TEST REPORT

Report Number: 101039189MIN-001A
Project Number: G101039189

Testing performed on the
AdvisorOne
AVO-ZW

FCC ID: B4Z-959B-ZW
Industry Canada ID: 1175C-959BZW

to
47 CFR Part 15.249:2010
RSS- 210, Issue 8, 2010
RSS-Gen, Issue 3, 2010
47 CFR, Part 15:2010, §15.107 and §15.109, Class / ICES-003, Issue 5:2012

For
UTC Fire & Security Americas Corporation, Inc.

Test Performed by:	Test Authorized by:
Intertek Testing Services NA, Inc.	UTC Fire & Security Americas Corporation, Inc.
7250 Hudson Blvd., Suite 100	1275 Red Fox Road
Oakdale, MN 55128 USA	Arden Hills, MN 55112 USA

Prepared by: _____ Date: May 30, 2013
Uri Spector

Reviewed by: _____ Date: May 30, 2013
Simon Khazon

TABLE OF CONTENTS

1.0 GENERAL DESCRIPTION

Models:	AdvisorOne
Type of EUT:	Security Alarm
FCC ID:	B4Z-959B-ZW
Industry Canada ID:	1175C-959BZW
Related Submittal(s) Grants:	None
Company:	UTC Fire & Security Americas Corporation, Inc.
Customer:	Mr. Kevin Flanders
Address:	1275 Red Fox Road Arden Hills, MN 55112 USA
Phone:	(651) 773-4663
Fax:	(651) 779-4884
email:	kevin.flanders@fs.utc.com
Test Standards:	☒ 47 CFR, Part 15:2010, §15.249 ☒ RSS–210, Issue 8, 2010 ☒ RSS-Gen, Issue 3, 2010 ☒ 47 CFR, Part 15:2010, §15.107 and §15.109, Class B ☒ ICES-003, Issue 5:2012 ☐ Other
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	February 22, 2013
Test Work Started:	February 22, 2013
Test Work Completed:	April 31, 2013
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good

1.1 Product Description; Test Facility

Product Description:	Z-Wave
Board Revision:	55-959
Operating Frequency	908.40MHz
Modulation:	FSK
Emission Designator:	133KFXD
Antenna(s) Info:	Antenna Type: Integral
Antenna Installation:	☐ User ☒ Professional ☐ Factory
Transmitter Power Configuration:	☐ Internal battery ☒ External power source ☒ 120VAC ☐ 230VAC ☐ 400VAC ☐ 3.0VDC ☐ Other: Amp. ☒ 50Hz ☐ 60Hz
Special Test Arrangement:	None
Test Facility Accreditation:	A2LA (Certificate No. 1427.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.10-2009

1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

☒ - Standby
☒ - Continuous
☐ - Continuous un-modulated
☐ - Test program (customer specific)
☐ -

Operating modes of the EUT:

No.	Description
1	Samples wired to provide continuous transmitting mode or receiving/standby mode were tested

Cables:

No.	Type	Length	Designation	Note
1	RJ45, not shielded	<100ft	Ethernet WAN cable	
2	RJ45, not shielded	<100ft	Ethernet LAN cable	
3	RJ45, not shielded	>100ft	Home telephone connection cable	
4	2-wire not shielded DC power	6ft	Battery Connection	
5	2-wire not shielded DC power	>100ft	Telephone bell	
6	Zones 1, 2, 3, 4,5	>100ft	Superbus	
7	External antenna cable	<6ft	319.5MHz receive antenna	
8	External antenna cable	<6ft	GSM-GPRS antenna	

Support equipment/Services:

No.	Item	Description
1	None	

General notes: None

1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ **Normal**

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

1.4 Measurement uncertainty

The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be: ±4 dB at 10m and ±5.4 dB at 3m

The expanded uncertainty (k = 2) for conducted emissions from 150 kHz to 30 MHz has been determined to be:
±2.6 dB

1.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.
The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

Where: FS = Field Strength in dB(µV/m)
RA = Receiver Amplitude in dB(µV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(m^{-1})
AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(µV) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(µV/m).

RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/m)

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST SPECIFICATION	TEST PARAMETERS	RESULT
15.249(a) / RSS-210 A2.9(a)	Field strength of fundamental	Pass
15.249(a) / RSS-210 A2.9(a)	Field strength of harmonics	Pass
15.249(d) / RSS-210 A2.9(b)	Field strength of spurious emissions	Pass
15.215(c) / RSS- Gen 4.6.1	Bandwidth of the emission	Pass
15.207/RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	Pass
15.109/ICES-003	Receiver/digital device radiated emissions	Pass
15.107/ICES-003	Digital device conducted emissions	Pass

3.0 TEST CONDITIONS AND RESULTS

3.1 Field strength of fundamental

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Max. Emissions margin at fundamental: 0.6dB below the limits

Notes: None

Date:	February 22, 2013	**Result:** **Pass**
Standard:	FCC 15.249(a) / RSS-210 A2.9	
Tested by:	Uri Spector	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	None	

Table 3.1.1

Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	Peak Reading	Total @ 3m	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dBµV/m	dB	
			Emissions at Fundamental Frequency							
908.39	V	130	21.8	3.6	0.0	67.9	93.4	94.0	-0.6	
908.39	H	100	21.8	3.6	0.0	66.6	92.1	94.0	-1.9	

3.2 Field strength of harmonics and spurious emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Frequency range of measurements: 30MHz-10000MHz

Test result: **Pass**

Max. margin of harmonics and spurious emissions: 9.5dB below the limits
Max. margin of spurious emissions-bandedge compliance: 15.1dB below the limits

Notes: Radiated emissions not related with transmitter operation and emissions at fundamental frequency were excluded from the Table.

