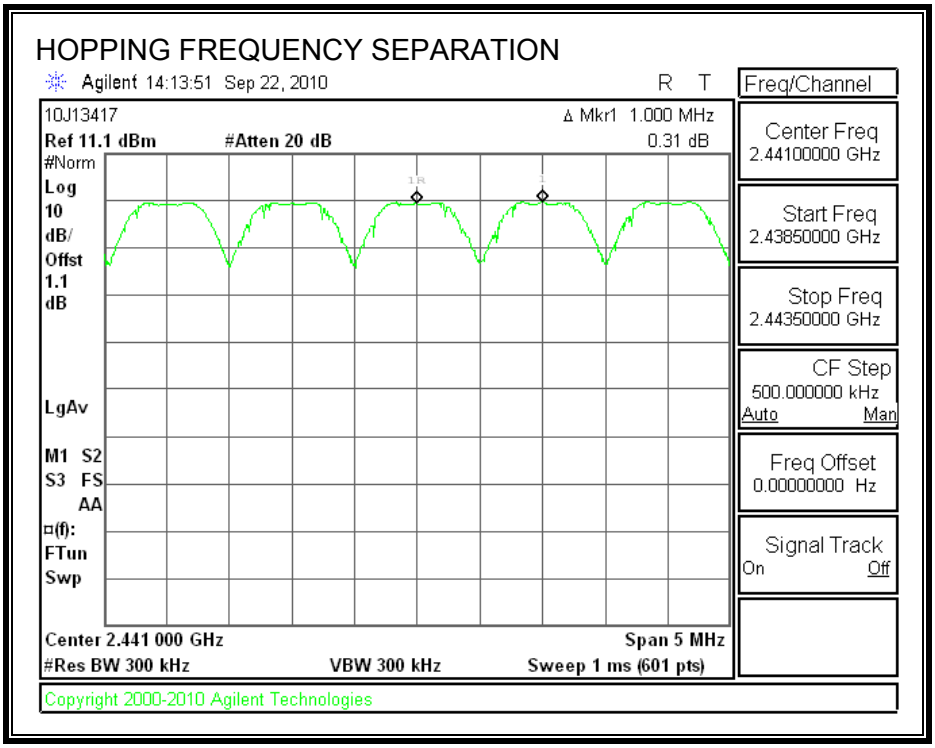
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 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

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

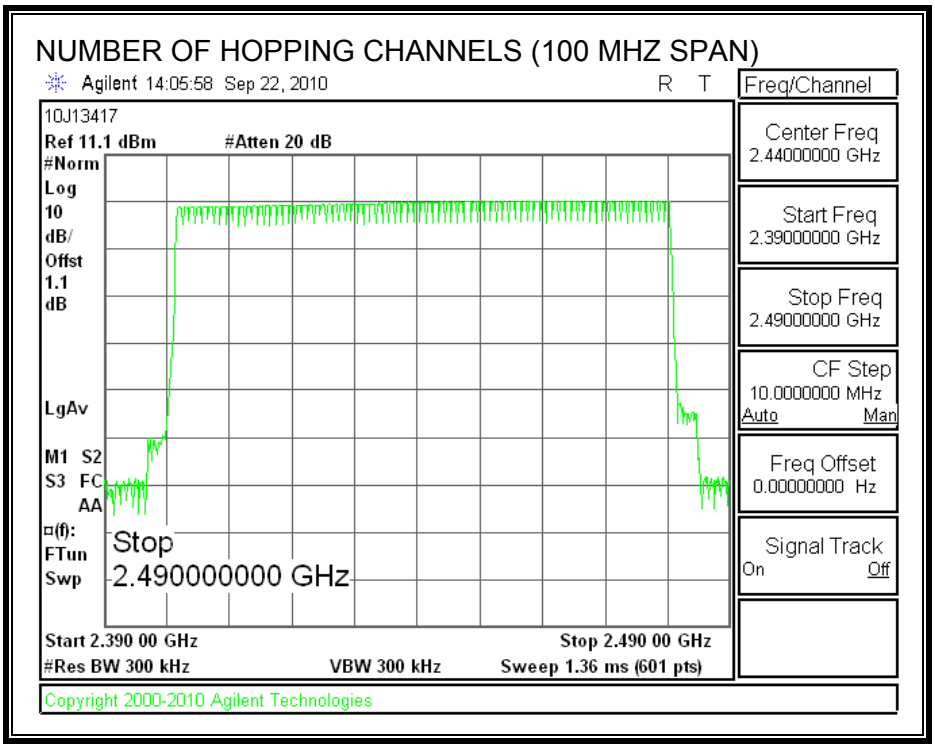
TEST PROCEDURE

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 a maximum of 1 % of the span. The analyzer is set to Max Hold.

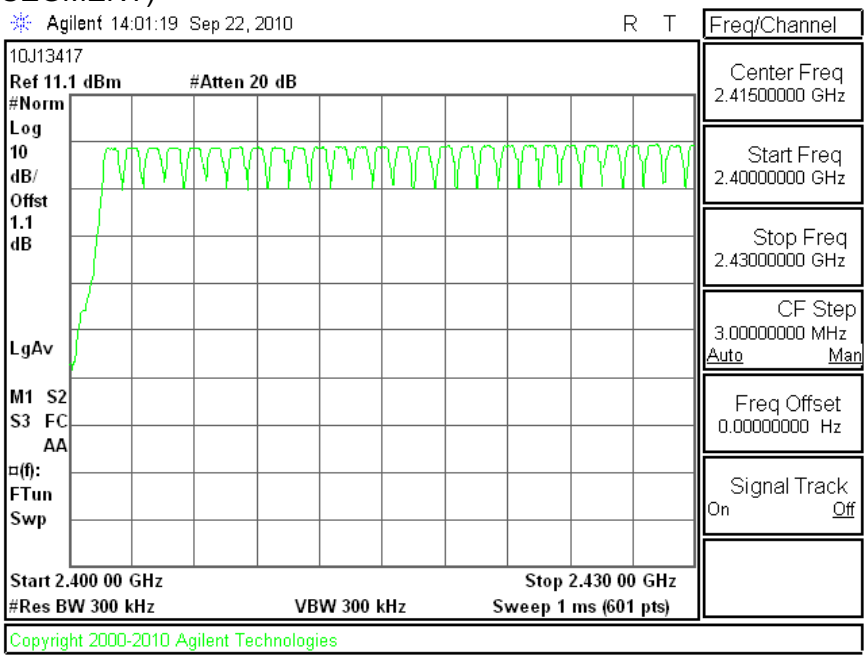
RESULTS

79 Channels observed.

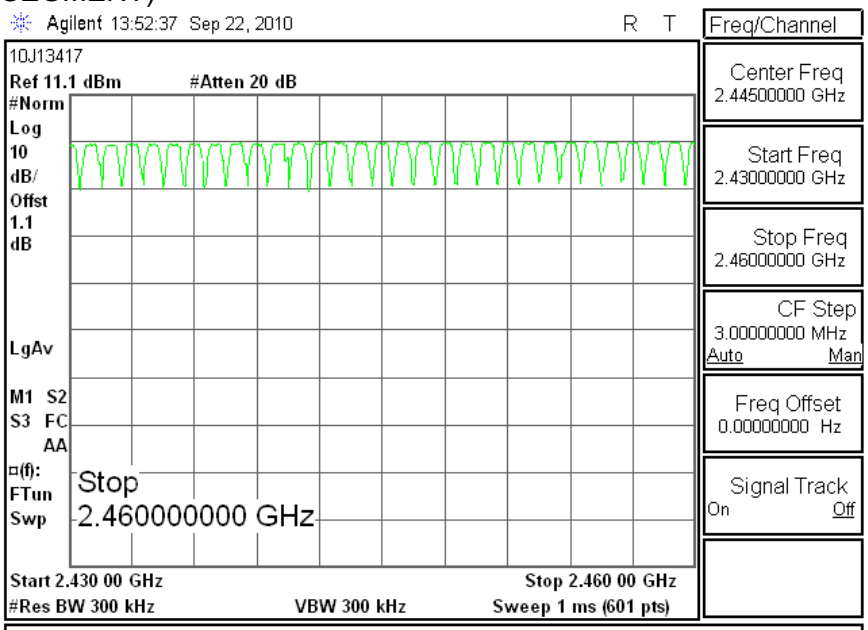
NUMBER OF HOPPING CHANNELS



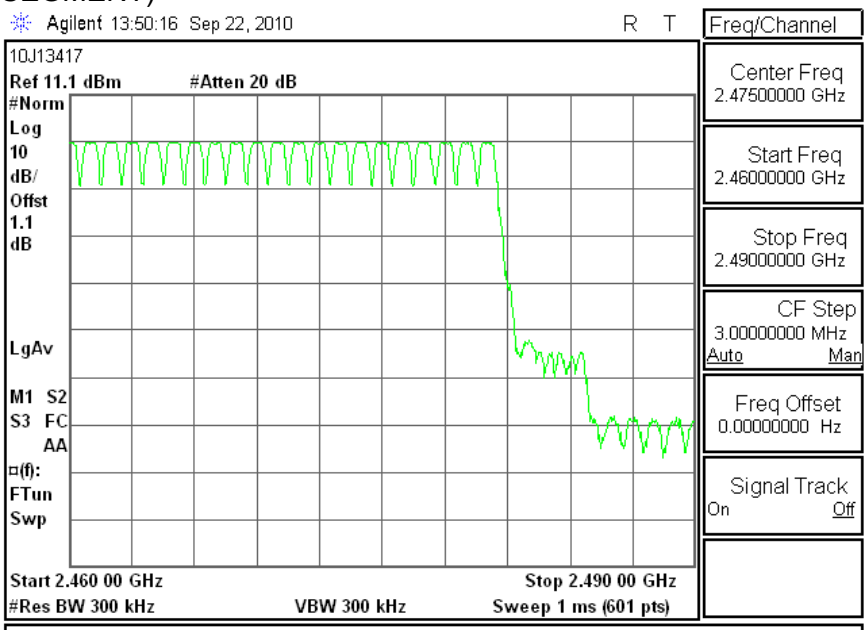
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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.

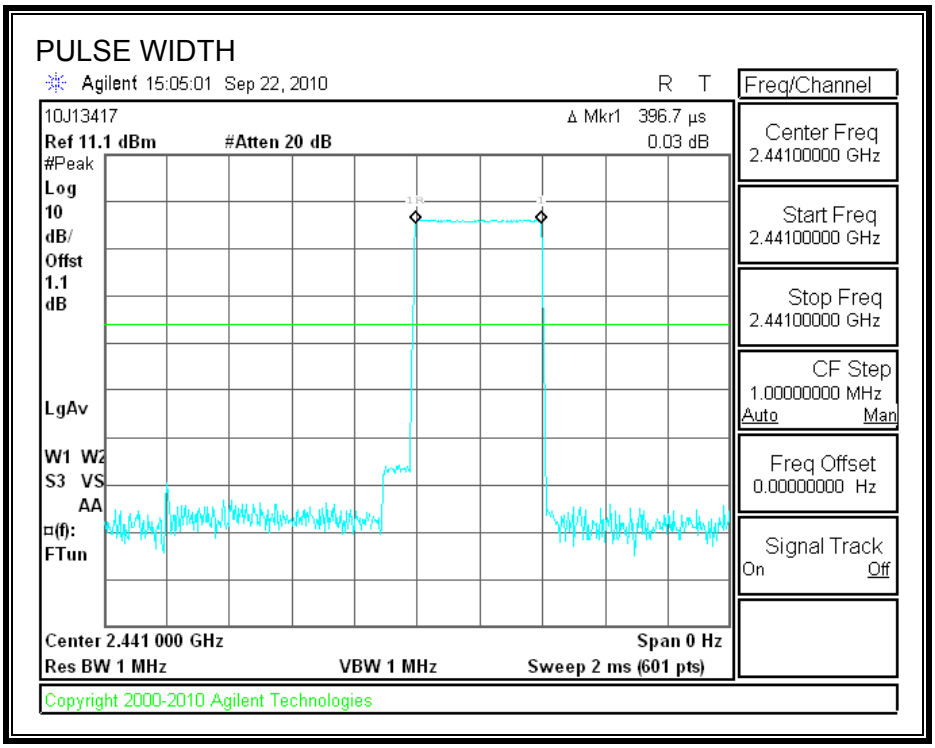
RESULTS

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

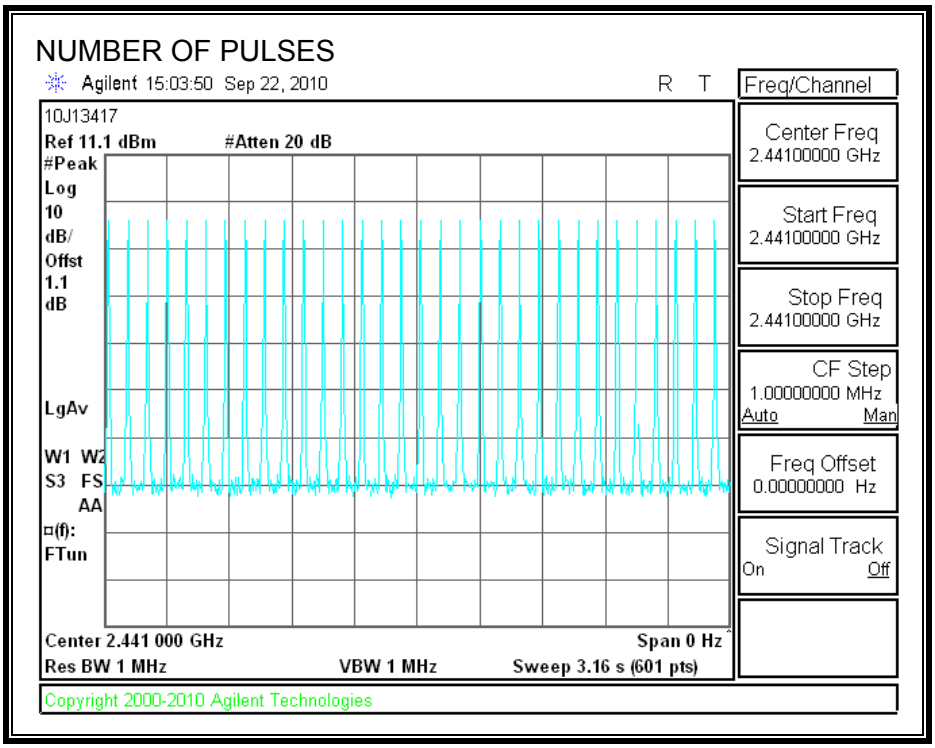
GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.3967	32	0.127	0.4	0.273
DH3	1.65	16	0.264	0.4	0.136
DH5	2.892	11	0.318	0.4	0.082

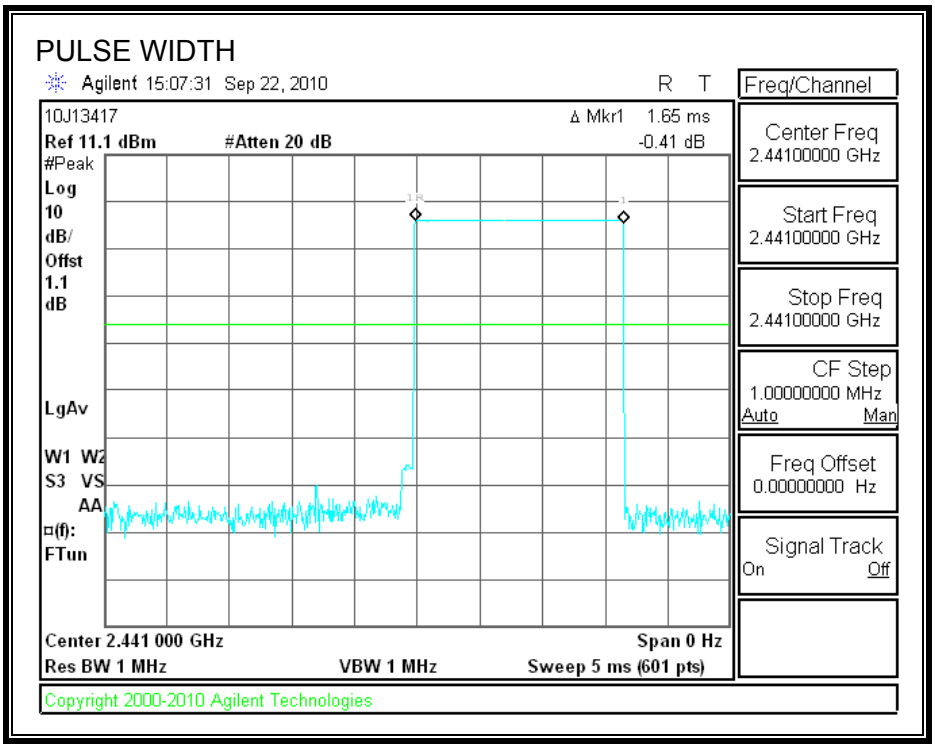
DH1 PULSE WIDTH



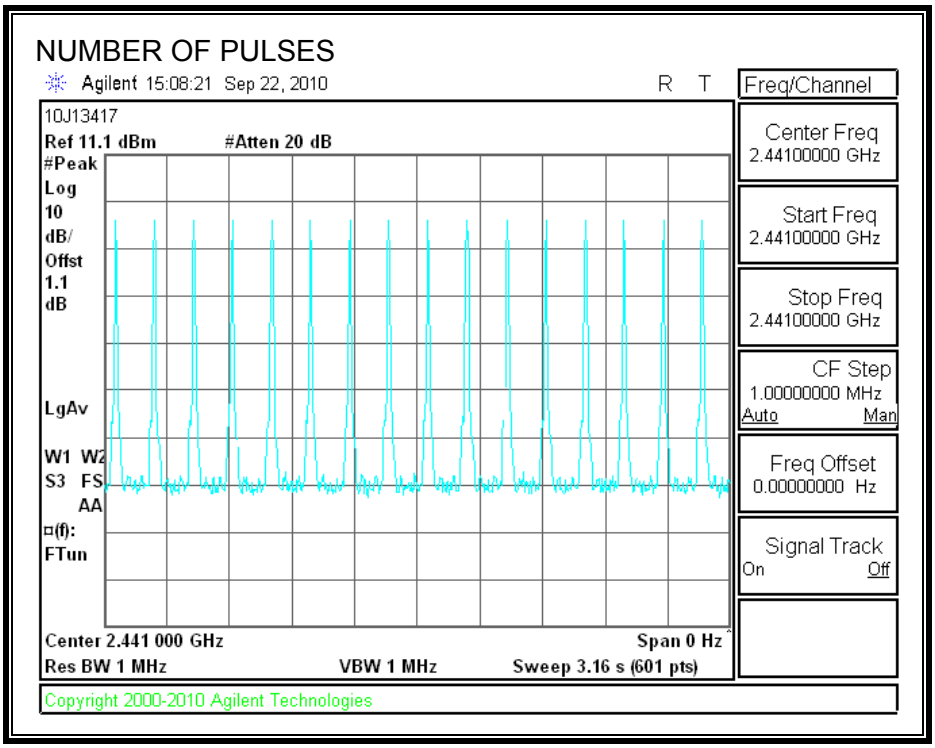
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



