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:

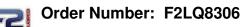
❖ FCC Part 15 Subpart C, Section 15.249

❖ 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

Report Number: F2LQ8306C-01E Page 1 of 41 Issue Date: July 21, 2016



Joe Knepper

Evaluation Conducted by:

Joe Knepper, EMC Proj. Eng.

Report Reviewed by:

Ken Littell, Director of EMC & Wireless Operations

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Report Number: F2LQ8306C-01E Page 2 of 41 Issue Date: July 21, 2016

TABLE OF CONTENTS

		_
Section	Title	Page
1	ADMINISTRATIVE INFORMATION	4
2	SUMMARY OF TEST RESULTS/MODIFICATIONS	5
3	TABLE OF MEASURED RESULTS	6
4	ENGINEERING STATEMENT	7
5	LIST OF MEASUREMENT INSTRUMENTATION	8
6	EUT INFORMATION AND DATA	9
7	FCC PART 15.215(e) - OCCUPIED BANDWIDTH	10
8	FCC Part 15.249(a)(d) - FIELD STRENGTH OF EMISSIONS	3 23
9	FCC PART 15.31(e) - VOLTAGE VARIATIONS	35
10	FCC PART 15.207 - CONDUCTED EMISSIONS	36
11	PHOTOS/EXHIBITS - PRODUCT PHOTOS, TEST SETUPS	39

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	

Report Number: F2LQ8306C-01E Page 4 of 41 Issue Date: July 21, 2016

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	Test Modulation		Mid Channel (2.440 MHz)	High Channel (2480 MHz)
	GFSK	91.3 dBuV/m	74.8 dBuV/m	83.5 dBuV/m
Average Field	Pi/4DPSK	78.2 dBuV/m	81.7 dBuV/m	81.5 dBuV/m
Strength of Fundamental	8DPSK	82.3 dBuV/m	84.7 dBuV/m	79.0 dBuV/m
i diladillollal	BLE	87.9 dBuV/m	83.8 dBuV/m	85.5 dBuV/m
	GFSK	91.8 dBuV/m	76.0 dBuV/m	84.3 dBuV/m
Peak Field Strength of	Pi/4DPSK	82.2 dBuV/m	84.8 dBuV/m	84.9 dBuV/m
Fundamental	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)
	GFSK	0.952 MHz	0.9476 MHz	0.9436 MHz
-20dB Occupied	Pi/4DPSK	2.196 MHz	1.533 MHz	1.461 MHz
Bandwidth	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.

Report Number: F2LQ8306C-01E Page 6 of 41 Issue Date: July 21, 2016

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.

Report Number: F2LQ8306C-01E Page 7 of 41 Issue Date: July 21, 2016

Order Number: F2LQ8306 Client: Silent Beacon LLC Model: Silent Beacon 001

Model: Siler

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.

Report Number: F2LQ8306C-01E Page 8 of 41 Issue Date: July 21, 2016

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	w/Monopole & 18" CL163		EHA-52B	100	May 2, 2017	
Horn Antenna	orn Antenna CL098		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	LISN CL181 Com-F		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			

Report Number: F2LQ8306C-01E Page 9 of 41 Issue Date: July 21, 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.

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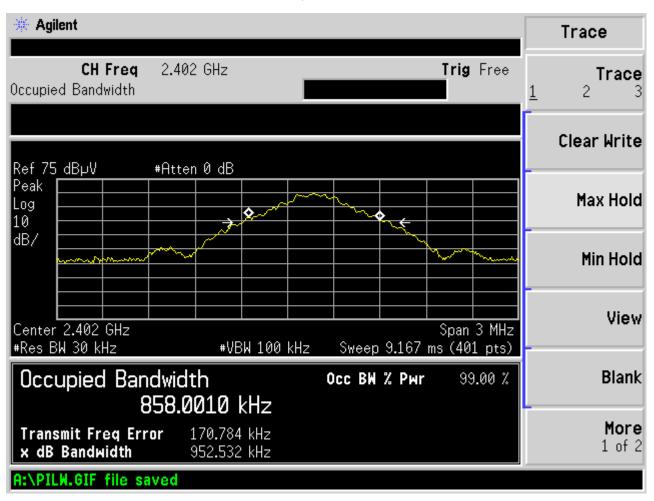
Report Number: F2LQ8306C-01E Page 10 of 41 Issue Date: July 21, 2016



