FCC CFR47 PART 15 SUBPART C

Keyless Entry System

CERTIFICATION TEST REPORT

FOR

DSS in the band 902-928 MHz

MODEL NUMBER : RED301-1WAY

FCC ID: VA5RED301-1WSS2

IC ID: 7087A-1WRED301SS2

REPORT NUMBER: 4788446314-E1V1

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Prepared for

SEGI LIMITED
UNIT S, 3-F, HARIBEST INDUSTRIAL BUILDING,
45-47, AU PUI WAN STREET, SHATIN, NT,
HONGKONG

Prepared by

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

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	05/04/18	Initial issue	Hoonpyo Lee
V2	05/05/18	Revised missed typo	Hoonpyo Lee
V3	05/07/18	Revised radiated test procedure	Hoonpyo Lee

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SEGI LIMITED

EUT DESCRIPTION: Keyless Entry System

MODEL NUMBER: RED301-1WAY

DATE TESTED: APR 30, 2018 - MAY 04, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

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:

Tested By:

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218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Hoonpyo Lee
Test Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

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

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
☐ 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/PDF/TL/TL-637.pdf.

FCC lab number: KR0161
IC test site registration number: 2324M-1

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 1 WAY 1 BUTTON REMOTES and using DSS operating under FCC Part 15.247. This test report addresses the DSS operational mode.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range[MHz]	Modulation Type	Power Mode	Output Power [mW]	Output Power [dBm]
910.92 ~ 919.08	FHSS	Peak	38.09	15.81

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

5.4. 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/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.

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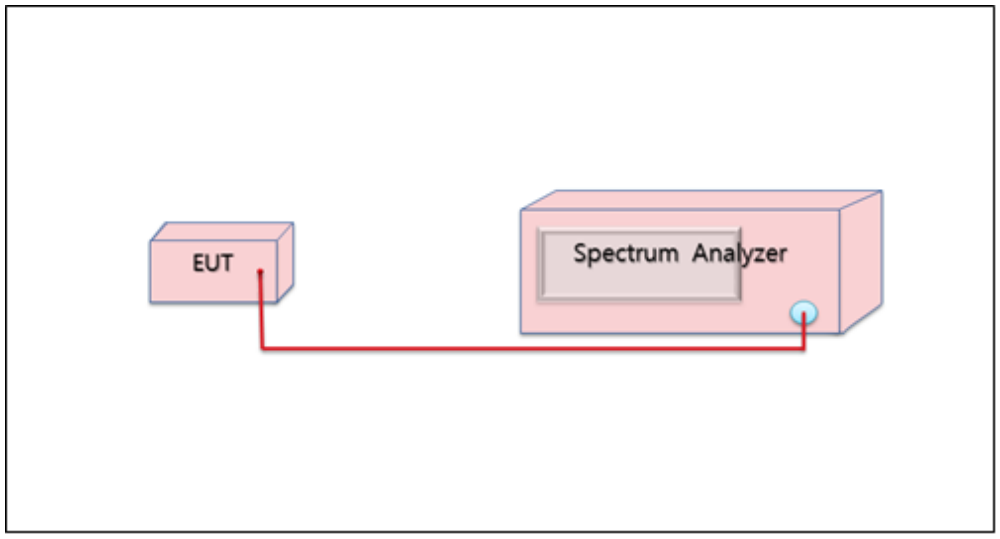
5.5. DESCRIPTION OF TEST SETUP

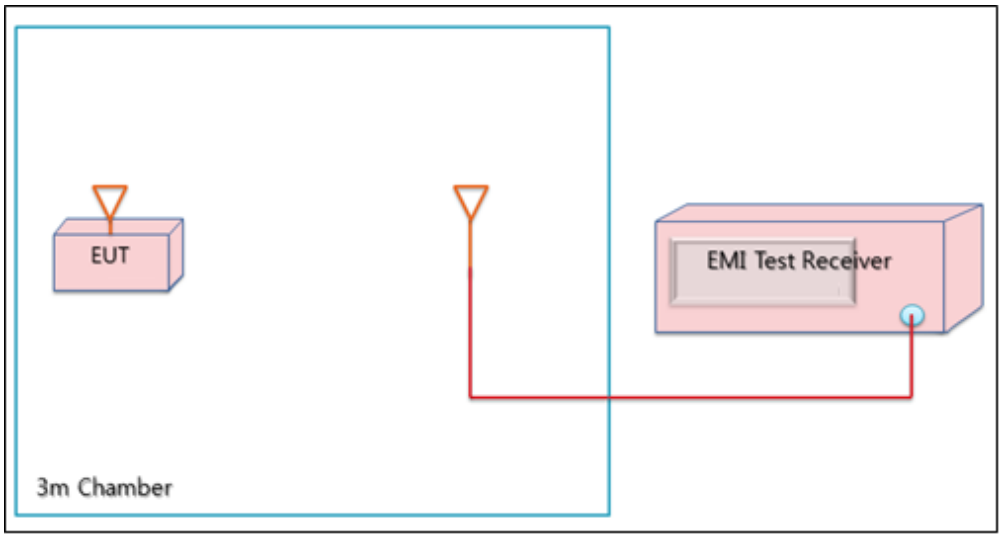
TEST SETUP

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

SETUP DIAGRAM FOR CONDUCTION TESTS



SETUP DIAGRAM FOR RADIATION TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	09-14-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-31-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3115	00161451	03-10-19
Antenna, Horn, 18 GHz	ETS	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00205959	11-29-18
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	11-13-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-10-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-08-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-08-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-11-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-11-18
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-08-18
Attenuator	PASTERNACK	PE7087-10	A001	08-08-18
Attenuator	PASTERNACK	PE7087-10	A008	08-08-18
Attenuator	PASTERNACK	PE7087-10	2	08-10-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-09-18
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-07-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-08-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-08-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-11-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-11-18
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-11-18
LISN	R&S	ENV-216	101837	08-09-18
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	

