TEST REPORT

Report Number: 100454919MIN-001
Project Number: G100454919

Testing performed on the
SPT-M1-AWS19-11

to
47 CFR, Part 27:2010, Enclosure Spurious Radiated Emissions
47 CFR, Part 24:2010, Enclosure Spurious Radiated Emissions

For
TE Connectivity / LGC Wireless

Test Performed by:	Test Authorized by:
Intertek Testing Services NA, Inc.	TE Connectivity / LGC Wireless
7250 Hudson Blvd., Suite 100	541 E Trimble Road
Oakdale, MN 55128 USA	San Jose, CA 95131 USA

Prepared by: Richard Blonigen Date: July 20, 2011

Reviewed by: Norman Shpilsher Date: July 20, 2011

TABLE OF CONTENTS

1.0 DESCRIPTION OF THE SAMPLE (EUT)

Model:	SPT-M1-AWS19-11
Type of EUT:	Distributed Antenna System / Repeater
Frequency Range:	1930-1990MHz 2110-2155MHz
Company:	TE Connectivity / LGC Wireless
Customer:	Sue Cyr
Address:	541 E. Trimble Road San Jose, CA 95131 USA
Phone:	408-952-2445
Fax:	408-952-2645
e-mail:	sue.cyr@te.com
Test Standards:	☐ EN 55022:2006 +A1:2007, Class ☐ EN 55011:2007 +A2:2007, Group , Class ☒ 47 CFR, Part 27:2010, Enclosure Spurious Radiated Emissions ☒ 47 CFR, Part 24:2010, Enclosure Spurious Radiated Emissions ☐ ICES-003, Issue 4:2004 ☐ EN 55014-1:2006 ☐ EN 61326-1:2006 ☐ Class for Radiated and Conducted Emissions ☐ Basic Immunity Test Requirements ☐ Immunity Test Requirements for Industrial Locations ☐ EN 60601-1-2:2001 +A1:2006 ☐ EN 61000-6-3:2007 ☐ EN 61000-6-4:2007 ☐ EN 61000-3-2:2006 ☐ EN 61000-3-3:1995 +A1:2001 +A2:2006 ☐ EN 61000-6-1:2007 ☐ EN 61000-6-2:2005 ☐ EN 55024:1998 + A1:2001 + A2:2003
Date Sample Submitted:	July 18, 2011
Test Work Started:	July 18, 2011
Test Work Completed:	July 18, 2011
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good ☐ Prototype ☒Production ☐ Used

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 STANDARD	TEST	RESULT
Part 24	Enclosure Spurious Radiated Emissions	Pass
Part 27	Enclosure Spurious Radiated Emissions	Pass

2.1 Statement of the Measurement Uncertainty

Note: The measured result in this report is within the specification limits by more than the measurement uncertainty; the measured result indicates that the product tested complies with the specification limit.

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

3.0 EQUIPMENT UNDER TEST

3.1 Power Configuration

Rated voltage:	☒ 120VAC ☐ 230VAC ☐ 400VAC ☐ VDC ☐ Other:
Rated current:	Amp.
Rated frequency:	☐ 50Hz ☒ 60Hz
Number of phases:	☒ 1 Phase ☐ 3 Phases

3.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

☐ - Standby
☐ - Test program (H - Pattern)
☒ - Continuous Operation (see details below)
☐ - Specific test program
☐ -

Operating modes of the EUT:

No.	Description
1	Continuous amplifying at 1931MHz, 1960MHz, and 1989MHz
2	Continuous amplifying at 2111MHz, 2132MHz, and 2154MHz

Cables:

No.	Type	Length	Designation	Note
1	Two RF coax cables	10m each	RF input and output RF cables	
2	3-wire, unshielded	1.8m	AC Power Input	

Support equipment/Services:

No.	Item	Description
1	Agilent 8648C	Signal Generator
2	Prism Host Unit p/n 1449226	Host Unit
3	IFEU p/n MR2216G7	54 V Power Supply
4	Prism DRU unit	DRU
5	Spectrum IFEU Unit	IFEU
6	Spectrum Main Ray	Remote Antenna

General notes: None

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 °C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.0 TEST CONDITIONS AND RESULTS

4.1 Enclosure Spurious Radiated Emissions

Description of the test location

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

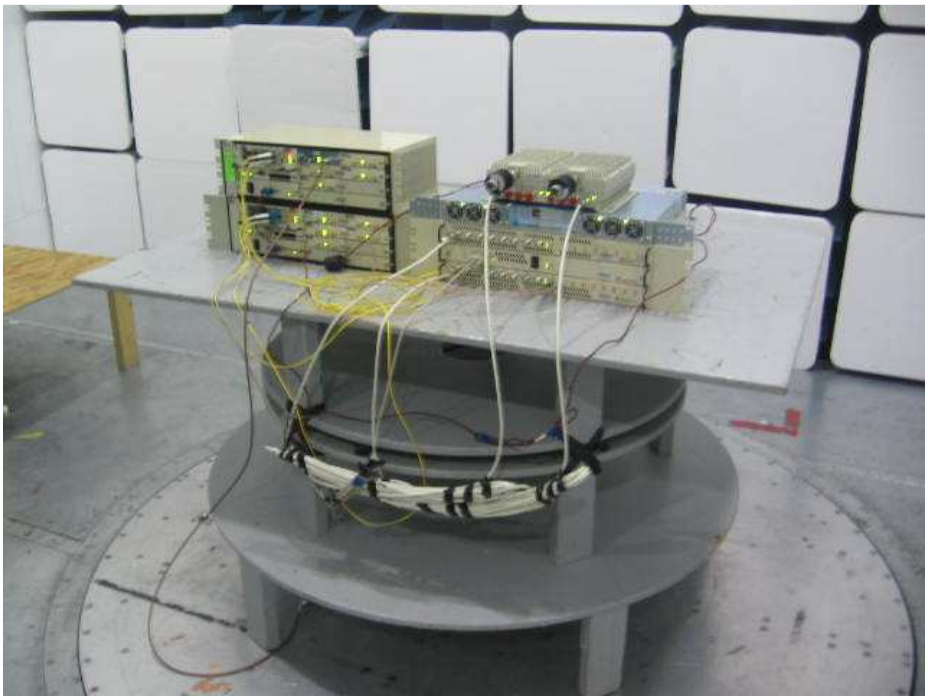
Test result: **Pass**

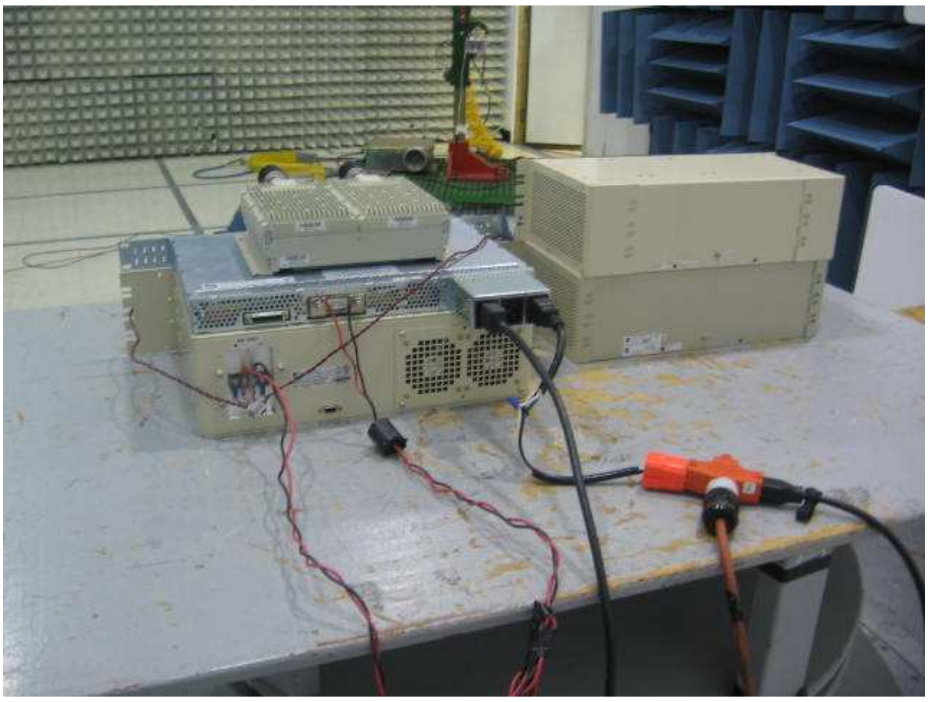
Frequency range: 30MHz-20GHz for 1930-1990MHz unit
30MHz-22GHz for 2110-2155MHz unit

Max. Emissions margin: 4.2 dB below the Reference Limits

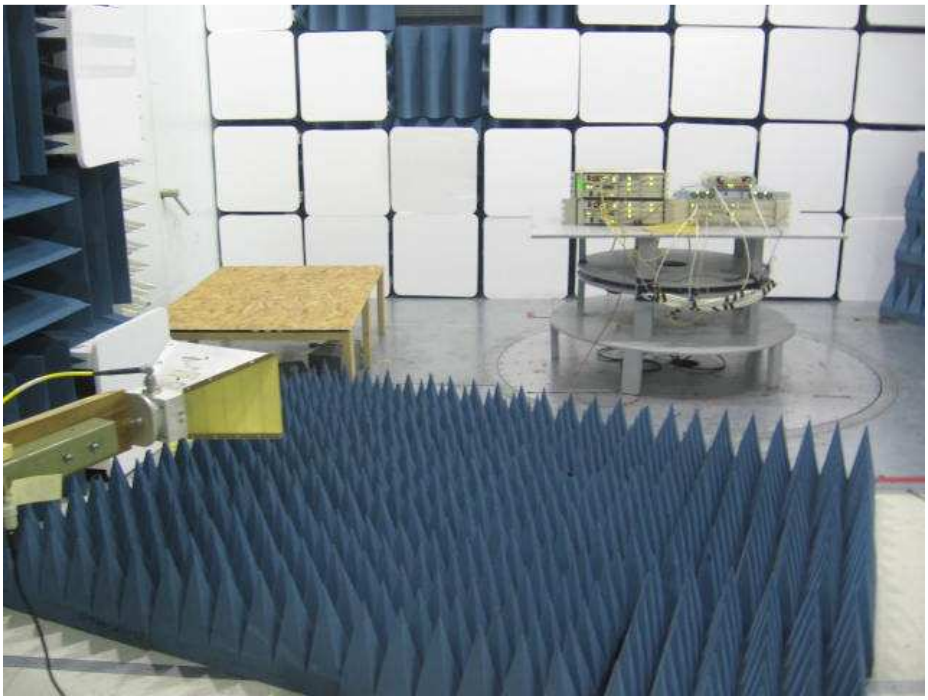
Notes:

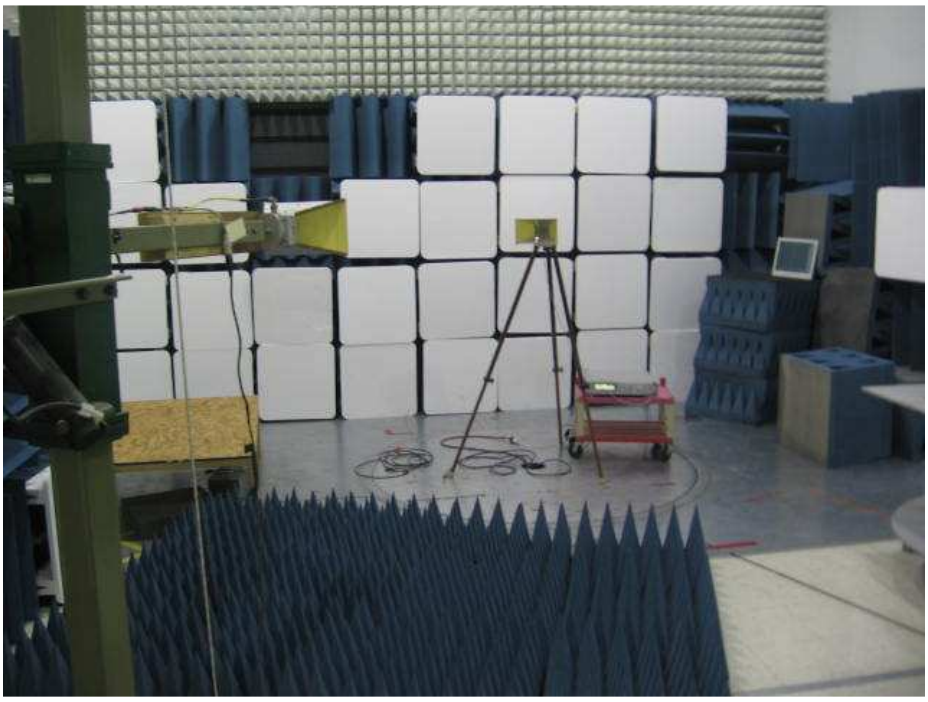
1. The Radiated Emissions testing was performed in the Anechoic chamber at 3m measurement distance (see Tables 1-2 & 4-5 and Graphs 1-36)
2. The Spurious Radiated Power limits of -13dBm was correlated with field strength Reference Limit of 82.2dBµV/m during field strength measurements at 3m measurement distance (see Tables 1-2).
3. Emissions with margin less than 20dB below the reference limit were measured with substitution method (see Table 3 & 6)
4. Emissions at operating frequencies were excluded from the tables





Test Setup Photos





Test Setup Photos

Date:	July 18, 2011	**Result: Pass**
Tested by:	Richard Blonigen & Ivaylo Nadarliyski	
Standard:	FCC Part 24	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 1930-1990MHz Frequency Range 30-1000MHz	

Table 1

Frequency	Ant. Polarity	Peak Reading dBµV	Ant.Factor dB1/m	Total at 3m dBµV/m	Reference Limit dBµV/m	Margin dB
Channel 1931MHz						
37.545 MHz	V	30.1	16.1	46.3	82.2	-36.0
77.56 MHz	V	36.8	8.5	45.3	82.2	-36.9
116.61 MHz	V	35.7	14.0	49.6	82.2	-32.6
368.78 MHz	V	28.8	18.0	46.8	82.2	-35.4
672.92 MHz	V	46.0	23.1	69.0	82.2	-13.2
78.177 MHz	H	35.9	8.6	44.6	82.2	-37.7
117.23 MHz	H	30.4	14.0	44.4	82.2	-37.9
164.14 MHz	H	37.2	11.7	48.9	82.2	-33.3
223.39 MHz	H	33.4	12.1	45.5	82.2	-36.7
672.92 MHz	H	48.5	23.1	71.5	82.2	-10.7
Channel 1960MHz						
38.844 MHz	V	30.5	15.4	45.8	82.2	-36.4
77.56 MHz	V	37.3	8.5	45.8	82.2	-36.4
116.17 MHz	V	35.3	13.9	49.3	82.2	-32.9
368.78 MHz	V	29.1	18.0	47.0	82.2	-35.2
643.44 MHz	V	50.6	23.0	73.6	82.2	-8.6
117.76 MHz	H	31.8	14.0	45.8	82.2	-36.5
161.76 MHz	H	37.6	11.8	49.5	82.2	-32.8
233.79 MHz	H	31.3	13.3	44.6	82.2	-37.6
643.44 MHz	H	47.6	23.0	70.5	82.2	-11.7
Channel 1989MHz						
36.212 MHz	V	29.3	16.9	46.2	82.2	-36.0
78.001 MHz	V	36.8	8.6	45.4	82.2	-36.8
117.14 MHz	V	35.6	14.0	49.5	82.2	-32.7
368.78 MHz	V	28.1	18.0	46.1	82.2	-36.1
614.52 MHz	V	51.4	22.2	73.6	82.2	-8.6
77.384 MHz	H	35.9	8.5	44.4	82.2	-37.8
117.23 MHz	H	30.6	14.0	44.6	82.2	-37.6
165.96 MHz	H	37.2	11.6	48.9	82.2	-33.4
233.35 MHz	H	31.1	13.3	44.4	82.2	-37.8
614.52 MHz	H	49.2	22.2	71.5	82.2	-10.7

