

# Allegion

REVISED TEST REPORT TO 102031-38

90mm MultiTech, OEM200

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.225  
(13.110-14.010 MHz)

Report No.: 102031-38A

Date of issue: January 2, 2020



Test Certificate # 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 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.

## TABLE OF CONTENTS

Administrative Information .....	3
Test Report Information .....	3
Revision History .....	3
Report Authorization .....	3
Test Facility Information .....	4
Software Versions .....	4
Site Registration & Accreditation Information .....	4
Summary of Results .....	5
Modifications During Testing .....	5
Conditions During Testing .....	5
Equipment Under Test .....	6
General Product Information .....	6
FCC Part 15 Subpart C .....	7
15.215(c) Occupied Bandwidth (20dB BW) .....	7
15.225(a)-(c) Field Strength of Fundamental .....	10
15.225(e) Frequency Stability .....	17
15.225(d) Radiated Emissions & Band Edge .....	19
15.207 AC Conducted Emissions .....	33
Supplemental Information .....	45
Measurement Uncertainty .....	45
Emissions Test Details .....	45

## ADMINISTRATIVE INFORMATION

### Test Report Information

**REPORT PREPARED FOR:**

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

Representative: Michael Stock  
Customer Reference Number: 4099813

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

Darcy Thompson  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 102031

March 18, 2019

March 18-29, 2019

### Revision History

**Original:** Testing of the 90mm MultiTech, OEM200 to FCC Part 15 Subpart C Section(s) 15.207 & 15.225 (13.110-14.010 MHz)

**Revision A:** The modulation reference has been revised on the General Product table and test sections. Since the time of testing, the manufacturer has revised the modulation from FSK (125kHz) and CW (13.56MHz) to CW (125kHz) and ASK (13.56MHz).

### Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, 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.  
1120 Fulton Place  
Fremont, CA 94539

## Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.12

## Site Registration & Accreditation Information

Location	*NIST CB #	FCC	JAPAN
Fremont, CA	US0082	US1023	A-0149

\*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

## SUMMARY OF RESULTS

### Standard / Specification: FCC Part 15 Subpart C - 15.225

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.225(a)-(c)	Field Strength of Fundamental	NA	Pass
15.225(e)	Frequency Stability	NA	Pass
15.225(d)	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

#### ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

## 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

For this report, testing was performed for the ASK (13.56MHz) portion of the EUT.

## 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 4

#### *Equipment Tested:*

Device	Manufacturer	Model #	S/N
90mm MultiTech	Allegion	OEM200	173200032

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
DC Power Supply	Allegion	PS-305D	020264904
Card	Allegion	None	None

## General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Radio Module
Modulation Type(s):	ASK (13.56MHz) and CW (125kHz)
Maximum Duty Cycle:	100%
Antenna Type(s) and Gain:	Integral/1dbi
Antenna Connection Type:	Integral
Nominal Input Voltage:	12VDC
Firmware / Software used for Test:	M21_01_04

## FCC Part 15 Subpart C

### 15.215(c) Occupied Bandwidth (20dB BW)

#### Test Setup/Conditions

Test Location:	Fremont Lab C3	Test Engineer:	Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2013)	Test Date(s):	03/20/2019 and 03/21/2019
Configuration:	4		
Test Setup:	The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits on the ground. The card is placed 2 inches away from the antenna to make the EUT transmit continuously. The measure antenna is 3m away for the EUT.		

#### Environmental Conditions

Temperature (°C)	23-23.1	Relative Humidity (%):	36-43
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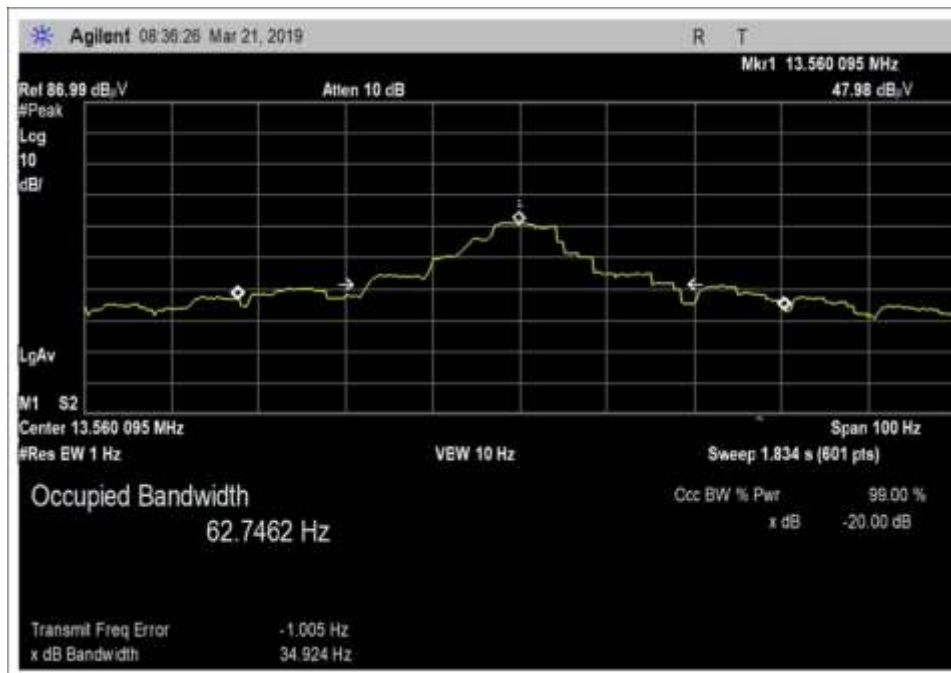
#### Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
00432	Loop Antenna	EMCO	6502	2/19/2019	2/19/2021
P00880	Cable	Pasternack	RG214U	5/14/2018	5/14/2020
P06691	Cable	Pasternack	PE3062-180	5/14/2018	5/14/2020
02660	Spectrum Analyzer	Agilent	E4446A	10/19/2018	10/19/2020

