NORTHWEST EMC

CINCH Systems

RF-ROR Heat Detector

FCC 15.231:2016

Report # CINC0001.1

NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: May 09, 2016
CINCH Systems
Model: RF-ROR Heat Detector

Radio Equipment Testing

Standards

Specification	Method
FCC 15.231:2016	ANSI C63.10:2013

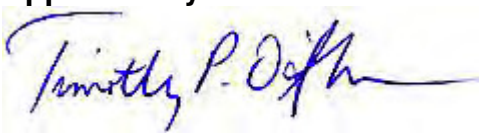
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
6.5, 6.6	Field Strength of Fundamental	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
6.9.2	Occupied Bandwidth	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Tim O'Shea, 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.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2016.3.22

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 - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

MSIP / 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:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

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 included as part of the applicable test description page. 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.

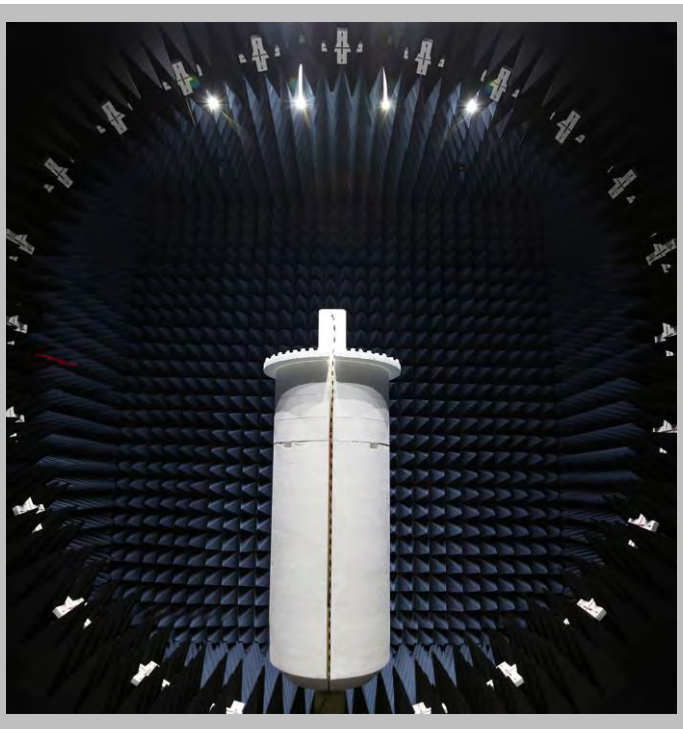
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

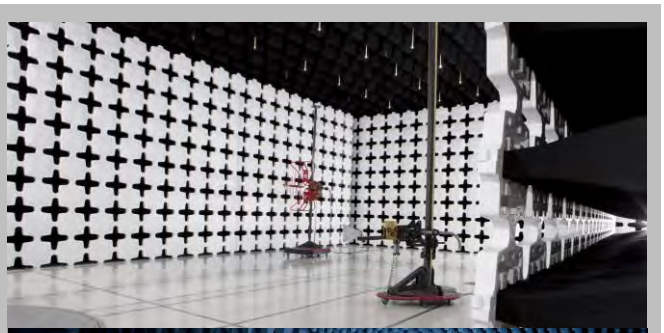
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