Date:	July 18, 2011	**Result:** **Pass**
Tested by:	Richard Blonigen & Ivaylo Nadarliyski	
Standard:	FCC Part 24	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 1930-1990MHz Frequency Range 1-20GHz	

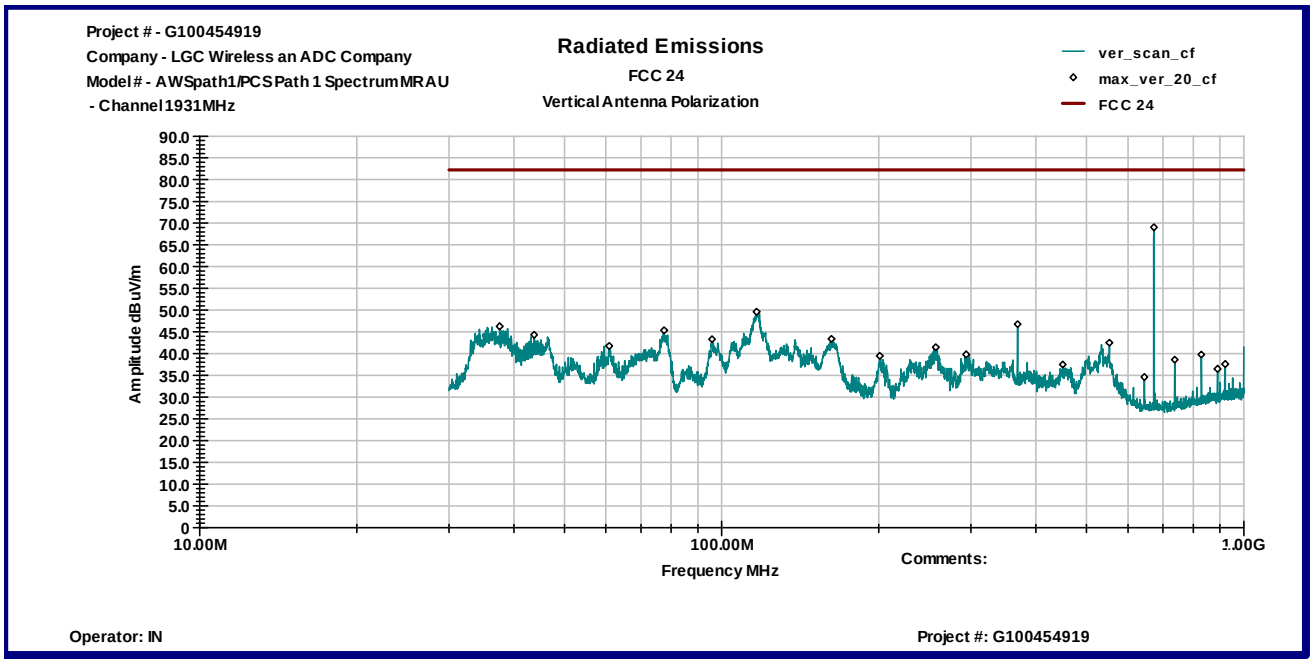
Table 2

Frequency MHz	Antenna Polarity	Peak Reading dBµV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBµV/m	Reference Limit dBµV/m	Margin dB
Channel 1931MHz							
3.8628 GHz	V	58.2	36.9	37.2	57.9	82.2	-24.3
5.794 GHz	V	57.9	39.9	36.5	61.4	82.2	-20.9
7.7252 GHz	V	58.3	43.0	36.3	65.1	82.2	-17.1
9.653 GHz	V	47.7	45.2	35.4	57.5	82.2	-24.8
13.519 GHz	V	44.8	48.5	37.0	56.3	82.2	-25.9
3.8628 GHz	H	56.2	36.9	37.2	55.9	82.2	-26.3
5.794 GHz	H	64.0	39.9	36.5	67.4	82.2	-14.8
6.8208 GHz	H	53.7	41.0	36.9	57.9	82.2	-24.4
7.7252 GHz	H	56.5	43.1	36.3	63.3	82.2	-18.9
9.653 GHz	H	49.0	45.2	35.4	58.7	82.2	-23.5
Channel 1960MHz							
3.9206 GHz	V	69.3	37.1	37.2	69.2	82.2	-13.0
5.8824 GHz	V	58.5	40.0	36.5	61.9	82.2	-20.3
7.8408 GHz	V	52.5	43.1	36.2	59.5	82.2	-22.8
9.7992 GHz	V	50.3	45.3	35.3	60.3	82.2	-21.9
11.761 GHz	V	53.6	46.9	35.4	65.1	82.2	-17.1
13.719 GHz	V	59.3	48.7	37.3	70.7	82.2	-11.5
3.9206 GHz	H	68.4	37.1	37.2	68.3	82.2	-13.9
5.8824 GHz	H	60.7	40.0	36.5	64.1	82.2	-18.1
7.8408 GHz	H	53.0	43.1	36.2	60.0	82.2	-22.3
9.7992 GHz	H	49.6	45.3	35.3	59.7	82.2	-22.5
11.761 GHz	H	50.7	46.9	35.4	62.3	82.2	-20.0
13.719 GHz	H	60.7	48.7	37.3	72.1	82.2	-10.1
Channel 1989MHz							
1.2482 GHz	V	69.9	27.2	38.9	58.2	82.2	-24.0
3.9784 GHz	V	55.3	37.3	37.1	55.4	82.2	-26.8
6.8208 GHz	V	51.4	41.0	36.9	55.5	82.2	-26.7
14.756 GHz	V	43.0	49.1	37.7	54.4	82.2	-27.8
3.9784 GHz	H	56.3	37.2	37.1	56.4	82.2	-25.8
4.5462 GHz	H	52.9	37.6	36.8	53.7	82.2	-28.5
6.1442 GHz	H	50.1	40.1	36.7	53.6	82.2	-28.7
6.8208 GHz	H	54.4	41.0	36.9	58.5	82.2	-23.7
13.866 GHz	H	43.0	48.9	37.6	54.3	82.2	-27.9

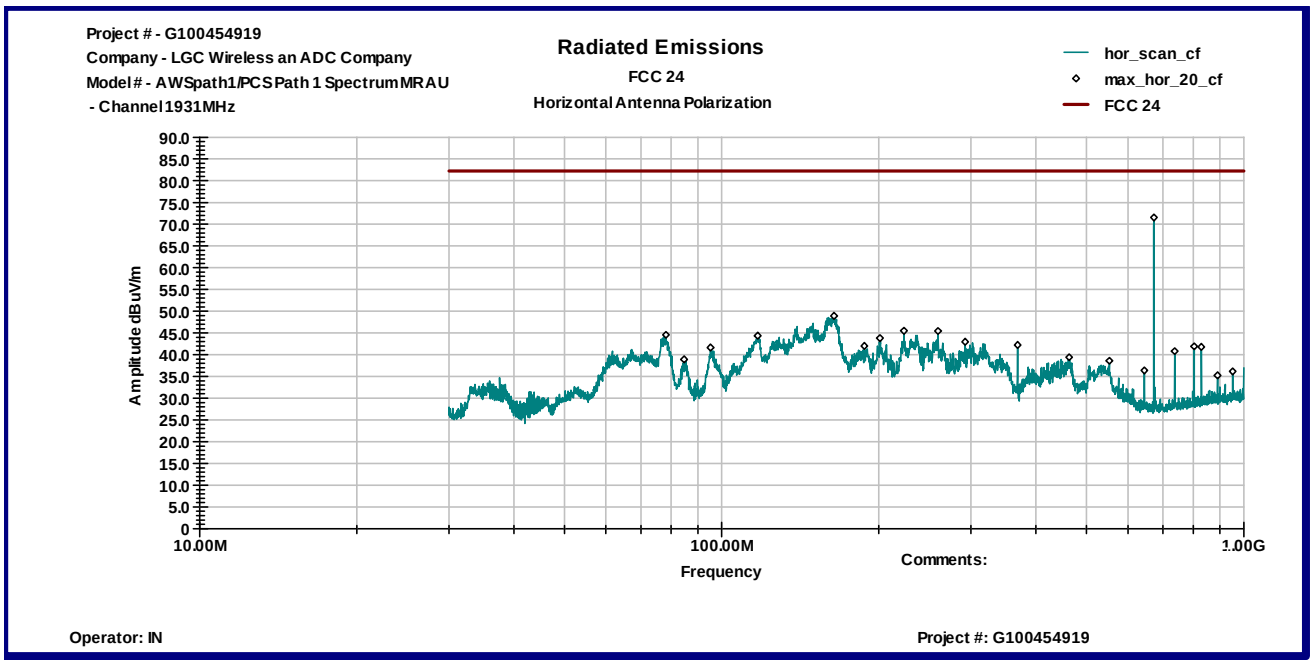
Date:	July 18, 2011	**Result:** **Pass**
Tested by:	Ivaylo Nadarliyski	
Standard:	FCC Part 24	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Substitution Method Channels 1930-1990MHz Frequency Range 30MHz-20GHz	

Table 3

Frequency MHz	Antenna Polarity	Measured Emissions dBµV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	Additional Loss/Gain dB	Emissions EIRP dBm	Limits dBm	Margin dB
			Channel 1931MHz						
672.92	V	46.0	-27.6	0.0	0.6	0.0	-28.2	-13.0	-15.2
672.92	H	48.8	-25.9	0.0	0.6	0.0	-26.5	-13.0	-13.5
5794.00	H	64.0	-38.5	11.0	1.9	0.0	-29.4	-13.0	-16.4
7725.20	V	58.3	-38.3	11.2	2.2	0.0	-29.2	-13.0	-16.2
7725.20	H	56.5	-39.0	11.2	2.2	0.0	-29.9	-13.0	-16.9
			Channel 1960MHz						
643.44	V	50.6	-21.7	0.0	0.6	0.0	-22.3	-13.0	-9.3
643.44	H	48.5	-25.9	0.0	0.6	0.0	-26.5	-13.0	-13.5
3920.60	V	69.3	-35.8	9.7	2.3	0.0	-28.5	-13.0	-15.5
3920.60	H	68.4	-36.5	9.7	2.3	0.0	-29.2	-13.0	-16.2
5882.00	V	58.5	-43.4	11.1	1.9	0.0	-34.2	-13.0	-21.2
5882.00	H	60.7	-40.6	11.1	1.9	0.0	-31.4	-13.0	-18.4
11761.00	V	53.6	-37.5	11.7	2.8	0.0	-28.6	-13.0	-15.6
11761.00	H	50.7	-38.8	11.7	2.8	0.0	-29.9	-13.0	-16.9
13719.40	V	59.3	-33.9	11.5	3.0	0.0	-25.3	-13.0	-12.3
13719.40	H	60.7	-25.8	11.5	3.0	0.0	-17.2	-13.0	-4.2
			Channel 1989MHz						
614.52	V	51.4	-23.1	0.0	0.6	0.0	-23.7	-13.0	-10.7
614.52	H	49.2	-26.1	0.0	0.6	0.0	-26.7	-13.0	-13.7



Graph 1



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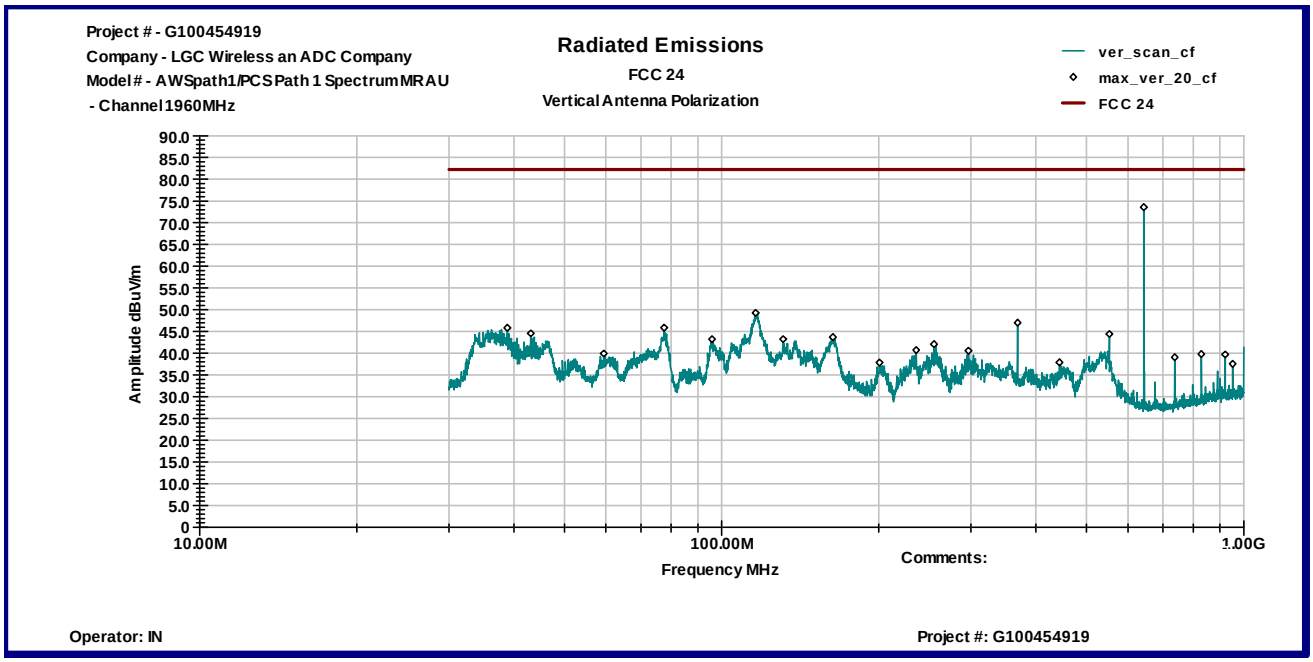
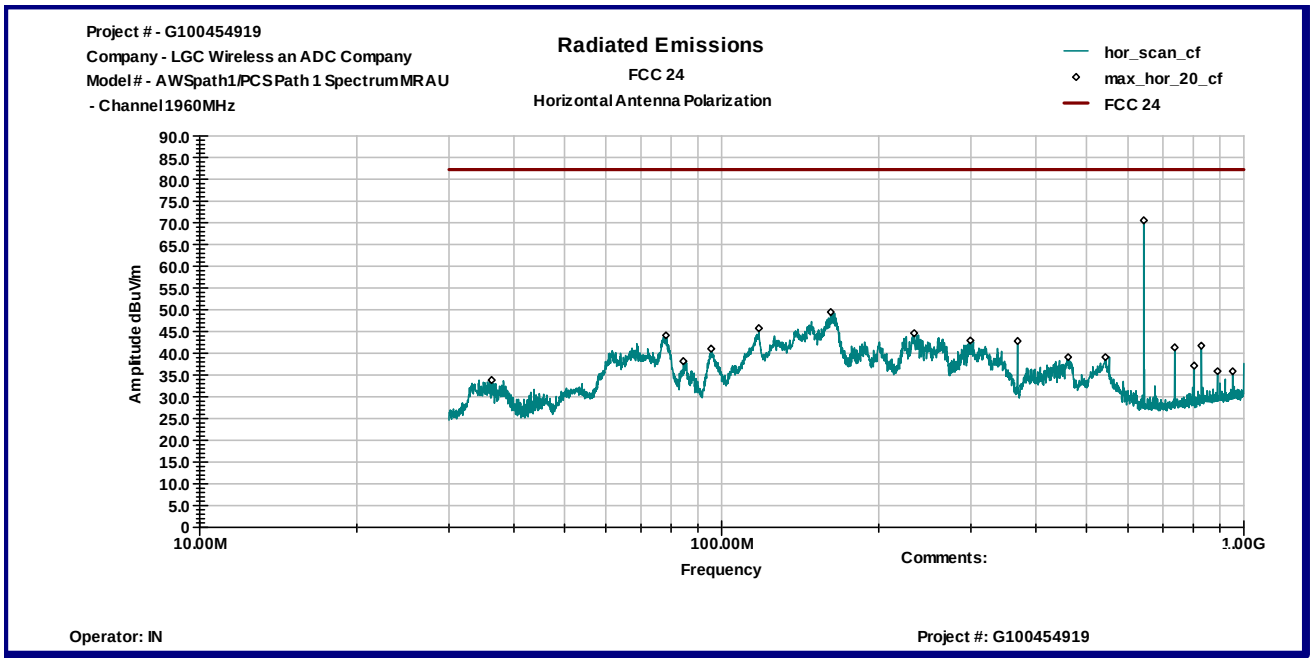
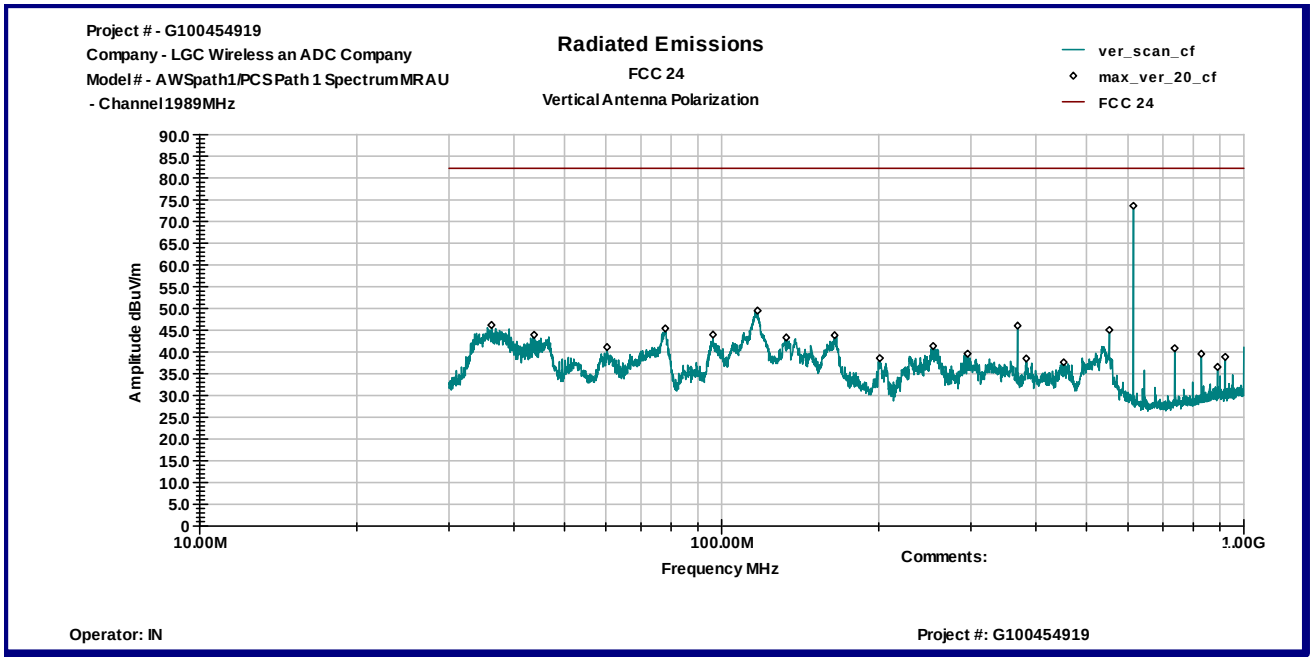


