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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: KPD6 Infinity Access Control Reader

Product Description: Access Control Reader with Multi-Technology Reading capability for RFID credentials at 125 kHz and 13.56 MHz with Wiegand and OSDP Interface.

Operating Voltage/Frequency: 12-24VDC

Model: KPD6*
**Denotes actual model tested as representative of product family that includes models KPD6, PRD6, SWH6200 and SWH6100.*

FCC ID: IXLKPD6PRD6

Testing Commenced: June 5, 2019

Testing Ended: July 9, 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 15.209
- ❖ 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
- ❖ FCC15.207 - Conducted Limits

Evaluation Conducted by:

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Report Reviewed by:

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TABLE OF CONTENTS

Section	Title	Page
1	ADMINISTRATIVE INFORMATION	4
2	SUMMARY OF TEST RESULTS/MODIFICATIONS	7
3	TABLE OF MEASURED RESULTS	8
4	ENGINEERING STATEMENT	9
5	EUT INFORMATION AND DATA	10
6	LIST OF MEASUREMENT INSTRUMENTATION	11
7	OCCUPIED BANDWIDTH	12
8	FIELD STRENGTH OF EMISSIONS/RADIATED SPURIOUS	15
9	VARIATION OF THE INPUT POWER	22
10	CONDUCTED EMISSIONS	25
11	PHOTOGRAPHS	30



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 equipment operating under Section 15.209. 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 is 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
F2P21386A-01E	First Issue	July 12, 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 15.209	Complies
Radiated Spurious Emissions	CFR 47 Part 15.209	Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies
Variation of the Input Power	CFR 47 Part 15.31(e)	Complies

Modifications Made to the Equipment
None



3 TABLE OF MEASURED RESULTS

Test	125 kHz	13.56 MHz
¹ Field Strength of Fundamental corrected for 40dB/decade distance correction	-45 dB μ V/m	-19 dB μ V/m
Limit for Fundamental	25.66 dB μ V/m	29.5 dB μ V/m
¹ Field Strength of Fundamental at a shorter distance	55 dB μ V/m	21 dB μ V/m
Limit for Fundamental adjusted for 40dB	125.7 dB μ V/m	69.5 dB μ V/m
-20dB Occupied Bandwidth	453.6 Hz	507.4 Hz
² Variation of Input Power to 7VDC	55 dB μ V/m	21 dB μ V/m
² Variation of Input Power to 24VDC	55 dB μ V/m	21 dB μ V/m

- ¹ 125 kHz Field Strength was measured at 1m. 13.56 MHz Field Strength was measured at 3m. The dB μ V/m were converted to dB μ A/m by subtracting 51.5dB.
- ² This DC device is rated to operate at 12VDC and not to exceed 24VDC. The low voltage testing was done at 7VDC below which the unit ceased to function. Readings were recorded at 1m distance.



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 15.209 of the FCC Rules using ANSI C63.10 2013 and Part 15 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: **KPD6 Infinity Access Control Reader**

Model: KPD6*

**Denotes actual model tested as representative of product family that includes models KPD6, PRD6, SWH6200 and SWH6100.*

Serial No.: None Specified

FCC ID: **IXLKPD6PRD6**

5.2 Trade Name:

Deister Electronics USA, Inc.

5.3 Power Supply:

7-24VDC from external power supply

5.4 Applicable Rules:

CFR 47, Part 15.209

5.5 Equipment Category:

Radio Transmitter

5.6 Antenna:

0 dBi Inductor antenna

5.7 Accessories:

DC Supply: BK Precision 1685B, s/n 7611-3204-1010

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was configured to transmit in the continuous mode on 125kHz and 13.56 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
Temp/Hum. Recorder	CL263	Extech	445814	06	Mar. 6, 2020
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 25, 2019
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	Oct. 11, 2019
Amplifier w/Monopole & 18" Loop	CL163-Loop	AH Systems, Inc.	EHA-52B	100	July 31, 2019
Pre-Amplifier	CL153	Agilent	83006-69007	MY39500791	Aug. 24, 2019
Spectrum Analyzer	0141	Hewlett Packard	8591E	3520A04145	Jan. 25, 2020
LISN	CL181	Com-Power	LI-125A	191226	July 3, 2021
LISN	CL182	Com-Power	LI-125A	191225	July 3, 2021
Software:	Tile Version 3.4.B.3		Software Verified: May 15, 2019; July 9, 2019		
Software:	EMC 32, Version 8.53.0		Software Verified: May 15, 2019		



7 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.

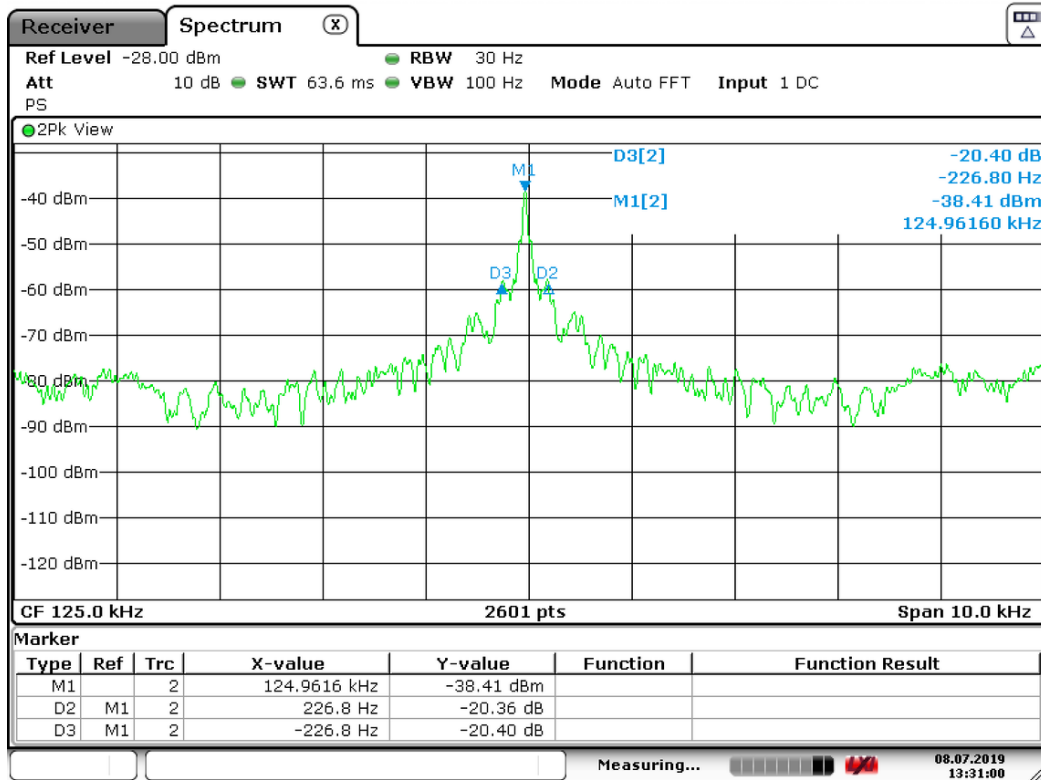
Bandwidth measurements were made at the 125kHz and 13.56 MHz frequencies. The bandwidth was measured using the Marker Delta method.