7. REFERENCE MEASUREMENT RESULTS

7.1. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

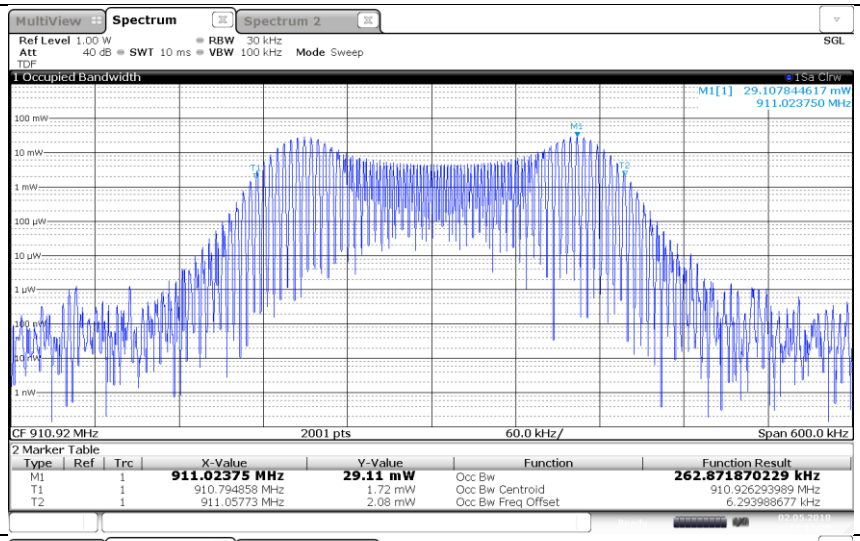
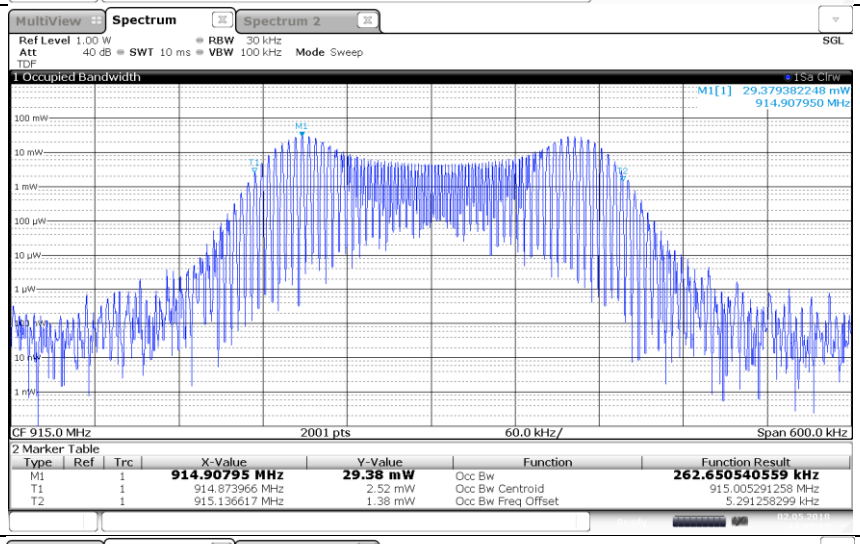
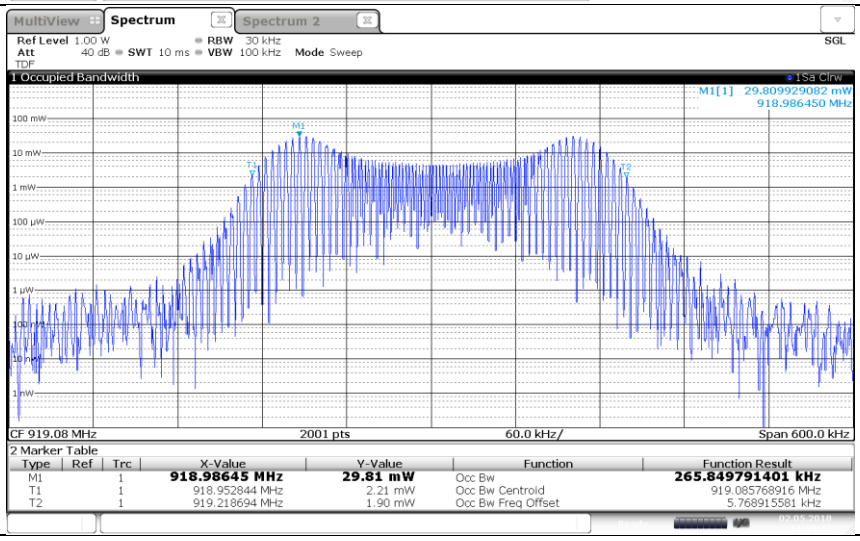
TEST PROCEDURE

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 sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency [MHz]	99 % Bandwidth [kHz]
Lowest	910.92	262.87
Middle	915.00	262.65
Highest	919.08	265.85
Maximum		265.85

99% BANDWIDTH PLOTS

Lowest Channel	
Middle Channel	
Highest Channel	

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8. SUMMARY TABLE

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 8.8	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

9. ANTENNA PORT TEST RESULTS

9.1. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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

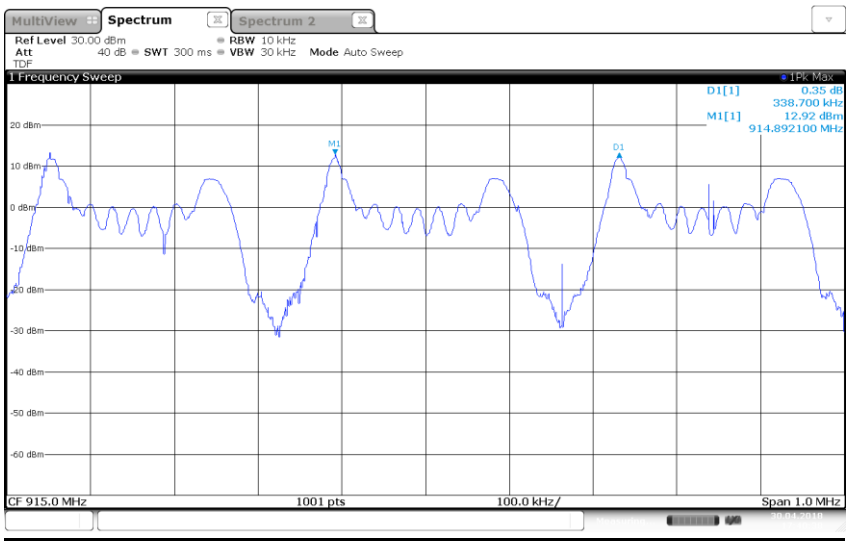
TEST PROCEDURE

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

RESULTS

338.7 kHz

HOPPING FREQUENCY SEPARATION PLOT



9.2. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (i)

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

TEST PROCEDURE

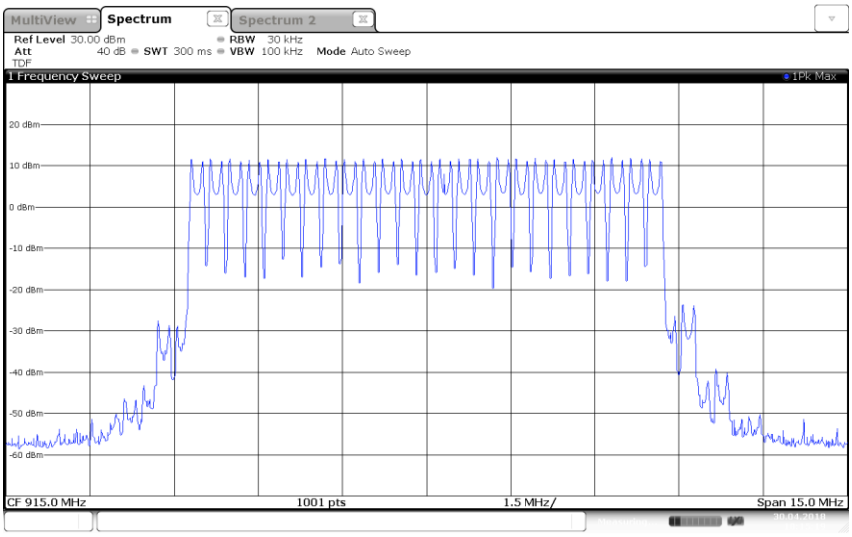
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is et the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. The analyzer is set to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

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	193.600	2	0.387200	0.4	-0.0128

