



## TEST REPORT

Report Number: 100776027MIN-001

Project Number: G100776027

Testing performed on the  
T46

FCC ID: CNMT46

Industry Canada ID: 1360A-T46

to

47 CFR Part 15. 237:2010

47 CFR, Part 15:2010, §15.107 and §15.109, Class B  
RSS- 210, Issue 8, 2010

For

Williams Sound Corp

Test Performed by:  
Intertek Testing Services NA, Inc.  
7250 Hudson Blvd., Suite 100  
Oakdale, MN 55128 USA

Test Authorized by:  
Williams Sound Corp  
10300 Valley View Rd.  
Eden Prairie, MN 55344 USA

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Date: July 12, 2012

Reviewed by: U. Spector  
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Date: July 12, 2012

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TABLE OF CONTENTS

**1.0 GENERAL DESCRIPTION..... 3**

1.1 Product Description; Test Facility.....4

1.3 Environmental conditions .....5

1.4 Measurement uncertainty.....6

1.5 Field Strength Calculation .....6

**2.0 TEST SUMMARY..... 7**

**3.0 TEST CONDITIONS AND RESULTS..... 8**

3.1 Field strength of fundamental.....8

3.2 Field strength of harmonics and spurious emissions ..... 10

3.3 Bandwidth of Emissions ..... 15

3.4 Transmitter power line conducted emissions .....22

3.5 Receiver/digital device radiated emissions .....23

3.6 Digital device conducted emissions .....25

**4.0 TEST EQUIPMENT..... 26**



## 1.0 GENERAL DESCRIPTION

<b>Model:</b>	T46
<b>Type of EUT:</b>	Transmitter
<b>Serial Number :</b>	Proto
<b>FCC ID:</b>	CNMT46
<b>Industry Canada ID:</b>	1360A-T46
<b>Related Submittal(s) Grants:</b>	None
<b>Company:</b>	Williams Sound Corp.
<b>Customer:</b>	Mr. Gregg Abram
<b>Address:</b>	10300 Valley View Road Eden Prairie, MN 55344, USA
<b>Phone:</b>	(952) 943-2252
<b>Fax:</b>	(952) 943-2174
<b>Test Standards:</b>	<input checked="" type="checkbox"/> 47 CFR, Part 15:2010, §15.237 <input checked="" type="checkbox"/> RSS-210, Issue 8, 20010 <input type="checkbox"/> RSS-Gen, Issue 3, 2010 <input checked="" type="checkbox"/> 47 CFR, Part 15:2010, §15.107 and §15.109, Class B <input checked="" type="checkbox"/> ICES-003, Issue 4:2004 <input type="checkbox"/> Other
<b>Type of radio:</b>	<input checked="" type="checkbox"/> Stand -alone <input type="checkbox"/> Module <input type="checkbox"/> Hybrid
<b>Date Sample Submitted:</b>	July 9, 2012
<b>Test Work Started:</b>	July 9, 2012
<b>Test Work Completed:</b>	July 10, 2012
<b>Test Sample Conditions:</b>	<input type="checkbox"/> Damaged <input type="checkbox"/> Poor (Usable) <input checked="" type="checkbox"/> Good



## 1.1 Product Description; Test Facility

<b>Product Description:</b>	Professional Headset Microphone
<b>Operating Frequency</b>	72.0-73.0; 74.6-74.8 and 75.2-76.0 MHz
<b>Number of Channels:</b>	9 channels from 72.1 to 72.9MHz 1 Channel from 74.6 to 74.8MHz 8 Channels from 75.3 to 75.9 MHz
<b>Modulation:</b>	FM
<b>Emission Designator:</b>	F3E
<b>Antenna(s) Info:</b>	Monopole (shield of MIC 100 cable), 3.5mm audio mono plug
<b>Antenna Installation:</b>	<input checked="" type="checkbox"/> User <input type="checkbox"/> Professional <input type="checkbox"/> Factory
<b>Transmitter Power Configuration:</b>	<input checked="" type="checkbox"/> Internal battery <input type="checkbox"/> External power source <input type="checkbox"/> 120VAC <input type="checkbox"/> 230VAC <input type="checkbox"/> 400VAC <input type="checkbox"/> [ ] VDC <input type="checkbox"/> Other: [ ] [ ] Amp. <input type="checkbox"/> 50Hz <input type="checkbox"/> 60Hz
<b>Special Test Arrangement:</b>	None
<b>Test Facility Accreditation:</b>	A2LA (Certificate No. 1427.01)
<b>Test Methodology:</b>	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	Continuously Transmitting Unmodulated Signal at 72.1MHz, 74.7MHz and 75.9MHz channels.
2	Continuously Transmitting Modulated (1KHz) Signal at 72.1MHz, 74.7MHz and 75.9MHz channels.

### Cables:

No.	Type	Length	Designation	Note
1	3 wires, unshielded	1 m	Head Set/Antenna	

### Support equipment/Services:

No.	Item	Description
1	BK Precision model 3001	Audio Generator

## 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:  $\pm 4$  dB at 10m and  $\pm 5.4$  dB at 3m

The expanded uncertainty ( $k = 2$ ) for conducted emissions from 150 kHz to 30 MHz has been determined to be:  
 $\pm 2.6$  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( $\mu$ V/m)

RA = Receiver Amplitude in dB( $\mu$ 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( $\mu$ 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( $\mu$ V/m).

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

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

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

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

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

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

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

### General notes:

## 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
15.237/ RSS-210 A4.1	Field strength of fundamental	Pass
15.237/ RSS-210 A4.1	Field strength of harmonics	Pass
15.237 / RSS-210 A4.1	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	N/A
15.109/ICES-003	Receiver/digital device radiated emissions	Pass
15.107/ ICES-003	Digital device conducted emissions	N/A



### 3.0 TEST CONDITIONS AND RESULTS

#### 3.1 Field strength of fundamental

**Test location:** ☐ OATS ☒ Anechoic Chamber ☐ Other

**Test distance:** ☐ 10 meters ☒ 3 meters

**Frequency range of measurements:** 30MHz-1000MHz

**Test result:** **Pass**

**Max. margin at fundamental:** 5.9dB below the limits

**Notes:** None

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<b>Date:</b>	July 9-10, 2012	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.237/ RSS-210 A4.1	
<b>Tested by:</b>	Simon Khazon	
<b>Test Point:</b>	Enclosure with antenna	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	None	