7.2 Test Data - Occupied Bandwidth

Test Date(s):	July 8, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	23.2°C
		Relative Humidity:	35%

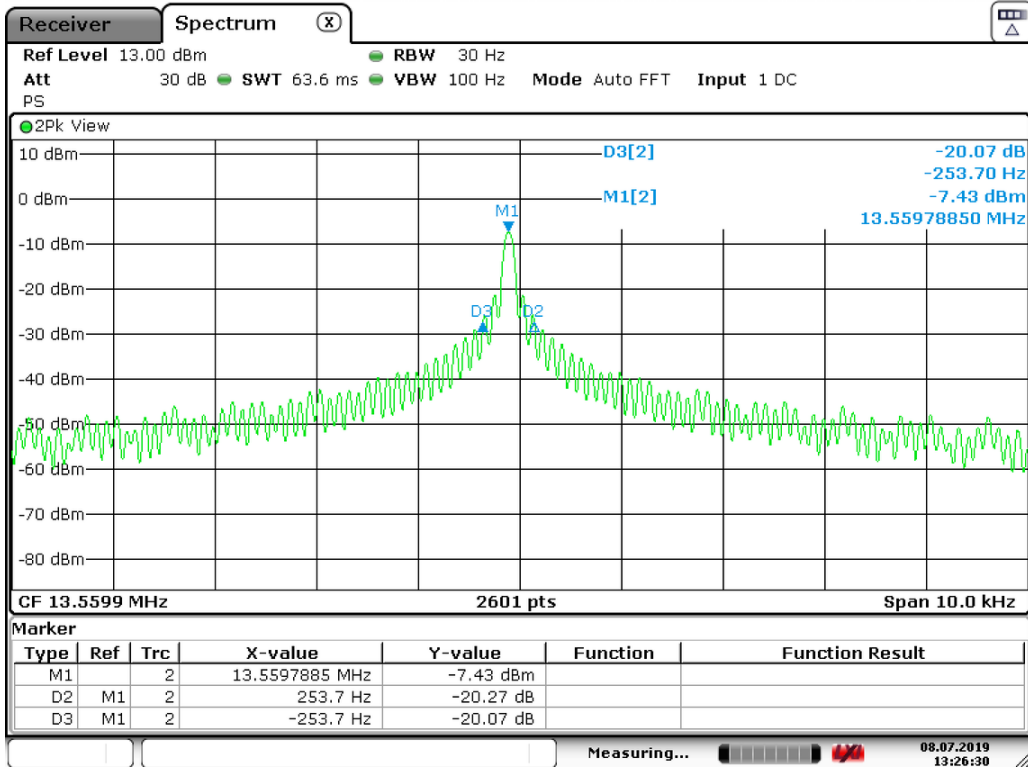
-20dB: 125kHz



Date: 8.JUL.2019 13:31:00



-20dB: 13.56 MHz



Date: 8.JUL.2019 13:26:30



8 FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Notes:

During the pre-scan evaluation, the EUT was rotated in all possible directions and all three orthogonal positions 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.

125 kHz Field Strength was measured at 1m. 13.56 MHz Field Strength was measured at 3m.

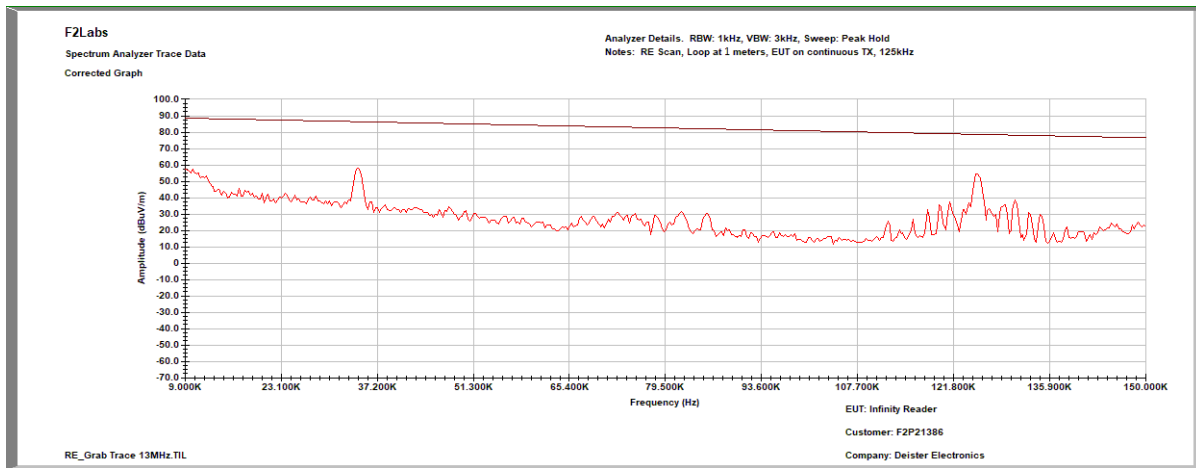
This DC device is rated to operate at 12VDC and not to exceed 24VDC. The low voltage testing was done at 7VDC below which the unit ceased to function. Readings were recorded at 1m distance.



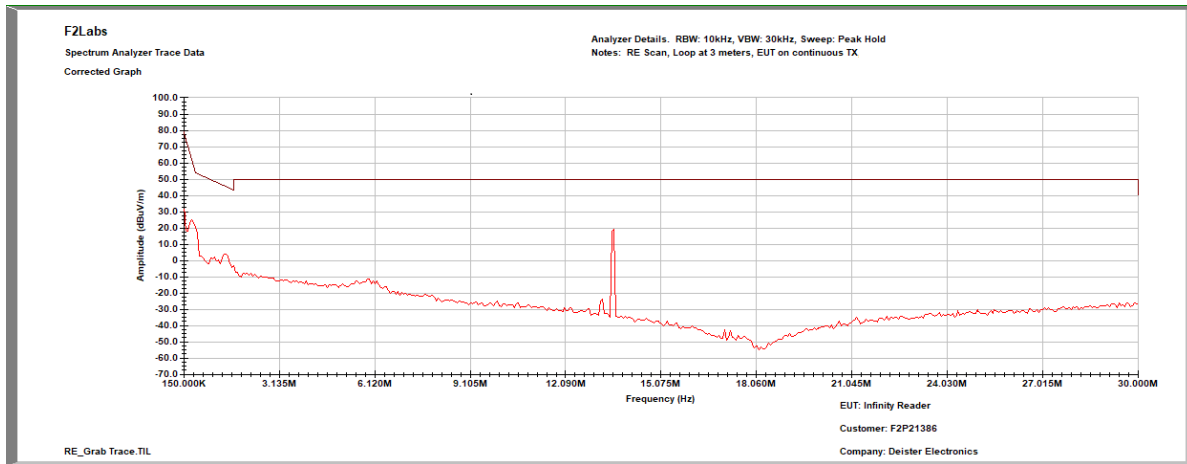
8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	June 5, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	20.7°C
Results:	Complies	Relative Humidity:	45%

125kHz: 0.009 MHz to 015. MHz



13 MHz: 0.15 MHz to 30 MHz



Frequency (MHz)	Antenna Height (m)	Azimuth (degrees)	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Emission corrected for 40dB/decade distance correction (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.125000	1.00	87.00	3.07	51.9	54.97	-45.03	25.7	70.7
13.560000	1.00	37.00	15.73	5.3	21.03	-18.97	29.5	48.5



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 and three orthogonal positions 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.

