



TEST REPORT

Report Number: 100381608MIN-003

Project Number: G100381608

Testing performed on the
Spectrum 700/AWS Path Secondary Remote Antenna Unit

to

47 CFR, Part 27:2009, Enclosure Spurious Radiated Emissions

For

TE Connectivity / LGC Wireless

Test Performed by:
Intertek Testing Services NA, Inc.
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Oakdale, MN 55128 USA

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

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Date: April 28, 2011

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Norman Shpilsher

Date: April 28 2011

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1.0 DESCRIPTION OF THE SAMPLE (EUT)

Model:	Spectrum 700/AWS Path Secondary Remote Antenna Unit SPT-S2-70AWS-1-SISO
Type of EUT:	Distributed Antenna System / Repeater
Frequency Range:	728 – 756MHz 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 ☐ 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 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 729MHz 742MHz and 755MHz
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

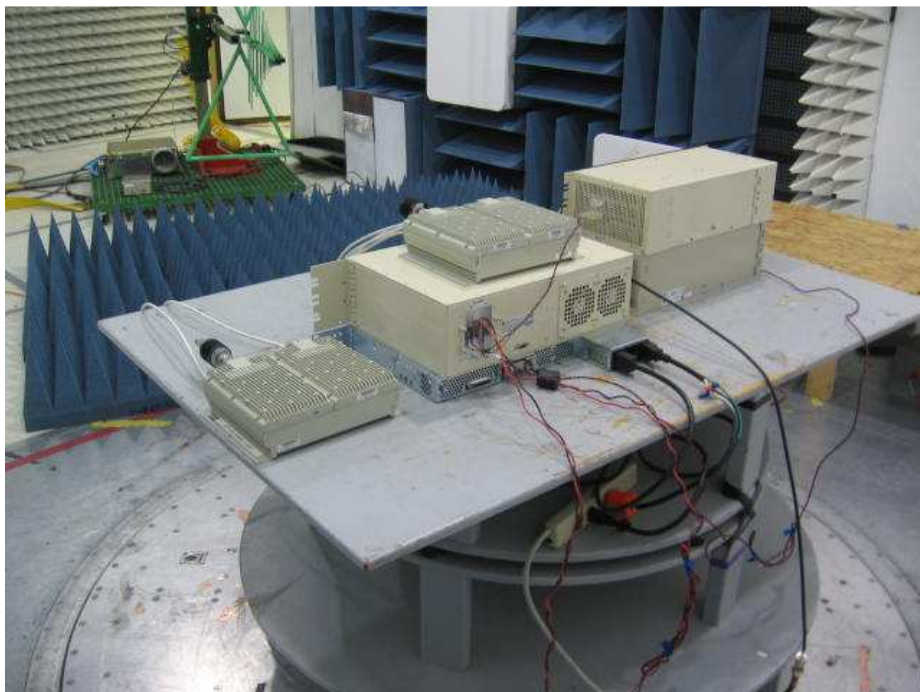
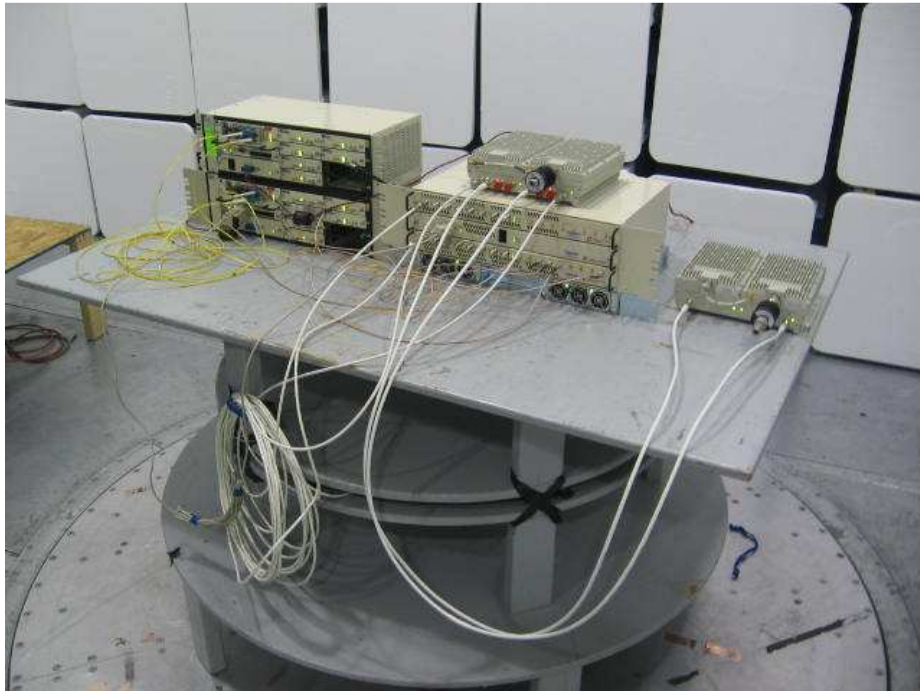
Test result: **Pass**

Frequency range: 30MHz-8GHz for 728-756MHz unit

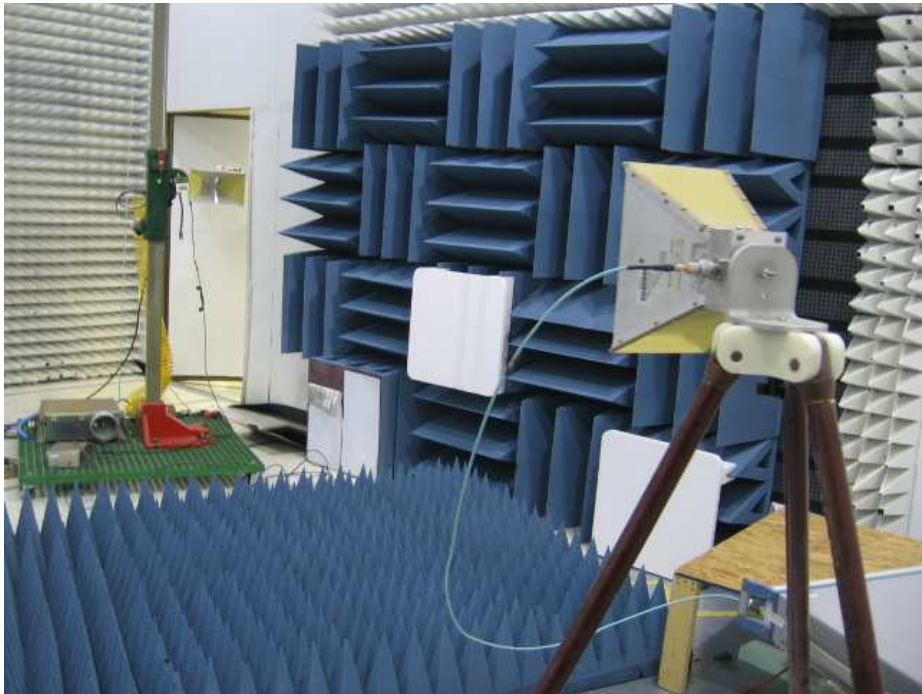
Frequency range: 30MHz-22GHz for 2110-2155MHz unit

Max. Emissions margin: dB below the Reference Limits

- Notes:**
1. The Radiated Emissions testing was performed in the Anechoic chamber at 3m measurement distance (see Table 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 table
-



Test Setup Photos

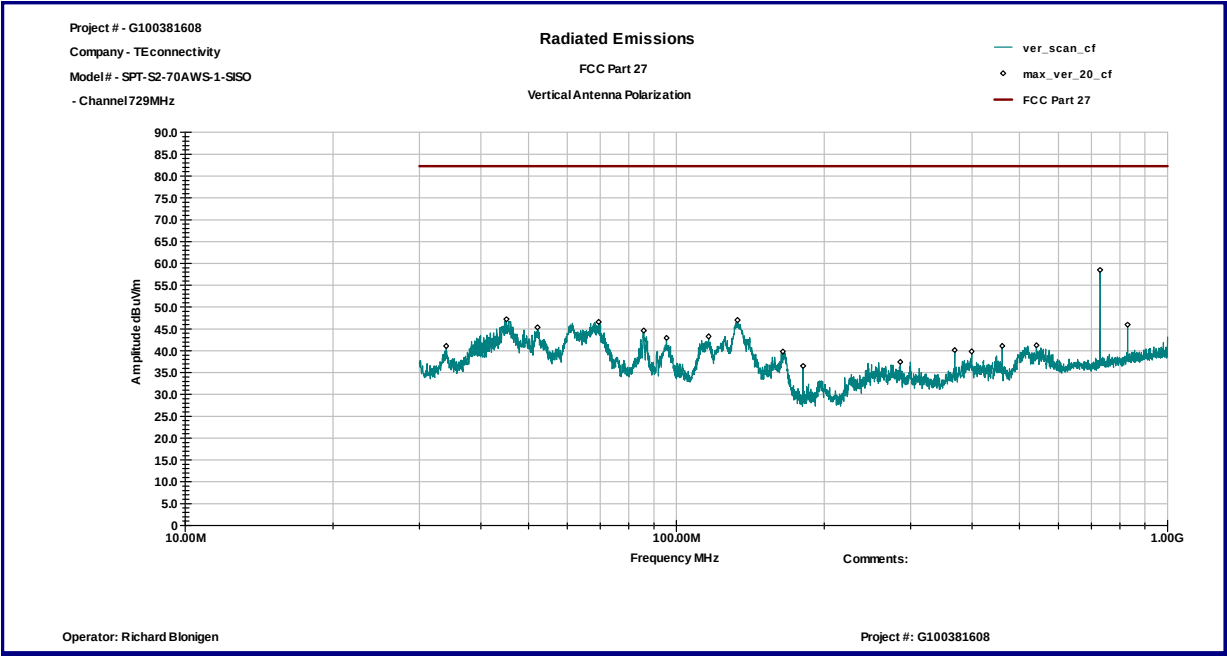


Test Setup Photos

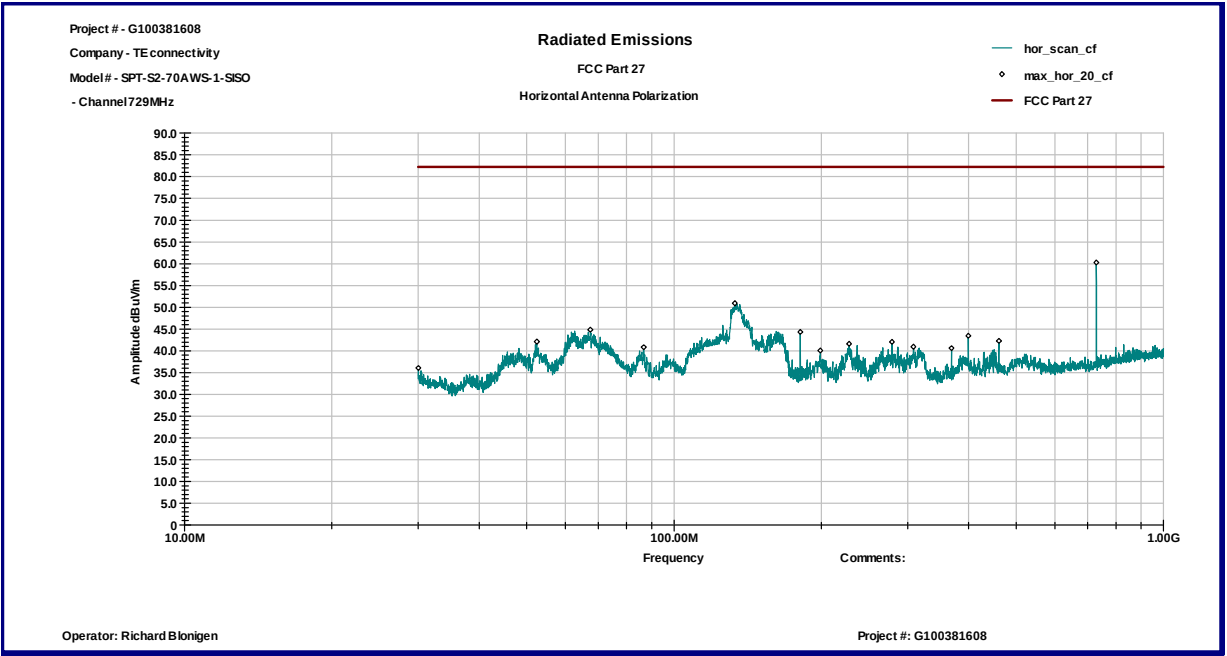
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 728-756MHz Frequency Range 30-1000MHz	

