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CERTIFICATION TEST REPORT

Manufacturer: Babyation LLC
911 Washington Avenue, Suite 427
St. Louis, Missouri 63101 USA

Applicant: Same as Above

Product Name: The Pump by Babyation

Product Description: The Pump by Babyation is a powered suction device to be used by lactating women in the hospital or home setting to express and collect milk from their breasts.

Operating Voltage/Frequency: 120V/60 Hz

Model: BP1

FCC ID: 2ANWWBP1

Testing Commenced: Oct. 6, 2017

Testing Ended: Nov. 7, 2017

Summary of Test Results: **In Compliance**

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

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**
- ❖ **FCC Part 15 Subpart A, Section 15.31(e) – Measurement Standards**



Order Number: F2LQ9527C

Client: Babyation LLC

Model: BP1

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 of DTS operating under Section 15.249. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data, and are expressed with a 95% confidence factor using a coverage factor of $k=2$. The Uncertainty for a laboratory are referred to as U_{lab} . For Radiated and Conducted Emissions, the Expanded Uncertainty is compared to the U_{cispr} values to determine if a specific margin is required to deem compliance.

U_{lab}

Measurement Range	Combined Uncertainty	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	2.54	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66	3.32dB

U_{cispr}

Measurement Range	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	5.2dB
Radiated Emissions <1 GHz @ 10m	5.2dB
Radiated Emissions 1 GHz to 2.7 GHz	Under Consideration
Radiated Emissions 2.7 GHz to 18 GHz	Under Consideration
AC Power Line Conducted Emissions, 150kHz to 30 MHz	3.6dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	4.0dB

If U_{lab} is less than or equal to U_{cispr} , then:

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} in table 1, then:

- compliance is deemed to occur if no measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Note: Only measurements listed in the tables above that relate to tests included in this Test Report are applicable.



Order Number: F2LQ9527C

Client: Babyation LLC

Model: BP1

1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2LQ9527C-04E	First Issue	Nov. 7, 2017	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

Modifications Made to the Equipment
None



3 TABLE OF MEASURED RESULTS

Test	Low Channel 2402 MHz	Mid Channel 2440 MHz	High Channel 2480 MHz
Average Field Strength of Fundamental	75.2 dB μ V/m	75.0 dB μ V/m	73.8 dB μ V/m
Peak Field Strength of Fundamental	76.7 dB μ V/m	76.0 dB μ V/m	74.8 dB μ V/m
Average Limit for Fundamental	50 millivolts/meter (93.97 dB μ V/m)	50 millivolts/meter (93.97 dB μ V/m)	50 millivolts/meter (93.97 dB μ V/m)
Peak Limit for Fundamental	(113.97dBuV/m)	(113.97dBuV/m)	(113.97dBuV/m)
-20dB Occupied Bandwidth (MHz)	1.230	1.236	1.224

The -20dB 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 Babyation 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: The Pump by Babyation

Model: BP1

Serial No.: 100-036-0005

FCC ID: 2ANWWBP1

5.2 Trade Name:

Babyation LLC

5.3 Power Supply:

Meanwell model GSM25U12

5.4 Applicable Rules:

CFR 47, Part 15.249

5.5 Equipment Category:

Radio Transmitter-DTS

5.6 Antenna:

3.3dBi, Inverted F 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 in a normal operating mode, with device on and pump running. For emissions tests, EUT was set to expression, suction at 10, speed at 10. EUT was set up in a testing mode from a PC, constantly transmitting. Device was transmitting in three different channels (low, mid and high).

**6 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	AlbatrossProjects	B83117-DF435-T261	US140023	Nov. 14, 2017
Temp/Hum. Recorder	CL137	Extech	RH520	CH16992	June 21, 2018
Antenna, Bilog	CL211	Sunol Sciences, Inc.	JB1	A021017	Mar. 2, 2018
Pre-Amplifier	CL153	Keysight Tech.	83006A	MY39500791	June 20, 2018
Pre-Amplifier	CL189	Com-Power	PAM-840A	461303	June 14, 2019
Active 18" Loop Antenna	CL163	A.H. Systems, Inc.	EHA-52B	100	May 2, 2018
Horn Antenna	CL098	Emco	3115	9809-5580	Dec. 28, 2018
Horn Antenna 18-26.5GHz	CL114	A.H. Systems, Inc.	SAS-572	237	Nov. 17, 2018
Software:	Tile Version 3.4.B.3		Software Verified: Oct. 6, 2017		
Software:	EMC 32, Version 8.53.0		Software Verified: Oct. 6, 2017		



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 -20dB 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.