Graph 3



Graph 4



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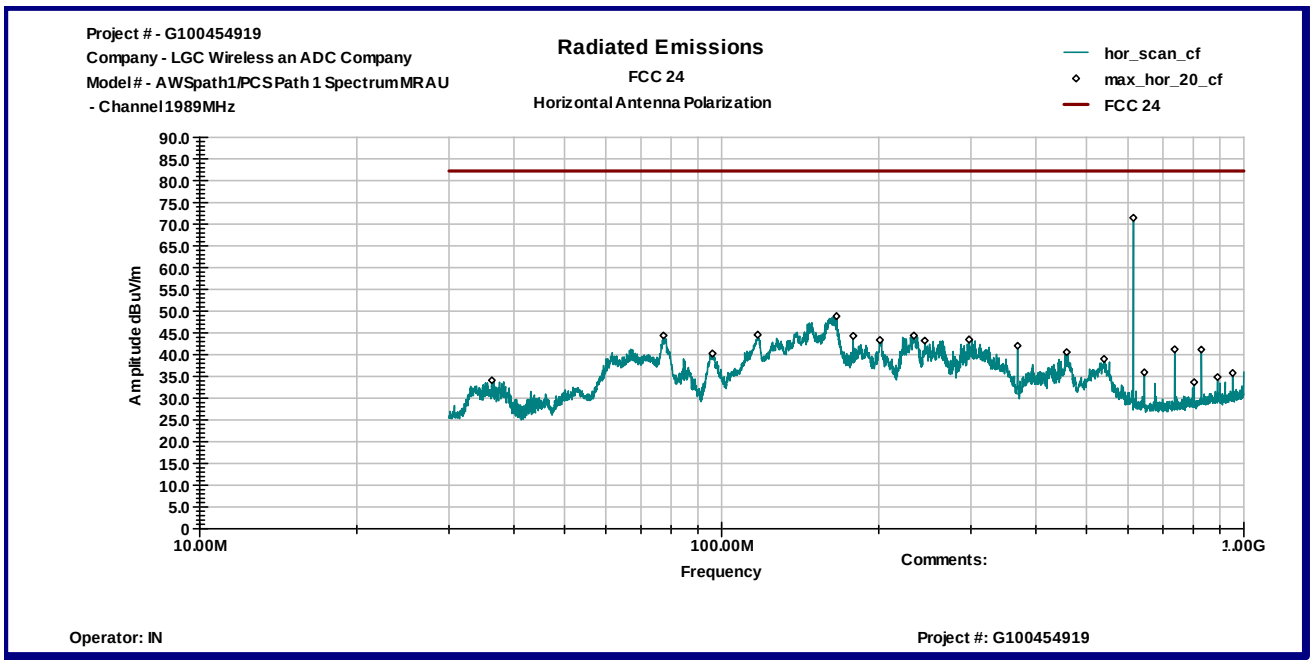

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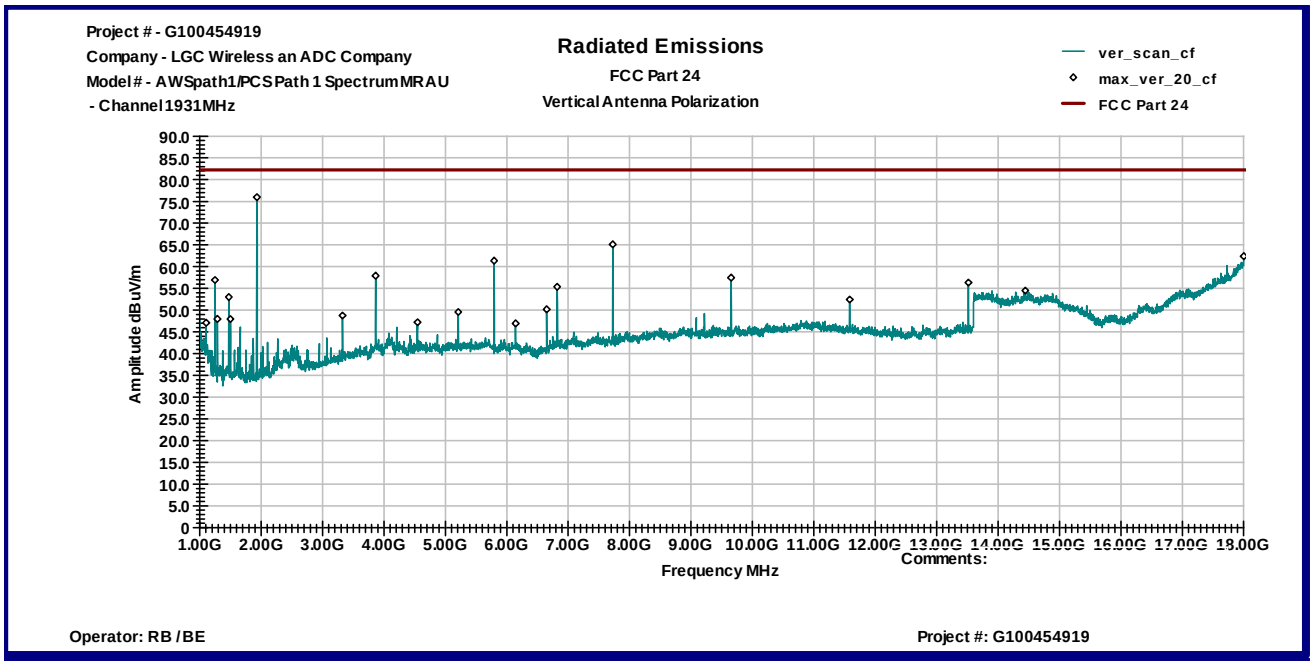

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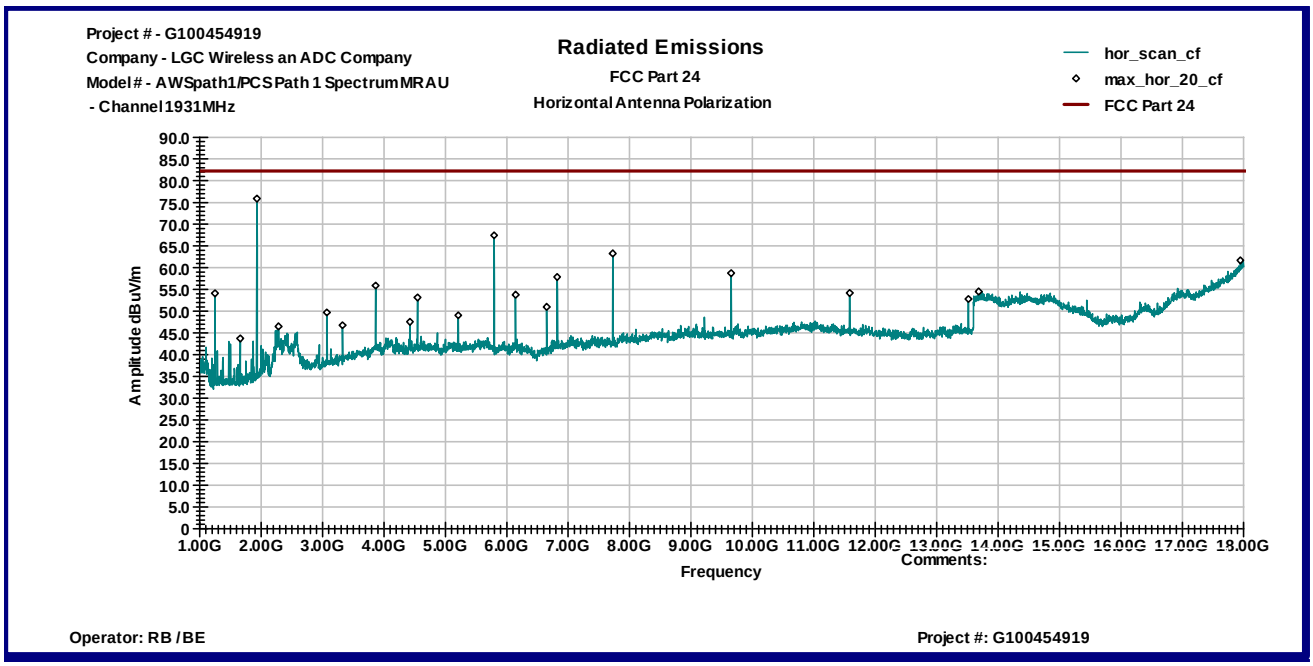

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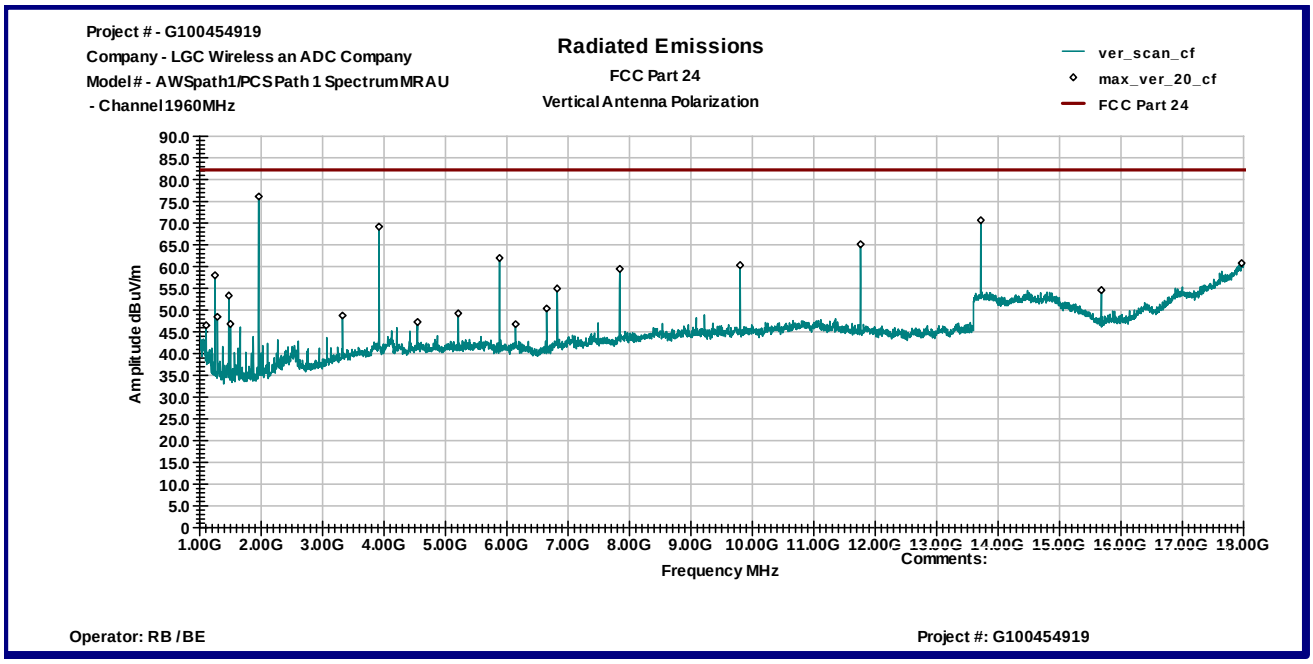

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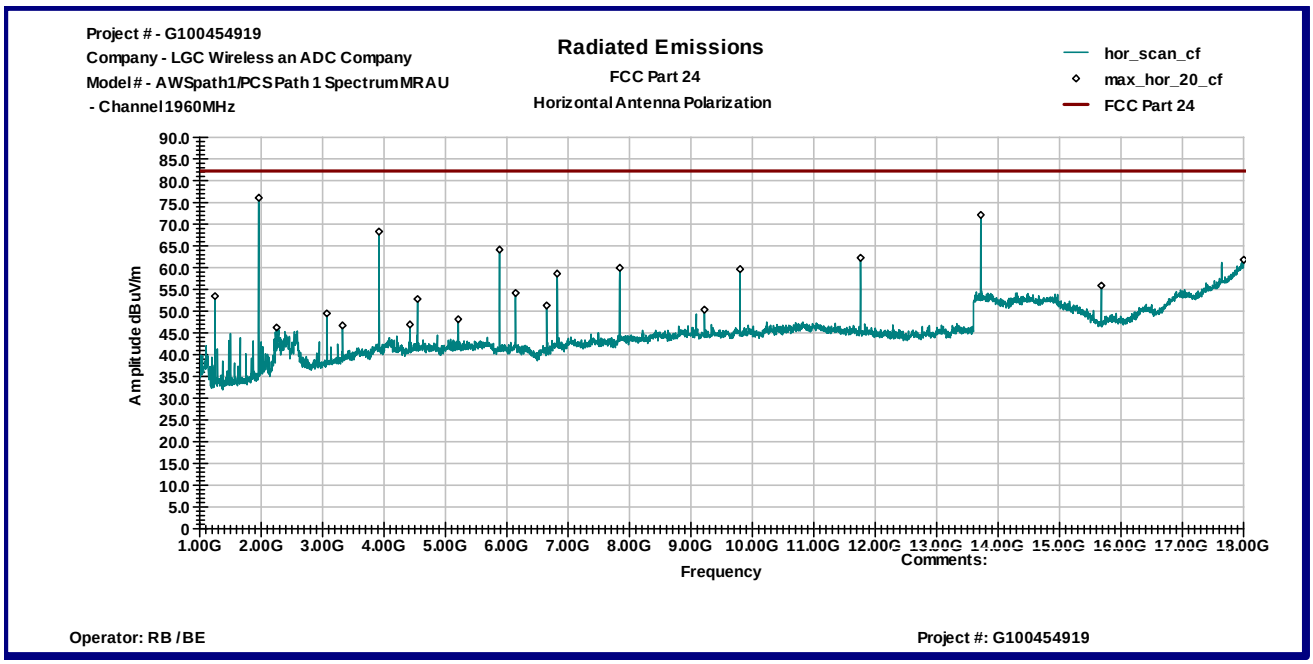

