



TEST REPORT

Report Number: 100507799MIN-001
Project Number: G100507799

Testing performed on the
Surf Link Watch Remote Control

FCC ID: EOA-WW
Industry Canada ID: 6903A-WW
to
47 CFR Part 15. 249:2010
RSS- 210, Issue 8, 2010
RSS-Gen, Issue 3, 2010
ICES-003, Issue 4:2004
47 CFR, Part 15:2009, §15.107 and §15.109, Class B

For
Starkey Laboratories, Inc.

Test Performed by:
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Date: October 7, 2011

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Date: October 7, 2011

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1.0 GENERAL DESCRIPTION

Model:	Surf Link Watch Remote Control
Type of EUT:	Remote Control
Serial	3
FCC ID:	EOA-WW
Industry Canada ID:	6903A-WW
Related Submittal(s) Grants:	None
Company:	Starkey Laboratories Inc.
Customer:	Mr. Ken Meyer
Address:	6700 Washington Avenue South Eden Prairie, MN 55344 USA
Phone:	(952) 947-4734
Fax:	(952) 828-9262
Email:	ken_meyer@starkey.com
Test Standards:	<input checked="" type="checkbox"/> 47 CFR, Part 15:2010, §15.249 <input checked="" type="checkbox"/> RSS-210, Issue 8, 20010 <input checked="" 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 [REDACTED]
Type of radio:	<input type="checkbox"/> Stand -alone <input type="checkbox"/> Module <input type="checkbox"/> Hybrid
Date Sample Submitted:	October 4, 2011
Test Work Started:	October 4, 2011
Test Work Completed:	October 5, 2011
Test Sample Conditions:	<input type="checkbox"/> Damaged <input type="checkbox"/> Poor (Usable) <input checked="" type="checkbox"/> Good



1.1 Product Description; Test Facility

Product Description:	Watch Style Remote Control for Hearing Aids
Operating Frequency	915.7 to 922.1MHz
Modulation:	FSK
Emission Designator:	276KFXD
Receiver Portion :	None
Antenna(s) Info:	Integral
Antenna Installation:	<input type="checkbox"/> User <input type="checkbox"/> Professional <input checked="" type="checkbox"/> Factory
Transmitter Power Configuration:	<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"/> [redacted] VDC <input type="checkbox"/> Other: [redacted] [redacted] Amp. <input type="checkbox"/> 50Hz <input type="checkbox"/> 60Hz Note: a new batteries were used for device testing
Special Test Arrangement:	As a hand-held device the EUT was rotated through three orthogonal axes to determine and tested with the maximum emissions
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)
- [REDACTED]

Operating modes of the EUT:

No.	Description
1	EUT has 2 channels of operation; testing consisted of lower and upper channel transmitting continuously with one channel being transmitted at a given time.
2	Standby / Receiving mode were used for FCC Part 15.109 and ICES-003 testing.

Cables:

No.	Type	Length	Designation	Note
	None			

Support equipment/Services:

No.	Item	Description
	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(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).

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

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

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

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

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

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

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

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
15.249(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	N/A
15.109/ICES-003	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-10GHz

Test result: **Pass**

Max. Emissions margin at fundamental: **9.7dB below the limits**

Notes: Test performed at low and upper channels



Date:	October 4, 2011	Result: Pass
Standard:	FCC 15.249(a) / RSS-210 A2.9	
Tested by:	Simon Khazon	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Fundamental	

Table 3.1.1

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak Reading dB μ V	Total @ 3m dB μ V/m	Limit dB μ V/m	Margin dB	Comments
	Polarity	Hts(cm)								
Channel 396 (915.7MHz)										
915.62	V	144	22.0	3.6	0.0	58.5	84.1	94.0	-9.9	
915.62	H	271	22.0	3.6	0.0	53.4	79.0	94.0	-15.0	
Channel 417 (922.1MHz)										
922.10	V	147	22.0	3.7	0.0	58.6	84.3	94.0	-9.7	
922.10	H	149	22.0	3.7	0.0	53.5	79.2	94.0	-14.8	



Date:	October 4, 2011	Result: Pass
Standard:	FCC 15.249(a) / RSS-210 A2.9	
Tested by:	Simon Khazon	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Band Edge Compliance	

Table 3.1.2

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)							
902.00	V	100	21.9	3.6	0.0	1.3	26.8	46.0	-19.2
902.00	H	100	21.9	3.6	0.0	1.1	26.6	46.0	-19.4
928.00	V	100	22.1	3.7	0.0	1.1	26.8	46.0	-19.2
928.00	H	100	22.1	3.7	0.0	0.9	26.6	46.0	-19.4



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-10GHz

Test result: **Pass**

Max. margin of harmonics and spurious emissions: **2.7dB** below the limits

Notes: No Spurious Emissions related to transmitter were detected at the frequency range 30MHz-1000MHz and no emissions were detected above ambient noise at 4th harmonic and above. For Harmonics Emissions see Tables 3.2.1-3.2.2 and Graphs 3.2.1-3.2.6.
Test performed at low and upper channels.



Date:	October 4-5, 2011	Result: Pass
Standard:	FCC 15.249(a) and (d) / RSS-210 A2.9	
Tested by:	Simon Khazon	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Frequency Range 30-1000MHz	

Table 3.2.1

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	QP Reading dBuV	Total @ 3m dBuV/m	Limit dBuV/m	Margin dB
	Polarity	Hts(cm)							
Channel 396 (915.7MHz)									
66.86	V	269	6.2	0.8	0.0	5.9	13.0	40.0	-27.0
68.72	V	261	6.4	0.8	0.0	4.7	11.9	40.0	-28.1
99.84	V	266	11.3	1.0	0.0	3.9	16.2	43.5	-27.3
372.25	V	279	16.0	2.2	0.0	7.4	25.5	46.0	-20.5
400.94	V	179	16.7	2.3	0.0	8.1	27.1	46.0	-18.9
66.22	H	129	6.2	0.8	0.0	3.7	10.7	40.0	-29.3
128.94	H	334	12.8	1.2	0.0	5.9	19.9	43.5	-23.6
132.50	H	241	12.6	1.2	0.0	10.7	24.5	43.5	-19.0
Channel 417 (922.1MHz)									
68.50	V	277	6.4	0.8	0.0	4.0	11.2	40.0	-28.8
109.30	V	251	12.4	1.1	0.0	2.9	16.4	43.5	-27.1
372.28	V	282	16.0	2.2	0.0	6.3	24.4	46.0	-21.6
400.89	V	266	16.7	2.3	0.0	12.1	31.1	46.0	-14.9
128.90	H	336	12.8	1.2	0.0	9.7	23.7	43.5	-19.8
132.50	H	223	12.6	1.2	0.0	11.0	24.8	43.5	-18.7