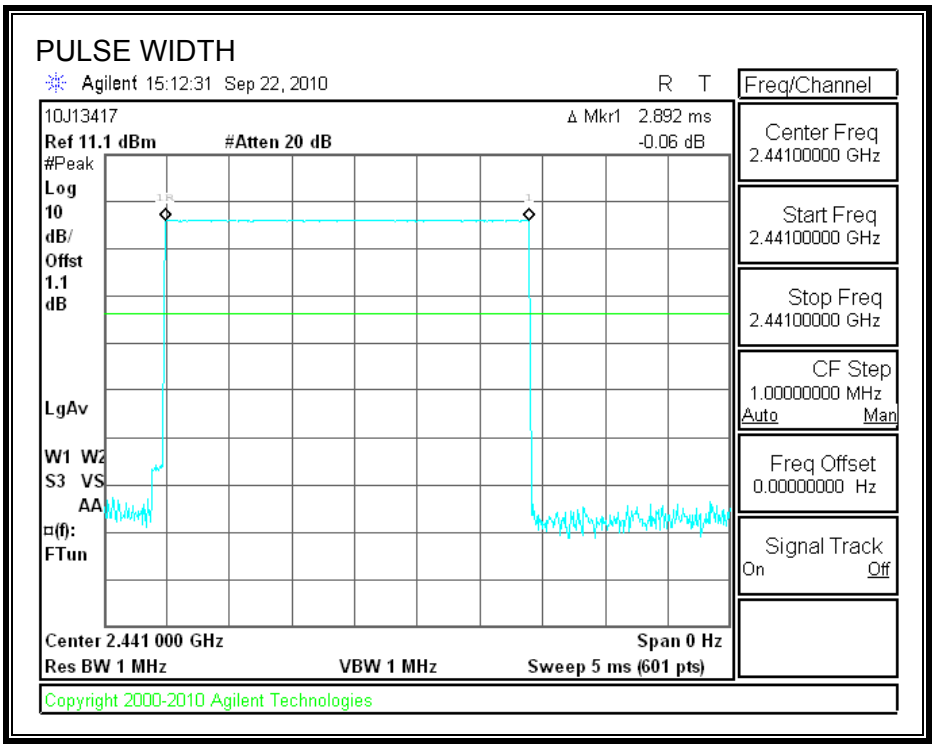
DH3 PULSE WIDTH



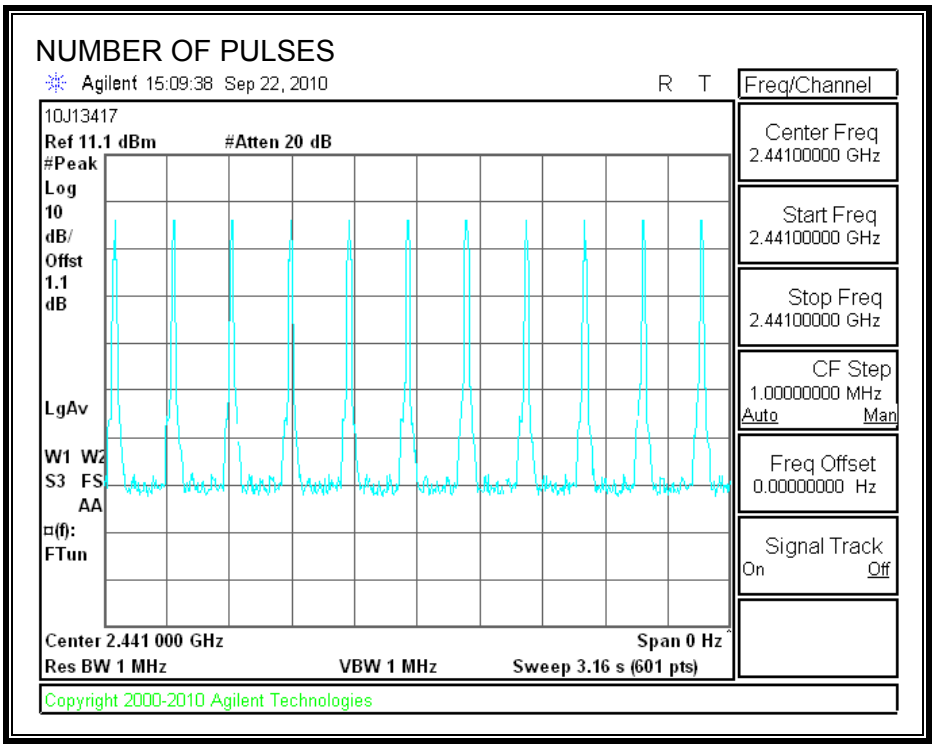
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



DH5 PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

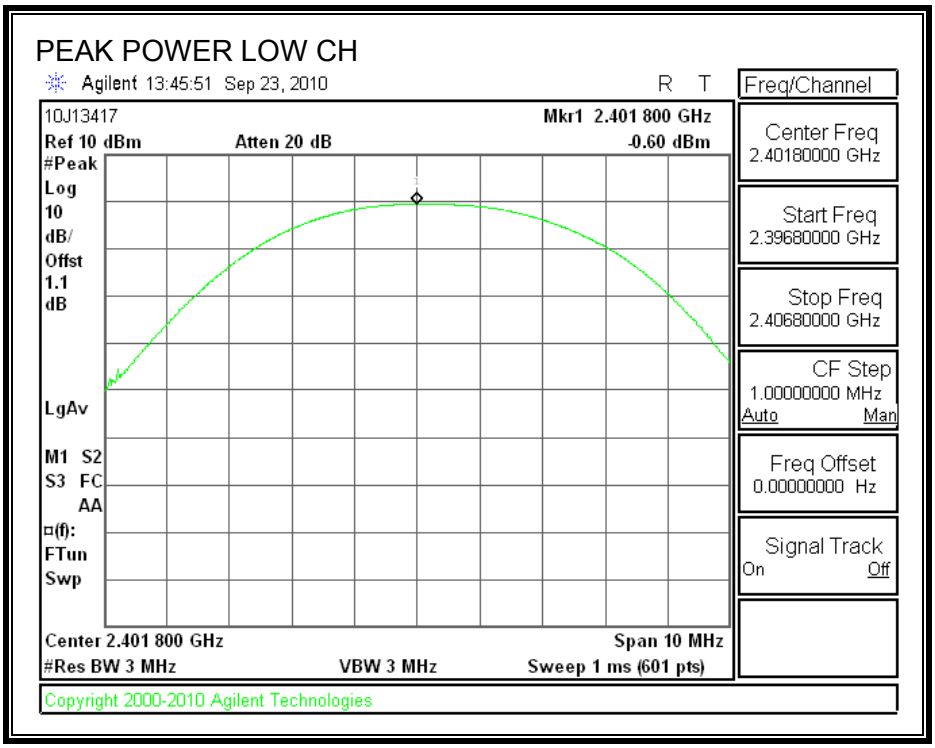
TEST PROCEDURE

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

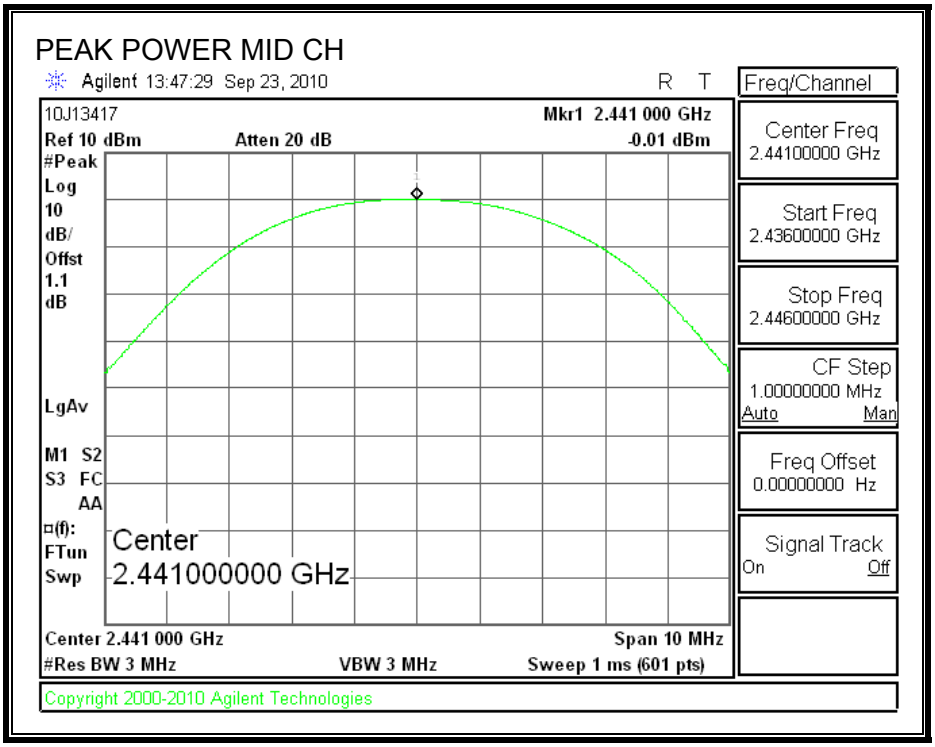
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.60	30	-30.60
Middle	2441	-0.01	30	-30.01
High	2480	0.01	30	-29.99

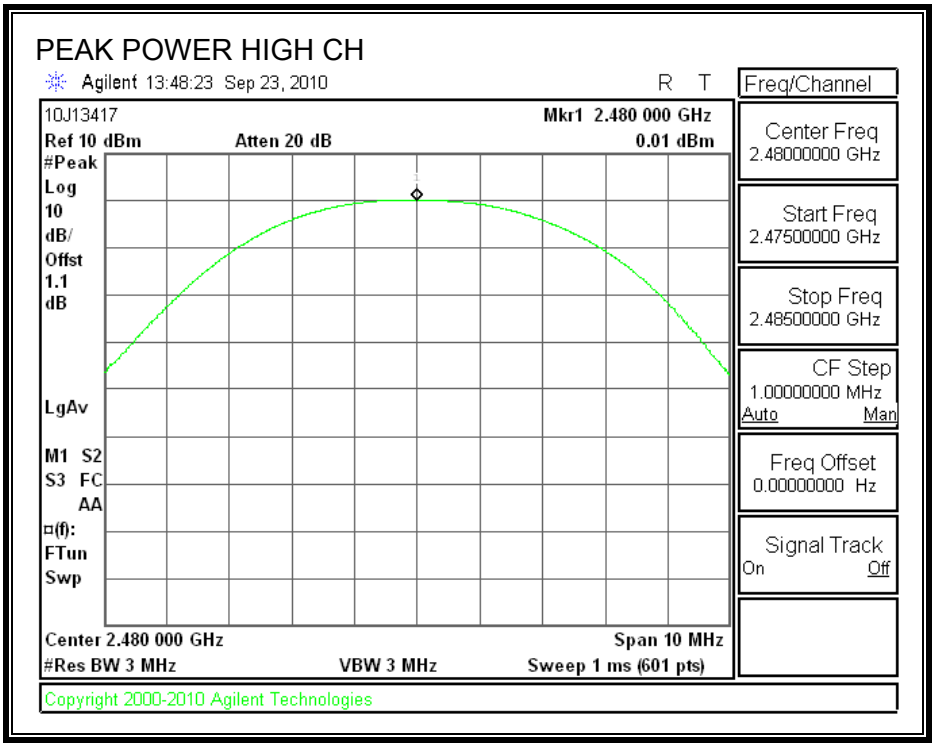
OUTPUT POWER



PEAK POWER MID CH



PEAK POWER HIGH CH



7.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 1.1 dB (including 0 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-0.78
Middle	2441	-0.21
High	2480	-0.06

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

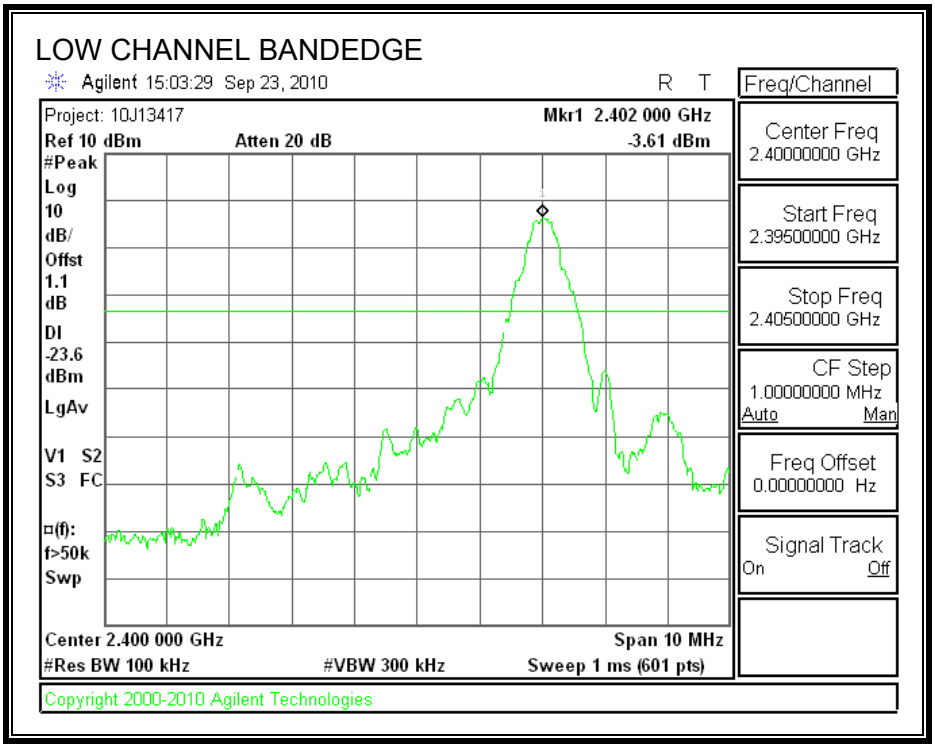
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

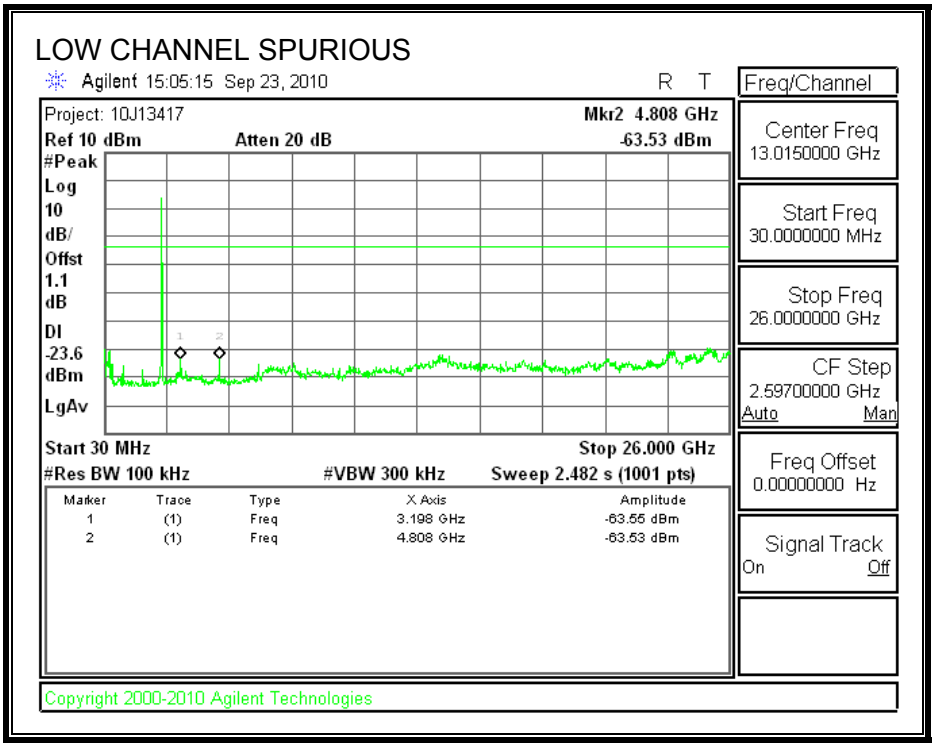
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

