



# TEST REPORT

**Report Number. :** 13999648-E1V1

**Applicant :** HUNTER INDUSTRIES INC  
1940 DIAMOND STREET  
SAN MARCOS, CA 92078, U.S.A.

**Model :** LINK-MOD

**Brand :** HUNTER

**FCC ID :** M3U-LINKMOD

**IC :** 2772A-LINKMOD

**EUT Description :** LUXOR WIRELESS LINKING MODULE

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 5 + A1

**Date Of Issue:**

December 09, 2021

**Prepared by:**

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## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	11/16/2021	Initial Issue	---
V2	12/9/2021	Updated EUT's description and model number	Tina Chu

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** HUNTER INDUSTRIES INC  
1940 DIAMOND STREET  
SAN MARCOS, CA 92078, U.S.A.

**EUT DESCRIPTION:** LUXOR WIRELESS LINKING MODULE

**MODEL:** LINK-MOD

**BRAND:** HUNTER

**SERIAL NUMBER:** 4790101431 (CONDUCTED); 4353273 (RADIATED)

**SAMPLE RECEIPT DATE:** NOVEMBER 03, 2021

**DATE TESTED:** NOVEMBER 03, 2021 TO NOVEMBER 15, 2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1	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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

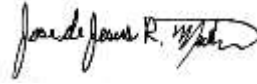
Approved & Released For  
UL Verification Services Inc. By:



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UL Verification Services Inc.

Prepared By:



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JOSE MARTINEZ  
TEST ENGINEER  
UL Verification Services Inc.

Reviewed By:



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TINA CHU  
SENIOR PROJECT ENGINEER  
UL Verification Services Inc.

## 2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Complies	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Not applicable	EUT is powered via host which is powered by batteries.

## 3. 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 v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1, and RSS-247 Issue 2.

## 4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building 1: 47173 Benicia Street, Fremont, California, USA	US0104	2324A	208313
<input type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, California, USA	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, California, USA	US0104	2324B	208313

## 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 5.1. 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.

### 5.2. 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.)

### 5.3. 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	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

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

### 5.4. 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.

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



## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is a module to wirelessly link lighting controllers that operates in the 902-928MHz band.

### 6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
903 - 927	LoRa	11.98	15.78

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

The radio utilizes an integrated antenna, with a maximum gain of 2.2 dBi.

### 6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 0.04

### 6.5. WORST-CASE CONFIGURATION AND MODE

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

Band edge and radiated emissions below 1G and between 1GHz and 10GHz 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 (Landscape) was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation (Landscape).

The EUT is powered by a host where the host is powered by 9VDC batteries pack; therefore, AC line conducted emissions were not required.

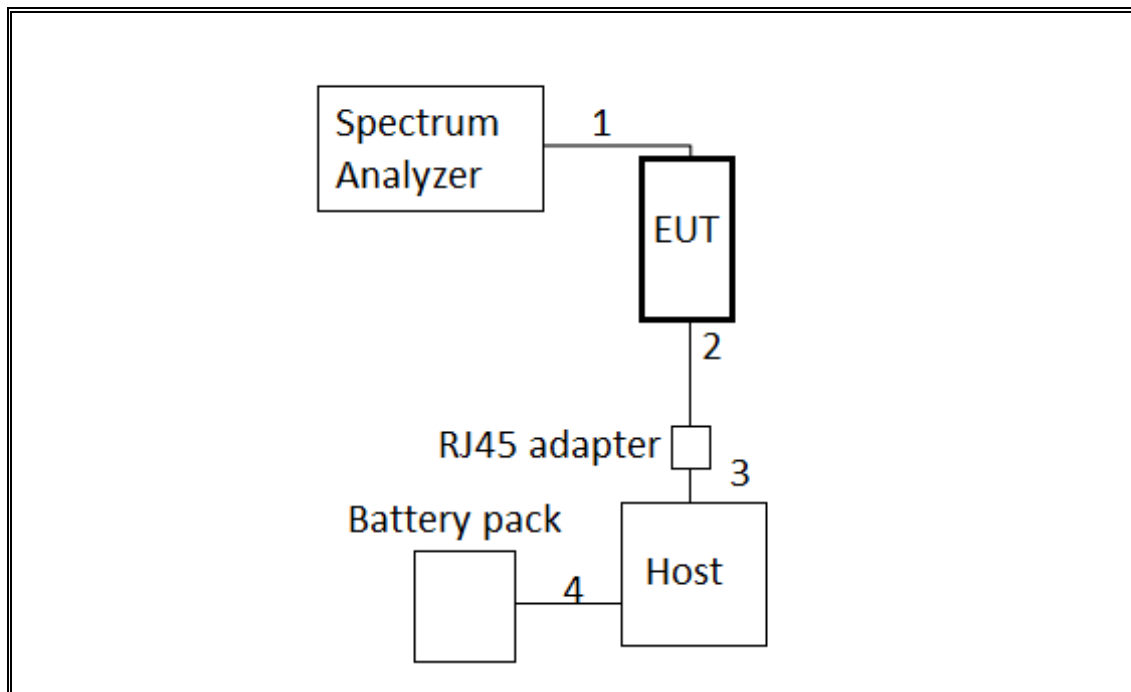
## 6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC		
Host	Hunter Industries	N/A	N/A	N/A		
RJ45 adapter female to female	N/A	N/A	N/A	N/A		
9V Battery Pack	N/A	N/A	N/A	N/A		
I/O CABLES (RF CONDUCTED TEST AND RADIATED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-shielded	1	To spectrum analyzer
2	RJ45	1	RJ45	shielded	3	
3	RJ45	1	RJ45	shielded	0.1	
4	DC	1	DC power jack	Un-shielded	0.2	

### TEST SETUP

The EUT is powered by the host where the host is powered by battery pack. Selected modes and channels via host.

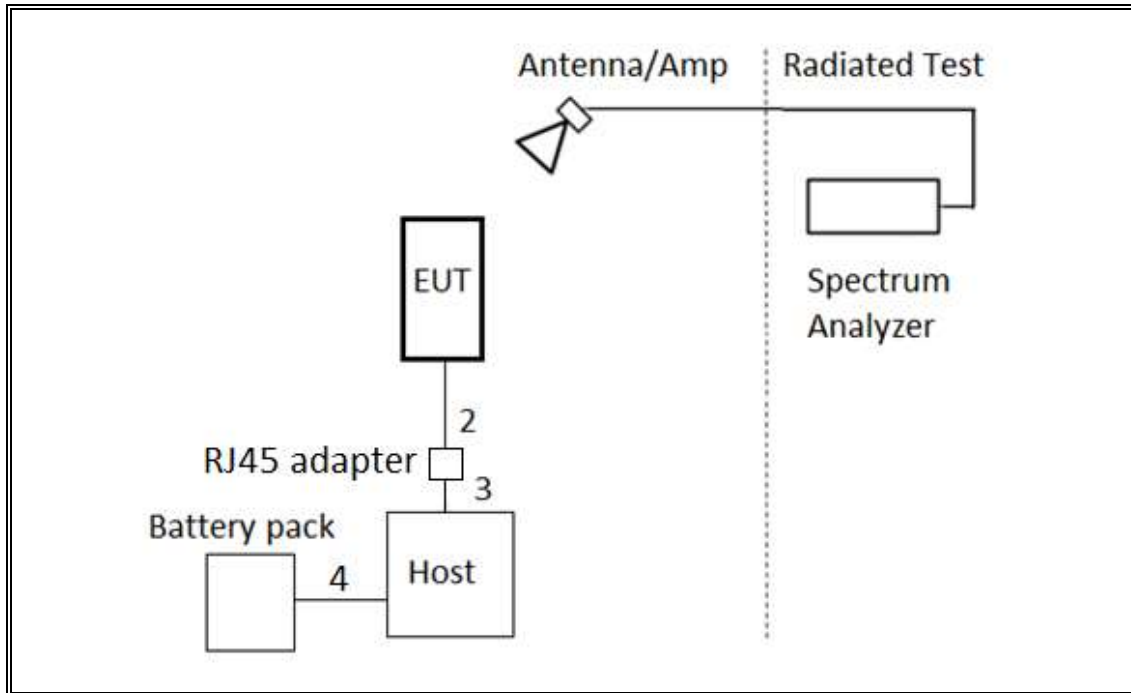
### SETUP DIAGRAMS



**TEST SETUP- RADIATED TEST**

**SETUP DIAGRAM**

The EUT is powered by the host where the host is powered by battery pack. Selected modes and channels via host.



## 7. MEASUREMENT METHOD

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW  $\geq$  DTS BW

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

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

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

Output 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 Integration method -Trace averaging across ON and OFF times DC correction

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

## 8. 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	ID Num	Cal Due	Last Cal
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170013	7/29/2022	7/29/2021
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170015	7/29/2022	7/29/2021
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	82258	10/1/2022	10/1/2021
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	1/21/2022	1/21/2021
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80404	8/4/2022	8/4/2021
Amplifier, 100MHz-18GHz	AMPLICAL	AMP0.1G18-47-20	185686	4/8/2022	4/8/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2/21/2022	2/21/2021
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	206806	2/3/2022	2/3/2021
Amplifier, 1 to 18GHz, 35dB	AMPLICAL	AMP1G18-35	138300	10/27/2022	10/27/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2/23/2022	2/23/2021
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Keysight Technologies Inc	E4440A	82404	2/19/2022	2/19/2021
Filter, BRF 902 to 928MHz	MICRO-TRONICS	BRC50722	156484	4/8/2022	4/8/2021
Filter, HPF 1.5GHzGHZ	MICRO-TRONICS	HPM50114	204786	6/24/2022	6/24/2021
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90756	1/25/2022	1/25/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90391	6/17/2022	6/17/2021
Test Software List					
Radiated Software	UL	UL EMC		Rev 9.5, Jan 03, 2020	
Antenna Port Software	UL	UL RF		AP2021.8.10	

## **9. ANTENNA PORT TEST RESULTS**

### **9.1. ON TIME AND DUTY CYCLE**

#### **LIMITS**

None; for reporting purposes only.

#### **PROCEDURE**

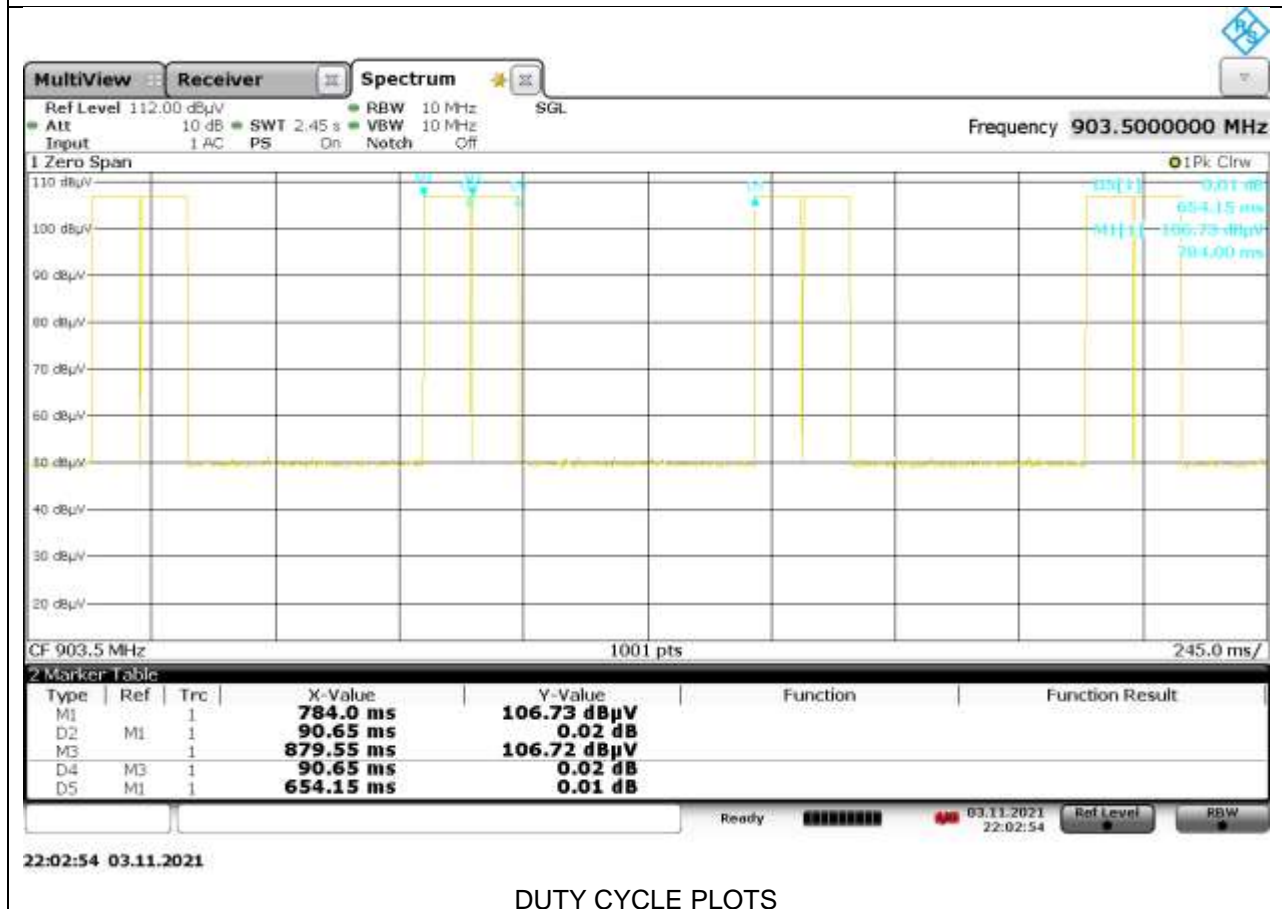
KDB 558074 Zero-Span Spectrum Analyzer Method.

