



# TEST REPORT

**Report Number:** 13486961-E1V1

**Applicant :** XIAMEN NEW SOUND TECHNOLOGY CO., LTD  
NO.13 of XIANG YUE ROAD,  
TORCH HI-TECH INDUSTRIAL DEVELOPMENT ZONE,  
XIANG AN DISTRICT, XIAMEN, CHINA

**Model :** SBW01

**FCC ID :** 2A14Q-SBW

**EUT Description :** DESKTOP WIRELESS CHARGER

**Test Standard(s) :** FCC CFR 47 PART 18 SUBPART C

**Date Of Issue:**

September 18, 2020

**Prepared by:**

UL Verification Services Inc.  
47173 Benicia Street  
Fremont, CA 94538, U.S.A.  
TEL: (510) 319-4000  
FAX: (510) 661-0888



NVLAP Lab code: 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	9/18/2020	Initial Issue	--

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** XIAMEN NEW SOUND TECHNOLOGY CO., LTD  
NO.13 of XIANG YUE ROAD,  
TORCH HI-TECH INDUSTRIAL DEVELOPMENT ZONE,  
XIANG AN DISTRICT, XIAMEN, CHINA

**EUT DESCRIPTION:** DESKTOP WIRELESS CHARGER

**MODEL NUMBER:** SBW01

**SERIAL NUMBER:** 2035

**DATE TESTED:** SEPTEMBER 04, 2020 – SEPTEMBER 09, 2020

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC CFR 47 PART 18 SUBPART C	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.

Approved & Released For  
UL Verification Services Inc. By:



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DAN CORONIA  
OPERATIONS LEADER  
UL Verification Services Inc.

Prepared By:



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ERIC YU  
TEST ENGINEER  
UL Verification Services Inc.

Reviewed By:



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TINA CHU  
SENIOR PROJECT ENGINEER  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC / OST MP-5, "FCC Methods of Measurements of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment."

## 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 47658 Kato Road 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 Road
<input type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D	<input type="checkbox"/> Chamber I
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E	<input type="checkbox"/> Chamber J
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F	<input checked="" type="checkbox"/> Chamber K
	<input type="checkbox"/> Chamber G	<input type="checkbox"/> Chamber L
	<input type="checkbox"/> Chamber H	<input type="checkbox"/> 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: 2324B.

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

## 4. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

### 4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

### 4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U <sub>Lab</sub>
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 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	4.26 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.39 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.19 dB

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

### 4.4. SAMPLE CALCULATION

#### RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

#### MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Final Voltage (dBuV)} = \text{Measured Voltage (dBuV)} + \text{Cable Loss (dB)} + \text{Limiter Factor (dB)} + \text{LISN Insertion Loss}$$

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a Desktop Wireless Charger. Wireless power transfer is only transmitting a continuous carrier wave signal at 917.5MHz frequency single channel when hearing aids are placed upon the top surface of the EUT and requests for charge. The charger pad uses BLE to pair with the receiving devices.

This report documents test results of the Wireless Power Transfer ISM portion of the wireless charger.

### 5.2. OPERATING FREQUENCY AND POWER

The EUT operates at 917.5 MHz.

Output power data is excerpted from the applicable document serial no.: 1C2009090055-R1.2A14Q, issued by PCTEST Lab.

The highest maximum measured conducted average power is 28.93dBm.

Mode	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Power (dBm)
WPT	917.5	25.97	25.87	28.93

### 5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Version: 4.1.1.46

The software installed in the EUT during testing was WattUp app Version: 4.0.12



## 5.4. CONFIGURATION

The EUT is a tabletop device and it has one USB type C port for power only, all final radiated testing was performed with the EUT in tabletop orientation powered by AC/DC adapter via USB cable.

The EUT supports two WPT nearfield PIFA antennas with antenna peak gain 1dBi each. The antennas are identical. Both of the antennas are active at the same time for all the charging mode testing.

Configuration	Mode	Description
1	Standby mode	EUT is powered by AC/DC adapter via USB cable. WPT in standby mode, BLE is in normal operating mode as the worst case.
2	Charging mode	EUT is powered by AC/DC adapter via USB cable and <b>both</b> receiving devices are placed on the surface of the EUT and receives maximum 917.5 MHz RF energy from EUT. BLE and WPT can transmit simultaneously, BLE is in normal operating mode as the worst case.
3	Charging mode	EUT is powered by AC/DC adapter via USB cable and <b>one</b> receiving device is placed on the <b>left</b> surface of EUT and receives maximum 917.5 MHz RF energy from EUT. BLE and WPT can transmit simultaneously, BLE is in normal operating mode as the worst case.
4	Charging mode	EUT is powered by AC/DC adapter via USB cable and <b>one</b> receiving device is placed on the <b>right</b> surface of EUT and receives maximum 917.5 MHz RF energy from EUT. BLE and WPT can transmit simultaneously, BLE is in normal operating mode as the worst case.

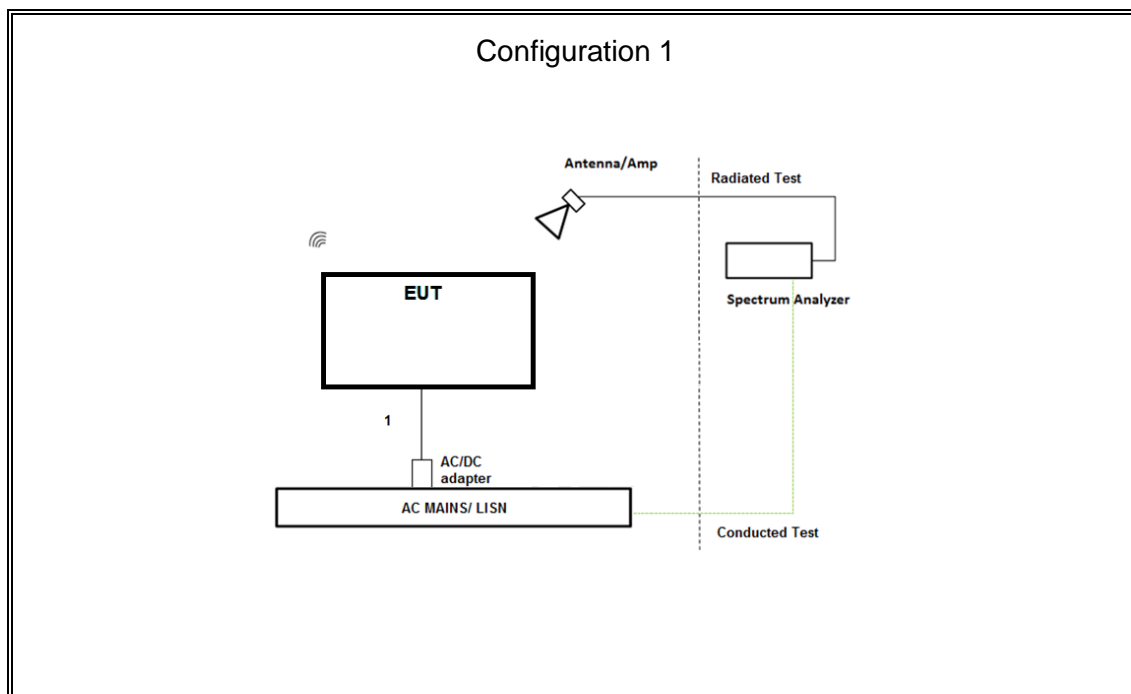
### 5.5. DESCRIPTION OF TEST SETUP

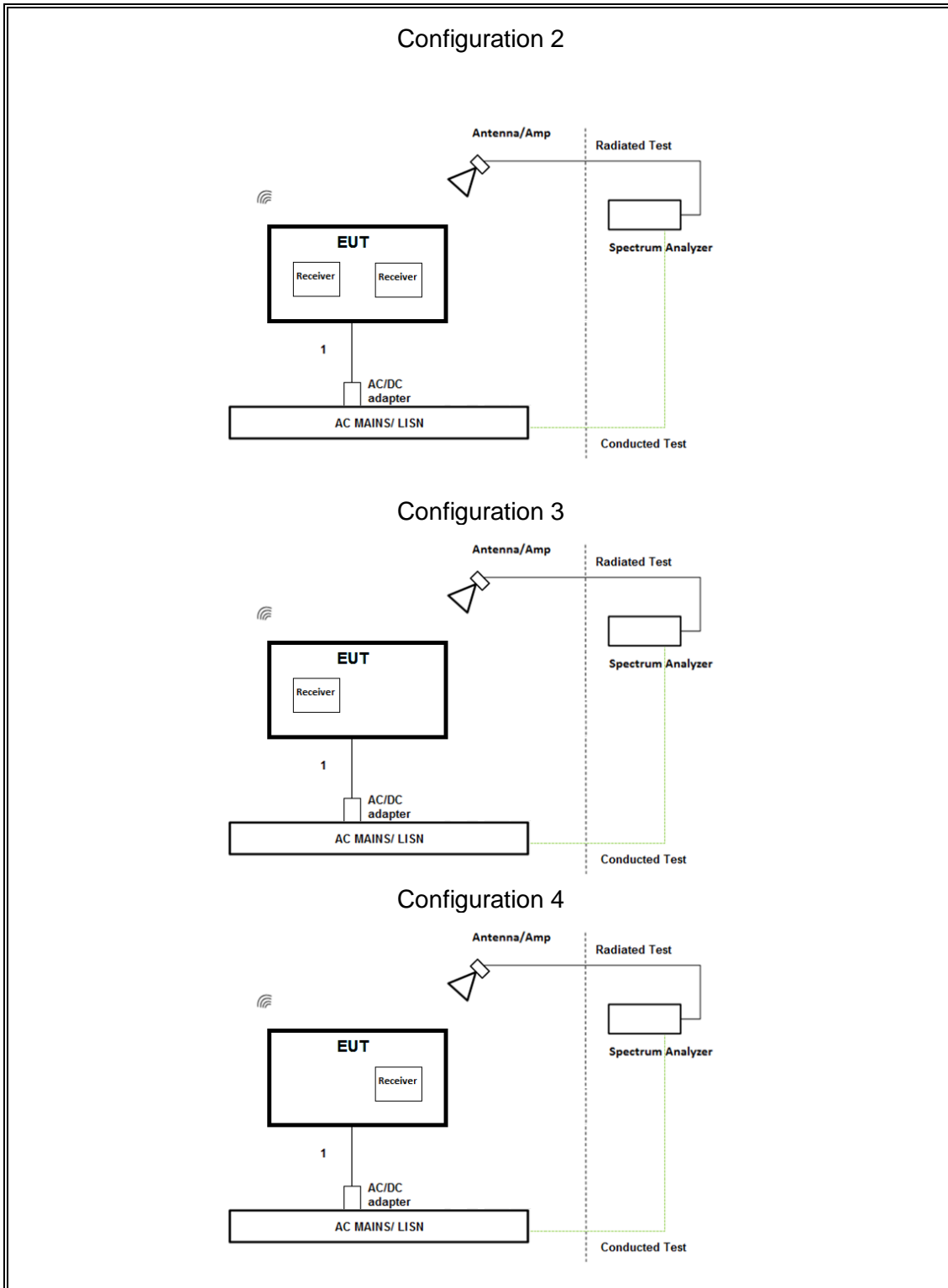
SUPPORT TEST EQUIPMENT						
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC		
Hearing aids	Xiamen New Sound Technology Co., Ltd	Primo W	2037 and 2038	2A14Q-PRIMO		
EUT AC/DC adapter	Huoni	HNEM050200UU	None	DoC		
I/O CABLES (RF RADIATED/AC POWER LINE TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	1	N/A
2	USB	1	USB Type C	Un-shielded	1	N/A

#### TEST SETUP- RADIATED TEST/AC POWER LINE TEST

The EUT is powered by AC/DC adapter via USB cable, one or two receiving devices are placed on the EUT surface for wireless charging purpose at maximum power.

#### SETUP DIAGRAM





## 6. TEST AND MEASUREMENT EQUIPMENT

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

<b>TEST EQUIPMENT LIST</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Asset</b>	<b>Cal Due</b>
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	PRE0179465	07/27/2021
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	PRE0179467	07/27/2021
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	08/31/2021
Amplifier, 100MHz-18GHz	AMPLICAL	AMP0.1G18-47-20	PRE0197319	05/04/2021
Antenna, Broadband Hybrid, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0181574	10/14/2020
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	01/23/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179376	04/03/2021
Filter, BRF 902 to 928MHz	MICRO-TRONICS	BRC50722	T1846	09/02/2021
Filter, HPF 1.5 to 18GHz	MICRO-TRONICS	HPM50114	T1853	11/30/2020
<b>AC Line Conducted</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>ID Num</b>	<b>Cal Due</b>
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	PRE0186446	01/21/2021
L.I.S.N	FCC INC.	FCC LISN 50/250	24	01/21/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESR	T1436	02/20/2021
Transient Limiter	COM-POWER	LIT-930A	PRE0129246	01/23/2021
<b>UL AUTOMATION SOFTWARE</b>				
Radiated Software	UL	UL EMC	Rev 9.5, 30 Apr, 2020	
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 21 Feb 2020	

## 7. APPLICABLE LIMITS AND TEST RESULTS

### 7.1. RADIATED EMISSIONS

#### LIMIT

§18.301 Operating frequencies

The EUT operates at 917.5 MHz, within the tolerance of the ISM Frequency of 915 +/- 13MHz.

§18.305 Field Strength Limits

(b) The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit ( $\mu\text{V}/\text{m}$ )	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 $25 \times \text{SQRT}(\text{power}/500)$	300 <sup>1</sup> 300

<sup>1</sup>Field strength may not exceed  $10\mu\text{V}/\text{m}$  at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

The RF Power generated by the equipment is below 500 W therefore the field strength limit is  $25\mu\text{V}/\text{m}$  at 300 m, equivalent to 28 dBuV/m at 300 m.

#### TEST PROCEDURE

Tested in accordance with FCC / OST MP-5

The frequency range was investigated from 9 kHz to 10 GHz.

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.

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

### **KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification**

For below 30MHz testing, based on KDB 414788, Clause 2, for Part 18 equipment, Section 2.1 of FCC Measurement Procedure MP-5 also permits the use of test sites other than an open-field test site only if it can be shown that the results obtained at such a location are correlated with those made at an open-field test site.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

### **Distance Correction Factor**

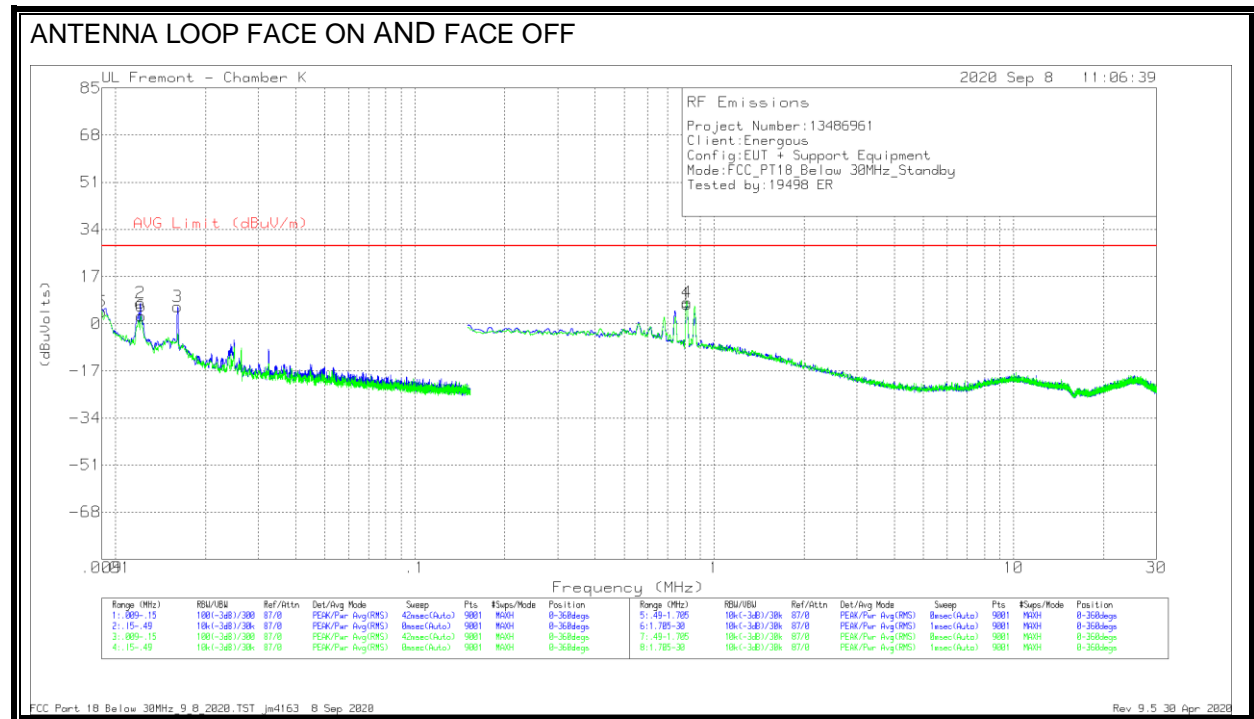
Based on FCC 18.305, note 2. Testing for compliance with these limits may be made at closer distances, provided a sufficient number of measurements are taken to plot the radiation pattern, to determine the major lobes of radiation, and to determine the expected field strength level at 30, 300, or 1600 meters. Alternatively, if measurements are made at only one closer fixed distance, then the permissible field strength limits shall be adjusted using  $1/d$  as an attenuation factor.

- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**RESULTS**

**7.1.1. SPURIOUS EMISSIONS 9 kHz TO 30 MHz**

**CONFIGURATION 1**



**DATA**

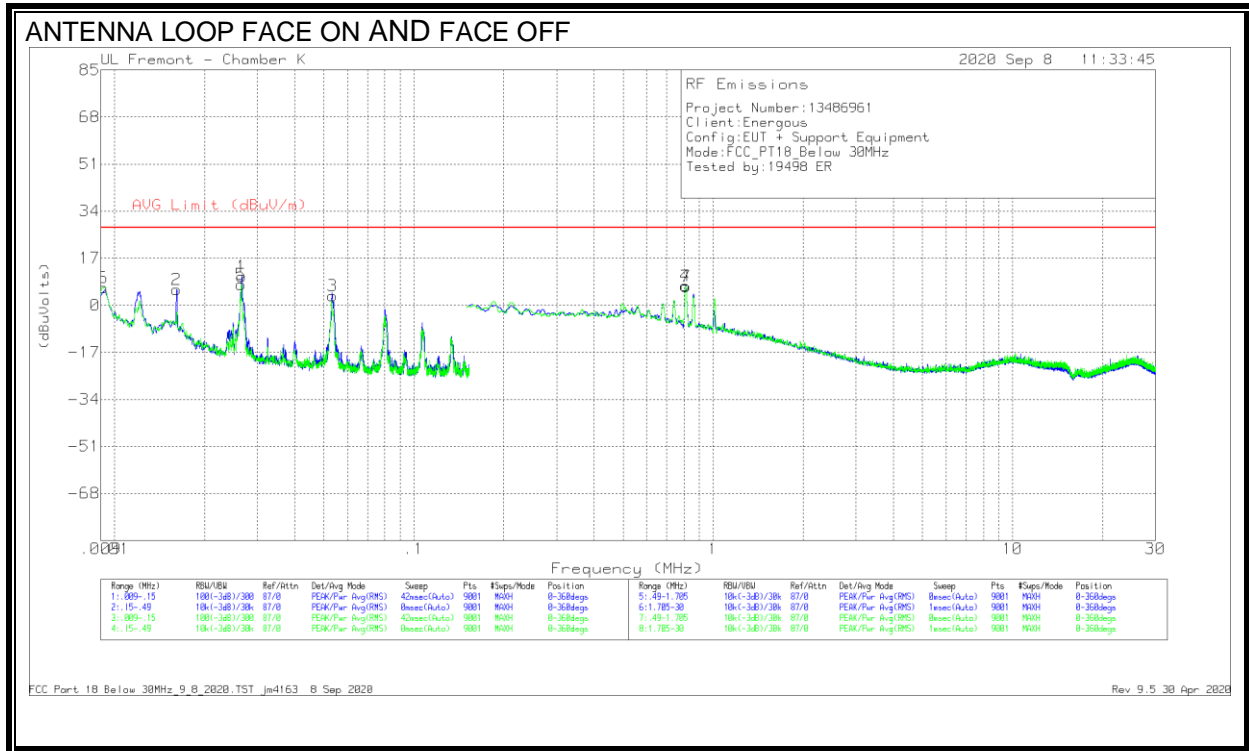
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	AVG Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.01212	19.14	Pk	59.8	-31.5	-40	7.44	28	-20.56	0-360
3	.01614	18.66	Pk	59.3	-31.8	-40	6.16	28	-21.84	0-360
5	.00902	14.5	Pk	61.1	-31.3	-40	4.3	28	-23.7	0-360
6	.01217	14.55	Pk	59.8	-31.5	-40	2.85	28	-25.15	0-360
1	.81076	30.85	Pk	48.3	-32.2	-40	6.95	28	-21.05	0-360
4	.81076	31.64	Pk	48.3	-32.2	-40	7.74	28	-20.26	0-360

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 2**



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	AVG Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.02668	24.64	Pk	58.1	-32.2	-40	10.54	28	-17.46	0-360
2	.01615	18.25	Pk	59.3	-31.8	-40	5.75	28	-22.25	0-360
3	.05346	19.17	Pk	56.6	-32.3	-40	3.47	28	-24.53	0-360
5	.02655	21.45	Pk	58.1	-32.1	-40	7.45	28	-20.55	0-360
6	.00918	16.73	Pk	60.9	-31.3	-40	6.33	28	-21.67	0-360
4	.80833	30.97	Pk	48.3	-32.2	-40	7.07	28	-20.93	0-360
7	.80982	30.67	Pk	48.3	-32.2	-40	6.77	28	-21.23	0-360

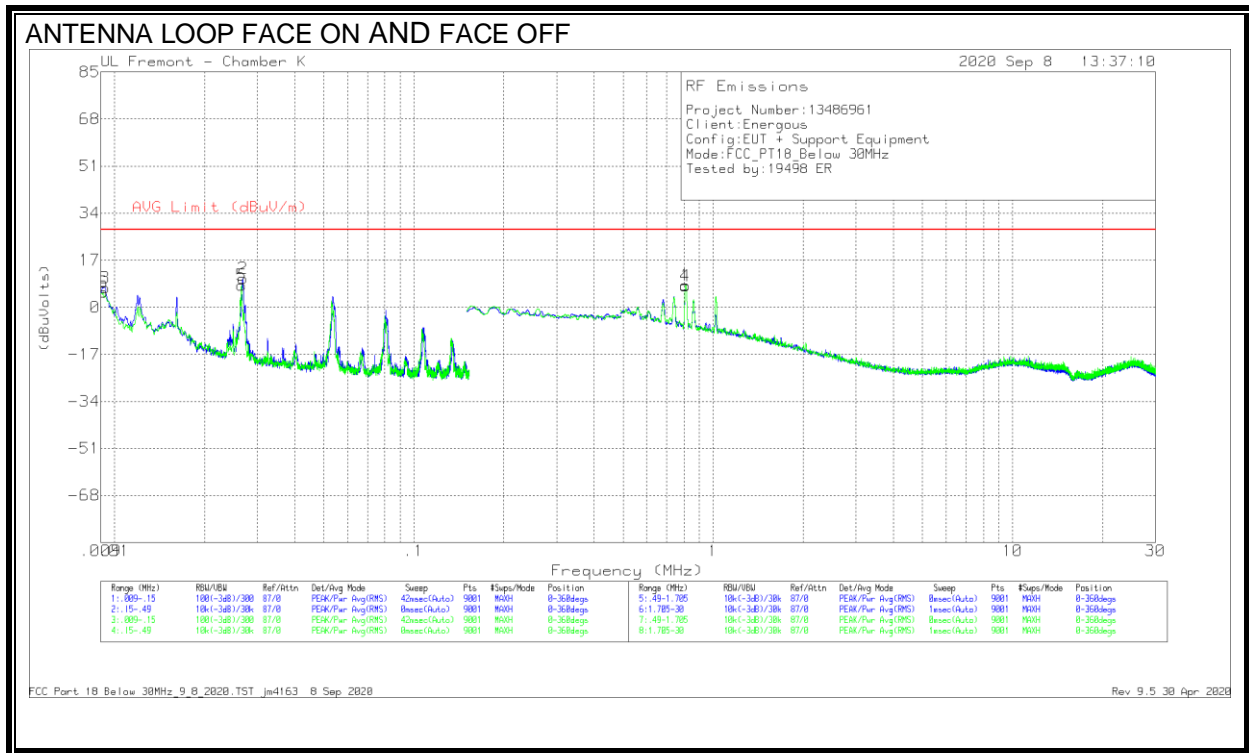
Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$



**CONFIGURATION 3**



**DATA**

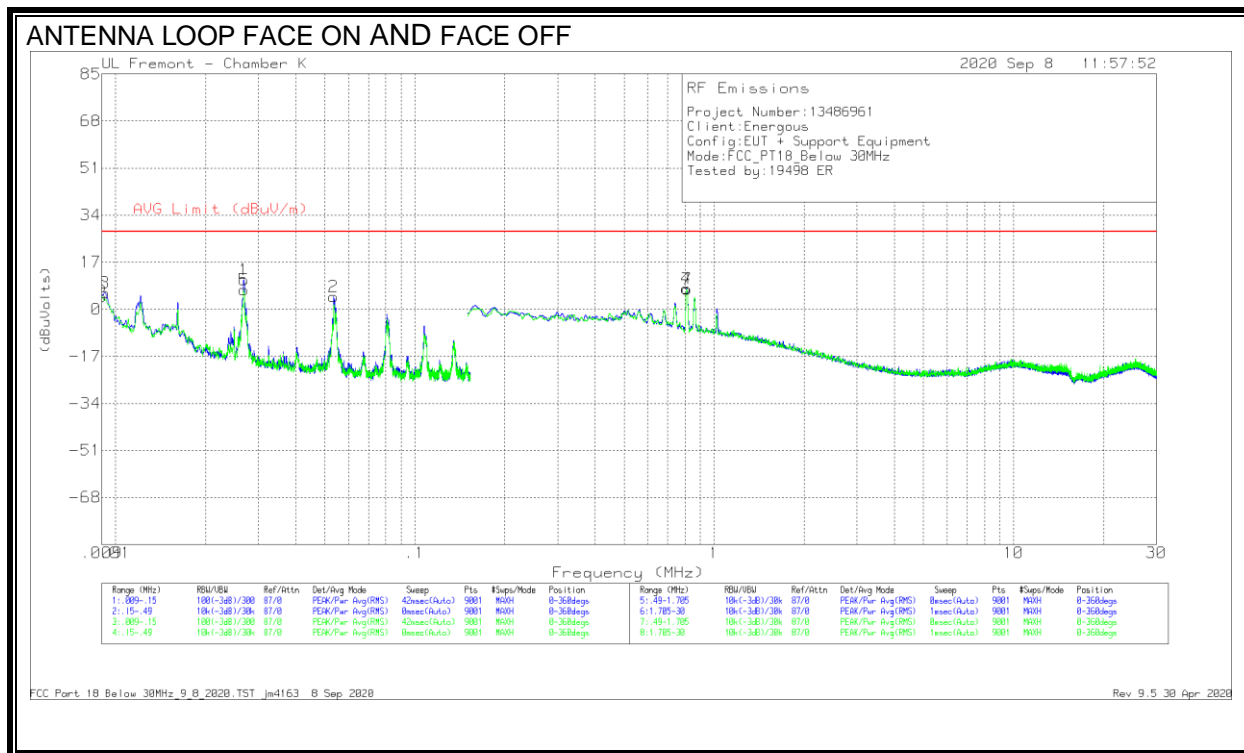
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	AVG Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.02686	24.72	Pk	58	-32.2	-40	10.52	28	-17.48	0-360
3	.00932	17.46	Pk	60.8	-31.3	-40	6.96	28	-21.04	0-360
5	.02662	21.84	Pk	58.1	-32.1	-40	7.84	28	-20.16	0-360
6	.00916	15.82	Pk	60.9	-31.3	-40	5.42	28	-22.58	0-360
1	.80833	31.94	Pk	48.3	-32.2	-40	8.04	28	-19.96	0-360
4	.80833	31.59	Pk	48.3	-32.2	-40	7.69	28	-20.31	0-360

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 4**



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	AVG Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.02686	24.82	Pk	58	-32.2	-40	10.62	28	-17.38	0-360
2	.05362	20.25	Pk	56.6	-32.3	-40	4.55	28	-23.45	0-360
3	.00922	16.41	Pk	60.9	-31.3	-40	6.01	28	-21.99	0-360
5	.0269	21.28	Pk	58	-32.2	-40	7.08	28	-20.92	0-360
6	.00902	14.84	Pk	61.1	-31.3	-40	4.64	28	-23.36	0-360
4	.80833	31.32	Pk	48.3	-32.2	-40	7.42	28	-20.58	0-360
7	.80988	31.06	Pk	48.3	-32.2	-40	7.16	28	-20.84	0-360

Pk - Peak detector

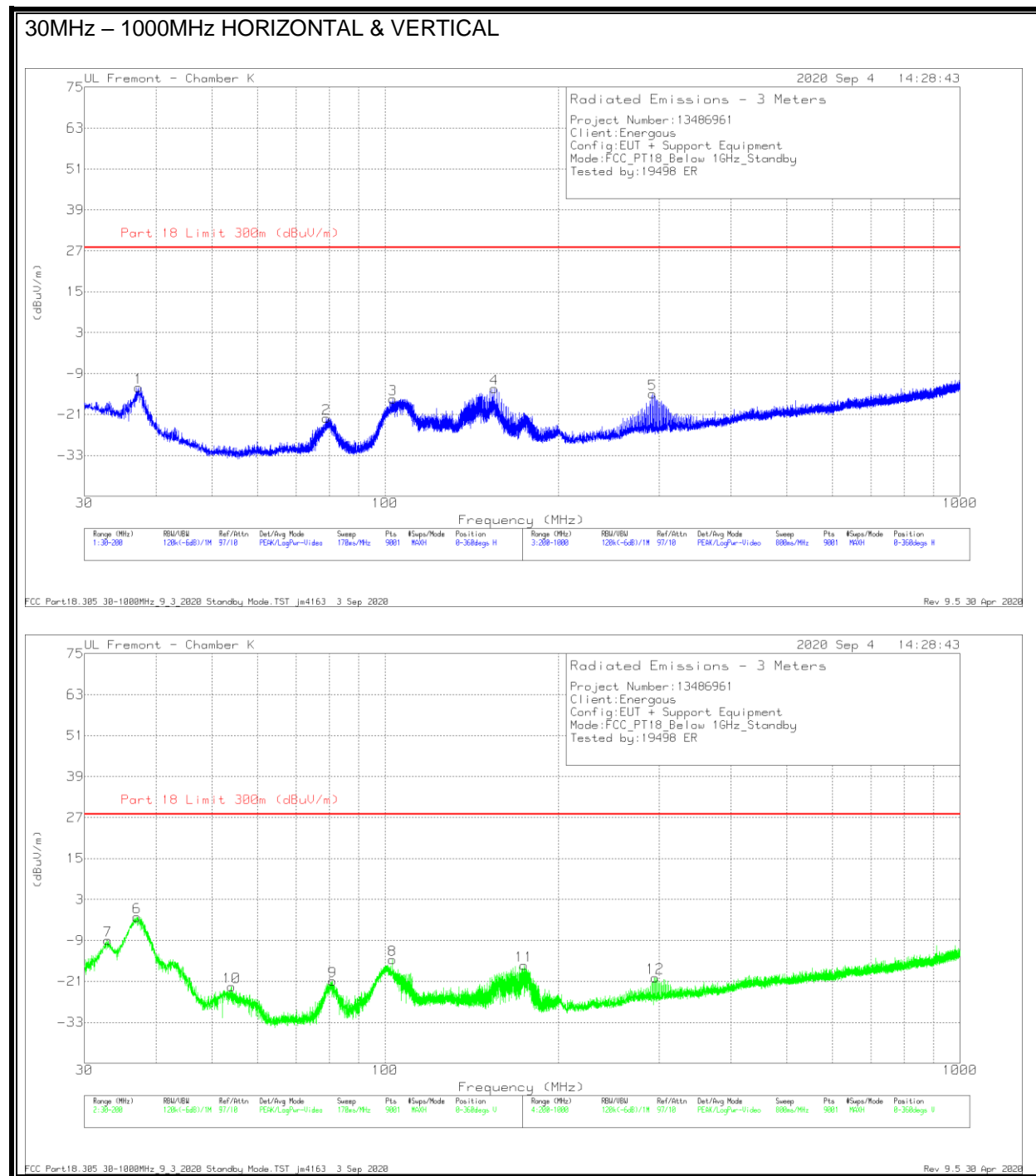
Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

### 7.1.2. SPURIOUS EMISSIONS 30 MHz TO 1000 MHz

#### CONFIGURATION 1

#### Spurious Emissions 30 – 1000 MHz



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	37.2345	36.62	Pk	21.8	-31.5	-40	-13.08	28	-41.08	0-360	401	H
2	79.0925	35.4	Pk	13.6	-31.1	-40	-22.1	28	-50.1	0-360	201	H
3	103.2893	37.41	Pk	17.1	-30.9	-40	-16.39	28	-44.39	0-360	301	H
4	154.8563	38.96	Pk	18.3	-30.6	-40	-13.34	28	-41.34	0-360	101	H
6	36.9889	47.31	Pk	22	-31.5	-40	-2.19	28	-30.19	0-360	100	V
	37.137	43.22	Qp	21.9	-31.5	-40	-6.38	28	-34.38	138	99	V
7	32.9278	37.48	Pk	25	-31.5	-40	-9.02	28	-37.02	0-360	100	V
8	103.006	39.23	Pk	17	-30.9	-40	-14.67	28	-42.67	0-360	100	V
9	81.0759	36.71	Pk	13.4	-31	-40	-20.89	28	-48.89	0-360	100	V
10	54.1024	35.55	Pk	13.2	-31.3	-40	-22.55	28	-50.55	0-360	100	V
11	174.312	36.76	Pk	17.4	-30.4	-40	-16.24	28	-44.24	0-360	100	V
5	292.0001	35.81	Pk	19.1	-29.9	-40	-14.99	28	-42.99	0-360	100	H
12	295.2001	30.92	Pk	19.1	-29.9	-40	-19.88	28	-47.88	0-360	200	V

Pk - Peak detector

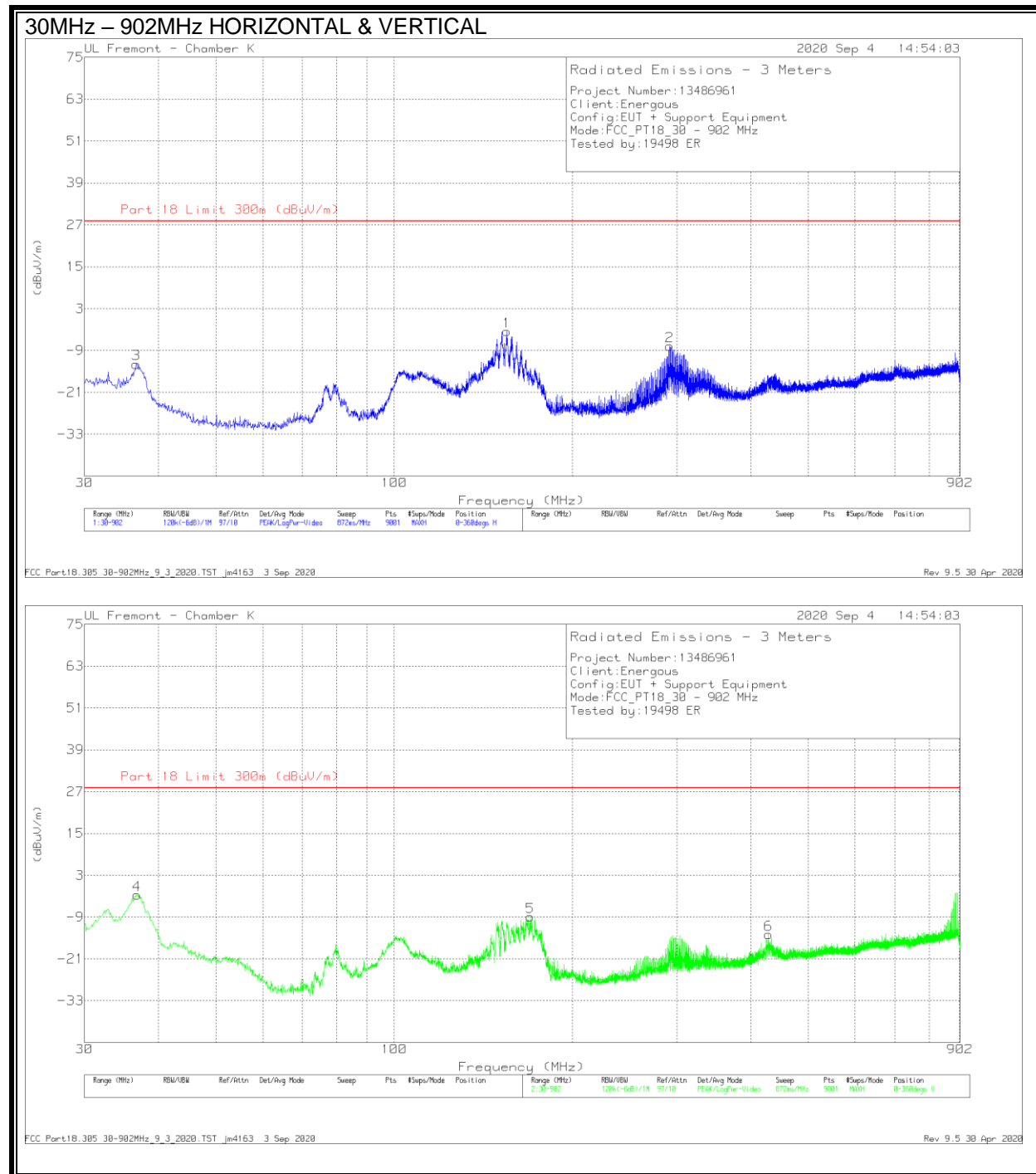
Qp - Quasi-Peak detector

Note:

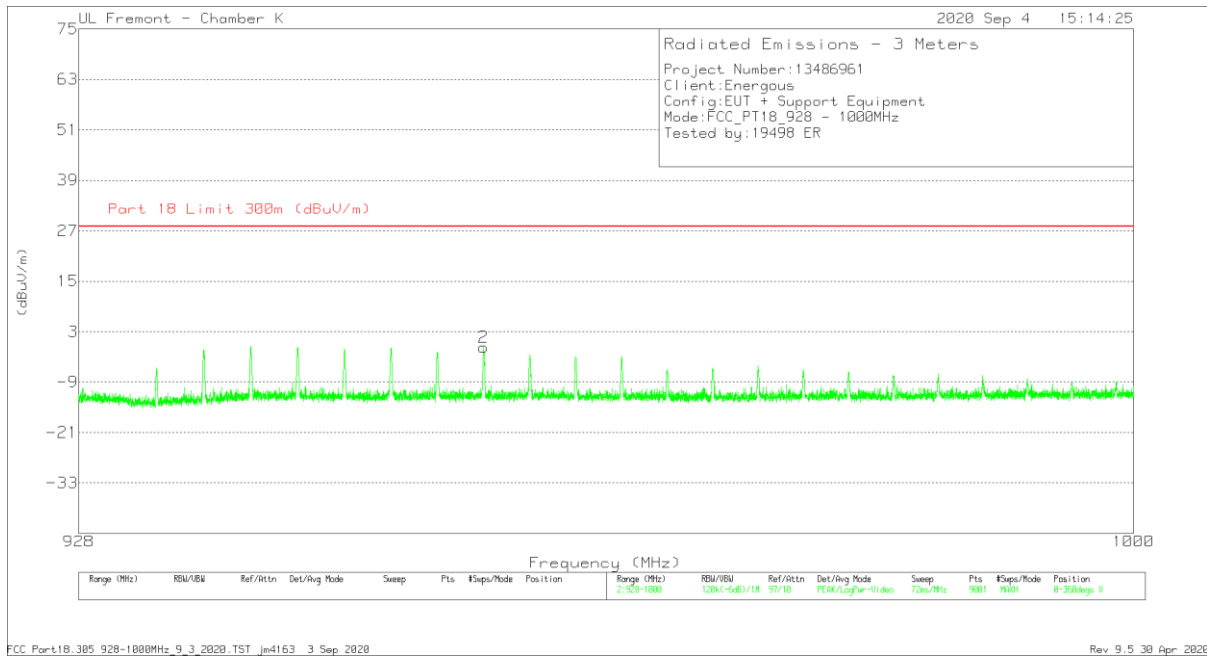
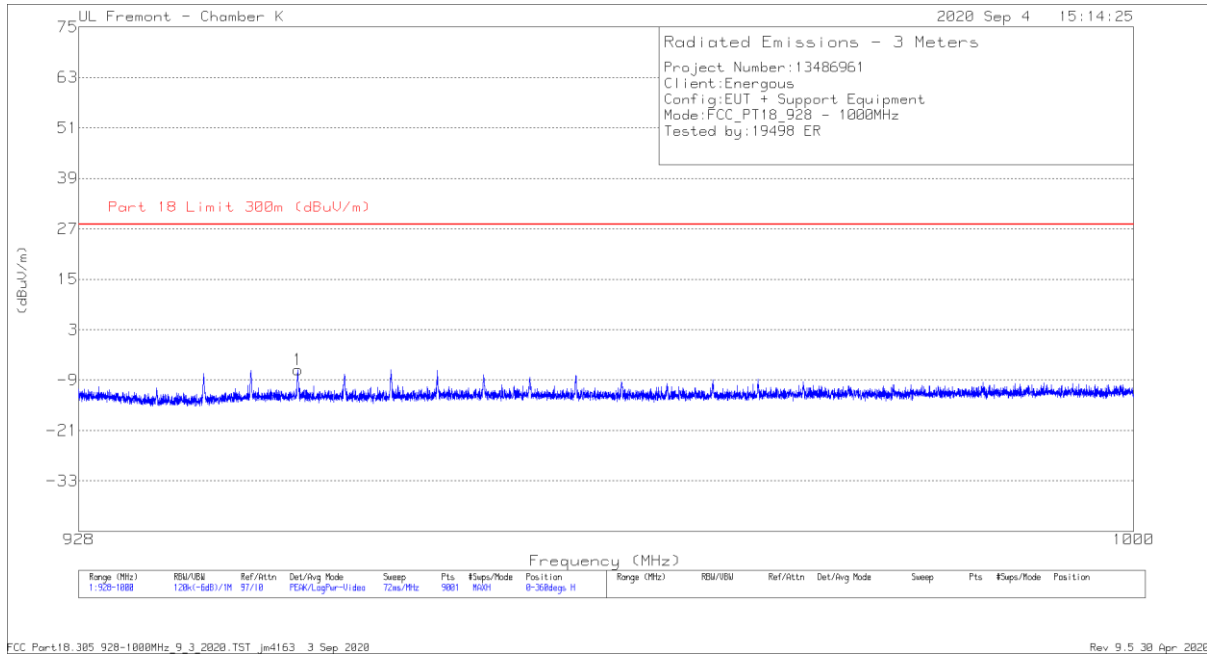
- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 2**

**Spurious Emissions 30 – 1000 MHz with a Notch Filter**



928MHz – 1000MHz HORIZONTAL & VERTICAL



**DATA**

30MHz – 902MHz range

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	T1846 BRF (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	154.8899	48.01	Pk	18.3	-30.6	-40	.8	-3.49	28	-31.49	0-360	201	H
2	292.0847	42.22	Pk	19.1	-29.9	-40	.8	-7.78	28	-35.78	0-360	99	H
3	36.6853	35.62	Pk	22.2	-31.5	-40	.8	-12.88	28	-40.88	0-360	301	H
4	36.7822	45.91	Pk	22.1	-31.5	-40	.8	-2.69	28	-30.69	0-360	100	V
	37.1418	41.62	Qp	21.9	-31.5	-40	.8	-7.18	28	-35.18	255	128	V
5	169.7139	43.17	Pk	17.6	-30.5	-40	.8	-8.93	28	-36.93	0-360	100	V
6	428.7951	32.41	Pk	22.3	-29.5	-40	.8	-13.99	28	-41.99	0-360	100	V

Pk - Peak detector  
 Qp - Quasi-Peak detector

928MHz – 1000MHz range

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	T1846 BRF (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	942.52	30.76	Pk	28.6	-26.7	-40	.8	-6.54	28	-34.54	0-360	200	H
2	955.008	36.23	Pk	28.8	-26.5	-40	.8	-.67	28	-28.67	0-360	100	V
	955.024	34.94	Qp	28.8	-26.5	-40	.8	-1.96	28	-29.96	114	95	V

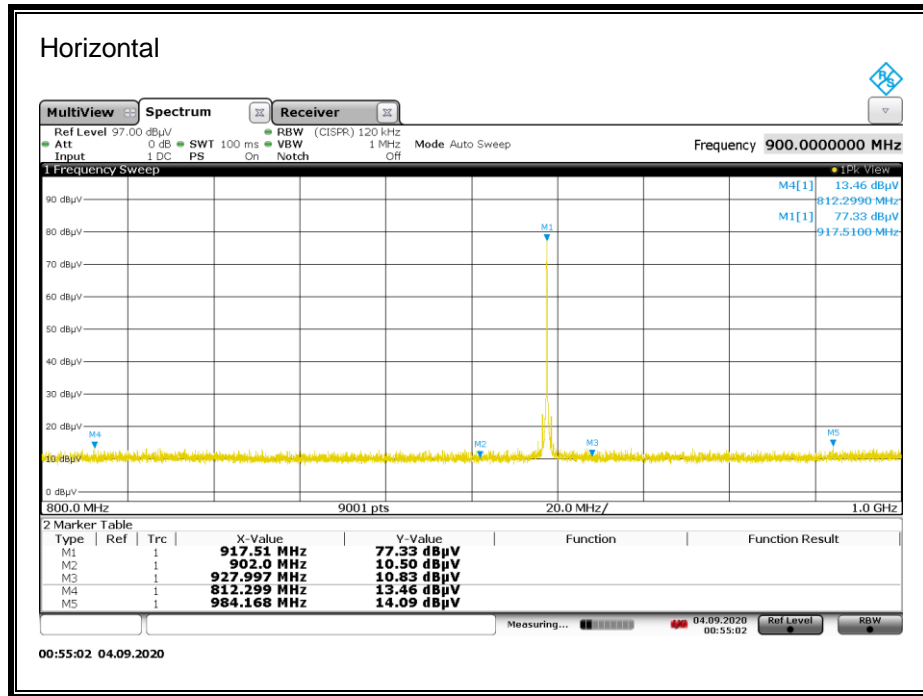
Pk - Peak detector  
 Qp - Quasi-Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Notch filter was used to prevent system overloading

**Spurious Emissions 800 – 1000 MHz without a Notch Filter and without amplifier**

Tested by:	19498 ER
Date:	09/08/2020



**DATA**

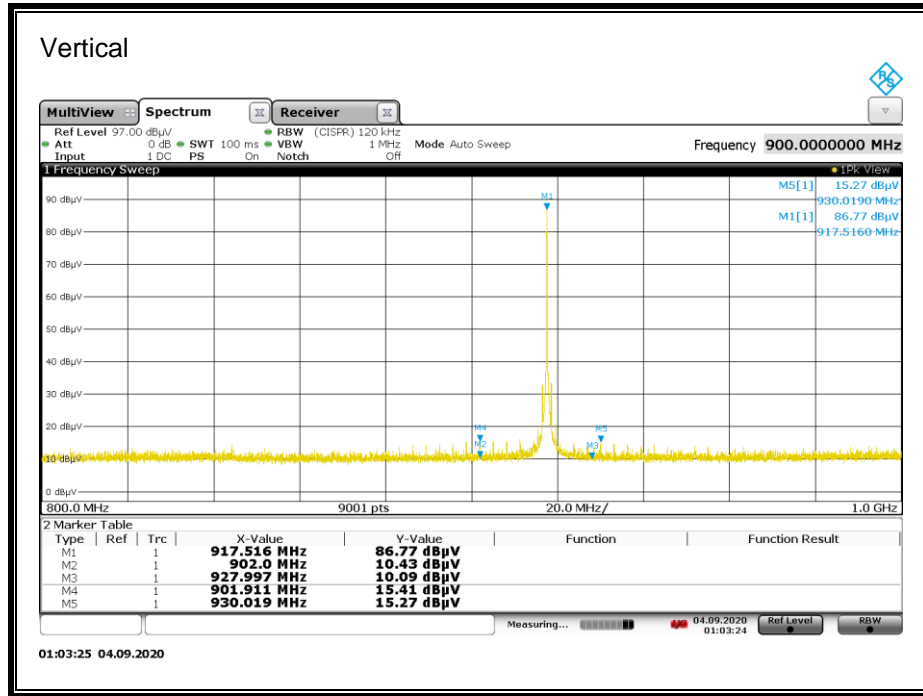
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	812.299	13.46	Pk	27.3	3.75	-40	4.51	28	-23.49	101	129	H
5	984.168	14.09	Pk	29.2	4.15	-40	7.44	28	-20.56	100	129	H

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$





**DATA**

Marker	Frequency (MHz)	Meter Reading (dBµV)	Det	AF PRE0181574 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBµV/m)	FCC PART18 300m LIMIT (dBµV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	901.91	15.41	Pk	27.9	3.97	-40	7.28	28	-20.72	209	140	V
5	930.019	15.27	Pk	28.5	4.04	-40	7.81	28	-20.19	77	157	V

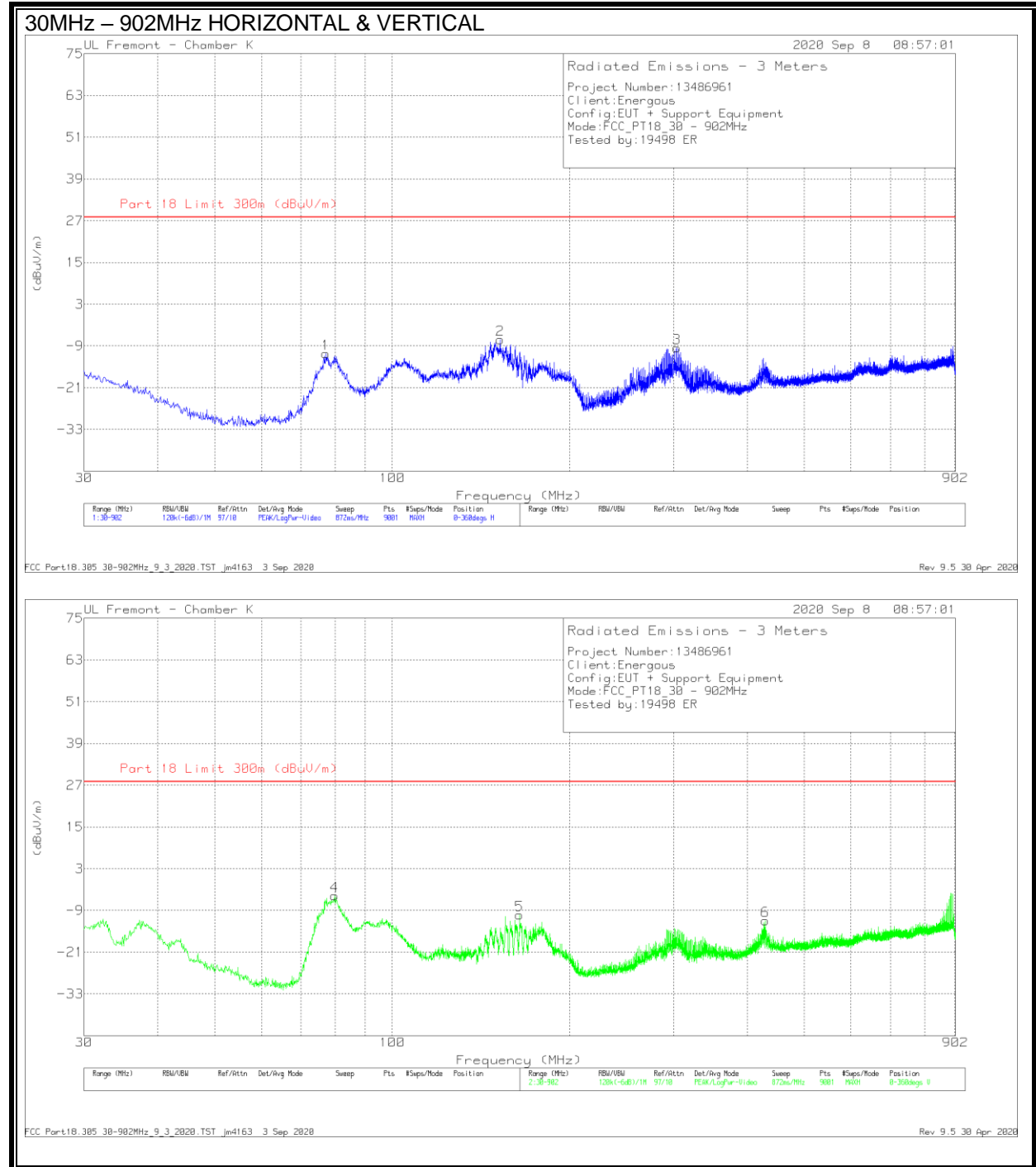
Pk - Peak detector

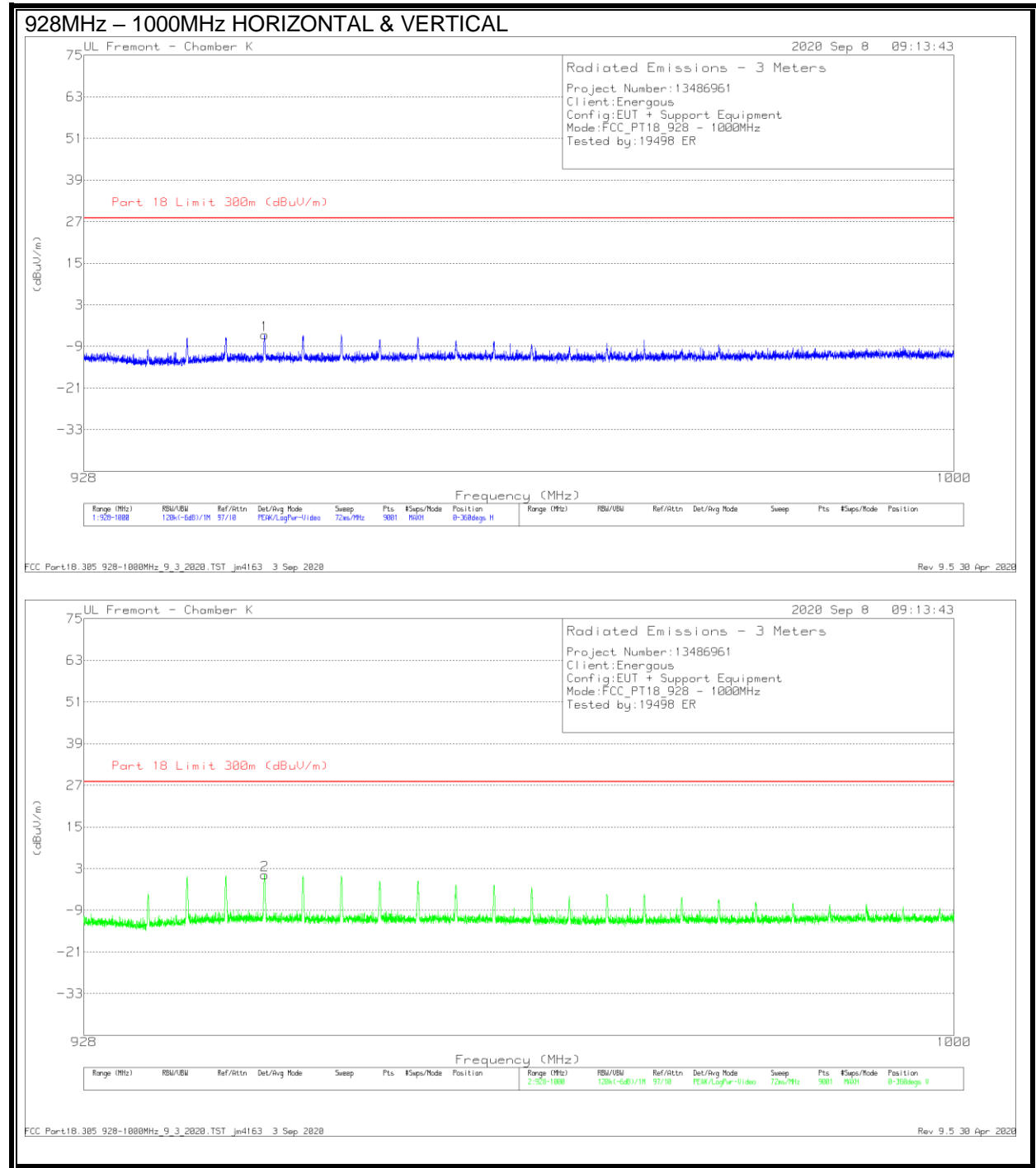
Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 3**

