



# TEST REPORT

Report Number: 100105325MIN-001  
Project Number: G100105325

Testing performed on the  
Sharc  
FCC ID: EOA-WP  
Industry Canada ID: 6903A-WP

to  
47 CFR Part 15. 249:2009  
RSS- 210, Issue 7, 2007

For  
Starkey Laboratories, Inc.

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

Test Authorized by:  
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6700 Washington Avenue South  
Eden Prairie, MN 55344

Prepared by: Richard Blonigen  
Richard Blonigen

Date: May 17, 2010

Reviewed by: Uri Spector  
Uri Spector

Date: May 17, 2010

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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..... 25
  - 3.6 Digital device conducted emissions..... 29
- 4.0 TEST EQUIPMENT ..... 32**



## 1.0 GENERAL DESCRIPTION

<b>Model:</b>	Sharc
<b>Type of EUT:</b>	Hearing Aid Programmer
<b>Serial Number:</b>	N/A
<b>FCC ID:</b>	EOA-WP
<b>Industry Canada ID:</b>	6903A-WP
<b>Related Submittal(s) Grants:</b>	None
<b>Company:</b>	Starkey Laboratories Inc.
<b>Customer:</b>	Mr. Ken Meyer
<b>Address:</b>	6700 Washington Avenue South Eden Prairie, MN 55344
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<b>Test Standards:</b>	<input checked="" type="checkbox"/> 47 CFR, Part 15:2009, §15.249 <input checked="" type="checkbox"/> RSS-210, Issue 7, 2007 <input checked="" type="checkbox"/> RSS-Gen, Issue 2, 2007 <input checked="" type="checkbox"/> 47 CFR, Part 15:2008, §15.107 and §15.109, Class B <input type="checkbox"/> Other [REDACTED]
<b>Type of radio:</b>	<input checked="" type="checkbox"/> Stand -alone <input type="checkbox"/> Module <input type="checkbox"/> Hybrid
<b>Date Sample Submitted:</b>	May 10, 2010
<b>Test Work Started:</b>	May 10, 2010
<b>Test Work Completed:</b>	May 12, 2010
<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>	Hearing Aid Programmer
<b>Operating Frequency</b>	902-928 MHz
<b>Number of Channels</b>	11 Channels
<b>Modulation:</b>	FSK
<b>Emission Designator:</b>	323KFXD
<b>Antenna(s) Info:</b>	Integral
<b>Antenna Installation:</b>	<input type="checkbox"/> User <input type="checkbox"/> Professional <input checked="" type="checkbox"/> Factory
<b>Transmitter Power Configuration:</b>	<input type="checkbox"/> Internal battery <input checked="" type="checkbox"/> External DC power from Host Computer <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>	
<b>Test Facility Accreditation:</b>	A2LA (Certificate No. 1427.01)
<b>Test Methodology:</b>	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)
- [REDACTED]

#### Operating modes of the EUT:

No.	Description
1	EUT has 11 channels of operation; testing consisted of lower, middle, and upper channel transmitting continuously with one channel being transmitted at a given time.
2	Standby / Receiving mode was used for FCC Part 15.109 and ICES-003 testing; 914.77 MHz signal was used to transmit.

#### Cables:

No.	Type	Length	Designation	Note
1	Unshielded	2.5 m	USB	
2				

#### Support equipment/Services:

No.	Item	Description
1	HP laptop computer	Host Computer
2	R + S SMR 20 Generator	Signal Source during FCC 15.109 testing

### 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).

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

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

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

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

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

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

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

**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	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:**                      0.5 dB below the limits

**Notes:**                Test performed at low, middle and upper channel

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<b>Date:</b>	May 10, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.249(a) / RSS-210 A2.9	
<b>Tested by:</b>	Norman Shpilsher	
<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)	Reading dBµV	Total @ 3m dBµV/m	Limit dBµV/m	Margin dB	Comments
	Polarity	Hts(cm)								
<b>Fundamental</b>										
<b>Channel 366, Vert EUT Ant</b>										
906.58	V	191 / 177	21.8	3.6	0.0	63.7	89.1	94.0	-4.9	Pk
906.58	H	100 / 104	21.8	3.6	0.0	67.9	93.3	94.0	-0.7	Pk
<b>Channel 393, Vert EUT Ant</b>										
914.77	V	176 / 166	21.8	3.6	0.0	63.6	89.0	94.0	-5.0	Pk
914.77	H	100 / 101	21.8	3.6	0.0	67.3	92.7	94.0	-1.3	Pk
<b>Channel 417, Vert EUT Ant</b>										
922.06	V	165 / 205	21.7	3.7	0.0	65.8	91.2	94.0	-2.8	Pk
922.06	H	100 / 102	21.7	3.7	0.0	68.1	93.5	94.0	-0.5	Pk
<b>Band Edge Compliance</b>										
902.00	V	191 / 177	21.8	3.6	0.0	8.6	34.1	46.0	-12.0	QP
902.00	H	100 / 104	21.8	3.6	0.0	8.9	34.4	46.0	-11.7	QP
928.00	V	165 / 205	21.7	3.7	0.0	9.0	34.4	46.0	-11.7	QP
928.00	H	100 / 102	21.7	3.7	0.0	8.9	34.3	46.0	-11.8	QP



### 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:** 5.4dB 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 4<sup>th</sup> harmonic and beyond. For Harmonics Emissions see Table 3.2.1 and Graphs 3.2.1-3.2.3. Test performed at low, middle and upper channel.

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<b>Date:</b>	May 11, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.249(a) and (d) / RSS-210 A2.9	
<b>Tested by:</b>	Richard Blonigen	
<b>Test Point:</b>	Enclosure with antenna	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	No emissions above ambient noise were detected above the 3 <sup>rd</sup> harmonics	

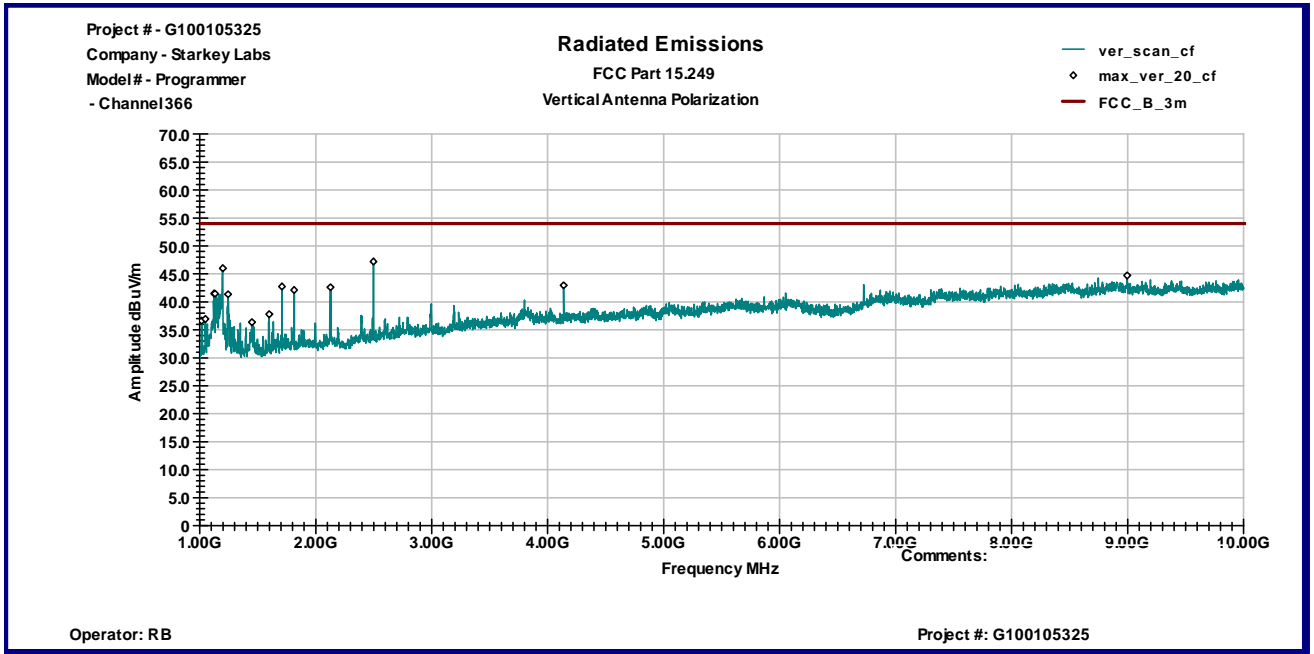
**Table 3.2.1**

Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	Average Reading	Total @ 3m	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBµV	dBµV/m	dBµV/m	dB	
<b>Harmonics Emissions</b>										
<b>Channel 366 (906.5MHz)</b>										
1813.00	V	203	26.2	3.6	43.1	54.0	40.8	54.0	-13.2	
2720.00	V	127	28.7	4.0	43.2	48.0	37.5	54.0	-16.4	
3626.00	V	100	31.3	4.4	43.2	31.5	24.1	54.0	-29.9	
1813.00	H	206	26.2	3.6	43.1	52.5	39.3	54.0	-14.7	
2720.00	H	100	28.7	4.0	43.2	59.0	48.5	54.0	-5.4	
3626.00	H	100	31.3	4.4	43.2	31.5	24.1	54.0	-29.9	
<b>Channel 393 (914.77MHz)</b>										
1830.00	V	139	26.3	3.6	43.1	55.3	42.1	54.0	-11.8	
2745.00	V	206	28.8	4.0	43.3	48.5	38.1	54.0	-15.9	
3660.00	V	100	31.4	4.4	43.2	31.0	23.7	54.0	-30.3	
1830.00	H	119	26.3	3.6	43.1	58.0	44.8	54.0	-9.1	
2745.00	H	100	28.8	4.0	43.3	55.0	44.6	54.0	-9.4	
3660.00	H	100	31.4	4.4	43.2	31.0	23.7	54.0	-30.3	
<b>Channel 417 (922.06MHz)</b>										
1844.00	V	208	26.3	3.7	43.1	60.0	46.9	54.0	-7.1	
2766.00	V	134	28.9	4.0	43.3	51.0	40.6	54.0	-13.4	
3688.00	V	100	31.5	4.4	43.2	31.4	24.2	54.0	-29.8	
1844.00	H	123	26.3	3.7	43.1	58.0	44.9	54.0	-9.1	
2766.00	H	100	28.9	4.0	43.3	59.0	48.6	54.0	-5.4	
3688.00	H	100	31.5	4.4	43.2	31.4	24.2	54.0	-29.8	

