

TEST REPORT

Report Number: 100381613MIN-003

Project Number: G100381613

Testing performed on the
Spectrum 800 / 2100 SMR/AWS Path Secondary Remote Antenna Unit
to
47 CFR, Part 90:2009, Enclosure Spurious Radiated Emissions
47 CFR, Part 27:2009, Enclosure Spurious Radiated Emissions

For
TE Connectivity / LGC Wireless

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

Test Authorized by:
TE Connectivity / LGC Wireless
541 E Trimble Road
San Jose, CA 95131 USA

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Richard Blonigen

Date: April 27, 2011

Reviewed by: Norman Shpilsher
Norman Shpilsher

Date: April 27 2011

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1.0 DESCRIPTION OF THE SAMPLE (EUT)

Model:	Spectrum 800 / 2100 SMR/AWS Path Secondary Remote Antenna Unit SPT-S1-80AWS-1
Type of EUT:	Distributed Antenna System / Repeater
Frequency Range:	851-869MHz and 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 27:2009, Enclosure Spurious Radiated Emissions ☒ 47 CFR, Part 90:2009, 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:	April 25, 2011
Test Work Started:	April 25, 2011
Test Work Completed:	April 26, 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 90	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 852MHz 860MHz and 868MHz
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

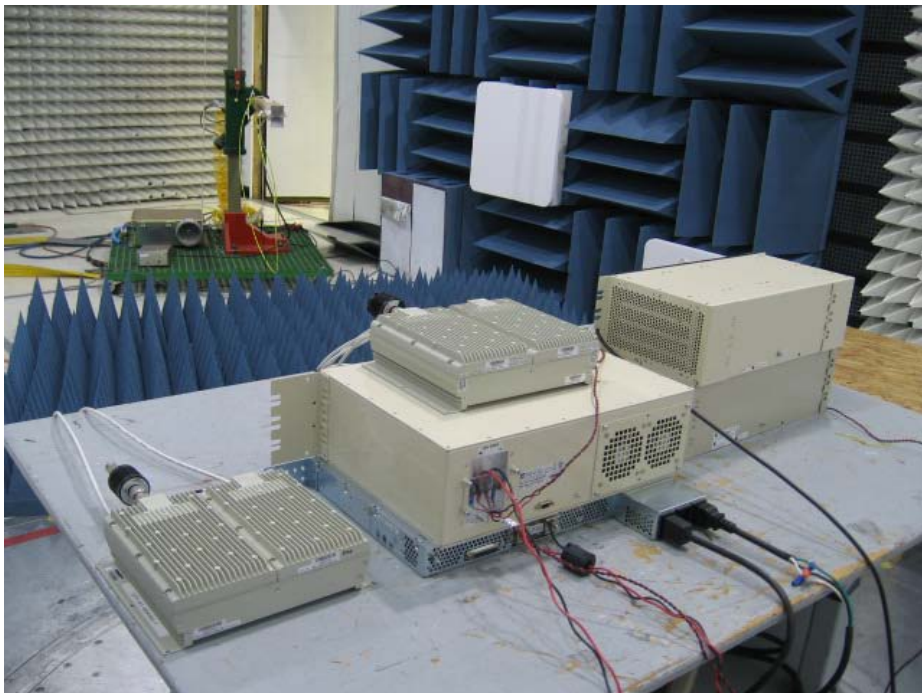
Test result: **Pass**

Frequency range: 30MHz-9GHz for 851-869MHz unit

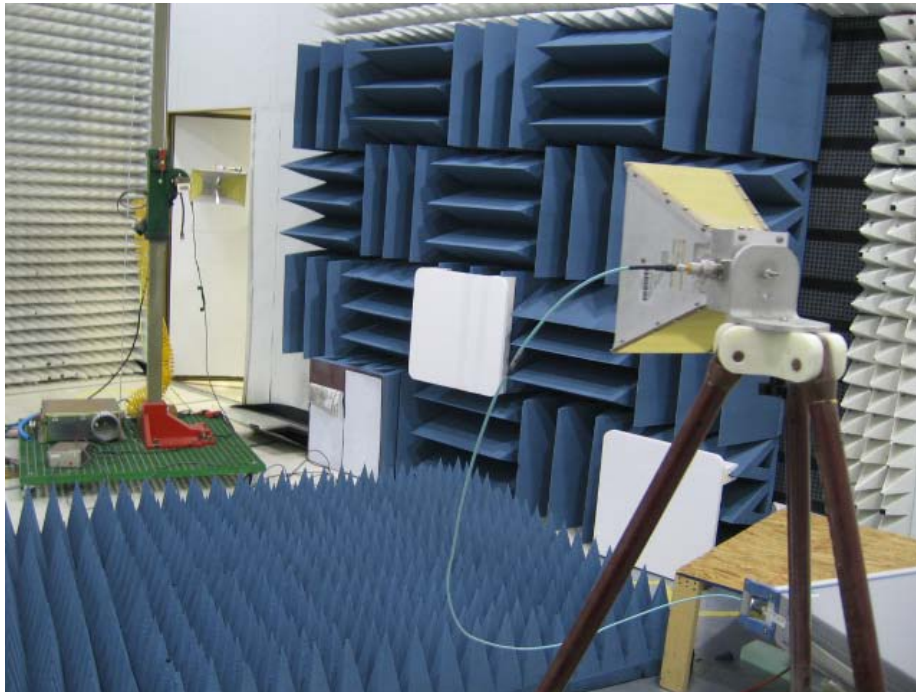
Frequency range: 30MHz-22GHz for 2110-2155MHz unit

Max. Emissions margin: 3.4 dB below the Reference Limits

- Notes:**
1. The Radiated Emissions testing was performed in the Anechoic chamber at 3m measurement distance (see Tables and Graphs)
 2. The Spurious Radiated Power limits of -13dBm was correlated with field strength Reference Limit of 82.2dB μ V/m during field strength measurements at 3m measurement distance
 3. Emissions at operating frequencies were excluded from the tables
-



Test Setup Photos

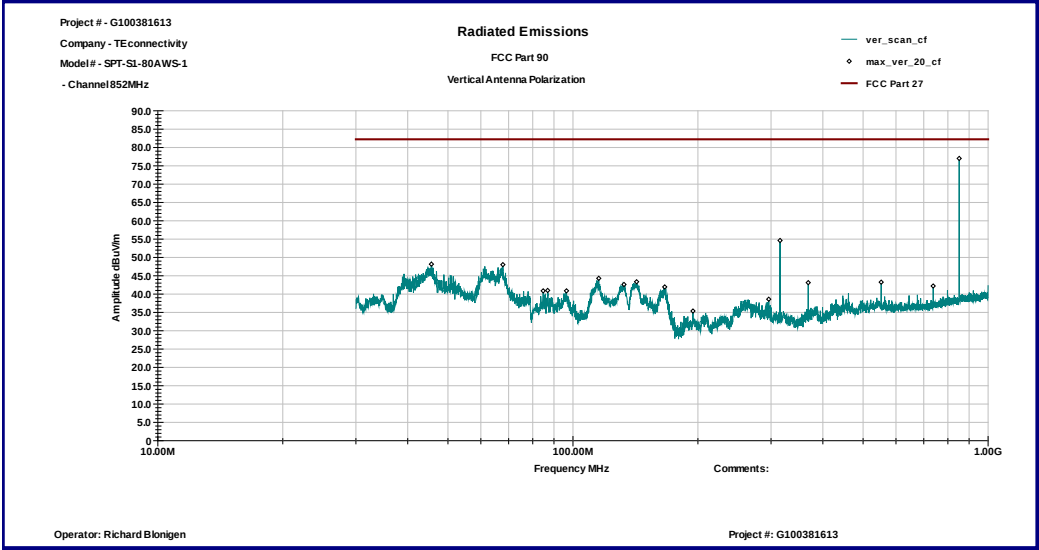


Test Setup Photos

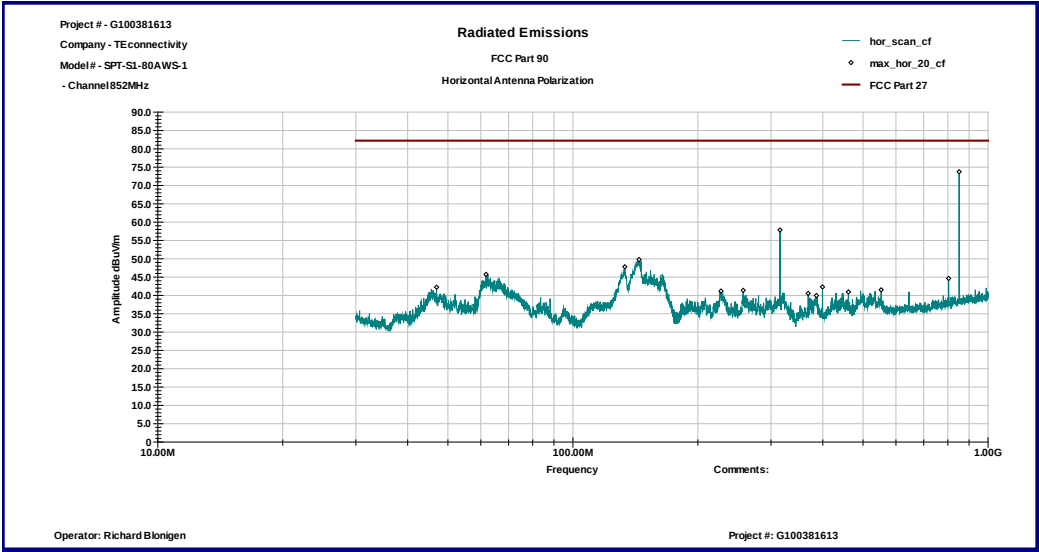
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 90	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 851-869MHz Frequency Range 30-1000MHz	