#### Test Data Summary

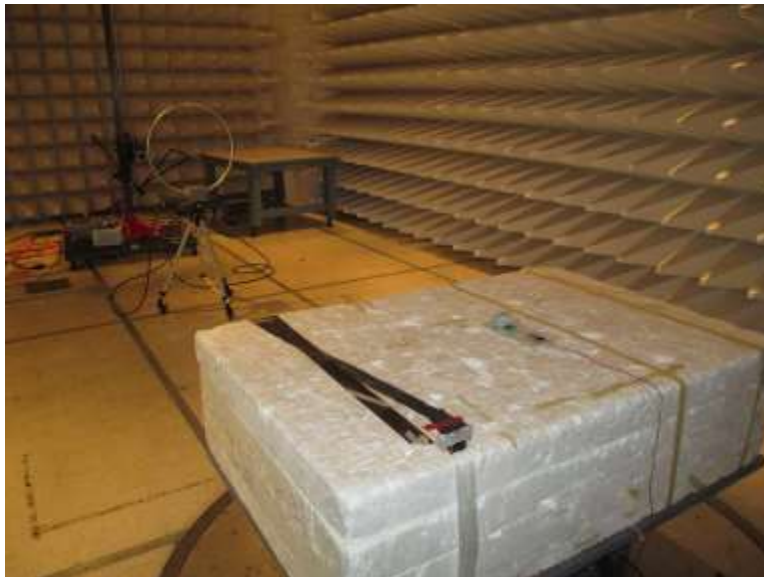
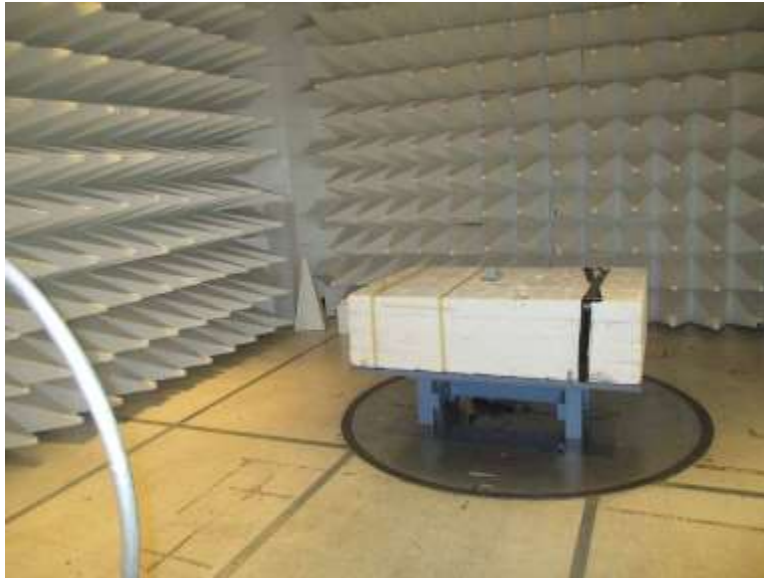
Frequency (MHz)	Antenna Port	Modulation	Measured (Hz)	Limit (kHz)	Results
13.56	1	ASK	34.924	None	NA

## Plot(s)





Test Setup Photo(s)



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

### Test Data Summary - Voltage Variations

Frequency (MHz)	Modulation / Ant Port	V <sub>Minimum</sub> (dBuV/m@30m)	V <sub>Nominal</sub> (dBuV/m@30m)	V <sub>Maximum</sub> (dBuV/m@30m)	Max Deviation from V <sub>Nominal</sub> (dB)
13.56	ASK/Integral	29.6	29.6	29.6	0.0

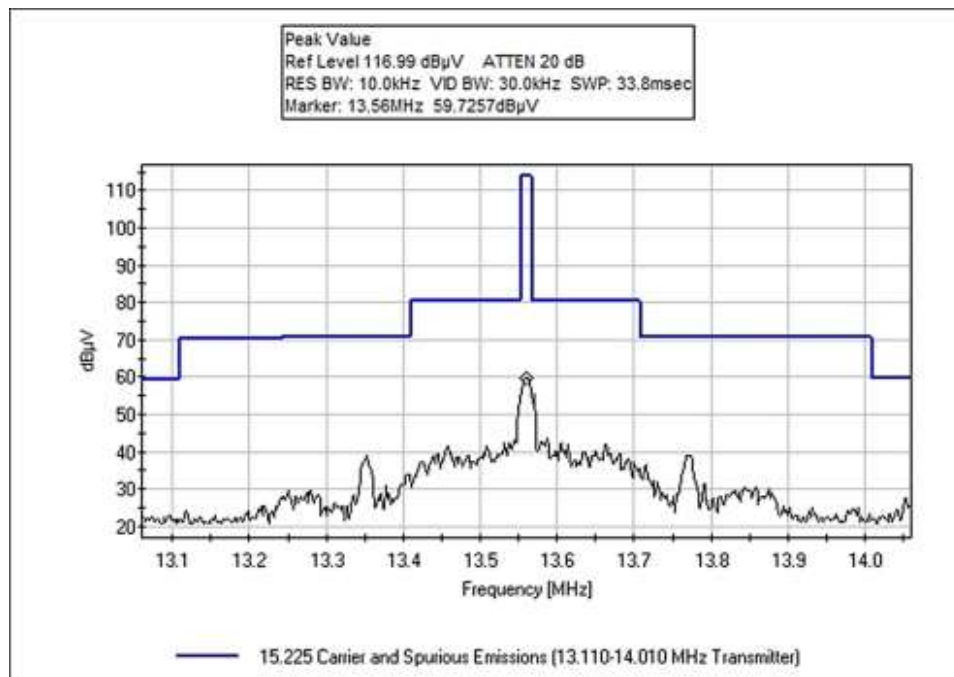
Test performed using operational mode with the highest output power, representing worst case.

### Parameter Definitions:

Measurements performed at input voltage V<sub>Nominal</sub> ± 15%.

Parameter	Value
V <sub>Nominal</sub> :	5-16VDC
V <sub>Minimum</sub> :	4.25VDC
V <sub>Maximum</sub> :	18.4VDC

### Emissions Mask Data



### Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Allegion**  
 Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**  
 Work Order #: **102031** Date: 3/21/2019  
 Test Type: **Radiated Scan** Time: 09:03:02  
 Tested By: Hieu Song Nguyenpham Sequence#: 144  
 Software: EMITest 5.03.12

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

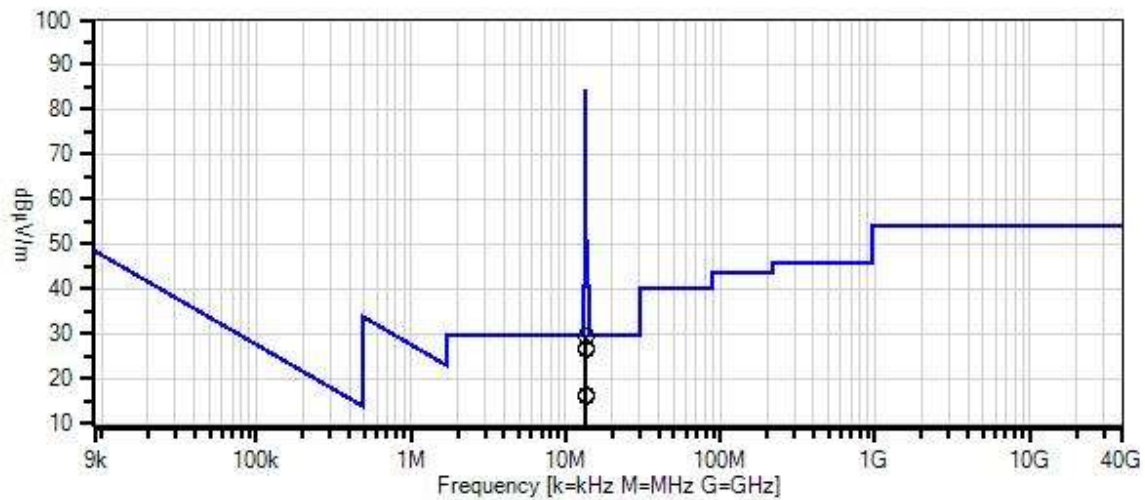
#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

#### Test Conditions / Notes:

Fundamental  Temperature: 23.1°C Relative Humidity: 36 % Atmospheric Pressure: 101.9 kPa Transmitting operating frequency: 13.56MHz Gain of the antenna: 1dBi Firmware: M21_01_04 Method: ANSI C 63.10 2013  The EUT is set up and operated as intended. It is powered from a DC Power supply which sits on the ground. The card is placed 2 inches away from the antenna to make the EUT transmit continuously.
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Allegion WO#: 102031 Sequence#: 144 Date: 3/21/2019  
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.12
- 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00432	Loop Antenna	6502	2/19/2019	2/19/2021
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020

