



element

Alarm.com

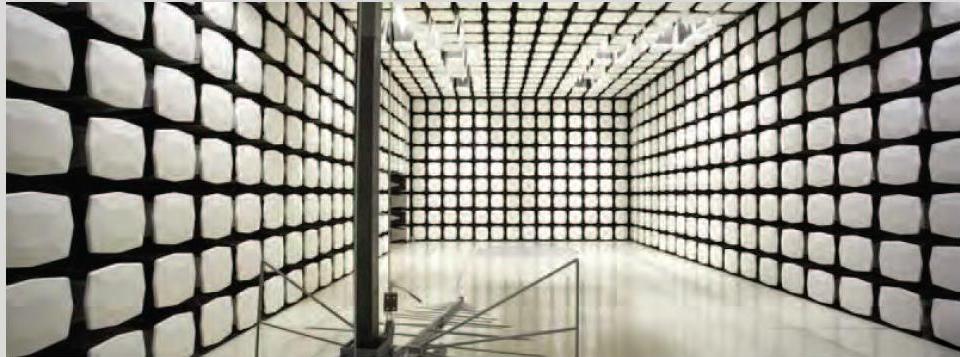
Rev 6.3 Communicator Module

FCC 15.249:2022

RSS-210 Issue 10:2019+A1:2020

902 - 928 MHz Transceiver

Report: PCTE0028.2, Issue Date: December 12, 2022



CERTIFICATE OF TEST



Last Date of Test: November 11, 2022
Alarm.com
EUT: Rev 6.3 Communicator Module

Radio Equipment Testing

Standards

Specification	Method
FCC 15.249:2022	
FCC 15.207:2022	
RSS-210 Issue 10:2019+A1:2020	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions (Transmitter)	Pass	15.207	RSS-Gen 8.8	6.2	
Field Strength of Fundamental	Pass	15.249(a),(c-e)	RSS-210 B.10(a)	6.5	
Field Strength of Harmonics and Spurious Radiated Emissions	Pass	15.249(a),(c-e)	RSS-210 B.10(a-b)	6.5, 6.6	
Occupied Bandwidth (99%)	Pass	N/A	RSS-Gen 6.7	6.9.3	
Emissions Bandwidth (20 dB)	Pass	15.215(c)	6.9.2	6.9.3	
Duty Cycle	N/A	N/A	RSS-Gen 3.2	7.5	

Deviations From Test Standards

None

Approved By:

Johnny Candelas, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

[California](#)

[Minnesota](#)

[Oregon](#)

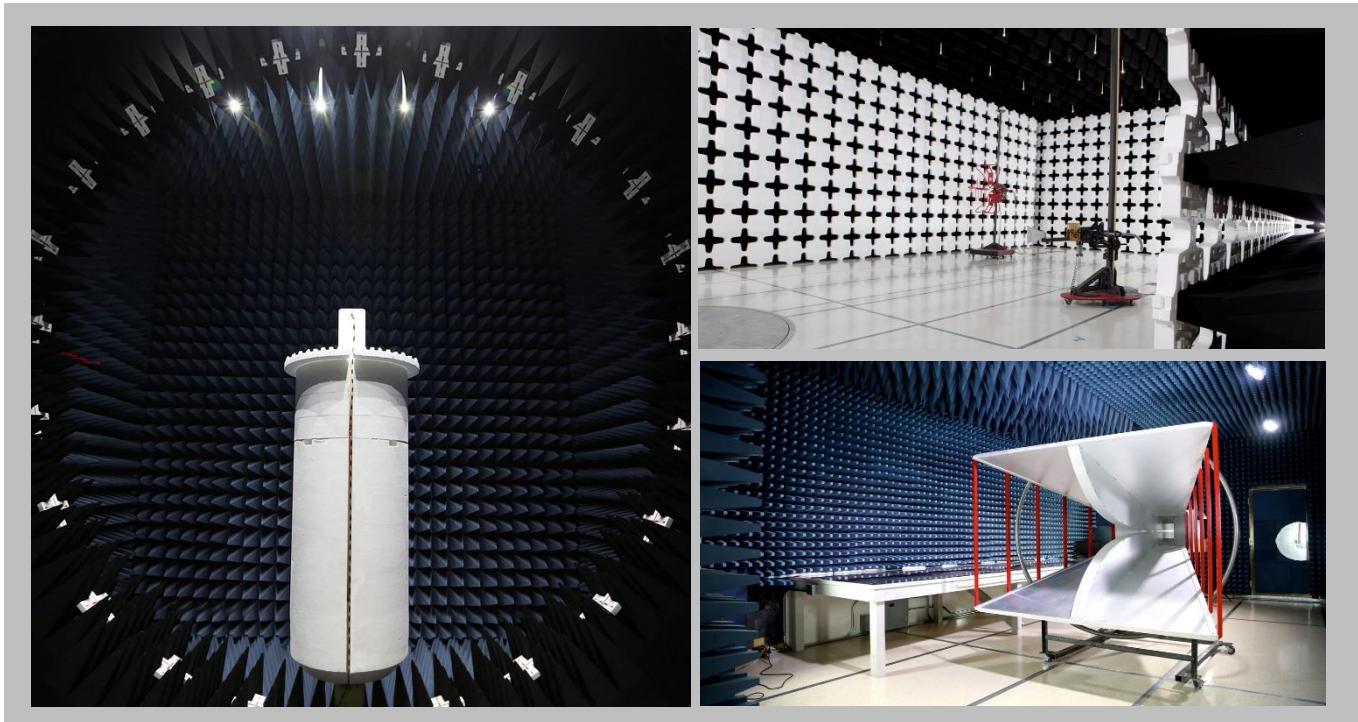
[Texas](#)

[Washington](#)

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425) 984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	3.2 dB	-3.2 dB

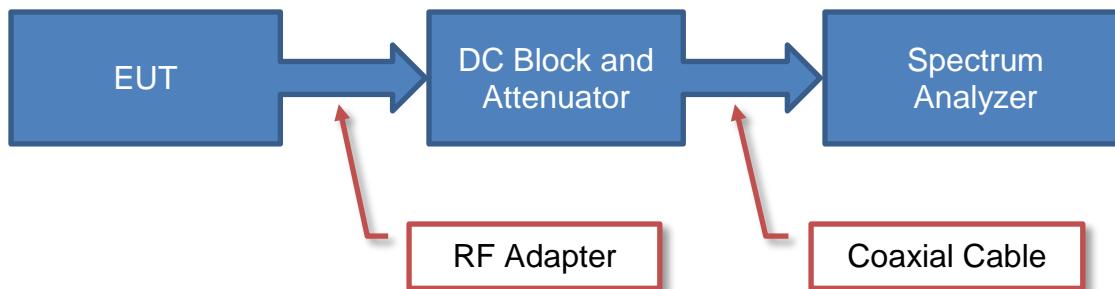
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

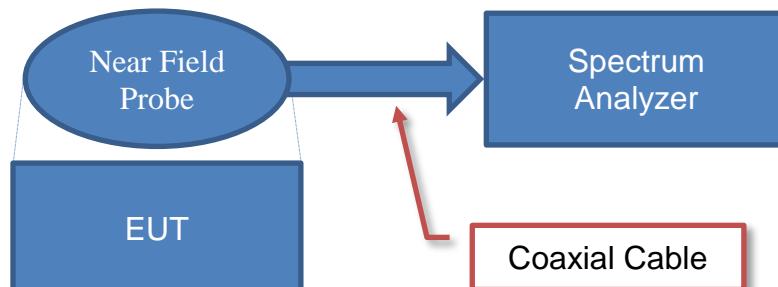
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

$$\text{Measured Value} \quad 71.2 \quad = \quad \text{Measured Level} \quad 42.6 \quad + \quad \text{Reference Level Offset} \quad 28.6$$

