



CERTIFICATION TEST REPORT

Report Number. : 4789464424-FR1V3

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

Model : 2WT13R-SF

FCC ID : VA5RCJ500-2WLR
IC : 7087A-2WRCJ500LR

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 10, 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



Testing Laboratory
TL-637

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	07/07/20	Initial issue	Robby Lee
V2	07/08/20	Updated about the TCB's question	Robby Lee
V3	07/10/20	Revised the form number	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: 2WT13R-SF

SERIAL NUMBER: Prototype (CONDUCTED)
Prototype (RADIATED);

DATE TESTED: JUN 19, 2020 – JUL 07, 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	
☐	Chamber 1
☐	Chamber 2
☒	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	18.25	66.83

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 -1.0 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

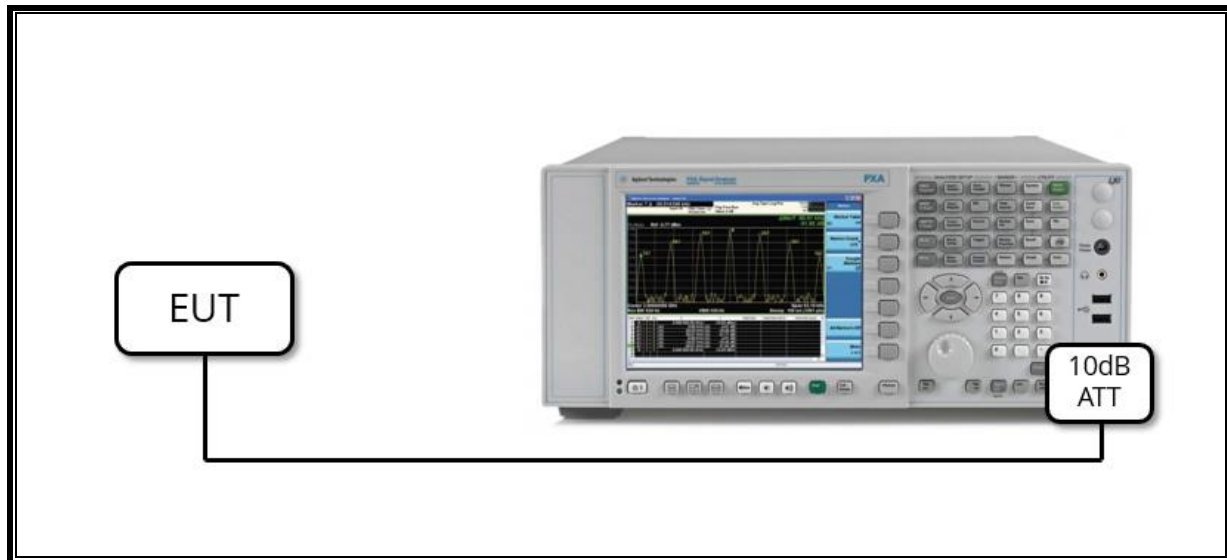
I/O CABLE

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

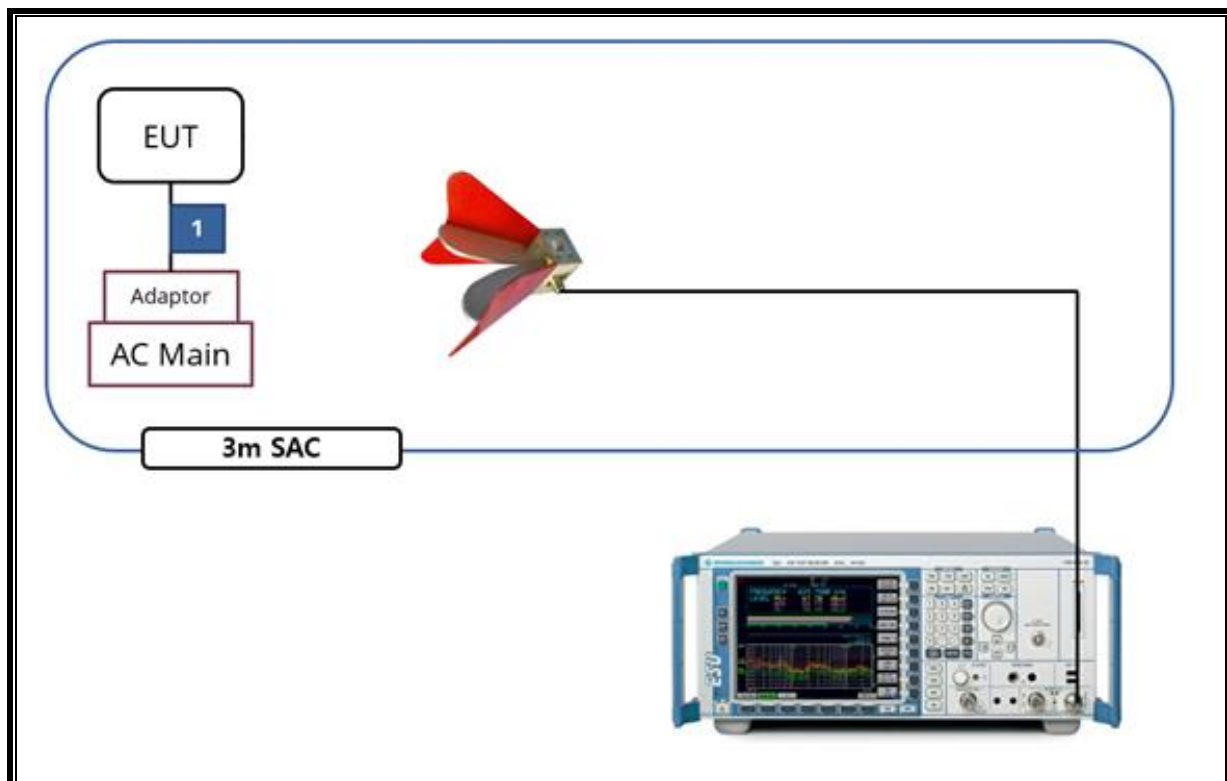
TEST SETUP

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	

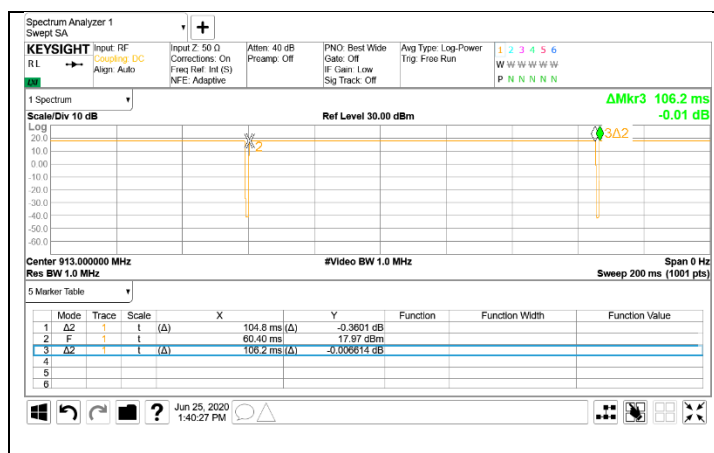
9. ANTENNA PORT TEST RESULTS

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	104.8	106.2	0.987	98.7%	0.00	0.010



9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

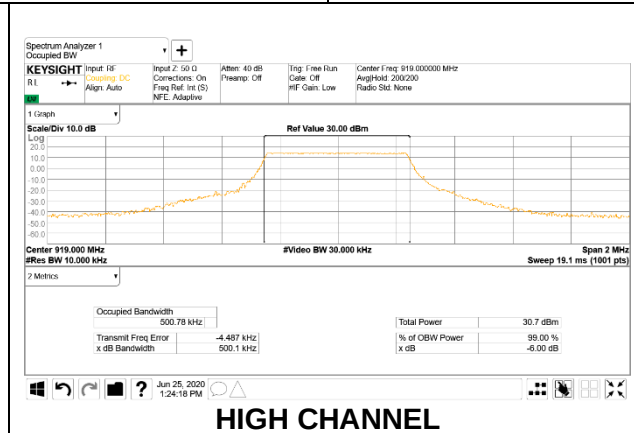
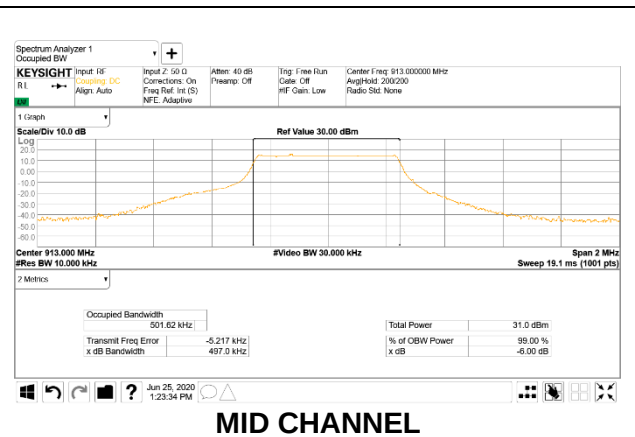
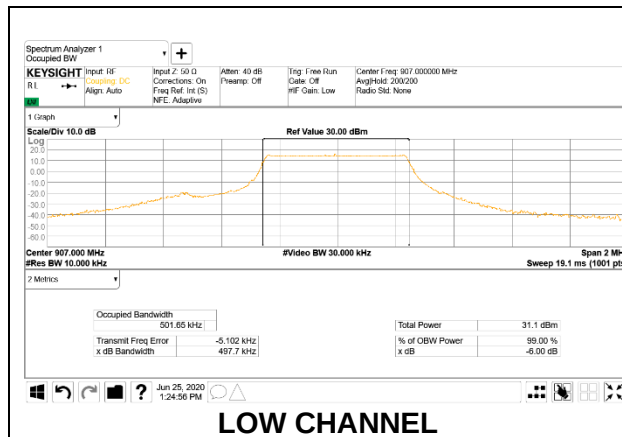
TEST PROCEDURE