**Table 3.1.1**

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dBµV	Total @ 3m dBµV/m	Limit dBµV/m	Margin dB
	Polarity	Hts(cm)							
			Emissions at Fundamental Frequency						
72.10	V	367	6.7	0.8	0.0	77.1	84.7	98.1	-13.4
72.10	H	239	6.7	0.8	0.0	82.4	90.0	98.1	-8.1
74.70	V	379	7.2	0.9	0.0	90.1	77.6	98.1	-20.5
74.70	H	400	7.2	0.9	0.0	77.2	84.1	98.1	-14.0
75.90	V	400	7.3	0.9	0.0	79.6	87.8	98.1	-10.3
75.90	H	256	7.3	0.9	0.0	84.0	92.2	98.1	-5.9



### 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-1000MHz

**Test result:** **Pass**

**Maximum margin of emissions:** 8.9dB below the limits

**Notes:** Testing was performed at 3-meters distance (see Table 3.2.1 and Graphs 3.2.1 to 3.2.3, emissions at the Fundamental Frequency were excluded from the Table)

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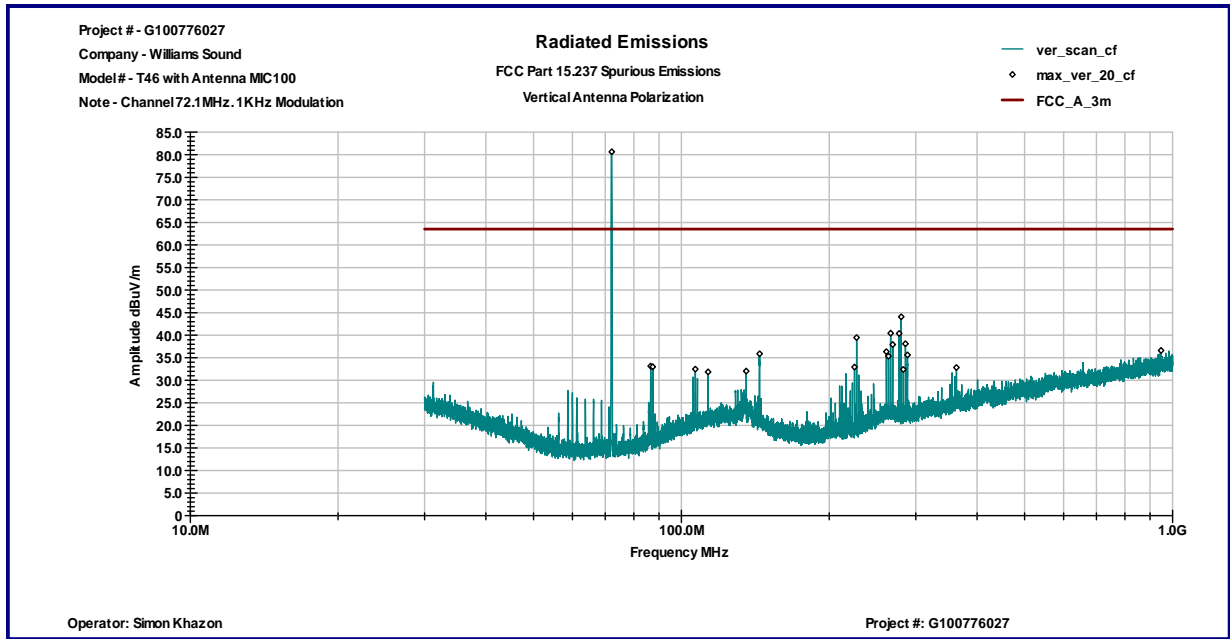
<b>Date:</b>	July 9-10, 2012	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.237and (d) / RSS-210 A4.1	
<b>Tested by:</b>	Simon Khazon	
<b>Test Point:</b>	Enclosure with antenna	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	None	

**Table 3.2.1**

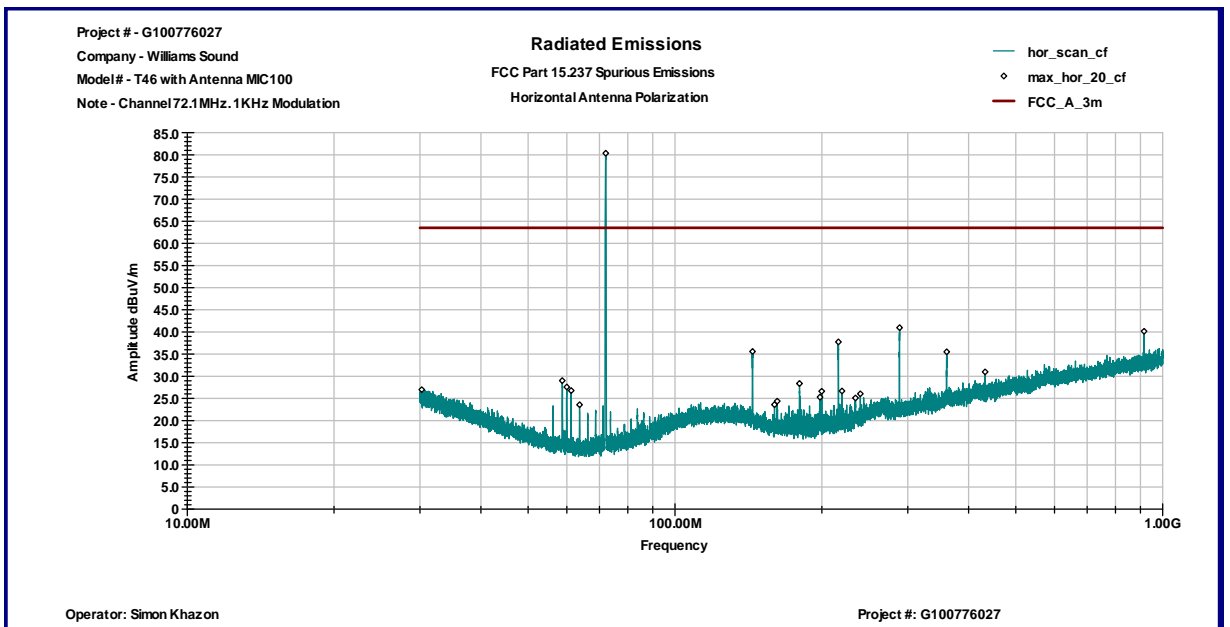
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dBµV	Total @ 3m dBµV/m	Limit dBµV/m	Margin dB
	Polarity	Hts(cm)							
				Channel 72.1MHz					
144.25	V	100	11.8	1.3	0.0	22.3	35.4	63.5	-28.1
288.66	V	100	13.8	1.9	0.0	17.1	32.8	63.5	-30.7
216.50	H	160	10.6	1.6	0.0	26.3	38.5	64.5	-26.0
				Channel 74.7MHz					
149.53	V	100	11.5	1.3	0.0	36.7	49.5	63.5	-14.0
298.72	V	100	14.0	1.9	0.0	30.3	46.2	64.5	-18.3
149.50	H	285	11.5	1.3	0.0	40.3	53.1	63.5	-10.4
299.08	H	116	14.0	1.9	0.0	39.7	55.6	64.5	-8.9
				Channel 75.9MHz					
151.92	V	100	11.3	1.3	0.0	41.1	53.7	63.5	-9.8
227.85	H	193	11.1	1.6	0.0	33.8	46.6	63.5	-16.9
303.74	H	100	14.1	1.9	0.0	35.7	51.8	63.5	-11.7

