



CERTIFICATION TEST REPORT

Report Number. : 12356844-E2V1

Applicant : GOOGLE LLC
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA 94043, U.S.A.

Model : H1A

FCC ID : A4RH1A

IC : 10395A-H1A

EUT Description : INTERACTIVE VIDEO STREAMING DEVICE

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5

Date Of Issue:
August 10, 2018

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	08/10/18	Initial Issue	---

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOOGLE LLC
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA 94043, U.S.A.

EUT DESCRIPTION: INTERACTIVE VIDEO STREAMING DEVICE

MODEL: H1A

SERIAL NUMBER: G1424638 (CONDUCTED)
G1421457 (RADIATED)

DATE TESTED: July 18, 2018 –July 31, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
ISED RSS-247 Issue 2	Pass
ISED RSS-GEN Issue 5	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 the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Francisco de Anda
CONSUMER TECHNOLOGY DIVISION
Operations Leader
UL Verification Services Inc.

Prepared By:



Eric Yu
CONSUMER TECHNOLOGY DIVISION
Test Engineer
UL Verification Services Inc.

TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v4, ANSI C63.10-2013, RSS-GEN Issue 5, and RSS-247 Issue 2.

2. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, 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	47658 Kato Rd
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input checked="" type="checkbox"/> Chamber K (ISED:2324A-1)
<input checked="" type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber L (ISED:2324A-3)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	
	<input type="checkbox"/> Chamber G (ISED:22541-4)	
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

3. CALIBRATION AND UNCERTAINTY

3.1. 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.

3.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

3.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

4. EQUIPMENT UNDER TEST

4.1. EUT DESCRIPTION

The EUT is an Interactive Video Streaming Device

4.2. 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	5.76	3.77

4.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 4dBi.

4.4. SOFTWARE AND FIRMWARE

The EUT firmware and utility software during testing was version 127694.

4.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

EUT can only be set up in desktop orientation; therefore, all radiated testing was performed with the EUT in desktop orientation.

Simultaneous transmission for BT/BLE radios and 2.4GHz or 5GHz WIFI radios was investigated, no additional noticeable emissions were found.

Worst-case data rate as provided by the client was:

BLE: 1 Mbps.

4.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	ADLX65NCT2A	11S36200293ZZ10049556E	NA
Laptop	Lenovo	X220	R9-P89W3	NA
AC adapter	Google	NA	W015R007q	NA

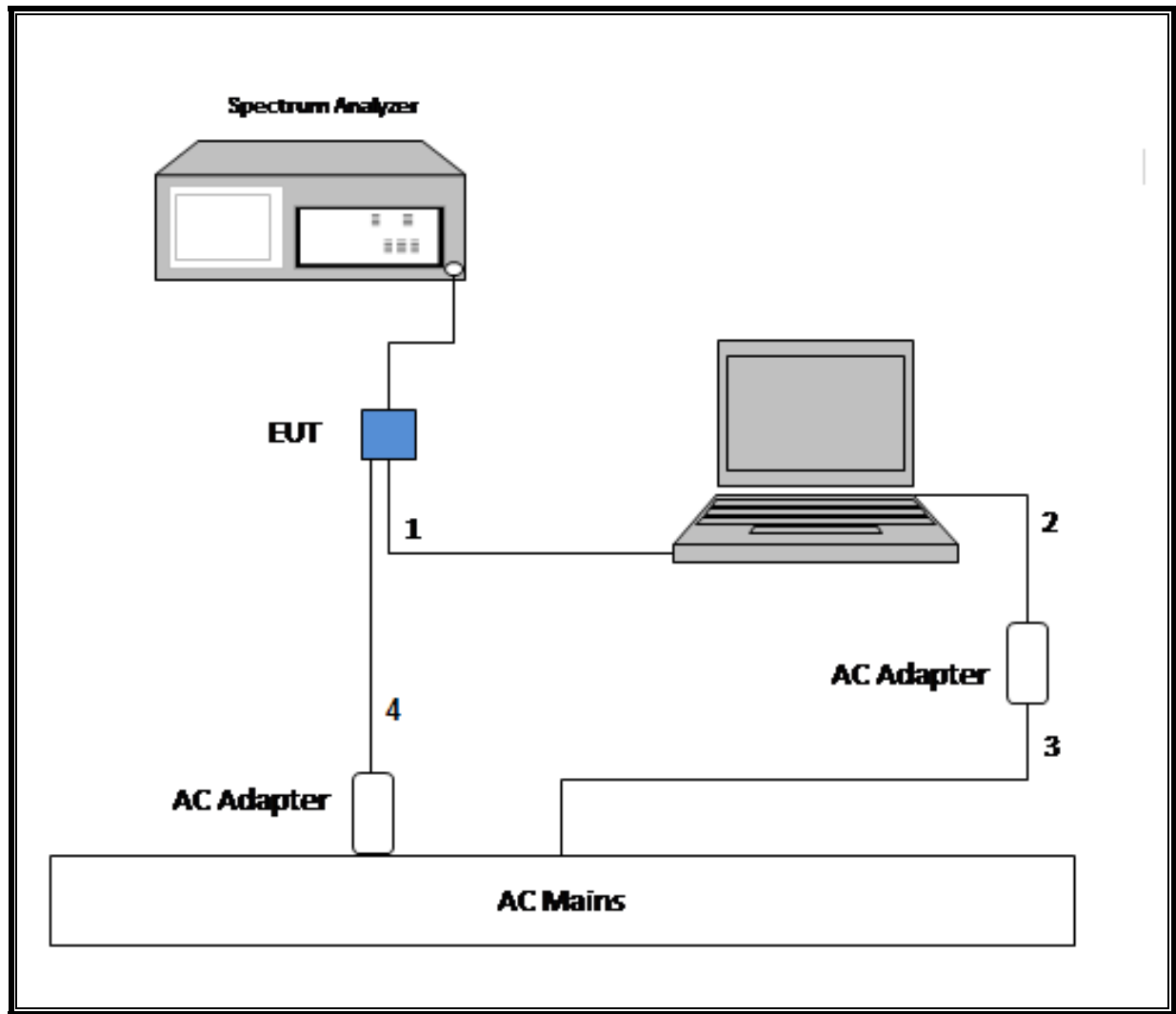
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	micro USB	Shielded	1	
2	DC	1	DC connector	Unshielded	1.75	
3	AC	1	2-Prong	Unshielded	1	
4	DC	1	DC connector	Unshielded	1.75	

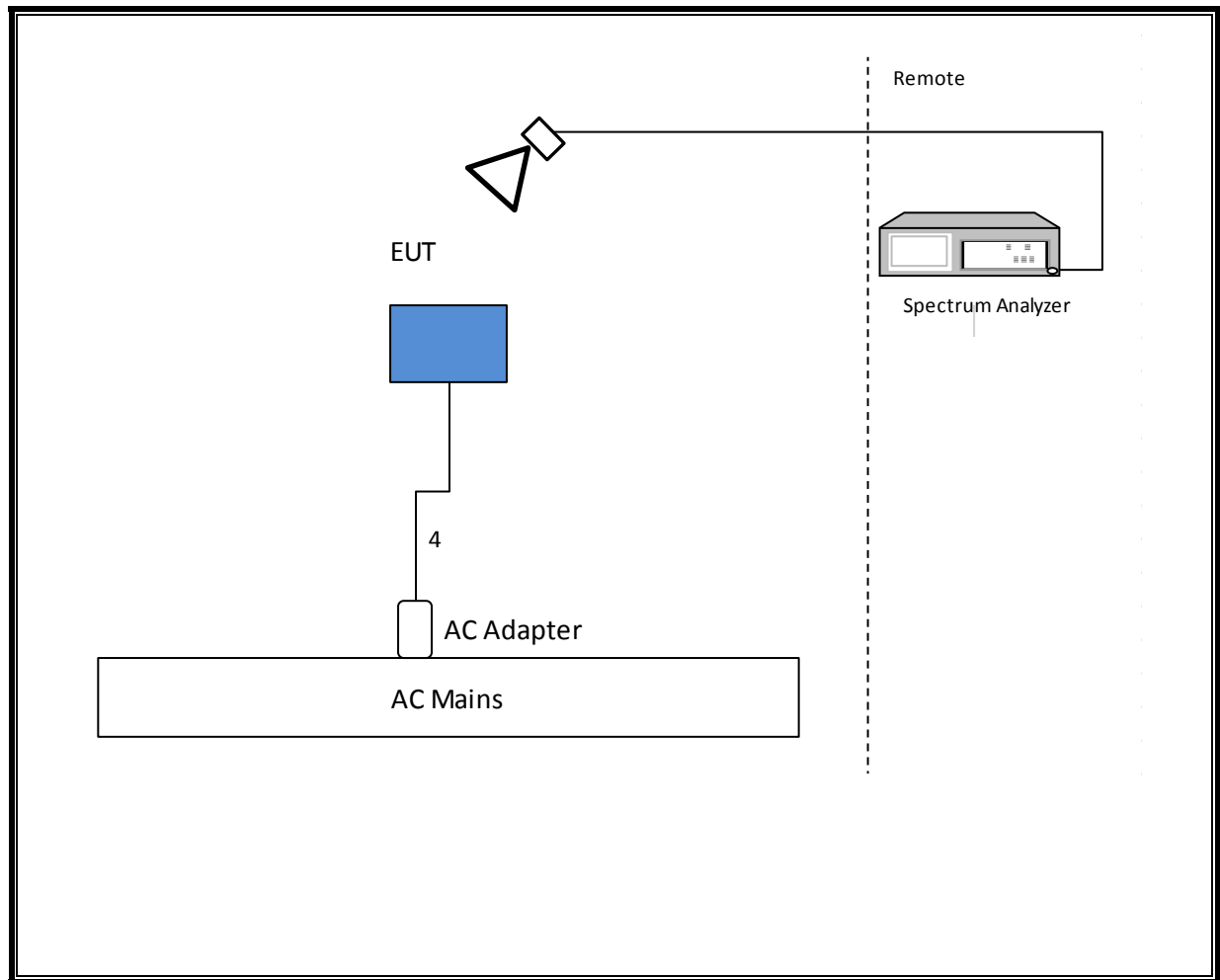
TEST SETUP

The EUT was connected to a host Laptop via USB cable. Test software exercised the EUT.

