

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

**CERTIFICATION TEST REPORT** 

FOR

## **BLUETOOTH LASER MOUSE**

## MODEL NUMBER: VGP- BMS80

FCC ID: GT3FC007

**REPORT NUMBER: 09J12682-1** 

**ISSUE DATE: AUGUST 24, 2009** 

Prepared for SMK CORPORATION 5-5 TOGOSHI 6-CHOME SHINAGAWA-KU, TOKYO 142-8511 JAPAN

Prepared by COMPLIANCE CERTIFICATION SERVICES 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

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NVLAP LAB CODE 200065-0

### **Revision History**

Rev.	Issue Date	Revisions	Revised By
	08/24/09	Initial Issue	T. Chan

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# **1. ATTESTATION OF TEST RESULTS**

INDUSTRY CANADA RSS-210 Issue 7 Annex 8

**INDUSTRY CANADA RSS-GEN Issue 2** 

COMPANY NAME:	SMK CORPORATION 5-5 TOGOSHI 6-CHOME SHINAGAWA-KU, TOKYO 142-8511 JAPAN					
EUT DESCRIPTION:	BLUETOOTH LASER MOUSE					
MODEL:	VGP-BMS80					
SERIAL NUMBER:	F03DA5 (RADIATED UNIT), F03DAE (CONDUCTED UNIT)					
DATE TESTED:	AUGUST 11 - 23, 2009					
	APPLICABLE STANDARDS					
ST	ANDARD	TEST RESULTS				
CFR 47 P	art 15 Subpart C	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:

THU CHAN EMC MANAGER COMPLIANCE CERTIFICATION SERVICES

Tested By:

Chin Pany

CHIN PANG EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Pass

Pass

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN 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 <u>http://www.ccsemc.com</u>.

# 4. CALIBRATION AND UNCERTAINTY

# 4.1. MEASURING INSTRUMENT CALIBRATION

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

# 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

# 4.3. MEASUREMENT UNCERTAINTY

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

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

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

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# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth Laser Mouse operated at 2402-2480MHz

The radio module is manufactured by SMK Corporation.

# 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	3.98	2.50
2402 - 2480	Enhanced 8PSK	2.79	1.90

# 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip antenna, with a maximum gain of 0.14dBi.

# 5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was RF Test Tool for Bluetooth Device, rev. 1.2.2.

# 5.5. WORST-CASE CONFIGURATION AND MODE

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

The EUT is a portable device that has three orientations; therefore X, Y and Z orientations have been investigated. The worst case was found to be X orientation.

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# 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Description Manufacturer Model Serial Number FCC ID						
AC Adapter	HP	SU10095-1003	592C60EYMV40H	DoC			
Laptop	HP	Presario F700	CNF7468G3Q	DoC			

## I/O CABLES

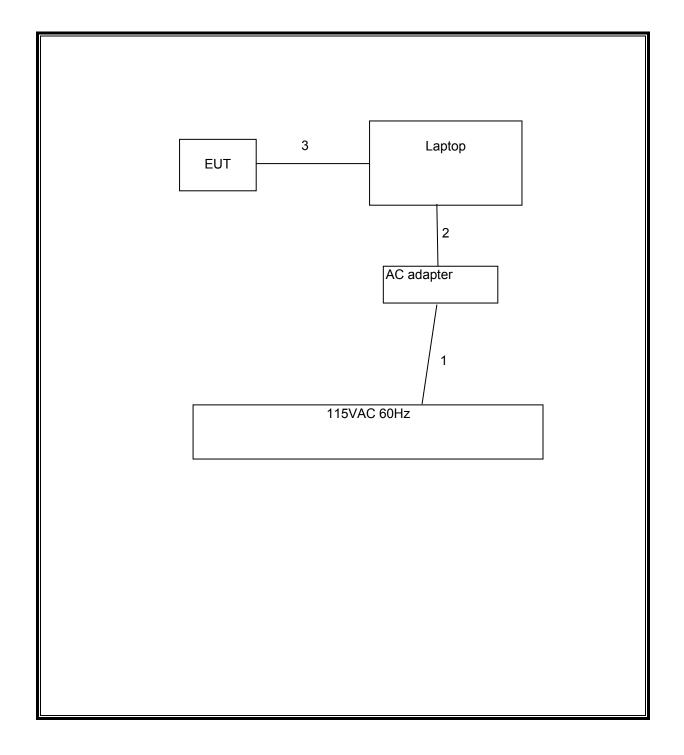
	I/O CABLE LIST								
Cable No.	Port	# of Identica	Connector Type	Cable Type	Cable Length	Remarks			
		Ports							
1	AC	1	US 115V	Un-shielded	2m	N/A			
2	DC	1	DC	Un-shielded	2m	N/A			
3	USB	1	USB	Un-shielded	1.0m	N/A			

### TEST SETUP

The EUT is a stand alone device. A laptop PC is connected via USB to exercise the device.

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## **SETUP DIAGRAM FOR TESTS**



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# 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						
Spectum Analyzer	Agilent	MXA	1176	10/23/09		
Power Meter	HP	437B	2778	08/04/10		
Power Sensor	Agilent	8481A	2781	11/02/09		
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	08/06/10		
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09		
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	06/01/10		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	02/04/10		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/09		
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	01/14/10		
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR		

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# 7. ANTENNA PORT TEST RESULTS

## 7.1. BASIC DATA RATE GFSK MODULATION

## 7.1.1. 20 dB AND 99% BANDWIDTH

## <u>LIMIT</u>

None; for reporting purposes only.

## TEST PROCEDURE

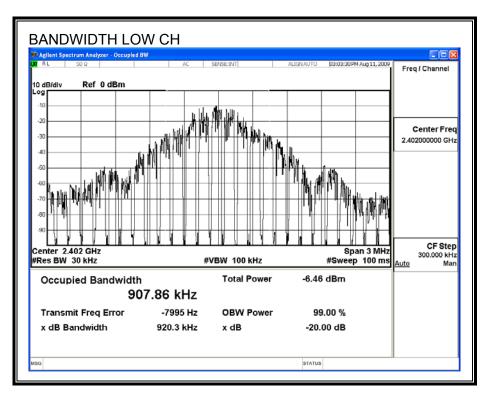
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

## **RESULTS**

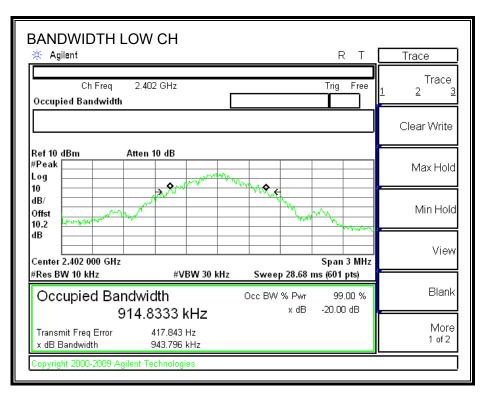
Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	943.796	907.86
Middle	2441	921.159	929.8
High	2480	873.2	900.57

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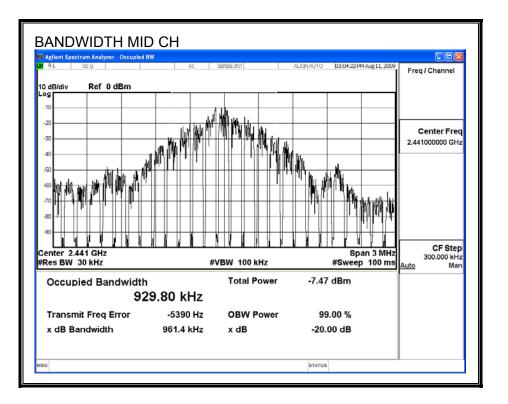
#### 99% BANDWIDTH



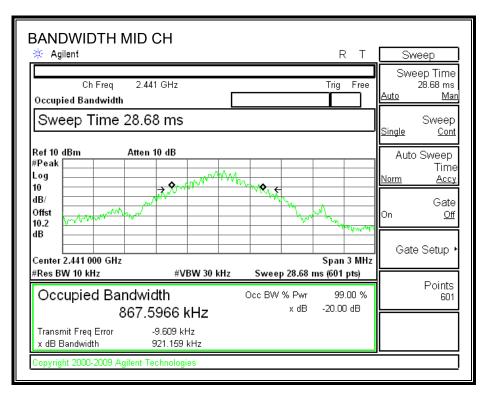
### 20dB BANDWIDTH



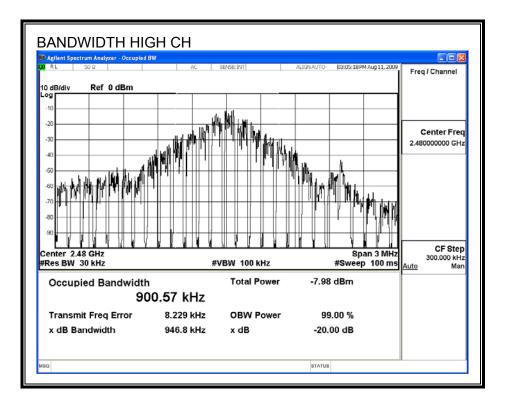
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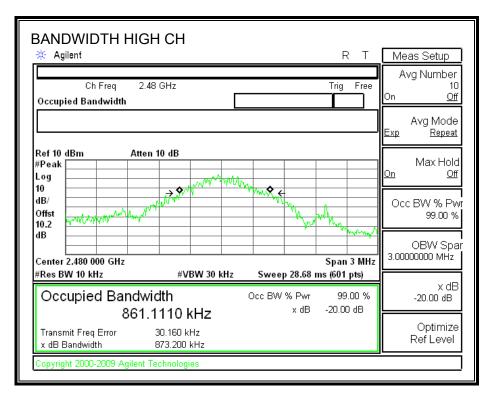
### 20dB BANDWIDTH



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#### 20dB BANDWIDTH



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## 7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

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

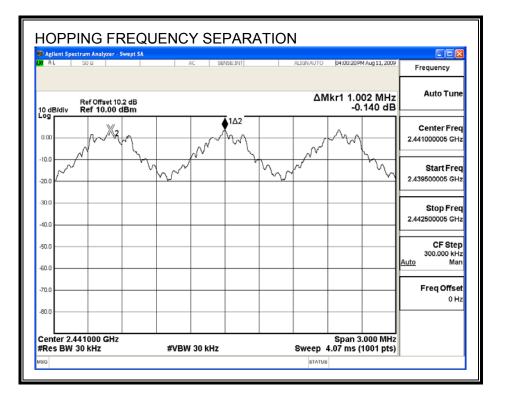
#### TEST PROCEDURE

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

#### **RESULTS**

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#### **HOPPING FREQUENCY SEPARATION**



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## 7.1.3. NUMBER OF HOPPING CHANNELS

## <u>LIMIT</u>

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 nonoverlapping channels.

