



UTC Fire and Security
CO Detector - Model: TX-6310-01-1

FCC 15.231:2018

Low Power Radio

Report # UTCF0105



NVLAP LAB CODE: 200676-0



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CERTIFICATE OF TEST

Last Date of Test: July 25, 2018
UTC Fire and Security
CO Detector - Model: TX-6310-01-1

Radio Equipment Testing

Standards

Specification	Method
FCC 15.231:2018	ANSI C63.10:2013

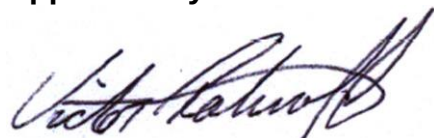
Results

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	No	N/A	Not required for CIIPC, original FCC ID: B4Z-929A-CO
7.5	Duty Cycle	No	N/A	Not required for CIIPC, original FCC ID: B4Z-929A-CO

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, 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



Revision Number		Description	Date	Page Number
00		None		

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

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

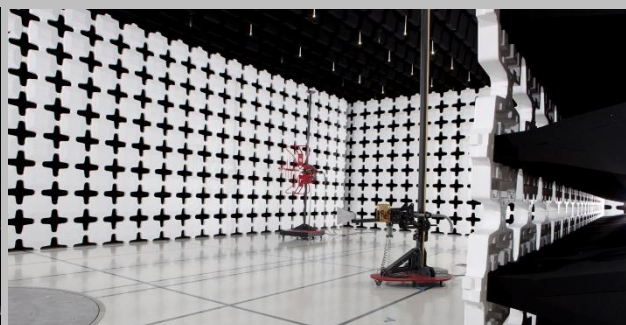
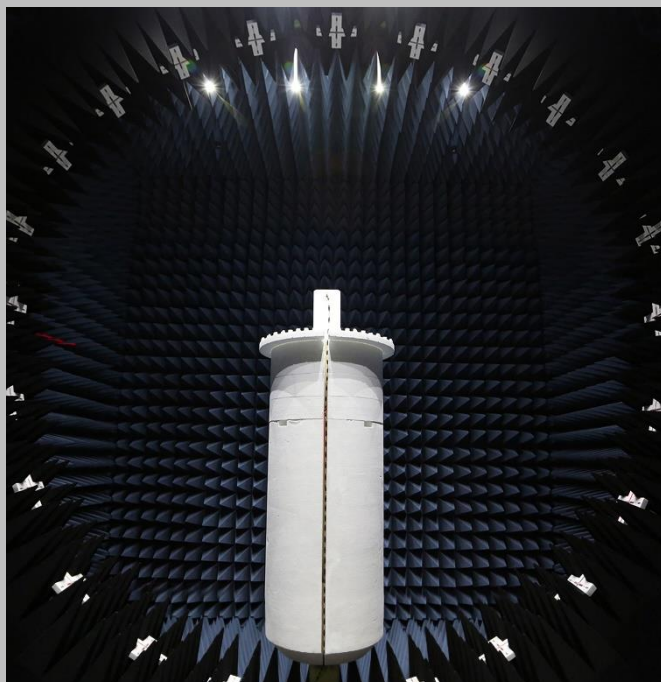
<http://portlandcustomer.element.com/ts/scope/scope.htm>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th 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
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	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/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	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.

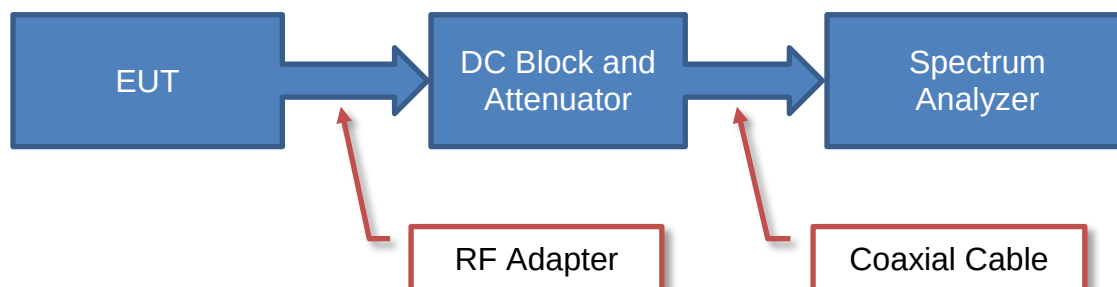
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable 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.

