FCC 47 CFR PART 15 SUBPART C

BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT

FOR

Tv Box, 10/100 Ethernet, MoCA 1.1/2.0, WiFi AP, HDMI 1.4 w/ HDCP

MODEL NUMBER: GFHD200

FCC ID: A4RGFHD200

REPORT NUMBER: 14U17737-5 Revision A

ISSUE DATE: June 10, 2014

Prepared for
GOOGLE
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW
CA, 94043, US

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/02/14	Initial Issue	F. de Anda
A	06/10/14	Update- test equipment list and >1GHz BE test procedure	F. de Anda

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOOGLE
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA, 94043, US

EUT DESCRIPTION: Tv Box, 10/100 Ethernet, MoCA 1.1/2.0, WiFi AP, HDMI 1.4 w/ HDCP

MODEL: GFHD200

SERIAL NUMBER: GTAFSJ1419Dl0012

DATE TESTED: MAY 7-15, 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.

Approved & Released For
UL Verification Services Inc. By:

FRANCISCO DE ANDA
PROJECT LEAD
UL Verification Services Inc.

Tested By:

STEVE AGUILAR
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 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 1000 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 TV set top box that includes the following interfaces;

- 10/100 Ethernet
- MoCA 1.1/2.0
- 2.4/5.2/5.8 GHz WiFi AP
- HDMI1.4 w/HDCP
- BT 4.0 and BLE

The radio chipset is manufactured by Marvell.

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	BLE	4.36	2.73

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a stamped metal dipole antenna with a maximum gain of 3.0 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was gftv200-37.11.

The test utility software on the support laptop used during testing was Dut Labtool ver. 2.0.0.44.

5.5. 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.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	G505	2586122356414	DoC
AC/DC Adapter Alternate	Lenovo	ADLX45NDC3A	45N0290	DoC
Router	Google	GFRG100	G20A32200404	DoC
AC/DC Adapter	Google	STD-12018U1	31500077	DoC
EUT AC Adapter	Liteon Tech. Corp.	PB-1180-29	N/A	N/A

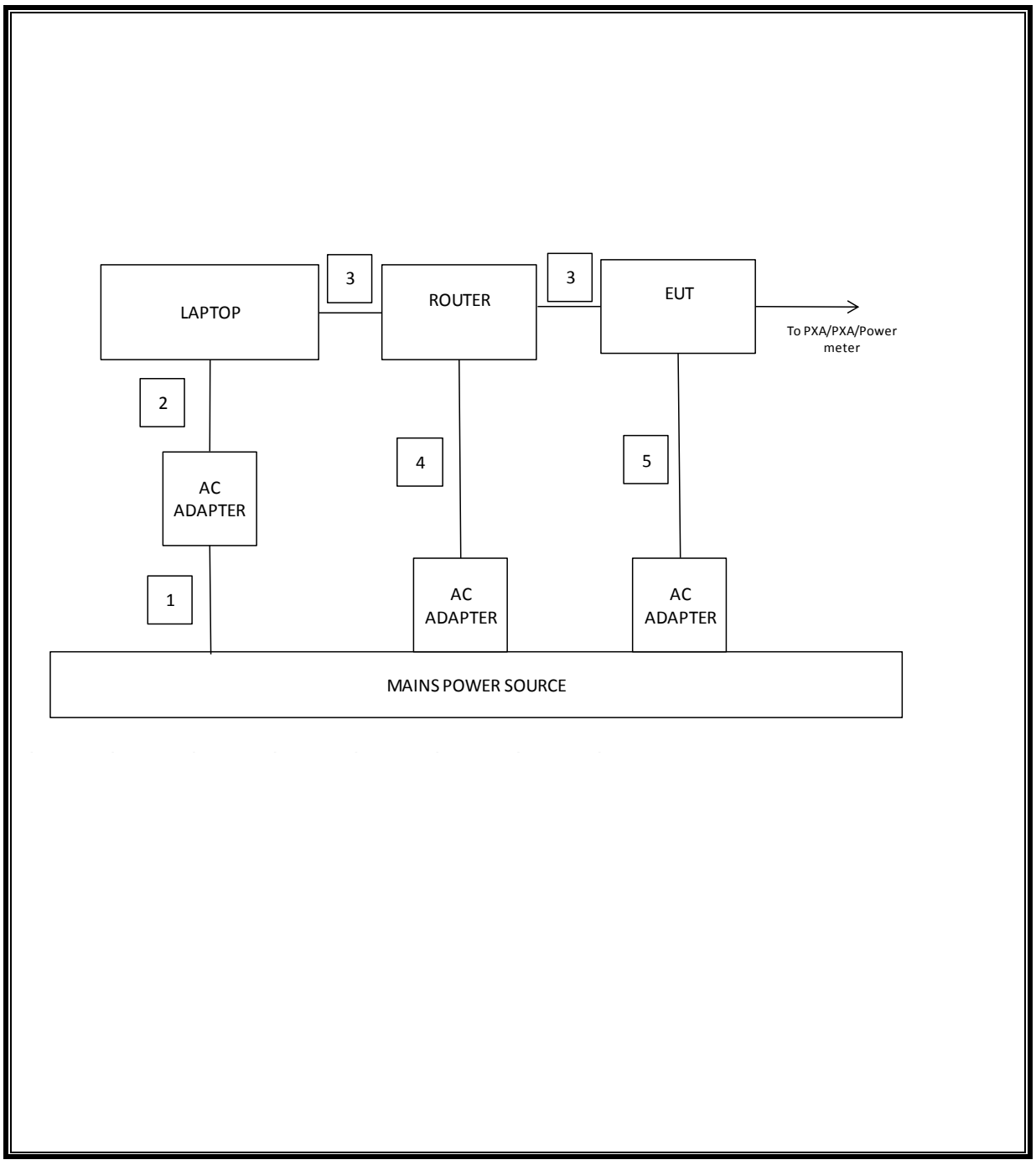
I/O CABLES I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	3-prong	Un-Shielded	1	N/A
2	DC	1	Barrel	Un-Shielded	1.8	N/A
3	LAN	2	RJ45	Un-Shielded	1	N/A
4	DC	1	Barrel	Un-Shielded	1.8	EUT power
5	DC	1	Barrel	Un-Shielded	1.8	N/A

TEST SETUP

The EUT is installed in a typical configuration. Test software exercised the EUT to test the Bluetooth functions.

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 Date**	**Cal Due**
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/26/13	11/26/14
Antenna, Horn, 18GHz	ETS Lindgren	3117	T711	06/24/13	06/24/14
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB3	F00027	05/05/14	05/05/15
High Pass Filter, fc: 3.0GHz, 50 Ohms	Micro-Tronics	HPM17543	F00182	08/30/13	08/30/14
Low Pass Filter, fc: 5GHz, 50 Ohms	Micro-Tronics	LPS17541	F00176	08/30/13	08/30/14
High Pass Filter, fc: 6GHz, 50 Ohms	Micro-Tronics	HPS17542	F00177	08/30/13	08/30/14
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	F00352	08/30/13	08/30/14
Amplifier	Sonoma	310	F00009	04/23/14	04/23/15
PreAmplifier, 1-26.5GHz	Agilent	8449B	F00167	03/25/14	03/25/15
Spectrum Analyzer	Agilent	N9030A	F00127	03/11/14	03/11/15
Wideband Power Sensor, 30MHz BW	Agilent	N1921A	F00360	09/30/13	09/30/14
P-Series single channel Power Meter	Agilent	N1911A	F00050	10/04/13	10/04/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/17/14	01/17/15
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	F00092	09/09/13	09/09/14

7. ANTENNA PORT TEST RESULTS

8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

8.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	0.380	0.626	0.607	60.70%	2.17	2.632

8.2. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r01, Section 8.1.

Output Power: KDB 558074 D01 v03r01, Section 9.1.1.

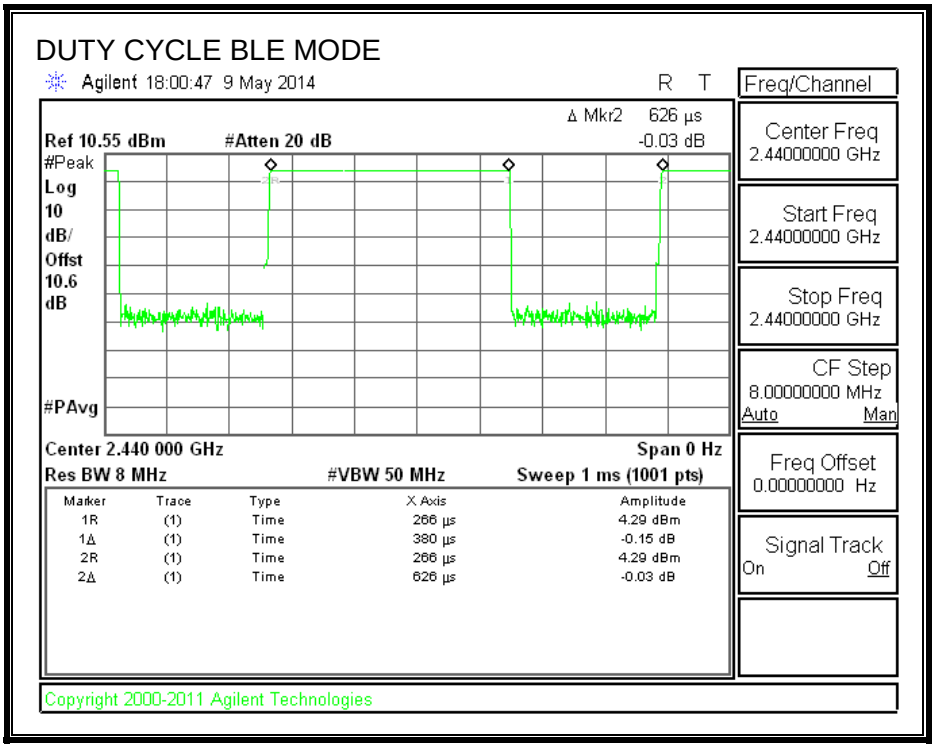
Power Spectral Density: KDB 558074 D01 v03r01, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r01, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r01, Section 12.1.

Band-edge: KDB 558074 D01 v03r01, Section 13.2.

