TEST REPORT

Report Number: 100267895MIN-001
Project Number: G100267895

Testing performed on the
TX-6310-01-1

FCC ID: B42-929A-CO
Industry Canada ID: 1175C-929ACO

to
47 CFR Part 15. 231:2009
RSS- 210 , Issue 7, 2007

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: December 6, 2010
Richard Blonigen

Reviewed by: _____ Date: December 6, 2010
Norman Shpilsher

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1.0 GENERAL DESCRIPTION

Model:	TX-6310-01-1
Type of EUT:	Transmitter for CO Detector
FCC ID:	B42-929A-CO
Industry Canada ID:	1175C-929ACO
Related Submittal(s) Grants:	None
Company:	UTC Fire & Security Americas Corporation, Inc.
Customer:	Mr. Rick Connor
Address:	1275 Red Fox Road Arden Hills, MN 55112, USA
Phone:	(651) 779-4824
Fax:	(651) 779-4884
e-mail:	Rick.Conner@ge.com
Test Standards:	☒ 47 CFR, Part 15:2009, §15.231 ☒ RSS–210, Issue 7, 2007 ☒ RSS-Gen, Issue 2, 2007 ☒ 47 CFR, Part 15:2008, §15.107 and §15.109, Class B ☐ Other
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	December 3, 2010
Test Work Started:	December 3, 2010
Test Work Completed:	December 6, 2010
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good

1.1 Product Description; Test Facility

Product Description:	Alarm Periodic Transmitter
Operating Frequency	319.508 MHz
Modulation:	FSK
Emission Designator:	K1D
Antenna(s) Info:	Wire Antenna soldered to PCB
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter power configuration:	☒ Internal battery ☐ External power source ☐ 120VAC ☐ 230VAC ☐ 400VAC ☒ 4.5 VDC ☐ 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 C63.4-2003

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	Normal operation with transmission every 64 minutes upon activation
2	Continuous operation
3	Standby mode

Cables:

No.	Type	Length	Designation	Note
1	None			
2				

Support equipment/Services:

No.	Item	Description
1	None	
2		

General notes: The Normal Operation unit and unit wired to transmit continuously were tested.

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
15.231(a) / RSS-210 A1.1.1(a)	Transmitter deactivation time	Pass
15.231(b) / RSS-210 A1.1.2	Transmitter field strength of emissions	Pass
15.231(c) / RSS-210 A1.1.3	Bandwidth of the emission	Pass
15.207/RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	N/A
15.109/ICES-003/ RSS-Gen 4.10	Receiver/digital device radiated emissions	Pass
15.107/ ICES-003	Digital device conducted emissions	N/A

3.0 TEST CONDITIONS AND RESULTS

3.1 Transmitter deactivation time

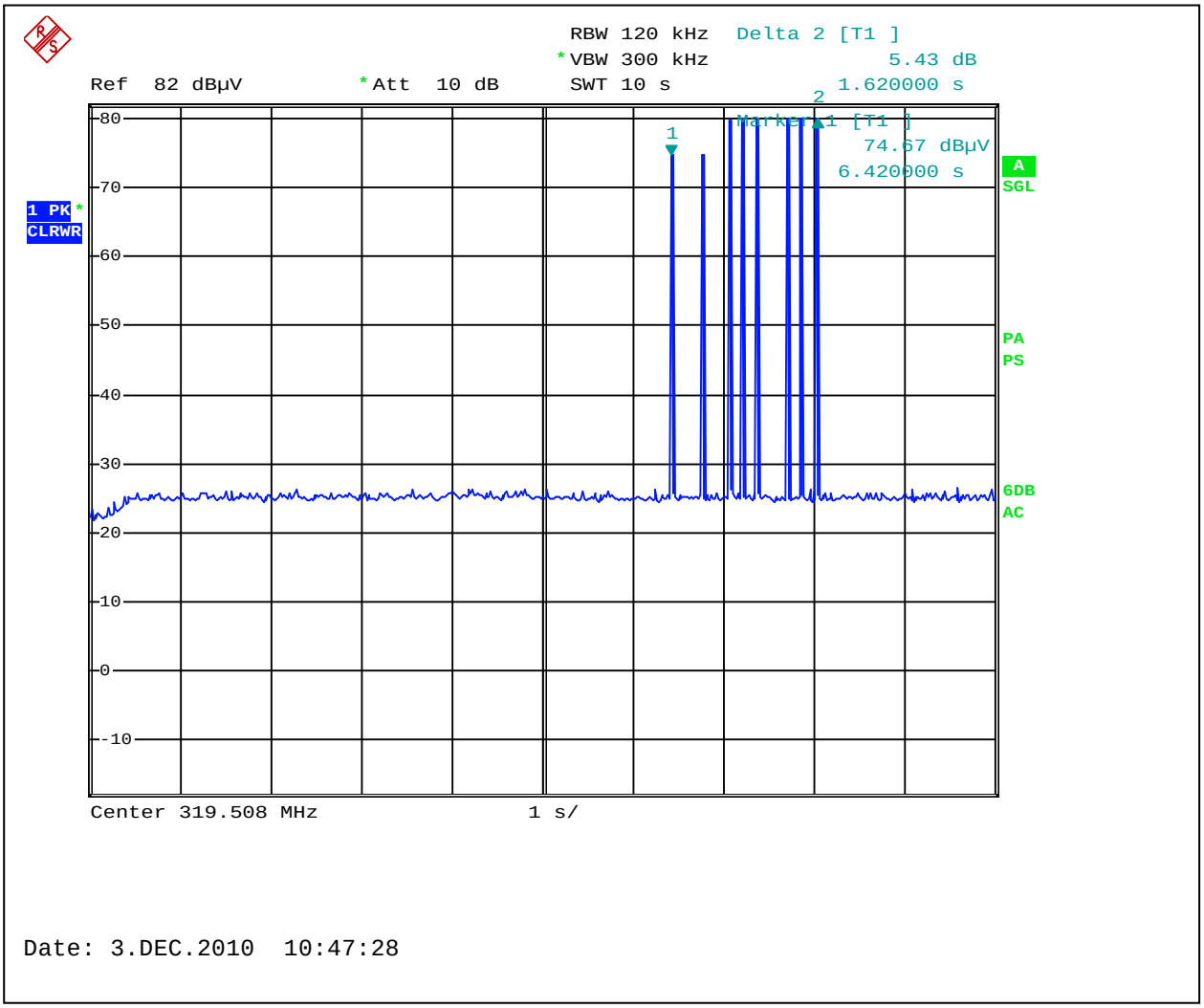
Maximum allowed deactivation time: 5 sec

Measured deactivation time: 1.62 sec

Test result: **Pass**

Notes: None

Graph 3.1.1



3.2 Transmitter field strength of emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Frequency range of measurements: 30MHz-3200MHz

Test result: **Pass**

Max. Emissions margin at fundamental: 26.7 dB below the limits

Max. margin of harmonics and spurious emissions: 39.4 dB below the limits

Notes: None

Date:	December 3 & 6, 2010	**Result:** **Pass**
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Richard Blonigen	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Peak Value	