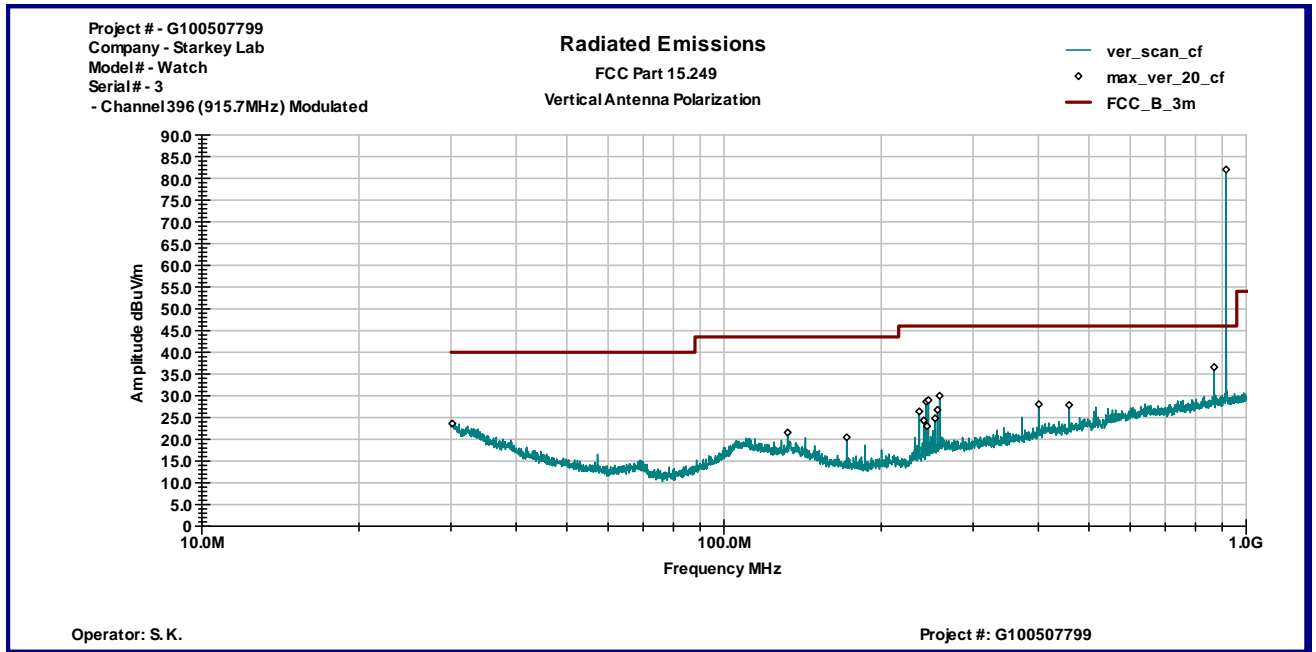
Date:	October 4-5, 2011	Result: Pass
Standard:	FCC 15.249(a) and (d) / RSS-210 A2.9	
Tested by:	Simon Khazon	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Frequency Range 1-10GHz No emissions above ambient noise were detected above the 4 nd harmonics	

Table 3.2.2

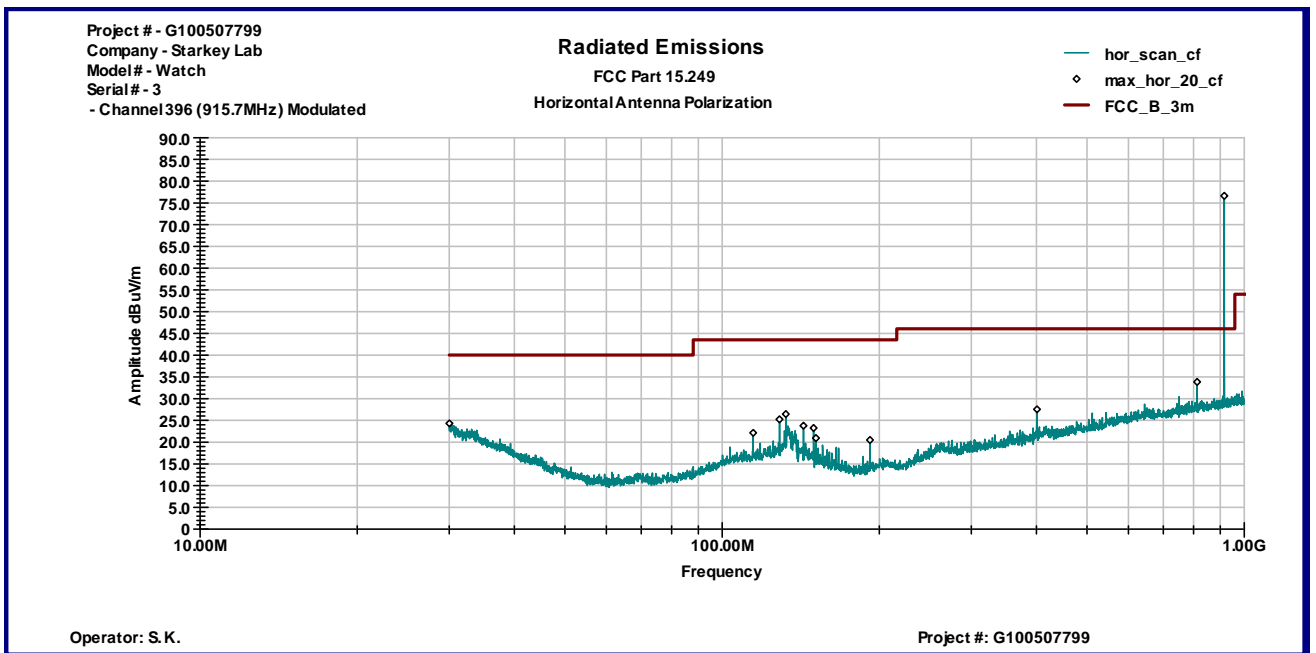
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Reading dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB	Comments
	Polarity	Hts(cm)								
Channel 396 (915.7MHz)										
1831.27	V	100	27.5	5.7	0.0	17.1	50.3	54.0	-3.7	Qpeak
1831.27	V	100	27.5	5.7	0.0	17.4	50.6	54.0	-3.4	Peak
2746.78	V	100	29.5	3.7	37.7	51.8	47.3	54.0	-6.7	Ave
2746.78	H	156	29.5	3.7	37.7	46.3	41.8	54.0	-12.2	Ave
Channel 417 (922.1MHz)										
1844.00	V	100	27.6	5.7	0.0	17.3	50.7	54.0	-3.3	Peak
1844.00	V	100	27.6	5.7	0.0	17.9	51.3	54.0	-2.7	Qpeak
2766.33	V	100	29.6	3.7	37.7	50.3	45.9	54.0	-8.1	Ave
2766.33	H	321	29.6	3.7	37.7	41.6	37.2	54.0	-16.8	Ave

