

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

BD REMOTE CONTROL

MODEL NUMBER: CECH-ZRC1U

FCC ID: CWTASAZY102 IC: 1788F-ASAZY102

REPORT NUMBER: 10J13520-1

ISSUE DATE: JANUARY 25, 2011

Prepared for ALPS ELECTRIC CO., LTD. 6-3-36, FURUKAWANAKAZATO OSAKI-CITY MIYAGI-PREF, 989-6181, JAPAN

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

(R)

NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
	01/25/11	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

INDUSTRY CANADA RSS-GEN Issue 3

COMPANY NAME:ALPS ELECTRIC CO., LTD. 6-3-36, FURUKAWANAKAZATO, OSAKI-CITY MIYAGI-PREF, 989-6181, JAPAN				
EUT DESCRIPTION:	BD REMOTE CONTROL			
MODEL:	CECH-ZRC1U			
SERIAL NUMBER:	11			
DATE TESTED:	JANUARY 13-19, 2011			
	APPLICABLE STANDARDS			
ST	ANDARD	TEST RESULTS		
CFR 47 Pa	art 15 Subpart C	Pass		
INDUSTRY CANADA	Pass			

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

FRANK IBRAHIM EMC SUPERVISOR UL CCS

Tested By:

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2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth & IR Remote control unit, powered by battery.

The radio module is manufactured by CSR.

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	4.15	2.60
2402 - 2480	DQPSK	3.51	1.00
2402 - 2480	Enhanced 8PSK	3.65	2.32

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes $\lambda \setminus 4$ PIFA antenna, with a maximum gain of -0.9 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Bluetest, Btcli (BTM).

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number				
Laptop PC	Toshiba	PSJ50N-0C4006	36017601H				
AC/DC Adapter	Toshiba	PA3282U-2ACA	606				
DC Power Supply	HP	6282A	2410A-04939				
Test Kit	ALPS	Bluetooth Quick Tarter Kit 2	N/A				

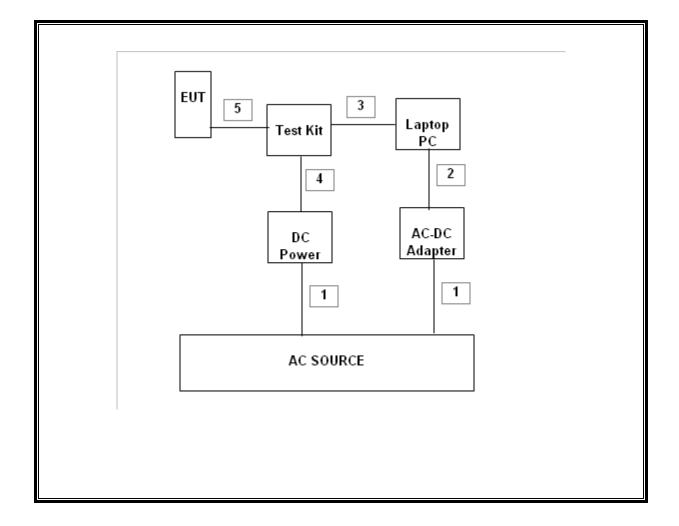
I/O CABLES

	I/O CABLE LIST								
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks			
1	AC Input	2	AC	Un-Shielded	2m	N/A			
2	DC Input	1	DC	Un-Shielded	1.7m	N/A			
3	USB-RS232 Converter	1	USB-RS232	Shielded	0.6m	N/A			
4	DC Input (2P)	1	DC	Un-Shielded	0.9m	N/A			
5	DC Input (3P)	1	DC	Un-Shielded	0.3m	N/A			

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SETUP DIAGRAM FOR RADIATED 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		
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	7/12/2011		
Preamplifier, 1300 MHz	Agilent/HP	8447D	C00885	7/11/2011		
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	5/05/2011		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/11		
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/11		
Spectrum Analyzer, 26.5 GHz	Agilent/HP	E4440A	C01179	08/18/11		
Spectrum Analyzer, 26.5 GHz	Agilent/HP	E4440A	C01178	08/30/11		
Power Meter	Agilent / HP	438A	C01068	7/18/11		
Reject Filter, 2.4-2.5 GHz	Maro-Tranics	BRM50702	N02685	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

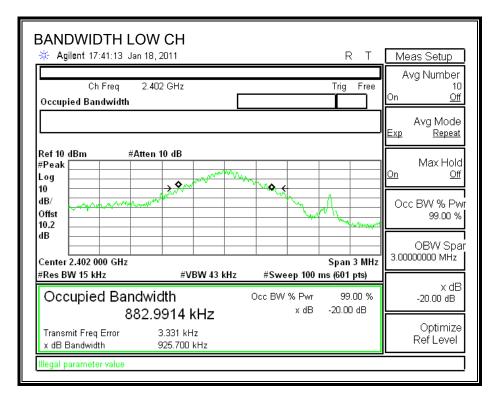
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	925.7	938.3961
Middle	2441	925.626	951.0308
High	2480	923.118	986.0936

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20 dB BANDWIDTH

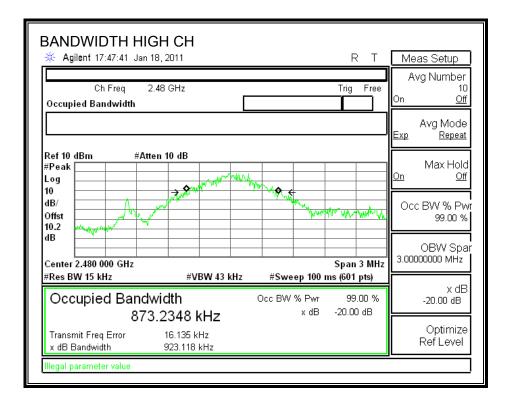


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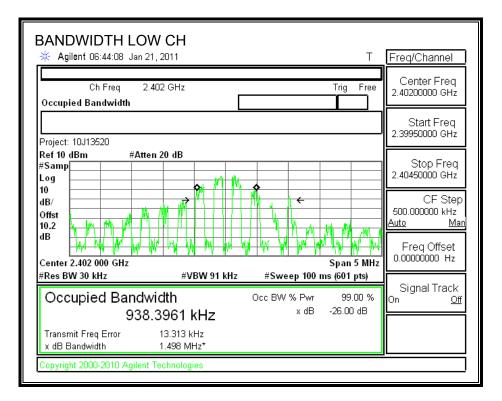
BANDWIDTH MID (Agilent 17:34:35 Jan 18,	-		RТ	Meas Setup
Ch Freq 2.44 Occupied Bandwidth	1 GHz		Trig Free	Avg Number 10 On <u>Off</u>
				Avg Mode <u>Exp Repeat</u>
Ref 10 dBm #Atten #Peak Log 10				Max Hold <u>On Off</u>
dB/ Offst 10.2		- Minut	Martin	Occ BW % Pw 99.00 %
dB	///DW/ 42.111		Span 3 MHz	OBW Spa 3.0000000 MHz
#Res BW 15 kHz Occupied Bandwid	#VBW 43 kHz dth 499 kHz	#Sweep 100 r Occ BW % Pwr x dB	ns (601 pts) 99.00 % -20.00 dB	x dB -20.00 dB
Transmit Freq Error	499 КП2 7.386 kHz 925.626 kHz			Optimize Ref Level
lllegal parameter value				

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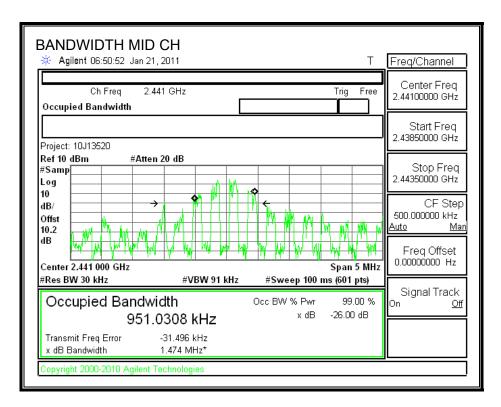
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99% BANDWIDTH

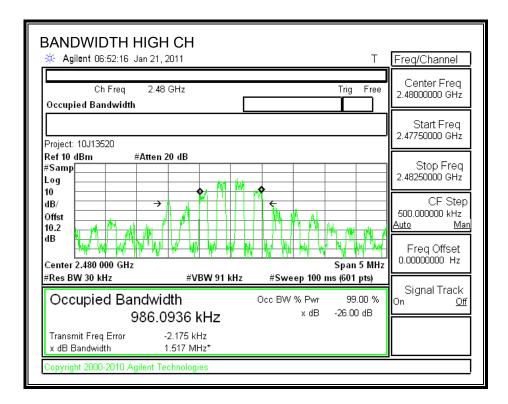


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7.1.2. HOPPING FREQUENCY SEPARATION

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.

