

# XceedID Corporation

## TEST REPORT FOR

**Enrollment Reader  
Model: MT20**

**Tested To The Following Standards:**

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

**Report No.: 96065-10**

**Date of issue: October 28, 2014**



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:**

XceedID Corporation  
500 Golden Ridge Road  
Bldg #1 Suite 160  
Golden, CO 80401

Representative: Bryan Hoff  
Customer Reference Number: 4043899

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

Morgan Tramontin  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 96065

September 23, 2014

September 24 - 27, 2014

### 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 that reads "Steve Behm".

**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	5.00.14
Immunity	5.00.07

## Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136
Mariposa D	US0103	SL2-IN-E-1147R	3082A-1	784962	A-0136

## SUMMARY OF RESULTS

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

Test Procedure/Method	Description	Modifications*	Results
15.207 / ANSI C63.4	Conducted Emissions	NA	Pass
15.209	Field Strength of Radiated Spurious Emissions	NA	Pass
15.209(a)	Fundamental Field Strength	NA	Pass
15.215(c)	Occupied Bandwidth	NA	Pass
15.225(a)	Fundamental Field Strength	NA	Pass
15.225(b)(c)	Emission Mask	NA	Pass
15.225(d)	Field Strength of Spurious Emissions	NA	Pass
15.225(e)	Frequency Stability	NA	Pass

## Modifications\*/Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
The Enrollment Reader employs two separate transmitters. One is at 13.56MHz and the other is at 125kHz.
No modifications were made during testing.

**\*Modifications listed above must be incorporated into all production units.**

## **EQUIPMENT UNDER TEST (EUT)**

### **EQUIPMENT UNDER TEST**

#### **Enrollment Reader**

Manuf: XceedID

Model: MT20

Serial: 0001

### **PERIPHERAL DEVICES**

The EUT was tested with the following peripheral device(s):

#### **AC Adaptor**

Manuf: Lenovo

Model: 42T4422

Serial: 11S42T4422Z1ZF3D01T2L3

#### **Laptop Computer**

Manuf: Lenovo

Model: SL410

Serial: LR-ZZW25

## FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) CFR 47 Section 15 Subpart C requirements for Intentional Radiators.

### 15.207 AC Conducted Emissions

#### Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer:	<b>Allegion</b>	Date:	9/27/2014
Specification:	<b>15.207 AC Mains - Average</b>	Time:	12:06:18
Work Order #:	<b>96065</b>	Sequence#:	2
Test Type:	<b>Conducted Emissions</b>	Tested By:	Eddie Mariscal
Equipment:	<b>Enrollment Reader</b>		120V 60Hz
Manufacturer:	XceedID		
Model:	MT20		
S/N:	0001		

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T1	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T2	ANMACOND	Cable		8/26/2014	8/26/2016
T3	ANP02221	Attenuator	PE7010-10	6/25/2013	6/25/2015
T4	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

#### Support Devices:

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

**Test Conditions / Notes:**

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The AC mains port of the support laptop was tested.

The EUT is transmitting at 125kHz.

The EUT is powered by +5VDC via USB cable.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Atmospheric Conditions:

Temperature: 21°C

Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

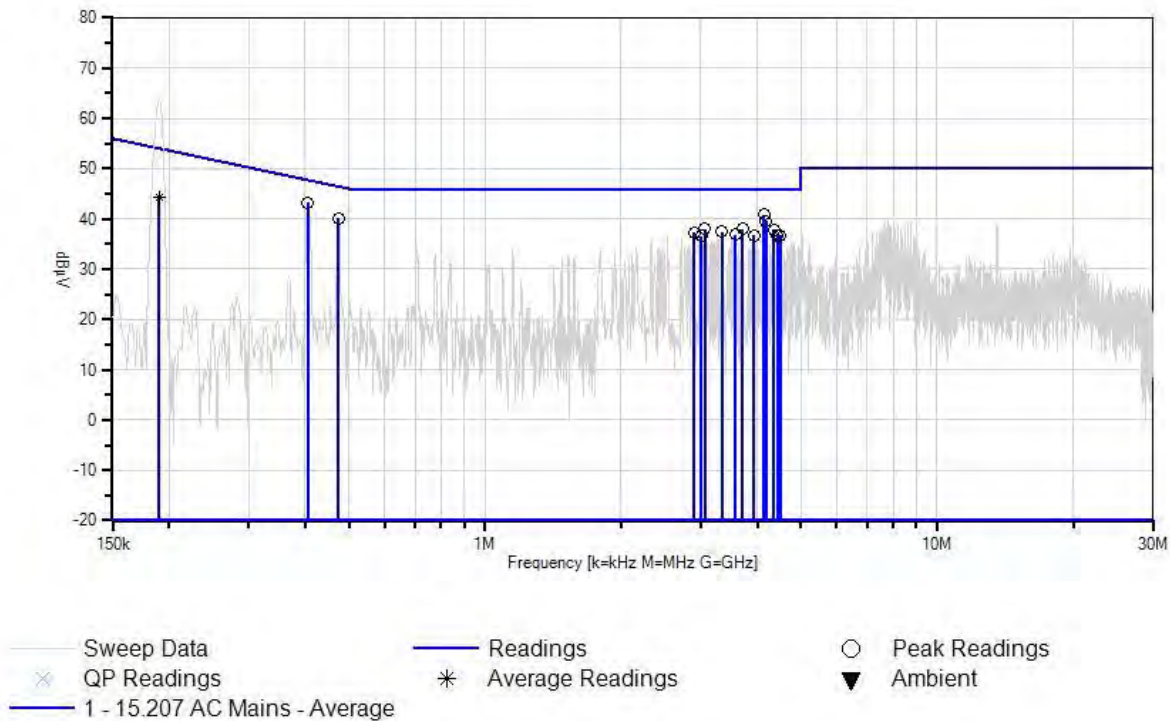
**Measurement Data:**

Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	406.172k	33.0	+0.2	+0.1	+9.9	+0.1	+0.0	43.3	47.7	-4.4	Black
2	4.144M	30.5	+0.1	+0.3	+9.9	+0.1	+0.0	40.9	46.0	-5.1	Black
3	474.529k	29.8	+0.2	+0.1	+9.9	+0.1	+0.0	40.1	46.4	-6.3	Black
4	4.178M	29.2	+0.1	+0.3	+9.9	+0.1	+0.0	39.6	46.0	-6.4	Black
5	3.064M	27.7	+0.1	+0.2	+9.9	+0.1	+0.0	38.0	46.0	-8.0	Black
6	3.711M	27.6	+0.1	+0.3	+9.9	+0.1	+0.0	38.0	46.0	-8.0	Black
7	4.349M	27.4	+0.1	+0.3	+9.9	+0.1	+0.0	37.8	46.0	-8.2	Black
8	3.345M	27.1	+0.1	+0.2	+9.9	+0.1	+0.0	37.4	46.0	-8.6	Black
9	2.903M	27.0	+0.1	+0.2	+9.9	+0.1	+0.0	37.3	46.0	-8.7	Black
10	3.583M	26.5	+0.1	+0.3	+9.9	+0.1	+0.0	36.9	46.0	-9.1	Black
11	3.932M	26.3	+0.1	+0.3	+9.9	+0.1	+0.0	36.7	46.0	-9.3	Black
12	4.434M	26.3	+0.1	+0.3	+9.9	+0.1	+0.0	36.7	46.0	-9.3	Black
13	4.493M	26.3	+0.1	+0.3	+9.9	+0.1	+0.0	36.7	46.0	-9.3	Black
14	3.005M	26.3	+0.1	+0.2	+9.9	+0.1	+0.0	36.6	46.0	-9.4	Black
15	190.050k	34.2	+0.2	+0.0	+9.9	+0.1	+0.0	44.4	54.0	-9.6	Black
Ave											
^	190.050k	53.3	+0.2	+0.0	+9.9	+0.1	+0.0	63.5	54.0	+9.5	Black

CKC Laboratories, Inc. Date: 9/27/2014 Time: 12:06:18 Allegion WO#: 96065  
 15.207 AC Mains - Average Test Lead: Black 120V 60Hz Sequence#: 2 Ext ATTN: 0 dB



Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

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 #: **96065**  
 Test Type: **Conducted Emissions**  
 Equipment: **Enrollment Reader**  
 Manufacturer: **XceedID**  
 Model: **MT20**  
 S/N: **0001**

Date: 9/27/2014  
 Time: 12:15:42  
 Sequence#: 3  
 Tested By: Eddie Mariscal  
 120V 60Hz

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T2	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T3	ANMACOND	Cable		8/26/2014	8/26/2016
T4	ANP02221	Attenuator	PE7010-10	6/25/2013	6/25/2015
	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
T5	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

**Support Devices:**

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

**Test Conditions / Notes:**

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The AC mains port of the support laptop was tested.

The EUT is transmitting at 125kHz.

