Allegion

TEST REPORT FOR

Multi Tech Reader
Model: MT11-485

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.209

Report No.: 99080-4

Date of issue: December 7, 2016

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Allegion
500 Golden Ridge Road, Bldg 1, Suite 160
Golden, CO 80401

REPRESENTATIVE: Bryan Hoff
Customer Reference Number: 4071752

REPORT PREPARED BY:

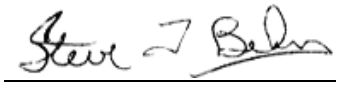
Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 99080

DATE OF EQUIPMENT RECEIPT: November 14, 2016
DATE(S) OF TESTING: November 14-15, 2016

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	US1024	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.209

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.209	Field Strength of Fundamental	NA	Pass
15.209	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	NP

NA = Not Applicable

NP = CKC Laboratories was not contracted to perform test.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
None

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
Since previous testing, the manufacturer has made the following modifications to the EUT. Testing was performed to demonstrate continued compliance with the incorporated modifications. Modifications made to the EUT prior to testing: 1. Main Board - U1 – NXP CLRC663 o Added more vias to the pad footprint o Moved traces from under the part on inner layer ▪ SPI Com Port – MOSI,MISO,SCK,NSS 2. Moved component FR4 a few hundred mils up the board o Bottom layer - moved trace associated with this part as well to adjust for part move 3. Main Board - U6 – NXP P5FD081 o Added vias o Moved traces from under the part, inner layer ▪ LED control Red and Green 4. Daughter Board - U1 Microchip PIC24FJ32GA104 o Added vias o Moved traces from under the part on all layers where traces were.

EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Multi Tech Reader	Allegion	MT11-485	16440006

Support Equipment:

Device	Manufacturer	Model #	S/N
DC Power Supply	HP	6205C	2228A01775

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type:	CW
Maximum Duty Cycle:	Not Performed
Antenna Type(s) and Gain:	Coil Antenna / .00165m^2
Antenna Connection Type:	Integral
Nominal Input Voltage:	12VDC
Firmware / Software used for Test:	X09_14 and X14_14

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

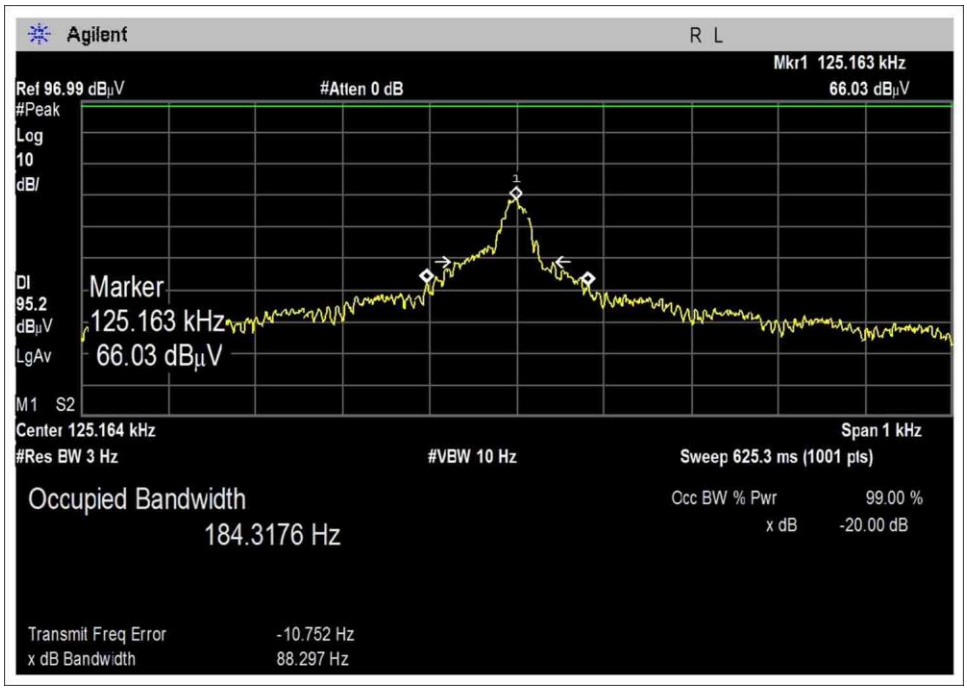
Test Setup/Conditions			
Test Location:	Mariposa Lab A	Test Engineer:	Benny Lovan
Test Method:	ANSI C63.10 (2013)	Test Date(s):	11/14/16
Configuration:	1		
Test Setup:	Radiated Emissions Fundamental Measurements (125kHz) Modulation: CW Antenna Type: Integral (Proximity Coil) Antenna Gain 0dB Gain Antenna Size: .00165m^2 The EUT is powered by a DC power supply at 12VDC. The customer declares the EUT standard method of installation is wall mounted in the upright/vertical (Y-axis) orientation. The EUT is setup on an 80cm foam block. It has been programmed to continuously transmit the RFID signal at 125kHz. A card is placed in front of the EUT and it is reading the card continuously. Measurements reported are from the worst case orientation (Y-Axis)		

