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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:	**ATA1 Asset Transponder**
Product Description:	amanTag asset location transponder for detection and communication of location vicinity of appropriate amanTag reader
Operating Voltage/Frequency:	Battery-Operated (3.3VDC)
Model(s):	**ATA1*** **Denotes actual model tested as representative of product family that includes the following: ATA1, BTA1, PSA1, UTA1, UTA2 and UTA3.*
FCC ID:	**IXLATA1**
Testing Commenced:	June 10, 2019
Testing Ended:	June 10, 2019
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 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**

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
F2P21410A-01E	First Issue	June 17, 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
Conducted Emissions	CFR 47 Part 15.207(a)	N/A
Variation of the Input Power	CFR 47 Part 15.231(e)	Complies*

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

Modifications Made to the Equipment
None

3 TABLE OF MEASURED RESULTS

Test	Low Channel 916.2 MHz	High Channel 920.8 MHz
Quasi-Peak Field Strength of Fundamental	91.4 dBµV/m	93.8 dBµV/m
Average Limit for Fundamental	94 dBµV/m	94 dBµV/m
Peak Field Strength of Fundamental	92.50 dBµV/m	93.94 dBµV/m
Peak Limit for Fundamental	114.00dBuV/m	114.00dBuV/m
-20dB Occupied Bandwidth (MHz)	0.128	0.129

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 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: ATA1 Asset Transponder
Model: ATA1
Serial No.: None Specified
FCC ID: **IXLATA1**

5.2 Trade Name:

Deister Electronics USA Inc.

5.3 Power Supply:

Battery-Operated

5.4 Applicable Rules:

CFR 47, Part 15.249

5.5 Equipment Category:

DXT

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 set to continuously transmit a modulated signal on 916.2 MHz 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
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
Loop Antenna	CL163	A.H. Systems, Inc.	EAH-52B	100	June. 4, 2019
Pre-Amplifier	CL153	Agilent	83006-69007	MY39500791	Aug. 24, 2019
Software:	EMC 32, Version 8.53.0		Software Verified: June 10, 2019		

7 FCC PART 15.215(e), OCCUPIED BANDWIDTH

7.1 Requirements:

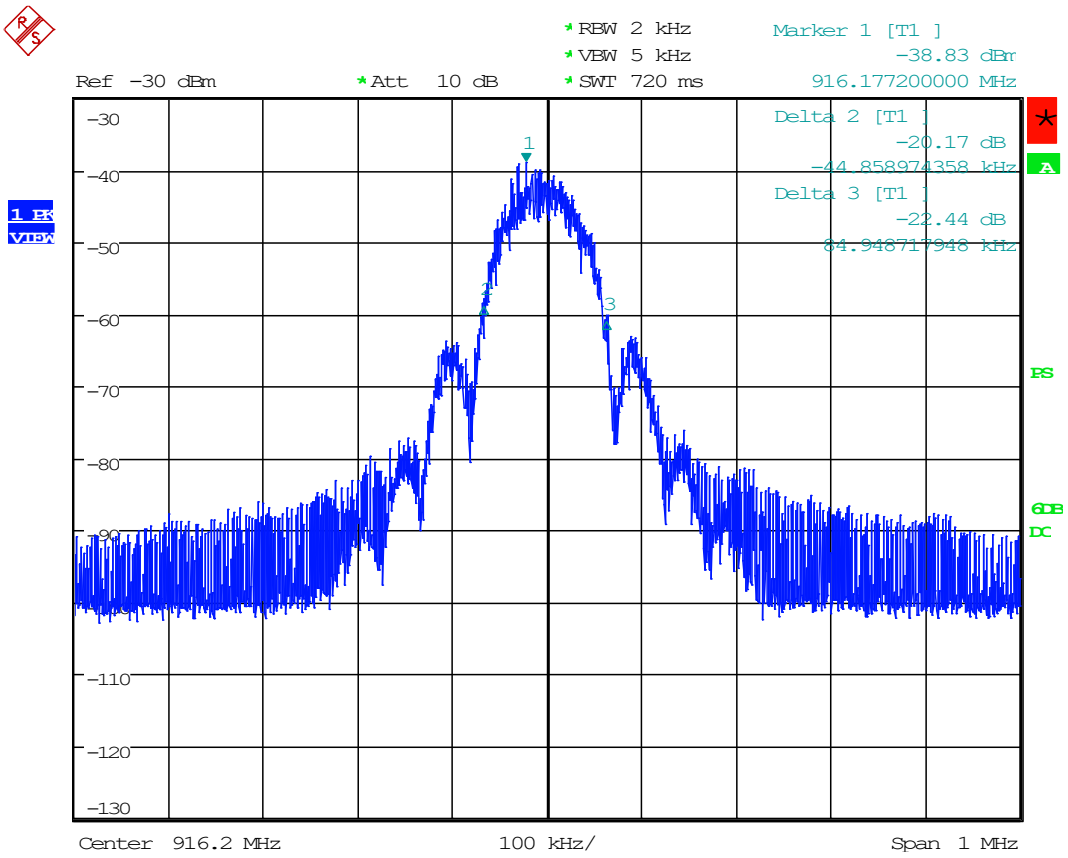
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the -20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific 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 low (916.2 MHz) and high (920.8) frequencies. The bandwidth was measured using the marker delta method.