7.2 Occupied Bandwidth Test Data

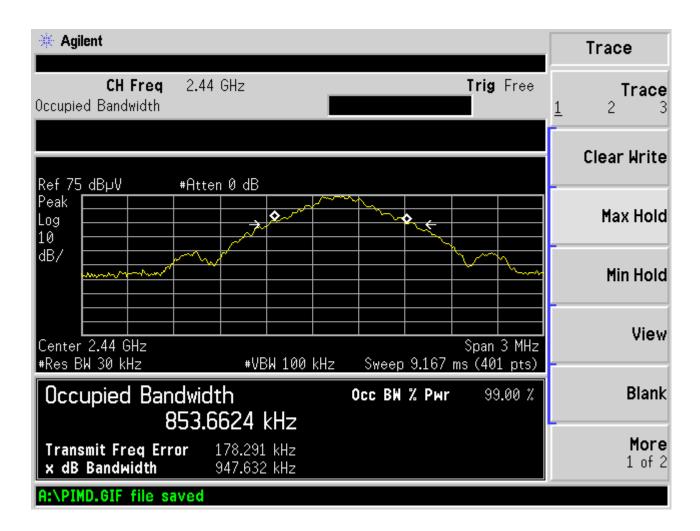
Test Date:	July 13, 2016	Test Engineer(s):	J. Knepper
	CFR 47 Part 15.215(c)	Air Temperature:	22.3ºC
Standards:		Relative Humidity:	46%