Date:	May 2, 2013	**Result:** **Pass**
Standard:	FCC 15.249(a) and (d) / RSS-210 A2.9	
Tested by:	Uri Spector	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	None	

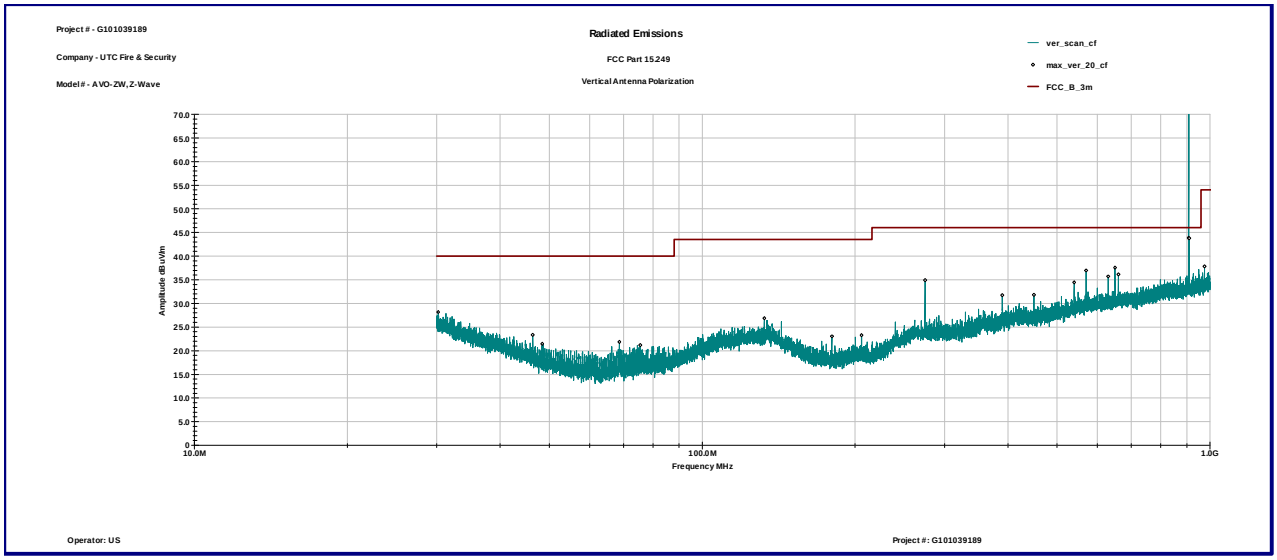
Table 3.2.1

Frequency MHz	Antenna Polarity	Peak Reading dBµV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBµV/m	Limit dBµV/m	Margin dB
1.513 GHz	V	50.6	27.7	41.8	36.5	54.0	-17.5
8.4295 GHz	H	38.9	42.8	37.2	44.5	54.0	-9.5

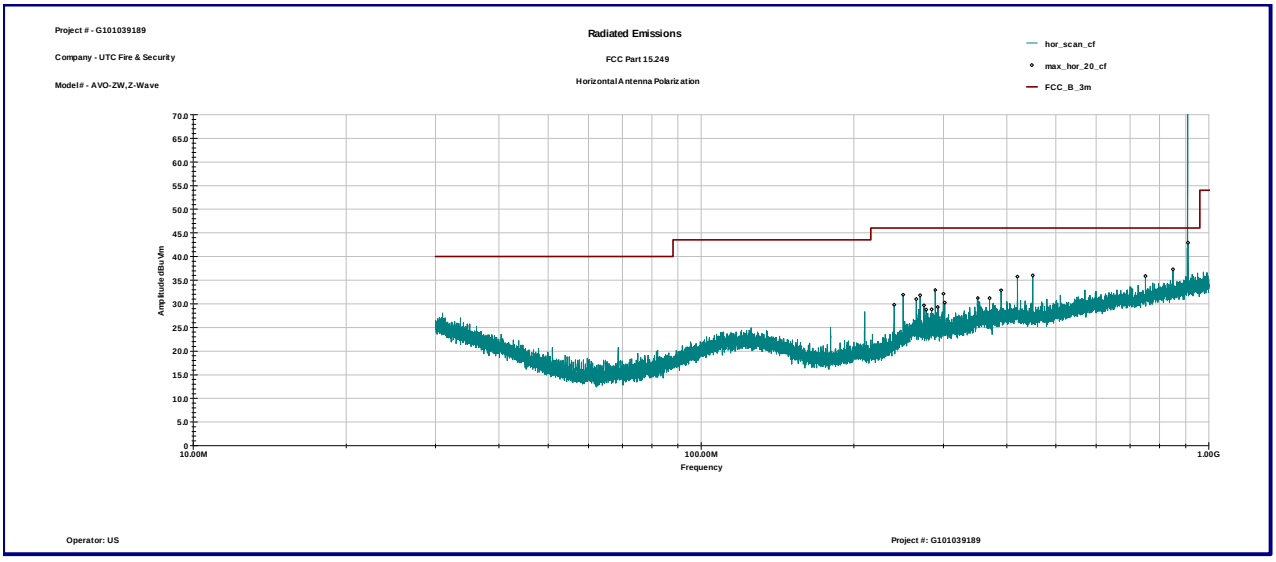
Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	Reading	Total @ 3m	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dBµV/m	dB	
	Spurious Emissions-Bandedge Compliance, QP Reading									
902.00	V	100	21.8	3.6	0.0	5.2	30.6	46.0	-15.4	
902.00	H	100	21.8	3.6	0.0	5.1	30.5	46.0	-15.5	
928.00	V	100	21.9	3.7	0.0	5.3	30.9	46.0	-15.1	
928.00	H	100	21.9	3.7	0.0	5.3	30.9	46.0	-15.1	