7.2 Occupied Bandwidth Test Data

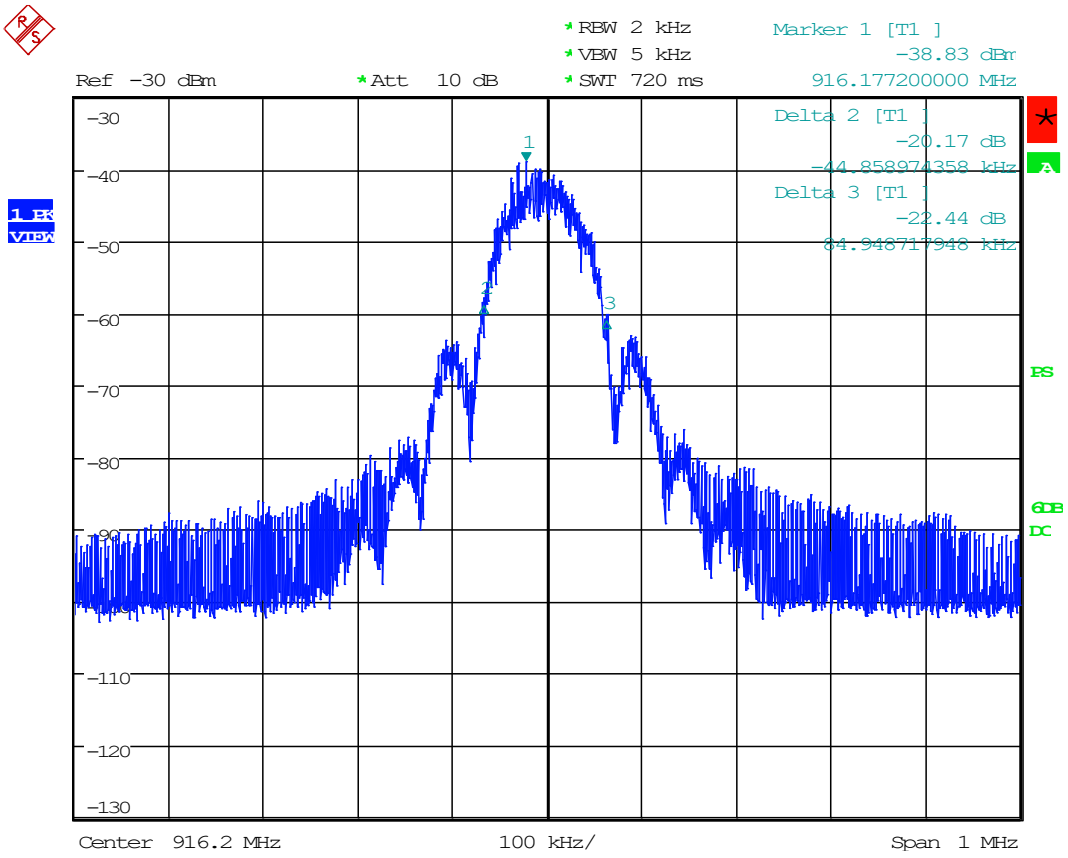
Test Date(s):	June 10, 2019	**Test Engineer(s):**	J. Chiller
Standards:	CFR 47 Part 15.215(c)	**Air Temperature:**	21.3ºC
		Relative Humidity:	50%

