

TEST REPORT

Report Number: 101560152MIN-001

Project Number: G101560152

Testing performed on the
60-460-319.5 / 60-460-319.5-LB
60-460-01-95

FCC ID: B4Z-569E-LMRISE
Industry Canada ID: 1175C-569EROR

to
47 CFR Part 15. 231:2010
RSS- 210, Issue 8, 2010
RSS-Gen, Issue 3, 2010
47 CFR, Part 15:2010, §15.109, Class / ICES-003, Issue 5:2012

For
UTC Fire & Security Americas Corporation, Inc.

Test Performed by:
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Test Authorized by:
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1275 Red Fox Road
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Date: March 10, 2014

Reviewed by: Richard Blonigen
Richard Blonigen

Date: March 10, 2014

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1.0 GENERAL DESCRIPTION

Models:	60-460-319.5 60-460-01-95
Type of EUT:	135F Alarm Sensor (60-460-319.5) 194F Alarm Sensor (60-460-01-95)
FCC ID:	B4Z-569E-LMRISE
Industry Canada ID:	1175C-569EROR
Related Submittal(s) Grants:	None
Company:	UTC Fire & Security Americas Corporation, Inc.
Customer:	Mr. Chris Fuller
Address:	1275 Red Fox Road Arden Hills, MN 55112 USA
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e-mail:	Christopher.Fuller@fs.utc.com
Test Standards:	☒ 47 CFR, Part 15:2010, §15.231 ☒ RSS-210, Issue 8, 20010 ☒ RSS-Gen, Issue 3, 2010 ☒ 47 CFR, Part 15:2010, §15.109, Class B ☒ ICES-003, Issue 5:2012 ☐ Other
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	March 3, 2014
Test Work Started:	March 3, 2014
Test Work Completed:	March 4, 2014
Test Sample Conditions:	☐ Damaged ☐ Poor (Usable) ☒ Good

1.1 Product Description; Test Facility

Product Description:	Periodic Transmitter
Operating Frequency	319.5 MHz
Modulation:	ON / OFF Keying
Emission Designator:	103KX1D
Antenna(s) Info:	Integral
Antenna Installation:	☐ User ☐ Professional ☐ Factory
Transmitter power configuration:	☒ Internal battery ☐ External power source ☐ 120VAC ☒ 9 VDC Pile Alkaline battery 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
- ☒ - Normal Mode
- ☒ - Continuous modulated
- ☐ - Test program (customer specific)
- ☐ -

Operating modes of the EUT:

No.	Description
1	The transmitter was programmed to transmit continuously, or in normal mode

Cables:

No.	Type	Length	Designation	Note
1	None			

Support equipment/Services:

No.	Item	Description
1	None	

General notes: Both 60-460-319.5 and 60-460-01-95 Alarm Sensors are electrically identical with different set point and were tested separately; based on electrical similarity and similar test results the both radios can be certified under same FCC ID and Industry Canada ID.
The model 60-460-01-95 might be equipped with lithium battery, the model name for such device is 60-460-01-95-LB and deemed comply with standards requirements with no testing as electrically identical to the model 60-460-01-95.

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(μ V/m)

RA = Receiver Amplitude in dB(μ V)

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(μ V) 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(μ V/m).

$$RA = 48.1 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

$$FS = RA + AF + CF - AG$$

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

$$FS = 41.1 \text{ dB}(\mu\text{V}/\text{m})$$



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(a) / RSS-210 A1.1.2	Transmitter field strength at fundamentals	Pass
15.231(a) / RSS-210 A1.1.2	Transmitter spurious emissions field strength	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	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

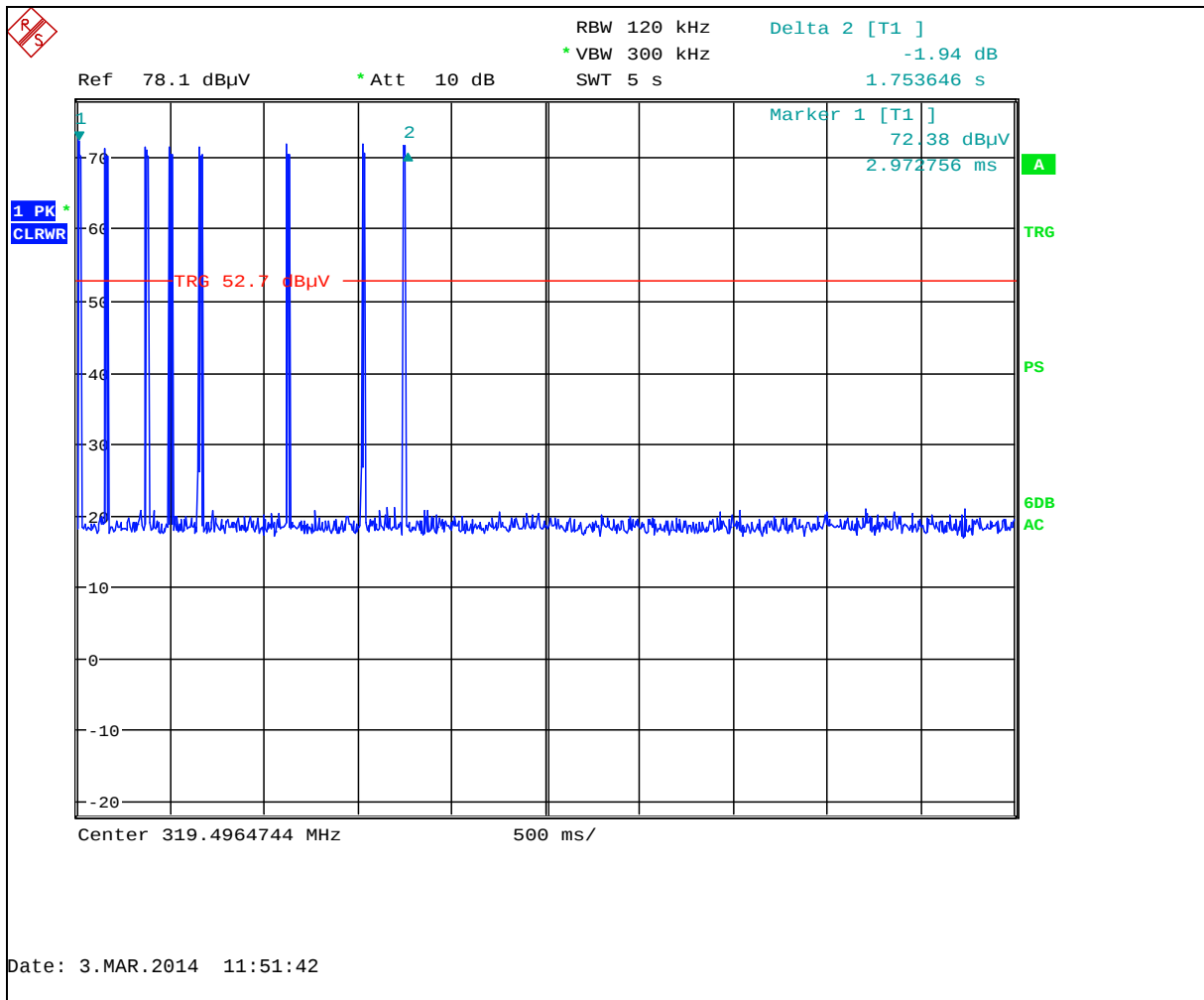
Maximum allowed deactivation time: 5 sec

Measured deactivation time: about 1.75 sec

Test result: Pass

Notes: 1. Graph 3.1.1 shows deactivation time for normal mode transmission.

Graph 3.1.1



Graph 3.1.2

3.2 Transmitter field strength of emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Frequency range of measurements: 30MHz-4000MHz

Test result: Pass

Max. Emissions margin at fundamental: 7.2 dB below the limits

Max. margin of harmonics and spurious emissions: 15.0 dB below the limits

Notes: None

Date:	March 3, 2014	Result: Pass
Standard:	FCC 15.231(e) / RSS-210 A1.1.2	
Tested by:	Simon Khazon	
Test Point:	Field Strength at Fundamental	
Operation mode:	See Page 5	
Note:	60-460-319.5 (135)	

Table 3.2.1

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dBμV	Total @ 3m dBμV/m	Corr Facto dB	Limit dBμV/m	Margin dB
	Polarity	Hts(cm)								
				Peak Value						
319.51	V	190	14.6	1.4	0.0	70.4	86.5	0.0	95.9	-9.4
319.50	H	202	14.6	1.4	0.0	70.5	86.6	0.0	95.9	-9.3
				Average Value						
319.51	V	190	14.6	1.4	0.0	70.4	86.5	17.9	75.9	-7.3
319.50	H	202	14.6	1.4	0.0	70.5	86.6	17.9	75.9	-7.2

Date:	March 3, 2014	Result: Pass
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Simon Khazon	
Test Point:	Field Strength of Spurious Emissions	
Operation mode:	See Page 5	
Note:	60-460-319.5 (135) Frequency Range 30-1000MHz	

Table 3.2.2

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dBμV	Total @ 3m dBμV/m	Corr Factor dB	AVG Limit dBμV/m	Margin dB
	Polarity	Hts(cm)								
Average Value										
106.50	V	100	12.2	0.8	0.0	29.3	42.3	17.9	55.9	-31.5
213.00	V	100	10.5	1.1	0.0	39.4	51.0	17.9	55.9	-22.8
639.00	V	166	19.7	1.3	0.0	37.3	58.4	17.9	55.9	-15.4
745.00	V	148	20.5	2.3	0.0	31.7	54.5	17.9	55.9	-19.3
852.02	V	118	21.5	2.5	0.0	31.9	55.9	17.9	55.9	-17.9
Peak Value										
106.50	H	100	12.2	0.8	0.0	29.2	42.2	17.9	55.9	-31.6
213.00	H	100	10.5	1.1	0.0	39.7	51.3	17.9	55.9	-22.5
639.00	H	183	19.7	1.3	0.0	36.7	57.8	17.9	55.9	-16.0
852.02	H	100	21.5	2.5	0.0	33.0	57.0	17.9	55.9	-16.8
213.00	V	100	10.5	1.1	0.0	39.4	51.0	0.0	75.9	-24.9
532.50	V	130	18.9	1.9	0.0	29.4	50.2	0.0	75.9	-25.7
639.00	V	166	19.7	1.3	0.0	37.3	58.4	0.0	75.9	-17.5
745.00	V	148	20.5	2.3	0.0	31.7	54.5	0.0	75.9	-21.4
852.02	V	118	21.5	2.5	0.0	31.9	55.9	0.0	75.9	-20.0
958.52	V	100	22.2	2.7	0.0	22.0	46.9	0.0	75.9	-29.0
106.50	H	100	12.2	0.8	0.0	29.2	42.2	0.0	75.9	-33.7
213.00	H	100	10.5	1.1	0.0	39.7	51.3	0.0	75.9	-24.6
532.50	H	100	18.9	1.9	0.0	30.8	51.6	0.0	75.9	-24.3
639.00	H	183	19.7	1.3	0.0	36.7	57.8	0.0	75.9	-18.1
852.02	H	100	21.5	2.5	0.0	33.0	57.0	0.0	75.9	-18.9

