



TEST DATA REPORT

Test Data Number: 102460119MIN-001

Project Number: G102460119

Testing performed on the
LSD500

to

47 CFR Part 15.247:2015 / RSS-247, Issue 1:2015

Spurious Radiated Emissions

47 CFR, Part 15:2015, §15.109, Class B / ICES-003, Issue 6:2016

For

Honeywell International Inc.

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

Test Authorized by:
Honeywell International Inc.
2 Corporate Center Drive
Melville, NY 11747 USA

Prepared by: Clay Huff
Clay Huff

Reviewed by: Norman Shpilsher Date of issue: February 10, 2016
Norman Shpilsher

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1.0 GENERAL DESCRIPTION

Model:	LSD500
Type of EUT:	Wireless Smoke Alarm
Sample ID:	MEL-024 and MEL-025
Company:	Honeywell International Inc.
Customer:	Mr. Andrew Roussin
Address:	2 Corporate Center Drive Melville, NY 11747 USA
Phone:	(516) 577-5935
e-mail:	AndrewRoussin@Honeywell.com
Date Sample Submitted:	February 1, 2016
Test Work Started:	February 1, 2016
Test Work Completed:	February 8, 2016
Test Sample Conditions:	☐ Damaged ☐ Poor (Usable) ☒ Good



1.1 Product Description; Test Facility

Product Description:	Transceiver
Transmitter power configuration:	☒ Internal battery ☐ External power source ☐ 120VAC ☐ 230VAC ☐ 400VAC ☐ █ VDC ☐ Other: █ █ Amp. ☐ 50Hz ☐ 60Hz
Permitted Band of Operation:	2400 – 2483.5MHz
Band of Operation:	2405 – 2475MHz
Test Facility Accreditation:	A2LA (Certificate No. 1427.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.10-2013

1.2 EUT Configuration

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

- ☒ - Continuous (see details below)
- ☐ - Test program (customer specific)
- ☐ -

Operating modes of the EUT:

No.	Description
1	The both samples MEL-024 and MEL-025 were tested in continuous transmitting mode at channel 11 (2405MHz), channel 19 (2445MHz), and channel 25 (2475MHz), and in receive mode. Unit MEL-024 was set to operate with Antenna 1; Unit MEL-025 was set to operate with Antenna 2.

Cables:

No.	Type	Length	Designation	Note
	None			

Support equipment/Services:

No.	Item	Description
	None	

General notes: The both samples MEL-024 and MEL-025 were tested individually with fresh batteries.

1.3 Measurement uncertainty

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

1.4 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(μ V/m)

RA = Receiver Amplitude in dB(μ 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(μ 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(μ V/m).

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

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

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

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

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

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

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

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
15.247(d) / RSS-247 5.5	Radiated spurious emissions	Pass
15.109 / ICES-003	Receiver/digital device radiated emissions	Pass



3.0 TEST CONDITIONS AND RESULTS

3.1 Radiated spurious emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Max. Margin: 13.3dB below the limits for Spurious Emissions

Max. Margin: 11.3dB below the limits for Bandedge Emissions

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance.
Graphs 3.1.1 to 3.1.60 show peak of emissions, limits lines show the Average limits.
Tables 3.1.1 and 3.1.3 show Peak value of spurious emissions which are above the Average limits.
Tables 3.1.2 and 3.1.4 show Average value of spurious emissions falling in the restricted band of operation per FCC Part 15.205.

Date:	February 1 – 3, 2016	Result: Pass
Tested by:	Clay Huff	
Standard:	FCC part 15.247(d)	
Test Point:	Enclosure Sample MEL-024	
Operation mode:	See page 5	
Environmental Conditions:	22.2°C; 23.4%(RH); 98kPa	
Equipment Verification:	☒	
Note:	Sample MEL-024, Peak readings	

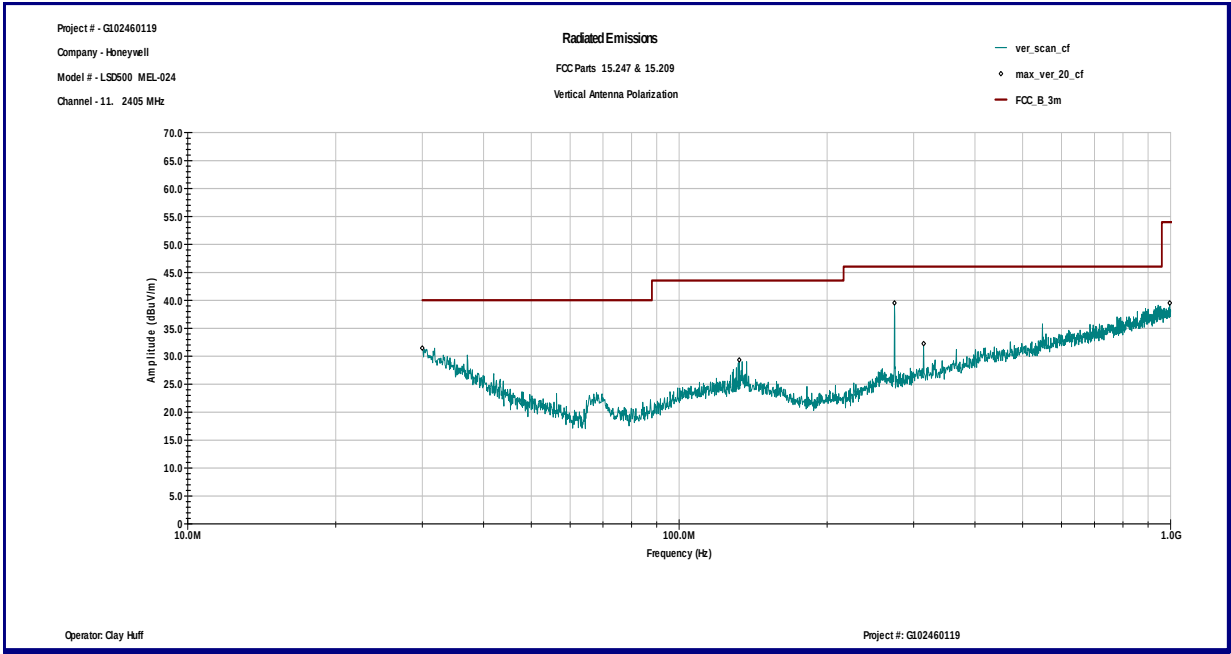
Table 3.1.1

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak readings dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB	Comments
Polarity	Hts(cm)									
Channel 11 . 2405 MHz										
7215.00	V	127	35.7	5.3	40.9	60.8	60.9	74.0	-13.1	
7215.00	H	108	35.7	5.3	40.9	57.8	57.9	74.0	-16.1	
12026.70	H	100	39.2	6.8	40.5	49.1	54.7	74.0	-19.3	
Channel 19 . 2445 MHz										
7330.00	V	105	36.0	5.3	40.8	55.4	55.9	74.0	-18.1	
7330.00	H	107	36.0	5.3	40.8	55.2	55.7	74.0	-18.3	
Channel 25 . 2475 MHz										
7430.00	V	100	36.2	5.4	40.7	54.2	55.1	74.0	-18.9	
7430.00	H	100	36.2	5.4	40.7	57.3	58.2	74.0	-15.8	

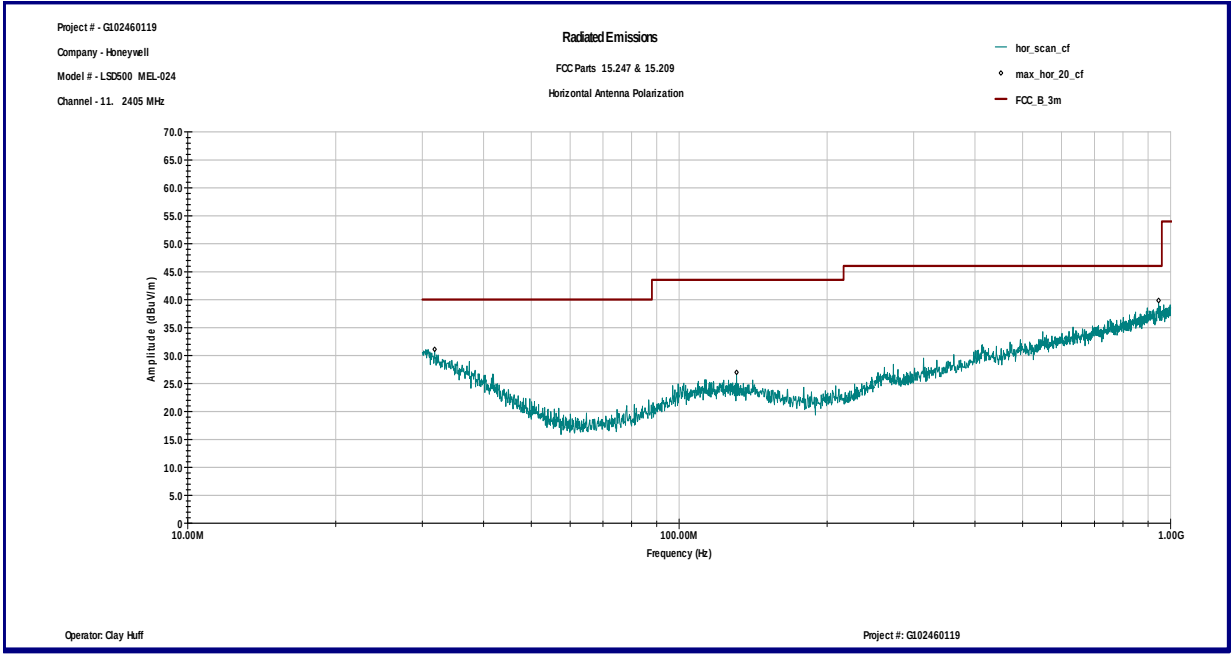
Date:	February 1 – 3, 2016	Result: Pass
Tested by:	Clay Huff	
Standard:	FCC part 15.247(d)	
Test Point:	Enclosure Sample MEL-024	
Operation mode:	See page 5	
Environmental Conditions:	22.2°C; 23.4%(RH); 98kPa	
Equipment Verification:	☒	
Note:	Sample MEL-024, Average value	

Table 3.1.2

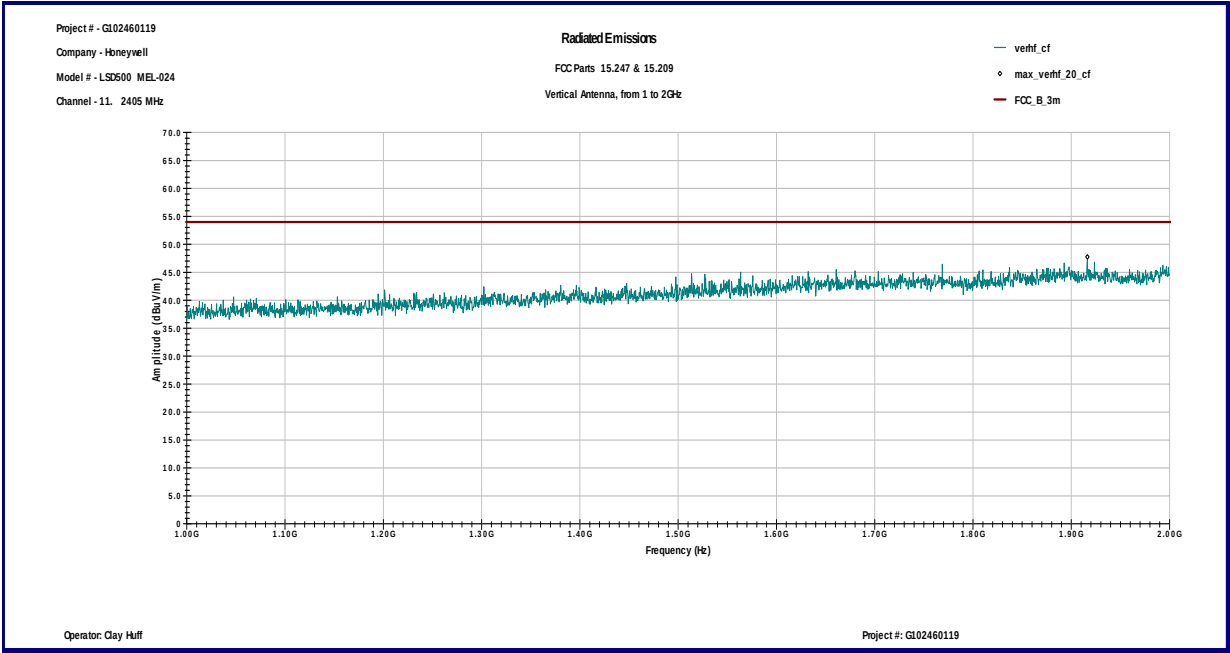
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	AVG Reading dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB	Comments
Polarity	Hts(cm)									
Channel 11 . 2405 MHz										
2390.00	V	105	28.1	2.9	0.0	10.7	41.7	54.0	-12.3	Bandedge
2390.00	H	110	28.1	2.9	0.0	10.5	41.5	54.0	-12.5	Bandedge
7215.00	V	127	35.7	5.3	40.9	32.5	32.6	54.0	-21.4	
14010.00	V	100	41.7	7.1	40.5	21.2	29.6	54.0	-24.4	
7215.00	H	108	35.7	5.3	40.9	40.6	40.7	54.0	-13.3	
9620.00	H	100	38.0	6.0	40.5	18.2	21.7	54.0	-32.2	
14430.00	H	100	42.3	7.2	40.4	20.5	29.7	54.0	-24.3	
Channel 19 . 2445 MHz										
4890.00	V	100	33.0	4.1	41.8	32.3	27.6	54.0	-26.4	
7330.00	V	105	36.0	5.3	40.8	36.2	36.7	54.0	-17.3	
12230.00	V	105	39.0	6.9	40.6	22.3	27.5	54.0	-26.4	
7330.00	H	107	36.0	5.3	40.8	30.3	30.8	54.0	-23.2	
Channel 25 . 2475 MHz										
2483.50	V	130	28.4	2.9	0.0	11.3	42.6	54.0	-11.4	Bandedge
2483.50	H	110	28.4	2.9	0.0	10.7	42.0	54.0	-12.0	Bandedge
4950.00	V	100	33.1	4.1	41.7	31.3	26.8	54.0	-27.2	
7430.00	V	100	36.2	5.4	40.7	32.3	33.2	54.0	-20.8	
7430.00	H	112	36.2	5.4	40.7	28.9	29.8	54.0	-24.2	