### TEST PROCEDURE

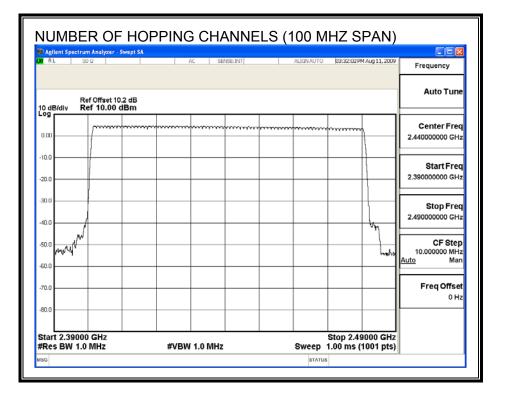
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

#### **RESULTS**

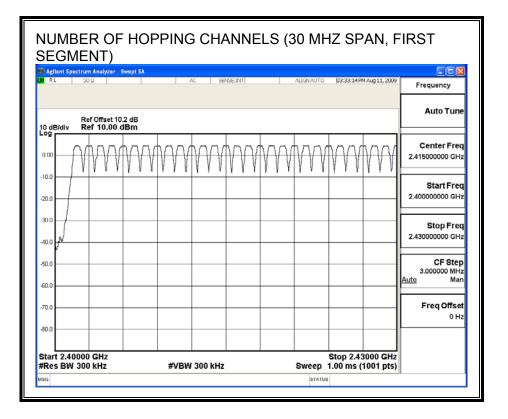
79 Channels observed.

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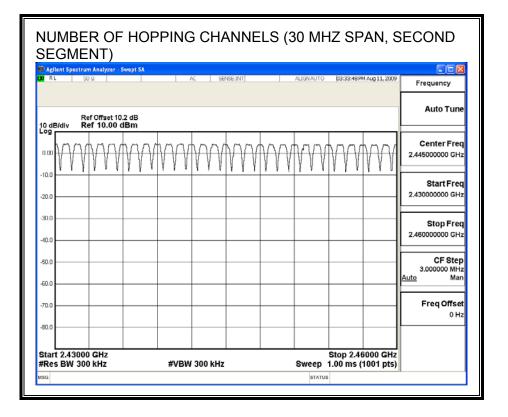
### NUMBER OF HOPPING CHANNELS



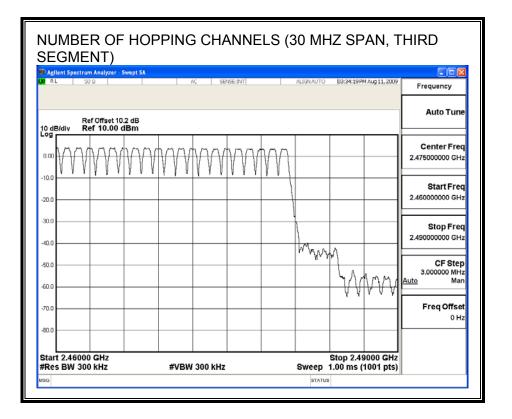
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## 7.1.4. AVERAGE TIME OF OCCUPANCY

## <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### TEST PROCEDURE

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

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

### **RESULTS**

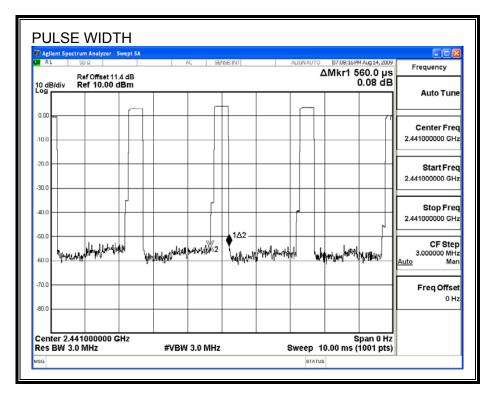
Time Of Occupancy = 10 \* 11 pulses \* 3.04 msec = 334 msec

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.56	32	0.179	0.4	0.221
DH3	1.79	16	0.286	0.4	0.114
DH5	3.04	11	0.334	0.4	0.066

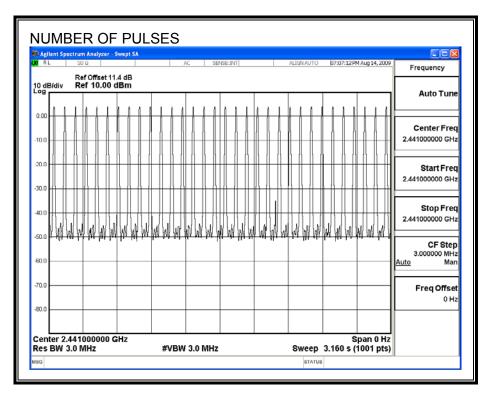
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### <u>DH1</u>

### PULSE WIDTH



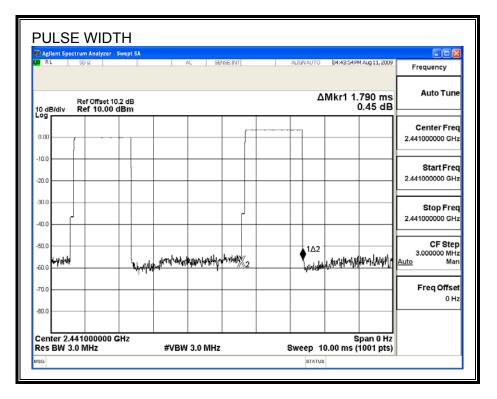
## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



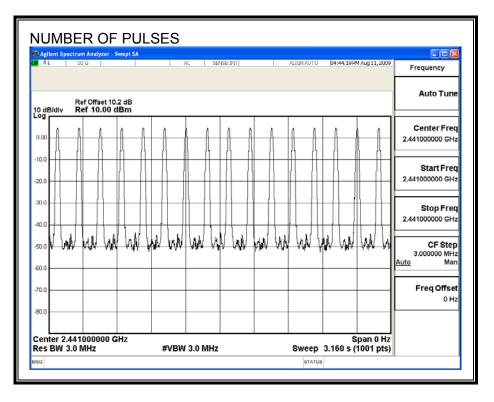
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### <u>DH3</u>

### PULSE WIDTH



## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

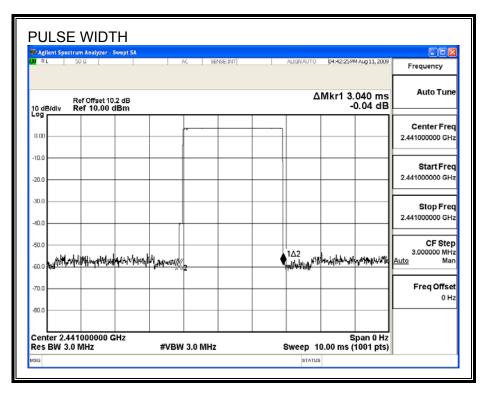


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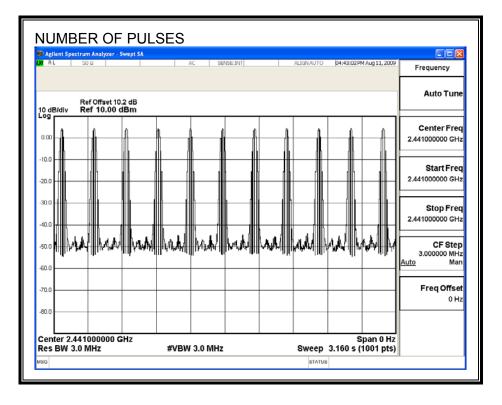
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# DH5

## PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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## 7.1.5. OUTPUT POWER

## <u>LIMIT</u>

§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

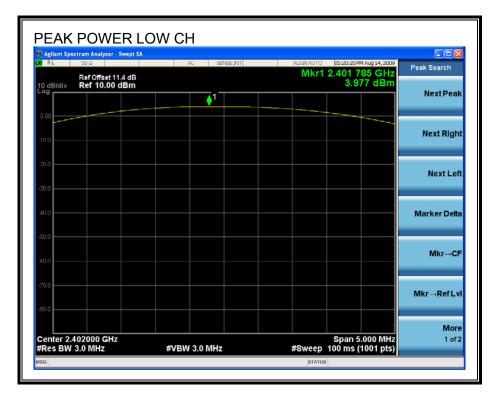
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

### **RESULTS**

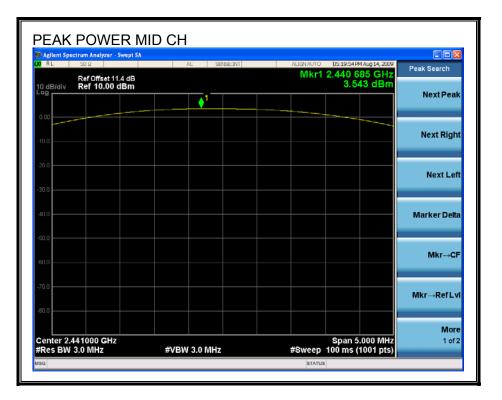
Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	3.98	30	-26.02
Middle	2441	3.54	30	-26.46
High	2480	2.39	30	-27.61

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## **OUTPUT POWER**



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		AC SE	INSEINT	ALIGNAUTO	ALIGN AUTO 05:19:29 PM Aug 14, 2009		
Ref Offse					Mkr1 2.479 725 GHz		
0 dB/div Ref 10.0	00 dBm	 			2.390 dBm		
		↓ <sup>1</sup>				NextPeak	
0.00							
10.0						Next Right	
20.0							
						Next Left	
30.0							
40.0						Marker Delta	
50.0							
60.0						Mkr→CF	
70.0						Mkr→RefLv	
80.0							
					Span 5.000 MHz	More	

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## 7.1.6. AVERAGE POWER

## <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### RESULTS

The cable assembly insertion loss of 11.2 dB (including 10 dB pad and 1.2dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power			
	(MHz)	(dBm)			
Low	2402	3.06			
Middle	2441	2.61			
High	2480	1.45			

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## 7.1.7. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

## TEST PROCEDURE

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

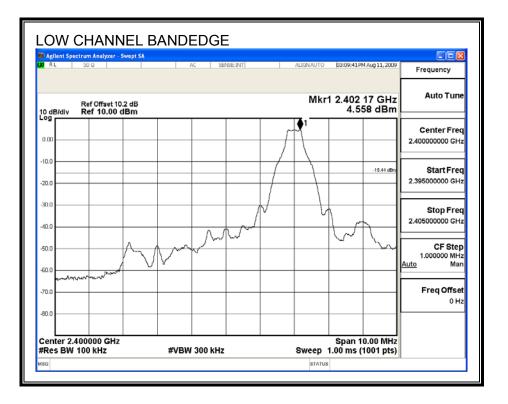
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

### <u>RESULTS</u>

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### SPURIOUS EMISSIONS, LOW CHANNEL

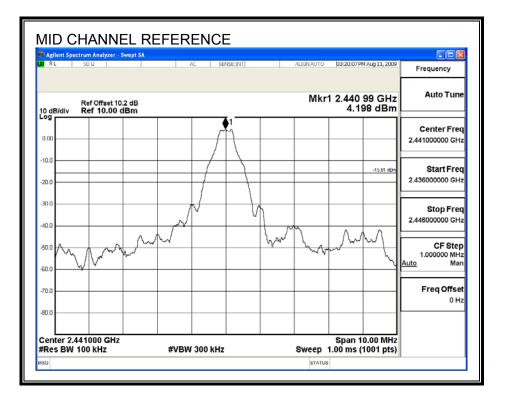


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	ctrum Analyzer -			OUS						
RL	50 Q			VC SB	NSE:INT		ALIGNAUTO	03:11:17P	M Aug 11, 2009	Frequency
0 dB/div	Ref Offset 10 Ref 10.00						N		02 GHz 68 dBm	Auto Tune
og 0.00	<b>●</b> 1									Center Free 13.015000000 GH
0.0									-15.44 dBm	Start Free 30.000000 MH
0.0										Stop Free 26.000000000 GH
0.0									1. AL - 11. AV	CF Stej 2.597000000 GH <u>Auto</u> Ma
0.0 <b>8 pp 100</b> 00	w had many	ebénjenlynge	handread and a	L. WORKS	an the state of th	HLANS <sup>W</sup> LANN	washerioldy <sup>re</sup>	http://www.	19.19.19.19.18.18.18.18.18.18.18.18.18.18.18.18.18.	Freq Offse 0 H
tart 30 N	1Hz 100 kHz		#VBW	300 kHz			Sweep		6.00 GHz	