GFSK, Low Channel

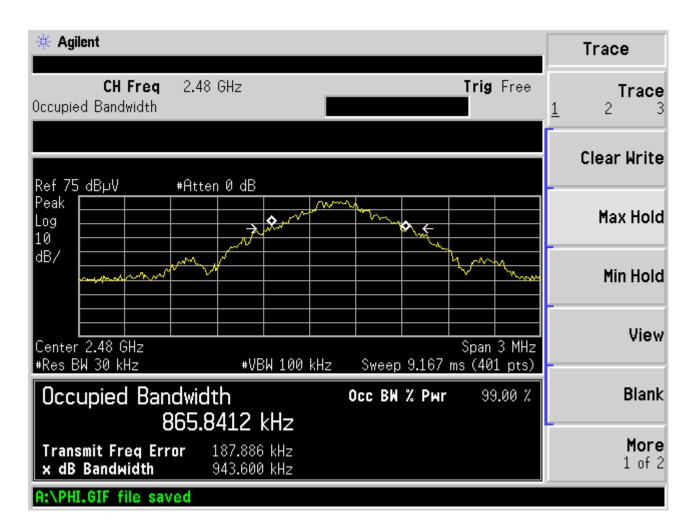


Report Number: F2LQ8306C-01E Page 11 of 41 Issue Date: July 21, 2016

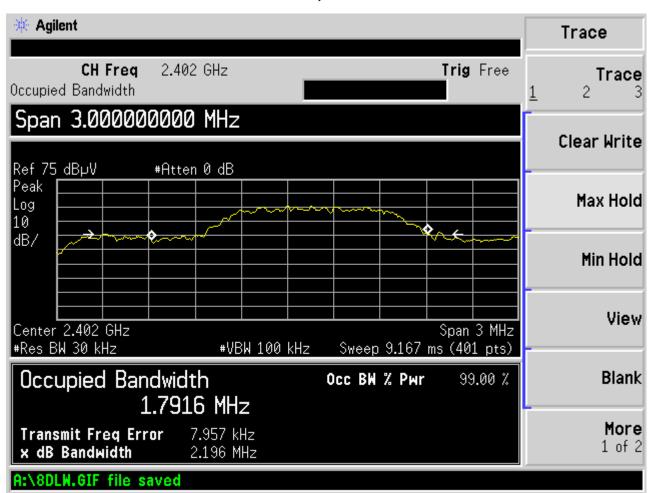
GFSK, Mid Channel



GFSK, High Channel

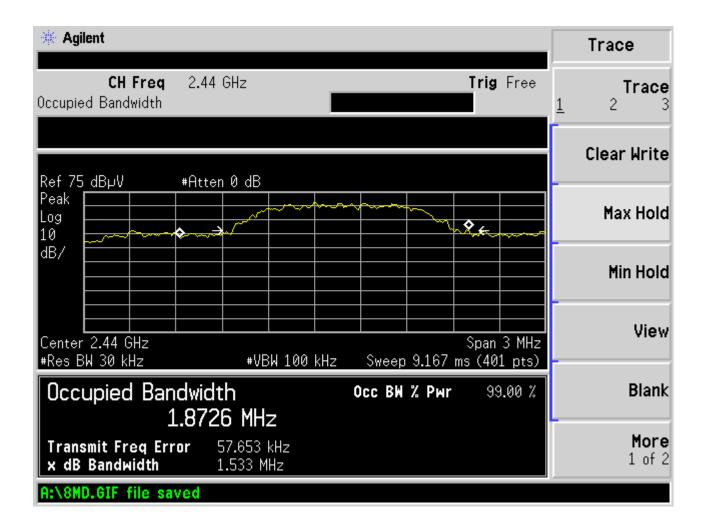


Pi/4 DPSK, Low Channel



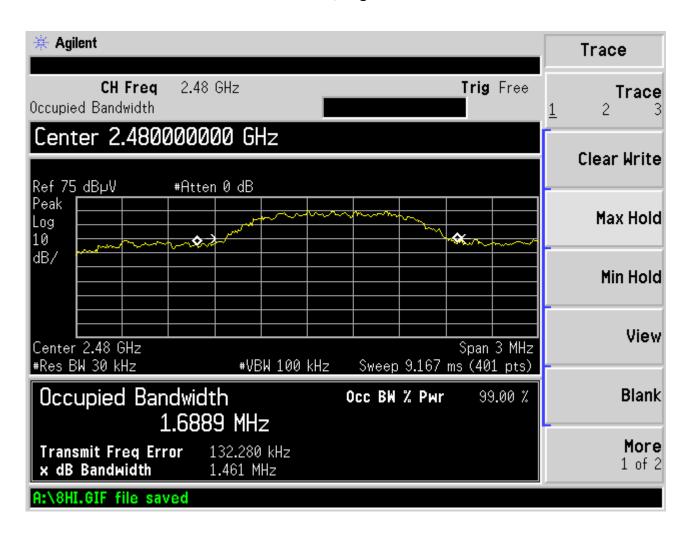


Pi/4 DPSK, Mid Channel



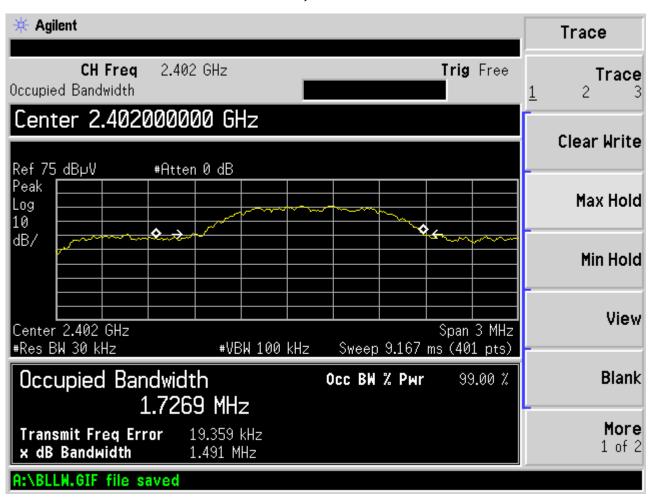
Report Number: F2LQ8306C-01E Page 15 of 41 Issue Date: July 21, 2016