Table 1

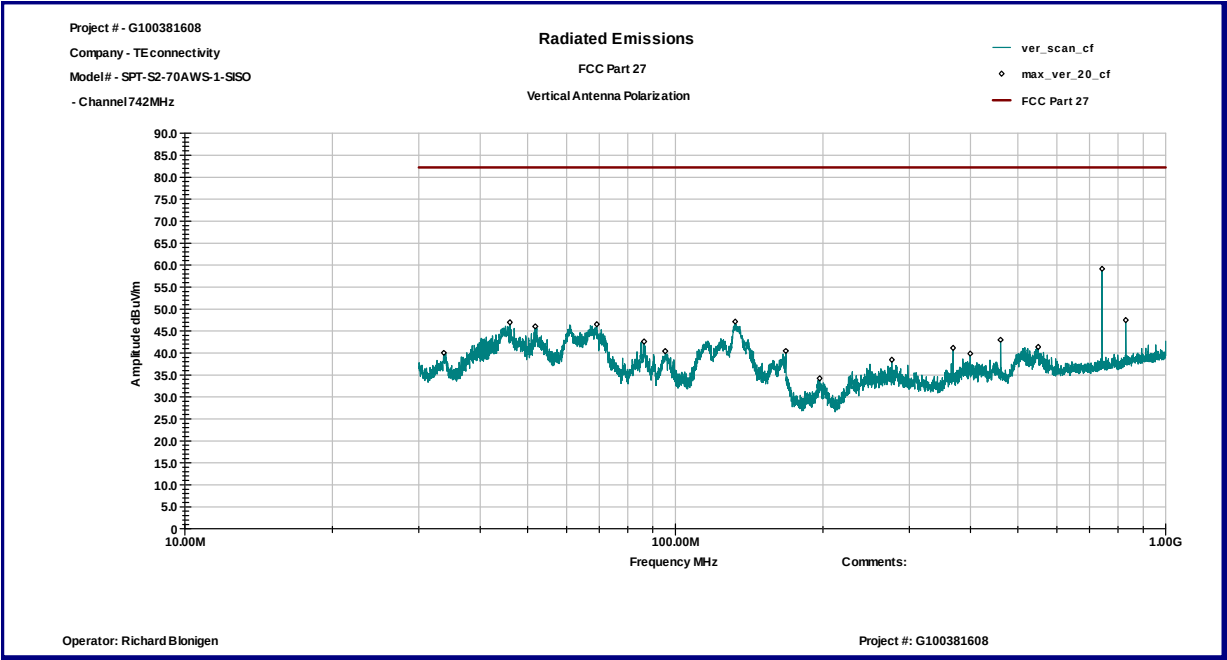
Frequency	Ant. Polarity	Peak Reading dBμV	Ant.Factor dB1/m	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
Channel 729 MHz						
133.26 MHz	V	33.3	13.8	47.0	82.2	-35.2
729.09 MHz	V	35.1	23.4	58.5	82.2	-23.7
829.47 MHz	V	21.1	24.9	46.0	82.2	-36.2
133.12 MHz	H	37.2	13.8	50.9	82.2	-31.3
399.31 MHz	H	24.5	18.9	43.4	82.2	-38.8
729.09 MHz	H	36.9	23.4	60.3	82.2	-22.0
Channel 742 MHz						
132.47 MHz	V	33.3	13.8	47.1	82.2	-35.1
742.09 MHz	V	35.4	23.7	59.1	82.2	-23.1
829.4 MHz	V	22.6	24.9	47.5	82.2	-34.7
168.09 MHz	H	34.0	11.6	45.5	82.2	-36.7
460.69 MHz	H	22.4	20.0	42.4	82.2	-39.8
742.09 MHz	H	37.8	23.7	61.5	82.2	-20.7
Channel 756 MHz						
155.12 MHz	V	35.8	12.3	48.1	82.2	-34.1
755.18 MHz	V	35.0	23.9	58.8	82.2	-23.4
829.4 MHz	V	20.7	24.9	45.6	82.2	-36.7
155.12 MHz	H	40.1	12.3	52.4	82.2	-29.8
755.18 MHz	H	39.7	23.9	63.6	82.2	-18.6
829.4 MHz	H	17.3	24.9	42.1	82.2	-40.1



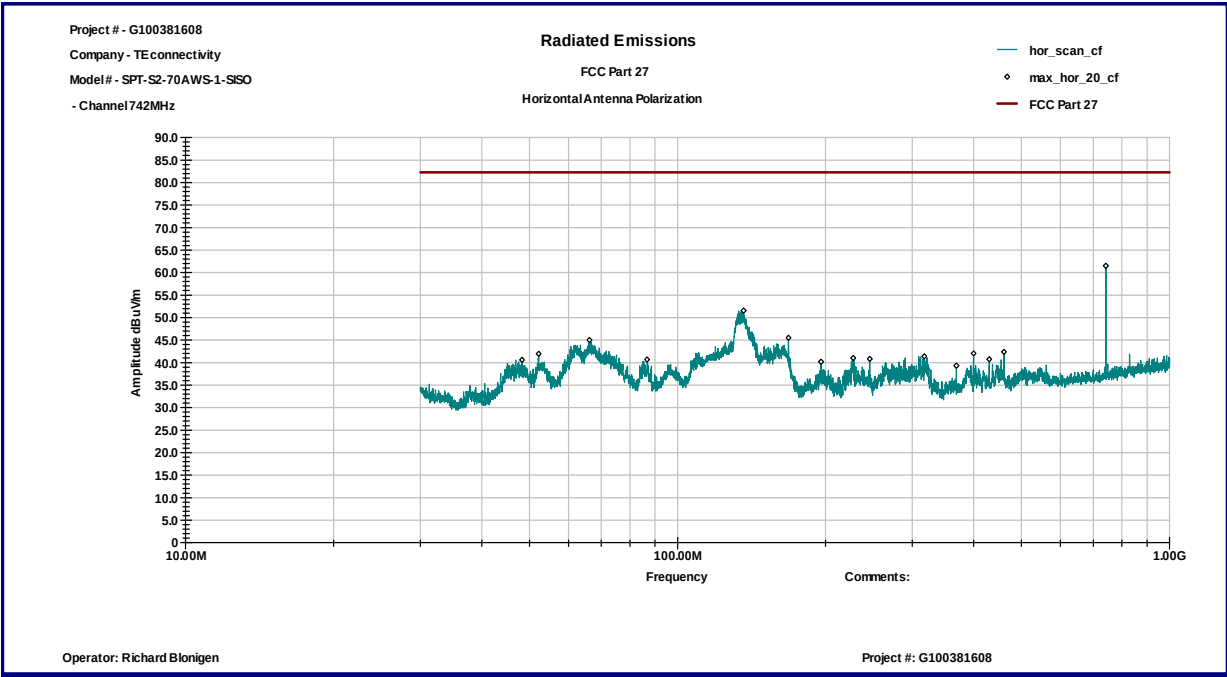
Graph 1



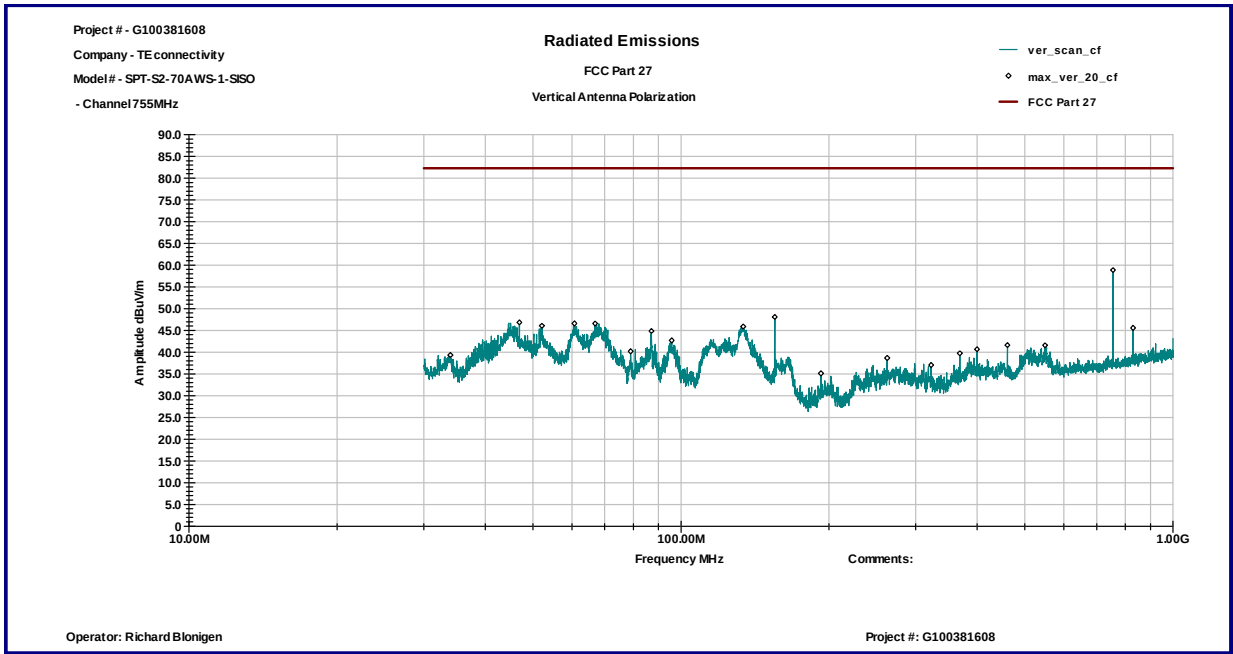
Graph 2



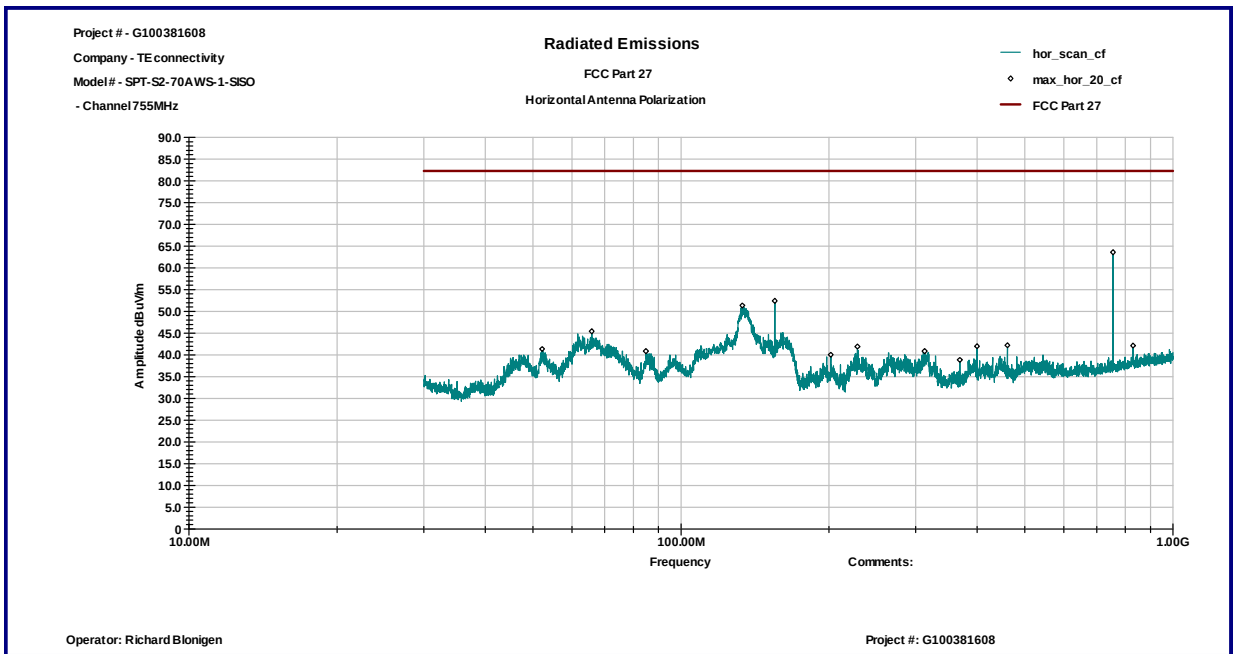
Graph 3



Graph 4



Graph 5



Graph 6

Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 728-756MHz Frequency Range 1000-8000MHz	

