Amber Helm Development L.C.
92723 Michigan Hwy-152
Sister Lakes, Michigan 49047 USA
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EMC Test Report

RC11-WR1922TX
Issued: **April 5, 2020**

regarding

USA: CFR Title 47, Part 15.209 (Emissions)
Canada: ISED RSS-210/GENe (Emissions)

for

RC11

Category: Door Access Reader Controller

Judgments:
15.209/RSS-210 Compliant Transmitter
Testing Completed: March 20, 2020

TESTING
NVLAP LAB CODE 200129-0

Prepared for:

Schlage Lock Company / Allegion

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Date of Issue: April 5, 2020

Revision History

Rev. No.	Date	Details	Revised By
r0	April 5, 2020	Initial Release.	J. Brunett

Contents

List of Tables

List of Figures

1 Test Report Scope and Limitations

1.1 Laboratory Authorization

Test Facility description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: US5348 and US5356) and with ISED Canada, Ottawa, ON (File Ref. No: 3161A and 24249). Amber Helm Development L.C. holds accreditation under NVLAP Lab Code 200129-0.

1.2 Report Retention

For equipment verified to comply with the regulations herein, the manufacturer is obliged to retain this report with the product records for the life of the product, and no less than ten years. A copy of this Report will remain on file with this laboratory until May 2030.

1.3 Subcontracted Testing

This report does not contain data produced under subcontract.

1.4 Test Data

This test report contains data included within the laboratories scope of accreditation.

1.5 Limitation of Results

The test results contained in this report relate only to the item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require reevaluation.

1.6 Copyright

1.7 Endorsements

This report shall not be used to claim product endorsement by any accrediting, regulatory, or governmental agency.

1.8 Test Location

The EUT was fully tested by **Amber Helm Development L.C.**, headquartered at 92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA. Table 1 lists all sites employed herein. Specific test sites utilized are also listed in the test results sections of this report where needed.

Table 1: Test Site List.

Description	Location	Quality Num.
OATS (3 meter)	3615 E Grand River Rd., Williamston, Michigan 48895	OATSC

1.9 Traceability and Equipment Used

Pertinent test equipment used for measurements at this facility is listed in Table 2. The quality system employed at Amber Helm Development L.C. has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards.

Table 2: Equipment List.

Description	Manufacturer/Model	SN	Quality Num.	Cal/Ver By / Date Due
Shielded Loop Antenna	EMCO / 6502	9502-2926	EMCOLOOP1	Lib. Labs. / Aug-2020
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Keysight / Aug-2020
Log Periodic Antenna	EMCO / 3146	9305-3614	LOGEMCO01	Keysight / Aug-2020
BNC-BNC Coax	WRTL / RG58/U	001	CAB001-BLACK	AHD / Jul-2020
3.5-3.5MM Coax	PhaseFlex / PhaseFlex	001	CAB015-PURP	AHD / Jul-2020
Spectrum Analyzer	R & S / FSV30	101660	RSFSV30001	RS / Apr-2021
Spectrum Analyzer	R & S / FPC1500	101692	RSFPC15001	RS / May-2020
LISN	Solar / 8012-50-R-24-BNC	962138	LISN7	AHD / April-2021
Quad Ridge Horn	Singer / A6100	C35200	HQR1TO18S01	Keysight / Aug-2020
K-Band Horn	JEF / NRL Std.	001	HRNK01	AHD / Jul-2020

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The goal of Schlage Lock Company / Allegion is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the Schlage Lock Company / Allegion RC11 for compliance to:

Country/Region	**Rules or Directive**	**Referenced Section(s)**
United States	Code of Federal Regulations	CFR Title 47, Part 15.209
Canada	ISED Canada	ISED RSS-210/GENe

It has been determined that the equipment under test is subject to the rules and directives above at the date of this testing. In conjunction with these rules and directives, the following specifications and procedures are followed herein to demonstrate compliance (in whole or in part) with these regulations.

ANSI C63.4:2014	"Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
ANSI C63.10:2013	"American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
IEEE Trans. EMC, Vol. 47, No. 3 August 2005	"Extrapolating Near-Field Emissions of Low-Frequency Loop Transmitters," J.D.Brunett, V.V.Liepa, D.L.Sengupta
TP0102RA	"AHD Internal Document TP0102 - Radiated Emissions Test Procedure"
TP0106RC	"AHD Internal Document TP0106 - Emissions Measurement Procedures (above 40 GHz)"
ISED Canada	"The Measurement of Occupied Bandwidth"
ICES-003; Issue 6 (2016)	"Information Technology Equipment (ITE) - Limits and methods of measurement"

3 Configuration and Identification of the Equipment Under Test

3.1 Description and Declarations

The EUT is commercial access card reader and entry controller. The EUT is approximately 14 x 4 x 2.5 cm in dimension, and is depicted in Figure 1. It is powered by PoE PoE system power supply. This device is used as an entry door access pad that reads LF keycards and controls latch and button devices. Table 3 outlines provider declared EUT specifications.

Figure 1: Photos of EUT.

Table 3: EUT Declarations.

General Declarations	
Equipment Type:	Door Access Reader Controller
Country of Origin:	USA
Nominal Supply:	PoE
Oper. Temp Range:	Not Declared
Frequency Range:	$0.125, 13.56$ MHz
Antenna Dimension:	Not Declared
Antenna Type:	Integral LF Coils
Antenna Gain:	Not Declared
Number of Channels:	1 (per band)
Channel Spacing:	Not Applicable
Alignment Range:	Not Declared
Type of Modulation:	AM
United States	
FCC ID Number:	XPB-RC11
Classification:	DCD, DXX
Canada	
IC Number:	8053B-RC11
Classification:	RFID Device

3.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 2.