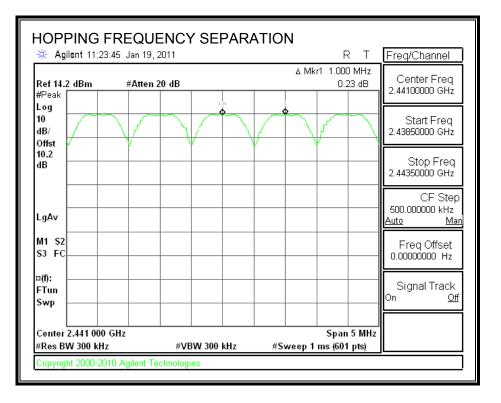
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

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RESULTS

HOPPING FREQUENCY SEPARATION



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7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

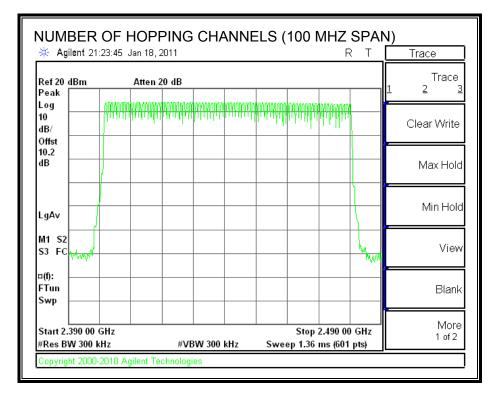
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

79 Channels observed.

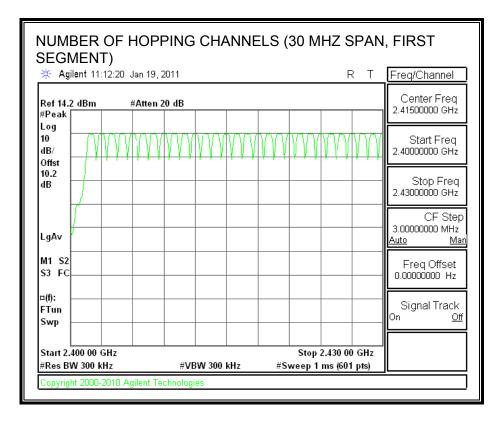
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NUMBER OF HOPPING CHANNELS

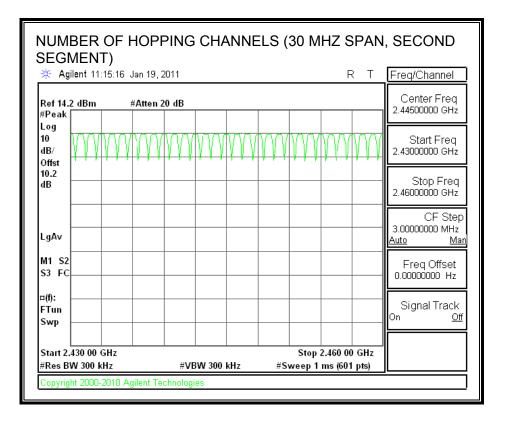


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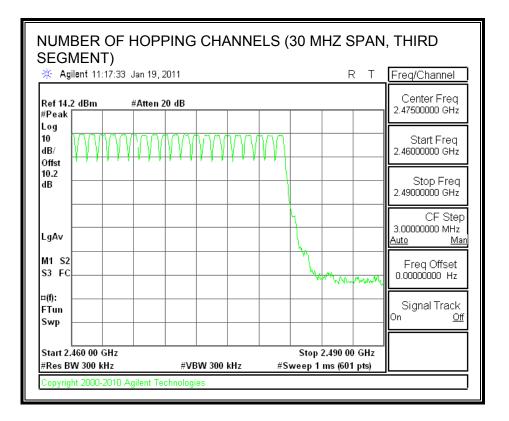
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7.1.4. AVERAGE TIME OF OCCUPANCY

<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

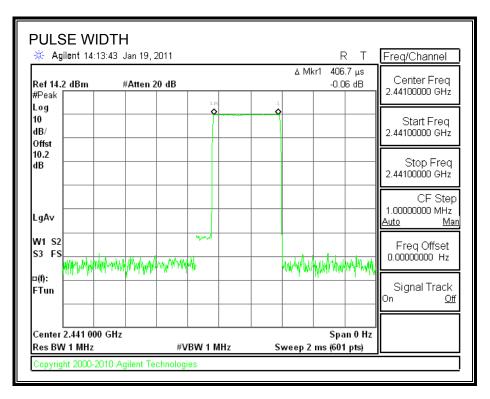
Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.4067	42	0.1708	0.4	0.2292
DH3	1.6000	12	0.1920	0.4	0.2080
DH5	2.9330	7	0.2053	0.4	0.1947

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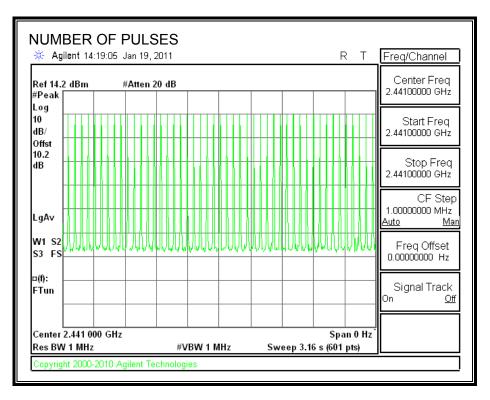
DH1 PULSE WIDTH



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DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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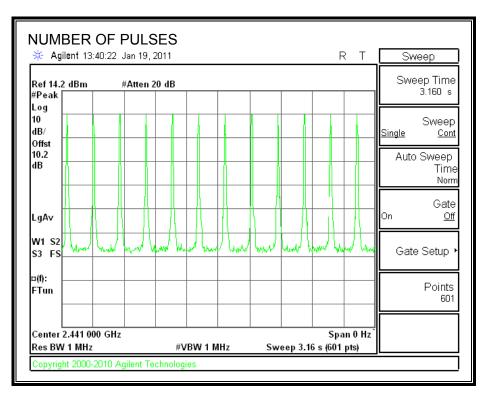
DH3 PULSE WIDTH

※ Agilent 14:05:21 Jan 19, 2 Ref 14.2 dBm #Atten 2 #Peak		R	[−] II. Constan Eron I	
Log 10 dB/ Offst			Start Freq 2.44100000 GHz	
dB			Stop Freq 2.44100000 GHz	
LgAv			CF Step 1.0000000 MHz <u>Auto Man</u>	
W1 S2 S3 FS	l	and the second states and the second states and the second s	Freq Offset 0.00000000 Hz	
¤(f): FTun			Signal Track On <u>Off</u>	
Center 2.441 000 GHz Res BW 1 MHz	#VBW 1 MHz	Span 0 Sweep 10 ms (601 pts)		
Copyright 2000-2010 Agilent Technologies				

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DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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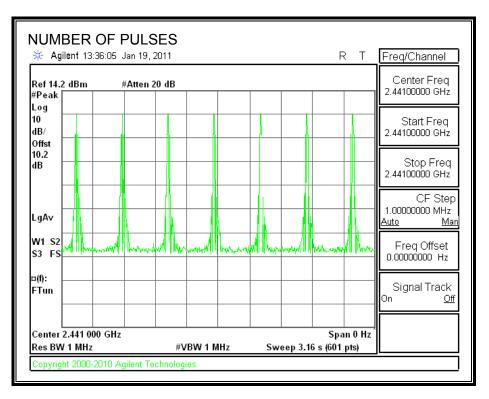
DH5 PULSE WIDTH

PULSE WIDTH				
- 🔆 Agilent 13:58:04 J	an 19, 2011		RT	Freq/Channel
Ref 14.2 dBm #	Atten 20 dB	∆ Mk	(r1 2.933 ms -0.05 dB	Center Freq 2.44100000 GHz
Log AR	\$			Start Freq 2.44100000 GHz
dB				Stop Freq 2.44100000 GHz
LgAv				CF Step 1.0000000 MHz <u>Auto Man</u>
W1 S2 S3 FS		an ala an	the the test of the second second	Freq Offset 0.00000000 Hz
¤(f): FTun				Signal Track On <u>Off</u>
Center 2.441 000 GHz Res BW 1 MHz	#VBW 1 MH	z Sweep 10	Span 0 Hz ms (601 pts)	
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DH5 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.

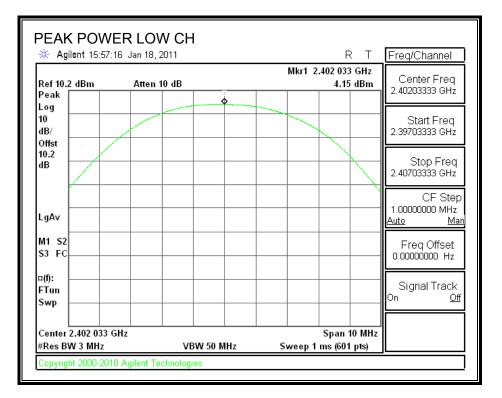
RESULTS

Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	4.15	30	-25.85
Middle	2441	4.12	30	-25.88
High	2480	3.55	30	-26.45

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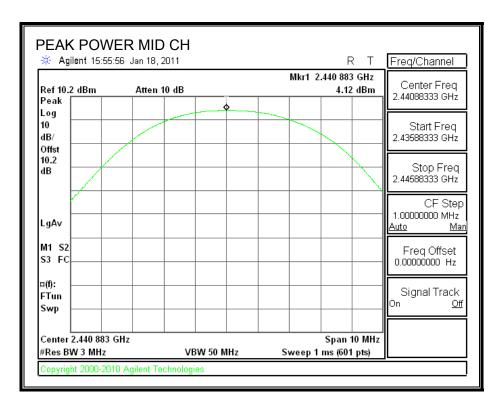
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OUTPUT POWER

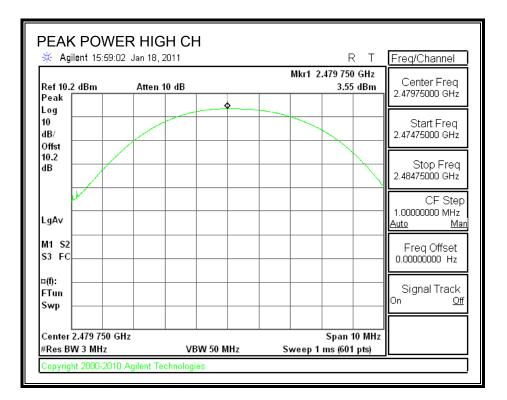


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7.1.6. AVERAGE POWER

<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 10.2 dB (including 10 dB pad and 0.2 dB 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	1.00	
Middle	2441	0.94	
High	2480	0.39	

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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.