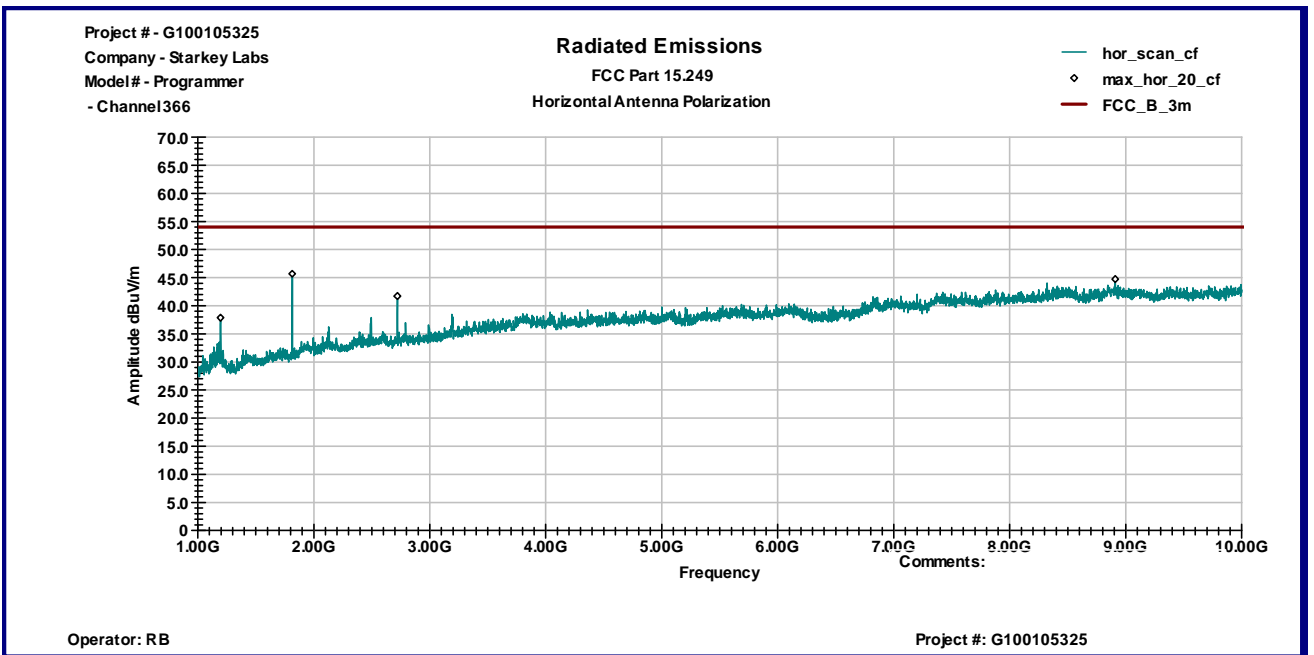


Graph 3.2.1

Vertical antenna polarization



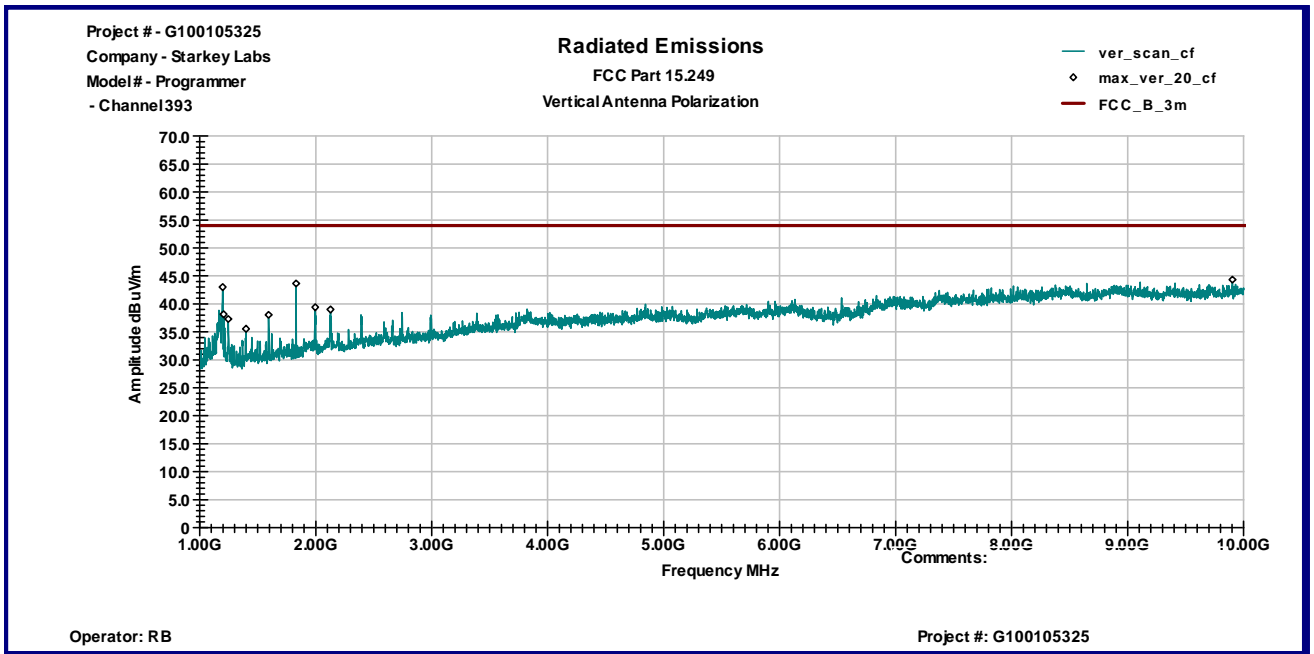
Horizontal antenna polarization



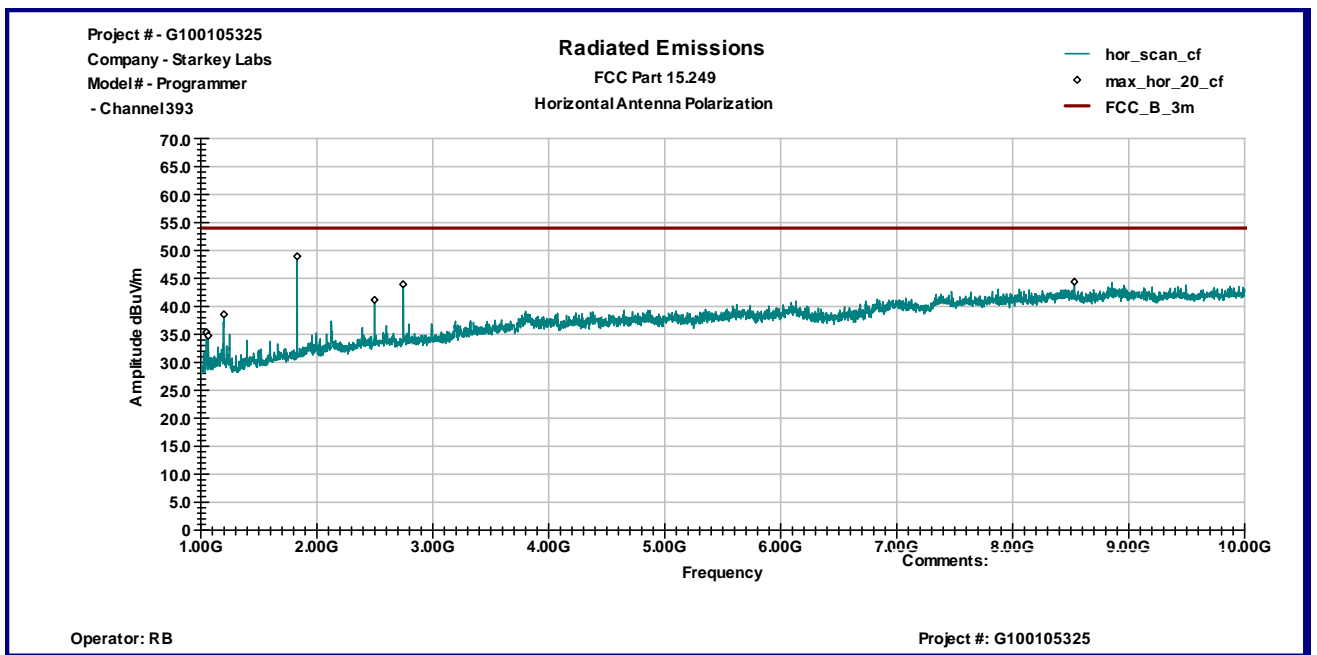


Graph 3.2.2

Vertical antenna polarization



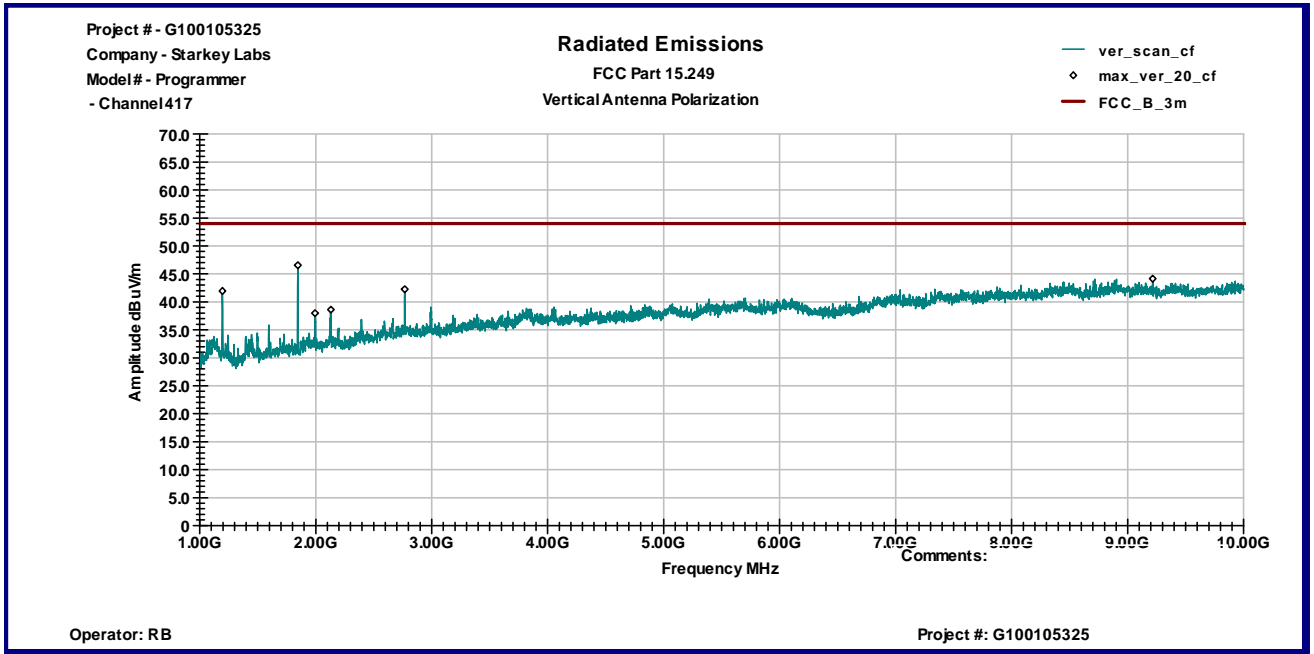
Horizontal antenna polarization



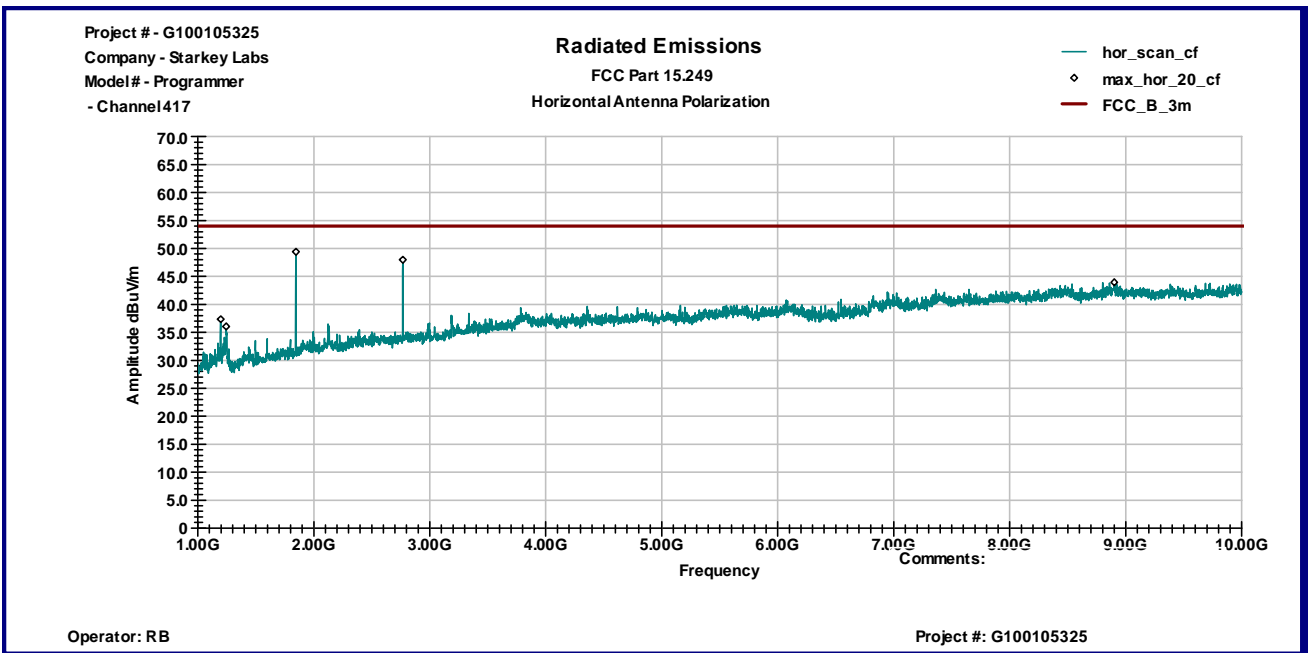


