



TEST REPORT

Report Number. : 13257051-E1V3

Applicant : EVERACTIVE
2986 OAKMEAD VILLAGE CT
SANTA CLARA, CA 95051
U.S.A.

Model : 810-00001

FCC ID : 2AO7C-81000001

ISED ID : 23743-81000001

EUT Description : Energy harvesting sensor node

Test Standard(s) : FCC 47 CFR
ISED RSS-247
ISED RSS-GEN

Date Of Issue:

May 27, 2020

Prepared by:

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	05/06/2020	Initial Issue	---
V2	05/21/2020	Revised based on reviewer's comments.	Bobby Bayani
V3	05/27/2020	Report revised based on reviewer's comments. Sec. 8.2 updated.	Bobby Bayani

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: EVERACTIVE
2986 OAKMEAD VILLAGE CT
SANTA CLARA, CA 95051
U.S.A.

EUT DESCRIPTION: Energy harvesting sensor node

MODEL: 810-00001

SERIAL NUMBER: 13118 (Radiated Sample)
13115 (Conducted Sample)

DATE TESTED: FEBERUARY 25 – MARCH 11, 2020

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.

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UL Verification Services Inc.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.10:2013
- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- RSS-GEN Issue 5
- RSS-247 Issue 2
- KDB 558074 D01 15.247 Meas Guidance v05r02

3. FACILITIES AND ACCREDITATION

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

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
<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	

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

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 _{Lab}
Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Radiated Disturbance, 26000 to 40000 MHz	5.17 dB
Occupied Channel Bandwidth	±0.39 %
Temperature	±0.9 °C
Supply voltages	±0.45 %
Time	±0.02 %

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

4.4. 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)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + 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. EUT DESCRIPTION

The EUT is an energy harvesting sensor node that operates in the 902-928MHz band.

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)
902-928	Normal	6.87	4.86

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio uses a fixed custom-built antenna with a peak gain 0.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was svg_fcc_v0.0.2_2020_03_04.

5.5. WORST-CASE CONFIGURATION AND MODE

For below 30MHz testing, investigation was done on three antenna orientations: Rx antenna Face-on, Face-off and horizontal (parallel to ground). The worst-case configurations were determined on Rx antenna Face-on and Face-off; therefore, all final tests were performed using these two orientations.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 meter open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Radiated emissions below 30MHz were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emissions from 30MHz to 1GHz were performed with the EUT set to transmit at low middle and high channels.

Band edge and radiated emissions between 30MHz 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 Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
DC Power Supply	SORENSEN	XT 15-4	1319A02780	
Laptop	Lenovo	X1 Carbon	-	PD962205ANSU
Laptop Adapter	Lenovo	ADLX65NCC2A	11S45N0255Z1 ZSH956T1BH V2.0	-
Debug Board	Saiko Systems LTD	BRK_UBS-C	PCB 100090B V1.0	-
Silverglade Debug Board 2.0	Silverglade	SVG Prog 2.0	SN1	-

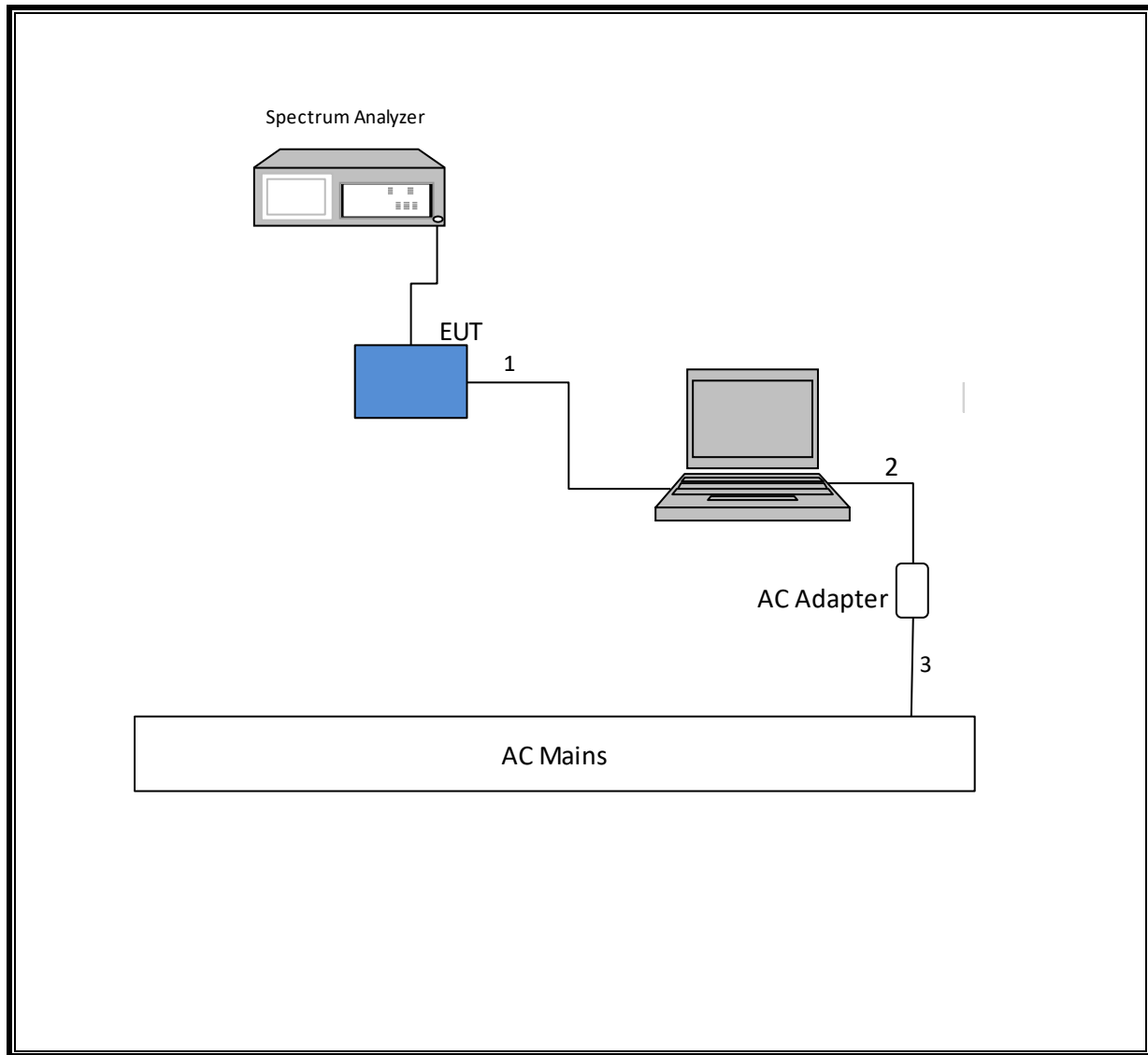
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Shielded	1	
2	DC	1	DC	Shielded	1	
3	AC	1	3-Prong	Unshielded	1	
4	USB	1	USB	Shielded	1	EUT to debug board
5	DC	1	DC	Unshielded	1	debug board to DC power supply
6	AC	1	AC	Unshielded	1	debug board to DC power supply

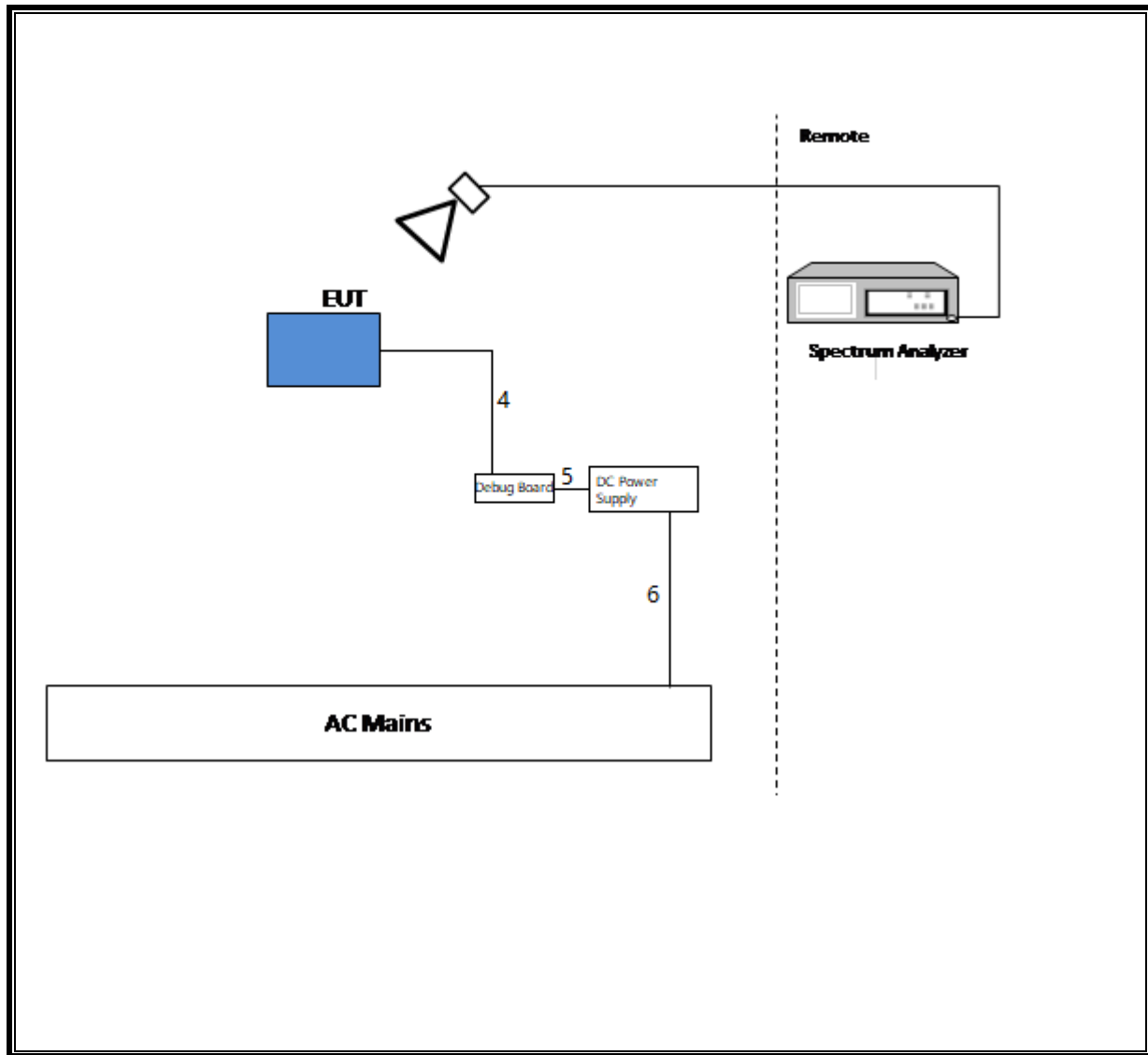
TEST SETUP

The EUT is connected to a debug board, which connected to a DC power supply, during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179372	02/16/2021
Antenna	ETS-Lindgren	3117	EMC4294	06/14/2020
RF Filter Box, 1-18GHz	UL,FREMONT	-	PRE0180022	01/30/2021
Antenna, BroadBand Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	PRE0181574	10/14/2020
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	PRE0186650	01/23/2021
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight Technologies Inc	E4446A	T146	01/29/2021
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	PRE0165308	04/11/2020
Filter, BRF 902 to 928MHz	MICRO-TRONICS	BRC50722	T1847	07/29/2020
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1269	01/21/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	T1225	02/13/2021
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, Oct 21, 2019	
Antenna Port Software	UL	UL RF	Ver 2020.1.8	