Graph 3.2.1

### Vertical antenna polarization

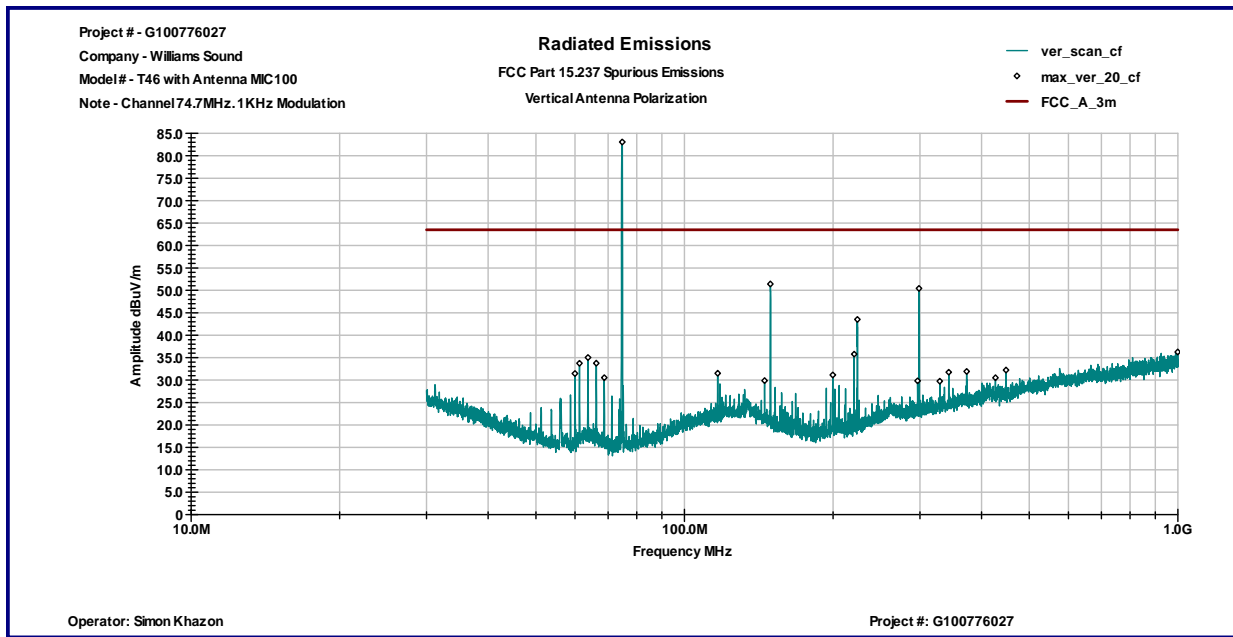


### Horizontal antenna polarization

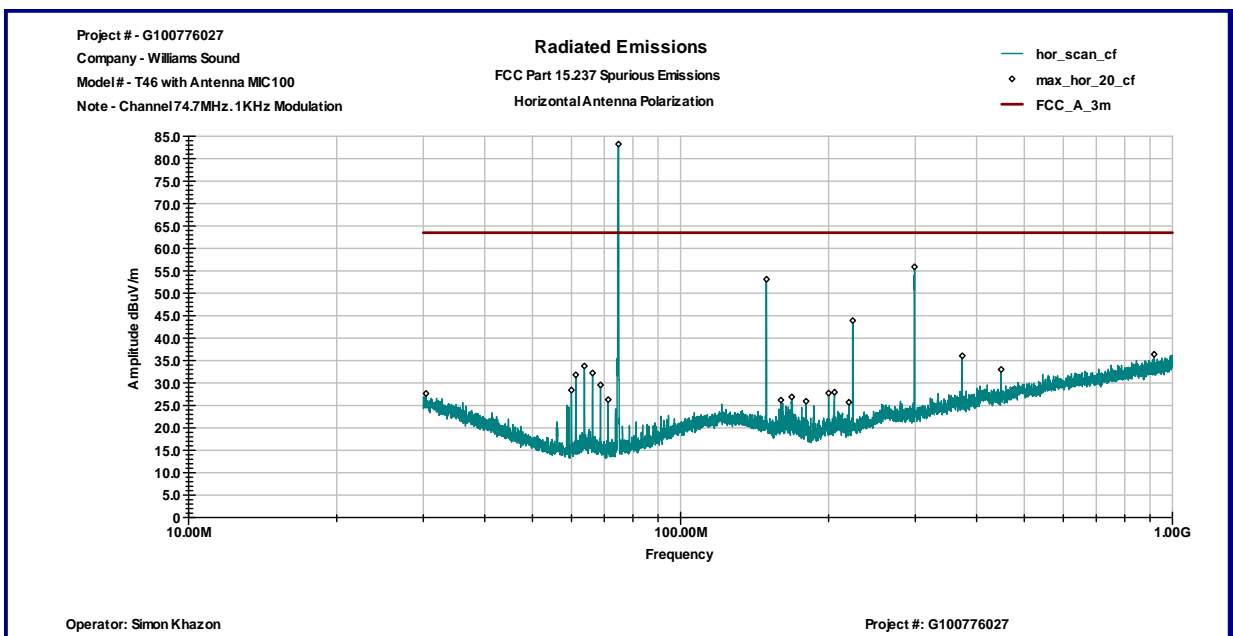


Graph 3.2.2

# Vertical antenna polarization

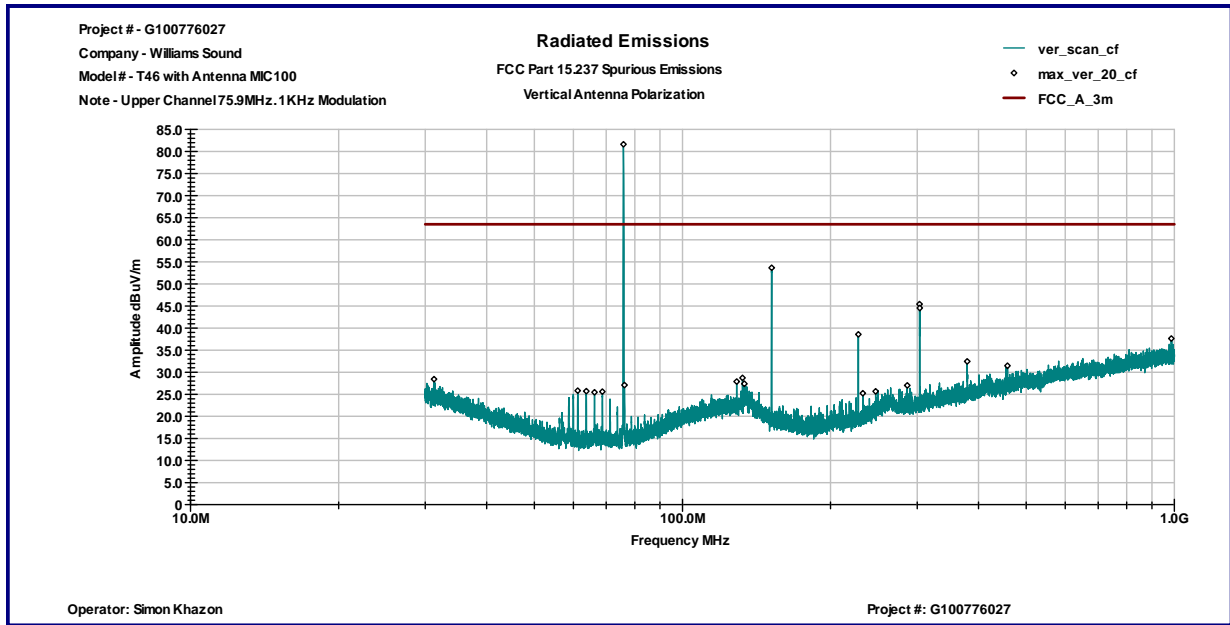