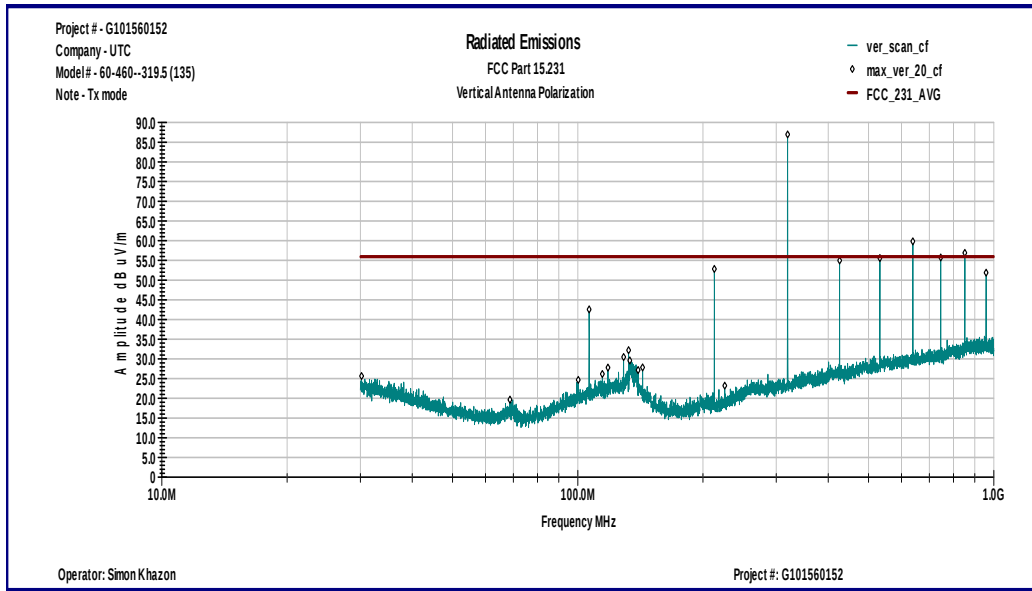
Date:	March 3, 2014	Result: Pass
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Simon Khazon	
Test Point:	Field Strength of Spurious Emissions	
Operation mode:	See Page 5	
Note:	60-460-319.5 (135) Frequency Range 1.0 -4.0GHz	

Table 3.2.3

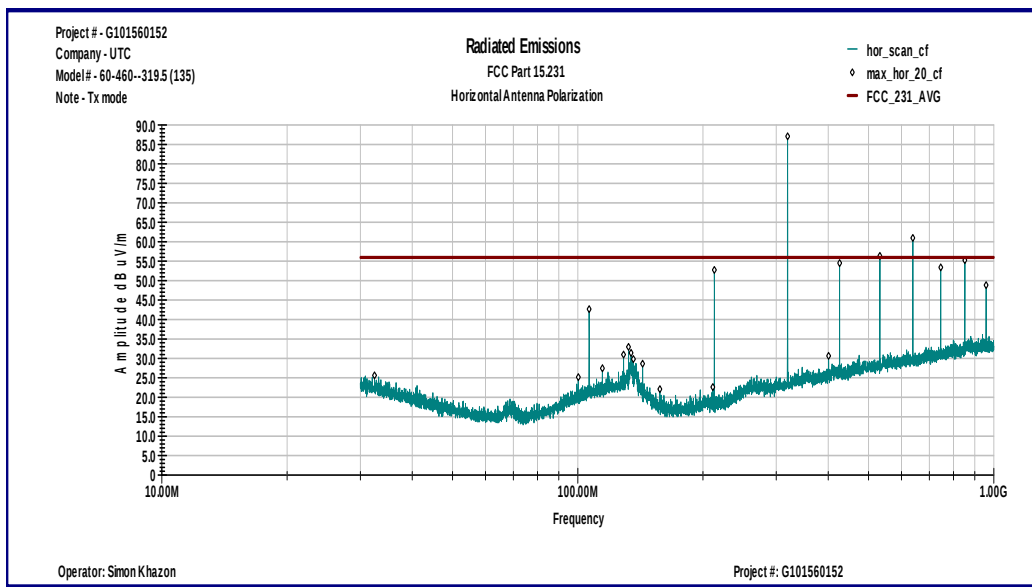
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Corr Factor dB	Ave Limit dBμV/m	Margin dB
	Polarity	Hts(cm)								
				Average Value						
1704.01	V	206	27.2	3.9	41.4	65.3	55.0	17.9	55.9	-18.8
2449.60	V	161	28.5	2.9	40.4	62.9	53.9	17.9	55.9	-19.9
1704.00	H	126	27.2	3.9	41.6	67.7	57.2	17.9	55.9	-16.6
2344.00	H	250	28.2	2.9	40.5	61.1	51.7	17.9	55.9	-22.1
2449.60	H	360	28.5	2.9	40.4	60.4	51.4	17.9	55.9	-22.4
				Peak Value						
1704.01	V	206	27.2	3.9	41.4	65.3	55.0	0.0	75.9	-20.9
2449.60	V	161	28.5	2.9	40.4	62.9	53.9	0.0	75.9	-22.0
1704.00	H	126	27.2	3.9	41.6	67.7	57.2	0.0	75.9	-18.7
2344.00	H	250	28.2	2.9	40.5	61.1	51.7	0.0	75.9	-24.2
2449.60	H	360	28.5	2.9	40.4	60.4	51.4	0.0	75.9	-24.5

Graph 3.2.1

Vertical antenna polarization

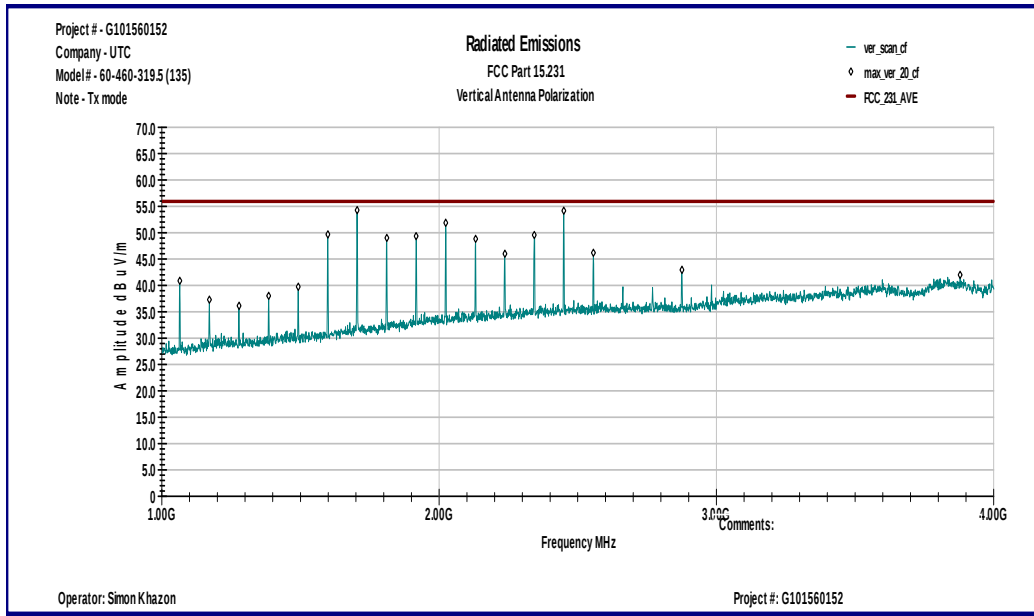


Horizontal antenna polarization

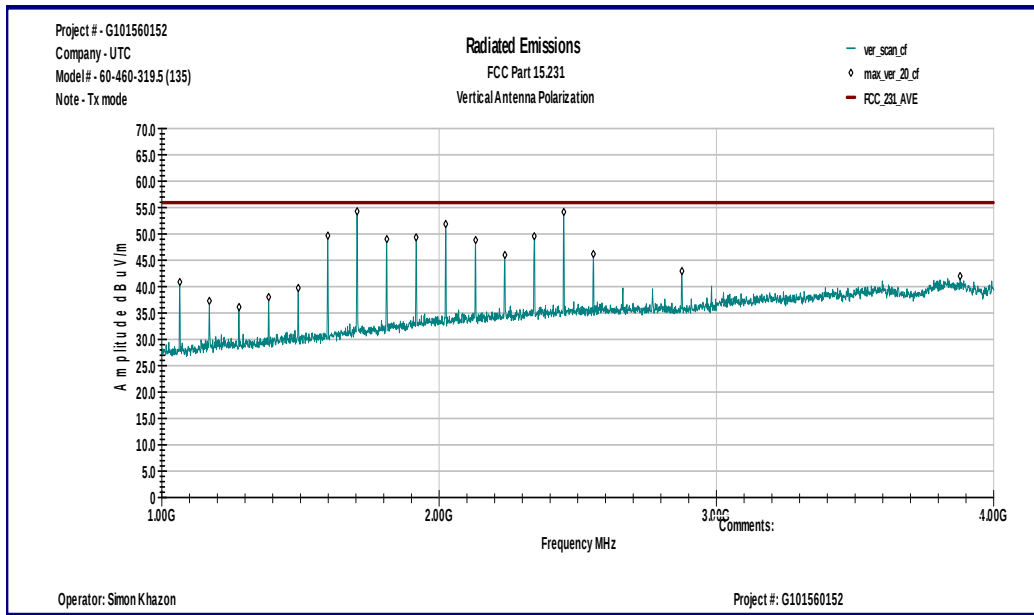


Graph 3.2.2

Vertical antenna polarization



Horizontal antenna polarization



Date:	March 3, 2014	Result: Pass
Standard:	FCC 15.231(e) / RSS-210 A1.1.2	
Tested by:	Simon Khazon	
Test Point:	Field Strength at Fundamental	
Operation mode:	See Page 5	
Note:	60-460-01-95	