Environmental Conditions			
Temperature (ºC)	16	Relative Humidity (%):	50

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P06231	Cable	Andrew	CXTA04A-70	3/3/2016	3/3/2018
P06847	Cable	Times Microwave Systems	LMR195-FR-6	7/9/2015	7/9/2017
P06232	Cable	Andrew	CXTA04A-35	3/3/2016	3/3/2018
AN00226	Loop Antenna	EMCO	6502	4/4/2016	4/4/2018
02668	Spectrum Analyzer	Agilent	E4446A	8/26/2016	8/26/2017

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
125kHz	Integral	CW	0.088297	None	NA

Plot



Test Setup Photos

15.209 Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation / Ant Port**	**$V_{Minimum}$ (dBuV/m)**	**$V_{Nominal}$ (dBuV/m)**	**$V_{Maximum}$ (dBuV/m)**	**Max Deviation from $V_{Nominal}$ (dB)**
0.125 Parallel	CW / Integral Antenna	1	1	1.2	0.2
0.125 Perpendicular	CW / Integral Antenna	-15.9	-15.8	-15.9	0.1
0.125 Ground Parallel	CW / Integral Antenna	-3.0	-3.3	-3.2	0.3

Test performed using operational mode with the highest output power, representing worst case. Worst case orientation for this unit was the Y-Axis.

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

Parameter	Value
$V_{Nominal}$:	12VDC
$V_{Minimum}$:	5 VDC
$V_{Maximum}$:	16 VDC

Test Data Summary – Radiated Field Strength Measurement					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Measured (dBuV/m @ 300m)**	**Limit (dBuV/m @ 300m)**	**Results**
0.125 (Parallel)	CW	Integral	1	≤25.7	Pass
0.125 (Perpendicular)	CW	Integral	-15.8	≤25.7	Pass
0.125 (Ground Parallel)	CW	Integral	-3.3	≤25.7	Pass

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 209-966-5240		
Customer:	**Allegion**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**99080**	Date:	11/15/2016
Test Type:	**Radiated Scan**	Time:	08:01:36
Tested By:	Benny Lovan	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Emissions Fundamental Measurements (125kHz)

