



## TEST REPORT

Report Number: 100097415MIN-007

Project Number: G100097415

Testing performed on the  
Pedal Brain Synapse  
FCC ID: YDSSB626  
Industry Canada ID: 8968A-SB626

to  
47 CFR Part 15. 249:2009  
RSS- 210, Issue 7, 2007  
47 CFR, Part 15:2009, §15.109, Class B  
ICES-003, Issue 4:2004

For  
Pedal Brain LLC.

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

Test Authorized by:  
Pedal Brain LLC.  
528 SE University Ave  
Minneapolis, MN 55414

Prepared by: Richard Blonigen  
Richard Blonigen

Date: April 30, 2010

Reviewed by: Uri Spector  
Uri Spector

Date: April 30, 2010

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## 1.0 GENERAL DESCRIPTION

<b>Model:</b>	Pedal Brain Synapse
<b>Type of EUT:</b>	iPhone accessory
<b>FCC ID:</b>	YDSSB626
<b>Industry Canada ID:</b>	8968A-SB626
<b>Related Submittal(s) Grants:</b>	None
<b>Company:</b>	Pedal Brain LLC.
<b>Customer:</b>	Mr. Matt Bauer
<b>Address:</b>	528 SE University Ave Minneapolis, MN 55414
<b>Phone:</b>	612-799-5487
<b>Email:</b>	bauer@pedalbrain.com
<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 15:2009, §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>	April 28, 2010
<b>Test Work Started:</b>	April 28, 2010
<b>Test Work Completed:</b>	April 30, 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

Product Description:	iPhone accessory
Operating Frequency	2400-2483.5 MHz
Number of Channels	9 channels
Modulation:	
Emission Designator:	
Antenna(s) Info:	Integral
Antenna Installation:	<input type="checkbox"/> User <input type="checkbox"/> Professional <input checked="" type="checkbox"/> Factory
Transmitter Power Configuration:	<input type="checkbox"/> Internal battery <input checked="" type="checkbox"/> External DC power from iPhone <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
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 C63.4-2003

## 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	EUT has 8 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; 2450MHz signal was used to transmit

### Cables:

No.	Type	Length	Designation	Note
1	6-wire unshielded	2 inch	Communication	
2				

### Support equipment/Services:

No.	Item	Description
1	Apple iPhone	Host Device
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).

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

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

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

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

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

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

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

### 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
15.249(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	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. Emissions margin at fundamental:** 17.5dB below the limits

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

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<b>Date:</b>	April 28, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.249(a) / 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>	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)								
2403.00	V	134	28.5	3.5	43.1	87.6	76.5	94.0	-17.5	
2403.00	H	183	28.5	3.5	43.1	83.0	71.9	94.0	-22.1	
2441.00	V	133	28.5	3.6	43.1	84.7	73.7	94.0	-20.3	
2441.00	H	176	28.5	3.6	43.1	79.6	68.6	94.0	-25.4	
2480.00	V	130	28.6	3.6	43.1	83.5	72.6	94.0	-21.4	
2480.00	H	174	28.6	3.6	43.1	78.0	67.1	94.0	-26.9	



### 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-25GHz

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

**Max. margin of harmonics and spurious emissions:** 14.4dB 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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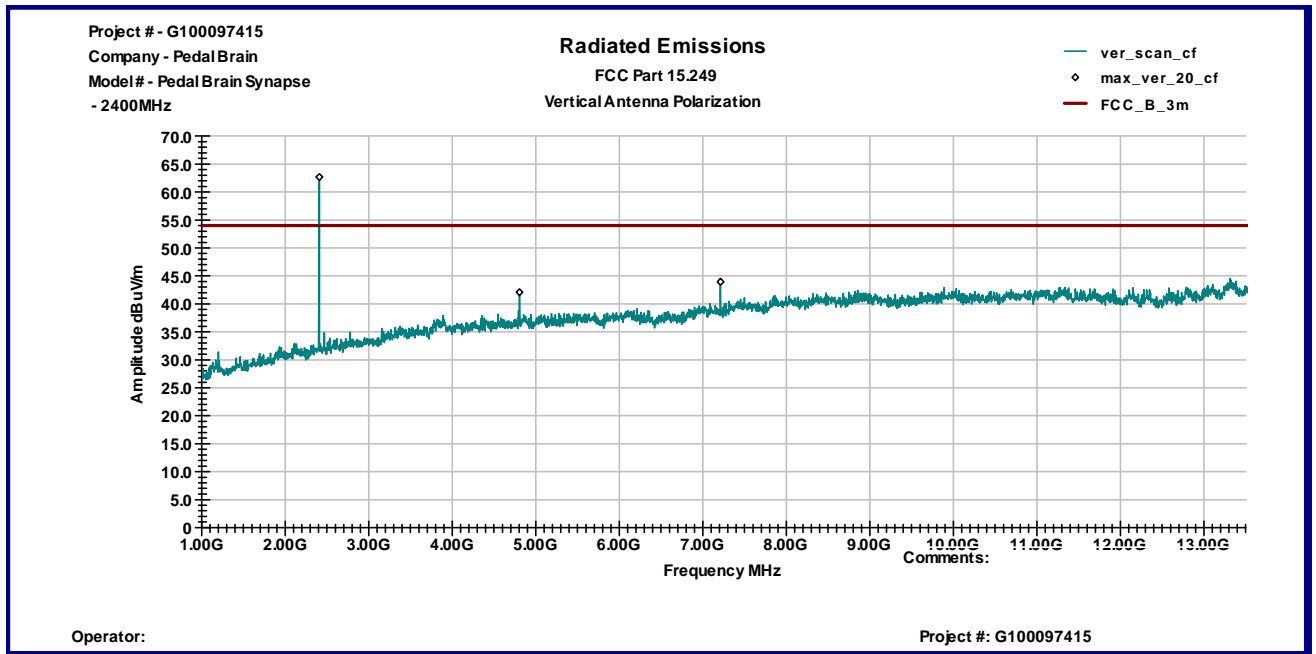
<b>Date:</b>	April 30, 2010	<b>Result: Pass</b>
<b>Standard:</b>	FCC 15.249(a) and (d) / RSS-210 A2.9	
<b>Tested by:</b>	Richard Blonigen	
<b>Test Point:</b>	Enclosure with antenna	
<b>Operation mode:</b>	See Page 5	
<b>Note:</b>	No emissions above ambient noise were detected above the 3 <sup>rd</sup> harmonics	

