



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

**CERTIFICATION TEST REPORT**

**FOR**

**WIRELESS OFFICE AND CALL CENTER COMMUNICATION ACCESSORY**

**MODEL NUMBER: WO2**

**FCC ID: AL8-WO2  
IC: 457A-WO2**

**REPORT NUMBER: 10U13328-1**

**ISSUE DATE: AUGUST 12, 2010**

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**NVLAP LAB CODE 200065-0**

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** PLANTRONICS, INC.  
345 ENCINAL STREET  
SANTA CRUZ, CA, 95060, U.S.A

**EUT DESCRIPTION:** WIRELESS OFFICE AND CALL CENTER COMMUNICATION  
ACCESSORY

**MODEL:** WO2

**SERIAL NUMBER:** 114

**DATE TESTED:** AUGUST 03- 05, 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, Inc. (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 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by 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 CCS By:



FRANK IBRAHIM  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

Tested By:



THANH NGUYEN  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 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.

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 Wireless Office and Call Center Communication Accessory that provides wide band voice and stereo audio reception.

The radio module is manufactured by Plamex SA DE CV, Avenida Production #216. Parque Industrial Internacional, Tijuana Mesa De Otoy, Tijuana, Baja California 22425, Mexico.

### 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	3.76	2.38
2402 - 2480	Enhanced 8PSK	2.78	1.90

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a printed PIFA antenna, with a maximum gain of 1.8 dBi.

### 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was PNX 98 SITEL 19.16 BT 2.4.0 PIC 1.1 HW REV 28

The EUT driver software installed in the host support equipment during testing was EMC Test V1.0 Windows Media Player V9.00.00.3344 Windows Sound Recorder V5.1

The test utility software used during testing was CSR Bluetest.exe 2.0, exercise the Bluecore Build-in selftest. (BIST) function.

### 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

Radiated emission 30-1000 MHz and power line conducted emission was performed with the EUT set to transmit at the channel with highest output power.

Radiated testing was performed in the normal orientation as a desktop unit.

EUT was tested in both GFSK and 8PSK modulations.

**5.6. DESCRIPTION OF TEST SETUP**

**SUPPORT EQUIPMENT**

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	D400	Plantronics 31938	DoC
AC/DC Adapter	Dell	LA90PS0-09	CN0DF266-71615-855	DoC
SPI Interface Connect	Plantronics	N/A	N/A	N/A
Level Shifter	Plantronics	N/A	N/A	N/A
DC Power Supply	HP	E3610	CCS02844	DoC

**I/O CABLES**

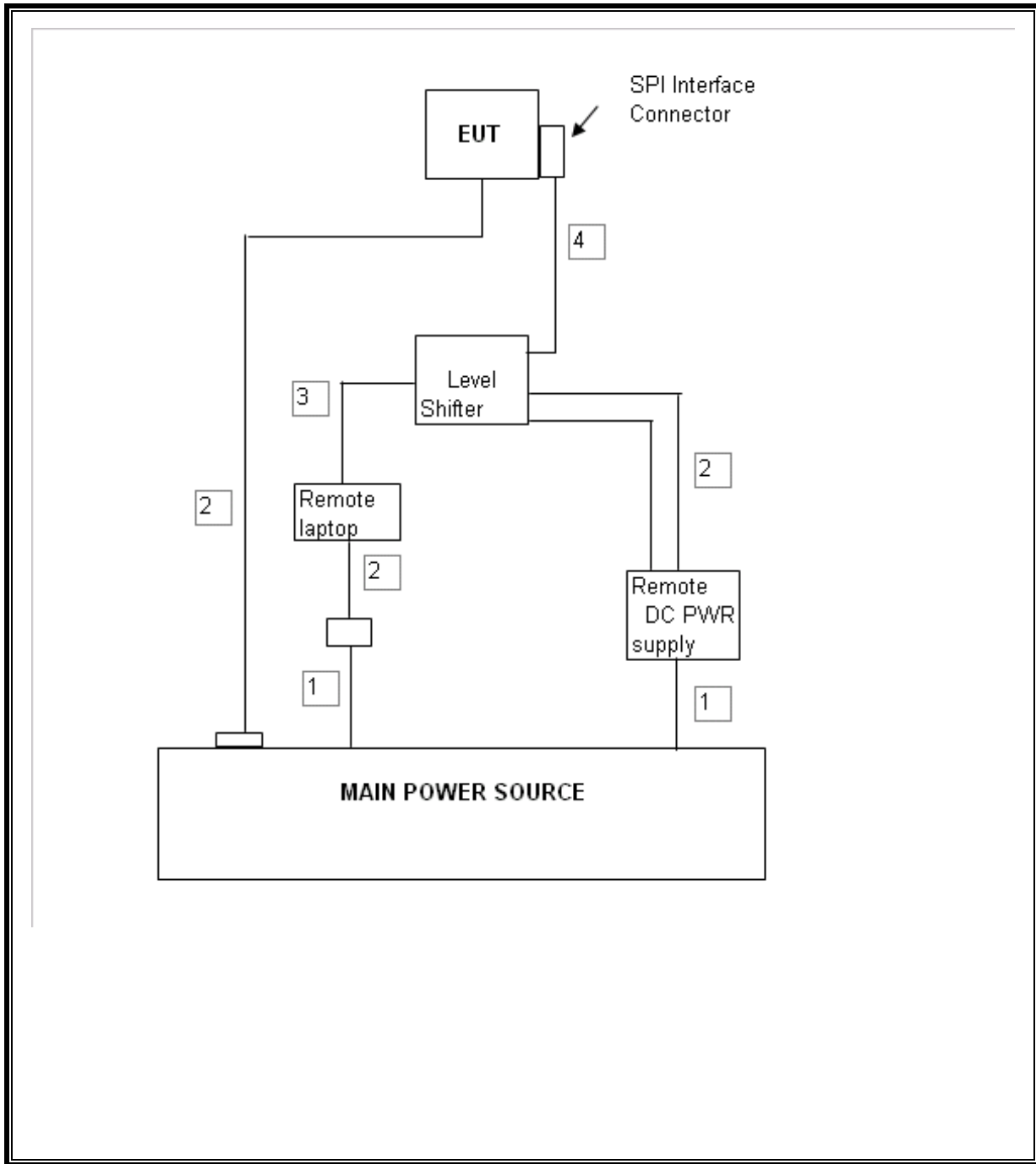
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US 115V	Un-shielded	2m	N/A
2	DC	3	AC Adapter	Un-shielded	1.5m	N/A
3	Parallel	2	25 Pin	Un-shielded	1m	N/A
4	Interface	1	14 Pin	Twist apair	0.4m	N/A

**TEST SETUP**

The EUT is connected to an interface test card and a remote laptop computer used to exercise the radio card.



**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/09	12/18/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/09	12/19/10
PSA Series Spectrum Analyzer	Agilent / HP	E4446A	C01069	01/05/10	04/05/11
Power Meter	Boonton	4541 RF	C01189	02/26/10	02/26/11
Power sensor	Boonton	57006	6871	02/27/10	02/27/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/09	12/18/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	08/05/09	12/17/10
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09	10/29/10
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/09	10/29/10
EMI Receiver	R & S	ESHS 20	N02396	02/06/09	08/06/10

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 20 dB AND 99% BANDWIDTH

#### LIMIT

None; for reporting purposes only.

#### TEST PROCEDURE

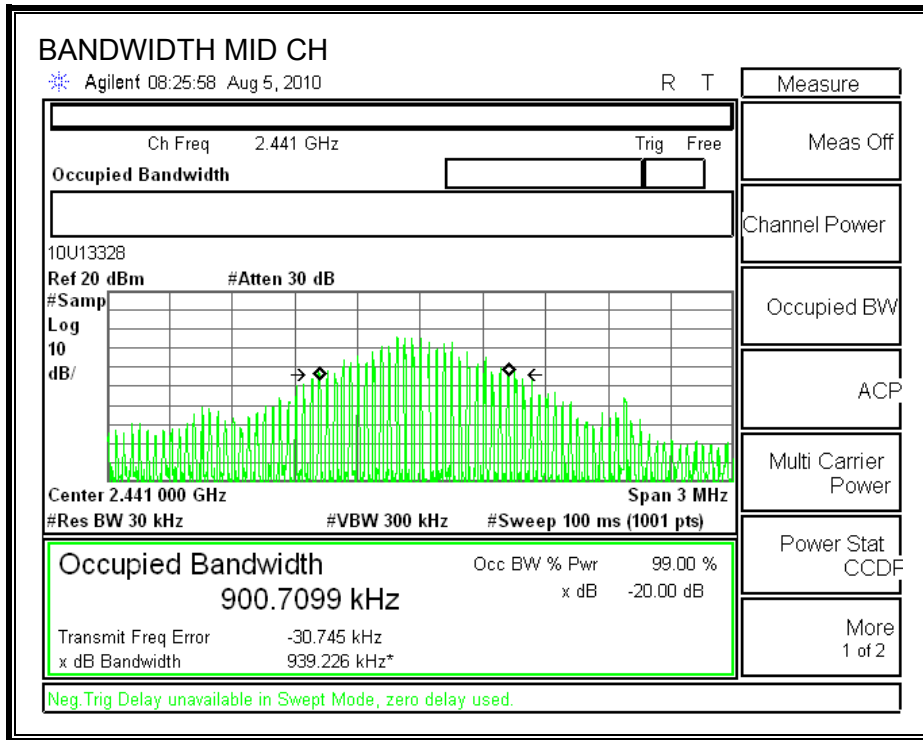
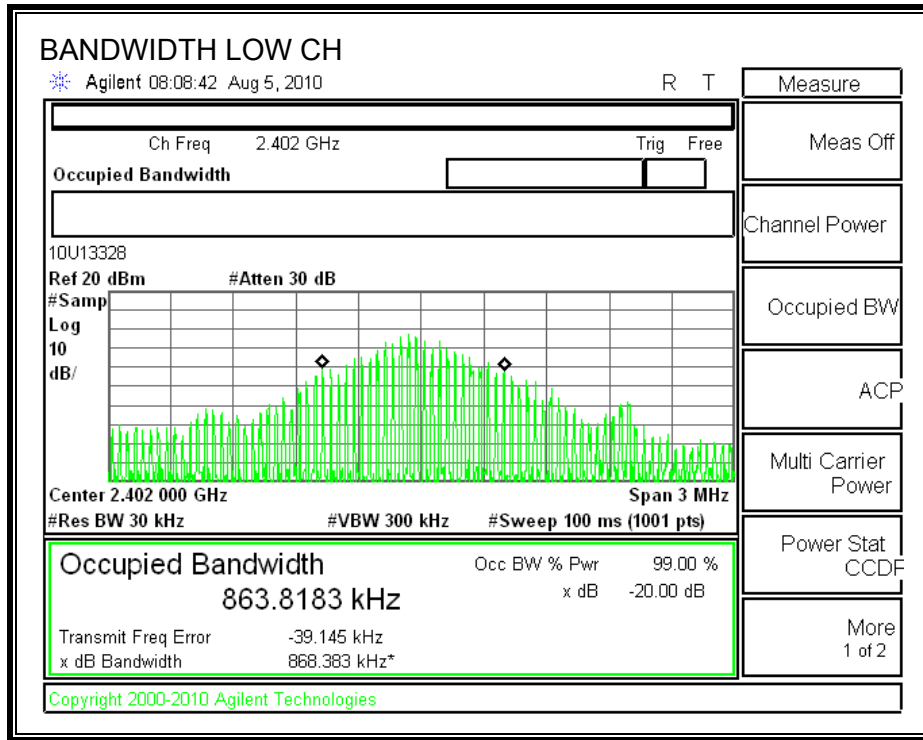
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq 1\%$  of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

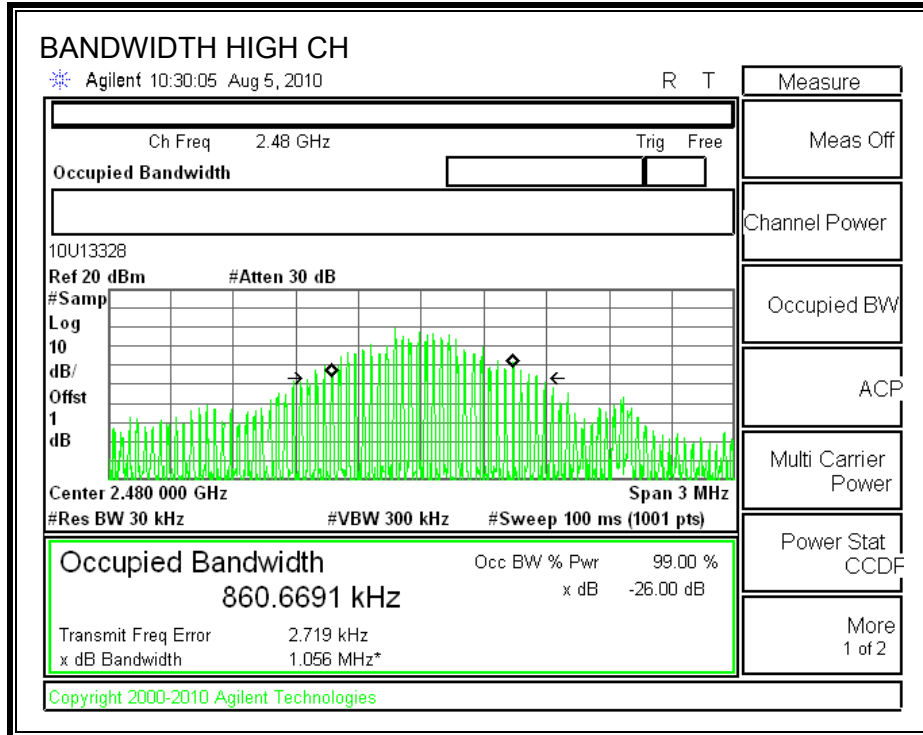
#### RESULTS

##### 7.1.1. BASIC DATA RATE GFSK MODULATION

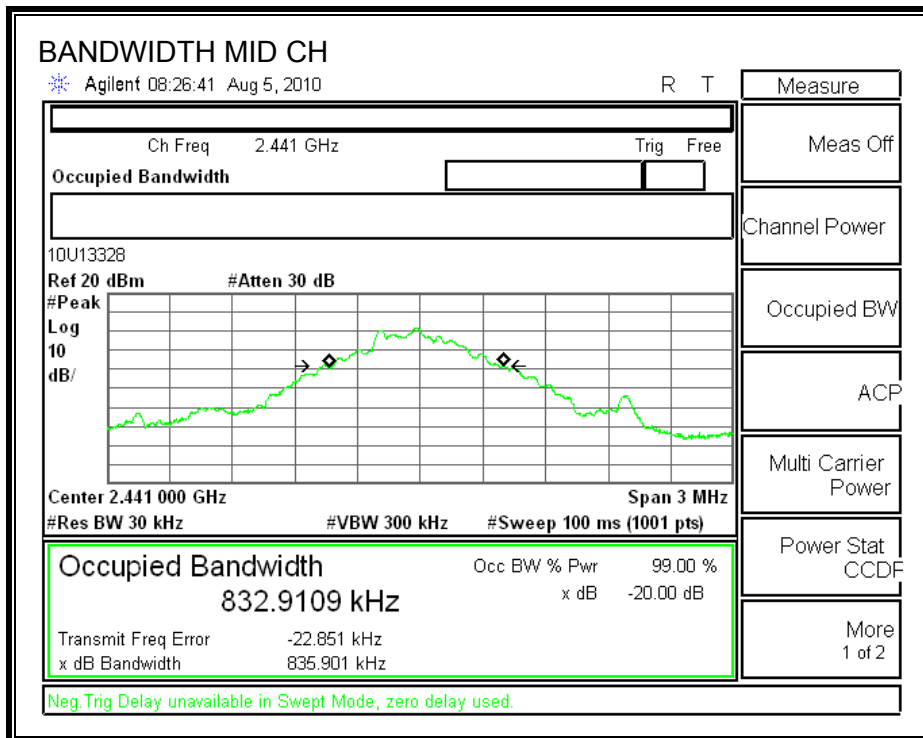
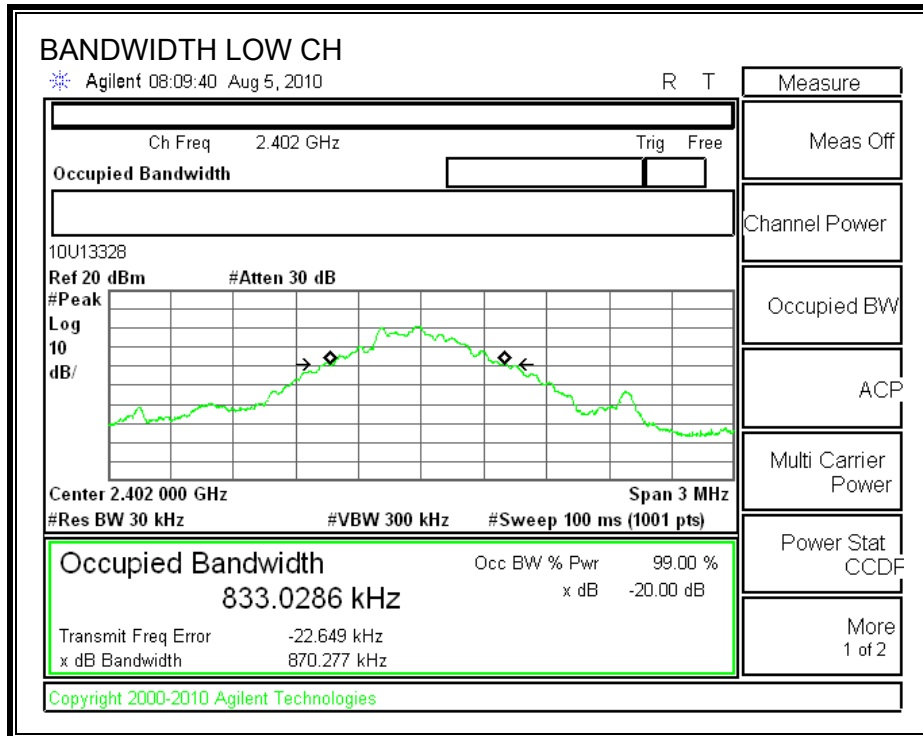
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	870.277	863.8183
Middle	2441	835.901	900.7099
High	2480	866.205	860.6691

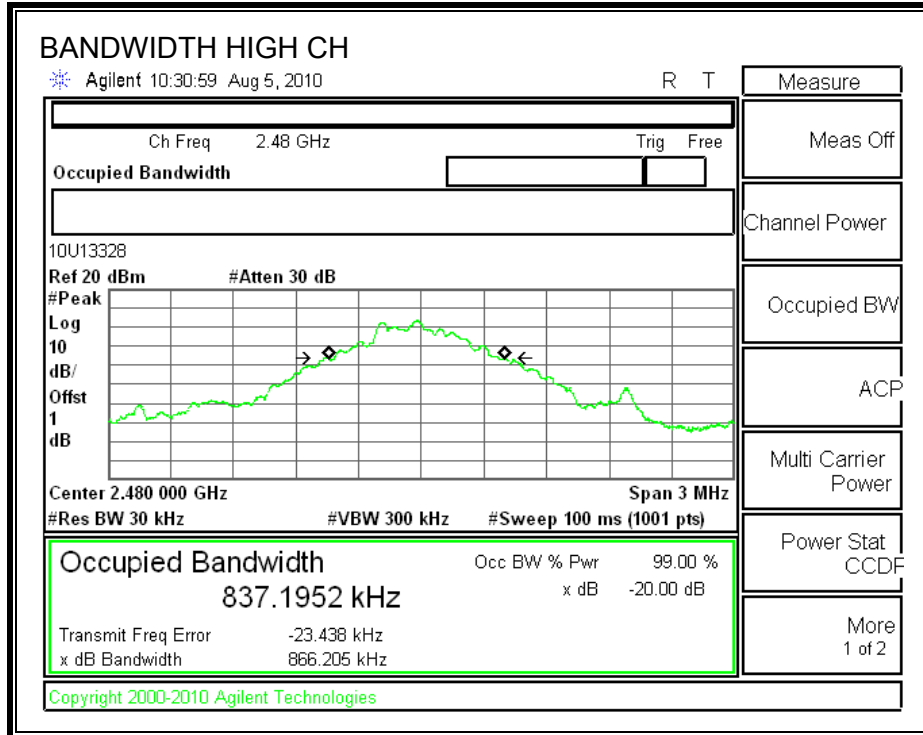
**99% BANDWIDTH**





**20 dB BANDWIDTH**



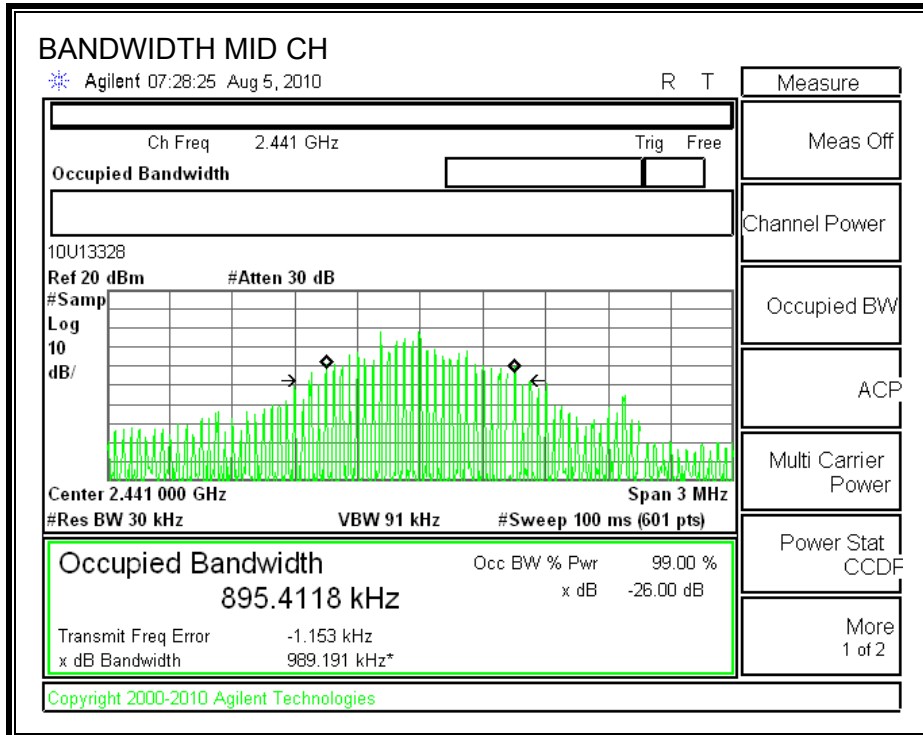
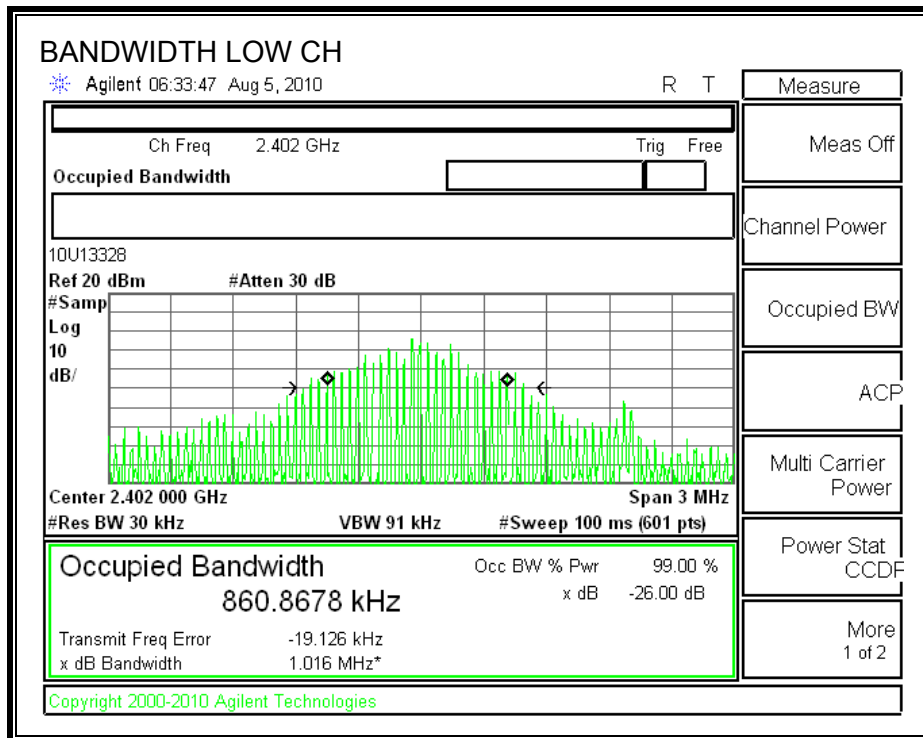