7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

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

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

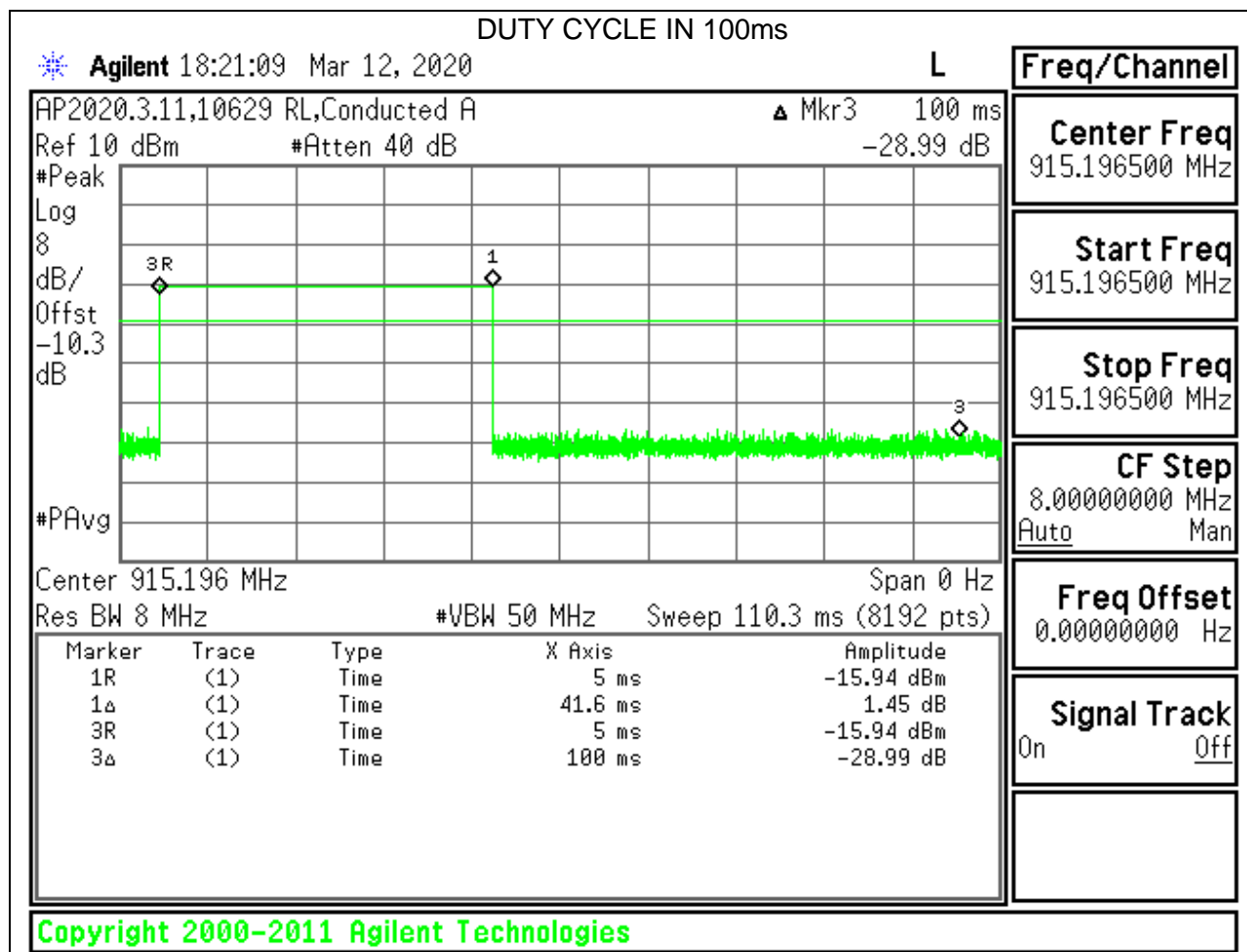
LIMITS

None; for reporting purposes only.

ON TIME AND DUTY CYCLE RESULTS

ON Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
41.6	100.0	0.416	41.60%	7.62

DUTY CYCLE PLOTS



8.2. 20 dB AND 99% BANDWIDTH

LIMITS

FCC §15.247 (a) (1)(i)

RSS-247 (5.1) (c)

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

TEST PROCEDURE

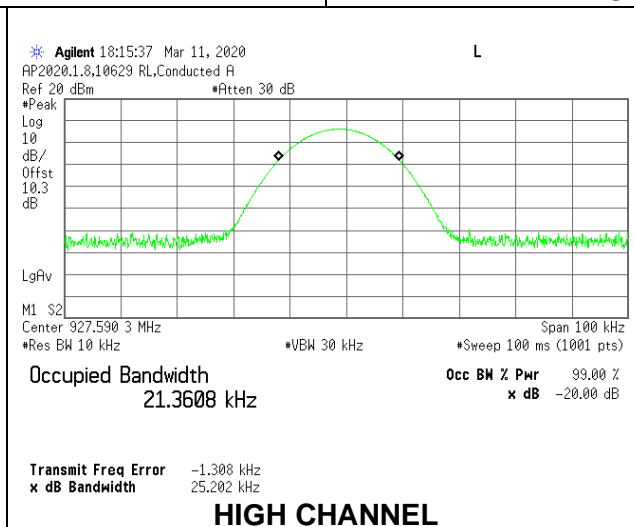
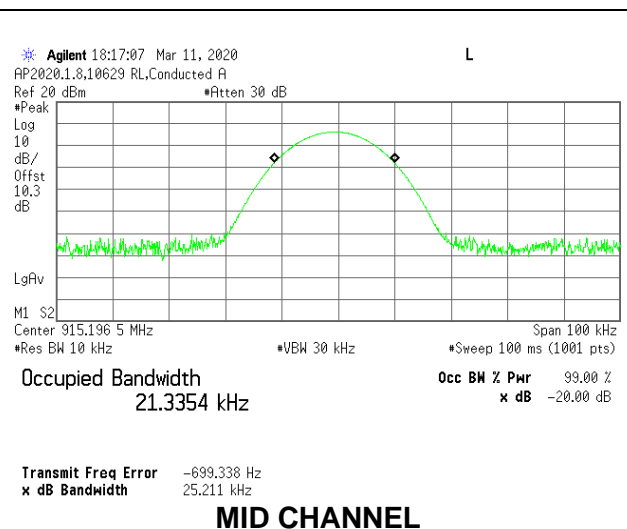
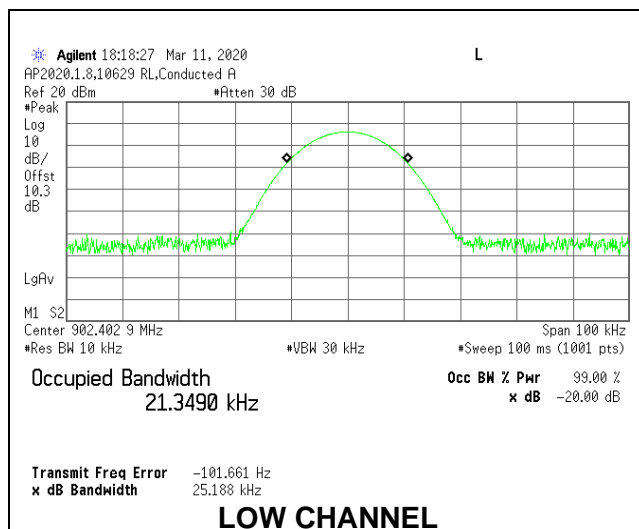
The transmitter output is connected to the spectrum analyzer. The RBW is set to 10kHz. The VBW is set to 3 times the RBW. The sweep time is coupled.

Note: Because the measured signal is CW or CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

RESULTS

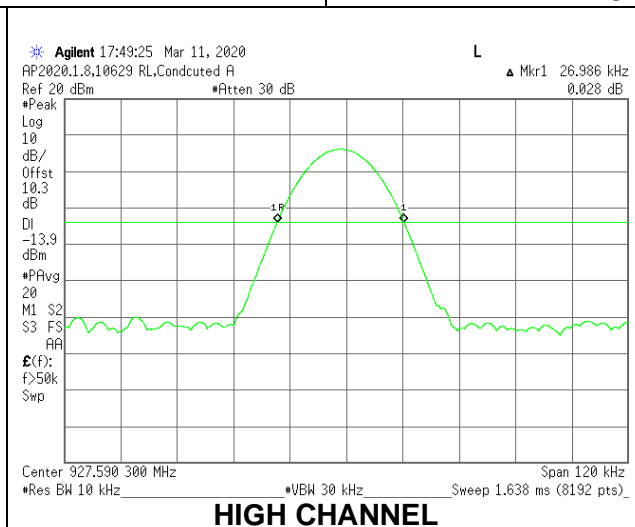
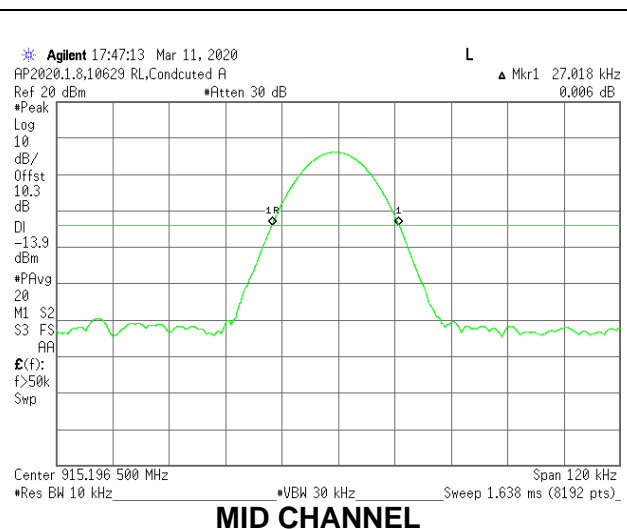
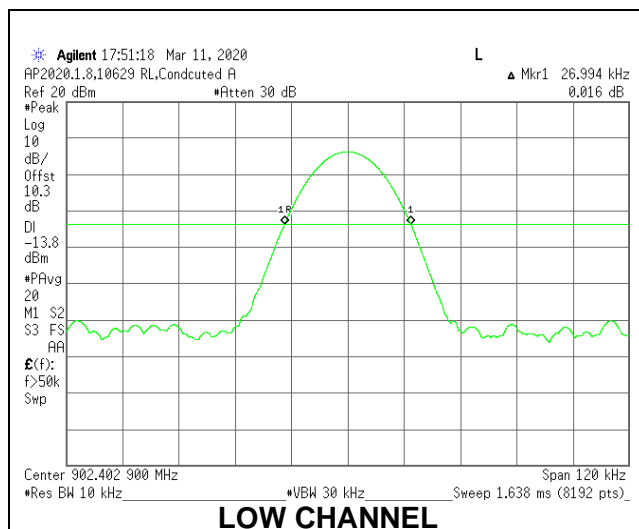
8.2.1. 99% OCCUPIED BANDWIDTH

Channel	Frequency (MHz)	99% Bandwidth (kHz)
Low	902.4029	21.3490
Mid	915.1965	21.3354
High	927.5903	21.3608



8.2.2. 20dB BANDWIDTH

Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
Low	902.4029	26.994	500
Mid	915.1965	27.018	500
High	927.5903	26.986	500



8.3. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

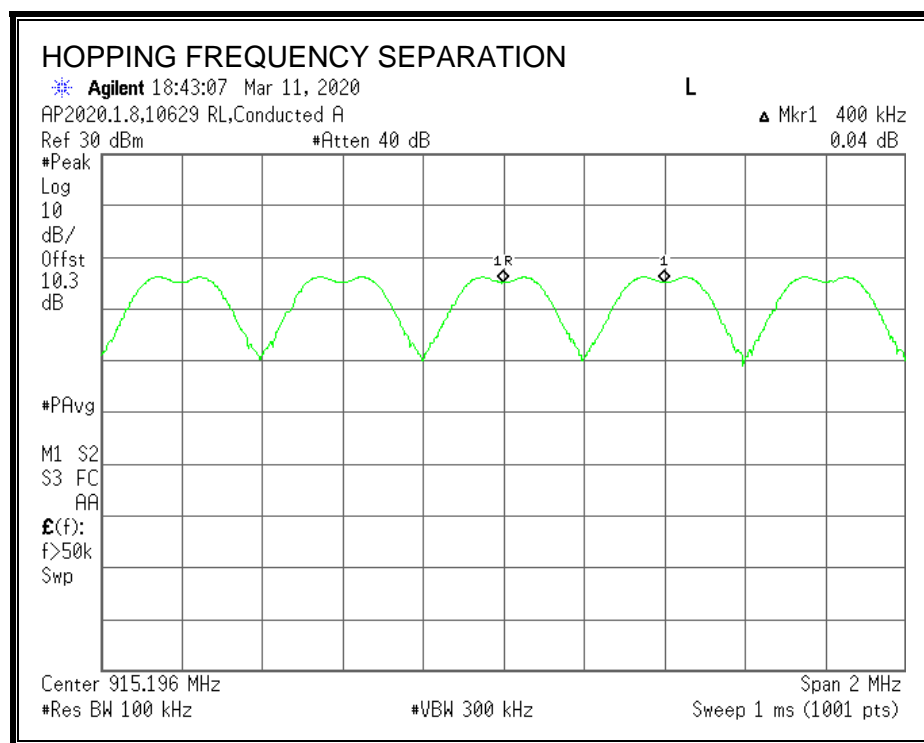
RSS-247 (5.1) (c)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS



8.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

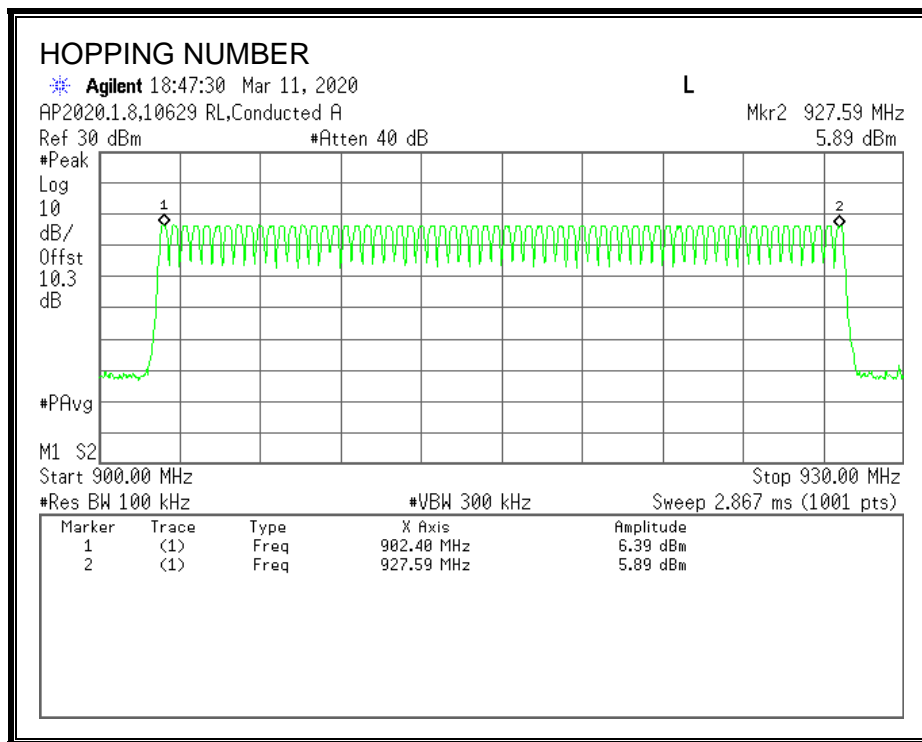
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 64 Channels observed



8.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

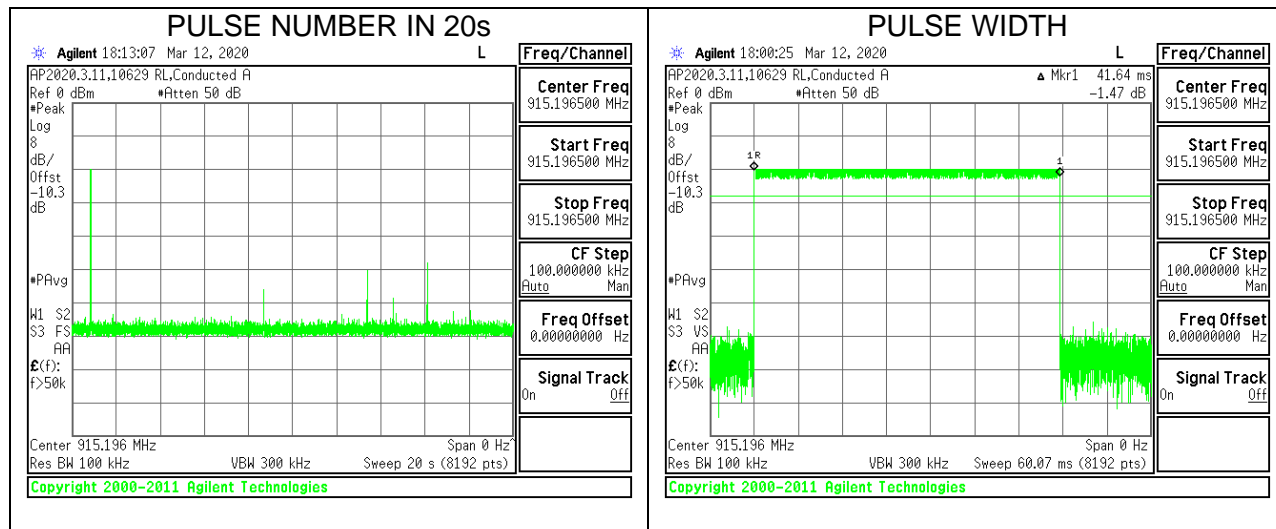
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 20 second scan, to enable resolution of each occurrence.

RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 20 seconds	Average Time of Occupancy in 20 seconds (sec)	Limit (sec)	Margin (sec)
Normal	41.64	1	0.0416	0.4	-0.3584



8.6. OUTPUT POWER

LIMITS

§15.247 (b) (2)

RSS-247 (5.4) (a)

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels as permitted under paragraph (a)(1)(i) of this section.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

Tested By:	10629 RL
Date:	3/11/2020

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.4029	6.87	30	-23.13
Middle	915.1965	6.81	30	-23.19
High	927.5903	6.80	30	-23.2

8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

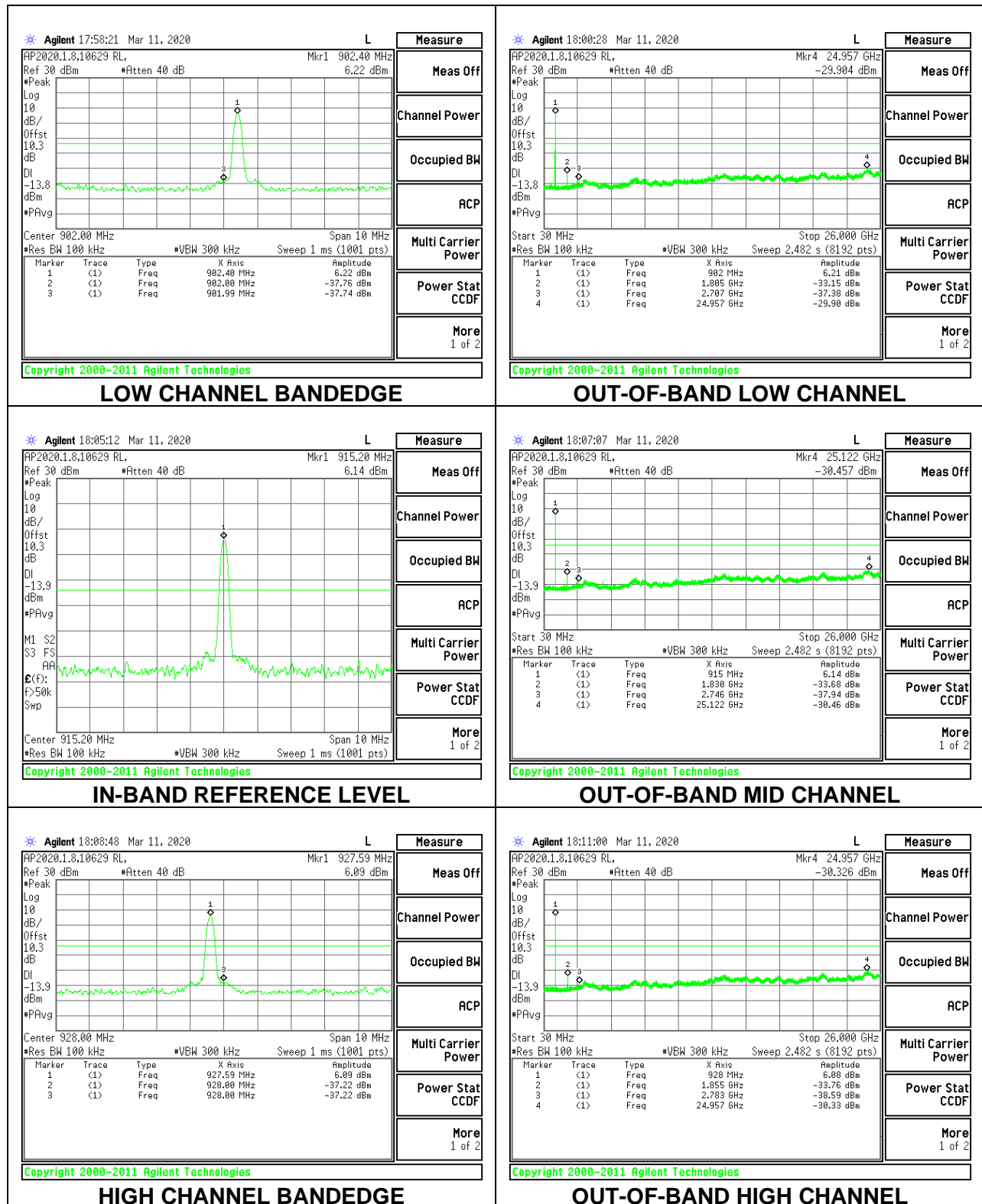
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

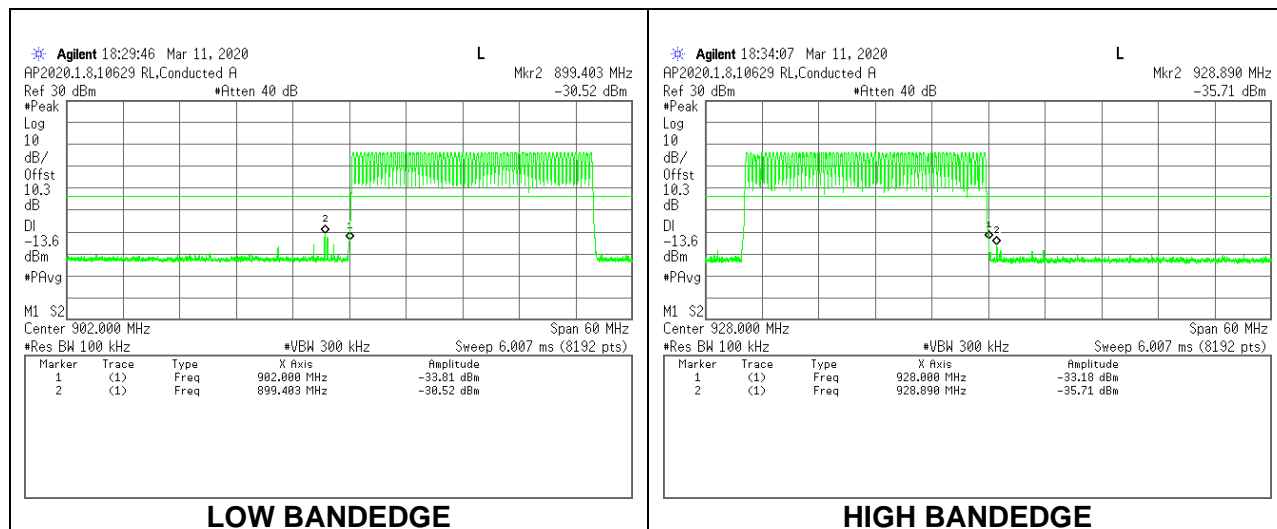
The bandedges at 902MHz and 928MHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

SPURIOUS EMISSIONS, NON-HOPPING



SPURIOUS BANDEGE EMISSIONS WITH HOPPING ON



9. RADIATED TEST RESULTS

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.