#### **RESULTS**

Date:	11/3/2021
Test Engineer:	23653 DC

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)
LoRa	181.300	654.150	0.277	27.72	5.57	0.006



DUTY CYCLE PLOTS

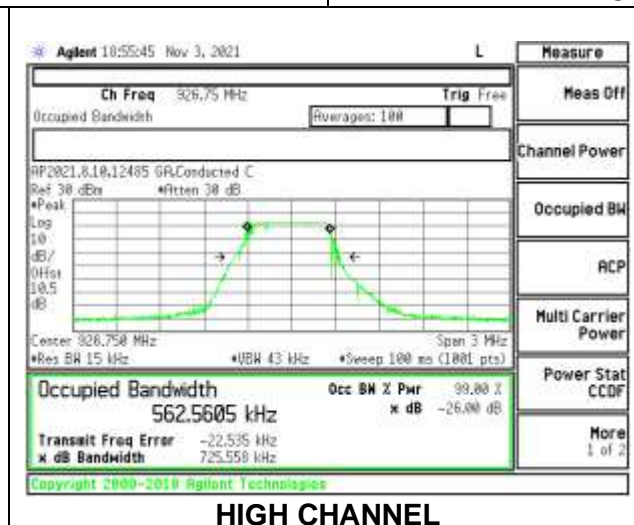
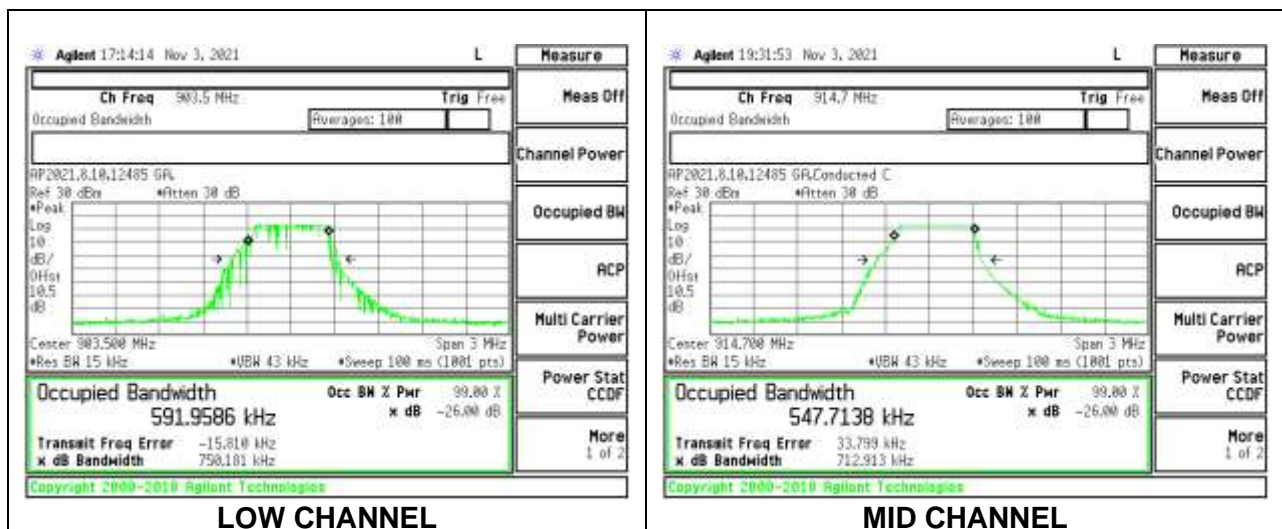
## 9.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	903.5	0.5916
Middle	914.7	0.5477
High	926.75	0.5626





### 9.3. 6 dB BANDWIDTH

#### LIMITS

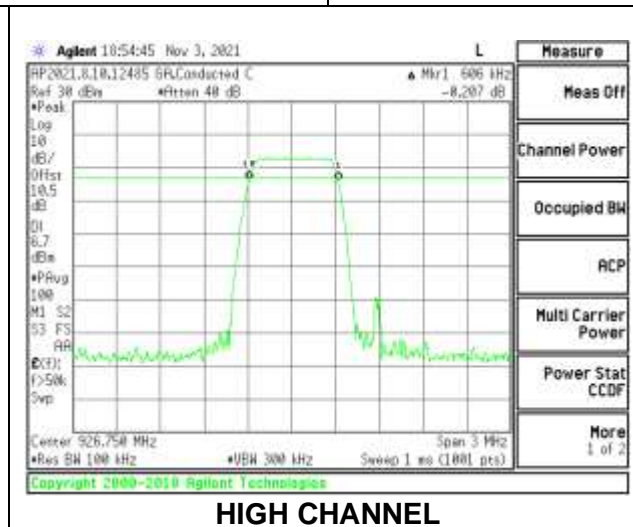
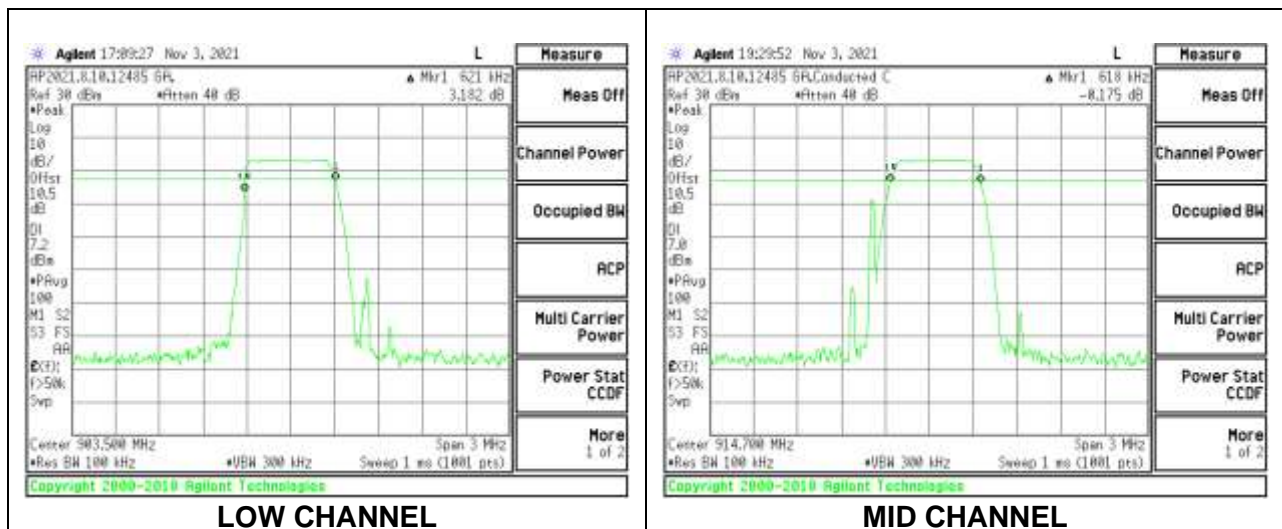
FCC §15.247 (a) (2)

RSS-247 5.2 (a)

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

#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	903.5	0.621	0.5
Middle	914.7	0.618	0.5
High	926.75	0.606	0.5



## 9.4. OUTPUT POWER

### LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter.

### RESULTS

<b>Tested By:</b>	12485 GA
<b>Date:</b>	11/8/2021

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Power Reading (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Low	903.5	11.98	30	-18.02
Middle	914.7	11.72	30	-18.28
High	926.75	11.51	30	-18.49

## 9.5. AVERAGE POWER

### LIMITS

None; for reporting purposes only

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

### RESULTS

<b>Tested By:</b>	12485 GA
<b>Date:</b>	11/8/2021

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>AV power (dBm)</b>
Low	903.5	11.82
Middle	914.7	11.58
High	926.75	11.34

## 9.6. POWER SPECTRAL DENSITY

### LIMITS

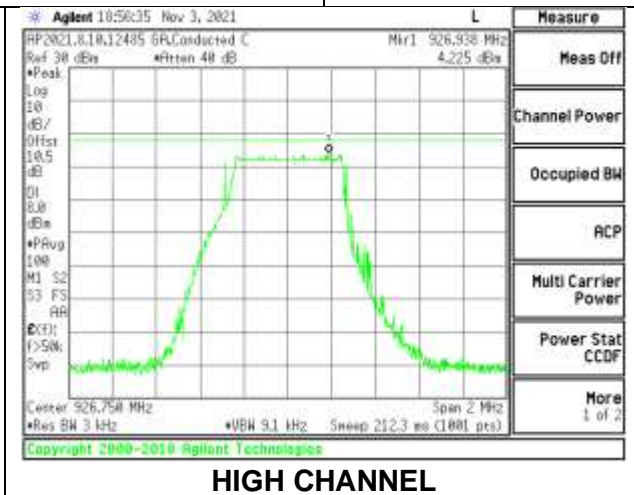
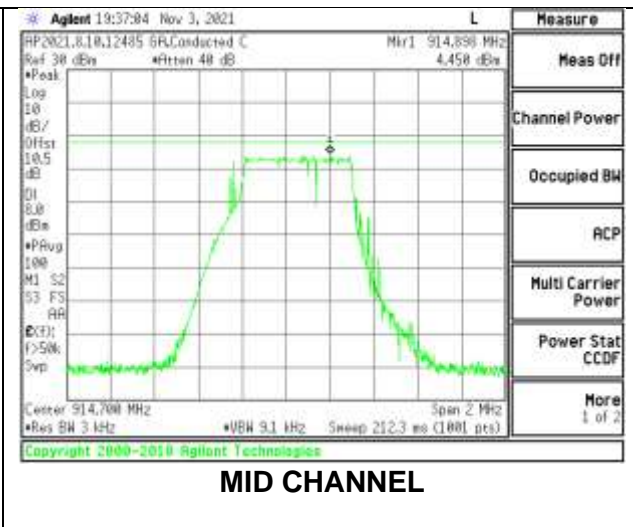
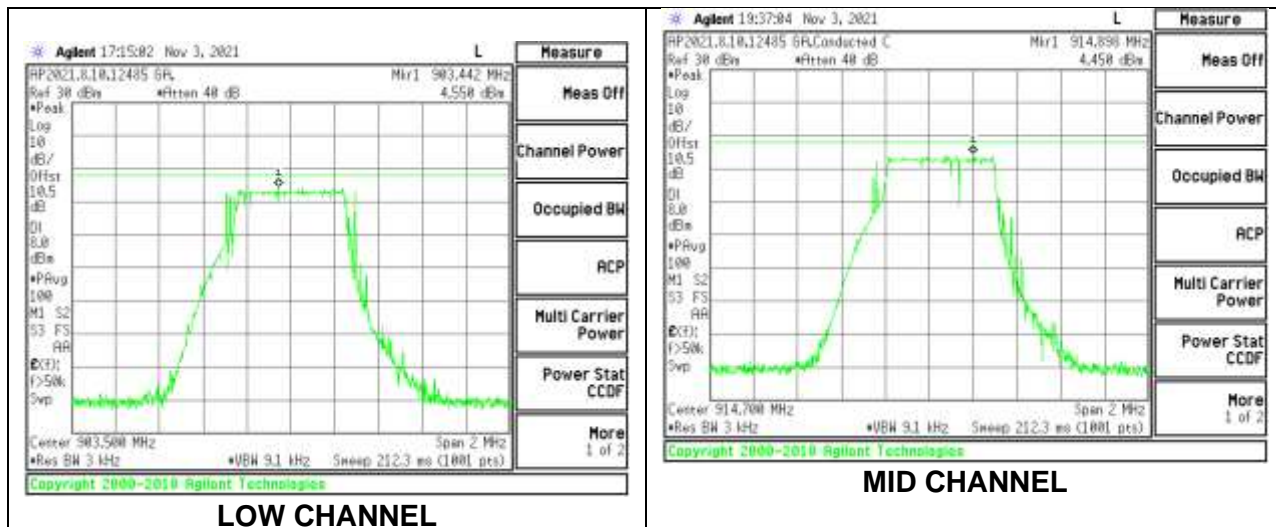
FCC §15.247 (e)