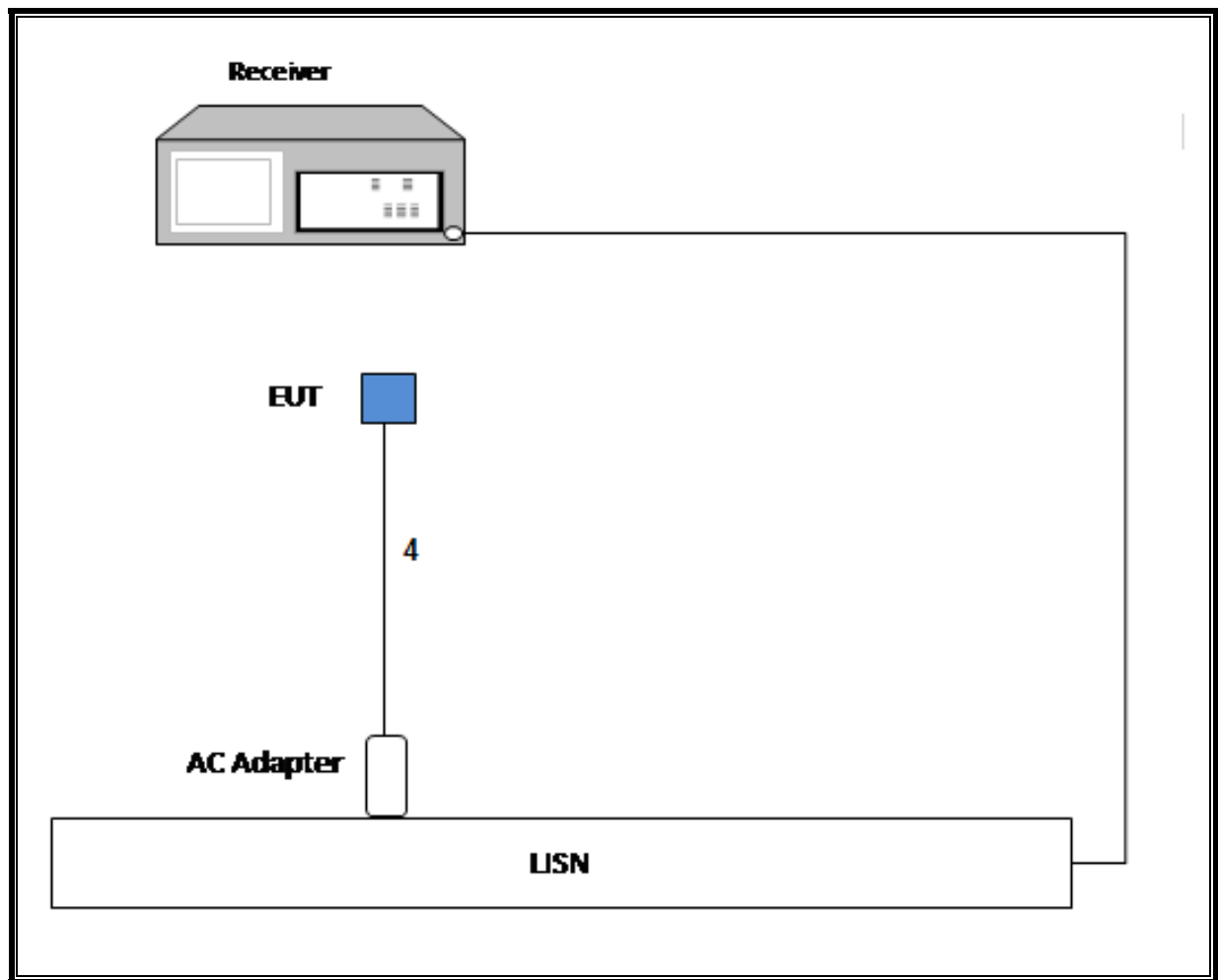
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR AC LINE CONDUCTED TESTS



5. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB BW: KDB 558074 D01 v04, Section 8.1.

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: KDB 558074 D01 v04, Section 9.1.3.

Power Spectral Density: KDB 558074 D01 v04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

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
Amplifier	Hewlett Packard	8447D	T64	02/14/2019
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T931	09/20/2018
Amplifier, 1 - 18GHz	Amplical	AMP1G18-35	T1569	06/03/2019
RF Preamplifier, 1 - 26GHz	Agilent	8449B	T404	03/09/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/10/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	06/21/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/2019
Antenna Horn, 18 to 26GHz	ARA	MWH-1826/B	T488	10/04/2018
Power Meter, P-series single channel	Keysight	N1912A	T1271	07/26/2019
Power Sensor	Keysight	N1921A	T1225	04/10/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179367	04/28/2019
AC Line Conducted				
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ESC17	T1124	11/07/2018
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2	EMC4385	01/31/2019
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2018
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016	
Antenna Port Software	UL	UL EMC	Ver 7.9, Jan 24, 2018	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

NOTES:

- Equipment listed above that was calibrated during the testing period was used for testing after calibration.
- Equipment listed above that has a calibration due date during the testing period; the testing was completed before equipment expiration date.

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

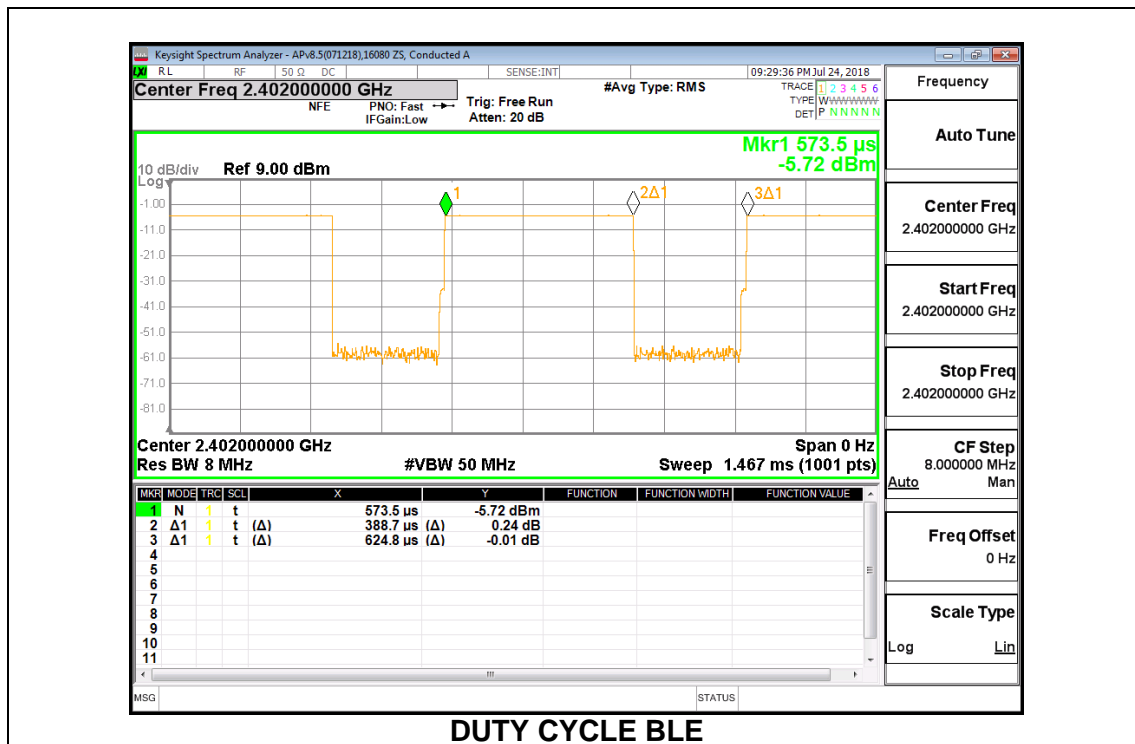
None; for reporting purposes only.

PROCEDURE

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)
2.4GHz Band						
BLE	0.389	0.625	0.622	62.21%	2.06	2.573

DUTY CYCLE PLOTS



7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

7.2.1. BLE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0520
Middle	2440	1.0530
High	2480	1.0540



7.3. 6 dB BANDWIDTH

LIMITS

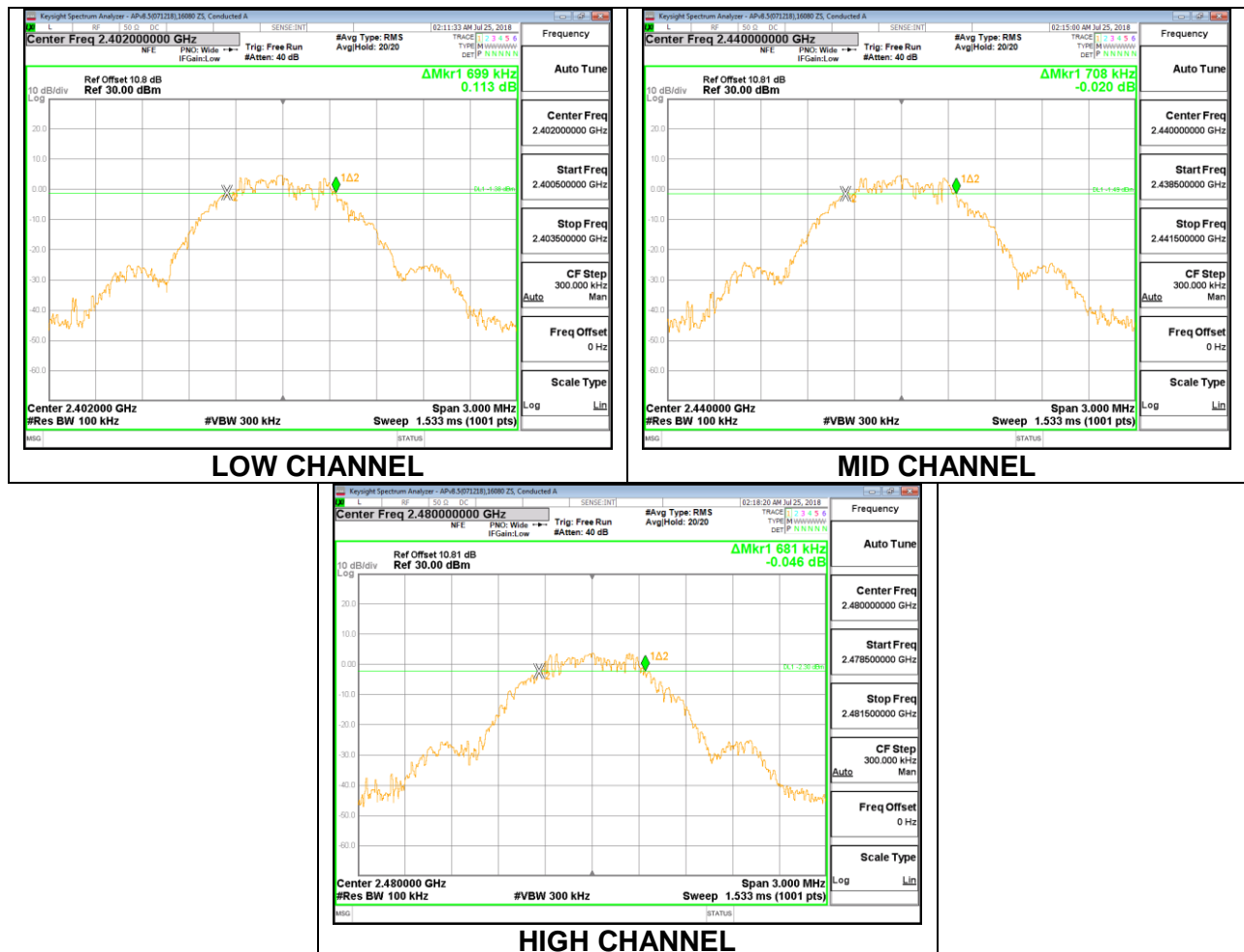
FCC §15.407 (e)
RSS-247 5.2 (a)

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

RESULTS

7.3.1. BLE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6990	0.5
Middle	2440	0.7080	0.5
High	2480	0.6810	0.5



7.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

TEST PROCEDURE

The transmitter output is connected to a power meter to allow for gated peak reading of power.

RESULTS

7.4.1. BLE

Tested By:	16080 ZS
Date:	07/25/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.74	30	-24.260
Middle	2440	5.76	30	-24.240
High	2480	4.88	30	-25.120

7.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter to allow for gated ave. reading of power.

