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CERTIFICATION TEST REPORT

Manufacturer:	**Duncan Parking Technologies, Inc.** **316 North Milwaukee Street, Suite 202** **Milwaukee, Wisconsin 53202 USA**
Applicant:	Same as Above
Product Name:	**LNG**
Product Description:	LNG Main Board. Processing and RF communications boards for authorized OEM equipment.
Model:	**LNG-L-A002**
FCC ID:	**UIBLNGLA002**

Testing Commenced:	Sept. 1, 2017	**Testing Ended:**	Oct. 26, 2017
Testing Commence:	April 5, 2018	**Testing Ended:**	April 23, 2018

Summary of Test Results: **In Compliance, with Modifications**

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. 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 15.247**
- **FCC Part 15.31(e)**
- **ANSI C63.10:2013**

Evaluation Conducted by: Julius Chiller, EMC/Wireless Engineer
(also signing for 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 15.247 and in KDB558074. 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 Uncertainly	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.

Measurement	Uncertainty
Radiated RF Immunity 80 MHz to 1 GHz	2.12dB
Conducted Common Mode RF Immunity, CDN 150kHz to 80 MHz	1.72dB
Conducted Common Mode RF Immunity, BCI 150kHz to 80 MHz	2.06dB
Harmonic Emissions	6.25%
Flicker	6.63%

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

1.4 Document History

Document Number	Description	Issue Date	Approved By
F2LQ9793A-01E	First Issue	April 23, 2018	K. Littell

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
-6dB Occupied Bandwidth	CFR 47 Part 15.247(a)(2) / KDB558074	Complies
Conducted Output Power	CFR 47 Part 15.247(b)(3) / KDB558074	Complies
*Voltage Variations	CFR 47 Part 15.31(e)	Complies
Conducted Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.207 / KDB558074	Complies
Radiated Spurious Emission with 1.5dBi Whip Antenna	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Peak Power Spectral Density	CFR 47 Part 15.247(e) / KDB558074	Complies

*Note: Product was operated using fully charged Lithium Ion batteries supplied by the customer. Requirements of 15.31 were met.

Modifications Made to the Equipment
The following modifications were made to meet Band Edge requirements: Manufacturer supplied revised software image to lock out 902 MHz and 928 MHz. Unit's default frequency is 903 MHz.

3 TABLE OF MEASURED RESULTS

Test	Low Channel 903 MHz	Mid Channel 915 MHz	High Channel 927 MHz
Conducted Output Power	31.6mW (15.0dBm)	36.224mW (15.59dBm)	29.31mW (14.67dBm)
Conducted Output Power Limit	1 Watt, (30dBm)	1 Watt, (30dBm)	1 Watt, (30dBm)
E.I.R.P. with 1.5dBi Integral Antenna	44.67mW (16.5dBm)	51.17mW (17.09dBm)	41.4mW (16.17dBm)
E.I.R.P. Limit	4 Watts, (36.02dBm)	4 Watts, (36.02dBm)	4 Watts, (36.02dBm)
Peak Power Spectral Density	-3.82dBm	2.62 dBm	-3.70dBm
Peak Power Spectral Density Limit	8 dBm	8 dBm	8 dBm
-6dB Occupied Bandwidth	0.716 MHz	0.6923 MHz	0.684 MHz
-6dB Occupied Bandwidth Limit	≥ 500KHz	≥ 500KHz	≥ 500KHz

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Duncan Parking Technologies, Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10:2013 and KDB558074 standards. 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: LNG
Model: LNG-L-A002
Serial No.: None Specified
FCC ID: UIBLNGLA002

5.2 Trade Name:

Duncan Parking Technologies, Inc.

5.3 Power Supply:

N/A

5.4 Applicable Rules:

CFR 47, Part 15.247, subpart C

5.5 Equipment Category:

Radio Transmitter-DTS

5.6 Antenna:

1.5dBi Whip 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:

Testing Conducted Sept. 1, 2017 to Oct. 26, 2017: The EUT was set up in a normal testing manner, powered by batteries. EUT constantly transmitted at (915 MHz) mid channel. The highest emissions were recorded in the data tables.

Testing Conducted April 5, 2018: Unit was tested at full output power on Low and High frequencies of 903 MHz and 927 MHz. The highest emissions were recorded in the data tables.

6 LIST OF MEASUREMENT INSTRUMENTATION

Testing Conducted Sept. 1, 2017 to Oct. 26, 2017

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
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Nov. 28, 2017
Antenna, Bilog	CL211	Sunol Sciences, Inc.	JB1	A021017	Mar. 2, 2018
Pre-Amplifier	CL153	Keysight Tech.	83006A	MY39500791	June 20, 2018
Amplifier w/Monopole & 18" Loop	CL163	A.H. Systems, Inc.	EHA-52B	100	May 2, 2018
Horn Antenna	CL098	Emco	3115	9809-5580	Dec. 28, 2018
Software:	Tile Version 3.4.B.3		Software Verified: Sept. 1, 2017, Oct. 26, 2017		
Software:	EMC 32, Version 8.53.0		Software Verified: Sept. 1, 2017, Oct. 26, 2017		

Testing Conducted Apr. 5, 2018

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	AlbatrossProjects	B83117-DF435-T261	US140023	Jan. 9, 2019
Spectrum Analyzer	CL147	Agilent	E7402A	MY45101241	Nov. 16, 2018
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Nov. 17, 2019
Antenna	CL175	Sunol	JB3	A030315	Oct. 11, 2019
Software:	EMC 32, Version 8.53.0		Software Verified: Apr. 5, 2018		

7 FCC PART 15.247(a)(2) – OCCUPIED BANDWIDTH

7.1 Requirements:

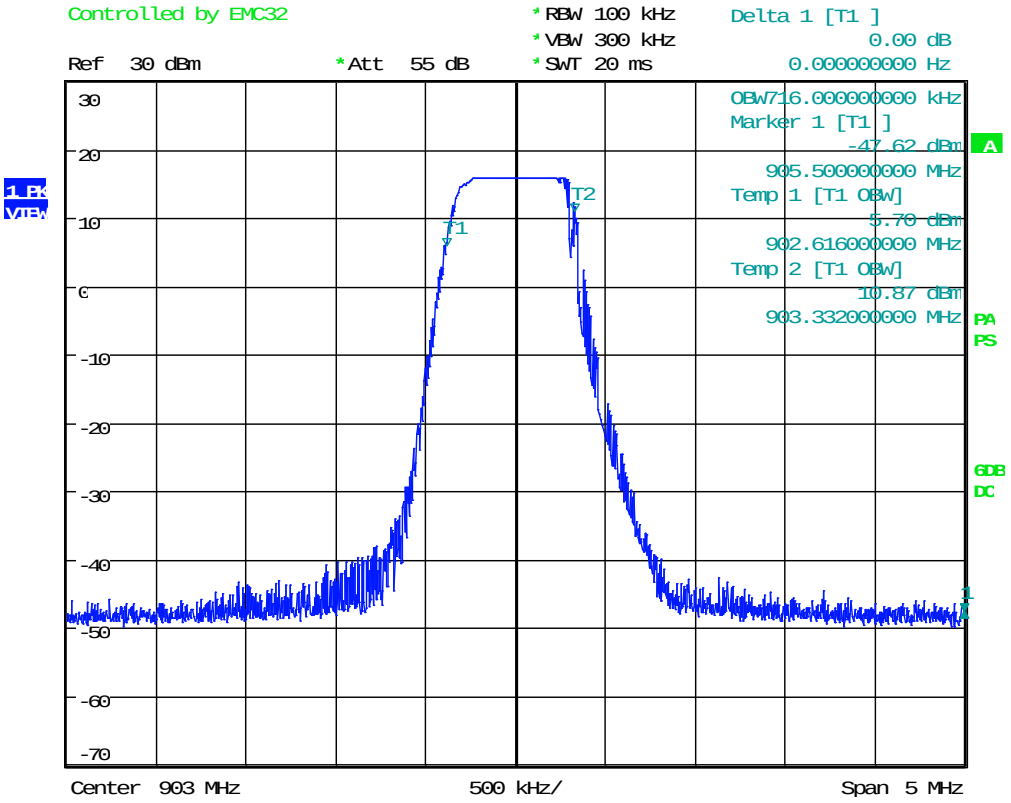
The 6dB bandwidth shall be greater than 500 kHz.

Bandwidth measurements were made at the low (903 MHz), mid (915 MHz) and upper (927 MHz) frequencies with the resolution Bandwidth set at 100 kHz (video bandwidth set at 300 kHz). The bandwidth was measured using the analyzer's marker function.

7.2 Occupied Bandwidth Test Data

Test Date(s):	Sept. 1, 2017; Apr. 5, 2018	**Test Engineer(s):**	J. Knepper; J. Chiller
Standards:	CFR 47 Part 15.247(a)(2); KDB558074	**Air Temperature:**	22.2ºC; 22.0ºC
		Relative Humidity:	43%; 38%

Low Channel



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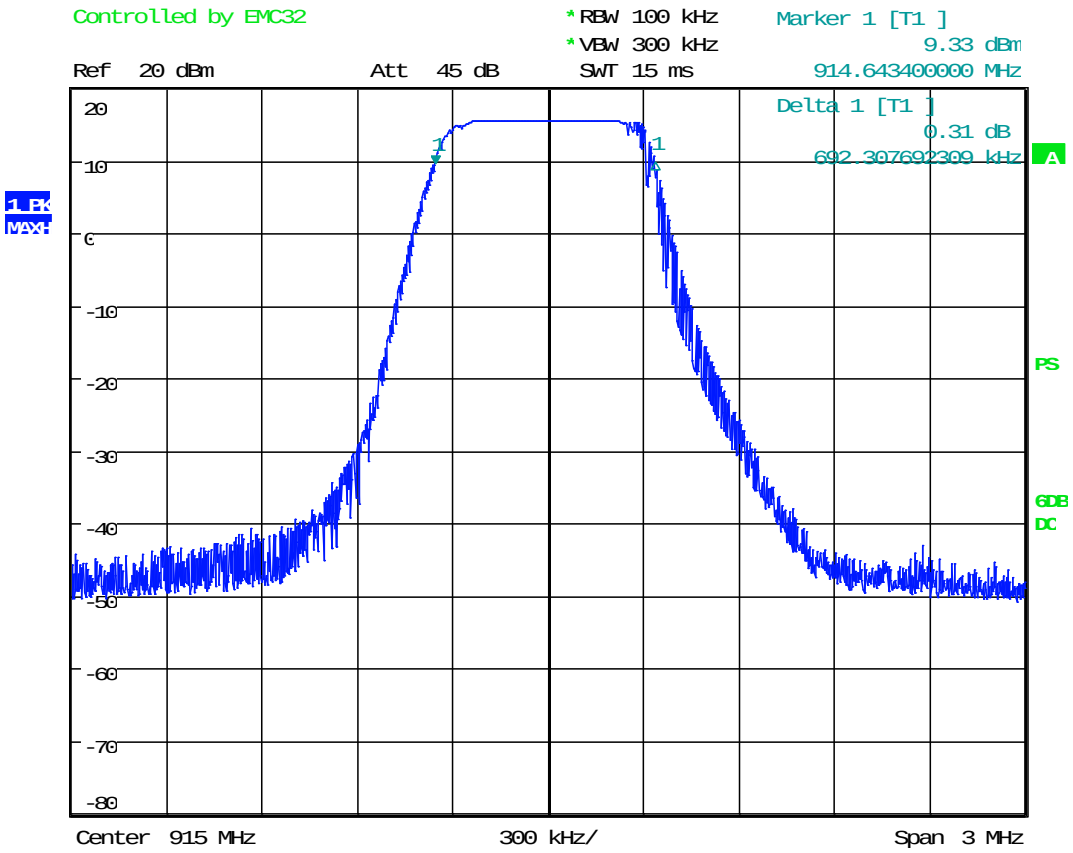