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 ≥ 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	501.65
Mid	913	501.62
High	919	500.78
Worst		501.65



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

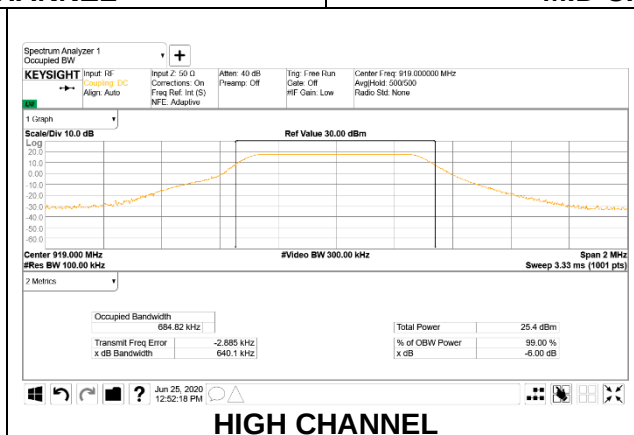
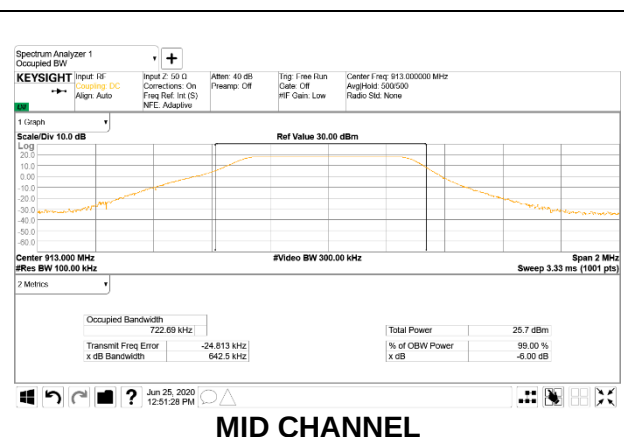
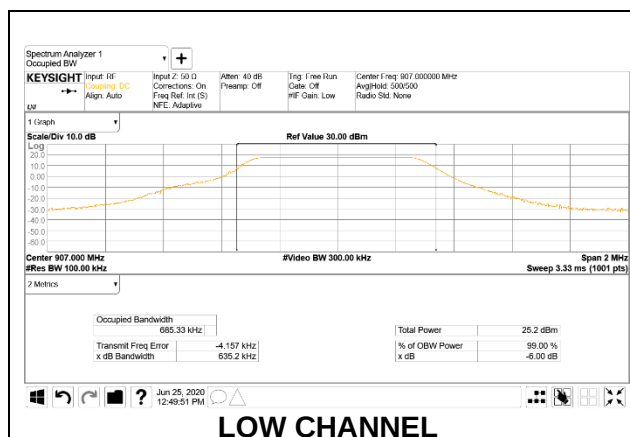
RSS-247 5.2 (a)

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	635.2	500.0
Mid	913	642.5	500.0
High	919	640.1	500.0
Worst		635.2	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.

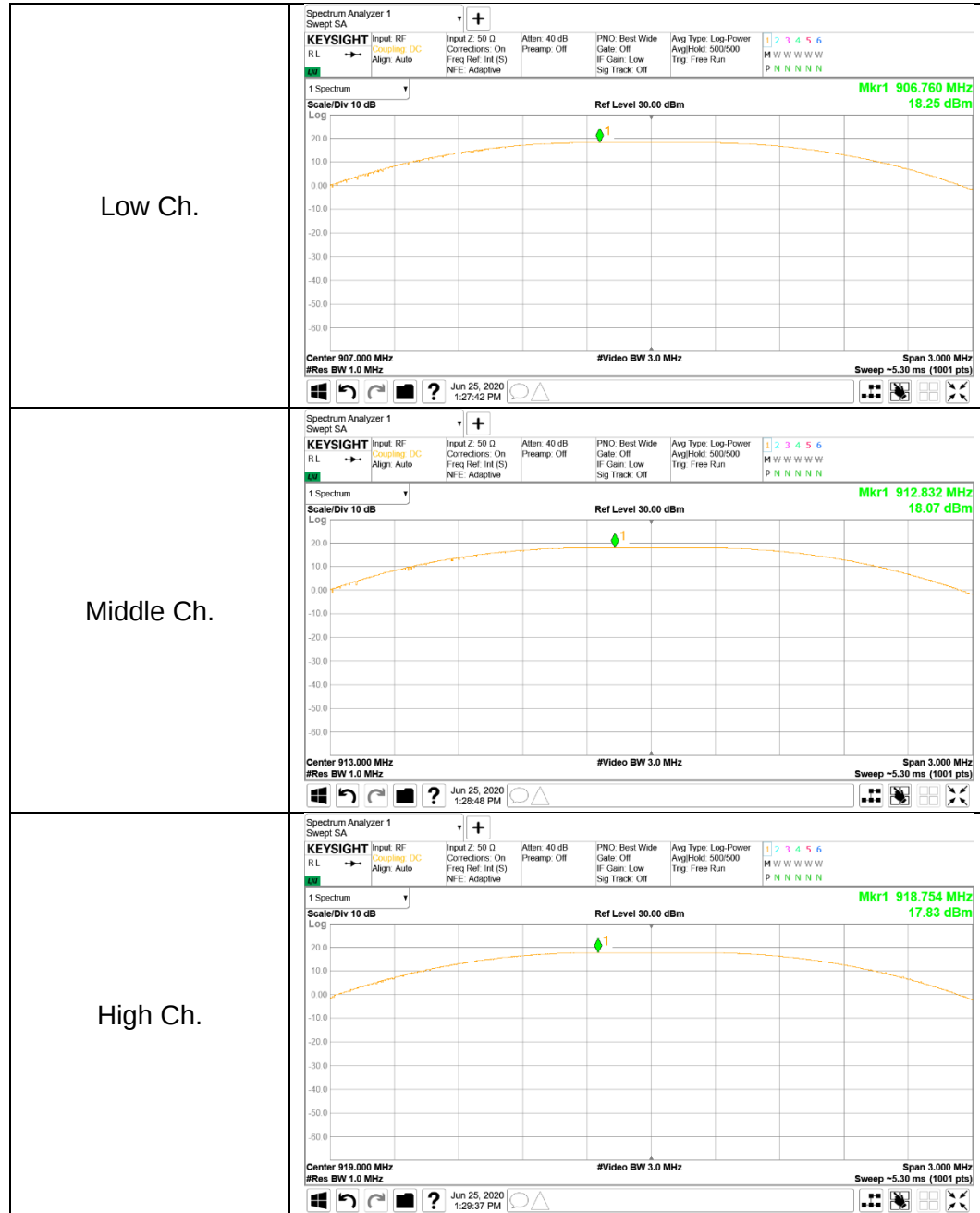
TEST PROCEDURE

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	18.250	30.000	-11.750
Mid	913	18.070	30.000	-11.930
High	919	17.830	30.000	-12.170
Worst		18.250	30.000	-11.750

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.