RESULTS

7.5.1. BLE

Tested By:	16080 ZS
Date:	07/25/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	5.54
Middle	2440	5.55
High	2480	4.66

7.6. POWER SPECTRAL DENSITY

LIMITS

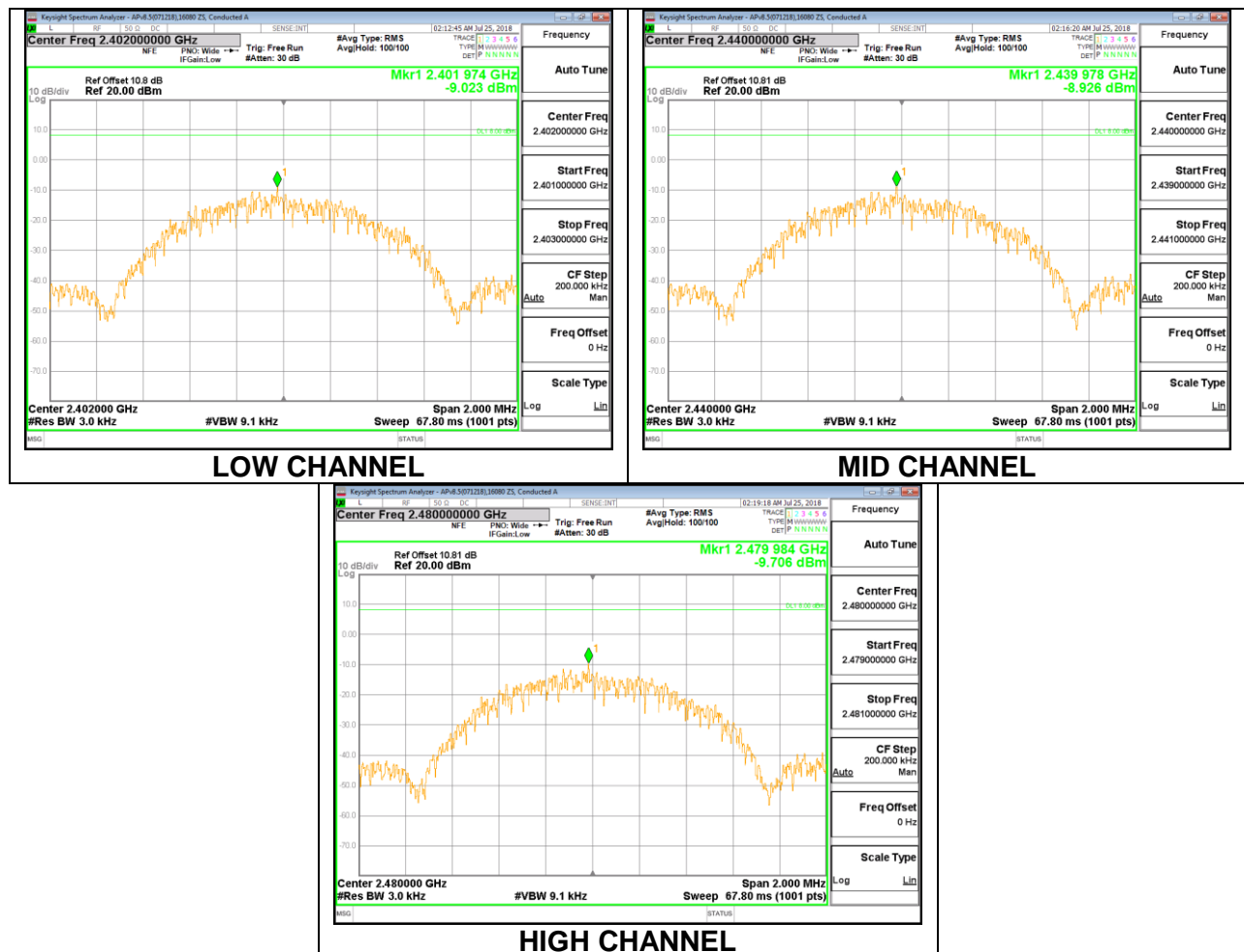
FCC §15.247 (e)
RSS-247 (5.2) (b)

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

7.6.1. BLE

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-9.02	8	-17.02
Middle	2440	-8.93	8	-16.93
High	2480	-9.71	8	-17.71



7.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

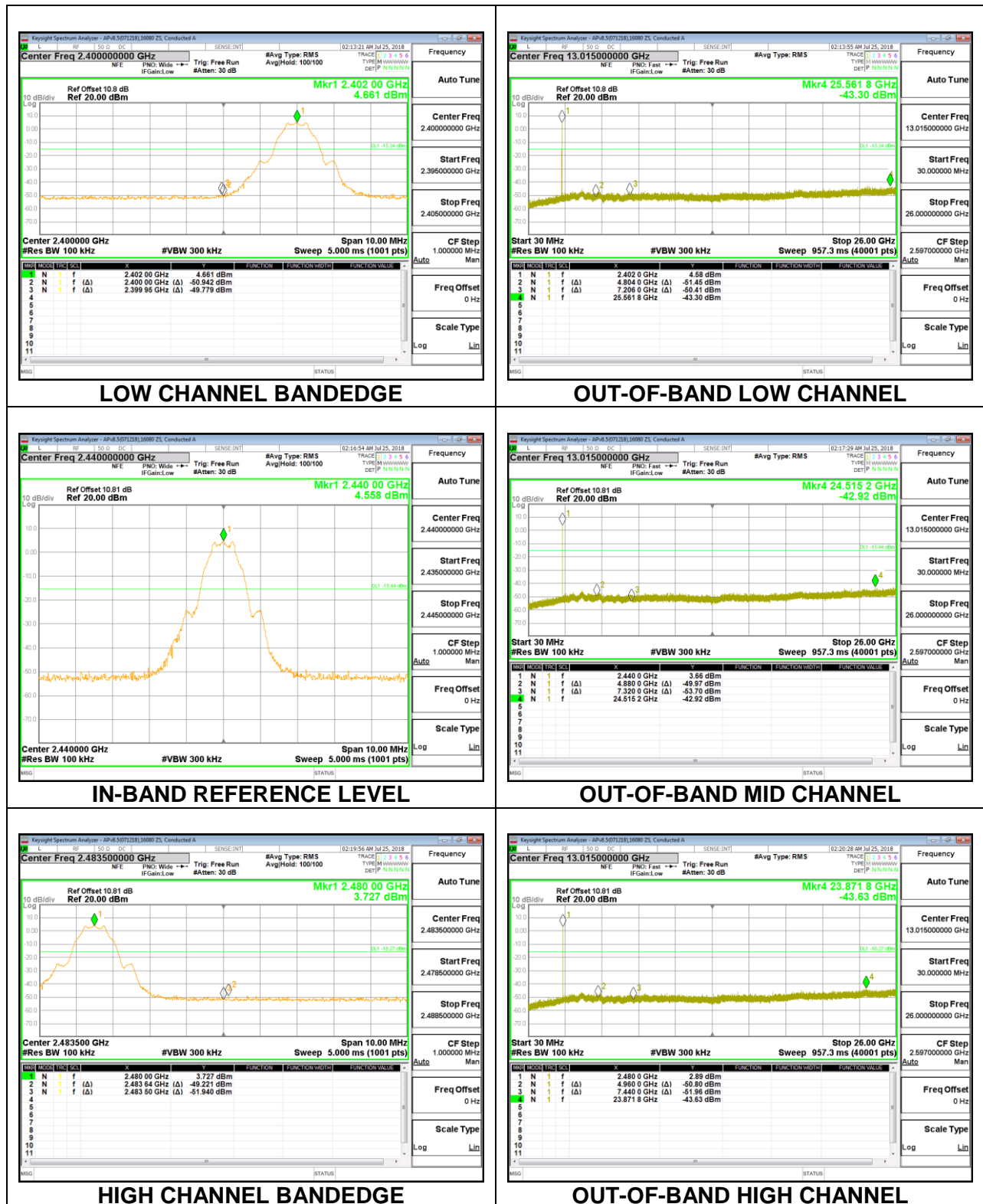
FCC §15.247 (d)

RSS-247 5.5

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

RESULTS

7.7.1. BLE



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
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 for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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 pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

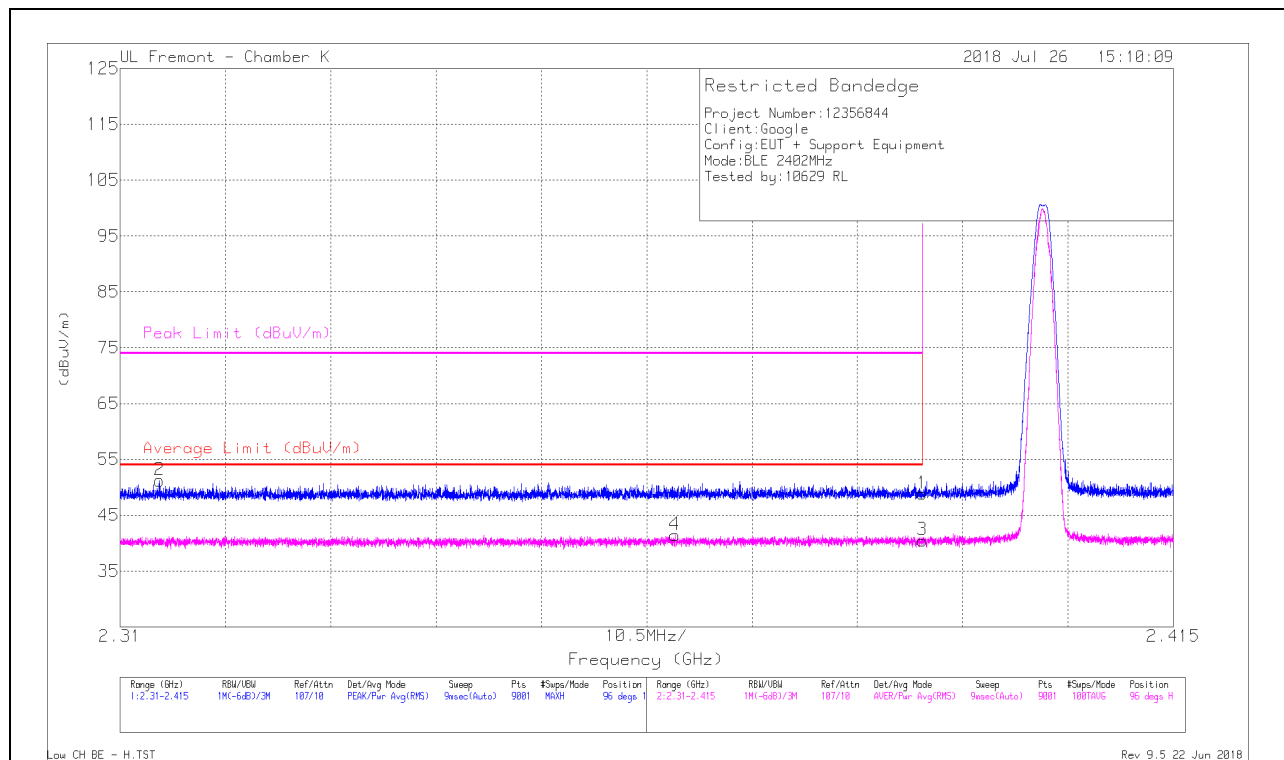
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BLE