Temperature: 16°C
Humidity:50%
Atmospheric Pressure: 98.2 kPa

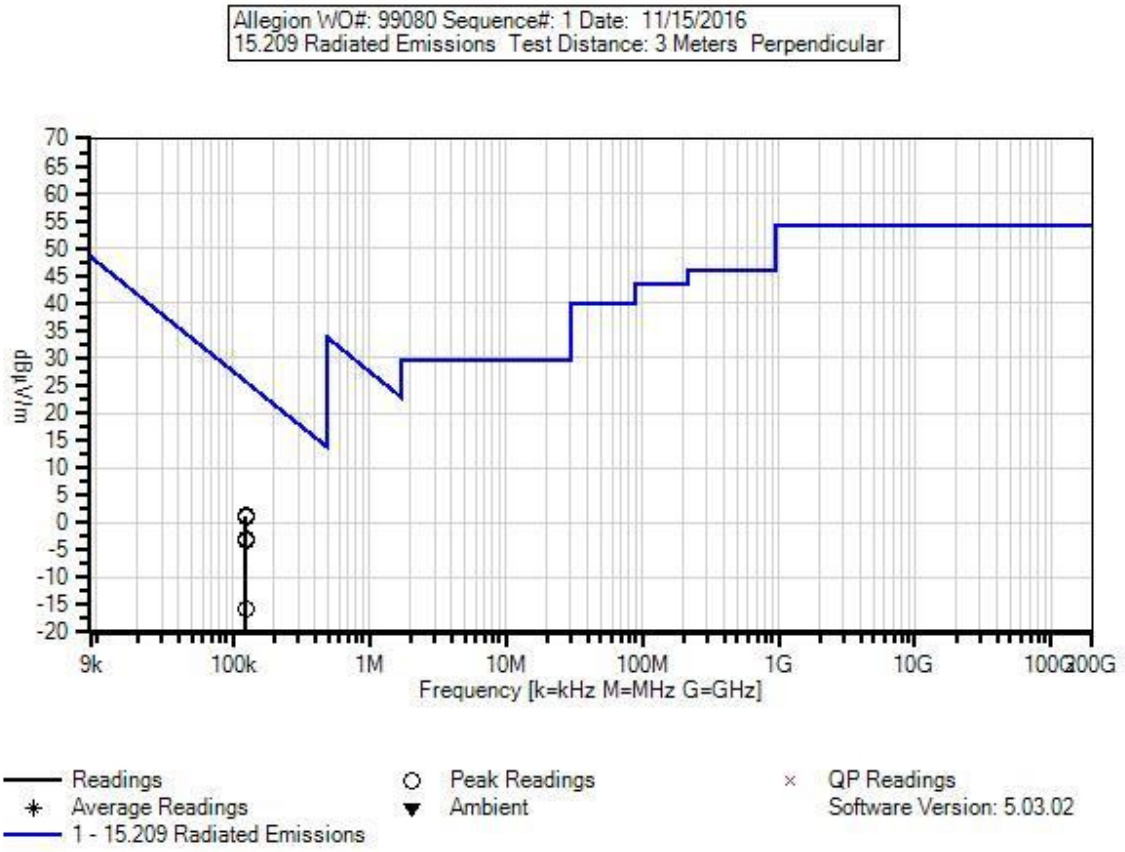
Method: ANSI C63.10 2013

Modulation: CW
Antenna Type: Integral (Proximity Coil)
Antenna Gain 0dB Gain
Antenna Size: .00165m^2

The EUT is powered by a DC power supply at 12VDC. The customer declares the EUT standard method of installation is wall mounted in the upright/vertical (Y-axis) orientation.
The EUT is setup on an 80cm foam block. It has been programmed to continuously transmit the RFID signal at 125kHz. A card is placed in front of the EUT and it is reading the card continuously.

Measurements reported are worst case between two orientations (Y-Axis).

Voltage variation of 5VDC and 16VDC are also provided (Rated Voltages).


Allegion WO#: 99080 Sequence#: 1 Date: 11/15/2016
15.209 Radiated Emissions Test Distance: 3 Meters Perpendicular
dBµV/m
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
9k
100k
1M
10M
100M
1G
10G
100G
200G
Frequency [k=kHz M=MHz G=GHz]
Readings
Average Readings
1 - 15.209 Radiated Emissions
Peak Readings
Ambient
QP Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	4/4/2016	4/4/2018
T2	ANP06232	Cable	CXTA04A-35	3/3/2016	3/3/2018
T3	ANP06231	Cable	CXTA04A-70	3/3/2016	3/3/2018
T4	ANP06847	Cable	LMR195-FR-6	7/9/2015	7/9/2017
	02668	Spectrum Analyzer	E4446A	8/26/2016	8/26/2017