Table 3.2.4

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dBμV	Total @ 3m dBμV/m	Corr Factor dB	Limit dBμV/m	Margin dB
	Polarity	Hts(cm)								
Peak Value										
319.51	V	161	14.6	1.4	0.0	69.3	85.4	0.0	95.9	-10.5
319.50	H	156	14.6	1.4	0.0	69.5	85.6	0.0	95.9	-10.3
Average Value										
319.51	V	161	14.6	1.4	0.0	69.3	85.4	17.9	75.9	-8.4
319.50	H	156	14.6	1.4	0.0	69.5	85.6	17.9	75.9	-8.2

Date:	March 3, 2014	Result: Pass
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Simon Khazon	
Test Point:	Field Strength of Spurious Emissions	
Operation mode:	See Page 5	
Note:	60-460-01-95 Frequency Range 30-1000MHz	

Table 3.2.5

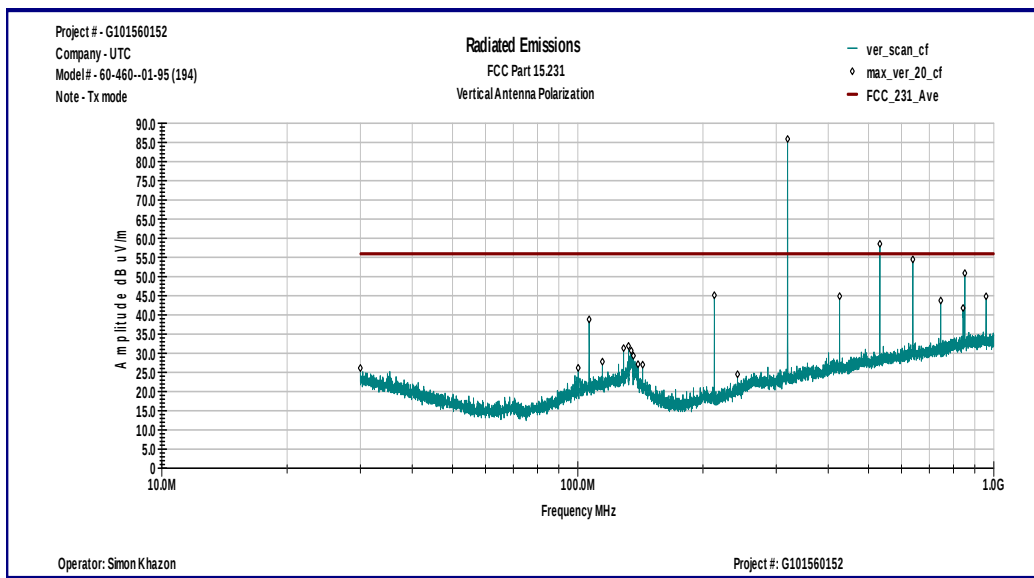
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Corr Factor dB	Limit dBμV/m	Margin dB
	Polarity	Hts(cm)								
				Average Value						
213.00	V	100	10.5	1.1	0.0	33.2	44.8	17.9	55.9	-29.0
532.50	V	100	18.9	1.9	0.0	37.6	58.4	17.9	55.9	-15.4
639.00	V	123	19.7	1.3	0.0	31.9	53.0	17.9	55.9	-20.8
532.50	H	100	18.9	1.9	0.0	38.0	58.8	17.9	55.9	-15.0
639.00	H	100	19.7	1.3	0.0	34.1	55.2	17.9	55.9	-18.6
852.02	H	100	21.5	2.5	0.0	27.3	51.3	17.9	55.9	-22.5
				Peak Value						
213.00	V	100	10.5	1.1	0.0	33.2	44.8	0.0	75.9	-31.1
532.50	V	100	18.9	1.9	0.0	37.6	58.4	0.0	75.9	-17.5
639.00	V	123	19.7	1.3	0.0	31.9	53.0	0.0	75.9	-22.9
852.02	V	109	21.5	2.5	0.0	26.2	50.2	0.0	75.9	-25.7
426.00	H	100	16.8	1.7	0.0	26.1	44.6	0.0	75.9	-31.3
532.50	H	100	18.9	1.9	0.0	38.0	58.8	0.0	75.9	-17.1
639.00	H	100	19.7	1.3	0.0	34.1	55.2	0.0	75.9	-20.7

Date:	March 3, 2014	Result: Pass
Standard:	FCC 15.231(b) / RSS-210 A1.1.2	
Tested by:	Simon Khazon	
Test Point:	Field Strength of Spurious Emissions	
Operation mode:	See Page 5	
Note:	60-460-01-95 Frequency Range 1.0 -4.0GHz	

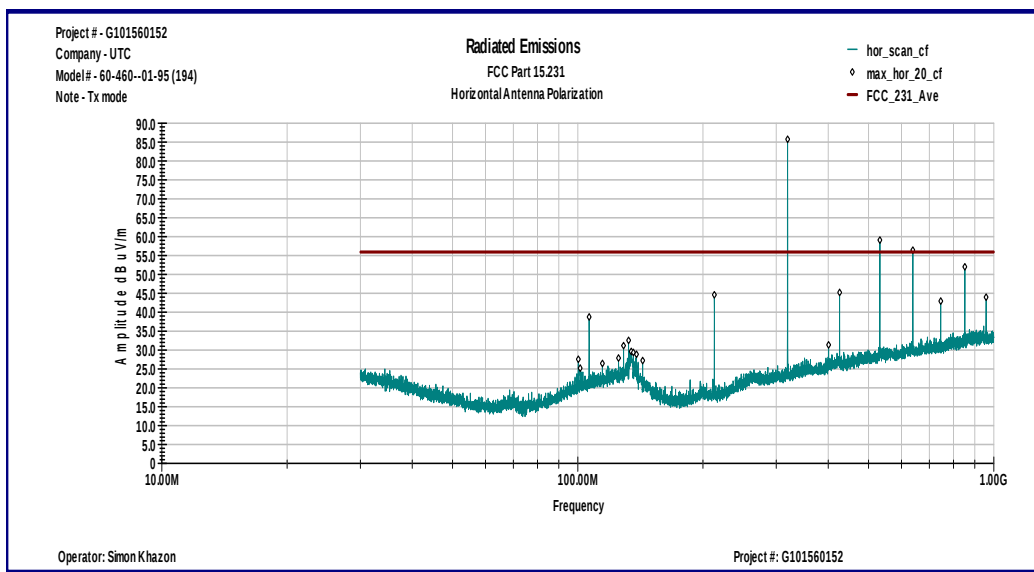
Table 3.2.6

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Corr Factor dB	Limit dBμV/m	Margin dB
	Polarity	Hts(cm)								
				Average Value						
1597.45	V	161	26.3	3.7	41.6	67.0	55.4	17.9	55.9	-18.4
1704.40	V	159	27.2	3.9	41.4	66.9	56.6	17.9	55.9	-17.2
1811.20	V	217	27.5	4.0	41.3	66.4	56.6	17.9	55.9	-17.2
1597.48	H	220	26.3	3.7	41.6	63.0	51.4	17.9	55.9	-22.4
1703.98	H	263	27.2	3.9	41.4	62.9	52.6	17.9	55.9	-21.2
1810.46	H	197	27.5	4.0	41.3	62.3	52.5	17.9	55.9	-21.3
				Peak Value						
1597.45	V	161	26.3	3.7	41.6	67.0	55.4	0.0	75.9	-20.5
1704.40	V	159	27.2	3.9	41.4	66.9	56.6	0.0	75.9	-19.3
1811.20	V	217	27.5	4.0	41.3	66.4	56.6	0.0	75.9	-19.3
1597.48	H	220	26.3	3.7	41.6	63.0	51.4	0.0	75.9	-24.5
1703.98	H	263	27.2	3.9	41.4	62.9	52.6	0.0	75.9	-23.3
1810.46	H	197	27.5	4.0	41.3	62.3	52.5	0.0	75.9	-23.4

Vertical antenna polarization

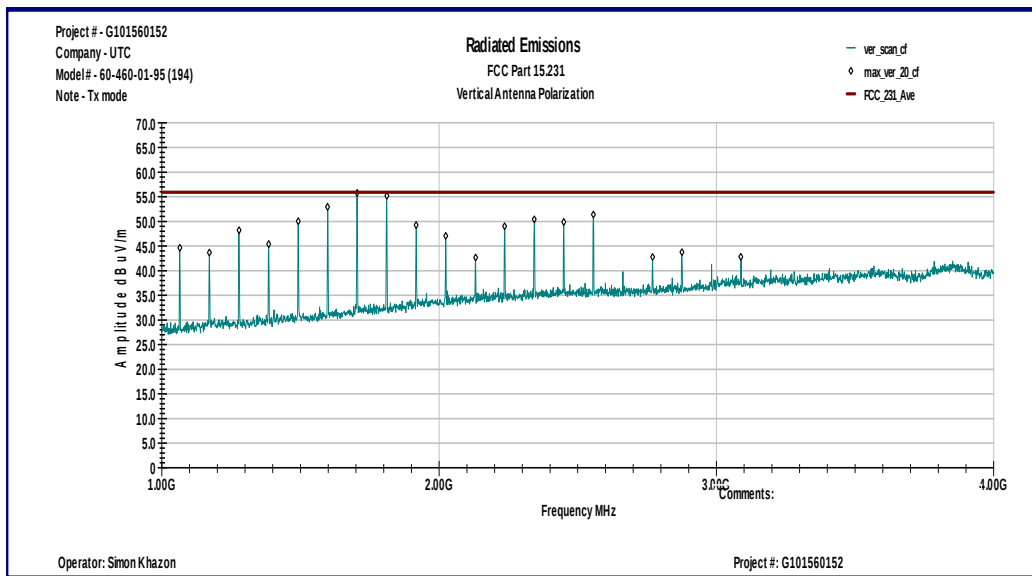


Horizontal antenna polarization

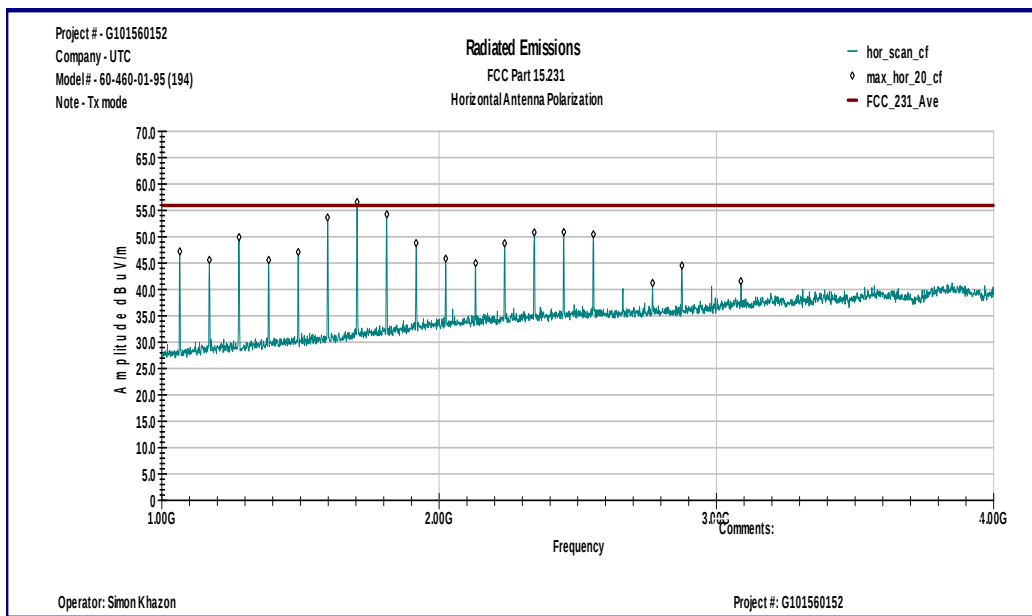


Graph 3.2.4

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.