**Table 3.2.1**

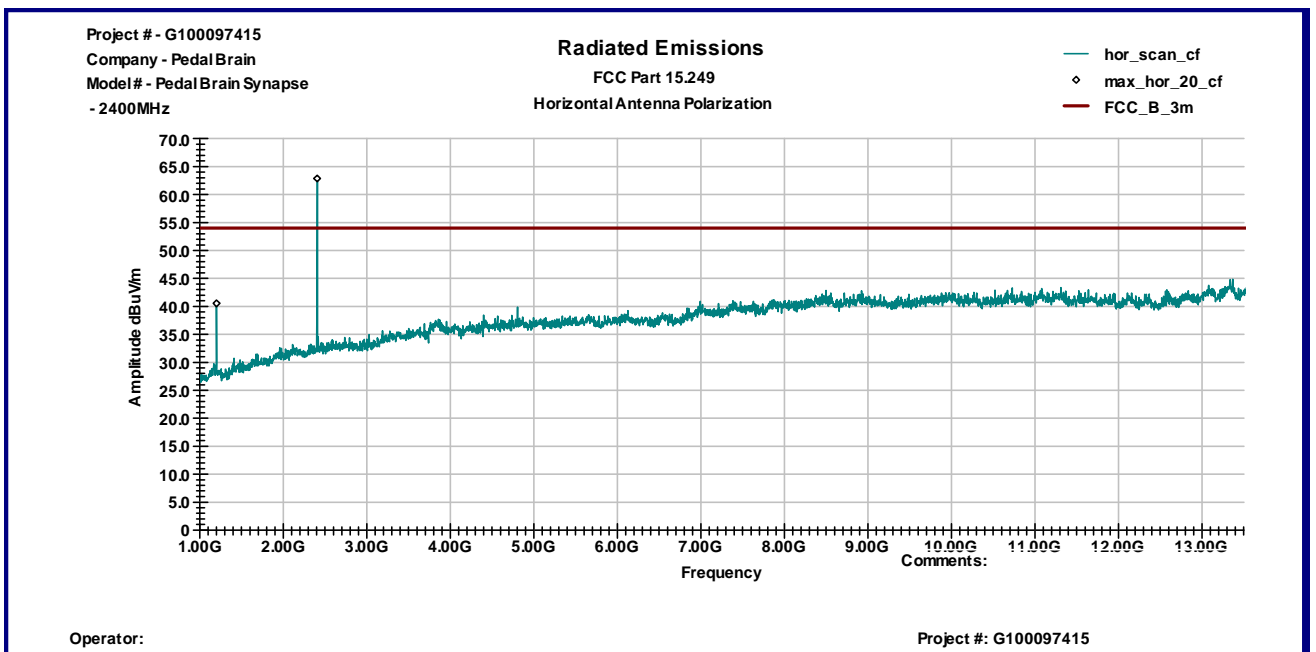
Frequency	Antenna		Ant. CF	Cable loss	Pre-amp	Peak Reading	Total @ 3m	Limit	Margin	Comments
MHz	Polarity	Hts(cm)	dB1/m	dB	Gain (dB)	dBμV	dBμV/m	dBμV/m	dB	
<b>Harmonics Emissions</b>										
<b>Channel 2400MHz</b>										
4806.00	V	190	32.6	6.3	41.9	40.4	37.5	54.0	-16.5	
7209.00	V	246	35.4	7.7	41.4	37.8	39.6	54.0	-14.4	
9612.00	V	100	38.0	8.6	40.7	24.9	30.8	54.0	-23.2	
4806.00	H	214	32.6	6.3	41.9	39.0	36.1	54.0	-17.9	
7209.00	H	156	35.4	7.7	41.4	32.7	34.5	54.0	-19.5	
9612.00	H	100	38.0	8.6	40.7	24.9	30.8	54.0	-23.2	
<b>Channel 2441MHz</b>										
4882.00	V	180	32.7	6.4	41.8	41.9	39.2	54.0	-14.7	
7323.00	V	240	35.6	7.7	41.2	35.5	37.7	54.0	-16.3	
9764.00	V	100	38.1	8.5	40.8	24.5	30.2	54.0	-23.8	
4882.00	H	197	32.7	6.4	41.8	38.6	35.9	54.0	-18.0	
7323.00	H	128	35.6	7.7	41.2	31.6	33.8	54.0	-20.2	
9764.00	H	100	38.1	8.5	40.8	24.5	30.2	54.0	-23.8	
<b>Channel 2480MHz</b>										
4960.00	V	196	32.8	6.5	41.7	41.4	39.0	54.0	-15.0	
7440.00	V	180	35.8	7.7	41.0	31.9	34.5	54.0	-19.5	
9920.00	V	100	38.1	8.4	41.0	24.6	30.2	54.0	-23.8	
4960.00	H	210	32.8	6.5	41.7	38.5	36.1	54.0	-17.9	
7440.00	H	157	35.8	7.7	41.0	29.1	31.7	54.0	-22.3	
9920.00	H	100	38.1	8.4	41.0	24.6	30.2	54.0	-23.8	
<b>Spurious Emissions-Bandedge Compliance, Peak Reading</b>										
2400.00	V	100	27.9	4.1	43.1	45.6	34.5	54.0	-19.5	
2400.00	H	100	27.9	4.1	43.1	41.2	30.1	54.0	-23.9	
2483.50	V	100	28.1	4.1	43.1	44.0	33.2	54.0	-20.8	
2483.50	H	100	28.1	4.1	43.1	42.0	31.2	54.0	-22.8	

