UTC Fire and Security

60-807-95R Motion Sensor PIR

FCC 15.231:2014

Report # UTCF0022

NVLAP Lab Code: 200881-0

NORTHWEST EMC

WTD 13.9.30

CERTIFICATE OF TEST

Last Date of Test: September 11, 2014
UTC Fire and Security
Model: 60-807-95R Motion Sensor PIR

Radio Equipment Testing

Standards

Specification	Method
FCC 15.231:2014	ANSI C63.10:2009

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	
6.9.1	Occupied Bandwidth	Yes	Pass	
7.5	Duty Cycle	Yes	N/A	

Deviations From Test Standards

None

Approved By:

Tim O'Shea, Operations Manager

NORTHWEST EMC
REV 2012.08.02

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

REV 2014.08.11

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 - Accredited by A2LA to ISO / IEC Guide 65 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 Conformity Assessment Body (CAB) under the EMC directive and 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

OFTA – Recognized by OFTA 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/

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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is listed below. 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 16-4-1 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.

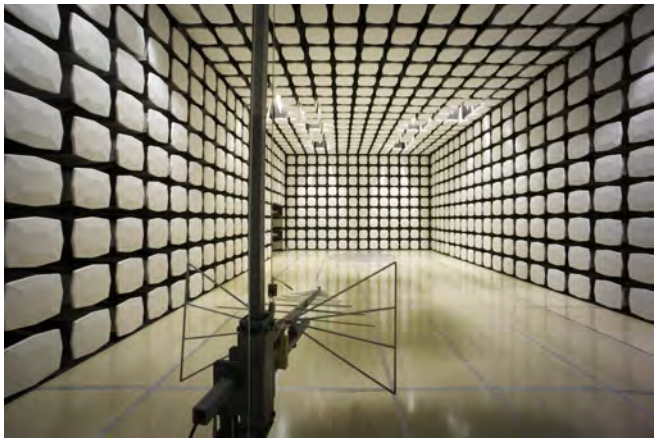
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.12	-0.01
Amplitude Accuracy (dB)	0.49	-0.49
Conducted Power (dB)	0.41	-0.41
Radiated Power via Substitution (dB)	0.69	-0.68
Temperature (degrees C)	0.81	-0.81
Humidity (% RH)	2.89	-2.89
Field Strength (dB)	3.80	-3.80
AC Powerline Conducted Emissions (dB)	2.94	-2.94

NORTHWEST EMC

REV 2013.06.28

FACILITIES

Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	**California** Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	**New York** Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	**Minnesota** Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	**Washington** Labs NC01-05,SU02,SU07 19201 120th Ave. NE Bothell, WA 98011 (425) 984-6600
VCCI				
A-0108	A-0029		A-0109	A-0110
Industry Canada				
2834D-1, 2834D-*2*	2834B-1, 2834B-2, 2834B-3		2834E-1	2834F-1
NVLAP				
NVLAP Lab Code: 200630-0	NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200629-0



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	UTC Fire and Security
Address:	1275 Red Fox Road
City, State, Zip:	Arden Hills, MN 55112
Test Requested By:	Paul Price
Model:	60-807-95R Motion Sensor
First Date of Test:	September 11, 2014
Last Date of Test:	September 11, 2014
Receipt Date of Samples:	September 11, 2014
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
PIR Motion Sensor

Testing Objective:
To demonstrate compliance to FCC 15.231 specifications

CONFIGURATIONS

Configuration UTCF0022- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
PIR Motion Sensor	UTC Fire and Security	60-807-95R	TXID 041235C DL 5C2341

Configuration UTCF0022- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
PIR Motion Sensor	UTC Fire and Security	60-807-95R	TXID 043515E DL 5E5143

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	9/11/2014	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.
2	9/11/2014	Duty Cycle	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	9/11/2014	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.
4	9/11/2014	Spurious Radiated Emissions	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