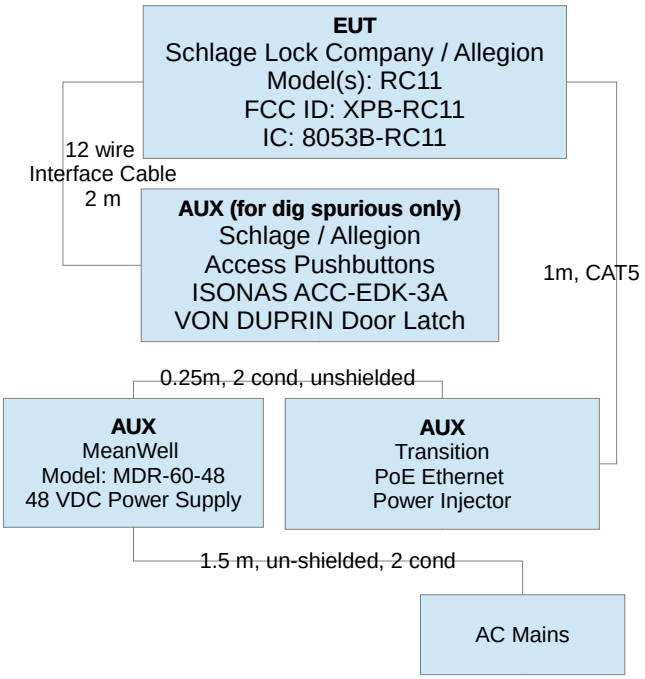


Figure 2: EUT Test Configuration Diagram.

3.1.2 Modes of Operation

The EUT is capable of operating as a LF access card reader with integral controller, powered over an ethernet interface. The EUT also includes a BLE pre-certified modular transceiver for BLE based access tracking. The BLE transceiver (FCC ID: QOQBGM111, IC: 5123A-BGM111) employed in this product is modularly pre-approved. The LF card reader component and digital spurious emissions, including worst case spurious from the pre-certified modular radio, are reported herein. All three radios are capable of simultaneous transmission and were set to actively transmit while each individual transmitter was tested. Worst case digital spurious emissions were observed and are reported for the door reader control when attached to all accessories, including access buttons, an opto-isolator, and a door latch and sensor, as detailed in the block diagram depicted here.

3.1.3 Variants

There is only a single electrical version of the EUT, as tested.

3.1.4 Test Samples

Four samples of the EUT were provided for emissions testing. Two samples were capable of CW transmission at 125 kHz and 13.56 MHz via LF programming cards. Two other samples contained normal operating firmware. An installation representative PoE supply was also provided to power the unit.

3.1.5 Functional Exerciser

Normal operating EUT functionality was verified by observation of transmitted signal. Access keycards were provided to place the EUT into CW transmitting modes as well as for normal access testing.

3.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory.

3.1.7 Production Intent

The EUT appears to be a production ready sample.

3.1.8 Declared Exemptions and Additional Product Notes

This EUT employs a pre-approved Bluetooth (BLE) module. The LF card reader intentional emissions, as well as unintentional and digital spurious emissions from all radios are evaluated in this report.

4 Emissions

4.1 General Test Procedures

4.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first pre-scanned in our screen room. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.8 are employed. After pre-scan, emission measurements are made on the test site of record. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in relevant test standards are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 3. All intentionally radiating elements that are not fixed-mounted in use are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded. If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied.

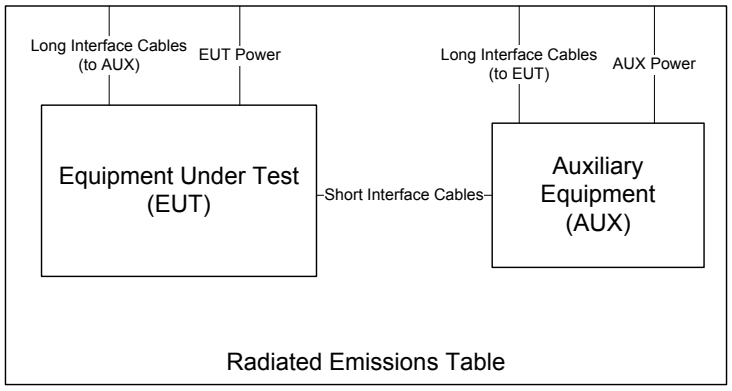


Figure 3: Radiated Emissions Diagram of the EUT.

For devices with intentional emissions below 30 MHz, a shielded loop antenna and/or E-field and H-Field broadband probes are used depending on the regulations. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, the broadband probes employed are 10cm diameter single-axis shielded transducers and measurements are repeated and summed over three axes.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through 360^o in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Emissions above 1 GHz are characterized using standard gain or broadband ridge-horn antennas on our OATS with a 4×5 m rectangle of ECCOSORB absorber covering the OATS ground screen and a 1.5m table height. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced. Photographs of the test setup employed are depicted in Figure 4.

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to dBμV/m at the regulatory distance, using

$$E_{dist} = 107 + P_R + K_A - K_G + K_E - C_F$$

where P_R is the power recorded on spectrum analyzer, in dBm, K_A is the test antenna factor in dB/m, K_G is the combined pre-amplifier gain and cable loss in dB, K_E is duty correction factor (when applicable) in dB, and C_F is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is computed, it is computed as

$$EIRP(dBm) = E_{3m}(dB\mu V/m) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.