Graph 3.2.1

Vertical antenna polarization

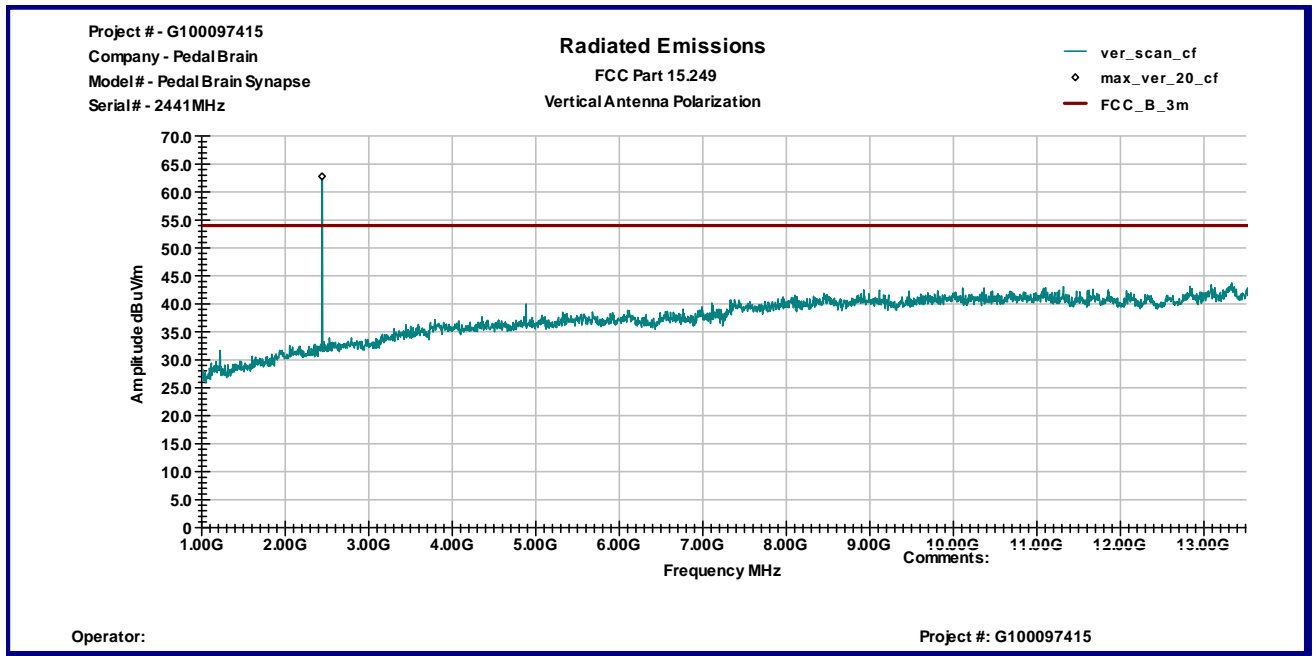


Horizontal antenna polarization

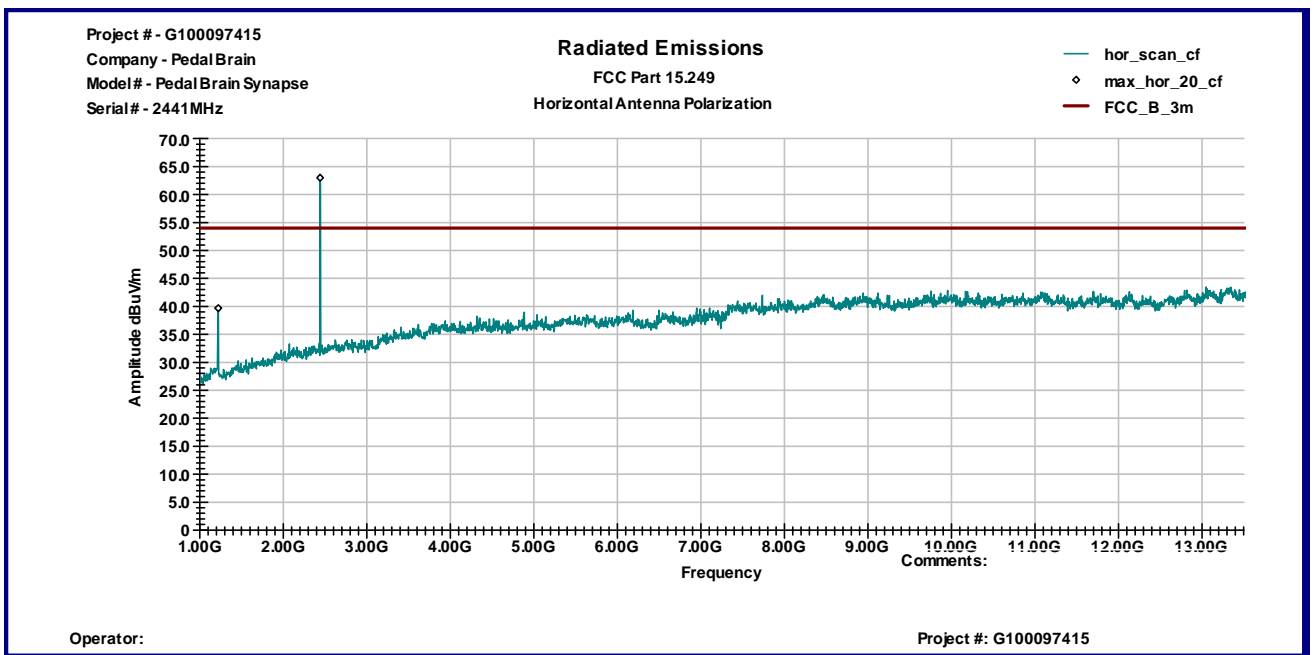


Graph 3.2.2

Vertical antenna polarization

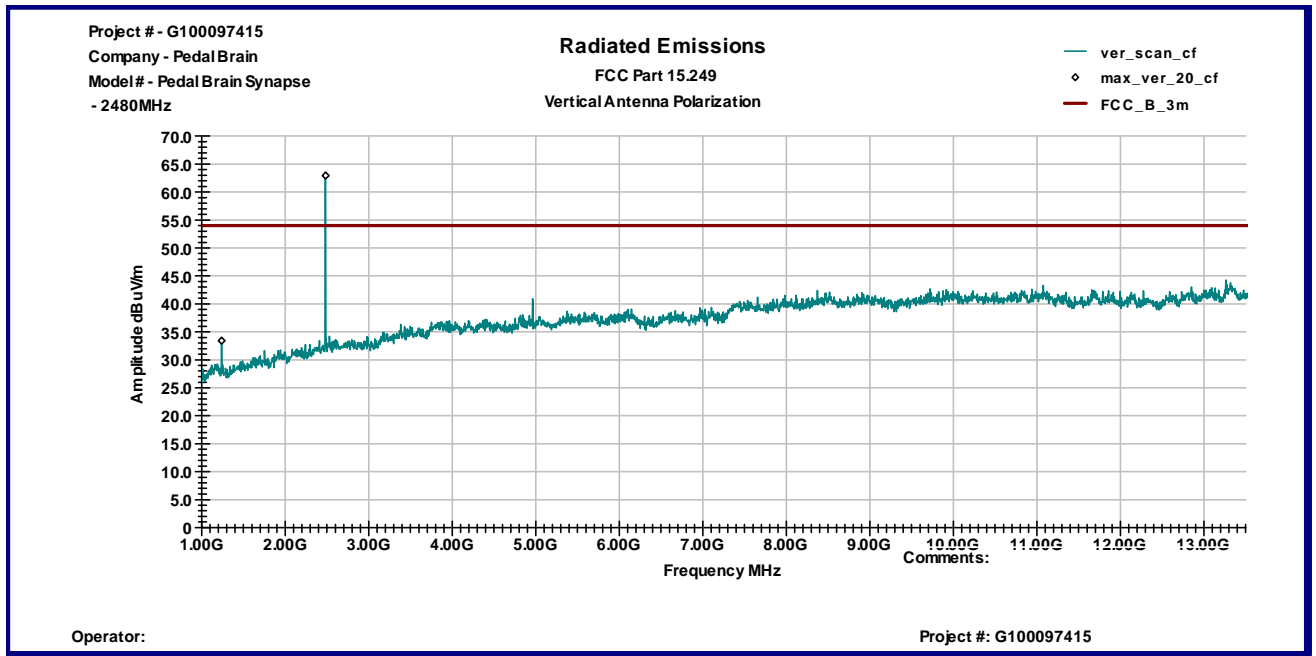


Horizontal antenna polarization

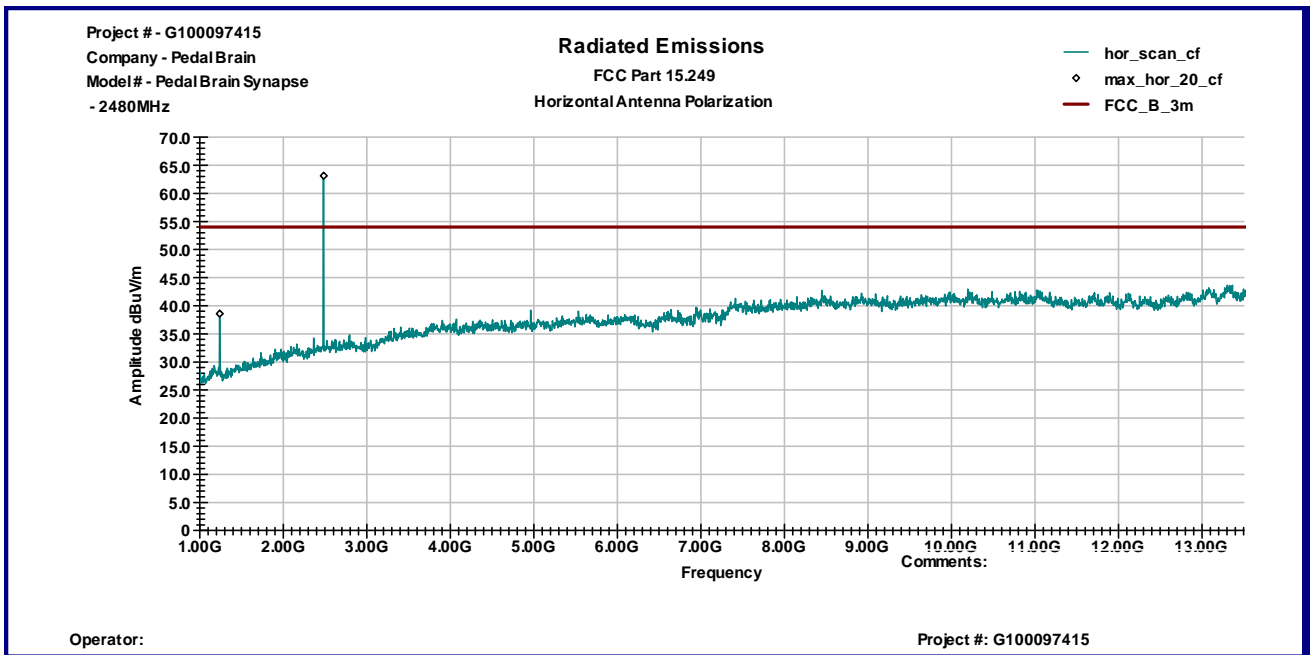


Graph 3.2.3

Vertical antenna polarization