Near Field Test Fixture Measurements

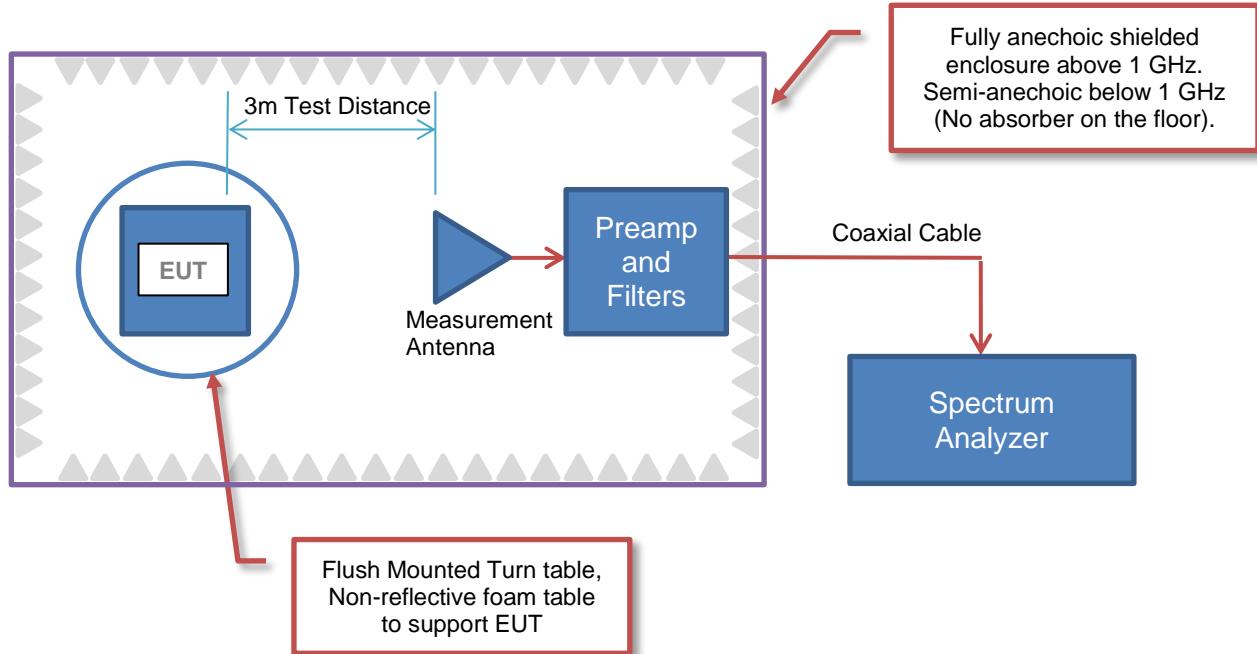


Sample Calculation (logarithmic units)

$$\text{Measured Value} \quad 71.2 \quad = \quad \text{Measured Level} \quad 42.6 \quad + \quad \text{Reference Level Offset} \quad 28.6$$

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Factor							
Measured Level (Amplitude)	Antenna Factor	Cable Factor	Amplifier Gain	Distance Adjustment Factor	External Attenuation	=	Field Strength
42.6	28.6	+	3.1	-	40.8		33.5
				0.0	0.0	=	

Conducted Emissions:

Factor					
Measured Level (Amplitude)	Transducer Factor	Cable Factor	External Attenuation	Adjusted Level	
26.7	0.3	+	0.1	20.0	= 47.1

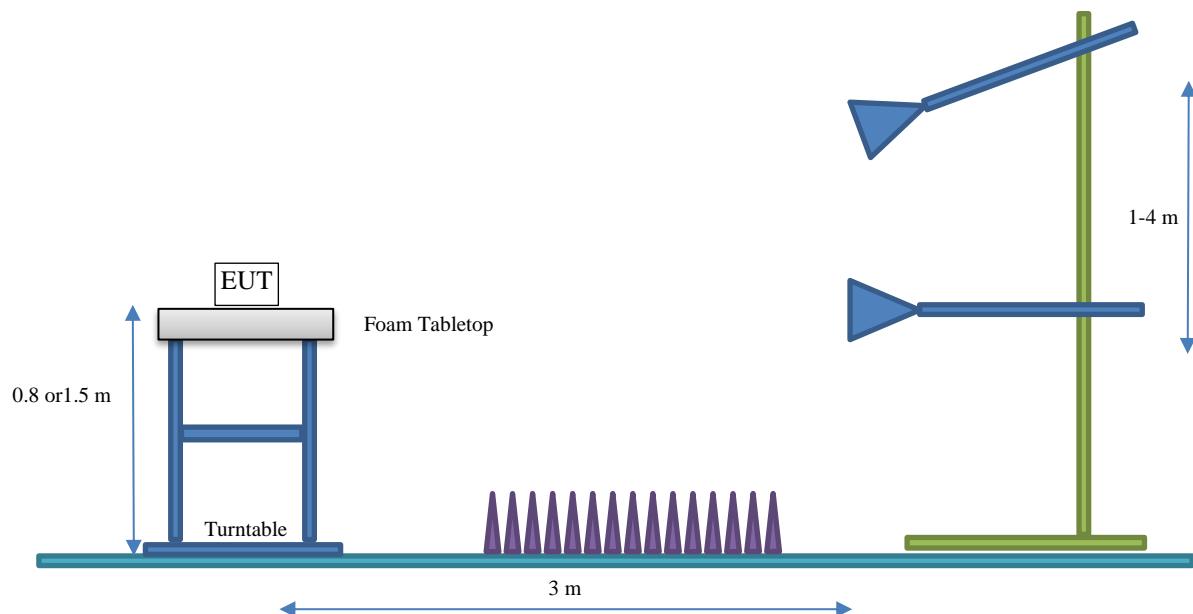
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	- 2.15	= 13.9/16.0

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION



Client and Equipment under Test (EUT) Information

Company Name:	Alarm.com
Address:	8281 Greensboro Dr., Suite 100
City, State, Zip:	Tysons, VA 22102
Test Requested By:	Josie Sabado
EUT:	Rev 6.3 Communicator Module
First Date of Test:	November 7, 2022
Last Date of Test:	November 11, 2022
Receipt Date of Samples:	November 7, 2022
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Cellular and ZWave Daughterboard
Testing Objective:
Seeking to demonstrate compliance in the 902 - 928 MHz band for operation under FCC 15.249:2022. To demonstrate compliance to RSS-210 Issue 10:2019+A1:2020, RSS-Gen Issue 5:2018+A1:2019+A2:2021 Annex B.10 specifications.

CONFIGURATIONS



Configuration PCTE0028- 1

Software/Firmware Running During Test	
Description	Version
Firmware	193

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless Daughter Board	Alarm.com	Rev 6.3 Communicator Module	T00680428
4G LTE Full Band Antenna	SANAV	EPH-405AL MMCX90P-72	None
Ultra Wide Band Antenna	taoglas	FXUB63	None

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Linear DC Power Supply	Tek Power	TP3005P	772307

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Hewlett Packard	EliteBook 840	5CG4454K21
Laptop Power Supply	Hewlett Packard	Series PPP012H-S	F12941232038602

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
4G LTE Antenna Cable	Yes	1.8m	No	4G LTE Full Band Antenna	Wireless Daughter Board
Ultra Wide Antenna Cable	Yes	0.2m	No	Ultra Wide Band Antenna	Wireless Daughter Board
Ethernet Cable	No	0.1m	No	Wireless Daughter Board	Unterminated
Debug Cable	No	2.4m	No	Wireless Daughter Board	Laptop
DC Cable	No	1.2m	No	Linear DC Power Supply	Wireless Daughter Board
AC Cable	No	1.5m	No	Linear DC Power Supply	AC Mains
DC Cable	Yes	2.0m	Yes	Laptop	Laptop Power Supply
AC Cable	No	1.6m	No	Laptop Power Supply	AC Mains

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Copper Wire Monopole	Alarm.com	907 MHz – 925 MHz	0.27 dBi

The EUT was tested using the power settings provided by the manufacturer which were based upon:

Test software settings Test software/firmware installed on EUT: _____ 193
 Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Data Rates (Baudrates)	Channel	Frequency	Power Setting
GFSK	100 kbps	0	916 MHz	6
FSK	40 kbps	1	908.4 MHz	6
FSK	9.6 kbps	2	908.4 MHz	6

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-11-07	Field Strength of Harmonics and Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-11-09	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2022-11-11	Powerline Conducted Emissions (Transmitter)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2022-11-11	Occupied Bandwidth (99%)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2022-11-11	Emissions Bandwidth (20 dB)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS



TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Gauss Instruments	TDEMI 30M	ARO	2022-04-06	2023-04-06
LISN	Solar Electronics	9252-50-24-BNC	LIB	2021-12-22	2022-12-22
LISN	Solar Electronics	9252-50-24-BNC	LIA	2022-09-15	2023-09-15
Power Supply	Pacific Power	AFX 12kVA	SMT	NCR	NCR
Cable - Conducted Cable Assembly	Northwest EMC	OCP, HFP, AWC	OCPA	2022-07-28	2023-07-28

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

PCTE0028-1

MODES INVESTIGATED

Transmitting Z-Wave: Channel 1 40 kbps (908.4 MHz)

POWERLINE CONDUCTED EMISSIONS



EUT:	Rev 6.3 Communicator Module	Work Order:	PCTE0028
Serial Number:	T00680428	Date:	2022-11-11
Customer:	Alarm.com	Temperature:	21.8°C
Attendees:	None	Relative Humidity:	41.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Mark Baytan	Job Site:	OC06
Power:	3.9 VDC via 120VAC/60Hz	Configuration:	PCTE0028-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

