



**FCC PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8
CERTIFICATION TEST REPORT**

FOR

HANDHELD TERMINAL

MODEL NUMBER: IT-300-35E

**FCC ID: BBQIT300
IC: 2388F-IT300**

REPORT NUMBER: 10J13537-7, REVISION A

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Prepared for

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	02/23/11	Initial Issue	F. Ibrahim
A	04/07/11	Revised IC standard revision in page 5, Worst-case configuration description in page 7, Bandwidth in page 14 and Peak plot in page 58.	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-300-35E

SERIAL NUMBER: NO 15

DATE TESTED: SEPTEMBER 21, 2010 - FEBRUARY 01, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	PASS
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	PASS
INDUSTRY CANADA RSS-GEN Issue 3	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:

Tested By:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

TOM CHEM
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with RSS-GEN Issue 3, and RSS-210 Issue 8.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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 Bluetooth and 802.11b/g equipped Handheld Terminal

The radio module is manufactured by Universal Scientific Industrial Corp.

5.2. 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

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip antenna, with a maximum gain of -1.63 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was BTRadio Test Ver 3.20

The test utility software used during testing was BT Radio: BTRadioTest_Auth.exe

5.5. WORST-CASE CONFIGURATION AND MODE

The fundamental was measured in three different orientations X, Y, Z and the worst among them with AC/DC Adapter, USB and Charging Unit and headphone to find worst-case orientation, and it was found that Y orientation with AC/DC Adapter, USB and Charging Unit and headphone is worst-case; therefore final testing for radiated emissions was performed with EUT in Y orientation with AC/DC Adapter, USB and Charging Unit and headphone

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.

5.6. DESCRIPTION OF TEST SETUP

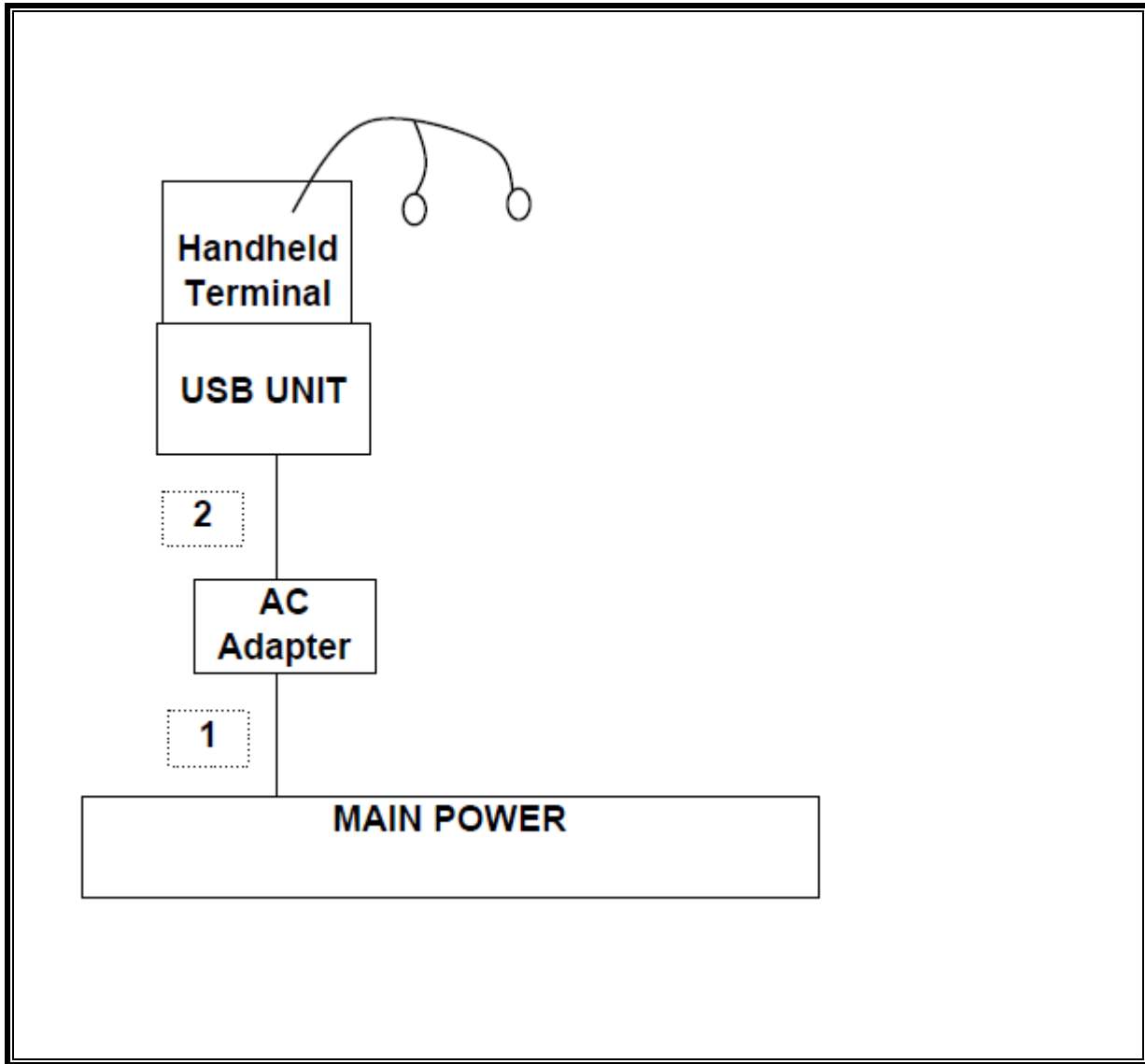
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
AC/DC Adapter	Casio	AD-S15050B	N/A
USB and Charging Unit	Casio	HA-J65US	N/A
Headphone	Rastabanana	N/A	N/A
Micro SD	San Disk	09228042950J1	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	US 115V	Un-Shielded	1.9m	
2	DC Input (USB Unit)	1	Mini-Jack	Shielded	1.85m	Ferrite at USB unit end

SETUP DIAGRAM



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, Horn, 18 GHz	EMCO	3115	C00945	06/29/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	03/05/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/10/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	07/10/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	11/10/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
Peak Power Meter	Boonton	4541	C01186	03/01/11

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

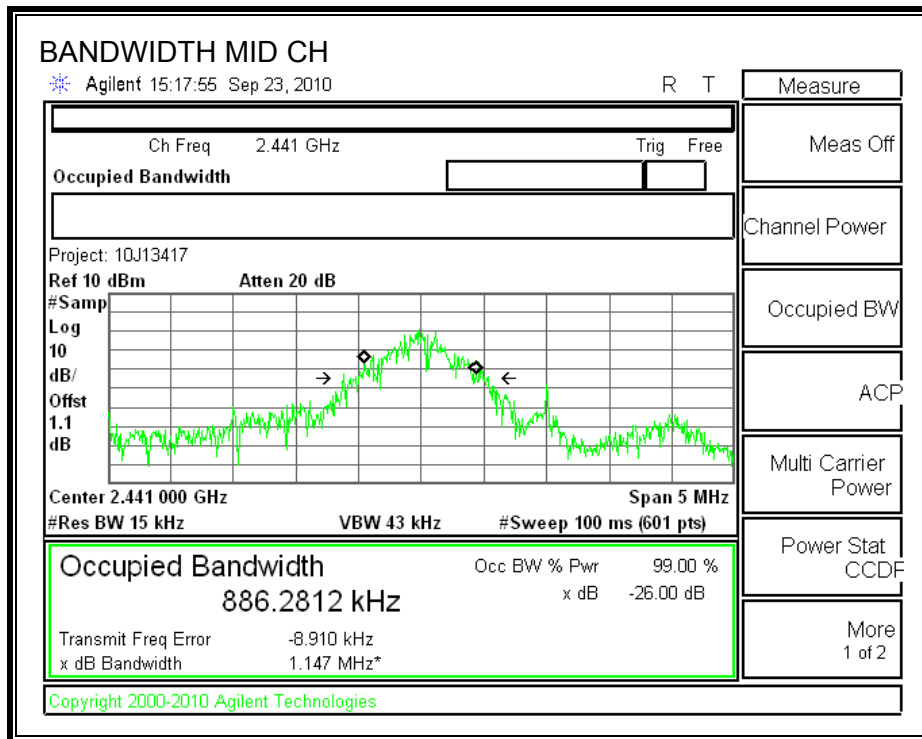
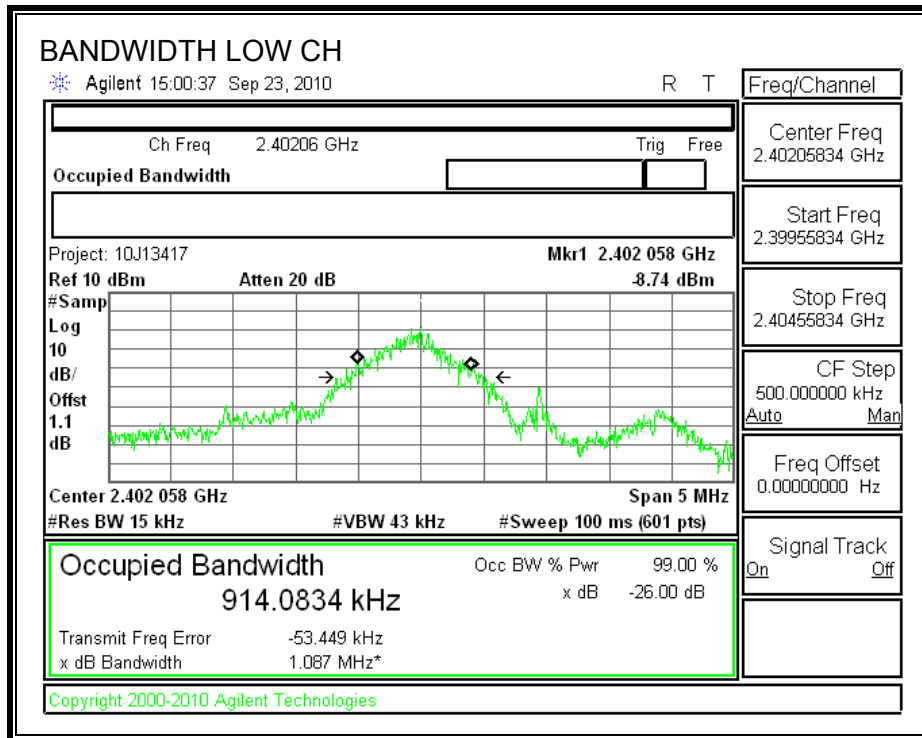
TEST PROCEDURE

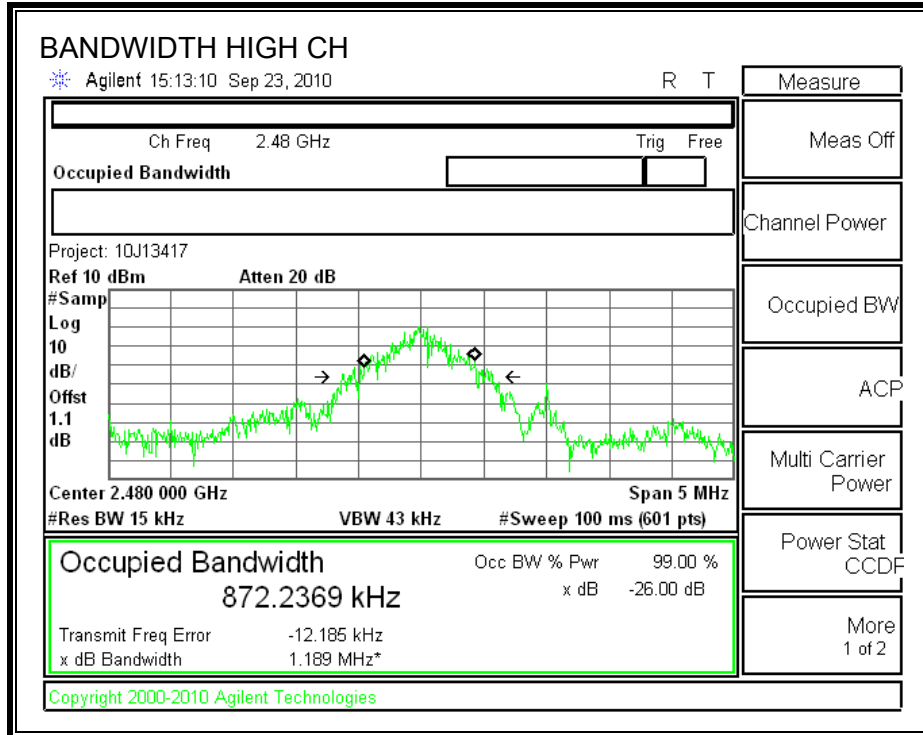
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 99% bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)
Low	2402	914.0834
Middle	2441	886.2812
High	2480	872.2369

99% BANDWIDTH





7.1.2. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

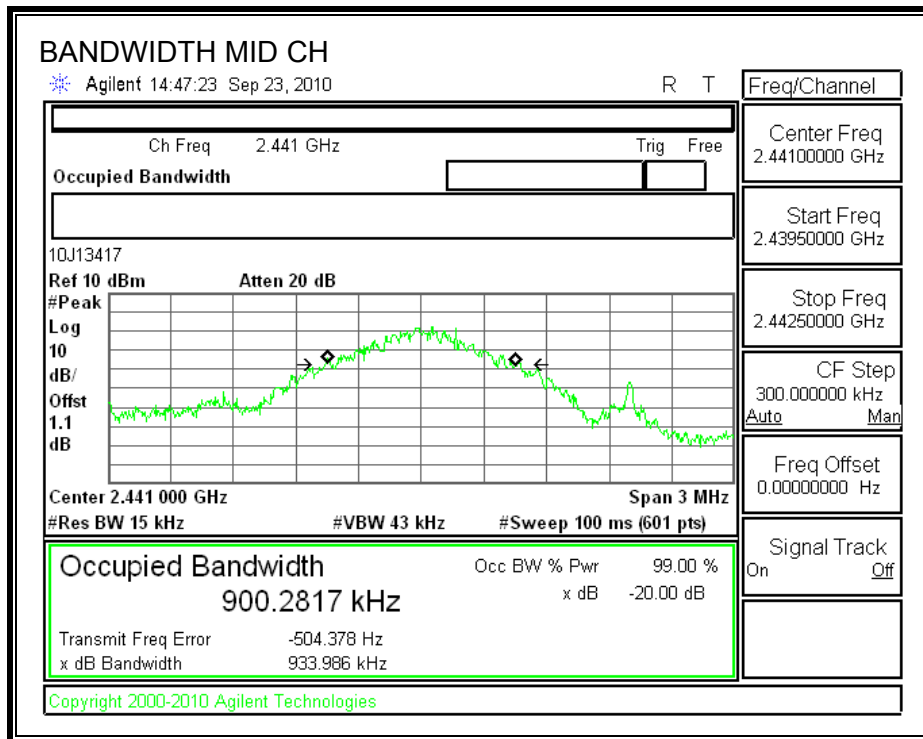
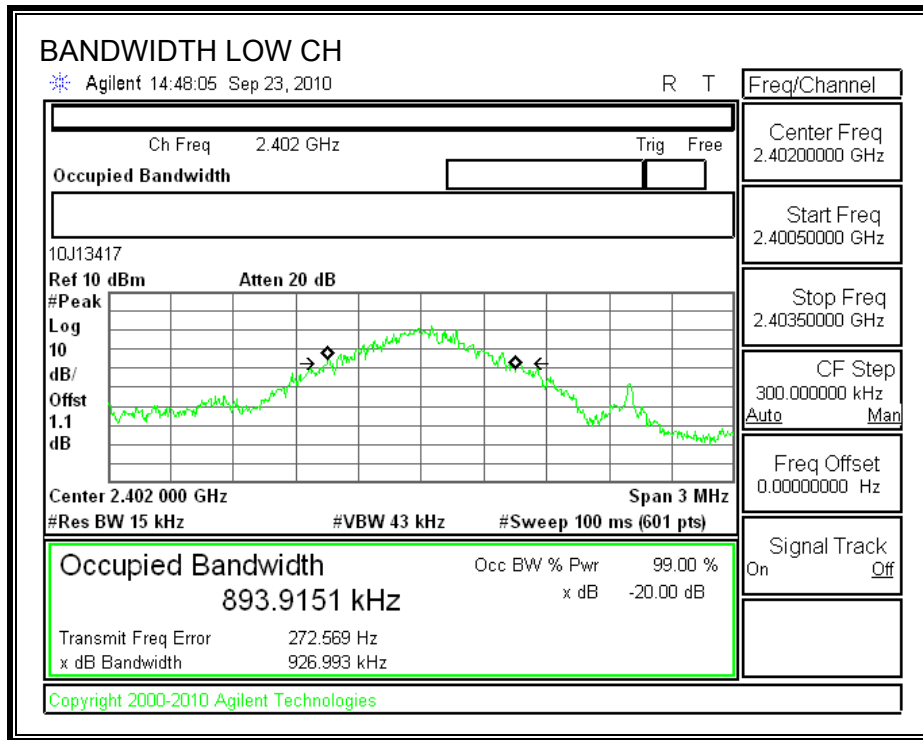
TEST PROCEDURE

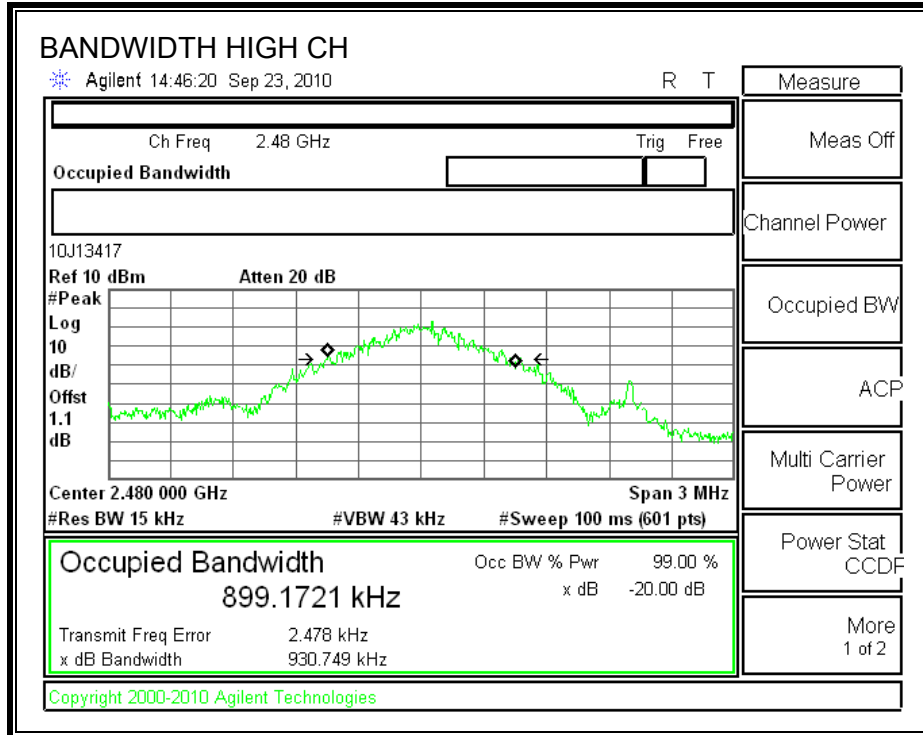
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	926.993
Middle	2441	933.986
High	2480	930.749

20 dB BANDWIDTH





7.1.3. 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 hopping channel, whichever is greater.

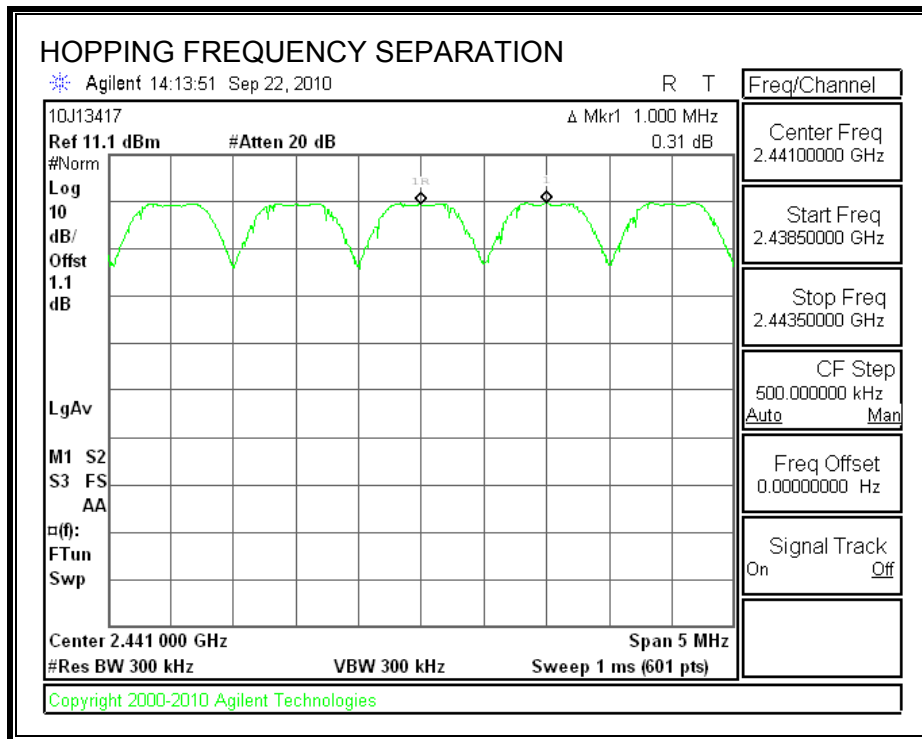
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

HOPPING FREQUENCY SEPARATION



7.1.4. 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.