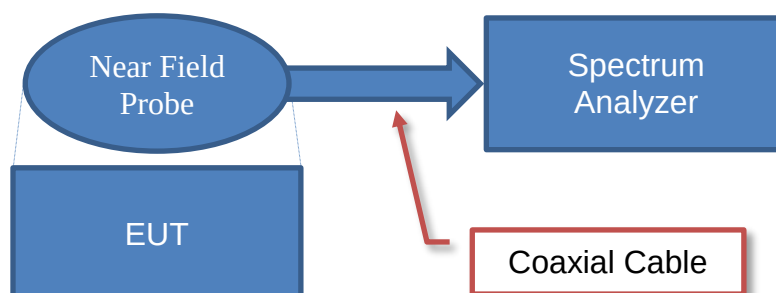
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

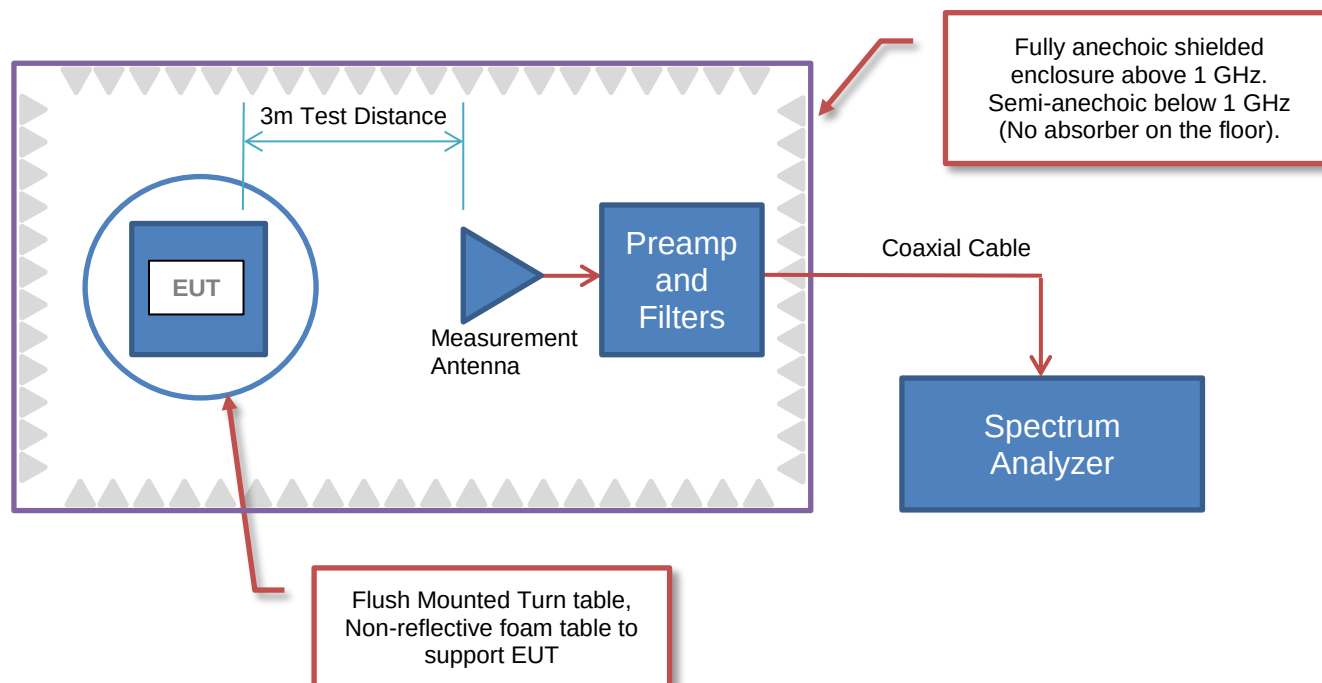
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	UTC Fire and Security
Address:	9 Farm Springs Road
City, State, Zip:	Farmington, CT 06034
Test Requested By:	Konstantin Khurstov
Model:	CO Detector - Model: TX-6310-01-1
First Date of Test:	July 17, 2018
Last Date of Test:	July 25, 2018
Receipt Date of Samples:	July 10, 2018
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The TX-6310-01-1 wireless carbon monoxide (CO) alarm monitors the levels of CO gas and gives early warning when potentially dangerous levels exist. It does not detect fire, smoke, or any other gas. If a dangerous concentration of CO is detected by patented and field-proven electrochemical sensor, an LED indicator illuminates and an internal siren is activated in temporal 4 pattern.