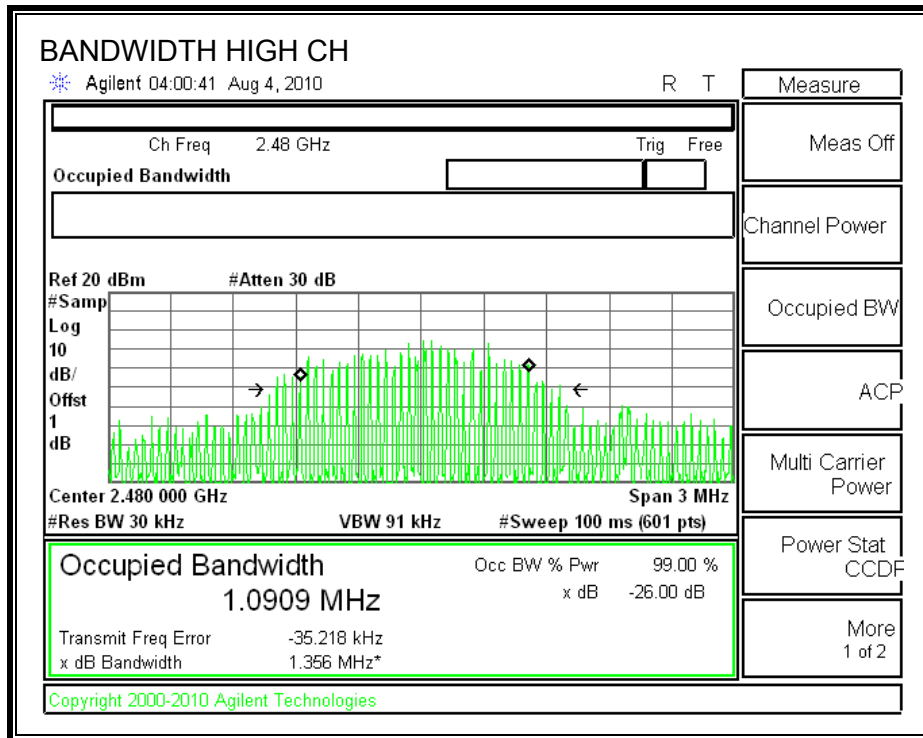
### 7.1.2. EXTENDED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	841.311	860.8678
Middle	2441	870.074	895.4118
High	2480	1217.000	1090.9

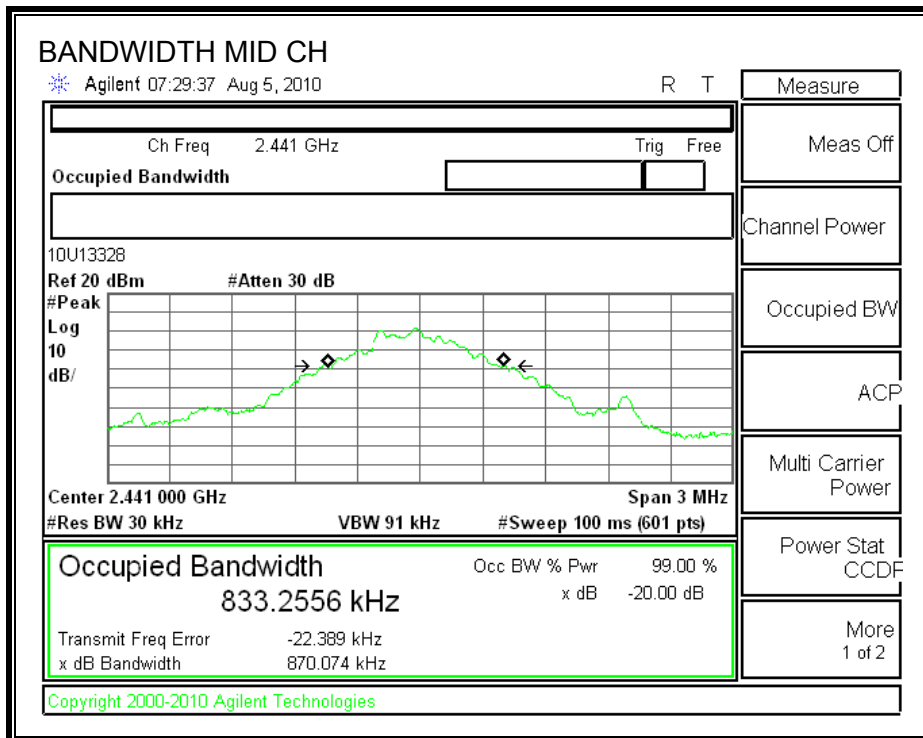
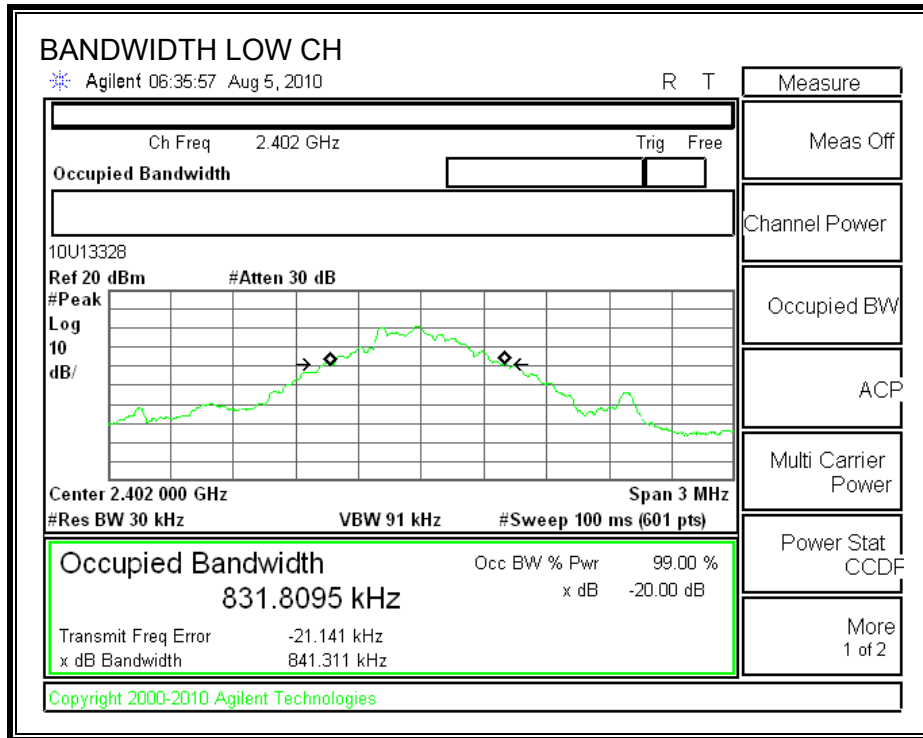


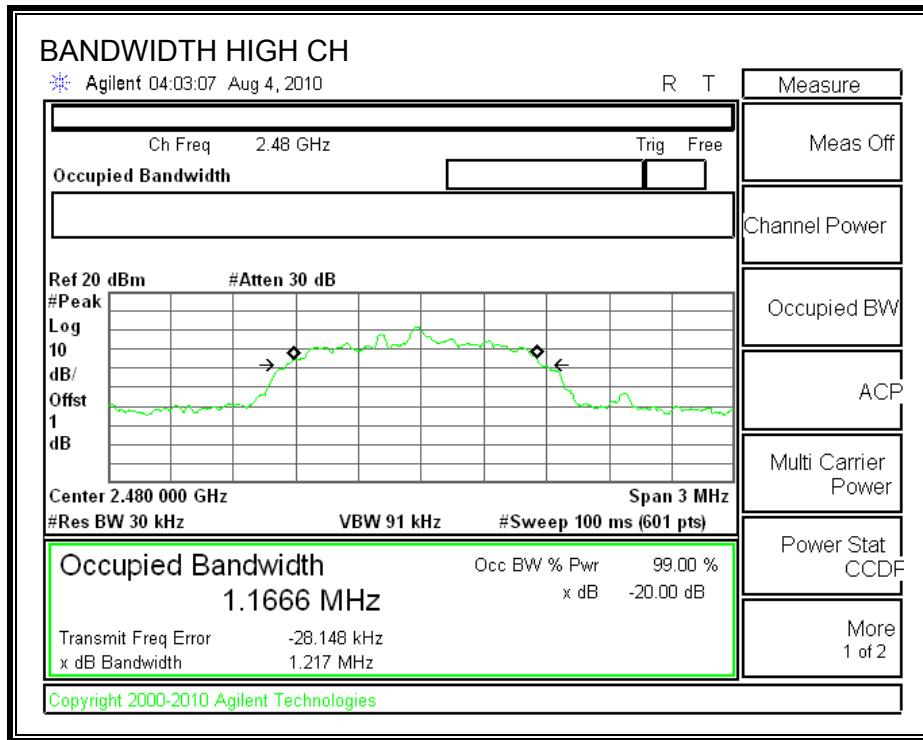
**99% BANDWIDTH**





**20 dB BANDWIDTH**





## **7.2. 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 hopping channel, whichever is greater.

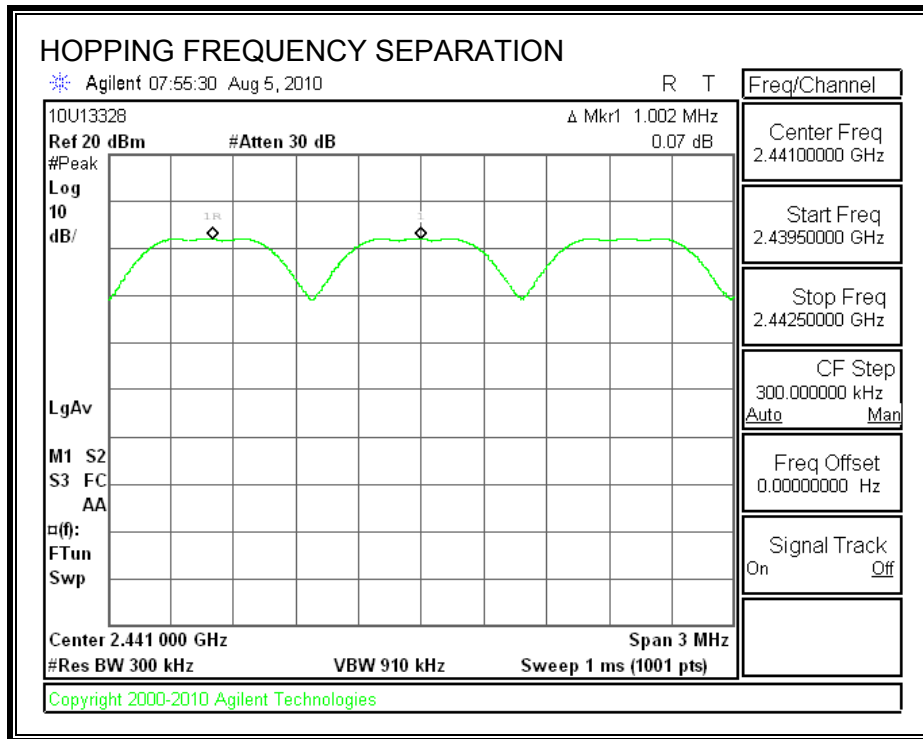
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### **TEST PROCEDURE**

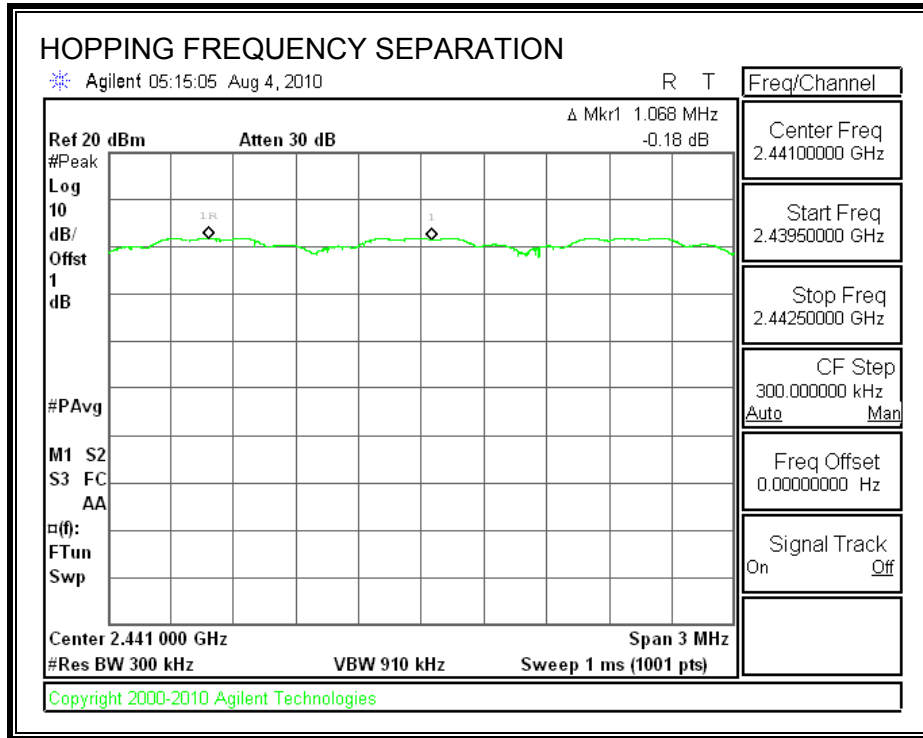
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

**RESULTS**

**7.2.1. BASIC DATA RATE GFSK MODULATION**



### 7.2.2. EXTENDED DATA RATE 8PSK MODULATION



### **7.3. 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**

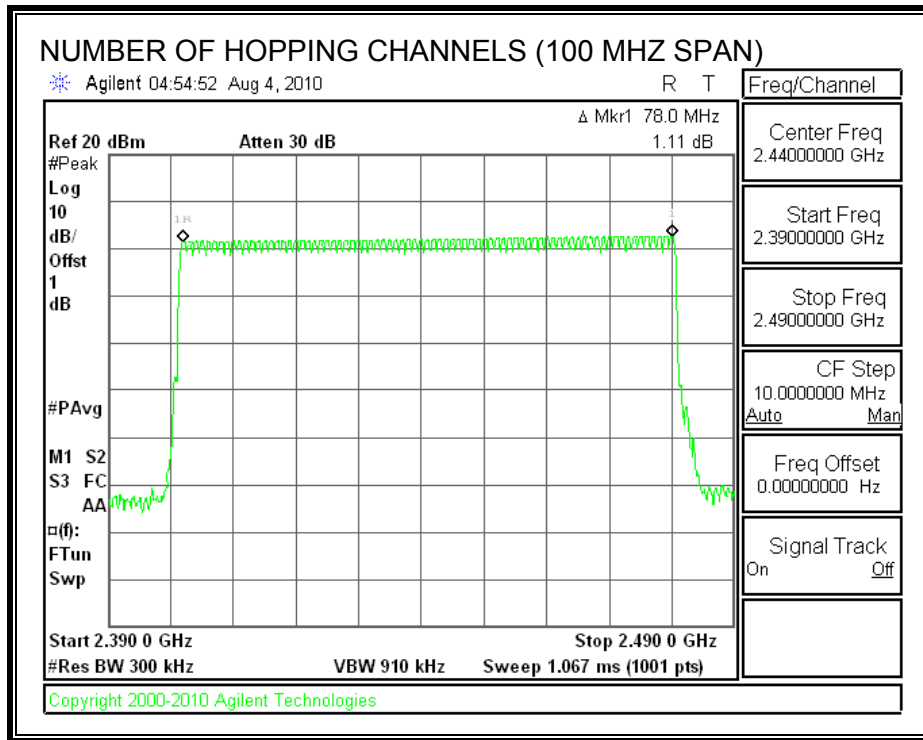
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

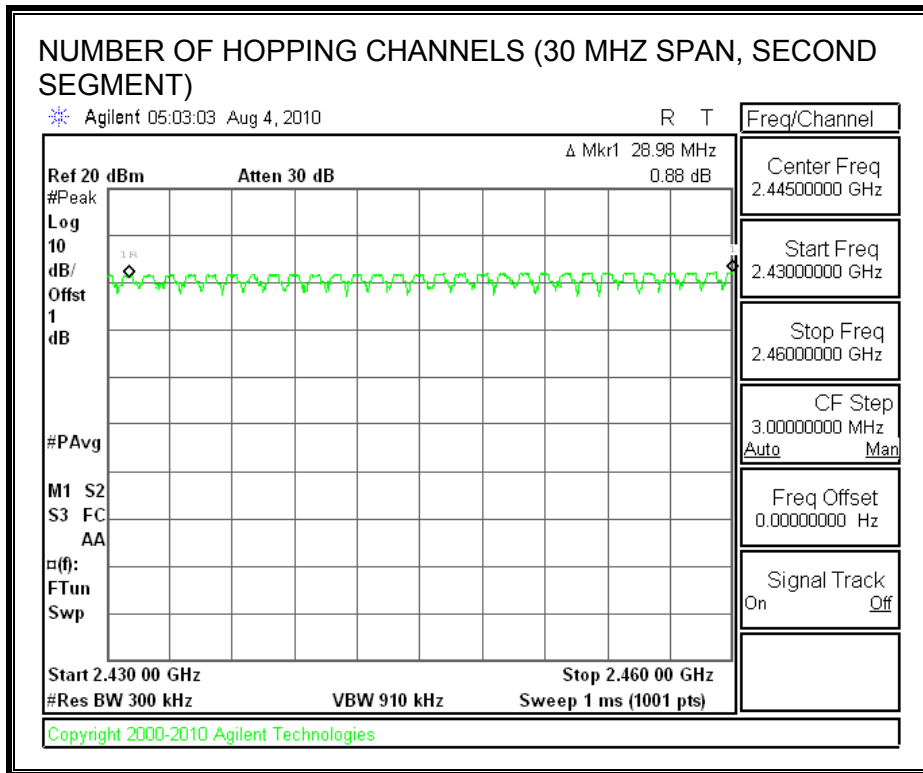
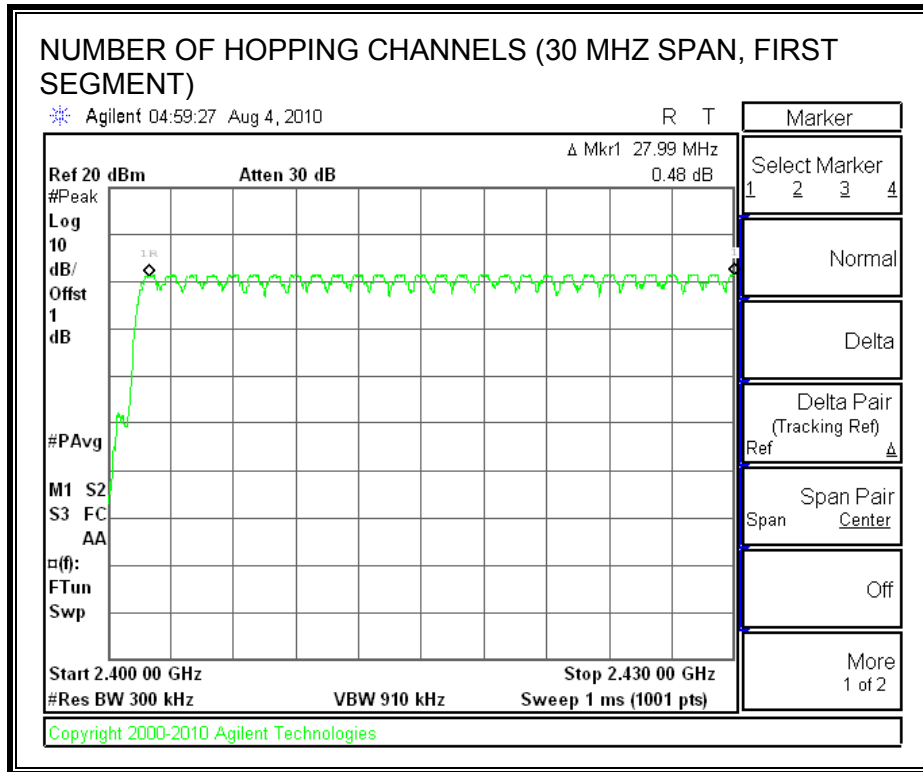
#### **RESULTS**

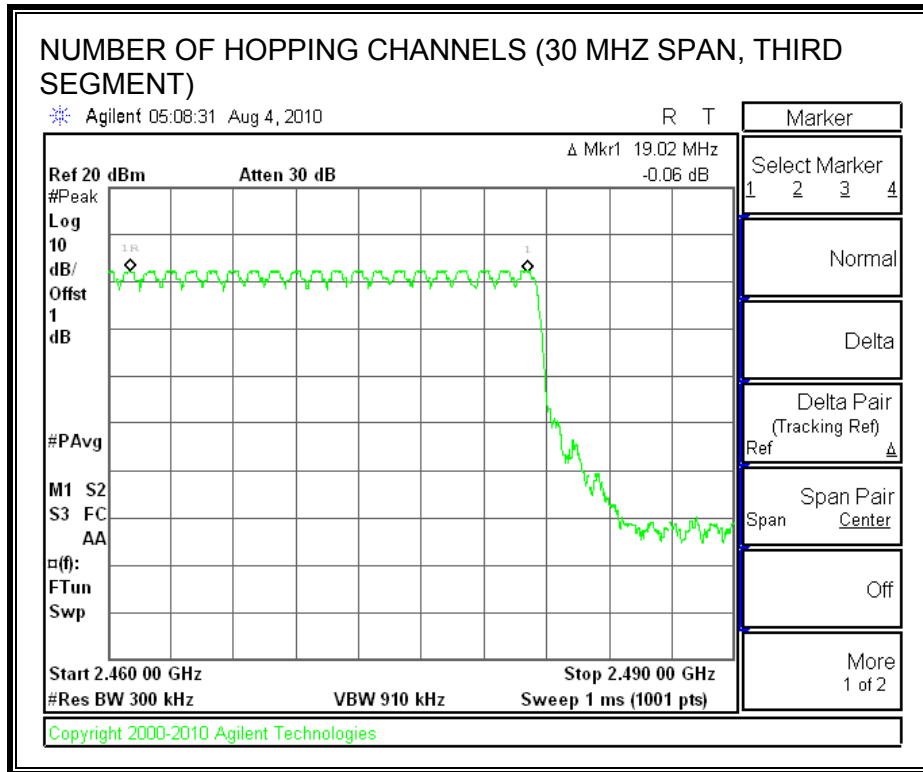
79 Channels observed.