Horizontal antenna polarization



### 3.3 Bandwidth of Emissions

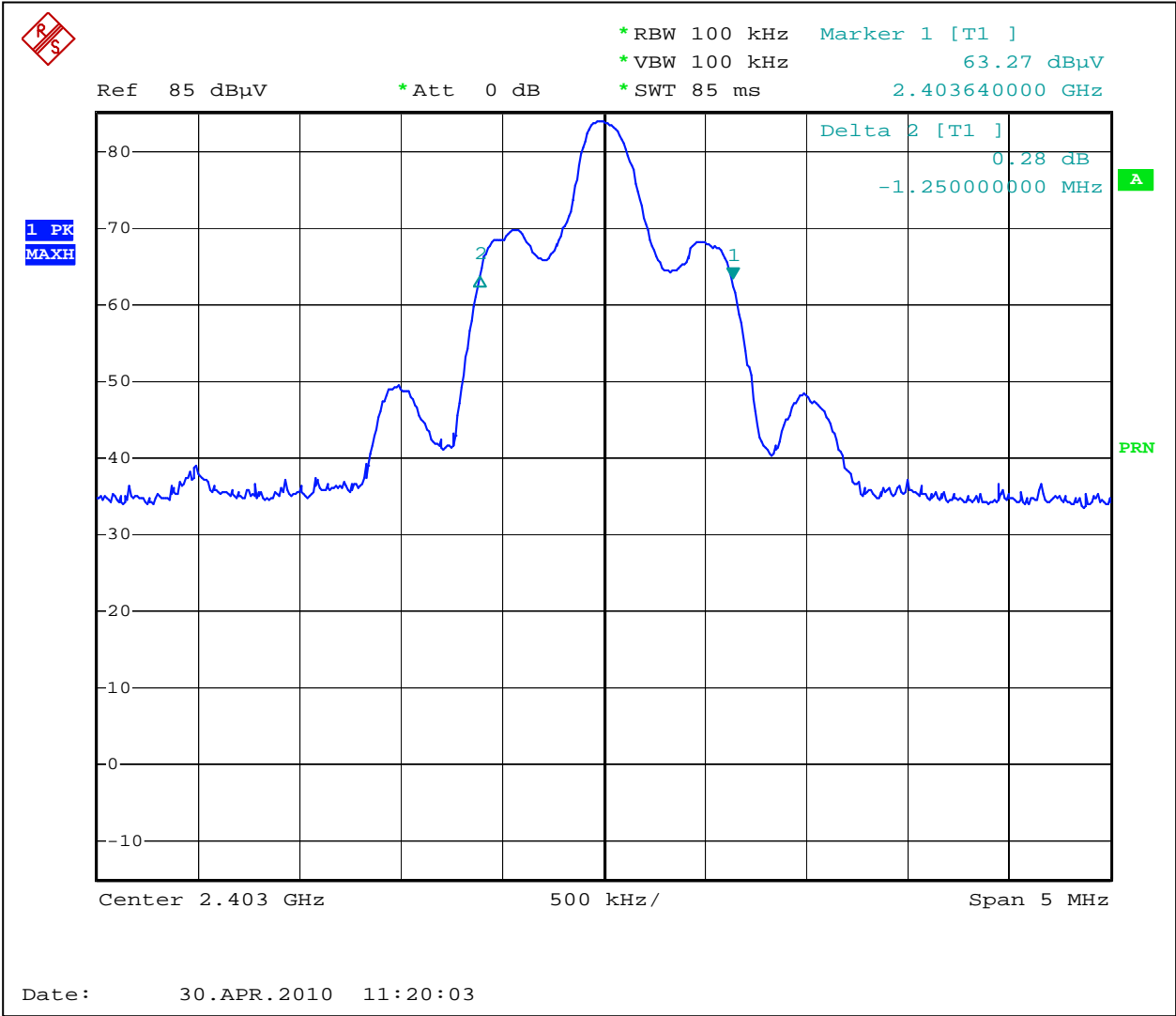
Center Frequency of operation MHz	Measured 20dB bandwidth MHz	Measured 99% bandwidth MHz
2403	1.25	1.15
2441	1.22	1.14
2480	1.25	1.15

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

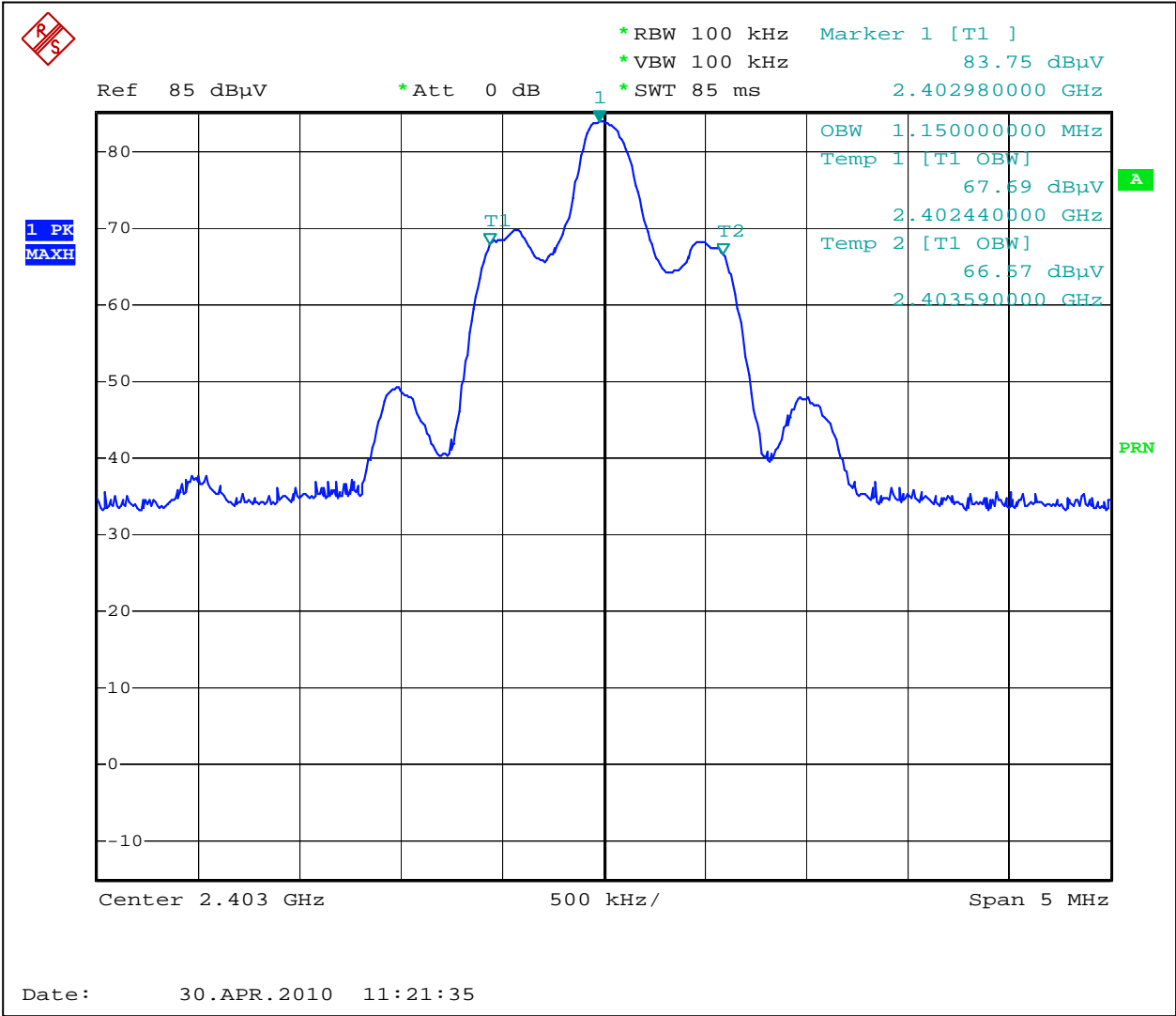
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Graph 3.3.1