The EUT is powered by +5VDC via USB cable.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Atmospheric Conditions:

Temperature: 21°C

Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

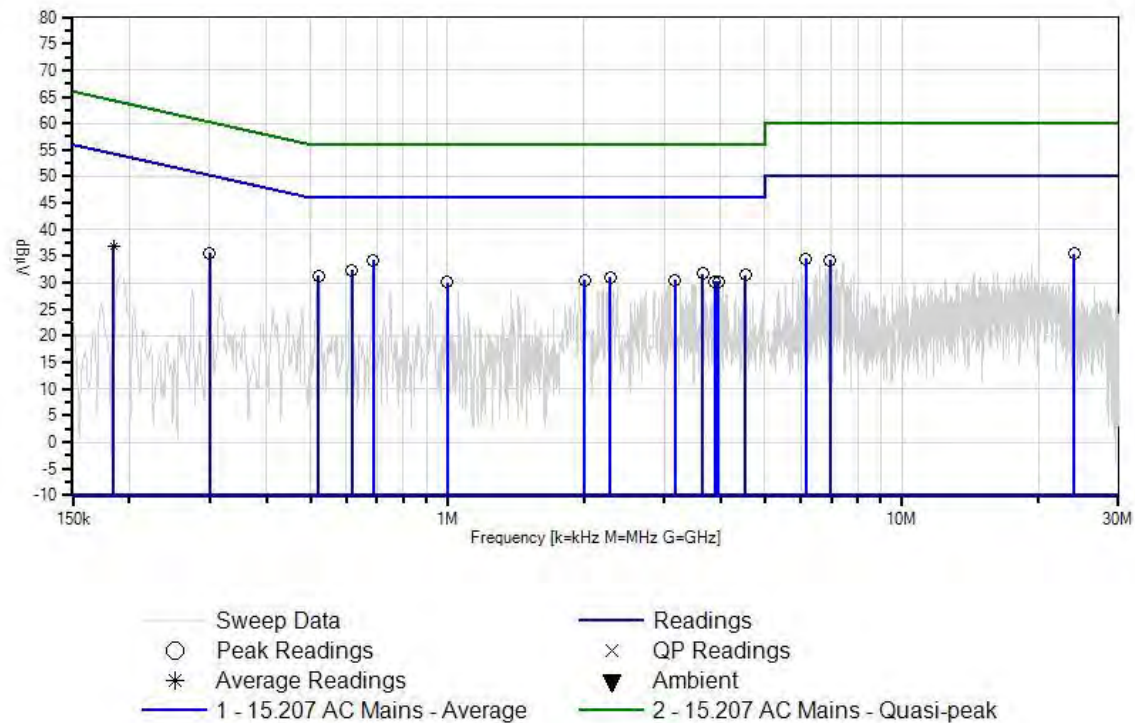
**Measurement Data:**

Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB $\mu$ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	686.874k	23.9	+0.0 +0.1	+0.2	+0.1	+9.9	+0.0	34.2	46.0	-11.8	White
2	617.062k	22.1	+0.0 +0.1	+0.2	+0.1	+9.9	+0.0	32.4	46.0	-13.6	White
3	3.651M	21.3	+0.0 +0.1	+0.1	+0.3	+9.9	+0.0	31.7	46.0	-14.3	White
4	4.536M	21.1	+0.0 +0.1	+0.1	+0.3	+9.9	+0.0	31.5	46.0	-14.5	White
5	23.990M	24.5	+0.0 +0.2	+0.2	+0.7	+9.9	+0.0	35.5	50.0	-14.5	White
6	299.850k	25.4	+0.0 +0.1	+0.1	+0.1	+9.9	+0.0	35.6	50.2	-14.6	White
7	521.071k	21.0	+0.0 +0.1	+0.2	+0.1	+9.9	+0.0	31.3	46.0	-14.7	White
8	2.282M	20.8	+0.0 +0.1	+0.1	+0.2	+9.9	+0.0	31.1	46.0	-14.9	White
9	2.010M	20.2	+0.0 +0.1	+0.1	+0.2	+9.9	+0.0	30.5	46.0	-15.5	White
10	3.175M	20.2	+0.0 +0.1	+0.1	+0.2	+9.9	+0.0	30.5	46.0	-15.5	White
11	6.160M	24.1	+0.0 +0.1	+0.1	+0.3	+9.9	+0.0	34.5	50.0	-15.5	White
12	6.951M	23.8	+0.0 +0.1	+0.1	+0.4	+9.9	+0.0	34.3	50.0	-15.7	White
13	3.881M	19.8	+0.0 +0.1	+0.1	+0.3	+9.9	+0.0	30.2	46.0	-15.8	White
14	3.949M	19.8	+0.0 +0.1	+0.1	+0.3	+9.9	+0.0	30.2	46.0	-15.8	White
15	999.572k	19.8	+0.0 +0.1	+0.2	+0.1	+9.9	+0.0	30.1	46.0	-15.9	White
16	184.637k	26.6	+0.0 +0.1	+0.3	+0.0	+9.9	+0.0	36.9	54.3	-17.4	White
Ave											
^	184.600k	52.1	+0.0 +0.1	+0.3	+0.0	+9.9	+0.0	62.4	54.3	+8.1	White

CKC Laboratories, Inc. Date: 9/27/2014 Time: 12:15:42 Allegion WO#: 96065  
15.207 AC Mains - Average Test Lead: White 120V 60Hz Sequence#: 3 Ext ATTN: 0 dB



Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

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 #: **96065**  
 Test Type: **Conducted Emissions**  
 Equipment: **Enrollment Reader**  
 Manufacturer: **XceedID**  
 Model: **MT20**  
 S/N: **0001**

Date: 9/27/2014  
 Time: 12:22:37  
 Sequence#: 5  
 Tested By: Eddie Mariscal  
 120V 60Hz

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T1	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T2	ANMACOND	Cable		8/26/2014	8/26/2016
T3	ANP02221	Attenuator	PE7010-10	6/25/2013	6/25/2015
T4	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

**Support Devices:**

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

**Test Conditions / Notes:**

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The AC mains port of the support laptop was tested.

The EUT is transmitting at 13.56Hz.

The EUT is powered by +5VDC via USB cable.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Atmospheric Conditions:

Temperature: 21°C

Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

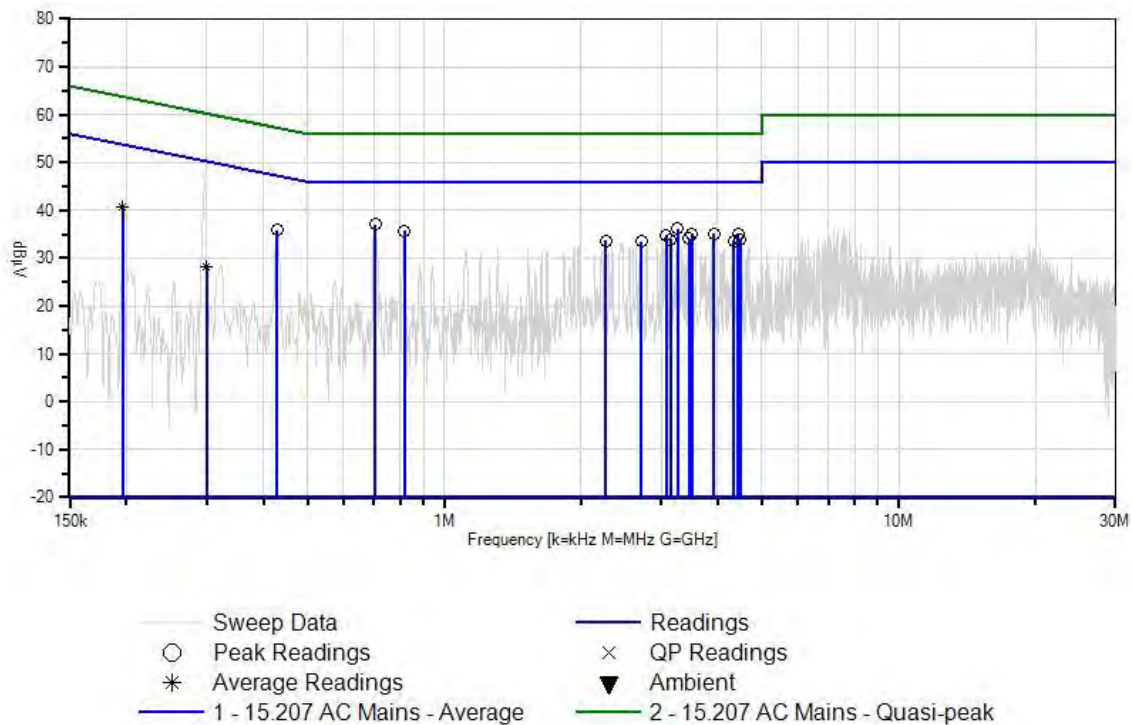
**Measurement Data:**

Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	704.327k	26.7	+0.2	+0.1	+9.9	+0.1	+0.0	37.0	46.0	-9.0	Black
2	3.268M	25.9	+0.1	+0.2	+9.9	+0.1	+0.0	36.2	46.0	-9.8	Black
3	816.316k	25.5	+0.2	+0.1	+9.9	+0.1	+0.0	35.8	46.0	-10.2	Black
4	3.507M	24.8	+0.1	+0.3	+9.9	+0.1	+0.0	35.2	46.0	-10.8	Black
5	3.923M	24.7	+0.1	+0.3	+9.9	+0.1	+0.0	35.1	46.0	-10.9	Black
6	4.434M	24.7	+0.1	+0.3	+9.9	+0.1	+0.0	35.1	46.0	-10.9	Black
7	3.081M	24.4	+0.1	+0.2	+9.9	+0.1	+0.0	34.7	46.0	-11.3	Black
8	429.443k	25.6	+0.2	+0.1	+9.9	+0.1	+0.0	35.9	47.3	-11.4	Black
9	3.456M	23.7	+0.1	+0.3	+9.9	+0.1	+0.0	34.1	46.0	-11.9	Black
10	3.149M	23.7	+0.1	+0.2	+9.9	+0.1	+0.0	34.0	46.0	-12.0	Black
11	4.485M	23.6	+0.1	+0.3	+9.9	+0.1	+0.0	34.0	46.0	-12.0	Black
12	2.265M	23.4	+0.1	+0.2	+9.9	+0.1	+0.0	33.7	46.0	-12.3	Black
13	4.340M	23.2	+0.1	+0.3	+9.9	+0.1	+0.0	33.6	46.0	-12.4	Black
14	2.716M	23.2	+0.1	+0.2	+9.9	+0.1	+0.0	33.5	46.0	-12.5	Black
15	196.256k	30.4	+0.2	+0.1	+9.9	+0.1	+0.0	40.7	53.8	-13.1	Black
Ave											
^	196.000k	49.1	+0.2	+0.1	+9.9	+0.1	+0.0	59.4	53.8	+5.6	Black
17	299.851k	18.1	+0.1	+0.1	+9.9	+0.1	+0.0	28.3	50.2	-21.9	Black
Ave											
^	299.851k	37.4	+0.1	+0.1	+9.9	+0.1	+0.0	47.6	50.2	-2.6	Black

CKC Laboratories, Inc. Date: 9/27/2014 Time: 12:22:37 Allegion WO#: 96065  
15.207 AC Mains - Average Test Lead: Black 120V 60Hz Sequence#: 5 Ext ATTN: 0 dB



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Customer: **Allegion**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **96065**  
 Test Type: **Conducted Emissions**  
 Equipment: **Enrollment Reader**  
 Manufacturer: **XceedID**  
 Model: **MT20**  
 S/N: **0001**

