



# element

**Ademco, Inc.**

**C7089R3013**

**FCC 15.247:2022**

**RSS-247 Issue 2:2017**

**902 – 928 MHz FHSS Transceiver**

**Report: ADEM0024.1 Rev. 1, Issue Date: October 20, 2022**



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# CERTIFICATE OF TEST



**Last Date of Test: August 23, 2022**  
**Ademco, Inc.**  
**EUT:C7089R3013**

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2022	ANSI C63.10:2013, KDB 558074 v05r02:2019
RSS-247 Issue 2:2017	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

### Results

Test Description	Result	FCC Section(s)	RSS Section(s)	ANSI C63.10 Section(s)	Comments
Band Edge Compliance	Pass	15.247(d)	RSS-247 5.5	7.8.6	
Band Edge Compliance - Hopping Mode	Pass	15.247(d)	RSS-247 5.5	7.8.6	
Carrier Frequency Separation	Pass	15.247(a)(1)	RSS-247 5.1(b)	7.8.2	
Duty Cycle	N/A	15.247	RSS-Gen 3.2	7.5	Operates at 100%.
Dwell Time	Pass	15.247(a)(1)	RSS-247 5.1(d)	7.8.4	
Emissions Bandwidth (dB)	Pass	15.247(a)	RSS-247 5.2(a)	7.8.7	
Equivalent Isotropic Radiated Power (EIRP)	Pass	15.247(b)	RSS-247 5.4(d)	7.8.5	
Number of Hopping Frequencies	Pass	15.247(a)(1)	RSS-247 5.1(d)	7.8.3	
Occupied Bandwidth (99%)	Pass	15.247(a)	RSS-Gen 6.7	7.8.7	
Output Power	Pass	15.247(b)	RSS-247 5.4(d)	7.8.5	
Power Spectral Density	N/A	15.247(e)	RSS-247 5.2(b)	11.10.2	Not required for FHSS devices.
Powerline Conducted Emissions (Transmitter)	N/A	15.207	RSS-Gen 8.8	6.2	Not required for a battery powered EUT.
Spurious Conducted Emissions	Pass	15.247(d)	RSS-247 5.5	7.8.8	
Spurious Radiated Emissions	Pass	15.247(d)	RSS-247 5.5	6.5, 6.6	
Powerline Conducted Emissions (Receiver)	N/A	15.101, 15.107	RSS-Gen 5.2	ANSI C63.4 - 12.2.4	Not included per FCC 15.101 as this will be covered under SDoC rules for the FCC. RSS-Gen section 7 stated receiver requirements only apply to standalone receivers operating in the 30-960 MHz band and this is not a standalone receiver.
Radiated Emissions for Receiver	N/A	15.101, 15.109	RSS-Gen 5.2	ANSI C63.4 - 12.2.5	Not included per FCC 15.101 as this will be covered under SDoC rules for the FCC. RSS-Gen section 7 stated receiver requirements only apply to standalone receivers operating in the 30-960 MHz band and this is not a standalone receiver.

**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.**

# CERTIFICATE OF TEST



## Deviations From Test Standards

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None

### Approved By:

Cole Ghizzone, Department 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



<b>Revision Number</b>	<b>Description</b>	<b>Date</b> (yyyy-mm-dd)	<b>Page Number</b>
01	Updated antenna gain to 5.2 dBi	2022-10-20	12
	Updated antenna gain to 5.2 dBi, and EIRP value	2022-10-20	33-35

# ACCREDITATIONS AND AUTHORIZATIONS



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## 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.

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## 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.

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## European Union

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

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## United Kingdom

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

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## 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.

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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## SCOPE

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

[California](#)

[Minnesota](#)

[Oregon](#)

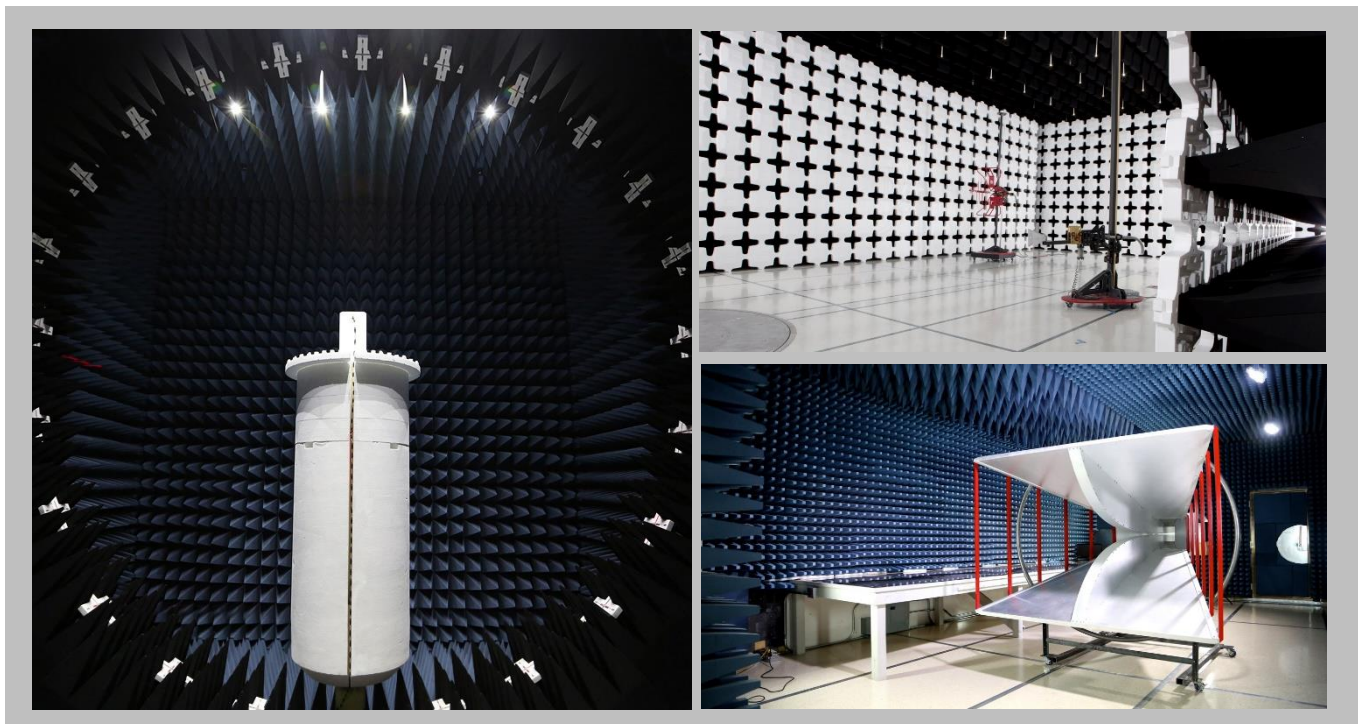
[Texas](#)

[Washington](#)

# FACILITIES



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

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
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)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	3.2 dB	-3.2 dB

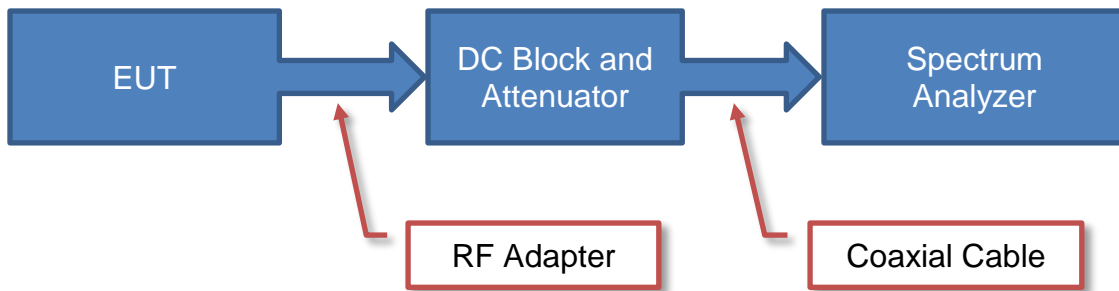
# TEST SETUP BLOCK DIAGRAMS

## 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.

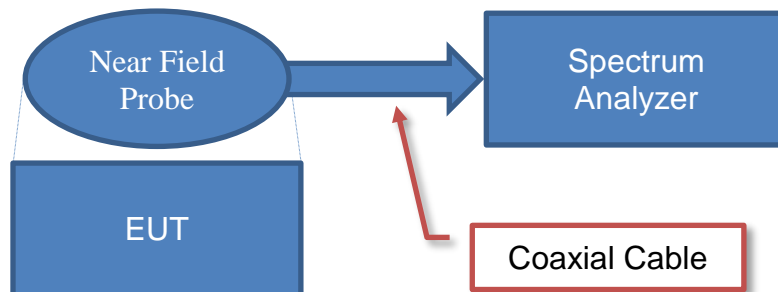
## Antenna Port Conducted Measurements



### Sample Calculation (logarithmic units)

$$\begin{array}{r}
 \text{Measured Value} \\
 71.2
 \end{array}
 =
 \begin{array}{r}
 \text{Measured Level} \\
 42.6
 \end{array}
 +
 \begin{array}{r}
 \text{Reference Level Offset} \\
 28.6
 \end{array}$$

## Near Field Test Fixture Measurements



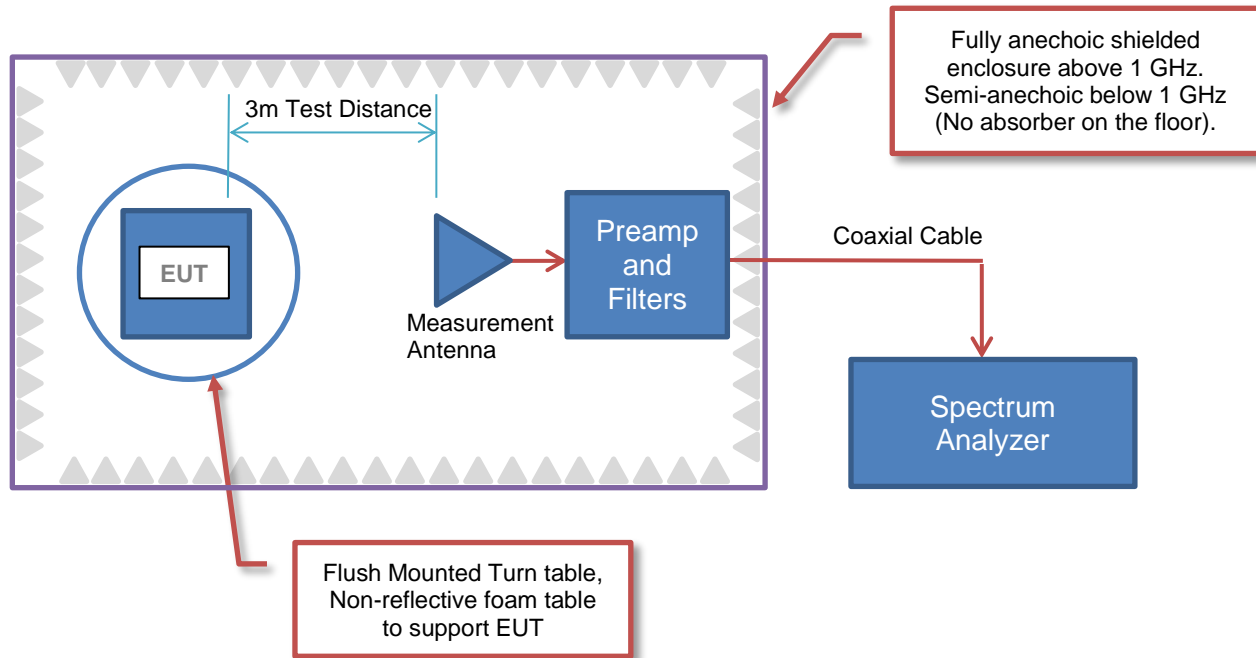
### Sample Calculation (logarithmic units)

$$\begin{array}{r}
 \text{Measured Value} \\
 71.2
 \end{array}
 =
 \begin{array}{r}
 \text{Measured Level} \\
 42.6
 \end{array}
 +
 \begin{array}{r}
 \text{Reference Level Offset} \\
 28.6
 \end{array}$$



