TEST REPORT

Report Number: 100189018DEN-001
Project Number: 100189018

Report Issue Date: 08/31/2010

Product Designation: **6.4 IR UHF Pro Remote**

Standards: **FCC CFR47 Part 15.231**
RSS-210, Issue 7: 2007
IC RSS-Gen, Issue 2: 2007 (In-Part)

Tested by:
Intertek Testing Services NA, Inc.
1795 Dogwood Street, Suite 200
Louisville, CO 80027

Emissions Testing Facility
40 Meadow Rd
Pinewood Springs, CO 80540

Client:

Echostar Corporation
dba
EchoStar Technologies, LLC
94 Inverness Terrace East
Englewood, CO 80112

Report Prepared by: Randy Thompson

Report reviewed by:

Randy Thompson
EMC Senior Project Engineer

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded **the product tested complies with the requirements of the standard(s) indicated**. The results obtained in this test report pertain only to the item(s) tested.

2 Test Summary

Section	Test full name	Test date	Result
5	Radiated Emissions – FCC CFR 47 Part 15B,Class B (15.209) / 15.231(b)(3)	08/10/10	Pass
6	AC Mains Conducted Emissions – FCC CFR 47 15.107, Class B	-----	N/A
7	Radiated Emissions – Manual On/Off Timing per FCC 15.231(a)(1) (Complies with RSS-210, A1.1.1	08/11/10	Pass
8	Radiated Intentional Emissions – Fundamental & Harmonics of Fundamental (Spurious) per FCC (15.205) / 15.231(b)(1)(2)(3) (Complies with RSS-210, A1.1.2 (1)(2)(3)	08/10/10	Pass
9	Radiated Emissions – 20dBc Emission Bandwidth - FCC 15.231(c) (Complies with RSS-210, A1.1.3	08/11/10	Pass
10	Radiated Emissions – Occupied Bandwidth - RSS-Gen, Section 4.6.1	08/11/10	Pass

Notes:

The following remarks are to be considered as “where applicable“ and should be taken into account while completing any FCC/IC/ETSI radio tests at Intertek-Louisville Lab.

1) Product is battery-powered – Conducted Emissions not applicable.

2) Testing was performed in 3 different orthogonal axes to determine the worst case emissions from the device. The worst case emissions measurements are shown in this report.

3) FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

4) FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths were utilized when performing the measurements within this report. Measurements were taken utilizing the methods dictated by Part 15.35 for averaging pulsed emissions and for limiting peak emissions.

3 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
6.4 IR UHF Pro Remote	EchoStar Technologies	6.4 IR/UHF Pro Remote (Part Number 140077)	FSK1

Receive Date:	08/10/2010
Received Condition:	Good
Type:	Production Sample

Description of Equipment Under Test (provided by client)

Product: 6.4 IR/UHF Pro Remote for Satellite Television Receiver.

Product to be generally used in household/office, dry locations.

FSK Modulation: Channels: 1,2,4 & 5
OOK Modulation Channel 3

Channel 1: 369.625 MHz
Channel 2: 375.25 MHz
Channel 3: 384.25 MHz
Channel 4: 388.375 MHz
Channel 5: 394.375 MHz

Lowest Clock utilized in product: 4 MHz
Highest Clock utilized in product: 400MHz

Product to be sold in USA and Canada

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
6 VDC Internal Battery	----	N/A	N/A

Operating modes of the EUT:

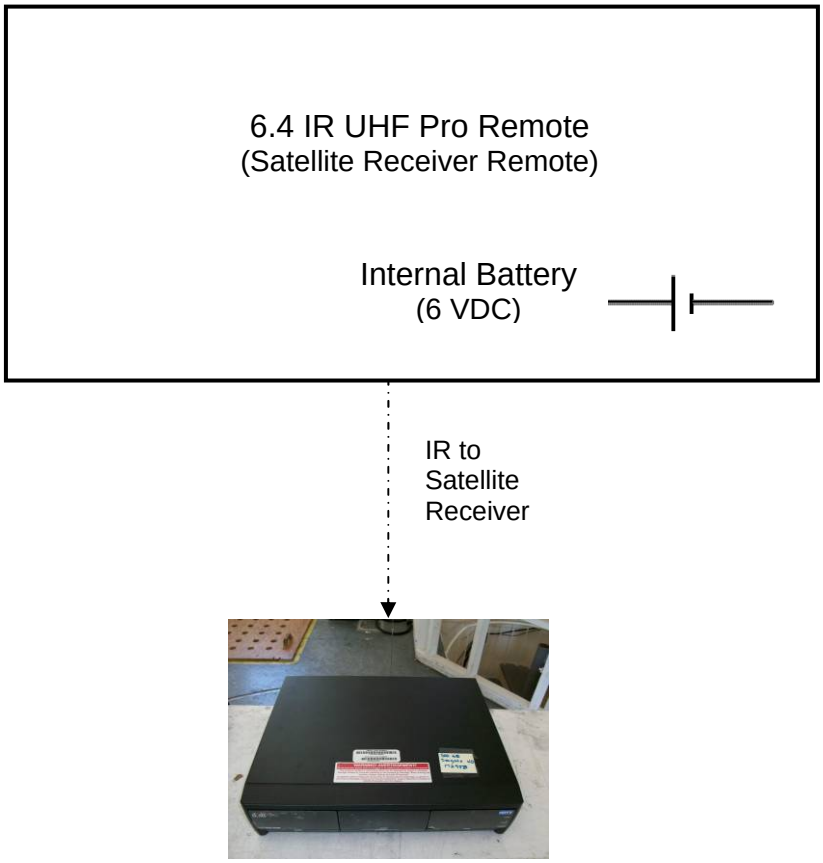
No.	Descriptions of EUT Exercising
1	Product set up with 5-channels, transmitting maximum duty cycle and power per channel.
2	

4 System setup including cable interconnection details, support equipment and simplified block diagram

4.1 Method:

Record the details of EUT cabling, document the support equipment, and show the interconnections in a block diagram.

4.2 EUT Block Diagram:



4.3 Data:

ID	Description/ Function	Shield Type	Length	Connector	Connection	Ferrites
1	-----	-----	-----	-----	-----	-----
2						
3						
4						
5						
6						
7						
8						

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
-----	-----	-----	-----

General notes: Product required no support equipment during testing other than satellite receiver/dish.

5 Radiated Emissions – Unintentional & Spurious

5.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from FCC CFR 47 Part (15.209) / 15.231 and IC RSS-210.

Intertek Louisville's emissions testing facility is located at 40 Meadow Rd. in Pinewood Springs CO 80540. The emissions testing facility is ISO17025:2005 accredited by NVLAP, our lab code is 200624-0, BSMI lab number is SL2-IN-E-029R, our VCCI registration no. R-1643, our FCC designation no. US5170 and our IC lab no. 2042N.

5.2 Test Equipment Used:

Asset ID:	Description:	Manufacturer:	Model:	Serial:	Cal Date	Cal Due
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	11/12/2009	11/12/2010
18660	Spectrum Analyzer Display Section (set 1)	Hewlett-Packard	85662A	2318A04983	11/12/2009	11/12/2010
18880	Q.P Adapter	Hewlett-Packard	85650A	2811A01300	11/12/2009	11/12/2010
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/04/2010	06/04/2011
18906	Pre-Amplifier 1-4 GHz	Mini-Circuits Lab	ZHL-42	N052792-2	06/11/2010	06/11/2011
18798	Bicon Antenna 30 - 300 MHz	EMCO	3109	9801-3142	02/03/2010	02/03/2011
18808	Log Periodic Antenna	EMCO	3146	9203-3376	11/05/2009	11/05/2010
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	10/14/2009	10/14/2010

5.3 Results:

The sample tested was found to comply with the requirements of:

- Provisions of FCC CFR 47 Part 15.205/ 15.35
- FCC CFR 47 Part 15.109, Class B
- FCC CFR 47 Part (15.209) 15.231(b)(3)
- IC RSS-210, A1.1.2(3)

5.4 Data Summary Table

Minimum limit margin -11.4 dB at 383.37 MHz

Remarks: Emissions testing for 15.209 started at 4MHz – Quasi-Peak Measurements

5.5 Setup Photographs:

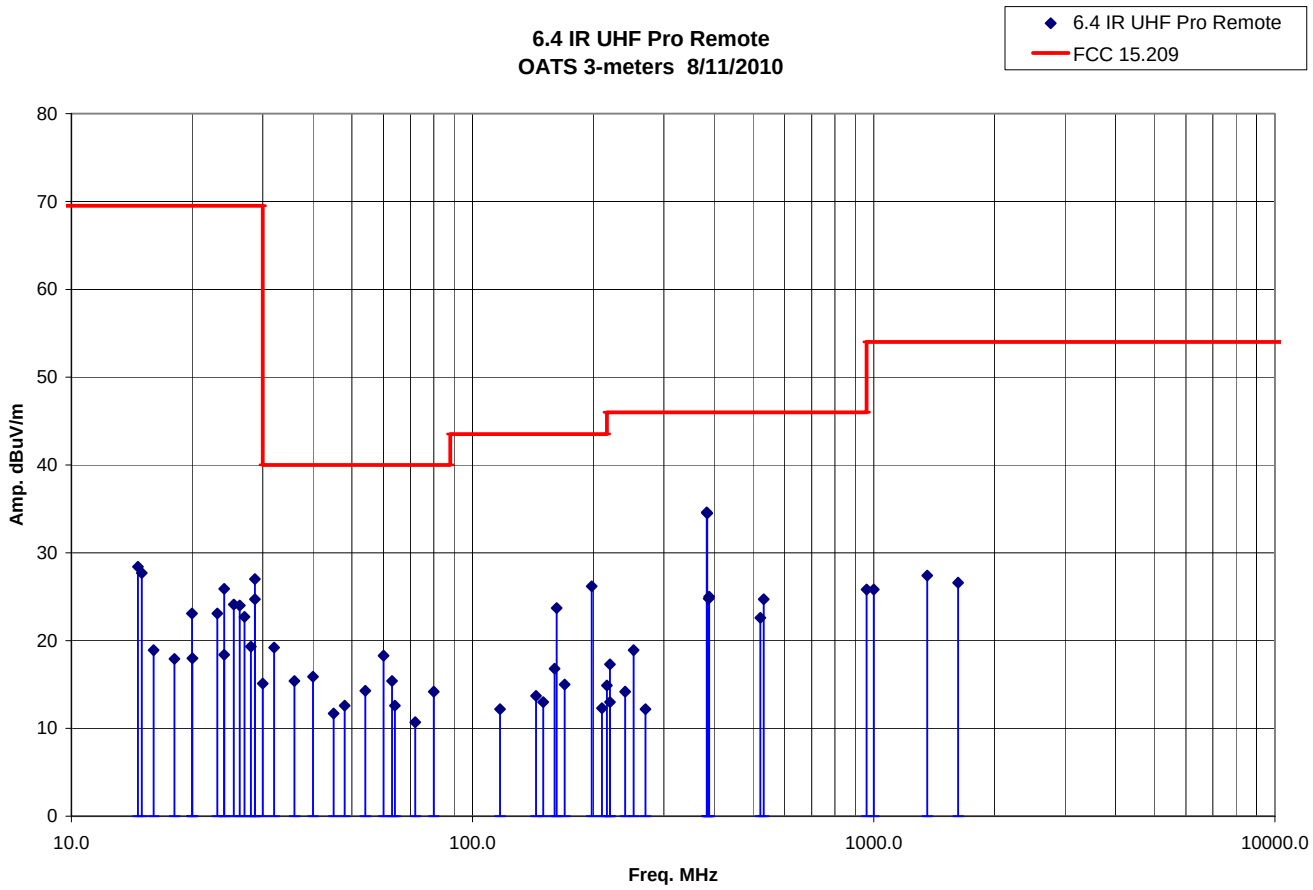
Test Setup – Radiated Emissions (Front View)

Photo:

Test Setup – Radiated Emissions (Rear View)

5.6 Plots: Summary Data

Radiated Emissions – FCC CFR 47 Part 15.209 (4 MHz to 2 GHz)



5.7 Test Data:

Radiated Electromagnetic Emissions

Test Report #:	**500249550 Run 1**	Test Area:	Pinewood Site 1 (3m)	Temperature:	26.9	°C
Test Method:	**FCC Part 15.209**	Test Date:	10-Aug-2010	Relative Humidity:	37.1	%
EUT Model #:	6.4 IR/UHF Pro Remote	EUT Power:	Battery 6VDC	Air Pressure:	79.9	kPa
EUT Serial #:	FSK1					
Manufacturer:	Echostar					
EUT Description:	UHF Remote					

Notes: Remote Active, Tx FSK & OOK temporarily activated while looking for spurious signals not related to the fundamental or harmonics of the fundamental

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
Loop Antenna - 4MHz to 30MHz						
Antenna Parallel to EUT						
8.03	23.0 Qp	0.2 / 10.7 / 0.0	33.9	V / 1.0 / 176.0	-35.6	N/A
4.03	14.9 Qp	0.2 / 10.6 / 0.0	25.7	V / 1.0 / 12.0	-43.8	N/A
12.03	25.1 Qp	0.3 / 10.7 / 0.0	36.1	V / 1.0 / 10.0	-33.4	N/A
16.03	8.0 Qp	0.3 / 10.6 / 0.0	18.9	V / 1.0 / 10.0	-50.6	N/A
24.02	15.7 Qp	0.5 / 9.8 / 0.0	25.9	V / 1.0 / 188.0	-43.6	N/A
28.02	10.1 Qp	0.5 / 8.7 / 0.0	19.3	V / 1.0 / 10.0	-50.2	N/A
9.06	13.8 Qp	0.2 / 10.8 / 0.0	24.8	V / 1.0 / 10.0	-44.7	N/A
18.06	7.0 Qp	0.4 / 10.6 / 0.0	17.9	V / 1.0 / 10.0	-51.6	N/A
27.00	13.2 Qp	0.5 / 9.0 / 0.0	22.7	V / 1.0 / 354.0	-46.8	N/A
4.82	24.6 Qp	0.2 / 10.6 / 0.0	35.4	V / 1.0 / 21.0	-34.1	N/A
14.65	17.4 Qp	0.3 / 10.6 / 0.0	28.4	V / 1.0 / 78.0	-41.1	N/A
14.98	16.8 Qp	0.3 / 10.6 / 0.0	27.7	V / 1.0 / 78.0	-41.8	N/A
19.98	12.1 Qp	0.4 / 10.6 / 0.0	23.1	V / 1.0 / 78.0	-46.4	N/A
23.11	10.2 Qp	0.5 / 10.0 / 0.0	20.6	V / 1.0 / 78.0	-48.9	N/A
25.41	14.1 Qp	0.5 / 9.5 / 0.0	24.1	V / 1.0 / 186.0	-45.4	N/A
26.30	14.3 Qp	0.5 / 9.2 / 0.0	24.0	V / 1.0 / 186.0	-45.5	N/A
28.66	17.9 Qp	0.5 / 8.5 / 0.0	27.0	V / 1.0 / 186.0	-42.5	N/A
Antenna Perpendicular to EUT						
4.00	15.6 Qp	0.2 / 10.6 / 0.0	26.4	H / 1.0 / 186.0	-43.1	N/A
4.42	28.3 Qp	0.2 / 10.6 / 0.0	39.1	H / 1.0 / 112.0	-30.4	N/A
4.82	30.0 Qp	0.2 / 10.6 / 0.0	40.8	H / 1.0 / 112.0	-28.7	N/A
14.65	14.7 Qp	0.3 / 10.6 / 0.0	25.6	H / 1.0 / 56.0	-43.9	N/A
14.98	14.4 Qp	0.3 / 10.6 / 0.0	25.3	H / 1.0 / 56.0	-44.2	N/A
23.11	12.7 Qp	0.5 / 10.0 / 0.0	23.1	H / 1.0 / 124.0	-46.4	N/A

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
24.03	8.1 Qp	0.5 / 9.8 / 0.0	18.4	H / 1.0 / 124.0	-51.1	N/A
28.67	15.7 Qp	0.5 / 8.5 / 0.0	24.7	H / 1.0 / 22.0	-44.8	N/A
30-200MHz Vertical 0 degrees						
30.00	29.0 Qp	0.5 / 13.7 / 28.1	15.1	V / 1.0 / 0.0	-24.9	N/A
60.00	36.6 Qp	0.7 / 8.9 / 28.0	18.3	V / 1.0 / 0.0	-21.7	N/A
36.00	30.2 Qp	0.6 / 12.6 / 28.1	15.4	V / 1.0 / 0.0	-24.6	N/A
45.00	27.8 Qp	0.7 / 11.2 / 28.0	11.7	V / 1.0 / 0.0	-28.3	N/A
54.00	31.7 Qp	0.7 / 9.9 / 28.0	14.3	V / 1.0 / 0.0	-25.7	N/A
63.00	34.2 Qp	0.7 / 8.4 / 27.9	15.4	V / 1.0 / 0.0	-24.6	N/A
72.00	28.1 Qp	0.8 / 7.6 / 27.9	8.7	V / 1.0 / 0.0	-31.3	N/A
144.00	27.5 Qp	1.3 / 12.5 / 27.5	13.7	V / 1.0 / 0.0	-29.8	N/A
117.00	27.1 Qp	1.2 / 11.6 / 27.7	12.2	V / 1.0 / 0.0	-31.3	N/A
162.00	37.6 Qp	1.4 / 12.2 / 27.5	23.7	V / 1.0 / 0.0	-19.8	N/A
198.00	37.9 Qp	1.5 / 14.1 / 27.3	26.2	V / 1.0 / 0.0	-17.3	N/A
32.00	33.2 Qp	0.6 / 13.6 / 28.1	19.2	V / 1.0 / 0.0	-20.8	N/A
40.00	29.9 Qp	0.6 / 12.3 / 28.0	14.7	V / 1.0 / 0.0	-25.3	N/A
48.00	29.1 Qp	0.7 / 10.8 / 28.0	12.6	V / 1.0 / 0.0	-27.4	N/A
64.00	31.4 Qp	0.8 / 8.4 / 27.9	12.6	V / 1.0 / 0.0	-27.4	N/A
80.00	32.5 Qp	0.9 / 7.0 / 27.9	12.6	V / 1.0 / 0.0	-27.4	N/A
160.00	28.4 Qp	1.4 / 12.3 / 27.5	14.6	V / 1.0 / 0.0	-28.9	N/A
169.57	28.8 Qp	1.4 / 12.1 / 27.4	14.8	V / 1.0 / 0.0	-28.7	N/A
30-200MHz Vertical 90 degrees						
80.01	32.4 Qp	0.9 / 7.0 / 27.9	12.5	V / 1.0 / 90.0	-27.5	N/A
30-200MHz Vertical 180 degrees						
150.02	24.3 Qp	1.3 / 12.4 / 27.5	10.5	V / 1.0 / 180.0	-33.0	N/A
No higher signals found: 30-200MHz Vertical 270 degrees						
Following signals maximized between 30 & 200MHz Vertical						
80.02	28.4 Qp	0.9 / 7.0 / 27.9	8.5	V / 1.0 / 12.0	-31.5	N/A
197.99	34.0 Qp	1.5 / 14.1 / 27.3	22.3	V / 1.0 / 212.0	-21.2	N/A
30-200MHz Horizontal 0 degrees						
30.00	24.4 Qp	0.5 / 13.7 / 28.1	10.6	H / 1.6 / 0.0	-29.4	N/A
32.00	24.4 Qp	0.6 / 13.6 / 28.1	10.5	H / 1.6 / 0.0	-29.5	N/A
36.00	24.3 Qp	0.6 / 12.6 / 28.1	9.4	H / 1.6 / 0.0	-30.6	N/A
40.00	26.1 Qp	0.6 / 12.3 / 28.0	11.0	H / 1.6 / 0.0	-29.0	N/A
45.00	25.1 Qp	0.7 / 11.2 / 28.0	9.0	H / 1.6 / 0.0	-31.0	N/A
48.00	28.6 Qp	0.7 / 10.8 / 28.0	12.1	H / 1.6 / 0.0	-27.9	N/A
54.00	27.5 Qp	0.7 / 9.9 / 28.0	10.1	H / 1.6 / 0.0	-29.9	N/A
60.00	28.8 Qp	0.7 / 8.9 / 28.0	10.4	H / 1.6 / 0.0	-29.6	N/A
63.00	30.8 Qp	0.7 / 8.4 / 27.9	12.0	H / 1.6 / 0.0	-28.0	N/A
64.01	27.3 Qp	0.8 / 8.4 / 27.9	8.5	H / 1.6 / 0.0	-31.5	N/A