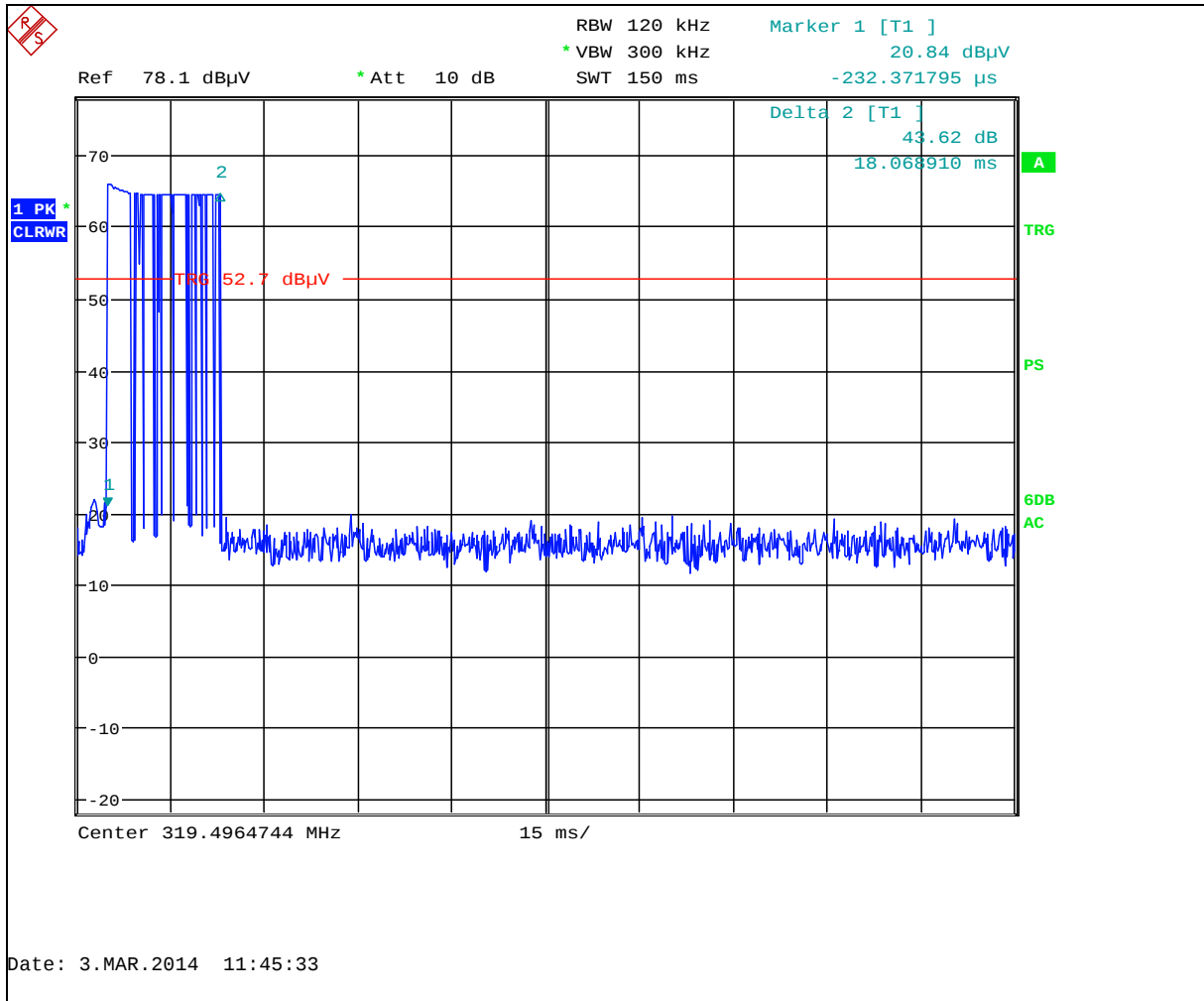
One complete pulse train, including blanking intervals = 18.0 ms

Time with field strength is in its maximum value (length of pulses) = $(58 \times 0.1314) + 0.5 + 1.0 = 12.7$ ms

Average Correction Factor = $20\text{Log}(12.7\text{ms}/100\text{ms}) = -17.9\text{dB}$

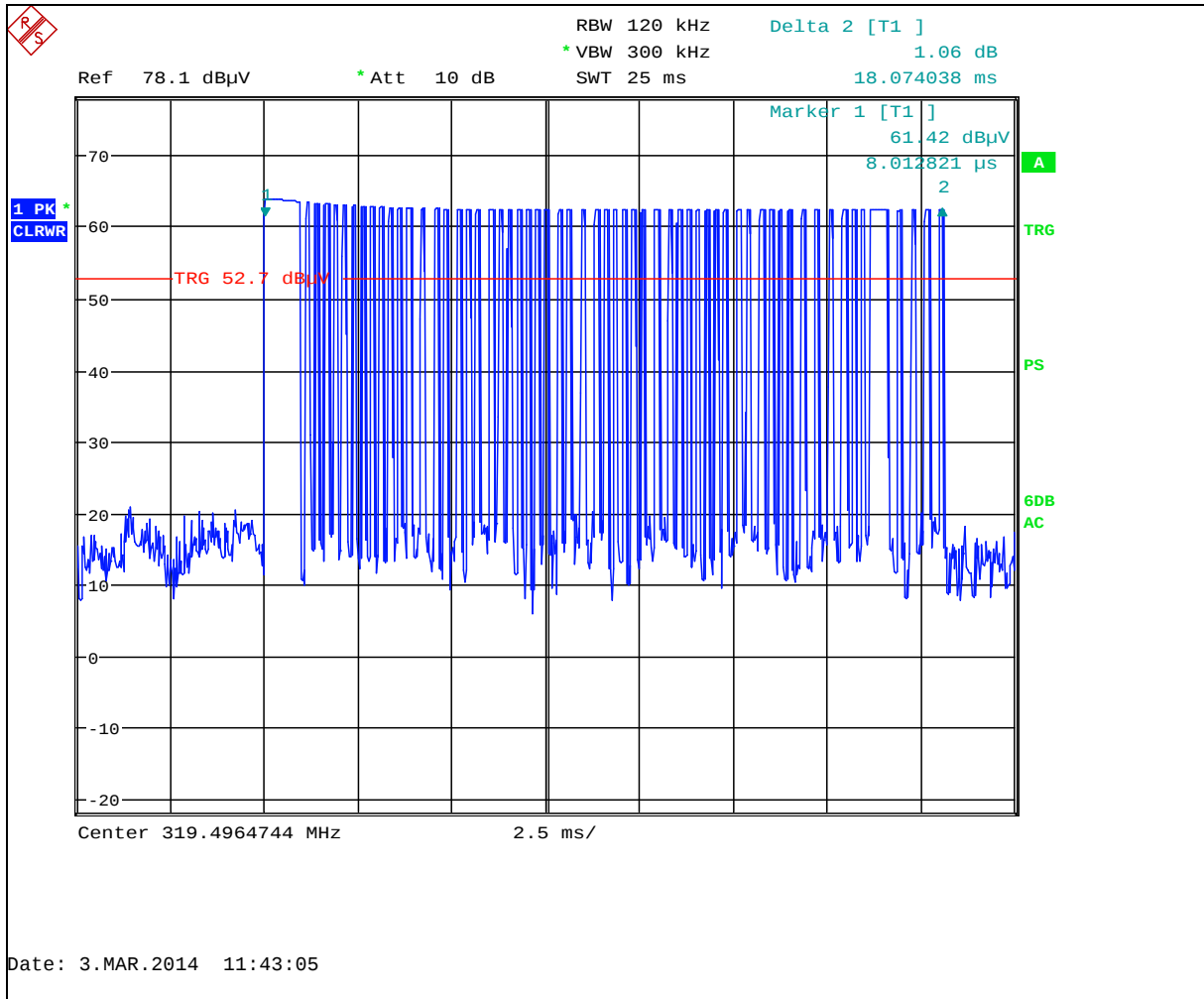
Graphs 3-2-5 to 3-2-8 are show pulse train timing.