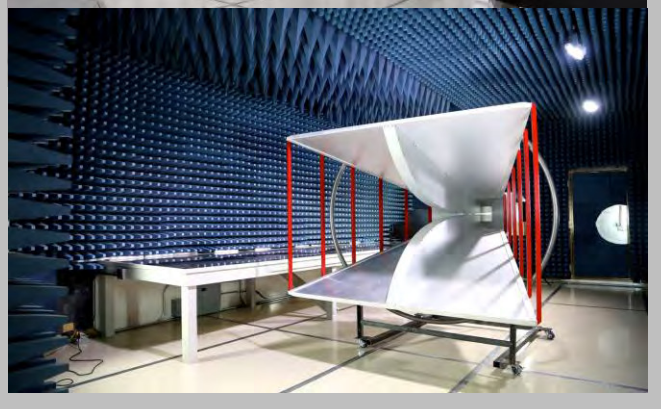
FACILITIES

NORTHWEST EMC
REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	CINCH Systems
Address:	12075 43rd Street NE Suite 300
City, State, Zip:	St. Michael, MN 55376
Test Requested By:	David Streitz
Model:	RF-ROR Heat Detector
First Date of Test:	May 09, 2016
Last Date of Test:	May 09, 2016
Receipt Date of Samples:	May 09, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
This is a wireless heat detector. The unit contains a temperature sensor used for both heat and freeze detection. Packets are sent wirelessly to a panel which monitors the detector for any alarms or event from a supervisory standpoint.

Testing Objective:
To demonstrate compliance to FCC 15.231 specifications.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration CINC0001- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RF-ROR Heat Detector (CW)	CINCH Systems	RF-ROR-ITI-135	50036

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
3 VDC Battery	Panasonic	CR123A	None

Configuration CINC0001- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RF-ROR Heat Detector (Mod)	CINCH Systems	RF-ROR-ITI-135	50030

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
3 VDC Battery	Panasonic	CR123A	None

Configuration CINC0001- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RF-ROR Heat Detector (Mod)	CINCH Systems	RF-ROR-ITI-135-F	50032

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
3 VDC Battery	Panasonic	CR123A	None

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	5/9/2016	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	5/9/2016	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	5/9/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	5/9/2016	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

FIELD STRENGTH OF FUNDAMENTAL

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

MODES OF OPERATION

Unmodulated carrier.

POWER SETTINGS INVESTIGATED

3 VDC

CONFIGURATIONS INVESTIGATED

CINC0001 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	319.5 MHz	Stop Frequency	319.5 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12 mo

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

TEST DESCRIPTION

The single, integral antenna to be used with the EUT was tested. The EUT was configured for continuous unmodulated operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where “On time” = N1L1 +N2L2 +….

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +…)/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT’s pulse train are as follows:

Period = 100 mSec
Pulsewidth of Type 1 Pulse = .122 mSec
Pulsewidth of Type 2 Pulse = .486 mSec
Pulsewidth of Type 3 Pulse = 1.082 mSec
Number of Type 1 Pulses = 59
Number of Type 2 Pulses = 1
Number of Type 3 Pulses = 1

Duty Cycle = 20 log [((59)(.122) + (1)(.486) + (1)(1.082))/100] = -21.2 dB

The duty cycle correction factor of –21.2 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

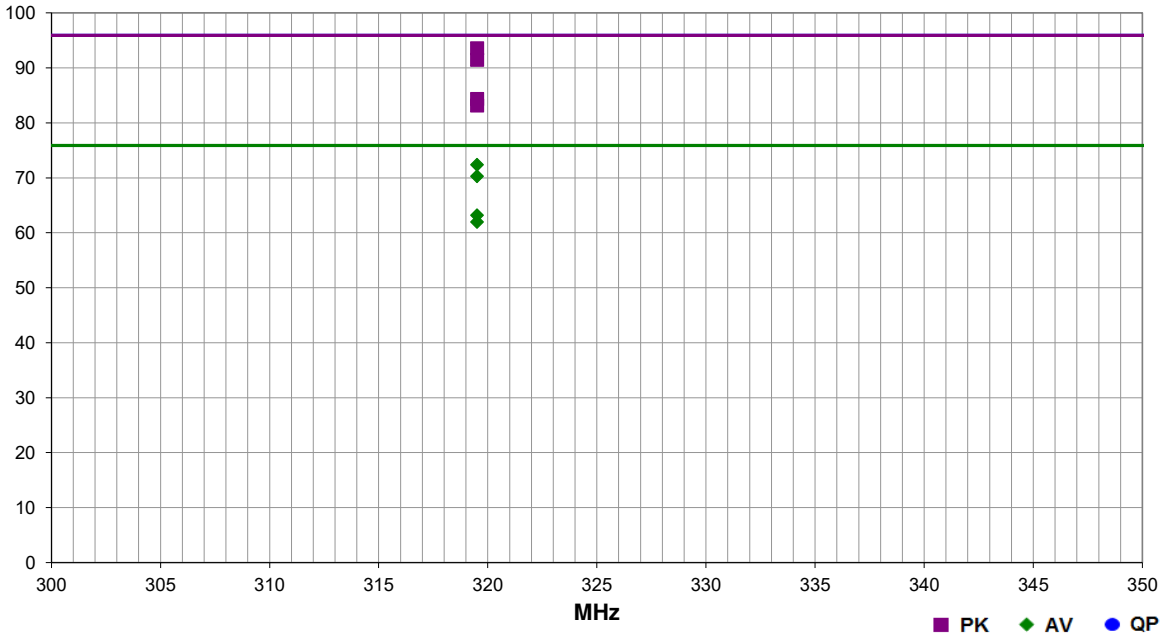
The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	CINC0001	**Date:**	05/09/16		
Project:	None	**Temperature:**	22.9 °C		
Job Site:	MN05	**Humidity:**	29.9% RH		
Serial Number:	50036	**Barometric Pres.:**	1014 mbar	**Tested by:**	Jared Ison
EUT:	RF-ROR Heat Detector				
Configuration:	1				
Customer:	CINCH Systems				
Attendees:	David Streitz				
EUT Power:	3 VDC				
Operating Mode:	Unmodulated carrier.				
Deviations:	None				
Comments:	EUT only has two rotational axis due to antenna symmetry.				