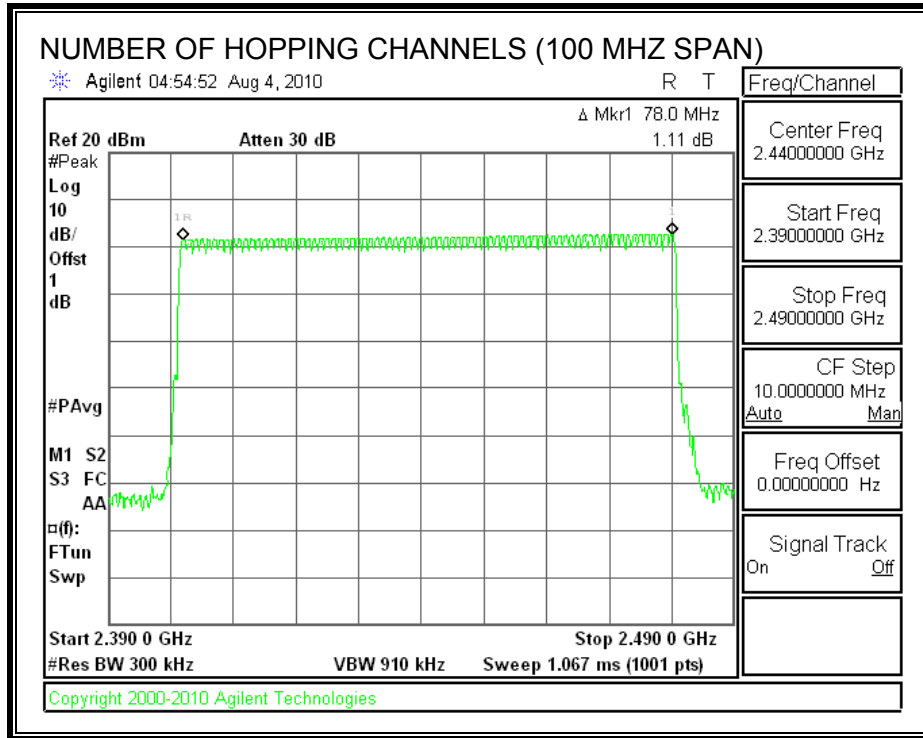
### 7.3.1. BASIC DATA RATE GFSK MODULATION

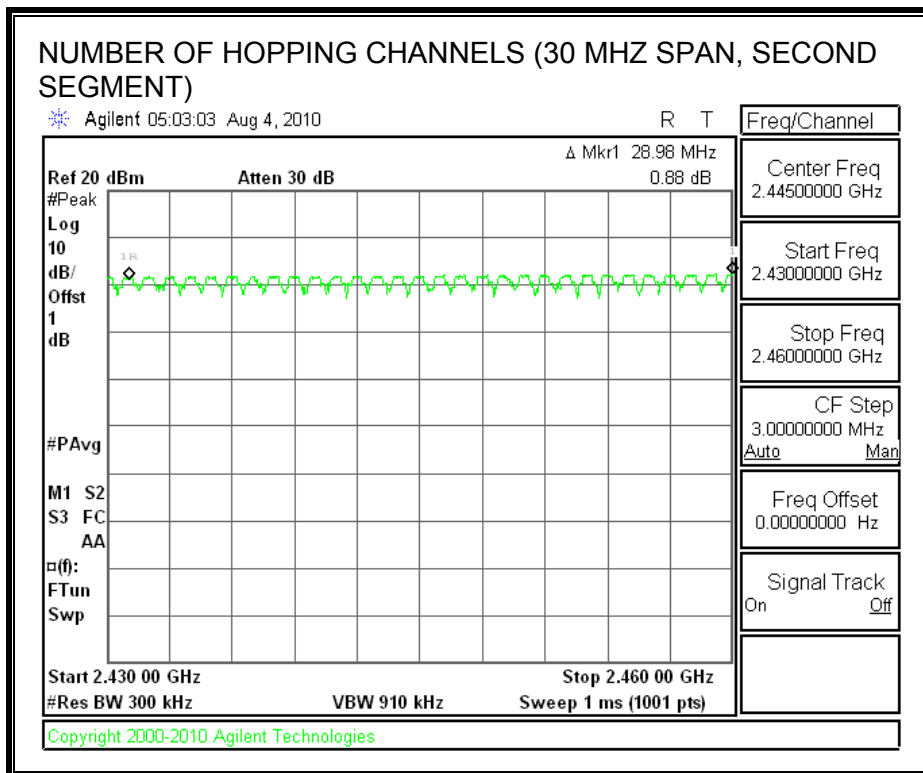
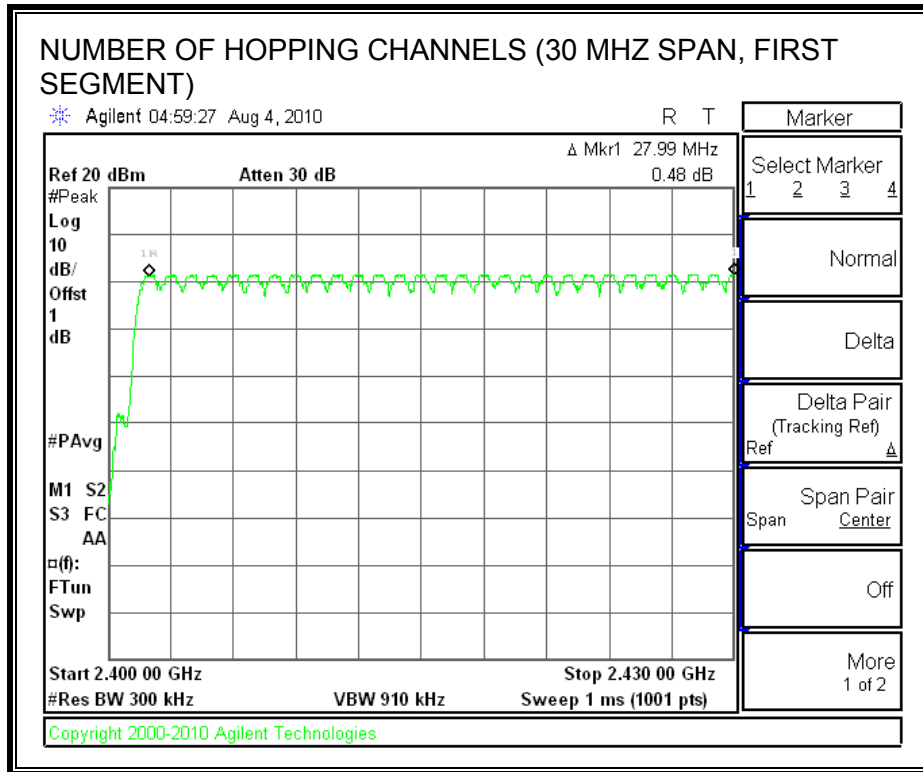


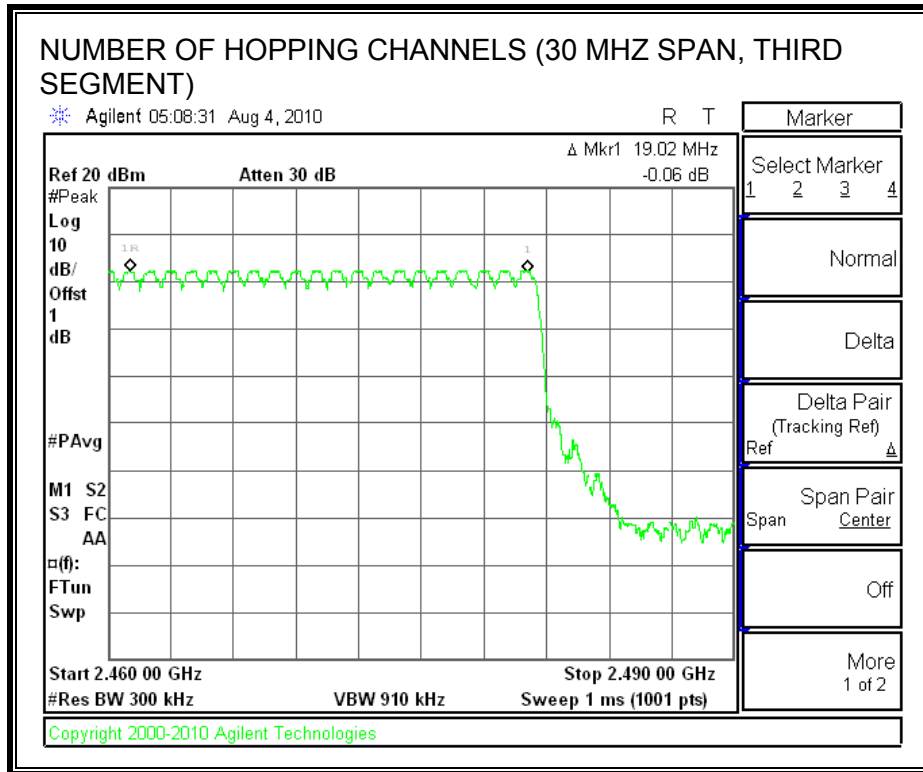




### 7.3.2. EXTENDED DATA RATE 8PSK MODULATION







## 7.4. 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  $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$ .

### RESULTS

Time Of Occupancy =  $10 * xx \text{ pulses} * yy \text{ msec} = zz \text{ msec}$

#### GFSK Mode

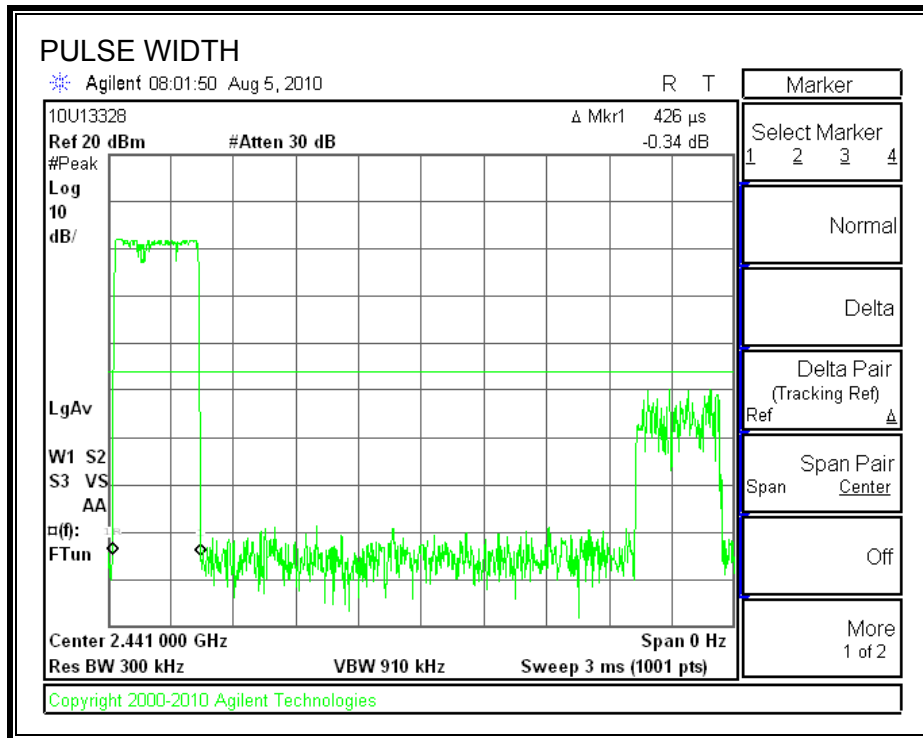
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.424	32	0.136	0.4	0.264

#### 8PSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.425	32	0.136	0.4	0.264

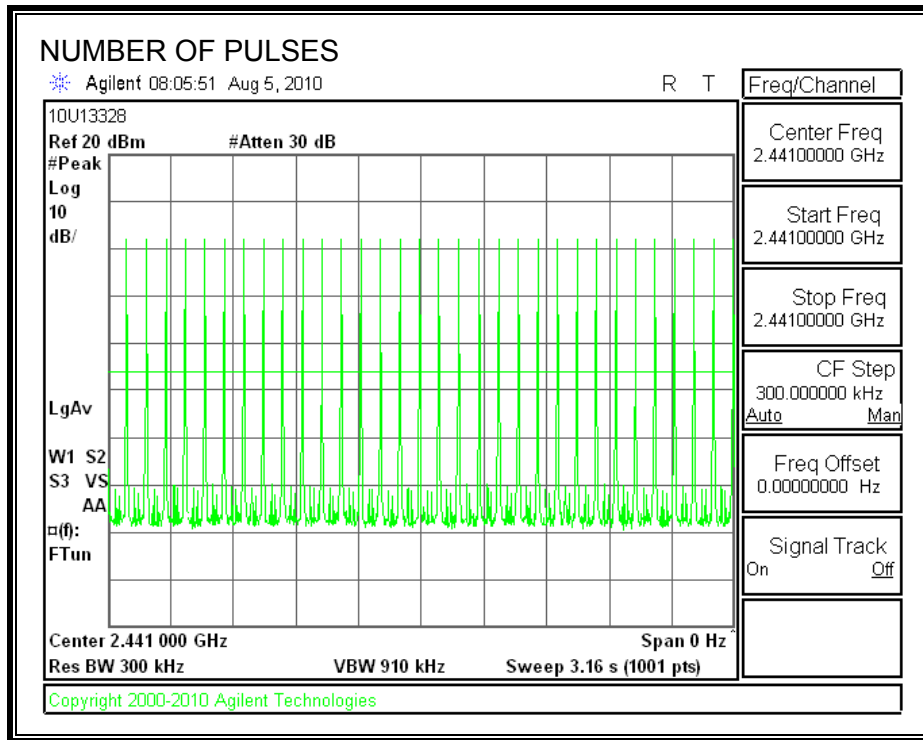
### 7.4.1. BASIC DATA RATE GFSK MODULATION

#### PULSE WIDTH



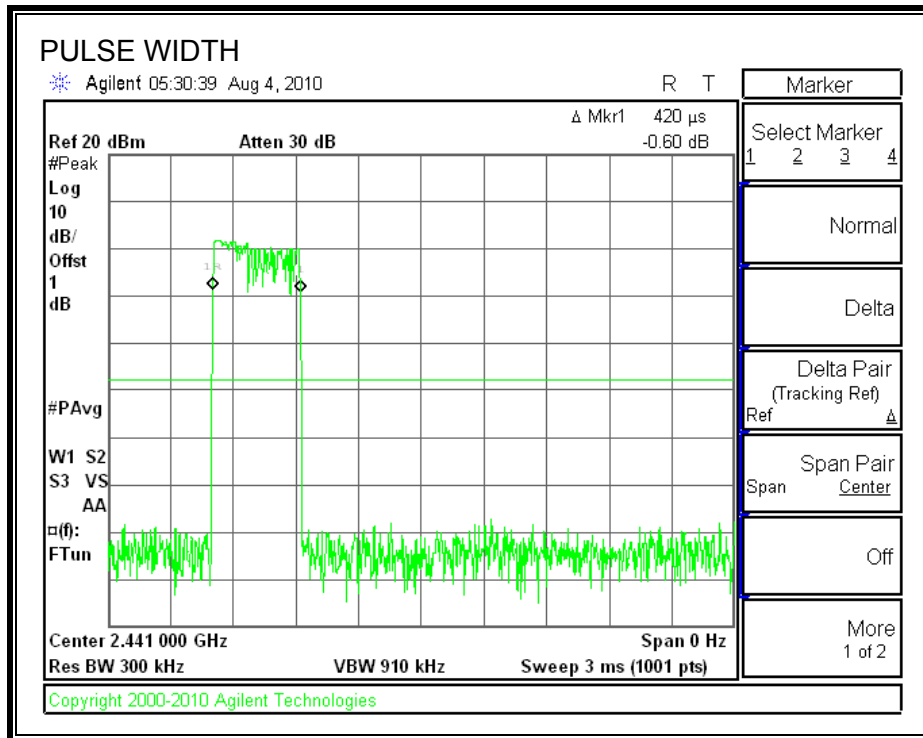


**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**

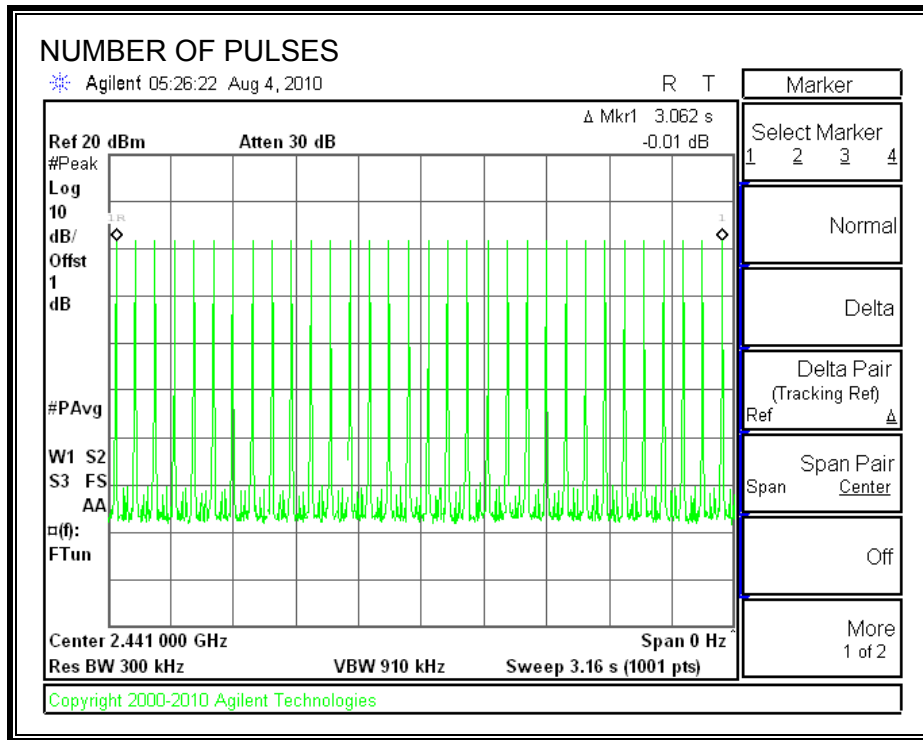


### 7.4.2. EXTENDED DATA RATE 8PSK MODULATION

#### PULSE WIDTH



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**



## 7.5. 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

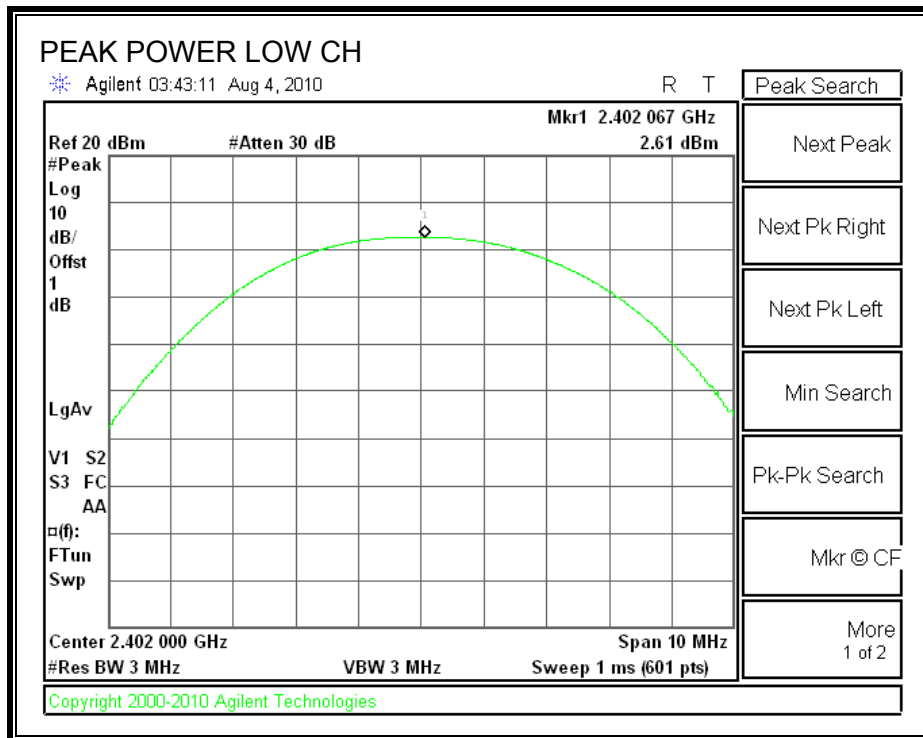
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