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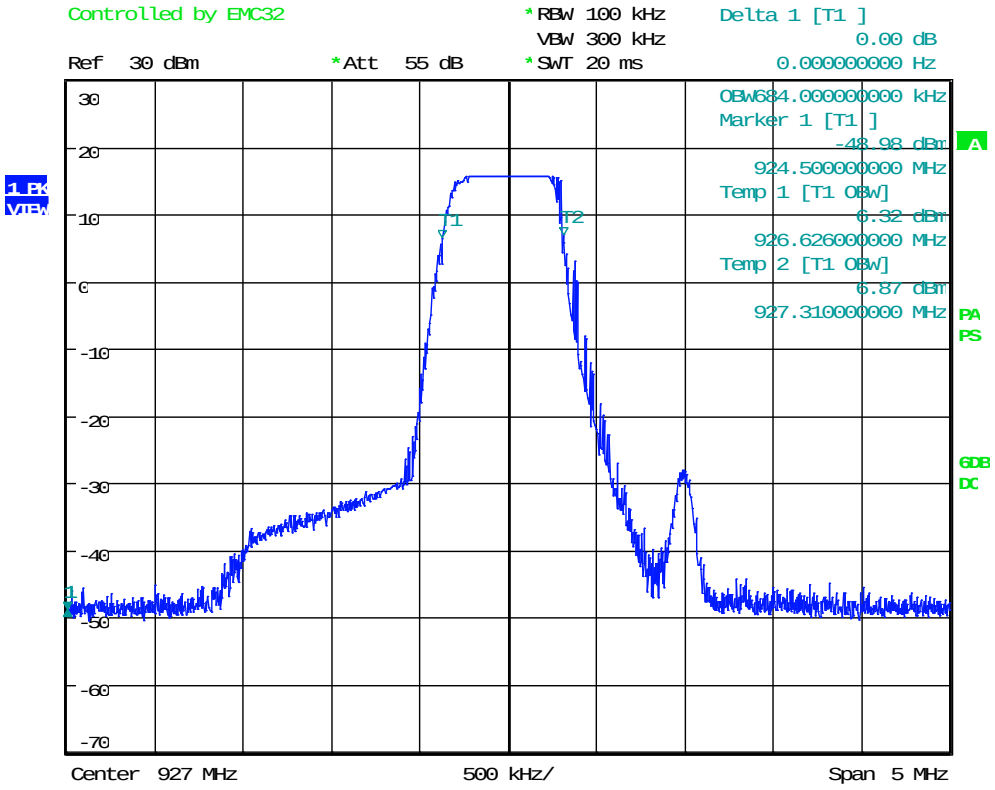

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8 FCC PART 15.247(b)(3) – CONDUCTED OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

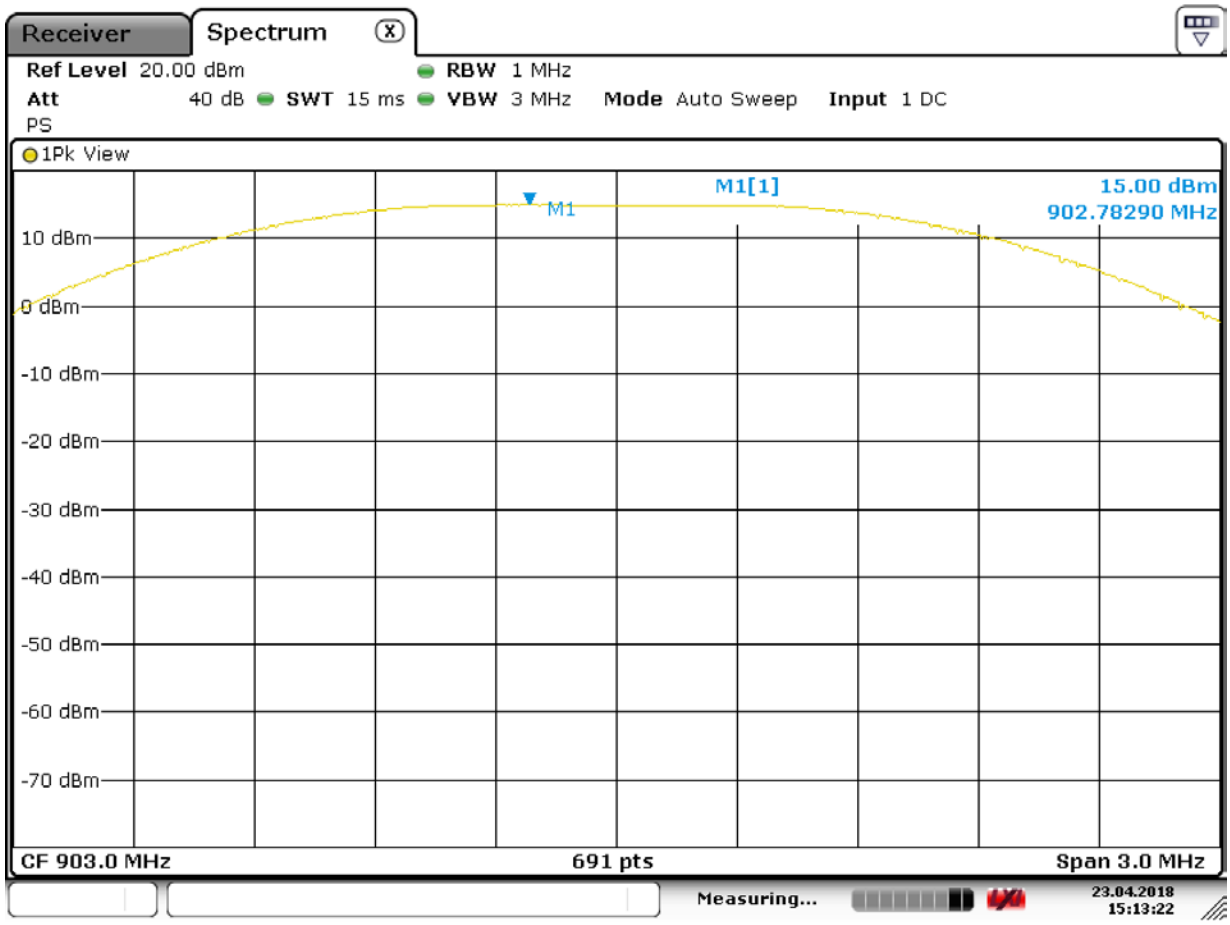
8.1 Requirements:

The peak power output shall be 1 watt (30 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.

8.2 Conducted Output Power Test Data

Test Date(s):	Sept. 1, 2017; April 23, 2018	**Test Engineer(s):**	J. Knepper; J. Chiller
Standards:	CFR 47 Part 15.247(b)(3); KDB558074	**Air Temperature:**	22.2ºC; 22.3ºC
		Relative Humidity:	45%; 38%

Low Channel



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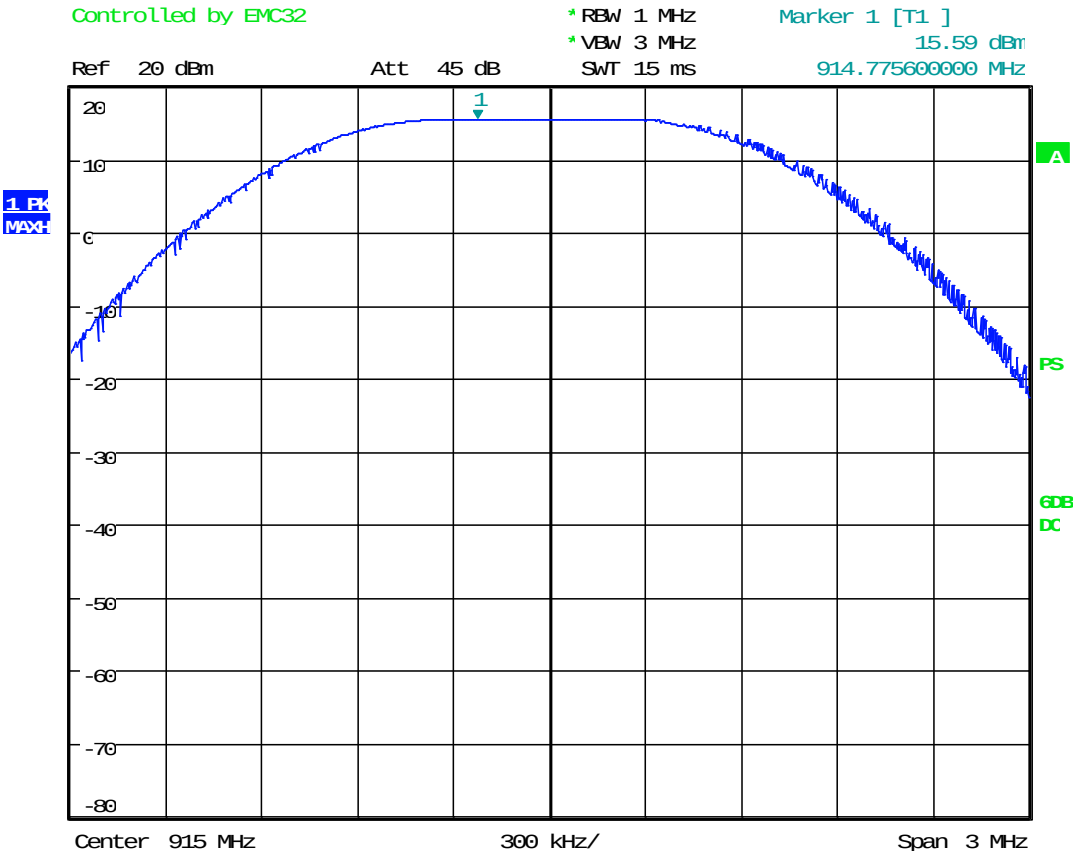

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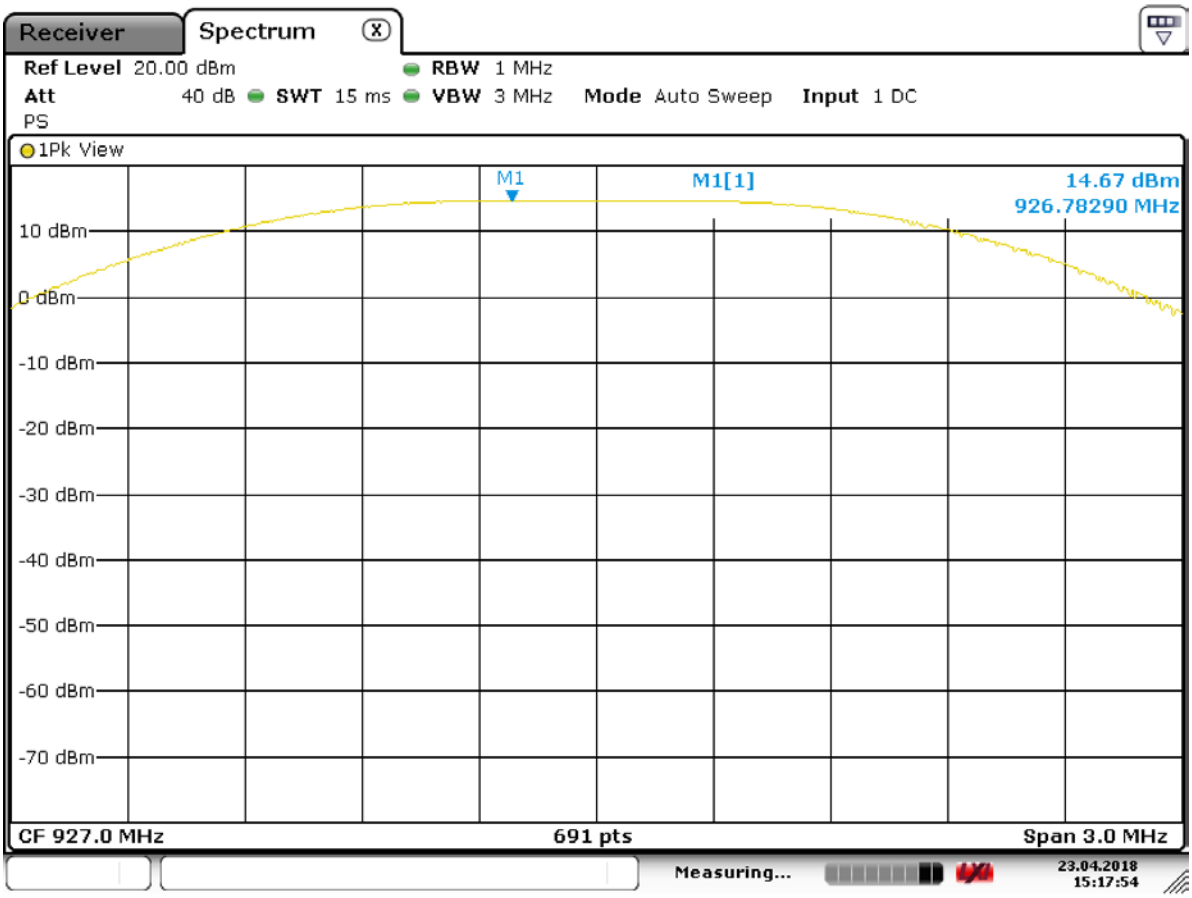

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9 FCC Part 15.247(d) – CONDUCTED SPURIOUS EMISSIONS

The following tests were performed to demonstrate compliance.