Testing Objective:

To demonstrate compliance to FCC 15.231 specifications.

CONFIGURATIONS



Configuration UTCF0105- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
CO Detector	UTC Fire and Security	TX-6310-01-1	0A7C097

Configuration UTCF0105- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
CO Detector	UTC Fire and Security	TX-6310-01-1	82136 72164

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/17/2018	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	7/25/2018	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



PSA-ESCI 2018.05.04

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 CW at 319.5 MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

UTCFO105 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz
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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
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	1-Aug-2017	12 mo
Antenna - Biconilog	Teseg	CBL 6141A	AYE	7-Nov-2017	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	21-Nov-2017	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was configured for continuous 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 C63.10:2013).

To derive average emission measurements, a duty cycle correction factor of -21.8 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.

FIELD STRENGTH OF FUNDAMENTAL

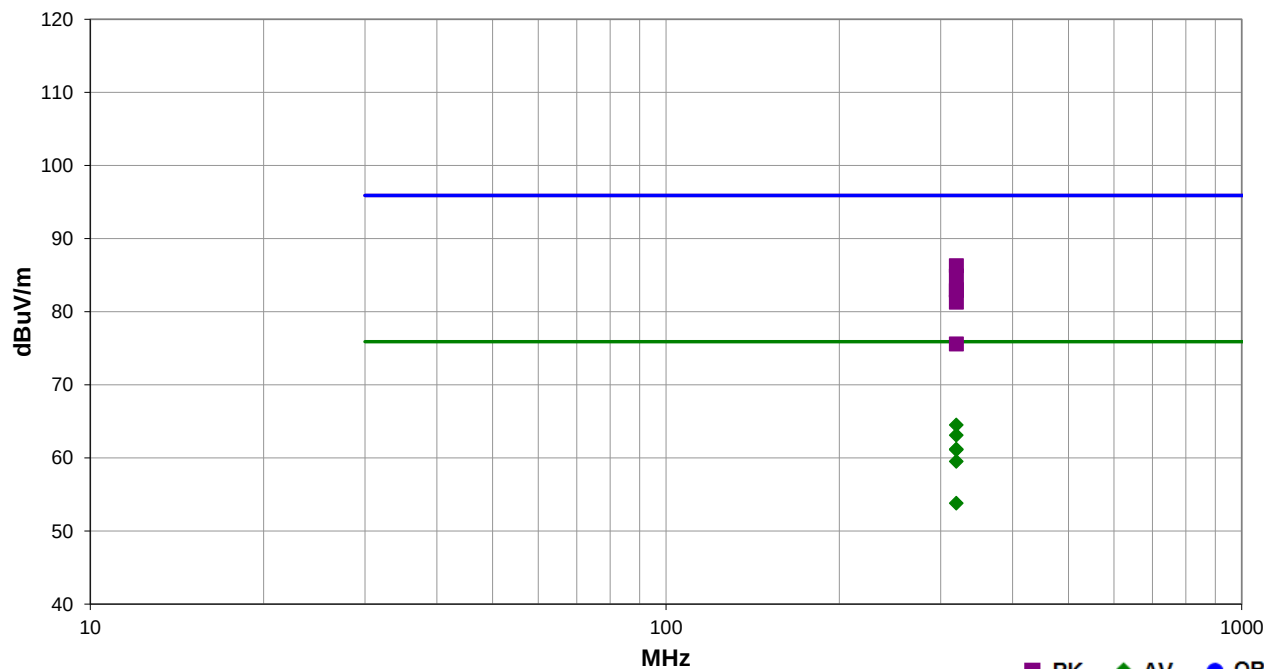


EmIRS 2018.05.07

PSA-ESCI 2018.05.04

Work Order:	UTCF0105	Date:	25-Jul-2018	
Project:	None	Temperature:	25.3 °C	
Job Site:	OC10	Humidity:	50.3% RH	
Serial Number:	82136 72164	Barometric Pres.:	1017 mbar	Tested by: Mark Baytan
EUT:	CO Detector - Model: TX-6310-01-1			
Configuration:	3			
Customer:	UTC Fire and Security			
Attendees:	None			
EUT Power:	Battery			
Operating Mode:	Transmitting CW at 319.5 MHz			
Deviations:	None			
Comments:	The duty cycle correction factor was referenced from the testing report under FCC ID: B42-929A-CO			

Test Specifications				Test Method			
FCC 15.231:2018				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