Table 3.2.1

Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	Peak Reading	Total @ 3m	Average CF	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dB	dBµV/m	dB	
			Emissions at Fundamental Frequency								
319.51	V	180	14.5	2.0	0.0	74.4	90.9	0.0	95.9	-4.9	
319.51	H	100	14.5	2.0	0.0	73.4	89.9	0.0	95.9	-5.9	
			Spurious and Harmonics Emissions								
106.50	V	100	12.1	1.1	0.0	42.7	55.8	0.0	75.9	-20.1	
213.01	V	100	10.8	1.6	0.0	33.3	45.7	0.0	75.9	-30.2	
426.01	V	134	17.0	2.3	0.0	30.5	49.8	0.0	75.9	-26.1	
639.02	V	100	19.9	3.0	0.0	35.4	58.3	0.0	75.9	-17.6	
745.53	V	100	20.5	3.2	0.0	29.5	53.2	0.0	75.9	-22.7	
1278.04	V	143	24.6	2.6	38.9	62.3	50.6	0.0	75.9	-25.3	
2342.67	V	100	28.0	3.5	37.9	54.7	48.2	0.0	75.9	-27.7	
2449.33	V	100	28.3	3.6	37.8	55.1	49.2	0.0	75.9	-26.7	
2769.33	V	100	29.2	3.7	37.7	56.9	52.2	0.0	75.9	-23.7	
2876.00	V	100	29.6	3.8	37.7	55.3	50.9	0.0	75.9	-25.0	
2982.67	V	100	29.9	3.8	37.7	59.0	55.0	0.0	75.9	-20.9	
106.50	H	265	12.1	1.1	0.0	39.1	52.2	0.0	75.9	-23.7	
213.01	H	119	10.8	1.6	0.0	34.4	46.8	0.0	75.9	-29.1	
426.02	H	100	17.0	2.3	0.0	29.7	49.0	0.0	75.9	-26.9	
958.54	H	155	22.3	3.7	0.0	24.0	50.0	0.0	75.9	-25.9	
2342.67	H	100	28.0	3.5	37.9	56.8	50.3	0.0	75.9	-25.6	
2449.33	H	100	28.3	3.6	37.8	60.1	54.2	0.0	75.9	-21.7	
2662.67	H	100	28.9	3.7	37.7	56.6	51.4	0.0	75.9	-24.5	
2876.00	H	100	29.6	3.8	37.7	56.4	52.0	0.0	75.9	-23.8	
2982.67	H	100	29.9	3.8	37.7	57.6	53.6	0.0	75.9	-22.3	

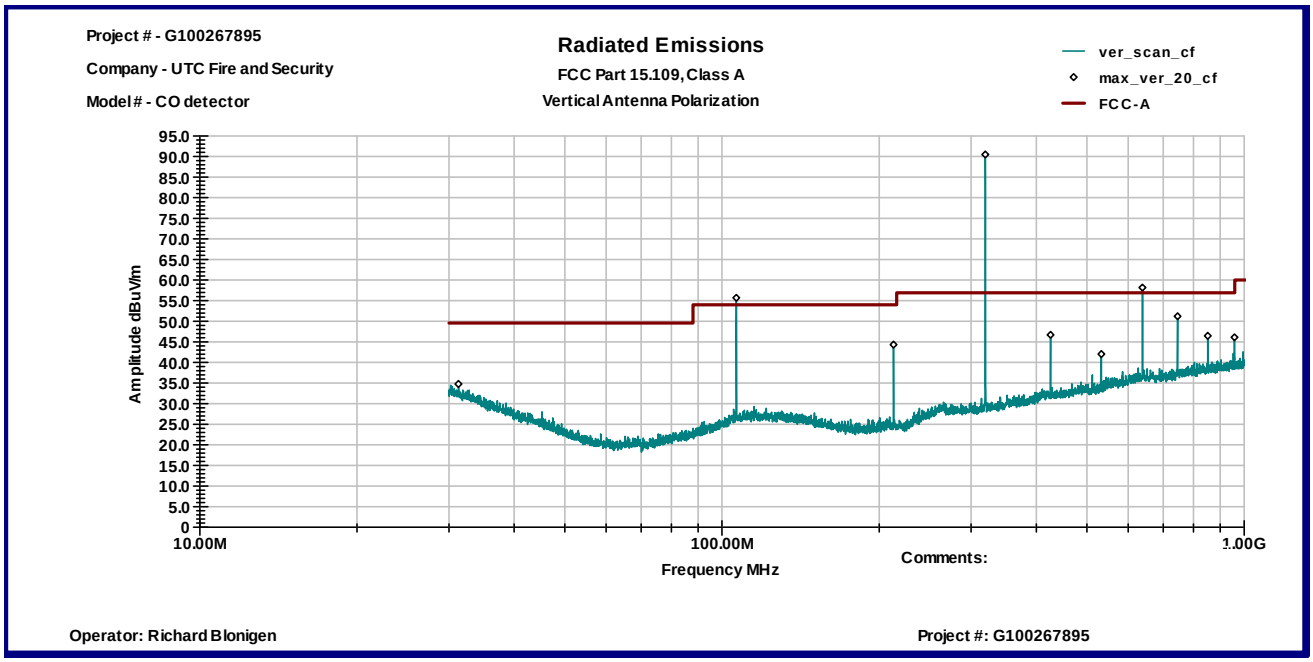
Date:	December 3 & 6, 2010	**Result:** **Pass**
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Richard Blonigen	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Average Value	

