

Allegion

EMC TEST REPORT FOR

MT20w

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s)
15.207, 15.209, & 15.225

Report No.: 96765-7

Date of issue: September 10, 2015



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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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: 4054685

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

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

Project Number: 96765

July 28, 2015

July 28 – August 14, 2015

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.

A handwritten signature in black ink, reading "Steve Behm", is written over a horizontal line.

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	5.02.00
EMITest Immunity	5.02.00

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure	Description	Modifications	Results
13.56MHz			
15.207	AC Conducted Emissions	NA	Pass
15.215(c)	20dB Bandwidth	NA	Pass
15.225(a)-(c)	Field Strength of Fundamental	NA	Pass
15.225(d)	Field Strength of Spurious Emissions	NA	Pass
15.225(e)	Frequency Stability	NA	Pass
125kHz			
15.207	AC Conducted Emissions	NA	Pass
15.209(a)	Radiated Spurious Emissions / Fundamental	NA	Pass
15.209(a)	Radiated Spurious Emissions	NA	Pass
15.215(c)	20dB Bandwidth	NA	Pass

NA = Not applicable.

Modifications During Testing

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

Summary of Conditions
No modifications were made during testing.

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
This EUT connects to a laptop or network via USB. The manufacturer has declared that the WiFi and Bluetooth modules are already certified and are being used as intended.
The only transmitters CKC Laboratories are testing are the RFID (13.56MHz and 125kHz).

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
MT20w	Allegion	MT20w	00000002

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Lenovo	Lenovo G50-45	PF0694HY
AC Adapter	Lenovo	ADLX45NLC3A	11S45N0293Z1ZS9L4C3NWN
Cable Tester	Paladin Tools	1570	NA
Ear Bud (Headphones)	Apple	NA	NA

FCC PART 15 SUBPART C

13.56MHz

15.207 AC Conducted Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **96765** Date: 8/14/2015
 Test Type: **Conducted Emissions** Time: 11:07:12 AM
 Tested By: Benny Lovan Sequence#: 14
 Software: EMITest 5.02.00 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

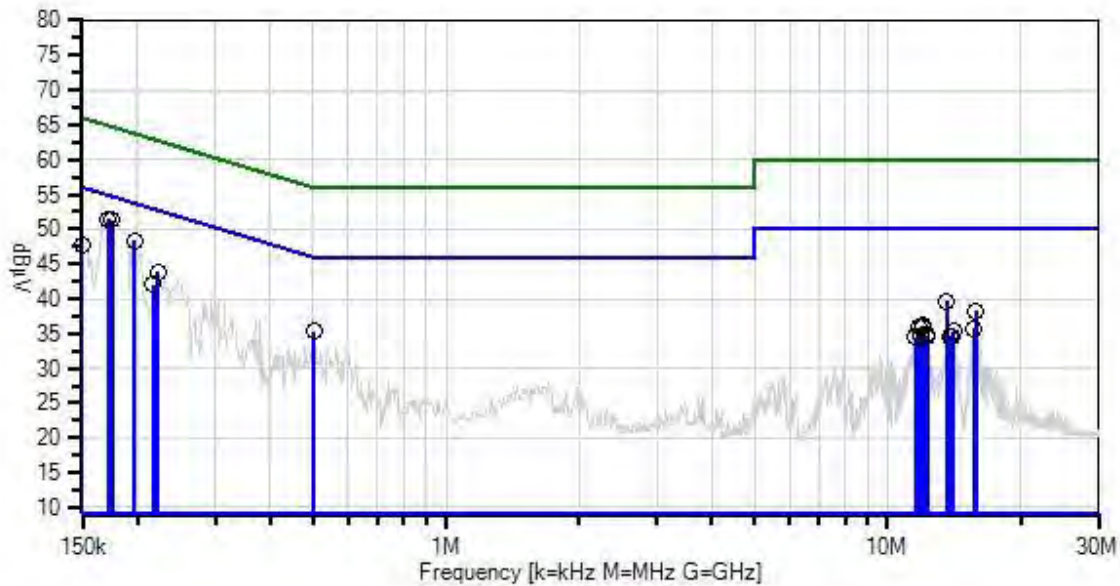
Conducted Emissions 150kHz - 30MHz

Temperature: 24°C
 Humidity: 29.0%
 Atmospheric Pressure: 98.3 kPa

Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

The EUT is setup to continuously transmit and an RFID card setup for 13.56MHz is lying on top of the EUT.
 The customer is using the program notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card.
 The EUT is inside of its non -conductive chassis.
 The EUT is setup with a full setup using a laptop, headphones, and an Ethernet cable terminated to a port tester as per ANSI setups where the EUT is a peripheral to a PC.

Allegion WO#: 96765 Sequence#: 14 Date: 8/14/2015
15.207 AC Mains - Average Test Lead: 120V 60Hz Line



— Sweep Data
x QP Readings
Software Version: 5.02.00

— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average

○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANMACOND	Cable		8/26/2014	8/26/2016
	AN03456	Spectrum Analyzer	8568B	11/15/2013	11/15/2015
	AN01183	Spectrum Analyzer Display	85662A	11/15/2013	11/15/2015
	AN00069	Quasi Peak Adapter	85650A	11/15/2013	11/15/2015
	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
T2	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
T3	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T4	ANP05624	Attenuator	PE7010-10	1/15/2015	1/15/2017

Measurement Data:

Reading listed by margin.

Test Lead: Line

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	175.453k	41.0	+0.0	+0.1	+0.3	+9.9	+0.0	51.3	54.7	-3.4	Line
2	171.817k	41.2	+0.0	+0.1	+0.3	+9.9	+0.0	51.5	54.9	-3.4	Line
3	197.269k	38.1	+0.1	+0.1	+0.2	+9.9	+0.0	48.4	53.7	-5.3	Line
4	150.001k	35.0	+0.0	+0.1	+2.8	+9.9	+0.0	47.8	56.0	-8.2	Line
5	222.721k	33.5	+0.1	+0.1	+0.2	+9.9	+0.0	43.8	52.7	-8.9	Line
6	13.572M	29.1	+0.5	+0.1	+0.1	+9.9	+0.0	39.7	50.0	-10.3	Line
7	502.694k	25.1	+0.1	+0.0	+0.2	+9.9	+0.0	35.3	46.0	-10.7	Line
8	217.267k	31.8	+0.1	+0.1	+0.2	+9.9	+0.0	42.1	52.9	-10.8	Line
9	15.818M	27.4	+0.6	+0.2	+0.1	+9.9	+0.0	38.2	50.0	-11.8	Line
10	12.011M	25.5	+0.5	+0.1	+0.1	+9.9	+0.0	36.1	50.0	-13.9	Line

11	12.056M	25.4	+0.5	+0.1	+0.1	+9.9	+0.0	36.0	50.0	-14.0	Line
12	11.722M	25.3	+0.5	+0.1	+0.1	+9.9	+0.0	35.9	50.0	-14.1	Line
13	15.683M	24.9	+0.6	+0.2	+0.1	+9.9	+0.0	35.7	50.0	-14.3	Line
14	14.131M	24.6	+0.5	+0.2	+0.1	+9.9	+0.0	35.3	50.0	-14.7	Line
15	12.264M	24.2	+0.5	+0.1	+0.1	+9.9	+0.0	34.8	50.0	-15.2	Line
16	14.023M	23.8	+0.5	+0.2	+0.1	+9.9	+0.0	34.5	50.0	-15.5	Line
17	11.903M	23.8	+0.5	+0.1	+0.1	+9.9	+0.0	34.4	50.0	-15.6	Line
18	11.560M	23.8	+0.5	+0.1	+0.1	+9.9	+0.0	34.4	50.0	-15.6	Line
19	13.879M	23.7	+0.5	+0.2	+0.1	+9.9	+0.0	34.4	50.0	-15.6	Line
20	12.318M	23.8	+0.5	+0.1	+0.1	+9.9	+0.0	34.4	50.0	-15.6	Line

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **96765** Date: 8/14/2015
 Test Type: **Conducted Emissions** Time: 11:12:56 AM
 Tested By: Benny Lovan Sequence#: 15
 Software: EMITest 5.02.00 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