Graph 3.2.1

Vertical antenna polarization

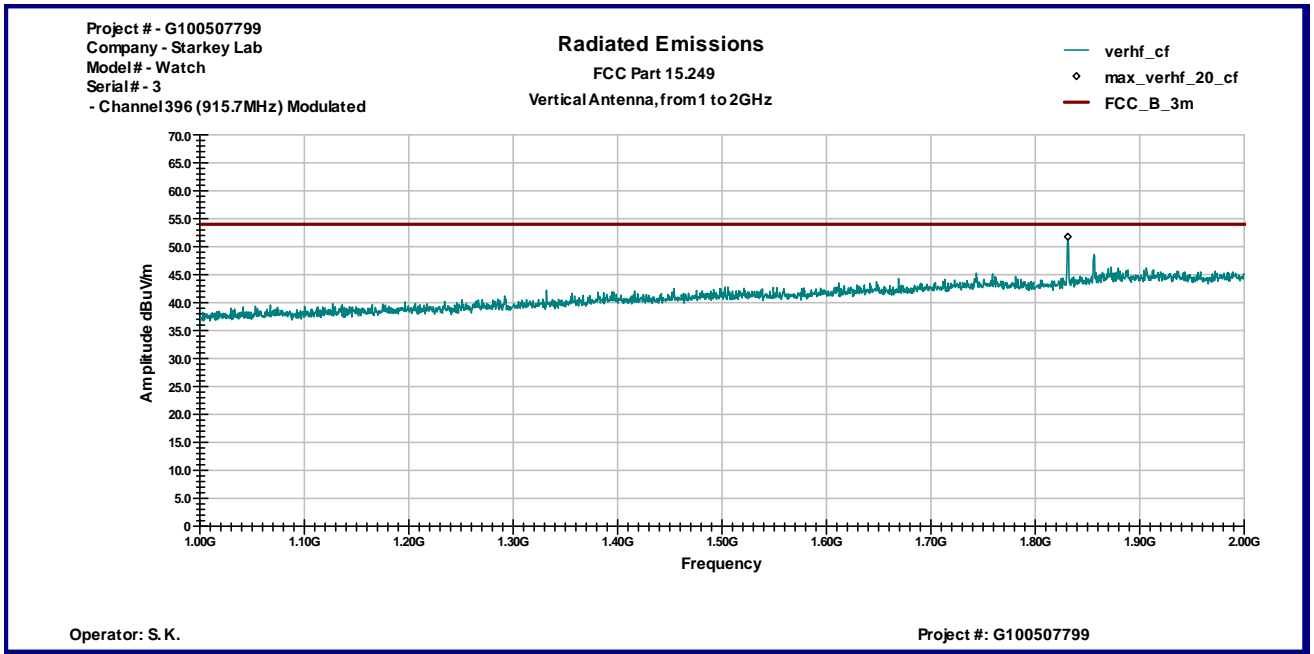


Horizontal antenna polarization

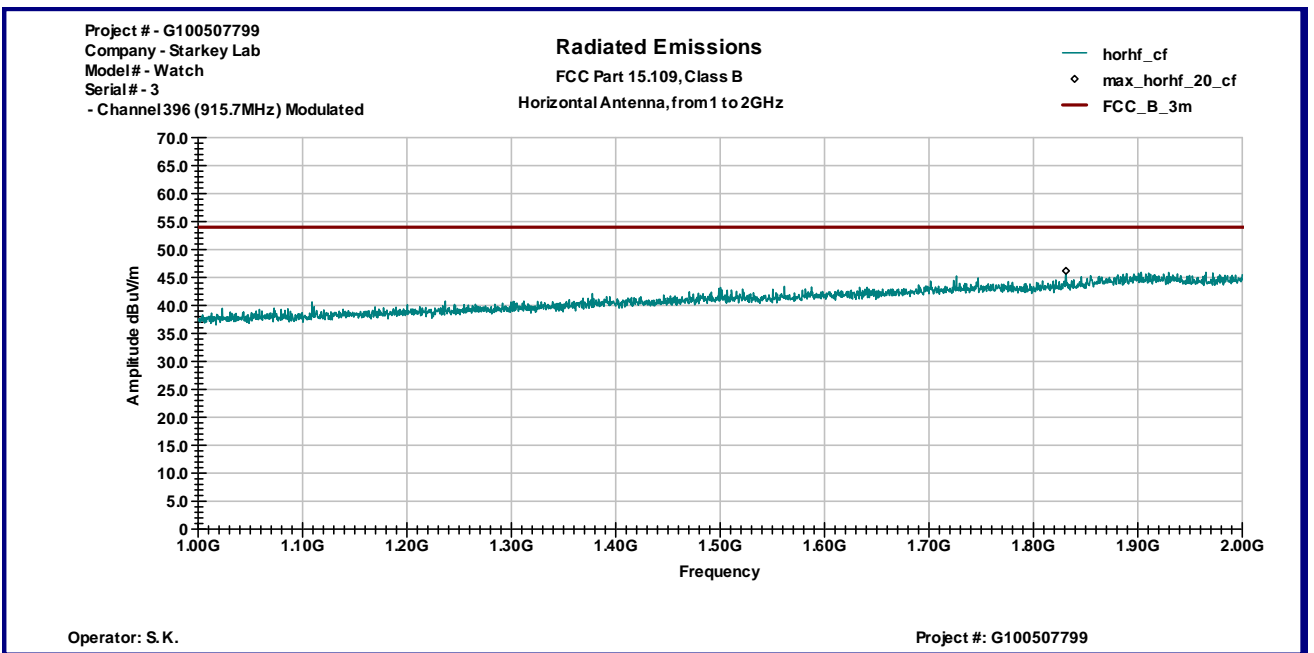


Graph 3.2.2

Vertical antenna polarization

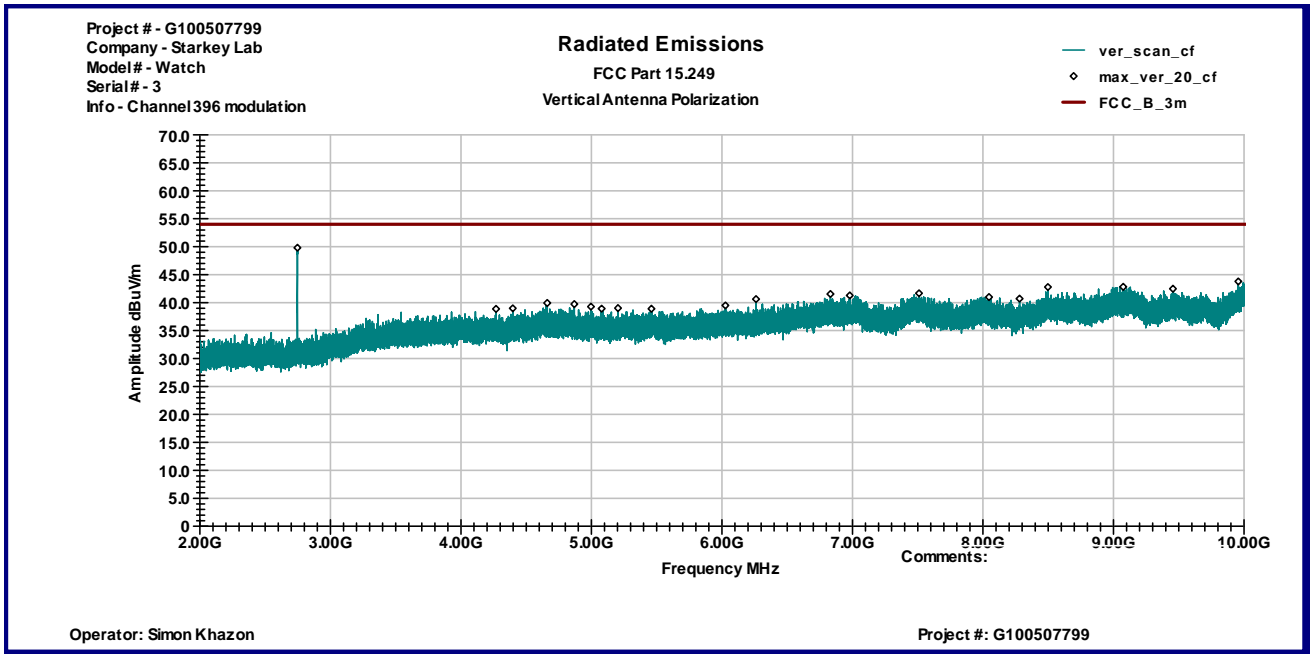


Horizontal antenna polarization