Test Specifications	**Test Method**
FCC 15.231:2016	ANSI C63.10:2013

Run #	1	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
319.512	73.6	20.0	1.0	22.1		0.0	Horz	PK	0.0	93.6	95.9	-2.3	EUT Horz
319.512	73.6	20.0	1.0	22.1	-21.2	0.0	Horz	AV	0.0	72.4	75.9	-3.5	EUT Horz
319.510	71.5	20.0	1.7	235.0		0.0	Vert	PK	0.0	91.5	95.9	-4.4	EUT Vert
319.510	71.5	20.0	1.7	235.0	-21.2	0.0	Vert	AV	0.0	70.3	75.9	-5.6	EUT Vert
319.510	64.4	20.0	1.0	44.1		0.0	Horz	PK	0.0	84.4	95.9	-11.5	EUT Vert
319.510	64.4	20.0	1.0	44.1	-21.2	0.0	Horz	AV	0.0	63.2	75.9	-12.7	EUT Vert
319.512	63.2	20.0	1.4	285.0		0.0	Vert	PK	0.0	83.2	95.9	-12.7	EUT Horz
319.512	63.2	20.0	1.4	285.0	-21.2	0.0	Vert	AV	0.0	62.0	75.9	-13.9	EUT Horz

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

MODES OF OPERATION

Unmodulated carrier, 319.5 MHz.

POWER SETTINGS INVESTIGATED

3 VDC

CONFIGURATIONS INVESTIGATED

CINC0001 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	8000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12 mo

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

TEST DESCRIPTION

The single, integral antenna to be used with the EUT was tested. The EUT was configured for un-modulated, CW operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where “On time” = N1L1 +N2L2 +….

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +…)/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT’s pulse train are as follows:

Period = 100 mSec
Pulsewidth of Type 1 Pulse = .122 mSec
Pulsewidth of Type 2 Pulse = .486 mSec
Pulsewidth of Type 3 Pulse = 1.082 mSec
Number of Type 1 Pulses = 59
Number of Type 2 Pulses = 1
Number of Type 3 Pulses = 1

Duty Cycle = 20 log [((59)(.122) + (1)(.486) + (1)(1.082))/100] = -21.2 dB

The duty cycle correction factor of –21.2 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 3MHz was used.