Graph 3.2.3

Vertical antenna polarization



Horizontal antenna polarization





### 3.3 Bandwidth of Emissions

Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
906.5	37.4	35.6
914.77	37.4	37.0
922.06	36.8	37.0

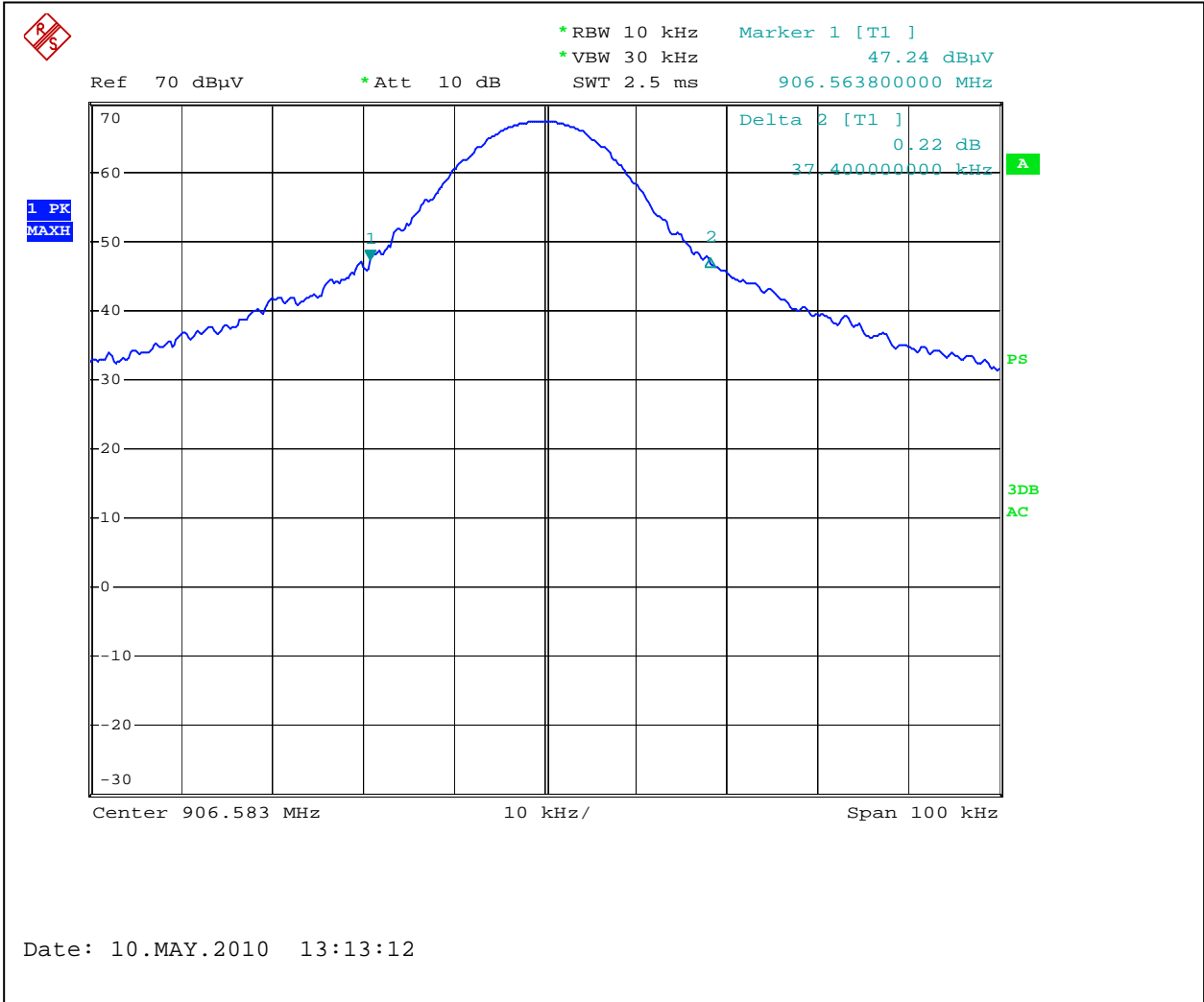
Graphs 3-3-1, 3-3-3, and 3-3-5 show 20dB Bandwidth.  
Graphs 3-3-2, 3-3-4, and 3-3-6 show 99% Bandwidth.

