

April 13, 2020

HID Global Corporation
6533 Flying Cloud Drive
Eden Prairie, MN 55344

Dear Robert Cresswell,

Enclosed is the EMC test report for compliance testing of the HID Global Corporation, 25B, tested to the requirements of LP0002 Low-power Radio-frequency Devices Technical Regulations for Certification as an Intentional Radiator.

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely yours,
EUROFINS E&E NORTH AMERICA

A handwritten signature in blue ink that reads "Joel Huna".

Joel Huna
Documentation Department

Reference: (\HID Global Corporation\EMCA106378-LP0002 Rev. 2)

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Electromagnetic Compatibility Criteria Test Report

for the

**HID Global Corporation
HID Signo Biometric Reader
25B**

Tested under

LP0002 Low-power Radio-frequency Devices Technical Regulations
for Intentional Radiators

Report: EMCA106378-LP0002 Rev. 2

April 13, 2020

Prepared For:

**HID Global Corporation
6533 Flying Cloud Drive
Eden Prairie, MN 55344**

Prepared By:

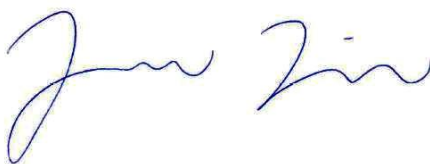
Eurofins E&E North America
13501 McCallen Pass,
Austin, TX 78753

**Electromagnetic Compatibility Criteria
Test Report**

for the

**HID Global Corporation
HID Signo Biometric Reader
25B****Tested under**LP0002 Low-power Radio-frequency Devices Technical Regulations
for Intentional RadiatorsGiuliano Messina, Project Engineer
Electromagnetic Compatibility LabJoel Huna
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the LP0002 under normal use and maintenance.

Jonathan Tavira,
Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	January 20, 2020	Initial Issue. Testing occurred under EMCA101051-LP0002 on February 8, 2019.
1	April 10, 2020	Customer Comments.
2	April 13, 2020	Typo Corrections.

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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB μ A	Decibels above one microamp
dB μ V	Decibels above one microvolt
dB μ A/m	Decibels above one microamp per meter
dB μ V/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μ H	microhenry
μ	microfarad
μ s	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the HID Global Corporation 25B, with the requirements of LP0002 Low-power Radio-frequency Devices Technical Regulations. In accordance with LP0002, the following data is presented in support of the Certification of the 25B. HID Global Corporation should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the 25B, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with LP0002, in accordance with HID Global Corporation, purchase order number 110963495. All tests were conducted using the measurement procedures of ANSI C63.4-2014 and LP0002 Appendix.

LP0002 Reference	Description	Compliance
2.2	Antenna Requirement	Compliant
2.3	Conducted Emission Limits	Not Applicable
Appendix I.II(VIII)	26dB Occupied Bandwidth	Compliant
3.2.1.1	Field Strength emissions within the band 13.553 – 13.567 MHz	Compliant
3.2.1.2	Field Strength emissions within the band 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Compliant
	Field Strength emissions within the band 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Compliant
	Outside-Band Field Strength emissions per 15.209 - 13.110 – 14.010 MHz	Compliant
3.2.1.3	Frequency Tolerance of the Carrier	Compliant
5.20	RF Exposure	Compliant

Figure 1. Executive Summary of EMC LP0002 Compliance Testing

Eurofins MET Laboratories Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

II. Equipment Configuration

A. Overview

Eurofins E&E North America was contracted by HID Global Corporation to perform testing on the 25B, under HID Global Corporation's purchase order number 110963495.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the HID Global Corporation, 25B.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	25B	
Model(s) Covered:	25B	
EUT Specifications:	Primary Power: 12 VDC	
	Type of Modulations:	ASK
	Equipment Code:	DXX
	Peak RF Output Power:	-15.26 dBm
	EUT Frequency Ranges:	13.56 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Giuliano Messina	
Report Date(s):	April 13, 2020	

Figure 2. EUT Summary Table

B. References

LP0002: 2016	Low-power Radio-frequency Devices Technical Regulations.
CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices

Figure 3. References

C. Test Site

Eurofins MET Laboratories Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

All testing was performed at Eurofins E&E North America, 13501 McCallen Pass, Austin, TX 78753. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with LP0002, a complete site description is contained at Eurofins E&E North America.

D. Description of Test Sample

The 25B, Equipment Under Test (EUT), is a robust, versatile and high-power fingerprint reader/controller that addresses the global need for a reliable biometric reader for physical access control applications. The HID Signo Biometric Reader 25B supports a variety of industry-standard technologies including iCLASS® Seos®, iCLASS SE, iCLASS®, MIFARE® DESFire®, MIFARE® Classic and HID Mobile Access® virtual credentials. The 25B device is paired with the web-based HID Biometric Manager software that performs configuration and management of the reader/ controller. In addition, the software enables enrollment of user's fingerprint credentials for use with the different biometric authentication modes - 1:1 verification and 1: N identification.

