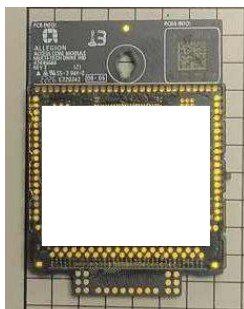


LF Test Report

regarding

USA: CFR Title 47, Part 15.225 (Emissions)
Canada: RSS-210v10/GENv5 (Emissions)

for



47446672

Category: Keycard Access Module

Judgments:

Complies with FCC Part 15.209, and ISED RSS-210v10

Testing Completed: March 1, 2023



Prepared for:

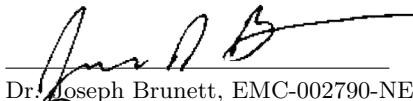
Allegion, PLC

11819 North Pennsylvania Street, Carmel Indiana 46032 USA

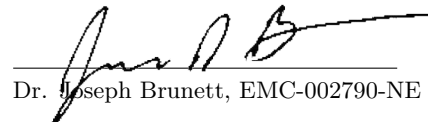
Phone: +1 (317) 810-3362, Fax: +1 (317) 810-3193

Contact: Frank Nardelli, Frank.Nardelli@allegion.com

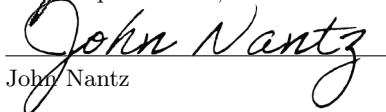
Data Rec./Rev. by:


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Rpt. Prep./Rev. by:


John Nantz

Date of Issue:

March 1, 2023

Revision History

Rev. No.	Date	Details	Revised By
r0	March 1, 2023	Initial Release.	J. Brunett
r1	June 13, 2023	add AC Emm. data.	J. Brunett

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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 April 2033.

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 laboratory's scope of accreditation. Any data in this report that is not covered under the laboratory's scope is clearly identified.

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

This report shall not be reproduced, except in full, without the written approval of Amber Helm Development L.C.

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
Spectrum Analyzer	R & S / FSV30	101660	RSFSV30001	RS / Apr-2024
Spectrum Analyzer	R & S / FPC1500	101692	RSFPC15001	RS / Dec-2023
Shielded Loop Antenna	EMCO / 6507	9012-1264	EMCOLOOP2	Keysight / Aug-2023
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Keysight / Aug-2023
Log Periodic Antenna	EMCO / 3146	9305-3614	LOGEMCO01	Keysight / Aug-2023

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The goal of Allegion, PLC 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 Allegion, PLC 47446672 for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.225
Canada	ISED Canada	RSS-210v10/GENv5

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"
TP0102RA	"AHD Internal Document TP0102 - Radiated Emissions Test Procedure"

3 Configuration and Identification of the Equipment Under Test

3.1 Description and Declarations

The EUT is an access card reader module. The EUT is approximately 3.5 x 5 x 0.5 cm in dimension, and is depicted in Figure 1. It is powered by 3.3 VDC lock power system. This product is used as an access reader to enable key free access to the manufacturer's lockset host products. Table 3 outlines provider declared EUT specifications.

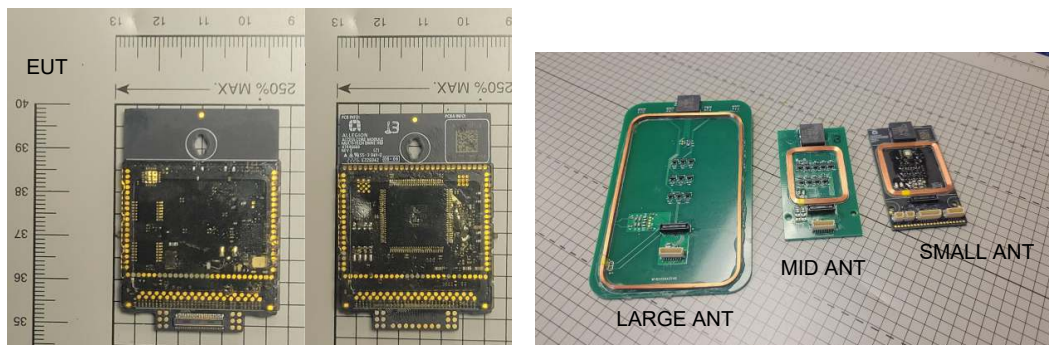


Figure 1: Photos of EUT.