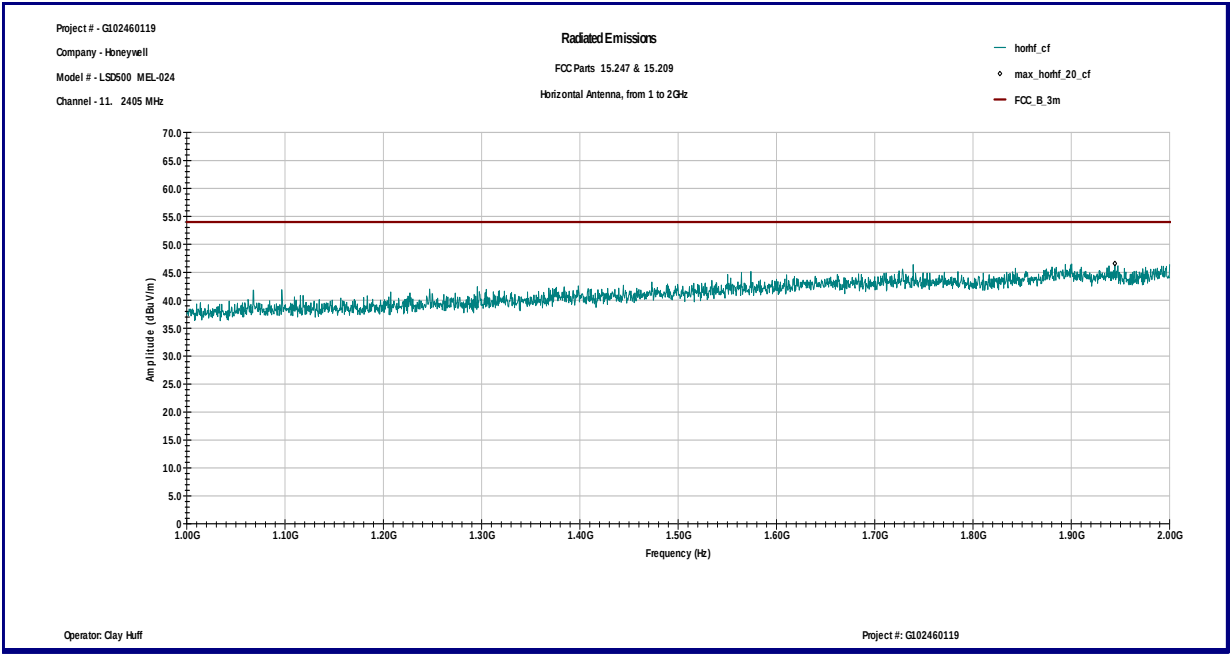
Graph 3.1.1



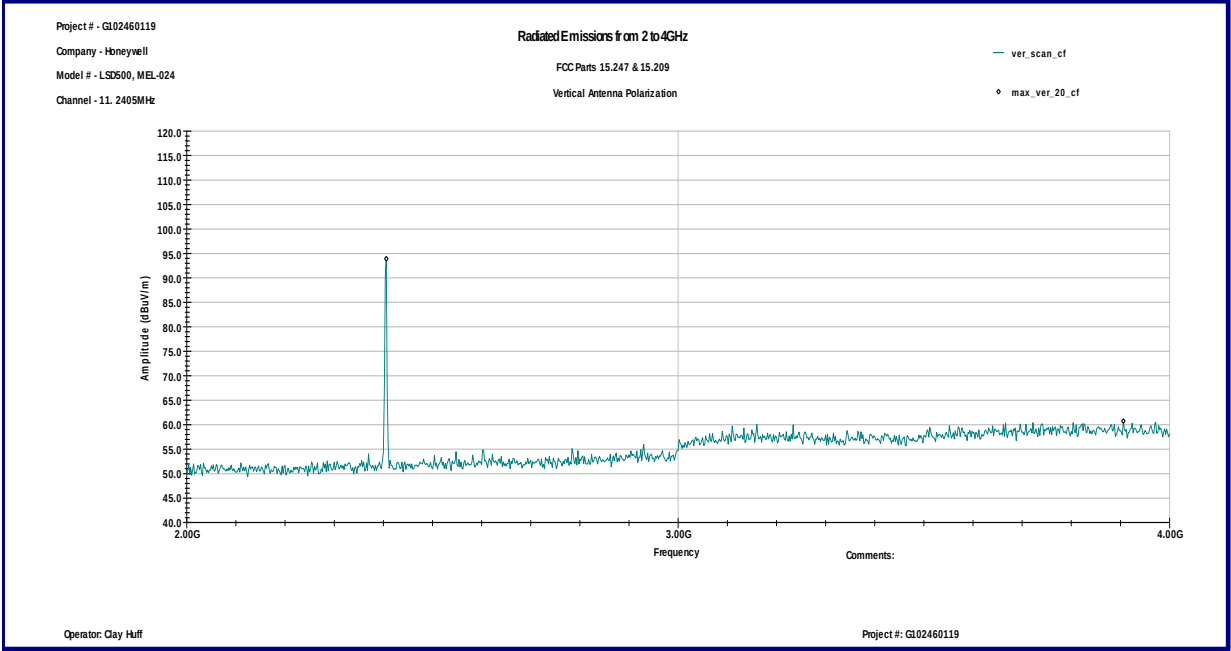
Graph 3.1.2



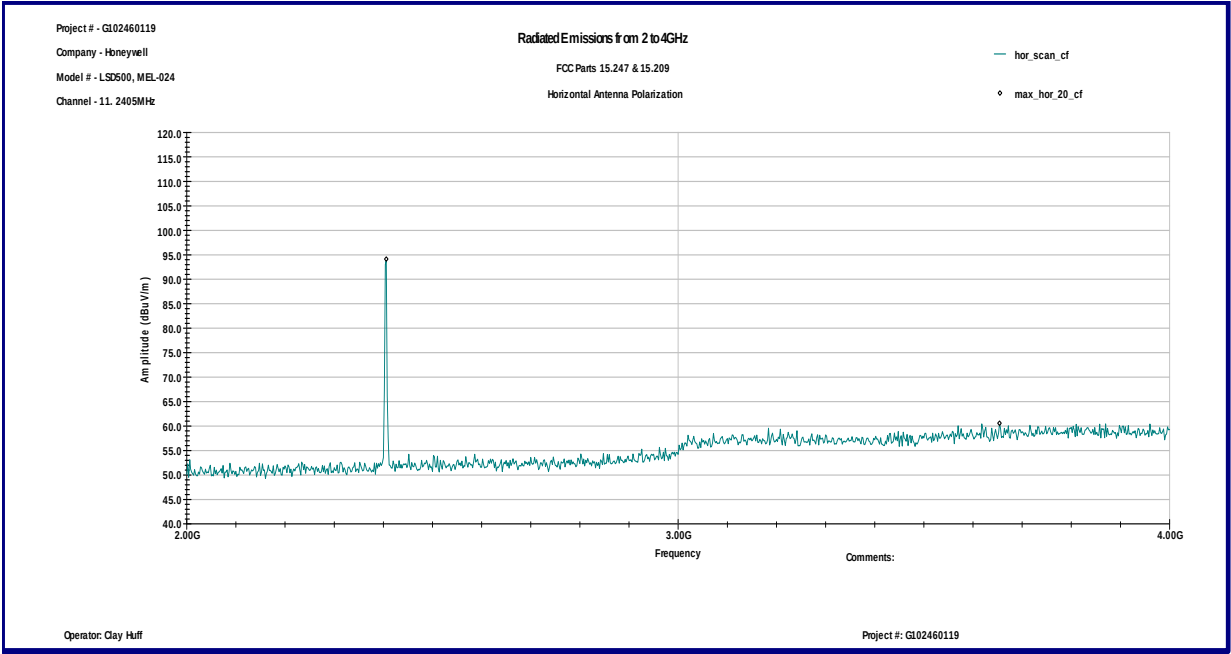
Graph 3.1.3



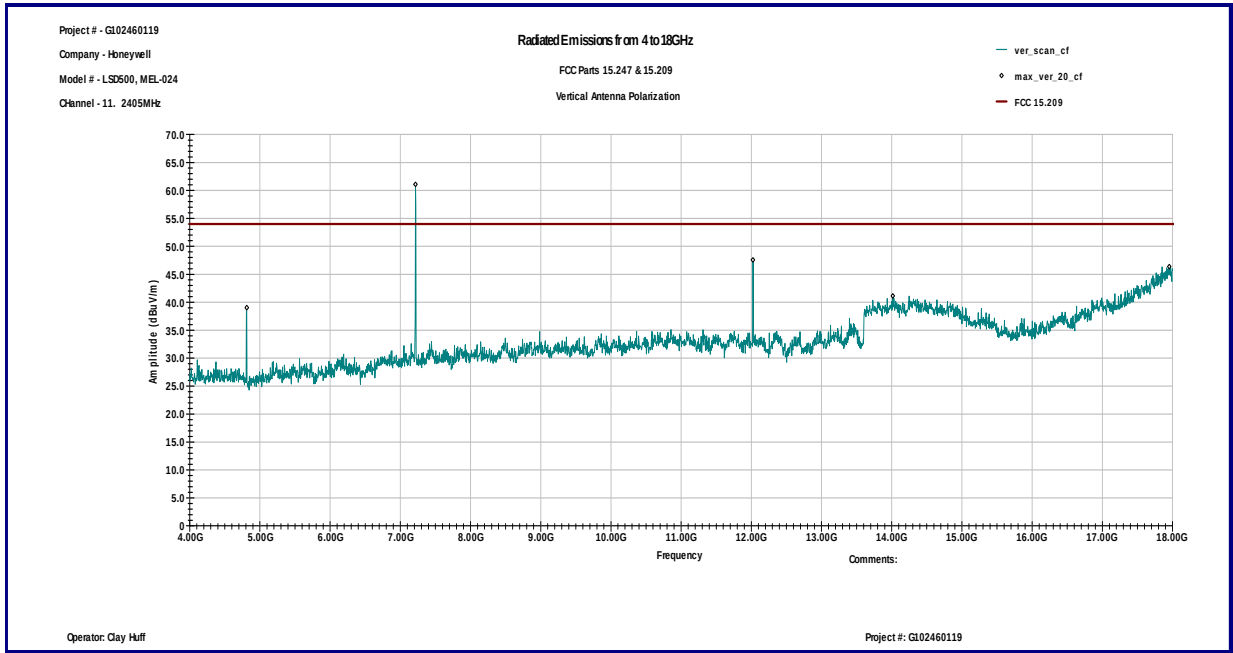
Graph 3.1.4



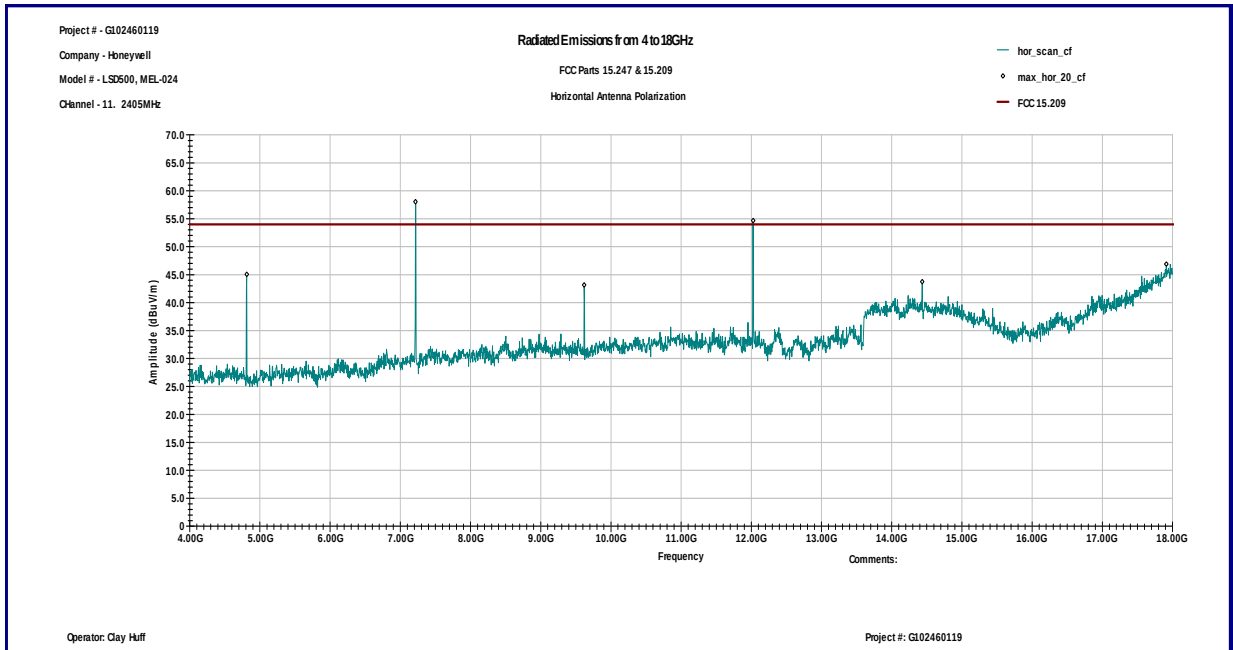
Graph 3.1.5



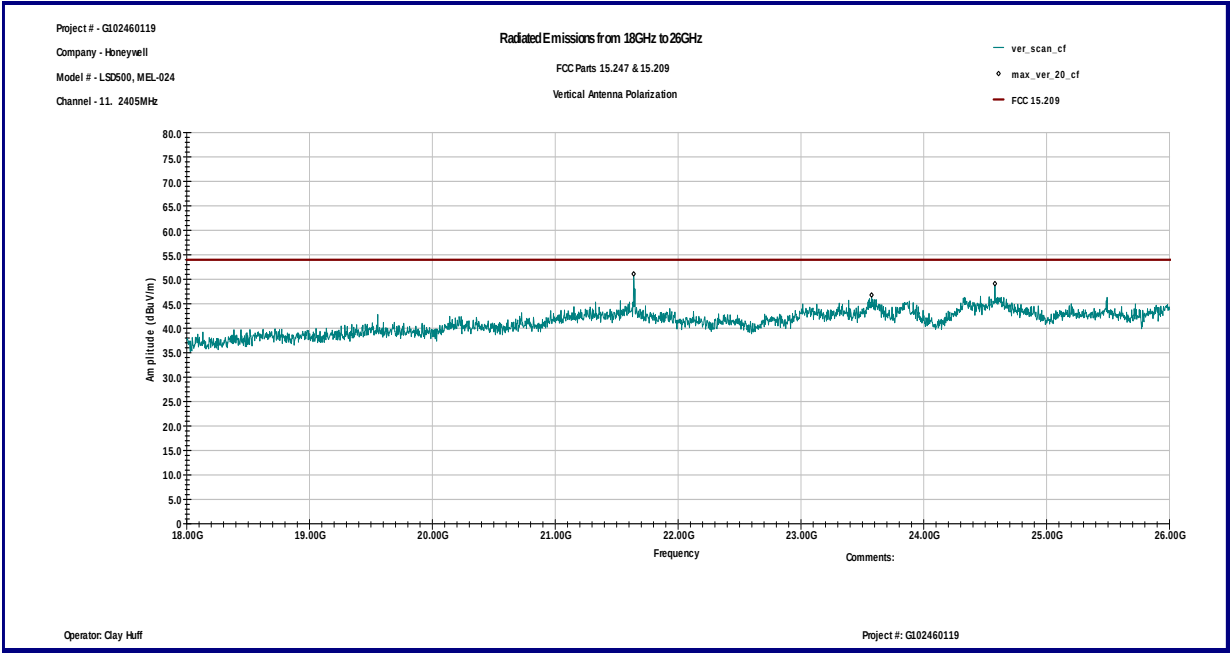
Graph 3.1.6



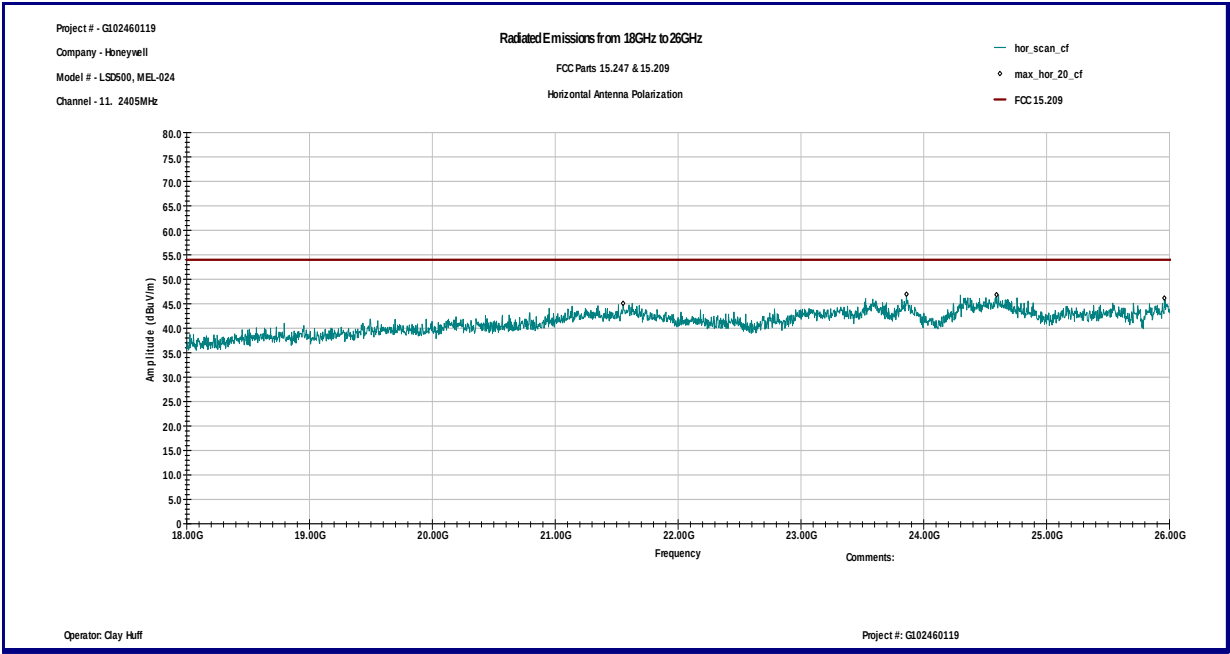
Graph 3.1.7



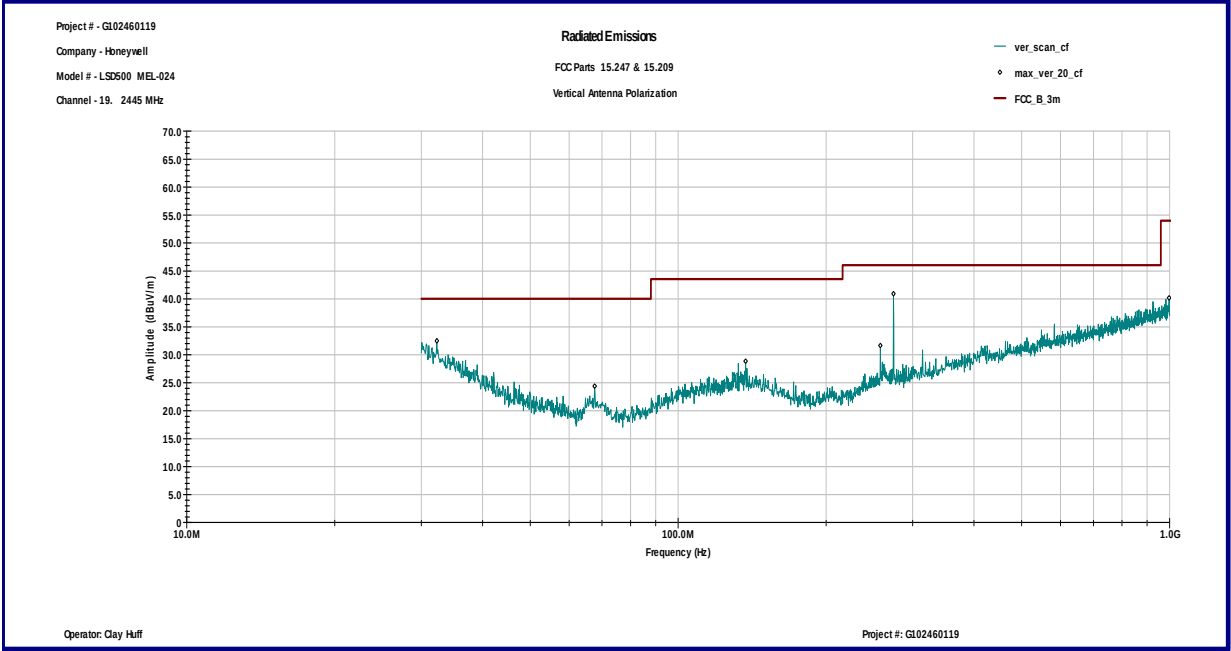
Graph 3.1.8



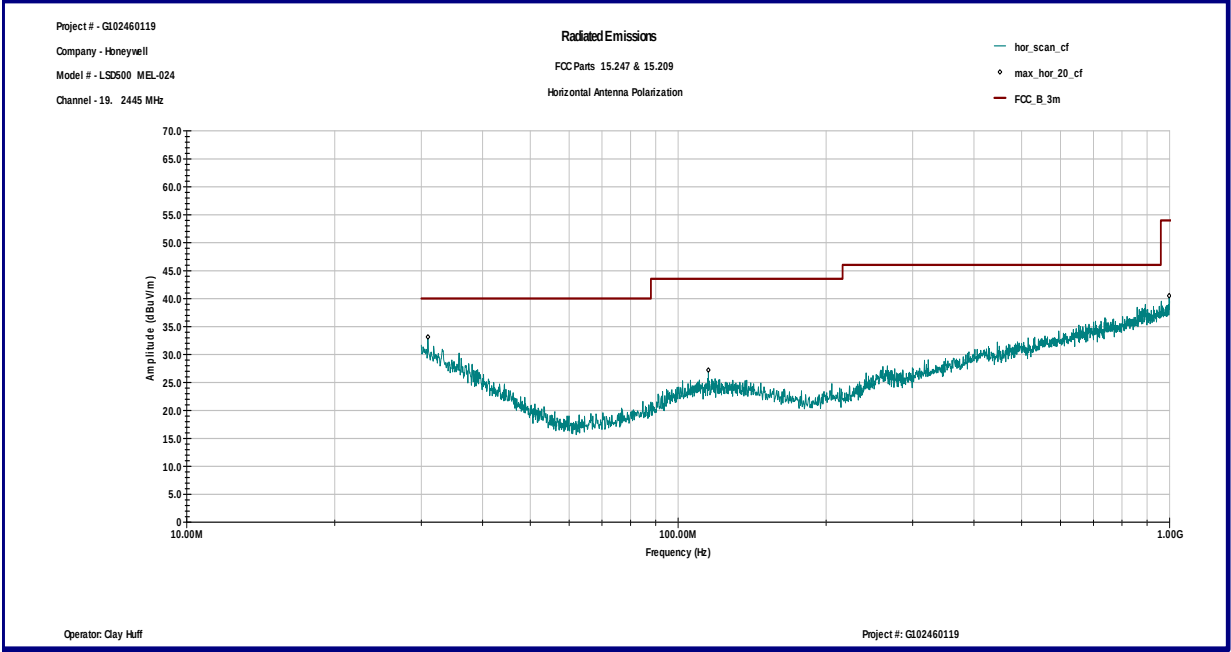
Graph 3.1.9



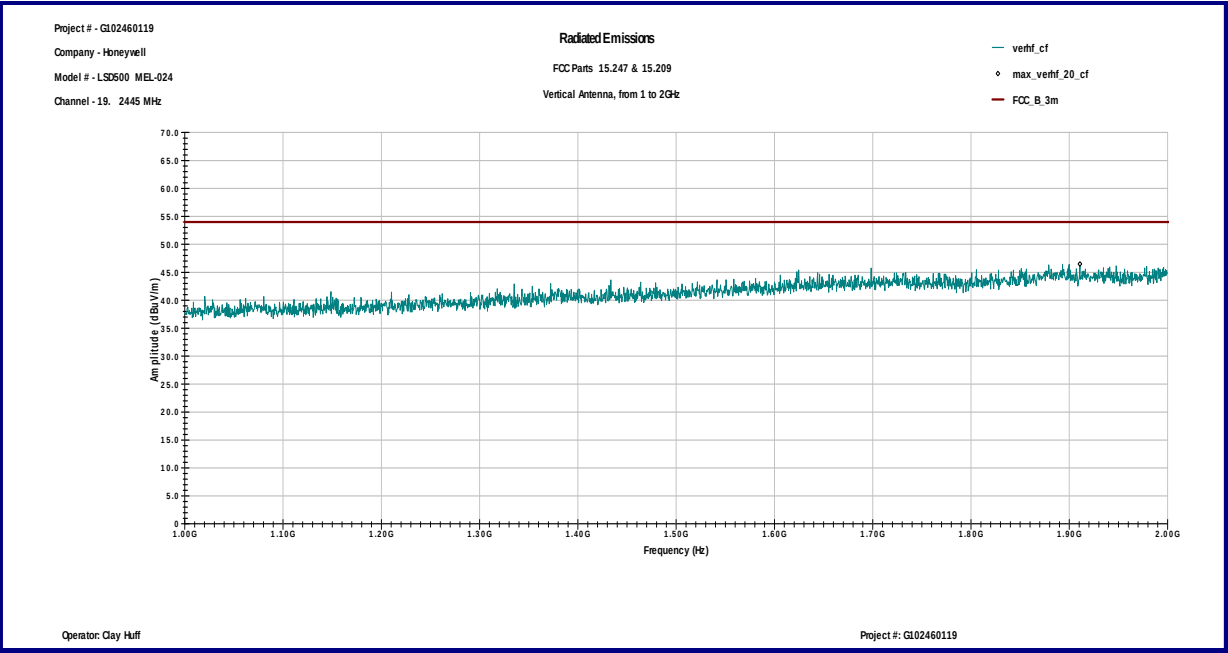
Graph 3.1.10



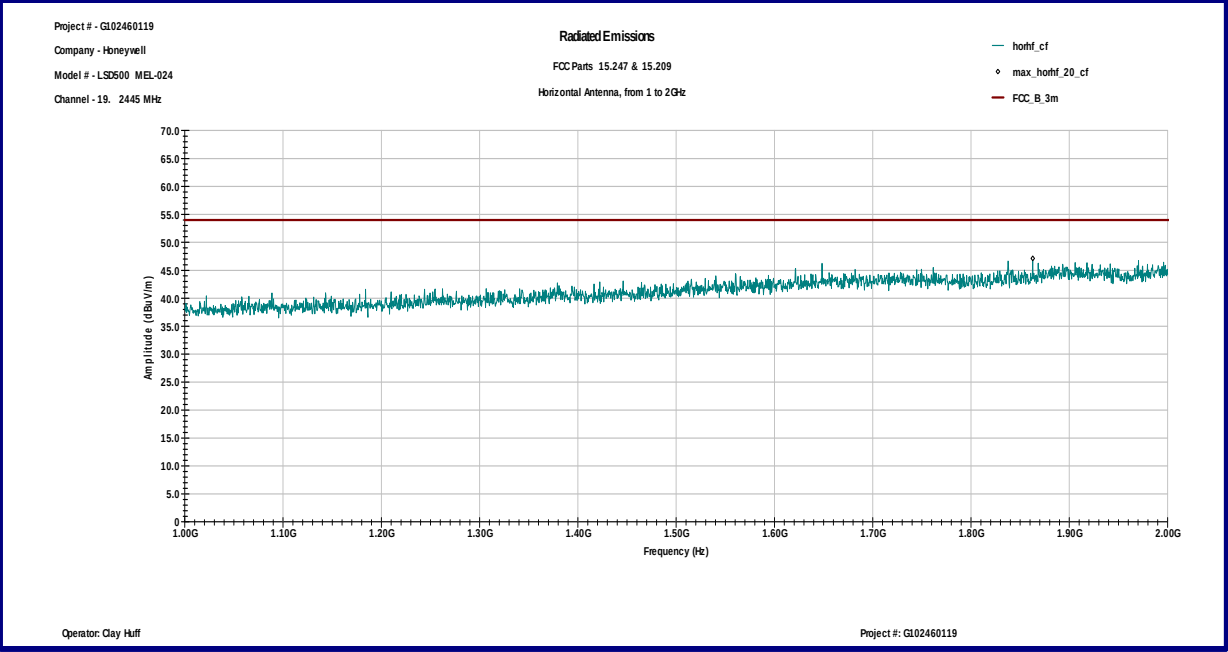
Graph 3.1.11



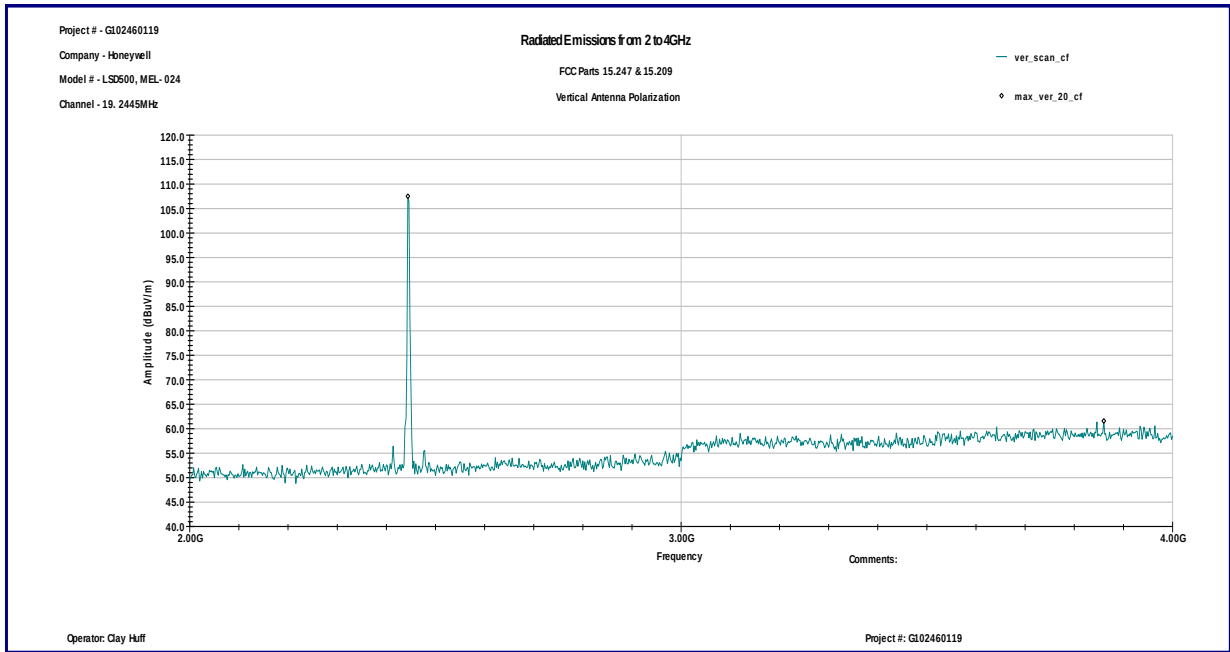
Graph 3.1.12



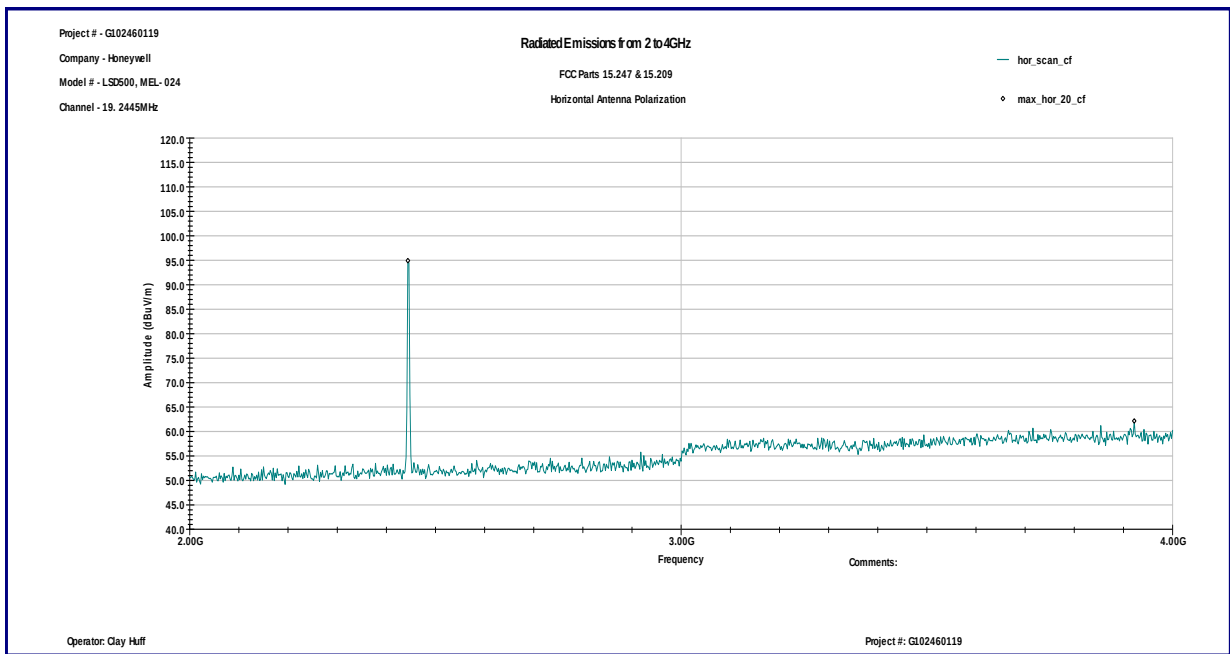
Graph 3.1.13



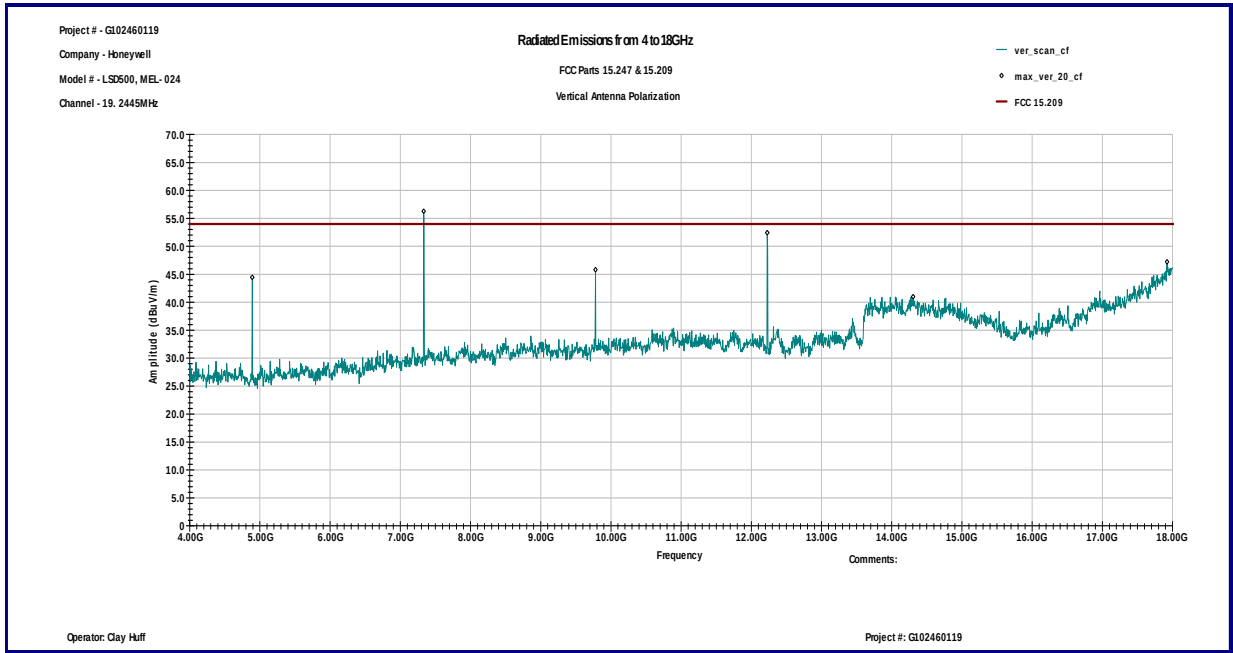
Graph 3.1.14



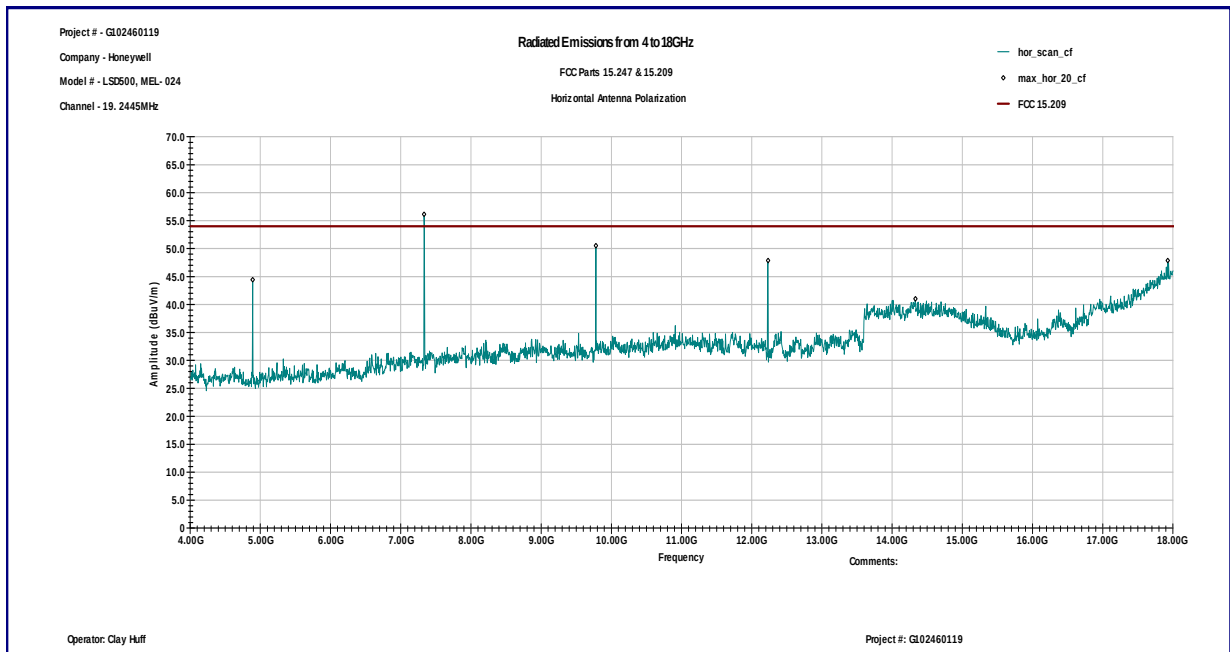
Graph 3.1.15



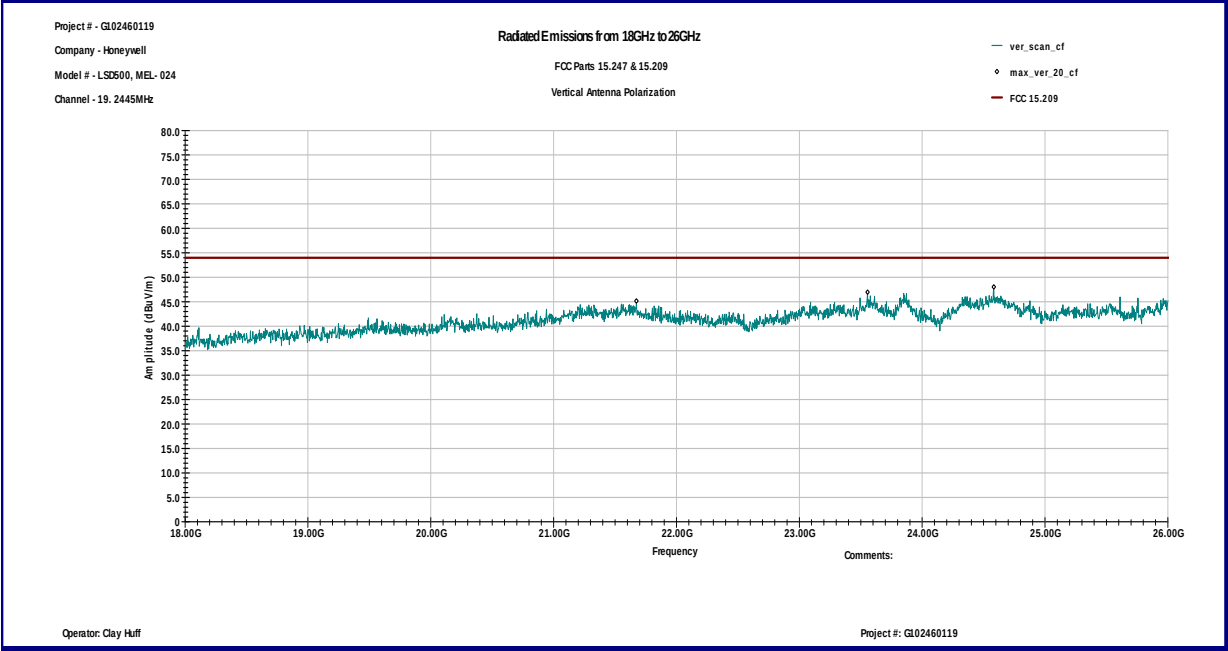
Graph 3.1.16



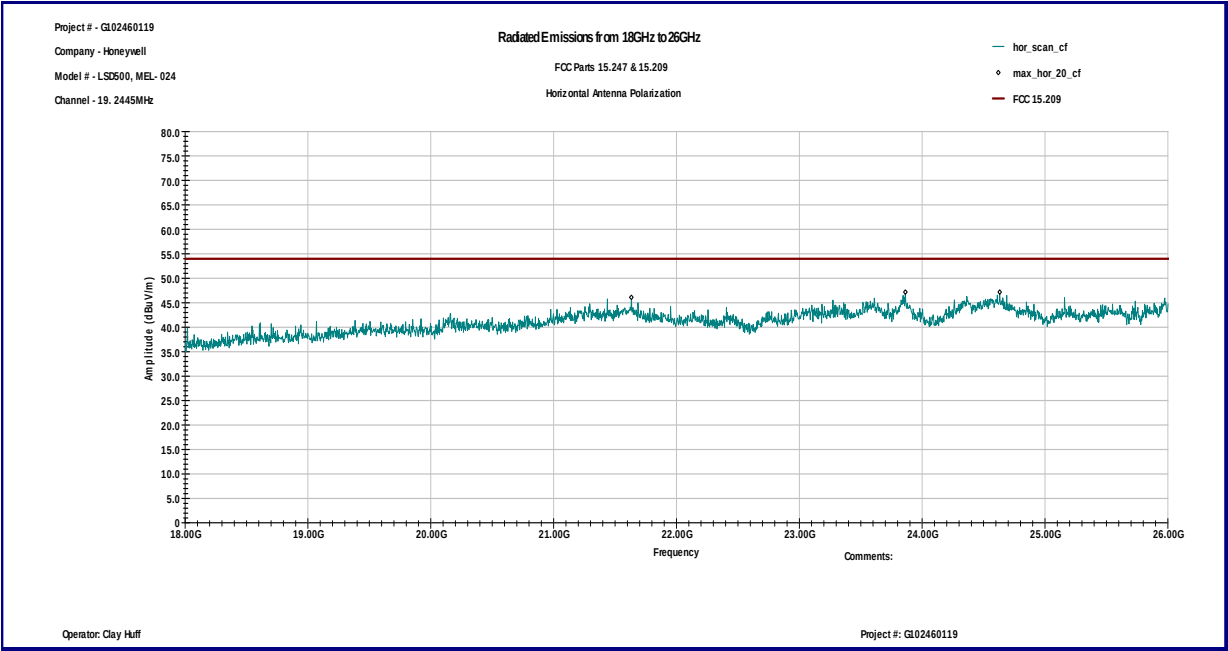
Graph 3.1.17



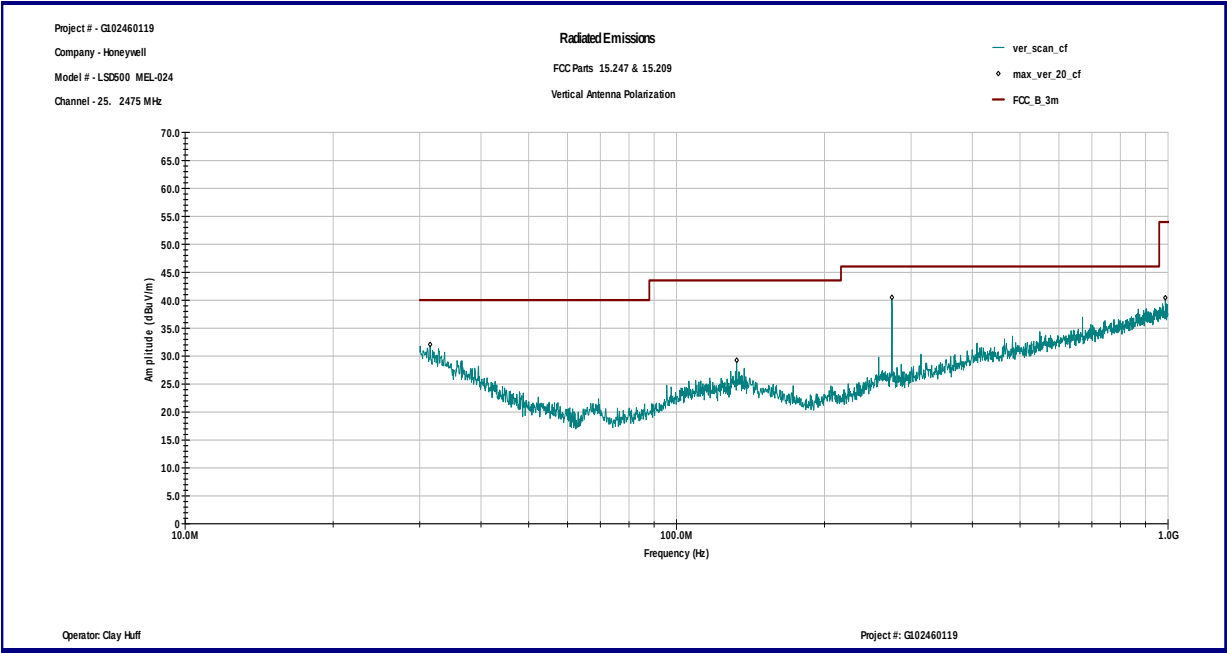
Graph 3.1.18



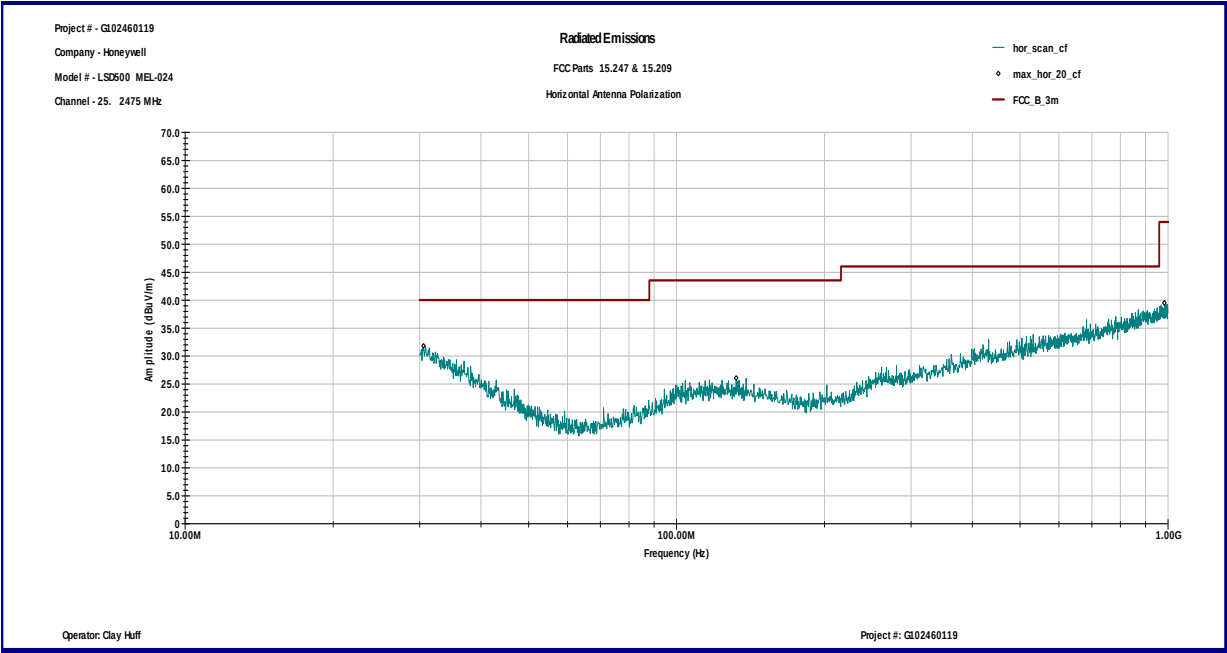
Graph 3.1.19



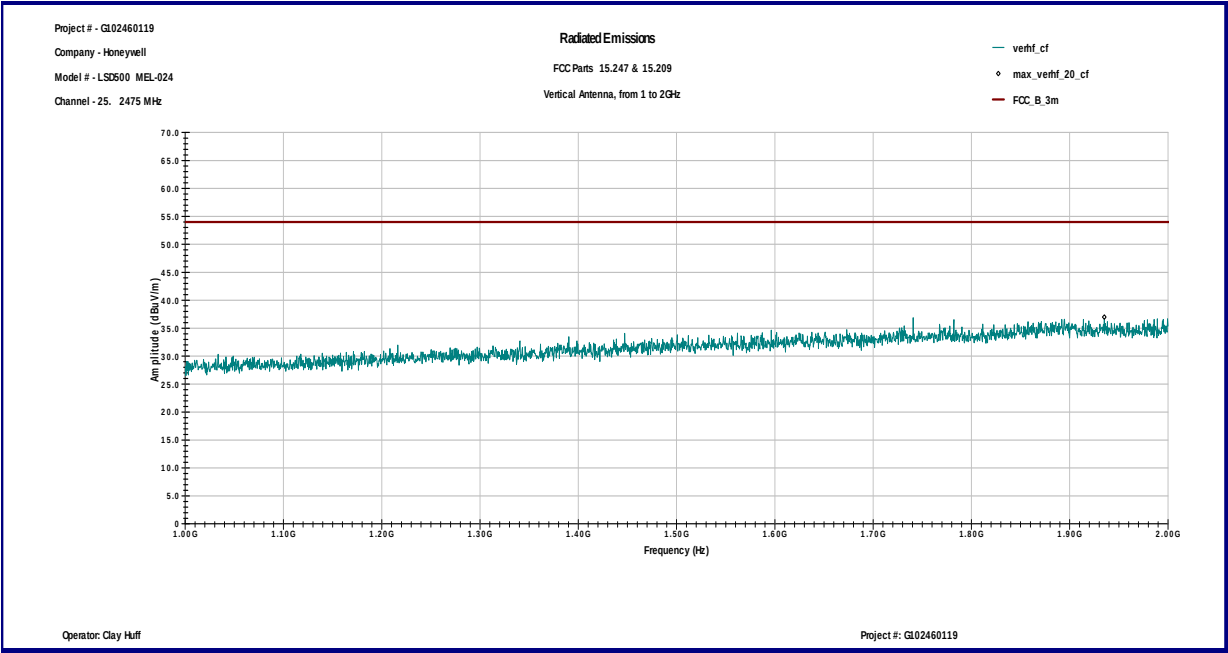
Graph 3.1.20



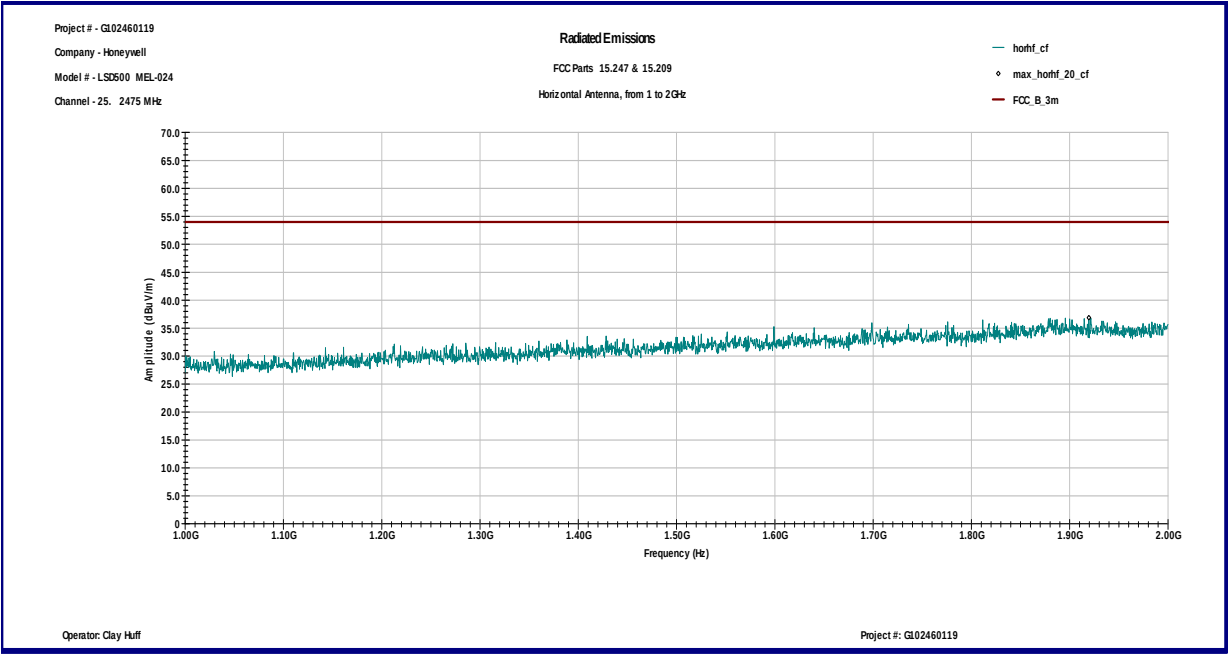
Graph 3.1.21



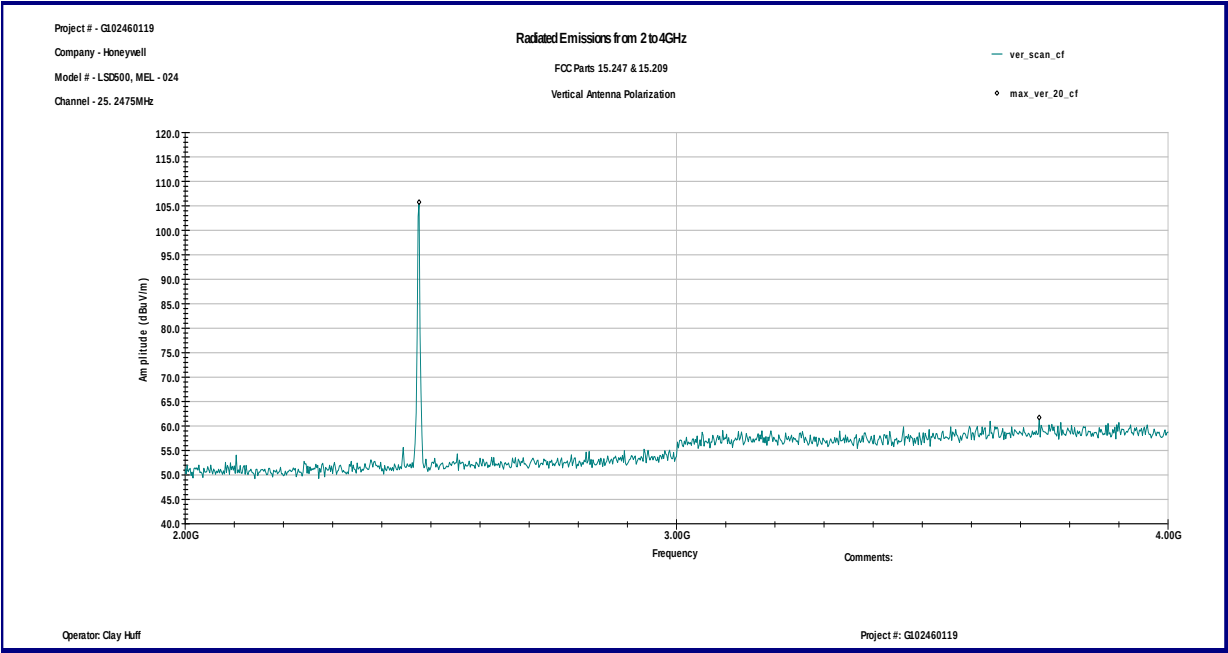
Graph 3.1.22



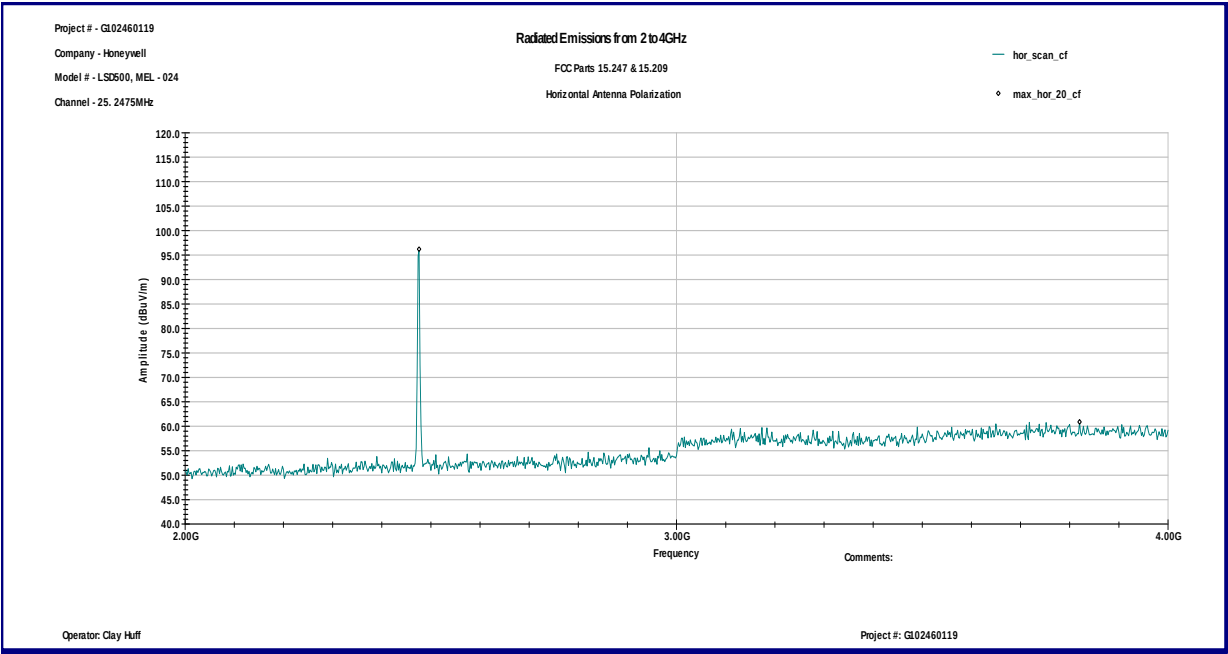
Graph 3.1.23



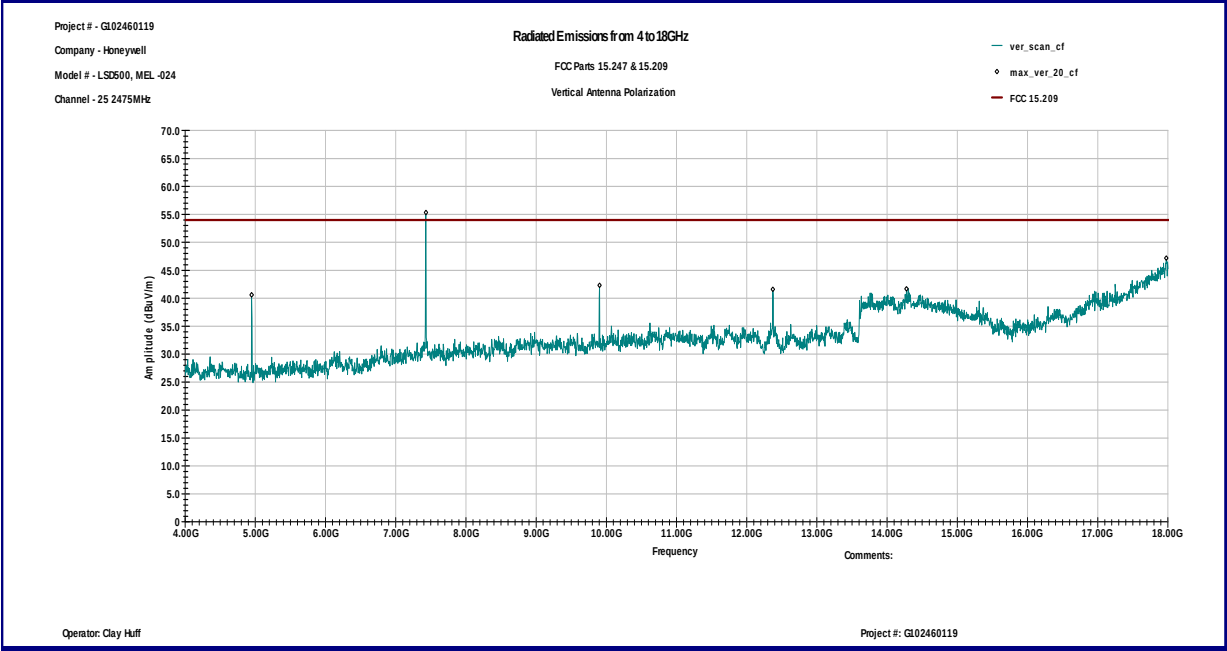
Graph 3.1.24