# TEST SETUP BLOCK DIAGRAMS

## Emissions Measurements



## Sample Calculation (logarithmic units)

### Radiated Emissions:

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

42.6 + 28.6 + 3.1 - 40.8 + 0.0 + 0.0 = 33.5

### Conducted Emissions:

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

26.7 + 0.3 + 0.1 + 20.0 = 47.1

### Radiated Power (ERP/EIRP) – Substitution Method:

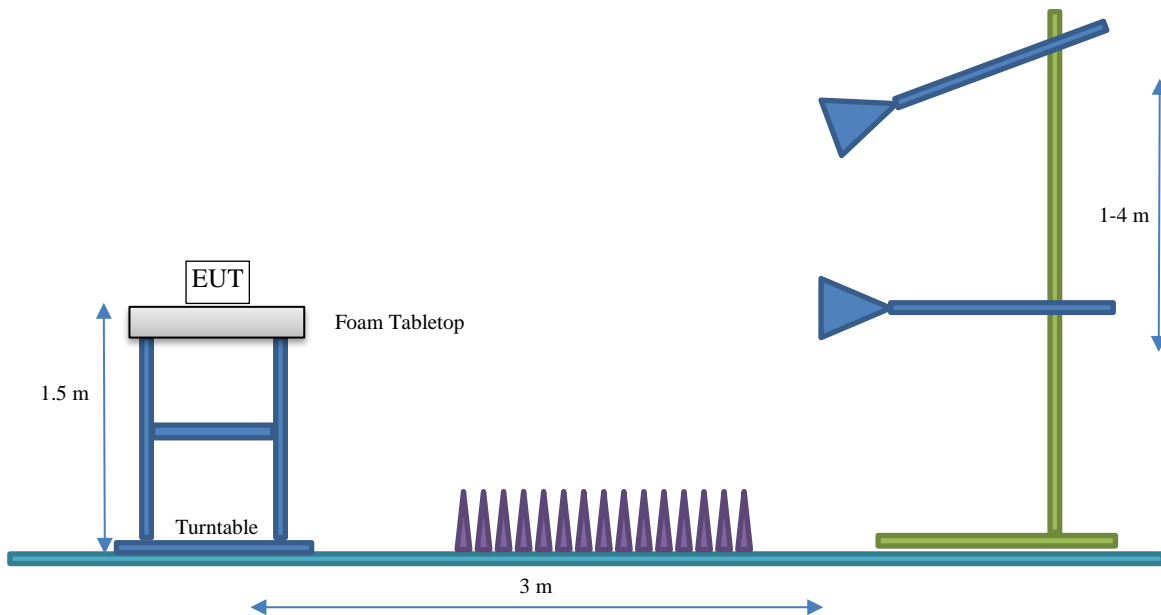
Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

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

<b>Company Name:</b>	Ademco, Inc.
<b>Address:</b>	251 Little Falls Drive
<b>City, State, Zip:</b>	Wilmington, DE 19808
<b>Test Requested By:</b>	Christian Fouth
<b>EUT:</b>	C7089R3013
<b>First Date of Test:</b>	August 22, 2022
<b>Last Date of Test:</b>	August 22, 2022
<b>Receipt Date of Samples:</b>	August 22, 2022
<b>Equipment Design Stage:</b>	Prototype
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

Battery powered wireless outdoor temperature and humidity sensor containing a 902-928 MHz radio with 1 antenna intended to be operated outside of the house.

### Testing Objective:

Seeking to demonstrate compliance in the 902 - 928 MHz band for operation under FCC 15.247:2022 and RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021 specifications under technology category Frequency Hopping - Other.

# 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)
PCB Monopole	Manufacturer	902-928	5.2

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

- Test software settings      Test software/firmware installed on EUT: XTR Firmware version 1.0.1.0  
 Rated power settings

## SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Position (if multiple channels)	Frequency (MHz)	Power Setting (dBm)
GFSK / 38.4 kbps	Low Channel	902.99973	12.5
	Mid Channel	914.59689	
	High Channel	926.39401	

# CONFIGURATIONS



## Configuration ADEM0024- 1

Software/Firmware Running During Test	
Description	Version
XTR SW	1.0.1.0

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless outdoor temperature and humidity sensor	Ademco, Inc.	C7089R3013	1128

## Configuration ADEM0024- 2

Software/Firmware Running During Test	
Description	Version
XTR SW	1.0.1.0

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless outdoor temperature and humidity sensor	Ademco, Inc.	C7089R3013	1124

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-08-22	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	2022-08-22	Band Edge Compliance	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	2022-08-22	Band Edge Compliance - Hopping Mode	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	2022-08-22	Carrier Frequency Separation	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	2022-08-22	Dwell Time	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2022-08-22	Emissions Bandwidth (dB)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2022-08-22	Equivalent Isotropic Radiated Power (EIRP)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2022-08-22	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.
9	2022-08-22	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
10	2022-08-22	Number of Hopping Frequencies	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
11	2022-08-22	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# BAND EDGE COMPLIANCE



element

XMI 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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.


The spectrum was scanned below the lower band edge and above the higher band edge.



# BAND EDGE COMPLIANCE



TelTx 2022.06.03.0 XMI: 2022.02.07.0

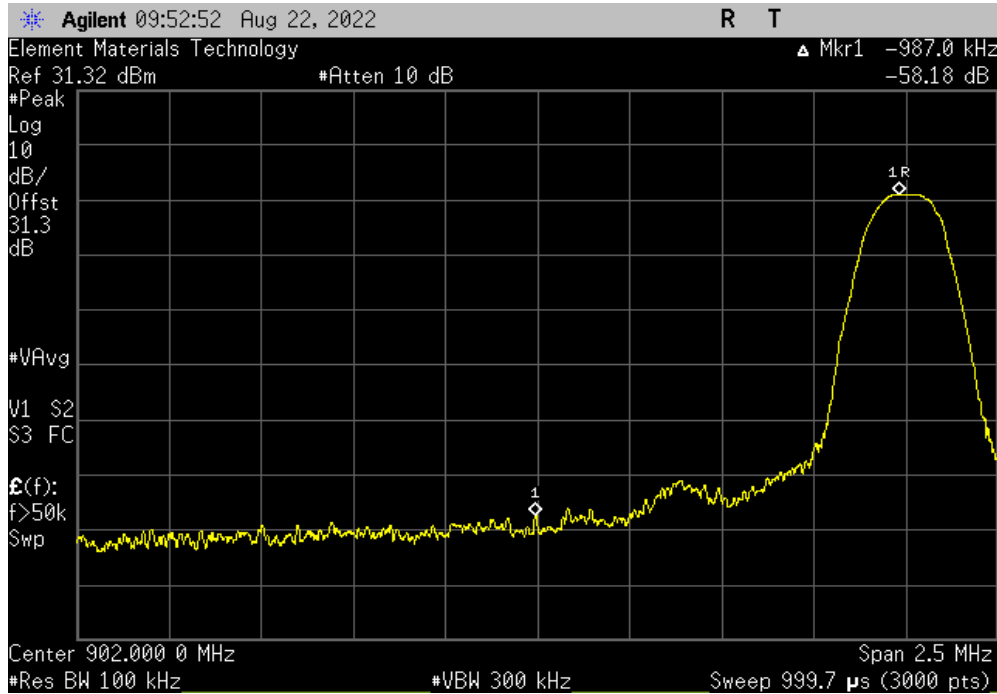
EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.2 °C	
Attendees: None		Humidity: 48.4% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
Single Channel Mode			
GFSK, 38.4 Kbps			
Low Channel, 902.99973 MHz		-58.18	-20 Pass
High Channel, 926.39401 MHz		-60.07	-20 Pass

# BAND EDGE COMPLIANCE

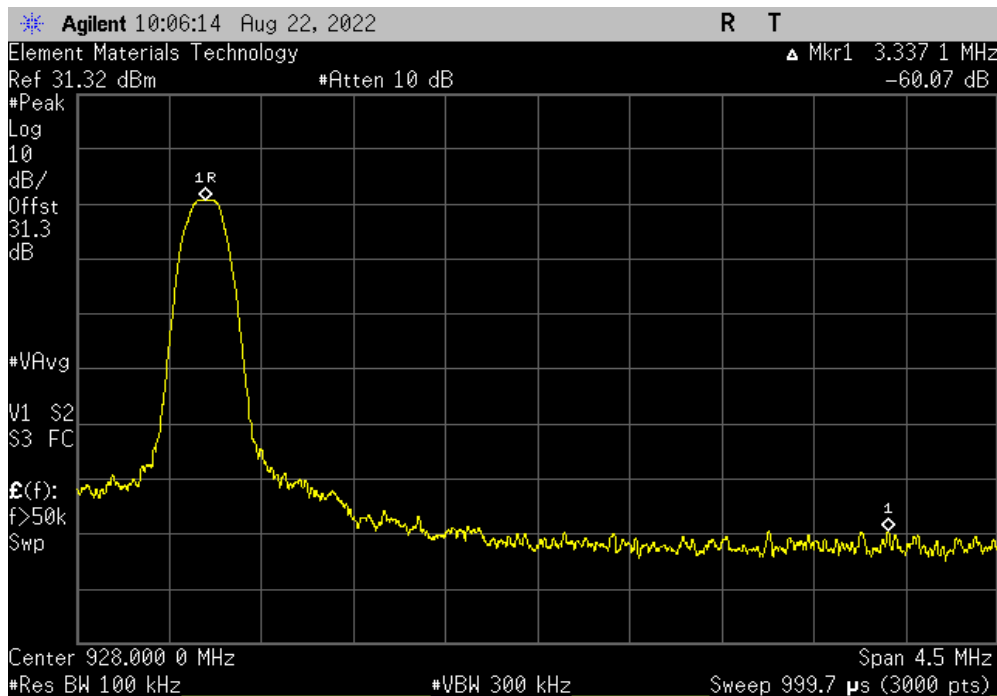


TuTx 2022.06.03.0 XMt 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-58.18	-20	Pass



Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-60.07	-20	Pass





# BAND EDGE COMPLIANCE - HOPPING MODE

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

# BAND EDGE COMPLIANCE - HOPPING MODE



TelTx 2022.06.03.0 XMI 2022.02.07.0

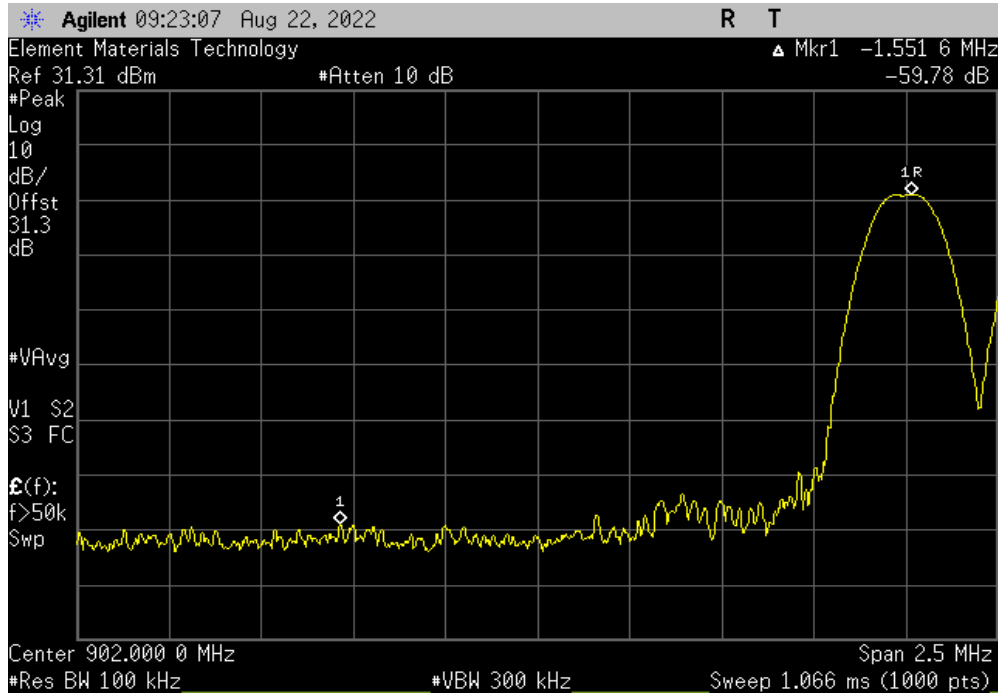
EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.2 °C	
Attendees: None		Humidity: 48.4% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method: ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature	
		Value (dBc)	Limit ≤ (dBc) Result
Hopping Mode			
GFSK, 38.4 Kbps			
Low Channel, 902.99973 MHz		-59.78	-20 Pass
High Channel, 926.39401 MHz		-58.96	-20 Pass

