CERTIFICATION TEST REPORT

Report Number. : 12751212-E4V1

Applicant	:	Braun GMBH T-QTA FRANKFURTER STRASSE 145 KRONBERG TS, D-61476 DE
Model	:	3758
FCC ID	:	USQ3758
IC	:	6856A-3758
EUT Description	:	ELECTRIC TOOTHBRUSH WITH BLUETOOTH LE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue:
October 14, 2019

Prepared by:
UL Verification Services Inc.
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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	10/14/2019	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BRAUN GMBH
T-QTA FRANKFURTER STRASSE 145
KRONBERG TS, D-61476 DE

EUT DESCRIPTION: Electric Toothbrush with BLE

MODEL: 3758

SERIAL NUMBER: W690(Radiated Sample), W694(Conducted Sample), D80192102474 (Wireless Travel Case Charger)

DATE TESTED: JANUARY 14 – JUNE 4, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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.

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Approved & Released For
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. 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
☐ Chamber A	☐ Chamber D	☒ Chamber I
☐ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☐ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

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

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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

RADIATED EMISSIONS
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

MAINS CONDUCTED EMISSIONS
Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

4.3. 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	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is an Electric Toothbrush with Bluetooth LE.

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	0.41	1.10

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an F-type PCB antenna, with a maximum gain -1.96.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was Texas Instruments BLE stack v3.0.1 (BLE specification 4.2)

The test utility software used during testing was 181205_Sonos_Test_ETSI, rev. 181205

5.5. 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.

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 with the charging case.

Worst case fundamental was investigated with travel case charger, home charger, and standalone. It was determined that travel case charger configuration was worst case; therefore, all final radiated testing was performed with the travel case charger.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Travel Charging Case	Braun	3759	D80192102474	N/A
AC Adapter	Braun	492-5217	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	RF	Shielded	0.3	To Spectrum Analyzer
2	AC	2	Power Cable	Unshielded	0.5	Charger to AC Mains

TEST SETUP

The EUT is a stand alone. Test software exercised the radio card.

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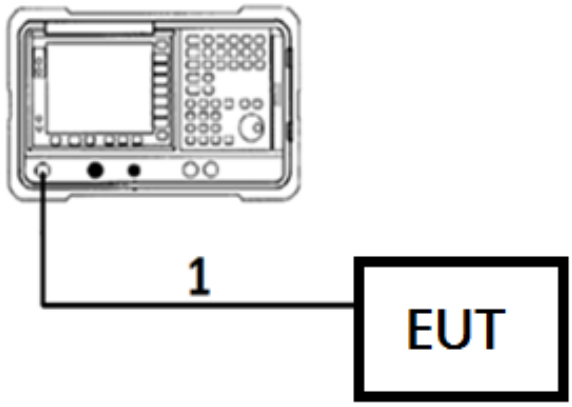
TEST SETUP-CONDUCTED TEST

For conducted tests: the EUT was stand alone. The test software exercises the radio.

SETUP DIAGRAMS



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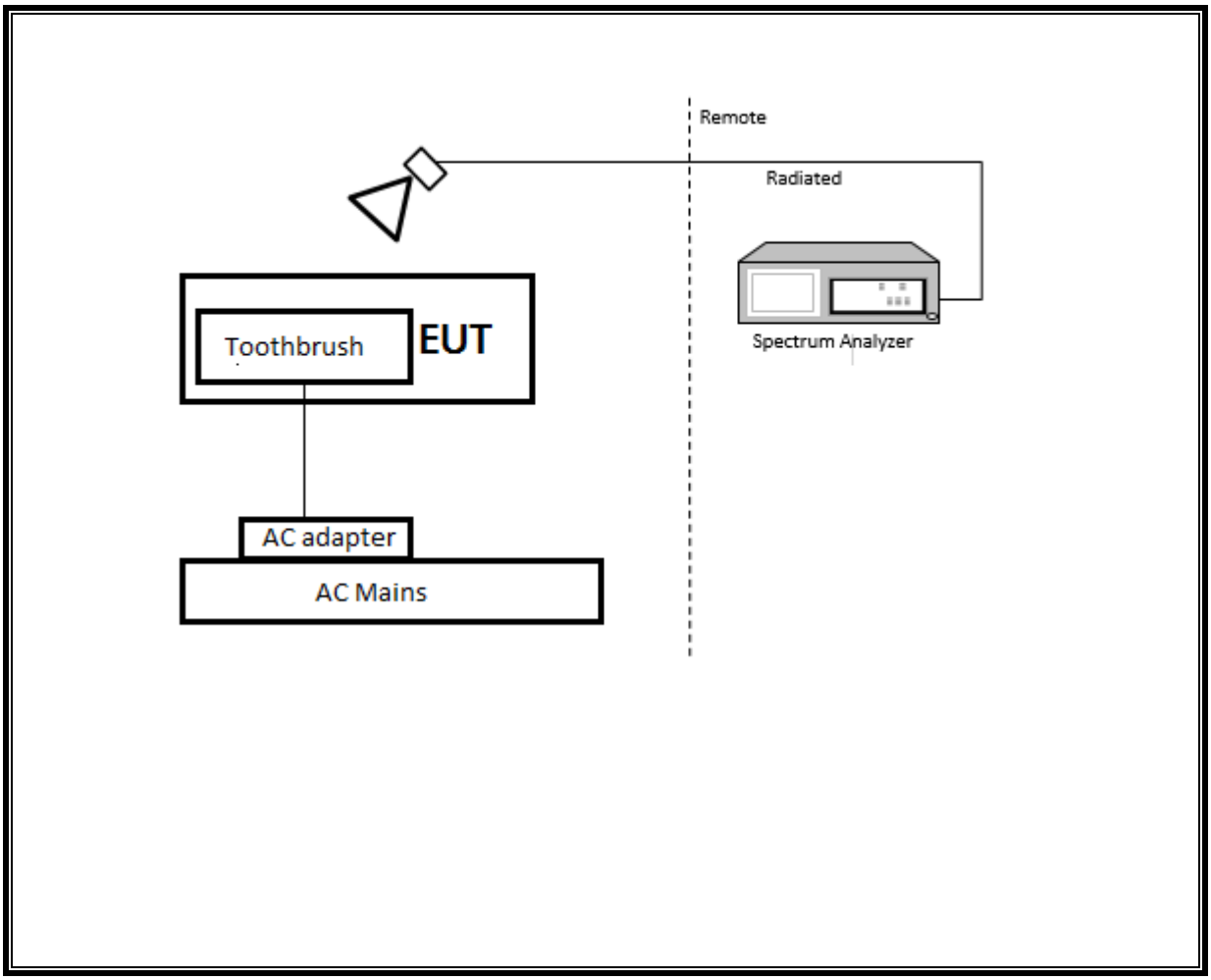
TEST SETUP-RADIATED TEST

For radiated tests: the EUT was stand alone. The test software exercises the radio.

SETUP DIAGRAMS



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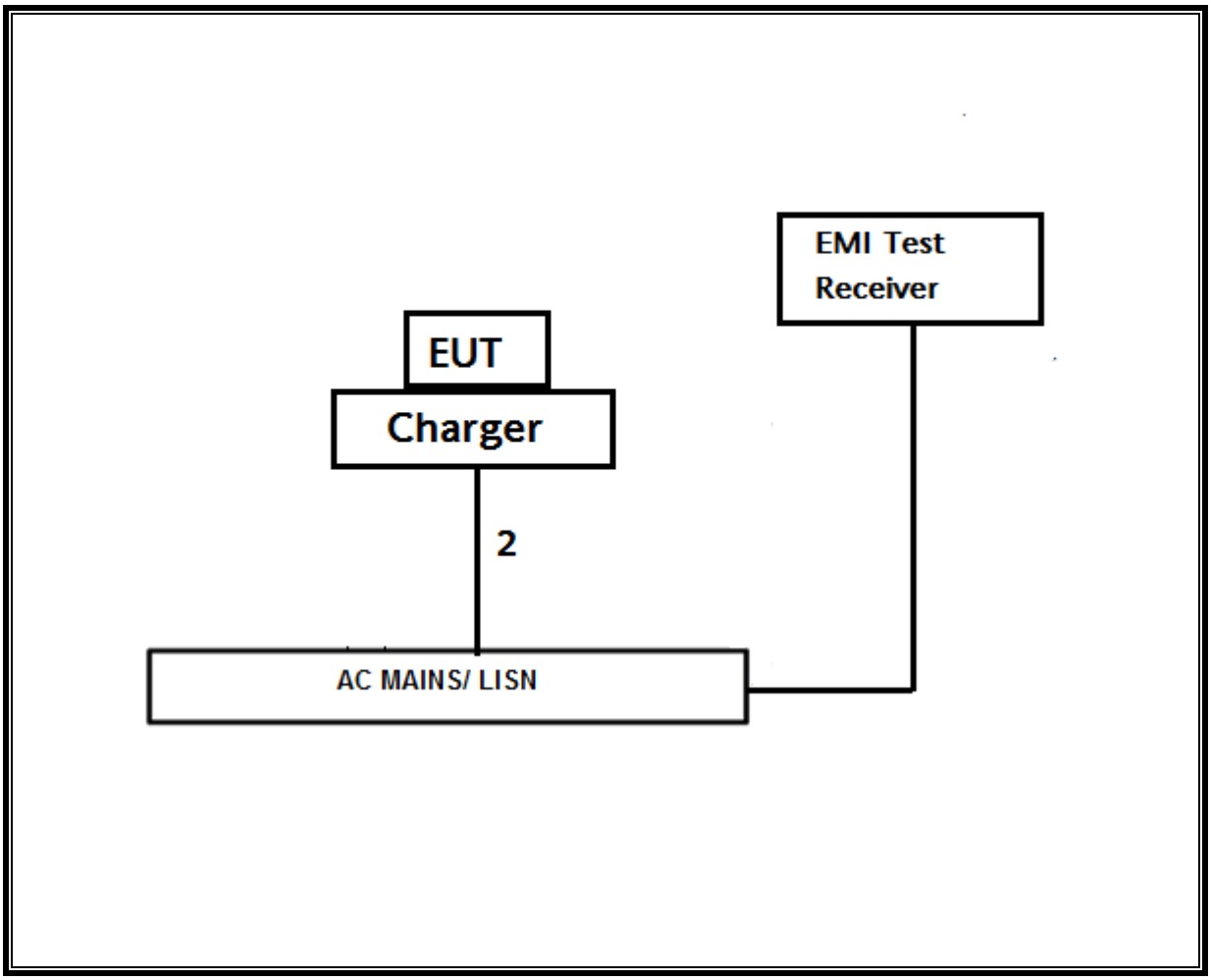
TEST SETUP-AC LINE CONDUCTED TEST

For AC line conducted tests: the EUT was placed on wireless charger. The test software exercises the radio.