Transmitting 319.5 MHz CW

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

UTCF0022 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	318.5 MHz	Stop Frequency	320.5 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
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/14/2014	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 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 antennas to be used with the EUT were tested. The EUT was configured for continuous modulated 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 = 1.085 mSec
Pulsewidth of Type 2 Pulse = 0.1205 mSec
Pulsewidth of Type 3 Pulse = 0.4821 mSec
Number of Type 1 Pulses = 1
Number of Type 2 Pulses = 58
Number of Type 3 Pulses = 1

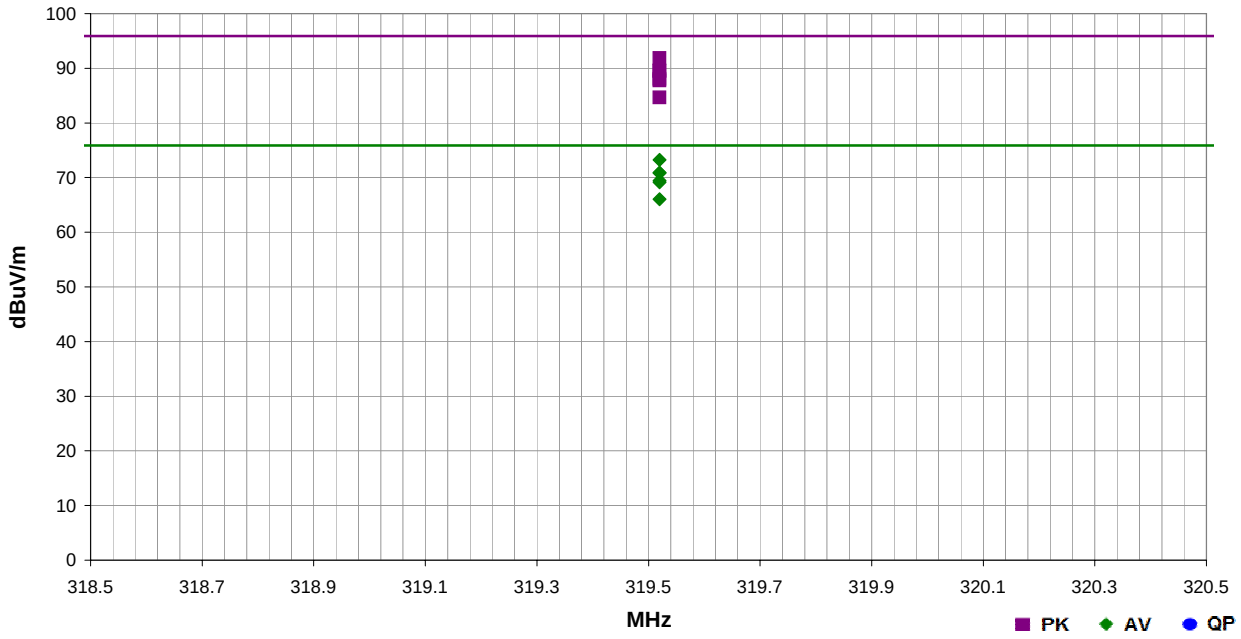
Duty Cycle = 20 log [((1)(1.085) + (58)(0.1205) + (1)(0.4821))/100] = -18.65 dB

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	UTCF0022	**Date:**	09/11/14		Trevor Buls
Project:	None	**Temperature:**	21.8 °C		
Job Site:	MN05	**Humidity:**	44.9% RH		
Serial Number:	TXID 041235C DL 5C2341	**Barometric Pres.:**	1026.7 mbar	**Tested by:**	Trevor Buls, Dustin Sparks
EUT:	60-807-95R Motion Sensor PIR				
Configuration:	1				
Customer:	UTC Fire and Security				
Attendees:	Renee Christian				
EUT Power:	Battery				
Operating Mode:	Transmitting 319.5 MHz CW				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.231:2014	ANSI C63.10:2009