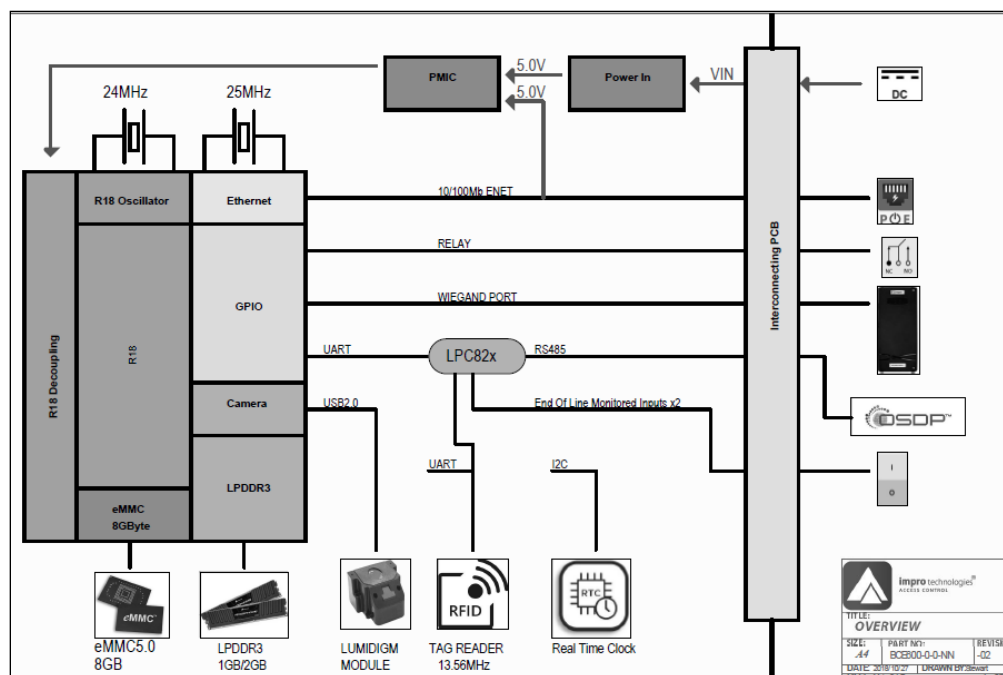


Figure 4. Block Diagram of Test Configuration

E. Equipment Configuration

The EUT was set up as outlined in Figure 1. All equipment incorporated as part of the EUT is included in the following list.

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
1	NA	HID Signo Biometric Reader	25B	NA	NA	NA

Figure 5. Equipment Configuration

F. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
1	Lap top	DELL	Inspiron 15.6"	NA
2	Ethernet Switch	NETGEAR 8 Port	GS108	NA
3	12VDC Battery	Duracell	12VDC 6A	NA

The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.

Figure 6. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded ? (Y/N)	Termination Box ID & Port Name
1	Ethernet	Ethernet cable CAT5/5E/6	1	0.46	100	Yes	Network
2	DC Input	22 awg wires	2	0.46	152	No	12VDC
3	Wiegand Port	22 awg wires	8	0.46	152	No	I/O
4	Inputs	22 awg wires	3	0.46	152	No	I/O
5	Relay	22 awg wires	3	0.46	152	No	I/O
6	RS-485	22 awg wires	3	0.46	152	No	I/O

Figure 7. Ports and Cabling Information

H. Mode of Operation

The unit has several modes: Card only; Finger only; Finger and Card; Template on card. Normal operation will be changing depending on the operator. For Card only- the unit will operate when a card is been presented. Finger only- the unit will be operated when a finger is scanned, for finger and Card- when a card is been presented and a finger as well. For template on card – when a card holds a finger print in it.

I. Method of Monitoring EUT Operation

The unit has several LEDs turning on as soon as the unit is powering up and indicting the status of the unit. when unit is first powered up LEDs will turn Blue and Green until booting process is done, then LEDs will turn Red until a finger or card will be presented. Once a card or a finger will be presented, the Red light will turn Green and back to Red. The finger sensor will turn LEDs blue to indicate ready to read status.

J. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to HID Global Corporation upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators**§ 2.2 Antenna Requirement**

Test Requirement: § 2.2: Antenna requirement: Low-power radio frequency transmitter or transceiver (receiver) shall utilize a permanently, semi-permanently attached antenna or uses a unique coupling of the antenna and at any cable connector between the transmitter and the antenna. The antenna shall be an omni-directional type. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector or other than authorized is prohibited. Such standard connectors are for example: BNC, F type, N type, M type, UG type, RCA, SMA, SMB, and other standard type antenna connectors.

Results: The EUT as tested is compliant with §2.2. EUT utilizes an integral antenna.

Test Engineer(s): Giuliano Messina

Test Date(s): November 26, 2018

Electromagnetic Compatibility Criteria for Intentional Radiators

Appendix I.II(VIII) 26 dB Occupied Bandwidth

Test Requirement(s): Supply the EUT with nominal AC voltage, or install a new or fully charged battery in the EUT. Turn the EUT on, and set it to any convenient frequency within its operating range. Set a reference level on the measuring instrument at -26 dB below the unmodulated carrier. Take modulated frequency into consideration, adjust resolution bandwidth, sweep speed, and sweep range and display calibrated.

Test Procedure: The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measure with the spectrum analyzer using an RBW of 1kHz. The 26 dB Bandwidth was measured and recorded.

Test Results: The EUT was compliant with this requirement.