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



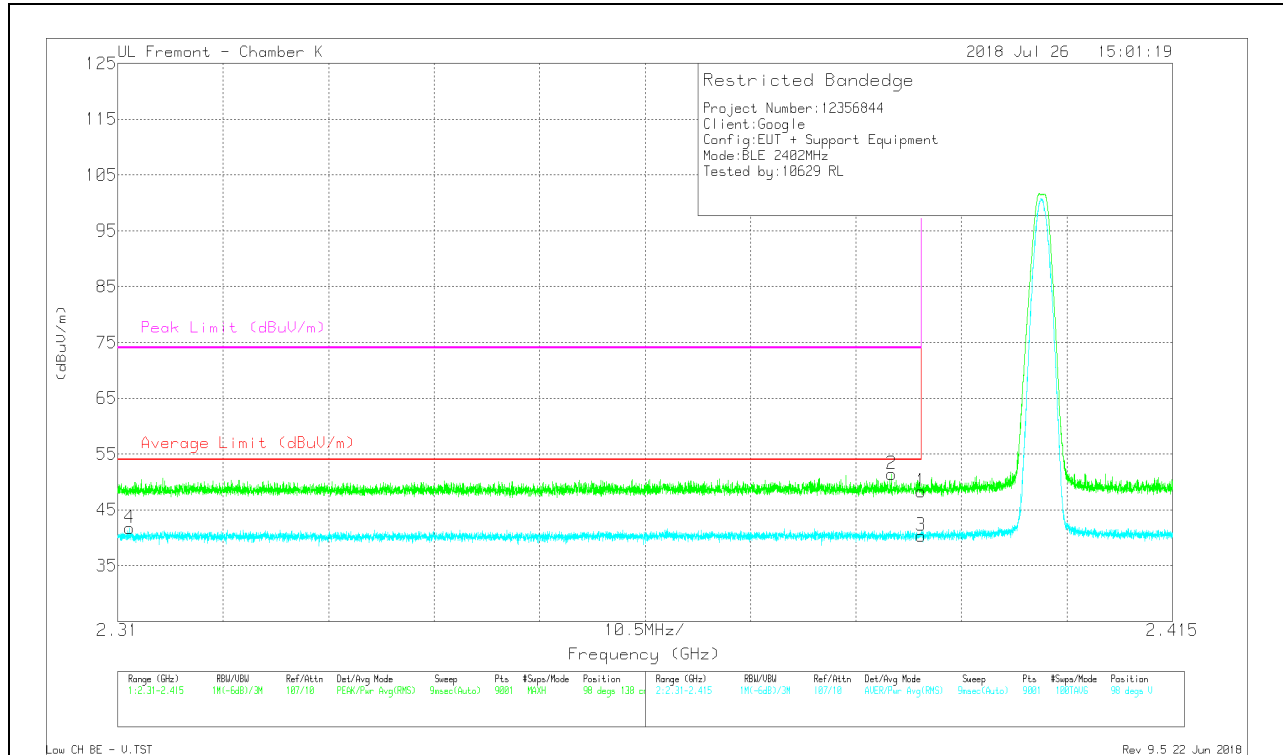
Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/CbW/Filt/Pad (dB)	DC Corr (dB)	Correcte d Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.64	Pk	31.9	-24.7	0	48.54	-	-	74	-25.16	96	185	H
2	* 2.314	44.24	Pk	31.7	-24.7	0	51.24	-	-	74	-22.76	96	185	H
3	* 2.39	31.25	RMS	31.9	-24.7	2.06	40.51	54	-13.49	-	-	96	185	H
4	* 2.365	32.2	RMS	31.8	-24.6	2.06	41.46	54	-12.54	-	-	96	185	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CbWFltr/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	41.11	Pk	31.9	-24.7	0	48.31	-	-	74	-25.69	98	138	V
2	* 2.387	44.11	Pk	31.9	-24.6	0	51.41	-	-	74	-22.59	98	138	V
3	* 2.39	31.1	RMS	31.9	-24.7	2.06	40.36	54	-13.64	-	-	98	138	V
4	* 2.311	32.65	RMS	31.7	-24.7	2.06	41.71	54	-12.29	-	-	98	138	V

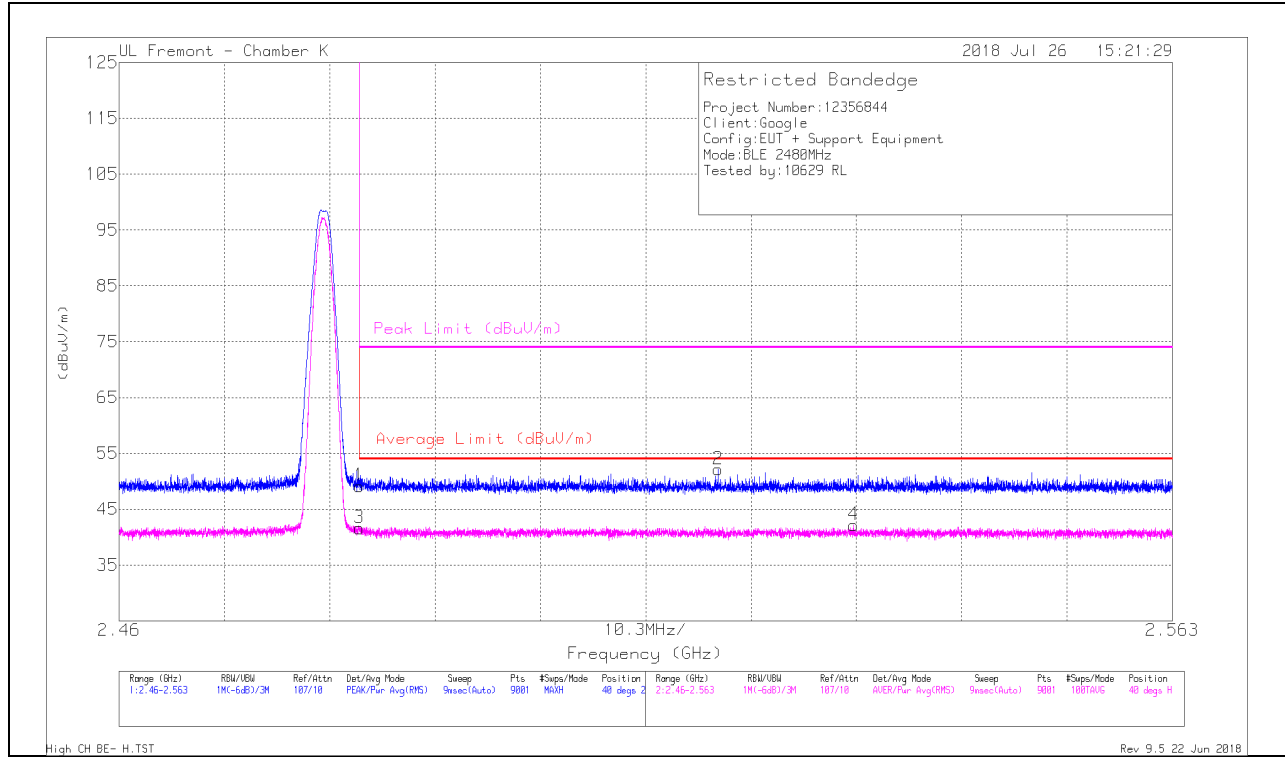
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



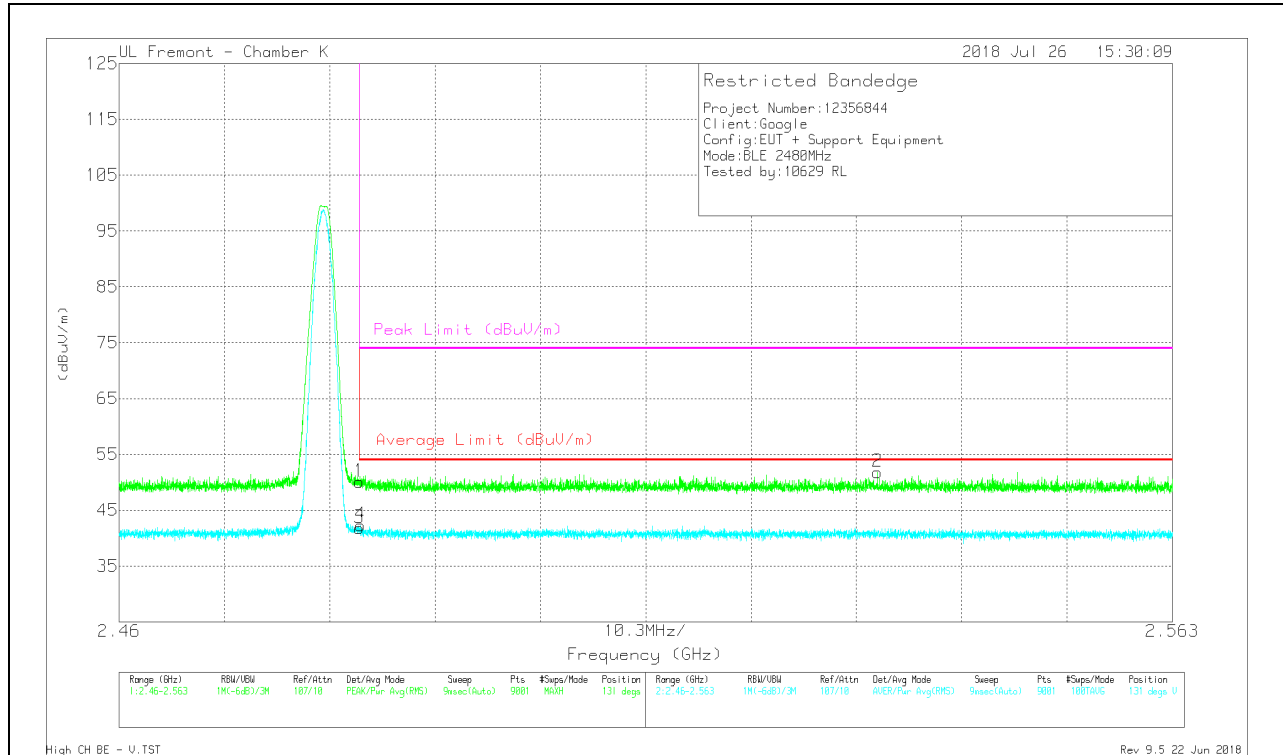
Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CbVftr/Pad (dB)	DC Corr (dB)	Correcte d Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.66	Pk	32.3	-24.8	0	49.16	-	-	74	-24.84	40	235	H
2	2.519	44.63	Pk	32.3	-24.8	0	52.13	-	-	74	-21.87	40	235	H
3	* 2.484	32.06	RMS	32.3	-24.8	2.06	41.62	54	-12.38	-	-	40	235	H
4	2.532	32.52	RMS	32.3	-24.7	2.06	42.18	54	-11.82	-	-	40	235	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CbWFltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	42.59	Pk	32.3	-24.8	0	50.09	-	-	74	-23.91	131	244	V
2	2.534	44.23	Pk	32.3	-24.7	0	51.83	-	-	74	-22.17	131	244	V
3	* 2.484	32.26	RMS	32.3	-24.8	2.06	41.82	54	-12.18	-	-	131	244	V
4	* 2.484	32.77	RMS	32.3	-24.8	2.06	42.33	54	-11.67	-	-	131	244	V