# BAND EDGE COMPLIANCE - HOPPING MODE

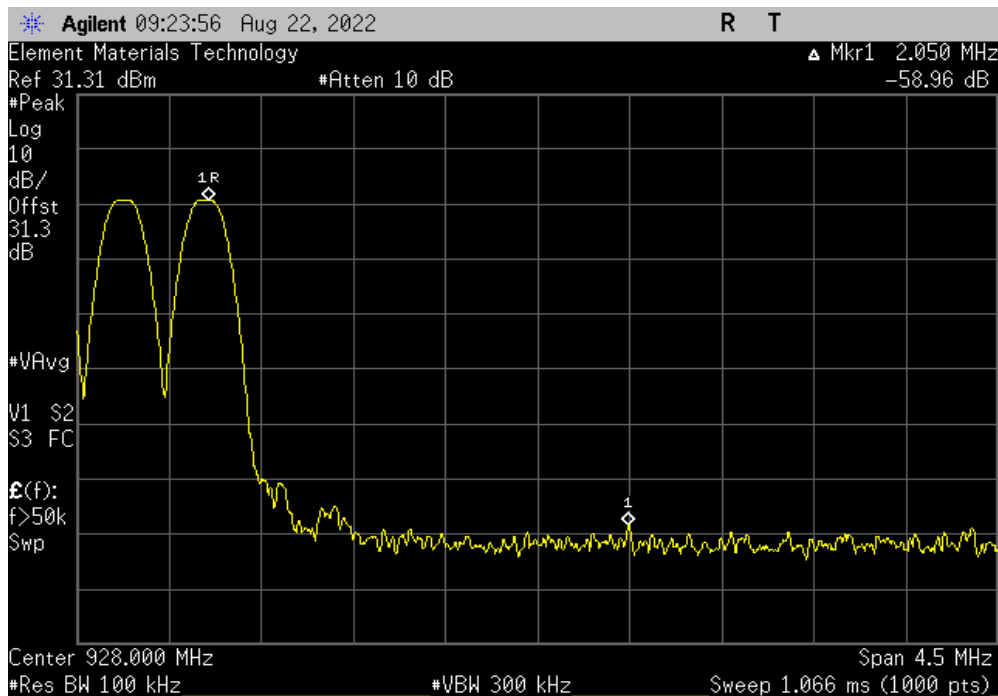


TuTx 2022.06.03.0 XMt 2022.02.07.0

Hopping Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-59.78	-20	Pass



Hopping Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-58.96	-20	Pass



# CARRIER FREQUENCY SEPARATION



XMH 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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The channel carrier frequencies in the 902-928 MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.



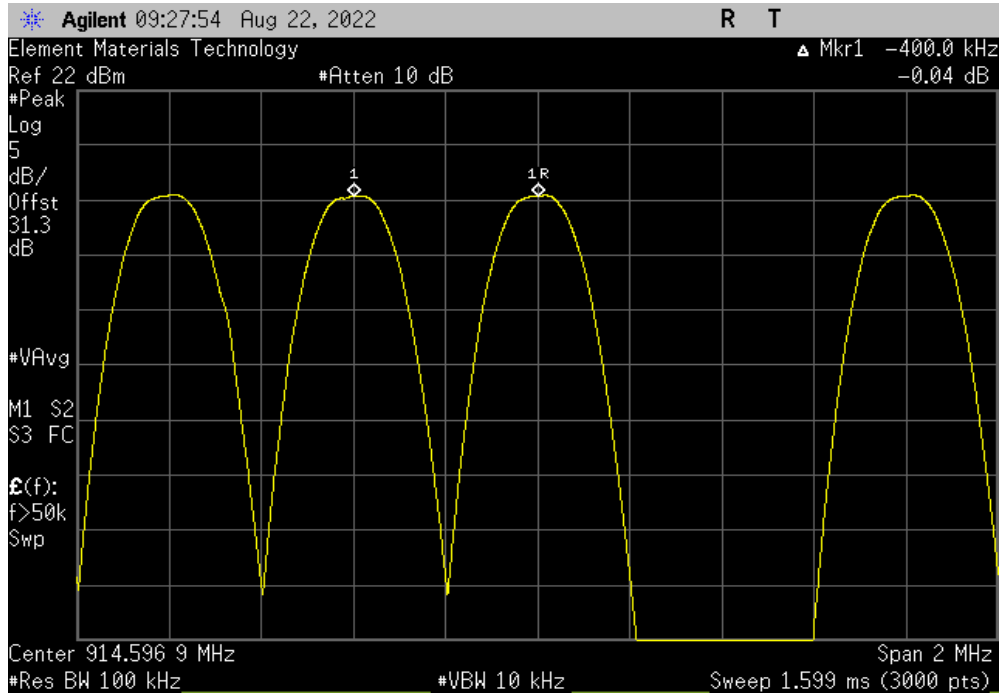


# CARRIER FREQUENCY SEPARATION



TbTx 2022.06.03.0 XMI 2022.02.07.0

Hopping Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz		
Value	Limit (≥)	Results
400 kHz	79.1 kHz	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.

# DWELL TIME



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
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

For systems have a 20 dB bandwidth of the hopping channel that is less than 250 kHz and at least 50 hopping frequencies, the average time of occupancy on any frequency shall not be greater than 0.4 seconds in a 20 second period.

# DWELL TIME



TelTx 2022.06.03.0 XMI 2022.02.07.0

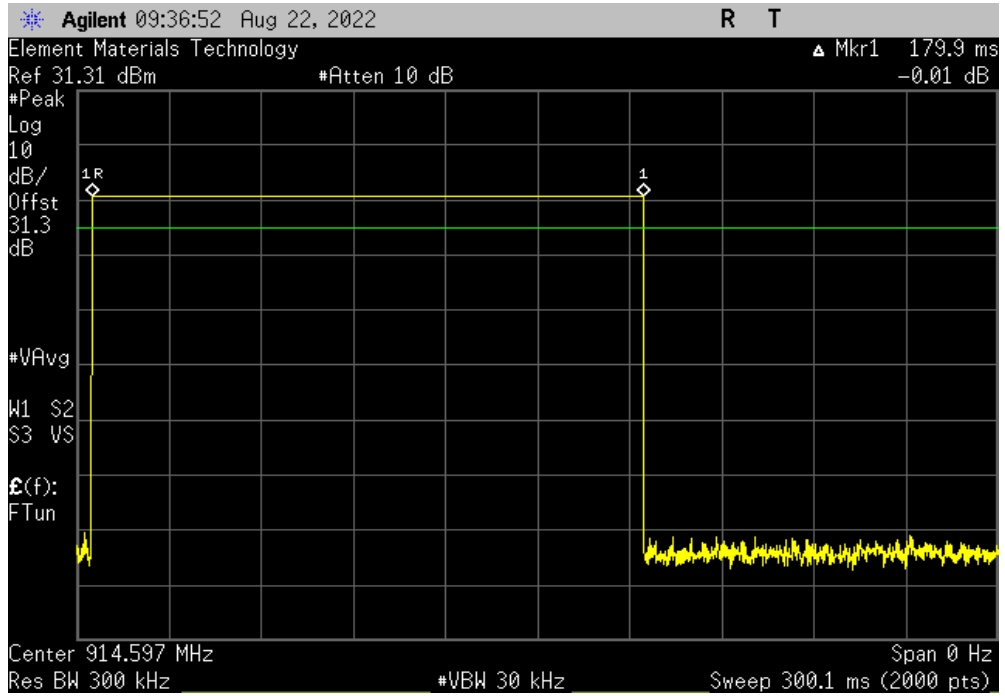
EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.1 °C	
Attendees: None		Humidity: 48.2% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature	
		Pulse Width (ms)	Number of Pulses
		On Time (ms) During 20 s	Limit (ms)
			Results
Hopping Mode	GFSK, 38.4 Kbps		
	Mid Channel, 914.59689 MHz	179.92	N/A
	Mid Channel, 914.59689 MHz	179.92	1
			N/A
			179.92
			≤ 400
			N/A
			Pass

# DWELL TIME

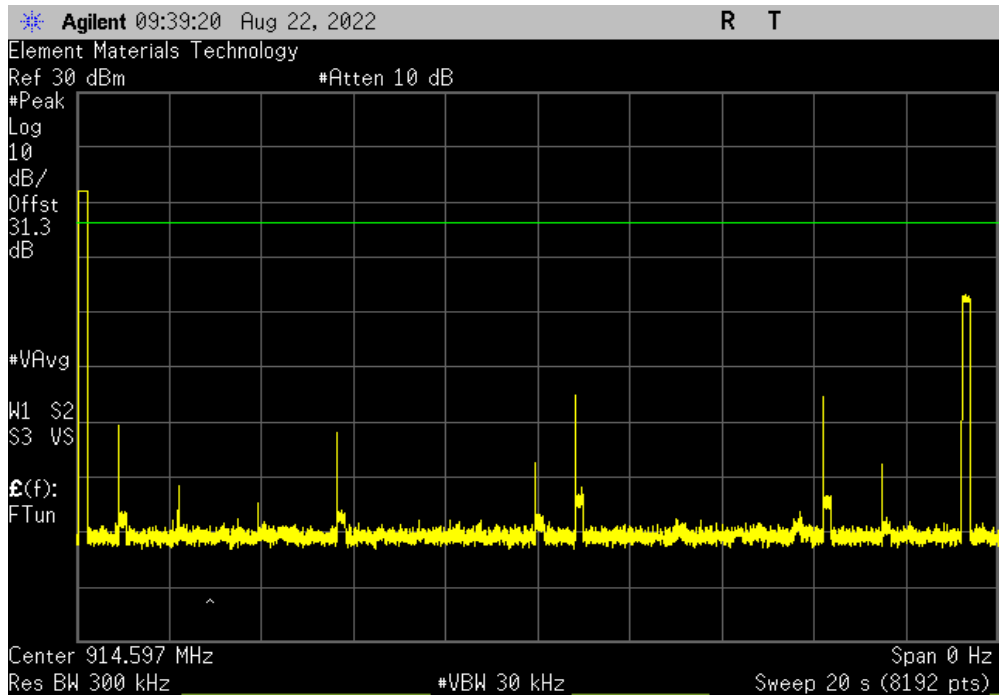


TuTx 2022.06.03.0 XMt 2022.02.07.0

Hopping Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz						
	Pulse Width (ms)	Number of Pulses	On Time (ms) During 20 s	Limit (ms)	Results	
	179.92	N/A	N/A	N/A	N/A	



Hopping Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz						
	Pulse Width (ms)	Number of Pulses	On Time (ms) During 20 s	Limit (ms)	Results	
	179.92	1	179.92	≤ 400	Pass	