319.507	64.1	22.2	1.0	201.0		0.0	Horz	PK	0.0	86.3	95.9	-9.6	EUT Horz
319.505	62.7	22.2	1.0	190.0		0.0	Horz	PK	0.0	84.9	95.9	-11.0	EUT on Side
319.507	64.1	22.2	1.0	201.0	-21.8	0.0	Horz	AV	0.0	64.5	75.9	-11.4	EUT Horz
319.505	62.7	22.2	1.0	190.0	-21.8	0.0	Horz	AV	0.0	63.1	75.9	-12.8	EUT on Side
319.507	60.8	22.2	1.9	86.0		0.0	Vert	PK	0.0	83.0	95.9	-12.9	EUT Vert
319.508	60.7	22.2	1.0	358.0		0.0	Horz	PK	0.0	82.9	95.9	-13.0	EUT Vert
319.508	59.1	22.2	2.4	332.0		0.0	Vert	PK	0.0	81.3	95.9	-14.6	EUT on Side
319.507	60.8	22.2	1.9	86.0	-21.8	0.0	Vert	AV	0.0	61.2	75.9	-14.7	EUT Vert
319.508	60.7	22.2	1.0	358.0	-21.8	0.0	Horz	AV	0.0	61.1	75.9	-14.8	EUT Vert
319.508	59.1	22.2	2.4	332.0	-21.8	0.0	Vert	AV	0.0	59.5	75.9	-16.4	EUT on Side
319.510	53.4	22.2	3.7	116.0		0.0	Vert	PK	0.0	75.6	95.9	-20.3	EUT Horz
319.510	53.4	22.2	3.7	116.0	-21.8	0.0	Vert	AV	0.0	53.8	75.9	-22.1	EUT Horz

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2018.05.04

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 CW at 319.5 MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

UTCF0105 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	8200 MHz
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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
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	2-Jul-2018	12 mo
Antenna - Double Ridge	EMCO	3115	AHB	28-Mar-2018	24 mo
Attenuator	Fairview Microwave	SA18H-10	TKP	16-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	1-Aug-2017	12 mo
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	1-Aug-2017	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	7-Nov-2017	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	21-Nov-2017	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 highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequency in each operational band and the modes as showed in the data sheets.

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

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

To derive average emission measurements, a duty cycle correction factor of -21.8 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.