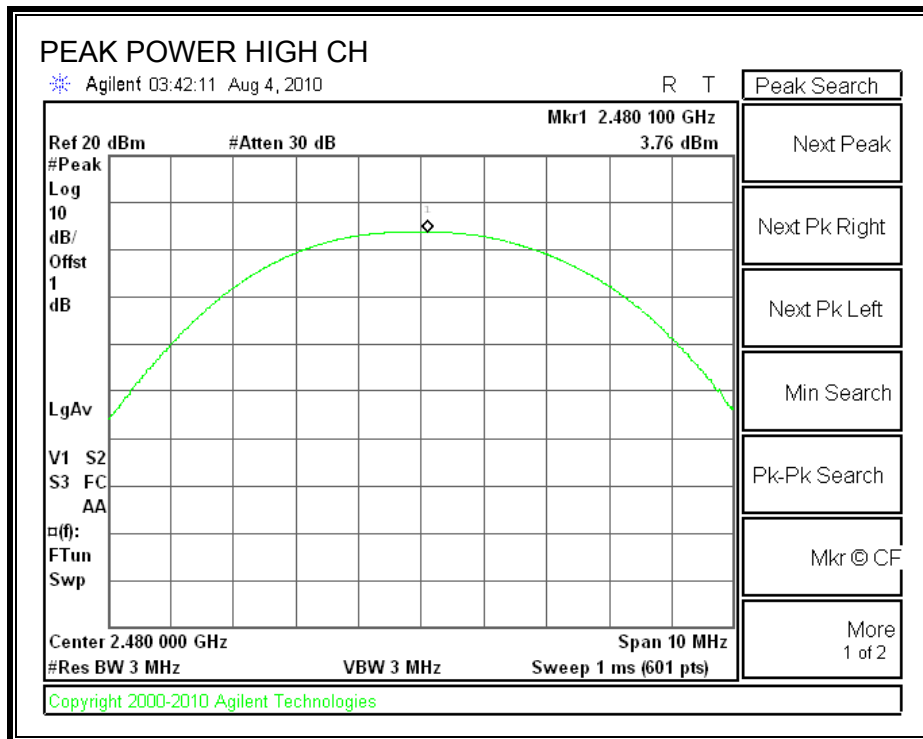
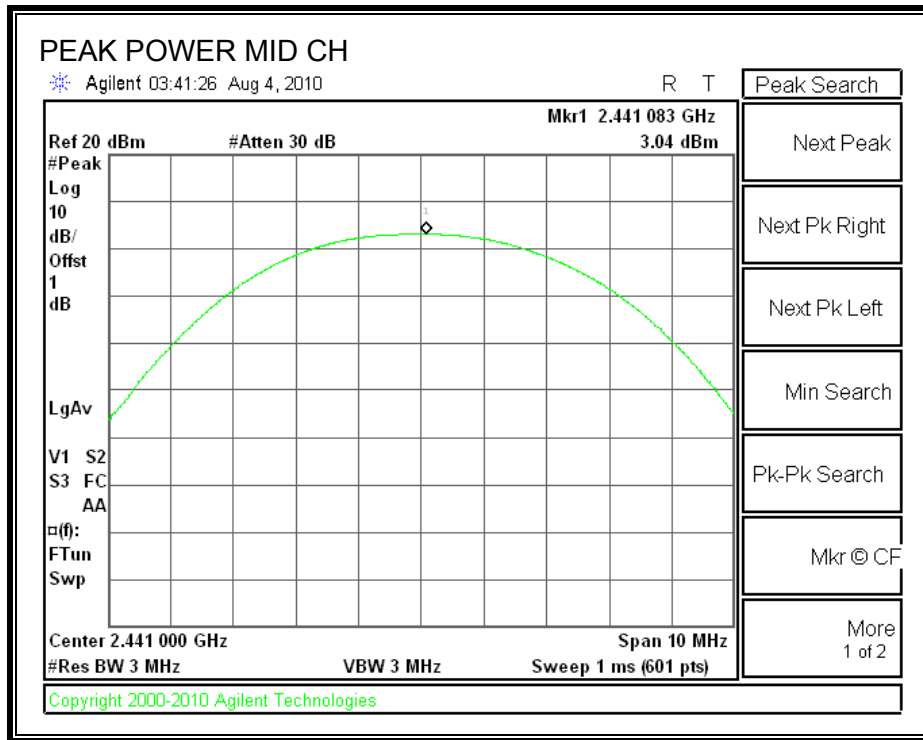
### RESULTS

#### 7.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.61	30	-27.39
Middle	2441	3.04	30	-26.96
High	2480	3.76	30	-26.24

**OUTPUT POWER**

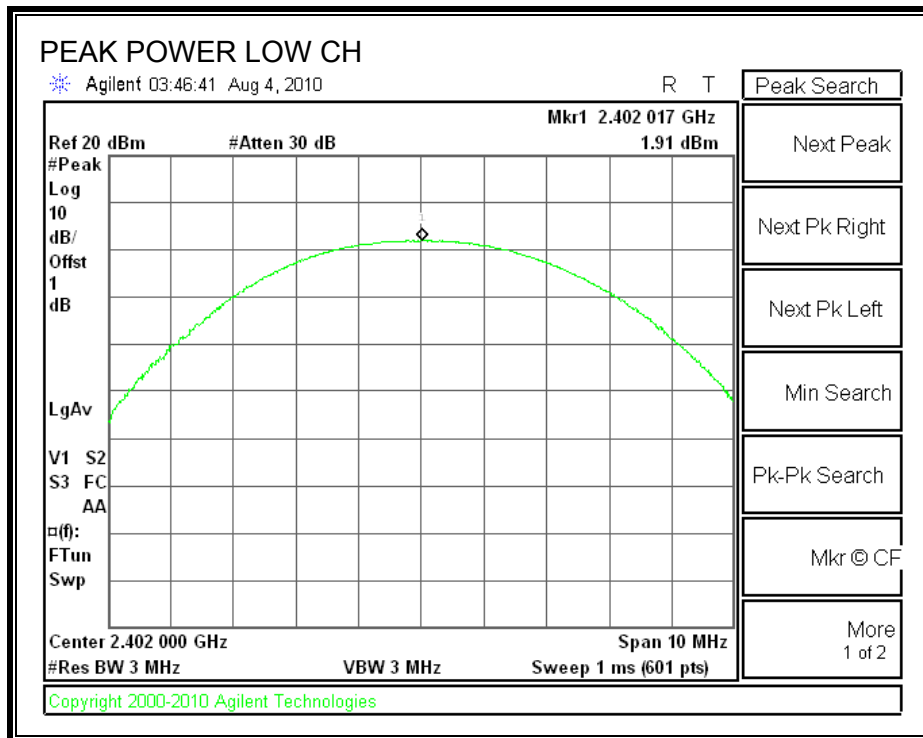




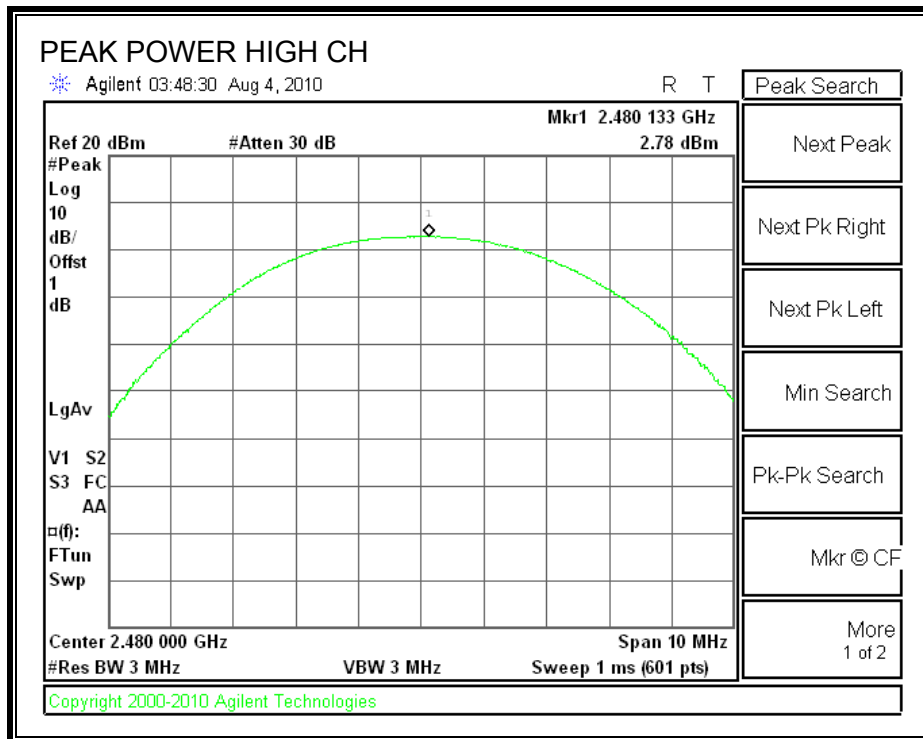
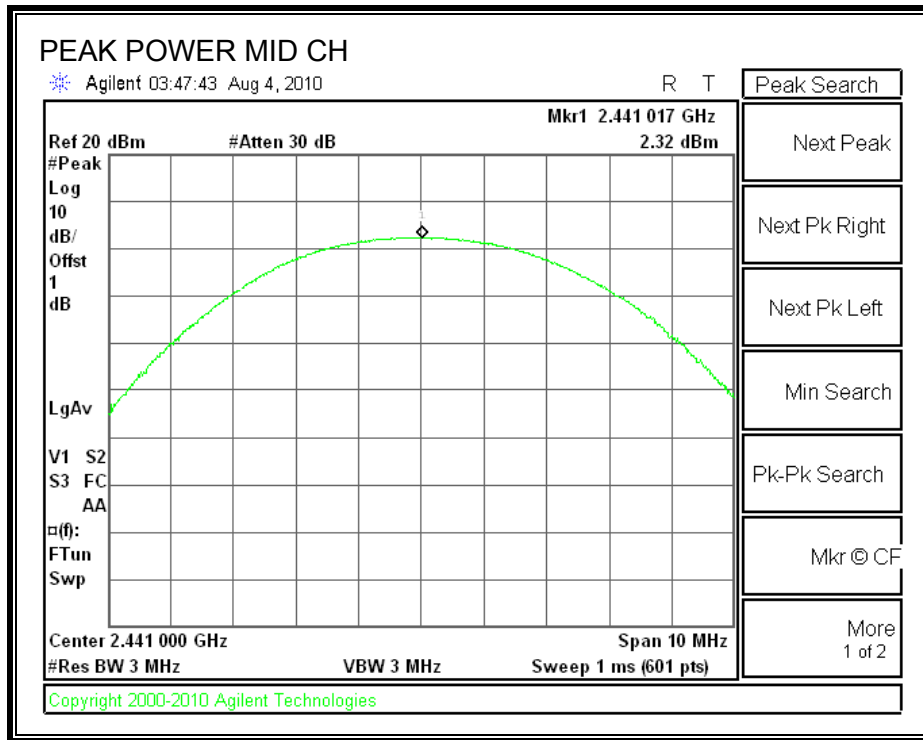
### 7.5.2. EXTENDED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.91	30	-28.09
Middle	2441	2.32	30	-27.68
High	2480	2.78	30	-27.22

**OUTPUT POWER**







## 7.6. 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 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### 7.6.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-3.22
Middle	2441	-2.50
High	2480	-1.98

#### 7.6.2. EXTENDED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-5.23
Middle	2441	-4.65
High	2480	-4.23

## 7.7. 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.

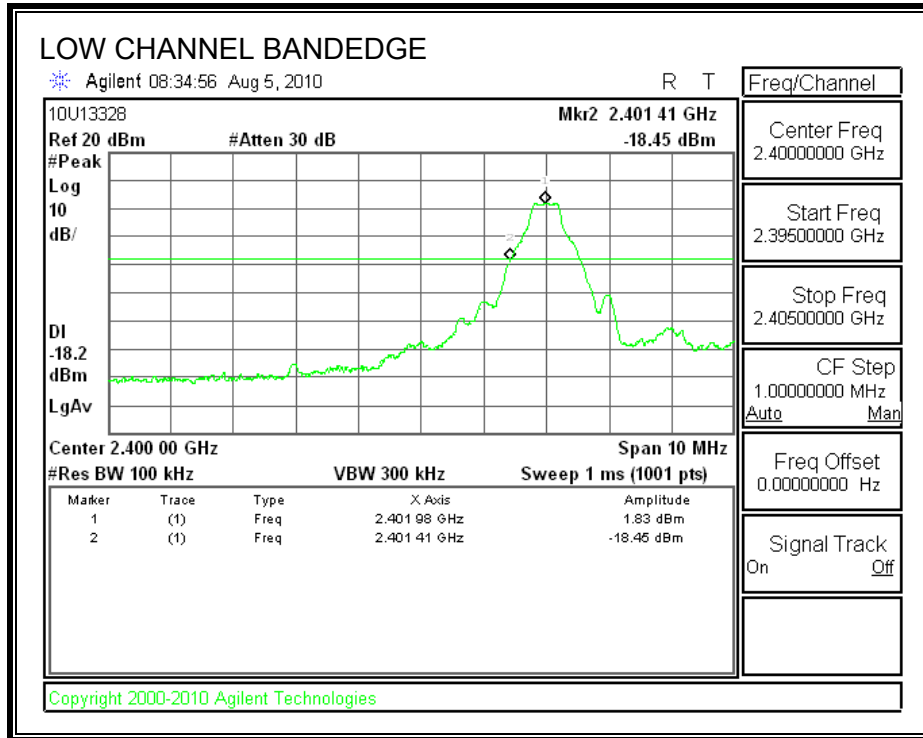
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

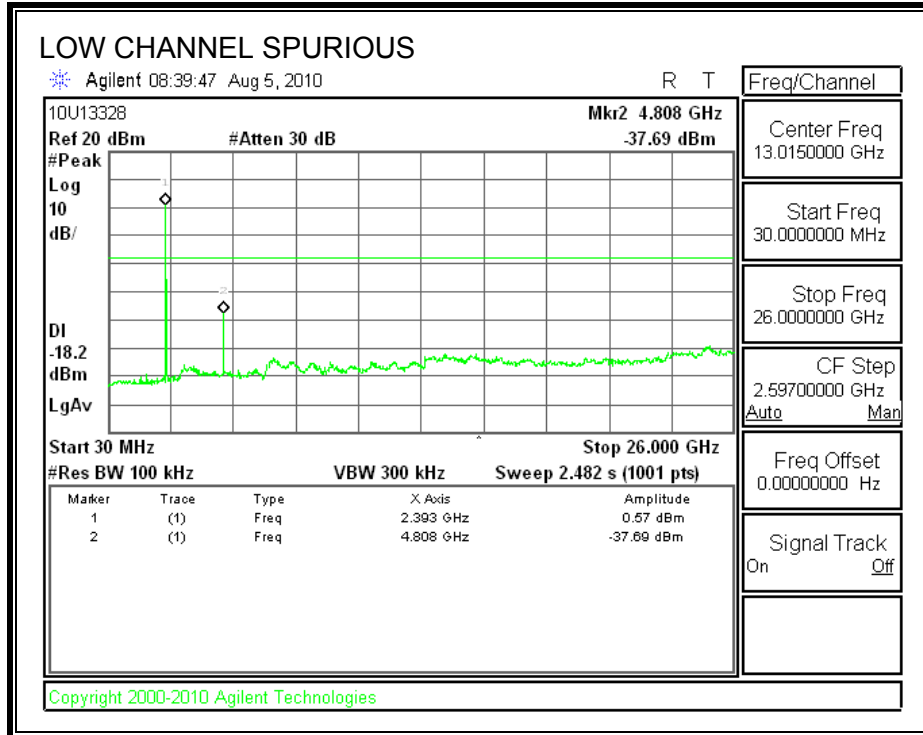
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

**RESULTS**

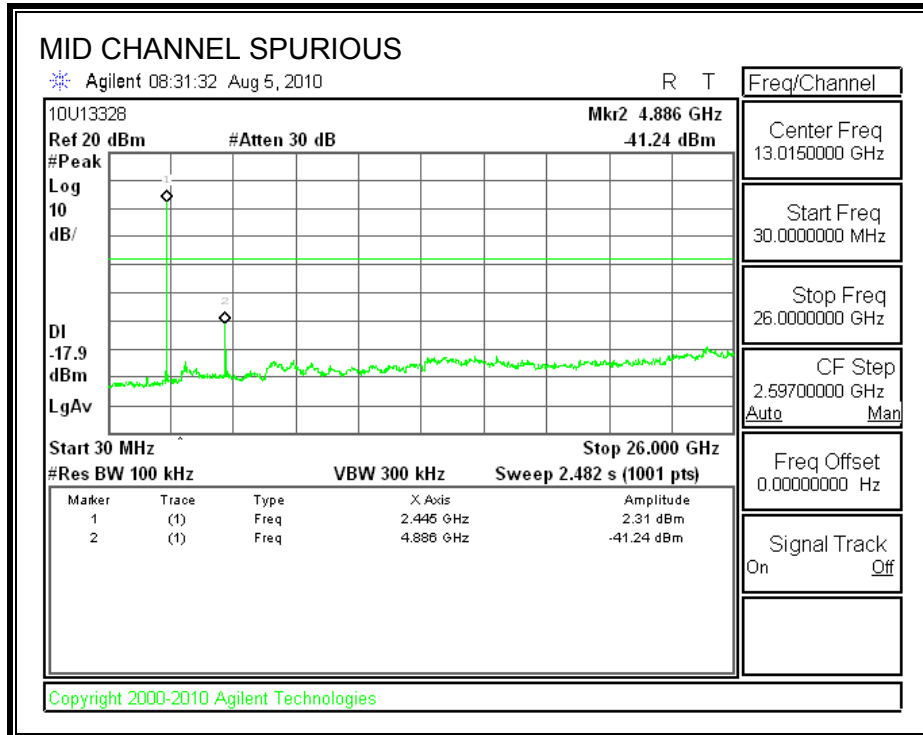
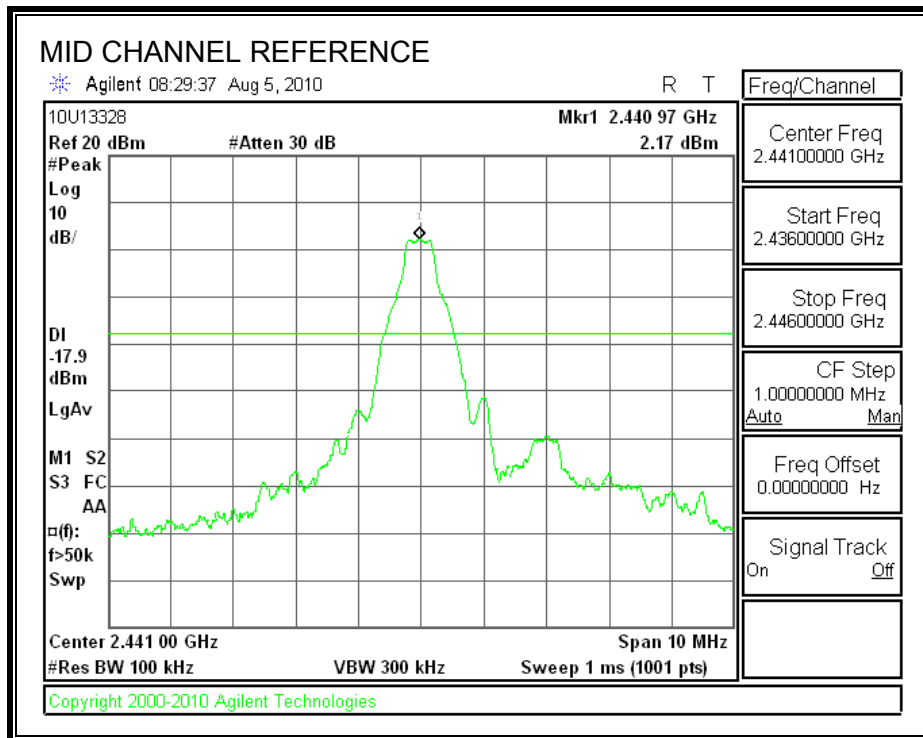
**7.7.1. BASIC DATA RATE GFSK MODULATION**