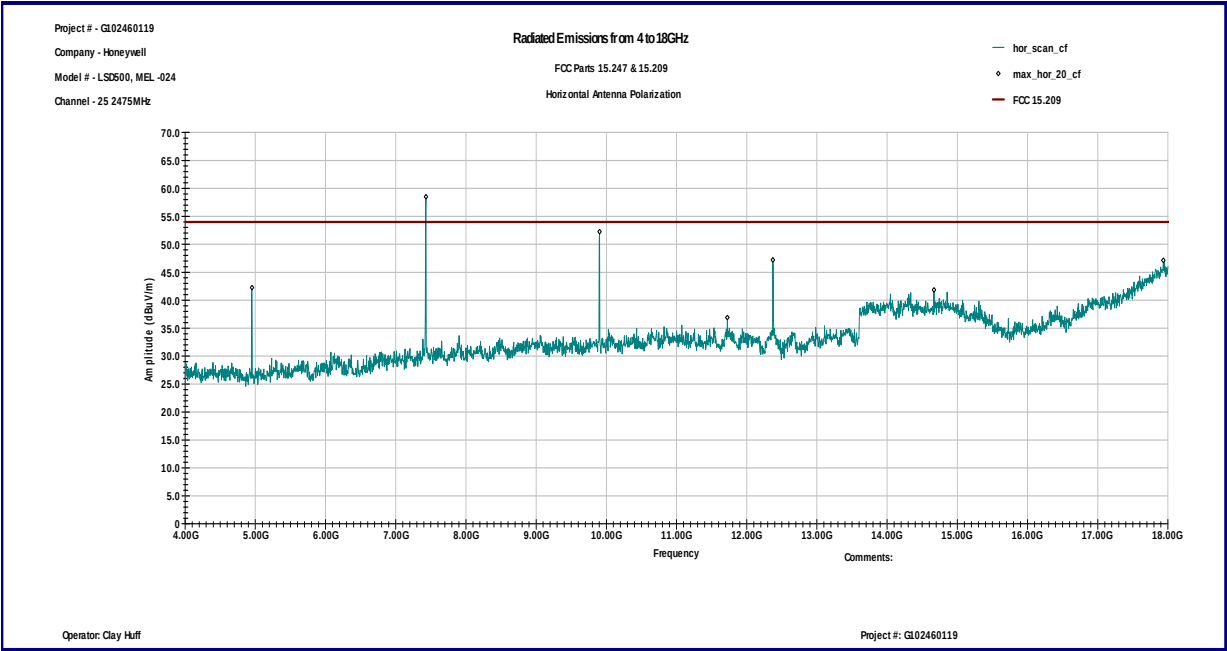
Graph 3.1.25



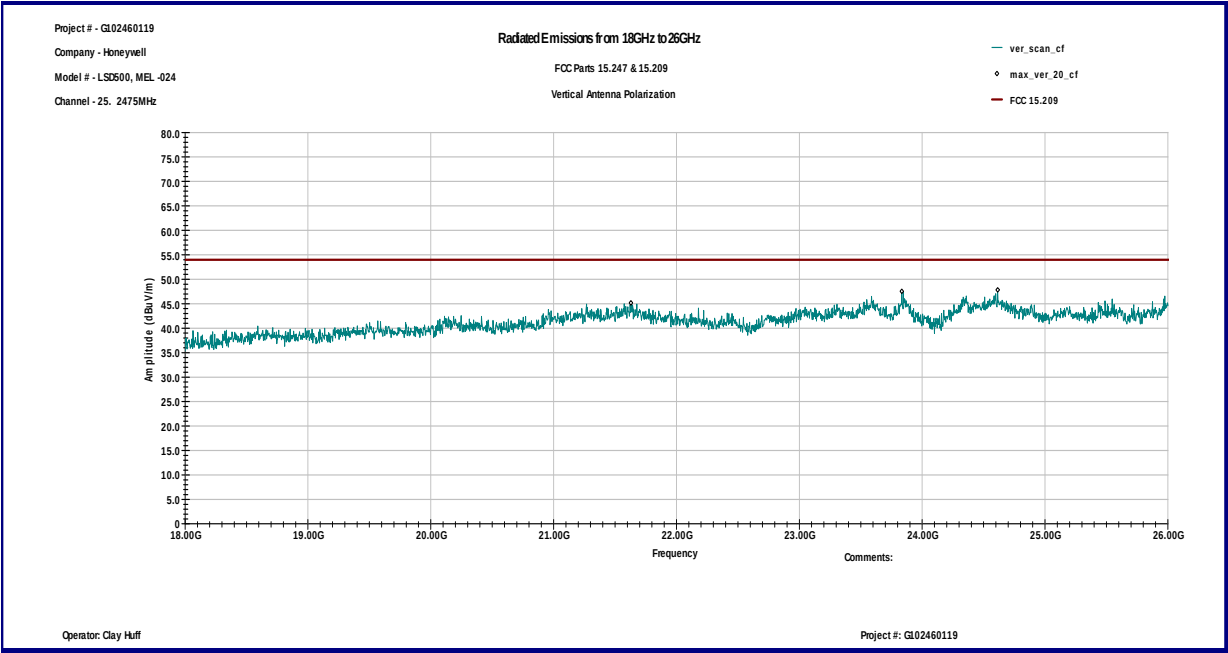
Graph 3.1.26



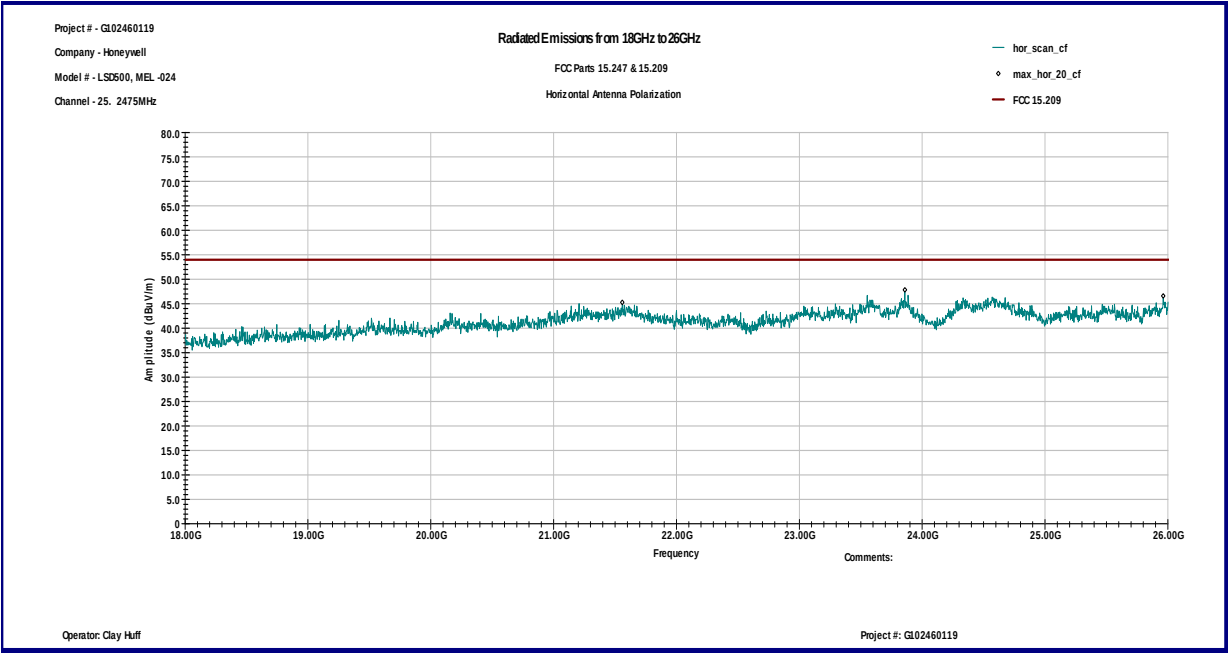
Graph 3.1.27



Graph 3.1.28



Graph 3.1.29



Graph 3.1.30

Date:	February 3 – 5, 2016	Result: Pass
Tested by:	Clay Huff	
Standard:	FCC part 15.247(d)	
Test Point:	Enclosure Sample MEL-024	
Operation mode:	See page 5	
Environmental Conditions:	22.2°C; 23.4%(RH); 98kPa	
Equipment Verification:	☒	
Note:	Sample MEL-025, Peak readings	

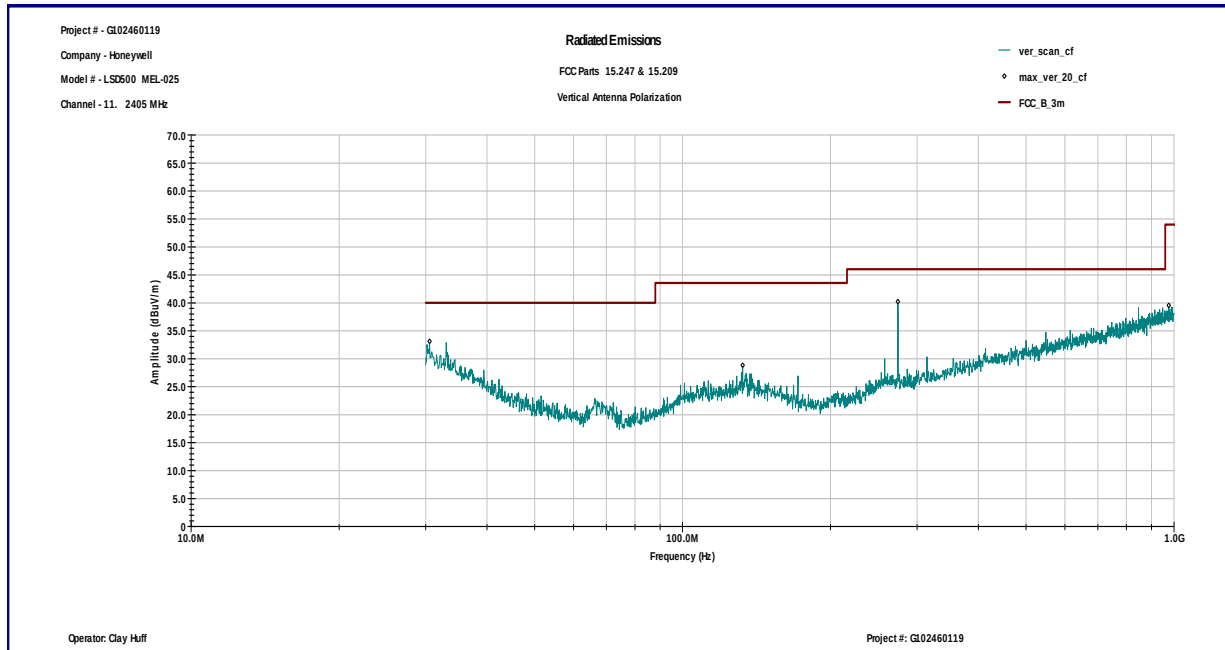
Table 3.1.3

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	Peak readings dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB	Comments
	Polarity	Hts(cm)								
Channel 11 . 2405 MHz										
7210.00	V	105	35.7	5.3	41.0	58.2	58.2	74.0	-15.8	
7210.00	H	100	35.7	5.3	41.0	58.4	58.4	74.0	-15.6	
12022.00	H	100	39.2	6.8	40.4	49.4	54.9	74.0	-19.1	
Channel 19 . 2445 MHz										
7330.00	V	100	36.0	5.3	40.8	59.8	60.4	74.0	-13.6	
7330.00	H	132	36.0	5.3	40.8	59.1	59.6	74.0	-14.4	
12220.00	H	100	39.0	6.9	40.6	51.5	56.8	74.0	-17.2	
Channel 25 . 2475 MHz										
7430.00	V	125	36.2	5.4	40.7	56.3	57.3	74.0	-16.7	
7430.00	H	110	36.2	5.4	40.7	58.1	59.0	74.0	-15.0	

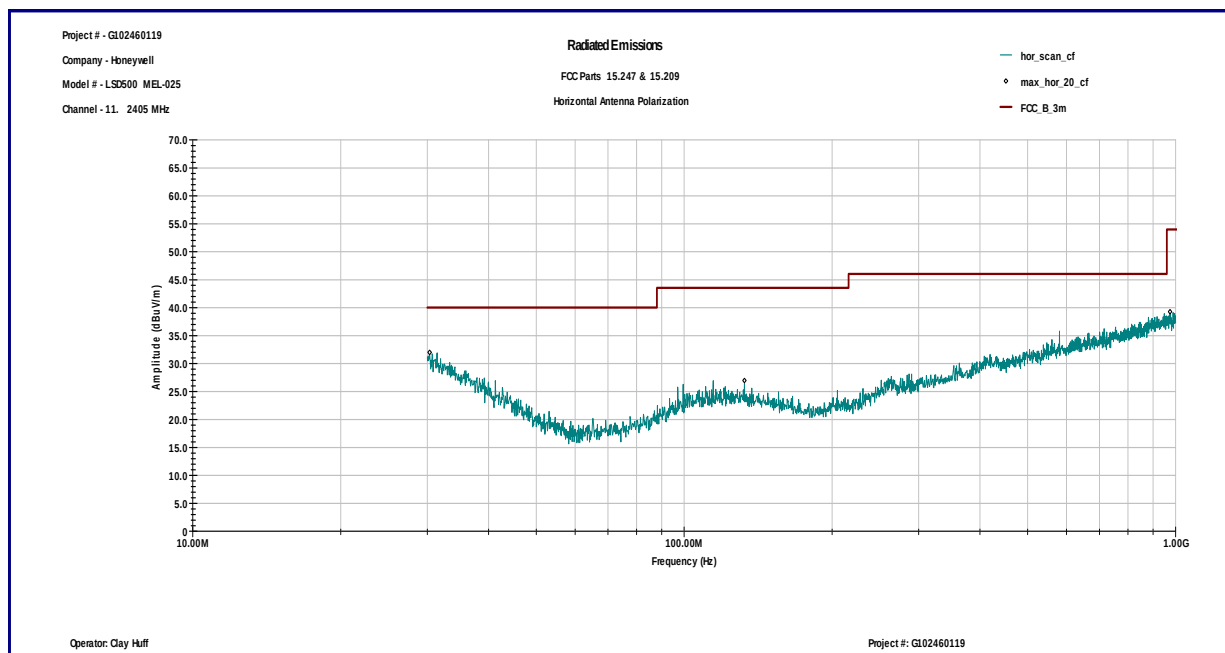
Date:	February 3 – 5, 2016	Result: Pass
Tested by:	Clay Huff	
Standard:	FCC part 15.247(d)	