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
72.00	28.4 Qp	0.8 / 7.6 / 27.9	9.0	H / 1.6 / 0.0	-31.0	N/A
80.00	34.1 Qp	0.9 / 7.0 / 27.9	14.2	H / 1.6 / 0.0	-25.8	N/A
117.02	24.6 Qp	1.2 / 11.6 / 27.7	9.7	H / 1.6 / 0.0	-33.8	N/A
144.00	27.4 Qp	1.3 / 12.5 / 27.5	13.6	H / 1.6 / 0.0	-29.9	N/A
150.02	26.8 Qp	1.3 / 12.4 / 27.5	13.0	H / 1.6 / 0.0	-30.5	N/A
160.00	30.6 Qp	1.4 / 12.3 / 27.5	16.8	H / 1.6 / 0.0	-26.7	N/A
169.60	29.0 Qp	1.4 / 12.1 / 27.4	15.0	H / 1.6 / 0.0	-28.5	N/A
198.00	28.8 Qp	1.5 / 14.1 / 27.3	17.1	H / 1.6 / 0.0	-26.4	N/A
30-200MHz Horizontal 90 degrees						
48.00	29.1 Qp	0.7 / 10.8 / 28.0	12.6	H / 1.6 / 90.0	-27.4	N/A
80.00	33.7 Qp	0.9 / 7.0 / 27.9	13.8	H / 1.6 / 90.0	-26.2	N/A
30-200MHz Horizontal 180 degrees						
40.00	26.2 Qp	0.6 / 12.3 / 28.0	11.1	H / 1.6 / 180.0	-28.9	N/A
80.00	33.3 Qp	0.9 / 7.0 / 27.9	13.4	H / 1.6 / 180.0	-26.6	N/A
160.00	29.9 Qp	1.4 / 12.3 / 27.5	16.0	H / 1.6 / 180.0	-27.5	N/A
No higher signals found: 30-200MHz Horizontal 270 degrees						
Following signals maximized between 30 & 200MHz Horizontal						
40.00	31.0 Qp	0.6 / 12.3 / 28.0	15.9	H / 1.6 / 124.0	-24.1	N/A
71.99	30.1 Qp	0.8 / 7.6 / 27.9	10.7	H / 2.4 / 58.0	-29.3	N/A
80.02	28.1 Qp	0.9 / 7.0 / 27.9	8.2	H / 1.7 / 242.0	-31.8	N/A
200-1000MHz Vertical 0 degrees						
210.00	26.9 Qp	1.5 / 11.1 / 27.2	12.3	V / 1.0 / 0.0	-31.2	N/A
240.00	28.3 Qp	1.7 / 11.3 / 27.1	14.2	V / 1.0 / 0.0	-31.8	N/A
216.00	26.1 Qp	1.6 / 11.0 / 27.2	11.5	V / 1.0 / 0.0	-32.0	N/A
220.09	27.7 Qp	1.6 / 11.0 / 27.2	13.0	V / 1.0 / 0.0	-33.0	N/A
252.15	26.5 Qp	1.7 / 12.1 / 27.1	13.2	V / 1.0 / 0.0	-32.8	N/A
269.64	24.1 Qp	1.8 / 13.1 / 27.0	12.0	V / 1.0 / 0.0	-34.0	N/A
383.37	33.9 Qp	2.1 / 15.0 / 27.5	23.5	V / 1.0 / 0.0	-22.5	N/A
384.62	33.5 Qp	2.2 / 15.0 / 27.5	23.1	V / 1.0 / 0.0	-22.9	N/A
521.64	25.9 Qp	2.6 / 17.9 / 28.2	18.3	V / 1.0 / 0.0	-27.7	N/A
531.46	26.1 Qp	2.6 / 17.9 / 28.2	18.4	V / 1.0 / 0.0	-27.6	N/A
959.99	25.8 Qp	3.7 / 23.0 / 27.3	25.1	V / 1.0 / 0.0	-20.9	N/A
Looked for spurious signals associated with the Tx signals - no obvious signals found						
200-1000MHz Vertical 90 degrees						
252.15	28.2 Qp	1.7 / 12.1 / 27.1	15.0	V / 1.0 / 90.0	-31.0	N/A
383.37	34.6 Qp	2.1 / 15.0 / 27.5	24.2	V / 1.0 / 90.0	-21.8	N/A
384.62	34.5 Qp	2.2 / 15.0 / 27.5	24.1	V / 1.0 / 90.0	-21.9	N/A

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
521.64	24.1 Qp	2.6 / 17.9 / 28.2	16.5	V / 1.0 / 90.0	-29.5	N/A
959.99	25.4 Qp	3.7 / 23.0 / 27.3	24.7	V / 1.0 / 90.0	-21.3	N/A
200-1000MHz Vertical 180 degrees						
216.00	27.4 Qp	1.6 / 11.0 / 27.2	12.8	V / 1.0 / 180.0	-30.7	N/A
220.01	27.4 Qp	1.6 / 11.0 / 27.2	12.7	V / 1.0 / 180.0	-33.3	N/A
383.37	34.5 Qp	2.1 / 15.0 / 27.5	24.1	V / 1.0 / 180.0	-21.9	N/A
384.62	34.4 Qp	2.2 / 15.0 / 27.5	24.0	V / 1.0 / 180.0	-22.0	N/A
No higher signals found: 200-1000MHz Vertical 270 degrees						
Following signals maximized between 200 & 1000MHz Vertical						
216.00	28.7 Qp	1.6 / 11.0 / 27.2	14.1	V / 1.0 / 316.0	-29.4	N/A
220.01	29.0 Qp	1.6 / 11.0 / 27.2	14.3	V / 1.0 / 188.0	-31.7	N/A
383.37	36.2 Qp	2.1 / 15.0 / 27.5	25.9	V / 1.0 / 164.0	-20.1	N/A
384.62	36.2 Qp	2.2 / 15.0 / 27.5	25.8	V / 1.0 / 164.0	-20.2	N/A
531.46	25.8 Qp	2.6 / 17.9 / 28.2	18.1	V / 1.0 / 236.0	-27.9	N/A
959.99	26.4 Qp	3.7 / 23.0 / 27.3	25.8	V / 1.0 / 12.0	-20.2	N/A
200-1000MHz Horizontal 0 degrees						
210.00	26.5 Qp	1.5 / 11.1 / 27.2	11.9	H / 1.6 / 0.0	-31.6	N/A
216.00	26.4 Qp	1.6 / 11.0 / 27.2	11.8	H / 1.6 / 0.0	-31.7	N/A
220.01	29.1 Qp	1.6 / 11.0 / 27.2	14.4	H / 1.6 / 0.0	-31.6	N/A
220.01	25.9 Qp	1.6 / 11.0 / 27.2	11.2	H / 1.6 / 0.0	-34.8	N/A
269.64	24.2 Qp	1.8 / 13.1 / 27.0	12.2	H / 1.6 / 0.0	-33.8	N/A
383.37	23.9 Qp	2.1 / 15.0 / 27.5	13.5	H / 1.6 / 0.0	-32.5	N/A
384.62	24.3 Qp	2.2 / 15.0 / 27.5	13.9	H / 1.6 / 0.0	-32.1	N/A
521.64	22.6 Qp	2.6 / 17.9 / 28.2	14.9	H / 1.6 / 0.0	-31.1	N/A
531.46	22.7 Qp	2.6 / 17.9 / 28.2	15.0	H / 1.6 / 0.0	-31.0	N/A
959.99	22.4 Qp	3.7 / 23.0 / 27.3	21.8	H / 1.6 / 0.0	-24.2	N/A
200-1000MHz Horizontal 90 degrees						
216.00	26.1 Qp	1.6 / 11.0 / 27.2	11.4	H / 1.6 / 90.0	-32.1	N/A
383.37	35.0 Qp	2.1 / 15.0 / 27.5	24.7	H / 1.6 / 90.0	-21.3	N/A
384.62	34.8 Qp	2.2 / 15.0 / 27.5	24.4	H / 1.6 / 90.0	-21.6	N/A
521.64	30.2 Qp	2.6 / 17.9 / 28.2	22.6	H / 1.6 / 90.0	-23.4	N/A
531.46	31.4 Qp	2.6 / 17.9 / 28.2	23.8	H / 1.6 / 90.0	-22.2	N/A
200-1000MHz Horizontal 180 degrees						
216.00	25.9 Qp	1.6 / 11.0 / 27.2	11.2	H / 1.6 / 180.0	-32.3	N/A
No higher signals found: 200-1000MHz Horizontal 270 degrees						
Following signals maximized between 200 & 1000MHz Horizontal						
216.00	29.5 Qp	1.6 / 11.0 / 27.2	14.9	H / 2.1 / 78.0	-28.6	N/A
220.01	32.0 Qp	1.6 / 11.0 / 27.2	17.3	H / 1.8 / 12.0	-28.7	N/A
252.15	32.1 Qp	1.7 / 12.1 / 27.1	18.9	H / 1.7 / 34.0	-27.1	N/A

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
Following 2 signals are spurs from 384MHz Tx signal						
383.37	45.0 Qp	2.1 / 15.0 / 27.5	34.6	H / 1.1 / 278.0	-11.4	N/A
384.62	44.9 Qp	2.2 / 15.0 / 27.5	34.5	H / 1.1 / 268.0	-11.5	N/A
531.46	32.4 Qp	2.6 / 17.9 / 28.2	24.7	H / 1.4 / 240.0	-21.3	N/A
Following 2 signals are spurs from the 388.375MHz Tx signal						
388.57	35.2 Qp	2.2 / 15.1 / 27.5	25.0	H / 2.3 / 82.0	-21.0	N/A
387.89	35.0 Qp	2.2 / 15.1 / 27.5	24.8	H / 2.3 / 108.0	-21.2	N/A
No other spurs found: 369.625, 375.25 & 394.375 Tx signals						
For Measurements > 1GHz, Tx 388.375 active - worst case from Intentional measurements						
1-4GHz Vertical 0 degrees						
1000.00	35.3 Av	3.7 / 24.1 / 37.3	25.8	H / 2.3 / 108.0	N/A	-28.2
1623.10	35.1 Av	2.6 / 25.6 / 36.8	26.6	H / 2.3 / 108.0	N/A	-27.4
No other signals found: 1-2 GHz Vertical						
1-2 GHz Horizontal - All signals maximized						
1359.98	37.2 Av	2.4 / 24.8 / 36.9	27.4	H / 1.3 / 220.0	N/A	-26.6

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	**FCC 15.209 <1GHz**	**FCC 15.209 >1GHz**
********** **Measurement Summary** **********						
383.37	**45.0 Qp**	**2.1 / 15.0 / 27.5**	**34.6**	**H / 1.1 / 278.0**	**-11.4**	**N/A**
384.62	44.9 Qp	2.2 / 15.0 / 27.5	34.5	H / 1.1 / 268.0	-11.5	N/A
198.00	37.9 Qp	1.5 / 14.1 / 27.3	26.2	V / 1.0 / 0.0	-17.3	N/A
162.00	37.6 Qp	1.4 / 12.2 / 27.5	23.7	V / 1.0 / 0.0	-19.8	N/A
959.99	26.4 Qp	3.7 / 23.0 / 27.3	25.8	V / 1.0 / 12.0	-20.2	N/A
32.00	33.2 Qp	0.6 / 13.6 / 28.1	19.2	V / 1.0 / 0.0	-20.8	N/A
388.57	35.2 Qp	2.2 / 15.1 / 27.5	25.0	H / 2.3 / 82.0	-21.0	N/A
387.89	35.0 Qp	2.2 / 15.1 / 27.5	24.8	H / 2.3 / 108.0	-21.2	N/A
531.46	32.4 Qp	2.6 / 17.9 / 28.2	24.7	H / 1.4 / 240.0	-21.3	N/A
60.00	36.6 Qp	0.7 / 8.9 / 28.0	18.3	V / 1.0 / 0.0	-21.7	N/A
521.64	30.2 Qp	2.6 / 17.9 / 28.2	22.6	H / 1.6 / 90.0	-23.4	N/A
40.00	31.0 Qp	0.6 / 12.3 / 28.0	15.9	H / 1.6 / 124.0	-24.1	N/A
36.00	30.2 Qp	0.6 / 12.6 / 28.1	15.4	V / 1.0 / 0.0	-24.6	N/A
63.00	34.2 Qp	0.7 / 8.4 / 27.9	15.4	V / 1.0 / 0.0	-24.6	N/A
30.00	29.0 Qp	0.5 / 13.7 / 28.1	15.1	V / 1.0 / 0.0	-24.9	N/A
54.00	31.7 Qp	0.7 / 9.9 / 28.0	14.3	V / 1.0 / 0.0	-25.7	N/A
80.00	34.1 Qp	0.9 / 7.0 / 27.9	14.2	H / 1.6 / 0.0	-25.8	N/A
1359.98	37.2 Av	2.4 / 24.8 / 36.9	27.4	H / 1.3 / 220.0	N/A	-26.6
160.00	30.6 Qp	1.4 / 12.3 / 27.5	16.8	H / 1.6 / 0.0	-26.7	N/A
252.15	32.1 Qp	1.7 / 12.1 / 27.1	18.9	H / 1.7 / 34.0	-27.1	N/A
48.00	29.1 Qp	0.7 / 10.8 / 28.0	12.6	H / 1.6 / 90.0	-27.4	N/A
64.00	31.4 Qp	0.8 / 8.4 / 27.9	12.6	V / 1.0 / 0.0	-27.4	N/A
1623.10	35.1 Av	2.6 / 25.6 / 36.8	26.6	H / 2.3 / 108.0	N/A	-27.4
1000.00	35.3 Av	3.7 / 24.1 / 37.3	25.8	H / 2.3 / 108.0	N/A	-28.2
45.00	27.8 Qp	0.7 / 11.2 / 28.0	11.7	V / 1.0 / 0.0	-28.3	N/A
169.60	29.0 Qp	1.4 / 12.1 / 27.4	15.0	H / 1.6 / 0.0	-28.5	N/A
216.00	29.5 Qp	1.6 / 11.0 / 27.2	14.9	H / 2.1 / 78.0	-28.6	N/A
4.82	30.0 Qp	0.2 / 10.6 / 0.0	40.8	H / 1.0 / 112.0	-28.7	N/A
220.01	32.0 Qp	1.6 / 11.0 / 27.2	17.3	H / 1.8 / 12.0	-28.7	N/A
71.99	30.1 Qp	0.8 / 7.6 / 27.9	10.7	H / 2.4 / 58.0	-29.3	N/A
144.00	27.5 Qp	1.3 / 12.5 / 27.5	13.7	V / 1.0 / 0.0	-29.8	N/A
150.02	26.8 Qp	1.3 / 12.4 / 27.5	13.0	H / 1.6 / 0.0	-30.5	N/A
210.00	26.9 Qp	1.5 / 11.1 / 27.2	12.3	V / 1.0 / 0.0	-31.2	N/A
117.00	27.1 Qp	1.2 / 11.6 / 27.7	12.2	V / 1.0 / 0.0	-31.3	N/A
240.00	28.3 Qp	1.7 / 11.3 / 27.1	14.2	V / 1.0 / 0.0	-31.8	N/A
220.09	27.7 Qp	1.6 / 11.0 / 27.2	13.0	V / 1.0 / 0.0	-33.0	N/A
269.64	24.2 Qp	1.8 / 13.1 / 27.0	12.2	H / 1.6 / 0.0	-33.8	N/A
8.03	23.0 Qp	0.2 / 10.7 / 0.0	33.9	V / 1.0 / 176.0	-35.6	N/A

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	**FCC 15.209 <1GHz**	**FCC 15.209 >1GHz**
14.65	17.4 Qp	0.3 / 10.6 / 0.0	28.4	V / 1.0 / 78.0	-41.1	N/A
14.98	16.8 Qp	0.3 / 10.6 / 0.0	27.7	V / 1.0 / 78.0	-41.8	N/A
28.66	17.9 Qp	0.5 / 8.5 / 0.0	27.0	V / 1.0 / 186.0	-42.5	N/A
4.00	15.6 Qp	0.2 / 10.6 / 0.0	26.4	H / 1.0 / 186.0	-43.1	N/A
24.02	15.7 Qp	0.5 / 9.8 / 0.0	25.9	V / 1.0 / 188.0	-43.6	N/A
4.03	14.9 Qp	0.2 / 10.6 / 0.0	25.7	V / 1.0 / 12.0	-43.8	N/A
9.06	13.8 Qp	0.2 / 10.8 / 0.0	24.8	V / 1.0 / 10.0	-44.7	N/A
28.67	15.7 Qp	0.5 / 8.5 / 0.0	24.7	H / 1.0 / 22.0	-44.8	N/A
25.41	14.1 Qp	0.5 / 9.5 / 0.0	24.1	V / 1.0 / 186.0	-45.4	N/A
26.30	14.3 Qp	0.5 / 9.2 / 0.0	24.0	V / 1.0 / 186.0	-45.5	N/A
19.98	12.1 Qp	0.4 / 10.6 / 0.0	23.1	V / 1.0 / 78.0	-46.4	N/A
23.11	12.7 Qp	0.5 / 10.0 / 0.0	23.1	H / 1.0 / 124.0	-46.4	N/A
27.00	13.2 Qp	0.5 / 9.0 / 0.0	22.7	V / 1.0 / 354.0	-46.8	N/A
28.02	10.1 Qp	0.5 / 8.7 / 0.0	19.3	V / 1.0 / 10.0	-50.2	N/A
16.03	8.0 Qp	0.3 / 10.6 / 0.0	18.9	V / 1.0 / 10.0	-50.6	N/A
24.03	8.1 Qp	0.5 / 9.8 / 0.0	18.4	H / 1.0 / 124.0	-51.1	N/A
20.03	7.0 Qp	0.4 / 10.6 / 0.0	18.0	V / 1.0 / 10.0	-51.5	N/A
18.06	7.0 Qp	0.4 / 10.6 / 0.0	17.9	V / 1.0 / 10.0	-51.6	N/A

Example calculation:

Measured Level	**+**	**Transducer, Cable Loss & Amplifier corrections**	**=**	**Corrected Reading**	**Specification Limit**	**-**	**Corrected Reading**	**=**	**Delta Specification**
(dBμV)		(dB)		(dBμV/m)	(dBμV/m)		(dBμV/m)		
14.0		**14.9**		**28.9**	**40.0**		**28.9**		**-11.1**

Deviations, Additions, or Exclusions: None

6 AC Mains Conducted Emissions – Test not Applicable

6.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from FCC CFR 47 Part 15B.

Intertek Louisville's emissions testing facility is located at 40 Meadow Rd. in Pinewood Springs CO 80540. The emissions testing facility is ISO17025:2005 accredited by NVLAP, our lab code is 200624-0, BSMI lab number is SL2-IN-E-029R, our VCCI registration no. C-1752, our FCC designation no. US5170 and our IC lab no. 2042N.

6.2 Test Equipment Used:

6.3 Results:

The sample tested was found to comply with the requirements of:

.

6.4 Setup Photographs:

6.5 Plots: Summary Data

6.6 Data:

Example calculation:

Measured Level	+	Transducer, Cable Loss & Amplifier corrections	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dBμV)		(dB)		(dBμV/m)	(dBμV/m)		(dBμV/m)		
14.0		**14.9**		**28.9**	**40.0**		**28.9**		**-11.1**

Deviations, Additions, or Exclusions: None

7 Radiated Emissions – Manual On/Off Timing

7.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from FCC 15.231 and RSS-210.

Intertek Louisville's emissions testing facility is located at 40 Meadow Rd. in Pinewood Springs CO 80540. The emissions testing facility is ISO17025:2005 accredited by NVLAP, our lab code is 200624-0, BSMI lab number is SL2-IN-E-029R, our VCCI registration no. C-1752, our FCC designation no. US5170 and our IC lab no. 2042N.