Graph 3.2.5



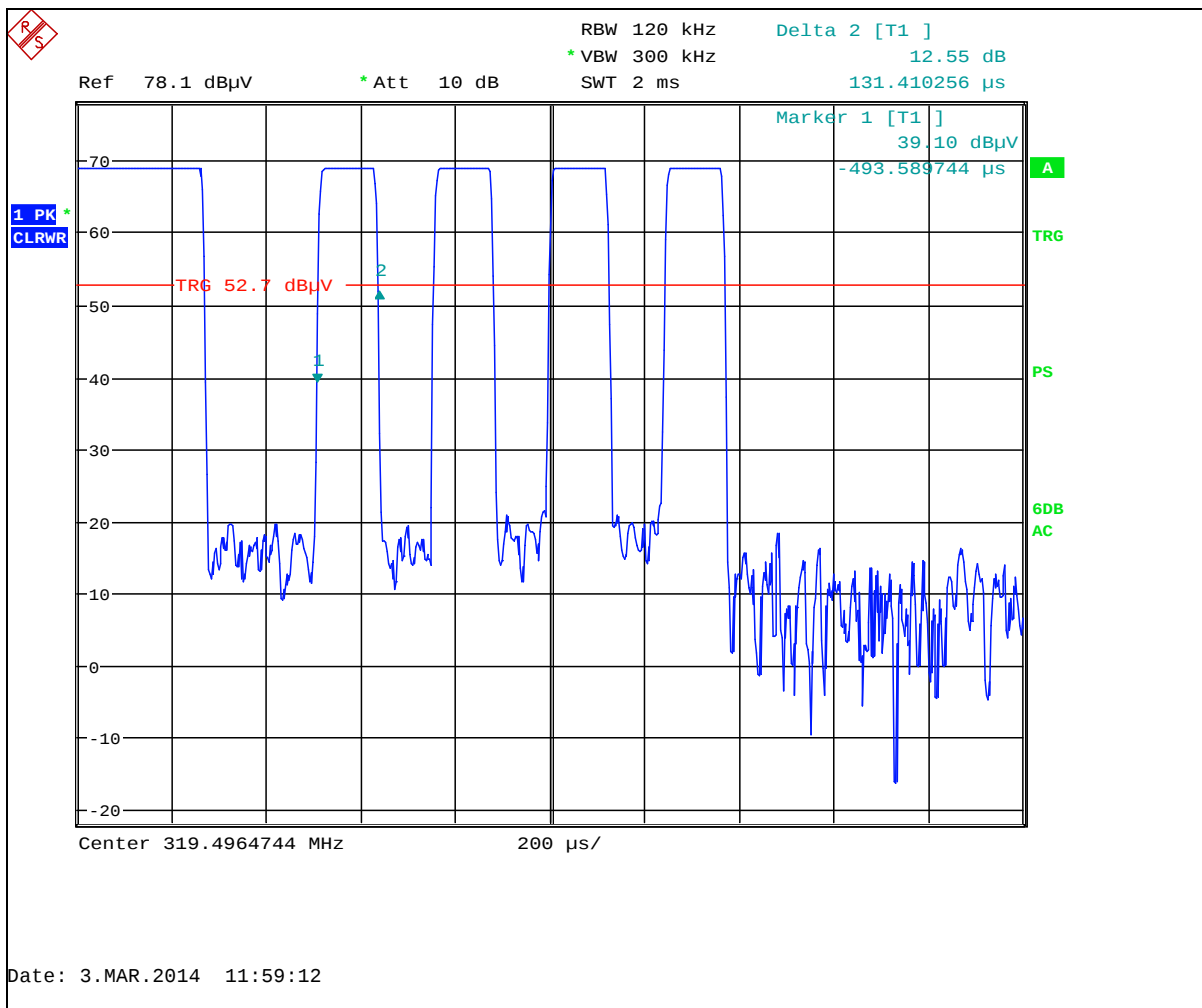


Graph 3.2.6



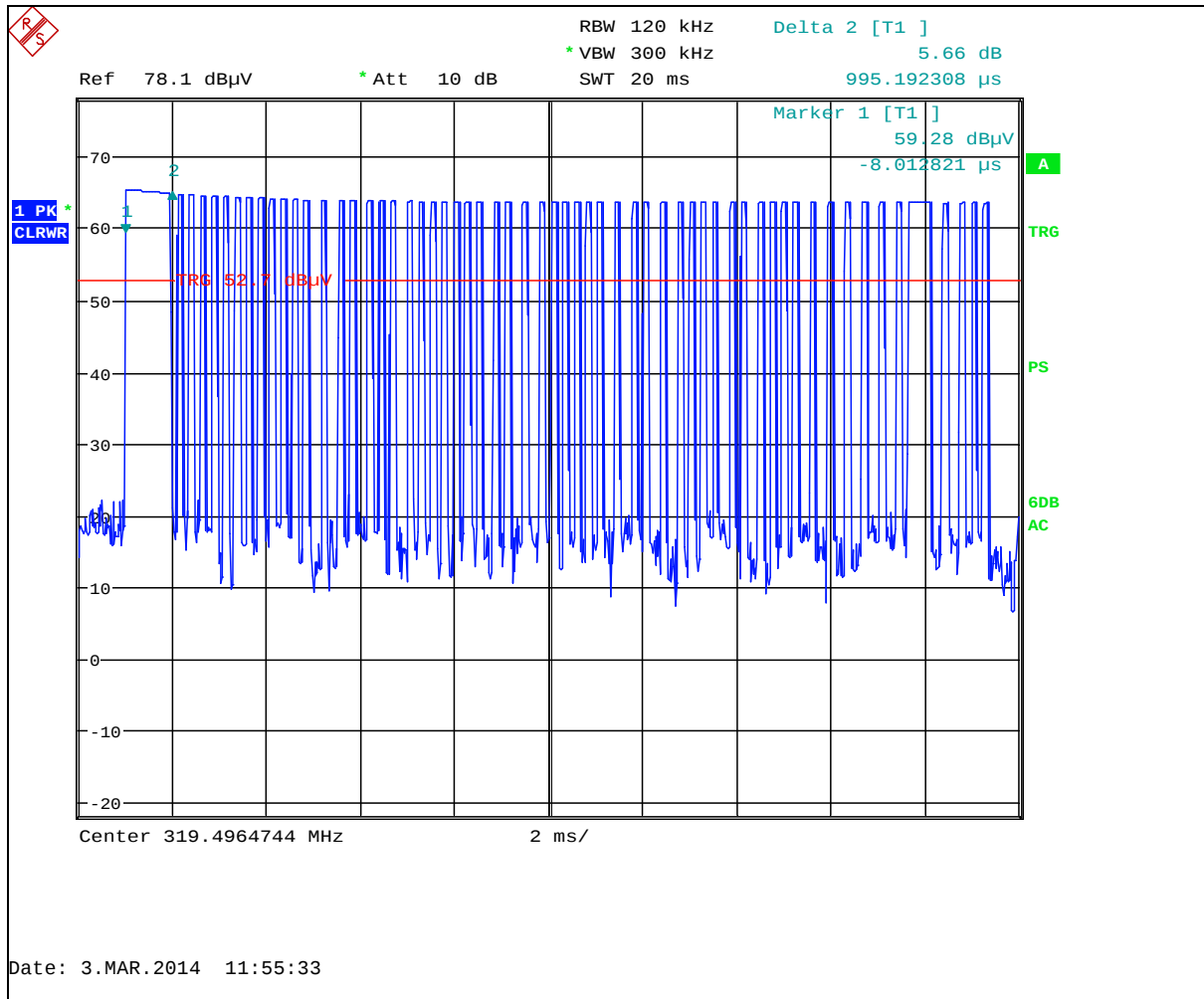


Graph 3.2.7





Graph 3.2.8





3.3 Bandwidth of Emissions

Model: 60-460-319.5

Center Frequency of operation MHz	Maximum allowed bandwidth kHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz	Result
319.5	798.75	42.9	82.4	Pass
Maximum allowed bandwidth:	☒ 0.25% of the centre operating frequency ☐ 0.5% of the centre operating frequency			
RBW:	☒ 10kHz	☐ 100kHz	☐ other kHz	
VBW:	☒ 30kHz	☐ 300kHz	☐ other kHz	

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

Model: 60-460-01-95

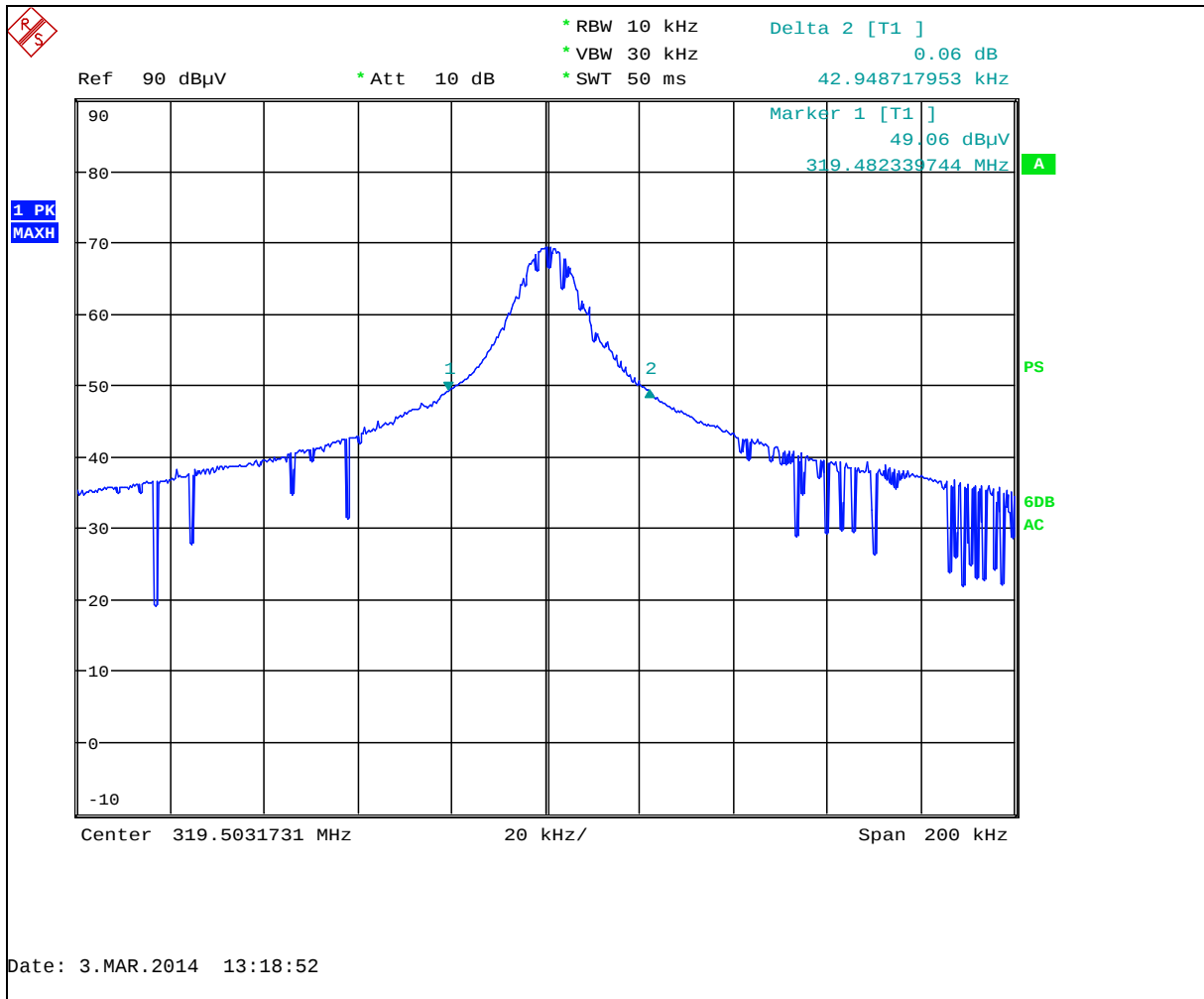
Center Frequency of operation MHz	Maximum allowed bandwidth kHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz	Result
319.5	798.75	45.8	103.4	Pass
Maximum allowed bandwidth:	☒ 0.25% of the centre operating frequency ☐ 0.5% of the centre operating frequency			
RBW:	☒ 10kHz	☐ 100kHz	☐ other kHz	
VBW:	☒ 30kHz	☐ 300kHz	☐ other kHz	