RF Antenna Conducted Test

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

9.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.

9.2 Conducted Spurious Emissions Test Data

Test Date(s):	Sept. 1, 2017; Apr. 5, 2018	**Test Engineer(s):**	J. Knepper; J. Chiller
Standards:	CFR 47 Part 15.247(d) / Part 15.207 KDB558074	**Air Temperature:**	22.3ºC; 22.1ºC
		Relative Humidity:	45%; 40%

Low Channel

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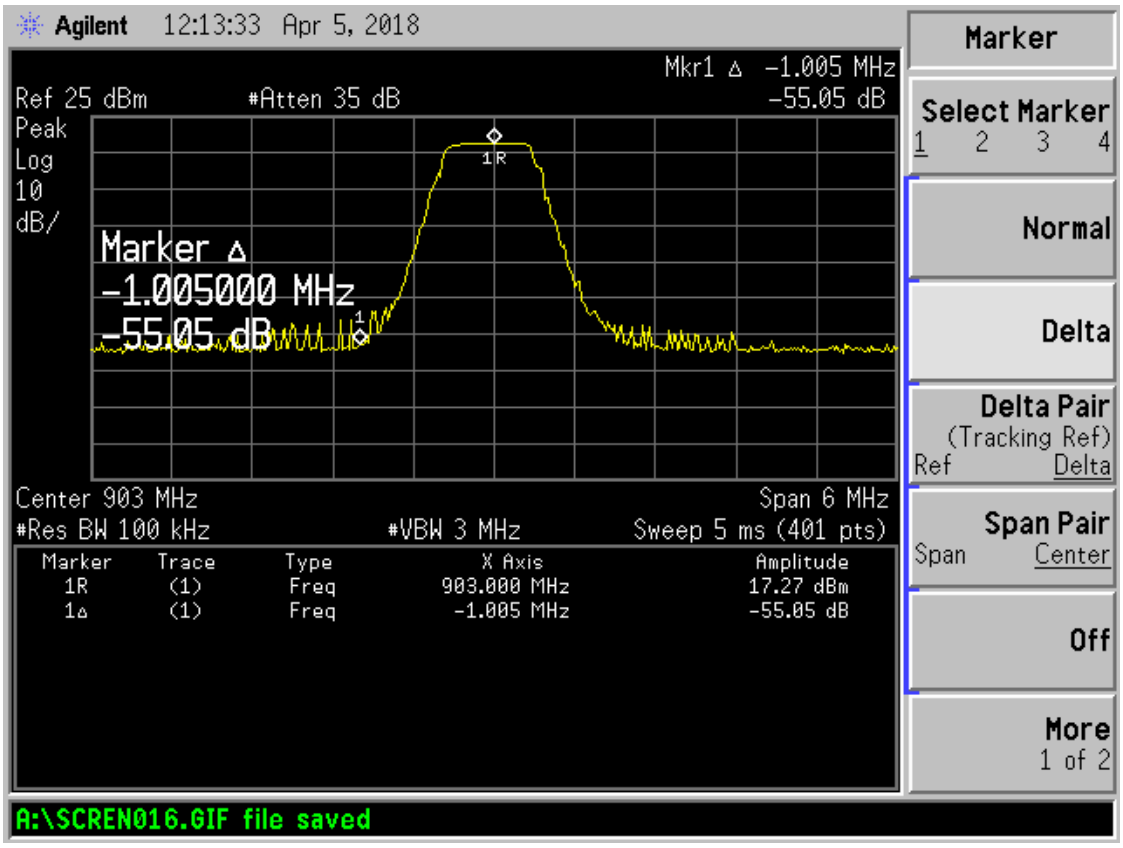

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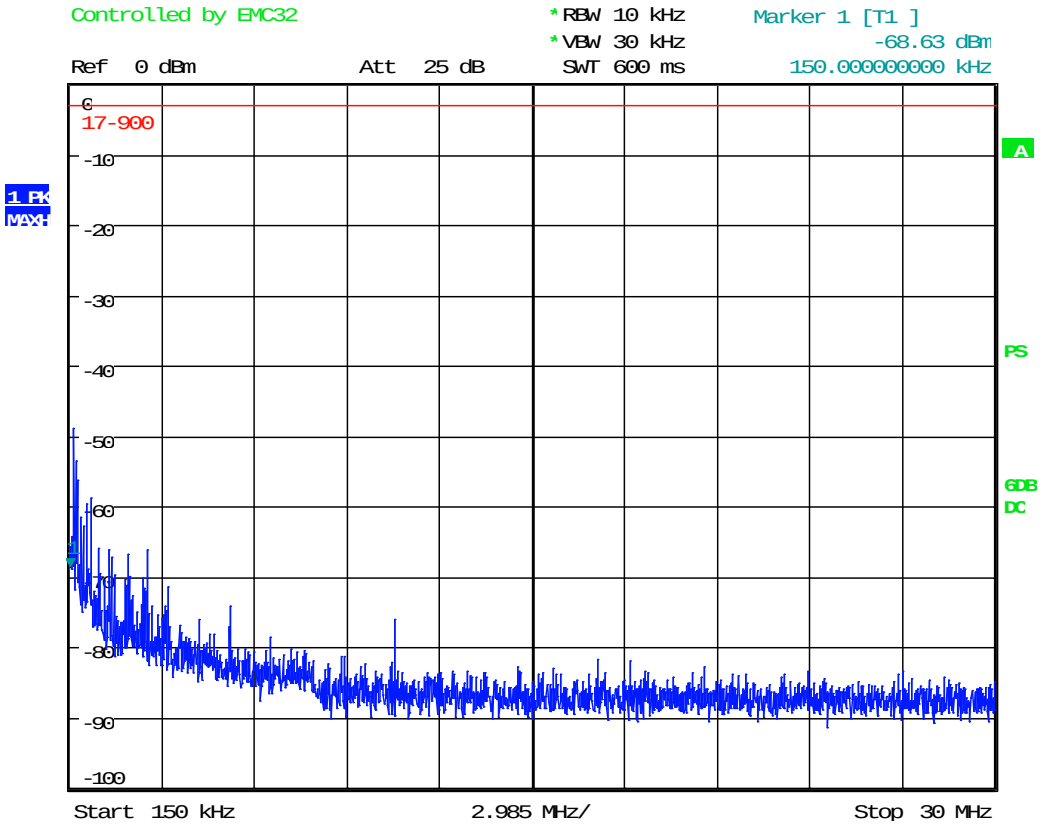

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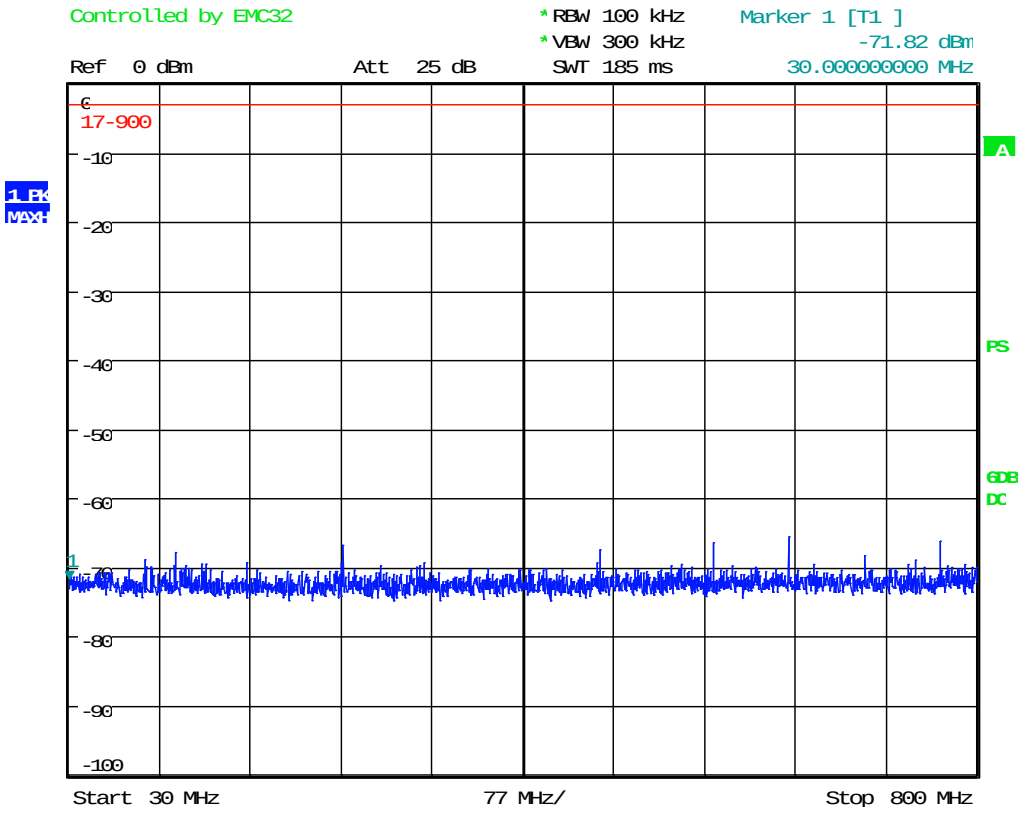