**Spurious Emissions 30 – 1000 MHz with a Notch Filter**





**DATA**

**30MHz – 902MHz range**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	T1846 BRF (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	77.1849	45.35	Pk	13.8	-31.1	-40	.8	-11.15	28	-39.15	0-360	200	H
2	152.3708	44.29	Pk	18.3	-30.6	-40	.8	-7.21	28	-35.21	0-360	200	H
3	303.9052	40.17	Pk	19.3	-29.8	-40	.8	-9.53	28	-37.53	0-360	101	H
4	79.8009	51.89	Pk	13.5	-31	-40	.8	-4.81	28	-32.81	0-360	100	V
	79.7409	48.34	Qp	13.5	-31	-40	.8	-8.36	28	-36.36	357	106	V
5	164.385	41.36	Pk	18	-30.5	-40	.8	-10.34	28	-38.34	0-360	201	V
6	429.6671	34.5	Pk	22.3	-29.5	-40	.8	-11.9	28	-39.9	0-360	100	V

Pk - Peak detector  
 Qp - Quasi-Peak detector

**928MHz – 1000MHz range**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	T1846 BRF (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	942.528	31.69	Pk	28.6	-26.7	-40	.8	-5.61	28	-33.61	0-360	201	H
2	942.52	38.55	Pk	28.6	-26.7	-40	.8	1.25	28	-26.75	0-360	100	V
	942.506	38.57	Qp	28.6	-26.7	-40	.8	1.27	28	-26.73	195	95	V

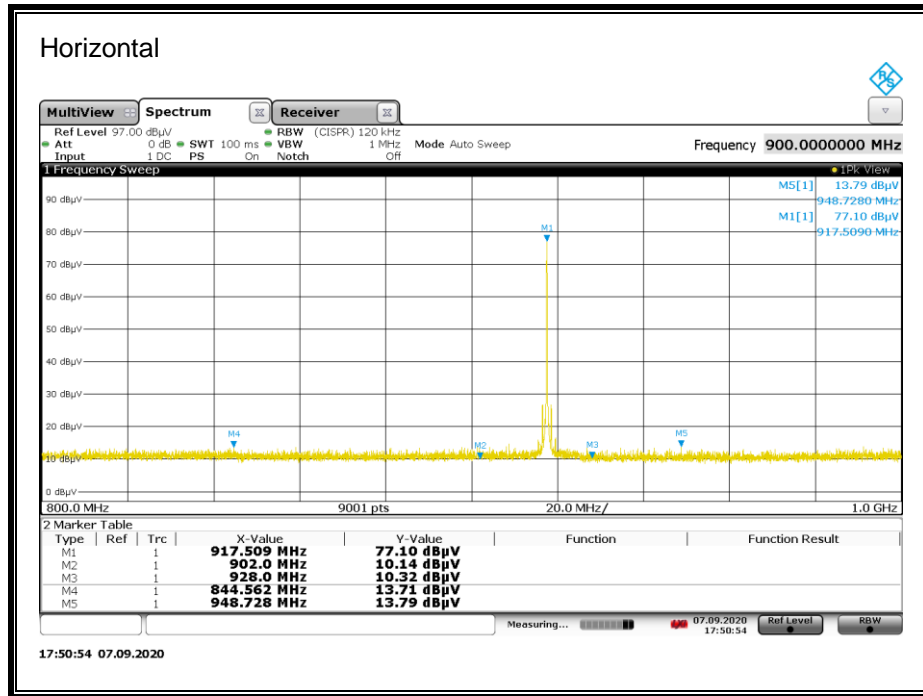
Pk - Peak detector  
 Qp - Quasi-Peak detector

**Note:**

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Notch filter was used to prevent system overloading

**Spurious Emissions 800 – 1000 MHz without a Notch Filter and without amplifier**

Tested by:	19498 ER
Date:	09/08/2020



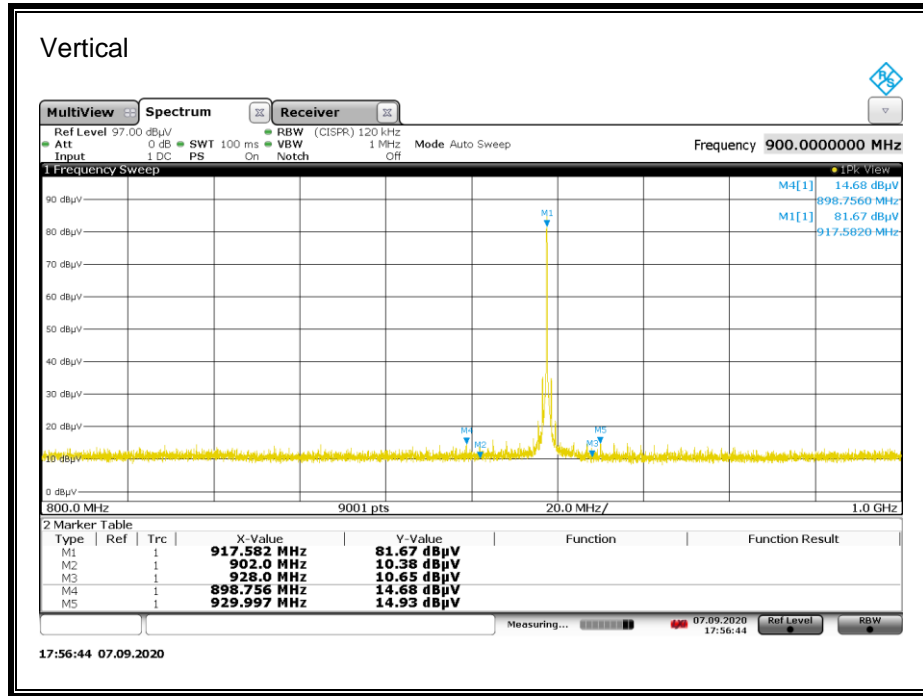
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	844.562	13.71	Pk	27.7	3.82	-40	5.23	28	-22.77	226	116	H
5	948.728	13.79	Pk	28.7	4.07	-40	6.56	28	-21.44	182	137	H

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	898.756	14.68	Pk	27.8	3.91	-40	6.39	28	-21.61	36	134	V
5	929.997	14.93	Pk	28.4	4.10	-40	7.43	28	-20.57	87	119	V

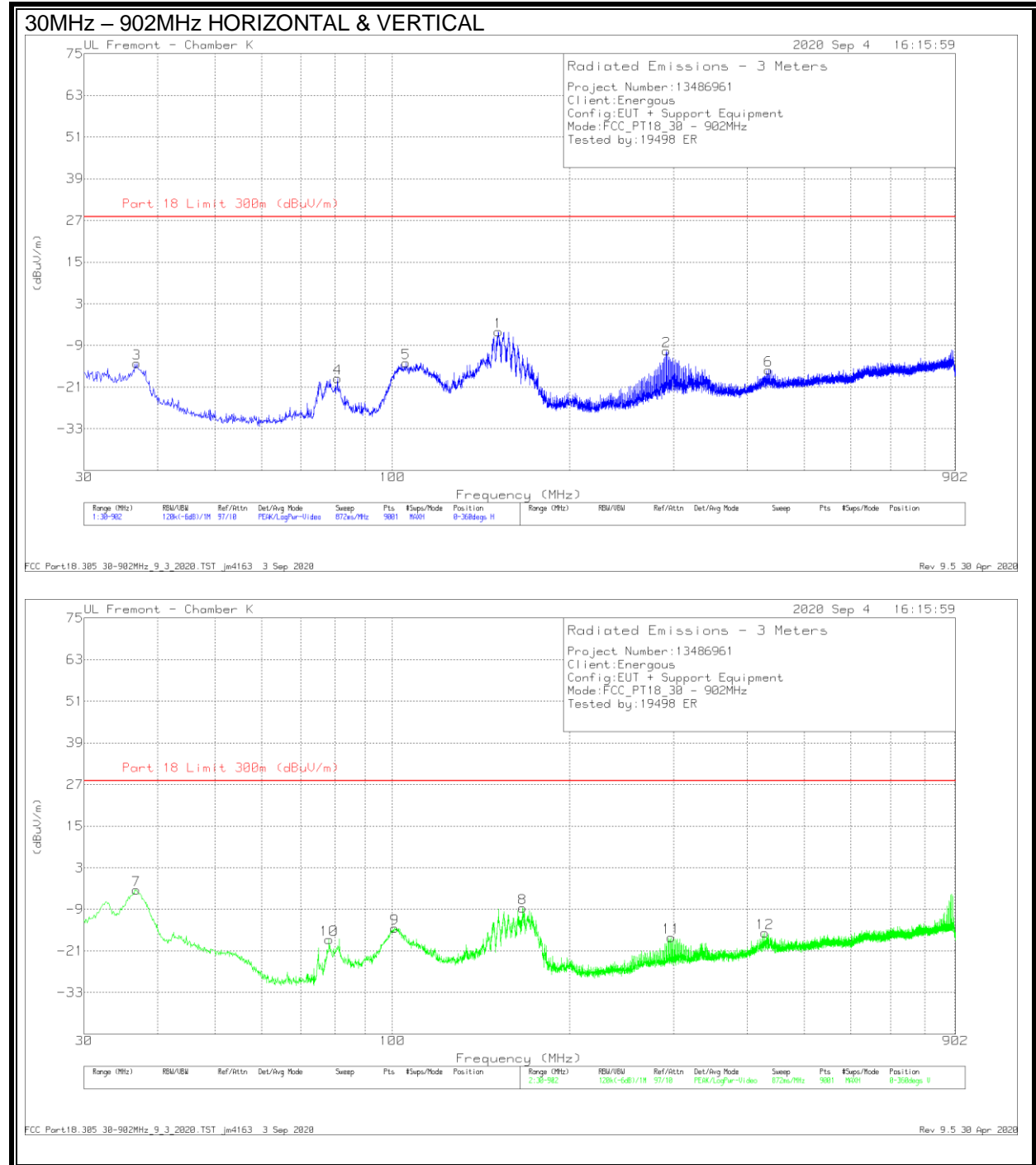
Pk - Peak detector

Note:

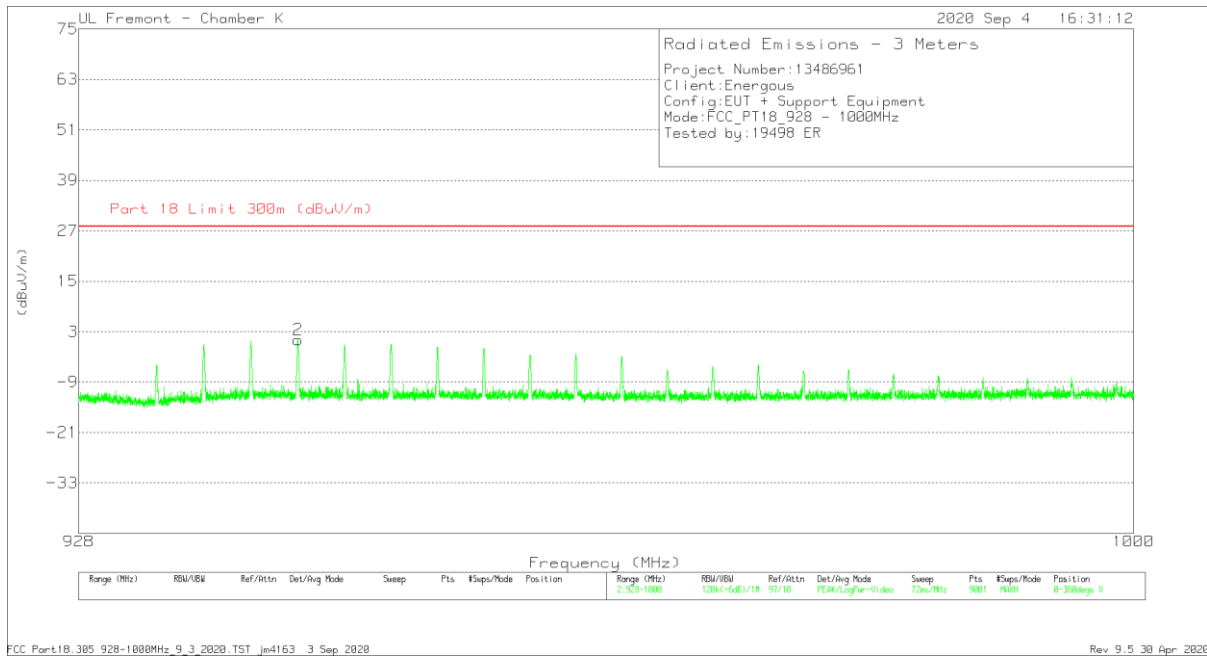
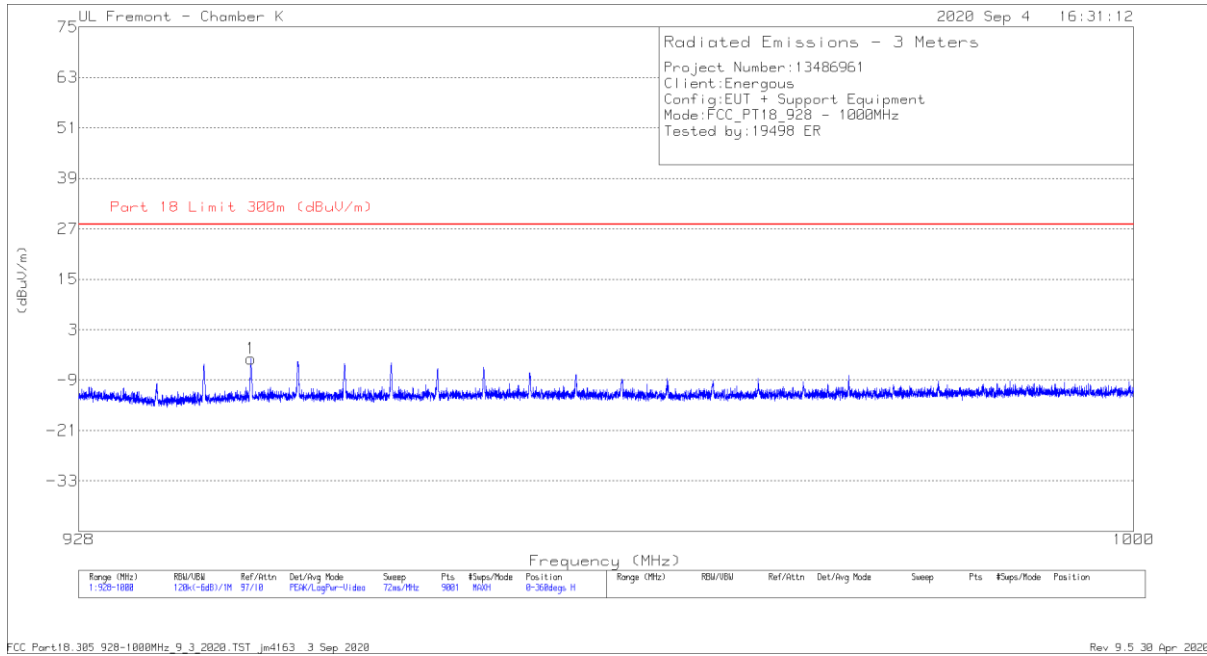
- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 4**

**Spurious Emissions 30 – 1000 MHz with a Notch Filter**



928MHz – 1000MHz HORIZONTAL & VERTICAL





**DATA**

**30MHz – 902MHz range**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	T1846 BRF (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	151.4019	46.46	Pk	18.3	-30.6	-40	.8	-5.04	28	-33.04	0-360	100	H
2	291.6003	39.38	Pk	19.1	-29.9	-40	.8	-10.62	28	-38.62	0-360	100	H
3	36.8791	34.5	Pk	22.1	-31.5	-40	.8	-14.1	28	-42.1	0-360	201	H
4	80.7698	38.28	Pk	13.4	-31	-40	.8	-18.52	28	-46.52	0-360	301	H
5	105.4765	38.45	Pk	17.6	-30.9	-40	.8	-14.05	28	-42.05	0-360	301	H
6	434.4147	30.07	Pk	22.4	-29.4	-40	.8	-16.13	28	-44.13	0-360	201	H
7	36.7822	45.2	Pk	22.1	-31.5	-40	.8	-3.4	28	-31.4	0-360	100	V
	36.9922	42.89	Qp	22	-31.5	-40	.8	-5.81	28	-33.81	205	104	V
8	166.4197	43.12	Pk	17.9	-30.5	-40	.8	-8.68	28	-36.68	0-360	100	V
9	100.9227	39.11	Pk	16.5	-30.9	-40	.8	-14.49	28	-42.49	0-360	100	V
10	78.1538	38.94	Pk	13.7	-31.1	-40	.8	-17.66	28	-45.66	0-360	100	V
11	297.3652	32.94	Pk	19.1	-29.9	-40	.8	-17.06	28	-45.06	0-360	200	V
12	428.4076	30.62	Pk	22.2	-29.4	-40	.8	-15.78	28	-43.78	0-360	200	V

Pk - Peak detector  
 Qp - Quasi-Peak detector

**928MHz – 1000MHz range**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	T1846 BRF (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	939.4	33.57	Pk	28.5	-26.8	-40	.8	-3.93	28	-31.93	0-360	200	H
2	942.52	38.38	Pk	28.6	-26.7	-40	.8	1.08	28	-26.92	0-360	100	V
	942.5119	37.43	Qp	28.6	-26.7	-40	.8	.13	28	-27.87	203	100	V

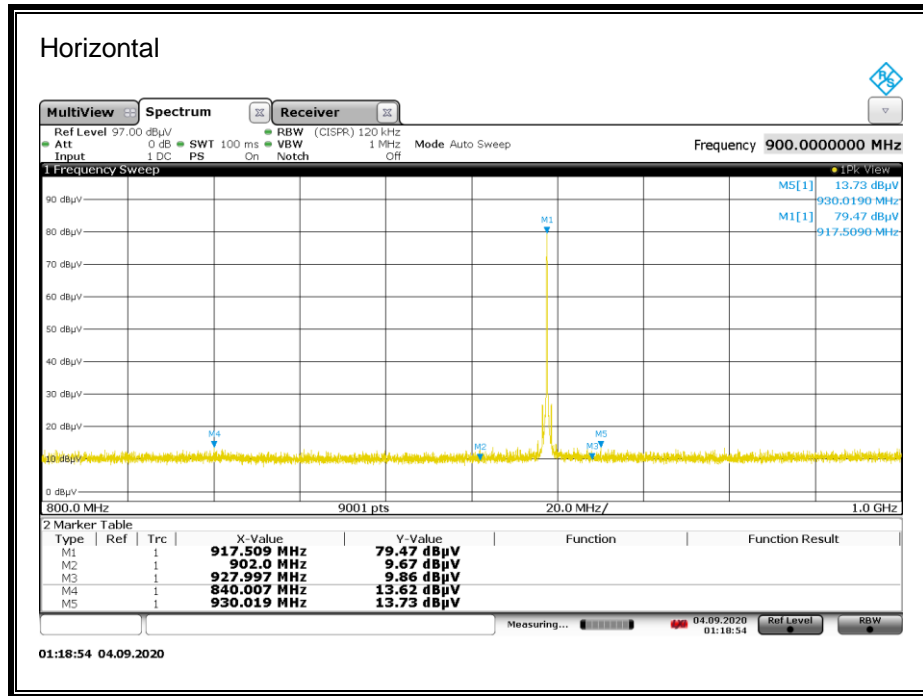
Pk - Peak detector  
 Qp - Quasi-Peak detector

**Note:**

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Notch filter was used to prevent system overloading