Pi/4 DPSK, High Channel



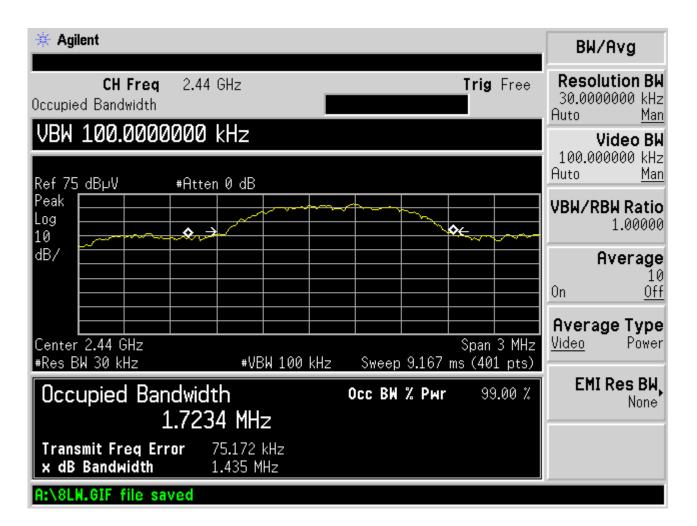
Report Number: F2LQ8306C-01E Page 16 of 41 Issue Date: July 21, 2016

8DPSK, Low Channel



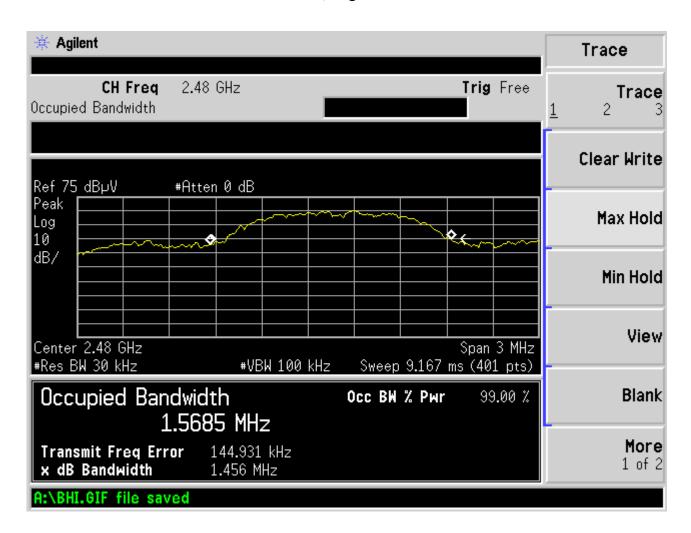


8DPSK, Mid Channel



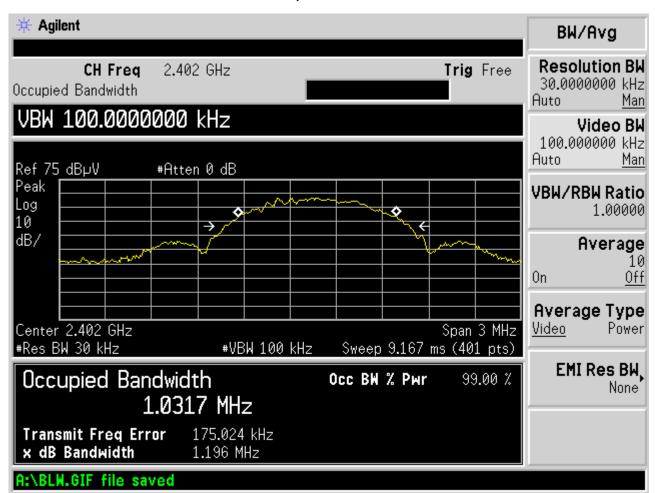
Report Number: F2LQ8306C-01E Page 18 of 41 Issue Date: July 21, 2016