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	125.105k	70.7	+10.5	+0.0	+0.0	+0.0	-80.0	1.2	25.7	-24.5	Paral
									16VDC Voltage VAR		
2	125.165k	70.5	+10.5	+0.0	+0.0	+0.0	-80.0	1.0	25.6	-24.6	Paral
									5VDC Voltage VAR		
3	125.087k	70.5	+10.5	+0.0	+0.0	+0.0	-80.0	1.0	25.7	-24.7	Paral
									12VDC Nominal		
4	125.099k	66.5	+10.5	+0.0	+0.0	+0.0	-80.0	-3.0	25.7	-28.7	Groun
									5VDC Voltage VAR		
5	125.109k	66.3	+10.5	+0.0	+0.0	+0.0	-80.0	-3.2	25.7	-28.9	Groun
									16VDC Voltage VAR		
6	125.107k	66.2	+10.5	+0.0	+0.0	+0.0	-80.0	-3.3	25.7	-29.0	Groun
									12VDC Nominal		
7	125.165k	53.6	+10.5	+0.0	+0.0	+0.0	-80.0	-15.9	25.6	-41.5	Perpe
									5VDC Voltage VAR		
8	125.119k	53.7	+10.5	+0.0	+0.0	+0.0	-80.0	-15.8	25.7	-41.5	Perpe
									12VDC Nominal		
9	125.159k	53.6	+10.5	+0.0	+0.0	+0.0	-80.0	-15.9	25.6	-41.5	Perpe
									16VDC Voltage VAR		

Test Setup Photos

15.209 Radiated Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 209-966-5240		
Customer:	**Allegion**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**99080**	Date:	11/15/2016
Test Type:	**Radiated Scan**	Time:	11:10:08
Tested By:	Benny Lovan	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Emissions Fundamental Measurements (125kHz)
Frequency range tested: 9kHz - 30MHz

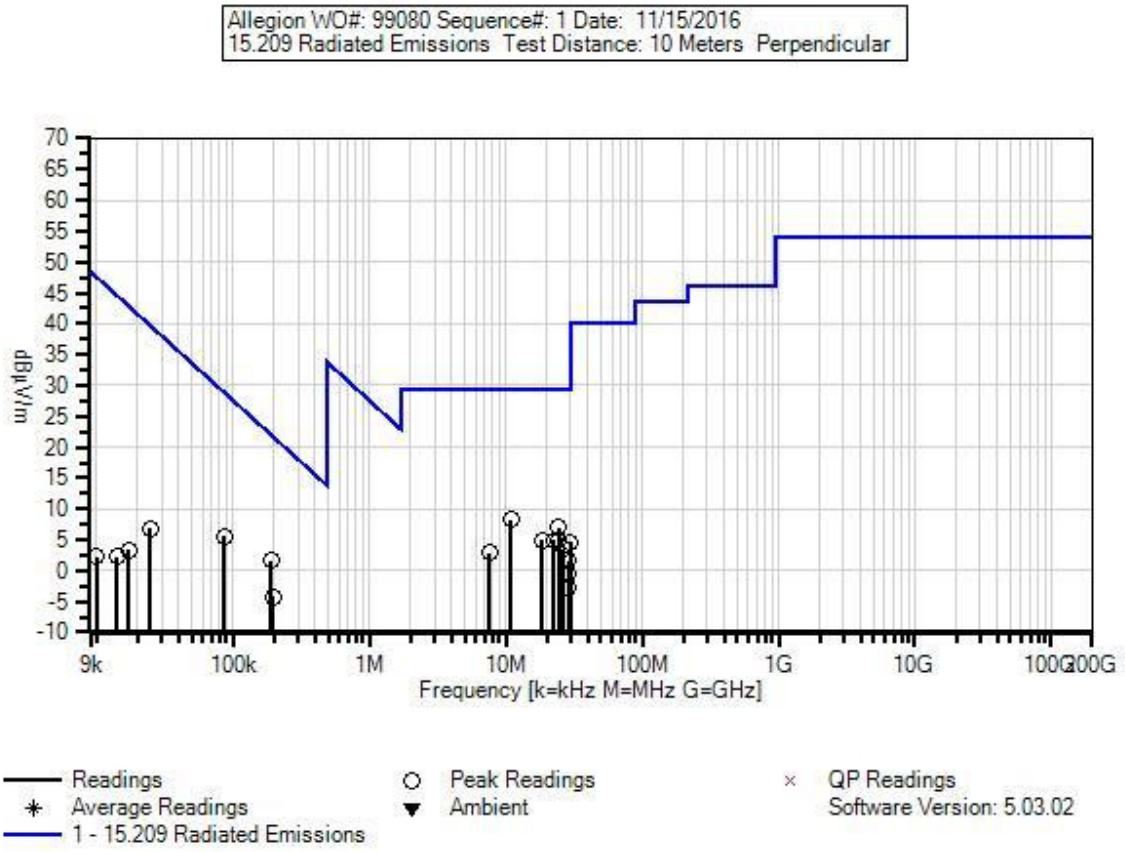
Temperature: 16°C
Humidity:50%
Atmospheric Pressure: 98.2 kPa

