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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:	**RHB2 doorLoxx Read Head (Mifare EV1, NFC & BLE)**
Product Description:	Digital Locking System Read Head. Reads Mifare DEFire EV1/2, NFC and BLE Credentials and determines right of access.
Operating Voltage/Frequency:	**Battery-Operated (3VDC Lithium)**
Model:	**RHB2**
FCC ID:	**IXLRHB**
Testing Commenced:	May 20, 2019
Testing Ended:	May 29, 2019
Summary of Test Results:	**In Compliance**

Standards:

- **FCC Part 15 Subpart C, Section 15.209**

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 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 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
F2P21306-03E	First Issue	June 14, 2019	K. Littell

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
Radiated Emissions	FCC Part 15 Subpart C 15.209	Complies
Variation of Input Power	15.31(e) was met by using new batteries.	Complies

Modifications Made to the Equipment
No modifications were made to the EUT.

3 TABLE OF MEASURED RESULTS

13 MHz

Test	13.56 MHz
Field Strength of Fundamental corrected for 40dB/decade distance correction	- 5 dBµV/m
Limit for Fundamental	29.54 dBµV/m
Field Strength of Fundamental at a 3-meter distance	35 dBµV/m
3-meter limit for Fundamental with 40dB/decade correction from 30 meters	69.54 dBµV/m
-20dB Occupied Bandwidth (kHz)	476.8 Hz

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: **RHB2 doorLoxx Read Head (Mifare EV1, NFC & BLE)**
Model: **RHB2**
Serial No.: None Specified
FCC ID: **IXLRHB**

5.2 Trade Name:

Deister Electronics USA, Inc.

5.3 Power Supply:

3.3VDC Battery

5.4 Applicable Rules:

CFR 47, Part 15.209

5.5 Equipment Category:

Radio Transmitter

5.6 Antenna:

0 dBi Gain Inductor Antenna

5.7 Accessories:

Battery – Eveready CR2

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was turned on and continuously transmitting. Channels/Frequency Tested: 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
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Oct. 25, 2019
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	Oct. 11, 2019
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 5.20.2		Software Verified: May 20-29, 2019		

7 FCC PART 15.215(e), OCCUPIED BANDWIDTH

7.1 Requirements:

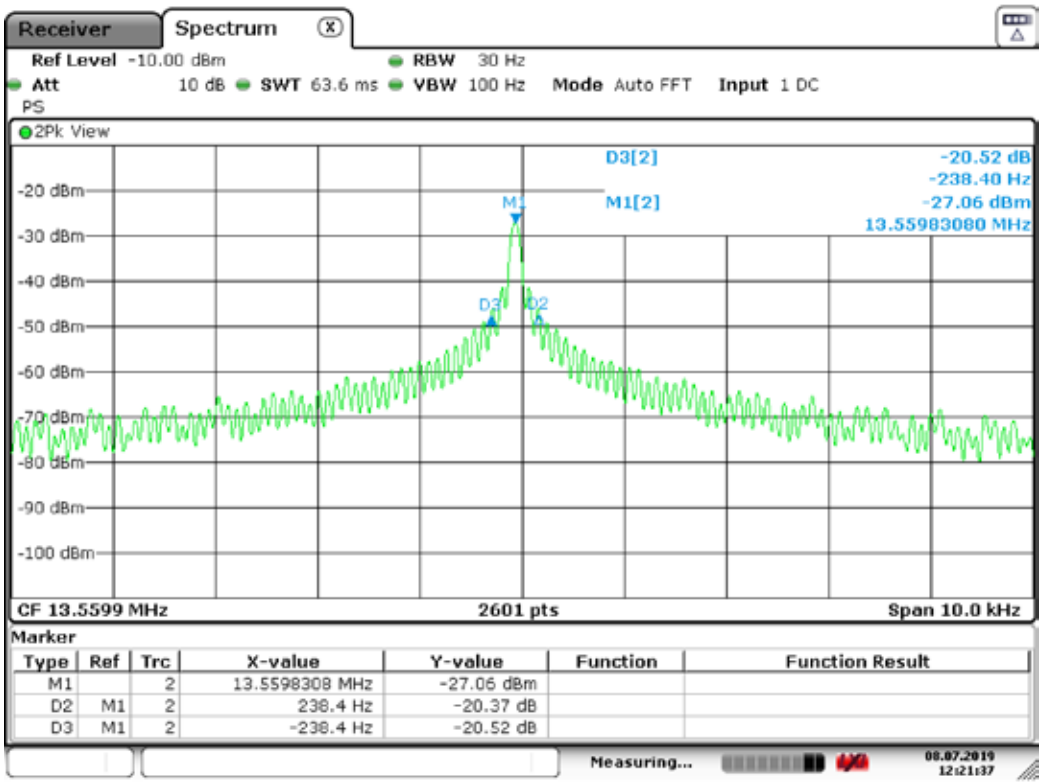
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the -20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific 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 13.56 MHz frequency. The bandwidth for 13.56 MHz was measured using the analyzer's measurement function.