SETUP DIAGRAMS



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6. MEASUREMENT METHOD

6 dB BW: ANSI C63.10 Subclause -11.8.1

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

Output Power : ANSI C63.10 Subclause -11.9.1.3 Method Peak Power Meter (Measurement using a broadband peak RF power meter)

Average Power: ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Subclause -11.13.3.4 Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

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

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7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
6 port rf switch, 1-18GHz	Pasternack	PE7159	171455	08/01/2019	08/01/2018
Antenna, Double Ridge Guide Horn Antenna 700MHz to 18GHz	A.H. SYSTEMS, INC.	SAS-571	PRE0190810	07/10/2019	07/10/2017
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179376	02/14/2020	02/14/2019
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184971	11/13/2019	11/13/2018
Thermometer	Control Company	14-650-118, 15557603	T1820	02/26/2020	02/26/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1271	7/26/2019	7/26/2018
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1225	04/10/2019	4/10/2018
Spectrum Analyzer	Agilent (Keysight) Technologies	E4446A	T146	08/13/2019	08/13/2018
EMI Receiver	Rohde & Schwarz	ESR	T1436	2/14/2020	2/14/2019
LSN	Fischer Custom Communications	LSN-50/250-25-2-01	T1310	1/24/2020	1/24/2019

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	
Antenna Port Software	UL	UL RF	
AC Line Conducted Software	UL	ULEMC	

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8. ANTENNA PORT TEST RESULTS (BLE 1Mbps)

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

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	1.000	1.000	1.000	100.00%	0.00	0.010

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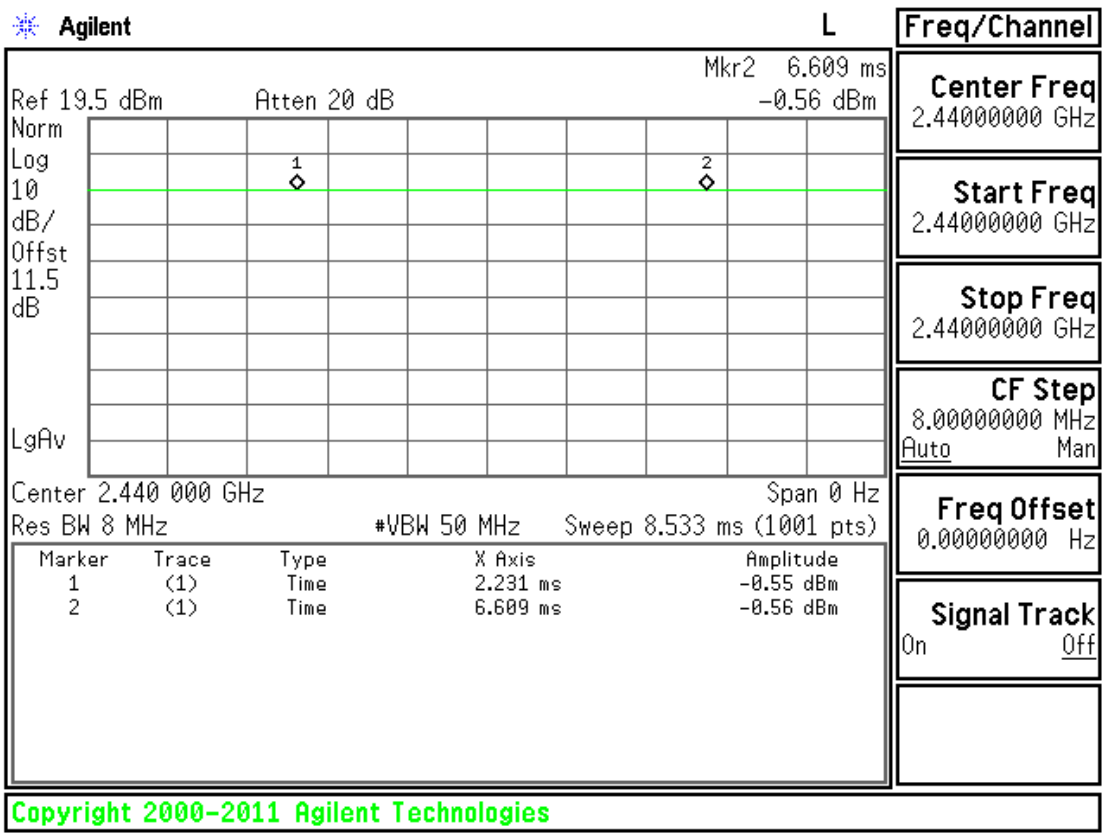
DUTY CYCLE PLOTS



DUTY CYCLE BLE

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8.2. 99% BANDWIDTH

LIMITS

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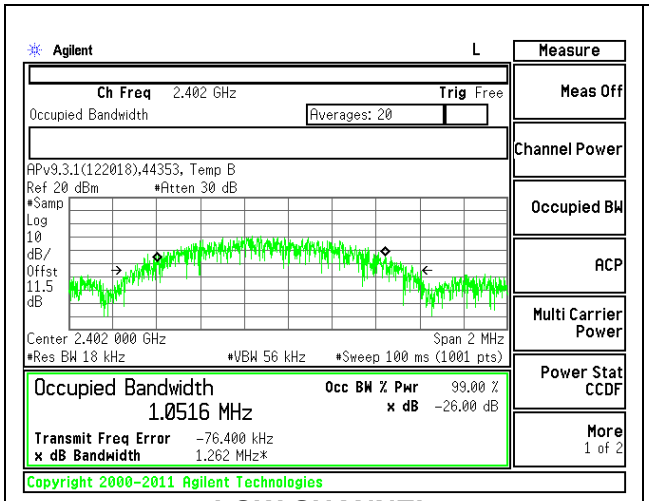
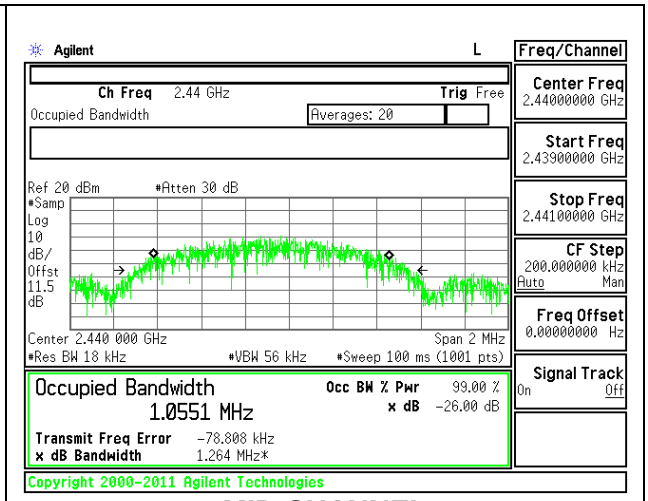
RESULTS

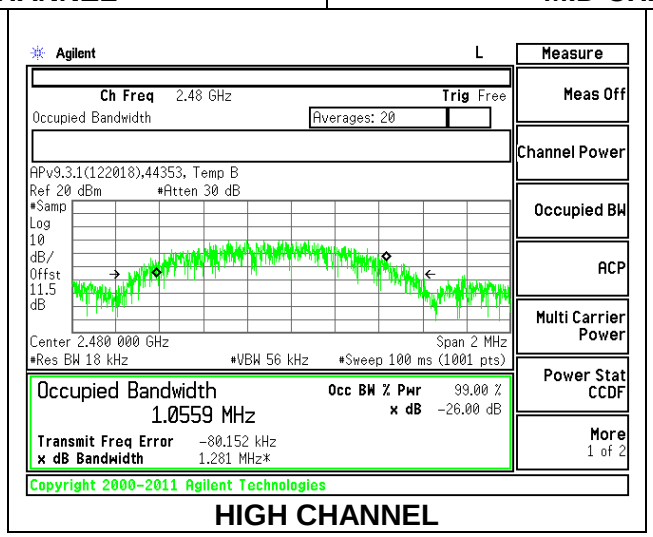
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0516
Middle	2440	1.0551
High	2480	1.0559



LOW CHANNEL



MID CHANNEL



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8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

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

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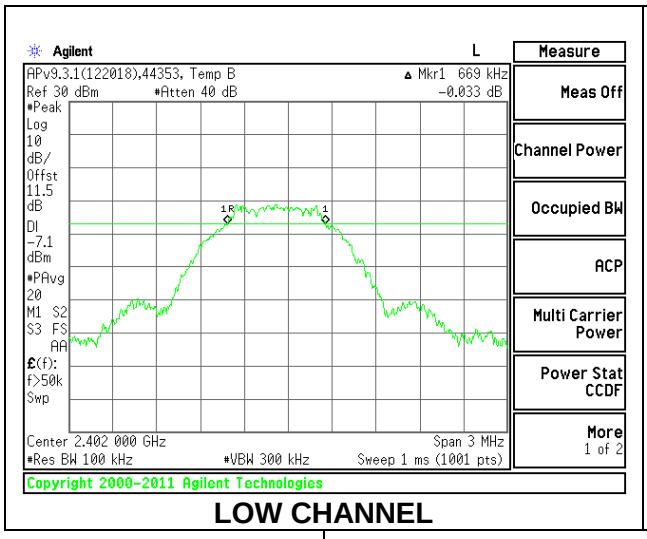
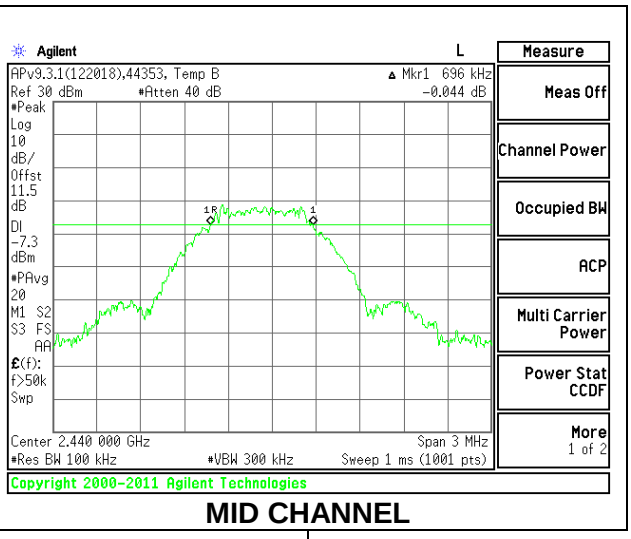
RESULTS

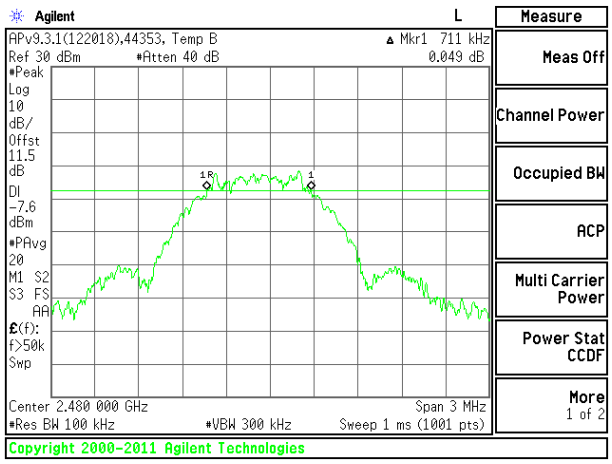
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6690	0.5
Middle	2440	0.6960	0.5
High	2480	0.7110	0.5



LOW CHANNEL



MID CHANNEL



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8.4. 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.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

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RESULTS

Tested By:	12981 KW
Date:	1/18/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	0.410	30	-29.590
Middle	2440	-0.070	30	-30.070
High	2480	-0.100	30	-30.100

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8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

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RESULTS

Tested By:	12981 KW
Date:	1/18/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-0.51
Middle	2440	-0.46
High	2480	-0.49

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8.6. 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.