# EMISSIONS BANDWIDTH (dB)



element

XMI 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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION


The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The 20 dB emissions bandwidth was measured with the EUT set to low, medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

# EMISSIONS BANDWIDTH (dB)



TelTx 2022.06.03.0 XMI: 2022.02.07.0

EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.2 °C	
Attendees: None		Humidity: 48.3% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature 	
		Value	Limit (-) Result
Single Channel Mode			
	GFSK, 38.4 Kbps		
	Low Channel, 902.99973 MHz	79.089 kHz	500 kHz Pass
	Mid Channel, 914.59689 MHz	78.062 kHz	500 kHz Pass
	High Channel, 926.39401 MHz	78.67 kHz	500 kHz Pass

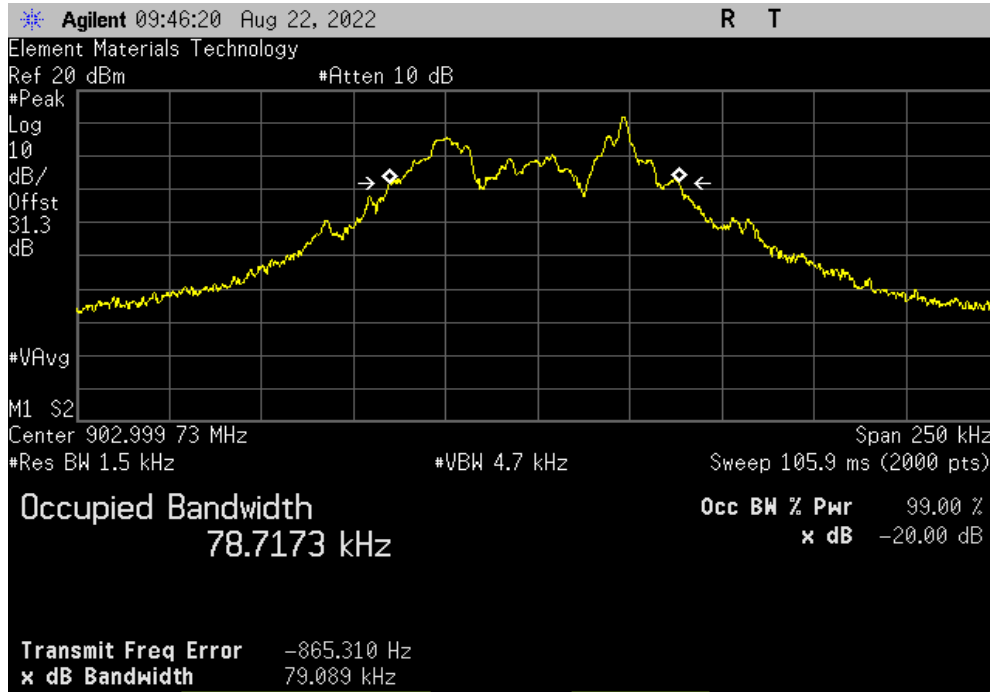


# EMISSIONS BANDWIDTH (dB)

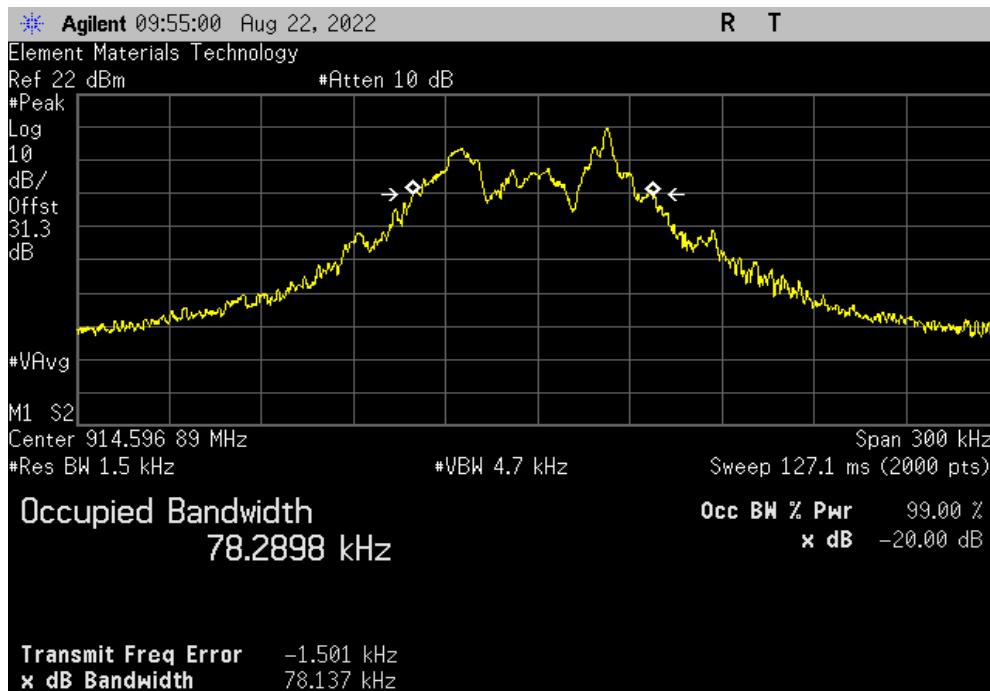


TuTx 2022.06.03.0 XMi 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz			
	Value	Limit (<)	Result
	79.089 kHz	500 kHz	Pass



Single Channel Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz			
	Value	Limit (<)	Result
	78.062 kHz	500 kHz	Pass

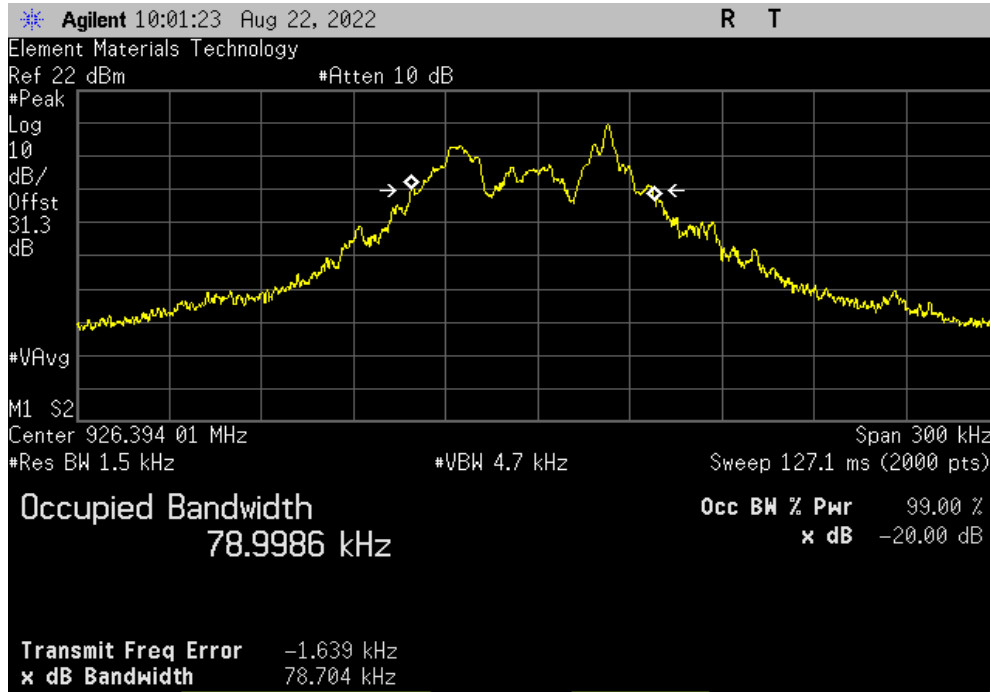


# EMISSIONS BANDWIDTH (dB)



TbTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz			
	Value	Limit	Result
	78.67 kHz	500 kHz	Pass



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMts 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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	S.M. Electronics	SA01B-010	AWH	2022-06-28	2023-06-28
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TelTx 2022.06.03.0 XMI 2022.02.07.0

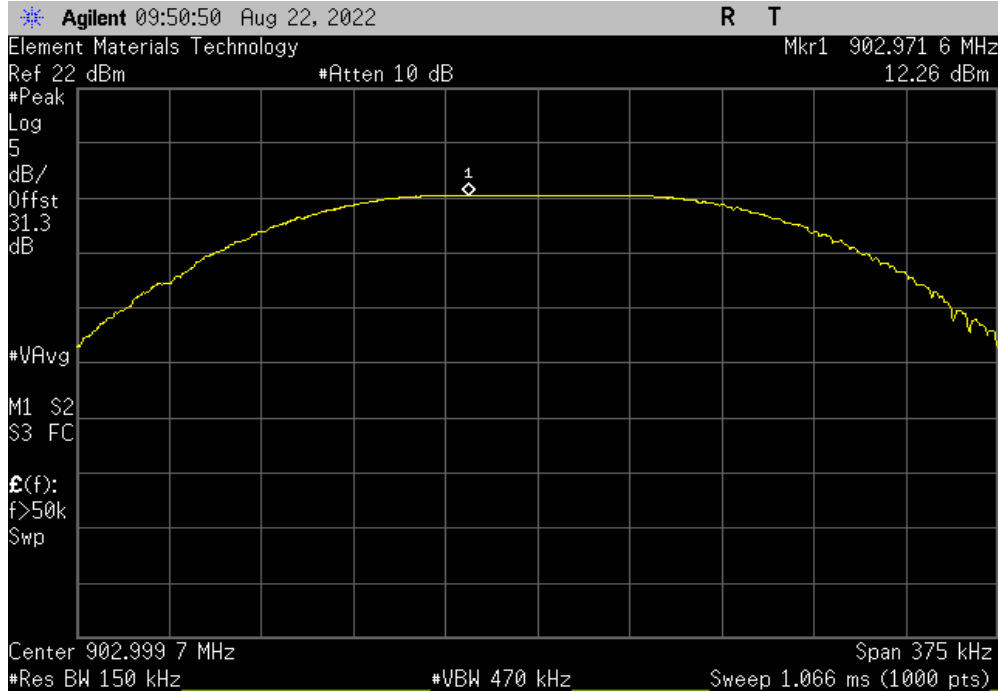
EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.2 °C	
Attendees: None		Humidity: 48.4% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature	
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
Single Channel Mode			
	GFSK, 38.4 Kbps		
	Low Channel, 902.99973 MHz	12.26	5.2
	Mid Channel, 914.59689 MHz	12.1	5.2
	High Channel, 926.39401 MHz	12.011	5.2
			17.5
			17.3
			17.2
			36
			36
			36
			Pass
			Pass
			Pass

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

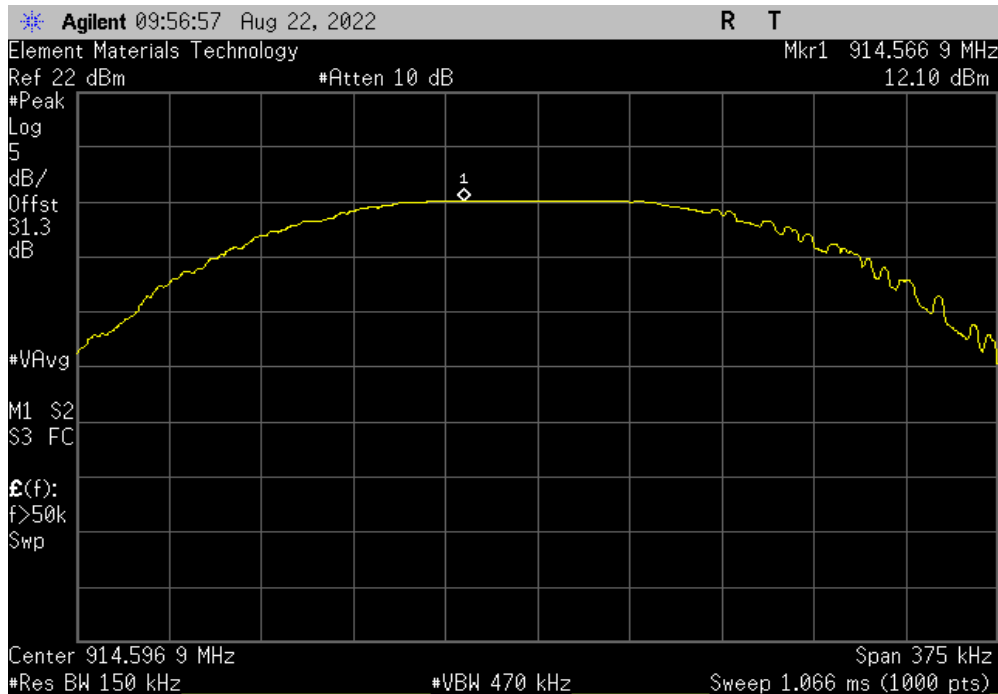


TbTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	12.26	5.2	17.5	36	Pass	



Single Channel Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	12.1	5.2	17.3	36	Pass	