Table 3: EUT Declarations.

General Declarations	
Equipment Type:	Keycard Access Module
Country of Origin:	Not Declared
Nominal Supply:	3.3 VDC
Oper. Temp Range:	Not Declared
Frequency Range:	125 kHz
Antenna Dimension:	Integral
Antenna Type:	Coils (large, medium, small)
Antenna Gain:	Integral
Number of Channels:	1
Channel Spacing:	None
Alignment Range:	Not Declared
Type of Modulation:	ASK
United States	
FCC ID Number:	XPB-47446672
Classification:	DXX
Canada	
IC Number:	8053B-47446672
Classification:	Other

3.1.1 EUT Configuration

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

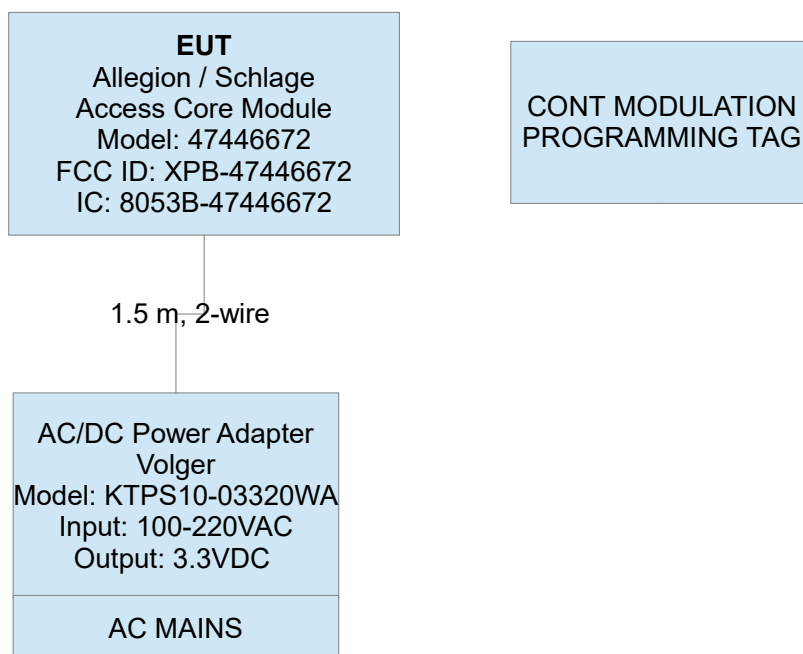


Figure 2: EUT Test Configuration Diagram.

3.1.2 Modes of Operation

The EUT is capable of two modes of operation, POLLING continuously to detect a 125 kHz tag and TAG READ interrogation if detected. Both modes are tested herein. This product is also populated with 13.56 MHz NFC proximity tag reader circuitry with test data reported in AHD Report No. ALGACA-WR2240USA. Digital spurious and AC mains spurious emissions are reported with both radios active. Furthermore, this EUT has been evaluated when co-located with this manufacturer's DTS transceiver modules (Digital Core modules, FCC ID: XPB-47334321, IC: 8053B-47334321 and FCC ID: XPB-47334317, IC: 8053B-47334317) in a separate host / cabinet emissions report, AHD Report No. ALGACA-WR2240USC.

3.1.3 Variants

There is only a single version of the EUT.

3.1.4 Test Samples

Two samples of the fully populated EUT were provided for testing along with 3 unique PCB/coil antennas that can be employed. Each EUT sample was capable of either normal operation or forced transmission for testing via a custom programming tag. Test data is provided demonstrating compliance with all three antennas. The EUT employs unique power and antenna board connectors used only by the module manufacturer, preventing this module's use in any device other than those tested and authorized by this module manufacturer.

3.1.5 Functional Exerciser

Normal functionality was confirmed by measurement of transmitted signals.