Test Engineer(s): Giuliano Messina

Test Date(s): November 26, 2018

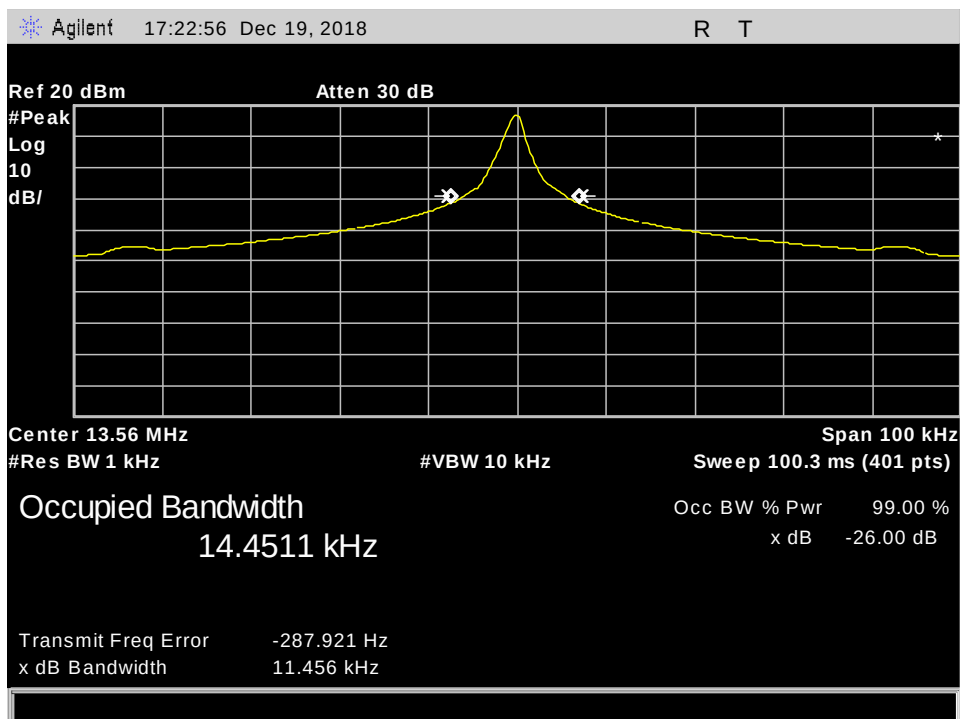


Figure 8. Occupied Bandwidth, 1 kHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 3.2.1.1 Operation within the band 13.553 – 13.567 MHz

Test Requirement(s): § 3.2.1.1: The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Test Procedure: The EUT was set to transmit and placed on a 0.8m-high non-reflective (acrylic) table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4: 2014 and LP0002 appendix were used. The loop antenna was located 3 m from the EUT. Measurements were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. The spectrum analyzer RBW was set to 10 kHz and VBW was set to 30 kHz. A peak detector was used.

The measurements were made at 3m and then extrapolated to 30m using the following correction factor.

$$40\log(3/30) = -40 \text{ dB}$$

Test Results: The EUT was compliant with the requirements of §3.2.1.1.