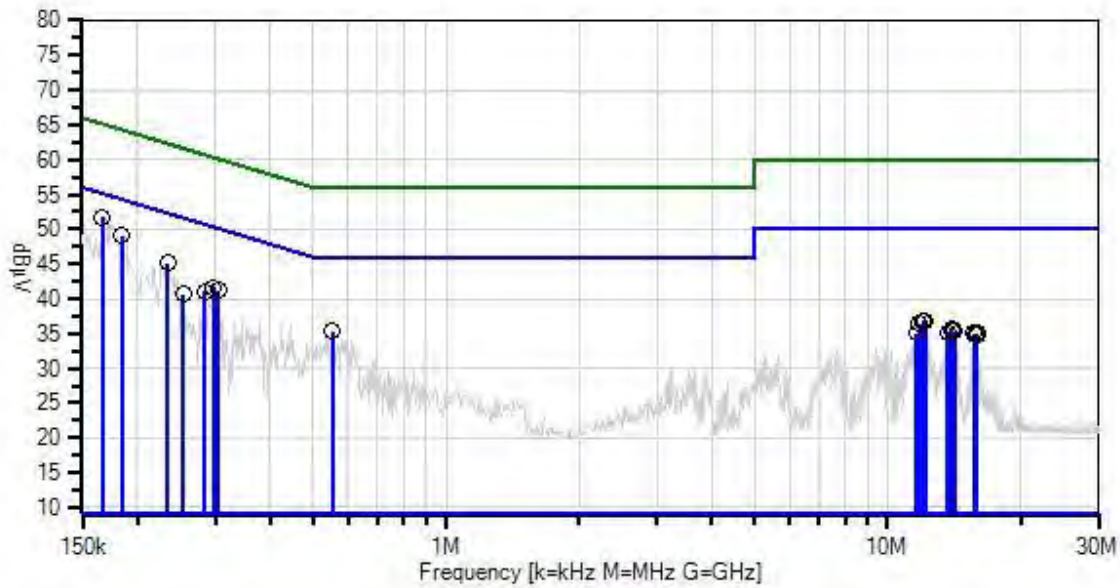
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Conducted Emissions 150kHz - 30MHz Temperature: 24°C Humidity: 29.0% Atmospheric Pressure: 98.3 kPa Highest Generated Frequency: 48MHz Method: ANSI C63.4 2009 The EUT is setup to continuously transmit and an RFID card setup for 13.56MHz is lying on top of the EUT. The customer is using the program notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card. The EUT is inside of its non -conductive chassis. The EUT is setup with a full setup using a laptop, headphones, and an Ethernet cable terminated to a port tester as per ANSI setups where the EUT is a peripheral to a PC.

Allegion WO#: 96765 Sequence#: 15 Date: 8/14/2015
15.207 AC Mains - Average Test Lead: 120V 60Hz Neutral



— Sweep Data
 × QP Readings
 Software Version: 5.02.00

— Readings
 * Average Readings
 — 1 - 15.207 AC Mains - Average

○ Peak Readings
 ▼ Ambient
 — 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANMACOND	Cable		8/26/2014	8/26/2016
	AN03456	Spectrum Analyzer	8568B	11/15/2013	11/15/2015
	AN01183	Spectrum Analyzer Display	85662A	11/15/2013	11/15/2015
	AN00069	Quasi Peak Adapter	85650A	11/15/2013	11/15/2015
T2	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
T3	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T4	ANP05624	Attenuator	PE7010-10	1/15/2015	1/15/2017

Measurement Data:

Reading listed by margin.

Test Lead: Neutral

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	166.363k	41.3	+0.0	+0.1	+0.4	+9.9	+0.0	51.7	55.1	-3.4	Neutr
2	184.543k	38.8	+0.0	+0.1	+0.3	+9.9	+0.0	49.1	54.3	-5.2	Neutr
3	233.629k	34.8	+0.1	+0.1	+0.2	+9.9	+0.0	45.1	52.3	-7.2	Neutr
4	297.259k	31.4	+0.1	+0.1	+0.1	+9.9	+0.0	41.6	50.3	-8.7	Neutr
5	304.531k	31.0	+0.1	+0.1	+0.1	+9.9	+0.0	41.2	50.1	-8.9	Neutr
6	284.533k	30.7	+0.1	+0.1	+0.2	+9.9	+0.0	41.0	50.7	-9.7	Neutr
7	551.781k	25.0	+0.1	+0.1	+0.2	+9.9	+0.0	35.3	46.0	-10.7	Neutr
8	253.627k	30.3	+0.1	+0.1	+0.2	+9.9	+0.0	40.6	51.6	-11.0	Neutr
9	12.047M	26.1	+0.5	+0.2	+0.1	+9.9	+0.0	36.8	50.0	-13.2	Neutr
10	12.137M	25.9	+0.5	+0.3	+0.1	+9.9	+0.0	36.7	50.0	-13.3	Neutr
11	11.794M	25.8	+0.5	+0.2	+0.1	+9.9	+0.0	36.5	50.0	-13.5	Neutr

12	13.942M	24.9	+0.5	+0.3	+0.1	+9.9	+0.0	35.7	50.0	-14.3	Neutr
13	14.023M	24.5	+0.5	+0.3	+0.1	+9.9	+0.0	35.3	50.0	-14.7	Neutr
14	14.185M	24.5	+0.5	+0.3	+0.1	+9.9	+0.0	35.3	50.0	-14.7	Neutr
15	13.680M	24.4	+0.5	+0.3	+0.1	+9.9	+0.0	35.2	50.0	-14.8	Neutr
16	15.927M	24.0	+0.6	+0.4	+0.1	+9.9	+0.0	35.0	50.0	-15.0	Neutr
17	11.632M	24.3	+0.5	+0.2	+0.1	+9.9	+0.0	35.0	50.0	-15.0	Neutr
18	15.674M	24.1	+0.6	+0.3	+0.1	+9.9	+0.0	35.0	50.0	-15.0	Neutr
19	15.837M	23.9	+0.6	+0.4	+0.1	+9.9	+0.0	34.9	50.0	-15.1	Neutr
20	15.891M	23.9	+0.6	+0.4	+0.1	+9.9	+0.0	34.9	50.0	-15.1	Neutr

Test Setup Photos



15.215(c) 20 dB Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: Allegion
 Specification: **15.215 20dB Bandwidth**
 Work Order #: **96765** Date: 7/28/2015
 Test Type: **Radiated Scan** Time: 06:45:19
 Tested By: Benny Lovan Sequence#: 1
 Software: EMITest 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
T2	ANMA10M	Cable		8/26/2014	8/26/2016

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

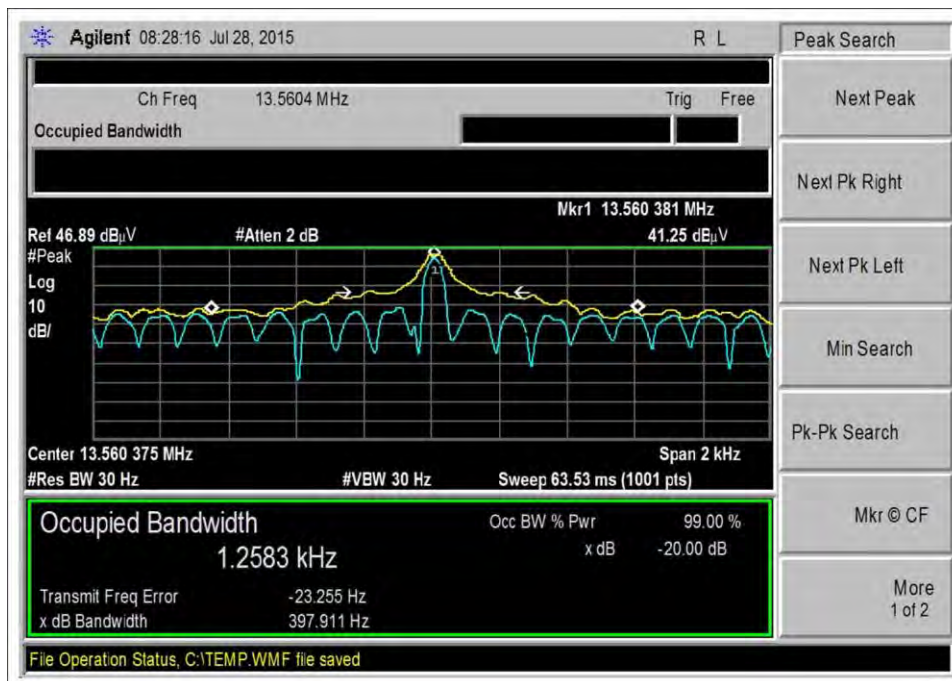
Radiated Emissions 9kHz - 30MHz

 Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

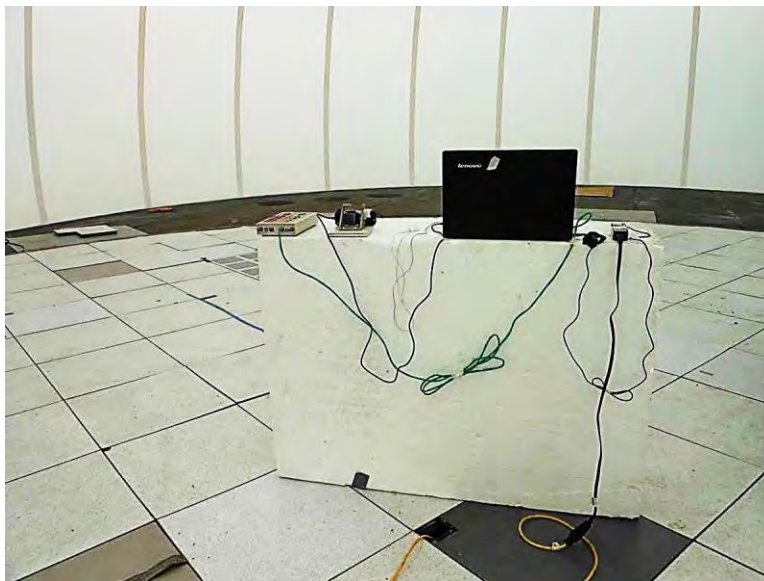
 Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 13.56MHz, it is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card.
 The EUT is inside of its non-conductive chassis