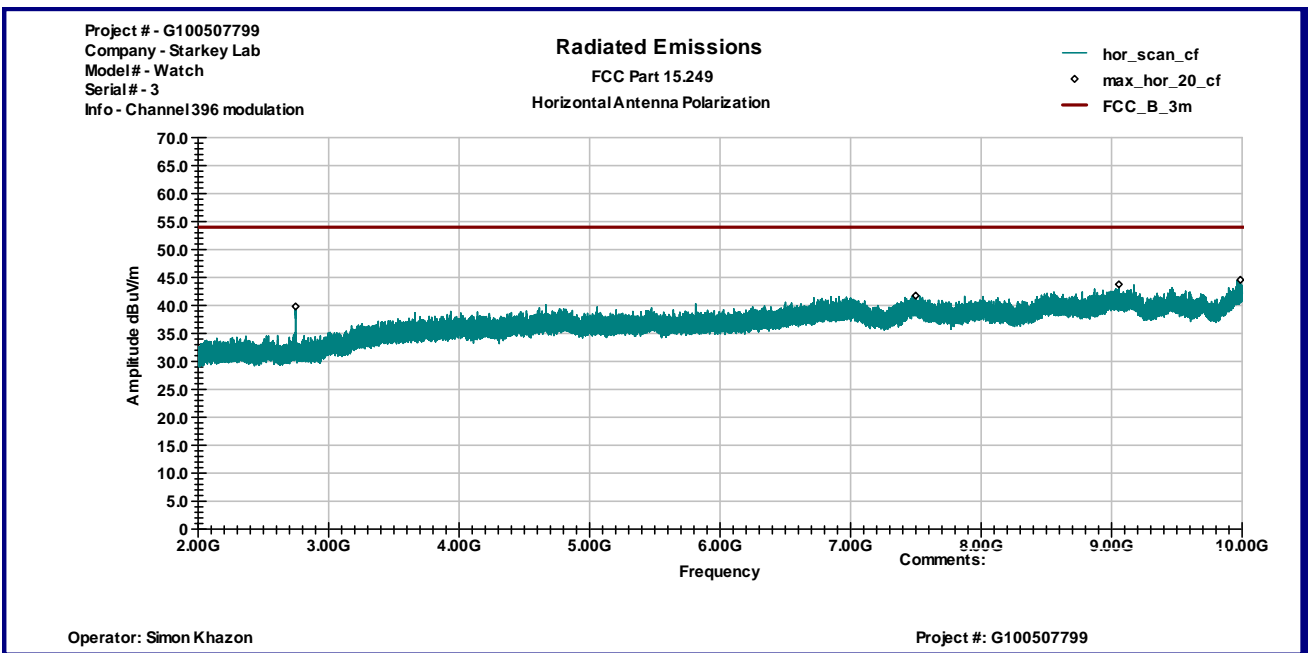


Graph 3.2.3

Vertical antenna polarization

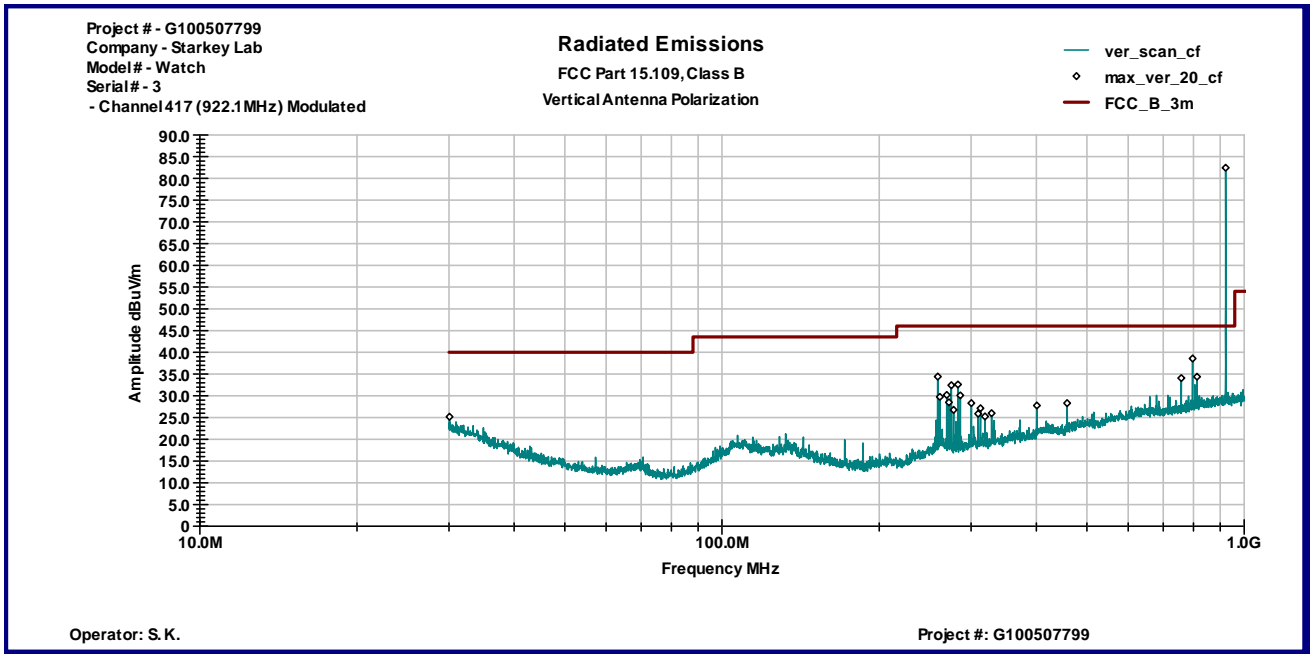


Horizontal antenna polarization

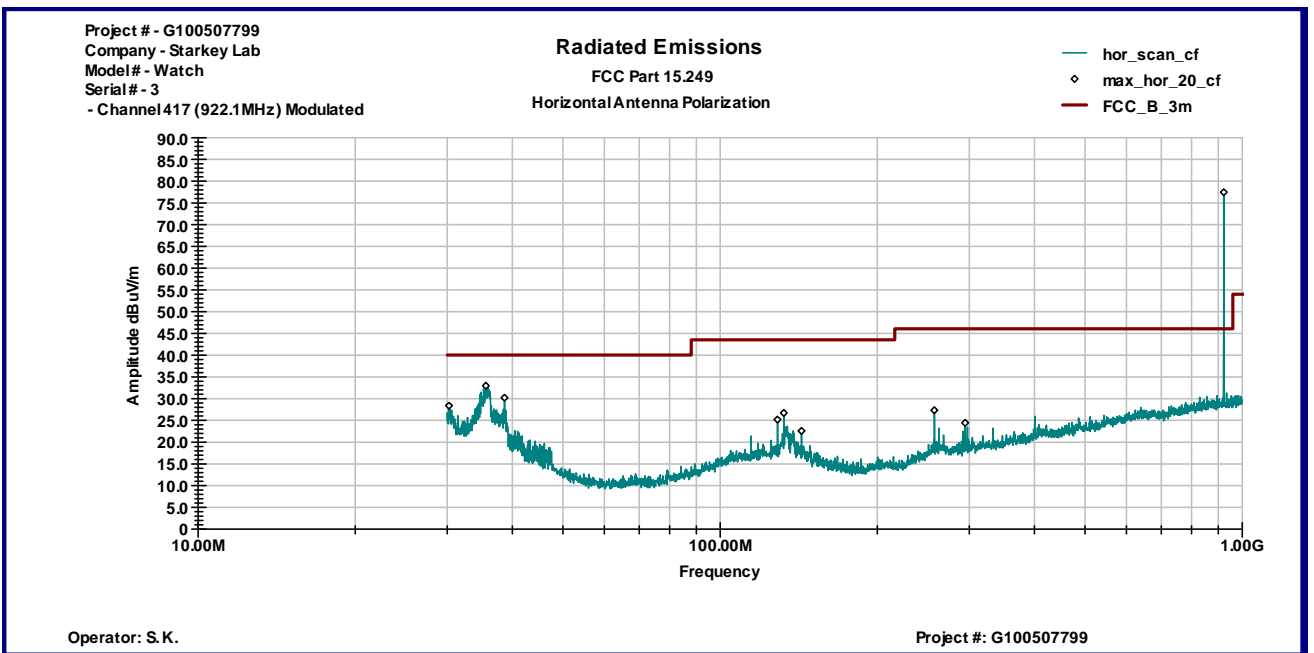


Graph 3.2.4

Vertical antenna polarization

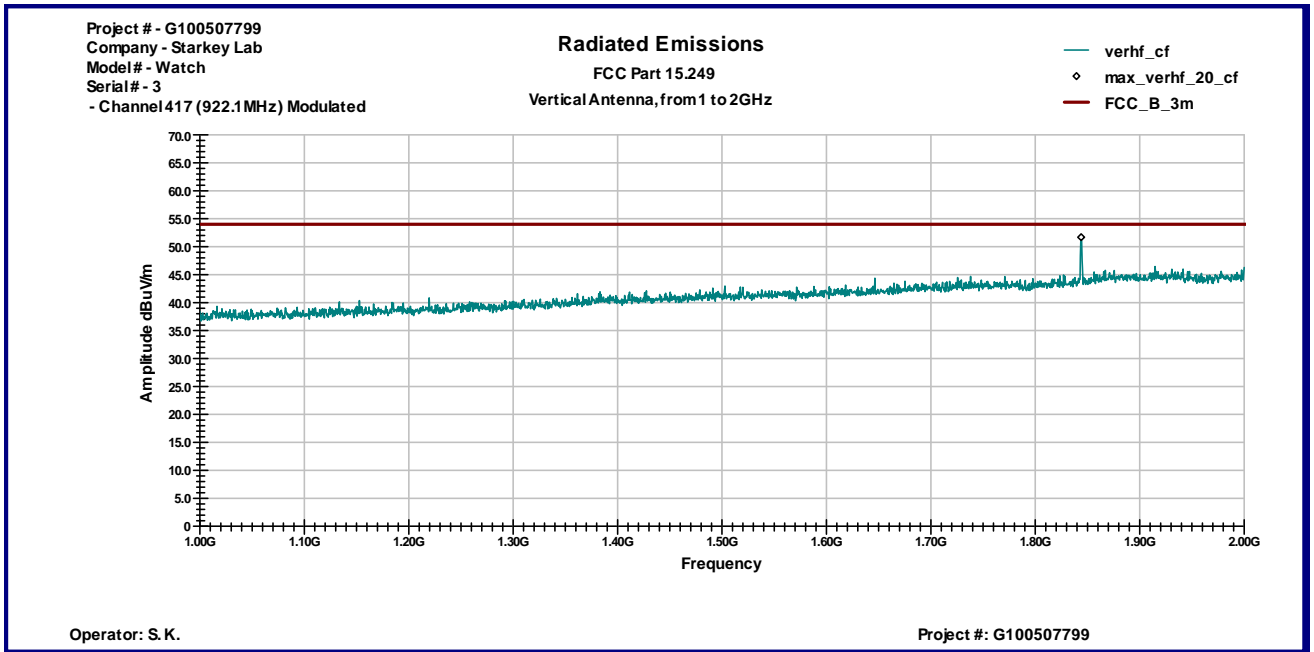