8.3. DUTY CYCLE PLOTS



8.4. 6 dB BANDWIDTH

LIMITS

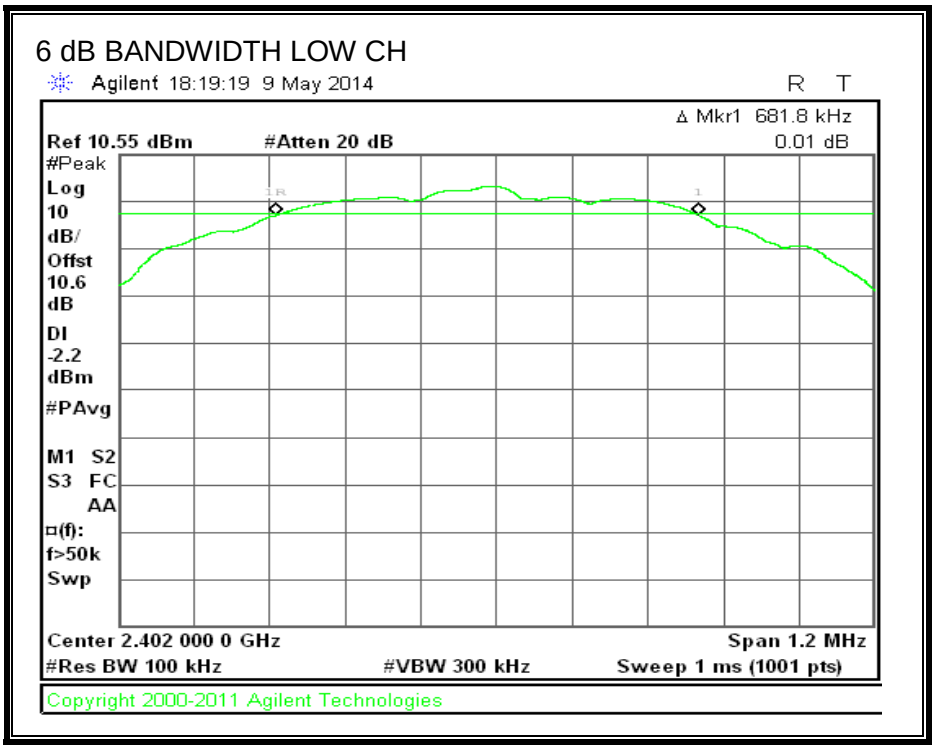
FCC §15.247 (a) (2)

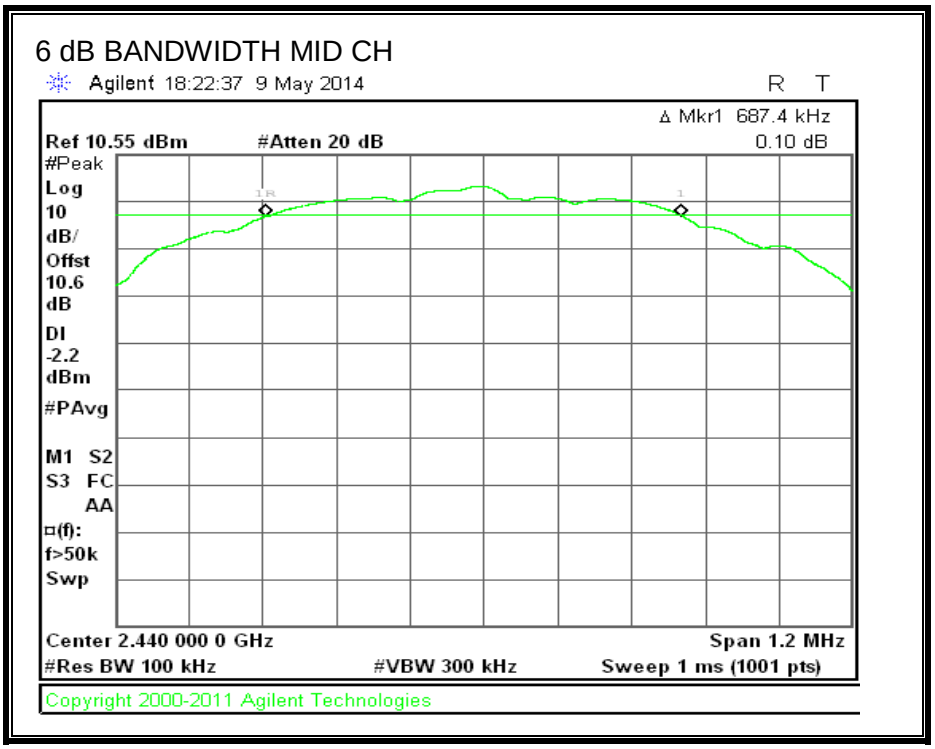
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

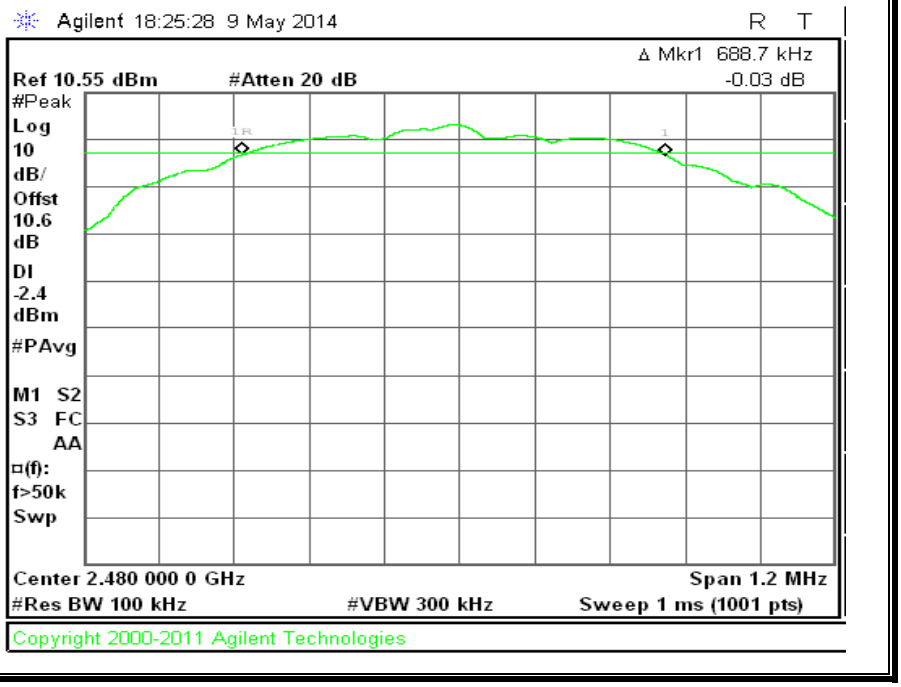
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6818	0.5
Middle	2440	0.6874	0.5
High	2480	0.6887	0.5

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CH



8.5. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

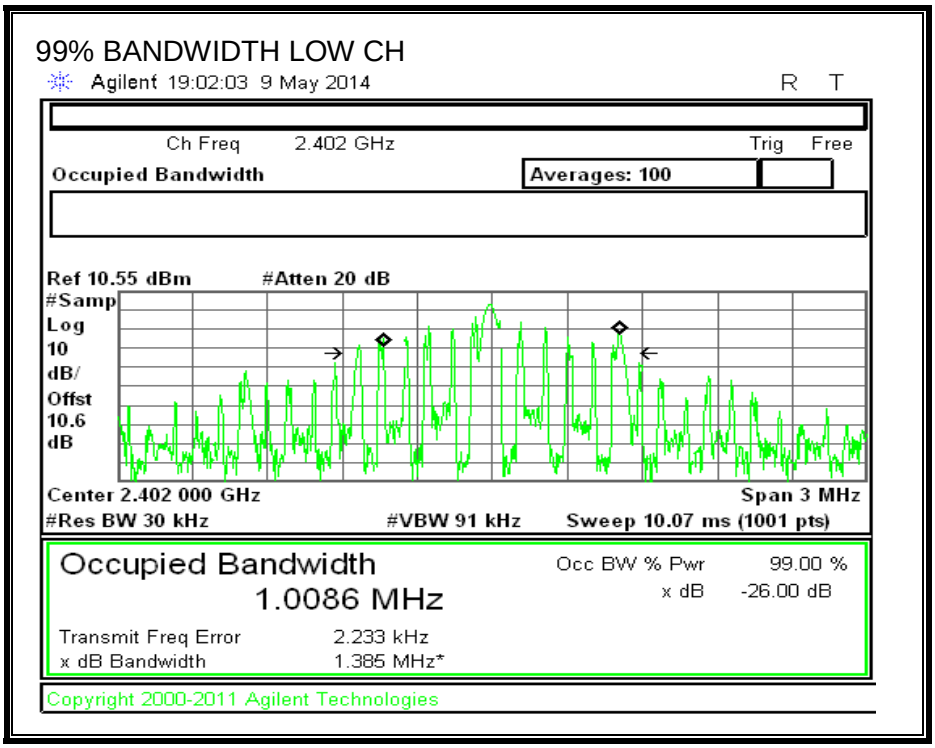
TEST PROCEDURE

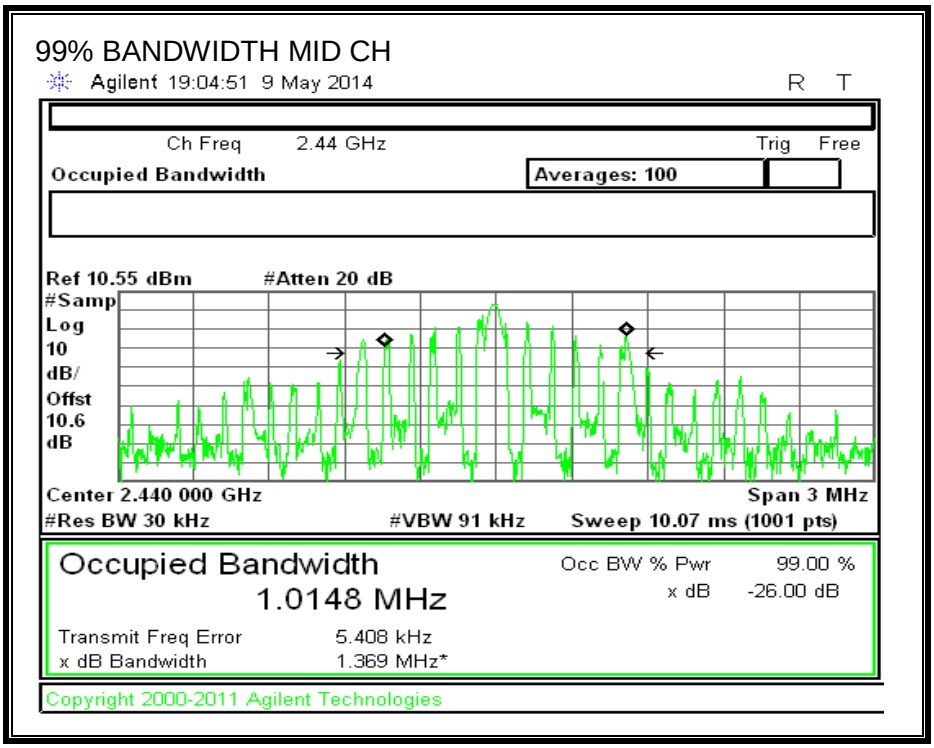
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

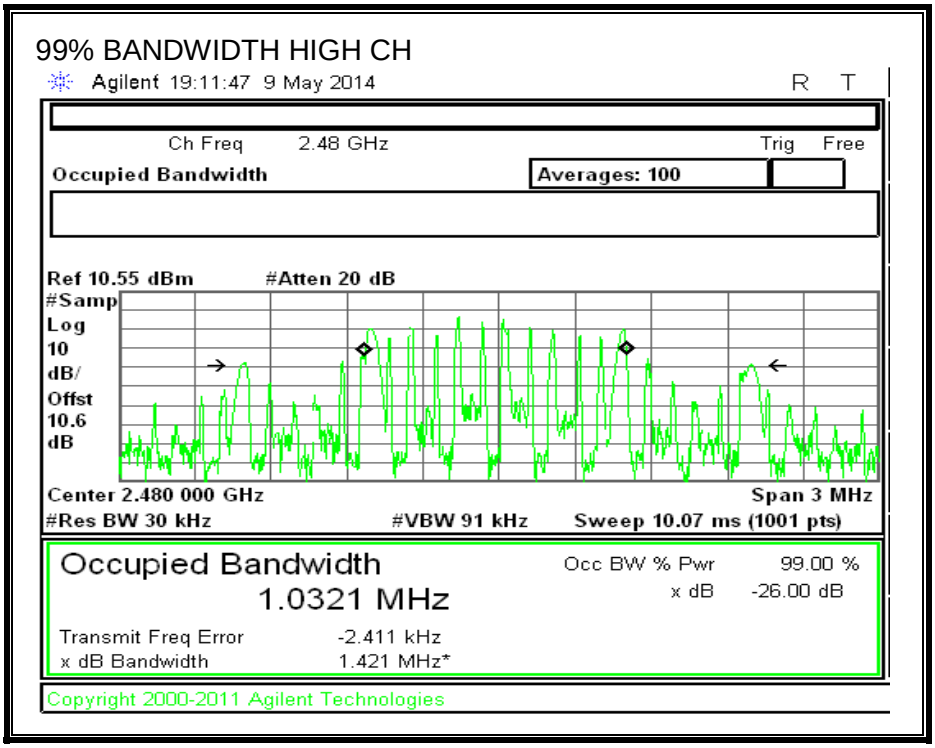
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0080
Middle	2440	1.0148
High	2480	1.0321