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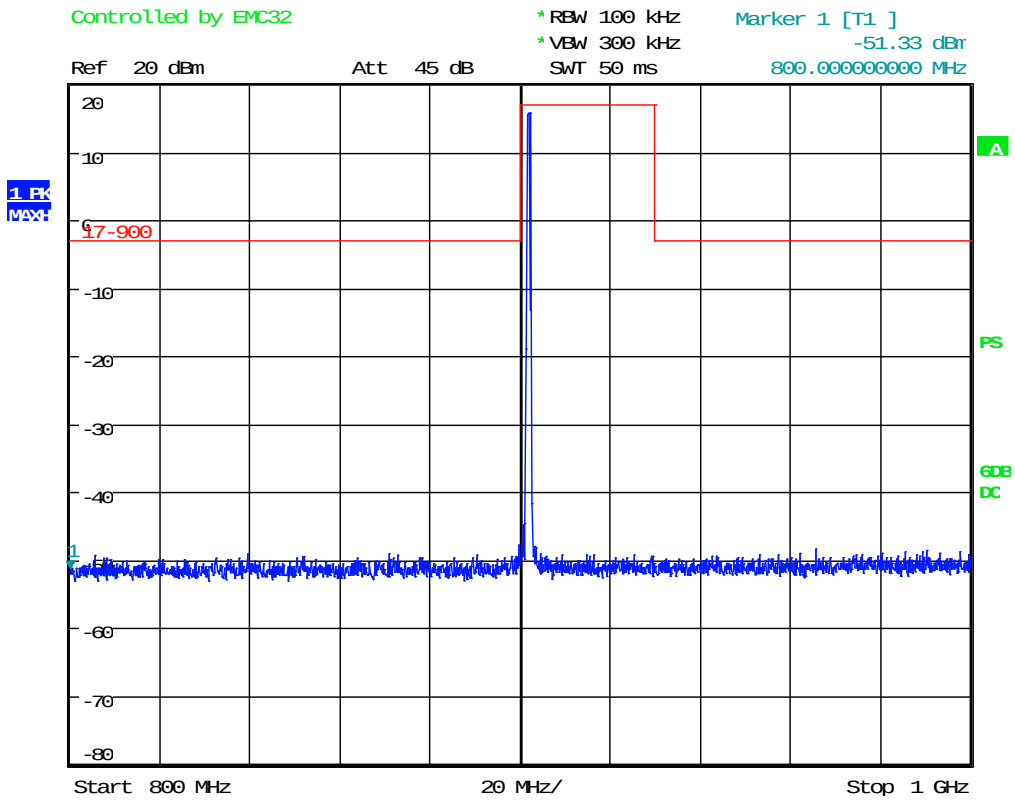

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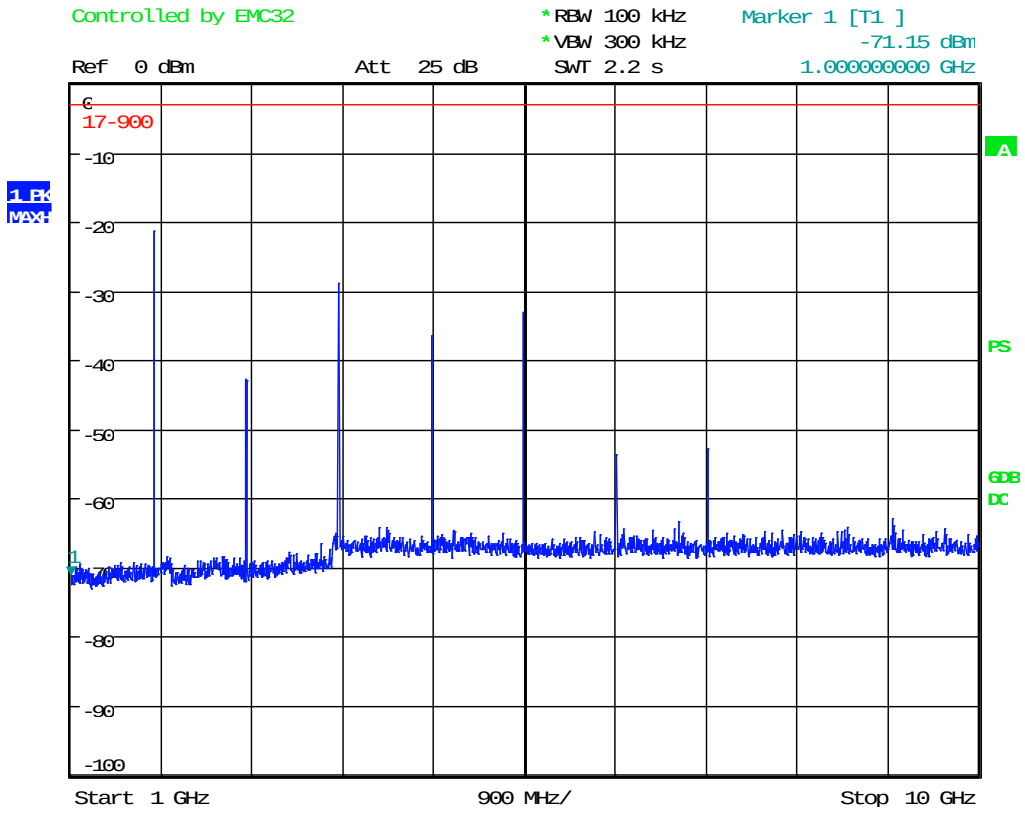

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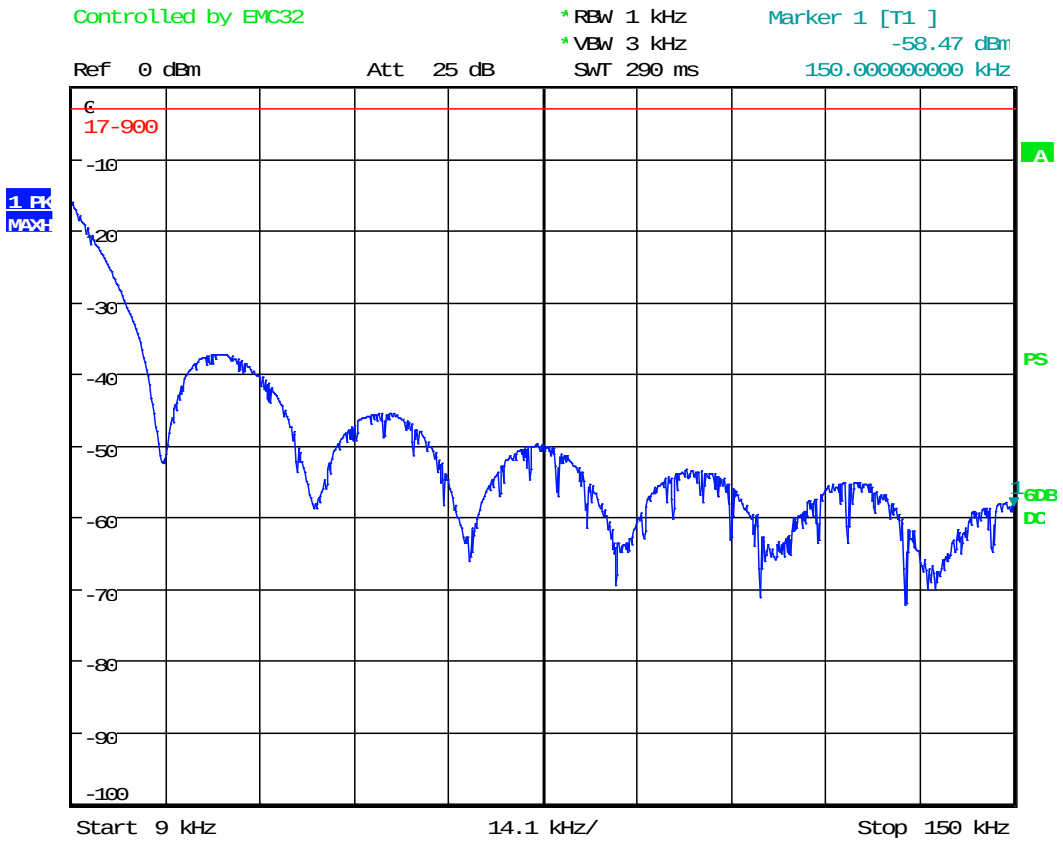

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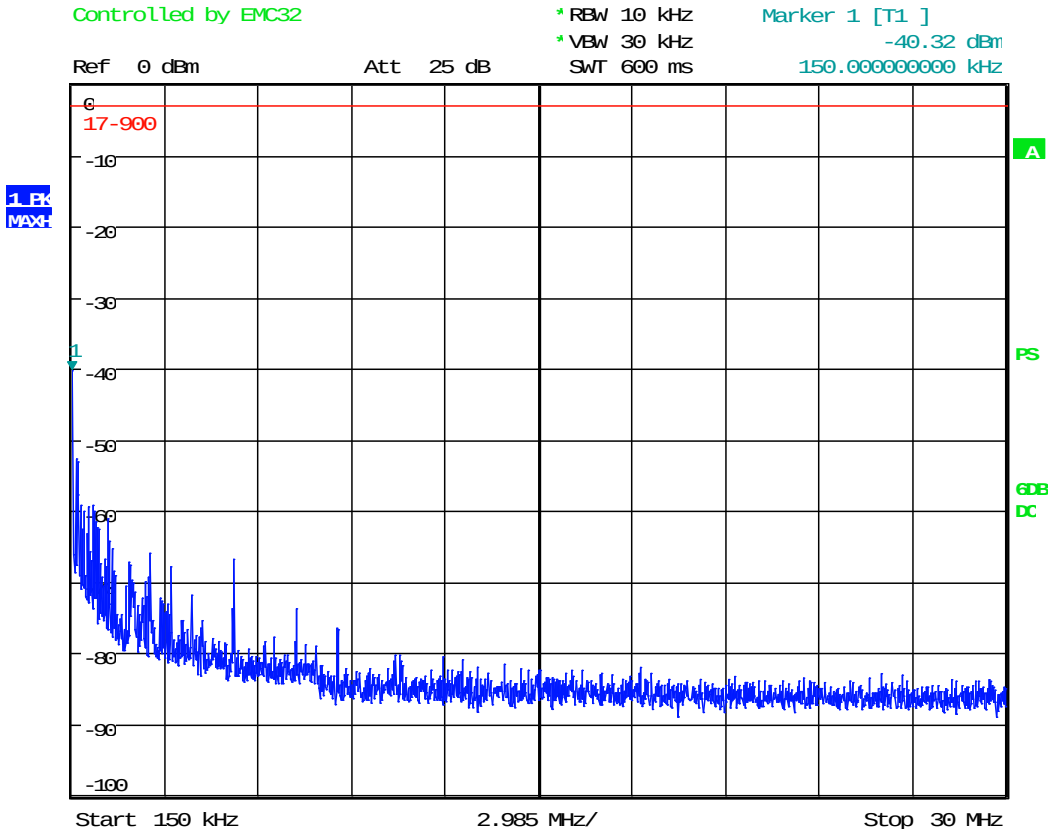

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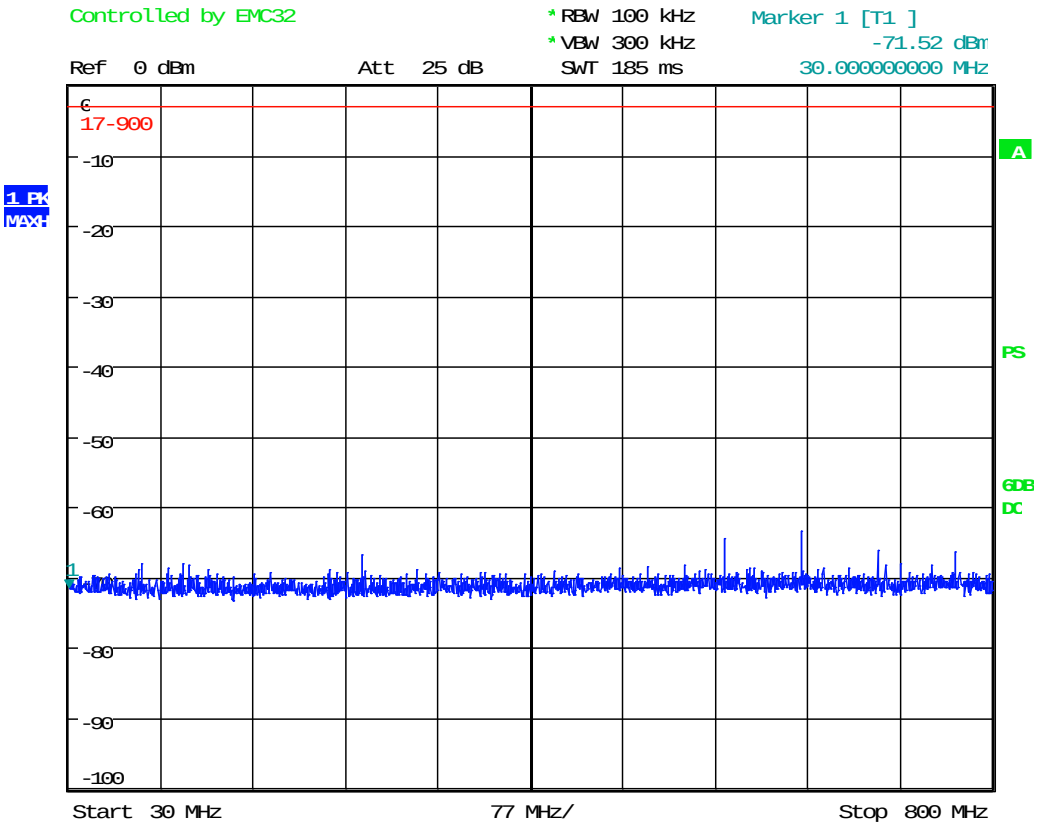