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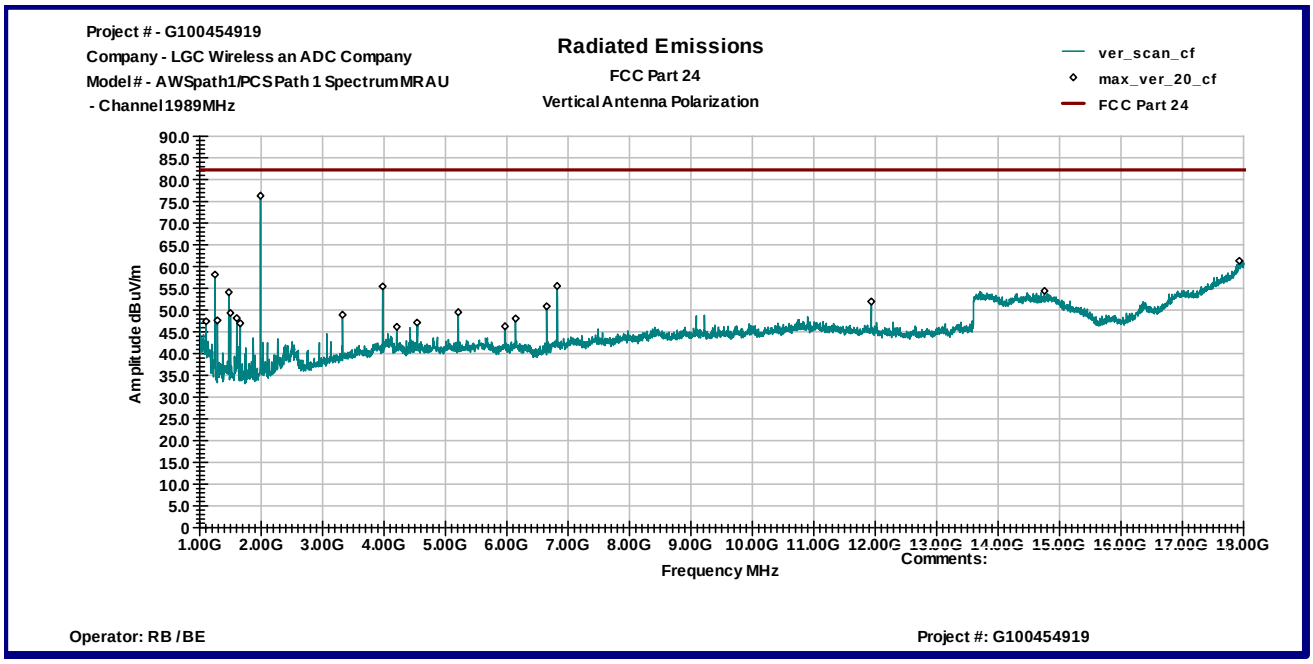
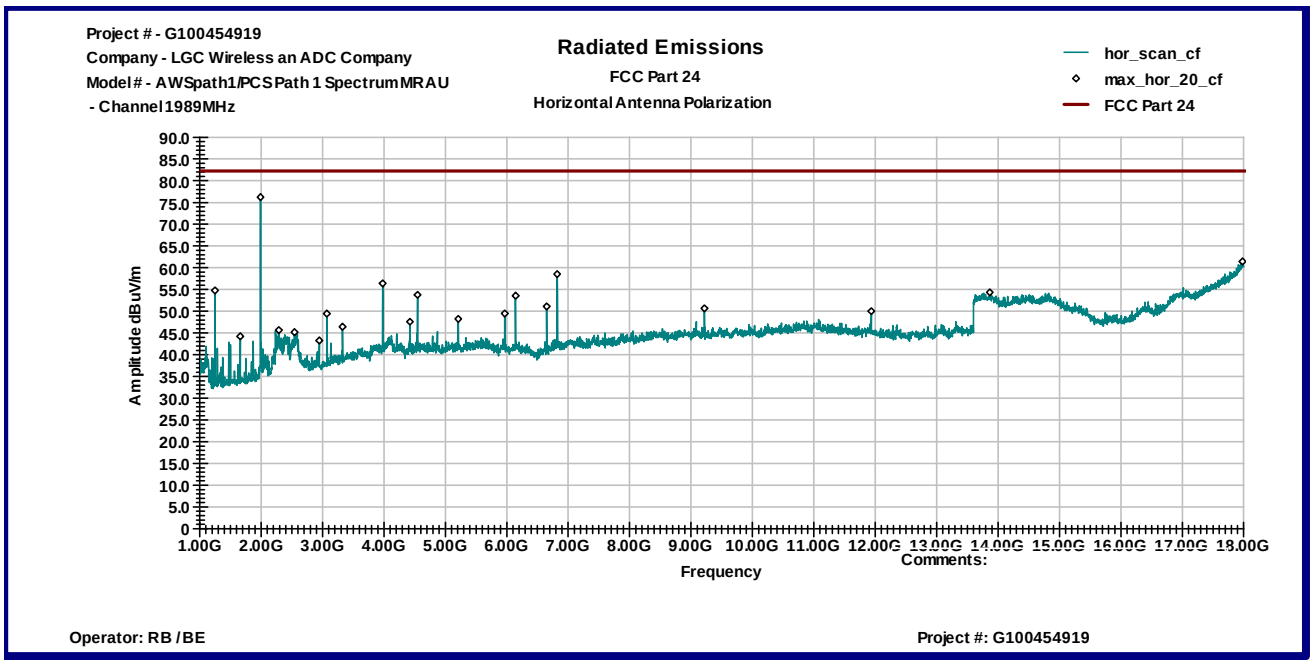


Graph 11



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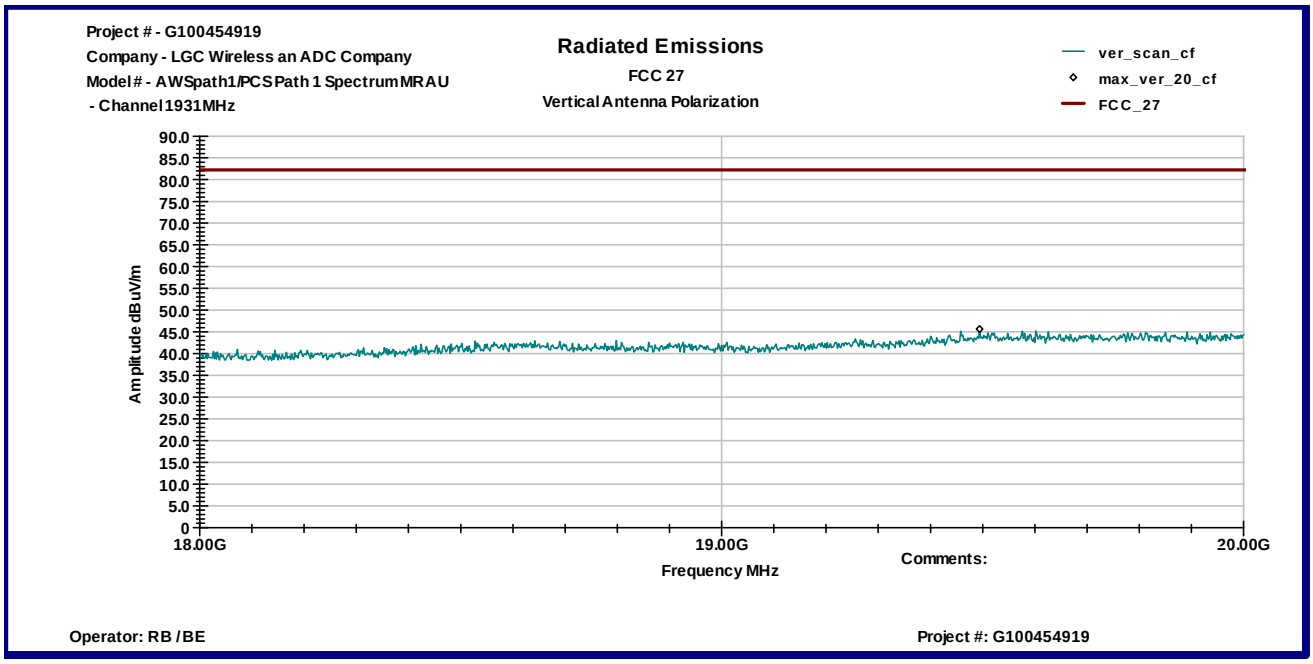

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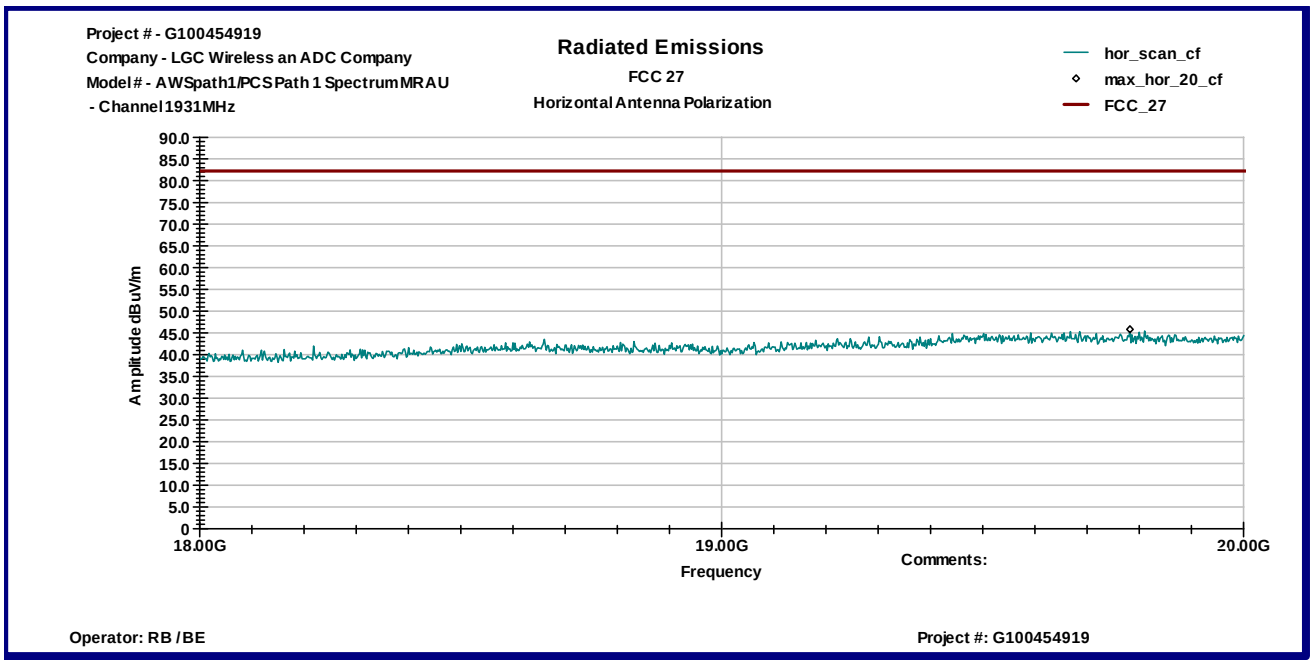

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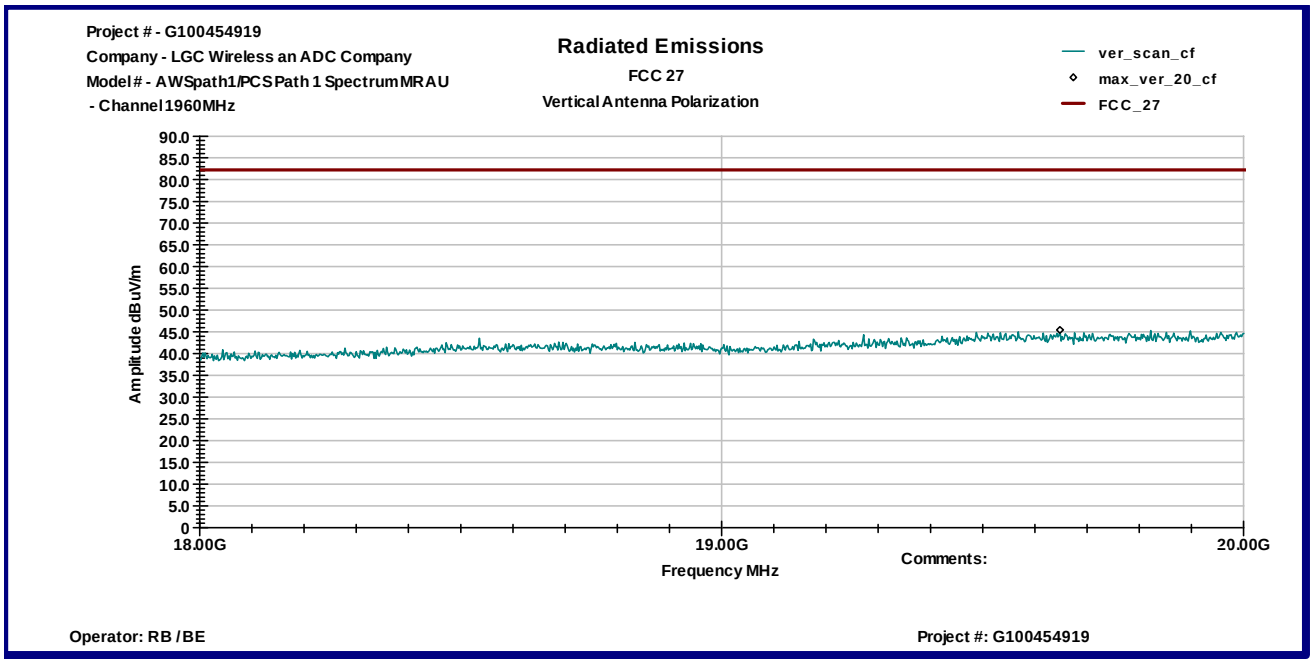