Plot



Test Setup Photos



15.225(a)-(c) Field Strength of Fundamental

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**
 Work Order #: **96765** Date: 7/28/2015
 Test Type: **Radiated Scan** Time: 06:45:19
 Tested By: Benny Lovan Sequence#: 1
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

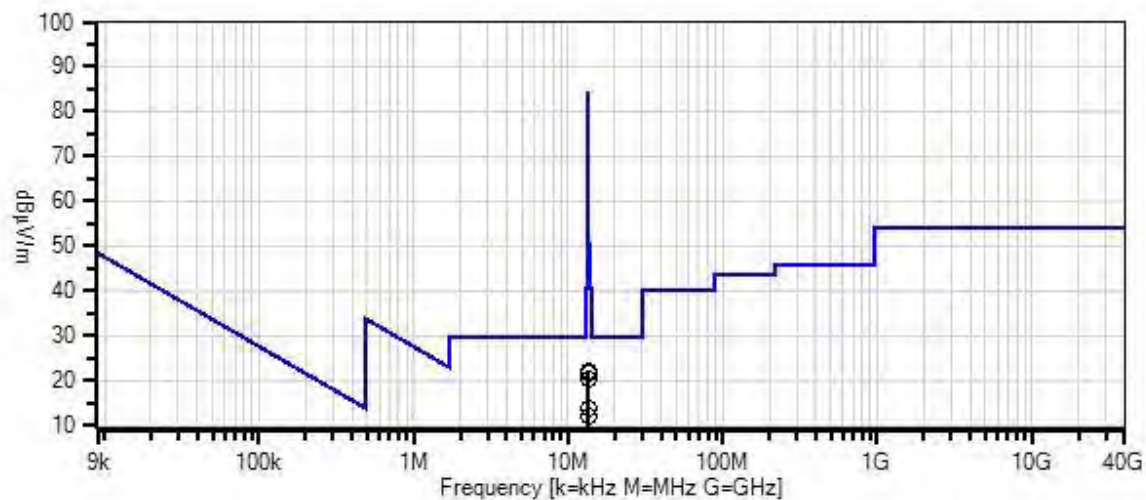
Radiated Emissions 9kHz - 30MHz

 Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

 Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 13.56MHz, it is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card.
 The EUT is inside of its non -conductive chassis

Allegion WO#: 96765 Sequence#: 1 Date: 7/28/2015
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 10 Meters Perpendicular



- Readings
 - Peak Readings
 - × QP Readings
 - * Average Readings
 - ▼ Ambient
- Software Version: 5.02.00
- 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
T2	ANMA10M	Cable		8/26/2014	8/26/2016

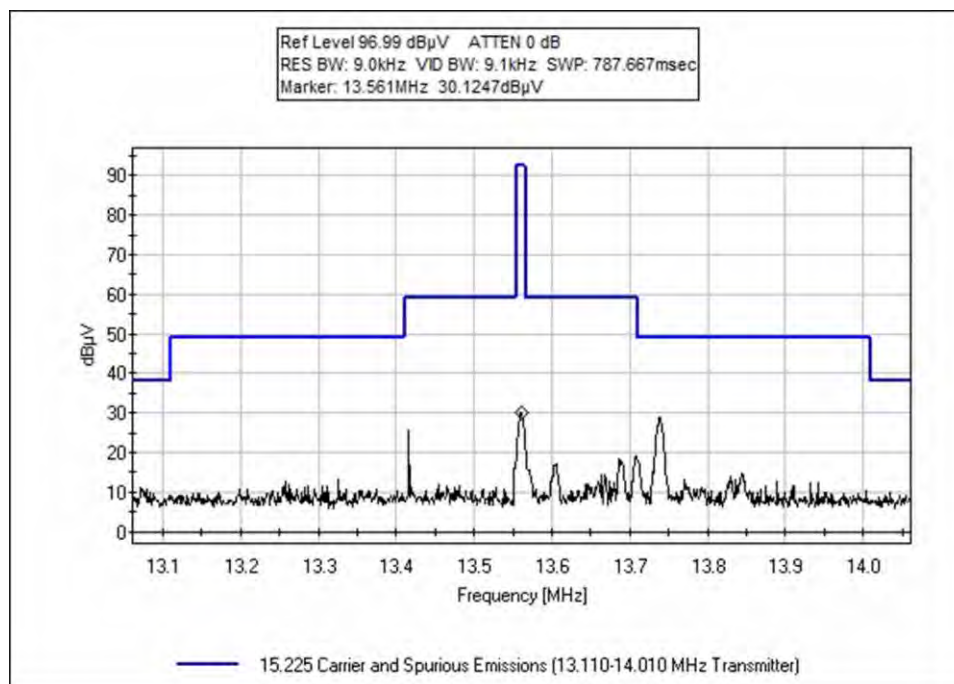
Measurement Data:

Reading listed by margin.

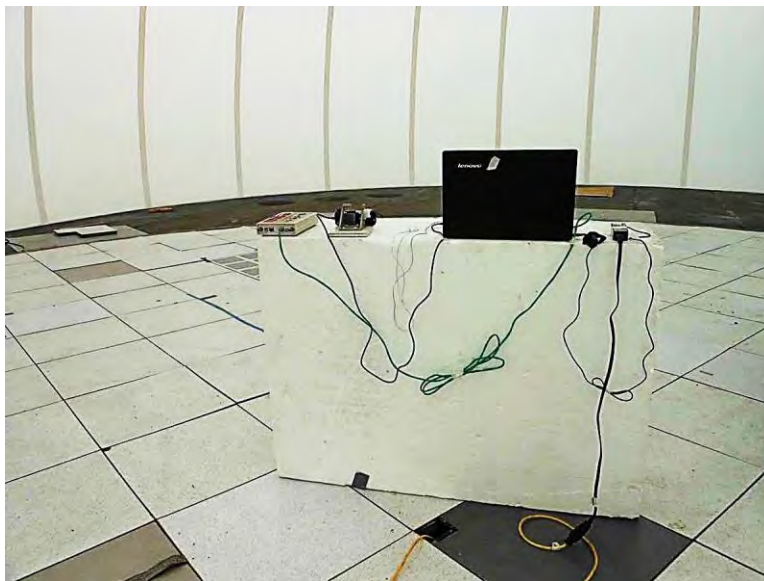
Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	13.560M	30.6	+9.7	+0.8			-19.1	22.0	84.0	-62.0	Paral
									Y Axis		
2	13.561M	30.5	+9.7	+0.8			-19.1	21.9	84.0	-62.1	Perpe
									Z Axis		
3	13.561M	30.1	+9.7	+0.8			-19.1	21.5	84.0	-62.5	Perpe
									Y-Axis		
4	13.560M	29.1	+9.7	+0.8			-19.1	20.5	84.0	-63.5	Paral
									Z Axis		
5	13.560M	22.4	+9.7	+0.8			-19.1	13.8	84.0	-70.2	Perpe
									X-Axis		
6	13.560M	20.5	+9.7	+0.8			-19.1	11.9	84.0	-72.1	Paral
									X-Axis		

Emissions Mask Plot



Test Setup Photos





X Axis



Y Axis



Z Axis

15.225(d) Radiated Spurious Emissions

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**
 Work Order #: **96765** Date: 7/28/2015
 Test Type: **Radiated Scan** Time: 14:46:28
 Tested By: Benny Lovan Sequence#: 4
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