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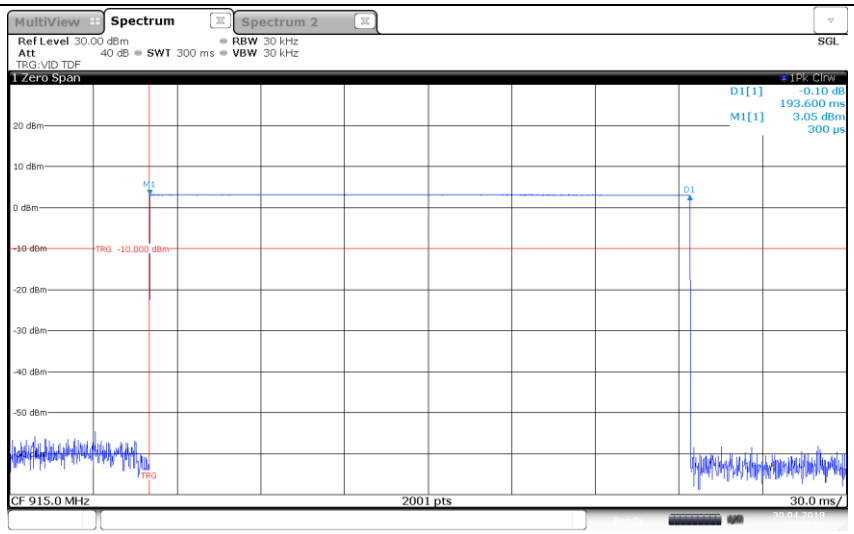
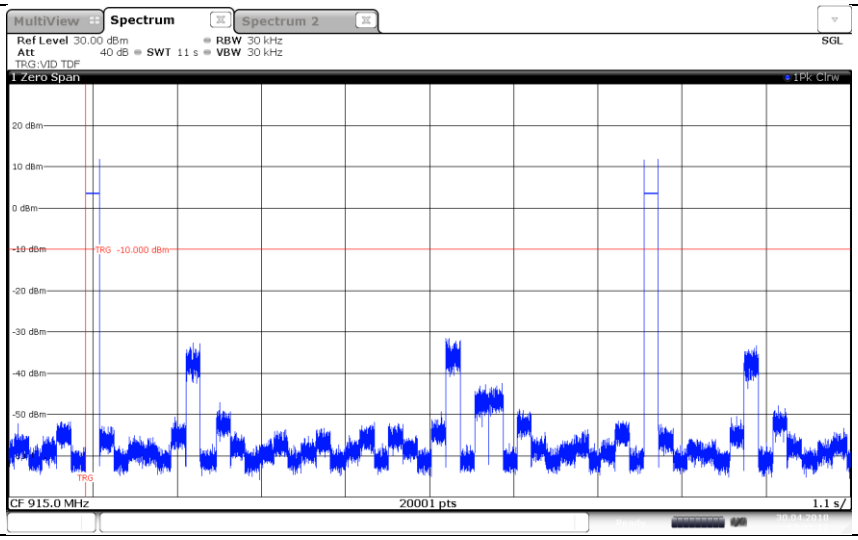
Pulse Width	
NUMBER OF PULSES IN 10 SECOND OBSERVATION PERIOD	

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9.4. 20 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (1) (i)

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

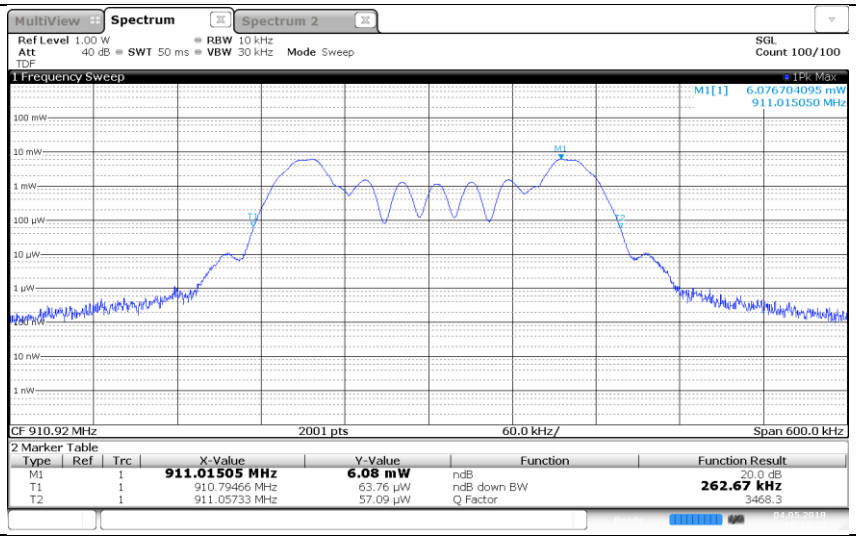
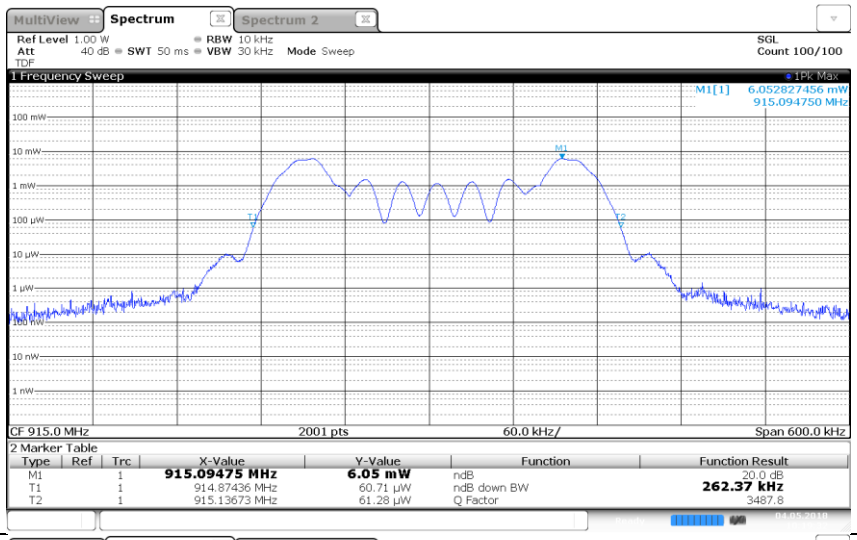
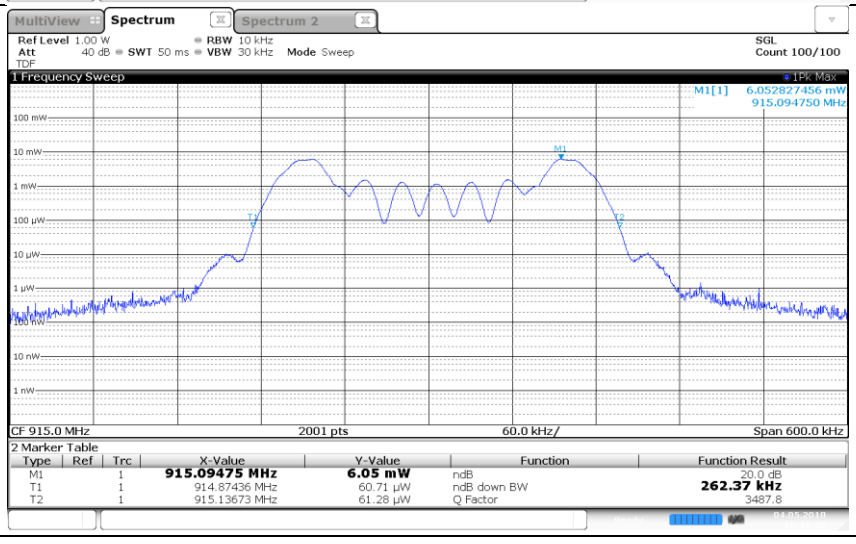
TEST PROCEDURE

