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CERTIFICATION TEST REPORT

Manufacturer: Deister Electronic GMBH
11 Hermann Bahlsen Str
Barsinghausen 30890 GERMANY

Applicant: Deister Electronics USA, Inc.
9817 Godwin Drive, #201
Manassas, Virginia 20110 USA

Product Name: PSA3 Personal 3 Button Transponder

Product Description: amanTag Personal Transponder for location and button activated transmissions

Operating Voltage/Frequency: Battery-operated (Lithium 3V)

Model: ITA3.

FCC ID: IXLPSA3

Testing Commenced: June 19, 2019

Testing Ended: June 28, 2019

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 15.249**
- ❖ **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: F2P21411A

Applicant: Deister Electronics USA, Inc.
Model: ITA3

Evaluation Conducted by:

Julius Chiller, EMC/Wireless Engineer

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 DXT 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.



1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2P21411A-01E	First Issue	July 15, 2019	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
Radiated Spurious Emissions	CFR 47 Part 15.249(d) / Part 15.209	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	N/A
Variation of the Input Power	CFR 47 Part 15.31(e)	Complies*

**Requirements of 15.31(e) met by using new batteries.*

Modifications Made to the Equipment
Output power was reduced in order to meet 94 dB μ V/m field strength limit.



3 TABLE OF MEASURED RESULTS

Test	916.2 MHz	920.8 MHz
Field Strength of Fundamental	92.3 dB μ V/m 41.2 millivolts/meter	92.2 dB μ V/m 40.75 millivolts/meter
Limit for Fundamental	94 dB μ V/m 50 millivolts/meter	94 dB μ V/m 50 millivolts/meter
-20dB Occupied Bandwidth (MHz)	0.131	0.130



4 ENGINEERING STATEMENT

This report has been prepared on behalf of Deister Electronics USA, Inc., 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: **PSA3 Personal 3 Button Transponder**

Model: ITA3

FCC ID: **IXLPSA3**

5.2 Trade Name:

Deister Electronics USA, Inc.

5.3 Power Supply:

Battery-operated (Lithium 3V)

5.4 Applicable Rules:

CFR 47, Part 15.249

5.5 Equipment Category:

Radio Transmitter

5.6 Antenna:

Integral Antenna, 1dBi gain

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 configured to continuously transmit on two frequencies: 916.2 and 920.8 MHz.

**6 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	Albatross Projects	B83117-DF435-T261	US140023	Aug. 30, 2019
Temp/Hum. Recorder	CL261	Extech	445814	04	Mar. 6, 2020
Spectrum Analyzer	CL147	Agilent	E702A	MY45101241	Jan. 25, 2020
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 25, 2019
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	Oct. 11, 2019
Horn Antenna	CL098	Emco	3115	9809-5580	Jan. 31, 2021
Pre-Amplifier	CL153	Agilent	83006-69007	MY39500791	Aug. 24, 2019
Amplifier w/Monopole & 18" Loop	CL194-Loop	AH Systems Inc.	EHA-52B	281	May 23, 2020
Software:	Tile Version 3.4.B.3		Software Verified: June 19, 2019		
Software:	EMC 32, Version 8.53.0		Software Verified: June 19, 2019		



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.