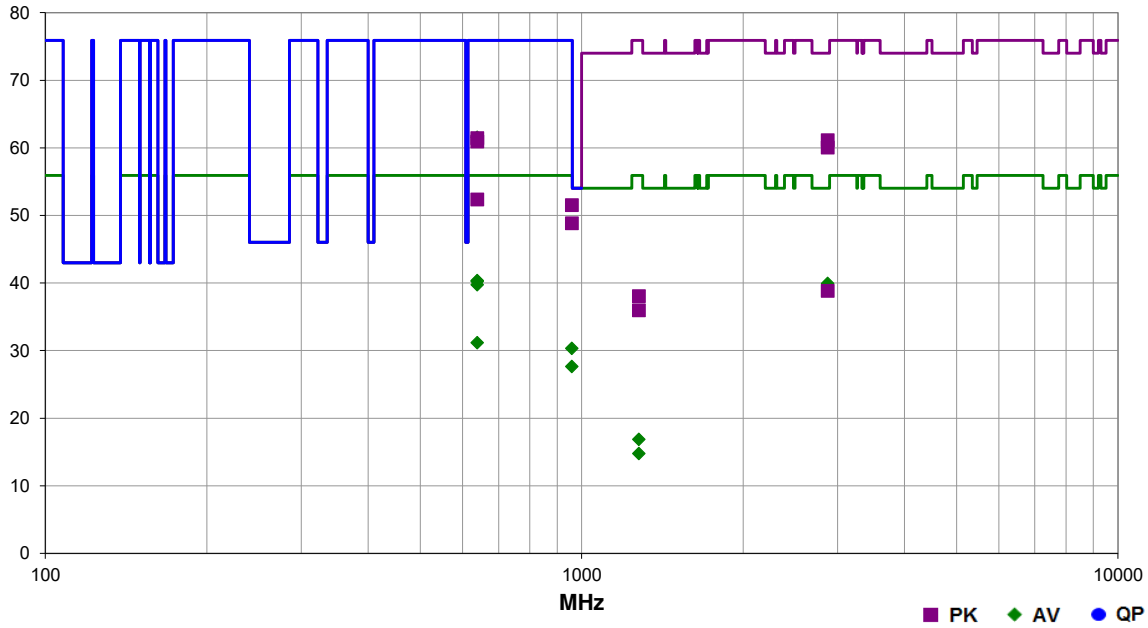
The field strength of the spurious emissions meet the limits as defined in 47 CFR 15.231(b). The spurious emissions also meet the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions. Further, spurious emissions meet the provisions of 15.205 using the measurement instrumentation specified in that section.

SPURIOUS RADIATED EMISSIONS

Work Order:	CINC0001	**Date:**	05/09/16		
Project:	None	**Temperature:**	22.9 °C		
Job Site:	MN05	**Humidity:**	29.9% RH		
Serial Number:	50036	**Barometric Pres.:**	1014 mbar	**Tested by:**	Jared Ison
EUT:	RF-ROR Heat Detector				
Configuration:	1				
Customer:	CINCH Systems				
Attendees:	David Streitz				
EUT Power:	3 VDC				
Operating Mode:	Unmodulated carrier.				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.231:2016	ANSI C63.10:2013

