



# **CERTIFICATION TEST REPORT**

**Report Number. :** 4789464427-FR1V2

**Applicant :** SEGI LIMITED  
Unit J2, 4/F, Block 1, Kinho Industrial Building,  
14-24 Au Pui Wan Street, Shatin, New Territories  
HONGKONG, China

**Model :** 2WR5R-SF

**FCC ID :** VA5REK500-2WLR  
**IC :** 7087A-2WREK500LR

**EUT Description :** Keyless Entry System

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 Issue 2  
INDUSTRY CANADA RSS-GEN Issue 5

**Date Of Issue:**

July 14, 2020

**Prepared by:**

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, LTD. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu

Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433



ACCREDITED

**Testing Laboratory**

**TL-637**

## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	07/13/20	Initial issue	Robby Lee
V2	07/14/20	Updated the equipment list	Robby Lee

## TABLE OF CONTENTS

REPORT REVISION HISTORY .....	2
TABLE OF CONTENTS .....	3
1. ATTESTATION OF TEST RESULTS .....	4
2. SUMMARY TABLE.....	5
3. TEST METHODOLOGY.....	6
4. FACILITIES AND ACCREDITATION.....	6
5. CALIBRATION AND UNCERTAINTY .....	7
5.1. MEASURING INSTRUMENT CALIBRATION .....	7
5.2. SAMPLE CALCULATION.....	7
5.3. MEASUREMENT UNCERTAINTY.....	7
5.4. DECISION RULE .....	7
6. EQUIPMENT UNDER TEST .....	8
6.1. EUT DESCRIPTION.....	8
6.2. MAXIMUM OUTPUT POWER.....	8
6.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	8
6.4. WORST-CASE CONFIGURATION AND MODE.....	8
6.5. DESCRIPTION OF TEST SETUP.....	9
7. MEASUREMENT METHOD.....	11
8. TEST AND MEASUREMENT EQUIPMENT .....	12
9. ANTENNA PORT TEST RESULTS .....	13
9.1. ON TIME AND DUTY CYCLE.....	13
9.2. 99% BANDWIDTH .....	14
9.3. 6 dB BANDWIDTH.....	16
9.4. OUTPUT POWER.....	18
9.5. POWER SPECTRAL DENSITY .....	20
9.6. CONDUCTED SPURIOUS EMISSIONS.....	22
10. RADIATED TEST RESULTS.....	24
10.1. LIMITS AND PROCEDURE .....	24
10.2. TRANSMITTER ABOVE 1 GHz .....	27
10.3. WORST CASE BELOW 1 GHZ.....	33
11. AC POWER LINE CONDUCTED EMISSIONS.....	35
11.1.1. AC Power Line .....	36

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SEGI LIMITED  
**EUT DESCRIPTION:** Keyless Entry System  
**MODEL:** 2WR5R-SF  
**SERIAL NUMBER:** Prototype (CONDUCTED)  
Prototype (RADIATED);  
**DATE TESTED:** JUL 01, 2020 – JUL 08, 2020;

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

UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Korea, Ltd. By:



CY Choi  
Suwon Lab Engineer  
UL Korea, Ltd.

Tested By:



Robby Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. SUMMARY TABLE

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	RSS-247 5.2(a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247 (b)(3)	RSS-247 5.4(d)	TX conducted output power	<30dBm		Pass
15.247 (e)	RSS-247 5.2(b)	PSD	<8dBm		Pass
15.207 (a)	RSS-GEN Clause 8.8	AC Power Line conducted emissions	Section 11	Power Line conducted	Pass
15.205, 15.209	RSS-GEN Clause 7 & 8.9	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	Pass

### 3. TEST METHODOLOGY

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

### 4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 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.

218 Maeyeong-ro
<input type="checkbox"/> Chamber 1
<input type="checkbox"/> Chamber 2
<input checked="" type="checkbox"/> Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/wp-content/uploads/2017/05/TL-637.pdf>.

## 5. CALIBRATION AND UNCERTAINTY

### 5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

### 5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.35 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

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

### 5.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is Keyless Entry System.  
This test report addresses the DTS operational mode.

### 6.2. MAXIMUM OUTPUT POWER

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

Frequency Range[MHz]	Modulation Type	Power Mode	Output Power [dBm]	Output Power [mW]
907 ~ 919	DSSS	Peak	18.08	64.27

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.  
Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes an internal antenna, with a maximum gain of -9.0 dBi

### 6.4. WORST-CASE CONFIGURATION AND MODE

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

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Note : All radiated and power line conducted tests were performed attached with travel adapter for the worst case condition mode.



## 6.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC adaptor	SAMSUNG	EP-TA200	R37M14P3GY1SE3	None

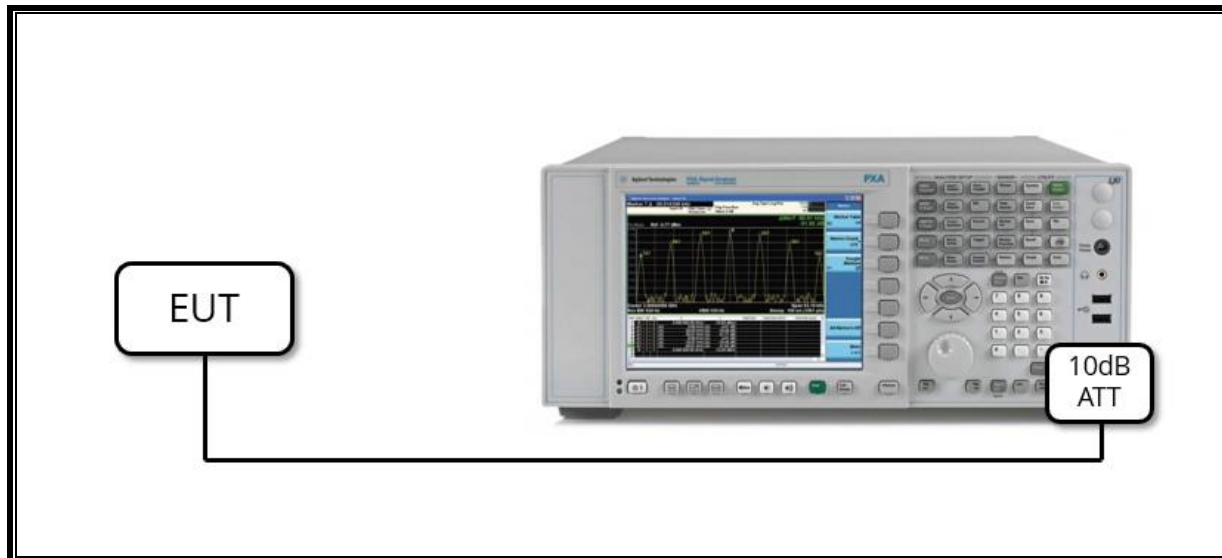
### I/O CABLE

Cable No	Port	# of identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Micro USB	1	Micro USB	Shilded	0.8	-

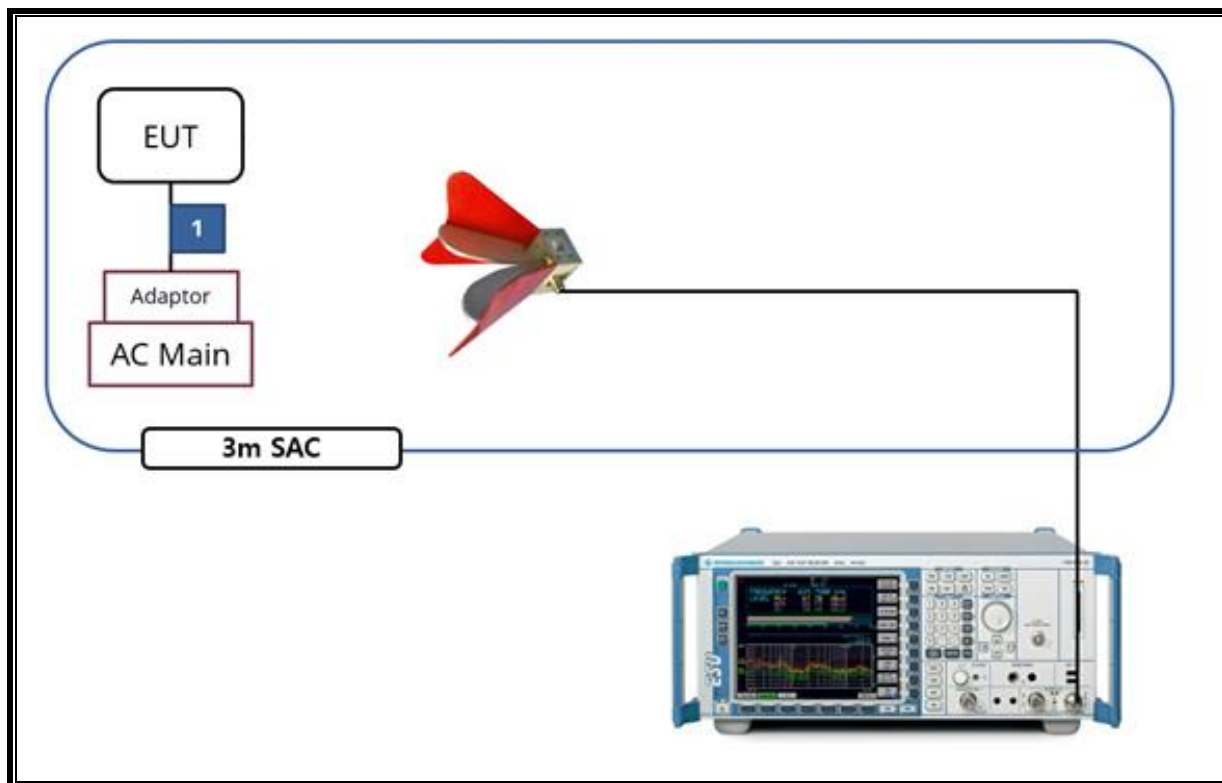
### TEST SETUP

The EUT is a unit with test jig during the tests.  
The EUT was tested in forced transmit mode by software.