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## SPURIOUS EMISSIONS, MID CHANNEL

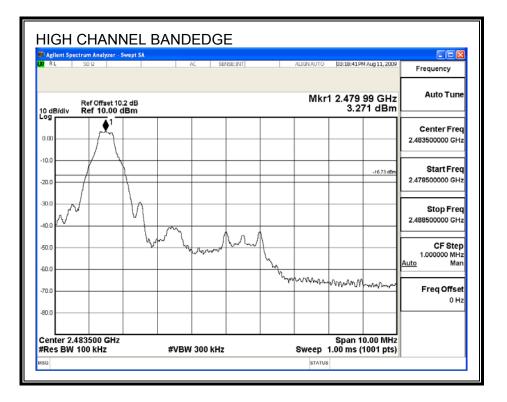


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Agilent Spectru	ım Analyzer - S		PURIC							
RL S	Ω Ω		/	VC SB	NSE:INT		ALIGNAUTO	03:20:40 P	M Aug 11, 2009	Frequency
dB/div R	ef Offset 10. ef 10.00 d						M		41 GHz 58 dBm	Auto Tun
1.00	1									Center Fre 13.015000000 GH
0.0									-15.81 dBm	Start Fre 30.000000 MH
0.0										Stop Fre 26.000000000 GH
0.0										CF Stej 2.597000000 GH <u>Auto</u> Ma
0.0 Halender	with work	erdelageterterter	emelekteren er	the property of the state of th	reconstration	weeter	ht have a south	ernikiseybydd	Windowson and	Freq Offse 0 H
tart 30 MHz Res BW 10			#VBW	300 kHz			Sweep		6.00 GHz	

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## SPURIOUS EMISSIONS, HIGH CHANNEL

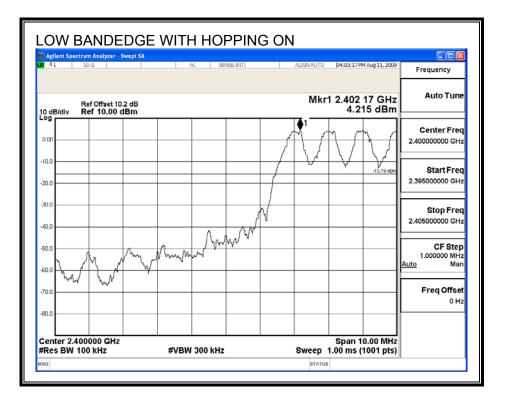


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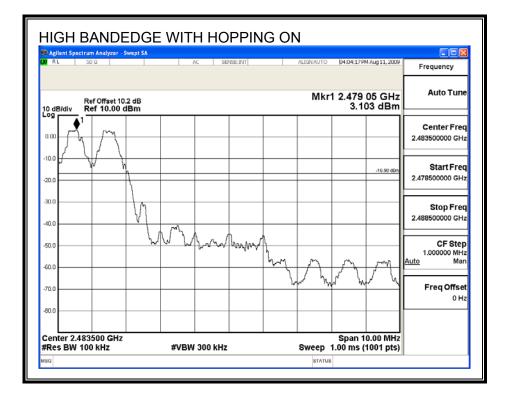
Agilent Spectrum Ana		PURIOUS				
RL 50Ω		AC SE	NSE:INT	ALIGNAUTO	03:19:14 PM Aug 11, 200	Frequency
0 dB/div Ref 1	fset 10.2 dB 0.00 dBm			N	1kr1 2.480 GH: 2.299 dBm	
						Center Freq 13.015000000 GHz
20.0					-16.73 dBr	Start Free 30.000000 MH:
10.0						Stop Free 26.00000000 GH:
80.0						CF Step 2.597000000 GH: Auto Mar
70.0 Horrischer Haussia	h <sub>estard</sub> en en service de la companya de la company	tertistaanta terteraantaataataat	an an ann an	where the man when the are when the second	orborningilling representations	Freq Offse
tart 30 MHz Res BW 100 kH		#VBW 300 kHz		Owen	Stop 26.00 GH	
	12	#VEVV 300 KHZ		Sweep		1

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#### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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# 7.2. ENHANCED DATA RATE 8PSK MODULATION

### 7.2.1. 20 dB AND 99% BANDWIDTH

### LIMIT

None; for reporting purposes only.

### TEST PROCEDURE

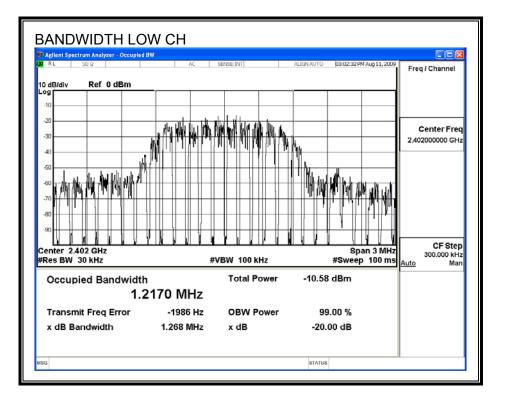
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

#### RESULTS

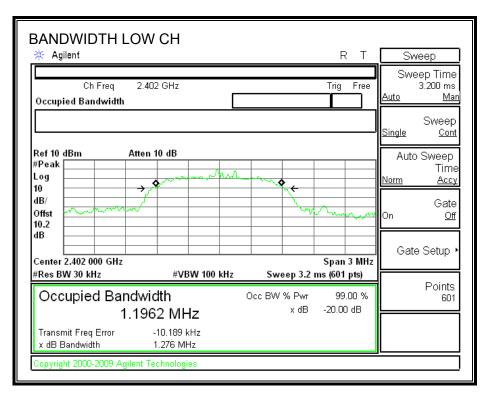
Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	1276	1217
Middle	2441	1237	1235.9
High	2480	1278	1224.5

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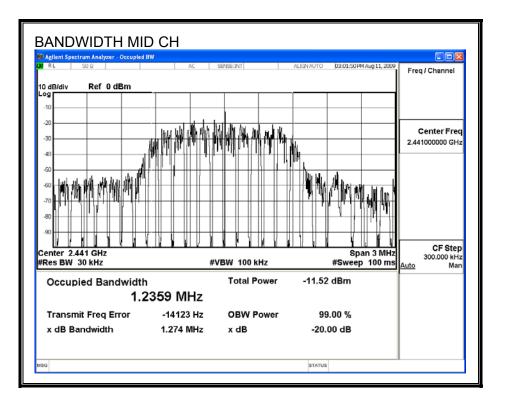
#### 99% BANDWIDTH



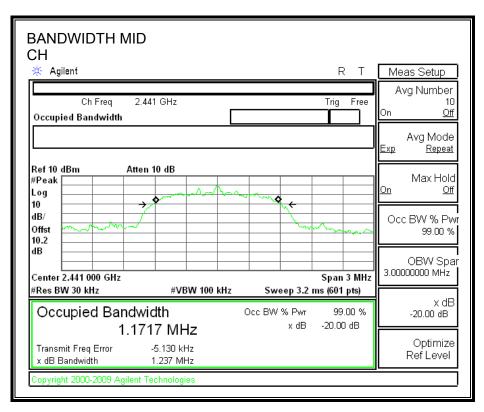
### 20dB BANDWIDTH



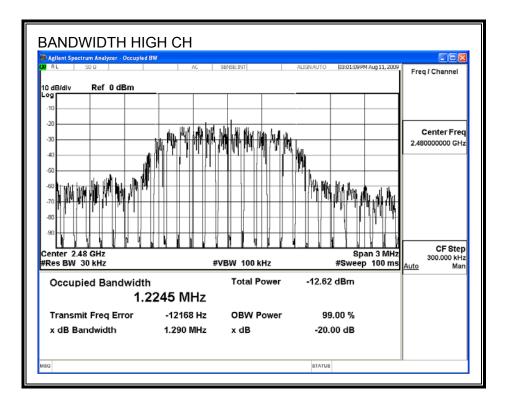
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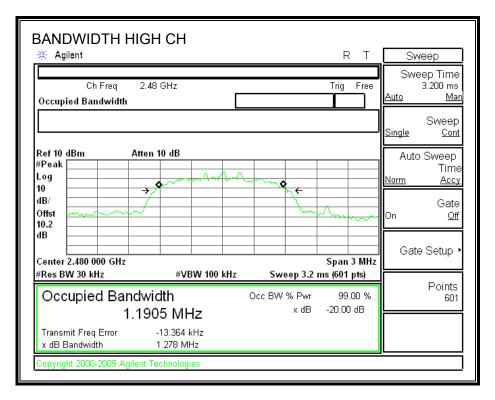
### 20dB BANDWIDTH



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#### 20dB BANDWIDTH



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# 7.2.2. HOPPING FREQUENCY SEPARATION

<u>LIMIT</u>

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

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

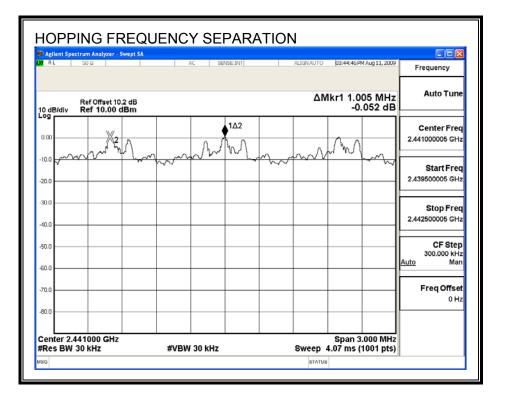
#### TEST PROCEDURE

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

### **RESULTS**

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### **HOPPING FREQUENCY SEPARATION**



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### 7.2.3. NUMBER OF HOPPING CHANNELS

### <u>LIMIT</u>

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 nonoverlapping channels.

### TEST PROCEDURE

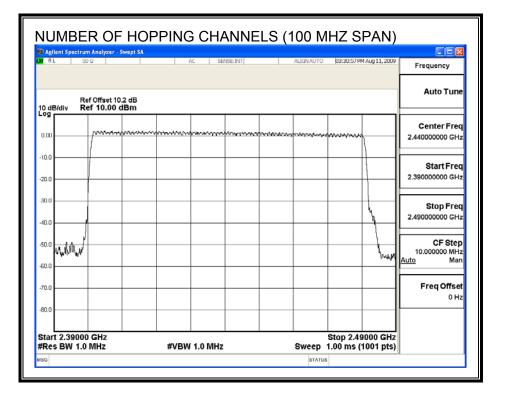
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

#### **RESULTS**

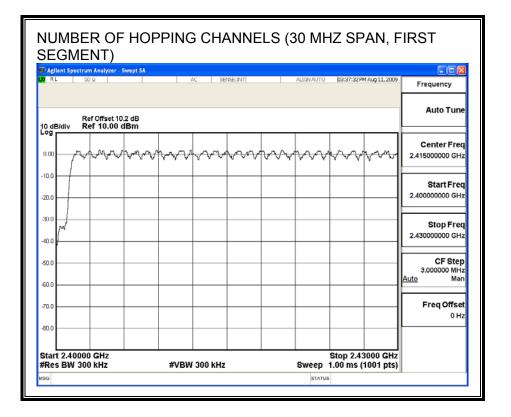
79 Channels observed.