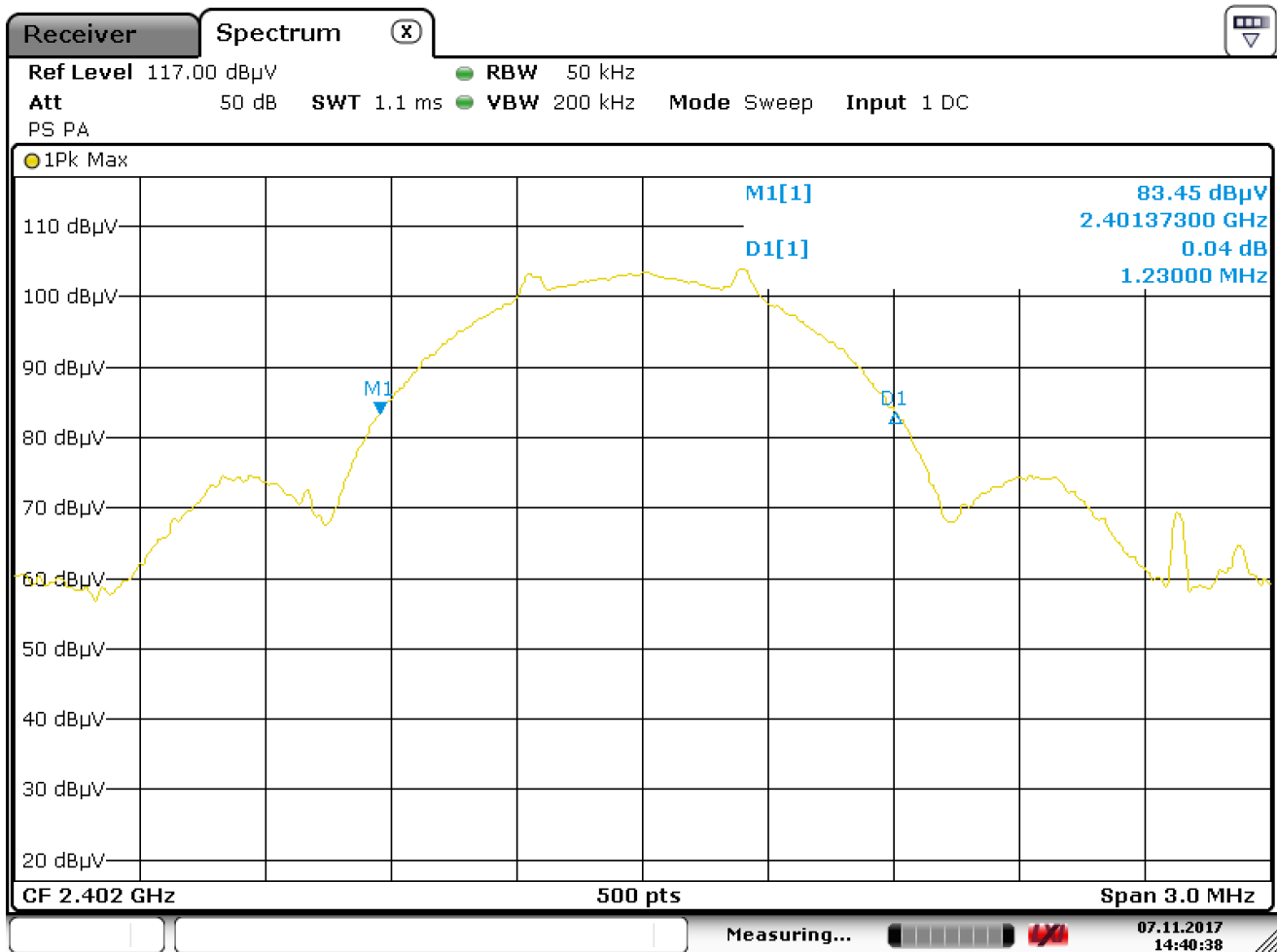
Bandwidth measurements were made at the low (2.402 GHz), mid (2.440 GHz) and upper (2.480 GHz) frequencies. The bandwidth was measured using the analyzer's marker function.