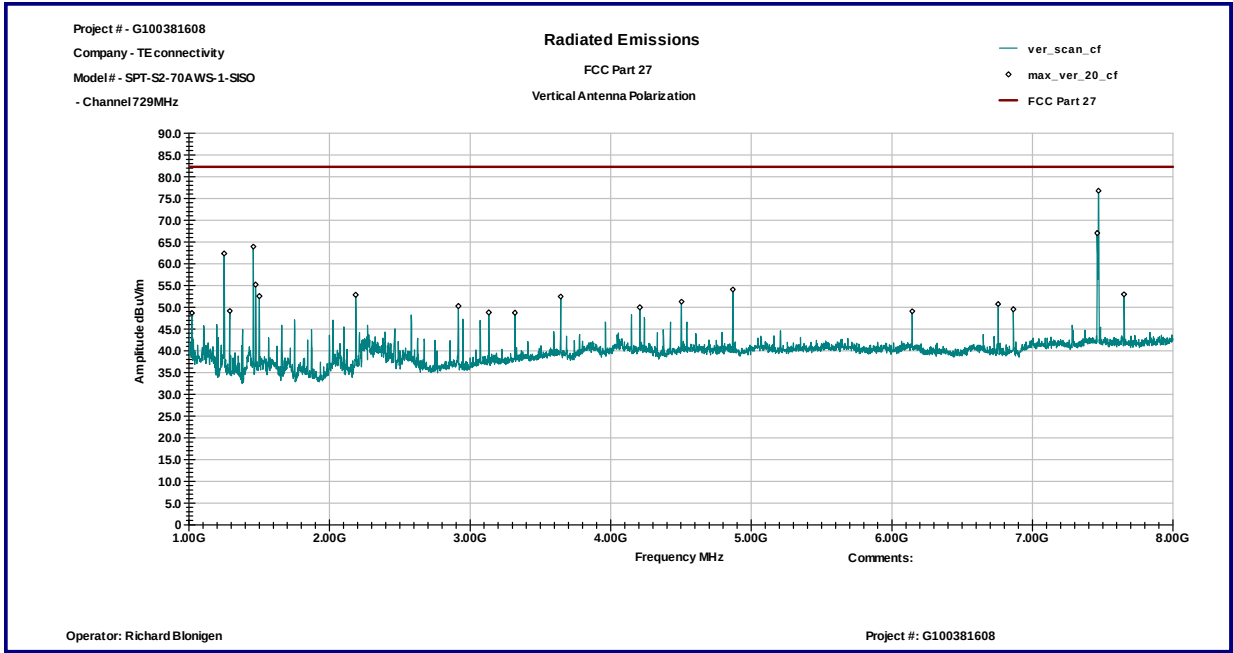
Table 2

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 729 MHz							
1.2502 GHz	V	74.1	27.2	38.9	62.3	82.2	-19.9
1.4585 GHz	V	75.0	27.9	38.9	63.9	82.2	-18.3
7.461 GHz	V	61.0	42.5	36.5	67.0	82.2	-15.2
7.4698 GHz	V	70.7	42.5	36.5	76.8	82.2	-5.5
1.2502 GHz	H	67.5	27.1	38.9	55.6	82.2	-26.6
7.461 GHz	H	60.8	42.6	36.5	67.0	82.2	-15.2
7.4698 GHz	H	69.8	42.6	36.5	76.0	82.2	-6.2
Channel 742 MHz							
1.2502 GHz	V	75.0	27.2	38.9	63.3	82.2	-19.0
1.4847 GHz	V	72.4	28.0	38.9	61.4	82.2	-20.8
7.461 GHz	V	58.4	42.5	36.5	64.4	82.2	-17.8
7.4698 GHz	V	71.1	42.5	36.5	77.2	82.2	-5.1
7.6378 GHz	V	46.8	42.7	36.3	53.2	82.2	-29.0
4.4527 GHz	H	52.6	37.5	36.9	53.2	82.2	-29.0
6.7557 GHz	H	50.6	40.7	36.9	54.4	82.2	-27.8
7.4698 GHz	H	67.0	42.6	36.5	73.2	82.2	-9.0
Channel 755 MHz							
1.2502 GHz	V	75.8	27.2	38.9	64.0	82.2	-18.2
1.511 GHz	V	72.9	28.1	38.9	62.1	82.2	-20.1
4.8692 GHz	V	53.3	38.1	36.6	54.7	82.2	-27.5
7.461 GHz	V	64.7	42.5	36.5	70.8	82.2	-11.4
7.4715 GHz	V	68.8	42.5	36.5	74.9	82.2	-7.3
1.511 GHz	H	68.0	28.2	38.9	57.2	82.2	-25.0
4.5035 GHz	H	52.4	37.5	36.9	53.1	82.2	-29.1
6.8642 GHz	H	48.1	41.1	36.9	52.3	82.2	-29.9
7.4698 GHz	H	68.9	42.6	36.5	75.1	82.2	-7.1

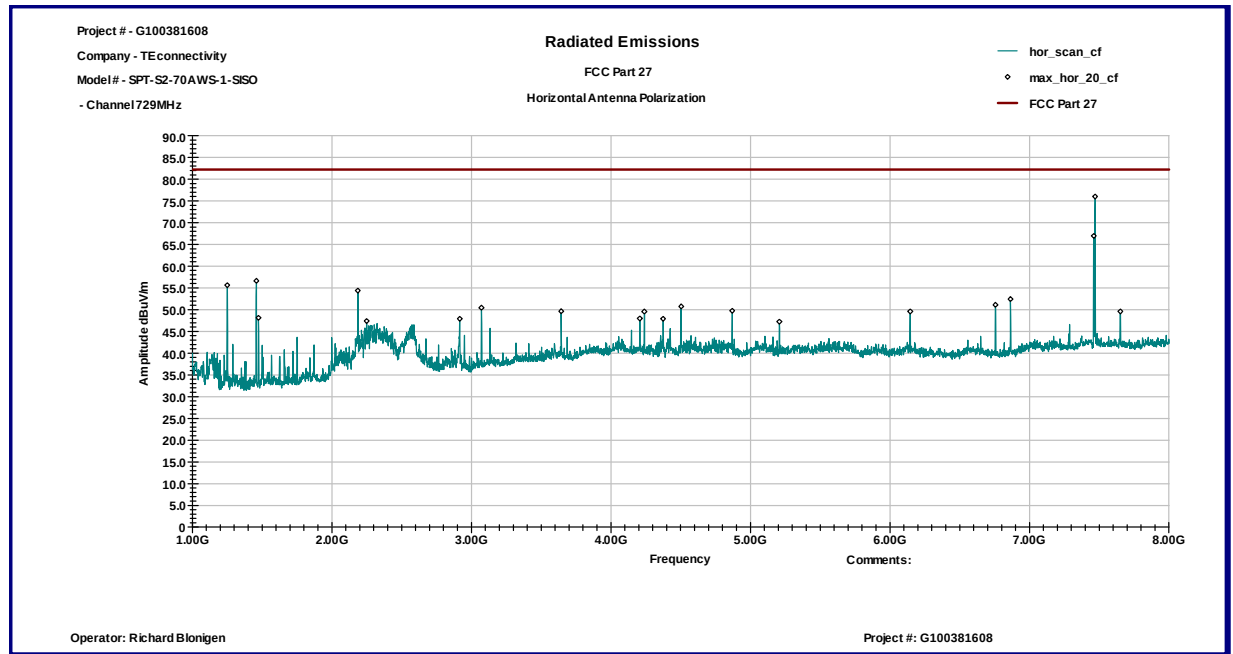
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Substitution Method Channels 728-756MHz Frequency Range 1000-8000MHz	

Table 3

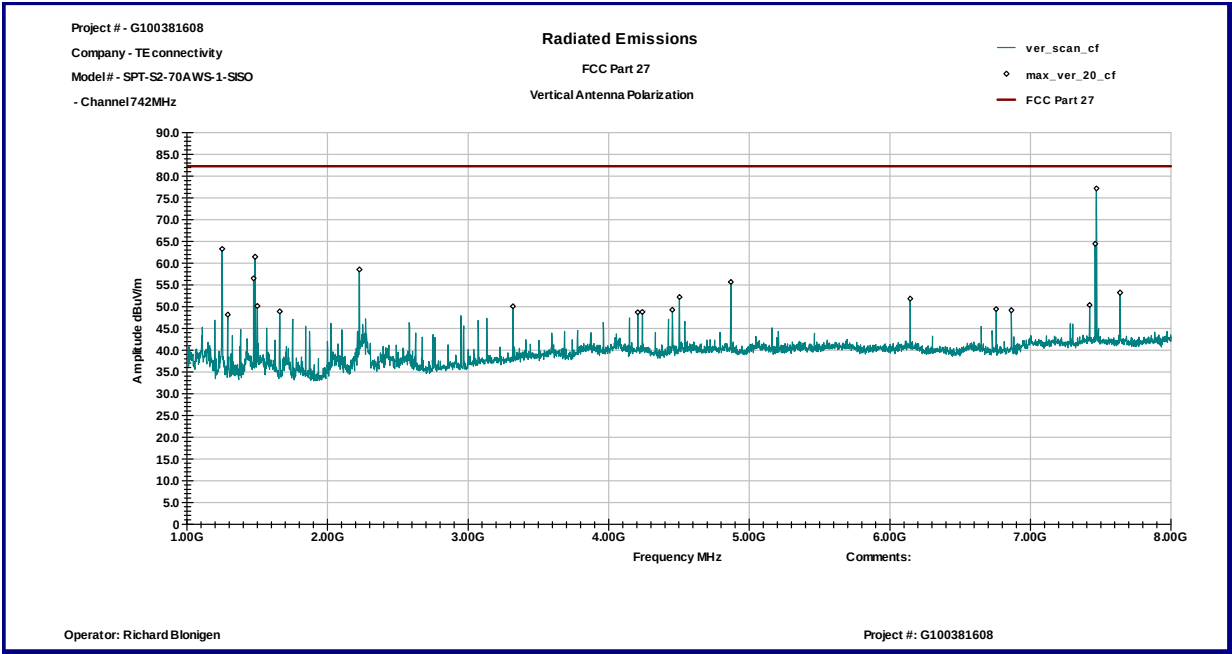
Frequency MHz	Antenna Polarity	Measured Emissions dBμV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	ERP Spur. Emissions dBm	Limit dBm	Margin dB
Channel 729 MHz								
1250.05	V	74.1	-39.5	6.9	2.8	-35.4	-13.0	-22.4
1458.05	V	75.1	-38.7	8.3	2.8	-33.2	-13.0	-20.2
7469.60	V	74.4	-22.7	11.3	2.8	-14.2	-13.0	-1.2
7469.60	H	68.7	-28.1	11.2	2.8	-19.7	-13.0	-6.7
Channel 742 MHz								
1250.10	V	75.5	-38.6	6.9	2.8	-34.5	-13.0	-21.5
7469.20	V	71.5	-24.7	11.3	2.8	-16.2	-13.0	-3.2
7469.20	H	68.6	-27.8	11.2	2.8	-19.4	-13.0	-6.4
Channel 755 MHz								
1511.00	V	74.1	-40.7	8.6	2.8	-34.9	-13.0	-21.9
1250.05	V	75.1	-38.4	6.9	2.8	-34.3	-13.0	-21.3
7470.65	V	74.4	-22.3	11.3	2.8	-13.8	-13.0	-0.8
7470.90	H	68.7	-27.1	11.2	2.8	-18.7	-13.0	-5.7