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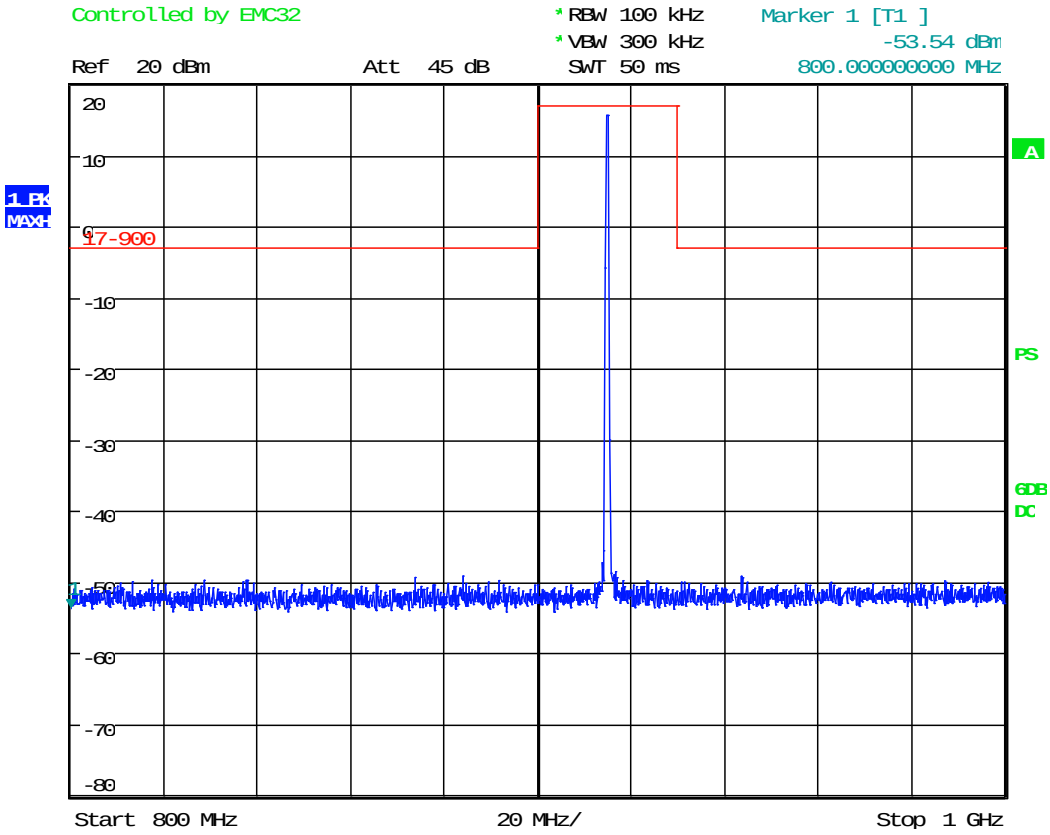

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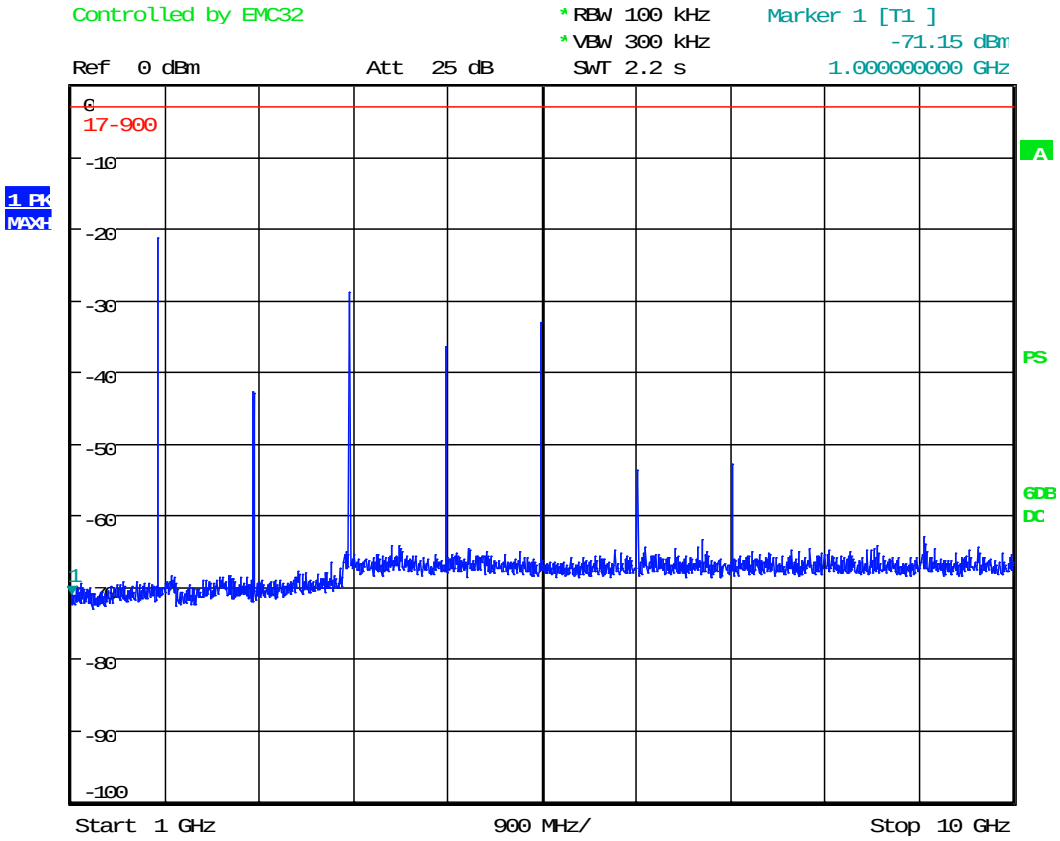

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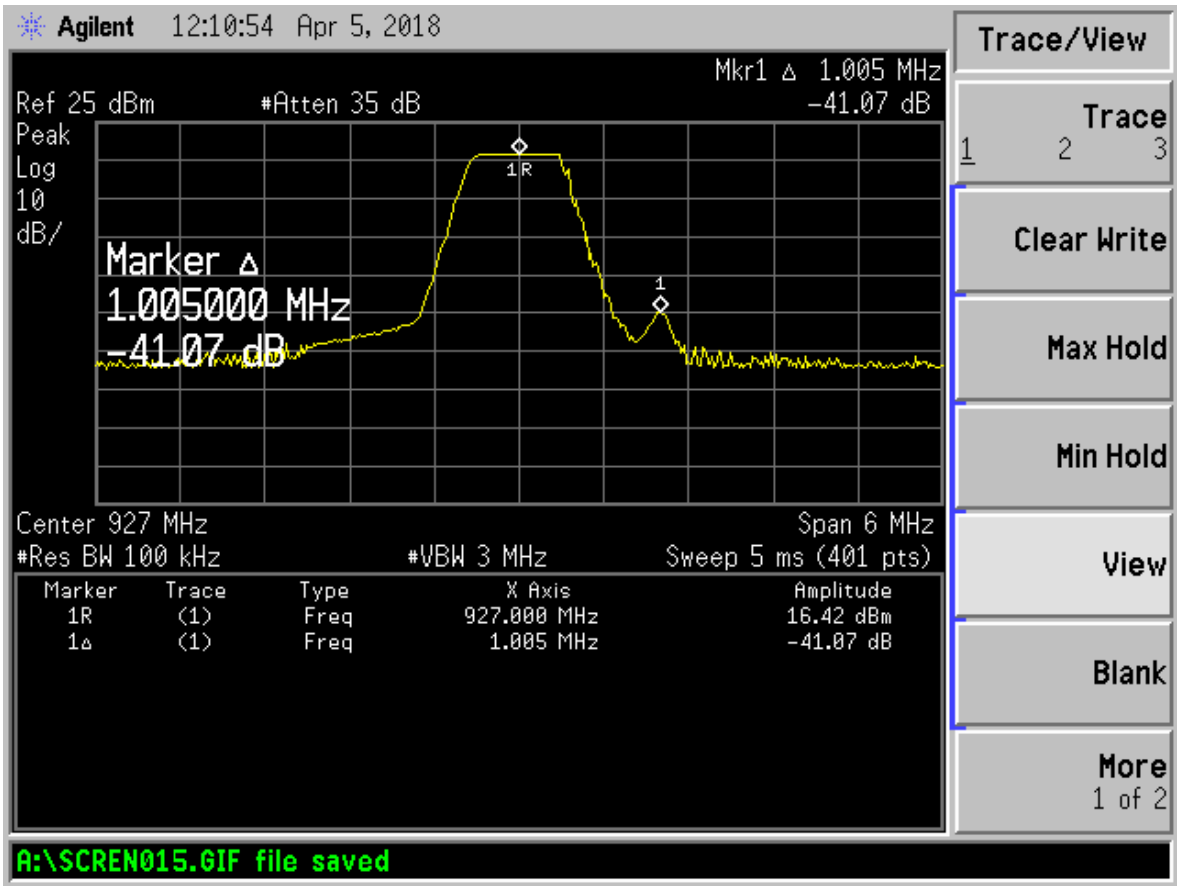

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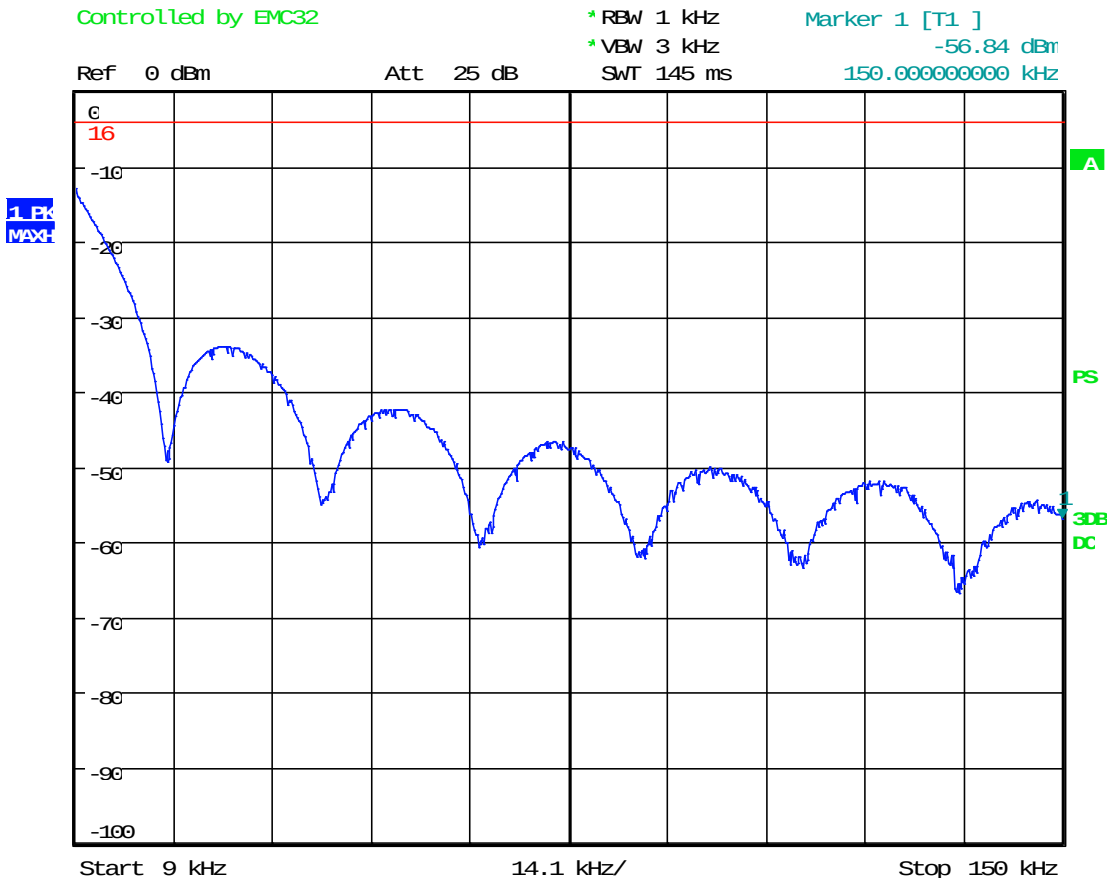