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

The EUT is a module, subject to further compliance evaluation in every host into which it may be employed. The manufacturer intends to complete this testing via SDoC evaluation completed separately.

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.

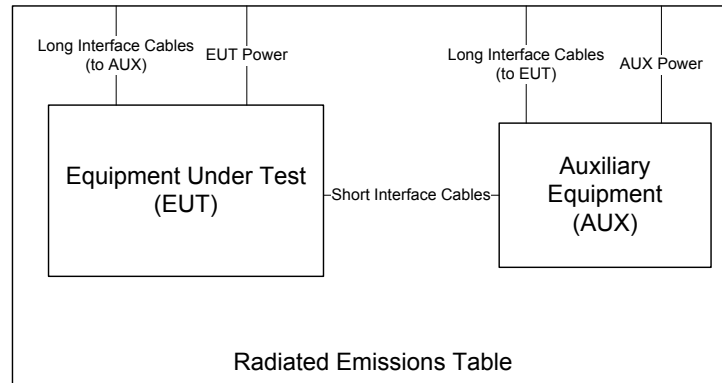


Figure 3: Radiated Emissions Diagram of the EUT.

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 regulation. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, 10cm diameter single-axis broadband probes meeting the requirements of ISSED SPR-002 section 5.2 are employed. Measurements are repeated and summed over three axes, and the entire frequency range is measured with and without the EUT transmitting.

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° 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.