Method: ANSI C63.10 2013

Modulation: CW
Antenna Type: Integral (Proximity Coil)
Antenna Gain 0dB Gain
Antenna Size: .00165m^2

The EUT is powered by a DC power supply at 12VDC. The customer declares the EUT standard method of installation is wall mounted in the upright/vertical (Y-axis) orientation.
The EUT is setup on an 80cm foam block. It has been programmed to continuously transmit the RFID signal at 125kHz. A card is placed in front of the EUT and it is reading the card continuously.

Measurements made in two orientations and the data reported is worst case of the data observed (Y-Axis).


Allegion WO#: 99080 Sequence#: 1 Date: 11/15/2016
15.209 Radiated Emissions Test Distance: 10 Meters Perpendicular
dBµV/m
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
9k
100k
1M
10M
100M
1G
10G
100G
200G
Frequency [k=kHz M=MHz G=GHz]
Readings
Average Readings
1 - 15.209 Radiated Emissions
Peak Readings
Ambient
QP Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	4/4/2016	4/4/2018
T2	ANP06847	Cable	LMR195-FR-6	7/9/2015	7/9/2017
T3	ANP06230	Cable	CXTA04A-50	3/3/2016	3/3/2018
T4	ANP04249	Cable	CXTA04A-50	3/3/2016	3/3/2018
	02668	Spectrum Analyzer	E4446A	8/26/2016	8/26/2017

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	190.170k	50.5	+10.0	+0.0	+0.1	+0.1	-59.1	1.6	22.0	-20.4	Perpe
2	10.939M	16.8	+9.8	+0.1	+0.4	+0.3	-19.1	8.3	29.5	-21.2	Perpe
3	24.465M	17.6	+7.4	+0.1	+0.6	+0.4	-19.1	7.0	29.5	-22.5	Paral
4	87.085k	54.3	+10.3	+0.0	+0.0	+0.1	-59.1	5.6	28.8	-23.2	Perpe
5	18.374M	14.6	+8.5	+0.1	+0.5	+0.3	-19.1	4.9	29.5	-24.6	Perpe
6	24.503M	15.5	+7.4	+0.1	+0.6	+0.4	-19.1	4.9	29.5	-24.6	Perpe
7	22.560M	15.3	+7.7	+0.1	+0.5	+0.4	-19.1	4.9	29.5	-24.6	Perpe
8	29.566M	17.3	+5.3	+0.1	+0.6	+0.4	-19.1	4.6	29.5	-24.9	Perpe
9	442.240k	38.6	+9.8	+0.0	+0.1	+0.1	-59.1	-10.5	14.7	-25.2	Paral
10	26.693M	15.0	+6.5	+0.1	+0.6	+0.4	-19.1	3.5	29.5	-26.0	Groun
11	195.530k	44.6	+10.0	+0.0	+0.1	+0.1	-59.1	-4.3	21.8	-26.1	Paral
12	398.580k	38.2	+9.8	+0.0	+0.1	+0.1	-59.1	-10.9	15.6	-26.5	Groun
13	7.657M	11.5	+9.8	+0.1	+0.4	+0.2	-19.1	2.9	29.5	-26.6	Groun
14	28.990M	14.1	+5.5	+0.1	+0.6	+0.4	-19.1	1.6	29.5	-27.9	Paral
15	28.924M	12.1	+5.5	+0.1	+0.6	+0.4	-19.1	-0.4	29.5	-29.9	Groun
16	28.687M	9.7	+5.6	+0.1	+0.6	+0.4	-19.1	-2.7	29.5	-32.2	Groun
17	24.750k	53.3	+12.6	+0.0	+0.1	+0.0	-59.1	6.9	39.7	-32.8	Paral
18	17.255k	48.5	+13.9	+0.0	+0.1	+0.0	-59.1	3.4	42.8	-39.4	Perpe
19	14.100k	46.5	+14.8	+0.0	+0.0	+0.0	-59.1	2.2	44.6	-42.4	Paral
20	10.065k	45.2	+16.2	+0.0	+0.0	+0.0	-59.1	2.3	47.5	-45.2	Groun