Run #	2	**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
319.520	72.6	19.3	1.0	294.0	-18.7	0.0	Horz	AV	0.0	73.2	75.9	-2.7	EUT vert
319.520	72.6	19.3	1.0	294.0		0.0	Horz	PK	0.0	91.9	95.9	-4.0	EUT vert
319.520	70.3	19.3	1.6	104.0	-18.7	0.0	Vert	AV	0.0	70.9	75.9	-5.0	EUT on side
319.520	70.2	19.3	1.0	127.0	-18.7	0.0	Horz	AV	0.0	70.8	75.9	-5.1	EUT horz
319.520	70.3	19.3	1.6	104.0		0.0	Vert	PK	0.0	89.6	95.9	-6.3	EUT on side
319.520	70.2	19.3	1.0	127.0		0.0	Horz	PK	0.0	89.5	95.9	-6.4	EUT horz
319.520	68.8	19.3	1.0	230.0	-18.7	0.0	Horz	AV	0.0	69.4	75.9	-6.5	EUT on side
319.520	68.5	19.3	1.9	217.0	-18.7	0.0	Vert	AV	0.0	69.1	75.9	-6.8	EUT horz
319.520	68.8	19.3	1.0	230.0		0.0	Horz	PK	0.0	88.1	95.9	-7.8	EUT on side
319.520	68.5	19.3	1.9	217.0		0.0	Vert	PK	0.0	87.8	95.9	-8.1	EUT horz
319.520	65.4	19.3	1.7	346.0	-18.7	0.0	Vert	AV	0.0	66.0	75.9	-9.9	EUT vert
319.520	65.4	19.3	1.7	346.0		0.0	Vert	PK	0.0	84.7	95.9	-11.2	EUT vert

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

Transmitting at 319.5 MHz CW

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

UTCF0022 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	8200 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
Attenuator, 10db, 'SMA'	S.M. Electronics	SA18H-10	REN	5/15/2014	12 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	3/14/2014	12 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	3/14/2014	12 mo
Antenna, Horn	ETS	3115	AJA	6/3/2014	24 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	3/14/2014	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/14/2014	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 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 = 1.085 mSec
Pulsewidth of Type 2 Pulse = 0.1205 mSec
Pulsewidth of Type 3 Pulse = 0.4821 mSec
Number of Type 1 Pulses = 1
Number of Type 2 Pulses = 58
Number of Type 3 Pulses = 1

Duty Cycle = 20 log [((1)(1.085) + (58)(0.1205) + (1)(0.4821))/100] = -18.65 dB

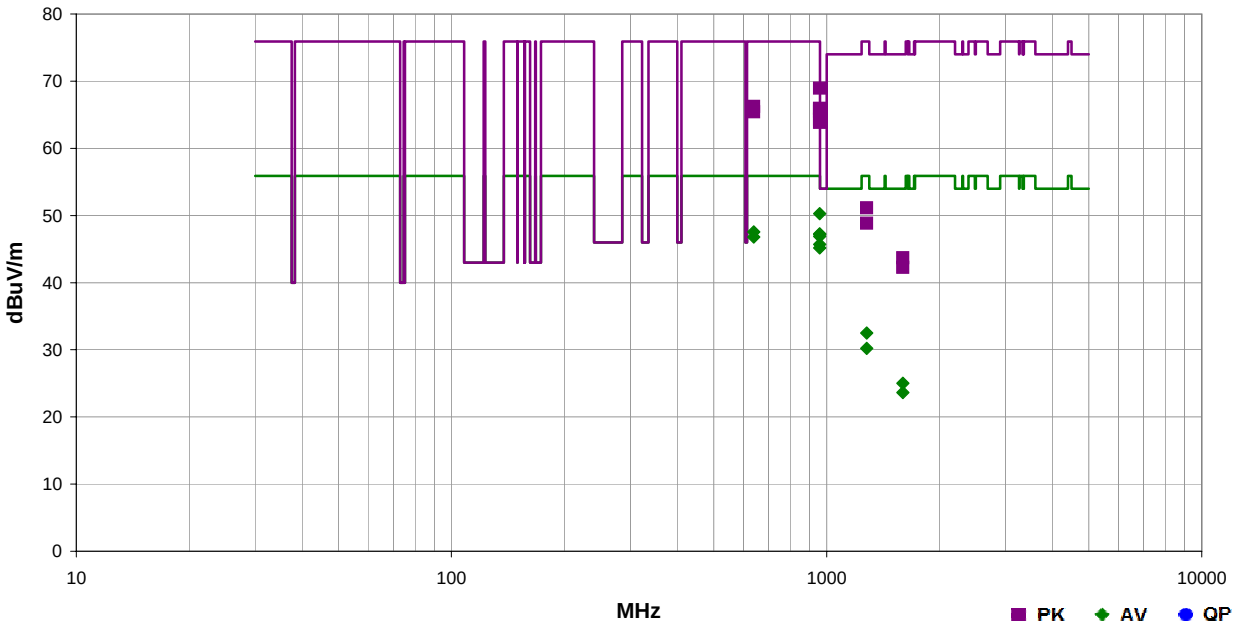
The duty cycle correction factor of –18.65 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 3MHz was used.