Date: 9/27/2014  
 Time: 12:19:22  
 Sequence#: 4  
 Tested By: Eddie Mariscal  
 120V 60Hz

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T1	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T2	ANMACOND	Cable		8/26/2014	8/26/2016
T3	ANP02221	Attenuator	PE7010-10	6/25/2013	6/25/2015
	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
T4	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

**Support Devices:**

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
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RBW = 9kHz; VBW > RBW

Atmospheric Conditions:

Temperature: 21°C

Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

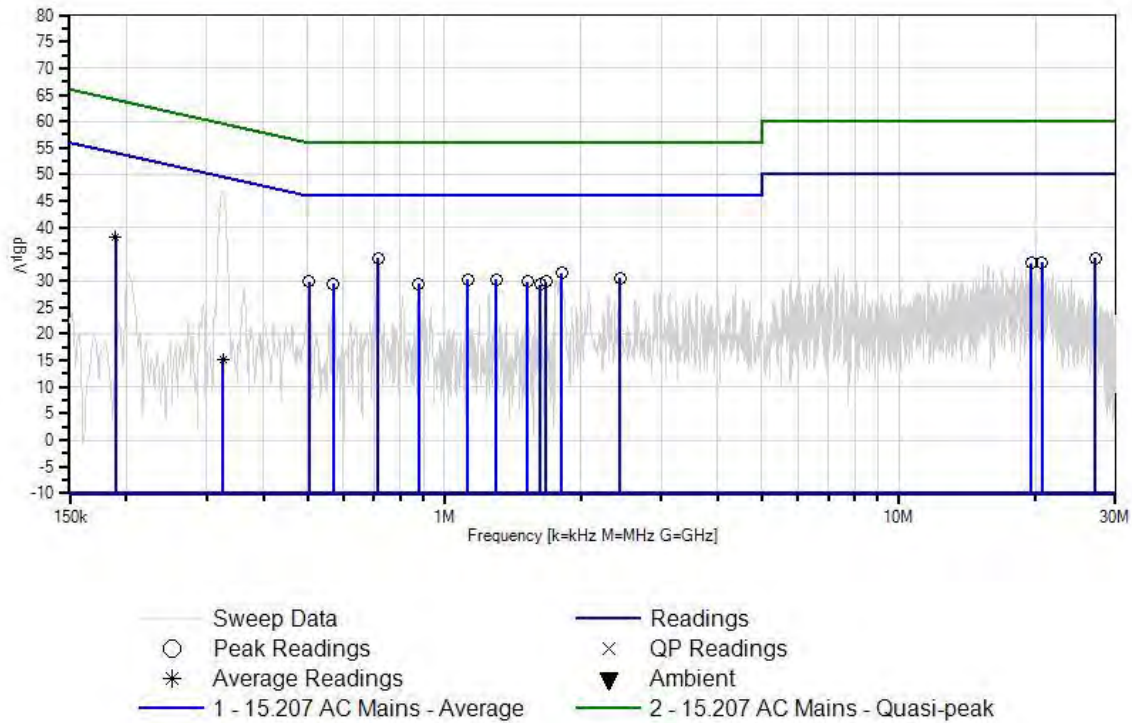
**Measurement Data:**

Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	715.962k	24.0	+0.2	+0.1	+9.9	+0.1	+0.0	34.3	46.0	-11.7	White
2	1.814M	21.1	+0.2	+0.2	+9.9	+0.1	+0.0	31.5	46.0	-14.5	White
3	2.435M	20.2	+0.1	+0.2	+9.9	+0.1	+0.0	30.5	46.0	-15.5	White
4	1.126M	20.0	+0.2	+0.1	+9.9	+0.1	+0.0	30.3	46.0	-15.7	White
5	27.026M	23.3	+0.2	+0.8	+9.9	+0.1	+0.0	34.3	50.0	-15.7	White
6	1.304M	20.0	+0.2	+0.1	+9.9	+0.1	+0.0	30.3	46.0	-15.7	White
7	188.951k	28.0	+0.2	+0.0	+9.9	+0.1	+0.0	38.2	54.1	-15.9	White
Ave											
^	189.000k	50.8	+0.2	+0.0	+9.9	+0.1	+0.0	61.0	54.1	+6.9	White
9	1.523M	19.5	+0.2	+0.2	+9.9	+0.1	+0.0	29.9	46.0	-16.1	White
10	505.072k	19.5	+0.2	+0.1	+9.9	+0.1	+0.0	29.8	46.0	-16.2	White
11	1.674M	19.4	+0.2	+0.2	+9.9	+0.1	+0.0	29.8	46.0	-16.2	White
12	570.521k	19.1	+0.2	+0.1	+9.9	+0.1	+0.0	29.4	46.0	-16.6	White
13	877.402k	19.1	+0.2	+0.1	+9.9	+0.1	+0.0	29.4	46.0	-16.6	White
14	20.692M	22.4	+0.2	+0.7	+9.9	+0.2	+0.0	33.4	50.0	-16.6	White
15	1.629M	18.9	+0.2	+0.2	+9.9	+0.1	+0.0	29.3	46.0	-16.7	White
16	19.593M	22.4	+0.2	+0.6	+9.9	+0.2	+0.0	33.3	50.0	-16.7	White
17	326.179k	5.1	+0.1	+0.1	+9.9	+0.1	+0.0	15.3	49.5	-34.2	White
Ave											
^	326.179k	36.7	+0.1	+0.1	+9.9	+0.1	+0.0	46.9	49.5	-2.6	White

CKC Laboratories, Inc. Date: 9/27/2014 Time: 12:19:22 Allegion WO#: 96065  
 15.207 AC Mains - Average Test Lead: White 120V 60Hz Sequence#: 4 Ext ATTN: 0 dB



Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

**Test Setup Photo(s)**



Front View



Back View

## 15.209 Field Strength of Radiated Spurious Emissions

### Test 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 #: **96065**  
 Test Type: **Maximized Emissions**  
 Equipment: **Enrollment Reader**  
 Manufacturer: XceedID  
 Model: MT20  
 S/N: 0001

Date: 10/18/2014  
 Time: 09:46:32  
 Sequence#: 1  
 Tested By: Eddie Mariscal

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01991	Biconilog Antenna	CBL6111C	3/7/2014	3/7/2016
T2	ANMA10M	Cable		8/26/2014	8/26/2016
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T3	AN00449	Preamp-Top Amp (dB)	8447F	4/7/2014	4/7/2016
T4	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

#### Support Devices:

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

#### Test Conditions / Notes:

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation. The EUT is transmitting at 125kHz.

The EUT is powered by +5VDC via USB cable.  
 Highest internal clock of the EUT: 48MHz  
 Frequency Range of Interest: 0.009-1000MHz

0.009-0.15MHz: RBW = 200Hz; VBW > RBW  
 0.15-30MHz: RBW = 9kHz; VBW > RBW  
 30-1000MHz: RBW = 120kHz; VBW > RBW

Atmospheric Conditions:  
 Temperature: 21°C  
 Relative Humidity: 56%  
 Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

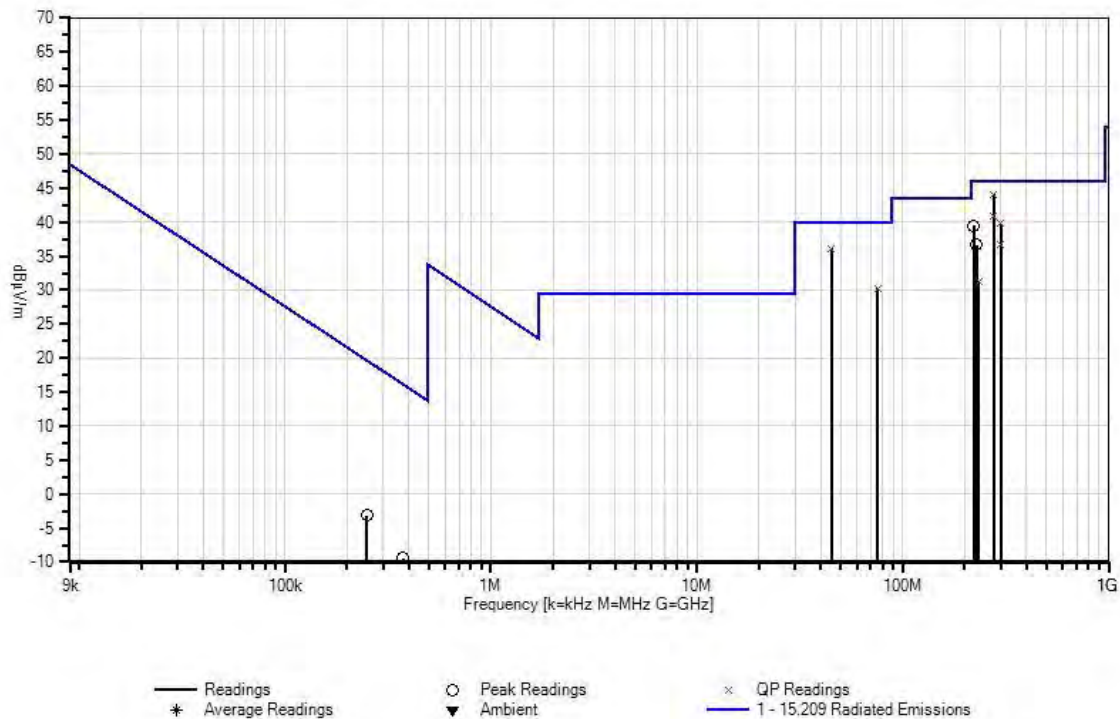
**Measurement Data:**

Reading listed by margin.

