F2 Labs
16740 Peters Road
Middlefield, Ohio 44062
United States of America
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CERTIFICATION TEST REPORT

Manufacturer:	**Silent Beacon LLC** **4F, Building 2, Guanghui Technology Park,** **MinQing Road, Longhua, Shenzhen, China 518109**
Applicant:	**Silent Beacon LLC** **12001 Glen Road** **Potomac, Maryland 20854**
Product Name:	**Silent Beacon**
Product Description:	Bluetooth device for emergency situations.
Operating Voltage/Frequency:	120V/60 Hz
Model:	**Silent Beacon 001**
FCC ID:	**2AIND052576SB**
Testing Commenced:	**July 6, 2016**
Testing Ended:	**July 13, 2016**
Summary of Test Results:	**In Compliance**

Standards:

- **FCC Part 15 Subpart C, Section 15.249**
- **FCC Part 15 Subpart C, Section 15.215(c) – Additional provisions to the general radiated emission limitations**
- **FCC15.207(a) - Conducted Limits**
- **FCC Part 15 Subpart A, Section 15.31(e) – Voltage Variations**

Evaluation Conducted by:

Joe Knepper, EMC Proj. Eng.

Report Reviewed by:

Ken Littell, Director of EMC & Wireless Operations

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD**.**

1.2 Measurement Procedure:

All measurements were performed according to the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement under Section 15.249. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

Radiated Emission

- Combined Uncertainty (+ or -) 2.67 dB
- Expanded Uncertainty (+ or -) 5.35 dB

Conducted Emissions

- Combined Uncertainty (+ or -) 1.88 dB
- Expanded Uncertainty (+ or -) 3.75 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2LQ8306C-01E	First Issue	July 21, 2016	K. Littell

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
-20dB Occupied Bandwidth	CFR 47 Part 15.215(c)	Complies
Field Strength of Emissions	CFR 47 Part 15.249(a)(d)	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies
Variation of the Input Power	CFR 47 Part 15.31(e)	Complies

Note: Product was operated using an AC to DC power supply, so Voltage Variation testing in 15.31(3)(e) was performed at the nominal voltage, and then the 85% and 115% of that voltage was tested also. The output power at the High, Mid, and Low channels was measured to verify how much the power and frequency were affected by the variation of the input power. Worst case was at the nominal voltage and the following data reflects testing at that voltage.

Modifications Made to the Equipment
None

3 TABLE OF MEASURED RESULTS

Test	Modulation	Low Channel (2.402 MHz)	Mid Channel (2.440 MHz)	High Channel (2480 MHz)
Average Field Strength of Fundamental	GFSK	91.3 dBuV/m	74.8 dBuV/m	83.5 dBuV/m
	Pi/4DPSK	78.2 dBuV/m	81.7 dBuV/m	81.5 dBuV/m
	8DPSK	82.3 dBuV/m	84.7 dBuV/m	79.0 dBuV/m
	BLE	87.9 dBuV/m	83.8 dBuV/m	85.5 dBuV/m
Peak Field Strength of Fundamental	GFSK	91.8 dBuV/m	76.0 dBuV/m	84.3 dBuV/m
	Pi/4DPSK	82.2 dBuV/m	84.8 dBuV/m	84.9 dBuV/m
	8DPSK	86.5 dBuV/m	87.9 dBuV/m	82.0 dBuV/m
	BLE	89.0 dBuV/m	86.2 dBuV/m	86.2 dBuV/m
Average Limit for Fundamental	All	50 millivolts/meter 93.97 (dBµV/m)	50 millivolts/meter 93.97 (dBµV/m)	50 millivolts/meter 93.97 (dBµV/m)
Peak Limit for Fundamental	All	113.97 (dBuV/m)	113.97 (dBuV/m)	113.97 (dBuV/m)
-20dB Occupied Bandwidth	GFSK	0.952 MHz	0.9476 MHz	0.9436 MHz
	Pi/4DPSK	2.196 MHz	1.533 MHz	1.461 MHz
	8DPSK	1.491 MHz	1.435 MHz	1.456 MHz
	BLE	1.196 MHz	1.191 MHz	1.176 MHz

The 20 dB bandwidth of the emission shall be contained within the frequency band designated in the rule section under which the equipment is operated.

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Silent Beacon LLC to provide documentation for the testing described herein. This equipment has been tested and found to comply with part 15.249 of the FCC Rules using ANSI C63.10 2013 standard. The test results found in this test report relate only to the items tested.

5 EUT INFORMATION AND DATA

5.1 Equipment Under Test:

Product: Silent Beacon
Model: Silent Beacon 001
Serial No.: None Specified
FCC ID: 2AIND052576SB

5.2 Trade Name:

Silent Beacon LLC

5.3 Power Supply:

AC/USB Adapter, Samsung EP-TA205WE

5.4 Applicable Rules:

CFR 47, Part 15.249

5.5 Equipment Category:

DSS FHSS Spread Spectrum Transmitter

5.6 Antenna:

0.5dBi Gain Integral Antenna

5.7 Accessories:

N/A

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was set up to transmit continuously at Low (2.402GHz), Mid (2.44 GHz) and High (2.48 GHz). EUT had four modulations tested at all channels, GFSK, Pi/4DPSK, 8DPSK and BLE.

6 LIST OF MEASUREMENT INSTRUMENTATION

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	AbatrossProjects	B83117-DF435-T261	US140023	May 12, 2017
Temp./Humidity Recorder	CL137	Extech	RH520	CH16992	May 3, 2017
Spectrum Analyzer	CL138	Agilent Technologies	E4407B	US41192779	Nov. 13, 2016
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Nov. 25, 2016
Pre-Amplifier	CL153	Keysight Technologies	83006A	MY39500791	June 6, 2017
Pre-Amplifier	CL136	Hewlett Packard	8447E	1937A01894	Apr. 11, 2017
Antenna/JB 3 Combination	CL175	Sunol Sciences	JB3	A030315	Apr. 1, 2017
Amplifier w/Monopole & 18” Loop	CL163	A.H. Systems, Inc.	EHA-52B	100	May 2, 2017
Horn Antenna	CL098	Emco	3115	9809-5580	Dec. 10, 2016
Horn Antenna	CL114	A.H. Systems, Inc.	SAS-572	237	Oct. 16, 2016
Temp./Humidity Recorder	CL119	Extech	RH520	H005869	Jan. 29, 2017
Transient Limiter	0202	Hewlett Packard	11947A	3107A00729	June 27, 2018
Spectrum Analyzer	CL147	Agilent	E7402A	MY45101241	Dec. 3, 2016
LISN	CL181	Com-Power	LI-125A	191226	June 24, 2018
LISN	CL182	Com-Power	LI=125A	191225	June 24, 2018
Software:	Tile Version 1.0		Software Verified: July 11-13, 2016		
Software:	EMC 32, Version 5.20.2		Software Verified: July 11, 2016		

7 FCC PART 15.215(e) – OCCUPIED BANDWIDTH

7.1 Requirements:

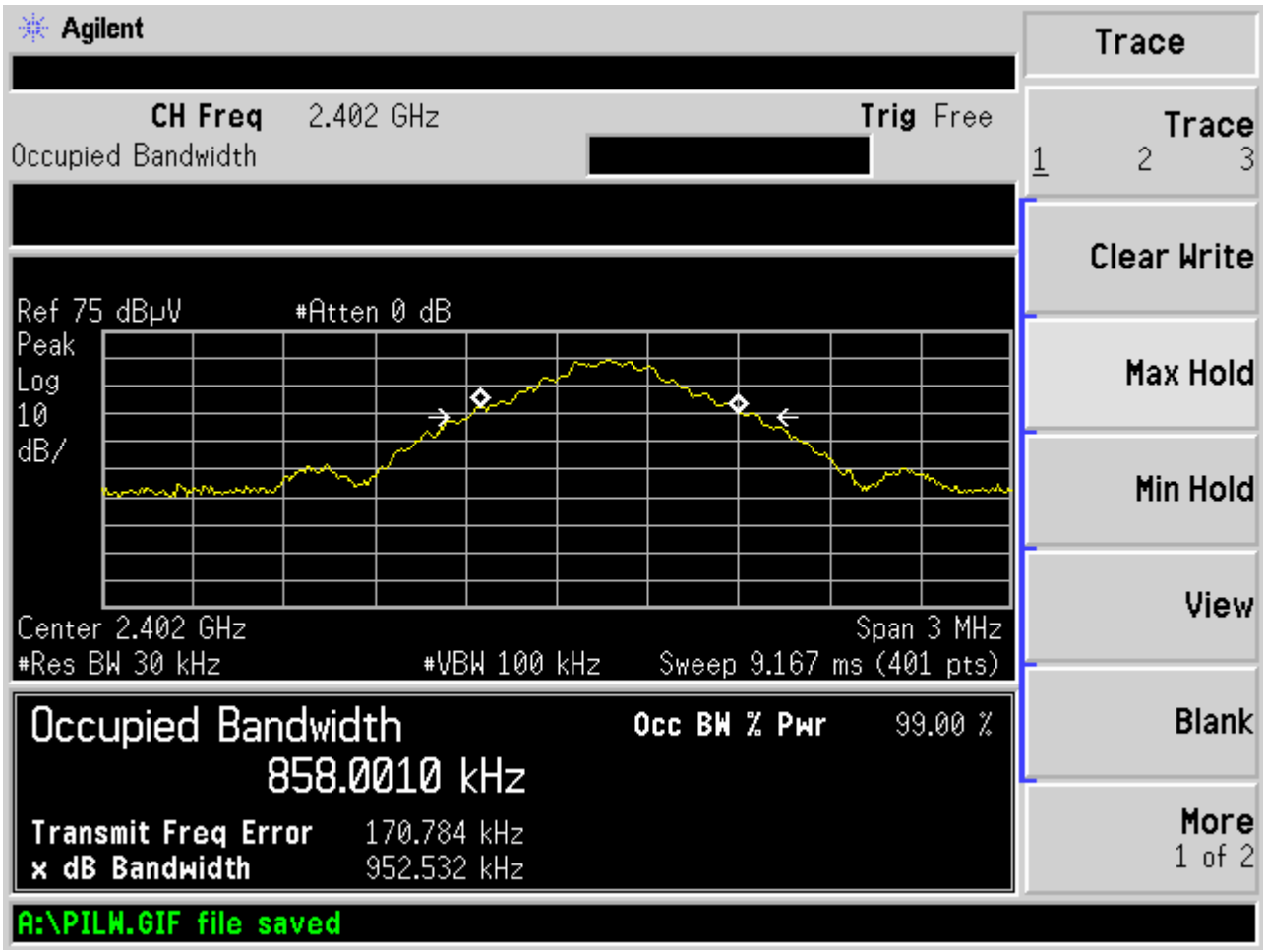
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

Bandwidth measurements were made at the low, mid and upper frequencies. The bandwidth was measured using the analyzer's marker function.