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



## 7. MEASUREMENT METHOD

6 dB BW : KDB 558074 D01 v05r02, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.1.1

POWER SPECTRAL DENSITY : KDB 558074 D01 v05r02, Section 8.4.

Out-of-band Emissions (Conducted) : KDB 558074 D01 v05r02, Section 8.5.

Out-of-band Emissions in Non-restricted Bands: KDB 558074 D01 v05r02, Section 8.5.

Out-of-band Emissions in Restricted Bands : KDB 558074 D01 v05r02, Section 8.6.

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

## 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	S/N	Next Cal. Date
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Preamplifier	ETS	3116C-PA	00168841	08-08-20
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-05-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-20
Attenuator	PASTERNAK	PE7087-10	A009	08-08-20
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-20
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-20
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-05-20
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	08-05-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-20
LISN	R&S	ENV-216	101837	08-09-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
Antenna, Loop, 9kHz-30MHz				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

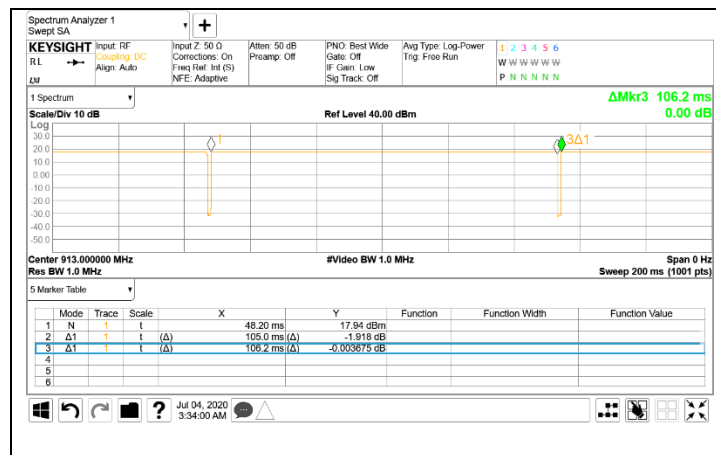
## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
DSSS	105.0	106.2	0.989	98.9%	0.00	0.010



## **9.2. 99% BANDWIDTH**

### **LIMITS**

None; for reporting purposes only.

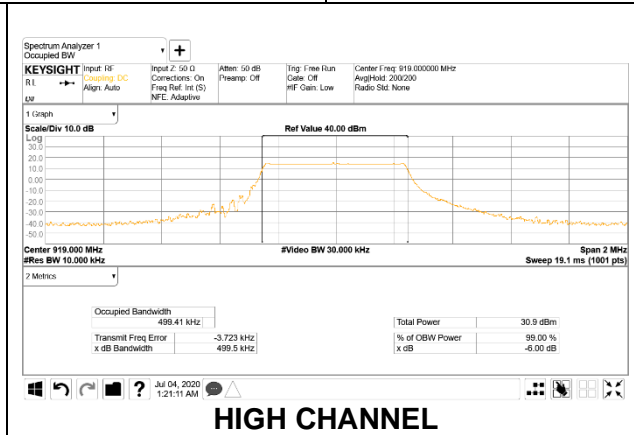
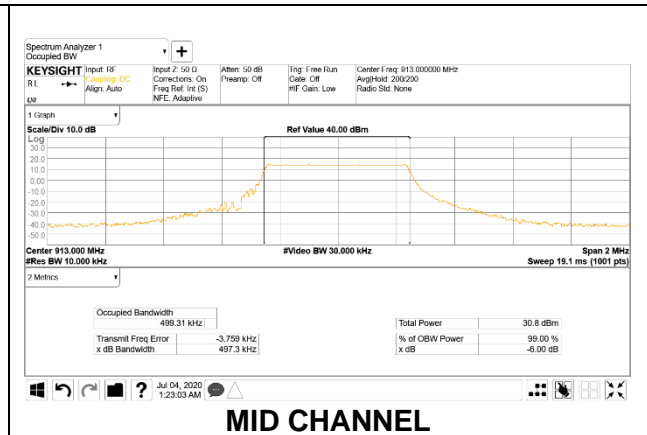
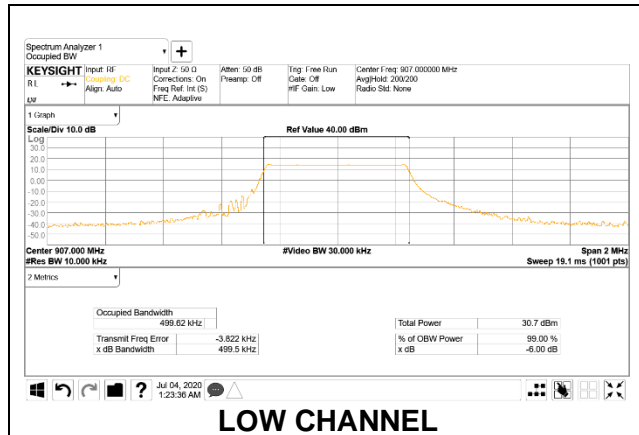
### **TEST PROCEDURE**

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to  $\geq 3$  times the RBW. The spectrum analyzer internal 99% bandwidth function is utilized.

### **RESULTS**

**99% BANDWIDTH data**

Channel	Frequency [MHz]	99% Bandwidth [kHz]
Low	907	499.62
Mid	913	499.31
High	919	499.41
Worst		499.62



### **9.3. 6 dB BANDWIDTH**

#### **LIMITS**

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

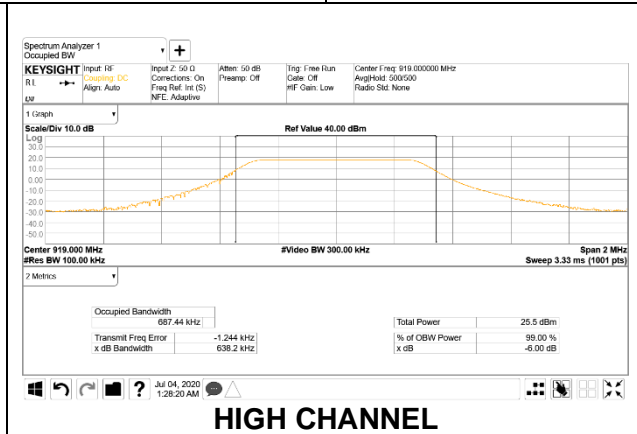
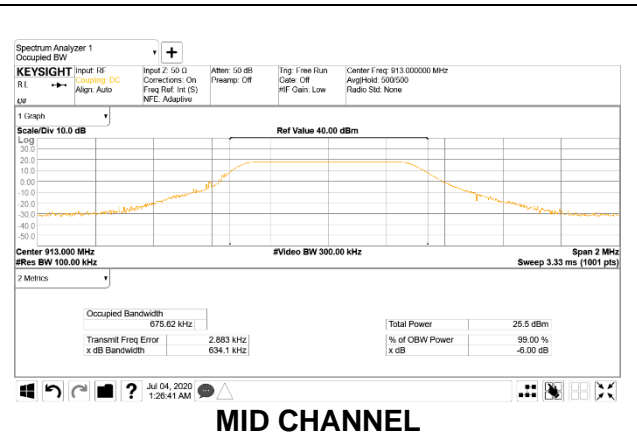
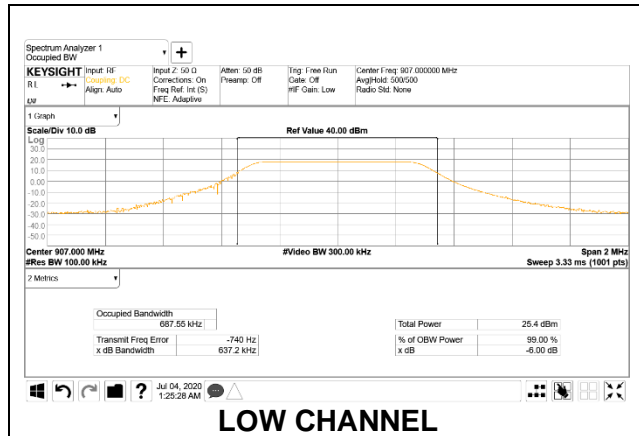
The minimum 6 dB bandwidth shall be at least 500 kHz.