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 [kHz]	Maximum Limit [kHz]
Lowest	910.92	262.7	500.0
Middle	915.00	262.4	500.0
Highest	919.08	262.4	500.0
Worst		262.4	500.0

20 dB BANDWIDTH PLOTS

Lowest Channel	
Middle Channel	
Highest Channel	

9.5. OUTPUT POWER

LIMITS

FCC §15.247 (b) (2)

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	Peak Power Reading		Limit	Margin
	[MHz]	[mW]	[dBm]	[dBm]	[dB]
Lowest	910.92	37.88	15.78	24.00	-8.22
Middle	915.00	38.02	15.80	24.00	-8.20
Highest	919.08	38.09	15.81	24.00	-8.19
Worst		38.09	15.81	24.00	-8.19

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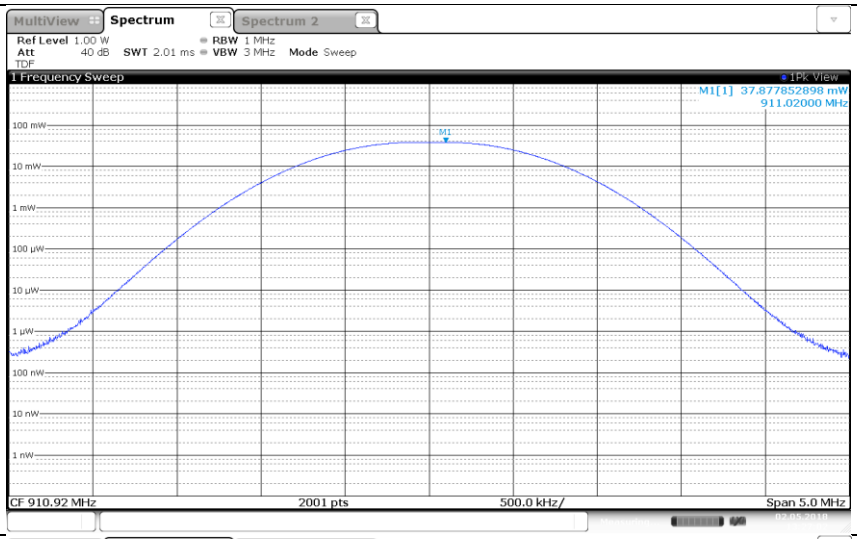
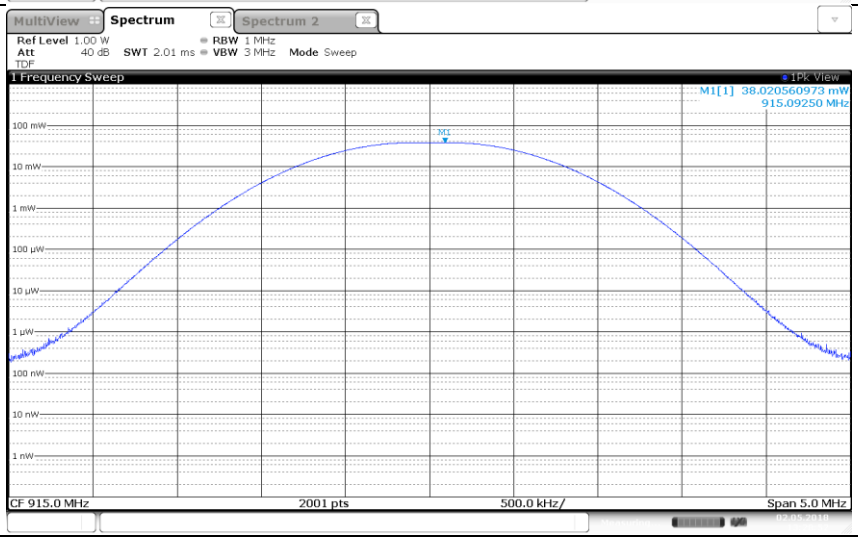
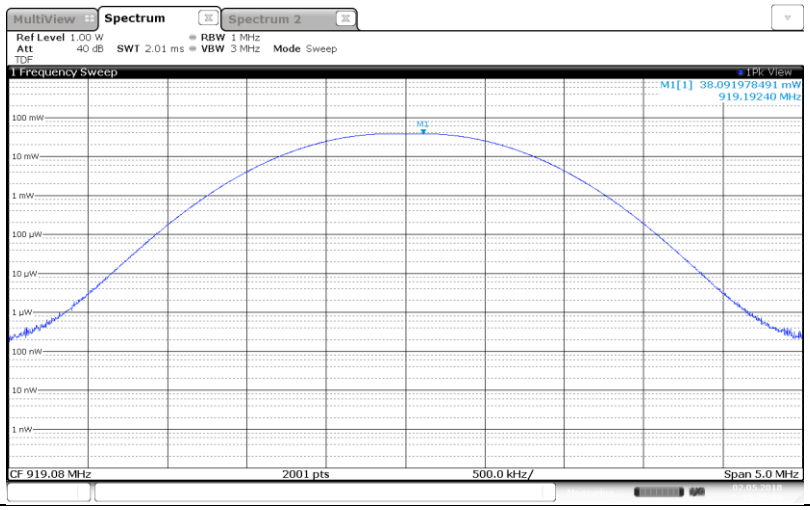
OUTPUT POWER PLOTS

Lowest Channel	
Middle Channel	
Highest Channel	

9.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

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, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