Graph 3.2.1

Vertical antenna polarization

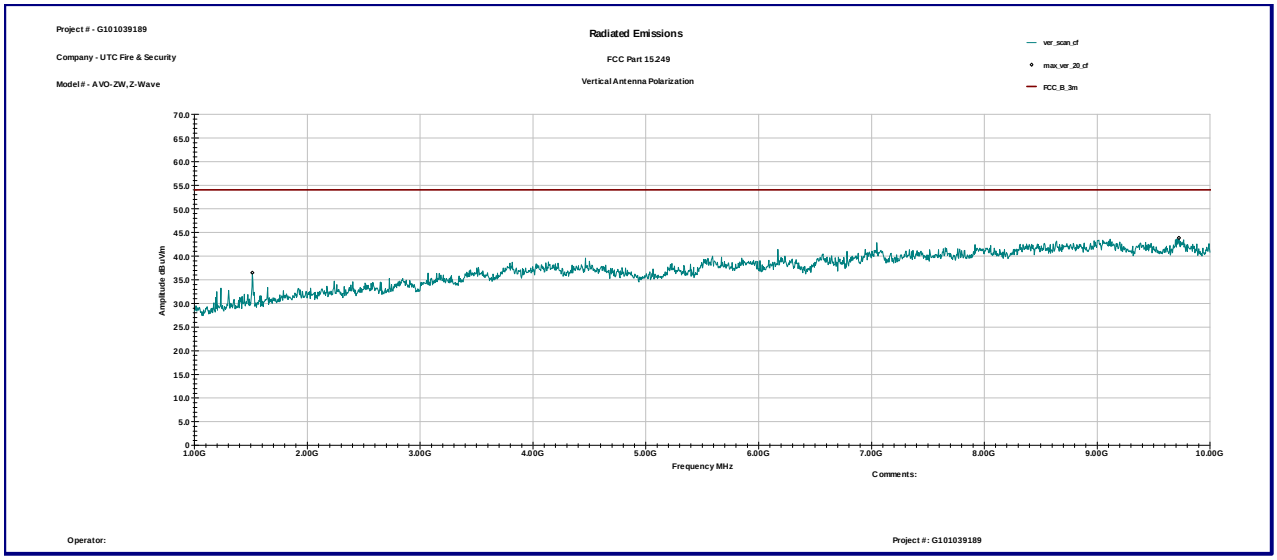


Horizontal antenna polarization

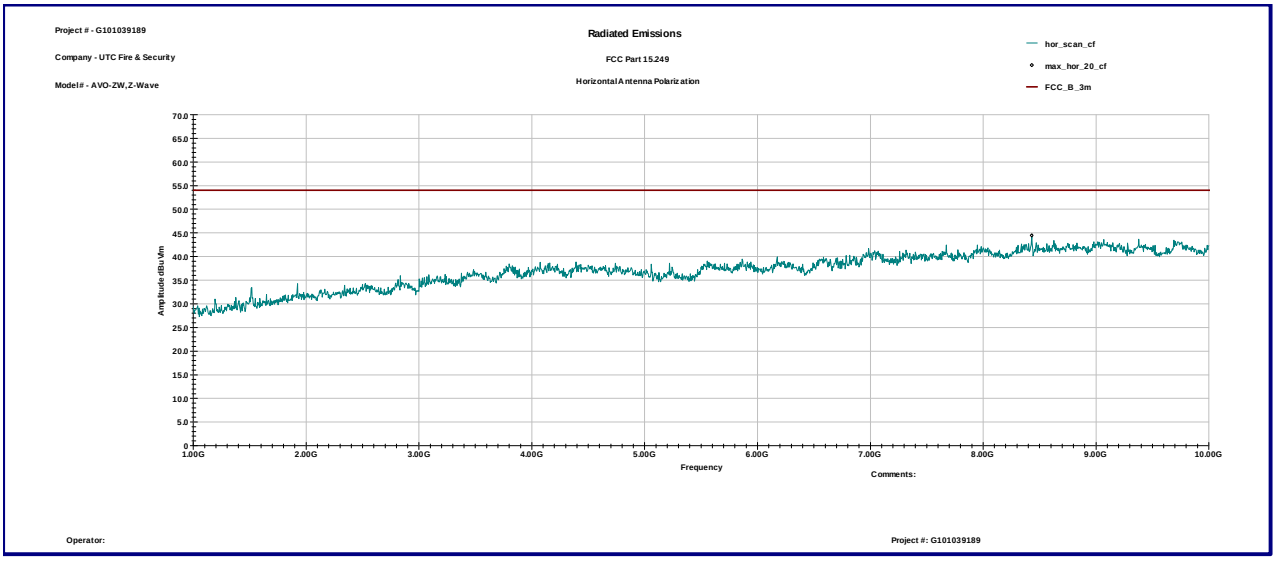


Graph 3.2.2

Vertical antenna polarization



Horizontal antenna polarization



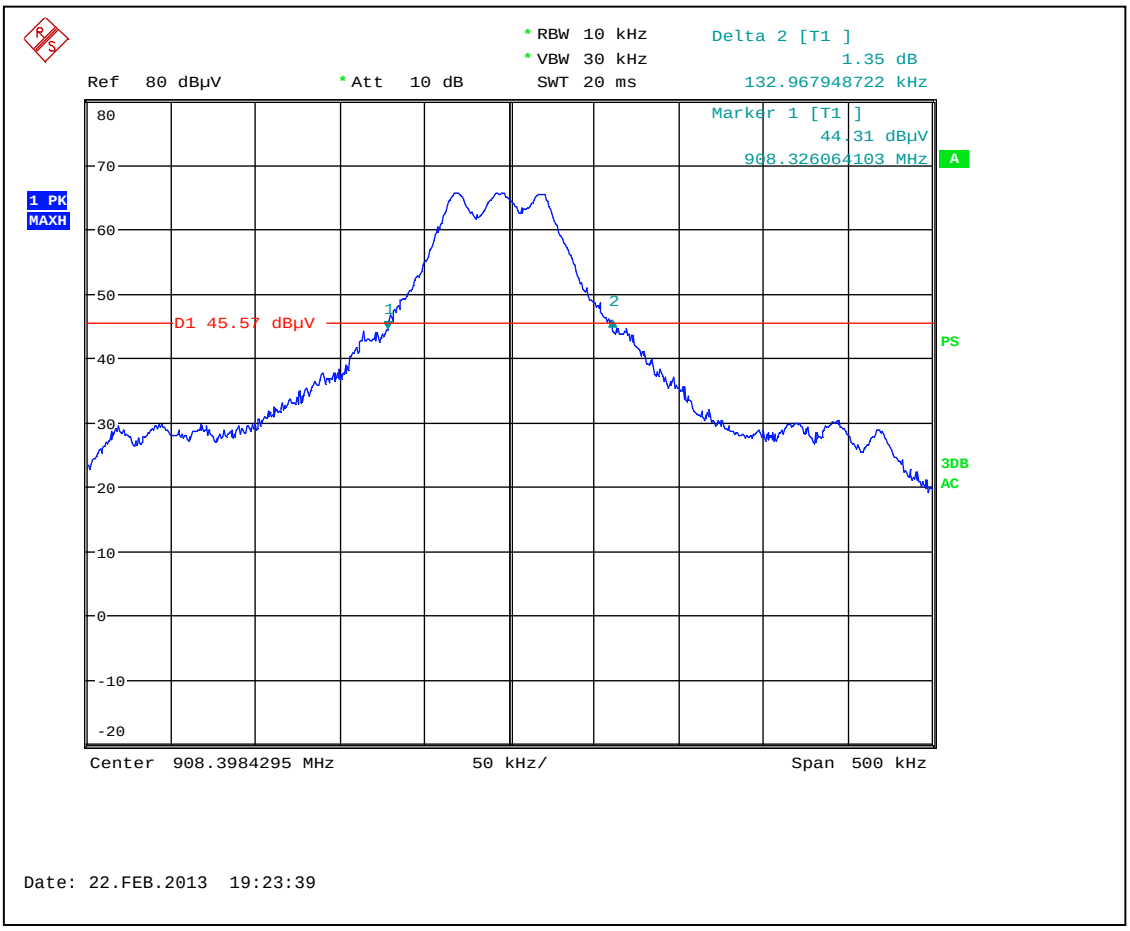
3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
908.4	132.96	113.00