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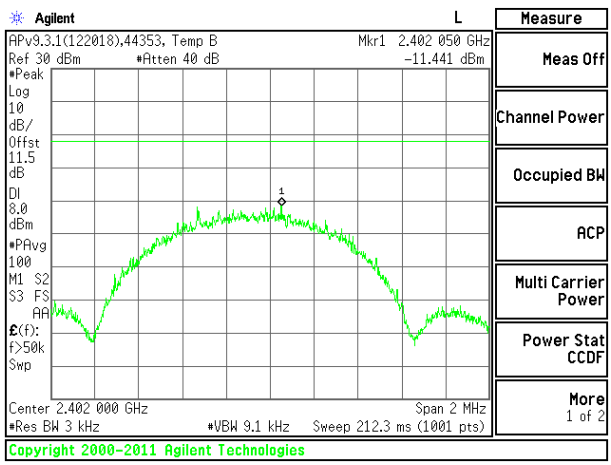
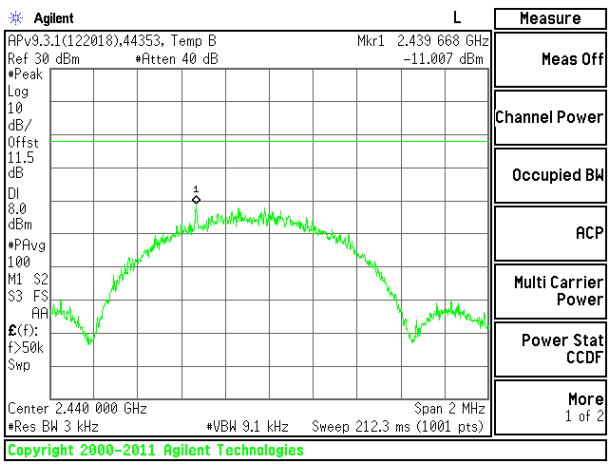
RESULTS

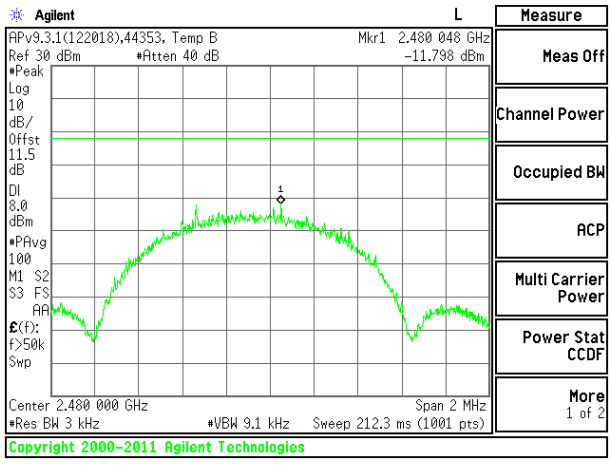
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-11.44	8	-19.44
Middle	2440	-11.01	8	-19.01
High	2480	-11.80	8	-19.80



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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8.7. 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.

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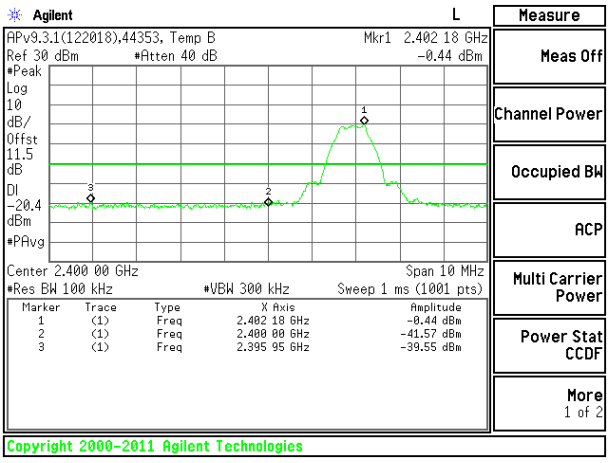
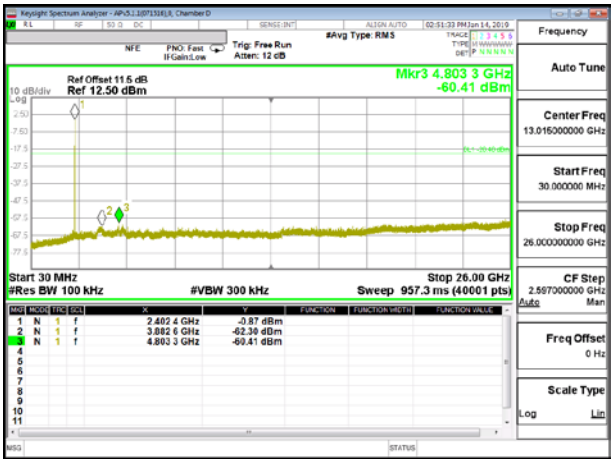
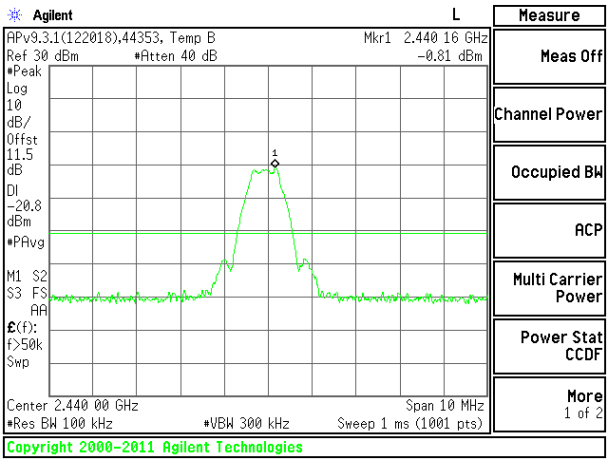
RESULTS



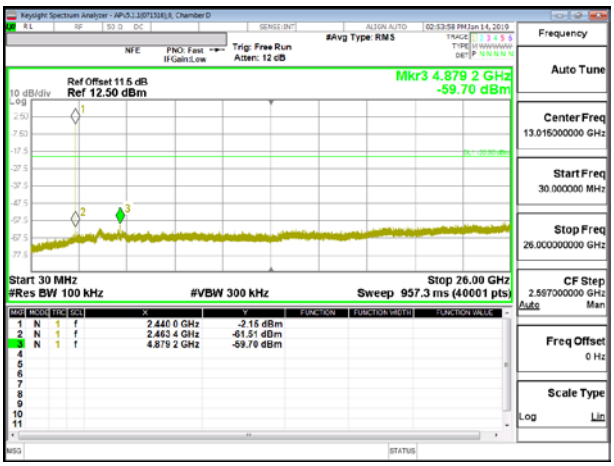
LOW CHANNEL BANDEDGE



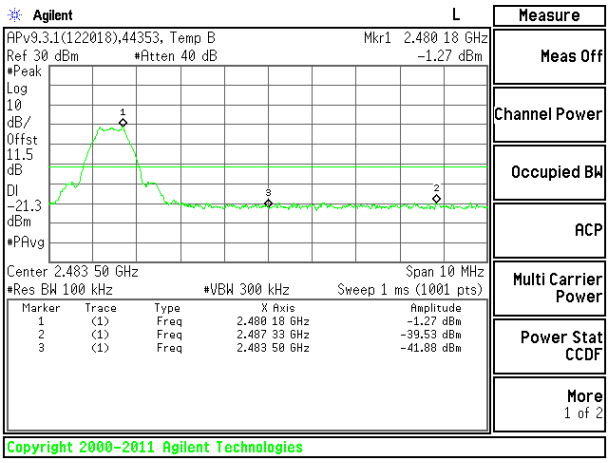
OUT-OF-BAND LOW CHANNEL



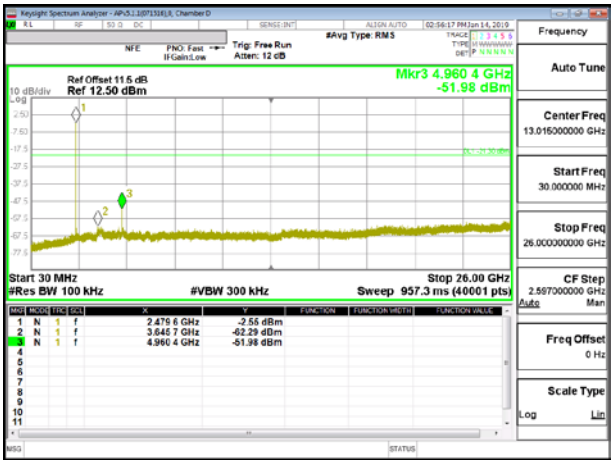
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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9. RADIATED TEST RESULTS (BLE 1 Mbps)