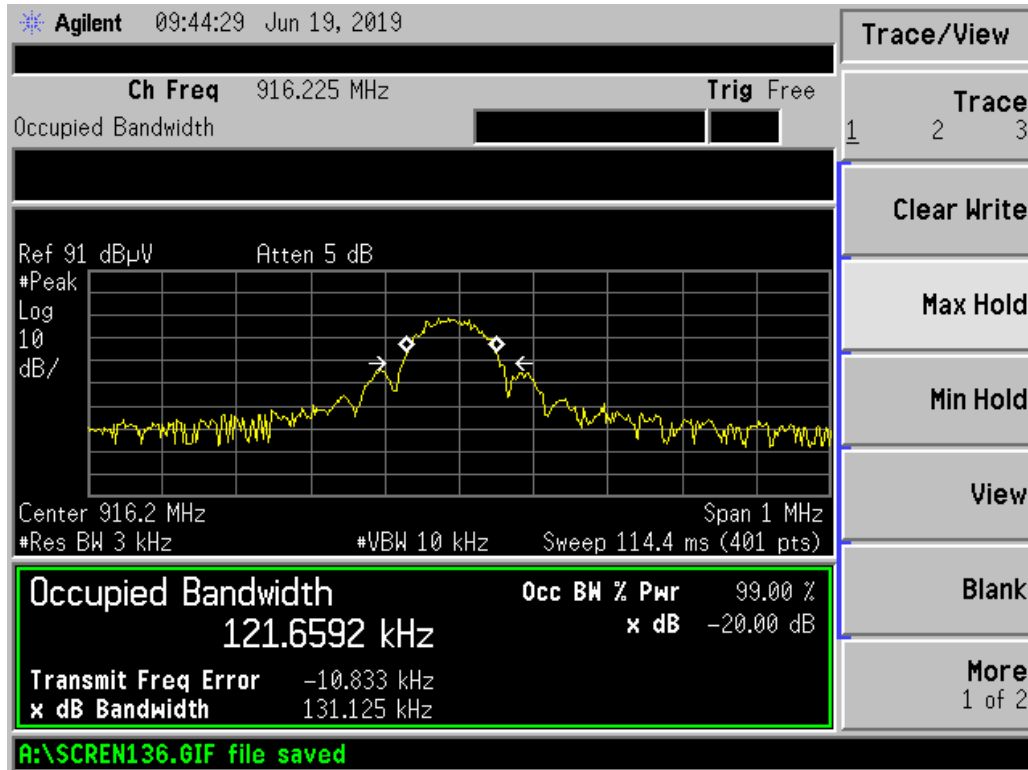
Bandwidth measurements were made at the 916.2 and 920.8 frequencies. The bandwidth was measured using the analyzer's measurement function.



7.2 Occupied Bandwidth Test Data

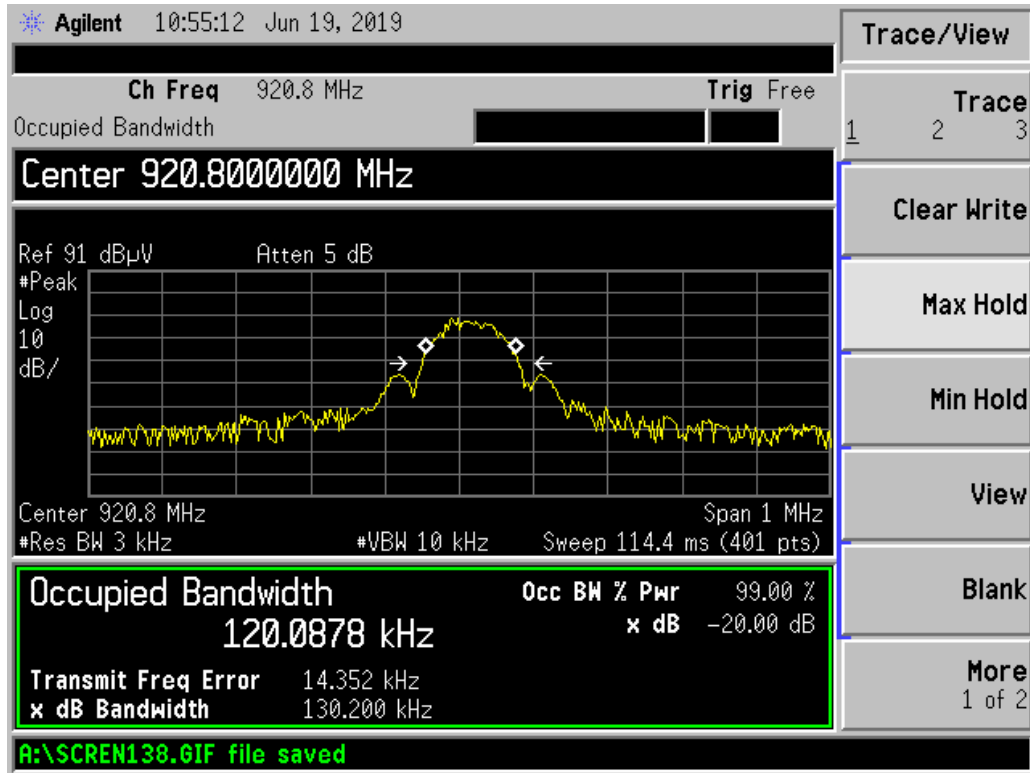
Test Date(s):	June 19, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	20.9°C
		Relative Humidity:	51%

916.2 MHz: -20dB





920.8 MHz: -20dB





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.