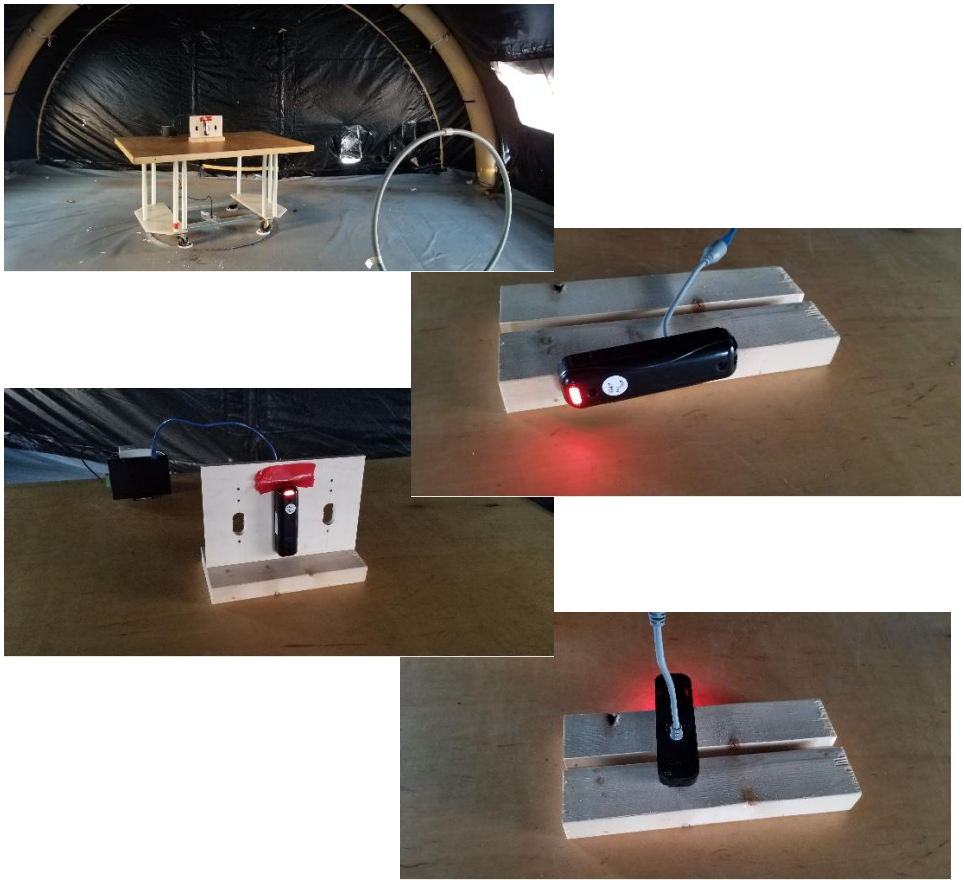


Figure 4: Radiated Emissions Test Setup Photograph(s).

4.1.2 Conducted Emissions Test Setup and Procedures

AC Port Conducted Spurious For this device, AC power line conducted emissions are measured in our screen room. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.4 / CISPR 22 are employed. Alternatively, an on-table layout more representative of actual use may be employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 5.

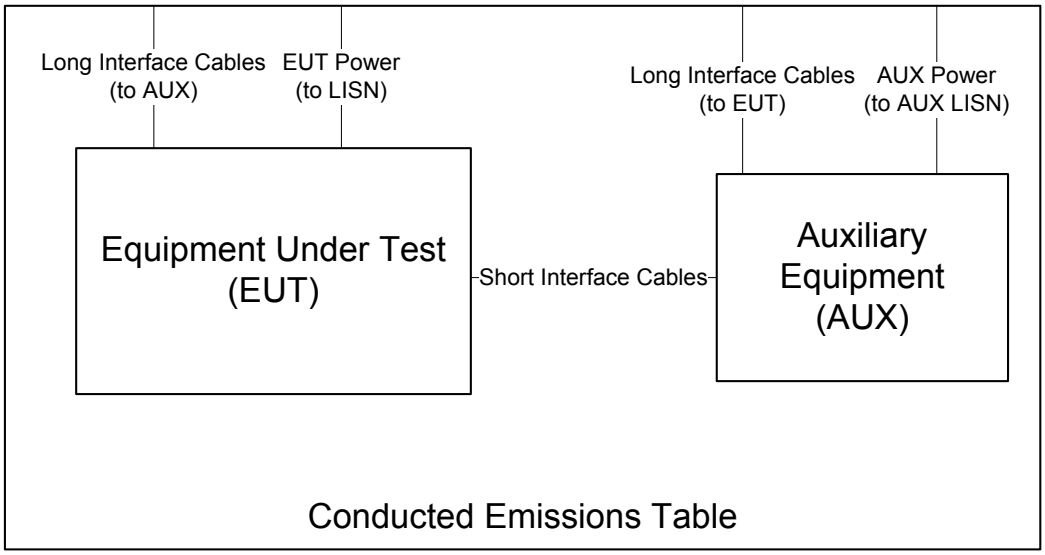


Figure 5: Conducted Emissions Setup Diagram of the EUT.

Conducted emissions are measured and recorded for each AC mains power source over the spectrum 0.15 MHz to 30 MHz for both the ungrounded (HI/PHASE) and grounded (LO/GND) conductors with the EUT placed in its highest current draw operating mode(s). The test receiver is set to peak-hold mode in order to record the peak emissions throughout the course of functional operation. Only if an emission exceeds or is near the limit are quasi-peak and average detection applied. Photographs of the test setup employed are depicted in Figure 6.

Figure 6: Conducted Emissions Test Setup Photograph(s).

4.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case of this EUT, measurements of the worst-case radiated emissions are performed with the supply voltage varied by no less than 85% and 115% of the nominal rated value for devices connecting to AC power mains.

4.2 Intentional Emissions

4.2.1 Fundamental Emission Pulsed Operation

The details and results of testing the EUT for pulsed operation are summarized in Table 4.

Table 4: Pulsed Emission Characteristics (Duty Cycle).