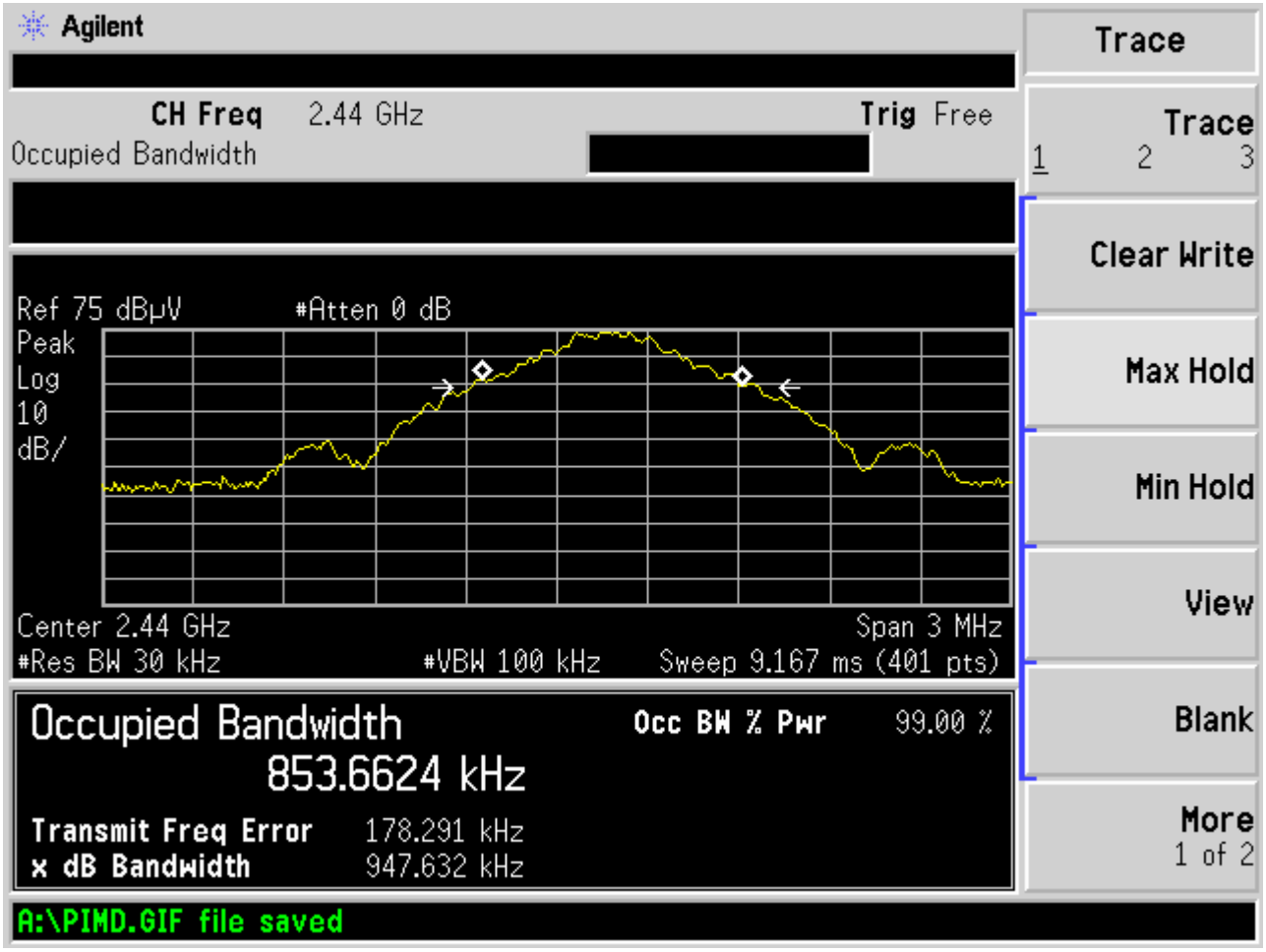
7.2 Occupied Bandwidth Test Data

Test Date:	July 13, 2016	**Test Engineer(s):**	J. Knepper
Standards:	CFR 47 Part 15.215(c)	**Air Temperature:**	22.3ºC
		Relative Humidity:	46%