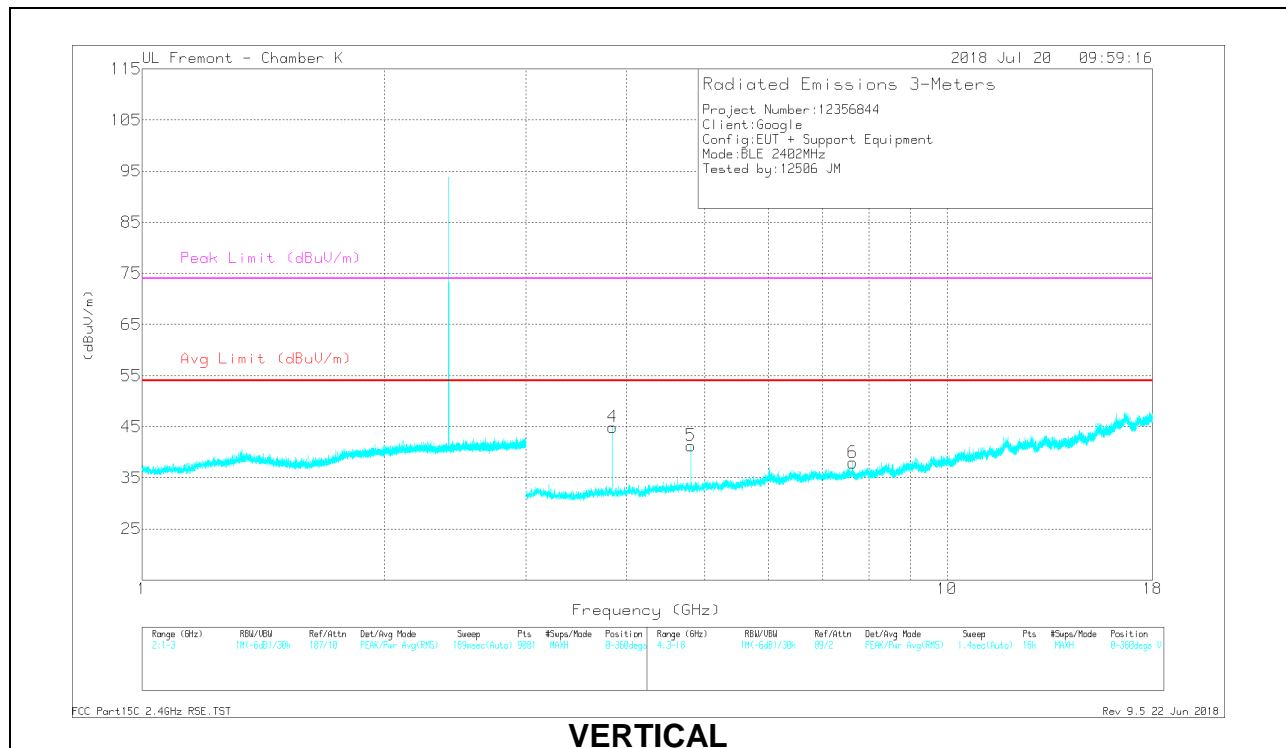
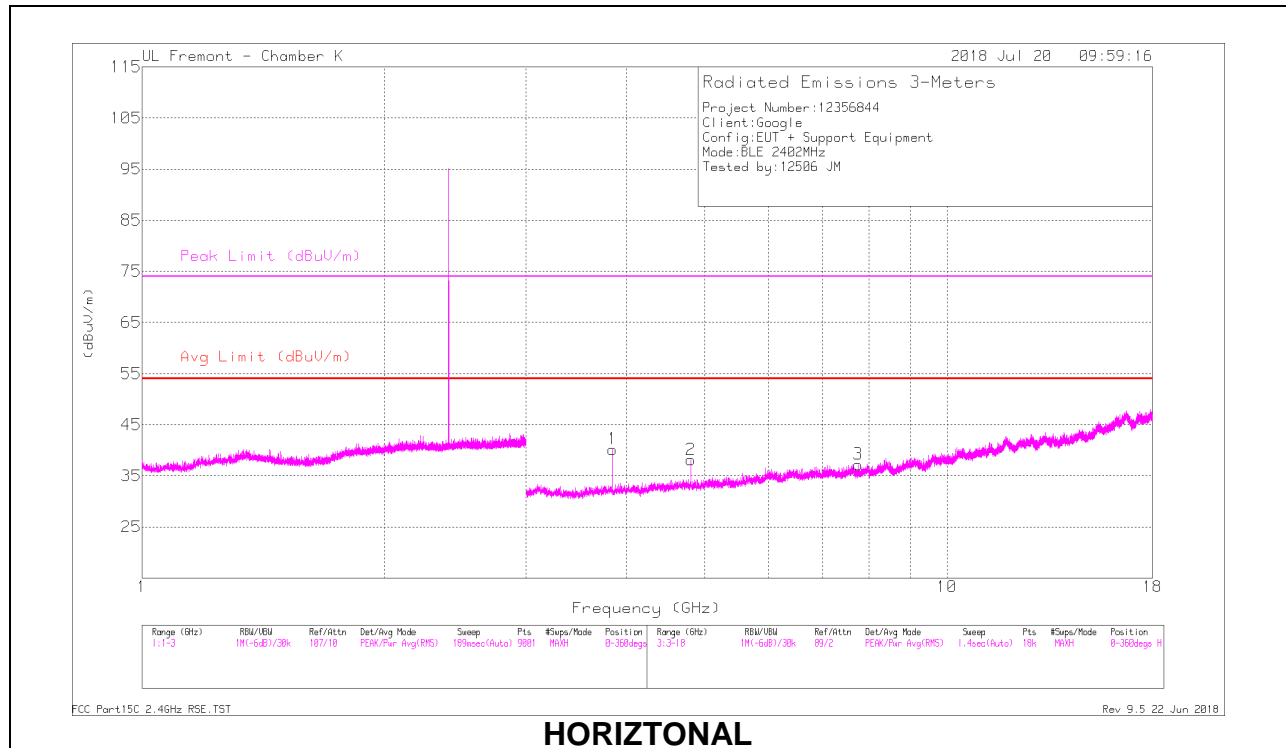
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

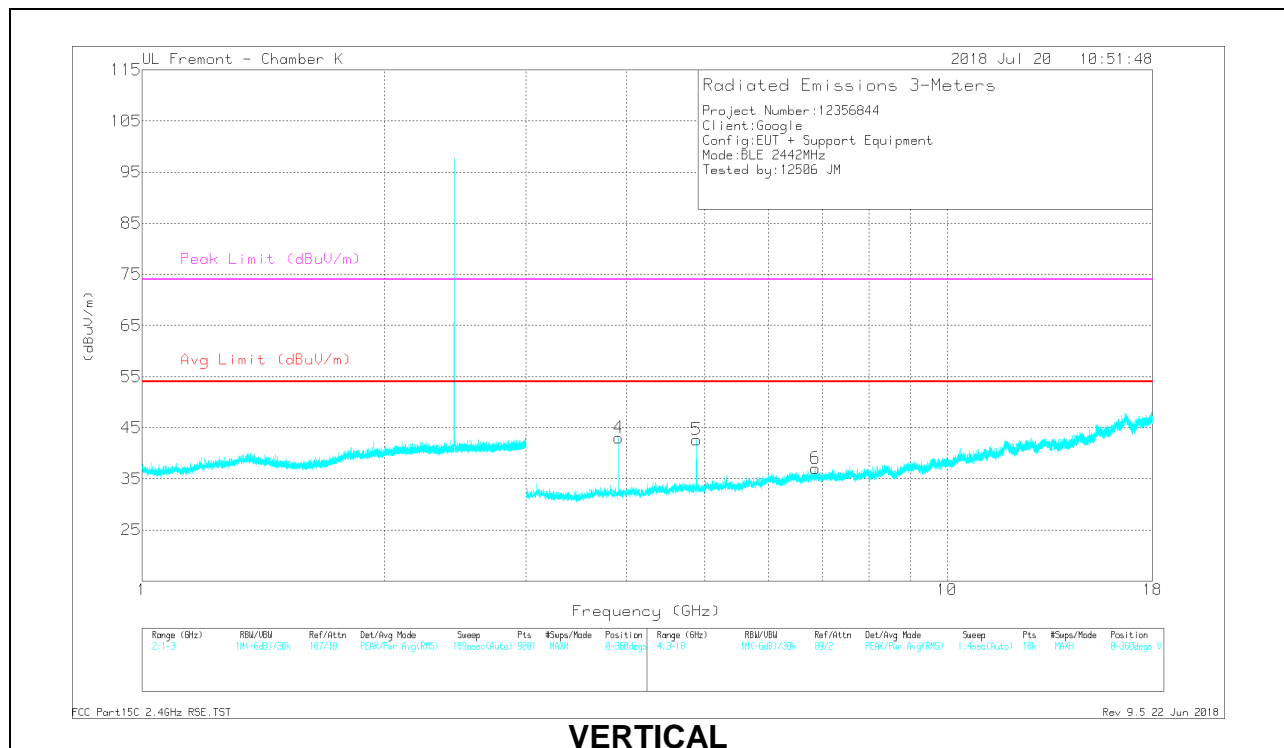
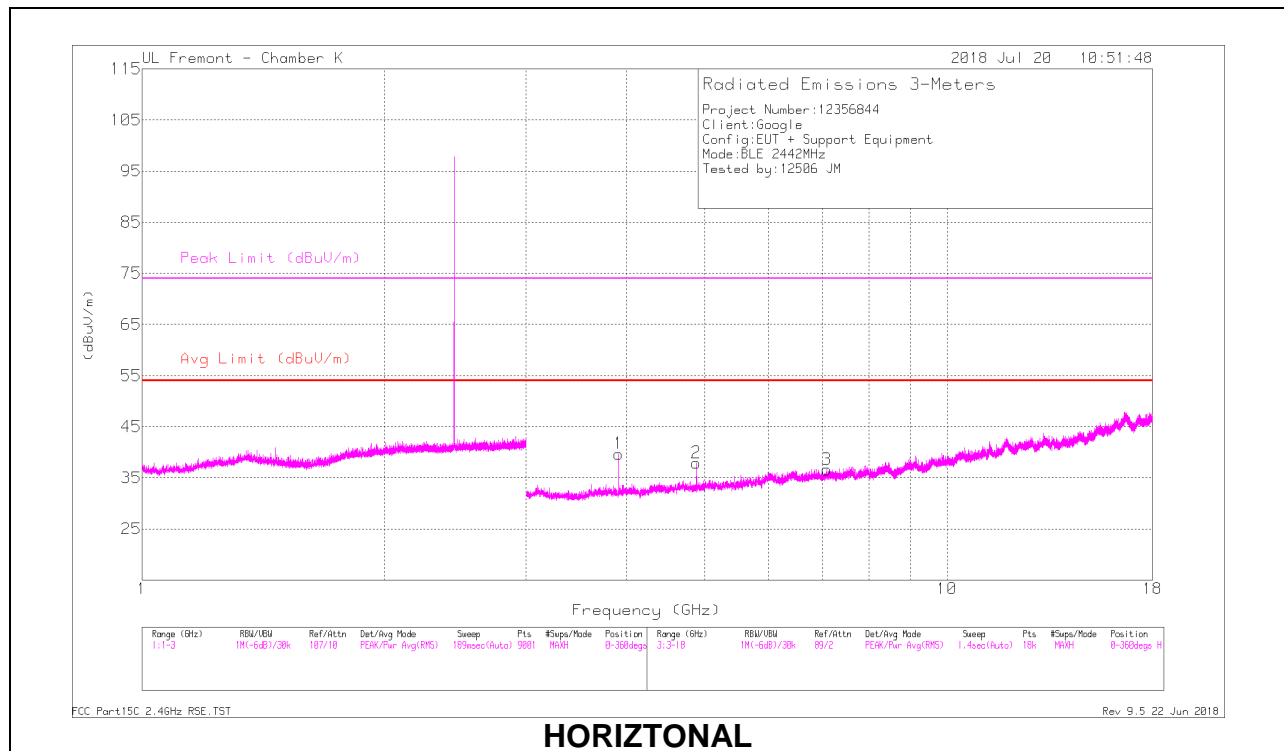
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.843	39.64	PK2	33.4	-31.4	0	41.64	-	-	74	-32.36	308	400	H
* 3.843	31.09	MAv1	33.4	-31.4	2.05	35.14	54	-18.86	-	-	308	400	H
* 4.804	39.84	PK2	34.2	-30.3	0	43.74	-	-	74	-30.26	321	162	H
* 4.804	30.52	MAv1	34.2	-30.3	2.05	36.47	54	-17.53	-	-	321	162	H
7.75	34.14	PK2	35.7	-26.1	0	43.74	-	-	-	-	324	180	H
7.751	23.77	MAv1	35.7	-26.1	2.05	35.42	-	-	-	-	324	180	H
* 3.843	44.68	PK2	33.4	-31.4	0	46.68	-	-	74	-27.32	312	193	V
* 3.843	39.37	MAv1	33.4	-31.4	2.05	43.42	54	-10.58	-	-	312	193	V
* 4.804	42.91	PK2	34.2	-30.3	0	46.81	-	-	74	-27.19	5	162	V
* 4.804	32.95	MAv1	34.2	-30.3	2.05	38.9	54	-15.1	-	-	5	162	V
* 7.639	33.06	PK2	35.6	-25.4	0	43.26	-	-	74	-30.74	29	130	V
* 7.638	24.13	MAv1	35.6	-25.4	2.05	36.38	54	-17.62	-	-	29	130	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