Run #	4	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2875.645	63.4	-2.3	1.0	32.0		0.0	Horz	PK	0.0	61.1	74.0	-12.9	EUT Horz
2875.650	62.3	-2.3	1.0	114.0		0.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT Vert
2875.645	63.4	-2.3	1.0	32.0	-21.2	0.0	Horz	AV	0.0	39.9	54.0	-14.1	EUT Horz
639.023	44.7	6.8	1.0	78.0		10.0	Vert	PK	0.0	61.5	75.9	-14.4	EUT Vert
639.022	44.6	6.8	1.2	195.1		10.0	Horz	PK	0.0	61.4	75.9	-14.5	EUT Horz
639.018	44.1	6.8	1.2	332.0		10.0	Horz	PK	0.0	60.9	75.9	-15.0	EUT Vert
2875.650	62.3	-2.3	1.0	114.0	-21.2	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT Vert
639.023	44.7	6.8	1.0	78.0	-21.2	10.0	Vert	AV	0.0	40.3	55.9	-15.6	EUT Vert
639.022	44.6	6.8	1.2	195.1	-21.2	10.0	Horz	AV	0.0	40.2	55.9	-15.7	EUT Horz
639.018	44.1	6.8	1.2	332.0	-21.2	10.0	Horz	AV	0.0	39.7	55.9	-16.2	EUT Vert
639.022	35.5	6.8	1.3	271.9		10.0	Vert	PK	0.0	52.3	75.9	-23.6	EUT Horz
958.505	28.0	13.5	1.5	126.0		10.0	Horz	PK	0.0	51.5	75.9	-24.4	EUT Horz
639.022	35.5	6.8	1.3	271.9	-21.2	10.0	Vert	AV	0.0	31.1	55.9	-24.8	EUT Horz
958.505	28.0	13.5	1.5	126.0	-21.2	10.0	Horz	AV	0.0	30.3	55.9	-25.6	EUT Horz
958.550	25.3	13.5	1.2	26.1		10.0	Vert	PK	0.0	48.8	75.9	-27.1	EUT Vert
958.550	25.3	13.5	1.2	26.1	-21.2	10.0	Vert	AV	0.0	27.6	55.9	-28.3	EUT Vert
1278.242	45.0	-6.9	1.0	192.1		0.0	Vert	PK	0.0	38.1	75.9	-37.8	EUT Vert
1278.242	45.0	-6.9	1.0	192.1	-21.2	0.0	Vert	AV	0.0	16.9	55.9	-39.0	EUT Vert
1278.375	42.9	-6.9	1.0	286.0		0.0	Horz	PK	0.0	36.0	75.9	-39.9	EUT Horz
1278.375	42.9	-6.9	1.0	286.0	-21.2	0.0	Horz	AV	0.0	14.8	55.9	-41.1	EUT Horz

OCCUPIED BANDWIDTH

XMit 2015.01.14

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.	Interval (mo)
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12

TEST DESCRIPTION

The 20 dB occupied bandwidth is required to be no wider that 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

The measurement was made using a radiated method with the EUT transmitting at its maximum data rate.

OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

EUT:	RF-ROR Heat Detector			**Work Order:**	CINC0001
Serial Number:	50030			**Date:**	05/09/16
Customer:	CINCH Systems			**Temperature:**	22°C
Attendees:	David Streitz			**Humidity:**	33%
Project:	None			**Barometric Pres.:**	980.4
Tested by:	Jared Ison	**Power:**	3 VDC	**Job Site:**	MN05

TEST SPECIFICATIONS	Test Method
FCC 15.231:2016	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