RSS-247 (5.2) (b)

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

### RESULTS

Channel	Frequency (MHz)	Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low	903.5	4.55	8.0	-3.5
Mid	914.7	4.45	8.0	-3.6
High	926.75	4.23	8.0	-3.8



## **9.7. CONDUCTED SPURIOUS EMISSIONS**

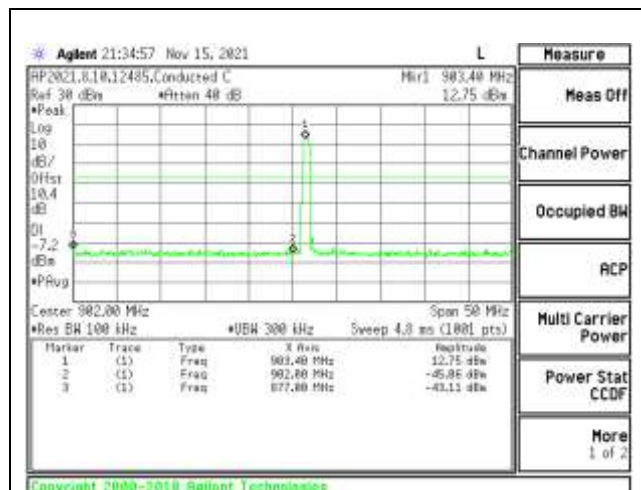
### **LIMITS**

FCC §15.247 (d)

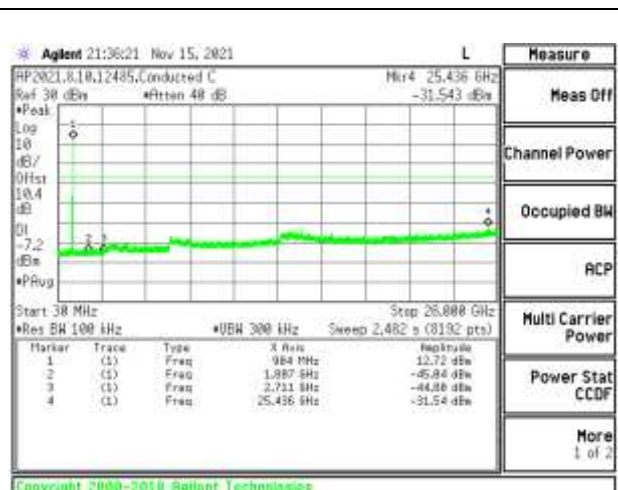
RSS-247 5.5

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

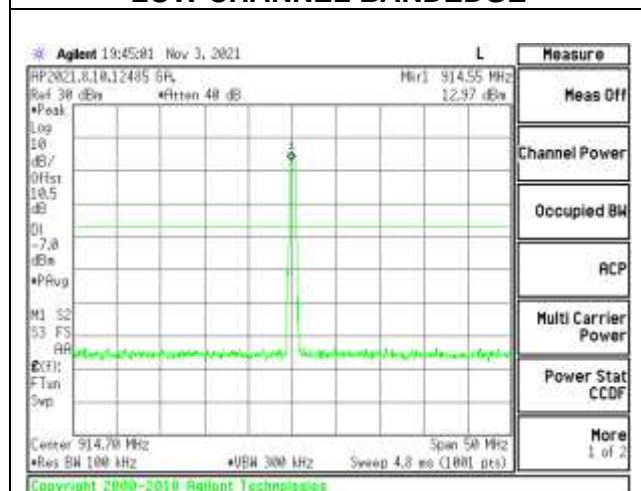
### **RESULTS**



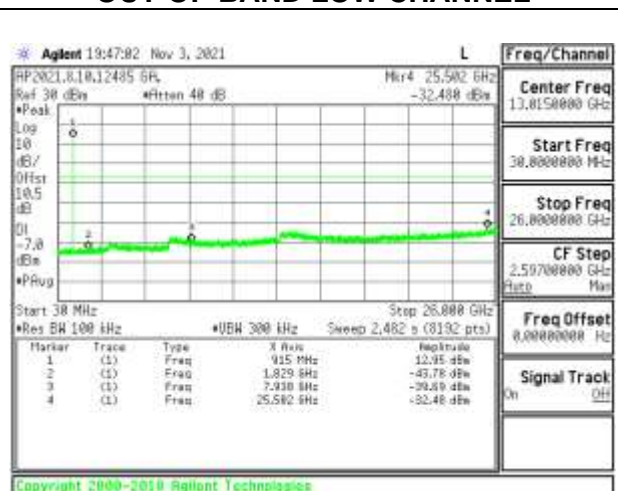
**LOW CHANNEL BANDEDGE**



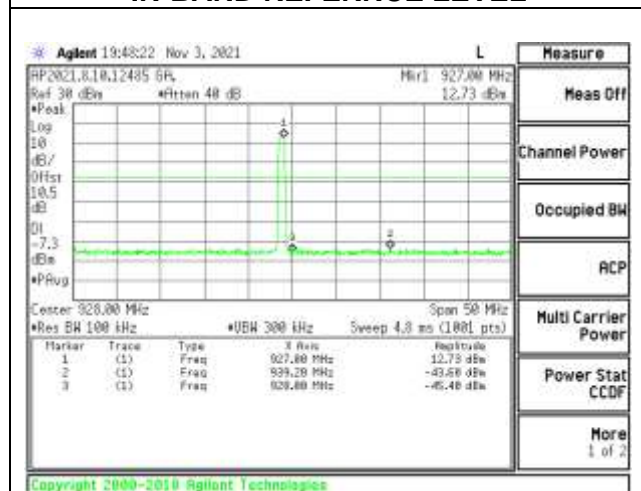
**OUT-OF-BAND LOW CHANNEL**



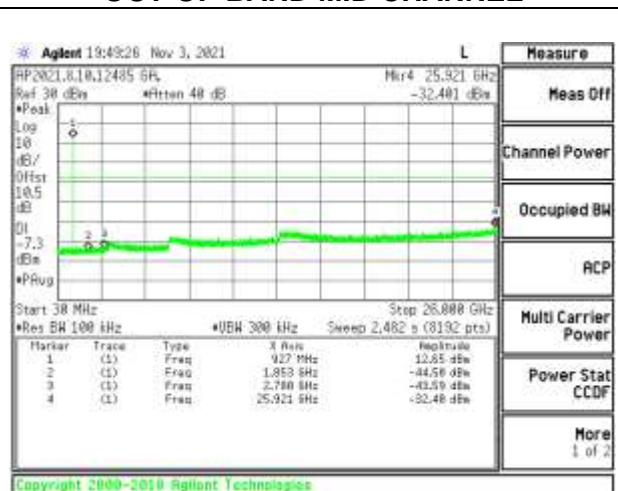
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND MID CHANNEL**



**HIGH CHANNEL BANDEDGE**



**OUT-OF-BAND HIGH CHANNEL**

## 10. 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 in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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 30MHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

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. Blue color trace on plots: Parallel orientation. Green color trace on plots: Perpendicular orientation.

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

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

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

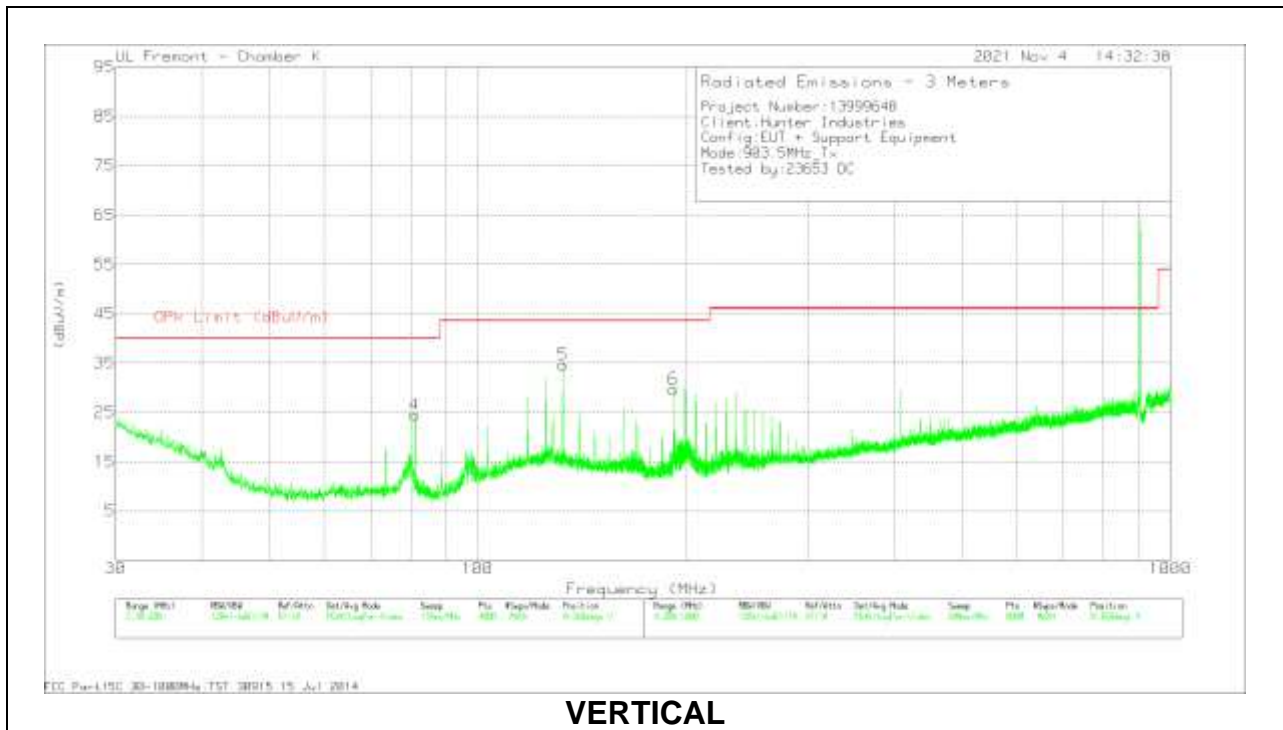
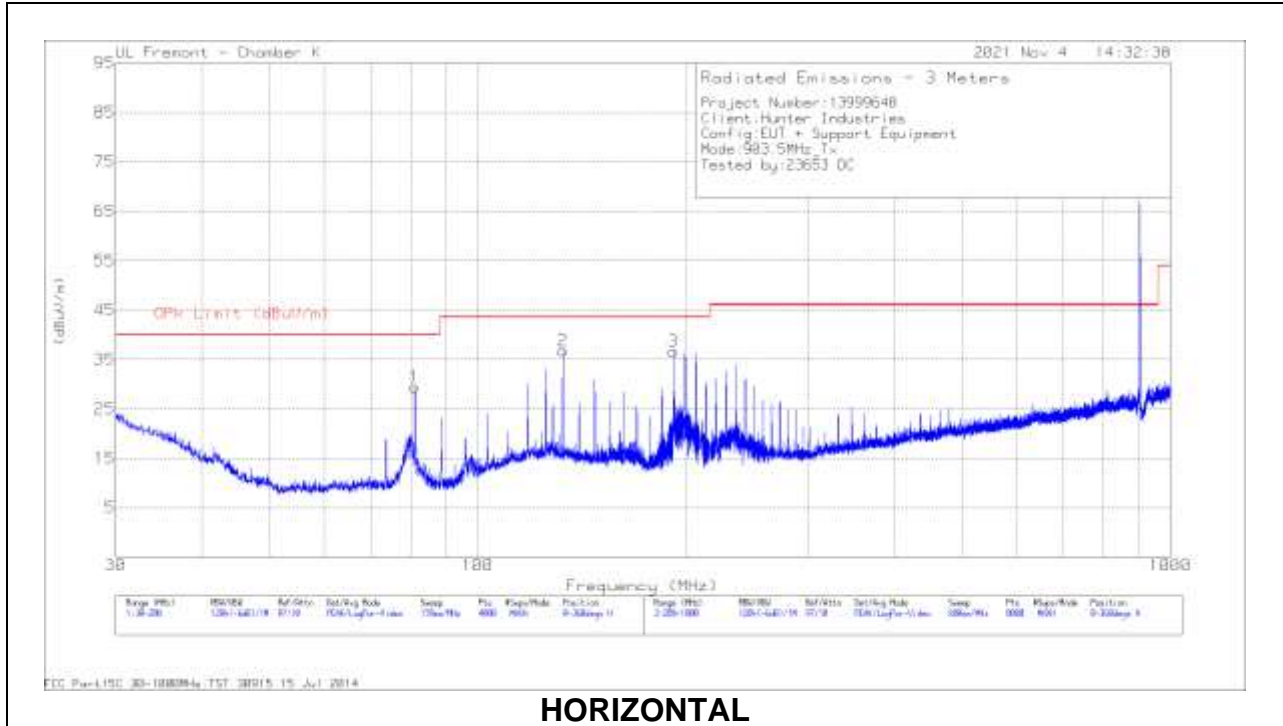
NOTE: The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance of 377 Ohms. For example the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to  $Y - 51.5 = Z$  dBuA/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.