Graphs 3-3-3 and 3-3-4 are show bandwidth of emissions

Notes:

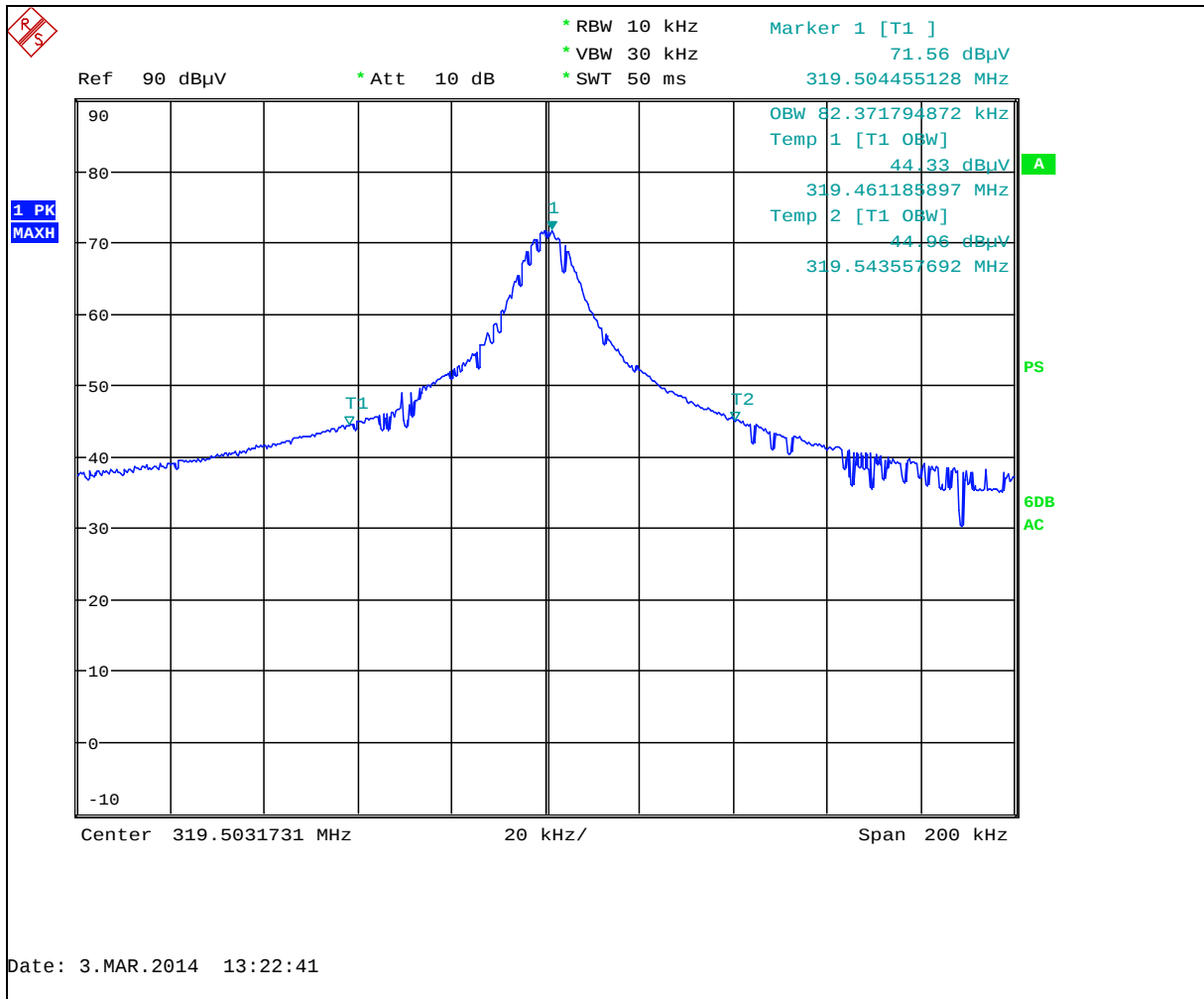


Graph 3.3.1



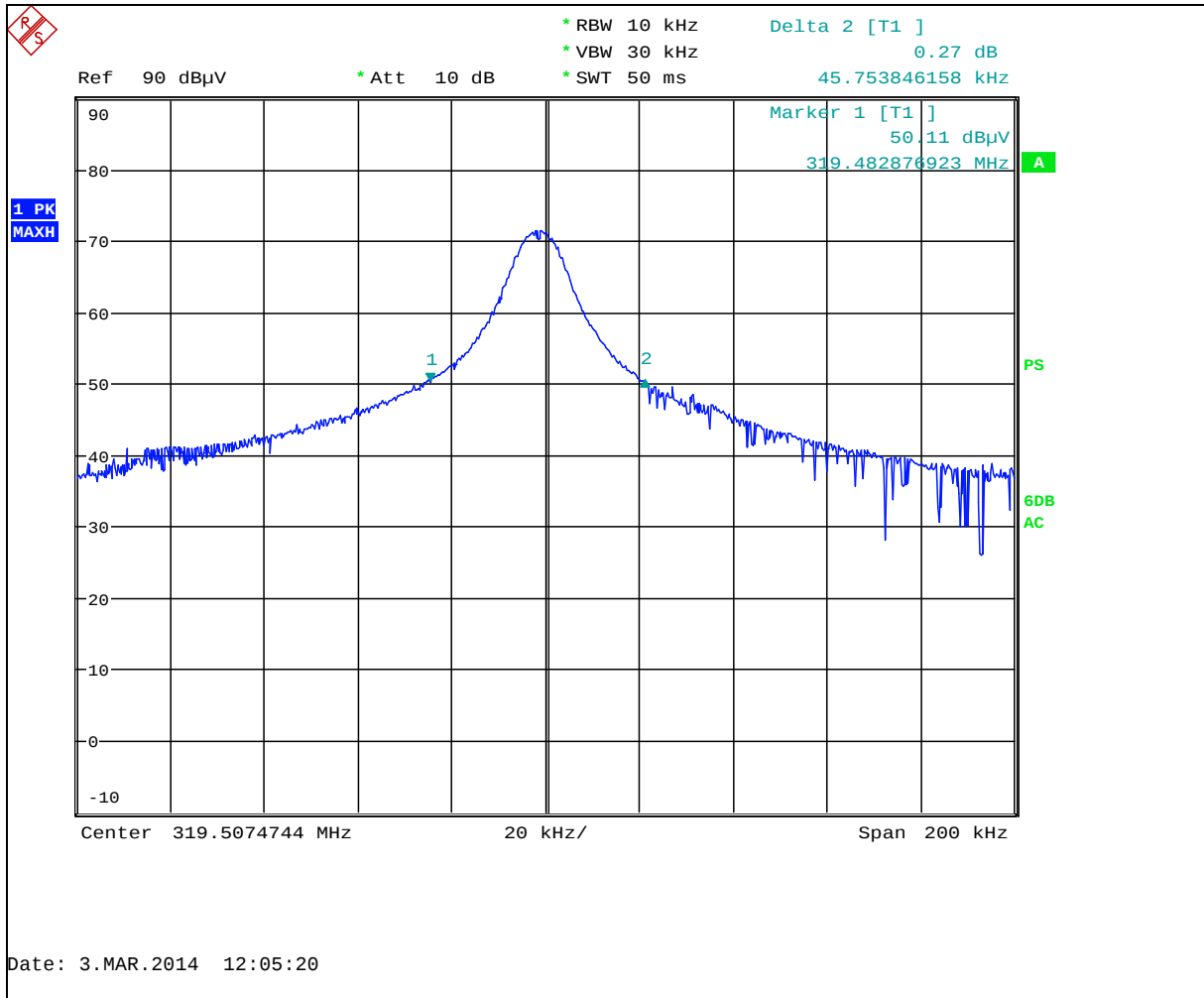


Graph 3.3.2



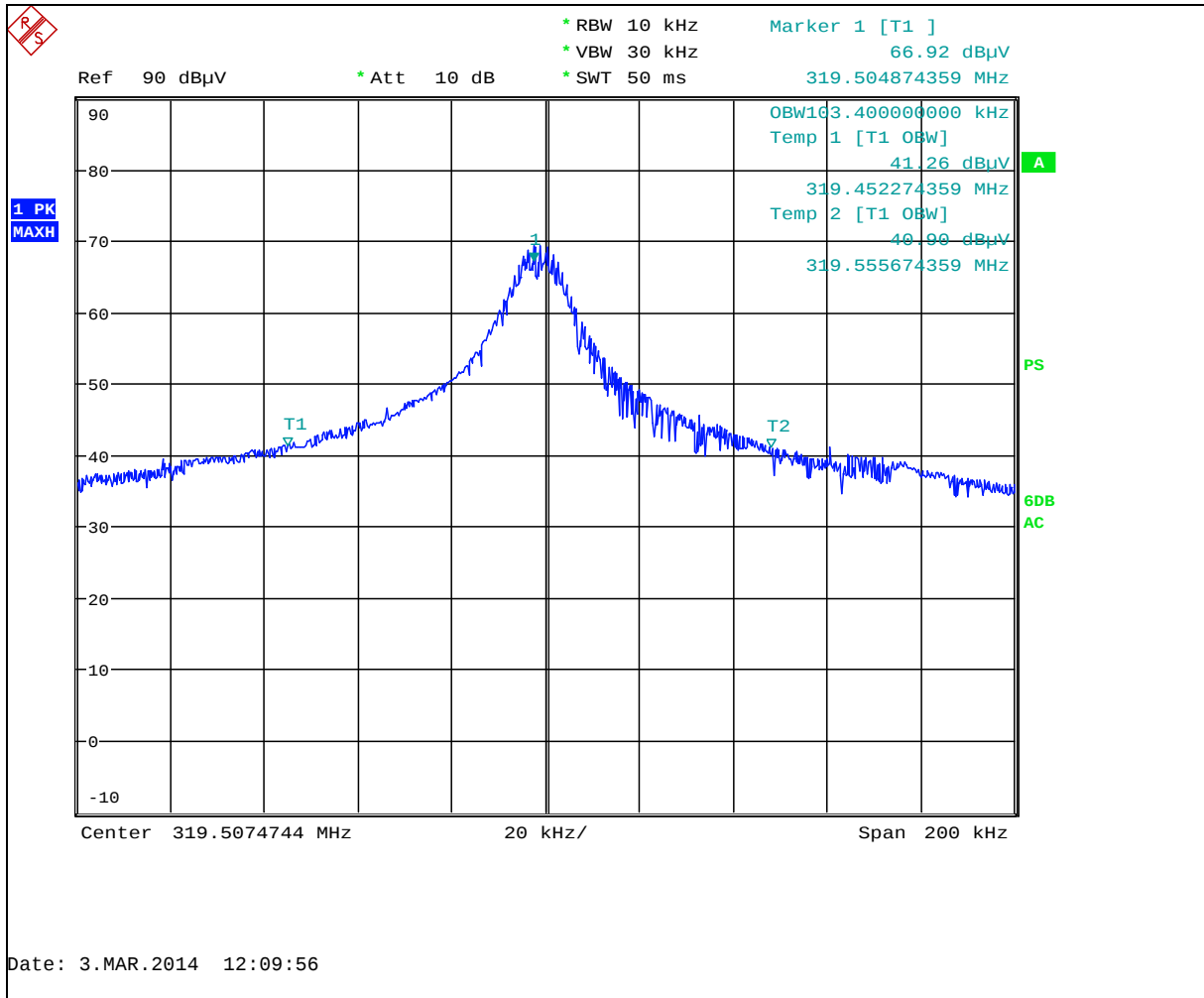


Graph 3.3.3





Graph 3.3.4



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: 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).