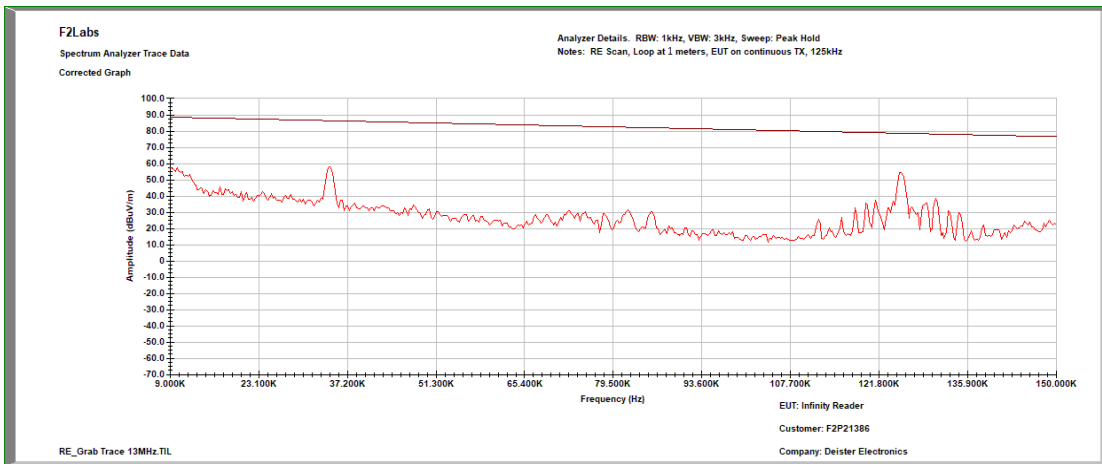
At least 6 of the highest frequencies were measured per ANSI 63.4 in a 3-meter anechoic chamber. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies 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 1000 MHz and the highest emissions are listed below.

In the following plots, the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables below.

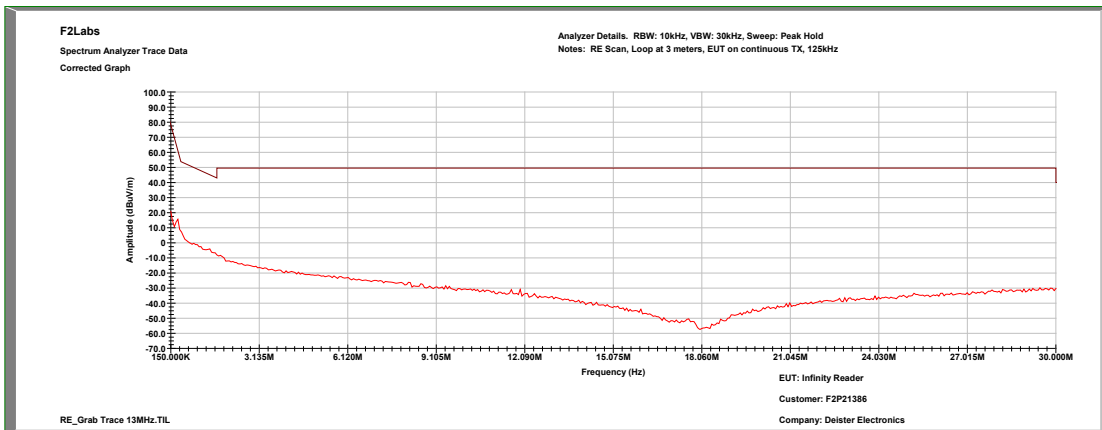


Test Date(s):	June 4, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	23.2°C
Results:	Complies	Relative Humidity:	35%

125kHz: Characterization Scan, 0.009 MHz to 0.15 MHz (Loop Antenna)

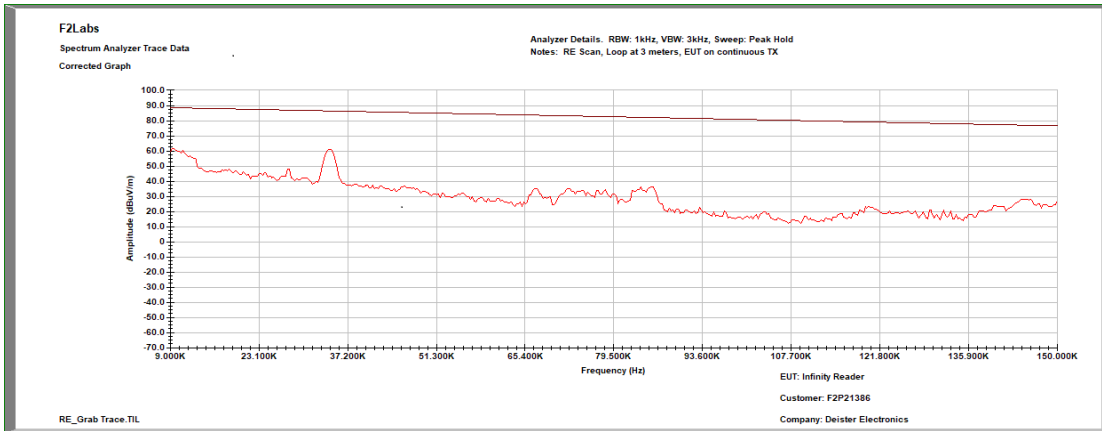


125kHz: Characterization Scan, 0.15 MHz to 30 MHz (Loop Antenna)