#### **RESULTS**



**6dB Bandwidth data**

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minumun Limit [kHz]
Low	907	637.2	500.0
Mid	913	<b>634.1</b>	500.0
High	919	638.2	500.0
Worst		634.1	500.0



## 9.4. OUTPUT POWER

### LIMITS

FCC §15.247 (b)

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

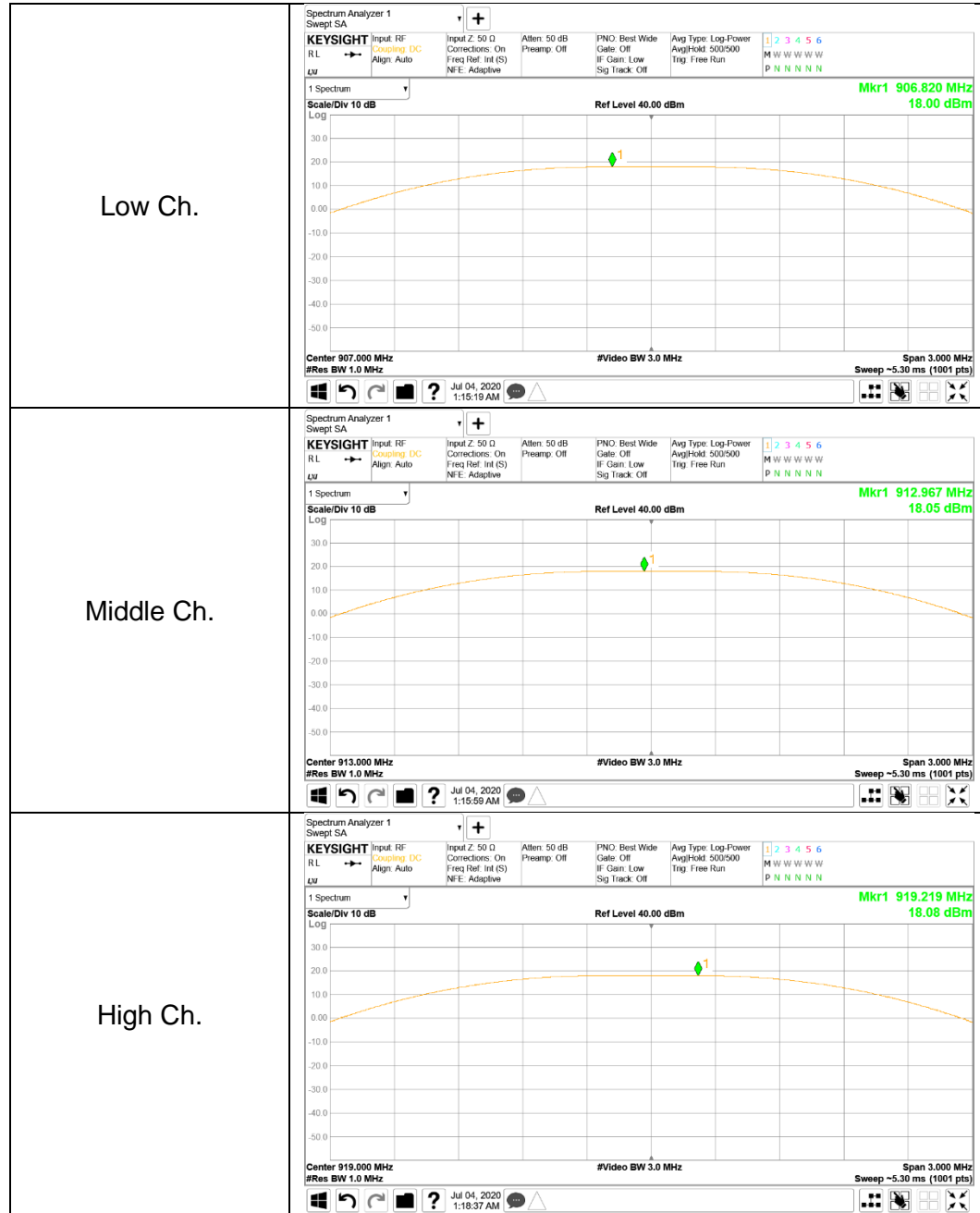
### TEST PROCEDURE

Peak power is measured using ANSI C63.10(2013) under section 11.9.1.1 utilizing spectrum analyzer.

### RESULTS

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	907	18.000	30.000	-12.000
Mid	913	18.050	30.000	-11.950
High	919	18.080	30.000	-11.920
Worst		18.080	30.000	-11.920

**PEAK OUTPUT POWER PLOTS**



## **9.5. 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.

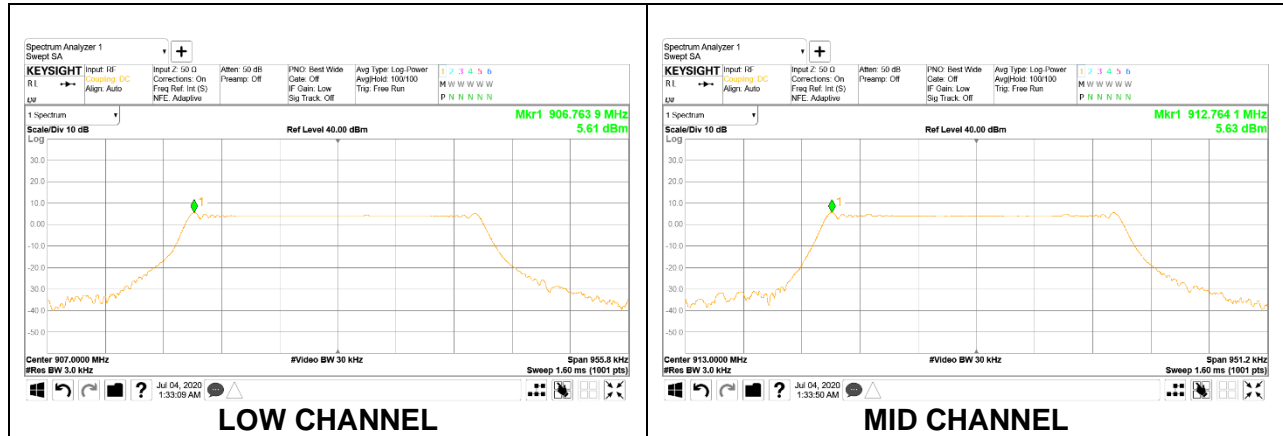
### **TEST PROCEDURE**

Power Spectral Density was measured using ANSI C63.10(2013) under section 11.10.2 utilizing spectrum analyzer.

### **RESULTS**

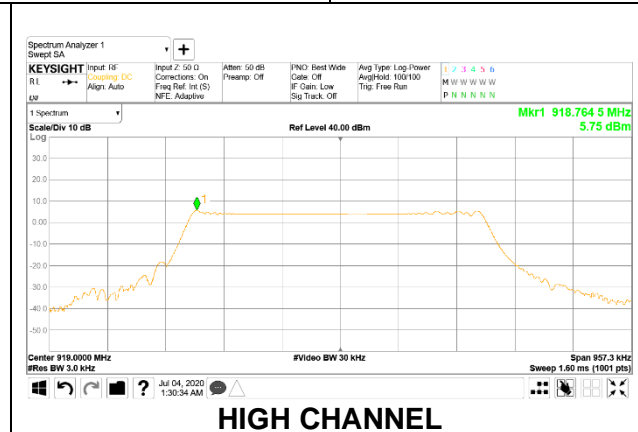
**PSD data**

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
Low	907	5.610	8.000	-2.390
Mid	913	<b>5.630</b>	<b>8.000</b>	<b>-2.370</b>
High	919	5.750	8.000	-2.250