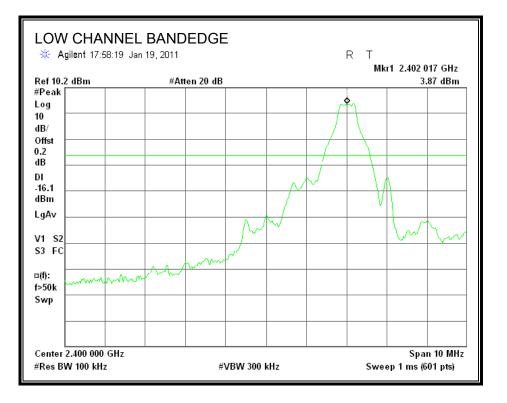
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

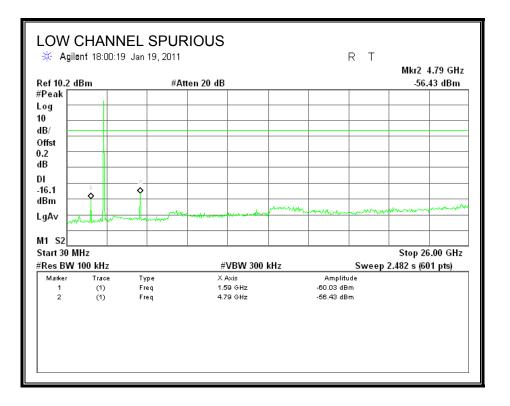
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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

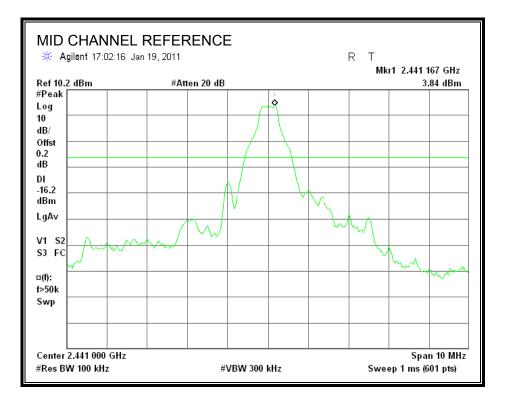


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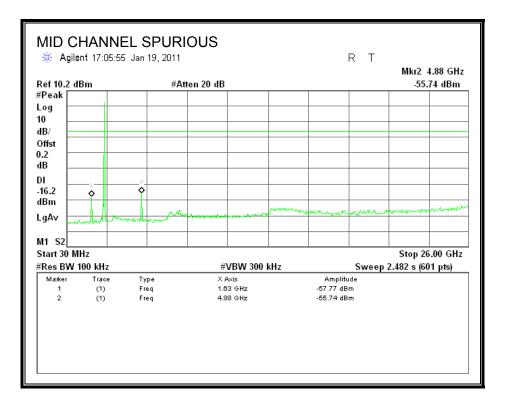


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SPURIOUS EMISSIONS, MID CHANNEL

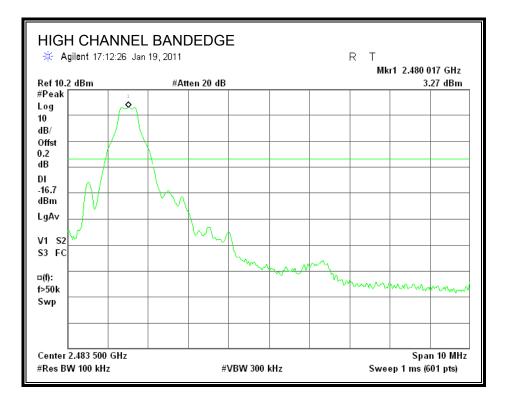


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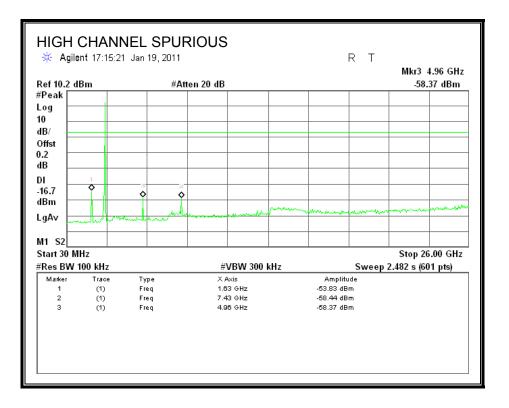


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SPURIOUS EMISSIONS, HIGH CHANNEL

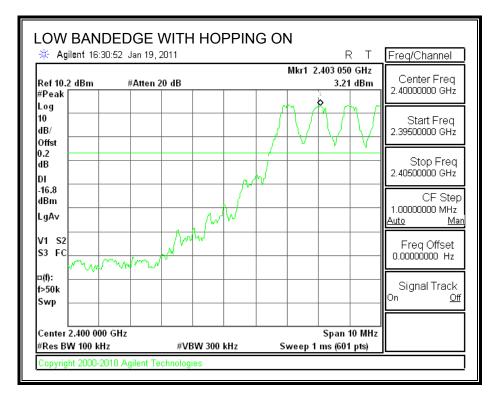


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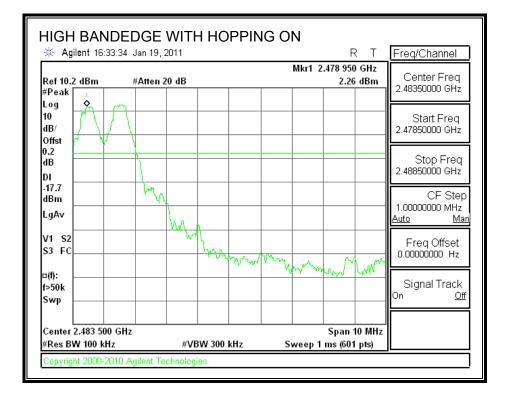
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SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

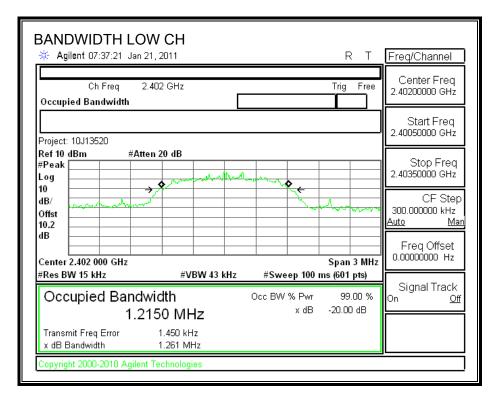
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	1261	1264.3
Middle	2441	1331	1266
High	2480	1234	1245.7

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20 dB BANDWIDTH



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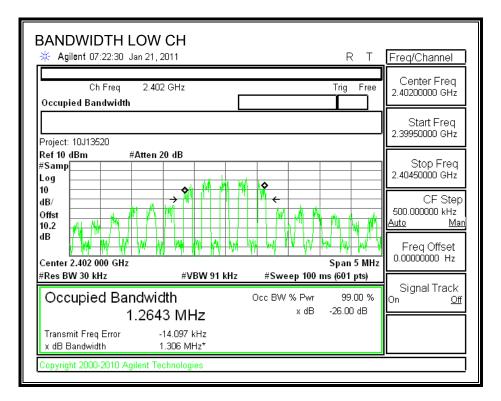
BANDWIDTH MID	-		RТ	Freq/Channel
Ch Freq 2.4 Occupied Bandwidth	41 GHz		Trig Free	Center Freq 2.44100000 GHz
Project: 10J13520				Start Freq 2.43950000 GHz
Ref 10 dBm #Atter #Peak	• 20 dB	and the state of t	~	Stop Freq 2.44250000 GHz CF Step 300.000000 kHz Auto Man
dB Center 2.441 000 GHz #Res BW 15 kHz	#VBW 43 kHz	#Sweep 100 m	Span 3 MHz s (601 pts)	Freq Offset 0.00000000 Hz
Occupied Bandw 1.22	idth 78 MHz	Occ BW % Pwr x dB	99.00 % -20.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error x dB Bandwidth	-3.079 kHz 1.331 MHz			
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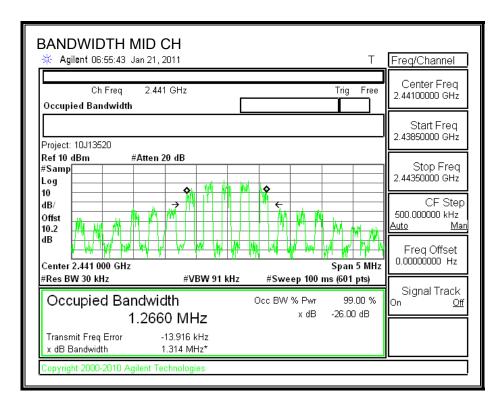
BANDWIDTH HIGH CH ** Agilent 07:45:28 Jan 21, 2011 R T	Freq/Channel		
Ch Freq 2.48 GHz Trig Free Occupied Bandwidth	Center Freq 2.48000000 GHz		
Project: 10J13520	Start Freq 2.47850000 GHz		
Ref 10 dBm #Atten 20 dB #Peak	Stop Freq 2.48150000 GHz		
10 dB/ Offst 10.2	CF Step 300.000000 kHz <u>Auto Man</u>		
dB Span 3 MH Center 2.480 000 GHz Span 3 MH #Res BW 15 kHz #VBW 43 kHz #Sweep 100 ms (601 pts)	Freq Offset 0.00000000 Hz		
#Res BW 15 kHz #VBW 43 kHz #Sweep 100 ms (601 pts) Signal Track Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track 1.2129 MHz x dB -20.00 dB Image: Comparison of the second			
Transmit Freq Error -2.240 kHz x dB Bandwidth 1.234 MHz			
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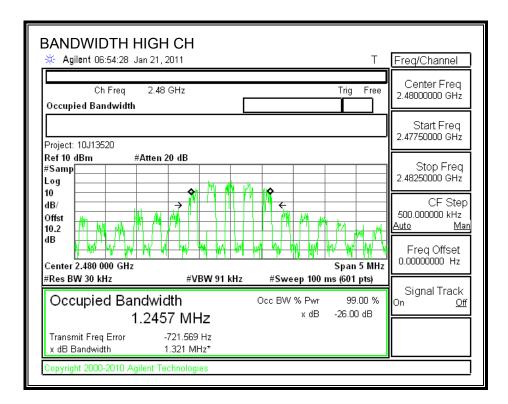
99% BANDWIDTH