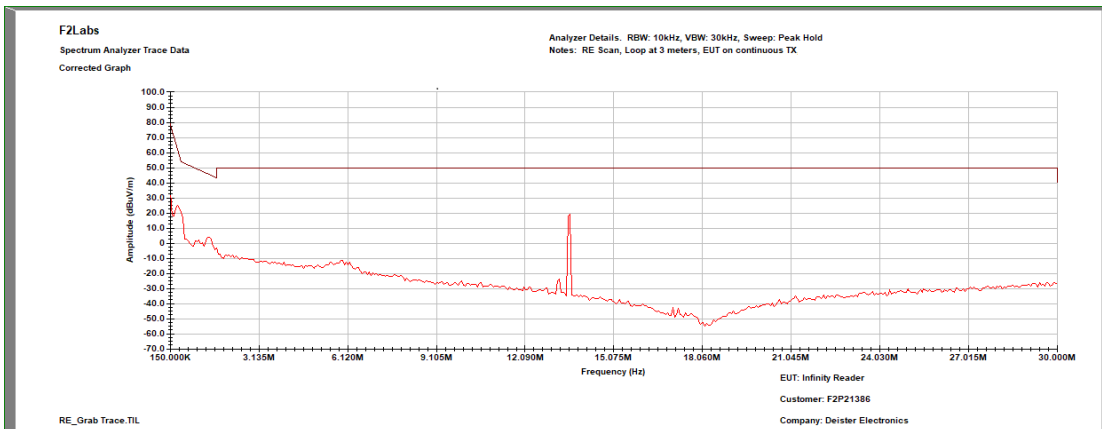




13.56 MHz: Characterization Scan, 0.009 MHz to 0.15 MHz (Loop Antenna)

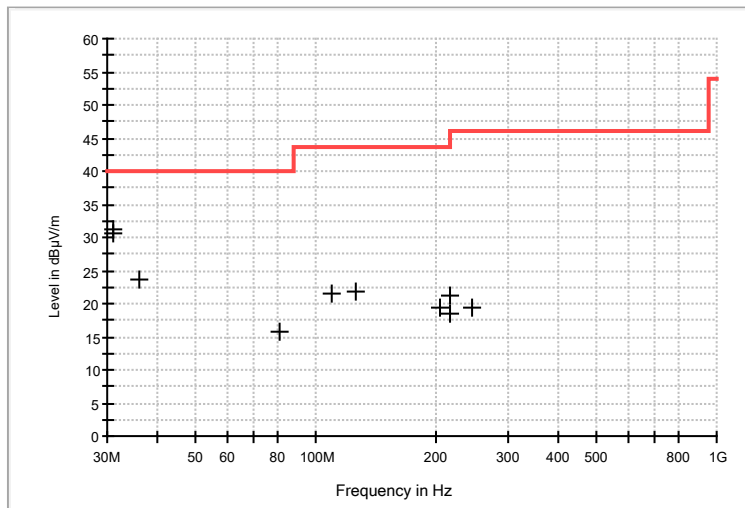


13.56 MHz: Characterization Scan, 0.15 MHz to 30 MHz (Loop Antenna)



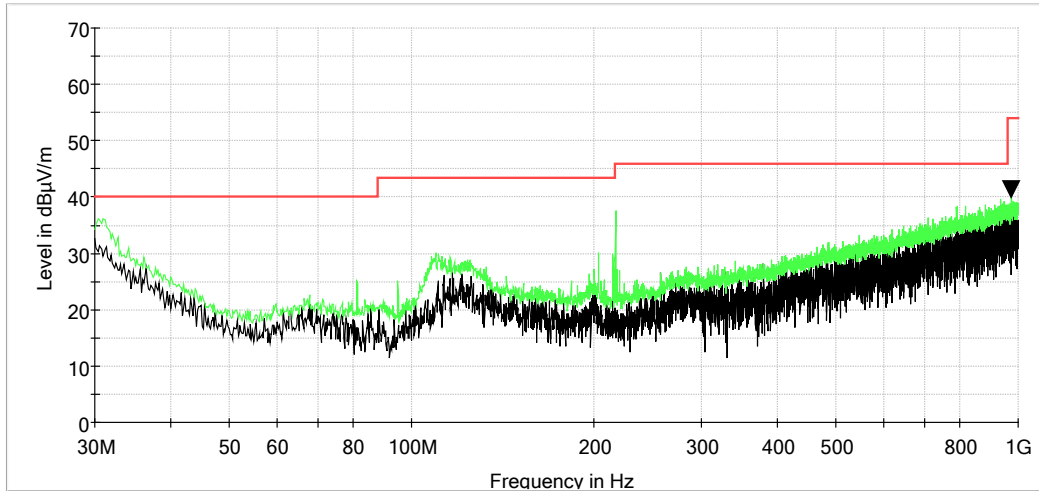


Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dB μ V)	Cable Loss & Antenna Factor (dB)	Emission (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.960000	H	0.00	230.00	23.8	7.5	31.30	40.0	-8.7
31.160000	H	0.00	0.00	23.4	7.3	30.70	40.0	-9.3
36.200000	H	0.00	0.00	20.2	3.4	23.60	40.0	-16.4
81.200000	H	0.00	317.00	21.7	-5.9	15.80	40.0	-24.2
109.560000	H	0.00	152.00	22.5	-1.1	21.40	43.5	-22.1
125.080000	H	0.00	52.00	21.1	0.6	21.70	43.5	-21.8
203.240000	H	0.00	169.00	19.8	-0.3	19.50	43.5	-24.0
216.840000	H	0.00	0.00	19.9	-1.3	18.60	46.0	-27.4
216.840000	H	0.00	3.00	22.5	-1.3	21.20	46.0	-24.8
244.000000	H	0.00	0.00	19.4	-0.1	19.30	46.0	-26.7

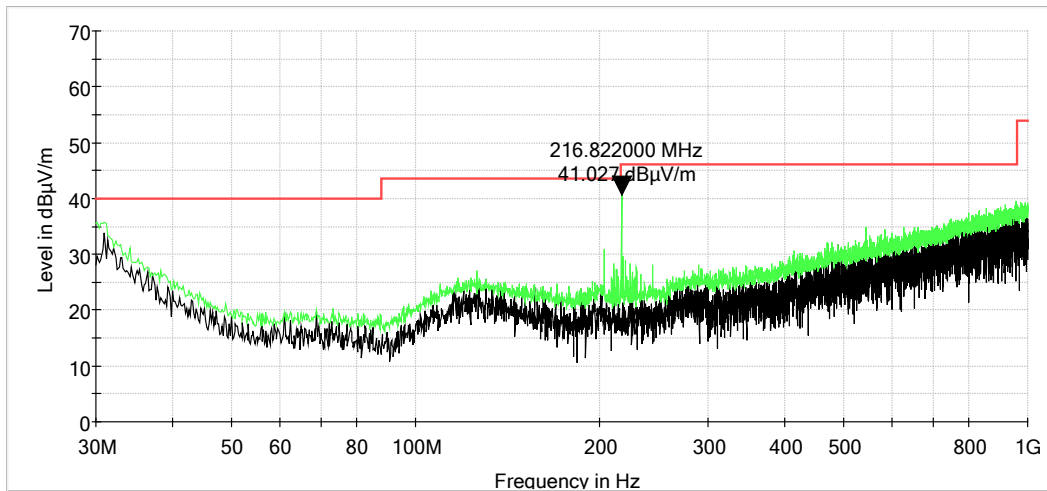




13.56 MHz, Characterization Scan, 30 MHz to 1000 MHz, Vertical



13.56 MHz, Characterization Scan, 30 MHz to 1000 MHz, Horizontal





9 VARIATION OF THE INPUT POWER, 15.31(e)

9.1 Requirements:

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.

This DC device is rated to operate at 12VDC and not to exceed 24VDC. The low voltage testing was done at 7VDC below which the unit ceased to function.