99% BANDWIDTH







8.6. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 10.55 dB (including 10 dB pad and .55 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.01
Middle	2440	3.96
High	2480	3.88

8.7. OUTPUT POWER

LIMITS

FCC §15.247 (b)

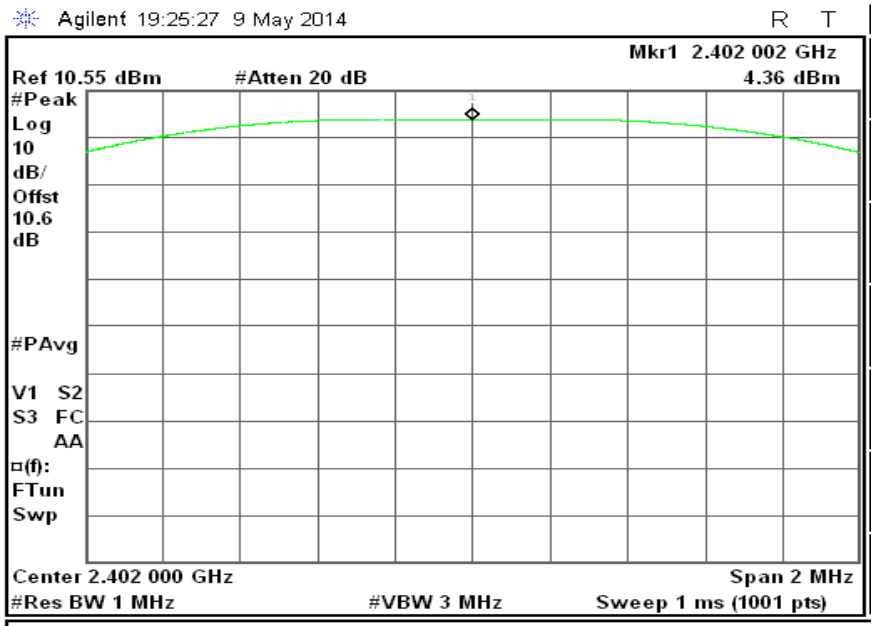
The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

RESULTS

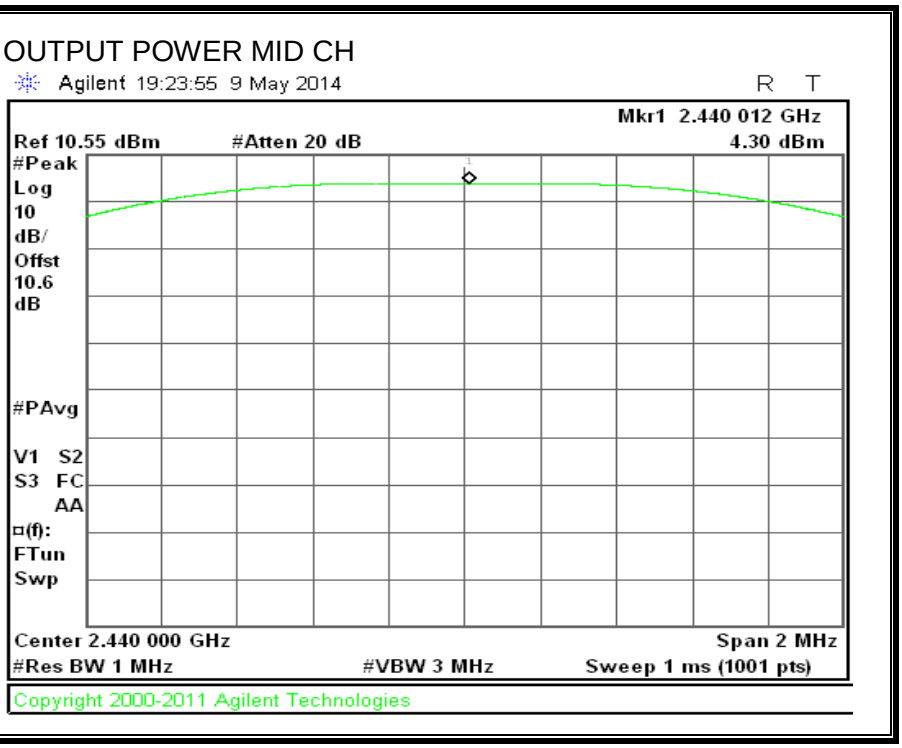
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.360	30	-25.640
Middle	2440	4.300	30	-25.700
High	2480	4.180	30	-25.820

OUTPUT POWER

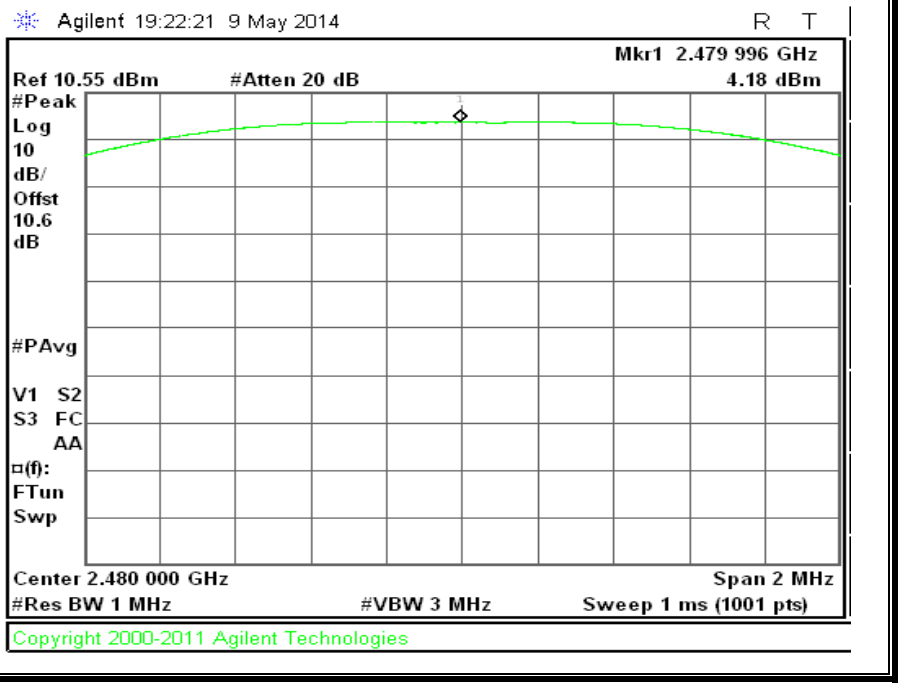
OUTPUT POWER LOW CH



OUTPUT POWER MID CH



OUTPUT POWER HIGH CH



8.8. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

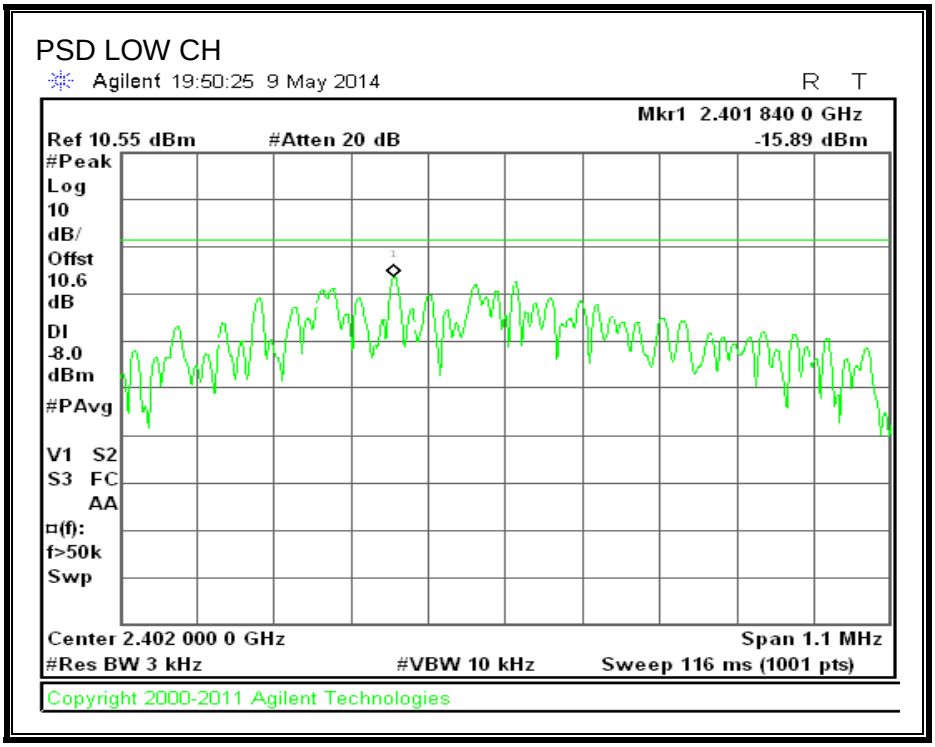
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

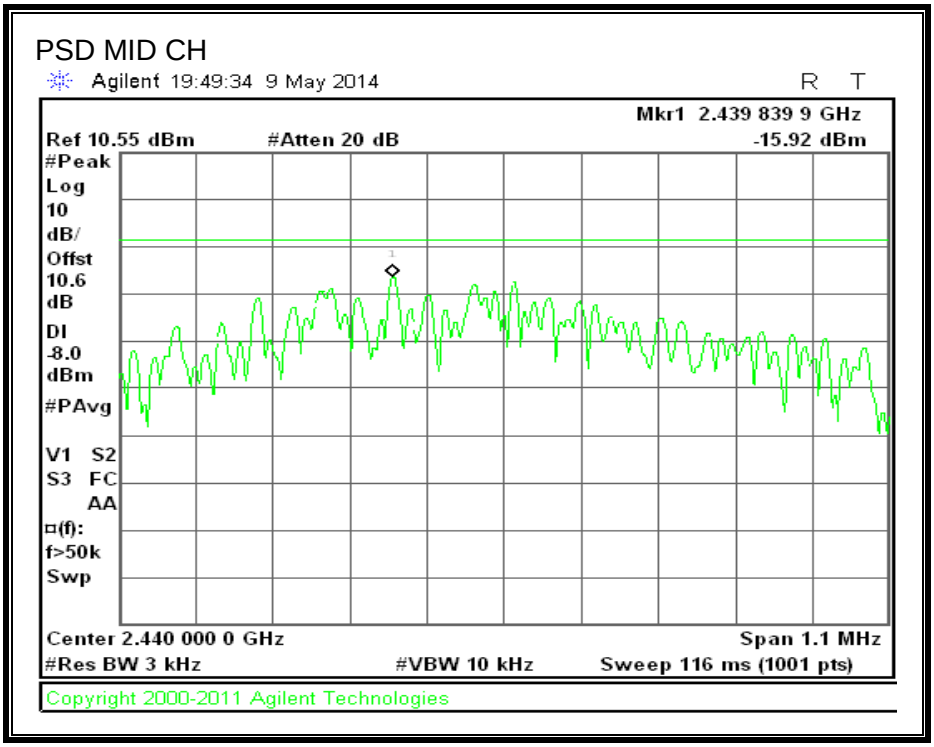
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-15.89	8	-23.89
Middle	2440	-15.92	8	-23.92
High	2480	-16.03	8	-24.03