Table 3.2.2

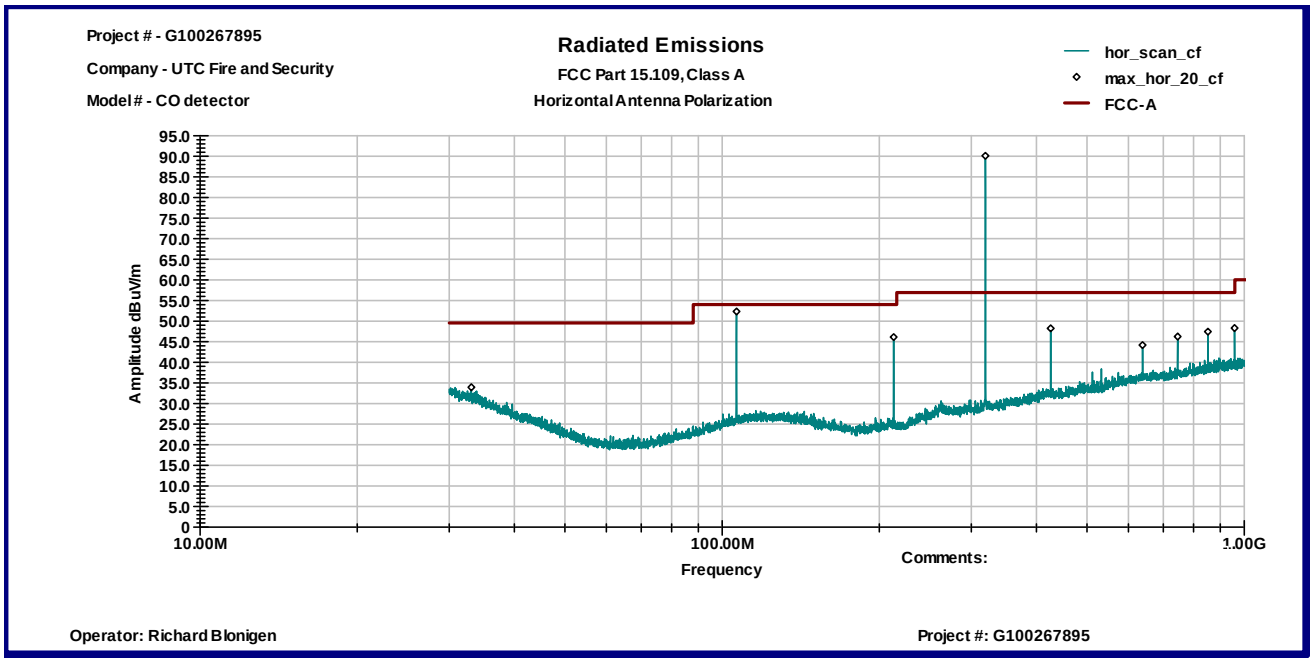
Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	Peak Reading	Total @ 3m	Average CF	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dB	dBµV/m	dB	
			Emissions at Fundamental Frequency								
319.51	V	180	14.5	2.0	0.0	74.4	90.9	21.8	75.9	-6.7	
319.51	H	100	14.5	2.0	0.0	73.4	89.9	21.8	75.9	-7.7	
			Spurious and Harmonics Emissions								
106.50	V	100	12.1	1.1	0.0	42.7	55.8	21.8	55.9	-21.9	
213.01	V	100	10.8	1.6	0.0	33.3	45.7	21.8	55.9	-32.0	
426.01	V	134	17.0	2.3	0.0	30.5	49.8	21.8	55.9	-27.9	
639.02	V	100	19.9	3.0	0.0	35.4	58.3	21.8	55.9	-19.4	
745.53	V	100	20.5	3.2	0.0	29.5	53.2	21.8	55.9	-24.5	
1278.04	V	143	24.6	2.6	38.9	62.3	50.6	21.8	55.9	-27.1	
2342.67	V	100	28.0	3.5	37.9	54.7	48.2	21.8	55.9	-29.5	
2449.33	V	100	28.3	3.6	37.8	55.1	49.2	21.8	55.9	-28.5	
2769.33	V	100	29.2	3.7	37.7	56.9	52.2	21.8	55.9	-25.5	
2876.00	V	100	29.6	3.8	37.7	55.3	50.9	21.8	55.9	-26.8	
2982.67	V	100	29.9	3.8	37.7	59.0	55.0	21.8	55.9	-22.7	
106.50	H	265	12.1	1.1	0.0	39.1	52.2	21.8	55.9	-25.5	
213.01	H	119	10.8	1.6	0.0	34.4	46.8	21.8	55.9	-30.9	
426.02	H	100	17.0	2.3	0.0	29.7	49.0	21.8	55.9	-28.7	
958.54	H	155	22.3	3.7	0.0	24.0	50.0	21.8	55.9	-27.7	
2342.67	H	100	28.0	3.5	37.9	56.8	50.3	21.8	55.9	-27.4	
2449.33	H	100	28.3	3.6	37.8	60.1	54.2	21.8	55.9	-23.5	
2662.67	H	100	28.9	3.7	37.7	56.6	51.4	21.8	55.9	-26.3	
2876.00	H	100	29.6	3.8	37.7	56.4	52.0	21.8	55.9	-25.6	
2982.67	H	100	29.9	3.8	37.7	57.6	53.6	21.8	55.9	-24.1	