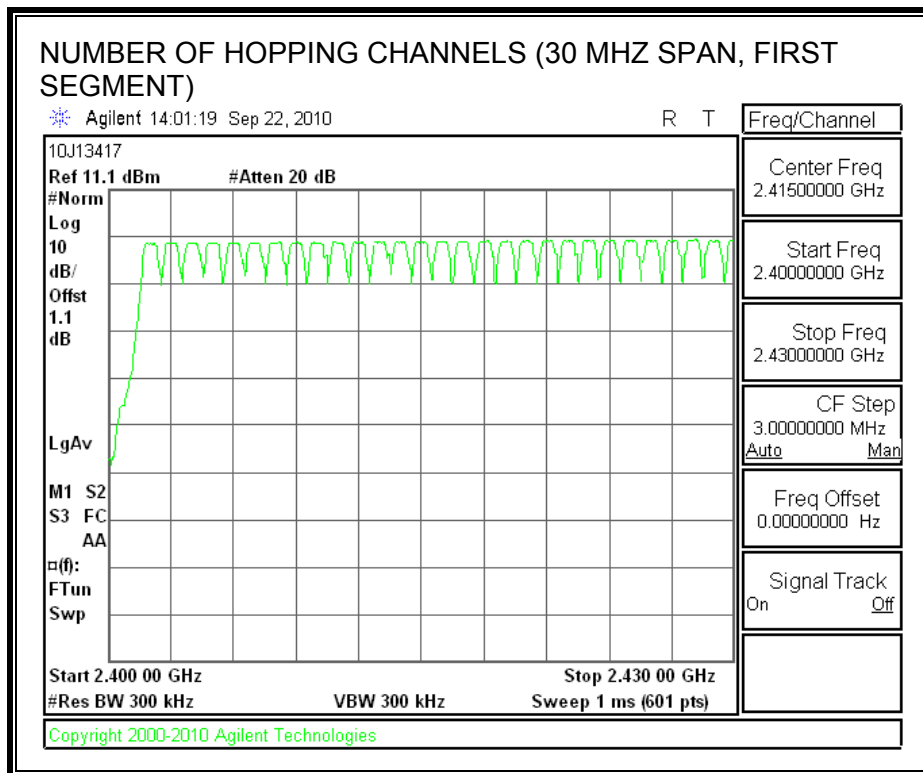
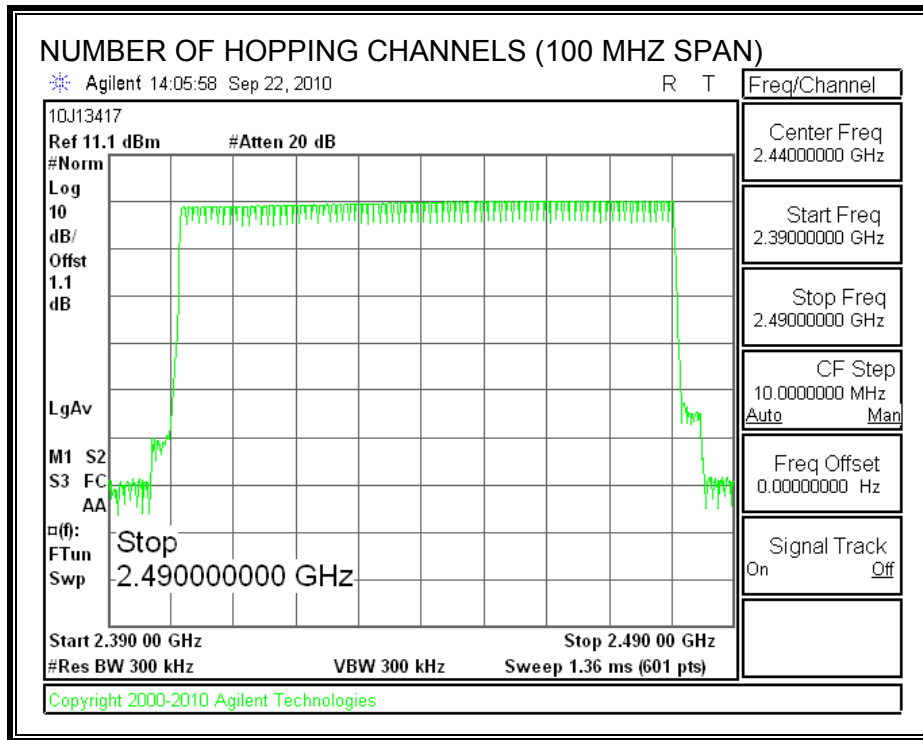
TEST PROCEDURE

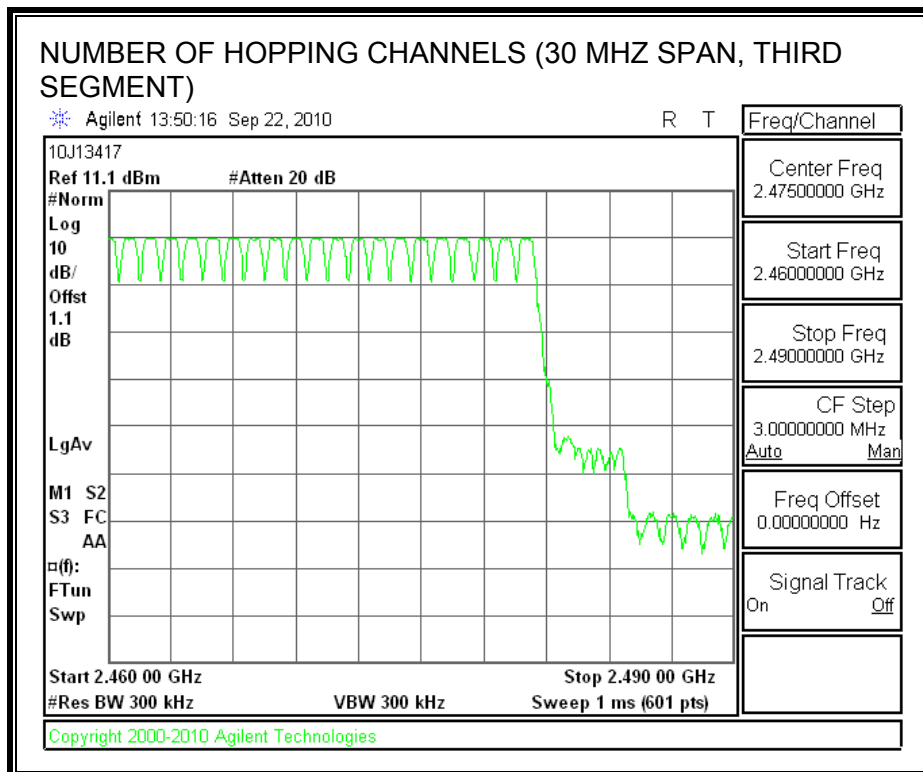
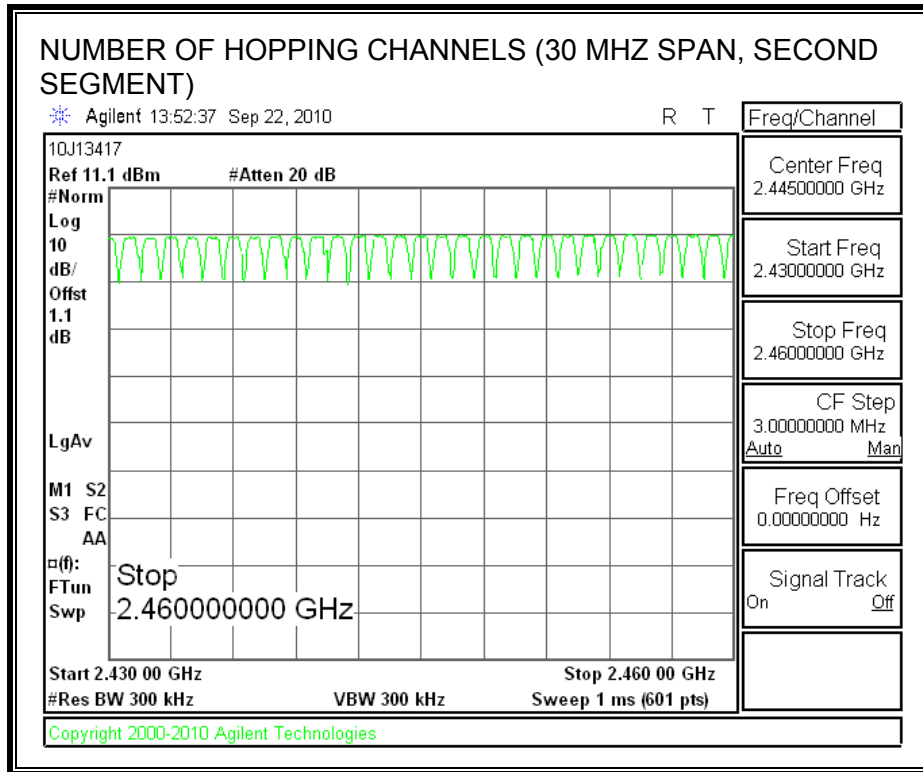
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

79 Channels observed.

NUMBER OF HOPPING CHANNELS





7.1.5. 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 $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

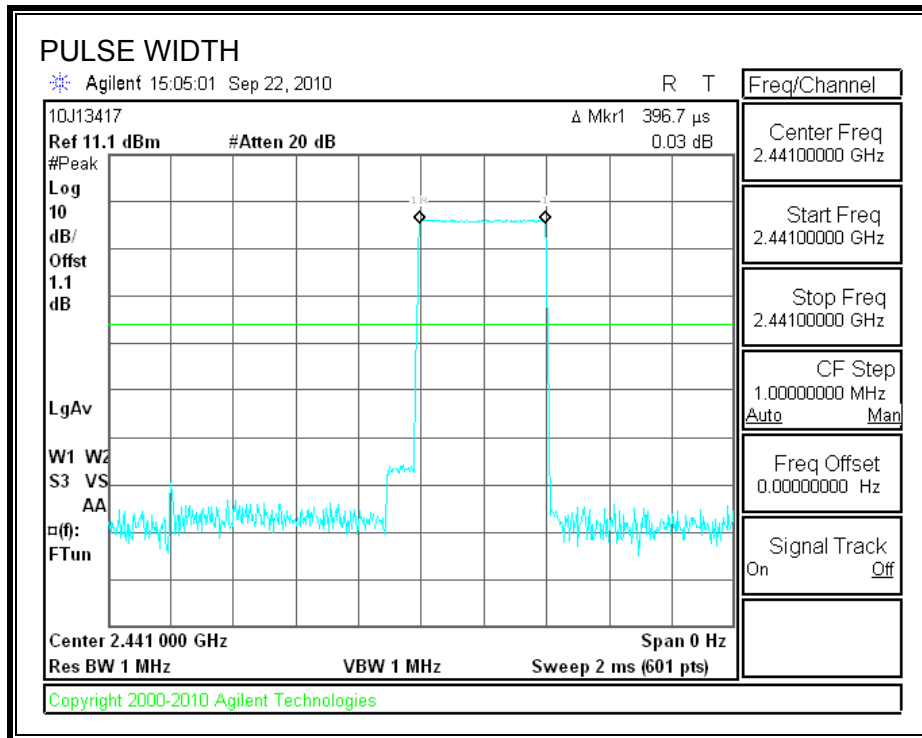
RESULTS

GFSK Mode

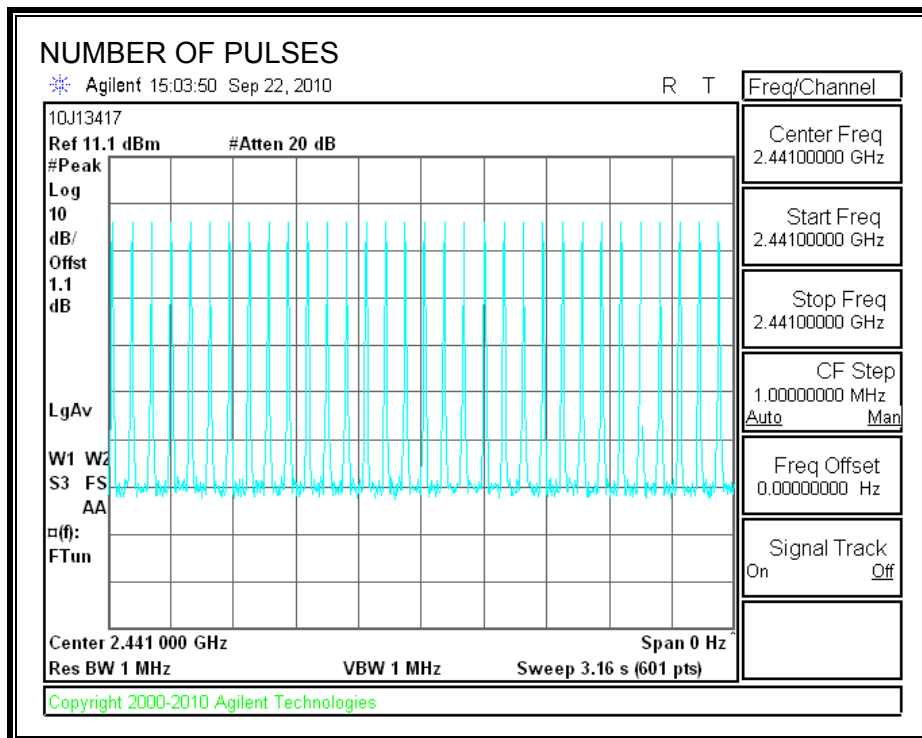
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.397	32	0.127	0.4	0.273
DH3	1.650	17	0.281	0.4	0.120
DH5	2.892	11	0.318	0.4	0.082

DH1

PULSE WIDTH

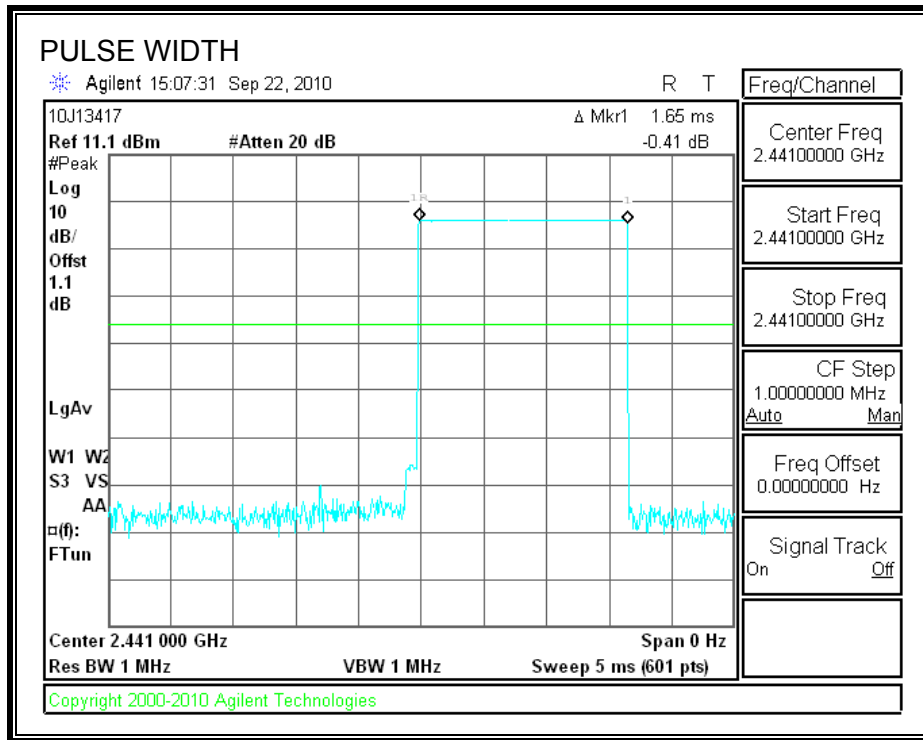


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

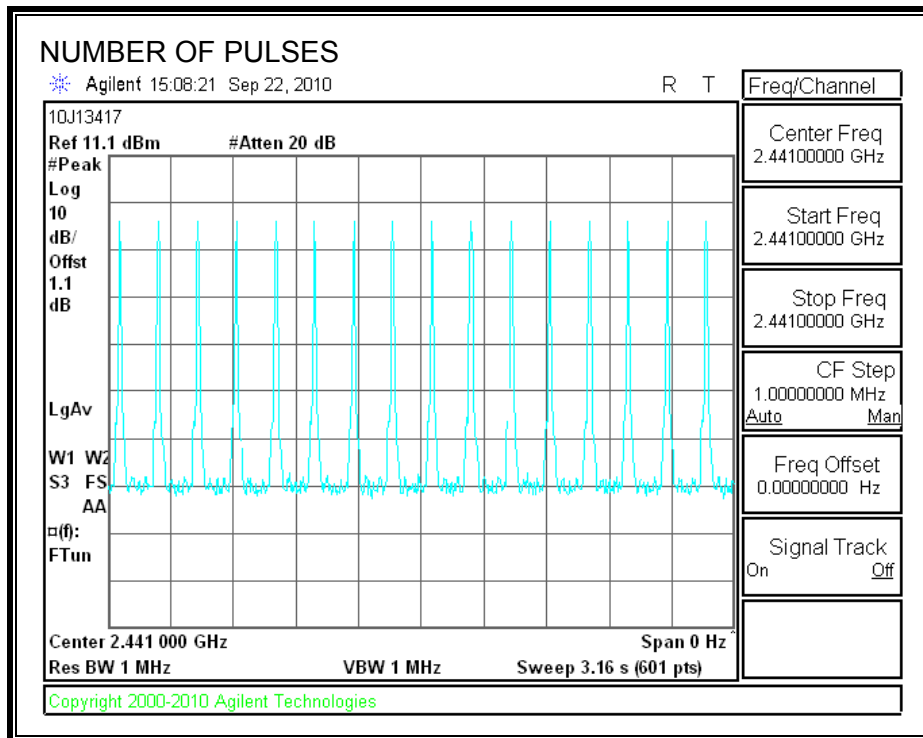


DH3

PULSE WIDTH

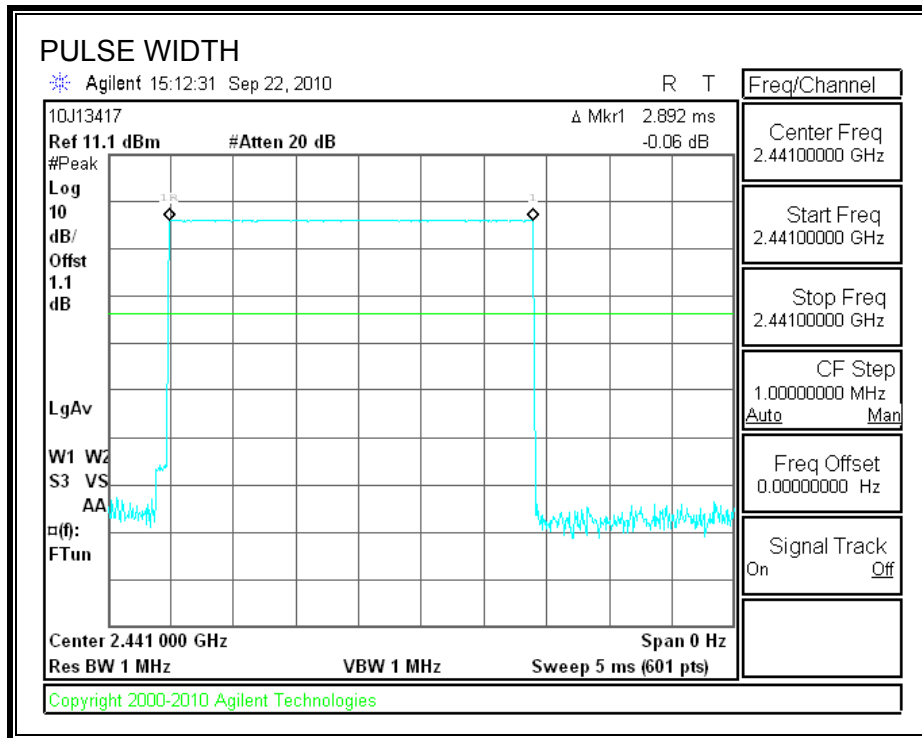


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

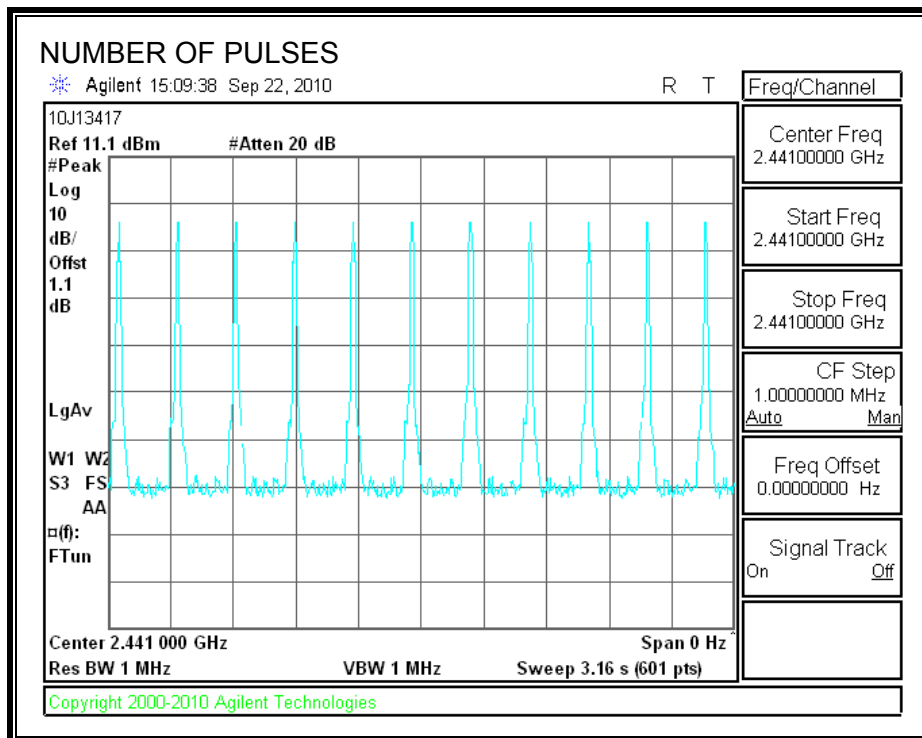


DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.6. 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.