POWER SPECTRAL DENSITY

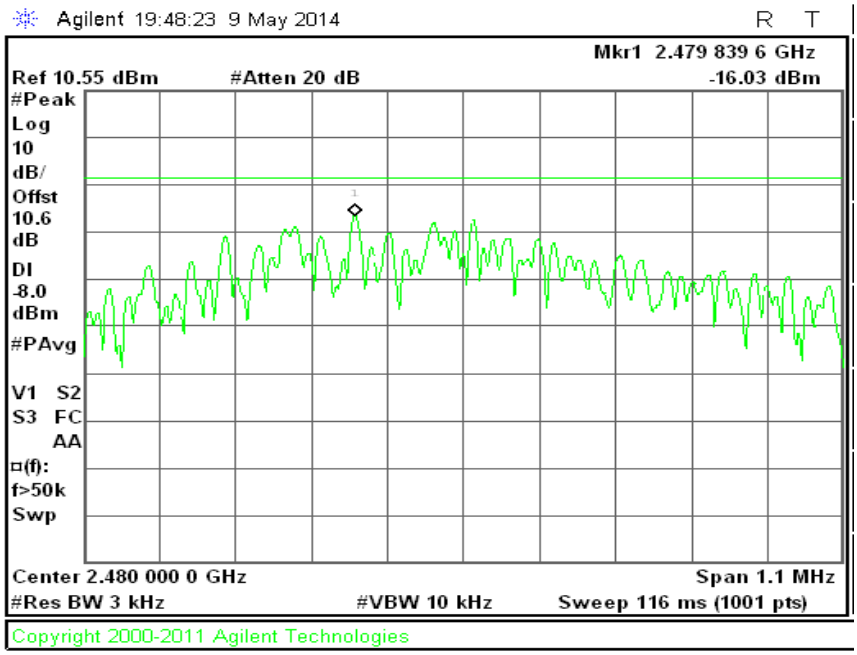
PSD LOW CH



PSD MID CH



PSD HIGH CH



8.9. CONDUCTED SPURIOUS EMISSIONS

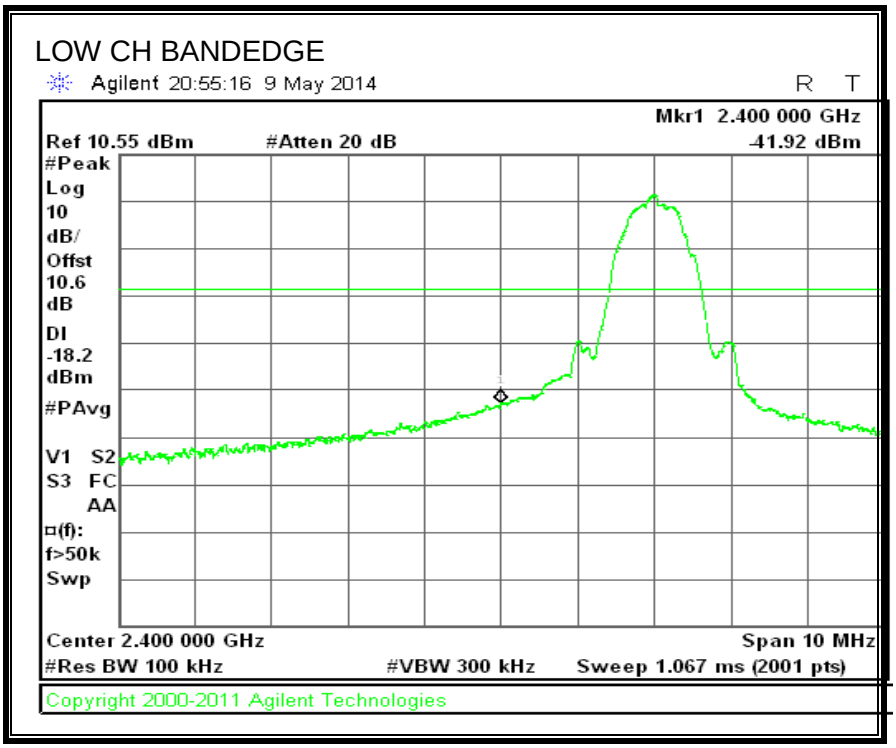
LIMITS

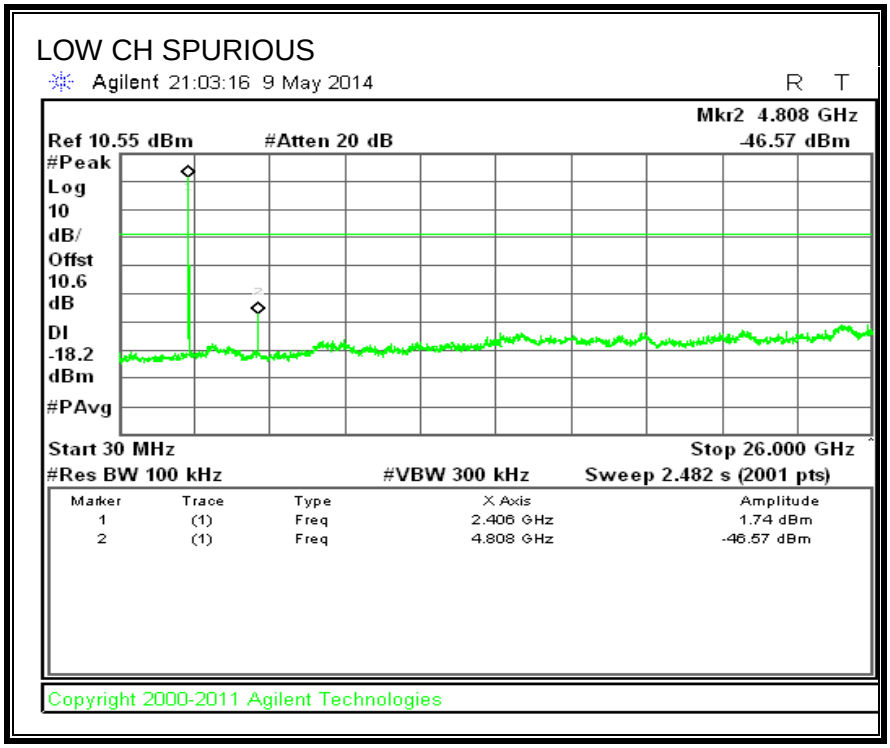
FCC §15.247 (d)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