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#### NUMBER OF HOPPING CHANNELS



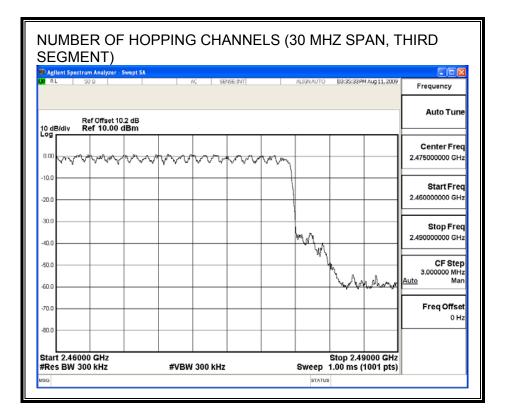
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II Agilent Spectrum Analyzer - S α RL SOΩ	C SENSE:INT]	ALIGN AUTO	03:36:40 PM Aug 11, 200	Frequency
Ref Offset 10. 0 dB/dly Ref 10.00 d				Auto Tune
000	$\sqrt{2}$		$\phi \phi $	Center Freq 2.445000000 GHz
20.0				Start Freq 2.430000000 GHz
40.0				Stop Freq 2.46000000 GHz
50.0				CF Step 3.000000 MHz Auto Man
70.0				Freq Offset
80.0				_

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# 7.2.4. AVERAGE TIME OF OCCUPANCY

### <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### TEST PROCEDURE

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

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

### **RESULTS**

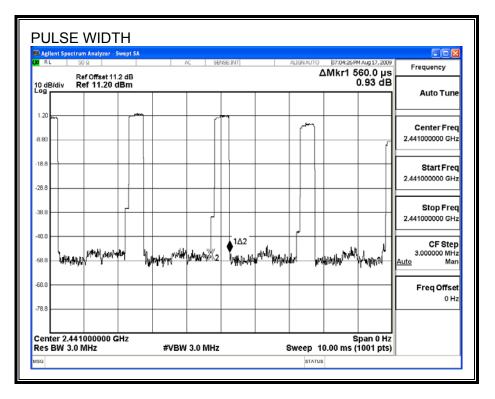
Time Of Occupancy = 10 \* 11 pulses \*3.05msec = 335.5 msec

DH Packet	Pulse Width	Width Number of Pulses in 3.16 seconds		Limit	Margin
	(msec)		(sec)	(sec)	(sec)
DH1	0.56	32	0.179	0.4	0.221
DH3	1.8	16	0.288	0.4	0.112
DH5	3.05	11	0.336	0.4	0.065

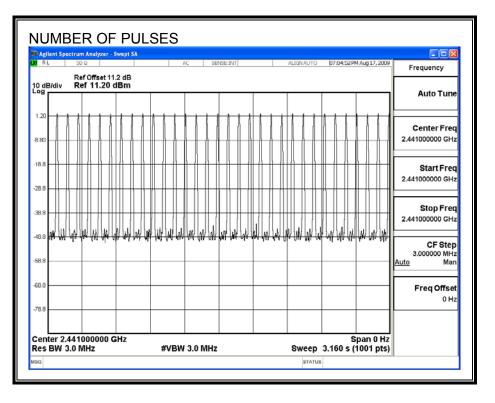
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### <u>DH1</u>

### PULSE WIDTH



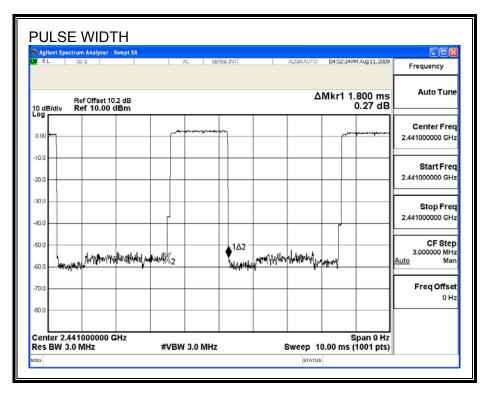
### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



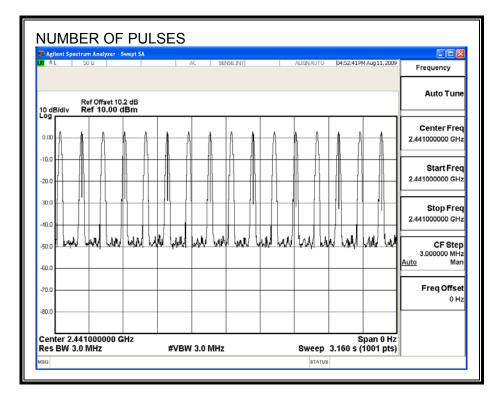
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### <u>DH3</u>

### PULSE WIDTH



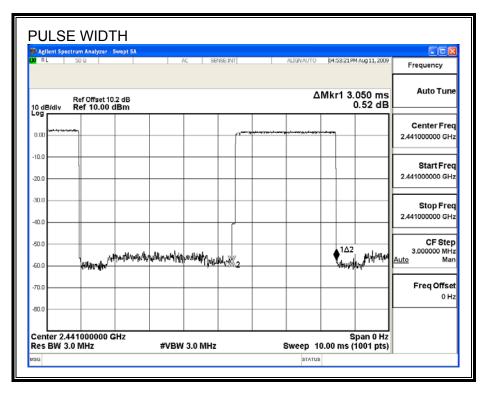
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



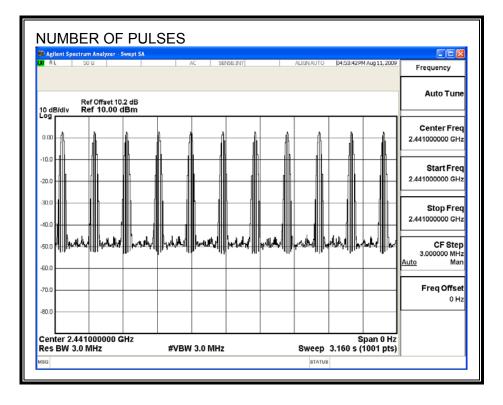
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### <u>DH5</u>

### PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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# 7.2.5. OUTPUT POWER

### <u>LIMIT</u>

§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

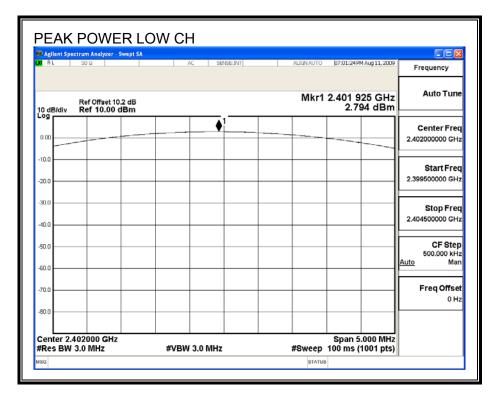
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

### **RESULTS**

Channel	Frequency	SA Output	Limit	Margin
	(MHz)	Power	(dBm)	(dB)
Low	2402	2.79	21	-18.44
Middle	2441	2.51	21	-18.59
High	2480	1.57	21	-19.23

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### **OUTPUT POWER**



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	R MID CH			
🗊 Agilent Spectrum Analyzer - Swe	ept SA			
UM/RL   50Ω	AC SENSE:INT	ALIGNAUTO	07:00:02 PM Aug 11, 2009	Frequency
Ref Offset 10.2 10 dB/div Ref 10.00 dB		Mkr1	2.440 865 GHz 2.511 dBm	Auto Tune
0.00	∳ <sup>1</sup>			Center Freq 2.441000000 GHz
-10.0				Start Free 2.438500000 GHz
-40.0				Stop Free 2.443500000 GHz
-50.0				CF Step 500.000 kHz Auto Mar
-70.0				Freq Offset 0 H;
-80.0 Center 2.441000 GHz #Res BW 3.0 MHz	#VBW 3.0 MHz	#Sweep	Span 5.000 MHz 100 ms (1001 pts)	
MSG		STATUS	5	

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🕼 Agilent Spectrum Analyzer - Sw	R HIGH C				
<b>N</b> RL 50Ω		AC SENSE:INT	ALIGNAUTO	07:00:33 PM Aug 11, 2009	Peak Search
Ref Offset 10.2 10 dB/div Ref 10.00 dB			Mkr1	2.479 830 GHz 1.568 dBm	NextPea
0.00		<b>↓</b> <sup>1</sup>			Next Righ
-10.0					Next Lei
				F	Marker Delt
-50.0					Mkr→Ci
60.0					
70.0					Mkr→RefLv
-80.0					More
Center 2.480000 GHz #Res BW 3.0 MHz	#VBV	/ 3.0 MHz	#Sweep	Span 5.000 MHz 100 ms (1001 pts)	1 of 2

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# 7.2.6. AVERAGE POWER

### <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### RESULTS

The cable assembly insertion loss of 11.2 dB (including 10 dB pad and 1.2dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	-0.77
Middle	2441	-0.99
High	2480	-2.43

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### 7.2.7. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

### TEST PROCEDURE

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

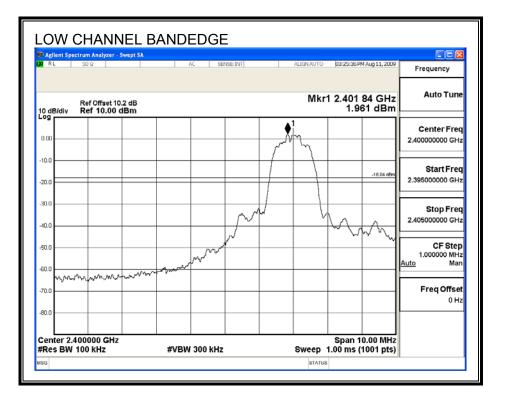
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

### <u>RESULTS</u>

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### SPURIOUS EMISSIONS, LOW CHANNEL