7.2 Test Equipment Used:

Asset ID:	Description:	Manufacturer:	Model:	Serial:	Cal Date	Cal Due
18913	Spectrum Analyzer	Hewlett-Packard	E7405A	My44211889	05/07/2010	05/07/2011

7.3 Results:

The sample tested was found to comply with the requirements of:

- FCC CFR 47 Part 15.231(a)(1)
- IC RSS-210, A1.1.1

7.4 Data Summary Table

Remarks: **Specification:** Maximum time to automatically deactivate the transmitter is 5 seconds

Actual Result: Transmitter deactivated after 250 ms (FSK Channel 1 & Channel 2 worst-case)

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7.5 Setup Photographs:

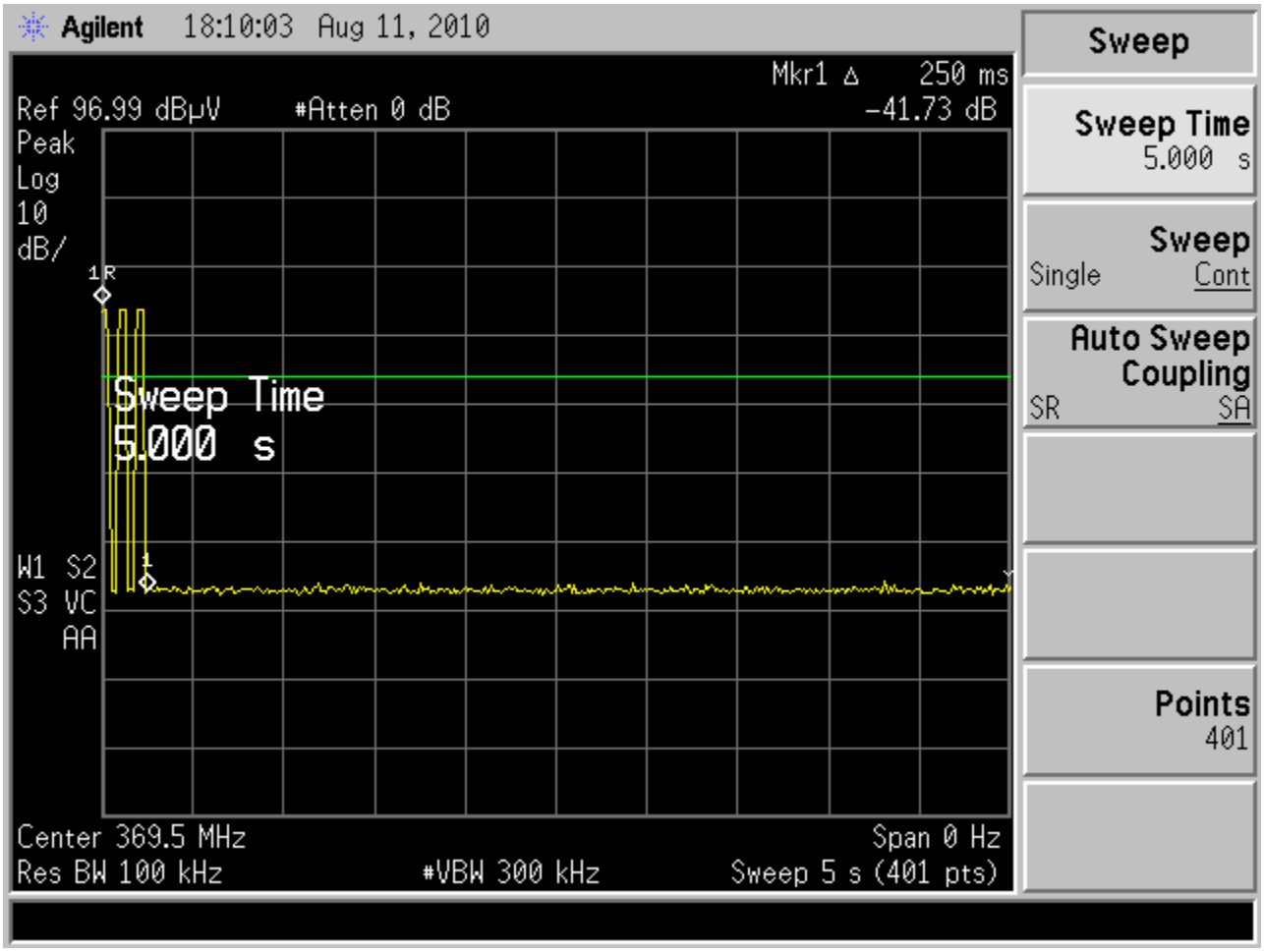
Test Setup – Manual On/Off Timing

7.6 Data:

Manual Switch Transmit Time On/Off

(FCC 15.231(a)(1) / RSS-210 A1.1.1(a)

Channel 1 – FSK (369.5 MHz)

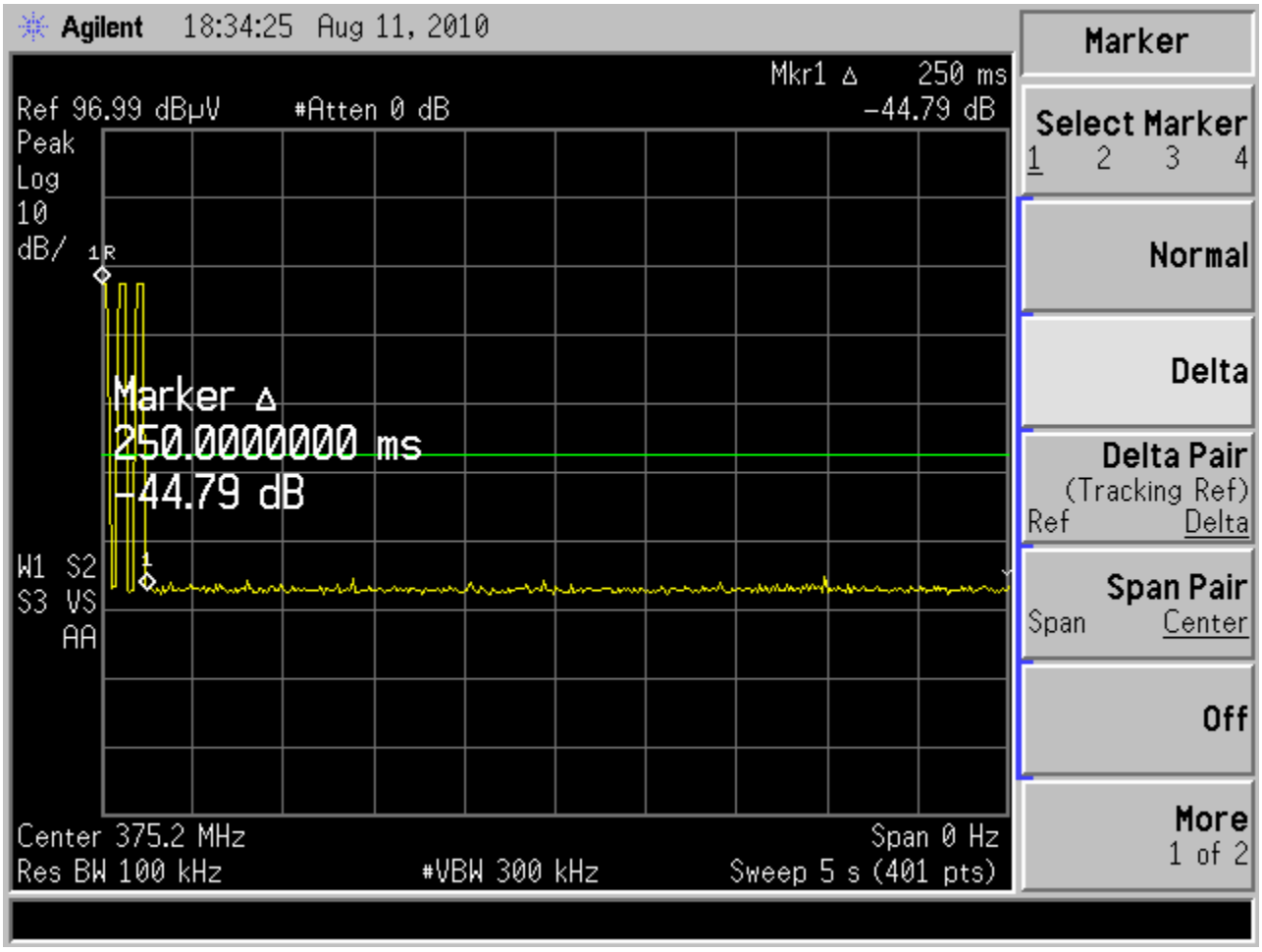


Time On: 250 ms

Manual Switch Transmit Time On/Off

(FCC 15.231(a)(1) / RSS-210 A1.1.1(a)

Channel 2 – FSK (375.25 MHz)

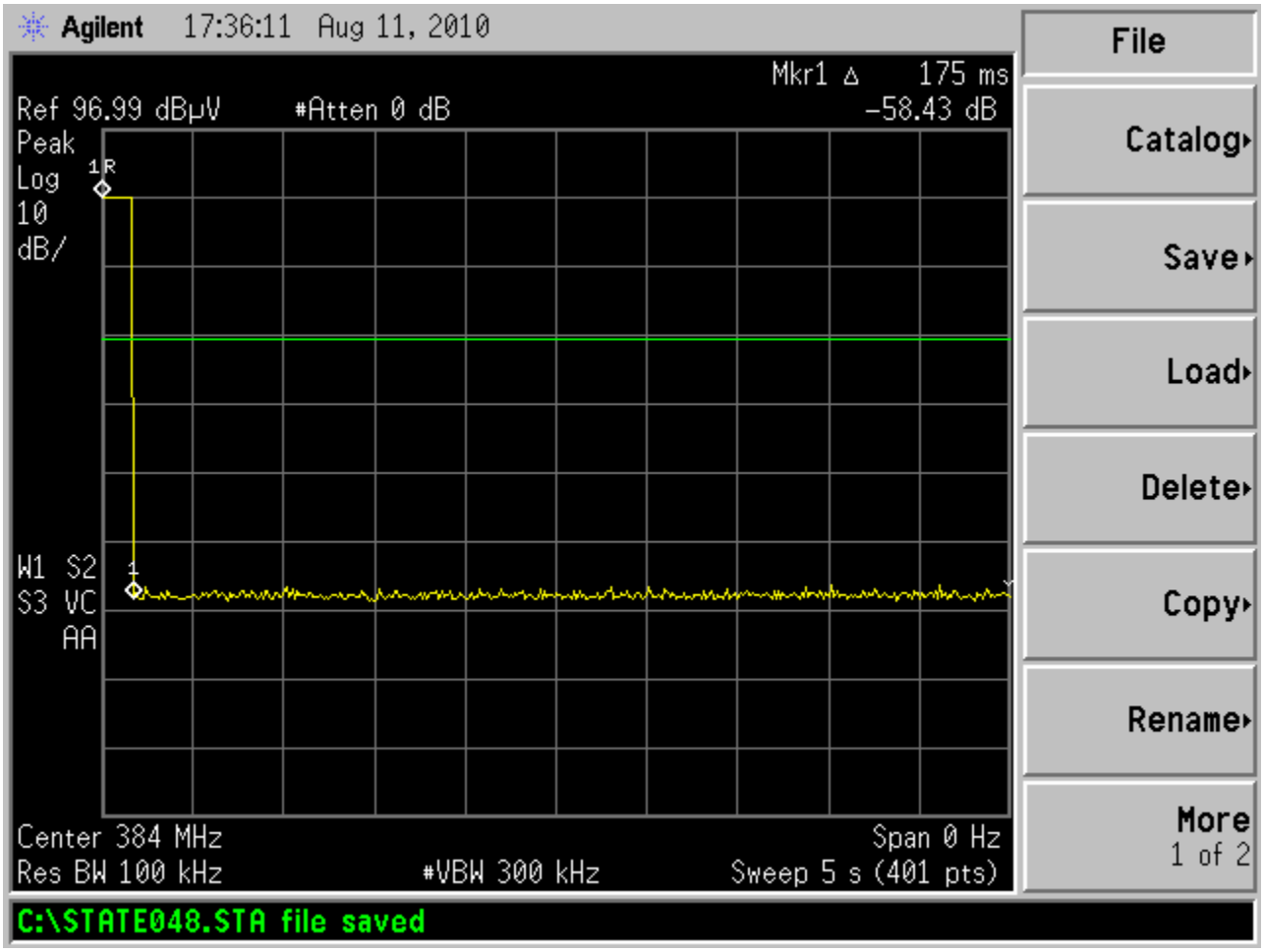


Time On: 250 ms

Manual Switch Transmit Time On/Off

(FCC 15.231(a)(1) / RSS-210 A1.1.1(a)

Channel 3 – OOK (384.0 MHz)

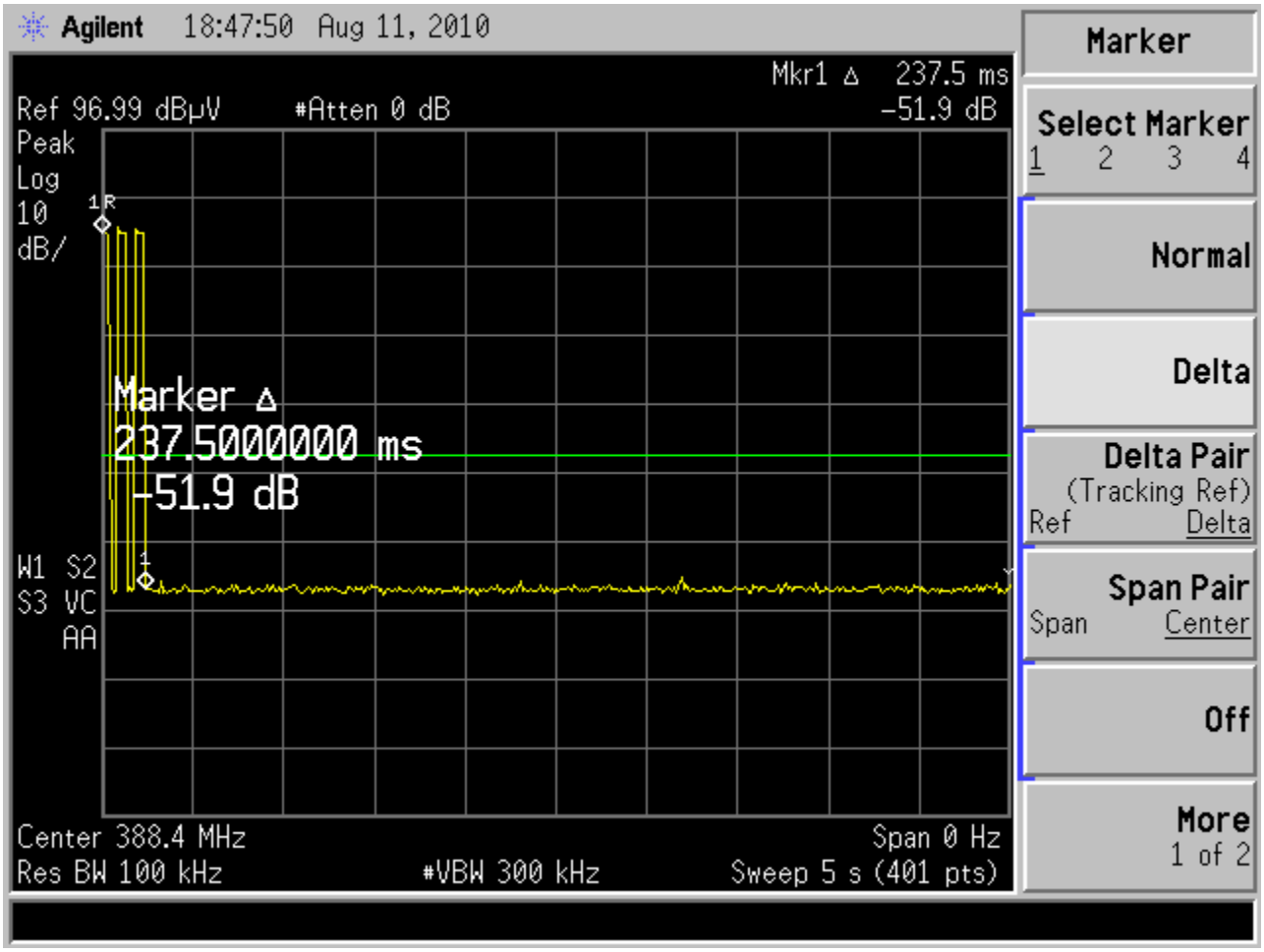


Time On: 175 ms

Manual Switch Transmit Time On/Off

(FCC 15.231(a)(1) / RSS-210 A1.1.1(a)

Channel 4 – FSK (388.375 MHz)

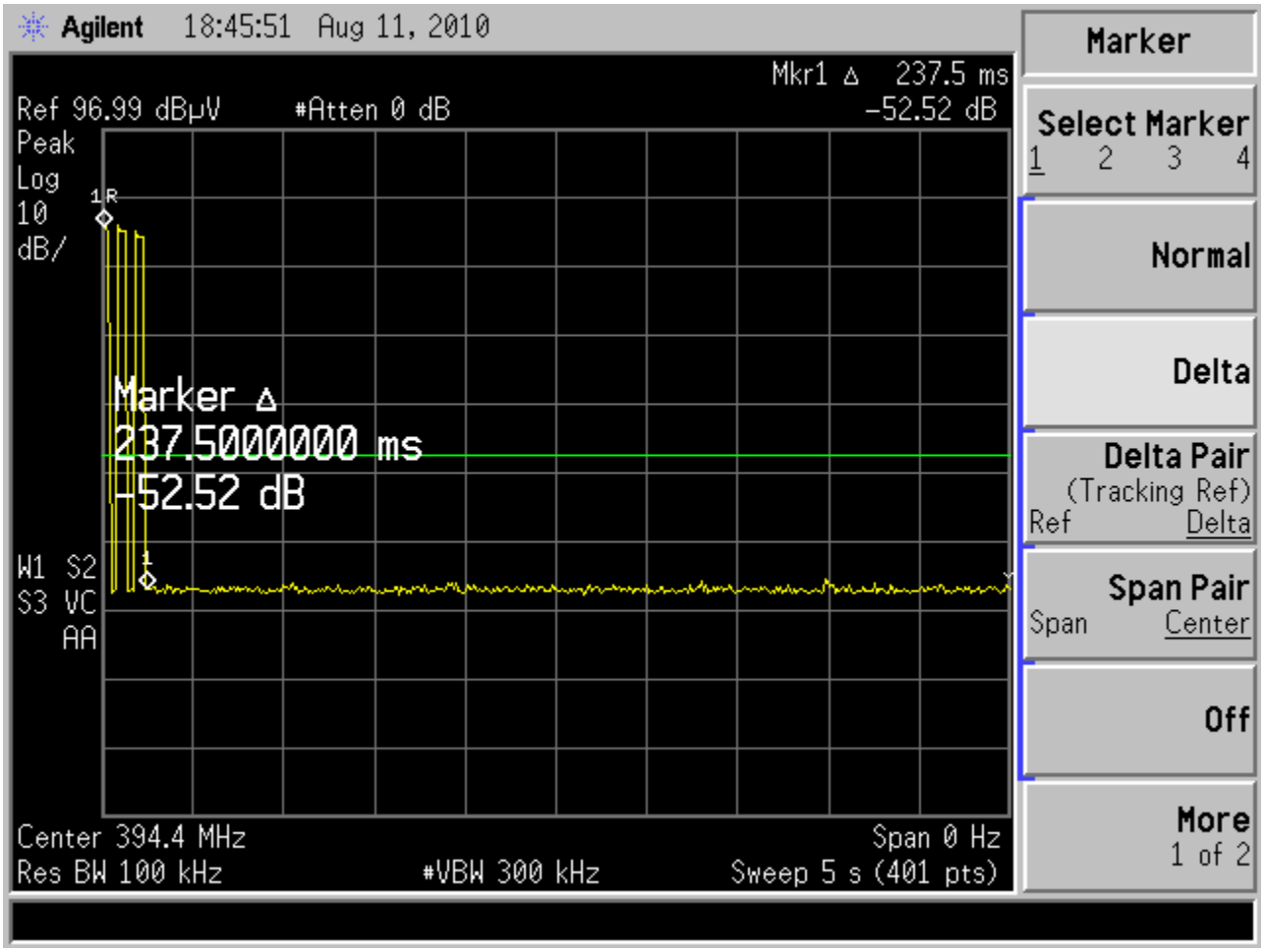


Time On: 238 ms

Manual Switch Transmit Time On/Off

(FCC 15.231(a)(1) / RSS-210 A1.1.1(a)

Channel 5 – FSK (394.375 MHz)



Time On: 238 ms

Deviations, Additions, or Exclusions: None

8 Radiated Intentional Emissions – Fundamental & Harmonics of Fundamental

8.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from FCC CFR 47 Part 15.231.

Intertek Louisville's emissions testing facility is located at 40 Meadow Rd. in Pinewood Springs CO 80540. The emissions testing facility is ISO17025:2005 accredited by NVLAP, our lab code is 200624-0, BSMI lab number is SL2-IN-E-029R, our VCCI registration no. C-1752, our FCC designation no. US5170 and our IC lab no. 2042N.