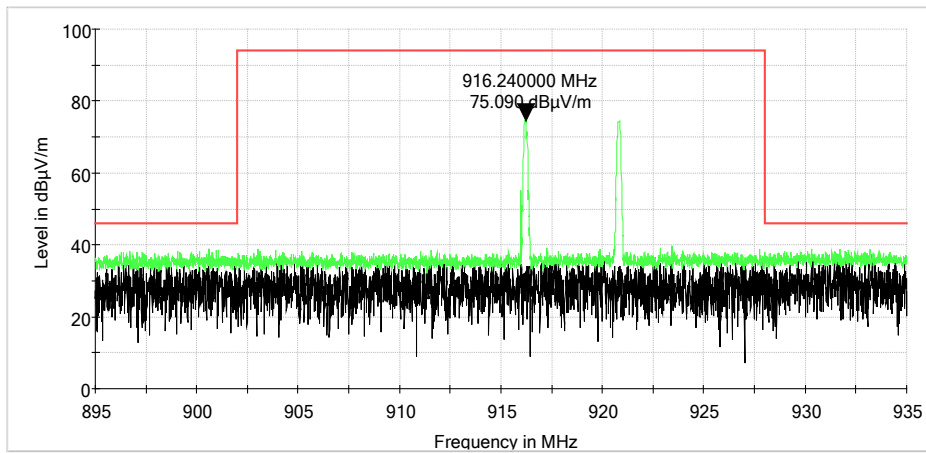
NOTE: During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions.



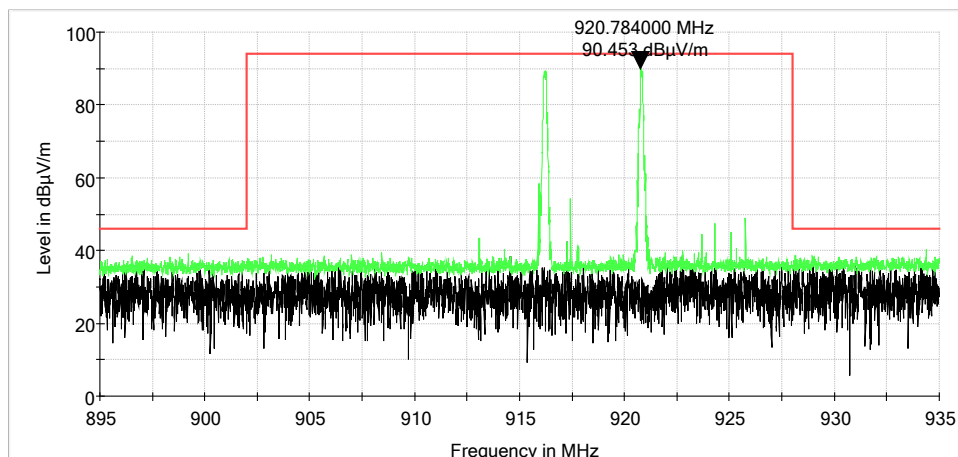
8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	June 28, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.249(a)	Air Temperature:	23.1°C
		Relative Humidity:	47%