Test Point:	Enclosure Sample MEL-024	
Operation mode:	See page 5	
Environmental Conditions:	22.2°C; 23.4%(RH); 98kPa	
Equipment Verification:	☒	
Note:	Sample MEL-025, Average value	

Table 3.1.4

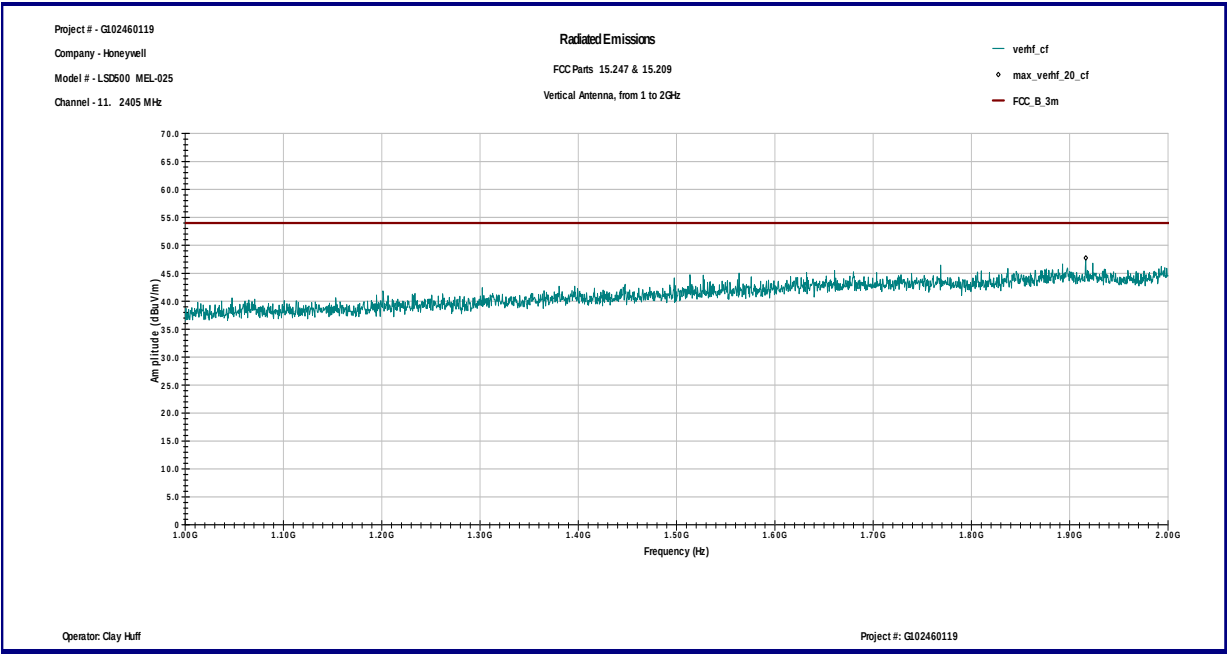
Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	AVG Reading dBμV	Total @ 3m dBμV/m	Limit dBμV/m	Margin dB	Comments
Polarity	Hts(cm)									
Channel 11 . 2405 MHz										
2390.00	V	100	28.1	2.9	0.0	10.8	41.8	54.0	-12.2	Bandedge
2390.00	H	103	28.1	2.9	0.0	10.7	41.7	54.0	-12.3	Bandedge
7210.00	V	105	35.7	5.3	41.0	40.2	40.2	54.0	-13.7	
14420.00	V	100	42.3	7.2	40.4	20.3	29.5	54.0	-24.5	
7210.00	H	100	35.7	5.3	41.0	31.2	31.2	54.0	-22.7	
9620.00	H	100	38.0	6.0	40.5	18.9	22.4	54.0	-31.5	
14420.00	H	100	42.3	7.2	40.4	20.3	29.5	54.0	-24.5	
Channel 19 . 2445 MHz										
7330.00	V	100	36.0	5.3	40.8	34.5	35.0	54.0	-19.0	
12220.00	V	100	39.0	6.9	40.6	24.6	29.8	54.0	-24.1	
7330.00	H	132	36.0	5.3	40.8	36.8	37.3	54.0	-16.7	
12220.00	H	100	39.0	6.9	40.6	24.6	29.8	54.0	-24.1	
Channel 25 . 2475 MHz										
2483.50	V	100	28.4	2.9	0.0	11.4	42.7	54.0	-11.3	Bandedge
2483.50	H	100	28.4	2.9	0.0	10.6	41.9	54.0	-12.1	Bandedge
7430.00	V	125	36.2	5.4	40.7	35.6	36.5	54.0	-17.5	
12230.00	V	100	39.0	6.9	40.6	26.8	32.0	54.0	-21.9	
7430.00	H	110	36.2	5.4	40.7	36.4	37.3	54.0	-16.7	
12230.00	H	105	39.0	6.9	40.6	27.4	32.6	54.0	-21.3	