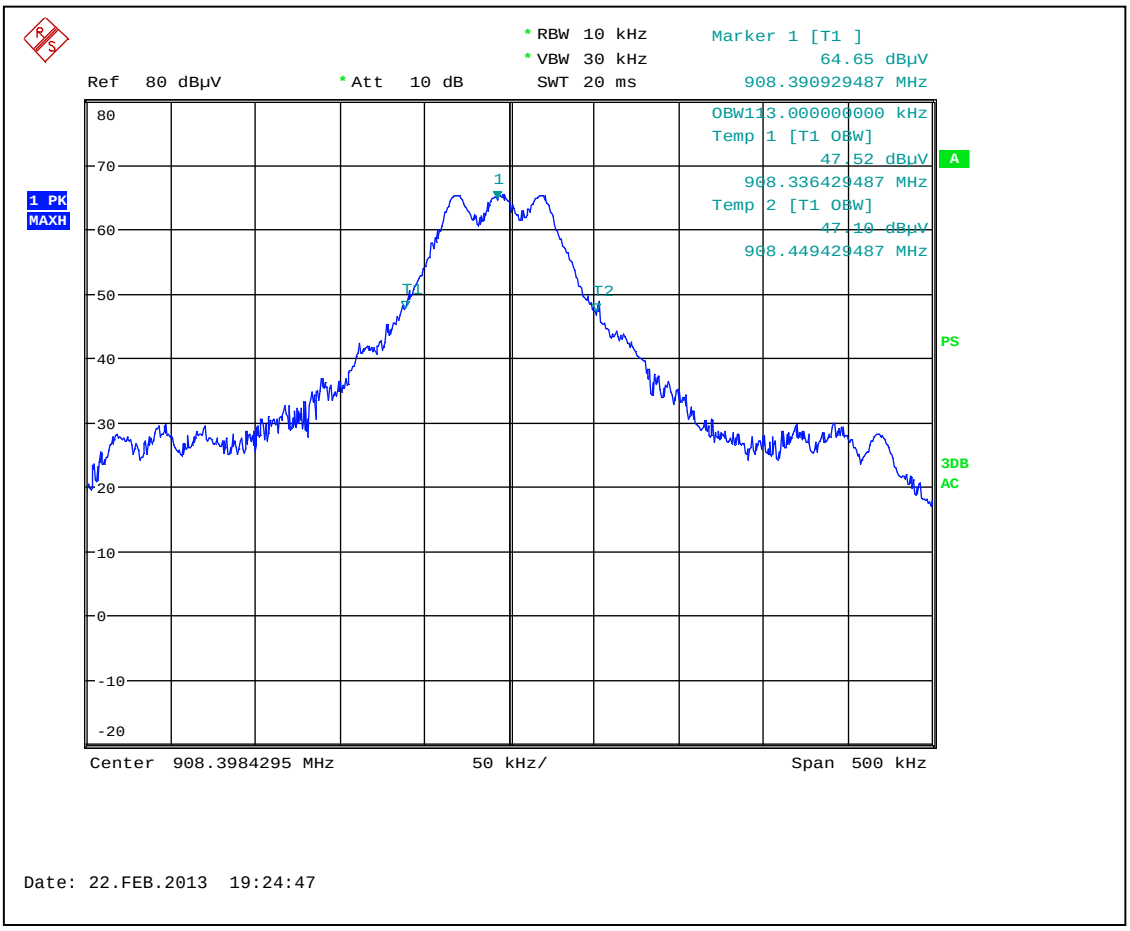
Graphs 3-3-1 and 3-3-2 show bandwidth of emissions

Notes: The bandwidth of emissions is contained within the frequency band of operation

Graph 3.3.1


*RBW 10 kHz
*VBW 30 kHz
Ref 80 dBµV
*Att 10 dB
SWT 20 ms
Delta 2 [T1]
1.35 dB
132.967948722 kHz
Marker 1 [T1]
44.31 dBµV
908.326064103 MHz
A
1 PK
MAXH
D1 45.57 dBµV
PS
3DB
AC
80
70
60
50
40
30
20
10
0
-10
-20
Center 908.3984295 MHz
50 kHz/
Span 500 kHz
Date: 22.FEB.2013 19:23:39

Graph 3.3.2


RBW 10 kHz
VBW 30 kHz
SWT 20 ms
Marker 1 [T1]
64.65 dBµV
908.390929487 MHz
Ref 80 dBµV
Att 10 dB
OBW113.000000000 kHz
Temp 1 [T1 OBW]
47.52 dBµV
908.336429487 MHz
Temp 2 [T1 OBW]
47.10 dBµV
908.449429487 MHz
1 PK
MAXH
A
PS
3DB
AC
80
70
60
50
40
30
20
10
0
-10
-20
T1
T2
Center 908.3984295 MHz
50 kHz/
Span 500 kHz
Date: 22.FEB.2013 19:24:47

3.4 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 2.9dB below the limits

Notes: None

Date:	April 30, 3013	**Result:**	**Pass**
Standard:	FCC 15.207		
Tested by:	Uri Spector		
Test Point:	Power Line		
Operation mode:	See Page 5		
Note:	None		

