



FCC 47 CFR PART 15 SUBPART C

**BLUETOOTH
C2PC CERTIFICATION TEST REPORT
FOR**

GSM/CDMA/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac and NFC

**MODEL NUMBER: LGLS990, LG-LS990, LS990
FCC ID: ZNFLS990**

REPORT NUMBER: 14U17849-2

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Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/02/14		P. ZHANG

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	5
4.1. MEASURING INSTRUMENT CALIBRATION	5
4.2. SAMPLE CALCULATION	5
4.3. MEASUREMENT UNCERTAINTY	5
5. EQUIPMENT UNDER TEST	6
5.1. DESCRIPTION OF EUT	6
5.2. MAXIMUM OUTPUT POWER.....	6
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	6
5.4. WORST-CASE CONFIGURATION AND MODE.....	7
5.5. DESCRIPTION OF TEST SETUP.....	8
6. TEST AND MEASUREMENT EQUIPMENT	10
7. SUMMARY TABLE	11
8. RADIATED TEST RESULTS.....	12
8.1. LIMITS AND PROCEDURE	12
8.2. TRANSMITTER ABOVE 1 GHz	13
8.2.1. BASIC DATA RATE GFSK MODULATION	13
8.2.2. ENHANCED DATA RATE 8PSK MODULATION	29
8.3. WORST-CASE BELOW 1 GHz.....	42
WORST-CASE WITH WPC CHARGER AND BACK COVER BELOW 1 GHz.....	45
9. SETUP PHOTOS.....	48

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC.

EUT DESCRIPTION: GSM/CDMA/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac and NFC.

MODEL: LGLS990, LG-LS990, LS990

SERIAL NUMBER: 17QZC (Radiated)

DATE TESTED: MAY 20 – JUNE 2, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☒ Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 18000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/CDMA/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac and NFC.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	9.33	8.57
2402 - 2480	Enhanced 8PSK	8.20	6.61

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 8.6.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -4dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-04WT2	TA350000050	N/A
Earphone	LG	N/A	N/A	N/A
WPC Cover	LG	N/A	N/A	N/A
WPC Charger	LG	WPC-300	304HYBF00069	BEJWCP300

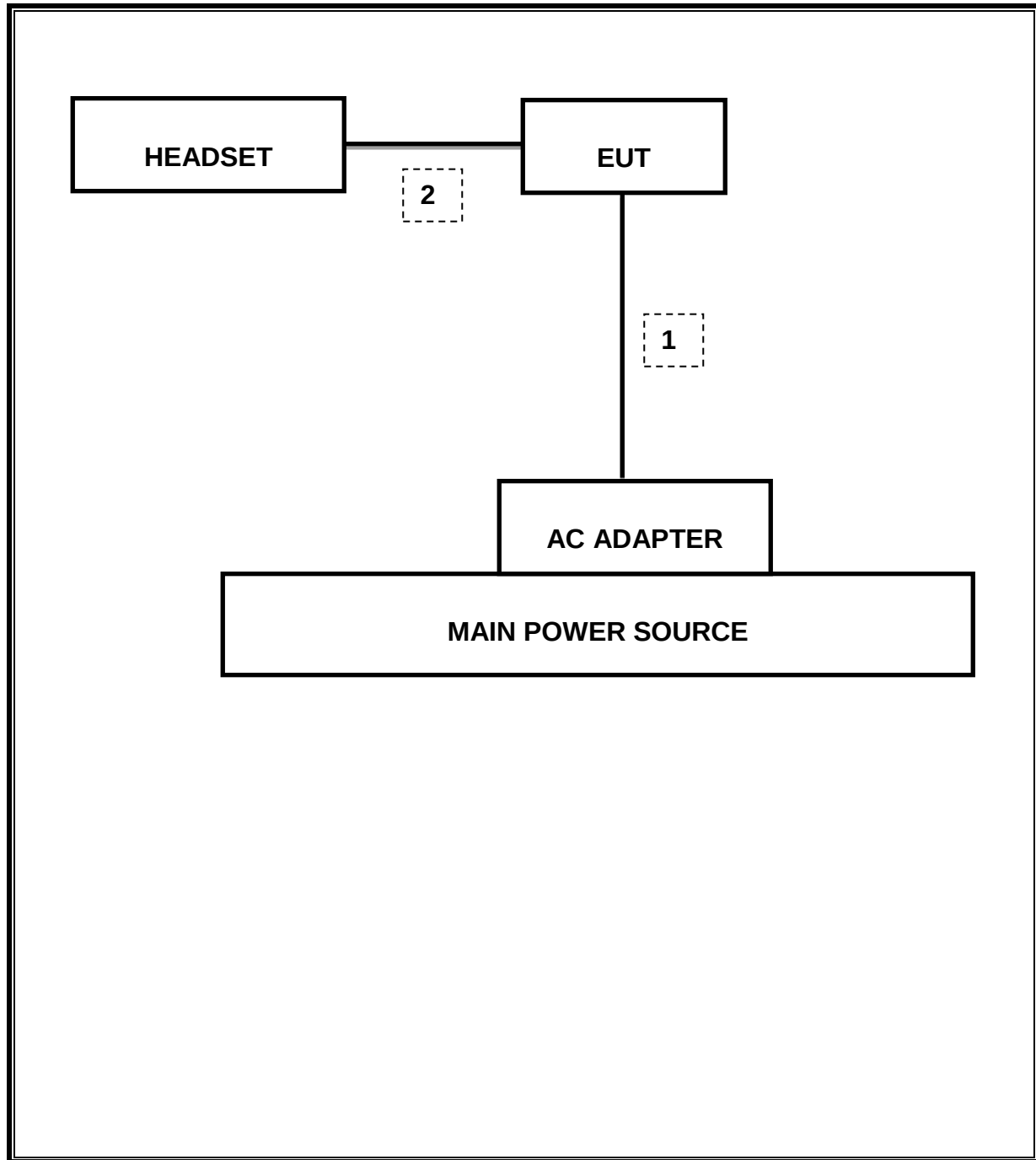
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests. EUT was set in the Hidden menu mode to enable BT communications.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/15
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/14
CBT Bluetooth Tester	R & S	CBT	None	07/12/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/14

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	RSS-GEN 4.6	Occupied Band width (99%)	N/A	Conducted	Pass	see original
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	see original
15.247 (b)(1)	RSS-210 A8.4	TX conducted output power	<21dBm		Pass	see original
15.247 (a)(1)	RSS-210 A8.1(b)	Hopping frequency separation	> 25KHz		Pass	see original
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	see original
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Avg Time of Occupancy	< 0.4sec		Pass	see original
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	see original
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	37.62dBuV/m

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 1/T (on time) for average measurement. $GFSK = 1/T = 1 / 0.0029S = 260Hz$.

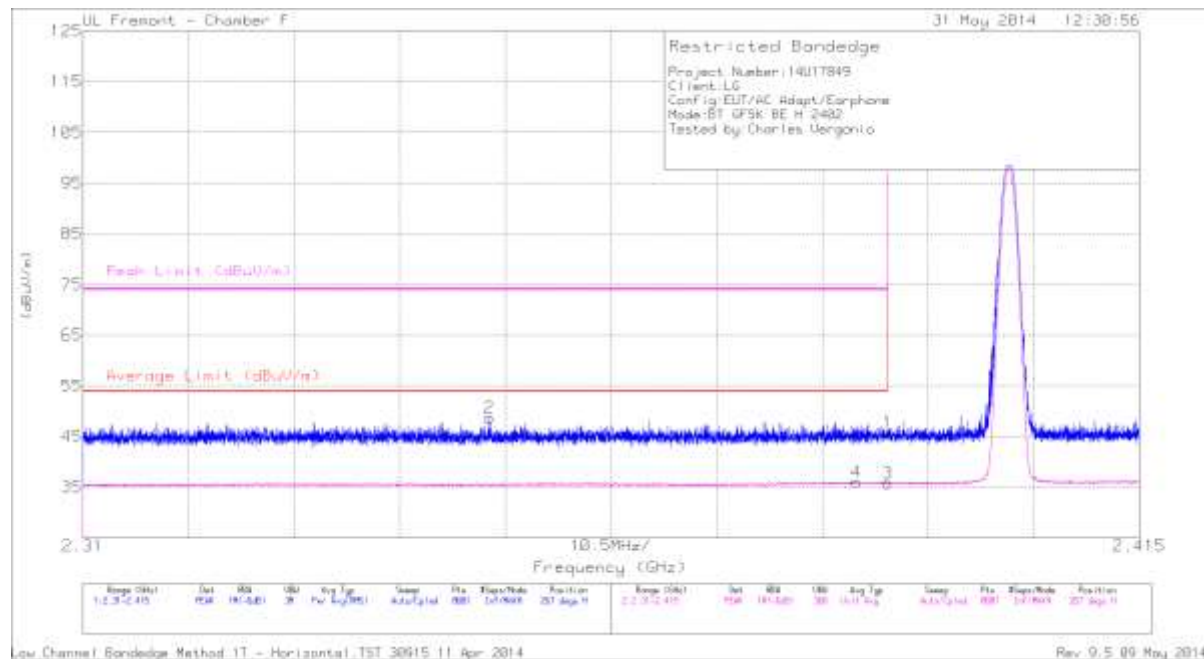
The spectrum from 1GHzHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



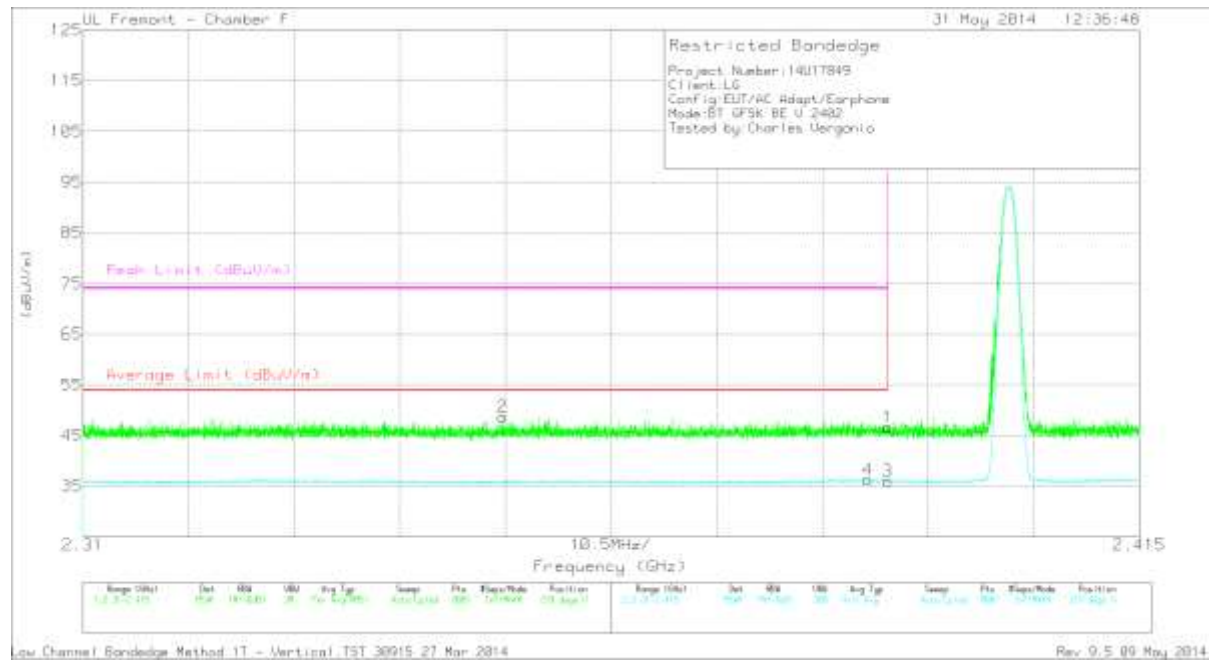
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT120 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.47	PK	32.2	-23.8	0	45.87	-	-	74	-28.13	267	318	H
2	* 2.35	40.39	PK	32	-23.7	0	48.69	-	-	74	-25.31	267	318	H
3	* 2.39	27.41	VB1T	32.2	-23.8	0	35.81	54	-18.19	-	-	267	318	H
4	* 2.387	27.65	VB1T	32.2	-23.8	0	36.05	54	-17.95	-	-	267	318	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEGE (LOW CHANNEL, VERTICAL)