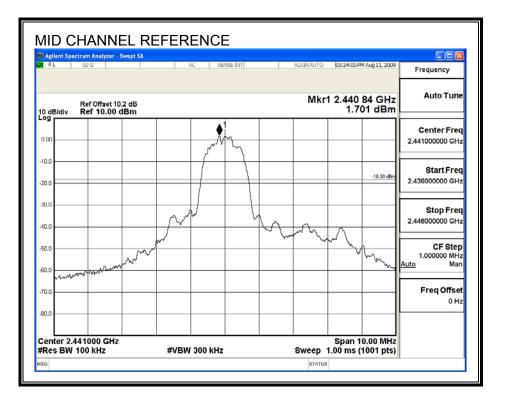


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Agilent Spectrum Analyzer - S					
RL 50Ω	AC	SENSE:INT	ALIGNAUTO	03:26:09 PM Aug 11, 2009	Frequency
Ref Offset 10. 0 dB/div Ref 10.00 d			MI	kr1 2.402 GHz -3.836 dBm	Auto Tune
.00 ↓1					Center Free 13.015000000 GH
20.0				-18.04 dBm	Start Free 30.000000 MH:
10.0					Stop Free 26.00000000 GH
0.0					CF Stej 2.597000000 GH Auto Mai
		water water and the provide sport	Montheory	hered with the fill of the second	Freq Offse 0 H
itart 30 MHz Res BW 100 kHz	#VBW 3(	00 kH7	Sween	Stop 26.00 GHz 2.48 s (1001 pts)	

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### SPURIOUS EMISSIONS, MID CHANNEL

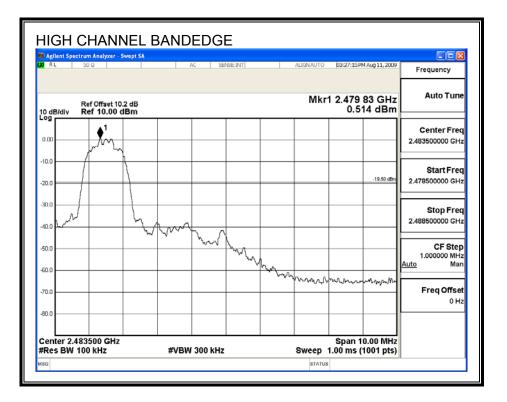


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Agilent Spe	ctrum Analyzer - 50 Ω	Swept SA			NOTABAT		ALICALALITO	0004000	1 Aug 11, 2009	
KL.	50 92			VC SB	NSE:INT		ALIGNAUTO	U3:24:39Ph	1 AUG 11, 2009	Frequency
0 dB/div	Ref Offset 10 Ref 10.00						M		41 GHz 34 dBm	Auto Tun
0 g	↓ 1									Center Fre 13.015000000 GH
0.0									-18.30 dBm	Start Fre 30.000000 MH
0.0										<b>Stop Fre</b> 26.00000000 GH
0.0										<b>CF Ste</b> j 2.597000000 GH <u>Auto</u> Ma
0.0	- Anima demon	hideposy.fraity	₩ <sup>₩</sup> ₩₩₩	ang in second	and the second second	Haybool allow	Antquint	فالطيعور والمحاليات	Netersty,	Freq Offse 0 H
tart 30 M	//Hz 100 kHz		#VBW	300 kHz			Sween		6.00 GHz 1001 pts)	

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### SPURIOUS EMISSIONS, HIGH CHANNEL

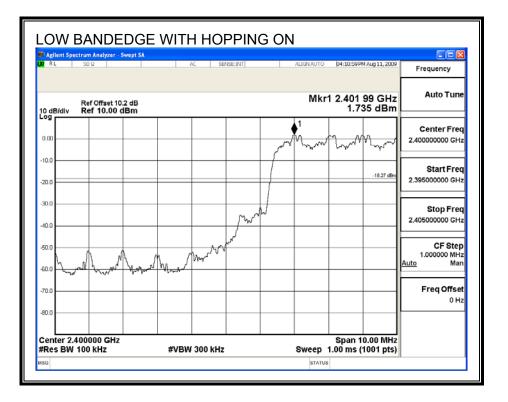


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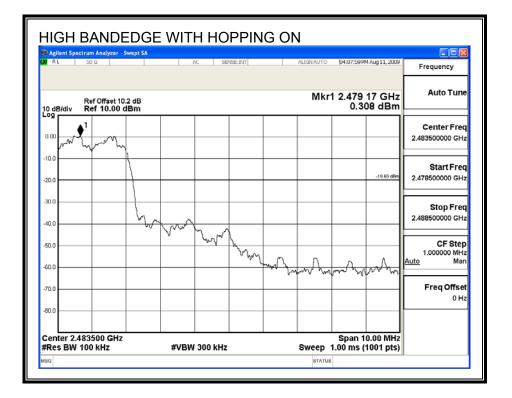
🛙 Agilent Sp	CHAN ectrum Analyzer									
RL	50 Q		1	VC SB	NSE:INT		ALIGNAUTO	03:27:41P	M Aug 11, 2009	Frequency
0 dB/div	Ref Offset 1 Ref 10.00						М		80 GHz 84 dBm	Auto Tune
1.00	<b>1</b>									Center Free 13.015000000 GH
20.0									-19.50 dBm	Start Free 30.000000 MH
0.0										Stop Free 26.00000000 GH
0.0										CF Step 2.597000000 GH Auto Mar
70.0 Jan 199	apper and welling register	her the the second second	,philtrout,r⊷	daa kaay kabaatiin ka	knowlike	realised warns	an in the second	versentaline	hayweelligeneer	Freq Offse 0 Hi
80.0 itart 30								Stor 0	6.00 GHz	
	100 kHz		#VBW	300 kHz			Sweep		1001 pts)	

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### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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# 8. RADIATED TEST RESULTS

# 8.1. LIMITS AND PROCEDURE

### <u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

### TEST PROCEDURE

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

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

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

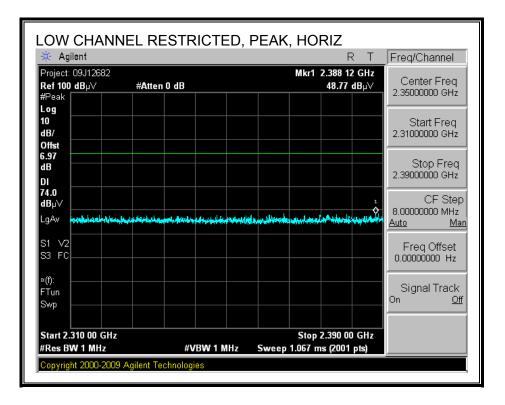
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

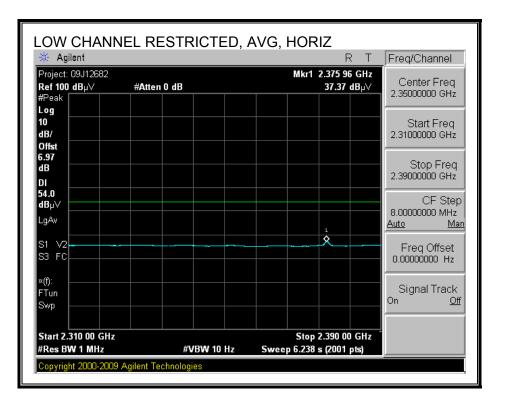
# 8.2. TRANSMITTER ABOVE 1 GHz

# 8.2.1. BASIC DATA RATE GFSK MODULATION

### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

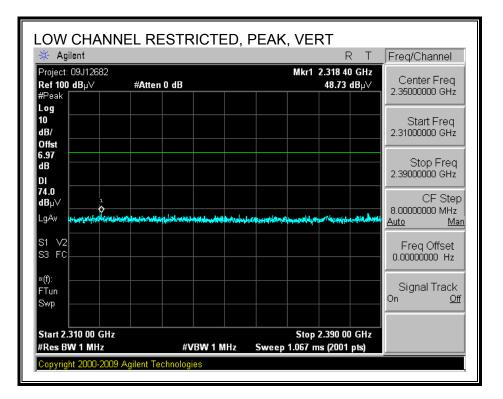


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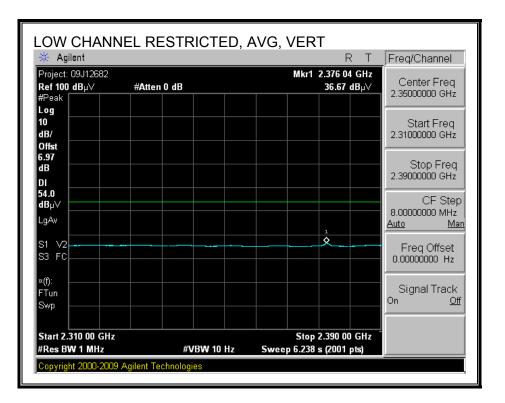


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### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

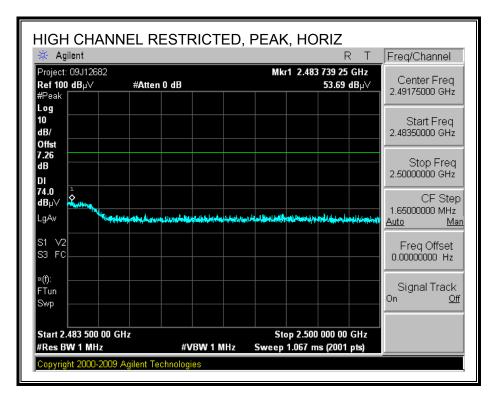


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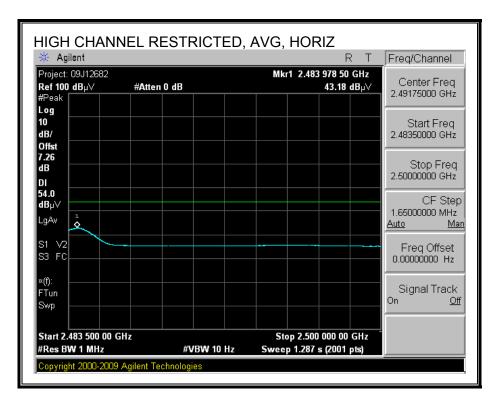


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## RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

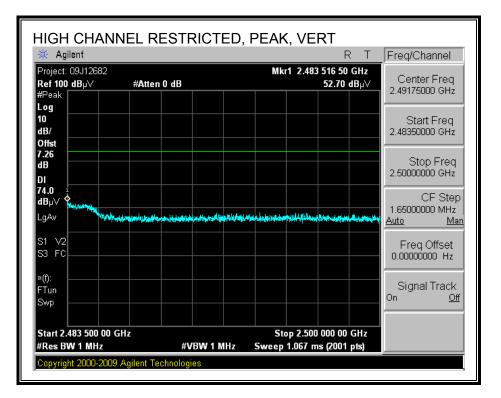


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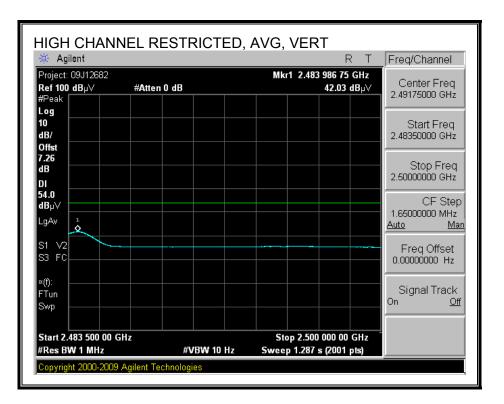


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### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



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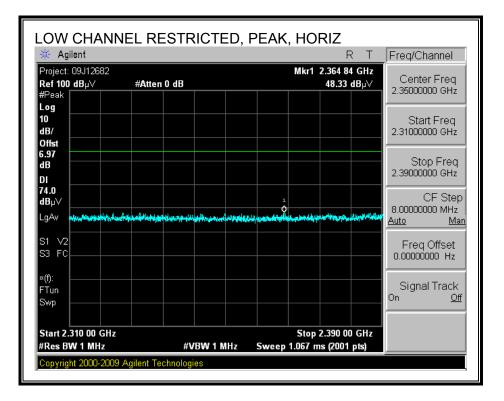
## HARMONICS AND SPURIOUS EMISSIONS