9.1. 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.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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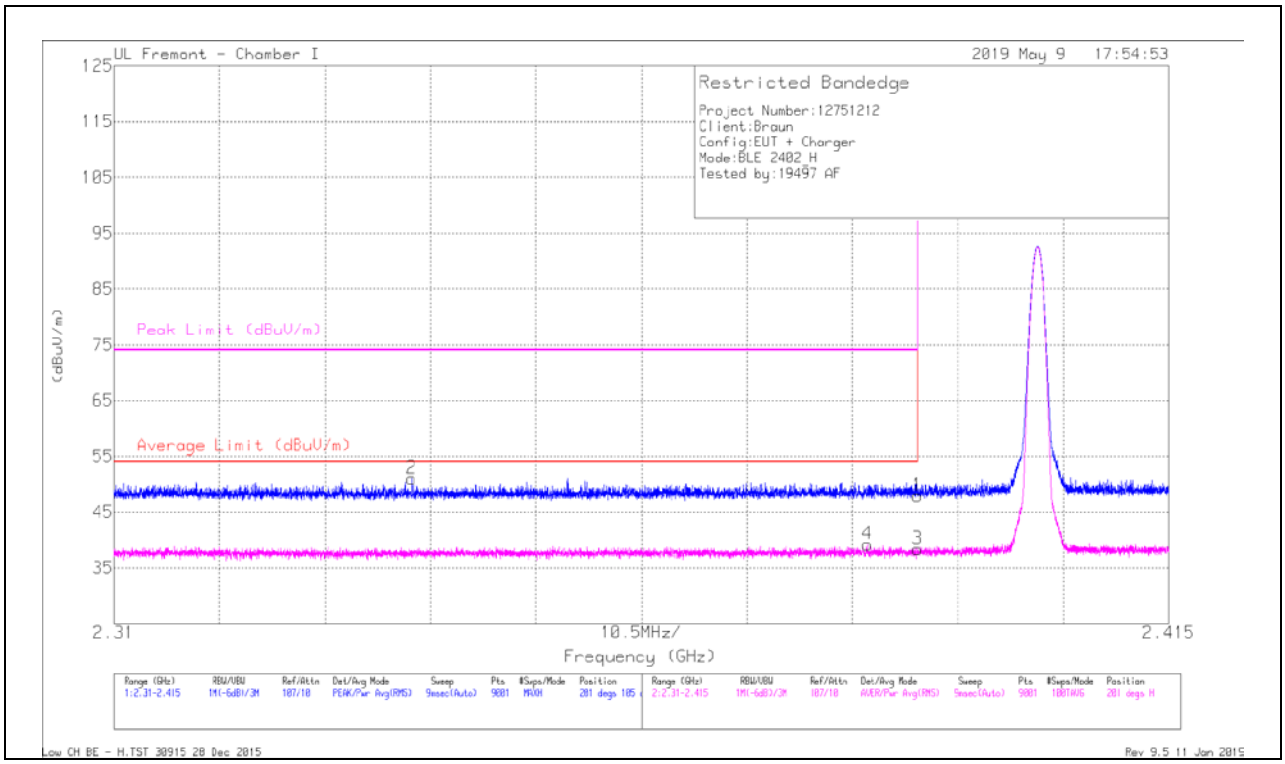
9.2. TRANSMITTER ABOVE 1 GHz

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	37.72	Pk	31.8	-21.6	0	47.92	-	-	74	-26.08	201	105	H
2	2.34	41.09	Pk	31.5	-21.5	0	51.09	-	-	74	-22.91	201	105	H
3	2.39	28.13	RMS	31.8	-21.6	0	38.33	54	-15.67	-	-	201	105	H
4	2.385	29.02	RMS	31.8	-21.6	0	39.22	54	-14.78	-	-	201	105	H

Pk - Peak detector
RMS - RMS detection

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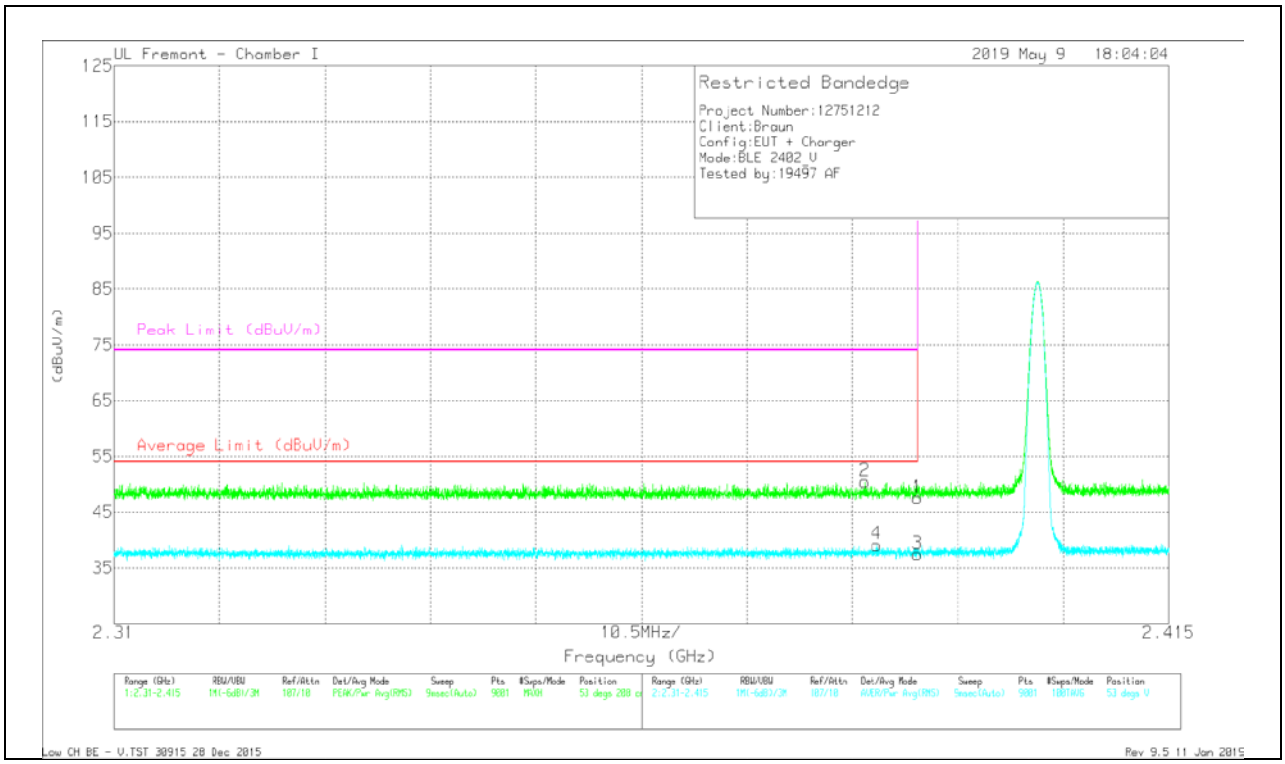
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	37.31	Pk	31.8	-21.6	0	47.51	-	-	74	-26.49	53	208	V
2	2.385	40.28	Pk	31.8	-21.6	0	50.48	-	-	74	-23.52	53	208	V
3	2.39	27.36	RMS	31.8	-21.6	0	37.56	54	-16.44	-	-	53	208	V
4	2.386	28.98	RMS	31.8	-21.6	0	39.18	54	-14.82	-	-	53	208	V