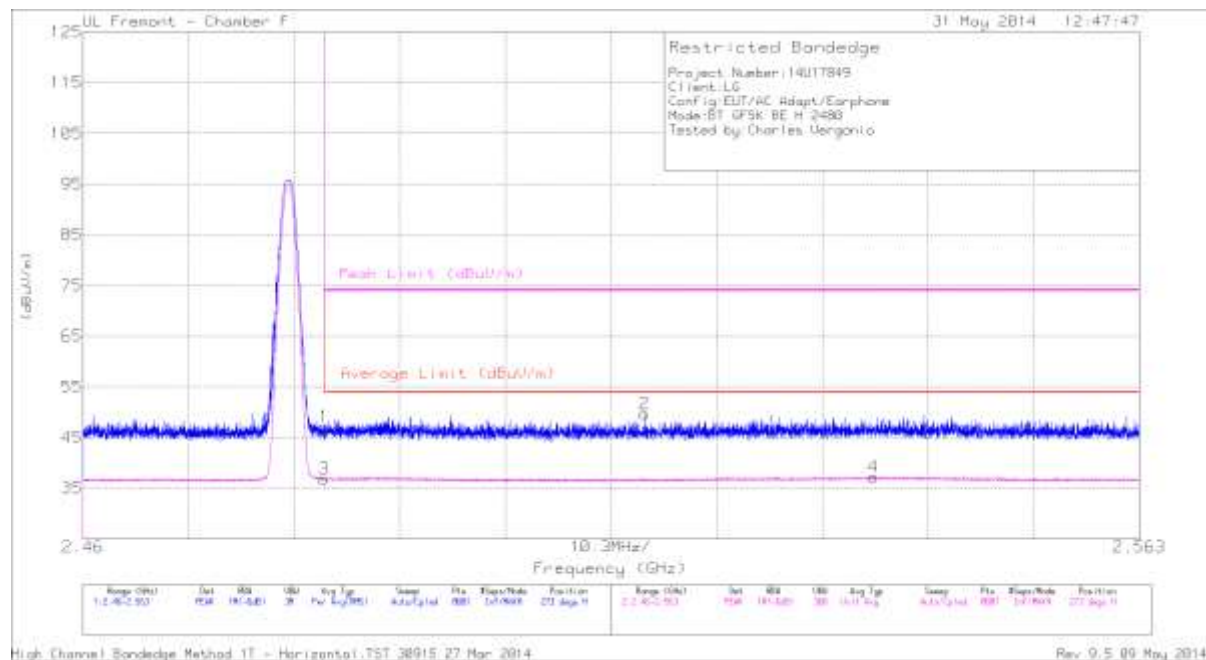
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.25	PK	32.2	-23.8	0	46.65	-	-	74	-27.35	219	260	V
2	* 2.352	40.36	PK	32	-23.7	0	48.66	-	-	74	-25.34	219	260	V
3	* 2.39	27.61	VB1T	32.2	-23.8	0	36.01	54	-17.99	-	-	219	260	V
4	* 2.388	27.91	VB1T	32.2	-23.8	0	36.31	54	-17.69	-	-	219	260	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEGE (HIGH CHANNEL, HORIZONTAL)



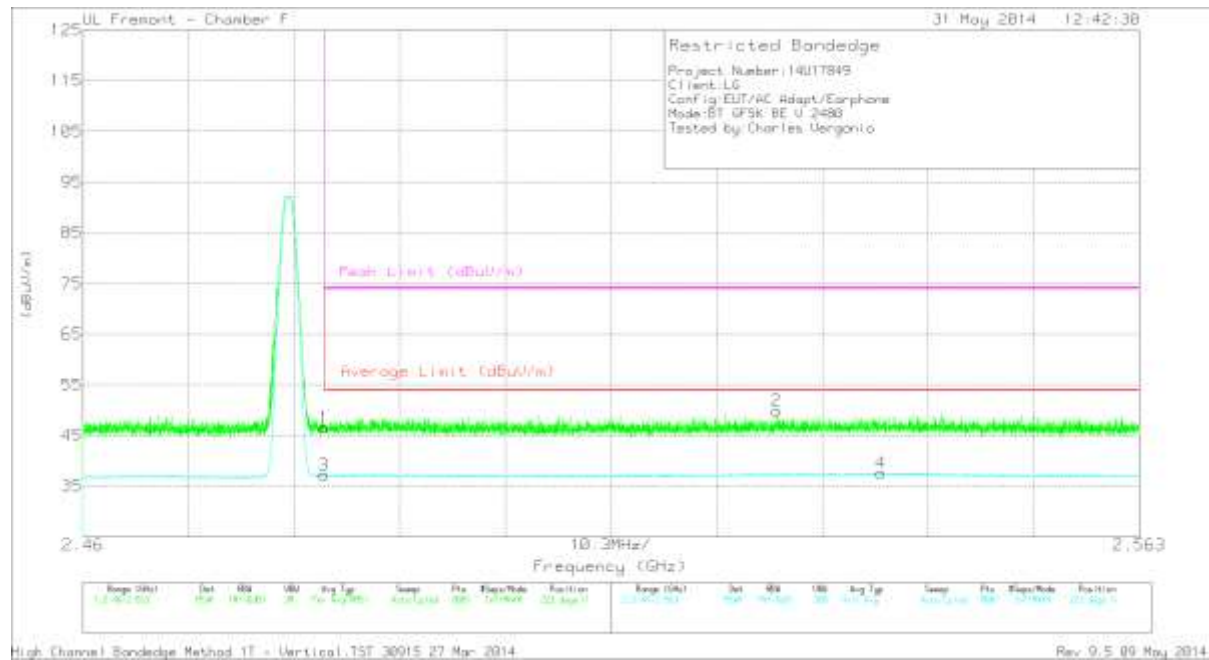
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.62	PK	32.6	-23	0	47.22	-	-	74	-26.78	273	297	H
2	2.515	40	PK	32.7	-23	0	49.7	-	-	74	-24.3	273	297	H
3	* 2.484	27.24	VB1T	32.6	-23	0	36.84	54	-17.16	-	-	273	297	H
4	2.537	27.39	VB1T	32.7	-22.8	0	37.29	54	-16.71	-	-	273	297	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.94	PK	32.6	-23	0	46.54	-	-	74	-27.46	223	313	V
2	2.528	40.11	PK	32.7	-22.9	0	49.91	-	-	74	-24.09	223	313	V
3	* 2.484	27.65	VB1T	32.6	-23	0	37.25	54	-16.75	-	-	223	313	V
4	2.538	27.72	VB1T	32.7	-22.8	0	37.62	54	-16.38	-	-	223	313	V

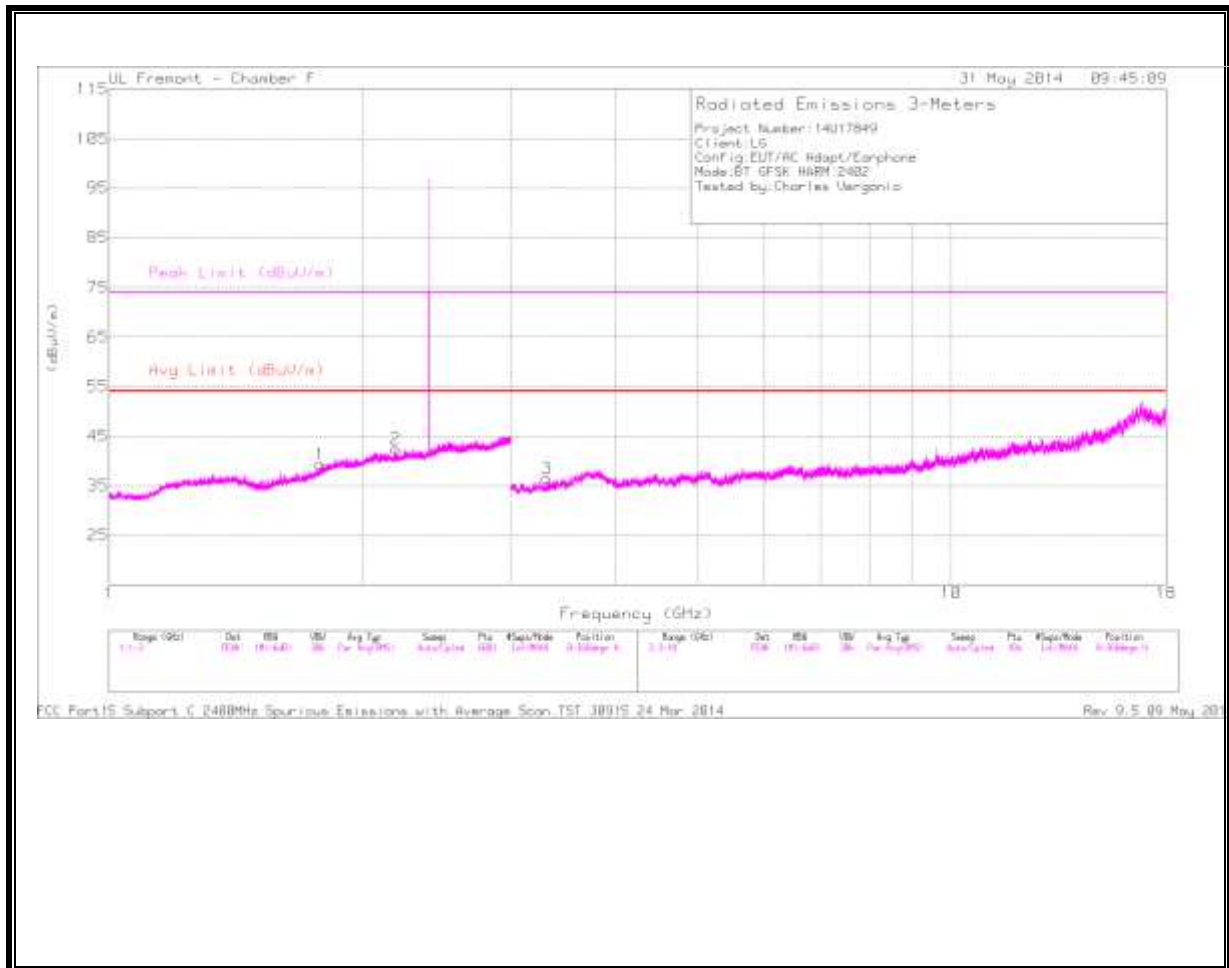
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

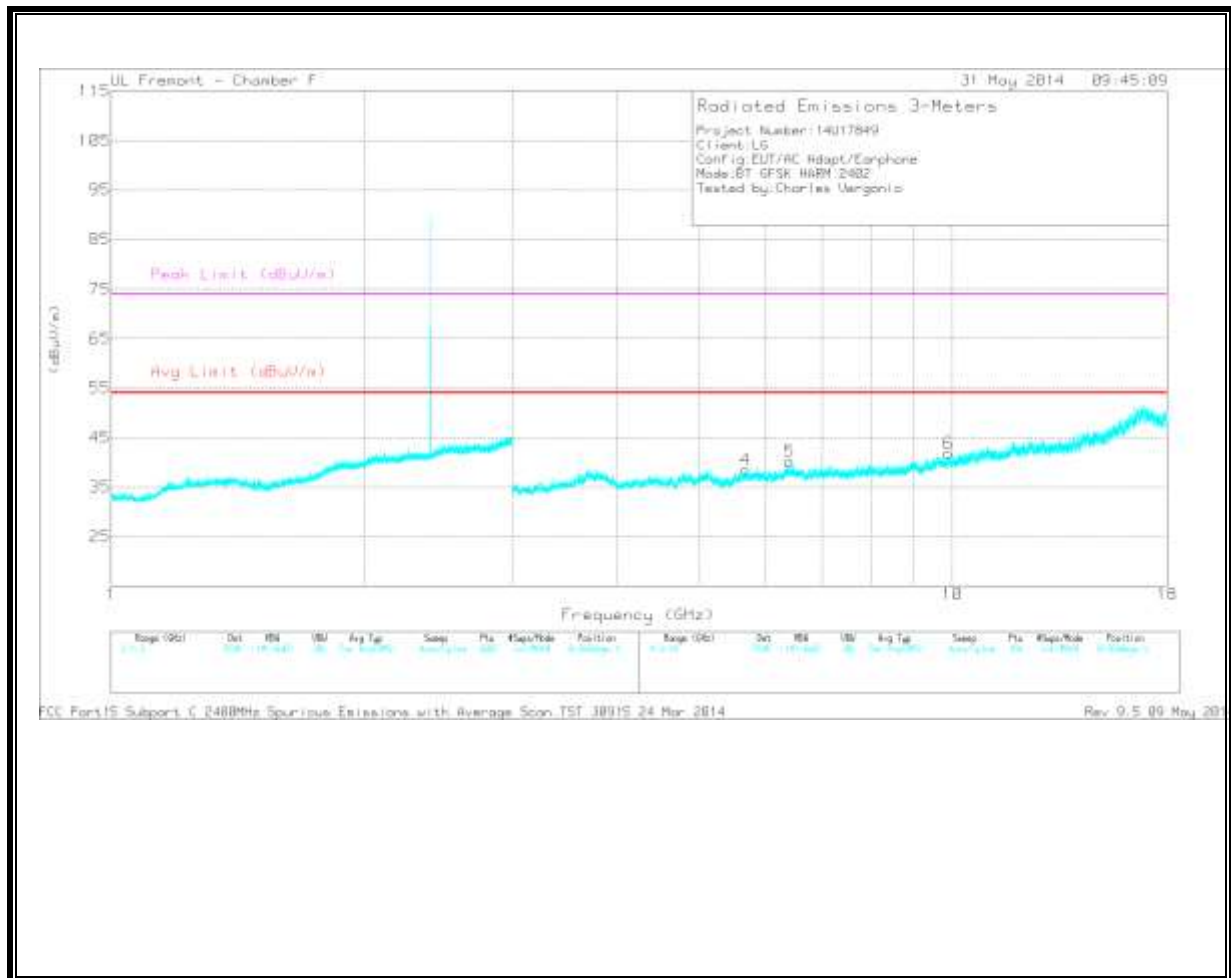
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