**Spurious Emissions 800 – 1000 MHz without a Notch Filter and without amplifier**

Tested by:	19498 ER
Date:	09/08/2020



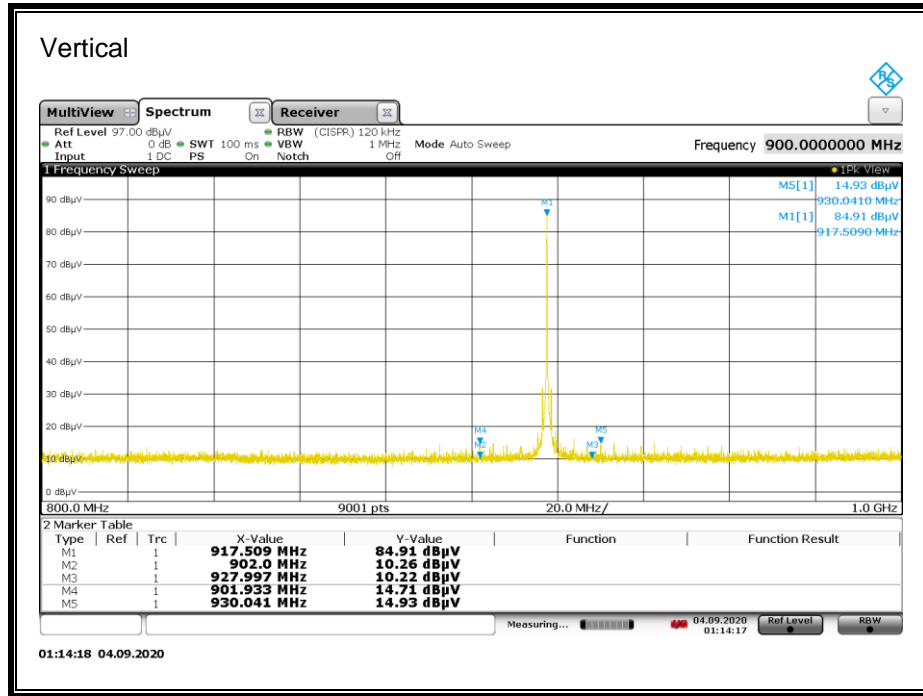
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	840.007	13.62	Pk	27.7	3.83	-40	5.15	28	-22.85	112	117	H
5	930.019	13.73	Pk	28.5	4.04	-40	6.27	28	-21.73	108	120	H

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	901.933	14.71	Pk	27.9	3.97	-40	6.58	28	-21.42	167	136	V
5	930.041	14.93	Pk	28.5	4.04	-40	7.47	28	-20.53	88	108	V

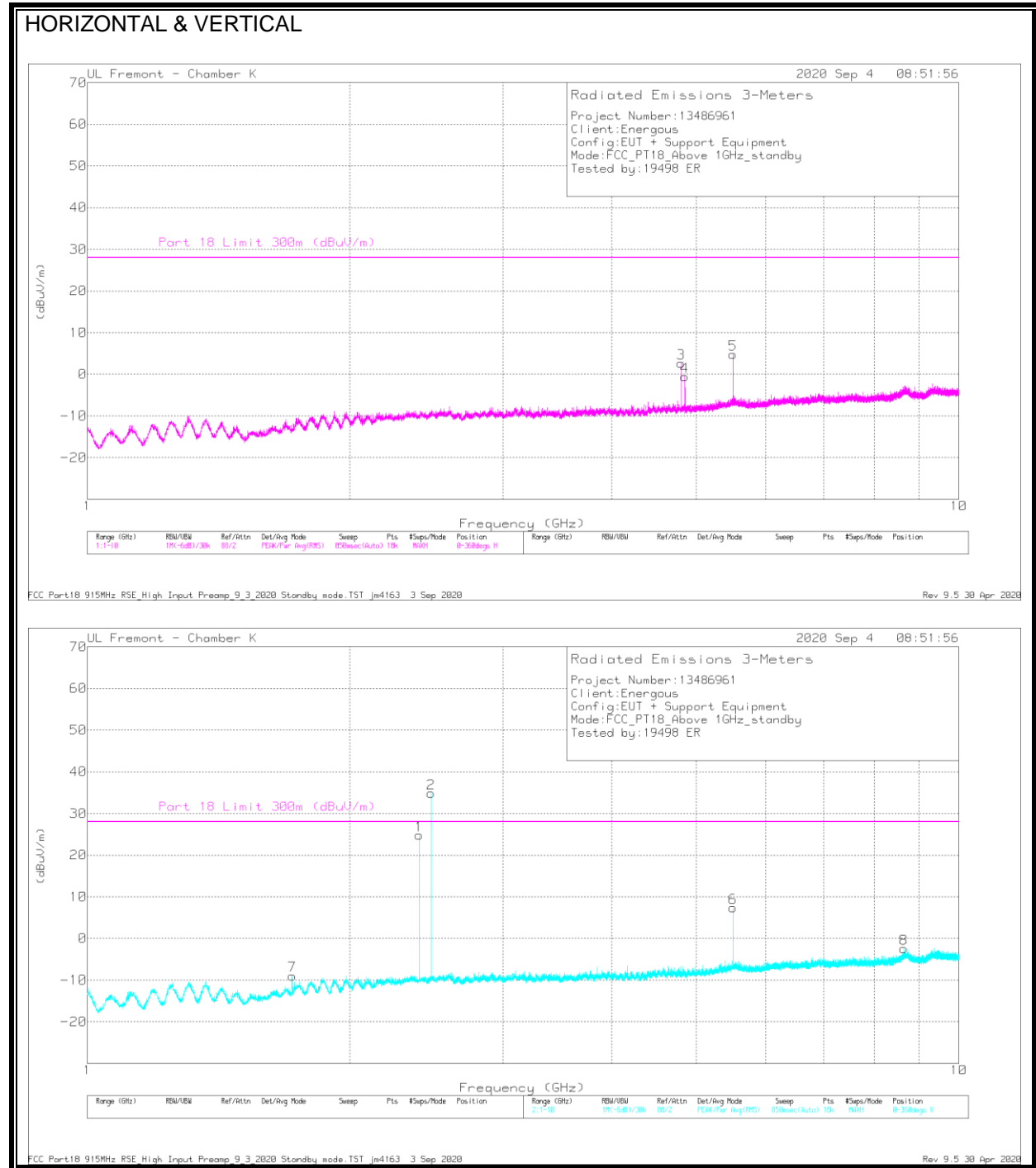
Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

### 7.1.3. SPURIOUS EMISSIONS 1 GHz TO 10 GHz

#### CONFIGURATION 1



**DATA**

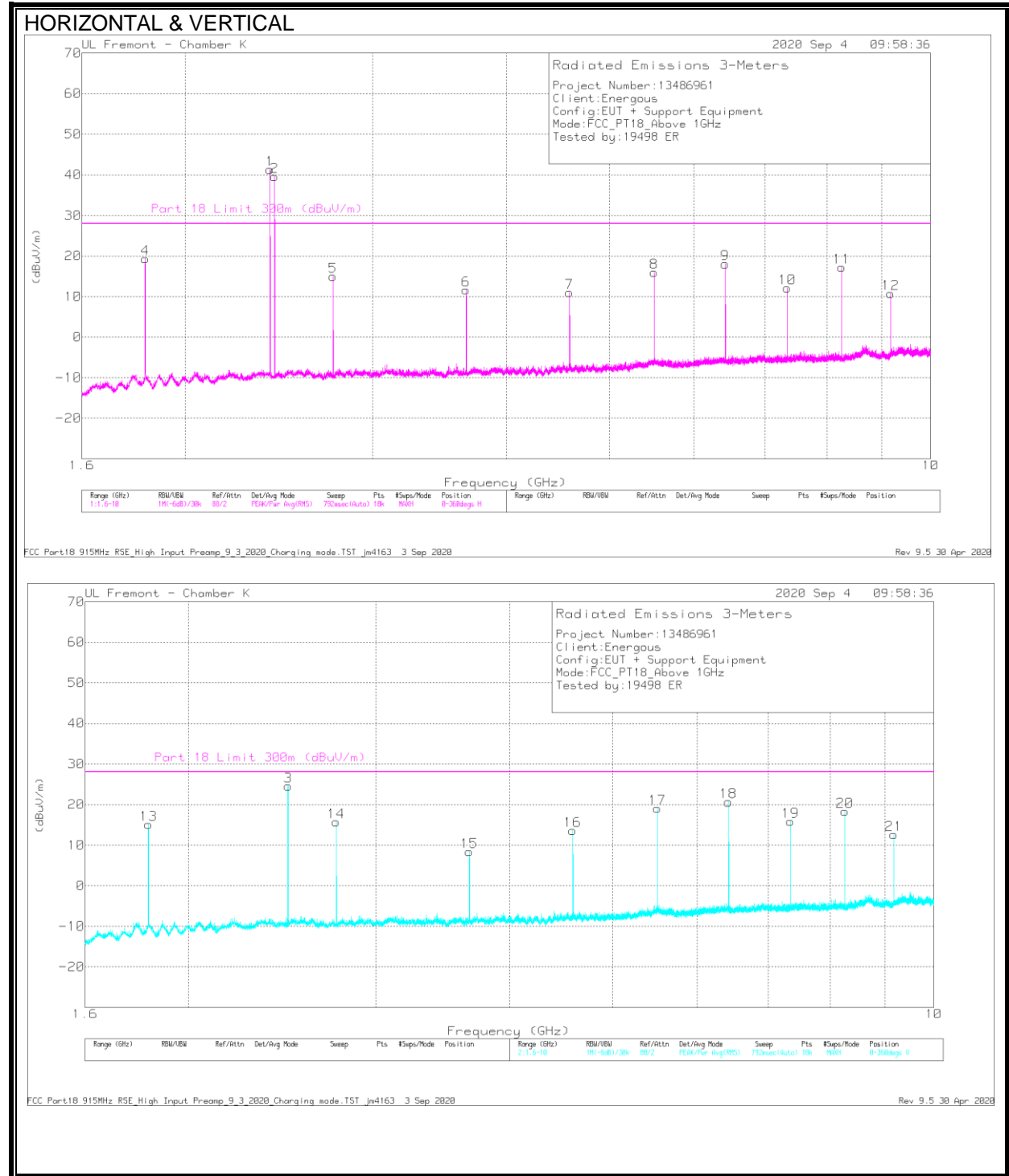
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.40292	77.31	Pk	32.4	-44.9	-40	24.81	-	-	0-360	200	V
2	2.47992	87.31	Pk	32.4	-44.8	-40	34.91	-	-	0-360	100	V
5	5.50508	49.79	ADR	35.7	-40.7	-40	4.79	28	-23.21	281	115	H
3	4.79568	37.17	ADR	34.3	-41.6	-40	-10.13	28	-38.13	334	277	H
4	4.84481	37.48	ADR	34.4	-41.4	-40	-9.52	28	-37.52	99	318	H
6	5.50507	52.41	ADR	35.7	-40.7	-40	7.41	28	-20.59	55	95	V
7	1.70823	42.83	ADR	29.3	-46.6	-40	-14.47	28	-42.47	0	292	V
8	8.66044	35.65	ADR	36.2	-37.5	-40	-5.65	28	-33.65	22	232	V

ADR - AD primary method, RMS average

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Markers 1 and 2 are BLE signals

**CONFIGURATION 2**



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	T1853 HPF (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.40169	93.06	Pk	32.4	-44.8	.7	-40	41.36	-	-	0-360	200	H
2	2.42595	91.42	Pk	32.4	-44.9	.7	-40	39.62	-	-	0-360	100	H
4	1.83472	74.11	Pk	30.7	-46.2	.7	-40	19.31	28	-8.69	0-360	100	H
5	2.75237	65.88	Pk	32.5	-44.1	.7	-40	14.98	28	-13.02	0-360	200	H
6	3.67002	59.8	Pk	33.5	-42.4	.7	-40	11.6	28	-16.4	0-360	200	H
7	4.58744	57.99	Pk	34.2	-41.9	.7	-40	10.99	28	-17.01	0-360	100	H
8	5.50485	60.31	Pk	35.7	-40.7	.7	-40	16.01	28	-11.99	0-360	100	H
9	6.42273	61.12	Pk	35.7	-39.5	.7	-40	18.02	28	-9.98	0-360	100	H
10	7.34015	53.87	Pk	36	-38.5	.7	-40	12.07	28	-15.93	0-360	100	H
11	8.25757	58.28	Pk	36.1	-37.9	.7	-40	17.18	28	-10.82	0-360	200	H
12	9.17545	50.89	Pk	36.6	-37.4	.7	-40	10.79	28	-17.21	0-360	200	H
3	2.48008	76.16	Pk	32.5	-44.8	.7	-40	24.56	-	-	0-360	100	V
13	1.83472	69.93	Pk	30.7	-46.2	.7	-40	15.13	28	-12.87	0-360	100	V
14	2.75214	66.67	Pk	32.5	-44.1	.7	-40	15.77	28	-12.23	0-360	100	V
15	3.67002	56.56	Pk	33.5	-42.4	.7	-40	8.36	28	-19.64	0-360	100	V
16	4.58744	60.6	Pk	34.2	-41.9	.7	-40	13.6	28	-14.4	0-360	100	V
17	5.50485	63.34	Pk	35.7	-40.7	.7	-40	19.04	28	-8.96	0-360	100	V
18	6.42273	63.73	Pk	35.7	-39.5	.7	-40	20.63	28	-7.37	0-360	100	V
19	7.34015	57.68	Pk	36	-38.5	.7	-40	15.88	28	-12.12	0-360	100	V
20	8.25757	59.44	Pk	36.1	-37.9	.7	-40	18.34	28	-9.66	0-360	100	V
21	9.17545	52.71	Pk	36.6	-37.4	.7	-40	12.61	28	-15.39	0-360	100	V

**Radiated Emissions**

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	T1853 HPF (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83503	73.77	ADR	30.7	-46.2	.7	-40	18.97	28	-9.03	243	97	H
6.4226	60.66	ADR	35.7	-39.5	.7	-40	17.56	28	-10.44	195	103	H
8.25763	57.37	ADR	36.1	-37.9	.7	-40	16.27	28	-11.73	269	172	H
6.4226	63.22	ADR	35.7	-39.5	.7	-40	20.12	28	-7.88	166	104	V
5.50509	62.31	ADR	35.7	-40.7	.7	-40	18.01	28	-9.99	64	104	V
8.25763	59.22	ADR	36.1	-37.9	.7	-40	18.12	28	-9.88	240	109	V

Pk - Peak detector

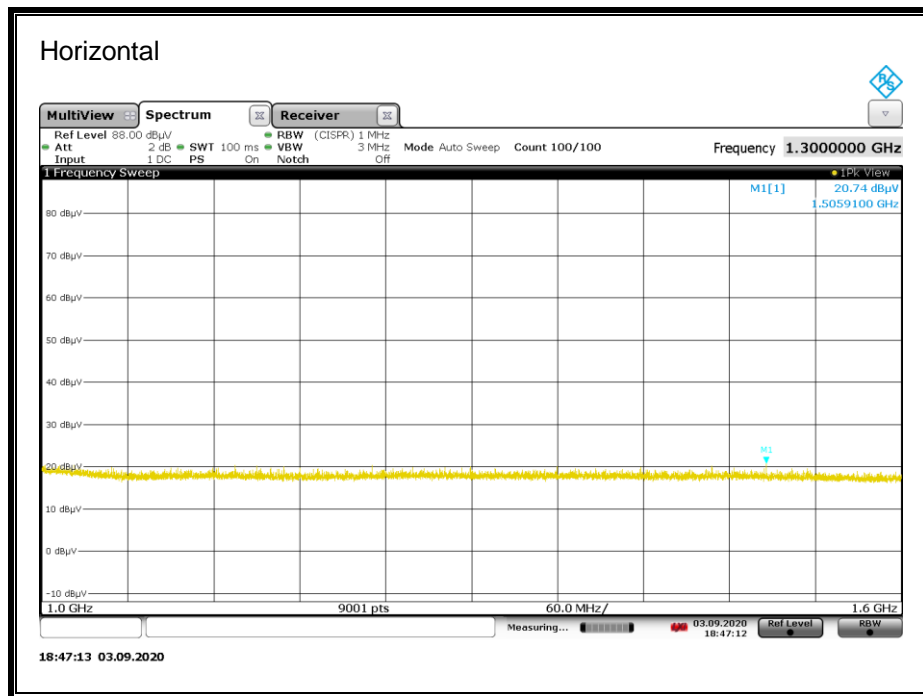
ADR - AD primary method, RMS average

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Markers 1, 2, 3 are BLE signals.
- Frequency Range 1G – 1.6GHz were investigation using due to High pass filter 1.5G was used. See the following test result of frequency range 1G-1.6GHz.