8DPSK, High Channel





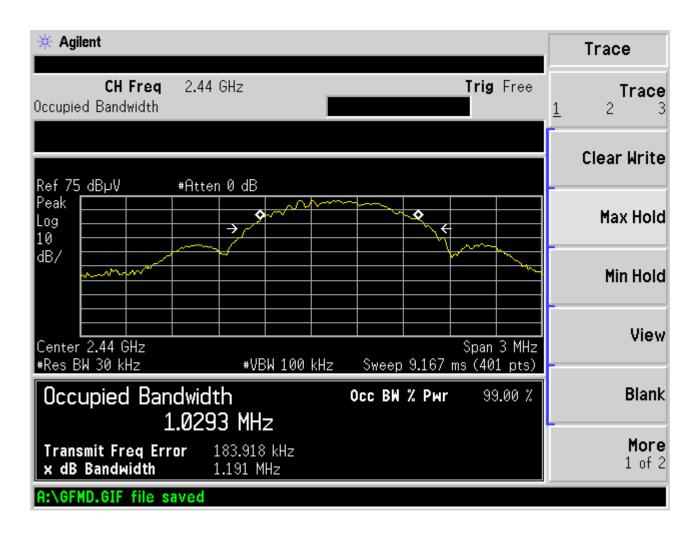
BLE, Low Channel



Report Number: F2LQ8306C-01E Page 20 of 41 Issue Date: July 21, 2016

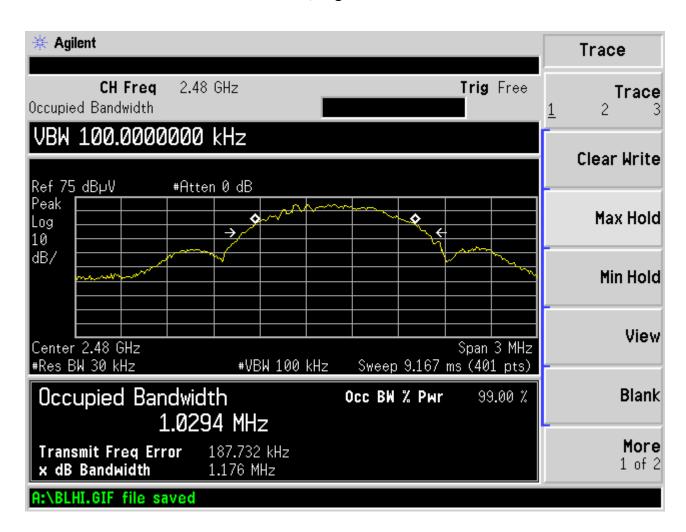


BLE, Mid Channel



Report Number: F2LQ8306C-01E Page 21 of 41 Issue Date: July 21, 2016

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.

Report Number: F2LQ8306C-01E Page 23 of 41 Issue Date: July 21, 2016



8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	July 11-2, 2016	Test Engineer(s):	J. Knepper
Standards:	CED 47 Port 15 240(a)	Air Temperature:	21.2ºC
	CFR 47 Part 15.249(a)	Relative Humidity:	46%

GFSK

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dBμV/m) Limit	MaxPeak Margin	Average (dΒμV/m)	Average (dΒμV/m) Limit	Average Margin	Bandwidth (kHz)
2402.110000	Н	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	Н	6.90	76	113.97	-38.0	74.8	93.97	-19.2	1000.000
2480.218000	Н	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 (dΒμV/m)	Average (dBμV/m) Limit	Average Margin	Bandwidth (kHz)
2402.040000	Н	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	Н	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	Н	6.90	84.9	113.97	-29.1	81.5	93.97	-12.5	1000.000

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Report Number: F2LQ8306C-01E Page 24 of 41 Issue Date: July 21, 2016

8DPSK, Field Strength

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dBμV/m) Limit	MaxPeak Margin	Average (dΒμV/m)	Average (dΒμV/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	Н	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	Н	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	Н	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	Н	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	Н	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	Н	6.90	86.2	113.97	-27.8	85.5	93.97	-8.5	1000.000
2480.250000	٧	6.90	81.1	113.97	-32.9	80.0	93.97	-14.0	1000.000

Report Number: F2LQ8306C-01E Page 25 of 41 Issue Date: July 21, 2016

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.