8.2 Test Equipment Used:

Asset ID:	Description:	Manufacturer:	Model:	Serial:	Cal Date	Cal Due
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	11/12/2009	11/12/2010
18660	Spectrum Analyzer Display Section (set 1)	Hewlett-Packard	85662A	2318A04983	11/12/2009	11/12/2010
18880	Q.P Adapter	Hewlett-Packard	85650A	2811A01300	11/12/2009	11/12/2010
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/04/2010	06/04/2011
18906	Pre-Amplifier 1-4 GHz	Mini-Circuits Lab	ZHL-42	N052792-2	06/11/2010	06/11/2011
18798	Bicon Antenna 30 - 300 MHz	EMCO	3109	9801-3142	02/03/2010	02/03/2011
18808	Log Periodic Antenna	EMCO	3146	9203-3376	11/05/2009	11/05/2010
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	10/14/2009	10/14/2010

8.3 Results:

The sample tested was found to comply with the requirements of:

- Provisions of FCC CFR 47 Part 15.205/ 15.35
- FCC CFR 47 Part 231(b)(1)(2)
- FCC CFR 47 Part 15.209
- IC RSS-210, A1.1.2 (1)(2)(3)

8.4 Data Summary Table

Minimum limit margin: Fundamental Frequency - 3.9 dB at 384.00 MHz

Remarks: Emission is from the On/Off key - Channel 3

Measurements were taken utilizing the methods dictated by FCC Part 15.35 for averaging pulsed emissions and for limiting peak emissions.

Minimum limit margin: Harmonics of the Fundamental - 13.5 dB at 1152.00 MHz

Remarks: Emission is from the On/Off key – Channel 3

Measurements were taken utilizing the methods dictated by FCC Part 15.35 for averaging pulsed emissions and for limiting peak emissions.

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8.5 Setup Photographs:

Test Setup – Fundamental & Harmonics of the Fundamental (Front View)

Photo:

Test Setup – Fundamental & Harmonics of the Fundamental (rear view)

Photo:

Test Setup – Axis 1: EUT Flat on Table

Note: Worst-Case Axis

Photo:

Test Setup – Axis 2: EUT Vertical

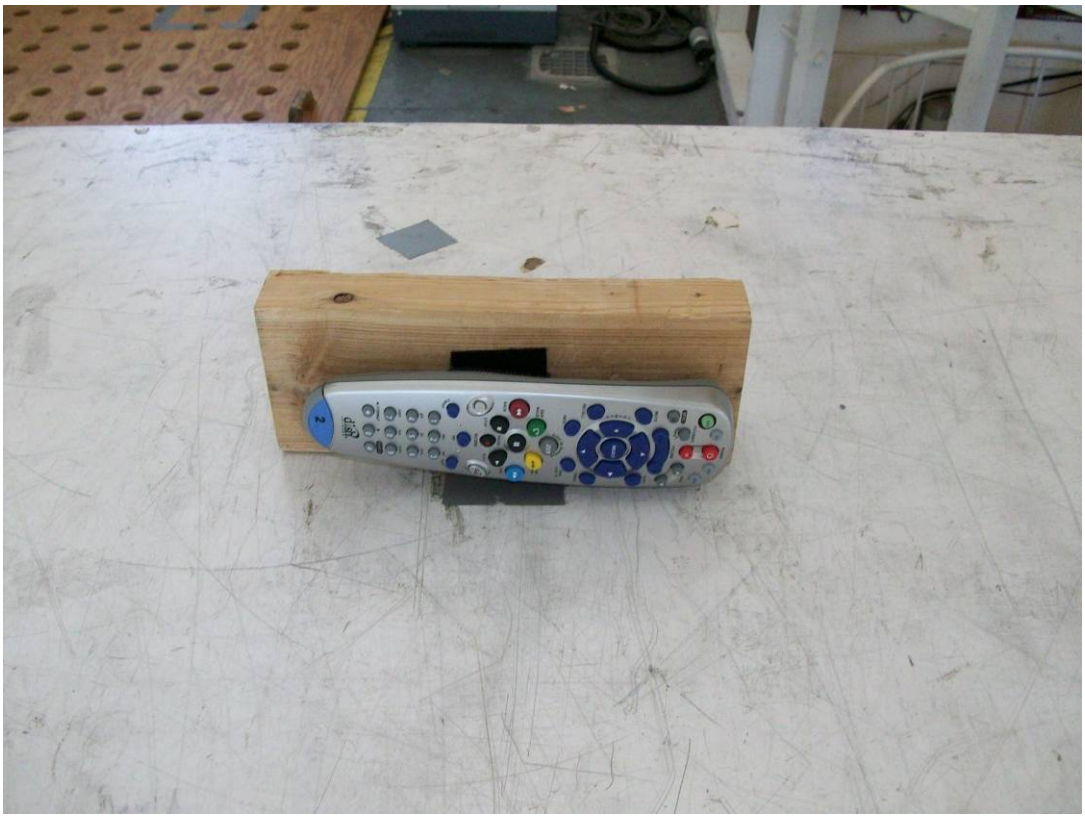


Photo:

Test Setup – Axis 3: EUT Vertical & Rotated 90 Degrees

8.6 Data:

Field Strength Measurements
(Fundamental and Spurious of the Transmitter)

Test Report #:	**500249550-Intentional Run 01**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.7	°C
Test Method:	FCC 15.231	Test Date:	10-Aug-2010	Relative Humidity:	40.1	%
EUT Model #:	6.4 IR/UHF Pro Remote	EUT Power:	Battery 6VDC	Air Pressure:	79.8	kPa
EUT Serial #:	FSK1					
Manufacturer:	Echostar					
EUT Description:	UHF Remote					
Notes:	FSK and OOK carriers active for testing-maximum power					
	New batteries installed between every channel measurement					

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35/ RSS-Gen, Section 4.5 utilized to calculate field strength emissions. The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and Part 15.231 emissions and delta limits were calculated as follows: Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and Part 15.231 and the emission/limit delta was calculated. The DTCF is calculated as follows: $20*\text{Log}_{10}$ (duty cycle in 100ms) "not to exceed 20 dB"								
All measurements Axis 1 - EUT is Flat on the Table								
Fundamental: Channel 1 - FSK								
369.46	48.0 Pk	2.1 / 14.7 / 0.0	64.8	V / 3.4 / 24.0	-8.3	56.5	78.40	-21.9
369.46	57.9 Pk	2.1 / 14.7 / 0.0	74.7	H / 1.1 / 82.0	-8.3	66.4	78.40	-12.0
Fundamental: Channel 2 - FSK								
375.27	57.7 Pk	2.1 / 14.8 / 0.0	74.6	H / 2.4 / 112.0	-8.3	66.3	78.64	-12.3
375.27	51.1 Pk	2.1 / 14.8 / 0.0	68	V / 2.2 / 18.0	-8.3	59.7	78.64	-18.9
Fundamental: Channel 3 - OOK								
384	68.0 Pk	2.1 / 15.0 / 0.0	85.1	V / 2.3 / 36.0	-16.2	68.9	79.01	-10.1
384	**74.2 Pk**	**2.1 / 15.0 / 0.0**	**91.3**	**H / 2.6 / 256.0**	**-16.2**	**75.1**	**79.01**	**-3.9**
Fundamental: Channel 4 - FSK								
388.27	65.0 Pk	2.2 / 15.1 / 0.0	82.3	H / 2.5 / 264.0	-8.3	74.0	79.18	-5.2
388.27	58.6 Pk	2.2 / 15.1 / 0.0	75.9	V / 2.4 / 15.0	-8.3	67.6	79.18	-11.6
Fundamental: Channel 5 - FSK								
394.27	57.9 Pk	2.2 / 15.2 / 0.0	75.3	V / 2.4 / 30.0	-8.3	67.0	79.42	-12.4
394.27	63.2 Pk	2.2 / 15.2 / 0.0	80.6	H / 2.5 / 260.0	-8.3	72.3	79.42	-7.1

All measurements Axis 2 - EUT is Vertical								
Fundamental: Channel 1 - FSK								
369.46	55.6 Pk	2.1 / 14.7 / 0.0	72.4	H / 1.1 / 15.0	-8.3	64.1	78.40	-14.3
369.46	46.9 Pk	2.1 / 14.7 / 0.0	63.7	V / 2.1 / 135.0	-8.3	55.4	78.40	-23.0
Fundamental: Channel 2 - FSK								
375.26	50.3 Pk	2.1 / 14.8 / 0.0	67.2	V / 2.2 / 124.0	-8.3	58.9	78.64	-19.7
375.26	57.5 Pk	2.1 / 14.8 / 0.0	74.5	H / 1.1 / 28.0	-8.3	66.2	78.64	-12.4
Fundamental: Channel 3 - OOK								
384	73.7 Pk	2.1 / 15.0 / 0.0	90.8	H / 2.3 / 358.0	-16.2	74.6	79.01	-4.4
384	67.2 Pk	2.1 / 15.0 / 0.0	84.3	V / 2.3 / 130.0	-16.2	68.1	79.01	-10.9
Fundamental: Channel 4 - FSK								
388.26	57.0 Pk	2.2 / 15.1 / 0.0	74.2	V / 2.3 / 130.0	-8.3	65.9	79.18	-13.3
388.26	64.2 Pk	2.2 / 15.1 / 0.0	81.4	H / 2.3 / 12.0	-8.3	73.1	79.18	-6.1
Fundamental: Channel 5 - FSK								
394.27	62.6 Pk	2.2 / 15.2 / 0.0	80	H / 2.5 / 220.0	-8.3	71.7	79.42	-7.7
394.27	55.7 Pk	2.2 / 15.2 / 0.0	73.1	V / 2.3 / 118.0	-8.3	64.8	79.42	-14.6

All measurements Axis 3 - EUT is Vertical & Rotated 90 Degrees								
Fundamental: Channel 1 - FSK								
369.46	55.2 Pk	2.1 / 14.7 / 0.0	72.1	V / 1.2 / 208.0	-8.3	63.8	78.40	-14.6
369.46	45.6 Pk	2.1 / 14.7 / 0.0	62.5	H / 2.1 / 116.0	-8.3	54.2	78.40	-24.2
Fundamental: Channel 2 - FSK								
375.26	47.5 Pk	2.1 / 14.8 / 0.0	64.4	H / 1.7 / 260.0	-8.3	56.1	78.64	-22.5
375.26	57.8 Pk	2.1 / 14.8 / 0.0	74.7	V / 1.3 / 234.0	-8.3	66.4	78.64	-12.2
Fundamental: Channel 3 - OOK								
384	73.3 Pk	2.1 / 15.0 / 0.0	90.5	V / 1.3 / 94.0	-16.2	74.3	79.01	-4.7
384	63.0 Pk	2.1 / 15.0 / 0.0	80.1	H / 1.8 / 288.0	-16.2	63.9	79.01	-15.1
Fundamental: Channel 4 - FSK								
388.26	54.4 Pk	2.2 / 15.1 / 0.0	71.7	H / 1.7 / 254.0	-8.3	63.4	79.18	-15.8
388.26	64.7 Pk	2.2 / 15.1 / 0.0	82	V / 1.3 / 120.0	-8.3	73.7	79.18	-5.5
Fundamental: Channel 5 - FSK								
394.26	64.8 Pk	2.2 / 15.2 / 0.0	82.3	V / 1.2 / 144.0	-8.3	74.0	79.42	-5.4
394.26	54.2 Pk	2.2 / 15.2 / 0.0	71.6	H / 1.8 / 116.0	-8.3	63.3	79.42	-16.1

Worst-Case Axis 1 - All Harmonics Measured Axis 1-EUT Flat on Table								
Harmonics: Channel 1 FSK								
738.92	39.0 Pk	3.2 / 20.9 / 28.0	35.1	V / 1.0 / 178.0	-8.3	26.8	58.40	-31.6
738.92	44.3 Pk	3.2 / 20.9 / 28.0	40.4	H / 1.1 / 236.0	-8.3	32.1	58.40	-26.3
1108.39	49.6 Pk	2.1 / 24.3 / 37.3	38.7	V / 1.5 / 94.0	-8.3	30.4	54.00	-23.6
1108.4	48.1 Pk	2.1 / 24.3 / 37.3	37.2	H / 1.6 / 18.0	-8.3	28.9	54.00	-25.1
1477.85	43.1 Pk	2.5 / 25.0 / 36.7	33.8	V / 1.2 / 24.0	-8.3	25.5	54.00	-28.5
1477.86	39.3 Pk	2.5 / 25.0 / 36.7	30	H / 1.2 / 348.0	-8.3	21.7	54.00	-32.3
1847.31	50.0 Pk	2.8 / 26.5 / 37.1	42.2	V / 1.1 / 294.0	-8.3	33.9	58.40	-24.5
1847.32	47.0 Pk	2.8 / 26.5 / 37.1	39.2	H / 1.6 / 12.0	-8.3	30.9	58.40	-27.5
2216.77	43.2 Pk	3.1 / 27.9 / 37.4	36.8	V / 1.3 / 176.0	-8.3	28.5	54.00	-25.5
2216.78	40.9 Pk	3.1 / 27.9 / 37.4	34.4	H / 1.3 / 168.0	-8.3	26.1	54.00	-27.9
2586.23	42.7 Pk	3.3 / 29.2 / 37.6	37.6	V / 1.4 / 176.0	-8.3	29.3	58.40	-29.1
2586.24	41.5 Pk	3.3 / 29.2 / 37.6	36.3	H / 1.2 / 12.0	-8.3	28.0	58.40	-30.4
2955.69	38.4 Pk	3.7 / 30.7 / 37.5	35.3	V / 1.0 / 12.0	-8.3	27.0	58.40	-31.4
2955.7	40.1 Pk	3.7 / 30.7 / 37.5	37	H / 1.3 / 76.0	-8.3	28.7	58.40	-29.7
3325.15	38.9 Pk	4.2 / 31.3 / 37.2	37.2	V / 1.1 / 76.0	-8.3	28.9	58.40	-29.5
3325.15	37.4 Pk	4.2 / 31.3 / 37.2	35.6	H / 1.1 / 76.0	-8.3	27.3	58.40	-31.1
3694.61	38.3 Pk	4.5 / 31.8 / 37.7	37	V / 1.1 / 76.0	-8.3	28.7	54.00	-25.3
3694.61	37.5 Pk	4.5 / 31.8 / 37.7	36.2	H / 1.1 / 76.0	-8.3	27.9	54.00	-26.1

Worst-Case Axis 1 - All Harmonics Measured Axis 1-EUT Flat on Table								
Harmonics: Channel 2 FSK								
750.52	46.4 Pk	3.2 / 20.9 / 28.0	42.5	H / 1.1 / 244.0	-8.3	34.2	58.64	-24.4
750.52	41.1 Pk	3.2 / 20.9 / 28.0	37.2	V / 1.4 / 282.0	-8.3	28.9	58.64	-29.7
1125.78	47.4 Pk	2.1 / 24.3 / 37.3	36.6	H / 1.5 / 36.0	-8.3	28.3	54.00	-25.7
1125.78	49.6 Pk	2.1 / 24.3 / 37.3	38.7	V / 1.5 / 94.0	-8.3	30.4	54.00	-23.6
1501.05	38.4 Pk	2.5 / 25.1 / 36.7	29.2	H / 1.0 / 12.0	-8.3	20.9	54.00	-33.1
1501.06	41.1 Pk	2.5 / 25.1 / 36.7	32	V / 1.0 / 99.0	-8.3	23.7	54.00	-30.3
1876.31	48.6 Pk	2.9 / 26.6 / 37.1	40.9	H / 1.5 / 178.0	-8.3	32.6	58.64	-26.0
1876.32	47.9 Pk	2.9 / 26.6 / 37.1	40.2	V / 1.3 / 288.0	-8.3	31.9	58.64	-26.7
2251.57	38.8 Pk	3.1 / 28.0 / 37.5	32.4	H / 1.4 / 346.0	-8.3	24.1	54.00	-29.9
2251.6	41.8 Pk	3.1 / 28.0 / 37.5	35.4	V / 1.4 / 176.0	-8.3	27.1	54.00	-26.9
2626.84	42.0 Pk	3.4 / 29.3 / 37.6	37.1	H / 1.3 / 164.0	-8.3	28.8	58.64	-29.8
2626.86	42.5 Pk	3.4 / 29.3 / 37.6	37.6	V / 1.3 / 5.0	-8.3	29.3	58.64	-29.3
3002.1	41.1 Pk	3.8 / 30.9 / 37.5	38.3	H / 1.2 / 164.0	-8.3	30.0	58.64	-28.6
3002.12	40.5 Pk	3.8 / 30.9 / 37.5	37.7	V / 1.3 / 12.0	-8.3	29.4	58.64	-29.2
3377.36	35.9 Pk	4.2 / 31.4 / 37.2	34.2	H / 1.0 / 99.0	-8.3	25.9	58.64	-32.7
3377.38	36.5 Pk	4.2 / 31.4 / 37.2	34.8	V / 1.3 / 192.0	-8.3	26.5	58.64	-32.1
3752.64	39.5 Pk	4.6 / 31.9 / 37.6	38.4	H / 1.0 / 99.0	-8.3	30.1	54.00	-23.9
3752.64	39.7 Pk	4.6 / 31.9 / 37.6	38.6	V / 1.0 / 99.0	-8.3	30.3	54.00	-23.7

Worst-Case Axis 1 - All Harmonics Measured Axis 1-EUT Flat on Table								
Harmonics: Channel 3 OOK								
768	54.3 Pk	3.2 / 21.0 / 27.9	50.6	V / 1.4 / 300.0	-16.2	34.4	59.01	-24.6
768	61.2 Pk	3.2 / 21.0 / 27.9	57.5	H / 1.1 / 98.0	-16.2	41.3	59.01	-17.7
1152	66.9 Pk	2.2 / 24.4 / 37.3	56.1	V / 1.9 / 110.0	-16.2	39.9	54.00	-14.1
1152	**67.5 Pk**	**2.2 / 24.4 / 37.3**	**56.7**	**H / 1.4 / 18.0**	**-16.2**	**40.5**	**54.00**	**-13.5**
1536	54.6 Pk	2.5 / 25.2 / 36.8	45.5	V / 1.6 / 182.0	-16.2	29.3	54.00	-24.7
1536	52.6 Pk	2.5 / 25.2 / 36.8	43.6	H / 1.1 / 118.0	-16.2	27.4	54.00	-26.6
1920	52.1 Pk	2.9 / 26.8 / 37.2	44.7	V / 1.8 / 354.0	-16.2	28.5	59.01	-30.5
1920	55.8 Pk	2.9 / 26.8 / 37.2	48.4	H / 1.6 / 354.0	-16.2	32.2	59.01	-26.8
2304	45.8 Pk	3.2 / 28.2 / 37.5	39.5	V / 1.5 / 346.0	-16.2	23.3	59.01	-35.7
2304	45.2 Pk	3.2 / 28.2 / 37.5	39	H / 1.6 / 198.0	-16.2	22.8	59.01	-36.2
2688	52.3 Pk	3.4 / 29.6 / 37.5	47.8	V / 1.6 / 160.0	-16.2	31.6	59.01	-27.4
2688	49.3 Pk	3.4 / 29.6 / 37.5	44.8	H / 1.8 / 16.0	-16.2	28.6	59.01	-30.4
3072	44.8 Pk	3.8 / 31.0 / 37.5	42.2	V / 1.3 / 298.0	-16.2	26.0	59.01	-33.0
3072	47.4 Pk	3.8 / 31.0 / 37.5	44.7	H / 1.9 / 16.0	-16.2	28.5	59.01	-30.5
3456	50.8 Pk	4.3 / 31.4 / 37.4	49.2	V / 1.6 / 144.0	-16.2	33.0	59.01	-26.0
3456	47.2 Pk	4.3 / 31.4 / 37.4	45.7	H / 1.5 / 154.0	-16.2	29.5	59.01	-29.5
3840	46.8 Pk	4.6 / 32.1 / 37.3	46.2	V / 1.4 / 212.0	-16.2	30.0	54.00	-24.0
3840	44.6 Pk	4.6 / 32.1 / 37.3	44	H / 1.4 / 164.0	-16.2	27.8	54.00	-26.2