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

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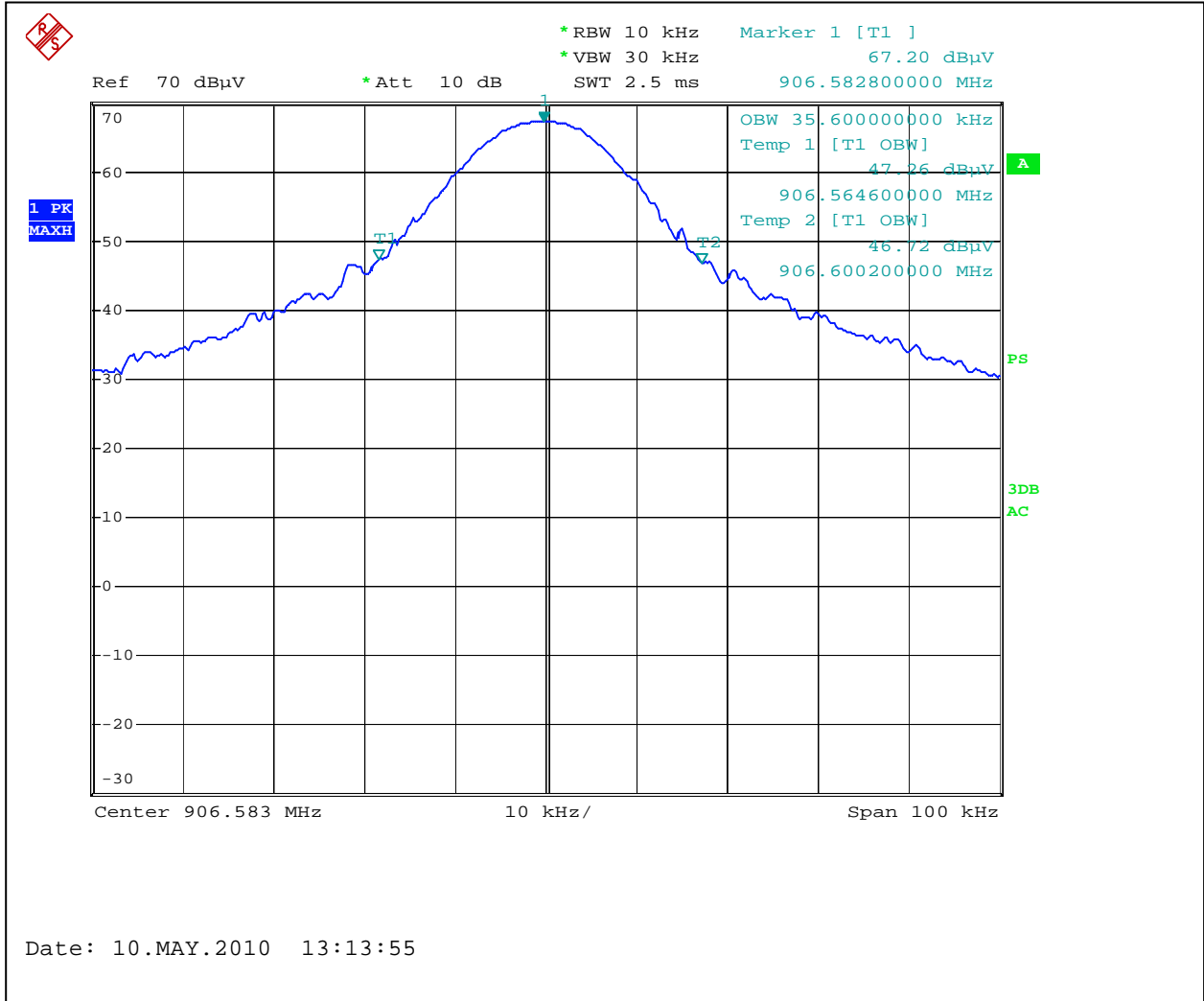