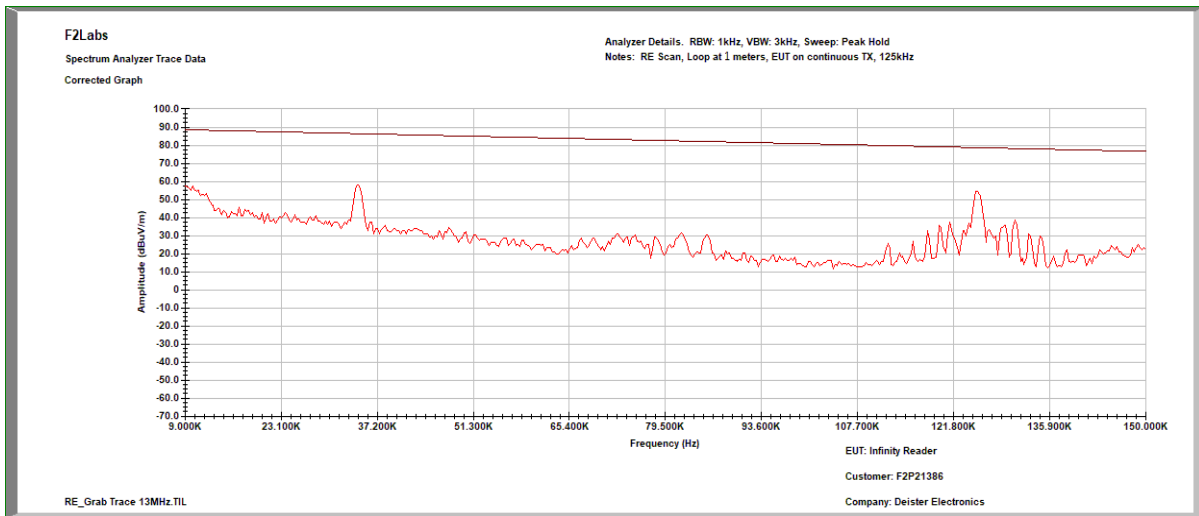


9.2 Test Data – Variation of the Input Power

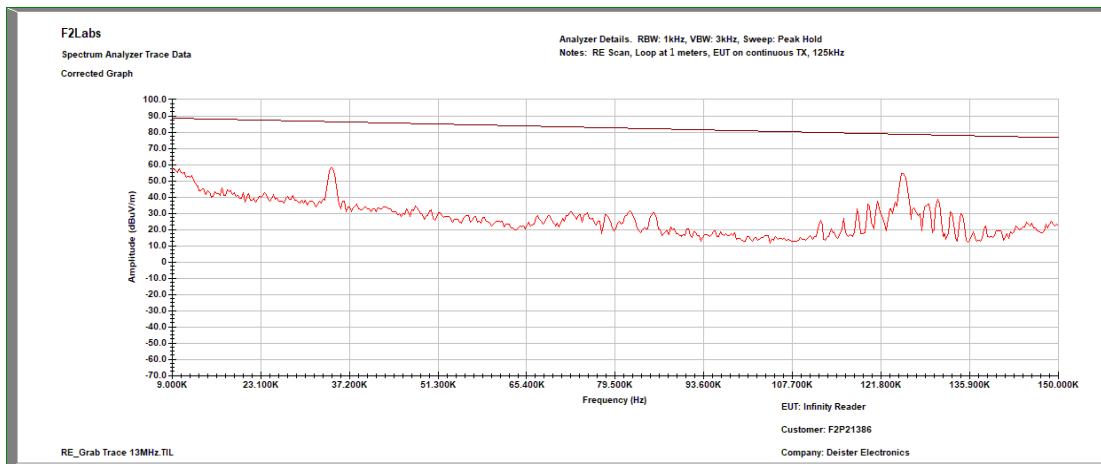
Test Date(s):	June 4, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.31(e)	Air Temperature:	23.2°C
Results:	Complies*	Relative Humidity:	35%