Table 1

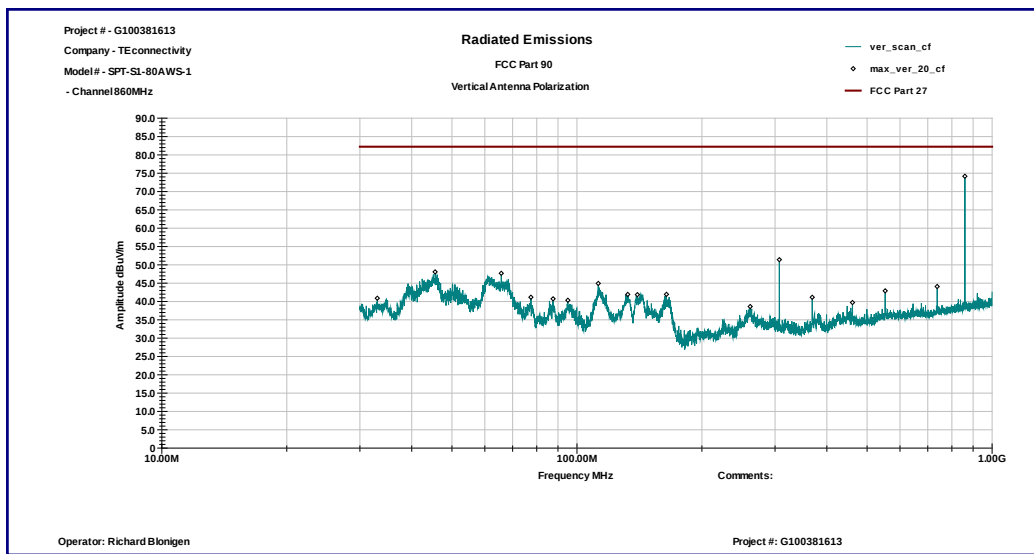
Frequency	Ant. Polarity	Peak Reading dBμV	Ant.Factor dB1/m	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
Channel 852 MHz						
45.617 MHz	V	36.1	12.1	48.2	82.2	-34.0
115.38 MHz	V	30.4	13.9	44.3	82.2	-37.9
296.24 MHz	V	22.8	15.8	38.6	82.2	-43.6
315.44 MHz	V	38.2	16.4	54.6	82.2	-27.6
144.3 MHz	H	36.7	13.1	49.8	82.2	-32.4
315.44 MHz	H	41.5	16.4	57.9	82.2	-24.4
399.31 MHz	H	23.4	18.9	42.3	82.2	-39.9
803.84 MHz	H	20.2	24.4	44.6	82.2	-37.6
Channel 860 MHz						
45.546 MHz	V	36.0	12.1	48.1	82.2	-34.1
65.734 MHz	V	40.7	7.0	47.7	82.2	-34.5
112.56 MHz	V	31.2	13.7	44.9	82.2	-37.3
737.44 MHz	V	20.4	23.7	44.1	82.2	-38.1
144.3 MHz	H	37.4	13.1	50.5	82.2	-31.7
307.37 MHz	H	41.7	16.2	57.9	82.2	-24.4
430.2 MHz	H	22.8	19.6	42.4	82.2	-39.8
Channel 868 MHz						
44.985 MHz	V	35.6	12.4	47.9	82.2	-34.3
61.229 MHz	V	42.6	7.0	49.6	82.2	-32.6
299.56 MHz	V	35.1	15.9	51.0	82.2	-31.2
144.02 MHz	H	36.3	13.1	49.4	82.2	-32.8
299.56 MHz	H	37.5	15.9	53.4	82.2	-28.8
383.87 MHz	H	24.5	18.3	42.8	82.2	-39.4



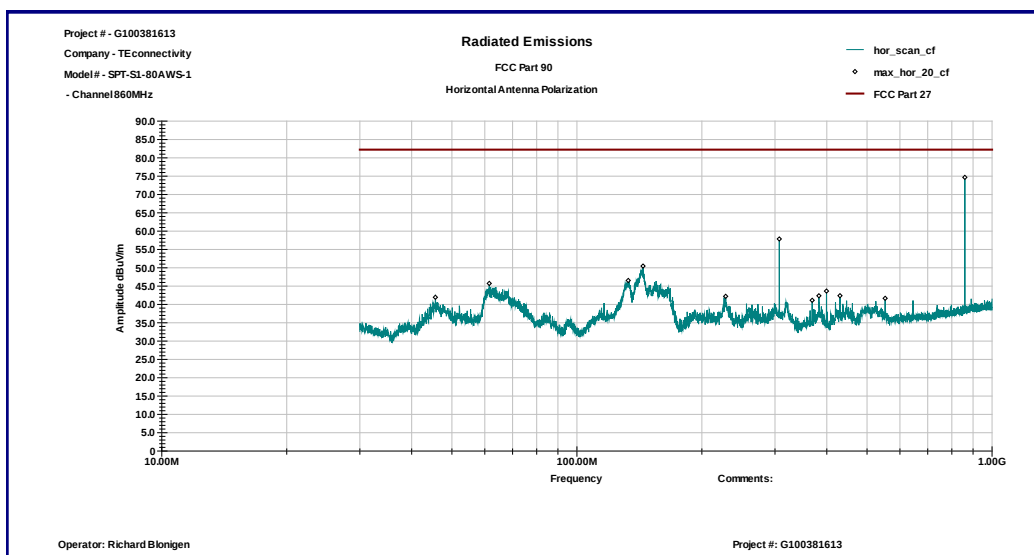
Graph 1



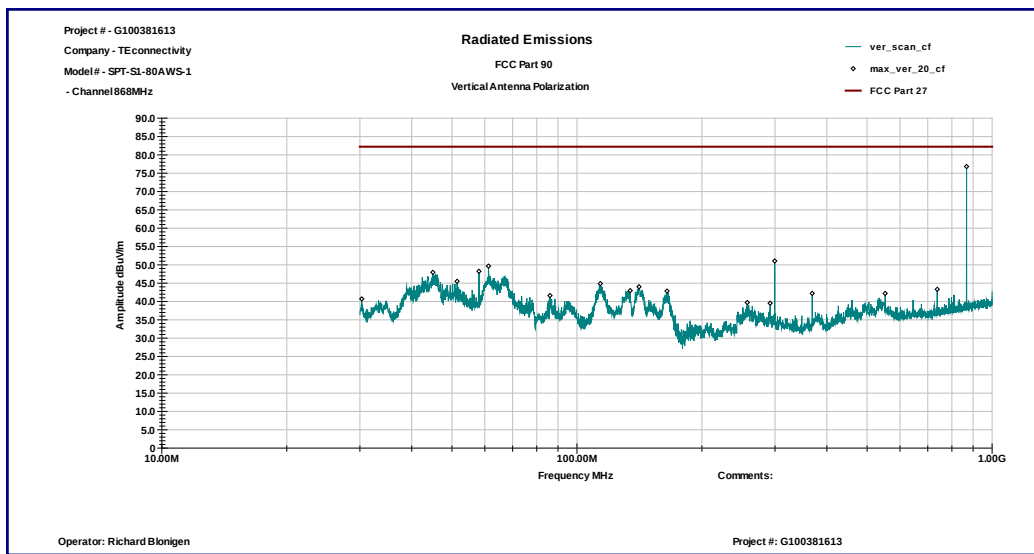
Graph 2



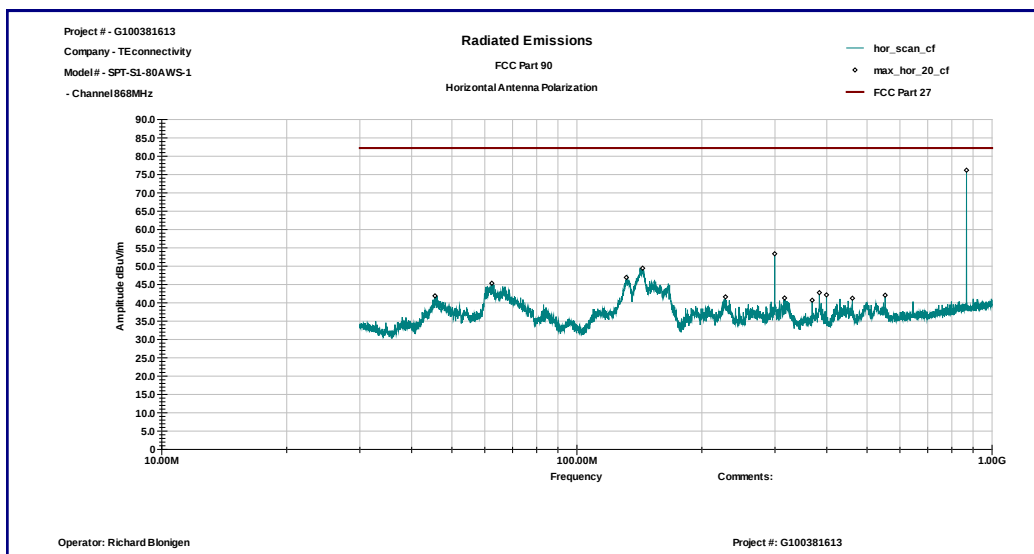
Graph 3



Graph 4



Graph 5



Graph 6

Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 90	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 851-869MHz Frequency Range 1000-9000MHz	

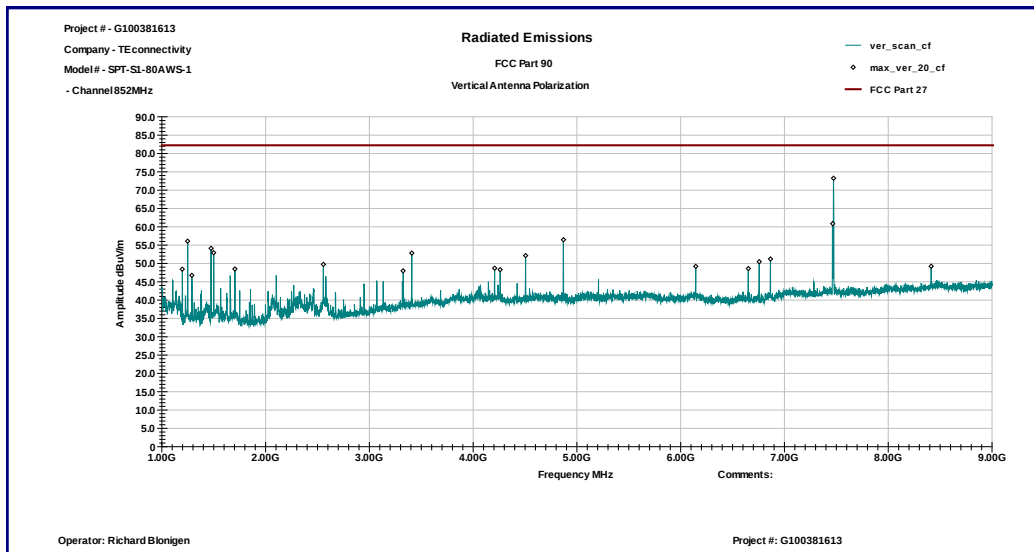
Table 2

Frequency MHz	Antenna Polarity	Reading dBμV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
Channel 852 MHz							
1.2489 GHz	V	67.8	27.2	38.9	56.1	82.2	-26.2
3.4089 GHz	V	55.1	35.3	37.5	52.8	82.2	-29.4
7.464 GHz	V	54.8	42.5	36.5	60.9	82.2	-21.4
7.4729 GHz	V	67.2	42.5	36.5	73.2	82.2	-9.0
2.5573 GHz	H	57.8	32.4	37.8	52.5	82.2	-29.7
4.5058 GHz	H	52.9	37.5	36.9	53.5	82.2	-28.7
7.464 GHz	H	59.3	42.6	36.5	65.5	82.2	-16.7
7.4729 GHz	H	67.2	42.6	36.5	73.4	82.2	-8.8
Channel 860 MHz							
1.2489 GHz	V	67.8	27.2	38.9	56.0	82.2	-26.2
1.4747 GHz	V	65.1	28.0	38.9	54.2	82.2	-28.1
7.464 GHz	V	61.8	42.5	36.5	67.8	82.2	-14.4
7.4729 GHz	V	66.8	42.5	36.5	72.9	82.2	-9.3
1.2489 GHz	H	63.1	27.1	38.9	51.2	82.2	-31.0
4.2996 GHz	H	51.8	37.3	37.0	52.2	82.2	-30.1
7.4729 GHz	H	67.0	42.6	36.5	73.2	82.2	-9.0
Channel 868 MHz							
1.2489 GHz	V	68.9	27.2	38.9	57.1	82.2	-25.1
4.3422 GHz	V	58.5	37.3	36.9	58.8	82.2	-23.4
7.4729 GHz	V	66.7	42.5	36.5	72.8	82.2	-9.4
1.736 GHz	H	63.4	29.4	38.7	54.2	82.2	-28.0
4.5058 GHz	H	52.6	37.5	36.9	53.2	82.2	-29.0
7.4658 GHz	H	64.8	42.6	36.5	70.9	82.2	-11.3
7.4729 GHz	H	63.0	42.6	36.5	69.2	82.2	-13.0