_	: Monic	a Hamison													
Date:		08/14/09	-												
Project #: ~		09J1268	2												
Company		SMK													
Fest Targ		DUT	-												
Mode Op		Tx GFSB				D				۸	F:-13 Ct				
	f Dist	Measurer Distance			-	Preamp ( Distance			4	-	Field Stren; Id Strength	-			
	Read	Analyzer			Avg			trength @			na strengtn 75. Average				
	AF	Antenna	-		Avg Peak	-		Field Stre		-	75. Average 75. Peak Lir				
	CL	Cable Los			HPF	High Pas				marênı	O. I CAK LH				
						-		1							
f	Dist	Read	AF	CL	Amp	D Corr		Corr.			Ant. Pol.	Det		Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	cm	Degree	
2480		4						48.0			<b></b>	~	100 -	318 /	
4.960 1.960	3.0	41.6	32.9	5.9 5 0	-34.9	0.0	0.0 0.0	45.6	74.0 54.0	-28.4	v v	P	100.7	312.4	
4.960 7.440	3.0 3.0	28.7 37.8	32.9 35.4	5.9 7.3	-34.9 -34.6	0.0 0.0	0.0	32.6 45.9	54.0 74.0	-21.4 -28.1	v V	A P	100.7 160.0	312.4 181.4	
7.440	3.0	25.0	35.4	7.3	-34.6	0.0	0.0	33.1	74.0 54.0	-20.1	v V	P A	160.0	181.4	
9.920	3.0	36.8	37.2	8.7	-35.1	0.0	0.0	47.6	74.0	-26.4	v	P	139.3	360.0	
9.920	3.0	24.1	37.2	8.7	-35.1	0.0	0.0	35.0	54.0	-19.0	v	Ā	139.3	360.0	
4.960	3.0	44.7	32.9	5.9	-34.9	0.0	0.0	48.6	74.0	-25.4	H	Р	181.6	164.7	
4.960	3.0	32.6	32.9	5.9	-34.9	0.0	0.0	36.5	54.0	-17.5	H	A	181.6	164.7	
7.440	3.0	37.7	35.4	7.3	-34.6	0.0	0.0	45.7	74.0	- <b>28.</b> 3	H	Р	136.8	38.6	
7.440	3.0	25.1	35.4	7.3	-34.6	0.0	0.0	33.2	54.0	-20.8	H	A	136.8	38.6	
9.920	3.0	37.9	37.2	8.7	-35.1	0.0	0.0	48.8	74.0	-25.2	H	P	154.1	173.9	
9.920	3.0	25.1	37.2	8.7	-35.1	0.0	0.0	35.9	54.0	-18.1	H	A	154.1	173.9	
2441 4.882	3.0	42.9	32.8	5.8	-34.9	0.0	0.0	46.7	74.0	-27.3	н	Р	199.8	62.9	
1.882	3.0	32.3	32.8	5.8	-34.9	0.0	0.0	40.7 36.1	74.0 54.0	-17.9	н Н	P A	199.8	62.9	
7.323	3.0	37.2	35.2	7.3	-34.7	0.0	0.0	45.0	74.0	-29.0	H	P	123.8	298.7	
7.323	3.0	24.4	35.2	7.3	-34.7	0.0	0.0	32.2	54.0	-21.8	H	Ā	123.8	298.7	
9.764	3.0	36.9	37.2	8.6	-35.0	0.0	0.0	47.7	74.0	- <b>26.</b> 3	H	Р	164.8	328.0	
9.764	3.0	23.4	37.2	8.6	-35.0	0.0	0.0	34.2	54.0	-19.8	H	A	164.8	328.0	
4.882	3.0	41.6	32.8	5.8	-34.9	0.0	0.0	45.4	74.0	-28.6	V	P	135.2	356.6	
4.882	3.0	30.0	32.8	5.8	-34.9	0.0	0.0	33.8	54.0 74.0	-20.2	V	A	135.2	356.6	
7.323 7.323	3.0 3.0	37.7 24.6	35.2 35.2	7.3	-34.7 -34.7	0.0 0.0	0.0 0.0	45.5 32.4	74.0 54.0	-28.5 -21.6	V V	P	153.3		
7.323 9.764	3.0	24.0 36.4	35.2	7.3 8.6	-34.7	0.0	0.0	32.4 47.2	54.0 74.0	-21.0	v V	A P	153.3 106.8	171.0 22.2	
9.764	3.0	23.6	37.2	8.6	-35.0	0.0	0.0	34.3	74.0 54.0	-19.7	v	F A	106.8	22.2	
2402									- ""						
4.804	3.0	41.1	32.8	5.8	-34.8	0.0	0.0	44.7	74.0	-29.3	V	Р	101.4	164.0	
4.804	3.0	28.1	32.8	5.8	-34.8	0.0	0.0	31.8	54.0	-22.2	V	A	101.4	164.0	
7.206	3.0	37.8	35.0	7.2	-34.7	0.0	0.0	45.4	74.0	- <b>28.6</b>	V	Р	182.3	212.9	
7.206	3.0	25.1	35.0	7.2	¢	0.0	0.0	32.7	54.0	-21.3	V	A	182.3	212.9	
9.608	3.0	36.3	37.1	8.5	-35.0	0.0	0.0	47.0	74.0	-27.0	V	P	139.7	281.7	
9.608	3.0	24.0 41.1	37.1 32.8	8.5 5.8	-35.0 -34.8	0.0	0.0	34.6	54.0 74.0	-19.4 -29.2	V H	A	139.7	281.7	
4.804 4.804	3.0 3.0	41.1 29.7	32.8 32.8	5.8 5.8	-34.8	0.0 0.0	0.0 0.0	44.8 33.4	74.0 54.0	-29.2	H H	P A	196.6 196.6	6.8 6.8	
1.004 7.206	3.0	37.4	35.0	7.2	-34.7	0.0	0.0	33.4 45.0	54.0 74.0	-20.0	н Н	P P	196.6	51.4	
7.206	3.0	24.7	35.0	7.2	-34.7	0.0	0.0	32.3	54.0	-21.7	H	Å	107.5	51.4	
9.608	3.0	37.3	37.1	8.5	-35.0	0.0	0.0	47.9	74.0	-26.1	H	P	199.7	162.4	
9.608	3.0	24.0	37.1	8.5	-35.0	0.0	0.0	34.6	54.0	-19.4	H	A	199.7	162.4	

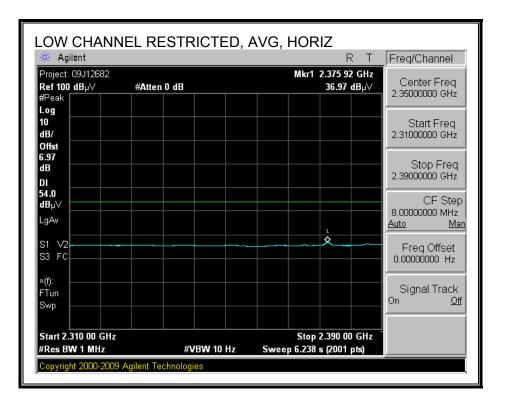
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## 8.2.2. ENHANCED DATA RATE 8PSK MODULATION

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

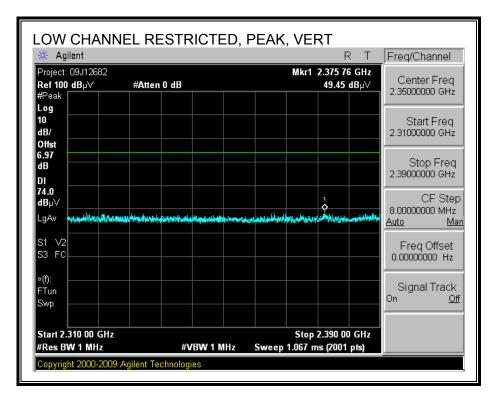


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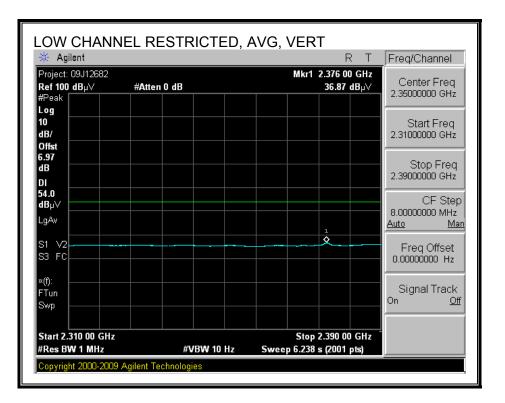


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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

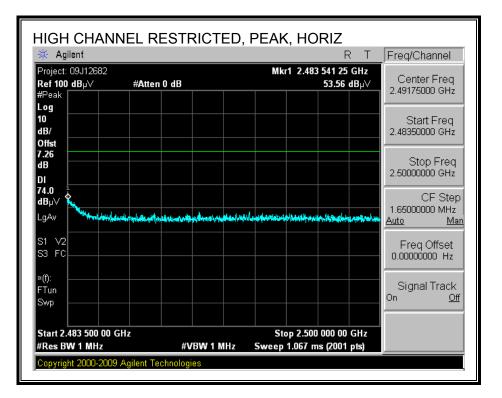


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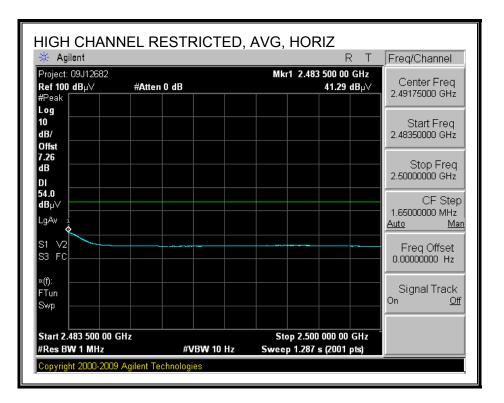


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## RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

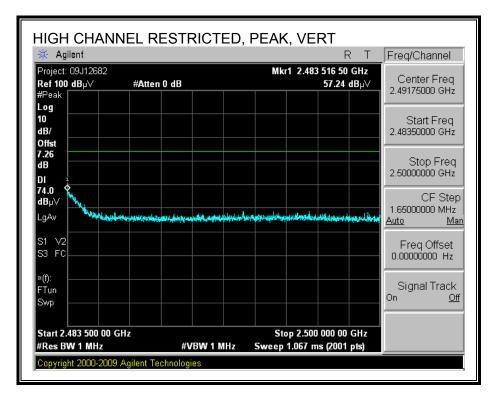


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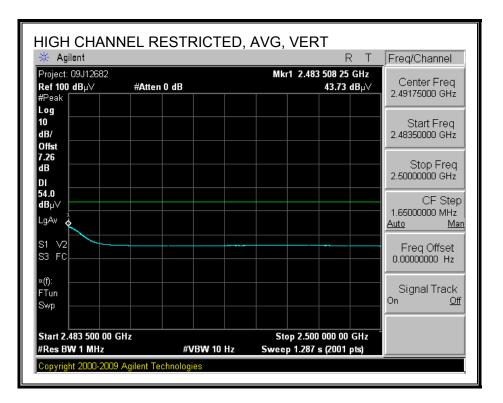