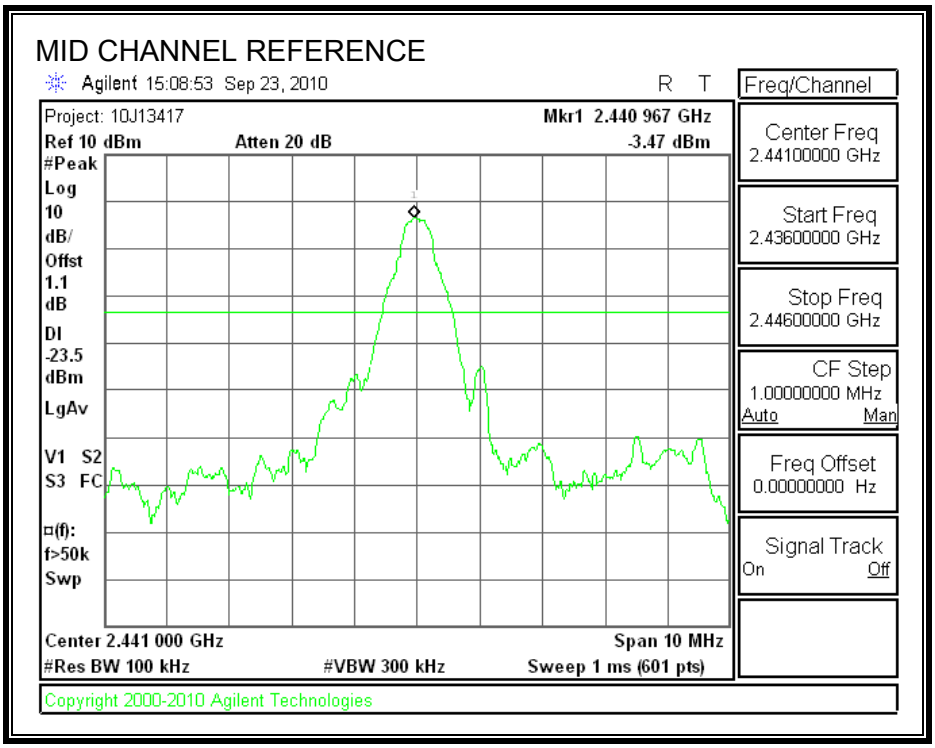
RESULTS

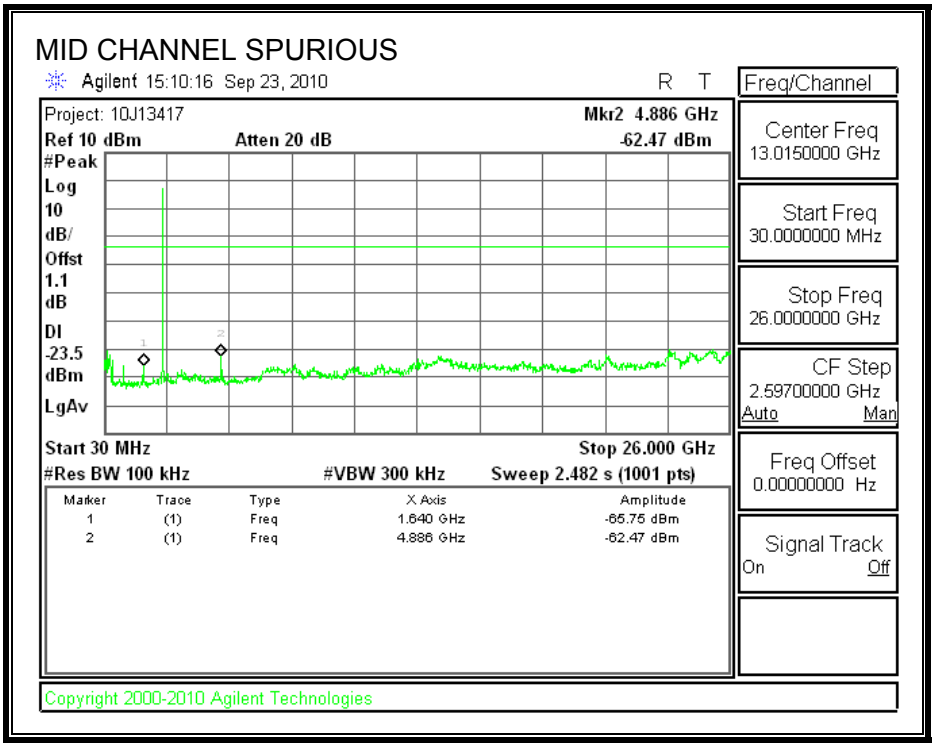
SPURIOUS EMISSIONS, LOW CHANNEL



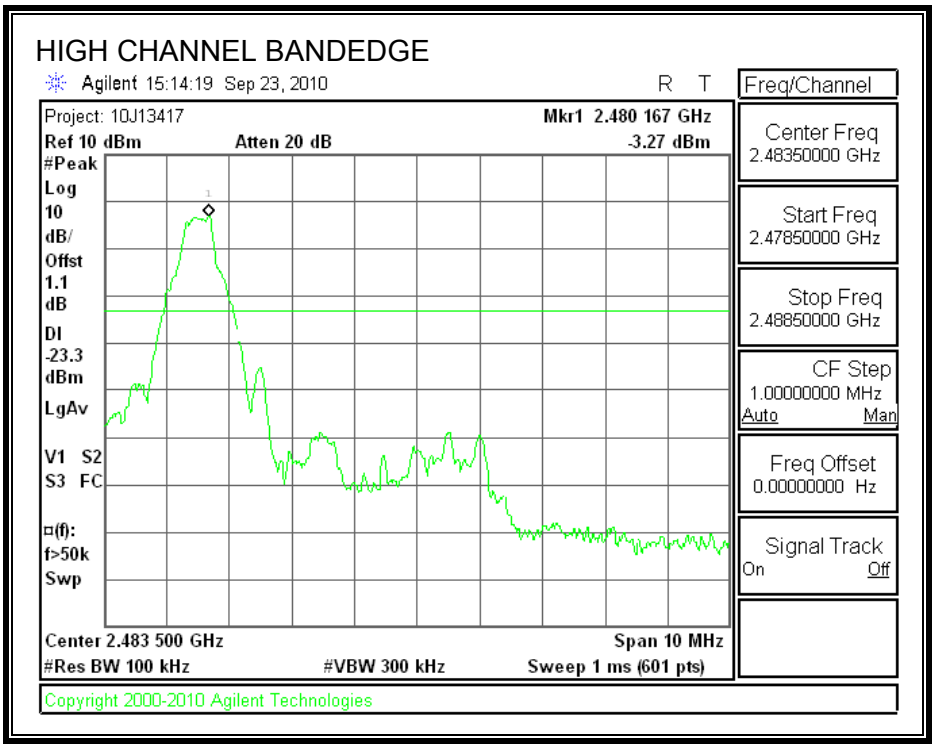


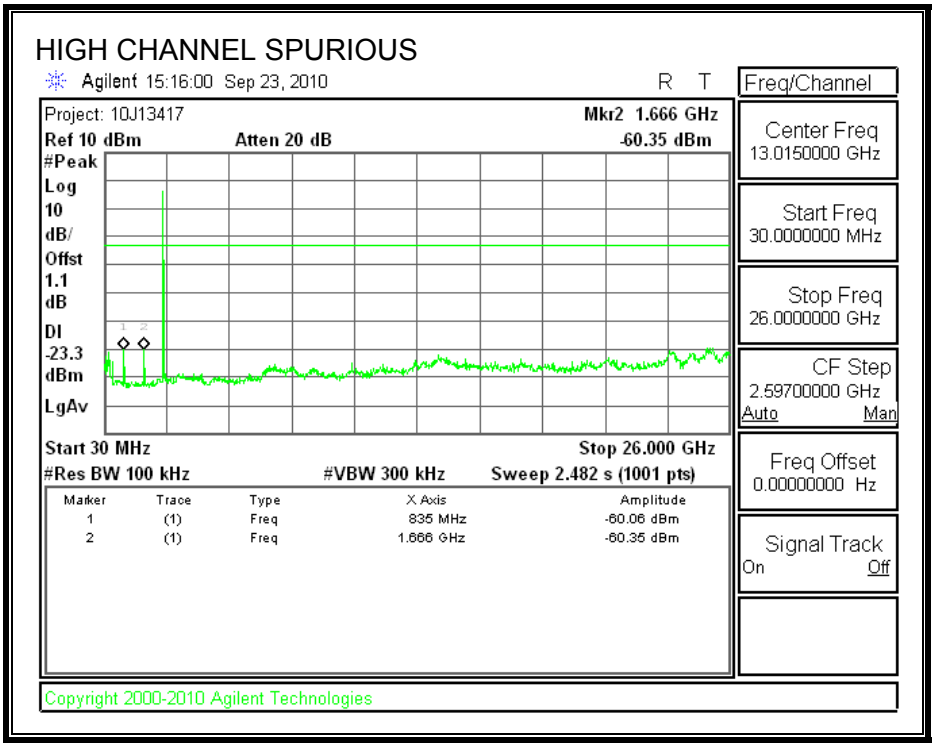
SPURIOUS EMISSIONS, MID CHANNEL



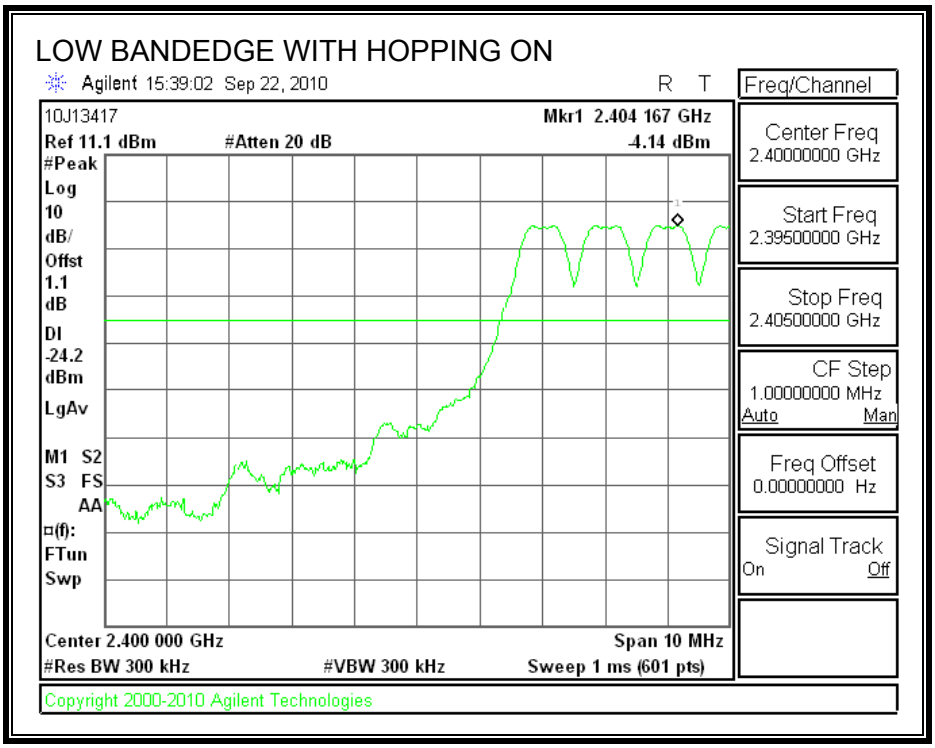


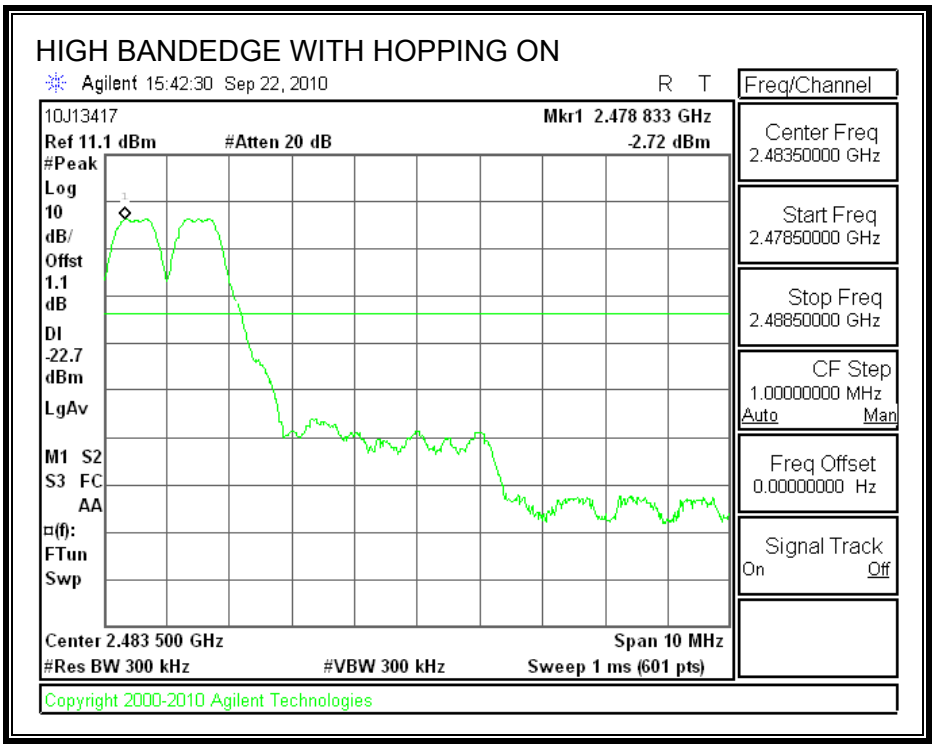
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

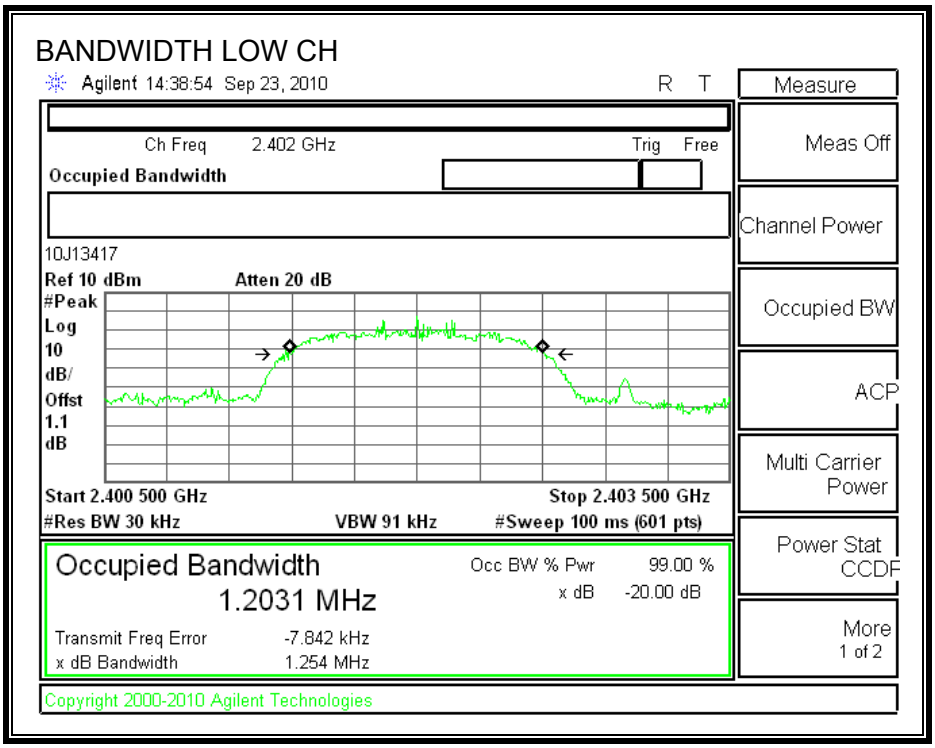
TEST PROCEDURE

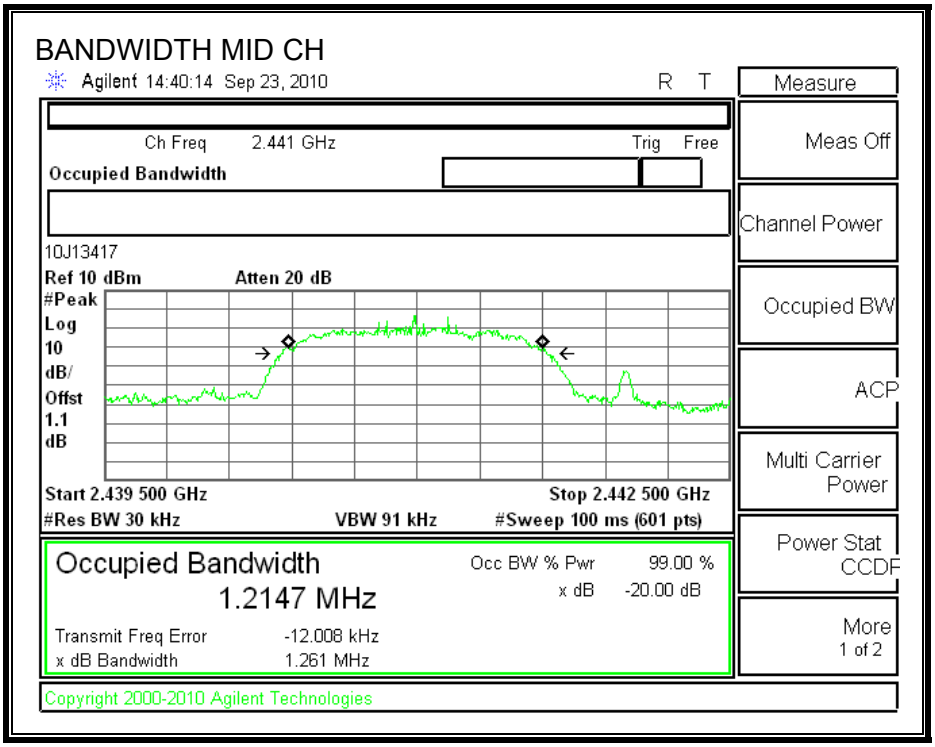
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

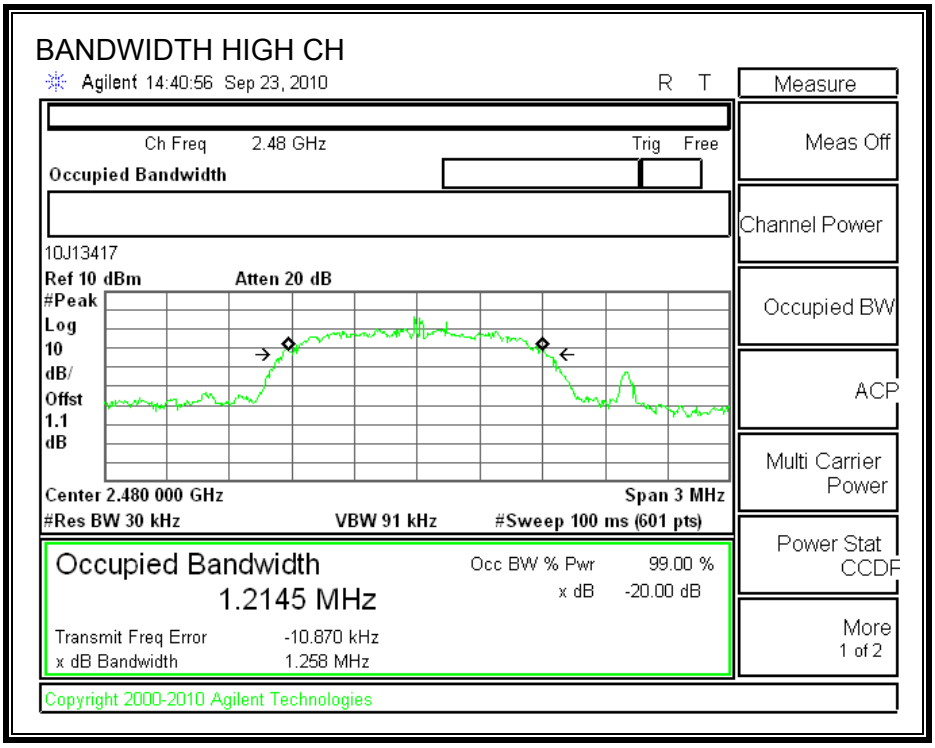
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1254	1234.1
Middle	2441	1261	1194.6
High	2480	1258	1213.3

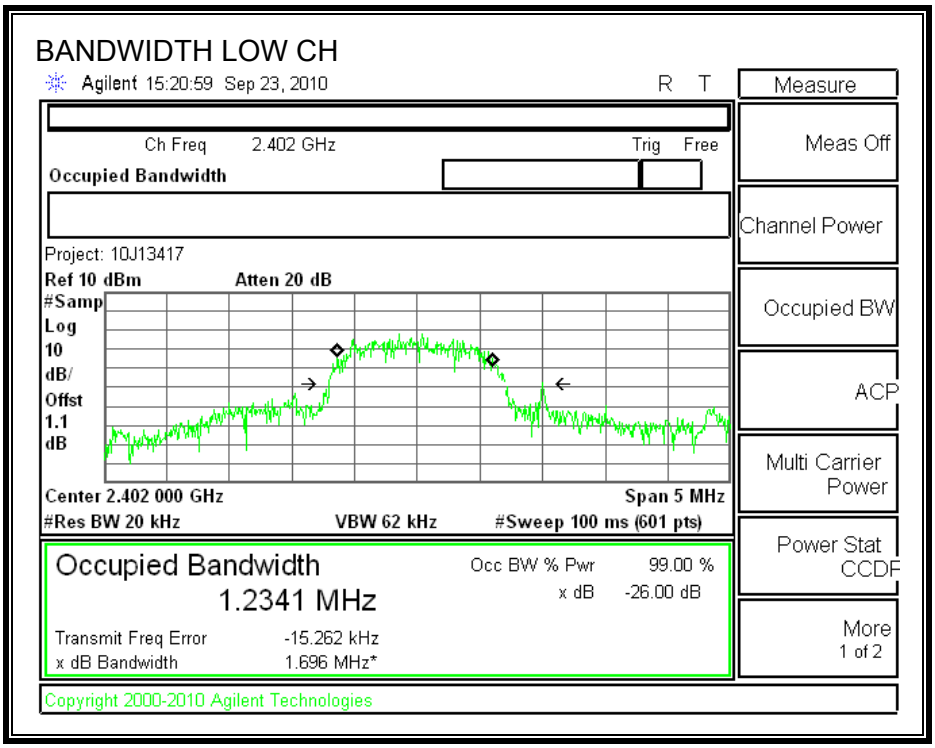
20 dB BANDWIDTH

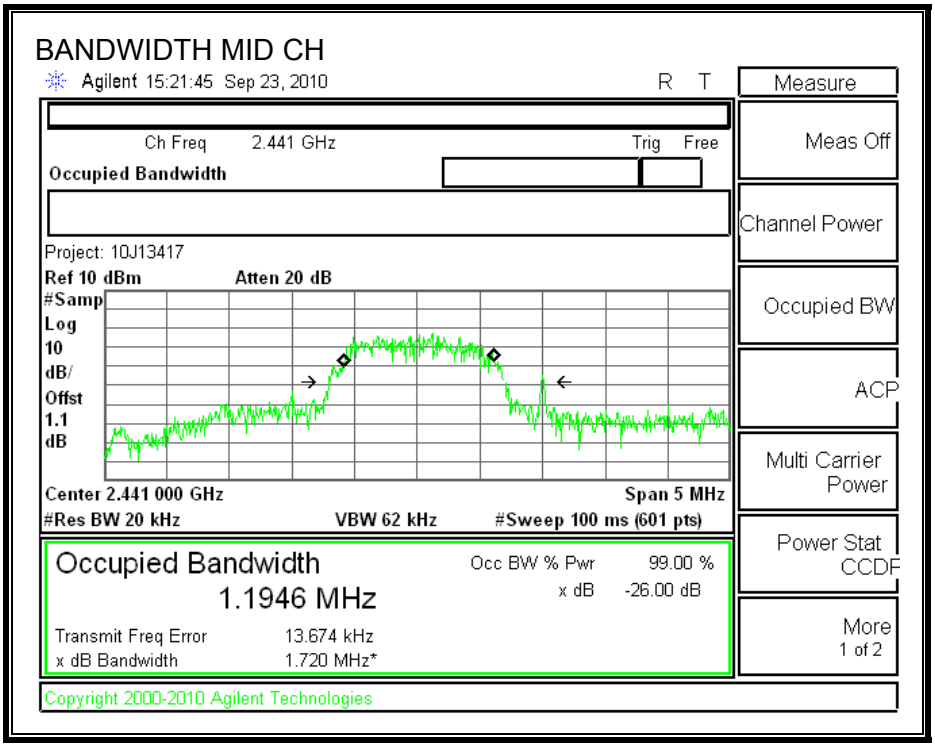


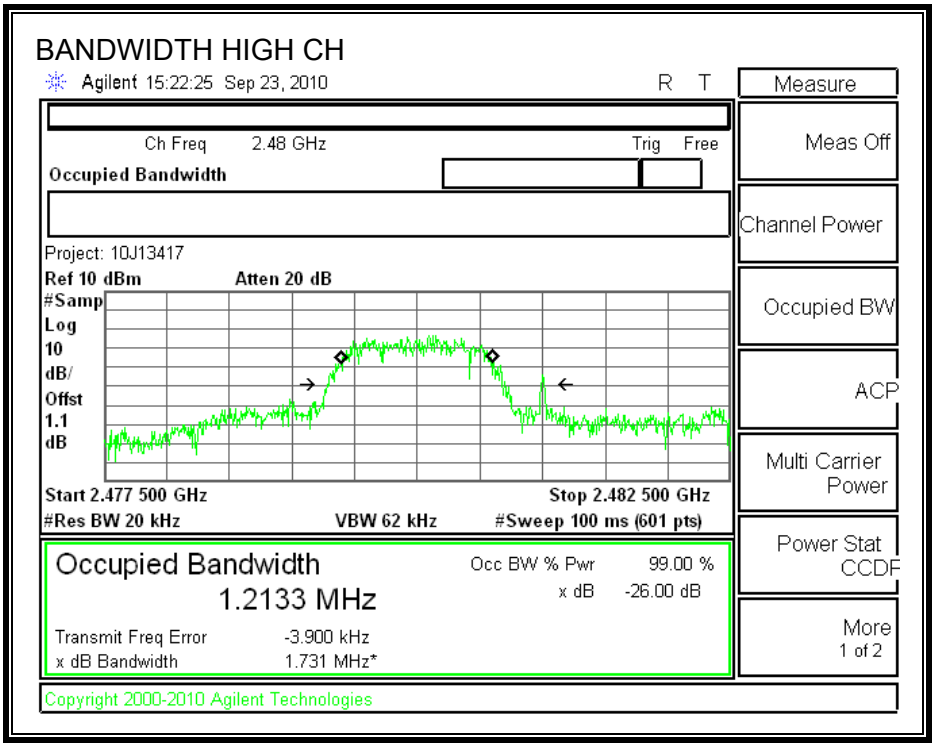




99% BANDWIDTH







7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

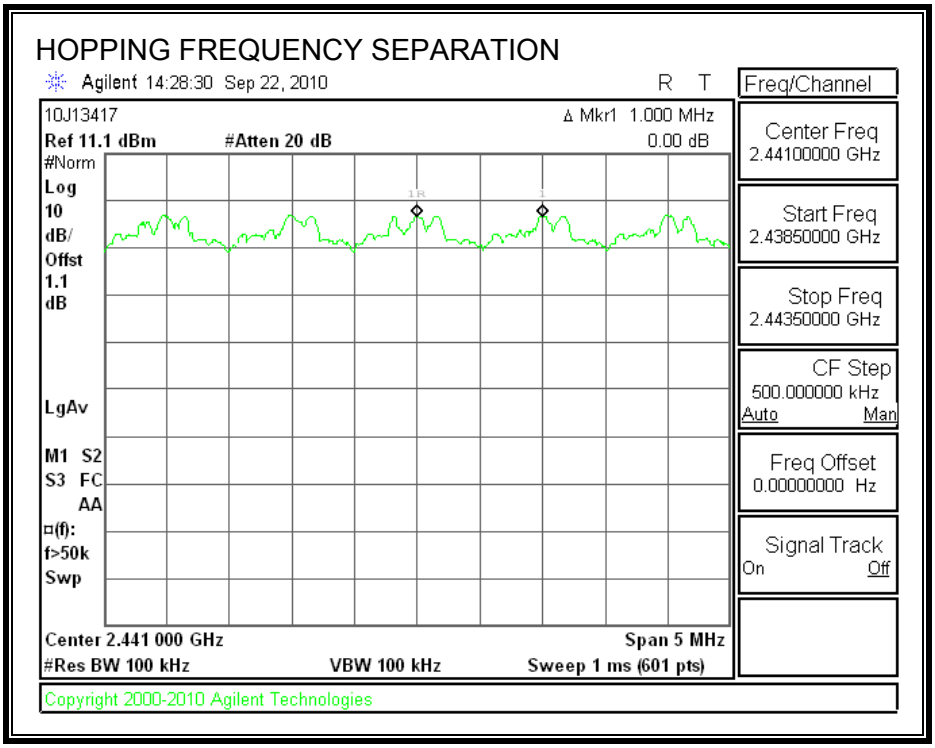
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 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

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

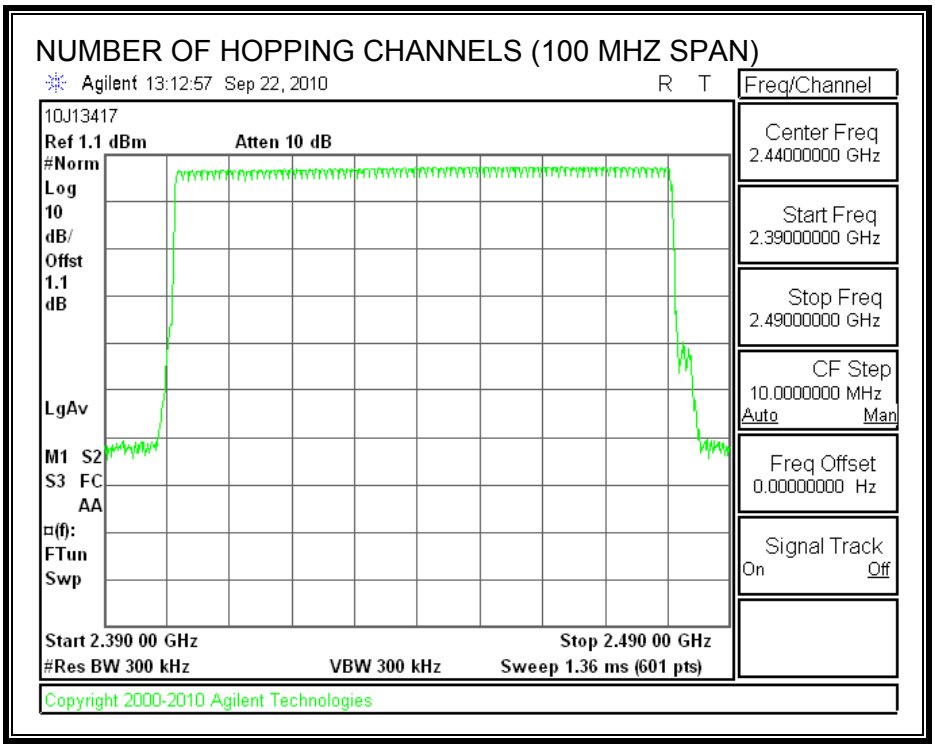
TEST PROCEDURE

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 a maximum of 1 % of the span. The analyzer is set to Max Hold.