Graph 3.3.1



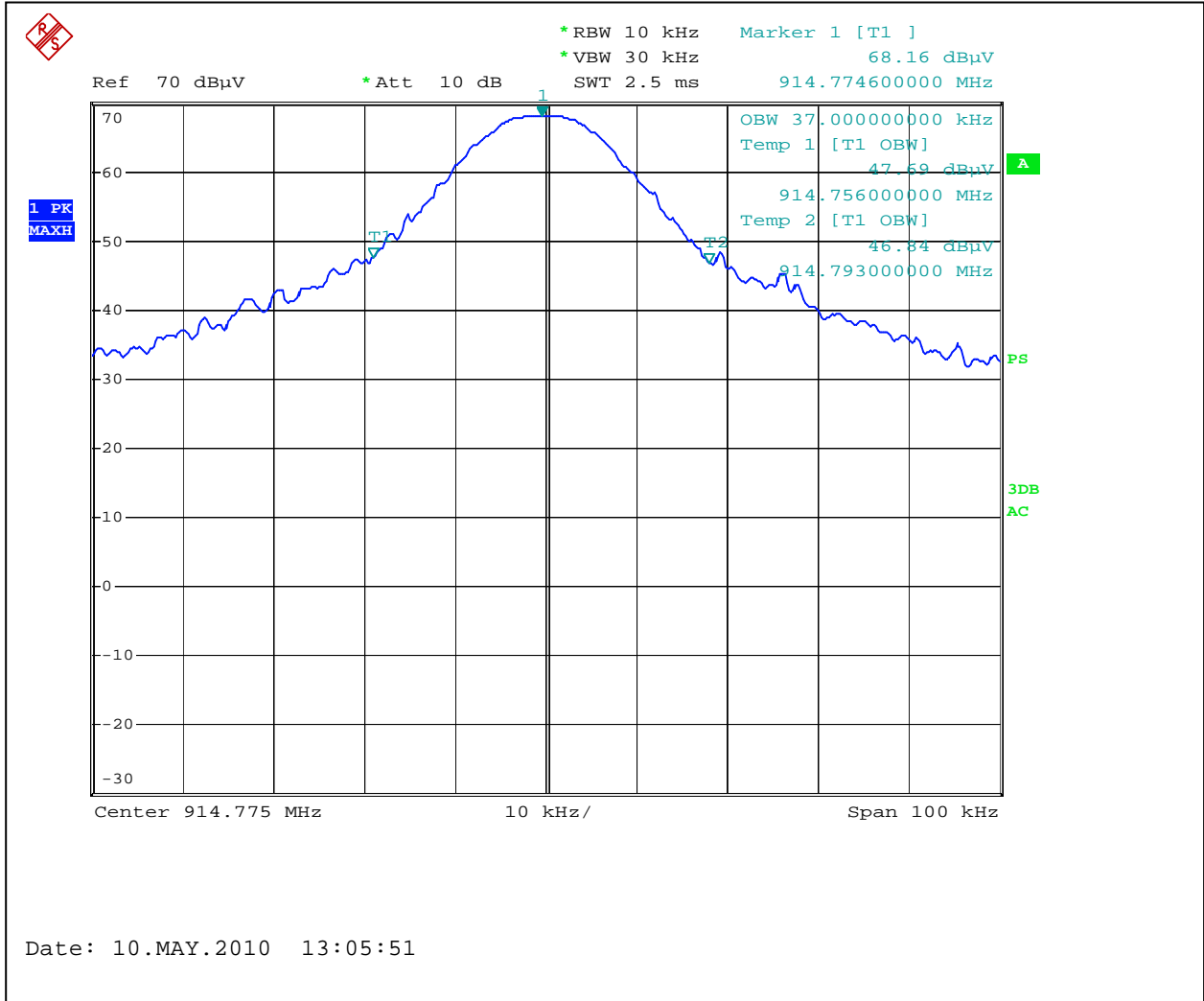


## Graph 3.3.2

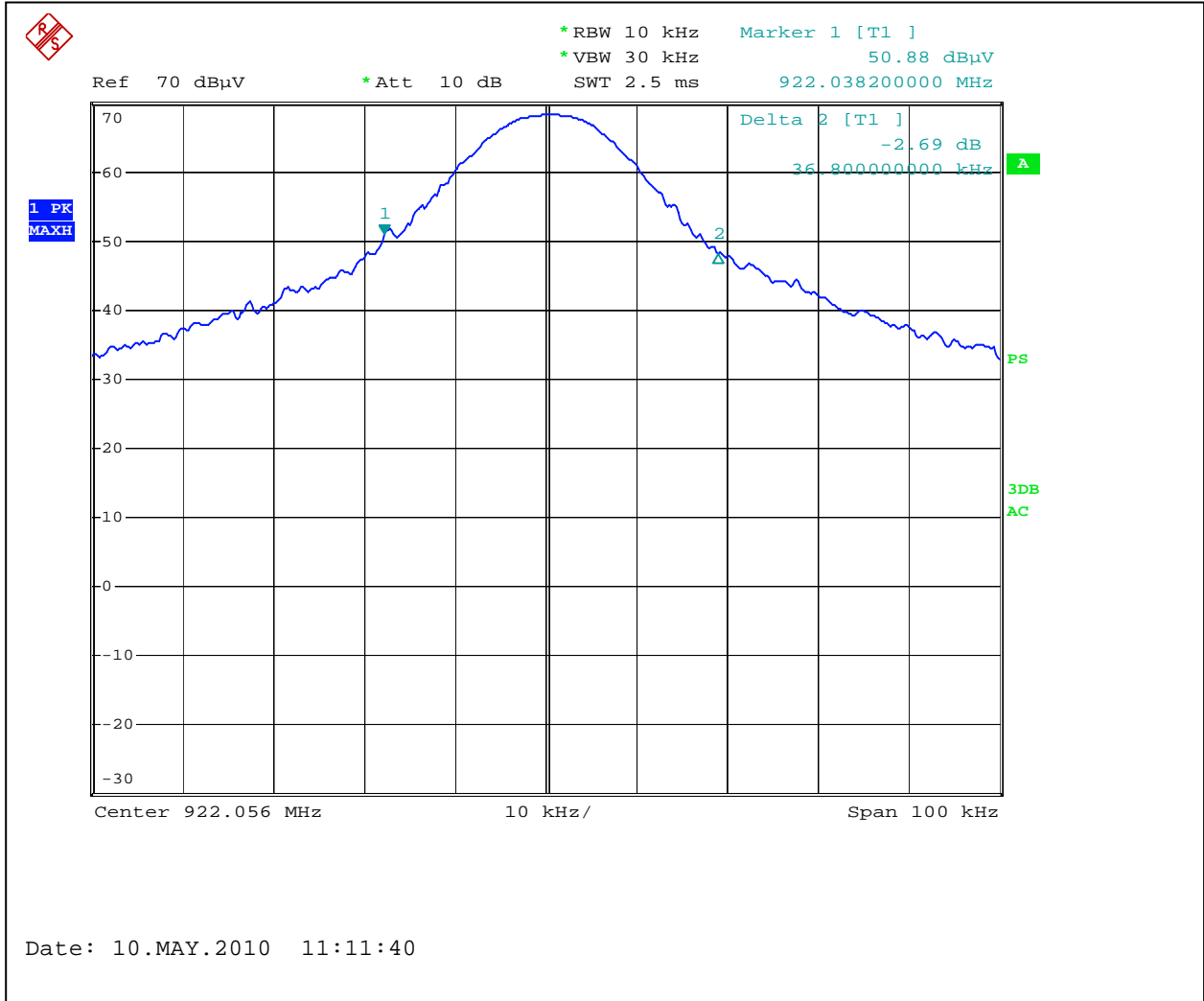




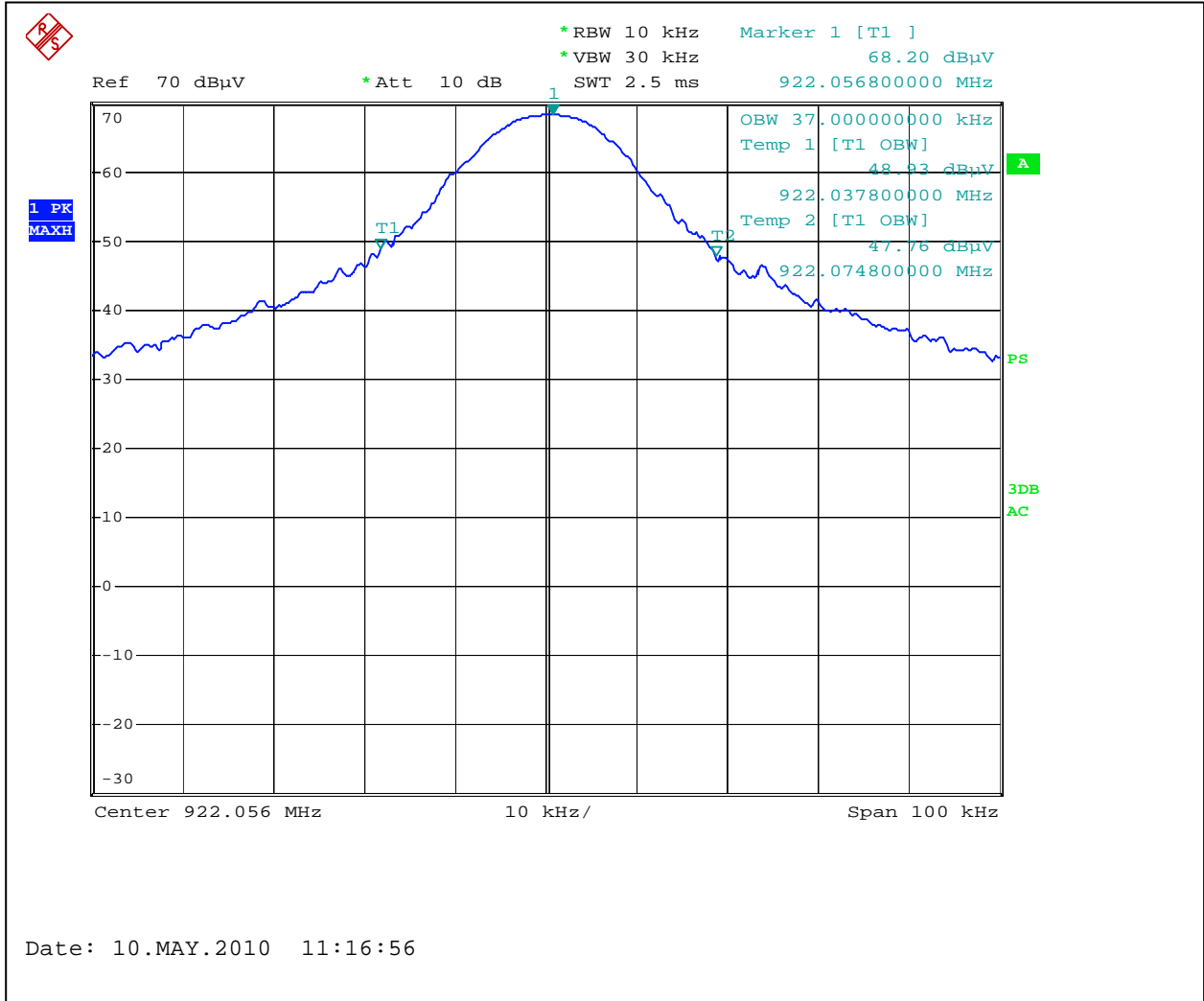
## Graph 3.3.4



## Graph 3.3.5



## Graph 3.3.6





### 3.4 Transmitter power line conducted emissions

**Test location:**  OATS  Anechoic Chamber  Other

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

**Frequency range:** 0.15MHz-30MHz

**Max. Emissions margin:** 17.3dB below the limits

**Notes:**

1. Conducted Emissions testing was performed on Host Computer AC power port as EUT is powered through USB of Host Computer.
2. Device was tested in middle frequency transmitting mode.