Test Distance: 10 Meters

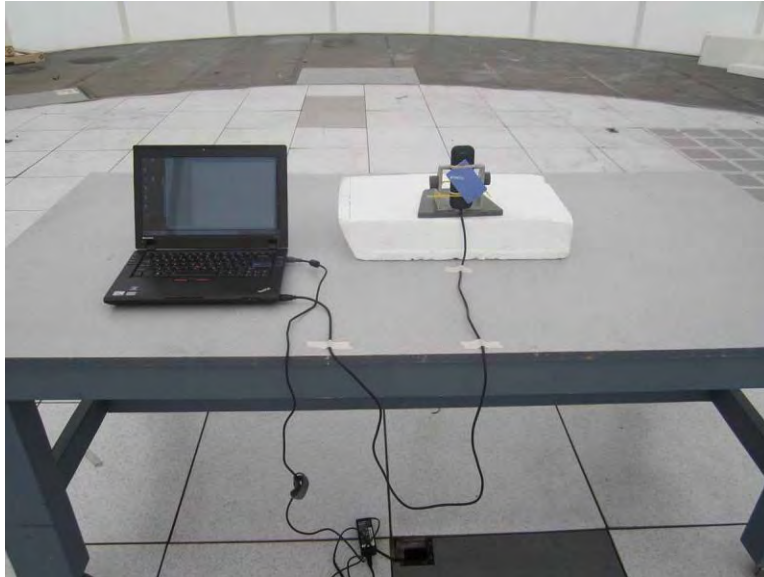
#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	276.023M	42.5	+13.0	+4.6	-26.5	+0.0	+10.5	44.1	46.0	-1.9	Horiz
	QP										
^	276.023M	50.5	+13.0	+4.6	-26.5	+0.0	+10.5	52.1	46.0	+6.1	Horiz
3	44.945M	40.0	+11.3	+1.6	-27.2	+0.0	+10.5	36.2	40.0	-3.8	Horiz
	QP										
^	44.945M	46.8	+11.3	+1.6	-27.2	+0.0	+10.5	43.0	40.0	+3.0	Horiz
5	276.037M	39.2	+13.0	+4.6	-26.5	+0.0	+10.5	40.8	46.0	-5.2	Vert
	QP										
^	276.037M	47.9	+13.0	+4.6	-26.5	+0.0	+10.5	49.5	46.0	+3.5	Vert
7	299.980M	37.6	+13.3	+4.9	-26.5	+0.0	+10.5	39.8	46.0	-6.2	Vert
	QP										
^	299.980M	44.8	+13.3	+4.9	-26.5	+0.0	+10.5	47.0	46.0	+1.0	Vert
9	221.140M	40.7	+10.7	+4.1	-26.5	+0.0	+10.5	39.5	46.0	-6.5	Horiz
10	300.025M	34.6	+13.3	+4.9	-26.5	+0.0	+10.5	36.8	46.0	-9.2	Horiz
	QP										
^	300.025M	43.0	+13.3	+4.9	-26.5	+0.0	+10.5	45.2	46.0	-0.8	Horiz
12	228.070M	37.3	+11.2	+4.1	-26.5	+0.0	+10.5	36.6	46.0	-9.4	Vert
13	75.385M	37.9	+6.9	+2.1	-27.2	+0.0	+10.5	30.2	40.0	-9.8	Horiz
	QP										
^	75.380M	45.6	+6.9	+2.1	-27.2	+0.0	+10.5	37.9	40.0	-2.1	Horiz
15	233.980M	31.5	+11.6	+4.2	-26.5	+0.0	+10.5	31.3	46.0	-14.7	Vert
	QP										
^	233.980M	40.4	+11.6	+4.2	-26.5	+0.0	+10.5	40.2	46.0	-5.8	Vert
17	250.000k	45.7	+0.0	+0.1	+0.0	+10.2	-59.1	-3.1	19.6	-22.7	Vert
18	375.000k	39.4	+0.0	+0.1	+0.0	+10.2	-59.1	-9.4	16.1	-25.5	Vert

CKC Laboratories, Inc. Date: 10/18/2014 Time: 09:46:32 Allegion WO#: 96065  
15,209 Radiated Emissions Test Distance: 10 Meters Sequence#: 1 Ext ATTN: 0 dB

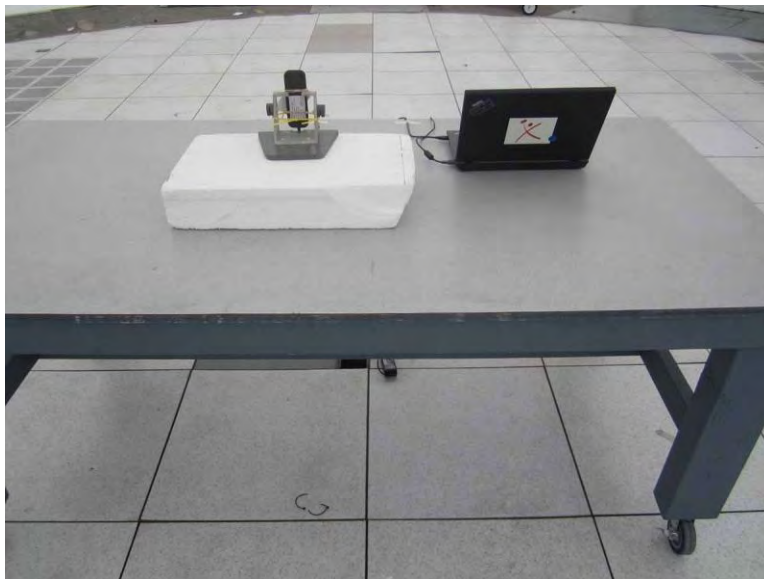


Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

## Test Setup Photo(s)



Front View



Back View

## 15.209(a) Fundamental Field Strength

### 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 #: **96065** Date: 9/27/2014  
 Test Type: **Maximized Emissions** Time: 13:10:16  
 Equipment: **Enrollment Reader** Sequence#: 1  
 Manufacturer: XceedID Tested By: Eddie Mariscal  
 Model: MT20  
 S/N: 0001

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T2	ANMACOND	Cable		8/26/2014	8/26/2016

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

#### Support Devices:

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

#### Test Conditions / Notes:

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation. The EUT is transmitting at 125kHz.

The EUT is powered by +5VDC via USB cable.

Highest internal clock of the EUT: 48MHz

Frequency Range of Interest: Fundamental (125kHz)

RBW = 200Hz; VBW > RBW

Atmospheric Conditions:

Temperature: 21°C

Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

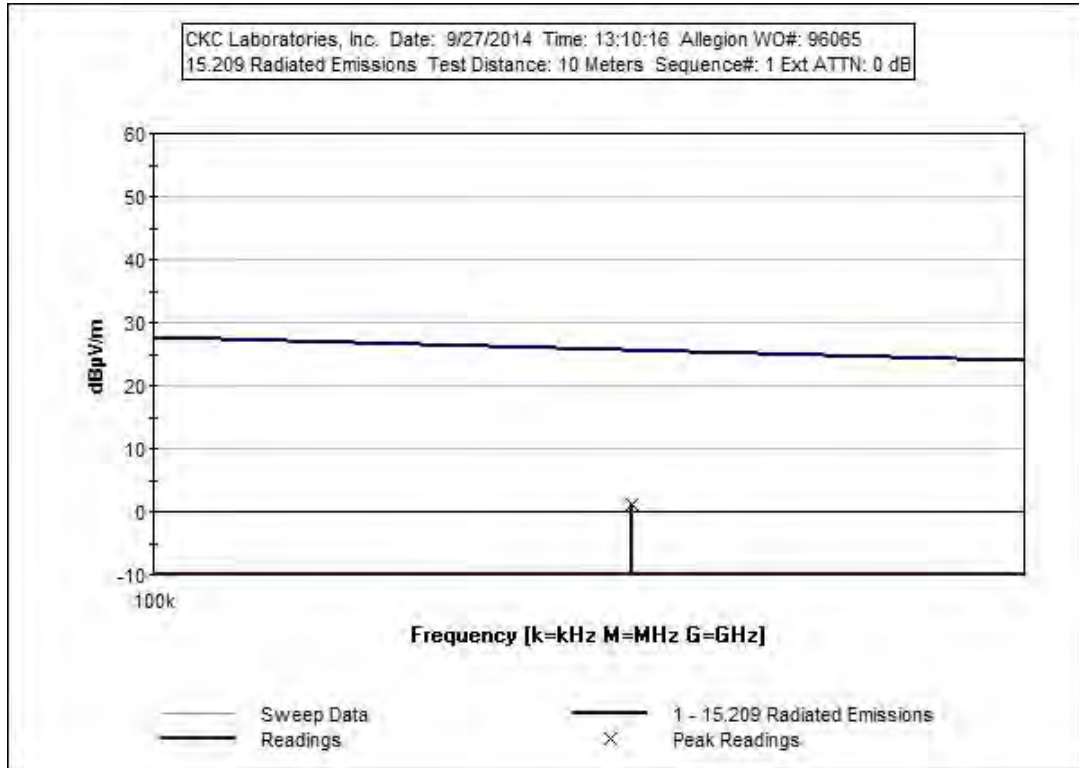
Ext Attn: 0 dB

**Measurement Data:**

Reading listed by margin.