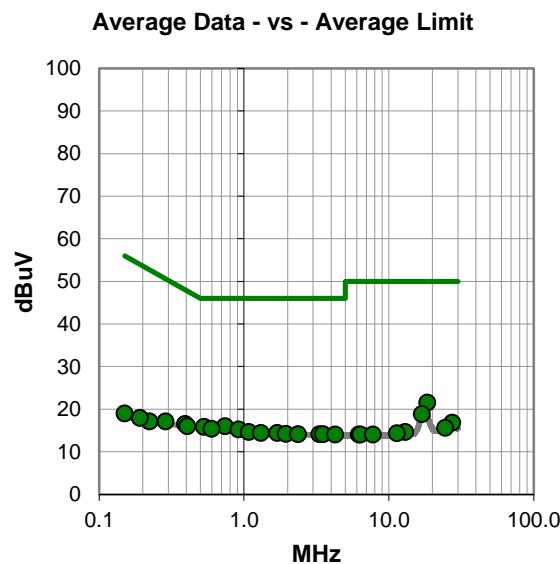
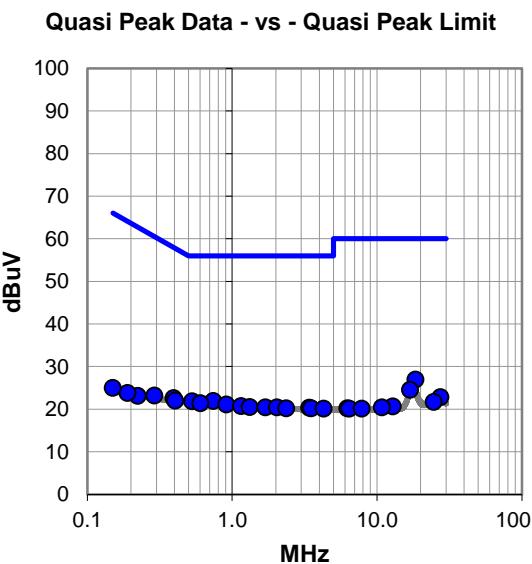
TX Power = 6

EUT OPERATING MODES

Transmitting Z-Wave: Channel 1 40 kbps (908.4 MHz)

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS



RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
18.432	6.1	20.8	26.9	60.0	-33.1
0.739	2.1	19.8	21.9	56.0	-34.1
0.528	2.0	19.8	21.8	56.0	-34.2
0.603	1.6	19.8	21.4	56.0	-34.6
0.914	1.4	19.7	21.1	56.0	-34.9
1.156	1.0	19.7	20.7	56.0	-35.3
0.394	2.8	19.8	22.6	58.0	-35.4
1.322	0.8	19.7	20.5	56.0	-35.5
16.943	3.9	20.6	24.5	60.0	-35.5
1.697	0.6	19.8	20.4	56.0	-35.6
2.042	0.6	19.8	20.4	56.0	-35.6
3.417	0.4	19.9	20.3	56.0	-35.7
0.405	2.2	19.8	22.0	57.8	-35.8
2.367	0.4	19.8	20.2	56.0	-35.8
3.521	0.3	19.9	20.2	56.0	-35.8
4.294	0.2	19.9	20.1	56.0	-35.9
27.404	1.3	21.5	22.8	60.0	-37.2
0.290	3.4	19.8	23.2	60.5	-37.3
24.683	0.6	21.1	21.7	60.0	-38.3
12.840	0.3	20.3	20.6	60.0	-39.4
0.223	3.3	19.8	23.1	62.7	-39.6
10.832	0.2	20.2	20.4	60.0	-39.6
6.244	0.2	20.0	20.2	60.0	-39.8
6.439	0.1	20.0	20.1	60.0	-39.9
7.869	0.0	20.1	20.1	60.0	-39.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
18.432	0.7	20.8	21.5	50.0	-28.5
0.740	-3.8	19.8	16.0	46.0	-30.0
0.528	-4.0	19.8	15.8	46.0	-30.2
0.597	-4.4	19.8	15.4	46.0	-30.6
0.916	-4.5	19.7	15.2	46.0	-30.8
16.961	-1.8	20.6	18.8	50.0	-31.2
1.078	-5.1	19.7	14.6	46.0	-31.4
0.393	-3.3	19.8	16.5	48.0	-31.5
1.313	-5.3	19.7	14.4	46.0	-31.6
1.696	-5.4	19.8	14.4	46.0	-31.6
0.406	-3.8	19.8	16.0	47.7	-31.7
1.943	-5.6	19.8	14.2	46.0	-31.8
2.365	-5.7	19.8	14.1	46.0	-31.9
3.322	-5.8	19.9	14.1	46.0	-31.9
3.508	-5.8	19.9	14.1	46.0	-31.9
4.274	-5.9	19.9	14.0	46.0	-32.0
27.402	-4.7	21.5	16.8	50.0	-33.2
0.287	-2.7	19.8	17.1	50.6	-33.5
24.546	-5.5	21.1	15.6	50.0	-34.4
12.964	-5.7	20.3	14.6	50.0	-35.4
0.223	-2.7	19.8	17.1	52.7	-35.6
11.365	-6.0	20.3	14.3	50.0	-35.7
6.207	-6.0	20.0	14.0	50.0	-36.0
6.366	-6.0	20.0	14.0	50.0	-36.0
7.784	-6.1	20.1	14.0	50.0	-36.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	Rev 6.3 Communicator Module	Work Order:	PCTE0028
Serial Number:	T00680428	Date:	2022-11-11
Customer:	Alarm.com	Temperature:	21.8°C
Attendees:	None	Relative Humidity:	41.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Mark Baytan	Job Site:	OC06
Power:	3.9 VDC via 120VAC/60Hz	Configuration:	PCTE0028-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	4	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

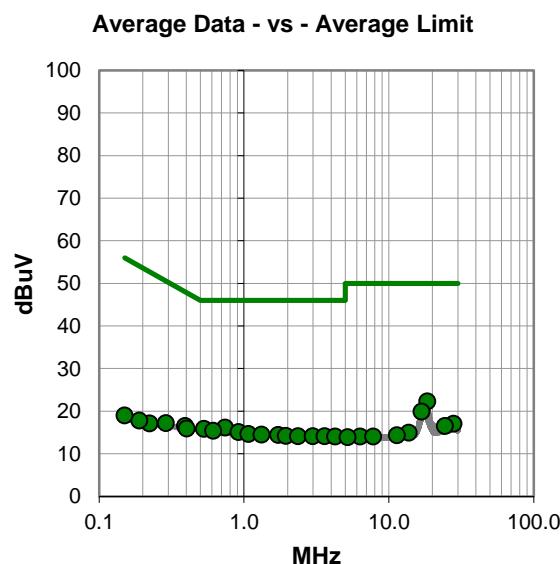
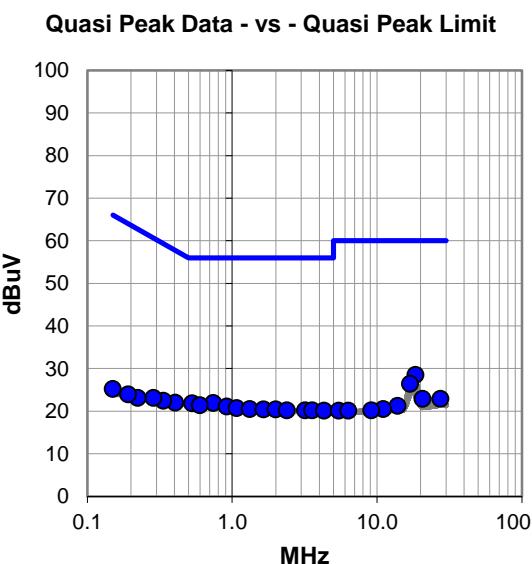
TX Power = 6

EUT OPERATING MODES

Transmitting Z-Wave: Channel 1 40 kbps (908.4 MHz)