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7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

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

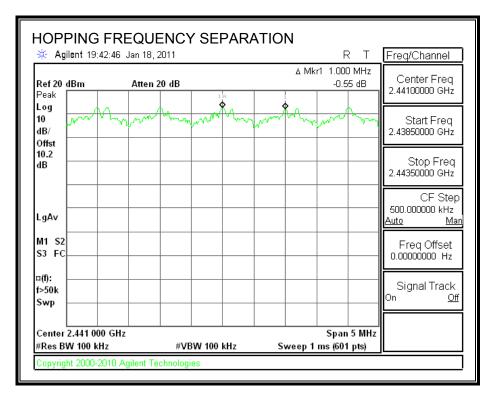
TEST PROCEDURE

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

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RESULTS

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

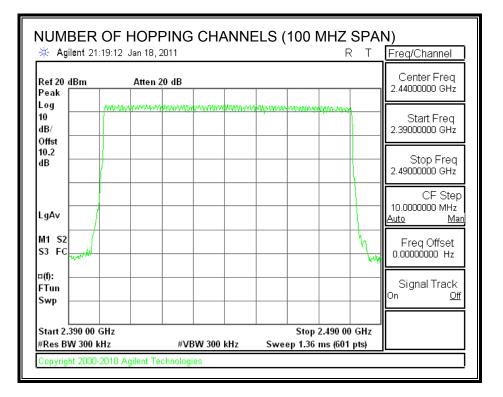
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

79 Channels observed.

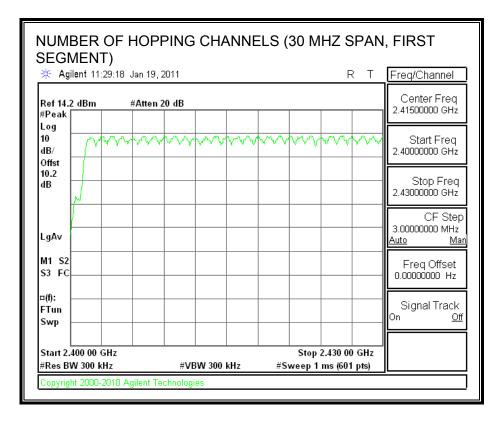
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NUMBER OF HOPPING CHANNELS



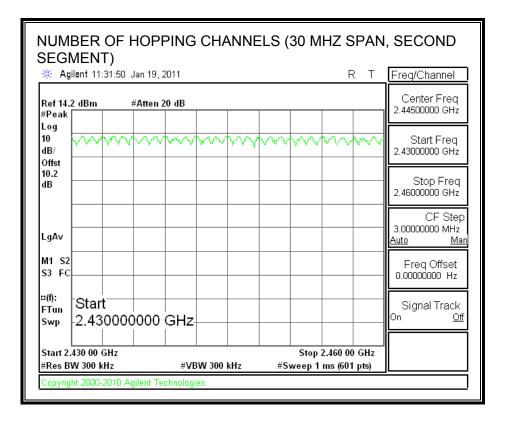
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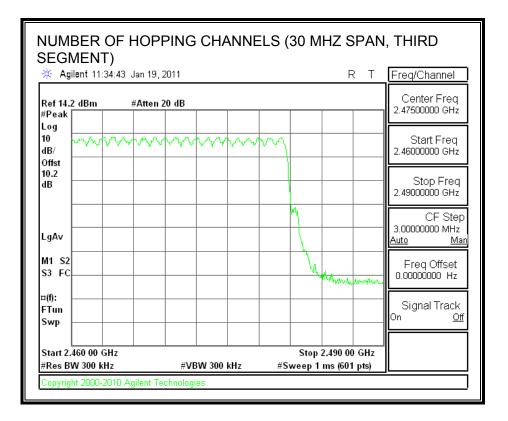


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7.2.4. AVERAGE TIME OF OCCUPANCY

<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

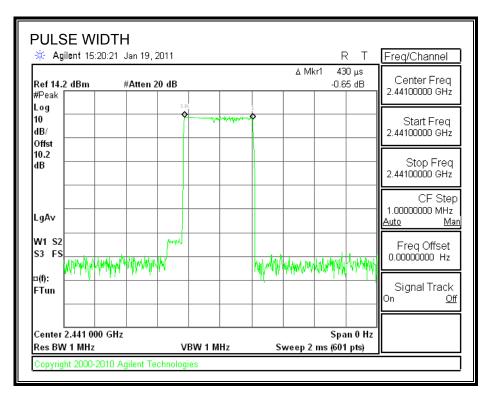
Time of Occupancy = 10 * xx pulses * yy msec = zz msec

8PSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.43	45	0.194	0.4	0.207
3DH3	1.675	12	0.201	0.4	0.199
3DH5	2.917	7	0.204	0.4	0.196

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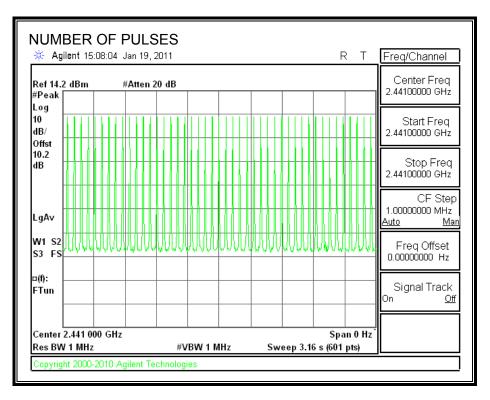
3DH1 PULSE WIDTH



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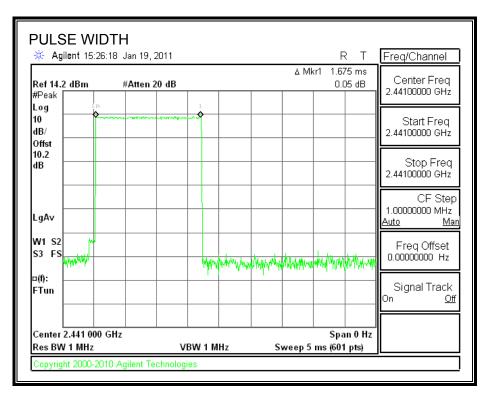
3DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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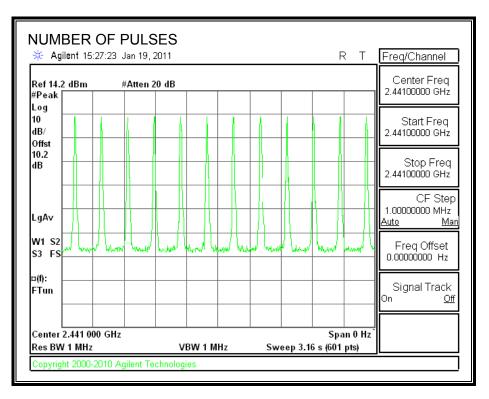
3DH3 PULSE WIDTH



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3DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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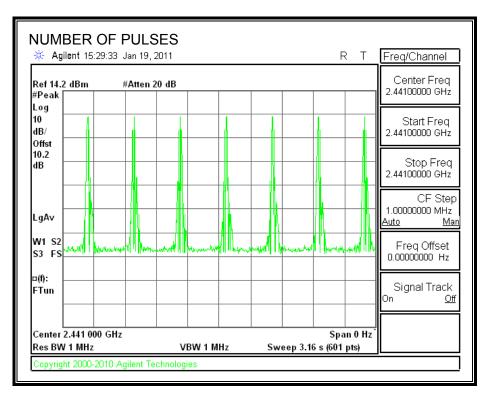
3DH5 PULSE WIDTH

PULSE WIDTH	I			
i 🔆 Agilent 15:31:39 J	lan 19, 2011	I	₹Т	Freq/Channel
#Peak	Atten 20 dB	0.	17 ms 22 dB	Center Freq 2.44100000 GHz
Log 10 dB/ Offst				Start Freq 2.44100000 GHz
10.2 dB				Stop Freq 2.44100000 GHz
LgAv				CF Step 1.00000000 MHz <u>Auto Man</u>
W1 S2 S3 FS	enapowelalan many manana		nan satura	Freq Offset 0.00000000 Hz
¤(f): FTun				Signal Track On <u>Off</u>
Center 2.441 000 GHz Res BW 1 MHz	VBW 1 MHz	Sp Sweep 10 ms (60	an 0 Hz 1 pts)	
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3DH5 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.