SPURIOUS RADIATED EMISSIONS



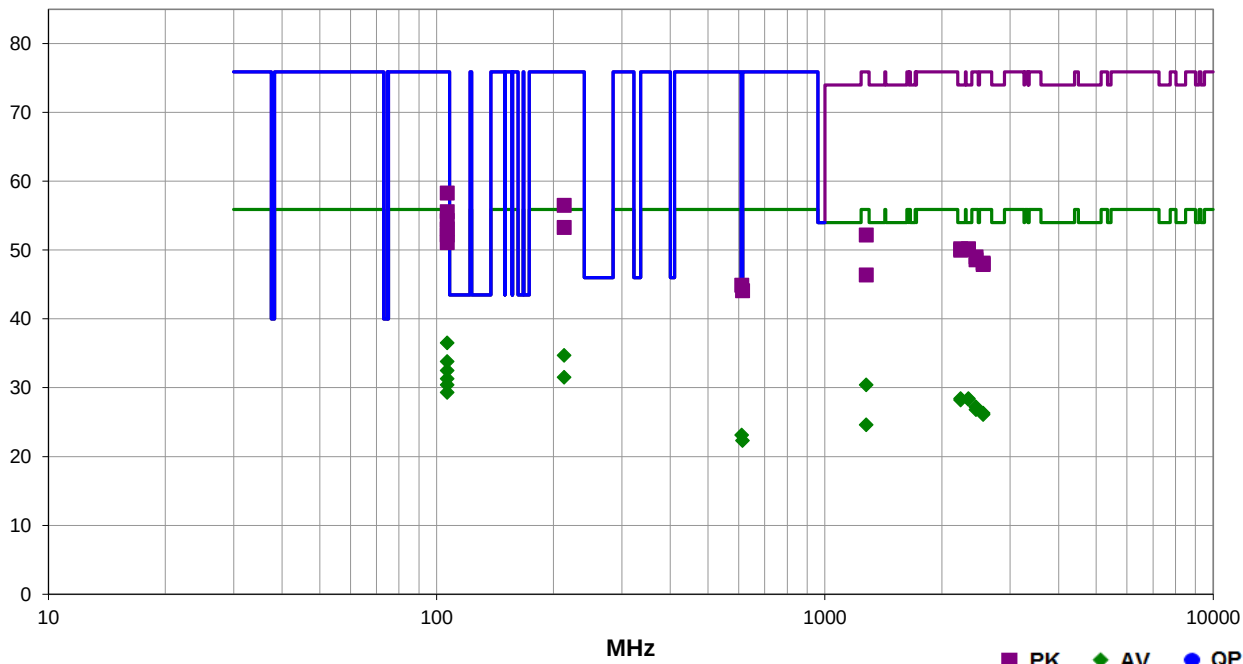
EmiRS 2018.05.07

PSA-ESCI 2018.05.04

Work Order:	UTCFO105	Date:	17-Jul-2018	
Project:	None	Temperature:	25.7 °C	
Job Site:	OC10	Humidity:	44.7% RH	
Serial Number:	0A7C097	Barometric Pres.:	1016 mbar	
EUT: CO Detector - Model: TX-6310-01-1				Tested by: Mark Baytan
Configuration:	1			
Customer:	UTC Fire and Security			
Attendees:	None			
EUT Power:	Battery			
Operating Mode:	Transmitting CW at 319.5 MHz			
Deviations:	None			
Comments:	The duty cycle correction factor was referenced from the testing report under FCC ID: B42-929A-CO			

Test Specifications	Test Method
FCC 15.231:2018	ANSI C63.10:2013

Run #	1	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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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
610.598	22.6	12.3	1.5	244.0		10.0	Horz	PK	0.0	44.9	46.0	-1.1	EUT Horz
613.979	22.0	12.1	1.2	270.0		10.0	Vert	PK	0.0	44.1	46.0	-1.9	EUT on side
106.504	46.9	1.4	1.0	329.0		10.0	Vert	PK	0.0	58.3	75.9	-17.6	EUT on side
106.504	46.9	1.4	1.0	329.0	-21.8	10.0	Vert	AV	0.0	36.5	55.9	-19.4	EUT on side
213.002	43.8	2.7	1.3	39.0		10.0	Horz	PK	0.0	56.5	75.9	-19.4	EUT Horz
106.500	44.2	1.4	1.0	108.0		10.0	Vert	PK	0.0	55.6	75.9	-20.3	EUT Vert
213.002	43.8	2.7	1.3	39.0	-21.8	10.0	Horz	AV	0.0	34.7	55.9	-21.2	EUT Horz
106.492	42.9	1.4	1.0	205.0		10.0	Vert	PK	0.0	54.3	75.9	-21.6	EUT Horz
106.500	44.2	1.4	1.0	108.0	-21.8	10.0	Vert	AV	0.0	33.8	55.9	-22.1	EUT Vert
213.003	40.6	2.7	1.0	325.0		10.0	Vert	PK	0.0	53.3	75.9	-22.6	EUT on side
106.494	41.7	1.4	2.4	51.0		10.0	Horz	PK	0.0	53.1	75.9	-22.8	EUT Horz
610.598	22.6	12.3	1.5	244.0	-21.8	10.0	Horz	AV	0.0	23.1	46.0	-22.9	EUT Horz
106.492	42.9	1.4	1.0	205.0	-21.8	10.0	Vert	AV	0.0	32.5	55.9	-23.4	EUT Horz