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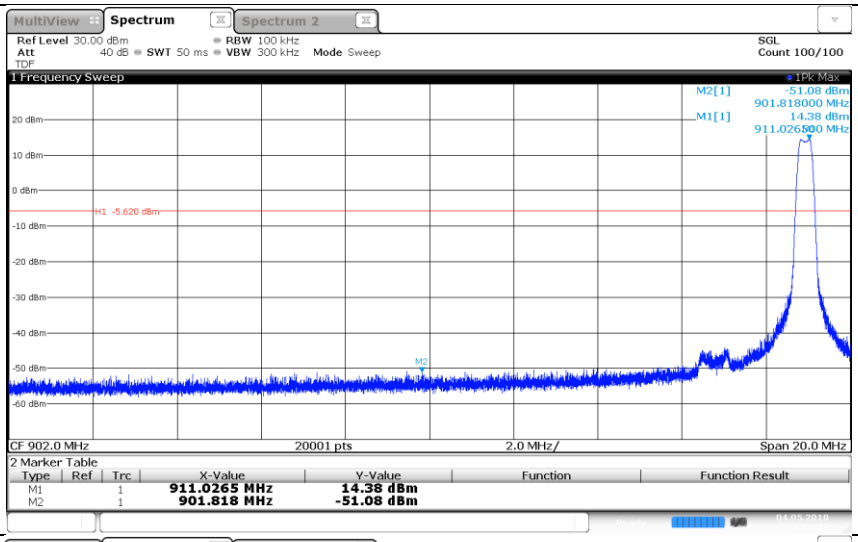
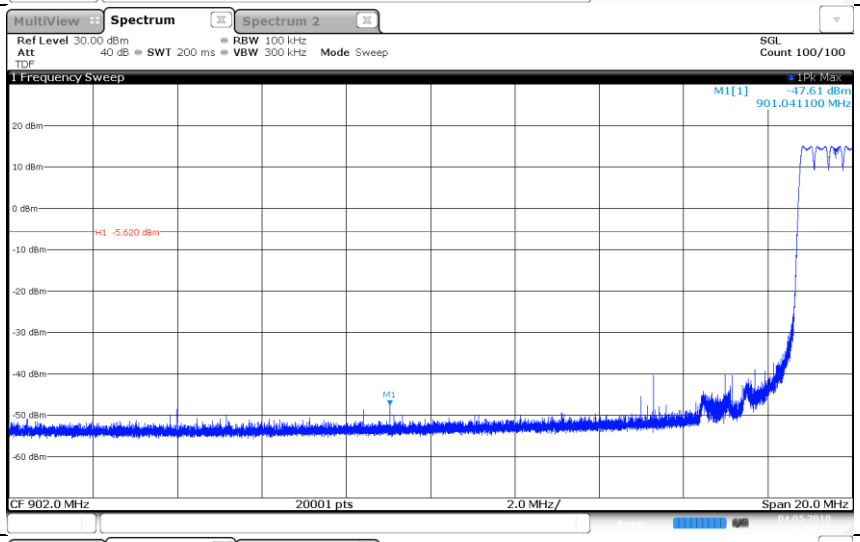
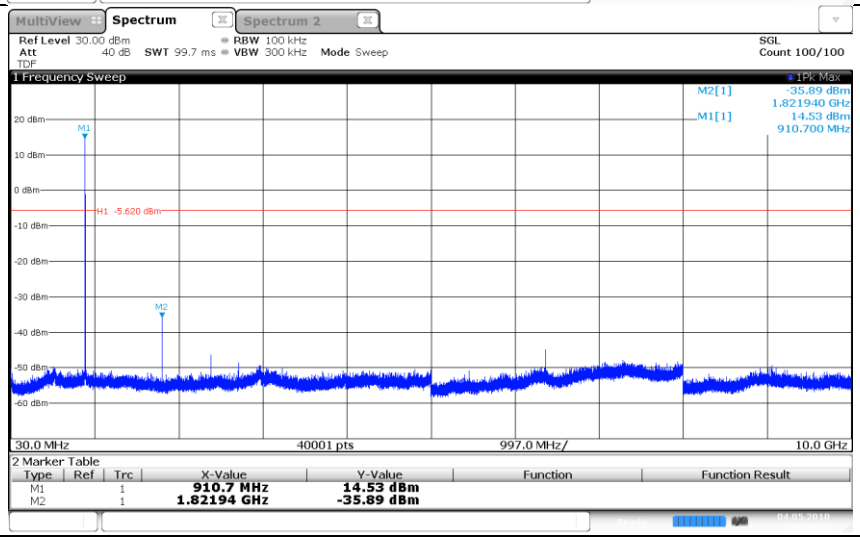
RESULTS

BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL

Lowest Channel BandEdge	
Lowest Channel hopping BandEdge	
Low Channel Spurious	

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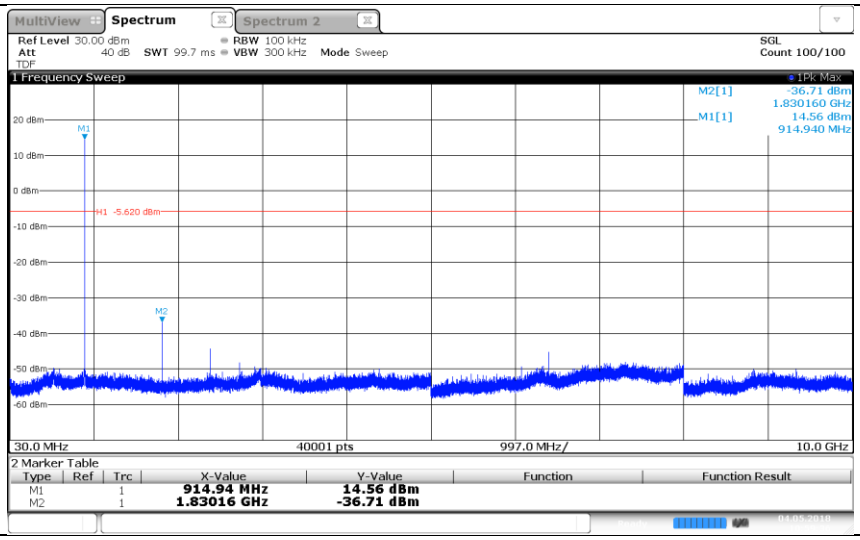
SPURIOUS EMISSIONS, MID CHANNEL

Middle Channel Spurious	

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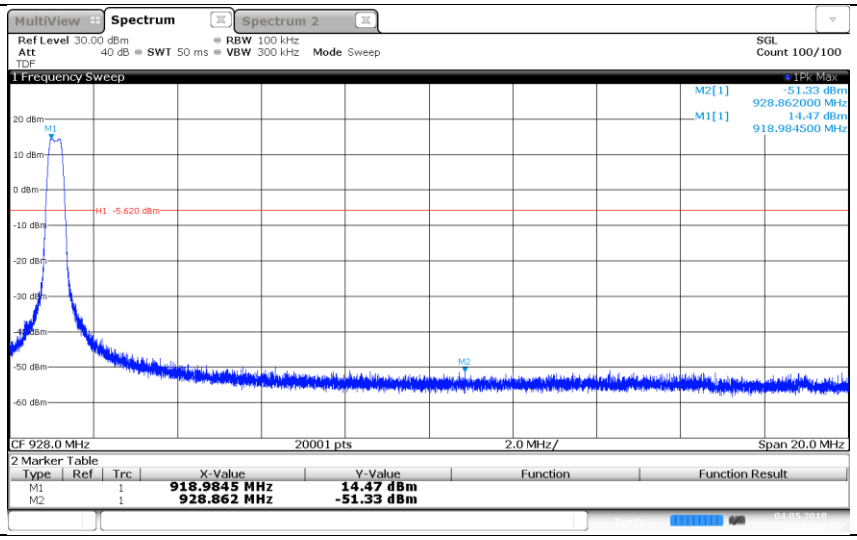
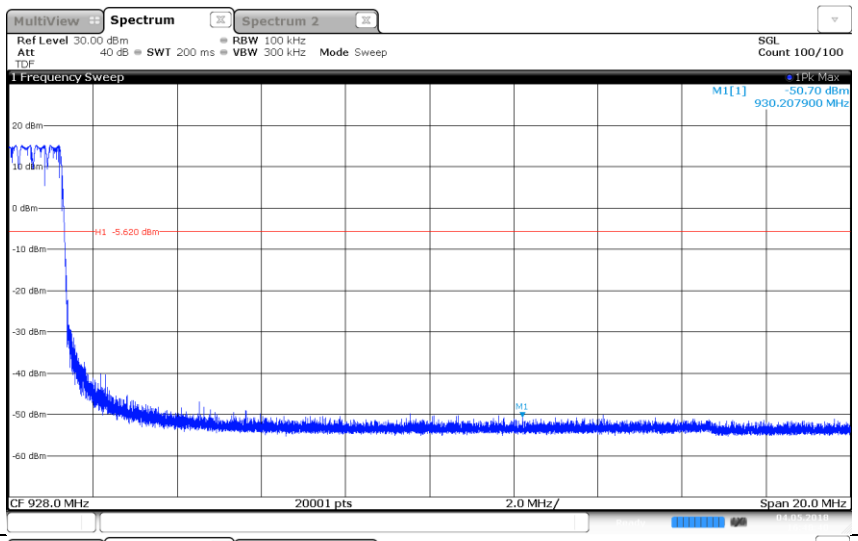
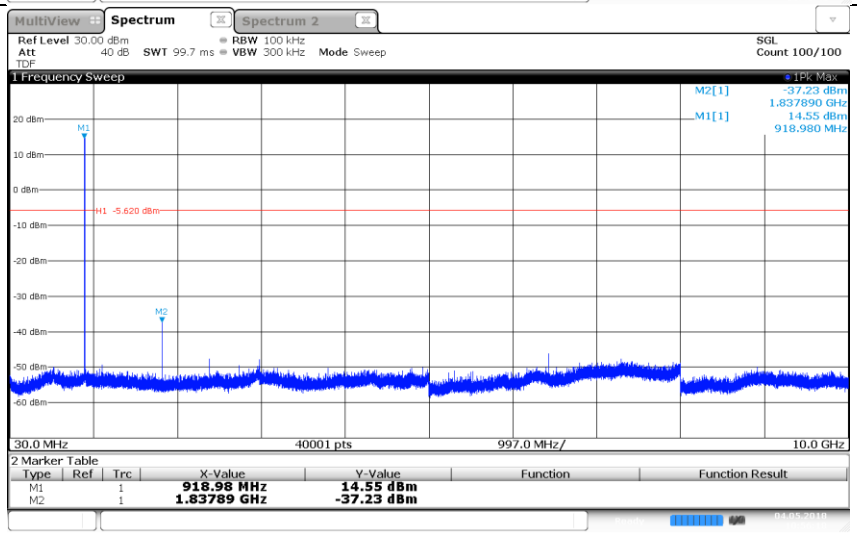
SPURIOUS EMISSIONS, HIGH CHANNEL