7.2 Occupied Bandwidth Test Data

Test Date:	Nov. 7, 2017	Test Engineer(s):	J. Knepper
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	21.2°C
		Relative Humidity:	48%

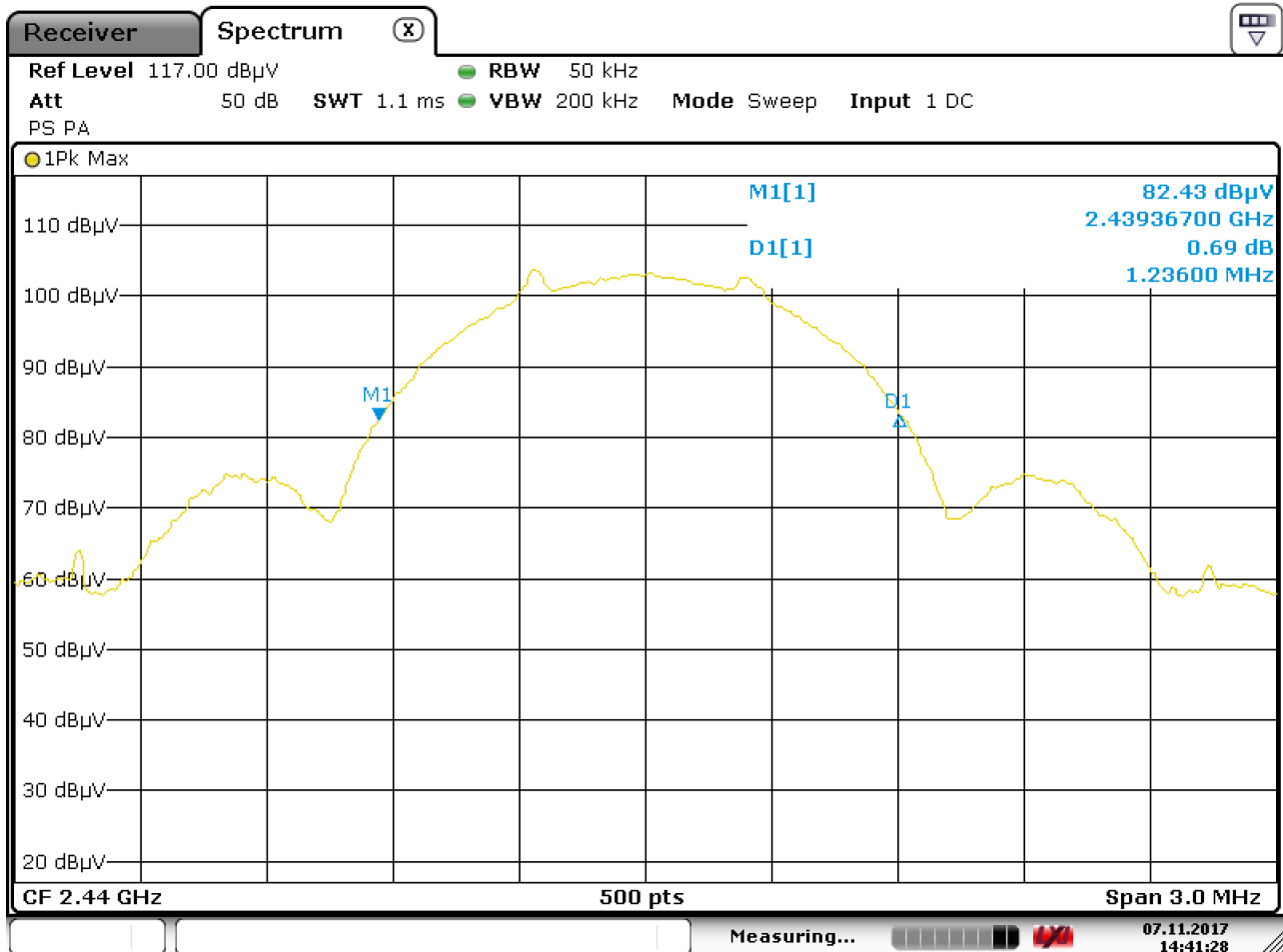
Low Channel



Date: 7.NOV.2017 14:40:38



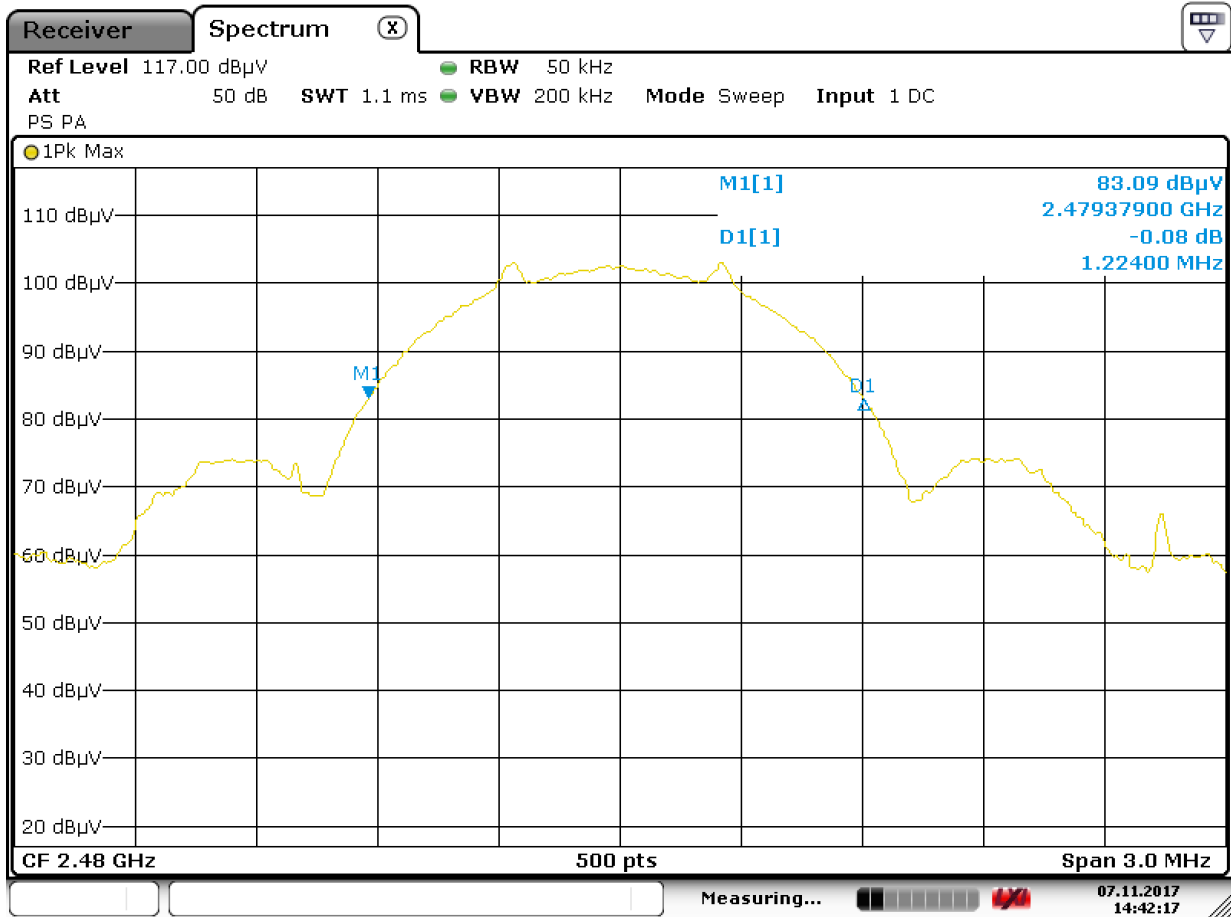