Test Engineer(s): Giuliano Messina

Test Date(s): October 25, 2018

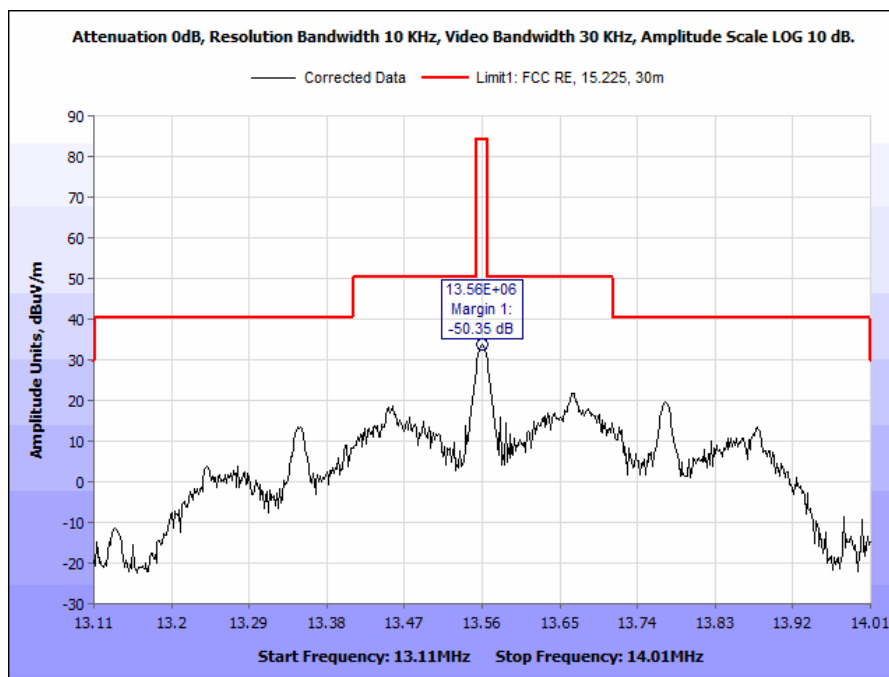


Figure 9. Emissions Within the Band 13.11 – 14.01 MHz Mask

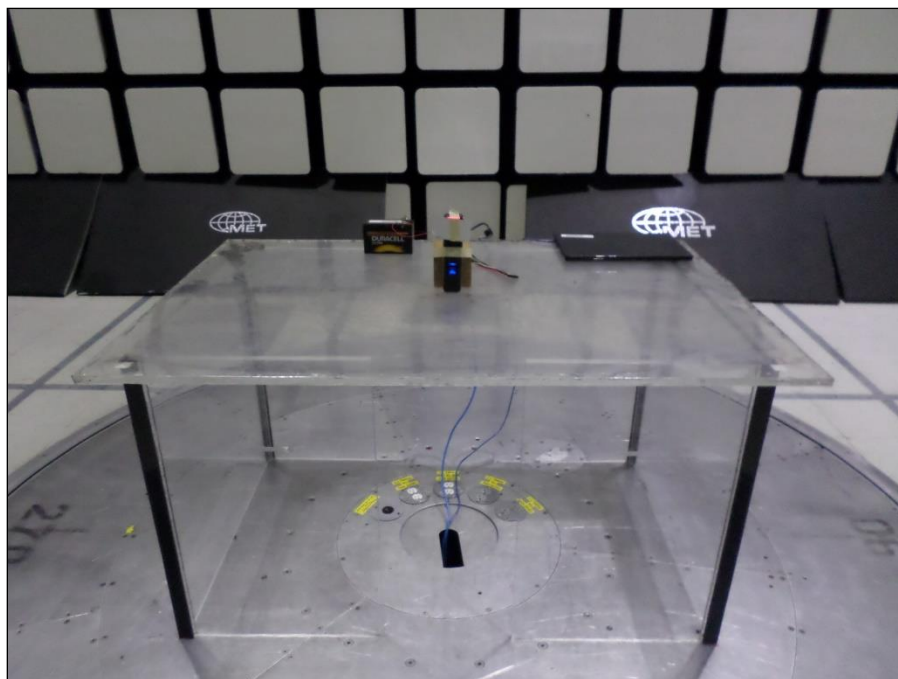


Figure 10. Emissions Within the Band 13.11 – 14.01 MHz, Front View



Figure 11. Emissions Within the Band 13.11 – 14.01 MHz, Loop Antenna View

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 3.2.1.2 Unwanted Emissions Outside 13.553 – 13.567 MHz

Test Requirement(s): § 3.2.1.2: The field strength of unwanted emissions shall not exceed the general radiated emissions limits in LP0002 § 2.8

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 – 0.490 (included)	2,400/Freq. (kHz)	300
0.490 (excluded) – 1.705 (included)	24,000/Freq. (kHz)	30
1.705 (excluded) – 30 (excluded)	30	30
30 (included) – 88 (included)	100	3
88 (excluded) – 216 (included)	150	3
216 (excluded) – 960 (included)	200	3
Above 960 (excluded)	500	3

Figure 12. General Radiated Emissions Limits of §2.8

Test Procedures: The EUT was set to transmit and placed on a 0.8m-high non-reflective (acrylic) table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4: 2014 and LP0002 Appendix were used. For measurements below 30 MHz a loop antenna placed 3m away from the unit was used. For measurements above 30 MHz a biconilog antenna placed 10m away from the unit was used. Measurements were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. The Spectrum analyzer RBW was set to 300 Hz for measurements below 150 kHz, 10 kHz for measurements between 150 kHz and 30 MHz, and 100 kHz for measurements above 30 MHz. A peak detector was used below 30 MHz and a quasi-peak detector was used for measurements for above 30 MHz.

The measurements made at 3m with the loop antenna were then extrapolated to 30m or 300 m using the following correction factors.

$$40\log(3/30) = -40 \text{ dB and } 40\log(3/300) = -80 \text{ dB}$$

The measurements made at 10m with the biconilog antenna were then extrapolated to the 3m using the following correction factor.