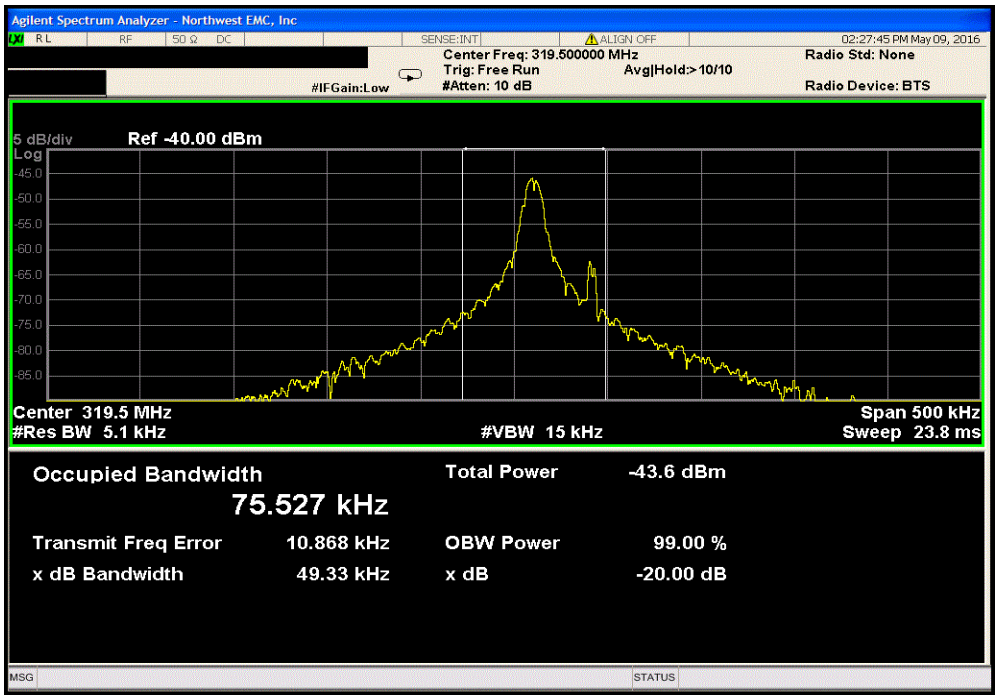
Configuration #	2	Signature

	Value	Limit	Result
319.5 MHz OOK			
Occupied Bandwidth	49.33 kHz	2.2 MHz	Pass

OCCUPIED BANDWIDTH

XMit 2015.01.14

319.5 MHz OOK, Occupied Bandwidth						
				Value	Limit	Result
				49.33 kHz	2.2 MHz	Pass



DUTY CYCLE

XMit 2015.01.14

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.	Interval (mo)
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24

TEST DESCRIPTION

For software controlled or pre-programmed devices, the manufacturer shall declare the duty cycle class or classes for the equipment under test. For manually operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmission is constant until the trigger is released or manually reset. The manufacturer shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and hence the duty class.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

To derive average emission measurements, a duty cycle correction factor was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where “On time” = N1L1 +N2L2 +….

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +…)/100mS or T, whichever is less. (Where T is the period of the pulse train.)

The measured values for the EUT’s pulse train are as follows:

Period = 100 mSec
Pulsewidth of Type 1 Pulse = .122 mSec
Pulsewidth of Type 2 Pulse = .486 mSec
Pulsewidth of Type 3 Pulse = 1.082 mSec
Number of Type 1 Pulses = 59
Number of Type 2 Pulses = 1
Number of Type 3 Pulses = 1

Duty Cycle = 20 log [((59)(.122) + (1)(.486) + (1)(1.082))/100] = -21.2 dB

The duty cycle correction factor of –21.2 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

DUTY CYCLE

NORTHWEST EMC

XMit 2015.01.14

EUT:	RF-ROR Heat Detector			**Work Order:**	CINC0001
Serial Number:	50032			**Date:**	05/09/16
Customer:	CINCH Systems			**Temperature:**	22°C
Attendees:	David Streitz			**Humidity:**	33%
Project:	None			**Barometric Pres.:**	980.4 mb
Tested by:	Jared Ison	**Power:**	3 VDC	**Job Site:**	MN05

TEST SPECIFICATIONS	Test Method
FCC 15.231:2016	ANSI C63.10:2013

COMMENTS

Used worst case part configuration, Heat and Freeze Detector. See Test Description for details.