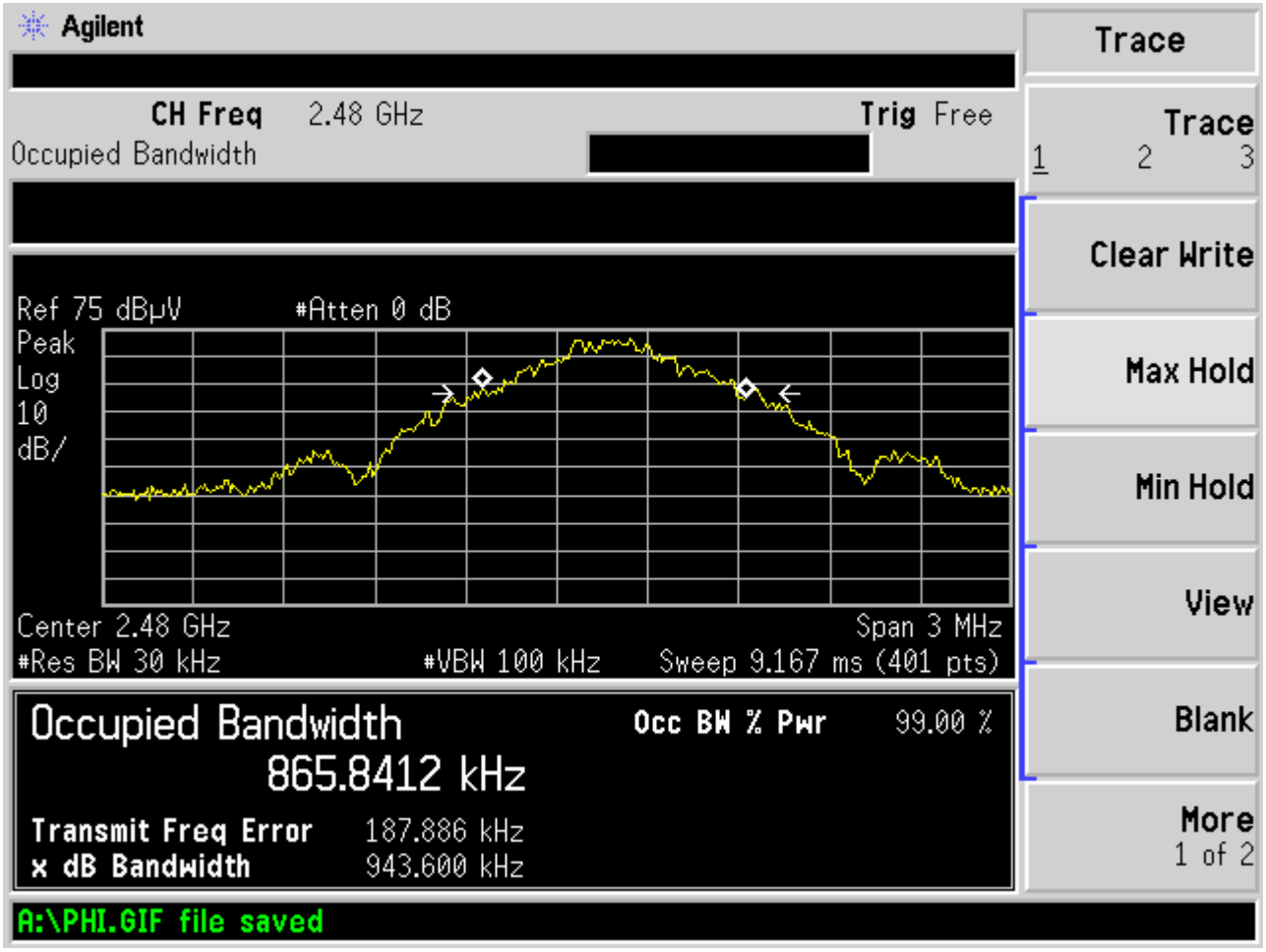
GFSK, Low Channel



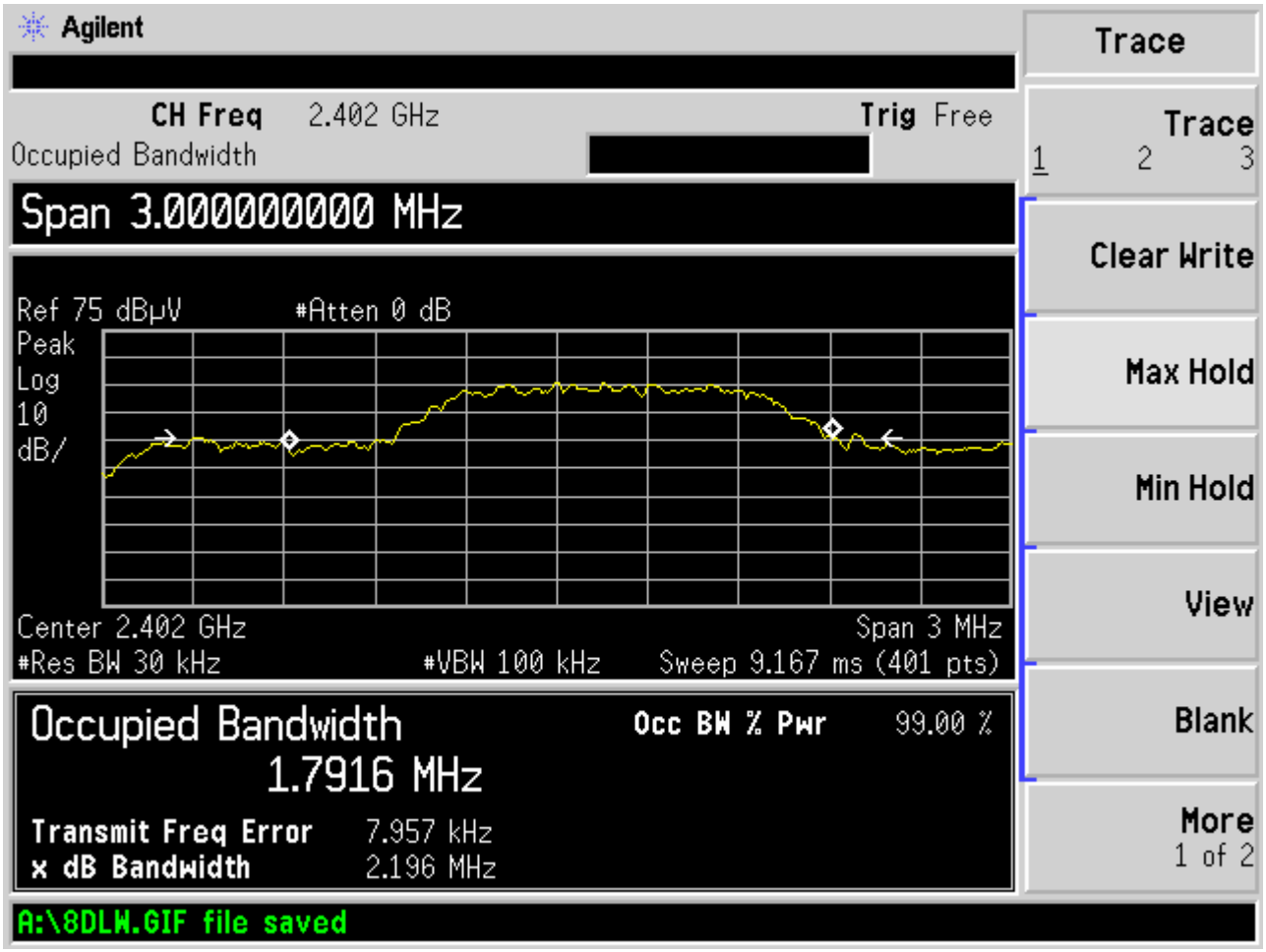
GFSK, Mid Channel



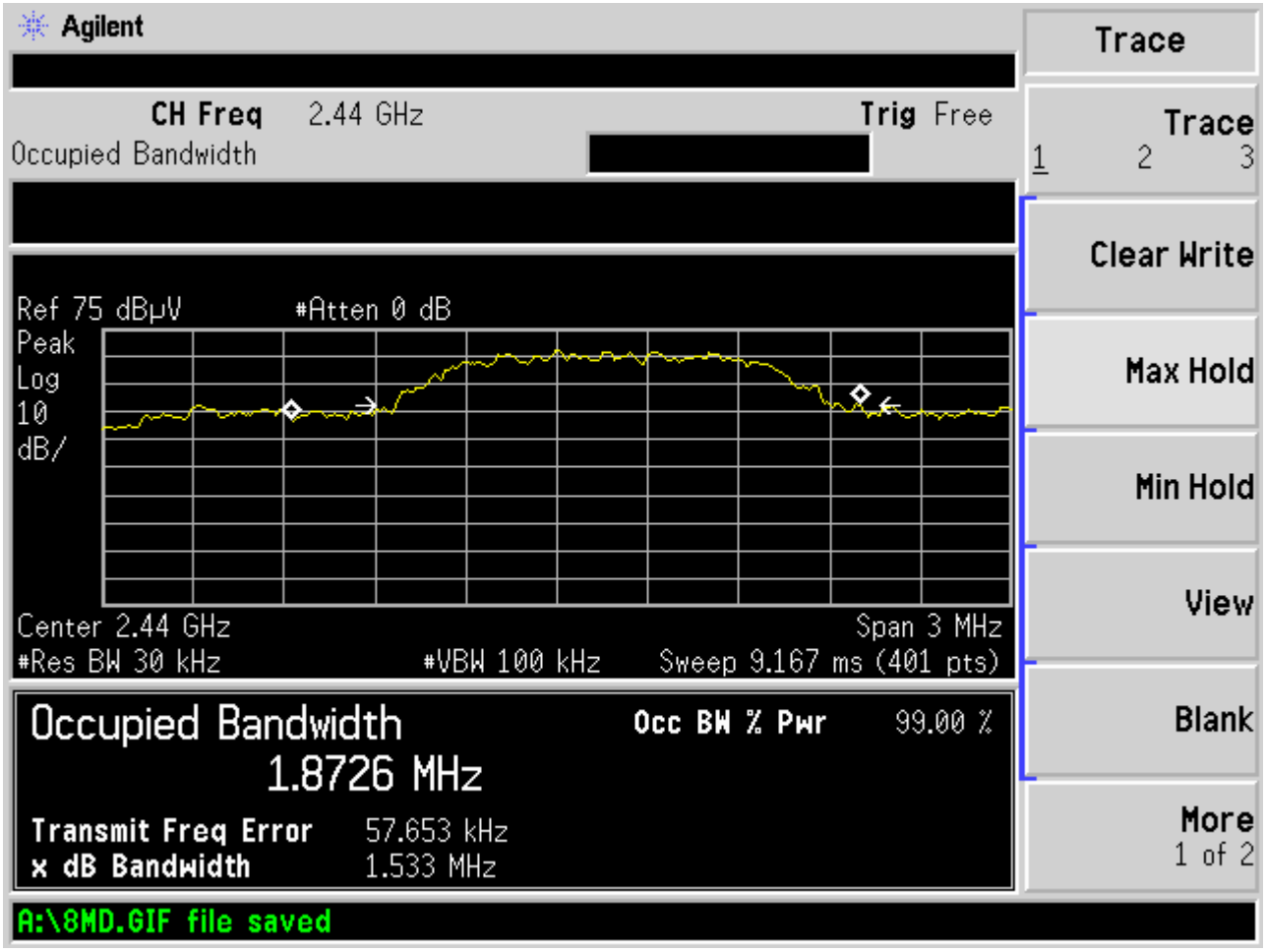
GFSK, High Channel



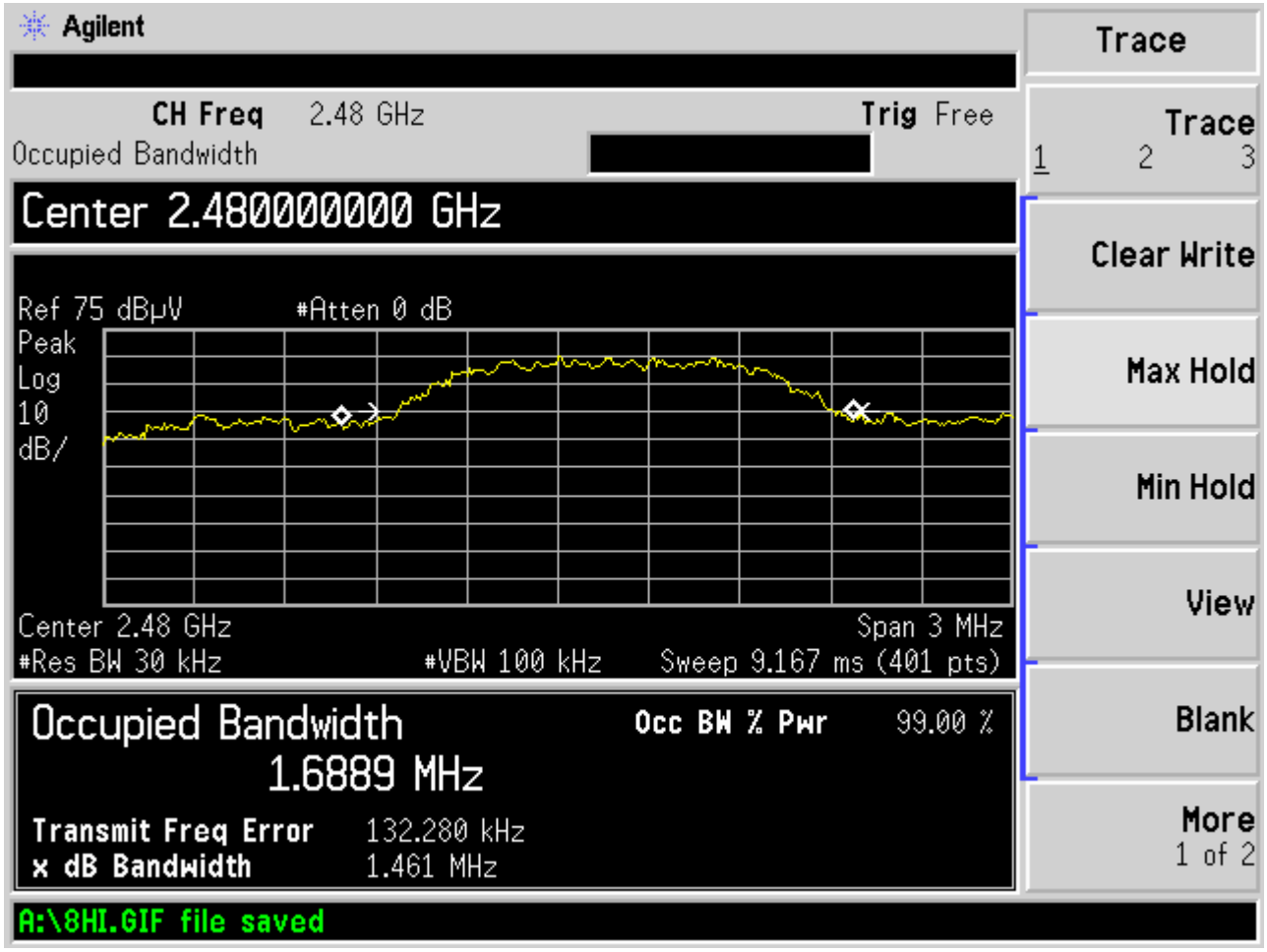
Pi/4 DPSK, Low Channel



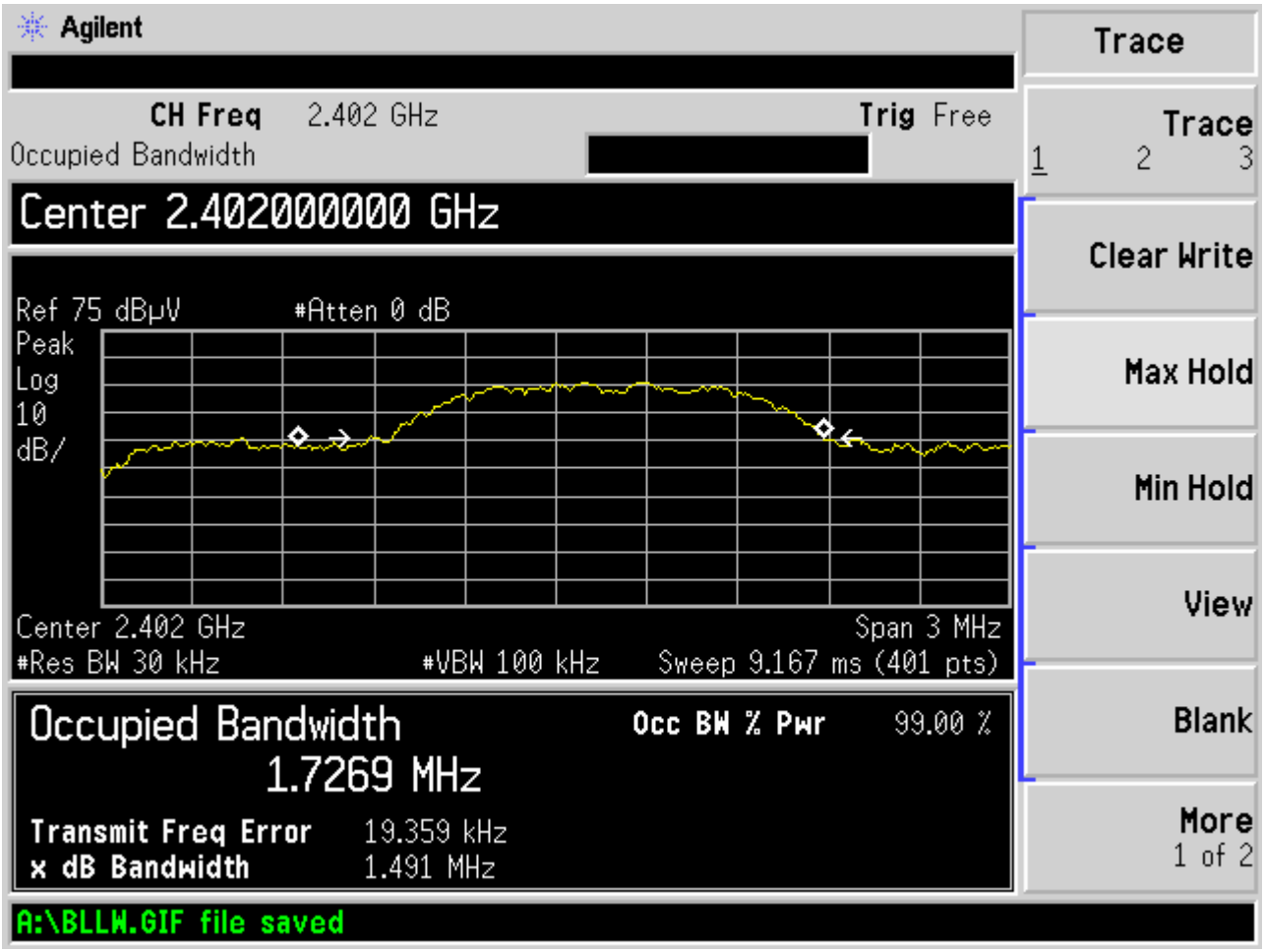
Pi/4 DPSK, Mid Channel



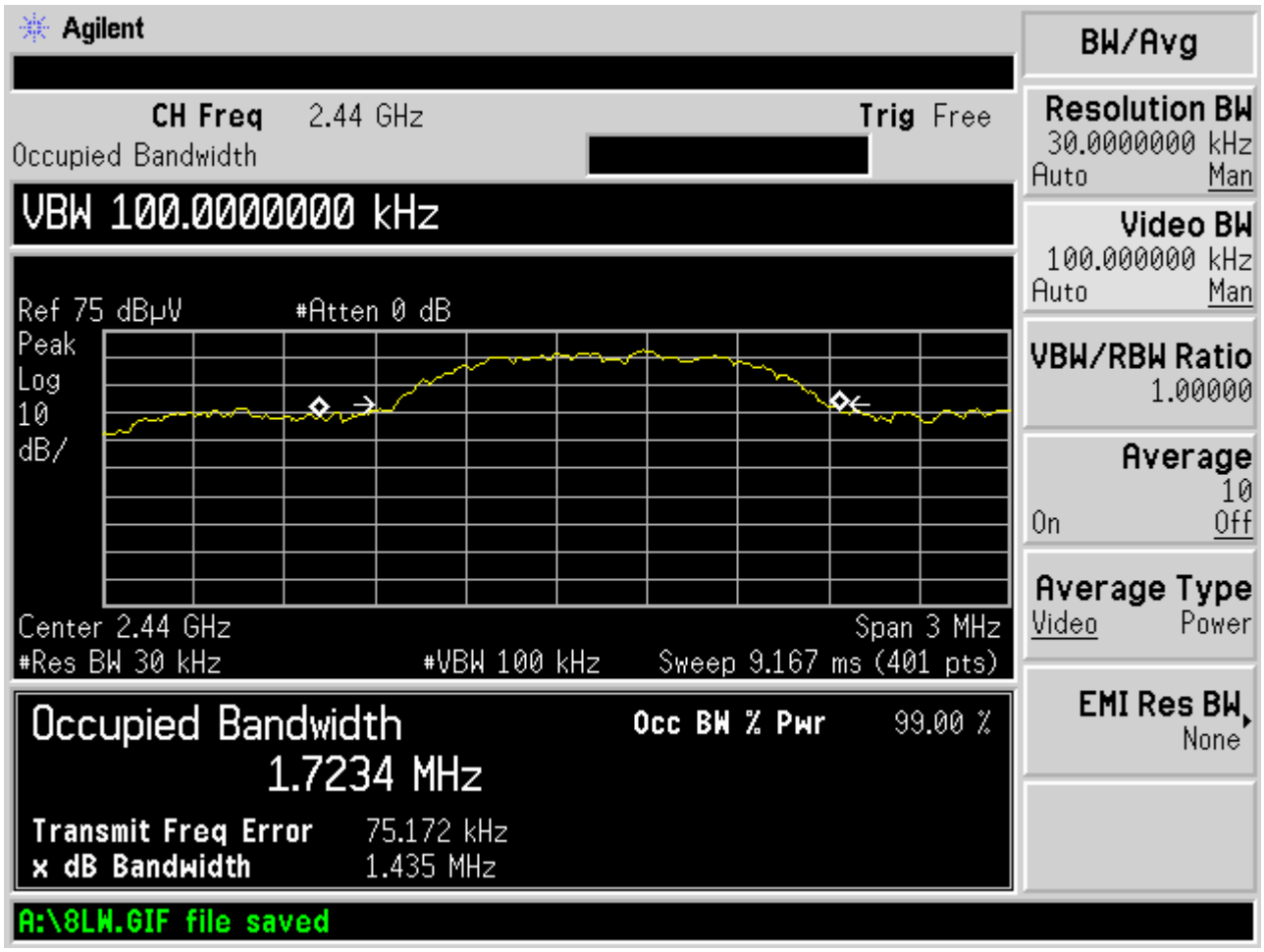
Pi/4 DPSK, High Channel



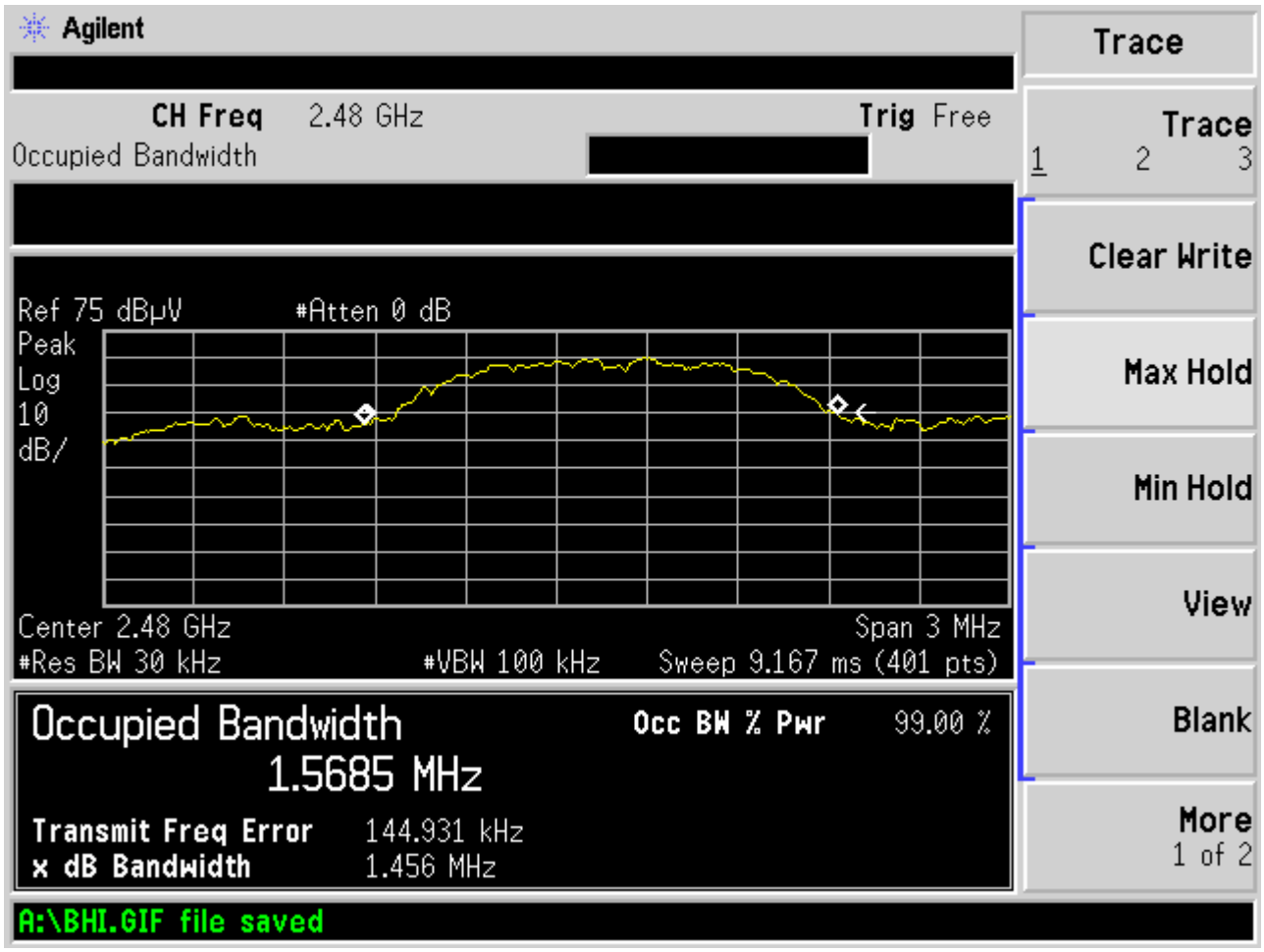
8DPSK, Low Channel



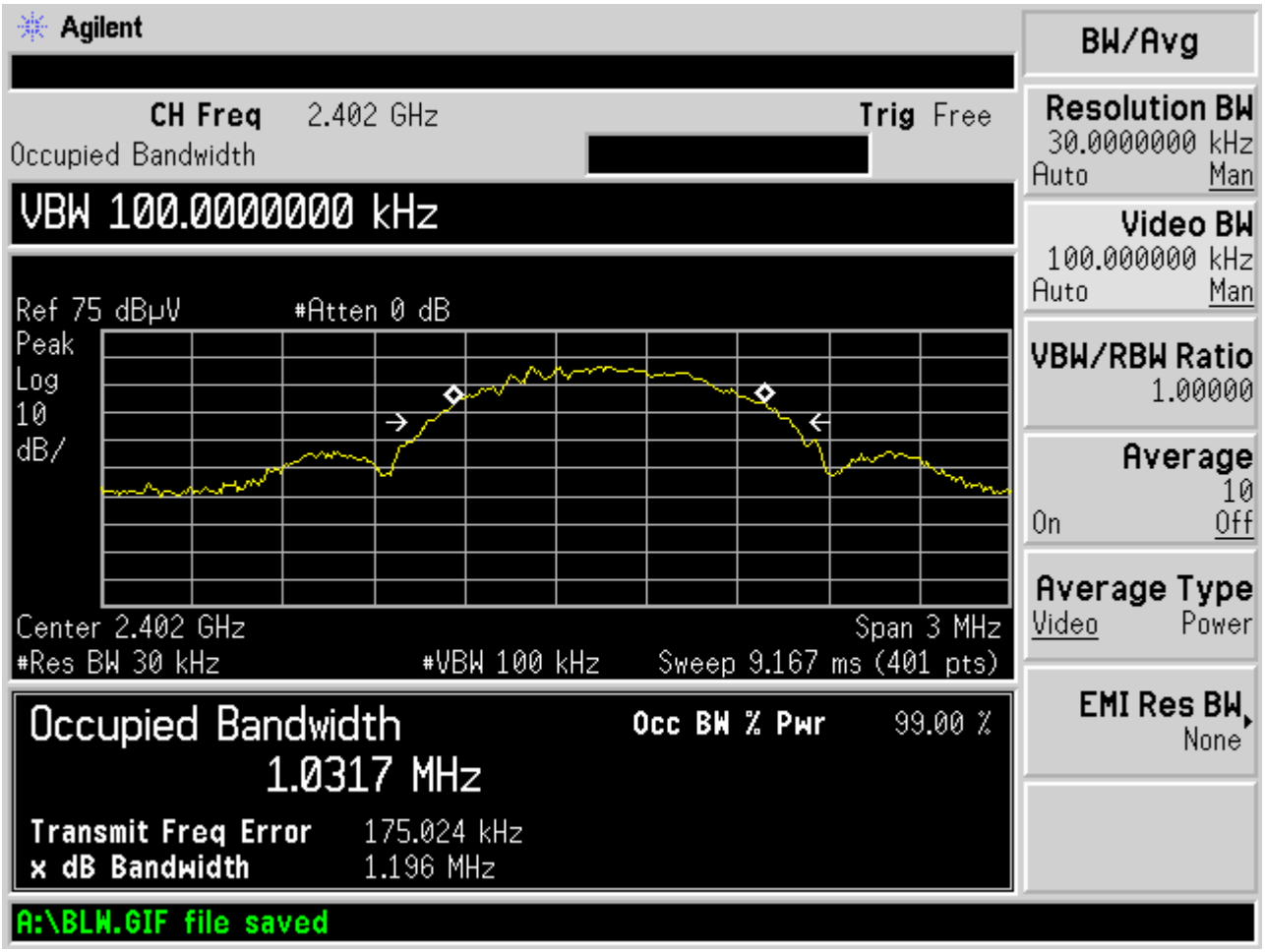
8DPSK, Mid Channel



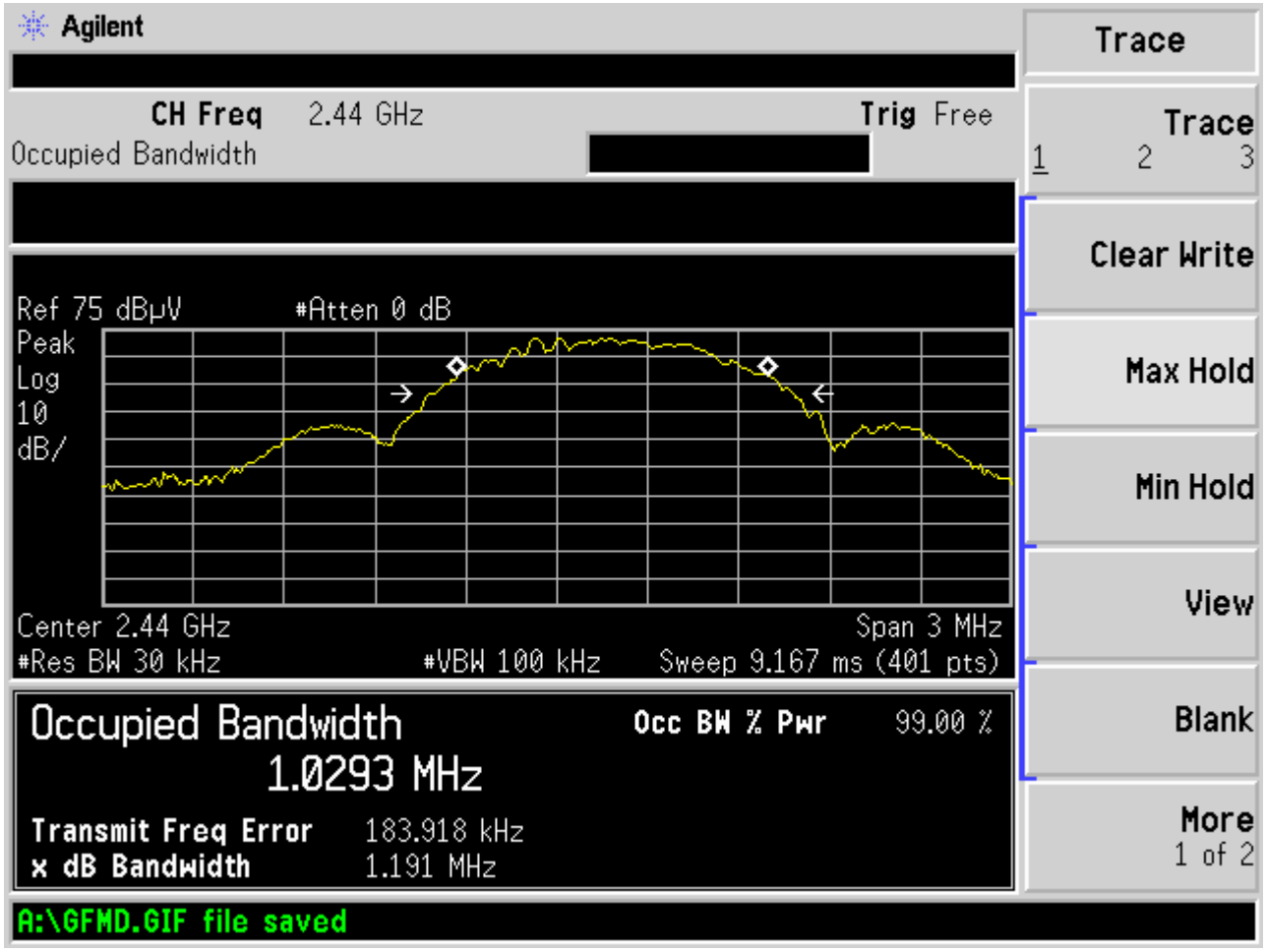
8DPSK, High Channel



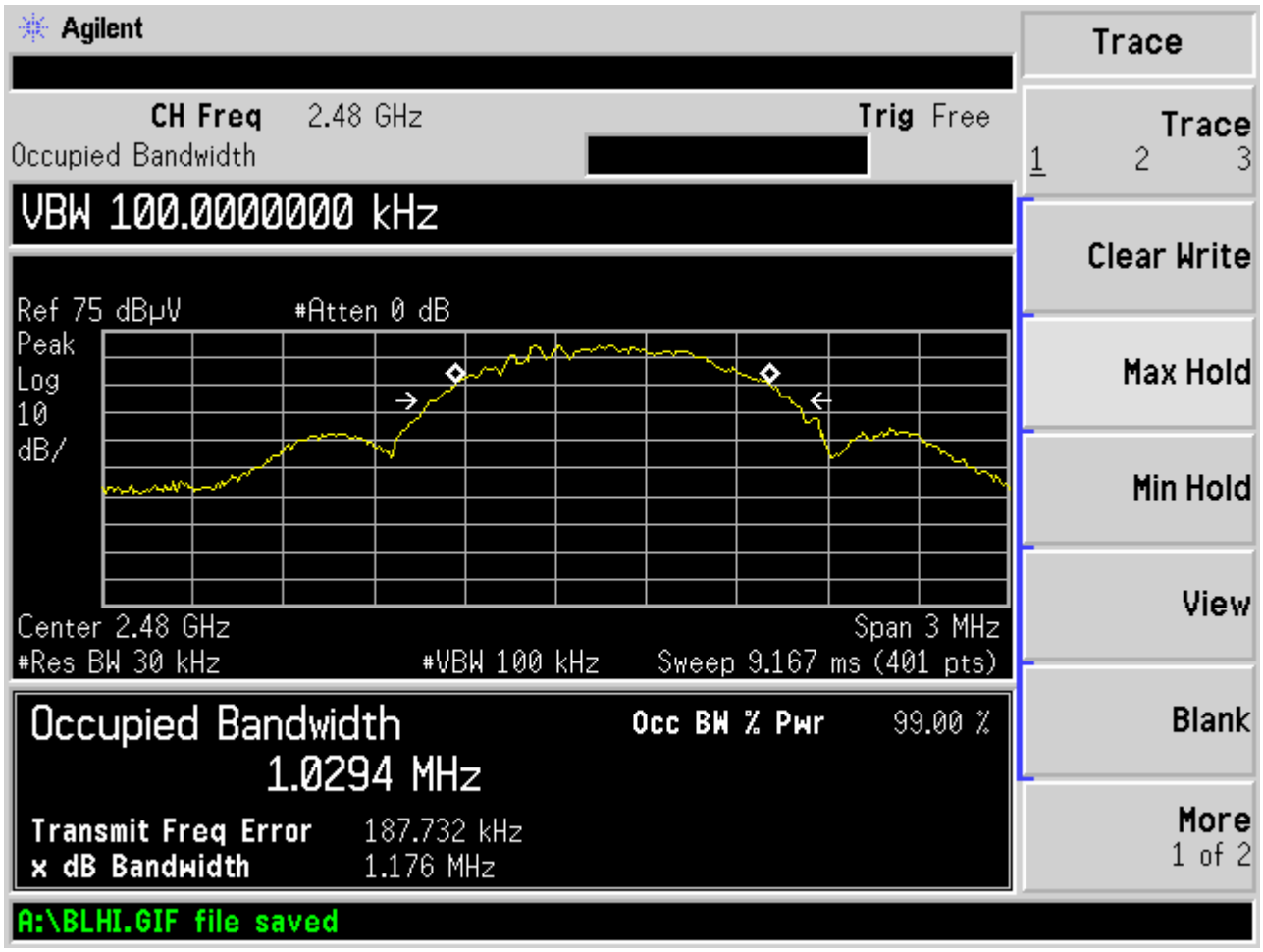
BLE, Low Channel



BLE, Mid Channel



BLE, High Channel



8 FCC PART 15.249(a)(d) – FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

NOTE: During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions.

8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	July 11-2, 2016	**Test Engineer(s):**	J. Knepper
Standards:	CFR 47 Part 15.249(a)	**Air Temperature:**	21.2ºC
		Relative Humidity:	46%