Frequency Range	Det	IF Bandwidth	Video Bandwidth
9 kHz ≤ f ≤ 150 kHz	Pk/QPk	200 Hz	300 Hz
150 kHz ≤ f ≤ 30 MHz	Pk/QPk	9 kHz/10 kHz	30 kHz
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz
f > 1 000 MHz	Pk	3 MHz	3MHz
f > 1 000 MHz	Avg	3 MHz	10kHz

Test Date:	13-Dec-19
Test Engineer:	Joseph Brunett
EUT Mode:	Normal Operating
Meas. Distance:	3 meters
EUT Tested:	Allegion RC11

#	EUT Mode	Overall Transmission: Min. Repetition Rate (sec)	Overall Transmission: Max. No. of Frames	Overall Transmission: Total Transmission Length (sec)	Internal Frame Characteristics: Max. Frame Length (ms)	Internal Frame Characteristics: Min. Frame Period (s)	Internal Frame Characteristics: Frame Encoding	Computed Duty Cycle*: (%)	Computed Duty Cycle*: Duty (dB)
1	Normal (125 kHz)	0.300	1	-	124.6	>100 ms	When a passive access key card is place over the access pad on the front of the EUT, the lock interrogates the passive card once every 300 ms, the longest frame has an on time of 124.6 ms when a card is found.	N/A	N/A
2	Normal (13.56 MHz)	0.294	3	-	281.8	>100 ms	When a passive access key card is place over the access pad on the front of the EUT, the lock interrogates the passive card once every 0.294 seconds with a set of 3 CW pulses, the longest of which has an on time of 281.8 ms when a card is found.	N/A	N/A

* No Duty Cycle is employed when demonstrating compliance.

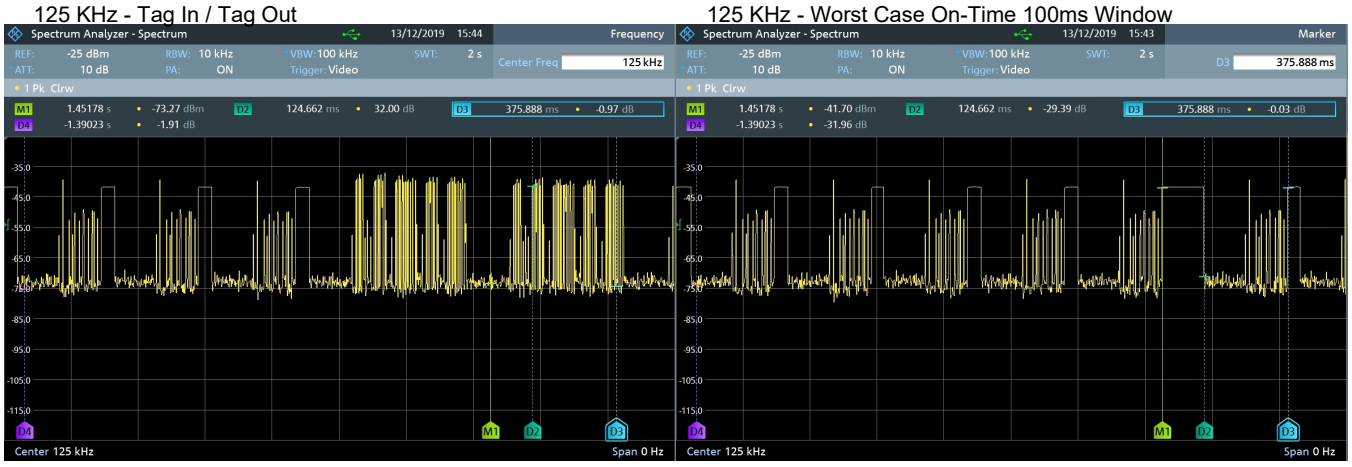
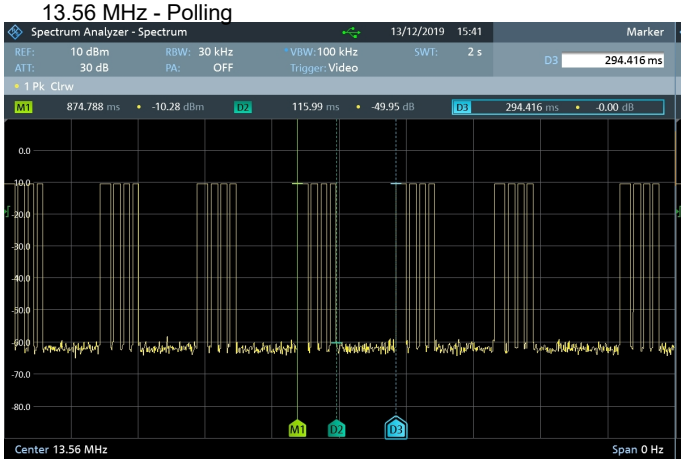
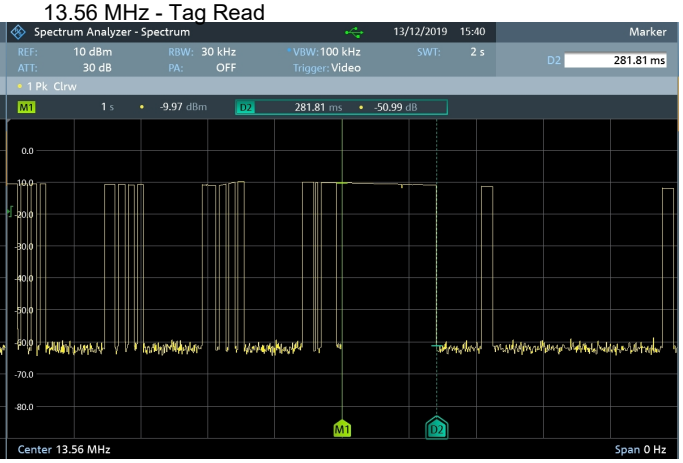


Figure 7(a): Pulsed Emission Characteristics (Duty Cycle).