7.2 Occupied Bandwidth Test Data

Test Date(s):	May 29, 2019	**Test Engineer(s):**	J. Chiller
Standards:	CFR 47 Part 15.215(c)	**Air Temperature:**	19.2ºC
		Relative Humidity:	51%

13 MHz: -20dB



8 RADIATED EMISSIONS

8.1 Requirements

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

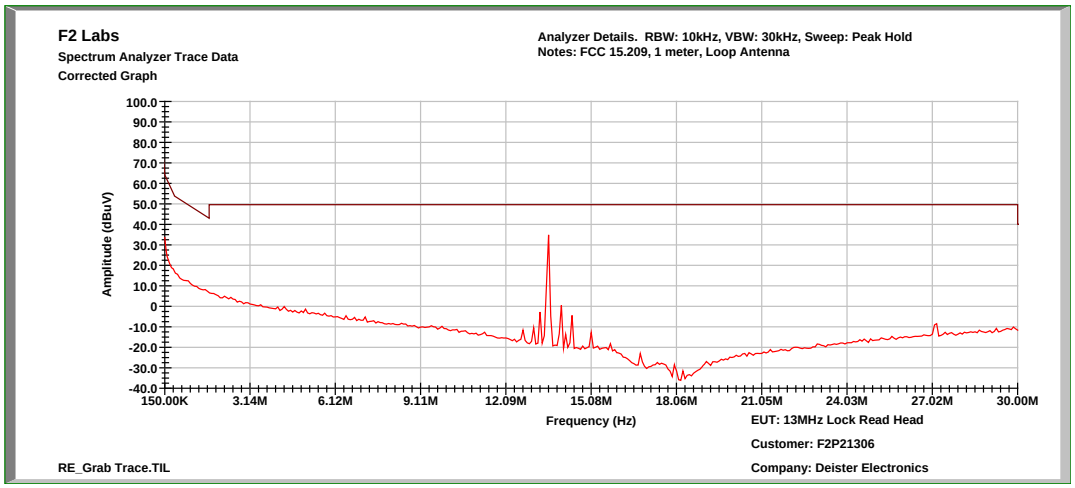
8.2 Test Procedure

The EUT was tested at a distance of 3 meters. The limits shown are extrapolated from the above table. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4 meter mast. Cable and peripheral positions were also varied to produce maximum emissions. Both horizontal and vertical polarities were measured for frequencies above 30MHz, and all three orientations of the loop antenna were scanned to determine worst case emission. The output of the antenna was connected to the input of the receiver and emissions were measured in the range 9 kHz to 1 GHz. The values up to 1GHz with a resolution bandwidth of 1, 9, and 120 kHz are quasi-peak readings made at 3 meters. The raw measurements were corrected to allow for antenna factor and cable loss.