Graph 3.2.1

Vertical antenna polarization

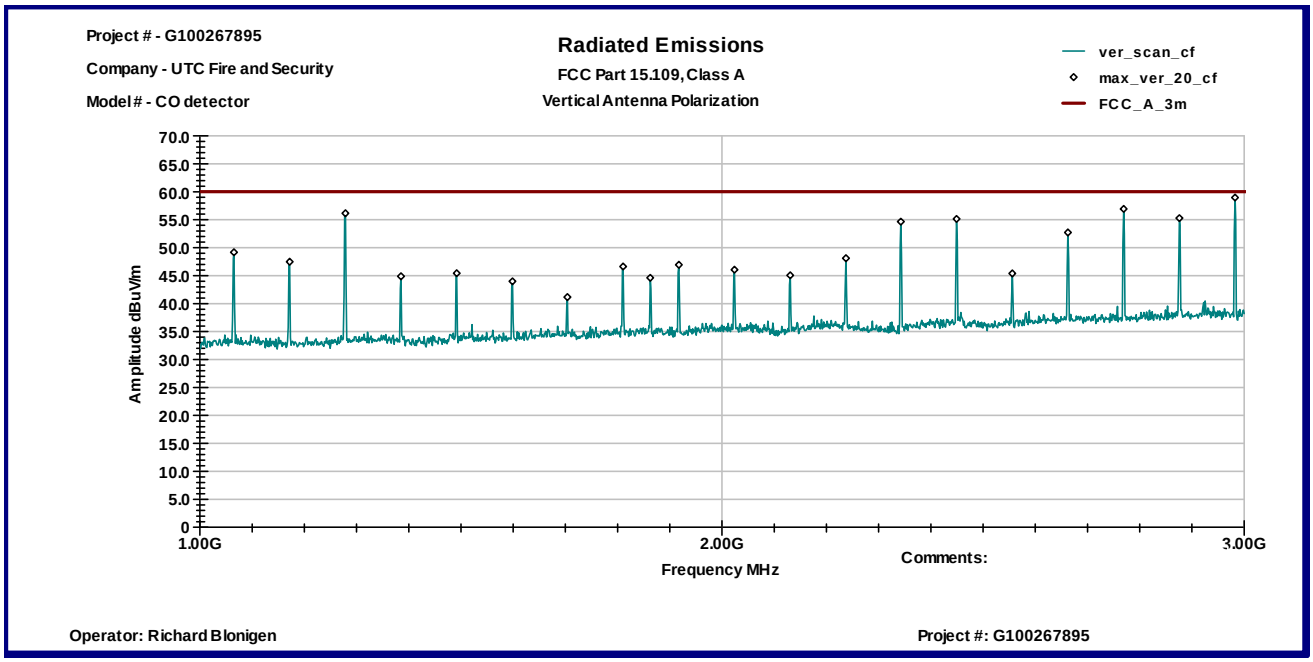


Horizontal antenna polarization

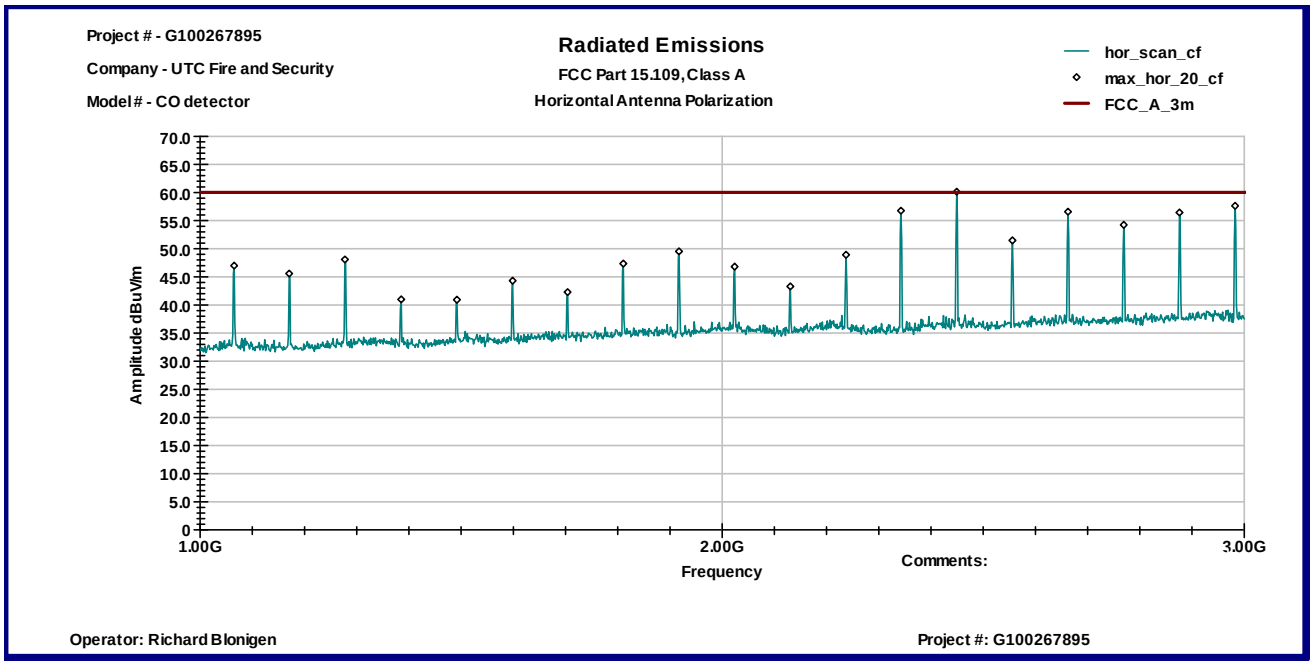


Graph 3.2.2

Vertical antenna polarization



Horizontal antenna polarization



3.2.1 Average correction factor calculation

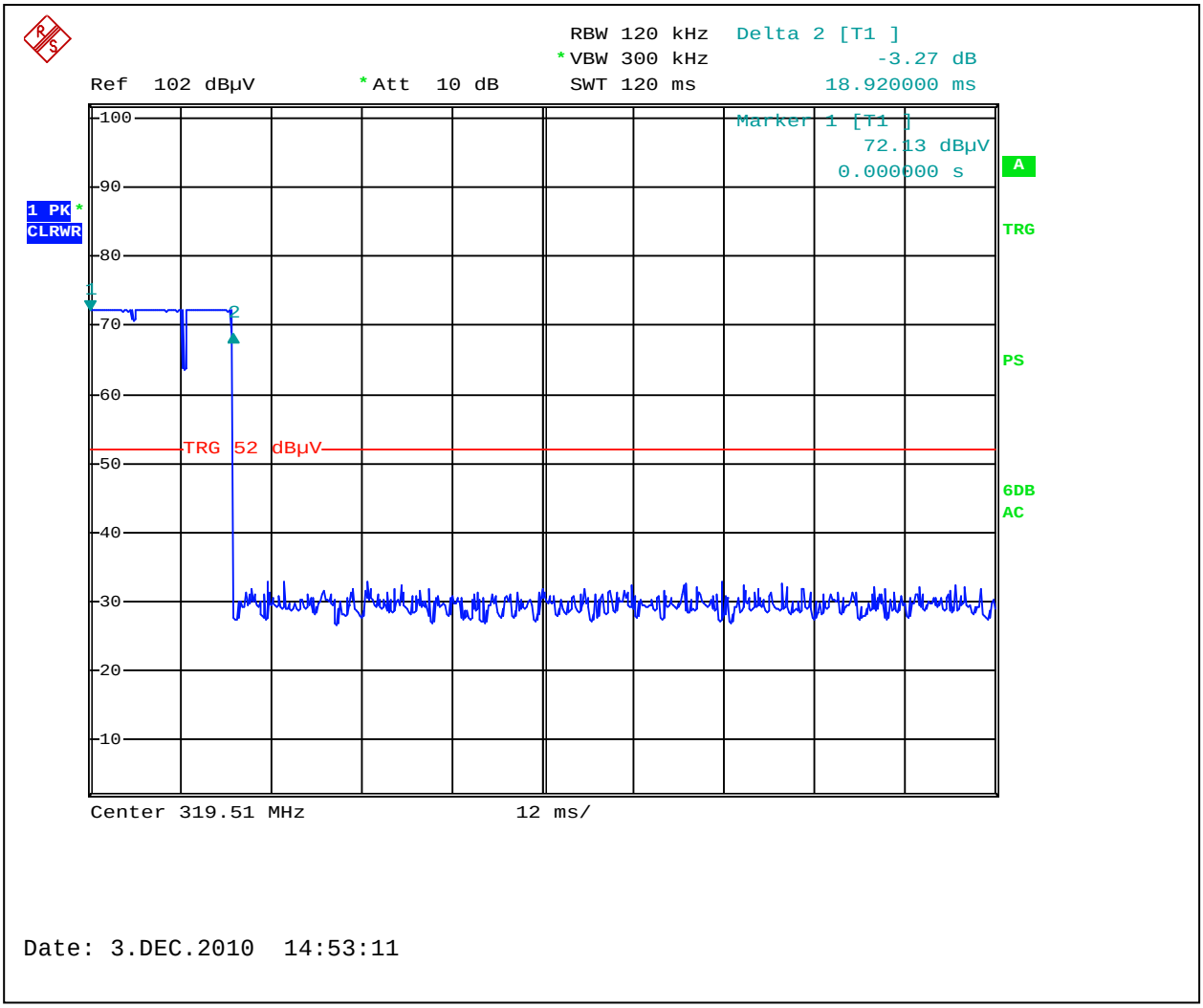
An Average correction factor is calculated by averaging one complete pulse train.