SPURIOUS RADIATED EMISSIONS

Work Order:	UTCF0022	**Date:**	09/11/14		
Project:	None	**Temperature:**	21.8 °C		
Job Site:	MN05	**Humidity:**	44.9% RH		
Serial Number:	TXID 041235C DL 5C2341	**Barometric Pres.:**	1026.7 mbar	**Tested by:**	Trevor Buls, Dustin Sparks
EUT:	60-807-95R Motion Sensor PIR				
Configuration:	1				
Customer:	UTC Fire and Security				
Attendees:	Renee Christian				
EUT Power:	Battery				
Operating Mode:	Transmitting at 319.5 MHz CW				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.231(b):2014	ANSI C63.10:2009

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 (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
958.550	48.1	10.8	1.1	185.0	-18.7	10.0	Vert	AV	0.0	50.3	55.9	-5.6	EUT vert
958.550	48.1	10.8	1.1	185.0		10.0	Vert	PK	0.0	68.9	75.9	-7.0	EUT vert
639.035	50.8	5.4	1.2	160.0	-18.7	10.0	Horz	AV	0.0	47.6	55.9	-8.3	EUT horz
958.550	45.1	10.8	1.5	236.0	-18.7	10.0	Horz	AV	0.0	47.3	55.9	-8.6	EUT horz
958.550	45.0	10.8	1.0	153.0	-18.7	10.0	Vert	AV	0.0	47.2	55.9	-8.7	EUT horz
958.550	44.7	10.8	1.1	287.0	-18.7	10.0	Vert	AV	0.0	46.9	55.9	-9.0	EUT on side
639.035	50.0	5.4	1.0	154.0	-18.7	10.0	Vert	AV	0.0	46.8	55.9	-9.1	EUT vert
639.035	50.8	5.4	1.2	160.0		10.0	Horz	PK	0.0	66.2	75.9	-9.7	EUT horz
958.550	45.1	10.8	1.5	236.0		10.0	Horz	PK	0.0	65.9	75.9	-10.0	EUT horz
958.550	45.0	10.8	1.0	153.0		10.0	Vert	PK	0.0	65.8	75.9	-10.1	EUT horz
958.550	43.5	10.8	1.0	20.0	-18.7	10.0	Horz	AV	0.0	45.7	55.9	-10.2	EUT vert
958.550	44.7	10.8	1.1	287.0		10.0	Vert	PK	0.0	65.5	75.9	-10.4	EUT on side
639.035	50.0	5.4	1.0	154.0		10.0	Vert	PK	0.0	65.4	75.9	-10.5	EUT vert
958.555	43.0	10.8	1.0	116.0	-18.7	10.0	Horz	AV	0.0	45.2	55.9	-10.7	EUT on side
958.550	43.5	10.8	1.0	20.0		10.0	Horz	PK	0.0	64.3	75.9	-11.6	EUT vert
958.555	43.0	10.8	1.0	116.0		10.0	Horz	PK	0.0	63.8	75.9	-12.1	EUT on side
1278.070	57.0	-5.9	1.0	321.0	-18.7	0.0	Horz	AV	0.0	32.5	55.9	-23.4	EUT horz
1278.070	57.0	-5.9	1.0	321.0		0.0	Horz	PK	0.0	51.1	75.9	-24.8	EUT horz
1278.070	54.7	-5.9	1.0	285.0	-18.7	0.0	Vert	AV	0.0	30.2	55.9	-25.7	EUT vert
1278.070	54.7	-5.9	1.0	285.0		0.0	Vert	PK	0.0	48.8	75.9	-27.1	EUT vert
1597.585	49.1	-5.4	1.0	279.0	-18.7	0.0	Vert	AV	0.0	25.0	54.0	-29.0	EUT vert
1597.585	49.1	-5.4	1.0	279.0		0.0	Vert	PK	0.0	43.7	74.0	-30.3	EUT vert
1597.585	47.7	-5.4	1.0	308.0	-18.7	0.0	Horz	AV	0.0	23.6	54.0	-30.4	EUT horz
1597.585	47.7	-5.4	1.0	308.0		0.0	Horz	PK	0.0	42.3	74.0	-31.7	EUT horz