Worst-Case Axis 1 - All Harmonics Measured Axis 1-EUT Flat on Table								
Harmonics: Channel 4 FSK								
776.52	45.8 Pk	3.2 / 21.0 / 27.9	42.1	H / 1.1 / 260.0	-8.3	33.8	59.18	-25.4
776.52	38.6 Pk	3.2 / 21.0 / 27.9	35	V / 1.5 / 306.0	-8.3	26.7	59.18	-32.5
1164.8	49.5 Pk	2.2 / 24.4 / 37.3	38.7	H / 1.4 / 32.0	-8.3	30.4	54.00	-23.6
1164.8	45.3 Pk	2.2 / 24.4 / 37.3	34.6	V / 1.3 / 24.0	-8.3	26.3	54.00	-27.7
1553.06	37.9 Pk	2.6 / 25.3 / 36.8	28.9	H / 1.2 / 32.0	-8.3	20.6	54.00	-33.4
1553.06	42.3 Pk	2.6 / 25.3 / 36.8	33.4	V / 1.3 / 177.0	-8.3	25.1	54.00	-28.9
1941.32	45.5 Pk	2.9 / 26.9 / 37.2	38.1	H / 1.6 / 32.0	-8.3	29.8	59.18	-29.4
1941.32	46.6 Pk	2.9 / 26.9 / 37.2	39.2	V / 1.2 / 88.0	-8.3	30.9	59.18	-28.3
2329.58	40.3 Pk	3.2 / 28.2 / 37.6	34.1	H / 1.0 / 99.0	-8.3	25.8	54.00	-28.2
2329.6	39.0 Pk	3.2 / 28.2 / 37.6	32.8	V / 1.4 / 12.0	-8.3	24.5	54.00	-29.5
2717.84	40.2 Pk	3.5 / 29.7 / 37.5	35.9	H / 1.0 / 99.0	-8.3	27.6	54.00	-26.4
2717.86	41.8 Pk	3.5 / 29.7 / 37.5	37.4	V / 1.4 / 12.0	-8.3	29.1	54.00	-24.9
3106.12	42.1 Pk	3.9 / 31.0 / 37.5	39.5	H / 1.2 / 12.0	-8.3	31.2	59.18	-28.0
3106.12	39.1 Pk	3.9 / 31.0 / 37.5	36.5	V / 1.0 / 99.0	-8.3	28.2	59.18	-31.0
3494.38	38.5 Pk	4.4 / 31.5 / 37.5	36.9	H / 1.2 / 12.0	-8.3	28.6	59.18	-30.6
3494.38	38.8 Pk	4.4 / 31.5 / 37.5	37.2	V / 1.4 / 184.0	-8.3	28.9	59.18	-30.3
3882.64	40.4 Pk	4.7 / 32.2 / 37.1	40.1	H / 1.2 / 12.0	-8.3	31.8	54.00	-22.2
3882.64	40.0 Pk	4.7 / 32.2 / 37.1	39.7	V / 1.4 / 184.0	-8.3	31.4	54.00	-22.6

Worst-Case Axis 1 - All Harmonics Measured Axis 1-EUT Flat on Table								
Harmonics: Channel 5 FSK								
788.52	35.5 Pk	3.3 / 21.1 / 27.8	32.1	V / 1.5 / 42.0	-8.3	23.8	59.42	-35.6
788.52	42.2 Pk	3.3 / 21.1 / 27.8	38.8	H / 1.0 / 102.0	-8.3	30.5	59.42	-28.9
1182.78	37.2 Pk	2.2 / 24.4 / 37.3	26.5	V / 1.0 / 99.0	-8.3	18.2	54.00	-35.8
1182.78	48.7 Pk	2.2 / 24.4 / 37.3	38	H / 1.2 / 348.0	-8.3	29.7	54.00	-24.3
1577.04	37.0 Pk	2.6 / 25.3 / 36.8	28.1	V / 1.0 / 99.0	-8.3	19.8	54.00	-34.2
1577.04	40.0 Pk	2.6 / 25.4 / 36.8	31.2	H / 1.2 / 32.0	-8.3	22.9	54.00	-31.1
1971.3	43.4 Pk	2.9 / 26.9 / 37.2	36	V / 1.0 / 99.0	-8.3	27.7	59.42	-31.7
1971.3	50.3 Pk	3.0 / 27.0 / 37.2	43.1	H / 1.2 / 32.0	-8.3	34.8	59.42	-24.6
2365.56	37.7 Pk	3.2 / 28.3 / 37.6	31.6	V / 1.0 / 99.0	-8.3	23.3	54.00	-30.7
2365.56	37.4 Pk	3.2 / 28.4 / 37.6	31.3	H / 1.0 / 99.0	-8.3	23.0	54.00	-31.0
2759.82	38.1 Pk	3.5 / 29.7 / 37.5	33.8	V / 1.0 / 99.0	-8.3	25.5	54.00	-28.5
2759.82	35.7 Pk	3.5 / 29.9 / 37.5	31.6	H / 1.0 / 99.0	-8.3	23.3	54.00	-30.7
3154.1	37.5 Pk	3.9 / 31.0 / 37.5	34.9	V / 1.0 / 99.0	-8.3	26.6	59.42	-32.8
3154.1	40.6 Pk	4.0 / 31.1 / 37.5	38.2	H / 1.0 / 99.0	-8.3	29.9	59.42	-29.5
3548.36	36.5 Pk	4.4 / 31.6 / 37.6	34.9	V / 1.2 / 184.0	-8.3	26.6	59.42	-32.8
3548.36	36.7 Pk	4.4 / 31.6 / 37.6	35.1	H / 1.0 / 99.0	-8.3	26.8	59.42	-32.6
3942.62	36.1 Pk	4.7 / 32.2 / 37.0	36	V / 1.0 / 99.0	-8.3	27.7	54.00	-26.3
3942.62	37.8 Pk	4.7 / 32.3 / 36.9	37.8	H / 1.2 / 184.0	-8.3	29.5	54.00	-24.5

Note: Frequencies in yellow are in the Restricted Bands of Operation per FCC 15.205

Example calculation:

Measured Level	+	**Transducer, Cable Loss & Amplifier corrections**	=	**Corrected Reading**	**Specification Limit**	-	**Corrected Reading**	=	**Delta Specification**
(dBμV)		(dB)		(dBμV/m)	(dBμV/m)		(dBμV/m)		
14.0		**14.9**		**28.9**	**40.0**		**28.9**		**-11.1**

Deviations, Additions, or Exclusions: None

9 Radiated Emissions – 20dBc Emission Bandwidth

9.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from FCC CFR 47 Part 231 and IC RSS-210 Annex 1.

Intertek Louisville's emissions testing facility is located at 40 Meadow Rd. in Pinewood Springs CO 80540. The emissions testing facility is ISO17025:2005 accredited by NVLAP, our lab code is 200624-0, BSMI lab number is SL2-IN-E-029R, our VCCI registration no. C-1752, our FCC designation no. US5170 and our IC lab no. 2042N.

9.2 Test Equipment Used:

Asset ID:	Description:	Manufacturer:	Model:	Serial:	Cal Date	Cal Due
18913	Spectrum Analyzer	Hewlett-Packard	E7405A	My44211889	05/07/2010	05/07/2011

9.3 Results:

The sample tested was found to comply with the requirements of:

- FCC CFR 47 Part 231(c)
- IC RSS-210 A1.1.3

9.4 Data Summary Table

Remarks: **Specification:** Maximum -20dBc Bandwidth is .25% of center frequency - worst-case allowed for all channels is 924 kHz (Channel 1)

Actual Result: Worst-case -20dBc Bandwidth is 375 kHz (Channel 3)

9.5 Setup Photographs:

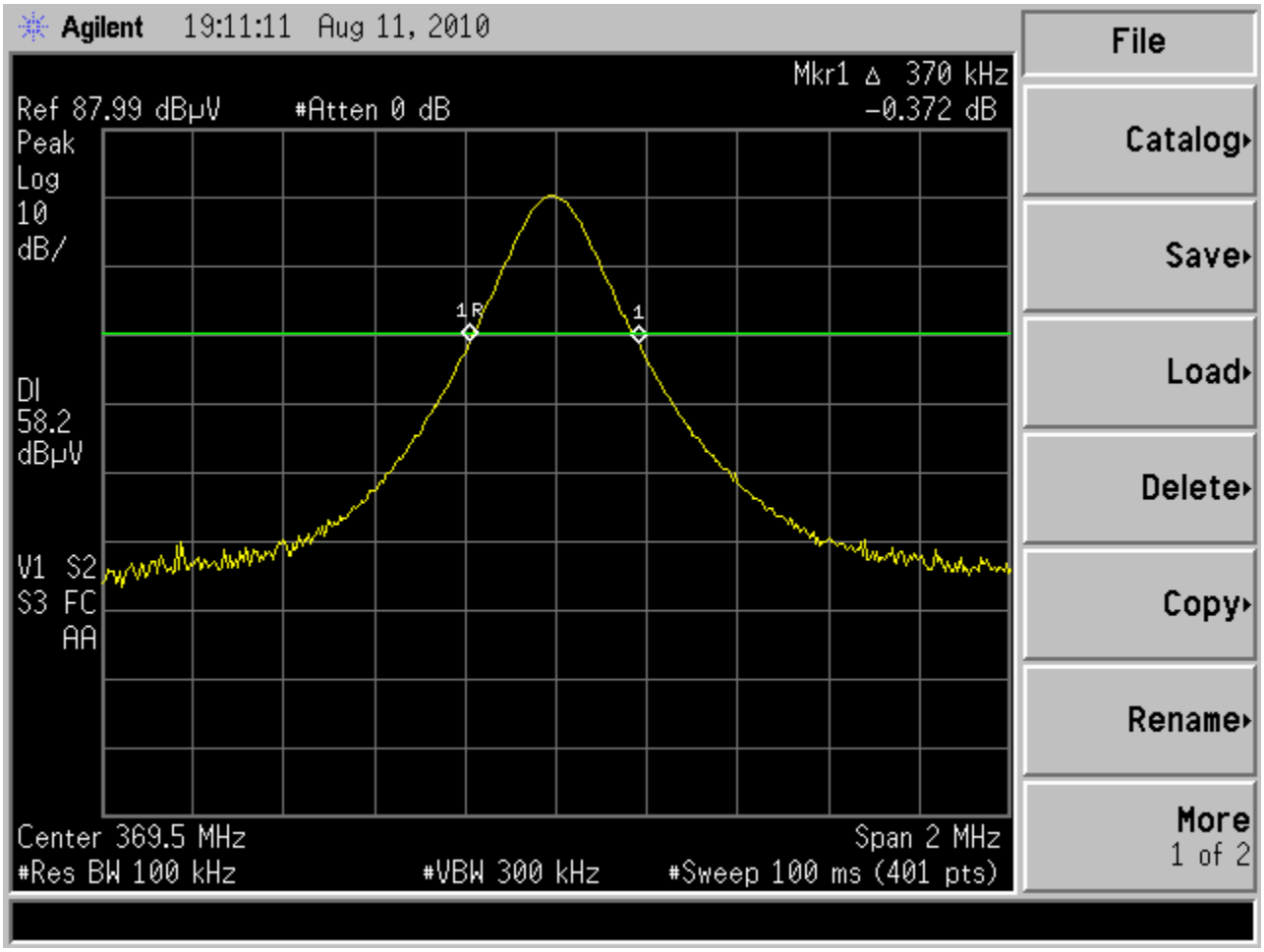
Test Setup – 20dBc Bandwidth

9.6 Data:

20 dB Bandwidth

(FCC 15.231(c) / RSS-210 A1.1.3

Channel 1 – FSK (369.5 MHz)

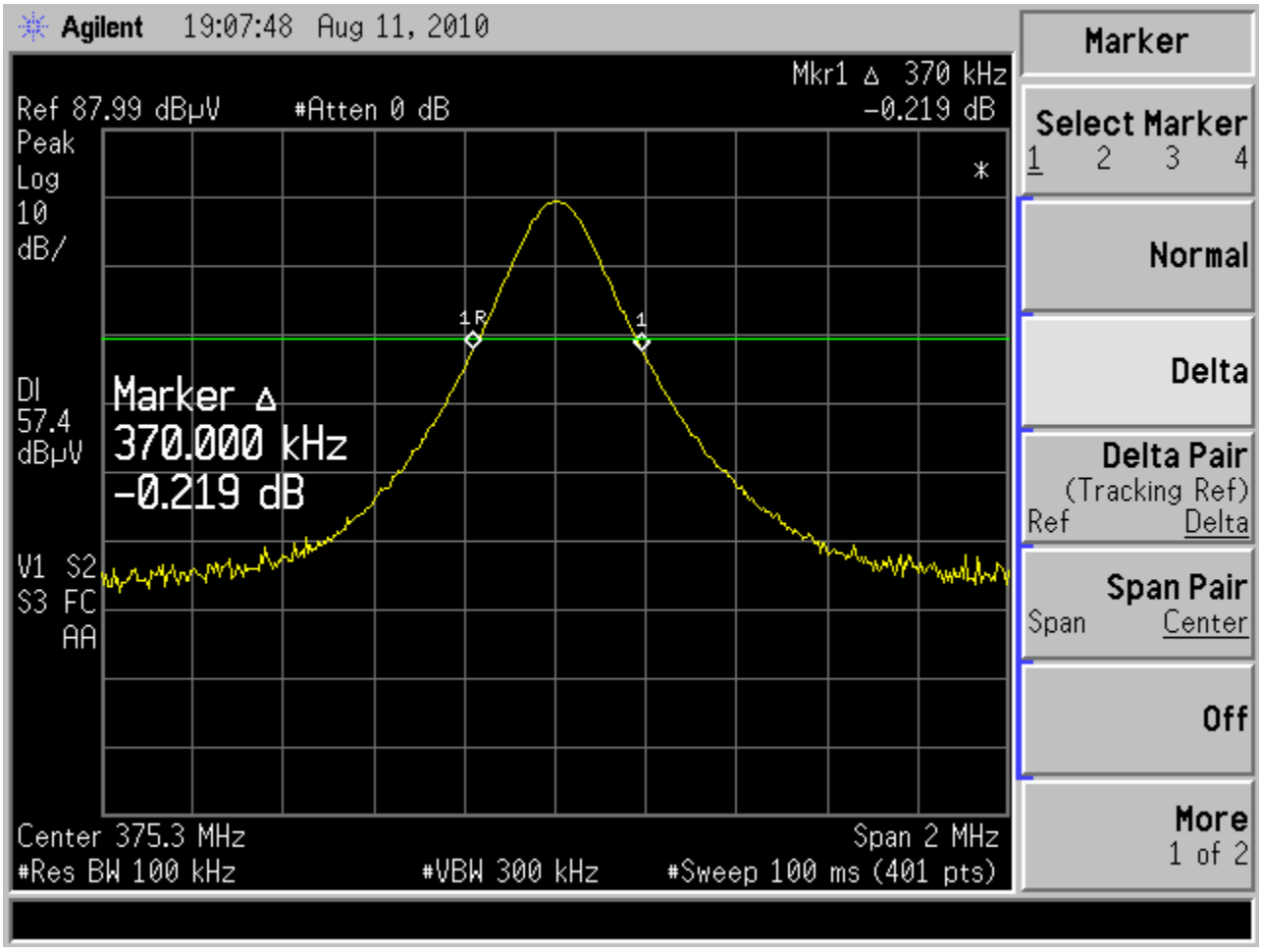


20dB BW 370 kHz

20 dB Bandwidth

(FCC 15.231(c) / RSS-210 A1.1.3

Channel 2 – FSK (375.25 MHz)

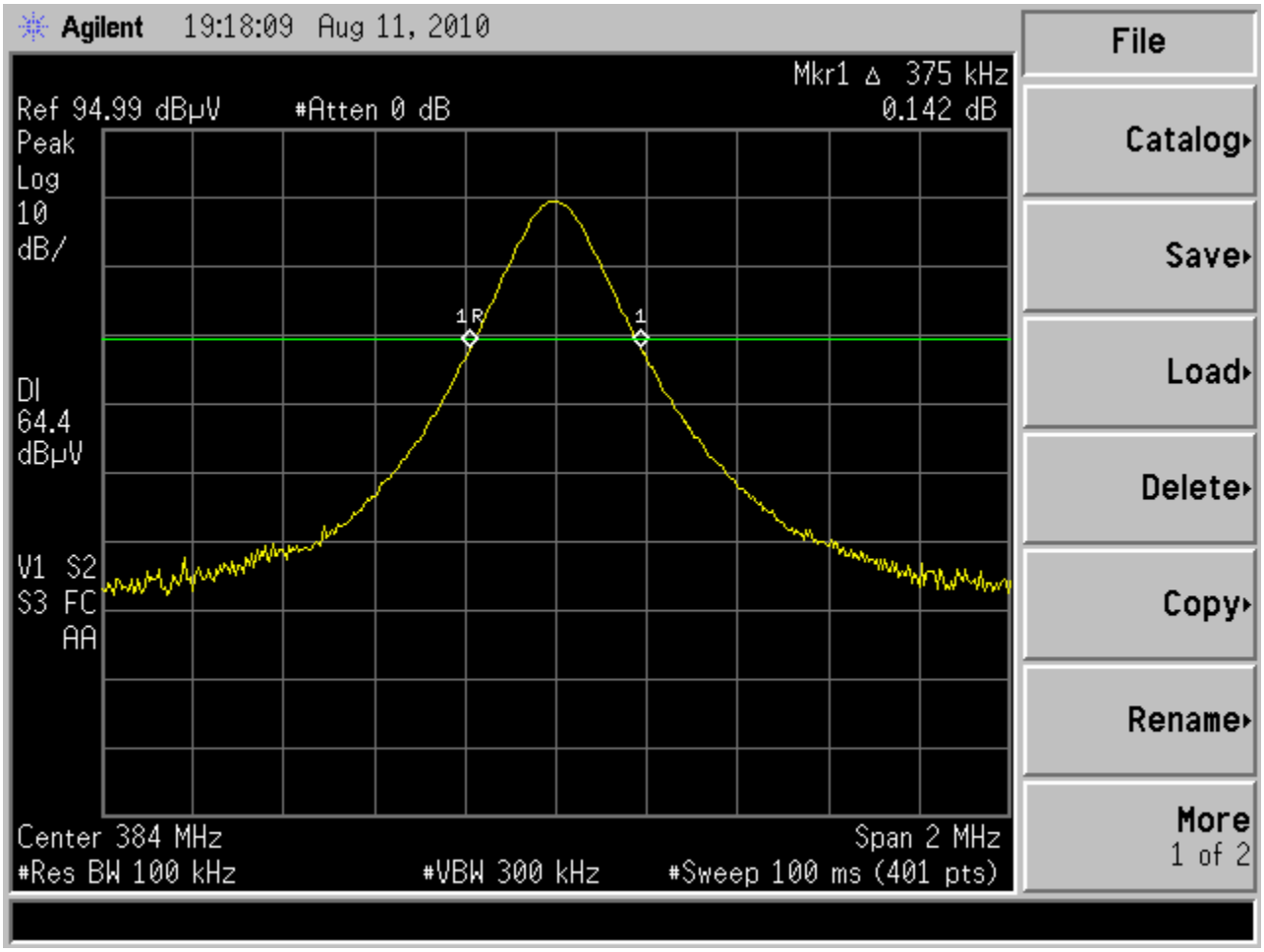


20dB BW 370 kHz

20 dB Bandwidth

(FCC 15.231(c) / RSS-210 A1.1.3

Channel 3 – OOK (384.0 MHz)