Mid Channel



Date: 7.NOV.2017 14:41:28



High Channel



Date: 7.NOV.2017 14:42:17

**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.

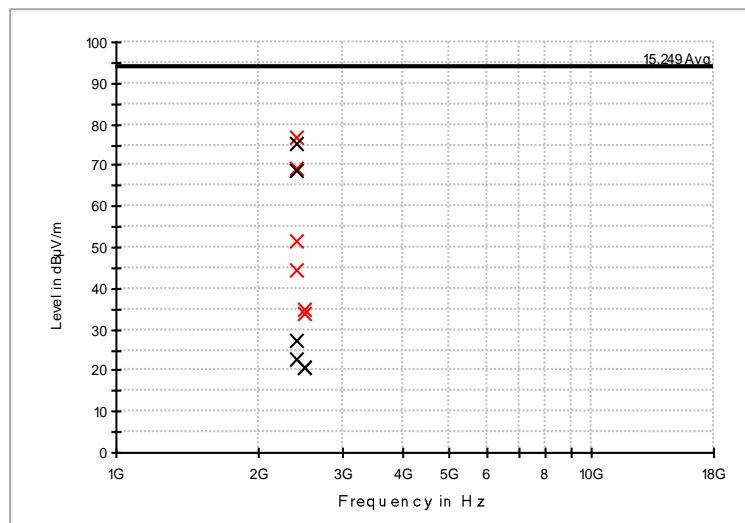
NOTE: During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions.