# Horizontal antenna polarization

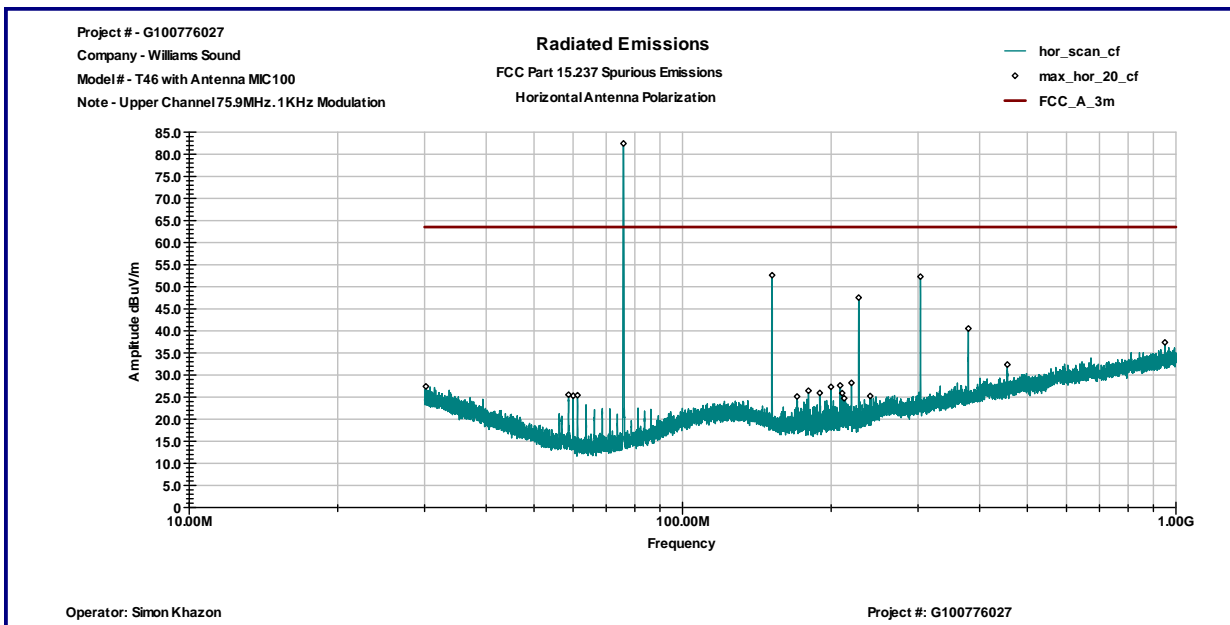


Graph 3.2.3

# Vertical antenna polarization



# Horizontal antenna polarization



### 3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
72.1MHz	165.1KHz	154.0KHz
74.7MHz	163.4KHz	153.5KHz
75.9MHz	142.3KHz	132.0KHz