$$20\log(10/3) = +10.46 \text{ dB}$$

Test Results: The EUT was compliant with the requirements of § 3.2.1.2

Test Engineer(s): Giuliano Messina

Test Date(s): November 26, 2018

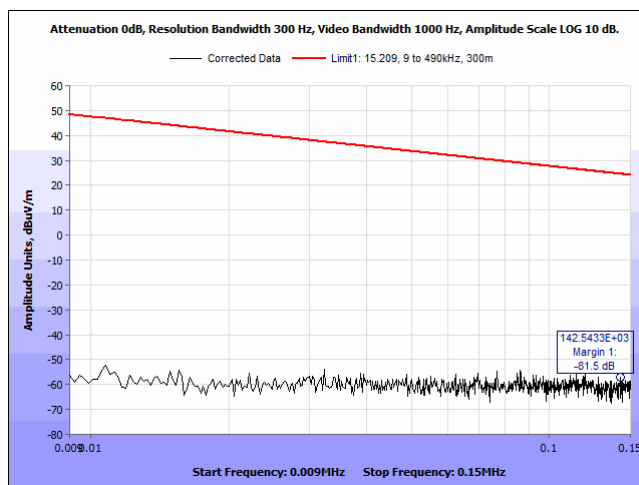


Figure 13. Spurious Emissions, Outside 13.56 MHz, 0.009 – 0.15 MHz

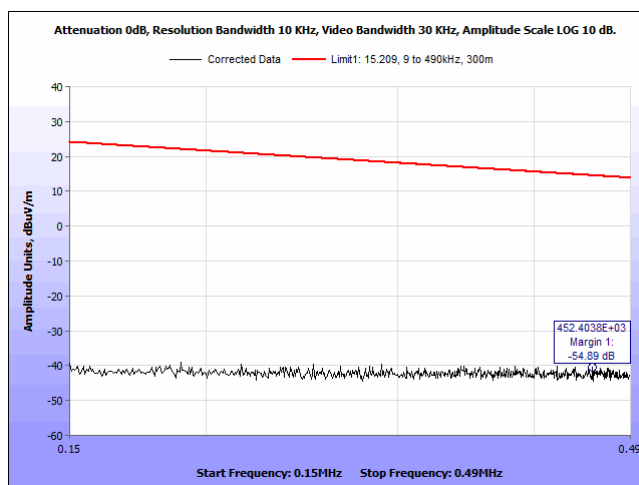


Figure 14. Spurious Emissions, Outside 13.56 MHz, 0.15 – 0.49 MHz

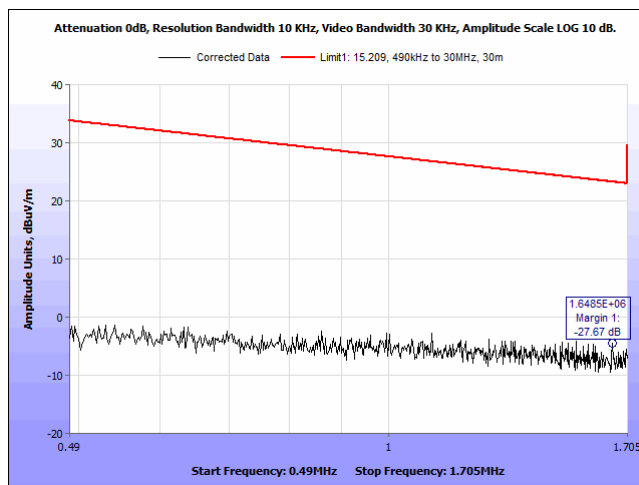


Figure 15. Spurious Emissions, Outside 13.56 MHz, 0.49 – 1.705 MHz

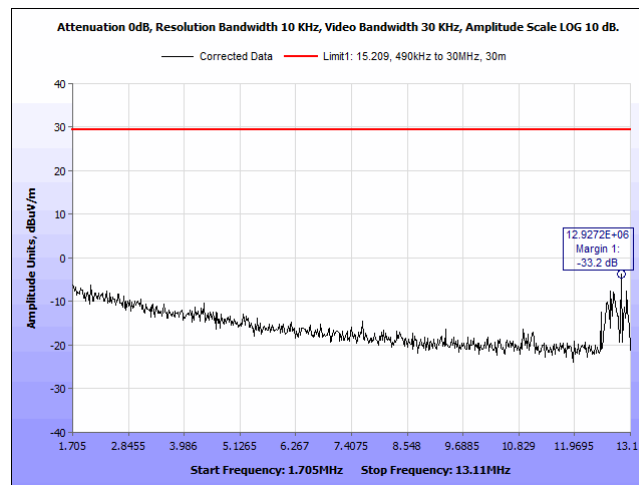


Figure 16. Spurious Emissions, Outside 13.56 MHz, 1.705 – 13.11 MHz

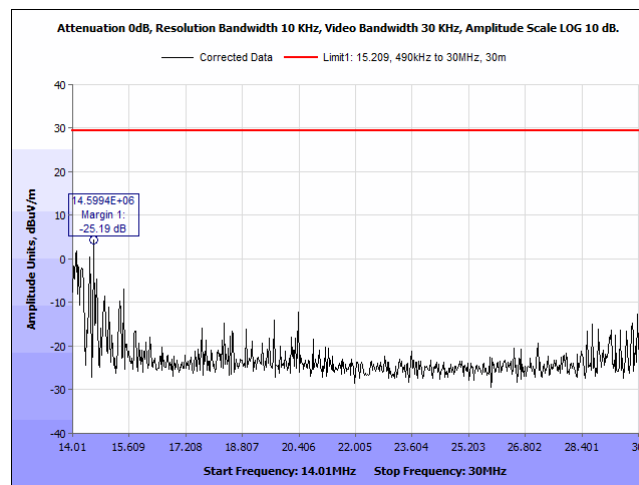


Figure 17. Spurious Emissions, Outside 13.56 MHz, 14.01 – 30 MHz

Frequency (Hz)	Meter Reading (dBuV)	RBW (Hz)	Distance Correction Factor (dB)	Measurement Sensor Factor Amplitude (dBuV)	Preamplifier Factor (dB)	Corrected Measurement dBuV/m	Limit 1, 15.209 Average Average dBuV/m	Margin 1 (dB)
40.68E+06	36.7	100000	10.46	16.8	-24.57	39.39	40	-0.61

Figure 18. Spurious Emissions, Outside 13.56 MHz, 30 - 135.6 MHz, Vertical, QP Marker Data

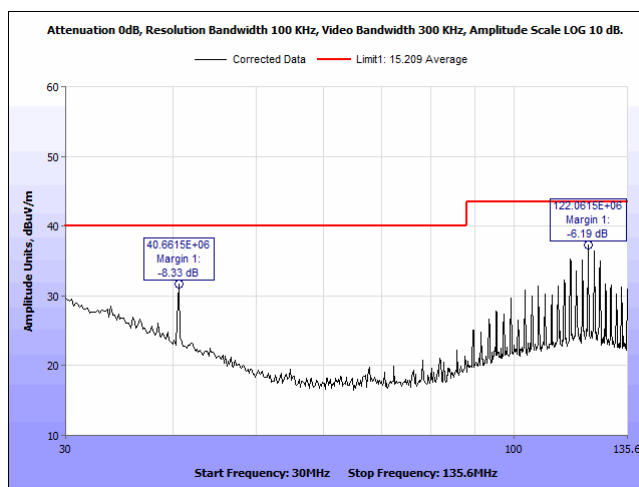


Figure 19. Spurious Emissions, Outside the Bands, 13.56 MHz, 30 – 135.6 MHz, Horizontal