-20dB: 916.20 MHz



Date: 10.JUN.2019 13:48:23

-20dB: 920.8 MHz



Date: 10.JUN.2019 13:48:23

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

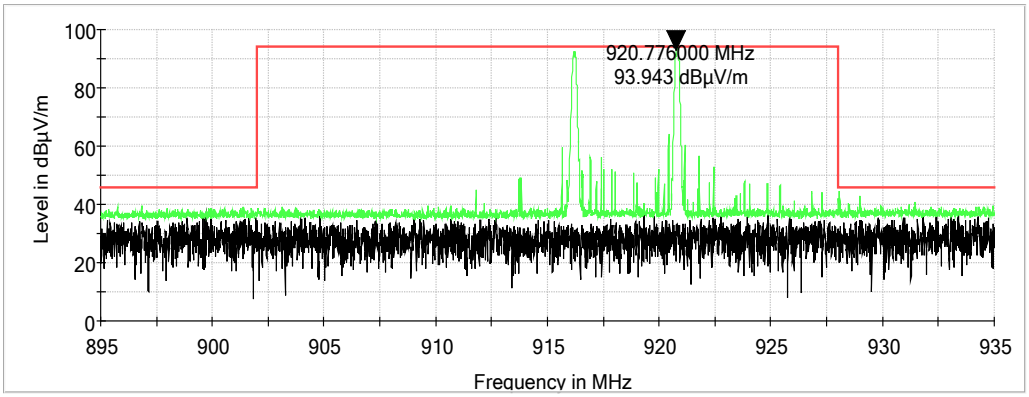
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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.

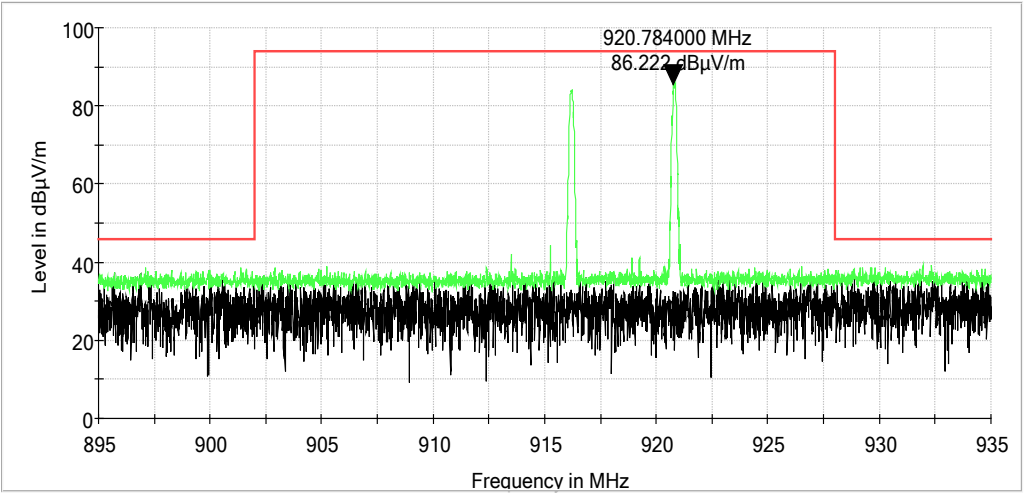
8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	June 10, 2019	**Test Engineer(s):**	J. Chiller
Standards:	CFR 47 Part 15.249(a)	**Air Temperature:**	21.9ºC
		Relative Humidity:	50%