Horizontal antenna polarization

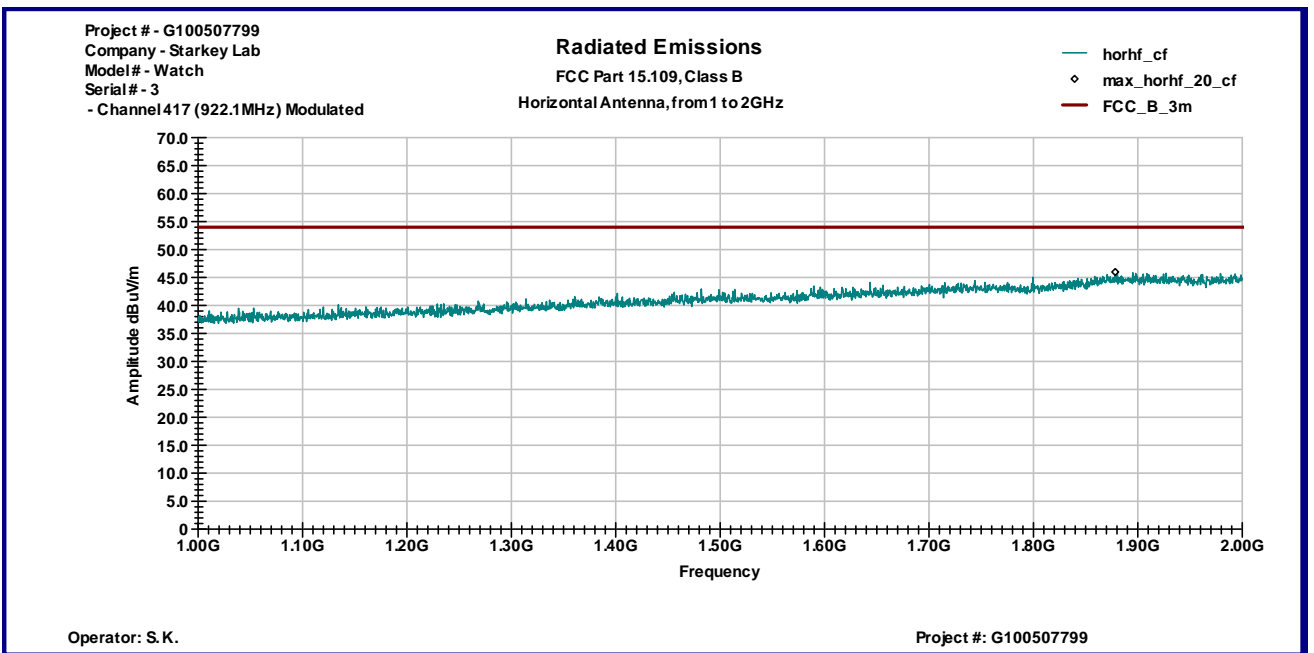


Graph 3.2.5

Vertical antenna polarization

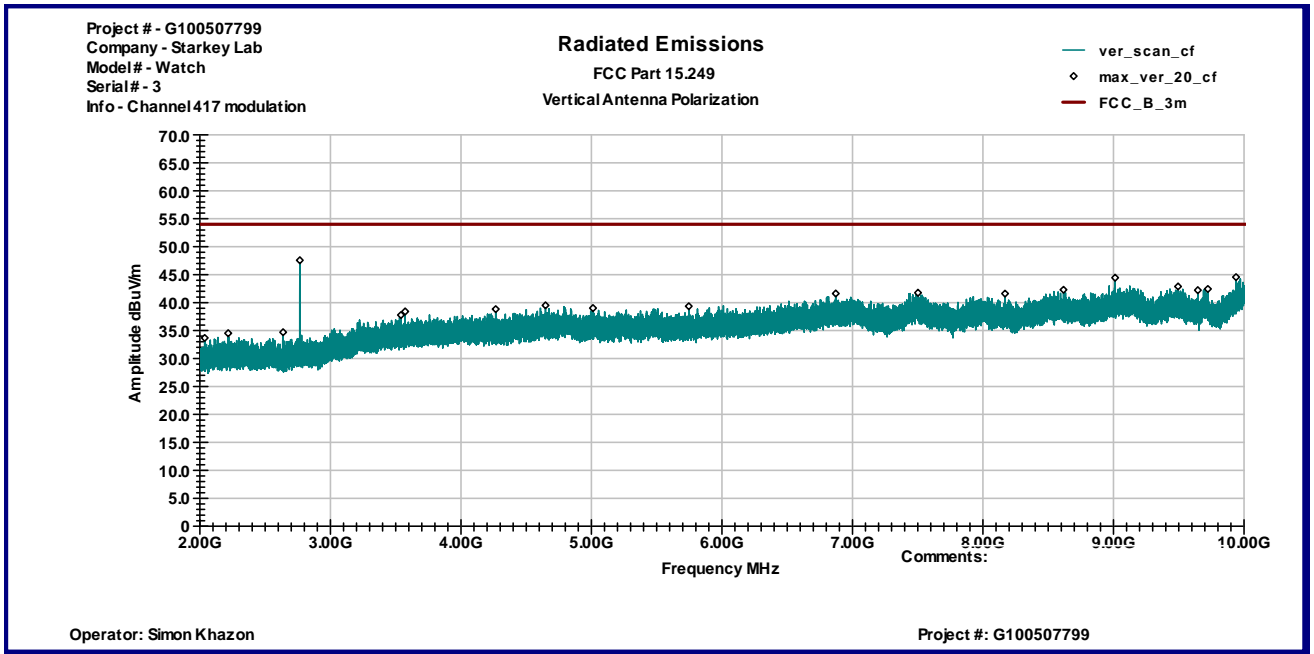


Horizontal antenna polarization

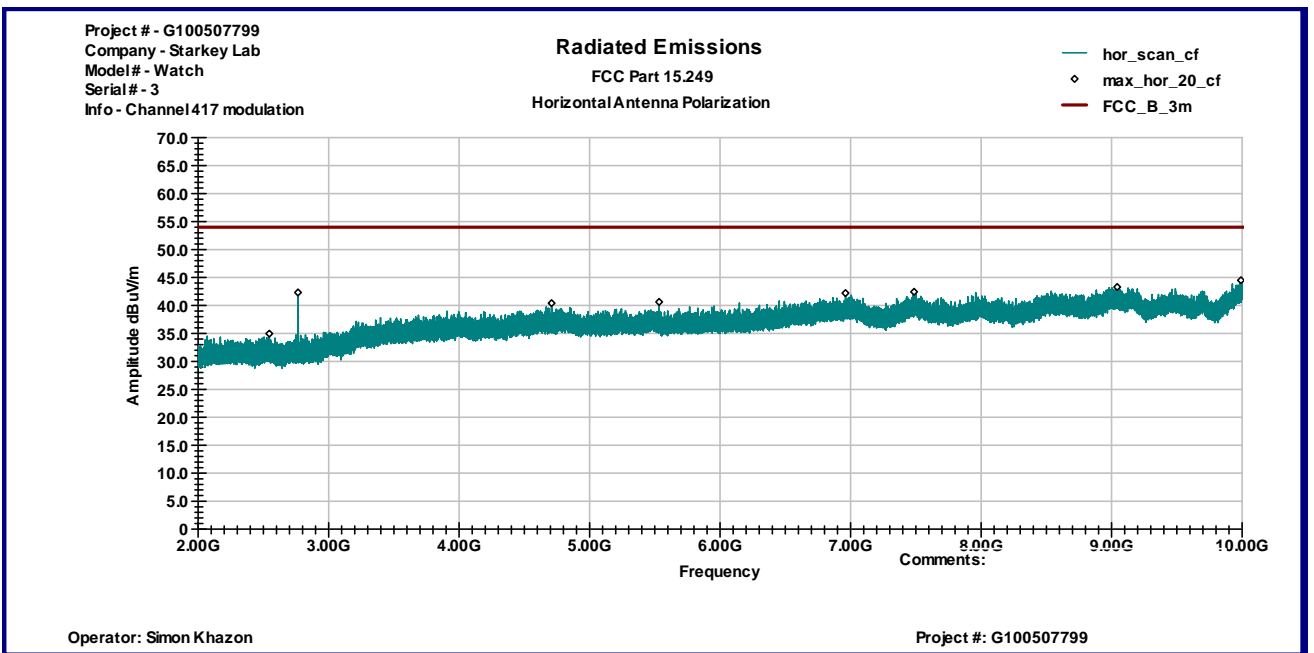


Graph 3.2.6

Vertical antenna polarization