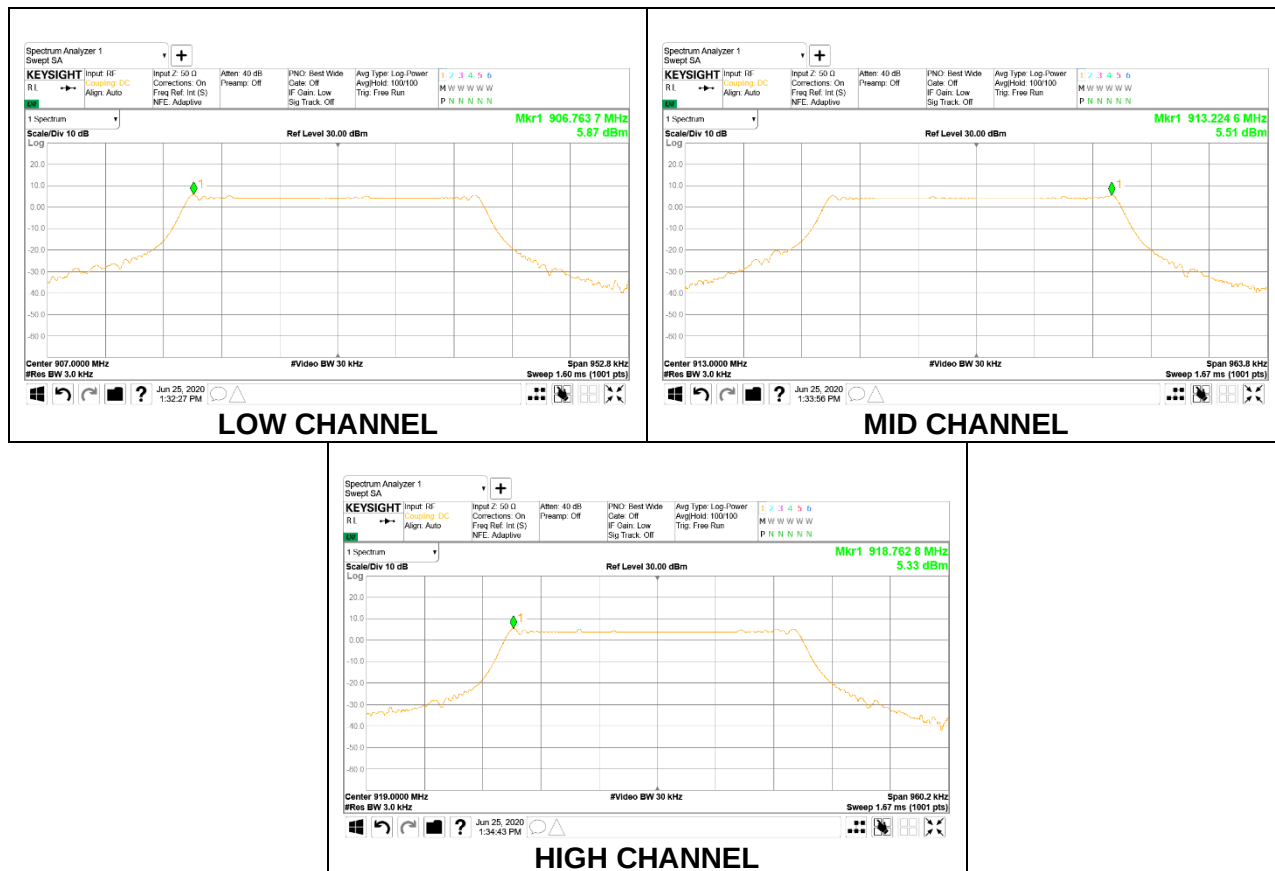
TEST PROCEDURE

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	5.870	8.000	-2.130
Mid	913	5.510	8.000	-2.490
High	919	5.330	8.000	-2.670



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

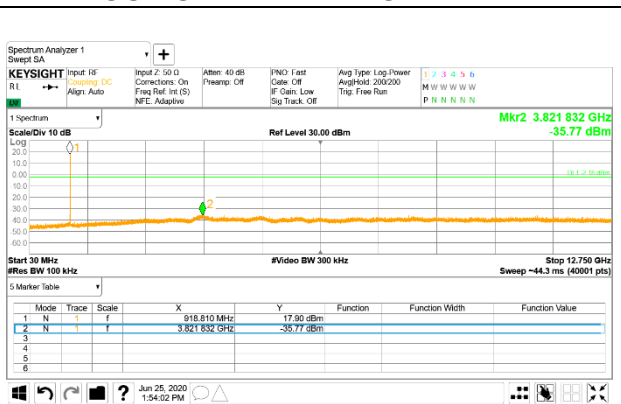
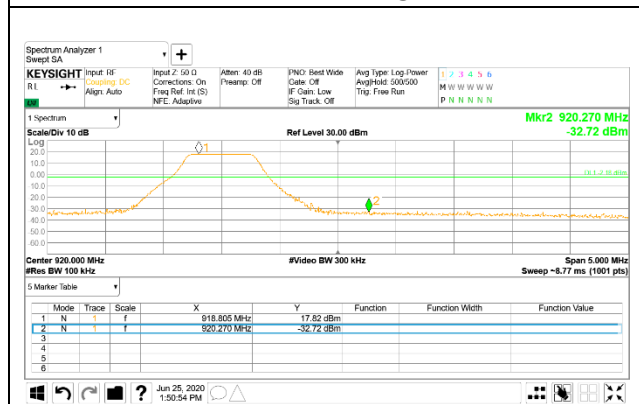
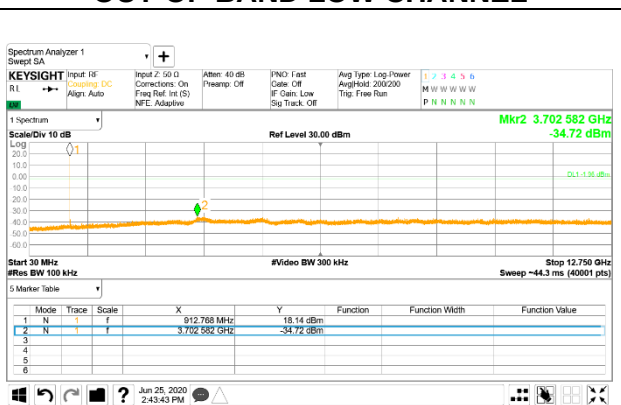
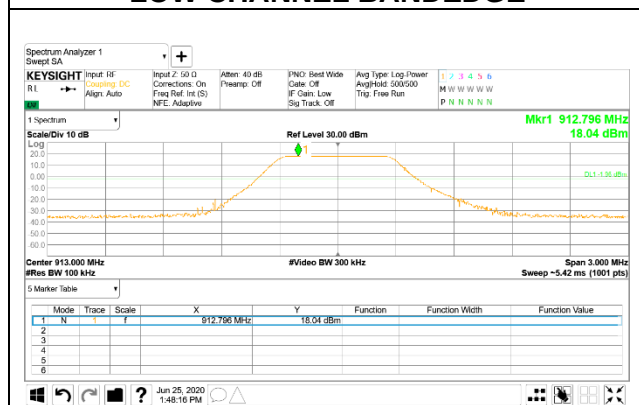
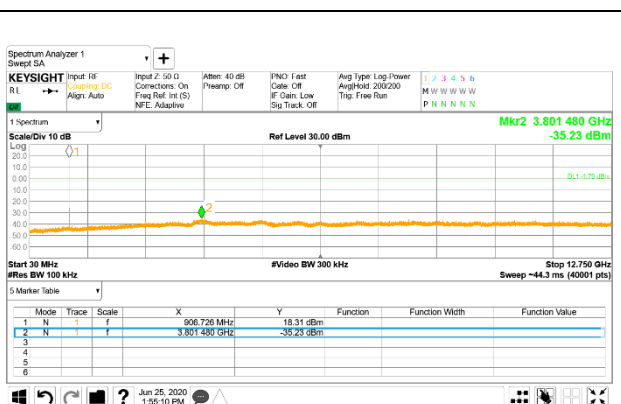
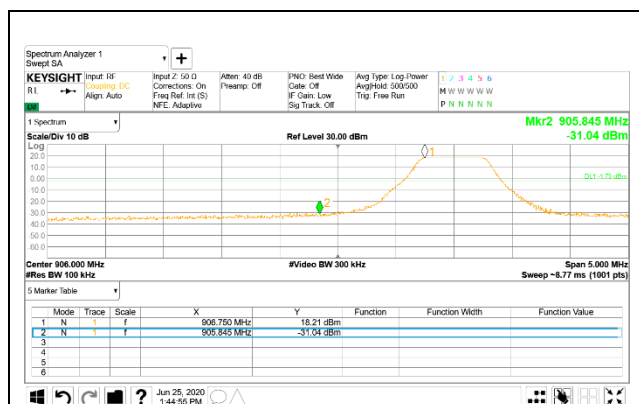
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

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

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

Frequency (MHz)	Magnetic field strength (H-Field) ($\mu\text{A/m}$)	Measurement Distance (m)
0.009–0.490 ^{Note 1}	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 377Ω 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.