13.56 MHz - Polling



13.56 MHz - Tag Read



13.56 MHz - Worst Case On-Time 100 ms

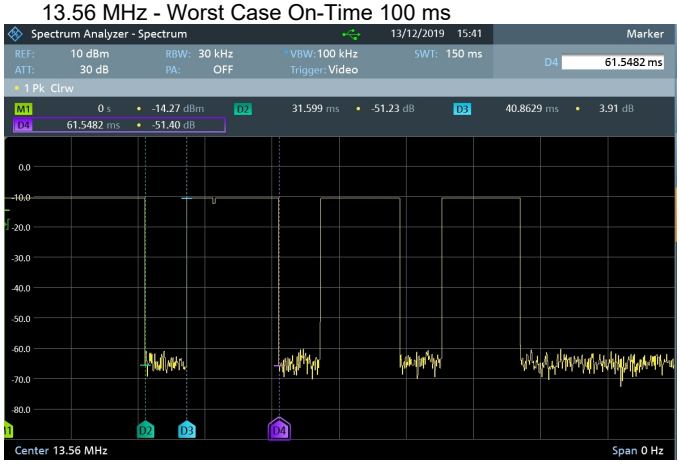


Figure 7(b): Pulsed Emission Characteristics (Duty Cycle).

4.2.2 Fundamental Emission Bandwidth

Emission bandwidth (EBW) of the EUT is measured with the device placed in the test mode(s) with the shortest available frame length and minimum frame spacing. Radiated emissions are recorded following the test procedures listed in Section 2.1. The 20 dB EBW is measured as the max-held peak-detected signal when the IF bandwidth is greater than or equal to 1% of the receiver span. For complex modulations other than ASK and FSK, the 99% emission bandwidth per IC test procedures has a different result, and is also separately reported.The results of EBW testing are summarized in Table 5. Plots showing measurements employed to obtain the emission bandwidth reported are provided in Figure 8.

Table 5: Intentional Emission Bandwidth.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
9 kHz ≤ f ≤ 150 kHz	Pk	> 1% Span	>= 3 * IFBW	**Test Date:**	13-Dec-19
150 kHz ≤ f ≤ 30 MHz	Pk	> 1% Span	>= 3 * IFBW	**Test Engineer:**	Joseph Brunett
				EUT Mode:	Normal Operating
				Meas. Distance:	0.1 meters
				EUT Tested:	Allegion RC11

#	Frequency Range (MHz)	Temp (C)	Supply (VDC)	99% PWR BW (kHz)	20 dB EBW (kHz)	110 kHz Restricted Band (dBc)			
1	0.125	20	6	21.041	1.320	32.4			
2	13.56	20	6	11.65	1.091	N/A			

Figure 8: Intentional Emission Bandwidth.

4.2.3 Fundamental Emission

Following the test procedures listed in Section 2.1, field emissions measurements are made on the EUT for both Horizontal and Vertically polarized coupling fields. The EUT's loop antenna(s) are measured along all three axes, including when the EUT loop axes are aligned in the same axis as the test loop and aligned coplanar (in the same plane) with the test loop antenna. Table 6 details the results of these measurements.

Table 6: Fundamental Radiated Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth
9 kHz ≤ f ≤ 150 kHz	Pk/QPk	200 Hz	300 Hz
150 kHz ≤ f ≤ 30 MHz	Pk/QPk	9 kHz	30 kHz
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz
f > 1 000 MHz	Pk	1 MHz	3MHz
f > 1 000 MHz	Avg	1 MHz	3MHz

Test Date:	18-Dec-19
Test Engineer:	Joseph Brunett
EUT Mode:	CW
Meas. Distance:	3 meters
EUT Tested:	Allegion RC11

Fundamental Emissions Measurements

#	Mode	Test Antenna Polarization	Freq. MHz	Ant. Used	Ant Ht.	Table Angle	Ka dB/m	Kg dB	Cf** 3m / 300m (dB)	E3m (Pk) dBuV/m	E300m (Pk) dBuV/m	E30m (QPk/Avg) dBuV/m	E300m Limit dBuV/m	Pass By***
1	**RC11**													
2		Coaxial - Horz	0.125	S. Loop	1.0	330.0	10.1	0.0	80.0	70.2	-9.8		25.7	**35.5**
3	125 CW	Coplanar - Vert	0.125	S. Loop	1.0	330.0	10.1	0.0	80.0	68.2	-11.8		25.7	37.5
4		Coplanar - Horz	0.125	S. Loop	1.0	330.0	10.1	0.0	80.0	66.3	-13.7		25.7	39.4
#	Mode	Test Antenna Polarization	Freq. MHz	Ant. Used	Pr (Pk) dBm	Pr (QPk/Avg)* dBm	Ka dB/m	Kg dB	Cf** 3m / 30m (dB)	E3m (Pk) dBuV/m	E30m (Pk) dBuV/m	E30m (QPk/Avg) dBuV/m	E30m Limit dBuV/m	Pass By***
5	**RC11**													
6		Coaxial - Horz	13.56	S. Loop	1.0	330.0	10.6	0.0	40.0	64.0	24.0		29.5	**5.5**
7	13.56 CW	Coplanar - Vert	13.56	S. Loop	1.0	330.0	10.6	0.0	40.0	62.0	22.0		29.5	7.5
8		Coplanar - Horz	13.56	S. Loop	1.0	330.0	10.6	0.0	40.0	59.9	19.9		29.5	9.6

#	Mode	Test Antenna Polarization	Freq. MHz	AC Supply Voltage	E3m (Pk) dBuV/m
9			.125	132.25	70.2
10	125 CW	Coaxial - Horz	.125	115.00	70.2
11			.125	97.75	70.2
12			13.56	132.25	64.0
13	13.56 CW	Coaxial - Horz	13.56	115.00	64.0
14			13.56	97.75	64.0

* EUT was tested in CW mode. No averaging applies and Quasi-Peak data was not needed to demonstrate compliance.
** 40 dB/dec conversion factor employed

4.3 Unintentional Emissions

4.3.1 Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 7. Following the test procedures listed in Section 2.1, field emissions measurements are made on the EUT for both Horizontal and Vertically polarized coupling fields. The EUT's loop antenna(s) are measured when the EUT loop axes placed in all three axes, including when they are aligned along the same axis as the test loop antenna and are aligned coplanar with the test loop antenna. For all arrangements, test loop is rotated for maximum field. The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 7. Measurements are performed to 10 times the highest fundamental operating frequency.