Horizontal antenna polarization





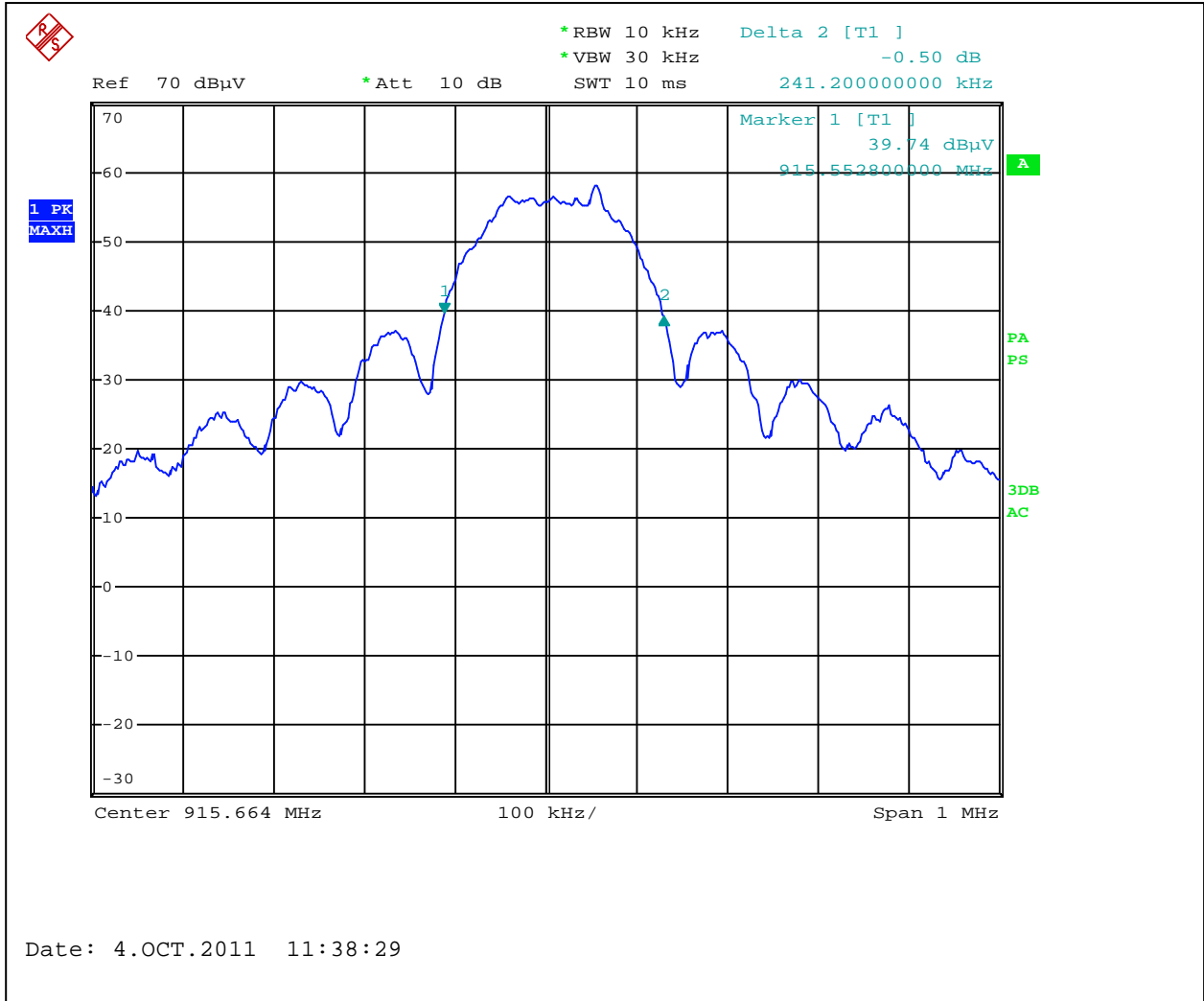
3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
915.66	241	268
922.0	244	276

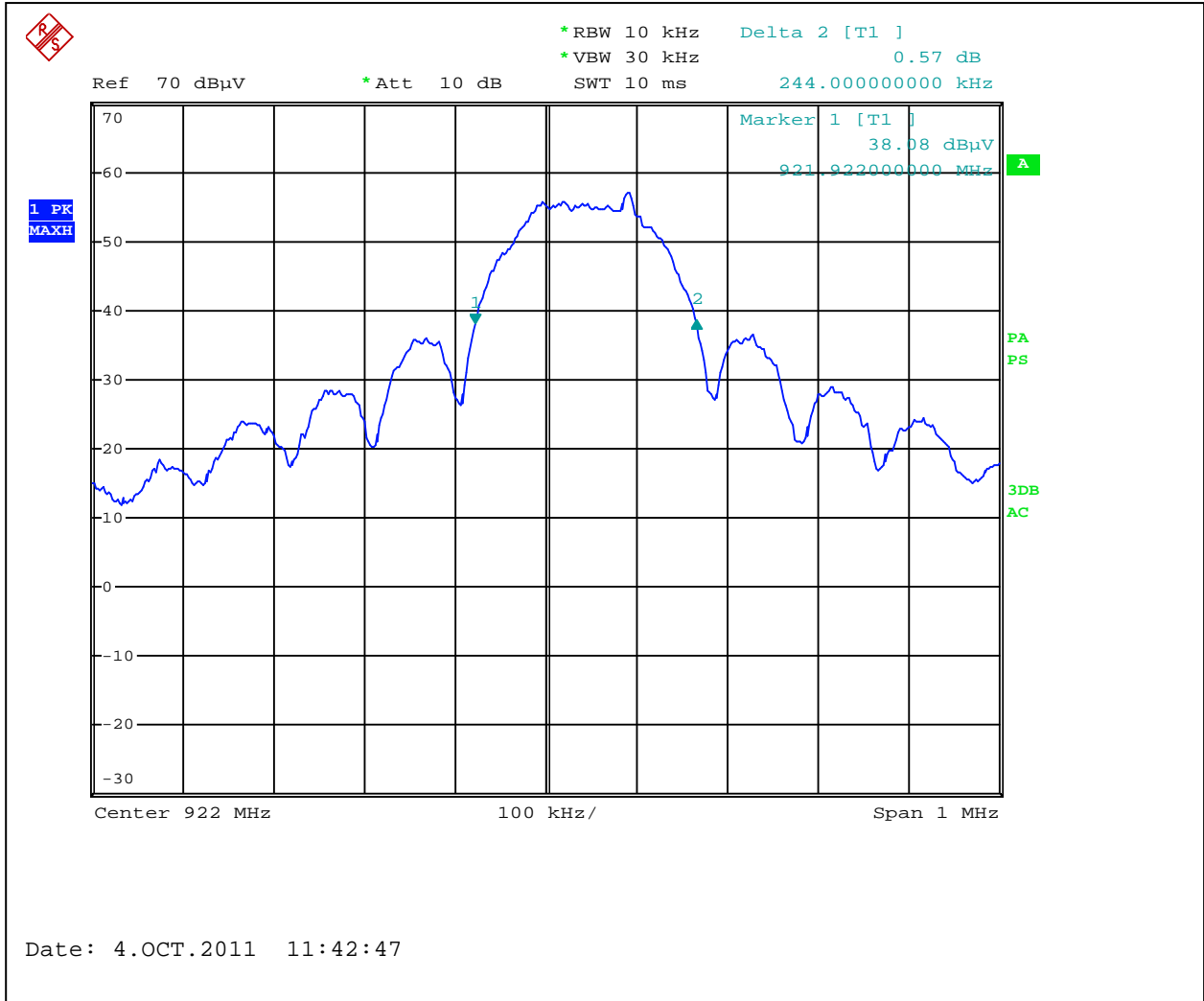
Graphs 3-3-1 and 3-3-2 show 20dB Bandwidth.
Graphs 3-3-3 and 3-3-4 show 99% Bandwidth.