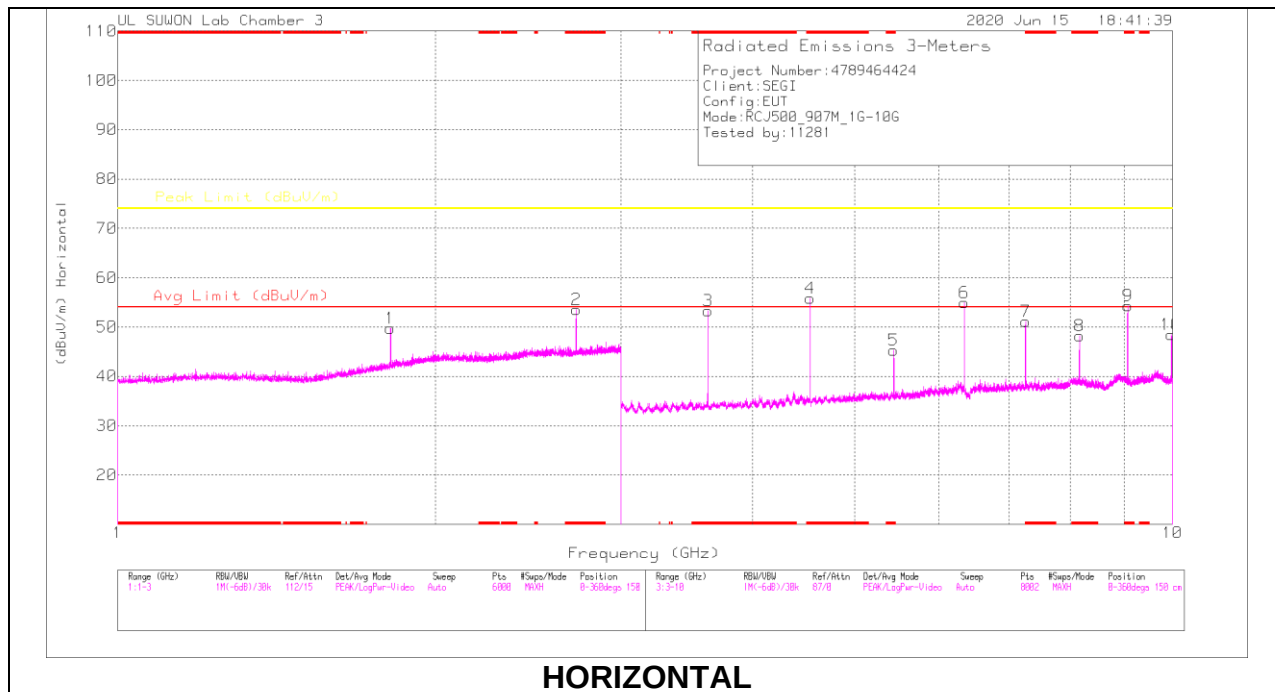
Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

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.

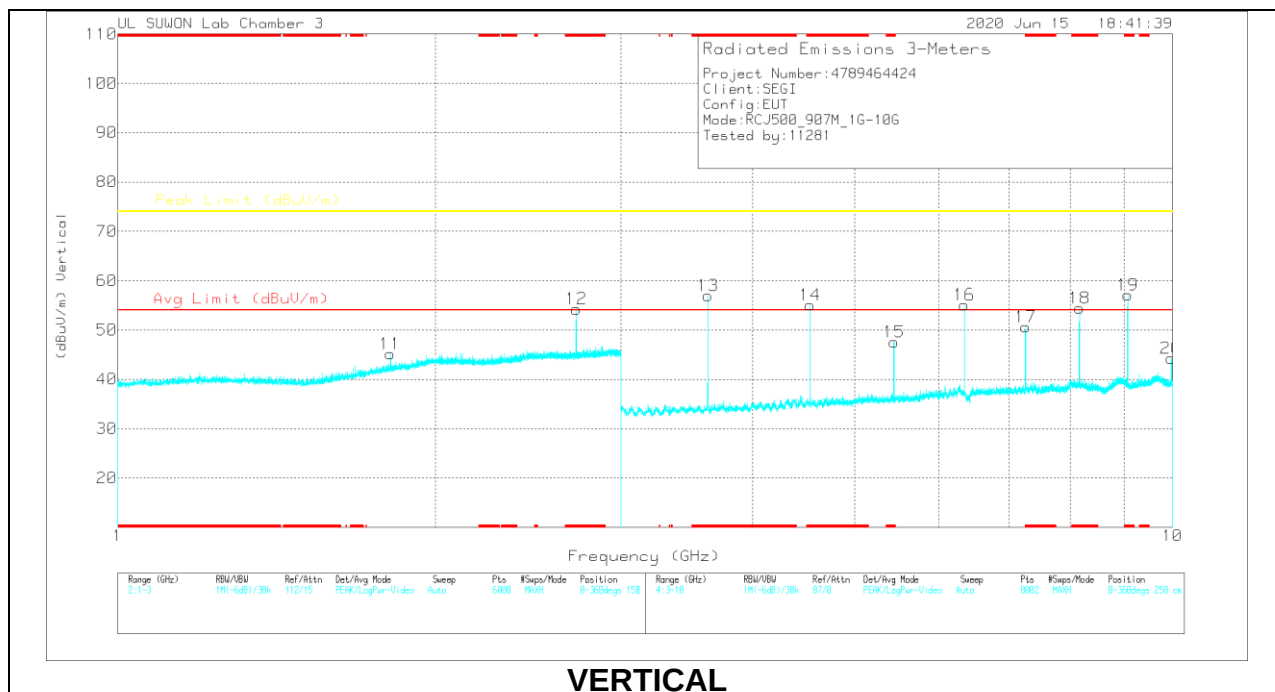
10.2. TRANSMITTER ABOVE 1 GHz

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	10dB_ATT[dB] + 1.2GHz HPF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.81418	49.38	PK2	30.5	-22.9	56.98	-	-	74	-17.02	354	193	H
* 2.72083	40.91	MAV1	32.3	-21.9	51.31	54	-2.69	-	-	204	133	H
* 2.72147	49.59	PK2	32.3	-21.9	59.99	-	-	74	-14.01	204	133	H
1.81389	45.81	PK2	30.5	-22.9	53.41	-	-	74	-20.59	84	204	V
* 2.72155	49.64	PK2	32.3	-21.9	60.04	-	-	74	-13.96	19	121	V
* 2.72077	42.01	MAV1	32.3	-21.9	52.41	54	-1.59	-	-	19	121	V