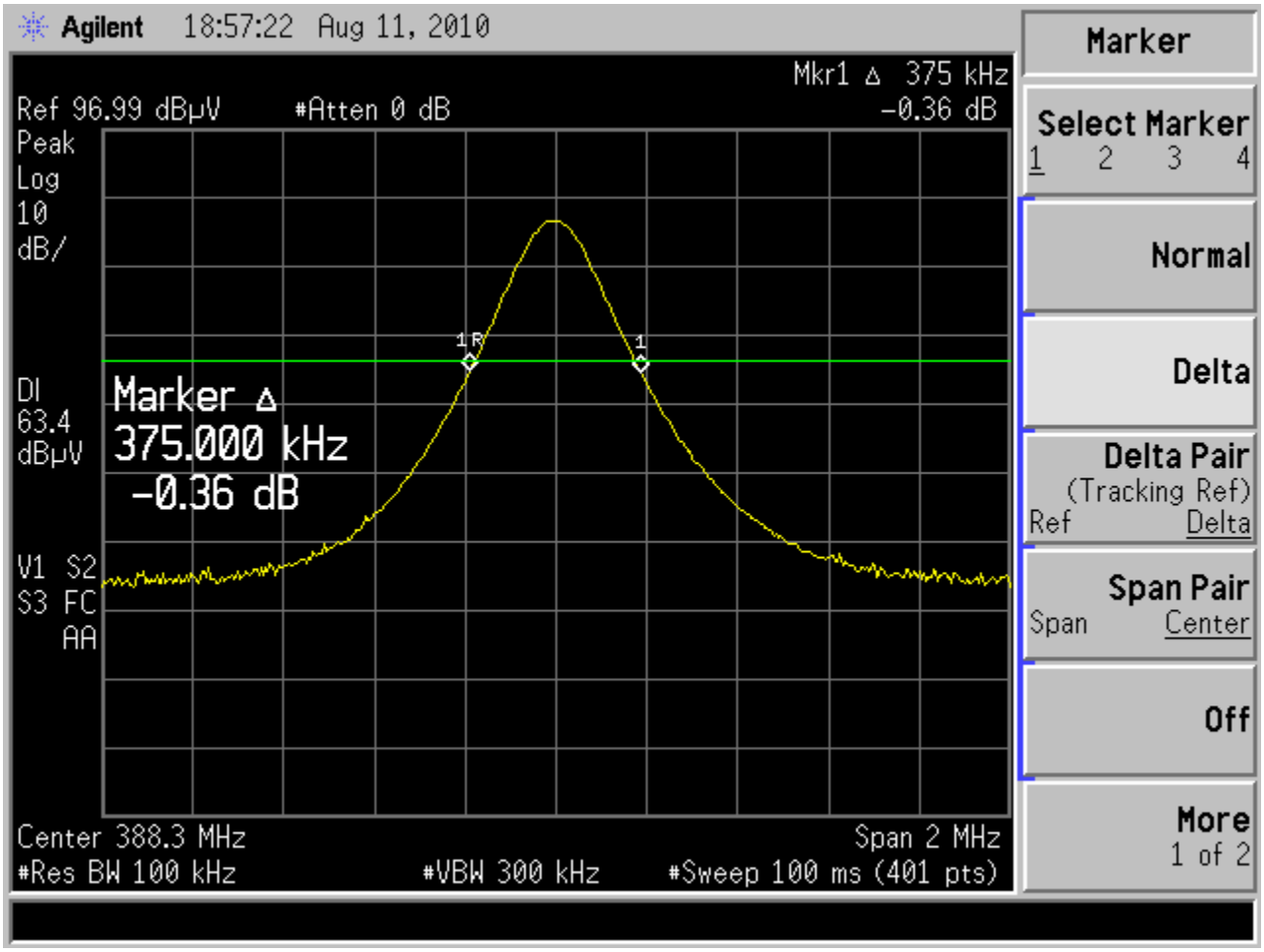


20dB BW 375 kHz

20 dB Bandwidth

(FCC 15.231(c) / RSS-210 A1.1.3

Channel 4 – FSK (388.375 MHz)

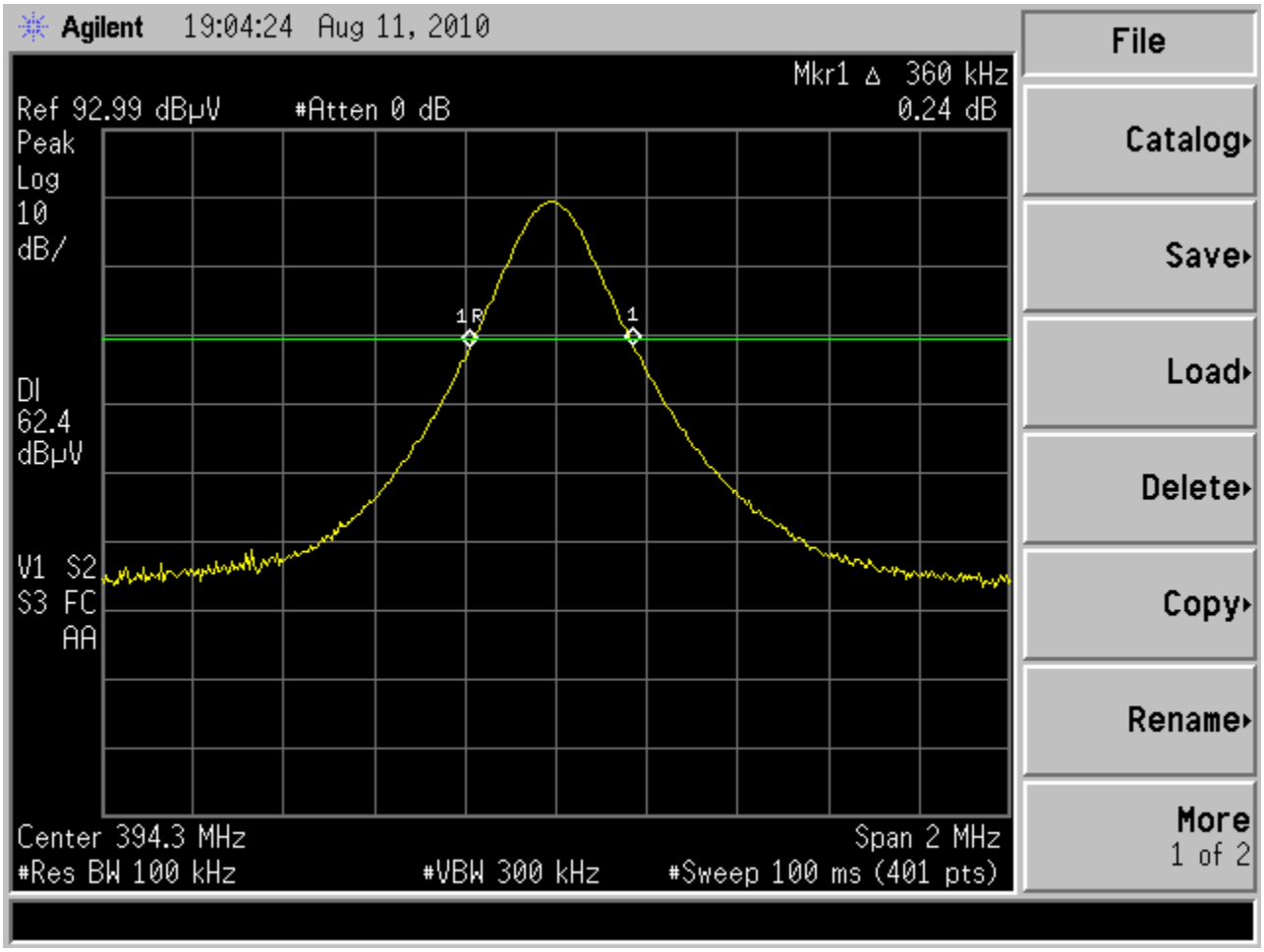


20dB BW 375 kHz

20 dB Bandwidth

(FCC 15.231(c) / RSS-210 A1.1.3

Channel 5 – FSK (394.375 MHz)



20dB BW 360 kHz

Deviations, Additions, or Exclusions: None

10 Radiated Emissions – Occupied Bandwidth

10.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from IC RSS-Gen.

Intertek Louisville's emissions testing facility is located at 40 Meadow Rd. in Pinewood Springs CO 80540. The emissions testing facility is ISO17025:2005 accredited by NVLAP, our lab code is 200624-0, BSMI lab number is SL2-IN-E-029R, our VCCI registration no. C-1752, our FCC designation no. US5170 and our IC lab no. 2042N.

10.2 Test Equipment Used:

Asset ID:	Description:	Manufacturer:	Model:	Serial:	Cal Date	Cal Due
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	11/12/2009	11/12/2010

10.3 Results:

The sample tested was found to comply with the requirements of:

- IC RSS-Gen, Section 4.6.1

10.4 Data Summary Table

Remarks: Worst-Case Occupied Bandwidth is 152 kHz (Channel 3)

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10.5 Setup Photographs:

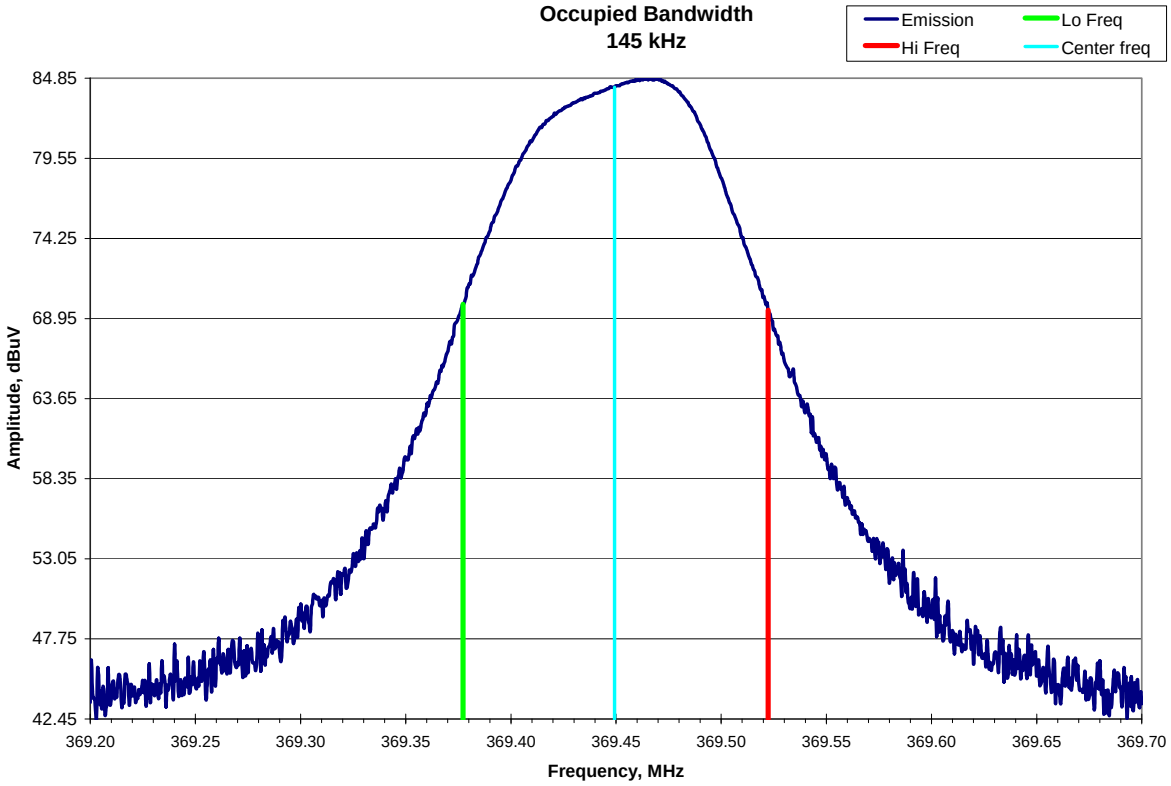
Test Setup – Occupied Bandwidth

10.6 Data:

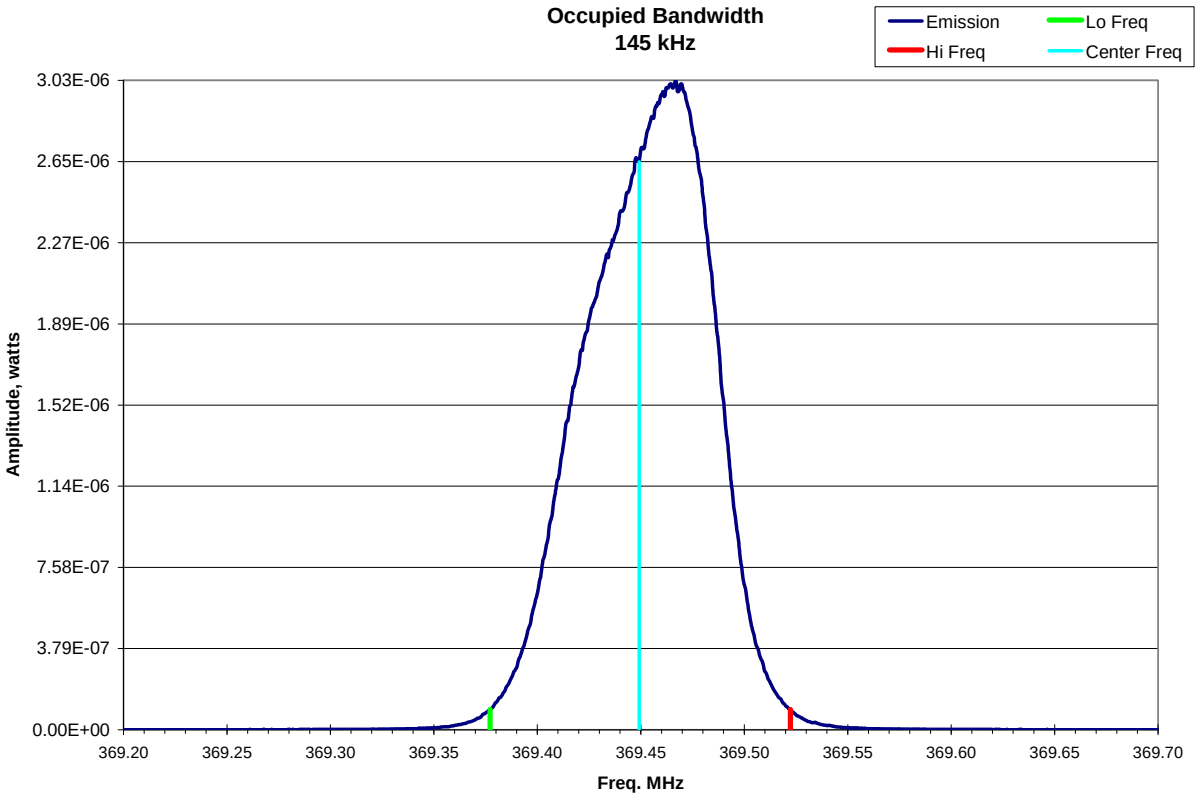
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Channel 1 – FSK (369.5 MHz)

Field Strength Graph



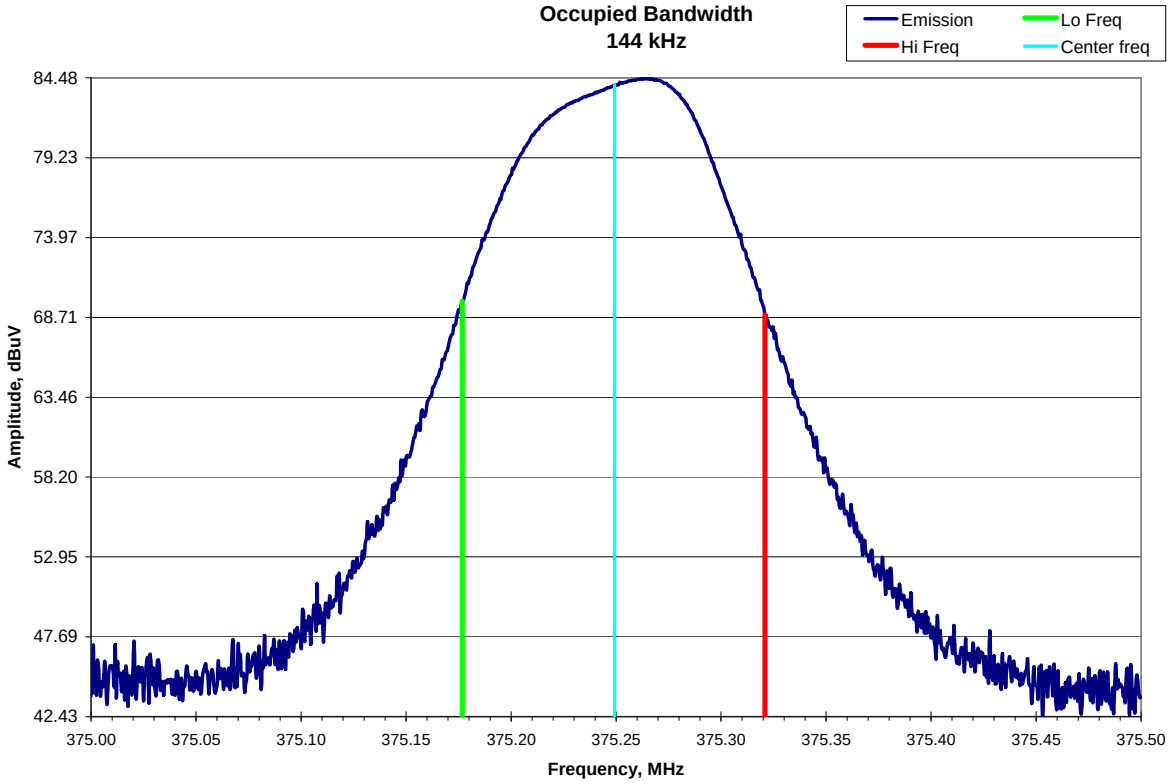
Power Graph


Occupied Bandwidth
145 kHz
Emission
Lo Freq
Hi Freq
Center Freq
3.03E-06
2.65E-06
2.27E-06
1.89E-06
1.52E-06
1.14E-06
7.58E-07
3.79E-07
0.00E+00
Amplitude, watts
369.20
369.25
369.30
369.35
369.40
369.45
369.50
369.55
369.60
369.65
369.70
Freq. MHz

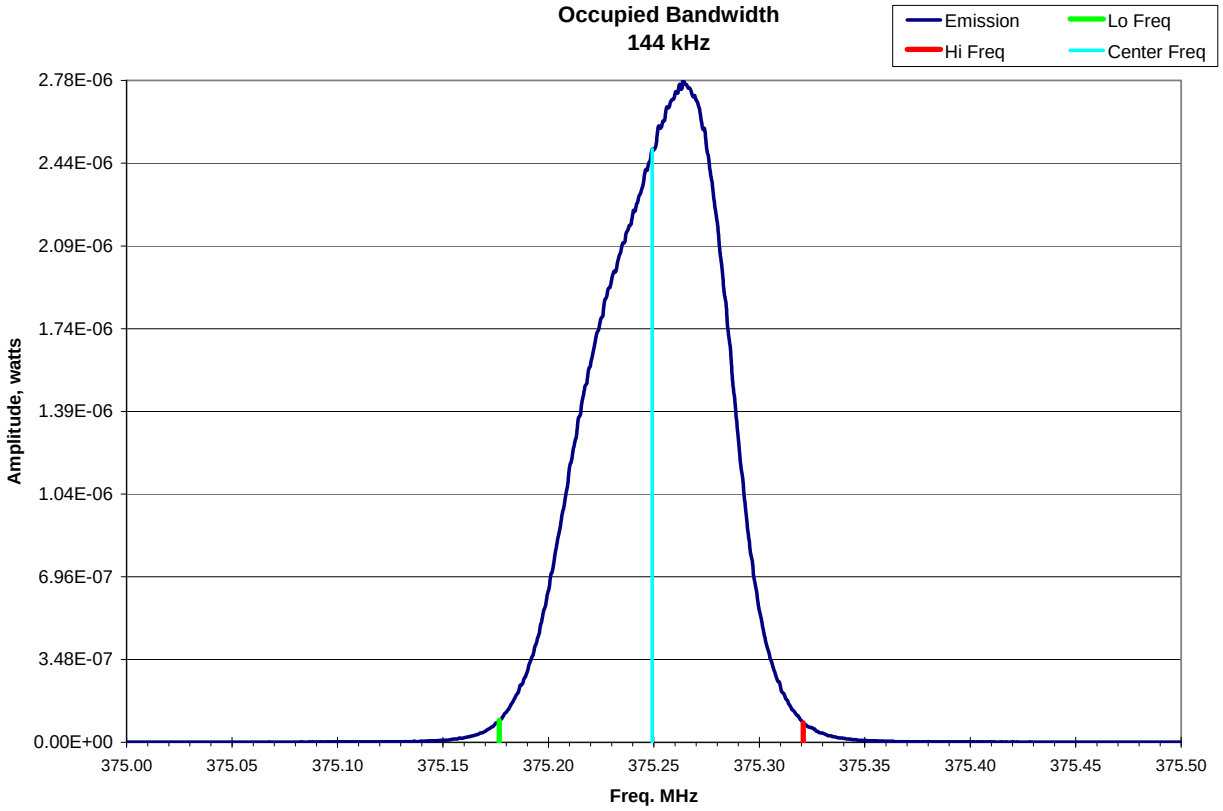
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Channel 2 – FSK (375.25 MHz)