8.3 Test Data

Test Date(s):	May 29, 2019	**Test Engineer(s):**	J. Chiller
Standards:	CFR 47 Part 15.209	**Air Temperature:**	23.3 ºC
		Relative Humidity:	36%

13 MHz: Characterization Scan, 0.15 to 30 MHz



9.0 SPURIOUS EMISSIONS

9.1 Test Procedure

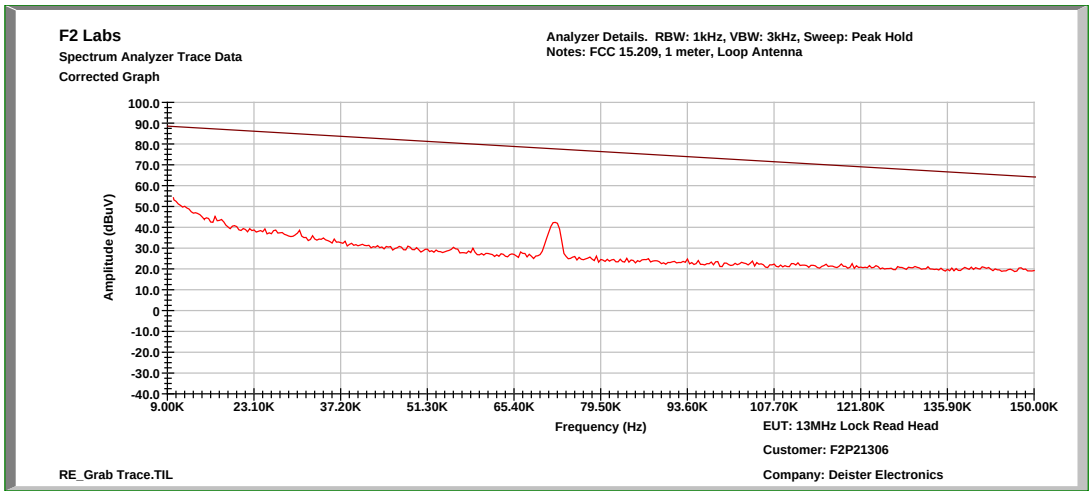
Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies,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

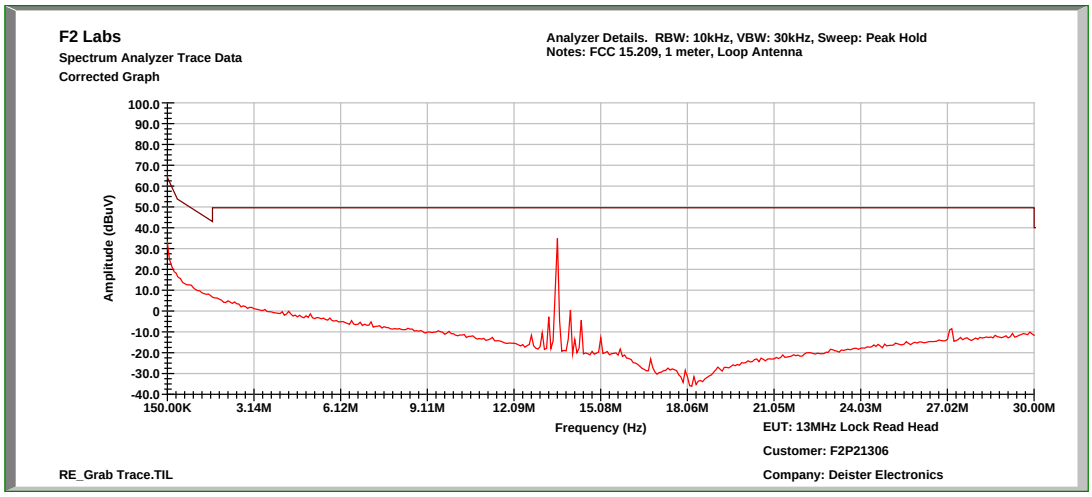
9.2 Test Data

Test Date(s):	May 22, 2019	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	23.3ºC
		Relative Humidity:	36%