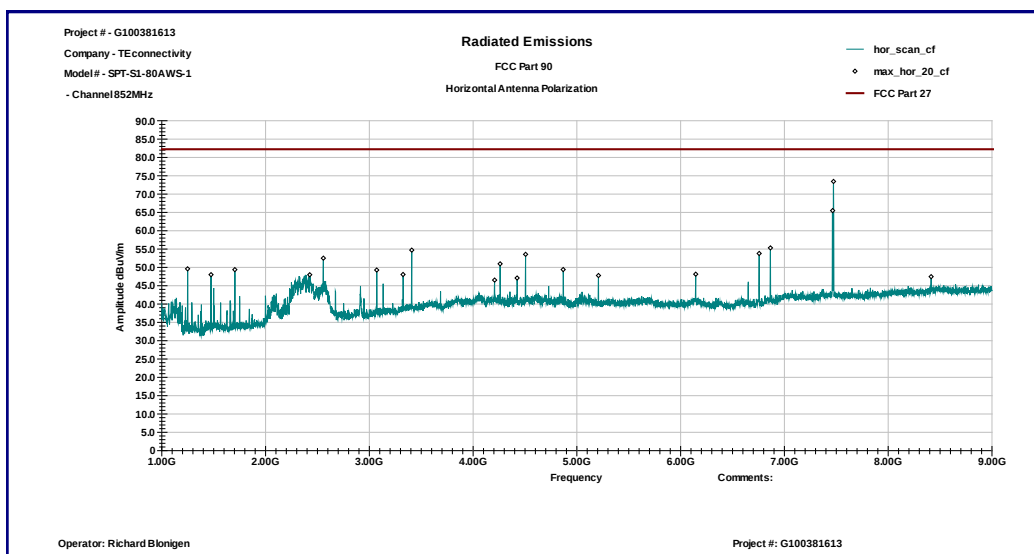
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 90	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Substitution Method Channels 851-869MHz Frequency Range 1000-9000MHz	

Table 3

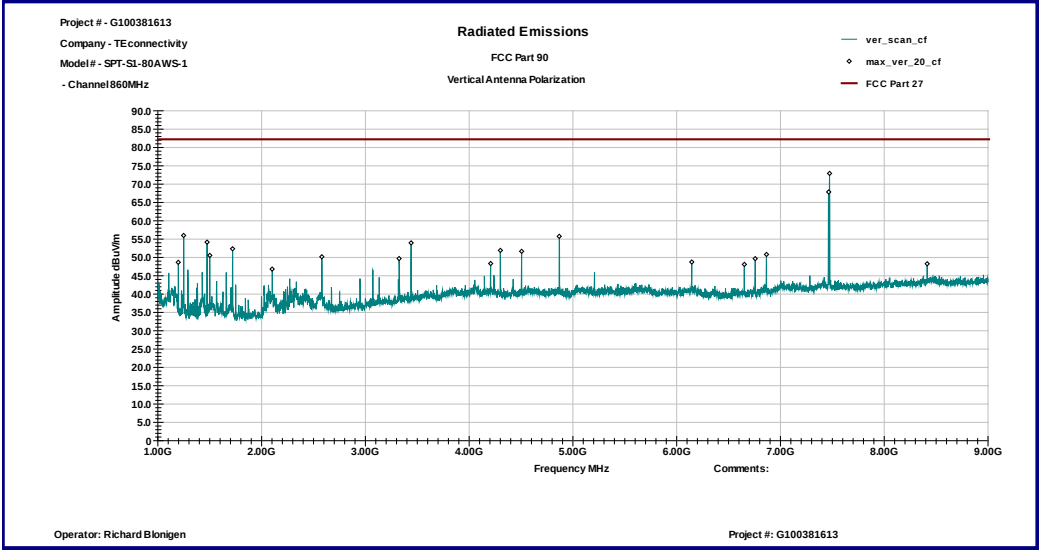
Frequency MHz	Antenna Polarity	Measured Emissions dBμV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	ERP Spur. Emissions dBm	Limit dBm	Margin dB
Channel 852 MHz								
7472.70	V	69.9	-25.3	11.3	2.8	-16.8	-13.0	-3.8
7472.70	H	69.8	-26.9	11.2	2.8	-18.5	-13.0	-5.5
Channel 860 MHz								
7472.90	V	68.7	-24.9	11.3	2.8	-16.4	-13.0	-3.4
7472.90	H	71.1	-25.9	11.2	2.8	-17.5	-13.0	-4.5
Channel 868 MHz								
7472.70	V	68.9	-25.1	11.3	2.8	-16.6	-13.0	-3.6
7472.70	H	71.6	-26.1	11.2	2.8	-17.7	-13.0	-4.7