Field Strength Graph



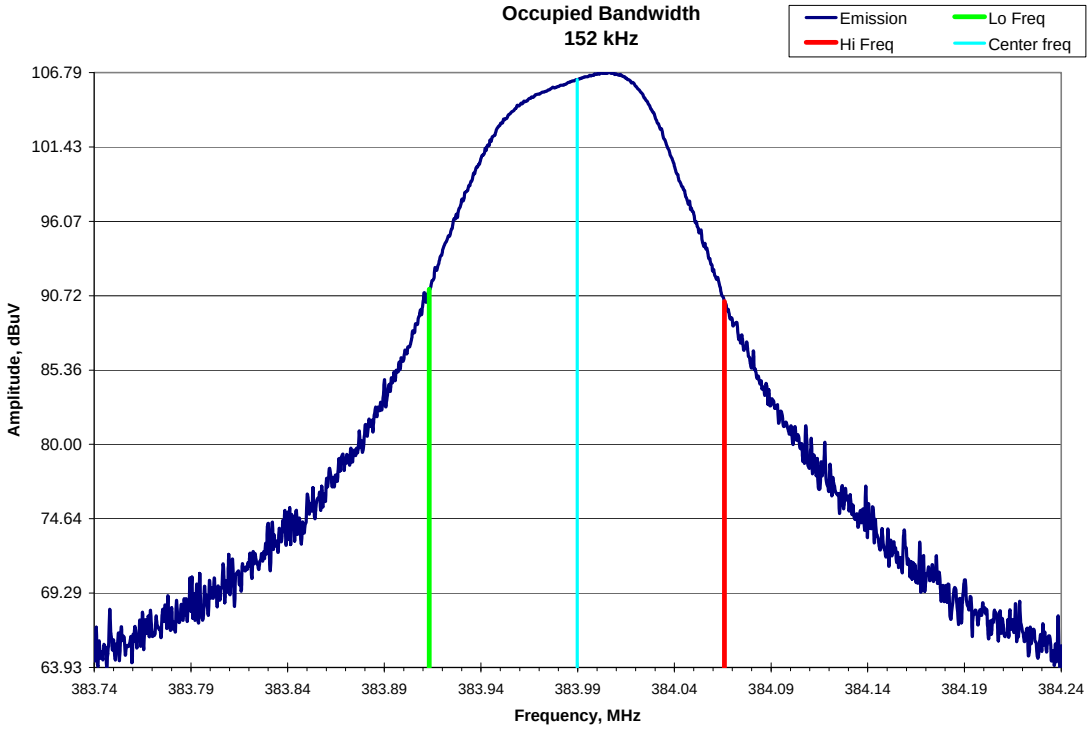
Power Graph


Occupied Bandwidth
144 kHz
Emission
Lo Freq
Hi Freq
Center Freq
2.78E-06
2.44E-06
2.09E-06
1.74E-06
1.39E-06
1.04E-06
6.96E-07
3.48E-07
0.00E+00
Amplitude, watts
375.00
375.05
375.10
375.15
375.20
375.25
375.30
375.35
375.40
375.45
375.50
Freq. MHz

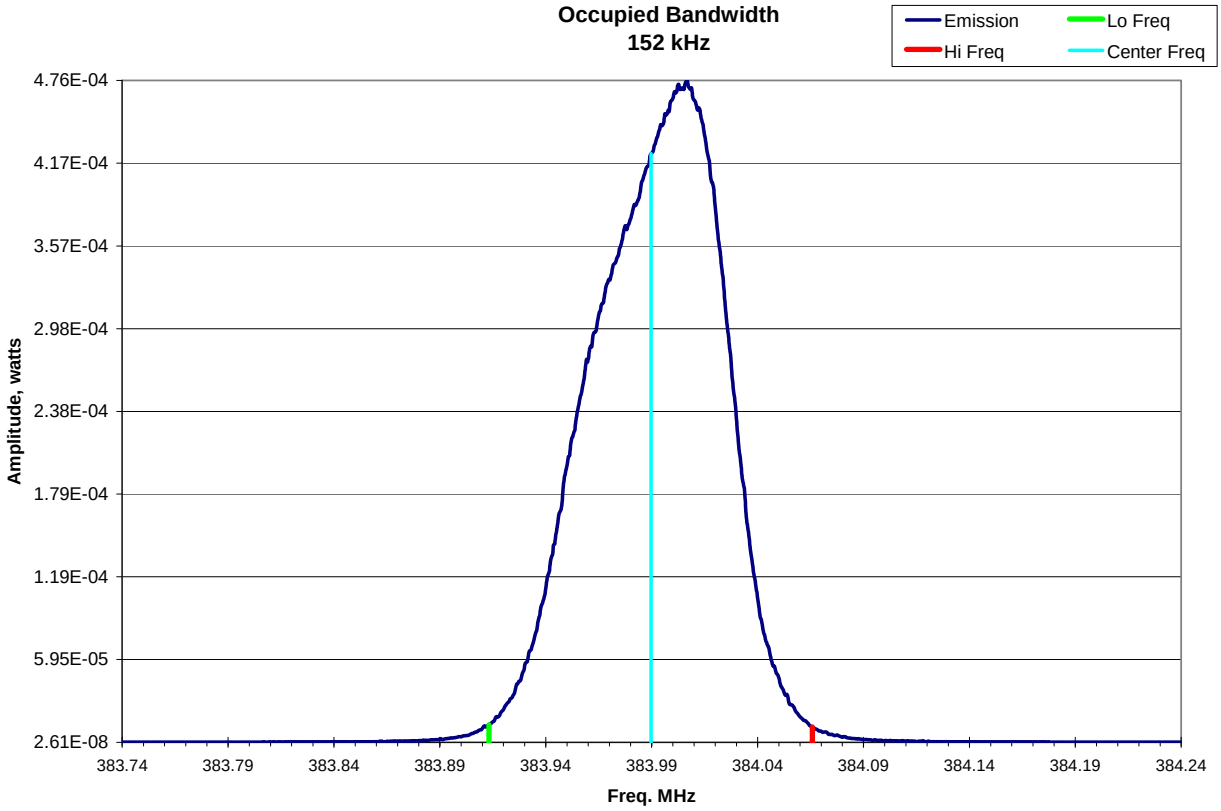
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Channel 3 – OOK (384.0 MHz)

Field Strength Graph



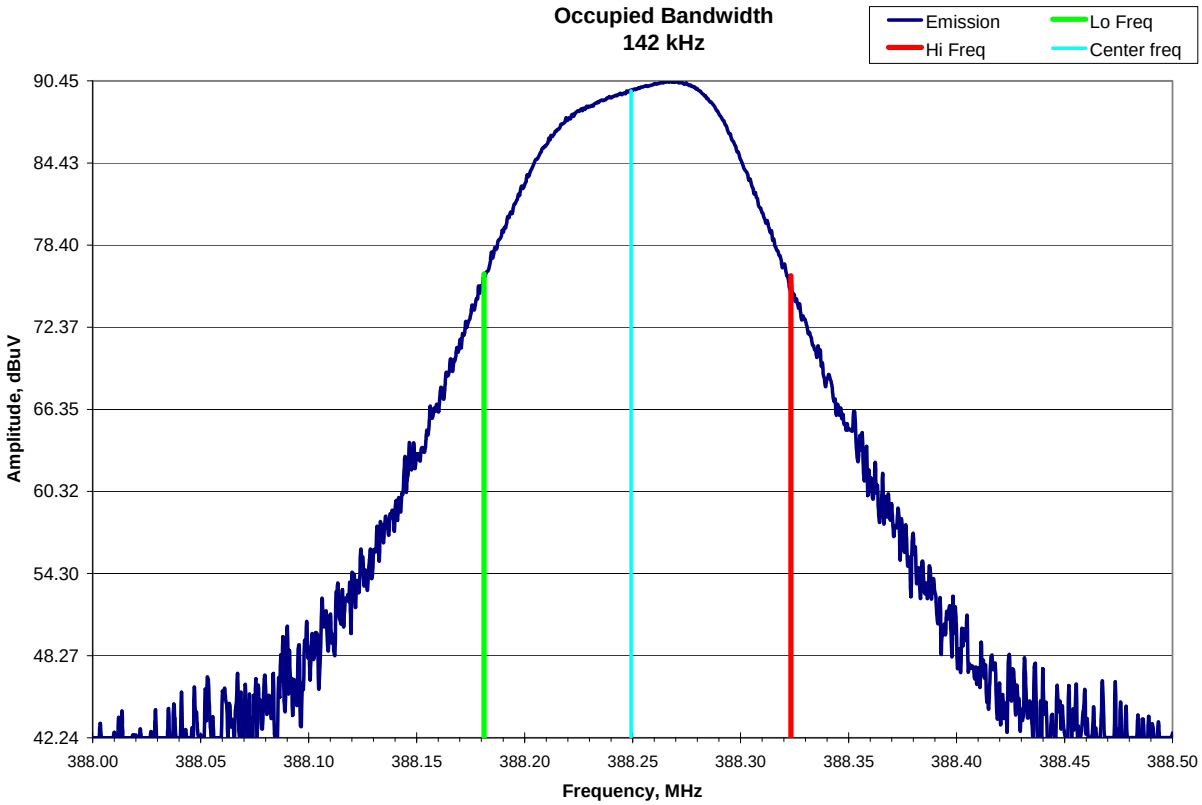
Power Graph


Occupied Bandwidth
152 kHz
Emission
Lo Freq
Hi Freq
Center Freq
4.76E-04
4.17E-04
3.57E-04
2.98E-04
2.38E-04
1.79E-04
1.19E-04
5.95E-05
2.61E-08
Amplitude, watts
383.74
383.79
383.84
383.89
383.94
383.99
384.04
384.09
384.14
384.19
384.24
Freq. MHz

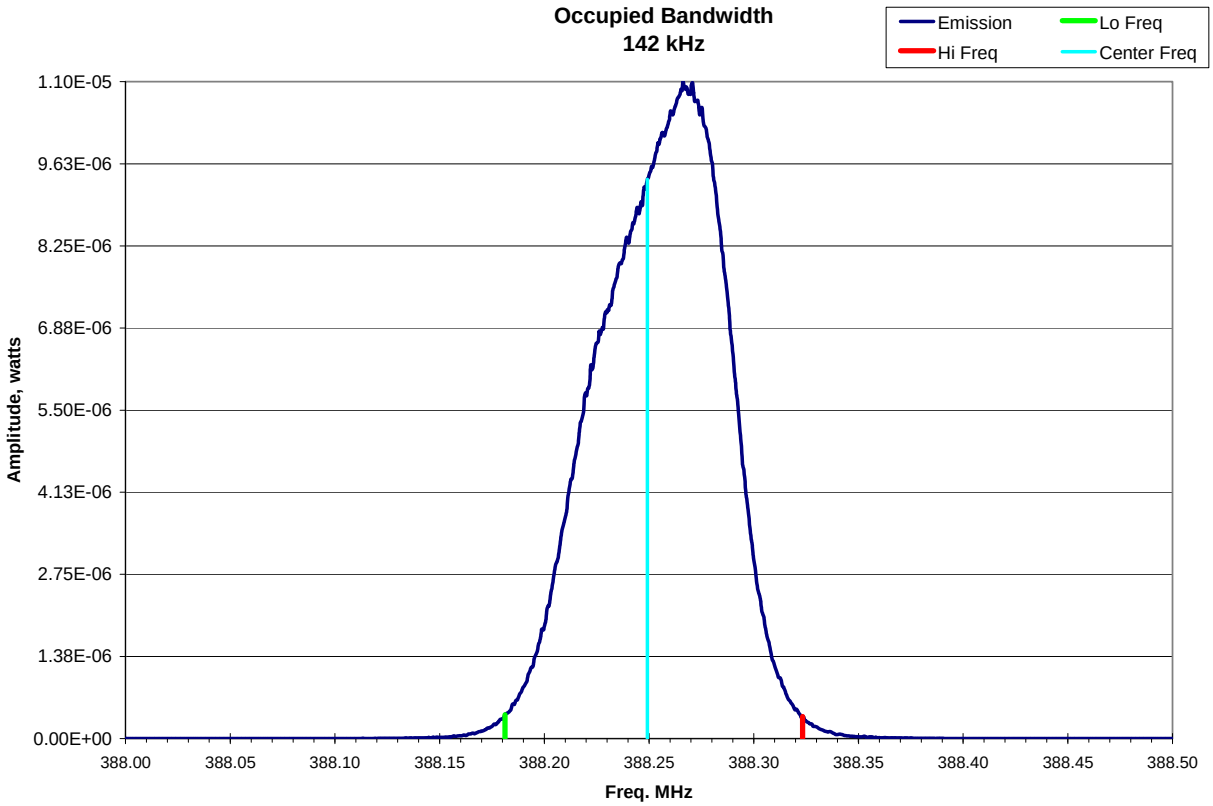
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Channel 4 – FSK (388.375 MHz)

Field Strength Graph



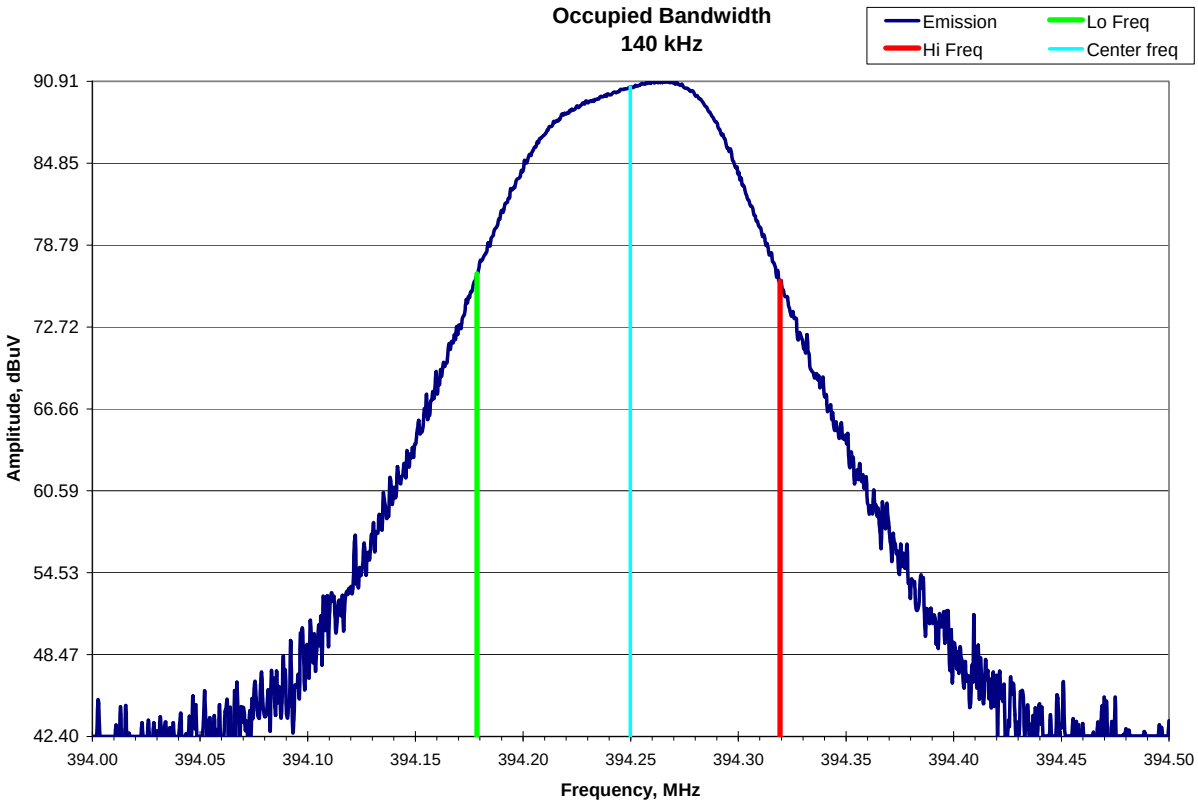
Power Graph



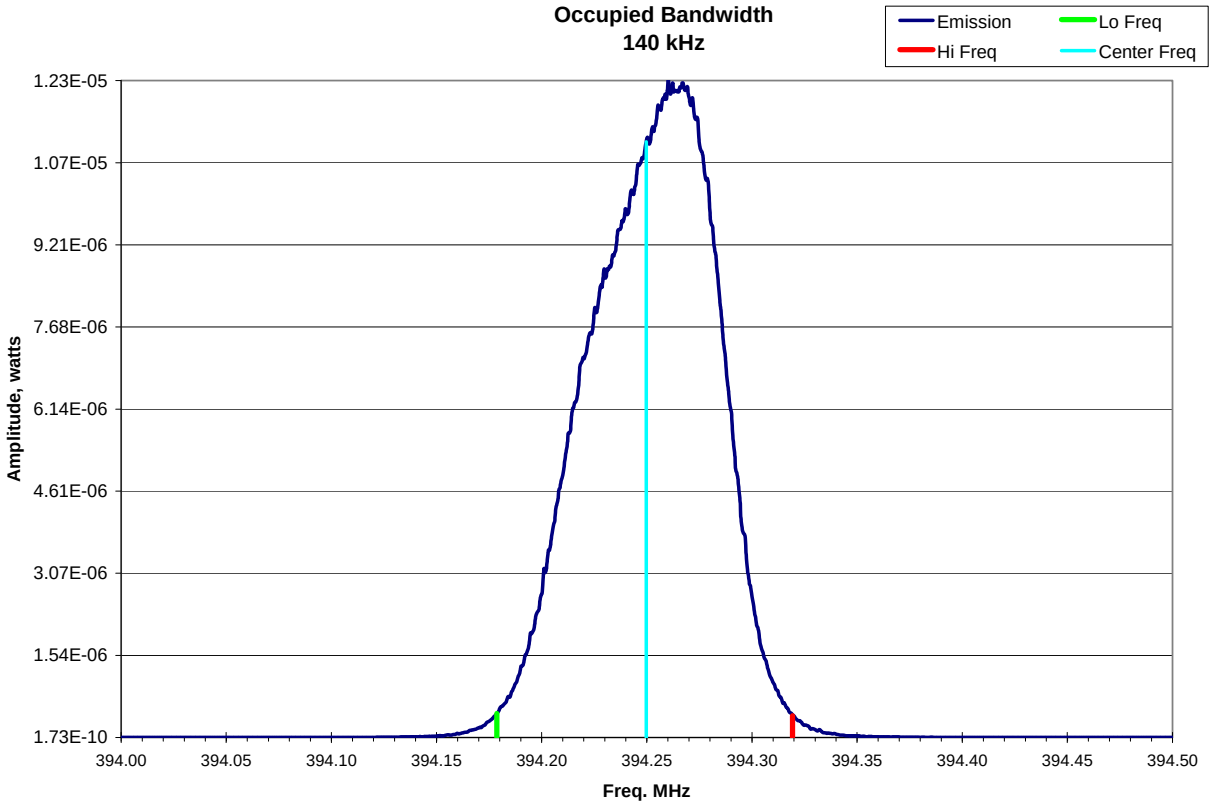
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Channel 5 – FSK (394.375 MHz)

Field Strength Graph



Power Graph



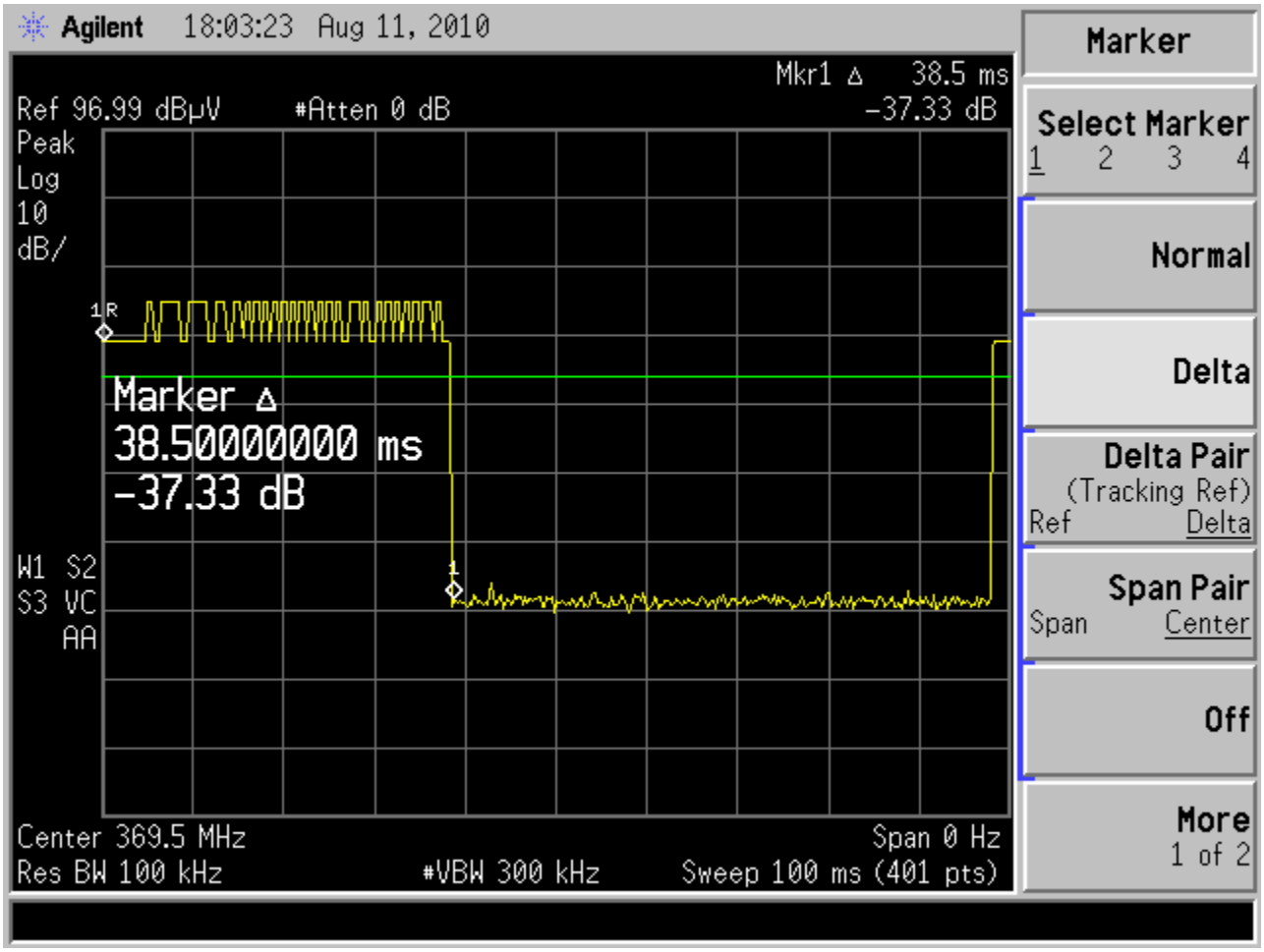
Deviations, Additions, or Exclusions: None