<b>Date:</b>	May 11, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.207	
<b>Tested by:</b>	Richard Blonigen	
<b>Test Point:</b>	Power Line	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	None	

**Table 3.4.1**

**Line 1**

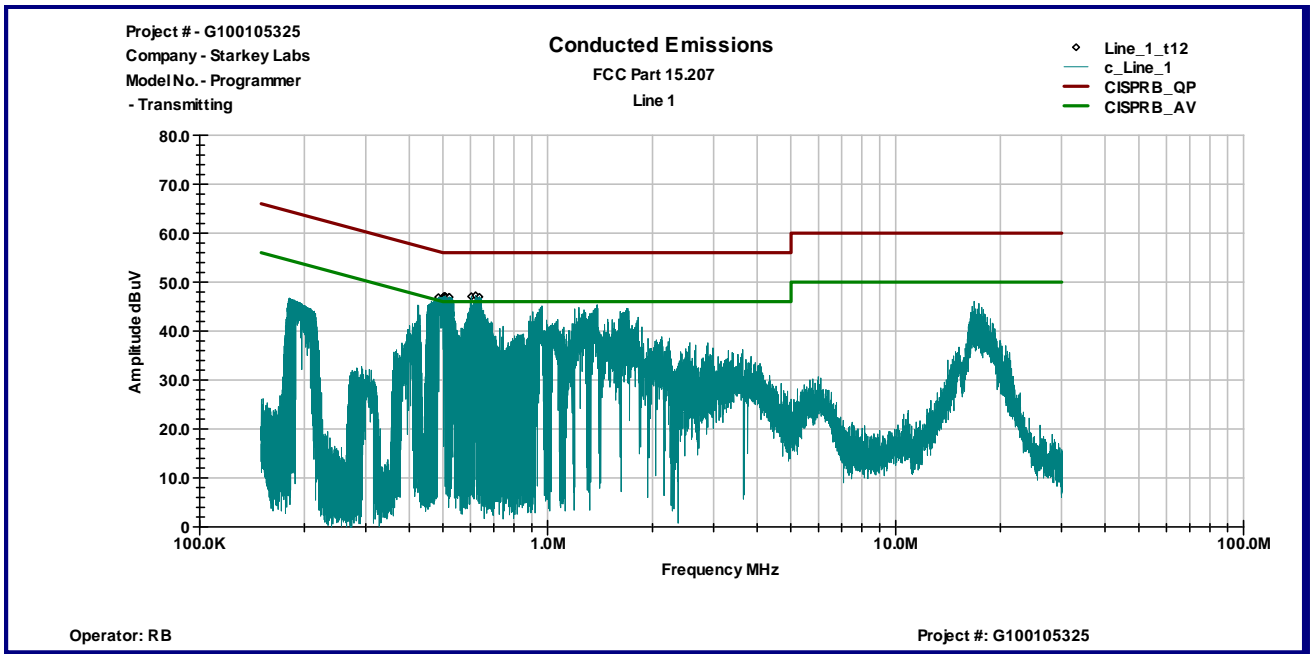
Frequency	QP dB $\mu$ V	AVG dB $\mu$ V	QP Limit dB $\mu$ V	AVG Limit dB $\mu$ V	QP Margin dB	AVG Margin dB
520.28 KHz	44.9	28.4	56.0	46.0	-11.1	-17.6
623.17 KHz	44.7	27.0	56.0	46.0	-11.3	-19.0
962.12 KHz	43.5	27.2	56.0	46.0	-12.5	-18.8
1.3986 MHz	35.0	19.1	56.0	46.0	-21.0	-26.9
1.7286 MHz	36.2	20.5	56.0	46.0	-19.9	-25.5
16.799 MHz	39.8	33.1	60.0	50.0	-20.2	-16.9

**Line 2**

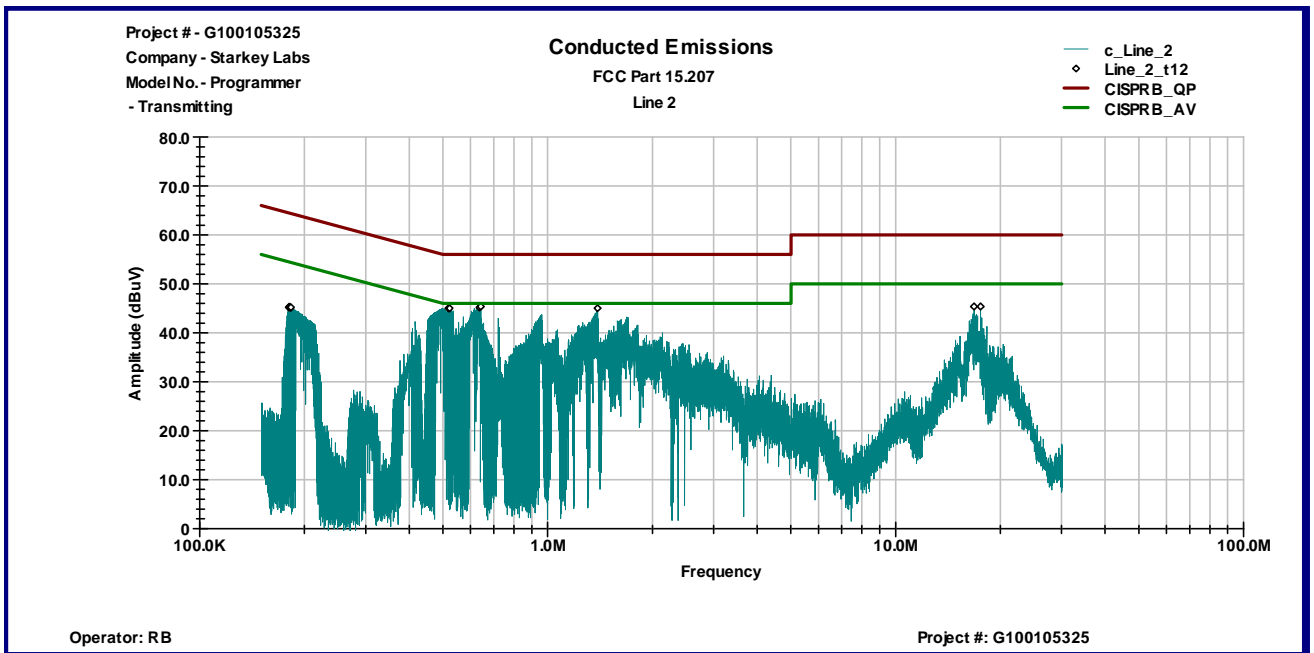
Frequency	QP dB $\mu$ V	AVG dB $\mu$ V	QP Limit dB $\mu$ V	AVG Limit dB $\mu$ V	QP Margin dB	AVG Margin dB
508.47 KHz	42.9	25.5	56.0	46.0	-13.1	-20.5
632.1 KHz	43.3	28.7	56.0	46.0	-12.8	-17.3
963.7 KHz	40.6	23.5	56.0	46.0	-15.4	-22.5
1.3886 MHz	42.4	25.7	56.0	46.0	-13.7	-20.3
1.7005 MHz	39.4	22.8	56.0	46.0	-16.6	-23.2
17.249 MHz	36.1	29.0	60.0	50.0	-23.9	-21.0

## 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-5GHz

**Max. Emissions margin:** 4.4dB below the limits

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



<b>Date:</b>	May 11, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC Part 15.109, Class B	
<b>Tested by:</b>	Richard Blonigen	
<b>Test Point:</b>	Enclosure	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	914.77MHz emission from the Generator was removed from table.	

**Table 3.5.1**

Frequency	Ant. Polarity	Peak Reading dB $\mu$ V	Ant.Factor dB1/m	Total at 3m dB $\mu$ V/m	QP Limit dB $\mu$ V/m	Margin dB
30.14 MHz	V	14.9	20.7	35.6	40.0	-4.4
97.157 MHz	V	21.7	11.4	33.1	43.5	-10.4
144.06 MHz	V	22.2	12.9	35.1	43.5	-8.5
234.07 MHz	V	22.0	13.1	35.1	46.0	-11.0
30.795 MHz	H	14.7	20.3	35.0	40.0	-5.0
143.97 MHz	H	16.9	12.9	29.9	43.5	-13.7
839.94 MHz *	H	8.2	24.8	33.0	46.0	-13.0