One complete pulse train, including blanking intervals = 18.92ms with cycle more than 100ms
Time with field strength is in its maximum value (length of pulses) during 1 pulse train = 8.12ms
(0.96ms + 0.49ms + 0.115ms x 58) = 8.12ms

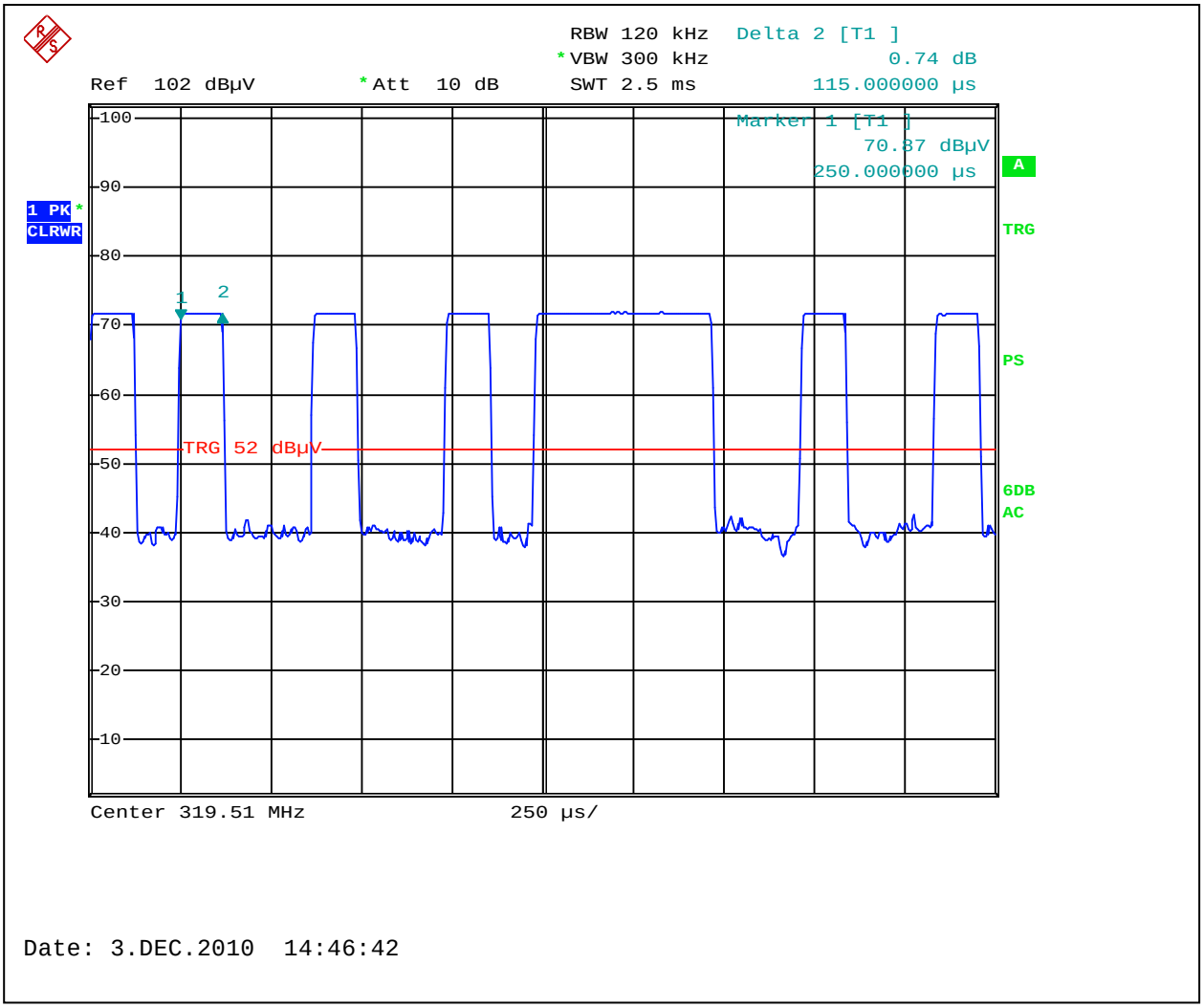
Average Correction Factor = 20Log(8.12ms/100ms) = -21.8dB

Graphs 3-2-3 to 3-2-6 show pulse train timing.

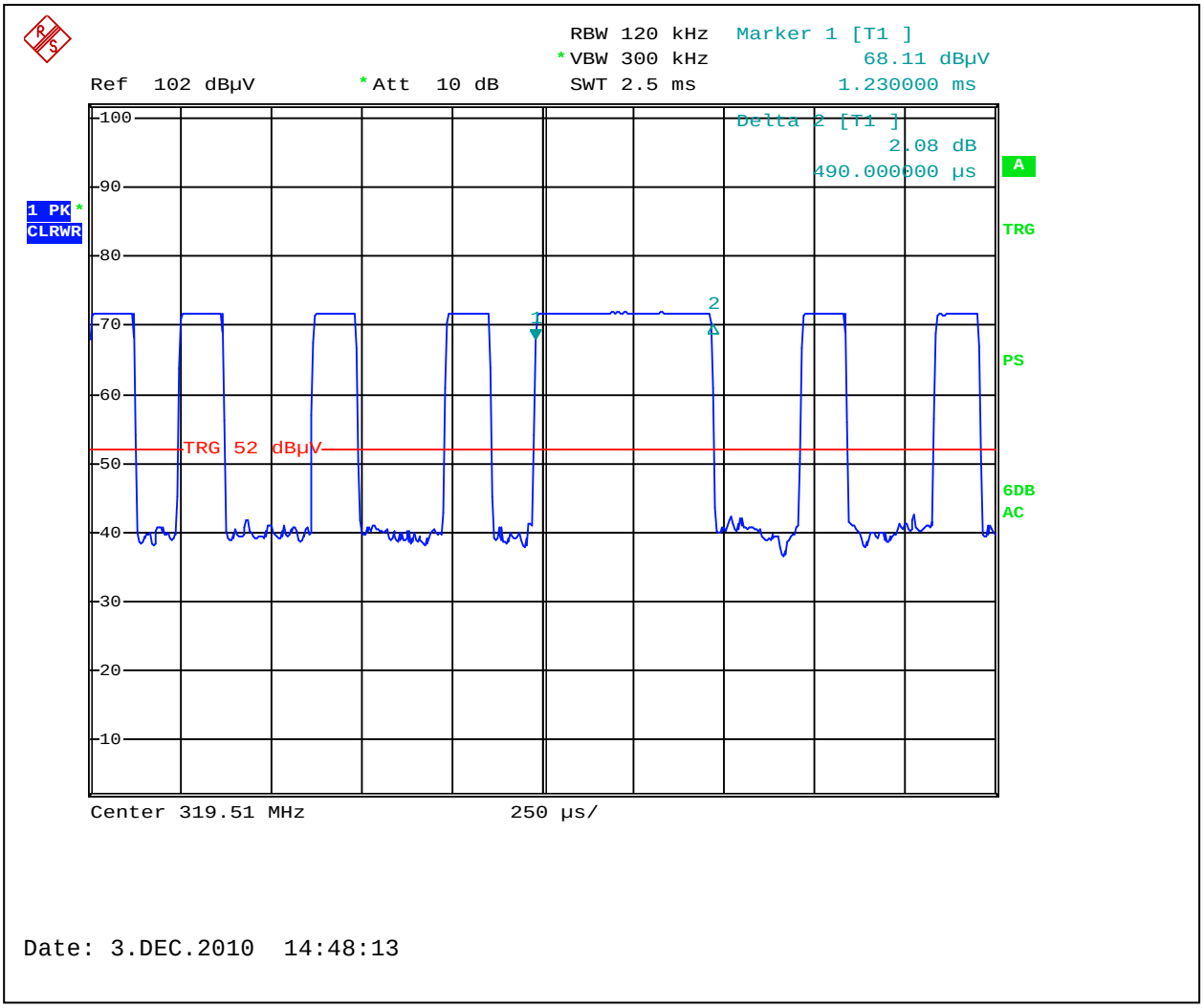
Graph 3.2.3


RBW 120 kHz
Delta 2 [T1]
*VBW 300 kHz
-3.27 dB
Ref 102 dBµV
*Att 10 dB
SWT 120 ms
18.920000 ms
Marker 1 [T1]
72.13 dBµV
0.000000 s
A
1 PK *
CLRWR
TRG
PS
6DB
AC
100
90
80
70
60
50
40
30
20
10
TRG 52 dBµV
Center 319.51 MHz
12 ms/
Date: 3.DEC.2010 14:53:11