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
18.434	7.7	20.8	28.5	60.0	-31.5
16.960	5.8	20.6	26.4	60.0	-33.6
0.740	2.1	19.8	21.9	56.0	-34.1
0.528	2.0	19.8	21.8	56.0	-34.2
0.597	1.6	19.8	21.4	56.0	-34.6
0.919	1.4	19.7	21.1	56.0	-34.9
1.076	1.0	19.7	20.7	56.0	-35.3
1.320	0.8	19.7	20.5	56.0	-35.5
1.645	0.7	19.7	20.4	56.0	-35.6
2.001	0.6	19.8	20.4	56.0	-35.6
0.403	2.2	19.8	22.0	57.8	-35.8
2.382	0.4	19.8	20.2	56.0	-35.8
3.196	0.4	19.8	20.2	56.0	-35.8
3.565	0.3	19.9	20.2	56.0	-35.8
4.297	0.2	19.9	20.1	56.0	-35.9
0.335	2.6	19.8	22.4	59.3	-36.9
20.672	2.0	20.9	22.9	60.0	-37.1
27.402	1.4	21.5	22.9	60.0	-37.1
0.286	3.3	19.8	23.1	60.6	-37.5
13.879	0.9	20.3	21.2	60.0	-38.8
11.035	0.3	20.2	20.5	60.0	-39.5
0.223	3.3	19.8	23.1	62.7	-39.6
9.161	0.1	20.1	20.2	60.0	-39.8
5.454	0.2	19.9	20.1	60.0	-39.9
6.349	0.1	20.0	20.1	60.0	-39.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
18.434	1.5	20.8	22.3	50.0	-27.7
0.740	-3.7	19.8	16.1	46.0	-29.9
16.882	-0.7	20.6	19.9	50.0	-30.1
0.528	-4.0	19.8	15.8	46.0	-30.2
0.614	-4.4	19.8	15.4	46.0	-30.6
0.916	-4.6	19.7	15.1	46.0	-30.9
1.076	-5.1	19.7	14.6	46.0	-31.4
0.393	-3.3	19.8	16.5	48.0	-31.5
1.320	-5.2	19.7	14.5	46.0	-31.5
1.722	-5.4	19.8	14.4	46.0	-31.6
1.943	-5.6	19.8	14.2	46.0	-31.8
0.402	-3.9	19.8	15.9	47.8	-31.9
2.365	-5.7	19.8	14.1	46.0	-31.9
2.988	-5.7	19.8	14.1	46.0	-31.9
3.614	-5.8	19.9	14.1	46.0	-31.9
4.273	-5.9	19.9	14.0	46.0	-32.0
27.979	-4.6	21.6	17.0	50.0	-33.0
0.289	-2.6	19.8	17.2	50.6	-33.4
24.444	-4.6	21.1	16.5	50.0	-33.5
13.774	-5.4	20.3	14.9	50.0	-35.1
0.223	-2.7	19.8	17.1	52.7	-35.6
11.363	-6.0	20.3	14.3	50.0	-35.7
6.342	-6.0	20.0	14.0	50.0	-36.0
7.826	-6.1	20.1	14.0	50.0	-36.0
5.203	-6.0	19.9	13.9	50.0	-36.1

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF FUNDAMENTAL



TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level was detected. This required the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search was utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT. Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance was 3 meters or 10 meters (from antenna to boundary of EUT). At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna was increased so that the lowest point of the bottom of the antenna cleared the ground surface by at least 25 cm.

The antennas to be used with the EUT were tested. The EUT was transmitting and while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT and EUT antenna in 3 orthogonal planes.

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.

The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Biconilog	EMCO	3142	AXB	2022-05-04	2024-05-04
Cable	ESM Cable Corp.	30-1GHz Cables	OCW	2022-02-04	2023-02-04
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	2021-11-29	2022-11-29
Attenuator	S.M. Electronics	SA18H-10	REN	2022-01-13	2023-01-13

MEASUREMENT UNCERTAINTY

Description			
Expanded k=2	4.7 dB		-4.7 dB

FREQUENCY RANGE INVESTIGATED

902 MHz TO 928 MHz

POWER INVESTIGATED

3.9 VDC

CONFIGURATIONS INVESTIGATED

PCTE0028-1

MODES INVESTIGATED

Transmitting Z-Wave: Channel 0 100 kbps (916 MHz), Channel 1 40 kbps (908.4 MHz), Channel 2 9.6 kbps (908.4 MHz)

FIELD STRENGTH OF FUNDAMENTAL



EUT:	Rev 6.3 Communicator Module	Work Order:	PCTE0028
Serial Number:	T00680428	Date:	2022-11-09
Customer:	Alarm.com	Temperature:	21.1°C
Attendees:	None	Relative Humidity:	53.8%
Customer Project:	None	Bar. Pressure (PMSL):	1022 mb
Tested By:	Mark Baytan	Job Site:	OC07
Power:	3.9 VDC	Configuration:	PCTE0028-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.249:2022	ANSI C63.10:2013
RSS-210 Issue 10:2019+A1:2020	ANSI C63.10:2013

TEST PARAMETERS

Run #:	33	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

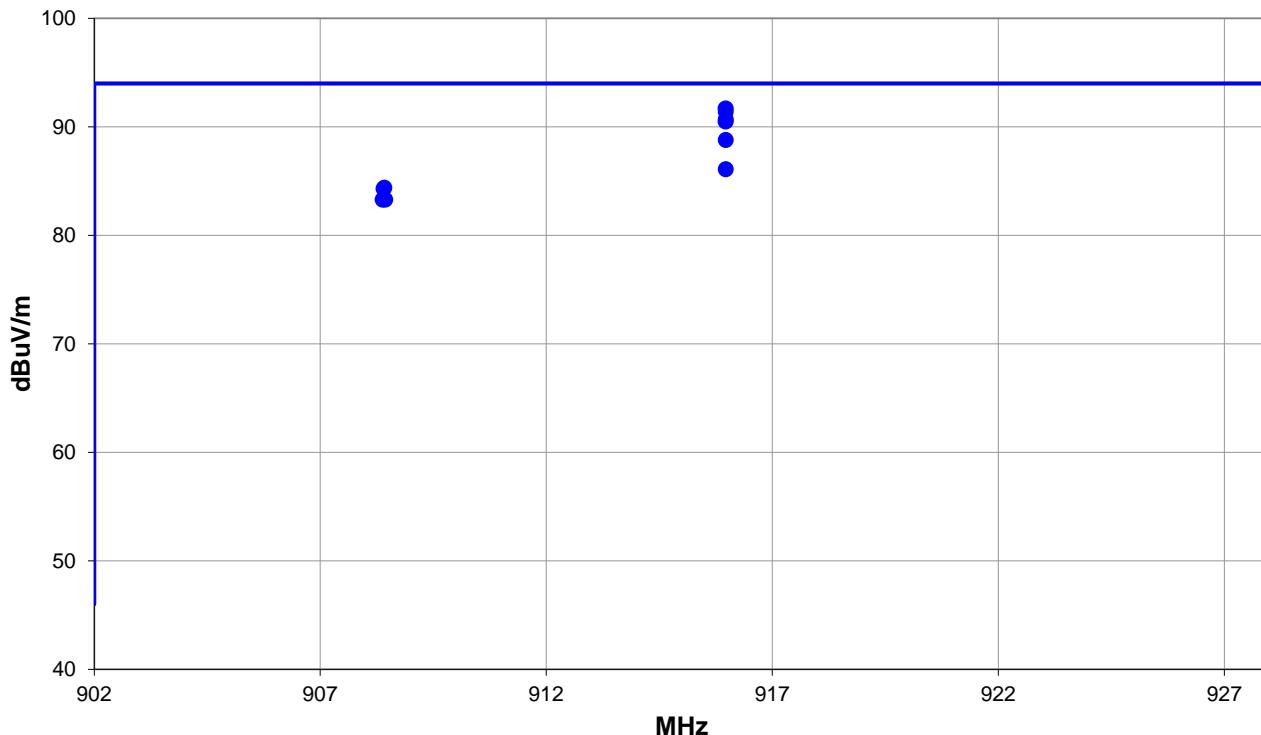
See comments for channel, data rate, TX Power setting, and position.

EUT OPERATING MODES

Transmitting Z-Wave: Channel 0 100 kbps (916 MHz), Channel 1 40 kbps (908.4 MHz), Channel 2 9.6 kbps (908.4 MHz)

DEVIATIONS FROM TEST STANDARD

None



Run #: 33

PK AV QP

FIELD STRENGTH OF FUNDAMENTAL



RESULTS - Run #33

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
915.969	48.6	33.1	1.0	286.0	3.0	10.0	Horz	QP	0.0	91.7	94.0	-2.3	Ch 0, 100 kbps, EUT/Ant Horz, Pwr=6
915.971	48.3	33.1	1.0	261.0	3.0	10.0	Vert	QP	0.0	91.4	94.0	-2.6	Ch 0, 100 kbps, EUT/Ant Vert, Pwr=6
915.970	47.6	33.1	1.0	309.0	3.0	10.0	Vert	QP	0.0	90.7	94.0	-3.3	Ch 0, 100 kbps, EUT/Ant on Side, Pwr=6
915.969	47.4	33.1	1.41	177.0	3.0	10.0	Horz	QP	0.0	90.5	94.0	-3.5	Ch 0, 100 kbps, EUT/Ant Vert, Pwr=6
915.970	45.7	33.1	1.0	219.0	3.0	10.0	Horz	QP	0.0	88.8	94.0	-5.2	Ch 0, 100 kbps, EUT/Ant on Side, Pwr=6
915.970	43.0	33.1	1.15	259.0	3.0	10.0	Vert	QP	0.0	86.1	94.0	-7.9	Ch 0, 100 kbps, EUT/Ant Horz, Pwr=6
908.418	41.4	33.0	1.0	261.0	3.0	10.0	Vert	QP	0.0	84.4	94.0	-9.6	Ch 1, 40 kbps, EUT/Ant Vert, Pwr=6
908.398	41.3	33.0	1.0	259.0	3.0	10.0	Vert	QP	0.0	84.3	94.0	-9.7	Ch 2, 9.6 kbps, EUT/Ant Vert, Pwr=6
908.436	40.3	33.0	1.0	127.0	3.0	10.0	Horz	QP	0.0	83.3	94.0	-10.7	Ch 2, 9.6 kbps, EUT/Ant Horz, Pwr=6
908.378	40.3	33.0	1.0	127.0	3.0	10.0	Horz	QP	0.0	83.3	94.0	-10.7	Ch 1, 40 kbps, EUT/Ant Horz, Pwr=6