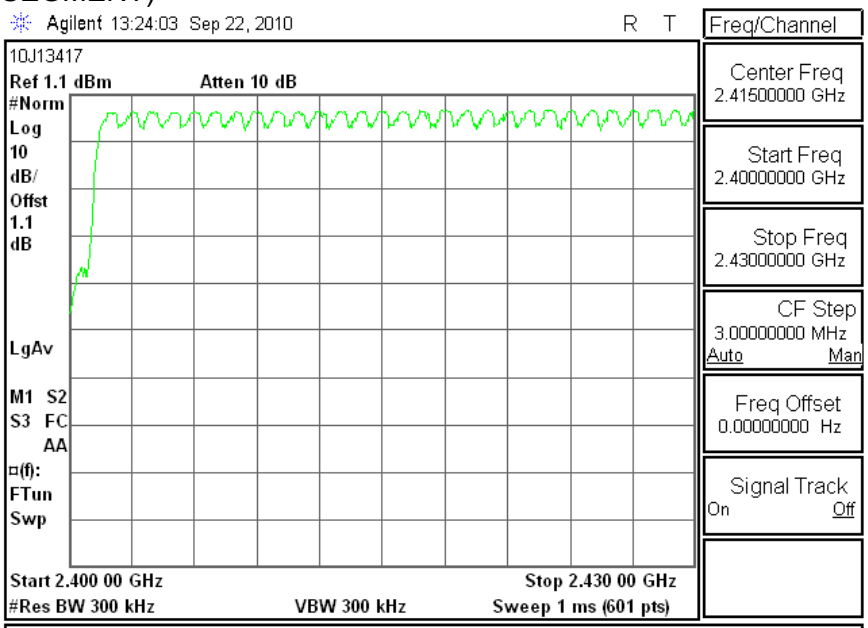
RESULTS

79 Channels observed.

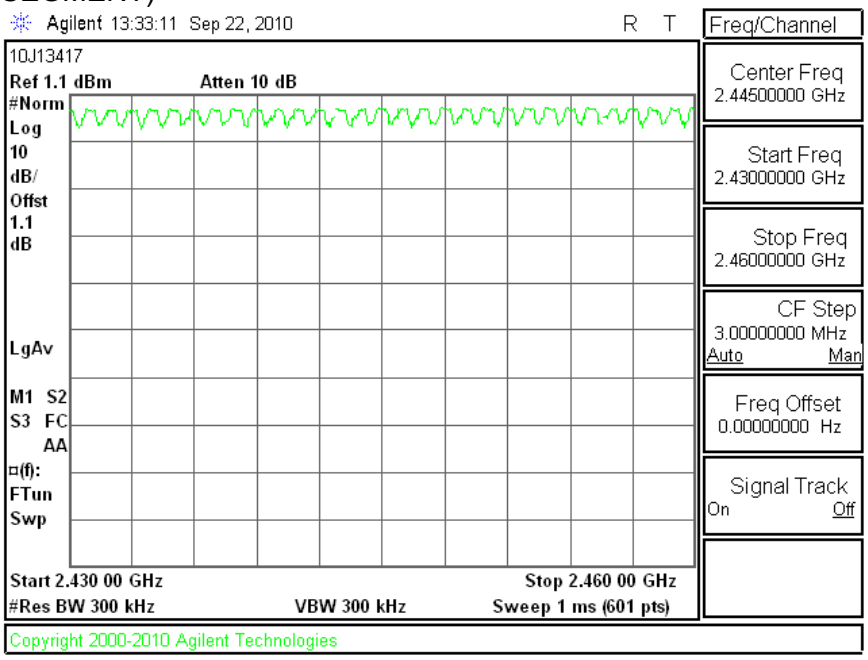
NUMBER OF HOPPING CHANNELS



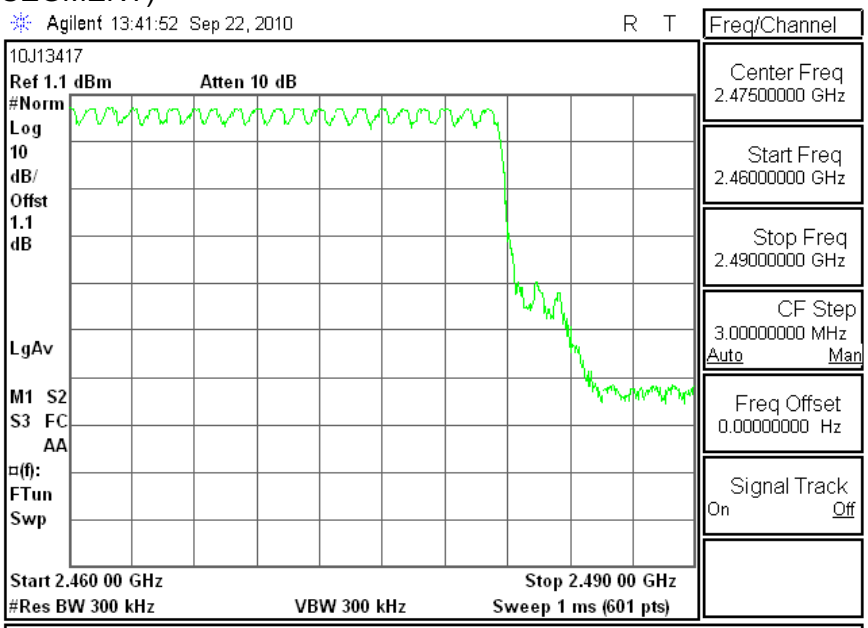
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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.

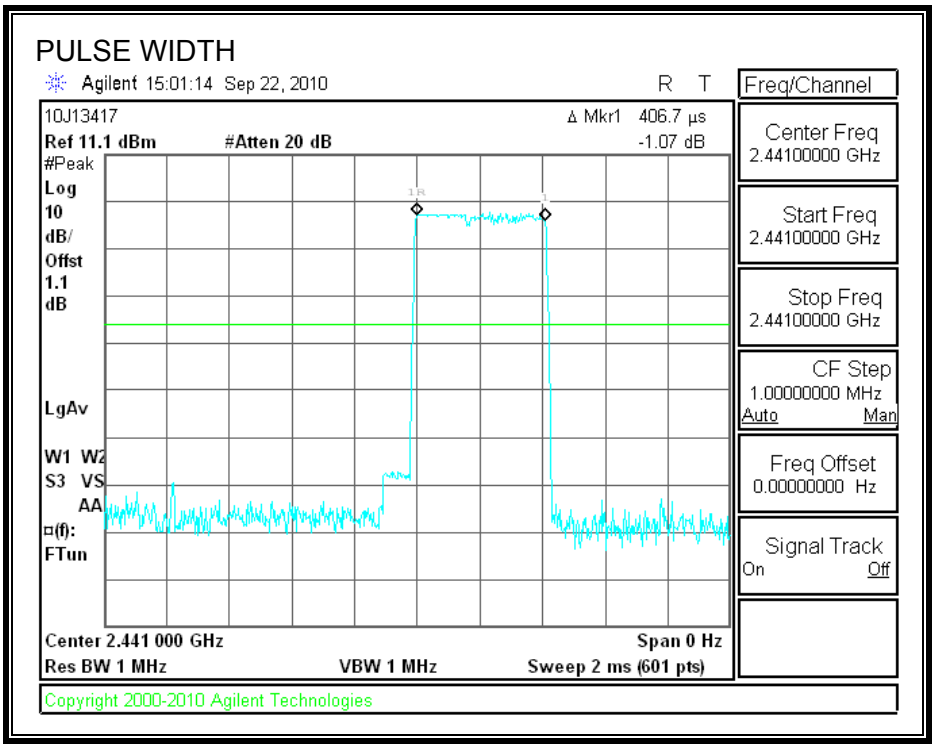
RESULTS

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

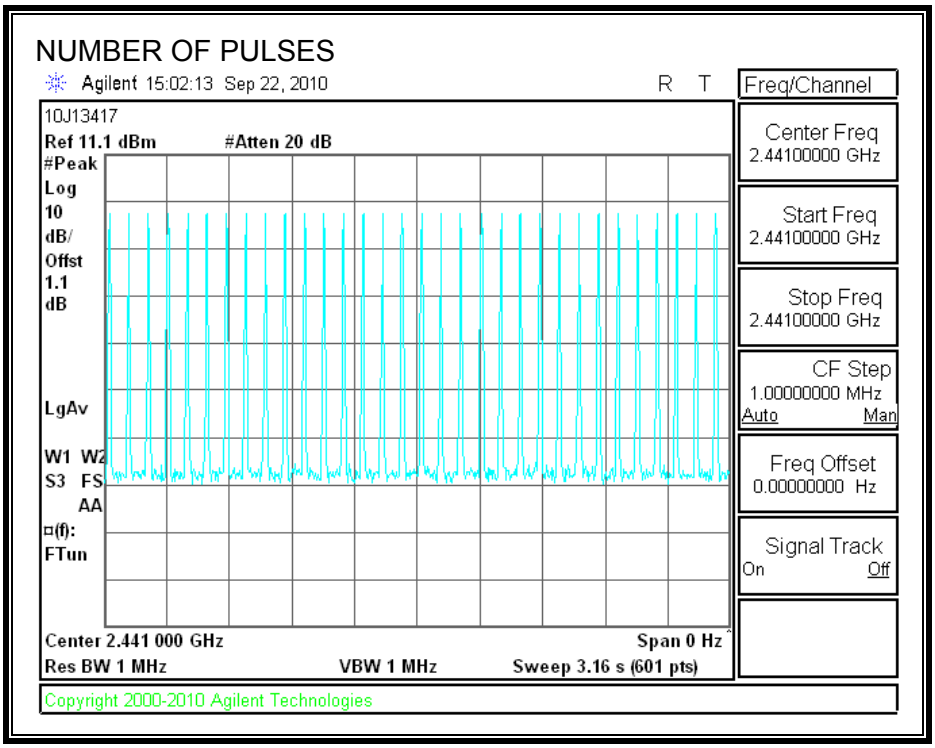
GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.4067	32	0.130	0.4	0.270
DH3	1.617	16	0.259	0.4	0.141
DH5	2.875	11	0.316	0.4	0.084

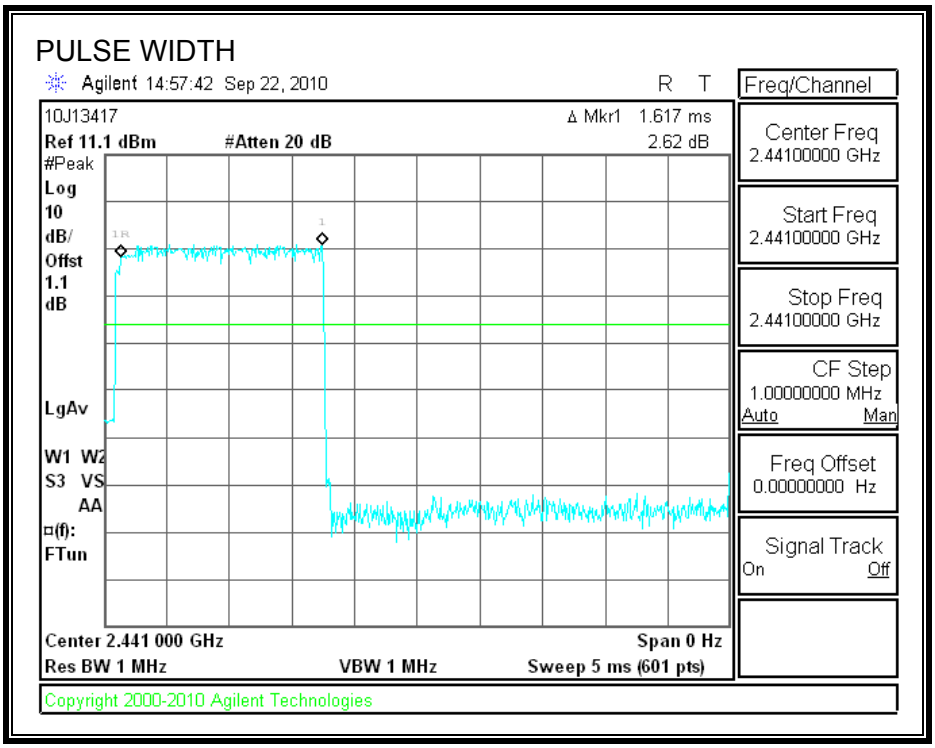
DH1 PULSE WIDTH



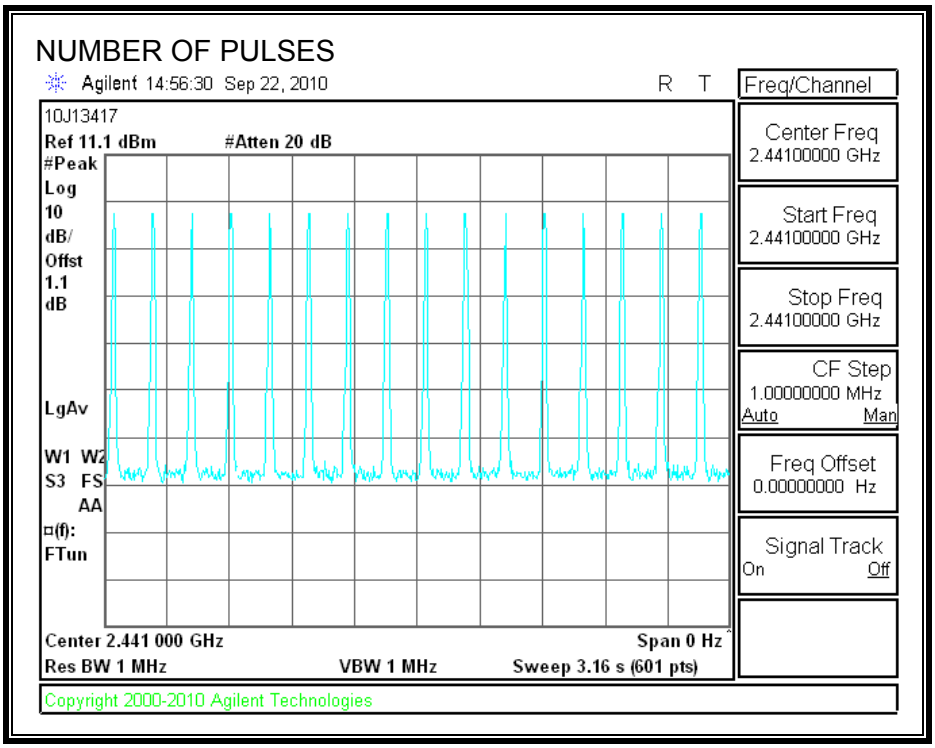
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



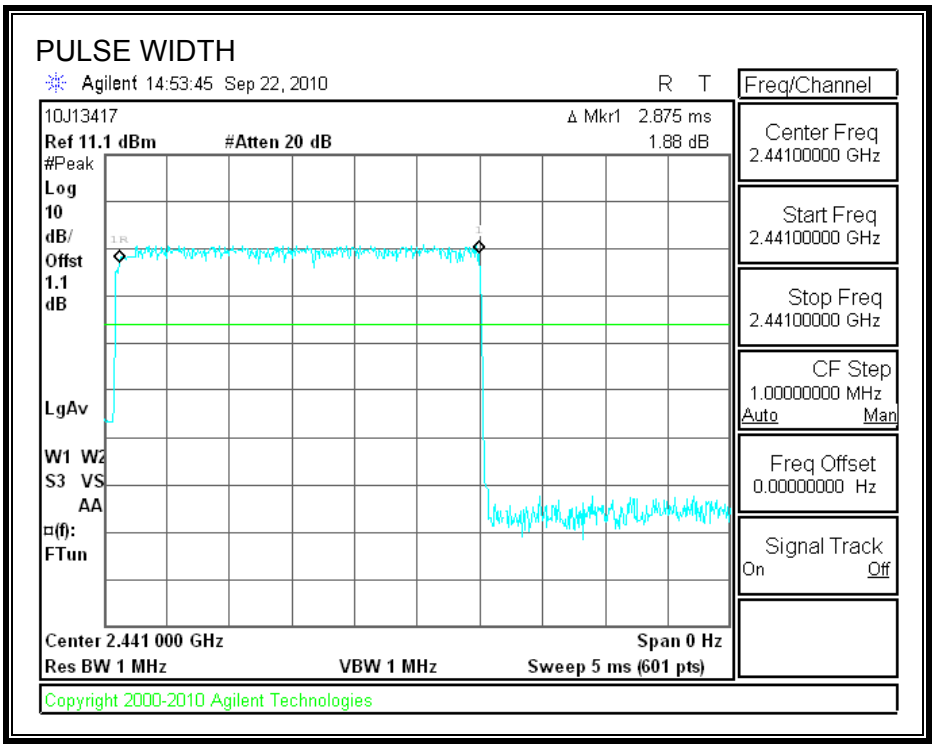
DH3 PULSE WIDTH



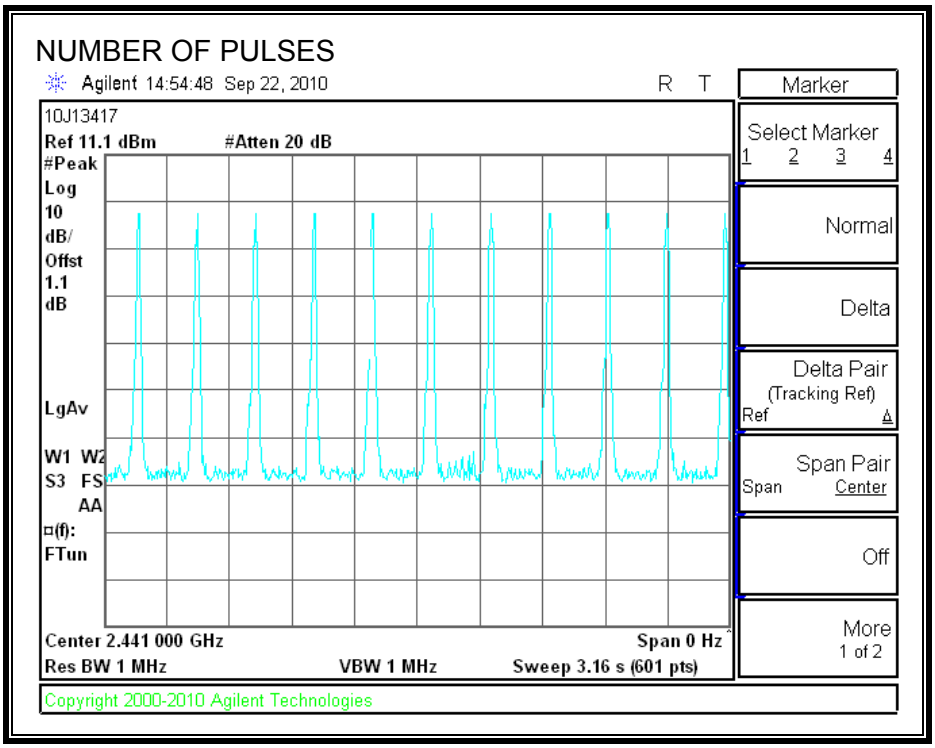
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