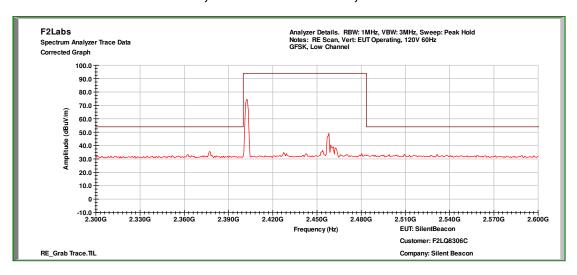
At least 6 of the highest frequencies were measured per ANSI 63.10 in a Semi-Anechoic Chamber. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies 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.

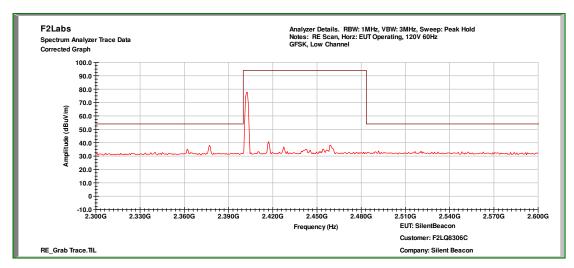
Report Number: F2LQ8306C-01E Page 26 of 41 Issue Date: July 21, 2016

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

GFSK, 2.3 GHz to 2.6 GHz, Vertical



GFSK, 2.3 GHz to 2.6 GHz, Horizontal



Report Number: F2LQ8306C-01E Page 27 of 41 Issue Date: July 21, 2016



GFSK, Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dBμV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dΒμV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	Н	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	Н	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	Н	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 (dΒμV/m) Limit	MaxPeak Margin	Average (dΒμV/m)	Average (dΒμV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	Н	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	Н	6.90	45.3	74	-28.7	32.1	54	-21.9	1000.000

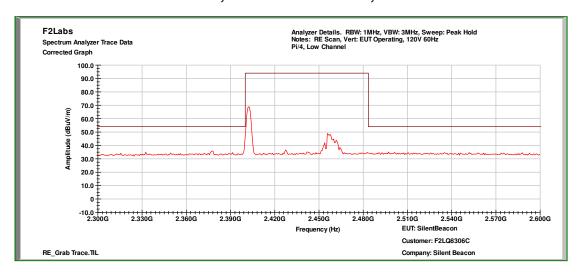
GFSK, High Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dΒμV/m) Limit	MaxPeak Margin	Average (dΒμV/m)	Average (dBμV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	Н	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	Н	6.90	45.3	74	-28.7	32.1	54	-21.9	1000.000
4960.216000	Н	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

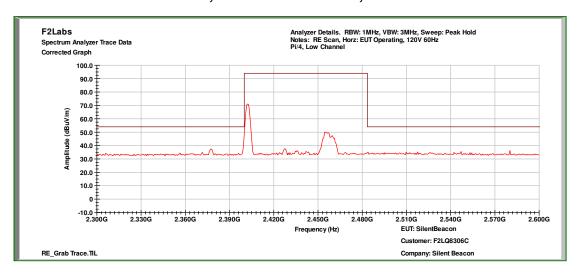
Report Number: F2LQ8306C-01E Page 28 of 41 Issue Date: July 21, 2016



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



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



Report Number: F2LQ8306C-01E Page 29 of 41 Issue Date: July 21, 2016

Pi/4DPSK, Low Channel

Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dΒμV/m) Limit	MaxPeak Margin	Average (dΒμV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	Н	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	Н	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	Н	11.70	53.8	74	-20.2	40.2	54	-13.8	1000.000

Pi/4DPSK, Mid Channel

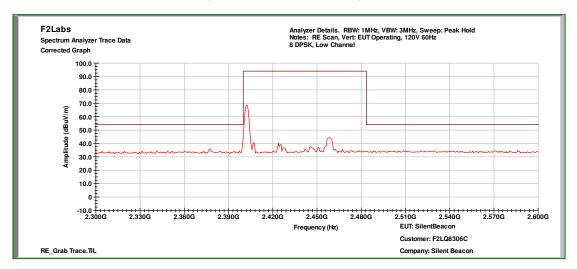
Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dΒμV/m) Limit	MaxPeak Margin	Average (dΒμV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	Н	6.70	45.7	74	-28.3	32.2	54	-21.8	1000.000
2390.000000	V	6.70	45.6	74	-28.4	31.8	54	-22.2	1000.000
2483.500000	V	6.90	45.6	74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