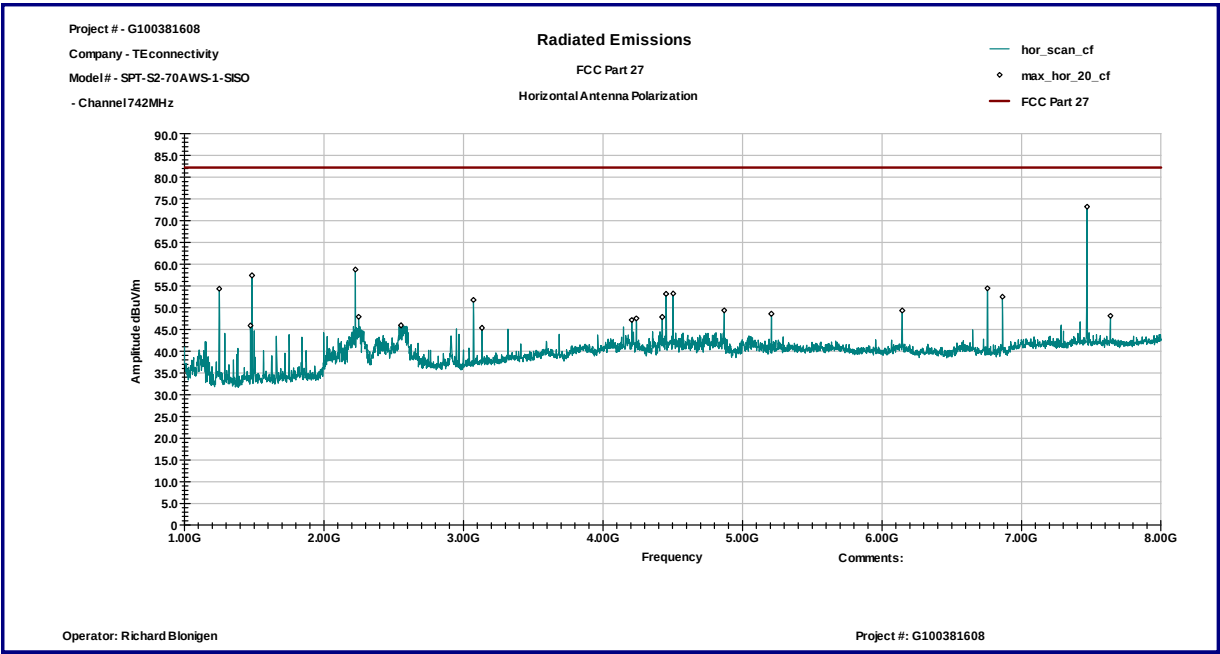
Graph 7



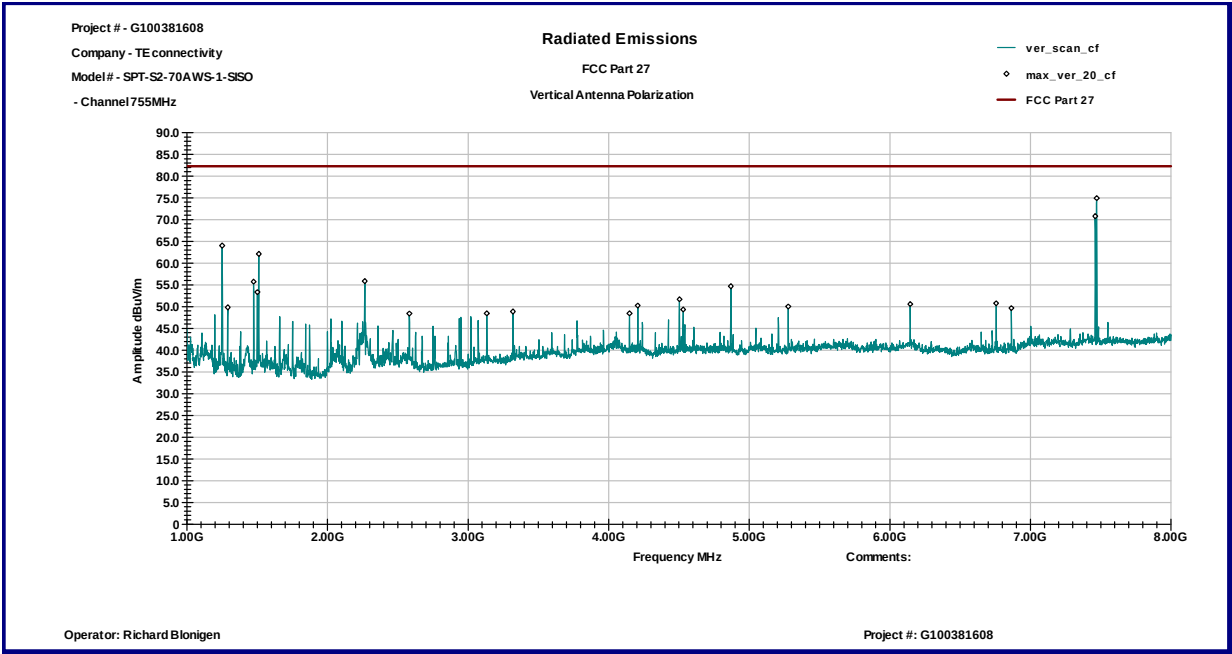
Graph 8



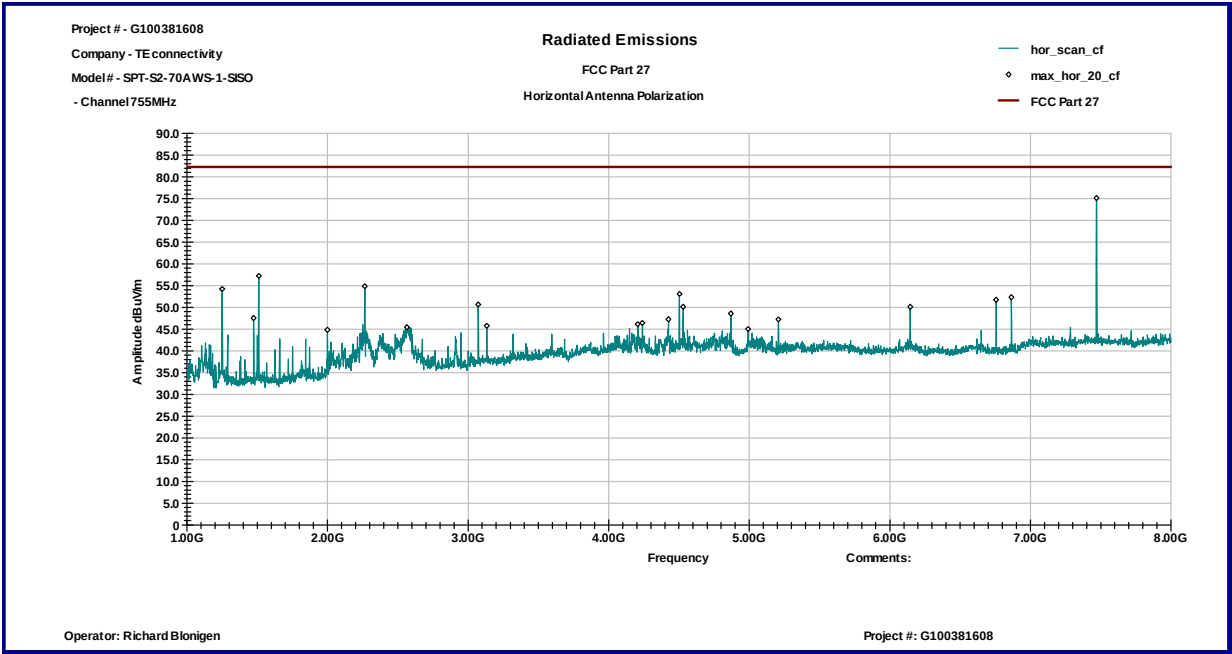
Graph 9



Graph 10



Graph 11

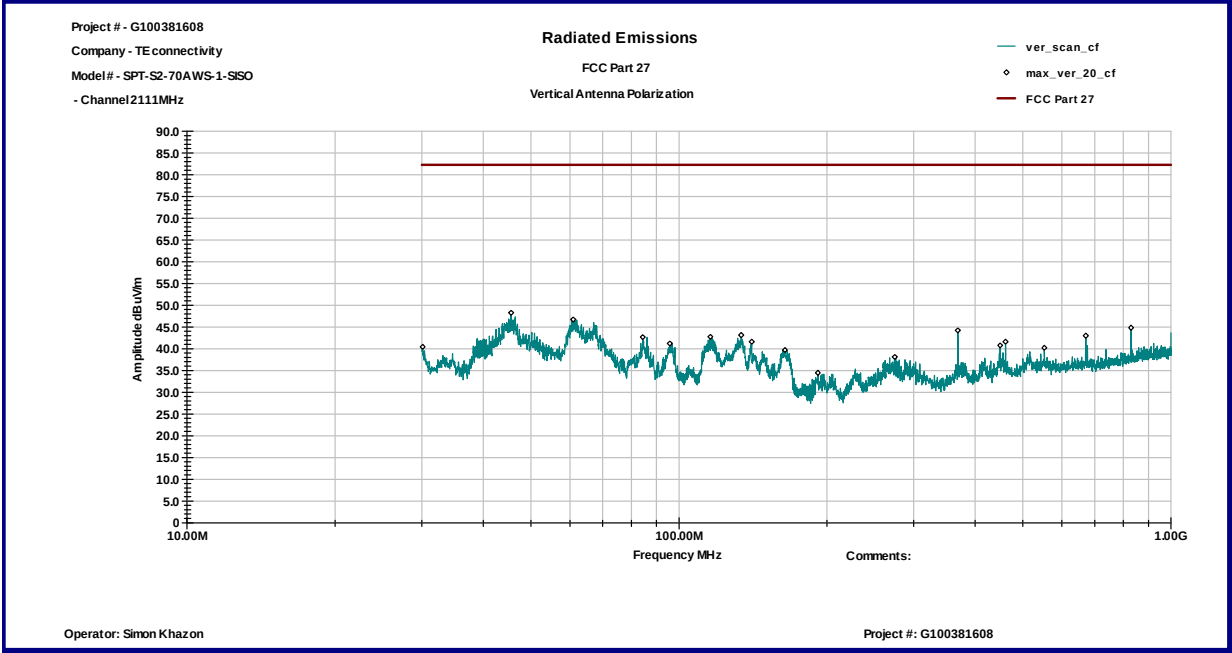


Graph 12

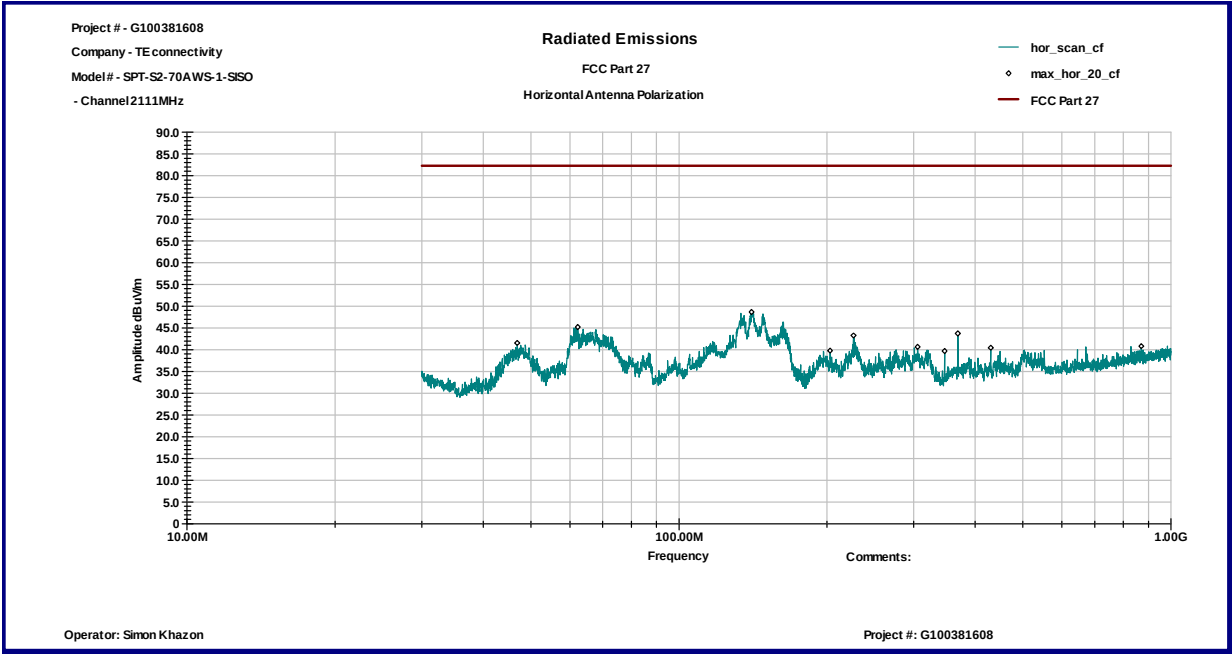
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Channels 2110-2155MHz Frequency Range 30-1000MHz	