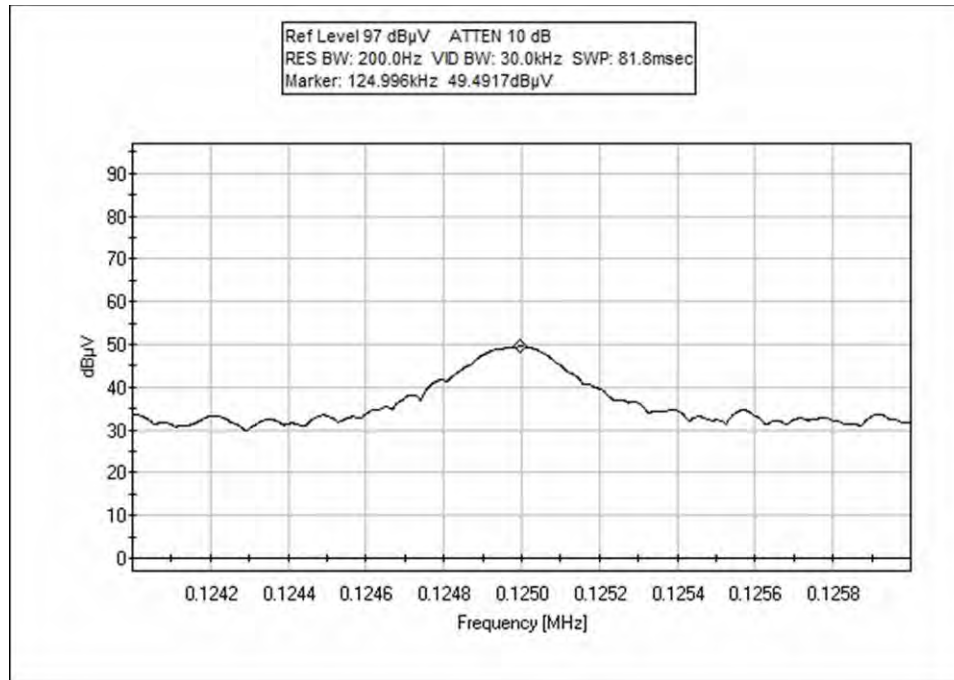
Test Distance: 10 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB			Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	124.980k	49.3	+10.8	+0.0			-59.1	1.0	25.7	-24.7	Vert

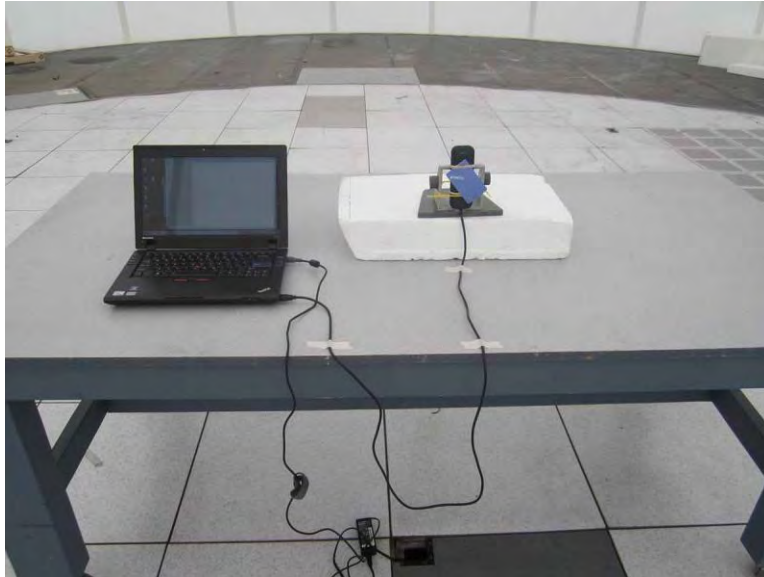


Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

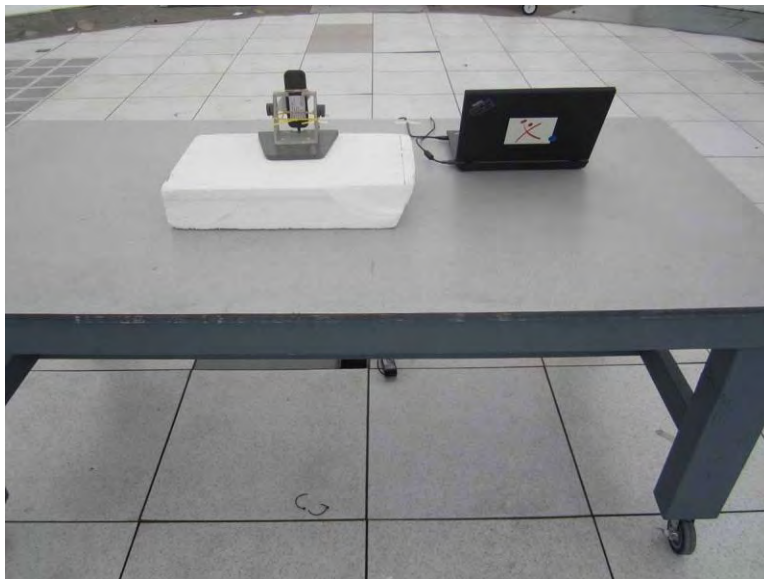
## Test Data



## Test Setup Photo(s)



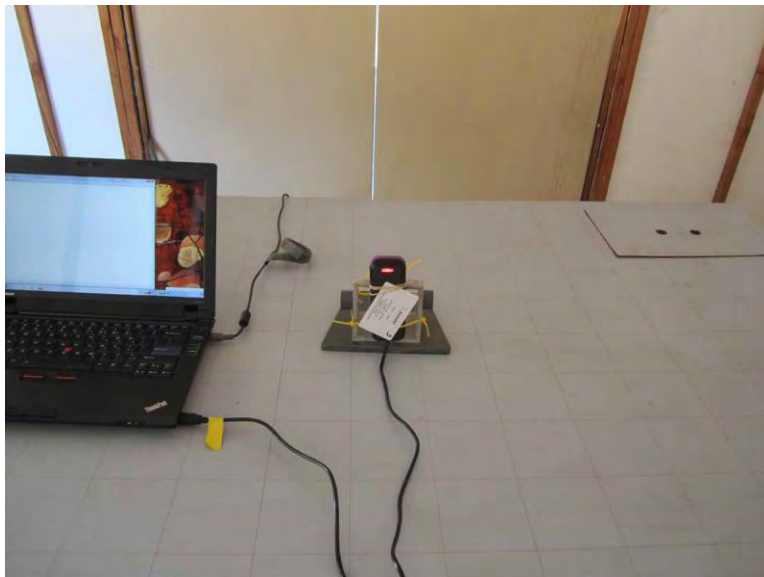
Front View



Back View



X-Axis



Y-Axis



Z-Axis

## 15.215(c) 20dB Occupied 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 #: **96065** Date: 9/26/2014  
 Test Type: **Maximized Emissions** Time: 17:25:53  
 Equipment: **Enrollment Reader** Sequence#: 1  
 Manufacturer: XceedID Tested By: Eddie Mariscal  
 Model: MT20  
 S/N: 0001

#### Test Equipment:

ID	Asset #	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
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

#### Support Devices:

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

#### Test Conditions / Notes:

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation.

The EUT is transmitting at 125kHz.

The EUT is powered by +5VDC via USB cable.

Highest internal clock of the EUT: 48MHz

Frequency Range of Interest: Fundamental (125kHz)

Atmospheric Conditions: Temperature: 21°C, Relative Humidity: 56%, Atmospheric Pressure: 97.8kPa

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer: **Allegion**  
 Specification: **15.215 20dB Bandwidth**  
 Work Order #: **96065** Date: 9/26/2014  
 Test Type: **Maximized Emissions** Time: 17:25:53  
 Equipment: **Enrollment Reader** Sequence#: 1  
 Manufacturer: XceedID Tested By: Eddie Mariscal  
 Model: MT20  
 S/N: 0001

**Test Equipment:**

ID	Asset #	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
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

**Support Devices:**

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

**Test Conditions / Notes:**

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation.

The EUT is transmitting at 13.56MHz.

The EUT is powered by +5VDC via USB cable.

Highest internal clock of the EUT: 48MHz

Frequency Range of Interest: Fundamental (13.56MHz)

Atmospheric Conditions:

Temperature: 21°C

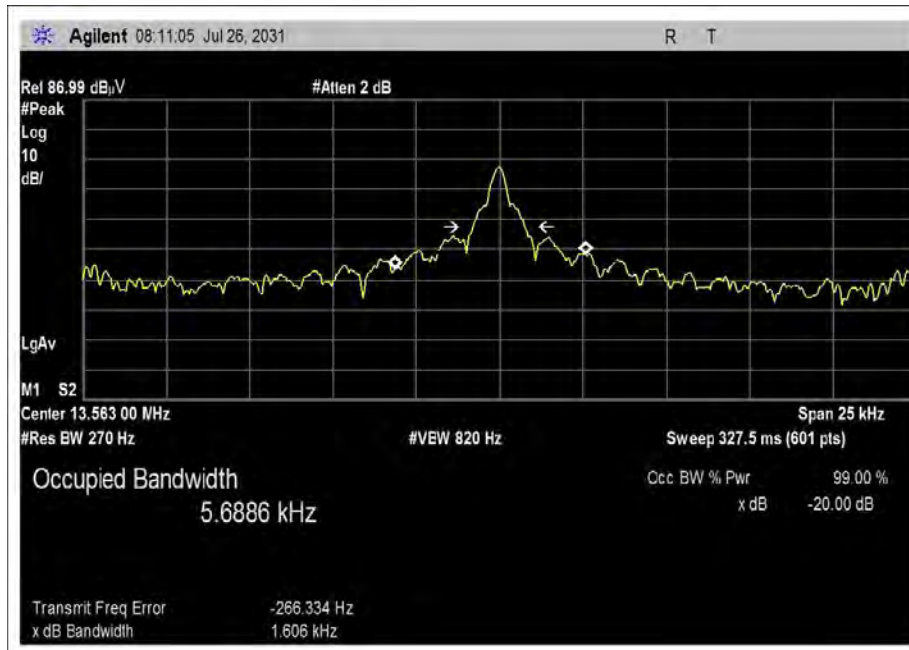
Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