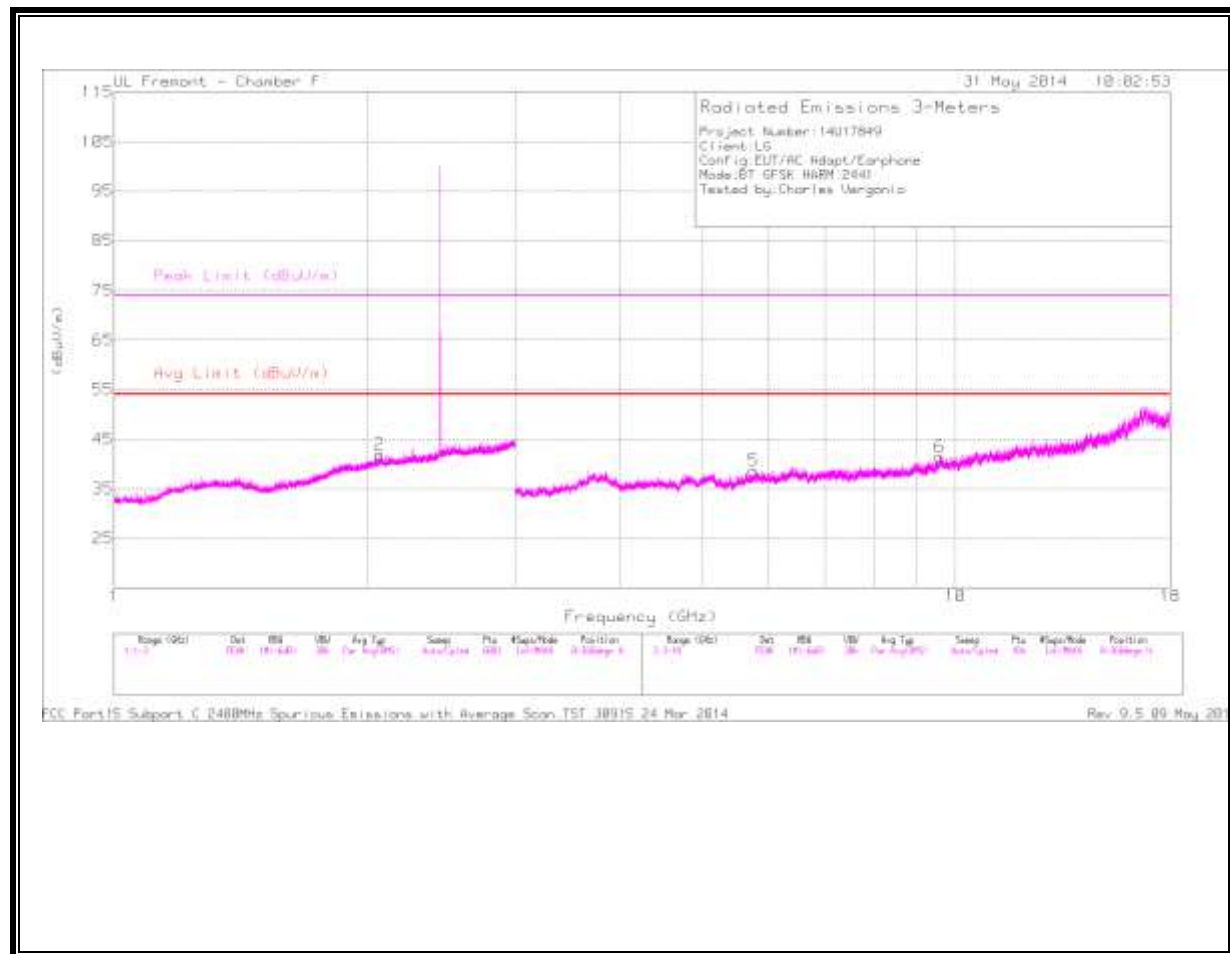
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Filt /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.781	34.03	PK	30.1	-24.9	0	39.23	54	-14.77	-	-	0-360	101	H
2	2.191	34.68	PK	31.8	-24	0	42.48	54	-11.52	-	-	0-360	199	H
3	3.306	32.12	PK	33.7	-29.4	0	36.42	54	-14.58	-	-	0-360	199	H
4	5.678	31.25	PK	34.7	-27.5	0	38.45	54	-15.55	-	-	0-360	201	V
5	6.399	31.82	PK	35.6	-27.3	0	40.12	54	-13.88	-	-	0-360	101	V
6	9.89	26.56	PK	37.2	-22	0	41.76	54	-12.24	-	-	0-360	201	V

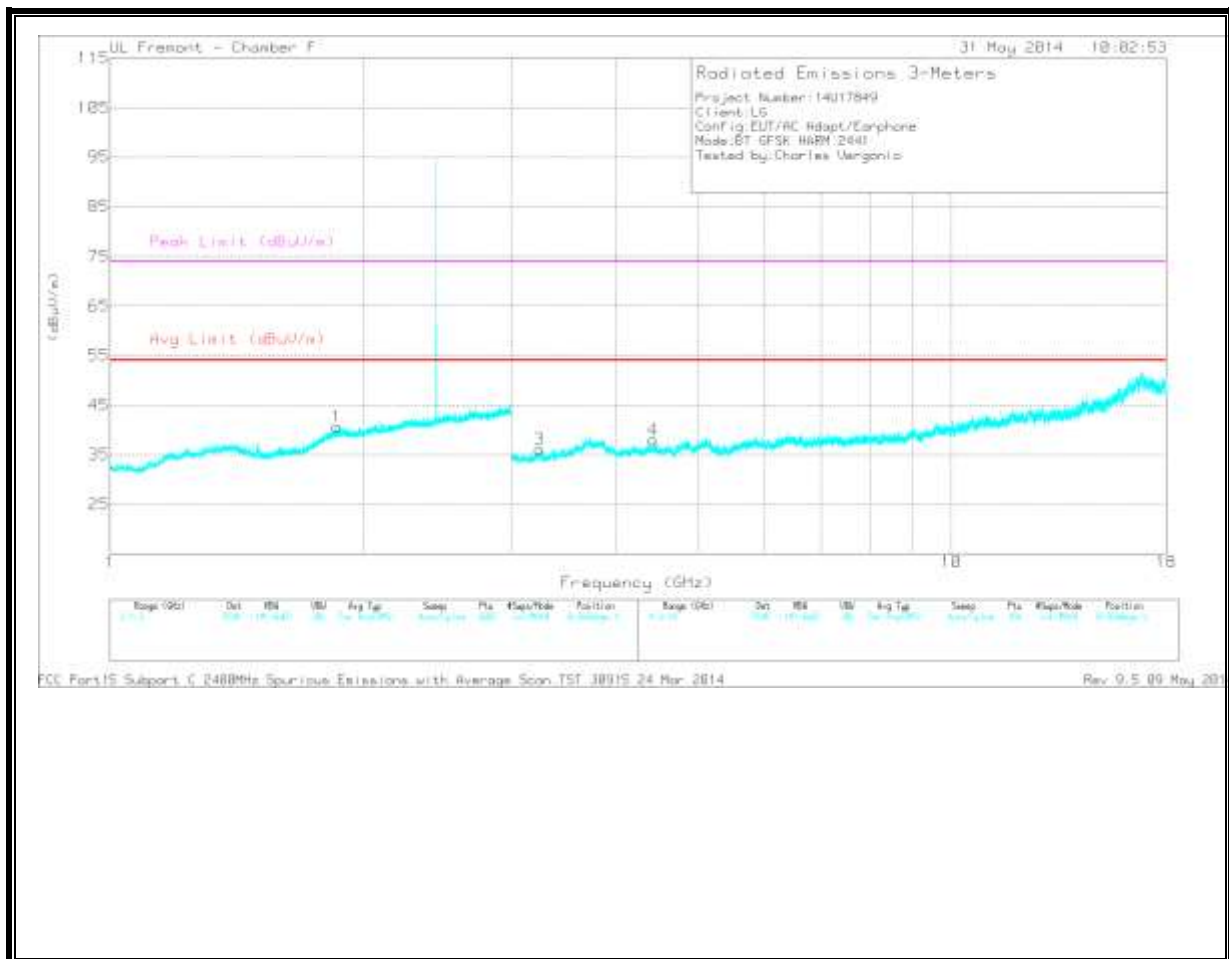
PK - Peak detector

MID CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



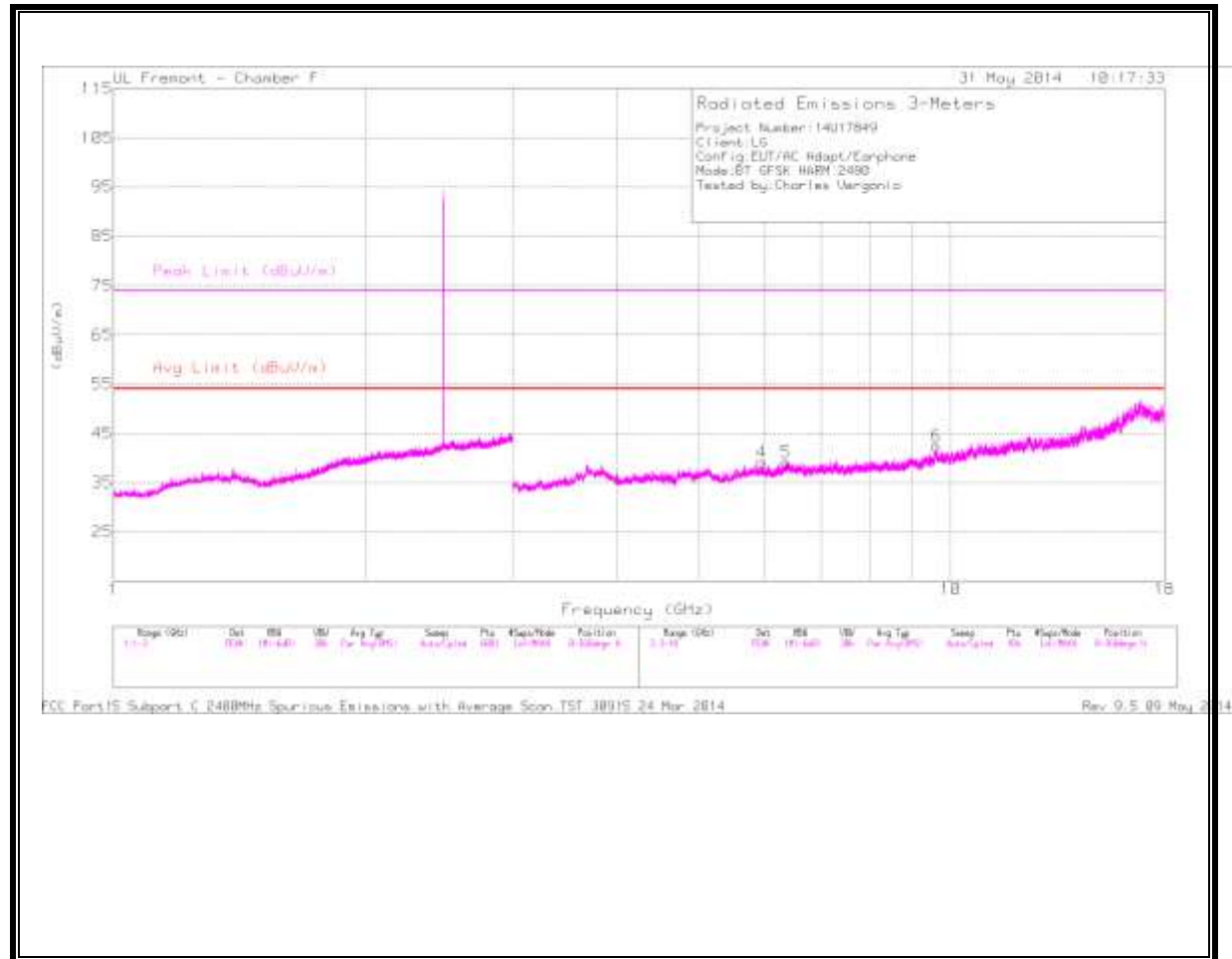
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	2.07	33.78	PK	31.8	-23.7	0	41.88	54	-12.12	-	-	0-360	101	H
1	1.861	33.94	PK	31	-24.3	0	40.64	54	-13.36	-	-	0-360	101	V
5	5.756	30.98	PK	34.9	-27.3	0	38.58	54	-15.42	-	-	0-360	200	H
6	9.582	26.42	PK	36.9	-21.9	0	41.42	54	-12.58	-	-	0-360	200	H
3	3.242	31.24	PK	33.5	-28.7	0	36.04	54	-17.96	-	-	0-360	101	V
4	4.427	32.77	PK	33.9	-28.7	0	37.97	54	-16.03	-	-	0-360	201	V