Characterization Scan, 30 MHz to 1000 MHz, Vertical

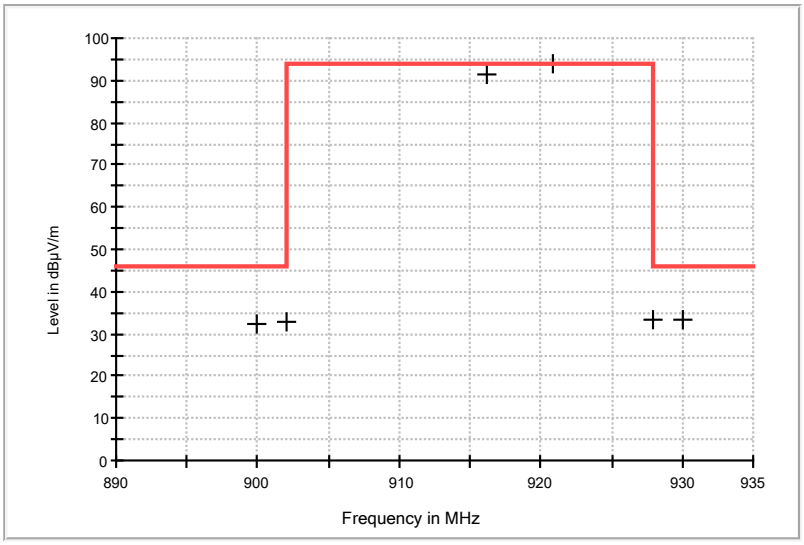


Characterization Scan, 30 MHz to 1000 MHz, Horizontal



Band Edge Measurements

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
900.000000	V	125.00	270.00	19.1	13.5	32.60	46.0	-13.4
902.000000	V	125.00	270.00	19.2	13.5	32.70	46.0	-13.3
916.200000	V	125.00	270.00	77.8	13.6	91.40	94.0	-2.6
920.800000	V	125.00	257.00	80.1	13.7	93.80	94.0	-0.2
928.000000	V	125.00	257.00	19.4	13.8	33.20	46.0	-12.8
930.000000	V	125.00	257.00	19.5	13.9	33.40	46.0	-12.6



8.2 Test Data – Spurious Emissions

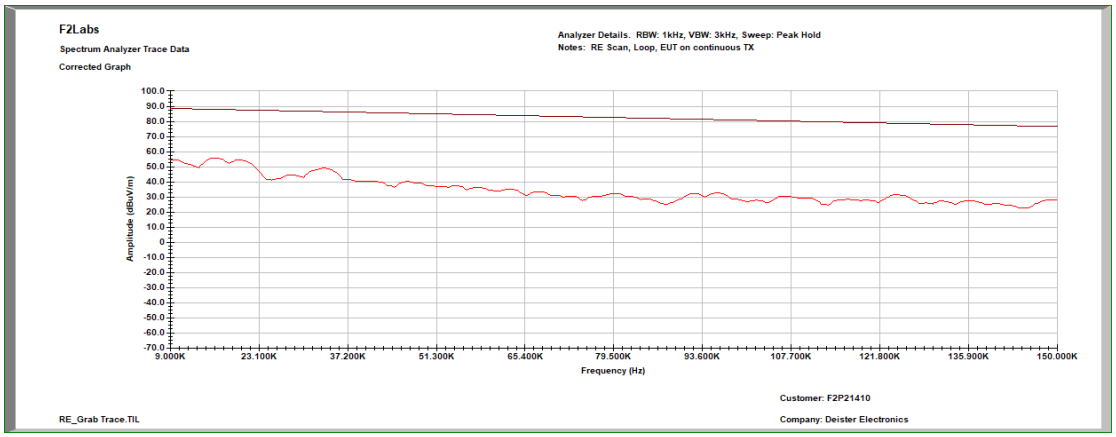
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some 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 1 GHz 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.