**Comments:** Measurements were taken using a Peak detector or CISPR Quasi-peak detector (marked \*)

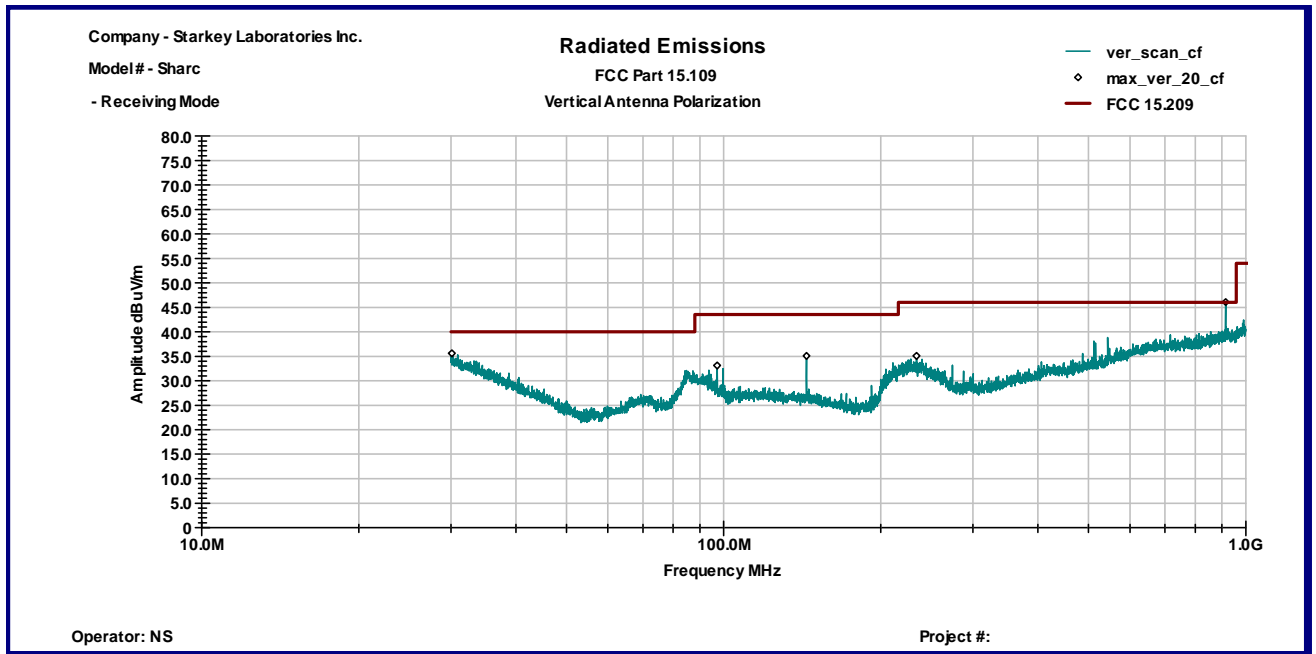
**Table 3.5.2**

Frequency MHz	Antenna Polarity	Reading dB $\mu$ V	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dB $\mu$ V/m	QP Limit dB $\mu$ V/m	Margin dB
1.1344 GHz	V	51.5	26.8	42.5	35.8	54.0	-18.2
1.1984 GHz	V	53.4	27.0	42.6	37.8	54.0	-16.1
1.5984 GHz	V	53.0	28.5	42.8	38.7	54.0	-15.3
1.9936 GHz	V	50.6	30.5	43.3	37.8	54.0	-16.1
2.1248 GHz	V	52.2	30.9	43.2	39.9	54.0	-14.1
2.3888 GHz	V	48.9	31.7	43.1	37.5	54.0	-16.5
4.8816 GHz	V	42.8	38.1	41.8	39.1	54.0	-14.9
1.1984 GHz	H	51.1	26.9	42.6	35.5	54.0	-18.5
2.128 GHz	H	49.2	31.2	43.2	37.2	54.0	-16.8
4.4256 GHz	H	44.6	37.4	42.4	39.7	54.0	-14.3

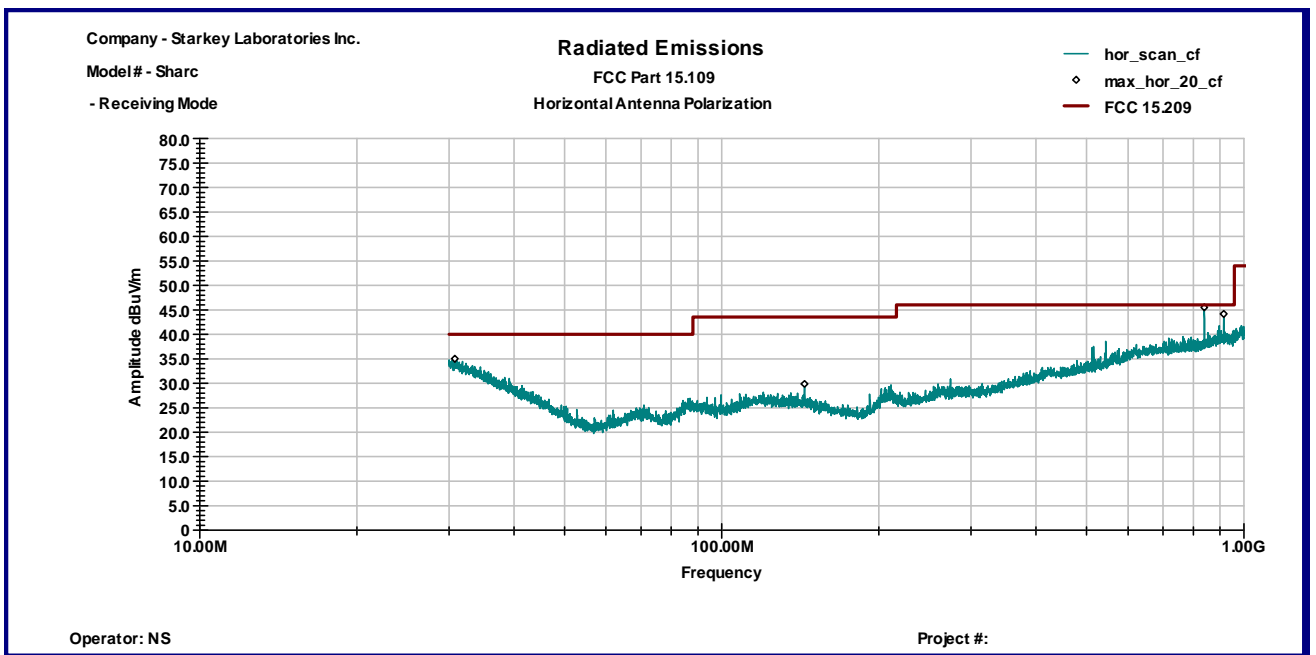


Graph 3.5.1

Vertical antenna polarization



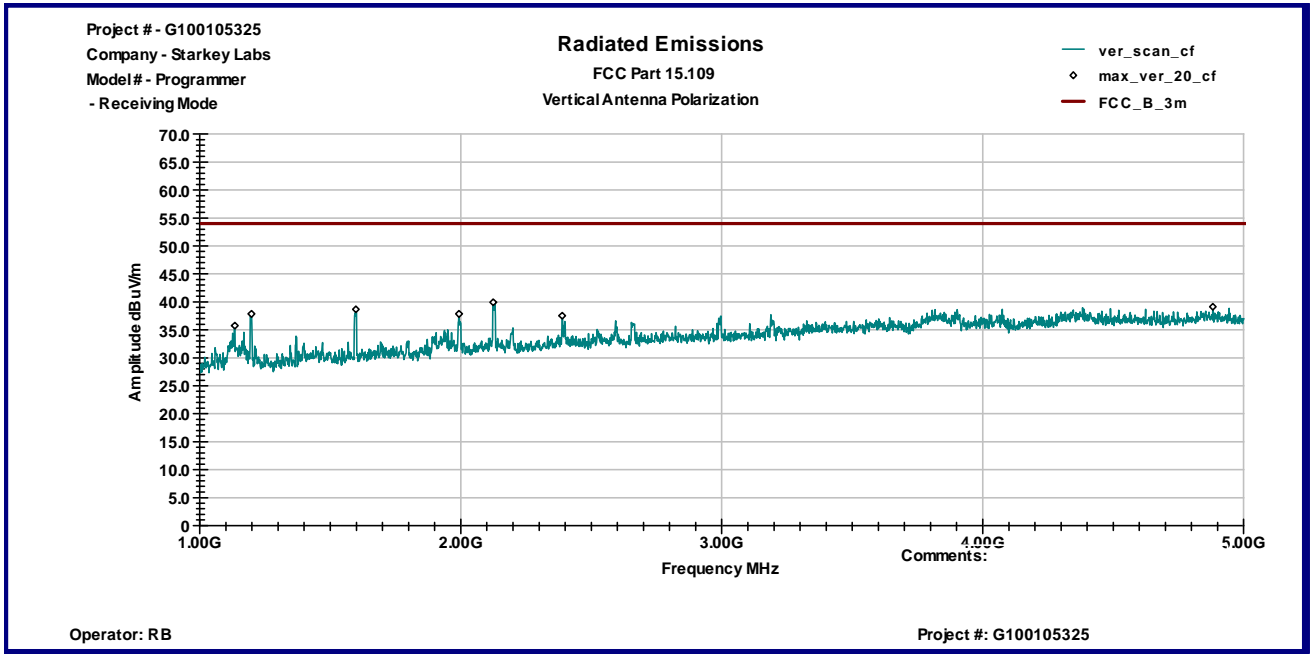
Horizontal antenna polarization



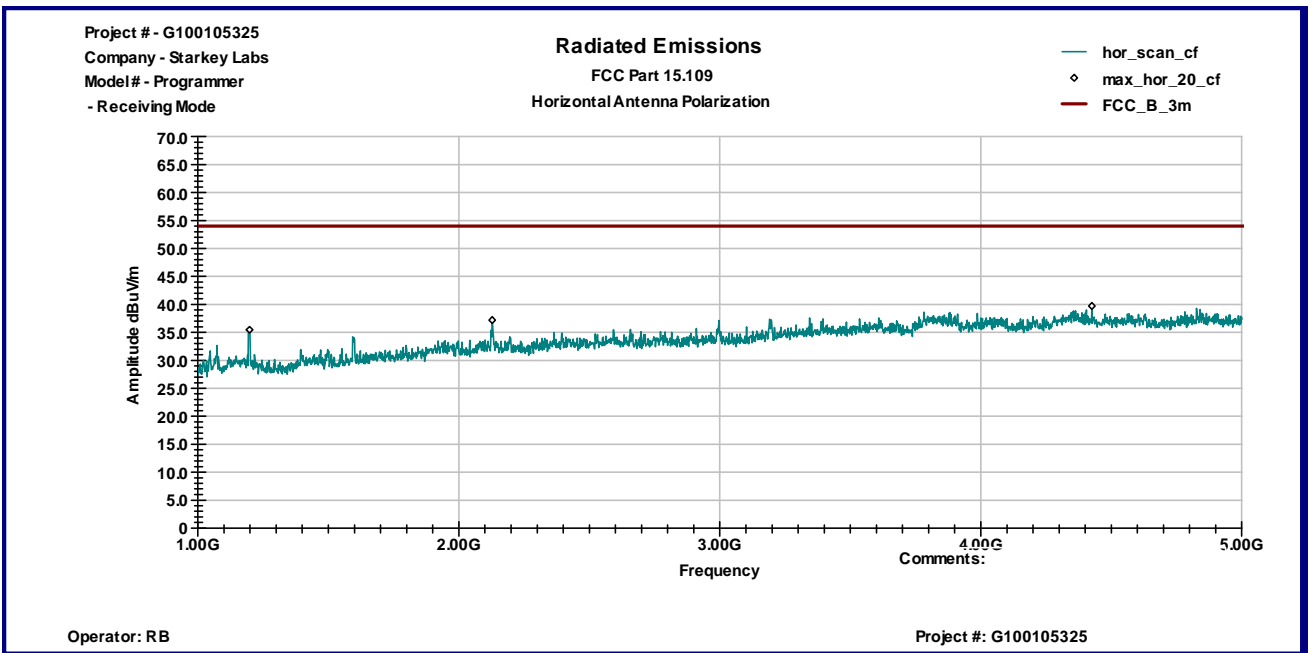


Graph 3.5.1

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:**        16.5 dB below the limits