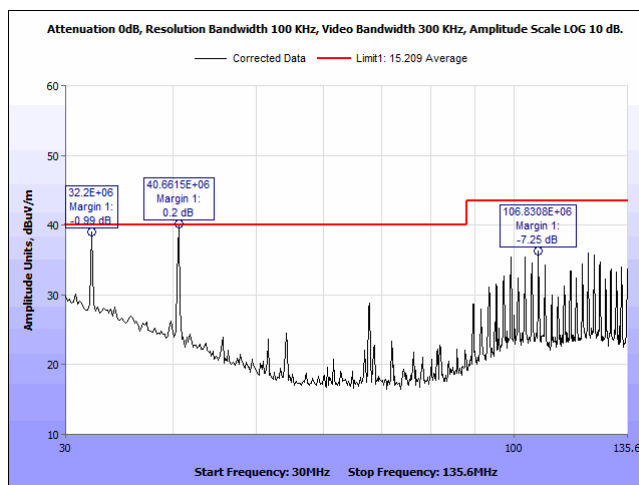


Figure 20. Spurious Emissions, Outside the Bands, 13.56 MHz, 30 – 135.6 MHz, Vertical



Figure 21. Spurious Emissions, Outside 13.56 MHz, Bilog Antenna View

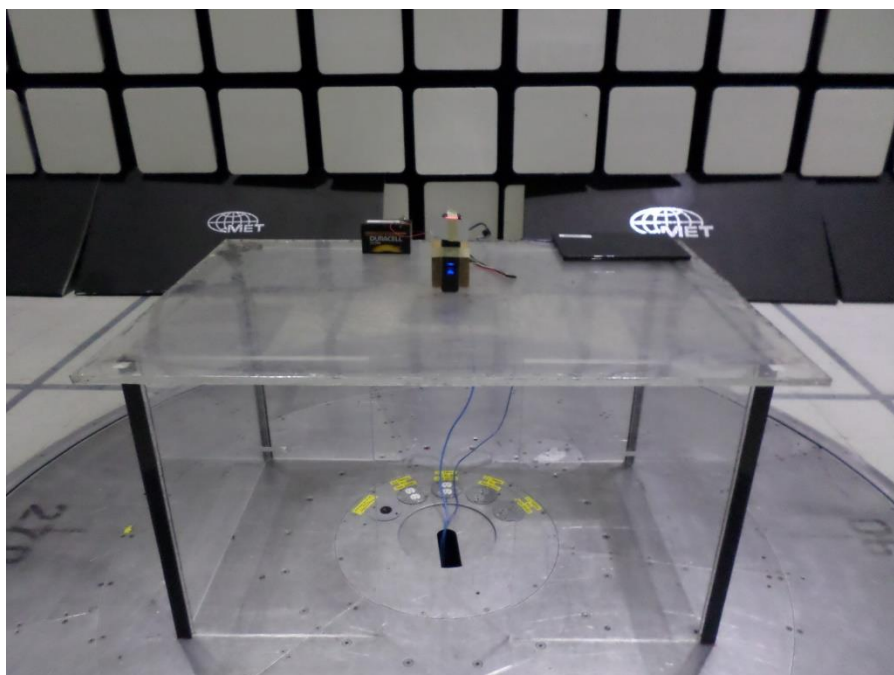


Figure 22. Spurious Emissions, Outside 13.56 MHz, Front View

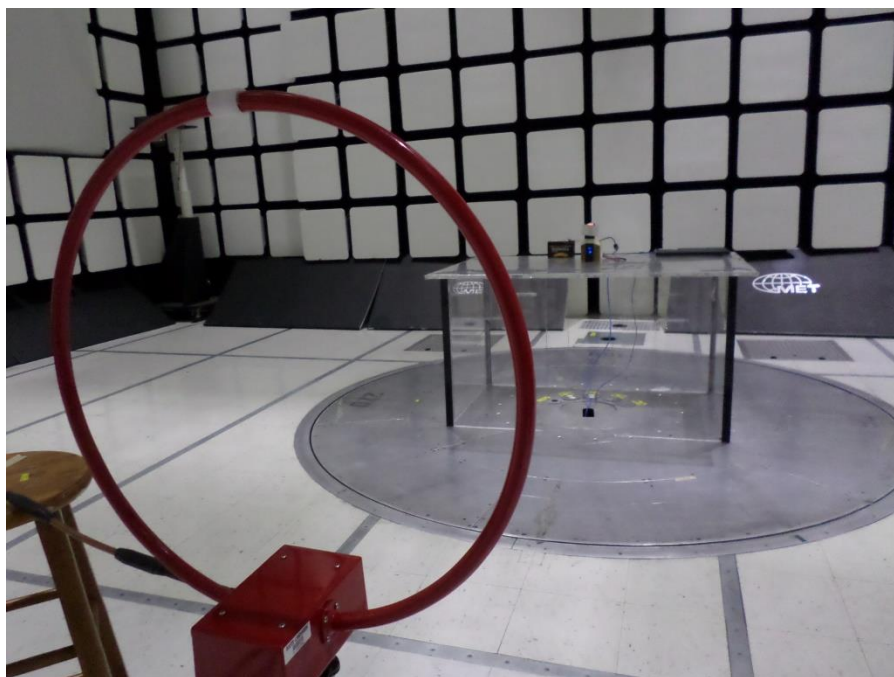


Figure 23. Spurious Emissions, Outside 13.56 MHz, Loop Antenna View

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 3.2.1.3 Frequency Tolerance

Test Requirement(s): § 3.2.1.3: The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure: Measurements are in accordance with 3.2.1.3. The EUT was placed in the Environmental Chamber and allowed to reach desired temperature. A spectrum analyzer was used to measure the frequency drift. The EUT was set to transmit in the operating frequency range. Frequency drift was investigated for the extreme temperatures and nominal temperature, until the unit is stabilized then recorded the reading in tabular format with the temperature range of -20° to 50°C.