### 10.1. TRANSMITTER BELOW 1 GHz

#### HARMONICS AND SPURIOUS EMISSIONS WITH A NOTCH FILTER

#### LOW CHANNEL RESULTS

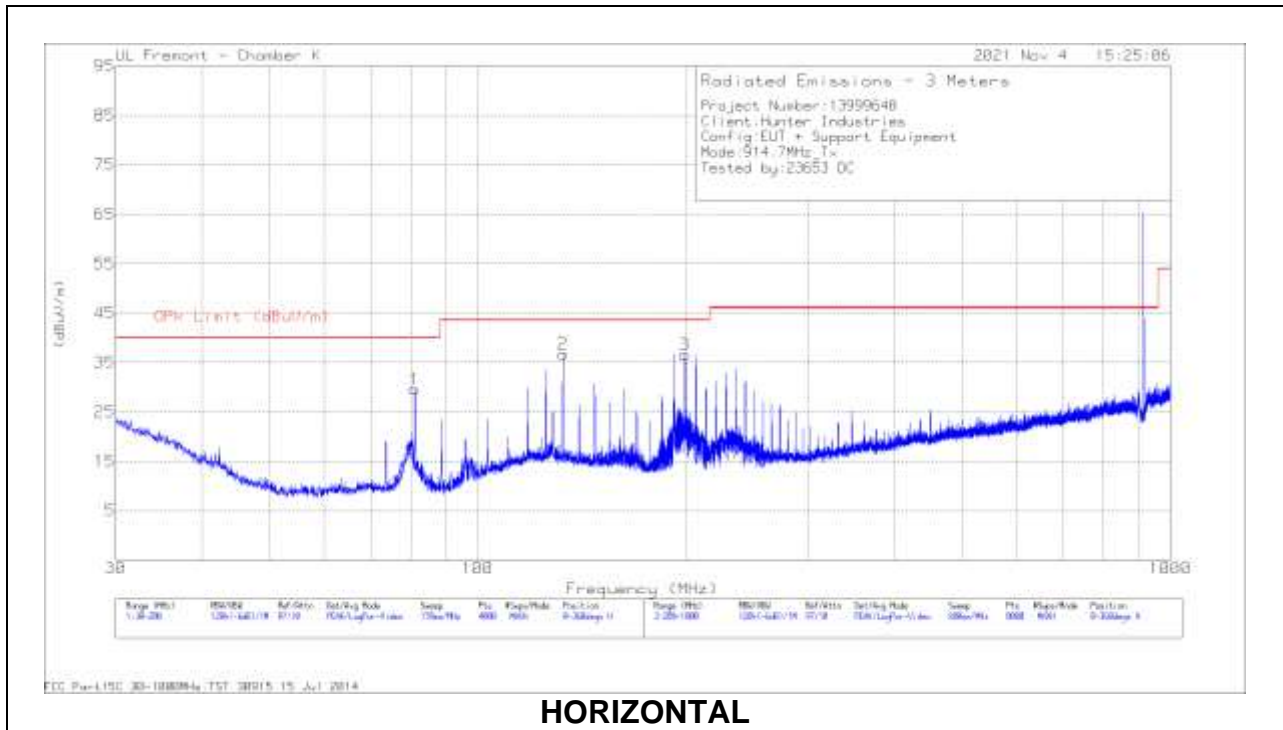


**RADIATED EMISSIONS**

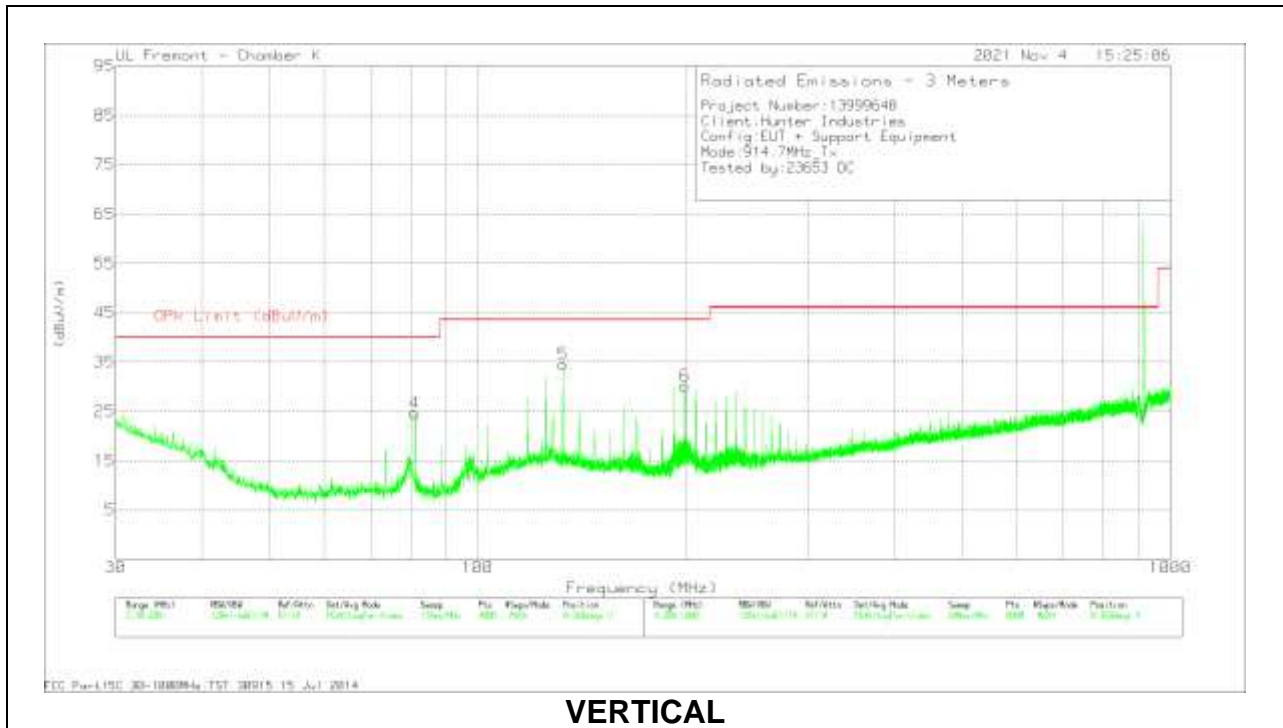
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	82258 ACF (dB)	Amp/Cbl (dB)	156484 BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	81.0982	46.92	Pk	13.6	-31	0.2	29.72	40	-10.28	0-360	295	H
2	* 132.7066	47.48	Pk	20	-30.7	0.2	36.98	43.52	-6.54	0-360	197	H
	* 132.71379	47.85	Qp	20	-30.7	0.2	37.35	43.52	-6.17	94	231	H
3	191.7118	49.03	Pk	17.9	-30.2	0.2	36.93	43.52	-6.59	0-360	100	H
4	81.0982	41.87	Pk	13.6	-31	0.2	24.67	40	-15.33	0-360	97	V
5	* 132.7066	45.43	Pk	20	-30.7	0.2	34.93	43.52	-8.59	0-360	97	V
6	191.7118	42.07	Pk	17.9	-30.2	0.2	29.97	43.52	-13.55	0-360	97	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Qp - Quasi-Peak detector  
 NOTE: 903.5MHz is the fundamental signal of transmitter.

### MID CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

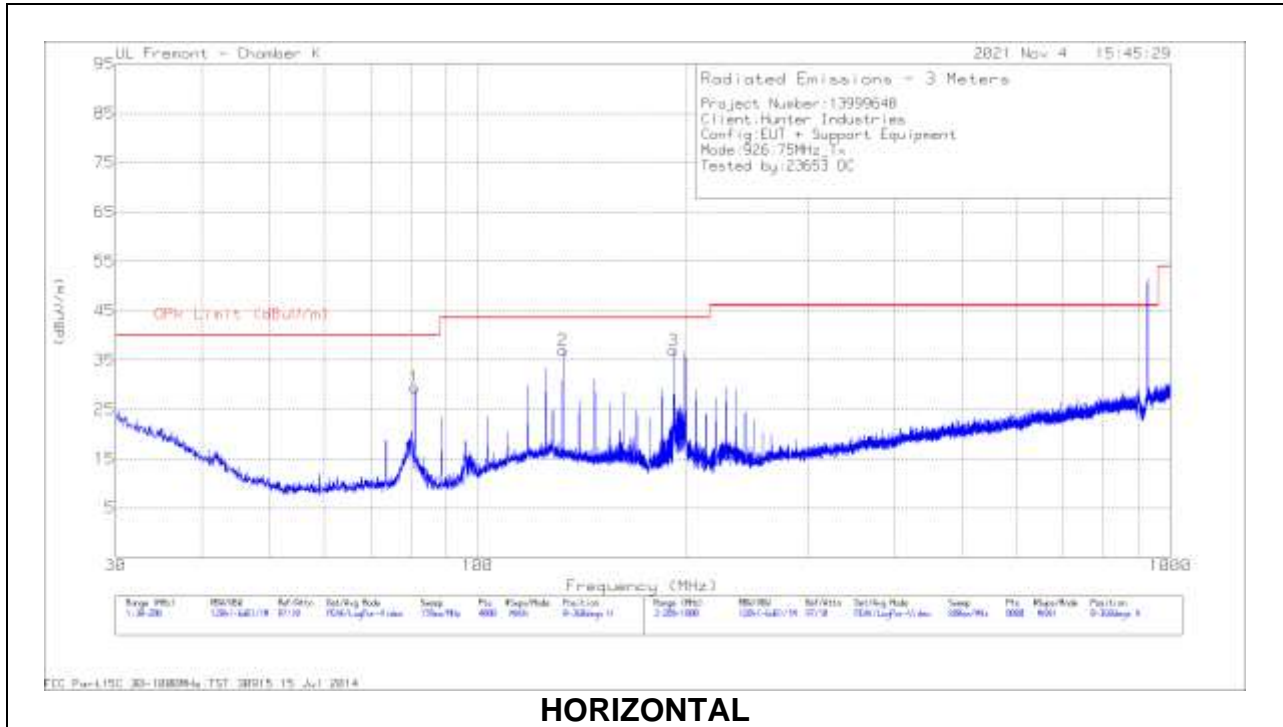
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	82258 ACF (dB)	Amp/Cbl (dB)	156484 BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	81.0982	47.03	Pk	13.6	-31	0.2	29.83	40	-10.17	0-360	295	H
2	* 132.7066	47.47	Pk	20	-30.7	0.2	36.97	43.52	-6.55	0-360	197	H
	* 132.71763	47.68	Qp	20	-30.7	0.2	37.18	43.52	-6.34	98	221	H
3	199.1088	47.6	Pk	19.2	-30.2	0.2	36.8	43.52	-6.72	0-360	100	H
4	81.0982	42.07	Pk	13.6	-31	0.2	24.87	40	-15.13	0-360	100	V
5	* 132.7066	45.23	Pk	20	-30.7	0.2	34.73	43.52	-8.79	0-360	100	V
6	199.0662	41.27	Pk	19.2	-30.2	0.2	30.47	43.52	-13.05	0-360	100	V