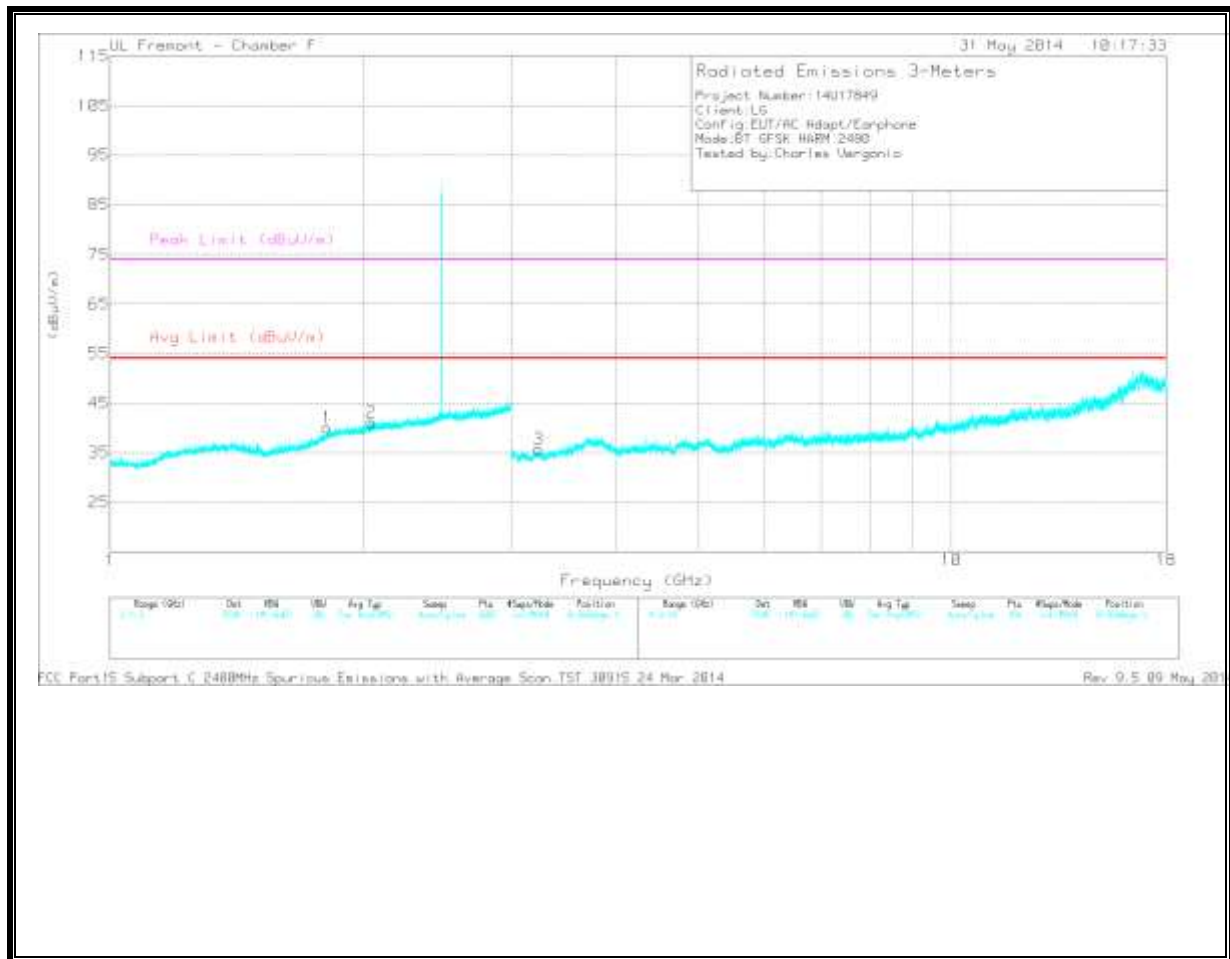
PK - Peak detector

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



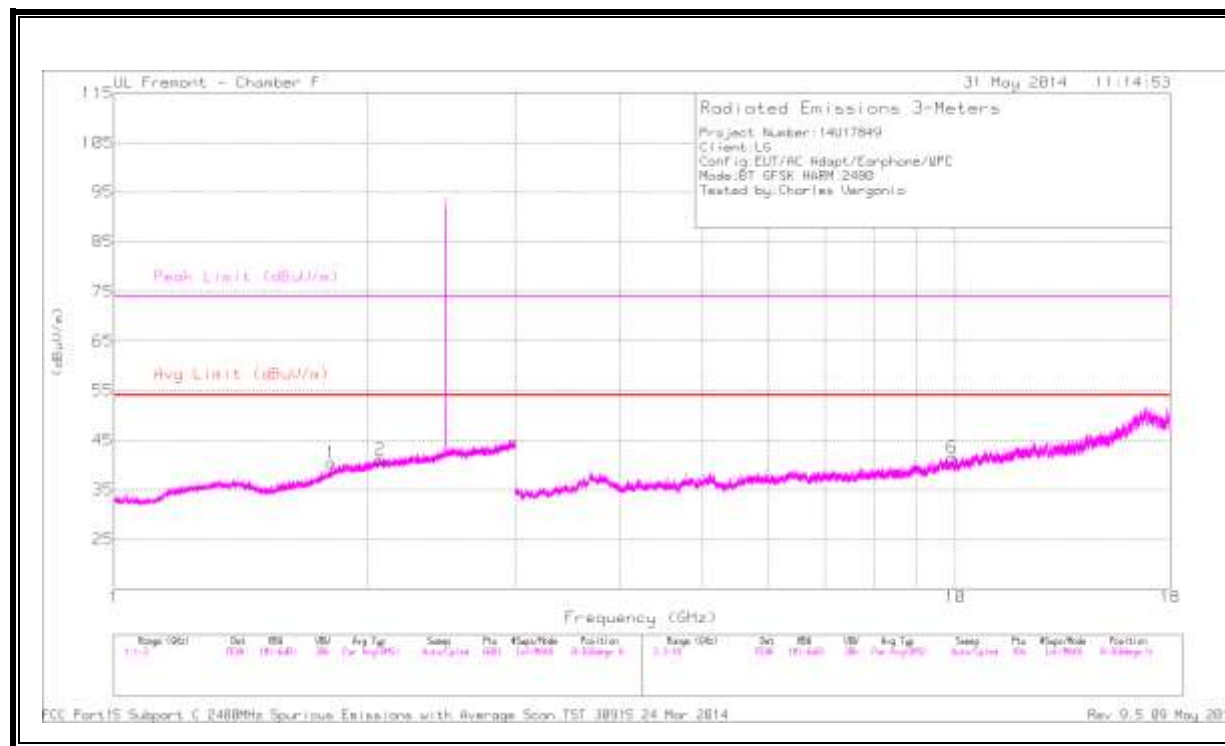
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

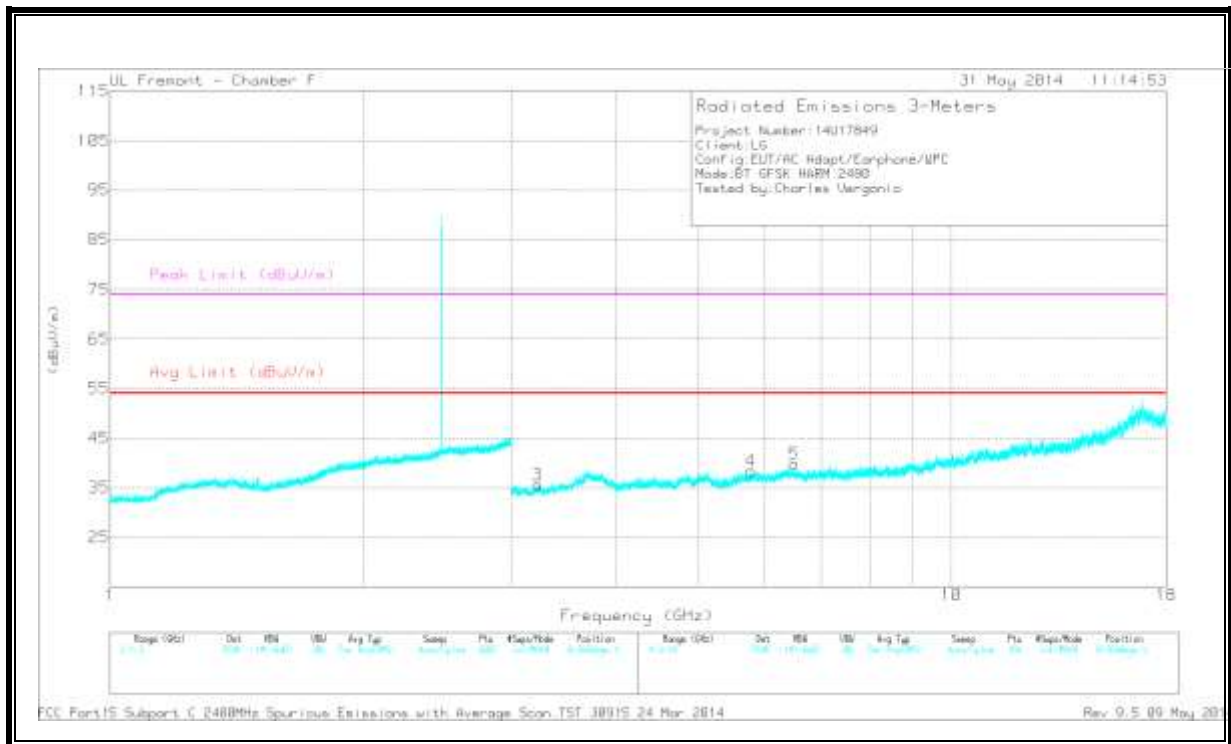
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.814	34.16	PK	30.4	-24.5	0	40.06	54	-13.94	-	-	0-360	101	V
2	2.045	33.45	PK	31.8	-24.1	0	41.15	54	-12.85	-	-	0-360	101	V
4	5.943	31.72	PK	35.2	-27.8	0	39.12	54	-14.88	-	-	0-360	200	H
5	6.356	30.96	PK	35.6	-27.4	0	39.16	54	-14.84	-	-	0-360	200	H
6	9.609	26.95	PK	36.9	-21.4	0	42.45	54	-11.55	-	-	0-360	200	H
3	3.231	31.2	PK	33.4	-28.9	0	35.7	54	-18.3	-	-	0-360	201	V