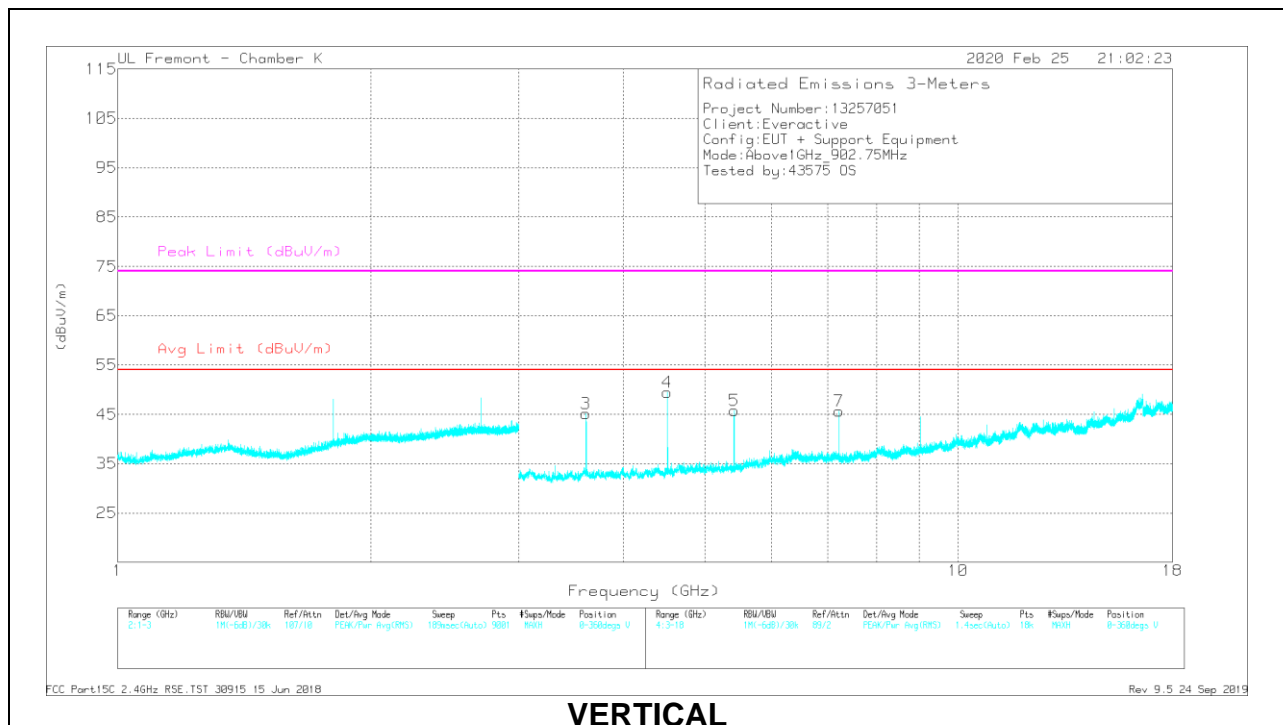
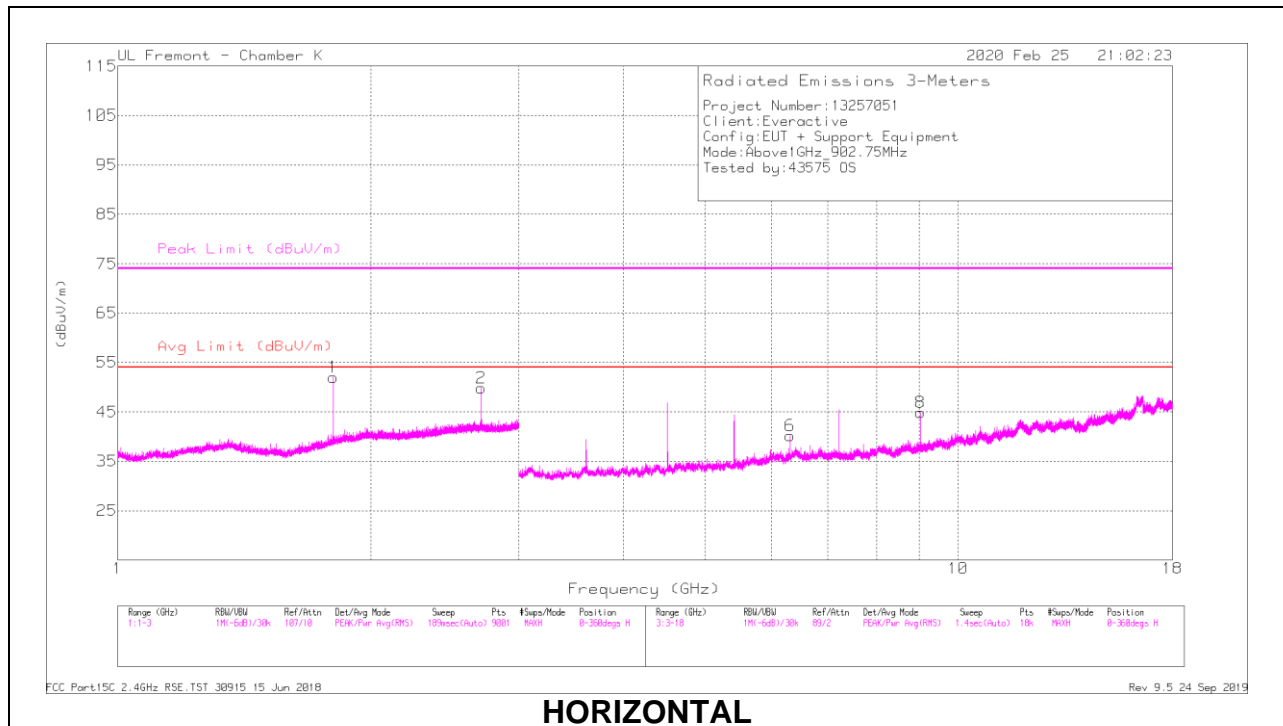
The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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.

9.1. TRANSMITTER ABOVE 1 GHz

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.80489	46.5	Pk	30.3	-24.8	52	-	-	-	-	0-360	199	H
2	* 2.70733	41.59	Pk	32.7	-24.4	49.89	-	-	74	-24.11	0-360	199	H
6	6.31685	31.14	Pk	35.8	-26.7	40.24	-	-	-	-	0-360	101	H
8	* 9.02367	31.49	Pk	36.3	-22.9	44.89	-	-	74	-29.11	0-360	101	H
3	* 3.6092	43.11	Pk	33.3	-31.3	45.11	-	-	74	-28.89	0-360	101	V
4	* 4.51175	45.48	Pk	33.7	-29.7	49.48	-	-	74	-24.52	0-360	101	V
5	* 5.4143	39.53	Pk	34.5	-28.2	45.83	-	-	74	-28.17	0-360	199	V
7	7.2194	35.26	Pk	35.6	-25.2	45.66	-	-	-	-	0-360	199	V

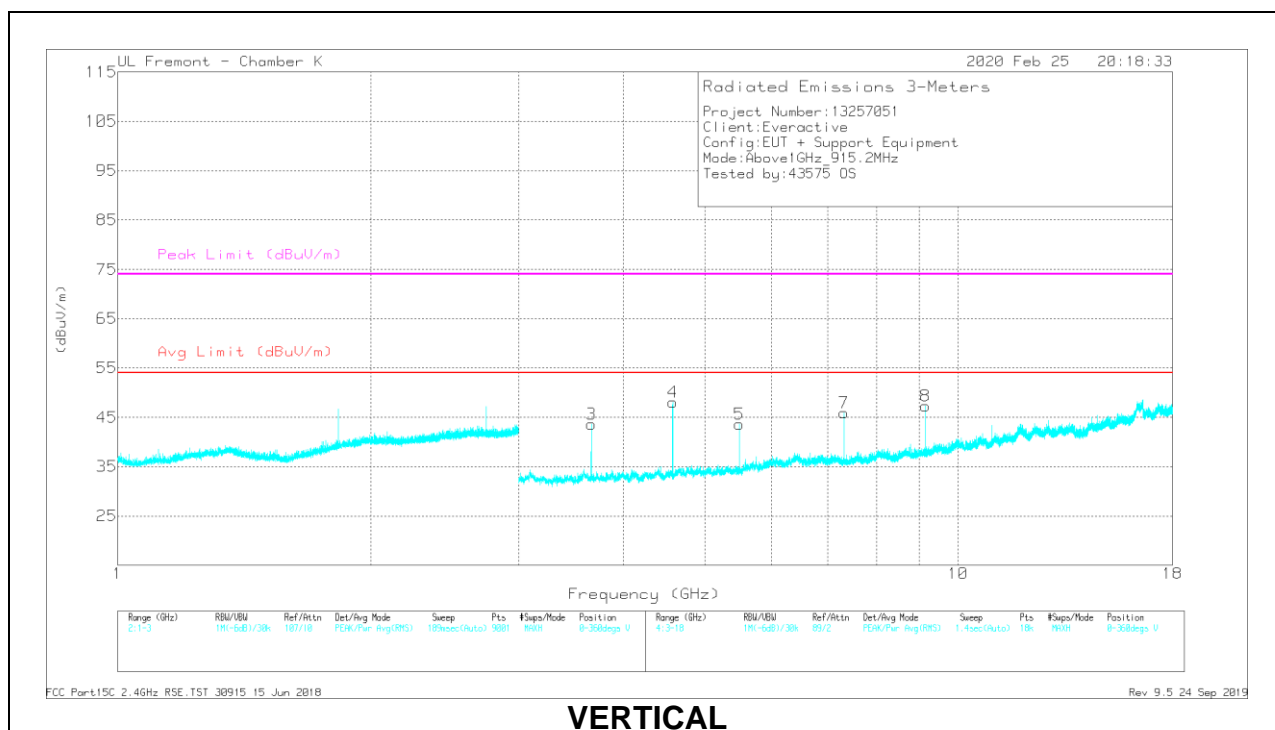
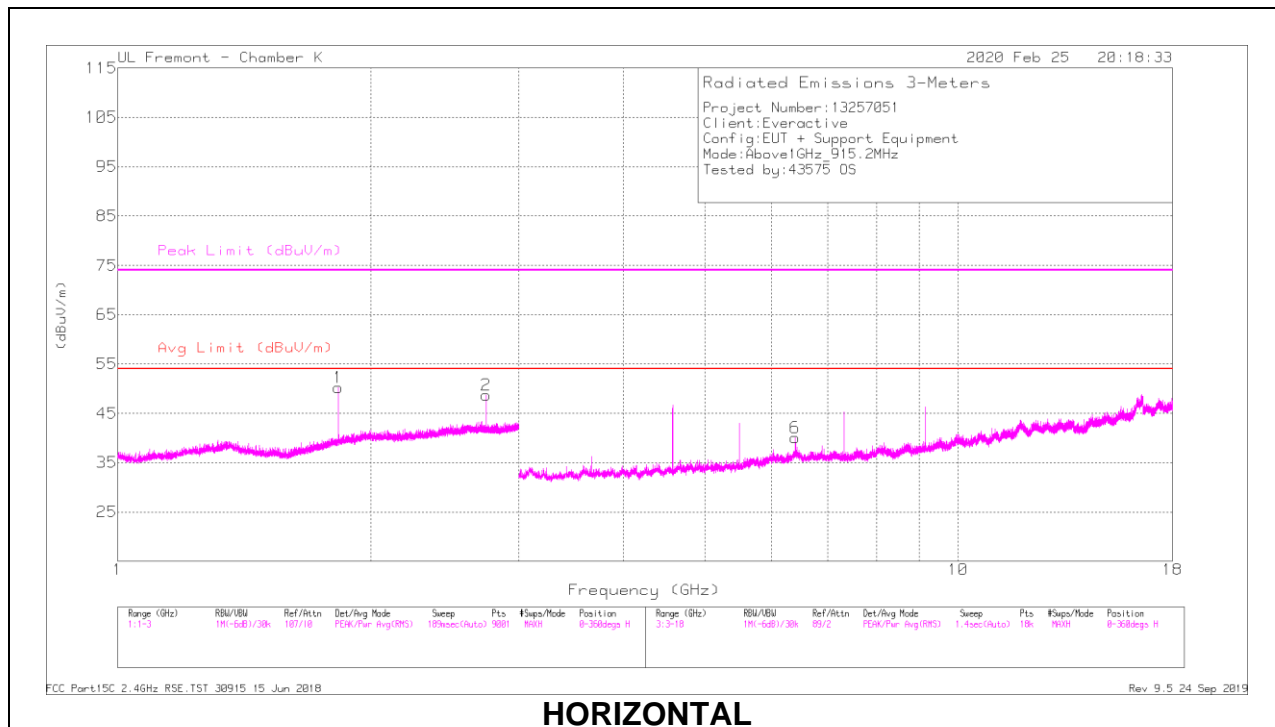
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.80482	48.45	PK2	30.3	-24.8	53.95	-	-	-	-	150	233	H
1.80481	45.55	MAv1	30.3	-24.8	51.05	-	-	-	-	150	233	H
* 2.70731	45.83	PK2	32.7	-24.4	54.13	-	-	74	-19.87	153	132	H
* 2.70722	39.17	MAv1	32.7	-24.4	47.47	54	-6.53	-	-	153	132	H
6.31691	37.35	PK2	35.8	-26.7	46.45	-	-	-	-	233	98	H
6.31685	28.76	MAv1	35.8	-26.7	37.86	-	-	-	-	233	98	H
* 9.02401	35.24	PK2	36.3	-22.9	48.64	-	-	74	-25.36	217	198	H
* 9.02407	27.75	MAv1	36.3	-22.9	41.15	54	-12.85	-	-	217	198	H
* 3.60965	45.6	PK2	33.3	-31.3	47.6	-	-	74	-26.4	202	101	V
* 3.60962	42.29	MAv1	33.3	-31.3	44.29	54	-9.71	-	-	202	101	V
* 4.51204	47.3	PK2	33.7	-29.6	51.4	-	-	74	-22.6	150	101	V
* 4.51203	45.21	MAv1	33.7	-29.6	49.31	54	-4.69	-	-	150	101	V
* 5.41441	42.07	PK2	34.5	-28.2	48.37	-	-	74	-25.63	222	213	V
* 5.41443	38.95	MAv1	34.5	-28.2	45.25	54	-8.75	-	-	222	213	V
7.21934	38.56	PK2	35.6	-25.2	48.96	-	-	-	-	226	111	V
7.21924	33.68	MAv1	35.6	-25.2	44.08	-	-	-	-	226	111	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