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

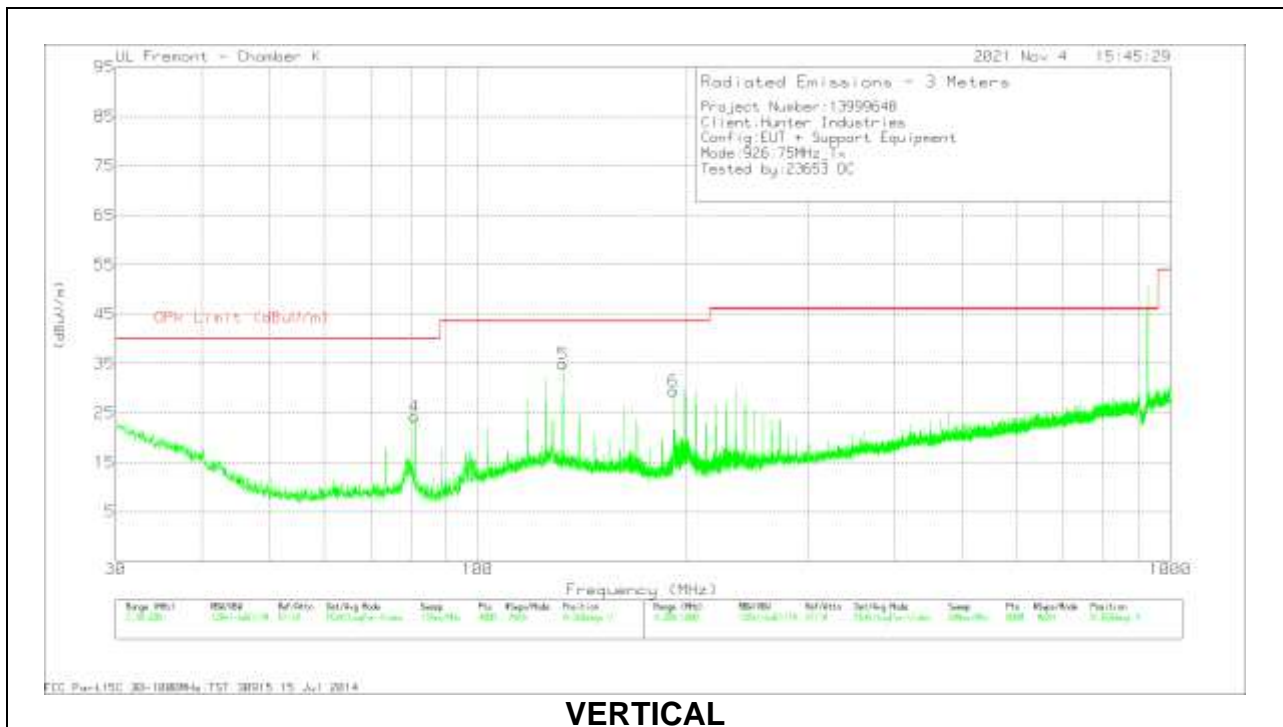
Qp - Quasi-Peak detector

NOTE: 914.7MHz is the fundamental signal of transmitter.

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	82258 ACF (dB)	Amp/Cbl (dB)	156484 BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	81.0982	46.88	Pk	13.6	-31	0.2	29.68	40	-10.32	0-360	295	H
2	* 132.7066	47.66	Pk	20	-30.7	0.2	37.16	43.52	-6.36	0-360	197	H
	* 132.7148	47.72	Qp	20	-30.7	0.2	37.22	43.52	-6.3	91	232	H
3	191.7118	49.29	Pk	17.9	-30.2	0.2	37.19	43.52	-6.33	0-360	99	H
4	81.0982	41.61	Pk	13.6	-31	0.2	24.41	40	-15.59	0-360	101	V
5	* 132.7491	45.57	Pk	20	-30.7	0.2	35.07	43.52	-8.45	0-360	101	V
6	191.7118	41.75	Pk	17.9	-30.2	0.2	29.65	43.52	-13.87	0-360	101	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Qp - Quasi-Peak detector  
 NOTE: 926.75MHz is the fundamental signal of transmitter.

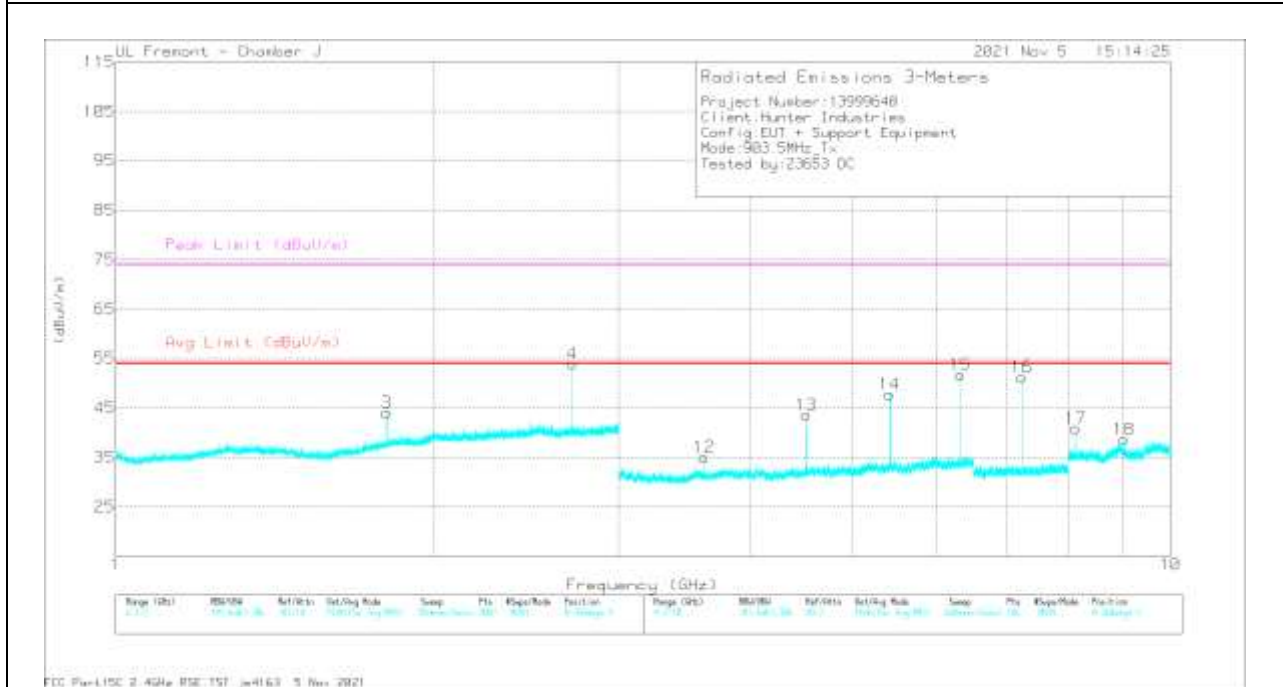
## 10.2. TRANSMITTER ABOVE 1 GHz

### HARMONICS AND SPURIOUS EMISSIONS (WITH HPF 85494)

#### LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

### RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 206806 (dBm)	Amp/Cbl/Filt/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	1.80755	50.95	Pk	30.1	-27.2	0	53.85	-	-	-	-	0-360	101	H
2	* 2.71022	49.86	PK2	32.4	-26.9	0	55.36	-	-	74	-18.64	100	356	H
3	* 2.70843	33.28	MAV1	32.4	-26.9	5.57	44.35	54	-9.65	-	-	100	356	H
4	1.80689	41.16	Pk	30.1	-27.2	0	44.06	-	-	-	-	0-360	200	V
4	* 2.71043	51.58	Pk	32.4	-26.9	0	57.08	-	-	74	-16.92	190	142	V
	* 2.71102	33.38	MAV1	32.4	-26.9	5.57	44.45	54	-9.55	-	-	190	142	V
5	* 3.61331	44.24	Pk	33.1	-34.6	0	42.74	-	-	74	-31.26	0-360	101	H
6	* 4.5188	51.02	PK2	34	-33.3	0	51.72	-	-	74	-22.28	102	270	H
	* 4.51661	30.24	MAV1	34	-33.3	5.57	36.51	54	-17.49	-	-	102	270	H
7	* 5.42145	33.21	PK2	34.4	-32.3	0	55.31	-	-	74	-18.69	145	261	H
	* 5.42104	30.01	MAV1	34.4	-32.3	5.57	37.68	54	-16.32	-	-	145	261	H
8	6.32401	51.7	Pk	35.4	-30.6	0	56.5	-	-	-	-	0-360	199	H
9	7.23017	49.99	Pk	35.7	-30.1	0	56.59	-	-	-	-	0-360	199	H
10	* 8.1305	35.74	Pk	35.8	-29.5	0	42.04	-	-	74	-31.96	0-360	101	H
11	* 9.03394	33.22	Pk	36.1	-27.8	0	41.52	-	-	74	-32.48	0-360	199	H
12	* 3.61448	36.5	Pk	33.1	-34.6	0	35	-	-	74	-39	0-360	199	V
13	* 4.51687	47.45	PK2	34	-33.3	0	48.15	-	-	74	-25.85	190	125	V
	* 4.51694	34.24	MAV1	34	-33.3	5.57	40.51	54	-13.49	-	-	190	125	V
14	* 5.41919	54.62	PK2	34.4	-32.3	0	56.62	-	-	74	-17.38	77	376	V
	* 5.42233	30.28	MAV1	34.4	-32.3	5.57	37.95	54	-16.05	-	-	77	376	V
15	6.32596	46.93	Pk	35.4	-30.6	0	51.73	-	-	-	-	0-360	199	V
16	7.22745	45.55	Pk	35.7	-30	0	51.25	-	-	-	-	0-360	199	V
17	* 8.13322	34.53	Pk	35.8	-29.4	0	40.93	-	-	74	-33.07	0-360	199	V
18	* 9.03355	30.34	Pk	36.1	-27.8	0	38.64	-	-	74	-35.36	0-360	199	V

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

Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

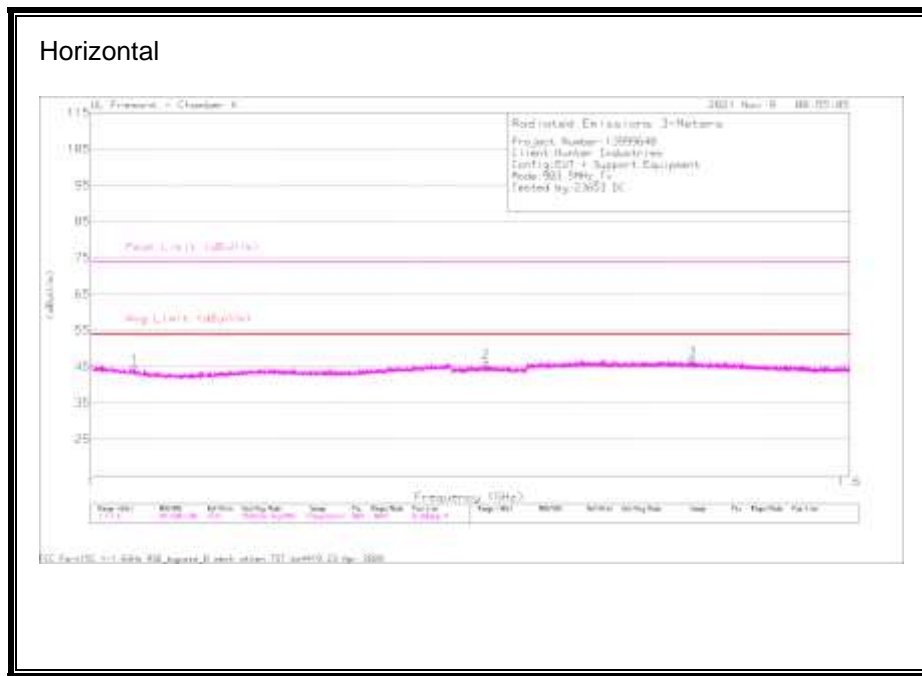
MAV1 - KDB558074 Option 1 Maximum RMS Average

NOTE: Worst highest 6 markers frequencies in restricted bands are picked and maximized.