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	2021-11-29	2022-11-29
Antenna - Biconilog	EMCO	3142	AXB	2022-05-04	2024-05-04
Cable	ESM Cable Corp.	30-1GHz Cables	OCW	2022-02-04	2023-02-04
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	2022-02-04	2023-02-04
Filter - Low Pass	Micro-Tronics	LPM50003	HGO	2022-01-13	2023-01-13
Attenuator	S.M. Electronics	SA18H-10	REN	2022-01-13	2023-01-13
Antenna - Double Ridge	EMCO	3115	AHB	2022-04-13	2024-04-13
Cable	ESM Cable Corp.	1-8GHz Cables	OCX	2022-02-04	2023-02-04
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	2022-02-04	2023-02-04
Filter - High Pass	Micro-Tronics	HPM50108	HGP	2022-01-13	2023-01-13
Antenna - Standard Gain	ETS Lindgren	3160-07	AHX	NCR	NCR
Cable	ESM Cable Corp.	8-18GHz Cables	OCY	2022-02-04	2023-02-04
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	2022-02-04	2023-02-04
Antenna - Standard Gain	EMCO	3160-08	AHK	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	2022-02-04	2023-02-04

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.1 dB	-5.1 dB

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



FREQUENCY RANGE INVESTIGATED

30 MHz TO 18000 MHz

POWER INVESTIGATED

3.9 VDC

CONFIGURATIONS INVESTIGATED

PCTE0028-1

MODES INVESTIGATED

Transmitting Z-Wave: Channel 0 100 kbps (916 MHz), Channel 1 40 kbps (908.4 MHz), Channel 2 9.6 kbps (908.4 MHz)

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



EUT:	Rev 6.3 Communicator Module	Work Order:	PCTE0028
Serial Number:	T00680428	Date:	2022-11-07
Customer:	Alarm.com	Temperature:	22.1°C
Attendees:	None	Relative Humidity:	56.7%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mb
Tested By:	Mark Baytan	Job Site:	OC07
Power:	3.9 VDC	Configuration:	PCTE0028-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.249:2022	ANSI C63.10:2013
RSS-210 Issue 10:2019+A1:2020	ANSI C63.10:2013

TEST PARAMETERS

Run #:	11	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

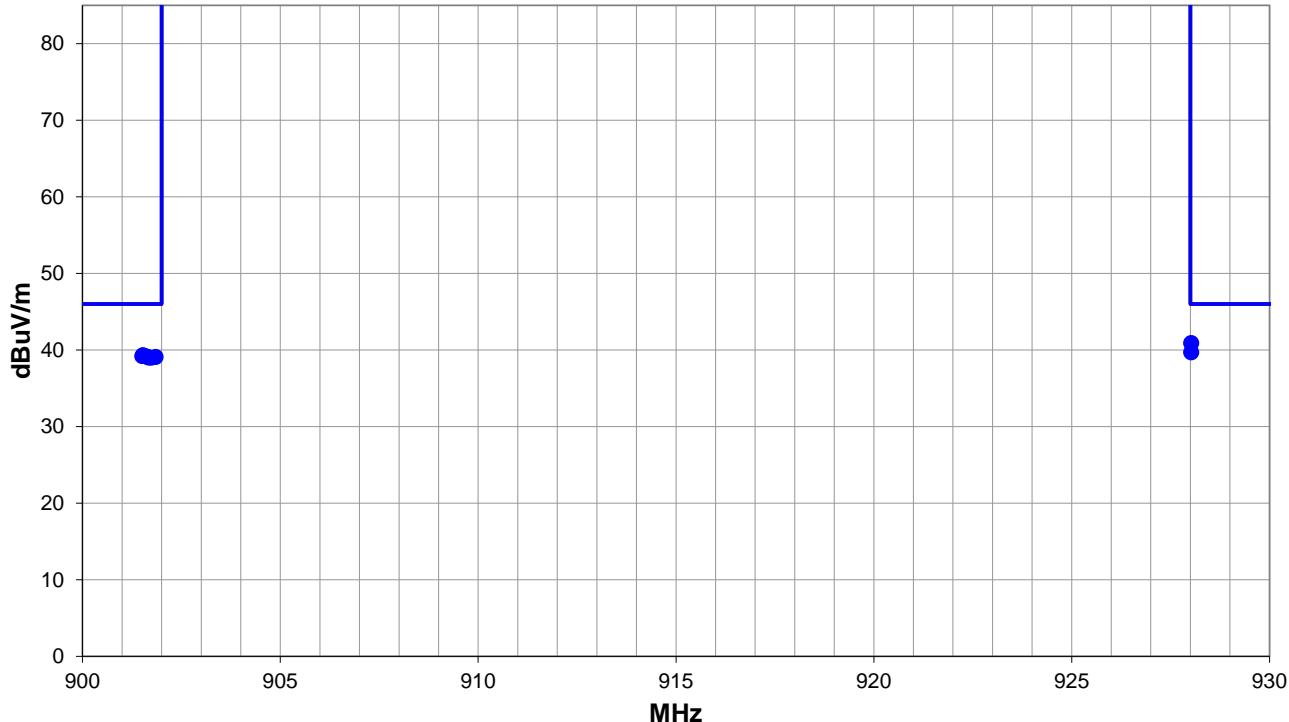
See comments for channel, data rate, TX Power setting, and position.

EUT OPERATING MODES

Transmitting Z-Wave: Channel 0 100 kbps (916 MHz), Channel 1 40 kbps (908.4 MHz), Channel 2 9.6 kbps (908.4 MHz)

DEVIATIONS FROM TEST STANDARD

None



Run #: 11

■ PK ♦ AV ● QP

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



RESULTS - Run #11

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
928.020	18.5	12.4	1.0	327.0	3.0	10.0	Vert	QP	0.0	40.9	46.0	-5.1	Ch 0, 100 kbps, EUT/Ant on Side, Pwr=6
928.022	17.3	12.4	1.0	86.0	3.0	10.0	Horz	QP	0.0	39.7	46.0	-6.3	Ch 0, 100 kbps, EUT/Ant Horz, Pwr=6
901.525	17.2	12.1	1.01	218.0	3.0	10.0	Vert	QP	0.0	39.3	46.0	-6.7	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr=6
901.529	17.2	12.1	1.0	77.0	3.0	10.0	Horz	QP	0.0	39.3	46.0	-6.7	Ch 2, 9.6 kbps, EUT/Ant Horz, Pwr=6
901.592	17.1	12.1	1.0	281.0	3.0	10.0	Horz	QP	0.0	39.2	46.0	-6.8	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr=6
901.512	17.1	12.1	2.22	219.0	3.0	10.0	Vert	QP	0.0	39.2	46.0	-6.8	Ch 2, 9.6 kbps, EUT/Ant Vert, Pwr=6
901.848	17.0	12.1	1.0	340.0	3.0	10.0	Horz	QP	0.0	39.1	46.0	-6.9	Ch 2, 9.6 kbps, EUT/Ant Vert, Pwr=6
901.643	17.0	12.1	1.0	210.0	3.0	10.0	Horz	QP	0.0	39.1	46.0	-6.9	Ch 1, 40 kbps, EUT/Ant on Side, Pwr=6
901.739	16.9	12.1	1.0	234.0	3.0	10.0	Vert	QP	0.0	39.0	46.0	-7.0	Ch 2, 9.6 kbps, EUT/Ant Horz, Pwr=6
901.677	16.9	12.1	3.07	189.0	3.0	10.0	Vert	QP	0.0	39.0	46.0	-7.0	Ch 1, 40 kbps, EUT/Ant on Side, Pwr=6

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



EUT:	Rev 6.3 Communicator Module	Work Order:	PCTE0028
Serial Number:	T00680428	Date:	2022-11-09
Customer:	Alarm.com	Temperature:	22.3°C
Attendees:	None	Relative Humidity:	51.3%
Customer Project:	None	Bar. Pressure (PMSL):	1021 mb
Tested By:	Mark Baytan	Job Site:	OC07
Power:	3.9 VDC	Configuration:	PCTE0028-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.249:2022	ANSI C63.10:2013
RSS-210 Issue 10:2019+A1:2020	ANSI C63.10:2013