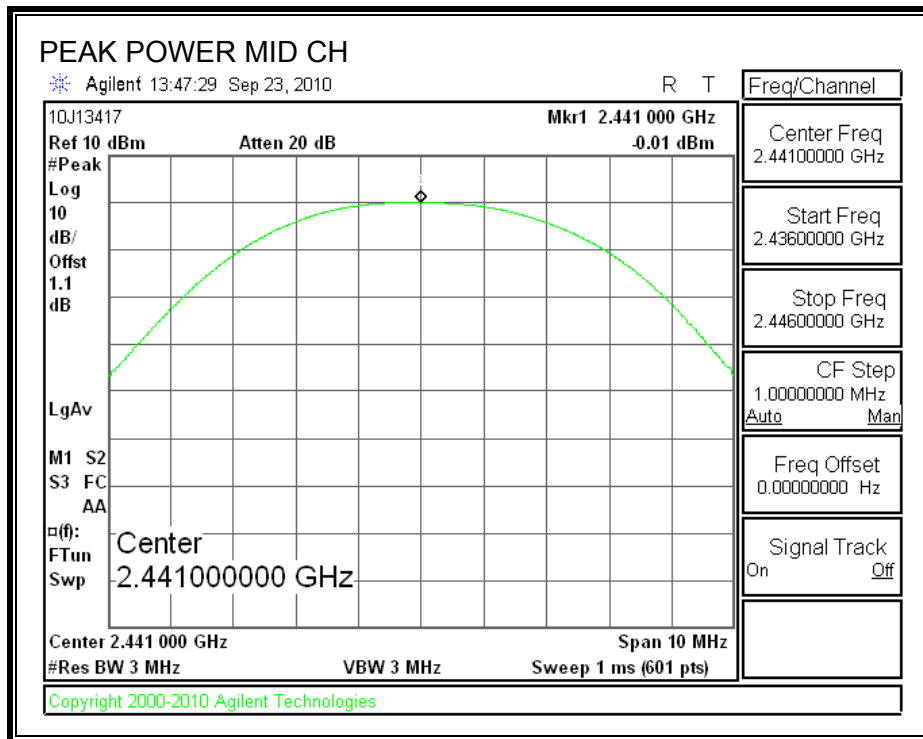
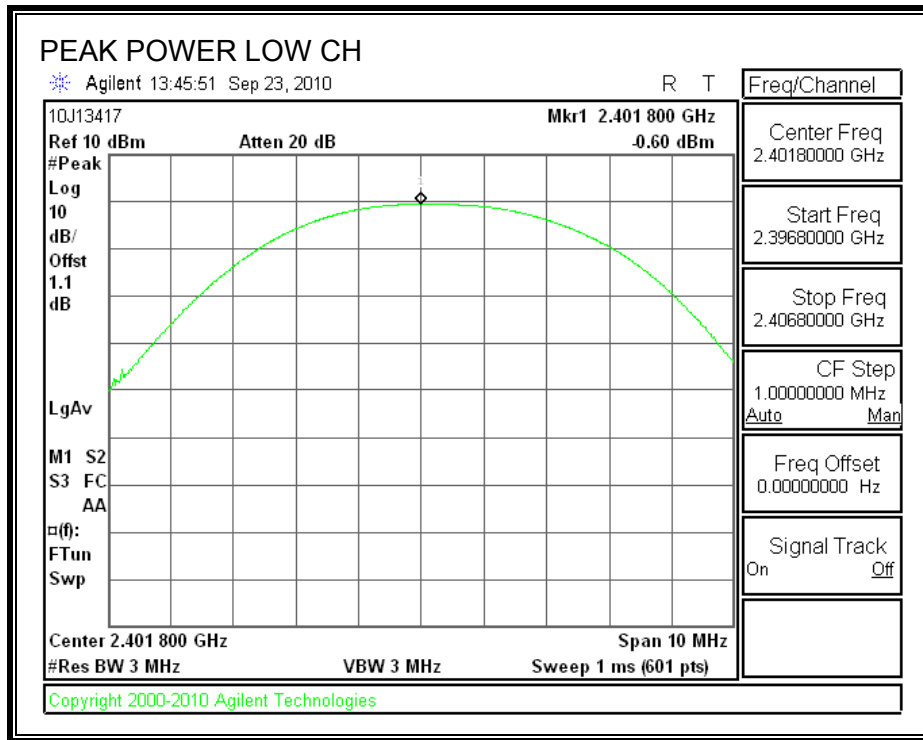
TEST PROCEDURE

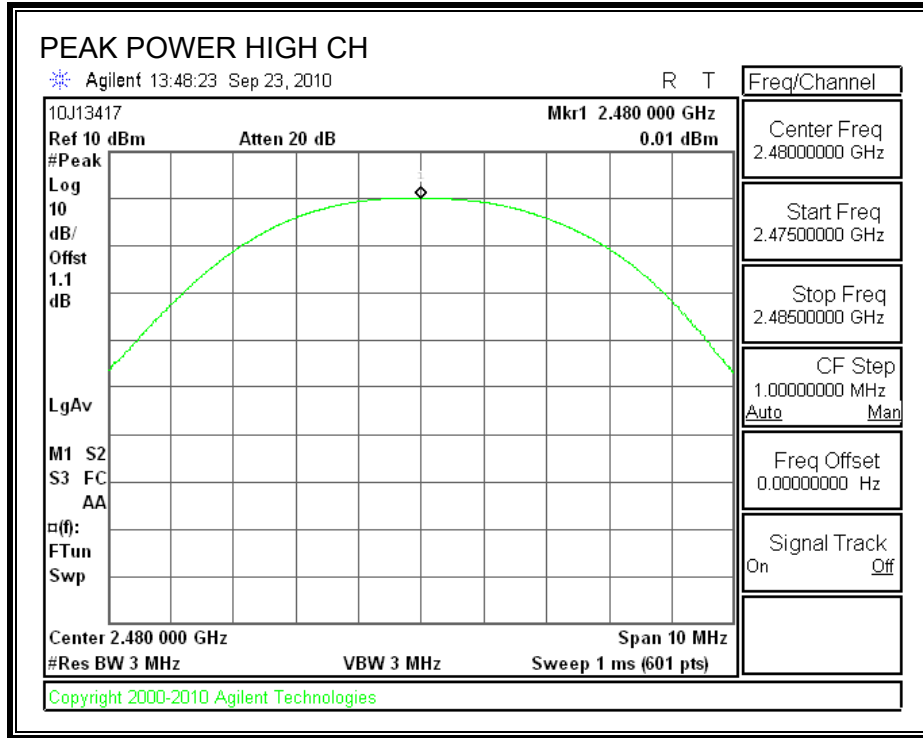
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

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





7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

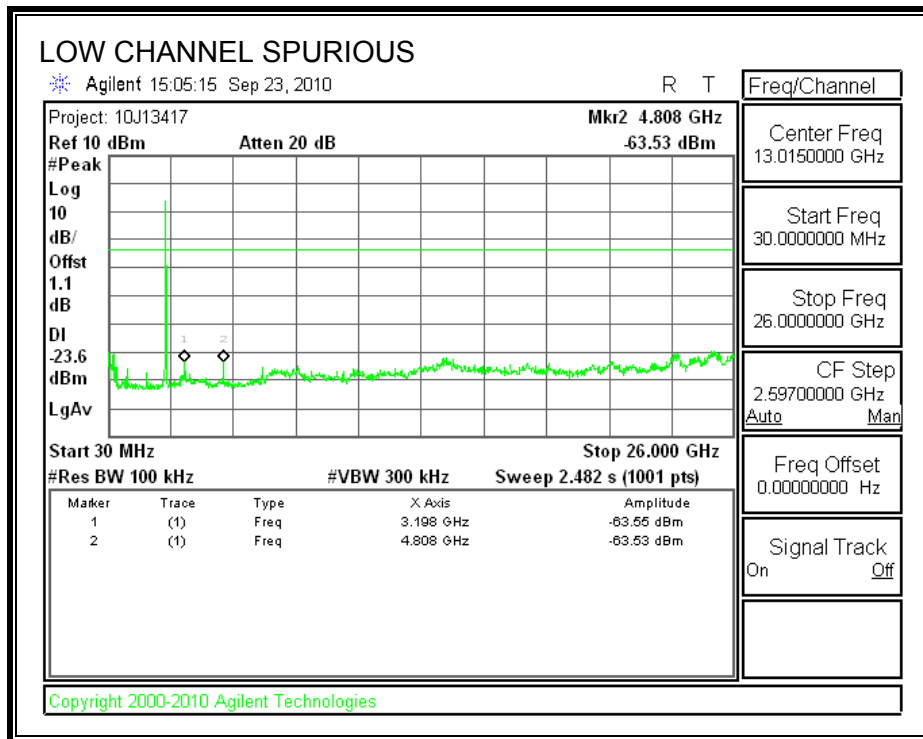
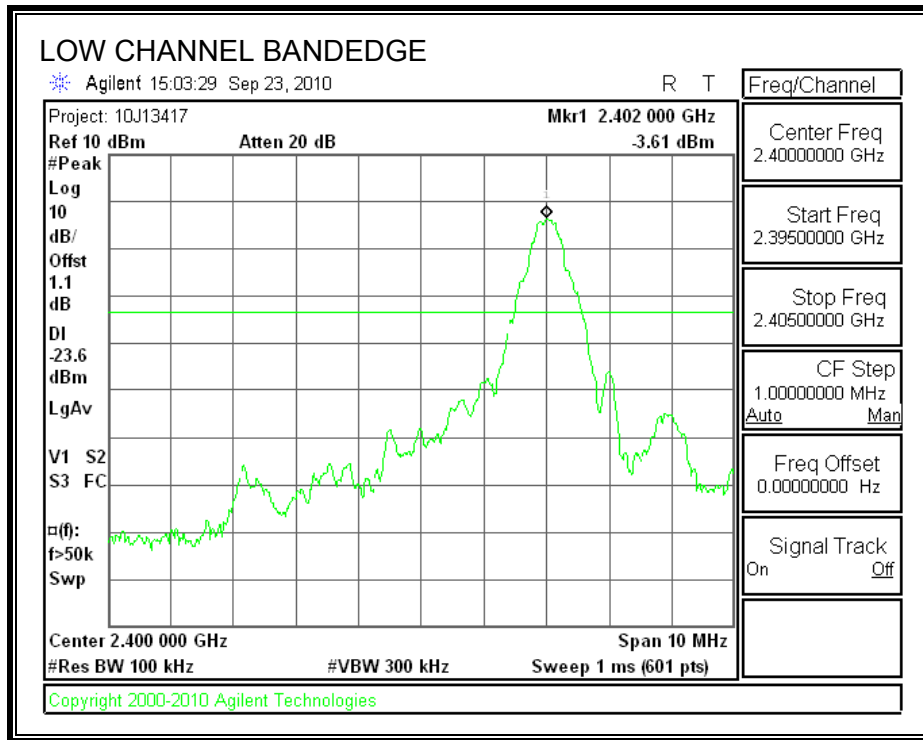
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

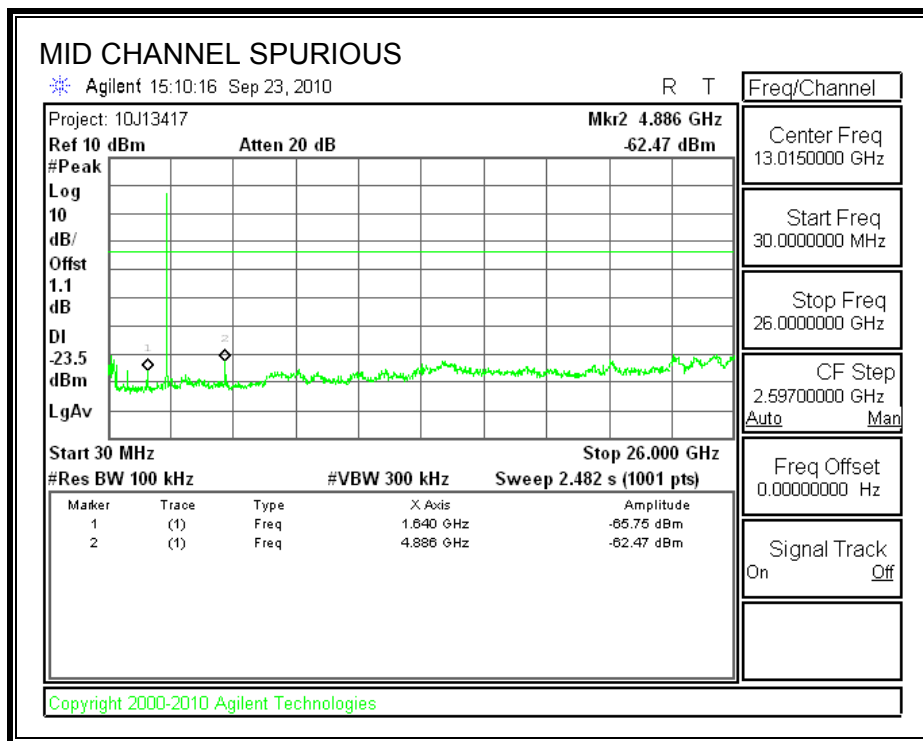
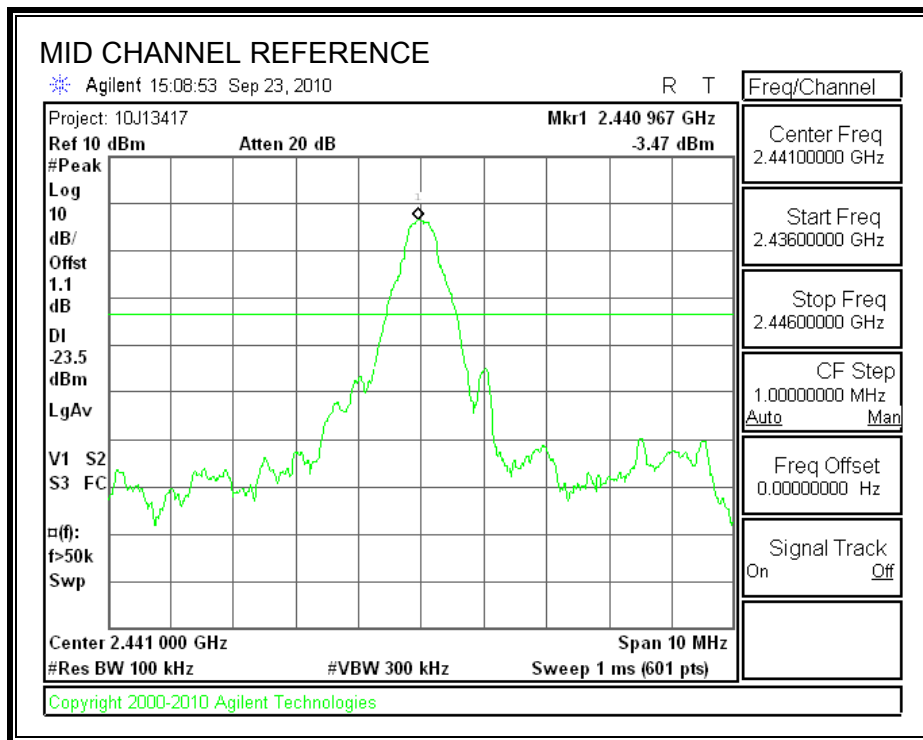
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

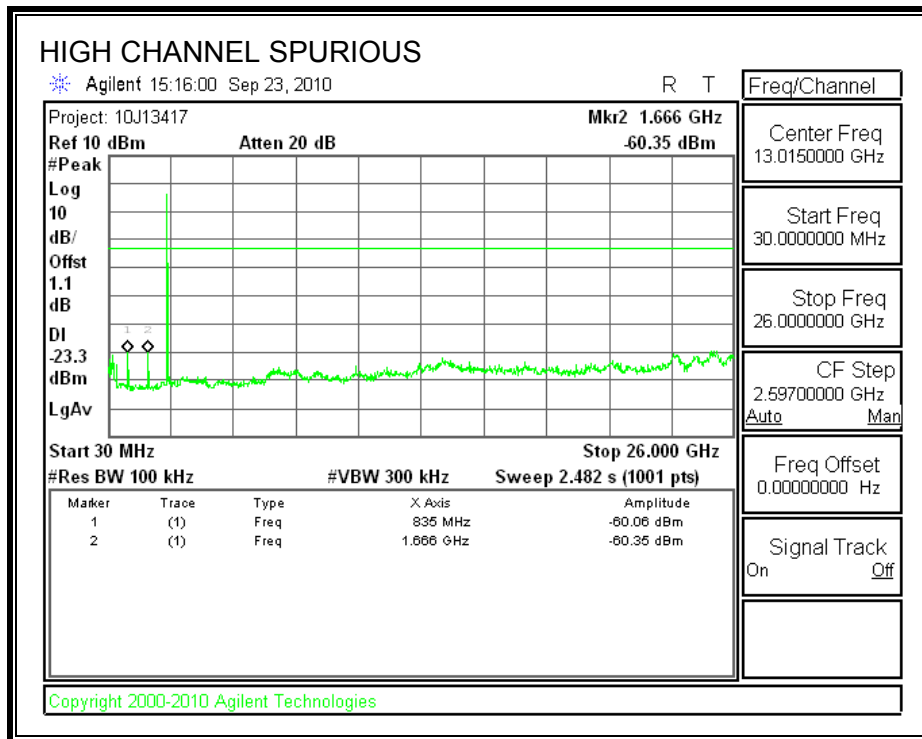
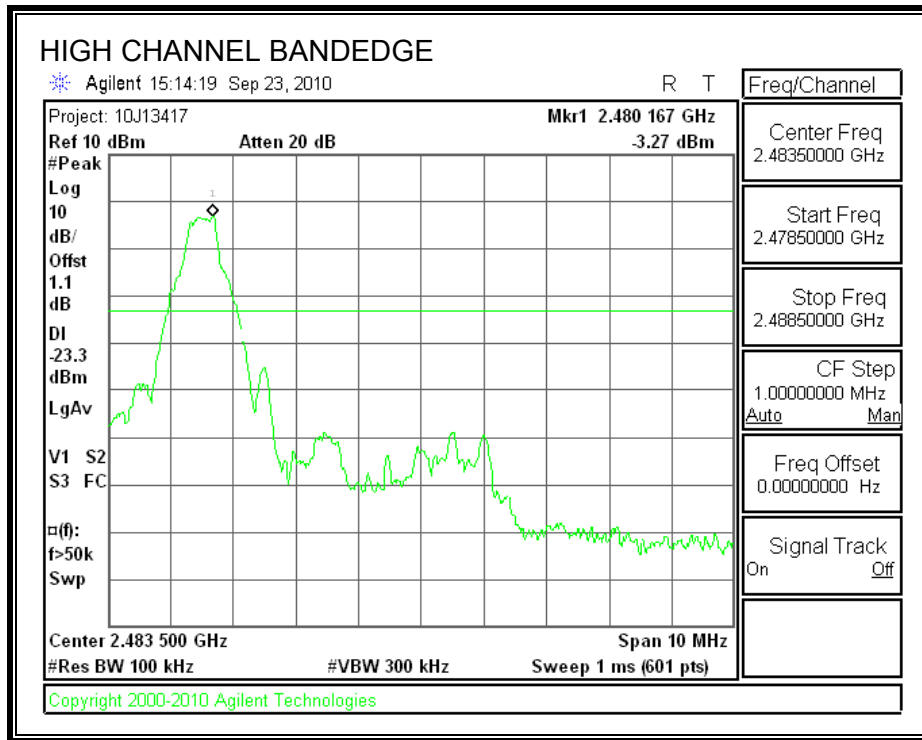
SPURIOUS EMISSIONS, LOW CHANNEL



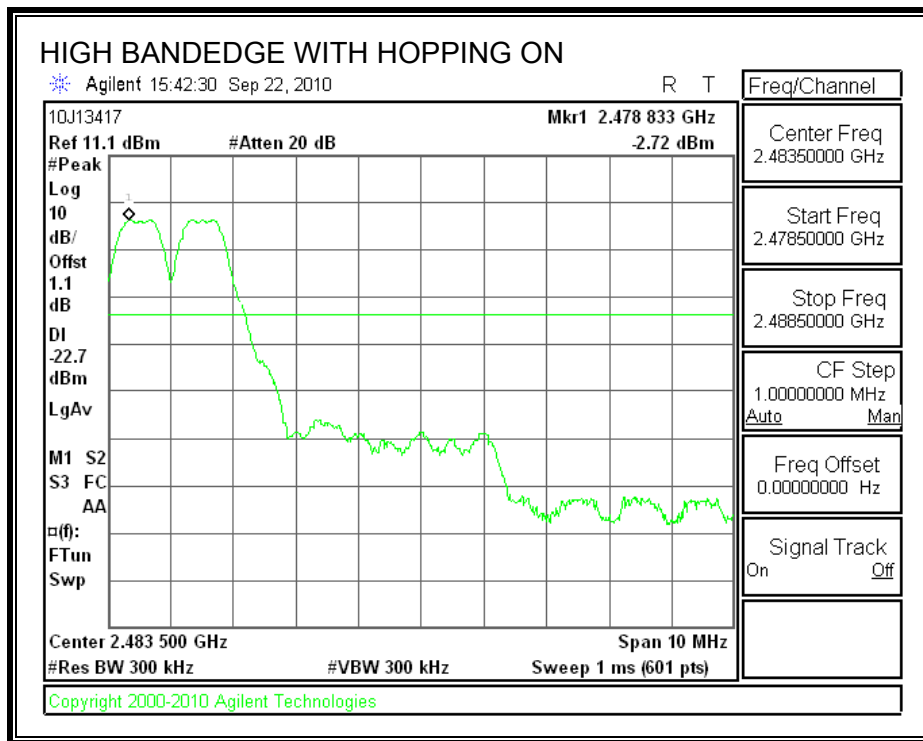
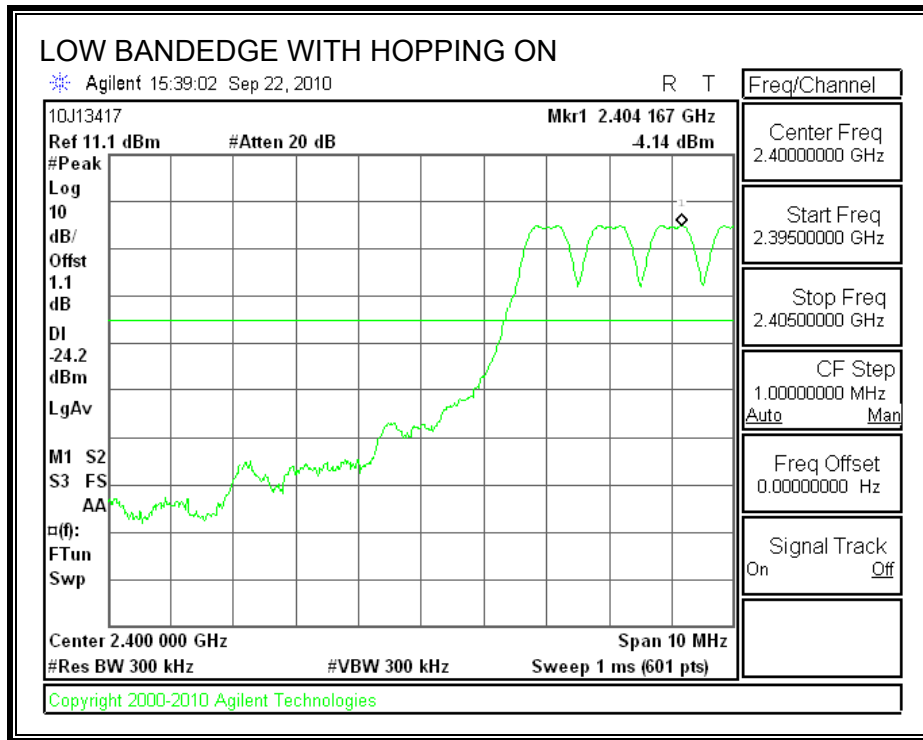
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