Table 4

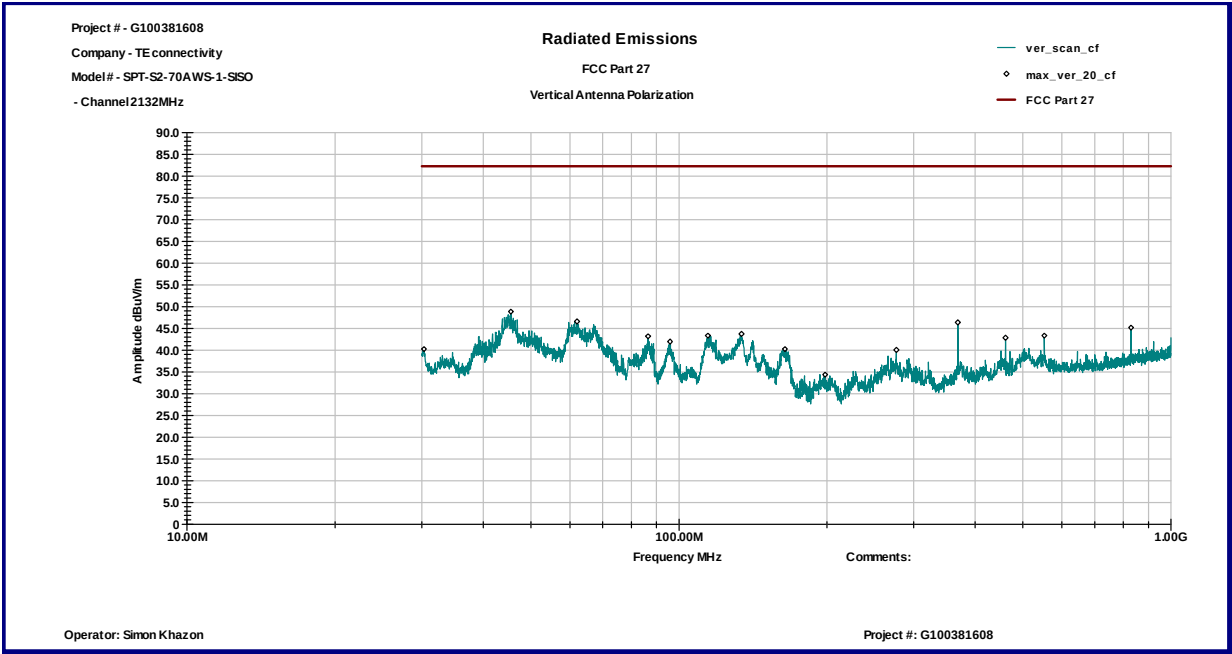
Frequency	Ant. Polarity	Peak Reading dBμV	Ant.Factor dB1/m	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
Channel 2111 MHz						
45.582 MHz	V	36.2	12.1	48.3	82.2	-34.0
368.78 MHz	V	26.3	18.0	44.2	82.2	-38.0
829.47 MHz	V	19.9	24.9	44.8	82.2	-37.4
140.39 MHz	H	35.3	13.3	48.6	82.2	-33.6
368.78 MHz	H	25.8	18.0	43.7	82.2	-38.5
430.2 MHz	H	20.9	19.6	40.4	82.2	-41.8
Channel 2142 MHz						
45.546 MHz	V	36.8	12.1	48.8	82.2	-33.4
133.96 MHz	V	30.0	13.7	43.7	82.2	-38.5
368.78 MHz	V	28.4	18.0	46.3	82.2	-35.9
148.07 MHz	H	35.5	12.8	48.3	82.2	-33.9
228.92 MHz	H	30.4	12.7	43.1	82.2	-39.1
368.78 MHz	H	26.4	18.0	44.4	82.2	-37.8
Channel 2156 MHz						
45.125 MHz	V	35.6	12.3	47.9	82.2	-34.3
368.78 MHz	V	26.8	18.0	44.8	82.2	-37.4
829.47 MHz	V	21.8	24.9	46.6	82.2	-35.6
68.46 MHz	H	38.2	7.2	45.4	82.2	-36.8
133.96 MHz	H	34.7	13.7	48.4	82.2	-33.9
368.78 MHz	H	26.9	18.0	44.9	82.2	-37.3