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

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

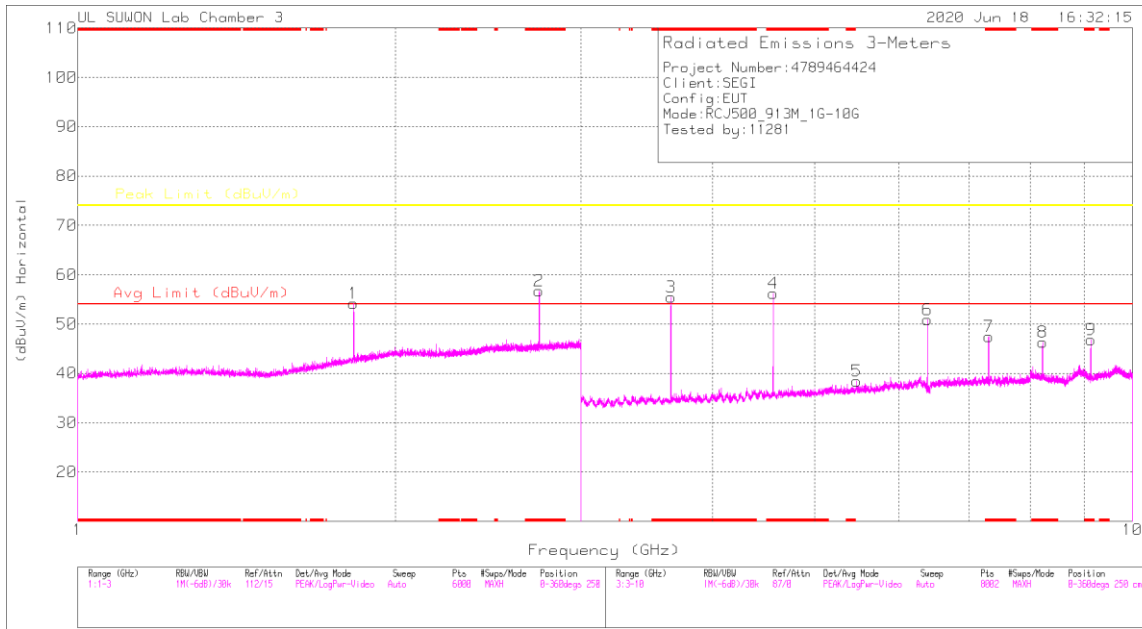
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB] + 1.2GHz HPF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.62782	48.75	MAV1	33	-29.9	51.85	54	-2.15	-	-	146	279	H
* 4.53436	46.65	MAV1	33.8	-28.5	51.95	54	-2.05	-	-	157	101	H
* 5.44153	31.41	MAV1	34.3	-25.6	40.11	54	-13.89	-	-	162	125	H
* 7.25669	34.13	MAV1	35.6	-22.8	46.93	54	-7.07	-	-	327	100	H
* 8.16288	31.36	MAV1	35.8	-20.8	46.36	54	-7.64	-	-	173	258	H
* 9.06795	28.08	MAV1	36.3	-20	44.38	54	-9.62	-	-	36	102	H
* 3.62786	49.72	MAV1	33	-29.9	52.82	54	-1.18	-	-	333	120	V
* 4.53474	46.43	MAV1	33.8	-28.5	51.73	54	-2.27	-	-	191	105	V
* 5.44106	34.85	MAV1	34.3	-25.6	43.55	54	-10.45	-	-	219	104	V
* 7.25652	25.81	MAV1	35.6	-22.8	38.61	54	-15.39	-	-	330	100	V
* 8.1634	31.21	MAV1	35.8	-20.8	46.21	54	-7.79	-	-	185	100	V
* 9.06972	27.69	MAV1	36.3	-19.9	44.09	54	-9.91	-	-	163	102	V
* 3.62799	54.22	PK2	33	-29.9	57.32	-	-	74	-16.68	146	279	H
* 4.53481	52.71	PK2	33.8	-28.5	58.01	-	-	74	-15.99	157	101	H
* 5.44062	41.43	PK2	34.3	-25.6	50.13	-	-	74	-23.87	162	125	H
6.34897	48	PK2	35.4	-25	58.4	-	-	74	-15.6	168	103	H
* 7.257	43.73	PK2	35.6	-22.8	56.53	-	-	74	-17.47	327	100	H
* 8.16346	40.76	PK2	35.8	-20.8	55.76	-	-	74	-18.24	173	258	H
* 9.06889	38.58	PK2	36.3	-19.9	54.98	-	-	74	-19.02	36	102	H
9.97582	37.48	PK2	37.1	-18.6	55.98	-	-	74	-18.02	209	239	H
* 3.62736	55.65	PK2	33	-29.8	58.85	-	-	74	-15.15	333	120	V
* 4.53541	53.31	PK2	33.8	-28.5	58.61	-	-	74	-15.39	191	105	V
* 5.44163	44.01	PK2	34.3	-25.6	52.71	-	-	74	-21.29	219	104	V
6.34922	46.21	PK2	35.4	-25	56.61	-	-	74	-17.39	222	114	V
* 7.25621	37.45	PK2	35.6	-22.8	50.25	-	-	74	-23.75	330	100	V
* 8.16432	40.67	PK2	35.8	-20.8	55.67	-	-	74	-18.33	185	100	V
* 9.07027	39.11	PK2	36.3	-19.9	55.51	-	-	74	-18.49	163	102	V
9.97877	35.65	PK2	37.1	-18.6	54.15	-	-	74	-19.85	150	238	V

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

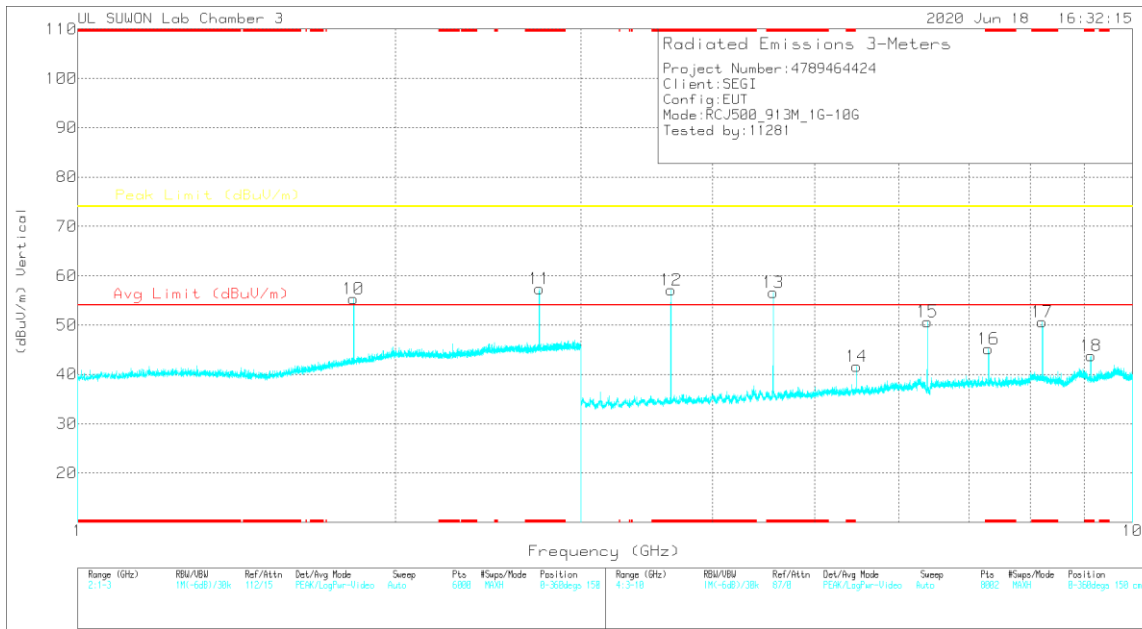
PK2 - KDB558074 Method: Maximum Peak

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] + 1.2GHz HPF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.82596	51.9	PK2	30.6	-22.8	59.7	-	-	74	-14.3	273	130	H
* 2.73956	47.74	PK2	32.3	-21.9	58.14	-	-	74	-15.86	185	139	H
* 2.739	40.68	MAV1	32.3	-21.9	51.08	54	-2.92	-	-	185	139	H
1.82544	49.61	PK2	30.6	-22.8	57.41	-	-	74	-16.59	178	108	V
* 2.73905	49.9	PK2	32.3	-21.9	60.3	-	-	74	-13.7	59	100	V
* 2.73915	41.4	MAV1	32.3	-21.9	51.8	54	-2.2	-	-	59	100	V