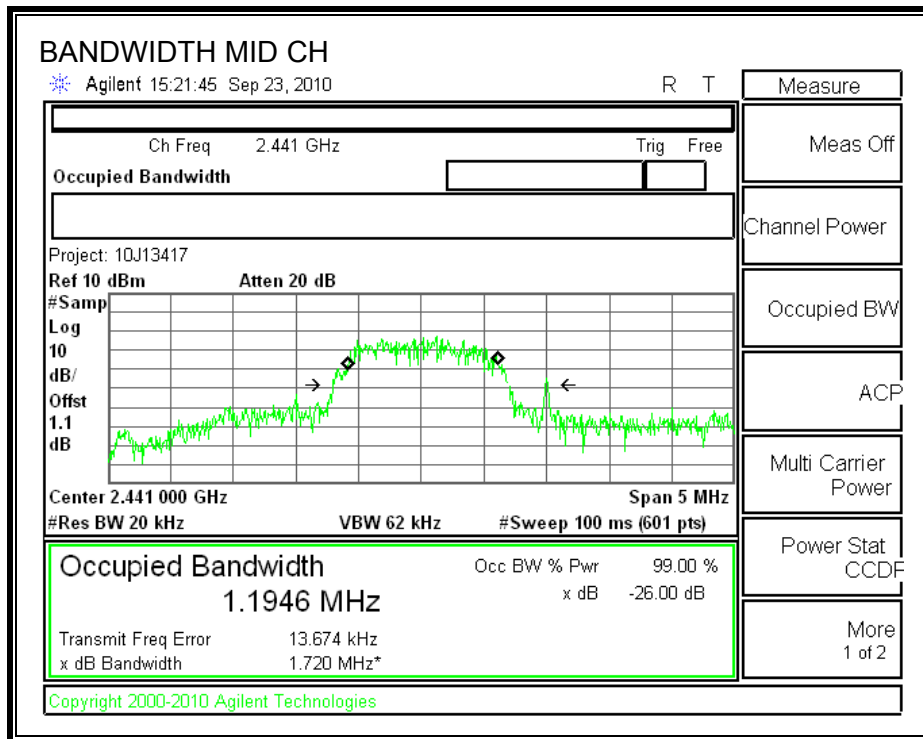
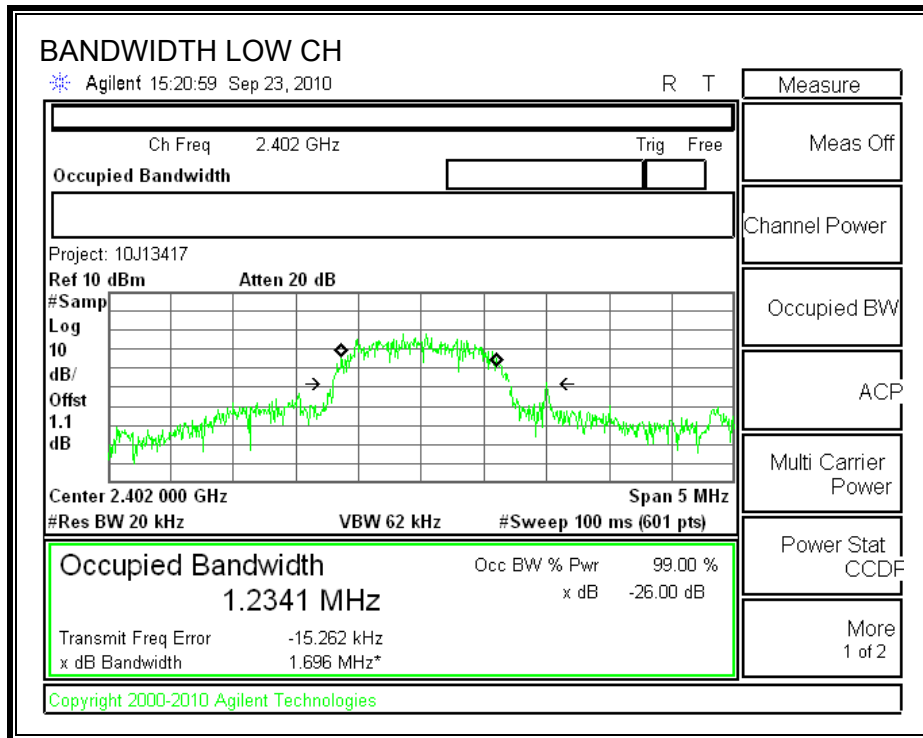
TEST PROCEDURE

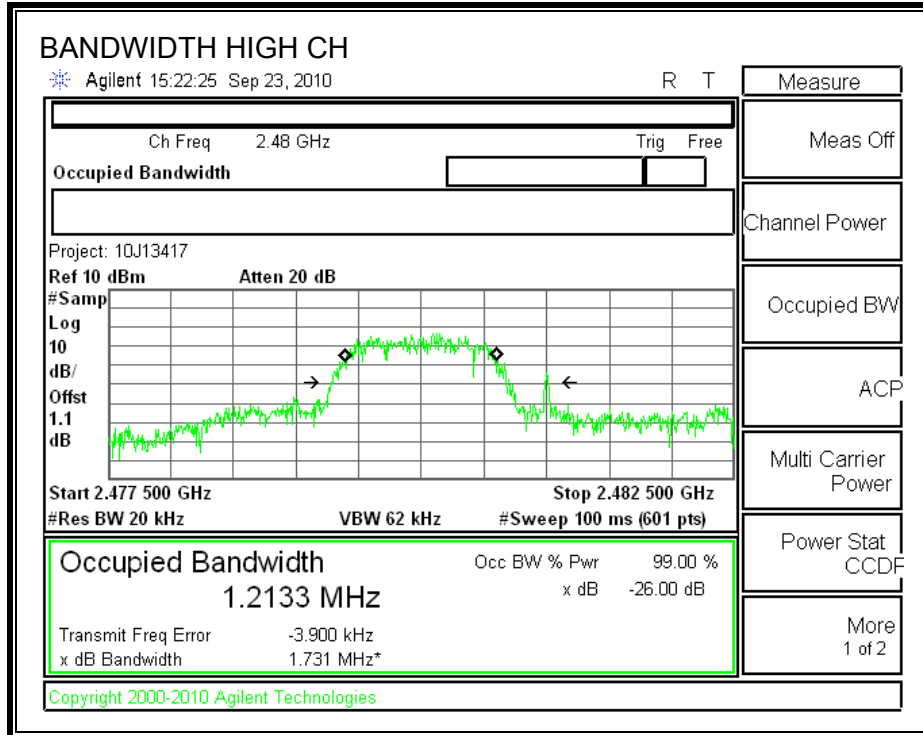
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 99% bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.2341
Middle	2441	1.1946
High	2480	1.2133

99% BANDWIDTH





7.2.2. 20dB BANDWIDTH

LIMIT

None; for reporting purposes only.

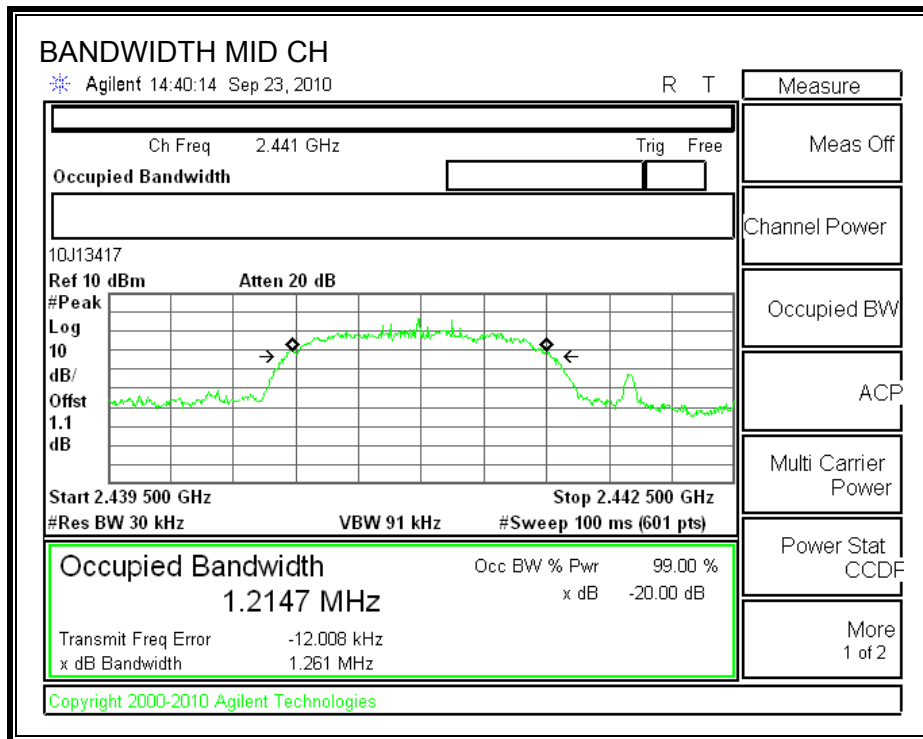
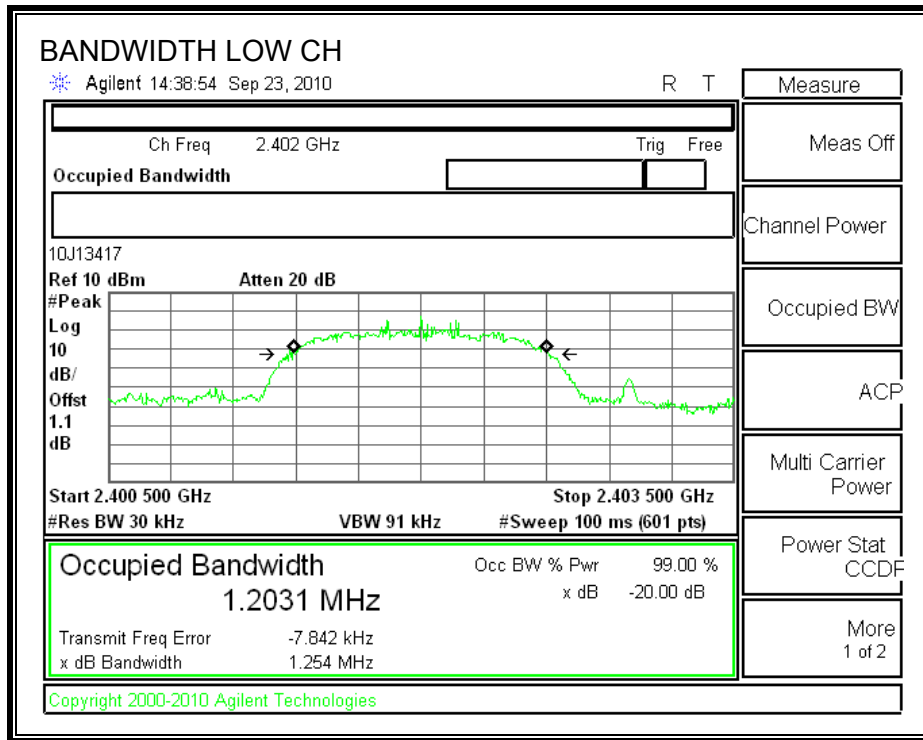
TEST PROCEDURE

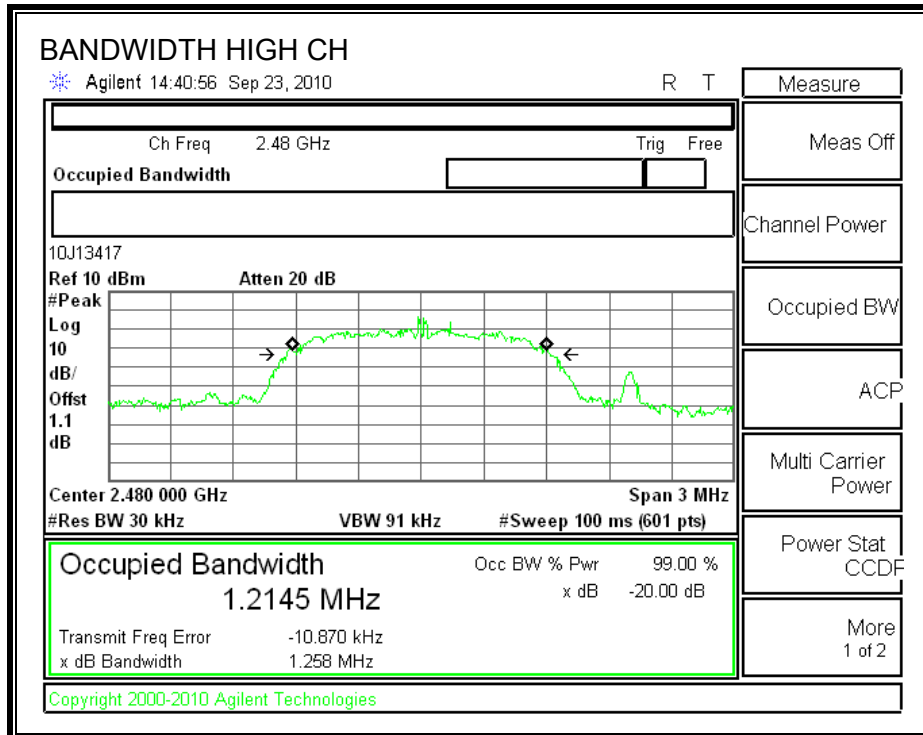
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	1.254
Middle	2441	1.261
High	2480	1.258

20 dB BANDWIDTH





7.2.3. 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 hopping channel, whichever is greater.

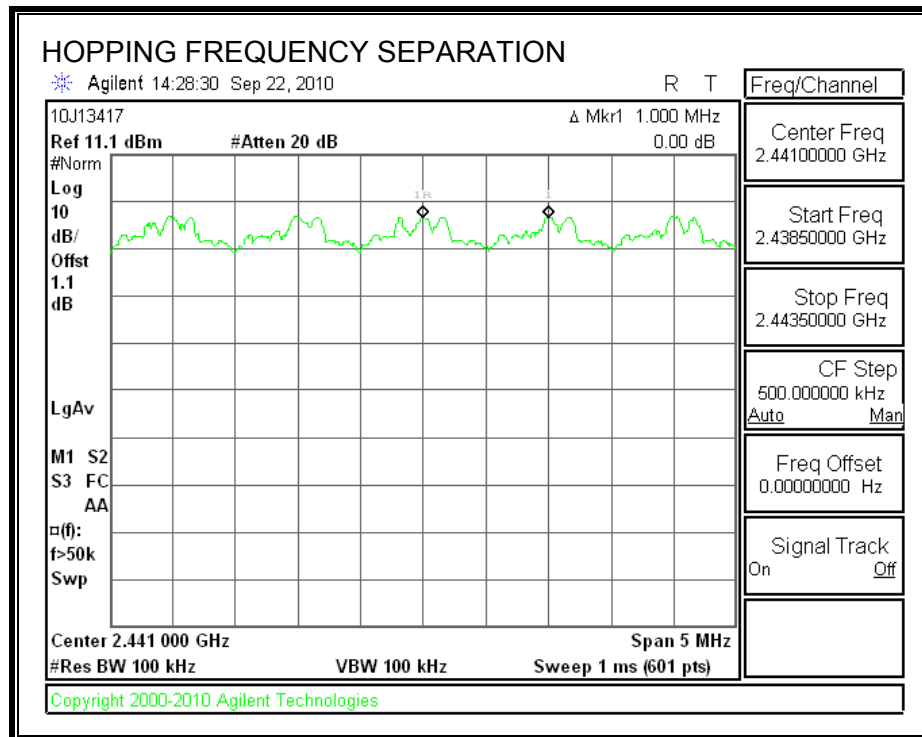
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

HOPPING FREQUENCY SEPARATION



7.2.4. 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.

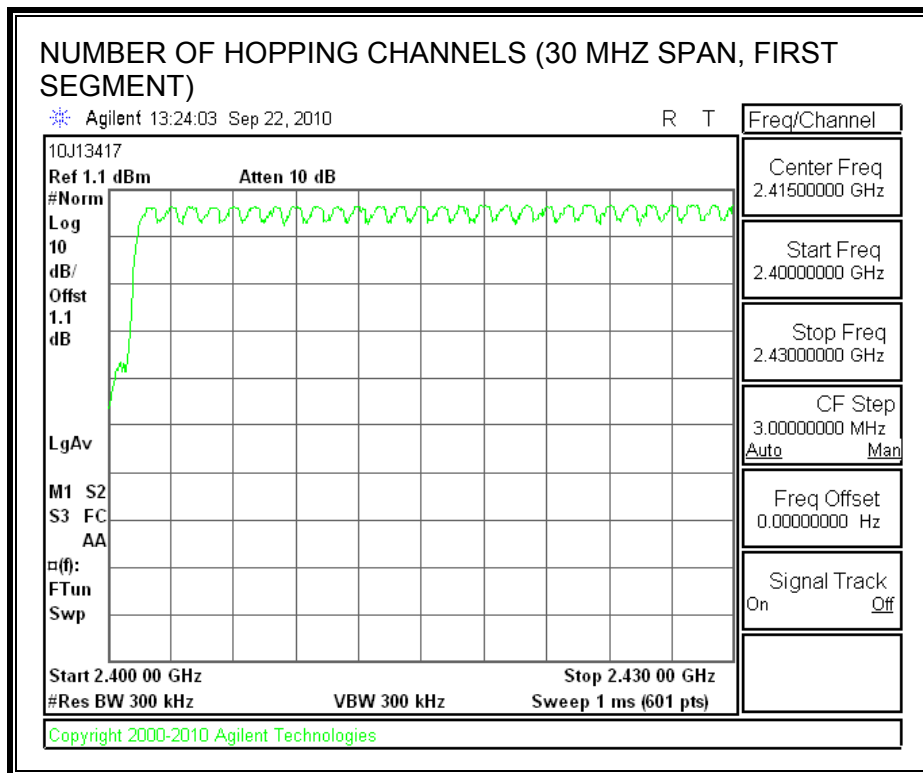
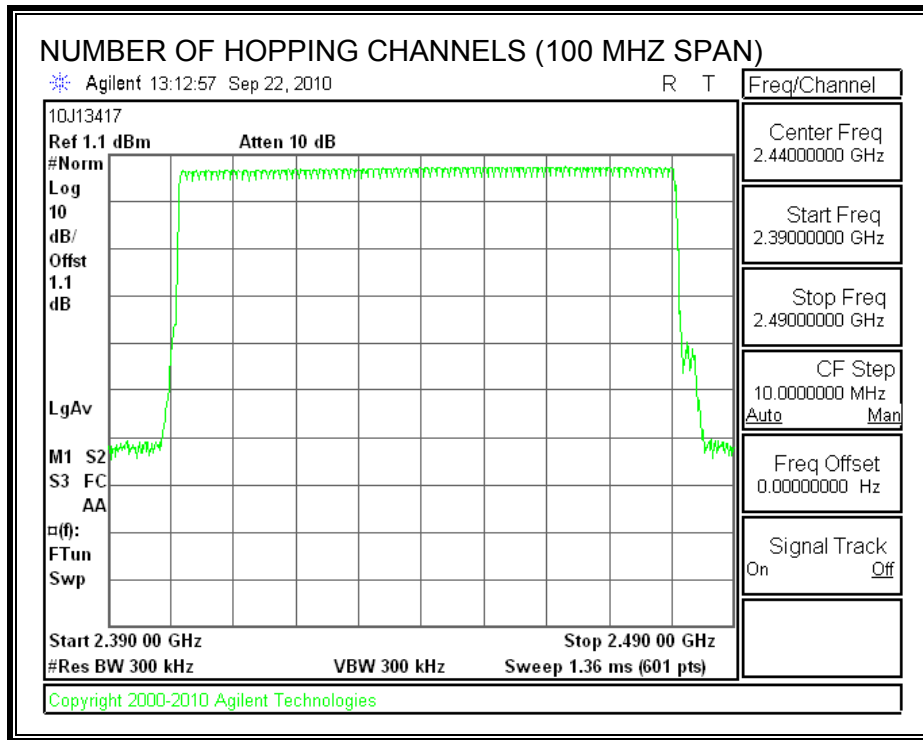
TEST PROCEDURE

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



7.2.5. 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 $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