Pi/4DPSK, High Channel

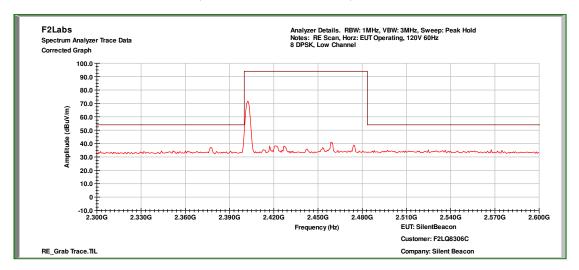
Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dΒμV/m) Limit	MaxPeak Margin	Average (dBμV/m)	Average (dBµV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	V	6.70	44.8	74	-29.2	31.6	54	-22.4	1000.000
2390.000000	Н	6.70	46.2	74	-27.8	31.6	54	-22.4	1000.000
2483.500000	Н	6.90	58.8	74	-15.2	42.3	54	-11.7	1000.000
2483.500000	٧	6.90	53	74	-21.0	37.1	54	-16.9	1000.000
4960.416000	Н	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

Report Number: F2LQ8306C-01E Page 30 of 41 Issue Date: July 21, 2016

8DPSK, 2.3 GHz to 2.6 GHz, Vertical



8DPSK, 2.3 GHz to 2.6 GHz, Horizontal



Report Number: F2LQ8306C-01E Page 31 of 41 Issue Date: July 21, 2016

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	Н	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	Н	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	Н	11.70	55.6	74	-18.4	44.2	54	-9.8	1000.000

8DPSK, Mid Channel

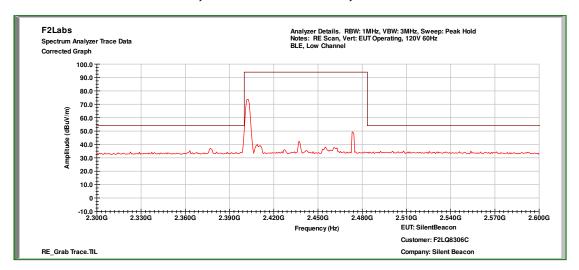
Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dBμV/m) Limit	MaxPeak Margin	Average (dBµV/m)	Average (dΒμV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	Н	6.70	45.6	74	-28.4	32.3	54	-21.7	1000.000
2390.000000	V	6.70	45	74	-29.0	32.2	54	-21.8	1000.000
2483.500000	V	6.90	45.8	74	-28.2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

8DPSK, High Channel

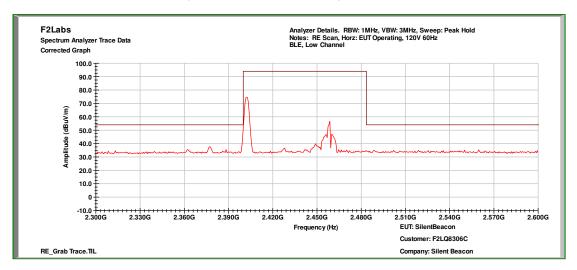
Frequency (MHz)	Polarity	Corr. (dB)	MaxPeak (dBμV/m)	MaxPeak (dΒμV/m) Limit	MaxPeak Margin	Average (dBμV/m)	Average (dΒμV/m) Limit	Average Margin	Bandwidth (kHz)
2390.000000	٧	6.70	44.6	74	-29.4	31.6	54	-22.4	1000.000
2390.000000	Н	6.70	45	74	-29.0	31.6	54	-22.4	1000.000
2483.500000	V	6.90	55.7	74	-18.3	39.7	54	-14.3	1000.000
2483.500000	Н	6.90	59.8	74	-14.2	43.2	54	-10.8	1000.000
4960.282000	Н	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