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.83022	44.48	Pk	30.6	-24.8	50.28	-	-	-	-	0-360	199	H
2	* 2.74555	40.51	Pk	32.5	-24.3	48.71	-	-	74	-25.29	0-360	101	H
6	6.40602	29.71	Pk	35.8	-25.4	40.11	-	-	-	-	0-360	101	H
3	* 3.66004	41.77	Pk	32.9	-31.1	43.57	-	-	74	-30.43	0-360	101	V
4	* 4.57592	44.06	Pk	33.9	-29.9	48.06	-	-	74	-25.94	0-360	101	V
5	5.49097	37.48	Pk	34.5	-28.4	43.58	-	-	-	-	0-360	101	V
7	* 7.32108	35.61	Pk	35.6	-25.3	45.91	-	-	74	-28.09	0-360	101	V
8	* 9.15201	33.28	Pk	36.4	-22.4	47.28	-	-	74	-26.72	0-360	199	V

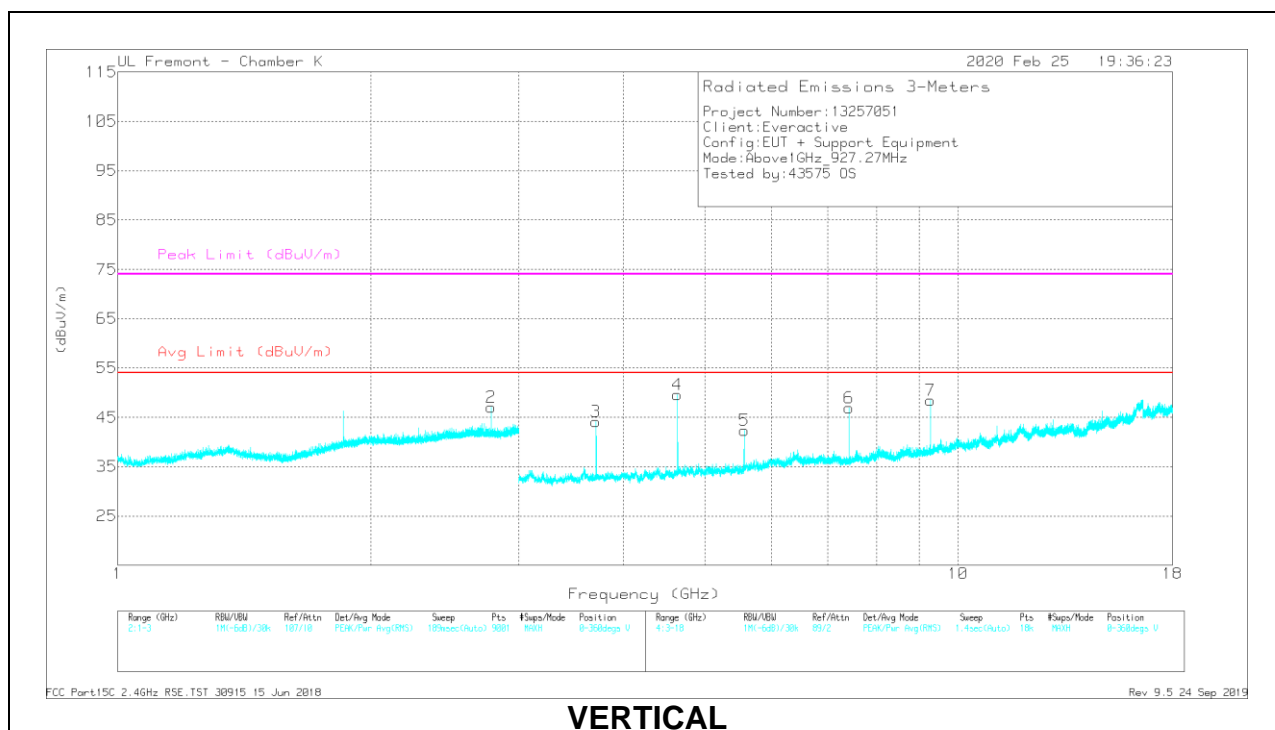
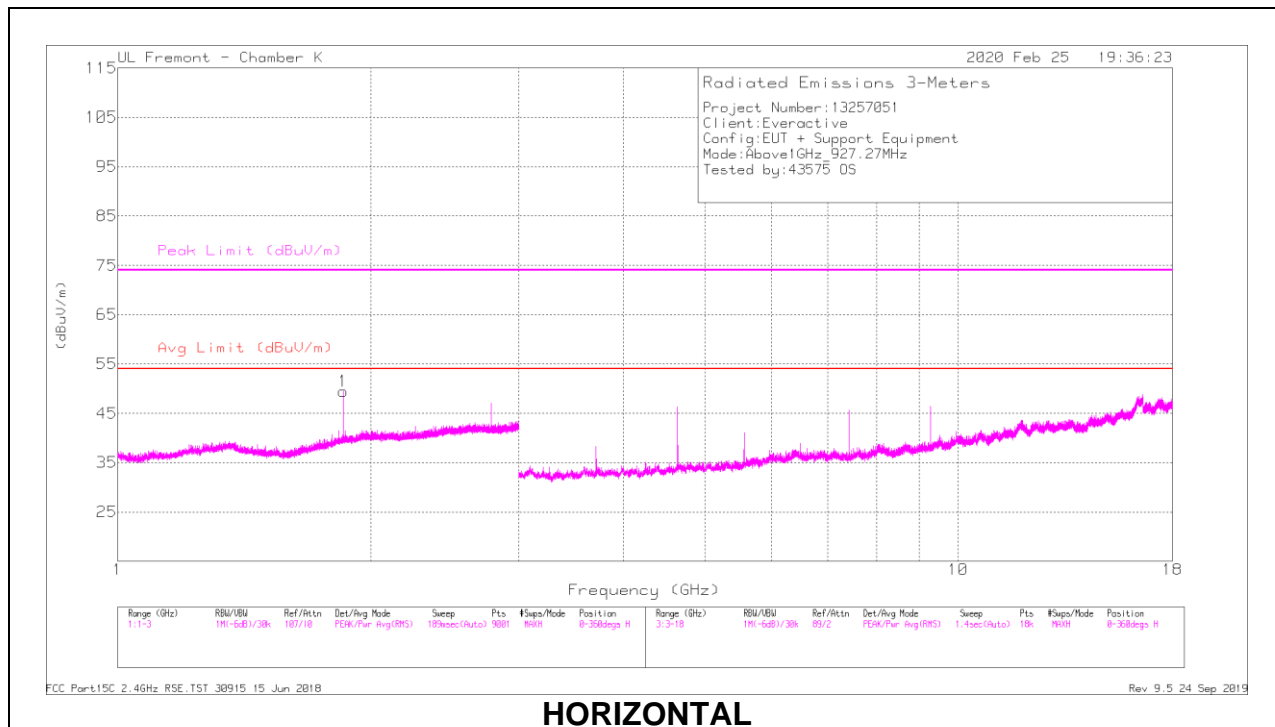
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83033	47.02	PK2	30.6	-24.8	52.82	-	-	-	-	151	199	H
1.83039	43.07	MAV1	30.6	-24.8	48.87	-	-	-	-	151	199	H
* 2.7455	45	PK2	32.5	-24.3	53.2	-	-	74	-20.8	162	183	H
* 2.74561	38.14	MAV1	32.5	-24.3	46.34	54	-7.66	-	-	162	183	H
6.40626	36.13	PK2	35.8	-25.4	46.53	-	-	-	-	244	122	H
6.40639	26.95	MAV1	35.8	-25.4	37.35	-	-	-	-	244	122	H
* 3.66076	44.51	PK2	32.9	-31.1	46.31	-	-	74	-27.69	195	104	V
* 3.6608	40.35	MAV1	32.9	-31.1	42.15	54	-11.85	-	-	195	104	V
* 4.57597	47.17	PK2	33.9	-29.9	51.17	-	-	74	-22.83	149	96	V
* 4.57601	45.17	MAV1	33.9	-29.9	49.17	54	-4.83	-	-	149	96	V
5.49111	40.58	PK2	34.5	-28.4	46.68	-	-	-	-	212	129	V
5.4912	35.81	MAV1	34.5	-28.4	41.91	-	-	-	-	212	129	V
* 7.32157	39.02	PK2	35.6	-25.3	49.32	-	-	74	-24.68	231	116	V
* 7.32159	34.51	MAV1	35.6	-25.3	44.81	54	-9.19	-	-	231	116	V
* 9.15201	37.05	PK2	36.4	-22.4	51.05	-	-	74	-22.95	204	237	V
* 9.152	32.3	MAV1	36.4	-22.4	46.3	54	-7.7	-	-	204	237	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



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dBm)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.85533	43.4	Pk	30.9	-24.8	0	49.5	-	-	-	-	0-360	101	H
2	* 2.78266	38.89	Pk	32.4	-24.2	0	47.09	-	-	74	-26.91	0-360	101	V
3	* 3.71004	41.83	Pk	33.1	-30.8	0	44.13	-	-	74	-29.87	0-360	101	V
4	* 4.63759	45.64	Pk	33.9	-29.9	0	49.64	-	-	74	-24.36	0-360	101	V
5	5.56514	35.9	Pk	34.6	-28.2	0	42.3	-	-	-	-	0-360	101	V
6	* 7.42025	36.57	Pk	35.7	-25.4	0	46.87	-	-	74	-27.13	0-360	101	V
7	9.27618	34.62	Pk	36.4	-22.6	0	48.42	-	-	-	-	0-360	199	V

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

Radiated Emissions

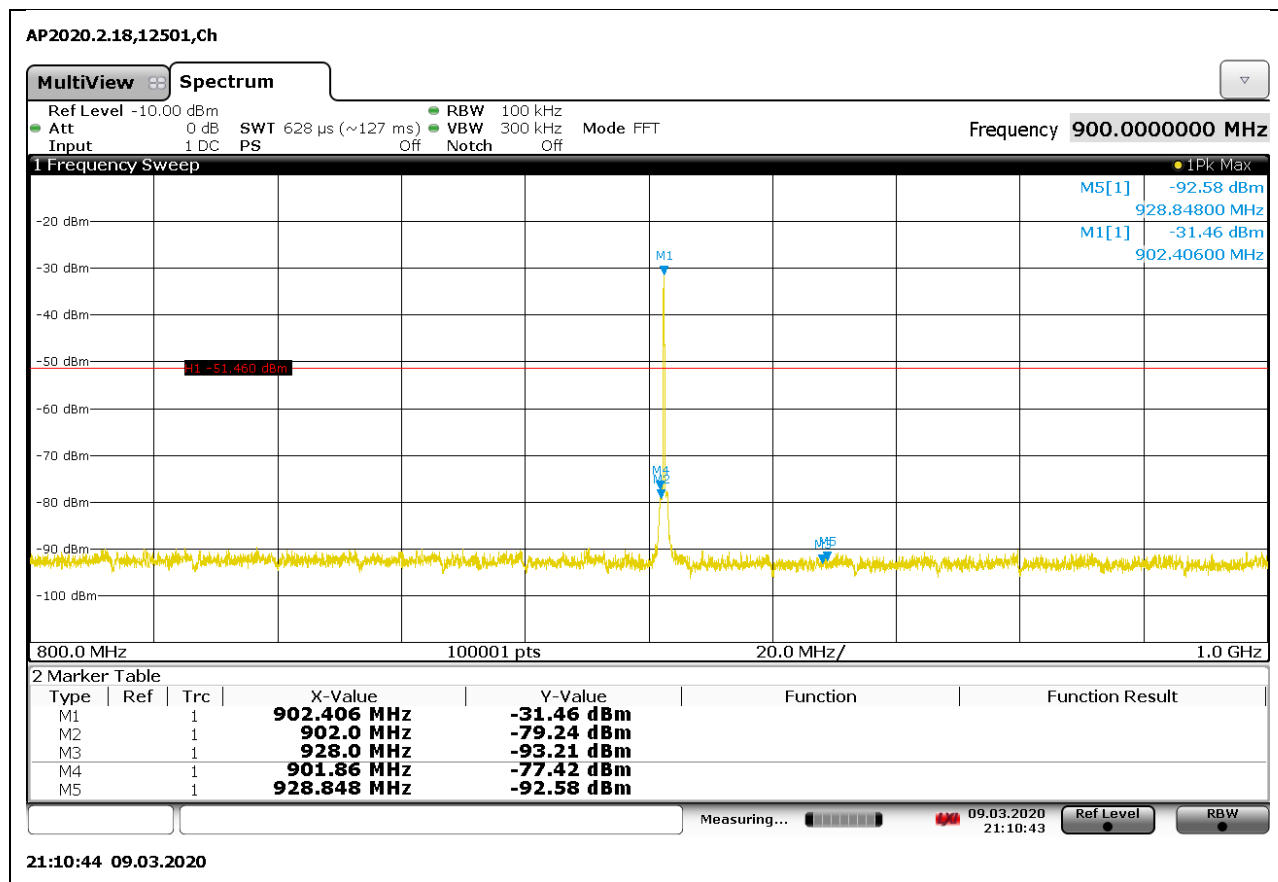
Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dBm)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.85519	46.58	PK2	30.9	-24.8	0	52.68	-	-	-	-	147	101	H
1.85518	41.46	MAV1	30.9	-24.8	0	47.56	-	-	-	-	147	101	H
* 2.78283	44.22	PK2	32.4	-24.2	0	52.42	-	-	74	-21.58	67	119	V
* 2.78278	36.02	MAV1	32.4	-24.2	0	44.22	54	-9.78	-	-	67	119	V
* 3.71034	44.75	PK2	33.1	-30.8	0	47.05	-	-	74	-26.95	197	97	V
* 3.71038	41.18	MAV1	33.1	-30.8	0	43.48	54	-10.52	-	-	197	97	V
* 4.63793	47.06	PK2	33.9	-29.9	0	51.06	-	-	74	-22.94	151	120	V
* 4.63796	44.65	MAV1	33.9	-29.9	0	48.65	54	-5.35	-	-	151	120	V
5.56563	41.28	PK2	34.6	-28.2	0	47.68	-	-	-	-	246	192	V
5.56556	35.4	MAV1	34.6	-28.2	0	41.8	-	-	-	-	246	192	V
* 7.42074	39.09	PK2	35.6	-25.4	0	49.29	-	-	74	-24.71	249	194	V
* 7.42074	35.34	MAV1	35.6	-25.4	0	45.54	54	-8.46	-	-	249	194	V
9.27591	38.01	PK2	36.4	-22.6	0	51.81	-	-	-	-	207	227	V
9.27594	32.95	MAV1	36.4	-22.6	0	46.75	-	-	-	-	207	227	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAV1 - KDB558074 Option 1 Maximum RMS Average