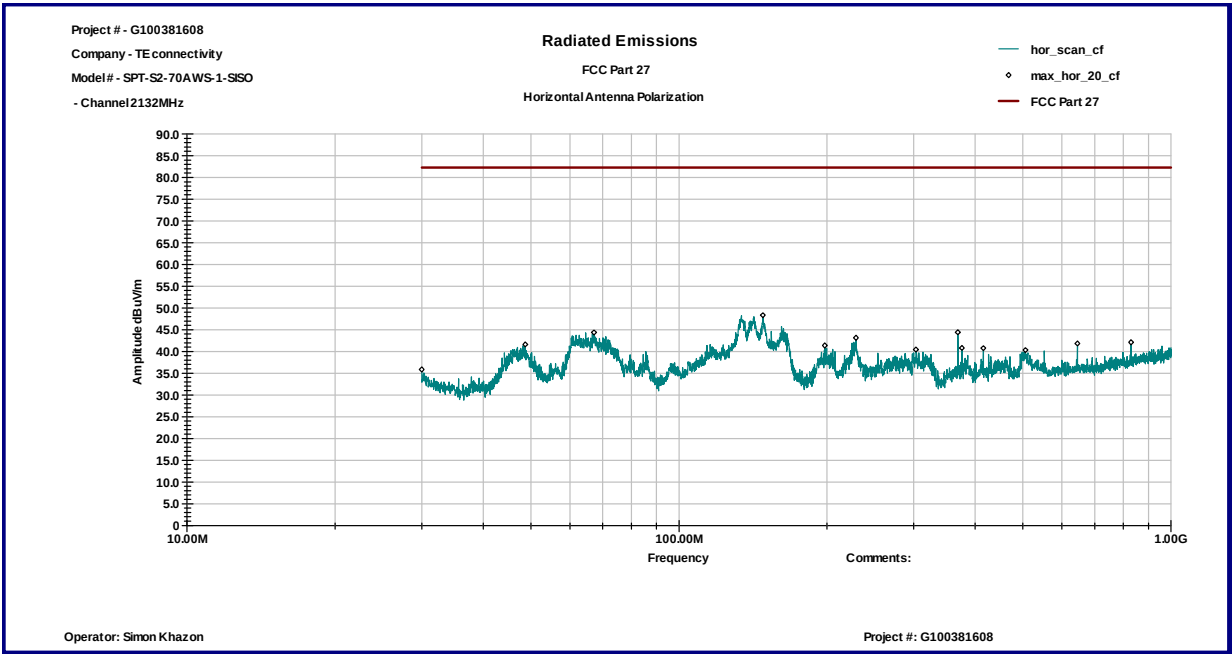
Graph 13



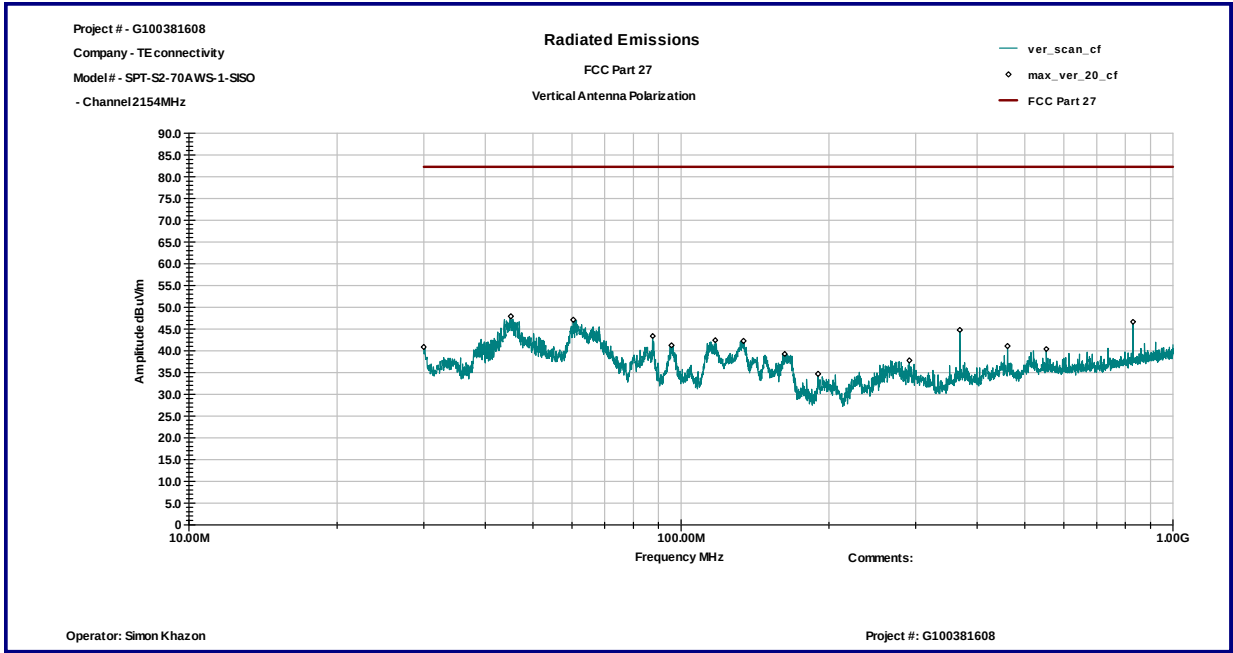
Graph 14



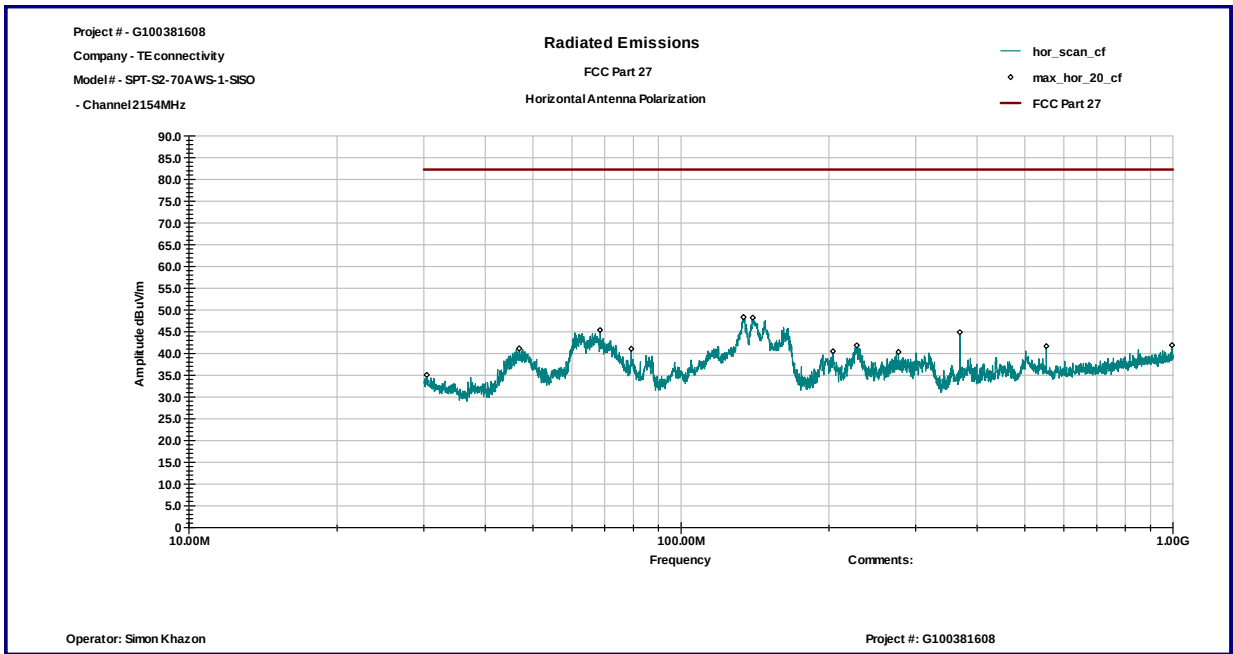
Graph 15



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	

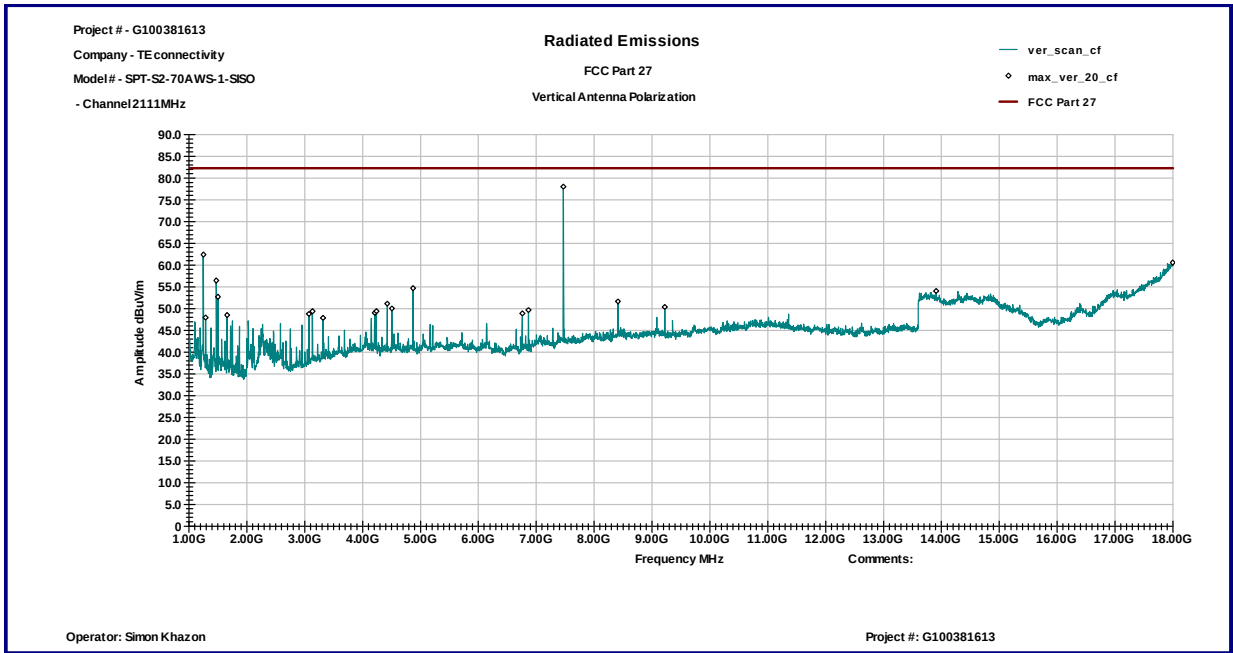
Table 4

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							
1.2507 GHz	V	74.1	27.2	38.9	62.4	82.2	-19.8
4.8717 GHz	V	53.3	38.1	36.6	54.7	82.2	-27.5
7.4685 GHz	V	72.0	42.5	36.5	78.0	82.2	-4.2
17.996 GHz	V	40.9	53.5	33.9	60.6	82.2	-21.6
4.5035 GHz	H	51.6	37.5	36.9	52.2	82.2	-30.0
6.7557 GHz	H	50.8	40.7	36.9	54.7	82.2	-27.5
7.4698 GHz	H	67.1	42.6	36.5	73.3	82.2	-8.9
Channel 2132 MHz							
1.2507 GHz	V	74.3	27.2	38.9	62.6	82.2	-19.7
7.4685 GHz	V	72.9	42.5	36.5	79.0	82.2	-3.2
17.983 GHz	V	40.4	53.5	33.9	59.9	82.2	-22.3
1.2502 GHz	H	67.0	27.1	38.9	55.2	82.2	-27.0
6.8642 GHz	H	49.8	41.1	36.9	54.0	82.2	-28.2
7.461 GHz	H	58.4	42.6	36.5	64.6	82.2	-17.6
7.4698 GHz	H	70.3	42.6	36.5	76.5	82.2	-5.7
4.4527 GHz	H	52.6	37.5	36.9	53.2	82.2	-29.0
6.7557 GHz	H	50.6	40.7	36.9	54.4	82.2	-27.8
7.4698 GHz	H	67.0	42.6	36.5	73.2	82.2	-9.0
Channel 2154 MHz							
1.2507 GHz	V	74.2	27.2	38.9	62.4	82.2	-19.8
7.4685 GHz	V	72.9	42.5	36.5	79.0	82.2	-3.2
13.945 GHz	V	42.2	48.9	37.7	53.4	82.2	-28.8
17.974 GHz	V	40.9	53.4	33.9	60.4	82.2	-21.8
1.2502 GHz	H	67.8	27.1	38.9	56.0	82.2	-26.3
6.8642 GHz	H	49.3	41.1	36.9	53.5	82.2	-28.7
7.461 GHz	H	62.4	42.6	36.5	68.5	82.2	-13.7
7.4698 GHz	H	66.9	42.6	36.5	73.1	82.2	-9.1

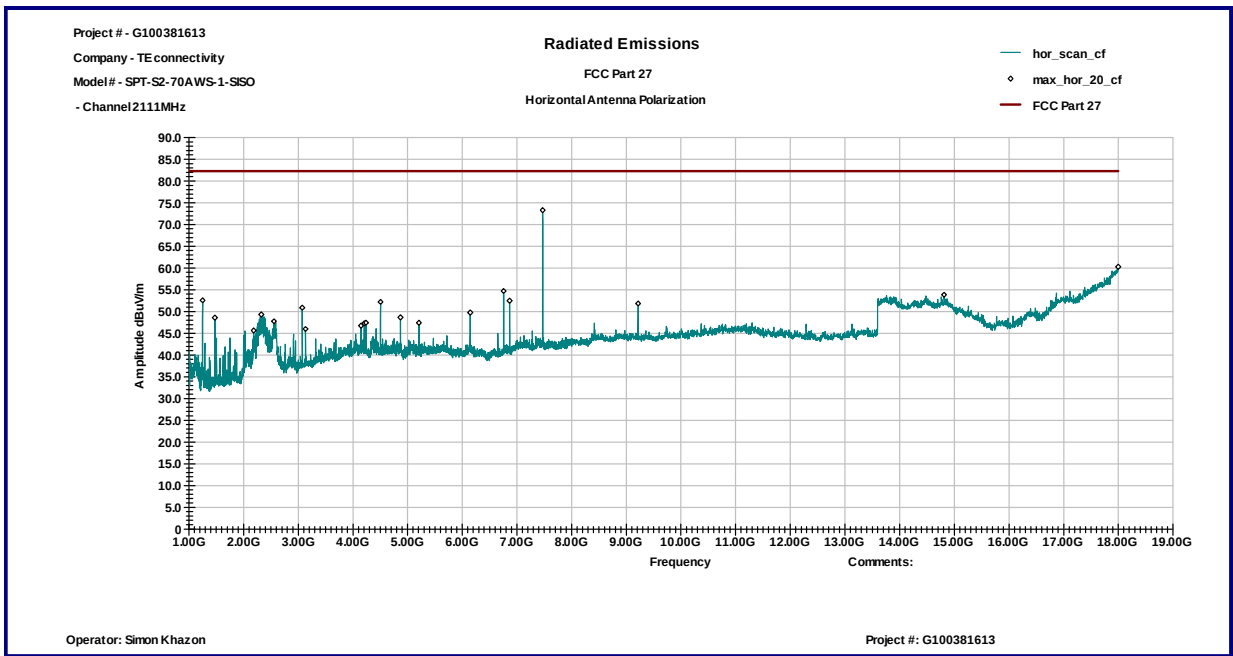
Date:	April 25-26, 2011	Result: Pass
Tested by:	Richard Blonigen & Simon Khazon	
Standard:	FCC Part 27	
Test Point:	Enclosure	
Operation mode:	See page 5	
Note:	Substitution Method Channels 2110-2155MHz Frequency Range 1-22GHz	

Table 5

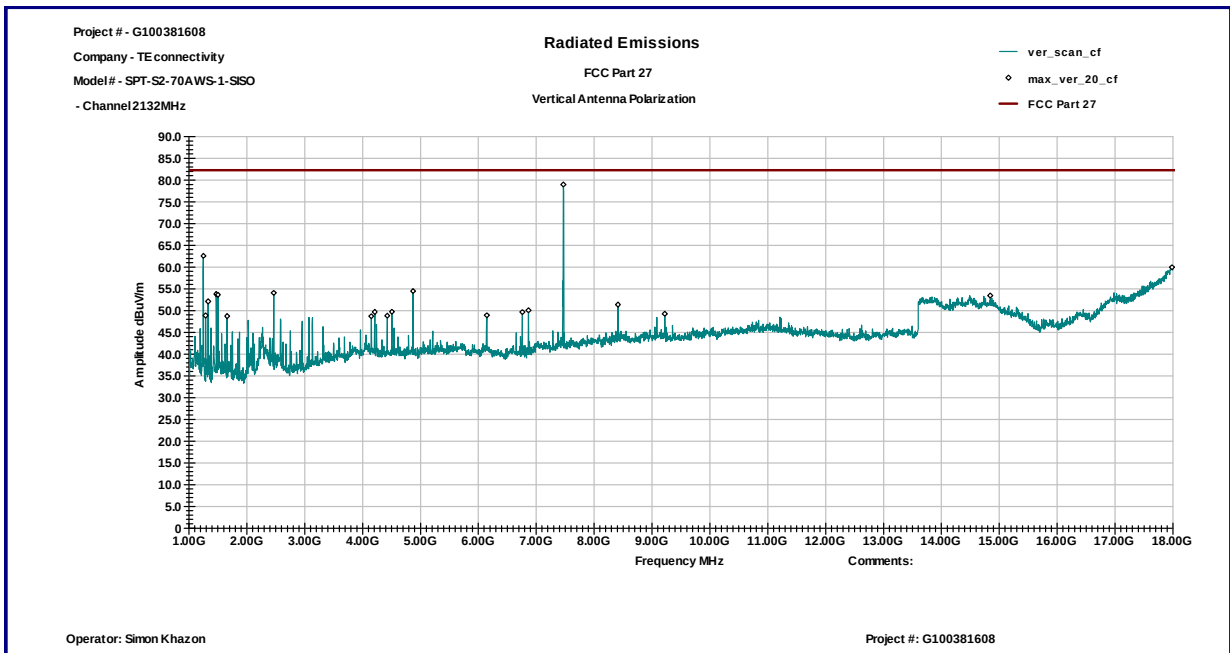
Frequency MHz	Antenna Polarity	Measured Emissions dBμV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	ERP Spur. Emissions dBm	Limit dBm	Margin dB
Channel 2111								
1250.05	V	74.3	-39.3	6.9	2.8	-35.2	-13.0	-22.2
7470.04	V	75.1	-22.3	11.3	2.8	-13.8	-13.0	-0.8
7470.04	H	68.3	-26.4	11.2	2.8	-18.0	-13.0	-5.0
Channel 2132								
1250.05	V	75.0	-38.4	6.9	2.8	-34.3	-13.0	-21.3
7470.68	V	71.5	-22.3	11.3	2.8	-13.8	-13.0	-0.8
7470.54	H	68.3	-27.4	11.2	2.8	-19.0	-13.0	-6.0
Channel 2154								
1250.05	V	68.3	-40.9	6.9	2.8	-36.8	-13.0	-23.8
7470.46	V	75.1	-22.3	11.3	2.8	-13.8	-13.0	-0.8
7470.46	H	70.6	-25.1	11.2	2.8	-16.7	-13.0	-3.7