GFSK

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2402.110000	H	6.90	85.8	113.97	-28.2	85.4	93.97	-8.6	1000.000
2402.152000	V	6.90	91.8	113.97	-22.2	91.3	93.97	-2.7	1000.000
2440.164000	V	6.90	75.3	113.97	-38.7	74.7	93.97	-19.3	1000.000
2440.164000	H	6.90	76	113.97	-38.0	74.8	93.97	-19.2	1000.000
2480.218000	H	6.90	84.3	113.97	-29.7	83.5	93.97	-10.5	1000.000
2480.248000	V	6.90	82.1	113.97	-31.9	81.4	93.97	-12.6	1000.000

Pi/4DPSK, Field Strength

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2402.040000	H	6.80	82.2	113.97	-31.8	78.2	93.97	-15.8	1000.000
2402.122000	V	6.80	80.7	113.97	-33.3	77	93.97	-17.0	1000.000
2440.144000	H	6.80	84.8	113.97	-29.2	81.7	93.97	-12.3	1000.000
2440.168000	V	6.80	80.5	113.97	-33.5	77.3	93.97	-16.7	1000.000
2480.138000	V	6.90	78.1	113.97	-35.9	75.4	93.97	-18.6	1000.000
2480.380000	H	6.90	84.9	113.97	-29.1	81.5	93.97	-12.5	1000.000

8DPSK, Field Strength

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2402.204000	V	6.80	86.5	113.97	-27.5	82.3	93.97	-11.7	1000.000