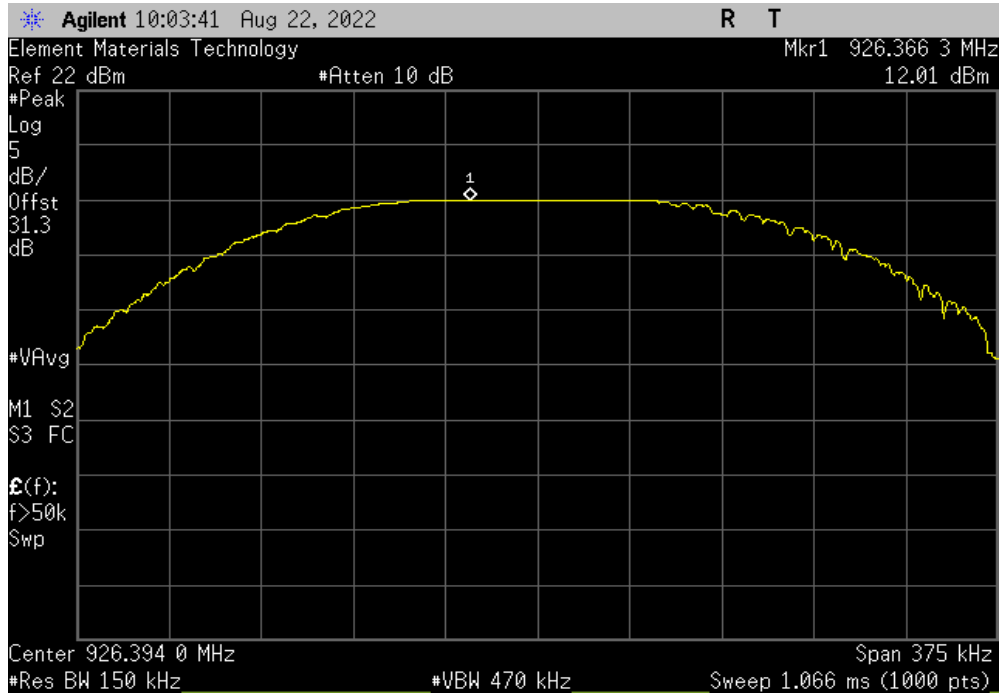


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
12.011	5.2	17.2	36	Pass	





# NUMBER OF HOPPING FREQUENCIES

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.


The number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.



# NUMBER OF HOPPING FREQUENCIES



TelTx 2022.06.03.0 XMI: 2022.02.07.0

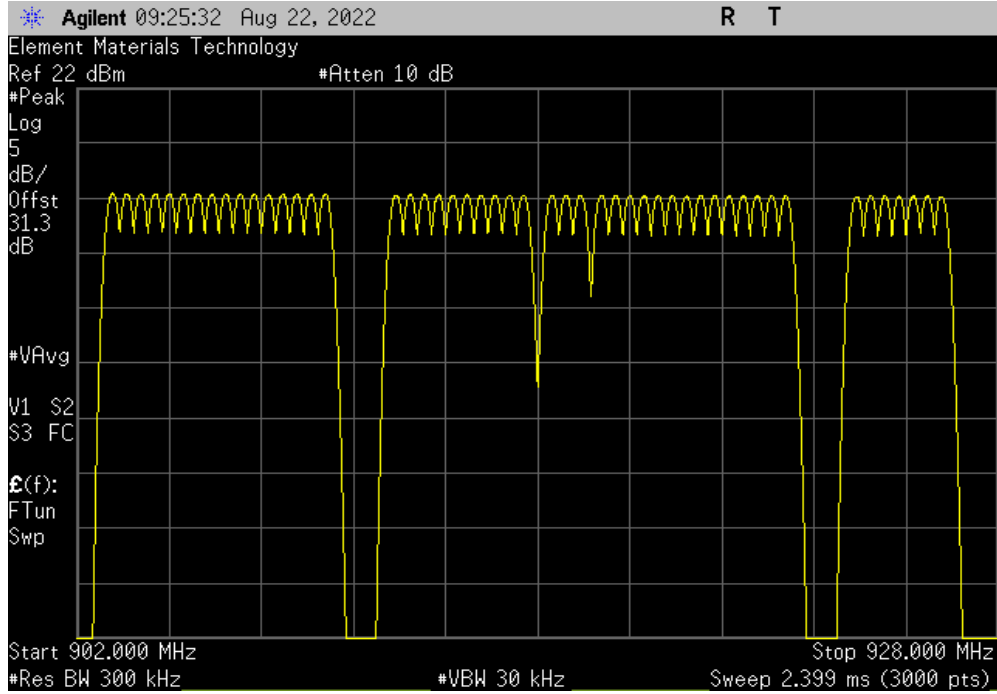
EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.1 °C	
Attendees: None		Humidity: 48.2% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature 	
		Number of Channels	Limit (≥)
Hopping Mode			Results
GFSK, 38.4 Kbps		50	50
Mid Channel, 914.59689 MHz			Pass

# NUMBER OF HOPPING FREQUENCIES



TbTx 2022.06.03.0 XMI 2022.02.07.0

Hopping Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz			
	Number of Channels	Limit (≥)	Results
	50	50	Pass



# OCCUPIED BANDWIDTH (99%)

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The 99% occupied bandwidth was measured with the EUT configured for continuous modulated operation.

Per ANSI C63.10:2013, 6.9.3, the spectrum analyzer was configured as follows:

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) of the spectrum analyzer was set to the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto to prevent video filtering or averaging. A sample detector was used unless the device was not able to be operated in a continuous transmit mode, in which case a peak detector was used.

The spectrum analyzer occupied bandwidth measurement function was used to sum the power of the transmission in linear terms to obtain the 99% bandwidth.

# OCCUPIED BANDWIDTH (99%)



TelTx 2022.06.03.0 XMI 2022.02.07.0

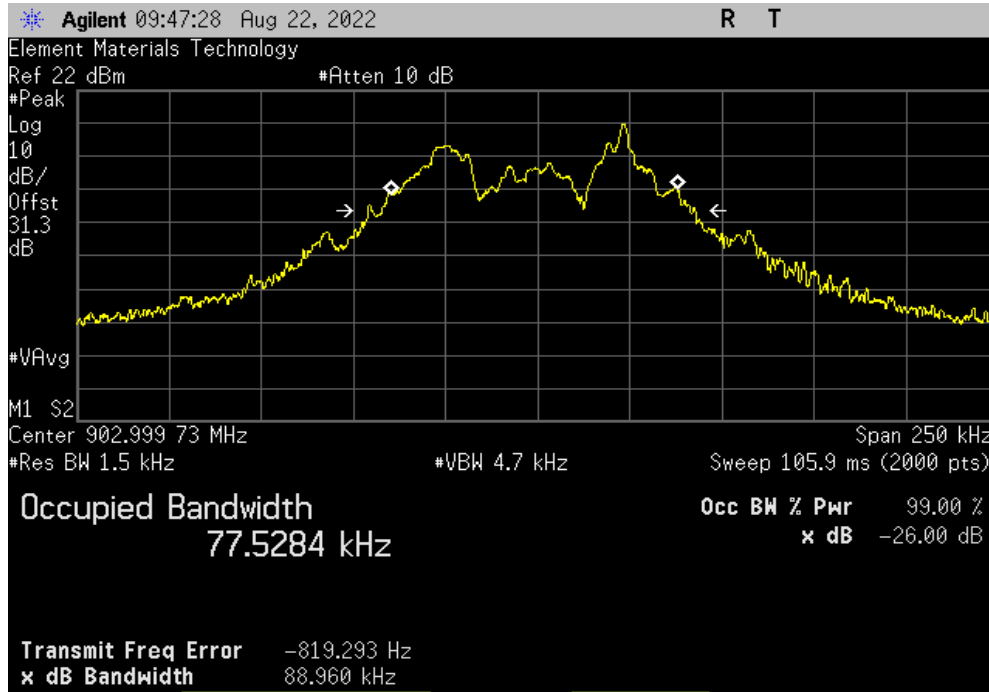
EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.2 °C	
Attendees: None		Humidity: 48.4% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature	
		Value	Limit
Single Channel Mode			Result
GFSK, 38.4 Kbps			
Low Channel, 902.99973 MHz		77.358 kHz	N/A
Mid Channel, 914.59689 MHz		77.776 kHz	N/A
High Channel, 926.39401 MHz		78.585 kHz	N/A

# OCCUPIED BANDWIDTH (99%)



TuTx 2022.06.03.0 XMi 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz			
	Value	Limit	Result
	77.358 kHz	N/A	N/A



Single Channel Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz			
	Value	Limit	Result
	77.776 kHz	N/A	N/A



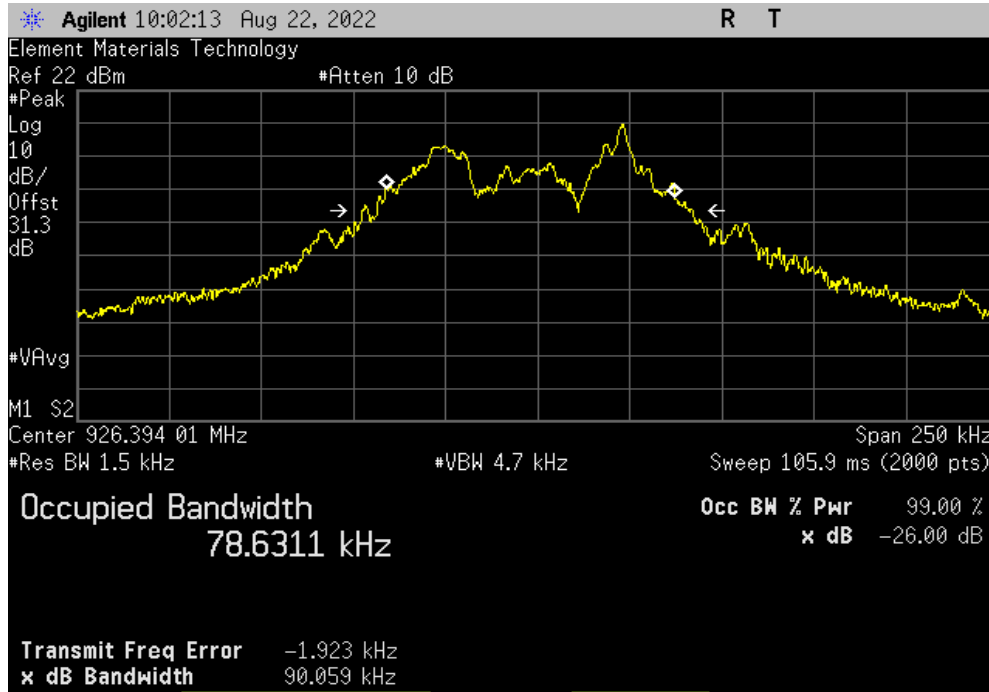
# OCCUPIED BANDWIDTH (99%)



TbTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz

	Value	Limit	Result
	78.585 kHz	N/A	N/A



# OUTPUT POWER



XMI 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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

# OUTPUT POWER



TelTx 2022.06.03.0 XMI: 2022.02.07.0

EUT: C7089R3013		Work Order: ADEM0024	
Serial Number: 1128		Date: 22-Aug-22	
Customer: Ademco, Inc.		Temperature: 23.2 °C	
Attendees: None		Humidity: 48.4% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Jeff Alcock	Power: Battery	Job Site: EV06	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	1	Signature	
		Out Pwr (dBm)	Limit (dBm) Result
Single Channel Mode			
	GFSK, 38.4 Kbps		
	Low Channel, 902.99973 MHz	12.26	30 Pass
	Mid Channel, 914.59689 MHz	12.1	30 Pass
	High Channel, 926.39401 MHz	12.011	30 Pass

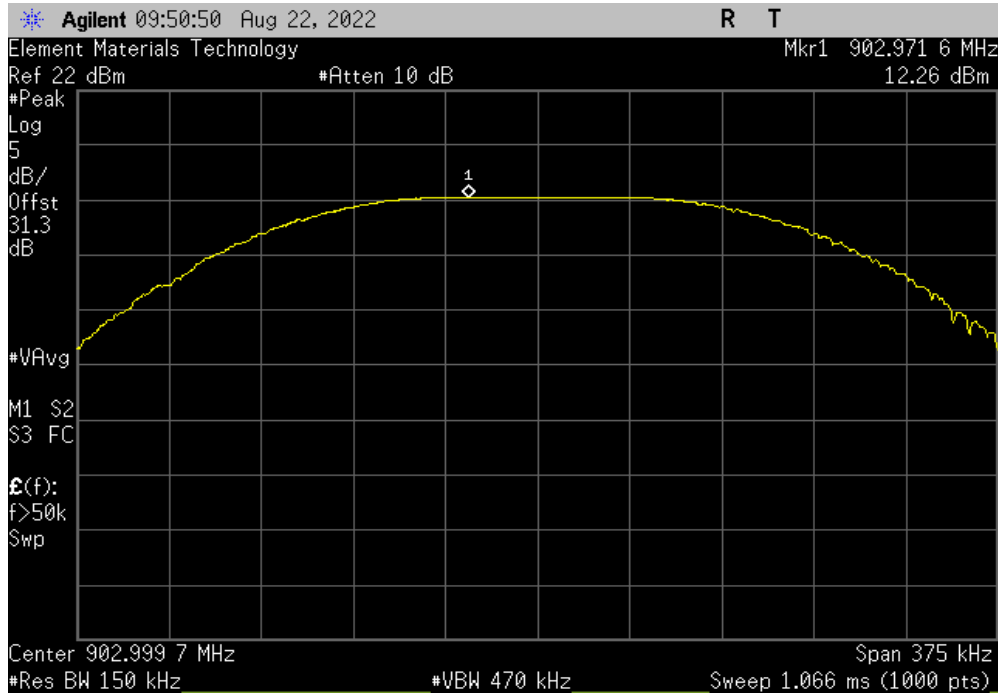


# OUTPUT POWER

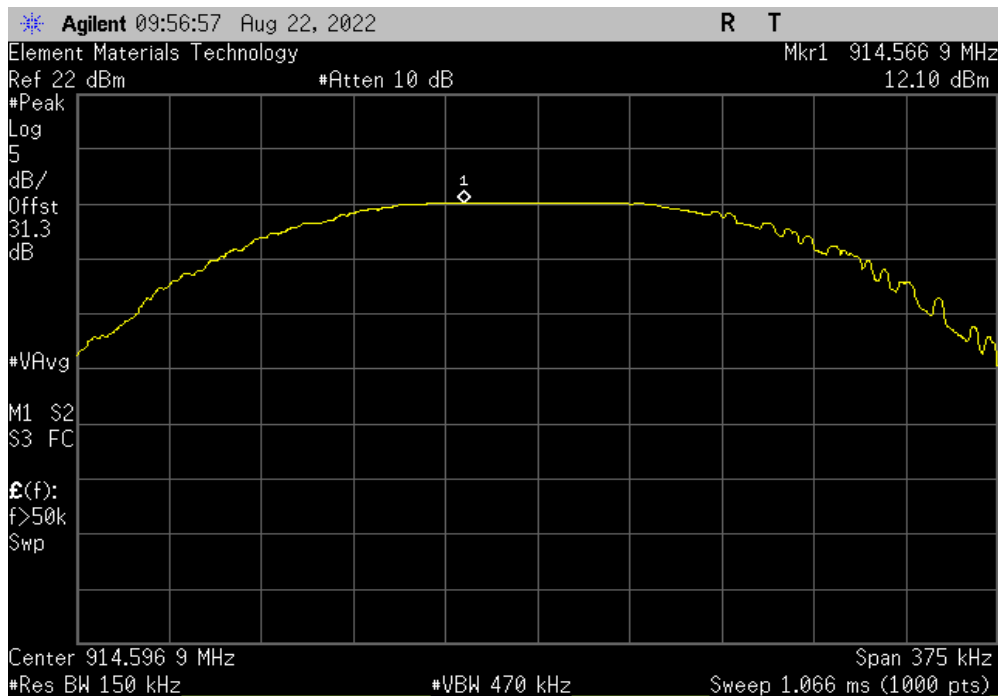


TbTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				12.26	30	Pass



Single Channel Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				12.1	30	Pass

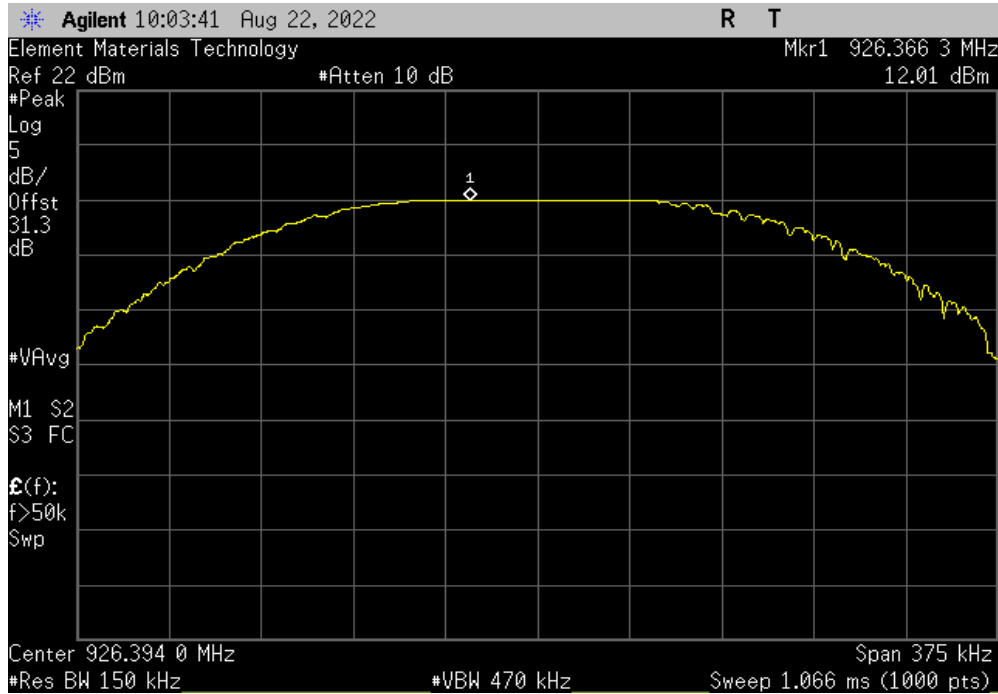


# OUTPUT POWER



TbTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				12.011	30	Pass





# SPURIOUS CONDUCTED EMISSIONS

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2021-12-05	2022-12-05
Attenuator	Fairview Microwave	SA26B-10	TWH	2022-03-15	2023-03-15
Attenuator	S.M. Electronics	SA26B-20	AUY	2022-03-15	2023-03-15
Block - DC	Fairview Microwave	SD3379	AMW	2022-03-14	2023-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2022-01-26	2023-01-26

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

The reference level offset for the fundamental screen capture was based on a measured value of the loss between the spectrum analyzer and the EUT which was verified at the time of test. The remaining screen capture(s) use an internal transducer factor on the analyzer to correct the displayed trace based on the cable loss over frequency. The reference level offset for the additional screen capture(s) is then based on the expected attenuator value and any other losses.

Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

Remaining Screen capture(s) Offset = "Internal" cable loss factor not shown on screen capture + Ref Lvl Offset showing expected attenuator value and any other losses

# SPURIOUS CONDUCTED EMISSIONS



TelTx 2022.06.03.0 XMI 2022.02.07.0

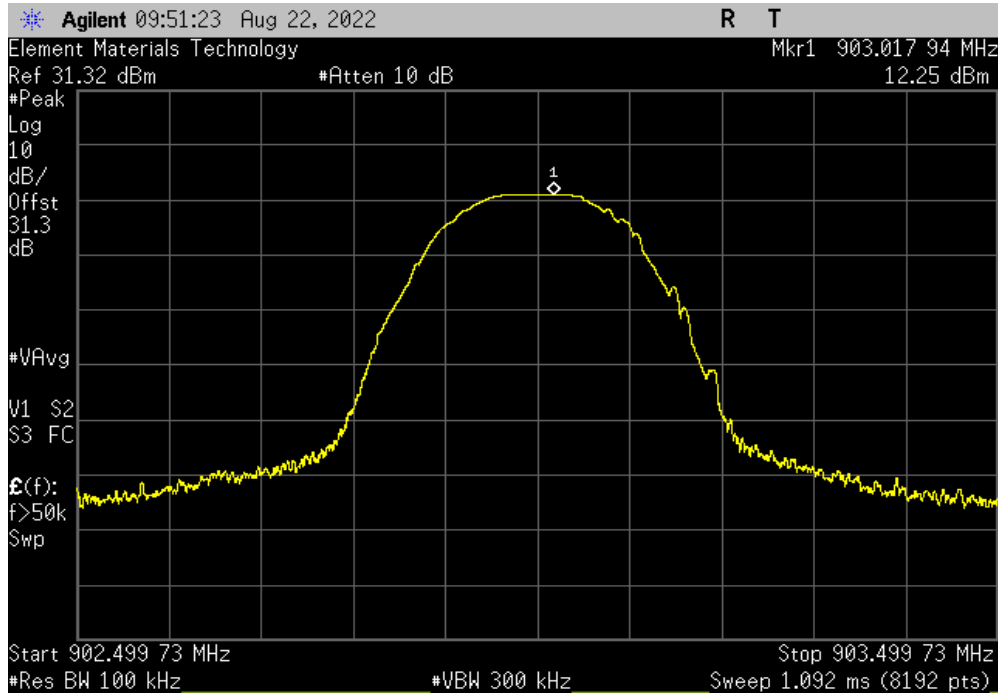
EUT: C7089R3013		Work Order: ADEM0024				
Serial Number: 1128		Date: 22-Aug-22				
Customer: Ademco, Inc.		Temperature: 23.2 °C				
Attendees: None		Humidity: 48.4% RH				
Project: None		Barometric Pres.: 1022 mbar				
Tested by: Jeff Alcoke	Power: Battery	Job Site: EV06				
<b>TEST SPECIFICATIONS</b>						
FCC 15.247:2022		Test Method				
RSS-247 Issue 2:2017		ANSI C63.10:2013				
		ANSI C63.10:2013				
<b>COMMENTS</b>						
Reference level offset includes: DC Block, 30 dB attenuation, measurement cable, and manufacturers provided SMA patch cable.						
<b>DEVIATIONS FROM TEST STANDARD</b>						
None						
Configuration #	1	Signature				
		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Single Channel Mode						
GFSK, 38.4 Kbps						
	Low Channel, 902.99973 MHz	Fundamental	903.02	N/A	N/A	N/A
	Low Channel, 902.99973 MHz	30 MHz - 10 GHz	1805.9	-51.7	-20	Pass
	Mid Channel, 914.59689 MHz	Fundamental	914.57	N/A	N/A	N/A
	Mid Channel, 914.59689 MHz	30 MHz - 10 GHz	1829	-52.65	-20	Pass
	High Channel, 926.39401 MHz	Fundamental	926.36	N/A	N/A	N/A
	High Channel, 926.39401 MHz	30 MHz - 10 GHz	1853.5	-54.7	-20	Pass