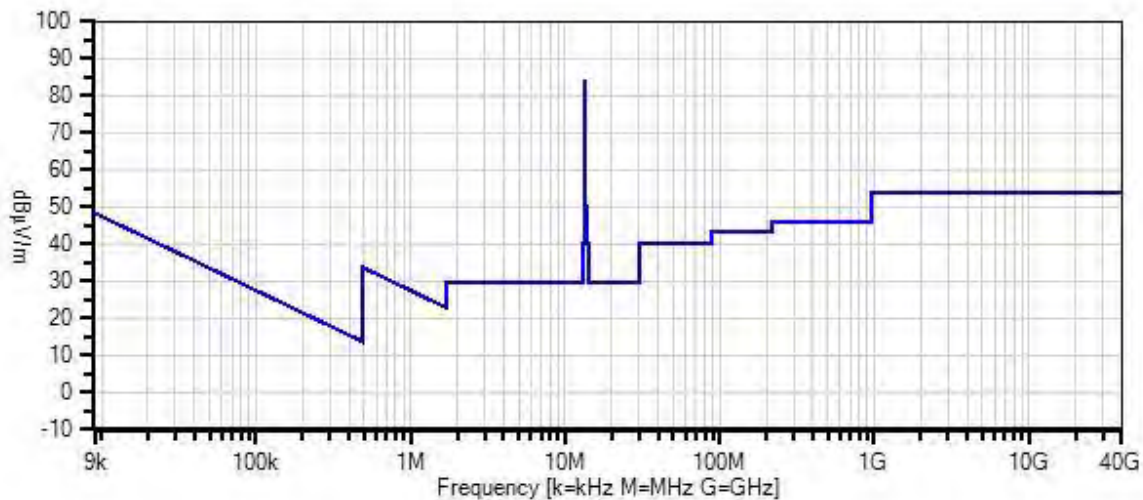
Radiated Spurious Emissions 9kHz - 30MHz

 Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

 Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 13.56MHz, it is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card.
 The EUT is inside of its non -conductive chassis

Allegion WO#: 96765 Sequence#: 4 Date: 7/28/2015
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 3 Meters Perpendicular



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.02.00
— 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
T2	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	27.161M	20.7	+7.2	+1.1	-40.0	-11.0	29.5	-40.5	Paral
2	27.123M	20.5	+7.2	+1.1	-40.0	-11.2	29.5	-40.7	Perpe

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**
 Work Order #: **96765** Date: 8/14/2015
 Test Type: **Radiated Scan** Time: 15:55:35
 Tested By: Benny Lovan Sequence#: 6
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

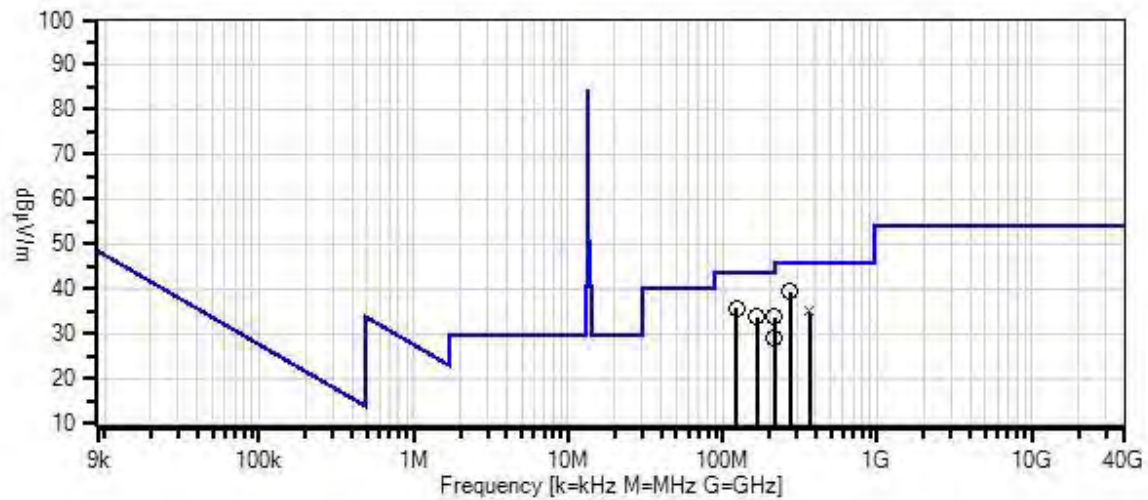
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Spurious Emissions 30-1000MHz Temperature: 27°C Humidity: 40.6% Atmospheric Pressure: 97.5 kPa Highest Generated Frequency: 48MHz Method: ANSI C63.4 2009 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 13.56MHz, it is lying on top of the EUT. The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card. The EUT is inside of its non -conductive chassis. The EUT is setup with a full setup using a laptop, headphones, and an Ethernet cable as per ANSI setups where the EUT is a peripheral to a PC.

Allegion W/O#: 96765 Sequence#: 6 Date: 8/14/2015
 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 10 Meters Vert



- Readings
- Peak Readings
- × QP Readings
- * Average Readings
- ▼ Ambient
- Software Version: 5.02.00
- 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANMA10M	Cable		8/26/2014	8/26/2016
T2	ANP05922	Cable	RG/214	9/5/2014	9/5/2016
T3	AN00449	Preamp-Top Amp (dB)	8447F	4/7/2014	4/7/2016
	AN02111	Spectrum Analyzer	8593EM	6/4/2015	6/4/2017
T4	AN01991	Biconilog Antenna	CBL6111C	3/7/2014	3/7/2016

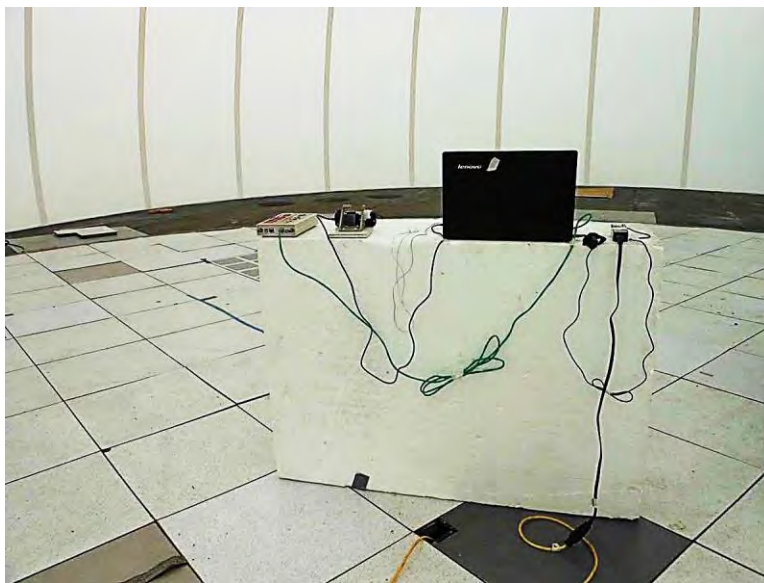
Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	271.176M	37.8	+4.6	+0.1	-26.5	+12.9	+10.5	39.4	46.0	-6.6	Vert
2	122.068M	37.4	+2.9	+0.1	-27.0	+11.7	+10.5	35.6	43.5	-7.9	Vert
3	166.229M	36.4	+3.5	+0.1	-26.8	+10.1	+10.5	33.8	43.5	-9.7	Vert
4	366.325M	30.7	+5.4	+0.1	-27.0	+15.3	+10.5	35.0	46.0	-11.0	Horiz
	QP										
^	366.325M	40.3	+5.4	+0.1	-27.0	+15.3	+10.5	44.6	46.0	-1.4	Horiz
6	216.984M	35.4	+4.0	+0.1	-26.6	+10.4	+10.5	33.8	46.0	-12.2	Vert
7	216.540M	30.7	+4.0	+0.1	-26.6	+10.3	+10.5	29.0	46.0	-17.0	Horiz

Test Setup Photos



15.225(e) Frequency Stability

Test Conditions / Setup

Test Date: August 21, 2015
Test Engineer: Benny Lovan
Test Specification: FCC 15.225

Operating Voltage: +5VDC
Frequency Limit: 0.01%

The EUT is placed inside the temperature chamber, transmitting at 13.56MHz.

The EUT's voltage is regulated at +5VDC via USB.

A USB extender cable was added to the USB cable of the EUT and cut open to expose the +/-5V leads.

The variation in voltage was obtained by connecting those leads to a DC power supply.

A card is presented to the EUT to ensure constant transmission.

RBW = 200Hz; VBW > RBW.