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

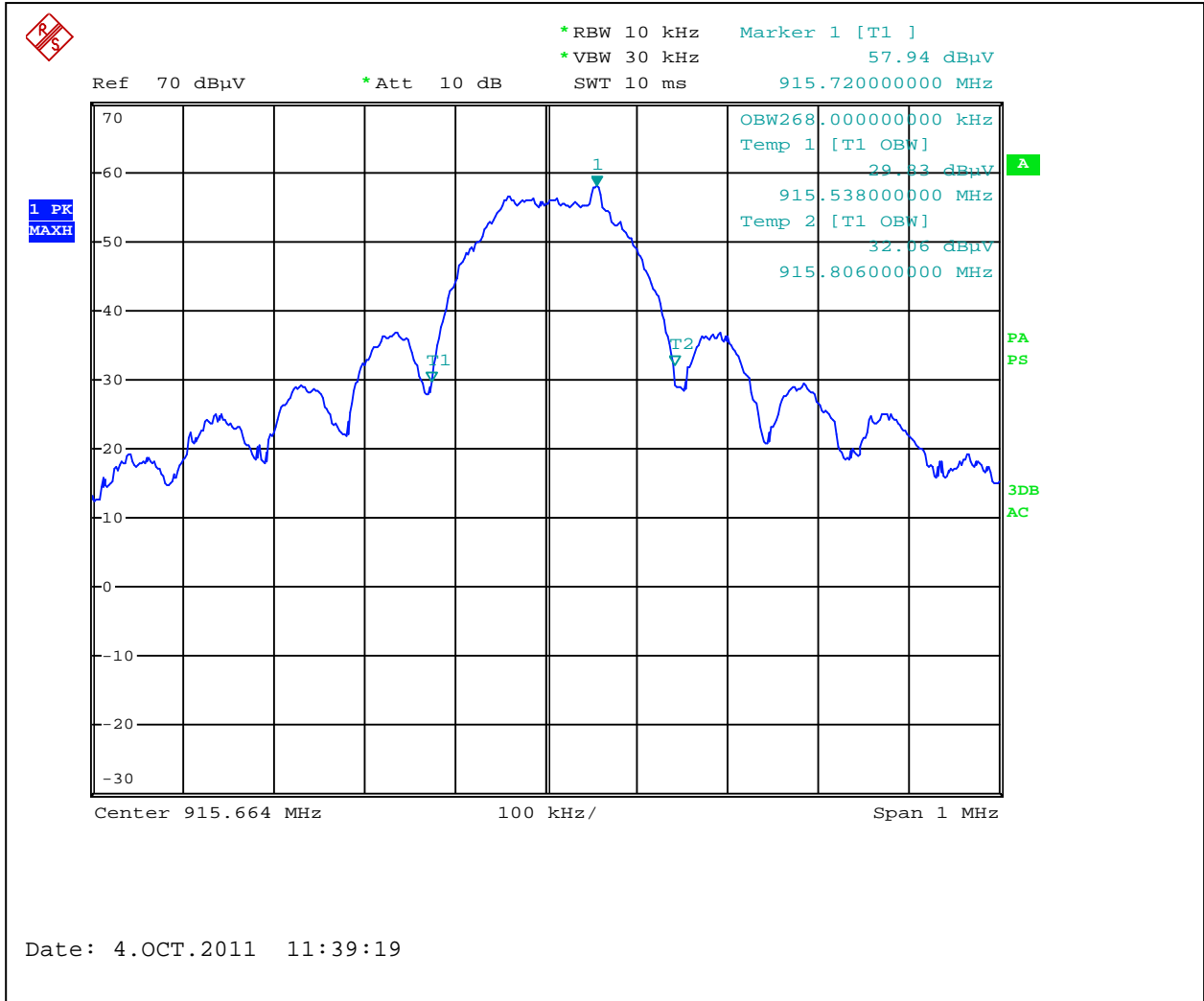
Graph 3.3.1



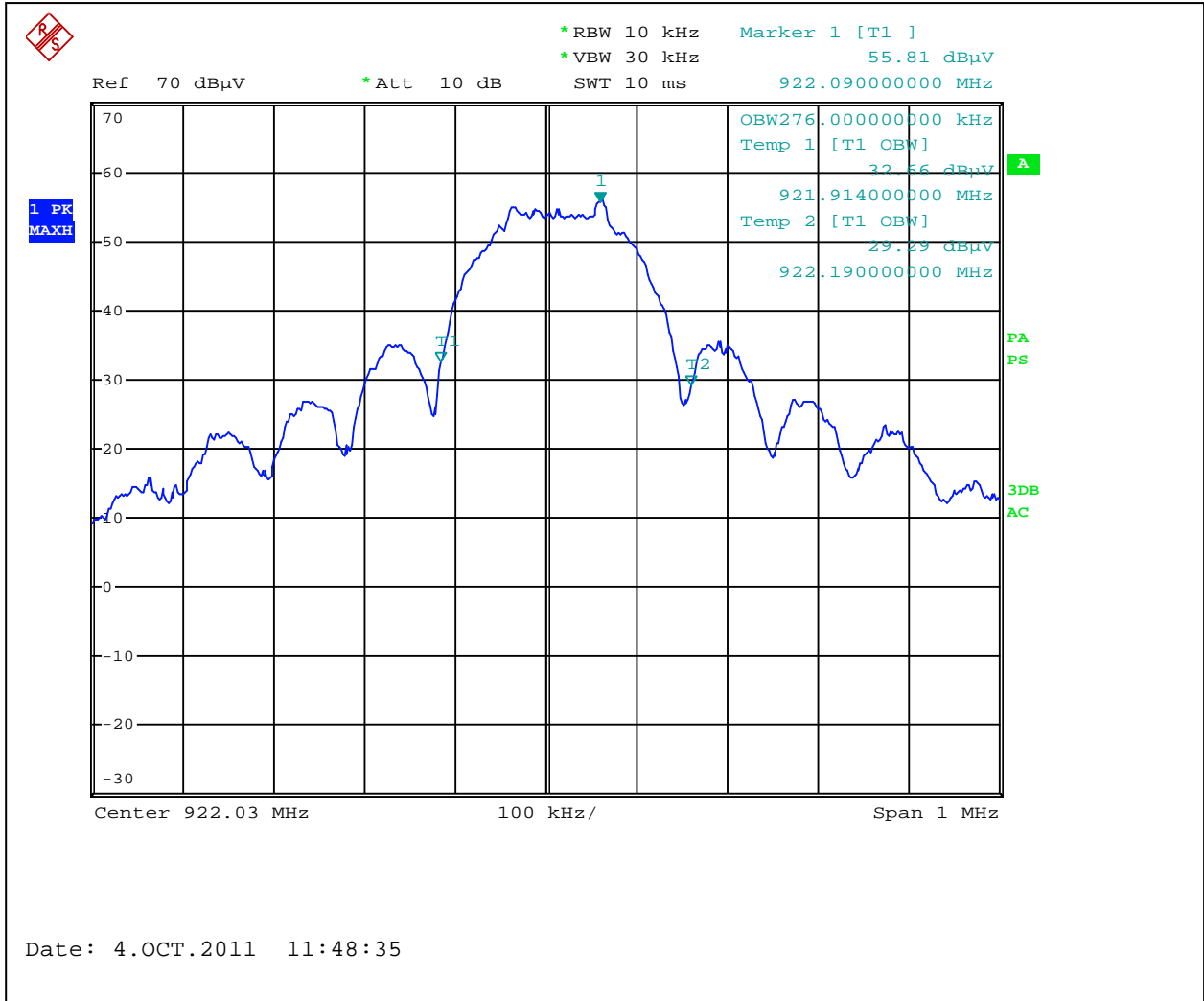
Graph 3.3.2



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: EUT powered from internal battery.