8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date:	Oct. 6-9, 2017	Test Engineer(s):	J. Knepper
Standards:	CFR 47 Part 15.249(a)	Air Temperature:	21.4°C
		Relative Humidity:	50%

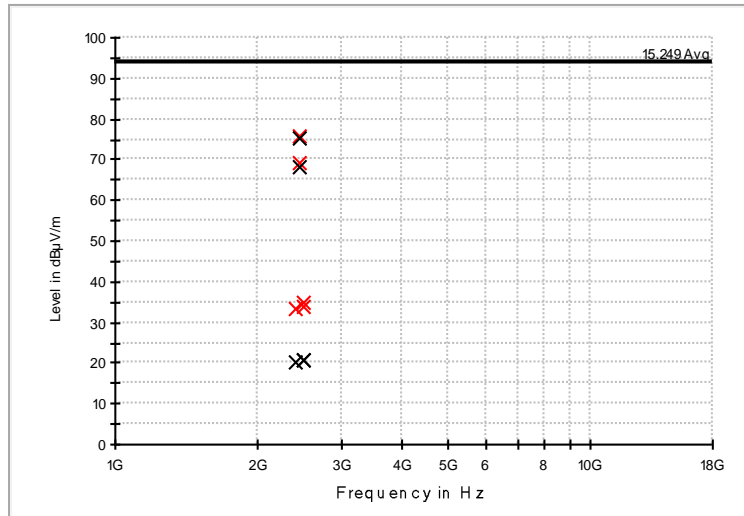
Low Channel



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)
2400.000000	H	-4.70	44.3	114	-69.7	22.8	94	-71.2	1000.000
2400.000000	V	-4.70	51.7	114	-62.3	27.2	94	-66.8	1000.000
2402.000000	V	-4.70	76.7	114	-37.3	75.2	94	-18.8	1000.000
2402.000000	H	-4.70	69.4	114	-44.6	68.5	94	-25.5	1000.000
2483.500000	H	-4.20	33.9	114	-80.1	20.8	94	-73.2	1000.000
2483.500000	V	-4.20	34.6	114	-79.4	20.8	94	-73.2	1000.000



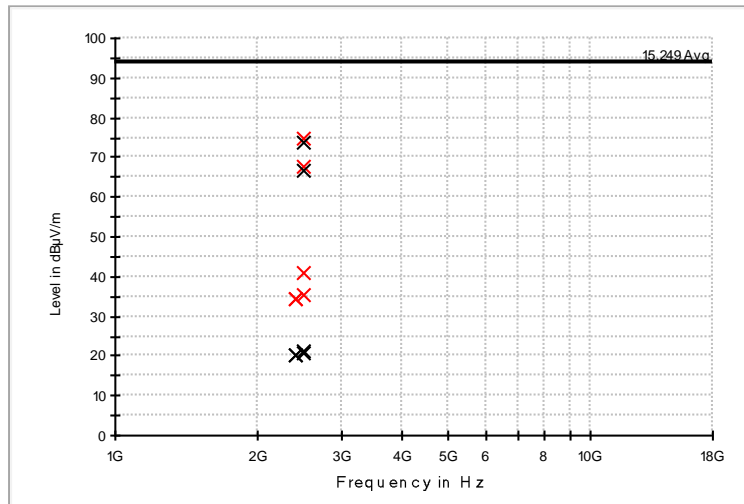
Mid Channel



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)
2400.000000	V	-4.70	33.5	114	-80.5	20.1	94	-73.9	1000.000
2440.000000	H	-4.30	69.5	114	-44.5	68	94	-26.0	1000.000
2440.000000	V	-4.30	76.0	114	-38.0	75	94	-19.0	1000.000
2483.500000	H	-4.20	34.9	114	-79.1	20.8	94	-73.2	1000.000
2483.500000	V	-4.20	34.1	114	-79.9	20.8	94	-73.2	1000.000



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)
2400.000000	V	-4.7	34.4	114	-79.6	20.1	94	-73.9	1000.000
2400.000000	H	-4.7	34.2	114	-79.8	20.1	94	-73.9	1000.000
2480.000000	H	-4.3	67.8	114	-46.2	66.4	94	-27.6	1000.000
2480.000000	V	-4.3	74.8	114	-39.2	73.8	94	-20.2	1000.000
2483.500000	H	-4.2	35.4	114	-78.6	20.9	94	-73.1	1000.000
2483.500000	V	-4.2	41.0	114	-73.0	21.3	94	-72.7	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 63.4 in a 3 meter 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. Frequencies were scanned from 9kHz to 26GHz and the highest emissions are listed below.