DH5 PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

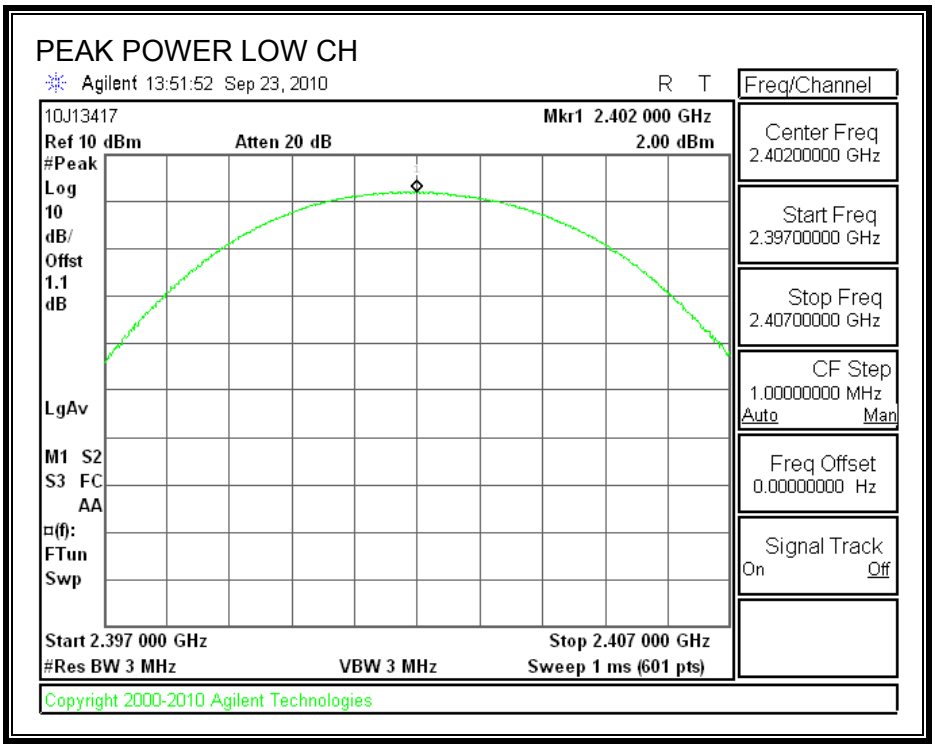
TEST PROCEDURE

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

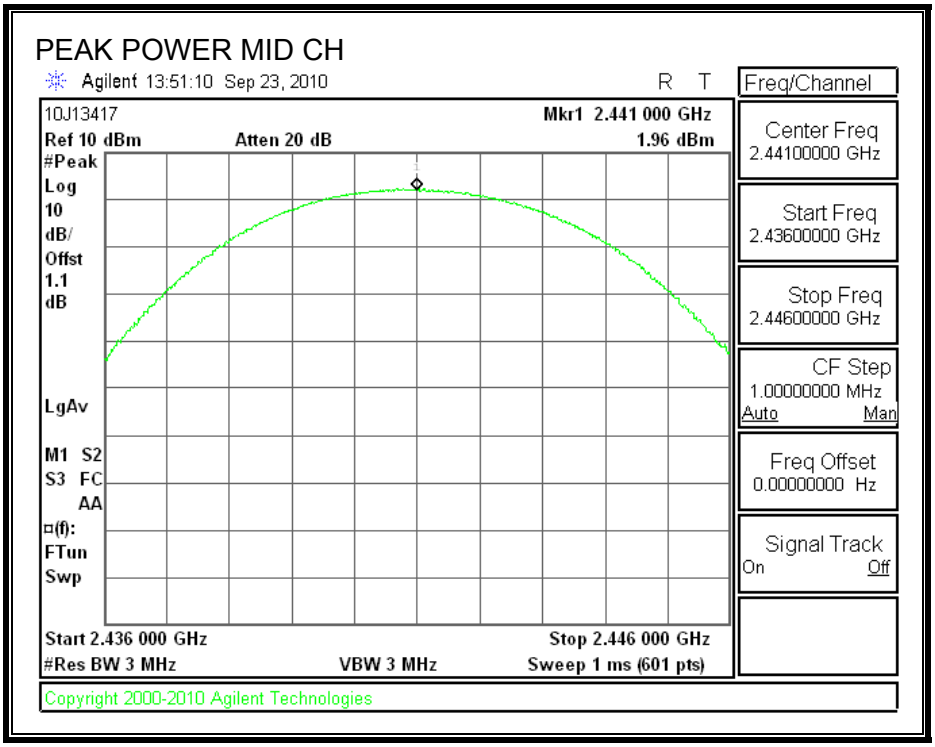
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.00	30	-28.00
Middle	2441	1.96	30	-28.04
High	2480	1.81	30	-28.19

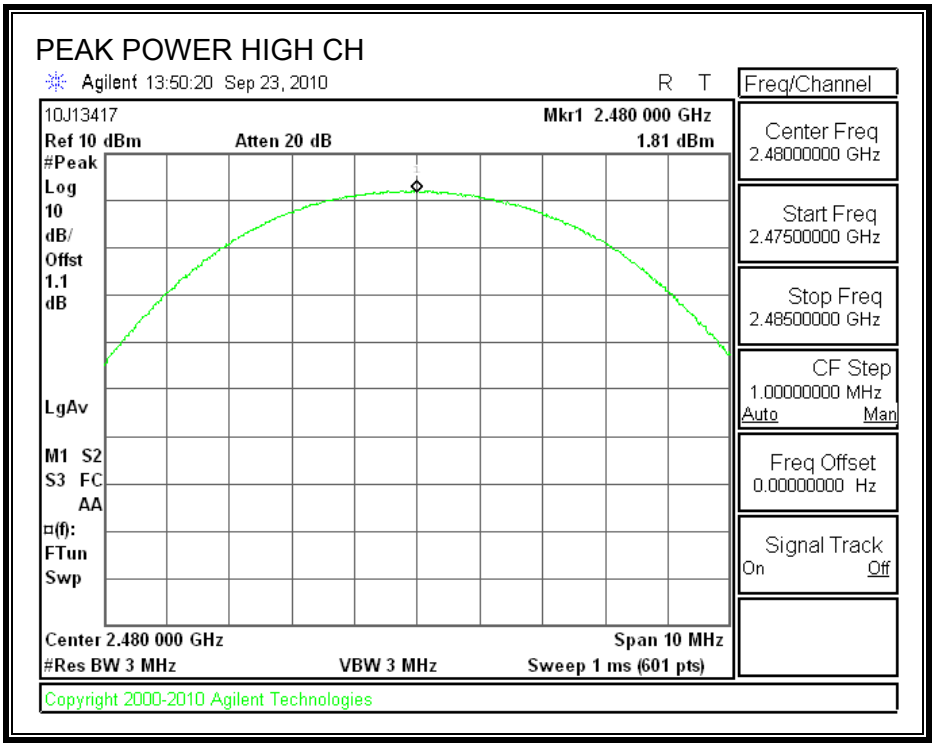
OUTPUT POWER



PEAK POWER MID CH



PEAK POWER HIGH CH



7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 1.1 dB (including 0 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-3.27
Middle	2441	-2.87
High	2480	-2.96

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

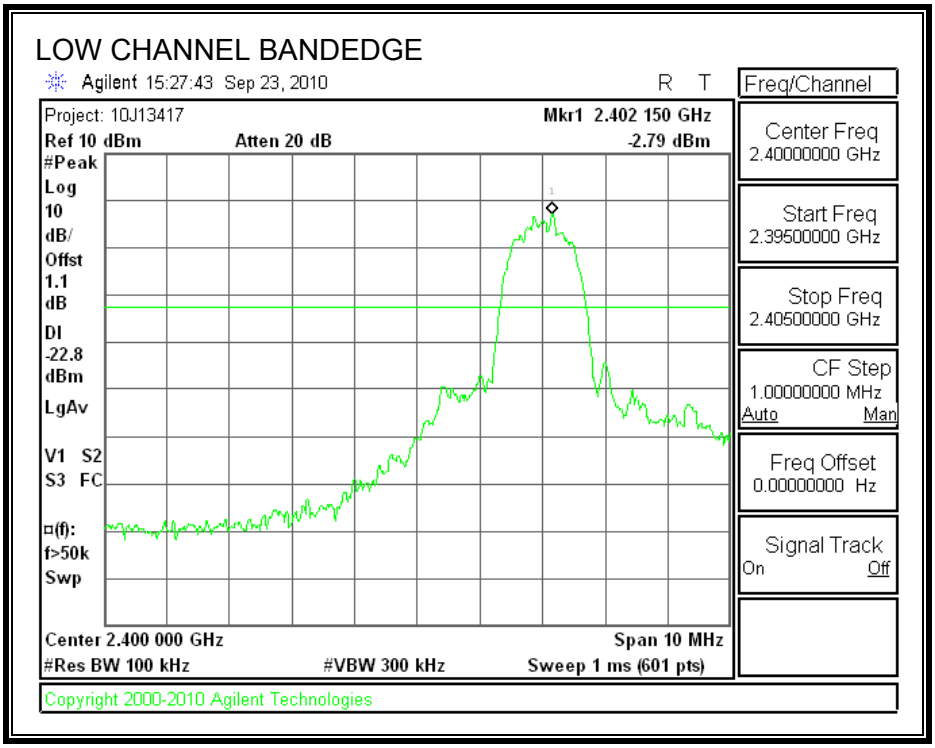
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

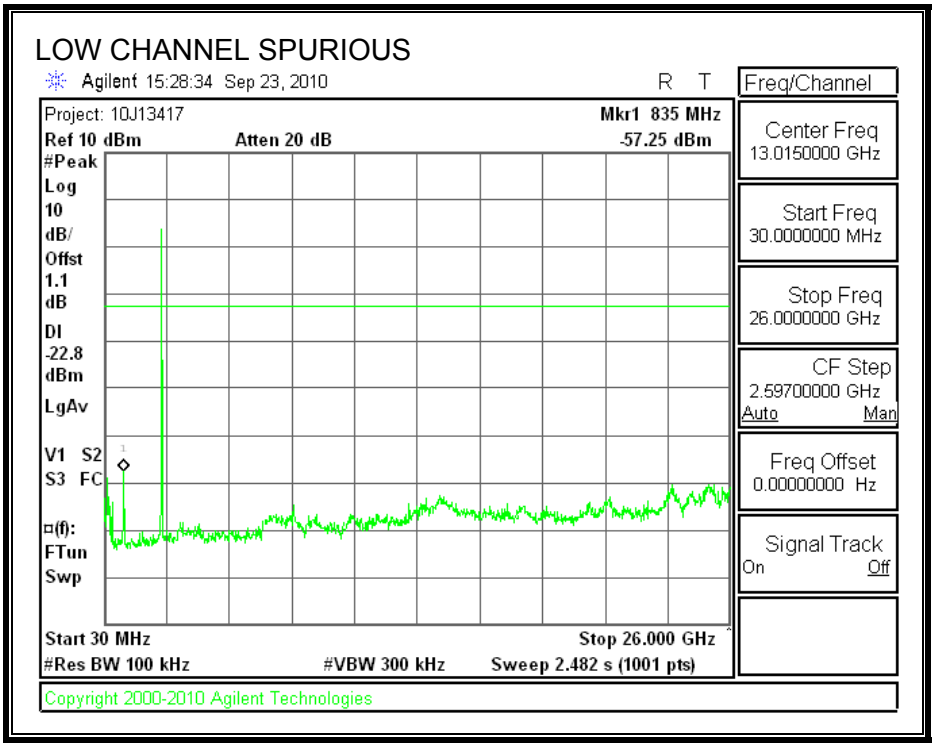
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