2402.218000	H	6.80	80.2	113.97	-33.8	75.7	93.97	-18.3	1000.000
2440.056000	V	6.80	85	113.97	-29.0	81.6	93.97	-12.4	1000.000
2440.148000	H	6.80	87.9	113.97	-26.1	84.7	93.97	-9.3	1000.000
2480.148000	V	6.90	82	113.97	-32.0	79.0	93.97	-15.0	1000.000
2481.920000	H	6.90	69.2	113.97	-44.8	55.7	93.97	-38.3	1000.000

BLE, Field Strength

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2402.034000	H	6.80	89.0	113.97	-25.0	87.9	93.97	-6.1	1000.000
2402.226000	V	6.80	86.6	113.97	-27.4	85.6	93.97	-8.4	1000.000
2439.880000	H	6.80	86.2	113.97	-27.8	83.8	93.97	-10.2	1000.000
2440.170000	V	6.80	82.6	113.97	-31.4	81.9	93.97	-12.1	1000.000
2480.146000	H	6.90	86.2	113.97	-27.8	85.5	93.97	-8.5	1000.000
2480.250000	V	6.90	81.1	113.97	-32.9	80.0	93.97	-14.0	1000.000

8.2 Test Data – Spurious Emissions

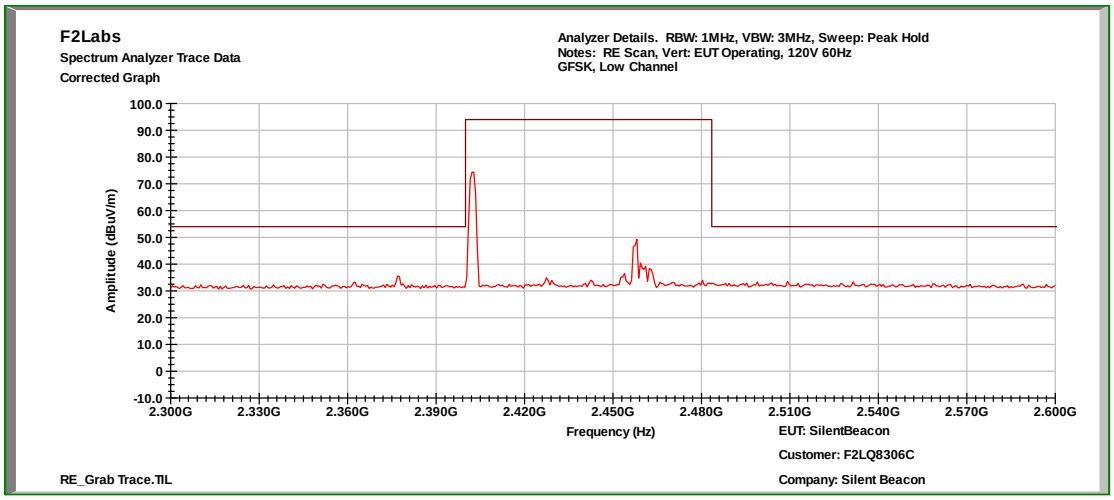
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies, no emissions from the EUT were measurable over the ambient noise floor. The readings did not change with EUT on and EUT off.