**SPURIOUS EMISSIONS, LOW CHANNEL**

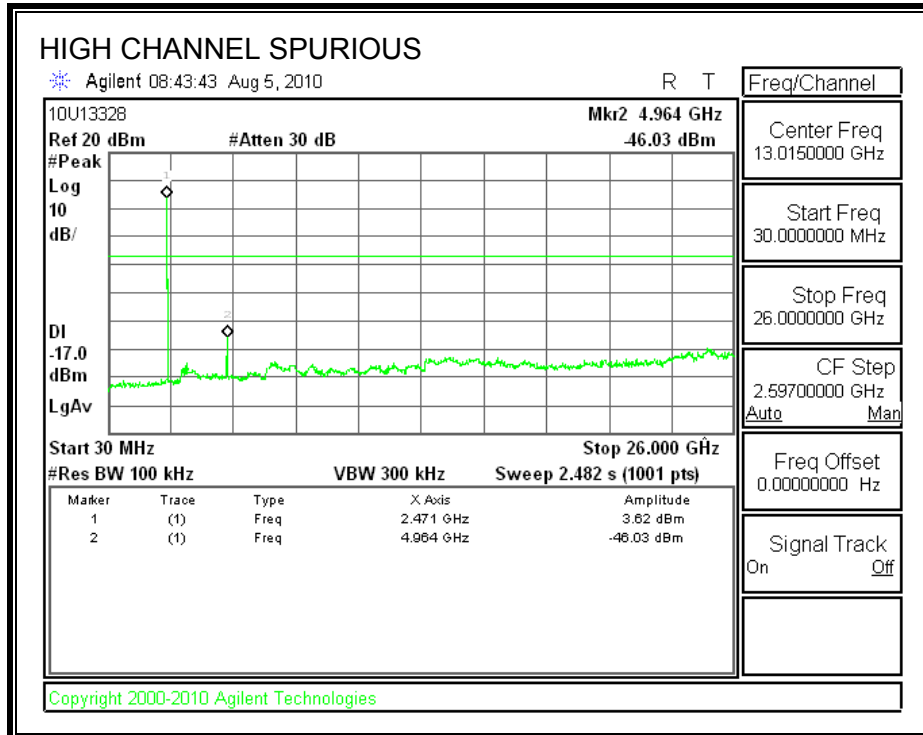
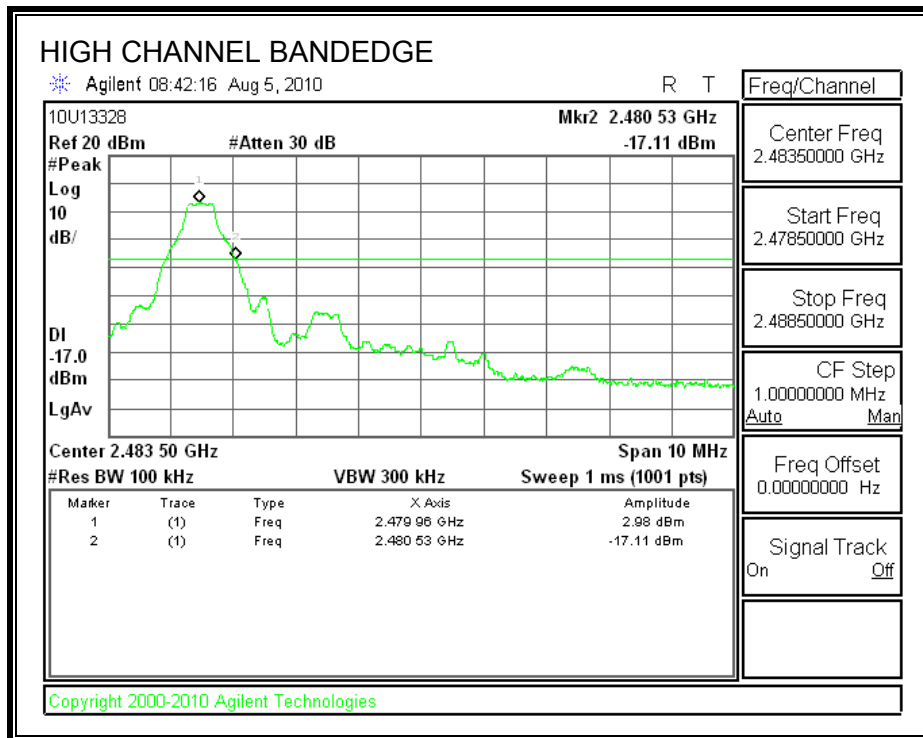




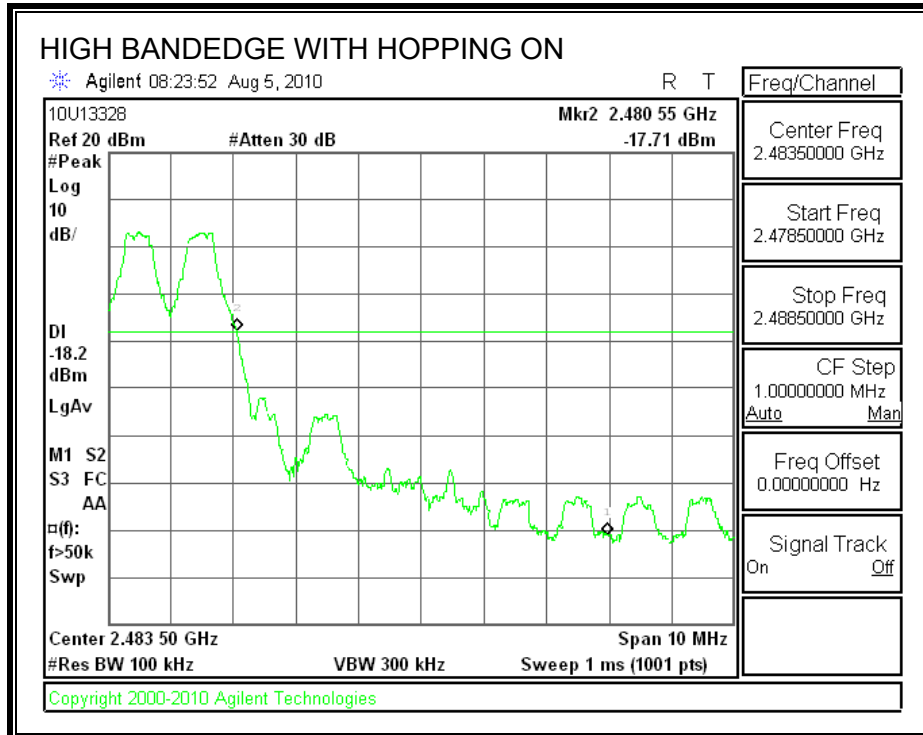
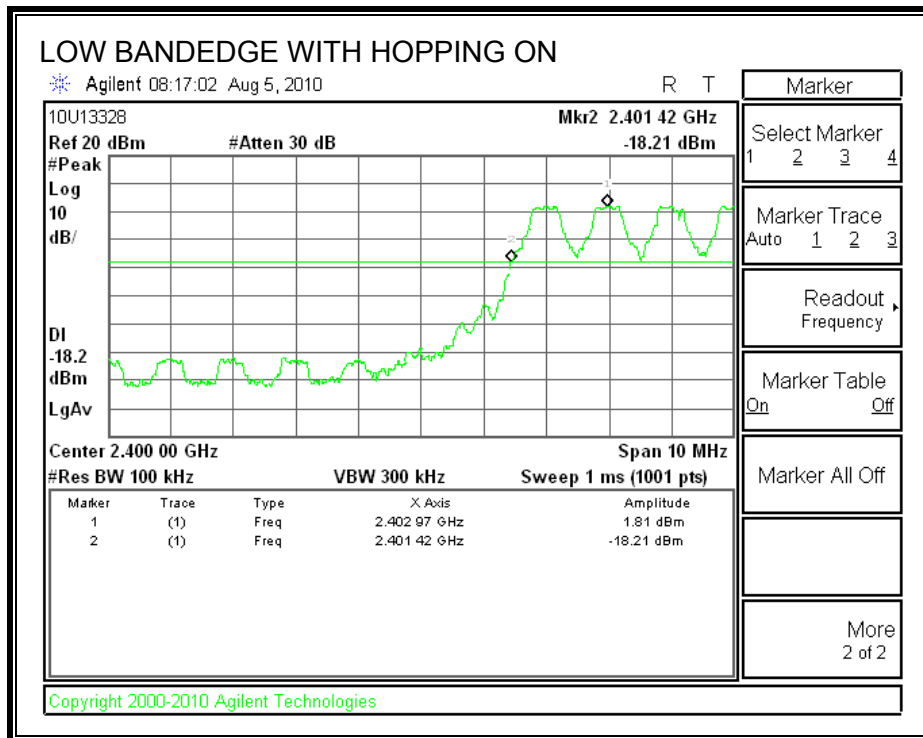
**SPURIOUS EMISSIONS, MID CHANNEL**



**SPURIOUS EMISSIONS, HIGH CHANNEL**



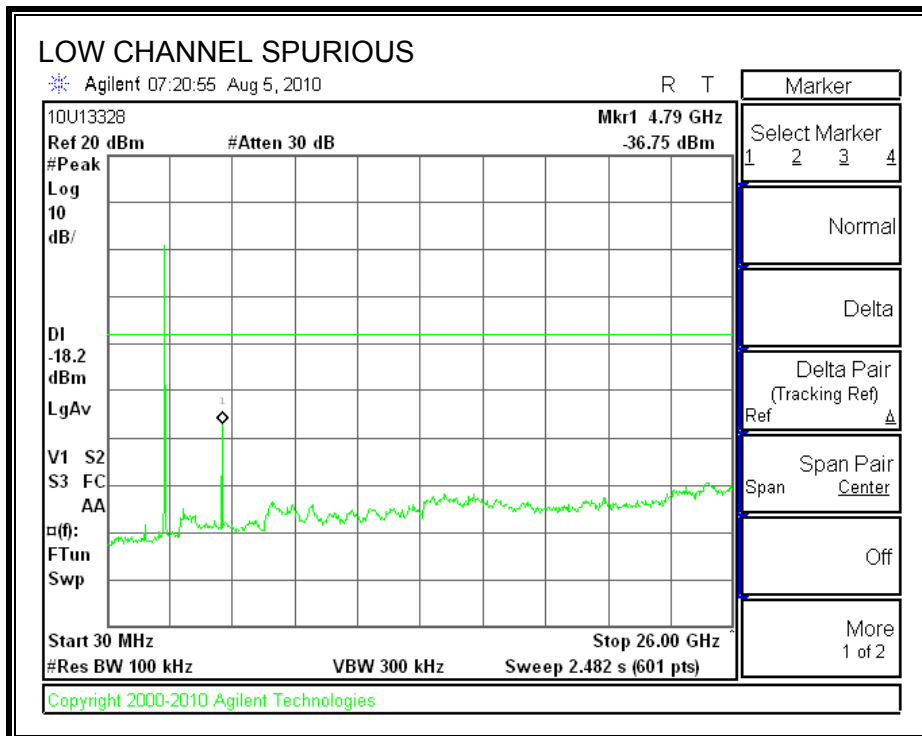
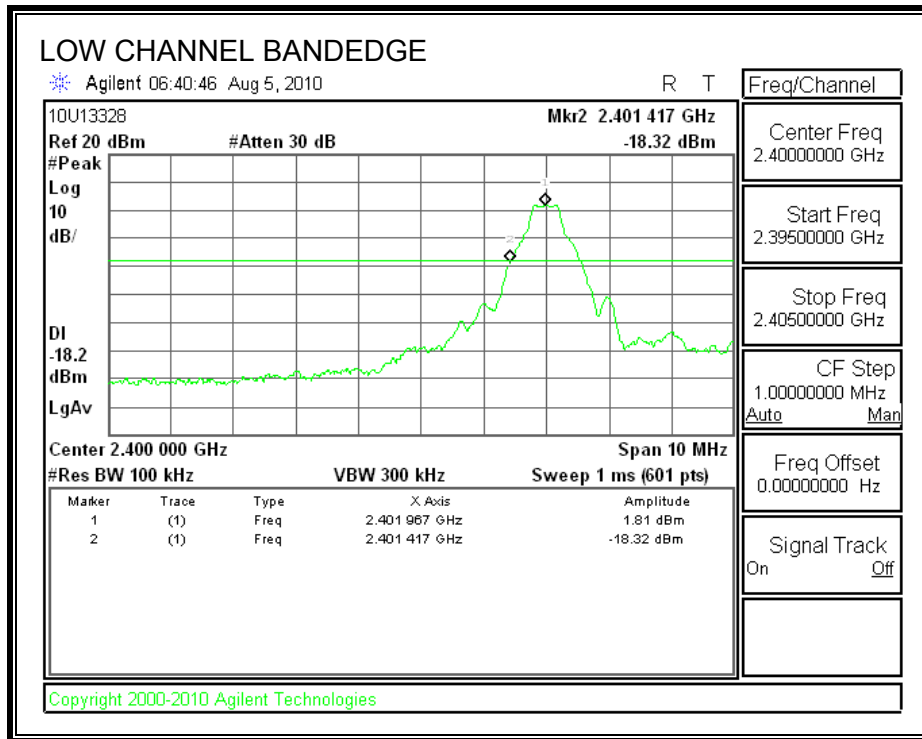
**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**



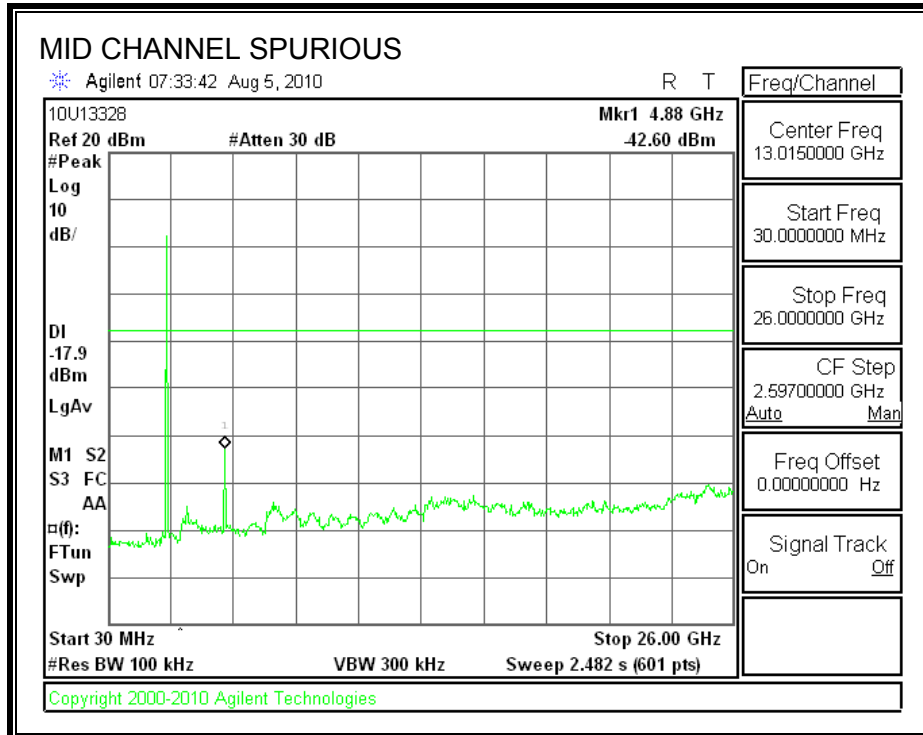
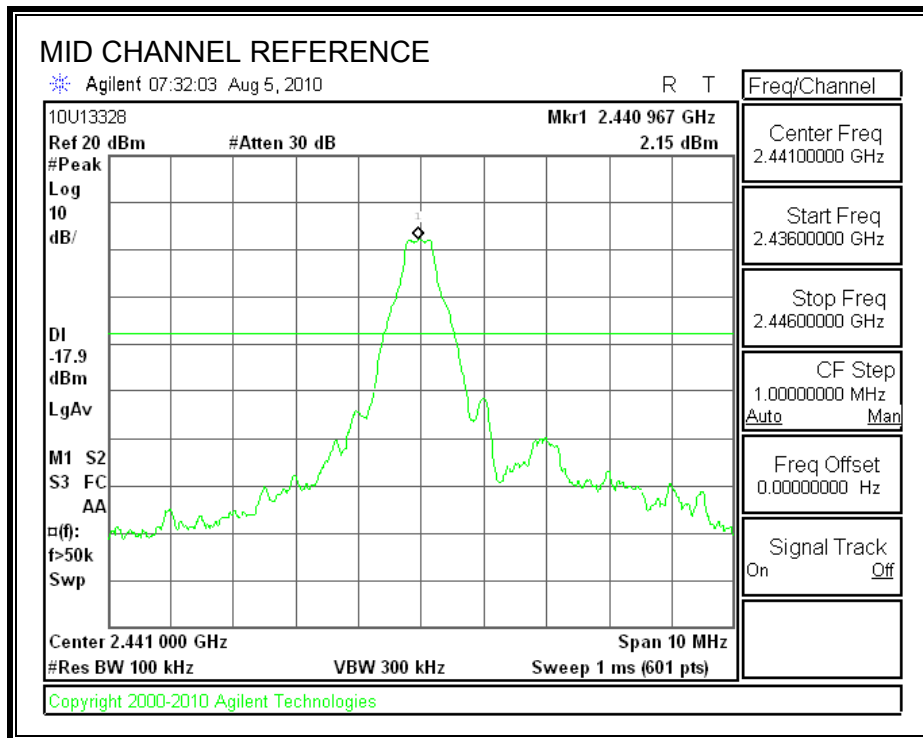


### 7.7.2. EXTENDED DATA RATE 8PSK MODULATION

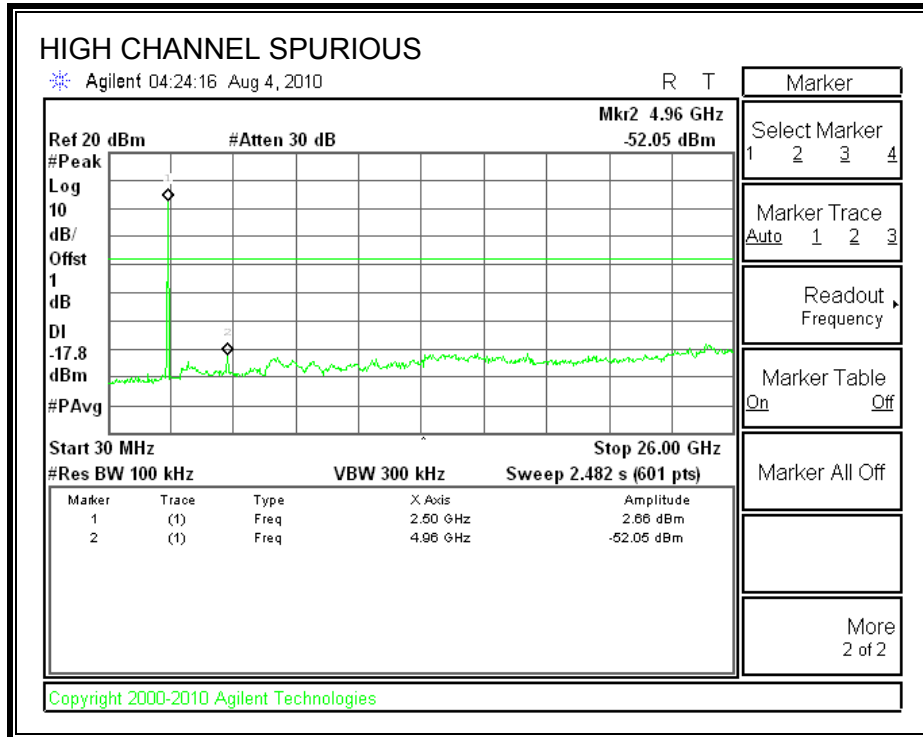
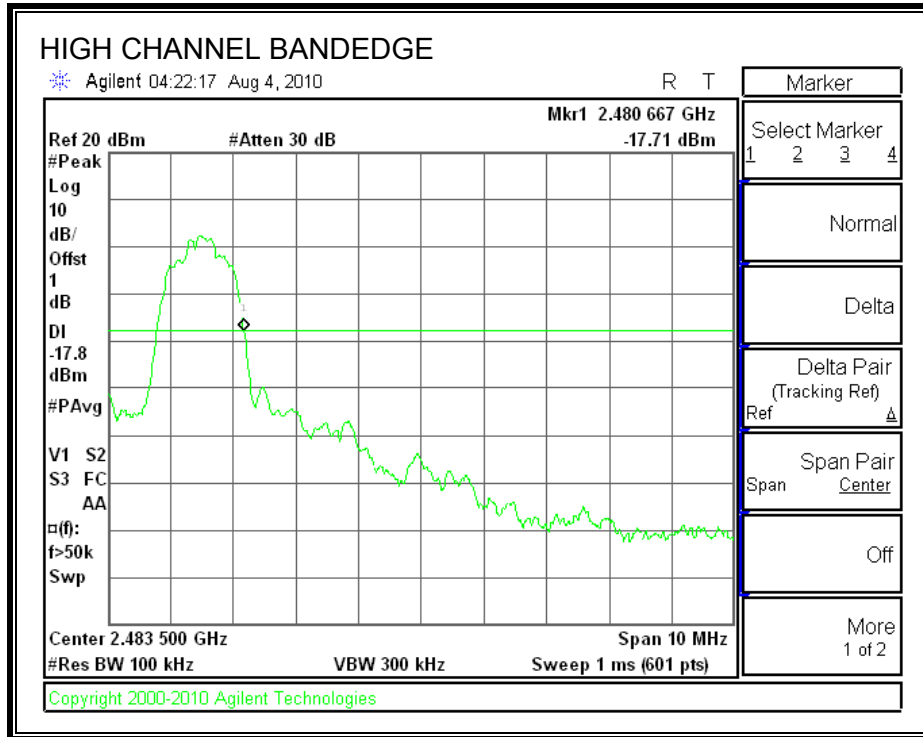
#### SPURIOUS EMISSIONS, LOW CHANNEL