Test Location:	CKC Laboratories Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 209-966-5240		
Customer:	**Allegion**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**99080**	Date:	11/15/2016
Test Type:	**Radiated Scan**	Time:	17:07:34
Tested By:	Benny Lovan	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Emissions Fundamental Measurements (125kHz)
Frequency range tested: 30-1000MHz

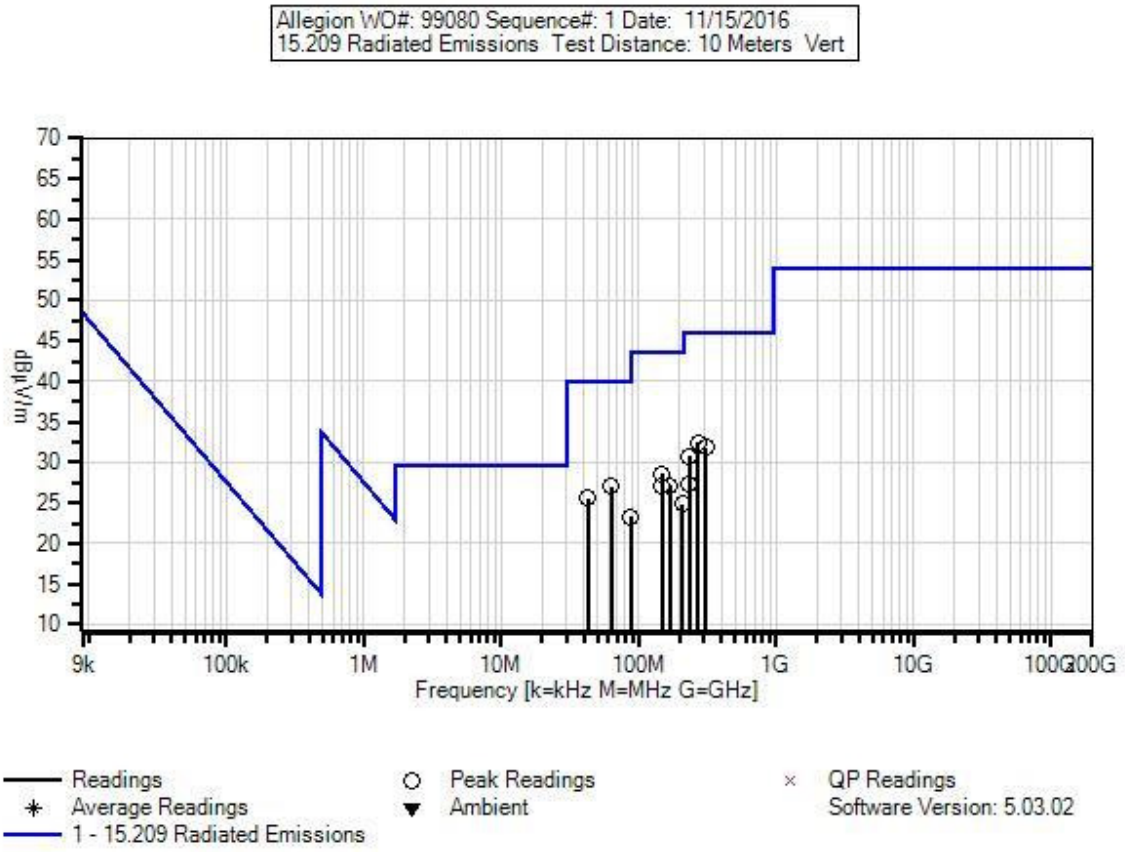
Temperature: 16°C
Humidity:50%
Atmospheric Pressure: 98.2 kPa