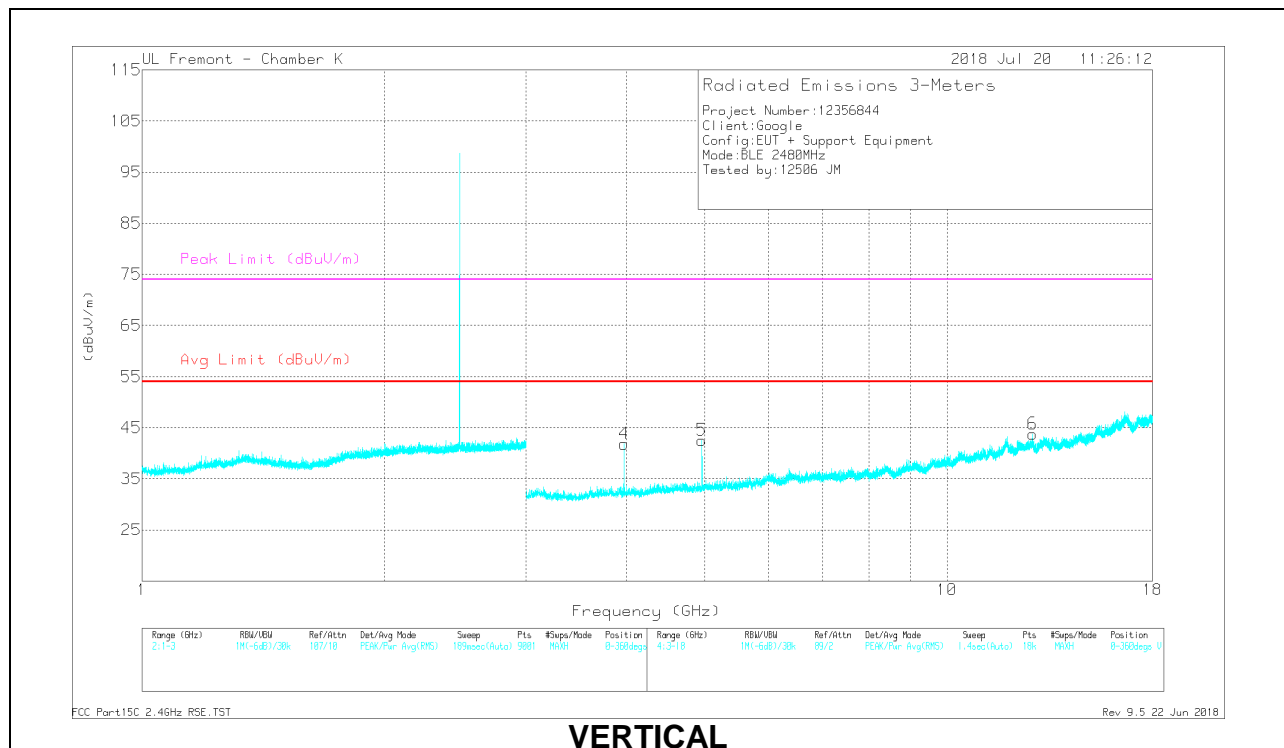
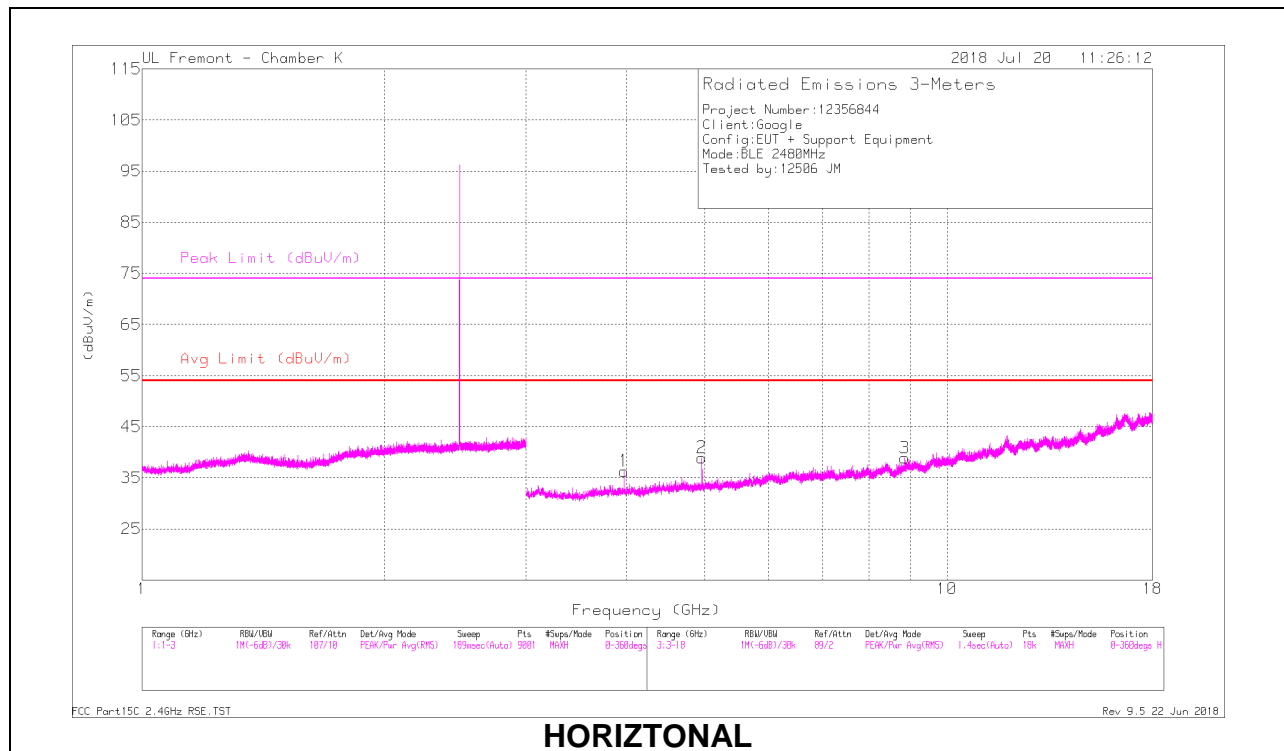
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.907	41.25	PK2	33.4	-31.7	0	42.95	-	-	74	-31.05	319	102	H
* 3.907	34.63	MAv1	33.4	-31.7	2.05	38.38	54	-15.62	-	-	319	102	H
* 4.884	39.89	PK2	34.1	-30.5	0	43.49	-	-	74	-30.51	11	107	H
* 4.884	31.29	MAv1	34.1	-30.5	2.05	36.94	54	-17.06	-	-	11	107	H
7.094	32.47	PK2	35.6	-26.4	0	41.67	-	-	-	-	38	134	H
7.095	25.03	MAv1	35.6	-26.4	2.05	36.28	-	-	-	-	38	134	H
* 3.907	43.78	PK2	33.4	-31.7	0	45.48	-	-	74	-28.52	354	104	V
* 3.907	37.7	MAv1	33.4	-31.7	2.05	41.45	54	-12.55	-	-	354	104	V
* 4.884	42.44	PK2	34.1	-30.5	0	46.04	-	-	74	-27.96	283	179	V
* 4.884	32.83	MAv1	34.1	-30.5	2.05	38.48	54	-15.52	-	-	283	179	V
6.862	32.22	PK2	35.5	-26.3	0	41.42	-	-	-	-	299	182	V
6.863	24.75	MAv1	35.5	-26.3	2.05	36	-	-	-	-	299	182	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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
* 3.968	41.59	PK2	33.4	-31.6	0	43.39	-	-	74	-30.61	311	146	H
* 3.968	32.81	MAv1	33.4	-31.6	2.05	36.66	54	-17.34	-	-	311	146	H
* 4.96	40.6	PK2	34.2	-30.6	0	44.2	-	-	74	-29.8	345	103	H
* 4.96	32.2	MAv1	34.2	-30.6	2.05	37.85	54	-16.15	-	-	345	103	H
8.862	31.72	PK2	36.1	-23.9	0	43.92	-	-	-	-	320	133	H
8.863	22.91	MAv1	36.1	-23.9	2.05	37.16	-	-	-	-	320	133	H
* 3.968	42.9	PK2	33.4	-31.6	0	44.7	-	-	74	-29.3	300	242	V
* 3.968	36.77	MAv1	33.4	-31.6	2.05	40.62	54	-13.38	-	-	300	242	V
* 4.959	42.38	PK2	34.2	-30.6	0	45.98	-	-	74	-28.02	13	102	V
* 4.96	33.99	MAv1	34.2	-30.6	2.05	39.64	54	-14.36	-	-	13	102	V
12.776	28.78	PK2	39	-20	0	47.78	-	-	-	-	56	133	V
12.779	20.87	MAv1	39	-20	2.05	41.92	-	-	-	-	56	133	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

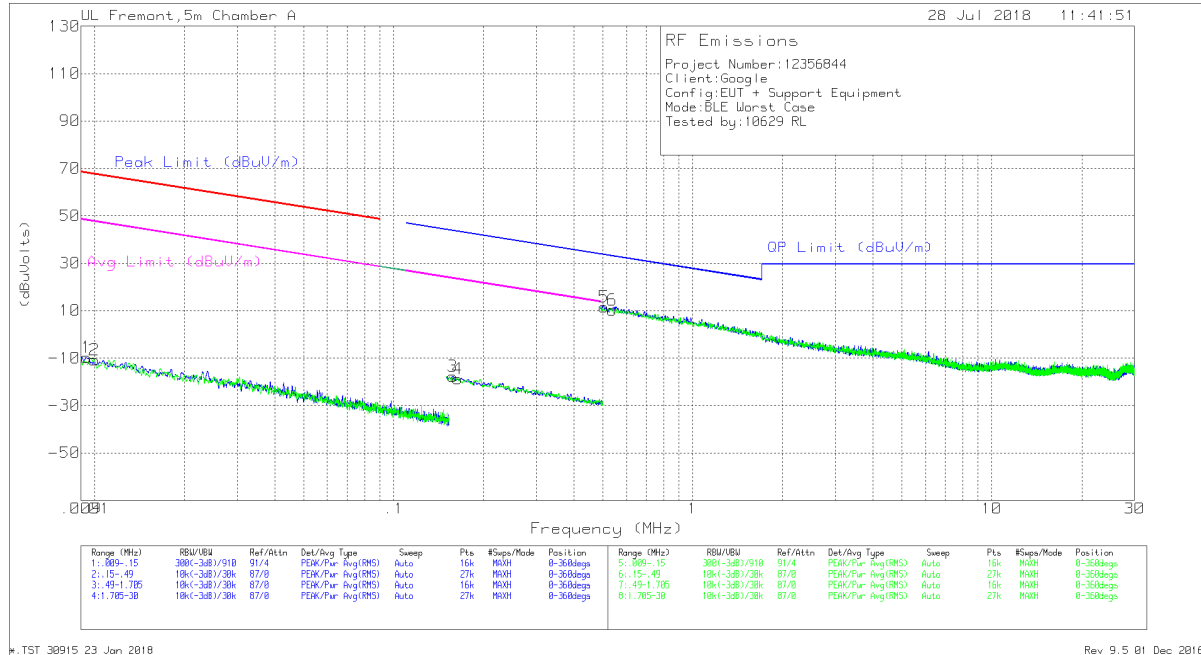
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