At least 6 of the highest frequencies were measured per ANSI 63.10 in a Semi-Anechoic Chamber. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit.

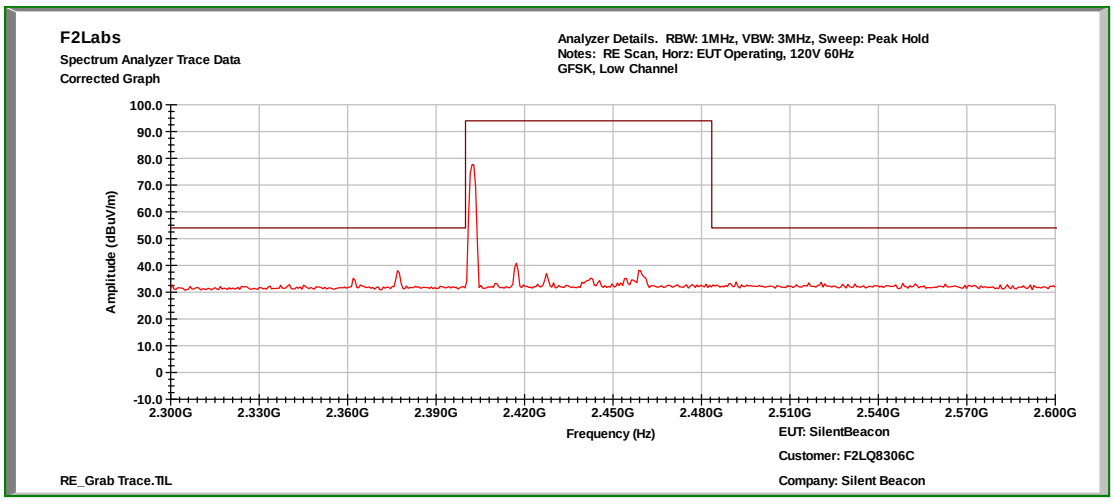
In the following plots, the black line indicates ambient noise and the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables below.

Test Date(s):	July 11-12, 2016	**Test Engineer(s):**	J. Knepper
Standards:	CFR 47 Part 15.249(d) / Part 15.209	**Air Temperature:**	21.2ºC
		Relative Humidity:	46%

GFSK, 2.3 GHz to 2.6 GHz, Vertical



GFSK, 2.3 GHz to 2.6 GHz, Horizontal



GFSK, Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.70	45.4	74	-28.6	31.7	54	-22.3	1000.000
2390.000000	V	6.70	44.6	74	-29.4	31.7	54	-22.3	1000.000
2483.500000	V	6.90	45.7	74	-28.3	32.1	54	-21.9	1000.000
2483.500000	H	6.90	46	74	-28.0	32.1	54	-21.9	1000.000
4804.356000	V	12.20	54.5	74	-19.5	42.1	54	-11.9	1000.000
4804.452000	H	12.20	54.9	74	-19.1	44.4	54	-9.6	1000.000

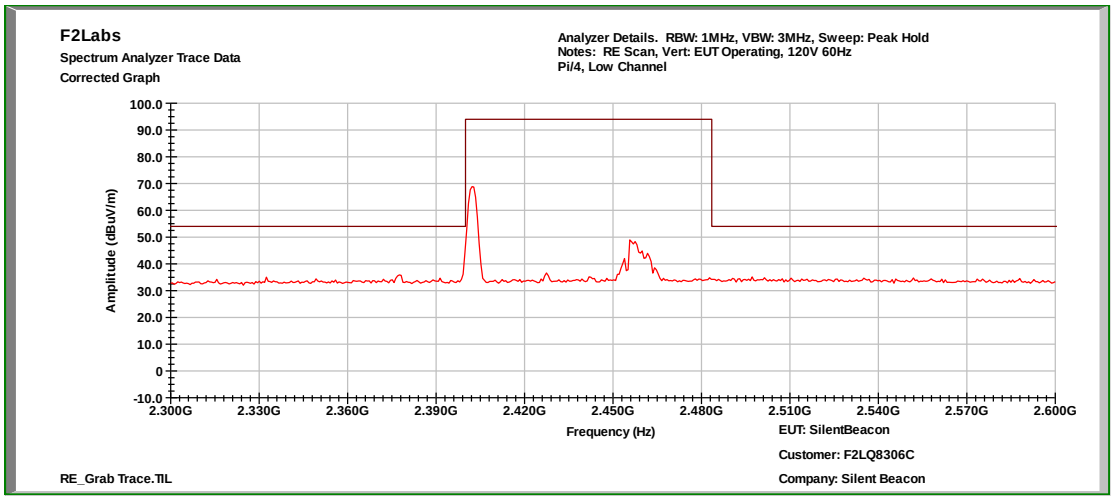
GFSK, Mid Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.70	44.8	74	-29.2	31.6	54	-22.4	1000.000
2390.000000	V	6.70	44.9	74	-29.1	31.6	54	-22.4	1000.000
2483.500000	V	6.90	45.3	74	-28.7	32.1	54	-21.9	1000.000
2483.500000	H	6.90	45.3	74	-28.7	32.1	54	-21.9	1000.000

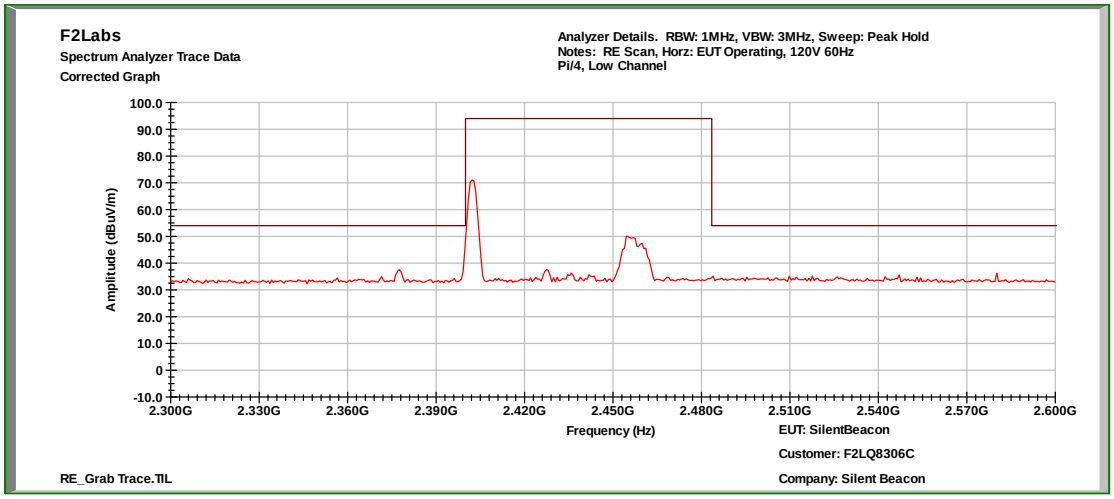
GFSK, High Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.70	45.1	74	-28.9	31.6	54	-22.4	1000.000
2390.000000	V	6.70	45.2	74	-28.8	31.6	54	-22.4	1000.000
2483.500000	V	6.90	45.3	74	-28.7	32.1	54	-21.9	1000.000
2483.500000	H	6.90	45.3	74	-28.7	32.1	54	-21.9	1000.000
4960.216000	H	12.20	58.1	74	-15.9	50.6	54	-3.4	1000.000
4960.216000	V	12.20	58.1	74	-15.9	51	54	-3.0	1000.000

Pi/4DPSK, 2.3 GHz to 2.6 GHz, Vertical



Pi/4DPSK, 2.3 GHz to 2.6 GHz, Horizontal



Pi/4DPSK, Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.70	45.0	74	-29.0	31.6	54	-22.4	1000.000
2390.000000	V	6.70	45.0	74	-29.0	31.6	54	-22.4	1000.000
2483.500000	V	6.90	44.8	74	-29.2	32.1	54	-21.9	1000.000
2483.500000	H	6.90	45.1	74	-28.9	32.1	54	-21.9	1000.000
4804.164000	V	11.70	52.8	74	-21.2	39.6	54	-14.4	1000.000
4804.316000	H	11.70	53.8	74	-20.2	40.2	54	-13.8	1000.000

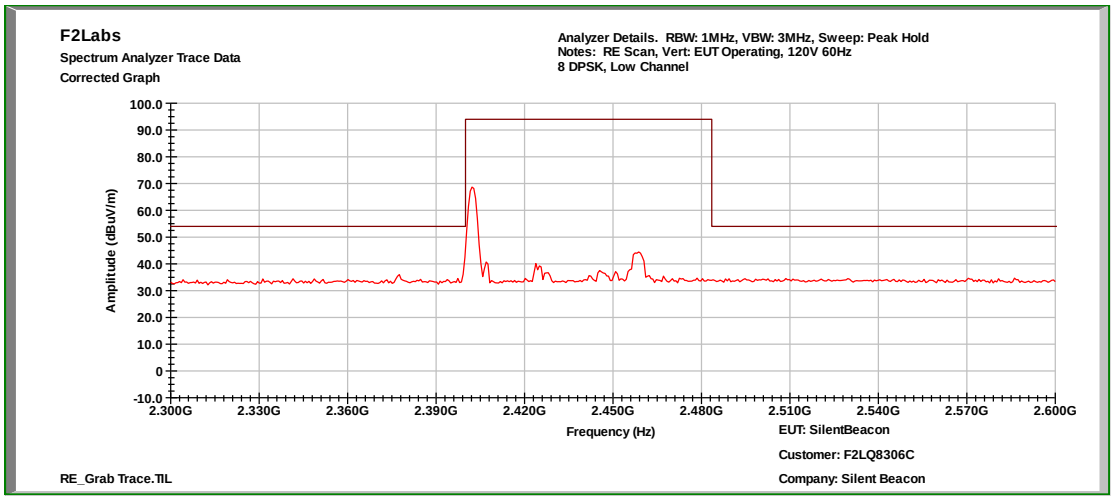
Pi/4DPSK, Mid Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.70	45.7	74	-28.3	32.2	54	-21.8	1000.000
2390.000000	V	6.70	45.6	74	-28.4	31.8	54	-22.2	1000.000
2483.500000	V	6.90	45.6	74	-28.4	32.1	54	-21.9	1000.000
2483.500000	H	6.90	46.5	74	-27.5	32.2	54	-21.8	1000.000
4880.652000	V	12.00	55.7	74	-18.3	43.9	54	-10.1	1000.000
4880.652000	H	12.00	59.4	74	-14.6	49.8	54	-4.2	1000.000