Test Results: The EUT was found **compliant** with §3.2.1.3 requirement(s) of this section.

Test Engineer(s): Giuliano Messina

Test Date(s): December 19, 2018

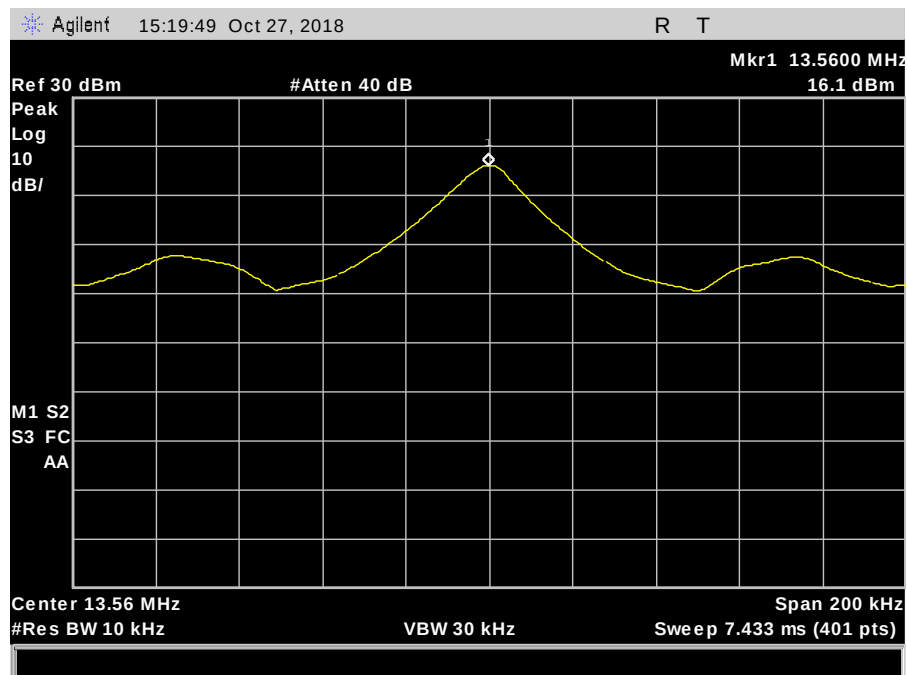


Figure 24. Frequency Tolerance, 85% of Supply

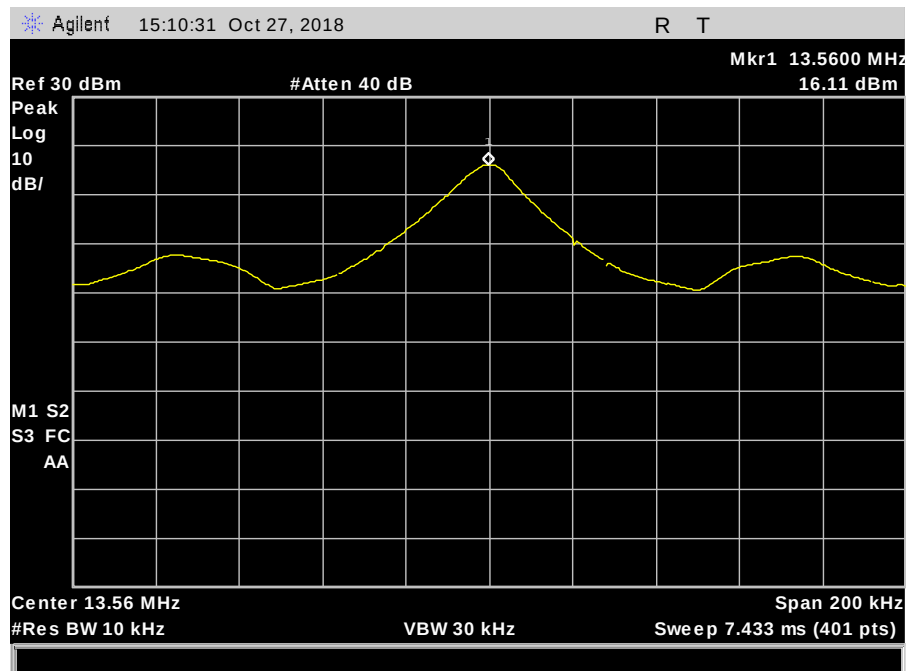


Figure 25. Frequency Tolerance, 115% of Supply

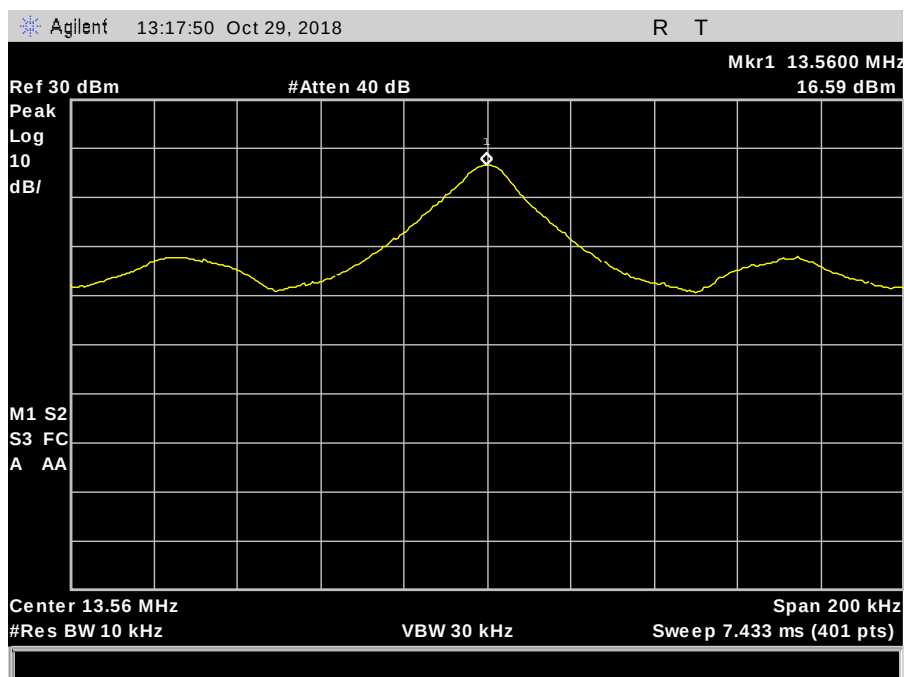


Figure 26. Frequency Tolerance, Extreme Temperatures, -20C

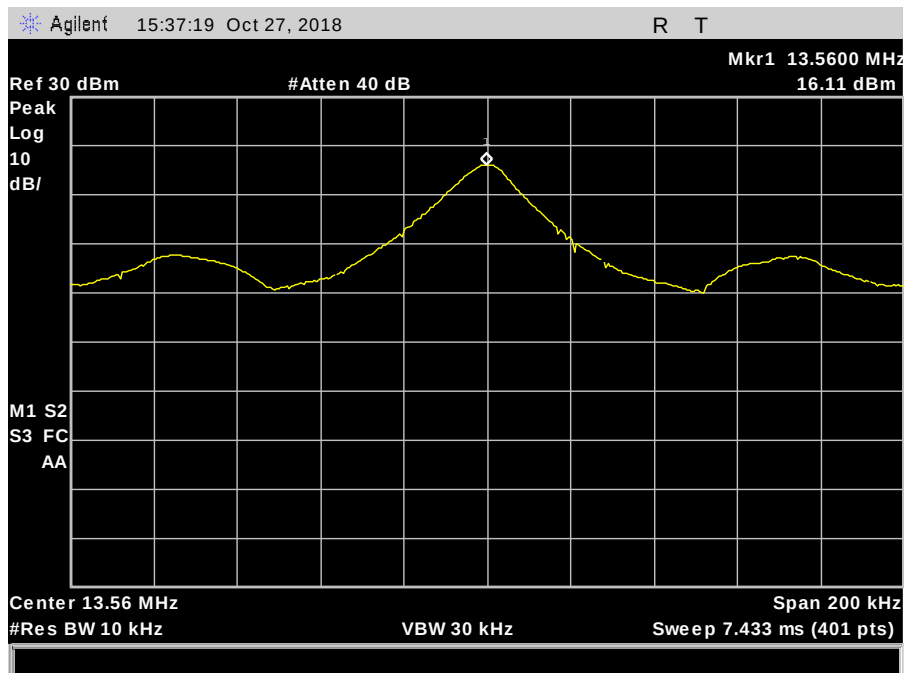


Figure 27. Frequency Tolerance, Extreme Temperatures, 50C

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 5.20 Radiofrequency radiation exposure

RF Exposure Requirements: 5.20.1 For purposes of RF exposure assessment requirements, Specific Absorption Rate (SAR) shall be measured as transmitters whose radiating structures are designed to be used within 20 centimeters of the body of the user. Limits are as follows:

RF Radiation Exposure Limit:

Position	Occupational/Controlled Exposure (W/kg)	General Population/Uncontrolled Exposure (W/kg)
Whole-Body	0.4	0.08