3.5 Digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-4000MHz

Max. Emissions margin: 10.9dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Tables 3.5.1-3.5.2 and Graphs 3.5.1 – 3.5.4)

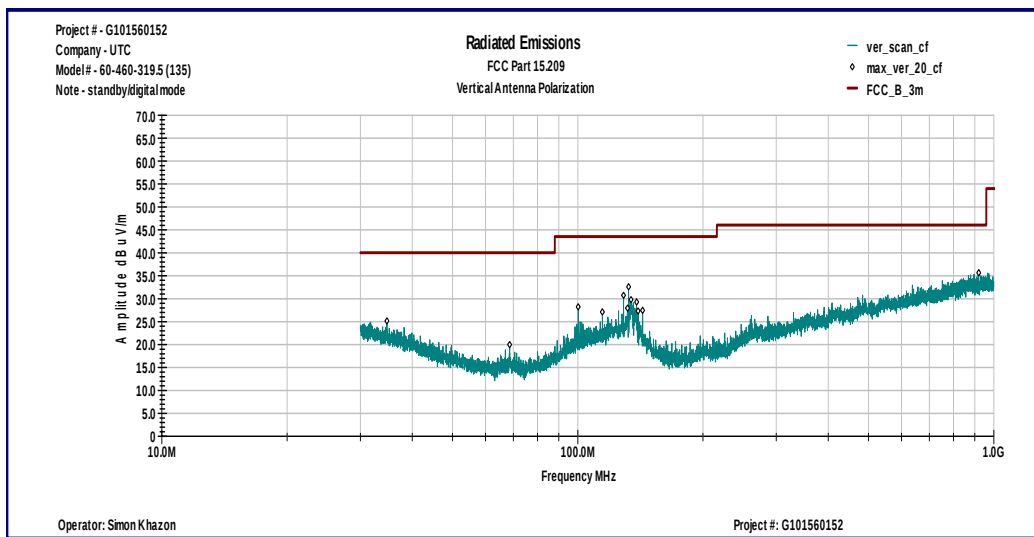
Date:	March 4, 2014	Result: Pass
Standard:	FCC Part 15.109, Class B	
Tested by:	Simon Khazon	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	60-460-319.5	

Table 3.5.1

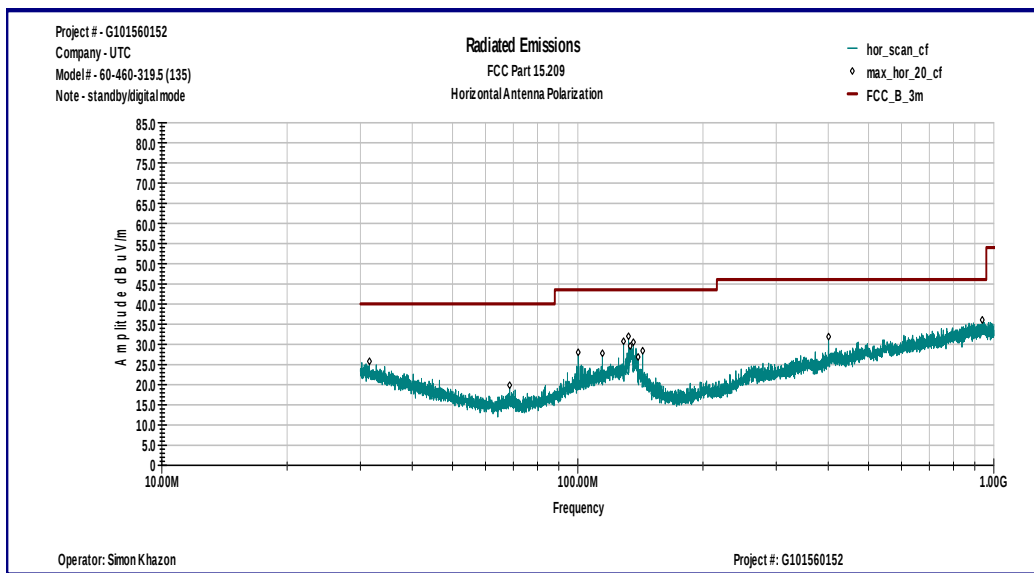
Frequency	Ant. Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
34.755 MHz	V	7.6	17.6	25.1	40.0	-14.9
100.26 MHz	V	15.9	12.4	28.2	43.5	-15.3
114.58 MHz	V	13.4	13.7	27.1	43.5	-16.4
128.86 MHz	V	16.8	14.0	30.7	43.5	-12.8
132.5 MHz	V	18.8	13.8	32.6	43.5	-10.9
134.24 MHz	V	16.1	13.6	29.8	43.5	-13.8
139.69 MHz	V	14.0	13.3	27.3	43.5	-16.2
143.18 MHz	V	14.4	13.0	27.4	43.5	-16.1
31.562 MHz	H	6.5	19.2	25.8	40.0	-14.2
68.571 MHz	H	12.7	7.2	19.9	40.0	-20.2
100.26 MHz	H	15.7	12.4	28.0	43.5	-15.5
114.63 MHz	H	14.1	13.7	27.8	43.5	-15.7
128.86 MHz	H	16.8	14.0	30.7	43.5	-12.8
132.43 MHz	H	18.2	13.8	32.0	43.5	-11.5
136.06 MHz	H	17.0	13.5	30.5	43.5	-13.0
143.25 MHz	H	15.4	13.0	28.4	43.5	-15.1
400.89 MHz	H	13.0	18.9	31.9	46.0	-14.1