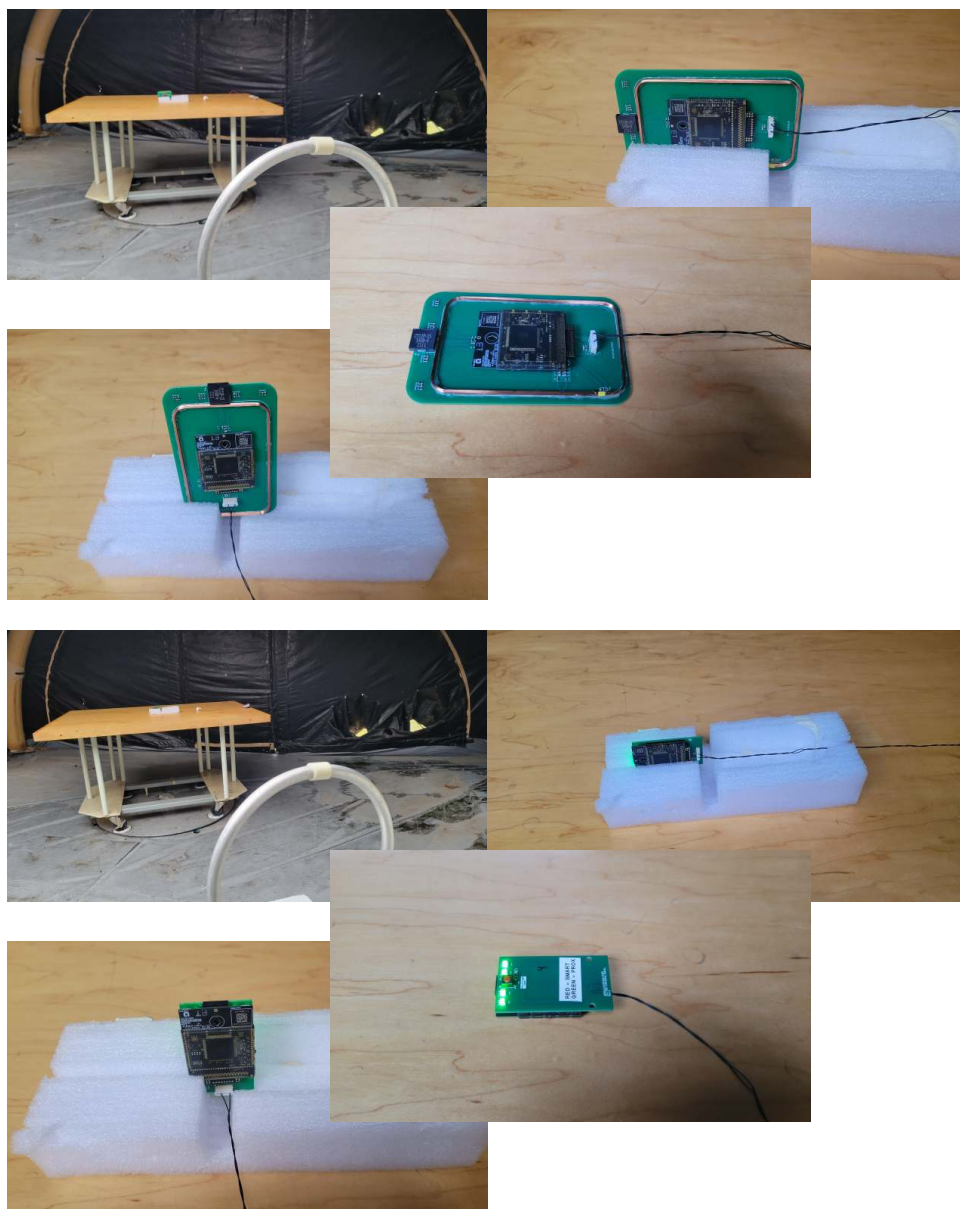


Figure 4: Radiated Emissions Test Setup Photograph(s).

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.

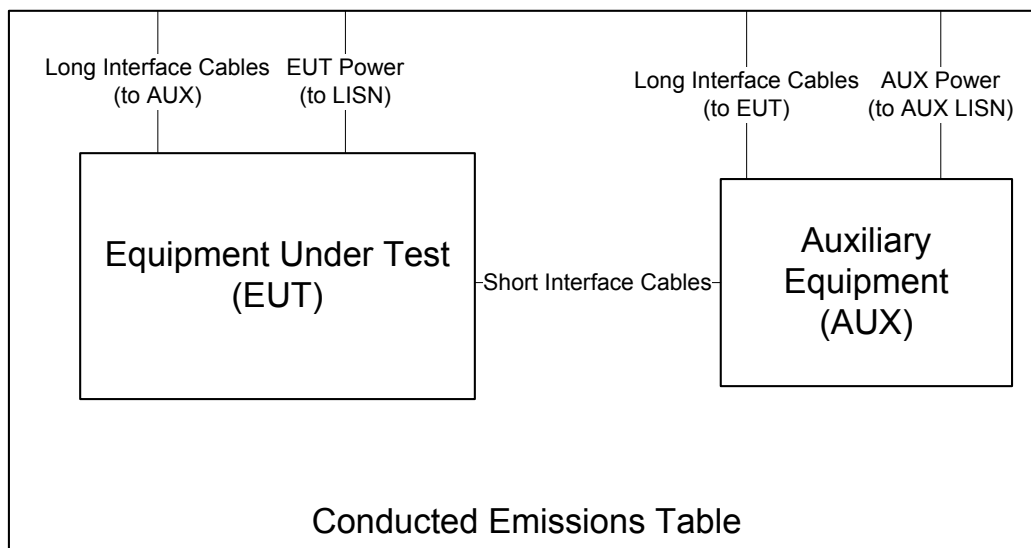


Figure 5: Conducted Emissions Setup Diagram of the EUT.

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).

Test Date: 11-Dec-22
 Test Engineer: Joseph Brunett
 EUT Mode: See Below
 Meas. Distance: 10cm
 EUT Tested: Allegion AC

#	EUT Mode	Overall Transmission			Internal Frame Characteristics			Computed Duty Cycle*	
		Min. Repetition Rate (sec)	Max. No. of Frames	Total Transmission Length (sec)	Max. Frame Length (ms)	Min. Frame Period (s)	Frame Encoding	(%)	Duty (dB)
1	Polling 125kHz	0.73	1	0.025	25.0	0.726	when powered, the EUT polls for the presense of an access tag via a 25ms frame every 726 ms.	100.000	*
2	Tag Read 125kHz	N/A	1	0.168	168.0	-	When a tag is presented to the EUT, it is interrogated via a 168ms long transmission.	100.000	*

* No Duty Cycle is employed when demonstrating compliance.