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

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

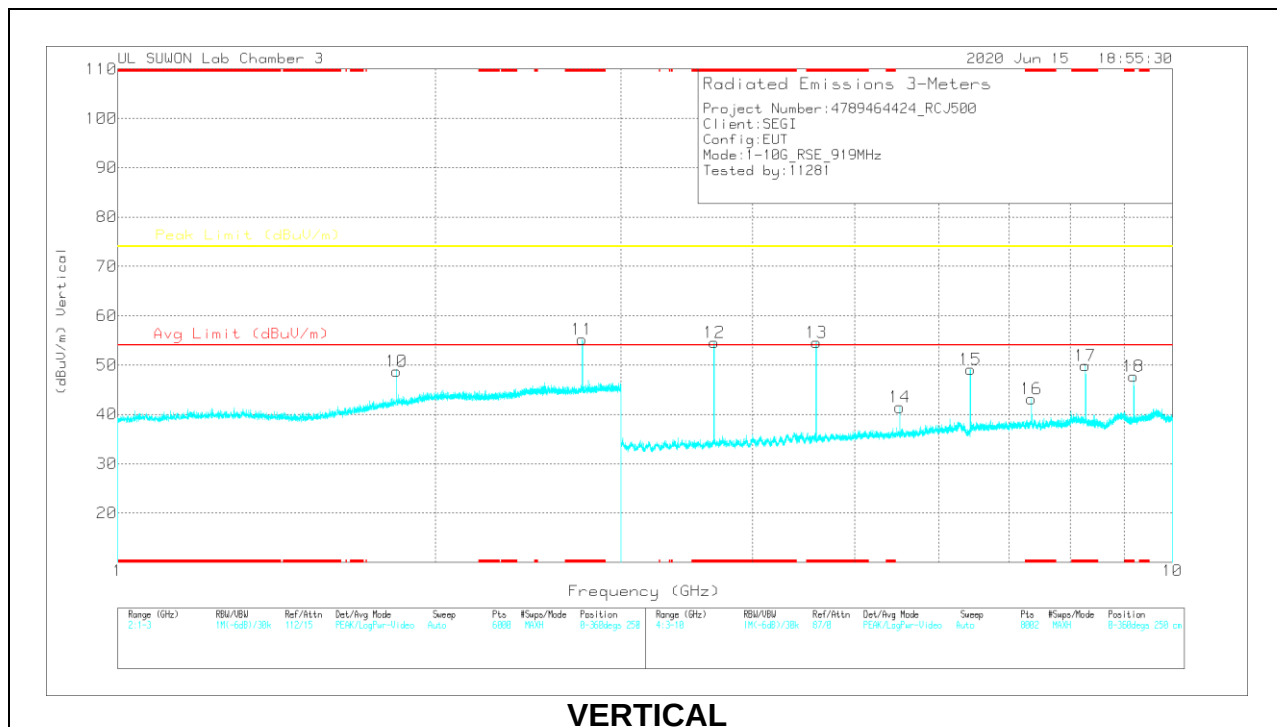
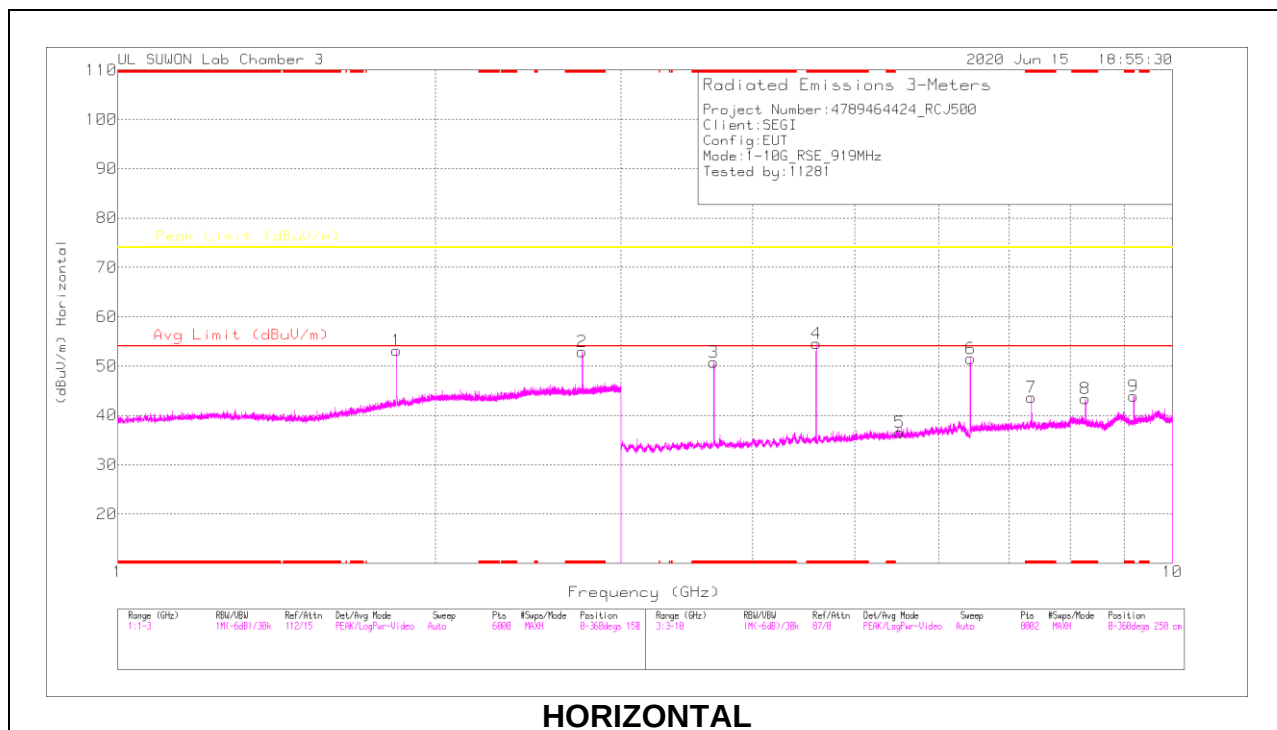
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB] + 1.2GHz HPF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.65181	48.37	MAV1	33	-29.6	51.77	54	-2.23	-	-	150	106	H
* 4.56424	47.71	MAV1	33.8	-28.6	52.91	54	-1.09	-	-	164	103	H
* 7.30546	28.23	MAV1	35.6	-22.7	41.13	54	-12.87	-	-	157	225	H
* 8.21878	25.47	MAV1	35.8	-20.9	40.37	54	-13.63	-	-	46	101	H
* 9.12789	24.43	MAV1	36.3	-19.7	41.03	54	-12.97	-	-	150	225	H
* 3.65163	49.59	MAV1	33	-29.6	52.99	54	-1.01	-	-	173	115	V
* 4.56417	45.71	MAV1	33.8	-28.6	50.91	54	-3.09	-	-	196	103	V
* 7.30325	26.95	MAV1	35.6	-22.7	39.85	54	-14.15	-	-	216	105	V
* 8.21725	30.4	MAV1	35.8	-20.9	45.3	54	-8.7	-	-	186	105	V
* 9.13175	24.14	MAV1	36.3	-19.7	40.74	54	-13.26	-	-	161	100	V
* 3.65275	53.97	PK2	33	-29.6	57.37	-	-	74	-16.63	150	106	H
* 4.56623	54.26	PK2	33.8	-28.6	59.46	-	-	74	-14.54	164	103	H
5.47737	39.03	PK2	34.3	-25.4	47.93	-	-	74	-26.07	126	317	H
6.3911	45.56	PK2	35.5	-25.3	55.76	-	-	74	-18.24	176	105	H
* 7.30331	39.27	PK2	35.6	-22.7	52.17	-	-	74	-21.83	157	225	H
* 8.21839	36.5	PK2	35.8	-20.9	51.4	-	-	74	-22.6	46	101	H
* 9.12838	37.22	PK2	36.3	-19.7	53.82	-	-	74	-20.18	150	225	H
* 3.65235	55.07	PK2	33	-29.6	58.47	-	-	74	-15.53	173	115	V
* 4.56605	52.81	PK2	33.8	-28.6	58.01	-	-	74	-15.99	196	103	V
5.47701	41.51	PK2	34.3	-25.4	50.41	-	-	74	-23.59	220	373	V
6.39037	45.18	PK2	35.5	-25.3	55.38	-	-	74	-18.62	173	100	V
* 7.3051	39.46	PK2	35.6	-22.7	52.36	-	-	74	-21.64	216	105	V
* 8.21894	40.79	PK2	35.8	-20.9	55.69	-	-	74	-18.31	186	105	V
* 9.12792	36.27	PK2	36.3	-19.7	52.87	-	-	74	-21.13	161	100	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

Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	10dB_ATT[dB] + 1.2GHz HPF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83779	53.67	PK2	30.7	-22.8	61.57	-	-	74	-12.43	264	269	H
* 2.75721	49.44	PK2	32.3	-21.7	60.04	-	-	74	-13.96	26	339	H
* 2.75673	40.72	MAV1	32.3	-21.8	51.22	54	-2.78	-	-	26	339	H
1.83831	51.43	PK2	30.7	-22.9	59.23	-	-	74	-14.77	152	119	V
* 2.75672	50.36	PK2	32.3	-21.8	60.86	-	-	74	-13.14	224	119	V
* 2.75708	42.61	MAV1	32.3	-21.7	53.21	54	-0.79	-	-	224	119	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
* 3.67555	48.28	MAV1	33	-29.3	51.98	54	-2.02	-	-	152	321	H
* 4.59557	44.85	MAV1	33.8	-28.3	50.35	54	-3.65	-	-	348	101	H
* 7.35093	36.1	MAV1	35.6	-22.3	49.4	54	-4.6	-	-	216	254	H
* 8.27127	25.67	MAV1	35.8	-21.2	40.27	54	-13.73	-	-	43	108	H
* 9.18915	22.55	MAV1	36.3	-19.2	39.65	54	-14.35	-	-	190	271	H
* 3.67565	48.13	MAV1	33	-29.3	51.83	54	-2.17	-	-	352	105	V
* 4.59535	44.44	MAV1	33.8	-28.3	49.94	54	-4.06	-	-	28	123	V
* 7.35145	30.3	MAV1	35.6	-22.3	43.6	54	-10.4	-	-	215	101	V
* 8.27243	29.4	MAV1	35.8	-21.2	44	54	-10	-	-	190	102	V
* 9.19204	19.9	MAV1	36.3	-19.2	37	54	-17	-	-	161	101	V
* 3.67621	54.64	PK2	33	-29.2	58.44	-	-	74	-15.56	152	321	H
* 4.59549	51.79	PK2	33.8	-28.3	57.29	-	-	74	-16.71	348	101	H
5.52067	35.72	PK2	34.3	-25.3	44.72	-	-	74	-29.28	360	100	H
6.43223	45.49	PK2	35.5	-25.4	55.59	-	-	74	-18.41	176	104	H
* 7.35284	44.67	PK2	35.6	-22.3	57.97	-	-	74	-16.03	216	254	H
* 8.2719	37.1	PK2	35.8	-21.2	51.7	-	-	74	-22.3	43	108	H
* 9.19181	34.42	PK2	36.3	-19.2	51.52	-	-	74	-22.48	190	271	H
* 3.67598	53.62	PK2	33	-29.2	57.42	-	-	74	-16.58	352	105	V
* 4.59501	50.85	PK2	33.8	-28.3	56.35	-	-	74	-17.65	28	123	V
5.51388	41.93	PK2	34.3	-25.3	50.93	-	-	74	-23.07	236	148	V
6.43268	44.83	PK2	35.5	-25.3	55.03	-	-	74	-18.97	256	223	V
* 7.35365	41.15	PK2	35.6	-22.3	54.45	-	-	74	-19.55	215	101	V
* 8.27248	40.02	PK2	35.8	-21.2	54.62	-	-	74	-19.38	190	102	V
* 9.19215	31.75	PK2	36.3	-19.2	48.85	-	-	74	-25.15	161	101	V