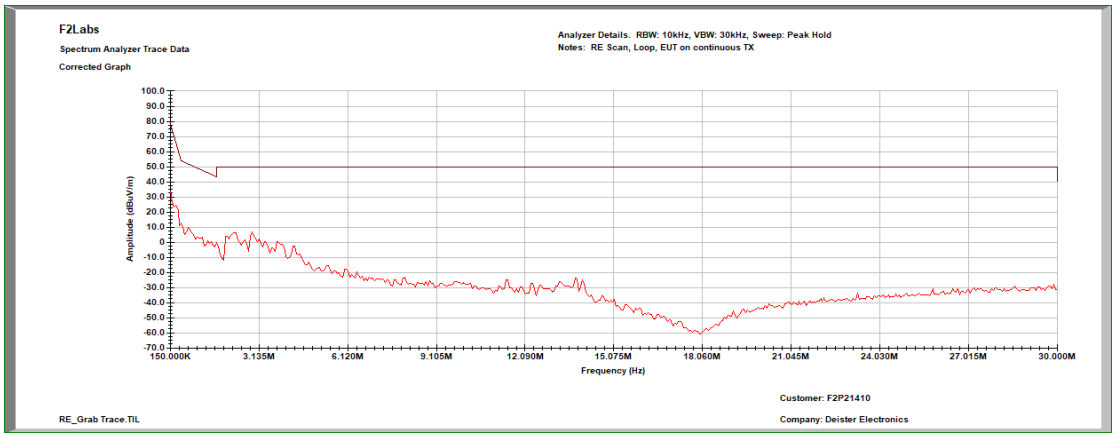
In the following plots, the black line indicates ambient noise and the red line indicates the measurement with the EUT on. Emissions to be found by the EUT on high, mid, and low channels were measured and listed in tables below. The following graphs represent scans from the high channel which was determined worst case.

Test Date(s):	June 10, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.249(d) / Part 15.209	Air Temperature:	22.8ºC
		Relative Humidity:	54%

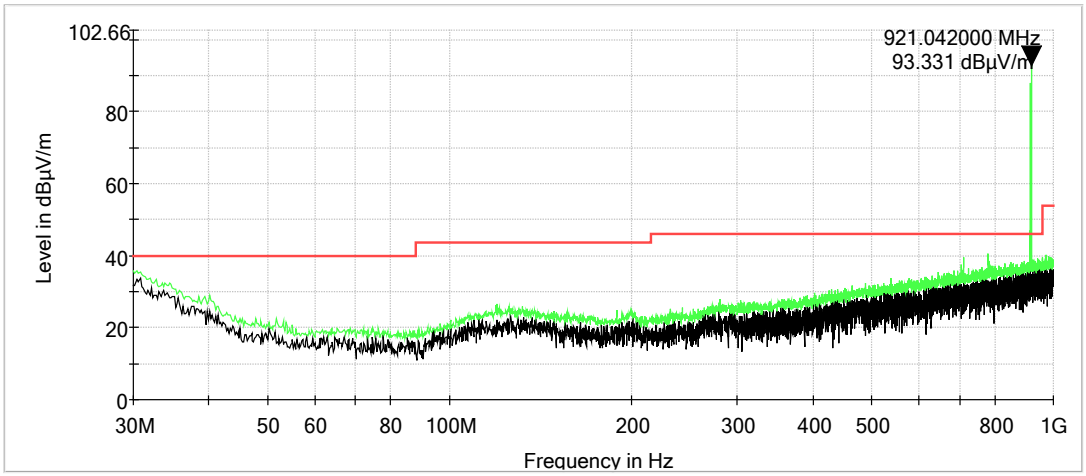
Characterization Scan, 0.009 MHz to 0.15 MHz (Loop)