Pk - Peak detector
RMS - RMS detection

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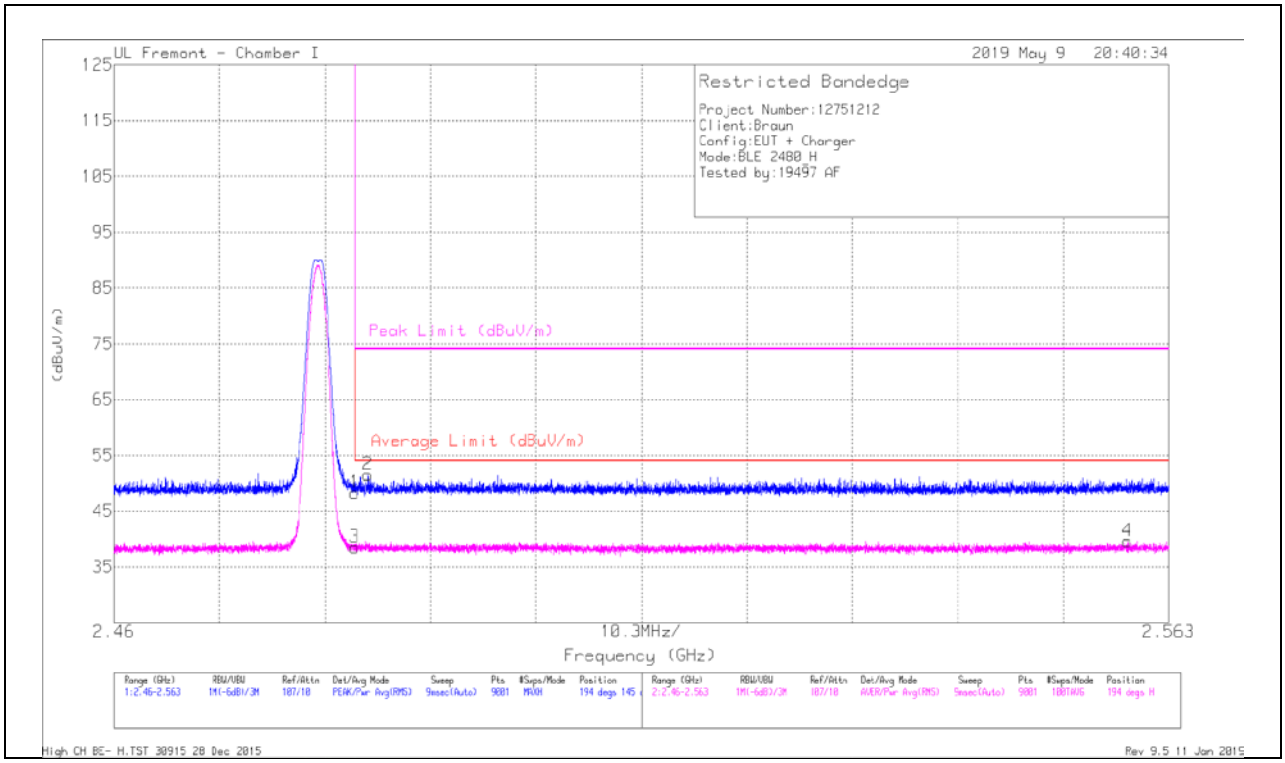
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	37.62	Pk	32.4	-21.7	0	48.32	-	-	74	-25.68	194	145	H
2	* 2.485	40.89	Pk	32.4	-21.8	0	51.49	-	-	74	-22.51	194	145	H
3	* 2.484	27.8	RMS	32.4	-21.7	0	38.5	54	-15.5	-	-	194	145	H
4	2.559	28.82	RMS	32.4	-21.6	0	39.62	54	-14.38	-	-	194	145	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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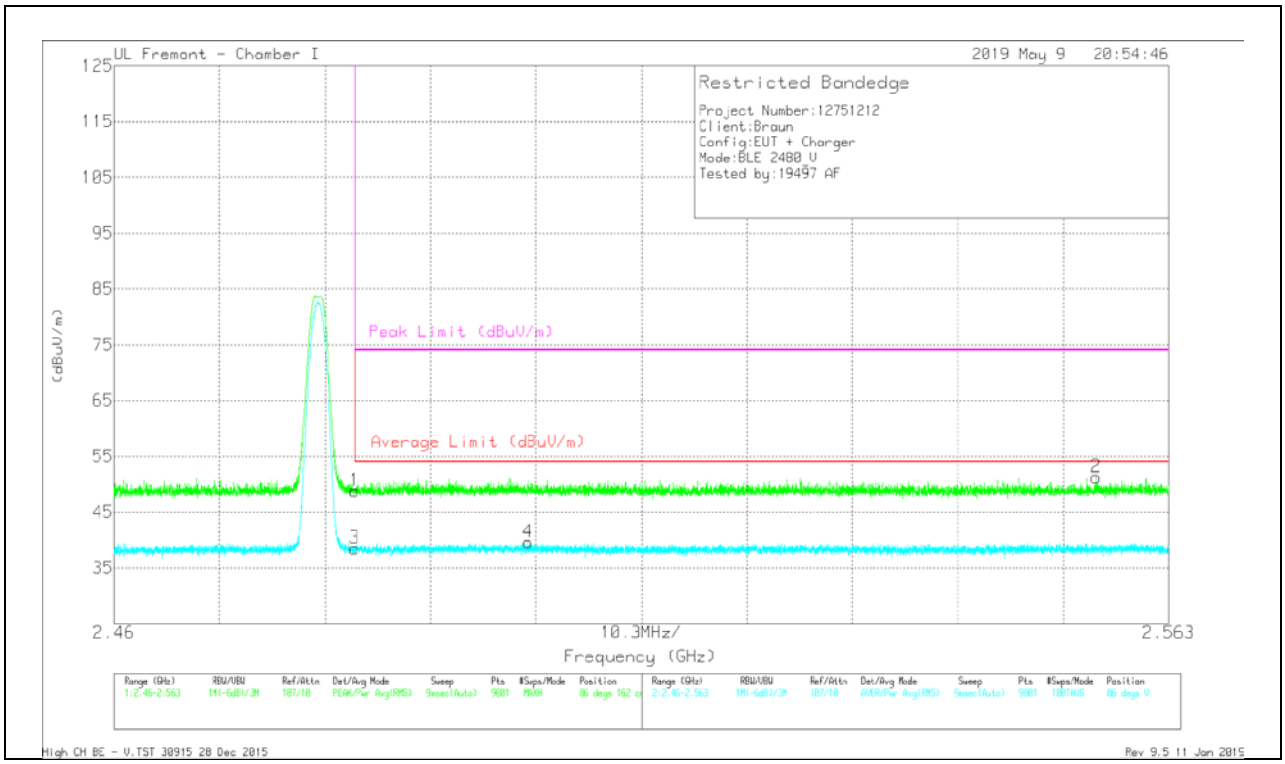
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	38.12	Pk	32.4	-21.7	0	48.82	-	-	74	-25.18	86	162	V
2	2.556	40.6	Pk	32.4	-21.7	0	51.3	-	-	74	-22.7	86	162	V
3	* 2.484	27.85	RMS	32.4	-21.7	0	38.55	54	-15.45	-	-	86	162	V
4	2.5	28.78	RMS	32.5	-21.7	0	39.58	54	-14.42	-	-	86	162	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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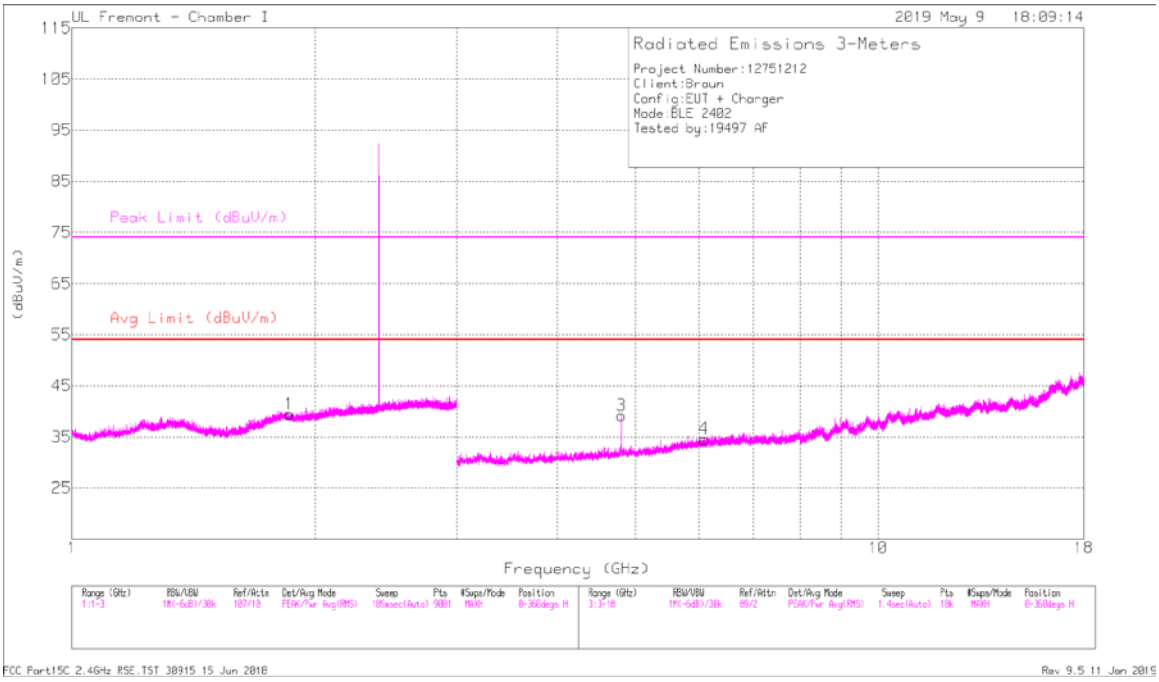
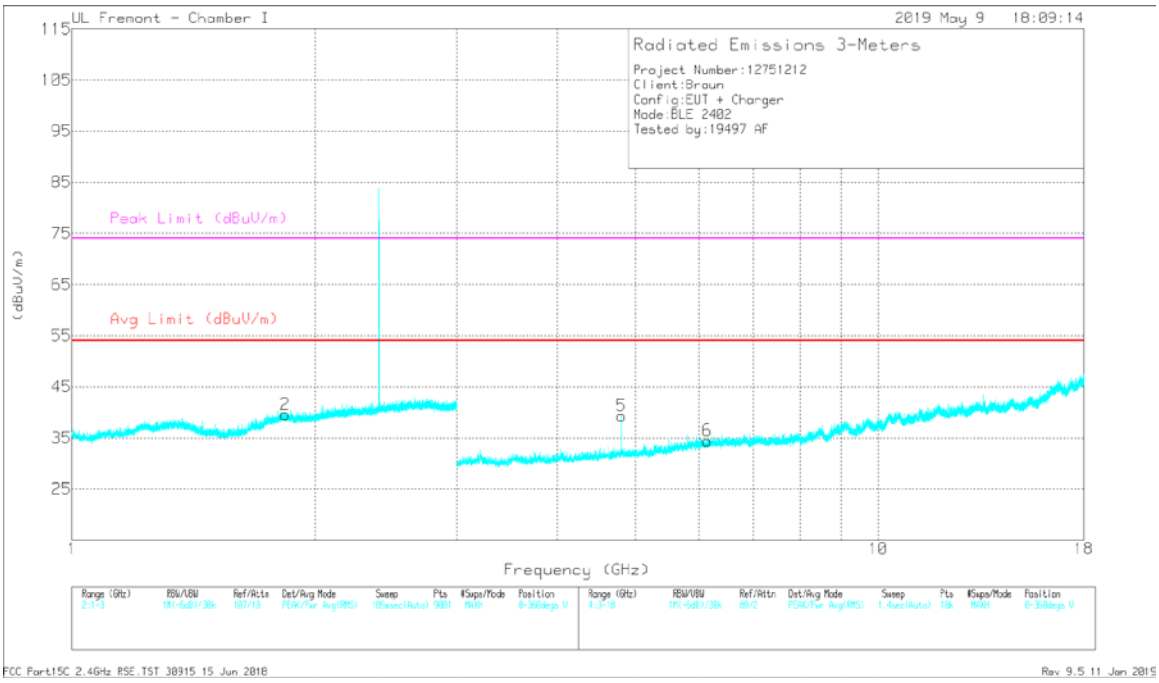
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
1.862	37.94	PK2	30.7	-22.3	0	46.34	-	-	-	-	84	291	H
1.84	37.91	PK2	30.7	-22.2	0	46.41	-	-	-	-	336	102	V
* 4.804	37.12	PK2	34.3	-28	0	43.42	-	-	74	-30.58	199	102	H
* 4.804	32.25	MAv1	34.3	-28	0	38.55	54	-15.45	-	-	199	102	H
6.082	33.19	PK2	35.4	-27.4	0	41.19	-	-	-	-	36	286	H
* 4.804	37.4	PK2	34.3	-28	0	43.7	-	-	74	-30.3	227	159	V
* 4.804	30.85	MAv1	34.3	-28	0	37.15	54	-16.85	-	-	227	159	V
6.146	34.9	PK2	35.5	-27.8	0	42.6	-	-	-	-	36	311	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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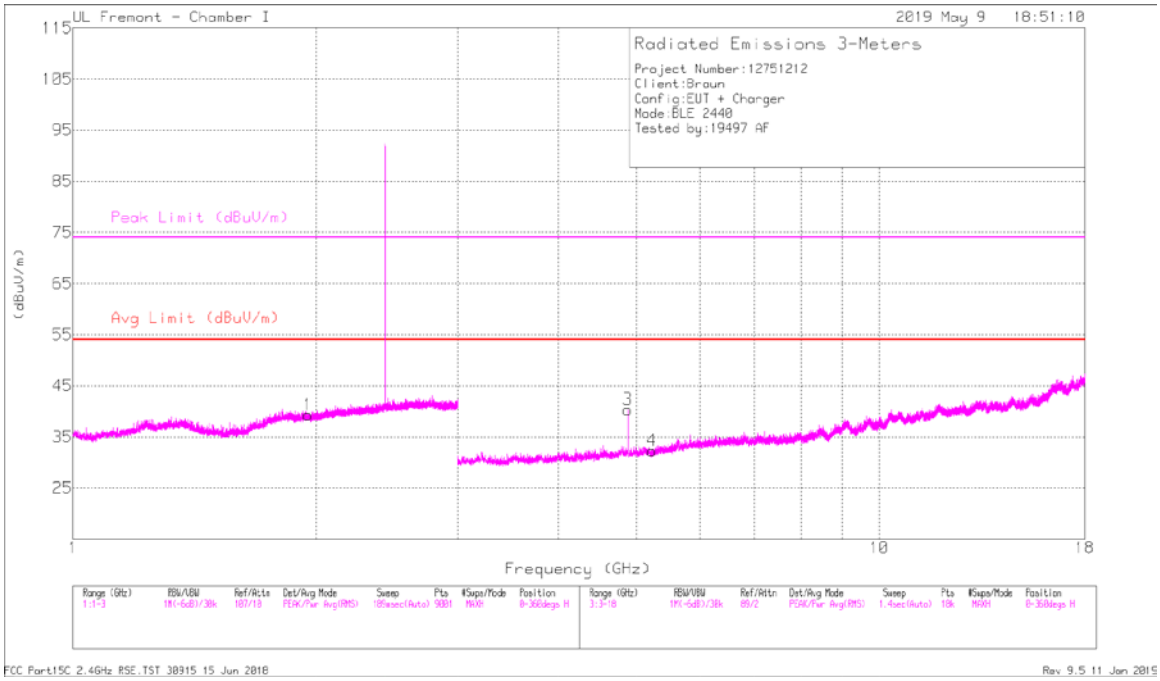
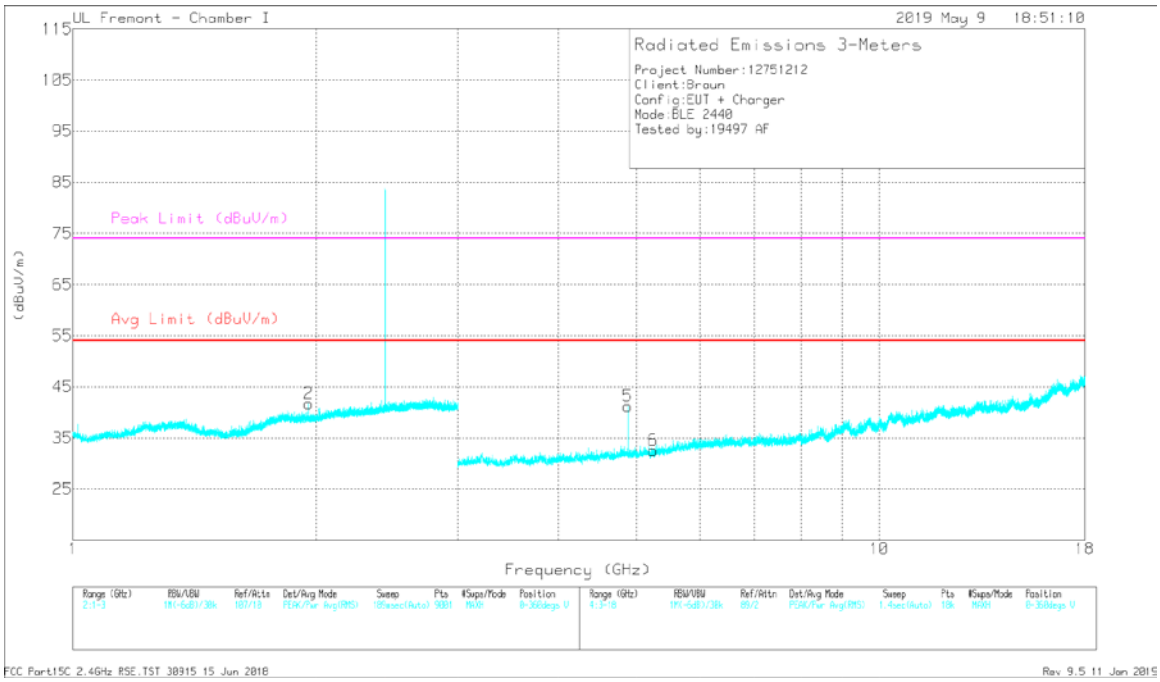
MID CHANNEL RESULTS