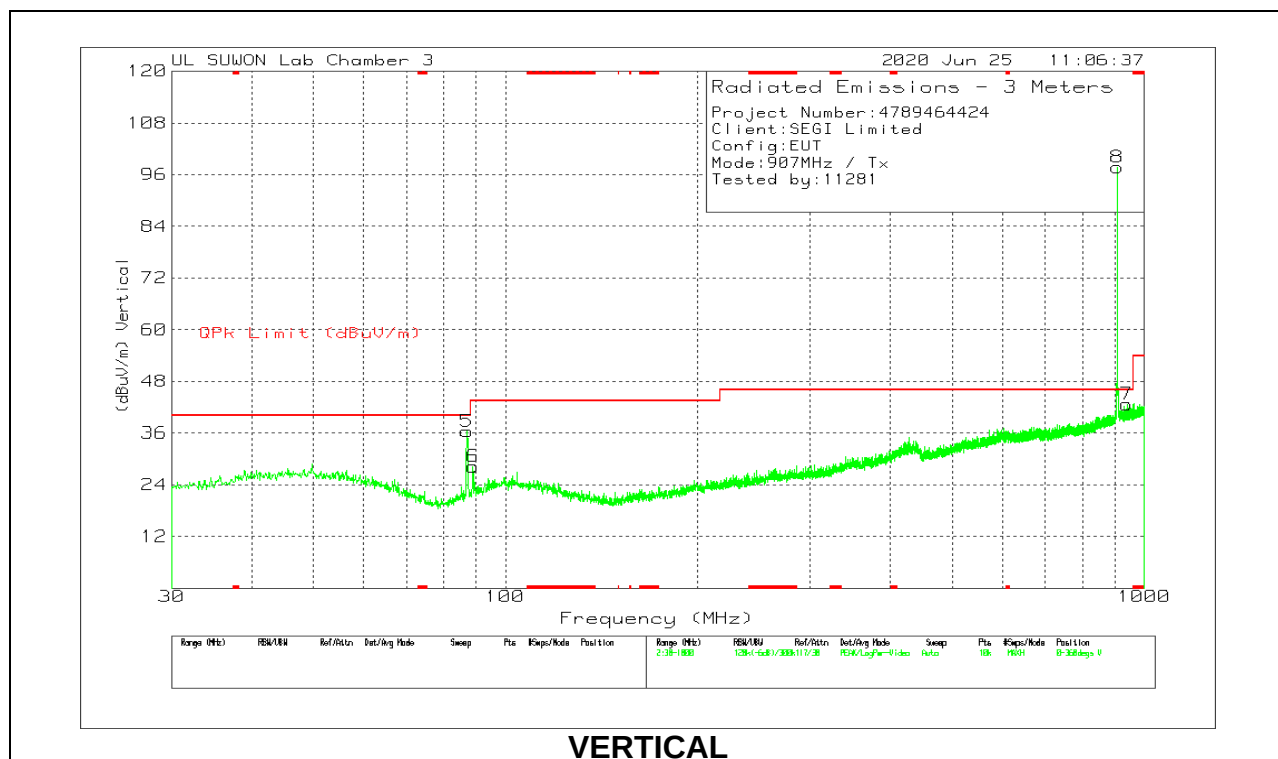
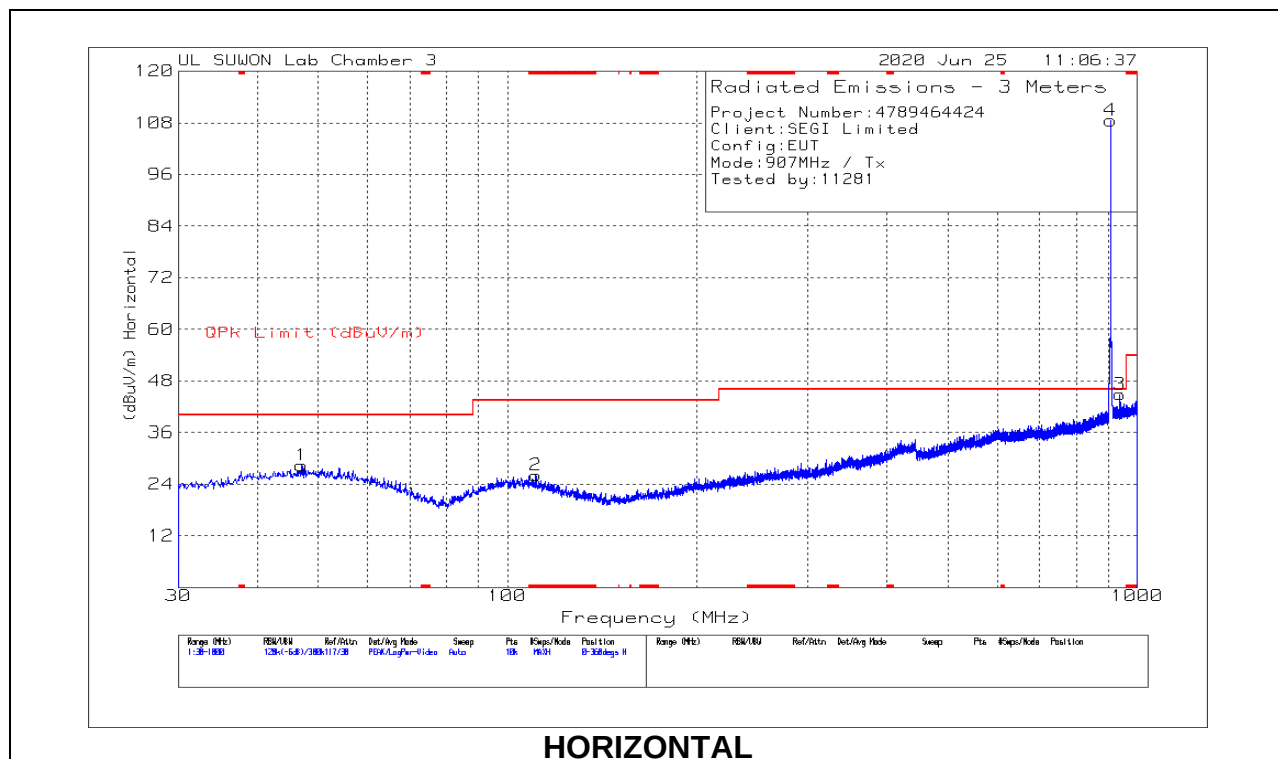
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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
1	47.0738	40.26	Pk	20.1	-32	28.36	40	-11.64	0-360	100	H
2	* 110.9063	40.35	Pk	17.3	-31.6	26.05	43.52	-17.47	0-360	200	H
3	938.7897	44.85	Pk	28.2	-28.2	44.85	46.02	-1.17	0-360	100	H
5	87.0419	53.2	Pk	15	-31.8	36.4	40	-3.6	0-360	200	V
6	88.8851	44.45	Pk	15.5	-31.7	28.25	43.52	-15.27	0-360	200	V
7	939.3717	42.77	Pk	28.1	-28.2	42.67	46.02	-3.35	0-360	300	V

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

Pk - Peak detector

Note: Marker #4 & #8 is fundamental frequency.