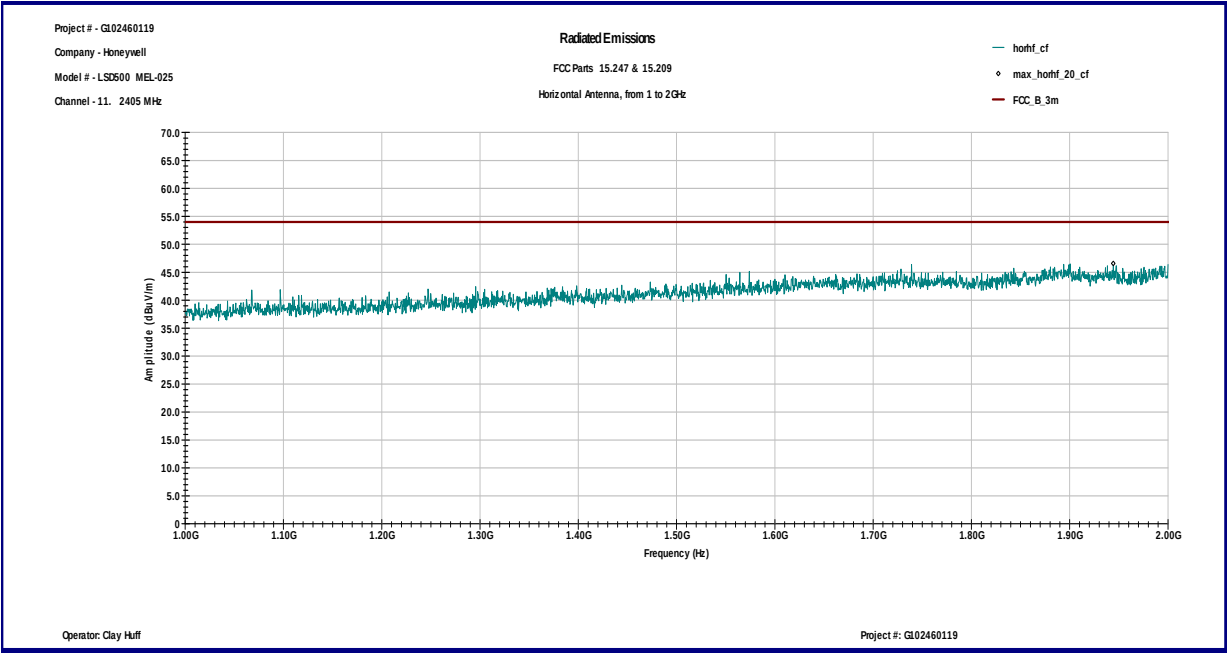
Graph 3.1.31



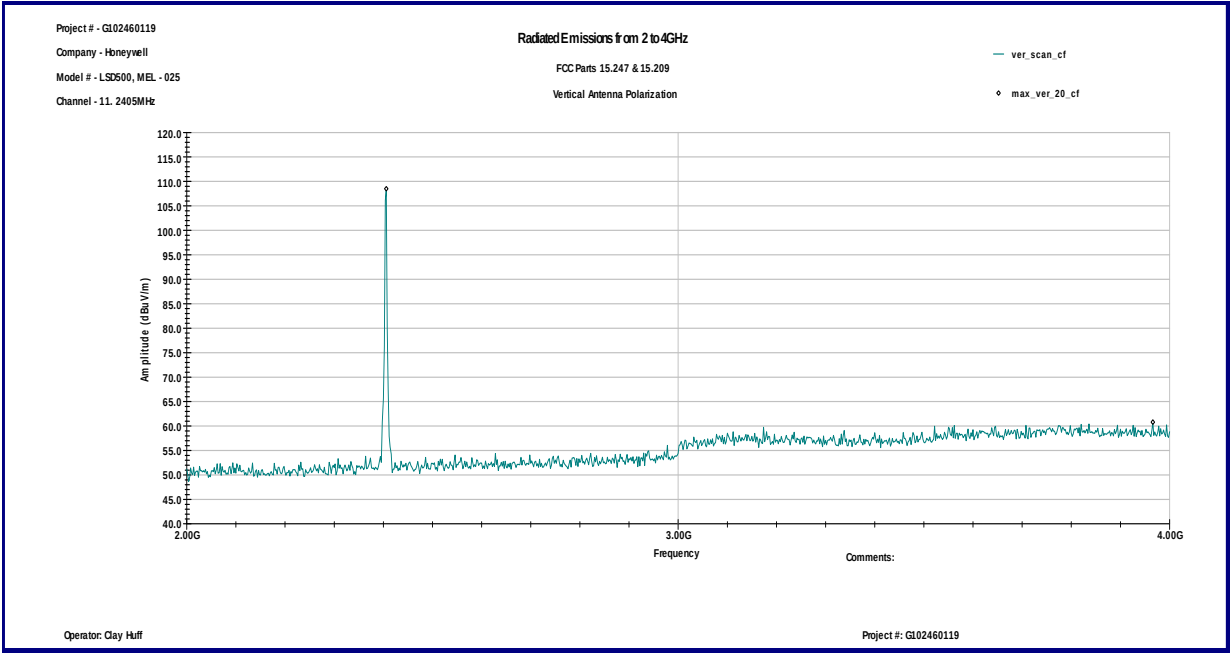
Graph 3.1.32



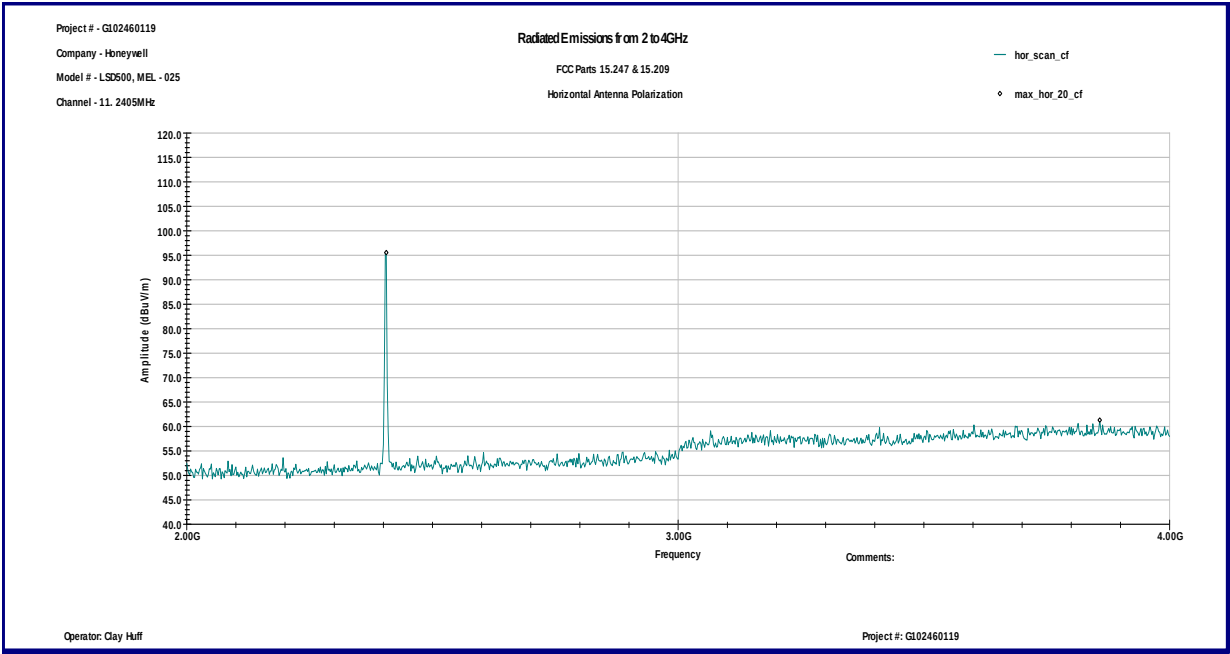
Graph 3.1.33



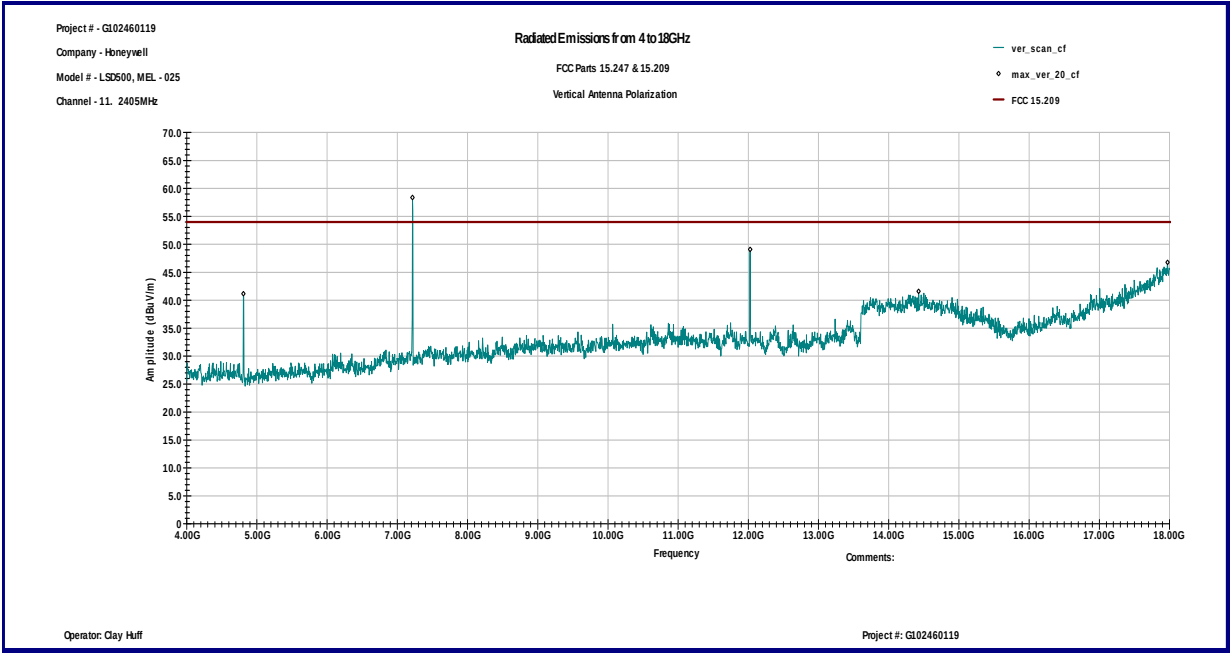
Graph 3.1.34



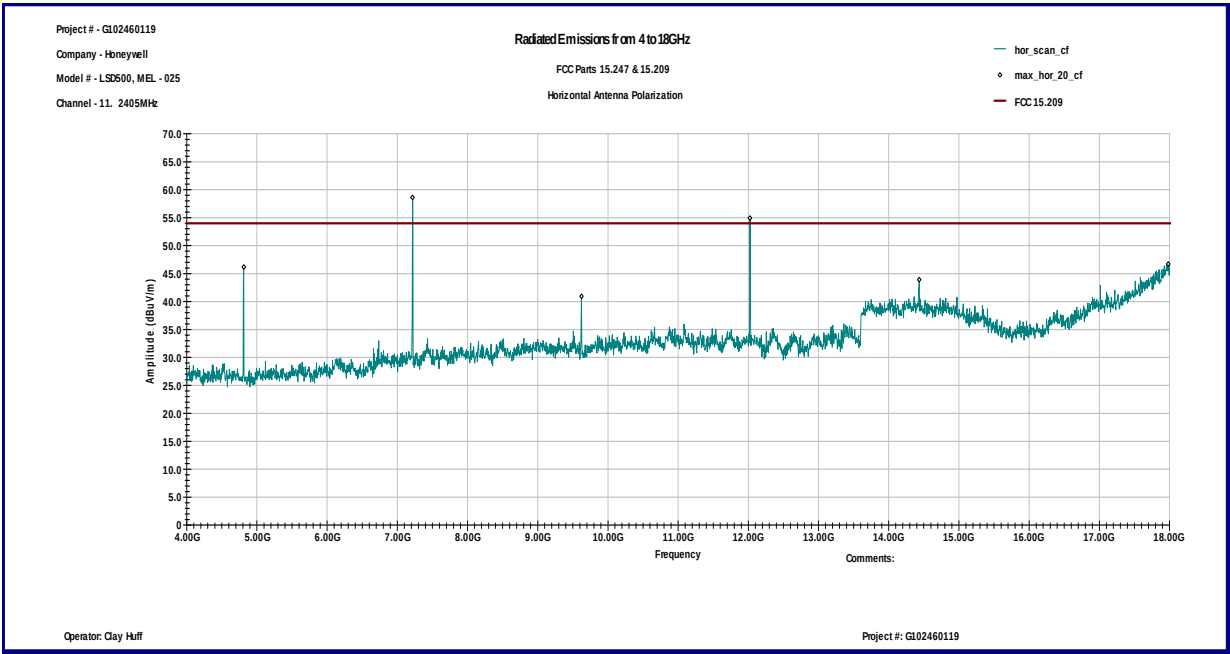
Graph 3.1.35



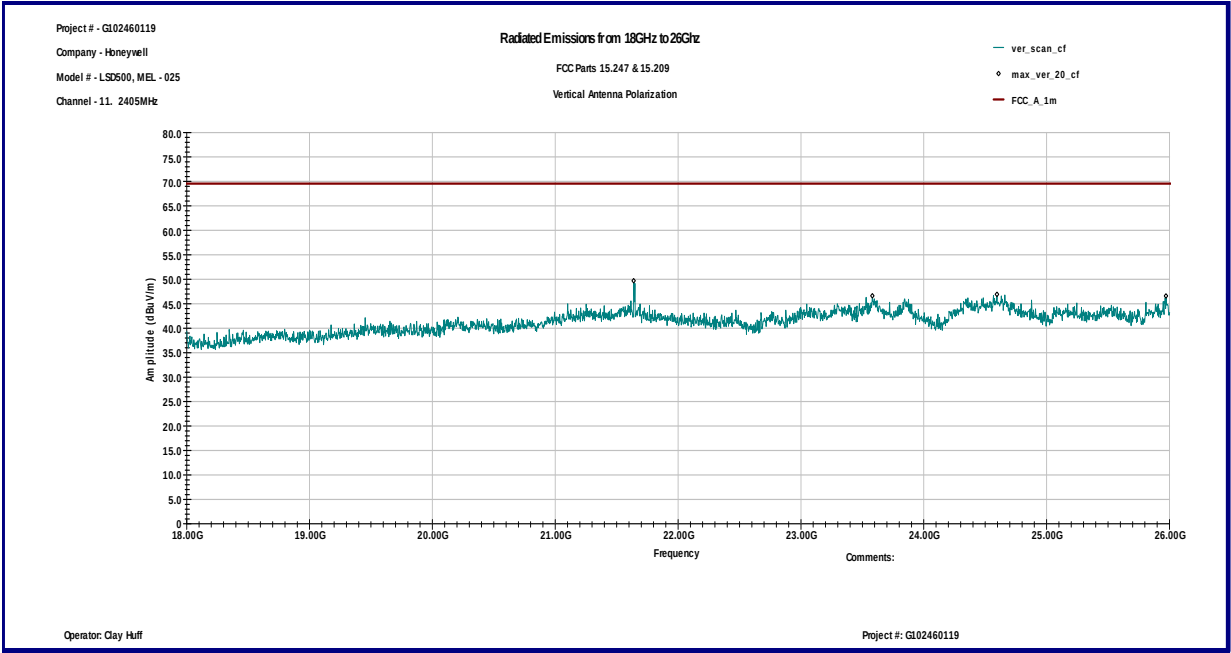
Graph 3.1.36



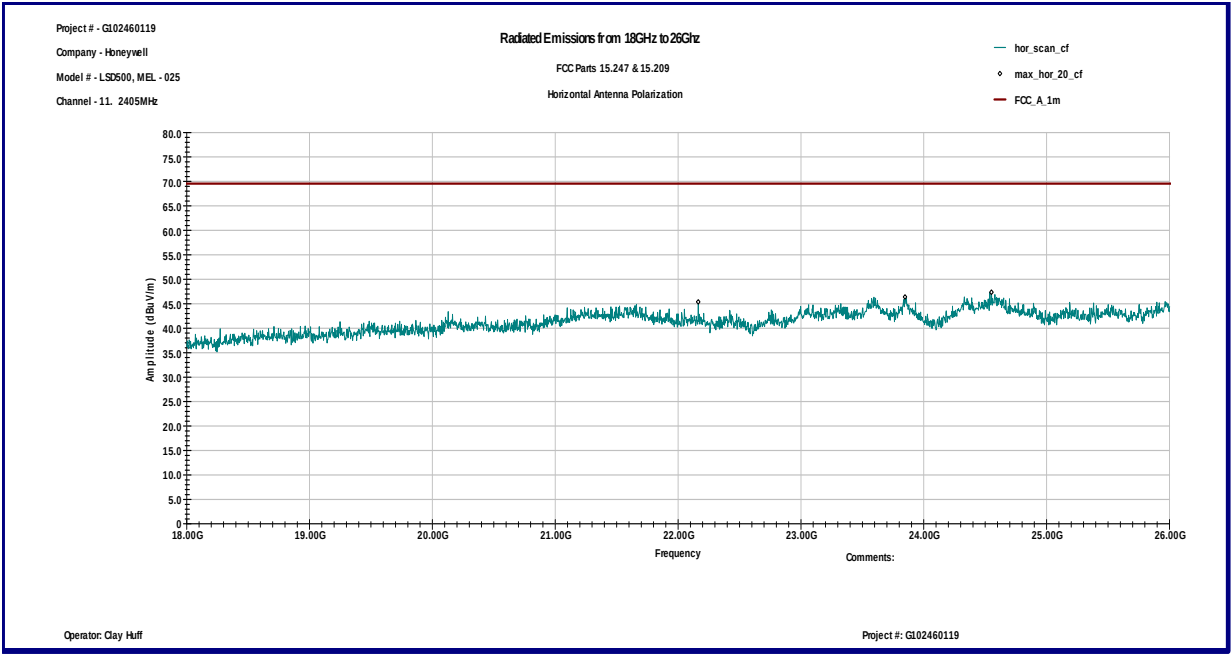
Graph 3.1.37



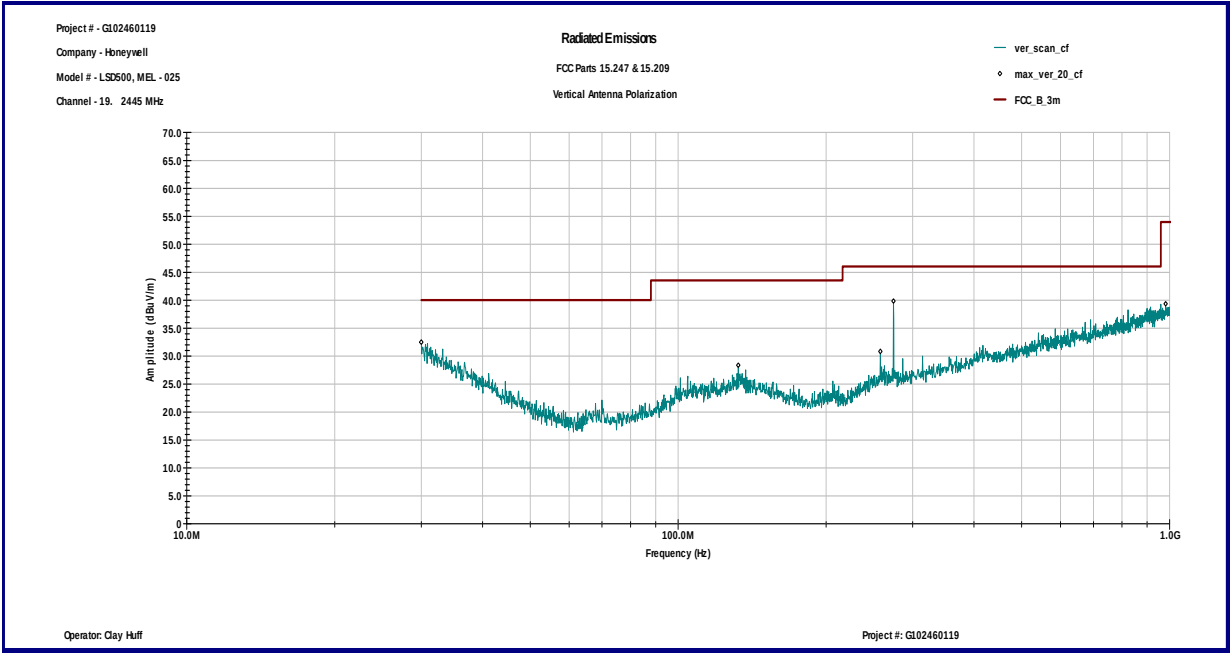
Graph 3.1.38



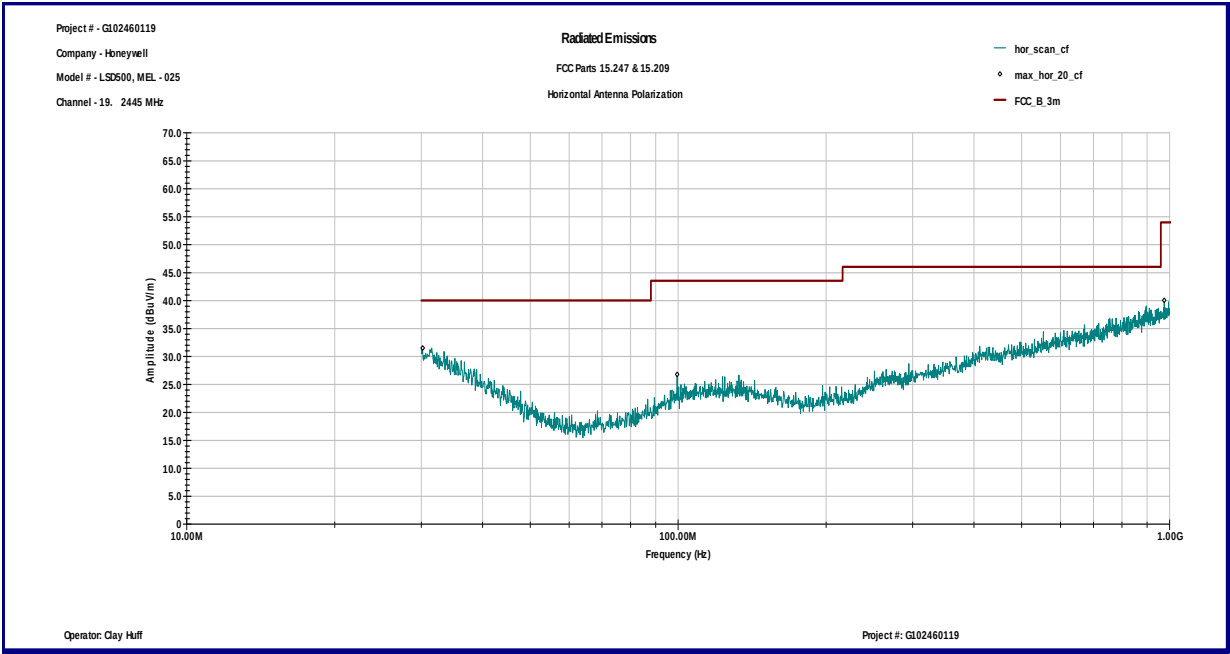
Graph 3.1.39



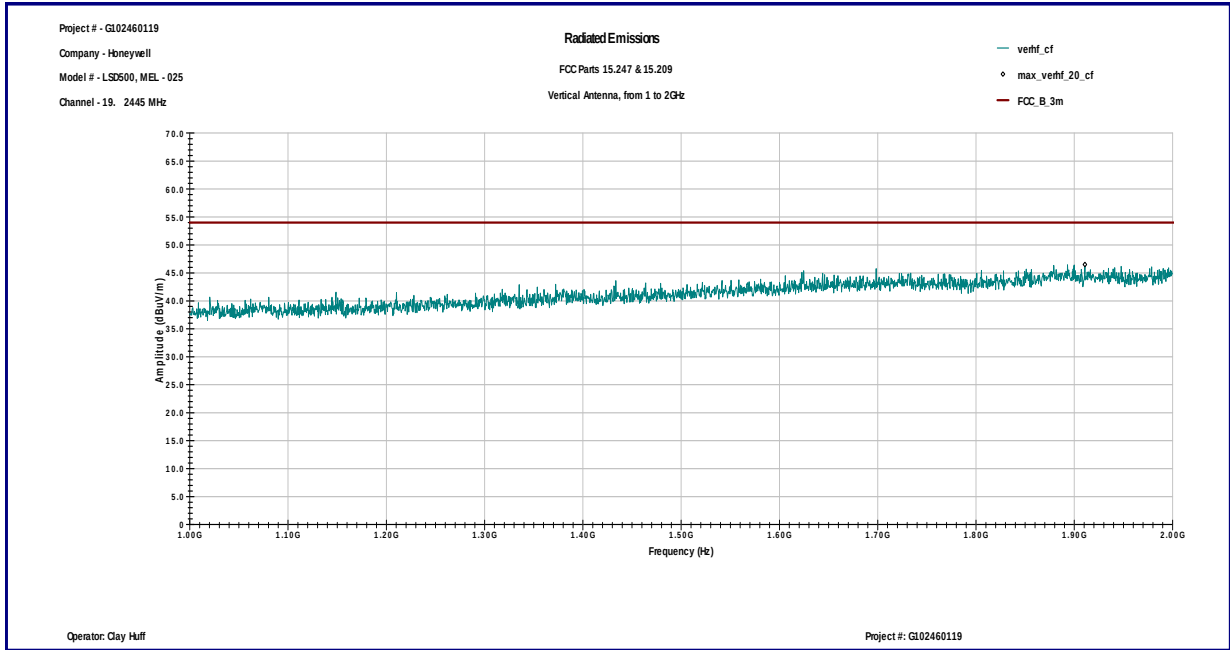
Graph 3.1.40



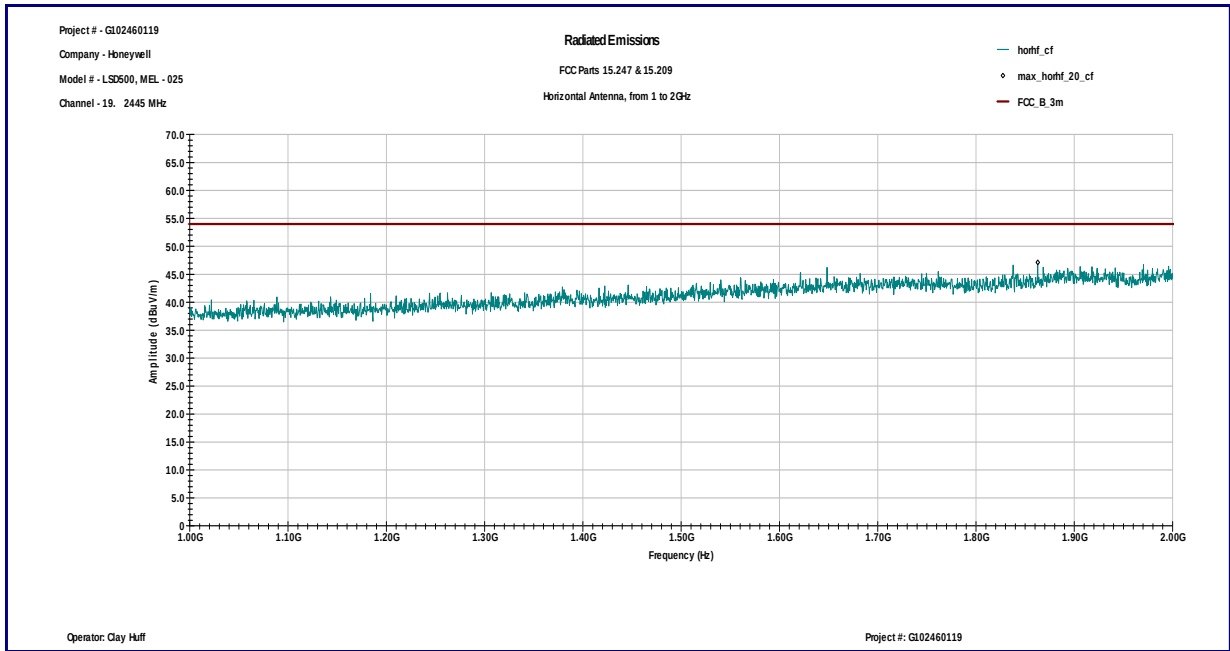
Graph 3.1.41