Figure 7: Example 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	Test Date:	11-Dec-22
9 kHz ≤ f ≤ 150 kHz	Pk	> 1% Span	≥ 3 * IFBW	Test Engineer:	Joseph Brunett
150 kHz ≤ f ≤ 30 MHz	Pk	> 1% Span	≥ 3 * IFBW	EUT Mode:	See Below
				Meas. Distance:	0.6 m
				EUT Tested:	Allegion AC

#	Mode	Frequency (MHz)	Temp (C)	Supply (VDC)	20 dB EBW (kHz)	99% EBW (kHz)	110 kHz Restricted Band* (dBc)		
1	Polling + Tag Read	0.1243	20	3.3	18.2	10.49	39.7		
2									

* Note: The EUT emissions in the 90-110 kHz restricted band are within 20 dB of the fundamental. However, the FCC permits emissions in that band so long as they are beyond the first null of the modulated spectrum, as those are not considered part of the fundamental intentional emission.

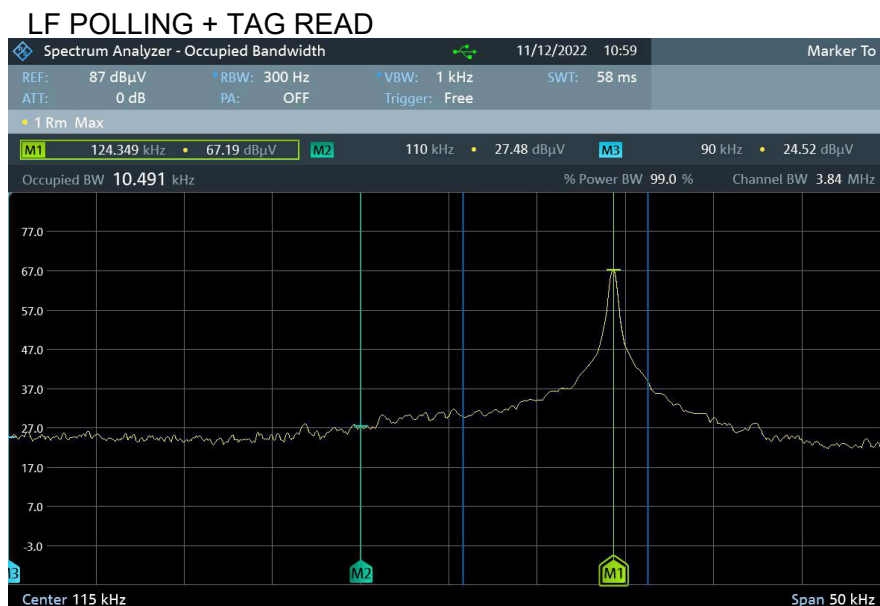


Figure 8: Example Intentional Emission Bandwidth.

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				Test Date:			11-Dec-22		
9 kHz ≤ f ≤ 150 kHz		Pk/QPk		200 Hz		300 Hz				Test Engineer:			J. Brunett		
150 kHz ≤ f ≤ 30 MHz		Pk/QPk		9 kHz		30 kHz				EUT Mode:			CM		
25 MHz ≤ f ≤ 1 000 MHz		Pk/QPk		120 kHz		300 kHz				Meas. Distance:			3 meters		
f > 1 000 MHz		Pk		1 MHz		3MHz				EUT Tested:			Allegion AC		
f > 1 000 MHz		Avg		1 MHz		3MHz									