Table 7(a): Transmit Chain Spurious Emissions.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	18-Dec-19
9 kHz ≤ f ≤ 150 kHz	Pk/QPk	200 Hz	300 Hz	**Test Engineer:**	Joseph Brunett
150 kHz ≤ f ≤ 30 MHz	Pk/QPk	9 kHz	30 kHz	**EUT Mode:**	CW
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Meas. Distance:**	3 meters
f > 1 000 MHz	Pk	3 MHz	3MHz	**EUT Tested:**	Allegion RC11
f > 1 000 MHz	Avg	3 MHz	10kHz		

Transmit Chain Spurious Emissions

#	Mode	Test Antenna Polarization	Freq. kHz	Ant. Used	Ant Ht. m	Table Angle deg	Ka dB/m	Kg dB	Cf** (3 to 300/30m) dB	E-field (300m / 30m) (Pk) dBuV/m	(Qpk/Avg) dBuV/m	E-field Limit (300m / 30m) dBuV/m	Pass By	Comments
1	**RC11 – 125 kHz Tx Harmonics**													
2	CW	Coaxial - Horz	250.0	SHLOOP01	1.0	330.0	10.0	0.0	80.0	-25.2		19.6	44.8	
3		Coplanar - Vert	250.0	SHLOOP01	1.0	330.0	10.0	0.0	80.0	-28.1		19.6	47.7	
4		Coplanar - Horz	250.0	SHLOOP01	1.0	330.0	10.0	0.0	80.0	-27.2		19.6	46.8	
5		H/V (worst case)	375.0	SHLOOP01	1.0	330.0	10.0	0.0	80.0	-33.9		16.1	50.0	
6		H/V (worst case)	500.0	SHLOOP01	1.0	330.0	10.2	0.0	40.0	-5.3		33.6	38.9	noise
7		H/V (worst case)	625.0	SHLOOP01	1.0	330.0	10.2	0.0	40.0	-4.9		31.7	36.6	noise
8		H/V (worst case)	750.0	SHLOOP01	1.0	330.0	10.1	0.0	40.0	-8.1		30.1	38.2	noise
9		H/V (worst case)	875.0	SHLOOP01	1.0	330.0	10.2	0.0	40.0	17.6		28.8	11.2	background
10		H/V (worst case)	1000.0	SHLOOP01	1.0	330.0	10.4	0.0	40.0	-6.6		27.6	34.2	noise
11		H/V (worst case)	1125.0	SHLOOP01	1.0	330.0	10.4	0.0	40.0	-8.8		26.6	**35.4**	noise
12		H/V (worst case)	1250.0	SHLOOP01	1.0	330.0	10.4	0.0	40.0	-15.1		25.7	40.8	noise

* EUT was tested in CW mode. No averaging applies and Quasi-Peak data was not needed to demonstrate compliance.
** 40 dB/dec Near-field conversion factor employed.

Table 7(b): Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
9 kHz ≤ f ≤ 150 kHz	Pk/QPk	200 Hz	300 Hz	**Test Date:**	18-Dec-19
150 kHz ≤ f ≤ 30 MHz	Pk/QPk	9 kHz	30 kHz	**Test Engineer:**	Joseph Brunett
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**EUT Mode:**	CW
f > 1 000 MHz	Pk	3 MHz	3MHz	**Meas. Distance:**	3 meters
f > 1 000 MHz	Avg	3 MHz	10kHz	**EUT Tested:**	Allegion RC11

Transmit Chain Spurious Emissions

#	Mode	Test Antenna Polarization	Freq. MHz	Ant. Used	Ant Ht. m	Table Angle deg	Ka dB/m	Kg dB	Cf** (3 to 30m) dB	E-field*** (Pk) dBuV/m	E-field*** (Qpk/Avg) dBuV/m	E-field Limit (30m / 3m) dBuV/m	Pass By	Comments
1	**RC11 – 13.56 MHz Tx Harmonics**													
2	CW	Coaxial - Horz	27.1	SHLOOP01	1.0	330.0	8.7	0.0	20.0	12.5		29.5	17.0	max all, noise
3		Coplanar - Vert	27.1	SHLOOP01	1.0	330.0	8.7	0.0	20.0	11.2		29.5	18.3	max all, noise
4		Coplanar - Horz	27.1	SHLOOP01	1.0	330.0	8.7	0.0	20.0	9.1		29.5	20.4	max all, noise
5		H/V (worst case)	40.7	BICEMCO01	1.0	max all	11.5	-.4	.0	22.4		40.0	17.6	noise
6		H/V (worst case)	54.2	BICEMCO01	1.0	max all	10.1	-.4	.0	23.4		40.0	16.6	noise
7		H/V (worst case)	67.8	BICEMCO01	1.0	max all	9.7	-.4	.0	31.2		40.0	8.8	background
8		H/V (worst case)	81.4	BICEMCO01	1.0	max all	9.5	-.5	.0	23.8		40.0	16.2	noise
9		H/V (worst case)	94.9	BICEMCO01	1.0	max all	9.7	-.5	.0	32.5		43.5	11.0	background
10		H/V (worst case)	108.5	BICEMCO01	1.0	max all	10.6	-.6	.0	27.0		43.5	16.5	background
11		H/V (worst case)	122.0	BICEMCO01	1.0	max all	11.7	-.6	.0	22.3		43.5	21.2	noise
12		H/V (worst case)	135.6	BICEMCO01	1.0	max all	12.3	-.6	.0	23.6		43.5	19.9	noise

* EUT was tested in CW mode. No averaging applies and Quasi-Peak data was not needed to demonstrate compliance.