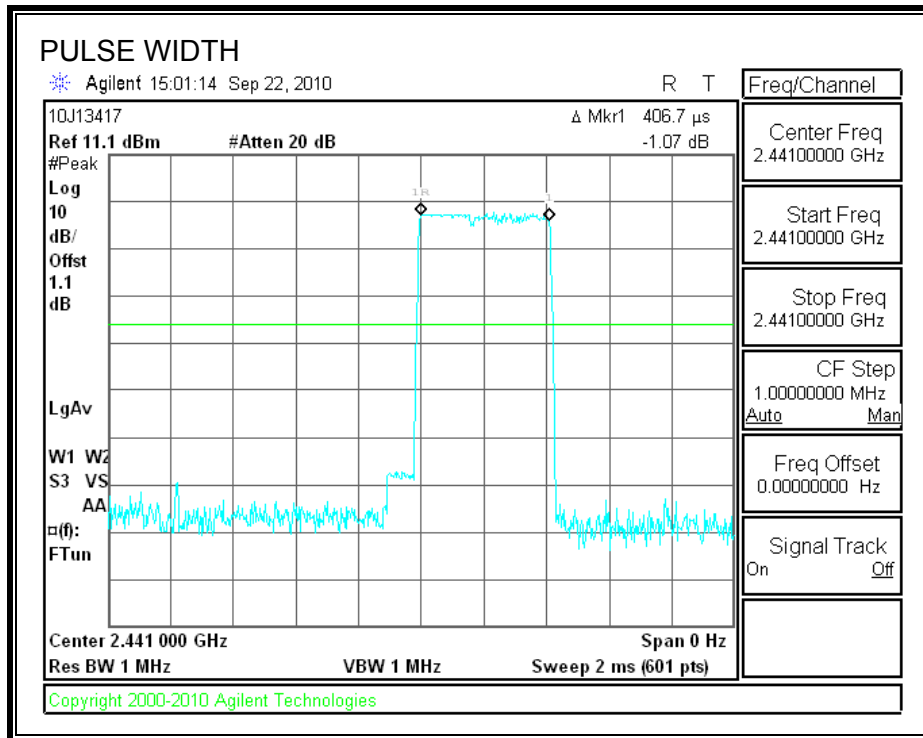
RESULTS

8PSK Mode

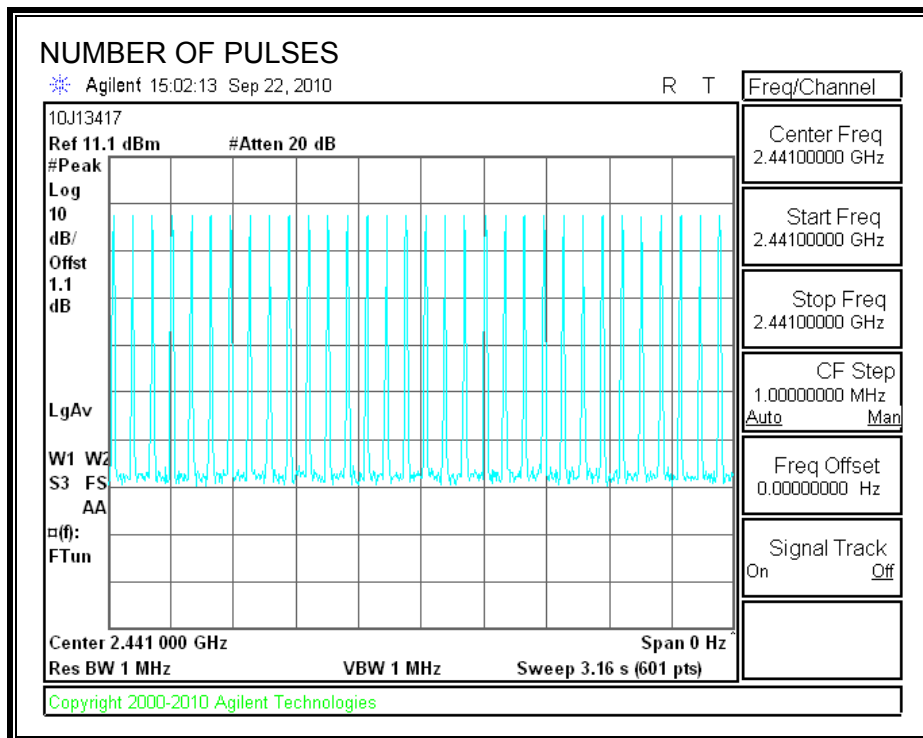
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.4067	32	0.130	0.4	0.270
DH3	1.617	16	0.259	0.4	0.141
DH5	2.875	11	0.316	0.4	0.084

DH1

PULSE WIDTH

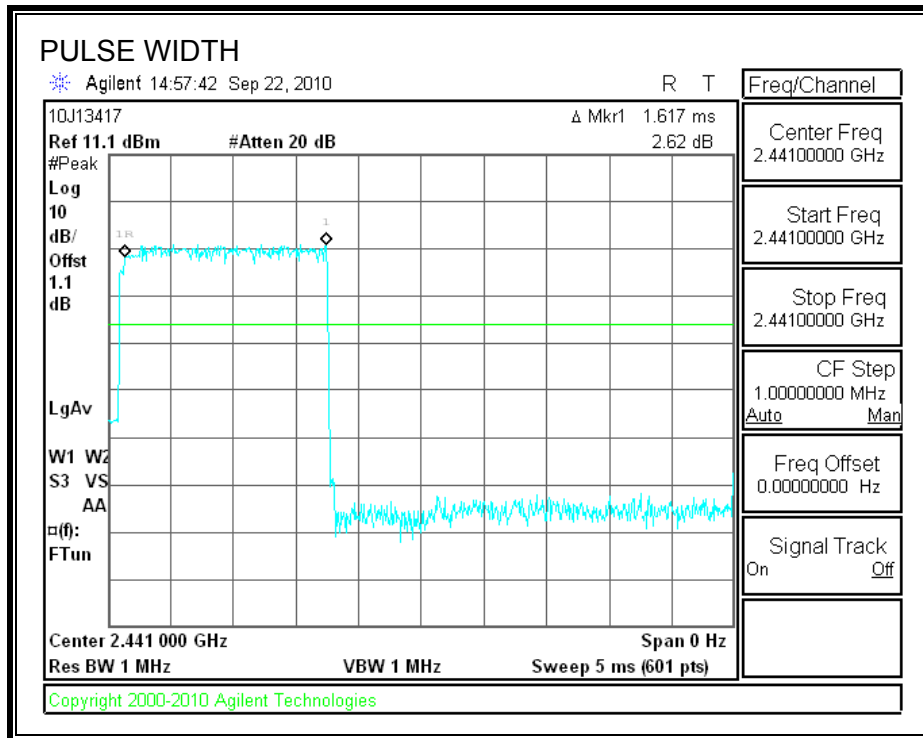


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

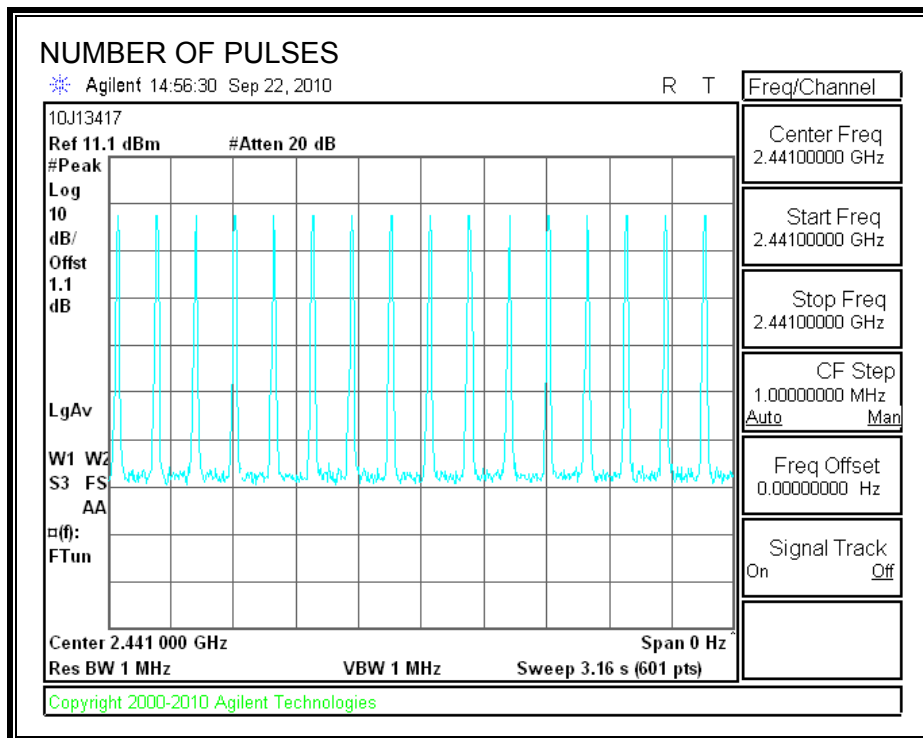


DH3

PULSE WIDTH

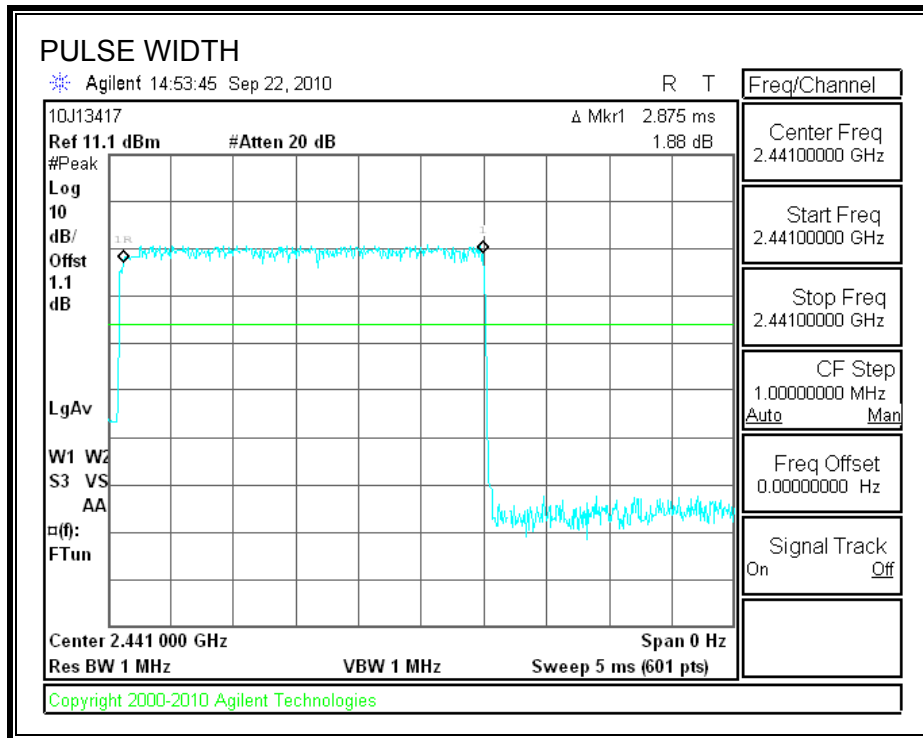


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

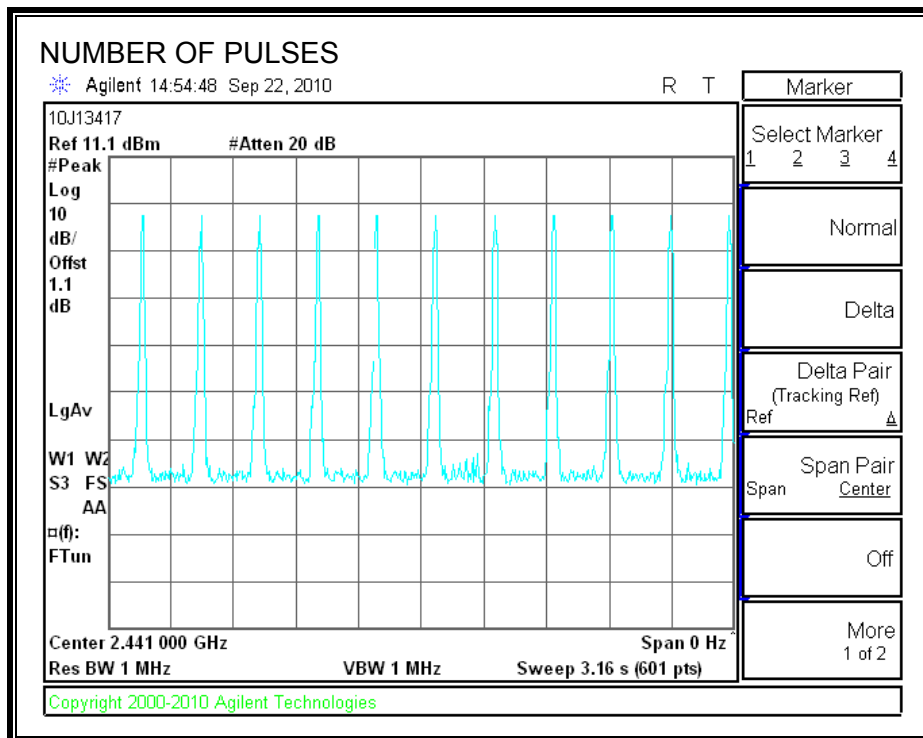


DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.2.6. 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.

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.

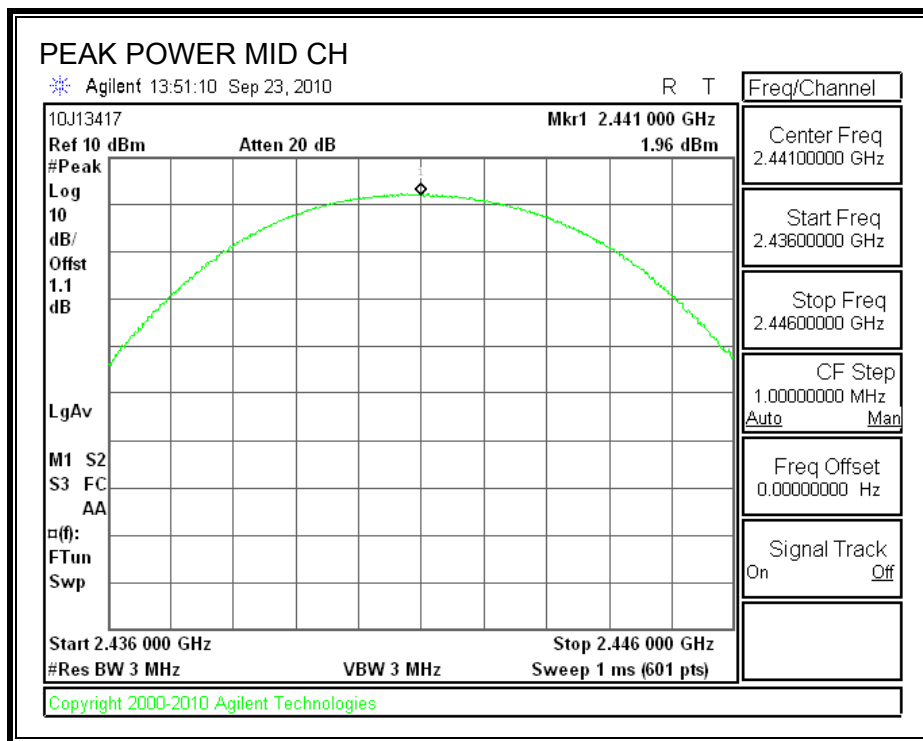
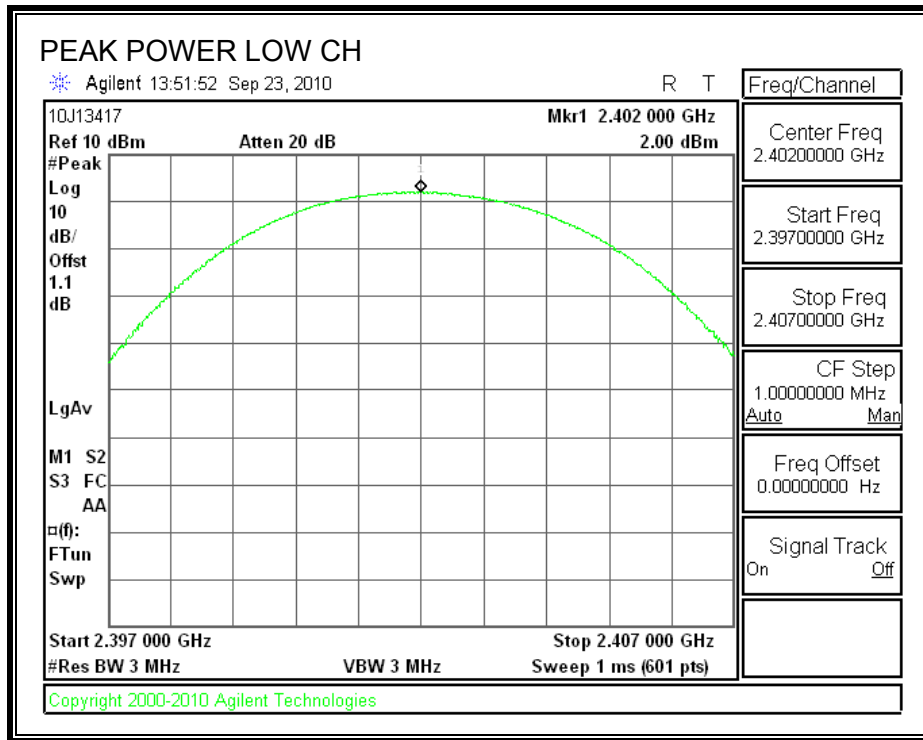
TEST PROCEDURE

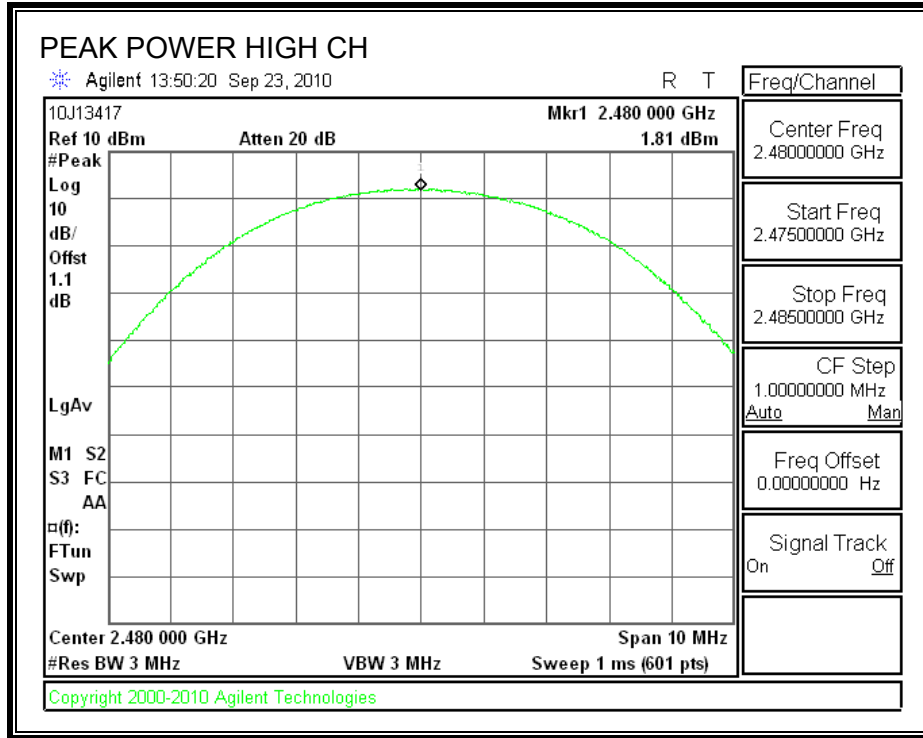
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

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





7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

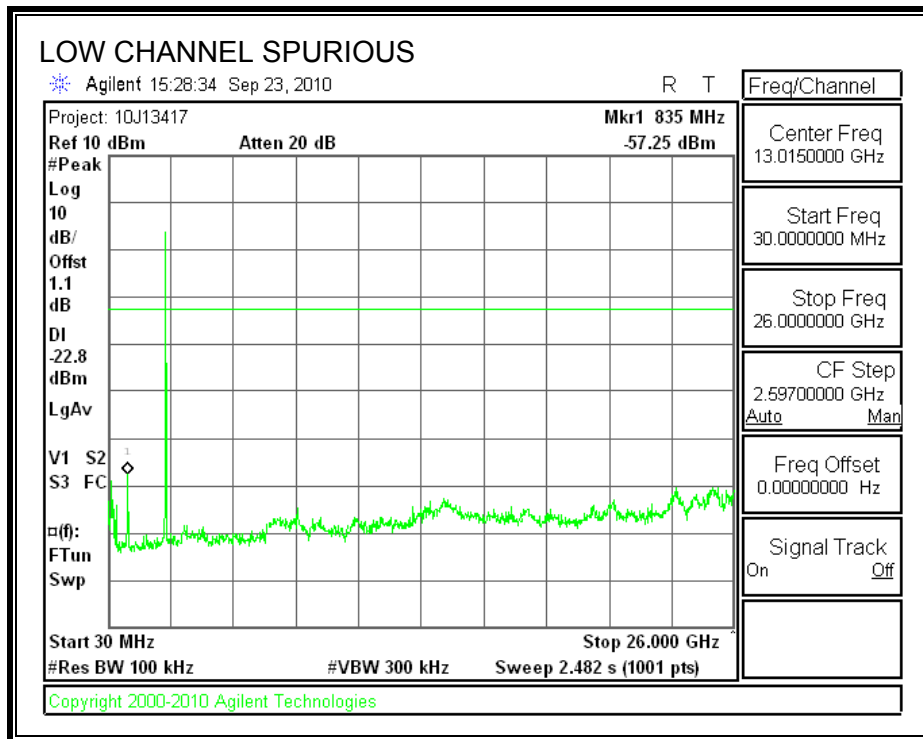
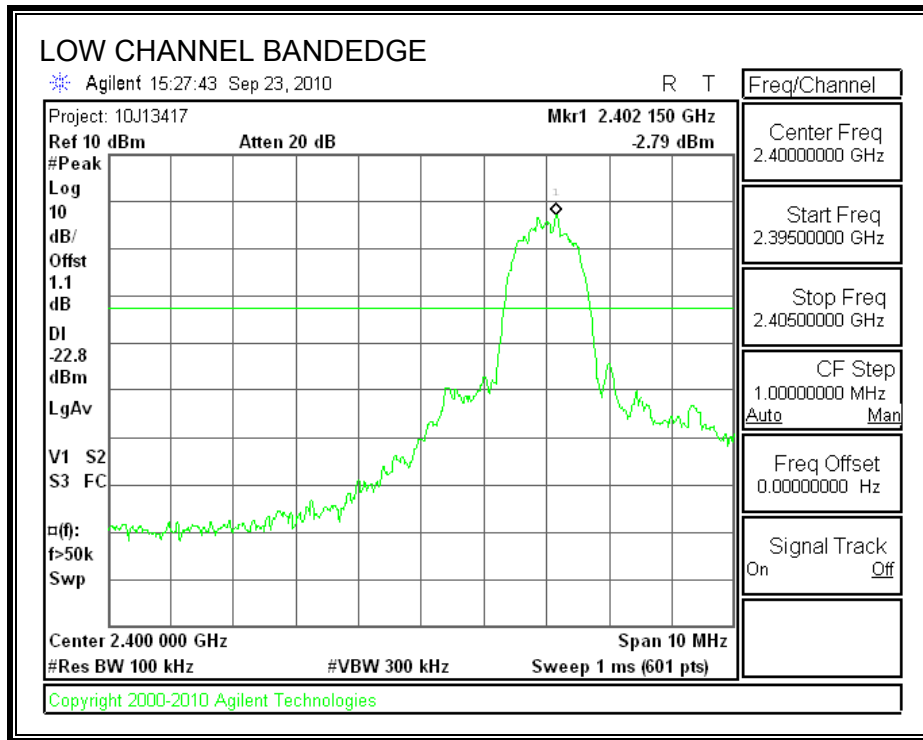
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