Fundamental Emissions Measurements																		
#	Mode	EUT Orientation	Freq. kHz	Ant. Used QN	Ant.** Height m	Table Azim deg	Ka dB/m	Kg dB	C ^{***} 3m / 300m dB	E-field @ 3m		E-field @ 300m			H-field @ 300m (ISED)			Pass By***
										Pk	Qpk dBuV/m	Pk	Qpk dBuV/m	Limit Qpk	Pk	Qpk dBuA/m	Limit Qpk	
1	CM - Large Antenna	Flat	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	84.9		4.9		25.7	-46.6		-25.8	20.8
2		Side	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	78.9		-1.1		25.7	-52.6		-25.8	26.8
3		End	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	74.9		-5.1		25.7	-56.6		-25.8	30.8
1	CM - Medium Antenna	Flat	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	71.1		-8.9		25.7	-60.4		-25.8	34.6
2		Side	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	65.2		-14.8		25.7	-66.3		-25.8	40.5
3		End	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	63.0		-17.0		25.7	-68.5		-25.8	42.7
1	CM - Small Antenna	Flat	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	66.8		-13.2		25.7	-64.7		-25.8	38.9
2		Side	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	61.0		-19.0		25.7	-70.5		-25.8	44.7
3		End	124.3	EMCOLOOP1	1.0	0	10.1	0.0	80.0	56.0		-24.0		25.7	-75.5		-25.8	49.7

#	Mode	Test Antenna Polarization	Freq. kHz	DC Supply Voltage	E-field dBuV/m
4	CM - Large Antenna	Flat	124.3	3.5	84.9
5			124.3	3.3	84.9
6			124.3	2.8	OFF

Measured OATS Field Decay Rate Applied for Cf				
Freq. kHz	Dist from EUT m	E (Pk) dBuV/m	Formula Fit	
124.3	3	129.5	E (Pk) vs Distance	
124.3	1.0	126.0	Base 10 Rate of Decay***	

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: Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:
9 kHz ≤ f ≤ 150 kHz	Pk/QPk	200 Hz	300 Hz	11-Dec-22
150 kHz ≤ f ≤ 30 MHz	Pk/QPk	9 kHz	30 kHz	Test Engineer: J. Brunett
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	EUT Mode: CM
f > 1 000 MHz	Pk/Avg	1 MHz	3MHz	Meas. Distance: 3 meters
				EUT Tested: Allegion AC