Graph 3.5.1

Vertical antenna polarization

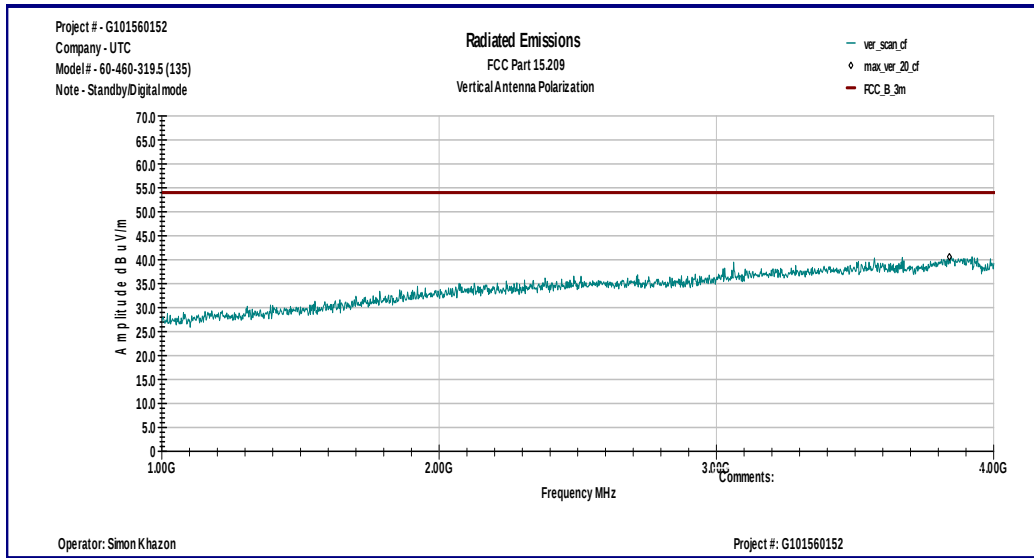


Horizontal antenna polarization

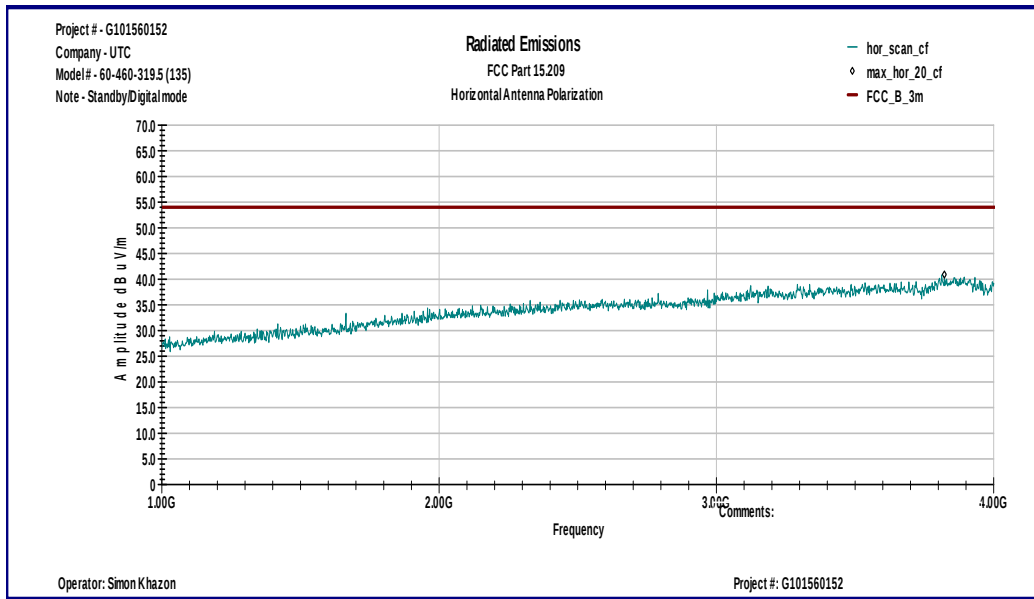


Graph 3.5.2

Vertical antenna polarization



Horizontal antenna polarization



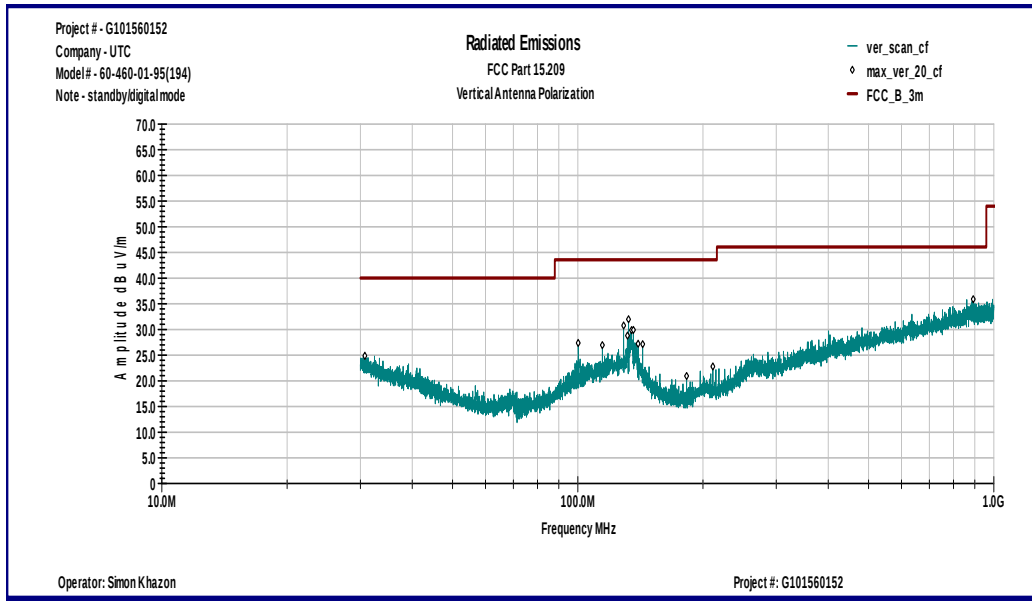
Date:	March 4, 2014	Result: Pass
Standard:	FCC Part 15.109, Class B	
Tested by:	Simon Khazon	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	60-460-01-95	

Table 3.5.2

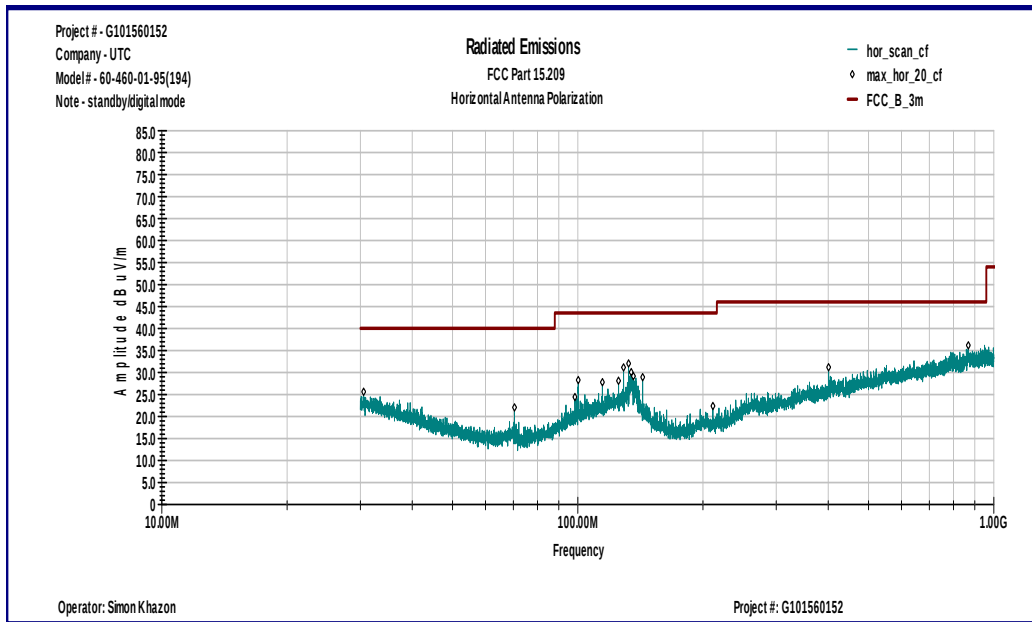
Frequency	Ant. Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
30.755 MHz	V	5.1	19.8	24.8	40.0	-15.2
100.26 MHz	V	15.0	12.4	27.3	43.5	-16.2
114.58 MHz	V	13.2	13.7	26.9	43.5	-16.6
128.93 MHz	V	16.8	14.0	30.7	43.5	-12.8
132.43 MHz	V	18.2	13.8	31.9	43.5	-11.6
143.25 MHz	V	14.1	13.0	27.1	43.5	-16.4
182.65 MHz	V	9.7	11.2	20.9	43.5	-22.6
211.21 MHz	V	10.8	12.0	22.8	43.5	-20.8
30.561 MHz	H	5.7	19.9	25.6	40.0	-14.4
70.434 MHz	H	14.7	7.4	22.1	40.0	-18.0
98.452 MHz	H	12.3	12.2	24.4	43.5	-19.1
100.3 MHz	H	15.9	12.4	28.3	43.5	-15.3
114.63 MHz	H	14.1	13.7	27.8	43.5	-15.7
125.3 MHz	H	14.2	13.9	28.1	43.5	-15.4
128.86 MHz	H	17.2	14.0	31.2	43.5	-12.4
132.5 MHz	H	18.3	13.8	32.0	43.5	-11.5
143.25 MHz	H	15.9	13.0	28.9	43.5	-14.6
211.32 MHz	H	10.4	12.0	22.4	43.5	-21.2
400.89 MHz	H	12.3	18.9	31.2	46.0	-14.8

Graph 3.5.3

Vertical antenna polarization

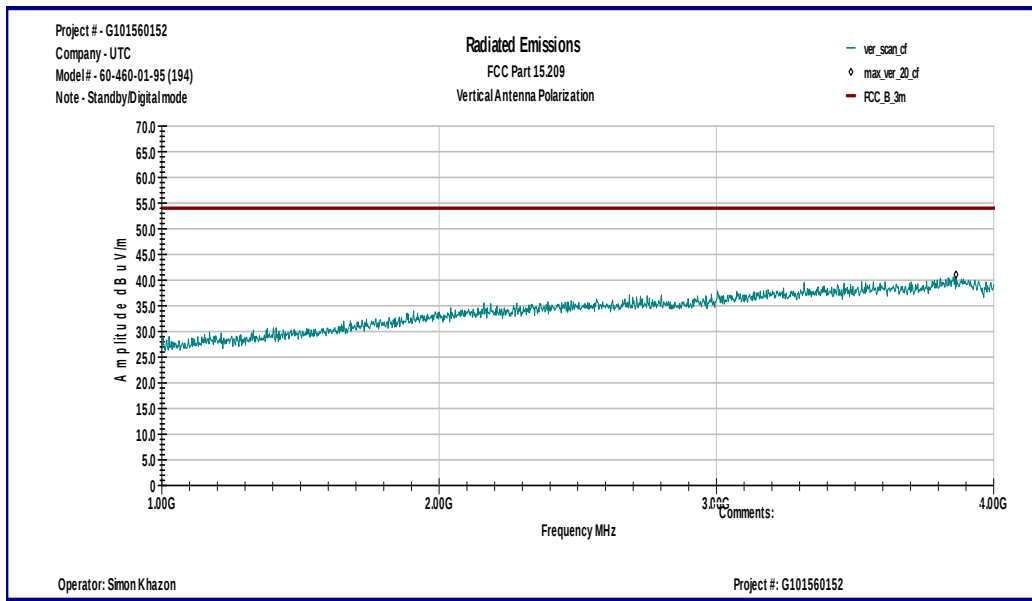


Horizontal antenna polarization

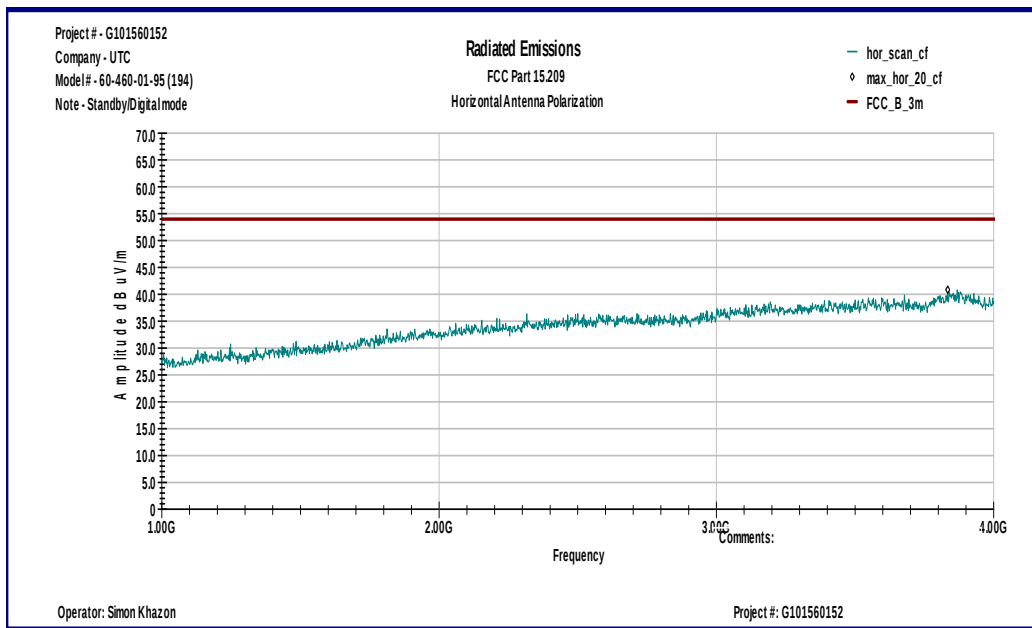


Graph 3.5.4

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	FSP 40	100024	12559	12/12/2014	☒
Spectrum Analyzer	R & S	ESU	100398	25283	01/07/2015	☒
Bicono-Log Antenna	Schaffner-Teseq	CBL6112B	2468	9734	12/12/2014	☒
Horn Antenna	EMCO	3115	9507-4513	9936	05/28/2014	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	11/12/2014	☒
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBV	☒