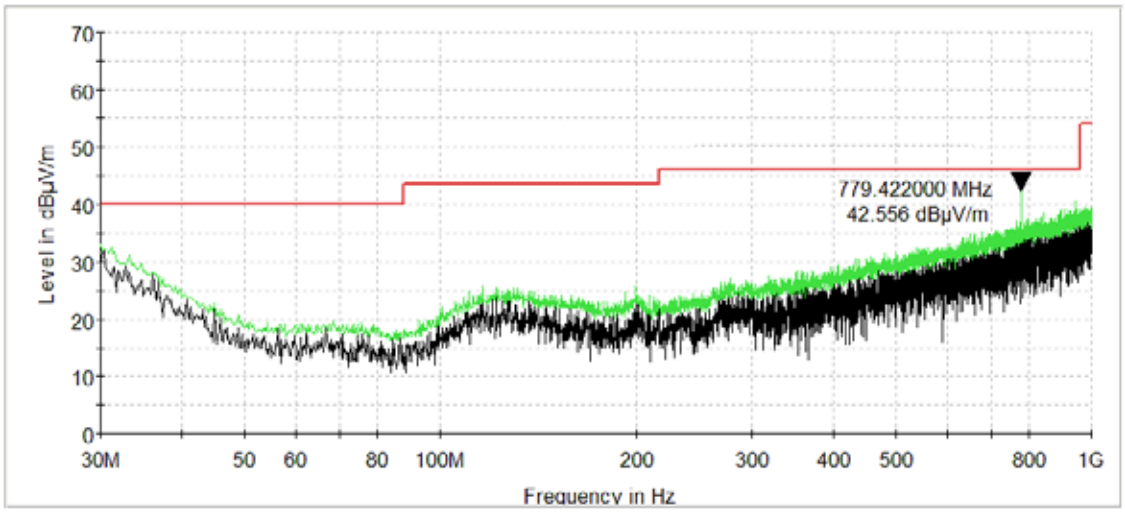
13 MHz: 0.009 MHz to 0.15 MHz (Loop Antenna)



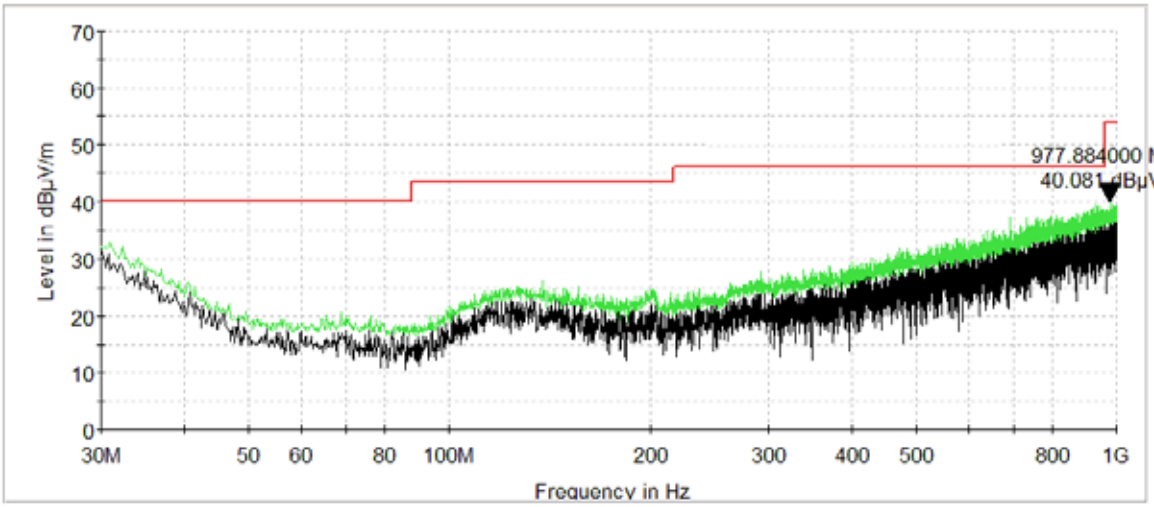
13 MHz: 0.15 MHz to 30 MHz (Loop Antenna)



13 MHz: Characterization Scan, 30 MHz to 1000 MHz, Vertical



13 MHz: Characterization Scan, 30 MHz to 1000 MHz, Horizontal



10 PHOTOGRAPHS

Field Strength of Emissions, Occupied Bandwidth

Radiated Spurious Emissions (Loop Antenna)

Radiated Spurious Emissions, 30 MHz to 1000 MHz