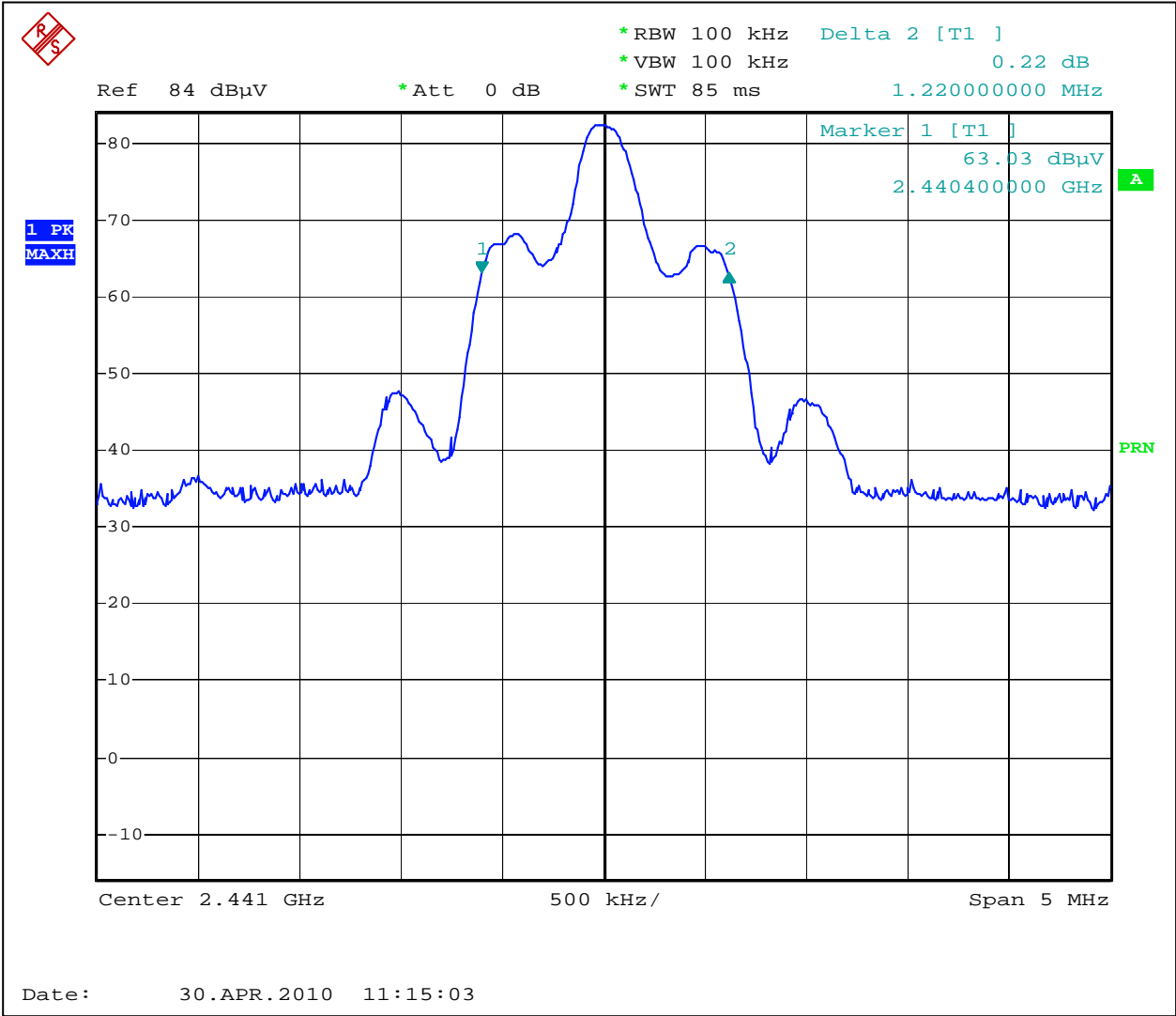




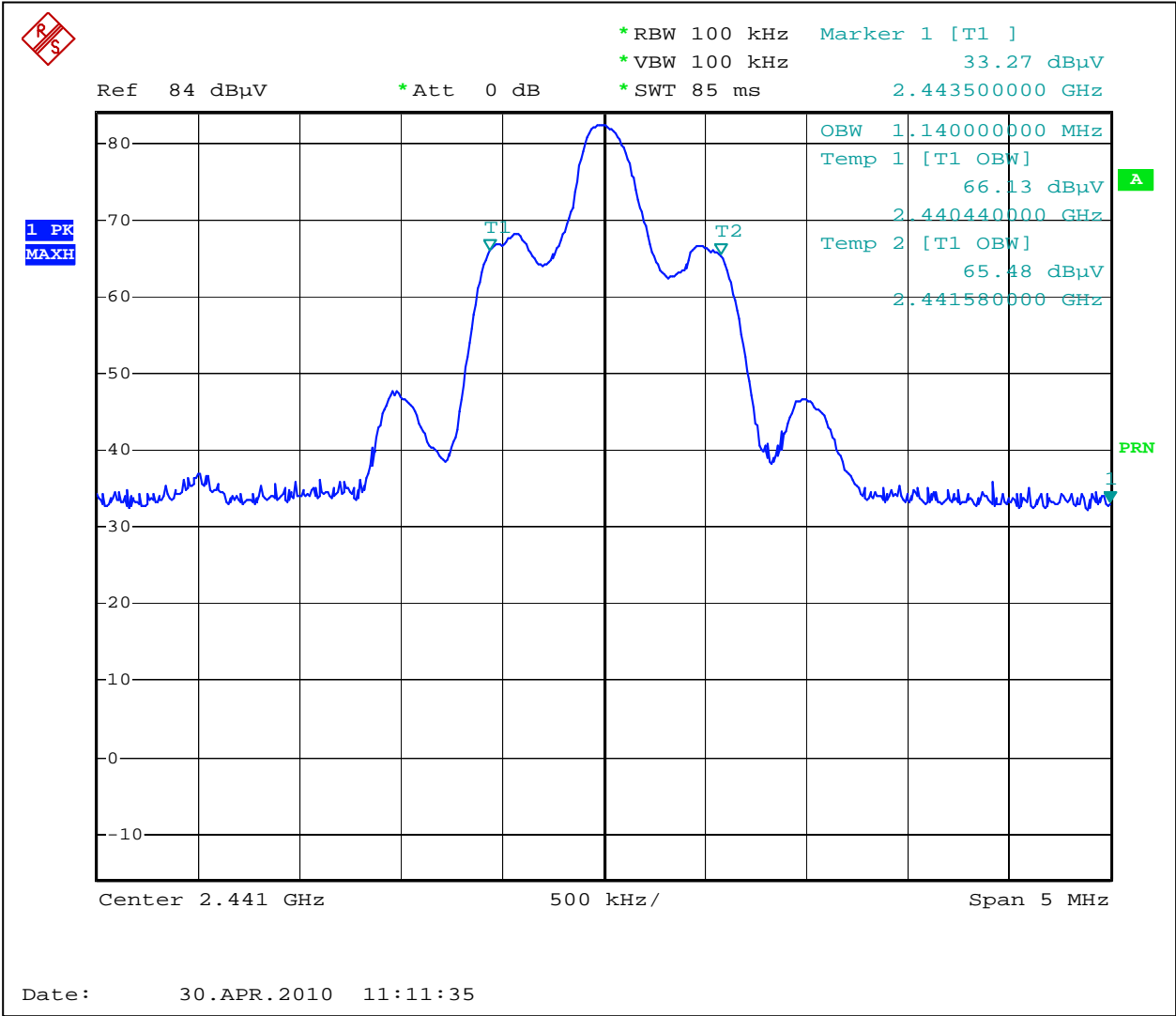
Graph 3.3.2



Graph 3.3.3

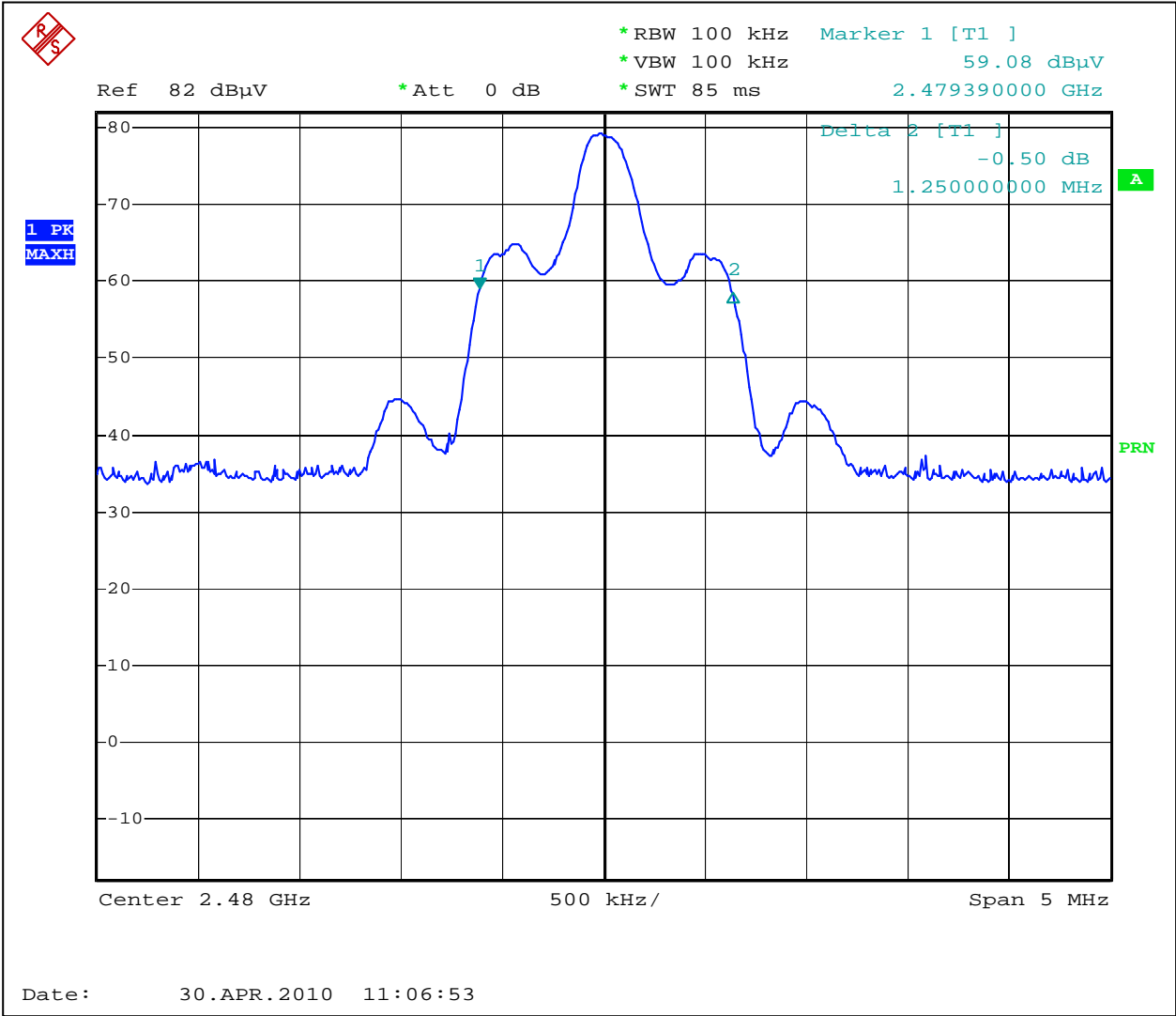


Graph 3.3.4

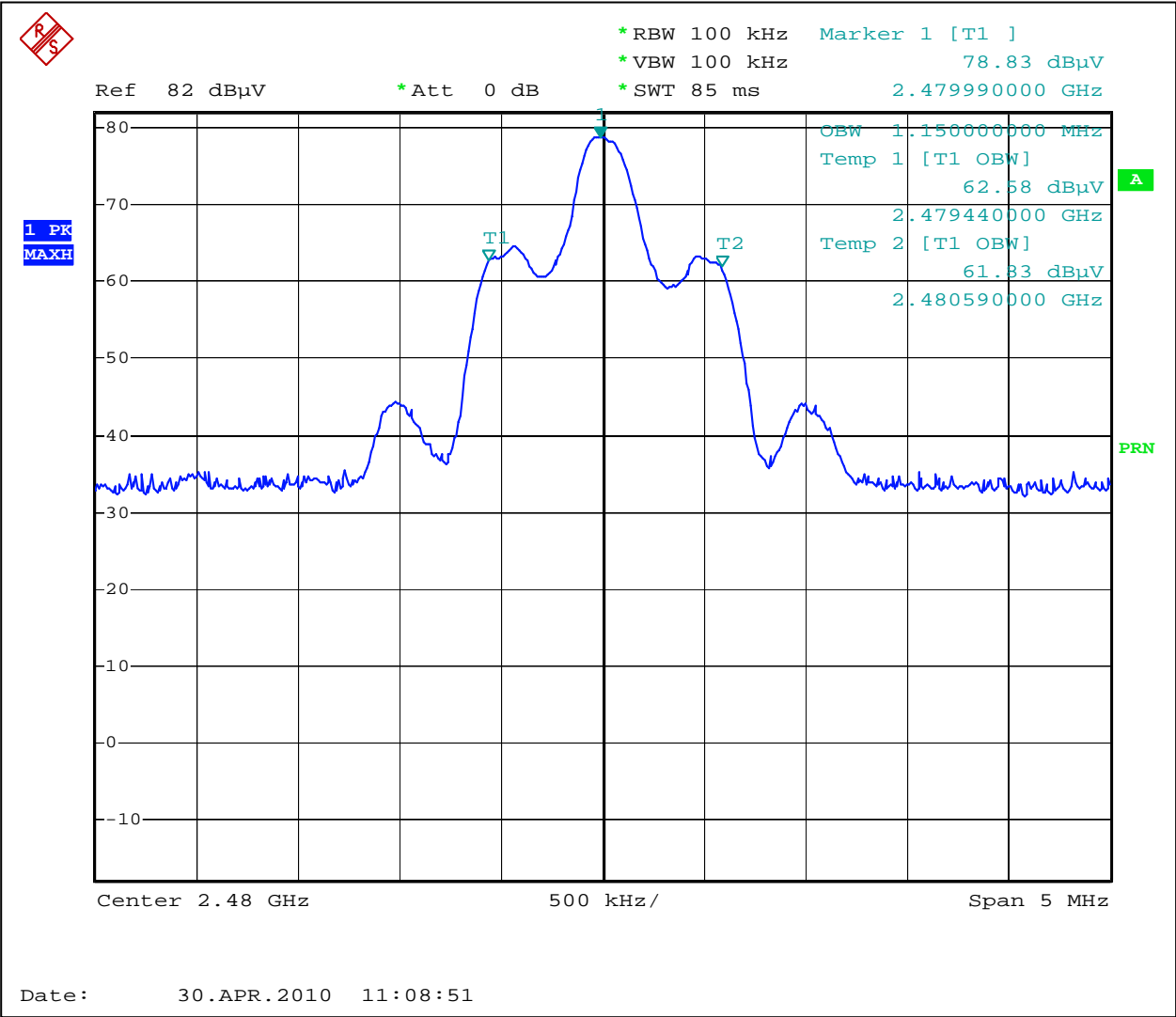




Graph 3.3.5



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:** Testing is not applicable as the EUT is powered from an internal battery of the Host Device.

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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-13.5GHz