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### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



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# HARMONICS AND SPURIOUS EMISSIONS

lest Engr	: Monic	a Harrison													
Date:		08/16/09													
Project #:		09J1268	2												
Company		SMK													
Test Targ		DUT													
Mode Op		Tx 8PSK				- ,					<b>-</b> :	<b></b>			
	f	Measuren			-	Preamp (				-	Field Stren	-			
	Dist Rood	Distance *				Distance					eld Strength				
	Read AF	Analyzer Antenna	-		Avg Peak	Average . Calculate		irength @ Field Stre		-	vs. Average vs. Peak Lii				
	CL	Cable Los			HPF	High Pas			ing in	marên:	V3. Fear Lu	mui			
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Ant.High	Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	cm	Degree	
2480															
4.960	3.0	38.3	32.9	5.9	-34.9	0.0	0.0	42.2	74.0	-31.8	H	Р	192.7	241.2	
4.960	3.0	25.2	32.9	5.9	-34.9	0.0	0.0	29.1	54.0	-24.9	H	A	192.7	241.2	
7.440	3.0	37.5	35.4	7.3	-34.6	0.0	0.0	45.5	74.0	-28.5	H	Р	198.9	16.5	
7.440 9.920	3.0 3.0	25.0 37.0	35.4 37.2	7.3 8.7	-34.6 -35.1	0.0 0.0	0.0 0.0	33.0 47.9	54.0 74.0	-21.0 -26.1	H H	A P	198.9 176.2	16.5 0.7	
9.920	3.0	24.0	37.2	8.7	-35.1	0.0	0.0	34.8	54.0	-19.2	H	Å	176.2	0.7	
4.960	3.0	39.2	32.9	5.9	-34.9	0.0	0.0	43.1	74.0	-30.9	V	Р	100.7	221.0	
4.960	3.0	25.4	32.9	5.9	-34.9	0.0	0.0	29.3	54.0	-24.7	V	A	100.7	221.0	
7.440	3.0	37.9	35.4	7.3	-34.6	0.0	0.0	46.0	74.0	-28.0	V.	P	140.9	83.2	
7.440 9.920	3.0 3.0	25.0 37.3	35.4 37.2	7.3	-34.6 -35.1	0.0 0.0	0.0 0.0	33.1 48.2	54.0 74.0	-20.9 -25.8	v v	A P	140.9 184.4	83.2 48.2	
9.920 9.920	3.0	23.9	37.2	8.7	-35.1	0.0	0.0	40.2 34.8	54.0	-19.2	v	A A	184.4	48.2	
2441											•				
4.882	3.0	38.1	32.8	5.8	-34.9	0.0	0.0	41.9	74.0	-32.1	V	Р	197.1	255.6	
4.882	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	V	A	197.1	255.6	
7.323	3.0	37.6	35.2	7.3	-34.7	0.0	0.0	45.4	74.0	-28.6	V.	P	193.1	166.0	
7.323 9.764	3.0 3.0	24.6 36.8	35.2 37.2	7.3 8.6	-34.7 -35.0	0.0 0.0	0.0 0.0	32.4 47.5	54.0 74.0	-21.6 -26.5	V V	A P	193.1 190.0	166.0 28.8	
9.764	3.0	23.7	37.2	8.6	-35.0	0.0	0.0	34.4	54.0	-19.6	v	Å	190.0	28.8	
4.882	3.0	38.3	32.8	5.8	-34.9	0.0	0.0	42.1	74.0	-31.9	H	P	146.2	119.5	
4.882	3.0	25.4	32.8	5.8	-34.9	0.0	0.0	29.2	54.0	-24.8	H	A	146.2	119.5	
7.323	3.0	37.0	35.2	7.3	-34.7	0.0	0.0	44.8	74.0	-29.2	H	P	113.5	196.2	
7.323	3.0	24.4	35.2 37.2	7.3	-34.7	0.0	0.0	32.2	54.0	-21.8	H	A	113.5	196.2	
9.764 9.764	3.0 3.0	36.2 23.3	37.2	8.6 8.6	-35.0 -35.0	0.0 0.0	0.0 0.0	46.9 34.0	74.0 54.0	-27.1 -20.0	H H	P A	131.0 131.0	250.5 250.5	
2402									- 114						
4.804	3.0	38.3	32.8	5.8	-34.8	0.0	0.0	42.0	74.0	-32.0	H	Р	176.9	336.2	
4.804	3.0	26.1	32.8	5.8	-34.8	0.0	0.0	29.8	54.0	-24.2	H	A	176.9	336.2	
7.206	3.0	36.9	35.0	7.2	-34.7	0.0	0.0	44.5	74.0	-29.5	H	Р	158.8	103.2	
7.206 9.608	3.0 3.0	24.5 36.6	35.0 37.1	7.2	-34.7 -35.0	0.0 0.0	0.0 0.0	32.1 47.2	54.0 74.0	-21.9 -26.8	H H	A P	158.8 175.6	103.2 338.2	
9.608	3.0	23.7	37.1	8.5	-35.0	0.0	0.0	34.3	54.0	-19.7	H	F A	175.6	338.2	
4.804	3.0	38.6	32.8	5.8	-34.8	0.0	0.0	42.3	74.0	-31.7	v	P	102.7	105.6	
4.804	3.0	26.1	32.8	5.8	-34.8	0.0	0.0	29.8	54.0	-24.2	V	A	102.7	105.6	
7.206	3.0	37.4	35.0	7.2	-34.7	0.0	0.0	45.0	74.0	-29.0	V.	P	102.3	338.4	
7.206	3.0	24.4	35.0	7.2	-34.7	0.0	0.0	32.0	54.0	-22.0	V	A	102.3	338.4	
9.608 9.608	3.0 3.0	36.3 23.7	37.1 37.1	8.5 8.5	-35.0 -35.0	0.0 0.0	0.0 0.0	46.9 34.3	74.0 54.0	-27.1 -19.7	V V	P A	123.3 123.3	341.4 341.4	
7.000	3.0		37.1	0.7	-32.0	0.0	0.0	34.3	24.U	-17.7	• • •	A	143.3	341.4	

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# 8.3. RECEIVER ABOVE 1 GHz

ate: roject # compan est Targ lode Op	y: ;et:	Monica 1 08/16/09 09J1268: SMK RSS 210 RX (Wor	2										
	f Dist Read AF CL	Measuren Distance Analyzer Antenna Cable Los	to Anter Reading Factor	una -	-	Preamp ( Distance Average : Calculate High Pas:	Correc Field S d Peak	trength @ Field Stre	3 m	Peak Fie Margin v	Field Stren; ld Strength 75. Average 75. Peak Lir	Limit Limit	
f	Dist	Read	AF	CL	Amp	D Corr		Corr.		-	Ant. Pol.		Notes
GHz	<u>(m)</u>	dBuV	dB/m	dB	dB	dB	dB		dBuV/m		V/H	P/A/QP	
365	3.0	41.4	28.2	3.8	-35.1	0.0	10.0	48.3	74.0	-25.7	H	P	
76	3.0	30.0	28.2	3.8	-35.1	0.0	10.0	37.0	54.0	-17.0	H	<u>A</u>	
376	3.0	42.5	28.2	3.8	-35.1	0.0	10.0	49.5	74.0	-24.5	<u>v</u>	P	
376	3.0	29.9	28.2	3.8	-35.1	0.0	10.0	36.9	54.0	-17.1	<u>v</u>	<u>A</u>	
184	3.0	50.0	28.5	3.9	-35.1	0.0	10.0	57.2	74.0	-16.8	V	P	
484	3.0	36.5	28.5	3.9	-35.1	0.0	10.0	43.7	54.0	-10.3	<u>v</u>	<u>A</u>	
484	3.0	46.3	28.5	3.9	-35.1	0.0	10.0	53.6	74.0	-20.4	H	P	
483	3.0	34.0	28.5	3.9	-35.1	0.0	10.0	41.3	54.0	-12.7	H	A	
				•	•	•							
tev. 4.1.1 Note: No		<u>missions</u>	were de	tected	1 above 1	the syster	<u>m nois</u>	e floor.					

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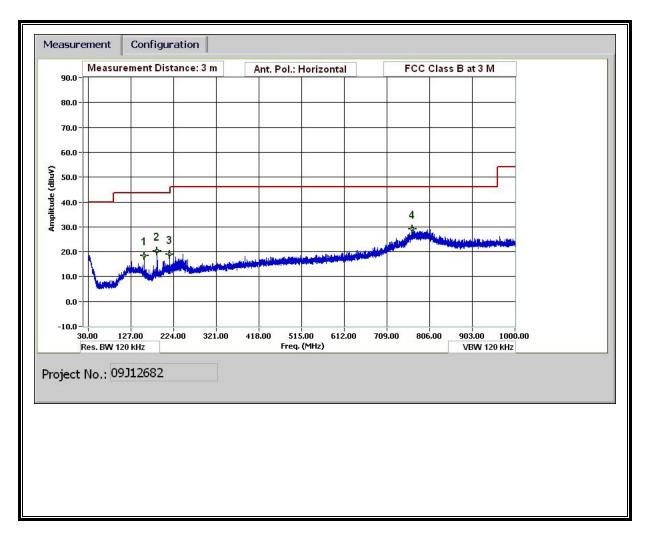
# 8.4. WORST-CASE BELOW 1 GHz