**LOW CHANNEL**

**MID CHANNEL**



**HIGH CHANNEL**

## 9.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

RSS-247 5.5

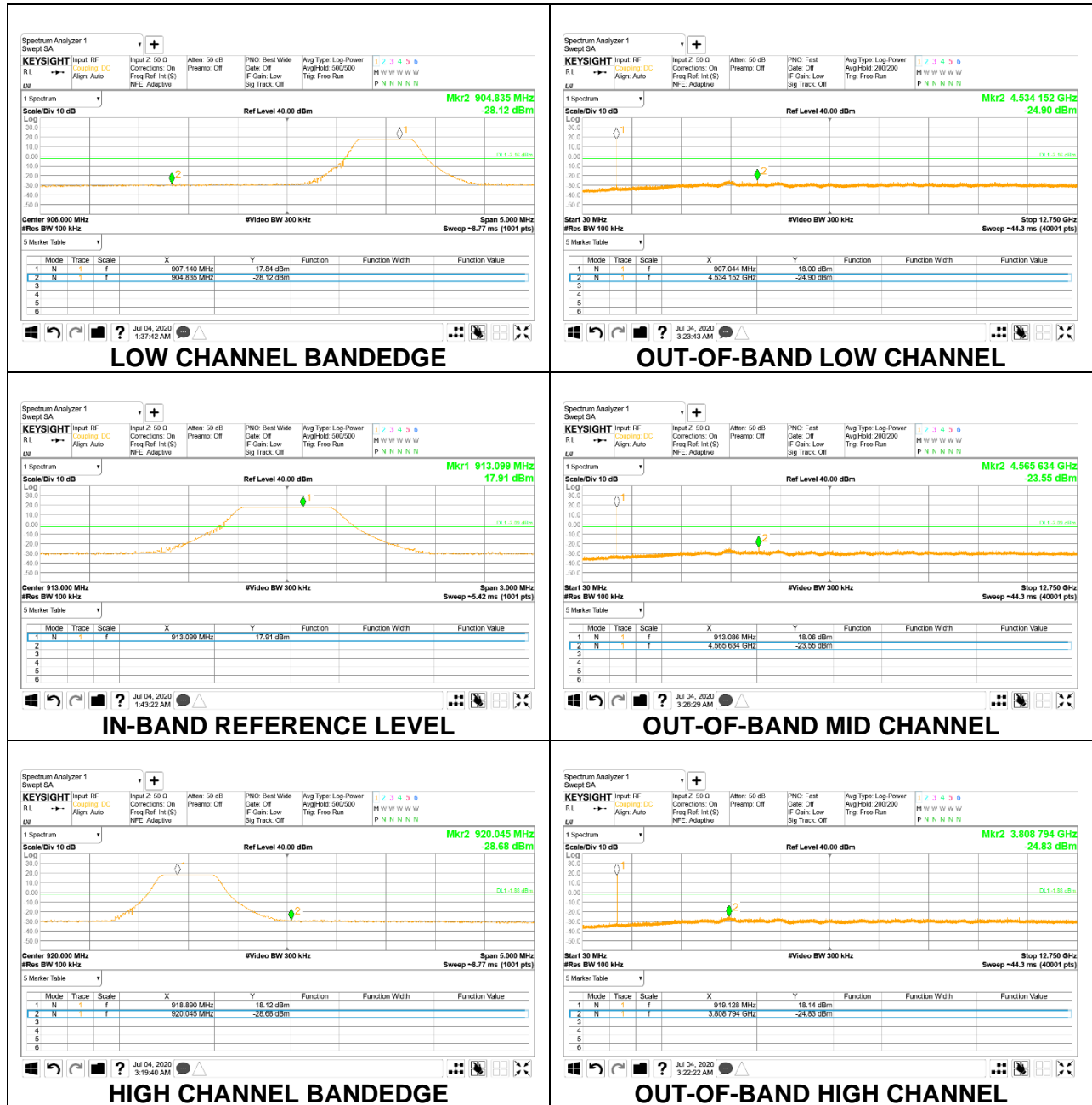
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

### RESULTS

**Test data**



## 10. RADIATED TEST RESULTS

### 10.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.



IC RSS-GEN Sections 8.9 and 8.10.

Frequency (MHz)	Field strength ( $\mu\text{V}/\text{m}$ at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Frequency (MHz)	Magnetic field strength (H-Field) ( $\mu\text{A}/\text{m}$ )	Measurement Distance (m)
0.009–0.490 <sup>Note 1</sup>	6.37/F (F in kHz)	300
0.490–1.705	63.7/F (F in kHz)	30
1.705–30.0	0.08	30
Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.		

Note: The limits for spurious emissions below 30 MHz in RSS GEN Section 8.9 Table 6 are given in dBuA/m while the FCC Part 15.209(a) limits are expressed in dBuV/m. Using the free space impedance of  $377\Omega$  to convert between electric and magnetic field strength (a factor of 51.5dB in logarithmic units) the two sets of limits are equivalent and therefore a measured value of X dBuV/m shown in the plots and tables is equal to a magnetic field strength of (X - 51.5) dBuA/m and the margin of that emission relative to the RSS GEN limit (FCC 15.209 limit – 51.5) dBuA/m would be the same as the margin to the FCC limit detailed in those plots/tables.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for 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 measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restricted band-edge, Final detection of spurious harmonic emissions) Duty cycle factor =  $10 \log(1/x)$ . But this EUT operated on a duty cycle of over 98% during test. Therefore, duty cycle factor is not applied.

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

The spectrum from 1 GHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the band (902 MHz ~ 928 MHz).  
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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.

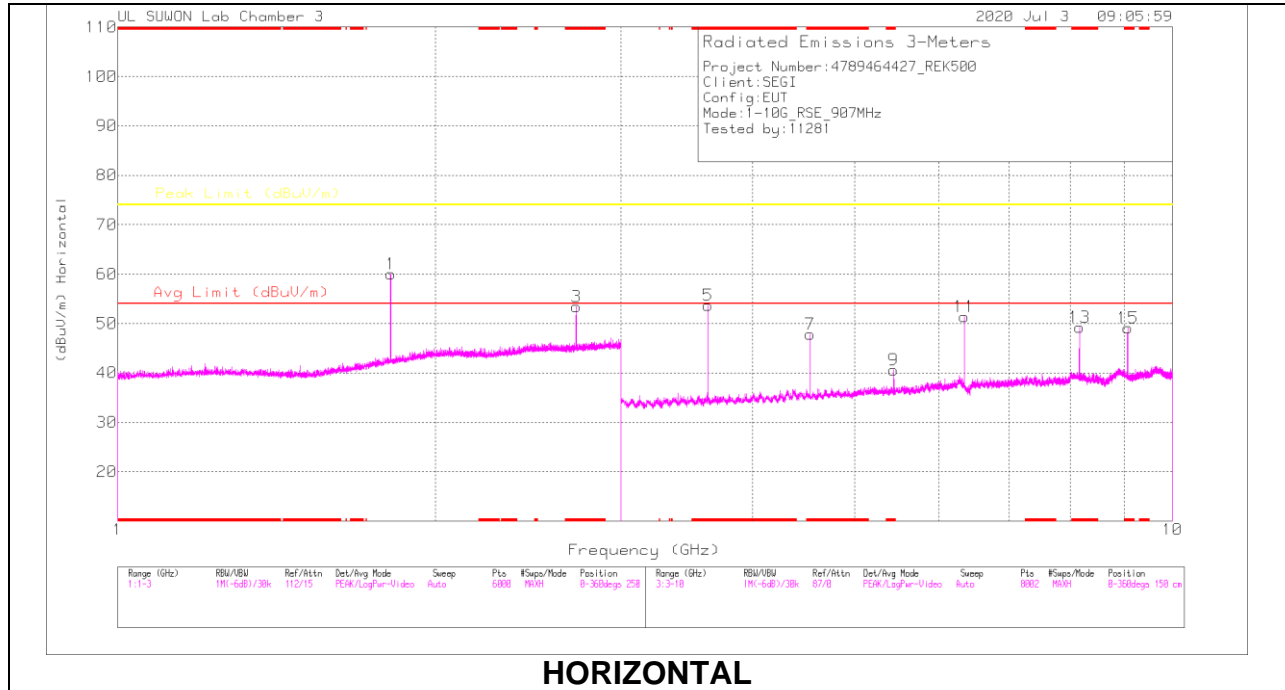
Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).  
Per FCC part 15.31(o), test results were not reported.