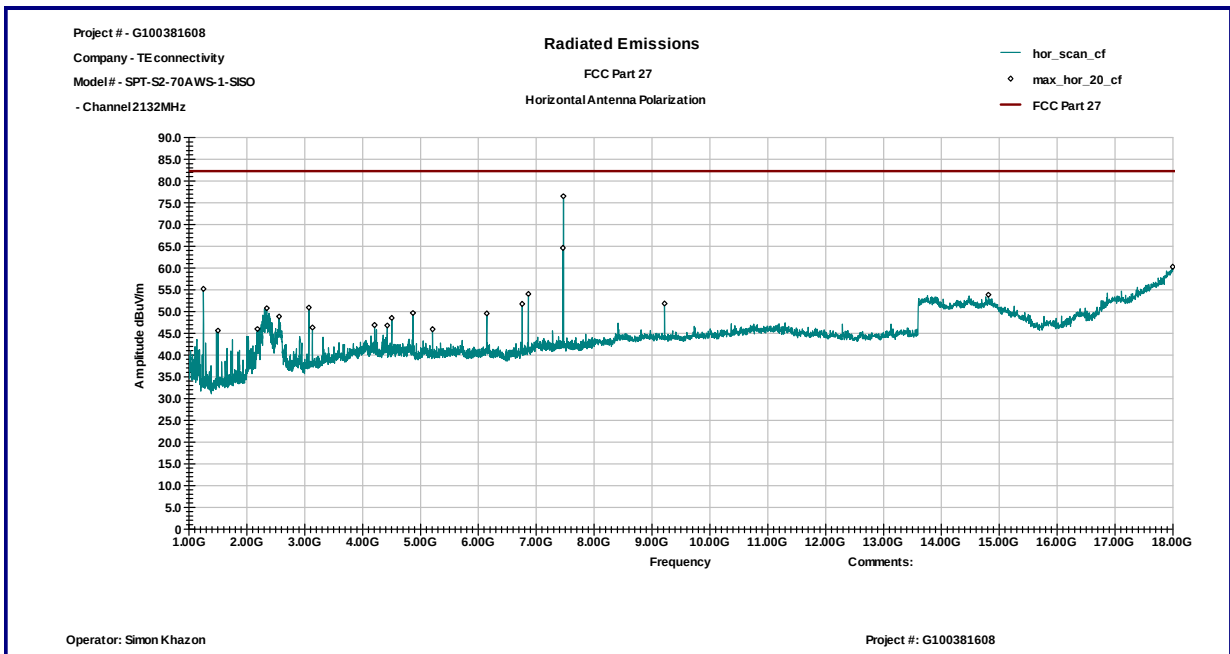
Graph 19



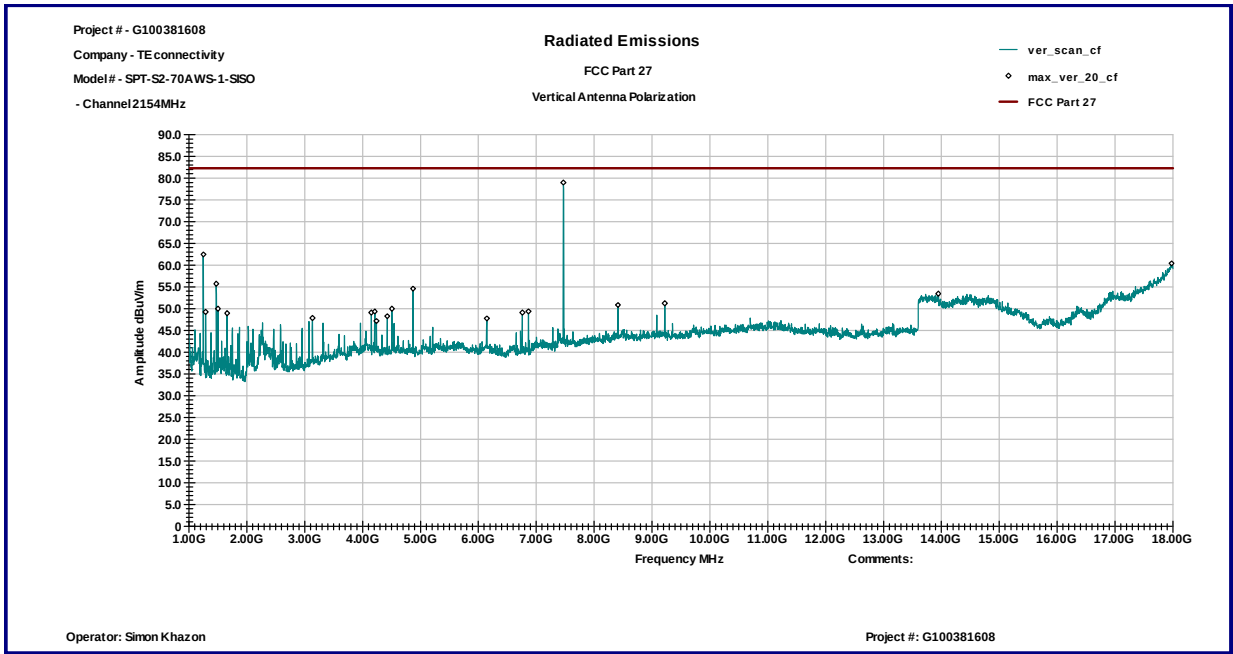
Graph 20



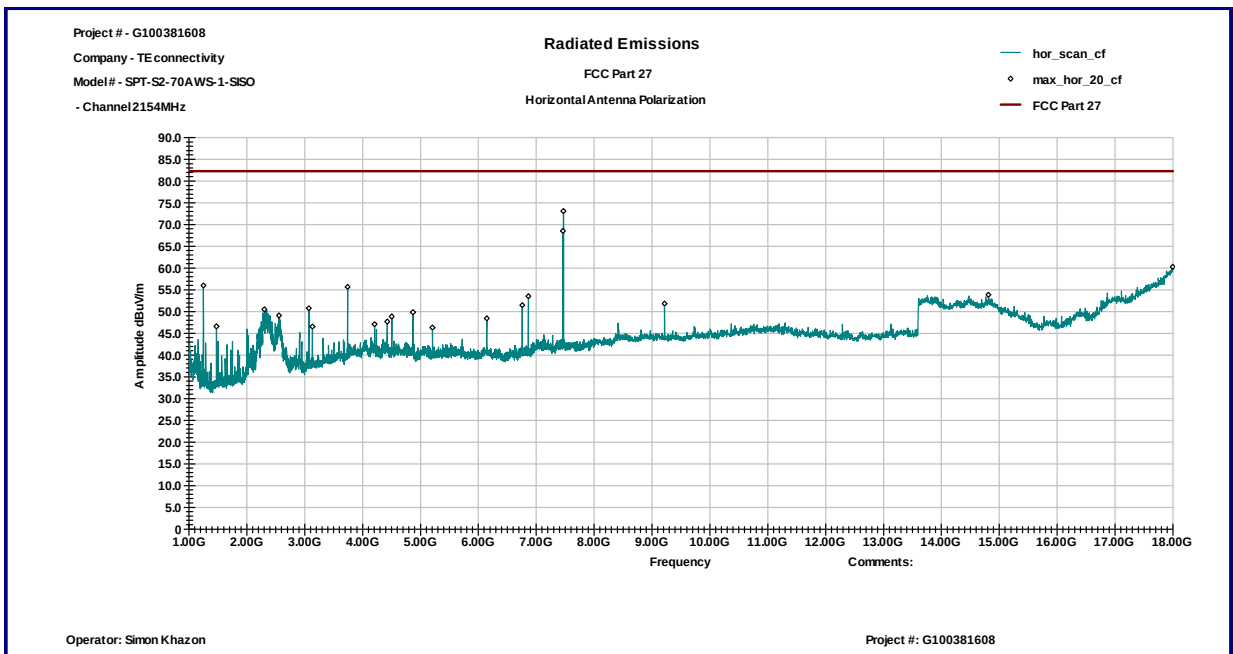
Graph 21



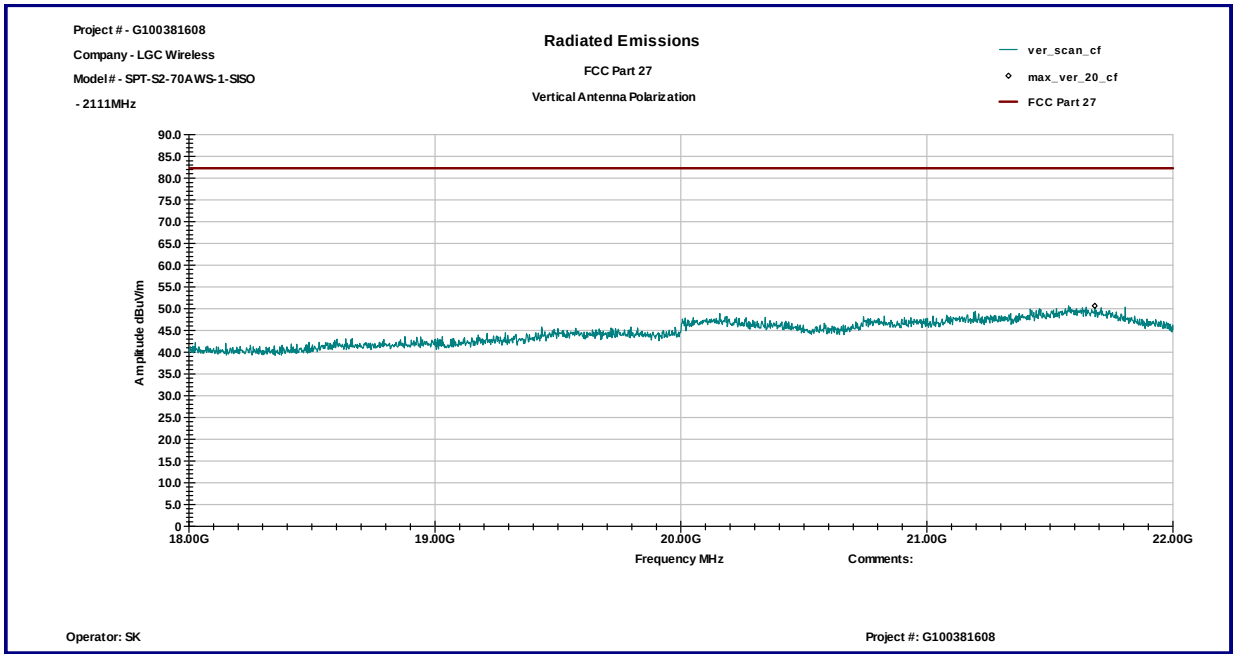
Graph 22



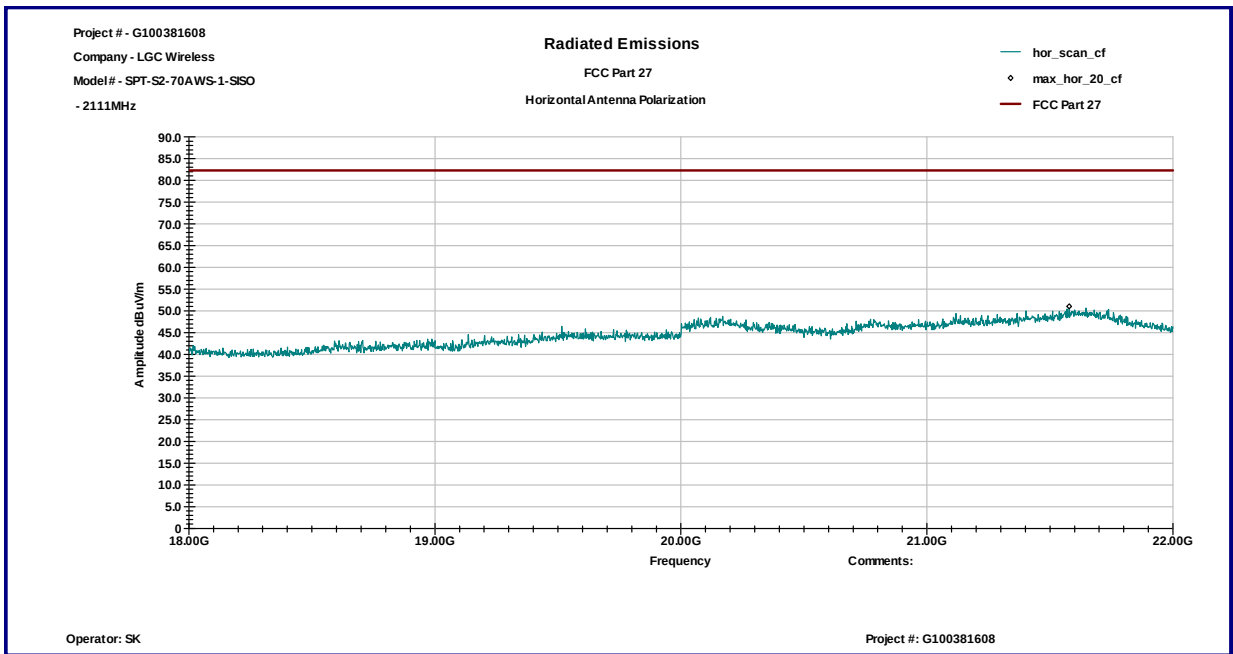
Graph 23