**Max. Emissions margin:** 6.5dB 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)

<b>Date:</b>	April 30, 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>	2450MHz emission from the Generator was removed from table.	

**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
30.035 MHz	V	11.5	20.7	32.2	40.0	-7.8
91.047 MHz	V	14.7	10.3	25.0	43.5	-18.5
144.3 MHz	V	13.8	12.9	26.7	43.5	-16.8
543.88 MHz	V	14.9	21.2	36.2	46.0	-9.9
985.71 MHz	V	12.6	26.6	39.2	54.0	-14.8
30.456 MHz	H	12.7	20.5	33.2	40.0	-6.8
118.82 MHz	H	11.9	14.1	26.0	43.5	-17.6
885.65 MHz	H	14.2	25.3	39.5	46.0	-6.5

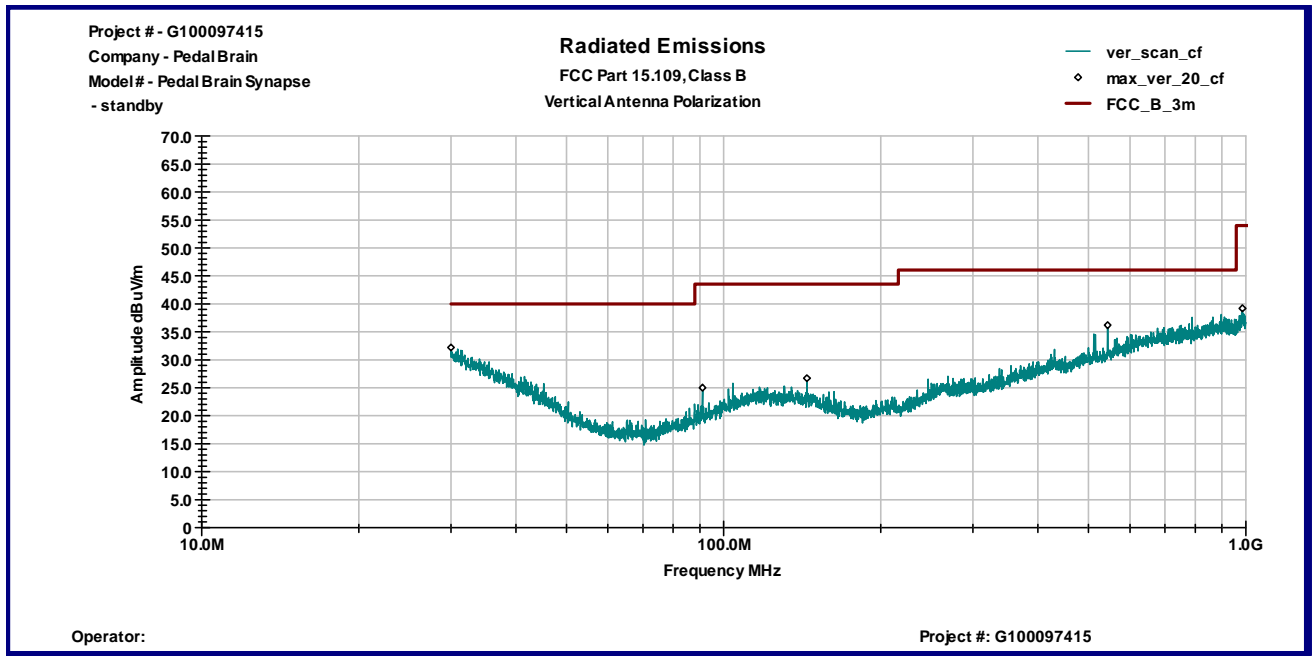
**Table 3.5.2**

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)								
1236.40	V	121	24.5	2.5	42.6	39.0	23.5	54.0	-30.5	
1240.00	V	143	24.5	2.5	42.6	46.7	31.2	54.0	-22.8	
1579.96	V	100	25.6	2.9	42.8	36.5	22.2	54.0	-31.7	
1236.40	H	137	24.5	2.5	42.6	38.4	22.8	54.0	-31.1	
1240.00	H	149	24.5	2.5	42.6	54.0	38.5	54.0	-15.5	
1579.96	H	143	25.6	2.9	42.8	37.8	23.5	54.0	-30.4	