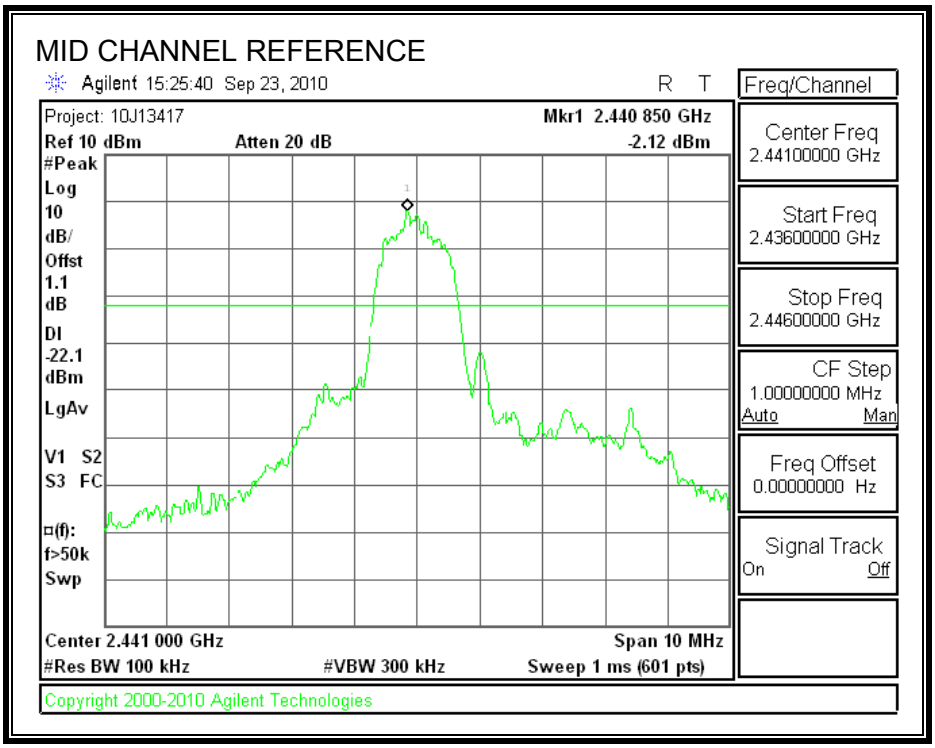
SPURIOUS EMISSIONS, LOW CHANNEL

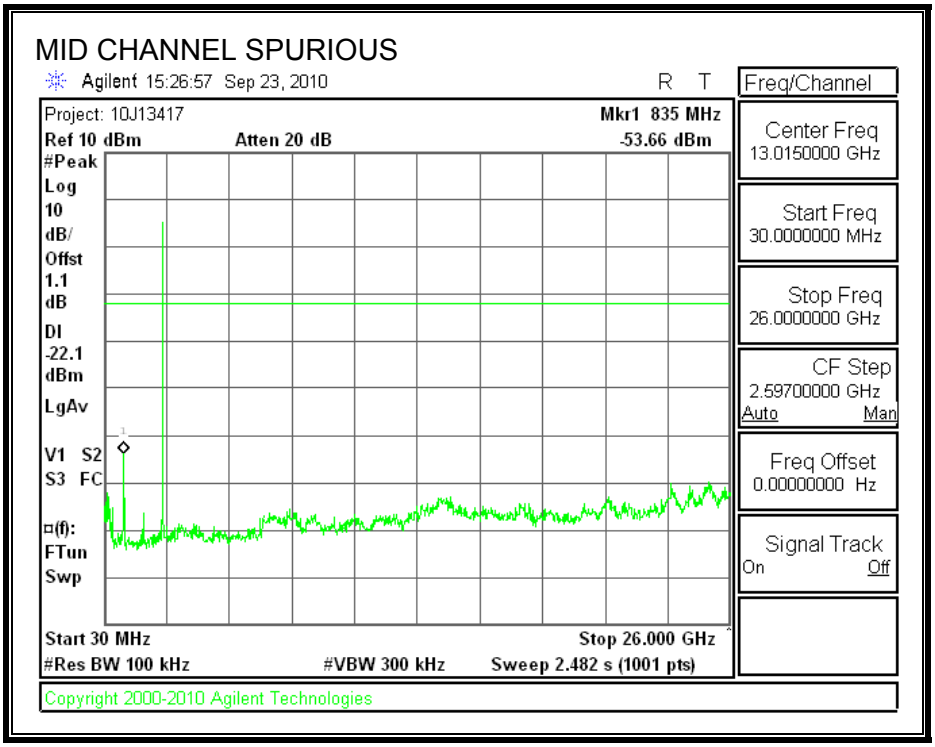


LOW CHANNEL SPURIOUS

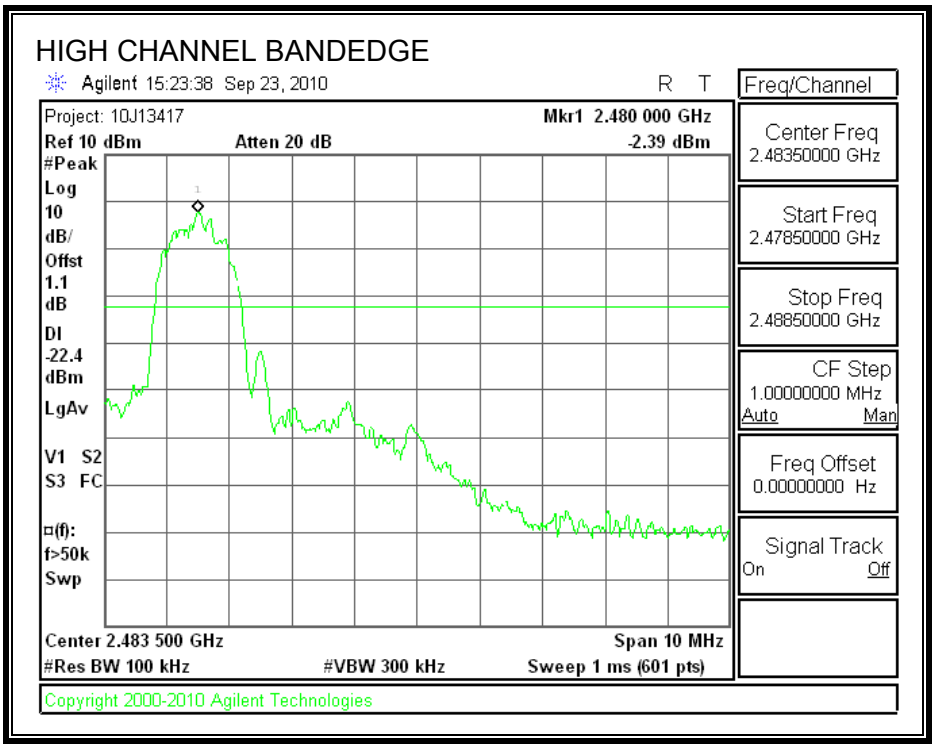


SPURIOUS EMISSIONS, MID CHANNEL

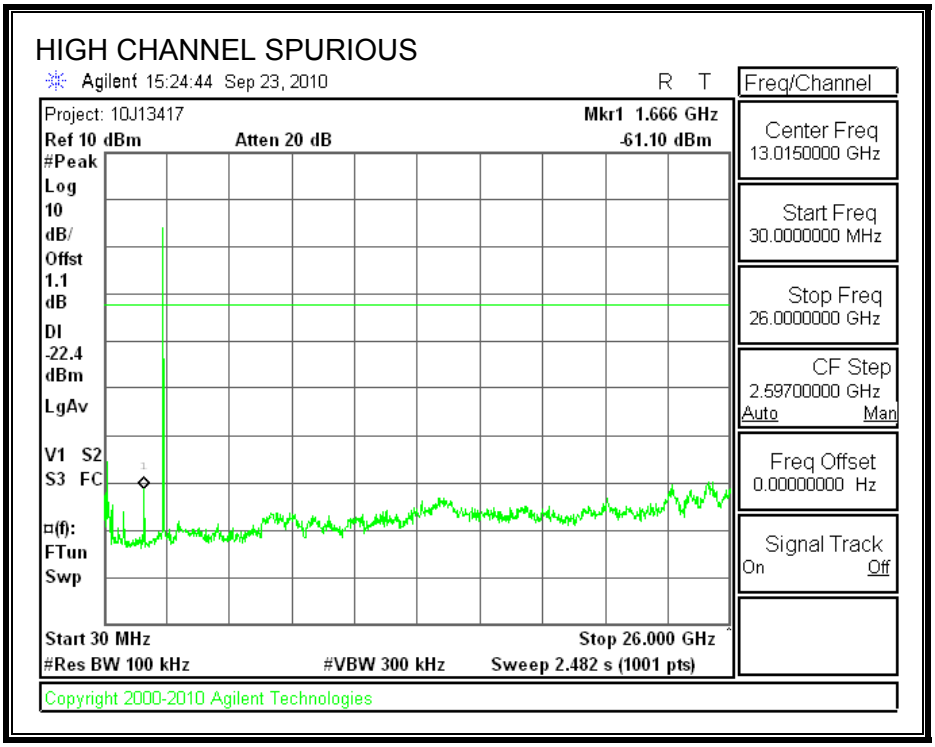




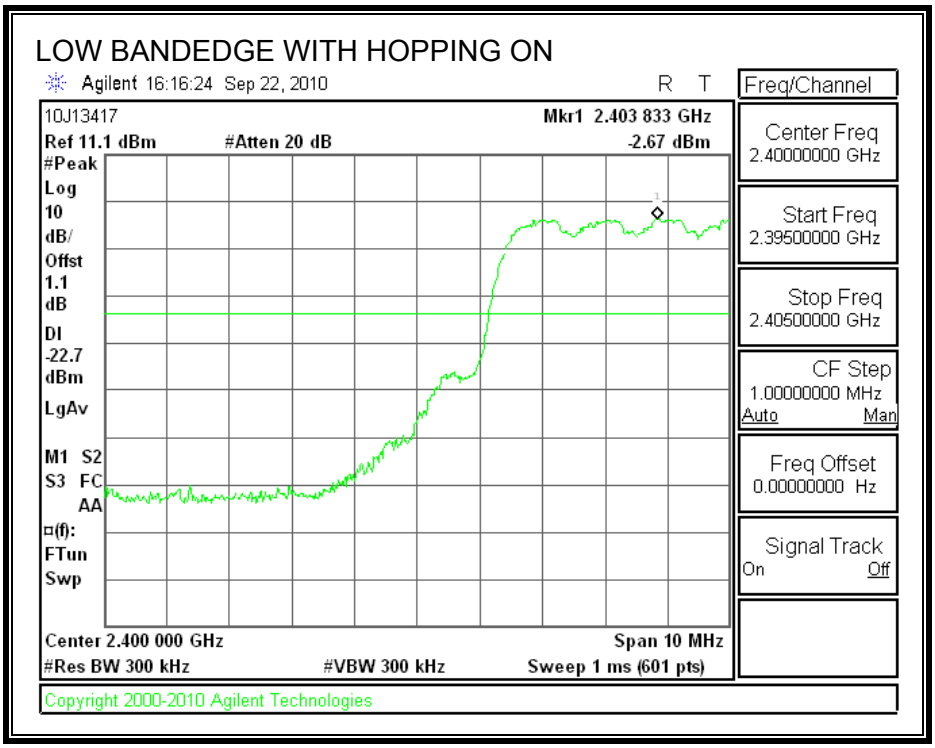
SPURIOUS EMISSIONS, HIGH CHANNEL



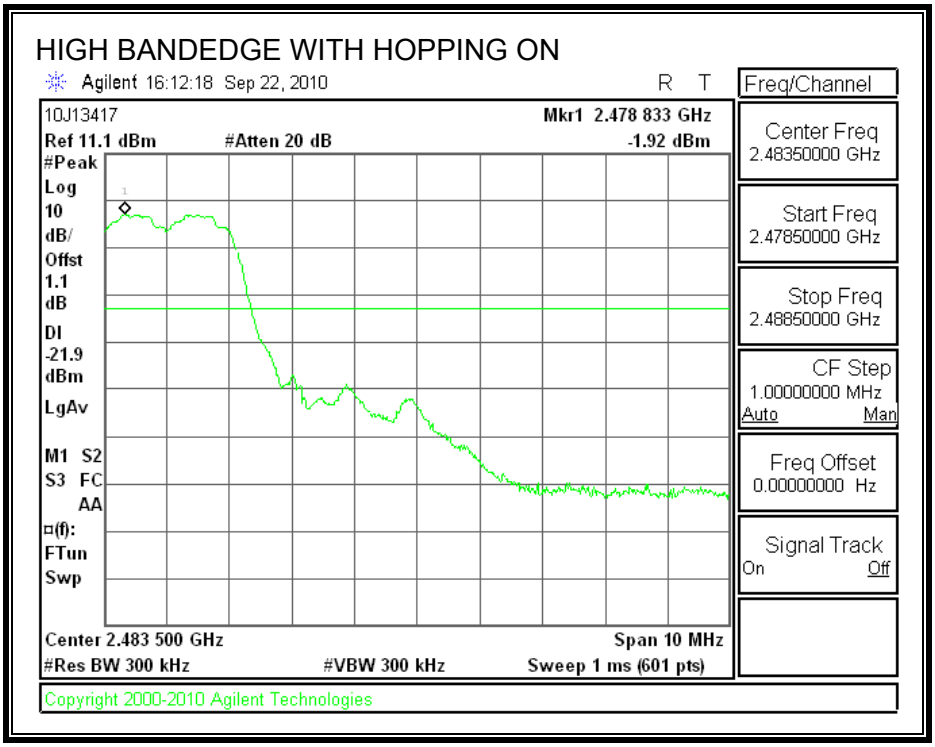
HIGH CHANNEL SPURIOUS



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

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.

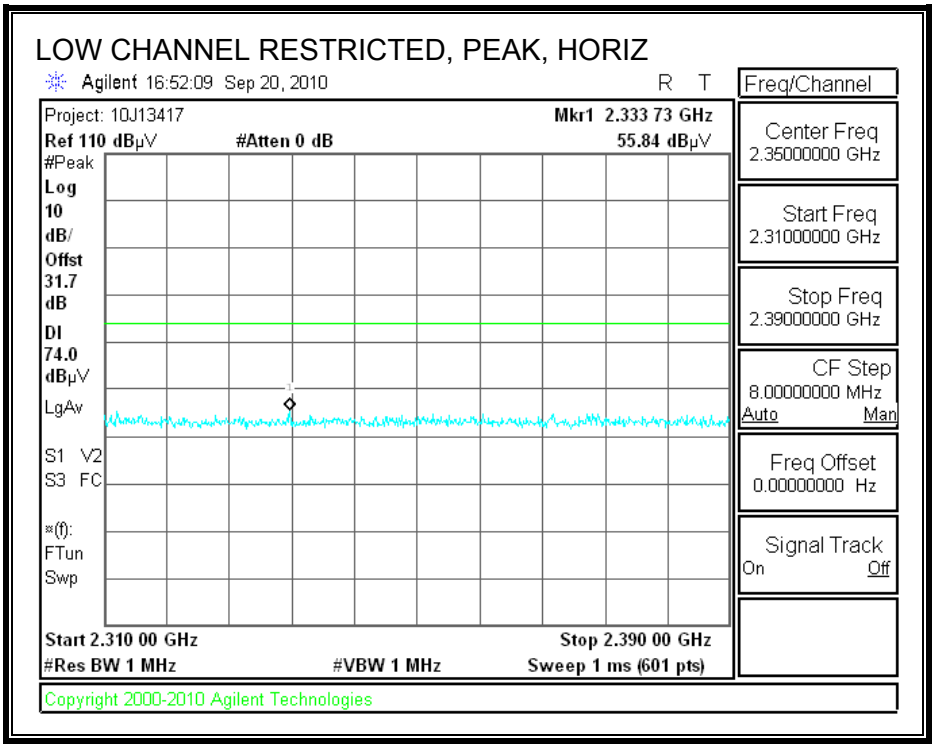
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The 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.

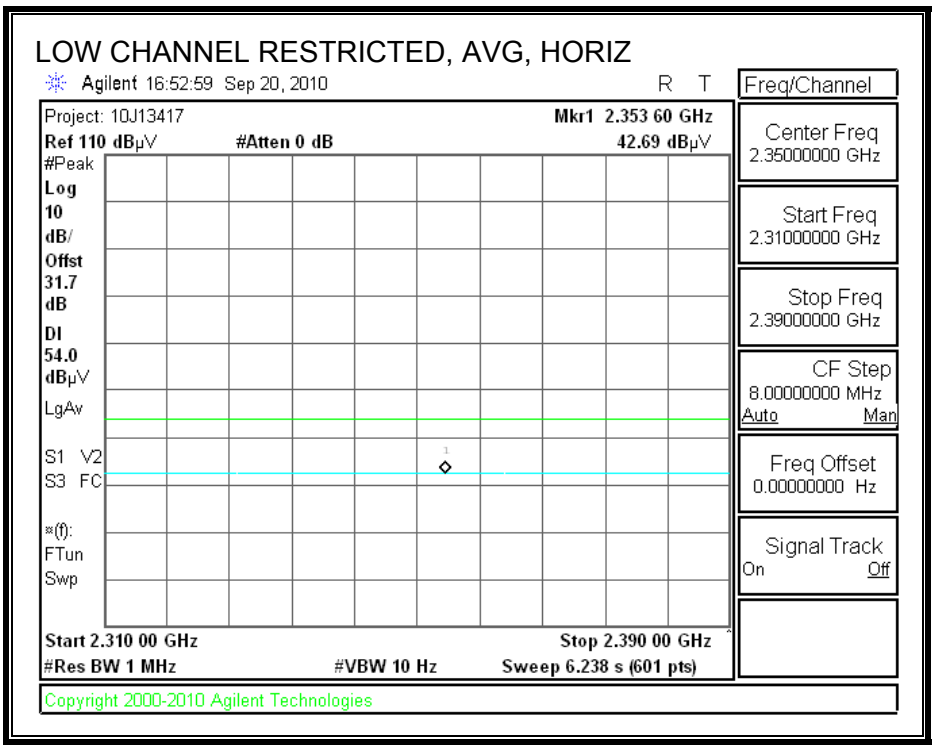
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

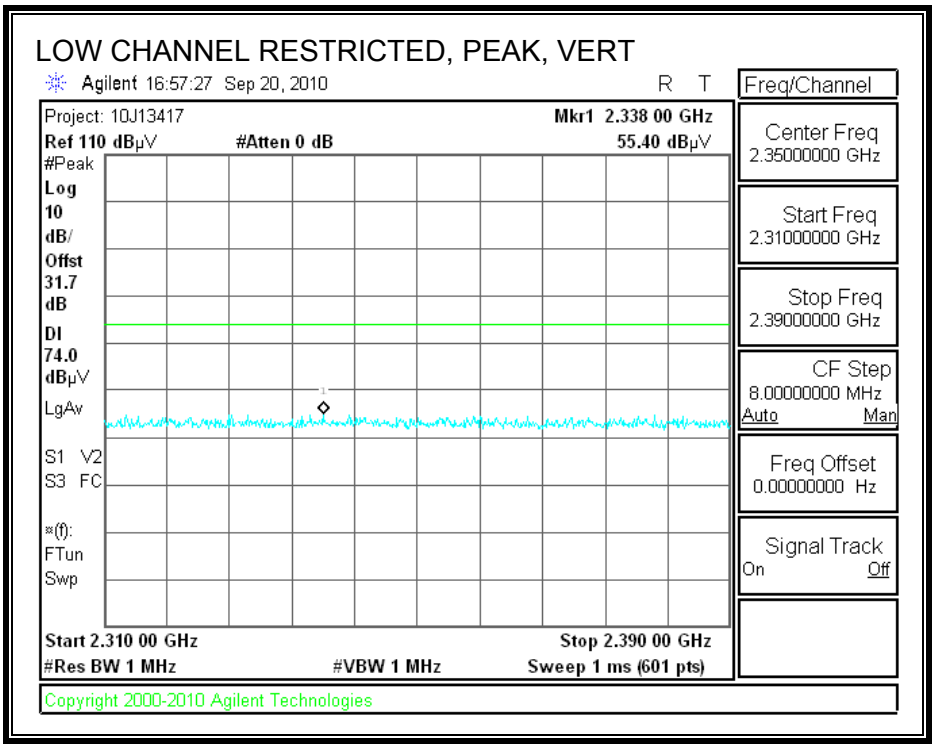
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

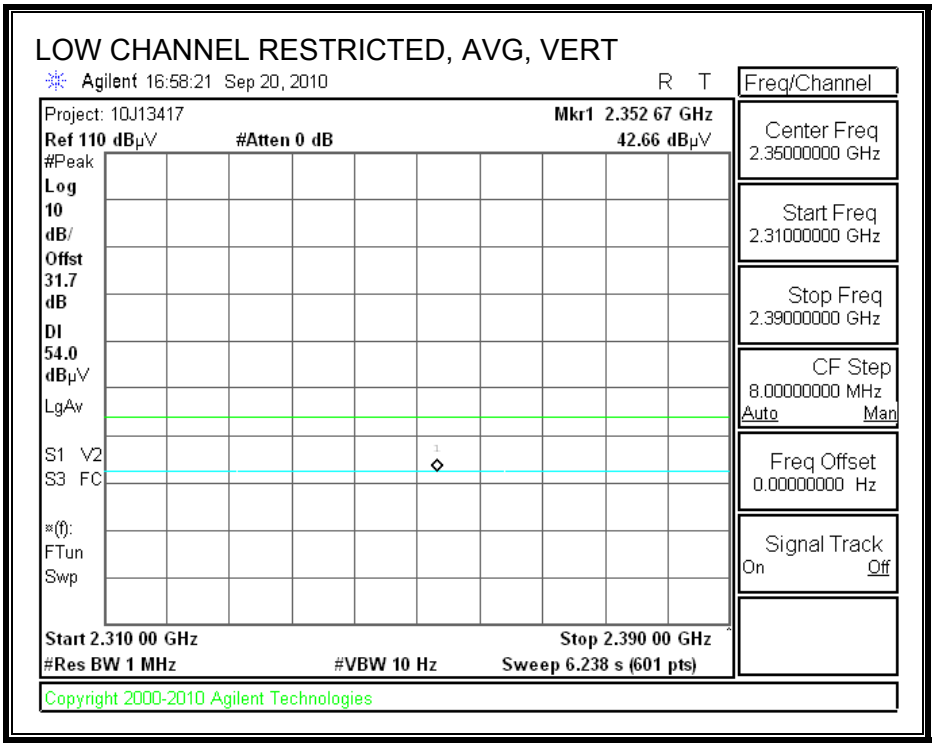


LOW CHANNEL RESTRICTED, AVG, HORIZ

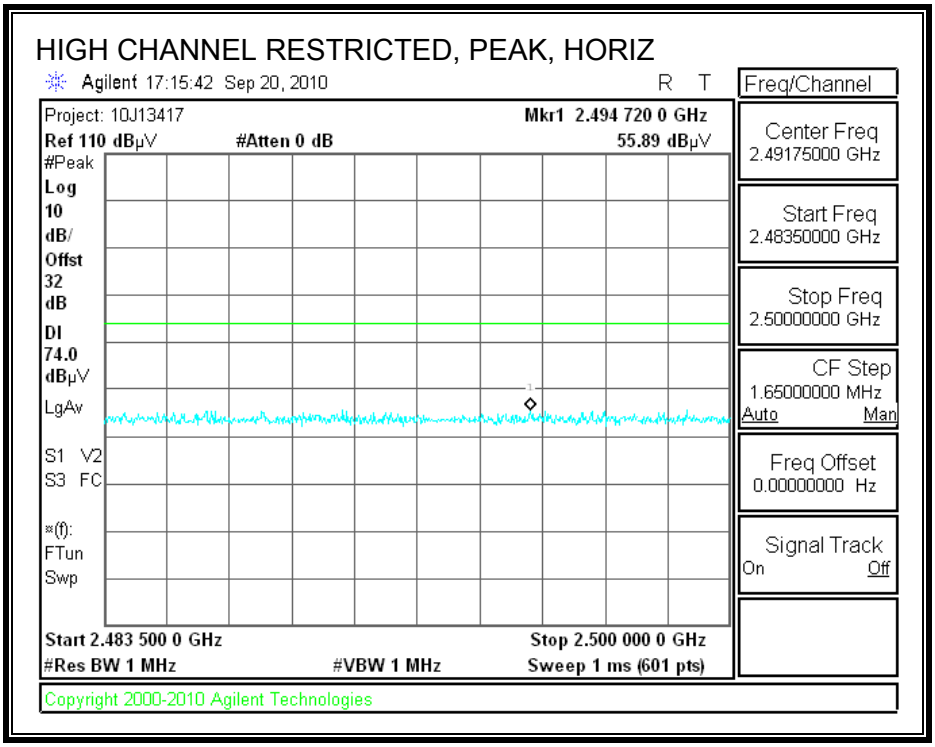


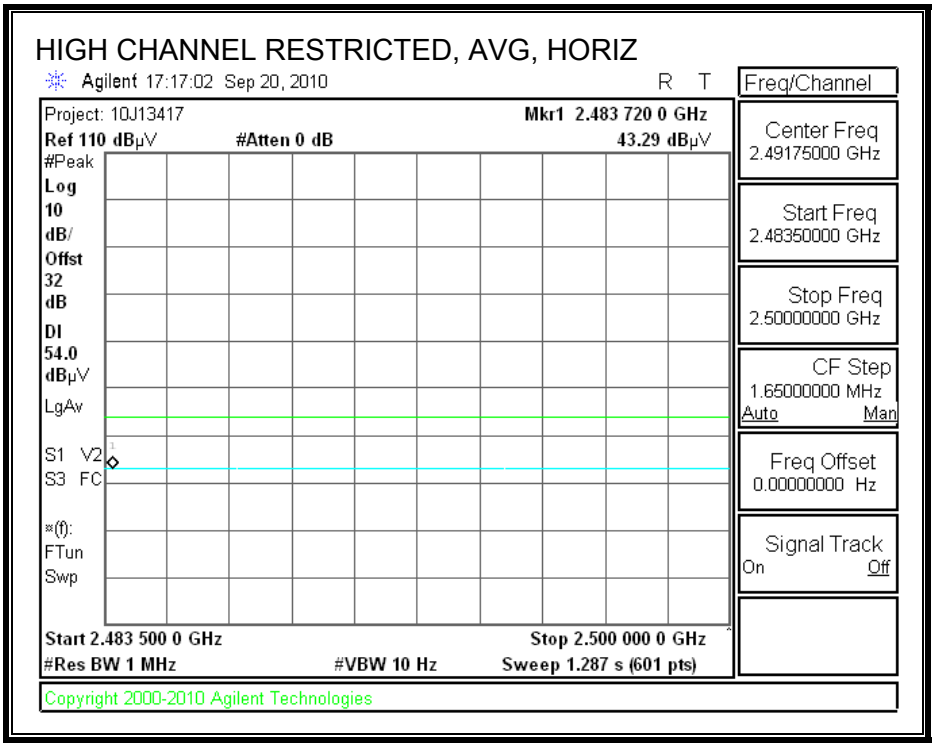
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



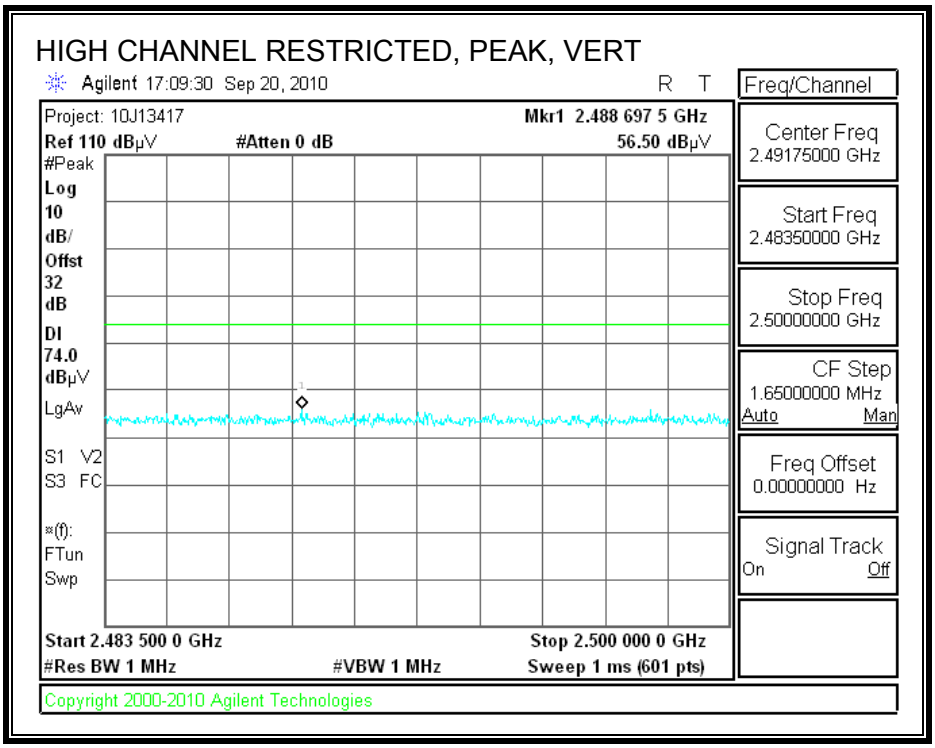


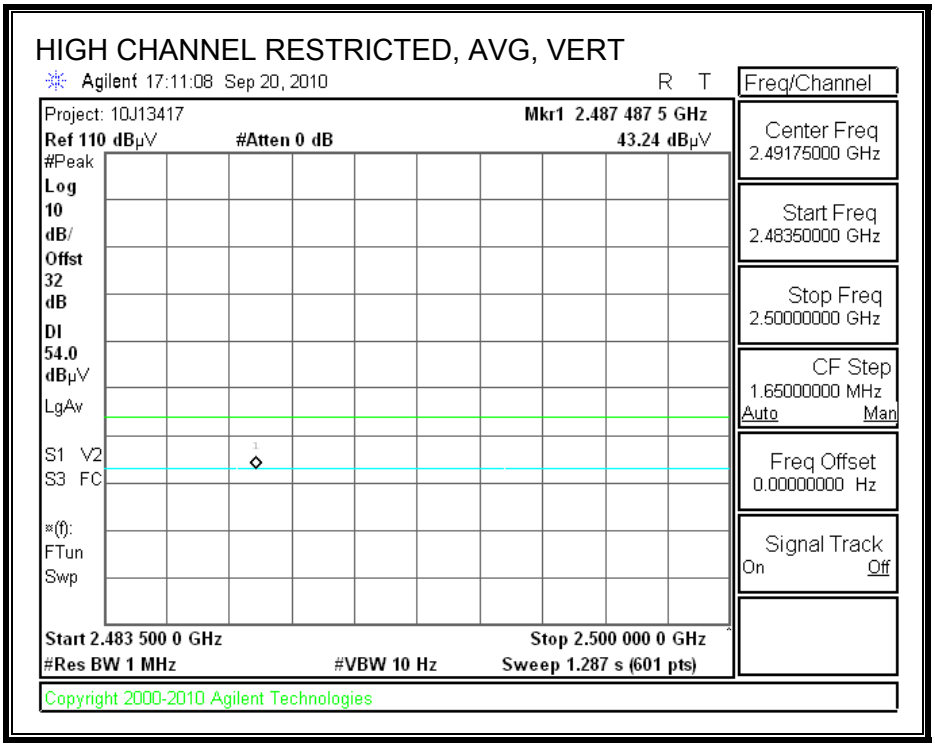
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 09/21/10
Project #: 10J13417
Company: Casio
Test Target: FCC Class B
Mode Oper: TX mode, GFSK