11 Duty Cycle Correction Factor – Justification

Tx Fundamental Duty Cycle

FCC 15.35 / RSS-Gen, Section 4.5

Channel 1 – FSK (369.5 MHz)

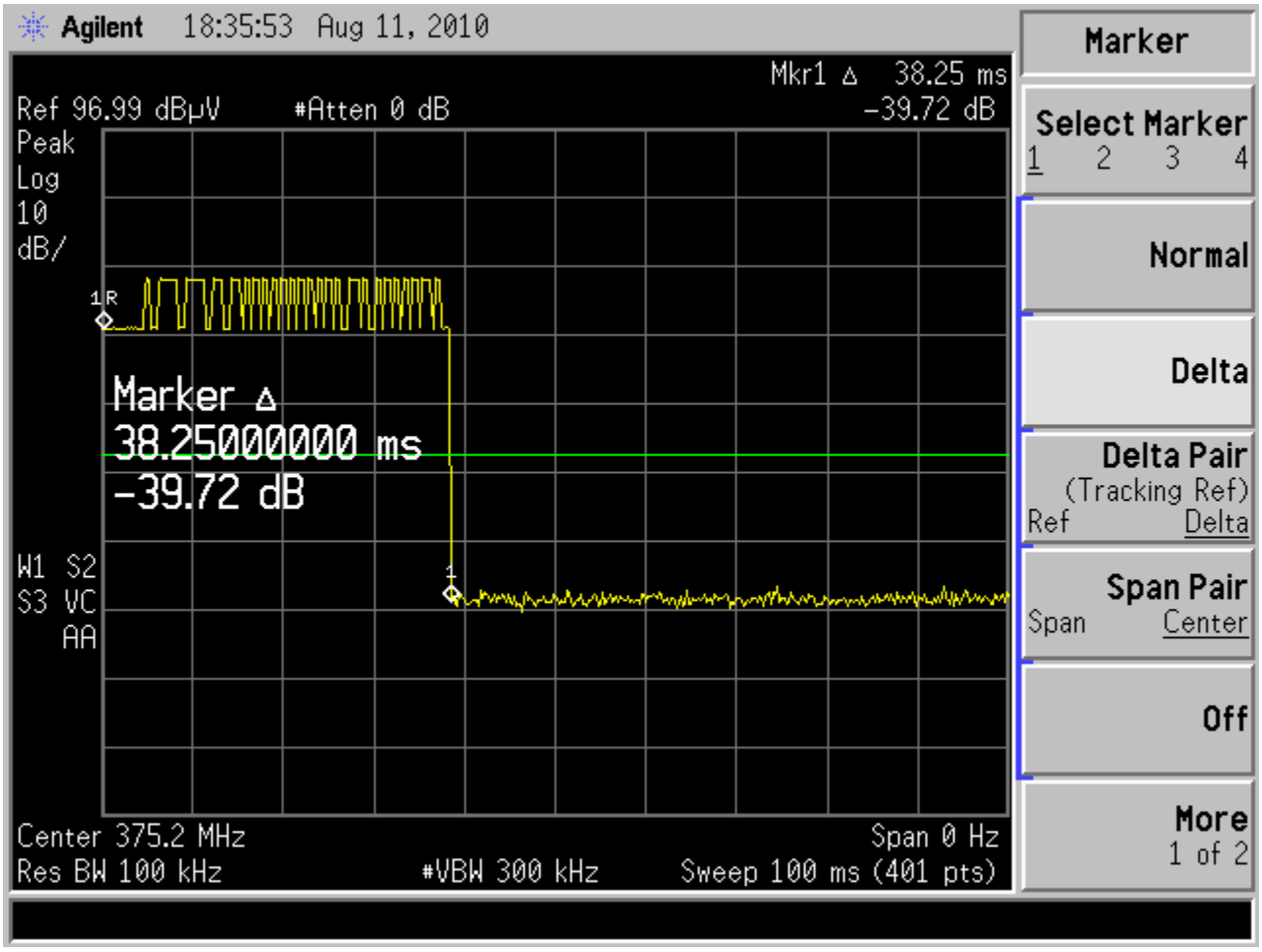


Duty Cycle: 38.5 ms

Tx Fundamental Duty Cycle

FCC 15.35 / RSS-Gen, Section 4.5

Channel 2 – FSK (375.25 MHz)

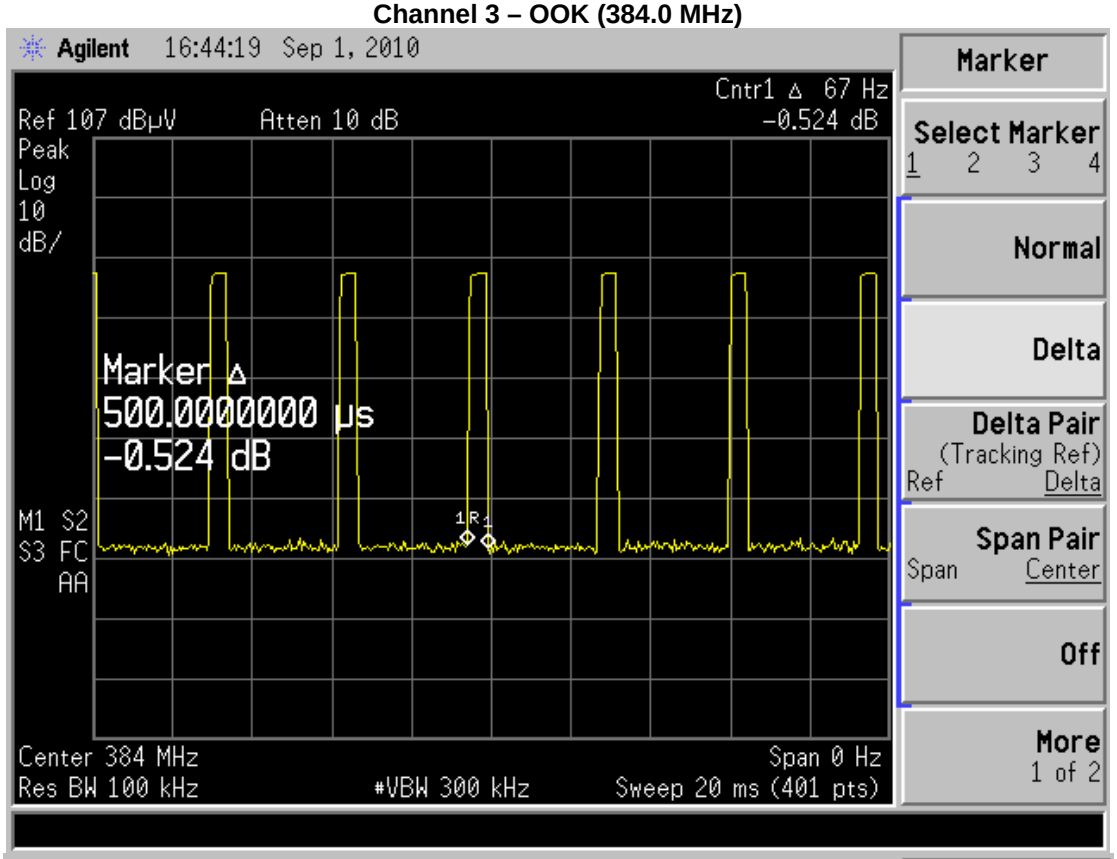


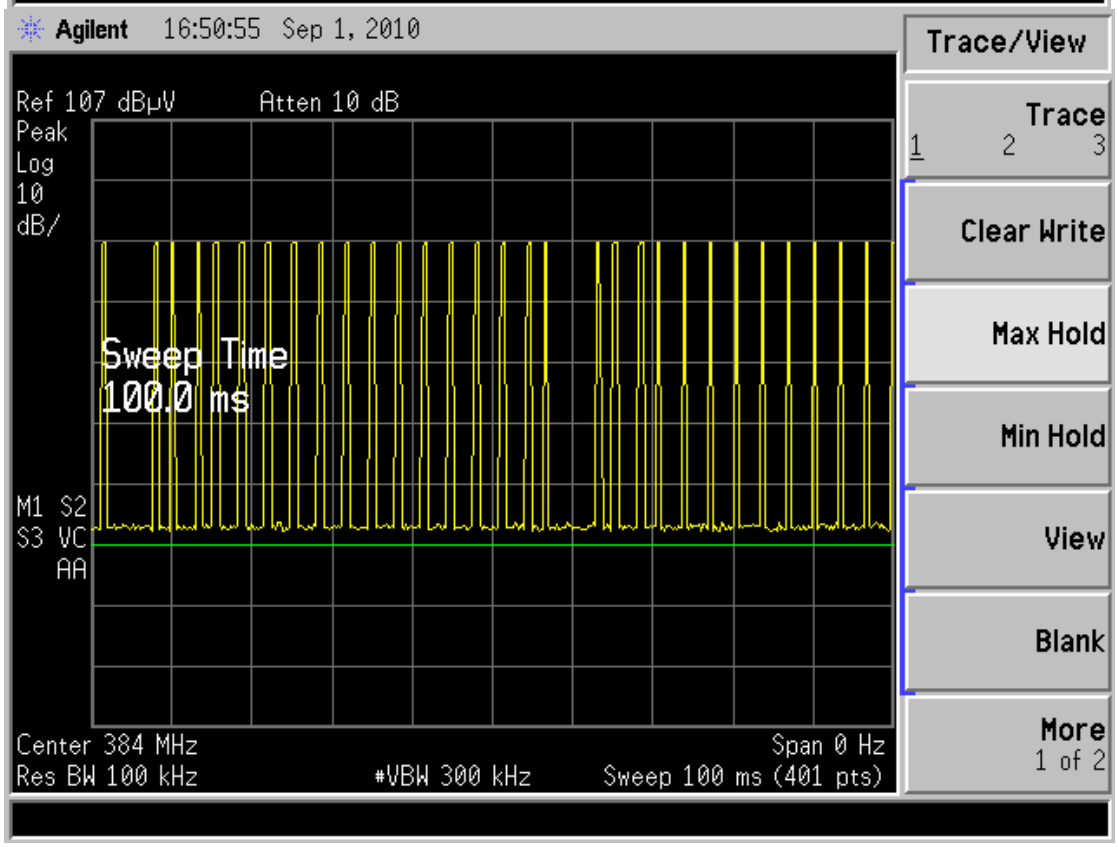
Duty Cycle: 38.25 ms

Tx Fundamental Duty Cycle

FCC 15.35 / RSS-Gen, Section 4.5

Channel 3 – OOK (384.0 MHz)



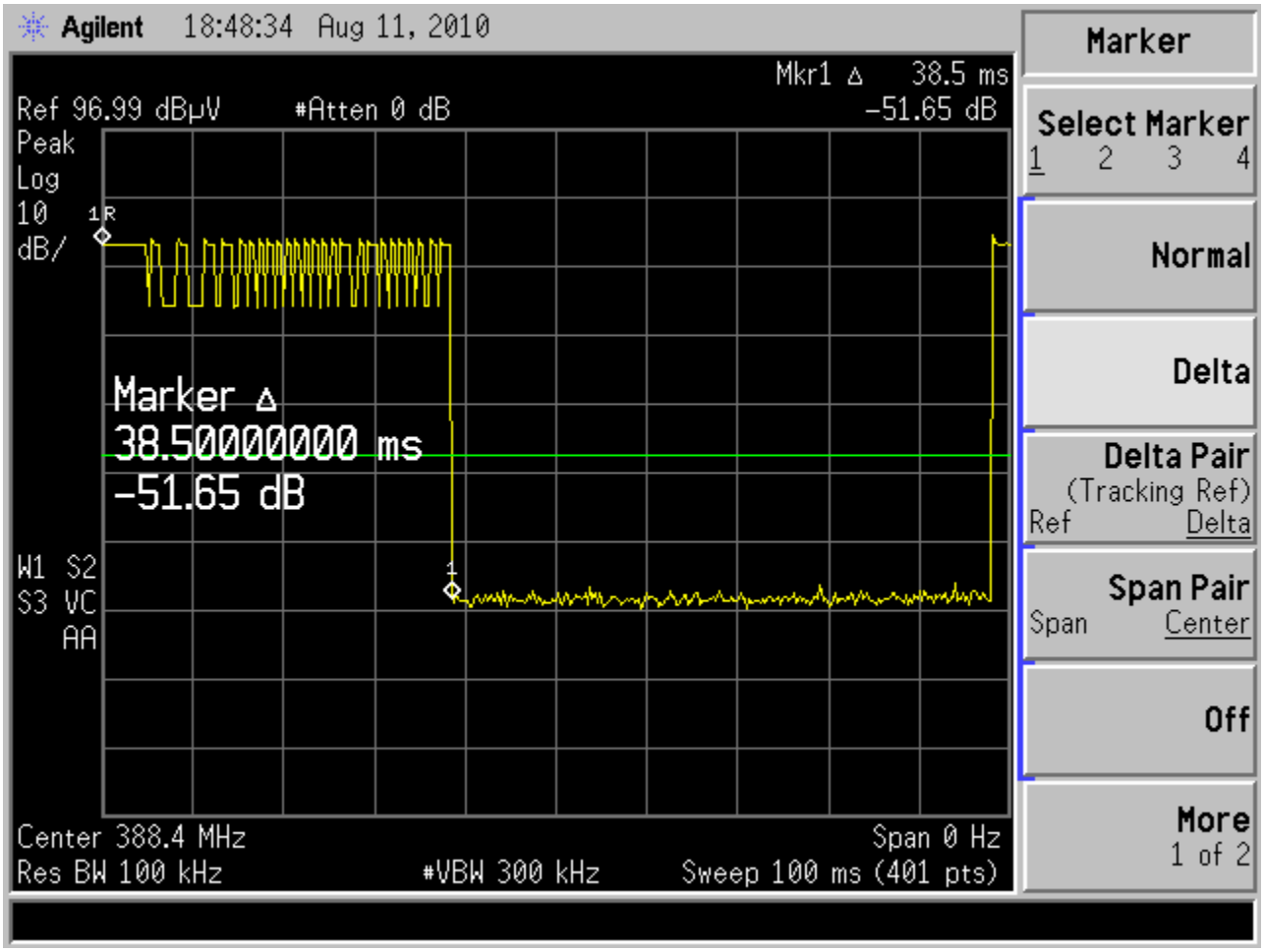


Duty Cycle: 31 x 0.5ms = 15.5 ms

Tx Fundamental Duty Cycle

FCC 15.35 / RSS-Gen, Section 4.5

Channel 4 – FSK (388.375 MHz)

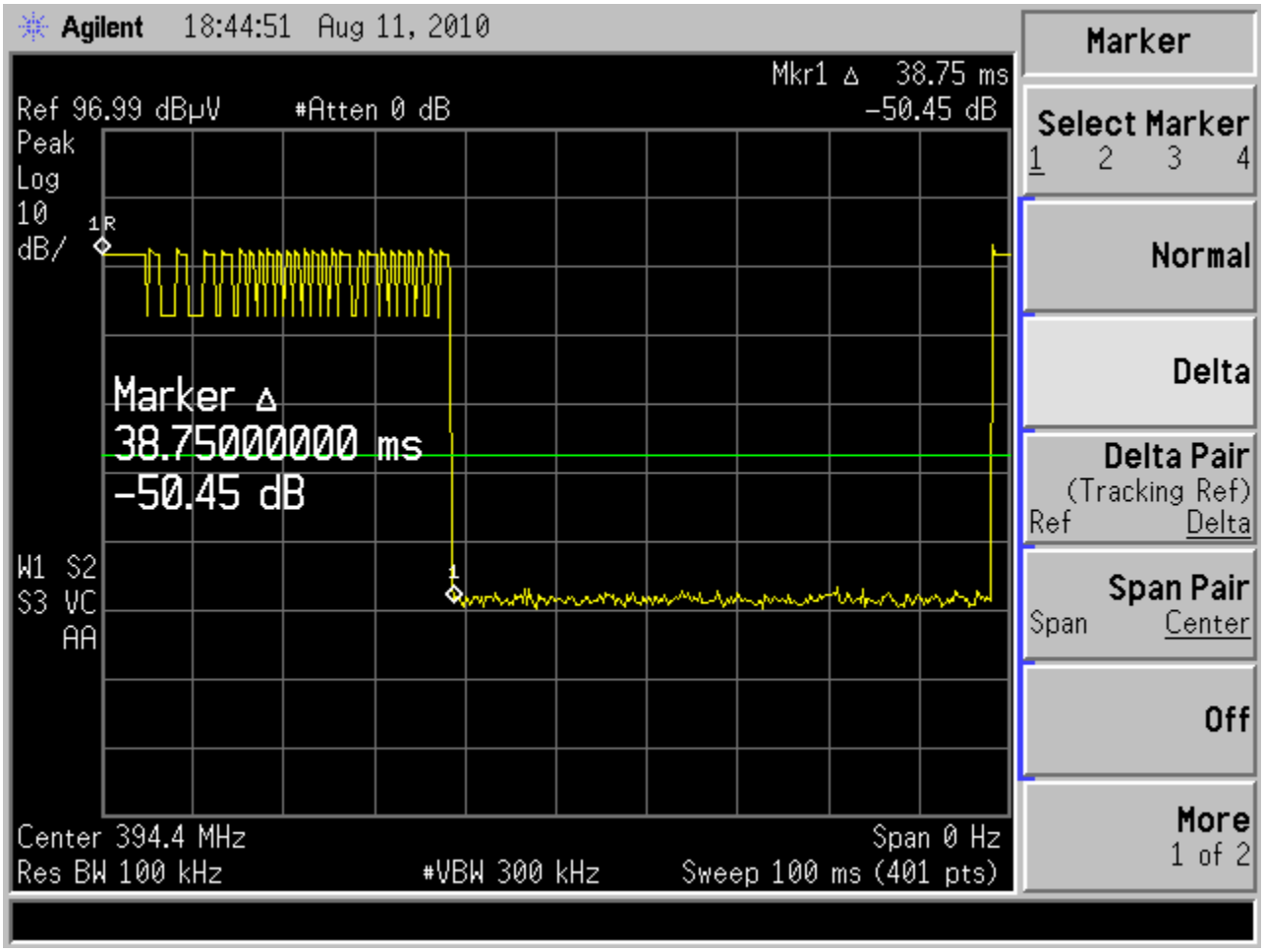


Duty Cycle: 38.5 ms

Tx Fundamental Duty Cycle

FCC 15.35 / RSS-Gen, Section 4.5

Channel 5 – FSK (394.375 MHz)



Duty Cycle: 3.75 ms

12 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty ±	Notes
Radiated emissions, 10kHz to 1000 MHz	4.8 dB	
Radiated emissions, 1 to 18 GHz	4.9 dB	
AC mains Conducted emissions, 150kHz to 30 MHz	3.14 dB	
Disturbance Power 30 to 1000 MHz	3.3 dB	
Telecom Port Conducted emissions, Voltage 150 kHz to 30 MHz	TBD	In Process
Harmonics	-	Meets the requirements specified by the standard.
Flicker	-	Meets the requirements specified by the standard.

13 Revision History

Revision Level	Date	Report Number	Notes	Author	Reviewer
0	08/31/2010	100189018DEN-001	Original Issue		
1	09/1/2010	100189018DEN-001	added note 4 – page 3 modify limits/data – Tx data sheet, pages 32-36 append duty cycle info – section 11 pages 55-59	Randy Thompson R.T.	Mike Spataro MAS