OCCUPIED BANDWIDTH

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
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/14/2014	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 mo

TEST DESCRIPTION

The 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 near field probe near the integral antenna of the EUT to the input of the spectrum analyzer. The EUT was transmitting at its maximum data rate.

OCCUPIED BANDWIDTH

EUT:	60-807-95R Motion Sensor PIR			**Work Order:**	UTCF0022
Serial Number:	TXID 041235C DL 5C2341			**Date:**	09/11/14
Customer:	UTC Fire and Security			**Temperature:**	22°C
Attendees:	None			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1028.1
Tested by:	Trevor Buls	**Power:**	Battery	**Job Site:**	MN05

TEST SPECIFICATIONS	Test Method
FCC 15.231:2014	ANSI C63.10:2009

COMMENTS

Limit is based on center frequency: 319.5 MHz * 0.25% = 0.79875 MHz.

DEVIATIONS FROM TEST STANDARD

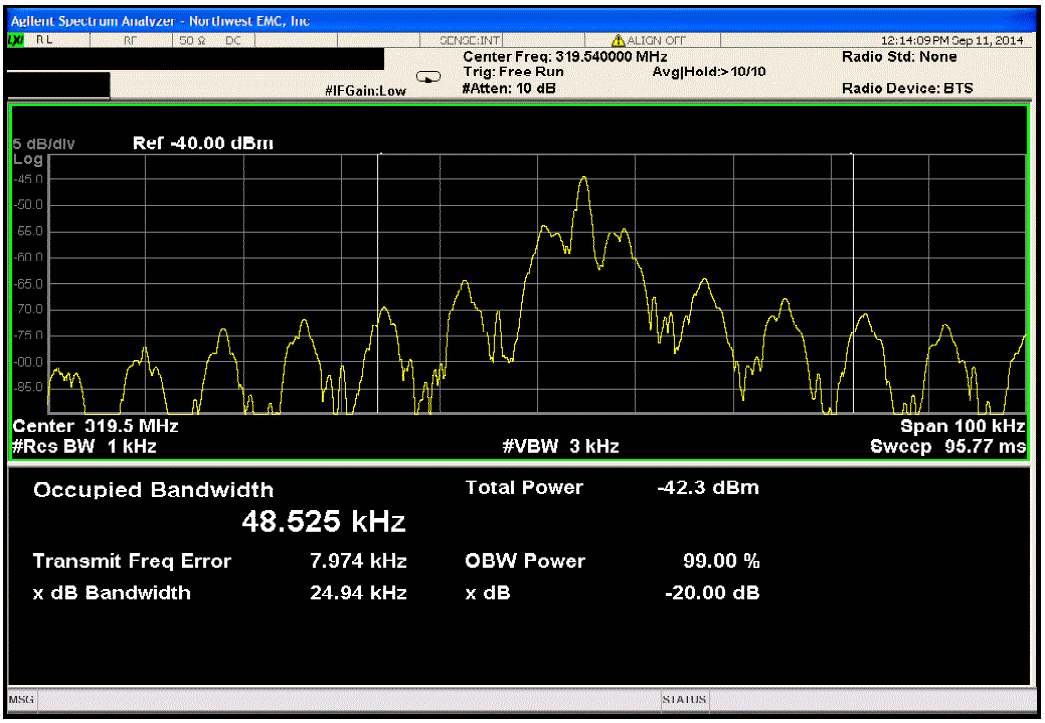
None

Configuration #	2	Signature	Trevor Buls

	Value (kHz)	Limit (kHz)	Result
319.5 MHz	24.94	798.75	Pass

OCCUPIED BANDWIDTH

319.5 MHz						
				Value (kHz)	Limit (kHz)	Result
				24.94	798.75	Pass



DUTY CYCLE

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
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/14/2014	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 mo

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 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 = 1.085 mSec
Pulsewidth of Type 2 Pulse = 0.1205 mSec
Pulsewidth of Type 3 Pulse = 0.4821 mSec
Number of Type 1 Pulses = 1
Number of Type 2 Pulses = 58
Number of Type 3 Pulses = 1

Duty Cycle = 20 log [((1)(1.085) + (58)(0.1205) + (1)(0.4821))/100] = -18.65 dB

The duty cycle correction factor of –18.65 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.

DUTY CYCLE

EUT:	60-807-95R Motion Sensor PIR			**Work Order:**	UTCF0022
Serial Number:	TXID 041235C DL 5C2341			**Date:**	09/11/14
Customer:	UTC Fire and Security			**Temperature:**	22°C
Attendees:	None			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1028.1
Tested by:	Trevor Buls	**Power:**	Battery	**Job Site:**	MN05

TEST SPECIFICATIONS	Test Method
FCC 15.231:2014	ANSI C63.10:2009

COMMENTS

Period between bursts is greater than 100 mS. Initial amplitude increase on the 30mS screen capture is due to the system becoming active and is below the spurious limits, so this was excluded from the "on time" of the duty cycle calculation.