** 20 dB/dec Far-field conversion factor employed, if 3 meters > lambda/(2*pi)

*** When E-field is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings.

4.3.2 General Radiated Spurious

The results for the measurement of general spurious emissions (emissions arising from digital circuitry) at the nominal voltage and temperature are provided in Table 8. Radiation from digital components are measured up to 1000 MHz or to the highest frequency required by the applied standards, whichever is greater.

Table 8: Radiated Digital Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	18-Dec-19
f > 1 000 MHz	Pk	1 MHz	3 MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT:**	Allegion RC11
				EUT Mode:	LF+RF Active
				Meas. Distance:	3 meters

Digital Spurious Emissions FCC/IC + CE(CISPR)

#	Test Freq. MHz	Antenna QN Used	Test Pol.	Ant Ht. m	Table Angle deg	Ka dB/m	Kg dB	E-Field @ 3m** Pk dBµV/m	E-Field @ 3m** QPk/Avg dBµV/m	FCC/IC Class B E3lim dBµV/m	FCC/IC Class B Pass dB	CE Class B E3lim dBµV/m	CE Class B Pass dB	FCC/IC Class A E3lim dBµV/m	FCC/IC Class A Pass dB	CE Class A E3lim dBµV/m	CE Class A Pass dB	Comments
1	81.7	BICEMCO01	H	1.2	90.0	9.5	-.5	33.7	28.4	40.0	11.6	40.5	12.1	49.5	21.1	50.5	22.1	
2	81.7	BICEMCO01	V	1.0	90.0	9.5	-.5	25.8	21.7	40.0	18.3	40.5	18.8	49.5	27.8	50.5	28.8	
3	128.3	BICEMCO01	H	1.2	max all	12.0	-.6	42.4	40.0	43.5	3.5	40.5	0.5	54.0	14.0	50.5	10.5	
4	129.9	BICEMCO01	H	1,2	max all	12.1	-.6	42.1	39.4	43.5	4.1	40.5	1.1	54.0	14.6	50.5	11.1	
5	184.7	BICEMCO01	H	1.2	max all	14.4	-.8	41.3	39.8	43.5	3.7	40.5	0.7	54.0	14.2	50.5	10.7	
6	182.6	BICEMCO01	V	1.0	max all	14.3	-.8	39.9	29.7	43.5	13.8	40.5	10.8	54.0	24.3	50.5	20.8	
7	186.0	BICEMCO01	H	1.3	max all	14.5	-.8	42.9	40.4	43.5	3.1	40.5	0.1	54.0	13.6	50.5	10.1	
8	186.0	BICEMCO01	V	1.0	max all	14.5	-.8	41.4	40.1	43.5	3.4	40.5	0.4	54.0	13.9	50.5	10.4	
9	186.3	BICEMCO01	H	1.3	max all	14.6	-.8	42.0	39.9	43.5	3.6	40.5	0.6	54.0	14.1	50.5	10.6	
10	186.3	BICEMCO01	V	1.0	max all	14.6	-.8	40.5	38.9	43.5	4.6	40.5	1.6	54.0	15.1	50.5	11.6	
11	232.0	LOGEMCO01	H	1.3	max all	11.9	-3.1	47.1	45.6	46.0	0.4	47.5	1.9	56.9	11.3	57.5	11.9	
12	232.5	LOGEMCO01	V	1.8	max all	11.9	-3.1	45.9	36.9	46.0	9.1	47.5	10.6	56.9	20.0	57.5	20.6	
13	233.0	LOGEMCO01	H	1.3	max all	11.9	-3.1	47.9	45.8	46.0	**0.2**	47.5	1.7	56.9	11.1	57.5	11.7	
14	233.3	LOGEMCO01	V	1.8	max all	11.9	-3.1	46.9	45.2	46.0	0.8	47.5	2.3	56.9	11.7	57.5	12.3	
15	232.0	LOGEMCO01	H	1.5	max all	11.9	-3.1	44.2	42.1	46.0	3.9	47.5	5.4	56.9	14.8	57.5	15.4	
16	232.5	LOGEMCO01	V	1.5	max all	11.9	-3.1	41.9	39.8	46.0	6.2	47.5	7.7	56.9	17.1	57.5	17.7	
17	233.0	LOGEMCO01	H	1.5	max all	11.9	-3.1	46.2	44.6	46.0	1.4	47.5	2.9	56.9	12.3	57.5	12.9	
18	233.3	LOGEMCO01	V	1.5	max all	11.9	-3.1	38.9	36.2	46.0	9.8	47.5	11.3	56.9	20.7	57.5	21.3	
19	298.3	LOGEMCO01	V	1.5	max all	13.7	-3.6	22.0	22.4	46.0	24.0	47.5	25.5	56.9	34.9	57.5	35.5	
20	360.0	LOGEMCO01	H	1.5	max all	15.0	-4.1	42.7	42.6	46.0	3.4	47.5	4.9	56.9	14.3	57.5	14.9	
21	360.0	LOGEMCO01	V	1.5	max all	15.0	-4.1	32.4	30.3	46.0	15.7	47.5	17.2	56.9	26.6	57.5	27.2	
22	440.0	LOGEMCO01	H	1.0	max all	16.4	-4.6	42.8	42.4	46.0	3.6	47.5	5.1	56.9	14.5	57.5	15.1	
23	440.0	LOGEMCO01	V	1.3	max all	16.4	-4.6	35.7	35.3	46.0	10.7	47.5	12.2	56.9	21.6	57.5	22.2	
24	551.0	LOGEMCO01	H	1.0	max all	18.3	-5.3	42.6	41.6	46.0	4.4	47.5	5.9	56.9	15.3	57.5	15.9	
25	763.0	LOGEMCO01	H	1.0	max all	21.1	-6.4	38.7	35.7	46.0	10.3	47.5	11.8	56.9	21.2	57.5	21.8	BLE MODULE
26	993.0	LOGEMCO01	H	1.0	max all	24.0	-7.4	29.9	28.0	54.0	26.0	47.5	19.5	60.0	32.0	57.5	29.5	BLE MODULE
27	2388.4	HQR1TO18S01	H/V	1.5	max all	30.5	-6.5	49.5	35.3	54.0	18.7	50.0	14.7					BLE - 13.56
28	2483.5	HQR1TO18S01	H/V	1.5	max all	30.8	-6.7	46.2	32.1	54.0	21.9	50.0	17.9					BLE + 13.56
29	2400.0	HQR1TO18S01	H/V	1.5	max all	30.5	-6.6	40.3	30.3	54.0	23.7	50.0	19.7					BLE - 0.125
30	2483.5	HQR1TO18S01	H/V	1.5	max all	30.8	-6.7	44.2	31.8	54.0	22.2	50.0	18.2					BLE + 0.125
31																		
32	No other emissions observed within 15 dB of the FCC Class B limit up to 26.5 GHz																	
33																		
34																		
35																		