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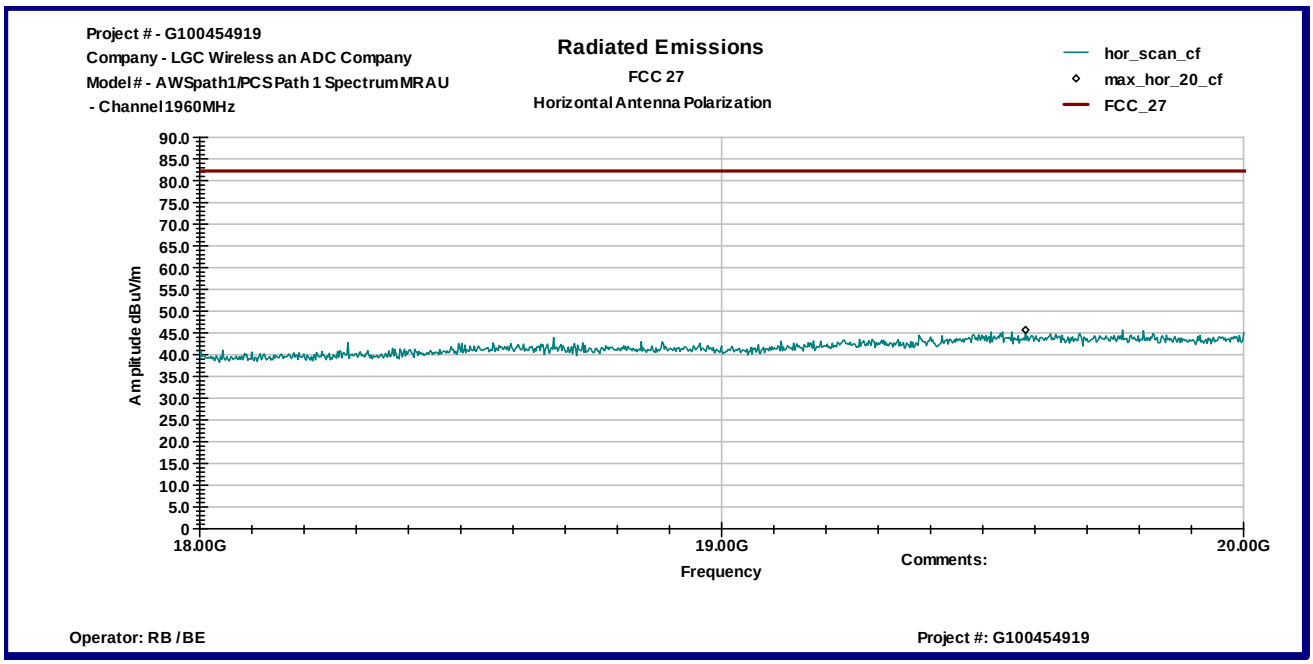

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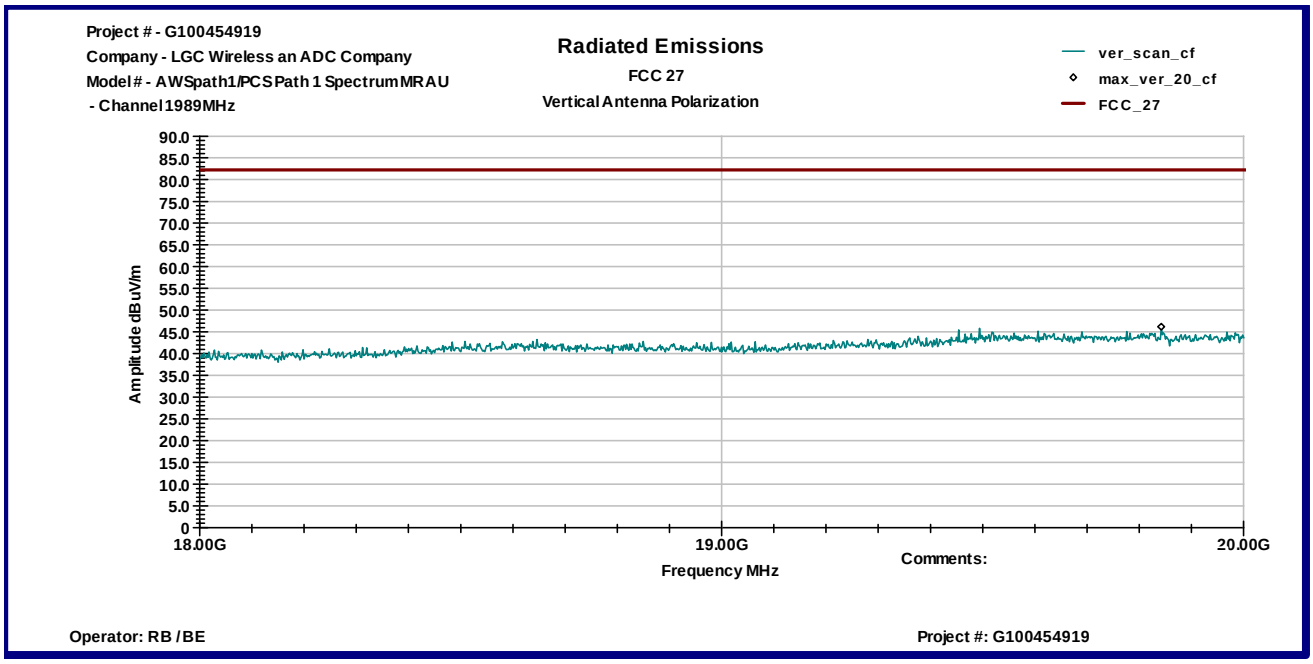

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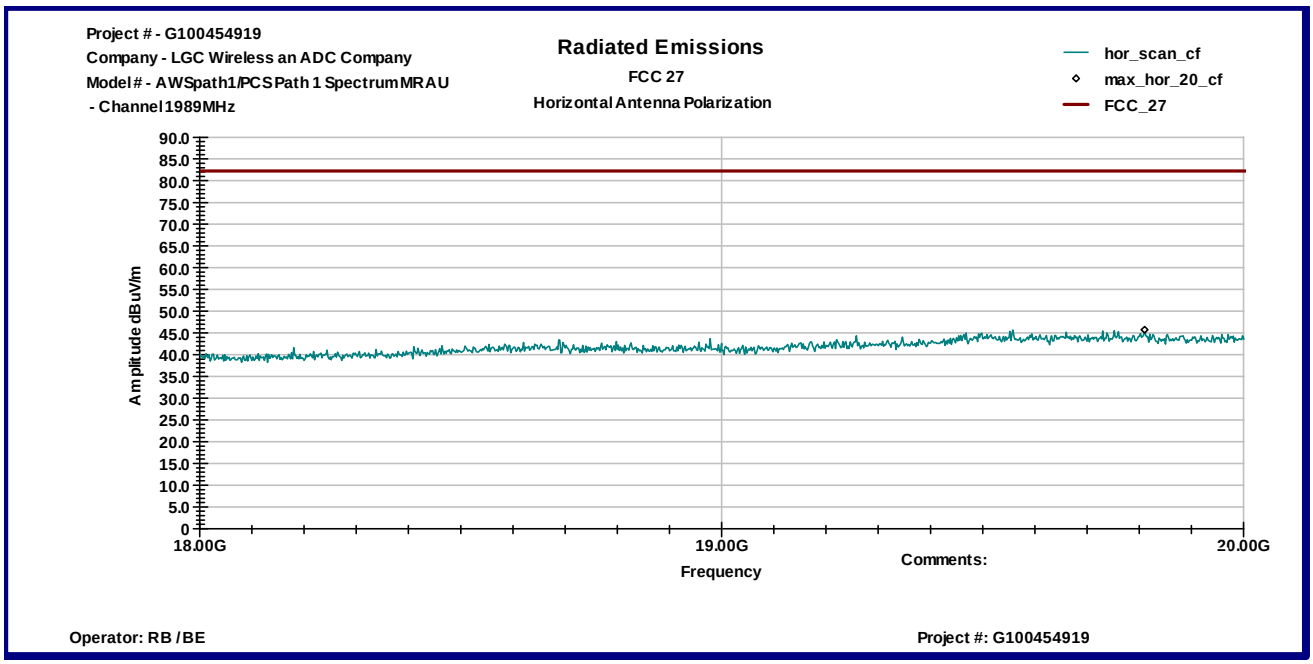


Graph 18

Date:	July 18, 2011	**Result: Pass**
Tested by:	Richard Blonigen	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 2110-2155MHz Frequency Range 30-1000MHz	

Table 4

Frequency	Ant. Polarity	Peak Reading dBµV	Ant.Factor dB1/m	Total at 3m dBµV/m	Reference Limit dBµV/m	Margin dB
Channel 2111MHz						
38.212 MHz	V	30.5	15.7	46.2	82.2	-36.0
78.177 MHz	V	35.6	8.6	44.3	82.2	-37.9
116.61 MHz	V	35.7	14.0	49.6	82.2	-32.6
146.68 MHz	V	31.5	12.9	44.5	82.2	-37.8
448.45 MHz	V	47.9	19.6	67.5	82.2	-14.7
116.96 MHz	H	31.9	14.0	45.8	82.2	-36.4
148.07 MHz	H	37.2	12.8	50.0	82.2	-32.2
234.24 MHz	H	32.2	13.4	45.6	82.2	-36.6
256.16 MHz	H	31.2	15.5	46.7	82.2	-35.5
448.45 MHz	H	49.4	19.6	69.1	82.2	-13.2
Channel 2132MHz						
37.615 MHz	V	29.7	16.1	45.7	82.2	-36.5
78.177 MHz	V	35.7	8.6	44.3	82.2	-37.9
116.44 MHz	V	35.6	13.9	49.6	82.2	-32.6
151.29 MHz	V	31.3	12.6	43.9	82.2	-38.3
469.5 MHz	V	44.9	20.3	65.2	82.2	-17.1
78.883 MHz	H	36.7	8.7	45.5	82.2	-36.8
149.19 MHz	H	37.8	12.8	50.6	82.2	-31.6
236.23 MHz	H	31.1	13.6	44.7	82.2	-37.5
305.97 MHz	H	30.2	16.1	46.2	82.2	-36.0
469.5 MHz	H	47.7	20.3	68.0	82.2	-14.2
Channel 2154MHz						
38.808 MHz	V	31.1	15.4	46.5	82.2	-35.8
78.442 MHz	V	35.7	8.7	44.3	82.2	-37.9
116.44 MHz	V	35.6	13.9	49.6	82.2	-32.6
163.72 MHz	V	32.5	11.7	44.3	82.2	-38.0
491.04 MHz	V	40.0	20.7	60.7	82.2	-21.5
78.618 MHz	H	36.5	8.7	45.2	82.2	-37.0
149.61 MHz	H	36.9	12.7	49.6	82.2	-32.6
239.33 MHz	H	30.4	13.9	44.3	82.2	-37.9
304.56 MHz	H	28.0	16.0	44.1	82.2	-38.1
491.04 MHz	H	38.3	20.7	59.0	82.2	-23.2

Date:	July 18, 2011	**Result:** **Pass**
Tested by:	Richard Blonigen	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 2110-2155MHz Frequency Range 1-22GHz	

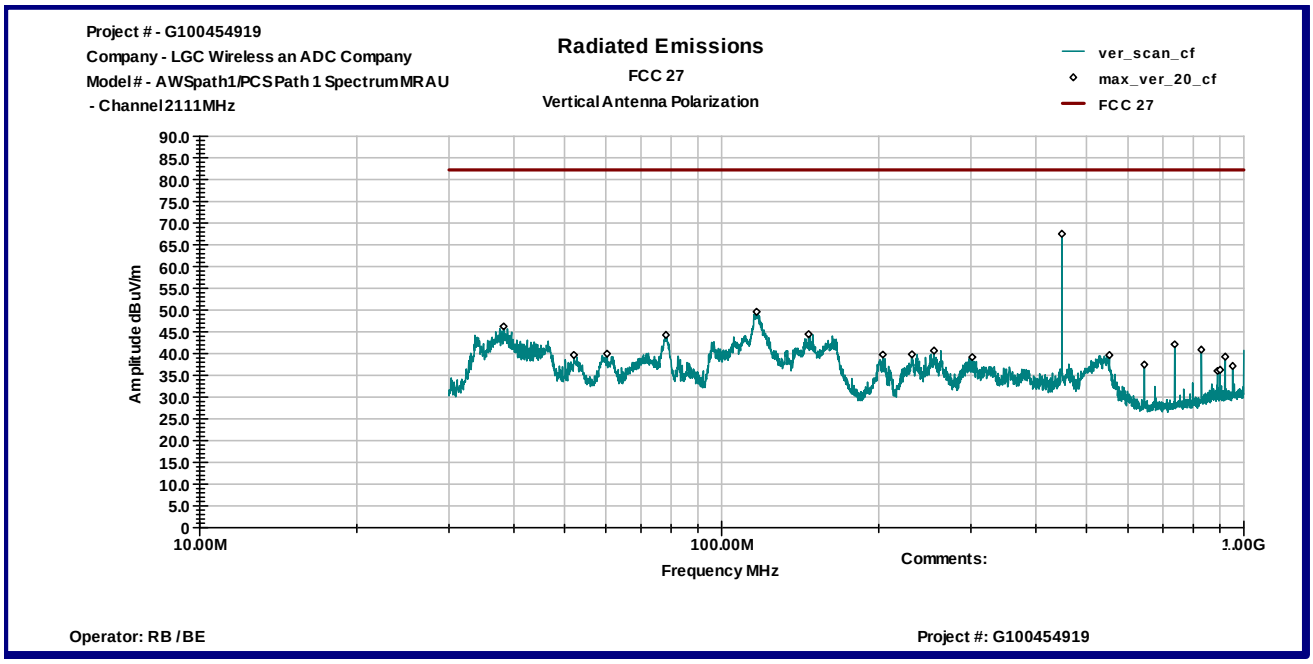
Table 5

Frequency MHz	Antenna Polarity	Peak Reading dBµV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBµV/m	Reference Limit dBµV/m	Margin dB
Channel 2111MHz							
1.2482 GHz	V	68.7	27.2	38.9	56.9	82.2	-25.3
4.2232 GHz	V	53.0	37.4	37.0	53.4	82.2	-28.8
6.8208 GHz	V	49.1	41.0	36.9	53.2	82.2	-29.0
10.557 GHz	V	40.8	46.1	34.8	52.2	82.2	-30.0
14.454 GHz	V	42.5	49.9	37.8	54.6	82.2	-27.6
1.2482 GHz	H	64.6	27.1	38.9	52.8	82.2	-29.4
4.2232 GHz	H	57.5	37.4	37.0	57.9	82.2	-24.3
6.1442 GHz	H	49.7	40.1	36.7	53.1	82.2	-29.1
6.8208 GHz	H	53.5	41.0	36.9	57.7	82.2	-24.6
13.883 GHz	H	43.7	48.9	37.6	55.0	82.2	-27.2
Channel 2132MHz							
1.2482 GHz	V	68.9	27.2	38.9	57.2	82.2	-25.1
1.4726 GHz	V	63.3	28.1	38.9	52.5	82.2	-29.7
4.264 GHz	V	52.8	37.5	37.0	53.3	82.2	-28.9
6.8208 GHz	V	49.4	41.0	36.9	53.5	82.2	-28.7
13.74 GHz	V	43.6	48.8	37.4	55.0	82.2	-27.2
1.2482 GHz	H	65.4	27.1	38.9	53.5	82.2	-28.7
4.264 GHz	H	61.4	37.4	37.0	61.8	82.2	-20.4
6.1442 GHz	H	50.4	40.1	36.7	53.8	82.2	-28.4
6.8208 GHz	H	54.0	41.0	36.9	58.1	82.2	-24.1
14.841 GHz	H	43.0	48.9	37.7	54.1	82.2	-28.1
Channel 2154MHz							
1.2482 GHz	V	69.4	27.2	38.9	57.6	82.2	-24.6
1.4726 GHz	V	63.5	28.1	38.9	52.7	82.2	-29.5
6.8208 GHz	V	49.4	41.0	36.9	53.5	82.2	-28.7
13.852 GHz	V	43.9	48.9	37.6	55.2	82.2	-27.0
1.2482 GHz	H	64.7	27.1	38.9	52.8	82.2	-29.4
4.3082 GHz	H	54.7	37.5	37.0	55.2	82.2	-27.0
6.1442 GHz	H	49.9	40.1	36.7	53.4	82.2	-28.8
6.8208 GHz	H	53.7	41.0	36.9	57.8	82.2	-24.4
13.685 GHz	H	43.2	48.7	37.3	54.6	82.2	-27.7