Report Number: F2LQ8306C-01E Page 32 of 41 Issue Date: July 21, 2016

BLE, 2.3 GHz to 2.6 GHz, Vertical



BLE, 2.3 GHz to 2.6 GHz, Horizontal



Report Number: F2LQ8306C-01E Page 33 of 41 Issue Date: July 21, 2016

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	Н	6.80	45.6	74	-28.4	24.04	54	-30.0	1000.000
2483.500000	Н	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	Н	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	Н	6.70	45.4	74	-28.6	24.34	54	-29.7	1000.000
2483.500000	Н	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	Н	12.00	62.6	74	-11.4	49.34	54	-4.7	1000.000
4880.320000	>	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 (dΒμV/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	>	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.

Report Number: F2LQ8306C-01E Page 35 of 41 Issue Date: July 21, 2016

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 μ H/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.

	Conducted limit (dBμV)				
Frequency of emission (MHz)	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.

Report Number: F2LQ8306C-01E Page 36 of 41 Issue Date: July 21, 2016

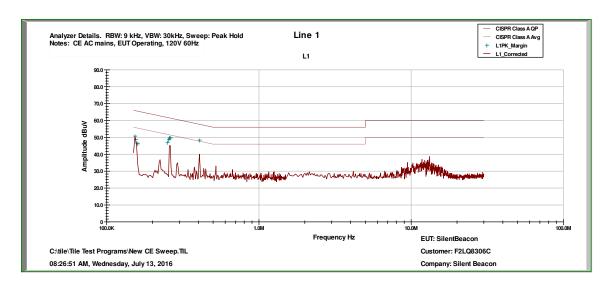


10.3 Conducted Emissions Test Data

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

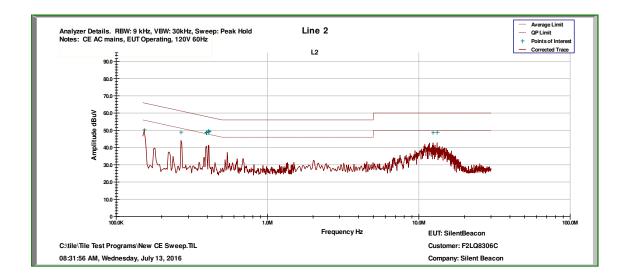


	Top Discrete Measurements										
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Adjustment (dB)	Results (dBµV)	Limit (dBµV)	Margin (dB)			
1	1 Line 1	0.153375	Quasi-Peak	30.253	11.340	41.593	65.728	-24.135			
'	Line	0.133373	Average	11.903	11.340	23.243	55.726	-32.483			
2	Line 1	0.155	Quasi-Peak	25.901	11.340	37.241	65.728	-28.487			
	Lille	0.133	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			
3		0.13073	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			
	Line		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			
U			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			
_ ′		Line 1 0.256	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			
	Line		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			
9	Line i		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			
10	Line i	0.4065	Average	7.813	10.400	18.213	47.719	-29.506			

Report Number: F2LQ8306C-01E Page 37 of 41 Issue Date: July 21, 2016



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)			
		` ′	Quasi-Peak	30.411	11.439	41.850	57.958	-16.108			
1	Line 2	0.153375	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			
	LITTE Z	0.200123	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			
		0.090	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			
	4 Line 2		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			
3	Liile		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			
0	LITTE Z		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			
	/ Line 2		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	9 Line 2	12.4012	Quasi-Peak	26.080	10.552	36.632	60.000	-23.368			
٦			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			
Line 2		13.2113	Average	9.515	10.615	20.130	50.000	-29.870			

Report Number: F2LQ8306C-01E Page 38 of 41 Issue Date: July 21, 2016

11 PHOTOGRAPHS/EXHIBITS - PRODUCT PHOTOS, TEST SETUPS

Field Strength of Emissions, <1 GHz



Page 39 of 41 Report Number: F2LQ8306C-01E Issue Date: July 21, 2016

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



Conducted Emissions