Table 3.4.1

Line 1

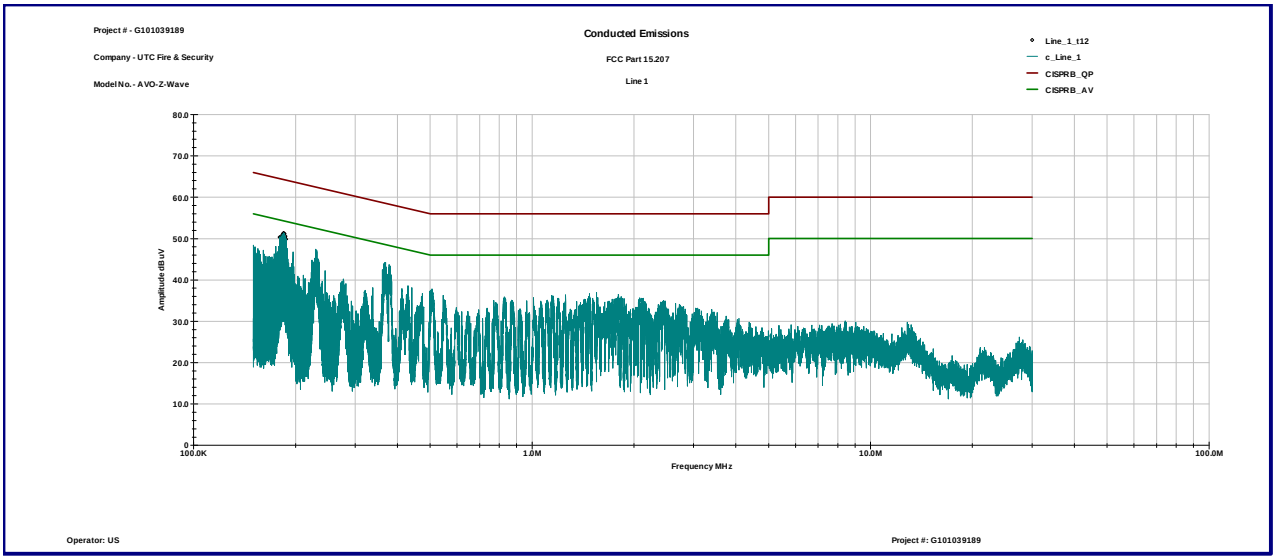
Frequency	Peak dBµV	QP Limit dBµV	AVG Limit dBµV	QP Margin dB	AVG Margin dB
179.52 KHz	50.3	64.5	54.5	-14.2	-4.2
182.82 KHz	51.0	64.4	54.4	-13.4	-3.4
184.18 KHz	51.3	64.3	54.3	-13.0	-3.0
230.79 KHz	47.1	62.4	52.4	-15.3	-5.3
368.72 KHz	44.2	58.6	48.6	-14.4	-4.4
1.797 MHz	36.5	56.0	46.0	-19.5	-9.5

Line 2

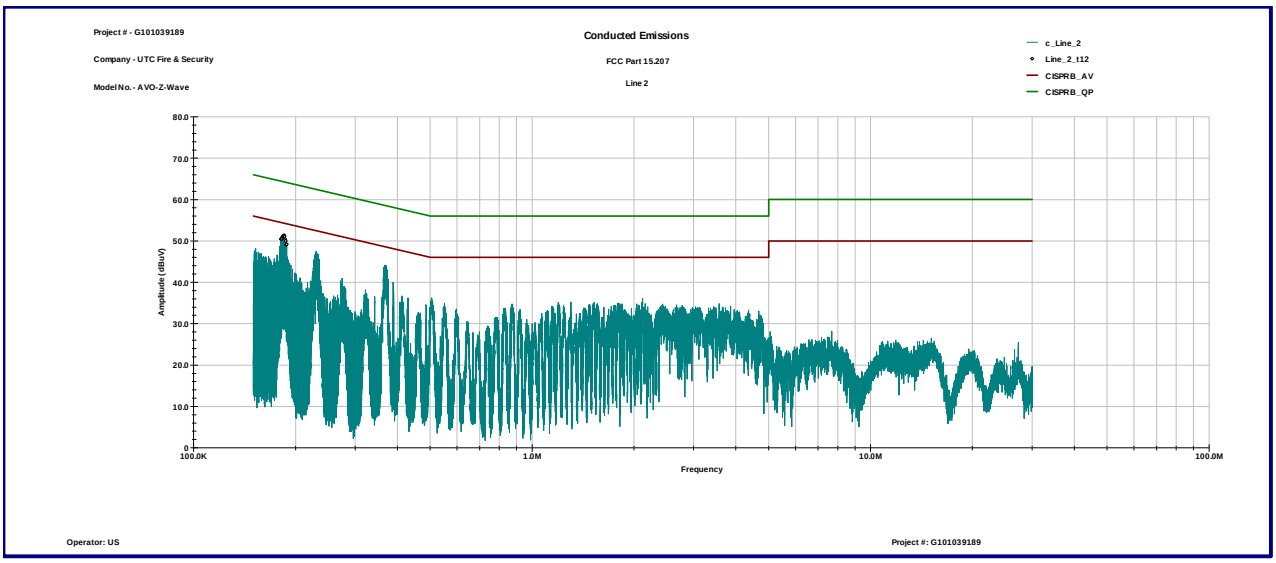
Frequency	Peak dBµV	QP Limit dBmV	AVG Limit dBmV	QP Margin dB	AVG Margin dB
180.95 KHz	50.5	64.4	54.4	-14.0	-4.0
184.92 KHz	51.4	64.3	54.3	-12.9	-2.9
229.90 KHz	47.4	62.4	52.4	-15.0	-5.0
370.3 KHz	43.9	58.3	48.3	-14.4	-4.4
504.40 KHz	36.2	56.0	46.0	-19.8	-9.8
1.301 MHz	35.2	56.0	46.0	-20.8	-10.8

Graph 3.4.1

Line 1



Line 2



3.5 Receiver/digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-5000MHz

Max. Emissions margin: 7.3dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Table 3.5.1 and Graphs 3.5.1and 3.5.2)