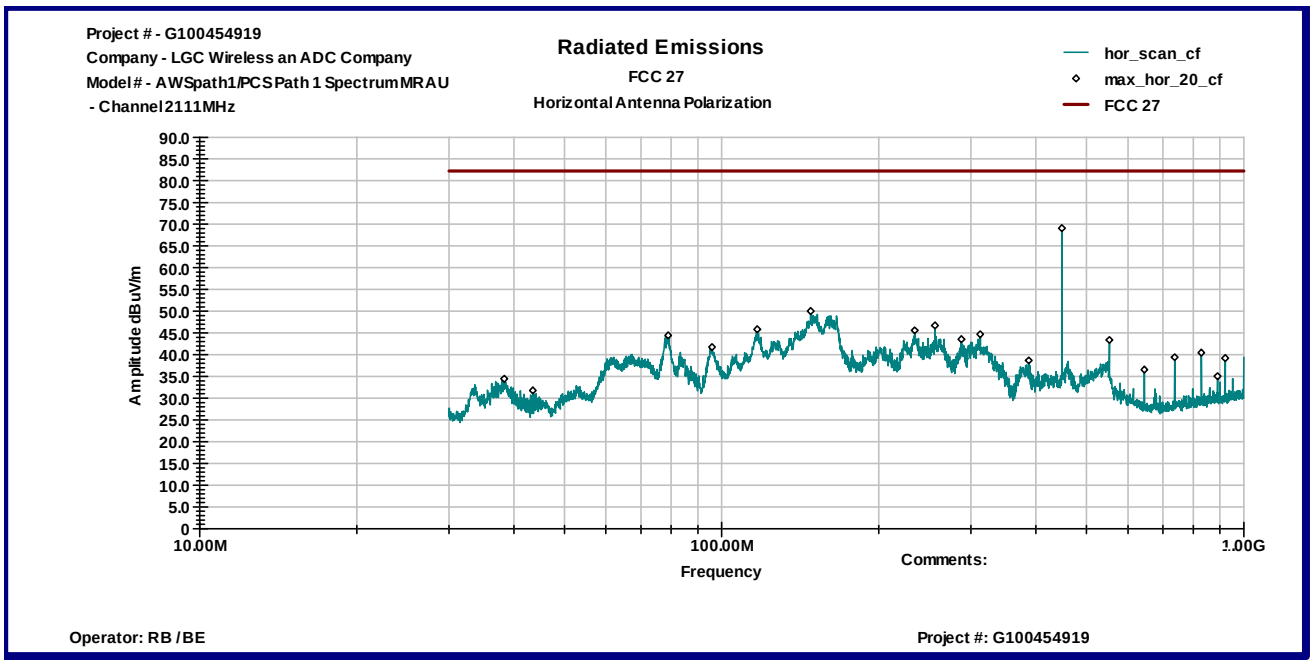
Date:	July 18, 2011	**Result:** **Pass**
Tested by:	Ivaylo Nadarliyski	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Substitution Method Channels 2110-2155MHz Frequency Range 30MHz-22GHz	

Table 6

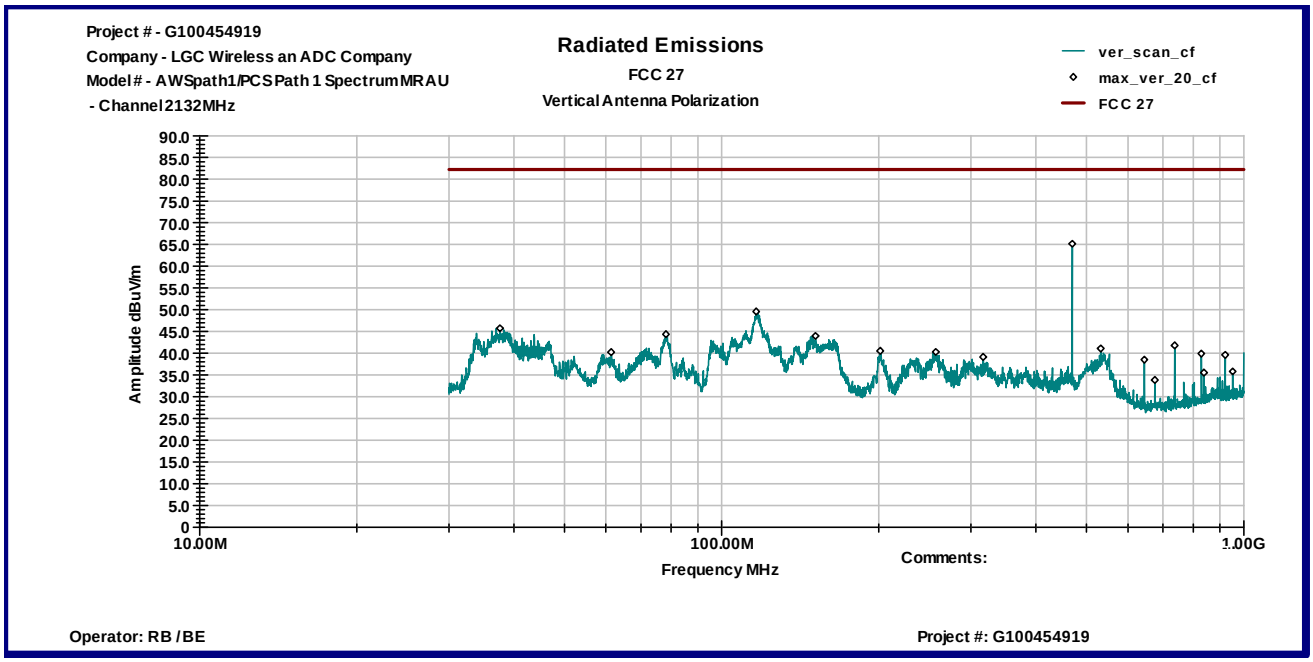
Frequency MHz	Antenna Polarity	Measured Emissions dBµV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	Additional Loss/Gain dB	Emissions EIRP dBm	Limits dBm	Margin dB
			Channel 2111MHz						
448.45	V	47.9	-20.2	0.0	0.5	0.0	-20.7	-13.0	-7.7
448.45	H	49.4	-16.7	0.0	0.5	0.0	-17.2	-13.0	-4.2
			Channel 2132MHz						
469.50	V	44.9	-21.3	0.0	0.5	0.0	-21.8	-13.0	-8.8
469.50	H	47.7	-21.5	0.0	0.5	0.0	-22.0	-13.0	-9.0