TEST PARAMETERS

Run #:	34	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

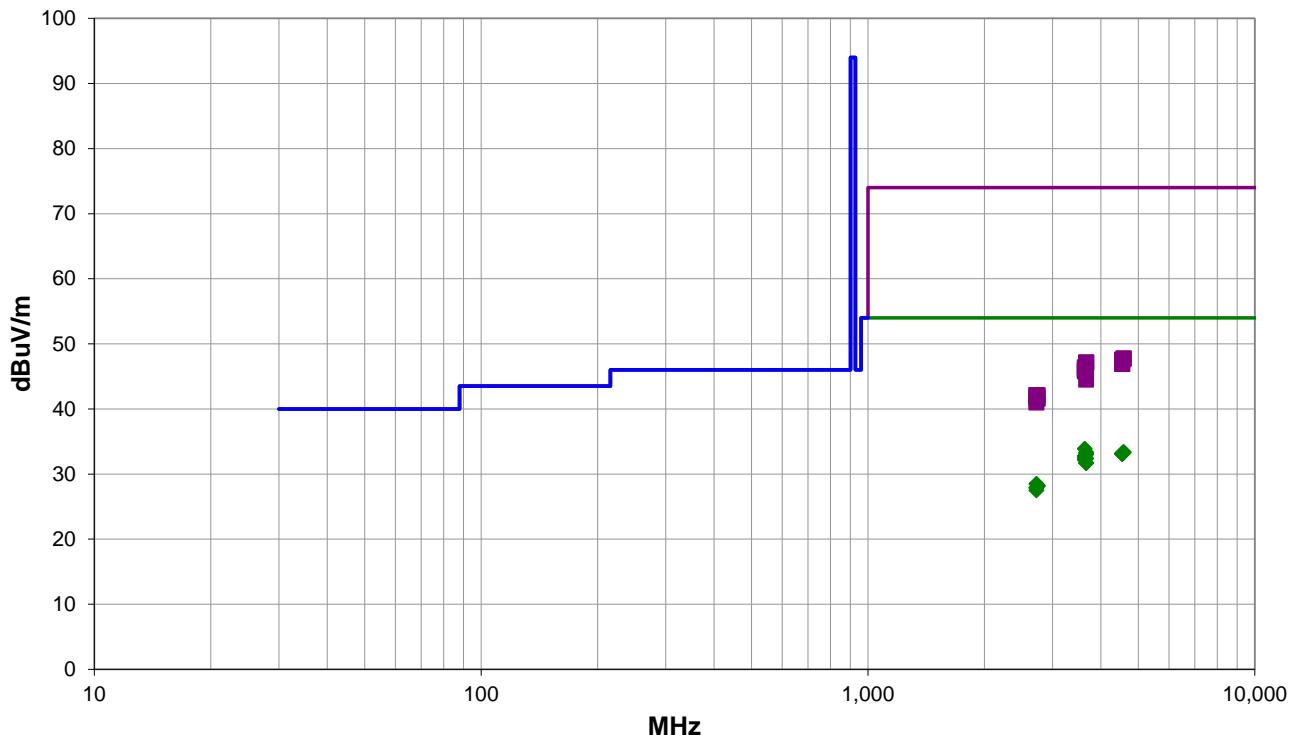
See comments for channel, data rate, TX Power setting, and position.

EUT OPERATING MODES

Transmitting Z-Wave: Channel 0 100 kbps (916 MHz), Channel 1 40 kbps (908.4 MHz), Channel 2 9.6 kbps (908.4 MHz)

DEVIATIONS FROM TEST STANDARD

None



Run #: 34

■ PK ♦ AV ● QP

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



RESULTS - Run #34

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
3633.730	28.8	5.1	2.63	170.0	3.0	0.0	Vert	AV	0.0	33.9	54.0	-20.1	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
4579.953	26.3	7.1	3.43	61.0	3.0	0.0	Vert	AV	0.0	33.4	54.0	-20.6	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
3663.997	28.0	5.3	3.07	254.0	3.0	0.0	Horz	AV	0.0	33.3	54.0	-20.7	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
3664.050	28.0	5.3	1.29	317.0	3.0	0.0	Horz	AV	0.0	33.3	54.0	-20.7	Ch 0, 100 kbps, EUT/Ant Horz, Pwr = 6
4579.060	26.2	7.1	1.3	247.0	3.0	0.0	Horz	AV	0.0	33.3	54.0	-20.7	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
4541.903	26.0	7.2	2.22	100.0	3.0	0.0	Vert	AV	0.0	33.2	54.0	-20.8	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
4541.940	25.9	7.2	2.67	249.0	3.0	0.0	Horz	AV	0.0	33.1	54.0	-20.9	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
4541.870	25.9	7.2	1.5	29.0	3.0	0.0	Horz	AV	0.0	33.1	54.0	-20.9	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
4541.030	25.9	7.2	1.5	221.0	3.0	0.0	Vert	AV	0.0	33.1	54.0	-20.9	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
3663.983	27.7	5.3	1.18	283.0	3.0	0.0	Vert	AV	0.0	33.0	54.0	-21.0	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
3633.663	27.7	5.1	3.47	225.0	3.0	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
3633.590	27.4	5.1	1.5	292.0	3.0	0.0	Horz	AV	0.0	32.5	54.0	-21.5	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
3664.007	27.1	5.3	2.33	283.0	3.0	0.0	Vert	AV	0.0	32.4	54.0	-21.6	Ch 0, 100 kbps, EUT/Ant Vert, Pwr = 6
3633.617	27.1	5.1	1.5	233.0	3.0	0.0	Vert	AV	0.0	32.2	54.0	-21.8	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
3664.093	26.4	5.3	1.2	158.0	3.0	0.0	Vert	AV	0.0	31.7	54.0	-22.3	Ch 0, 100 kbps, EUT/Ant Horz, Pwr = 6
3664.260	26.4	5.3	1.2	137.0	3.0	0.0	Horz	AV	0.0	31.7	54.0	-22.3	Ch 0, 100 kbps, EUT/Ant Vert, Pwr = 6
2725.183	30.3	-1.8	3.36	325.0	3.0	0.0	Horz	AV	0.0	28.5	54.0	-25.5	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
2748.033	29.8	-1.6	1.39	55.0	3.0	0.0	Vert	AV	0.0	28.2	54.0	-25.8	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
2748.077	29.8	-1.6	2.69	220.0	3.0	0.0	Horz	AV	0.0	28.2	54.0	-25.8	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
2725.167	29.7	-1.8	2.2	285.0	3.0	0.0	Vert	AV	0.0	27.9	54.0	-26.1	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
2725.270	29.7	-1.8	1.5	219.0	3.0	0.0	Horz	AV	0.0	27.9	54.0	-26.1	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
4580.357	40.7	7.1	3.43	61.0	3.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
4580.597	40.6	7.1	1.3	247.0	3.0	0.0	Horz	PK	0.0	47.7	74.0	-26.3	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
4541.150	40.4	7.2	1.5	29.0	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
2725.313	29.3	-1.8	1.5	64.0	3.0	0.0	Vert	AV	0.0	27.5	54.0	-26.5	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
4541.880	40.2	7.2	2.67	249.0	3.0	0.0	Horz	PK	0.0	47.4	74.0	-26.6	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
3664.680	41.9	5.3	1.18	283.0	3.0	0.0	Vert	PK	0.0	47.2	74.0	-26.8	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
3664.173	41.8	5.3	3.07	254.0	3.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
4542.027	39.7	7.2	2.22	100.0	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
4542.217	39.7	7.2	1.5	221.0	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
3633.940	41.3	5.1	2.63	170.0	3.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
3663.620	40.9	5.3	1.29	317.0	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	Ch 0, 100 kbps, EUT/Ant Horz, Pwr = 6
3633.707	41.1	5.1	1.5	233.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
3663.587	40.8	5.3	1.2	137.0	3.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	Ch 0, 100 kbps, EUT/Ant Vert, Pwr = 6
3634.033	40.8	5.1	3.47	225.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
3663.680	40.5	5.3	2.33	283.0	3.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	Ch 0, 100 kbps, EUT/Ant Vert, Pwr = 6
3633.883	40.7	5.1	1.5	292.0	3.0	0.0	Horz	PK	0.0	45.8	74.0	-28.2	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
3663.133	39.2	5.3	1.2	158.0	3.0	0.0	Vert	PK	0.0	44.5	74.0	-29.5	Ch 0, 100 kbps, EUT/Ant Horz, Pwr = 6
2748.120	43.7	-1.6	2.69	220.0	3.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
2725.737	43.9	-1.8	2.2	285.0	3.0	0.0	Vert	PK	0.0	42.1	74.0	-31.9	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2725.747	43.9	-1.8	1.5	219.0	3.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6
2747.770	43.2	-1.6	1.39	55.0	3.0	0.0	Vert	PK	0.0	41.6	74.0	-32.4	Ch 0, 100 kbps, EUT/Ant on Side, Pwr = 6
2724.913	43.4	-1.8	3.36	325.0	3.0	0.0	Horz	PK	0.0	41.6	74.0	-32.4	Ch 1, 40 kbps, EUT/Ant on Side, Pwr = 6
2725.380	42.8	-1.8	1.5	64.0	3.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	Ch 2, 9.6 kbps, EUT/Ant on Side, Pwr = 6

CONCLUSION

Pass

Tested By

OCCUPIED BANDWIDTH (99%)



XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA18H-10	REN	2022-01-13	2023-01-13
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	2021-11-29	2022-11-29
Cable	ESM Cable Corp.	30-1GHz Cables	OCW	2022-02-04	2023-02-04
Antenna - Biconilog	EMCO	3142	AXB	2022-05-04	2024-05-04

TEST DESCRIPTION

The measurement was made in a radiated configuration of the fundamental with the carrier fully maximized for its highest radiated power.