# SPURIOUS CONDUCTED EMISSIONS

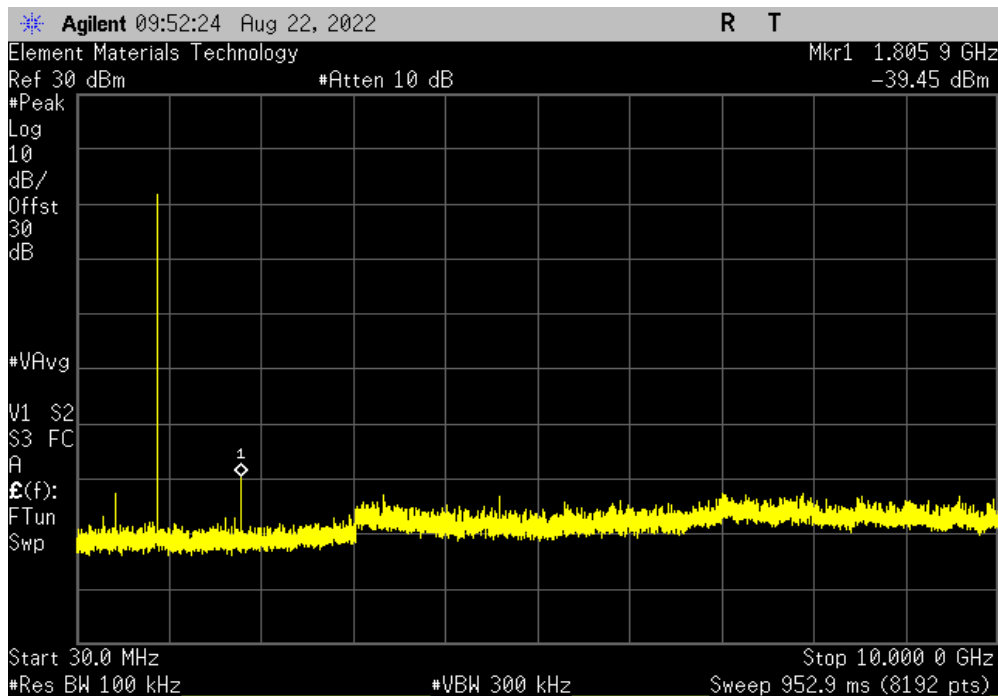


TuTx 2022.06.03.0 XMt 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	903.02	N/A	N/A	N/A	



Single Channel Mode, GFSK, 38.4 Kbps, Low Channel, 902.99973 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	1805.9	-51.7	-20	Pass	

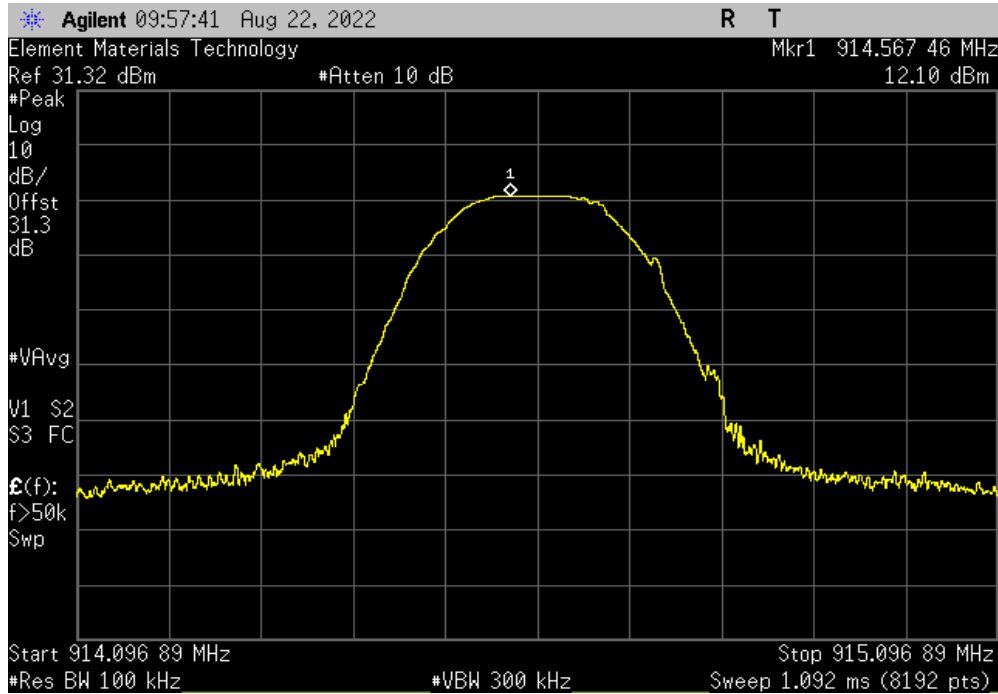


# SPURIOUS CONDUCTED EMISSIONS

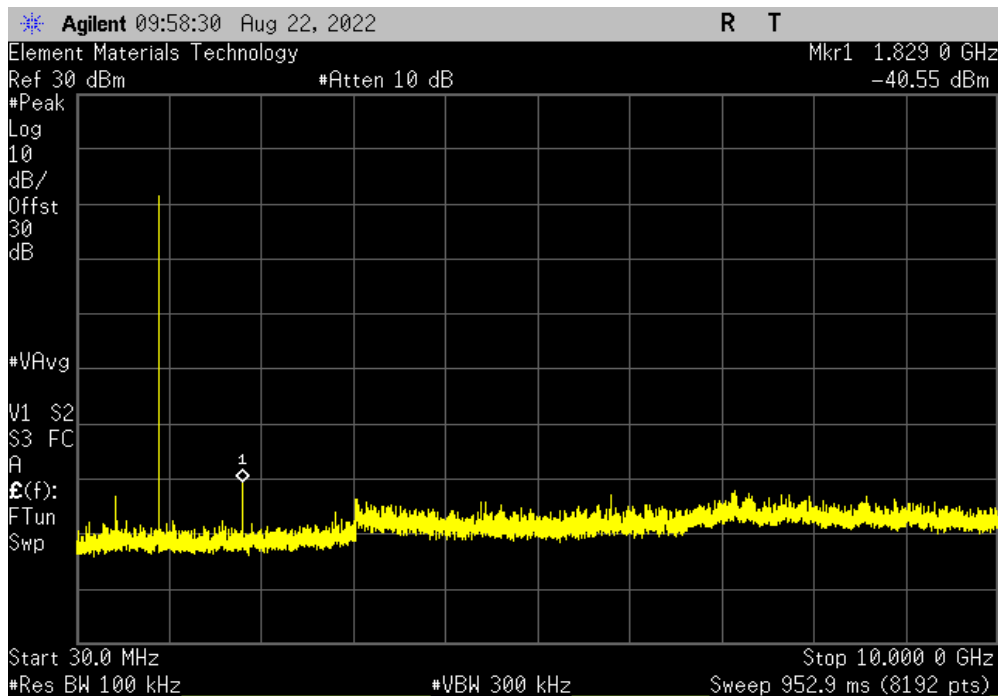


TuTx 2022.06.03.0 XMt 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	914.57	N/A	N/A	N/A	



Single Channel Mode, GFSK, 38.4 Kbps, Mid Channel, 914.59689 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	1829	-52.65	-20	Pass	

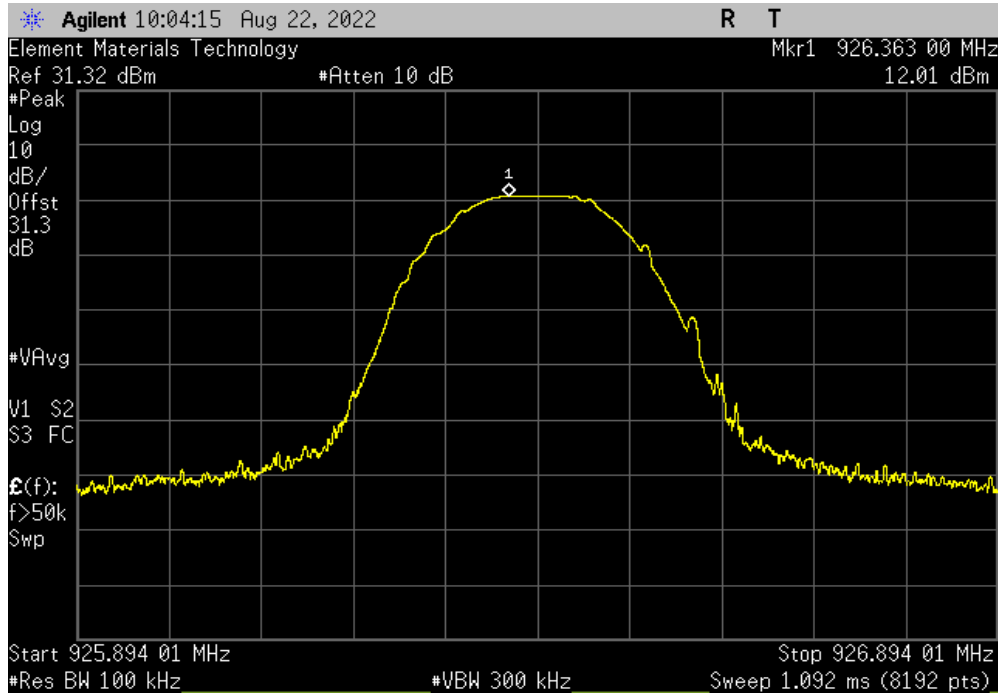


# SPURIOUS CONDUCTED EMISSIONS

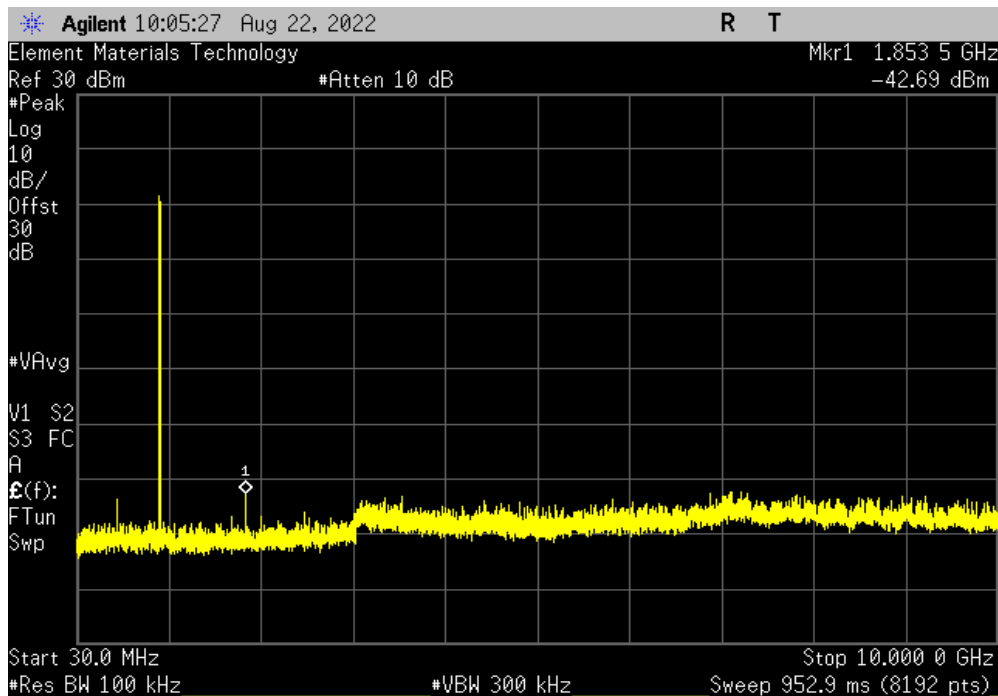


TuTx 2022.06.03.0 XMI 2022.02.07.0

Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	926.36	N/A	N/A	N/A		



Single Channel Mode, GFSK, 38.4 Kbps, High Channel, 926.39401 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 10 GHz	1853.5	-54.7	-20	Pass		



# SPURIOUS RADIATED 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 (in no-hop, single channel mode) 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 if required, 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 as well as the restricted band requirements.