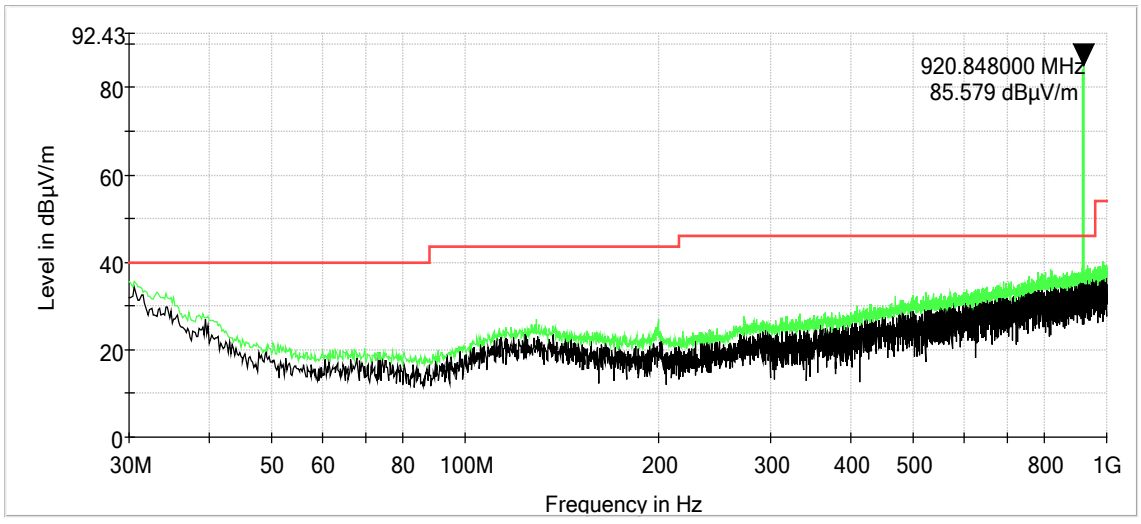
Characterization Scan, 0.15 MHz to 30 MHz (Loop)



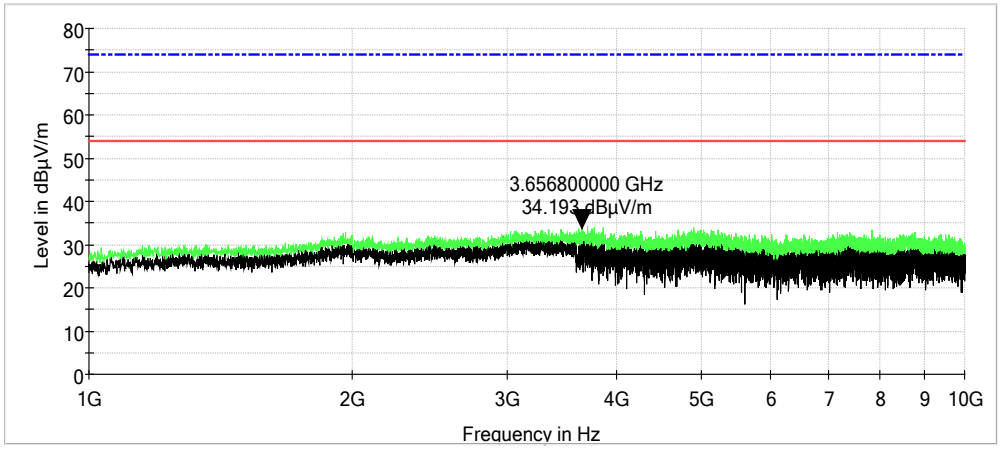
Characterization Scan, 30 MHz to 1000 MHz, Vertical