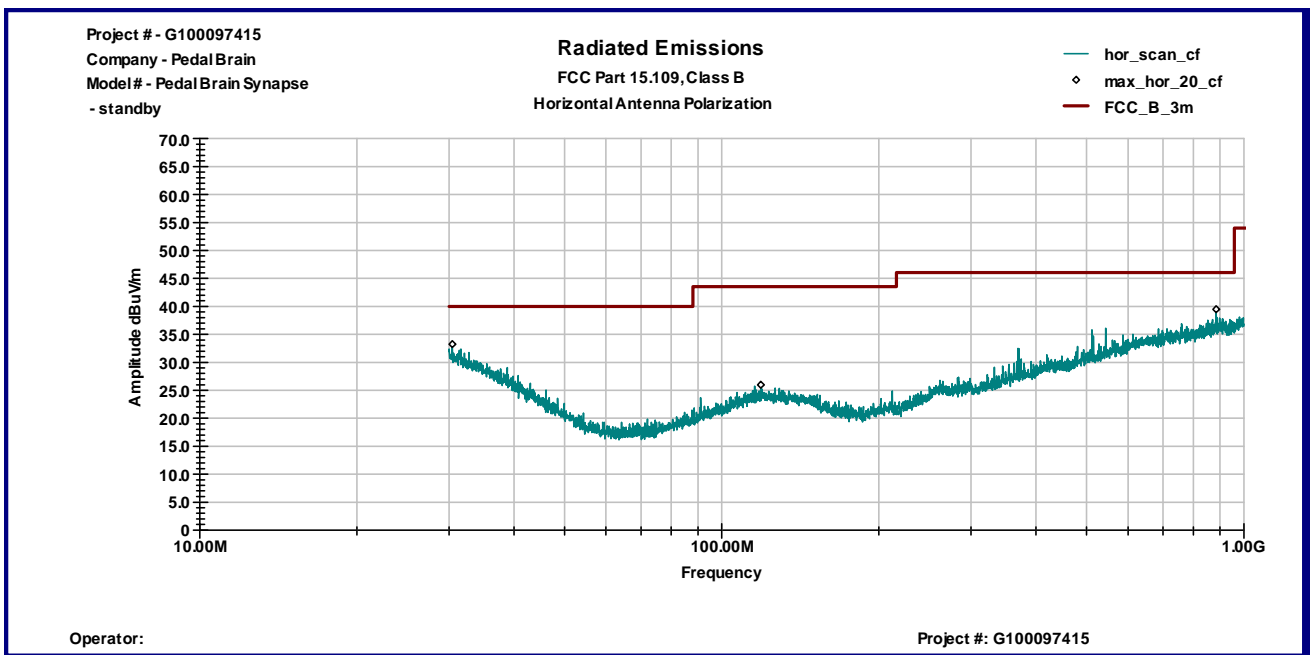


Graph 3.5.1

### Vertical antenna polarization

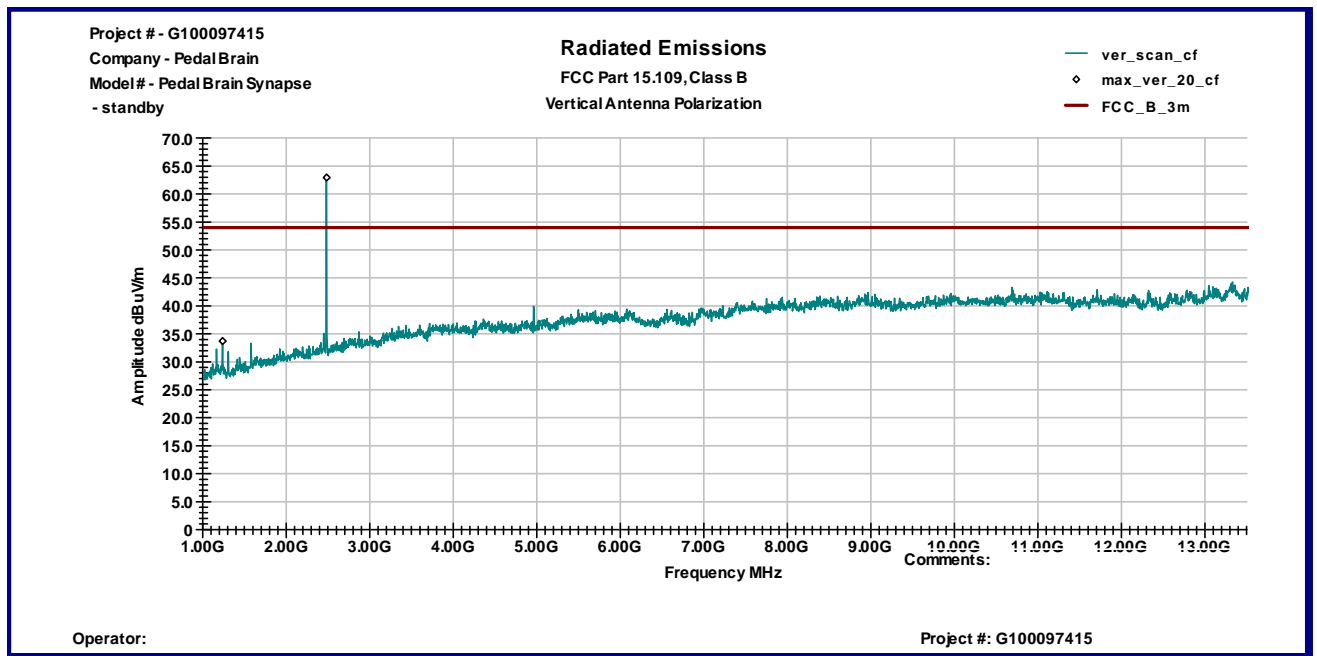


### Horizontal antenna polarization

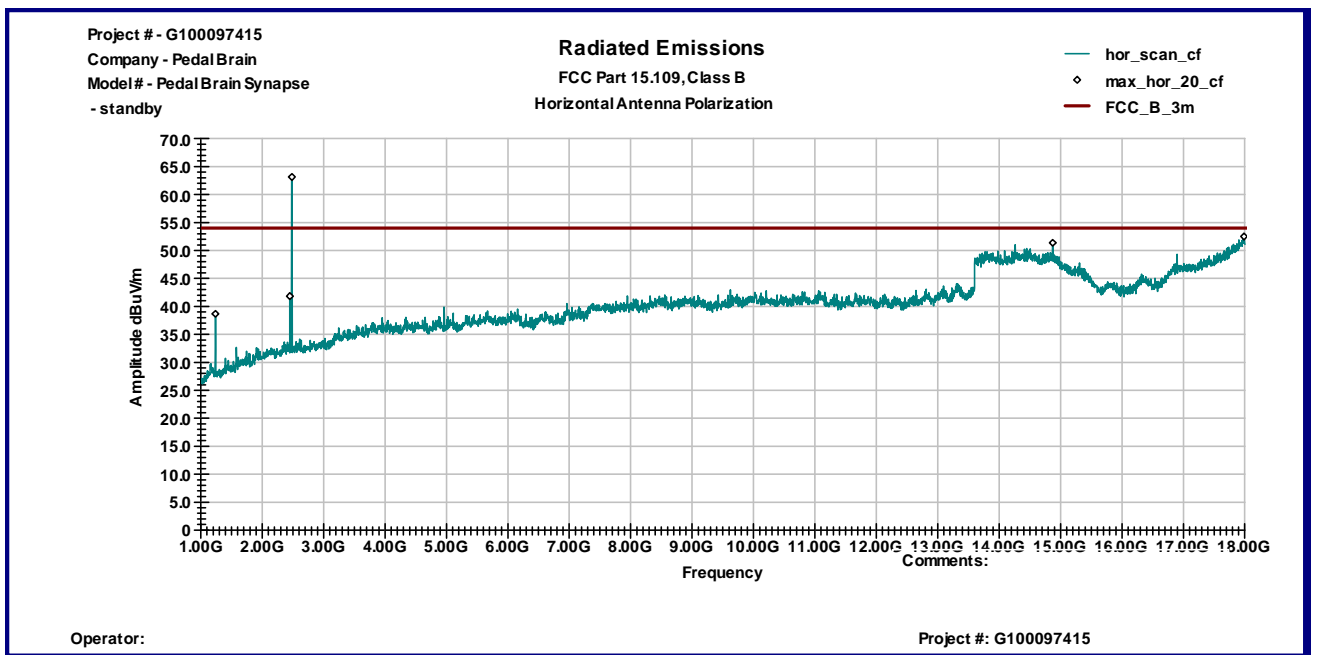


Graph 3.5.2

## 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:** Testing is not applicable as the EUT is powered from an internal battery of the Host Device.

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#### 4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	FSP 40	100024	12559	08/22/2009	<input checked="" type="checkbox"/>
Spectrum Analyzer	R & S	ESCI	100358	12909	05/18/2010	<input checked="" type="checkbox"/>
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	08/27/2009	<input checked="" type="checkbox"/>
Horn Antenna	EMCO	3115	9507-4513	9936	03/04/2010	<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	VBV	<input checked="" type="checkbox"/>



## Test Setup Photos