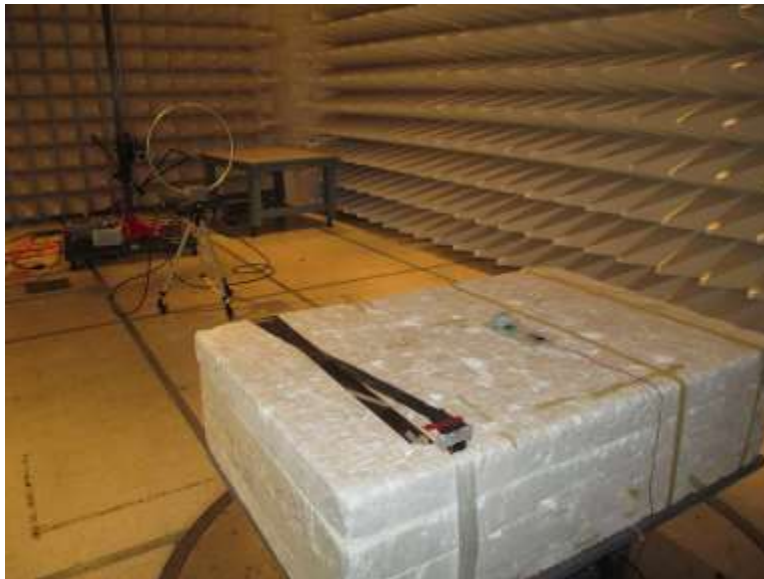
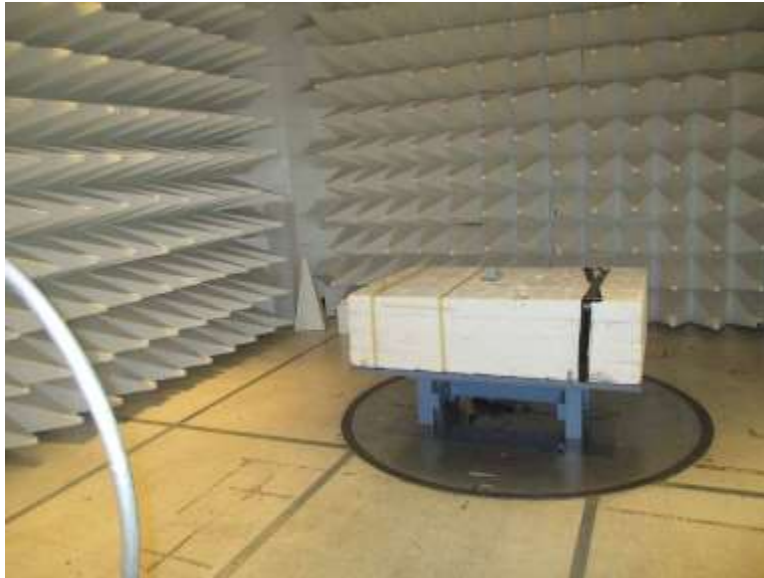
**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	13.560M	59.7	+9.5	+0.3	+0.1	-40.0	29.6	84.0 Y-axis-12V	-54.4	Paral
2	13.561M	59.5	+9.5	+0.3	+0.1	-40.0	29.4	84.0 Z-axis-12V	-54.6	Paral
3	13.560M	57.0	+9.5	+0.3	+0.1	-40.0	26.9	84.0 Z-axis-12V	-57.1	Perpe
4	13.560M	56.7	+9.5	+0.3	+0.1	-40.0	26.6	84.0 Y-axis-12V	-57.4	Perpe
5	13.560M	46.6	+9.5	+0.3	+0.1	-40.0	16.5	84.0 X-axis- 12V	-67.5	Paral
6	13.560M	45.9	+9.5	+0.3	+0.1	-40.0	15.8	84.0 X-axis-12V	-68.2	Perpe

Test Setup Photo(s)





X-Axis



Y-Axis





Z-Axis



## 15.225(e) Frequency Stability

### Test Setup/Conditions

Test Location:	Fremont Lab Bench	Test Engineer:	Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2013)	Test Date(s):	3/29/2019
Configuration:	4		
Test Setup:	The EUT is operated as intended. It is placed inside of temperature chamber. The near field probe is placed next to the EUT.		

### Environmental Conditions

Temperature (°C)	23.5	Relative Humidity (%):	48
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### Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02242	Thermometer	Omega	HH-26K	9/26/2018	9/26/2020
P06024	Near-Field Probe	CKC		6/4/2018	6/4/2020
P06692	Cable	Pasternack	PE3062-360	5/14/2018	5/14/2020
02721	Temperature Humidity Chamber/Oven	Thermotron	SM-8C	NCR	NCR

NCR = No Calibration Required

### Test Data Summary

Temperature (°C)	Voltage	Frequency (MHz)	Deviation (%)	Limit (%)	Results
-20	V <sub>Nominal</sub>	13.560280	0.0000020	±0.01	Pass
-10	V <sub>Nominal</sub>	13.560250	0.0000017	±0.01	
0	V <sub>Nominal</sub>	13.560250	0.0000017	±0.01	
10	V <sub>Nominal</sub>	13.560180	0.0000010	±0.01	
20	V <sub>Minimum</sub>	13.560080	0	±0.01	
20	V <sub>Nominal</sub>	13.560080	0	±0.01	
20	V <sub>Maximum</sub>	13.560120	0.0000004	±0.01	
30	V <sub>Nominal</sub>	13.560050	0.0000003	±0.01	
40	V <sub>Nominal</sub>	13.559980	0.0000010	±0.01	
50	V <sub>Nominal</sub>	13.559950	0.0000013	±0.01	
Nominal Frequency:		13.560080			

### Parameter Definitions:

Measurements performed at input voltage V<sub>Nominal</sub> ± 15%.

Parameter	Value
V <sub>Nominal</sub> :	5-16VDC
V <sub>Minimum</sub> :	4.25VDC
V <sub>Maximum</sub> :	18.4VDC

**Test Setup Photo**



## 15.225(d) Radiated Emissions & Band Edge

### Test Setup / Conditions/ Data

Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Allegion**  
 Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**  
 Work Order #: **102031** Date: 3/19/2019  
 Test Type: **Radiated Scan** Time: 10:10:35  
 Tested By: Hieu Song Nguyenpham Sequence#: 50  
 Software: EMITest 5.03.12

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

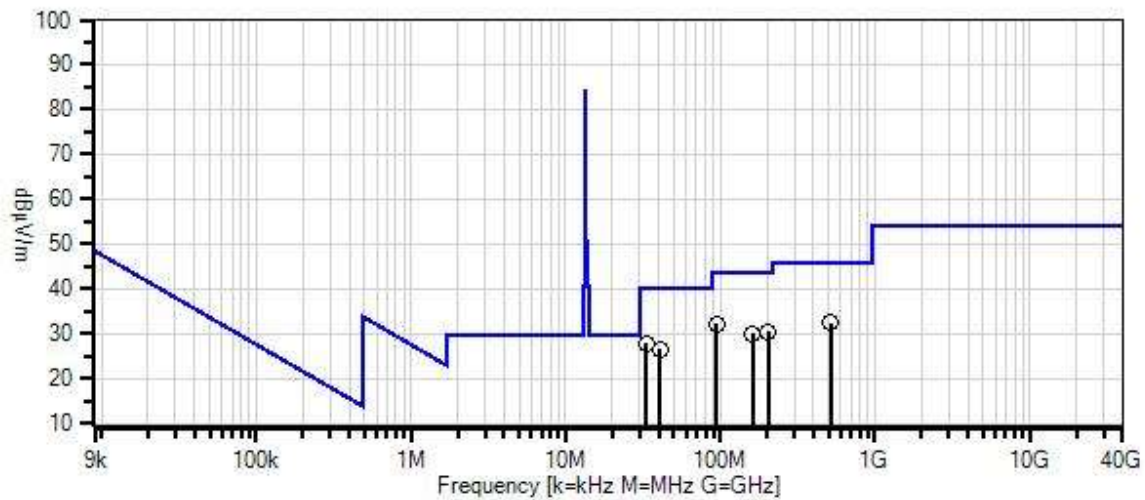
#### Test Conditions / Notes:

Radiated Emission  
 Frequency Range: 9kHz to 1000MHz  
  
 Temperature: 23.2°C  
 Relative Humidity: 38 %  
 Atmospheric Pressure: 101.15kPa  
 High Clock: 27.12MHz  
 Transmitting operating frequency: 13.56MHz and 125kHz  
 Gain of the antenna: 1dBi  
 Firmware: M21\_01\_04  
 Test Method: ANSI C 63.10 2013

The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits on the ground. The card is placed 2 inches away from the antenna to make the EUT transmit continuously.

Note:  
 13.56MHz Transmit Mode  
 X-axis

Allegion W/O#: 102031 Sequence#: 50 Date: 3/19/2019  
 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.12  
 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00852	Biconilog Antenna	CBL 6111C	5/1/2018	5/1/2020
T2	ANP07508	Preamp	310N	10/15/2018	10/15/2020
T3	ANP06049	Attenuator	PE7002-6	5/14/2018	5/14/2020
T4	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T5	ANP01187	Cable	CNT-195	8/20/2018	8/20/2020
T6	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
	AN00432	Loop Antenna	6502	2/19/2019	2/19/2021

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V					Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	94.938M	47.4	+9.7 +0.1	-32.2 +0.4	+5.9	+0.9	+0.0	32.2	43.5	-11.3	Horiz
2	33.072M	35.9	+17.4 +0.1	-32.1 +0.2	+5.9	+0.5	+0.0	27.9	40.0	-12.1	Vert
3	203.334M	45.0	+9.3 +0.3	-32.0 +0.5	+6.0	+1.4	+0.0	30.5	43.5	-13.0	Horiz
4	40.647M	37.6	+14.3 +0.1	-32.1 +0.2	+5.9	+0.5	+0.0	26.5	40.0	-13.5	Vert
5	162.689M	43.7	+10.6 +0.2	-32.1 +0.4	+5.9	+1.2	+0.0	29.9	43.5	-13.6	Horiz
6	515.429M	36.2	+18.2 +0.6	-32.0 +0.9	+6.0	+2.4	+0.0	32.3	46.0	-13.7	Horiz



Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Allegion**  
 Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**  
 Work Order #: **102031** Date: 3/19/2019  
 Test Type: **Radiated Scan** Time: 10:21:25  
 Tested By: Hieu Song Nguyenpham Sequence#: 53  
 Software: EMITest 5.03.12

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 4			

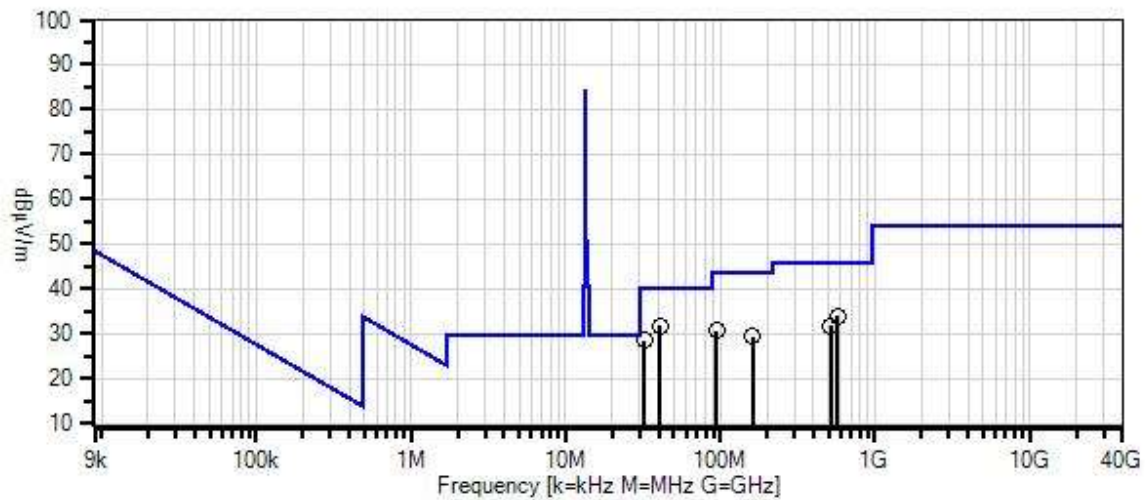
***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 4			

***Test Conditions / Notes:***

Radiated Emission Frequency Range: 9kHz to 1000MHz  Temperature: 23.2°C Relative Humidity: 38 % Atmospheric Pressure: 101.15kPa High Clock: 27.12MHz Transmitting operating frequency: 13.56MHz and 125kHz Gain of the antenna: 1dBi Firmware: M21_01_04 Test Method: ANSI C 63.10 2013  The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits on the ground. The card is placed 2 inches away from the antenna to make the EUT transmit continuously.  Note: 13.56MHz Transmit Mode Y-axis
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Allegion WO#: 102031 Sequence#: 53 Date: 3/19/2019  
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.12
- 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00852	Biconilog Antenna	CBL 6111C	5/1/2018	5/1/2020
T2	ANP07508	Preamp	310N	10/15/2018	10/15/2020
T3	ANP06049	Attenuator	PE7002-6	5/14/2018	5/14/2020
T4	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T5	ANP01187	Cable	CNT-195	8/20/2018	8/20/2020
T6	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
	AN00432	Loop Antenna	6502	2/19/2019	2/19/2021

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	40.689M	42.9	+14.3 +0.1	-32.1 +0.2	+5.9	+0.5	+0.0	31.8	40.0	-8.2	Vert
2	32.357M	36.1	+17.8 +0.1	-32.1 +0.2	+5.9	+0.5	+0.0	28.5	40.0	-11.5	Vert
3	569.724M	36.7	+19.2 +0.6	-32.1 +1.0	+6.0	+2.5	+0.0	33.9	46.0	-12.1	Horiz
4	94.938M	45.9	+9.7 +0.1	-32.2 +0.4	+5.9	+0.9	+0.0	30.7	43.5	-12.8	Horiz
5	162.689M	43.2	+10.6 +0.2	-32.1 +0.4	+5.9	+1.2	+0.0	29.4	43.5	-14.1	Vert
6	515.429M	35.7	+18.2 +0.6	-32.0 +0.9	+6.0	+2.4	+0.0	31.8	46.0	-14.2	Horiz





Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539  
Customer: **Allegion**  
Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**  
Work Order #: **102031** Date: 3/19/2019  
Test Type: **Radiated Scan** Time: 10:33:19  
Tested By: Hieu Song Nguyenpham Sequence#: 56  
Software: EMITest 5.03.12