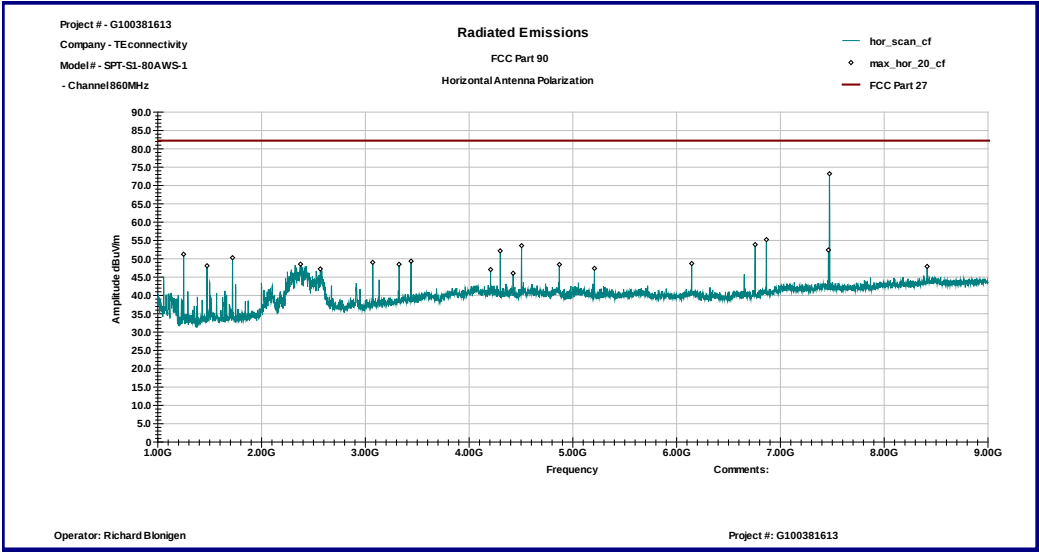
Graph 7



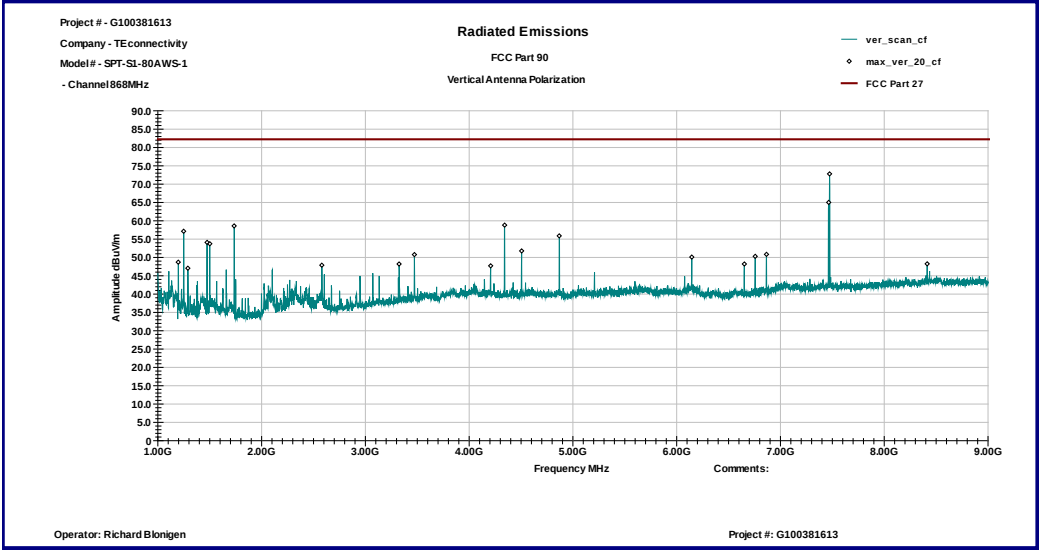
Graph 8



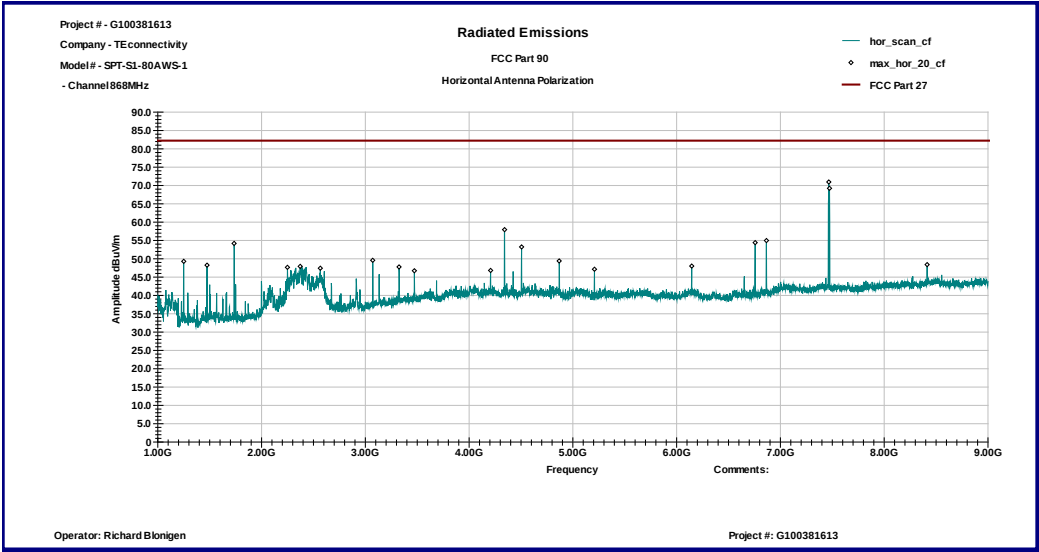
Graph 9



Graph 10



Graph 11

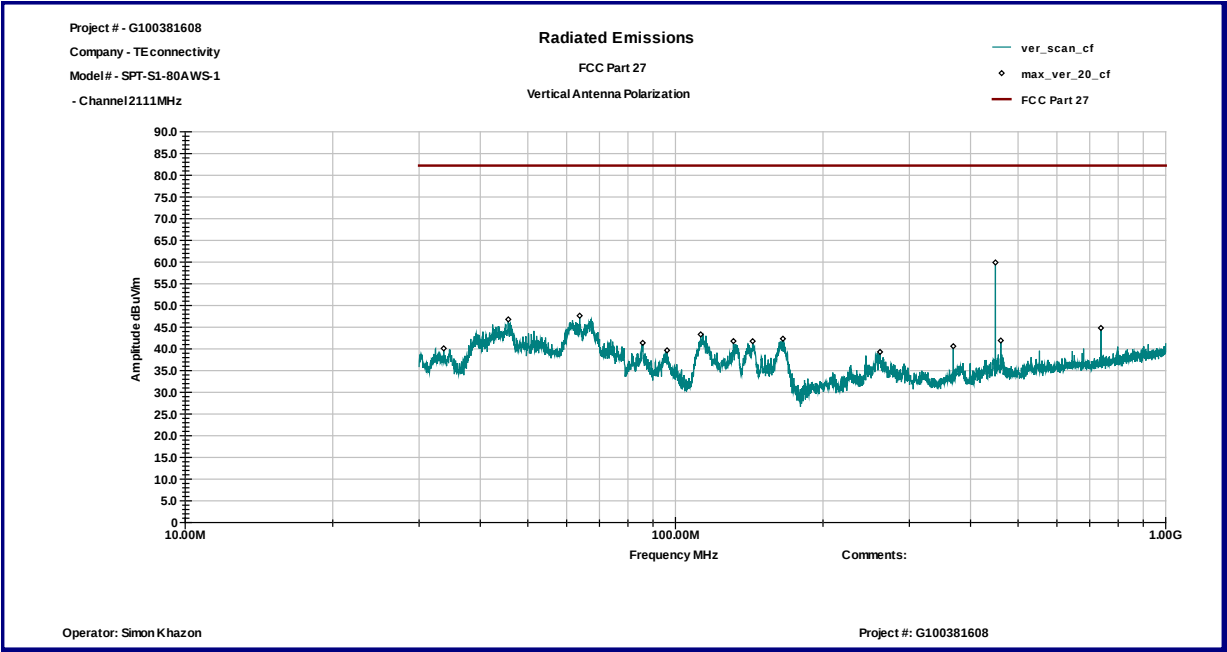


Graph 12

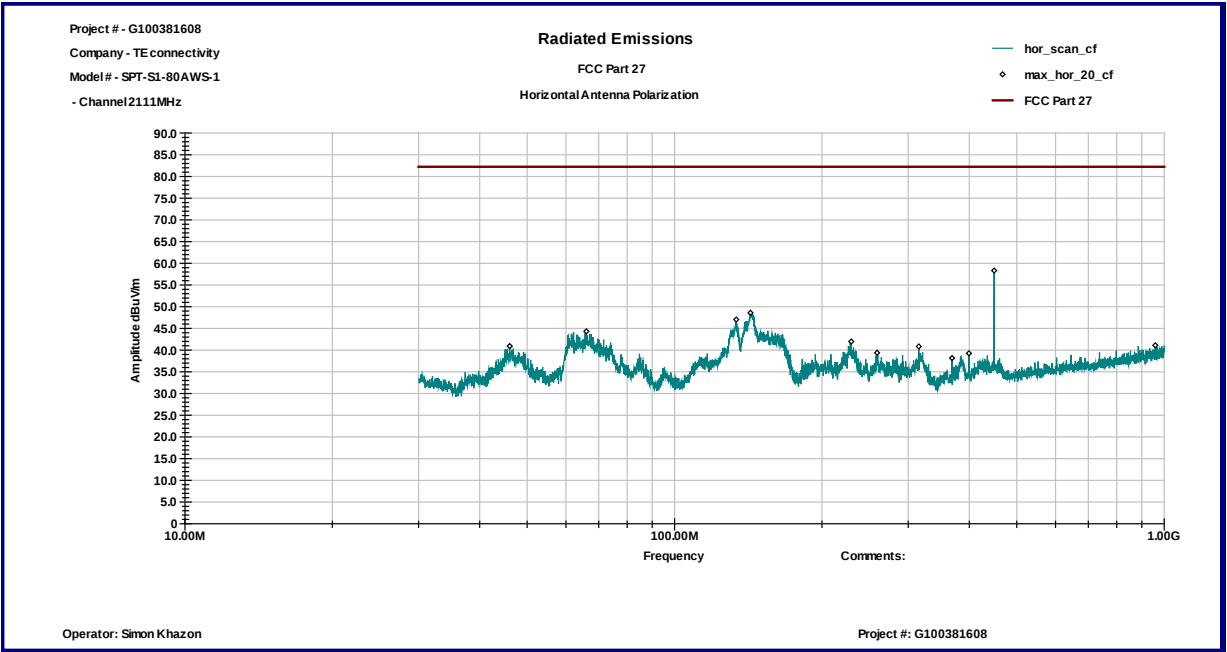
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 2110-2155MHz Frequency Range 30-1000MHz	

Table 4

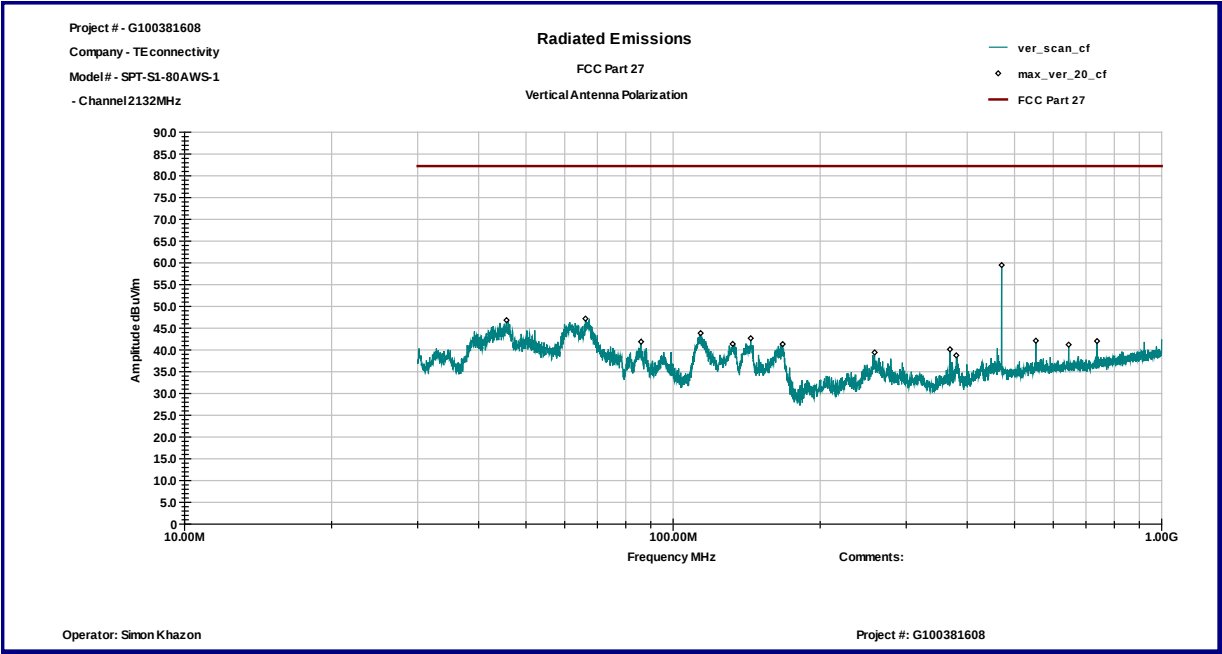
Frequency	Ant. Polarity	Peak Reading dBμV	Ant.Factor dB1/m	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
Channel 2111 MHz						
63.788 MHz	V	40.7	6.9	47.6	82.2	-34.6
449.5 MHz	V	40.3	19.6	59.9	82.2	-22.3
737.99 MHz	V	21.1	23.7	44.8	82.2	-37.4
142.9 MHz	H	35.4	13.2	48.6	82.2	-33.6
315.44 MHz	H	24.4	16.4	40.8	82.2	-41.4
449.5 MHz	H	38.7	19.6	58.3	82.2	-23.9
Channel 2132 MHz						
45.617 MHz	V	34.8	12.1	46.8	82.2	-35.4
113.88 MHz	V	30.0	13.8	43.8	82.2	-38.4
470.55 MHz	V	39.2	20.3	59.5	82.2	-22.7
132.98 MHz	H	32.3	13.8	46.1	82.2	-36.1
143.74 MHz	H	36.5	13.1	49.6	82.2	-32.6
470.55 MHz	H	39.4	20.3	59.7	82.2	-22.5
Channel 2154 MHz						
49.493 MHz	V	40.0	10.1	50.2	82.2	-32.0
61.897 MHz	V	43.2	7.0	50.2	82.2	-32.0
492.15 MHz	V	39.9	20.7	60.6	82.2	-21.6
64.678 MHz	H	41.1	6.9	48.0	82.2	-34.3
145.56 MHz	H	36.1	13.0	49.1	82.2	-33.1
492.15 MHz	H	37.8	20.7	58.5	82.2	-23.7