**Spurious Emissions 1GHz – 1.6GHz without a Notch Filter, without 1.5 GHz HPF, and without amplifier**

Tested by:	19498 ER
Date:	09/08/2020



**DATA**

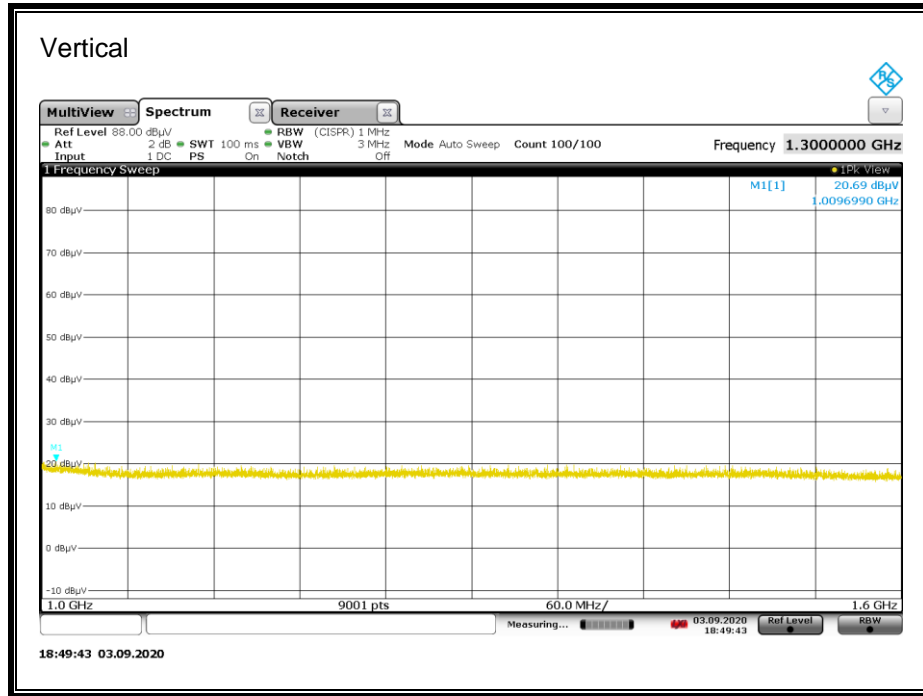
Marker	Frequency (GHz)	Meter Reading (dBμV)	Det	AF T863 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBμV/m)	FCC PART18 300m LIMIT (dBμV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.506	20.74	Pk	27.68	5.73	-40	14.15	28	-13.85	67	164	H

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$





**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.010	20.69	Pk	27.36	4.66	-40	12.71	28	-15.29	186	189	V

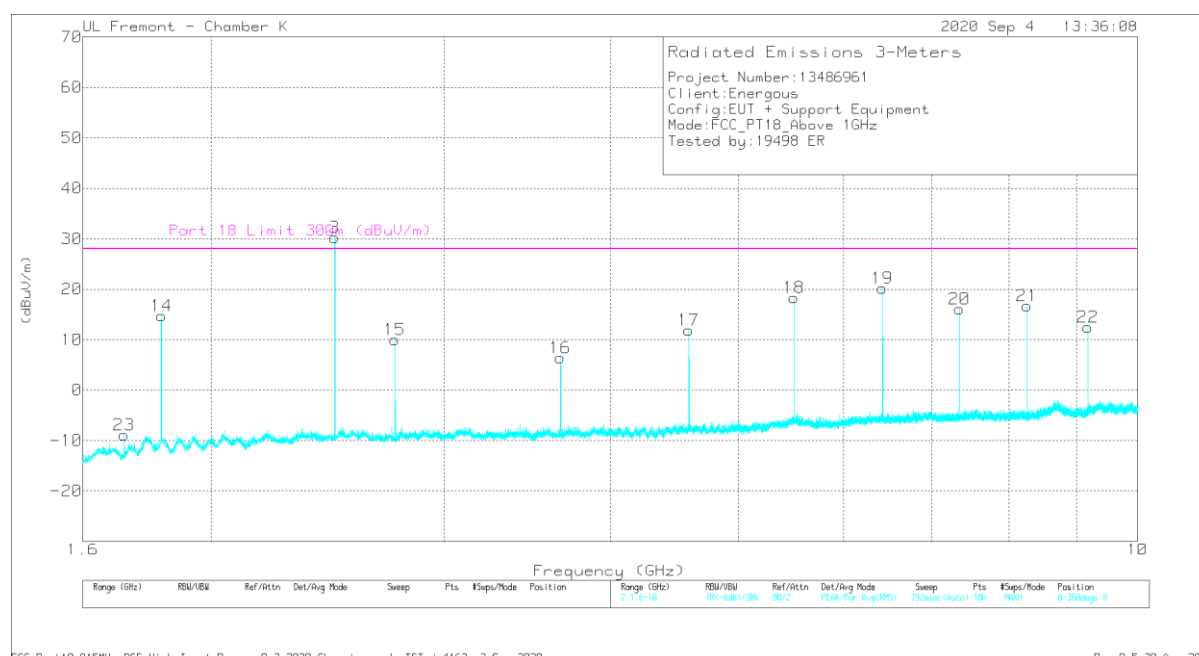
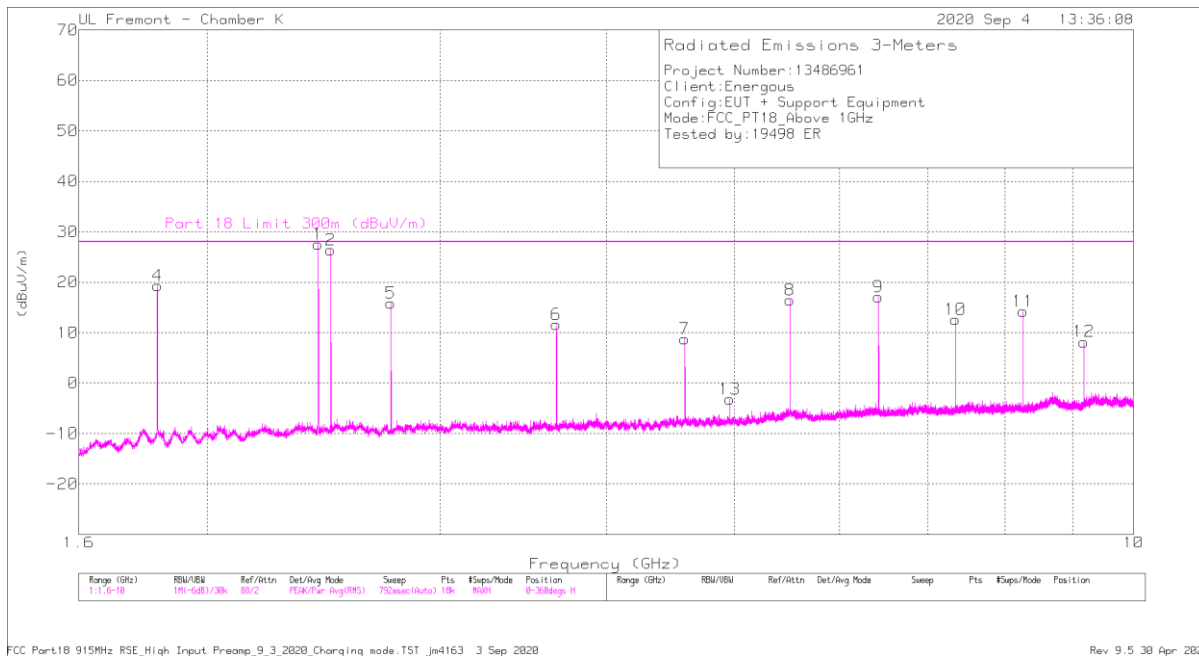
Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 3**

**HORIZONTAL & VERTICAL**



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	T1853 HPF (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.42595	79.33	Pk	32.4	-44.9	.7	-40	27.53	-	-	0-360	200	H
2	2.47962	78.05	Pk	32.4	-44.8	.7	-40	26.35	-	-	0-360	200	H
4	1.83472	74.09	Pk	30.7	-46.2	.7	-40	19.29	28	-8.71	0-360	100	H
5	2.7526	66.74	Pk	32.5	-44.1	.7	-40	15.84	28	-12.16	0-360	100	H
6	3.67002	59.8	Pk	33.5	-42.4	.7	-40	11.6	28	-16.4	0-360	200	H
7	4.58744	55.71	Pk	34.2	-41.9	.7	-40	8.71	28	-19.29	0-360	100	H
8	5.50485	60.76	Pk	35.7	-40.7	.7	-40	16.46	28	-11.54	0-360	100	H
9	6.42273	60.24	Pk	35.7	-39.5	.7	-40	17.14	28	-10.86	0-360	100	H
10	7.34015	54.41	Pk	36	-38.5	.7	-40	12.61	28	-15.39	0-360	100	H
11	8.25757	55.3	Pk	36.1	-37.9	.7	-40	14.2	28	-13.8	0-360	200	H
12	9.17545	48.3	Pk	36.6	-37.4	.7	-40	8.2	28	-19.8	0-360	200	H
13	4.95888	43.03	Pk	34.3	-41.2	.7	-40	-3.17	28	-31.17	0-360	100	H
3	2.47962	81.96	Pk	32.4	-44.8	.7	-40	30.26	-	-	0-360	200	V
14	1.83472	69.58	Pk	30.7	-46.2	.7	-40	14.78	28	-13.22	0-360	100	V
15	2.75237	60.86	Pk	32.5	-44.1	.7	-40	9.96	28	-18.04	0-360	100	V
16	3.67002	54.59	Pk	33.5	-42.4	.7	-40	6.39	28	-21.61	0-360	100	V
17	4.58744	58.92	Pk	34.2	-41.9	.7	-40	11.92	28	-16.08	0-360	100	V
18	5.50532	62.58	Pk	35.7	-40.7	.7	-40	18.28	28	-9.72	0-360	100	V
19	6.42273	63.31	Pk	35.7	-39.5	.7	-40	20.21	28	-7.79	0-360	200	V
20	7.34015	57.9	Pk	36	-38.5	.7	-40	16.1	28	-11.9	0-360	100	V
21	8.25757	57.83	Pk	36.1	-37.9	.7	-40	16.73	28	-11.27	0-360	200	V
22	9.17545	52.57	Pk	36.6	-37.4	.7	-40	12.47	28	-15.53	0-360	100	V
23	1.71993	47.38	Pk	29.6	-46.6	.7	-40	-8.92	28	-36.92	0-360	200	V

**Radiated Emissions**

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	T1853 HPF (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83503	73.96	ADR	30.7	-46.2	.7	-40	19.16	28	-8.84	243	100	H
5.50509	61.88	ADR	35.7	-40.7	.7	-40	17.58	28	-10.42	277	95	H
6.4226	60.3	ADR	35.7	-39.5	.7	-40	17.2	28	-10.8	200	106	H
5.50509	63.02	ADR	35.7	-40.7	.7	-40	18.72	28	-9.28	76	95	V
6.42261	63.67	ADR	35.7	-39.5	.7	-40	20.57	28	-7.43	277	183	V
8.25765	58.22	ADR	36.1	-37.9	.7	-40	17.12	28	-10.88	18	167	V

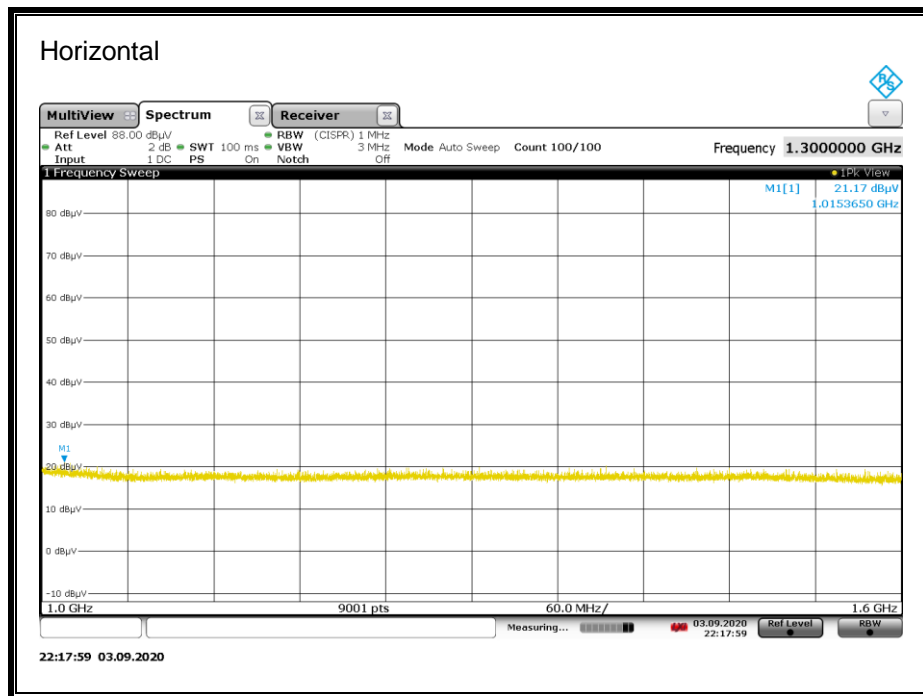
Pk - Peak detector  
 ADR - AD primary method, RMS average

**Note:**

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Markers 1, 2, 3 are BLE signals.
- Frequency Range 1G – 1.6GHz were investigation using due to High pass filter 1.5G was used. See the following test result of frequency range 1G-1.6GHz.

**Spurious Emissions 1GHz – 1.6GHz without a Notch Filter, without 1.5 GHz HPF, and without amplifier**

Tested by:	19498 ER
Date:	9/08/2020



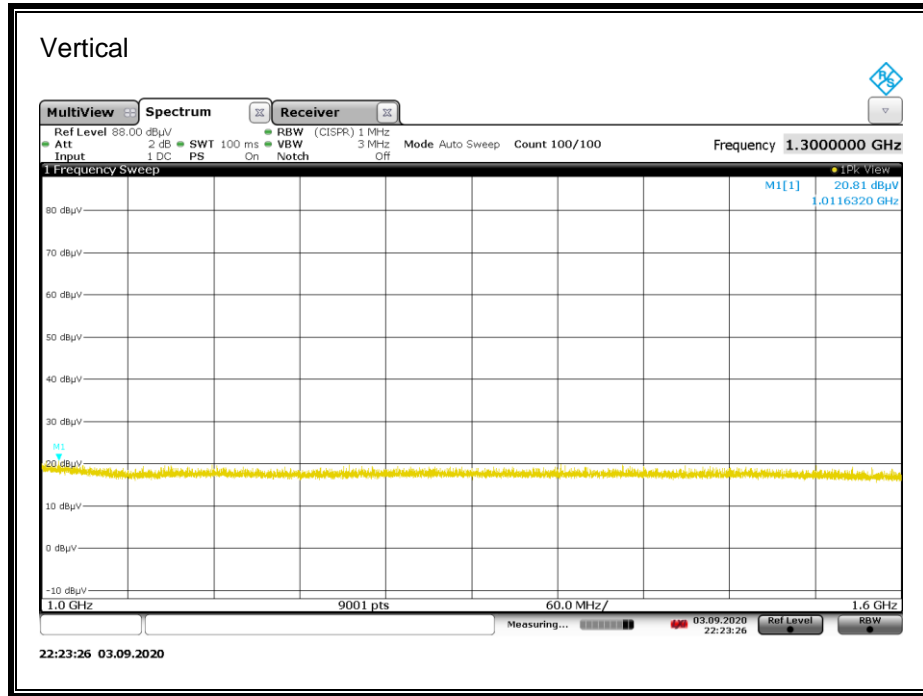
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.015	21.17	Pk	27.07	4.66	-40	12.9	28	-15.1	77	167	H

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$



**DATA**

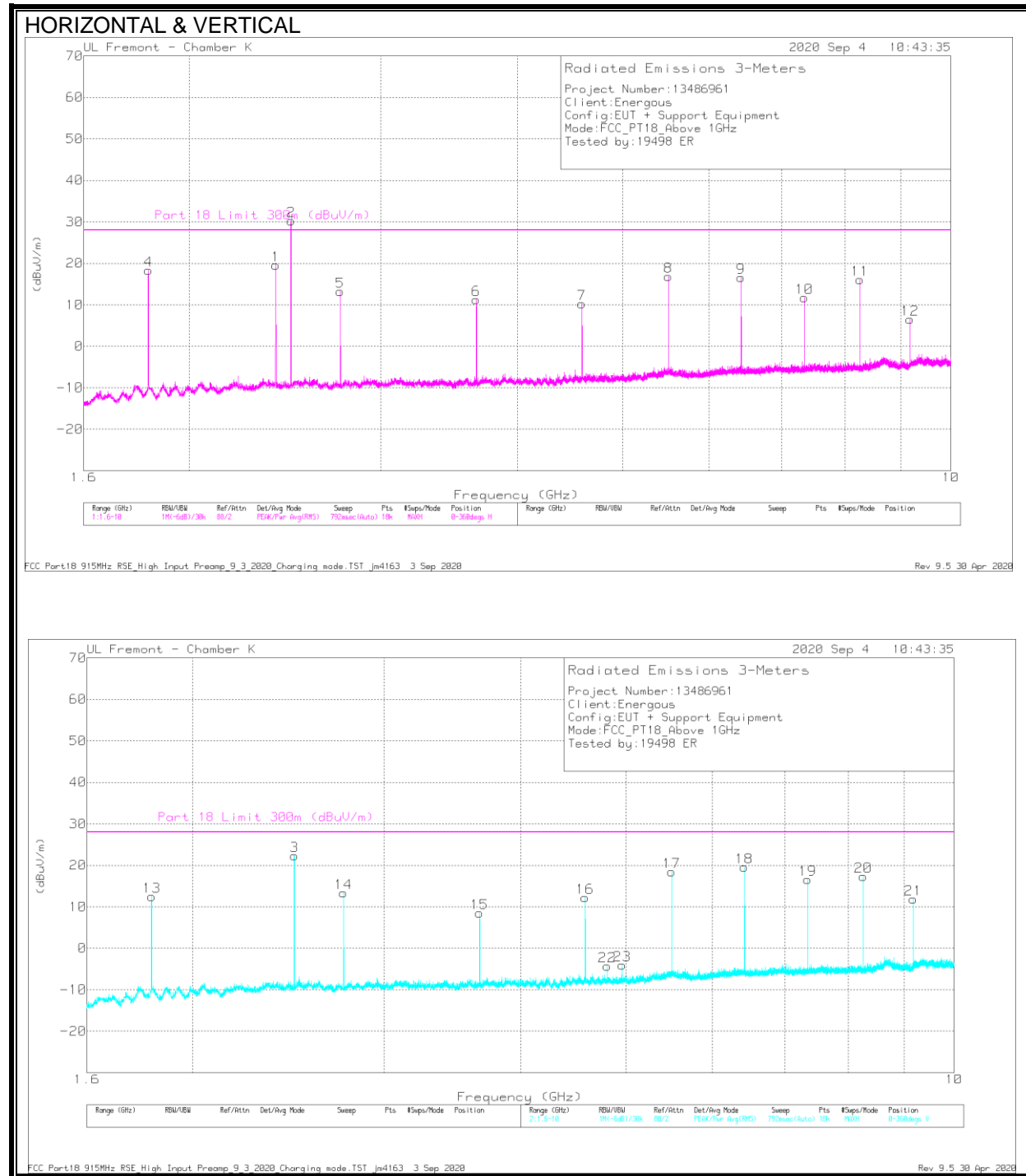
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.012	20.81	Pk	27.21	4.66	-40	12.68	28	-15.32	287	155	V

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

**CONFIGURATION 4**



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	T1853 HPF (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.40216	71.25	Pk	32.4	-44.8	.7	-40	19.55	-	-	0-360	100	H
2	2.48008	81.81	Pk	32.5	-44.8	.7	-40	30.21	-	-	0-360	200	H
4	1.83472	73.1	Pk	30.7	-46.2	.7	-40	18.3	28	-9.7	0-360	100	H
5	2.7526	64.12	Pk	32.5	-44.1	.7	-40	13.22	28	-14.78	0-360	200	H
6	3.67002	59.39	Pk	33.5	-42.4	.7	-40	11.19	28	-16.81	0-360	200	H
7	4.58744	57.3	Pk	34.2	-41.9	.7	-40	10.3	28	-17.7	0-360	200	H
8	5.50485	61.18	Pk	35.7	-40.7	.7	-40	16.88	28	-11.12	0-360	100	H
9	6.42273	59.74	Pk	35.7	-39.5	.7	-40	16.64	28	-11.36	0-360	100	H
10	7.34015	53.54	Pk	36	-38.5	.7	-40	11.74	28	-16.26	0-360	100	H
11	8.25757	57.22	Pk	36.1	-37.9	.7	-40	16.12	28	-11.88	0-360	100	H
12	9.17545	46.59	Pk	36.6	-37.4	.7	-40	6.49	28	-21.51	0-360	200	H
3	2.48008	73.88	Pk	32.5	-44.8	.7	-40	22.28	-	-	0-360	200	V
13	1.83472	67.32	Pk	30.7	-46.2	.7	-40	12.52	28	-15.48	0-360	100	V
14	2.75214	64.2	Pk	32.5	-44.1	.7	-40	13.3	28	-14.7	0-360	100	V
15	3.67002	56.75	Pk	33.5	-42.4	.7	-40	8.55	28	-19.45	0-360	100	V
16	4.58744	59.27	Pk	34.2	-41.9	.7	-40	12.27	28	-15.73	0-360	200	V
17	5.50485	62.77	Pk	35.7	-40.7	.7	-40	18.47	28	-9.53	0-360	100	V
18	6.42273	62.71	Pk	35.7	-39.5	.7	-40	19.61	28	-8.39	0-360	100	V
19	7.34015	58.37	Pk	36	-38.5	.7	-40	16.57	28	-11.43	0-360	100	V
20	8.25803	58.42	Pk	36.1	-37.9	.7	-40	17.32	28	-10.68	0-360	100	V
21	9.17545	51.99	Pk	36.6	-37.4	.7	-40	11.89	28	-16.11	0-360	100	V
22	4.80442	42.2	Pk	34.4	-41.6	.7	-40	-4.3	28	-32.3	0-360	100	V
23	4.96028	42.1	Pk	34.3	-41.2	.7	-40	-4.1	28	-32.1	0-360	200	V