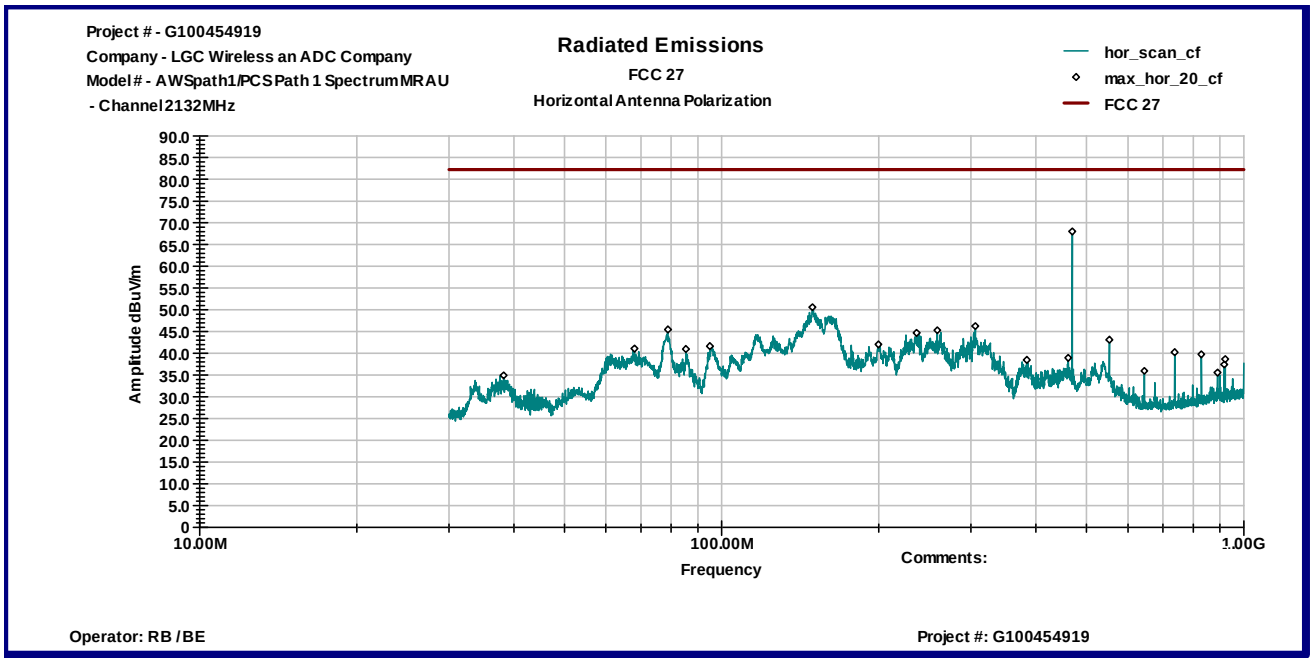
Graph 19



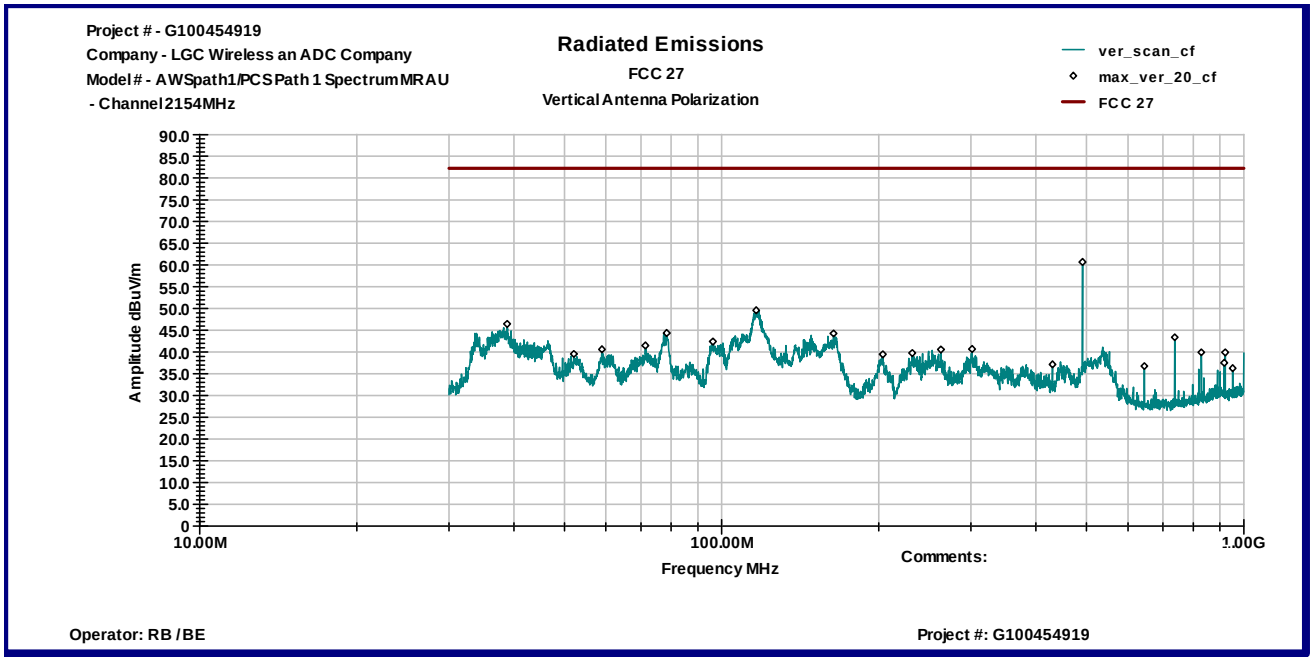
Graph 20



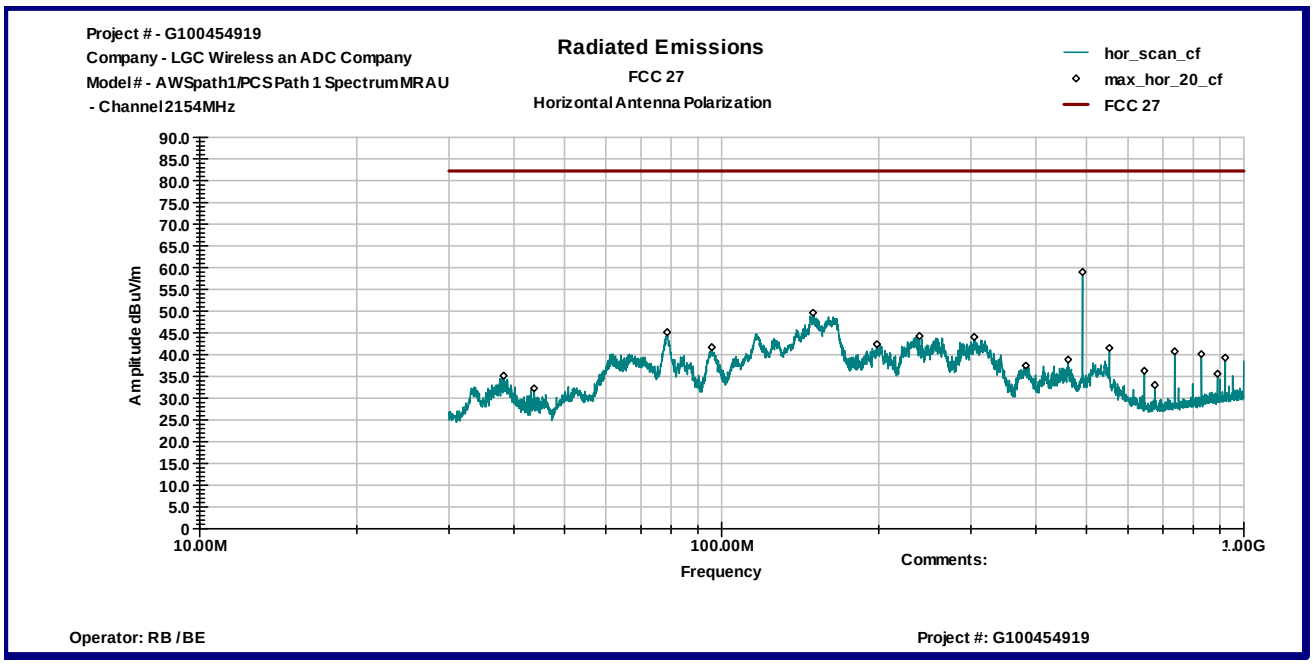
Graph 21



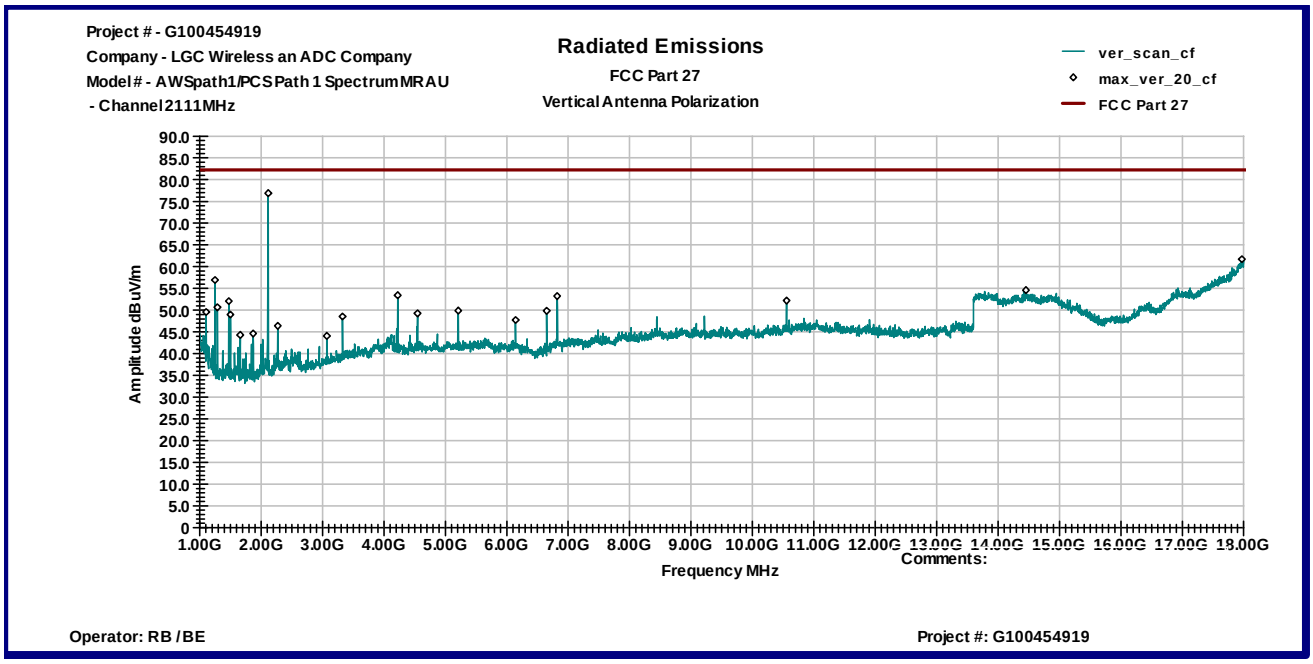
Graph 22



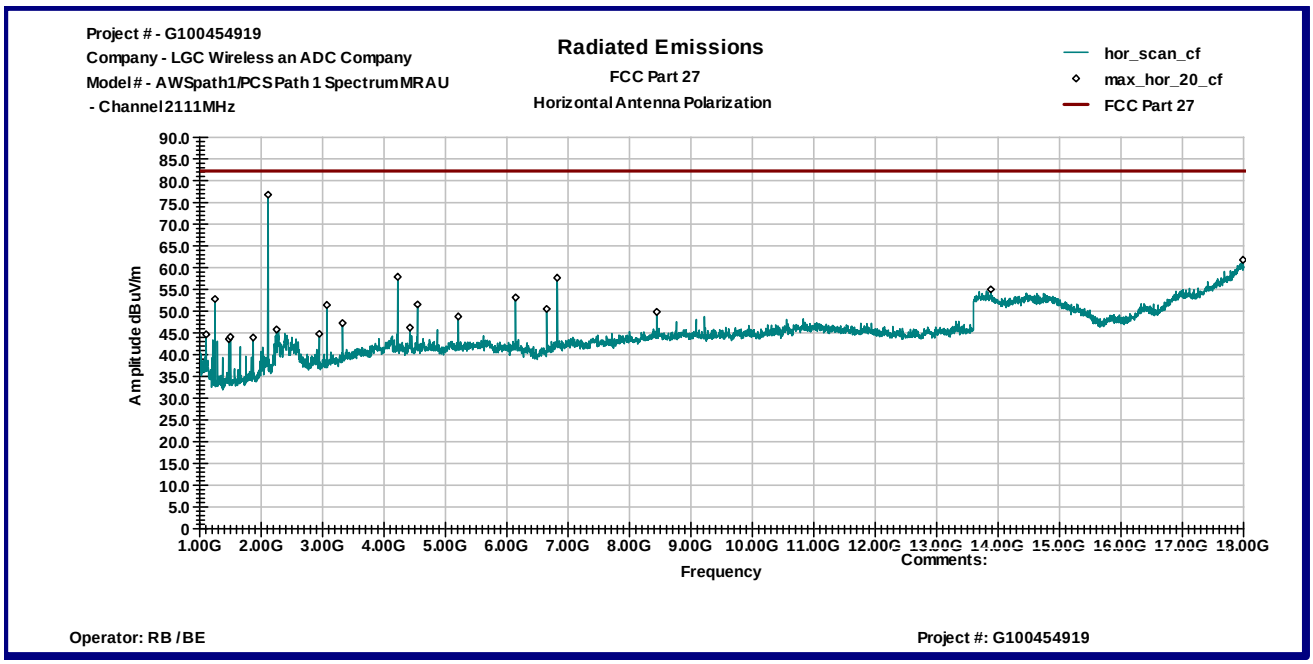
Graph 23



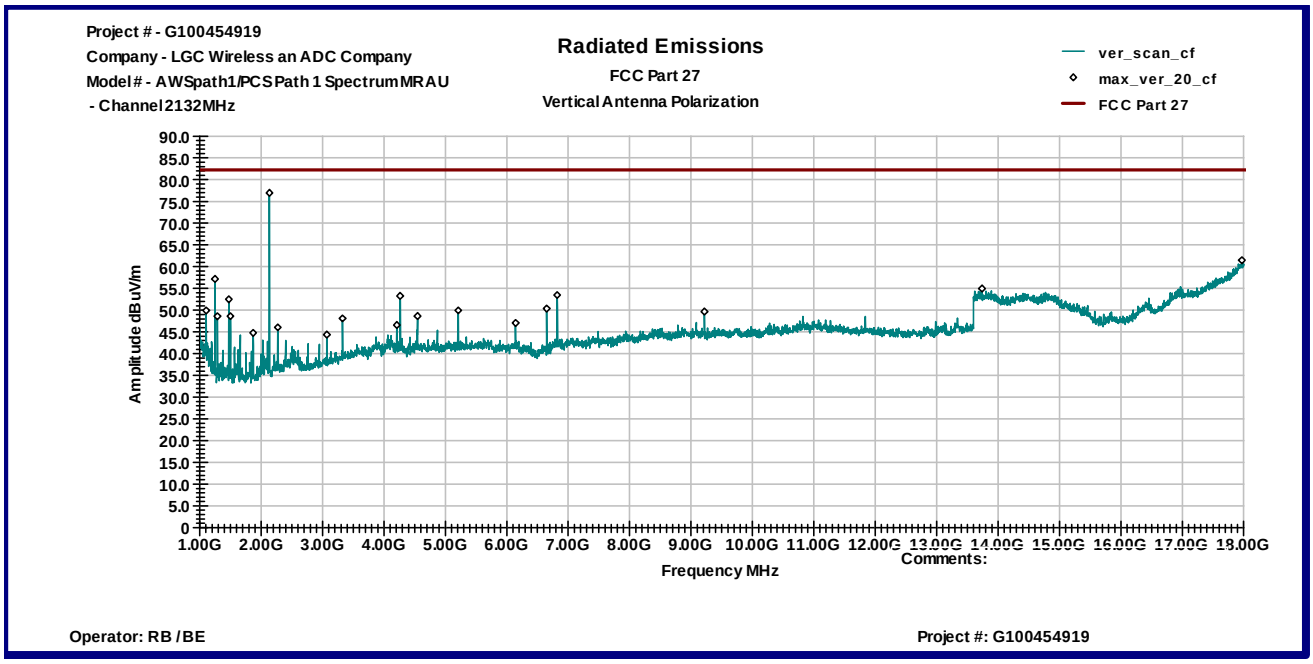
Graph 24



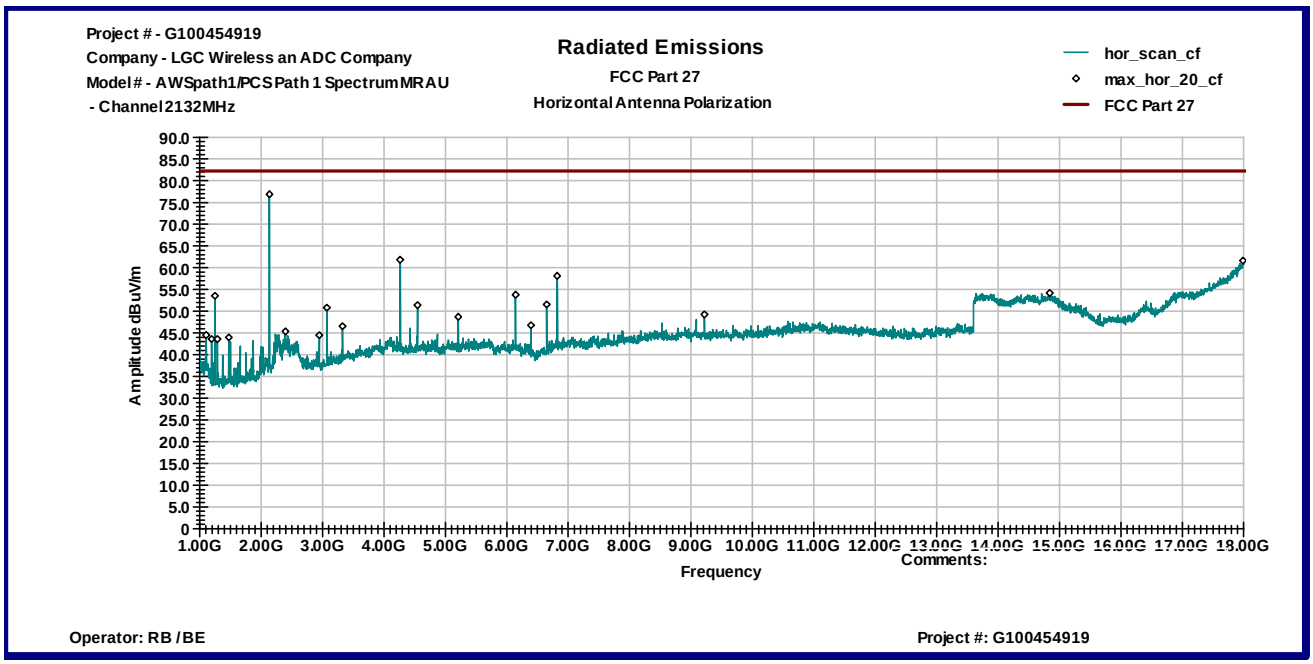
Graph 25



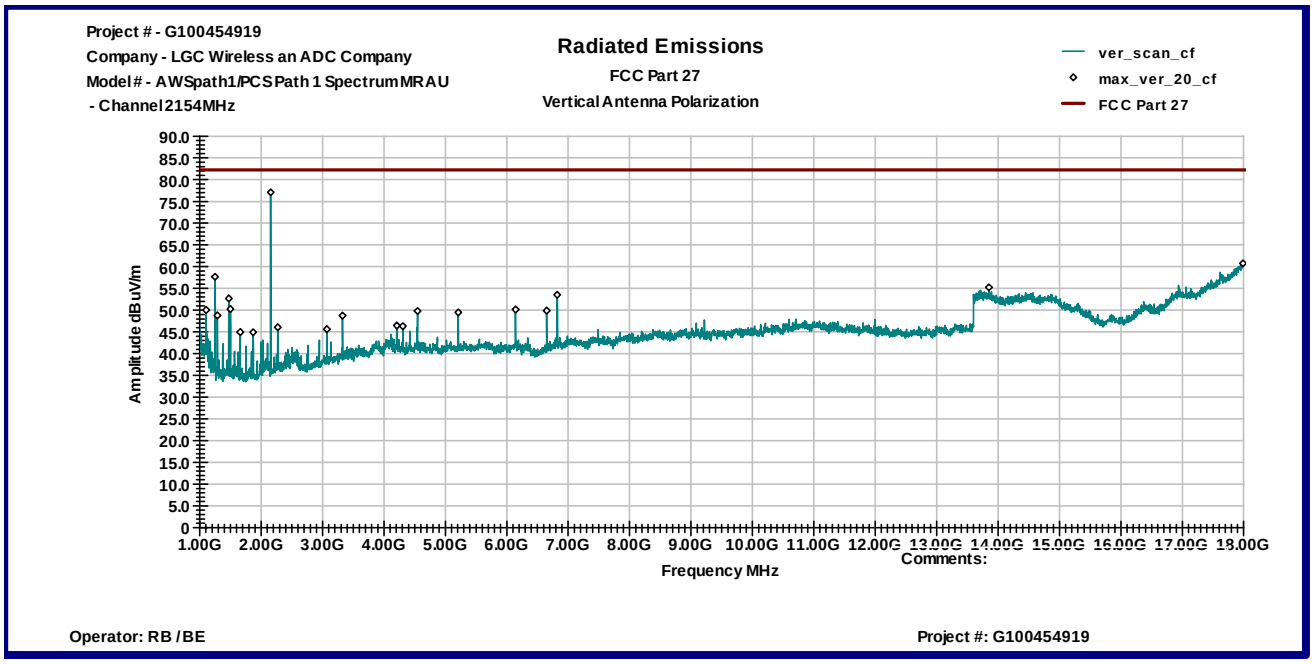
Graph 26



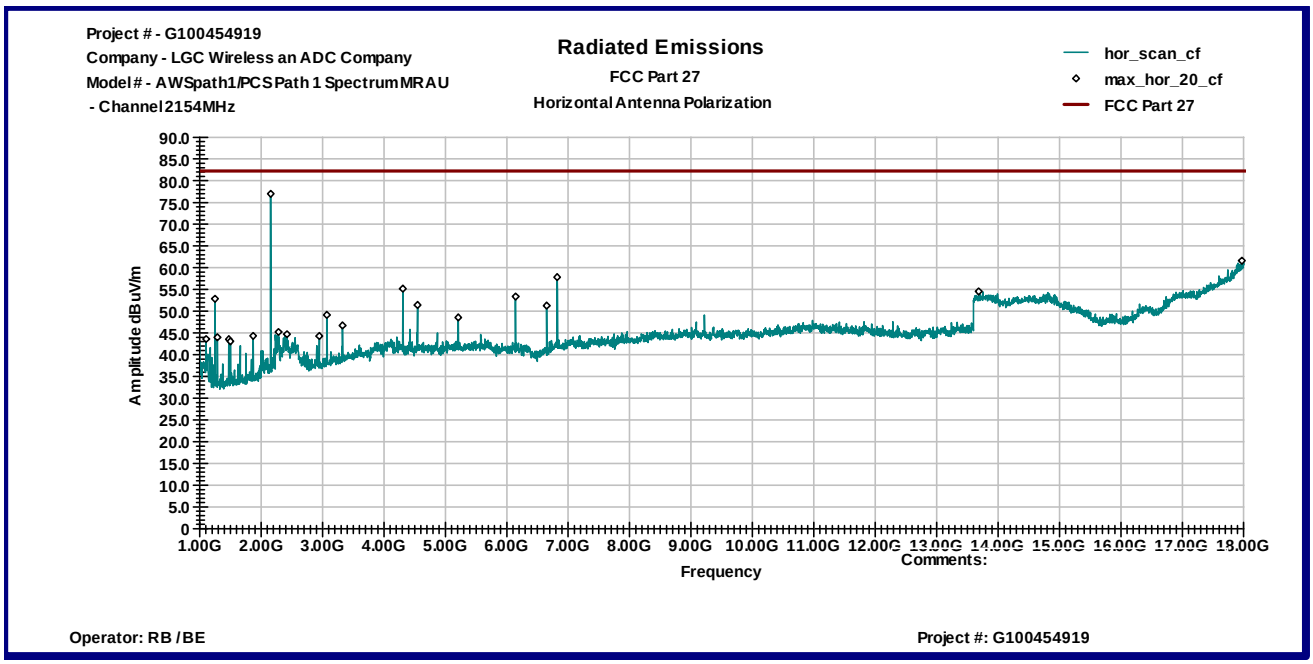
Graph 27



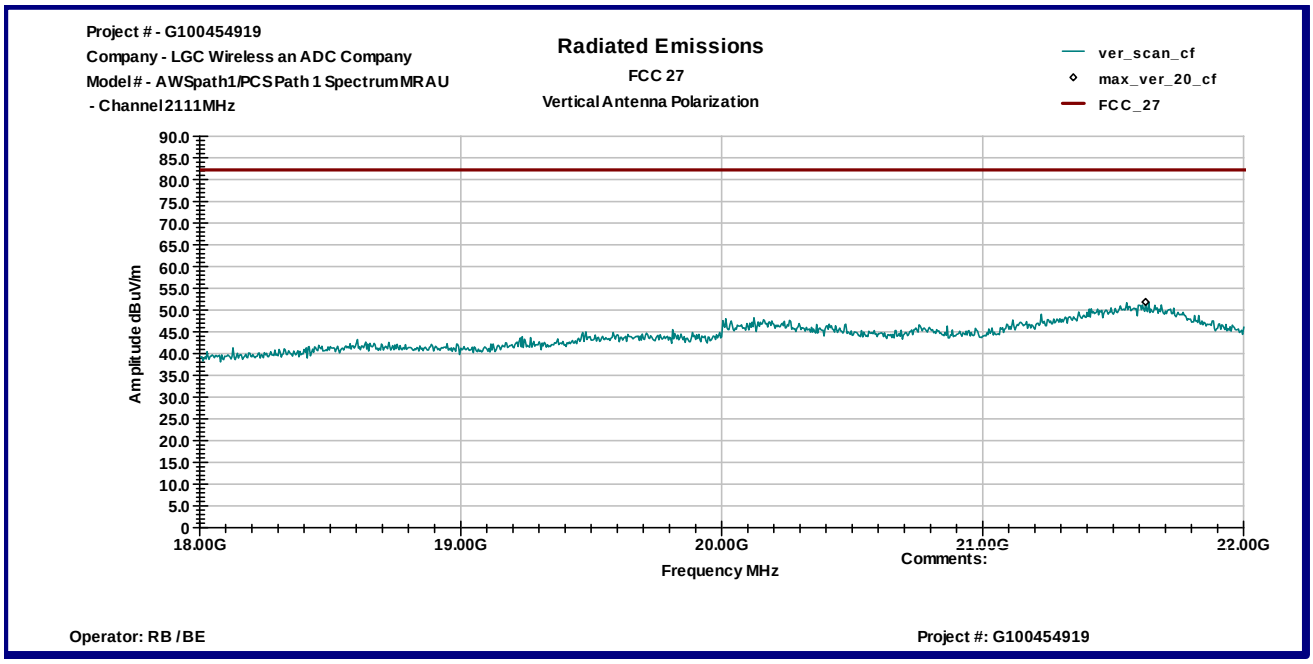
Graph 28



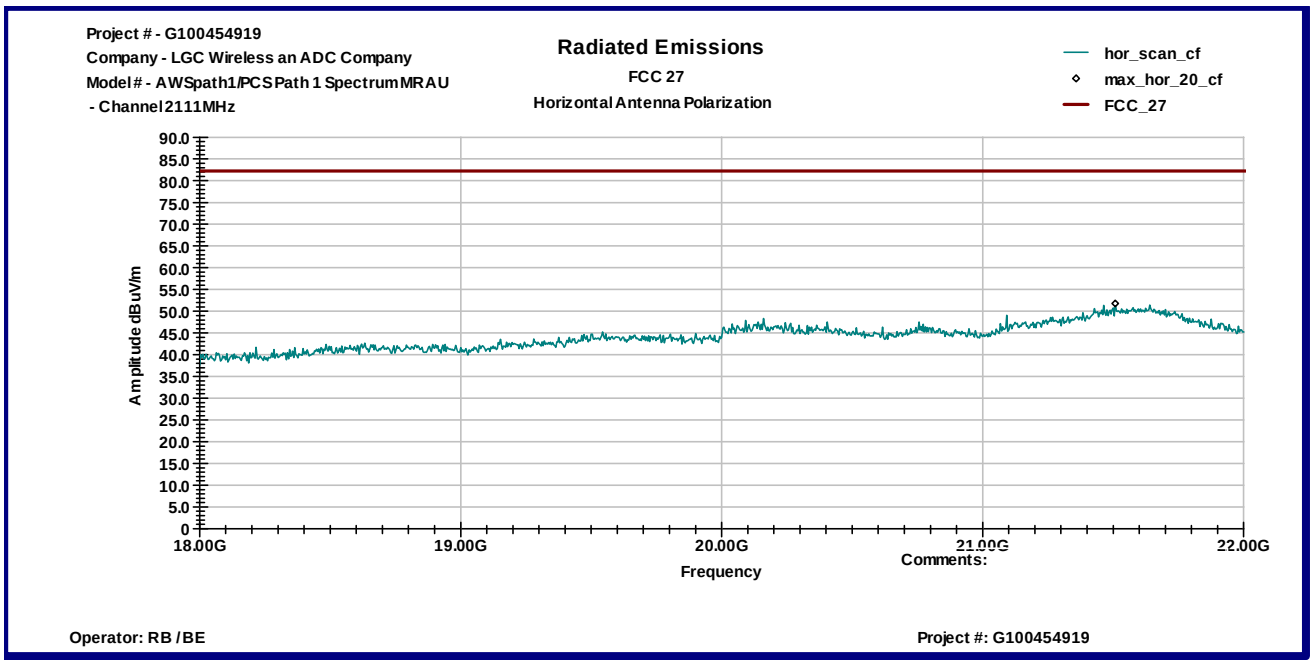
Graph 29



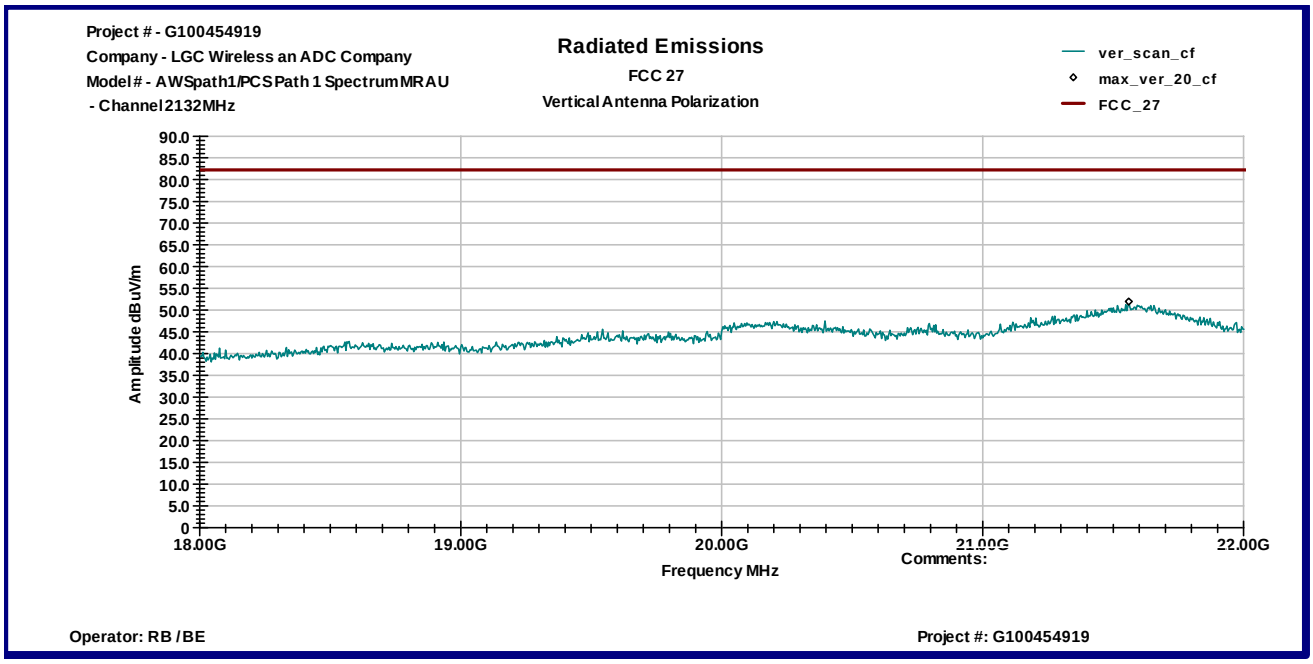
Graph 30



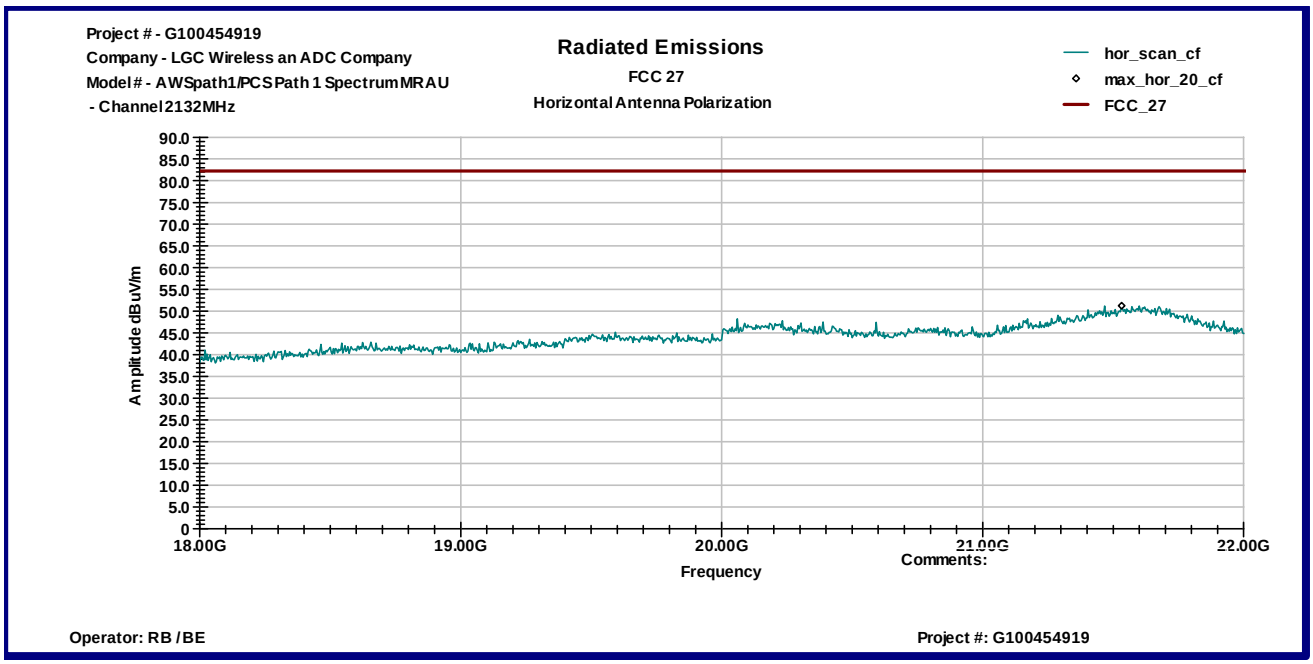
Graph 31