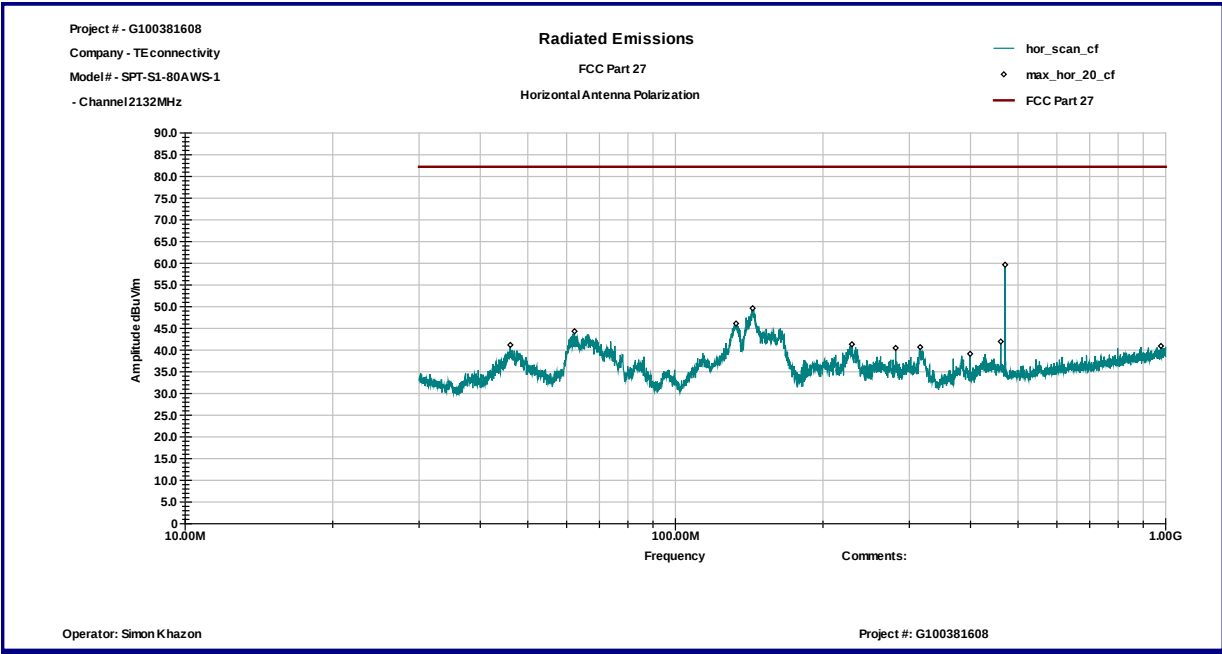
Graph 13



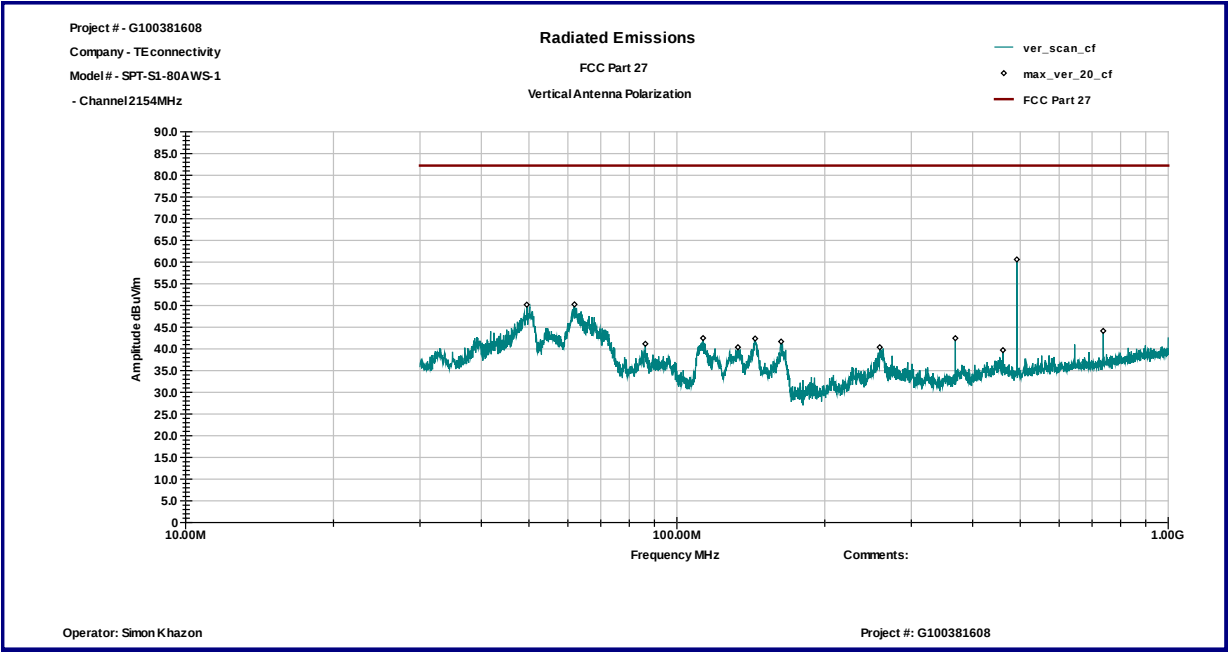
Graph 14



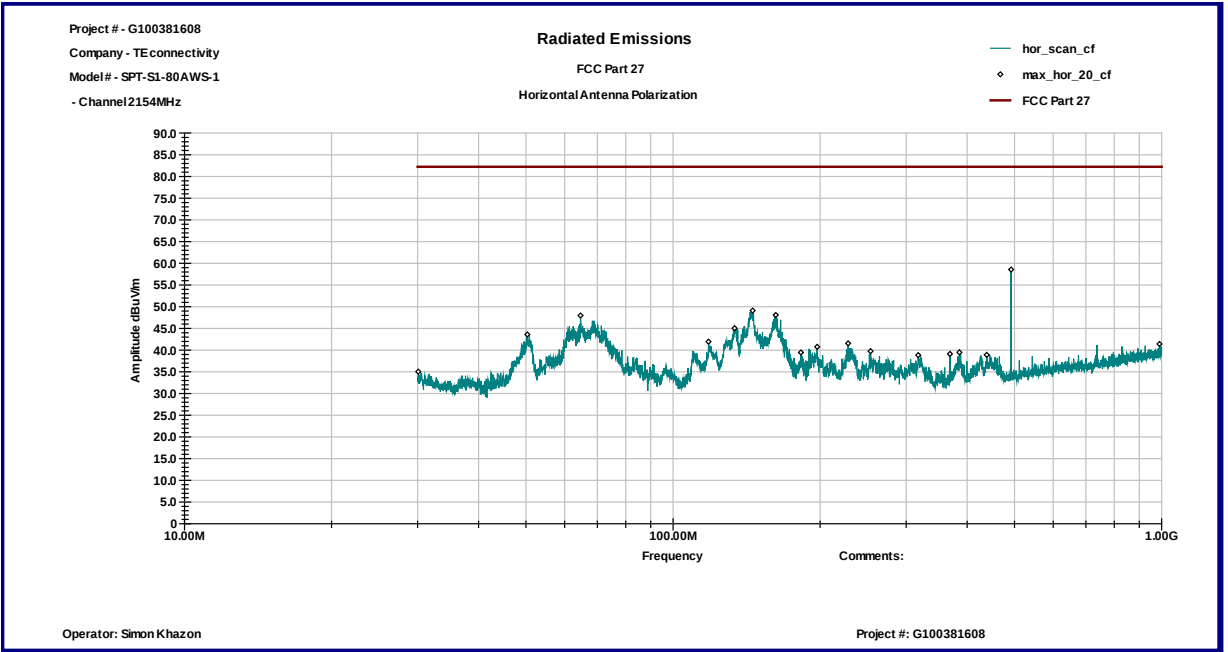
Graph 15



Graph 16



Graph 17



Graph 18

Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 2110-2155MHz Frequency Range 1-22GHz	