Vertical

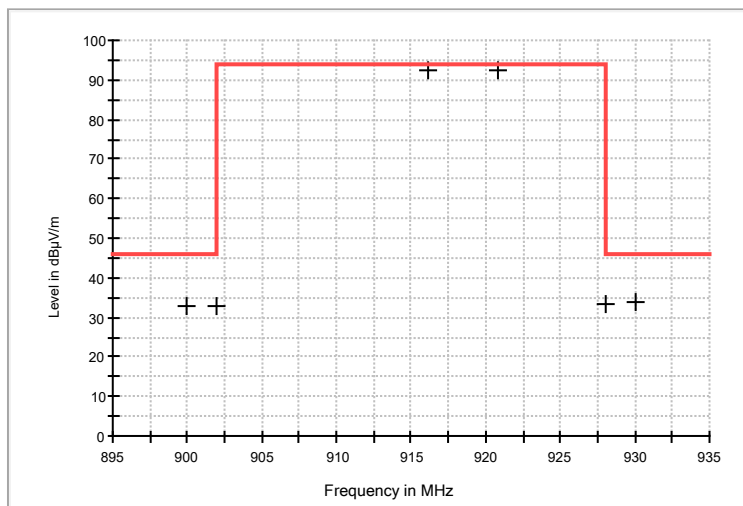


Horizontal





Frequency (MHz)	Antenna Polarization	Azimuth (degrees)	Reading (dB μ V)	Cable Loss & Antenna Factor (dB)	Emission (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
900.000000	H	240.00	19.3	13.5	32.80	46.0	-13.2
902.000000	H	240.00	19.4	13.5	32.90	46.0	-13.1
916.200000	H	240.00	78.7	13.6	92.30	94.0	-1.7
920.800000	H	232.00	78.5	13.7	92.20	94.0	-1.8
928.000000	H	232.00	19.6	13.8	33.40	46.0	-12.6
930.000000	H	232.00	19.7	13.9	33.60	46.0	-12.4





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 10 GHz 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.

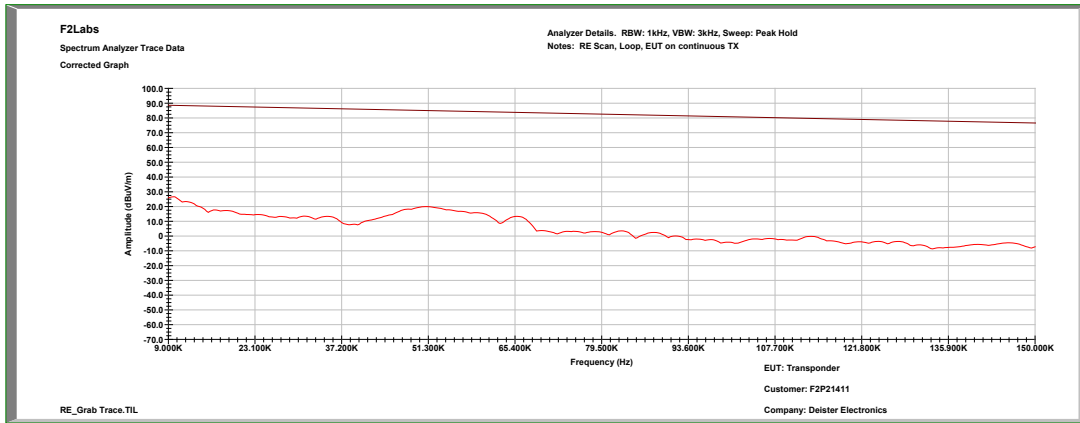
The following graphs are for the Low channel as determined worst-case. The measurement table includes data for all channels.



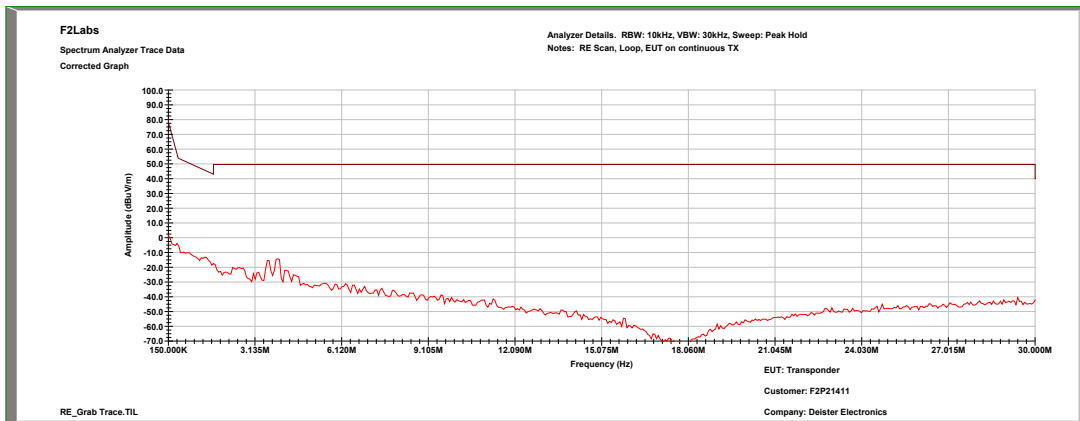
Test Date(s):	June 28, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.249(d) / Part 15.209	Air Temperature:	23.1°C
		Relative Humidity:	47%