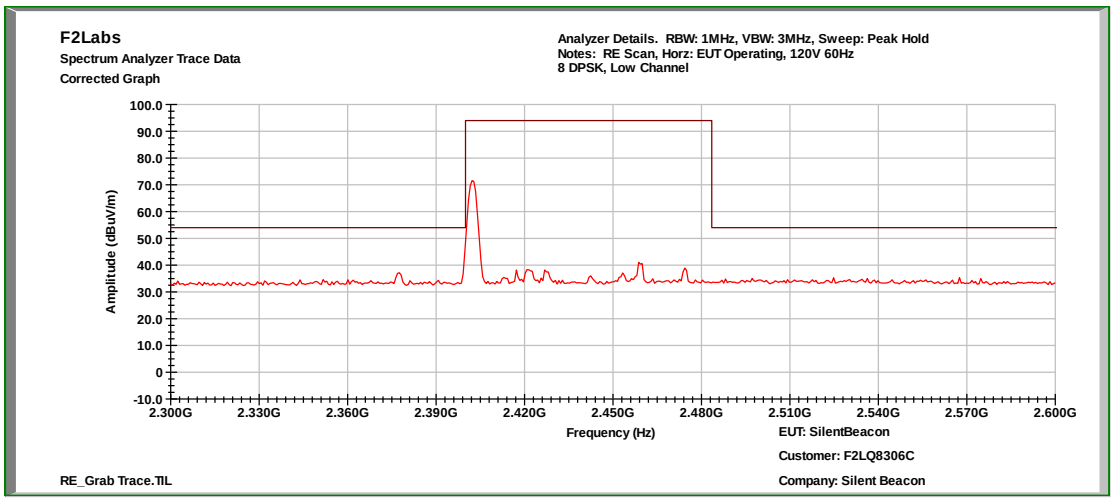
Pi/4DPSK, High Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.70	44.8	74	-29.2	31.6	54	-22.4	1000.000
2390.000000	H	6.70	46.2	74	-27.8	31.6	54	-22.4	1000.000
2483.500000	H	6.90	58.8	74	-15.2	42.3	54	-11.7	1000.000
2483.500000	V	6.90	53	74	-21.0	37.1	54	-16.9	1000.000
4960.416000	H	12.20	60.5	74	-13.5	52.4	54	-1.6	1000.000
4960.416000	V	12.20	55.4	74	-18.6	43.8	54	-10.2	1000.000

8DPSK, 2.3 GHz to 2.6 GHz, Vertical



8DPSK, 2.3 GHz to 2.6 GHz, Horizontal



8DPSK, Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.70	45	74	-29.0	31.6	54	-22.4	1000.000
2390.000000	H	6.70	45	74	-29.0	31.7	54	-22.3	1000.000
2483.500000	V	6.90	45.7	74	-28.3	32.1	54	-21.9	1000.000
2483.500000	H	6.90	46.7	74	-27.3	32.1	54	-21.9	1000.000
4804.440000	V	11.70	52.8	74	-21.2	39.7	54	-14.3	1000.000
4804.440000	H	11.70	55.6	74	-18.4	44.2	54	-9.8	1000.000

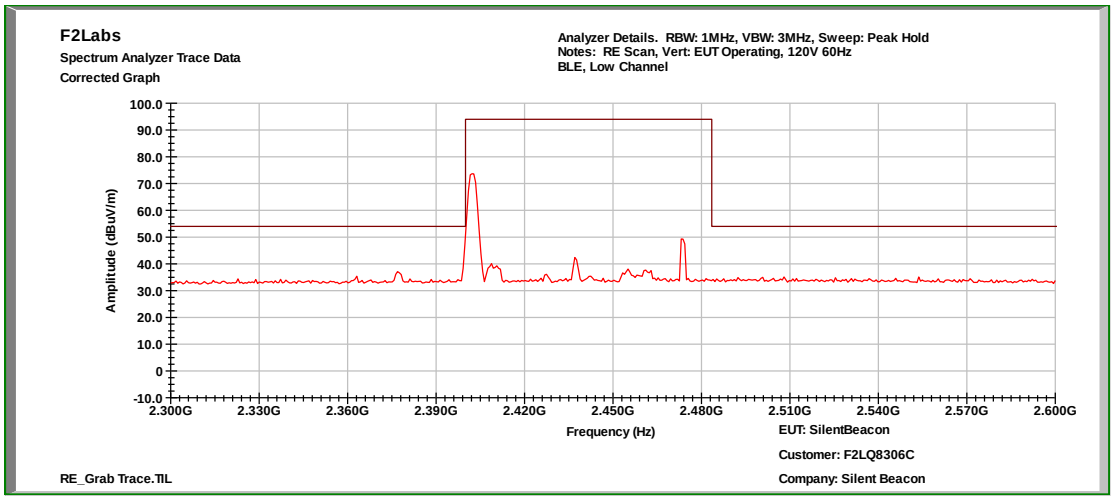
8DPSK, Mid Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	H	6.70	45.6	74	-28.4	32.3	54	-21.7	1000.000
2390.000000	V	6.70	45	74	-29.0	32.2	54	-21.8	1000.000
2483.500000	V	6.90	45.8	74	-28.2	32.2	54	-21.8	1000.000
2483.500000	H	6.90	45.4	74	-28.6	32.3	54	-21.7	1000.000
4880.188000	H	12.00	54.2	74	-19.8	40.3	54	-13.7	1000.000
4880.188000	V	12.00	53.2	74	-20.8	39.9	54	-14.1	1000.000

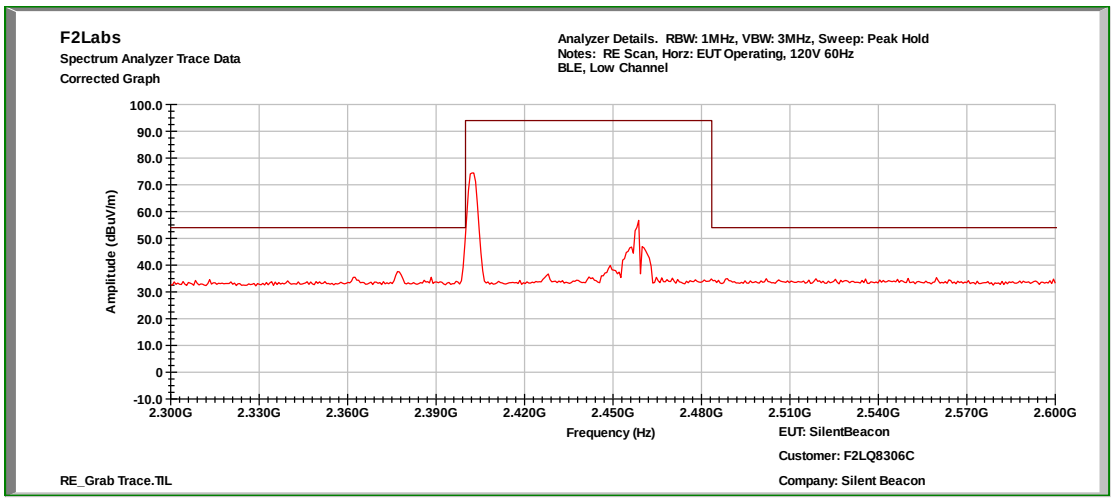
8DPSK, High Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.70	44.6	74	-29.4	31.6	54	-22.4	1000.000
2390.000000	H	6.70	45	74	-29.0	31.6	54	-22.4	1000.000
2483.500000	V	6.90	55.7	74	-18.3	39.7	54	-14.3	1000.000
2483.500000	H	6.90	59.8	74	-14.2	43.2	54	-10.8	1000.000
4960.282000	H	12.20	58.7	74	-15.3	50	54	-4.0	1000.000
4960.282000	V	12.20	56.7	74	-17.3	42.2	54	-11.8	1000.000

BLE, 2.3 GHz to 2.6 GHz, Vertical



BLE, 2.3 GHz to 2.6 GHz, Horizontal



BLE, Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average w/DCCF (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2400.000000	V	6.80	45.7	74	-28.3	24.54	54	-29.5	1000.000
2400.000000	H	6.80	45.6	74	-28.4	24.04	54	-30.0	1000.000
2483.500000	H	6.90	45.9	74	-28.1	24.14	54	-29.9	1000.000
2483.500000	V	6.90	45.5	74	-28.5	24.14	54	-29.9	1000.000
4803.798000	V	11.70	54.1	74	-19.9	33.04	54	-21.0	1000.000
4803.798000	H	11.70	62.7	74	-11.3	46.74	54	-7.3	1000.000

A duty cycle correction of 7.96dB was added to the field strength measured because the EUT has a 40% duty cycle. One transmission was on for 40ms, in a 100ms sweep.

The formula used was: DCCF = $20\log\left(\frac{40ms}{100ms}\right)$ =- 7.96

BLE, Mid Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average w/DCCF (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.70	45.0	74	-29.0	23.84	54	-30.2	1000.000
2390.000000	H	6.70	45.4	74	-28.6	24.34	54	-29.7	1000.000
2483.500000	H	6.90	45.4	74	-28.6	24.34	54	-29.7	1000.000
2483.500000	V	6.90	46.0	74	-28.0	24.14	54	-29.9	1000.000
4880.320000	H	12.00	62.6	74	-11.4	49.34	54	-4.7	1000.000
4880.320000	V	12.00	56.6	74	-17.4	47.8	54	-6.2	1000.000

A duty cycle correction of 7.96dB was added to the field strength measured because the EUT has a 40% duty cycle. One transmission was on for 40ms, in a 100ms sweep.

The formula used was: DCCF = $20\log\left(\frac{40ms}{100ms}\right)$ =- 7.96

BLE, High Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBµV/m)	MaxPeak (dBµV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.70	44.3	74	-29.7	31.6	54	-22.4	1000.000
2390.000000	V	6.70	45.1	74	-28.9	31.6	54	-22.4	1000.000
2483.500000	V	6.90	46	74	-28.0	32.1	54	-21.9	1000.000
2483.500000	V	6.90	45.8	74	-28.2	32.3	54	-21.7	1000.000

9 VOLTAGE VARIATIONS-15.31(e)

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery. A nominal voltage of 120VAC was used and then 100VAC and 140VAC were used as the 85% and 115% variations.

RESULTS: The results showed that the fundamental frequency did not move outside the frequency band and the field strength did not increase above the limit during the variations.