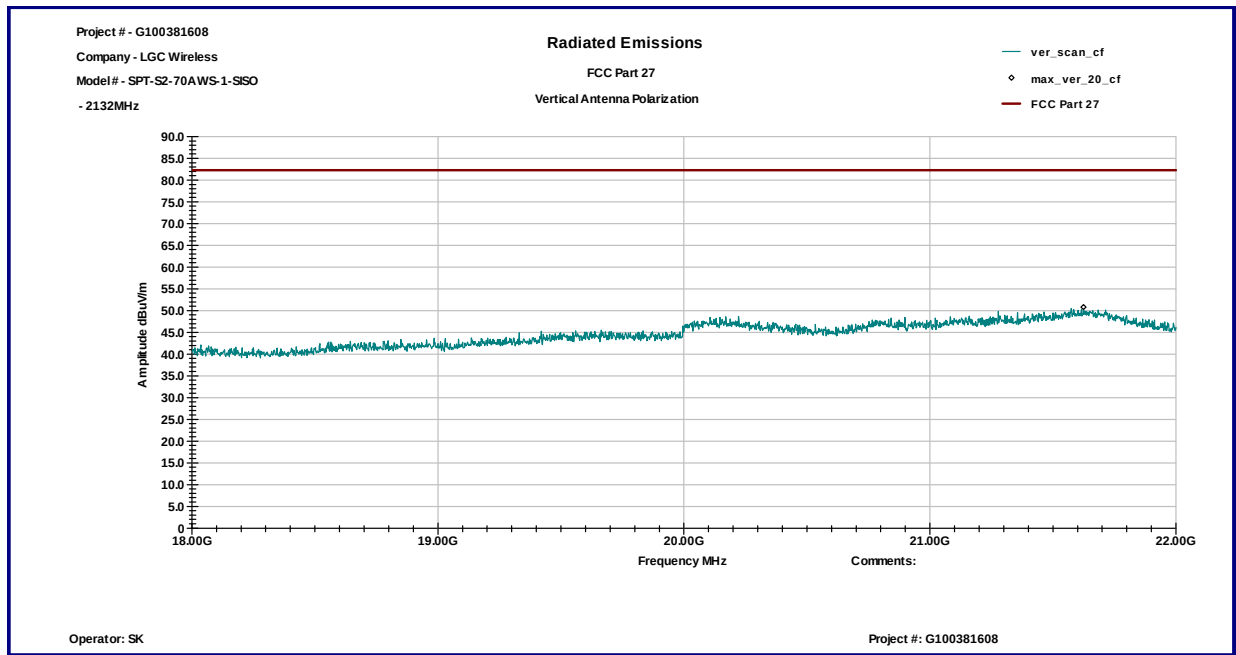
Graph 24



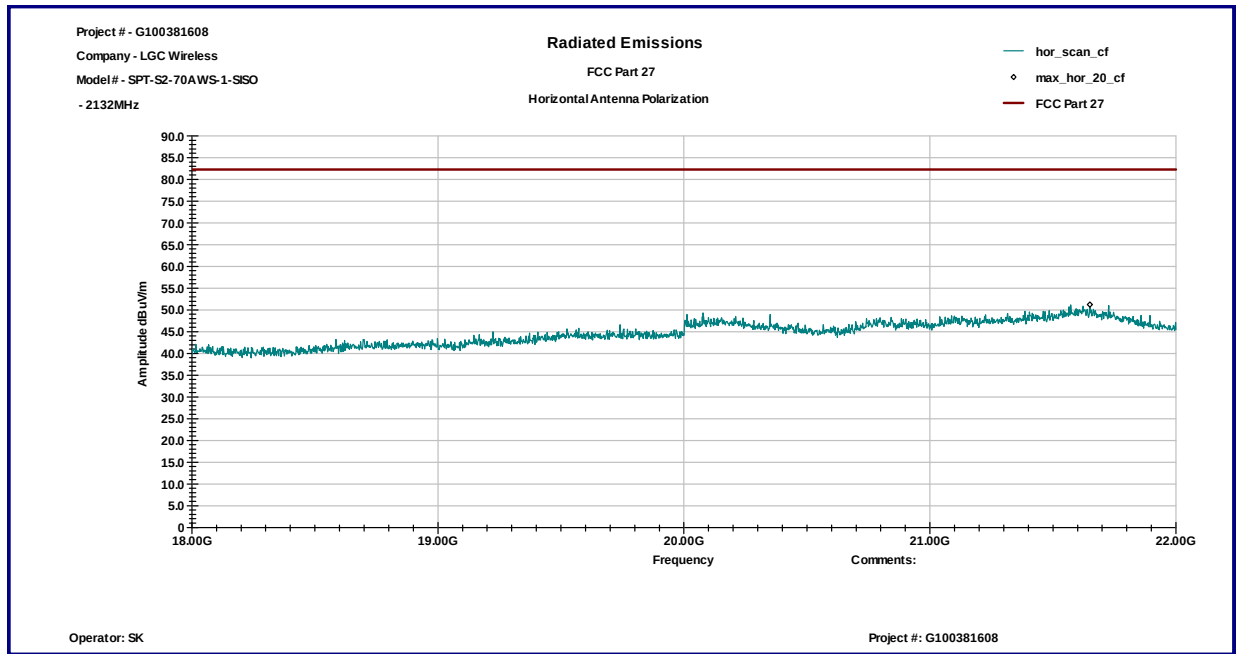
Graph 25



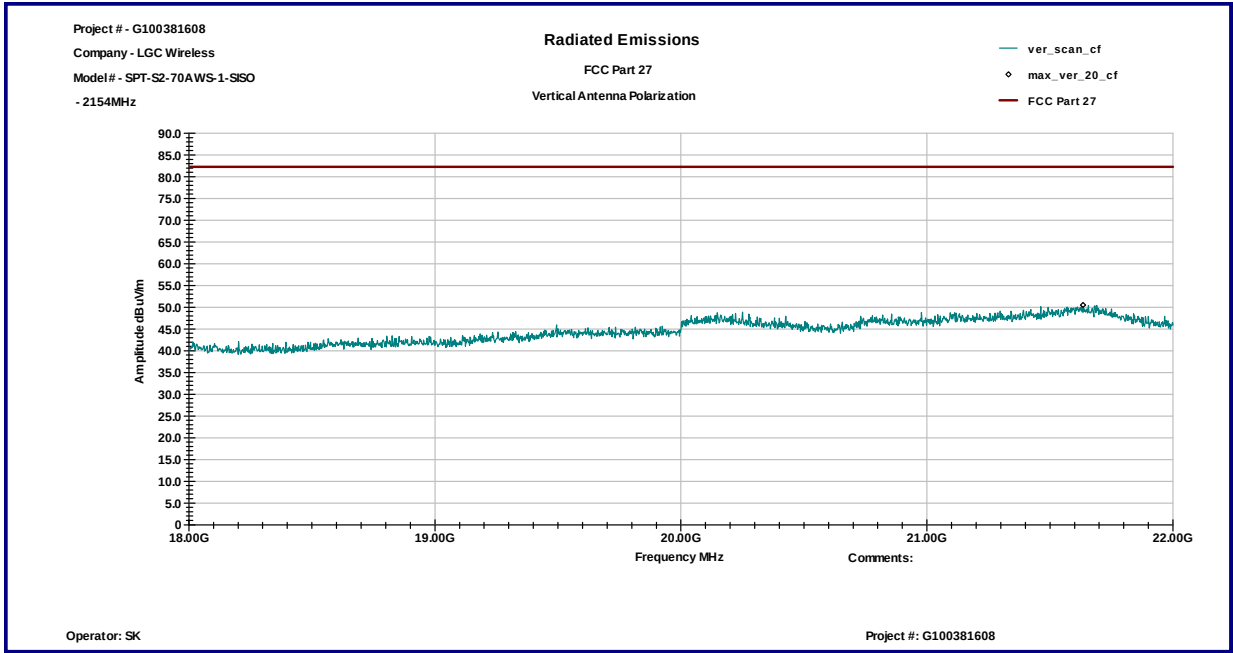
Graph 26



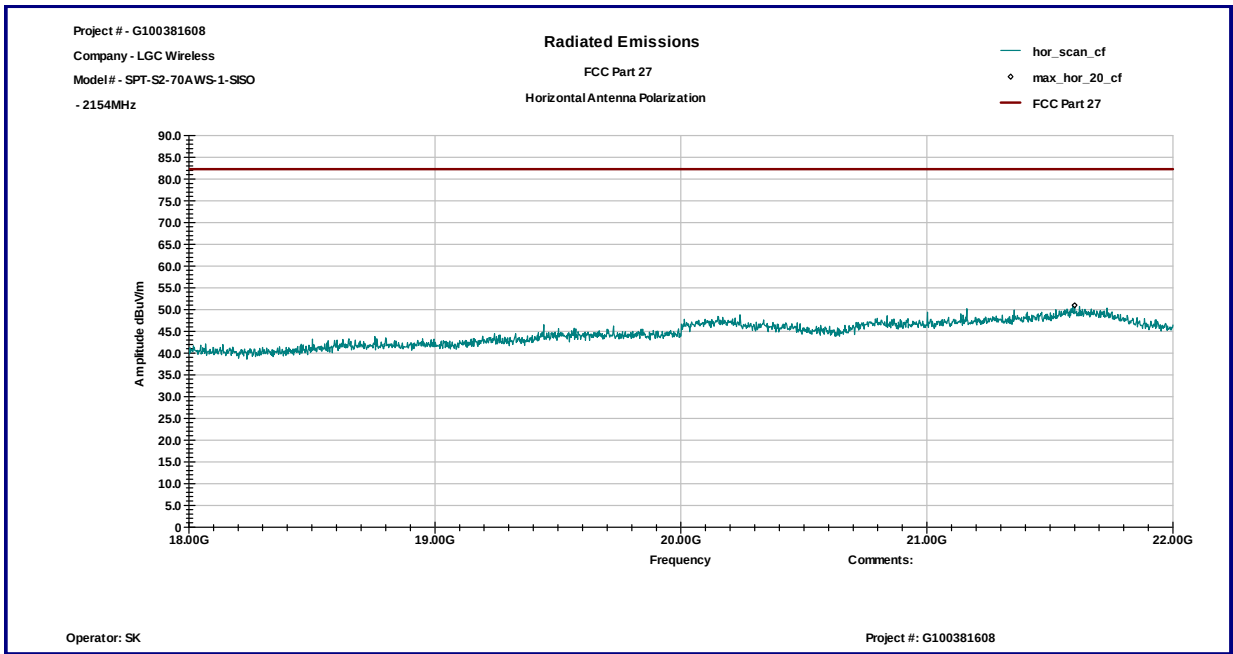
Graph 27



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	☒