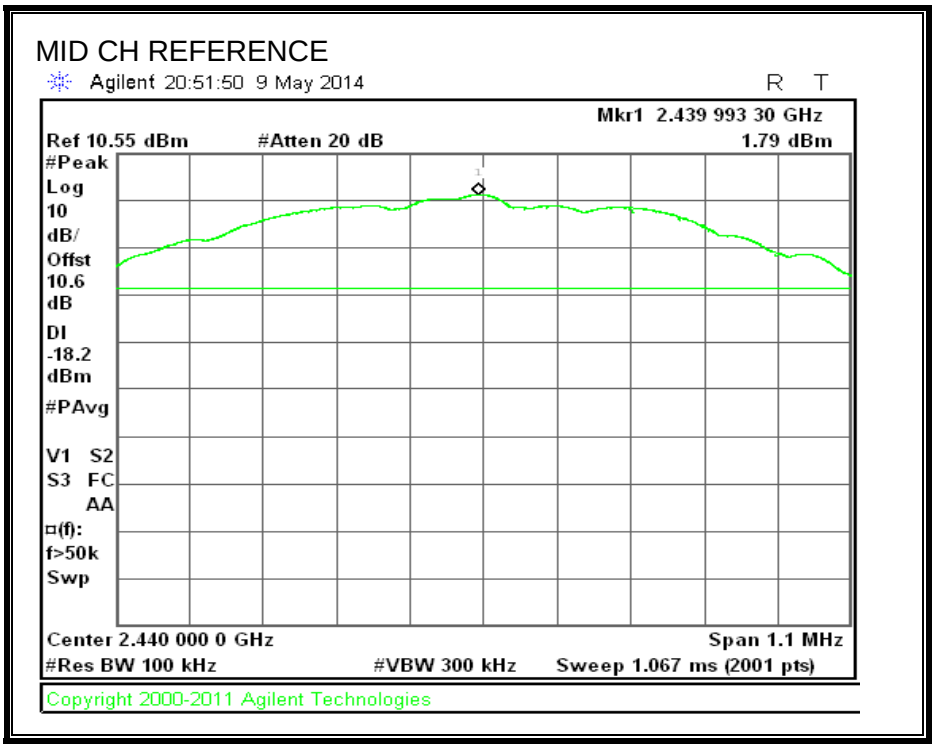
RESULTS

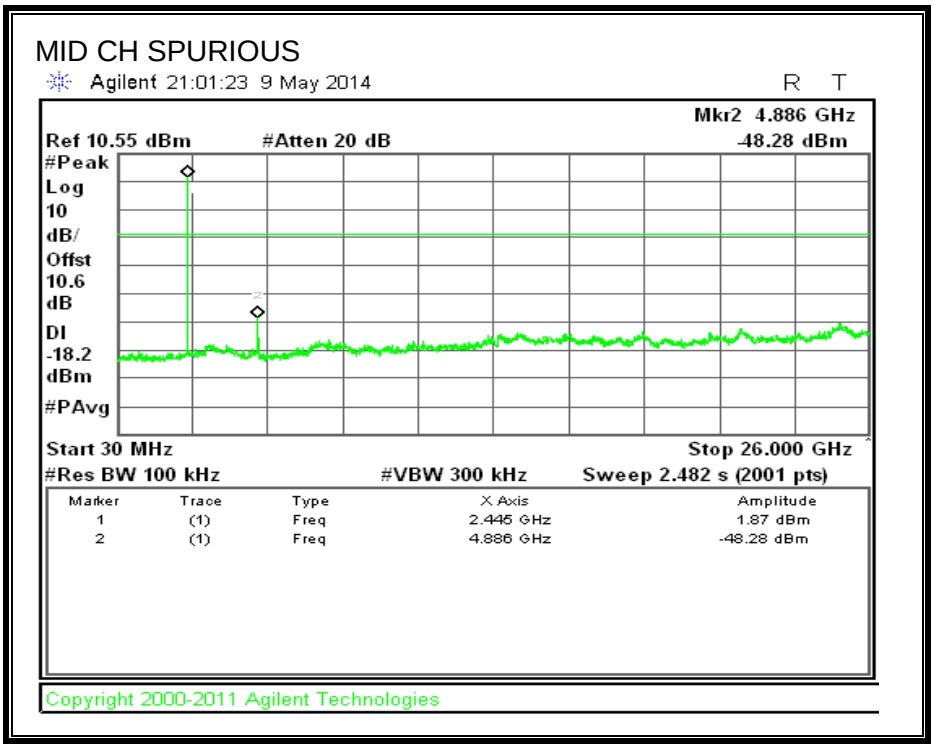
SPURIOUS EMISSIONS, LOW CHANNEL



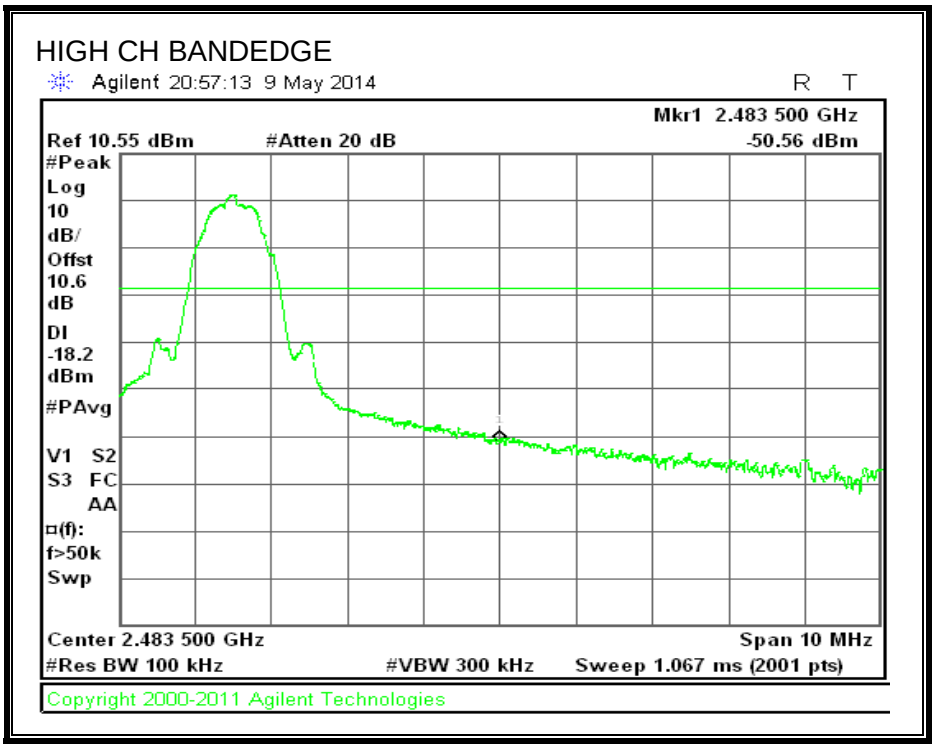


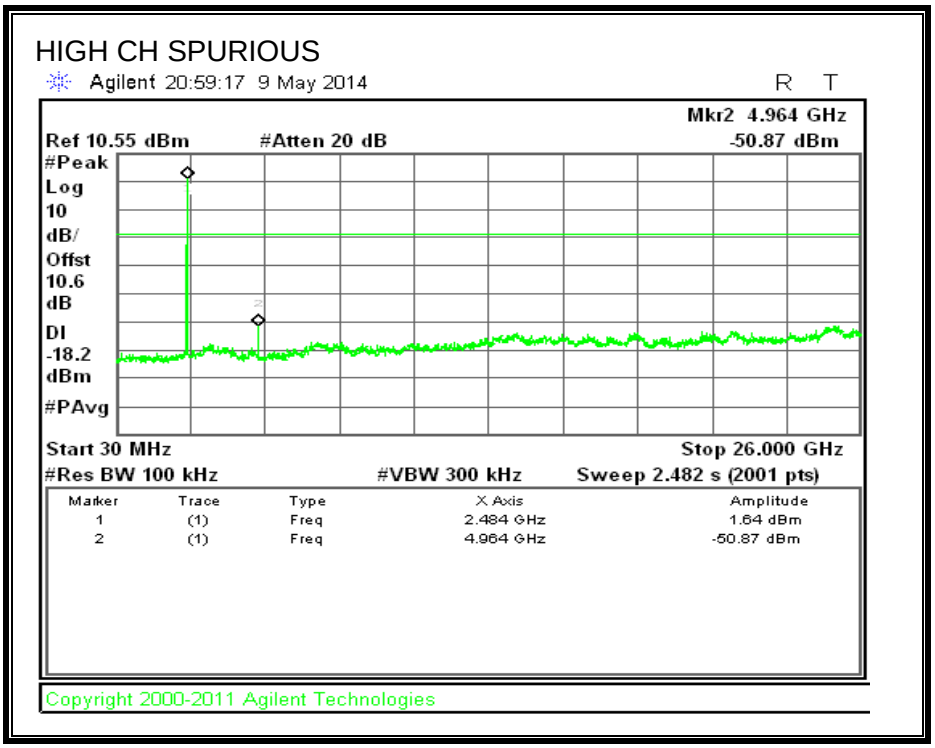
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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 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 for average measurements RMS detection method was used;
Average Type: Power (RMS)
If cycle is less than 98% and Video Triggering or Gating can't be achieved then perform the measurement on both ON and OFF times, then add 10 log (1/ duty cycle) factor to the measured value.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

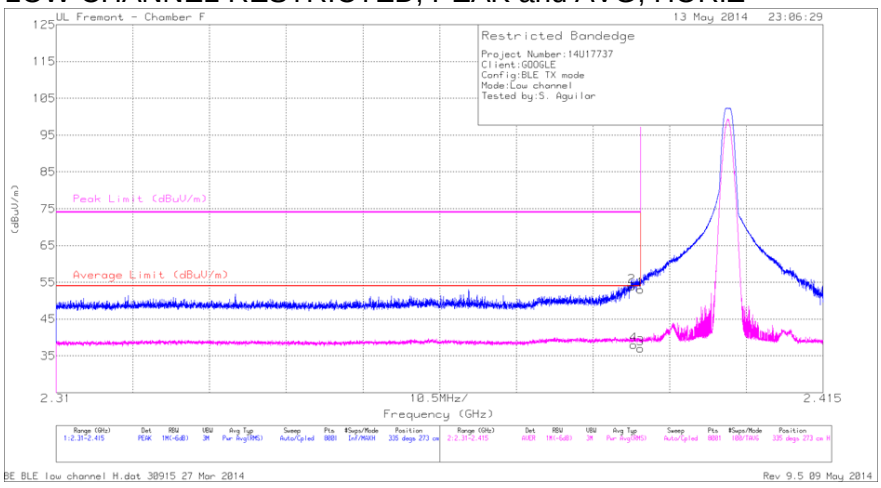
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

9.3. TX ABOVE 1 GHz FOR BLUETOOTH LOW ENERGY MODE IN 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK and AVG, HORIZ



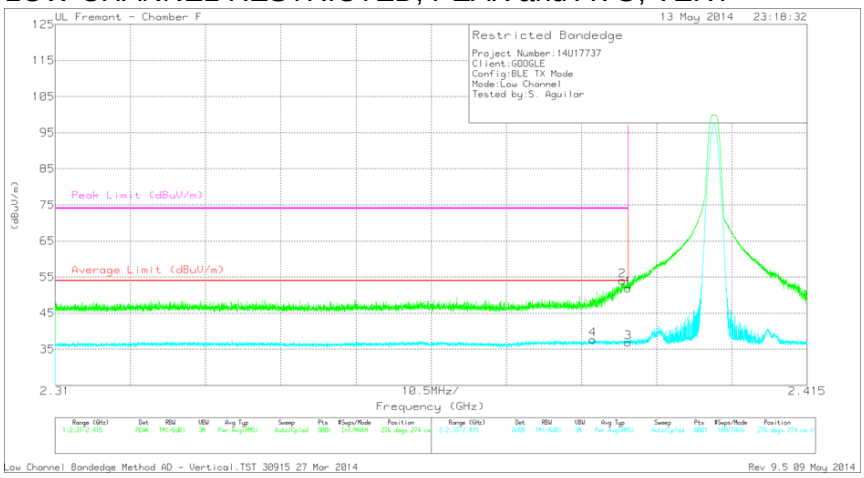
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/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	44.65	PK	32.2	-23.8	2.2	55.25	-	-	74	-18.75	335	273	H
2	* 2.389	45.48	PK	32.2	-23.8	2.2	56.08	-	-	74	-17.92	335	273	H
3	* 2.39	28.56	RMS	32.2	-23.8	2.2	39.16	54	-14.84	-	-	335	273	H
4	* 2.389	29.6	RMS	32.2	-23.8	2.2	40.2	54	-13.8	-	-	335	273	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK and AVG, VERT



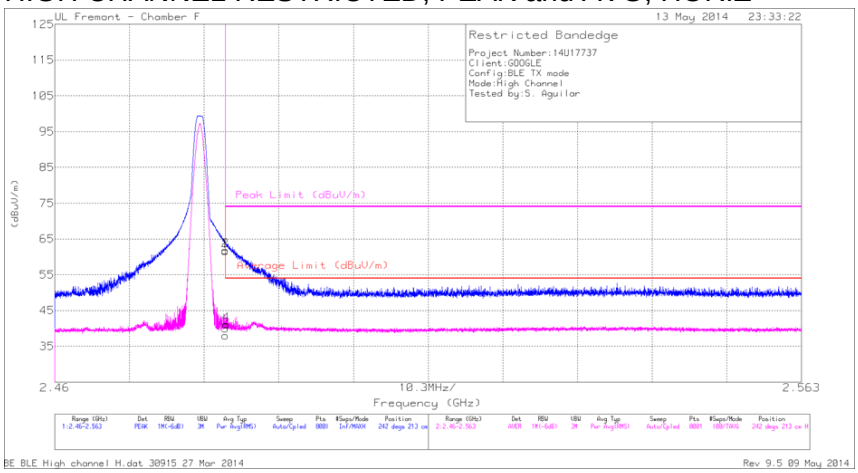
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/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	43.52	PK	32.2	-23.8	2.2	54.12	-	-	74	-19.88	276	274	V
2	* 2.389	45.61	PK	32.2	-23.8	2.2	56.21	-	-	74	-17.79	276	274	V
3	* 2.39	28.46	RMS	32.2	-23.8	2.2	39.06	54	-14.94	-	-	276	274	V
4	* 2.385	29.39	RMS	32.1	-23.8	2.2	39.89	54	-14.11	-	-	276	274	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK and AVG, HORIZ



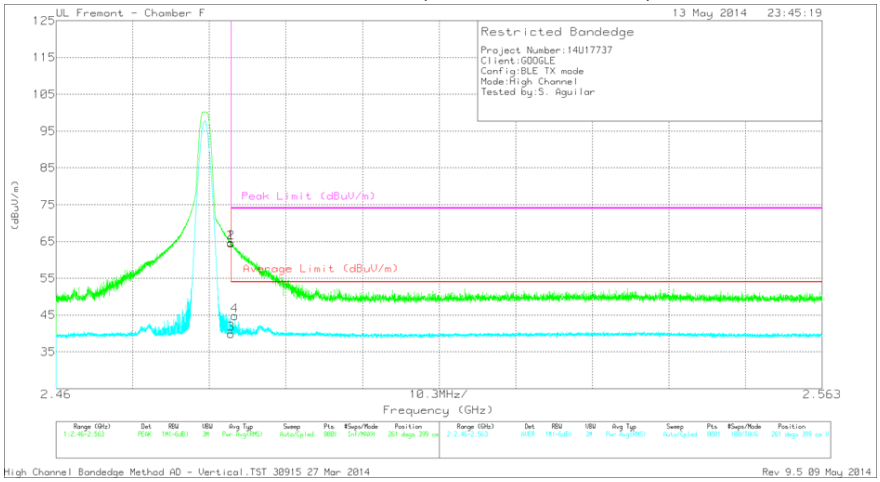
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/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	51.95	PK	32.6	-23	2.2	63.75	-	-	74	-10.25	242	213	H
2	* 2.484	52.21	PK	32.6	-23	2.2	64.01	-	-	74	-9.99	242	213	H
3	* 2.484	28.45	RMS	32.6	-23	2.2	40.25	54	-13.75	-	-	242	213	H
4	* 2.484	31.45	RMS	32.6	-23	2.2	43.25	54	-10.75	-	-	242	213	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK and AVG, VERT