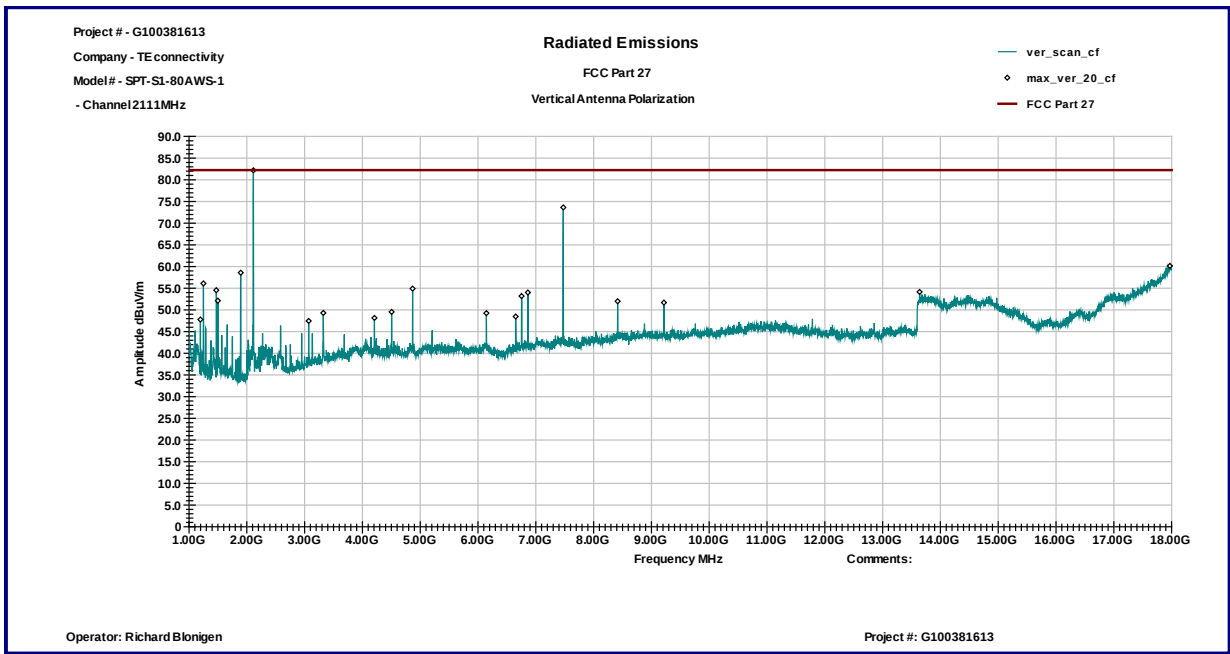
Table 5

Frequency MHz	Antenna Polarity	Reading dBμV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
Channel 2111 MHz							
1.8953 GHz	V	67.0	30.0	38.5	58.6	82.2	-23.6
7.4751 GHz	V	67.5	42.5	36.5	73.6	82.2	-8.6
17.97 GHz	V	40.7	53.4	33.9	60.1	82.2	-22.1
1.2493 GHz	H	61.5	27.1	38.9	49.7	82.2	-32.5
4.5058 GHz	H	50.3	37.5	36.9	51.0	82.2	-31.2
7.4751 GHz	H	67.4	42.7	36.5	73.6	82.2	-8.6
17.947 GHz	H	41.2	53.1	34.0	60.3	82.2	-21.9
Channel 2132 MHz							
1.2493 GHz	V	66.8	27.2	38.9	55.1	82.2	-27.1
7.4638 GHz	V	63.3	42.5	36.5	69.3	82.2	-12.9
7.4751 GHz	V	63.5	42.5	36.5	69.6	82.2	-12.6
17.981 GHz	V	41.4	53.5	33.9	60.9	82.2	-21.3
6.8631 GHz	H	48.1	41.1	36.9	52.3	82.2	-30.0
7.4751 GHz	H	67.1	42.7	36.5	73.3	82.2	-8.9
18.0 GHz	H	40.4	53.3	33.8	59.9	82.2	-22.3
Channel 2154 MHz							
1.4722 GHz	V	66.1	27.9	38.9	55.1	82.2	-27.1
4.8684 GHz	V	53.4	38.1	36.6	54.8	82.2	-27.4
7.4751 GHz	V	66.3	42.5	36.5	72.4	82.2	-9.8
17.989 GHz	V	41.6	53.5	33.9	61.2	82.2	-21.0
6.7536 GHz	H	48.4	40.7	36.9	52.3	82.2	-29.9
7.4751 GHz	H	67.1	42.7	36.5	73.3	82.2	-8.9
18.0 GHz	H	40.4	53.3	33.8	59.9	82.2	-22.3

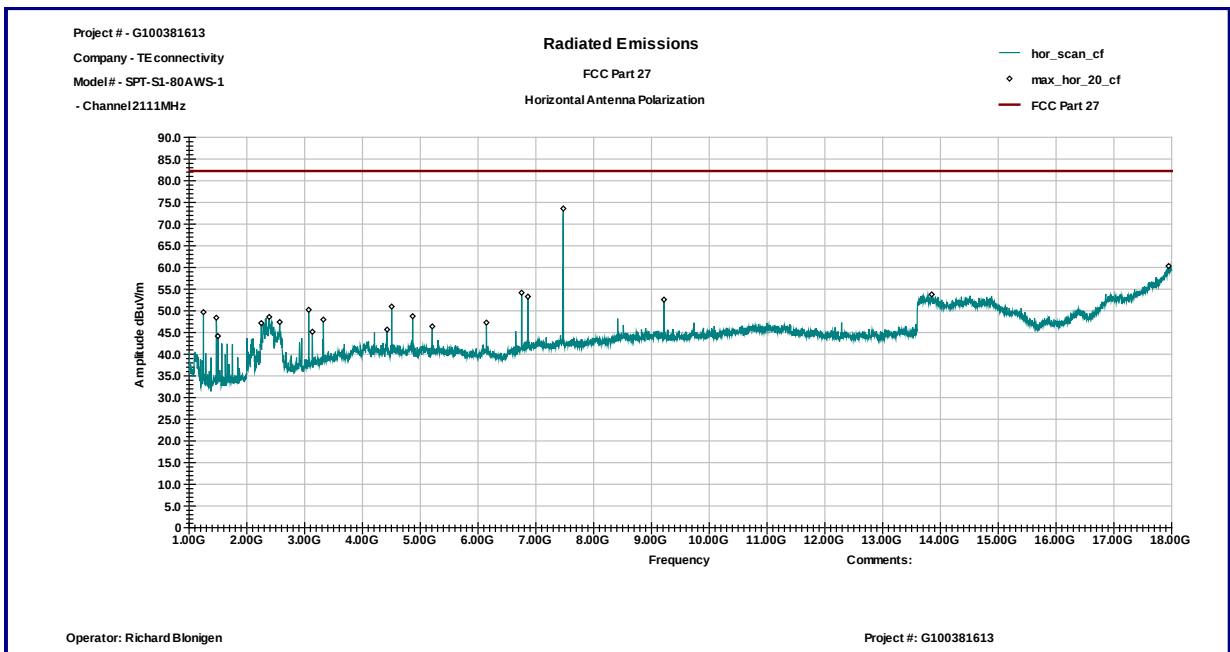
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Substitution Method Channels 2110-2155MHz Frequency Range 1-22GHz	

Table 6

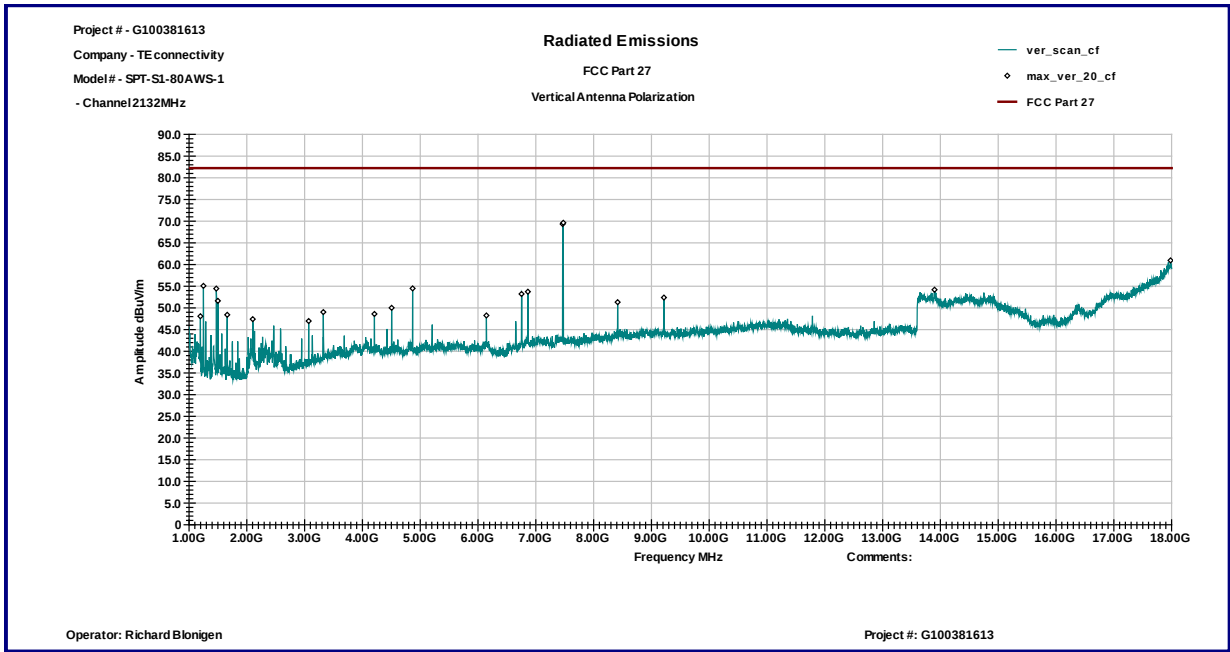
Frequency MHz	Antenna Polarity	Measured Emissions dBμV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	ERP Spur. Emissions dBm	Limit dBm	Margin dB
Channel 2111 MHz								
7472.70	V	69.3	-24.9	11.3	2.8	-16.4	-13.0	-3.4
7472.70	H	70.1	-26.5	11.2	2.8	-18.1	-13.0	-5.1
Channel 2132 MHz								
7472.90	V	69.8	-25.3	11.3	2.8	-16.8	-13.0	-3.8
7472.90	H	70.0	-26.6	11.2	2.8	-18.2	-13.0	-5.2
Channel 2154 MHz								
7472.90	V	69.3	-24.9	11.3	2.8	-16.4	-13.0	-3.4
7472.90	H	69.9	-26.2	11.2	2.8	-17.8	-13.0	-4.8