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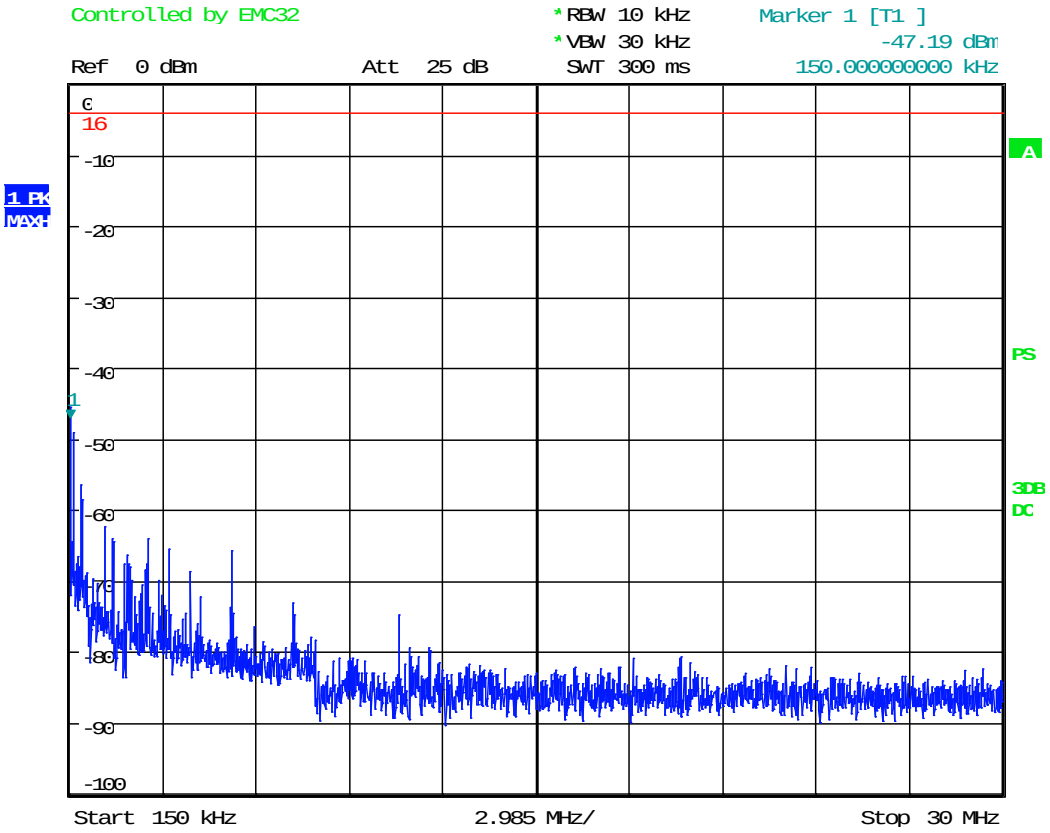

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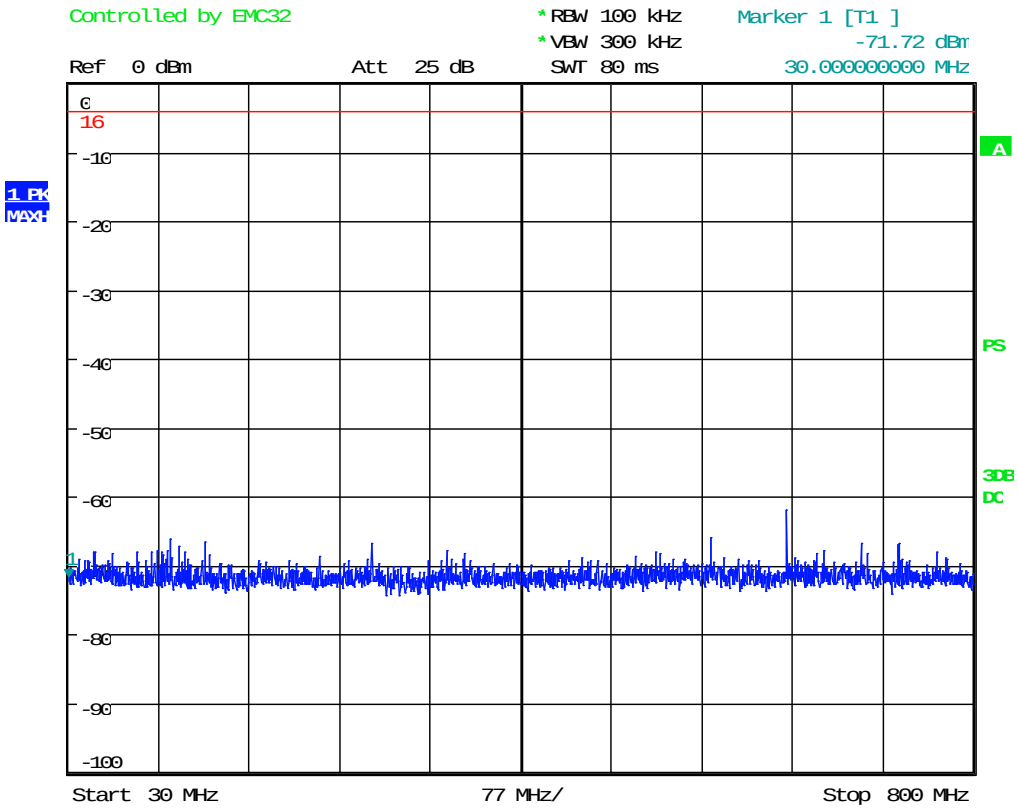

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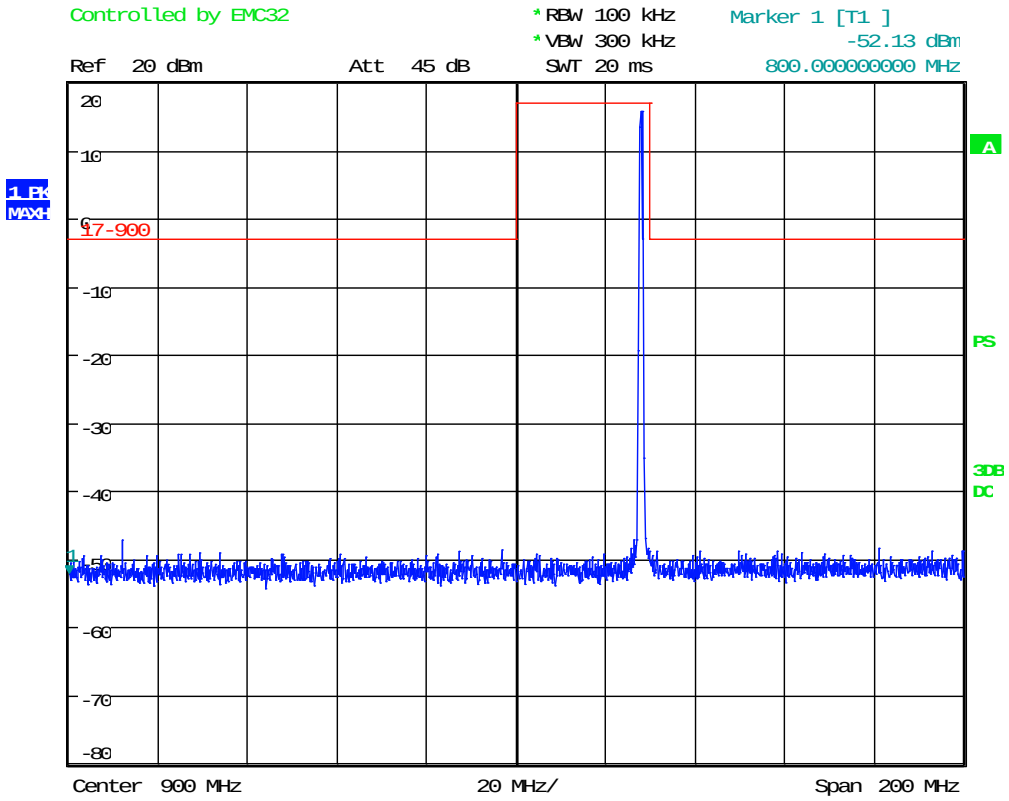

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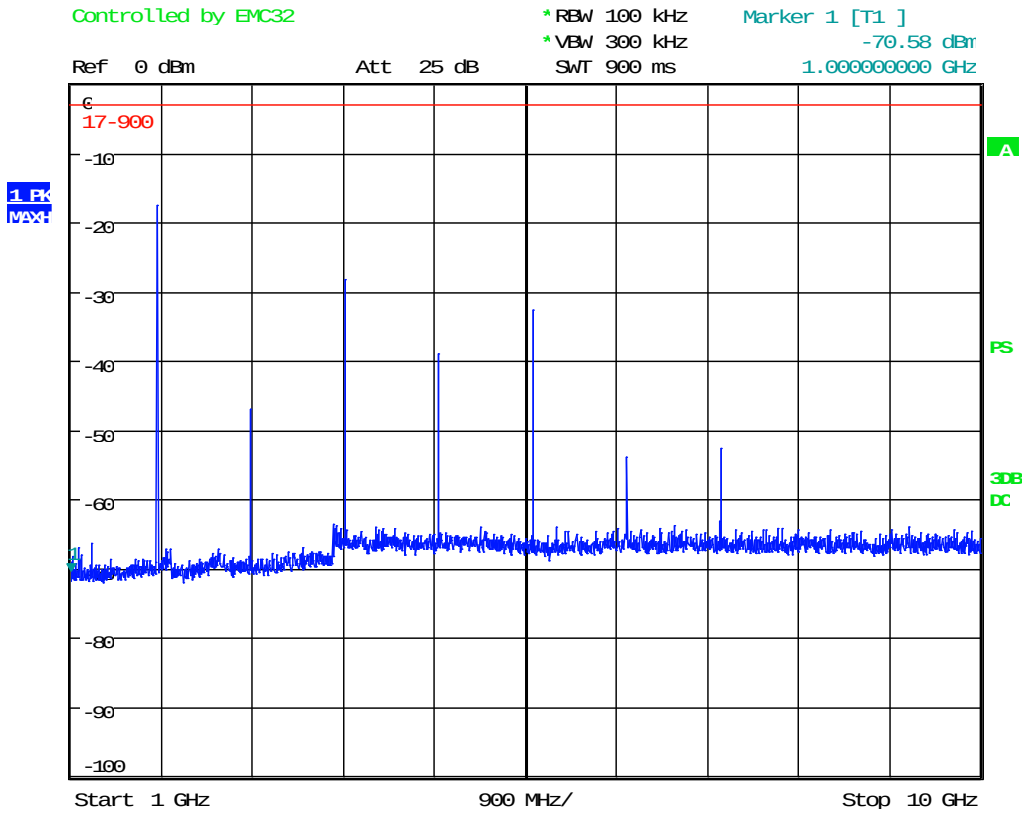

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10 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its 1.5dBi gain Whip antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

10.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).