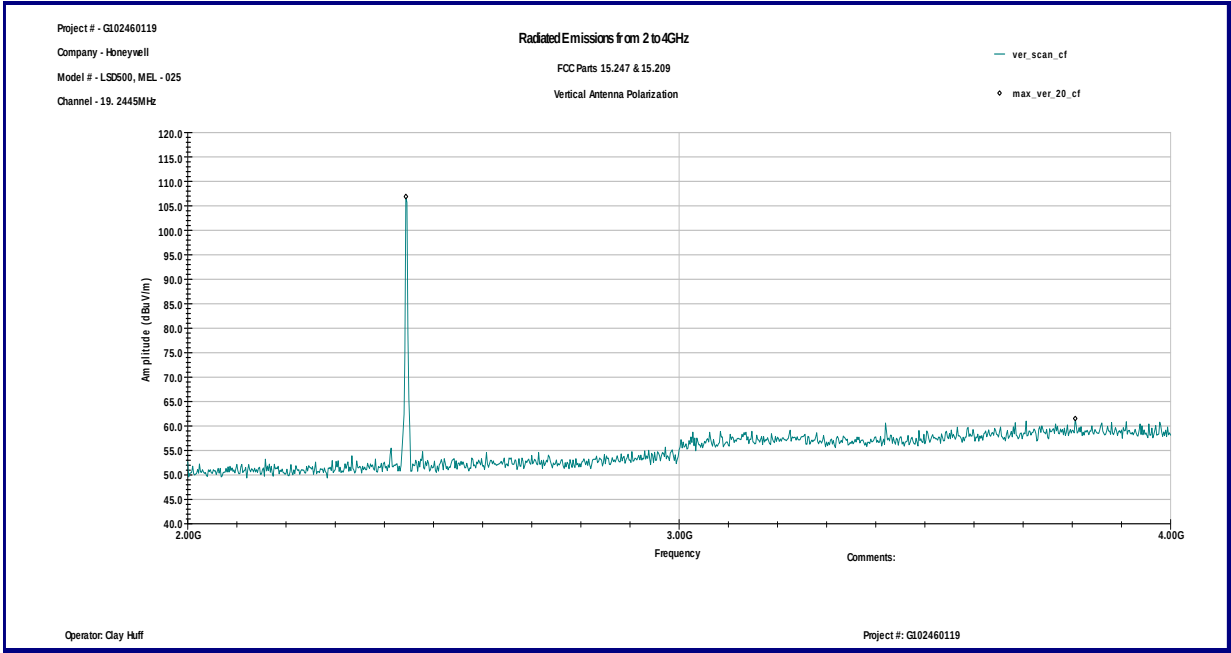
Graph 3.1.42



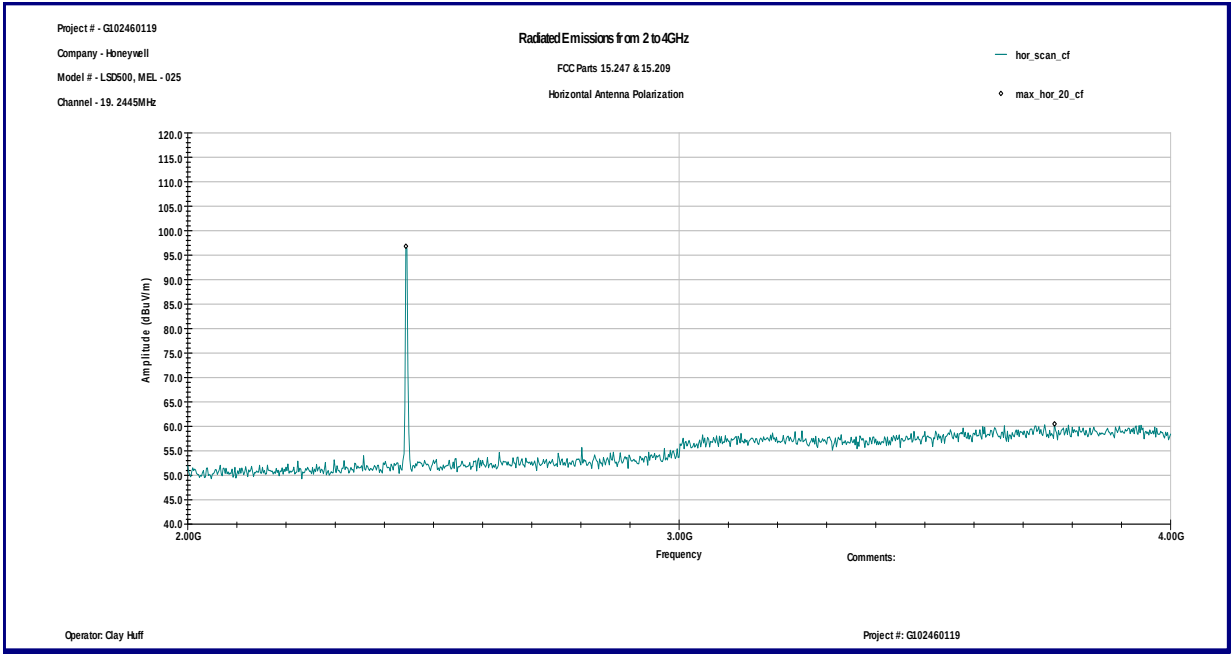
Graph 3.1.43



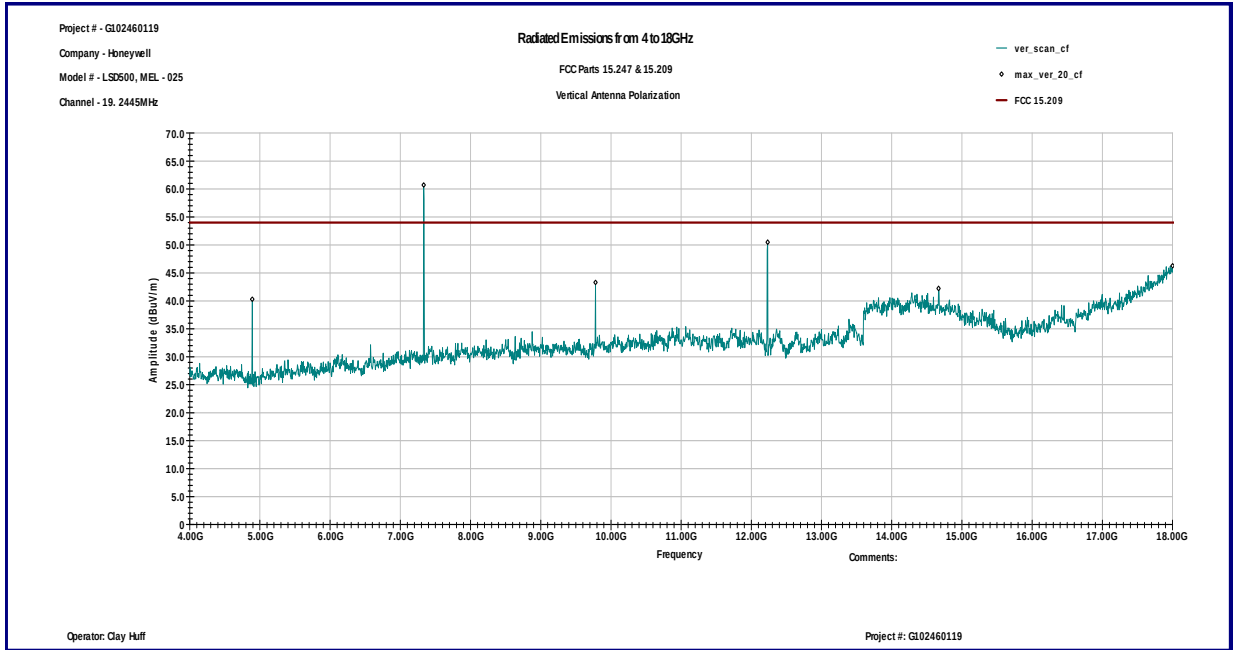
Graph 3.1.44



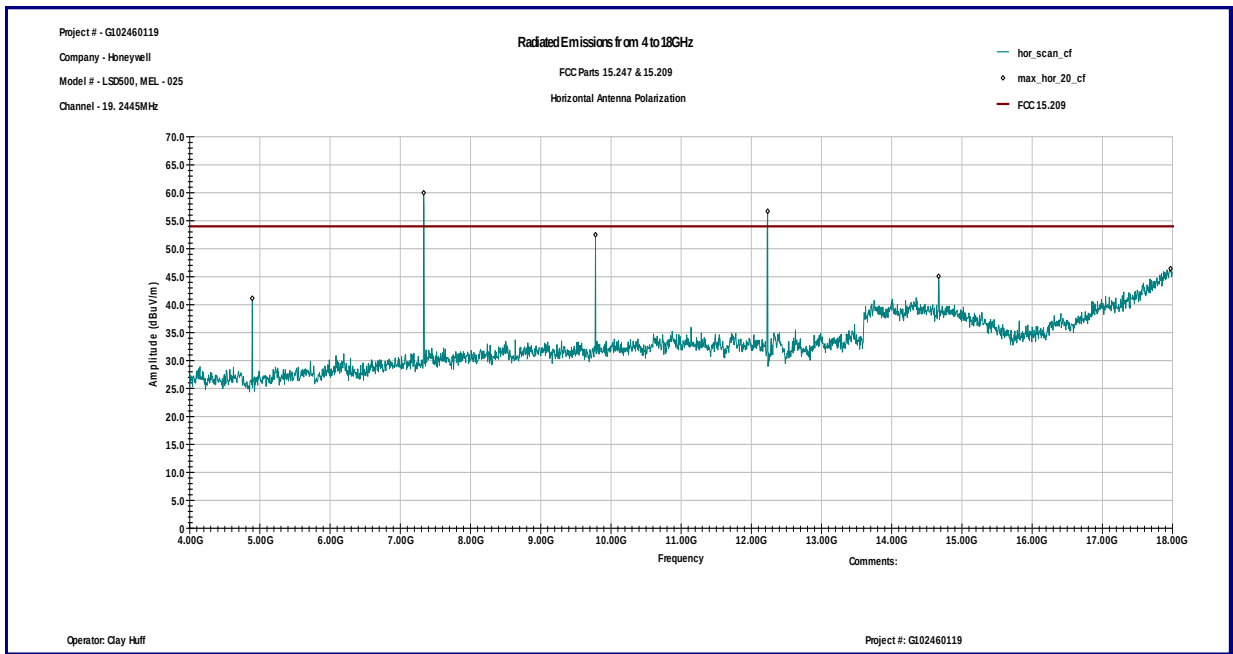
Graph 3.1.45



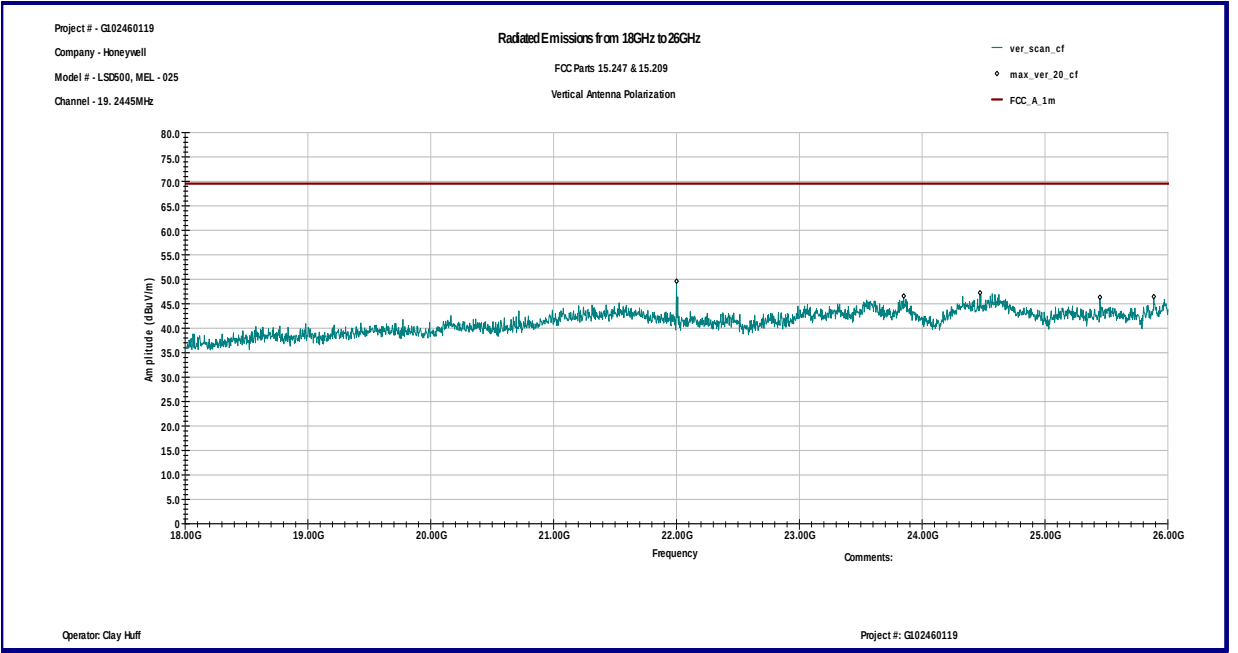
Graph 3.1.46



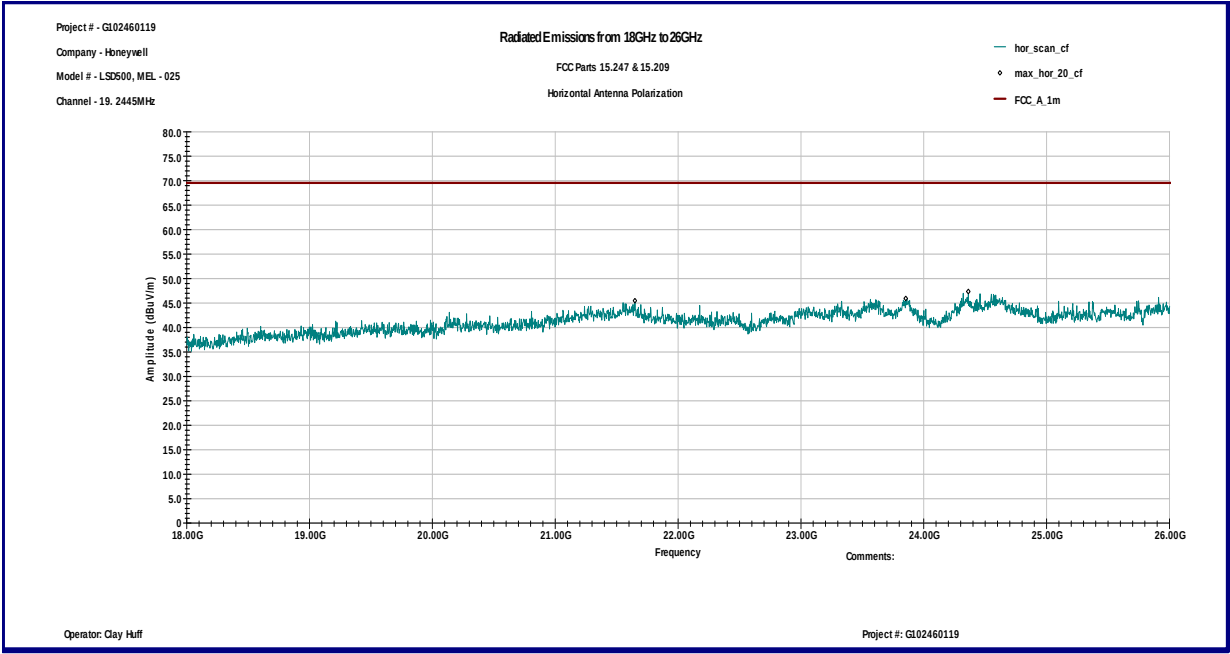
Graph 3.1.47



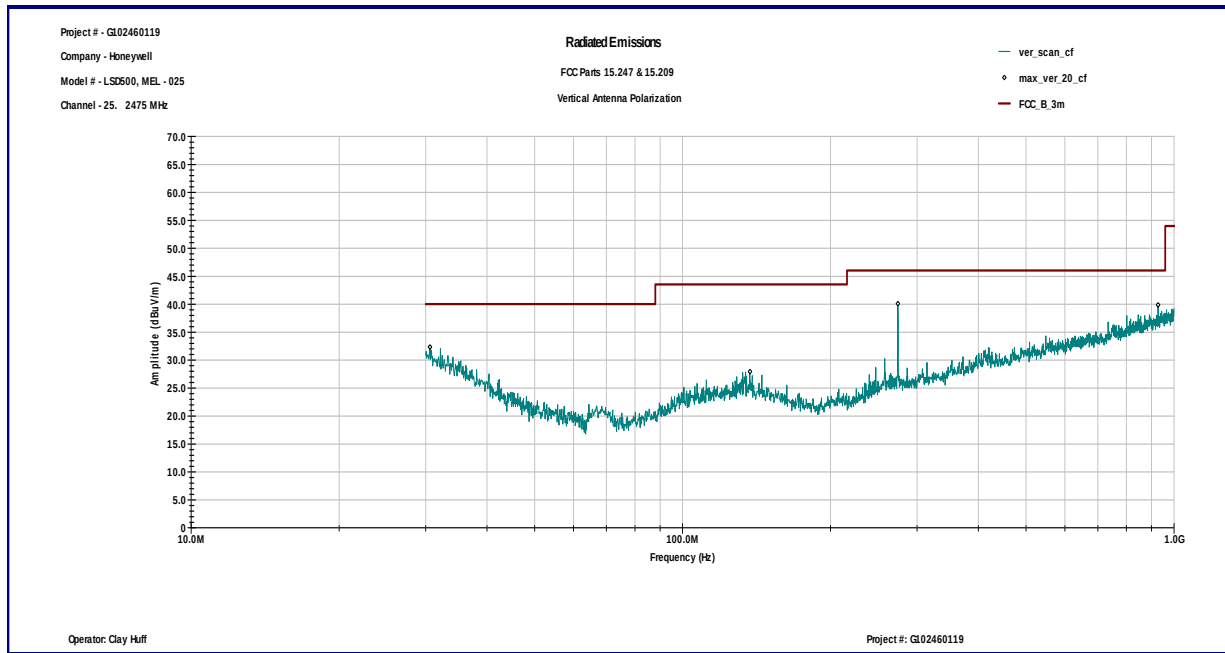
Graph 3.1.48



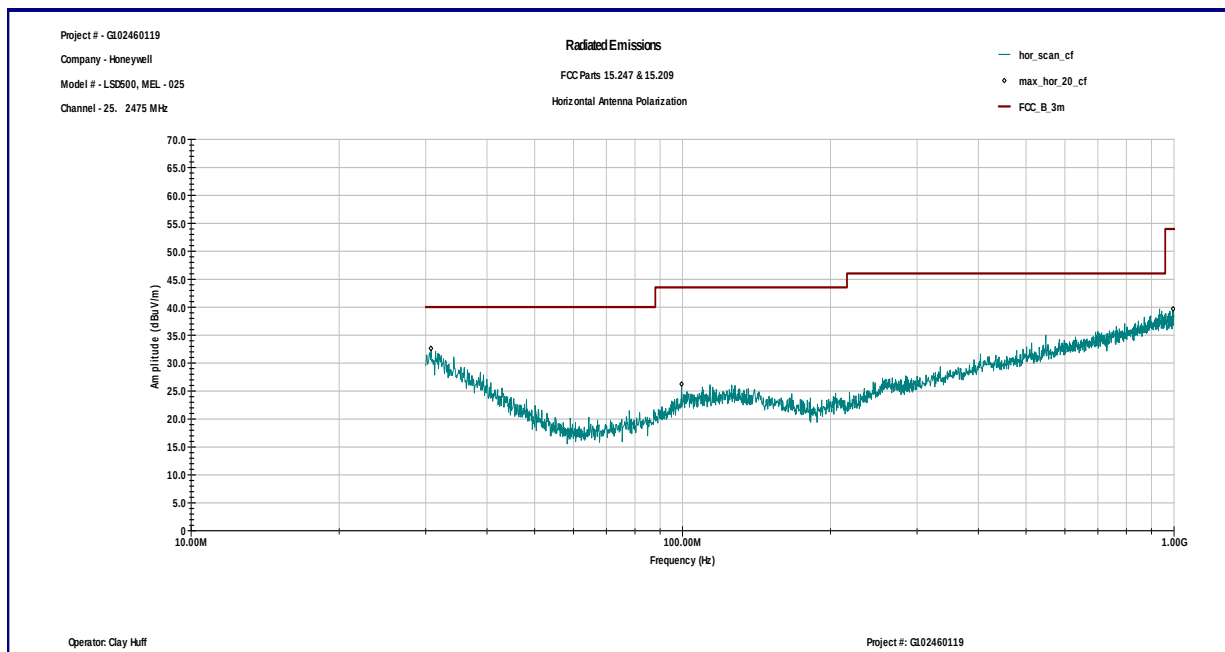
Graph 3.1.49



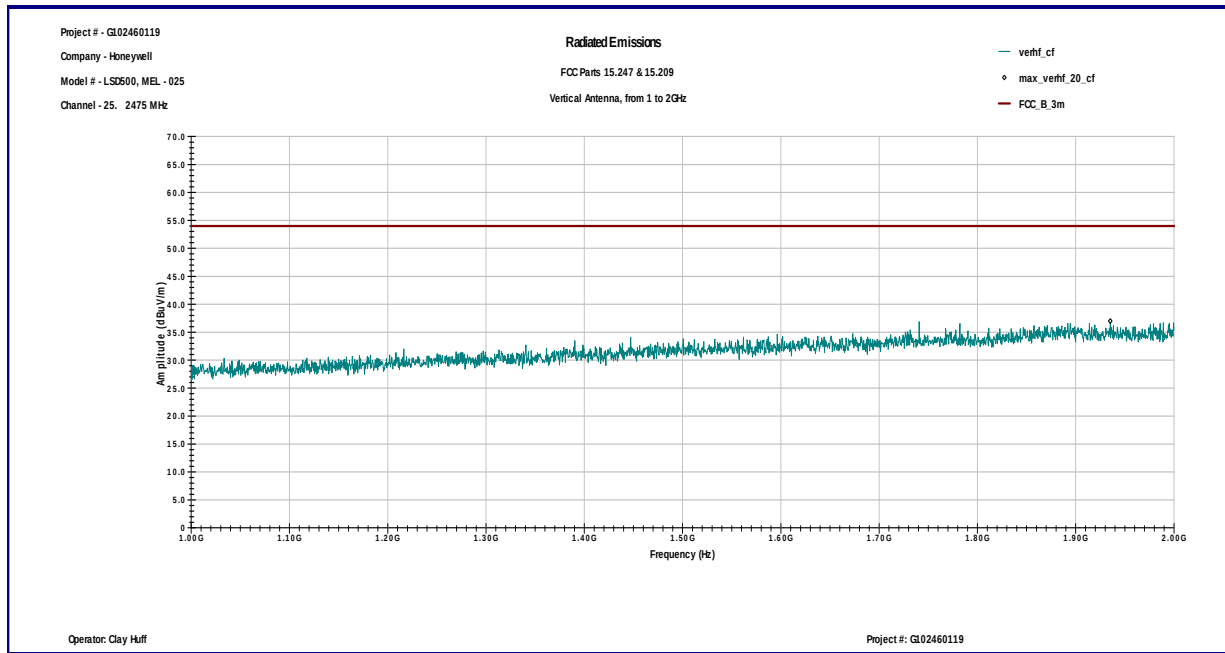
Graph 3.1.50



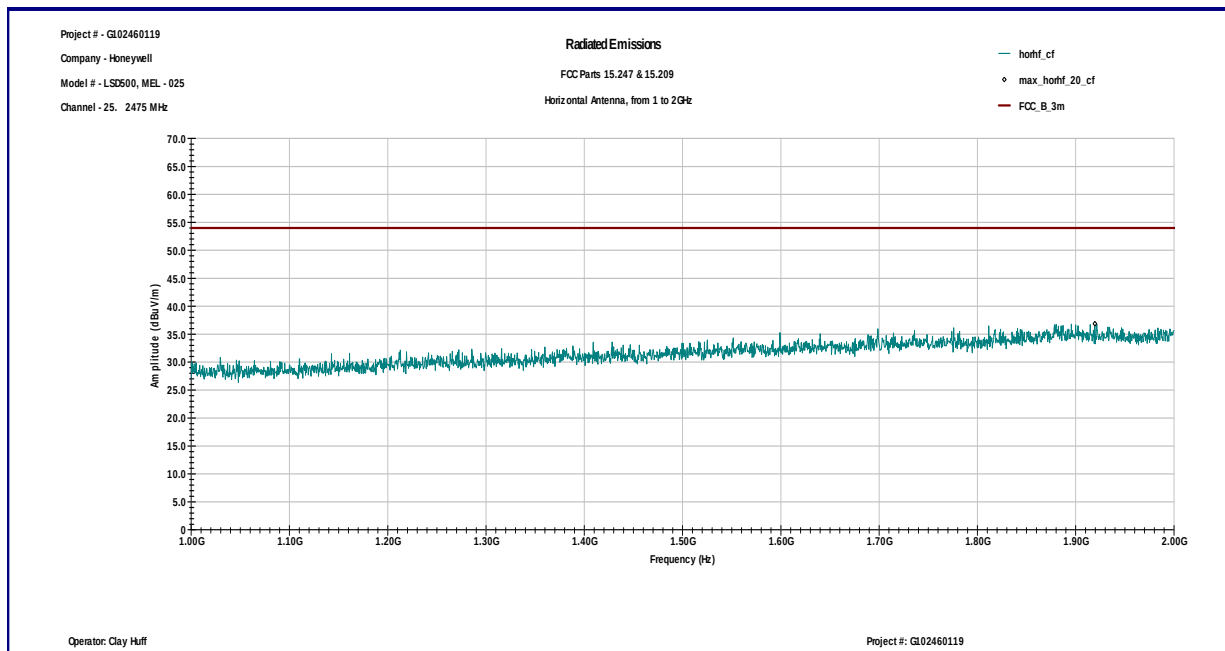
Graph 3.1.51



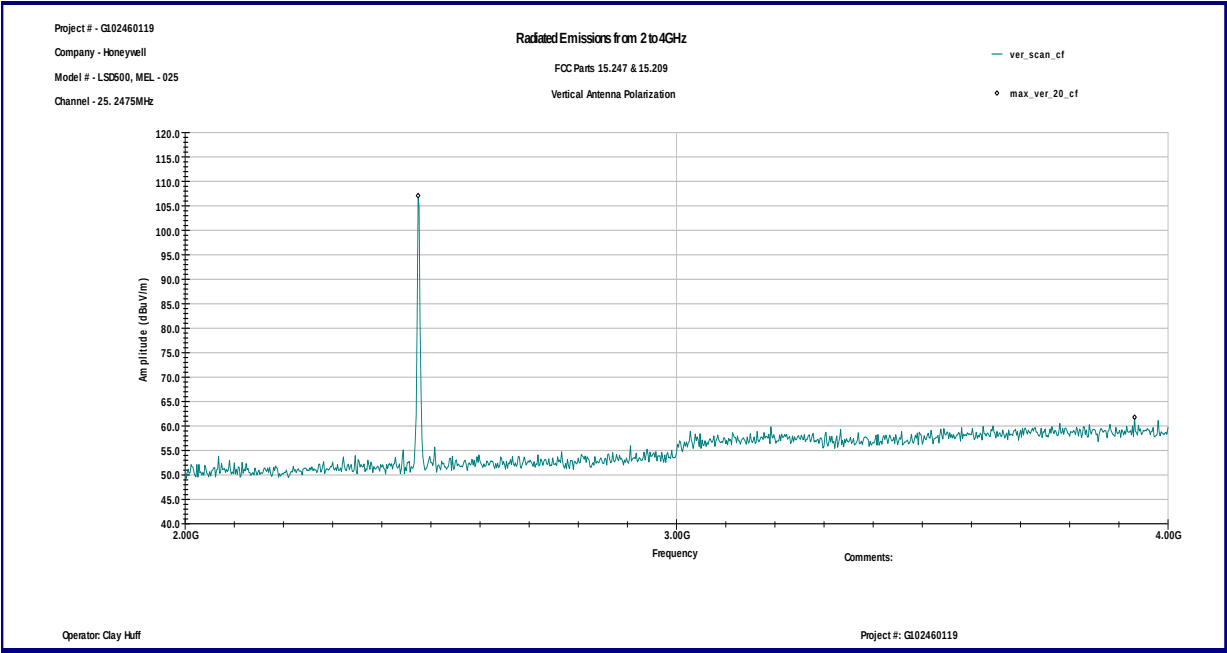