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

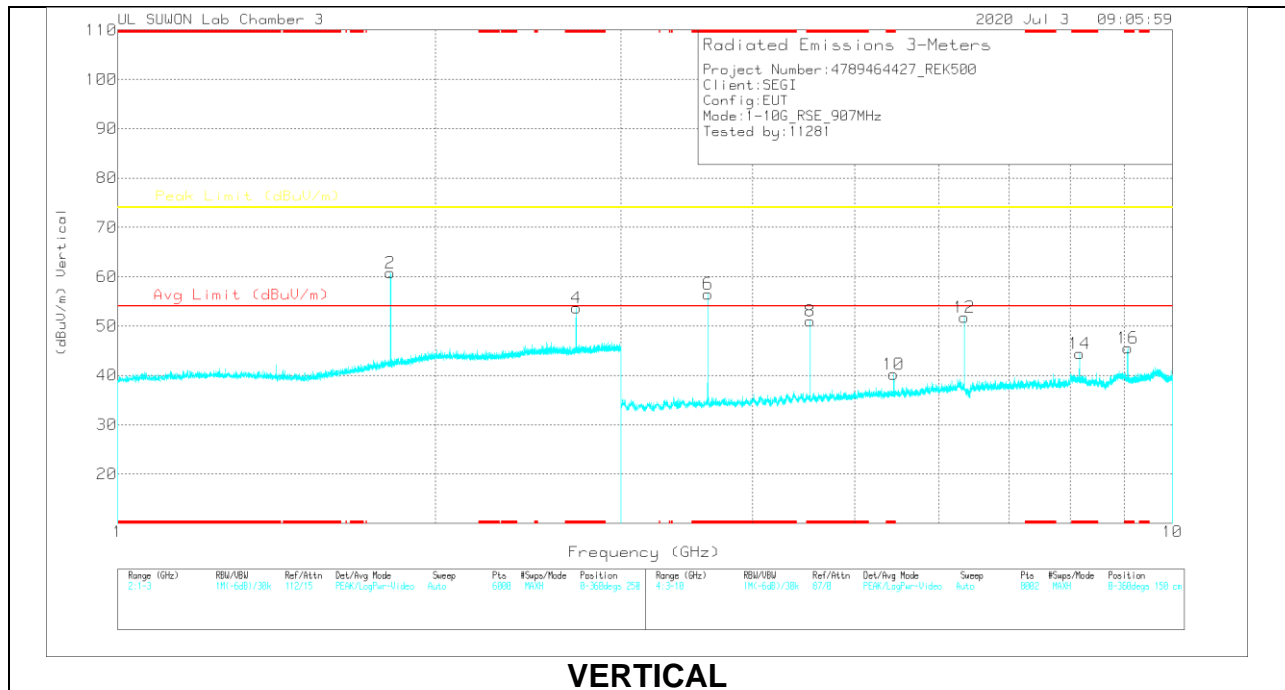
## 10.2. TRANSMITTER ABOVE 1 GHz

### HARMONICS AND SPURIOUS EMISSIONS

#### LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

**RADIATED EMISSIONS**

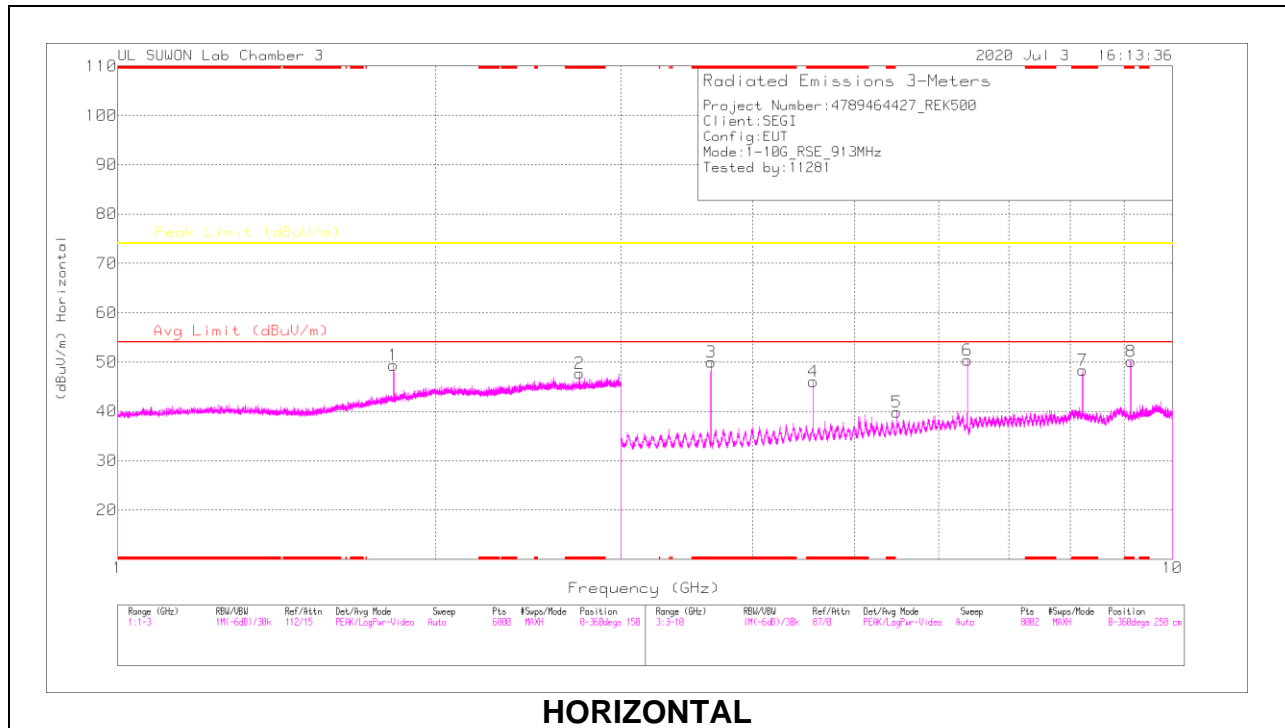
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.8143	56.3	PK2	30.5	-22.9	63.9	-	-	74	-10.1	211	228	H
* 2.72114	49.28	PK2	32.3	-21.9	59.68	-	-	74	-14.32	204	129	H
* 2.72093	40.97	MAv1	32.3	-21.9	51.37	54	-2.63	-	-	204	129	H
1.81382	56.29	PK2	30.5	-22.9	63.89	-	-	74	-10.11	77	119	V
* 2.72163	48.53	PK2	32.3	-21.9	58.93	-	-	74	-15.07	19	101	V
* 2.72112	39.43	MAv1	32.3	-21.9	49.83	54	-4.17	-	-	19	101	V

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

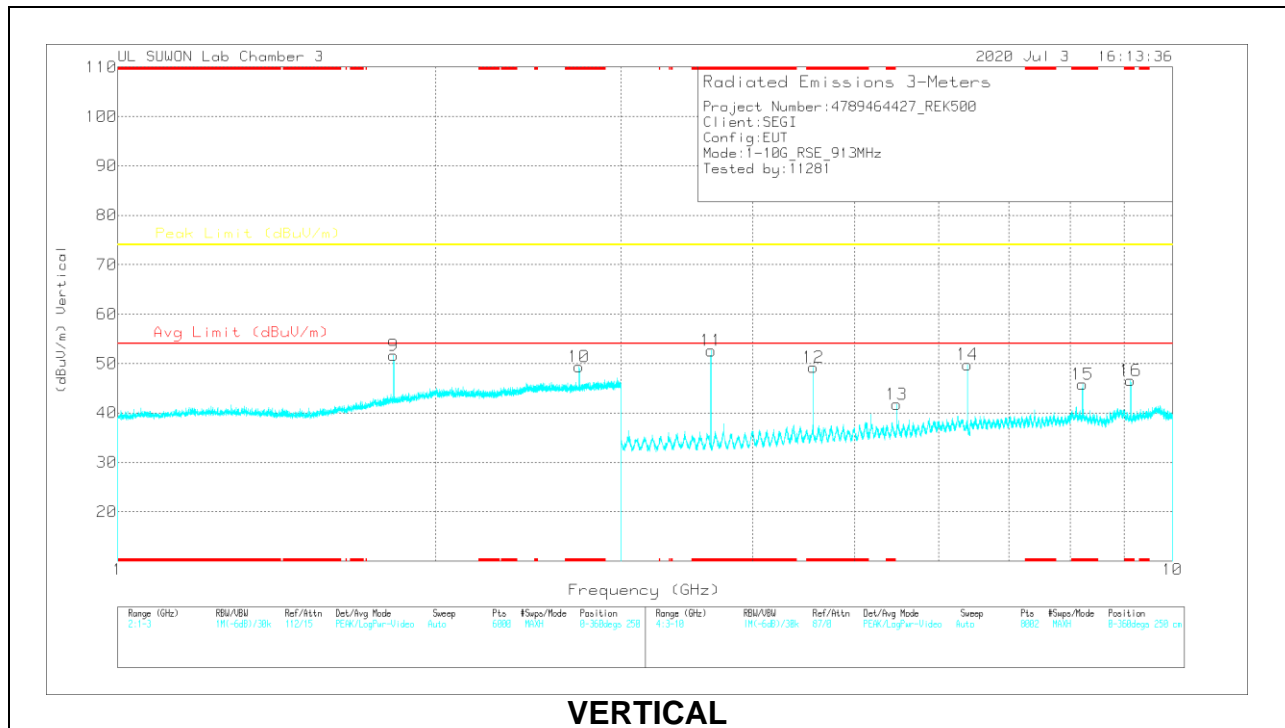
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.62791	45.64	MAv1	33	-29.9	48.74	54	-5.26	-	-	114	139	H
* 4.53506	40.12	MAv1	33.8	-28.5	45.42	54	-8.58	-	-	211	316	H
* 5.44324	28.45	MAv1	34.3	-25.6	37.15	54	-16.85	-	-	33	136	H
* 8.16444	27.53	MAv1	35.8	-20.8	42.53	54	-11.47	-	-	181	122	H
* 9.06831	28.66	MAv1	36.3	-19.9	45.06	54	-8.94	-	-	357	101	H
* 3.62835	49.25	MAv1	33	-29.9	52.35	54	-1.65	-	-	341	128	V
* 4.53508	41.73	MAv1	33.8	-28.5	47.03	54	-6.97	-	-	234	114	V
* 5.44116	28.81	MAv1	34.3	-25.6	37.51	54	-16.49	-	-	184	101	V
* 8.16118	24.76	MAv1	35.8	-20.8	39.76	54	-14.24	-	-	203	102	V
* 9.07102	28.18	MAv1	36.3	-19.9	44.58	54	-9.42	-	-	356	101	V
* 3.62722	52.28	PK2	33	-29.8	55.48	-	-	74	-18.52	114	139	H
* 4.53507	48.93	PK2	33.8	-28.5	54.23	-	-	74	-19.77	211	316	H
* 5.44314	39.91	PK2	34.3	-25.6	48.61	-	-	74	-25.39	33	136	H
6.34928	44.32	PK2	35.4	-25	54.72	-	-	74	-19.28	153	374	H
* 8.16435	38.31	PK2	35.8	-20.8	53.31	-	-	74	-20.69	181	122	H
* 9.07001	38.8	PK2	36.3	-19.9	55.2	-	-	74	-18.8	357	101	H
* 3.62749	54.88	PK2	33	-29.8	56.08	-	-	74	-15.92	341	128	V
* 4.53412	50.46	PK2	33.8	-28.5	55.76	-	-	74	-18.24	234	114	V
* 5.44076	39.86	PK2	34.3	-25.6	48.56	-	-	74	-25.44	184	101	V
6.34907	43.98	PK2	35.4	-25	54.38	-	-	74	-19.62	204	102	V
* 8.16326	36.6	PK2	35.8	-20.8	51.6	-	-	74	-22.4	203	102	V
* 9.07229	39.01	PK2	36.3	-19.9	55.41	-	-	74	-18.59	356	101	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