**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.*

125kHz: Characterization Scan, 7VDC

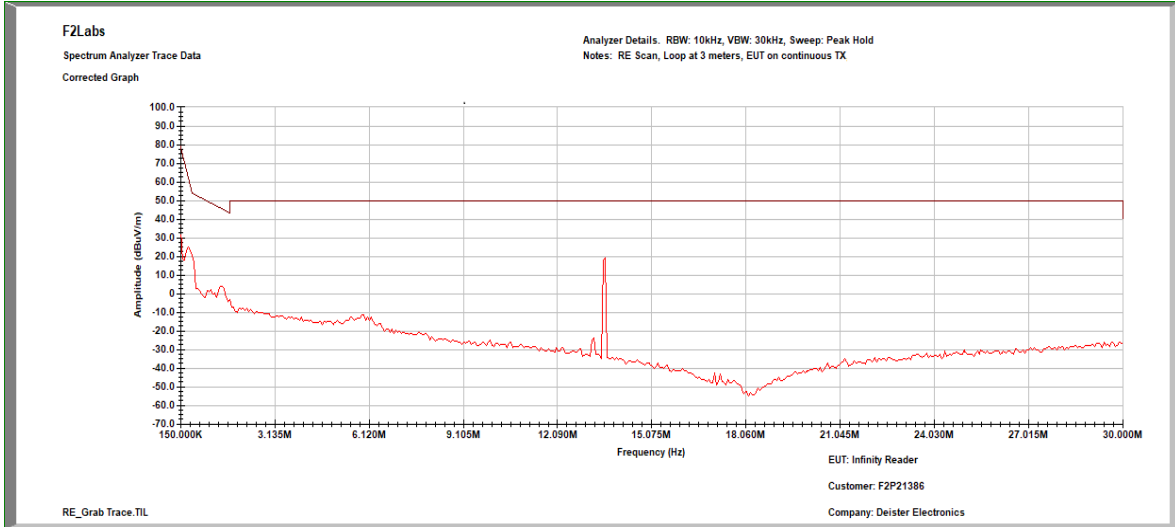


125kHz: Characterization Scan, 24VDC

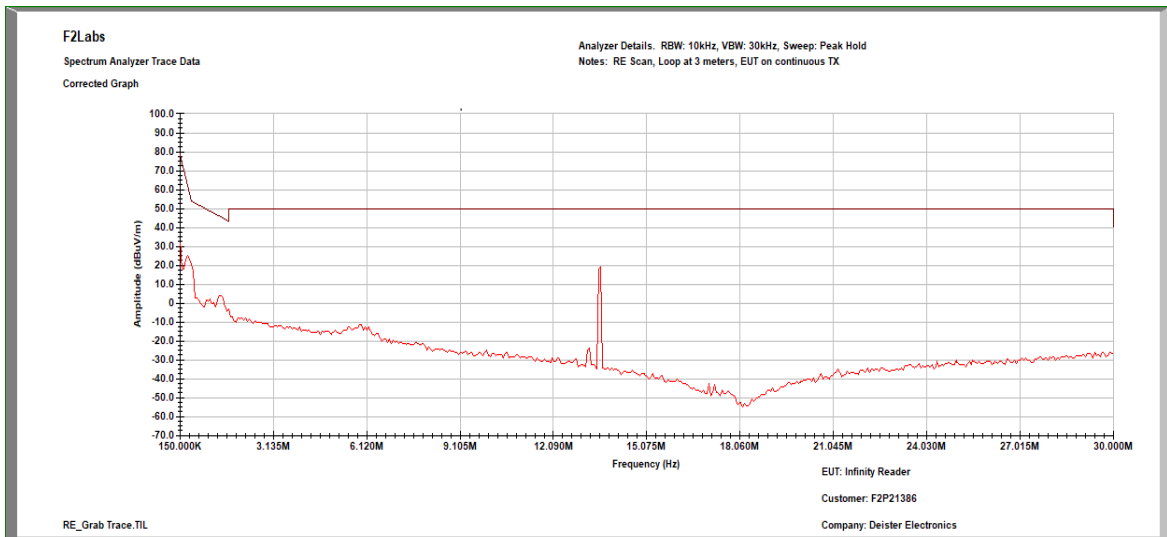




13.56 MHz: Characterization Scan, 7VDC



13.56 MHz: Characterization Scan, 24VDC





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.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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

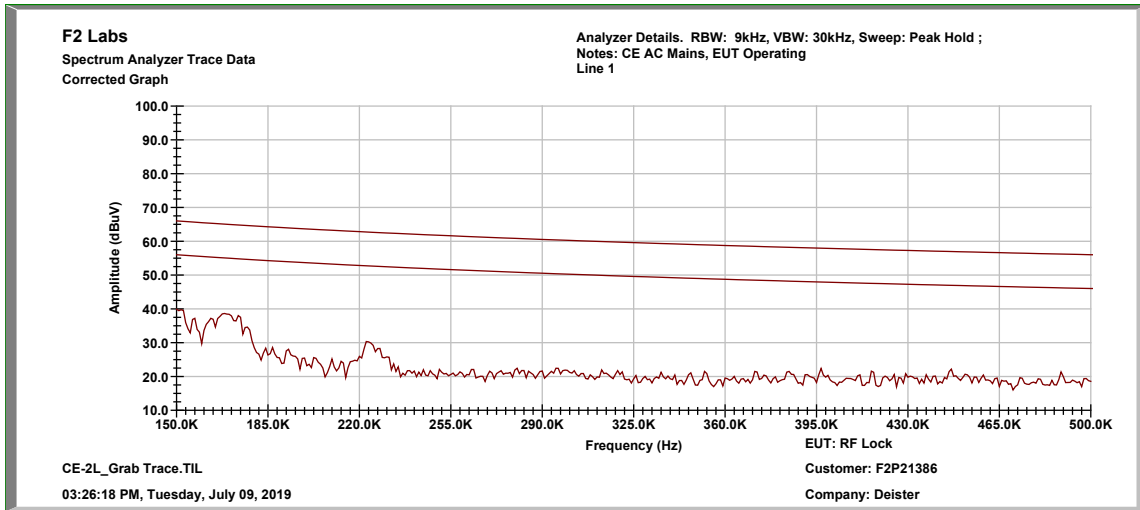
The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power 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.



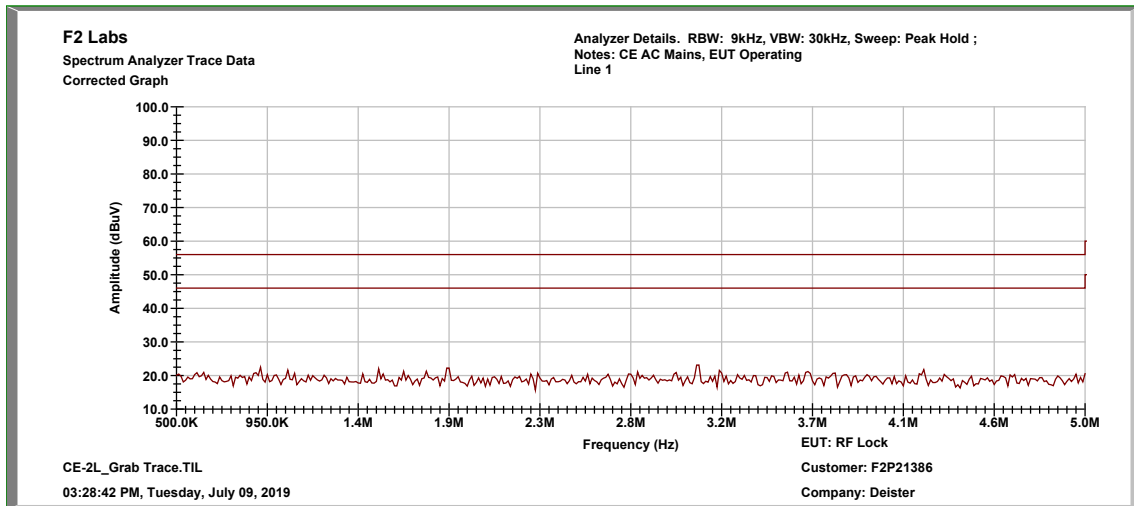
10.3 Conducted Emissions Test Data

Test Date:	July 9, 2019	Test Engineer:	J. Chiller
Rule:	15.207	Air Temperature:	24.5° C
Test Results:	Complies	Relative Humidity:	47%