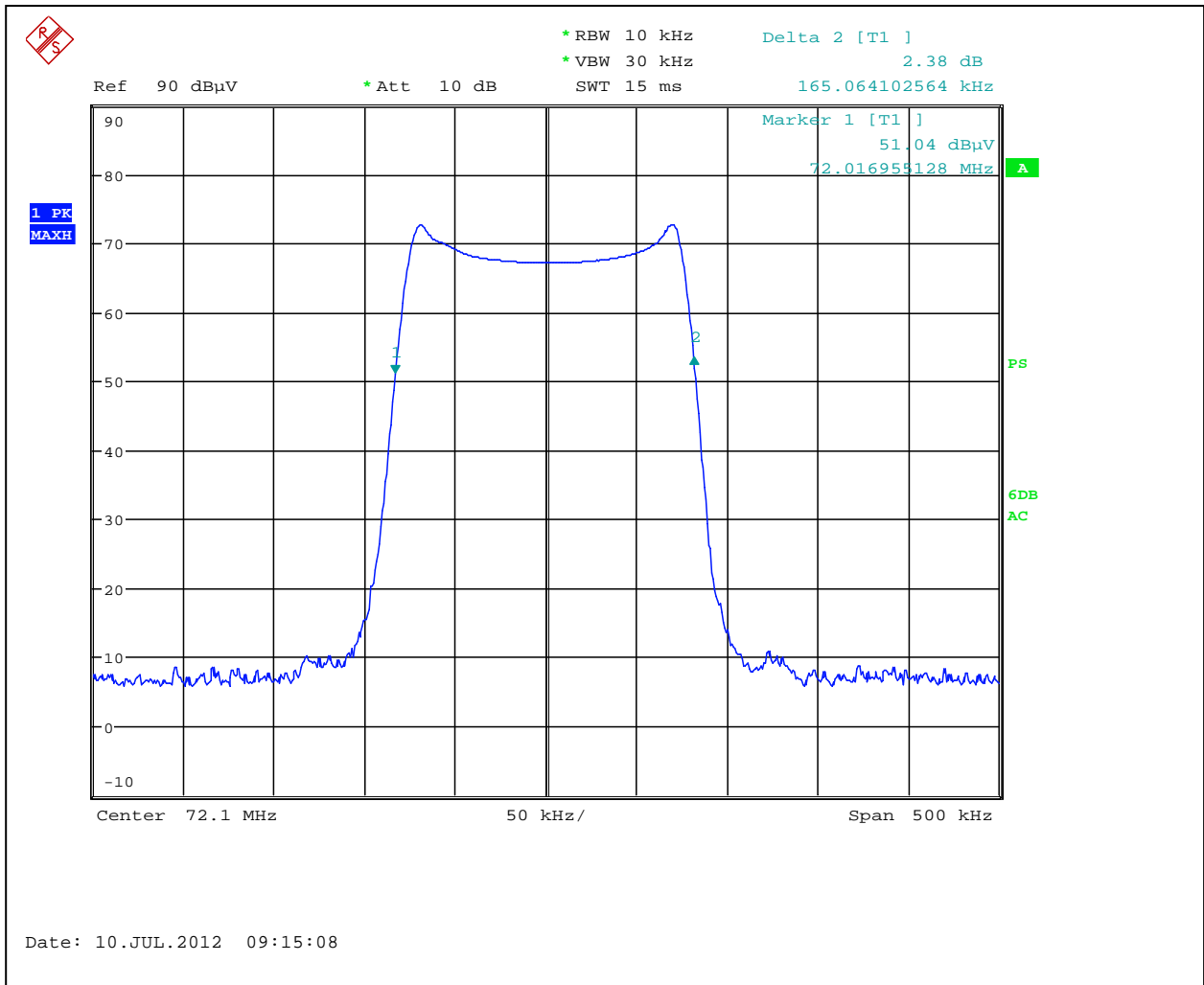
Graphs 3-3-1 and 3-3-6 are show bandwidth of emissions

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

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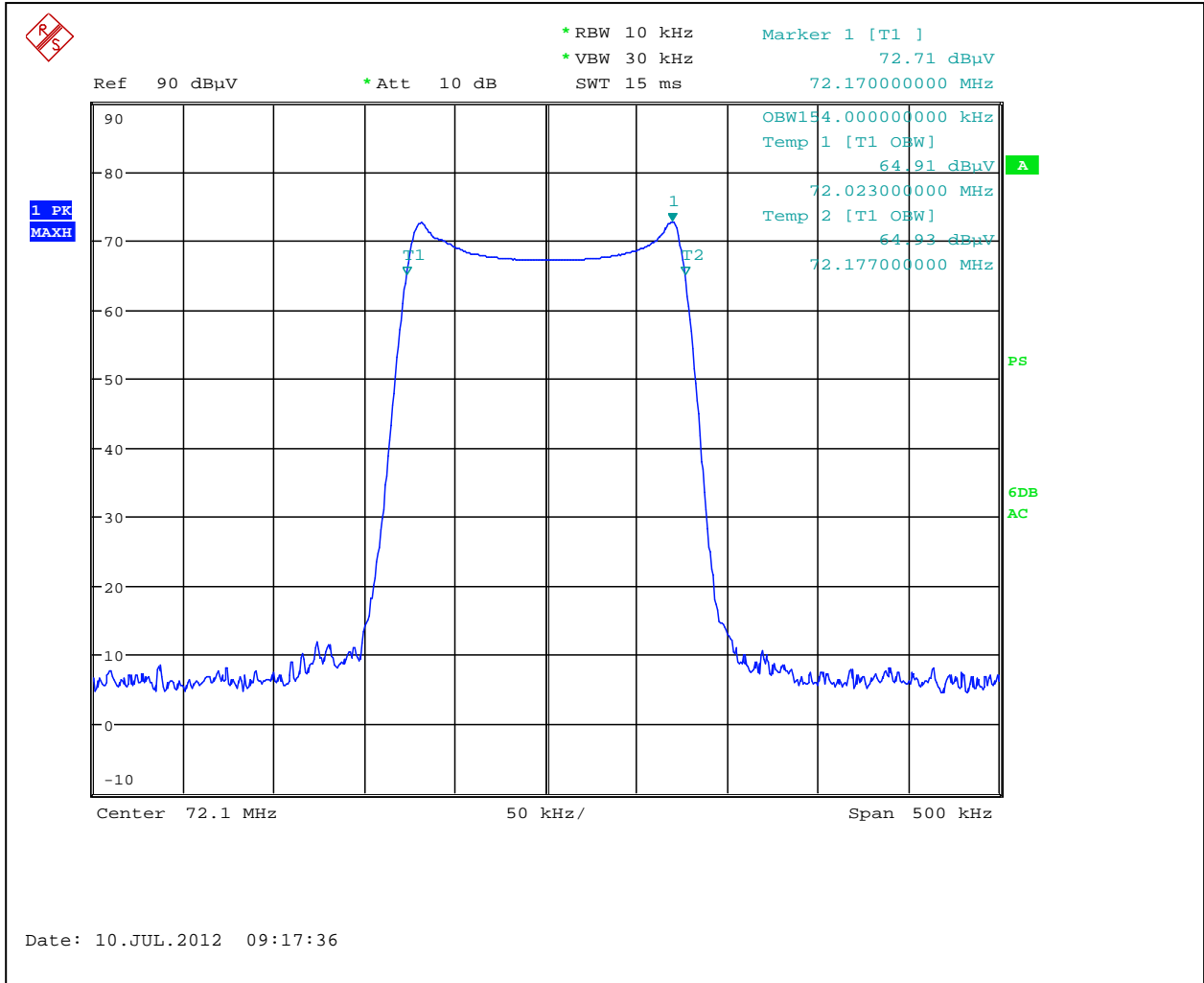