**Radiated Emissions**

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	T1853 HPF (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Part 18 Limit 300m (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83503	72.9	ADR	30.7	-46.2	.7	-40	18.1	28	-9.9	247	146	H
5.5051	61.84	ADR	35.7	-40.7	.7	-40	17.54	28	-10.46	276	95	H
6.42262	59.72	ADR	35.7	-39.5	.7	-40	16.62	28	-11.38	195	103	H
5.5051	62.43	ADR	35.7	-40.7	.7	-40	18.13	28	-9.87	76	96	V
6.42262	62.74	ADR	35.7	-39.5	.7	-40	19.64	28	-8.36	163	95	V
8.25766	57.93	ADR	36.1	-37.9	.7	-40	16.83	28	-11.17	242	116	V

Pk - Peak detector

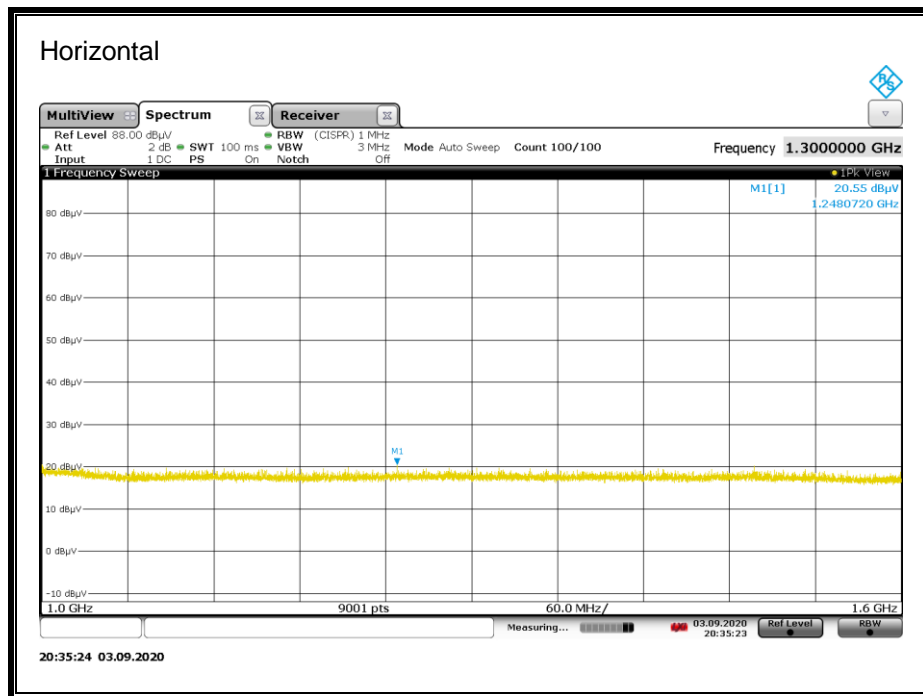
ADR - AD primary method, RMS average

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$
- Markers 1, 2, 3 are BLE signals.
- Frequency Range 1G – 1.6GHz were investigation using due to High pass filter 1.5G was used. See the following test result of frequency range 1G-1.6GHz.

**Spurious Emissions 1GHz – 1.6GHz without a Notch Filter, without 1.5 GHz HPF, and without amplifier**

Tested by:	19498 ER
Date:	9/08/2020



**DATA**

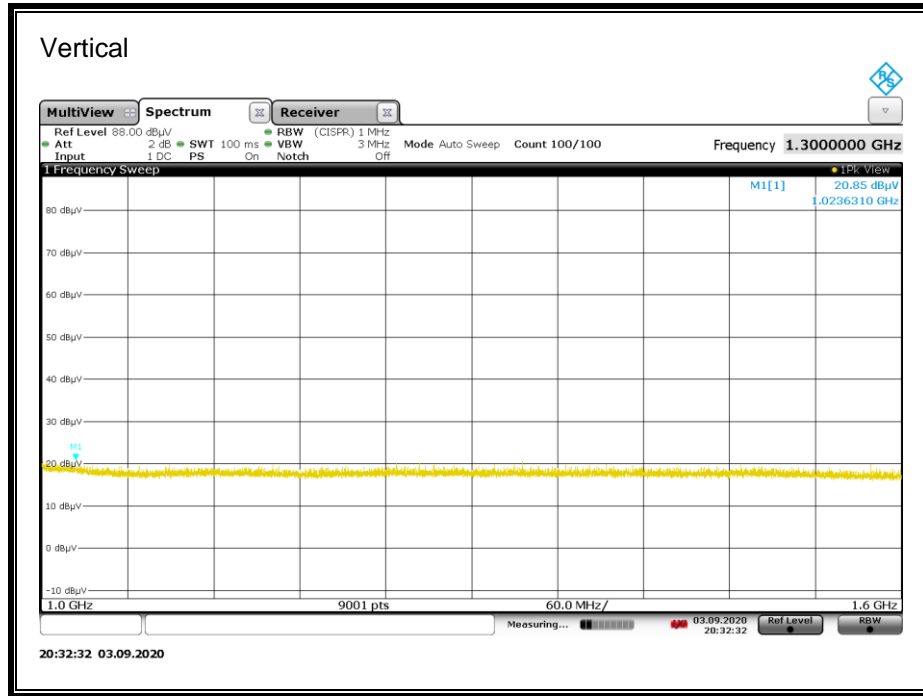
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.248	20.55	Pk	28.9	5.20	-40	14.65	28	-13.35	17	206	H

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$





**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Cable (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	FCC PART18 300m LIMIT (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.024	20.85	Pk	26.74	4.66	-40	12.25	28	-15.75	54	177	V

Pk - Peak detector

Note:

- Test was performed @ 3 meter distance.
- Distance factor from 3m to 300m =  $20\log(3/300) = -40\text{dB}$

## 7.2. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

§ 18.307 For the following equipment, when designed to be connected to the public utility (AC) power line the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following table. Compliance with the provisions of this paragraph shall be based on the measurements of the radio frequency voltage between each power line and ground at the power terminal using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

§ 18.307 (b) All other Part 18 consumer devices:

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ 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.

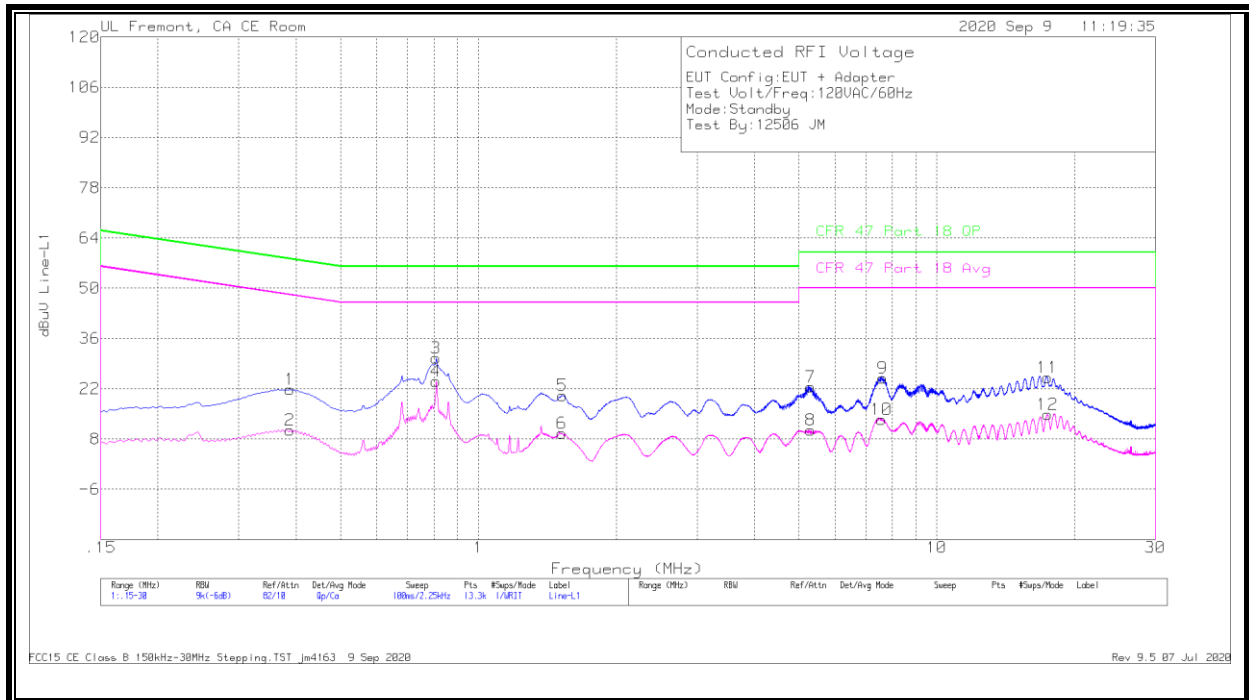
### TEST PROCEDURE

Tested in accordance with FCC / OST MP-5

### RESULTS

### 7.2.1. CONFIGURATION 1

#### LINE 1 RESULTS

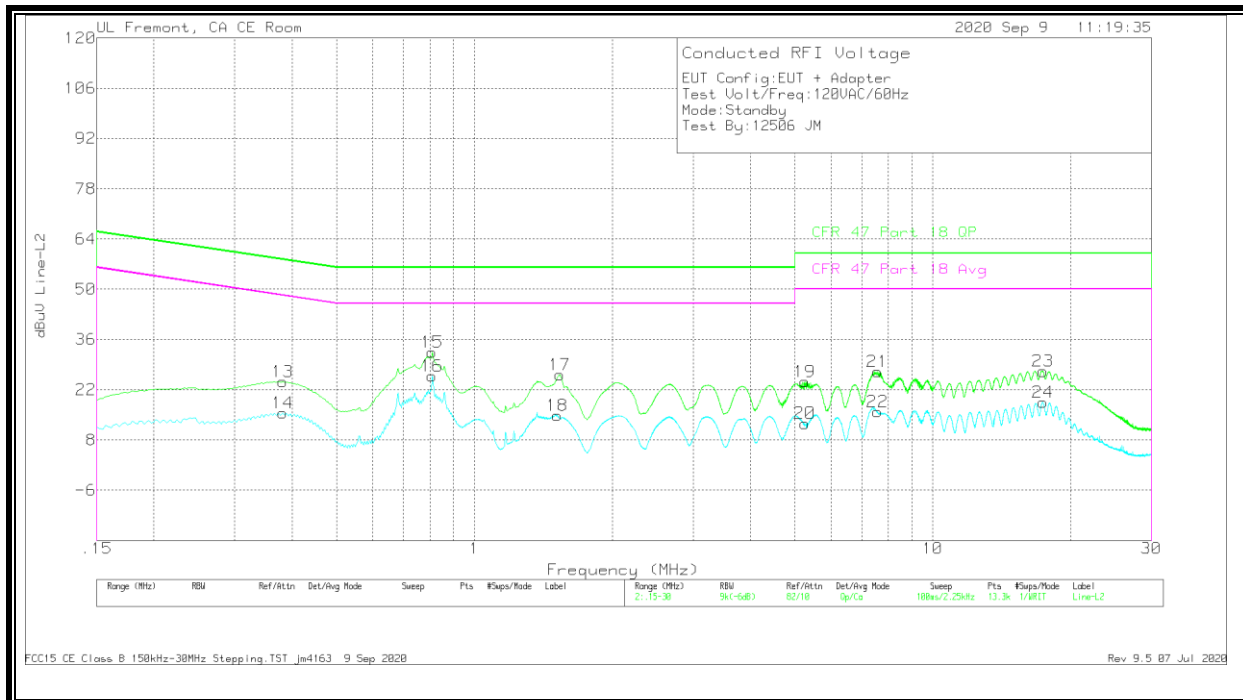


#### WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)Margin (dB)
1	.3885	11.74	Qp	0	0	10	21.74	58.1	-36.36	-	-
2	.3885	.5	Ca	0	0	10	10.5	-	-	48.1	-37.6
3	.80925	20.58	Qp	0	0	10	30.58	56	-25.42	-	-
4	.80925	14.06	Ca	0	0	10	24.06	-	-	46	-21.94
5	1.527	10.05	Qp	0	.1	10	20.15	56	-35.85	-	-
6	1.52025	-.49	Ca	0	.1	10	9.61	-	-	46	-36.39
7	5.31375	12.37	Qp	0	.1	10.1	22.57	60	-37.43	-	-
8	5.316	.24	Ca	0	.1	10.1	10.44	-	-	50	-39.56
9	7.6245	14.69	Qp	0	.2	10.1	24.99	60	-35.01	-	-
10	7.5795	3.17	Ca	0	.2	10.1	13.47	-	-	50	-36.53
11	17.43225	14.57	Qp	0	.3	10.2	25.07	60	-34.93	-	-
12	17.4345	4.28	Ca	0	.3	10.2	14.78	-	-	50	-35.22

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

**LINE 2 RESULTS**



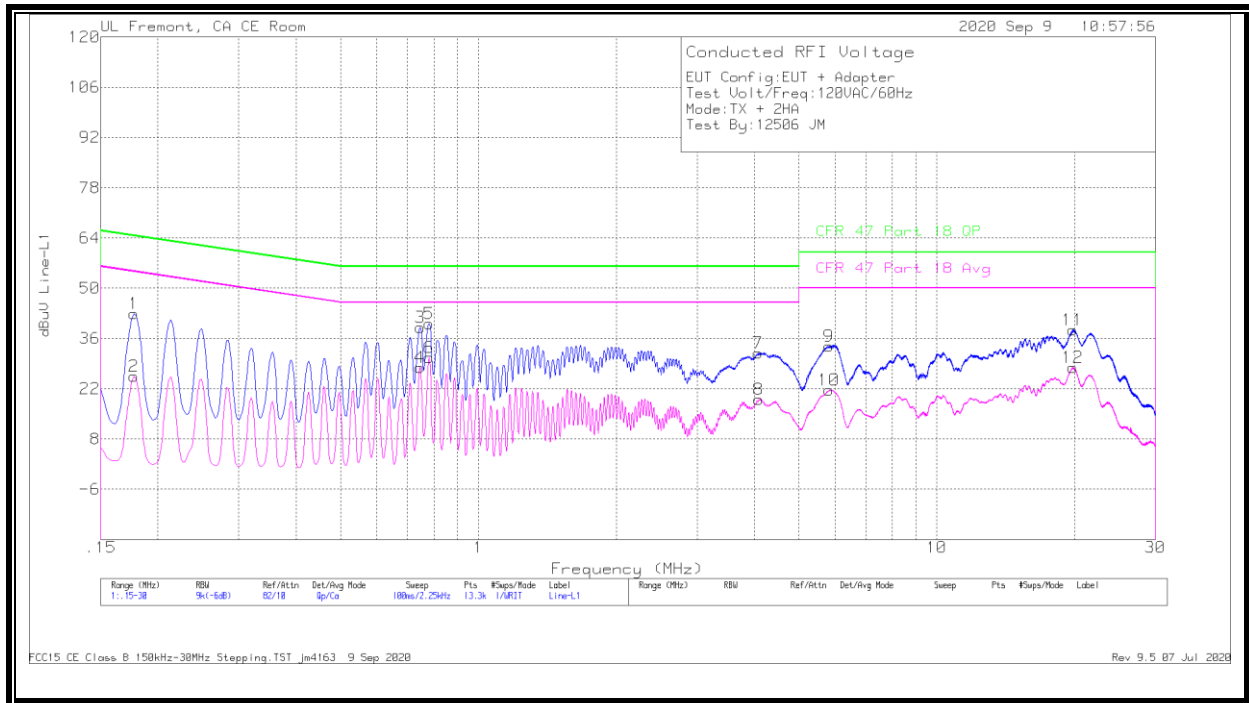
**WORST EMISSIONS**

Marker	Frequency (MHz)	Meter Reading (dBµV)	Det	PRE018644 6 LISN L2	LC Cables C2&C3	Limiters (dB)	Corrected Reading dBµV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)Margin (dB)
13	.38175	14.2	Qp	0	0	10	24.2	58.24	-34.04	-	-
14	.38175	5.48	Ca	0	0	10	15.48	-	-	48.24	-32.76
15	.80925	22.42	Qp	0	0	10	32.42	56	-23.58	-	-
16	.80925	15.85	Ca	0	0	10	25.85	-	-	46	-20.15
17	1.53375	16.01	Qp	0	.1	10	26.11	56	-29.89	-	-
18	1.518	4.67	Ca	0	.1	10	14.77	-	-	46	-31.23
19	5.25525	14.03	Qp	0	.1	10.1	24.23	60	-35.77	-	-
20	5.25638	2.45	Ca	0	.1	10.1	12.65	-	-	50	-37.35
21	7.57275	16.82	Qp	0	.2	10.1	27.12	60	-32.88	-	-
22	7.57275	5.62	Ca	0	.2	10.1	15.92	-	-	50	-34.08
23	17.37825	16.64	Qp	0	.3	10.2	27.14	60	-32.86	-	-
24	17.38838	7.99	Ca	0	.3	10.2	18.49	-	-	50	-31.51

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

### 7.2.2. CONFIGURATION 2

#### LINE 1 RESULTS

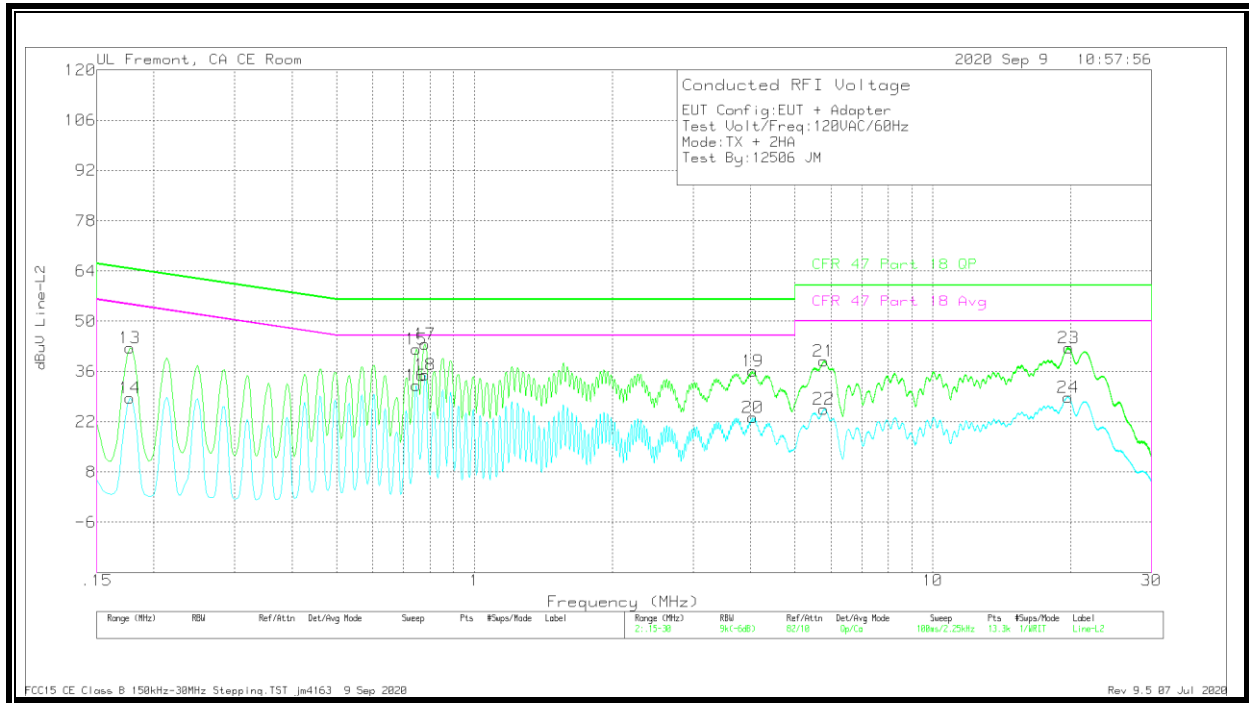


#### WORST EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)Margin (dB)
1	.177	32.98	Qp	0	0	10	42.98	64.63	-21.65	-	-
2	.177	15.52	Ca	0	0	10	25.52	-	-	54.63	-29.11
3	.74625	29.05	Qp	0	0	10	39.05	56	-16.95	-	-
4	.744	17.93	Ca	0	0	10	27.93	-	-	46	-18.07
5	.78	30.2	Qp	0	0	10	40.2	56	-15.8	-	-
6	.78	20.72	Ca	0	0	10	30.72	-	-	46	-15.28
7	4.074	21.67	Qp	0	.1	10.1	31.87	56	-24.13	-	-
8	4.092	8.89	Ca	0	.1	10.1	19.09	-	-	46	-26.91
9	5.82225	23.63	Qp	0	.2	10.1	33.93	60	-26.07	-	-
10	5.8245	11.31	Ca	0	.2	10.1	21.61	-	-	50	-28.39
11	19.8105	27.95	Qp	0	.3	10.2	38.45	60	-21.55	-	-
12	19.79475	17.37	Ca	0	.3	10.2	27.87	-	-	50	-22.13