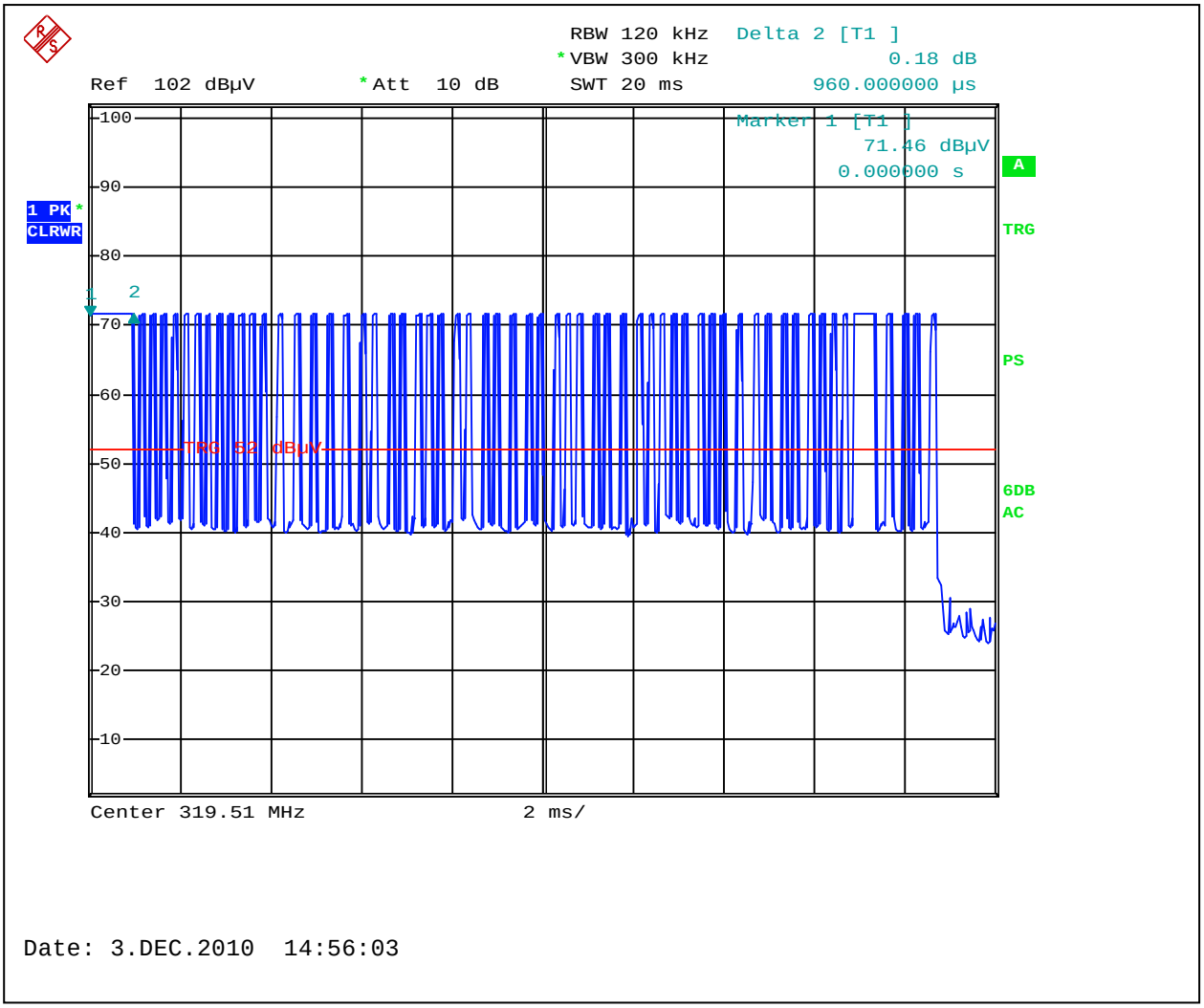
Graph 3.2.4


RBW 120 kHz
*VBW 300 kHz
Ref 102 dBµV
*Att 10 dB
SWT 2.5 ms
Delta 2 [T1]
0.74 dB
115.000000 µs
Marker 1 [T1]
70.87 dBµV
250.000000 µs
A
1 PK *
CLRWR
TRG
PS
6DB
AC
100
90
80
70
60
50
40
30
20
10
1
2
TRG 52 dBµV
Center 319.51 MHz
250 µs/
Date: 3.DEC.2010 14:46:42

Graph 3.2.5


RBW 120 kHz
*VBW 300 kHz
Ref 102 dBµV
*Att 10 dB
SWT 2.5 ms
Marker 1 [T1]
68.11 dBµV
1.230000 ms
Delta 2 [T1]
2.08 dB
490.000000 µs
1 PK *
CLRWR
A
TRG
PS
6DB
AC
100
90
80
70
60
50
40
30
20
10
TRG 52 dBµV
Center 319.51 MHz
250 µs/
Date: 3.DEC.2010 14:48:13

Graph 3.2.6


RBW 120 kHz
*VBW 300 kHz
Ref 102 dBµV
*Att 10 dB
SWT 20 ms
Delta 2 [T1]
0.18 dB
960.000000 µs
Marker 1 [T1]
71.46 dBµV
0.000000 s
1 PK *
CLRWR
A
TRG
PS
6DB
AC
TRG 52 dBµV
Center 319.51 MHz
2 ms/
Date: 3.DEC.2010 14:56:03