Graph 3.3.1



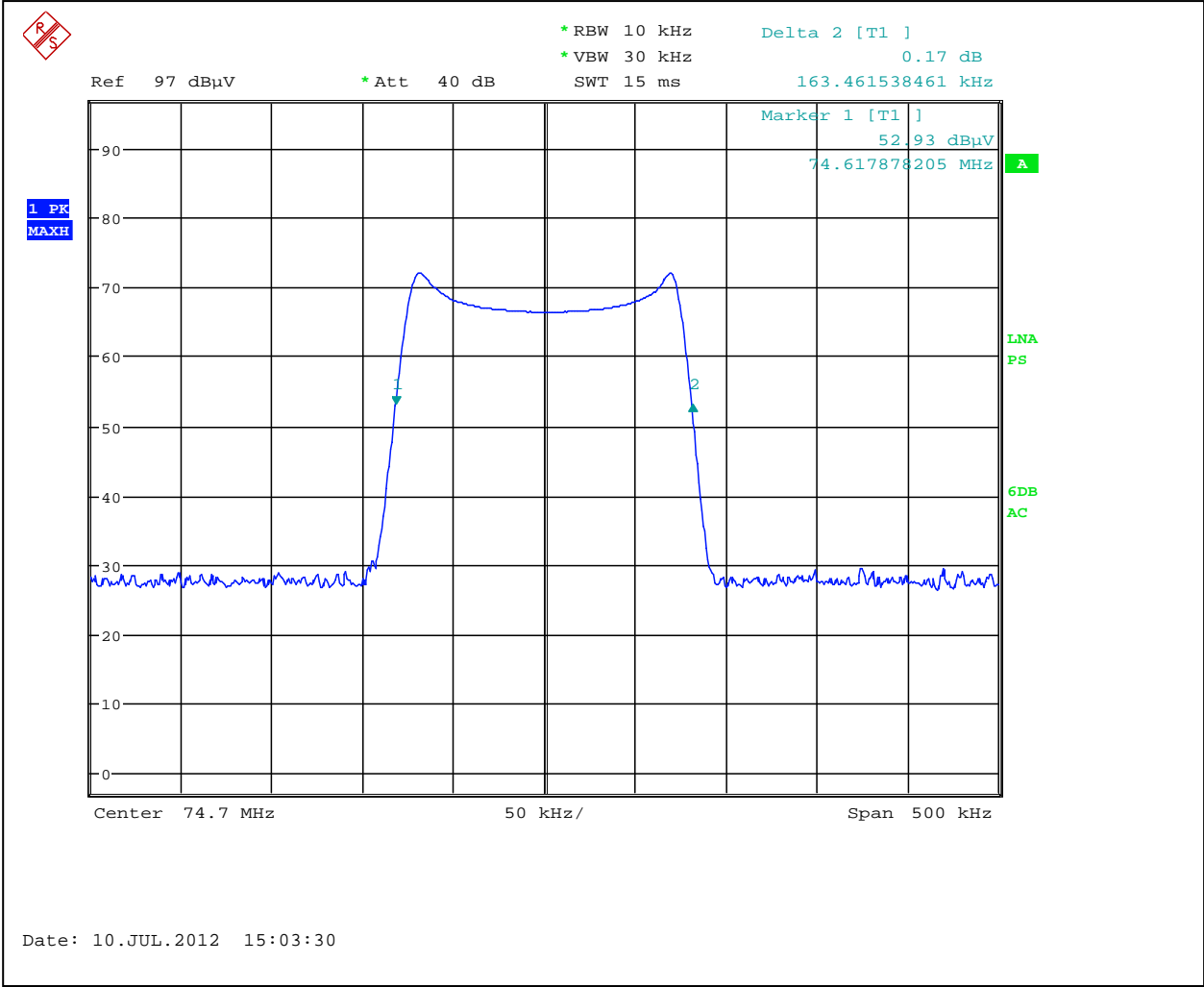


Graph 3.3.2

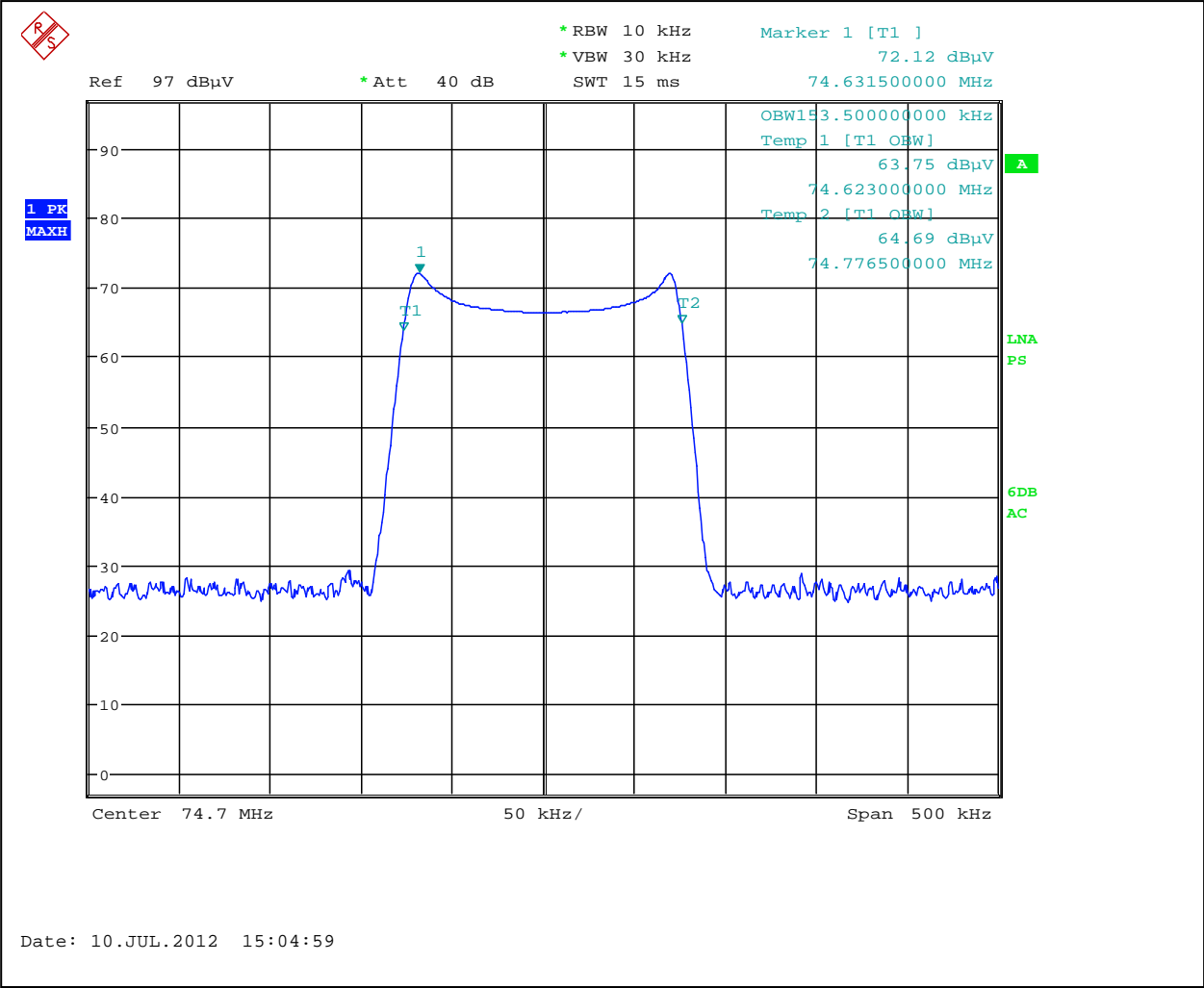




Graph 3.3.3

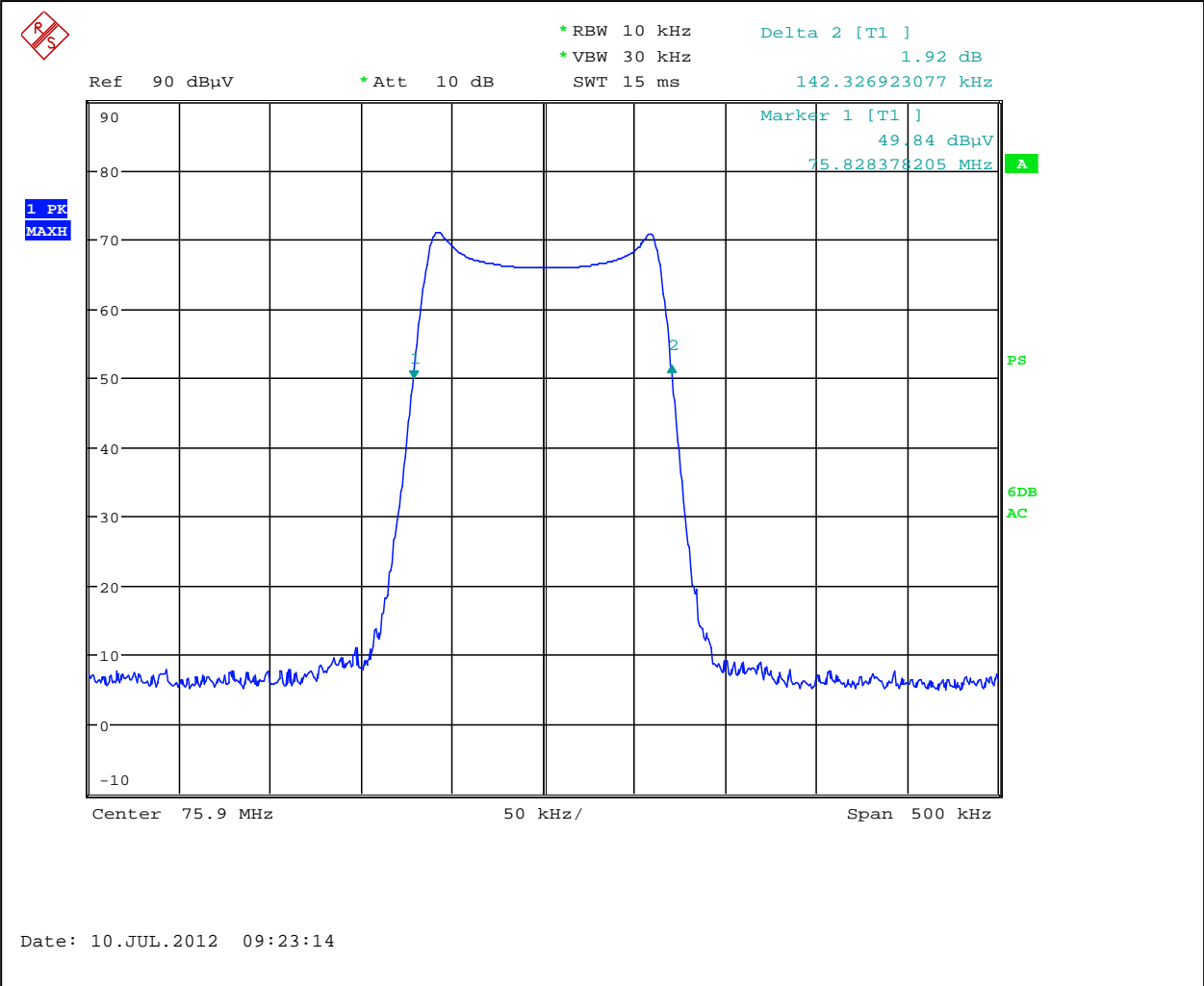


Graph 3.3.4

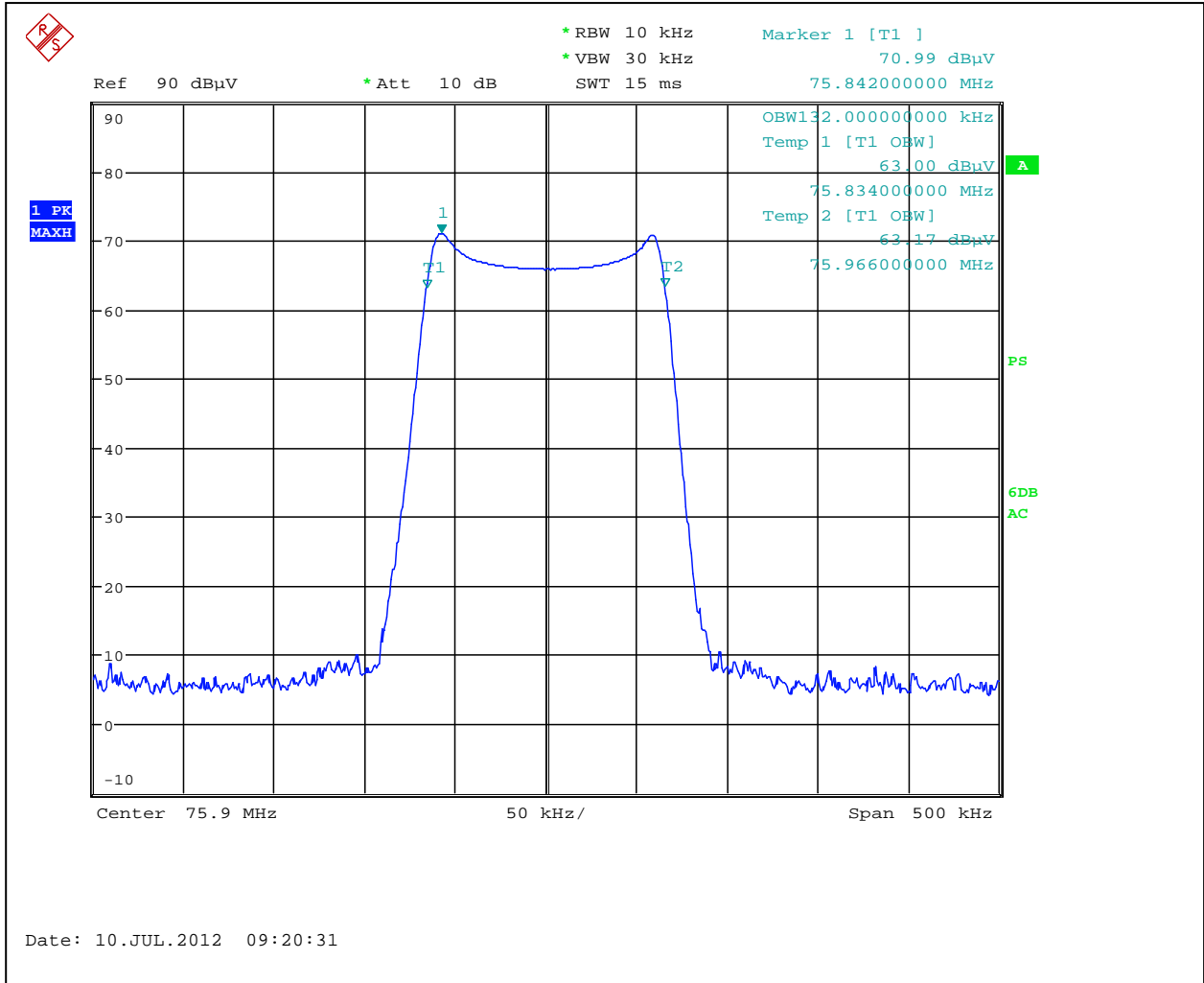




Graph 3.3.5



Graph 3.3.6





### 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).

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### 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:** 5.0dB below the limits

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

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<b>Date:</b>	July 11, 2012	<b>Result: Pass</b>
<b>Standard:</b>	FCC Part 15.109, Class B	
<b>Tested by:</b>	Simon Khazon	
<b>Test Point:</b>	Enclosure	
<b>Operation mode:</b>	Standby	