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

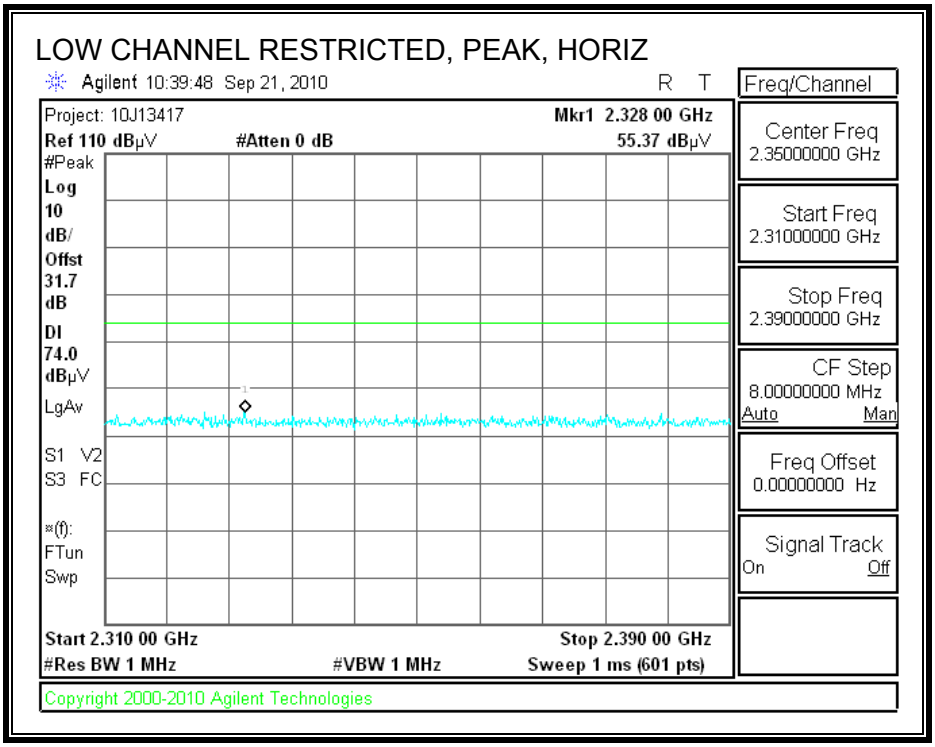
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2402 MHz Low CH													
4.804	3.0	41.3	32.8	5.8	-36.5	0.0	0.0	43.4	74.0	-30.6	H	P	
4.804	3.0	34.3	32.8	5.8	-36.5	0.0	0.0	36.4	54.0	-17.6	H	A	
7.206	3.0	37.1	35.0	7.2	-36.2	0.0	0.0	43.1	74.0	-30.9	H	P	
7.206	3.0	24.9	35.0	7.2	-36.2	0.0	0.0	31.0	54.0	-23.0	H	A	
2402 MHz Low CH													
4.804	3.0	44.8	32.8	5.8	-36.5	0.0	0.0	46.9	74.0	-27.1	V	P	
4.804	3.0	40.7	32.8	5.8	-36.5	0.0	0.0	42.8	54.0	-11.2	V	A	
7.206	3.0	37.4	35.0	7.2	-36.2	0.0	0.0	43.5	74.0	-30.5	V	P	
7.206	3.0	25.4	35.0	7.2	-36.2	0.0	0.0	31.4	54.0	-22.6	V	A	
2441 MHz Mid CH													
4.882	3.0	42.9	32.8	5.8	-36.5	0.0	0.0	45.1	74.0	-28.9	V	P	
4.882	3.0	38.7	32.8	5.8	-36.5	0.0	0.0	40.9	54.0	-13.1	V	A	
7.323	3.0	37.3	35.2	7.3	-36.2	0.0	0.0	43.6	74.0	-30.4	V	P	
7.323	3.0	25.1	35.2	7.3	-36.2	0.0	0.0	31.3	54.0	-22.7	V	A	
2441 MHz Mid CH													
4.882	3.0	40.2	32.8	5.8	-36.5	0.0	0.0	42.4	74.0	-31.6	H	P	
4.882	3.0	32.7	32.8	5.8	-36.5	0.0	0.0	34.8	54.0	-19.2	H	A	
7.323	3.0	37.6	35.2	7.3	-36.2	0.0	0.0	43.9	74.0	-30.1	H	P	
7.323	3.0	25.1	35.2	7.3	-36.2	0.0	0.0	31.4	54.0	-22.6	H	A	
2480 MHz High CH													
4.960	3.0	42.7	32.9	5.9	-36.5	0.0	0.0	45.1	74.0	-28.9	H	P	
4.960	3.0	37.9	32.9	5.9	-36.5	0.0	0.0	40.2	54.0	-13.8	H	A	
7.440	3.0	36.8	35.4	7.3	-36.2	0.0	0.0	43.3	74.0	-30.7	H	P	
7.440	3.0	24.6	35.4	7.3	-36.2	0.0	0.0	31.1	54.0	-22.9	H	A	
2480 MHz High CH													
4.960	3.0	43.0	32.9	5.9	-36.5	0.0	0.0	45.3	74.0	-28.7	V	P	
4.960	3.0	39.1	32.9	5.9	-36.5	0.0	0.0	41.5	54.0	-12.5	V	A	
7.440	3.0	37.8	35.4	7.3	-36.2	0.0	0.0	44.2	74.0	-29.8	V	P	
7.440	3.0	24.9	35.4	7.3	-36.2	0.0	0.0	31.4	54.0	-22.6	V	A	

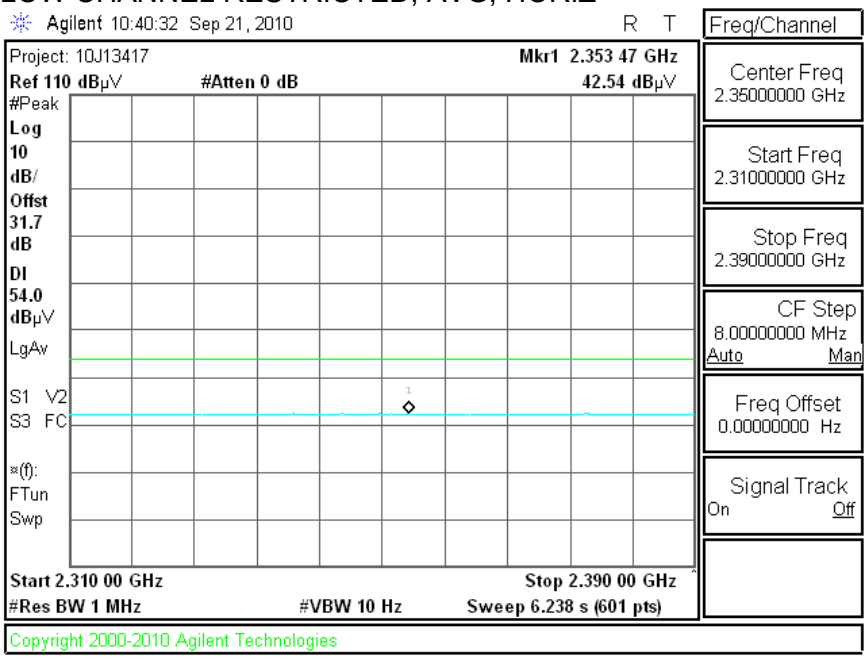
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

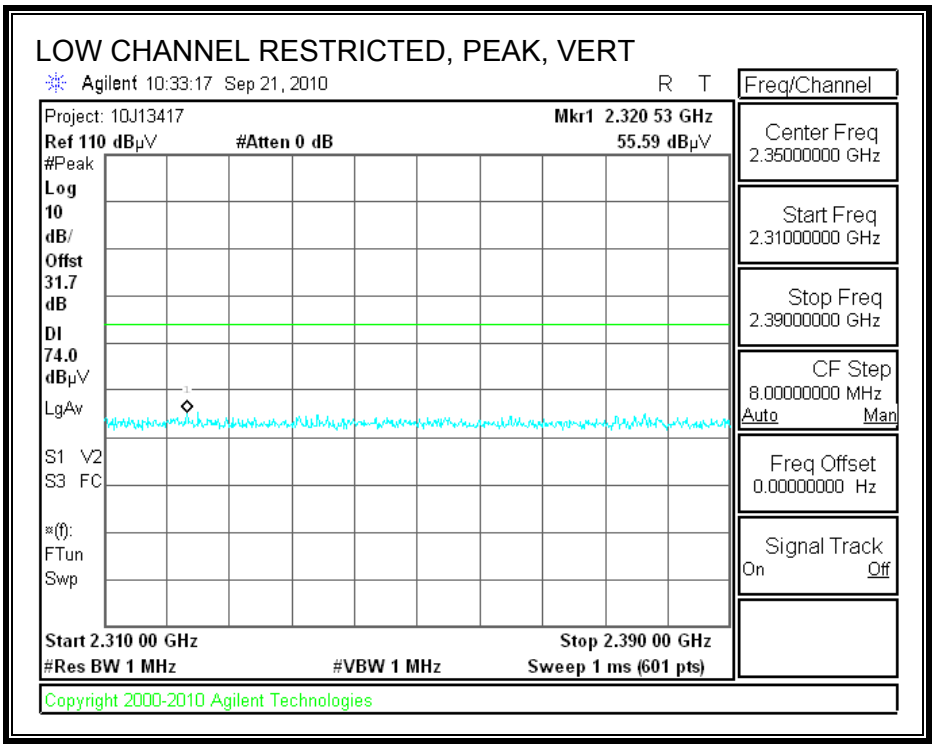
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



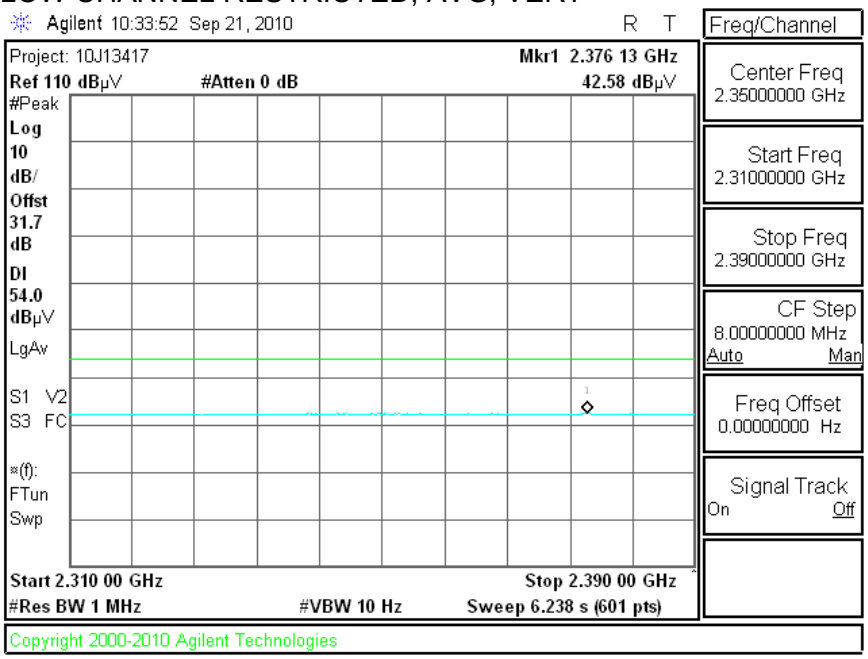
LOW CHANNEL RESTRICTED, AVG, HORIZ



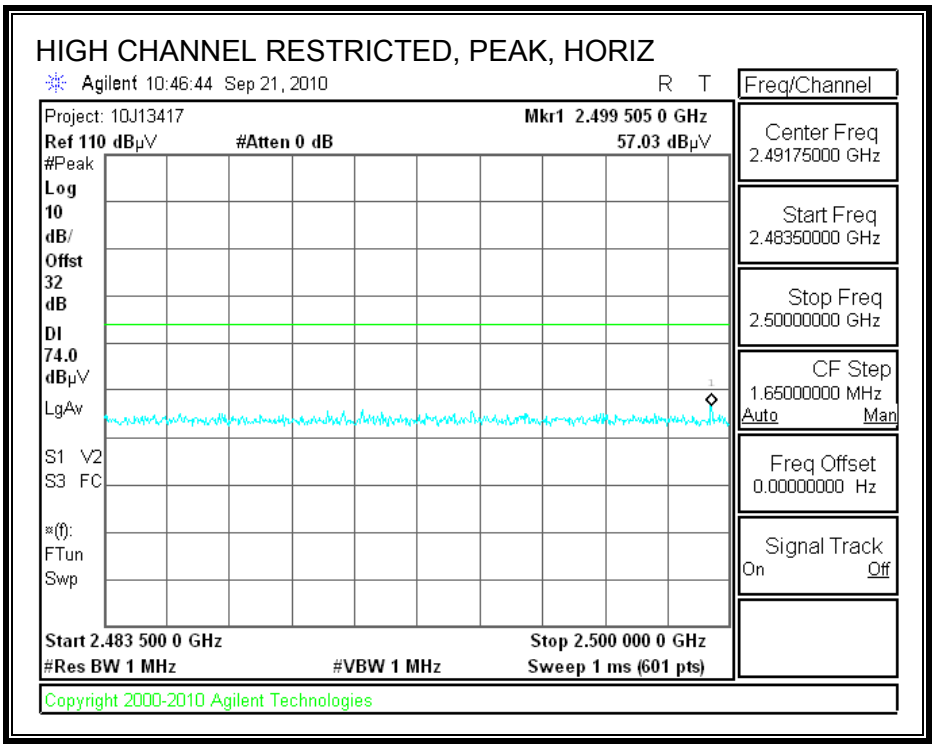
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

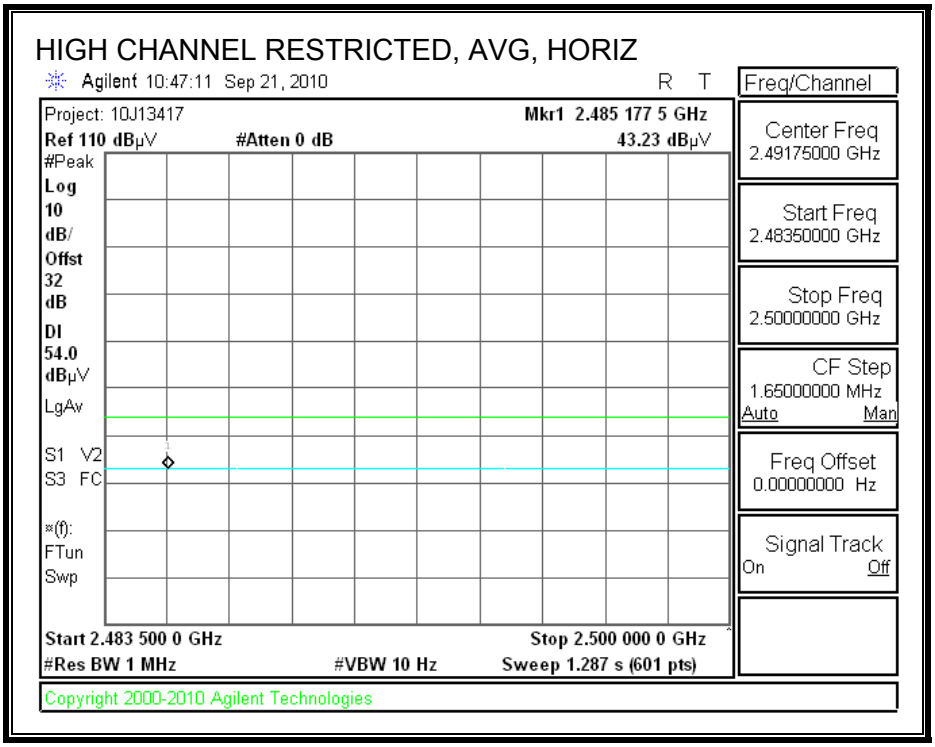


LOW CHANNEL RESTRICTED, AVG, VERT

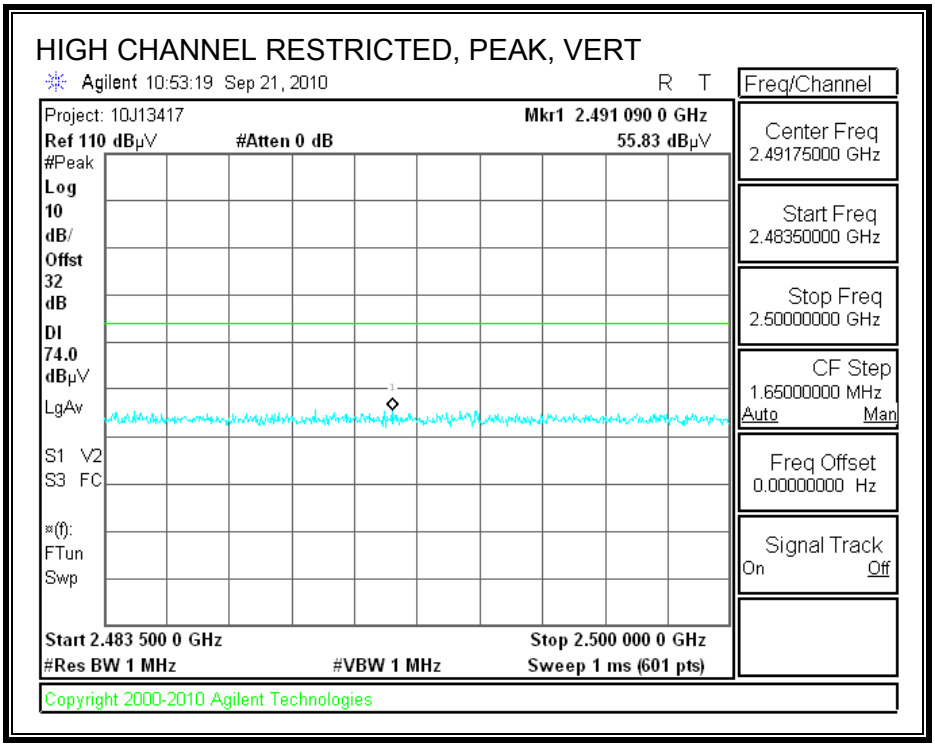


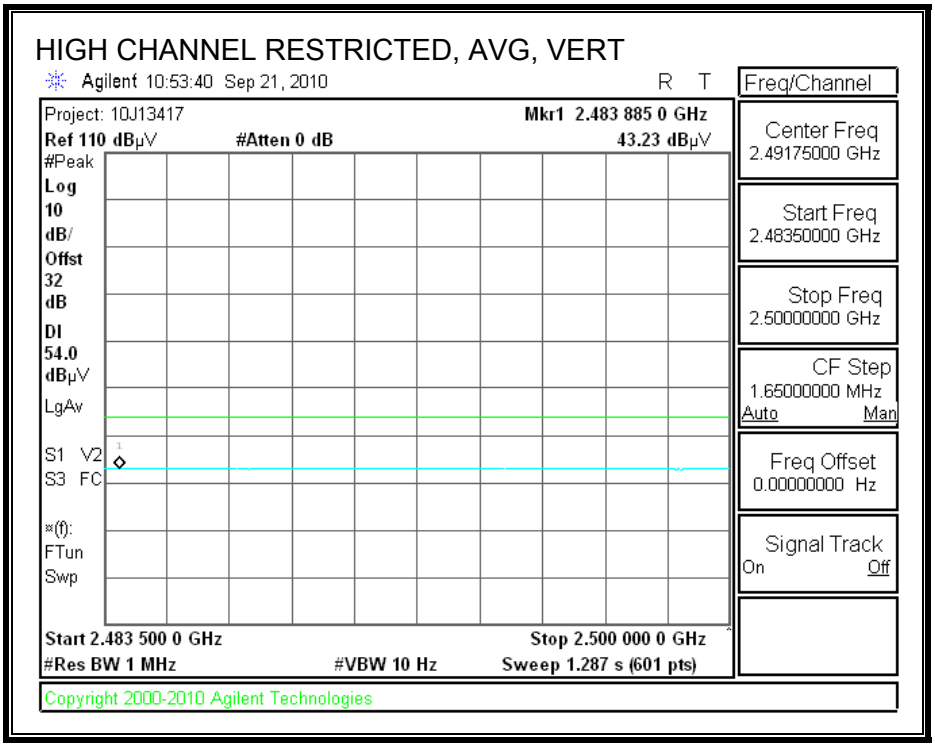
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