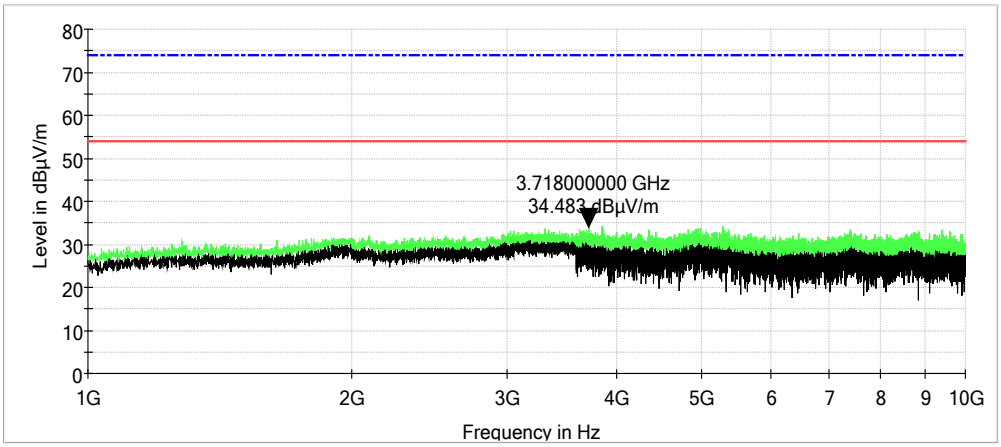
Characterization Scan, 30 MHz to 1000 MHz, Horizontal



Characterization Scan, 1 GHz to 10 GHz, Vertical



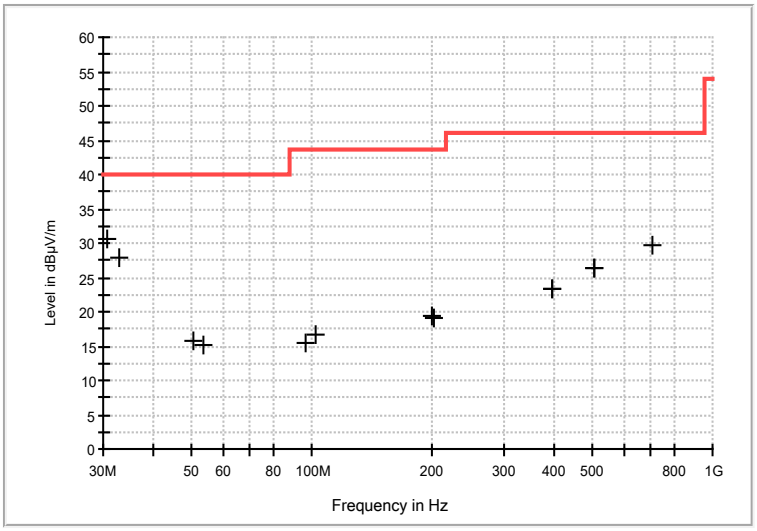
Characterization Scan, 1 GHz to 10 GHz, Horizontal



Measurements

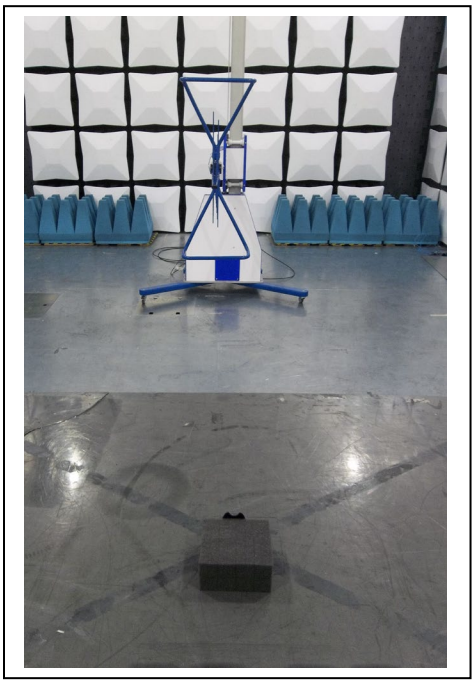
The following data reflects highest emissions from high, mid, and low channels.