Partial-Body	8.0	1.6
Hands, Wrists, Feet and Ankles	20.0	4.0

HF (13.56 MHz)

FCC								
Frequency (MHz)	Con. Pwr. (dBm)	Con. Pwr. (uW)	Ant. Gain (dBi)	Ant. Gain numeric	Total Pwr. (uW)	SAR Limit	Margin	Result
13.56	-15.26	29.79	1	1.26	37.5	0.08	0.0799	Pass

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1A1225	Temperature Chamber	Espec	EXP-2H	2/27/2018	2/27/2019
1A1083	EMI Test Receiver	Rohde & Schwarz	ESU40	10/17/2018	10/17/2019
1A1106	10m Chamber (FCC)	ETS	Semi-Anechoic	12/2/2016	12/2/2019
1A1050	Bilog Antenna (30MHz to 1GHz)	Schaffner	CBL 6112D	8/29/2018	2/29/2020
1A1050-A	Attenuator	Fairview Microwave	SA6N5WA-04	8/29/2018	2/29/2020
1A1176	Active Loop Antenna	ETS-Lindgren	6502	1/31/2018	7/31/2019
1A1099	Generator	COM-Power Corp	CGO-51000	See Note	
1A1088	Pre-Amp	Rohde & Schwarz	TS-PR1	See Note	
1A1044	Generator	COM-Power Corp	CG-520	See Note	
1A1073	Multi Device Controller	ETS EMCO	2090	See Note	
1A1074	System Controller	Panasonic	WV-CU101	See Note	

Figure 28. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

End of Report