Notes:        Device was tested in receiving mode. Device was tested through remote laptop computer as EUT is powered via USB.

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<b>Date:</b>	May 11, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.107, Class B	
<b>Tested by:</b>	Richard Blonigen	
<b>Test Point:</b>	Power Line	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	None	

**Table 3.6.1**

**Line 1**

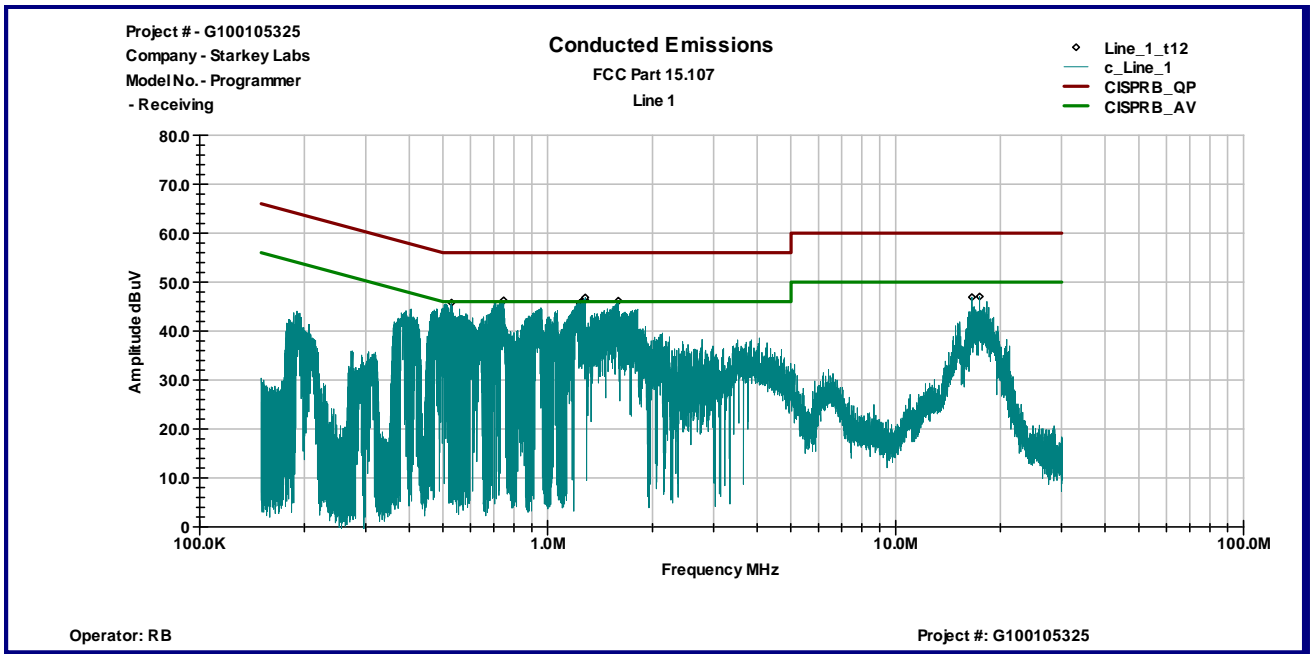
Frequency	QP dB $\mu$ V	AVG dB $\mu$ V	QP Limit dB $\mu$ V	AVG Limit dB $\mu$ V	QP Margin dB	AVG Margin dB
530.37 KHz	43.0	29.3	56.0	46.0	-13.1	-16.7
745.71 KHz	44.5	29.2	56.0	46.0	-11.5	-16.8
957.83 KHz	42.6	26.7	56.0	46.0	-13.4	-19.3
1.2751 MHz	44.0	28.1	56.0	46.0	-12.0	-17.9
1.5944 MHz	42.7	26.2	56.0	46.0	-13.3	-19.8
17.755 MHz	38.6	33.5	60.0	50.0	-21.4	-16.5

**Line 2**

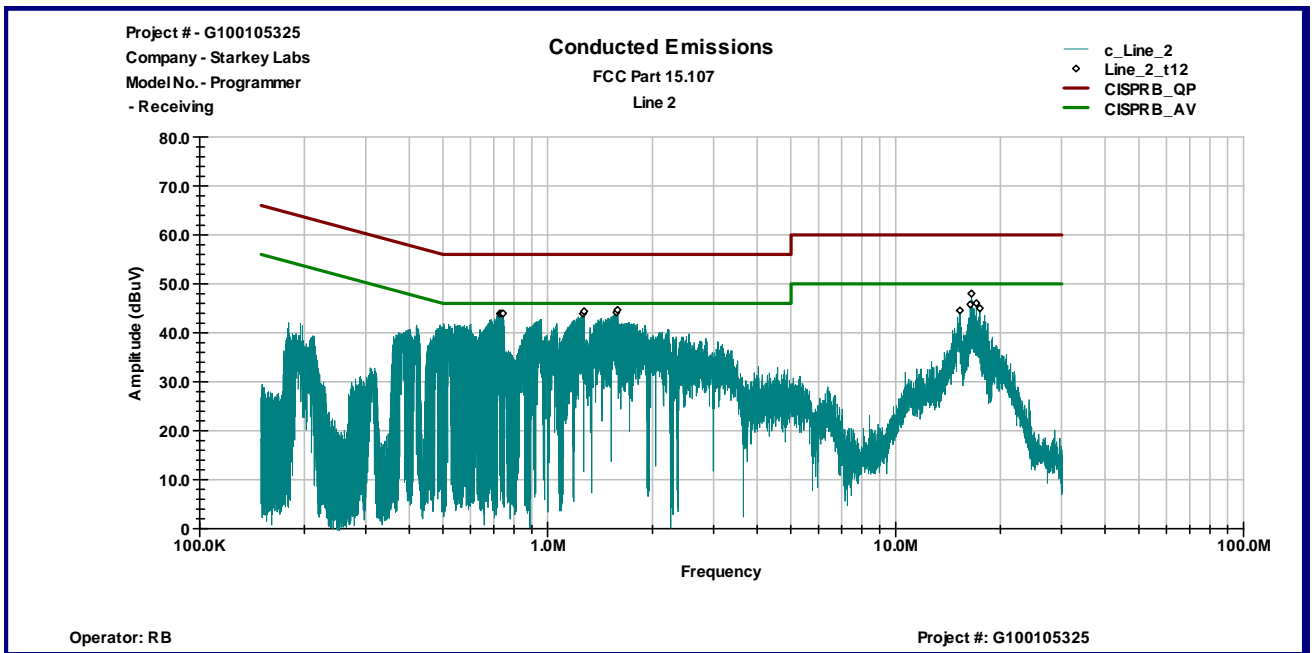
Frequency	QP dB $\mu$ V	AVG dB $\mu$ V	QP Limit dB $\mu$ V	AVG Limit dB $\mu$ V	QP Margin dB	AVG Margin dB
739.33 KHz	42.1	28.2	56.0	46.0	-13.9	-17.8
965.77 KHz	33.3	15.0	56.0	46.0	-22.7	-31.0
1.2737 MHz	41.2	24.4	56.0	46.0	-14.8	-21.6
1.6008 MHz	35.7	18.7	56.0	46.0	-20.3	-27.3
15.336 MHz	36.2	30.6	60.0	50.0	-23.8	-19.4
16.885 MHz	39.2	33.1	60.0	50.0	-20.8	-16.9

## 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	ESCI	100358	12909	05/18/2010	<input checked="" type="checkbox"/>
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	09/22/2010	<input checked="" type="checkbox"/>
Horn Antenna	EMCO	3115	9507-4513	9936	04/13/2011	<input checked="" type="checkbox"/>
LISN	Fischer Custom Communications	FCC-LISN-2 MOD.SD	316	9945	11/06/2010	<input checked="" type="checkbox"/>
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1402232	172081	08/07/2010	<input checked="" type="checkbox"/>
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	<input checked="" type="checkbox"/>





### Test Setup Photos