Graph 3.1.52



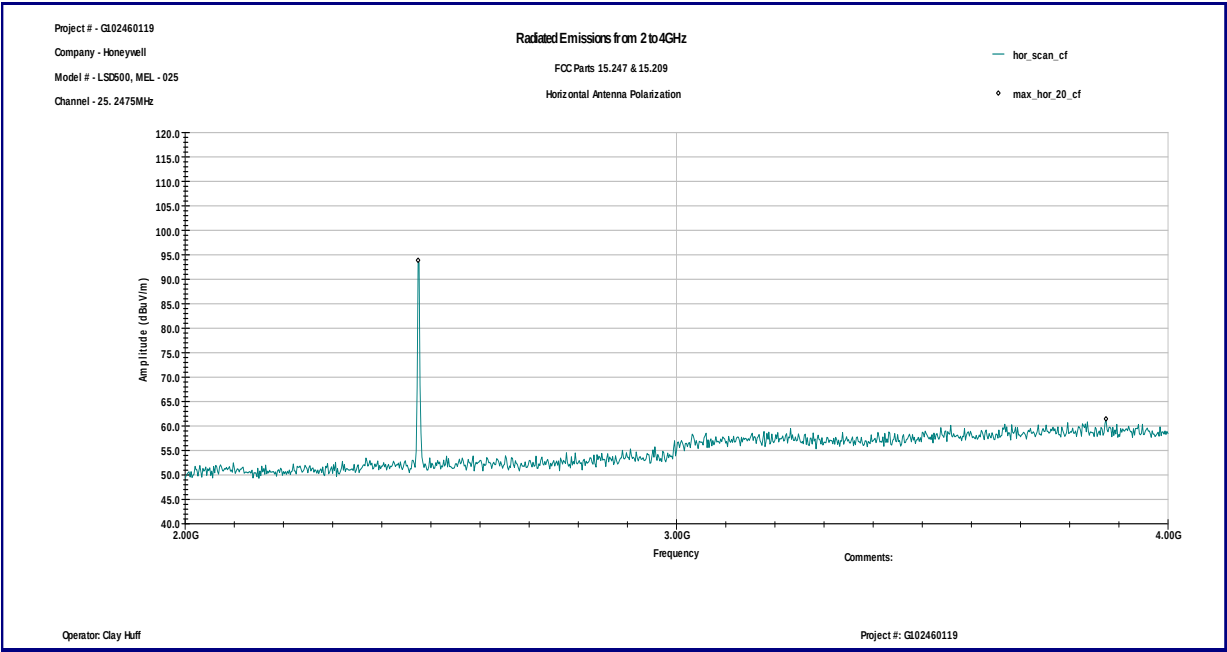
Graph 3.1.53



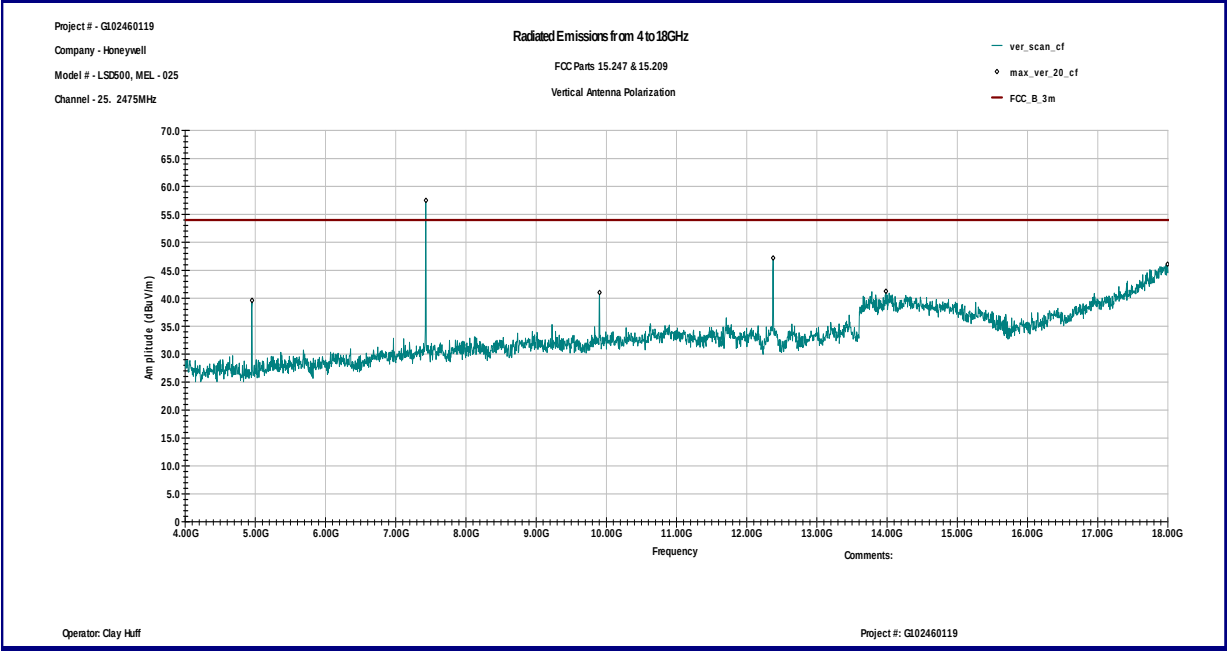
Graph 3.1.54



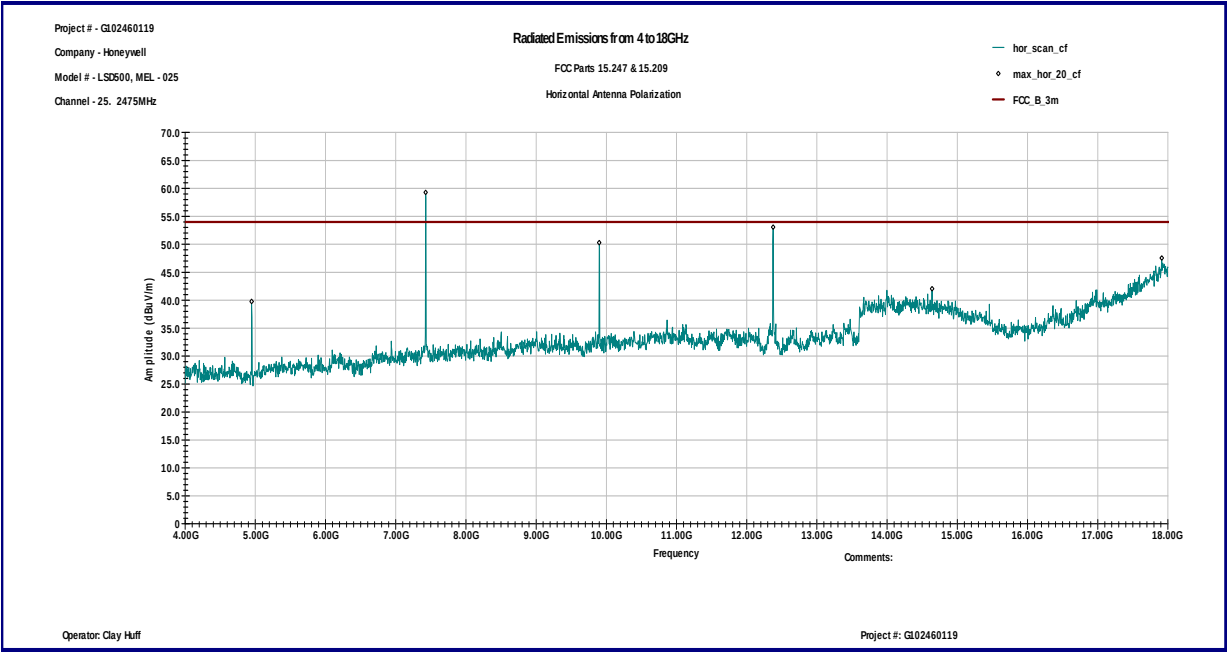
Graph 3.1.55



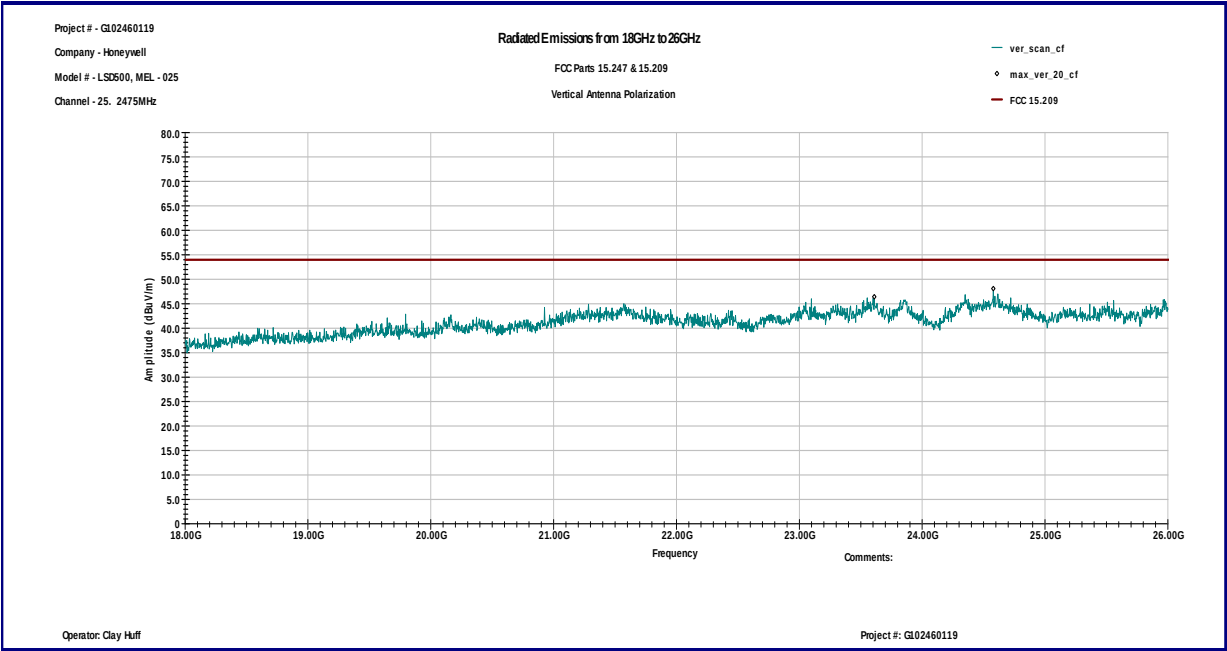
Graph 3.1.56



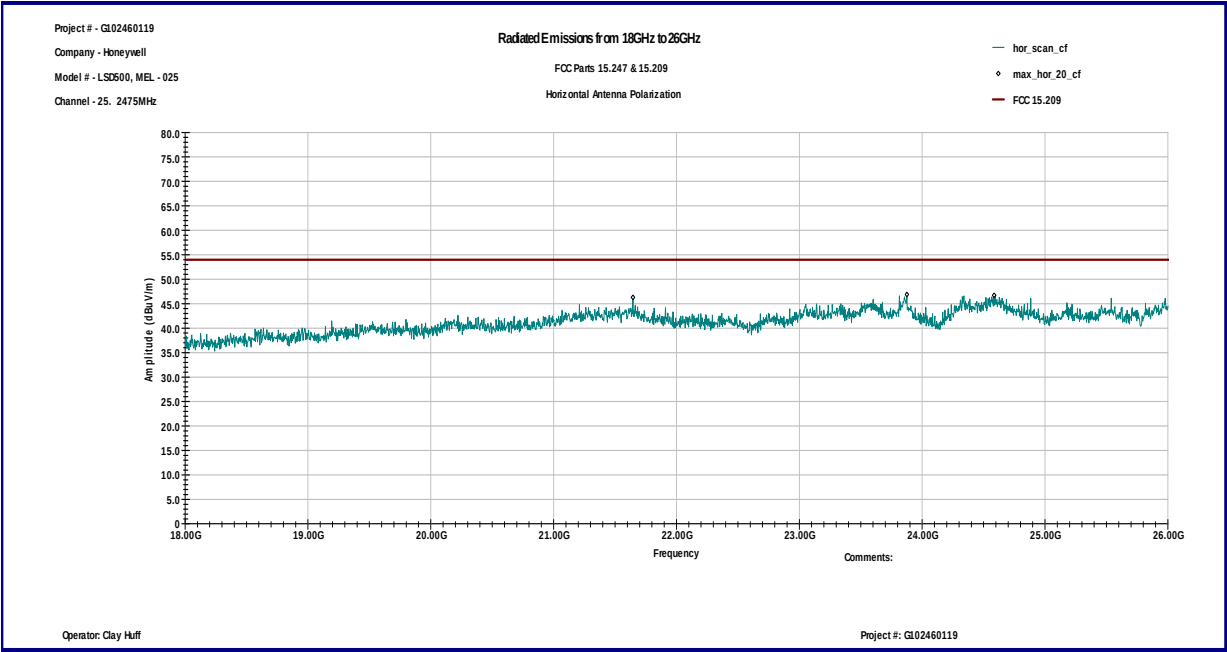
Graph 3.1.57



Graph 3.1.58



Graph 3.1.59



Graph 3.1.60



3.2 Receiver/digital device radiated emissions

Test location: ☐ OATS ☒ Anechoic Chamber

Test distance: ☐ 10 meters ☒ 3 meters

Test result: **Pass**

Frequency range: 30MHz-1300MHz

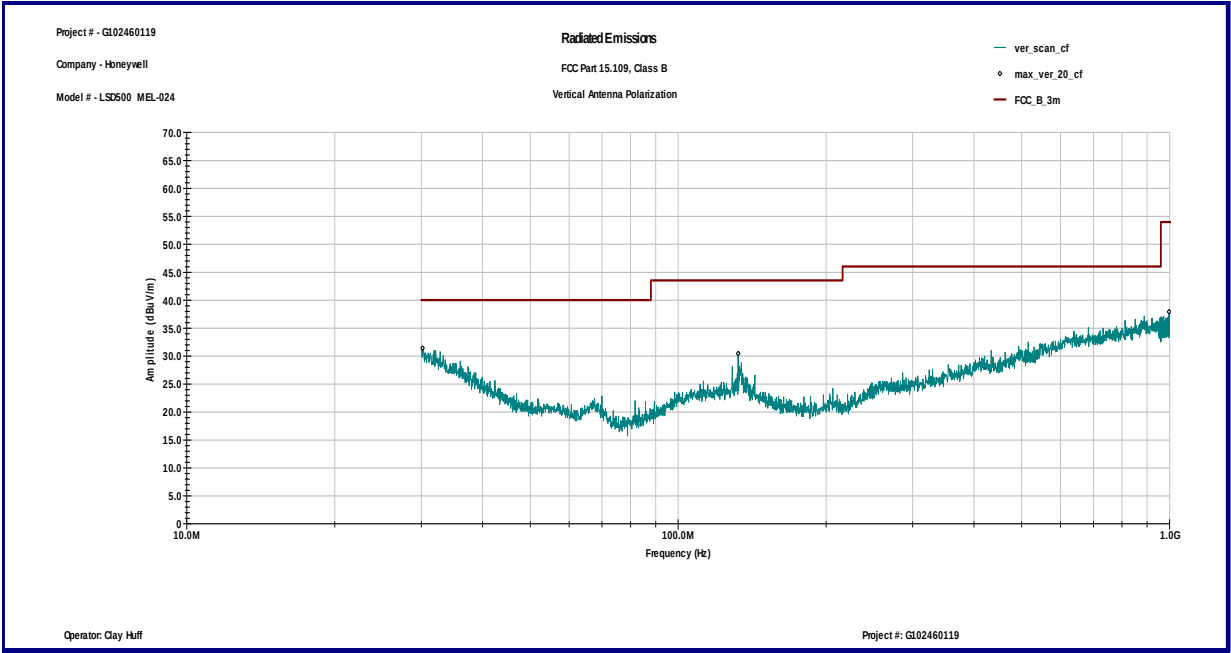
Max. Emissions margin: 8.0dB below the limits