Conducted Test – Line 1: 0.15 MHz to 0.5 MHz

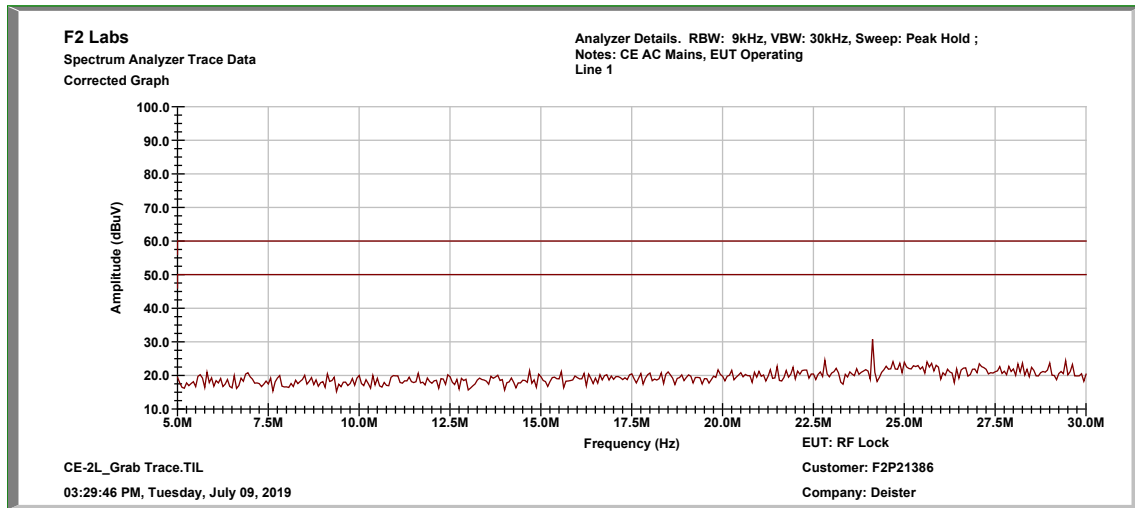


Conducted Test – Line 1: 0.5 MHz to 5.0 MHz





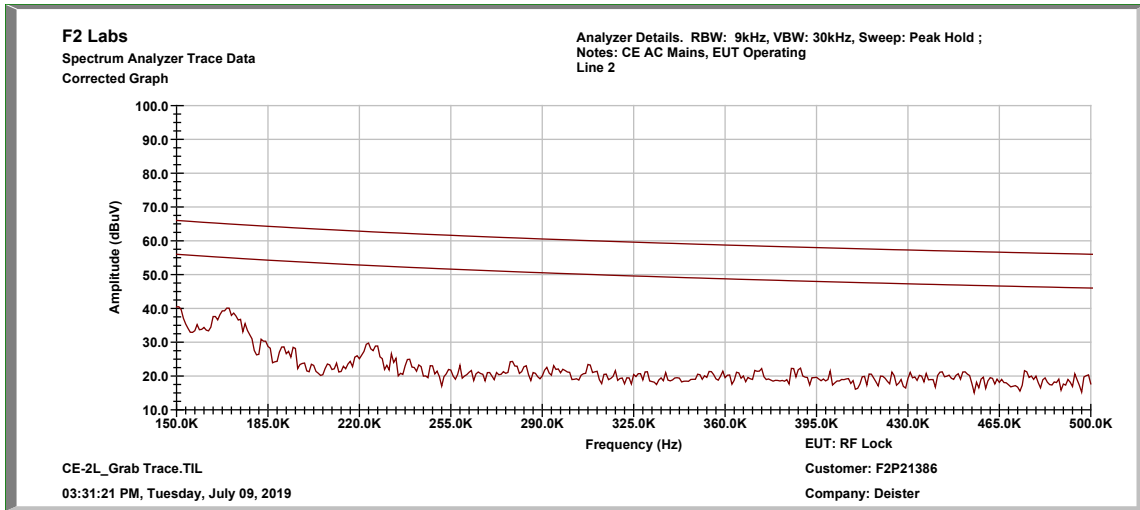
Conducted Test – Line 1: 5.0 MHz to 30.0 MHz



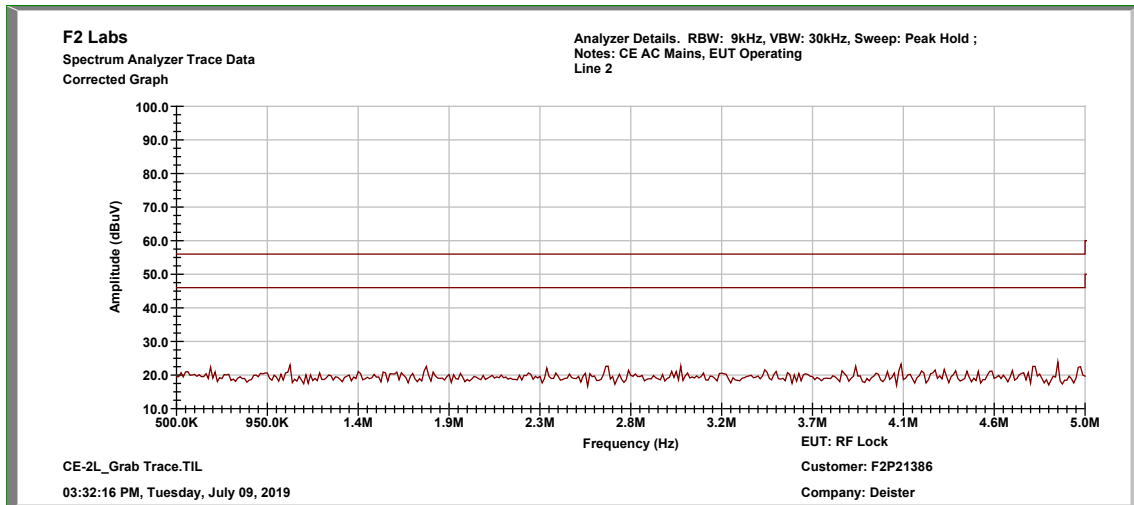
Note: No measurable points.



Conducted Test – Line 2: 0.15 MHz to 0.5 MHz

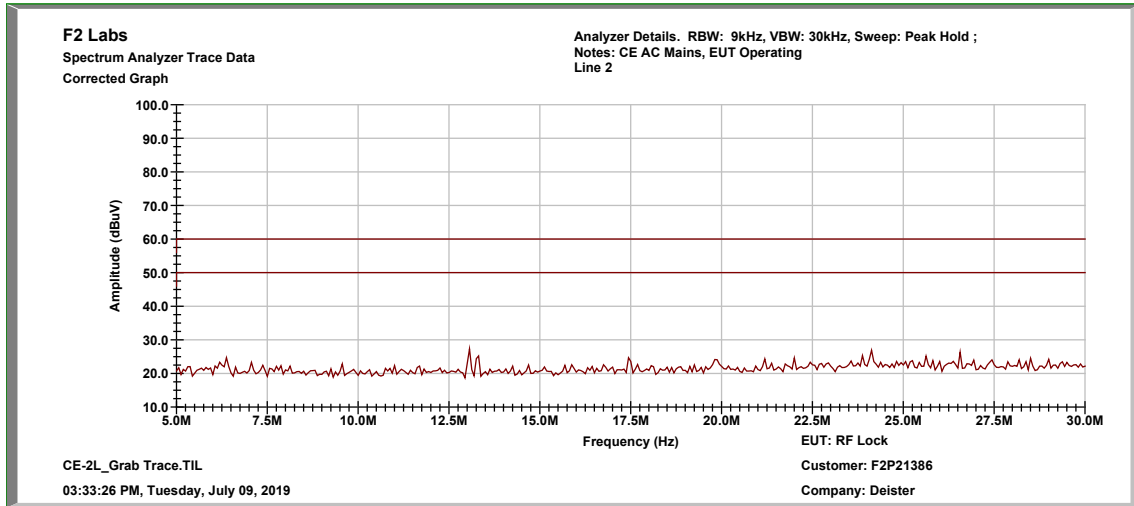


Conducted Test – Line 2: 0.5 MHz to 5.0 MHz





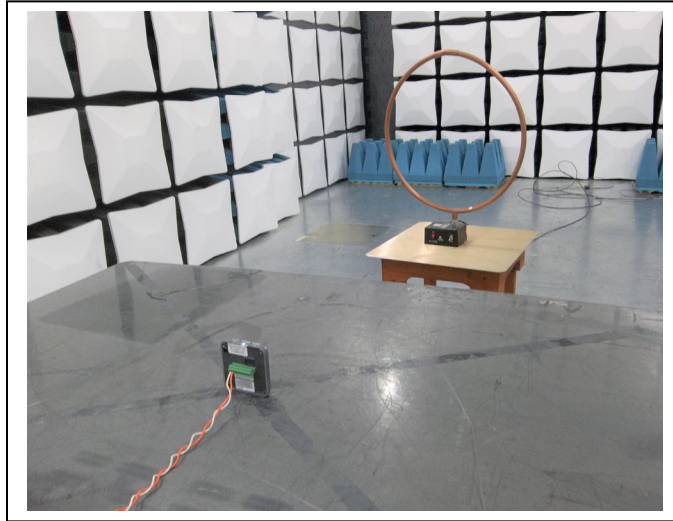
Conducted Test – Line 2: 5.0 MHz to 30.0 MHz