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.760000	V	100.00	0.00	22.9	7.7	30.60	40.0	-9.4
32.720000	H	100.00	0.00	21.8	6.0	27.80	40.0	-12.2
50.360000	H	100.00	0.00	20.9	-5.2	15.70	40.0	-24.3
53.680000	V	100.00	0.00	21.0	-5.8	15.20	40.0	-24.8
96.560000	H	100.00	0.00	20.0	-4.5	15.50	43.5	-28.0
101.400000	V	100.00	0.00	19.6	-3.0	16.60	43.5	-26.9
198.960000	H	100.00	0.00	18.9	0.4	19.30	43.5	-24.2
202.280000	V	100.00	0.00	18.9	0.1	19.00	43.5	-24.5
396.480000	V	100.00	0.00	18.9	4.5	23.40	46.0	-22.6
396.480000	H	100.00	0.00	18.8	4.5	23.30	46.0	-22.7
504.520000	H	100.00	0.00	19.2	7.2	26.40	46.0	-19.6
504.520000	H	100.00	0.00	19.1	7.2	26.30	46.0	-19.7
709.000000	V	100.00	0.00	18.9	10.7	29.60	46.0	-16.4
790.080000	H	100.00	0.00	19.3	12.0	31.30	46.0	-14.7

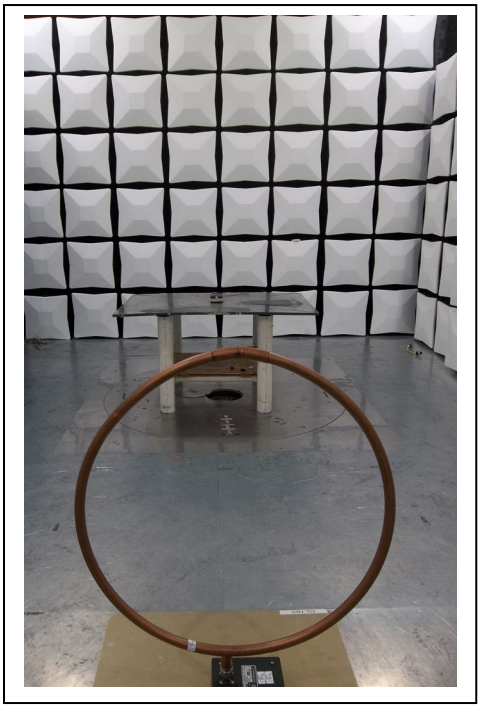


9 PHOTOGRAPHS

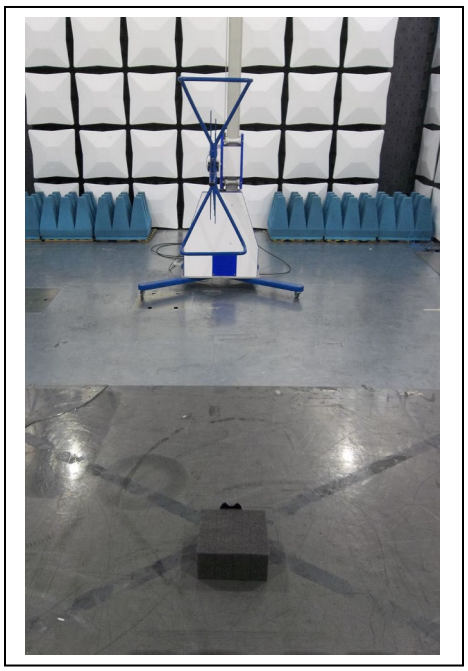
Occupied Bandwidth, Field Strength of Emissions



Radiated Spurious, Less Than 30 MHz



Radiated Spurious, 30 MHz to 1000 MHz



Radiated Spurious, Greater than 1 GHz