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

SUT M/N: VGP-BMS80         Lest Target:       FCC Class B         Mode Oper:       TX (Worst Case)         f       Measurement Frequency Dist       Amp       Preamp Gain       Margin       Margin vs. Limit         Bist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Margin       Margin vs. Limit         Read       Analyzer Reading       Filter       Filter Insert Loss       Corr.       Calculated Field Strength         AF       Antenna Factor       Corr.       Calculated Field Strength       Margin       Ant Pol       Det       Det         MHz       MBuV/n       dBuV/m       dBuV/m       dBuV/m       dBuV/m       dB       V/H       P/A/QP         opriz       C       C       Ang       DC       Corr.       Filter       BuV/m       dBuV/m       dB       V/H       P/A/QP         opriz       C       C       Ang       DC       O       18.3       43.5       -25.2       H       EP         18.6126       3.0       35.2       11.3       1.1       29.3       0.0       0.0       18.3       43.5       -23.2       H       EP         12.4.488       3.0 <t< th=""></t<>
EUT Description:       Bluetooth Laser Mouse         EUT M/N:       VGP-BMS80         Fest Target:       FCC Class B         Mode Oper:       TX (Worst Case)         f       Measurement Frequency       Amp       Preamp Gain       Margin       Margin vs. Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Margin       Margin vs. Limit         Read       Analyzer Reading       Filter       Filter Insert Loss       Margin       Margin vs. Limit         AF       Antenna Factor       Corr.       Calculated Field Strength       Clust       Det.       Det.       Det.         MHz       MBuV       dB/m       dB       dB       dB       dB       Margin       Ant. Pol.       Det.
EUT M/N:       VGP-BMS80         Test Target:       FCC Class B         Mode Oper:       TX (Worst Case)         f       Measurement Frequency       Amp       Preamp Gain       Margin       Margin vs. Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Margin       Margin vs. Limit         Read       Analyzer Reading       Filter       Filter Insert Loss       Margin       Margin vs. Limit         AF       Antenna Factor       Corr.       Calculated Field Strength       Itimit       Field Strength Limit         f       Dist       Read       AF       CL       Amp       D Corr       Filter Insert Loss         AF       Antenna Factor       Corr.       Calculated Field Strength Limit       Margin       Ant. Pol.       Det.       Det.         MHz       MBuV       dB/m       dB       dB       dB       dB       dB       dB       dB       dB       Margin       Ant. Pol.       Det.       Det.         fs1.445       3.0       35.2       11.3       1.1       29.3       0.0       0.0       18.3       43.5       -25.2       H       FP         186.126       3.0       35.3       20.4
FCC Class B         Mode Oper:       FC (Worst Case)         f       Measurement Frequency Distance to Antenna       Amp       Preamp Gain       Margin       Margin       Margin vs. Limit         Bist       Distance to Antenna Read       Analyzer Reading Analyzer Reading       Filter       Filter Insert Loss       Margin       Margin vs. Limit         f       Measurement Frequency Read       Analyzer Reading       Filter       Filter Insert Loss       Margin vs. Limit         AF       Antenna Factor       Corr.       Calculated Field Strength Limit       Corr.       Limit field Strength       Margin dBuV/m       Ant. Pol       Det.       Det.       P/A/QP         f       Mint       dBuV       dBm       dB
Mode Oper:TX ( Worst Case) $f$ Measurement Frequency Distance to AntennaAmp D CorrPreamp GainMarginMarginMargin vs. LimitDistDistance to AntennaD CorrDistance Correct to 3 meters $Amly$ $Preamp Gain$ Margin vs. LimitReadAnalyzer Reading AFFilterFilterFilter Insert Loss $Amly$ $Preamp Gain$ Margin vs. LimitAFAntenna FactorCorr.Calculated Field Strength $Corr.$ Calculated Field Strength $V/H$ $P/AQP$ fDistReadAFCLAmpD CorrFilterFilterCorr.LimitMarginAnt. Pol.Det.fDistReadAFCLAmpD CorrFilterCorr.LimitMargin vs. LimitDet.fMHz(m)dBuVdB/mdBdBdBdBdBuV/mdBuV/mdBV/H $P/A/QP$ horiz157.4453.035.211.31.129.30.00.018.343.5-25.2HHP186.1263.037.011.11.229.00.00.019.043.5-24.5HHP186.1263.036.611.91.328.90.00.029.146.0-16.9HHP214.8083.036.111.91.328.90.00.020.4
f       Measurement Frequency Dist       Amp       Preamp Gain       Margin       Margin vs. Limit         Dist       Distance to Antenna Read       Analyzer Reading       Filter       Filter Insert Loss       Insert Loss       Insert Loss         AF       Antenna Factor CL       Corr.       Calculated Field Strength Limit       Filter       Filter       Filter       Filter       Filter       Filter       Corr.       Limit       Margin       Margin vs. Limit       Insert Loss         f       Dist       Read       AF       CL       Amp       D Corr.       Calculated Field Strength       Limit       Margin       Ant. Pol.       Det.       Det. <td< th=""></td<>
Dist         Distance to Antenna Read         D Corr         Distance Correct to 3 meters           AF         Analyzer Reading AF         Filter         Filter         Filter Insert Loss           CL         Cable Loss         Corr.         Calculated Field Strength Limit         Limit         Margin BBuV/m         Ant. Pol BBuV/m         Det.         Det. <thdet.< th=""> <thdet.< th="">         Det.</thdet.<></thdet.<>
Read AF CL         Anigyzer Reading Af Cable Loss         Filter Corr.         Filter Insert Loss Calculated Field Strength Limit         Strength Field Strength Limit         Margin dB uV/m         Ant. Pol. dB         Det. Det.         Det. P/A/QP           f         Dist (m)         Read dBu/m         AF dB         CL         Amp dB         D Corr. dB         Filter         Corr. dB         Limit         Margin dB         Ant. Pol. Det.         Det.         D
AF CL       Antenna Factor Cable Loss       Corr. Limit       Calculated Field Strength Field Strength Limit         f       Dist (m)       Read dBwV       AF dB       CL       Amp dB       D Corr dB       Filter dB       Corr. dB       Limit       Margin dB       Ant. Pol.       Det.       Det.         f       Dist (m)       Read dB/m       AF dB       CL       Amp dB       D Corr dB       Filter dB       Corr.       Limit       Margin dB       Ant. Pol.       Det.
CL         Cable Loss         Limit         Field Strength Limit           f         Dist (m)         Read dB/m         AF         CL dB         Amp dB         D Corr dB         Filter         Corr. dB         Limit dBuV/m         Margin dB         Ant. Pol. Det.         Det.         Det. <thdet.< th="">         Det.         <thdet.< th=""> <thdet.< th=""> <thdet.< th=""></thdet.<></thdet.<></thdet.<></thdet.<>
f         Dist (m)         Read dB/m         AF dB         CL dB         Amp dB         D Corr dB         Filter dB         Corr. dB         Limit dBuV/m         Margin dB         Ant. Pol. V/H         Det. P/A/QP           horiz
MHz         (m)         dBuV         dB/m         dB         dB         dB         dB         dB         dB         dB         dBuV/m         dBuV/m         dB         V/H         P/A/QP           horiz         -
MHz         (m)         dBuV         dB/m         dB         <
157.445         3.0         35.2         11.3         1.1         29.3         0.0         0.0         18.3         43.5         -25.2         H         EP           186.126         3.0         37.0         11.1         1.2         29.0         0.0         0.0         20.3         43.5         -25.2         H         EP           186.126         3.0         37.0         11.1         1.2         29.0         0.0         0.0         20.3         43.5         -23.2         H         EP           214.808         3.0         34.6         11.9         1.3         28.9         0.0         0.0         19.0         43.5         -24.5         H         EP           767.190         3.0         35.3         20.4         2.7         29.3         0.0         0.0         29.1         46.0         -16.9         H         EP           99.087         3.0         36.1         11.9         1.3         28.9         0.0         0.0         20.4         43.5         -23.1         V         EP           202.687         3.0         34.4         12.0         1.3         28.9         0.0         0.0         18.8         43.5         -24.7
186.126         3.0         37.0         11.1         1.2         29.0         0.0         0.0         20.3         43.5         -23.2         H         EP           114.808         3.0         34.6         11.9         1.3         28.9         0.0         0.0         19.0         43.5         -23.2         H         EP           167.190         3.0         34.6         11.9         1.3         28.9         0.0         0.0         19.0         43.5         -24.5         H         EP           90.087         3.0         35.3         20.4         2.7         29.3         0.0         0.0         29.1         46.0         -16.9         H         EP           99.087         3.0         36.1         11.9         1.3         28.9         0.0         0.0         20.4         43.5         -23.1         V         EP           102.687         3.0         34.4         12.0         1.3         28.9         0.0         0.0         18.8         43.5         -24.7         V         EP
114.808       3.0       34.6       11.9       1.3       28.9       0.0       0.0       19.0       43.5       -24.5       H       EP         167.190       3.0       35.3       20.4       2.7       29.3       0.0       0.0       29.1       46.0       -16.9       H       EP         99.087       3.0       36.1       11.9       1.3       28.9       0.0       0.0       20.4       43.5       -23.1       V       EP         102.687       3.0       34.4       12.0       1.3       28.9       0.0       0.0       18.8       43.5       -24.7       V       EP
167.190         3.0         35.3         20.4         2.7         29.3         0.0         0.0         29.1         46.0         -16.9         H         EP           199.087         3.0         36.1         11.9         1.3         28.9         0.0         0.0         20.4         43.5         -23.1         V         EP           102.687         3.0         34.4         12.0         1.3         28.9         0.0         0.0         18.8         43.5         -24.7         V         EP
199.087         3.0         36.1         11.9         1.3         28.9         0.0         0.0         20.4         43.5         -23.1         V         EP           202.687         3.0         34.4         12.0         1.3         28.9         0.0         0.0         18.8         43.5         -24.7         V         EP
102.687 3.0 34.4 12.0 1.3 28.9 0.0 0.0 18.8 43.5 -24.7 V EP
77477 J.U 441 214 J.E 204 U.U 0.U 412 74U -110 V EF
ev. 1.27.09 lote: No other emissions were detected above the system noise floor.

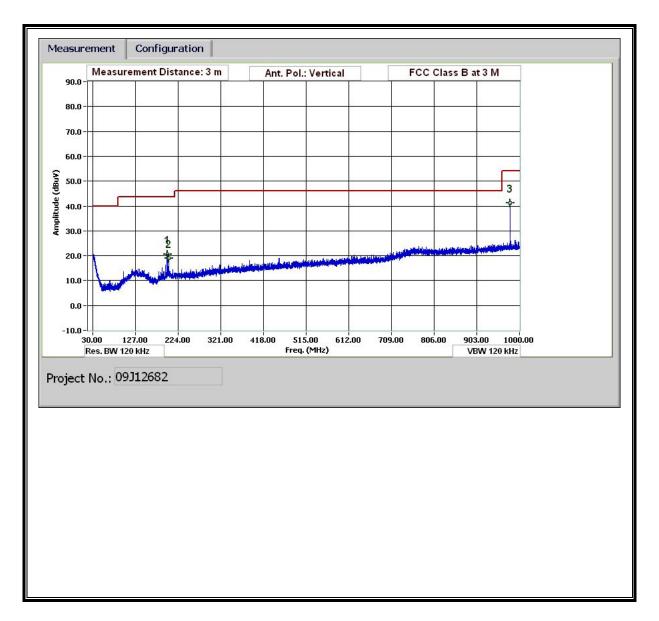
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#### HORIZONTAL PLOT



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## VERTICAL PLOT



COMPLIANCE CERTIFICATION SERVICES FORM NO: CCSUP4701C 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of CCS.

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# 9. 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.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lim	nits for Occupational	/Controlled Exposu	res	
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 8
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34 1.34–30	614 824/f	1.63 2.19/f	*(100) *(180/f²)	30 30

#### TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

#### 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/cm²)	Averaging time (minutes)
30–300 300–1500 1500–100,000	27.5	0.073	0.2 f/1500 1.0	30 30 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 occu-tions where a transient through a location where occu-

pational/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 ex-posed, 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.

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## 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 Ex-
posed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms	3 Magnetic Field Strength; rms	4 Power Density	5 Averaging Time
	(V/m)	(A/m)	(W/m²)	(min)
0.003–1	280	2.19		6
1–10	280/f	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>	0.0042f <sup>0.5</sup>	f/150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 /f <sup>1.2</sup>
150 000–300 000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> f	616 000 /ƒ <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  $10 \text{ W/m}^2$  is equivalent to  $1 \text{ mW/cm}^2$ .
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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## EQUATIONS

Power density is given by:

S = EIRP / (4 \* Pi \* 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 mWc/m<sup>2</sup> by dividing by 10.

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.

## <u>LIMITS</u>

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>

## <u>RESULTS</u>

Band	Mode	Separation	Output	Antenna	IC Power	FCC Power
		Distance	Power	Gain	Density	Density
		(m)	(dBm)	(dBi)	(W/m^2)	(mW/cm^2)
		(111)	(автт)	(UDI)	(**/111 2)	

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