Amplitude remained the same at 22dBuV with varying the voltage +/- 15%

Test Equipment					
Asset #	Description	Manufacturer	Model	Cal Date	Cal Due
1879	Temperature Chamber	Thermotron	S-1.2 Min.	12/5/2014	12/5/2016
3197	Multimeter	Extech	MM570A	9/14/2014	9/14/2016
762	DC Power Supply	HP	6205C	11/6/2013	11/6/2015
2668	Spectrum Analyzer	Agilent	E4446A	8/14/2015	8/14/2016

Test Data

Temperature Variations			
		Channel 1 (MHz)	Dev. (%)
Channel Frequency:		13.560381	
Temp (C)	Voltage		
-20	+5	13.56043	0.00034
-10	+5	13.56043	0.00035
0	+5	13.56040	0.00015
10	+5	13.56039	0.00004
20	+5	13.56038	0.00000
30	+5	13.56042	0.00025
40	+5	13.56039	0.00004
50	+5	13.56036	0.00015
Voltage Variations ($\pm 15\%$)			
20	4.3	13.56038	0.00001
20	+5	13.56038	0.00001
20	5.8	13.56038	0.00000
Max Deviation (%)			0.00035
		Pass	

Amplitude Measurement		
Voltage	Amplitude of Carrier	
4.3V	22dBuV	
5V	22dBuV	
5.8V	22dBuV	

Test Setup Photos



125kHz

15.207 AC Conducted Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **96765** Date: 8/14/2015
 Test Type: **Conducted Emissions** Time: 1:29:26 PM
 Tested By: Benny Lovan Sequence#: 16
 Software: EMITest 5.02.00 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

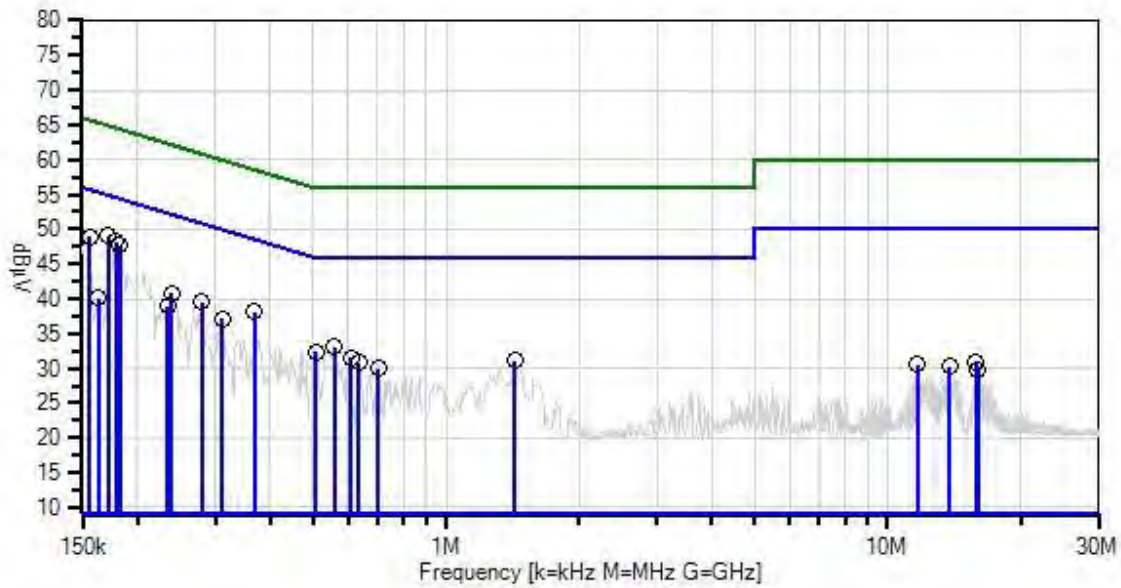
Conducted Emissions 150kHz - 30MHz

Temperature: 24°C
 Humidity: 29.0%
 Atmospheric Pressure: 98.3 kPa

Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

The EUT is setup to continuously transmit and an RFID card setup for 125kHz is lying on top of the EUT.
 The customer is using the program Notepad to observe the continuous transmission as well as the acceptance of the 125kHz RFID Card.
 The EUT is inside of its non -conductive chassis.
 The EUT is also setup with a full setup using a laptop, headphones, and an Ethernet cable terminated to a port tester as per ANSI setups where the EUT is a peripheral to a PC.

Allegion WO#: 96765 Sequence#: 16 Date: 8/14/2015
15.207 AC Mains - Average Test Lead: 120V 60Hz Line



— Sweep Data	— Readings	○ Peak Readings
x QP Readings	* Average Readings	▼ Ambient
Software Version: 5.02.00	— 1 - 15.207 AC Mains - Average	— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANMACOND	Cable		8/26/2014	8/26/2016
	AN03456	Spectrum Analyzer	8568B	11/15/2013	11/15/2015
	AN01183	Spectrum Analyzer Display	85662A	11/15/2013	11/15/2015
	AN00069	Quasi Peak Adapter	85650A	11/15/2013	11/15/2015
	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
T2	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
T3	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T4	ANP05624	Attenuator	PE7010-10	1/15/2015	1/15/2017

Measurement Data:

Reading listed by margin.

Test Lead: Line

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	171.817k	38.7	+0.0	+0.1	+0.3	+9.9	+0.0	49.0	54.9	-5.9	Line
2	179.089k	37.9	+0.0	+0.1	+0.3	+9.9	+0.0	48.2	54.5	-6.3	Line
3	182.725k	37.4	+0.0	+0.1	+0.3	+9.9	+0.0	47.7	54.4	-6.7	Line
4	155.455k	37.3	+0.0	+0.1	+1.6	+9.9	+0.0	48.9	55.7	-6.8	Line
5	368.162k	28.0	+0.1	+0.0	+0.1	+9.9	+0.0	38.1	48.5	-10.4	Line
6	279.079k	29.2	+0.1	+0.1	+0.2	+9.9	+0.0	39.5	50.8	-11.3	Line
7	239.083k	30.5	+0.1	+0.1	+0.2	+9.9	+0.0	40.8	52.1	-11.3	Line
8	311.803k	26.9	+0.1	+0.1	+0.1	+9.9	+0.0	37.1	49.9	-12.8	Line
9	557.235k	22.9	+0.1	+0.0	+0.2	+9.9	+0.0	33.1	46.0	-12.9	Line
10	233.629k	28.6	+0.1	+0.1	+0.2	+9.9	+0.0	38.9	52.3	-13.4	Line
11	508.148k	22.2	+0.1	+0.0	+0.2	+9.9	+0.0	32.4	46.0	-13.6	Line

12	609.957k	21.3	+0.1	+0.0	+0.2	+9.9	+0.0	31.5	46.0	-14.5	Line
13	1.428M	20.8	+0.2	+0.0	+0.2	+9.9	+0.0	31.1	46.0	-14.9	Line
14	635.409k	20.6	+0.1	+0.0	+0.2	+9.9	+0.0	30.8	46.0	-15.2	Line
15	162.727k	29.6	+0.0	+0.1	+0.5	+9.9	+0.0	40.1	55.3	-15.2	Line
16	702.676k	19.8	+0.1	+0.0	+0.2	+9.9	+0.0	30.0	46.0	-16.0	Line
17	15.818M	20.0	+0.6	+0.2	+0.1	+9.9	+0.0	30.8	50.0	-19.2	Line
18	11.659M	19.9	+0.5	+0.1	+0.1	+9.9	+0.0	30.5	50.0	-19.5	Line
19	13.788M	19.5	+0.5	+0.2	+0.1	+9.9	+0.0	30.2	50.0	-19.8	Line
20	15.981M	19.1	+0.6	+0.2	+0.1	+9.9	+0.0	29.9	50.0	-20.1	Line

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **96765** Date: 8/14/2015
 Test Type: **Conducted Emissions** Time: 1:33:20 PM
 Tested By: Benny Lovan Sequence#: 17
 Software: EMITest 5.02.00 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