TEST PROCEDURE

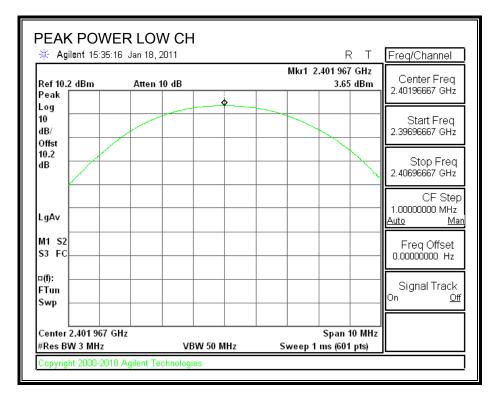
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	3.65	30	-26.35
Middle	2441	3.67	30	-26.33
High	2480	3.01	30	-26.99

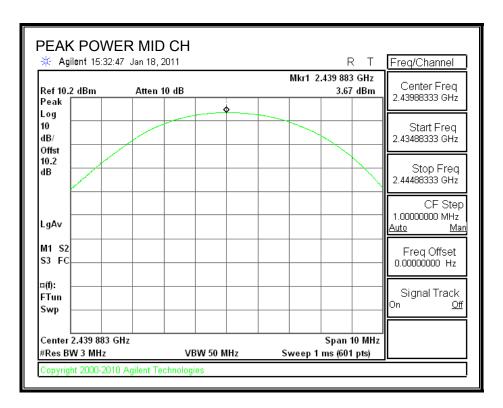
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OUTPUT POWER

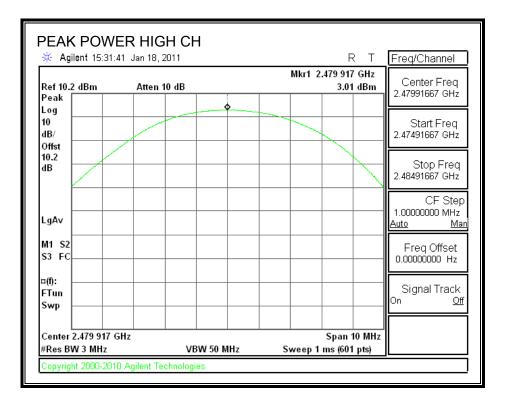


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7.2.6. AVERAGE POWER

<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 10.2 dB (including 10 dB pad and 0.2 dB 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	-1.35
Middle	2441	-1.15
High	2480	-1.88

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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.

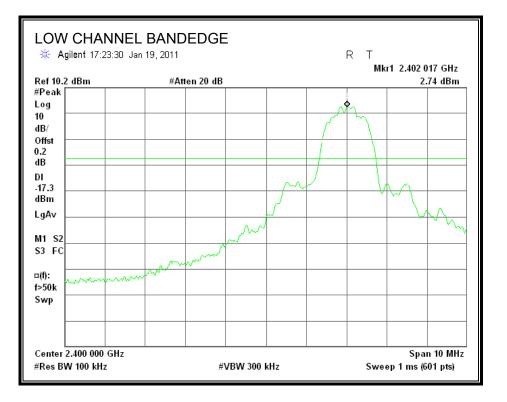
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

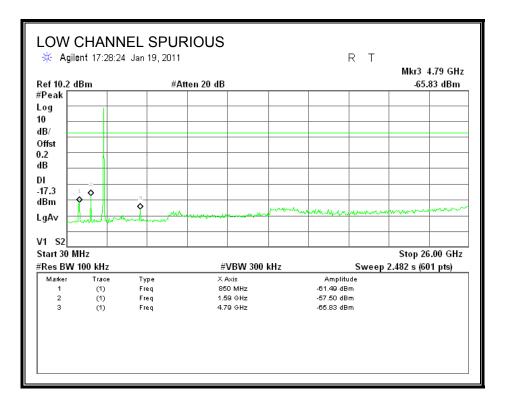
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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

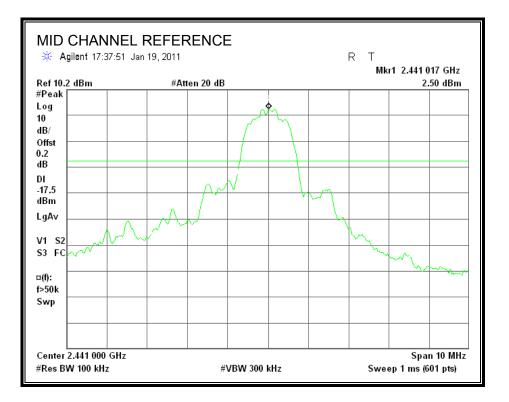


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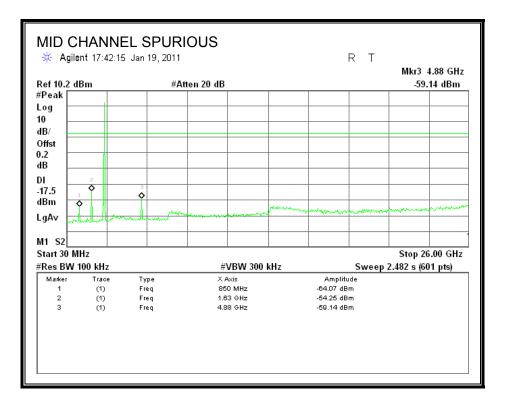


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SPURIOUS EMISSIONS, MID CHANNEL

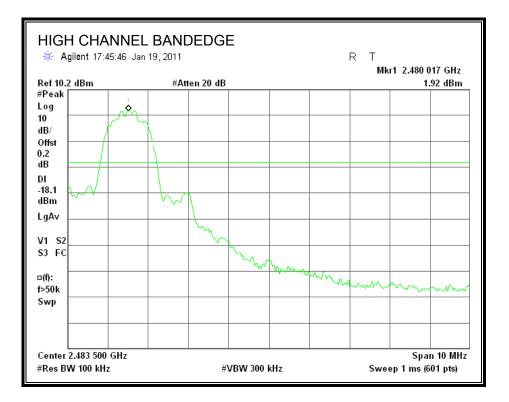


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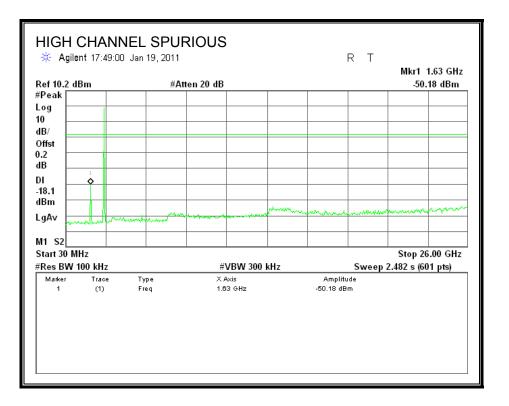


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SPURIOUS EMISSIONS, HIGH CHANNEL

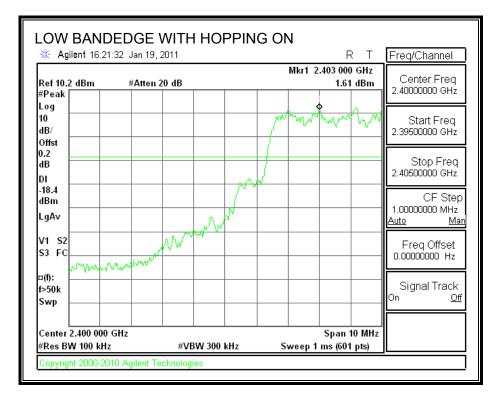


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SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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🔆 Agilent 16:26	28 Jan 19, 2011			RΤ	Freq/Channel
Ref 10.2 dBm #Peak	#Atten 20 dB		Mkr1 2.479	167 GHz 1.76 dBm	Center Freq 2.48350000 GHz
Log 10 AMA AA dB/	^~~				Start Freq 2.47850000 GHz
Offst 0.2 dB DI					Stop Freq 2.48850000 GHz
-18.3 dBm LgAv	- huy				CF Step 1.0000000 MHz <u>Auto M</u> an
V1 S2 S3 FC	Y	Manama	manna		Freq Offset 0.00000000 Hz
¤(f): f>50k Swp			* Www.hum	- March	Signal Track ^{On <u>Off</u>}
Center 2.483 500 #Res BW 100 kHz		VBW 300 kHz	Sp Sweep 1 ms	an 10 MHz (601 pts)	

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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.

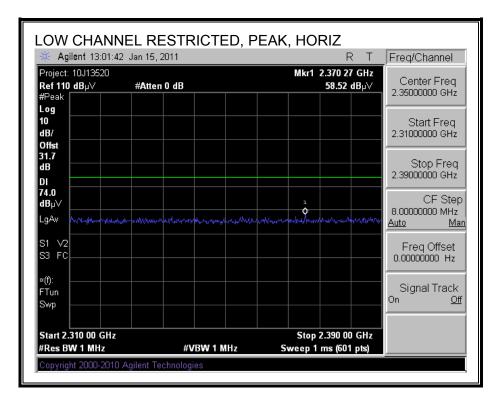
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

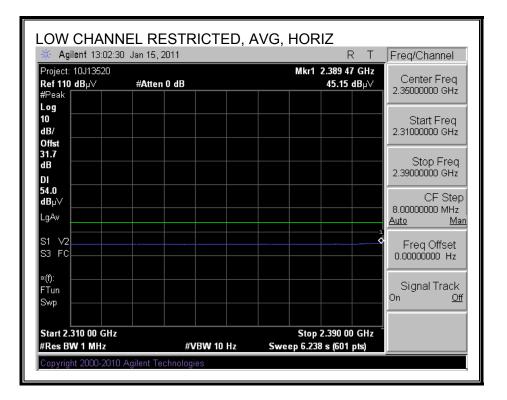
8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