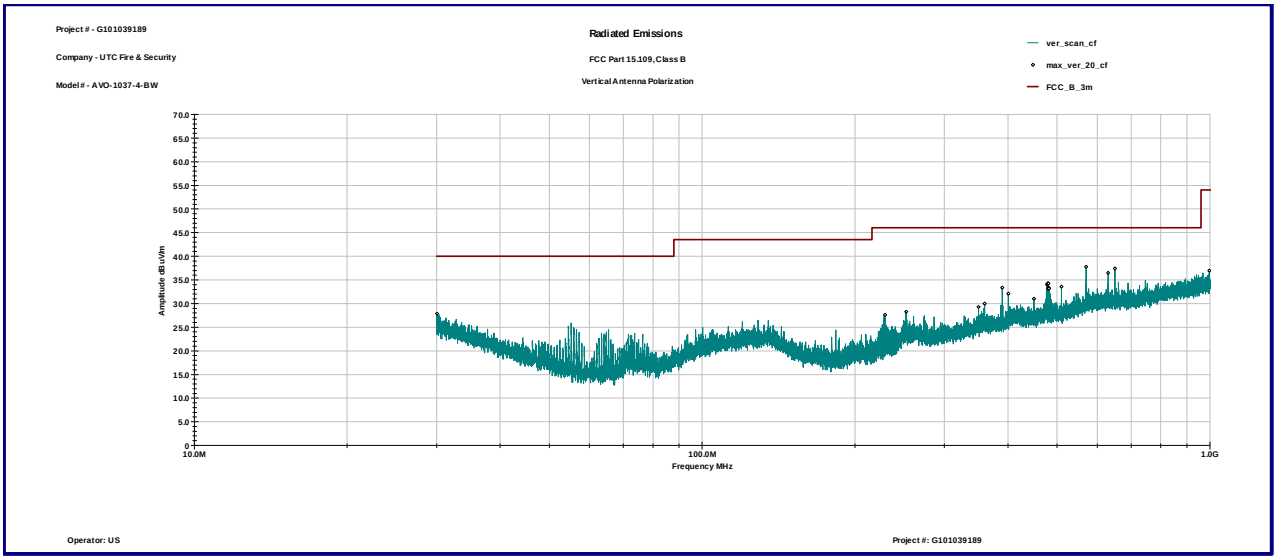
Date:	April 22, 2013	**Result:**	**Pass**
Standard:	FCC Part 15.109, Class B		
Tested by:	Uri Spector		
Test Point:	Enclosure		
Operation mode:	See page 5		
Note:	30MHz-5000MHz		

Table 3.5.1

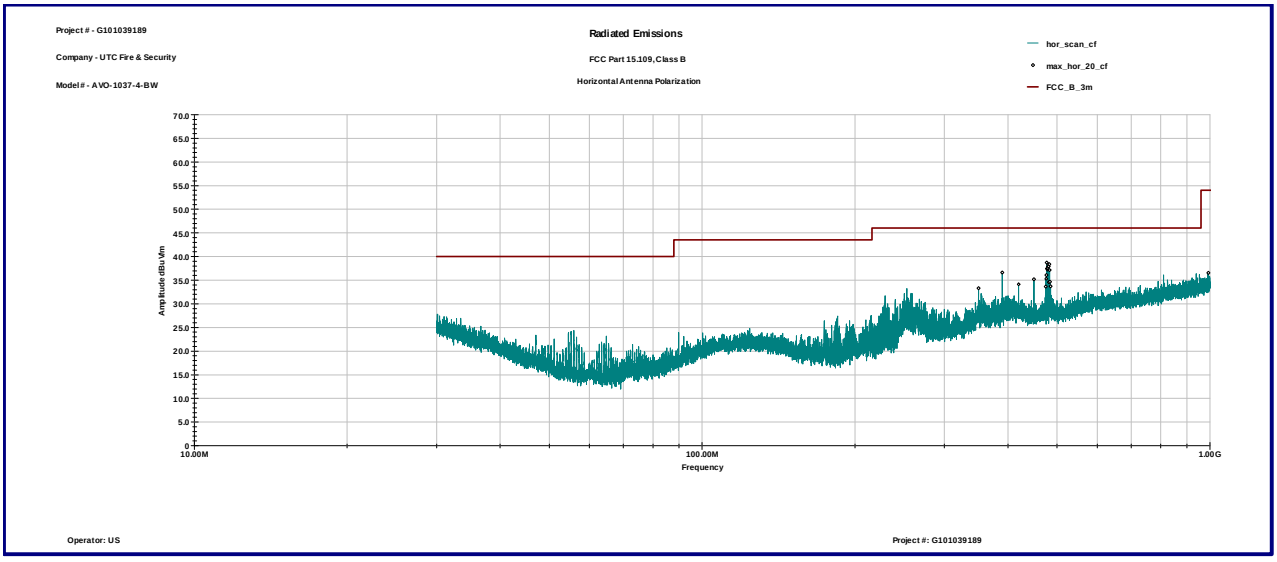
Frequency	Ant. Polarity	Peak Reading dBµV	Total C.F. dB1/m	Total at 3m dBµV/m	Limit dBµV/m	Margin dB
30.056 MHz	V	7.7	20.2	27.8	40.0	-12.2
229.09 MHz	V	14.8	12.8	27.6	46.0	-18.4
252.23 MHz	V	13.4	14.9	28.3	46.0	-17.8
350.09 MHz	V	11.8	17.5	29.3	46.0	-16.8
359.93 MHz	V	12.1	17.9	30.0	46.0	-16.0
390.01 MHz	V	15.0	18.4	33.4	46.0	-12.6
400.86 MHz	V	13.1	18.9	32.1	46.0	-14.0
450.03 MHz	V	11.5	19.5	31.0	46.0	-15.0
477.95 MHz	V	13.9	20.1	34.0	46.0	-12.0
478.59 MHz	V	13.9	20.1	34.0	46.0	-12.0
479.33 MHz	V	14.1	20.1	34.3	46.0	-11.8
510.01 MHz	V	13.2	20.4	33.6	46.0	-12.5
570.0 MHz	V	16.1	21.7	37.7	46.0	-8.3
629.95 MHz	V	14.0	22.5	36.5	46.0	-9.6
650.11 MHz	V	14.7	22.7	37.4	46.0	-8.6
390.01 MHz	H	18.2	18.4	36.6	46.0	-9.4
420.06 MHz	H	14.5	19.6	34.1	46.0	-11.9
477.31 MHz	H	18.6	20.1	38.7	46.0	-7.3
479.33 MHz	H	17.5	20.1	37.6	46.0	-8.5
480.71 MHz	H	18.2	20.1	38.3	46.0	-7.7
481.35 MHz	H	17.8	20.2	37.9	46.0	-8.1
482.73 MHz	H	18.2	20.2	38.4	46.0	-7.6
483.37 MHz	H	16.9	20.2	37.1	46.0	-8.9