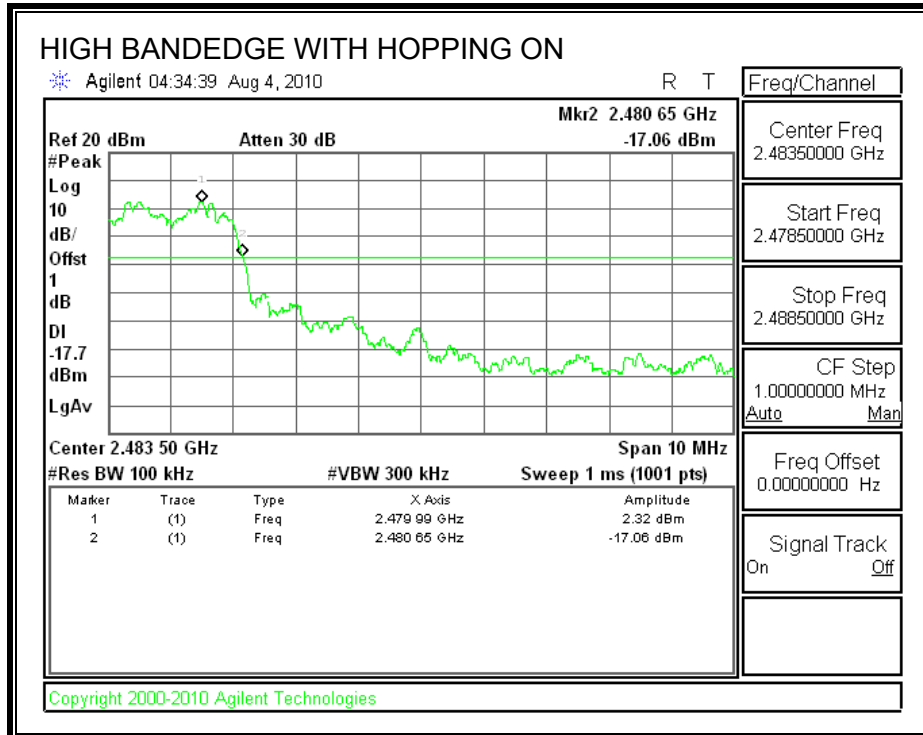
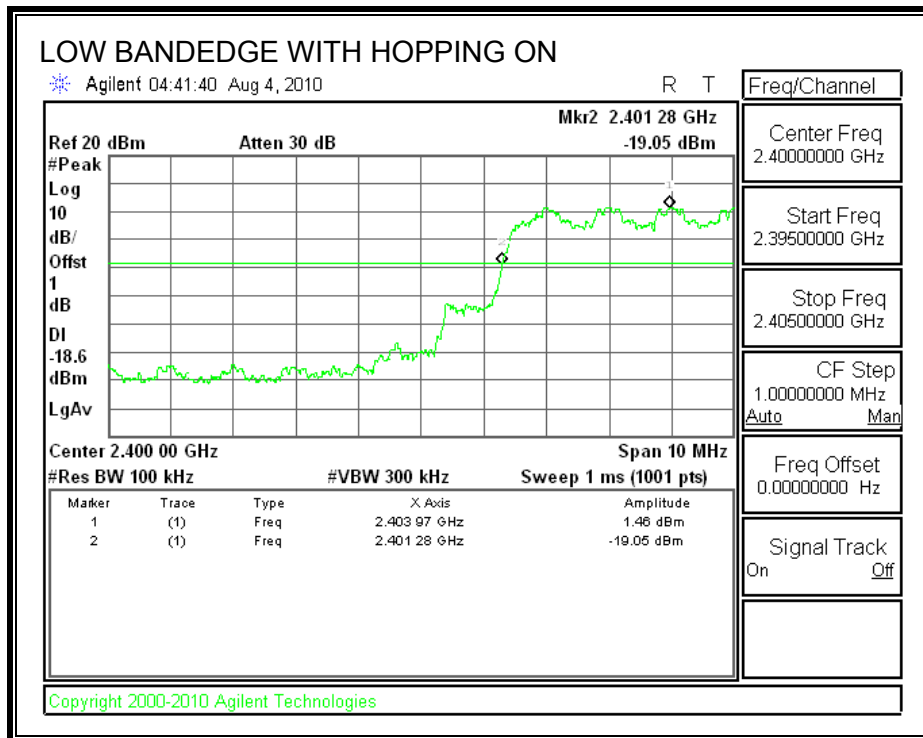
**SPURIOUS EMISSIONS, MID CHANNEL**



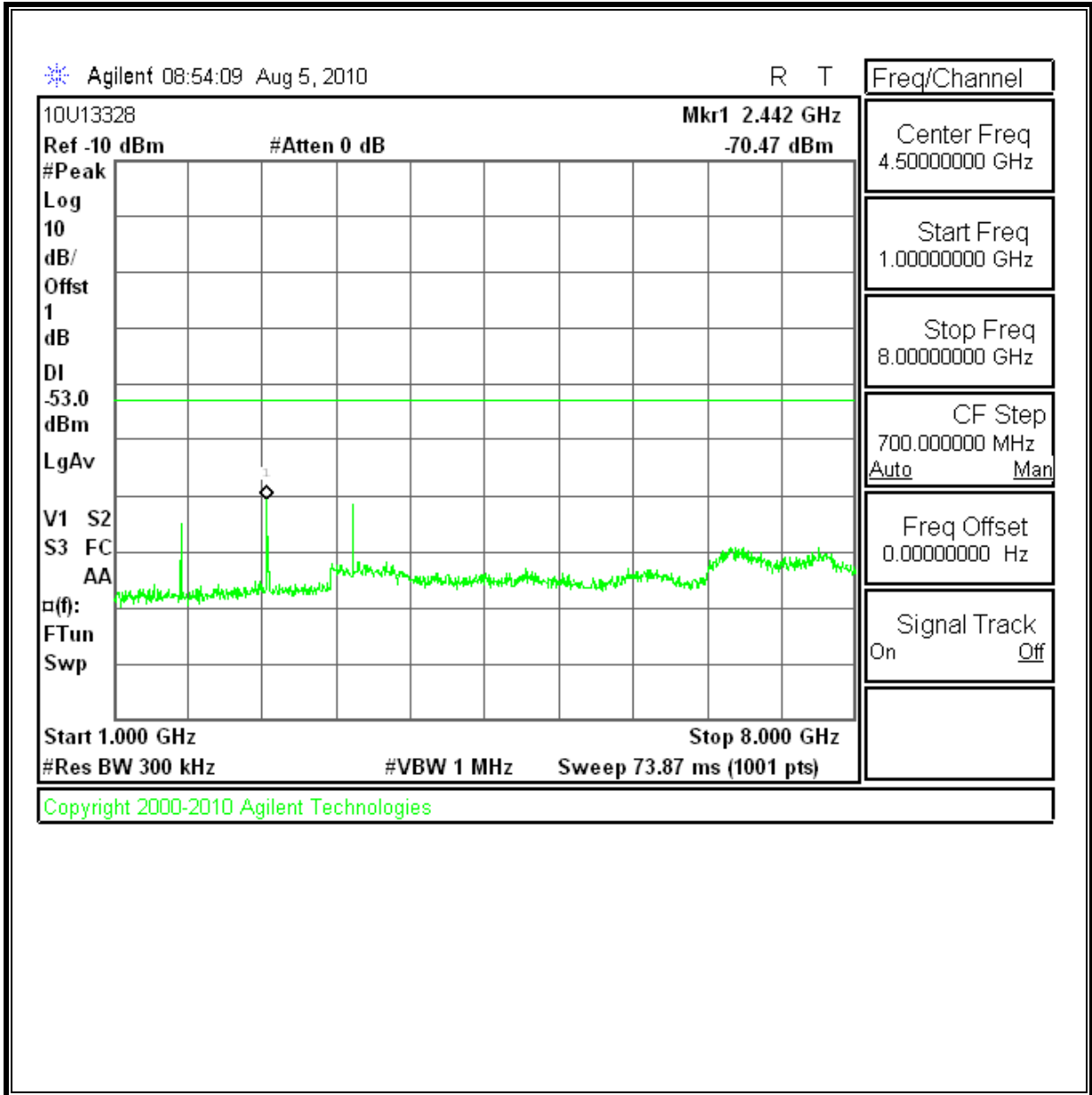
**SPURIOUS EMISSIONS, HIGH CHANNEL**



**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**



**7.7.3. RECEIVER ABOVE 1 GHz**



## 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.

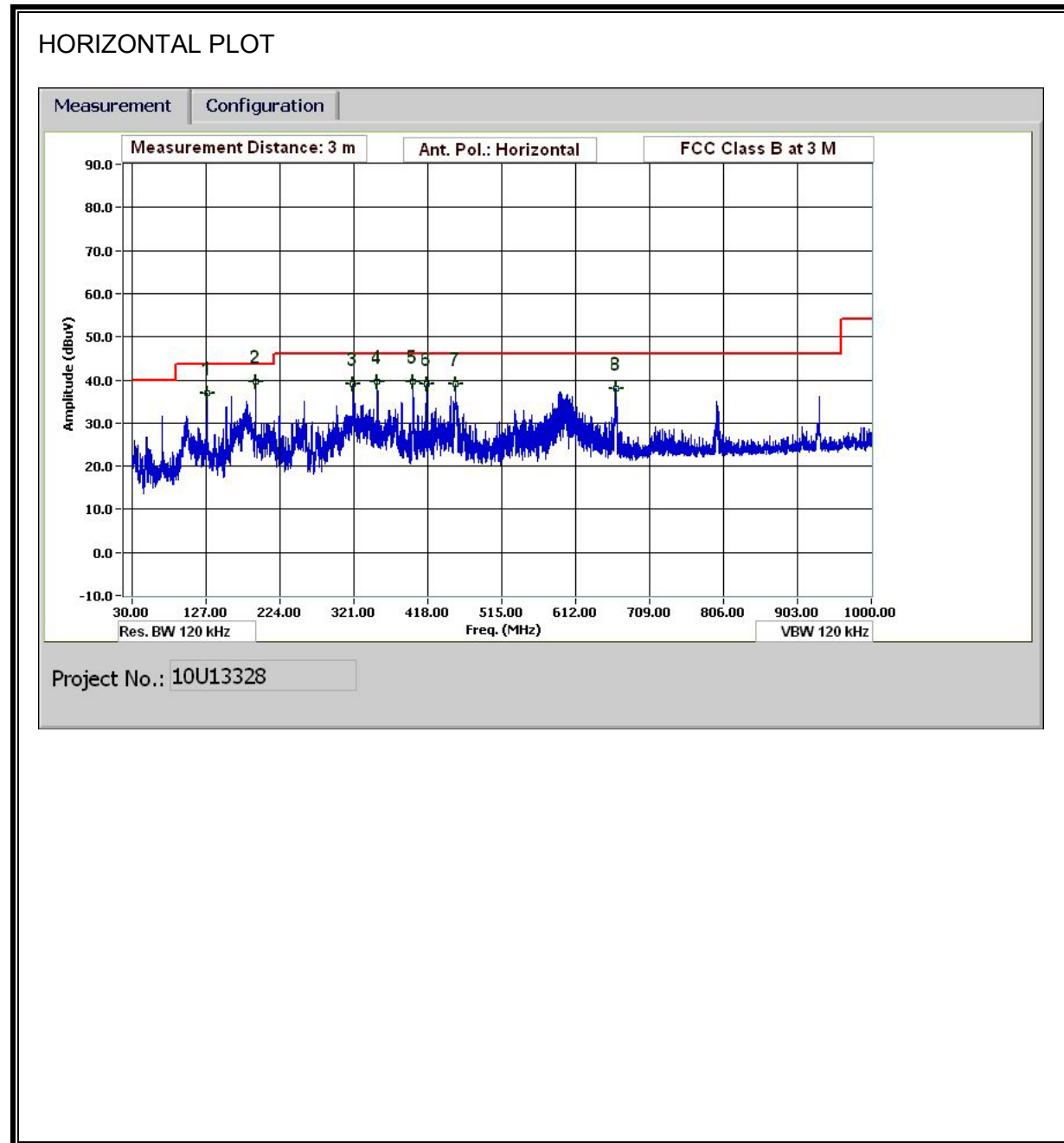
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

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.

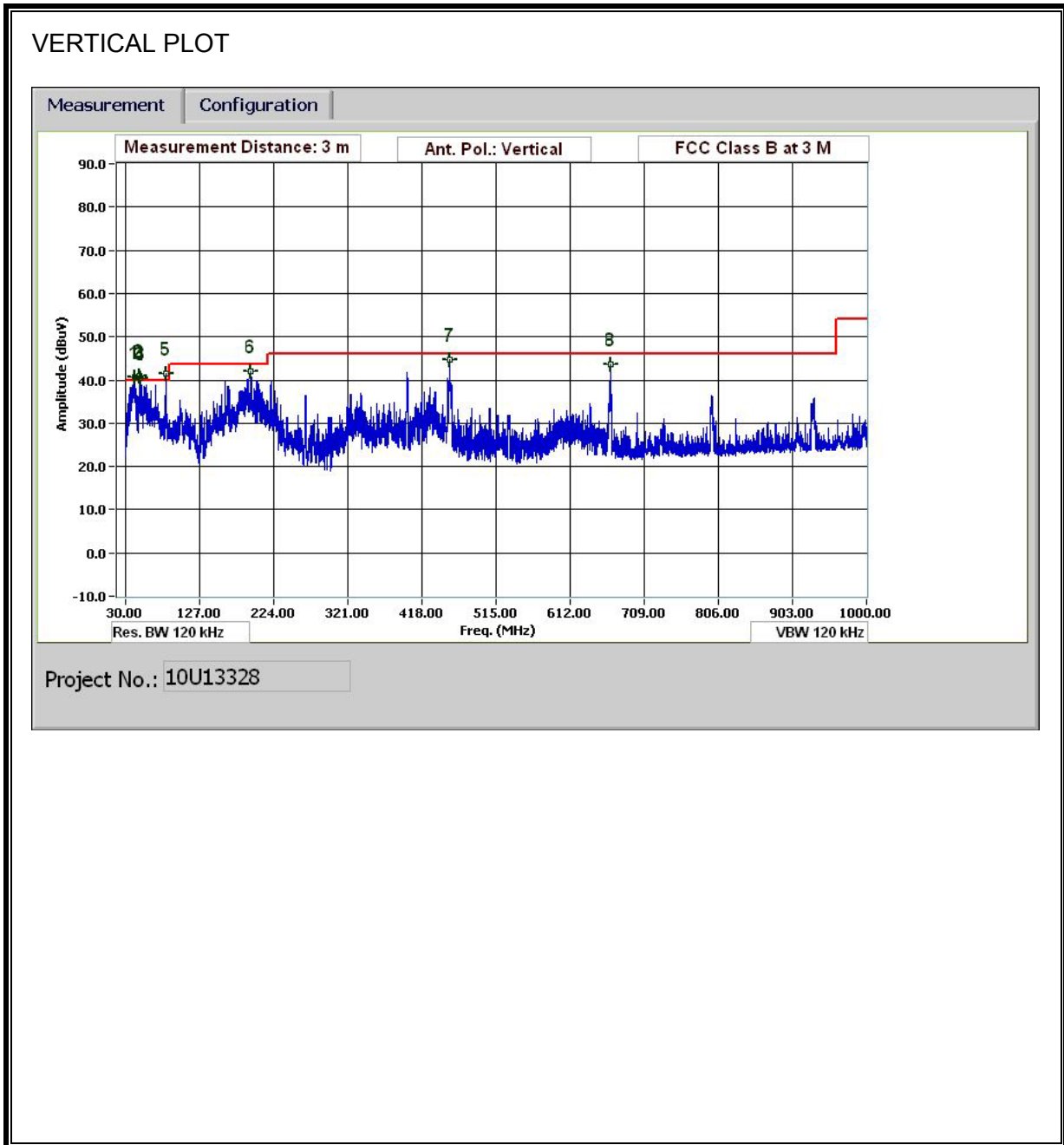
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 8.2. WORST-CASE BELOW 1 GHz

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



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





**DATA**

30-1000MHz Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Test Engr:		Thanh Nguyen														
Date:		08/03/10														
Project #:		10U13328														
Company:		Plantronics														
EUT Description:		UPCS DECT 6.0														
EUT M/N:		WO2														
Test Target:		FCC 15.247														
Mode Oper:		Transmit 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	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes	
41.640	3.0	34.5	12.9	0.6	28.4	0.0	0.0	19.6	40.0	-20.4	V	QP	100.0	0 - 360		
48.121	3.0	38.3	9.3	0.6	28.4	0.0	0.0	19.9	40.0	-20.1	V	QP	100.0	0 - 360		
49.321	3.0	38.5	8.7	0.6	28.4	0.0	0.0	19.5	40.0	-20.5	V	QP	100.0	0 - 360		
49.801	3.0	38.6	8.5	0.6	28.4	0.0	0.0	19.4	40.0	-20.6	V	QP	100.0	0 - 360		
83.042	3.0	40.6	7.4	0.8	28.3	0.0	0.0	20.5	40.0	-19.5	V	QP	100.0	0 - 360		
193.807	3.0	36.4	11.6	1.2	28.2	0.0	0.0	20.9	43.5	-22.6	V	QP	100.0	0 - 360		
454.818	3.0	33.7	15.9	1.9	27.9	0.0	0.0	23.6	46.0	-22.4	V	QP	100.0	0 - 360		
665.426	3.0	28.3	19.2	2.4	27.3	0.0	0.0	22.6	46.0	-23.4	V	QP	100.0	0 - 360		
127.924	3.0	30.3	13.6	1.1	28.3	0.0	0.0	16.7	43.5	-26.8	H	QP	100.0	0 - 360		
192.007	3.0	34.8	11.5	1.2	28.2	0.0	0.0	19.2	43.5	-24.3	H	QP	100.0	0 - 360		
319.932	3.0	31.5	13.7	1.6	28.1	0.0	0.0	18.7	46.0	-27.3	H	QP	100.0	0 - 360		
351.973	3.0	31.6	14.2	1.7	28.1	0.0	0.0	19.3	46.0	-26.7	H	QP	100.0	0 - 360		
398.775	3.0	30.8	14.9	1.8	28.1	0.0	0.0	19.4	46.0	-26.6	H	QP	100.0	0 - 360		
416.056	3.0	29.7	15.2	1.8	28.1	0.0	0.0	18.7	46.0	-27.3	H	QP	100.0	0 - 360		
454.818	3.0	28.9	15.9	1.9	27.9	0.0	0.0	18.8	46.0	-27.2	H	QP	100.0	0 - 360		
664.346	3.0	23.4	19.2	2.4	27.3	0.0	0.0	17.6	46.0	-28.4	H	QP	100.0	0 - 360		

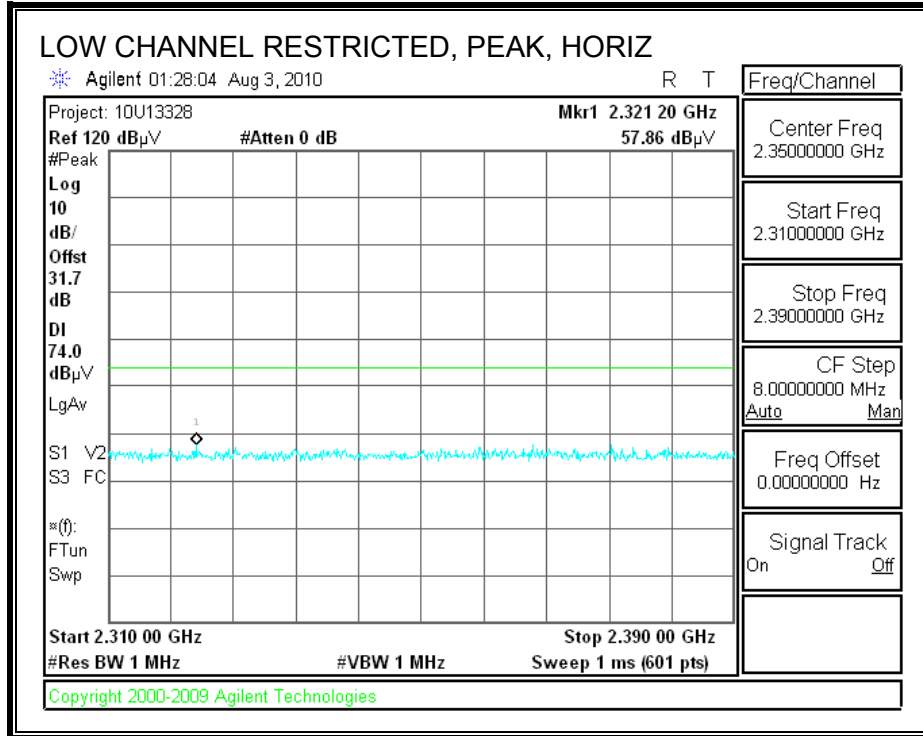
Rev. 1.27.09

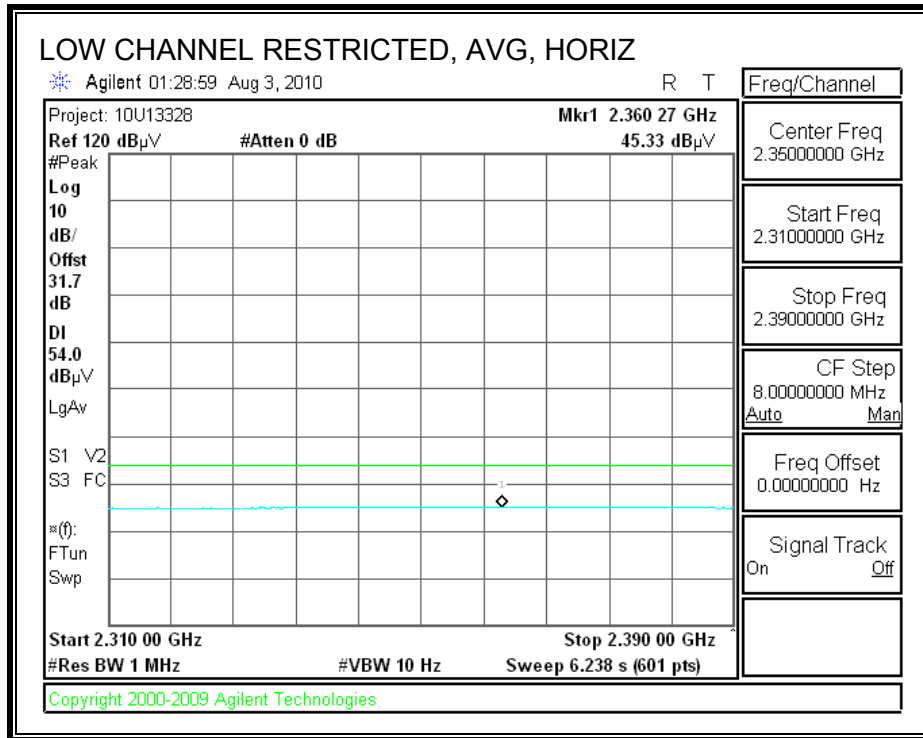
Note: No other emissions were detected above the system noise floor.