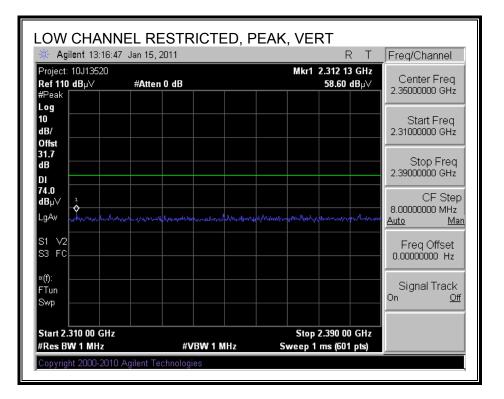
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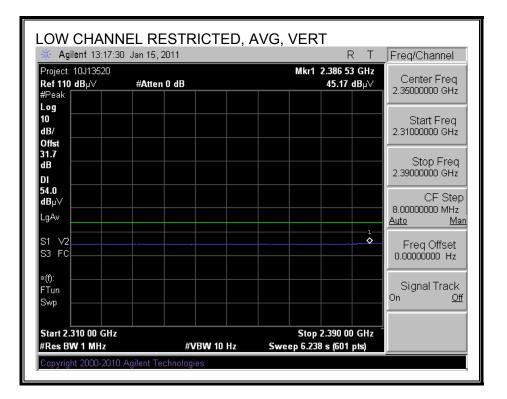
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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



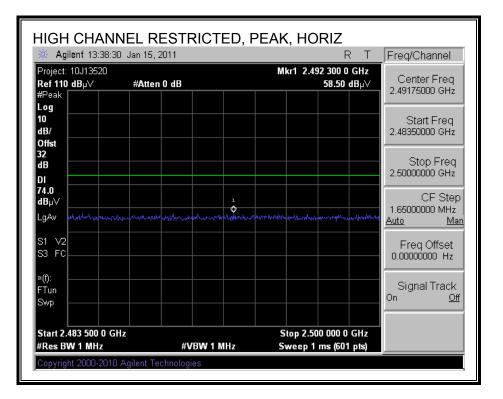
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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



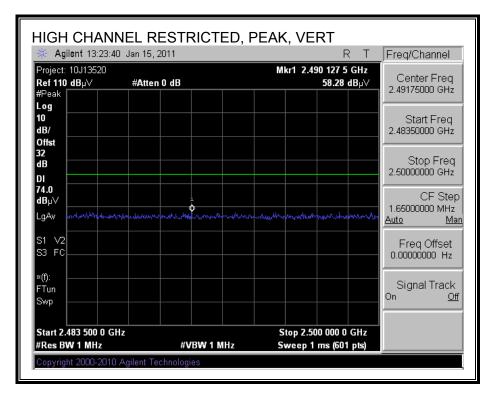
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HIGH CHANI		ED, AVG, HORIZ	Freq/Channel
Project: 10J13520 Ref 110 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.496 810 0 GHz 45.52 dBµ√	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
32 dB DI			Stop Freq 2.5000000 GHz
54.0 dBμ∨ LgAv			CF Step 1.6500000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GI #Res BW 1 MHz	Hz #VBW 10 H	Stop 2.500 000 0 GHz Hz Sweep 1.287 s (601 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 13:24:37	EL RESTRICTE Jan 15, 2011	R T	Freq/Channel
Project: 10J13520 Ref 110 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.484 655 0 GHz 45.62 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
32 dB DI			Stop Freq 2.5000000 GHz
54.0 dBµ∨ LgAw			CF Step 1.6500000 MHz <u>Auto Man</u>
S1 V2			Freq Offset 0.00000000 Hz
»(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 H	Stop 2.500 000 0 GHz z Sweep 1.287 s (601 pts)	

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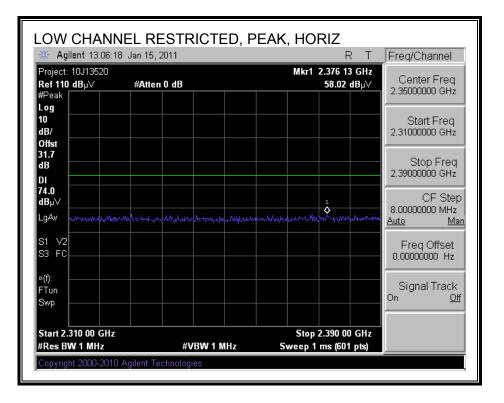
HARMONICS AND SPURIOUS EMISSIONS

'est Engr Date: Project # Company 'est Targ Node Op	: /: et:	Tom Cha 01/15/11 10J1352 ALPS FCC Cla GFSK TX											
	f Dist Read AF CL	Measuren Distance Analyzer Antenna Cable Los	to Anter Reading Factor	ma -	-	-	Correc Field S d Peak	trength @ : Field Stre)3 m	Peak Fie Margin v	Field Stren, Id Strength 75. Average 75. Peak Lir	Limit Limit	
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Согт.	Limit	-	Ant. Pol.		Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
2402MHz			22.0		34.5				7/0			n	/177/17/
4.804	3.0	47.9	33.0	5.8	-36.5	0.0	0.0	50.2	74.0	-23.8	V	P	GFSK
1.804 12 0 1 0	3.0	36.4	33.0	5.8	-36.5	0.0	0.0	38.7	54.0 74.0	-15.3	V	A	GFSK
	3.0 3.0	35.3	39.0	9.7	-35.4	0.0	0.0	48.6	74.0	-25.4	V	P	GFSK
12.010 2402MHz		23.3	39.0	9.7	-35.4	0.0	0.0	36.6	54.0	-17.4	V	A	GFSK
402MHz 4.804	3.0	46.1	33.0	5.8	-36.5	0.0	0.0	48.4	74.0	-25.6	н	Р	GFSK
1.804 1.804	3.0	46.1 35.1	•••••••••••••••••••	5.8 5.8	-36.5	0.0	0.0	48.4	74.U 54.0	*	н Н		GFSK
1.804 12.010	3.0	35.1	33.0 39.0	5.8 9.7	-30.5	0.0	0.0	37.4 50.2	54.U 74.0	-16.6	н Н	A P	GFSK
12.010 12.010	3.0	36.9 24.0	39.0	9.7 9.7	-35.4 -35.4	0.0	0.0	37.3	74.0 54.0	-23.8 -16.7	н Н	P A	GFSK
2441 MH		A	37.0		-32.4		0.0	() 	24NU	-10./		<u>л</u>	GFJK
4.882	3.0	41.5	32.8	5.8	-36.5	0.0	0.0	43.7	74.0	-30.3	H	Р	GFSK
4.882	3.0	31.4	32.8	5.8	-36.5	0.0	0.0	33.5	54.0	-20.5	H	A	GFSK
1.882	3.0	44.2	32.8	5.8	-36.5	0.0	0.0	46.4	74.0	-27.6	V N	P	GFSK
4.882	3.0	33.2	32.8	5.8	-36.5	0.0	0.0	35.4	54.0	-18.6	v	Å	GFSK
480MHz				· · · · ·							•		ve vet
4.960	3.0	38.2	33.2	5.9	-36.5	0.0	0.0	40.8	74.0	-33.2	H	Р	GFSK
4.960	3.0	26.0	33.2	5.9	-36.5	0.0	0.0	28.6	54.0	-25.4	H	Ā	GFSK
7.440	3.0	40.3	35.5	7.3	-36.2	0.0	0.0	46.9	74.0	-27.1	H	P	GFSK
7.440	3.0	28.8	35.5	7.3	-36.2	0.0	0.0	35.4	54.0	-18.6	H	Ā	GFSK
12.400	3.0	35.9	39.0	9.9	-35.4	0.0	0.0	49.4	74.0	-24.6	H	P	GFSK
12.400	3.0	23.7	39.0	9.9	-35.4	0.0	0.0	37.2	54.0	-16.8	H	A	GFSK
2480MHz	High C	H											
4.960	3.0	39.1	33.2	5.9	-36.5	0.0	0.0	41.7	74.0	-32.3	V	P	GFSK
4.960	3.0	28.3	33.2	5.9	-36.5	0.0	0.0	30.9	54.0	- 23.1	V	A	GFSK
1.440	3.0	41.9	35.5	7.3	-36.2	0.0	0.0	48.5	74.0	-25.5	V	P	GFSK
.440	3.0	30.8	35.5	7.3	-36.2	0.0	0.0	37.4	54.0	- 16.6	V	Α	GFSK
12.400	3.0	35.8	39.0	9.9	-35.4	0.0	0.0	49.3	74.0	-24.7	V	Р	GFSK
12.400	3.0	23.6	39.0	9,9	-35.4	0.0	0.0	37.2	54.0	-16.8	V	A	GFSK

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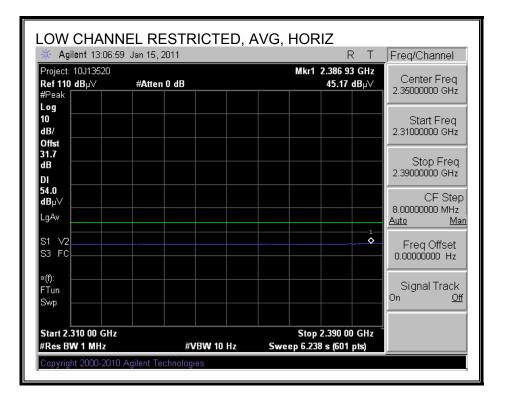
8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