Highest Channel BandEdge	
Highest Channel hopping BandEdge	
Highest Channel Spurious	

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10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

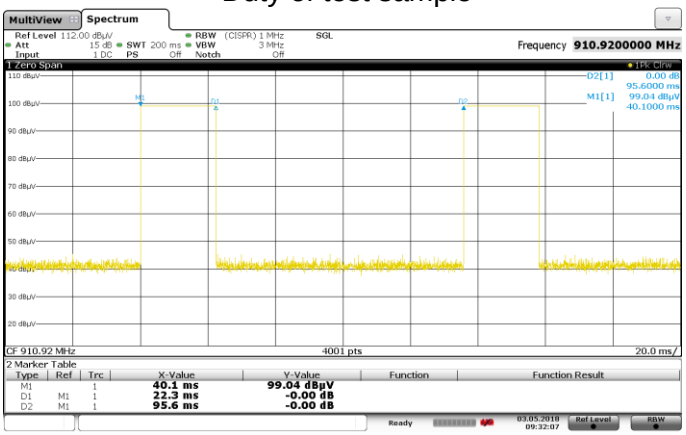
LIMITS

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.

< Duty of test sample>



Note: Ton = 22.3 ms ; 1/Ton = 45 Hz

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 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.)

For band edge 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 1/T (on time) for average measurement.

1/T = 1 / 0.0223S = 45Hz.

The minimum VBW was 45Hz, but test receiver couldn’t set value 45Hz. Due to this reason, testing VBW was set to 50Hz(Worst cases).

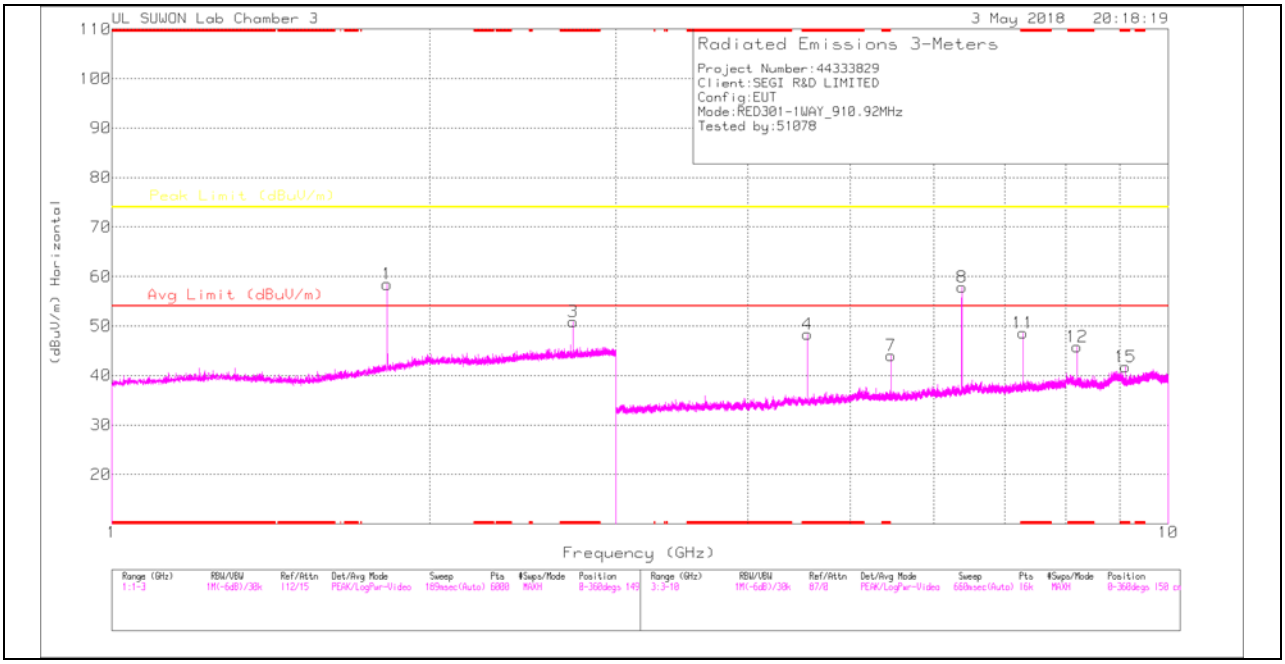
The spectrum from 1GHz to 10 GHz is investigated with the transmitter set to the lowest and highest channels in the 902 MHz ~ 928 MHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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.