PK - Peak detector

**WORST CASE WITH WPC CHARGER AND BACK COVER
HORIZONTAL**



VERTICAL



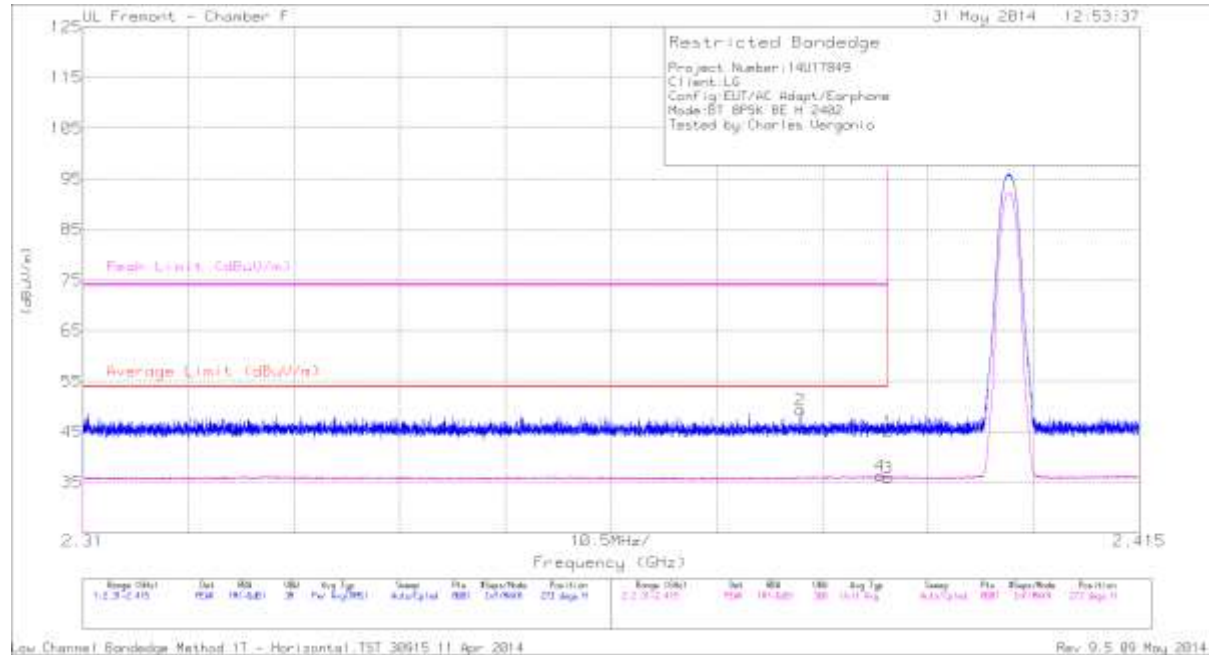
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.811	34.55	PK	30.4	-24.6	0	40.35	54	-13.65	-	-	0-360	100	H
2	2.074	33.03	PK	31.8	-23.7	0	41.13	54	-12.87	-	-	0-360	100	H
6	9.905	26.81	PK	37.2	-22.5	0	41.51	54	-12.49	-	-	0-360	101	H
3	3.222	31.26	PK	33.4	-29.1	0	35.56	54	-18.44	-	-	0-360	101	V
4	5.775	30.82	PK	34.9	-27.4	0	38.32	54	-15.68	-	-	0-360	101	V
5	6.505	31.51	PK	35.6	-27.4	0	39.71	54	-14.29	-	-	0-360	101	V

PK - Peak detector

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEGE (LOW CHANNEL, HORIZONTAL)



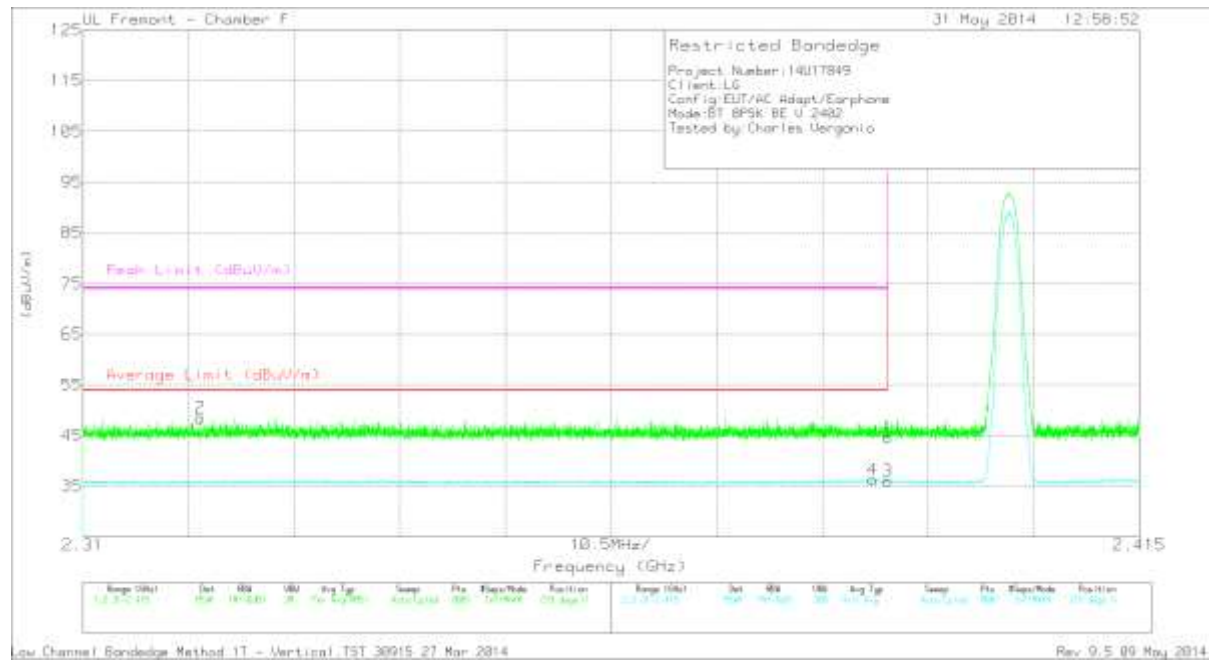
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.54	PK	32.2	-23.8	0	44.94	-	-	74	-29.06	273	257	H
2	* 2.381	40.97	PK	32.1	-23.8	0	49.27	-	-	74	-24.73	273	257	H
3	* 2.39	27.49	VB1T	32.2	-23.8	0	35.89	54	-18.11	-	-	273	257	H
4	* 2.389	27.87	VB1T	32.2	-23.8	0	36.27	54	-17.73	-	-	273	257	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEGE (LOW CHANNEL, VERTICAL)



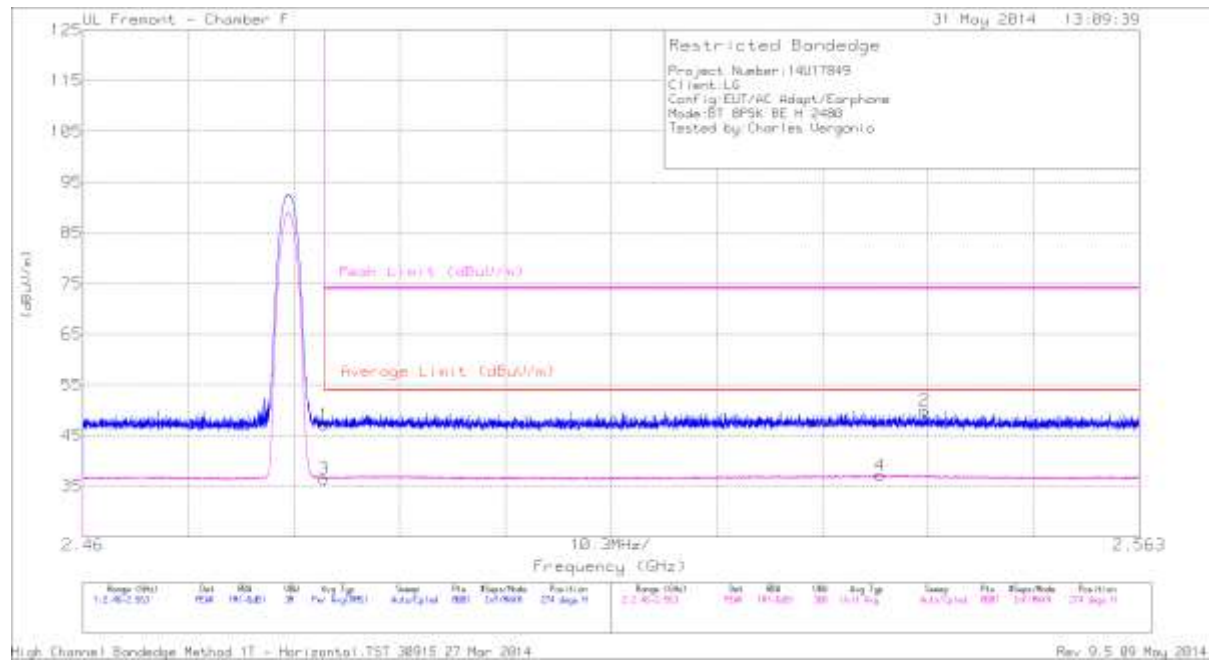
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.34	PK	32.2	-23.8	0	44.74	-	-	74	-29.26	215	262	V
2	* 2.322	40.09	PK	31.9	-23.5	0	48.49	-	-	74	-25.51	215	262	V
3	* 2.39	27.59	VB1T	32.2	-23.8	0	35.99	54	-18.01	-	-	215	262	V
4	* 2.389	27.81	VB1T	32.2	-23.8	0	36.21	54	-17.79	-	-	215	262	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



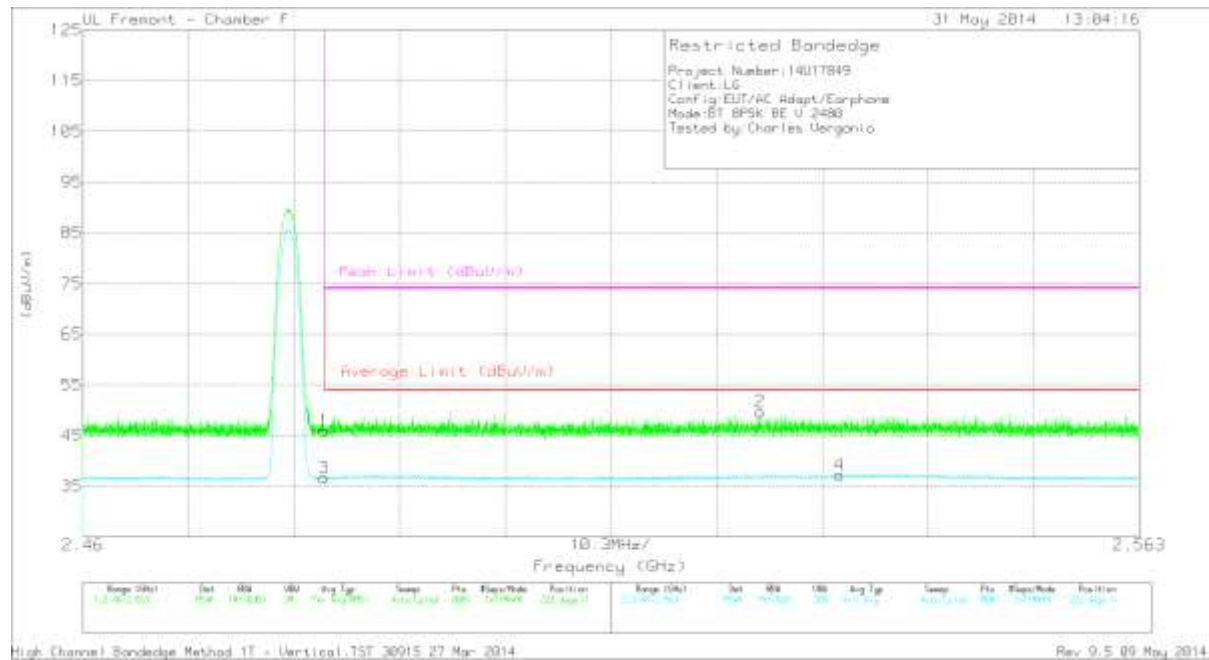
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Flt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.55	PK	32.6	-23	0	47.15	-	-	74	-26.85	274	373	H
2	2.542	40.06	PK	32.7	-22.9	0	49.86	-	-	74	-24.14	274	373	H
3	* 2.484	26.95	VB1T	32.6	-23	0	36.55	54	-17.45	-	-	274	373	H
4	2.538	27.28	VB1T	32.7	-22.8	0	37.18	54	-16.82	-	-	274	373	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.39	PK	32.6	-23	45.99	-	-	74	-28.01	222	321	V
2	2.526	39.93	PK	32.7	-22.9	49.73	-	-	74	-24.27	222	321	V
3	* 2.484	27.03	VB1T	32.6	-23	36.63	54	-17.37	-	-	222	321	V
4	2.534	27.31	VB1T	32.7	-22.8	37.21	54	-16.79	-	-	222	321	V