## Test Data



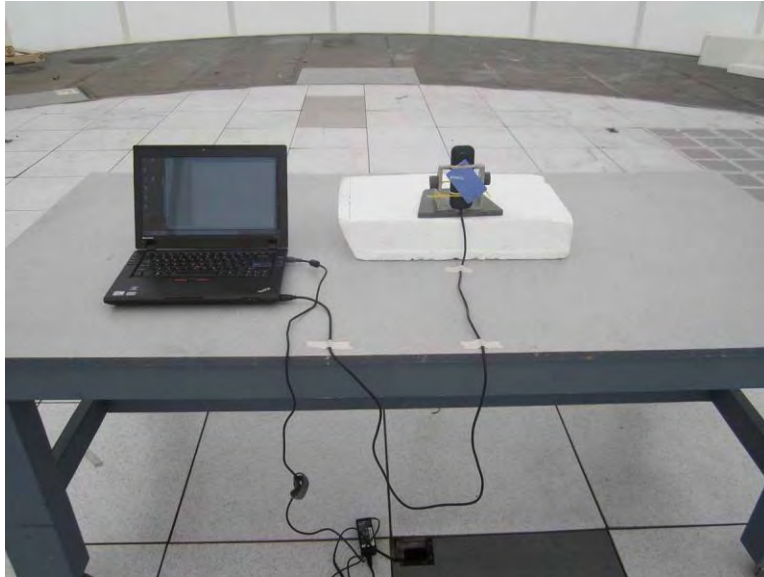
125kHz



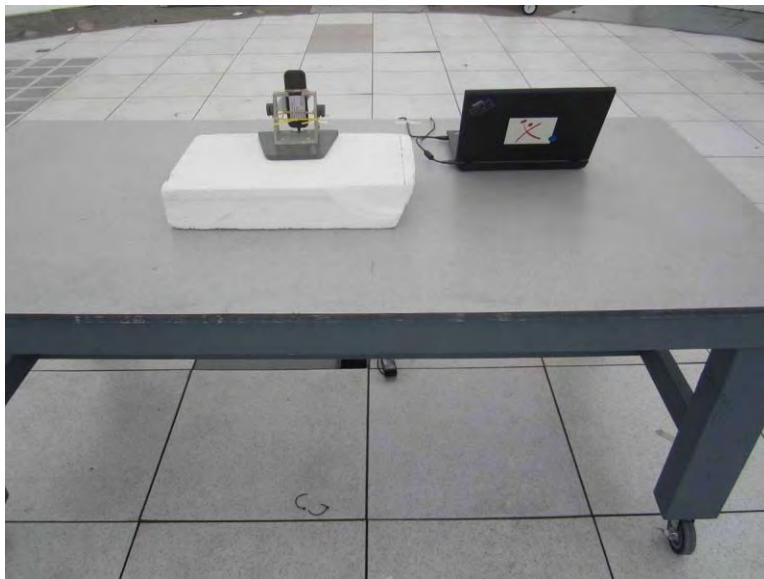
13.56MHz

Note: At the time of testing, the date on the above test screen captures was set on a default setting and should read 9/26/14. The screen capture was taken at the time of testing and cannot be changed.

## Test Setup Photo(s)



Front View



Back View

## 15.225(a) Fundamental Field Strength

### Test Data

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 #: **96065** Date: 9/26/2014  
 Test Type: **Maximized Emissions** Time: 17:25:53  
 Equipment: **Enrollment Reader** Sequence#: 1  
 Manufacturer: XceedID Tested By: Eddie Mariscal  
 Model: MT20  
 S/N: 0001

#### Test Equipment:

ID	Asset #	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
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

#### Support Devices:

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2 L3
Laptop Computer	Lenovo	SL410	LR-ZZW25

#### Test Conditions / Notes:

The EUT is placed atop a wooden, non-conductive table of height 80cm. EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation.

The EUT is transmitting at 13.56MHz.

The EUT is powered by +5VDC via USB cable.

Highest internal clock of the EUT: 48MHz

Frequency Range of Interest: Fundamental (13.56MHz)

0.009-0.15MHz: RBW = 200Hz; VBW > RBW

0.15-30MHz: RBW = 9kHz; VBW > RBW

30-1000MHz: RBW = 120kHz; VBW > RBW

Atmospheric Conditions: Temperature: 21°C, Relative Humidity: 56%, Atmospheric Pressure: 97.8kPa

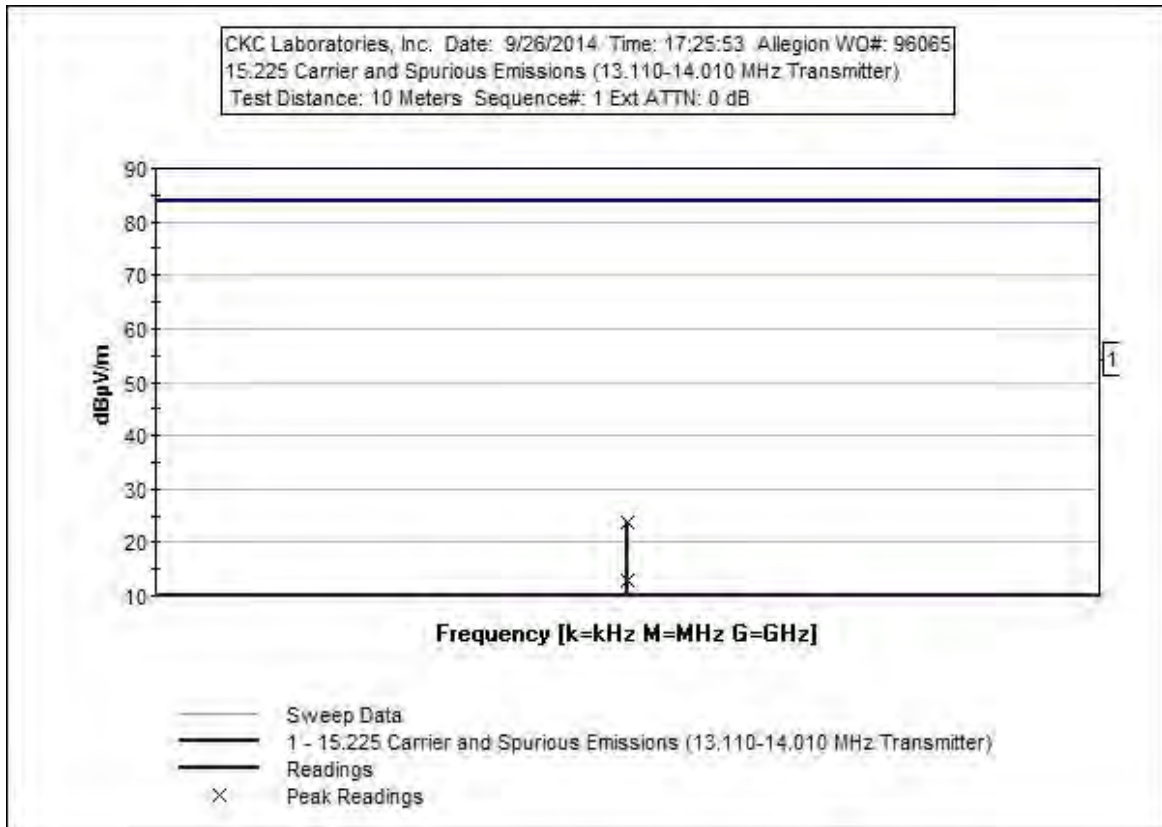
Ext Attn: 0 dB

**Measurement Data:**

Reading listed by margin.

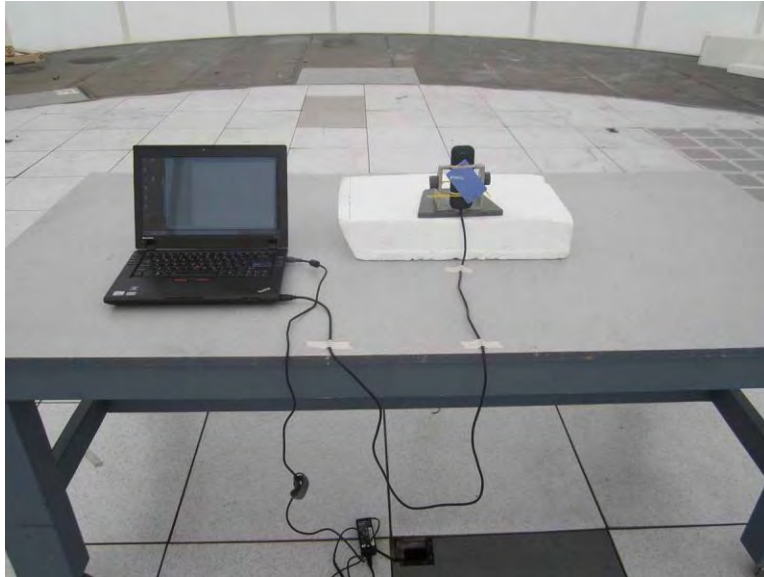
Test Distance: 10 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB		Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	13.563M	32.5	+9.7	+0.8		-19.1	23.9	84.0 Y-Axis	-60.1	Vert
2	13.563M	32.4	+9.7	+0.8		-19.1	23.8	84.0 Z-Axis	-60.2	Vert
3	13.563M	21.5	+9.7	+0.8		-19.1	12.9	84.0 X-Axis	-71.1	Vert