8.1. WORST-CASE BELOW 30 MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

FACE ON AND FACE OFF PLOTS



NOTE: KDB 414788 OATS and Chamber Correlation Justification

- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Trace Markers

Marker	Frequency(MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.00939	54.62	Pk	15.5	.1	-80	-9.78	68.13	-77.91	48.13	-57.91	0-360
2	.00998	53.98	Pk	15.2	.1	-80	-10.72	67.6	-78.32	47.6	-58.32	0-360
3	.15729	48.35	Pk	13.8	.1	-80	-17.75	43.69	-61.44	23.69	-41.44	0-360
4	.16413	47.37	Pk	13.8	.1	-80	-18.73	43.32	-62.05	23.32	-42.05	0-360

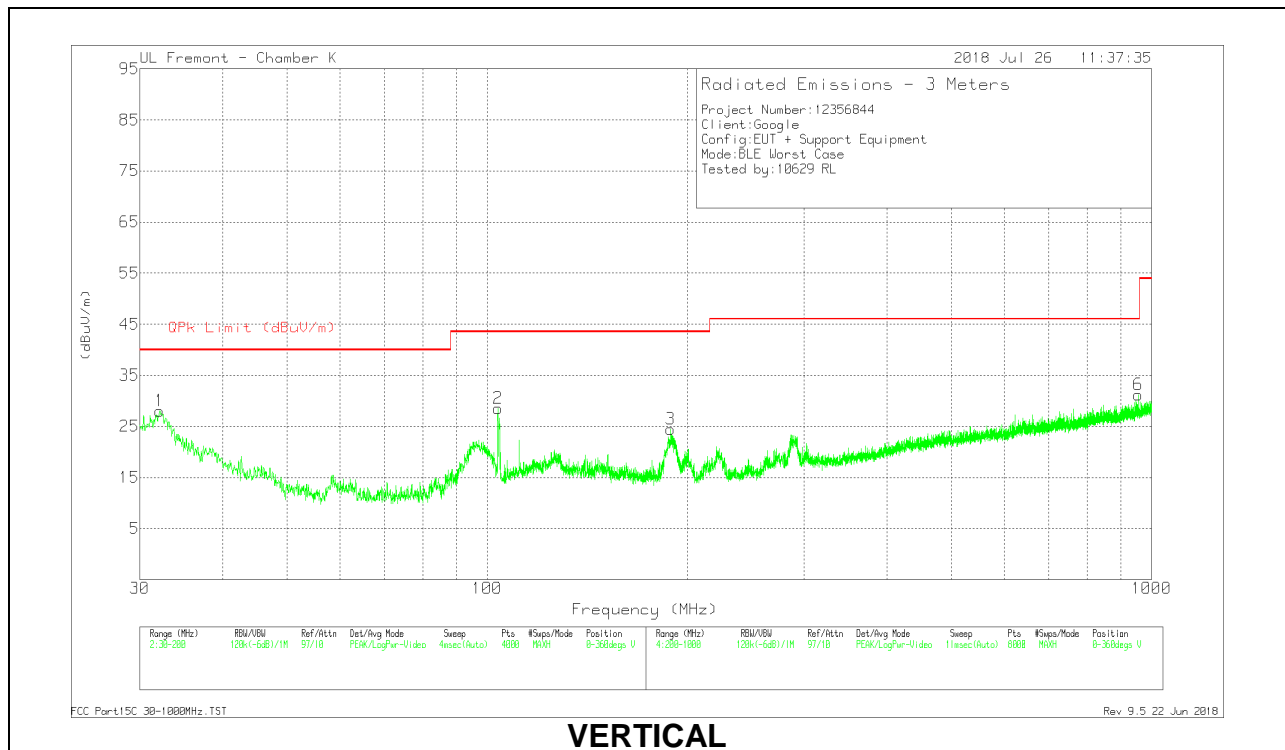
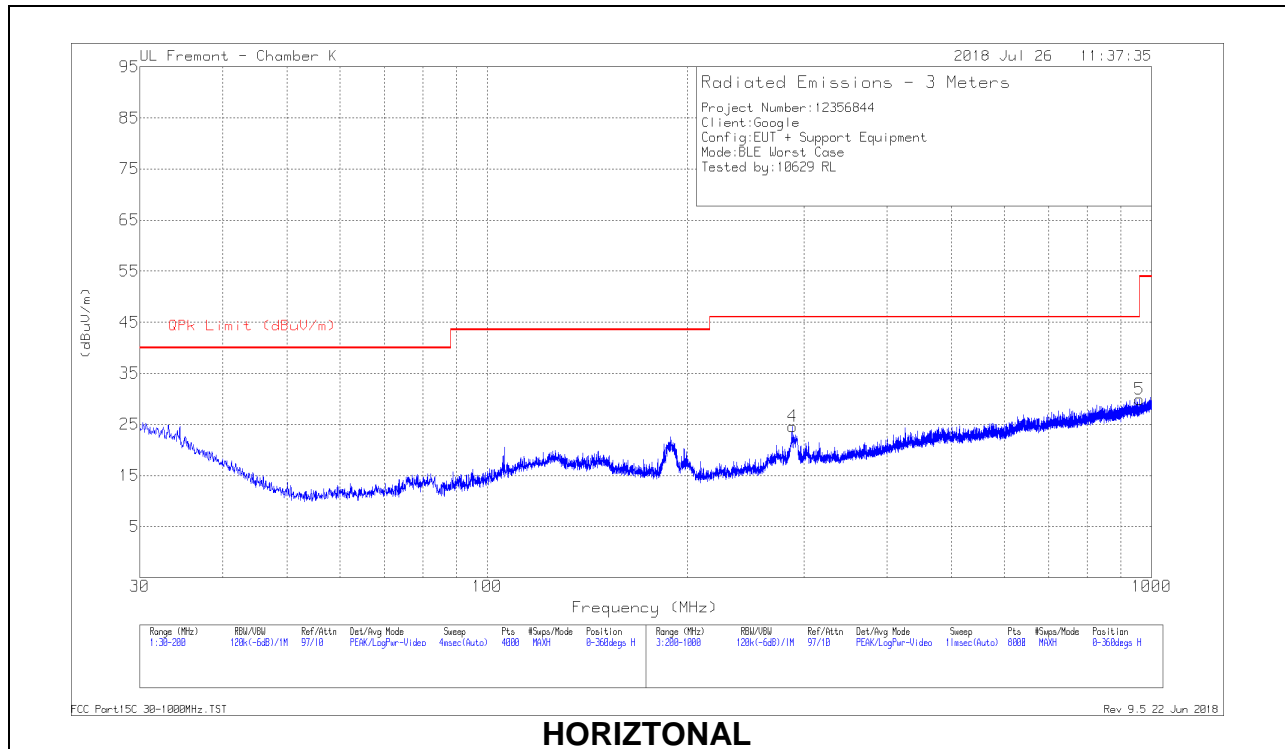
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.50452	37.53	Pk	13.9	.1	-40	11.53	33.55	-22.02	0-360
6	.53723	36.16	Pk	13.9	.1	-40	10.16	33	-22.84	0-360

Pk - Peak detector

8.2. Worst Case Below 1 GHz

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



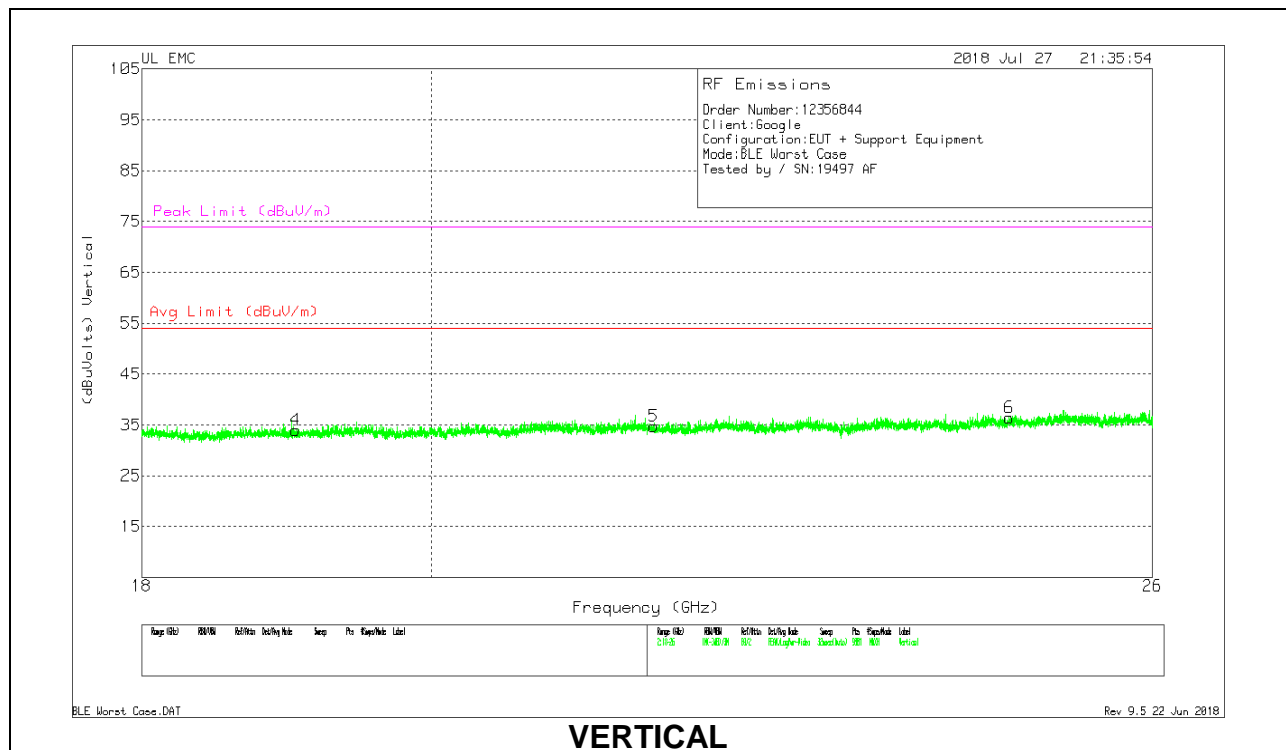
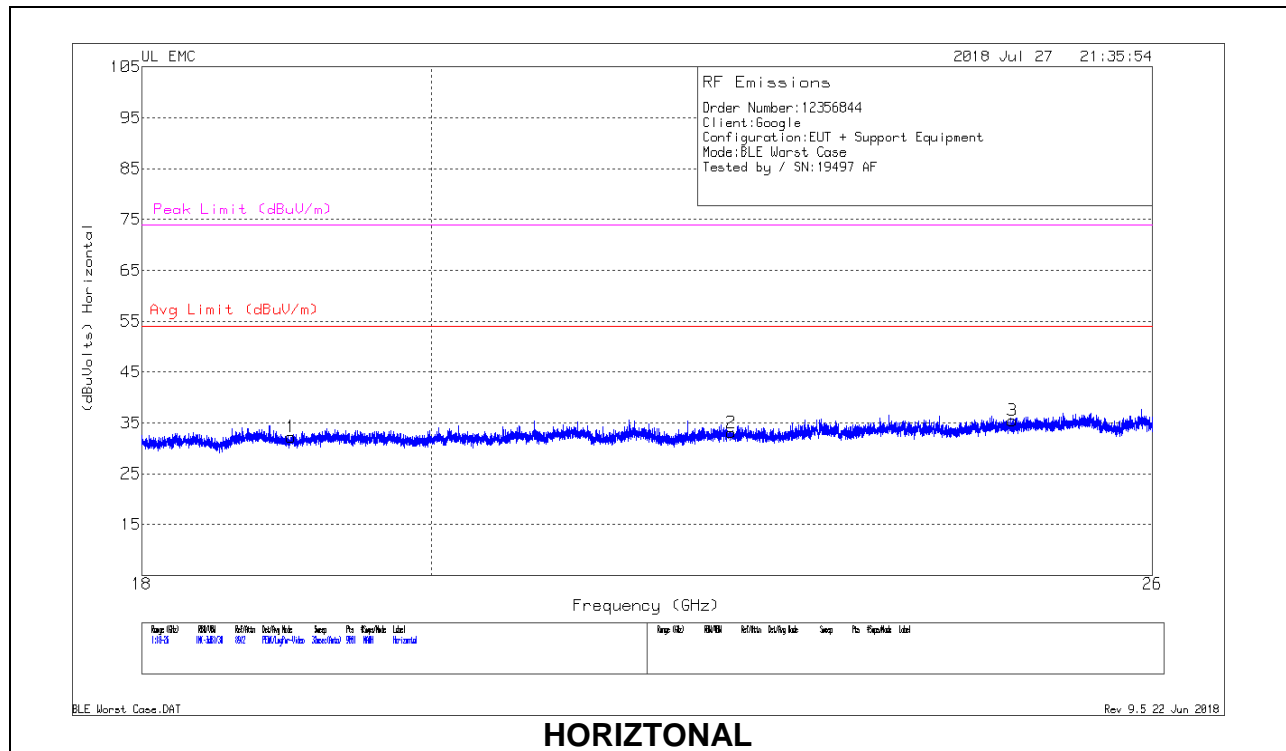
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.1256	32.18	Pk	23.5	-27.7	27.98	40	-12.02	0-360	100	V
2	103.7991	40.17	Pk	15.4	-27	28.57	43.52	-14.95	0-360	100	V
3	188.9486	35.54	Pk	15.3	-26.4	24.44	43.52	-19.08	0-360	100	V
4	288.3115	33.21	Pk	17.3	-25.9	24.61	46.02	-21.41	0-360	100	H
5	958.7986	26.37	Pk	26.8	-23.3	29.87	46.02	-16.15	0-360	199	H
6	955.9983	27.68	Pk	26.8	-23.3	31.18	46.02	-14.84	0-360	199	V