### 8.3. TX SPURIOUS EMISSIONS ABOVE 1 GHz

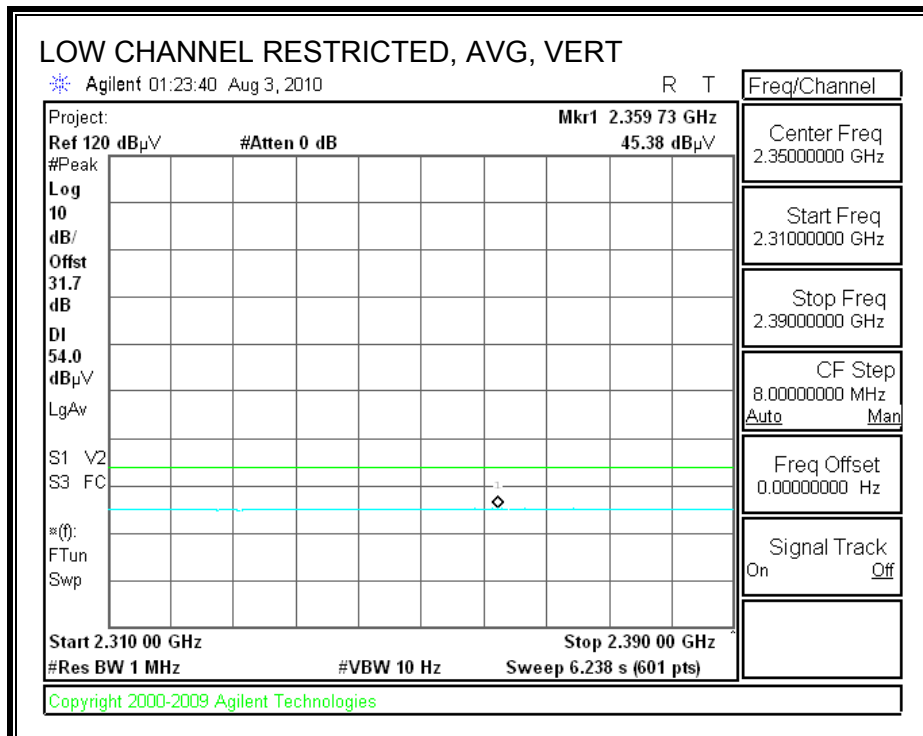
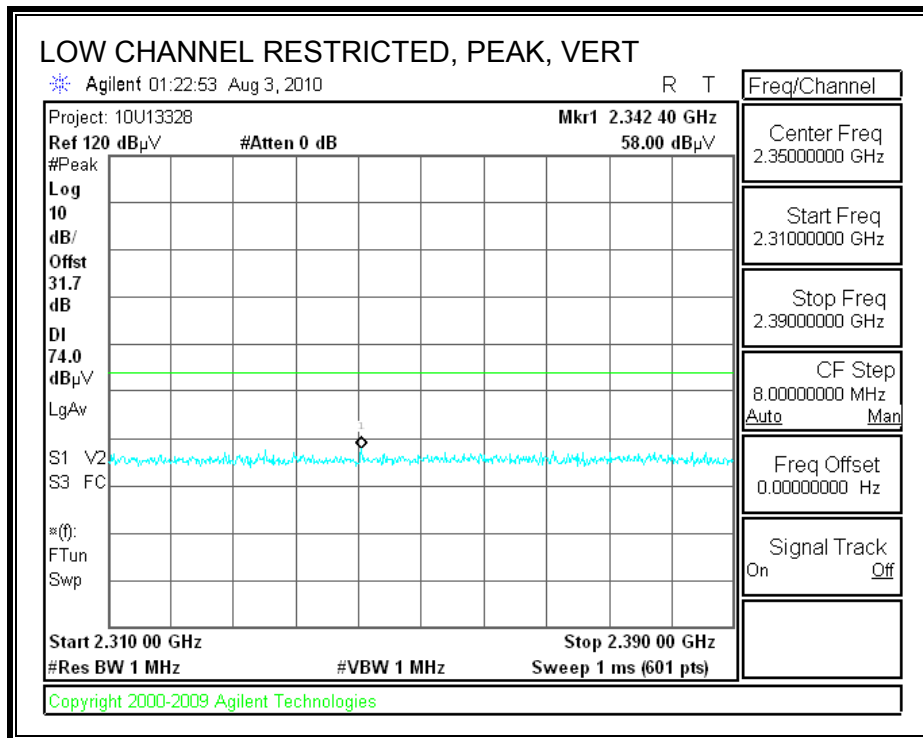
#### 8.3.1. BASIC DATA RATE GFSK MODULATION

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

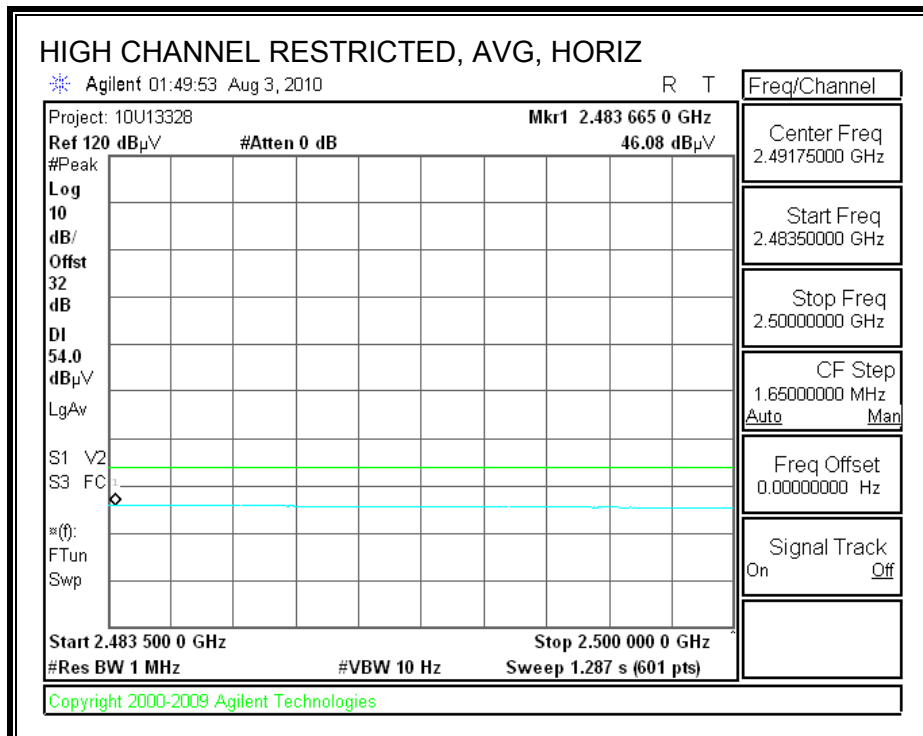
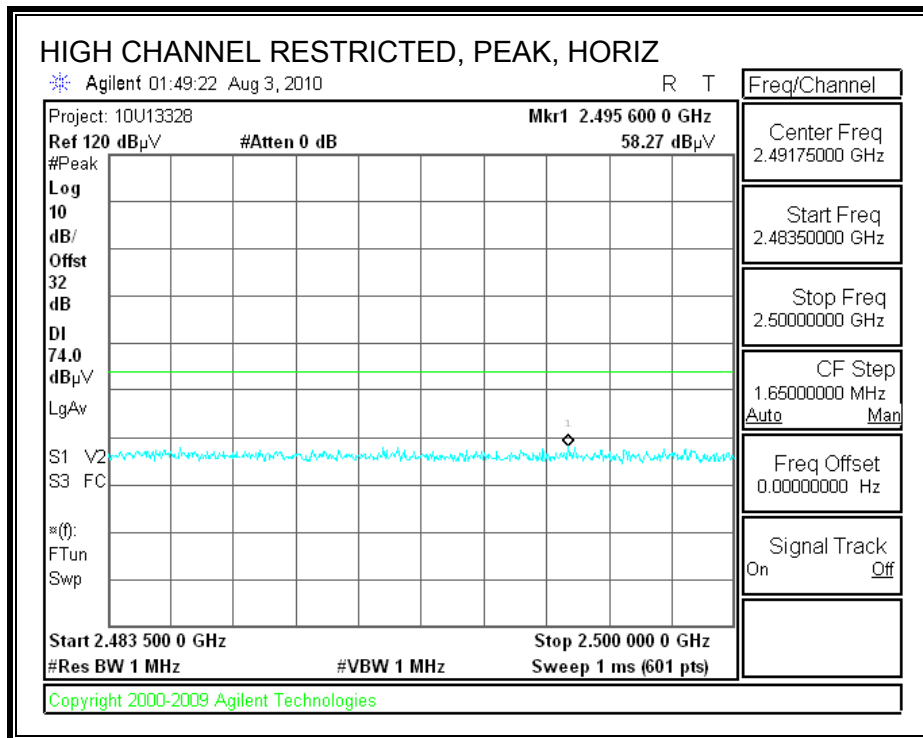




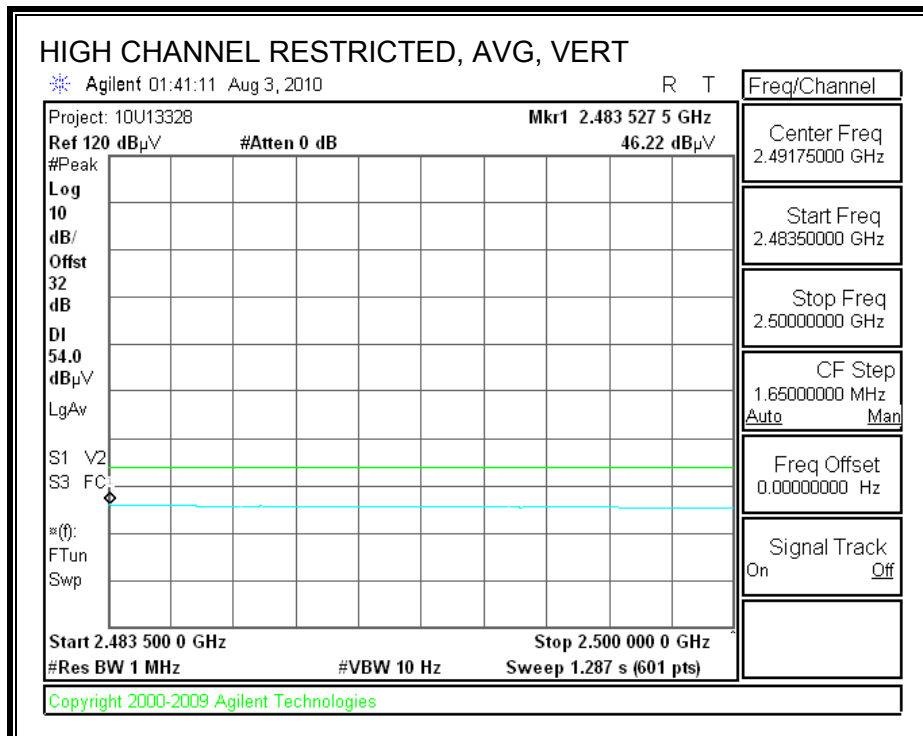
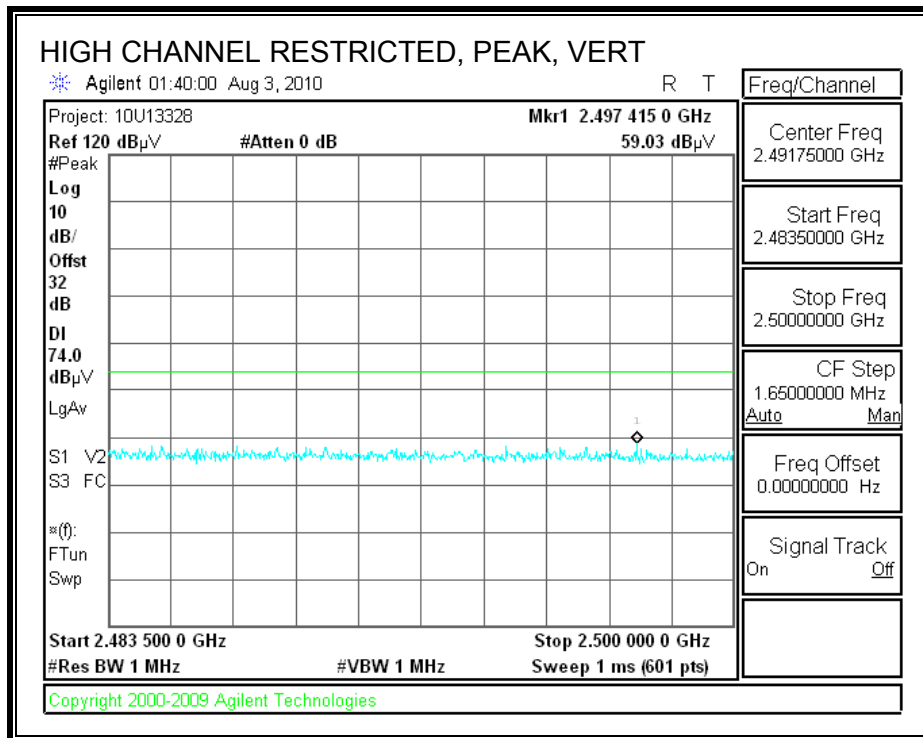
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



**HARMONICS AND SPURIOUS EMISSIONS**

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber

Company: Plantronics  
 Project #: 10U13328  
 Date: 8/3/2010  
 Test Engineer: Thanh Nguyen  
 Configuration: EUT, remote DC Power supply  
 Mode: Transmit Basic

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001	Average Measurements RBW=1MHz ; VBW=10Hz

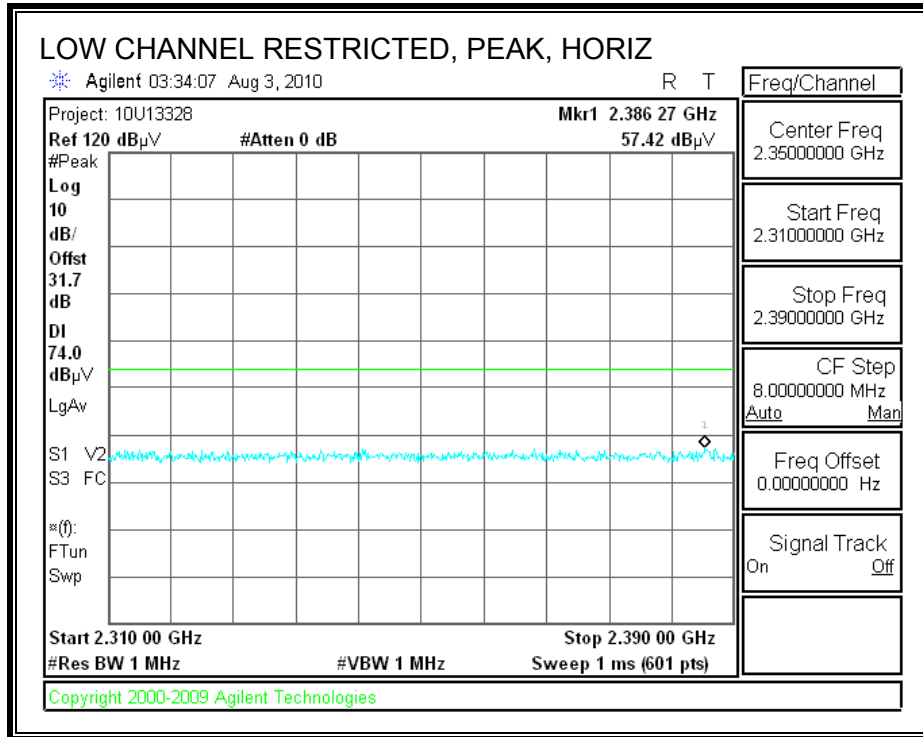
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
<b>Low Ch</b>															
4.804	3.0	53.3	34.4	33.0	5.8	-36.5	0.0	0.0	55.7	36.8	74	54	-18.3	-17.2	V
7.206	3.0	38.3	25.0	35.1	7.2	-36.2	0.0	0.0	44.4	31.1	74	54	-29.6	-22.9	Noise floor
4.804	3.0	50.7	33.3	33.0	5.8	-36.5	0.0	0.0	53.0	35.6	74	54	-21.0	-18.4	H
7.206	3.0	38.0	25.0	35.1	7.2	-36.2	0.0	0.0	44.2	31.1	74	54	-29.8	-22.9	Noise floor
<b>Mid Ch</b>															
4.882	3.0	51.9	33.5	33.1	5.8	-36.5	0.0	0.0	54.3	35.9	74	54	-19.7	-18.1	V
7.323	3.0	37.6	24.7	35.3	7.3	-36.2	0.0	0.0	44.0	31.0	74	54	-30.0	-23.0	Noise floor
4.882	3.0	47.8	31.4	33.1	5.8	-36.5	0.0	0.0	50.2	33.9	74	54	-23.8	-20.1	H
7.323	3.0	37.8	24.7	35.3	7.3	-36.2	0.0	0.0	44.2	31.1	74	54	-29.8	-22.9	Noise floor
<b>High Ch</b>															
4.960	3.0	49.1	31.8	33.2	5.9	-36.5	0.0	0.0	51.7	34.4	74	54	-22.3	-19.6	V
7.440	3.0	37.4	24.7	35.5	7.3	-36.2	0.0	0.0	44.0	31.3	74	54	-30.0	-22.7	Noise floor
4.960	3.0	47.5	30.0	33.2	5.9	-36.5	0.0	0.0	50.1	32.7	74	54	-23.9	-21.3	H
7.440	3.0	35.8	24.7	35.5	7.3	-36.2	0.0	0.0	42.4	31.3	74	54	-31.6	-22.7	Noise floor
No other emissions were detected above noise floor.															

Rev. 07.22.09

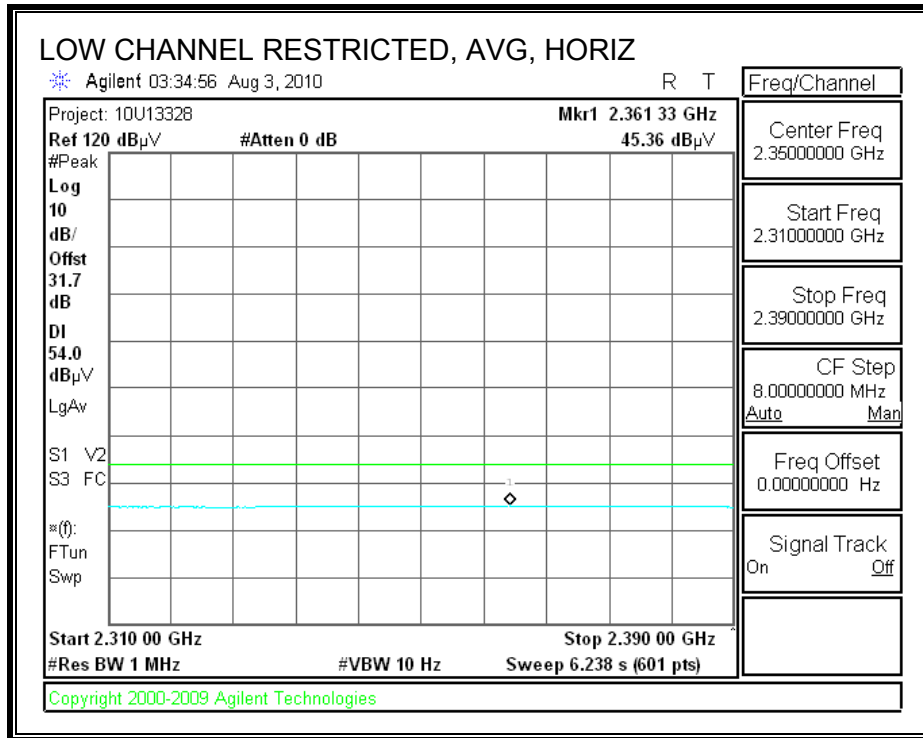
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

### 8.3.2. ENHANCED DATA RATE 8PSK MODULATION

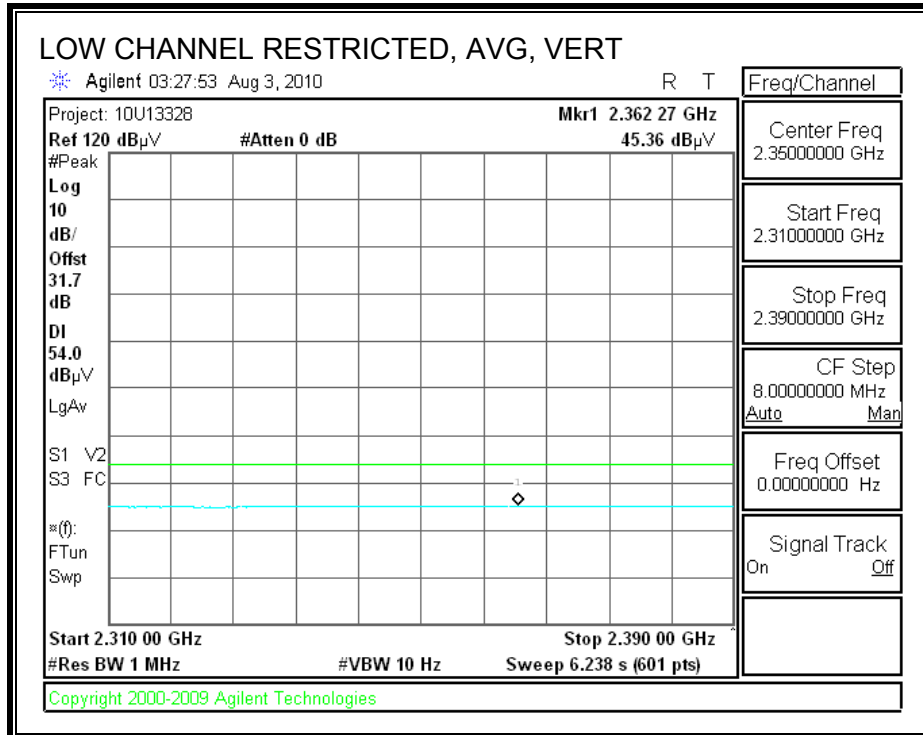
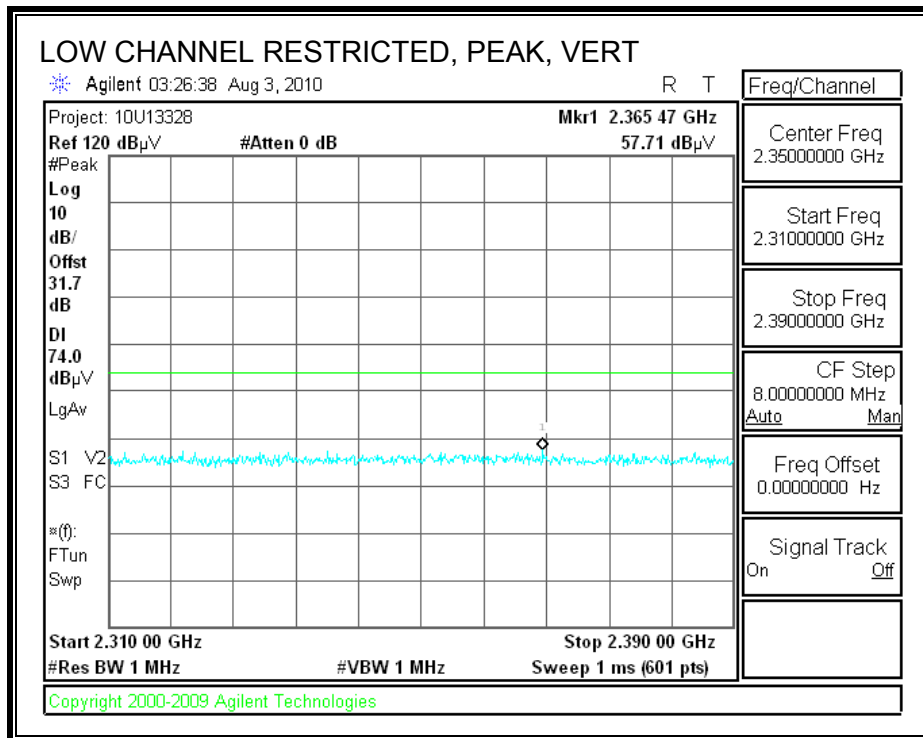
#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