Notes: The Radiated Emissions test was performed in the Anechoic chamber at 3m measurement distance (see Table 3.2.1 and 3.2.2)
Graphs 3.2.1 to 3.2.8 show peak of emissions

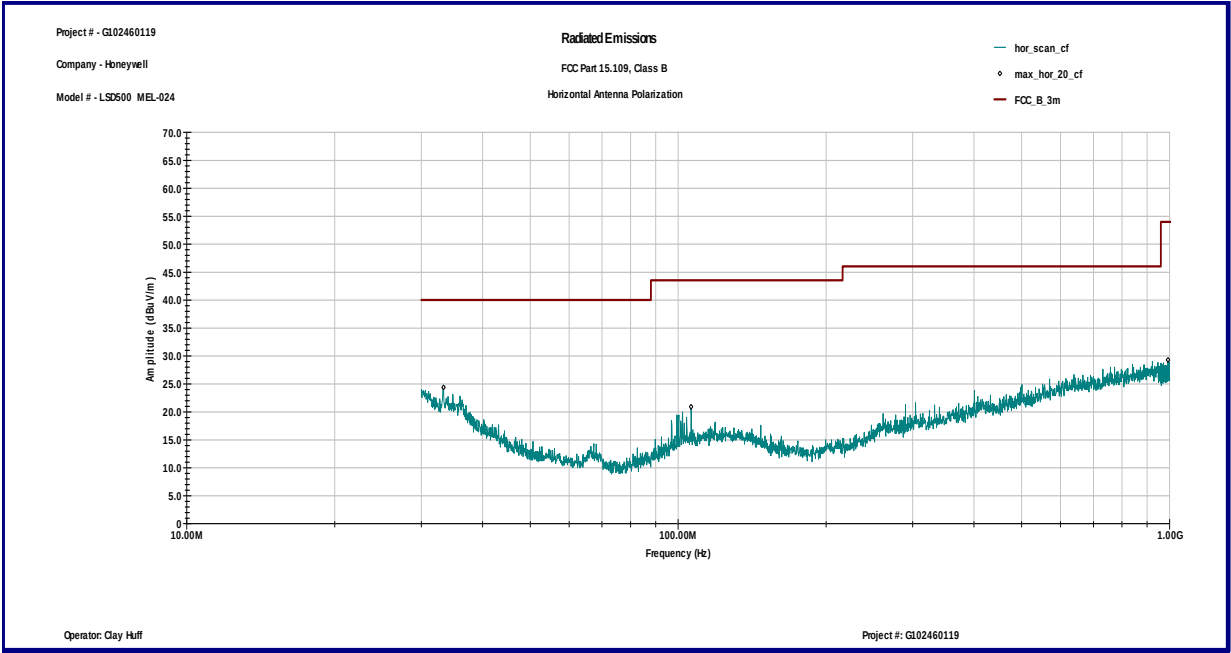
Date:	February 8, 2016	Result: Pass
Tested by:	Clay Huff	
Standard:	FCC Part 15.109, Class B	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	21.2°C; 16.3%(RH); 97kPa	
Equipment Verification:	☒	
Note:	Sample MEL-024	

Table 3.2.1

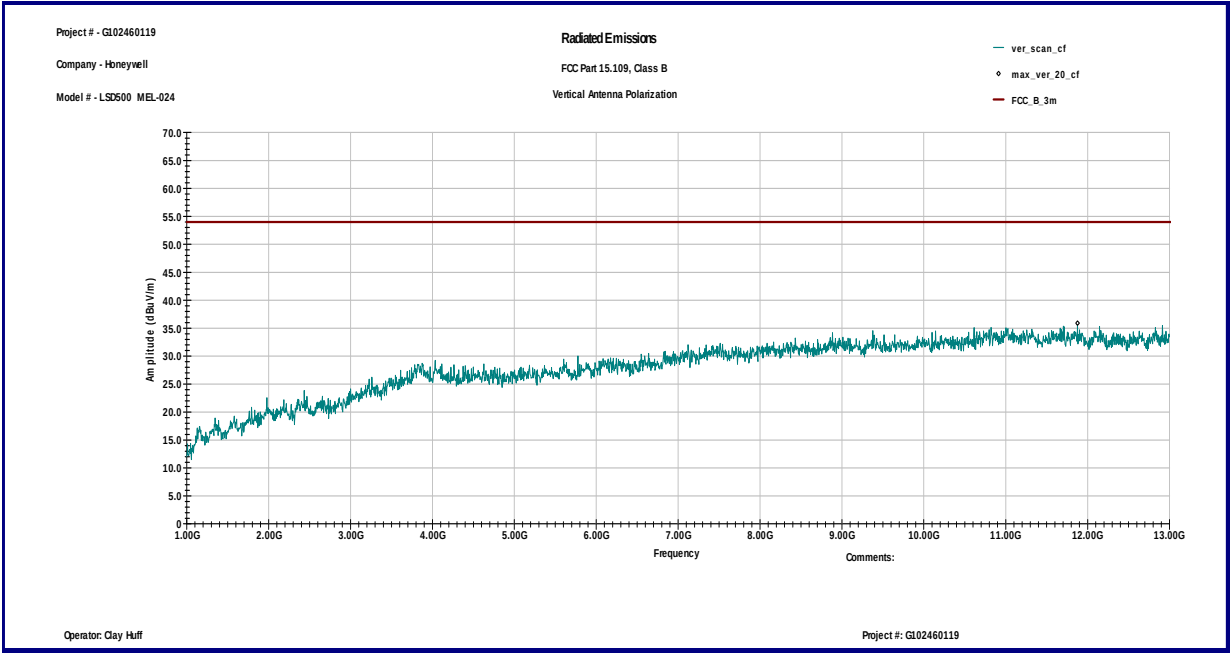
Frequency MHz	Antenna Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
30.187 MHz	V	11.2	20.3	31.4	40.0	-8.6
132.52 MHz	V	17.0	13.5	30.5	43.5	-13.1
997.95 MHz	V	12.6	25.3	37.9	54.0	-16.1
33.315 MHz	H	6.0	18.4	24.4	40.0	-15.6
106.24 MHz	H	7.9	13.0	20.9	43.5	-22.6
992.51 MHz	H	4.2	25.2	29.3	54.0	-24.7



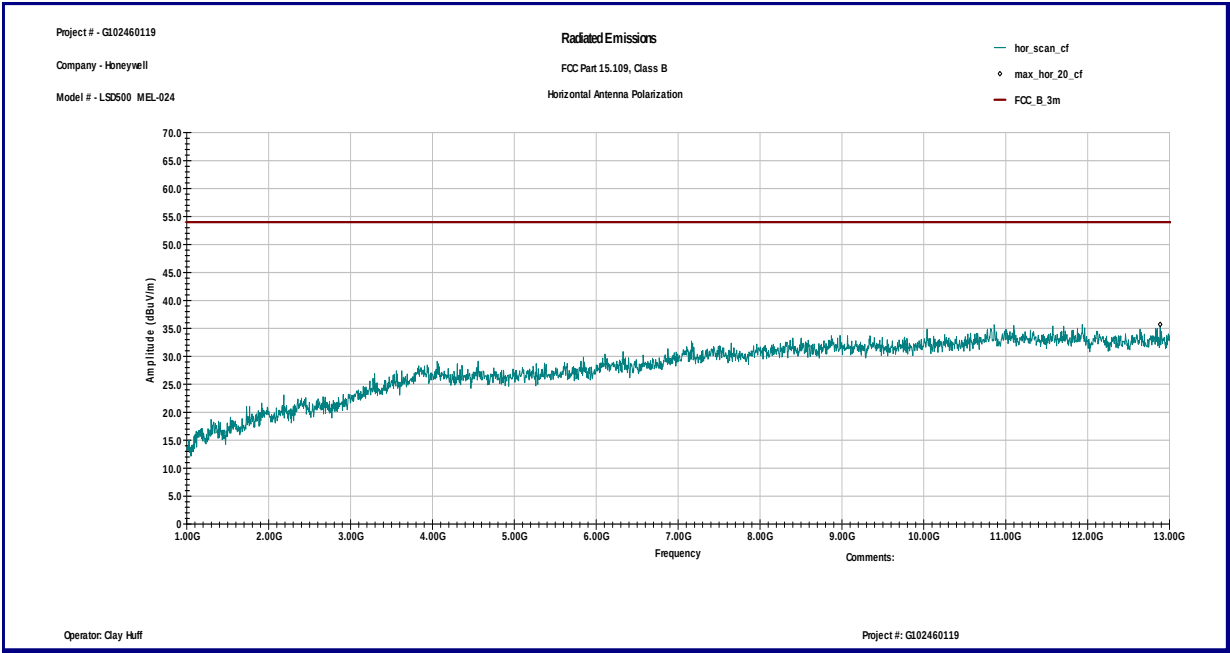
Graph 3.2.1



Graph 3.2.2



Graph 3.2.3

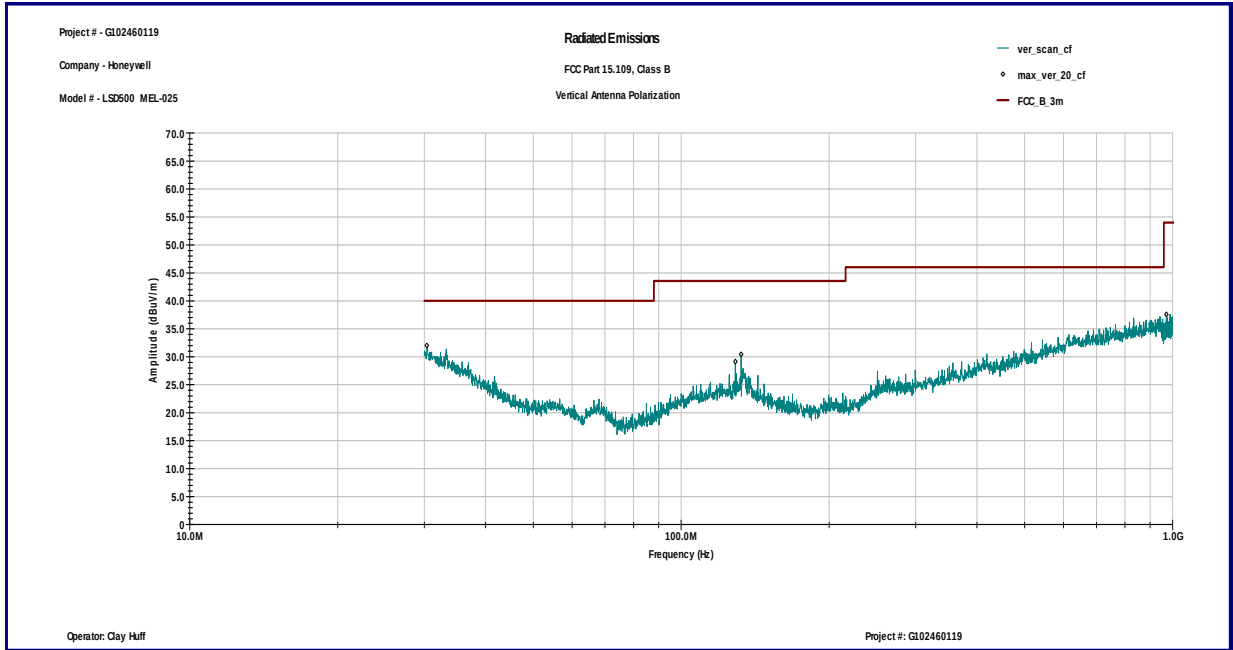


Graph 3.2.4

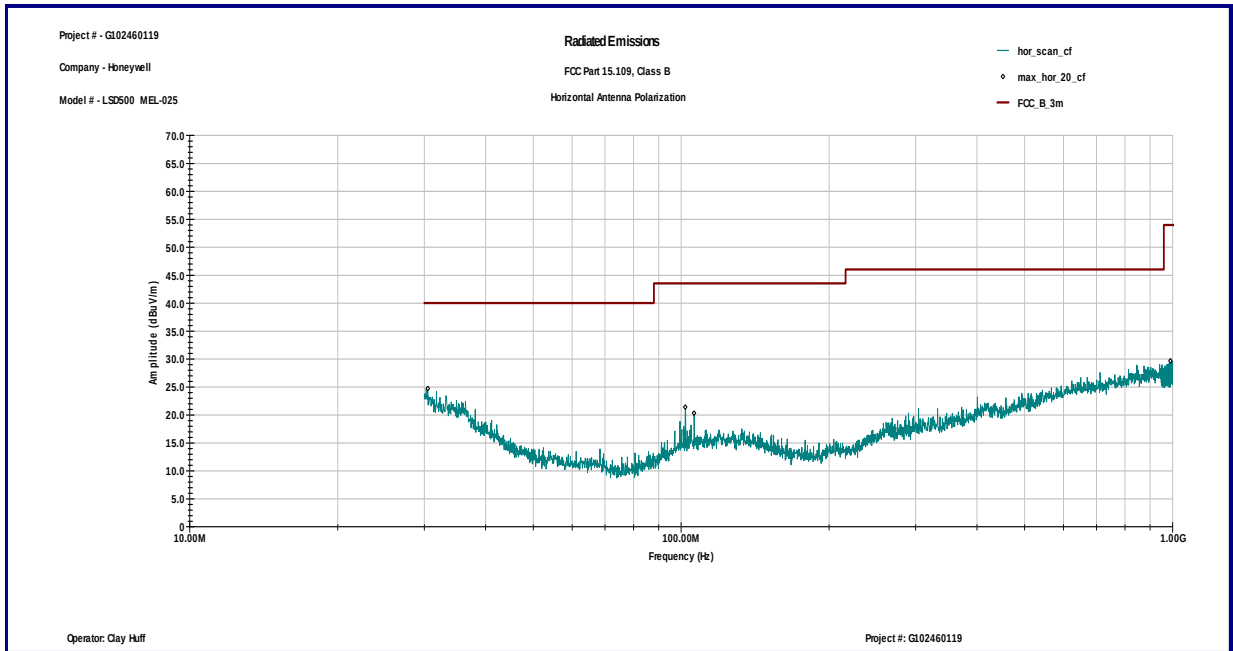
Date:	February 8, 2016	Result: Pass
Tested by:	Clay Huff	
Standard:	FCC Part 15.109, Class B	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	21.2°C; 16.3%(RH); 97kPa	
Equipment Verification:	☒	
Note:	Sample MEL-025	

Table 3.2.2

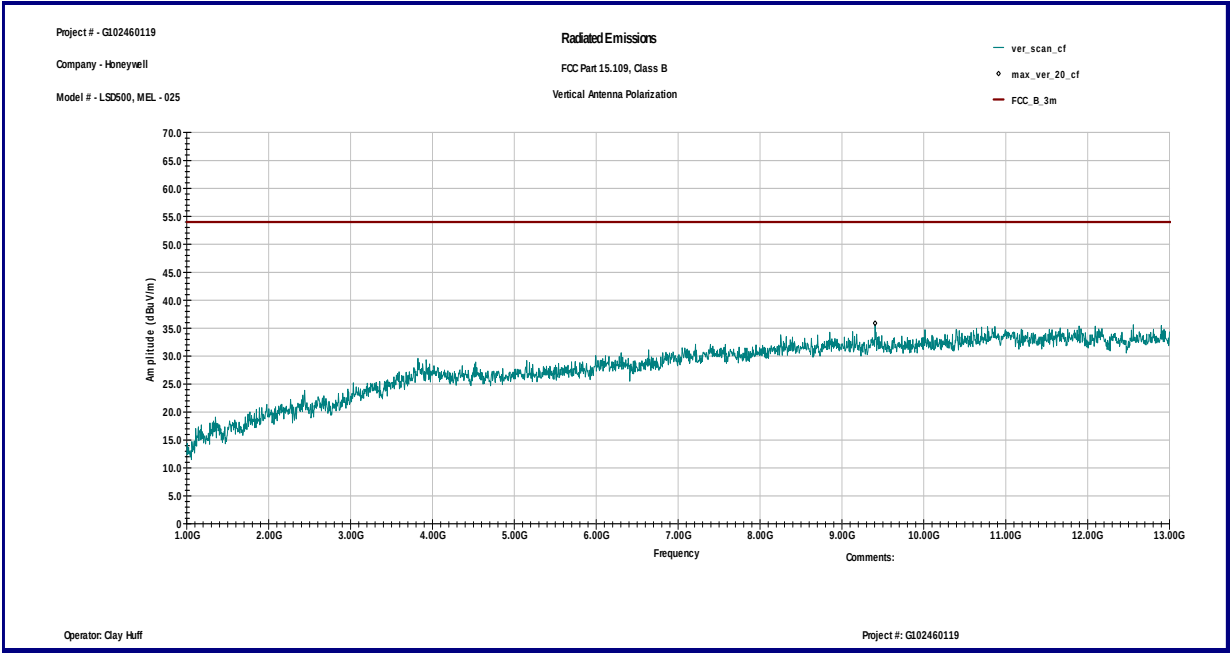
Frequency MHz	Antenna Polarity	Peak Reading dBμV	Total C.F. dB1/m	Total at 3m dBμV/m	Limit dBμV/m	Margin dB
30.374 MHz	V	11.8	20.2	32.0	40.0	-8.0
128.98 MHz	V	15.6	13.6	29.1	43.5	-14.4
132.52 MHz	V	17.0	13.5	30.4	43.5	-13.1
971.88 MHz	V	12.5	25.0	37.6	54.0	-16.4
30.514 MHz	H	4.7	20.1	24.7	40.0	-15.3
101.96 MHz	H	8.9	12.5	21.4	43.5	-22.1
106.24 MHz	H	7.3	13.0	20.3	43.5	-23.2
989.94 MHz	H	4.6	25.1	29.7	54.0	-24.3



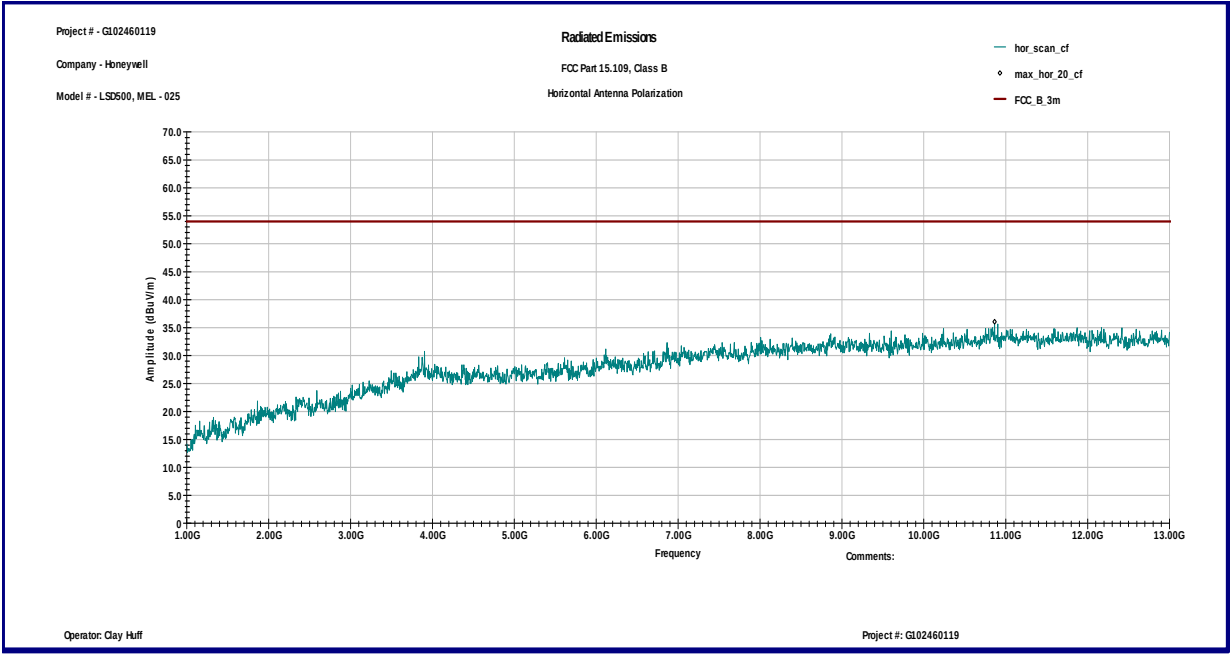
Graph 3.2.5



Graph 3.2.6



Graph 3.2.7



Graph 3.2.8

4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Spectrum Analyzer	R & S	FSP 40	100024	12559	01/20/2017	☒
Spectrum Analyzer	R & S	ESCI	100358	12909	10/20/2016	☒
Bicono-Log Antenna	Schaffner-Teseq	CBL6112B	2468	9734	01/11/2017	☒
Horn Antenna	EMCO	3115	9507-4513	9936	07/01/2016	☒
Waveguide Horn Antenna	EMCO	3116	9904-2423	9705	11/19/2016	☒
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1402232	172081	11/19/2016	☒
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	MIN-0065	11/19/2016	☒
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	☒

5.0 Revision History

REVISION LEVEL	DATE	REPORT NUMBER	PREPARED	REVIEWED	NOTES
0	02-10-2016	102460119MIN-001	CH	NS	Original Issue
1	03-22-2016	102460119MIN-001	SK <i>SKheya</i>	NS <i>Harsh</i>	Two Tables with Peak value of spurious emissions were added



Test Setup Photos