Method: ANSI C63.10 2013

Modulation: CW
Antenna Type: Integral (Proximity Coil)
Antenna Gain 0dB Gain
Antenna Size: .00165m^2

The EUT is powered by a DC power supply at 12VDC. The customer declares the EUT standard method of installation is wall mounted in the upright/vertical (Y-axis) orientation.
The EUT is setup on an 80cm foam block. It has been programmed to continuously transmit the RFID signal at 125kHz. A card is placed in front of the EUT and it is reading the card continuously.

Measurements made in two orientations and the data reported is worst case of the data observed (Y-Axis). .


Allegion WO#: 99080 Sequence#: 1 Date: 11/15/2016
15.209 Radiated Emissions Test Distance: 10 Meters Vert
70
65
60
55
50
45
40
35
30
25
20
15
10
dBuV/m
9k
100k
1M
10M
100M
1G
10G
100G
200G
Frequency [k=kHz M=MHz G=GHz]
Readings
Average Readings
1 - 15.209 Radiated Emissions
Peak Readings
Ambient
QP Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06847	Cable	LMR195-FR-6	7/9/2015	7/9/2017
T2	ANP06230	Cable	CXTA04A-50	3/3/2016	3/3/2018
T3	ANP04249	Cable	CXTA04A-50	3/3/2016	3/3/2018
T4	ANP05656	Attenuator	PE7004-6	12/22/2015	12/22/2017
T5	AN01993	Biconilog Antenna	CBL6111C	3/11/2016	3/11/2018
T6	AN00449	Preamp-Top Amp (dB)	8447F	2/18/2016	2/18/2018
T7	ANP06883	Cable	LMR195-FR-3	10/27/2015	10/27/2017
	02668	Spectrum Analyzer	E4446A	8/26/2016	8/26/2017

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	62.920M	30.0	+0.2 +5.7	+0.9 -27.1	+0.7 +0.1	+6.0	+10.5	27.0	40.0	-13.0	Vert
2	271.260M	25.2	+0.4 +13.3	+2.0 -26.5	+1.3 +0.3	+6.0	+10.5	32.5	46.0	-13.5	Vert
3	307.680M	23.6	+0.4 +13.9	+2.0 -26.2	+1.4 +0.3	+6.0	+10.5	31.9	46.0	-14.1	Horiz
4	42.845M	23.2	+0.2 +11.6	+0.7 -27.2	+0.5 +0.1	+6.0	+10.5	25.6	40.0	-14.4	Horiz
5	147.680M	24.8	+0.3 +11.2	+1.4 -26.8	+1.0 +0.2	+6.0	+10.5	28.6	43.5	-14.9	Horiz
6	232.220M	25.4	+0.4 +11.7	+1.8 -26.4	+1.2 +0.2	+6.0	+10.5	30.8	46.0	-15.2	Vert
7	167.920M	24.3	+0.3 +9.9	+1.5 -26.6	+1.0 +0.2	+6.0	+10.5	27.1	43.5	-16.4	Vert
8	148.485M	23.3	+0.3 +11.2	+1.4 -26.8	+1.0 +0.2	+6.0	+10.5	27.1	43.5	-16.4	Vert
9	87.110M	23.1	+0.2 +8.6	+1.1 -27.1	+0.8 +0.1	+6.0	+10.5	23.3	40.0	-16.7	Horiz
10	232.680M	22.0	+0.4 +11.7	+1.8 -26.4	+1.2 +0.2	+6.0	+10.5	27.4	46.0	-18.6	Horiz
11	207.680M	21.7	+0.3 +9.8	+1.7 -26.5	+1.1 +0.2	+6.0	+10.5	24.8	43.5	-18.7	Horiz

Test Setup Photos

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret (“^”) was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.