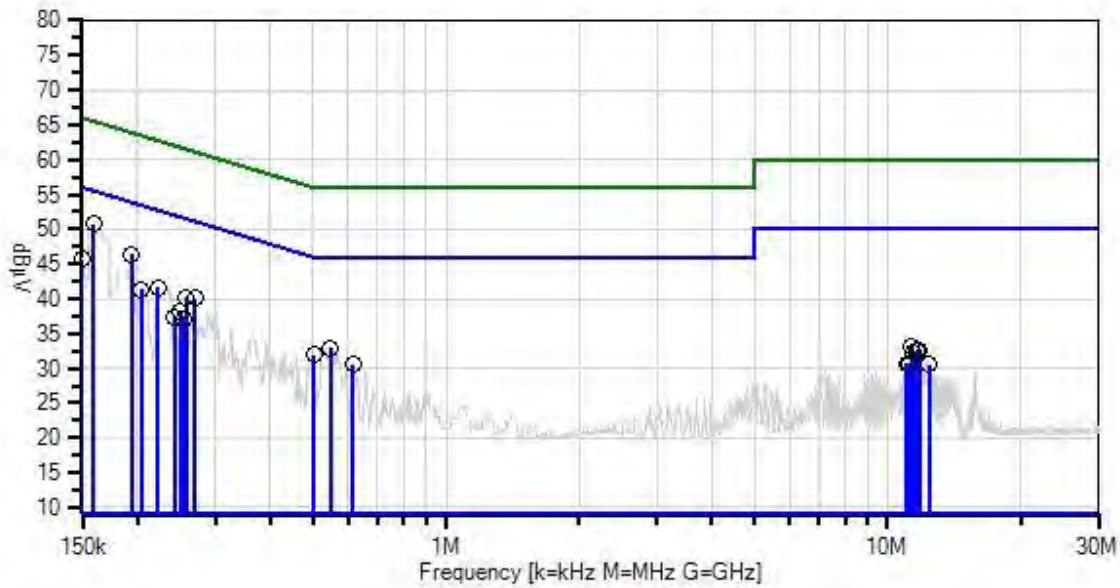
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Conducted Emissions 150kHz - 30MHz Temperature: 24°C Humidity: 29.0% Atmospheric Pressure: 98.3 kPa Highest Generated Frequency: 48MHz Method: ANSI C63.4 2009 The EUT is setup to continuously transmit and an RFID card setup for 125kHz is lying on top of the EUT. The customer is using the program Notepad to observe the continuous transmission as well as the acceptance of the 125kHz RFID Card. The EUT is inside of its non -conductive chassis. The EUT is also setup with a full setup using a laptop, headphones, and an Ethernet cable terminated to a port tester as per ANSI setups where the EUT is a peripheral to a PC.
--

Allegion WO#: 96765 Sequence#: 17 Date: 8/14/2015
15.207 AC Mains - Average Test Lead: 120V 60Hz Neutral



— Sweep Data
x QP Readings
Software Version: 5.02.00

— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average

○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANMACOND	Cable		8/26/2014	8/26/2016
	AN03456	Spectrum Analyzer	8568B	11/15/2013	11/15/2015
	AN01183	Spectrum Analyzer Display	85662A	11/15/2013	11/15/2015
	AN00069	Quasi Peak Adapter	85650A	11/15/2013	11/15/2015
T2	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	2/4/2015	2/4/2016
T3	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T4	ANP05624	Attenuator	PE7010-10	1/15/2015	1/15/2017

Measurement Data:

Reading listed by margin.

Test Lead: Neutral

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	159.091k	40.0	+0.0	+0.1	+0.8	+9.9	+0.0	50.8	55.5	-4.7	Neutr
2	193.633k	36.1	+0.1	+0.1	+0.2	+9.9	+0.0	46.4	53.9	-7.5	Neutr
3	150.001k	32.9	+0.0	+0.1	+2.8	+9.9	+0.0	45.7	56.0	-10.3	Neutr
4	269.989k	29.8	+0.1	+0.1	+0.2	+9.9	+0.0	40.1	51.1	-11.0	Neutr
5	222.721k	31.3	+0.1	+0.1	+0.2	+9.9	+0.0	41.6	52.7	-11.1	Neutr
6	257.263k	29.9	+0.1	+0.1	+0.2	+9.9	+0.0	40.2	51.5	-11.3	Neutr
7	204.541k	31.0	+0.1	+0.1	+0.2	+9.9	+0.0	41.3	53.4	-12.1	Neutr
8	548.145k	22.6	+0.1	+0.1	+0.2	+9.9	+0.0	32.9	46.0	-13.1	Neutr
9	249.991k	27.9	+0.1	+0.1	+0.2	+9.9	+0.0	38.2	51.8	-13.6	Neutr
10	500.876k	21.6	+0.1	+0.1	+0.2	+9.9	+0.0	31.9	46.0	-14.1	Neutr
11	253.627k	26.8	+0.1	+0.1	+0.2	+9.9	+0.0	37.1	51.6	-14.5	Neutr

12	242.719k	27.0	+0.1	+0.1	+0.2	+9.9	+0.0	37.3	52.0	-14.7	Neutr
13	615.411k	20.3	+0.1	+0.1	+0.2	+9.9	+0.0	30.6	46.0	-15.4	Neutr
14	11.325M	22.5	+0.5	+0.2	+0.1	+9.9	+0.0	33.2	50.0	-16.8	Neutr
15	11.686M	21.9	+0.5	+0.2	+0.1	+9.9	+0.0	32.6	50.0	-17.4	Neutr
16	11.821M	21.8	+0.5	+0.2	+0.1	+9.9	+0.0	32.5	50.0	-17.5	Neutr
17	11.461M	21.7	+0.5	+0.2	+0.1	+9.9	+0.0	32.4	50.0	-17.6	Neutr
18	11.046M	20.0	+0.5	+0.2	+0.1	+9.9	+0.0	30.7	50.0	-19.3	Neutr
19	11.145M	20.0	+0.5	+0.2	+0.1	+9.9	+0.0	30.7	50.0	-19.3	Neutr
20	12.426M	19.7	+0.5	+0.3	+0.1	+9.9	+0.0	30.5	50.0	-19.5	Neutr

Test Setup Photos



15.209(a) Radiated Spurious Emissions / Fundamental

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **96765** Date: 7/28/2015
 Test Type: **Radiated Scan** Time: 08:52:34
 Tested By: Benny Lovan Sequence#: 1
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

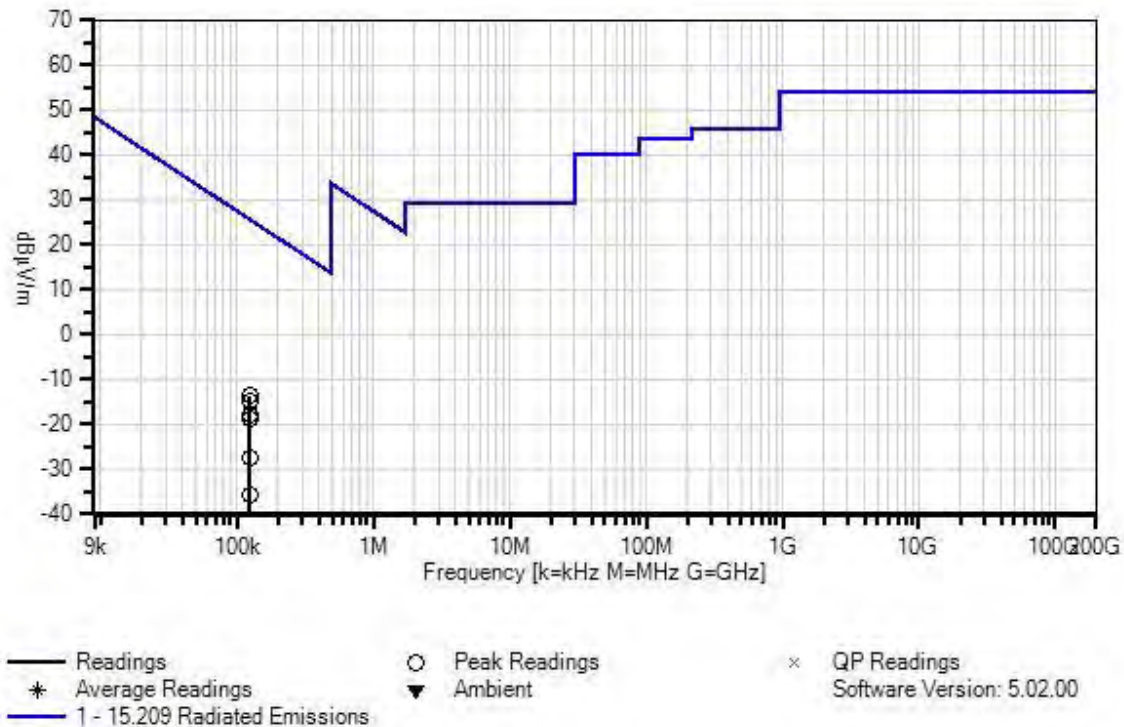
Radiated Emissions 9kHz - 30MHz

 Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

 Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 125kHz is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 13.56MHz RFID Card.
 The EUT is inside of its non -conductive chassis

Allegion WO#: 96765 Sequence#: 1 Date: 7/28/2015
15.209 Radiated Emissions Test Distance: 3 Meters Parallel



Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
T2	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016