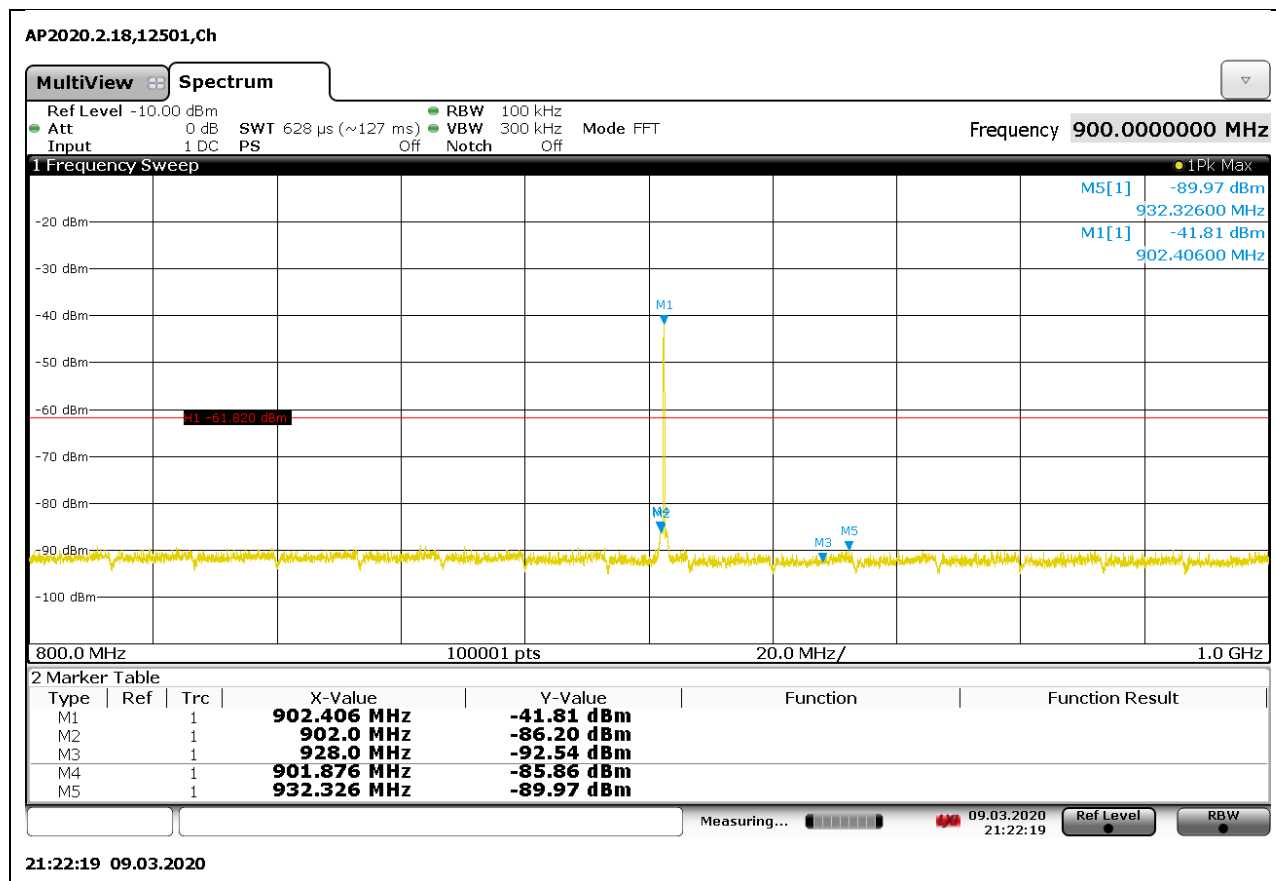
9.2. TRANSMITTER BELOW 1 GHz

-20 dBc BANDEDGE WITHOUT NOTCH FILTER AND PRE-AMPLIFIER (LOW CHANNEL)

HORIZONTAL RESULT

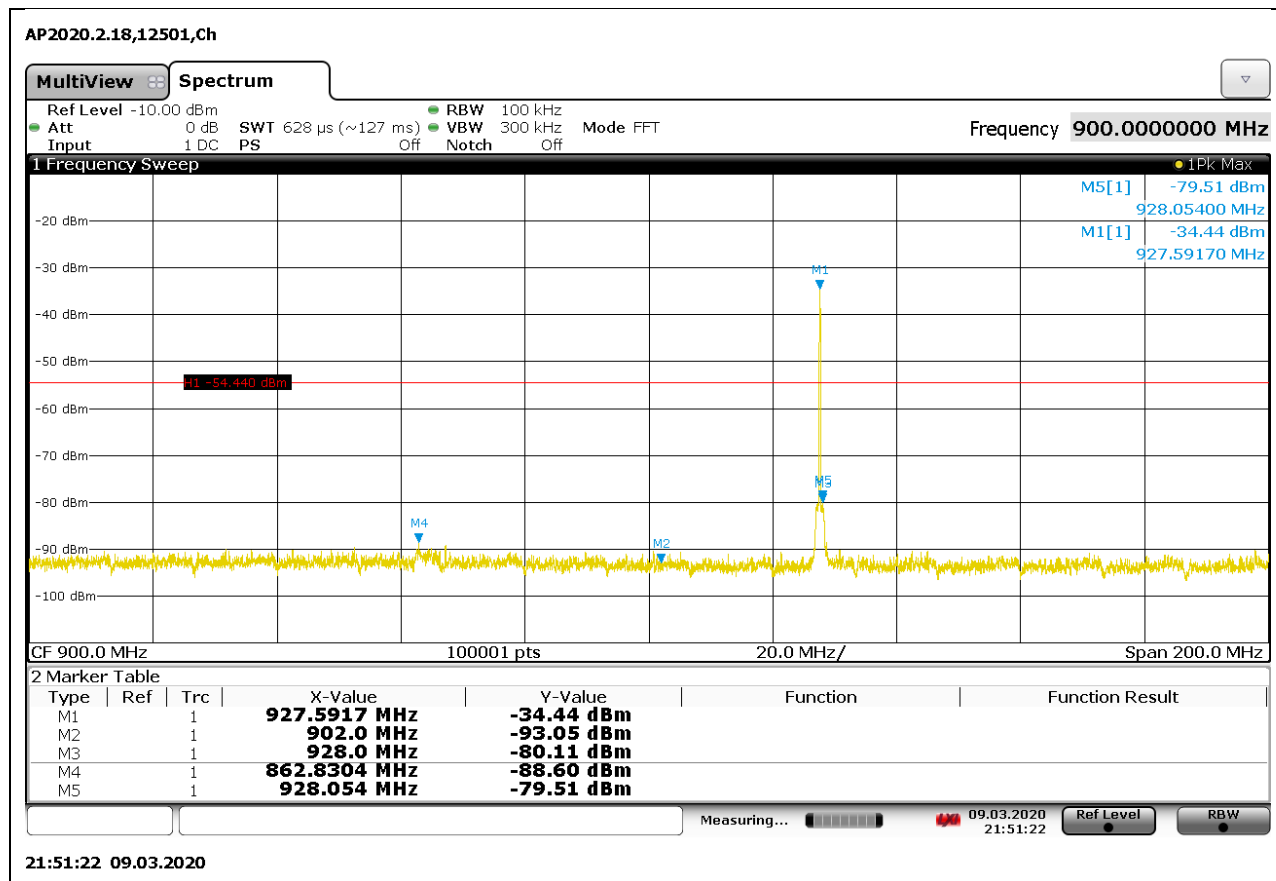


VERTICAL RESULT

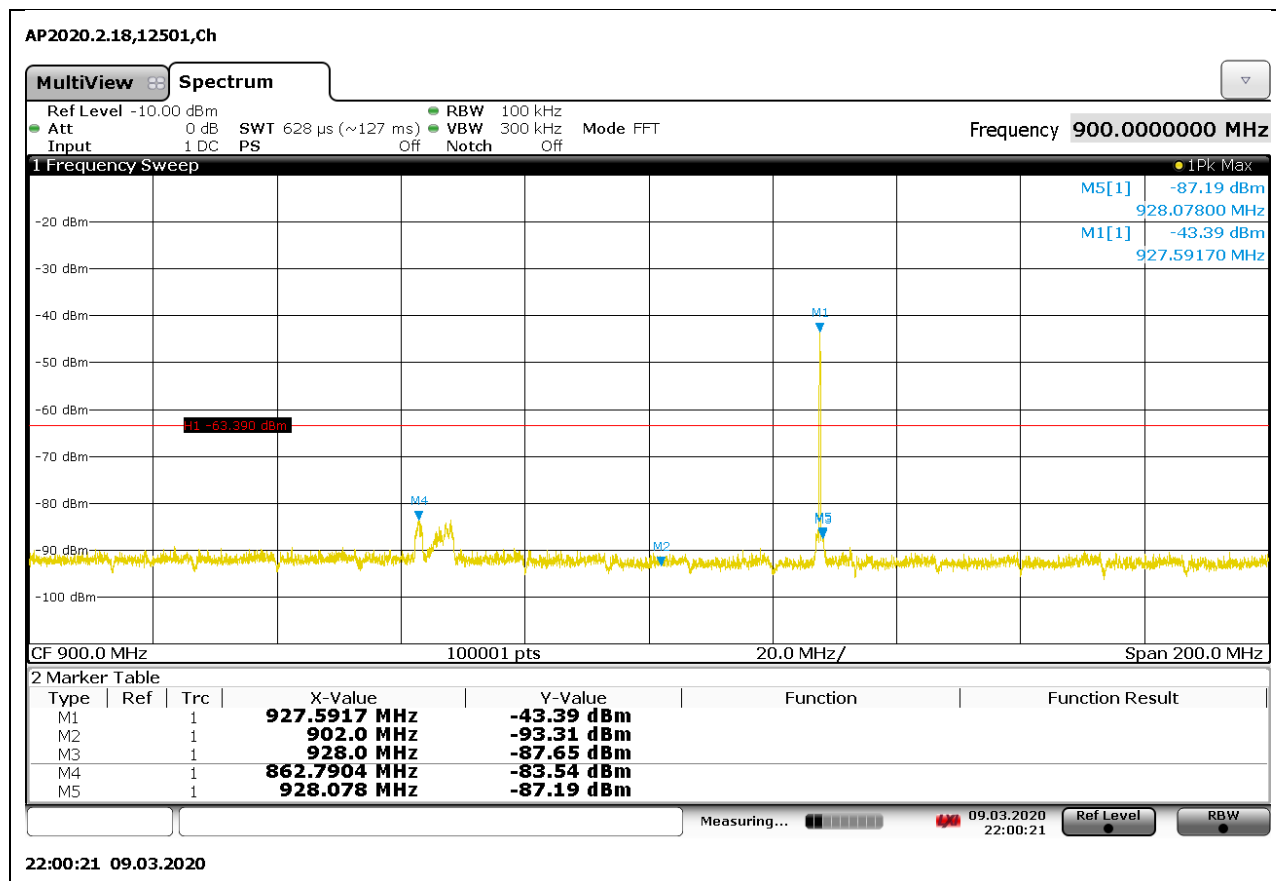


-20 dBc BANDEDGE WITHOUT NOTCH FILTER AND PRE-AMPLIFIER (HIGH CHANNEL)