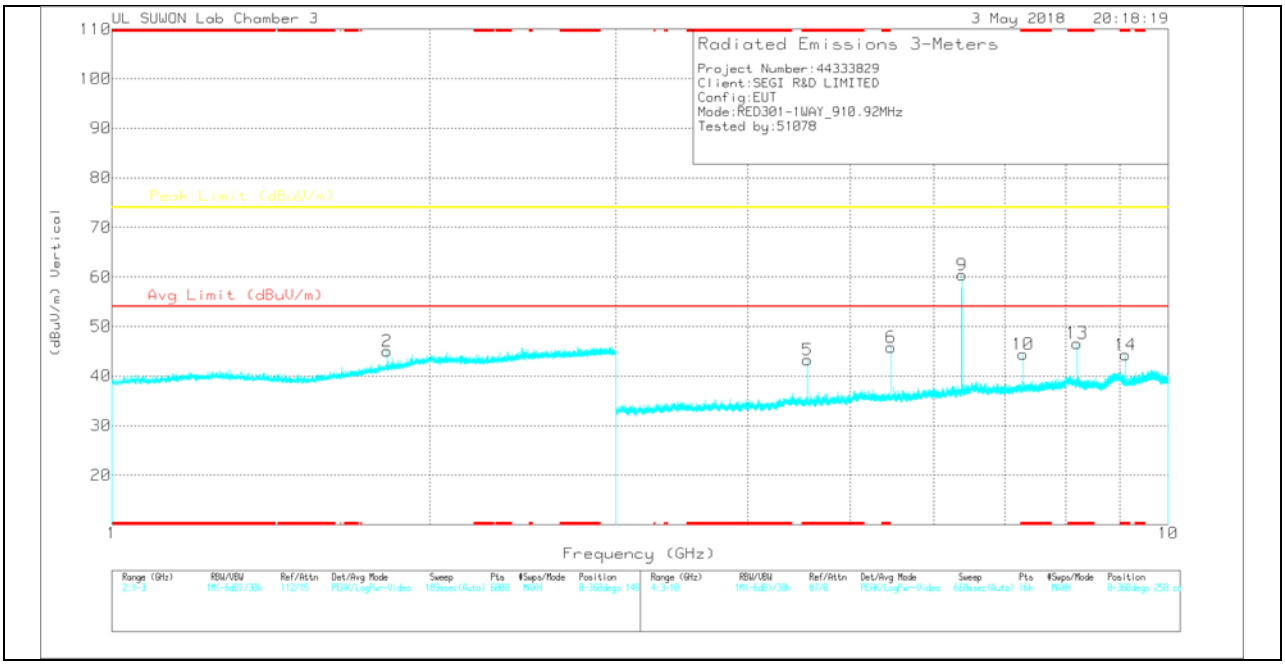
10.2. TRANSMITTER ABOVE 1 GHz

HARMONICS AND SPURIOUS EMISSIONS

LOWEST CHANNEL HORIZONTAL



LOWEST CHANNEL VERTICAL



Note: Emission was scanned up to 10 GHz

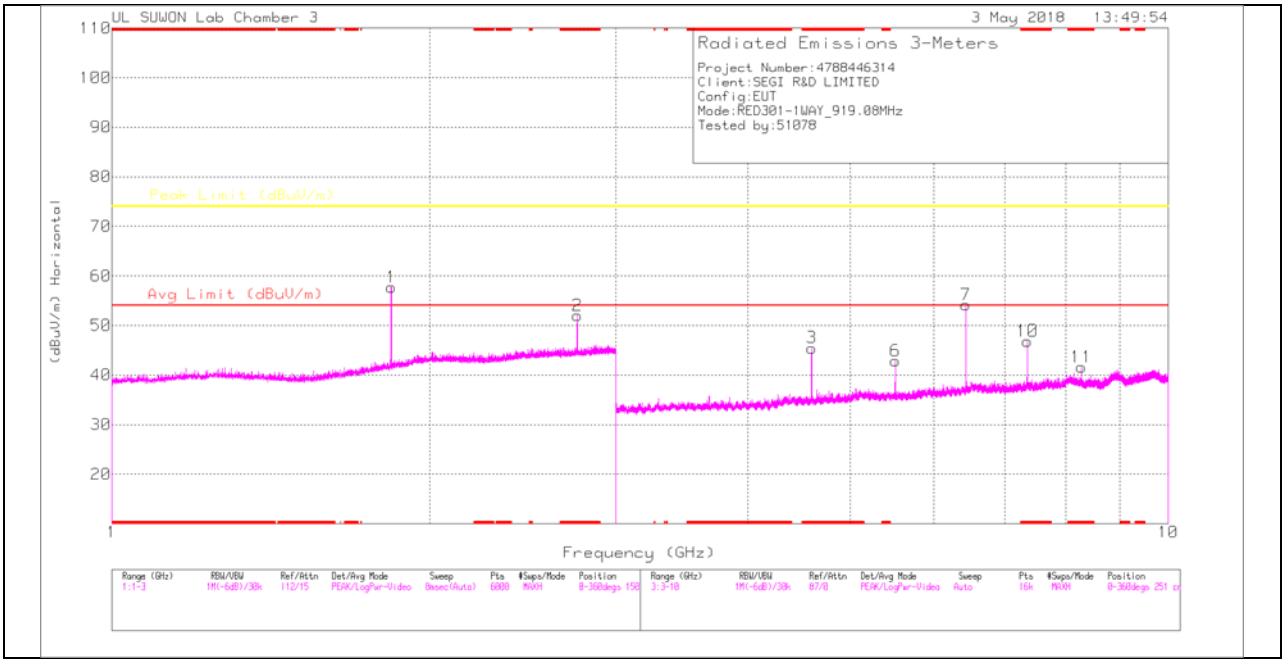
LOWEST CHANNEL DATA

Radiated Emissions

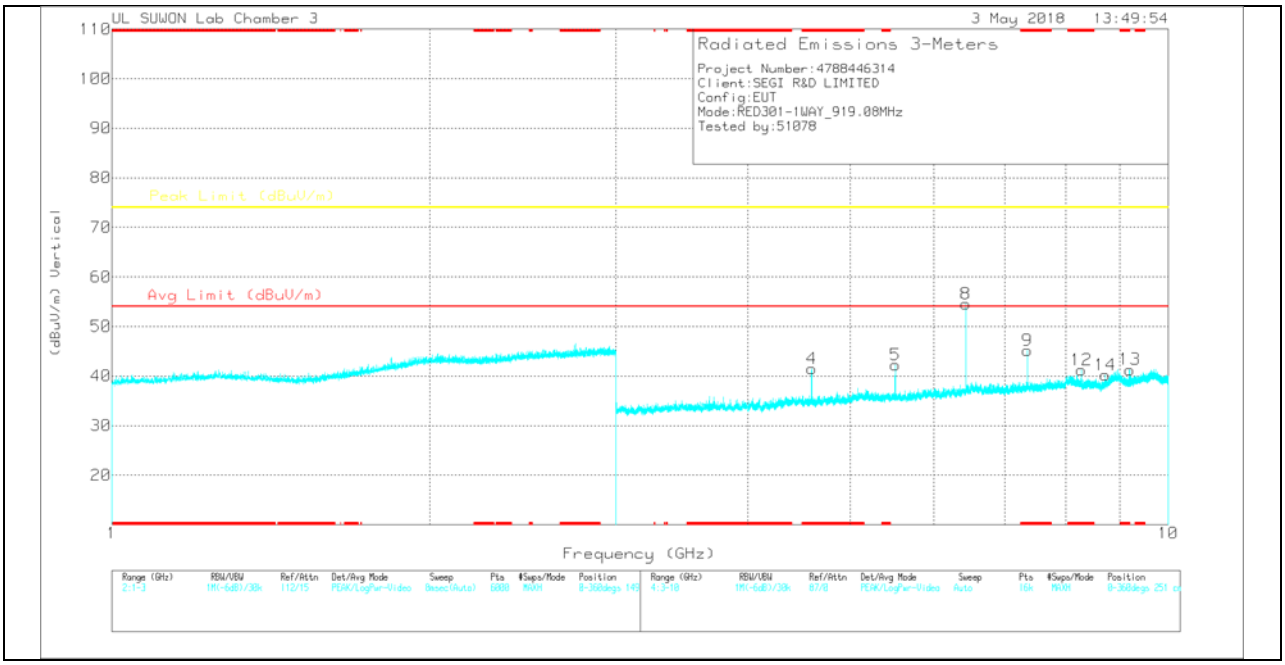
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.822	54.93	Pk	30.6	-23.8	0	61.73	-	-	74	-12.27	188	100	H
* 2.732	49.63	Pk	32.3	-22.8	0	59.13	-	-	74	-14.87	169	252	H
* 2.733	41.76	Avg	32.3	-22.9	0	51.16	54	-2.84	-	-	169	252	H
1.821	46.11	Pk	30.6	-23.8	0	52.91	-	-	74	-21.09	29	105	V
* 4.555	48.12	Pk	33.8	-29.4	0	52.52	-	-	74	-21.48	360	120	H
* 4.555	42.45	Avg	33.8	-29.4	0	46.85	54	-7.15	-	-	109	120	H
* 7.287	42.31	Pk	35.6	-23.8	0	54.11	-	-	74	-19.89	282	105	H
* 7.287	32.16	Avg	35.6	-23.7	0	44.06	54	-9.94	-	-	282	105	H
* 8.197	35.8	Pk	35.8	-21.7	0	49.9	-	-	74	-24.1	225	397	H
* 8.197	21.86	Avg	35.8	-21.7	0	35.96	54	-18.04	-	-	225	397	H
* 9.11	34.12	Pk	36.3	-20.7	0	49.72	-	-	74	-24.28	170	233	H
* 9.11	19.19	Avg	36.3	-20.7	0	34.79	54	-19.21	-	-	170	233	H
5.465	42.74	Pk	34.3	-26.4	0	50.64	-	-	74	-23.36	244	100	H
6.377	52.14	Pk	35.5	-26.1	0	61.54	-	-	74	-12.46	271	122	H
* 4.554	44.71	Pk	33.8	-29.4	0	49.11	-	-	74	-24.89	360	122	V
* 4.555	34.65	Avg	33.8	-29.4	0	39.05	54	-14.95	-	-	360	122	V
* 7.288	39.29	Pk	35.6	-23.7	0	51.19	-	-	74	-22.81	75	114	V
* 7.288	26.87	Avg	35.6	-23.7	0	38.77	54	-15.23	-	-	75	114	V
* 9.11	35.21	Pk	36.3	-20.7	0	50.81	-	-	74	-23.19	71	150	V
* 9.11	14.48	Avg	36.3	-20.7	0	30.08	54	-23.92	-	-	71	150	V
5.465	41.98	Pk	34.3	-26.4	0	49.88	-	-	74	-24.12	95	150	V
6.376	51.88	Pk	35.5	-26.1	0	61.28	-	-	74	-12.72	124	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGHEST CHANNEL HORIZONTAL