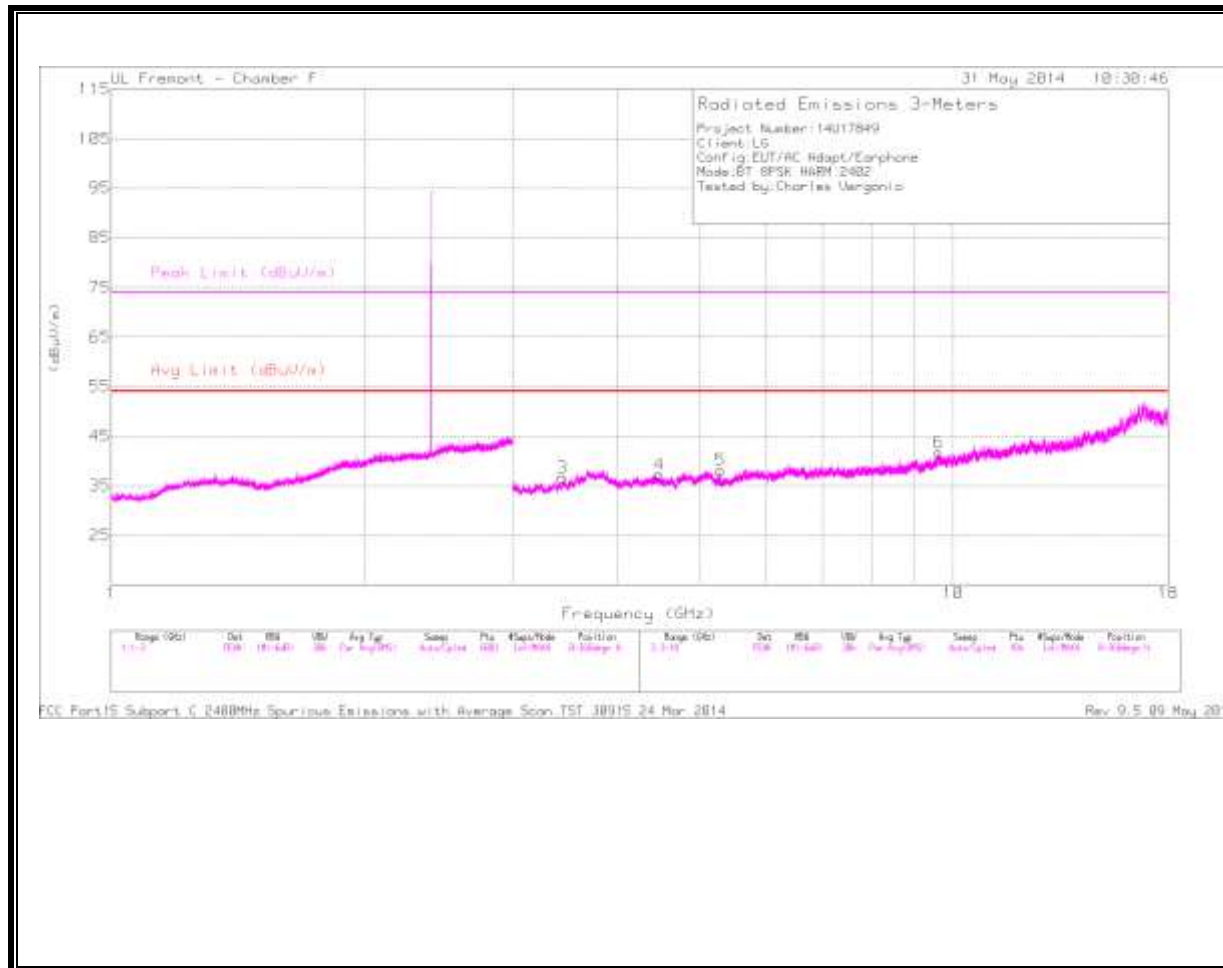
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

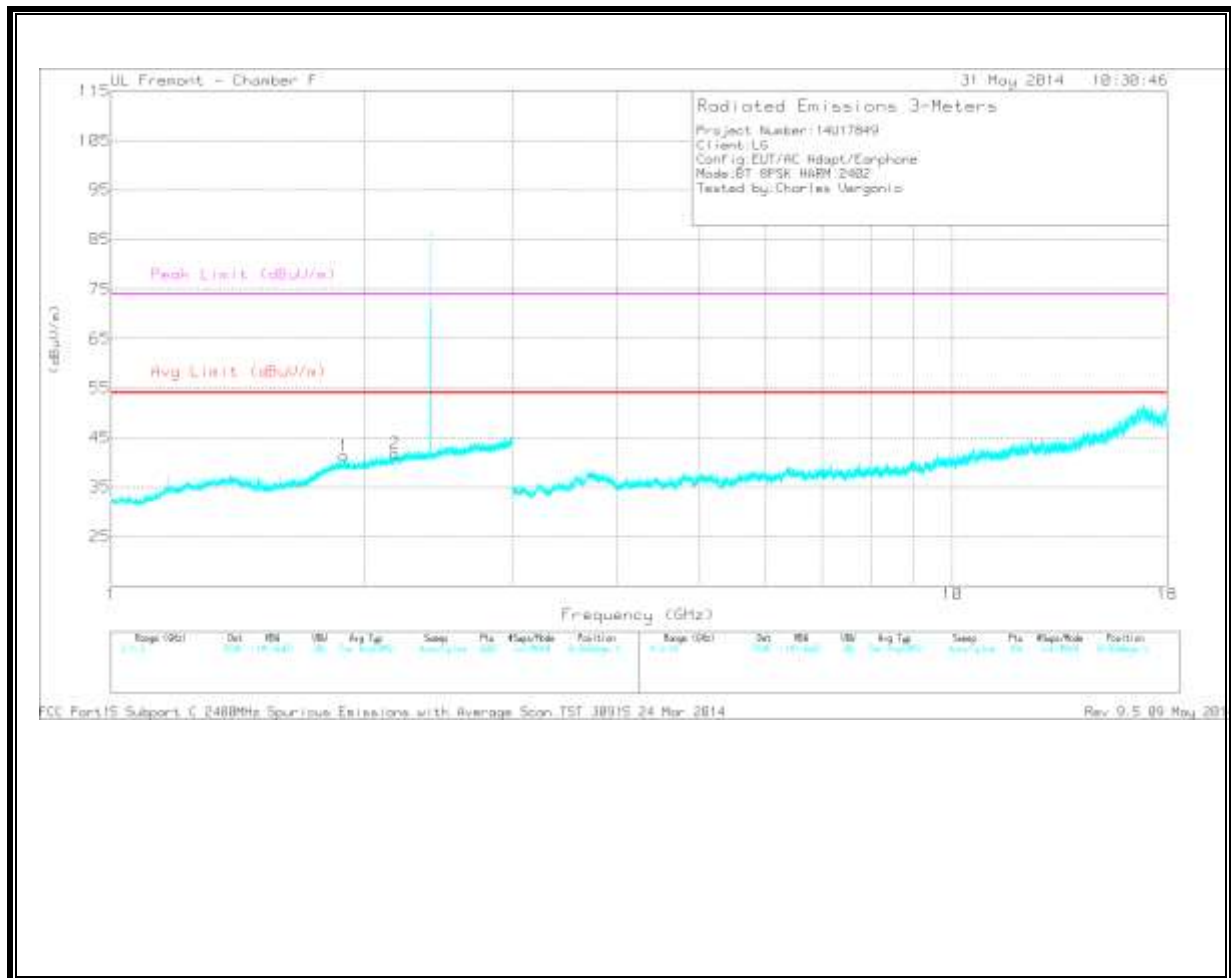
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



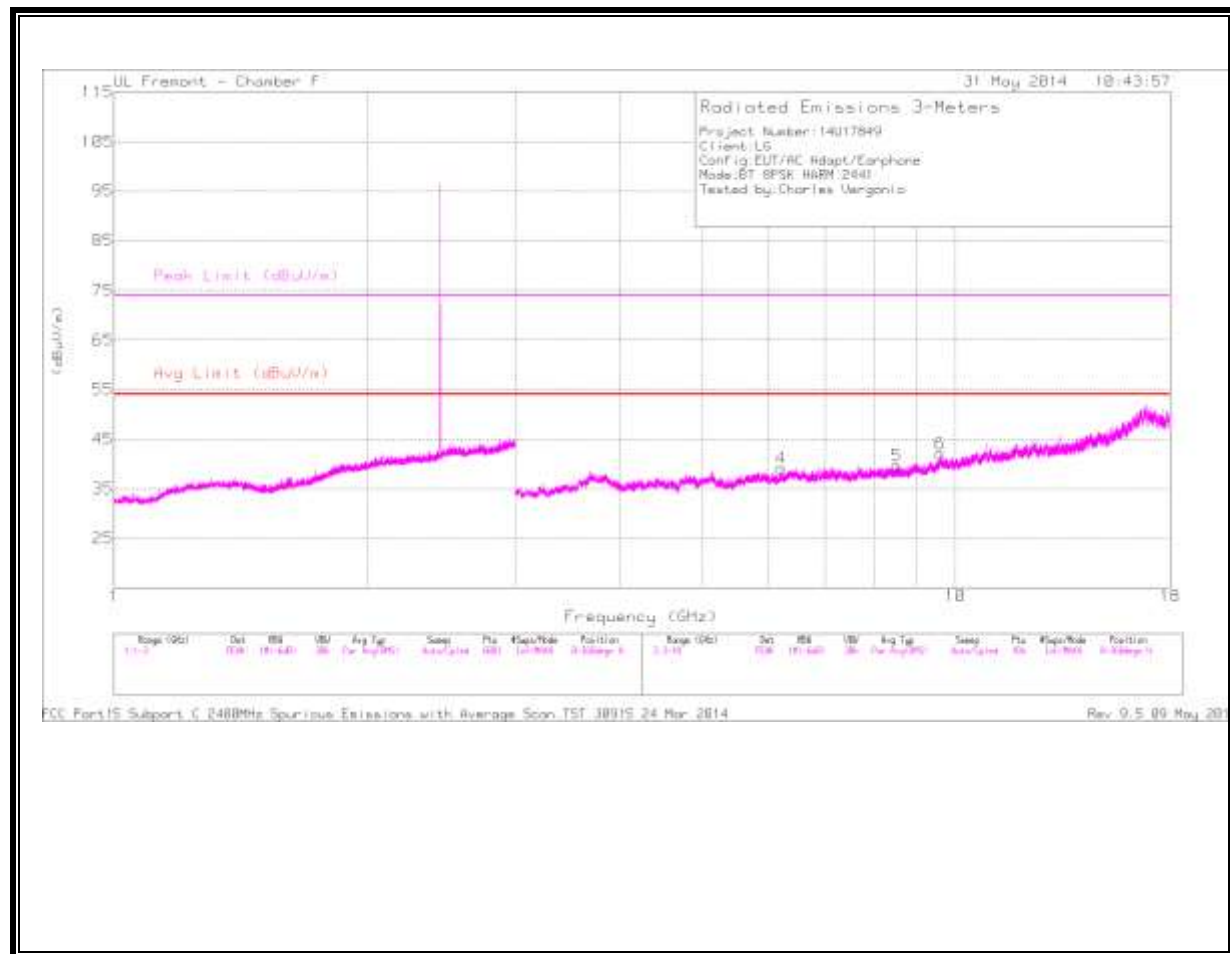
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.893	34.47	PK	31.3	-24.5	0	41.27	54	-12.73	-	-	0-360	101	V
2	2.175	34.15	PK	31.8	-24.1	0	41.85	54	-12.15	-	-	0-360	201	V
3	3.437	31.52	PK	34.1	-29	0	36.62	54	-17.38	-	-	0-360	101	H
4	4.48	31.82	PK	33.9	-28.5	0	37.22	54	-16.78	-	-	0-360	101	H
5	5.293	32.38	PK	34.5	-28.8	0	38.08	54	-15.92	-	-	0-360	101	H
6	9.605	26.06	PK	36.9	-21.3	0	41.66	54	-12.34	-	-	0-360	200	H