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 4			

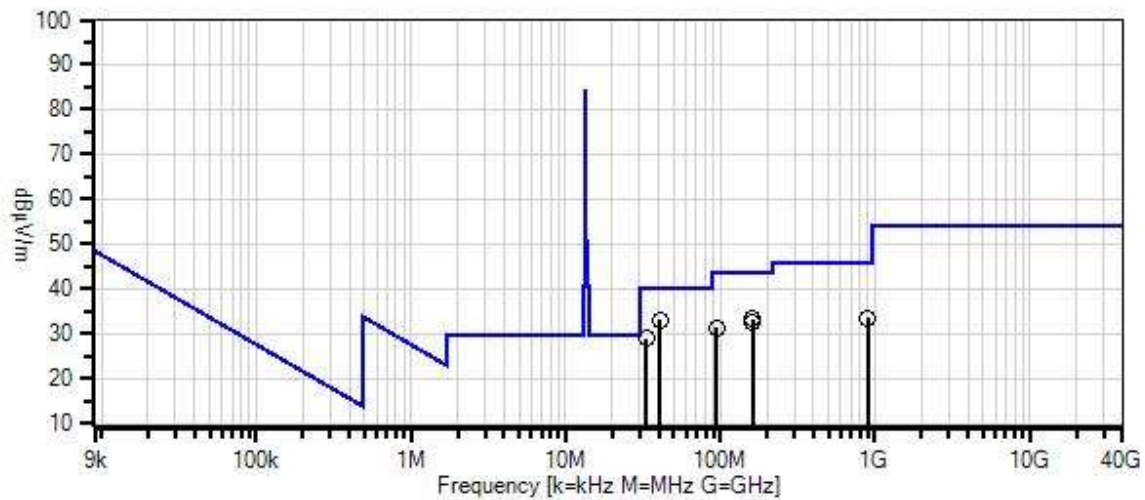
***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 4			

***Test Conditions / Notes:***

<p>Radiated Emission Frequency Range: 9kHz to 1000MHz</p> <p>Temperature: 23.2°C Relative Humidity: 38 % Atmospheric Pressure: 101.15 kPa High Clock: 27.12MHz Transmitting operating frequency: 13.56MHz and 125kHz Gain of the antenna: 1dBi Firmware: M21_01_04 Test Method: ANSI C 63.10 2013</p> <p>The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits on the ground. The card is placed 2 inches away from the antenna to make the EUT transmit continuously.</p> <p>Note: 13.56MHz Transmit Mode Z-axis</p>
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Allegion W/O#: 102031 Sequence#: 56 Date: 3/19/2019  
 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.12  
 1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00852	Biconilog Antenna	CBL 6111C	5/1/2018	5/1/2020
T2	ANP07508	Preamp	310N	10/15/2018	10/15/2020
T3	ANP06049	Attenuator	PE7002-6	5/14/2018	5/14/2020
T4	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T5	ANP01187	Cable	CNT-195	8/20/2018	8/20/2020
T6	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
	AN00432	Loop Antenna	6502	2/19/2019	2/19/2021

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

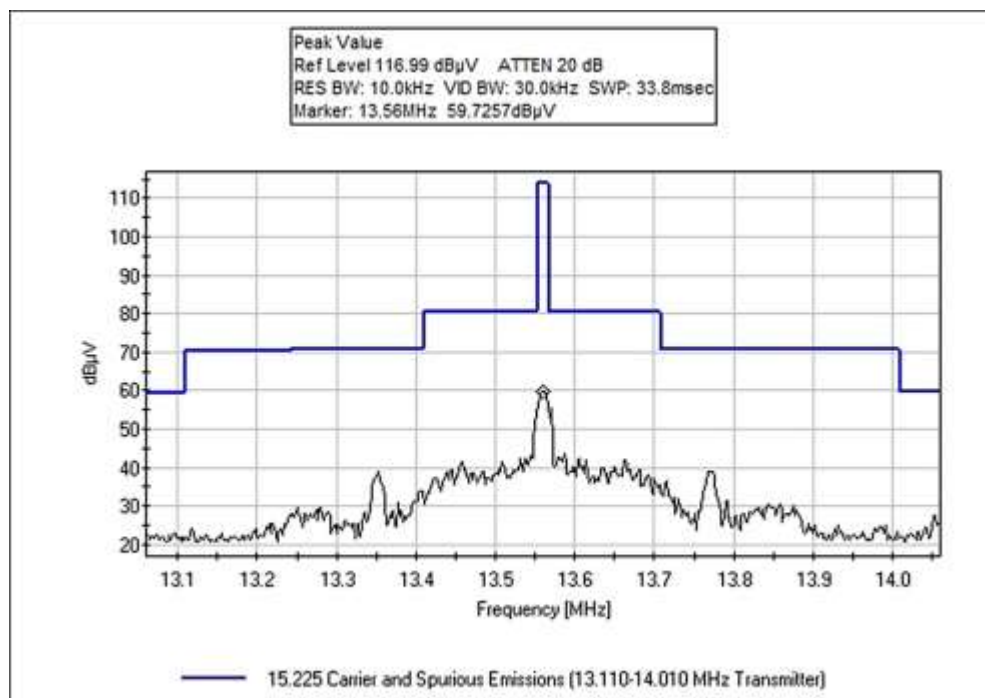
#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	40.689M	44.1	+14.3 +0.1	-32.1 +0.2	+5.9	+0.5	+0.0	33.0	40.0	-7.0	Vert
2	162.689M	47.0	+10.6 +0.2	-32.1 +0.4	+5.9	+1.2	+0.0	33.2	43.5	-10.3	Vert
3	162.689M	46.3	+10.6 +0.2	-32.1 +0.4	+5.9	+1.2	+0.0	32.5	43.5	-11.0	Horiz
4	33.030M	36.8	+17.5 +0.1	-32.1 +0.2	+5.9	+0.5	+0.0	28.9	40.0	-11.1	Vert
5	94.938M	46.5	+9.7 +0.1	-32.2 +0.4	+5.9	+0.9	+0.0	31.3	43.5	-12.2	Horiz
6	897.831M	30.9	+22.8 +0.9	-31.8 +1.4	+5.9	+3.3	+0.0	33.4	46.0	-12.6	Horiz

## Band Edge

### Band Edge Summary

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @30m)	Limit (dBuV/m @30m)	Results
13.110	ASK	Integral	-9.1	≤29.5	Pass
14.010	ASK	Integral	-8.9	≤29.5	Pass