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.8255	56.96	PK2	30.6	-22.8	64.76	-	-	74	-9.24	194	233	H
* 2.73938	47.38	PK2	32.3	-21.9	57.78	-	-	74	-16.22	169	131	H
* 2.73906	37.68	MAv1	32.3	-21.9	48.08	54	-5.92	-	-	169	131	H
1.82624	55.11	PK2	30.6	-22.8	62.91	-	-	74	-11.09	156	100	V
* 2.73833	49.77	PK2	32.3	-21.7	60.37	-	-	74	-13.63	75	126	V
* 2.73889	42.15	MAv1	32.3	-21.9	52.55	54	-1.45	-	-	75	126	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

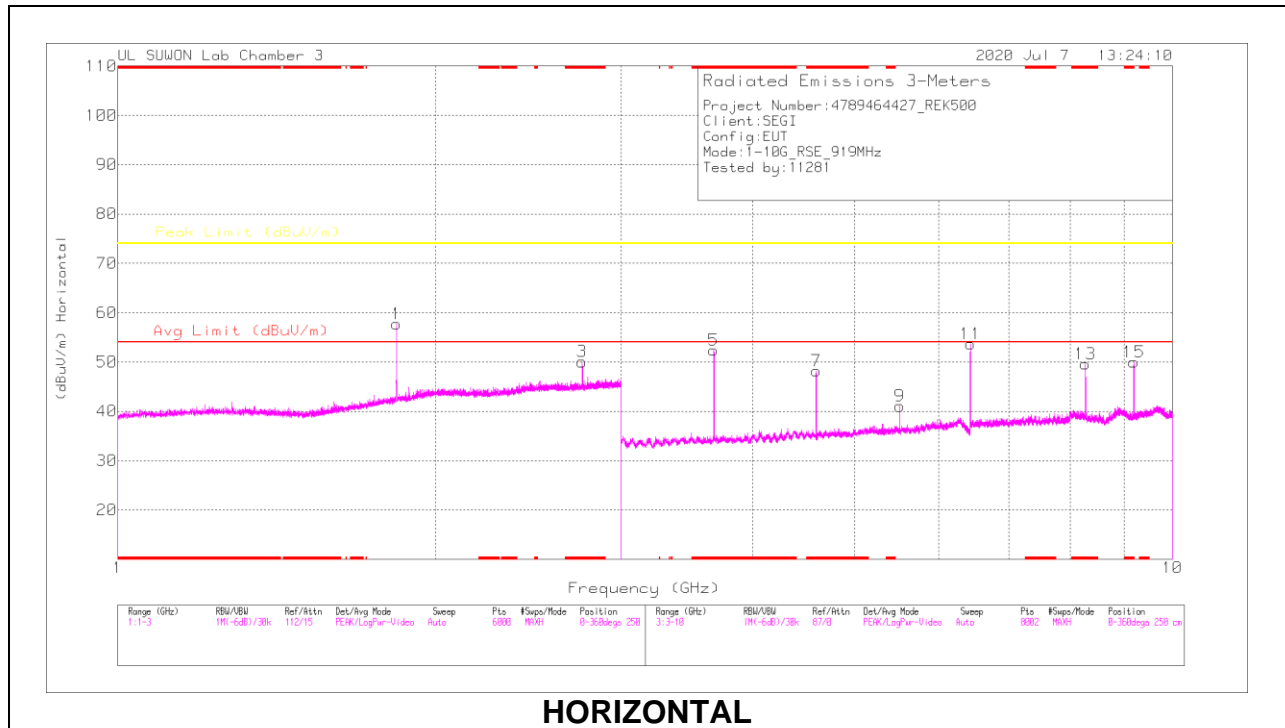
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.65225	48.79	MAv1	33	-29.6	52.19	54	-1.81	-	-	144	104	H
* 4.56438	37.48	MAv1	33.8	-28.6	42.68	54	-11.32	-	-	51	109	H
* 8.21835	28.11	MAv1	35.8	-20.9	43.01	54	-10.99	-	-	41	246	H
* 9.13126	29.02	MAv1	36.3	-19.7	45.62	54	-8.38	-	-	360	101	H
* 4.56482	42	MAv1	33.8	-28.6	47.2	54	-6.8	-	-	256	134	V
* 8.21794	25.88	MAv1	35.8	-20.9	40.78	54	-13.22	-	-	40	100	V
* 9.12815	24.3	MAv1	36.3	-19.7	40.9	54	-13.1	-	-	321	101	V
* 3.65215	49.51	MAv1	33	-29.6	52.91	54	-1.09	-	-	331	105	V
* 3.65131	54.59	PK2	33	-29.5	58.09	-	-	74	-15.91	144	104	H
* 4.56433	47.02	PK2	33.8	-28.6	52.22	-	-	74	-21.78	51	109	H
5.47888	40.94	PK2	34.3	-25.4	49.84	-	-	74	-24.16	50	109	H
6.38955	44.45	PK2	35.5	-25.3	54.65	-	-	74	-19.35	211	124	H
* 8.21913	38.94	PK2	35.8	-20.9	53.84	-	-	74	-20.16	41	246	H
* 9.13071	39.6	PK2	36.3	-19.7	56.2	-	-	74	-17.8	360	101	H
* 4.56493	51.66	PK2	33.8	-28.6	56.86	-	-	74	-17.14	256	134	V
5.4767	40.8	PK2	34.3	-25.4	49.7	-	-	74	-24.3	186	112	V
6.39093	46.27	PK2	35.5	-25.3	56.47	-	-	74	-17.53	192	121	V
* 8.21716	37.24	PK2	35.8	-20.9	52.14	-	-	74	-21.86	40	100	V
* 9.13086	35.95	PK2	36.3	-19.7	52.55	-	-	74	-21.45	321	101	V
* 3.65248	54.99	PK2	33	-29.6	58.39	-	-	74	-15.61	331	105	V

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

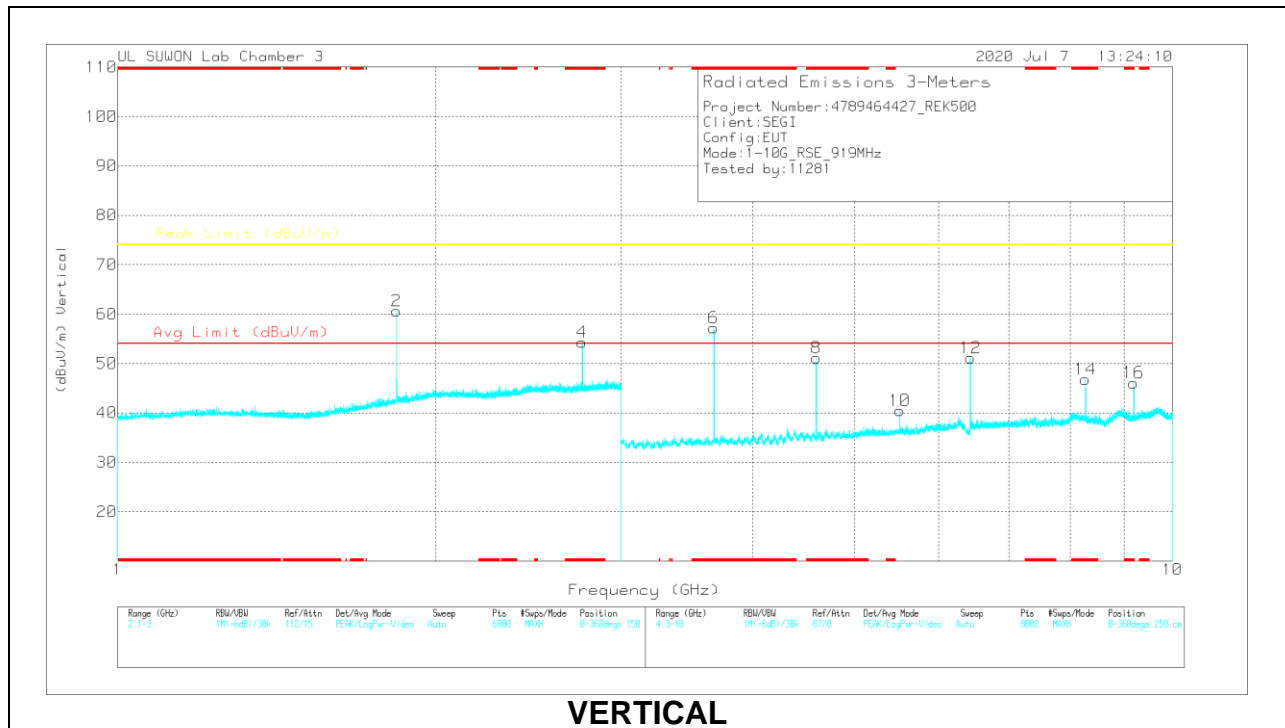
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83838	53.35	PK2	30.7	-22.9	61.15	-	-	74	-12.85	8	329	H
* 2.75767	48.09	PK2	32.3	-21.8	58.59	-	-	74	-15.41	264	102	H
* 2.75695	38.42	MAv1	32.3	-21.7	49.02	54	-4.98	-	-	264	102	H
1.83824	56.3	PK2	30.7	-22.9	64.1	-	-	74	-9.9	130	122	V
* 2.75766	50	PK2	32.3	-21.8	60.5	-	-	74	-13.5	92	121	V
* 2.75704	41.91	MAv1	32.3	-21.7	52.51	54	-1.49	-	-	92	121	V