<b>Note:</b>	None	

**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
59.978 MHz	V	24.3	7.2	31.5	40.0	-8.6
61.257 MHz	V	26.6	7.1	33.7	40.0	-6.3
63.76 MHz	V	28.1	7.0	35.0	40.0	-5.0
66.263 MHz	V	26.8	7.0	33.8	40.0	-6.2
68.766 MHz	V	23.4	7.2	30.5	40.0	-9.5
220.73 MHz	V	23.5	12.2	35.8	46.0	-10.3
296.9 MHz	V	14.0	15.9	29.8	46.0	-16.2
329.3 MHz	V	12.9	16.8	29.7	46.0	-16.3
343.34 MHz	V	14.6	17.1	31.8	46.0	-14.3
373.35 MHz	V	14.0	18.0	31.9	46.0	-14.1
426.86 MHz	V	11.0	19.5	30.5	46.0	-15.5
448.62 MHz	V	12.7	19.6	32.2	46.0	-13.8
999.51 MHz	V	9.8	26.4	36.2	54.0	-17.8
30.386 MHz	H	7.6	20.1	27.7	40.0	-12.3
60.006 MHz	H	21.2	7.2	28.4	40.0	-11.6
61.257 MHz	H	24.7	7.1	31.8	40.0	-8.2
63.76 MHz	H	26.8	7.0	33.8	40.0	-6.2
66.263 MHz	H	25.2	7.0	32.2	40.0	-7.8
68.766 MHz	H	22.4	7.2	29.5	40.0	-10.5
71.269 MHz	H	18.8	7.4	26.3	40.0	-13.7
200.03 MHz	H	15.6	12.1	27.7	43.5	-15.8
205.56 MHz	H	15.6	12.3	27.9	43.5	-15.6
373.87 MHz	H	18.1	18.0	36.0	46.0	-10.0
448.62 MHz	H	13.5	19.6	33.0	46.0	-13.0
918.43 MHz	H	10.9	25.5	36.4	46.0	-9.6





### 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).

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#### 4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	ESU	100398	25283	12/09/2012	<input checked="" type="checkbox"/>
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	9734	11/08/2012	<input checked="" type="checkbox"/>
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	<input checked="" type="checkbox"/>