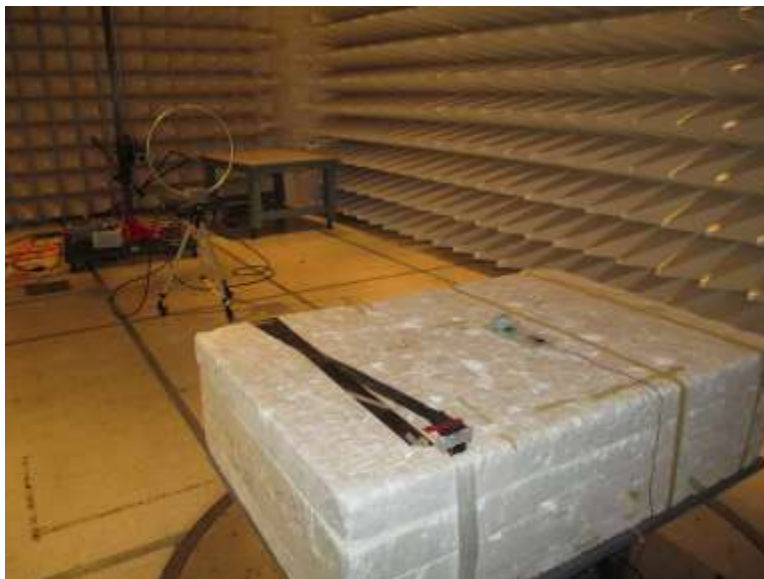
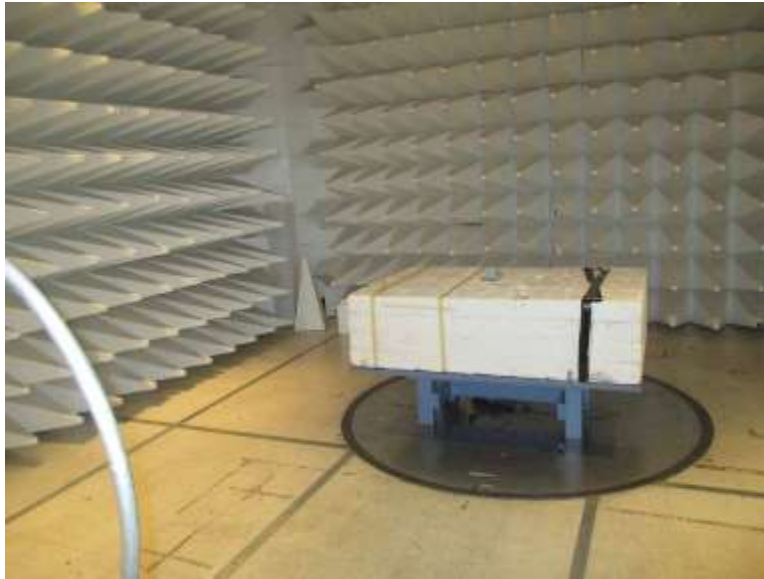
### Band Edge Plots



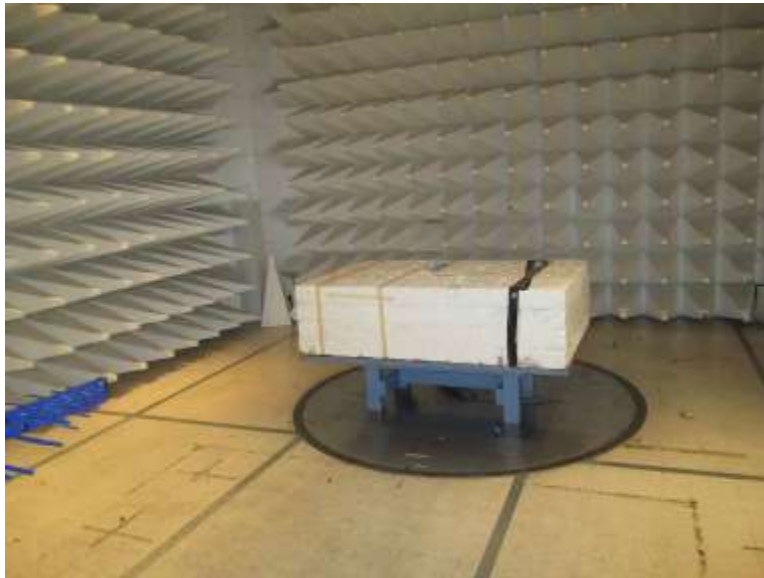
Configuration 4

**Test Setup Photo(s)**

9kHz – 30MHz



**30MHz – 1GHz**





X-Axis



Y-Axis





Z-Axis



## 15.207 AC Conducted Emissions

### Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Allegion**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **102031** Date: 3/20/2019  
 Test Type: **Conducted Emissions** Time: 09:27:16  
 Tested By: Hieu Song Nguyenpham Sequence#: 113  
 Software: EMITest 5.03.12 120V 60Hz

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

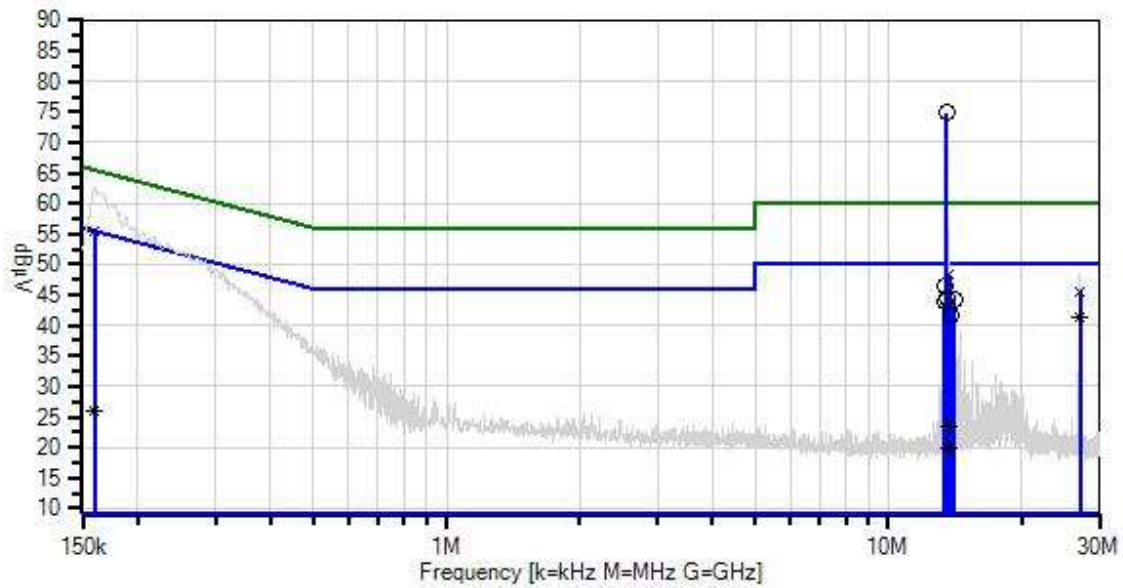
#### Test Conditions / Notes:

Conducted Emission  
 Frequency Range: 150kHz to 30MHz  
  
 Temperature: 23.0°C  
 Relative Humidity: 43 %  
 Atmospheric Pressure: 101.4 kPa  
 High Clock: 27.12MHz  
 Transmitting operating frequency: 13.56MHz and 125kHz  
 Gain of the antenna: 1dBi  
 Firmware: M21\_01\_04  
 Test Method: ANSI C63.10 (2013)

The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits next to it.  
 The card is placed 2 inches away from the antenna to make the EUT transmit continuously.

Note:  
 13.56MHz Transmit

Allegion WO#: 102031 Sequence#: 113 Date: 3/20/2019  
15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data  
 x QP Readings  
 Software Version: 5.03.12

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

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

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/22/2019	2/22/2021
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
T4	ANP05258	High Pass Filter	HE9615-150K-50-720B	9/19/2018	9/19/2020
T5	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/11/2019	3/11/2021
	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/11/2019	3/11/2021

**Measurement Data:**

Reading listed by margin.

Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	13.562M	64.1	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	74.8	50.0	+24.8	Line
2	13.481M	35.7	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	46.4	50.0	-3.6	Line
3	13.517M	33.7	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	44.4	50.0	-5.6	Line
4	14.085M	33.5	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	44.2	50.0	-5.8	Line
5	13.427M	33.1	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	43.8	50.0	-6.2	Line
6	13.842M	31.0	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	41.7	50.0	-8.3	Line
7	27.120M Ave	30.6	+9.9 +0.1	+0.4	+0.2	+0.2	+0.0	41.4	50.0	-8.6	Line
8	160.181k QP	44.7	+9.9 +0.3	+0.0	+0.0	+0.4	+0.0	55.3	65.5	-10.2	Line
9	13.770M QP	37.5	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	48.2	60.0	-11.8	Line
10	27.120M QP	34.8	+9.9 +0.1	+0.4	+0.2	+0.2	+0.0	45.6	60.0	-14.4	Line
^	27.120M	38.0	+9.9 +0.1	+0.4	+0.2	+0.2	+0.0	48.8	50.0	-1.2	Line

12	13.670M	34.1	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	44.8	60.0	-15.2	Line
13	13.770M	12.6	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	23.3	50.0	-26.7	Line
^	13.770M	45.3	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	56.0	50.0	+6.0	Line
15	160.181k	15.3	+9.9 +0.3	+0.0	+0.0	+0.4	+0.0	25.9	55.5	-29.6	Line
^	160.181k	52.2	+9.9 +0.3	+0.0	+0.0	+0.4	+0.0	62.8	55.5	+7.3	Line
17	13.670M	9.2	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	19.9	50.0	-30.1	Line
^	13.670M	43.8	+9.9 +0.3	+0.3	+0.1	+0.1	+0.0	54.5	50.0	+4.5	Line



Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Allegion**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **102031** Date: 3/20/2019  
 Test Type: **Conducted Emissions** Time: 09:44:50  
 Tested By: Hieu Song Nguyenpham Sequence#: 114  
 Software: EMITest 5.03.12 120V 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 4			

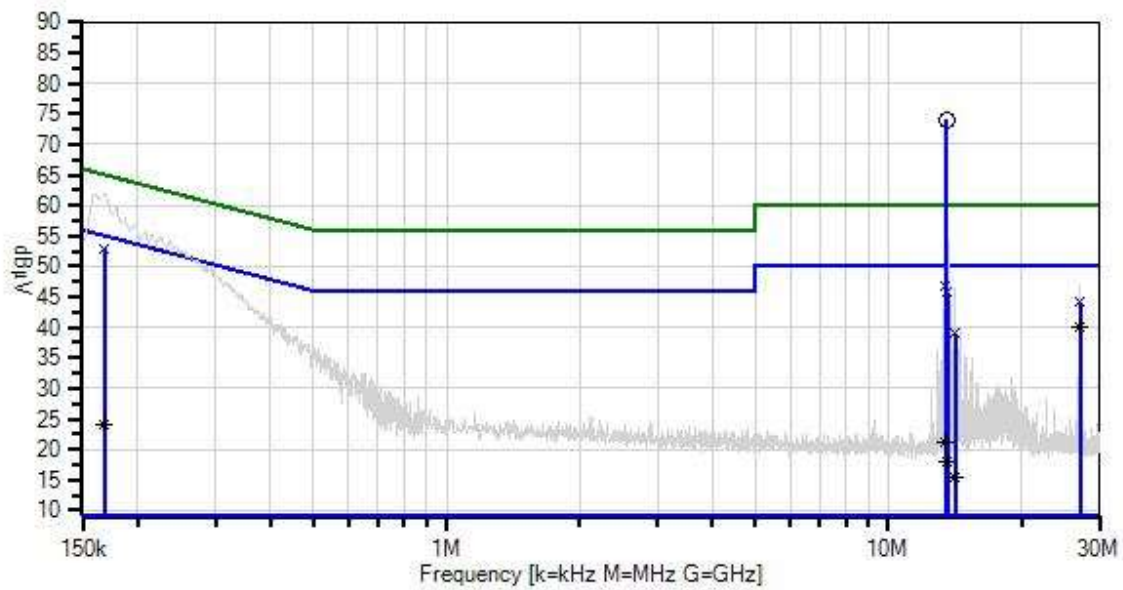
***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 4			

***Test Conditions / Notes:***

Conducted Emission Frequency Range: 150kHz to 30MHz  Temperature: 23.0°C Relative Humidity: 43 % Atmospheric Pressure: 101.4 kPa High Clock: 27.12MHz Transmitting operating frequency: 13.56MHz and 125kHz Gain of the antenna: 1dBi Firmware: M21_01_04 Test Method: ANSI C63.10 (2013)  The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits next to it. The card is placed 2 inches away from the antenna to make the EUT transmit continuously.  Note: 13.56MHz Transmit
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Allegion WO#: 102031 Sequence#: 114 Date: 3/20/2019  
15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data  
x QP Readings  
Software Version: 5.03.12

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

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

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/22/2019	2/22/2021
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
T4	ANP05258	High Pass Filter	HE9615-150K-50-720B	9/19/2018	9/19/2020
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/11/2019	3/11/2021
T5	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/11/2019	3/11/2021

**Measurement Data:**

Reading listed by margin.

Test Lead: Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	13.562M	63.5	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	74.1	50.0	+24.1	Neutr
									Fundamental		
2	168.179k QP	42.6	+9.9 +0.2	+0.0	+0.0	+0.3	+0.0	53.0	55.0	-2.0	Neutr
3	27.120M Ave	29.5	+9.9 +0.0	+0.4	+0.2	+0.2	+0.0	40.2	50.0	-9.8	Neutr
4	13.454M QP	36.1	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	46.7	60.0	-13.3	Neutr
5	13.634M QP	35.2	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	45.8	60.0	-14.2	Neutr
6	27.120M QP	33.4	+9.9 +0.0	+0.4	+0.2	+0.2	+0.0	44.1	60.0	-15.9	Neutr
^	27.120M	36.9	+9.9 +0.0	+0.4	+0.2	+0.2	+0.0	47.6	50.0	-2.4	Neutr
8	14.193M QP	28.4	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	39.0	60.0	-21.0	Neutr
9	13.454M Ave	10.7	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	21.3	50.0	-28.7	Neutr
^	13.454M	47.2	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	57.8	50.0	+7.8	Neutr
11	168.179k Ave	13.7	+9.9 +0.2	+0.0	+0.0	+0.3	+0.0	24.1	55.0	-30.9	Neutr
^	168.179k	50.2	+9.9 +0.2	+0.0	+0.0	+0.3	+0.0	60.6	55.0	+5.6	Neutr
13	13.634M Ave	7.3	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	17.9	50.0	-32.1	Neutr
^	13.634M	45.2	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	55.8	50.0	+5.8	Neutr
15	14.193M Ave	4.7	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	15.3	50.0	-34.7	Neutr
^	14.193M	37.5	+9.9 +0.2	+0.3	+0.1	+0.1	+0.0	48.1	50.0	-1.9	Neutr

Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Allegion**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **102031** Date: 3/20/2019  
 Test Type: **Conducted Emissions** Time: 09:52:19  
 Tested By: Hieu Song Nguyenpham Sequence#: 116  
 Software: EMITest 5.03.12 120V 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 4			