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

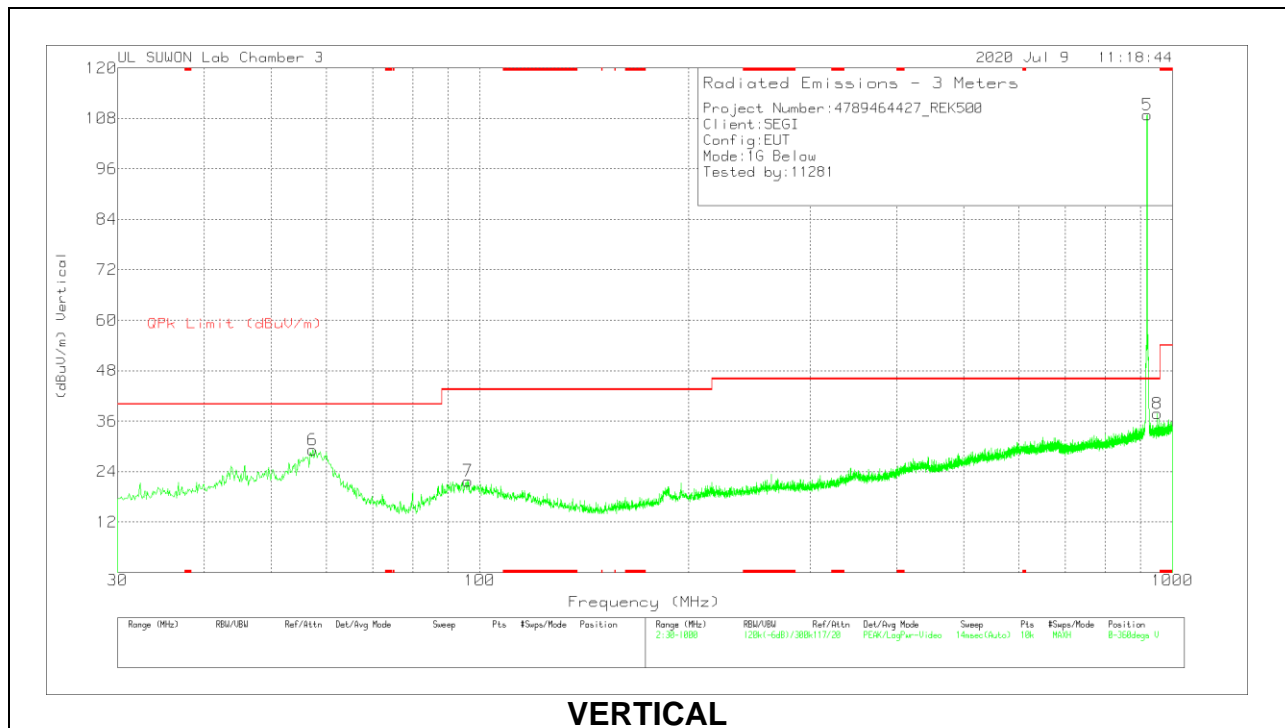
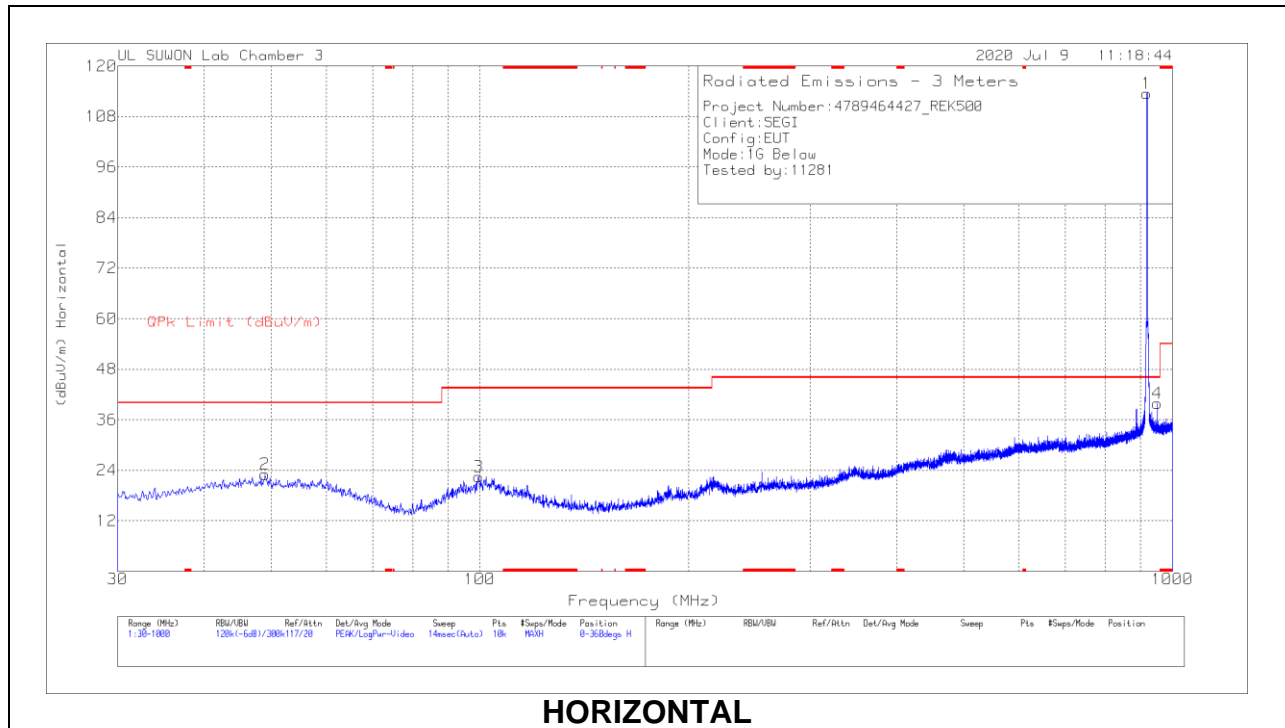
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.67558	44.08	MAv1	33	-29.3	47.78	54	-6.22	-	-	185	104	H
* 4.5947	38.43	MAv1	33.8	-28.3	43.93	54	-10.07	-	-	268	148	H
* 8.2712	27.83	MAv1	35.8	-21.2	42.43	54	-11.57	-	-	28	108	H
* 9.18827	27.14	MAv1	36.3	-19.2	44.24	54	-9.76	-	-	1	101	H
* 3.676	49.36	MAv1	33	-29.2	53.16	54	-0.84	-	-	335	105	V
* 4.59439	43.33	MAv1	33.8	-28.3	48.83	54	-5.17	-	-	291	103	V
* 8.27274	27.18	MAv1	35.8	-21.2	41.78	54	-12.22	-	-	182	244	V
* 9.18948	23.95	MAv1	36.3	-19.2	41.05	54	-12.95	-	-	35	207	V
* 3.67607	51.84	PK2	33	-29.2	55.64	-	-	74	-18.36	185	104	H
* 4.59492	47.33	PK2	33.8	-28.3	52.83	-	-	74	-21.17	268	148	H
5.51333	39.76	PK2	34.3	-25.3	48.76	-	-	74	-25.24	22	173	H
6.43449	46.59	PK2	35.5	-25.3	56.79	-	-	74	-17.21	311	255	H
* 8.27279	38.48	PK2	35.8	-21.2	53.08	-	-	74	-20.92	28	108	H
* 9.19099	37.66	PK2	36.3	-19.2	54.76	-	-	74	-19.24	1	101	H
* 3.67511	55.1	PK2	33	-29.3	58.8	-	-	74	-15.2	335	105	V
* 4.5949	50.56	PK2	33.8	-28.3	56.06	-	-	74	-17.94	291	103	V
5.51312	40.13	PK2	34.3	-25.3	49.13	-	-	74	-24.87	318	115	V
6.43269	44.74	PK2	35.5	-25.3	54.94	-	-	74	-19.06	160	277	V
* 8.27326	38.32	PK2	35.8	-21.2	52.92	-	-	74	-21.08	182	244	V
* 9.19148	36.08	PK2	36.3	-19.2	53.18	-	-	74	-20.82	35	207	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 1 GHZ

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



## Below 1GHz Data

### Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-845	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	48.917	35.08	Pk	20.1	-32.2	22.98	40	-17.02	0-360	200	H
3	99.5562	36.48	Pk	17.7	-31.7	22.48	43.52	-21.04	0-360	300	H
4	951.0129	39.68	Pk	28.2	-28	39.88	46.02	-6.14	0-360	100	H
6	57.3568	42.12	Pk	19.1	-32.1	29.12	40	-10.88	0-360	100	V
7	96.0638	36.28	Pk	17.2	-31.7	21.78	43.52	-21.74	0-360	100	V
8	951.11	37.6	Pk	28.2	-28	37.8	46.02	-8.22	0-360	100	V

Pk - Peak detector

Note: Marker #1 & #5 is fundamental frequency.