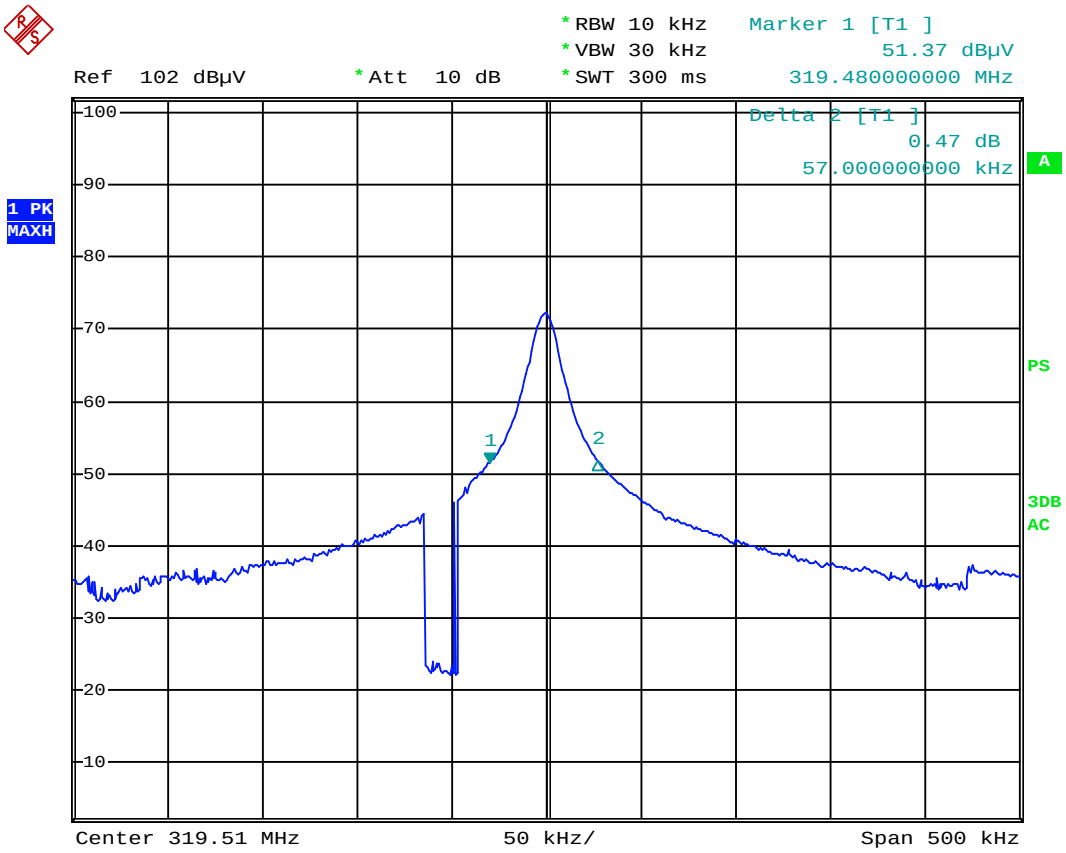
3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Maximum allowed bandwidth kHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz	Result
319.51	798.8	57.0	141.0	**Pass**
Maximum allowed bandwidth:	☒ 0.25% of the centre operating frequency ☐ 0.5% of the centre operating frequency			
RBW: **VBW:**	☒ 10kHz ☐ 100kHz ☐ other kHz ☒ 30kHz ☐ 300kHz ☐ other kHz			

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

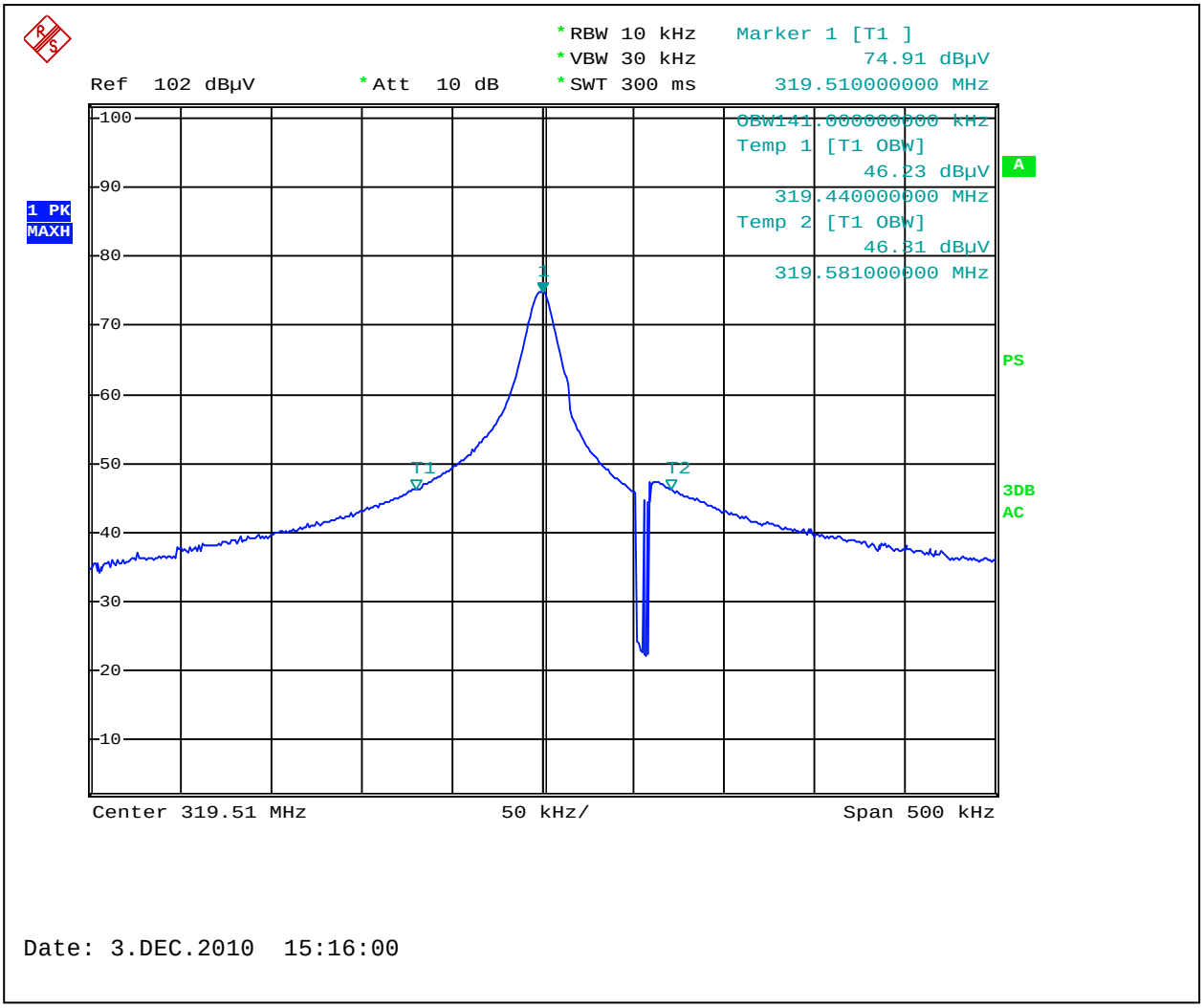
Notes:

Graph 3.3.1



Date: 3.DEC.2010 15:13:56

Graph 3.3.2


*RBW 10 kHz
*VBW 30 kHz
Ref 102 dBµV
*Att 10 dB
*SWT 300 ms
Marker 1 [T1]
74.91 dBµV
319.510000000 MHz
OBW141.000000000 kHz
Temp 1 [T1 OBW]
46.23 dBµV
319.440000000 MHz
Temp 2 [T1 OBW]
46.31 dBµV
319.581000000 MHz
1 PK
MAXH
A
PS
3DB
AC
T1
T2
100
90
80
70
60
50
40
30
20
10
Center 319.51 MHz
50 kHz/
Span 500 kHz
Date: 3.DEC.2010 15:16:00

3.4 Transmitter power line conducted emissions

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test result: **N/A**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: dB below the limits