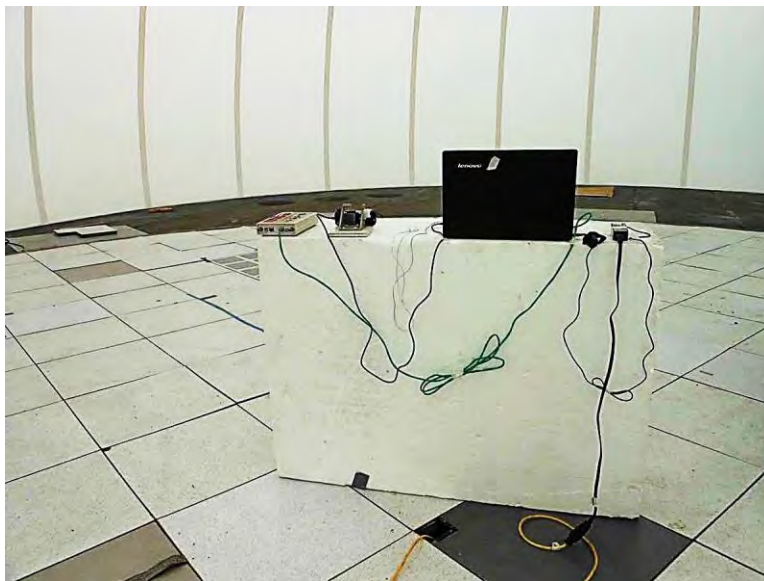
Measurement Data:

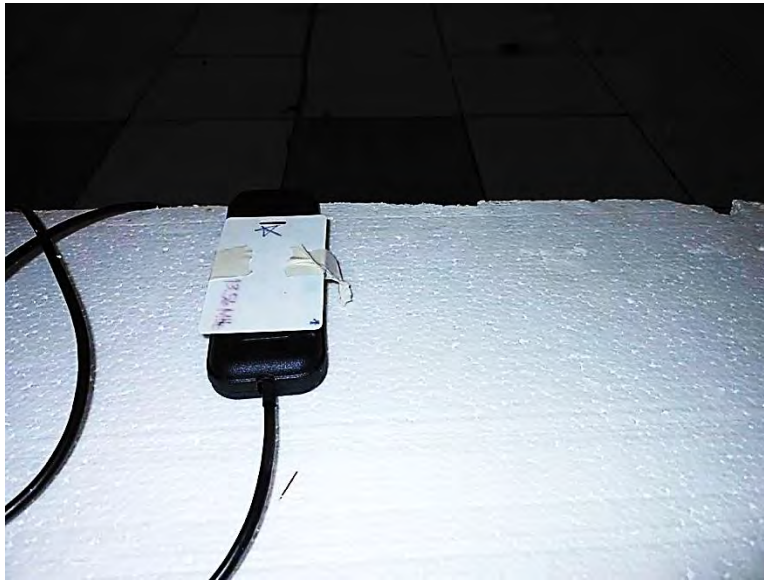
Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	125.034k	55.6	+10.8	+0.1			-80.0	-13.5	25.7 Y Axis	-39.2	Paral
2	125.008k	54.2	+10.8	+0.1			-80.0	-14.9	25.7 Z-Axis	-40.6	Paral
3	125.054k	51.4	+10.8	+0.1			-80.0	-17.7	25.7 Z Axis	-43.4	Perpe
4	125.008k	50.3	+10.8	+0.1			-80.0	-18.8	25.7 Y Axis	-44.5	Perpe
5	125.050k	41.7	+10.8	+0.1			-80.0	-27.4	25.7 X Axis	-53.1	Paral
6	124.936k	33.4	+10.8	+0.1			-80.0	-35.7	25.7 X Axis	-61.4	Perpe

Test Setup Photos





X Axis



Y Axis



Z Axis

15.209 Radiated Spurious Emissions

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **96765** Date: 7/28/2015
 Test Type: **Radiated Scan** Time: 15:21:44
 Tested By: Benny Lovan Sequence#: 5
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

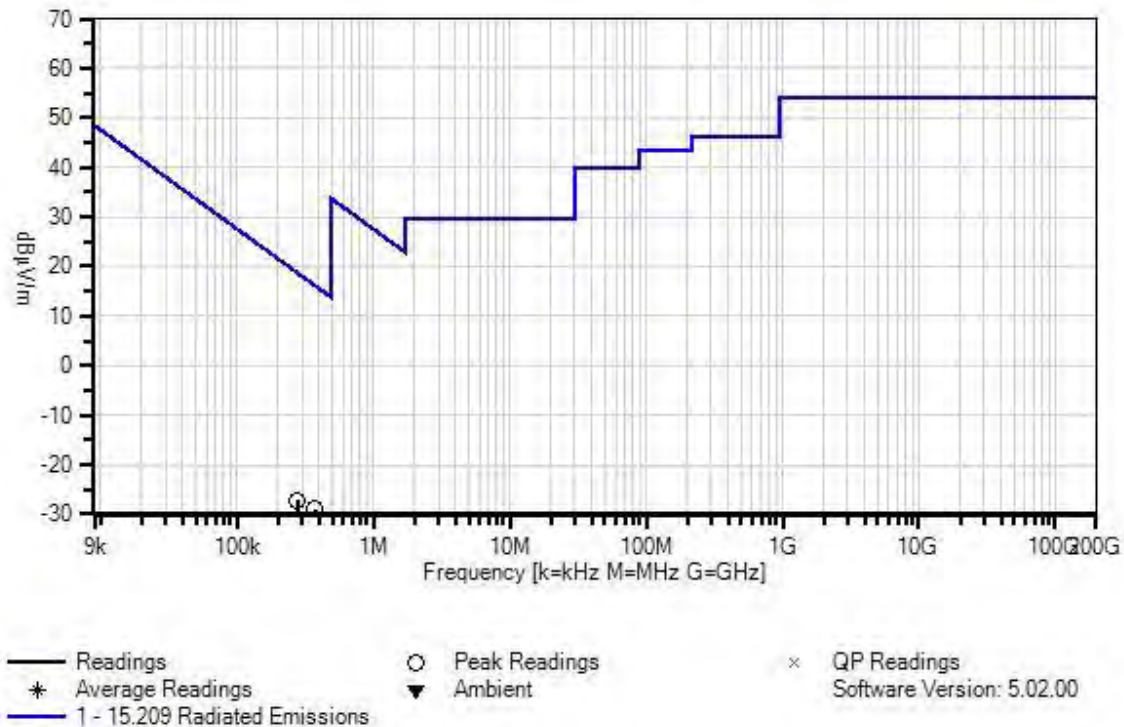
Radiated Spurious Emissions 9kHz - 30MHz

 Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

 Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 125kHz is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 125kHz RFID Card.
 The EUT is inside of its non -conductive chassis

Allegion WO#: 96765 Sequence#: 5 Date: 7/28/2015
15.209 Radiated Emissions Test Distance: 3 Meters Perpendicular



Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
T2	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	375.010k	40.7	+10.2	+0.1	-80.0	-29.0	16.1	-45.1	Perpe
2	276.190k	42.5	+10.2	+0.1	-80.0	-27.2	18.8	-46.0	Paral

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: **Allegion**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **96765** Date: 8/14/2015
 Test Type: **Radiated Scan** Time: 15:30:09
 Tested By: Benny Lovan Sequence#: 7
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

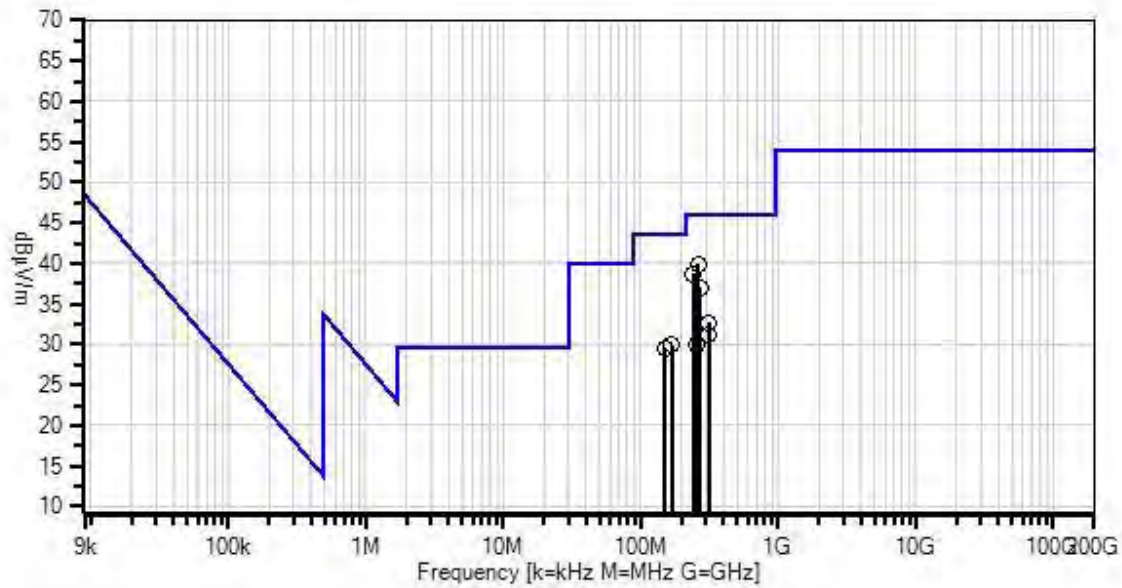
Radiated Spurious Emissions 30-1000MHz

Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

Highest Generated Frequency: 48MHz
 Method: ANSI C63.4 2009

The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 125kHz is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 125kHz RFID Card.
 The EUT is inside of its non -conductive chassis.
 The EUT is also setup with a full setup using a laptop, headphones, and an Ethernet cable as per ANSI setups where the EUT is a peripheral to a PC.