***Support Equipment:***

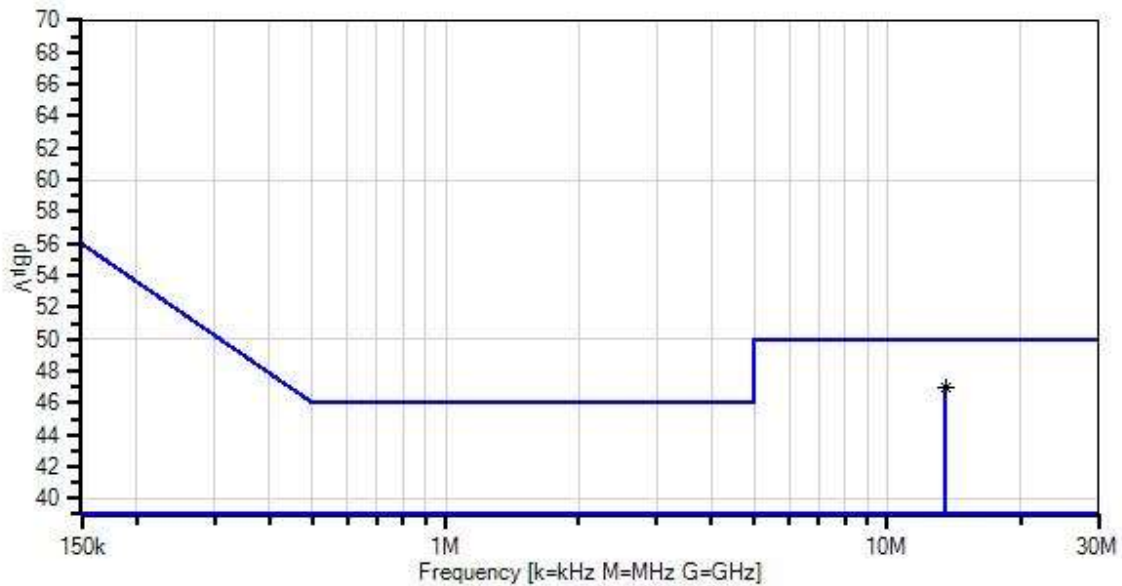
Device	Manufacturer	Model #	S/N
Configuration 4			

***Test Conditions / Notes:***

Conducted Emission Frequency Range: 150kHz to 30MHz  Temperature: 23.0°C Relative Humidity: 43 % Atmospheric Pressure: 101.4 kPa High Clock: 27.12MHz Transmitting operating frequency: 13.56MHz and 125kHz Gain of the antenna: 1dBi Firmware: M21_01_04 Test Method: ANSI C63.10 (2013)  The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits next to it. The 13.56MHz antenna is connected to 50Ohm Dummy Load.  Note: 13.56MHz Fundamental
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Allegion WO#: 102031 Sequence#: 116 Date: 3/20/2019  
15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data  
\* QP Readings  
Software Version: 5.03.12  
— Readings  
\* Average Readings  
— 1 - 15.207 AC Mains - Average  
○ Peak Readings  
▼ Ambient

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/22/2019	2/22/2021
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
T4	ANP05258	High Pass Filter	HE9615-150K-50-720B	9/19/2018	9/19/2020
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/11/2019	3/11/2021
	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/11/2019	3/11/2021

#### 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	13.560M	36.6	+9.9	+0.3	+0.1	+0.1	+0.0	47.0	50.0	-3.0	Line
Ave											
^	13.560M	45.9	+9.9	+0.3	+0.1	+0.1	+0.0	56.3	50.0	+6.3	Line



Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
Customer: **Allegion**  
Specification: **15.207 AC Mains - Average**  
Work Order #: **102031** Date: 3/20/2019  
Test Type: **Conducted Emissions** Time: 09:49:30  
Tested By: Hieu Song Nguyenpham Sequence#: 115  
Software: EMITest 5.03.12 120V 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 4			

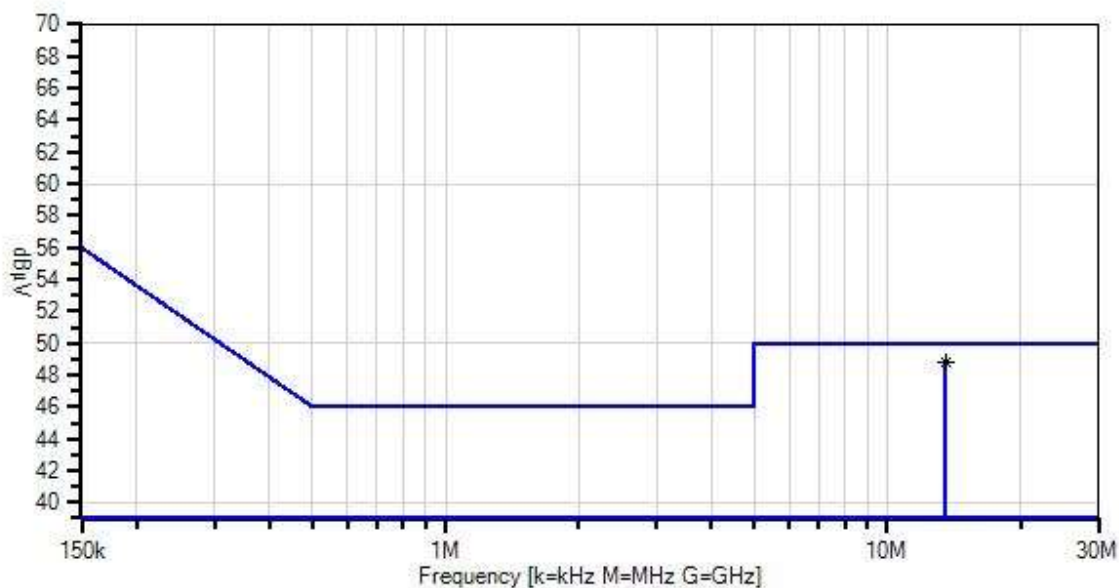
***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 4			

***Test Conditions / Notes:***

Conducted Emission Frequency Range: 150kHz to 30MHz  Temperature: 23.0°C Relative Humidity: 43 % Atmospheric Pressure: 101.4 kPa High Clock: 27.12MHz Transmitting operating frequency: 13.56MHz and 125kHz Gain of the antenna: 1dBi Firmware: M21_01_04 Test Method: ANSI C63.10 (2013)  The EUT is set up and operated as intended. It is powered at 12VDC from a DC Power supply which sits next to it. The 13.56MHz antenna is connected to 50Ohm Dummy Load.  Note: 13.56MHz Fundamental
---

Allegation WO#: 102031 Sequence#: 115 Date: 3/20/2019  
15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data  
× QP Readings  
Software Version: 5.03.12  
— Readings  
\* Average Readings  
— 1 - 15.207 AC Mains - Average  
○ Peak Readings  
▼ Ambient

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/22/2019	2/22/2021
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020
T4	ANP05258	High Pass Filter	HE9615-150K-50-720B	9/19/2018	9/19/2020
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/11/2019	3/11/2021
T5	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/11/2019	3/11/2021

#### Measurement Data:

Reading listed by margin.

Test Lead: Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	13.560M	38.2	+9.9	+0.3	+0.1	+0.1	+0.0	48.8	50.0	-1.2	Neutr
Ave			+0.2								
^	13.560M	47.4	+9.9	+0.3	+0.1	+0.1	+0.0	58.0	50.0	+8.0	Neutr
			+0.2								

Test Setup Photo(s)



## SUPPLEMENTAL INFORMATION

### Measurement Uncertainty

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

Uncertainties reported are worst case for all CKC Laboratories' sites and 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  $\text{dB}\mu\text{V}/\text{m}$ , the spectrum analyzer reading in  $\text{dB}\mu\text{V}$  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	( $\text{dB}\mu\text{V}$ )
+	Antenna Factor	( $\text{dB}/\text{m}$ )
+	Cable Loss	( $\text{dB}$ )
-	Distance Correction	( $\text{dB}$ )
-	Preamplifier Gain	( $\text{dB}$ )
=	Corrected Reading	( $\text{dB}\mu\text{V}/\text{m}$ )

### 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.