DEVIATIONS FROM TEST STANDARD

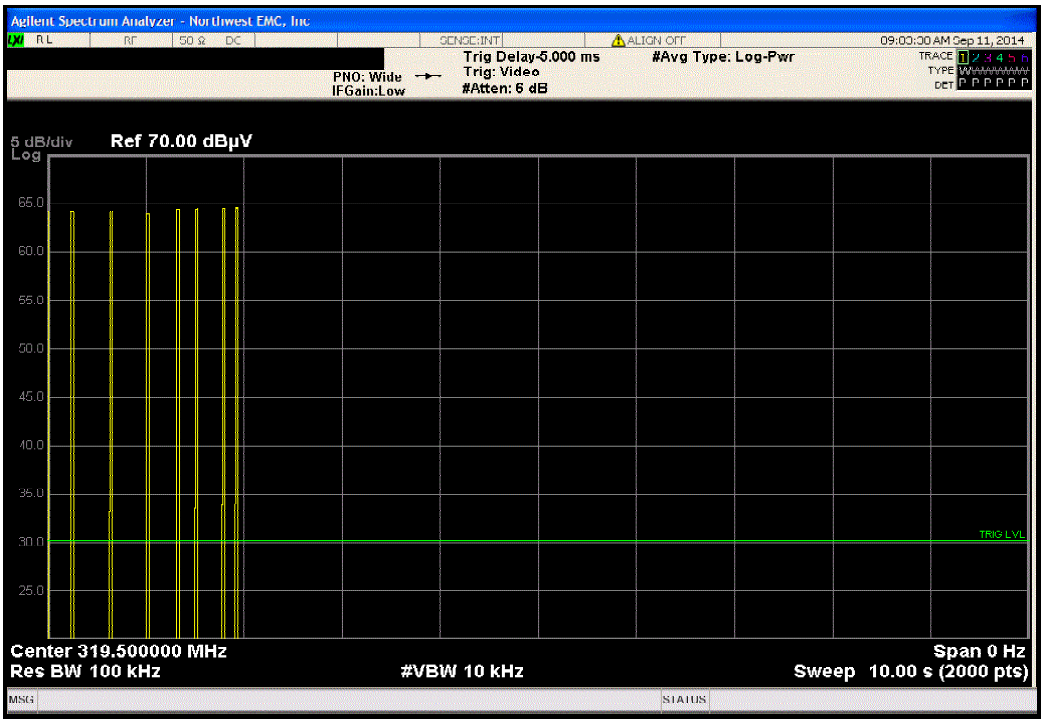
None

Configuration #	2	Signature	Trevor Buls

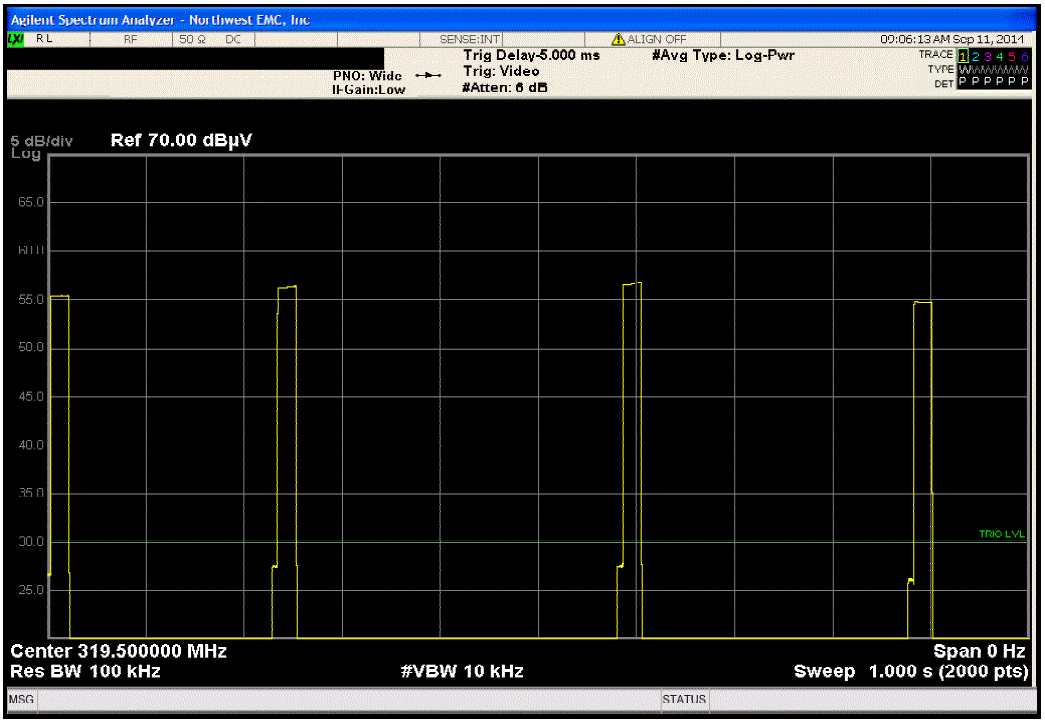
	Pulse Width Type 1 (mS)	Pulse Width Type 2 (mS)	Pulse Width Type 3 (mS)	Limit	Result
10 Second Interval	N/A	N/A	N/A	N/A	N/A
1 Second Interval	N/A	N/A	N/A	N/A	N/A
30 mS Interval	1.085	0.1205	0.4821	N/A	N/A

DUTY CYCLE

10 Second Interval						
		Pulse Width Type 1 (mS)	Pulse Width Type 2 (mS)	Pulse Width Type 3 (mS)	Limit	Result
		N/A	N/A	N/A	N/A	N/A



1 Second Interval						
		Pulse Width Type 1 (mS)	Pulse Width Type 2 (mS)	Pulse Width Type 3 (mS)	Limit	Result
		N/A	N/A	N/A	N/A	N/A



DUTY CYCLE

30 mS Interval						
		Pulse Width Type 1 (mS)	Pulse Width Type 2 (mS)	Pulse Width Type 3 (mS)	Limit	Result
		1.085	0.1205	0.4821	N/A	N/A