DEVIATIONS FROM TEST STANDARD

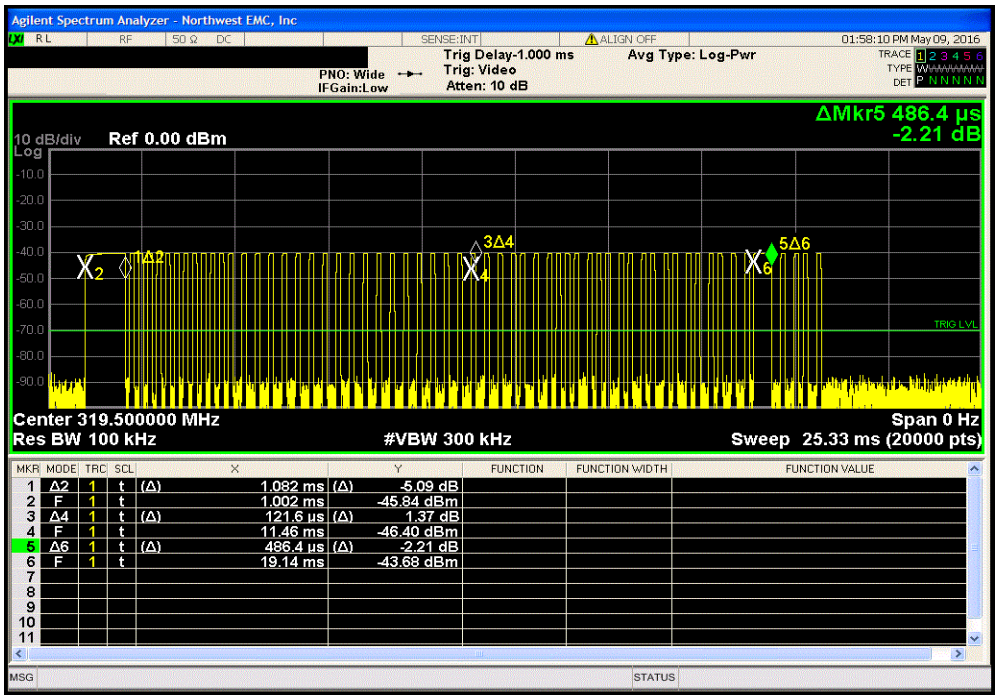
None

Configuration #	3	Signature

	Value	Limit	Result
319.5 MHz OOK			
25 ms sweep	N/A	N/A	N/A
100 ms sweep	N/A	N/A	N/A
10 s sweep	N/A	N/A	N/A

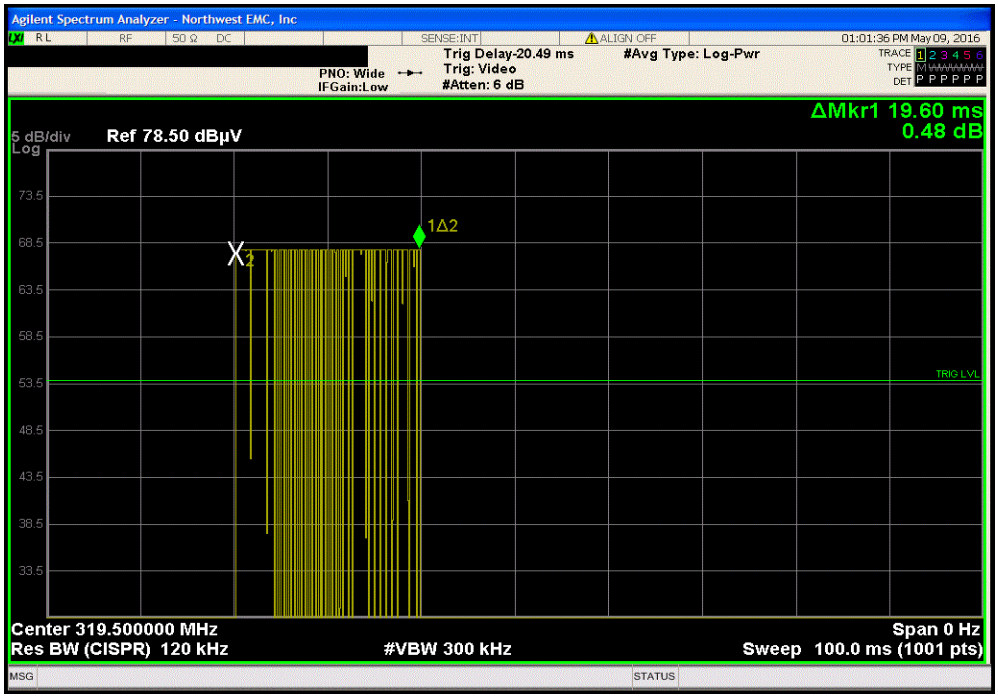
319.5 MHz OOK, 25 ms sweep

				Value	Limit	Result
				N/A	N/A	N/A



319.5 MHz OOK, 100 ms sweep

				Value	Limit	Result
				N/A	N/A	N/A



DUTY CYCLE

XMit 2015.01.14

319.5 MHz OOK, 10 s sweep						
				Value	Limit	Result
				N/A	N/A	N/A