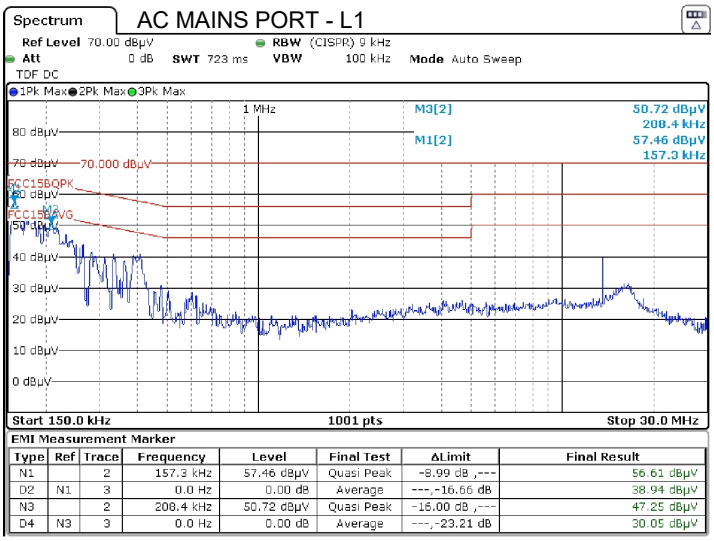
*QPk detection below 1 GHz, Avg detection at or above 1 GHz with receiver bandwidth as specified at top of table.

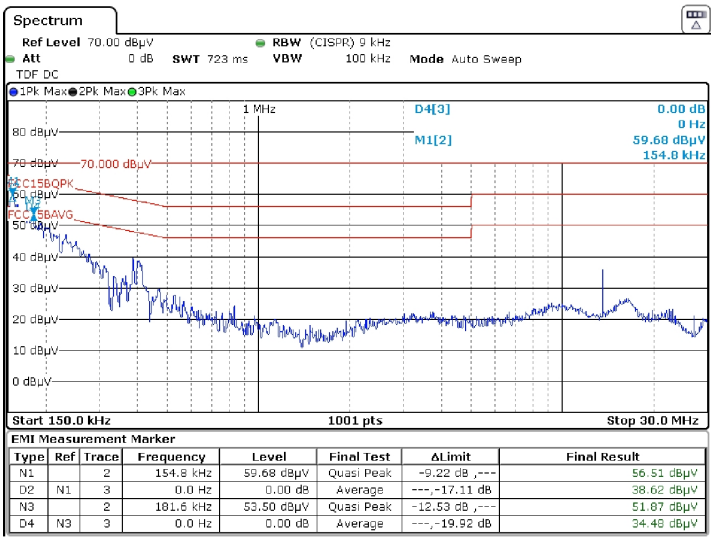
** When E-field is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings.

4.3.3 Conducted Emissions Test Results - AC Power Port(s)

The results of emissions from the EUT's AC mains power port(s) are reported in Table 9.

Table 9: AC Mains Power Conducted Emissions Results.





5 Measurement Uncertainty and Accreditation Documents

The maximum values of measurement uncertainty for the laboratory test equipment and facilities associated with each test are given in the table below. This uncertainty is computed for a 95.45% confidence level based on a coverage factor of $k = 2$.

Table 10: Measurement Uncertainty.

Measured Parameter	Measurement Uncertainty†
Radio Frequency	$\pm(f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS-1))/2 + 1\,\text{Hz})$
Conducted Emm. Amplitude	$\pm 1.9\,\text{dB}$
Radiated Emm. Amplitude $(30 - 200\,\text{MHz})$	$\pm 4.0\,\text{dB}$
Radiated Emm. Amplitude $(200 - 1000\,\text{MHz})$	$\pm 5.2\,\text{dB}$
Radiated Emm. Amplitude $(f > 1000\,\text{MHz})$	$\pm 3.7\,\text{dB}$

†Ref: CISPR 16-4-2:2011+A1:2014


United States Department of Commerce
National Institute of Standards and Technology

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NVLAP LAB CODE: 200129-0

AHD (Amber Helm Development, L.C.)
Sister Lakes, MI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2019-06-28 through 2020-06-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

Figure 9: Accreditation Documents