HORIZONTAL RESULT

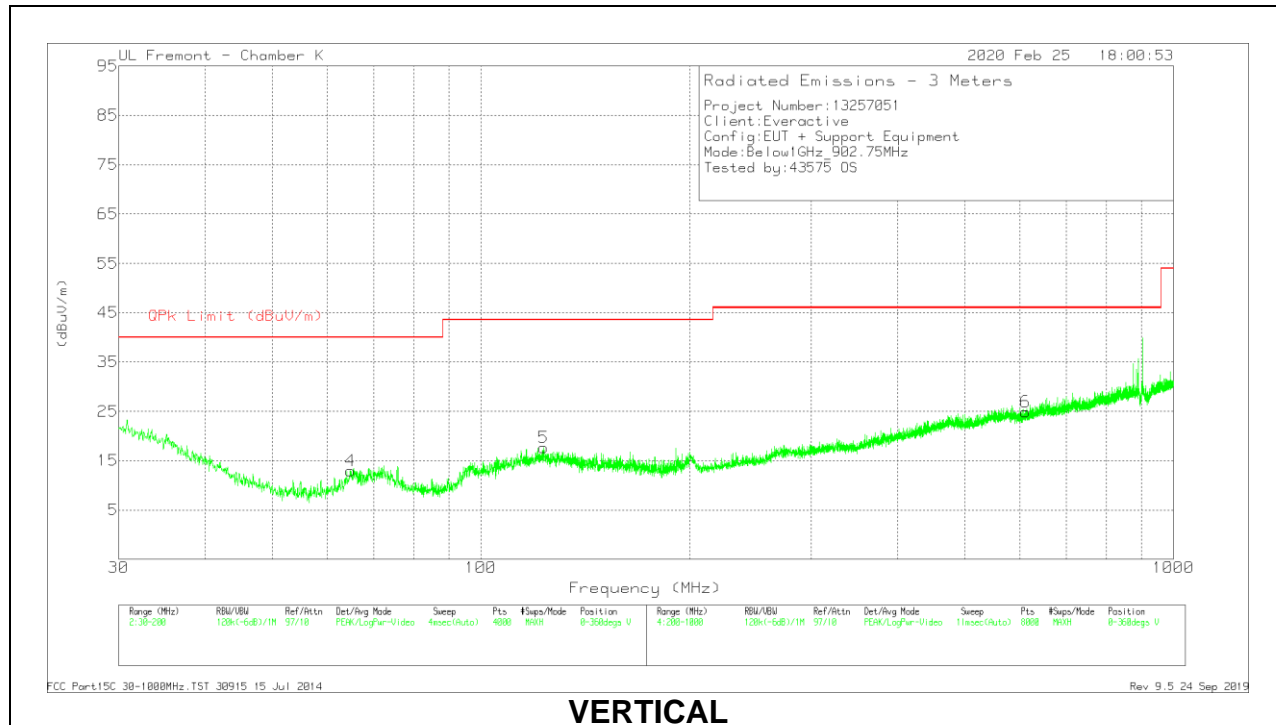
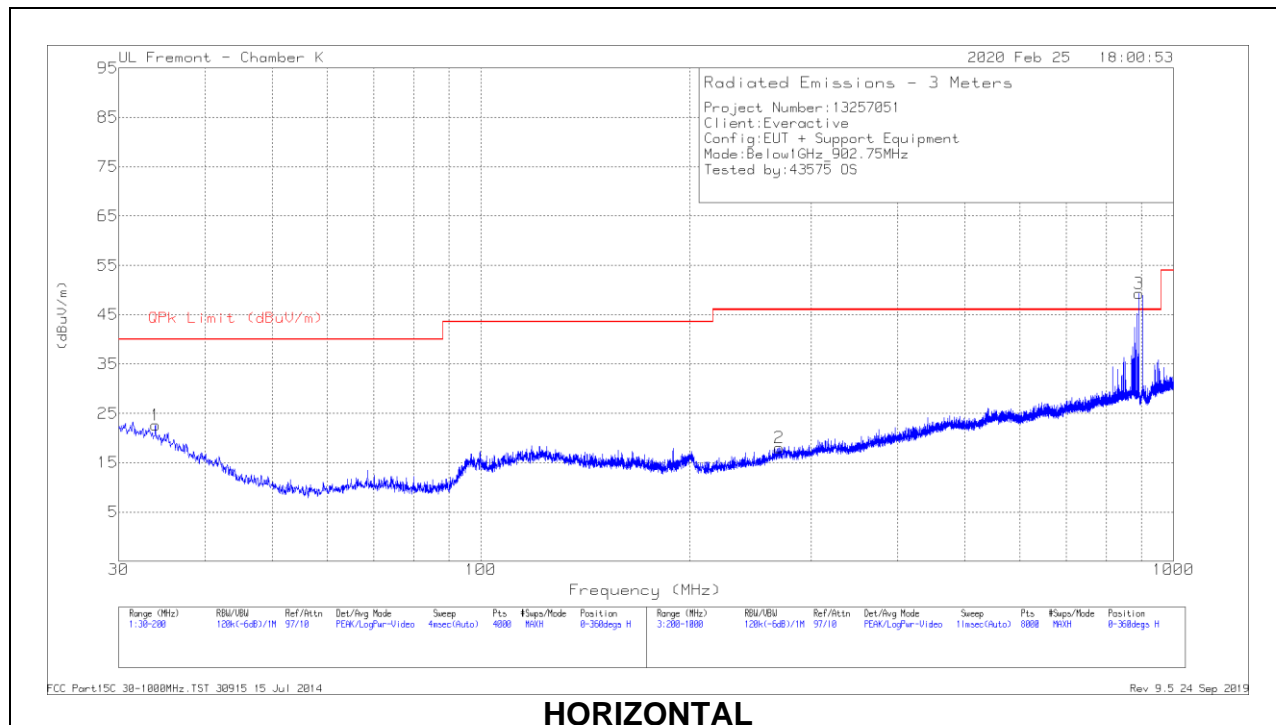


VERTICAL RESULT



HARMONICS AND SPURIOUS EMISSIONS WITH A NOTCH FILTER

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	33.911	29.92	Pk	24.2	-31.5	22.62	-	-	0-360	99	H
4	64.8165	30.4	Pk	13.8	-31.2	13	-	-	0-360	95	V
5	* 123.3116	28.5	Pk	19.9	-30.8	17.6	43.52	-25.92	0-360	95	V
2	* 269.409	28.94	Pk	19.1	-30	18.04	46.02	-27.98	0-360	399	H
3	891.7899	48.75	Pk	27.7	-27.2	49.25	-	-	0-360	99	H
6	* 611.3535	28.94	Pk	24.8	-28.9	24.84	46.02	-21.18	0-360	199	V

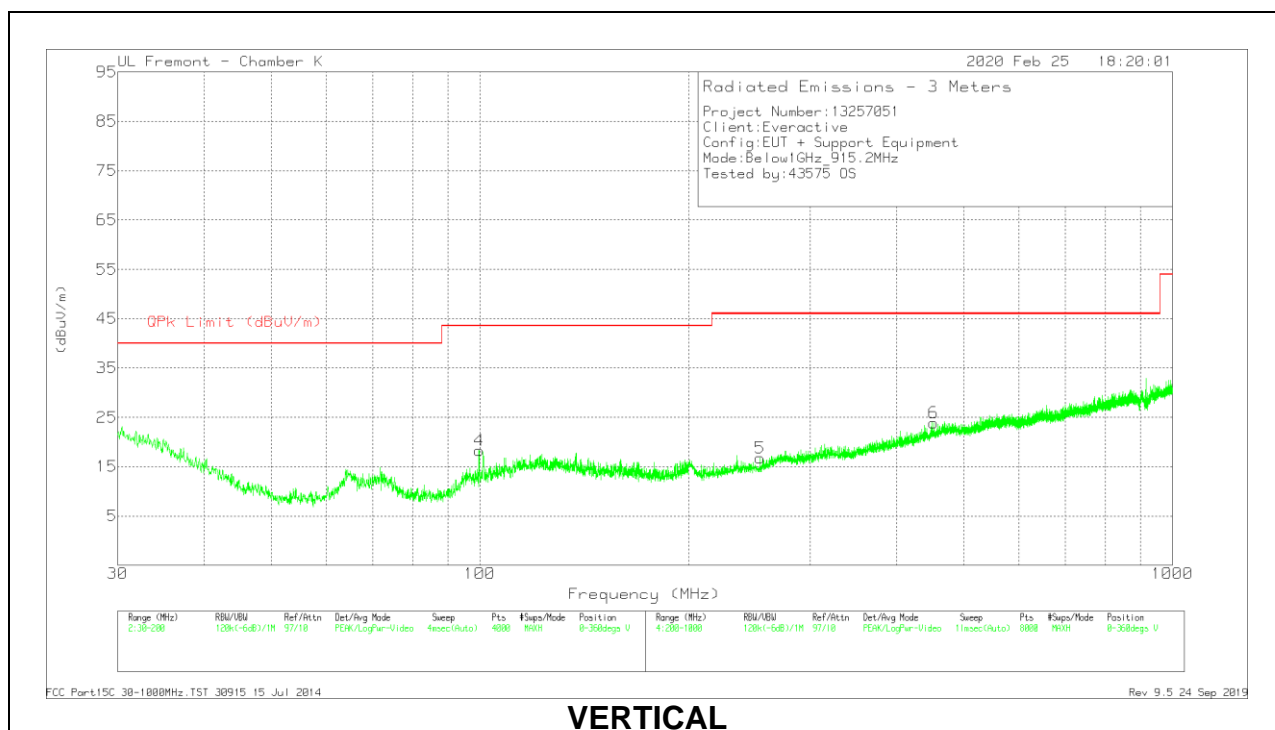
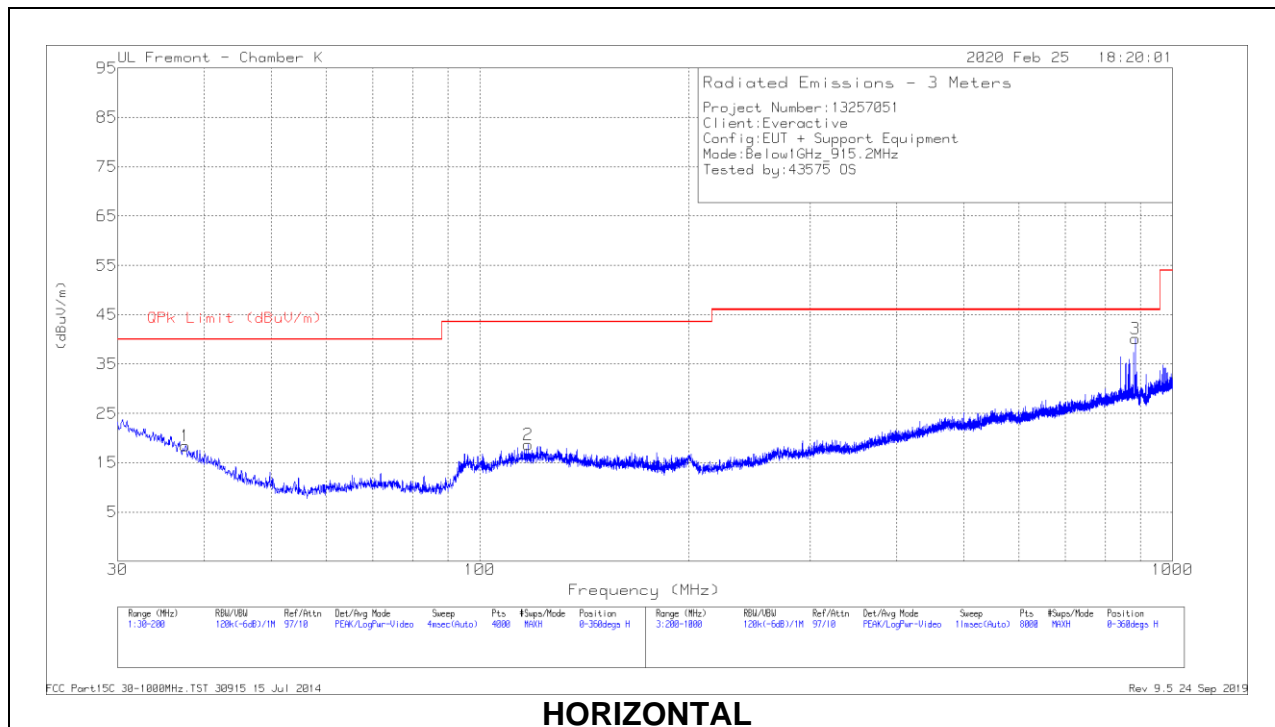
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 611.5247	28.56	Pk	24.8	-28.9	24.46	46.02	-21.56	103	354	V
* 611.28471	20.94	Qp	24.8	-28.9	16.84	46.02	-29.18	103	354	V