Allegion WO#: 96765 Sequence#: 7 Date: 8/14/2015
15.209 Radiated Emissions Test Distance: 10 Meters Horiz



— Readings
* Average Readings
— 1 - 15.209 Radiated Emissions

○ Peak Readings
▼ Ambient

× QP Readings
Software Version: 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANMA10M	Cable		8/26/2014	8/26/2016
T2	ANP05922	Cable	RG/214	9/5/2014	9/5/2016
T3	AN00449	Preamp-Top Amp (dB)	8447F	4/7/2014	4/7/2016
T4	AN01991	Biconilog Antenna	CBL6111C	3/7/2014	3/7/2016
	AN02111	Spectrum Analyzer	8593EM	6/4/2015	6/4/2017

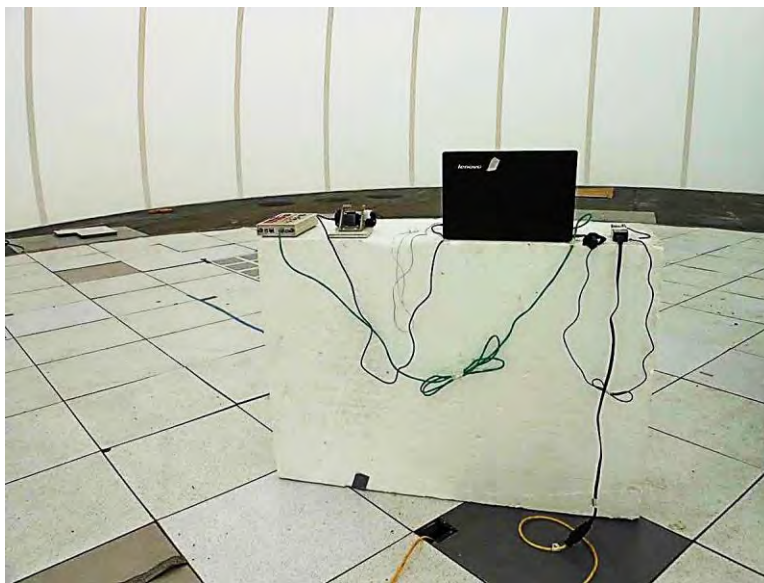
Measurement Data:

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	264.056M	38.5	+4.5	+0.1	-26.5	+12.8	+10.5	39.9	46.0	-6.1	Horiz
2	240.038M	38.3	+4.3	+0.1	-26.5	+12.0	+10.5	38.7	46.0	-7.3	Horiz
3	271.175M	35.4	+4.6	+0.1	-26.5	+12.9	+10.5	37.0	46.0	-9.0	Vert
4	312.053M	30.0	+5.0	+0.1	-26.6	+13.7	+10.5	32.7	46.0	-13.3	Horiz
5	168.105M	32.6	+3.5	+0.1	-26.8	+10.0	+10.5	29.9	43.5	-13.6	Horiz
6	150.052M	31.4	+3.3	+0.1	-26.9	+11.1	+10.5	29.5	43.5	-14.0	Vert
7	312.121M	28.4	+5.0	+0.1	-26.6	+13.7	+10.5	31.1	46.0	-14.9	Vert
8	258.074M	28.8	+4.4	+0.1	-26.5	+12.7	+10.5	29.9	46.0	-16.1	Vert

Test Setup Photos



15.215(c) 20 dB Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240
 Customer: Allegion
 Specification: **15.215 20dB Bandwidth**
 Work Order #: **96765** Date: 7/28/2015
 Test Type: **Radiated Scan** Time: 08:52:34
 Tested By: Benny Lovan Sequence#: 1
 Software: EMITest 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
T2	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

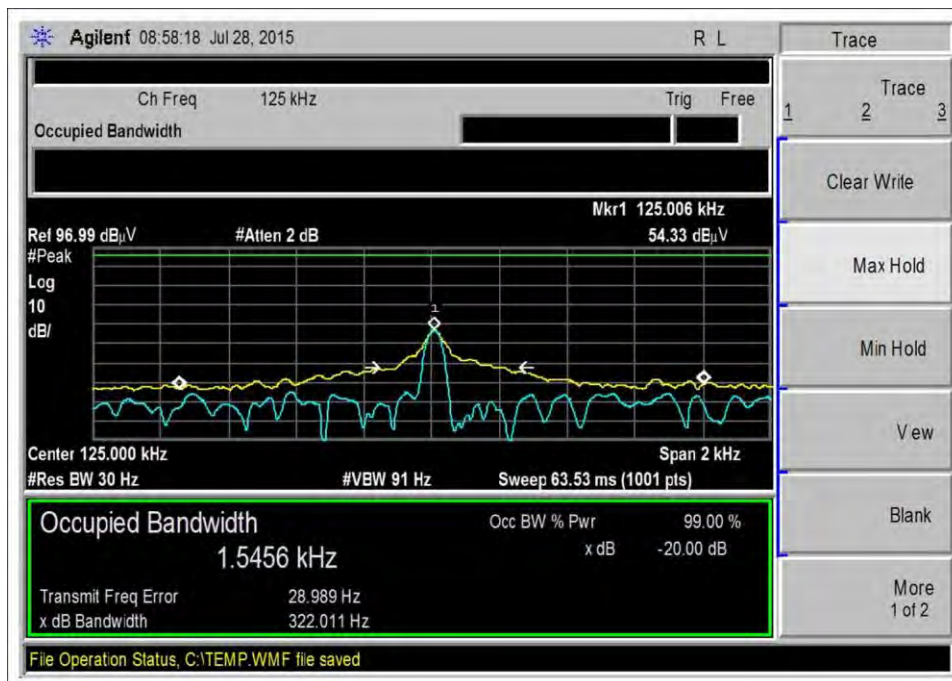
Radiated Emissions 9kHz - 30MHz

 Temperature: 27°C
 Humidity: 40.6%
 Atmospheric Pressure: 97.5 kPa

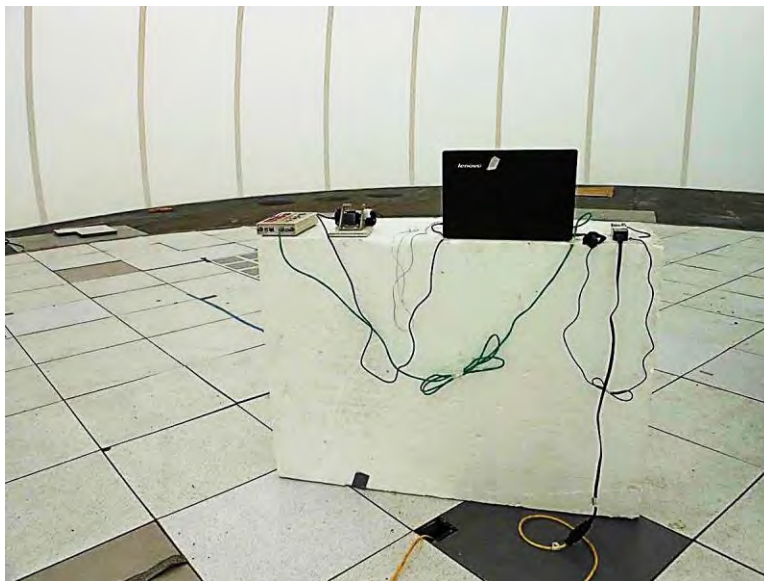
 Highest Generated Frequency: 48MHz

 The EUT is setup on an 80cm foam table. It is setup to continuously transmit and an RFID card setup for 125kHz is lying on top of the EUT.
 The customer is using Notepad to observe the continuous transmission as well as the acceptance of the 125kHz RFID Card.
 The EUT is inside of its non -conductive chassis

Plot



Test Setup Photos



SUPPLEMENTAL INFORMATION

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 dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB)
+	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 carrot ("^") 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.