The EUT was set to the channels and modes listed in the datasheet.

The 99% occupied bandwidth was measured using 3 kHz resolution bandwidth and 10 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

OCCUPIED BANDWIDTH (99%)



XMI 2022.02.07.0

EUT:	Rev 6.3 Communicator Module	Work Order:	PCTE0028
Serial Number:	T00680428	Date:	11-Nov-22
Customer:	Alarm.com	Temperature:	22.3 °C
Attendees:	None	Humidity:	39.6% RH
Project:	None	Barometric Pres.:	1019 mbar
Tested by:	Mark Baytan	Power:	3.9 VDC
TEST SPECIFICATIONS		Test Method	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Value	Limit
		115.21 kHz	N/A
		100.72 kHz	N/A
		132.96 kHz	N/A

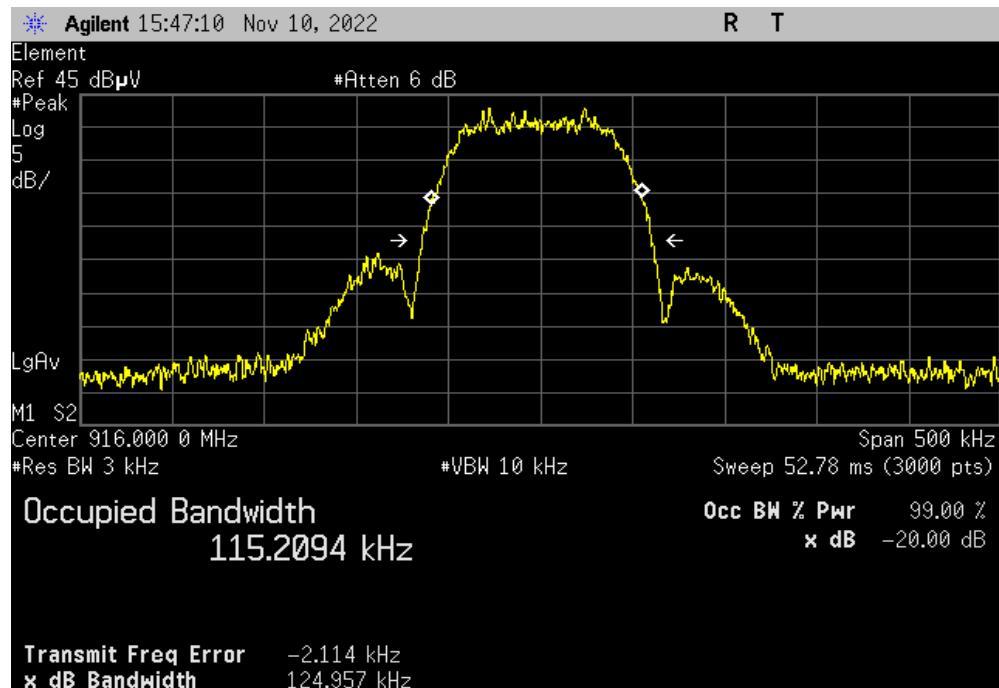
Ch 0, 916 MHz, 100 kbps
 Ch 1, 908.4 MHz, 40 kbps
 Ch 2, 908.4 MHz, 9.6 kbps

OCCUPIED BANDWIDTH (99%)

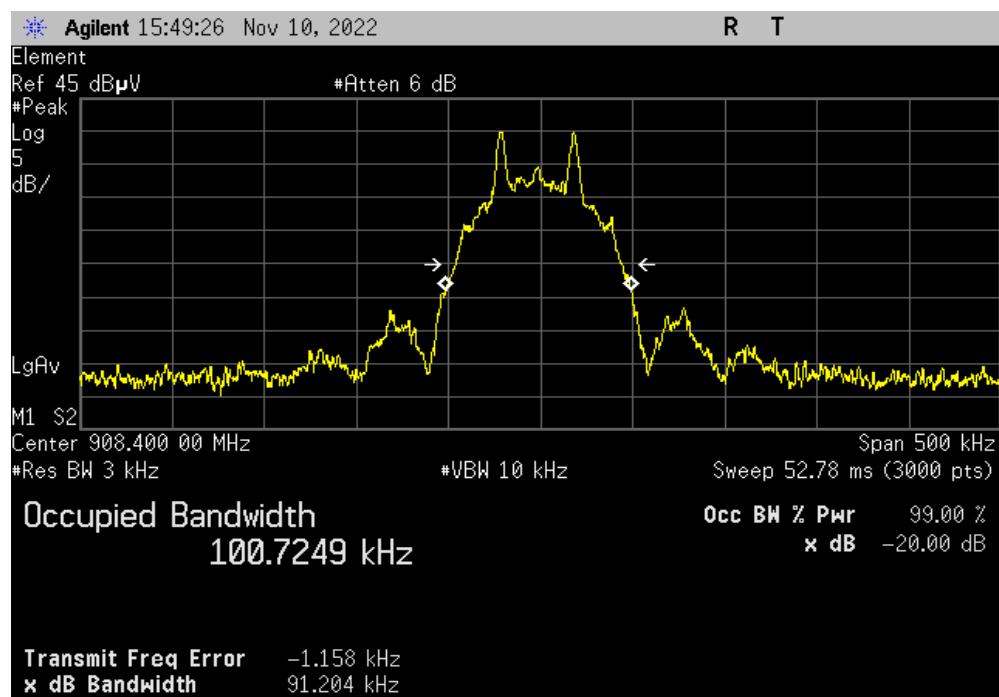


XMit 2022.02.07.0

Ch 0, 916 MHz, 100 kbps		
	Value	Limit
	115.21 kHz	N/A



Ch 1, 908.4 MHz, 40 kbps		
	Value	Limit
	100.72 kHz	N/A



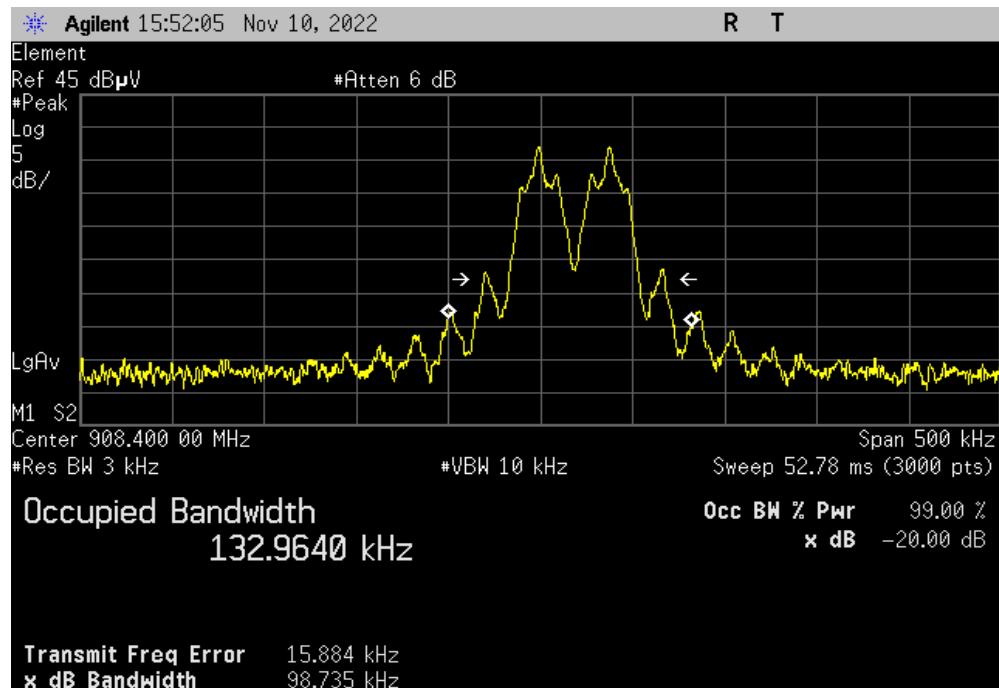
OCCUPIED BANDWIDTH (99%)



XMit 2022.02.07.0

Ch 2, 908.4 MHz, 9.6 kbps

	Value	Limit	Result
	132.96 kHz	N/A	N/A



EMISSIONS BANDWIDTH (20 dB)



XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA18H-10	REN	2022-01-13	2023-01-13
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	2021-11-29	2022-11-29
Cable	ESM Cable Corp.	30-1GHz Cables	OCW	2022-02-04	2023-02-04
Antenna - Biconilog	EMCO	3142	AXB	2022-05-04	2024-05-04

TEST DESCRIPTION

The measurement was made in a radiated configuration of the fundamental with the carrier fully maximized for its highest radiated power.