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
613.979	22.0	12.1	1.2	270.0	-21.8	10.0	Vert	AV	0.0	22.3	46.0	-23.7	EUT on side
106.497	40.8	1.4	2.0	1.0		10.0	Horz	PK	0.0	52.2	75.9	-23.7	EUT Vert
1277.900	54.6	-2.4	1.3	50.0		0.0	Horz	PK	0.0	52.2	75.9	-23.7	EUT Horz
2236.635	48.7	1.5	1.2	326.0		0.0	Horz	PK	0.0	50.2	74.0	-23.8	EUT Horz
2343.210	47.9	2.3	1.2	356.0		0.0	Horz	PK	0.0	50.2	74.0	-23.8	EUT Horz
2343.025	47.8	2.3	1.2	254.0		0.0	Vert	PK	0.0	50.1	74.0	-23.9	EUT on side
2236.670	48.5	1.5	1.1	275.0		0.0	Vert	PK	0.0	50.0	74.0	-24.0	EUT on side
213.003	40.6	2.7	1.0	325.0	-21.8	10.0	Vert	AV	0.0	31.5	55.9	-24.4	EUT on side
106.494	41.7	1.4	2.4	51.0	-21.8	10.0	Horz	AV	0.0	31.3	55.9	-24.6	EUT Horz
106.506	39.7	1.4	2.0	51.0		10.0	Horz	PK	0.0	51.1	75.9	-24.8	EUT on side
106.497	40.8	1.4	2.0	1.0	-21.8	10.0	Horz	AV	0.0	30.4	55.9	-25.5	EUT Vert
1277.900	54.6	-2.4	1.3	50.0	-21.8	0.0	Horz	AV	0.0	30.4	55.9	-25.5	EUT Horz
2236.635	48.7	1.5	1.2	326.0	-21.8	0.0	Horz	AV	0.0	28.4	54.0	-25.6	EUT Horz
2343.210	47.9	2.3	1.2	356.0	-21.8	0.0	Horz	AV	0.0	28.4	54.0	-25.6	EUT Horz
2343.025	47.8	2.3	1.2	254.0	-21.8	0.0	Vert	AV	0.0	28.3	54.0	-25.7	EUT on side
2236.670	48.5	1.5	1.1	275.0	-21.8	0.0	Vert	AV	0.0	28.2	54.0	-25.8	EUT on side
106.506	39.7	1.4	2.0	51.0	-21.8	10.0	Horz	AV	0.0	29.3	55.9	-26.6	EUT on side
2449.575	46.2	2.8	1.1	222.0		0.0	Vert	PK	0.0	49.0	75.9	-26.9	EUT on side
2449.615	45.8	2.8	1.0	50.0		0.0	Horz	PK	0.0	48.6	75.9	-27.3	EUT Horz
2556.310	45.4	2.7	1.2	46.0		0.0	Horz	PK	0.0	48.1	75.9	-27.8	EUT Horz
2556.145	45.2	2.7	1.0	252.0		0.0	Vert	PK	0.0	47.9	75.9	-28.0	EUT on side
2449.575	46.2	2.8	1.1	222.0	-21.8	0.0	Vert	AV	0.0	27.2	55.9	-28.7	EUT on side
2449.615	45.8	2.8	1.0	50.0	-21.8	0.0	Horz	AV	0.0	26.8	55.9	-29.1	EUT Horz
1278.045	48.8	-2.4	1.2	238.0		0.0	Vert	PK	0.0	46.4	75.9	-29.5	EUT on side
2556.310	45.4	2.7	1.2	46.0	-21.8	0.0	Horz	AV	0.0	26.3	55.9	-29.6	EUT Horz
2556.145	45.2	2.7	1.0	252.0	-21.8	0.0	Vert	AV	0.0	26.1	55.9	-29.8	EUT on side
1278.045	48.8	-2.4	1.2	238.0	-21.8	0.0	Vert	AV	0.0	24.6	55.9	-31.3	EUT on side