## 11. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

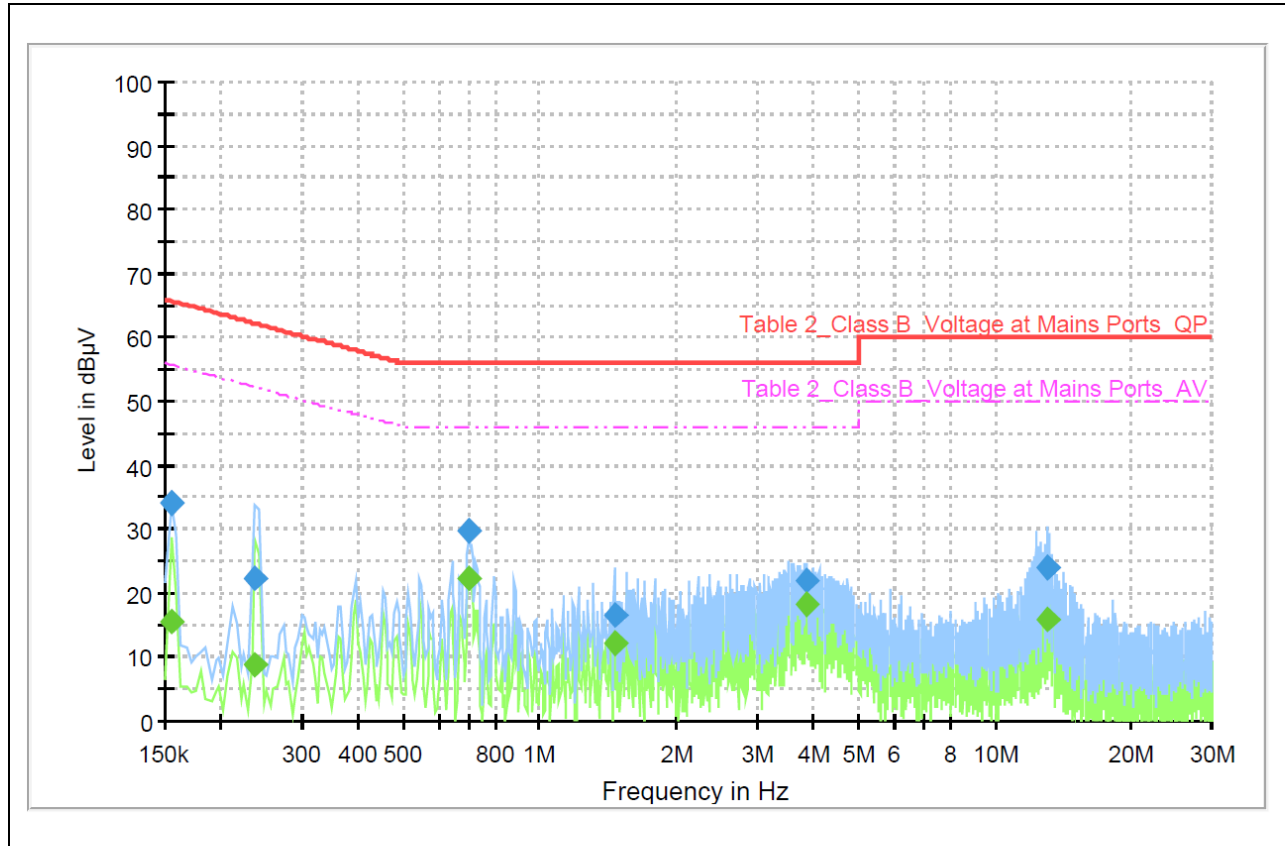
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 <sup>*</sup>	56 to 46 <sup>*</sup>
0.5-5	56	46
5-30	60	50

<sup>\*</sup> Decreases with the logarithm of the frequency.

### RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



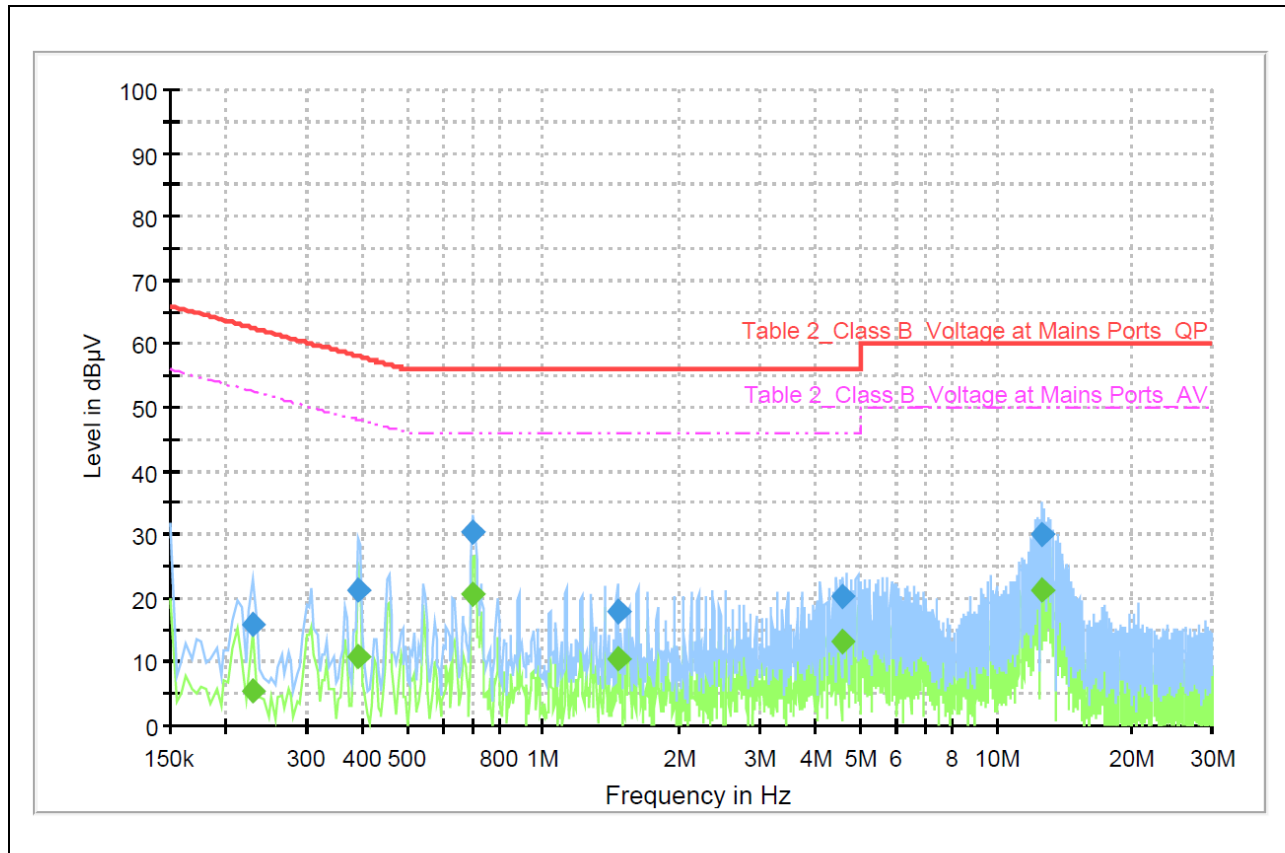
Final\_Result\_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154390	34.26	65.76	31.50	L1	ON	9.8
0.237794	22.39	62.17	39.78	L1	ON	9.7
0.698713	29.89	56.00	26.11	L1	ON	9.8
1.458132	16.66	56.00	39.34	L1	ON	9.7
3.872471	21.95	56.00	34.05	L1	ON	9.8
13.090853	24.04	60.00	35.96	L1	ON	10.0

Final\_Result\_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154390	15.56	55.76	40.20	L1	ON	9.8
0.237794	8.85	52.17	43.32	L1	ON	9.7
0.698713	22.29	46.00	23.71	L1	ON	9.8
1.458132	12.05	46.00	33.95	L1	ON	9.7
3.872471	18.15	46.00	27.85	L1	ON	9.8
13.090853	15.86	50.00	34.14	L1	ON	10.0

### LINE 2 RESULTS



#### Final\_Result\_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.229015	15.75	62.49	46.73	N	ON	9.7
0.391434	21.18	58.03	36.85	N	ON	9.9
0.698713	30.49	56.00	25.51	N	ON	9.8
1.458132	17.96	56.00	38.04	N	ON	9.7
4.601162	20.26	56.00	35.74	N	ON	9.8
12.568478	30.00	60.00	30.00	N	ON	9.9

#### Final\_Result\_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.229015	5.29	52.49	47.19	N	ON	9.7
0.391434	10.98	48.03	37.06	N	ON	9.9
0.698713	20.51	46.00	25.49	N	ON	9.8
1.458132	10.62	46.00	35.38	N	ON	9.7
4.601162	13.27	46.00	32.73	N	ON	9.8
12.568478	21.33	50.00	28.67	N	ON	9.9

## END OF TEST REPORT