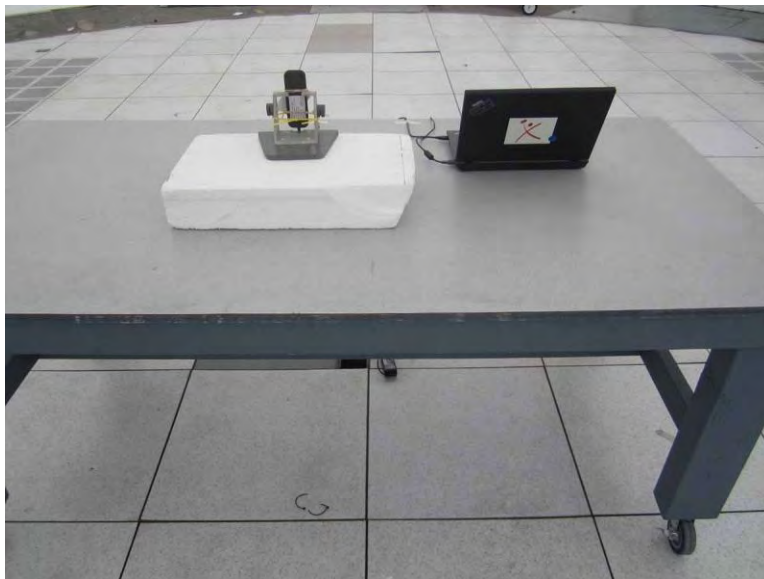


Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

## Test Setup Photo(s)



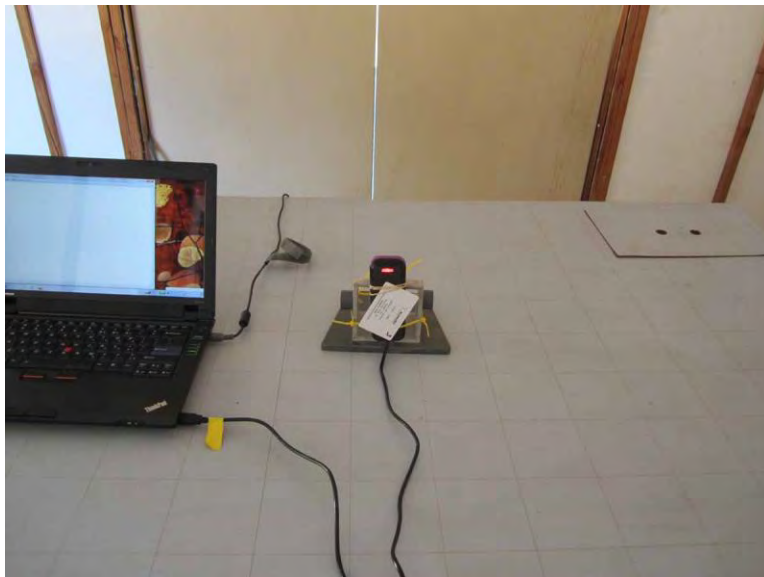
Front View



Back View



X-Axis



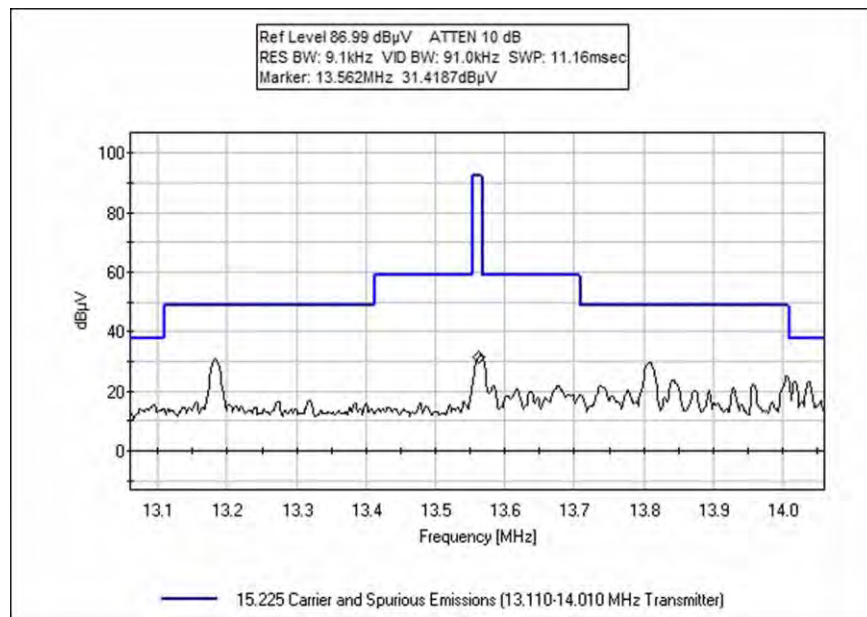
Y-Axis



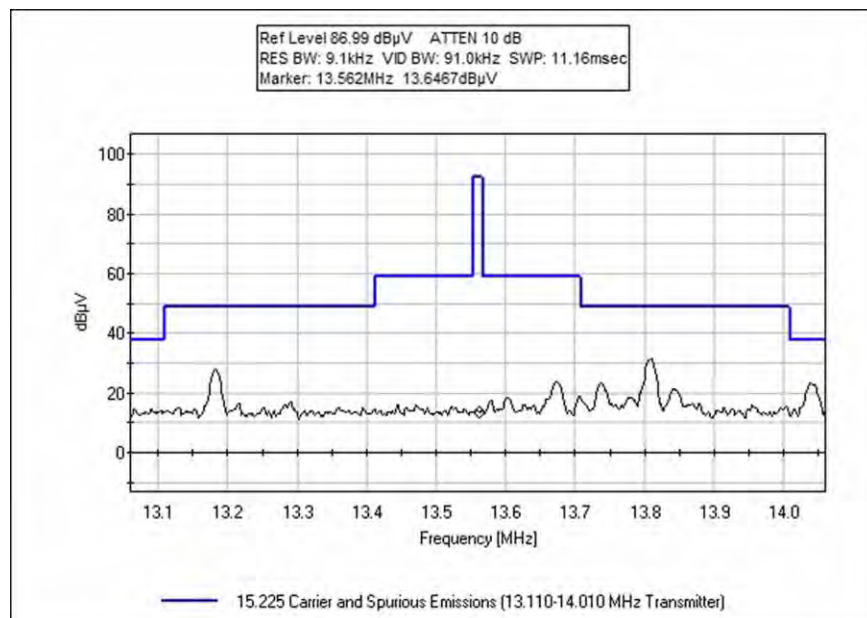
Z-Axis

## 15.225(b)(c) Emission Mask

### Test Data

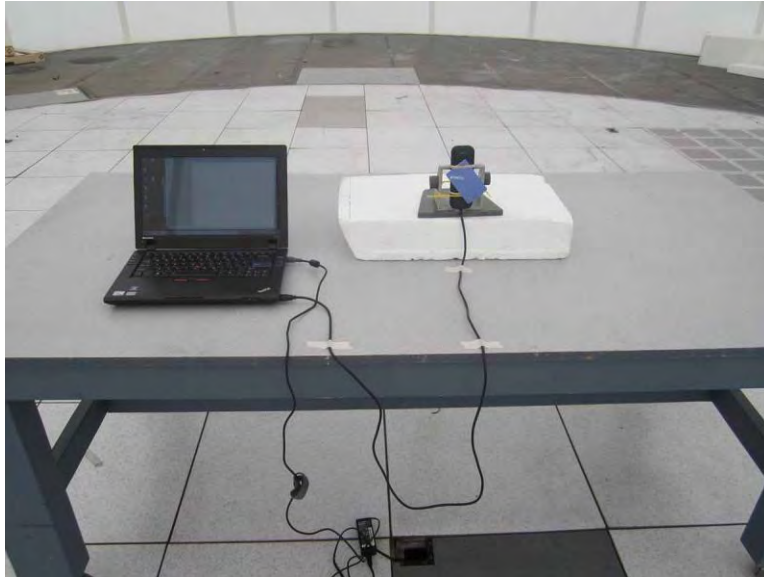


On, 13.56MHz

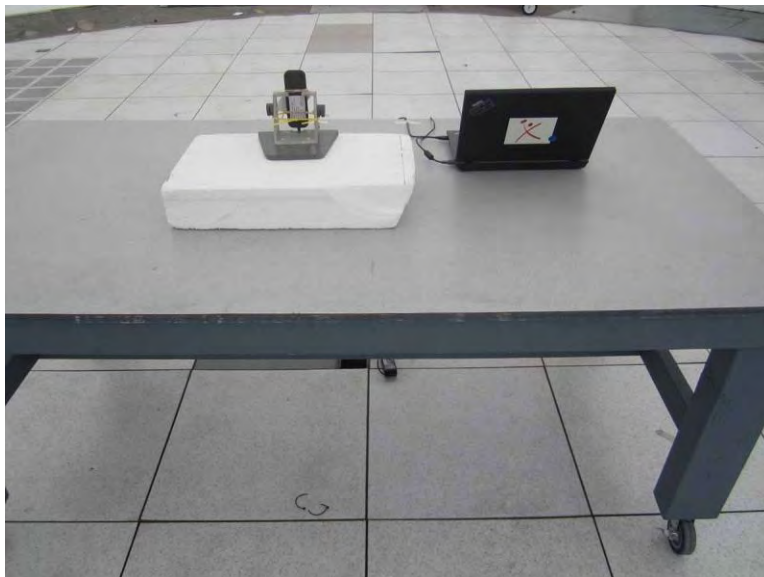


Off, 13.56MHz

## Test Setup Photo(s)



Front View



Back View

## 15.225(d) Field Strength of Spurious Emissions

### Test Data

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 #: **96065** Date: 10/18/2014  
 Test Type: **Maximized Emissions** Time: 09:41:56  
 Equipment: **Enrollment Reader** Sequence#: 1  
 Manufacturer: **XceedID** Tested By: Eddie Mariscal  
 Model: **MT20**  
 S/N: **0001**

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01991	Biconilog Antenna	CBL6111C	3/7/2014	3/7/2016
T2	ANMA10M	Cable		8/26/2014	8/26/2016
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T3	AN00449	Preamplifier (dB)	8447F	4/7/2014	4/7/2016
T4	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Enrollment Reader*	XceedID	MT20	0001

#### Support Devices:

Function	Manufacturer	Model #	S/N
AC Adaptor	Lenovo	42T4422	11S42T4422Z1ZF3D01T2
Laptop Computer	Lenovo	SL410	L3 LR-ZZW25

#### Test Conditions / Notes:

The EUT is placed atop a wooden, non-conductive table of height 80cm. The EUT is connected to support laptop via EUT's USB cable. A card is presented to the EUT during testing in order to allow the EUT to constantly transmit. The EUT was investigated about three orthogonal axes. The data presented represents the worst-case orientation. The EUT is transmitting at 13.56MHz.

The EUT is powered by +5VDC via USB cable.