Graph 3.5.1

Vertical antenna polarization

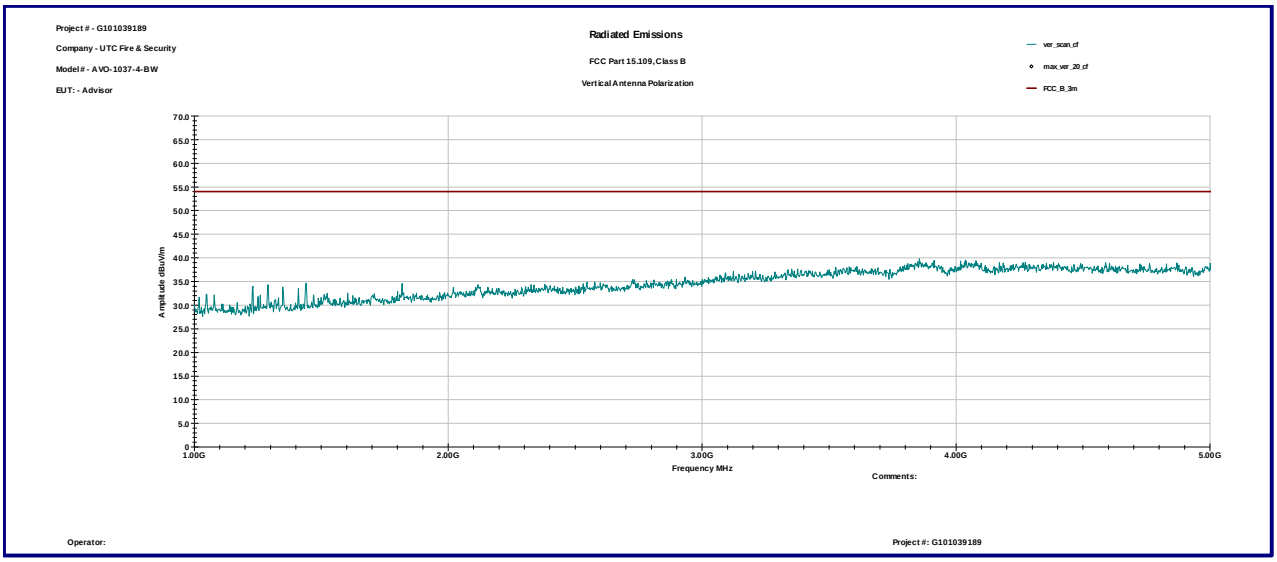


Horizontal antenna polarization

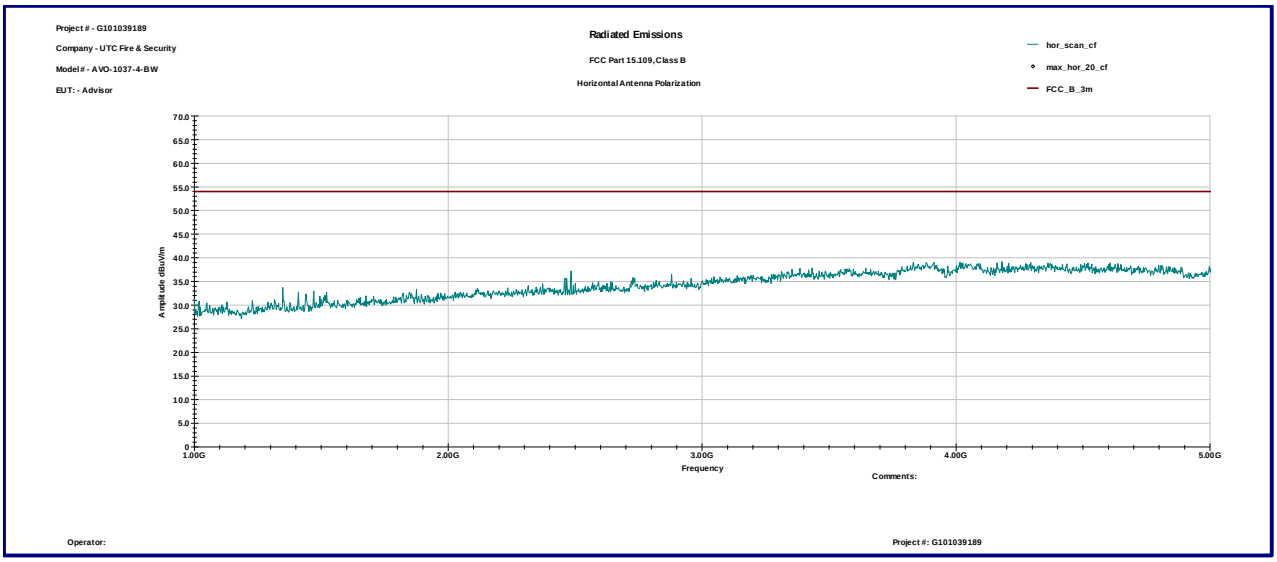


Graph 3.5.2

Vertical antenna polarization



Horizontal antenna polarization



3.6 Digital device conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 3.3dB below the limits

Notes: None

Date:	April 22, 2013	**Result:**	**Pass**
Standard:	FCC 15.107, Class B		
Tested by:	Uri Spector		
Test Point:	Power Line		
Operation mode:	See page 5		
Note:	None		