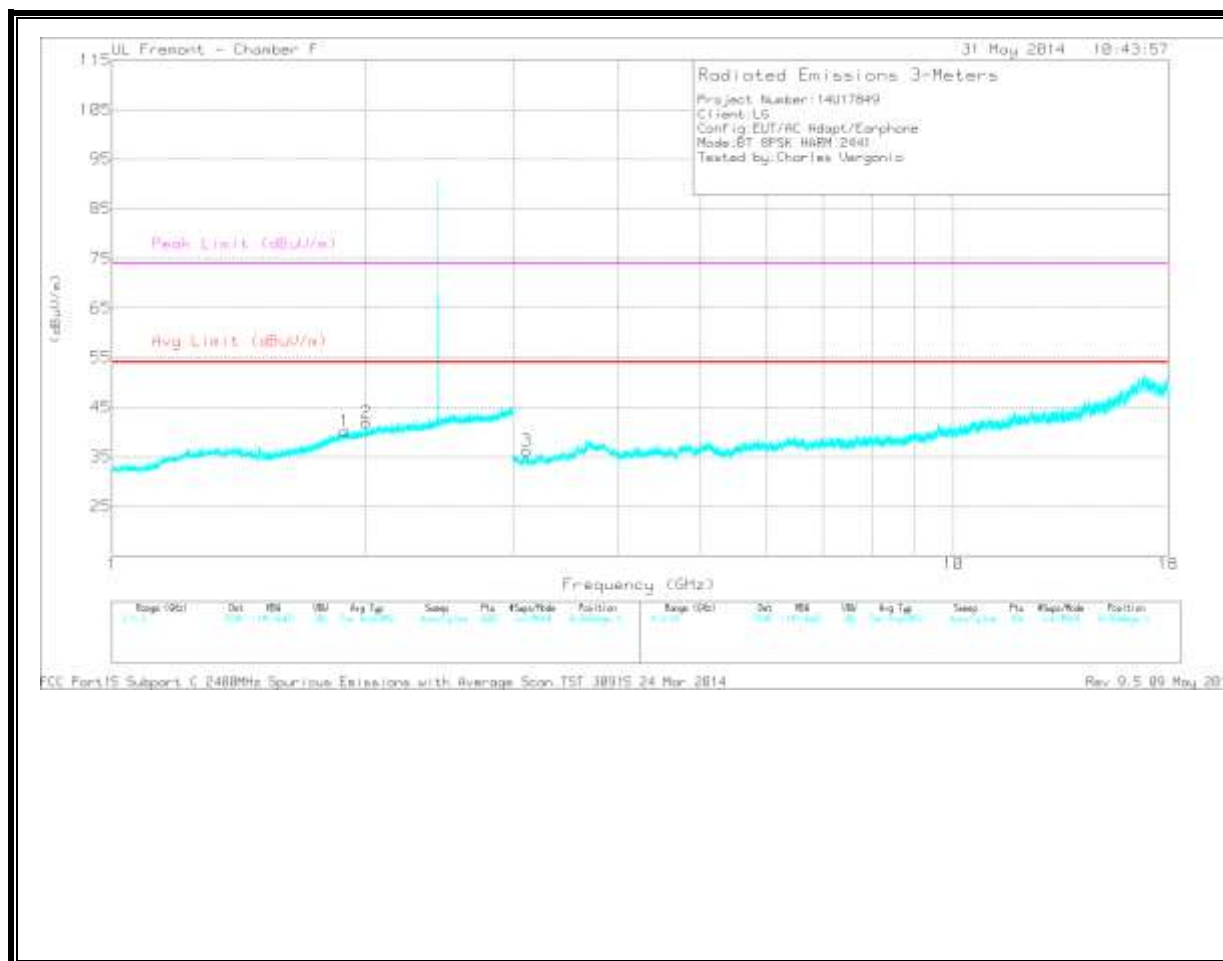
PK - Peak detector

MID CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



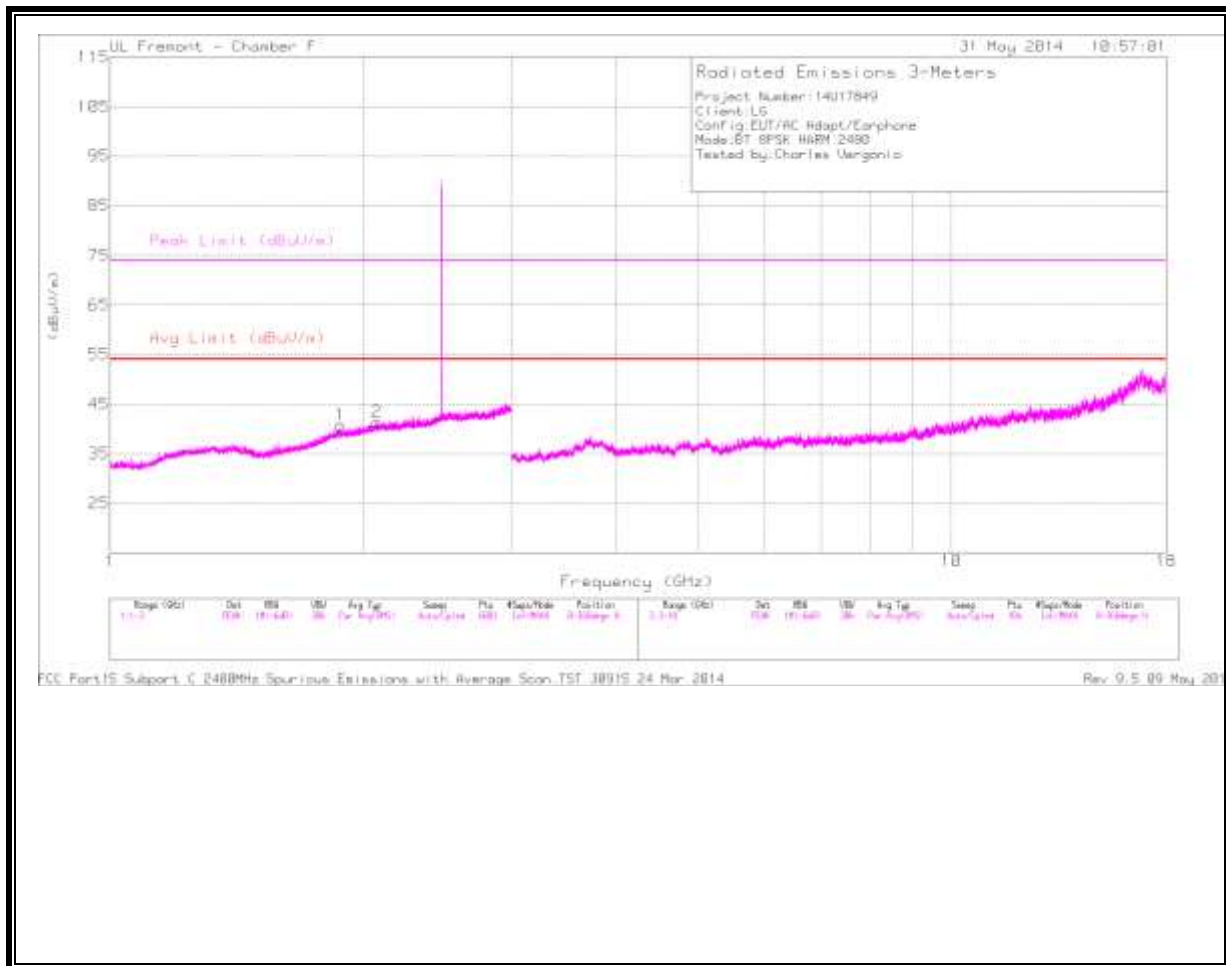
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Filt /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.894	33.38	PK	31.3	-24.5	0	40.18	54	-13.82	-	-	0-360	101	V
2	2.005	34.93	PK	31.7	-24.7	0	41.93	54	-12.07	-	-	0-360	201	V
4	6.21	31.27	PK	35.5	-27.7	0	39.07	54	-14.93	-	-	0-360	101	H
5	8.513	28.48	PK	35.8	-24.7	0	39.58	54	-14.42	-	-	0-360	200	H
6	9.596	26.52	PK	36.9	-21.4	0	42.02	54	-11.98	-	-	0-360	101	H
3	3.11	32.87	PK	33.3	-29.9	0	36.27	54	-17.73	-	-	0-360	201	V