Note: Test data reflects results with modifications.

0.009 MHz to 0.15 MHz (Loop Antenna)

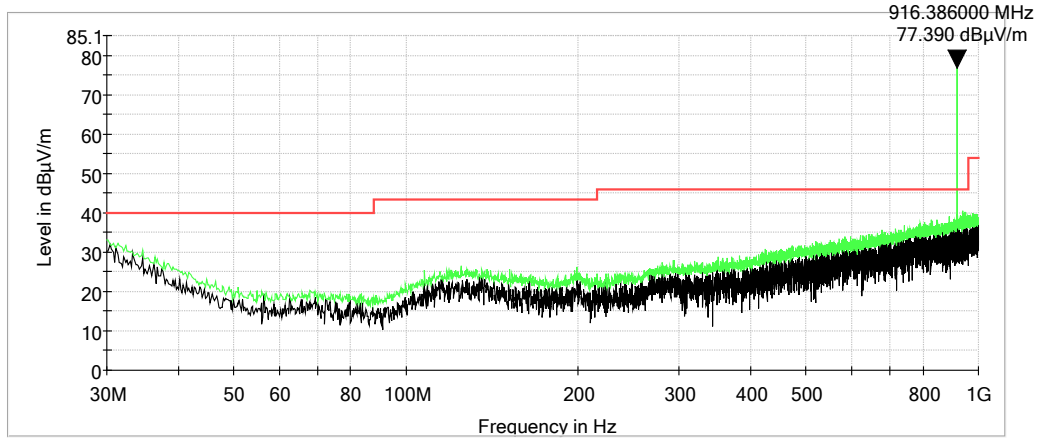


0.15 MHz to 30 MHz (Loop Antenna)

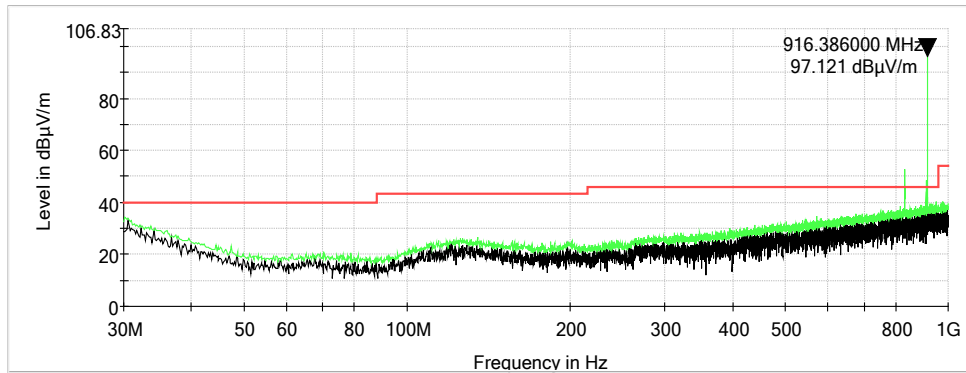




Characterization Scan: 30 MHz to 1000 MHz, Vertical



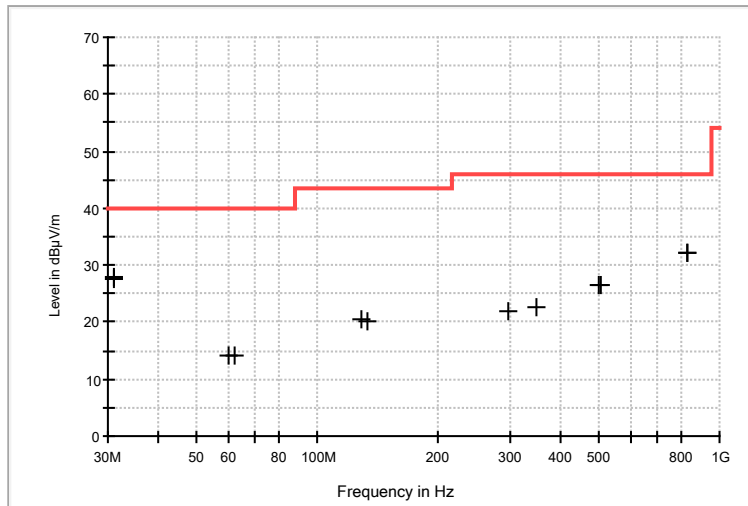
Characterization Scan: 30 MHz to 1000 MHz, Horizontal





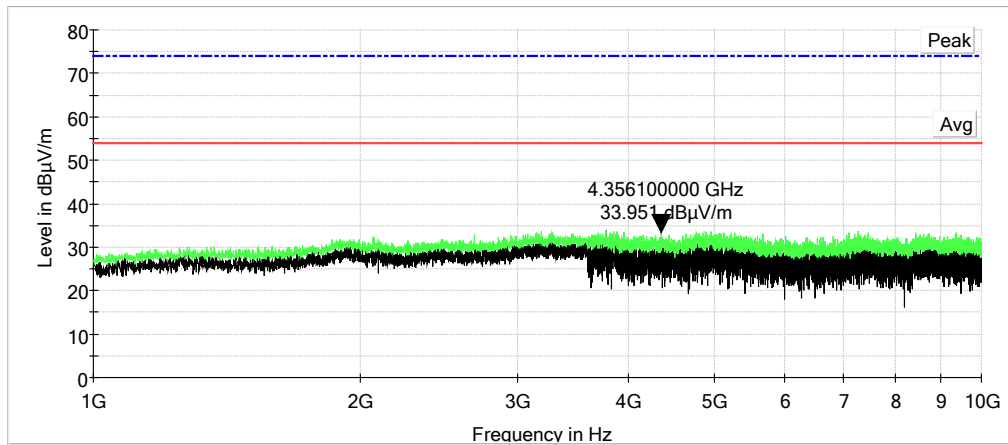
Measurements: 30 MHz to 1000 MHz

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dB μ V)	Cable Loss & Antenna Factor (dB)	Emission (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.960000	H	100.00	0.00	20.4	7.5	27.90	40.0	-12.1
31.160000	V	100.00	0.00	20.3	7.3	27.60	40.0	-12.4
59.880000	H	100.00	0.00	20.1	-6.0	14.10	40.0	-25.9
62.000000	V	100.00	0.00	19.9	-5.9	14.00	40.0	-26.0
127.600000	H	100.00	0.00	19.9	0.6	20.50	43.5	-23.0
133.000000	V	100.00	0.00	19.8	0.5	20.30	43.5	-23.2
298.680000	H	100.00	0.00	19.9	2.0	21.90	46.0	-24.1
348.160000	V	100.00	0.00	19.5	3.3	22.80	46.0	-23.2
502.600000	H	100.00	0.00	19.4	7.2	26.60	46.0	-19.4
507.840000	V	100.00	0.00	19.2	7.2	26.40	46.0	-19.6
827.360000	V	100.00	0.00	19.5	12.6	32.10	46.0	-13.9
832.560000	H	100.00	0.00	19.6	12.6	32.20	46.0	-13.8