10 CONDUCTED EMISSIONS

10.1 Requirements

In accordance with FCC CFR 47 Part 15.207(a), “Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

10.2 Procedure

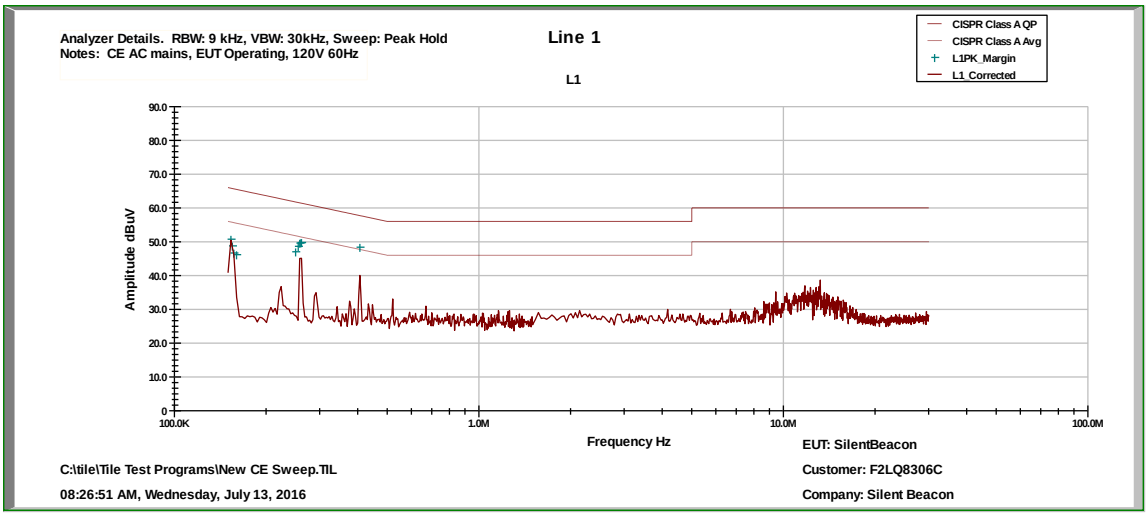
The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver via a transient limiter, and emissions in the range 150 kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak and average detectors as directed by the standard, and the resolution bandwidth during testing was 9 kHz. The raw measurements were corrected to allow for attenuation from the LISN, transient limiter and cables.

10.3 Conducted Emissions Test Data

Test Date:	July 13, 2016	**Test Engineer:**	J. Knepper
Rule:	15.207	**Air Temperature:**	21.4º C
Test Results:	Complies	**Relative Humidity:**	49%

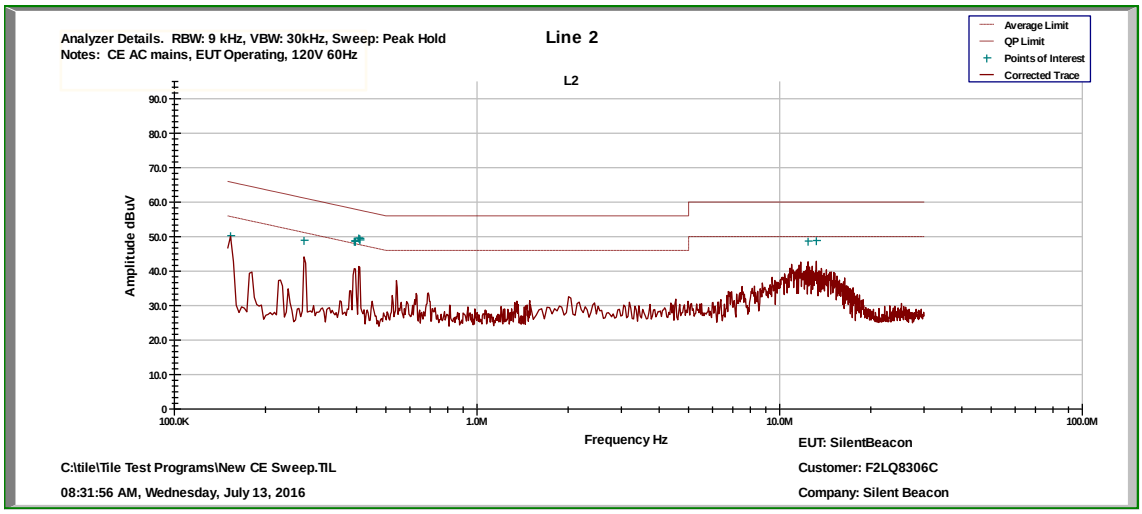
Note: The data below represents worst case results of all modulations.

Conducted Test – Line 1: 0.15 MHz to 30.0 MHz



Top Discrete Measurements								
No.	**Conductor**	**Frequency (MHz)**	**Detector**	**Level (dBµV)**	**Adjustment (dB)**	**Results (dBµV)**	**Limit (dBµV)**	**Margin (dB)**
1	Line 1	0.153375	Quasi-Peak	30.253	11.340	41.593	65.728	-24.135
			Average	11.903	11.340	23.243	55.726	-32.483
2	Line 1	0.155	Quasi-Peak	25.901	11.340	37.241	65.728	-28.487
			Average	10.940	11.340	22.280	55.728	-33.448
3	Line 1	0.15675	Quasi-Peak	28.488	11.340	39.828	65.636	-25.808
			Average	9.884	11.340	21.224	55.636	-34.412
4	Line 1	0.16	Quasi-Peak	25.618	11.340	36.958	65.464	-28.506
			Average	8.889	11.340	20.229	55.464	-35.235
5	Line 1	0.25	Quasi-Peak	24.716	10.720	35.436	61.757	-26.321
			Average	8.845	10.720	19.565	51.757	-32.192
6	Line 1	0.255	Quasi-Peak	26.701	10.702	37.403	61.593	-24.190
			Average	9.126	10.702	19.828	51.593	-31.765
7	Line 1	0.258	Quasi-Peak	27.481	10.691	38.172	61.496	-23.324
			Average	7.929	10.691	18.620	51.496	-32.876
8	Line 1	0.26	Quasi-Peak	27.700	10.684	38.384	61.432	-23.048
			Average	8.043	10.684	18.727	51.432	-32.705
9	Line 1	0.261375	Quasi-Peak	27.198	10.679	37.877	61.388	-23.511
			Average	9.726	10.679	20.405	51.388	-30.983
10	Line 1	0.4065	Quasi-Peak	22.410	10.400	32.810	57.719	-24.909
			Average	7.813	10.400	18.213	47.719	-29.506

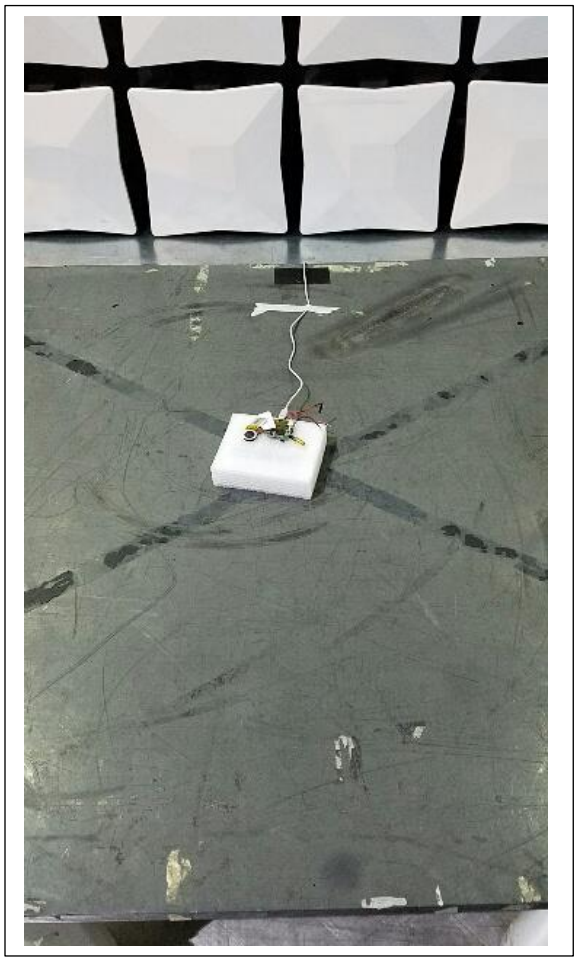
Conducted Test – Line 2: 0.15 MHz to 30.0 MHz



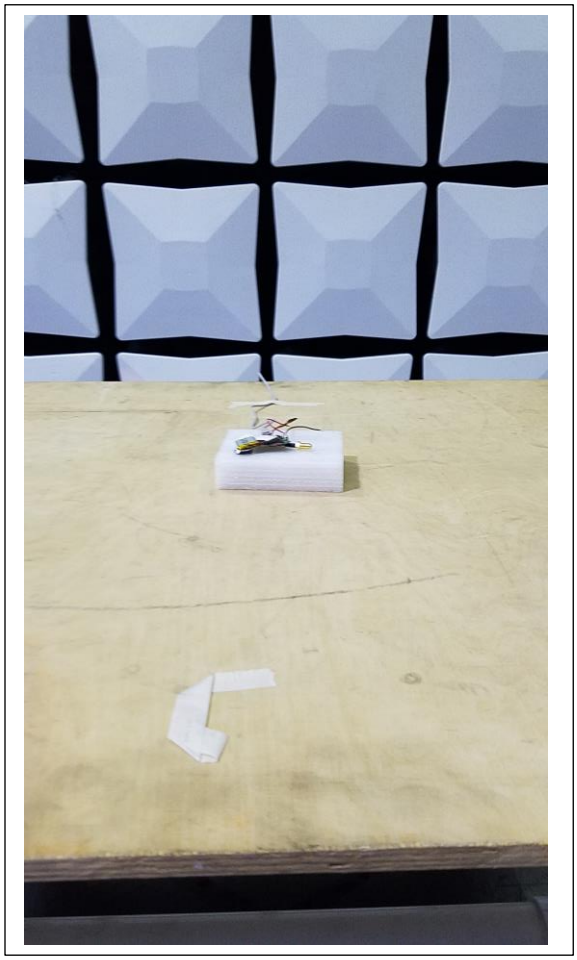
Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Adjustment (dB)	Results (dBµV)	Limit (dBµV)	Margin (dB)
1	Line 2	0.153375	Quasi-Peak	30.411	11.439	41.850	57.958	-16.108
			Average	10.570	11.439	22.009	47.958	-25.949
2	Line 2	0.268125	Quasi-Peak	28.221	10.655	38.876	57.958	-19.082
			Average	8.770	10.655	19.425	47.958	-28.533
3	Line 2	0.393	Quasi-Peak	22.215	10.407	32.622	58.958	-26.336
			Average	8.931	10.407	19.338	47.958	-28.620
4	Line 2	0.395	Quasi-Peak	22.563	10.405	32.968	57.958	-24.990
			Average	8.579	10.405	18.984	47.958	-28.974
5	Line 2	0.396375	Quasi-Peak	22.334	10.404	32.738	57.929	-25.19
			Average	8.242	10.404	18.646	47.929	-29.283
6	Line 2	0.4065	Quasi-Peak	22.683	10.400	33.083	57.719	-24.636
			Average	8.820	10.400	19.220	47.719	-28.499
7	Line 2	0.409875	Quasi-Peak	22.267	10.400	32.667	57.651	-24.984
			Average	8.443	10.400	18.843	47.651	-28.808
8	Line 2	0.41	Quasi-Peak	22.226	10.400	32.626	57.648	-25.022
			Average	9.055	10.400	19.455	47.648	-28.193
9	Line 2	12.4012	Quasi-Peak	26.080	10.552	36.632	60.000	-23.368
			Average	10.987	10.552	21.539	50.000	-28.461
10	Line 2	13.2113	Quasi-Peak	24.457	10.615	35.072	60.000	-24.928
			Average	9.515	10.615	20.130	50.000	-29.870

11 PHOTOGRAPHS/EXHIBITS – PRODUCT PHOTOS, TEST SETUPS

Field Strength of Emissions, <1 GHz



Field Strength of Emissions, >1 GHz
Occupied Bandwidth, Spurious Emissions



Conducted Emissions