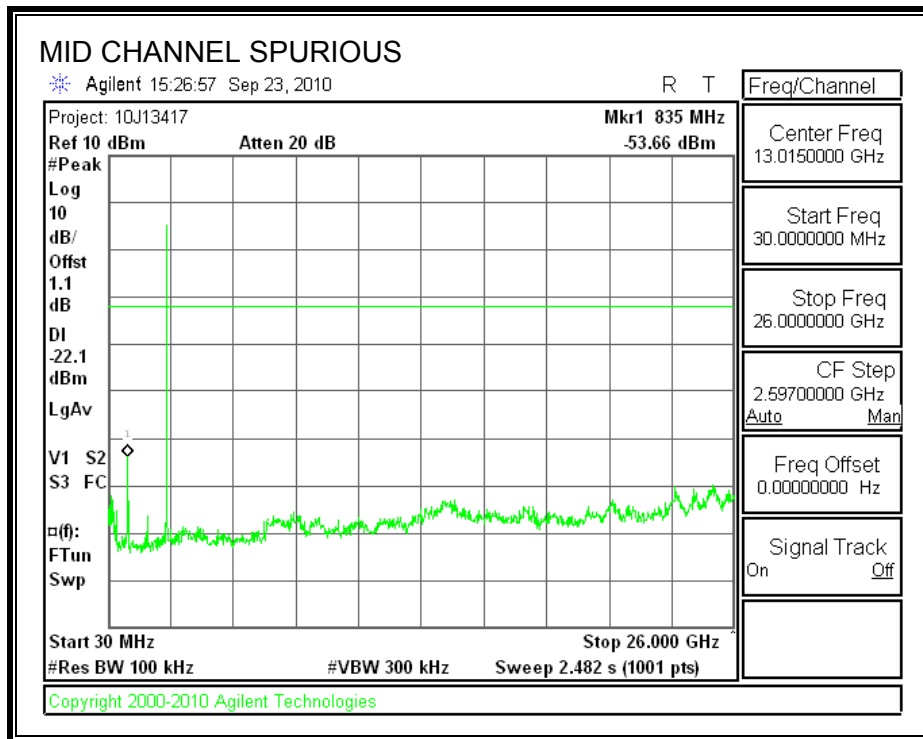
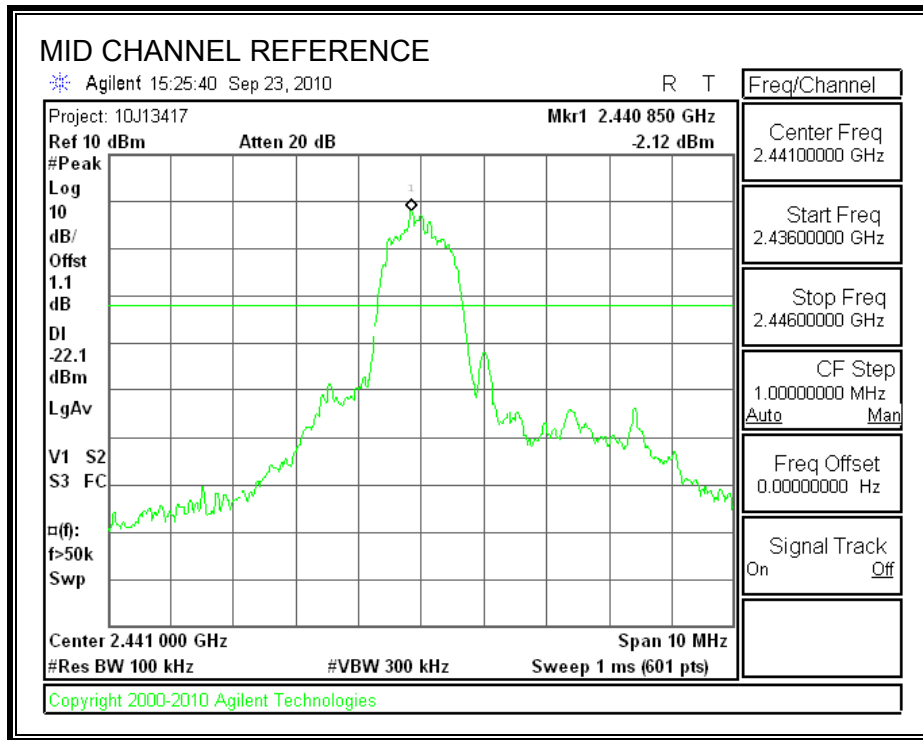
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

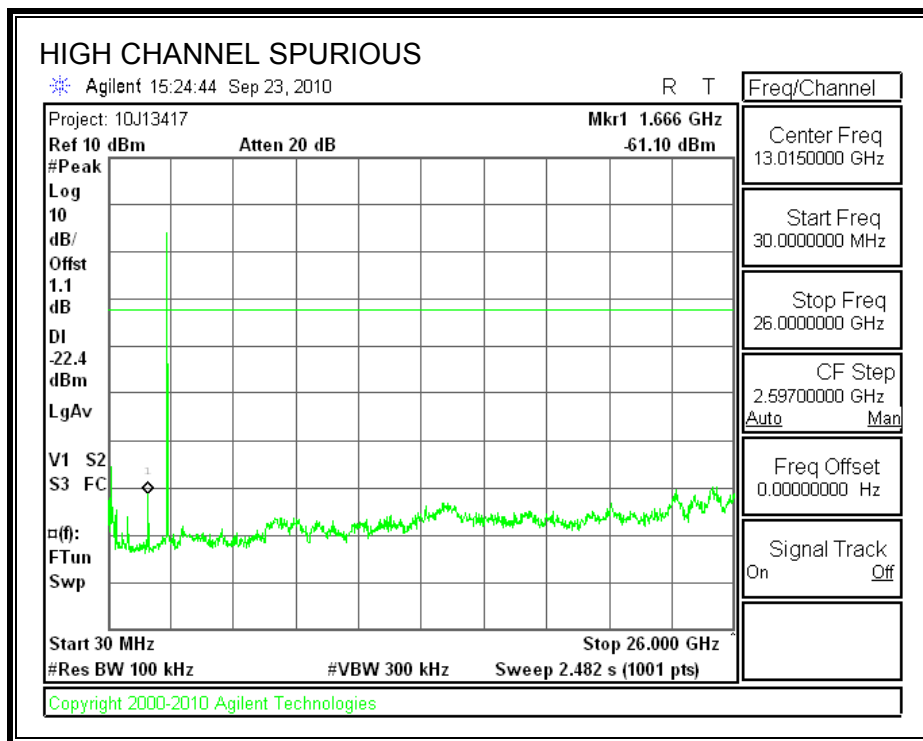
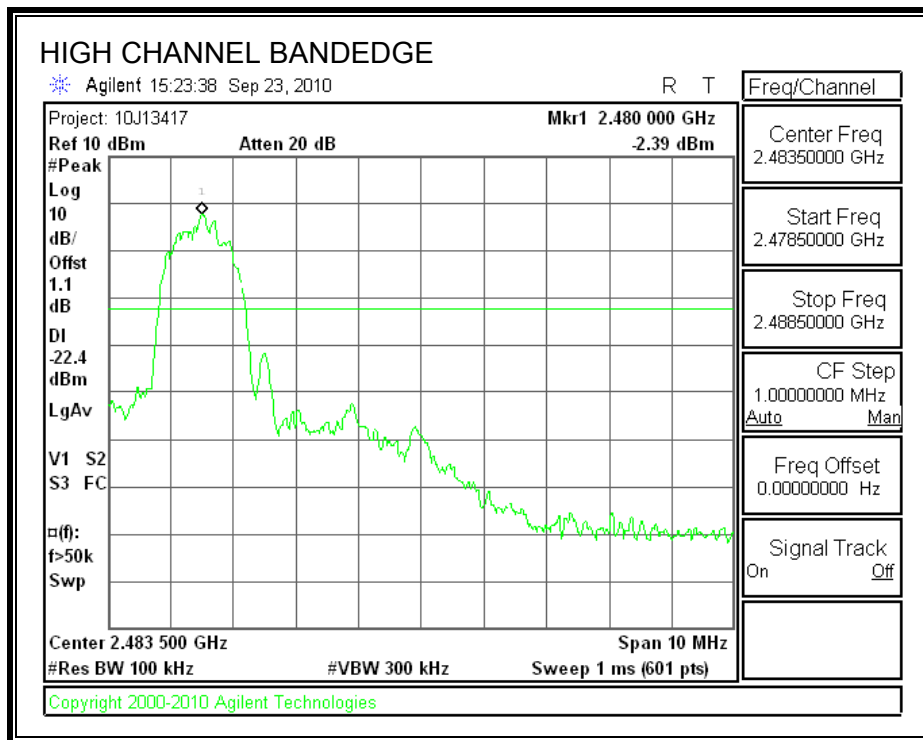
SPURIOUS EMISSIONS, LOW CHANNEL



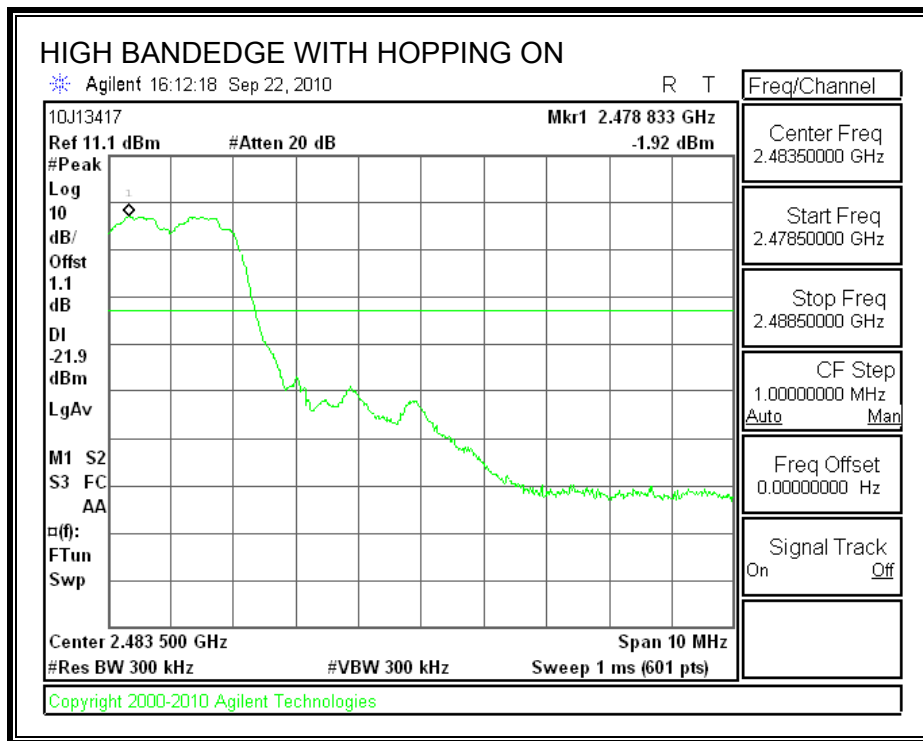
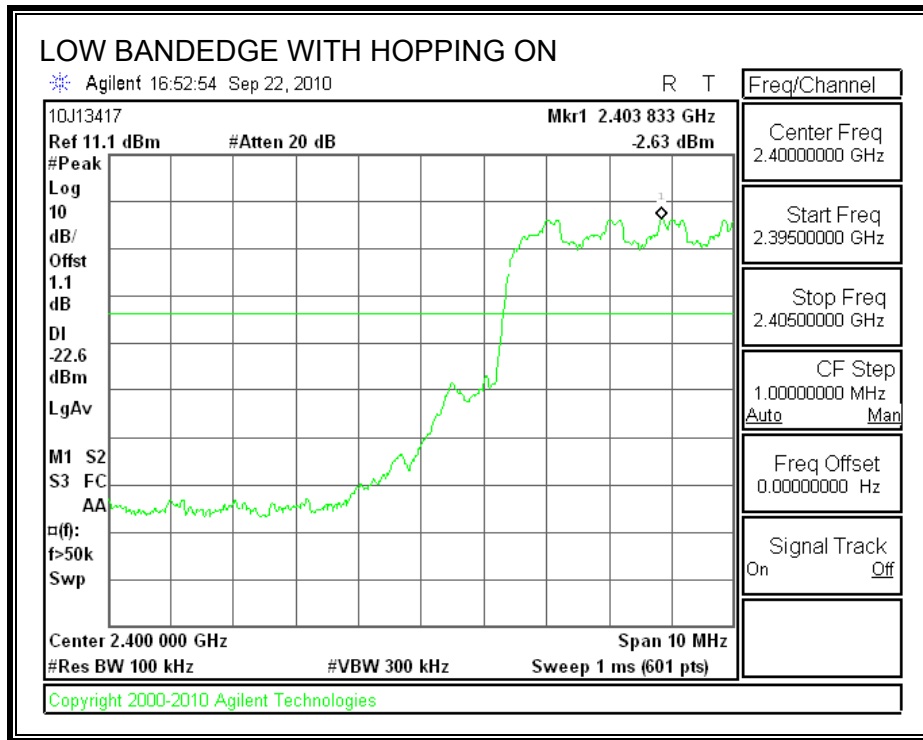
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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.

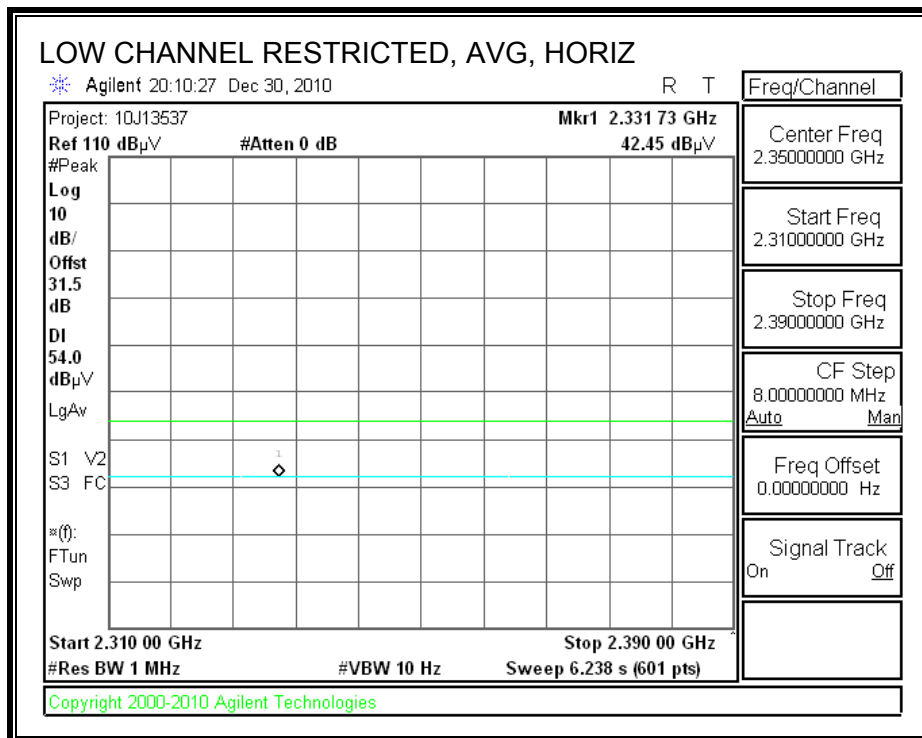
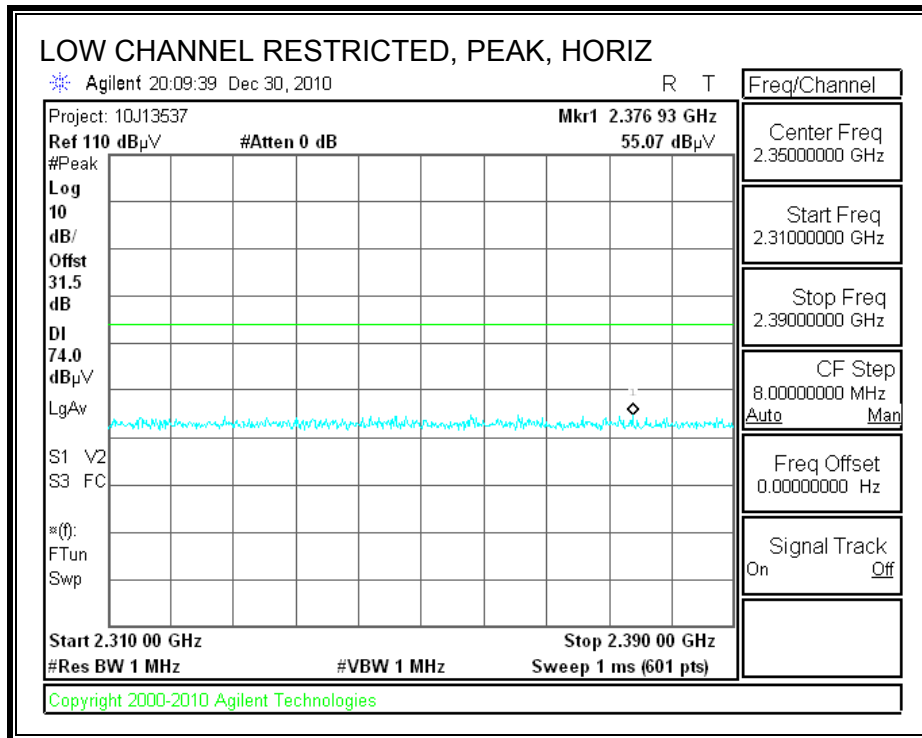
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

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.

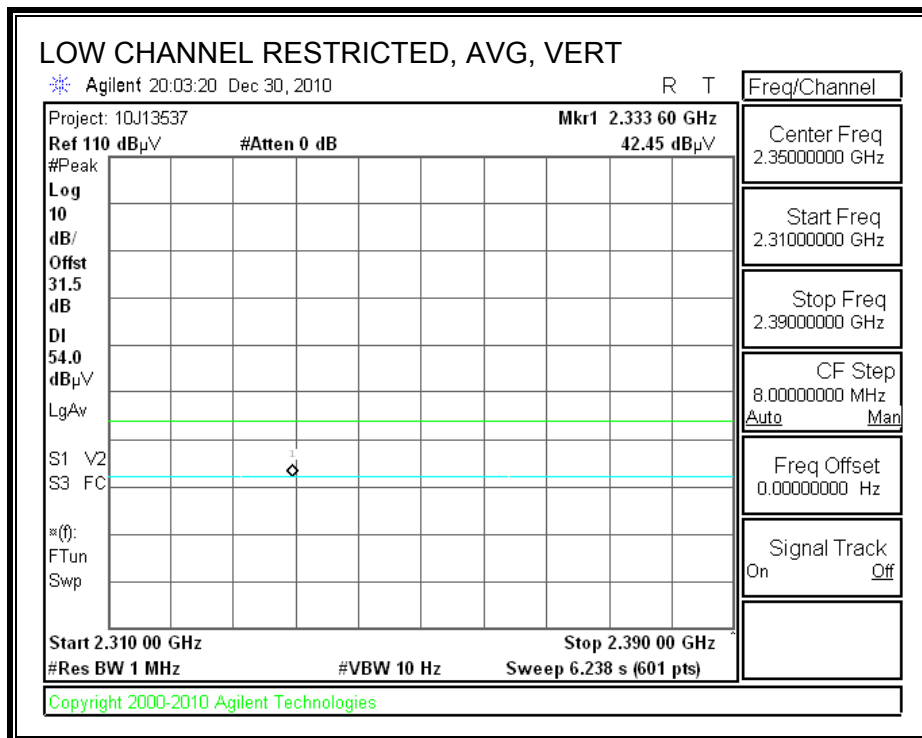
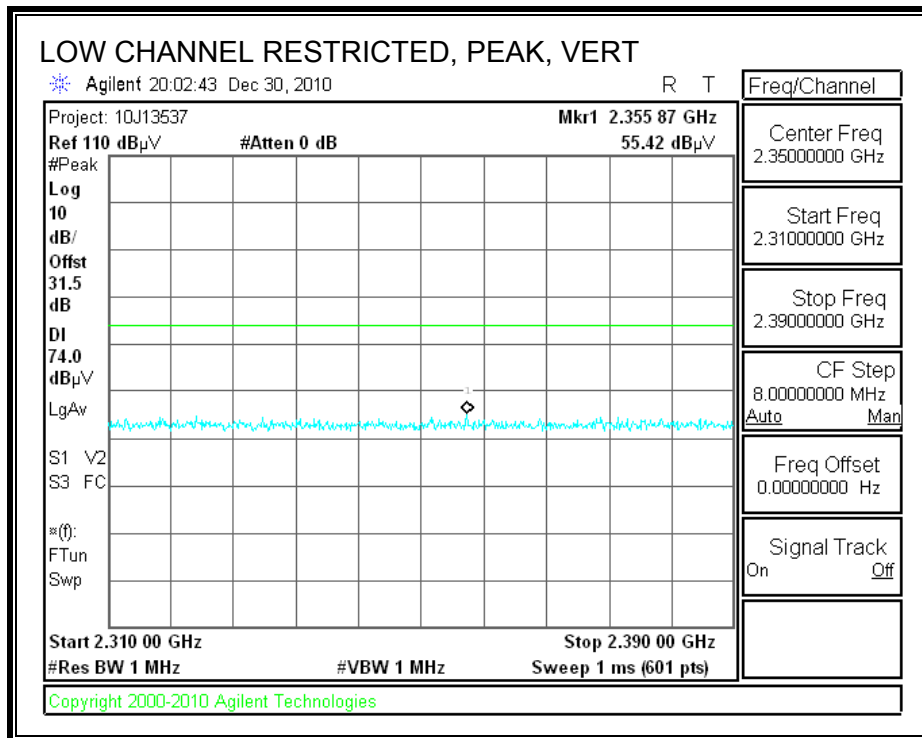
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.1.1. BASIC DATA RATE GFSK MODULATION