Pk - Peak detector

8.3. Worst Case 18-26 GHz

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T448 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.005	66.8	Pk	32.4	-57.5	-9.5	32.2	54	-21.8	74	-41.8
2	22.305	66.87	Pk	33.5	-57.8	-9.5	33.07	54	-20.93	74	-40.93
3	24.707	66.31	Pk	34.4	-55.8	-9.5	35.41	54	-18.59	74	-38.59
4	19.038	68.41	Pk	32.5	-57.4	-9.5	34.01	54	-19.99	74	-39.99
5	21.683	68.43	Pk	33.2	-57.4	-9.5	34.73	54	-19.27	74	-39.27
6	24.679	66.97	Pk	34.3	-55.4	-9.5	36.37	54	-17.63	74	-37.63

Pk - Peak detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

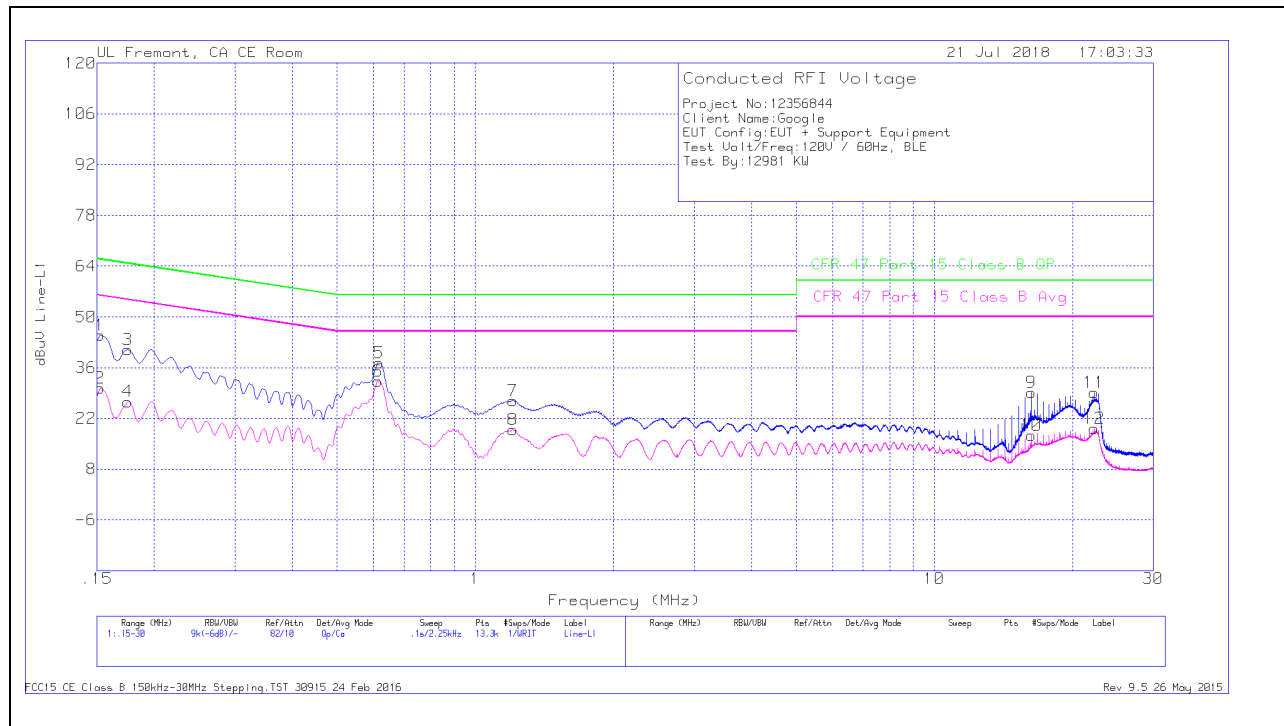
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

9.1.1. EUT POWERED BY AC/DC ADAPTER

LINE 1 RESULTS

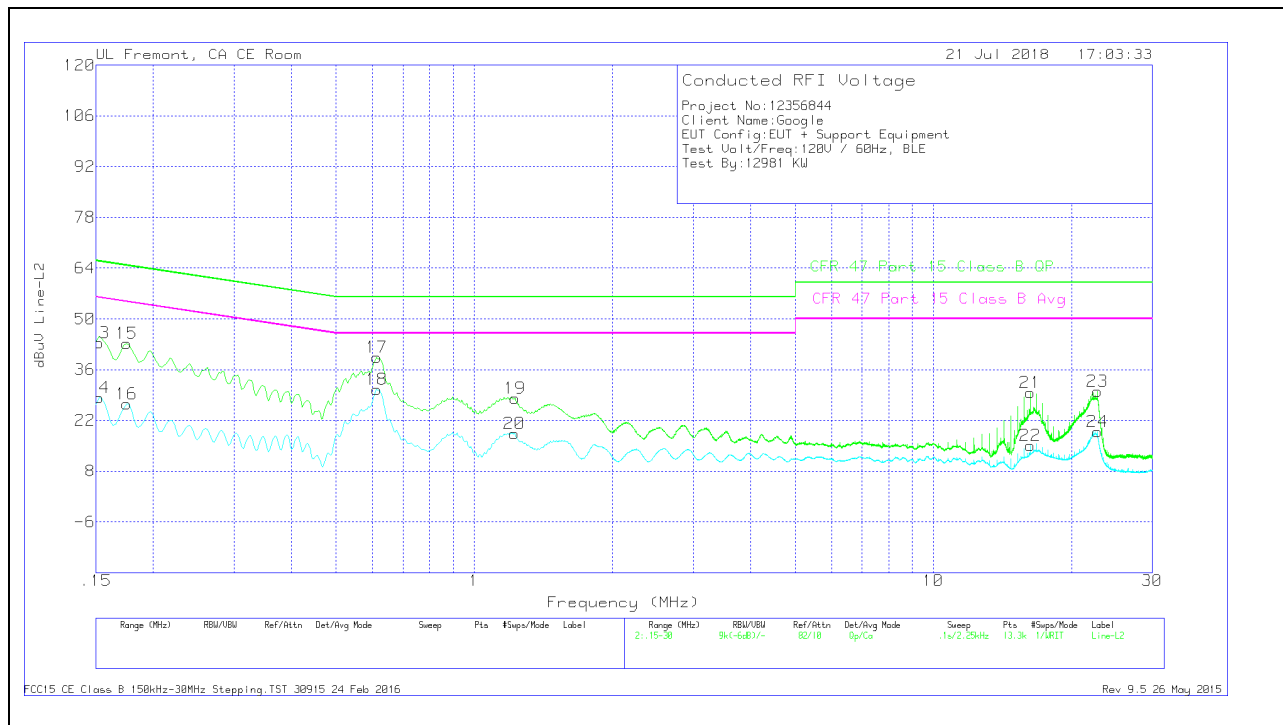


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15225	34.76	Qp	.1	0	10.1	44.96	65.88	-20.92	-	-
2	.15225	20.15	Ca	.1	0	10.1	30.35	-	-	55.88	-25.53
3	.17475	30.86	Qp	0	0	10.1	40.96	64.73	-23.77	-	-
4	.17475	16.52	Ca	0	0	10.1	26.62	-	-	54.73	-28.11
5	.618	27.18	Qp	0	0	10.1	37.28	56	-18.72	-	-
6	.6135	22.22	Ca	0	0	10.1	32.32	-	-	46	-13.68
7	1.2075	16.67	Qp	0	.1	10.1	26.87	56	-29.13	-	-
8	1.2075	8.71	Ca	0	.1	10.1	18.91	-	-	46	-27.09
9	16.27125	18.47	Qp	.1	.3	10.3	29.17	60	-30.83	-	-
10	16.27125	6.61	Ca	.1	.3	10.3	17.31	-	-	50	-32.69
11	22.27875	18.27	Qp	.1	.3	10.4	29.07	60	-30.93	-	-
12	22.281	8.38	Ca	.1	.3	10.4	19.18	-	-	50	-30.82

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.15225	45.16	Qp	.1	0	10.1	55.36	65.88	-10.52	-	-
14	.15225	18.04	Ca	.1	0	10.1	28.24	-	-	55.88	-27.64
15	.17475	33.16	Qp	0	0	10.1	43.26	64.73	-21.47	-	-
16	.17475	16.42	Ca	0	0	10.1	26.52	-	-	54.73	-28.21
17	.6135	29.35	Qp	0	0	10.1	39.45	56	-16.55	-	-
18	.6135	20.4	Ca	0	0	10.1	30.5	-	-	46	-15.5
19	1.2255	17.85	Qp	0	.1	10.1	28.05	56	-27.95	-	-
20	1.22213	8.15	Ca	0	.1	10.1	18.35	-	-	46	-27.65
21	16.27125	19.02	Qp	.1	.3	10.3	29.72	60	-30.28	-	-
22	16.27125	4.42	Ca	.1	.3	10.3	15.12	-	-	50	-34.88
23	22.7805	19.21	Qp	.1	.3	10.4	30.01	60	-29.99	-	-
24	22.7805	8.02	Ca	.1	.3	10.4	18.82	-	-	50	-31.18

Qp - Quasi-Peak detector

Ca - CISPR average detection