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2021-12-09	2022-12-09
Antenna - Biconilog	EMCO	3142B	AXJ	2021-03-03	2023-03-03
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2022-03-02	2024-03-02
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2021-11-17	2022-11-17
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2022-05-03	2023-05-03
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	2021-11-17	2022-11-17
Cable	N/A	Bilog Cables	EVA	2021-11-17	2022-11-17
Cable	N/A	Double Ridge Horn Cables	EVB	2022-05-03	2023-05-03
Cable	None	Standard Gain Horn Cables	EVF	2021-11-17	2022-11-17
Attenuator	Coaxicom	3910-20	AXZ	2022-02-10	2023-02-10
Filter - Low Pass	Micro-Tronics	LPM50003	LFB	2022-02-10	2023-02-10
Filter - High Pass	Micro-Tronics	HPM50108	HFV	2021-11-17	2022-11-17
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HFT	2021-11-12	2022-11-12

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

## FREQUENCY RANGE INVESTIGATED

30 MHz TO 12400 MHz

## POWER INVESTIGATED

Battery

## CONFIGURATIONS INVESTIGATED

ADEM0024-2

## MODES INVESTIGATED

Continuous Tx, GFSK, 38.4 kbps, Low Ch = 902.99973 MHz, Mid Ch = 914.59689, High Ch = 926.39401



# SPURIOUS RADIATED EMISSIONS



EUT:	C7089R3013	Work Order:	ADEM0024
Serial Number:	1124	Date:	2022-08-22
Customer:	Ademco, Inc.	Temperature:	23.2°C
Attendees:	None	Relative Humidity:	48.3%
Customer Project:	None	Bar. Pressure (PMSL):	1022 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	Battery	Configuration:	ADEM0024-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	7	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

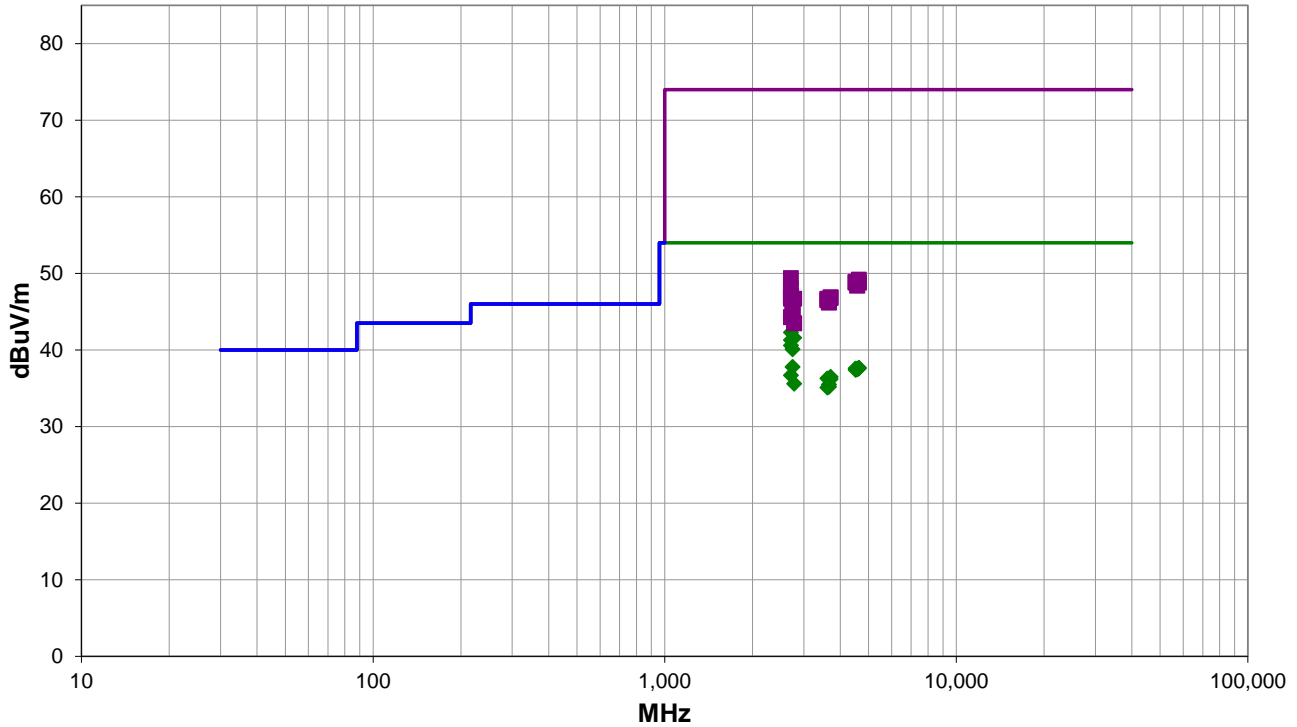
Please reference data comments below for channel and EUT orientation.

## EUT OPERATING MODES

Continuous Tx, GFSK, 38.4 kbps, Low Ch = 902.99973 MHz, Mid Ch = 914.59689, High Ch = 926.39401

## DEVIATIONS FROM TEST STANDARD

None



Run #: 7

■ PK    ◆ AV    ● QP

# SPURIOUS RADIATED EMISSIONS

## RESULTS - Run #7

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2709.033	44.6	0.1	1.0	39.0	3.0	0.0	Horz	AV	0.0	44.7	54.0	-9.3	Low Ch, EUT face up
2709.033	43.7	0.1	1.0	45.0	3.0	0.0	Horz	AV	0.0	43.8	54.0	-10.2	Low Ch, EUT on side
2709.008	42.2	0.1	1.0	309.0	3.0	0.0	Vert	AV	0.0	42.3	54.0	-11.7	Low Ch, EUT on side
2779.092	41.5	0.1	1.0	53.0	3.0	0.0	Horz	AV	0.0	41.6	54.0	-12.4	High Ch, EUT face up
2709.017	41.2	0.1	2.0	5.0	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	Low Ch, EUT upright
2708.975	40.5	0.1	1.2	148.0	3.0	0.0	Vert	AV	0.0	40.6	54.0	-13.4	Low Ch, EUT face up
2743.725	39.9	0.2	1.0	129.0	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9	Mid Ch, EUT face up
2743.758	37.6	0.2	1.5	218.0	3.0	0.0	Vert	AV	0.0	37.8	54.0	-16.2	Mid Ch, EUT on side
4629.742	29.3	8.4	1.5	164.0	3.0	0.0	Vert	AV	0.0	37.7	54.0	-16.3	High Ch, EUT on side
4515.000	29.4	8.2	1.0	16.0	3.0	0.0	Vert	AV	0.0	37.6	54.0	-16.4	Low Ch, EUT on side
4630.792	29.2	8.4	3.1	354.0	3.0	0.0	Horz	AV	0.0	37.6	54.0	-16.4	High Ch, EUT face up
4575.000	29.2	8.3	1.5	188.0	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	Mid Ch, EUT on side
4574.517	29.2	8.3	1.2	360.0	3.0	0.0	Horz	AV	0.0	37.5	54.0	-16.5	Mid Ch, EUT face up
4516.725	29.2	8.2	1.5	341.0	3.0	0.0	Horz	AV	0.0	37.4	54.0	-16.6	Low Ch, EUT face up
2708.925	36.6	0.1	1.5	92.0	3.0	0.0	Vert	AV	0.0	36.7	54.0	-17.3	Low Ch, EUT upright
3705.642	30.7	5.8	1.5	206.0	3.0	0.0	Horz	AV	0.0	36.5	54.0	-17.5	High Ch, EUT face up
3612.050	30.8	5.5	1.5	222.0	3.0	0.0	Horz	AV	0.0	36.3	54.0	-17.7	Low Ch, EUT face up
3705.375	30.4	5.8	2.8	194.0	3.0	0.0	Vert	AV	0.0	36.2	54.0	-17.8	High Ch, EUT on side
2779.192	35.5	0.1	1.5	172.0	3.0	0.0	Vert	AV	0.0	35.6	54.0	-18.4	High Ch, EUT on side
3658.392	30.0	5.5	1.5	197.0	3.0	0.0	Vert	AV	0.0	35.5	54.0	-18.5	Mid Ch, EUT on side
3657.967	29.7	5.5	1.5	120.0	3.0	0.0	Horz	AV	0.0	35.2	54.0	-18.8	Mid Ch, EUT face up
3612.600	29.6	5.5	1.5	22.0	3.0	0.0	Vert	AV	0.0	35.1	54.0	-18.9	Low Ch, EUT on side
2709.017	49.3	0.1	1.0	39.0	3.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	Low Ch, EUT face up
4629.758	40.8	8.4	3.1	354.0	3.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	High Ch, EUT face up
4516.542	40.7	8.2	1.5	341.0	3.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	Low Ch, EUT face up
4515.133	40.6	8.2	1.0	16.0	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	Low Ch, EUT on side
4572.525	40.6	8.2	1.5	188.0	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	Mid Ch, EUT on side
4634.417	40.4	8.4	1.5	164.0	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	High Ch, EUT on side
4570.558	40.2	8.2	1.2	360.0	3.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	Mid Ch, EUT face up
2708.983	47.9	0.1	1.0	45.0	3.0	0.0	Horz	PK	0.0	48.0	74.0	-26.0	Low Ch, EUT on side
2709.200	46.9	0.1	1.2	148.0	3.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	Low Ch, EUT face up
2709.175	46.9	0.1	1.0	309.0	3.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	Low Ch, EUT on side
3705.842	41.1	5.8	1.5	206.0	3.0	0.0	Horz	PK	0.0	46.9	74.0	-27.1	High Ch, EUT face up
3705.367	41.0	5.8	2.8	194.0	3.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	High Ch, EUT on side
2708.925	46.6	0.1	2.0	5.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	Low Ch, EUT upright
3612.175	41.2	5.5	1.5	22.0	3.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	Low Ch, EUT on side
2779.333	46.6	0.1	1.0	53.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	High Ch, EUT face up
3611.942	41.0	5.5	1.5	222.0	3.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Low Ch, EUT face up
3658.842	40.9	5.5	1.5	197.0	3.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	Mid Ch, EUT on side
3658.800	40.7	5.5	1.5	120.0	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	Mid Ch, EUT face up
2743.575	45.3	0.2	1.0	129.0	3.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	Mid Ch, EUT face up
2744.108	44.8	0.2	1.5	218.0	3.0	0.0	Vert	PK	0.0	45.0	74.0	-29.0	Mid Ch, EUT on side
2709.300	44.2	0.1	1.5	92.0	3.0	0.0	Vert	PK	0.0	44.3	74.0	-29.7	Low Ch, EUT upright

# SPURIOUS RADIATED 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
2778.817	43.4	0.1	1.5	172.0	3.0	0.0	Vert	PK	0.0	43.5	74.0	-30.5	High Ch, EUT on side

## CONCLUSION

Pass



Tested By

End of Test Report