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

Tested by:	23653 DC
Date:	11/9/21



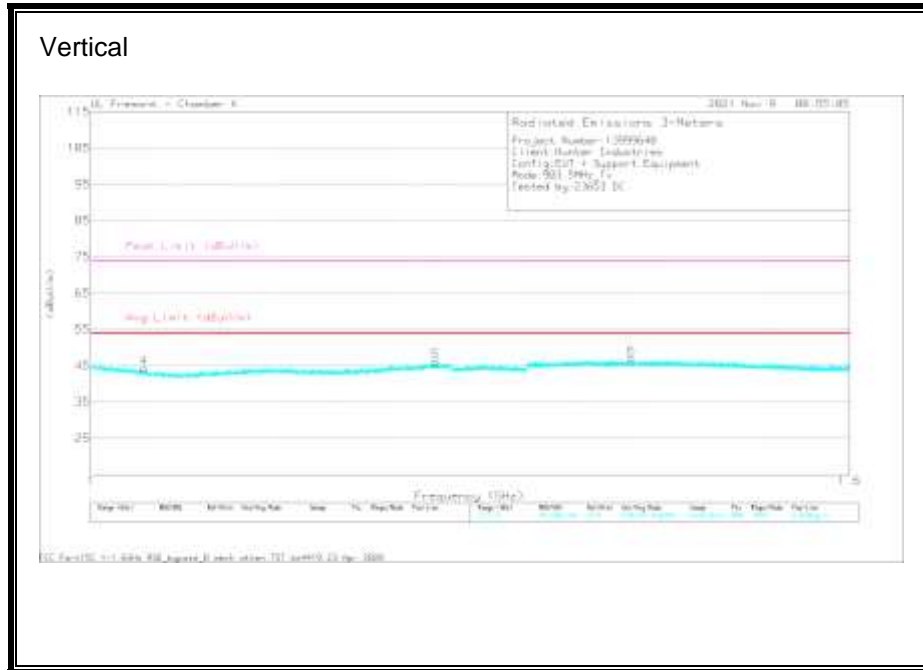
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 80404 (dB/m)	Bypass (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	* 1.02625	21.48	PK2	27.2	4.7	0	53.38	-	-	74	-20.62	336	382	H
	* 1.02907	9.91	MAV1	27.2	4.7	5.57	47.38	54	-6.62	-	-	336	382	H
2	* 1.27757	21.36	PK2	29.4	5.2	0	55.96	-	-	74	-18.04	256	143	H
	* 1.27942	9.69	MAV1	29.4	5.2	5.57	49.86	54	-4.14	-	-	256	143	H
3	* 1.45362	20.94	PK2	28.9	5.5	0	55.34	-	-	74	-18.66	247	187	H
	* 1.45292	9.76	MAV1	28.9	5.5	5.57	49.73	54	-4.27	-	-	247	187	H

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

**Note:**

- Test was performed @ 3 meter distance.



**DATA**

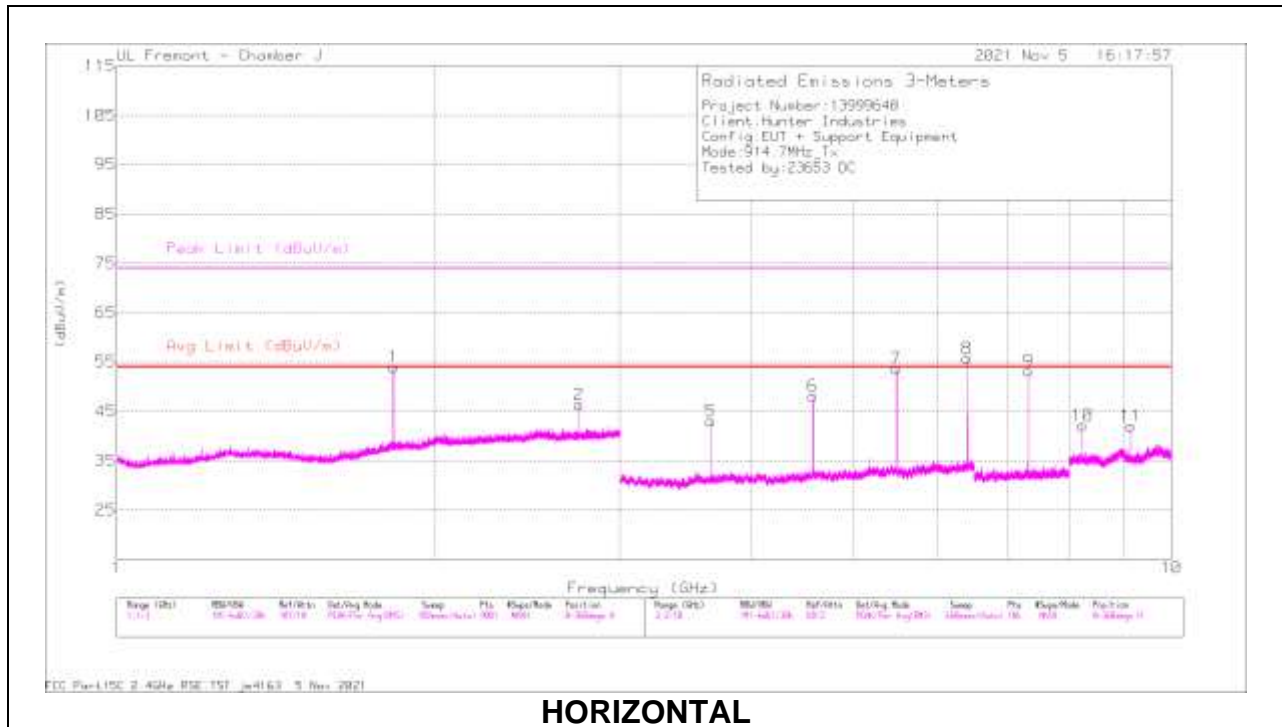
4	* 1.03487	21.53	PK2	27.1	4.7	0	53.33	-	-	74	-20.67	106	213	V
	* 1.03453	9.98	MAv1	27.1	4.7	5.57	47.35	54	-6.65	-	-	106	213	V
5	* 1.23849	21.24	PK2	28.6	5.2	0	55.04	-	-	74	-18.96	167	233	V
	* 1.23906	9.98	MAv1	28.6	5.2	5.57	49.35	54	-4.65	-	-	167	233	V
6	* 1.39894	21.46	PK2	28.9	5.4	0	55.76	-	-	74	-18.24	157	176	V
	* 1.39973	10	MAv1	29	5.4	5.57	49.97	54	-4.03	-	-	157	176	V

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

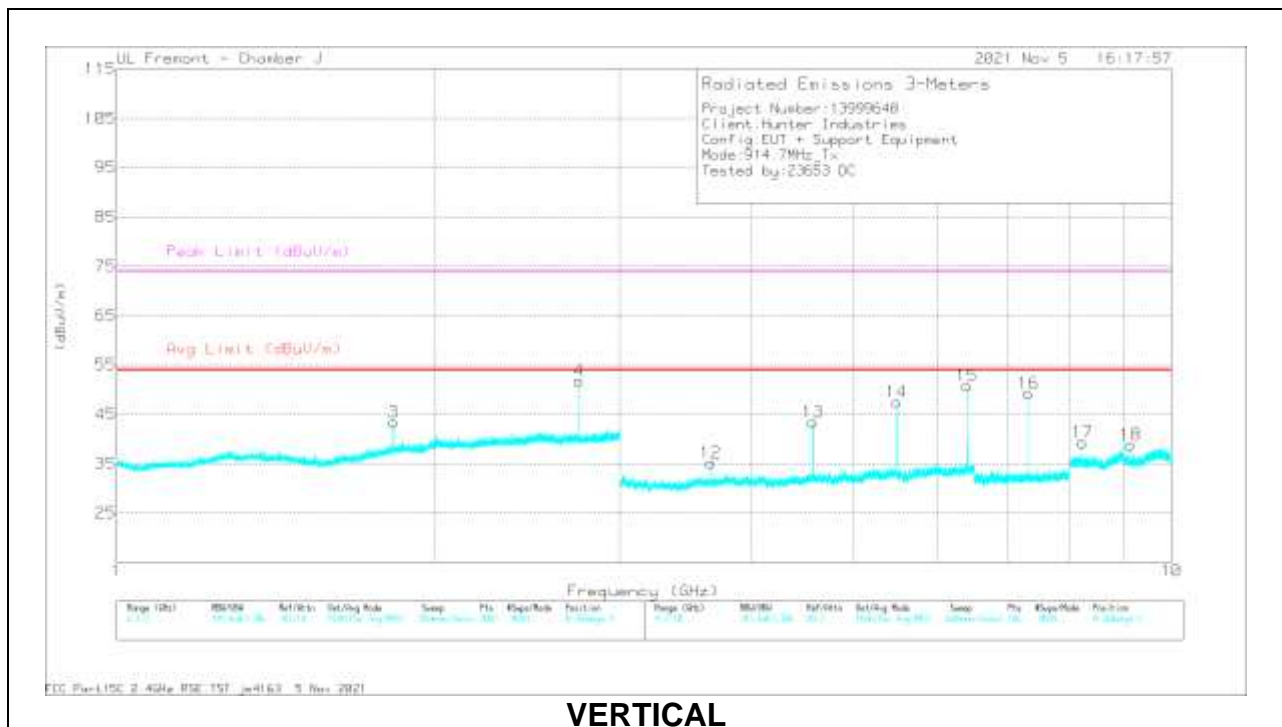
**Note:**

- Test was performed @ 3 meter distance.

### MID CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

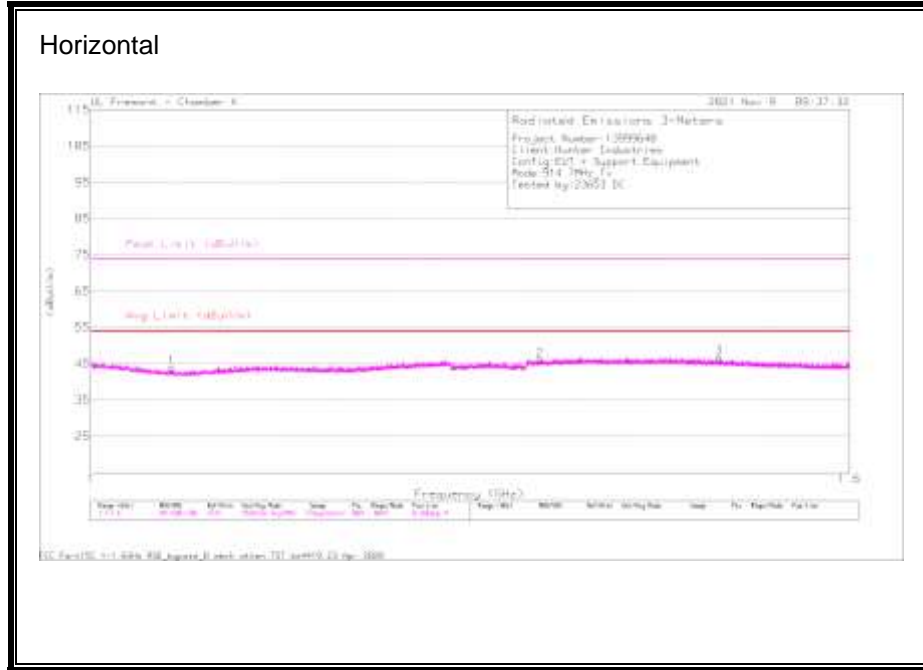
**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 205006 (dBm)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limt (dBuV/m)	Margin (dB)	Peak Limt (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.82955	50.63	Pk	30.5	-27.2	0	53.93	-	-	-	-	0-360	101	H
2	* 2.74361	48.98	PK2	32.4	-26.9	0	54.48	-	-	74	-19.52	261	339	H
	* 2.74711	33.45	MAv1	32.4	-26.9	5.57	44.52	54	-9.48	-	-	261	339	H
3	1.83	40.2	Pk	30.5	-27.2	0	43.5	-	-	-	-	0-360	200	V
4	* 2.74358	50.79	PK2	32.4	-26.9	0	56.29	-	-	74	-17.71	185	101	V
	* 2.74733	33.28	MAv1	32.4	-26.9	5.57	44.35	54	-9.65	-	-	185	101	V
5	* 3.65842	44.3	Pk	33.2	-34.4	0	43.1	-	-	74	-30.9	0-360	101	H
6	* 4.57458	50.65	PK2	34.2	-33.5	0	51.35	-	-	74	-22.65	92	133	H
	* 4.57424	40.29	MAv1	34.2	-33.5	5.57	46.56	54	-7.44	-	-	92	133	H
7	5.48669	50.8	Pk	34.4	-31.5	0	53.7	-	-	-	-	0-360	101	H
8	6.40218	51.49	Pk	35.5	-31.2	0	55.79	-	-	-	-	0-360	200	H
9	* 7.31768	51.9	PK2	35.6	-30.2	0	57.3	-	-	74	-16.7	141	234	H
	* 7.31824	27.18	MAv1	35.6	-30.2	5.57	38.15	54	-15.85	-	-	141	234	H
10	* 8.23434	35.54	Pk	36	-29.4	0	42.14	-	-	74	-31.86	0-360	101	H
11	* 9.1475	33.72	Pk	36.3	-28	0	42.02	-	-	74	-31.98	0-360	101	H
12	* 3.65842	36.4	Pk	33.2	-34.4	0	35.2	-	-	74	-38.8	0-360	200	V
13	* 4.5736	47.39	PK2	34.2	-33.5	0	48.09	-	-	74	-25.91	188	121	V
	* 4.57569	30.43	MAv1	34.2	-33.5	5.57	36.7	54	-17.3	-	-	188	121	V
14	5.48864	44.7	Pk	34.3	-31.5	0	47.5	-	-	-	-	0-360	200	V
15	6.40413	46.49	Pk	35.5	-31.2	0	50.79	-	-	-	-	0-360	200	V
16	* 7.31676	49.62	PK2	35.6	-30.2	0	55.02	-	-	74	-18.98	93	242	V
	* 7.3175	40.53	MAv1	35.6	-30.2	5.57	51.5	54	-2.5	-	-	93	242	V
17	* 8.23162	32.32	Pk	35.9	-29.5	0	33.32	-	-	74	-34.68	0-360	200	V
18	* 9.14844	30.62	Pk	36.3	-28	0	38.92	-	-	74	-35.08	0-360	200	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average  
 NOTE: Worst highest 6 markers frequencies in restricted bands are picked and maximized.