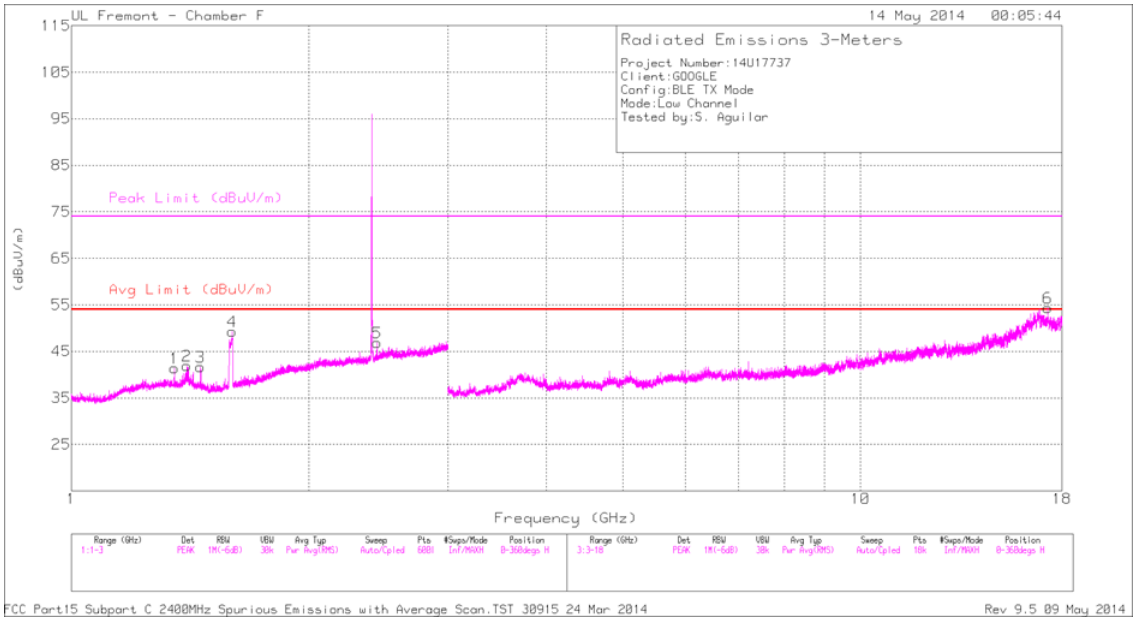
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/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	52.76	PK	32.6	-23	2.2	64.56	-	-	74	-9.44	261	399	V
2	* 2.484	52.87	PK	32.6	-23	2.2	64.67	-	-	74	-9.33	261	399	V
3	* 2.484	28.02	RMS	32.6	-23	2.2	39.82	54	-14.18	-	-	261	399	V
4	* 2.484	32.97	RMS	32.6	-23	2.2	44.77	54	-9.23	-	-	261	399	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

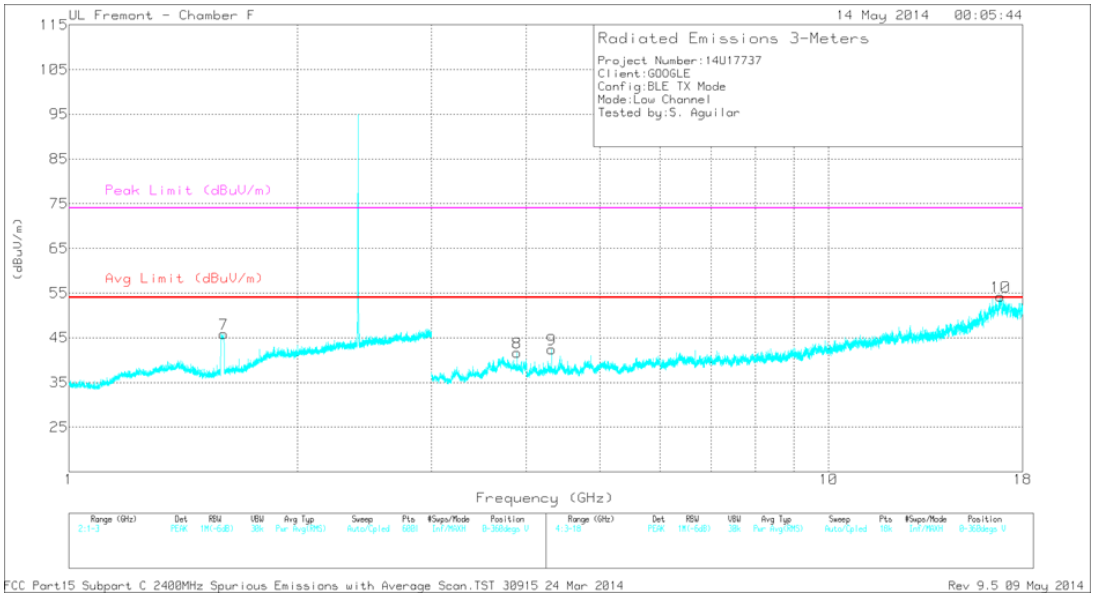
HARMONICS AND SPURIOUS EMISSIONS

Low Channel Horizontal



HARMONICS AND SPURIOUS EMISSIONS

Low Channel Vertical



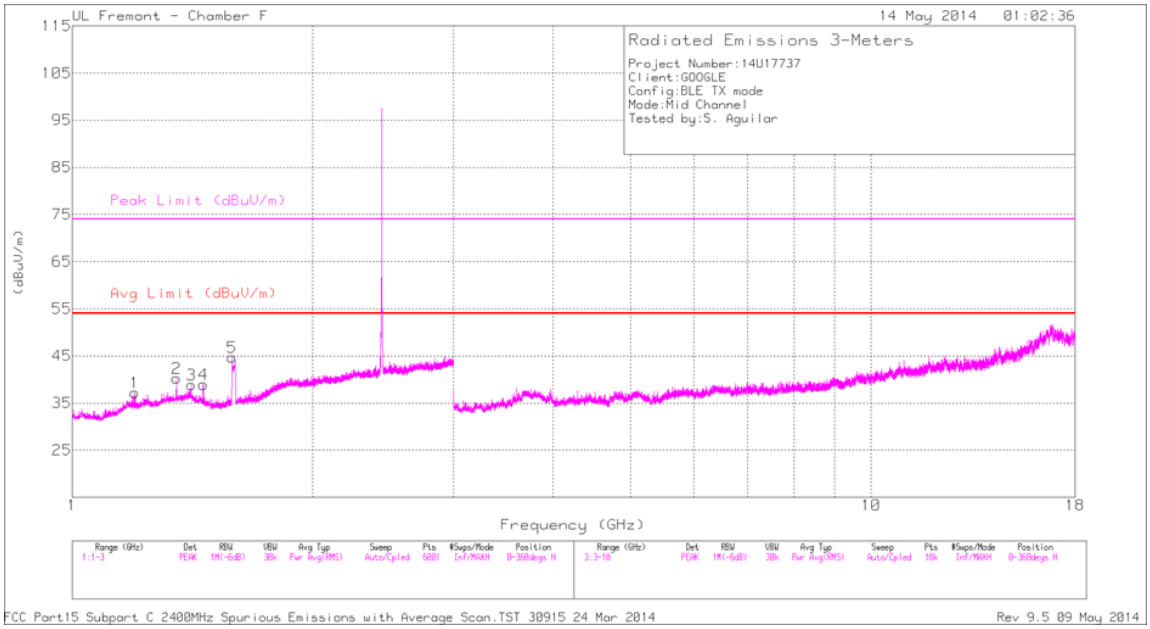
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.35	36.06	PK	29.6	-26.4	2.2	41.46	54	-12.54	74	-32.54	0-360	300	H
2	* 1.4	36.09	PK	29.2	-25.6	2.2	41.89	54	-12.11	74	-32.11	0-360	300	H
3	* 1.458	36.53	PK	28.7	-25.8	2.2	41.63	54	-12.37	74	-32.37	0-360	399	H
4	* 1.6	44.01	PK	28.5	-25.4	2.2	49.31	54	-4.69	74	-24.69	0-360	300	H
5	2.44	35.75	PK	32.4	-23.5	2.2	46.85	-	-	-	-	0-360	399	H
7	* 1.6	40.53	PK	28.5	-25.4	2.2	45.83	54	-8.17	74	-28.17	0-360	101	V
6	17.27	28.61	PK	40.8	-17.2	2.2	54.41	-	-	-	-	0-360	101	H
8	* 3.888	34.83	PK	34.1	-29.5	2.2	41.63	54	-12.37	74	-32.37	0-360	201	V
9	* 4.32	35.41	PK	33.7	-28.9	2.2	42.41	54	-11.59	74	-31.59	0-360	201	V
10	16.842	26.38	PK	41.5	-15.8	2.2	54.28	-	-	-	-	0-360	101	V