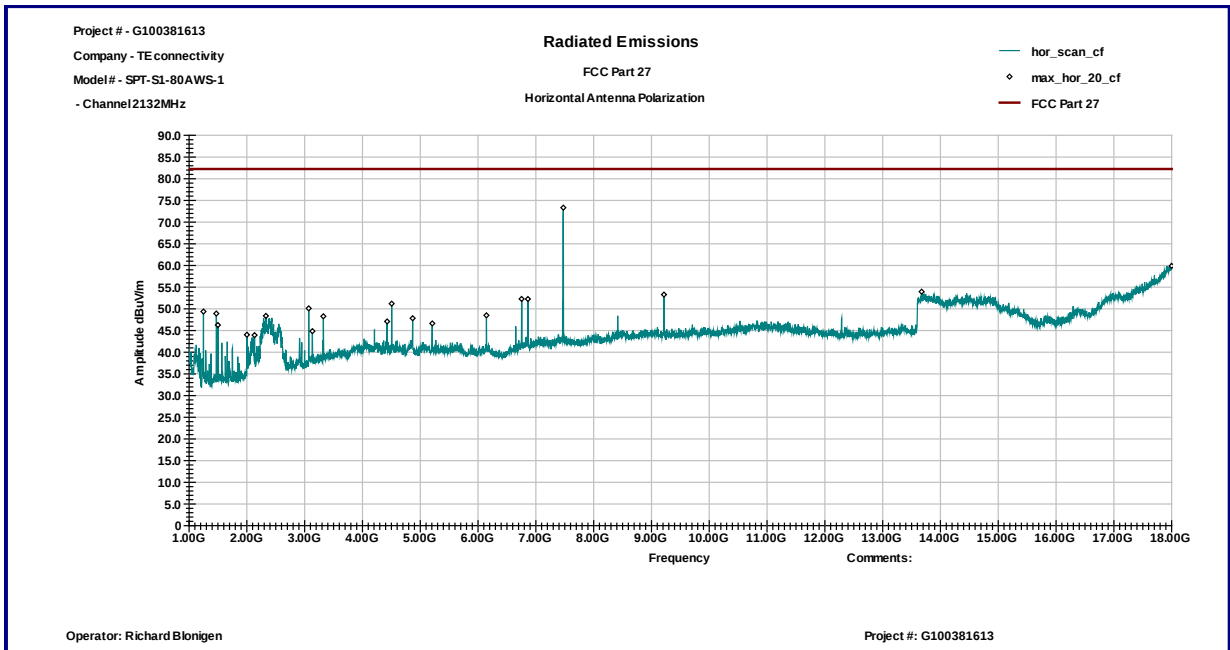
Graph 19



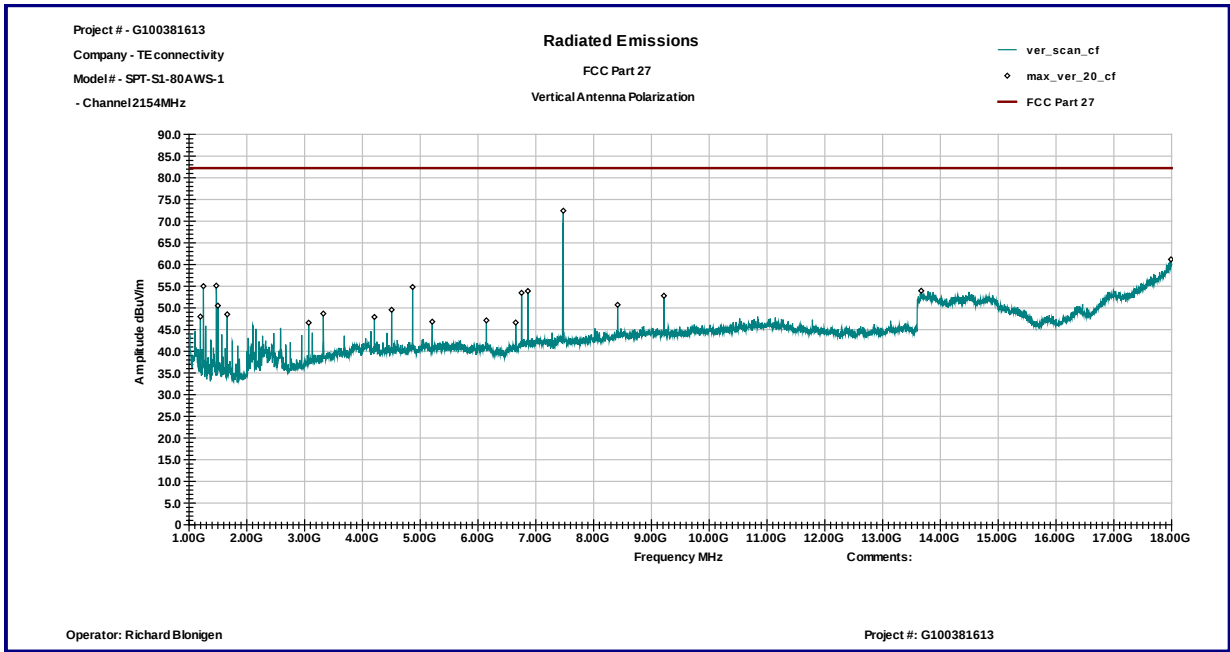
Graph 20



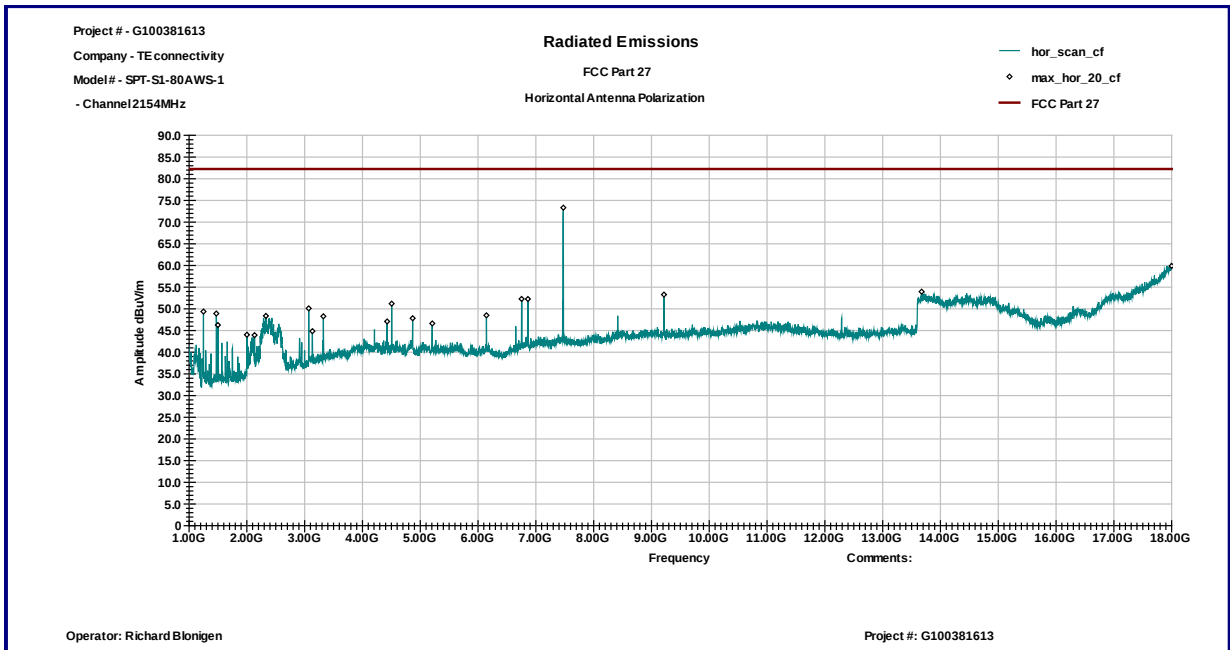
Graph 21



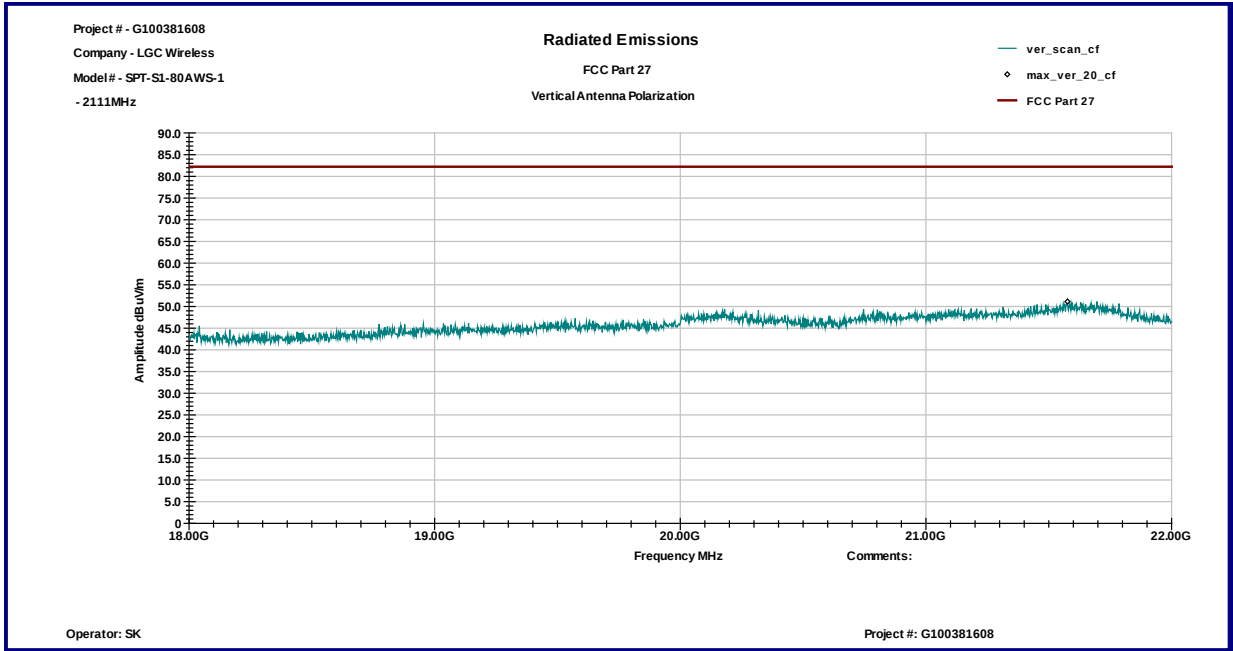
Graph 22



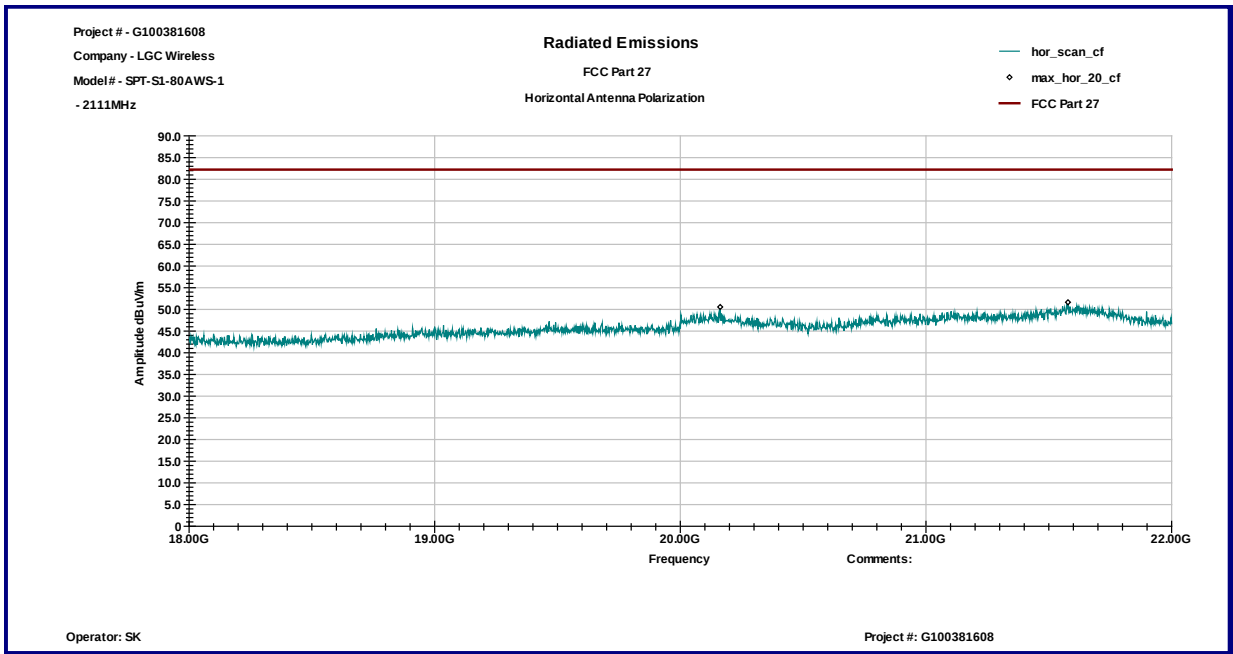
Graph 23



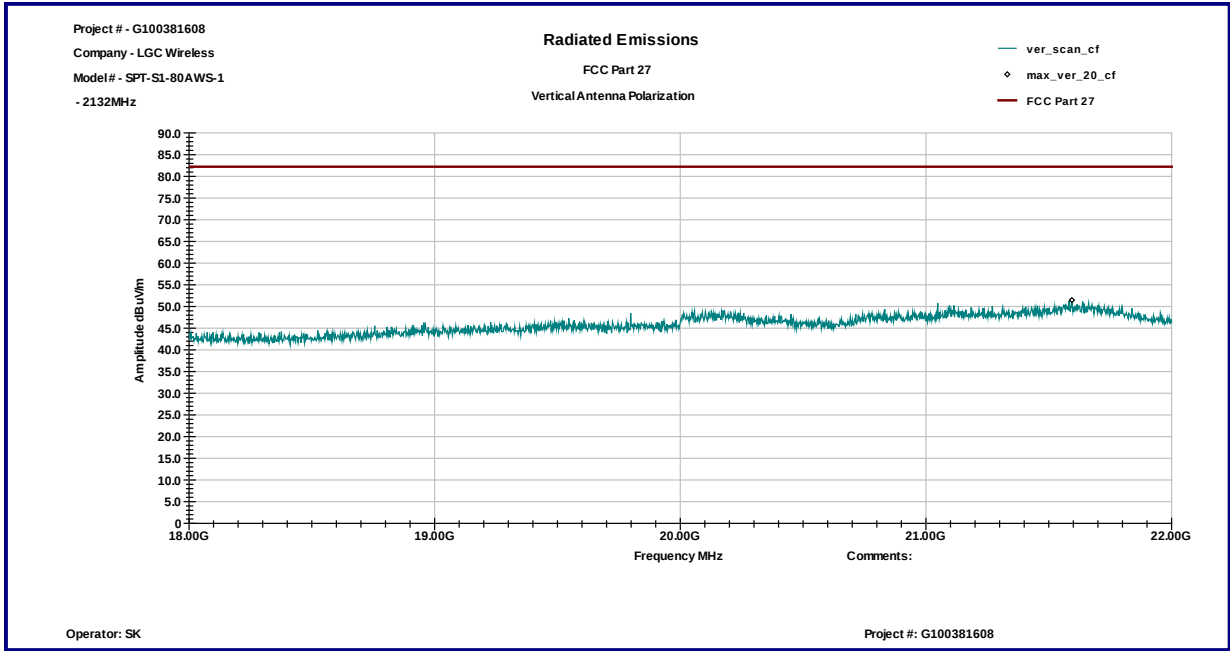
Graph 24



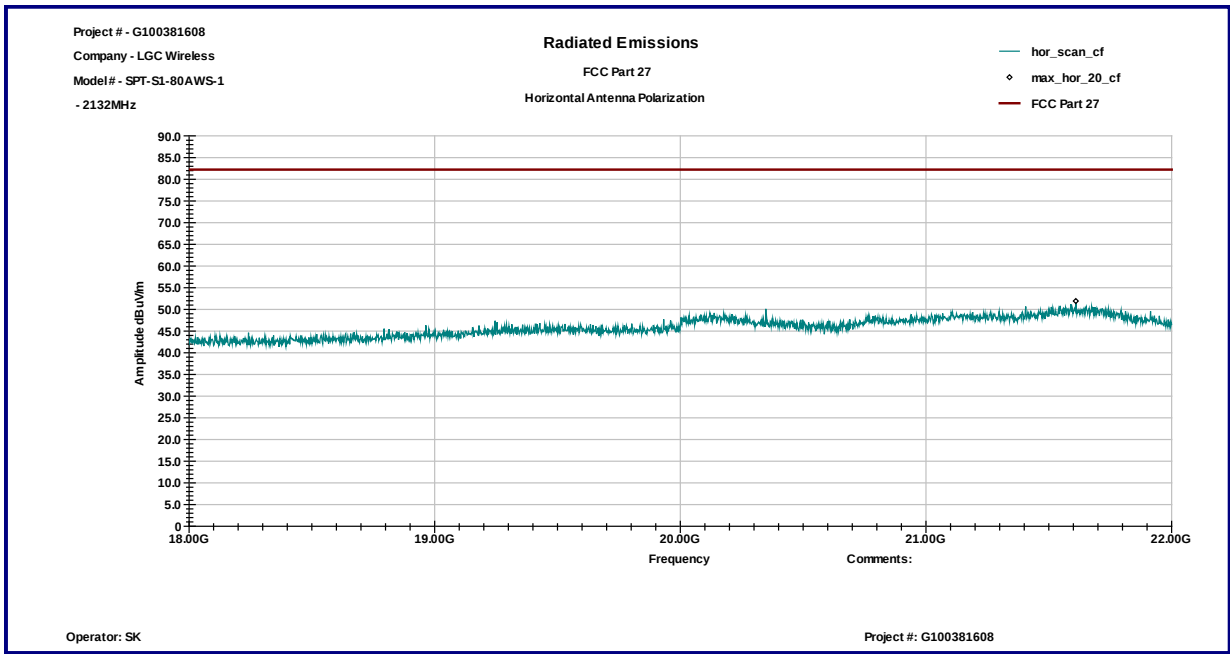
Graph 25



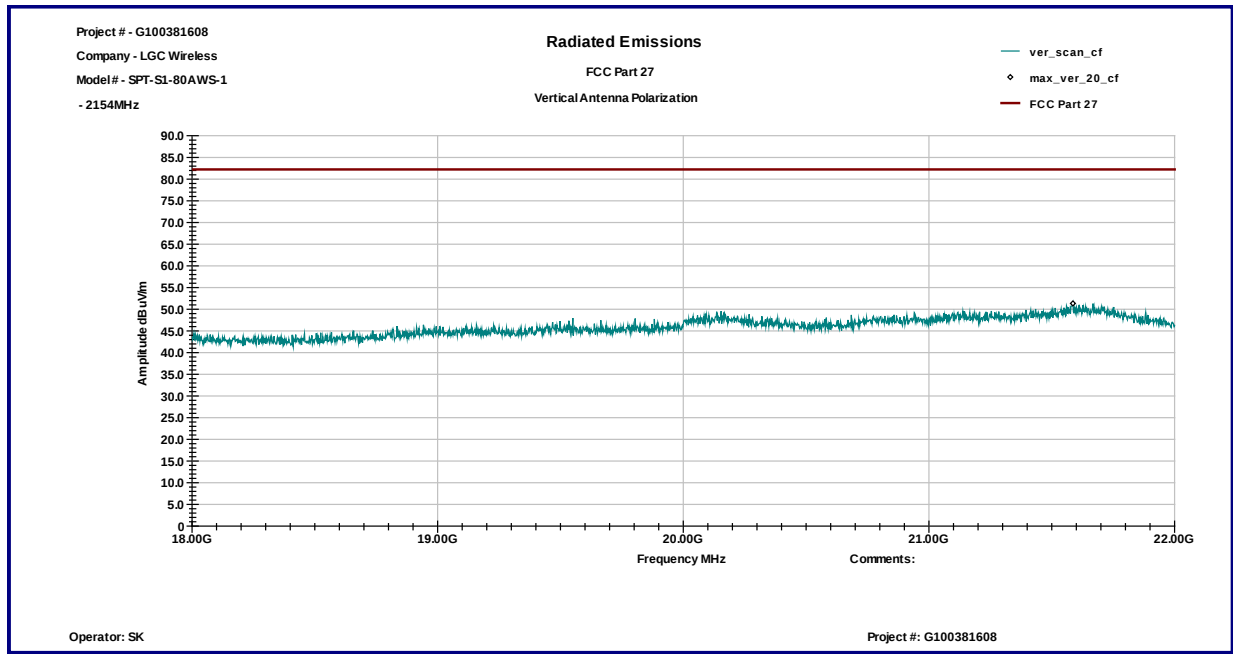
Graph 26