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

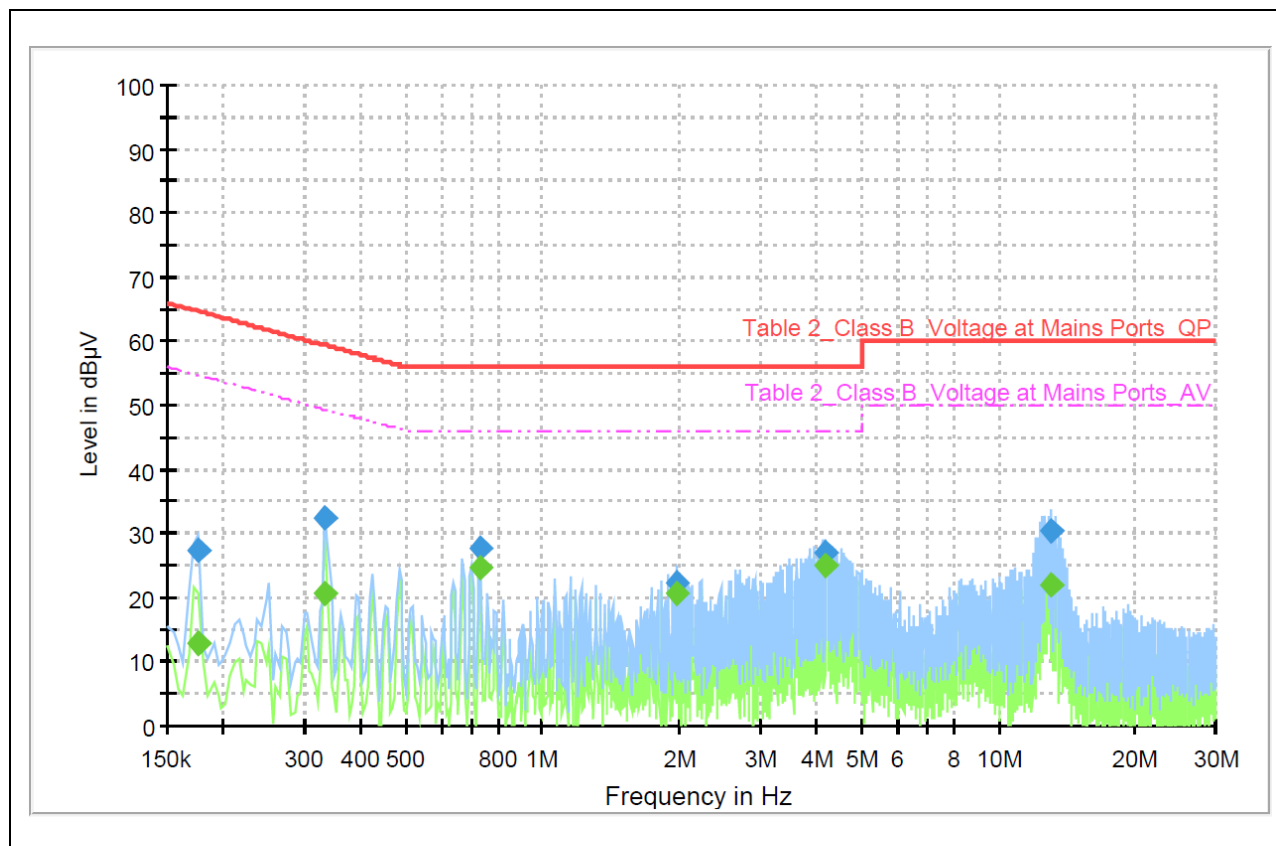
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 [*]	56 to 46 [*]
0.5-5	56	46
5-30	60	50

^{*} Decreases with the logarithm of the frequency.

RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



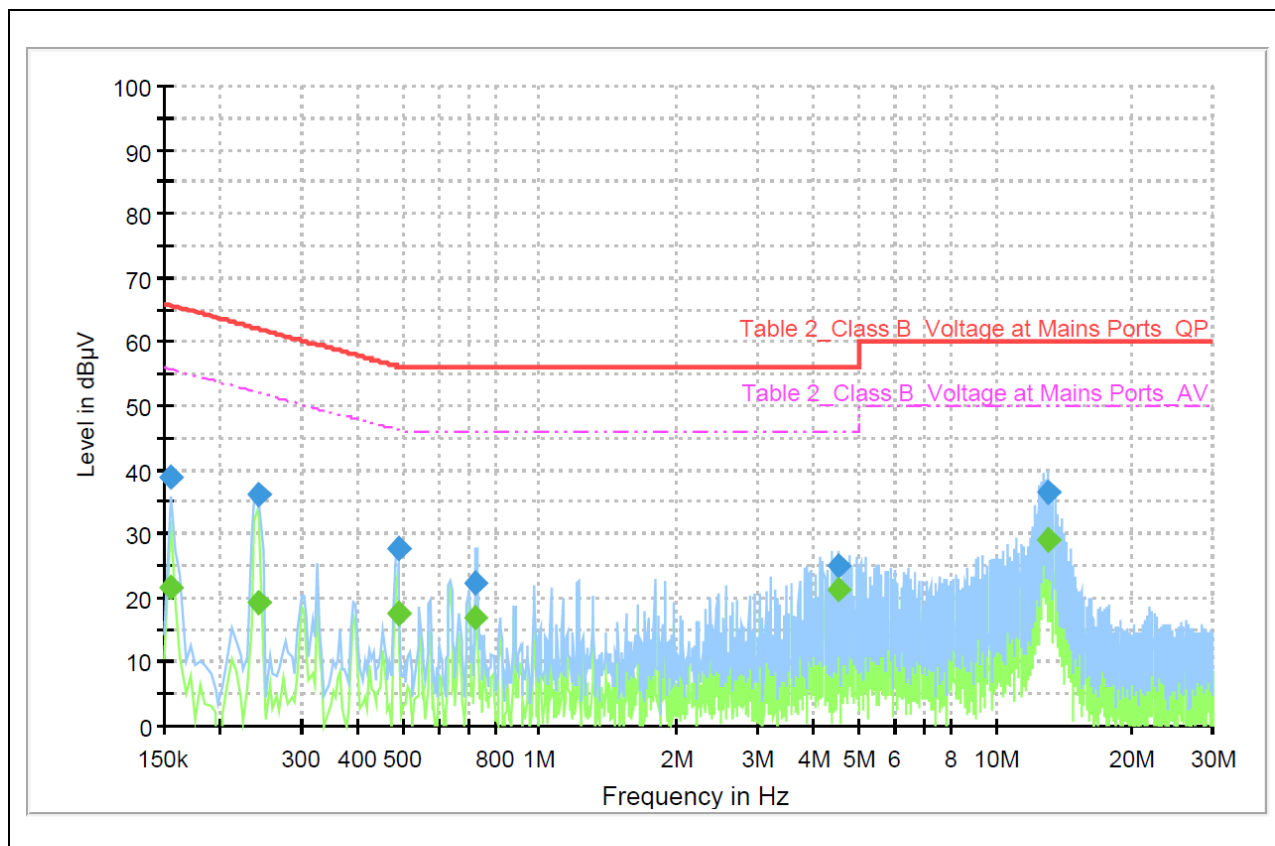
Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.176338	27.36	64.66	37.29	L1	ON	10.0
0.334368	32.32	59.34	27.02	L1	ON	9.8
0.729441	27.69	56.00	28.31	L1	ON	9.8
1.976118	22.35	56.00	33.65	L1	ON	9.7
4.170971	26.97	56.00	29.03	L1	ON	9.8
13.029397	30.40	60.00	29.60	L1	ON	10.0

Final_Result_CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.176338	12.99	54.66	41.67	L1	ON	10.0
0.334368	20.52	49.34	28.82	L1	ON	9.8
0.729441	24.70	46.00	21.30	L1	ON	9.8
1.976118	20.63	46.00	25.37	L1	ON	9.7
4.170971	25.00	46.00	21.00	L1	ON	9.8
13.029397	21.83	50.00	28.17	L1	ON	10.0

LINE 2 RESULTS



Final Result QPK

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154390	39.01	65.76	26.75	N	ON	9.8
0.242184	36.08	62.02	25.95	N	ON	9.6
0.488007	27.70	56.20	28.50	N	ON	9.9
0.725052	22.20	56.00	33.80	N	ON	9.8
4.535316	24.87	56.00	31.13	N	ON	9.8
12.989890	36.61	60.00	23.39	N	ON	10.0

Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154390	21.57	55.76	34.19	N	ON	9.8
0.242184	19.32	52.02	32.70	N	ON	9.6
0.488007	17.59	46.20	28.61	N	ON	9.9
0.725052	16.81	46.00	29.19	N	ON	9.8
4.535316	21.16	46.00	24.84	N	ON	9.8
12.989890	28.94	50.00	21.06	N	ON	10.0

END OF TEST REPORT