The EUT was set to the channels and modes listed in the datasheet.

The 20dB bandwidth was measured using 3 kHz resolution bandwidth and 10 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

EMISSIONS BANDWIDTH (20 dB)



XMI 2022.02.07.0

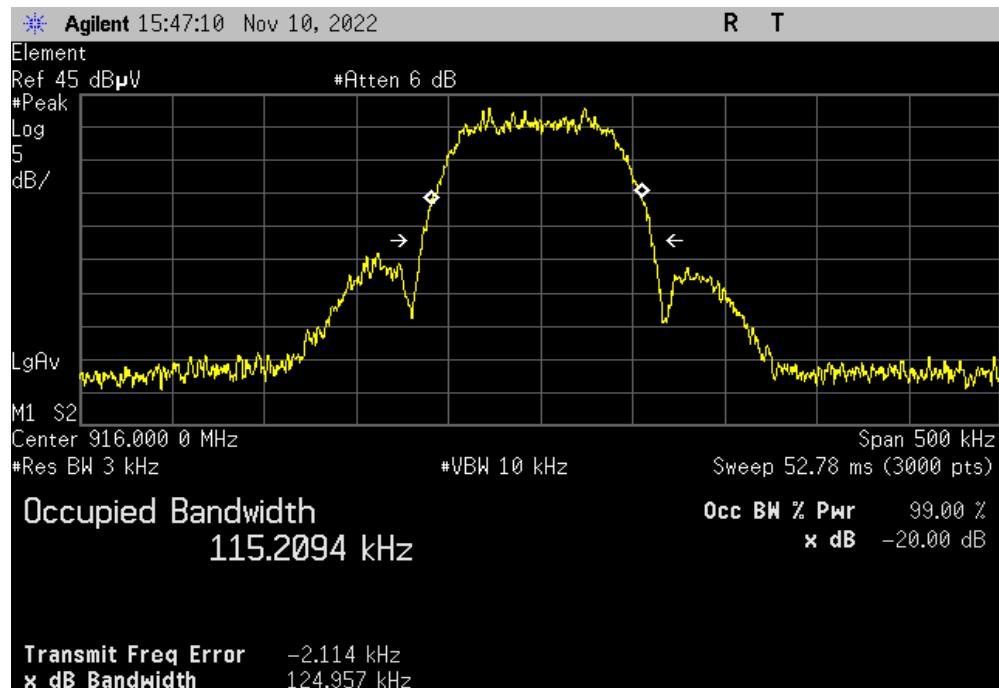
EUT:	Rev 6.3 Communicator Module		Work Order:	PCTE0028	
Serial Number:	T00680428		Date:	11-Nov-22	
Customer:	Alarm.com		Temperature:	22.3 °C	
Attendees:	None		Humidity:	39.6% RH	
Project:	None		Barometric Pres.:	1019 mbar	
Tested by:	Mark Baytan	Power:	3.9 VDC	Job Site:	OC07
TEST SPECIFICATIONS			Test Method		
FCC 15.249:2022			ANSI C63.10:2013		
COMMENTS					
None					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
			Value	Limit	Result
Ch 0, 916 MHz, 100 kbps			124.96 kHz	Within Band	Pass
Ch 1, 908.4 MHz, 40 kbps			91.204 kHz	Within Band	Pass
Ch 2, 908.4 MHz, 9.6 kbps			98.735 kHz	Within Band	Pass

EMISSIONS BANDWIDTH (20 dB)

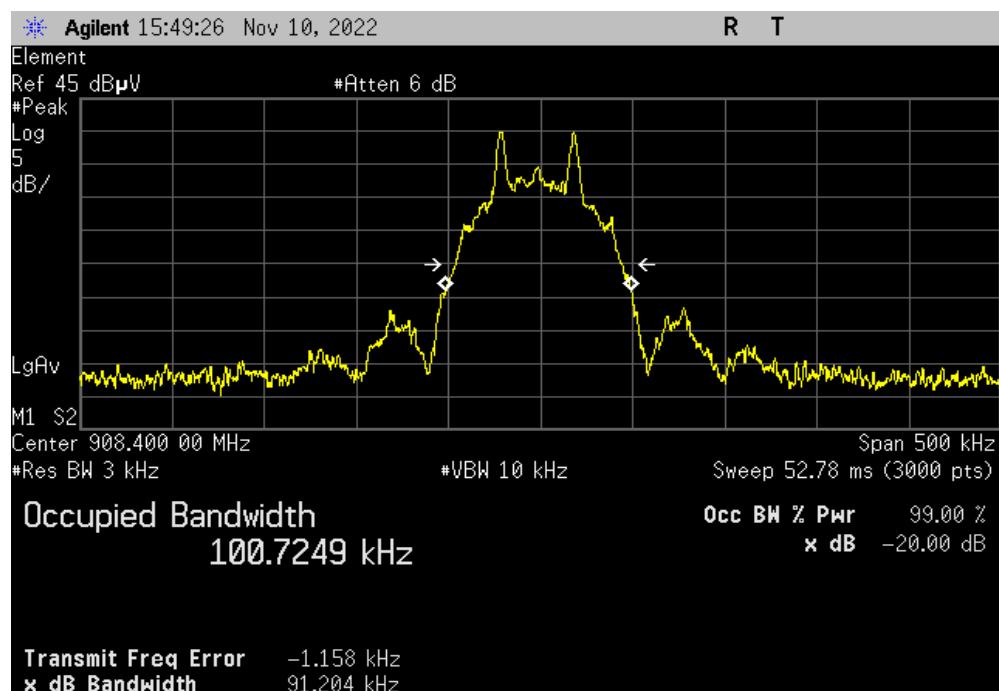


XMit 2022.02.07.0

Ch 0, 916 MHz, 100 kbps			
	Value	Limit	Result
	124.96 kHz	Within Band	Pass



Ch 1, 908.4 MHz, 40 kbps			
	Value	Limit	Result
	91.204 kHz	Within Band	Pass



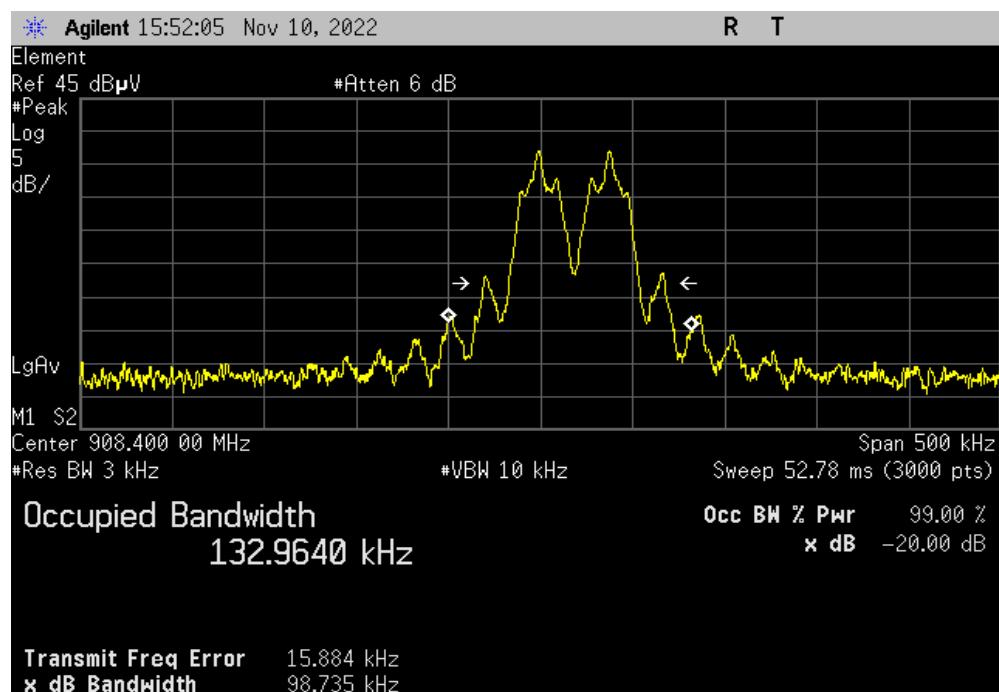
EMISSIONS BANDWIDTH (20 dB)



XMit 2022.02.07.0

Ch 2, 908.4 MHz, 9.6 kbps

	Value	Limit	Result
	98.735 kHz	Within Band	Pass





DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) were measured for each of the EUT operating modes. The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

The EUT operates at 100% Duty Cycle.

End of Test Report