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

**LINE 2 RESULTS**



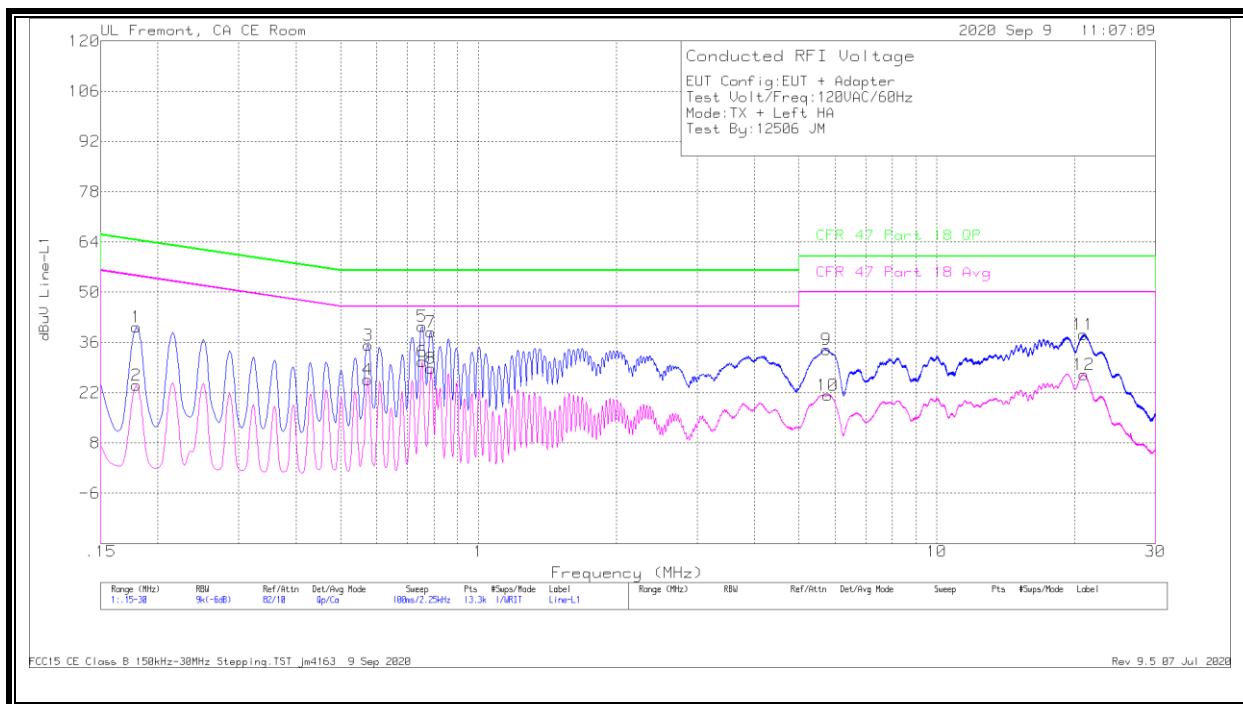
**WORST EMISSIONS**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 LISN L2	LC Cables C2&C3	Limiters (dB)	Corrected Reading dBuV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)Margin (dB)
13	.177	32.61	Qp	0	0	10	42.61	64.63	-22.02	-	-
14	.177	18.67	Ca	0	0	10	28.67	-	-	54.63	-25.96
15	.74625	32.19	Qp	0	0	10	42.19	56	-13.81	-	-
16	.74625	22.11	Ca	0	0	10	32.11	-	-	46	-13.89
17	.78	33.61	Qp	0	0	10	43.61	56	-12.39	-	-
18	.78	25.02	Ca	0	0	10	35.02	-	-	46	-10.98
19	4.04925	25.91	Qp	0	.1	10.1	36.11	56	-19.89	-	-
20	4.047	12.98	Ca	0	.1	10.1	23.18	-	-	46	-22.82
21	5.7885	28.69	Qp	0	.2	10.1	38.99	60	-21.01	-	-
22	5.78625	15.26	Ca	0	.2	10.1	25.56	-	-	50	-24.44
23	19.779	32.11	Qp	0	.3	10.2	42.61	60	-17.39	-	-
24	19.76325	18.35	Ca	0	.3	10.2	28.85	-	-	50	-21.15

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

### 7.2.3. CONFIGURATION 3

#### LINE 1 RESULTS

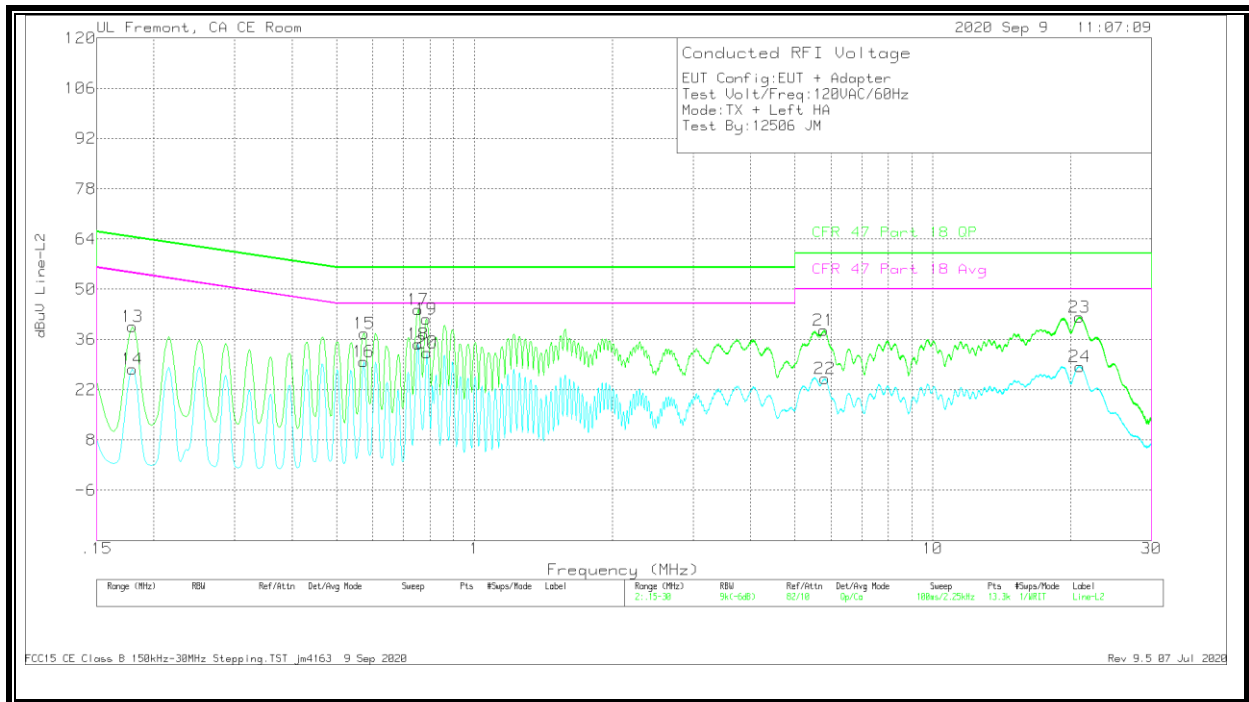


#### WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)Margin (dB)
1	.17925	30.28	Qp	0	0	10	40.28	64.52	-24.24	-	-
2	.17925	14.15	Ca	0	0	10	24.15	-	-	54.52	-30.37
3	.57525	25.28	Qp	0	0	10	35.28	56	-20.72	-	-
4	.573	15.7	Ca	0	0	10	25.7	-	-	46	-20.3
5	.753	30.52	Qp	0	0	10	40.52	56	-15.48	-	-
6	.753	20.67	Ca	0	0	10	30.67	-	-	46	-15.33
7	.78675	28.87	Qp	0	0	10	38.87	56	-17.13	-	-
8	.789	18.85	Ca	0	0	10	28.85	-	-	46	-17.15
9	5.74125	23.69	Qp	0	.2	10.1	33.99	60	-26.01	-	-
10	5.784	10.99	Ca	0	.2	10.1	21.29	-	-	50	-28.71
11	20.91075	27.67	Qp	0	.3	10.2	38.17	60	-21.83	-	-
12	20.93325	16.53	Ca	0	.3	10.2	27.03	-	-	50	-22.97

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

**LINE 2 RESULTS**



**WORST EMISSIONS**

Range 2: Line-L2 .15 - 30MHz

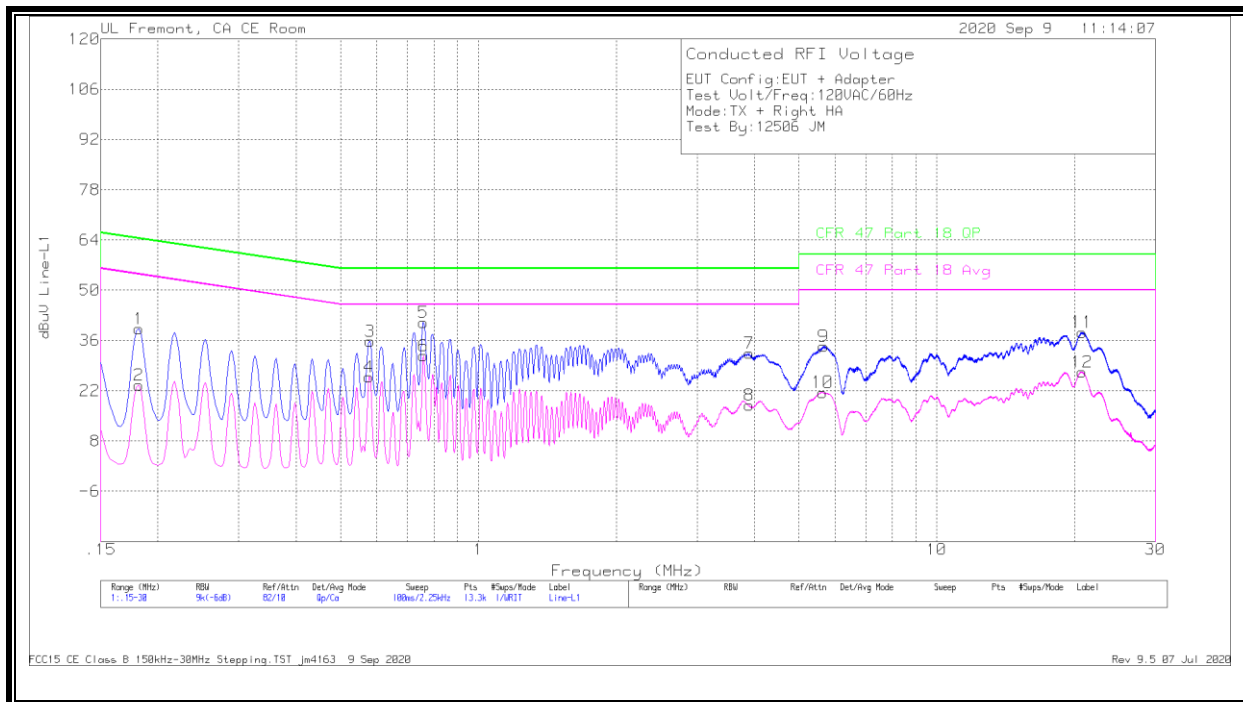
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)M argin (dB)
13	.17925	29.54	Qp	0	0	10	39.54	64.52	-24.98	-	-
14	.17925	17.7	Ca	0	0	10	27.7	-	-	54.52	-26.82
15	.57525	27.71	Qp	0	0	10	37.71	56	-18.29	-	-
16	.573	19.9	Ca	0	0	10	29.9	-	-	46	-16.1
17	.753	34.29	Qp	0	0	10	44.29	56	-11.71	-	-
18	.753	24.76	Ca	0	0	10	34.76	-	-	46	-11.24
19	.7845	31.74	Qp	0	0	10	41.74	56	-14.26	-	-
20	.789	22.37	Ca	0	0	10	32.37	-	-	46	-13.63
21	5.77725	28.26	Qp	0	.2	10.1	38.56	60	-21.44	-	-
22	5.811	14.75	Ca	0	.2	10.1	25.05	-	-	50	-24.95
23	20.88375	31.73	Qp	0	.3	10.2	42.23	60	-17.77	-	-
24	20.91975	18.02	Ca	0	.3	10.2	28.52	-	-	50	-21.48

Qp - Quasi-Peak detector  
 Ca - CISPR average detection



### 7.2.4. CONFIGURATION 4

#### LINE 1 RESULTS

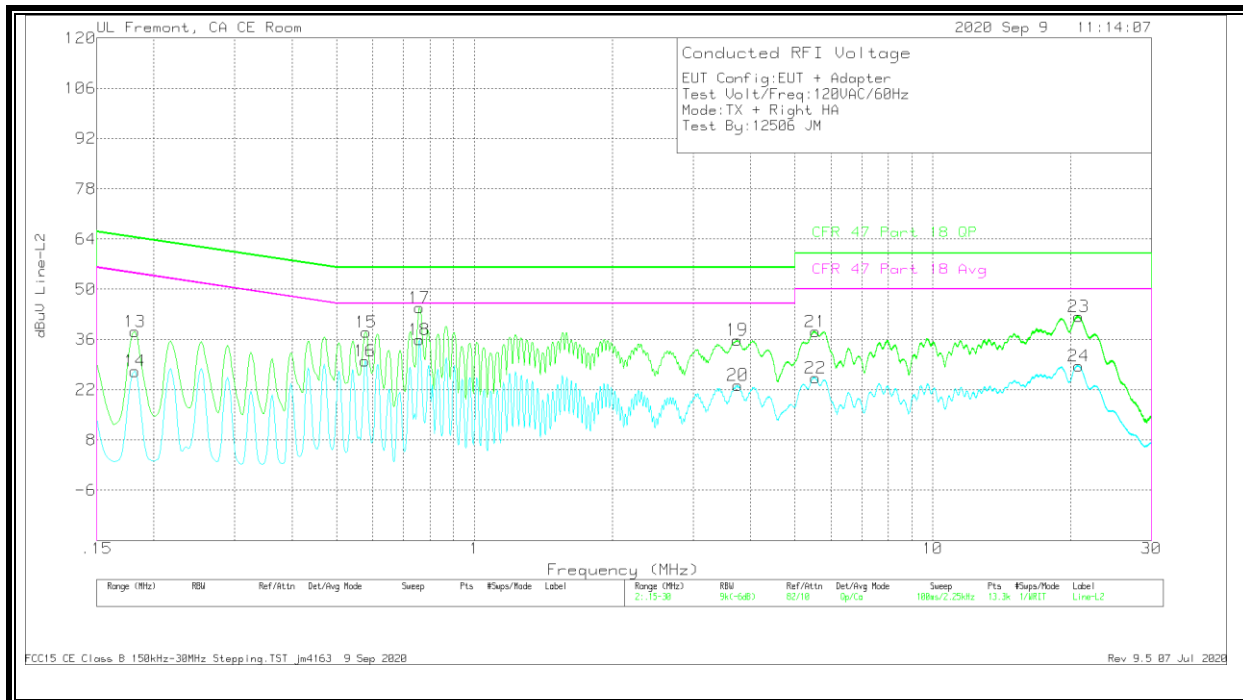


#### WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)Margin (dB)
1	.1815	29.34	Qp	0	0	10	39.34	64.42	-25.08	-	-
2	.1815	13.6	Ca	0	0	10	23.6	-	-	54.42	-30.82
3	.57975	25.7	Qp	0	0	10	35.7	56	-20.3	-	-
4	.5775	15.88	Ca	0	0	10	25.88	-	-	46	-20.12
5	.75975	31.01	Qp	0	0	10	41.01	56	-14.99	-	-
6	.75975	21.7	Ca	0	0	10	31.7	-	-	46	-14.3
7	3.8985	22.38	Qp	0	.1	10	32.48	56	-23.52	-	-
8	3.8985	7.86	Ca	0	.1	10	17.96	-	-	46	-28.04
9	5.66363	24.04	Qp	0	.2	10.1	34.34	60	-25.66	-	-
10	5.64225	11.25	Ca	0	.2	10.1	21.55	-	-	50	-28.45
11	20.73525	27.8	Qp	0	.3	10.2	38.3	60	-21.7	-	-
12	20.76225	16.78	Ca	0	.3	10.2	27.28	-	-	50	-22.72

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

**LINE 2 RESULTS**



**WORST EMISSIONS**

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBµV)	Det	PRE018644 6 LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBµV	CFR 47 Part 18 QP	QP Margin (dB)	CFR 47 Part 18 Avg	Av(CISPR)M argin (dB)
13	.1815	28.23	Qp	0	0	10	38.23	64.42	-26.19	-	-
14	.1815	17.14	Ca	0	0	10	27.14	-	-	54.42	-27.28
15	.57975	28.05	Qp	0	0	10	38.05	56	-17.95	-	-
16	.5775	19.94	Ca	0	0	10	29.94	-	-	46	-16.06
17	.75975	34.86	Qp	0	0	10	44.86	56	-11.14	-	-
18	.75975	25.99	Ca	0	0	10	35.99	-	-	46	-10.01
19	3.74775	25.76	Qp	0	.1	10	35.86	56	-20.14	-	-
20	3.75225	13.19	Ca	0	.1	10	23.29	-	-	46	-22.71
21	5.54325	27.99	Qp	0	.2	10.1	38.29	60	-21.71	-	-
22	5.541	15.06	Ca	0	.2	10.1	25.36	-	-	50	-24.64
23	20.81175	31.95	Qp	0	.3	10.2	42.45	60	-17.55	-	-
24	20.8095	18.19	Ca	0	.3	10.2	28.69	-	-	50	-21.31

Qp - Quasi-Peak detector  
 Ca - CISPR average detection