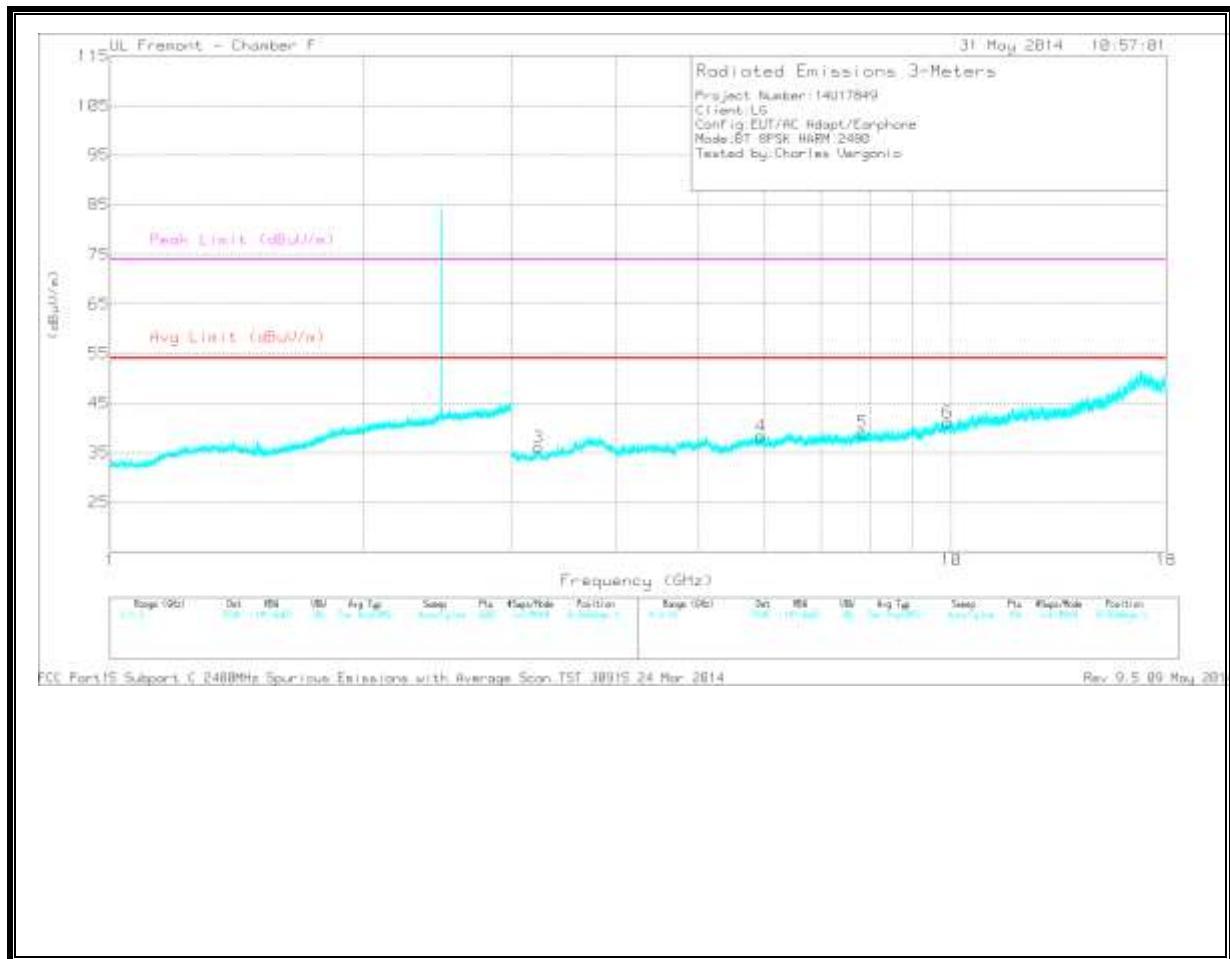
PK - Peak detector

HIGH CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

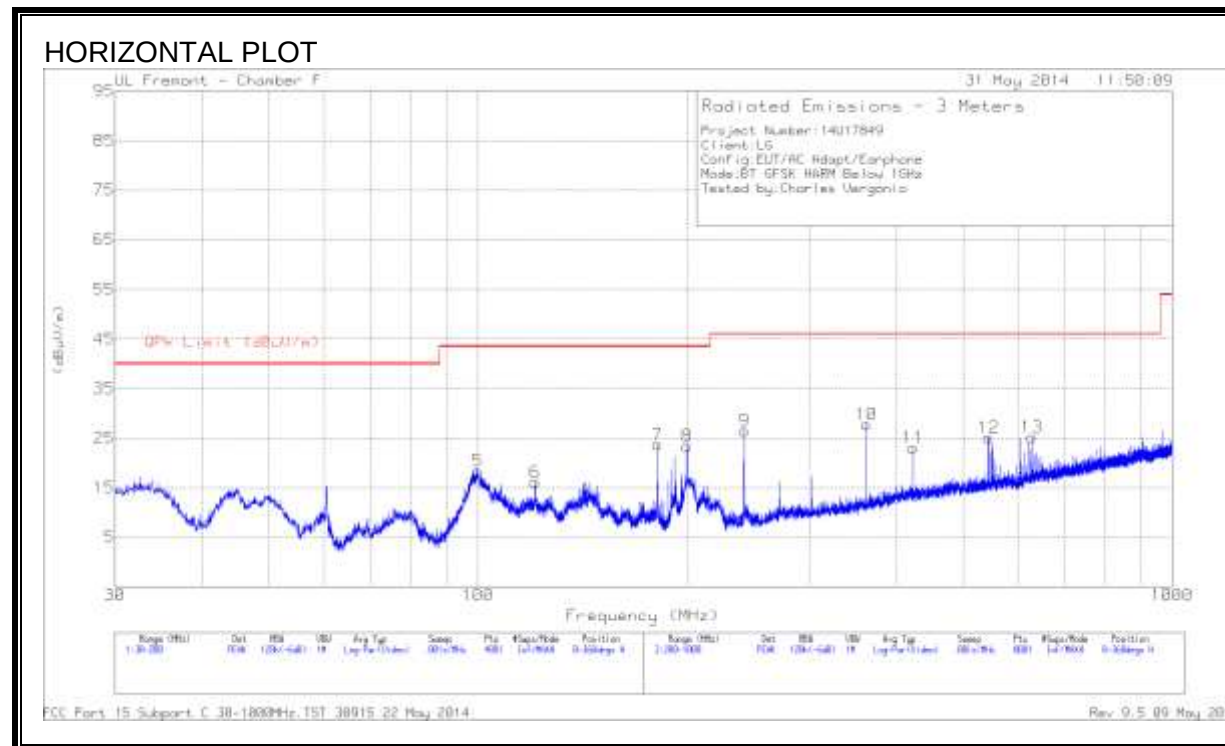
HIGH CHANNEL DATA

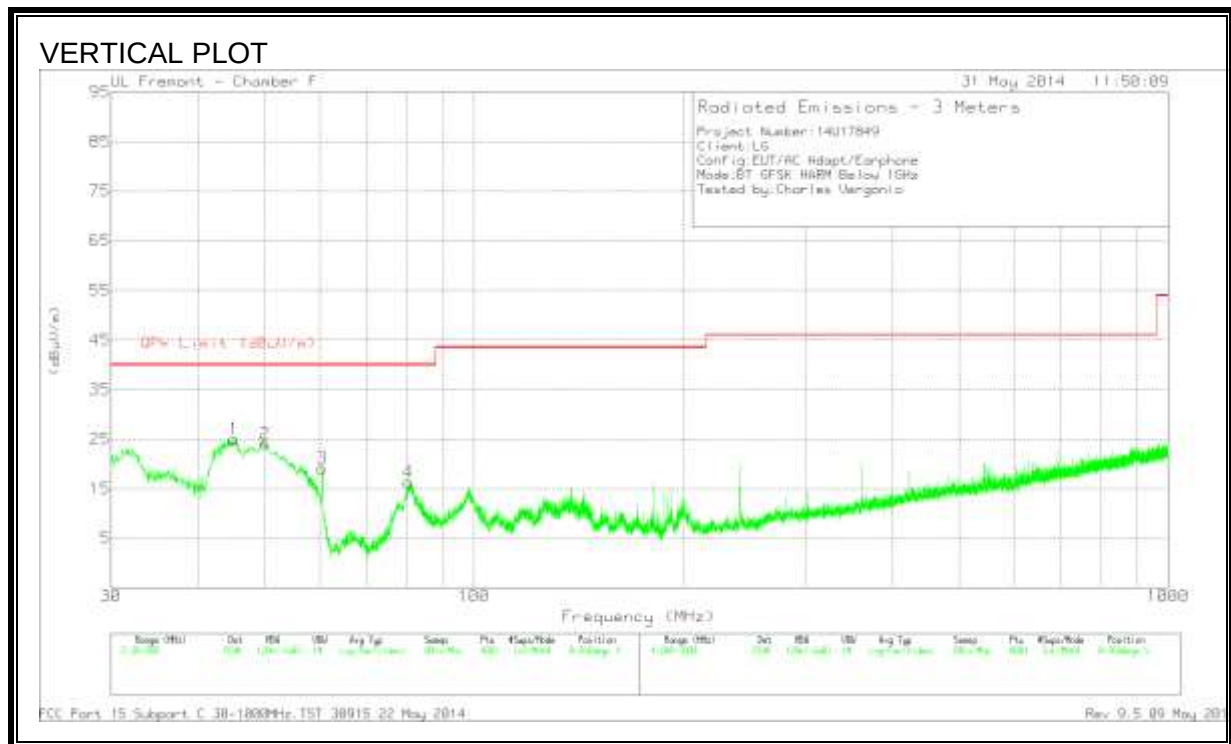
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.879	34.13	PK	31.2	-24.5	0	40.83	54	-13.17	-	-	0-360	199	H
2	2.075	33.33	PK	31.8	-23.7	0	41.43	54	-12.57	-	-	0-360	100	H
3	3.227	31.72	PK	33.4	-29	0	36.12	54	-17.88	-	-	0-360	201	V
4	5.932	31.12	PK	35.2	-28	0	38.32	54	-15.68	-	-	0-360	101	V
5	7.846	29.21	PK	35.7	-25.8	0	39.11	54	-14.89	-	-	0-360	201	V
6	9.891	25.89	PK	37.2	-21.9	0	41.19	54	-12.81	-	-	0-360	101	V

PK - Peak detector

8.3. WORST-CASE BELOW 1 GHz

GFSK SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)





DATA

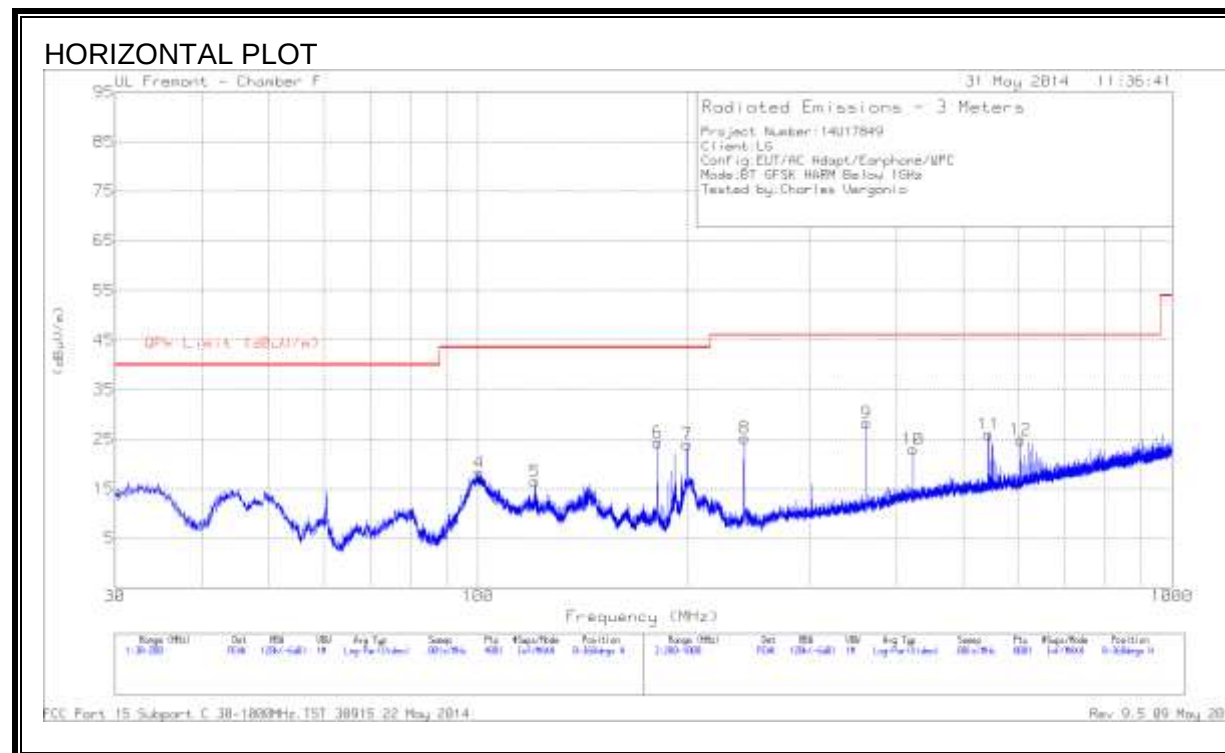
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	99.955	39.56	PK	10.2	-31.4	18.36	43.52	-25.16	0-360	301	H
6	* 120.95	33.37	PK	14	-31.3	16.07	43.52	-27.45	0-360	301	H
7	181.4275	43.71	PK	11.2	-31.2	23.71	43.52	-19.81	0-360	200	H
8	200	41.42	PK	12.8	-30.8	23.42	43.52	-20.1	0-360	301	H
1	45.1725	45.93	PK	10.3	-31.2	25.03	40	-14.97	0-360	100	V
2	50.0175	47.78	PK	8.1	-31.8	24.08	40	-15.92	0-360	100	V
3	60.4725	43.76	PK	7.5	-32.1	19.16	40	-20.84	0-360	100	V
4	80.49	40.01	PK	7.7	-31.4	16.31	40	-23.69	0-360	100	V
9	* 241.9	45.54	PK	11.7	-30.8	26.44	46.02	-19.58	0-360	201	H
10	362.8	43.23	PK	14.8	-30.3	27.73	46.02	-18.29	0-360	100	H
11	423.3	36.91	PK	16.5	-30.3	23.11	46.02	-22.91	0-360	100	H
12	544.2	36.95	PK	18.2	-30	25.15	46.02	-20.87	0-360	201	H
13	628	35.42	PK	19.4	-29.6	25.22	46.02	-20.8	0-360	201	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

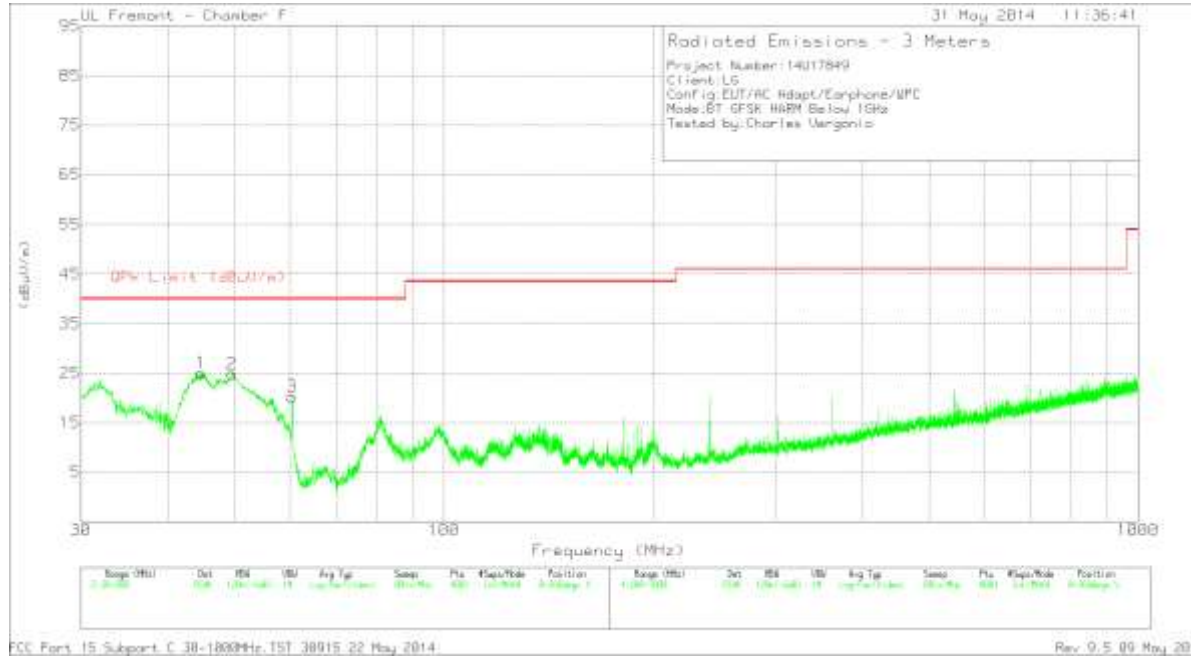
PK - Peak detector

WORST-CASE WITH WPC CHARGER AND BACK COVER BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



VERTICAL PLOT



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	100.3375	39.63	PK	10.3	-31.7	18.23	43.52	-25.29	0-360	301	H
5	* 120.9075	33.75	PK	14	-31.3	16.45	43.52	-27.07	0-360	201	H
6	181.4275	44.29	PK	11.2	-31.2	24.29	43.52	-19.23	0-360	201	H
7	200	41.91	PK	12.8	-30.8	23.91	43.52	-19.61	0-360	301	H
1	44.705	46.03	PK	10.6	-31.6	25.03	40	-14.97	0-360	100	V
2	49.5075	47.69	PK	8.2	-31	24.89	40	-15.11	0-360	100	V
3	60.4725	44.85	PK	7.5	-32.1	20.25	40	-19.75	0-360	100	V
8	* 241.9	44.34	PK	11.7	-30.8	25.24	46.02	-20.78	0-360	200	H
9	362.8	43.71	PK	14.8	-30.3	28.21	46.02	-17.81	0-360	100	H
10	423.3	36.75	PK	16.5	-30.3	22.95	46.02	-23.07	0-360	100	H
11	544.2	37.73	PK	18.2	-30	25.93	46.02	-20.09	0-360	200	H
12	604.7	36.14	PK	18.6	-29.9	24.84	46.02	-21.18	0-360	200	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector