



CERTIFICATION TEST REPORT

Report Number. : 4790375056-FR1V2

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

Model : 2WSSR-T11

FCC ID : VA5RCD500-2WSS
IC : 7087A-2WRCD500SS

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:
2022-07-13

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Testing Laboratory
TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	06/28/22	Initial issue	Jaehyong Lee
V2	07/13/22	Updated to address about the TCB's question	Jaehyong Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SEGI LIMITED
EUT DESCRIPTION: Keyless Entry System
MODEL: 2WSSR-T11
SERIAL NUMBER: Proto type
DATE TESTED: 2022-05-04 ~ 2022-05-20;

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:



Anthony Kim
Senior Laboratory Engineer
UL Korea, Ltd.

Tested By:



Jaehyong Lee
Laboratory Engineer Associate
UL Korea, Ltd.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. ANSI C63.10-2013.
4. IC RSS-GEN Issue 5.
5. IC RSS-247 Issue 2.

3. 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 checked="" type="checkbox"/>	Chamber 2
<input checked="" type="checkbox"/>	Chamber 3

Used ISED Test Site Reg.(company number): 2324L
CAB Identifier: KR0161

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

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

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.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. 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	2.87 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

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

4.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

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

5.2. MAXIMUM OUTPUT POWER

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

Frequency range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
910.92 ~ 919.08	FHSS	Peak	19.18	82.79

5.3. 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 antennas, with maximum gain of -2.90 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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 was investigated stand-alone mode and AC charging mode.
It was determined that stand-alone mode was worst-case test mode; therefore, all final radiated testing was performed with stand-alone mode.

Radiated emission above 1GHz was performed with the EUT set to transmit low/high channels.
Because frequency range in which EUT operates is in 1 MHz to 10 MHz.

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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
DC Power Supply	Dongdo Electronics	MCS-H06KD	DC861081141	N/A

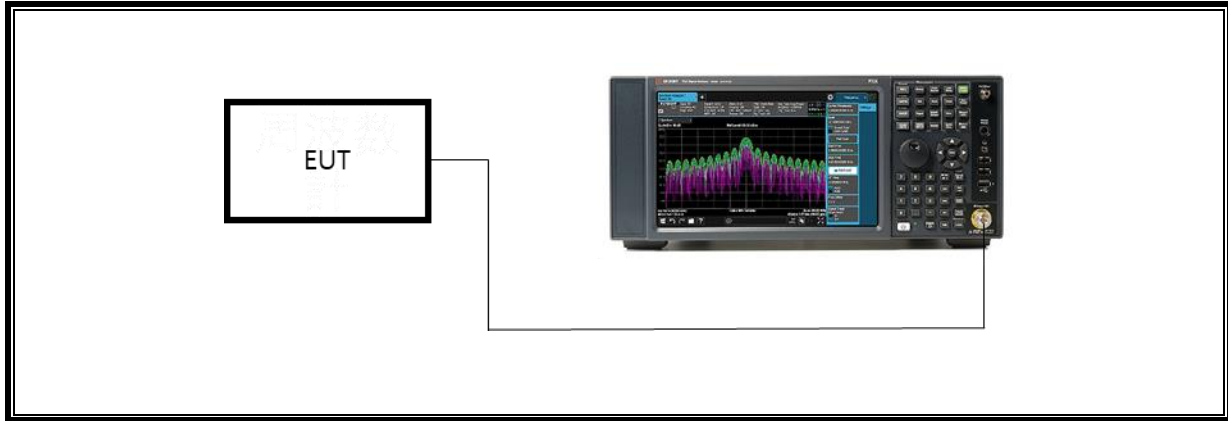
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	USB A to Micro C	Shielded	1.0 m	N/A

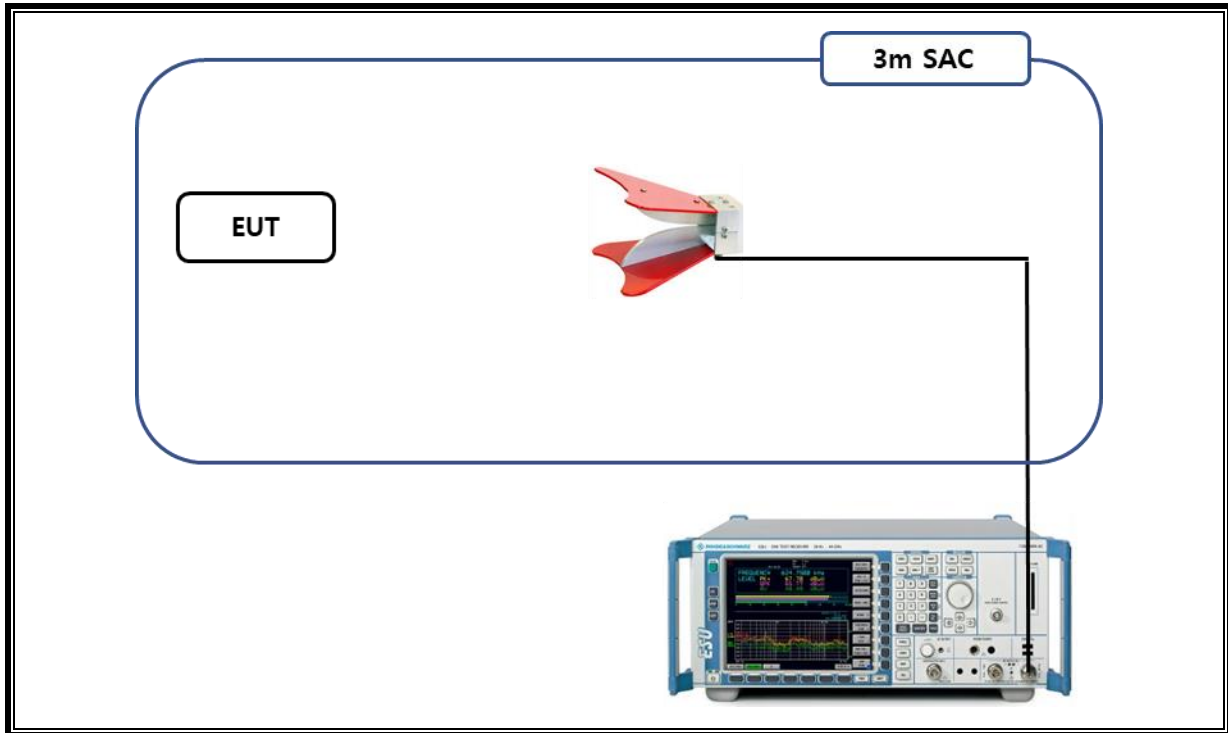
TEST SETUP

The EUT is a stand-alone unit during the tests.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. MEASUREMENT METHOD

20dB BW : ANSI C63.10, Section 6.9.2

99% BW : ANSI C63.10, Section 6.9.3

HOPPING FREQUENCY SEPARATION : ANSI C63.10, Section 7.8.2

NUMBER OF HOPPING CHANNELS : ANSI C63.10, Section 7.8.3

AVERAGE TIME OF OCCUPANCY : ANSI C63.10, Section 7.8.4

OUTPUT POWER : ANSI C63.10, Section 7.8.5.

Out-of-band EMISSIONS (Conducted) : ANSI C63.10, Section 7.8.6, 7.8.8

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: ANSI C63.10, Section 6.

Out-of-band EMISSIONS IN RESTRICTED BANDS : ANSI C63.10, Section 6.

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

7. 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	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2023-01-11
10dB ATTENUATOR	MINI-CIRCUITS	BW-K10-2W44+	2117	2022-10-22
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
EMI Test Receive, 44 GHz	R&S	ESW44	101590	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	102592	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022-08-02
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2022-08-03
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022-08-02
LISN	R&S	ENV216	102478	2022-08-06
OPEN SWITCH AND CONTROL	R&S	OSP220	101437	N/A
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	R&S	EMC32	Ver 10.60.10	

8. TEST RESULTS SUMMARY

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(1)(i)	RSS-247 5.1(c)	Occupied Band width (20dB)	≤ 500KHz	Conducted	PASS
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		PASS
15.247	RSS-247 5.4(a)	TX conducted output power	≤ 0.25 W		PASS
15.247 (a)(1)	RSS-247 5.1(c)	Hopping frequency separation	> the 20 dB bandwidth		PASS
15.247 (b)(2)	RSS-247 5.1(c)	Number of Hopping channels	More than 25 non-overlapping channels		PASS
15.247 (a)(1)(i)	RSS-247 5.1(c)	Avg Time of Occupancy	≤ 0.4sec within 10sec		PASS
15.205, 15.209	RSS-GEN Clause 8.9, 8.10	Radiated Spurious Emission	< 54dBuV/m	Radiated	PASS
15.207 (a)	RSS-GEN (8.8)	AC Power Line Conducted Emission	Section 11	Power Line Conducted	PASS

9. ANTENNA PORT TEST RESULTS

9.1 HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)
 IC RSS-247 section 5.1(c)

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

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

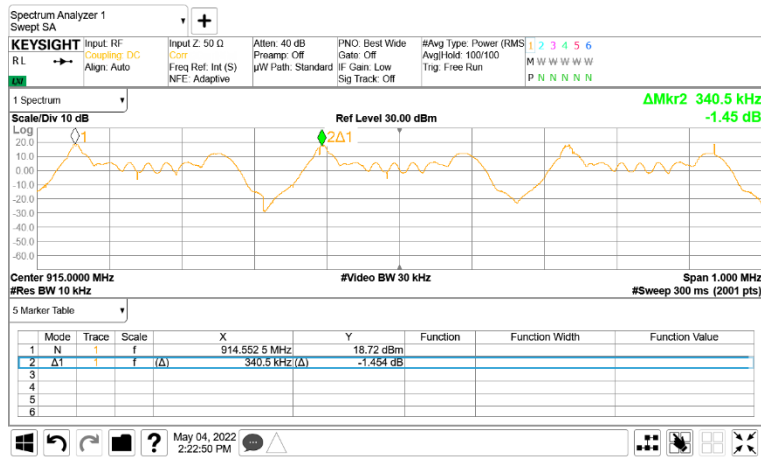
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 10 kHz and the VBW is set to 30 kHz. The sweep time is coupled.

RESULTS

340.5 kHz

HOPPING FREQUENCY SEPARATION PLOT



9.2 NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (i)
 IC RSS-247 section 5.1(c)

Frequency hopping systems in the 902-928 MHz band shall use at least 25 non-overlapping channels.

TEST PROCEDURE

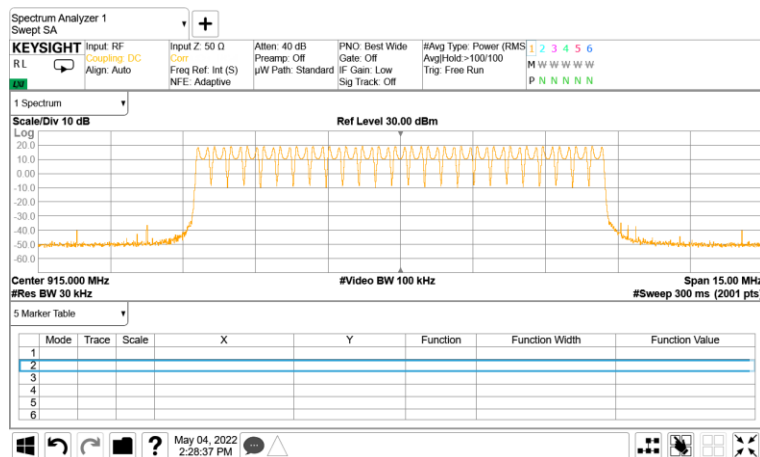
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. The analyzer is set to Max Hold.

RESULTS

25 Channels observed.

NUMBER OF HOPPING CHANNELS PLOTS[GFSK]

NUMBER OF HOPPING CHANNELS



9.3 AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (i)
IC RSS-247 section 5.1(c)

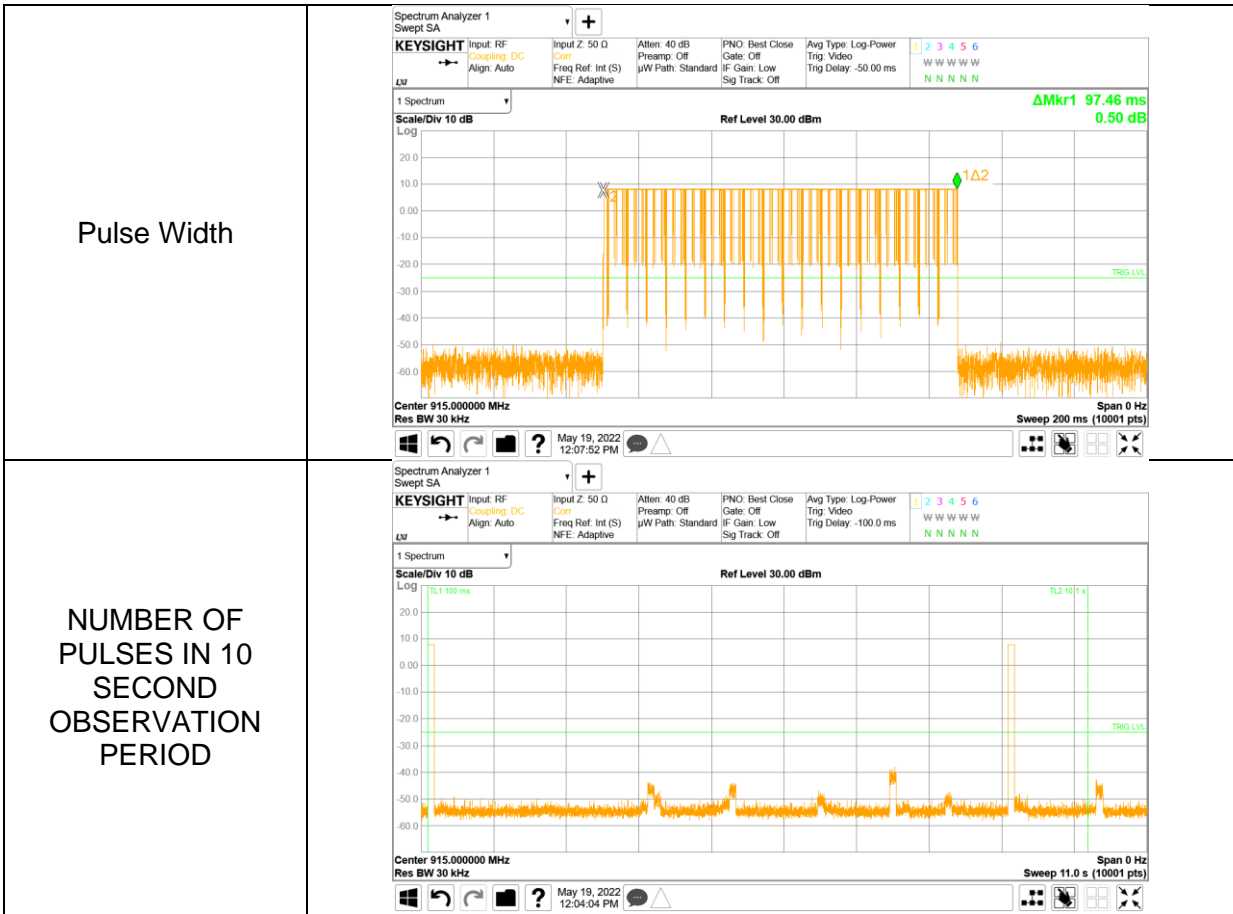
The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 10 second scan, to enable resolution of each occurrence.

RESULTS

Frequency	Pulse Width [msec]	Number of Pulses in 10 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
915	97.460	2	0.194920	0.4	-0.2051



9.4 20 dB AND 99% BANDWIDTH

LIMITS

FCC §15.247 (a) (1) (i)
IC RSS-247 section 5.1(c)

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

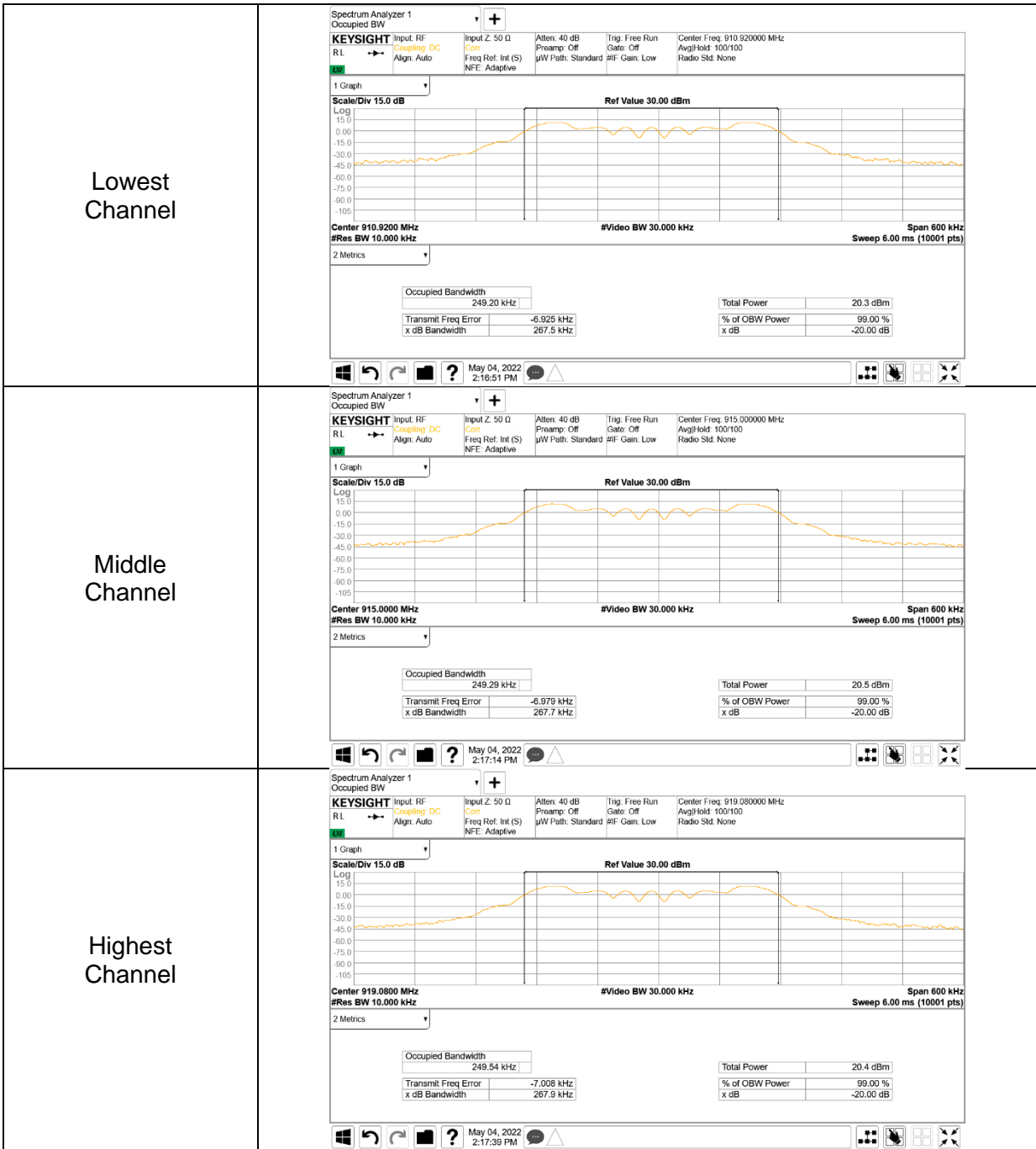
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 10 kHz and the VBW is set to 30 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]	Limits [MHz]
Low	910.92	0.268	0.249	0.500
Mid	915.00	0.268	0.249	0.500
High	919.08	0.268	0.250	0.500

20 dB AND 99% BANDWIDTH PLOTS



9.5 OUTPUT POWER

LIMITS

FCC §15.247 (b) (2)
IC RSS-247 section 5.5

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading		Limit [dBm]	Margin [dB]
		[mW]	[dBm]		
Lowest	910.92	82.79	19.18	24.00	-4.82
Middle	915.00	81.28	19.10	24.00	-4.90
Highest	919.08	81.28	19.10	24.00	-4.90
Worst		82.79	19.18	24.00	-4.82

OUTPUT POWER PLOTS



9.6 OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)
IC RSS-247 section 5.5

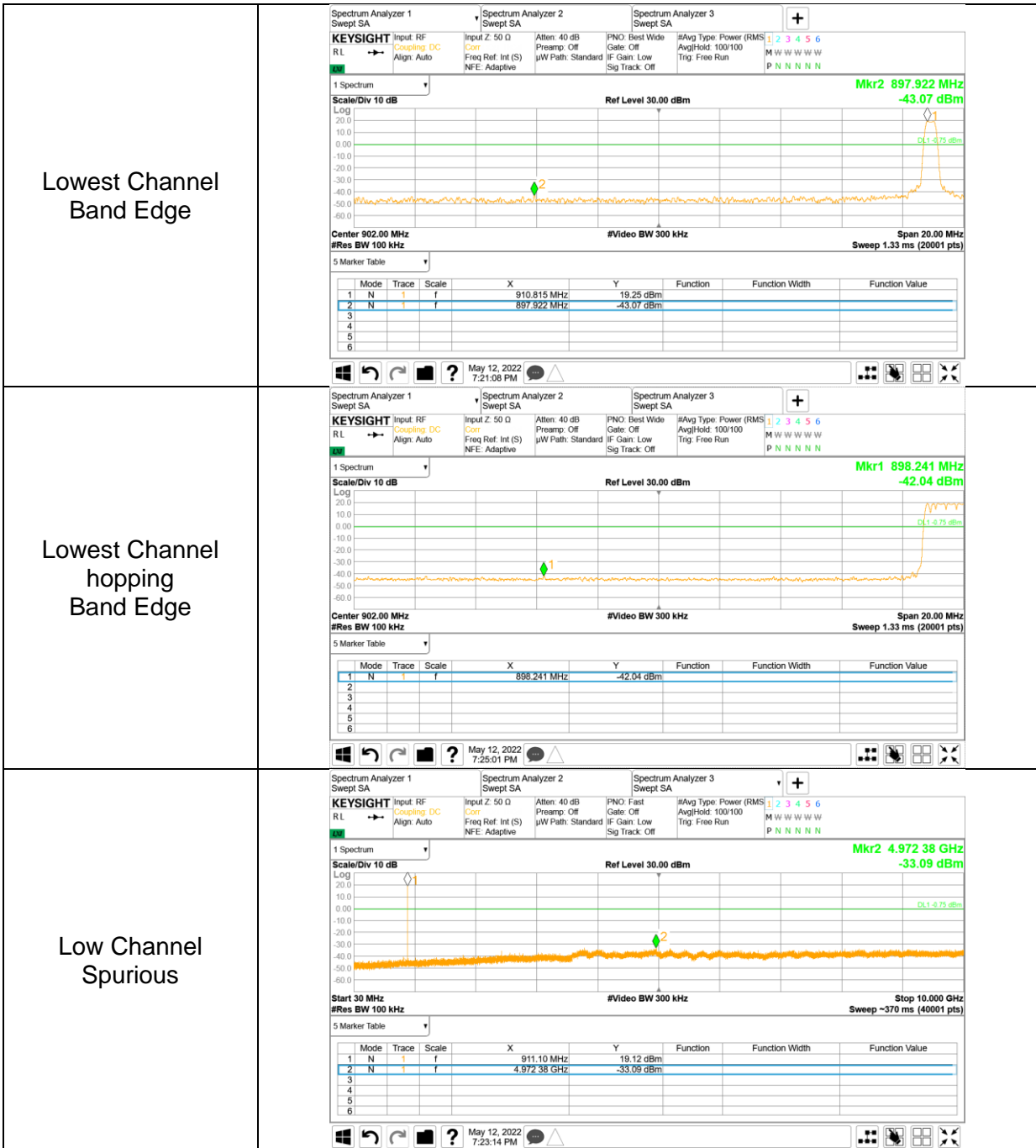
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

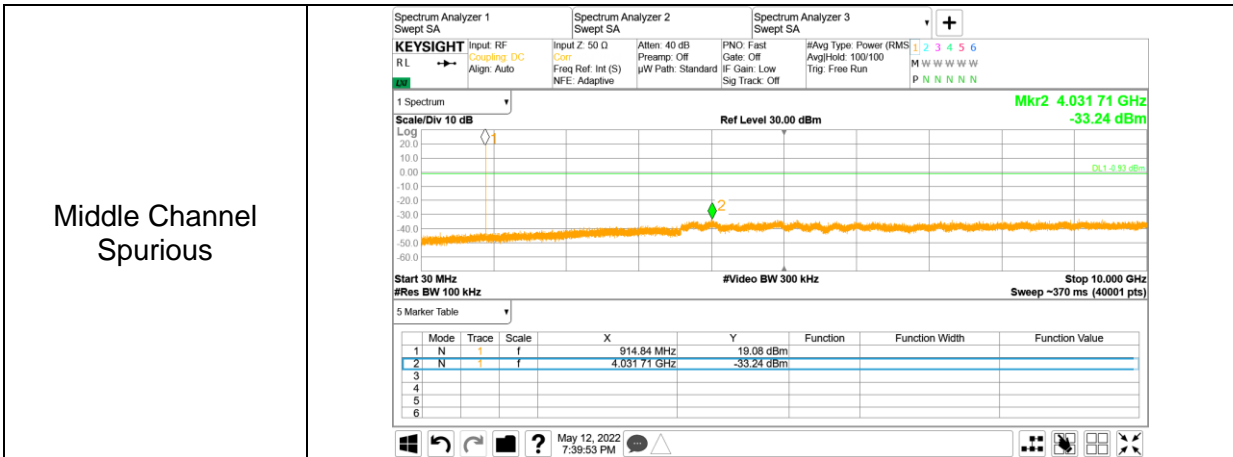
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, band edge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

BAND EDGE & SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



BAND EDGE & SPURIOUS EMISSIONS, HIGH CHANNEL



10 RADIATED TEST RESULTS

10.1 LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
 IC RSS-GEN Clause 8.9 and 8.10

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

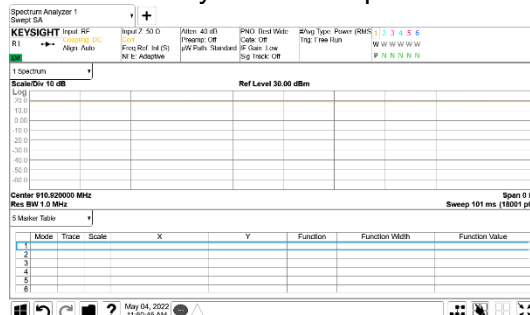
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 – 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 – 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

< Duty of test sample >



Note: Duty cycle (On time : 100 ms / On + Off time : 100 ms) = 100 %.

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; the video bandwidth is set to 3 MHz for peak measurements. (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 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.

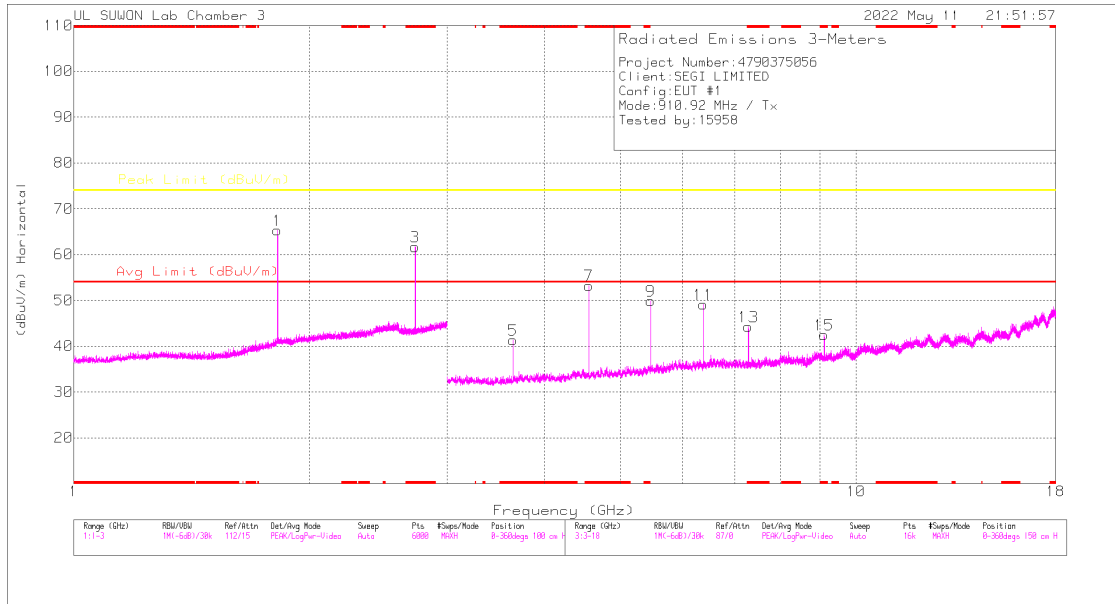
Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
 Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field 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.

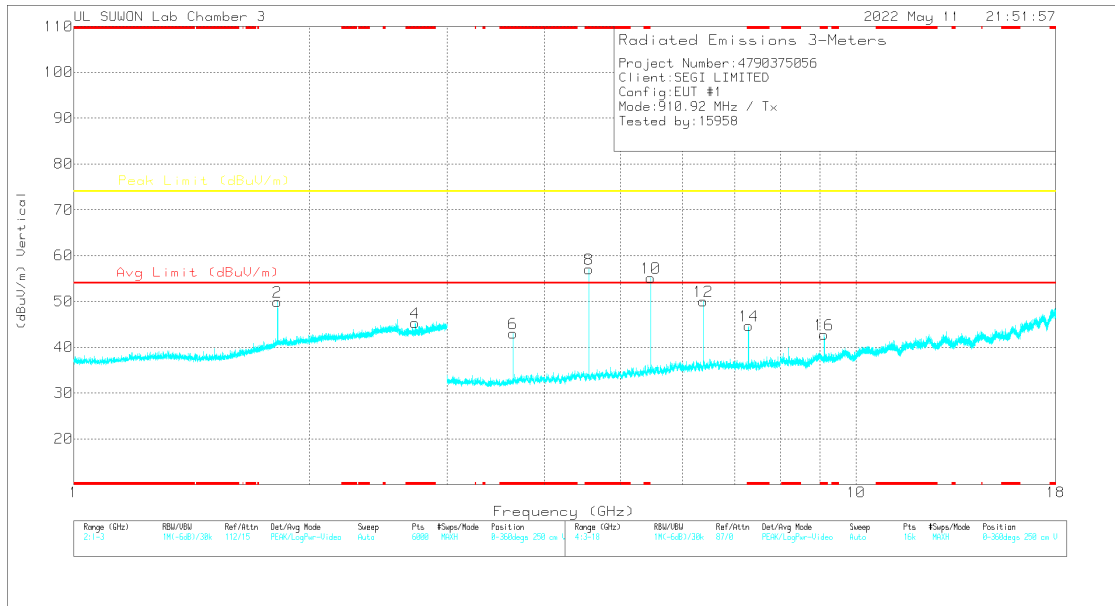
10.2 TRANSMITTER ABOVE 1 GHz

HARMONICS AND SPURIOUS EMISSIONS

LOWEST CHANNEL HORIZONTAL



LOWEST CHANNEL VERTICAL



LOWEST CHANNEL DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.82199	62.11	PK	31	-25.5	67.61	-	-	74	-6.39	242	112	H
* 2.73267	49.34	PK	32.8	-24.5	57.64	-	-	74	-16.36	130	155	H
* 2.73272	42.61	MAv	32.8	-24.5	50.91	54	-3.09	-	-	130	155	H
1.82176	53.38	PK	31	-25.5	58.88	-	-	74	-15.12	336	315	V
* 2.73263	39.98	MAv	32.8	-24.5	48.28	54	-5.72	-	-	182	332	V
* 2.73304	47.76	PK	32.8	-24.5	56.06	-	-	74	-17.94	182	332	V

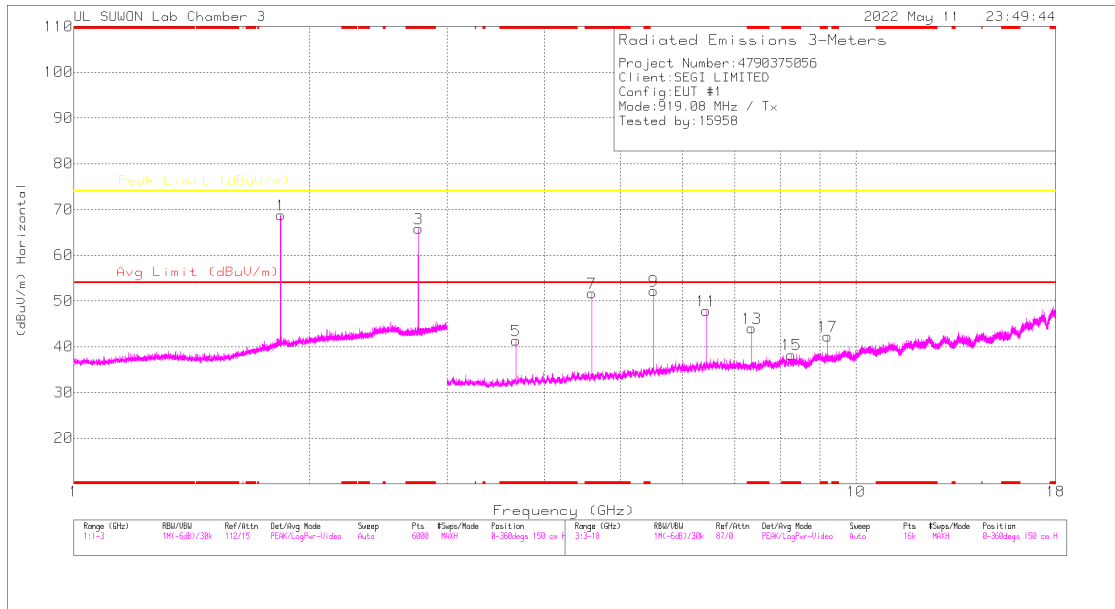
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.64335	37.21	MAv	33.6	-32.4	38.41	54	-15.59	-	-	91	120	H
* 4.55493	47.93	MAv	34.4	-31.2	51.13	54	-2.87	-	-	149	100	H
* 7.28816	31.73	MAv	36	-25.4	42.33	54	-11.67	-	-	129	110	H
* 9.10828	25.9	MAv	36.9	-22.5	40.3	54	-13.7	-	-	95	108	H
* 3.6434	39.22	MAv	33.6	-32.4	40.42	54	-13.58	-	-	193	110	V
* 4.55488	49.81	MAv	34.4	-31.2	53.01	54	-99	-	-	330	100	V
* 7.28823	32.43	MAv	36	-25.4	43.03	54	-10.97	-	-	335	100	V
* 9.10813	25.78	MAv	36.9	-22.5	40.18	54	-13.82	-	-	332	115	V
* 3.64325	45.05	PK	33.6	-32.4	46.25	-	-	74	-27.75	91	120	H
* 4.55506	52.41	PK	34.4	-31.2	55.61	-	-	74	-18.39	149	100	H
5.46624	48.6	PK	35.3	-28.2	55.7	-	-	74	-18.3	106	100	H
6.37687	45.65	PK	36.3	-27.8	54.15	-	-	74	-19.85	280	106	H
* 7.28753	40	PK	36	-25.5	50.5	-	-	74	-23.5	129	110	H
* 9.10844	35.85	PK	36.9	-22.5	50.25	-	-	74	-23.75	95	108	H
* 3.64403	46.46	PK	33.6	-32.4	47.66	-	-	74	-26.34	193	110	V
* 4.5549	54	PK	34.4	-31.2	57.2	-	-	74	-16.8	330	100	V
5.46608	50.57	PK	35.3	-28.2	57.67	-	-	74	-16.33	195	110	V
6.3771	45.38	PK	36.3	-27.8	53.88	-	-	74	-20.12	202	100	V
* 7.2867	40.83	PK	36	-25.5	51.33	-	-	74	-22.67	335	100	V
* 9.11005	35.4	PK	36.9	-22.5	49.8	-	-	74	-24.2	332	115	V

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

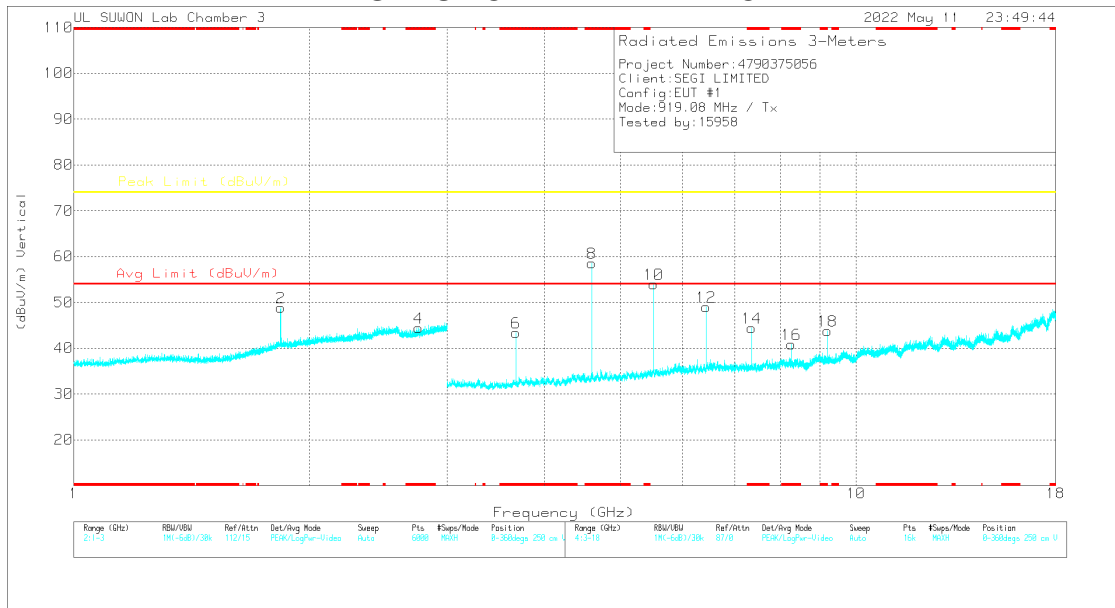
Pk - Peak detector

MAv - Maximum RMS Average

HIGHEST CHANNEL HORIZONTAL



HIGHEST CHANNEL VERTICAL



HIGHEST CHANNEL DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.83796	63.57	PK	31.1	-25.5	69.17	-	-	74	-4.83	247	175	H
* 2.75727	42.92	MAv	32.8	-24.5	51.22	54	-2.78	-	-	132	100	H
* 2.75753	49.73	PK	32.8	-24.5	58.03	-	-	74	-15.97	132	100	H
1.83791	51.81	PK	31.1	-25.5	57.41	-	-	74	-16.59	125	315	V
* 2.7572	42.32	MAv	32.8	-24.5	50.62	54	-3.38	-	-	178	316	V
* 2.75755	49.19	PK	32.8	-24.5	57.49	-	-	74	-16.51	178	316	V

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.67622	37.35	MAv	33.7	-31.9	39.15	54	-14.85	-	-	93	337	H
* 4.5958	47.38	MAv	34.5	-30.9	50.98	54	-3.02	-	-	221	113	H
* 7.35337	31.74	MAv	36	-24.8	42.94	54	-11.06	-	-	161	101	H
* 8.27092	25.17	MAv	36.2	-23.8	37.57	54	-16.43	-	-	55	105	H
* 9.19165	25.05	MAv	37	-21.8	40.25	54	-13.75	-	-	92	100	H
* 3.67627	39.5	MAv	33.7	-31.9	41.3	54	-12.7	-	-	194	138	V
* 4.59516	49.49	MAv	34.5	-30.9	53.09	54	-91	-	-	231	100	V
* 7.3534	31.41	MAv	36	-24.8	42.61	54	-11.39	-	-	336	100	V
* 8.2726	26.62	MAv	36.2	-23.8	39.02	54	-14.98	-	-	326	105	V
* 9.18983	25.45	MAv	37	-21.9	40.55	54	-13.45	-	-	205	100	V
* 3.676	45.27	PK	33.7	-31.9	47.07	-	-	74	-26.93	93	337	H
* 4.5959	52.22	PK	34.5	-30.9	55.82	-	-	74	-18.18	221	113	H
5.51477	48.01	PK	35.3	-28.1	55.21	-	-	74	-18.79	109	100	H
6.4343	44.56	PK	36.4	-28	52.96	-	-	74	-21.04	278	100	H
* 7.3529	39.33	PK	36	-24.8	50.53	-	-	74	-23.47	161	101	H
* 8.27231	36.21	PK	36.2	-23.8	48.61	-	-	74	-25.39	55	105	H
* 9.19178	34.78	PK	37	-21.8	49.98	-	-	74	-24.02	92	100	H
* 3.67628	46.12	PK	33.7	-31.9	47.92	-	-	74	-26.08	194	138	V
* 4.59591	53.91	PK	34.5	-30.9	57.51	-	-	74	-16.49	231	100	V
5.51387	50.25	PK	35.3	-28.1	57.45	-	-	74	-16.55	309	105	V
6.43425	45.3	PK	36.4	-28	53.7	-	-	74	-20.3	204	103	V
* 7.35244	40.05	PK	36	-24.8	51.25	-	-	74	-22.75	336	100	V
* 8.27093	36.4	PK	36.2	-23.8	48.8	-	-	74	-25.2	326	105	V
* 9.1918	35.19	PK	37	-21.8	50.39	-	-	74	-23.61	205	100	V

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

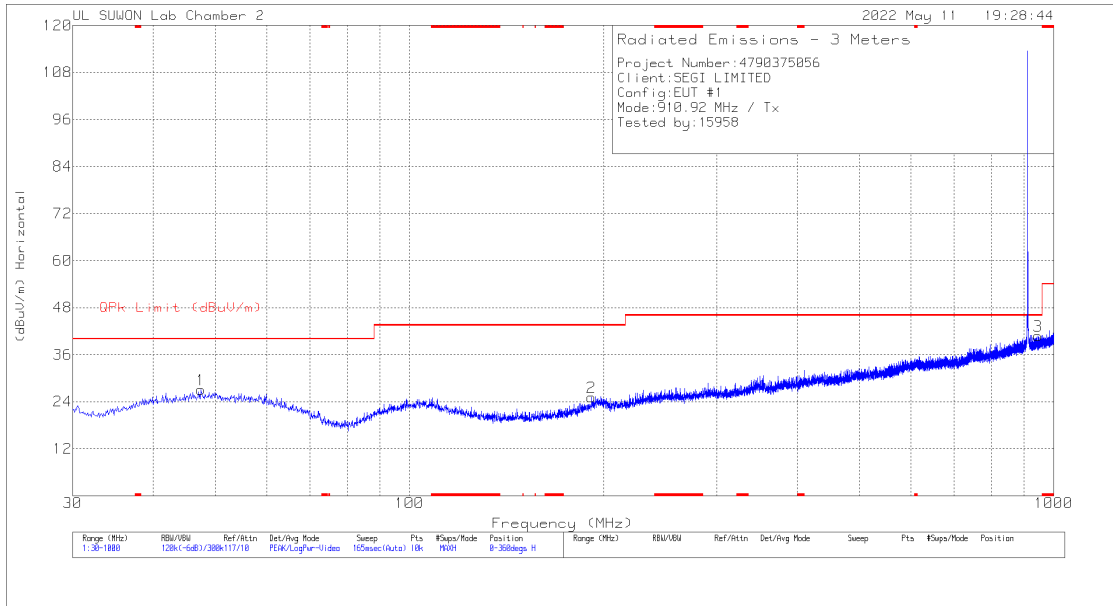
Pk - Peak detector

MAv - Maximum RMS Average

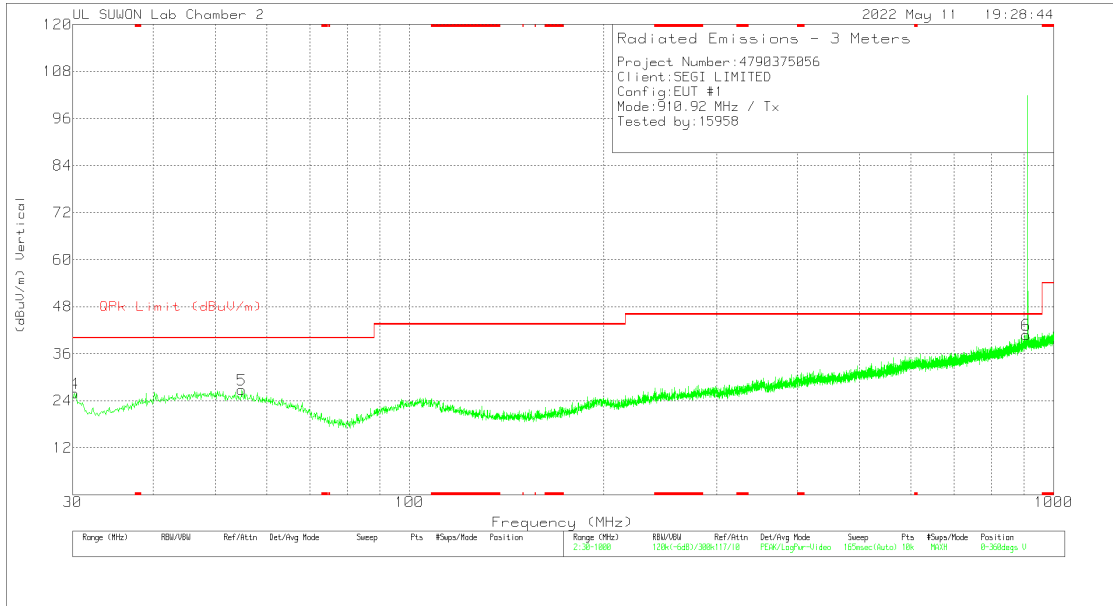
10.3 WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (Lowest Channel)

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

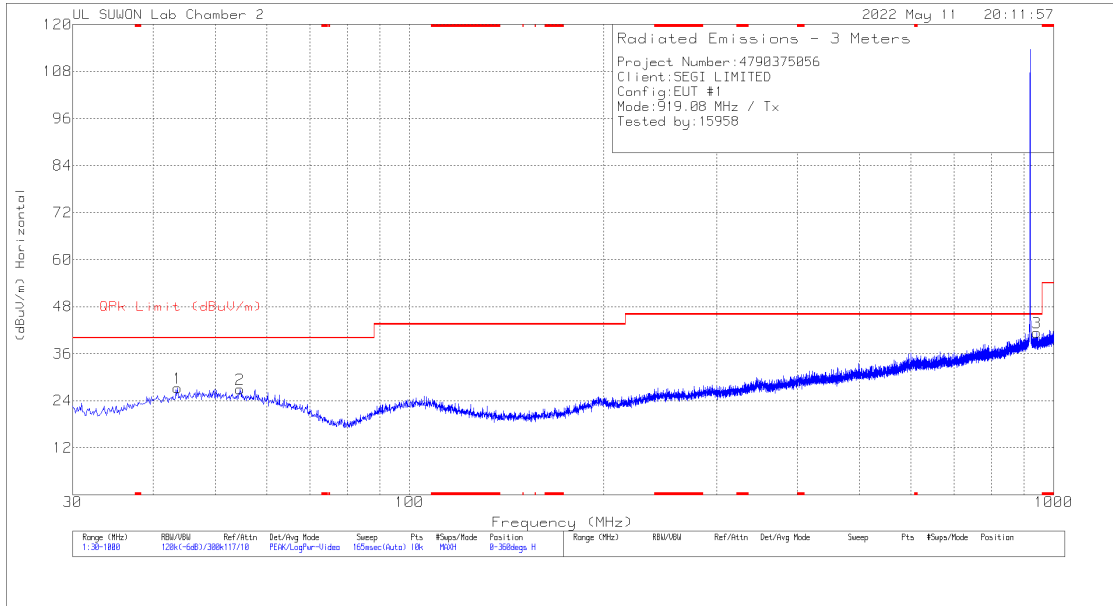
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.46	38.47	Pk	19.8	-31.2	27.07	40	-12.93	0-360	100	H
2	191.699	38.27	Pk	16.7	-29.8	25.17	43.52	-18.35	0-360	200	H
3	945.68	38.18	Pk	27.9	-25.3	40.78	46.02	-5.24	0-360	100	H
4	30.194	41.76	Pk	15.7	-31.6	25.86	40	-14.14	0-360	100	V
5	54.929	38.52	Pk	19.3	-31.1	26.72	40	-13.28	0-360	300	V
6	906.977	38.45	Pk	28.1	-25.7	40.85	46.02	-5.17	0-360	200	V

Pk - Peak detector

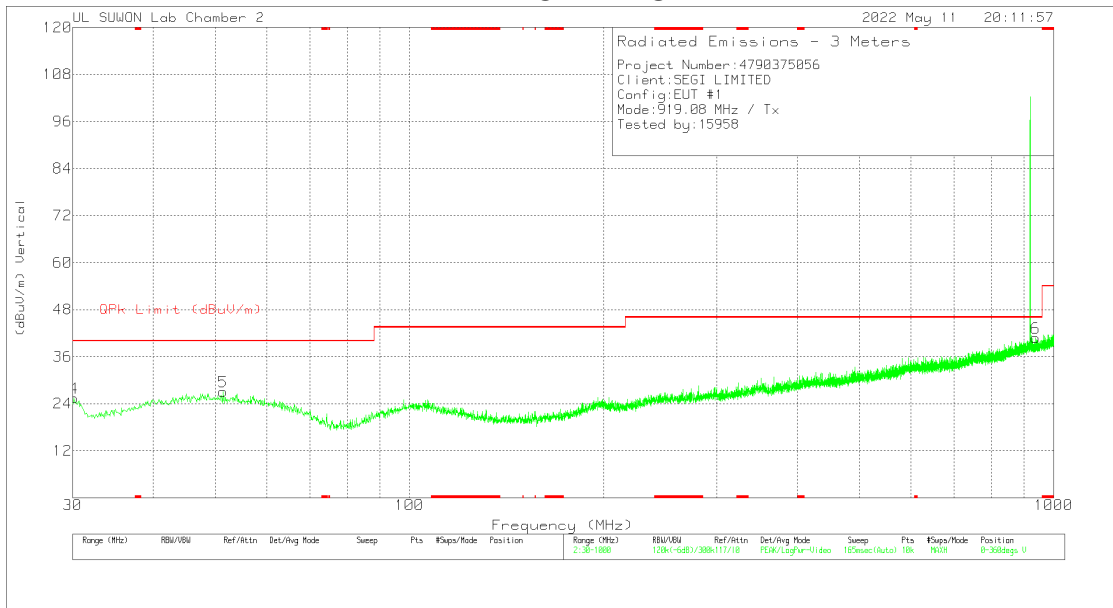
Note1: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than Quasi-Peak limit.