10.2 Radiated Spurious Emission Test Data

Test Date(s):	Sept. 6-Oct. 26, 2017; Apr. 5, 2018	**Test Engineer(s):**	J. Knepper; J. Chiller
Standards:	CFR 47 Part 15.247(d); Part 15.209 / KDB558074	**Air Temperature:**	20.3ºC; 22.1ºC
		Relative Humidity:	50%; 39%

The equipment was fully exercised with all cabling attached to the EUT and was positioned 3 meters from the antenna in a Semi-Anechoic chamber and positioned for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees and the EUT was tested in all three orthogonal positions to determine the maximum field strength. The tables of measured results can be found below.

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.

Measurements

Low Channel - MaxPeak

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1804.000000	V	59.7	-5.2	54.50	74.0	-19.5
1804.000000	H	64.7	-5.2	59.50	74.0	-14.5
2706.000000	V	43.4	-4.4	39.00	74.0	-35.0
2706.000000	H	39.1	-4.4	34.70	74.0	-39.3
2706.000000	H	38.3	-4.4	33.90	74.0	-40.1
3608.000000	V	49.0	-4.2	44.80	74.0	-29.2
3608.000000	H	56.4	-4.2	52.20	74.0	-21.8

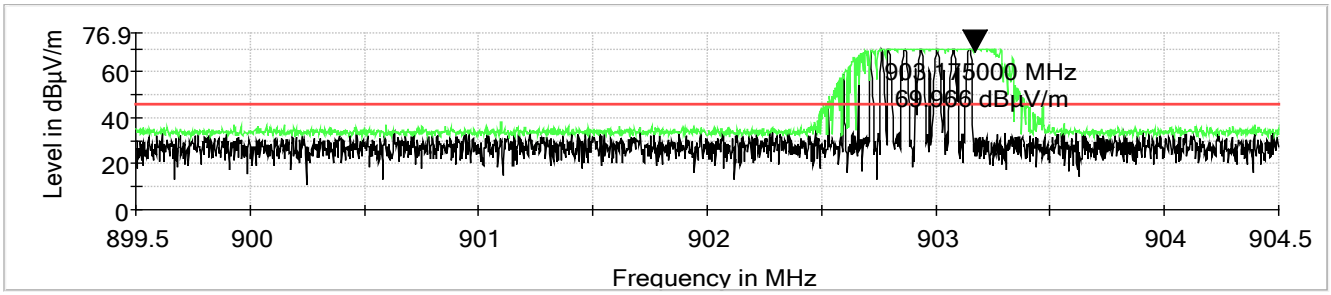
Low Channel - Average

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1804.000000	V	45.5	-5.2	40.30	54.0	-13.7
1804.000000	H	50.6	-5.2	45.40	54.0	-8.6
2706.000000	V	29.0	-4.4	24.60	54.0	-29.4
2706.000000	H	25.3	-4.4	20.90	54.0	-33.1
2706.000000	H	25.3	-4.4	20.90	54.0	-33.1
3608.000000	V	32.9	-4.2	28.70	54.0	-25.3
3608.000000	H	39.1	-4.2	34.90	54.0	-19.1

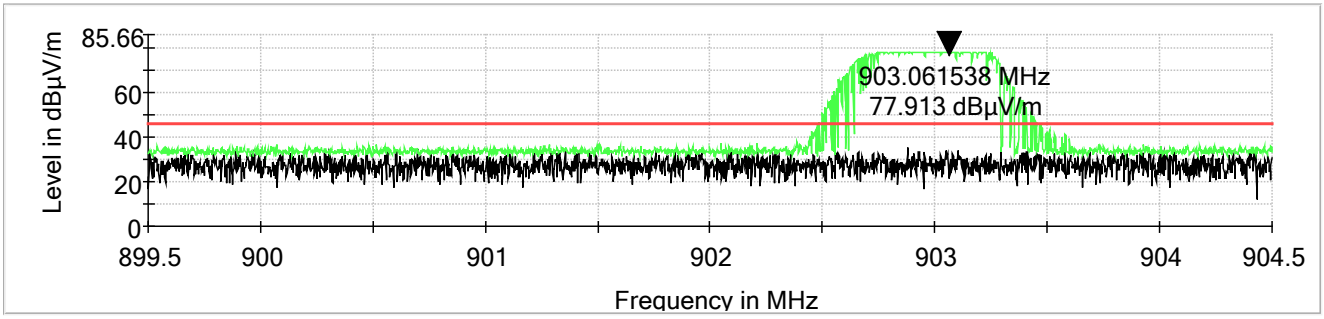
Low Channel - QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
902.000000	V	19.5	11.5	31.0	40.0	-9.0
902.000000	H	19.5	11.5	31.0	40.0	-9.0
928.000000	H	23.9	11.9	35.8	40.0	-4.2
928.000000	V	24.1	11.9	36.0	40.0	-4.0

Band Edge, Low Channel, Vertical



Band Edge, Low Channel, Horizontal



Mid Channel - MaxPeak

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1826.000000	H	58.8	-5.0	53.80	74.0	-20.2
1826.000000	V	55.5	-5.0	50.50	74.0	-23.5
2739.000000	H	38.0	-4.4	33.60	74.0	-40.4
2739.000000	V	41.7	-4.4	37.30	74.0	-36.7
3652.000000	H	54.3	-3.6	50.70	74.0	-23.3
3652.000000	V	48.4	-3.6	44.80	74.0	-29.2

Mid Channel - Average

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1826.000000	H	44.6	-5.0	39.60	54.0	-14.4
1826.000000	V	41.6	-5.0	36.60	54.0	-17.4
2739.000000	H	25.1	-4.4	20.70	54.0	-33.3
2739.000000	V	27.5	-4.4	23.10	54.0	-30.9
3652.000000	H	37.3	-3.6	33.70	54.0	-20.3
3652.000000	V	32.5	-3.6	28.90	54.0	-25.1

Mid Channel - QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
37.520000	H	-3.1	27.8	24.70	40.0	-15.3
37.520000	V	-3.1	27.8	24.70	40.0	-15.3
38.240000	H	-3.1	27.2	24.10	40.0	-15.9
38.240000	V	-3.1	27.2	24.10	40.0	-15.9
410.000000	H	-3.0	31.0	28.00	46.0	-18.0
410.000000	V	-2.9	31.0	28.10	46.0	-17.9
612.360000	V	-2.3	34.7	32.40	46.0	-13.6
612.360000	H	-2.5	34.7	32.20	46.0	-13.8
614.000000	H	-2.3	34.8	32.50	46.0	-13.5
614.000000	V	-2.4	34.8	32.40	46.0	-13.6
960.000000	V	-2.1	40.2	38.10	54.0	-15.9
960.000000	H	-2.2	40.2	38.00	46.0	-8.0

High Channel – MaxPeak

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1856.000000	V	52.5	-4.5	48.00	74.0	-26.0
1856.000000	H	61.7	-4.5	57.20	74.0	-16.8
2784.000000	V	39.8	-4.2	35.60	74.0	-38.4
2784.000000	H	42.1	-4.2	37.90	74.0	-36.1
3712.000000	H	54.5	-3.6	50.90	74.0	-23.1
3712.000000	V	44.4	-3.6	40.80	74.0	-33.2

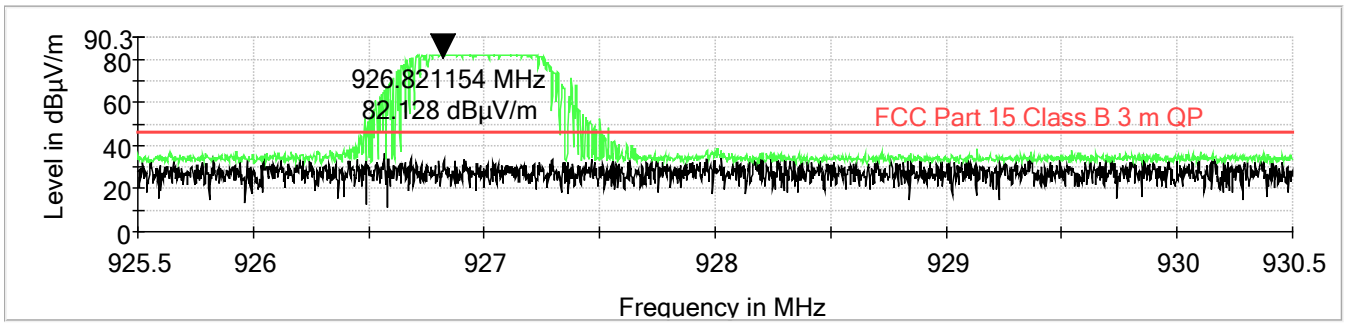
High Channel - Average

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1856.000000	V	38.3	-4.5	33.80	54.0	-20.2
1856.000000	H	47.5	-4.5	43.00	54.0	-11.0
2784.000000	V	26.2	-4.2	22.00	54.0	-32.0
2784.000000	H	27.7	-4.2	23.50	54.0	-30.5
3712.000000	H	37.7	-3.6	34.10	54.0	-19.9
3712.000000	V	29.9	-3.6	26.30	54.0	-27.7

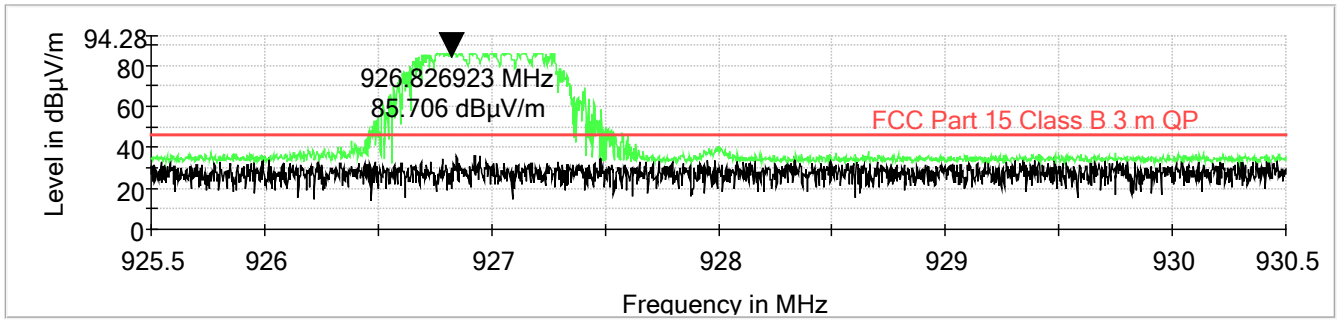
High Channel - QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
37.520000	V	-3.0	27.8	24.80	40.0	-15.2
37.520000	H	-3.0	27.8	24.80	40.0	-15.2
38.240000	V	-3.1	27.2	24.10	40.0	-15.9
38.240000	H	-3.1	27.2	24.10	40.0	-15.9
608.280000	V	-2.3	34.6	32.30	46.0	-13.7
608.280000	H	-2.3	34.6	32.30	46.0	-13.7
614.000000	V	-2.2	34.8	32.60	46.0	-13.4
614.000000	H	-2.2	34.8	32.60	46.0	-13.4
960.000000	V	-2.1	40.2	38.10	54.0	-15.9
960.000000	H	-2.3	40.2	37.90	46.0	-8.1

Band Edge, High Channel, Vertical



Band Edge, High Channel, Horizontal



11 FCC PART 15.247(e) – PEAK POWER SPECTRAL DENSITY (PSD)

Peak power spectral density measurements were performed.