Notes:

3.5 Receiver/digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-1000MHz

Max. Emissions margin: 3.4 dB 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 3.5.1 and 3.5.2)

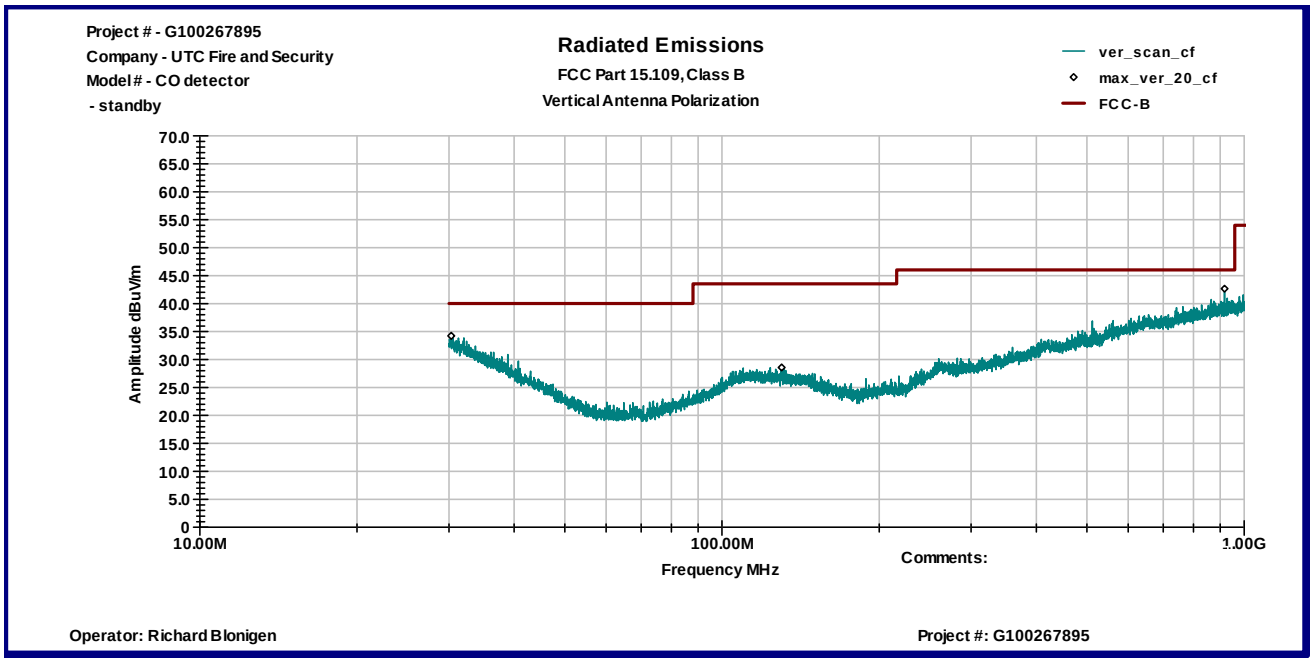
Date:	December 6, 2010	**Result:** **Pass**
Standard:	FCC Part 15.109, Class B / ICES-003	
Tested by:	Richard Blonigen	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Standby	

Table 3.5.1

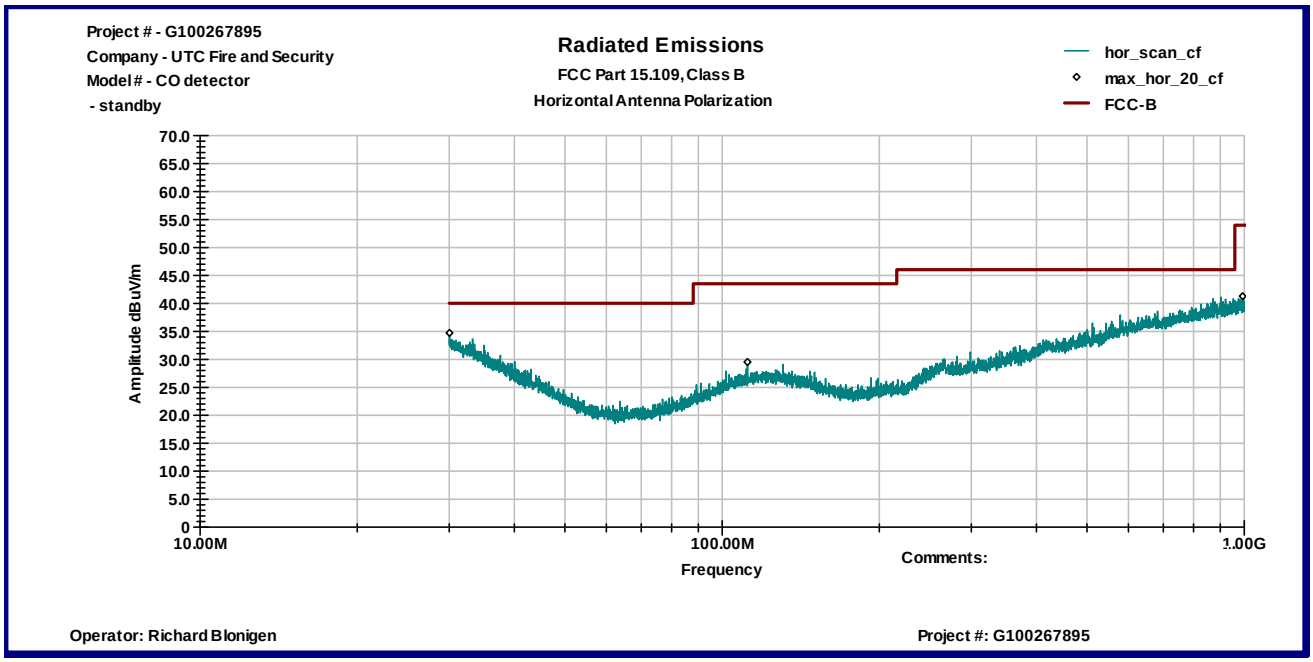
Frequency	Ant. Polarity	Peak Reading dBµV	Ant.Factor dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
30.304 MHz	V	14.1	20.2	34.2	40.0	-5.8
130.12 MHz	V	14.6	14.0	28.6	43.5	-15.0
917.63 MHz	V	17.2	25.5	42.7	46.0	-3.4
30.047 MHz	H	14.4	20.3	34.7	40.0	-5.3
111.83 MHz	H	15.8	13.7	29.5	43.5	-14.0
992.97 MHz	H	15.0	26.3	41.3	54.0	-12.7

Graph 3.5.1

Vertical antenna polarization



Horizontal antenna polarization



3.6 Digital device conducted emissions

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test result: **N/A**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: dB below the limits

Notes: It was determined from consideration of the electrical characteristics and usage of particular apparatus that Conducted Emissions testing is inappropriate and therefore unnecessary (as battery operated equipment).

4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	ESCI	100358	12909	07/12/2011	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	10/18/2011	☒
Horn Antenna	EMCO	3115	9507-4513	9936	04/13/2011	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	10/06/2011	☒
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	☒

Test Setup Photos