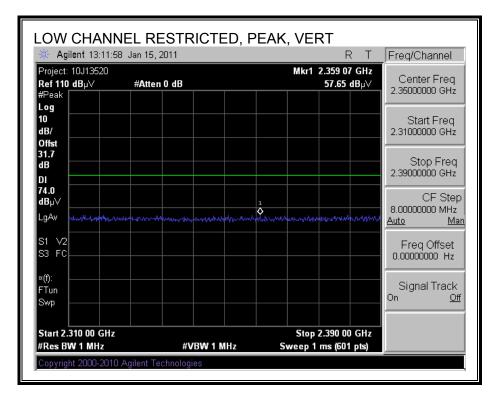
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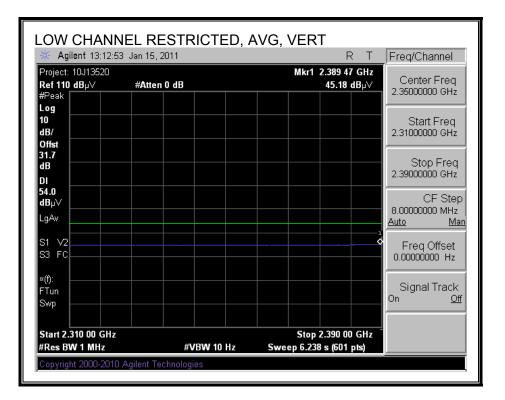
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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



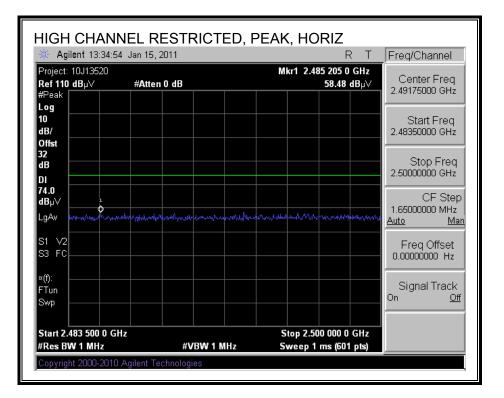
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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



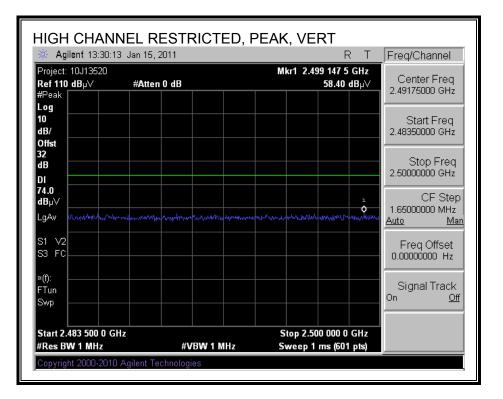
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🔆 Agilent 13:35:19	EL RESTRICTE Jan 15, 2011	RT	Freq/Channel
Project: 10J13520 Ref 110 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.497 415 0 GHz 45.50 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
32 dB DI			Stop Freq 2.5000000 GHz
54.0 dBµ∨ LgAv			CF Step 1.6500000 MHz <u>Auto Mar</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
≈(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.500 000 0 GHz z Sweep 1.287 s (601 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 13:30:3		ED, AVG, VERT	Freq/Channel
	5 Guil 10, 2011	Mkr1 2.483 747 5 GHz	
Project: 10J13520 Ref 110 dB µ∨ #Peak	#Atten 0 dB	MKT 2.4837475 GHz 45.60 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/			Start Freq 2.48350000 GHz
Offst 32 dB			Stop Freq 2.5000000 GHz
DI 54.0 dBµ∨ LgAv			CF Step 1.6500000 MHz
S1 V2			Auto Man Freq Offset 0.00000000 Hz
×(f):			Signal Track
Swp			On <u>Off</u>
Start 2.483 500 0 GH #Res BW 1 MHz	1z #VBW 10 I	Stop 2.500 000 0 GHz Iz Sweep 1.287 s (601 pts)	

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HARMONICS AND SPURIOUS EMISSIONS

est Engr ate: roject # compan; est Targ Iode Op	: y: jet:	Tom Chen 01/15/11 10J13520 ALPS FCC Class B 8PSK TX mode											
						-	. .				-		
	f	Measuren			-	Preamp (-	Field Stren	-	
	Dist Read	Distance				Distance					ld Strength		
	Kead AF	Analyzer Antenna	-		Avg Peak	-		trength @ : Field Stre		-	rs. Average rs. Peak Lii		
	CL	Cable Los			Peak HPF	High Pas			ngin	wargin /	лэ. геак Lll	τωτ	
	01	04016 1503	-		1		- 1 4(2)						
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
402 MH		н											
.804	3.0	42.6	32.8	5.8	-36.5	0.0	0.0	44.7	74.0	-29.3	H	Р	8PSK
4.804	3.0	31.2	32.8	5.8	-36.5	0.0	0.0	33.3	54.0	-20.7	H	A	8PSK
2.010	3.0	35.1	38.5	9.7	-35.4	0.0	0.0	47.9	74.0	-26.1	H	P	8PSK
2.010	<u>3.0</u>	23.1	38.5	9.7	-35.4	0.0	0.0	35.9	54.0	-18.1	H	A	8PSK
:402 MH 1.804	z Low C 3.0	н 44.7	32.8	5.8	-36.5	0.0	0.0	46.7	74.0	-27.3	v	Р	8PSK
.804 .804	3.0	44./ 32.3	32.8 32.8	5.8 5.8	-36.5 -36.5	0.0	0.0	40.7 34.3	74.0 54.0	-27.3	v V	A P	8PSK 8PSK
.206	3.0	38.1	35.0	7.2	-36.2	0.0	0.0	44.1	24.0 74.0	-19.7	v	P	8PSK
.206	3.0	25.0	35.0	7.2	-36.2	0.0	0.0	31.1	54.0	-22.9	v	Å	8PSK
2.010	3.0	35.1	38.5	9.7	-35.4	0.0	0.0	47.9	74.0	-26.1	v	P	8PSK
2.010	3.0	23.1	38.5	9.7	-35.4	0.0	0.0	35.9	54.0	-18.1	V	A	8PSK
	z Mid C		Į										
.882	3.0	41.2	32.8	5.8	-36.5	0.0	0.0	43.4	74.0	- 30.6	V	P	8PSK
1.882	3.0	29.2	32.8	5.8	-36.5	0.0	0.0	31.4	54.0	-22.6	V	A	8PSK
.882	3.0	39.6	32.8	5.8	-36.5	0.0	0.0	41.8	74.0	-32.2	H	Р	8PSK
.882	3.0	28.0	32.8	5.8	-36.5	0.0	0.0	30.2	54.0	-23.8	H	A	8PSK
480 MH .960	z High (3.0	сн 39.5	32.9	5.9	-36.5	0.0	0.0	41.8	74.0	-32.2	v	Р	8PSK
1.960 1.960	3.0	39.5 25.7	32.9	5.9 5.9	-36.5	0.0	0.0	41.8 28.0	74.0 54.0	-32.2	v V	P A	8PSK
.440	3.0	38.7	35.4	7.3	-36.2	0.0	0.0	45.2	24.0 74.0	-28.8	v	P	8PSK
.440	3.0	26.6	35.4	7.3	-36.2	0.0	0.0	33.1	54.0	-20.9	v	Ā	8PSK
2.400	3.0	35.3	38.7	9.9	-35.4	0.0	0.0	48.6	74.0	-25.4	V	P	8PSK
2.400	3.0	23.4	38.7	9,9	-35.4	0.0	0.0	36.6	54.0	-17.4	V	A	8PSK
480 MH	···· ··· ··· ··· ··· ··· ··· ··· ··· ·		ļ										
.960	3.0	38.2	32.9	5.9	-36.5	0.0	0.0	40.5	74.0	-33.5	H	Р	8PSK
.960	3.0	25.7	32.9	5.9	-36.5	0.0	0.0	28.0	54.0	-26.0	H	A	8PSK
.440	3.0	37.7	35.4	7.3	-36.2	0.0	0.0	44.2	74.0	-29.8	H	Р	8PSK
.440	3.0	25.5	35.4	7.3	-36.2	0.0	0.0	32.0	54.0 74.0	-22.0	H	A	8PSK
2.400	3.0 3.0	36.0 23.4	38.7 38.7	9.9 9.9	-35.4	0.0 0.0	0.0 0.0	49.2 36.6	74.0 54.0	-24.8	H H	P A	8PSK 8PSK
2.400 Rev. 4.1.2		; 4 3.4	36./		-35.4	: 0.0	; U.U	; J0.0	24.0	-17.4	n	n i	9L29V

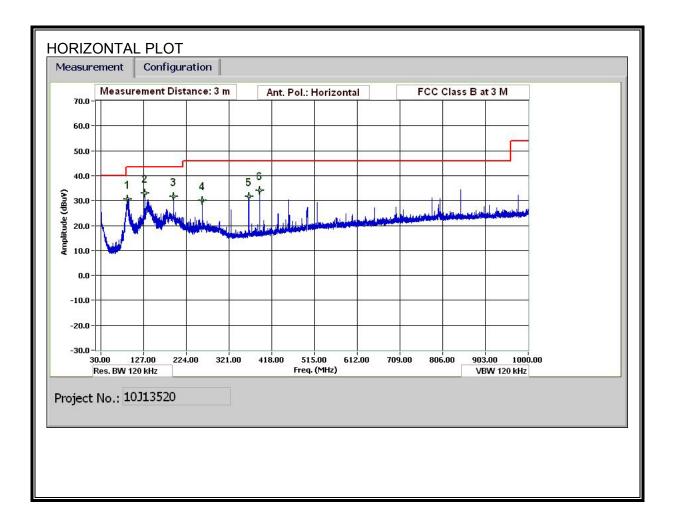
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8.3. RECEIVER ABOVE 1 GHz