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

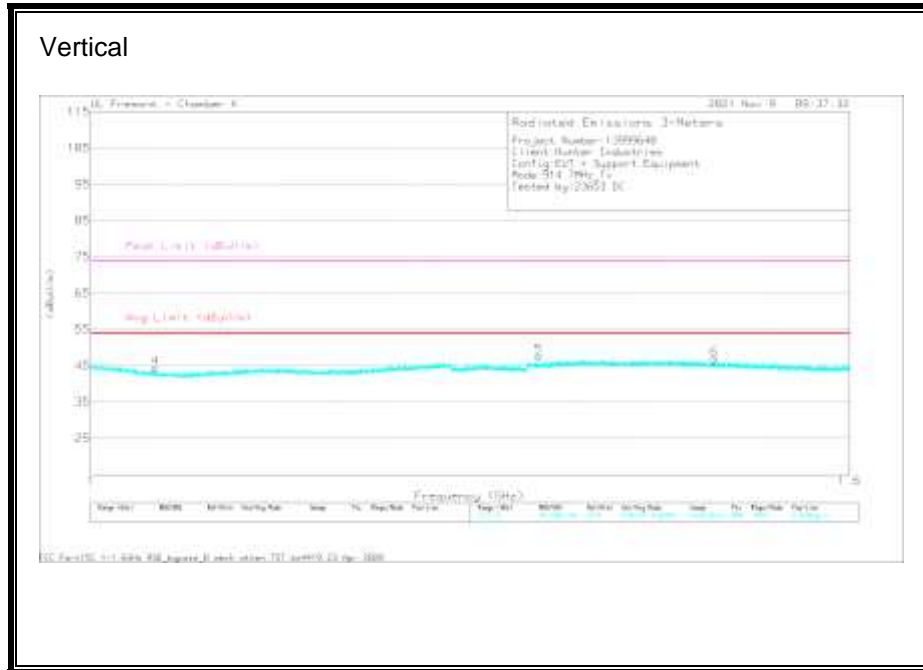
Tested by:	23653 DC
Date:	11/9/21



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 80404 (dB/m)	Bypass (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	* 1.05025	21.73	PK2	26.9	4.7	0	53.33	-	-	74	-20.67	165	173	H
	* 1.05333	9.85	MAV1	26.9	4.7	5.57	47.02	54	-6.98	-	-	165	173	H
2	* 1.31917	21.42	PK2	28.8	5.3	0	55.52	-	-	74	-18.48	209	208	H
	* 1.3229	9.81	MAV1	29	5.3	5.57	49.68	54	-4.32	-	-	209	208	H
3	* 1.47662	21.02	PK2	28.4	5.6	0	55.02	-	-	74	-18.98	256	162	H
	* 1.47534	10.07	MAV1	28.4	5.6	5.57	49.64	54	-4.36	-	-	256	162	H

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

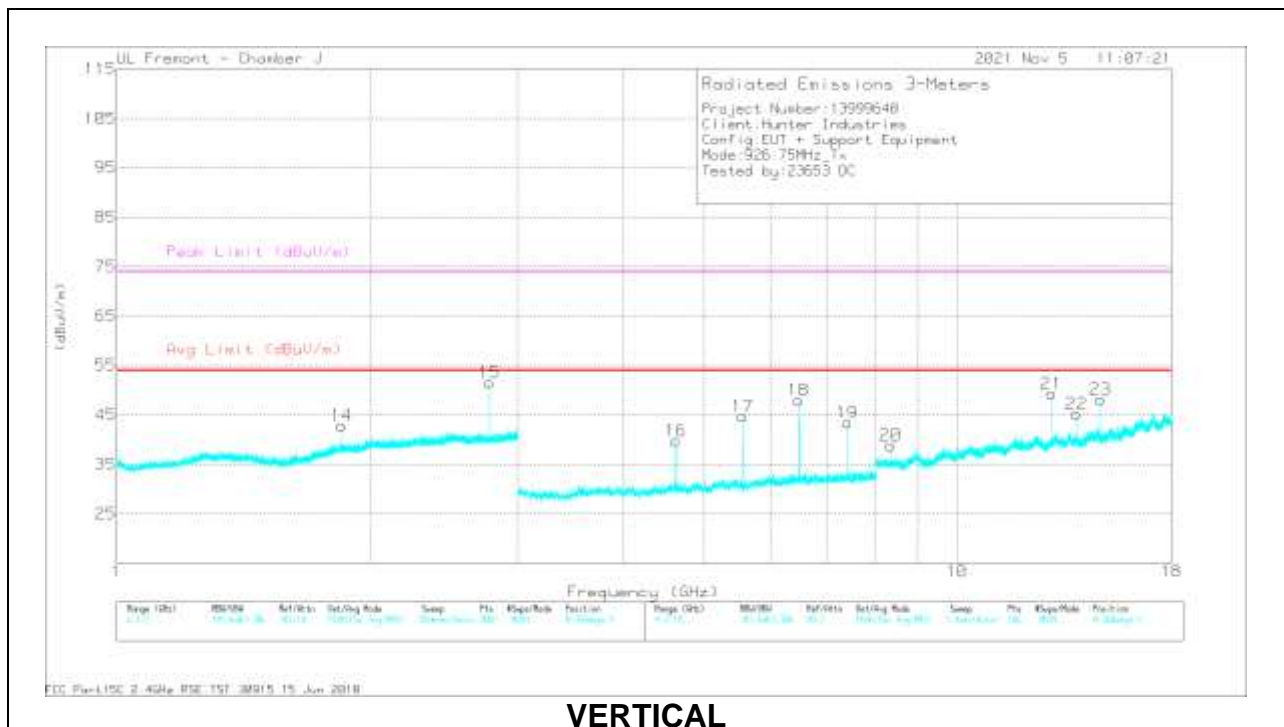
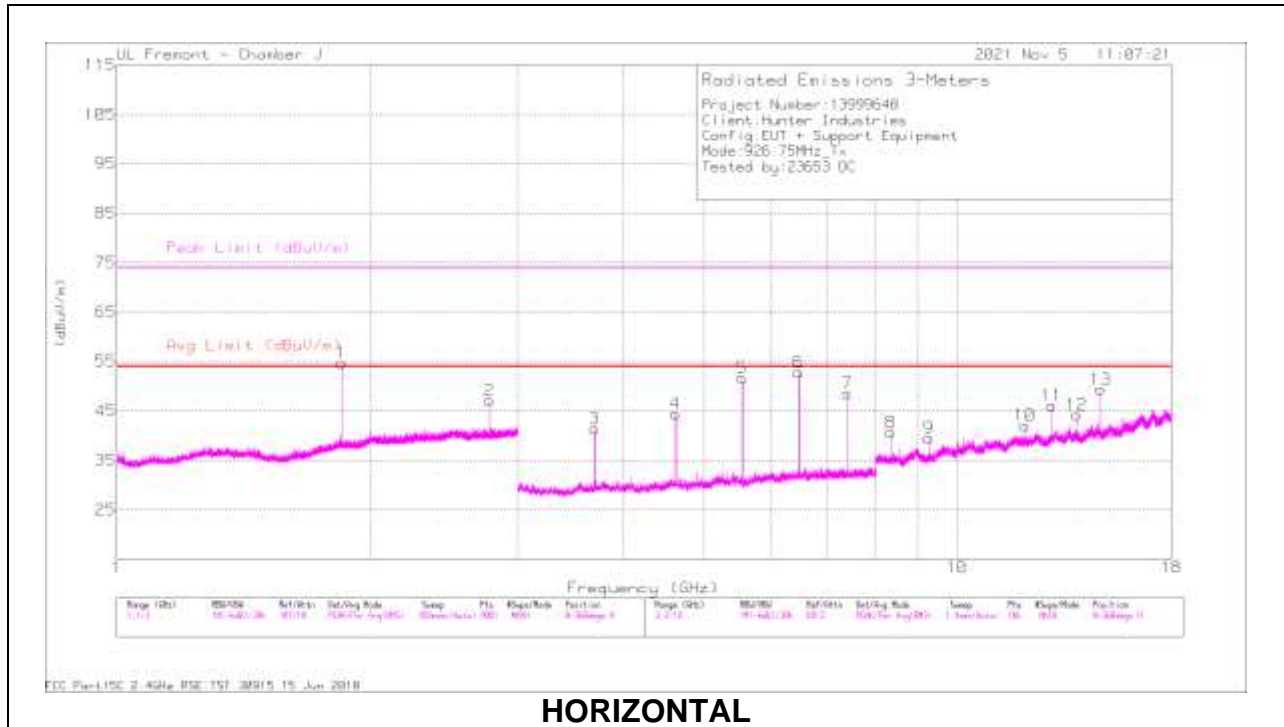


**DATA**

4	* 1.03882	21.98	PK2	27	4.7	0	53.68	-	-	74	-20.32	280	108	V
	* 1.04216	10.07	MAv1	27	4.7	5.57	47.34	54	-6.66	-	-	280	108	V
5	* 1.32119	21.18	PK2	28.9	5.3	0	55.38	-	-	74	-18.62	285	100	V
	* 1.32185	9.74	MAv1	29	5.3	5.57	49.61	54	-4.39	-	-	285	100	V
6	* 1.47124	21.36	PK2	28.5	5.6	0	55.46	-	-	74	-18.54	315	161	V
	* 1.4728	9.91	MAv1	28.5	5.6	5.57	49.58	54	-4.42	-	-	315	161	V