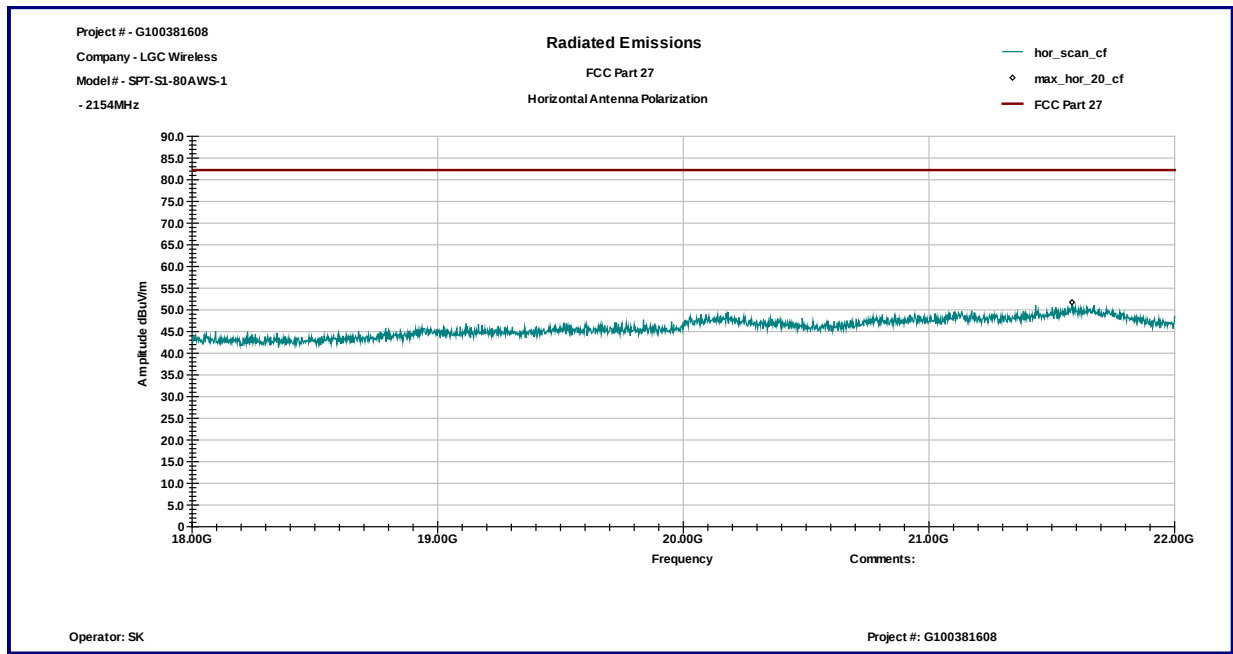
Graph 27



Graph 28



Graph 29



Graph 30

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	07/12/2011	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	10/18/2011	☒
Horn Antenna	EMCO	3115	6579	15580	04/29/2011	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	10/06/2011	☒
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBV	☒
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	☒