Highest internal clock of the EUT: 48MHz

Frequency Range of Interest: 0.009-1000MHz

0.009-0.15MHz: RBW = 200Hz; VBW > RBW

0.15-30MHz: RBW = 9kHz; VBW > RBW

30-1000MHz: RBW = 120kHz; VBW > RBW

Atmospheric Conditions:

Temperature: 21°C

Relative Humidity: 56%

Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

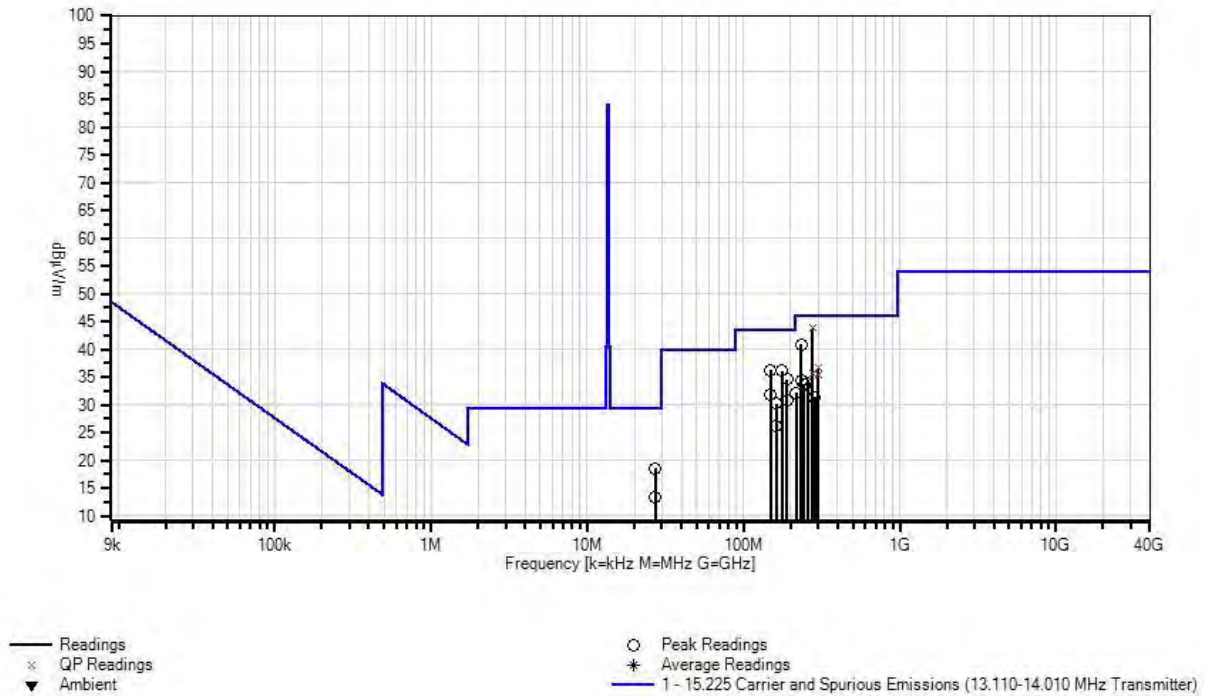
**Measurement Data:**

Reading listed by margin.

Test Distance: 10 Meters

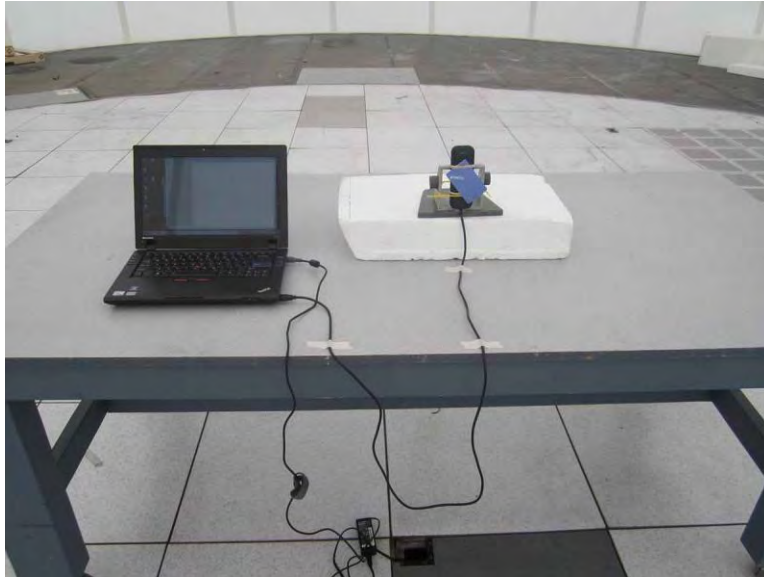
#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	276.024M	42.1	+13.0	+4.6	-26.5	+0.0	+10.5	43.7	46.0	-2.3	Vert
	QP										
^	276.024M	50.2	+13.0	+4.6	-26.5	+0.0	+10.5	51.8	46.0	+5.8	Vert
3	233.997M	41.1	+11.6	+4.2	-26.5	+0.0	+10.5	40.9	46.0	-5.1	Vert
4	149.185M	38.2	+11.1	+3.3	-26.9	+0.0	+10.5	36.2	43.5	-7.3	Horiz
5	176.310M	39.6	+9.3	+3.6	-26.8	+0.0	+10.5	36.2	43.5	-7.3	Horiz
6	189.870M	37.9	+9.1	+3.7	-26.7	+0.0	+10.5	34.5	43.5	-9.0	Horiz
7	299.949M	34.4	+13.3	+4.9	-26.5	+0.0	+10.5	36.6	46.0	-9.4	Vert
	QP										
^	299.949M	43.2	+13.3	+4.9	-26.5	+0.0	+10.5	45.4	46.0	-0.6	Vert
9	276.037M	34.0	+13.0	+4.6	-26.5	+0.0	+10.5	35.6	46.0	-10.4	Horiz
	QP										
^	276.028M	42.4	+13.0	+4.6	-26.5	+0.0	+10.5	44.0	46.0	-2.0	Horiz
11	300.018M	33.2	+13.3	+4.9	-26.5	+0.0	+10.5	35.4	46.0	-10.6	Horiz
	QP										
^	300.018M	43.5	+13.3	+4.9	-26.5	+0.0	+10.5	45.7	46.0	-0.3	Horiz
13	27.131M	29.2	+0.0	+1.2	+0.0	+7.2	-19.1	18.5	29.5	-11.0	Vert
14	149.199M	33.8	+11.1	+3.3	-26.9	+0.0	+10.5	31.8	43.5	-11.7	Vert
15	233.957M	34.5	+11.6	+4.2	-26.5	+0.0	+10.5	34.3	46.0	-11.7	Horiz
16	257.550M	32.8	+12.7	+4.4	-26.5	+0.0	+10.5	33.9	46.0	-12.1	Horiz
17	244.150M	33.2	+12.2	+4.3	-26.5	+0.0	+10.5	33.7	46.0	-12.3	Horiz
18	189.880M	34.3	+9.1	+3.7	-26.7	+0.0	+10.5	30.9	43.5	-12.6	Vert
19	162.754M	32.6	+10.5	+3.4	-26.8	+0.0	+10.5	30.2	43.5	-13.3	Horiz
20	217.000M	33.8	+10.4	+4.0	-26.6	+0.0	+10.5	32.1	46.0	-13.9	Vert
21	284.790M	29.6	+13.1	+4.7	-26.5	+0.0	+10.5	31.4	46.0	-14.6	Horiz
22	27.131M	24.1	+0.0	+1.2	+0.0	+7.2	-19.1	13.4	29.5	-16.1	Vert
23	162.756M	28.7	+10.5	+3.4	-26.8	+0.0	+10.5	26.3	43.5	-17.2	Vert

CKC Laboratories, Inc. Date: 10/18/2014 Time: 09:41:56 Allegion WO#: 96065  
 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 10 Meters Sequence#: 1  
 Ext ATTN: 0 dB

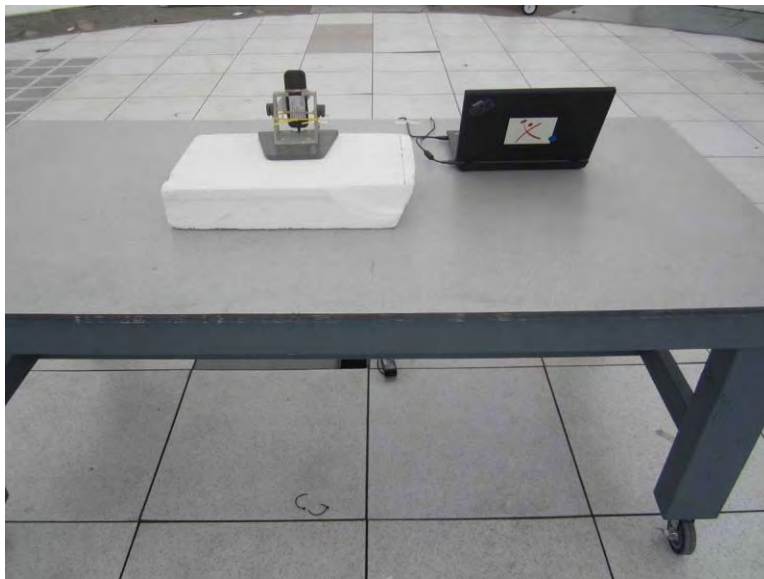


Note: Since the time of testing, it has come to CKC Laboratories attention the manufacturer name Allegion referenced in the above plot should read XceedID Corporation. The screen captures were taken at the time of testing and cannot be changed.

## Test Setup Photo(s)



Front View



Back View

## 15.225(e) Frequency Stability

### Test Conditions / Setup

The EUT was placed inside the temperature chamber, transmitting at 13.56MHz. The EUT's voltage is regulated at +5VDC via USB. The EUT also has voltage regulation at the input of the EUT to step from 5VDC to 3.3VDC; therefore voltage variations were not performed. A card is presented to the EUT to ensure constant transmission. RBW = 200Hz; VBW > RBW.

Test Equipment					
Asset/Serial #	Description	Model	Manufacturer	Cal Date	Cal Due
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2016
03197	Multimeter	MM570A	Extech	09/12/2014	09/12/2016
01879	Temperature Chamber	S-1.2 Min.	Thermotron	11/15/2012	11/15/2014
00170	Loop Antenna	7334-1	Solar	02/01/2013	02/01/2015
02242	Thermometer	HH-26K	Omega	05/02/2014	05/02/2016

## Test Data

**Customer:** Allegion  
**WO#:** 96065  
**Date:** 27-Sep-14  
**Test Engineer:** Eddie Mariscal  
**Test Specification:** FCC 15.225  
**Device Model #:** MT20  
**Operating Voltage:** +5 VDC  
**Frequency Limit:** 0.01 %

### Temperature Variations

Channel Frequency:		Channel 1 (MHz)	Dev. (%)
		13.562975	
Temp (C)	Voltage		
-20	+5	13.56299	0.00013
-10	+5	13.56300	0.00018
0	+5	13.56300	0.00018
10	+5	13.56300	0.00018
20	+5	13.56298	0.00000
30	+5	13.56298	0.00006
40	+5	13.56295	0.00018
50	+5	13.56295	0.00018

### Voltage Variations (±15%)

20	4.3	
20 +5		
20	5.8	

**Max Deviation (%)** 0.00018

**PASS**

**Test Setup Photo(s)**



Temperature Chamber

## SUPPLEMENTAL INFORMATION

### Measurement Uncertainty

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

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. 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 dB $\mu$ V/m, the spectrum analyzer reading in dB $\mu$ 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.