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

### HIGH CHANNEL RESULTS



**RADIATED EMISSIONS**

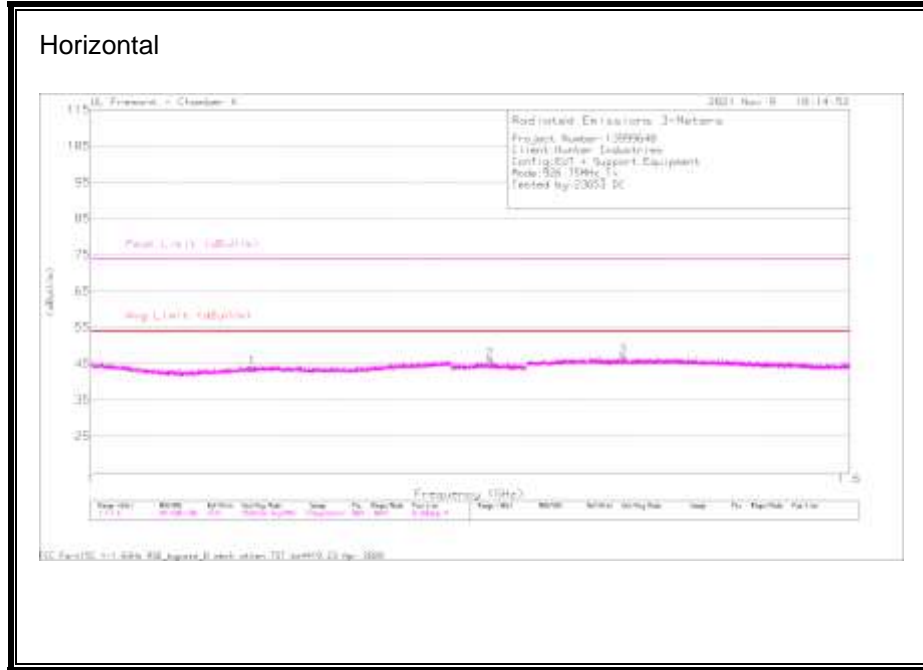
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF 206806 (dBm)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.85376	53.81	PK2	30.6	-27.2	0	57.21	-	-	-	-	89	181	H
	1.85719	33.48	MAv1	30.6	-27.2	5.57	42.45	-	-	-	-	89	181	H
2	* 2.77868	48.85	PK2	32.4	-26.9	0	54.35	-	-	74	-19.65	108	373	H
	* 2.77848	33.32	MAv1	32.4	-26.9	5.57	44.39	54	-9.61	-	-	108	373	H
14	1.85244	39.47	Pk	30.6	-27.2	0	42.87	-	-	-	-	0-360	200	V
15	* 2.77872	50.94	PK2	32.4	-26.9	0	56.44	-	-	74	-17.56	178	107	V
	* 2.77785	41.35	MAv1	32.4	-26.9	5.57	52.42	54	-1.58	-	-	178	107	V
3	* 3.70421	42.77	Pk	33.3	-34.7	0	41.37	-	-	74	-32.63	0-360	101	H
4	* 4.63267	50.09	PK2	34.2	-33.2	0	51.09	-	-	74	-22.91	96	123	H
	* 4.63293	30.29	MAv1	34.2	-33.2	5.57	36.86	54	-17.14	-	-	96	123	H
5	5.55431	48.97	Pk	34.3	-31.6	0	51.67	-	-	-	-	0-360	200	H
6	6.48353	47.6	Pk	35.6	-30.4	0	52.8	-	-	-	-	0-360	200	H
7	* 7.41227	49.06	PK2	35.7	-30.2	0	54.56	-	-	74	-19.44	133	228	H
	* 7.41445	32.63	MAv1	35.7	-30.2	5.57	43.7	54	-10.3	-	-	133	228	H
8	* 8.33447	34.11	Pk	35.8	-29.3	0	40.61	-	-	74	-33.39	0-360	200	H
9	9.28202	30.78	Pk	36.3	-27.6	0	39.48	-	-	-	-	0-360	101	H
10	* 12.03467	29.1	Pk	38.8	-25.8	0	42.1	-	-	74	-31.9	0-360	101	H
11	12.96306	32.21	Pk	39.4	-25.5	0	46.11	-	-	-	-	0-360	101	H
12	13.88978	30.36	Pk	38.6	-24.8	0	44.16	-	-	-	-	0-360	200	H
13	14.81233	34.39	Pk	39.6	-24.6	0	49.39	-	-	-	-	0-360	200	H
16	* 4.62842	38.8	Pk	34.2	-33.2	0	39.8	-	-	74	-34.2	0-360	101	V
17	5.55598	42.03	Pk	34.3	-31.6	0	44.73	-	-	-	-	0-360	200	V
18	6.48103	42.84	Pk	35.6	-30.4	0	48.04	-	-	-	-	0-360	200	V
19	* 7.41335	46.32	PK2	35.7	-30.2	0	51.82	-	-	74	-22.18	91	253	V
	* 7.41465	33.25	MAv1	35.7	-30.2	5.57	44.32	54	-9.68	-	-	91	253	V
20	* 8.3353	32.24	Pk	35.8	-29.2	0	38.84	-	-	74	-35.16	0-360	101	V
21	12.96139	35.34	Pk	39.4	-25.5	0	49.24	-	-	-	-	0-360	200	V
22	13.88644	31.39	Pk	38.6	-24.8	0	45.19	-	-	-	-	0-360	200	V
23	14.81233	33.17	Pk	39.6	-24.6	0	48.17	-	-	-	-	0-360	200	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average  
 NOTE: Worst highest 6 markers frequencies in restricted bands are picked and maximized.



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

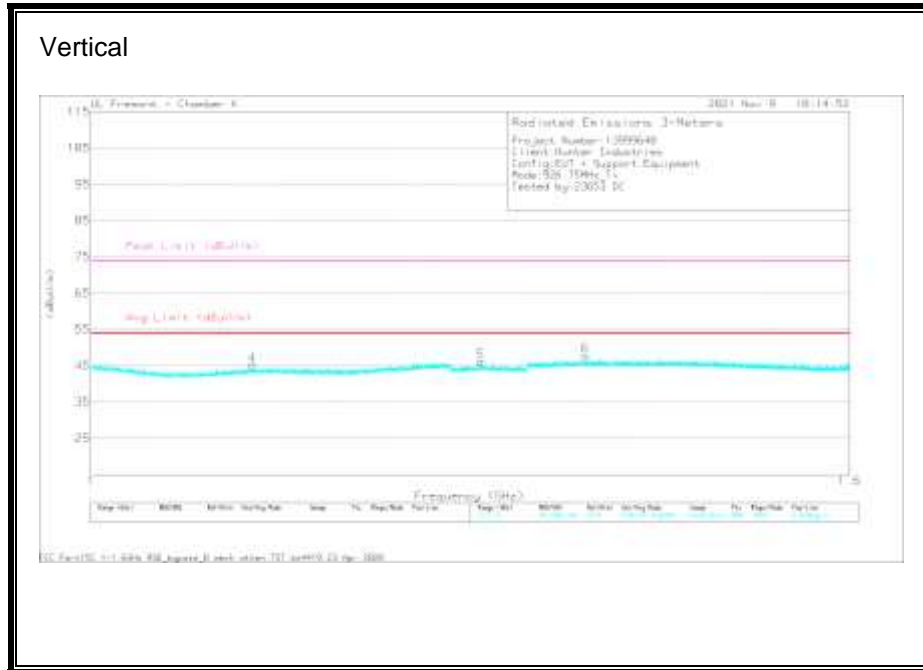
Tested by:	23653 DC
Date:	11/9/21



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 80404 (dB/m)	Bypass (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	* 1.10587	21.67	PK2	27.7	4.9	0	54.27	-	-	74	-19.73	195	126	H
	* 1.10701	10.14	MAV1	27.7	4.9	5.57	48.31	54	-5.69	-	-	195	126	H
2	* 1.2811	21.92	PK2	29.4	5.2	0	56.52	-	-	74	-17.48	205	137	H
	* 1.28059	9.67	MAV1	29.4	5.2	5.57	49.84	54	-4.16	-	-	205	137	H
3	* 1.38938	21.12	PK2	29	5.4	0	55.52	-	-	74	-18.48	335	100	H
	* 1.39227	10.08	MAV1	29	5.4	5.57	50.05	54	-3.95	-	-	335	100	H

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



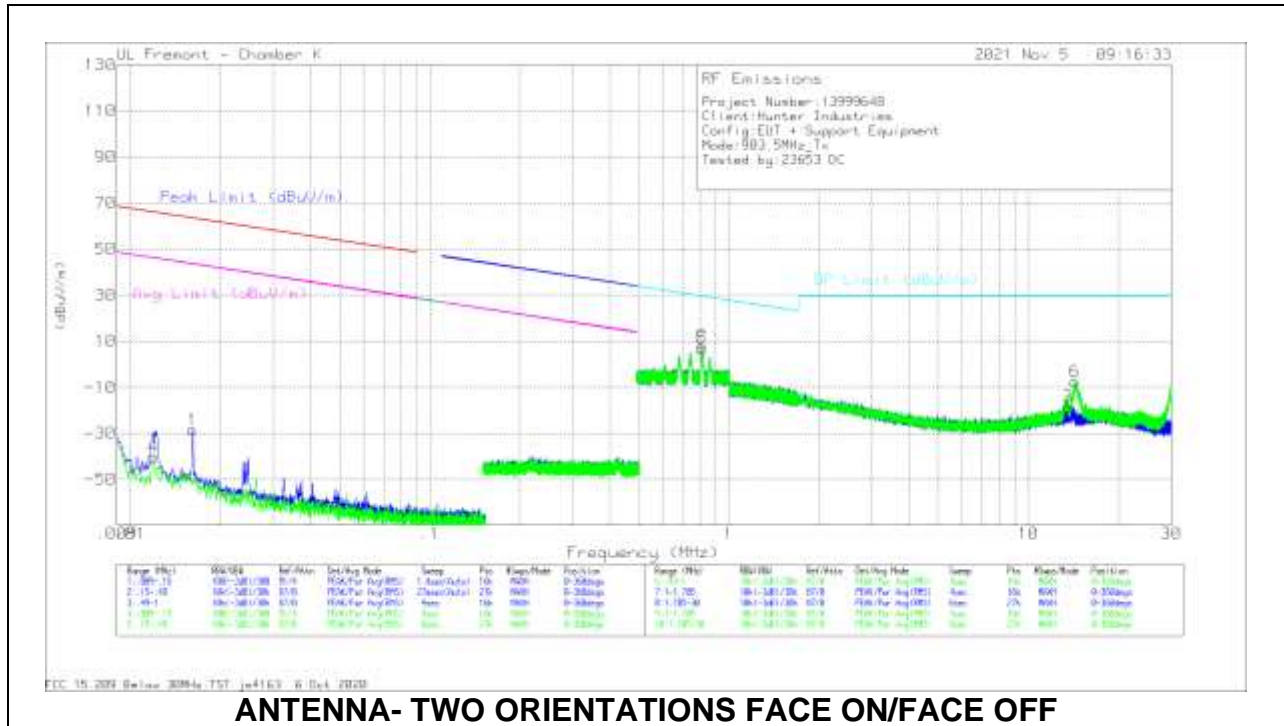
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 80404 (dBm)	Bypass (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
4	* 1.10431	21.67	PK2	27.7	4.9	0	54.27	-	-	74	-19.73	143	232	V
	* 1.10745	10.12	MAv1	27.7	4.9	5.57	48.29	54	-5.71	-	-	143	232	V
5	* 1.274	21.35	PK2	29.4	5.2	0	55.95	-	-	74	-18.05	51	117	V
	* 1.27397	9.91	MAv1	29.4	5.2	5.57	50.08	54	-3.92	-	-	51	117	V
6	* 1.35923	21.52	PK2	29.2	5.4	0	56.12	-	-	74	-17.88	124	142	V
	* 1.35873	9.72	MAv1	29.2	5.4	5.57	49.89	54	-4.11	-	-	124	142	V

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

### 10.3. WORST CASE BELOW 30MHz

#### SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



**ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF**

#### Below 30MHz Data

#### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01614	23.4	Pk	59.5	-31.5	-80	-28.6	63.43	-92.03	43.43	-72.03	0-360
4	.01194	10.98	Pk	60	-31.1	-80	-40.12	66.04	-106.16	46.04	-86.16	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.8099	23.53	Pk	56.2	-32.1	-40	7.63	29.45	-21.82	0-360
5	.81288	22.7	Pk	56.2	-32.1	-40	6.8	29.42	-22.62	0-360
3	13.56836	19.05	Pk	34.3	-31.8	-40	-18.45	29.5	-47.95	0-360
6	14.26947	30.05	Pk	34.2	-31.7	-40	-7.45	29.5	-36.95	0-360

Pk - Peak detector