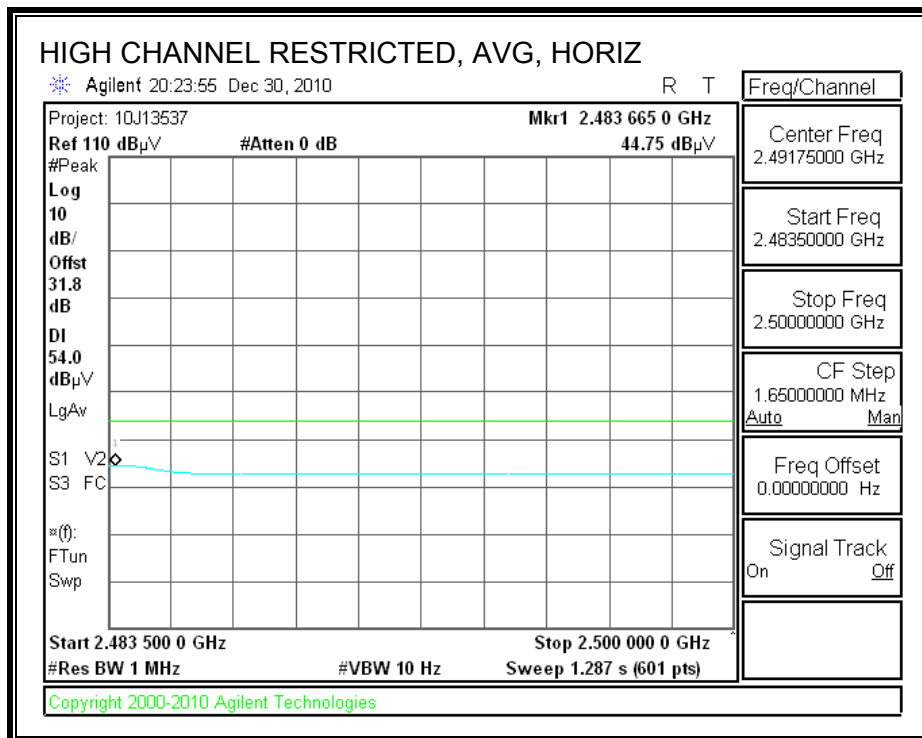
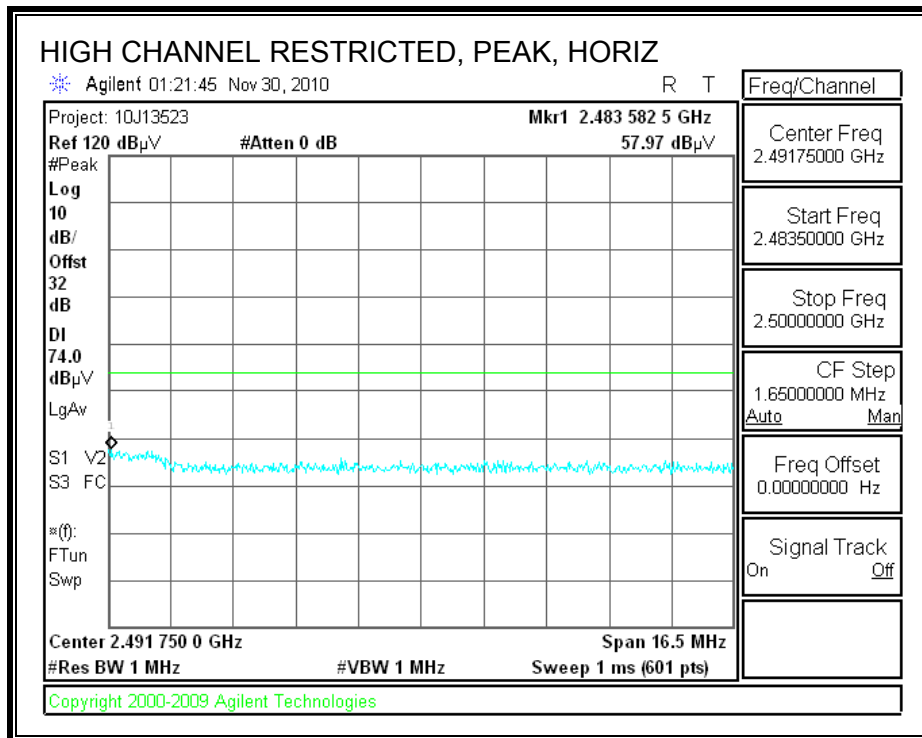
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



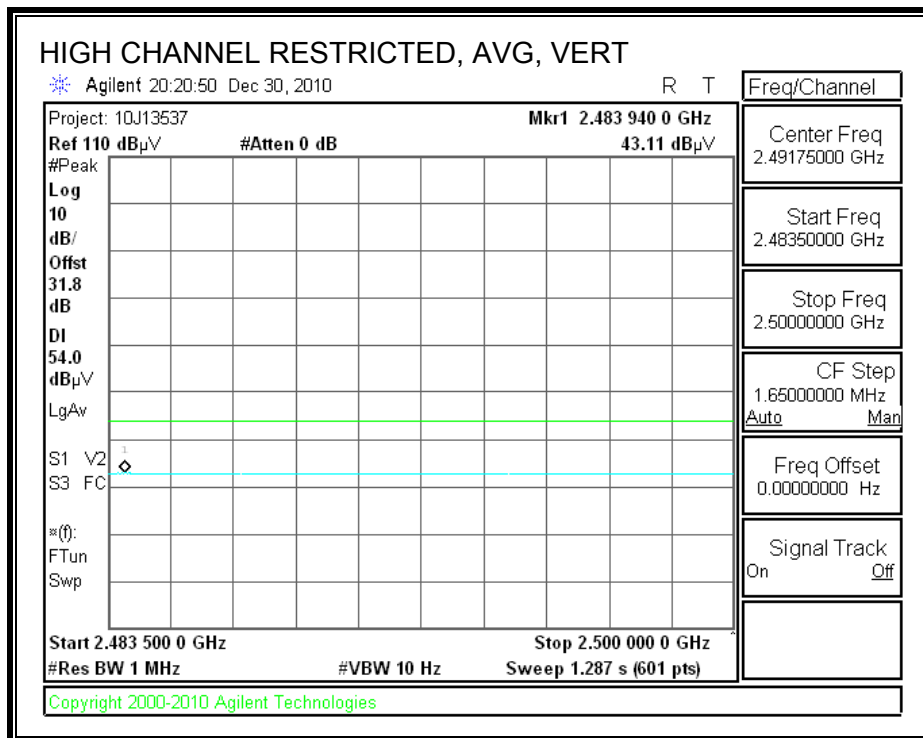
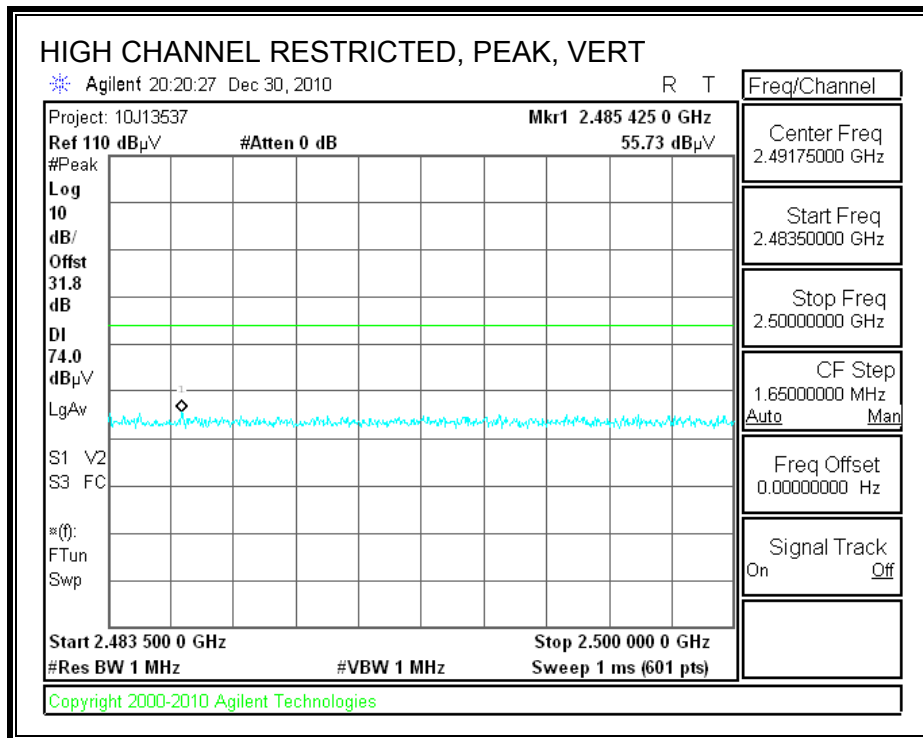
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

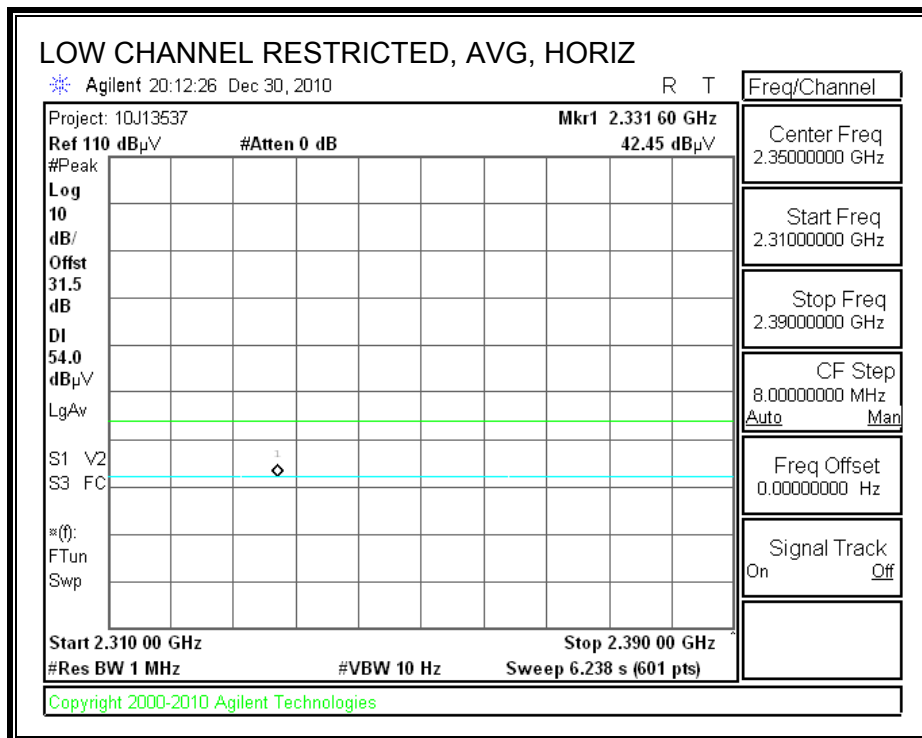
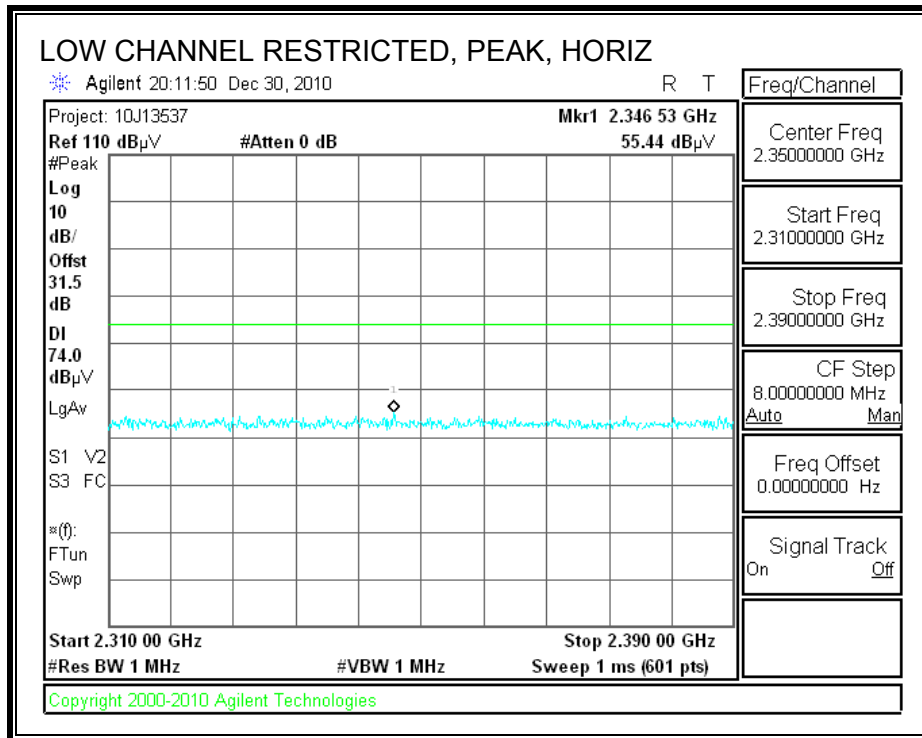


HARMONICS AND SPURIOUS EMISSIONS

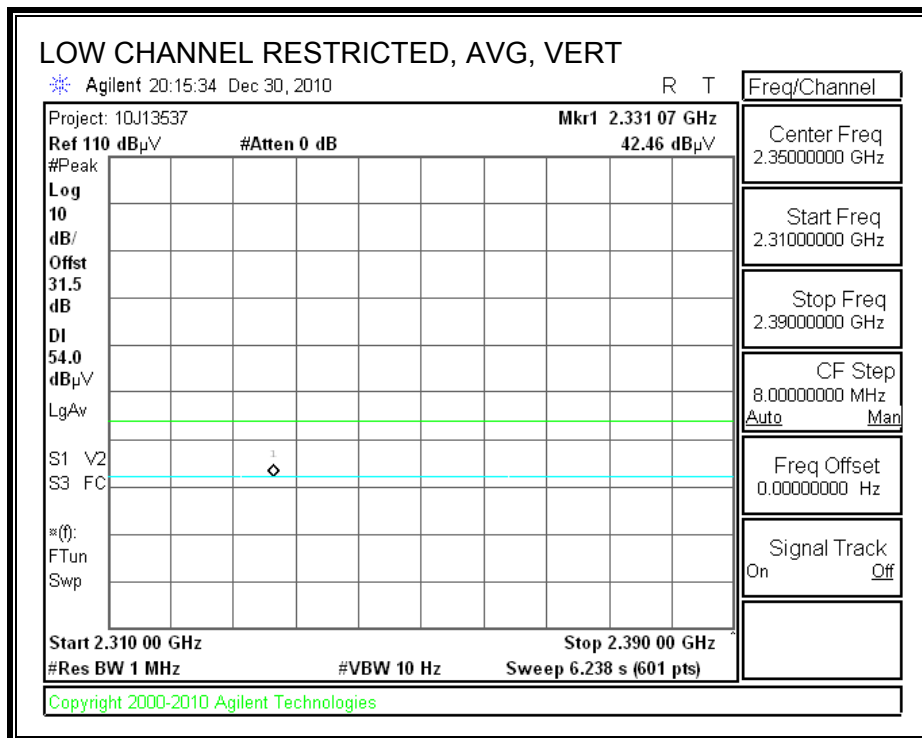
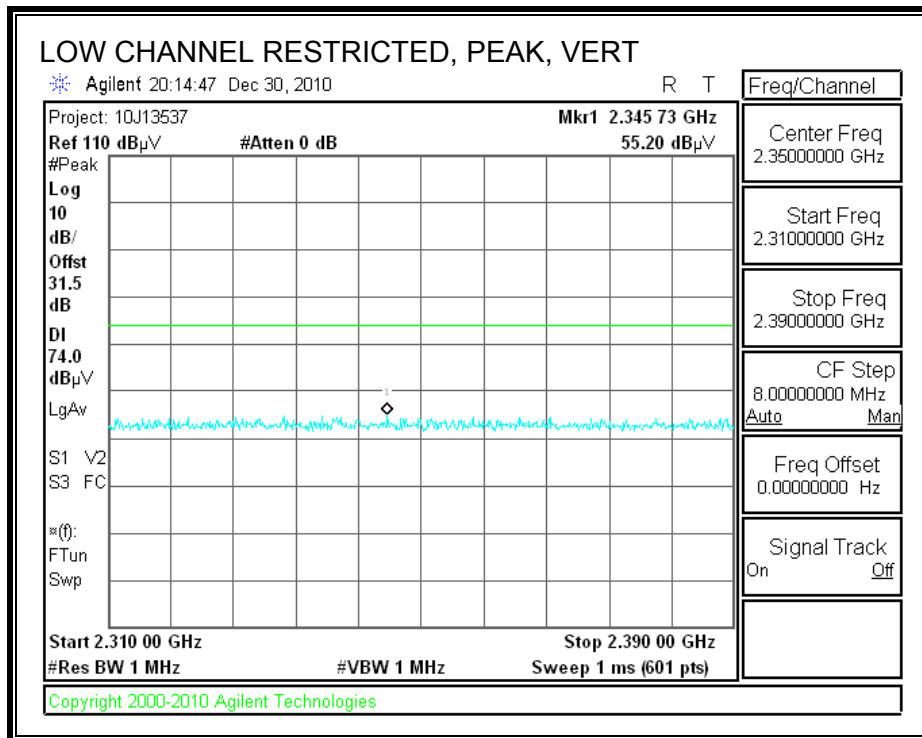
High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Oliver Su											
Date:		01/03/11											
Project #:		10J13537											
Company:		Casio											
Test Target:		FCC 15.247											
Mode Oper:		BT, No-EDR, TX, Y position (worst case)											
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	Fitr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low ch, 2402MHz													
4.804	3.0	44.8	33.0	5.8	-36.5	0.0	0.0	47.1	74.0	-26.9	V	P	
4.804	3.0	36.9	33.0	5.8	-36.5	0.0	0.0	39.2	54.0	-14.8	V	A	
4.804	3.0	42.1	33.0	5.8	-36.5	0.0	0.0	44.4	74.0	-29.6	H	P	
4.804	3.0	33.0	33.0	5.8	-36.5	0.0	0.0	35.4	54.0	-18.6	H	A	
Mid ch, 2441MHz													
4.882	3.0	42.8	33.1	5.8	-36.5	0.0	0.0	45.3	74.0	-28.7	V	P	
4.882	3.0	35.1	33.1	5.8	-36.5	0.0	0.0	37.6	54.0	-16.4	V	A	
7.323	3.0	36.2	35.3	7.3	-36.2	0.0	0.0	42.5	74.0	-31.5	V	P	
7.323	3.0	24.7	35.3	7.3	-36.2	0.0	0.0	31.1	54.0	-22.9	V	A	
4.882	3.0	40.2	33.1	5.8	-36.5	0.0	0.0	42.7	74.0	-31.3	H	P	
4.882	3.0	31.2	33.1	5.8	-36.5	0.0	0.0	33.7	54.0	-20.3	H	A	
7.323	3.0	36.9	35.3	7.3	-36.2	0.0	0.0	43.2	74.0	-30.8	H	P	
7.323	3.0	24.2	35.3	7.3	-36.2	0.0	0.0	30.6	54.0	-23.4	H	A	
High ch, 2480MHz													
4.960	3.0	41.0	33.2	5.9	-36.5	0.0	0.0	43.6	74.0	-30.4	H	P	
4.960	3.0	32.5	33.2	5.9	-36.5	0.0	0.0	35.2	54.0	-18.8	H	A	
7.440	3.0	36.8	35.5	7.3	-36.2	0.0	0.0	43.4	74.0	-30.6	H	P	
7.440	3.0	25.5	35.5	7.3	-36.2	0.0	0.0	32.1	54.0	-21.9	H	A	
4.960	3.0	41.9	33.2	5.9	-36.5	0.0	0.0	44.6	74.0	-29.5	V	P	
4.960	3.0	34.6	33.2	5.9	-36.5	0.0	0.0	37.2	54.0	-16.8	V	A	
7.440	3.0	37.1	35.5	7.3	-36.2	0.0	0.0	43.7	74.0	-30.3	V	P	
7.440	3.0	25.4	35.5	7.3	-36.2	0.0	0.0	32.0	54.0	-22.0	V	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