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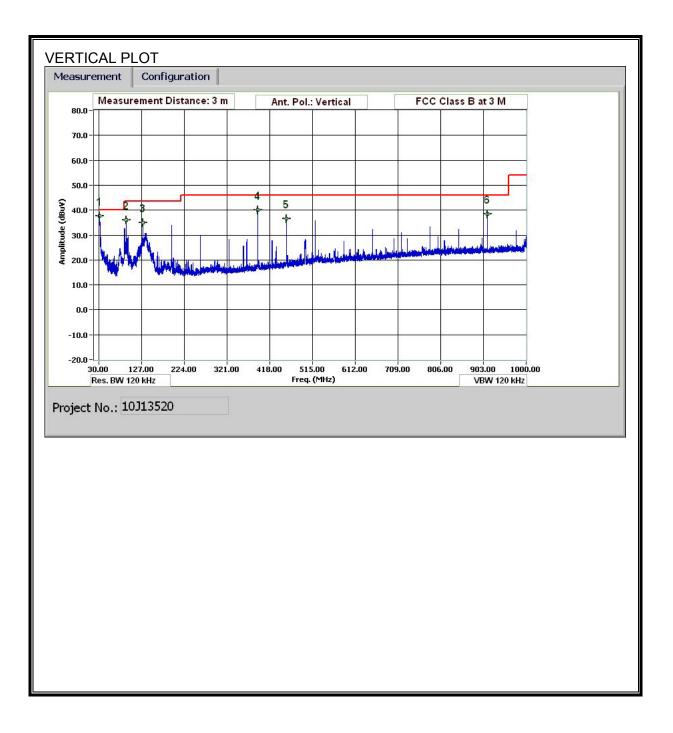
8.4. WORST-CASE BELOW 1 GHz

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



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



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Measurem Distance to Analyzer F Antenna F	o Antenn		Amp	Preamp (
Cable Loss			D Corr Filter Corr. Limit	Distance Filter Inse Calculatee Field Stre	Correct ert Loss 1 Field S	trength		Margin	Margin vs.	Limit	
Read	AF	CL	Amp	D Corr	Pad	Согт.	Limit		:		Notes
dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
41.5	10 7	05	79.4	0.0	0.0	22.2	40.0	67	v	OB.	
		¢									
		o				• • • • • • • • • • • • • • • • • • • •					
	······	¢				• • • • • • • • • • • • • • • • • • • •					
		¢				• • • • • • • • • • • • • • • • • • • •		· •			
						· •			v		,
									-		
50.3	7.8	0.8	28.3	0.0	0.0	30.6	43.5	-12.9	н	Р	
46.7	13.5	1.1	28.3	0.0	0.0	33.0	43.5	-10.5	H	Р	
46.9	11.7	1.2	28.2	0.0	0.0	31.6	43.5	-11.9	H	Р	
44.8	12.1	1.4	28.2	0.0	0.0	30.1	46.0	-15.9	H	Р	
43.8	14.4	1.7	28.1	0.0	0.0	31.8	46.0	-14.2	H	Р	
45.6	14.8	1.8	28.1	0.0	0.0	34.1	46.0	-11.9	H	Р	
	dBuV 41.5 55.3 48.6 51.5 46.5 41.4 50.3 46.7 46.9 41.8 43.8 45.6	dBuV dB/m 41.5 19.7 55.3 8.1 48.6 13.5 51.5 14.8 46.5 15.9 41.4 21.9 50.3 7.8 46.7 13.5 46.9 11.7 43.8 14.4 45.6 14.8	dBuV dB/m dB 41.5 19.7 0.5 55.3 8.1 0.9 48.6 13.5 1.1 51.5 14.8 1.8 46.5 15.9 1.9 41.4 21.9 2.8 50.3 7.8 0.8 46.7 13.5 1.1 46.9 11.7 1.2 44.8 12.1 1.4 43.8 14.4 1.7 45.6 14.8 1.8	dBuV dB/m dB dB 41.5 19.7 0.5 28.4 55.3 8.1 0.9 28.3 48.6 13.5 1.1 28.3 48.6 13.5 1.1 28.3 46.5 15.9 1.9 27.9 41.4 21.9 2.8 27.8 50.3 7.8 0.8 28.3 46.7 13.5 1.1 28.3 46.9 11.7 1.2 28.2 44.8 12.1 1.4 28.3 46.9 11.7 1.2 28.2 43.8 14.4 1.7 28.1 43.8 14.4 1.7 28.1 45.6 14.8 1.8 28.1	dBuV dB/m dB dB dB 41.5 19.7 0.5 28.4 0.0 55.3 8.1 0.9 28.3 0.0 48.6 13.5 1.1 28.3 0.0 46.5 15.5 14.8 1.8 28.1 0.0 46.5 15.9 1.9 27.9 0.0 41.4 21.9 2.8 27.8 0.0 50.3 7.8 0.8 28.3 0.0 46.7 13.5 1.1 28.3 0.0 46.9 11.7 1.2 28.2 0.0 44.8 12.1 1.4 28.2 0.0 44.8 12.1 1.4 28.2 0.0 43.8 14.4 1.7 28.1 0.0 45.6 14.8 1.8 28.1 0.0	dBuV dB/m dB dB dB dB dB dB 41.5 19.7 0.5 28.4 0.0 0.0 55.3 8.1 0.9 28.3 0.0 0.0 48.6 13.5 1.1 28.3 0.0 0.0 46.5 15.9 1.9 27.9 0.0 0.0 46.5 15.9 1.9 27.9 0.0 0.0 41.4 21.9 2.8 27.8 0.0 0.0 46.7 13.5 1.1 28.3 0.0 0.0 46.7 13.5 1.1 28.3 0.0 0.0 46.9 11.7 1.2 28.2 0.0 0.0 44.8 12.1 1.4 28.2 0.0 0.0 43.8 14.4 1.7 28.1 0.0 0.0 45.6 14.8 1.8 28.1 0.0 0.0	dBuV dB/m dB dS dS <th< th=""><th>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</th><th>dBuV dB/m dB dB dB dB dB dB dBuV/m dBuV/m dBuV/m dB 41.5 19.7 0.5 28.4 0.0 0.0 33.3 40.0 -6.7 41.5 19.7 0.5 28.4 0.0 0.0 33.3 40.0 -6.7 55.3 8.1 0.9 28.3 0.0 0.0 35.9 43.5 -7.6 48.6 13.5 1.1 28.3 0.0 0.0 34.9 43.5 -8.6 51.5 14.8 1.8 28.1 0.0 0.0 36.5 46.0 -9.5 41.4 21.9 2.8 27.8 0.0 0.0 38.4 46.0 -7.6 50.3 7.8 0.8 28.3 0.0 0.0 38.4 46.0 -7.6 46.7 13.5 1.1 28.3 0.0 0.0 30.6 43.5 -12.9 46.7 13.5</th><th>dBuV dB/m dB dB dB dB dB dB dB UV/m dB V/H 41.5 19.7 0.5 28.4 0.0 0.0 33.3 40.0 -6.7 V 55.3 8.1 0.9 28.3 0.0 0.0 35.9 43.5 -7.6 V 55.3 8.1 0.9 28.3 0.0 0.0 34.9 43.5 -8.6 V 51.5 14.8 1.8 28.1 0.0 0.0 34.9 43.5 -8.6 V 46.5 15.9 1.9 27.9 0.0 0.0 36.5 46.0 -9.5 V 41.4 21.9 2.8 27.8 0.0 0.0 38.4 46.0 -7.6 V 50.3 7.8 0.8 28.3 0.0 0.0 30.6 43.5 -11.9 H 46.7 13.5 1.1 28.3 0.0 0.0 33.0</th><th>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</th></th<>	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	dBuV dB/m dB dB dB dB dB dB dBuV/m dBuV/m dBuV/m dB 41.5 19.7 0.5 28.4 0.0 0.0 33.3 40.0 -6.7 41.5 19.7 0.5 28.4 0.0 0.0 33.3 40.0 -6.7 55.3 8.1 0.9 28.3 0.0 0.0 35.9 43.5 -7.6 48.6 13.5 1.1 28.3 0.0 0.0 34.9 43.5 -8.6 51.5 14.8 1.8 28.1 0.0 0.0 36.5 46.0 -9.5 41.4 21.9 2.8 27.8 0.0 0.0 38.4 46.0 -7.6 50.3 7.8 0.8 28.3 0.0 0.0 38.4 46.0 -7.6 46.7 13.5 1.1 28.3 0.0 0.0 30.6 43.5 -12.9 46.7 13.5	dBuV dB/m dB dB dB dB dB dB dB UV/m dB V/H 41.5 19.7 0.5 28.4 0.0 0.0 33.3 40.0 -6.7 V 55.3 8.1 0.9 28.3 0.0 0.0 35.9 43.5 -7.6 V 55.3 8.1 0.9 28.3 0.0 0.0 34.9 43.5 -8.6 V 51.5 14.8 1.8 28.1 0.0 0.0 34.9 43.5 -8.6 V 46.5 15.9 1.9 27.9 0.0 0.0 36.5 46.0 -9.5 V 41.4 21.9 2.8 27.8 0.0 0.0 38.4 46.0 -7.6 V 50.3 7.8 0.8 28.3 0.0 0.0 30.6 43.5 -11.9 H 46.7 13.5 1.1 28.3 0.0 0.0 33.0	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $

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9. AC POWER LINE CONDUCTED EMISSIONS

EUT is only powered by batteries and it does not connect to the public power network; therefore, this test is not required.

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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.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lim	its for Occupational	l/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 6
(B) Limits	for General Populati	on/Uncontrolled Exp	oosure	
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

	(V/m)	(A/m)	(mW/cm ²)	(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 (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m ²)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/f	2.19/ <i>f</i>		6
10–30	28	2.19/f		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042f ^{0.5}	f/150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 /f ^{1.2}
150 000–300 000	0.158f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616 000 /f ^{1.2}

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

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m² is equivalent to 1 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/m² EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

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

Distance is given by:

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

where

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

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

<u>LIMITS</u>

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

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

RESULTS

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