HORIZONTAL



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RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
1.956	38.03	PK2	30.7	-22.6	0	46.13	-	-	-	-	35	226	H
1.96	37.27	PK2	30.8	-22.5	0	45.57	-	-	-	-	134	179	V
* 4.88	39.68	PK2	34.2	-28.8	0	45.08	-	-	74	-28.92	191	102	H
* 4.88	35.21	MAv1	34.1	-28.8	0	40.51	54	-13.49	-	-	191	102	H
5.228	35.27	PK2	34.4	-28.9	0	40.77	-	-	-	-	244	276	H
* 4.88	40.09	PK2	34.1	-28.8	0	45.39	-	-	74	-28.61	234	123	V
* 4.88	35.25	MAv1	34.1	-28.8	0	40.55	54	-13.45	-	-	234	123	V
5.244	33.83	PK2	34.3	-28.9	0	39.23	-	-	-	-	273	180	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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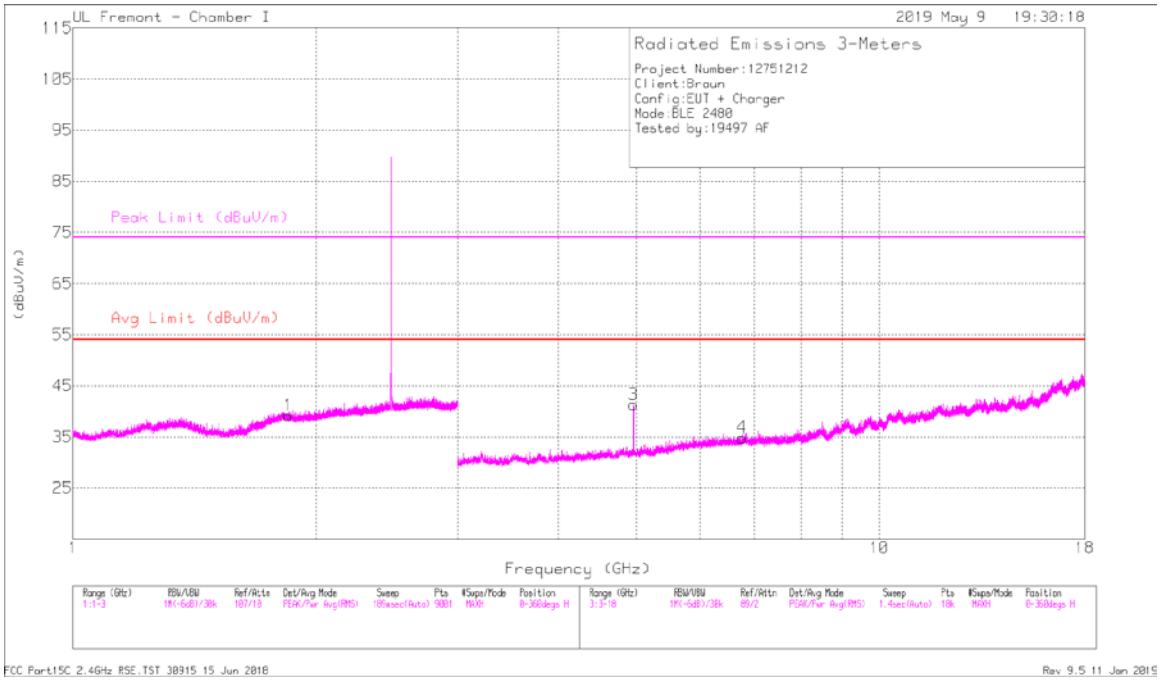
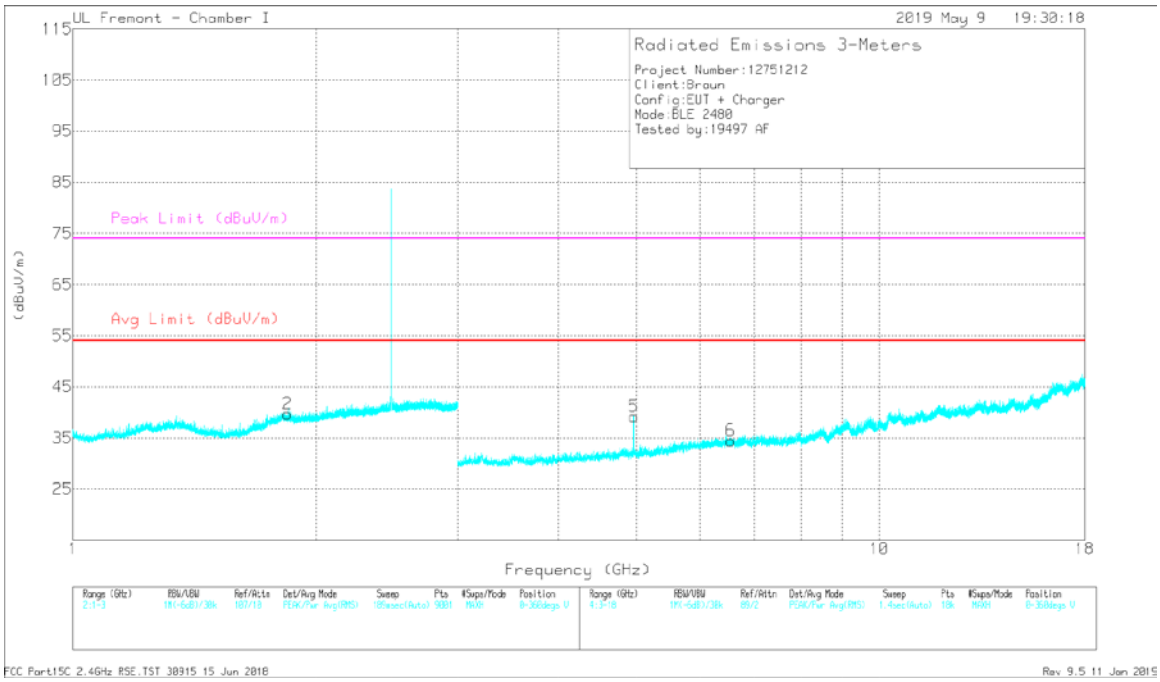
HIGH CHANNEL RESULTS