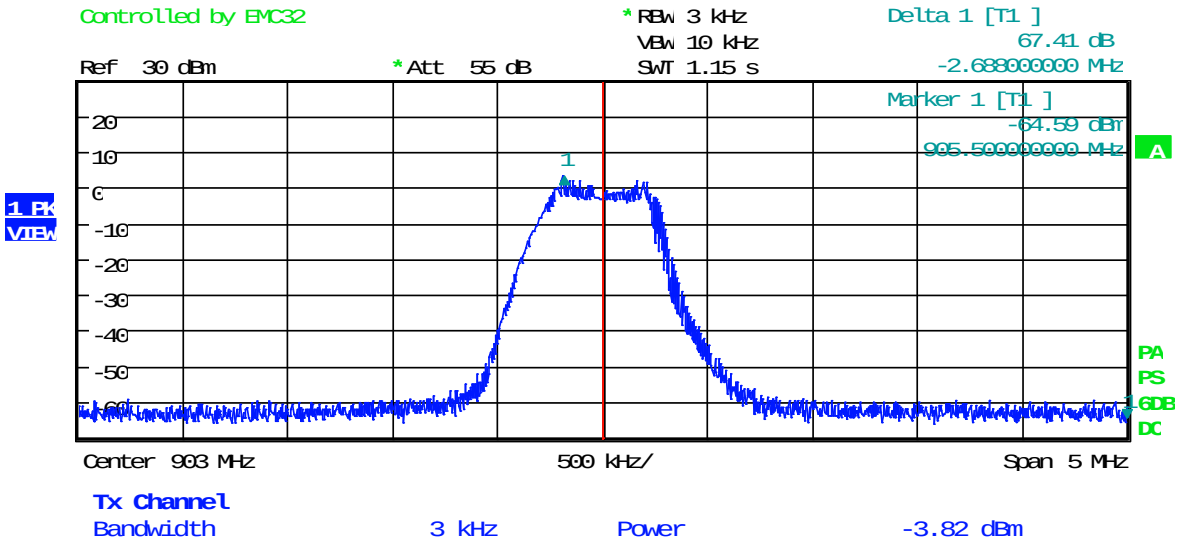
11.1 Requirements:

The peak power spectral density shall not exceed +8dBm in any 3 kHz band during any time interval of continuous transmission.

Power spectral density measurements were performed at a resolution bandwidth of 3 kHz (video bandwidth set at 10 KHz). The peak spectral densities were measured at the low, mid, and upper channels.

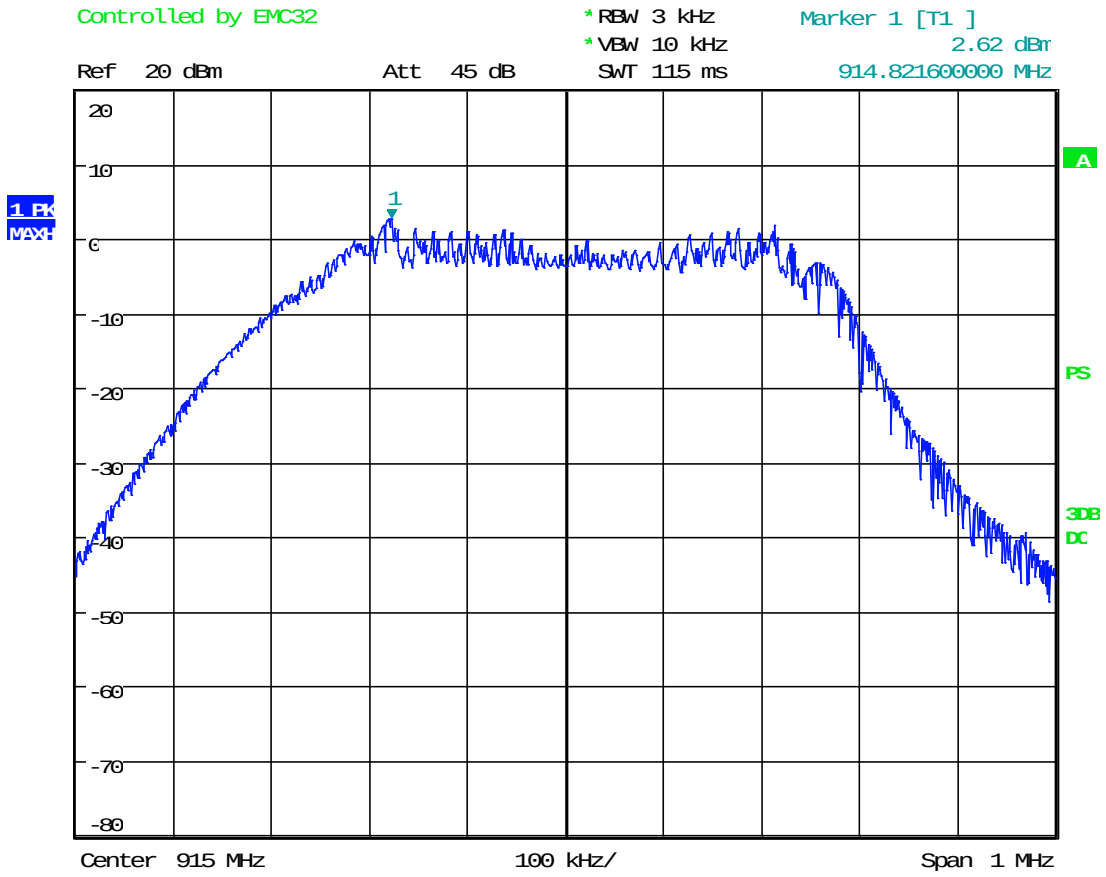
11.2 Peak Power Spectral Density Test Data

Test Date(s):	Sept. 1, 2017; Apr. 5, 2018	**Test Engineer(s):**	J. Knepper; J. Chiller
Standards:	CFR 47 Part 15.247(e); KDB558074	**Air Temperature:**	22.4ºC; 22.4ºC
		Relative Humidity:	45%; 38%



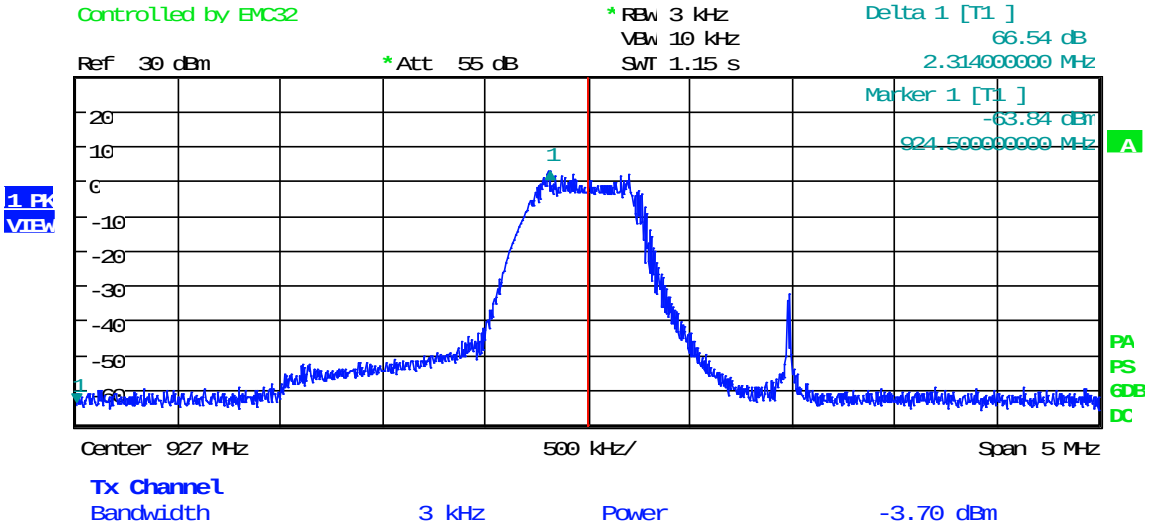
Date: 5.APR.2018 16:36:48

Mid Channel



Date: 1.SEP.2017 15:20:22

High Channel

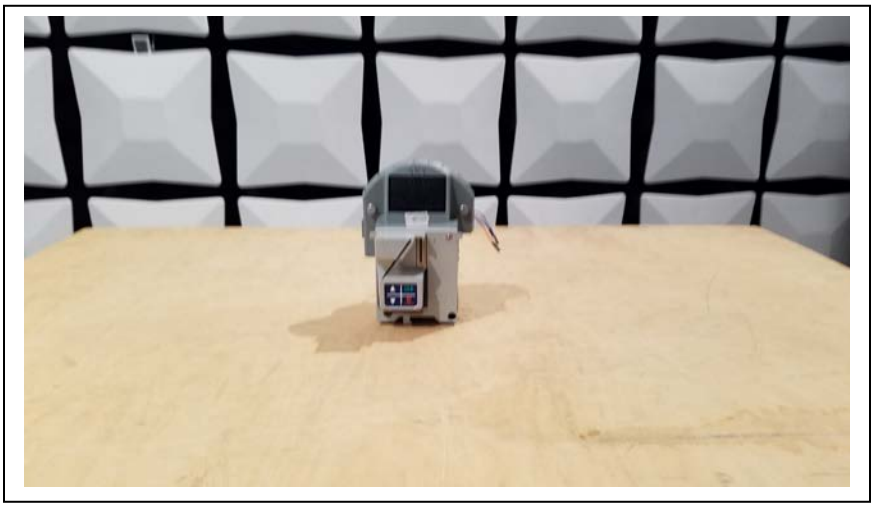


Date: 5.APR.2018 16:34:13

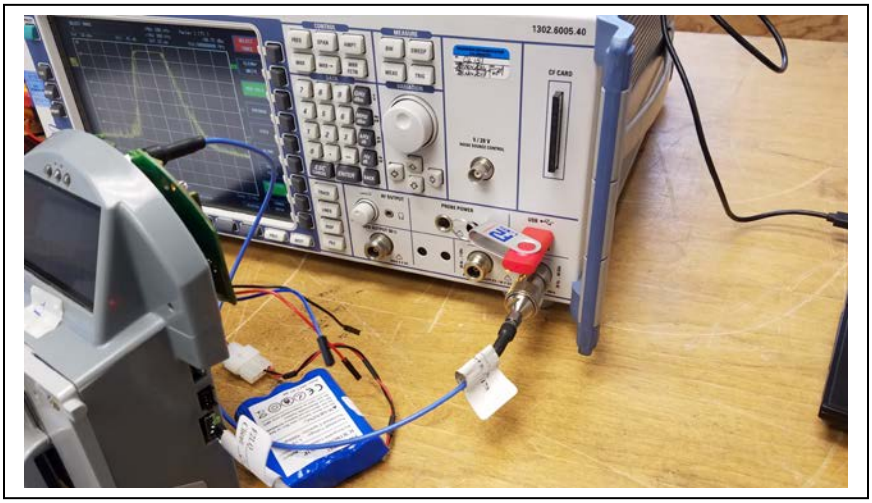
12 PHOTOGRAPHS/EXHIBITS – PRODUCT PHOTOS, TEST SETUPS

Testing Conducted Sept. 1, 2017 to Oct. 26, 2017

Radiated Spurious Emission



Conducted Output Power, Peak Power Spectral Density, Occupied Bandwidth, and Conducted Spurious Emissions



Testing Conducted Apr. 6, 2018

Radiated Spurious Emission

Conducted Output Power, Peak Power Spectral Density, Occupied Bandwidth, and Conducted Spurious Emissions