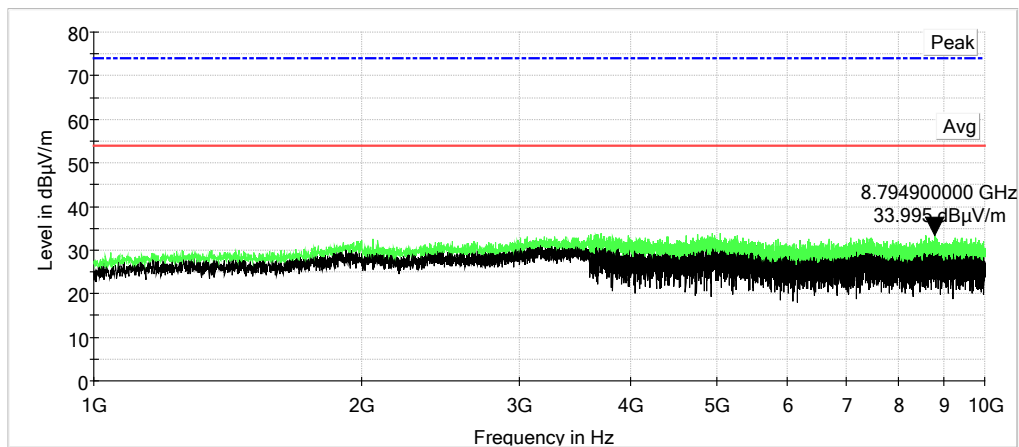




Characterization Scan: 1 GHz to 10 GHz, Vertical



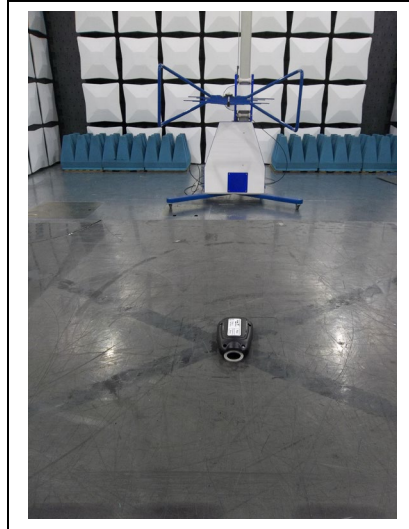
Characterization Scan: 1 GHz to 10 GHz, Horizontal



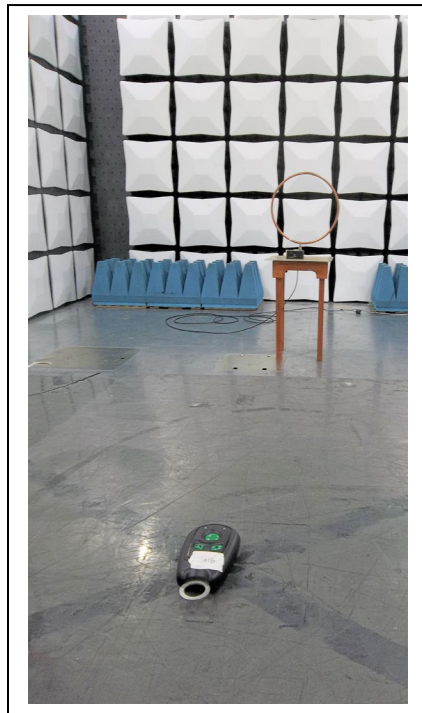


9 PHOTOGRAPHS

Field Strength of Emissions, Occupied Bandwidth

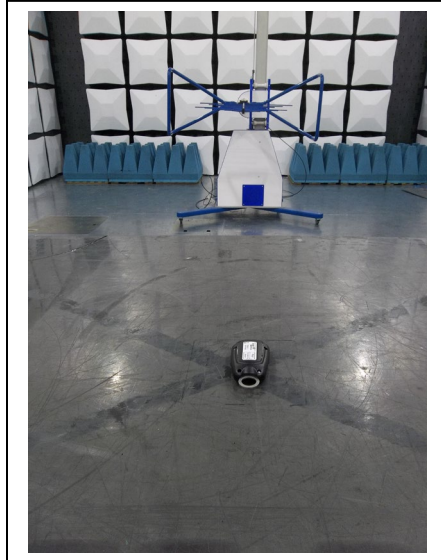


Loop Antenna





Radiated Spurious Emissions: Less than 1 GHz



Radiated Spurious Emissions: Greater than 1 GHz