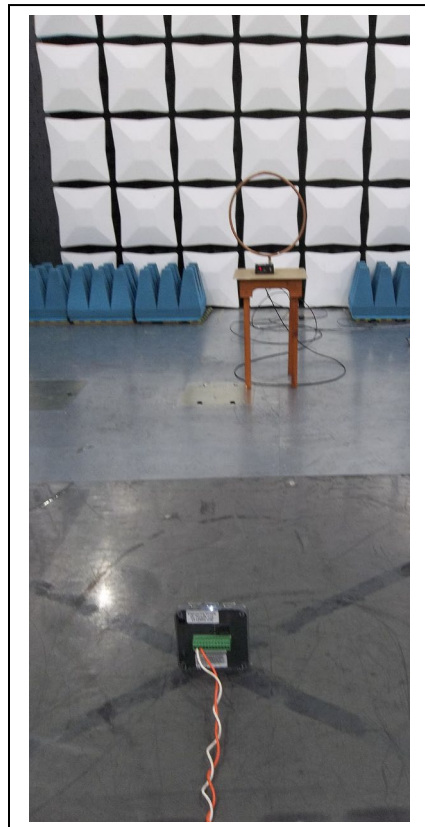
Note: No measurable points.

11 PHOTOGRAPHS

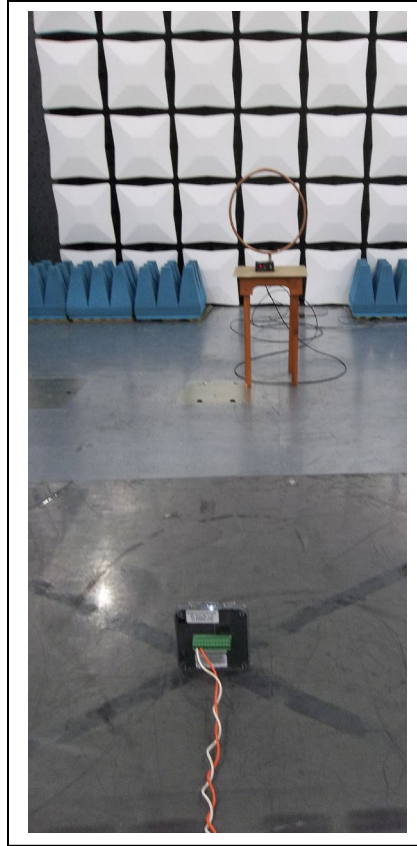
Occupied Bandwidth



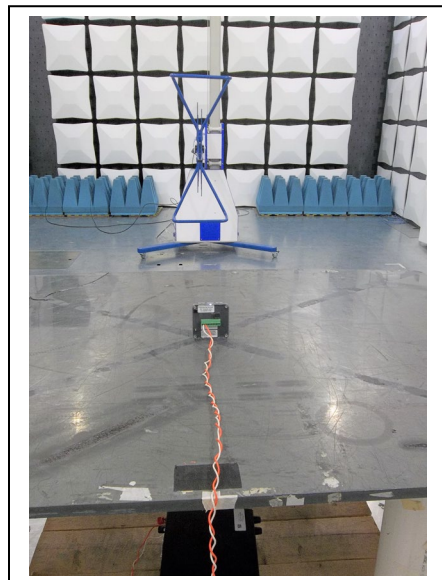
Field Strength



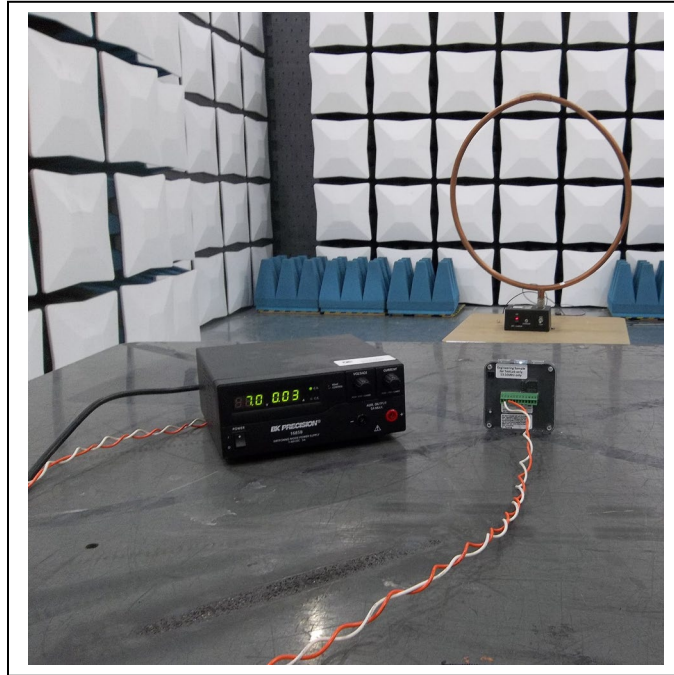
Radiated Spurious Emissions: Less than 30MHz



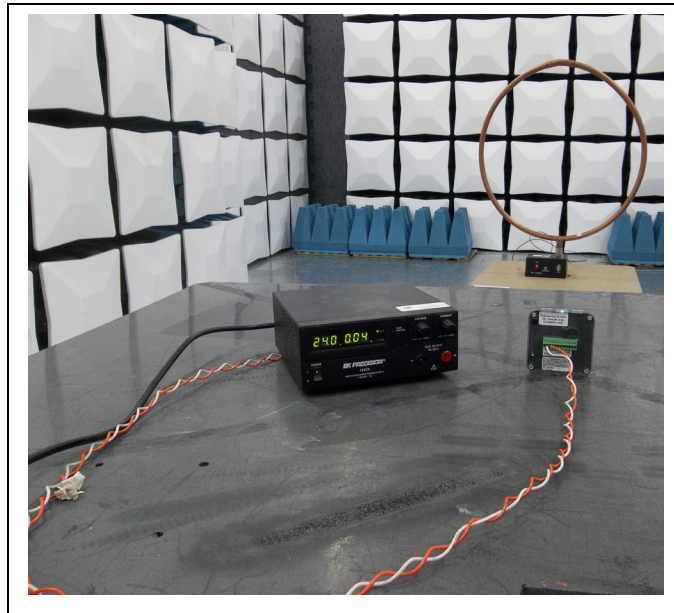
Radiated Spurious Emissions: 30 to 1000MHz



Voltage Variations, Low



Voltage Variations, High





Conducted Emissions