SPURIOUS EMISSIONS 30 TO 1000 MHz (Highest Channel)

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	43.677	39.13	Pk	19.4	-31.3	27.23	40	-12.77	0-360	300	H
2	54.541	38.76	Pk	19.3	-31.1	26.96	40	-13.04	0-360	200	H
3	941.703	38.69	Pk	27.9	-25.2	41.39	46.02	-4.63	0-360	100	H
4	30.097	41.13	Pk	15.8	-31.5	25.43	40	-14.57	0-360	100	V
5	51.34	38.48	Pk	19.8	-31.2	27.08	40	-12.92	0-360	200	V
6	937.435	38.07	Pk	28	-25.3	40.77	46.02	-5.25	0-360	100	V

Pk - Peak detector

Note1: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than Quasi-Peak limit.

10. 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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

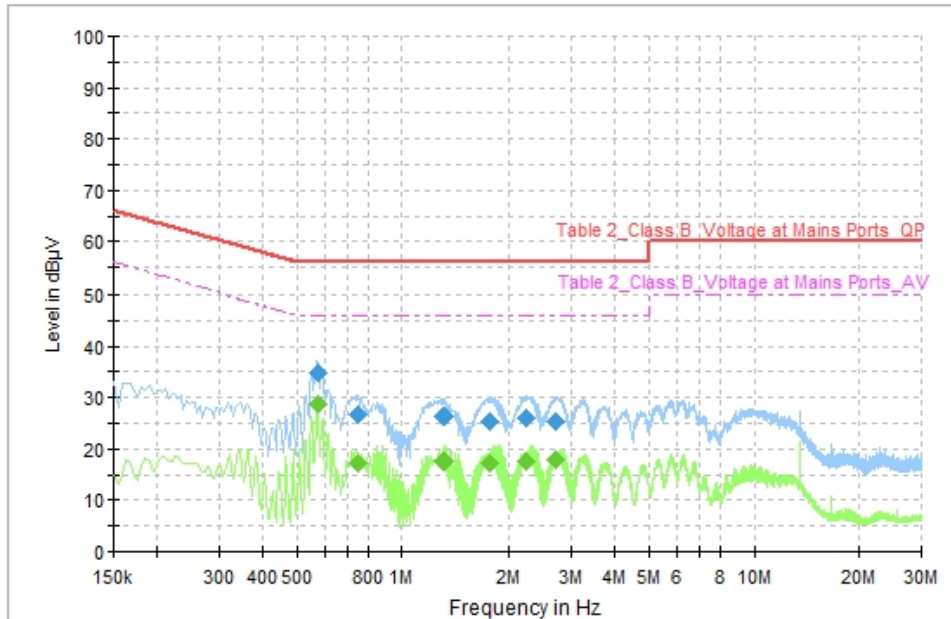
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS:

WORST EMISSIONS

LINE 1 DATA



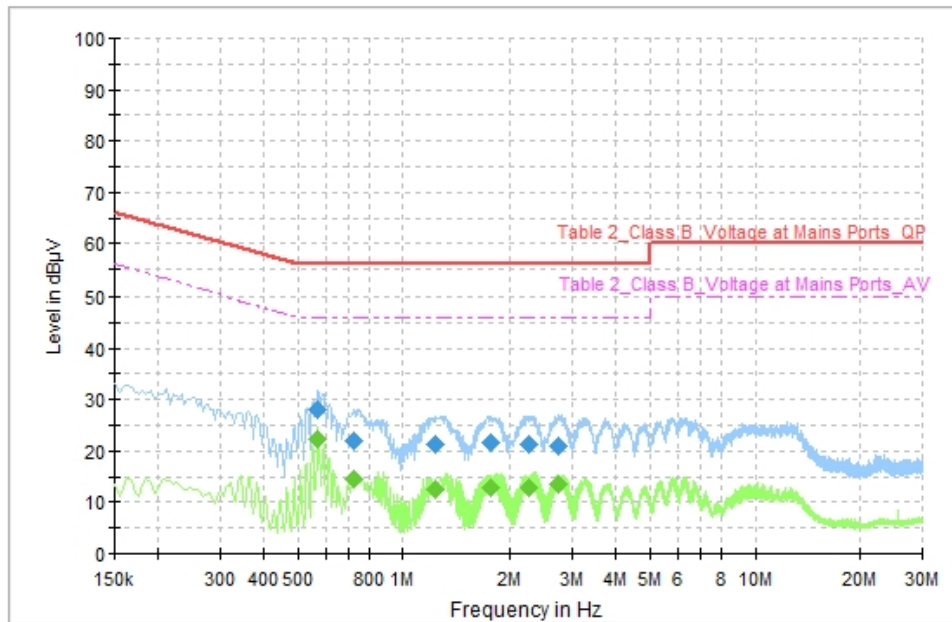
Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.575802	34.95	56.00	21.05	L1	ON	9.9
0.747000	26.74	56.00	29.26	L1	ON	9.8
1.300103	26.22	56.00	29.78	L1	ON	9.7
1.765412	25.27	56.00	30.73	L1	ON	9.7
2.235110	25.87	56.00	30.13	L1	ON	9.7
2.722368	25.19	56.00	30.81	L1	ON	9.7

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.575802	28.65	46.00	17.35	L1	ON	9.9
0.747000	17.15	46.00	28.85	L1	ON	9.8
1.300103	17.61	46.00	28.39	L1	ON	9.7
1.765412	17.13	46.00	28.87	L1	ON	9.7
2.235110	17.67	46.00	28.33	L1	ON	9.7
2.722368	17.92	46.00	28.08	L1	ON	9.7

LINE 2 DATA



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.571412	28.05	56.00	27.95	N	ON	9.9
0.720662	21.87	56.00	34.13	N	ON	9.8
1.234257	21.42	56.00	34.58	N	ON	9.7
1.756632	21.62	56.00	34.38	N	ON	9.7
2.257059	21.31	56.00	34.69	N	ON	9.7
2.744316	20.85	56.00	35.15	N	ON	9.7

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.571412	22.36	46.00	23.64	N	ON	9.9
0.720662	14.36	46.00	31.64	N	ON	9.8
1.234257	12.58	46.00	33.42	N	ON	9.7
1.756632	12.77	46.00	33.23	N	ON	9.7
2.257059	12.97	46.00	33.03	N	ON	9.7
2.744316	13.42	46.00	32.58	N	ON	9.7

END OF TEST REPORT