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

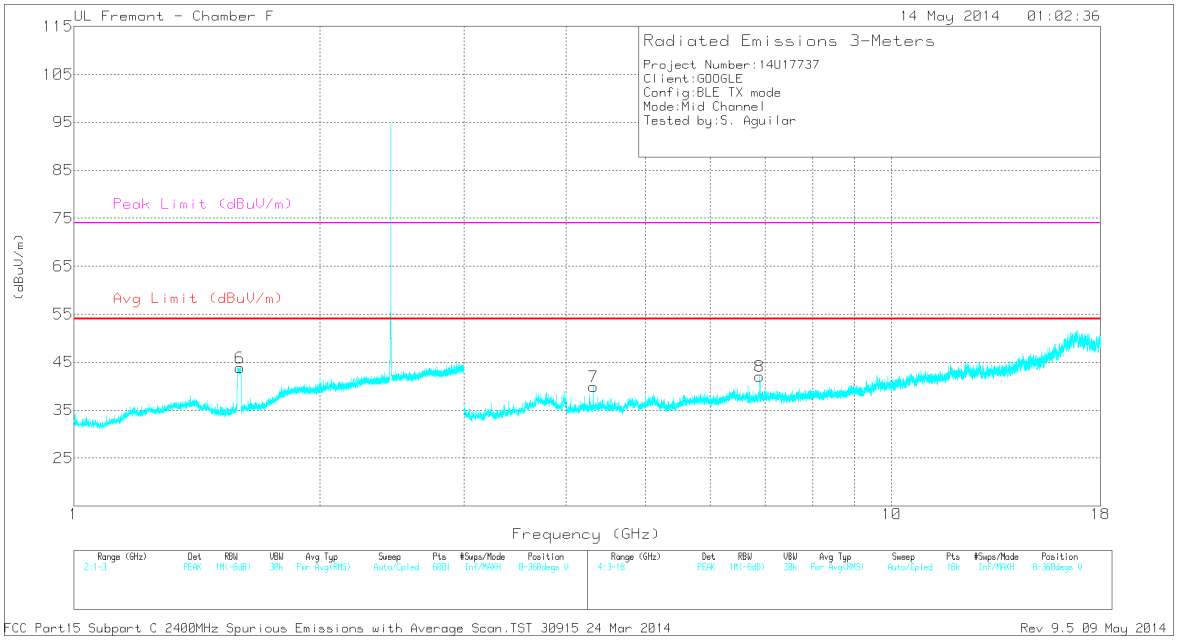
HARMONICS AND SPURIOUS EMISSIONS

Mid Channel Horizontal



HARMONICS AND SPURIOUS EMISSIONS

Mid Channel Vertical



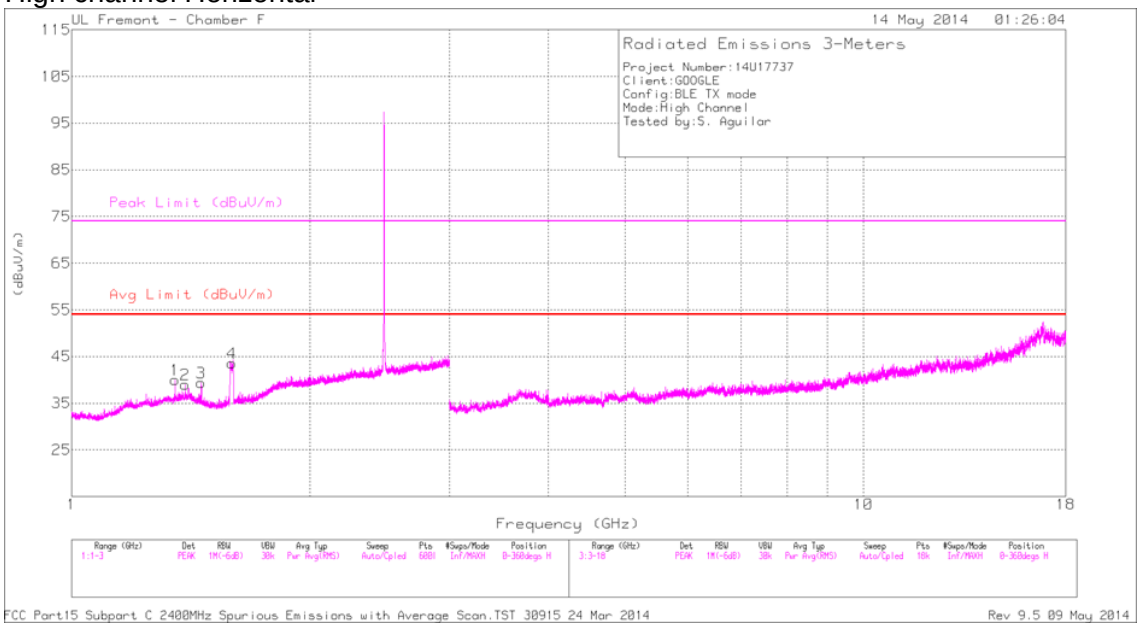
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.198	34.8	PK	28.9	-26.5	2.2	39.4	54	-14.6	74	-34.6	0-360	100	H
2	* 1.35	37.05	PK	29.6	-26.4	2.2	42.45	54	-11.55	74	-31.55	0-360	200	H
3	* 1.41	35.14	PK	29.1	-25.4	2.2	41.04	54	-12.96	74	-32.96	0-360	100	H
4	* 1.458	36.04	PK	28.7	-25.8	2.2	41.14	54	-12.86	74	-32.86	0-360	200	H
5	* 1.584	41.76	PK	28.5	-25.6	2.2	46.86	54	-7.14	74	-27.14	0-360	200	H
6	* 1.597	40.75	PK	28.5	-25.4	2.2	46.05	54	-7.95	74	-27.95	0-360	101	V
7	* 4.32	35.08	PK	33.7	-28.9	2.2	42.08	54	-11.92	74	-31.92	0-360	201	V
8	6.9	33.56	PK	35.5	-27	2.2	44.26	-	-	-	-	0-360	201	V

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

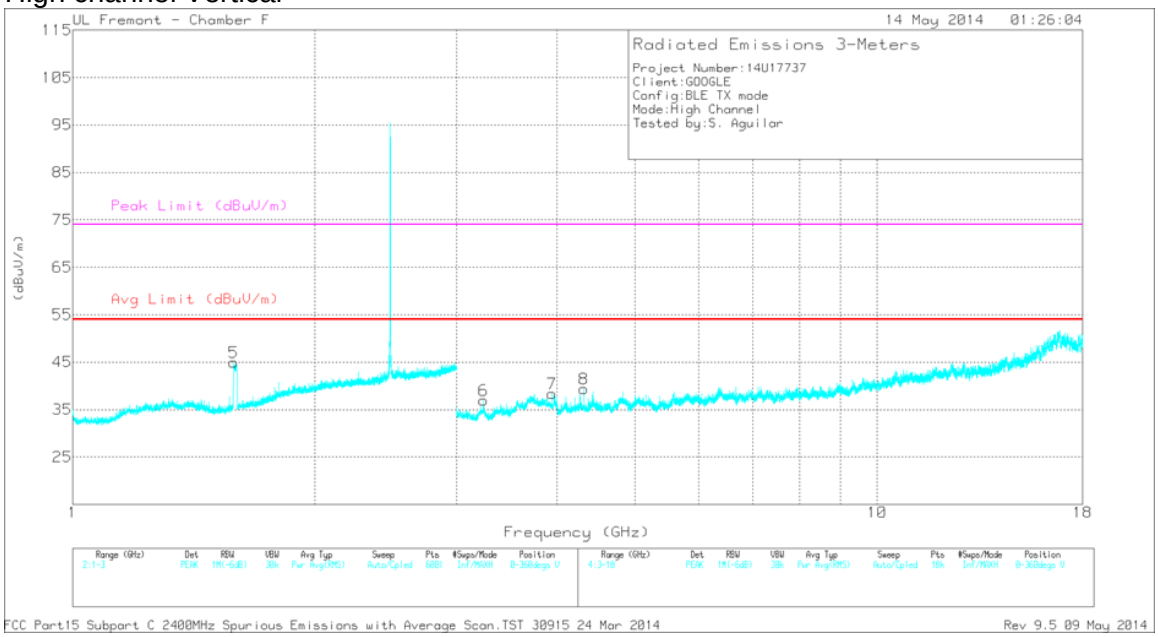
HARMONICS AND SPURIOUS EMISSIONS

High channel Horizontal



HARMONICS AND SPURIOUS EMISSIONS

High channel Vertical



Trace Markers

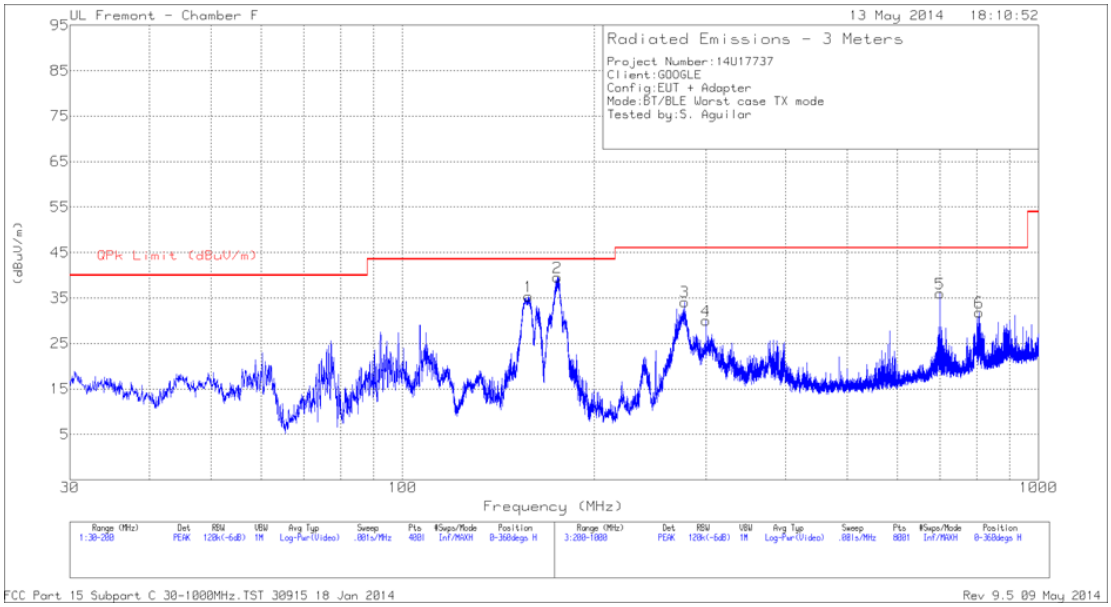
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.35	36.87	PK	29.6	-26.4	2.2	42.27	54	-11.73	74	-31.73	0-360	101	H
2	* 1.391	35.4	PK	29.3	-25.7	2.2	41.2	54	-12.8	74	-32.8	0-360	101	H
3	* 1.458	36.5	PK	28.7	-25.8	2.2	41.6	54	-12.4	74	-32.4	0-360	200	H
4	* 1.593	40.44	PK	28.5	-25.4	2.2	45.74	54	-8.26	74	-28.26	0-360	200	H
5	* 1.585	42.01	PK	28.5	-25.5	2.2	47.21	54	-6.79	74	-26.79	0-360	101	V
6	3.24	32.25	PK	33.5	-28.8	2.2	39.15	-	-	-	-	0-360	201	V
7	* 3.942	33.47	PK	33.9	-29	2.2	40.57	54	-13.43	74	-33.43	0-360	201	V
8	* 4.32	34.63	PK	33.7	-28.9	2.2	41.63	54	-12.37	74	-32.37	0-360	201	V

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

9.4. WORST-CASE BELOW 1 GHz

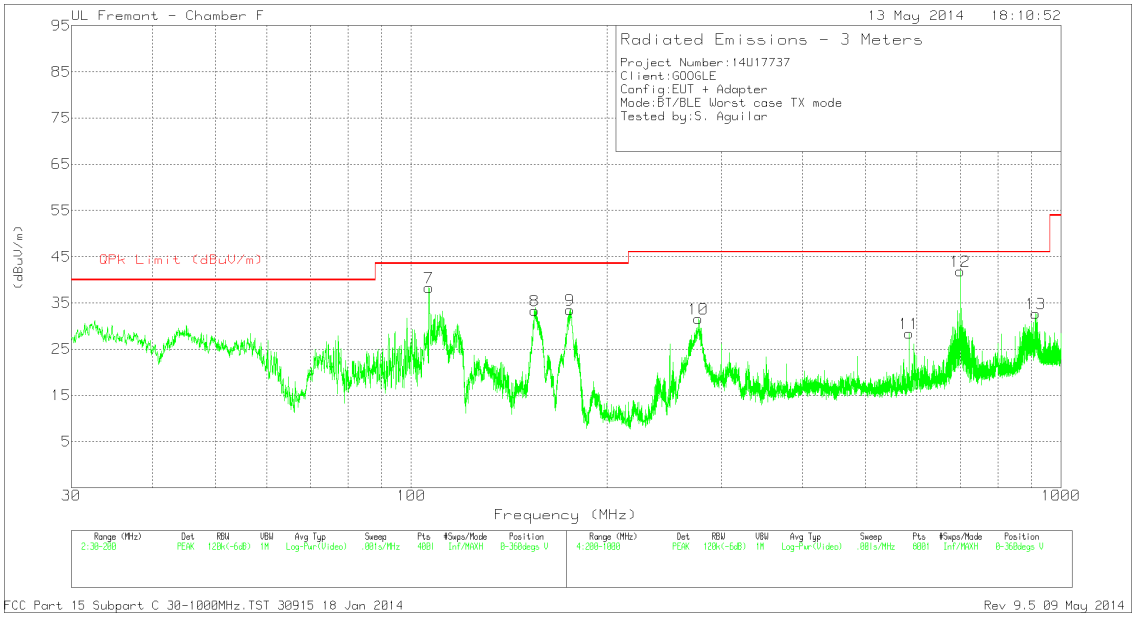
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