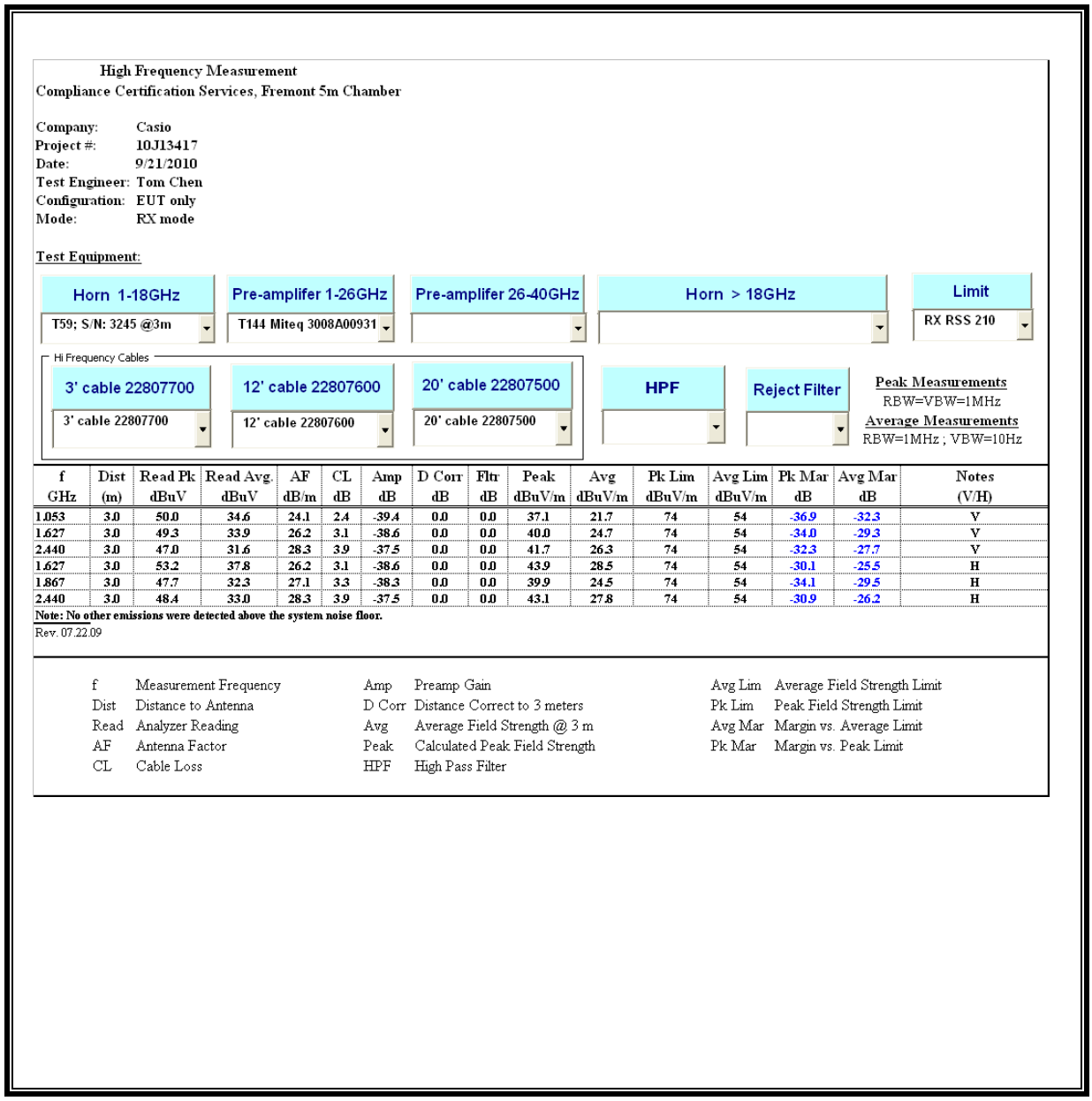
Test Engr: Tom Chen
Date: 09/21/10
Project #: 10J13417
Company: Casio
Test Target: FCC Class B
Mode Oper: TX mode, 8PSK

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2402 MHz Low CH													
4.804	3.0	40.1	32.8	5.8	-36.5	0.0	0.0	42.1	74.0	-31.9	H	P	
4.804	3.0	32.2	32.8	5.8	-36.5	0.0	0.0	34.3	54.0	-19.7	H	A	
7.206	3.0	38.1	35.0	7.2	-36.2	0.0	0.0	44.2	74.0	-29.8	H	P	
7.206	3.0	25.4	35.0	7.2	-36.2	0.0	0.0	31.4	54.0	-22.6	H	A	
2402 MHz Low CH													
4.804	3.0	42.9	32.8	5.8	-36.5	0.0	0.0	44.9	74.0	-29.1	V	P	
4.804	3.0	38.6	32.8	5.8	-36.5	0.0	0.0	40.7	54.0	-13.3	V	A	
7.206	3.0	37.9	35.0	7.2	-36.2	0.0	0.0	44.0	74.0	-30.0	V	P	
7.206	3.0	26.1	35.0	7.2	-36.2	0.0	0.0	32.1	54.0	-21.9	V	A	
2441 MHz Mid CH													
4.882	3.0	41.8	32.8	5.8	-36.5	0.0	0.0	44.0	74.0	-30.0	V	P	
4.882	3.0	34.7	32.8	5.8	-36.5	0.0	0.0	36.8	54.0	-17.2	V	A	
7.323	3.0	37.8	35.2	7.3	-36.2	0.0	0.0	44.0	74.0	-30.0	V	P	
7.323	3.0	25.9	35.2	7.3	-36.2	0.0	0.0	32.2	54.0	-21.8	V	A	
2441 MHz Mid CH													
4.882	3.0	39.1	32.8	5.8	-36.5	0.0	0.0	41.3	74.0	-32.7	H	P	
4.882	3.0	29.1	32.8	5.8	-36.5	0.0	0.0	31.3	54.0	-22.7	H	A	
7.323	3.0	37.9	35.2	7.3	-36.2	0.0	0.0	44.2	74.0	-29.8	H	P	
7.323	3.0	25.1	35.2	7.3	-36.2	0.0	0.0	31.4	54.0	-22.6	H	A	
2480 MHz High CH													
4.960	3.0	40.6	32.9	5.9	-36.5	0.0	0.0	42.9	74.0	-31.1	V	P	
4.960	3.0	33.1	32.9	5.9	-36.5	0.0	0.0	35.4	54.0	-18.6	V	A	
7.440	3.0	37.1	35.4	7.3	-36.2	0.0	0.0	43.6	74.0	-30.4	V	P	
7.440	3.0	26.0	35.4	7.3	-36.2	0.0	0.0	32.5	54.0	-21.5	V	A	
2480 MHz High CH													
4.960	3.0	38.4	32.9	5.9	-36.5	0.0	0.0	40.8	74.0	-33.2	H	P	
4.960	3.0	29.1	32.9	5.9	-36.5	0.0	0.0	31.4	54.0	-22.6	H	A	
7.440	3.0	37.5	35.4	7.3	-36.2	0.0	0.0	44.0	74.0	-30.0	H	P	
7.440	3.0	24.8	35.4	7.3	-36.2	0.0	0.0	31.3	54.0	-22.7	H	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.3. RECEIVER ABOVE 1 GHz



High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Casio
Project #: 10J13417
Date: 9/21/2010
Test Engineer: Tom Chen
Configuration: EUT only
Mode: RX mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

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)
1.053	3.0	50.0	34.6	24.1	2.4	-39.4	0.0	0.0	37.1	21.7	74	54	-36.9	-32.3	V
1.627	3.0	49.3	33.9	26.2	3.1	-38.6	0.0	0.0	40.0	24.7	74	54	-34.0	-29.3	V
2.440	3.0	47.0	31.6	28.3	3.9	-37.5	0.0	0.0	41.7	26.3	74	54	-32.3	-27.7	V
1.627	3.0	53.2	37.8	26.2	3.1	-38.6	0.0	0.0	43.9	28.5	74	54	-30.1	-25.5	H
1.867	3.0	47.7	32.3	27.1	3.3	-38.3	0.0	0.0	39.9	24.5	74	54	-34.1	-29.5	H
2.440	3.0	48.4	33.0	28.3	3.9	-37.5	0.0	0.0	43.1	27.8	74	54	-30.9	-26.2	H

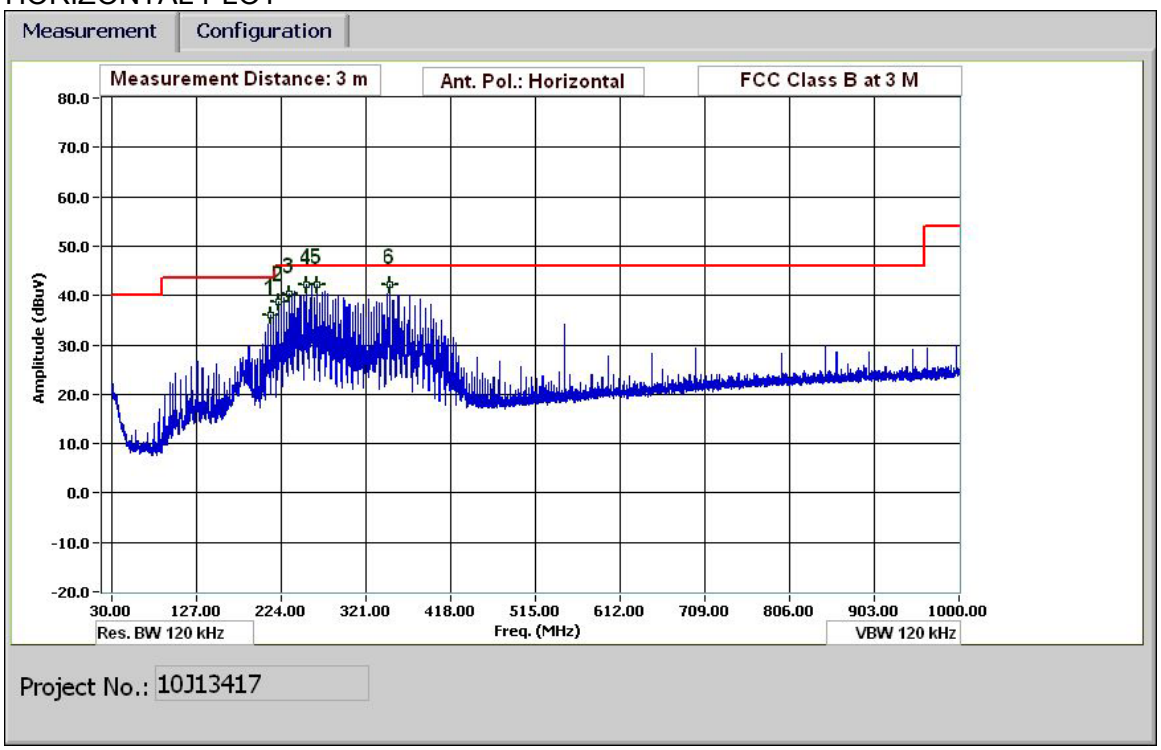
Note: No other emissions were detected above the system noise floor.
Rev. 07.22.09

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		

8.4. WORST-CASE BELOW 1 GHz

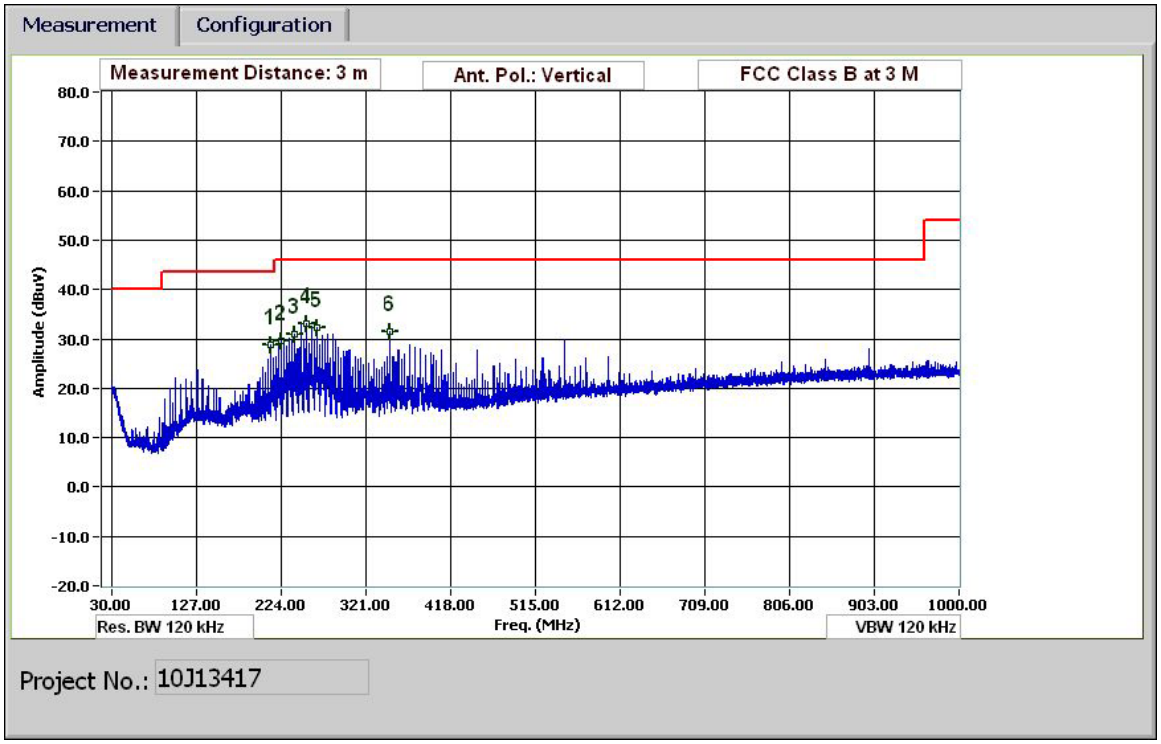
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 09/21/10
Project #: 10J13417
Company: Casio
Test Target: FCC Class B
Mode Oper: TX mode, Worst case

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Horizontal without Cradle													
211.807	3.0	51.0	12.0	1.3	28.2	0.0	0.0	36.0	43.5	-7.5	H	P	
221.168	3.0	53.7	11.9	1.3	28.2	0.0	0.0	38.7	46.0	-7.3	H	P	
233.648	3.0	55.3	11.9	1.3	28.2	0.0	0.0	40.2	46.0	-5.8	H	P	
252.369	3.0	54.6	11.9	1.4	28.2	0.0	0.0	39.7	46.0	-6.3	H	QP	
264.85	3.0	54.1	12.3	1.4	28.2	0.0	0.0	39.6	46.0	-6.4	H	QP	
348.973	3.0	52.0	14.1	1.7	28.1	0.0	0.0	39.7	46.0	-6.3	H	QP	
Vertical without Cradle													
211.928	3.0	43.7	12.0	1.3	28.2	0.0	0.0	28.7	43.5	-14.8	V	P	
224.288	3.0	44.5	11.9	1.3	28.2	0.0	0.0	29.5	46.0	-16.5	V	P	
239.889	3.0	46.0	11.8	1.3	28.2	0.0	0.0	31.0	46.0	-15.0	V	P	
252.369	3.0	48.0	11.9	1.4	28.2	0.0	0.0	33.0	46.0	-13.0	V	P	
264.85	3.0	46.8	12.3	1.4	28.2	0.0	0.0	32.3	46.0	-13.7	V	P	
348.853	3.0	43.8	14.1	1.7	28.1	0.0	0.0	31.5	46.0	-14.5	V	P	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

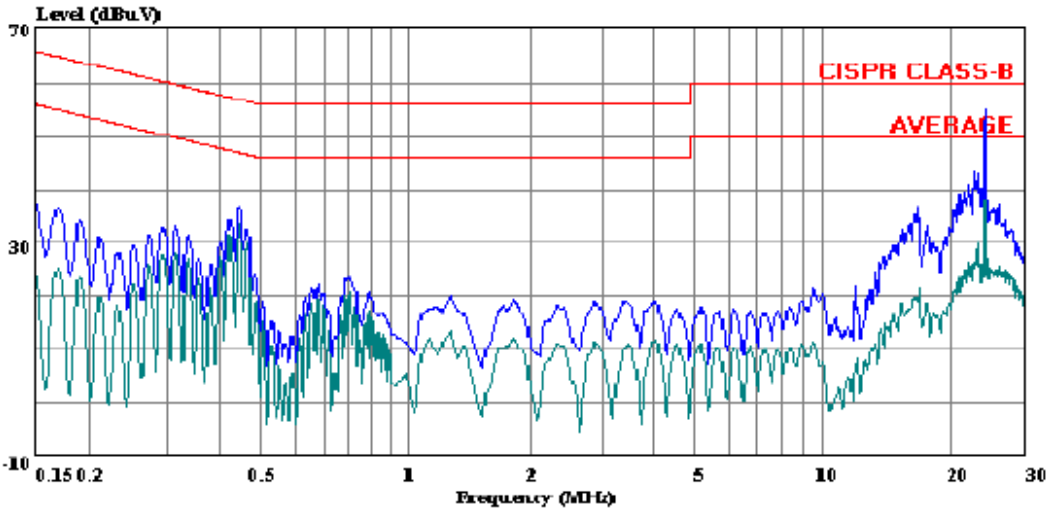
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.44	36.68	--	33.70	0.00	56.99	46.99	-20.31	-13.29	L1
16.66	36.62	--	19.04	0.00	60.00	50.00	-23.38	-30.96	L1
24.01	54.96	--	44.62	0.00	60.00	50.00	-5.04	-5.38	L1
0.44	34.13	--	27.62	0.00	57.16	47.16	-23.03	-19.54	L2
16.66	37.23	--	21.91	0.00	60.00	50.00	-22.77	-28.09	L2
24.01	54.60	--	44.41	0.00	60.00	50.00	-5.40	-5.59	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 10U13417-LC.EMI Date: 09-21-2010 Time: 15:25:16



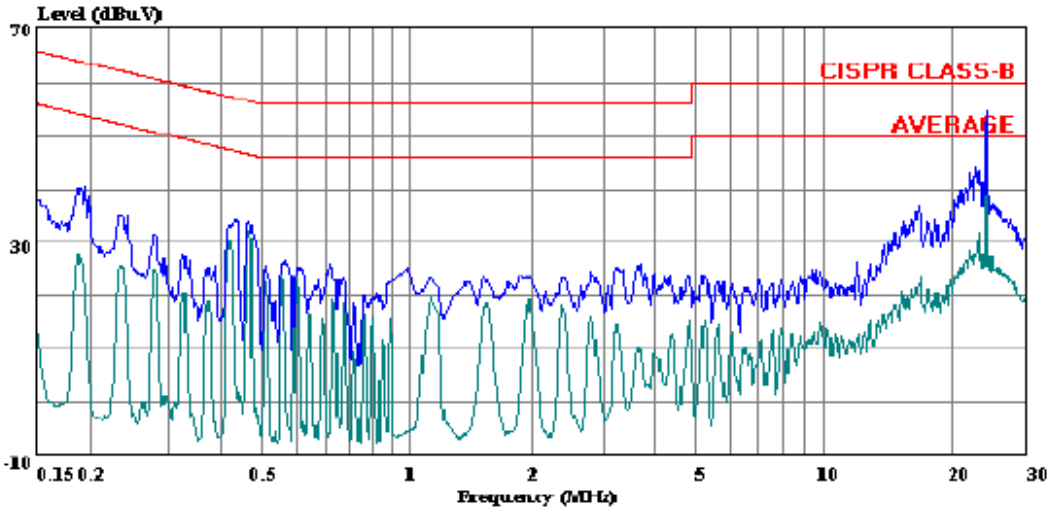
Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Tom Chen
Project #: : 10U13417
Company: : Casio
Configuration:: EUT with Cradle and AC Adapter
Mode : : Worst Case BT TX mode
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L1: Peak (Blue) ; Average (Green)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 21 File#: 10U13417-LC.EMI Date: 09-21-2010 Time: 15:54:29



Trace: 19 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Tom Chen
Project #: : 10U13417
Company: : Casio
Configuration:: EUT with Cradle and AC Adapter
Mode : : Worst Case BT TX mode
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L2: Peak (Blue) ; Average (Green)

10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§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.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

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

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	Bluetooth	0.20	2.00	-0.35	0.0029	0.0003