Table 3.6.1

Line 1

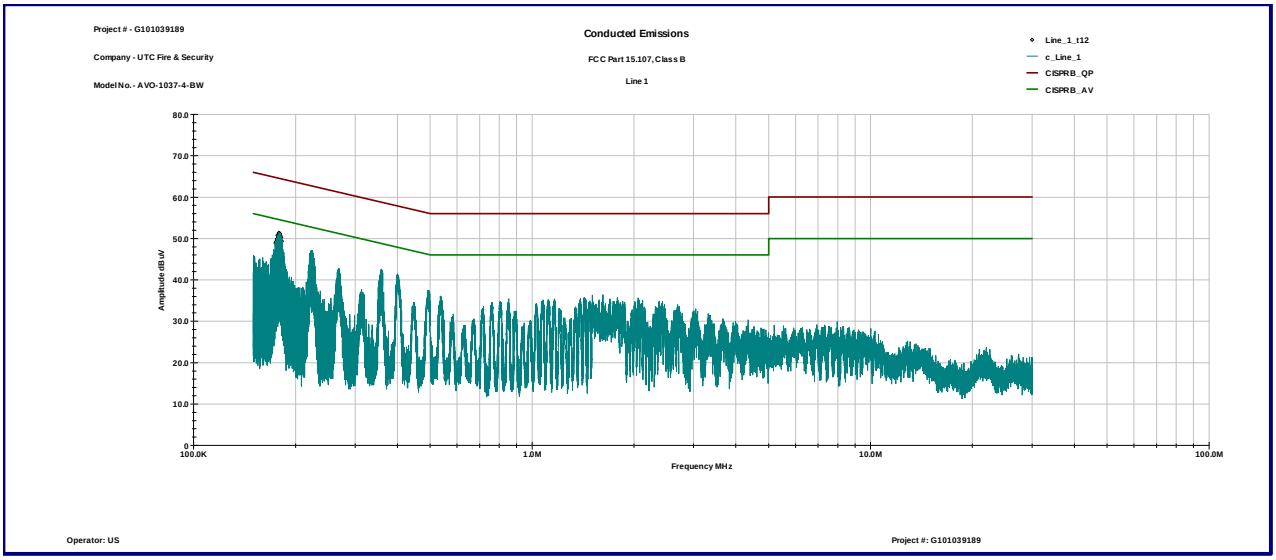
Frequency MHz	QP dBµV	AVG dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.180	49.0	35.5	0.1	64.5	54.5	-15.4	-18.9
0.222	45.1	34.6	0.1	62.7	52.7	-17.5	-18.0
0.267	39.9	32.8	0.1	61.2	51.2	-21.2	-18.3
0.358	40.2	34.3	0.1	58.8	48.8	-18.4	-14.3
0.400	39.9	36.7	0.1	57.9	47.9	-17.8	-11.0
0.491	35.6	32.7	0.2	56.2	46.2	-20.4	-13.3

Line 2

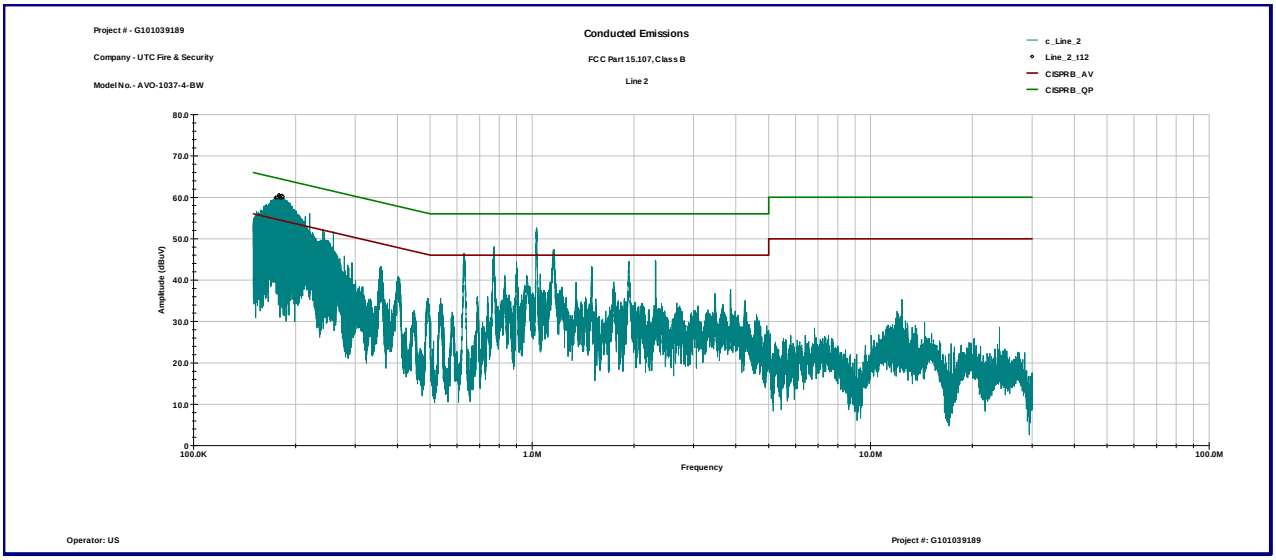
Frequency MHz	QP dBµV	AVG dBµV	Cable Loss dB	QP Lim dBµV	AVG Lim dBµV	QP Margin dB	AVG Margin dB
0.182	54.4	38.2	0.1	64.4	54.4	-9.9	-16.1
0.630	45.5	41.4	0.2	56.0	46.0	-10.3	-4.4
0.770	46.2	42.5	0.2	56.0	46.0	-9.6	-3.3
1.030	43.3	39.8	0.2	56.0	46.0	-12.5	-6.0
1.158	38.6	34.0	0.2	56.0	46.0	-17.2	-11.8
2.314	31.7	23.2	0.4	56.0	46.0	-23.9	-22.4

Graph 3.6.1

Line 1



Line 2



4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	ESU	100398	25283	12/19/2013	☒
Spectrum Analyzer	R & S	FSP 40	100024	12559	11/29/2013	☒
Bicono-Log Antenna	Teseq	CBL6112D	32859	25289	08/09/2013	☒
Horn Antenna	EMCO	3115	9507-4513	9936	05/16/2013	☒
LISN	Fischer Custom Communications	FCC-LISN-2 MOD.SD	316	9945	07/17/2013	☒
High Pass Filter	Reactel Inc.	7HS-1G-S1	0223	15275	VBU	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	11/01/2013	☒
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	☒