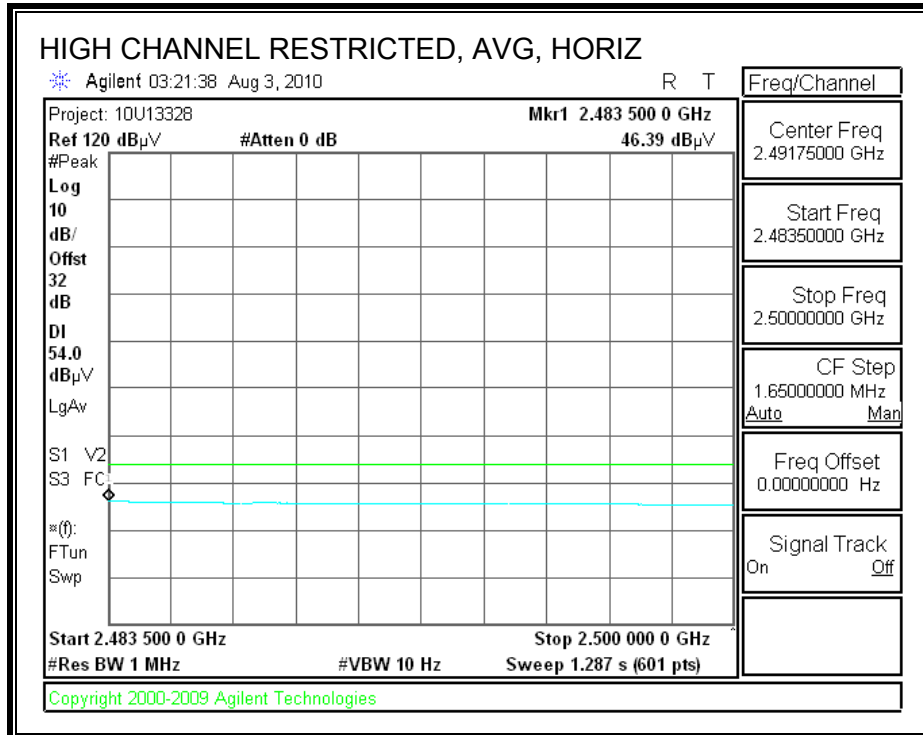
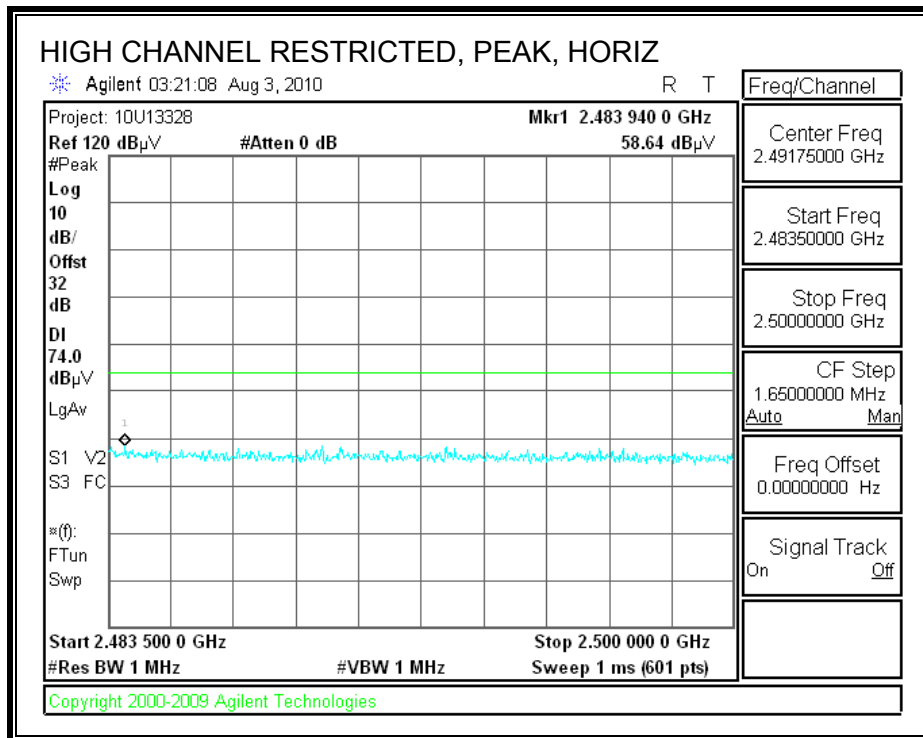




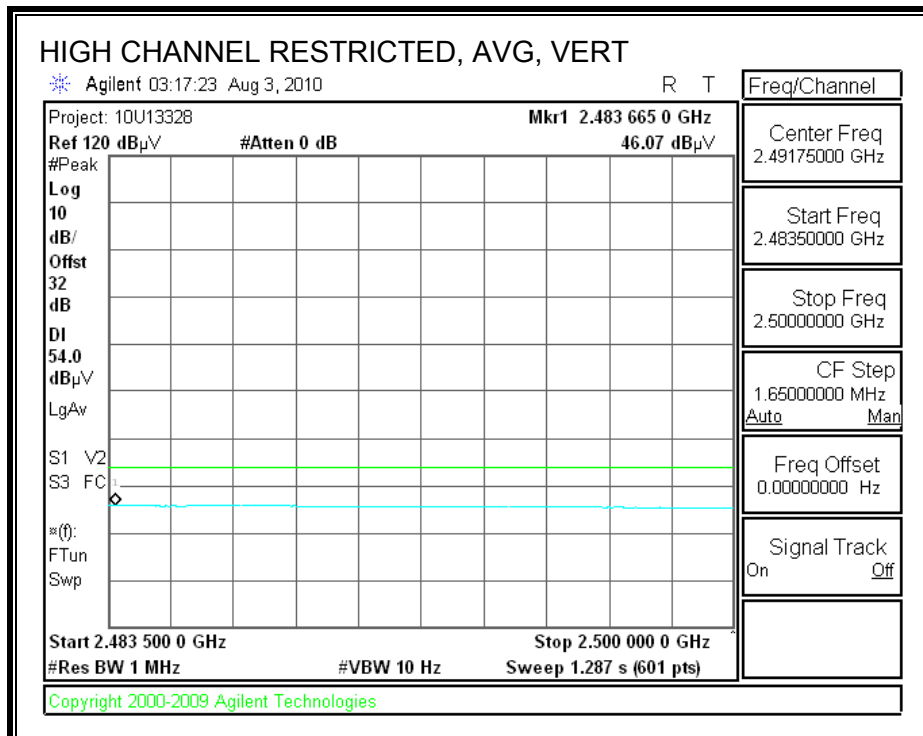
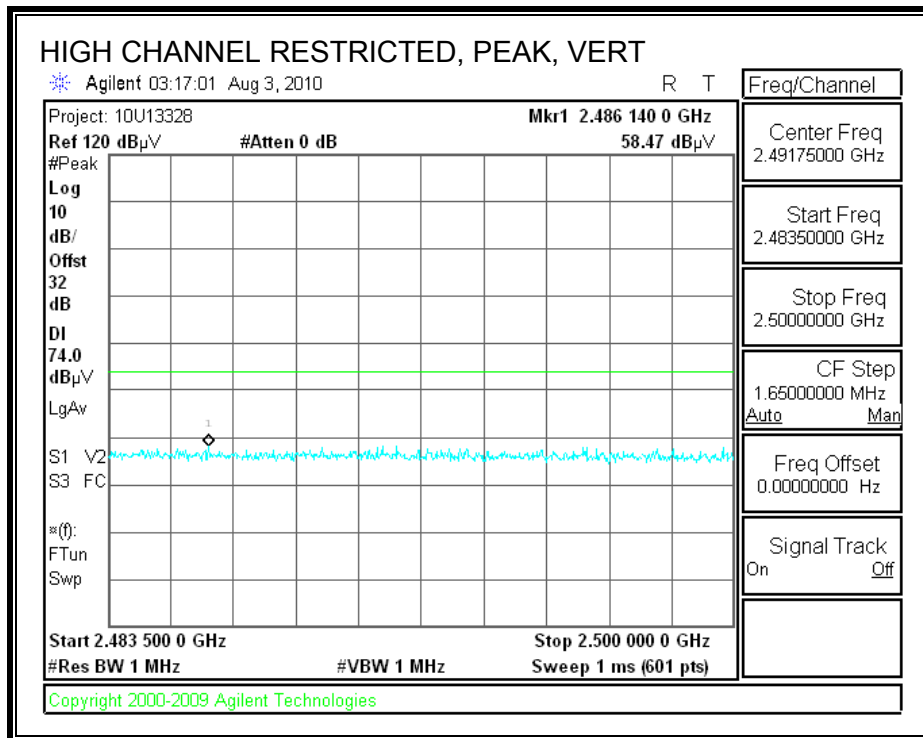
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



**HARMONICS AND SPURIOUS EMISSIONS**

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Company:		Plantronics															
Project #:		10U13328															
Date:		8/3/2010															
Test Engineer:		Thanh Nguyen															
Configuration:		EUT, remote DC Power supply															
Mode:		Transmit EDR															
<b>Test Equipment:</b>																	
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit	
T73; S/N: 6717 @3m				T144 Miteq 3008A00931												FCC 15.209	
Hi Frequency Cables																	
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF				Reject Filter	
3' cable 22807700				12' cable 22807600				20' cable 22807500								R_001	
Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz																	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
<b>Low Ch</b>																	
4.804	3.0	47.2	31.5	33.0	5.8	-36.5	0.0	0.0	49.6	33.8	74	54	-24.4	-20.2	V		
7.206	3.0	38.3	25.0	35.1	7.2	-36.2	0.0	0.0	44.4	31.1	74	54	-29.6	-22.9	Noise floor		
4.804	3.0	46.0	30.1	33.0	5.8	-36.5	0.0	0.0	48.4	32.4	74	54	-25.6	-21.6	H		
7.206	3.0	37.3	24.8	35.1	7.2	-36.2	0.0	0.0	43.4	30.9	74	54	-30.6	-23.1	Noise floor		
<b>Mid Ch</b>																	
4.882	3.0	45.7	28.0	33.1	5.8	-36.5	0.0	0.0	48.2	30.4	74	54	-25.8	-23.6	V		
7.323	3.0	37.0	24.7	35.3	7.3	-36.2	0.0	0.0	43.4	31.1	74	54	-30.6	-22.9	Noise floor		
4.882	3.0	44.6	30.4	33.1	5.8	-36.5	0.0	0.0	47.1	32.9	74	54	-26.9	-21.1	H		
7.323	3.0	38.6	24.7	35.3	7.3	-36.2	0.0	0.0	45.0	31.1	74	54	-29.0	-22.9	Noise floor		
<b>High Ch</b>																	
4.960	3.0	45.9	30.1	33.2	5.9	-36.5	0.0	0.0	48.5	32.7	74	54	-25.5	-21.3	V		
7.440	3.0	37.4	24.7	35.5	7.3	-36.2	0.0	0.0	44.0	31.3	74	54	-30.0	-22.7	Noise floor		
4.960	3.0	44.3	28.8	33.2	5.9	-36.5	0.0	0.0	46.9	31.4	74	54	-27.1	-22.6	H		
7.440	3.0	38.4	24.8	35.5	7.3	-36.2	0.0	0.0	45.0	31.4	74	54	-29.0	-22.6	Noise floor		
No other emissions were detected above 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										

## 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.

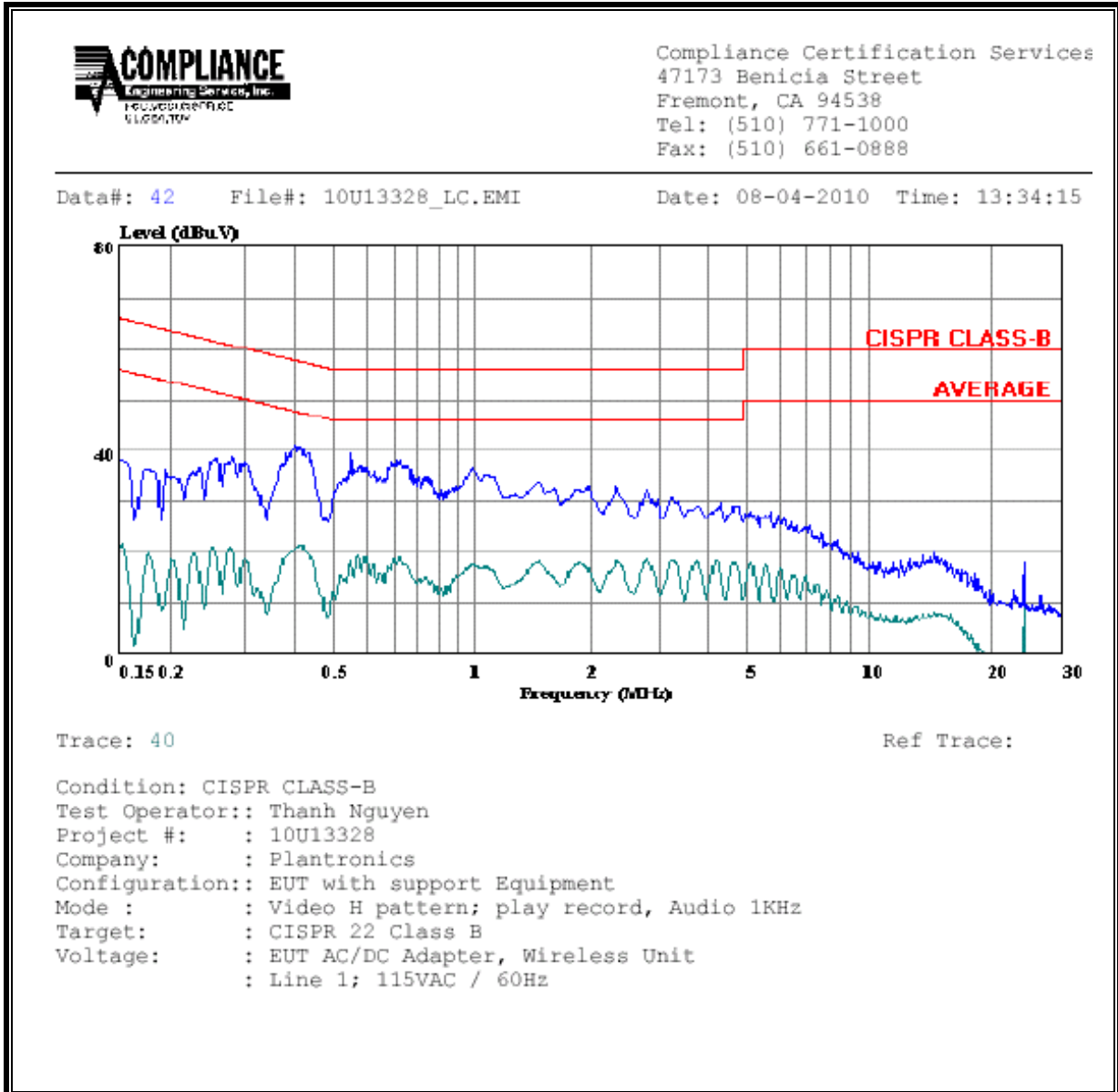
Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

**6 WORST EMISSIONS**

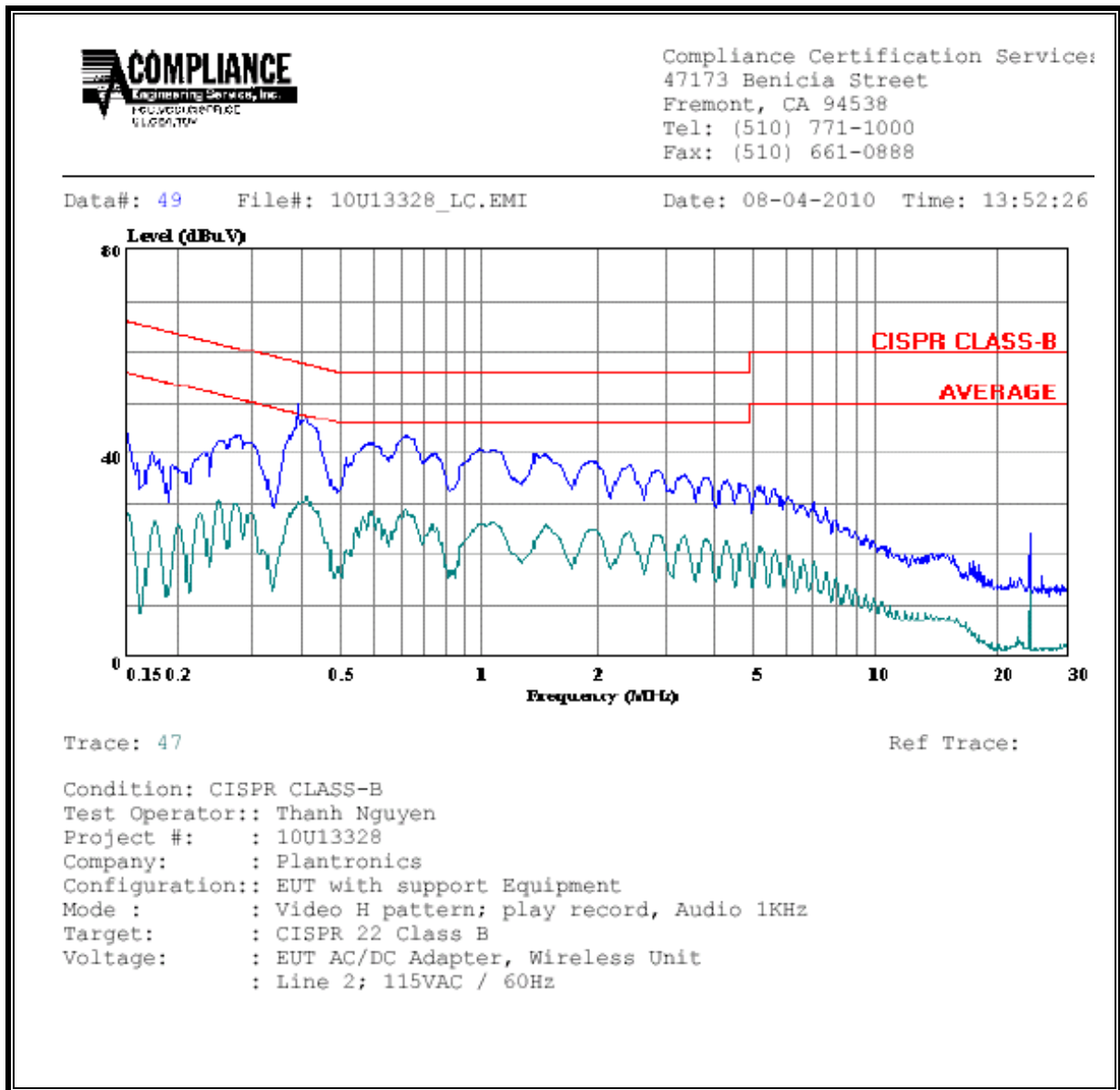
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Class	Limit	EN B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.28	38.93	--	--	0.00	60.76	50.76	-21.83	-11.83	L1
0.42	40.72	--	--	0.00	57.55	47.55	-16.83	-6.83	L1
0.55	39.33	--	--	0.00	56.00	46.00	-16.67	-6.67	L1
0.28	43.59	--	--	0.00	60.76	50.76	-17.17	-7.17	L2
0.39	49.87	--	31.55	0.00	58.04	48.04	-8.17	-16.49	L2
0.73	43.75	--	--	0.00	56.00	46.00	-12.25	-2.25	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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> <sup>0.5</sup>	0.0042 <i>f</i> <sup>0.5</sup>	<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> <sup>1.2</sup>
150 000–300 000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616 000 / <i>f</i> <sup>1.2</sup>

\* 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<sup>2</sup> is equivalent to 1 mW/cm<sup>2</sup>.
  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/m<sup>2</sup>

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m<sup>2</sup> is converted to units of mW/cm<sup>2</sup> 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/m<sup>2</sup>

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power \* Gain product (in linear units) of each transmitter.

$$\text{Total EIRP} = (P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)$$

where

Px = Power of transmitter x

Gx = Numeric gain of antenna x

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<sup>2</sup>

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

**RESULTS**

(MPE distance equals 20 cm)

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m <sup>2</sup> )	FCC Power Density (mW/cm <sup>2</sup> )
2.4 GHz	Bluetooth	0.20	3.76	1.80	0.01	0.001