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:	Oct. 6, 2017	Test Engineer(s):	J. Knepper
Standards:	CFR 47 Part 15.249(d) / Part 15.209	Air Temperature:	21.4°C
		Relative Humidity:	50%

Low Channel

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.388000	H	100.00	0.00	-2.2	33.3	31.10	40.0	-8.9
30.388000	V	100.00	0.00	-2.2	33.3	31.10	40.0	-8.9
38.924000	H	100.00	0.00	-2.6	26.8	24.20	40.0	-15.8
43.192000	V	100.00	0.00	1.6	23.7	25.30	40.0	-14.7
50.564000	V	100.00	0.00	0.3	20.1	20.40	40.0	-19.6
60.264000	V	100.00	0.00	-0.1	19.6	19.50	40.0	-20.5
118.076000	H	100.00	0.00	-2.5	26.3	23.80	43.5	-19.7
198.392000	V	100.00	0.00	-0.9	26.5	25.60	43.5	-17.9
199.556000	H	100.00	0.00	-1.1	26.7	25.60	43.5	-17.9
707.060000	H	100.00	0.00	0.4	36.4	36.80	46.0	-9.2
960.000000	H	100.00	0.00	0.9	40.2	41.10	46.0	-4.9
960.000000	V	100.00	0.00	0.8	40.2	41.00	46.0	-5.0

Mid Channel

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.378000	H	100.00	0.00	-2.2	33.3	31.10	40.0	-8.9
30.488000	V	100.00	0.00	-3.2	33.3	30.10	40.0	-9.9
39.024000	H	100.00	0.00	-2.5	26.8	24.30	40.0	-15.7
43.092000	V	100.00	0.00	1.4	23.7	25.10	40.0	-14.9
51.064000	V	100.00	0.00	0.2	20.1	20.30	40.0	-19.7
60.204000	V	100.00	0.00	0.2	19.6	19.80	40.0	-20.2
118.006000	H	100.00	0.00	-2.6	26.3	23.70	43.5	-19.8
197.992000	V	100.00	0.00	-1.0	26.5	25.50	43.5	-18.0
199.566000	H	100.00	0.00	-1.1	26.7	25.60	43.5	-17.9
706.060000	H	100.00	0.00	0.1	36.4	36.50	46.0	-9.5
960.000000	H	100.00	0.00	1.1	40.2	41.30	46.0	-4.7
960.000000	V	100.00	0.00	0.8	40.2	41.00	46.0	-5.0

High Channel

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.288000	H	100.00	0.00	-2.4	33.3	30.90	40.0	-9.1
31.388000	V	100.00	0.00	-2.2	33.3	31.10	40.0	-8.9
38.624000	H	100.00	0.00	-2.5	26.8	24.30	40.0	-15.7
43.292000	V	100.00	0.00	1.4	23.7	25.10	40.0	-14.9
50.500000	V	100.00	0.00	0.1	20.1	20.20	40.0	-19.8
60.465000	V	100.00	0.00	0.3	19.6	19.90	40.0	-20.1
118.086000	H	100.00	0.00	-2.9	26.3	23.40	43.5	-20.1
199.322000	V	100.00	0.00	-0.7	26.5	25.80	43.5	-17.7
198.546000	H	100.00	0.00	-1.3	26.7	25.40	43.5	-18.1
707.160000	H	100.00	0.00	0.3	36.4	36.70	46.0	-9.3
960.000000	H	100.00	0.00	1.1	40.2	41.30	46.0	-4.7
960.000000	V	100.00	0.00	0.8	40.2	41.00	46.0	-5.0

9 PHOTOGRAPHS/EXHIBITS – PRODUCT PHOTOS, TEST SETUPS

Radiated Spurious Emissions



Occupied Bandwidth