HORIZONTAL



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RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
1.848	37.8	PK2	30.7	-22.3	0	46.2	-	-	-	-	340	368	H
1.847	39.17	PK2	30.6	-22.3	0	47.47	-	-	-	-	107	398	V
* 4.959	39.86	PK2	34.2	-29	0	45.06	-	-	74	-28.94	197	102	H
* 4.96	32.97	MAv1	34.2	-29	0	38.17	54	-15.83	-	-	197	102	H
6.763	32.69	PK2	35.6	-26.7	0	41.59	-	-	-	-	269	139	H
* 4.959	39.93	PK2	34.2	-29	0	45.13	-	-	74	-28.87	62	111	V
* 4.96	32.74	MAv1	34.2	-29	0	37.94	54	-16.06	-	-	62	111	V
6.551	32.62	PK2	35.6	-25.9	0	42.32	-	-	-	-	246	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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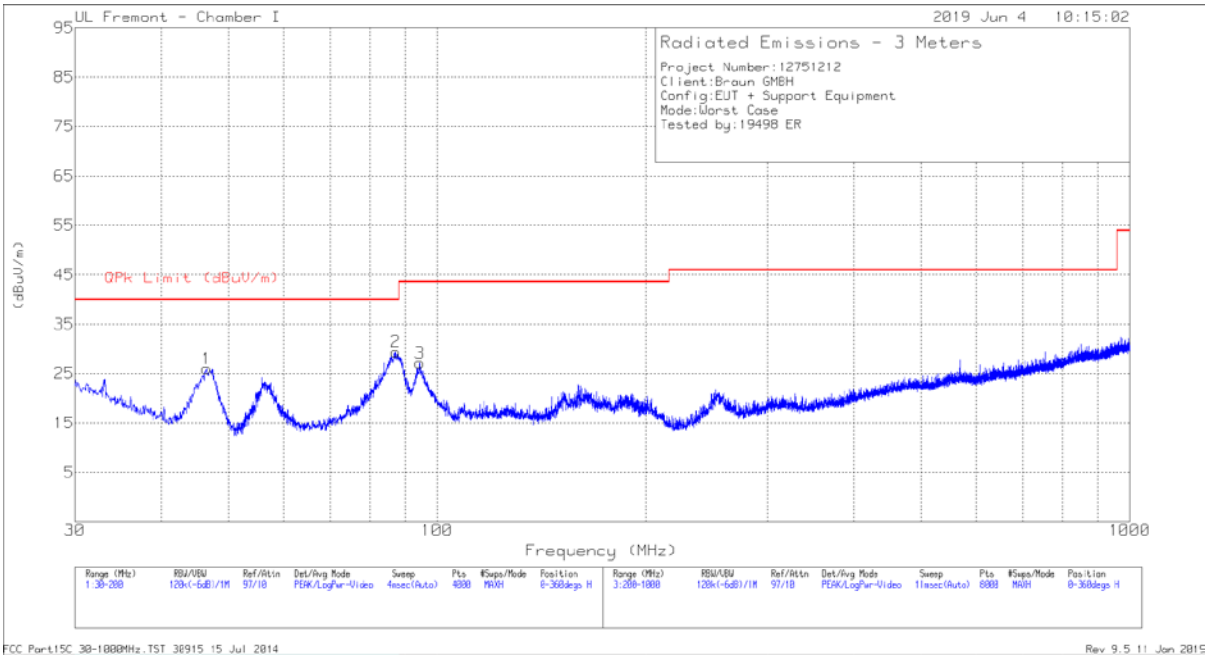
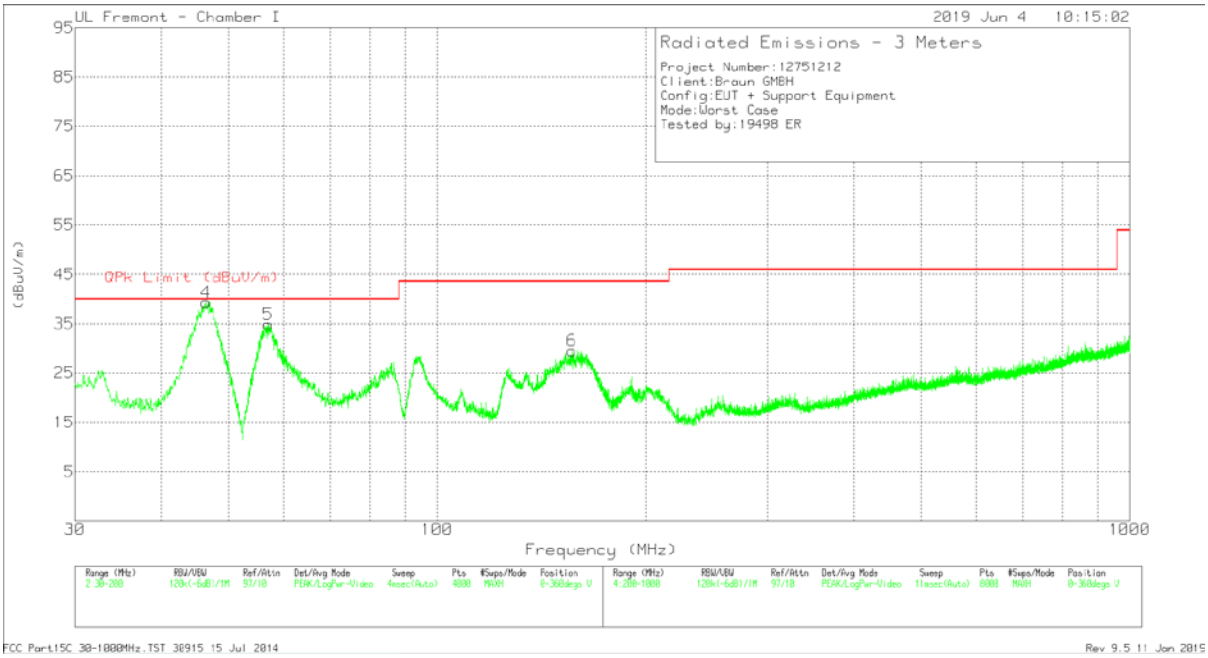
9.3. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



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Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	46.4518	42.03	Pk	15.1	-31.2	25.93	40	-14.07	0-360	200	H
2	87.0923	46.94	Pk	13.3	-30.8	29.44	40	-10.56	0-360	399	H
3	94.2766	43.46	Pk	14.5	-30.8	27.16	43.52	-16.36	0-360	200	H
4	46.3667	55.33	Pk	15.2	-31.2	39.33	40	-.67	0-360	100	V
5	57.037	52.99	Pk	13	-31.1	34.89	40	-5.11	0-360	100	V
6	156.4277	41.78	Pk	18.1	-30.4	29.48	43.52	-14.04	0-360	100	V

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
46.0367	52.58	Qp	15.4	-31.2	36.78	40	-3.22	176	105	V
57.117	51.02	Qp	13	-31.1	32.92	40	-7.08	123	113	V

Qp - Quasi-Peak detector

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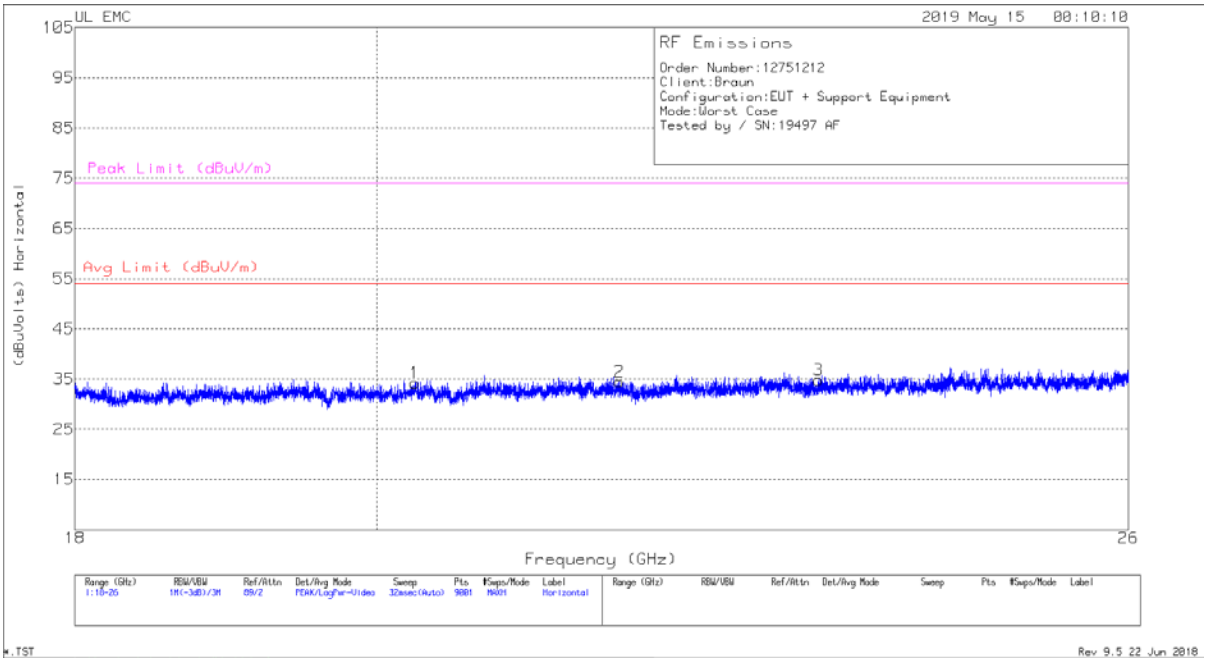
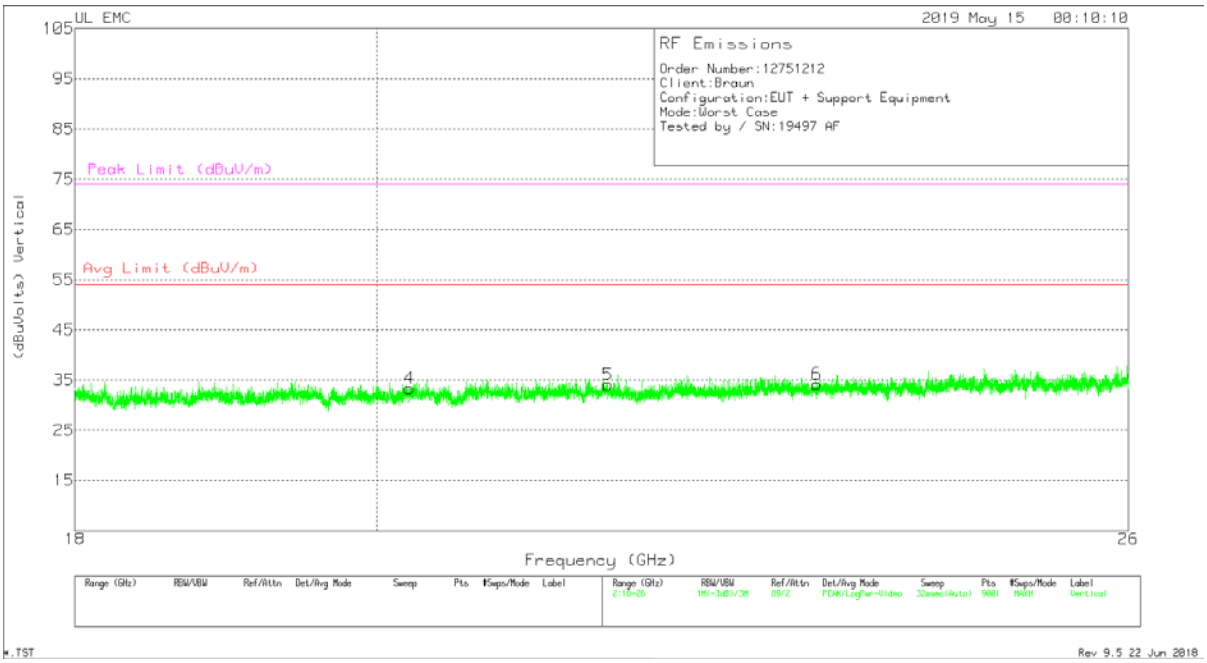
9.4. WORST CASE 18-26 GHZ