8.1.2. ENHANCED DATA RATE 8PSK MODULATION

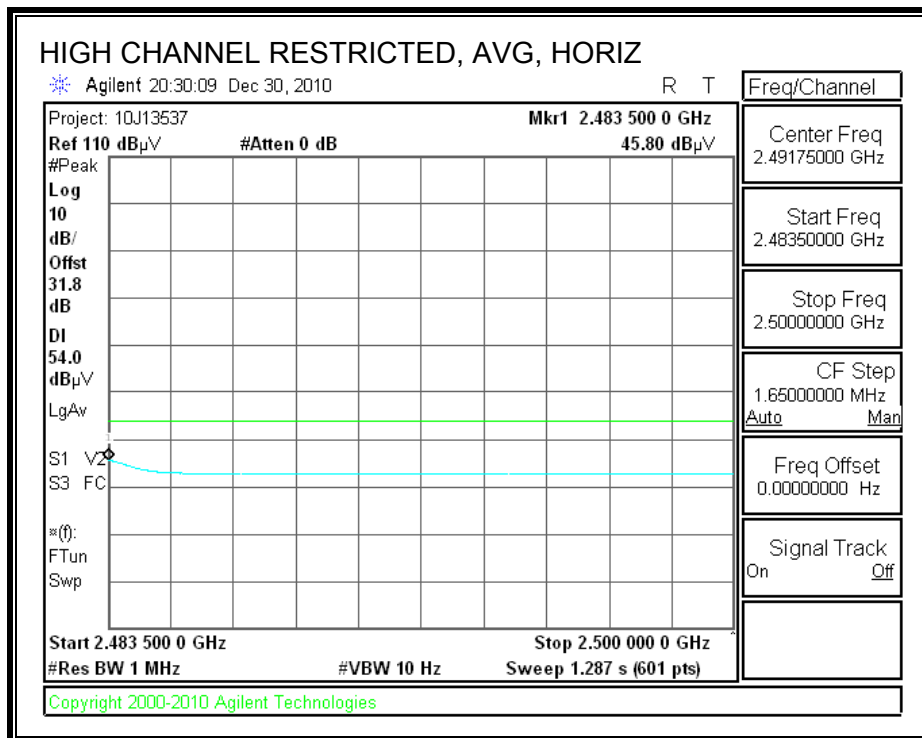
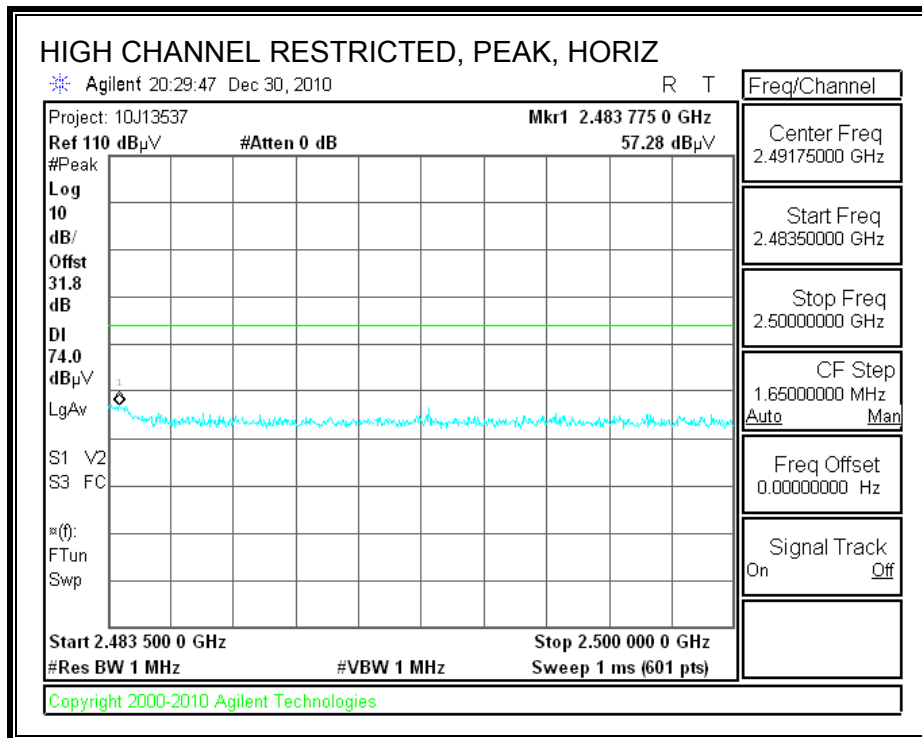
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



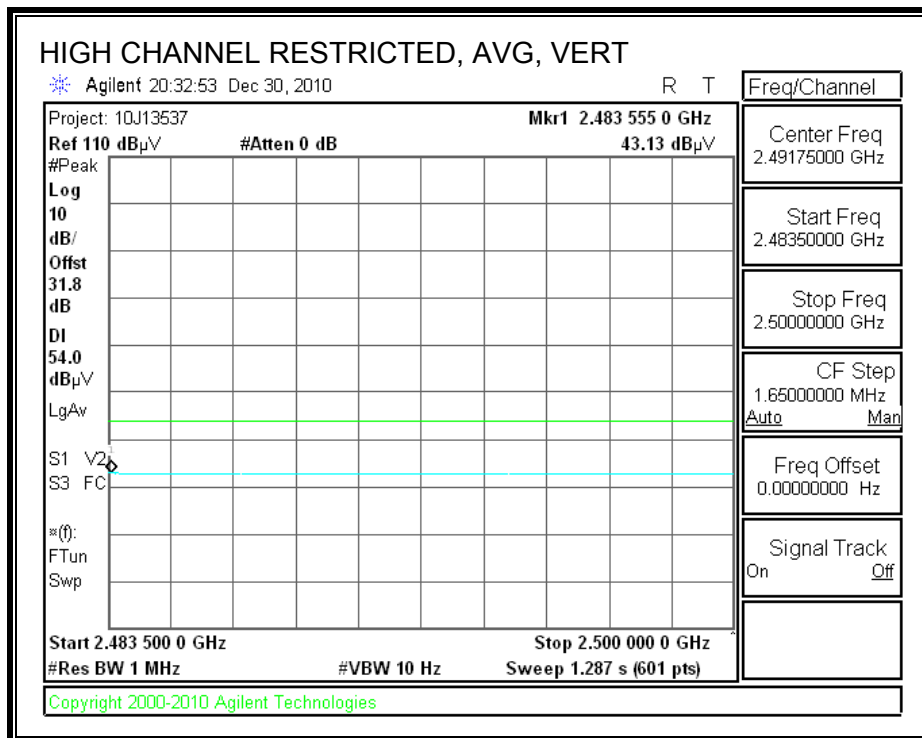
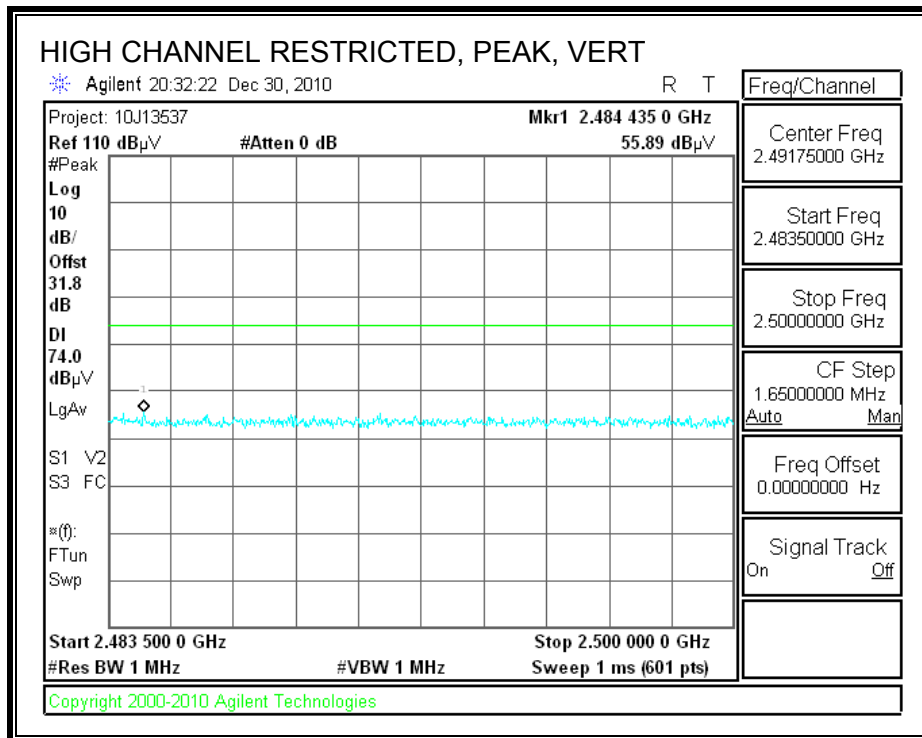
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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:		Oliver Su											
Date:		01/03/11											
Project #:		10J13537											
Company:		CASIO											
Test Target:		FCC 15.247											
Mode Oper:		BT, EDR3M, TX, Y-Position											
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	Fitr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low ch, 2402MHz													
4.804	3.0	38.2	33.0	5.8	-36.5	0.0	0.0	40.6	74.0	-33.4	H	P	
4.804	3.0	26.1	33.0	5.8	-36.5	0.0	0.0	28.4	54.0	-25.6	H	A	
4.804	3.0	38.8	33.0	5.8	-36.5	0.0	0.0	41.2	74.0	-32.8	V	P	
4.804	3.0	26.1	33.0	5.8	-36.5	0.0	0.0	28.4	54.0	-25.6	V	A	
Mid ch, 2441MHz													
4.882	3.0	37.7	33.1	5.8	-36.5	0.0	0.0	40.2	74.0	-33.8	V	P	
4.882	3.0	25.3	33.1	5.8	-36.5	0.0	0.0	27.8	54.0	-26.2	V	A	
7.323	3.0	36.6	35.3	7.3	-36.2	0.0	0.0	43.0	74.0	-31.0	V	P	
7.323	3.0	24.2	35.3	7.3	-36.2	0.0	0.0	30.6	54.0	-23.4	V	A	
4.882	3.0	39.3	33.1	5.8	-36.5	0.0	0.0	41.8	74.0	-32.2	H	P	
4.882	3.0	25.3	33.1	5.8	-36.5	0.0	0.0	27.8	54.0	-26.2	H	A	
7.323	3.0	37.2	35.3	7.3	-36.2	0.0	0.0	43.5	74.0	-30.5	H	P	
7.323	3.0	24.2	35.3	7.3	-36.2	0.0	0.0	30.6	54.0	-23.4	H	A	
High ch, 2480MHz													
4.960	3.0	38.0	33.2	5.9	-36.5	0.0	0.0	40.6	74.0	-33.4	H	P	
4.960	3.0	25.3	33.2	5.9	-36.5	0.0	0.0	27.9	54.0	-26.1	H	A	
7.440	3.0	36.8	35.5	7.3	-36.2	0.0	0.0	43.4	74.0	-30.6	H	P	
7.440	3.0	24.5	35.5	7.3	-36.2	0.0	0.0	31.1	54.0	-22.9	H	A	
4.960	3.0	39.0	33.2	5.9	-36.5	0.0	0.0	41.7	74.0	-32.3	V	P	
4.960	3.0	26.6	33.2	5.9	-36.5	0.0	0.0	29.2	54.0	-24.8	V	A	
7.440	3.0	36.5	35.5	7.3	-36.2	0.0	0.0	43.1	74.0	-30.9	V	P	
7.440	3.0	24.6	35.5	7.3	-36.2	0.0	0.0	31.2	54.0	-22.8	V	A	

Rev. 4.1.2.7

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

8.2. RECEIVER ABOVE 1 GHz

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Casio
 Project #: 10AJ13537
 Date: 2/1/11
 Test Engineer: Chin Pang
 Configuration: EUTAC Adapter/Headset
 Mode: RX, Bluetooth (Worse Case)

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0050			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz
3' cable 22807700	12' cable 22807600	20' cable 22807500			

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr 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, 2441MHz															
1.627	3.0	47.5	41.7	26.2	3.1	-35.7	0.0	0.0	41.1	35.3	74	54	-32.9	-18.7	H
2.440	3.0	47.6	41.4	28.3	3.9	-35.1	0.0	0.0	44.7	38.5	74	54	-29.3	-15.5	H
1.627	3.0	46.0	36.5	26.2	3.1	-35.7	0.0	0.0	39.6	30.1	74	54	-34.4	-23.9	V
2.440	3.0	48.0	41.0	28.3	3.9	-35.1	0.0	0.0	45.1	38.1	74	54	-28.9	-15.9	V

Rev. 11.10.08
Note: No other emissions were detected above the system noise floor.

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		

8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL AND VERTICAL DATA

30-1000MHz Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Oliver Su
 Date: 01/03/11
 Project #: 10J13537
 Company: CASIO
 Test Target: FCC 15 Class B
 Mode Oper: BT, EDR3M, TX, Y-Position (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
119.164	3.0	39.1	13.5	1.0	28.3	0.0	0.0	25.3	43.5	-18.2	V	P	
363.974	3.0	37.9	14.4	1.7	28.1	0.0	0.0	25.9	46.0	-20.1	V	P	
415.936	3.0	39.2	15.2	1.8	28.1	0.0	0.0	28.2	46.0	-17.8	V	P	
441.977	3.0	41.8	15.7	1.9	28.0	0.0	0.0	31.4	46.0	-14.6	V	P	
688.947	3.0	31.7	19.5	2.4	27.2	0.0	0.0	26.4	46.0	-19.6	V	P	
998.56	3.0	31.2	22.5	3.0	27.9	0.0	0.0	28.7	54.0	-25.3	V	P	
127.924	3.0	39.1	13.6	1.1	28.3	0.0	0.0	25.5	43.5	-18.0	H	P	
338.053	3.0	48.3	14.0	1.6	28.1	0.0	0.0	35.8	46.0	-10.2	H	P	
363.974	3.0	39.2	14.4	1.7	28.1	0.0	0.0	27.2	46.0	-18.8	H	P	
390.015	3.0	39.8	14.8	1.8	28.1	0.0	0.0	28.3	46.0	-17.7	H	P	
415.936	3.0	44.0	15.2	1.8	28.1	0.0	0.0	33.0	46.0	-13.0	H	P	
441.977	3.0	41.1	15.7	1.9	28.0	0.0	0.0	30.7	46.0	-15.3	H	P	

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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.

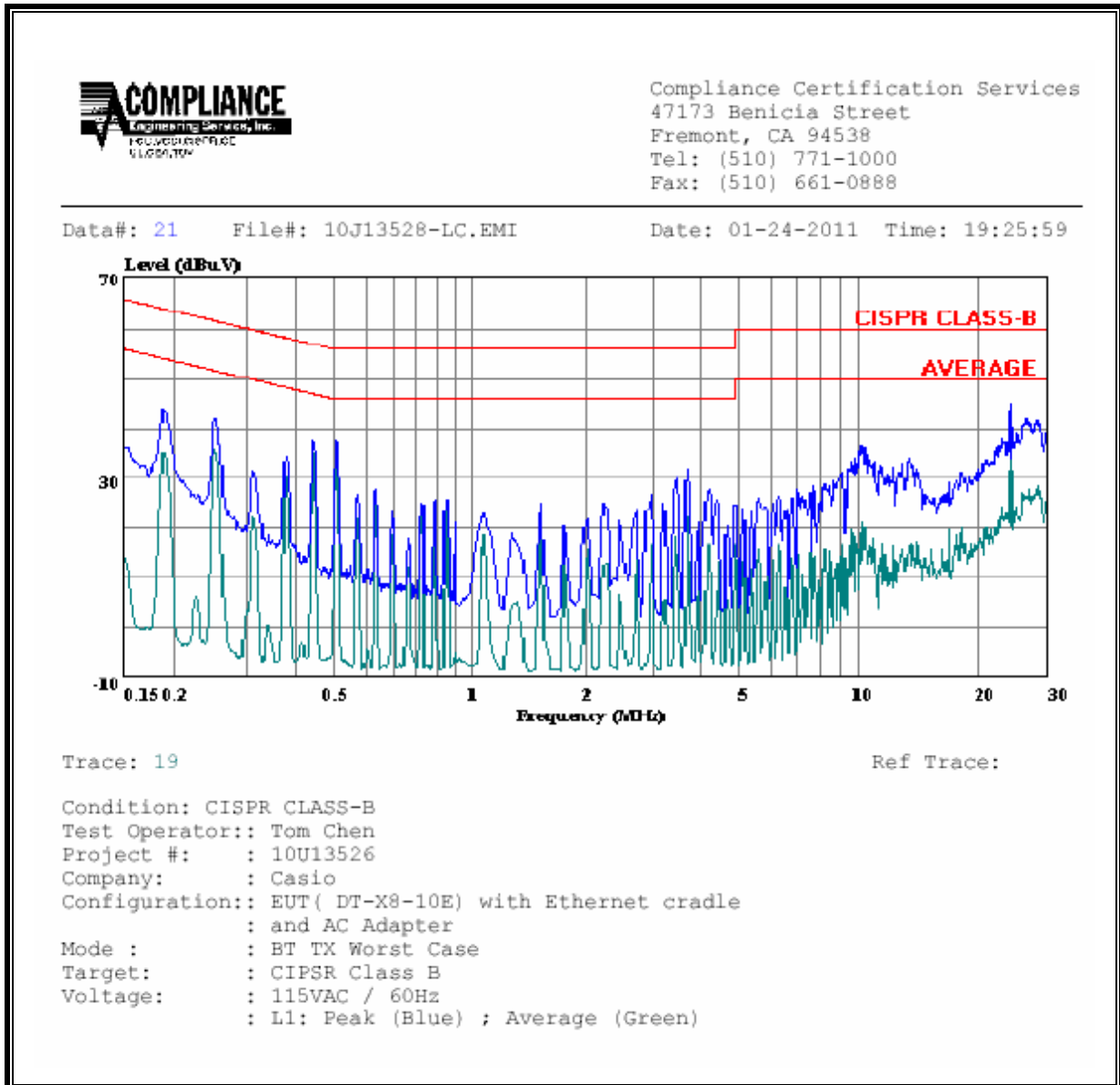
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

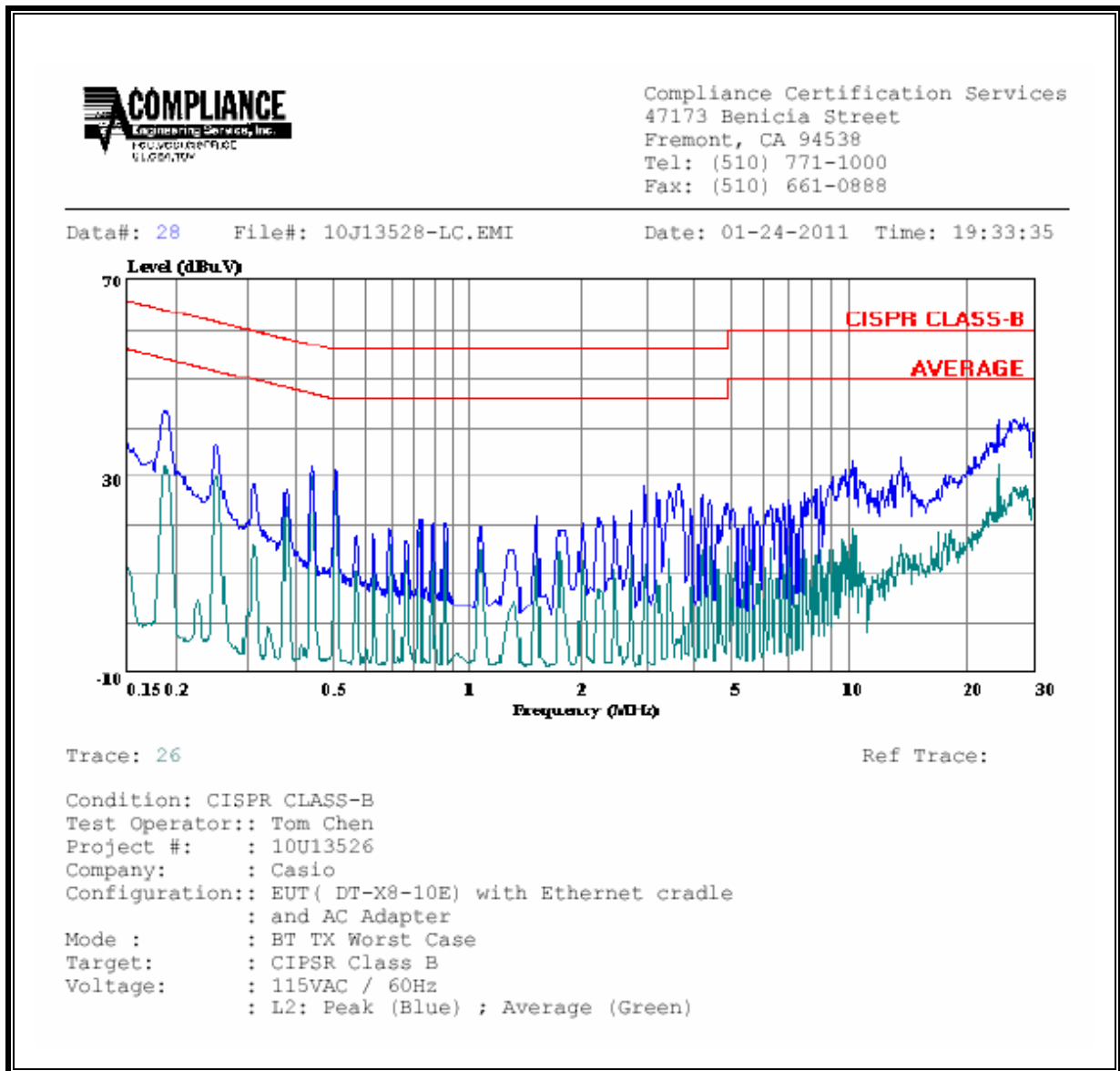
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq. (MHz)	Reading			Class (dB)	Limit QP	EN B		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)			AV	QP (dB)	AV (dB)		
0.19	43.84	--	34.88	0.00	64.12	54.12	-20.28	-19.24	L1	
0.25	41.90	--	34.85	0.00	61.66	51.66	-19.76	-16.81	L1	
0.51	37.58	--	34.72	0.00	56.00	46.00	-18.42	-11.28	L1	
0.19	42.07	--	30.25	0.00	64.04	54.04	-21.97	-23.79	L2	
0.25	36.54	--	30.17	0.00	61.72	51.72	-25.18	-21.55	L2	
0.44	32.14	--	29.36	0.00	57.02	47.02	-24.88	-17.66	L2	
6 Worst Data										

LINE 1 RESULTS



LINE 2 RESULTS



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/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042 <i>f</i> ^{0.5}	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> ^{1.2}
150 000–300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616 000 / <i>f</i> ^{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/m² is equivalent to 1 mW/cm².
 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:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

where

- S = Power density in W/m²
- EIRP = Equivalent Isotropic Radiated Power in W
- D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

- D = Separation distance in m
- EIRP = Equivalent Isotropic Radiated Power in W
- S = Power density in W/m²

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/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

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	-1.63	0.0022	0.0002

11. CO-LOCATED MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

Per OTE Bulletin 65, for frequency bands with the same MPE limits, the Power Densities produced by each transmitter are summed. The summation must be under the limit for the band.

Per OTE Bulletin 65, for frequency bands with different limits the Power Densities are calculated separately for each band, divided by the limit for the band and the results are then summed. The summation must be less than 1.

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	-1.63	0.0022	0.0002
2.4 GHz	802.11g	0.20	20.91	1.94	0.3837	0.0384
Colocated					0.3858	0.0386