Transmit Chain Spurious Emissions																			
#		EUT	Freq.	Ant.	Ant.** Height m	Table Azim deg	Ka	Kg	C1*** (3 to 30/300m) dB	E-field @ 3m Pk dBuV/m	E-field @ 30/300m			H-field @ 30/300m (ISED)			Pass By		
	Mode	Orientation	kHz	Used							Pk	Qpk dBuV/m	Limit Qpk	Pk	Qpk dBuA/m	Limit Qpk			Comments
1	CM - Large Antenna	Max All, Worst	248.6	EMCOLOOP1	1.0	90	10.0	0.0	80.0	71.2	-8.8		19.7	-60.3		-31.8	28.5		
2		Max All, Worst	372.9	EMCOLOOP1	1.0	90	10.0	0.0	80.0	63.6	-16.4		16.2	-67.9		-35.3	32.6		
3		Max All, Worst	497.2	EMCOLOOP1	1.0	90	10.2	0.0	40.0	56.2	16.2		33.7	-35.3		-17.8	17.5		
4		Max All, Worst	621.5	EMCOLOOP1	1.0	90	10.2	0.0	40.0	44.9	4.9		31.7	-46.6		-19.8	26.8		
5		Max All, Worst	745.8	EMCOLOOP1	1.0	90	10.1	0.0	40.0	38.0	-2.0		30.2	-53.5		-21.4	32.2		
6		Max All, Worst	870.1	EMCOLOOP1	1.0	90	10.3	0.0	40.0	35.1	-4.9		28.8	-56.4		-22.7	33.7		
7		Max All, Worst	994.4	EMCOLOOP1	1.0	90	11.5	0.0	40.0	48.3	8.3		27.7	-43.2		-23.9	19.4	background	
8		Max All, Worst	1118.7	EMCOLOOP1	1.0	90	11.3	0.0	40.0	41.2	1.2		26.6	-50.3		-24.9	25.4		
9		Max All, Worst	1243.0	EMCOLOOP1	1.0	90	12.3	0.0	40.0	54.0	14.0		25.7	-37.5		-25.8	11.7	background	
1	CM – Medium Antenna	Max All, Worst	248.6	EMCOLOOP1	1.0	90	10.0	0.0	80.0	55.7	-24.3		19.7	-75.8		-31.8	44.0		
2		Max All, Worst	372.9	EMCOLOOP1	1.0	90	10.0	0.0	80.0	40.3	-39.7		16.2	-91.2		-35.3	55.9		
3		Max All, Worst	497.2	EMCOLOOP1	1.0	90	10.2	0.0	40.0	37.9	-2.1		33.7	-53.6		-17.8	35.8		
4		Max All, Worst	621.5	EMCOLOOP1	1.0	90	10.2	0.0	40.0	33.9	-6.1		31.7	-57.6		-19.8	37.8		
5		Max All, Worst	745.8	EMCOLOOP1	1.0	90	10.1	0.0	40.0	32.7	-7.3		30.2	-58.8		-21.4	37.5		
6		Max All, Worst	870.1	EMCOLOOP1	1.0	90	10.3	0.0	40.0	35.1	-4.9		28.8	-56.4		-22.7	33.7		
7		Max All, Worst	994.4	EMCOLOOP1	1.0	90	11.5	0.0	40.0	48.3	8.3		27.7	-43.2		-23.9	19.4	background	
8		Max All, Worst	1118.7	EMCOLOOP1	1.0	90	11.3	0.0	40.0	41.2	1.2		26.6	-50.3		-24.9	25.4		
9		Max All, Worst	1243.0	EMCOLOOP1	1.0	90	12.3	0.0	40.0	54.0	14.0		25.7	-37.5		-25.8	11.7	background	
1	CM – Small Antenna	Max All, Worst	248.6	EMCOLOOP1	1.0	90	10.0	0.0	80.0	50.2	-29.8		19.7	-81.3		-31.8	49.5		
2		Max All, Worst	372.9	EMCOLOOP1	1.0	90	10.0	0.0	80.0	40.3	-39.7		16.2	-91.2		-35.3	55.9		
3		Max All, Worst	497.2	EMCOLOOP1	1.0	90	10.2	0.0	40.0	40.3	0.3		33.7	-51.2		-17.8	33.4		
4		Max All, Worst	621.5	EMCOLOOP1	1.0	90	10.2	0.0	40.0	36.7	-3.3		31.7	-54.8		-19.8	35.0		
5		Max All, Worst	745.8	EMCOLOOP1	1.0	90	10.1	0.0	40.0	33.7	-6.3		30.2	-57.8		-21.4	36.5		
6		Max All, Worst	870.1	EMCOLOOP1	1.0	90	10.3	0.0	40.0	35.1	-4.9		28.8	-56.4		-22.7	33.7		
7		Max All, Worst	994.4	EMCOLOOP1	1.0	90	11.5	0.0	40.0	48.3	8.3		27.7	-43.2		-23.9	19.4	background	
8		Max All, Worst	1118.7	EMCOLOOP1	1.0	90	11.3	0.0	40.0	41.2	1.2		26.6	-50.3		-24.9	25.4		
9		Max All, Worst	1243.0	EMCOLOOP1	1.0	90	12.3	0.0	40.0	54.0	14.0		25.7	-37.5		-25.8	11.7	background	

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

** Emissions were evaluated at 1m test antenna height from 9 kHz to 30 MHz. No significant spurious were observed past the 10th harmonic.

*** FCC E-field 40 dB/dec decay assumed. EUT field decay rate was not measured over a range of distances to determine CF between measurement and limit distance.