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



HORIZONTAL



VERTICAL

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18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0182188 (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	20.268	67.2	Pk	33.5	-57	-9.5	34.2	54	-19.8	74	-39.8
2	21.768	67.66	Pk	33.9	-57.6	-9.5	34.46	54	-19.54	74	-39.54
3	23.332	67.03	Pk	34.4	-57.1	-9.5	34.83	54	-19.17	74	-39.17
4	20.228	66.85	Pk	33.4	-57.4	-9.5	33.35	54	-20.65	74	-40.65
5	21.679	67.25	Pk	33.9	-57.6	-9.5	34.05	54	-19.95	74	-39.95
6	23.32	66.49	Pk	34.4	-57.2	-9.5	34.19	54	-19.81	74	-39.81

Pk - Peak detector

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10. AC POWER LINE CONDUCTED EMISSIONS (BLE 1 Mbps)

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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.

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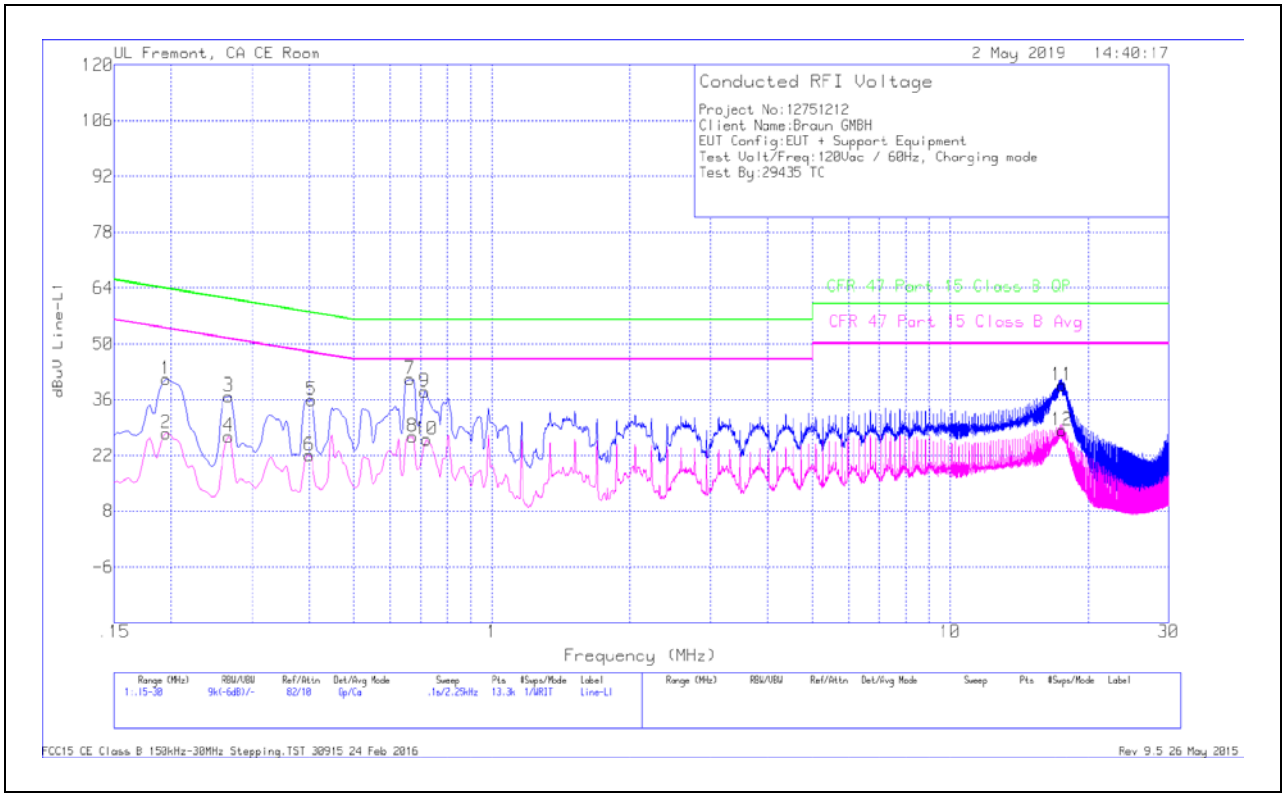
RESULTS

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	.195	31.06	Qp	0	0	10.1	41.16	63.82	-22.66	-	-
2	.195	17.54	Ca	0	0	10.1	27.64	-	-	53.82	-26.18
3	.267	26.77	Qp	0	0	10.1	36.87	61.21	-24.34	-	-
4	.267	16.69	Ca	0	0	10.1	26.79	-	-	51.21	-24.42
5	.40425	25.79	Qp	0	0	10.1	35.89	57.77	-21.88	-	-
6	.39975	11.93	Ca	0	0	10.1	22.03	-	-	47.86	-25.83
7	.663	31.01	Qp	0	0	10.1	41.11	56	-14.89	-	-
8	.672	16.55	Ca	0	0	10.1	26.65	-	-	46	-19.35
9	.71475	27.9	Qp	0	0	10.1	38	56	-18	-	-
10	.7215	15.84	Ca	0	0	10.1	25.94	-	-	46	-20.06
11	17.53575	28.82	Qp	.1	.3	10.3	39.52	60	-20.48	-	-
12	17.53575	17.53	Ca	.1	.3	10.3	28.23	-	-	50	-21.77

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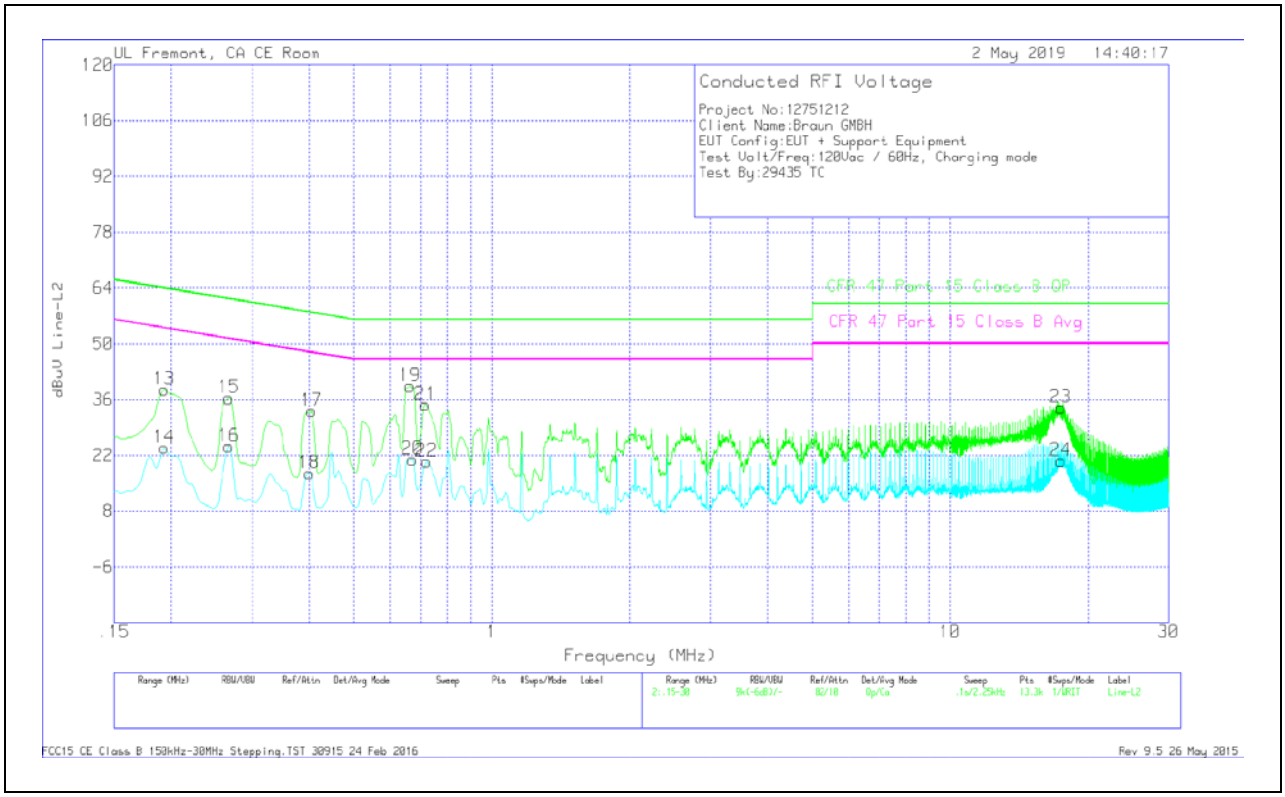
LINE 2 RESULTS



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	.19275	28.4	Qp	0	0	10.1	38.5	63.92	-25.42	-	-
14	.19275	13.75	Ca	0	0	10.1	23.85	-	-	53.92	-30.07
15	.267	26.26	Qp	0	0	10.1	36.36	61.21	-24.85	-	-
16	.267	14.1	Ca	0	0	10.1	24.2	-	-	51.21	-27.01
17	.40425	22.97	Qp	0	0	10.1	33.07	57.77	-24.7	-	-
18	.39975	7.43	Ca	0	0	10.1	17.53	-	-	47.86	-30.33
19	.663	29.26	Qp	0	0	10.1	39.36	56	-16.64	-	-
20	.672	10.95	Ca	0	0	10.1	21.05	-	-	46	-24.95
21	.717	24.64	Qp	0	0	10.1	34.74	56	-21.26	-	-
22	.7215	10.41	Ca	0	0	10.1	20.51	-	-	46	-25.49
23	17.44575	23.31	Qp	.1	.3	10.3	34.01	60	-25.99	-	-
24	17.44575	10	Ca	.1	.3	10.3	20.7	-	-	50	-29.3

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