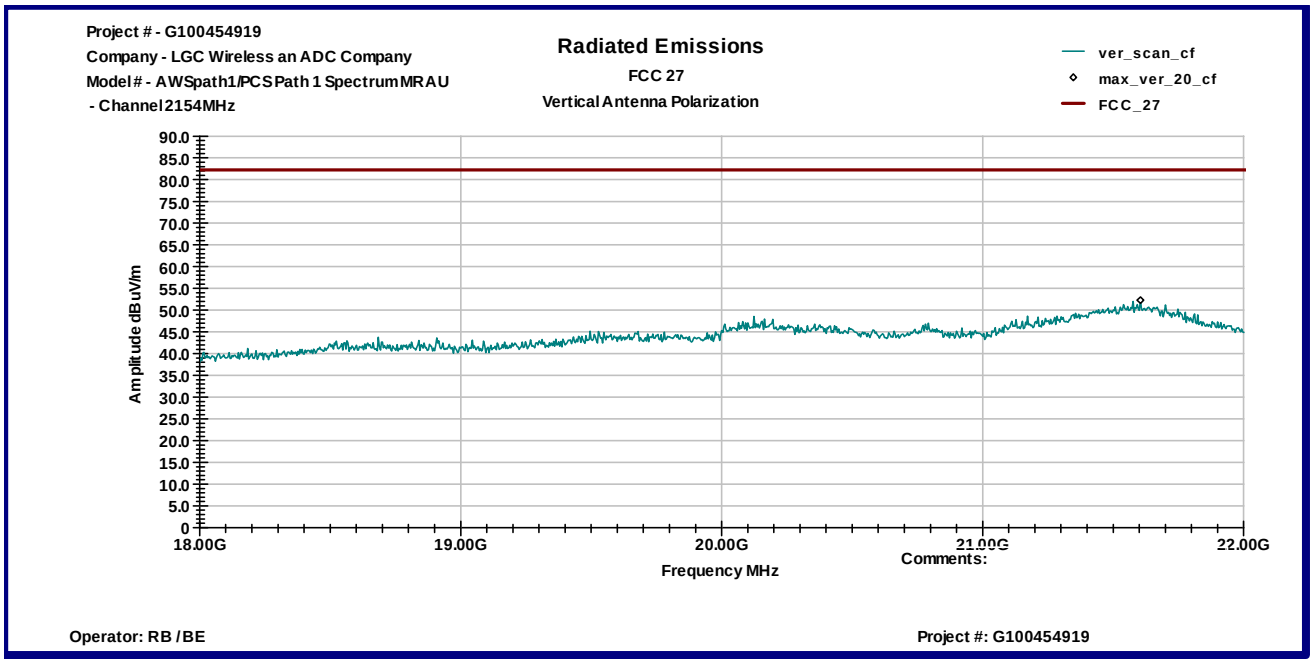
Graph 32



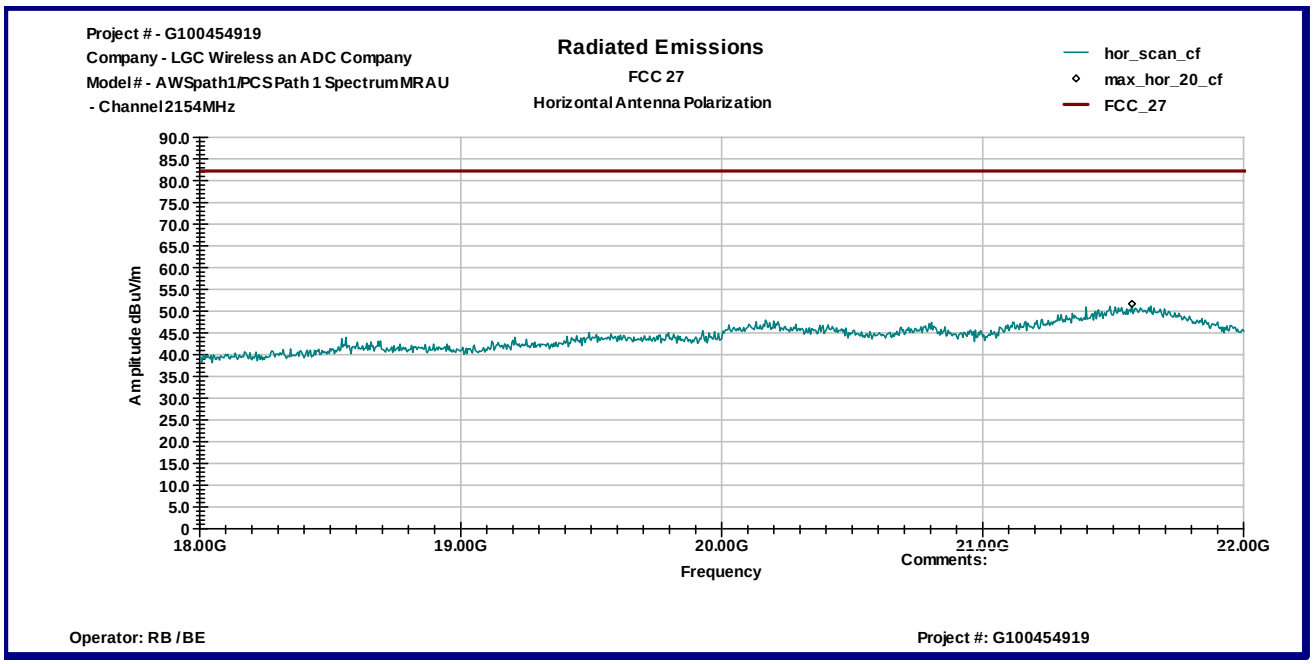
Graph 33



Graph 34



Graph 35



Graph 36

5.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	FSP 40	100024	12559	12/07/2011	☒
Spectrum Analyzer	R & S	ESCI	100358	12909	05/12/2012	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	10/18/2011	☒
Horn Antenna	EMCO	3115	9507-4513	9936	04/29/2012	☒
Horn Antenna	EMCO	3115	6579	15580	05/25/2012	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	10/06/2011	☒
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	☒
Waveguide Horn Antenna	EMCO	3116	9904-2423	9705	10/04/2011	☒
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	MIN-0065	10/06/2011	☒