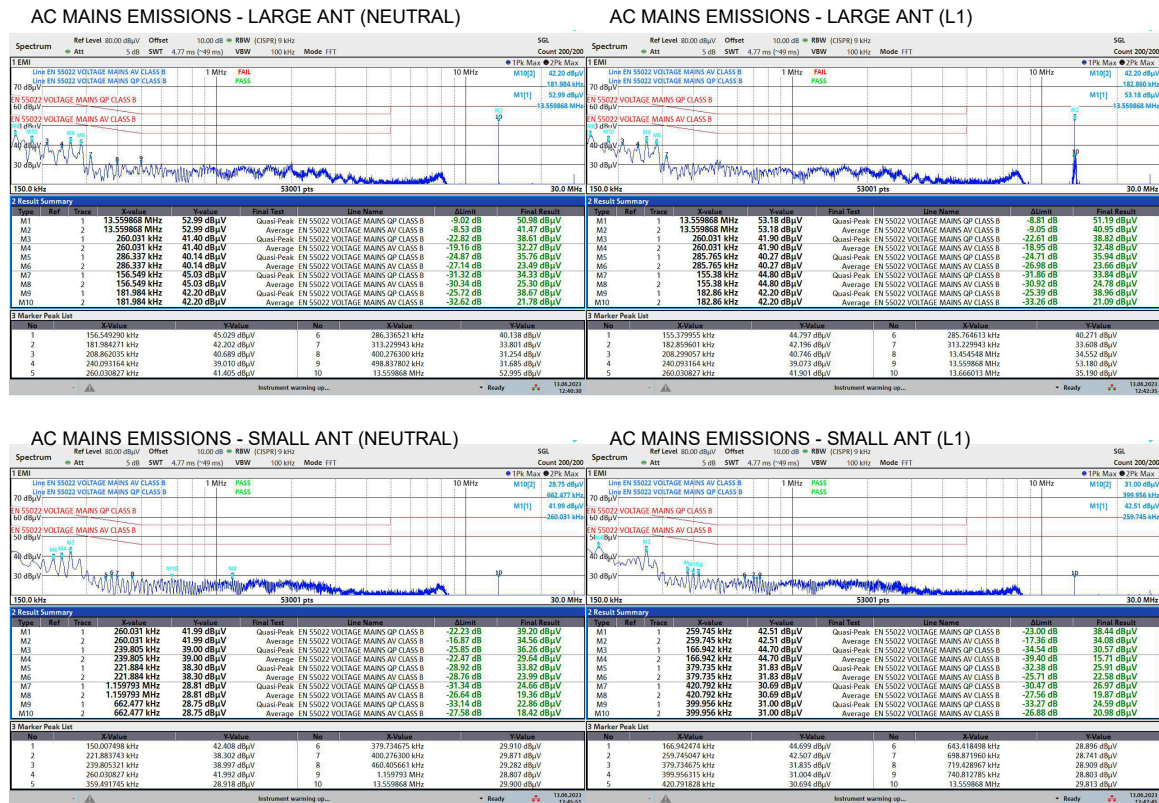
Measured OATS Field Decay Rate to Confirm Field Conversion below 490 KHz											
Freq. kHz	Dist. m	Pr (Pk) dBm	Formula Fit Pr (Pk) vs Distance	Freq. kHz	Dist. m	Pr (Pk) dBm	Formula Fit Pr (Pk) vs Distance	Freq. kHz	Dist. m	Pr (Pk) dBm	Formula Fit Pr (Pk) vs Distance
248.6	.5	84	-20.198 ln(x) - 67.7	372.9	.5	86.4	-22.766 ln(x) - 52.96	497.2	.5	82.1	-23.011 ln(x) - 67.37
248.6	1.0	67	Base 10 Rate of Decay**	372.9	1.0	84.0	Base 10 Rate of Decay**	497.2	1.0	66.0	Base 10 Rate of Decay**
248.6	2.0	82	(dB/dec)	372.9	2.0	69.0	(dB/dec)	497.2	2.0	84.0	(dB/dec)
248.6	4.0	noise	-46.5	372.9	4.0	85.0	-52.4	497.2	4.0	noise	-53.0

*** A Ln (x) = 2.303*A Log(x).

4.3.2 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 8.

Table 8: 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 9: 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 ($f < 30 \text{ MHz}$)	$\pm 3.1 \text{ dB}$
Radiated Emm. Amplitude (30 – 200 MHz)	$\pm 4.0 \text{ dB}$
Radiated Emm. Amplitude (200 – 1000 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



Figure 9: Accreditation Documents