3.5 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: 14.3dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Table 3.11.1 and Graphs 3.11.1 and 3.11.2)



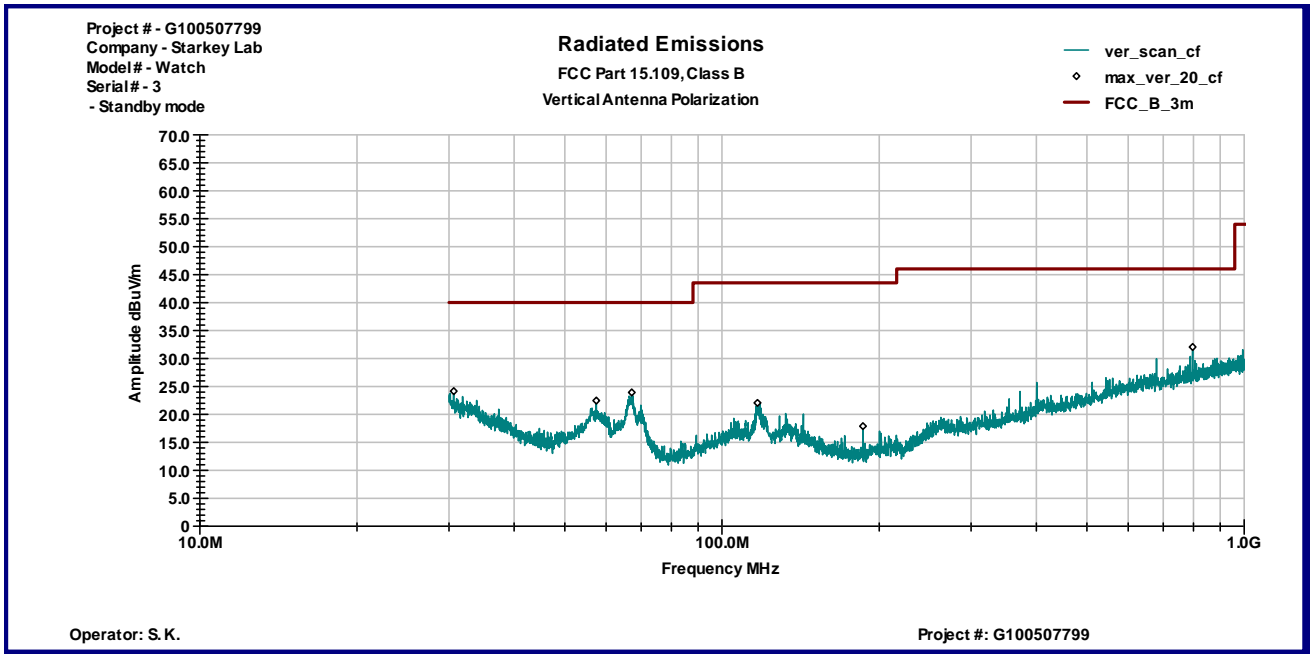
Date:	October 5, 2011	Result: Pass
Standard:	FCC Part 15.109, Class B	
Tested by:	Simon Khazon	
Test Point:	Enclosure	
Operation mode:	Standby	
Note:	None	

Table 3.5.1

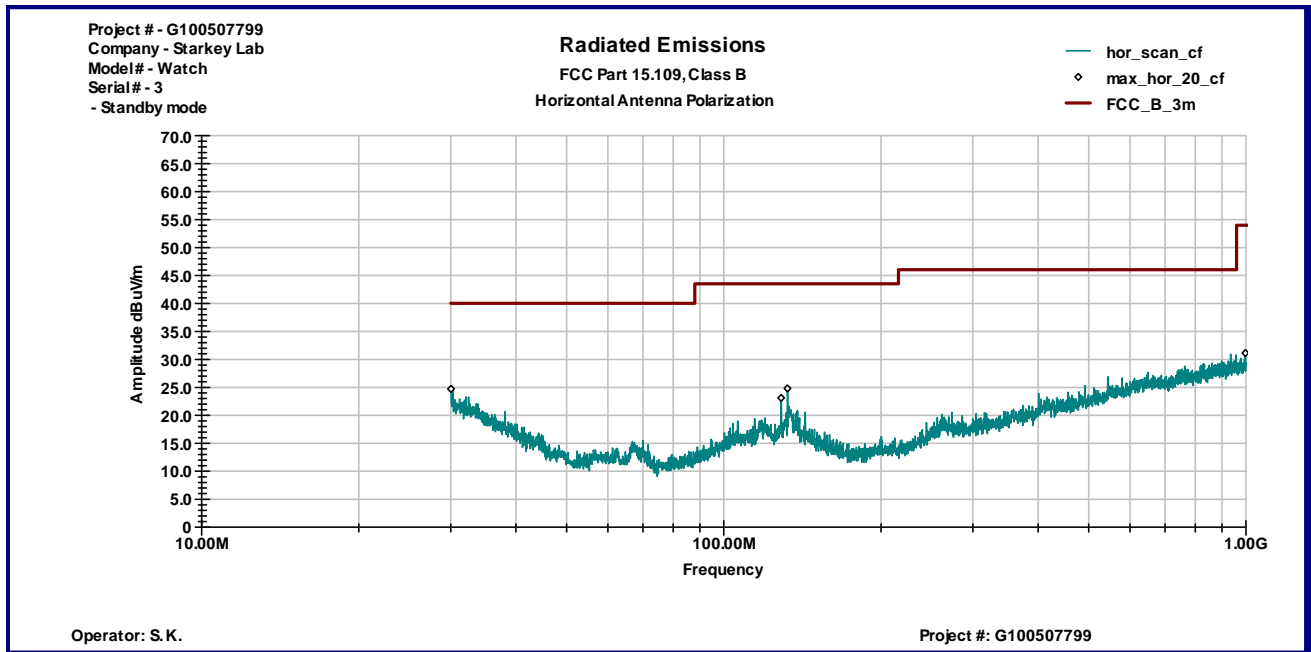
Frequency	Ant. Polarity	Peak Reading dB μ V	Ant.Factor dB1/m	Total at 3m dB μ V/m	QP Limit dB μ V/m	Margin dB
30.632 MHz	V	4.2	20.0	24.2	40.0	-15.9
57.447 MHz	V	14.9	7.6	22.5	40.0	-17.5
67.181 MHz	V	16.8	7.1	23.9	40.0	-16.1
116.96 MHz	V	8.1	14.0	22.1	43.5	-21.5
186.21 MHz	V	6.6	11.3	17.9	43.5	-25.6
796.94 MHz	V	7.7	24.3	32.1	46.0	-14.0
30.035 MHz	H	4.4	20.3	24.7	40.0	-15.3
128.79 MHz	H	9.1	14.0	23.1	43.5	-20.4
132.43 MHz	H	11.0	13.8	24.8	43.5	-18.7
998.03 MHz	H	4.7	26.4	31.1	54.0	-22.9

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	FSP 40	100024	12559	12/07/2011	<input checked="" type="checkbox"/>
Spectrum Analyzer	R & S	ESCI	100358	12909	05/12/2012	<input checked="" type="checkbox"/>
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	9734	10/18/2011	<input checked="" type="checkbox"/>
Horn Antenna	EMCO	3115	9507-4513	9936	04/29/2012	<input checked="" type="checkbox"/>
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	10/06/2011	<input checked="" type="checkbox"/>
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	<input checked="" type="checkbox"/>