DATA

Trace Markers

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
1	157.925	53.84	PK	12.5	-31	35.34	43.52	-8.18	0-360	200	H
2	175.1375	59.39	PK	11.5	-31.3	39.59	43.52	-3.93	0-360	200	H
7	106.5	57.98	PK	12	-31.7	38.28	43.52	-5.24	0-360	100	V
8	154.9925	51.76	PK	12.5	-30.9	33.36	43.52	-10.16	0-360	100	V
9	175.5625	53.18	PK	11.4	-31.1	33.48	43.52	-10.04	0-360	100	V
3	* 277.7	51.57	PK	13.4	-30.8	34.17	46.02	-11.85	0-360	100	H
4	300	47.06	PK	13.4	-30.4	30.06	46.02	-15.96	0-360	100	H
5	700	45.36	PK	20.3	-29.6	36.06	46.02	-9.96	0-360	100	H
6	805.6	39.38	PK	21.5	-29	31.88	46.02	-14.14	0-360	100	H
10	* 276.6	48.96	PK	13.3	-30.7	31.56	46.02	-14.46	0-360	200	V
11	583.3	39.5	PK	18.7	-29.8	28.4	46.02	-17.62	0-360	100	V
12	700	51.13	PK	20.3	-29.6	41.83	46.02	-4.19	0-360	100	V
13	913.2	38.57	PK	22.5	-28.4	32.67	46.02	-13.35	0-360	100	V

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

PK - Peak detector

Radiated Emissions

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
158.8335	52.44	QP	12.5	-31.3	33.64	43.52	-9.88	82	179	H
174.4905	55.75	QP	11.6	-31.4	35.95	43.52	-7.57	62	167	H
106.4936	44.73	QP	12	-31.7	25.03	43.52	-18.49	187	109	V
* 275.4389	47.03	QP	13.3	-30.8	29.53	46.02	-16.49	87	134	H
* 277.7174	49.57	QP	13.4	-30.8	32.17	46.02	-13.85	158	137	V
700.0038	49.45	QP	20.3	-29.6	40.15	46.02	-5.87	247	104	V

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

QP - Quasi-Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 30915 18 Jan 2014

Rev 9.5 09 May 2014

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

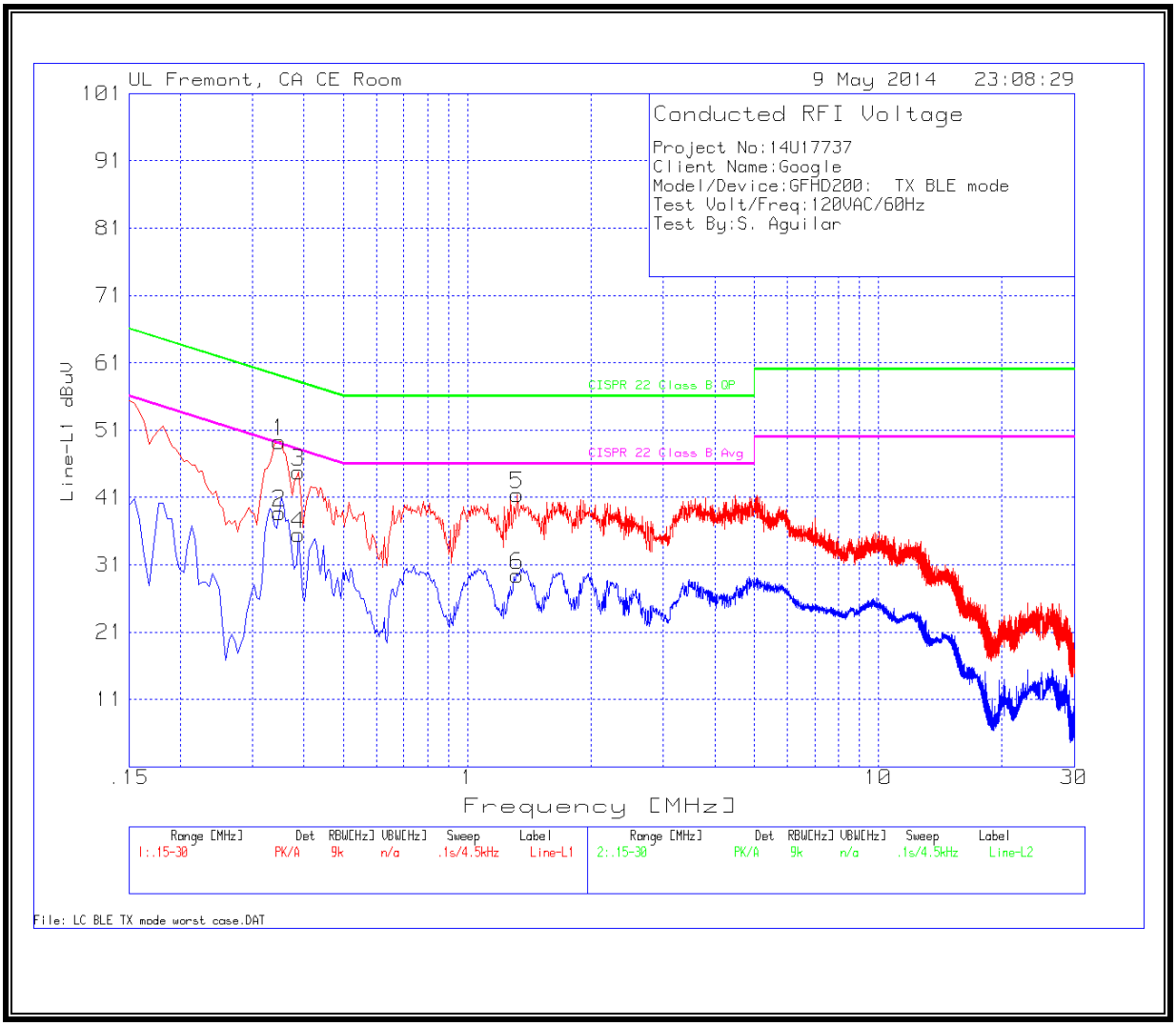
* Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.4

RESULTS

LINE 1 RESULTS

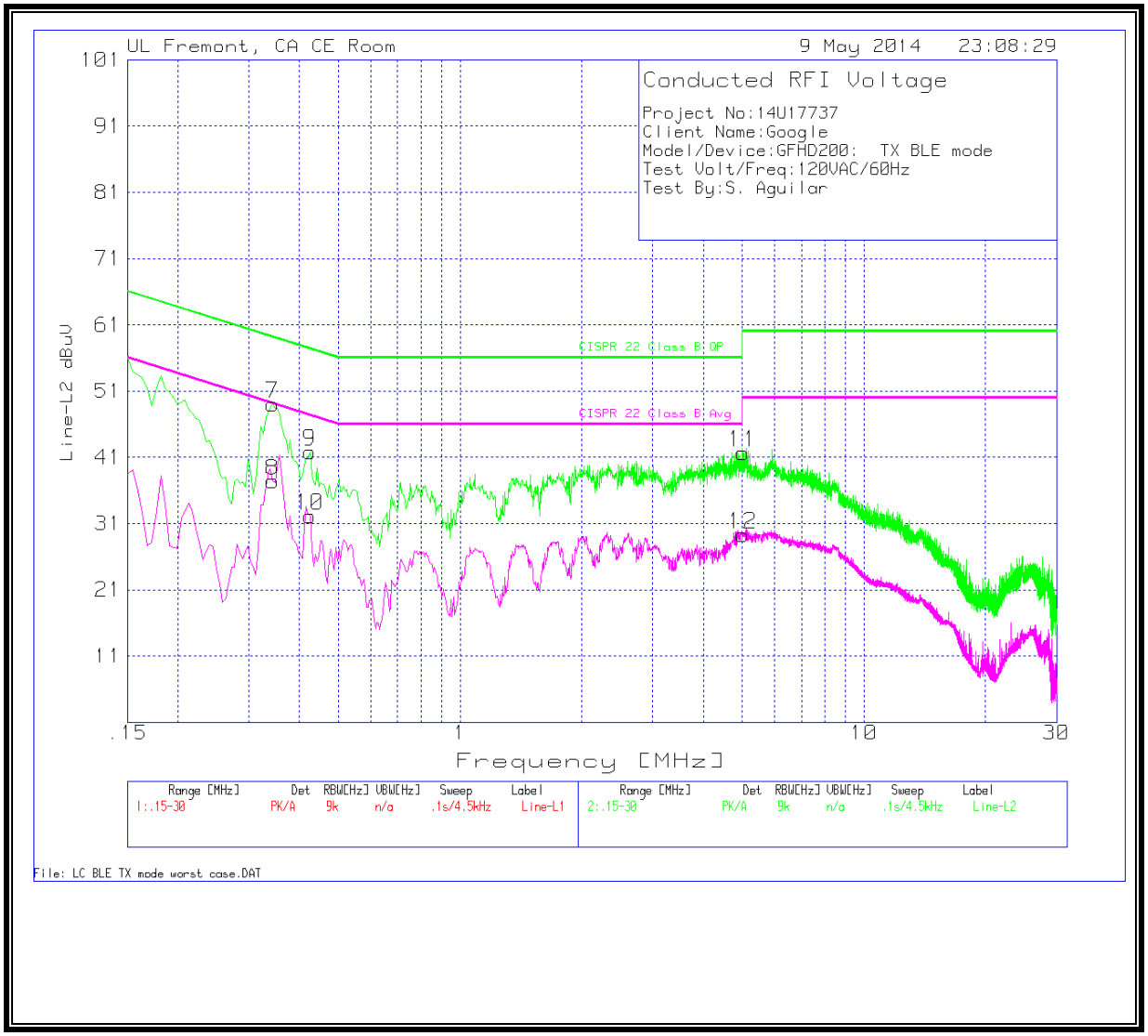


Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.348	48.8	PK	.5	0	49.3	59	-9.7	-	-
2	.348	38.27	Av	.5	0	38.77	-	-	49	-10.23
3	.3885	44.39	PK	.4	0	44.79	58.1	-13.31	-	-
4	.3885	35.09	Av	.4	0	35.49	-	-	48.1	-12.61
5	1.3245	41.19	PK	.2	.1	41.49	56	-14.51	-	-
6	1.3245	29.11	Av	.2	.1	29.41	-	-	46	-16.59

LINE 2 RESULTS



Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
7	.3435	48.52	PK	.5	0	49.02	59.1	-10.08	-	-
8	.3435	36.88	Av	.5	0	37.38	-	-	49.1	-11.72
9	.4245	41.44	PK	.4	0	41.84	57.4	-15.56	-	-
10	.4245	31.76	Av	.4	0	32.16	-	-	47.4	-15.24
11	5.01	41.44	PK	.2	.1	41.74	60	-18.26	-	-
12	5.01	29.07	Av	.2	.1	29.37	-	-	50	-20.63

PK - Peak detector
Av - average detection