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

MID CHANNEL RESULTS



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 37.567	28.44	Pk	21.5	-31.5	18.44	40	-21.56	0-360	99	H
2	* 117.4451	29.95	Pk	19.5	-30.8	18.65	43.52	-24.87	0-360	199	H
4	99.718	33.14	Pk	16.1	-30.9	18.34	-	-	0-360	95	V
3	884.789	39.52	Pk	27.8	-27.2	40.12	-	-	0-360	99	H
5	* 253.807	29.57	Pk	17.3	-30.1	16.77	46.02	-29.25	0-360	199	V
6	452.2328	30.51	Pk	22.7	-29.3	23.91	-	-	0-360	99	V

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

Pk - Peak detector

Radiated Emissions

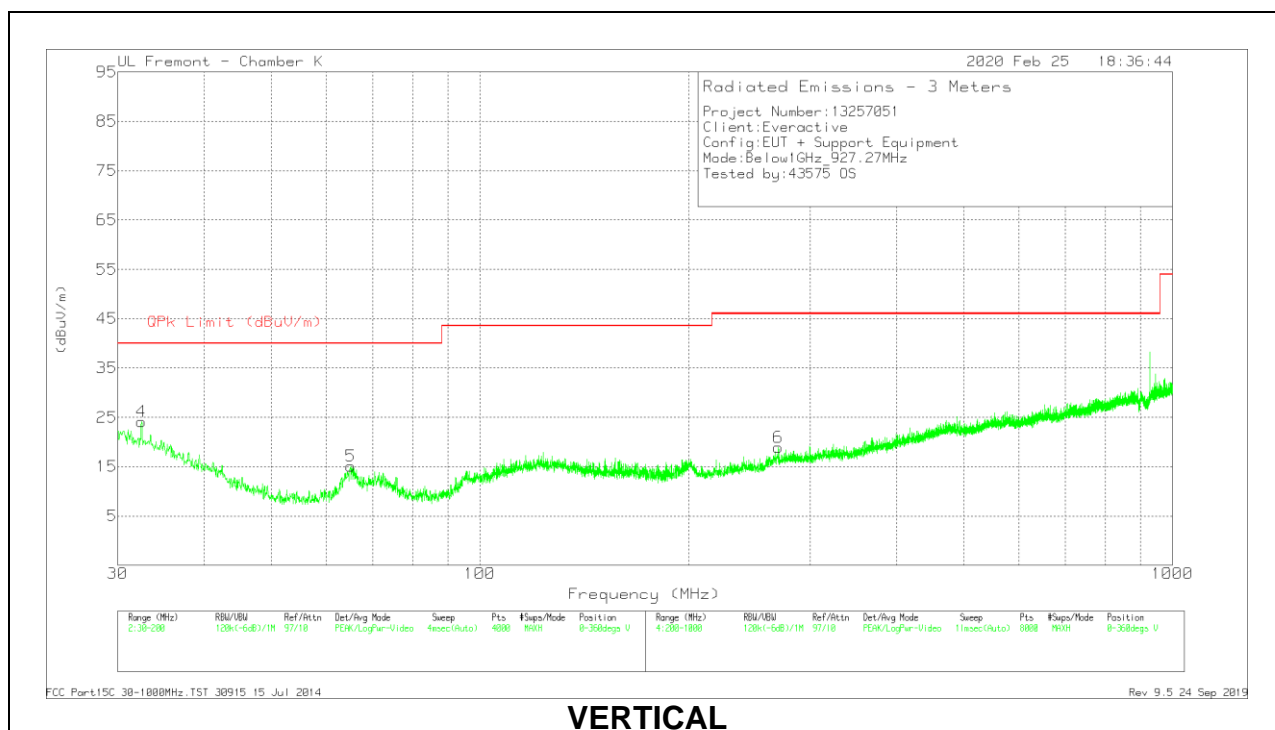
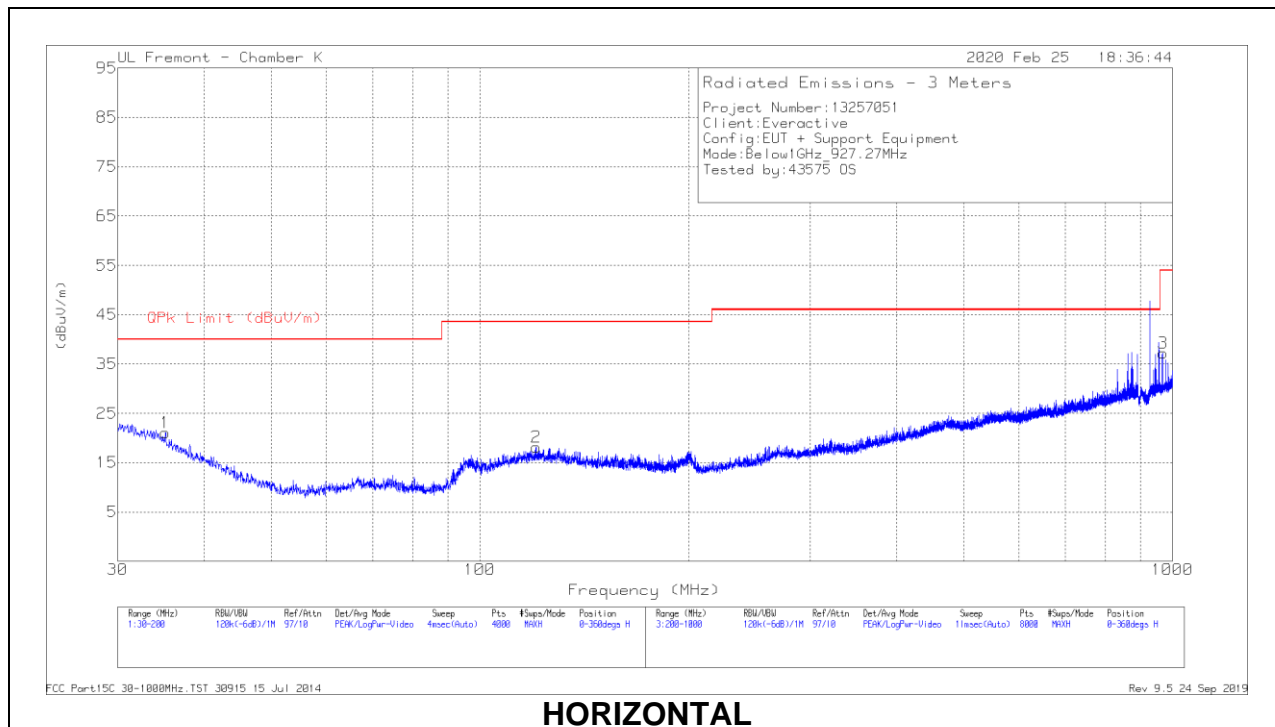
Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 37.5872	29.51	Pk	21.5	-31.5	19.51	40	-20.49	325	293	H
* 37.5872	21.67	Qp	21.5	-31.5	11.67	40	-28.33	325	293	H

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

Pk - Peak detector

Qp - Quasi-Peak detector

HIGH CHANNEL RESULTS



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	35.1438	29.24	Pk	23.3	-31.5	21.04	-	-	0-360	99	H
2	* 120.5484	29.19	Pk	19.8	-30.8	18.19	43.52	-25.33	0-360	99	H
4	32.4656	30.28	Pk	25.3	-31.5	24.08	-	-	0-360	100	V
5	65.0716	32.56	Pk	13.8	-31.2	15.16	-	-	0-360	100	V
3	* 969.4	34.66	Pk	28.8	-26.3	37.16	53.97	-16.81	0-360	100	H
6	* 269.9091	29.8	Pk	19.1	-30	18.9	46.02	-27.12	0-360	199	V

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

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 969.447	39.37	Pk	28.8	-26.3	41.87	53.97	-12.1	258	96	H
* 969.447	20.43	Qp	28.8	-26.3	22.93	53.97	-31.04	258	96	H

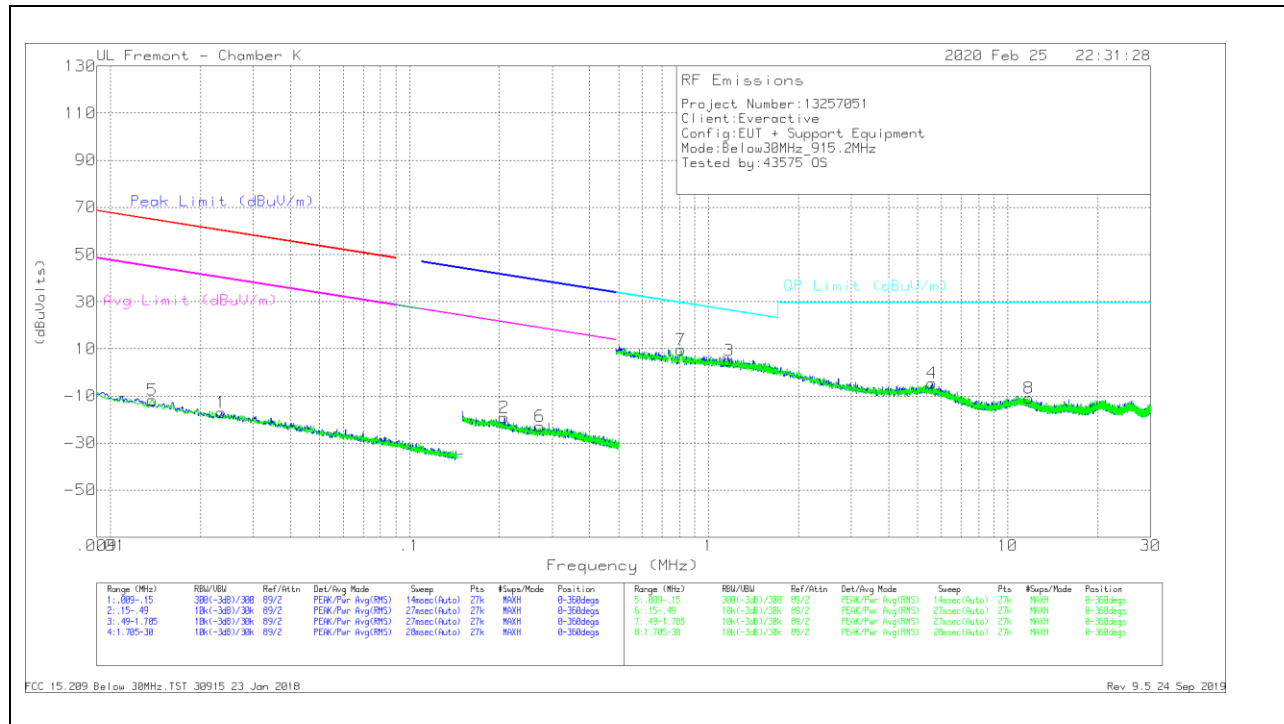
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

9.3. WORST CASE BELOW 30 MHz

SPURIOUS EMISSIONS 9 kHz TO 30 MHz (WORST-CASE CONFIGURATION)



Below 30MHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.02352	48	Pk	15	0	-80	-17	60.16	-77.16	40.16	-57.16	-	-	0-360
2	.20785	46.68	Pk	14	.1	-80	-19.22	41.26	-60.48	21.26	-40.48	-	-	0-360
5	.01381	53.1	Pk	15.1	0	-80	-11.8	64.78	-76.58	44.78	-56.58	-	-	0-360
6	.27302	42.98	Pk	13.9	.1	-80	-23.02	38.89	-61.91	18.89	-41.91	-	-	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 30m 40Log	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	1.17315	30.55	Pk	14.4	.1	-40	5.05	-	-	-	-	26.24	-21.19	0-360
4	5.58994	20.22	Pk	14.9	.3	-40	-4.58	-	-	-	-	29.5	-34.08	0-360
7	.8079	35.45	Pk	14.1	.1	-40	9.65	-	-	-	-	29.47	-19.82	0-360
8	11.77733	13.69	Pk	15	.4	-40	-10.91	-	-	-	-	29.5	-40.41	0-360

Pk - Peak detector