HIGHEST CHANNEL VERTICAL



Note: Emission was scanned up to 10 GHz

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HIGHEST CHANNEL DATA

Radiated Emissions

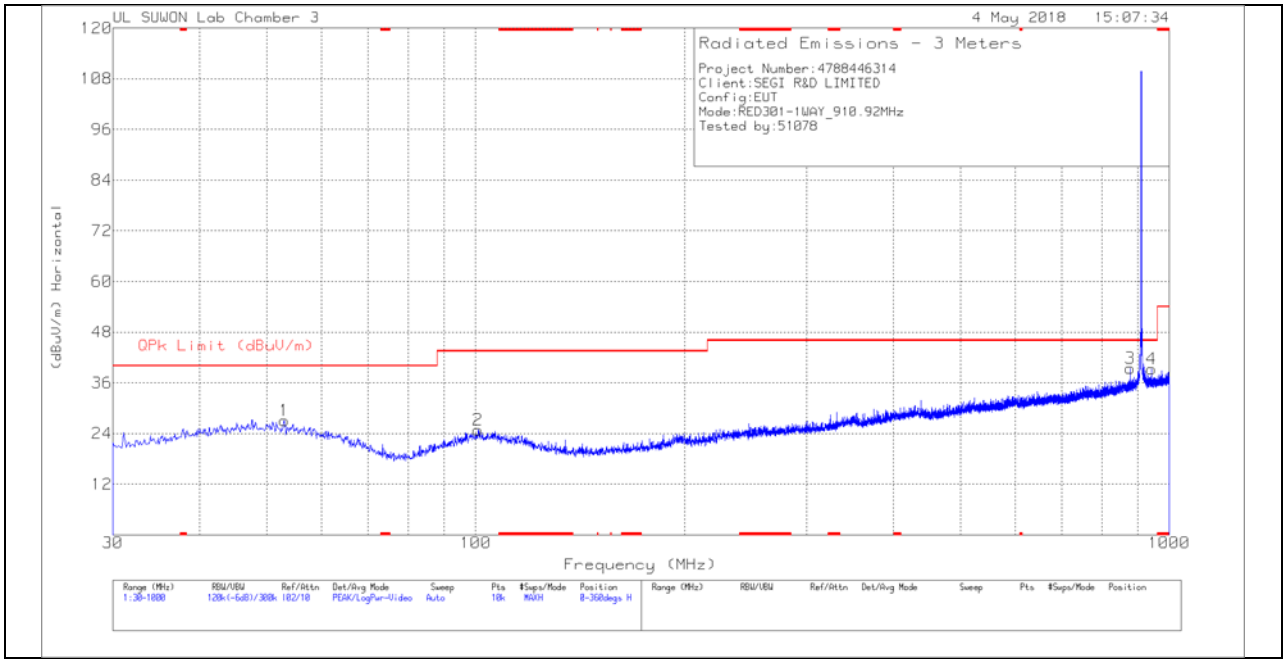
Frequency (GHz)	Meter Reading (dBuV)	Det	3117[00205959]	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.838	51.35	Pk	30.7	-23.8	58.25	-	-	74	-15.75	201	100	H
* 2.758	47.53	Pk	32.3	-22.8	57.03	-	-	74	-16.97	346	178	H
* 2.757	39.29	Avg	32.3	-22.8	48.79	54	-5.21	-	-	346	178	H
* 4.595	46.37	Pk	33.8	-29.1	51.07	-	-	74	-22.93	93	105	H
* 4.595	37.66	Avg	33.8	-29.1	42.36	54	-11.64	-	-	93	105	H
* 7.352	41.65	Pk	35.6	-23.1	54.15	-	-	74	-19.85	98	100	H
* 7.353	28.82	Avg	35.6	-23.2	41.22	54	-12.78	-	-	98	100	H
* 8.271	35.48	Pk	35.8	-22.2	49.08	-	-	74	-24.92	324	100	H
* 8.271	21.72	Avg	35.8	-22.2	35.32	54	-18.68	-	-	324	100	H
5.515	38.66	Pk	34.3	-26.4	46.56	-	-	74	-27.44	88	332	H
6.433	49.01	Pk	35.5	-26.2	58.31	-	-	74	-15.69	271	100	H
8.722	33.51	Pk	35.9	-21.3	48.11	-	-	74	-25.89	29	246	H
* 4.596	41.74	Pk	33.8	-29.1	46.44	-	-	74	-27.56	92	131	V
* 4.595	29	Avg	33.8	-29.1	33.7	54	-20.3	-	-	92	131	V
* 7.352	38.55	Pk	35.6	-23.2	50.95	-	-	74	-23.05	88	149	V
* 7.352	25.46	Avg	35.6	-23.2	37.86	54	-16.14	-	-	88	149	V
* 8.271	36.2	Pk	35.8	-22.2	49.8	-	-	74	-24.2	85	251	V
* 8.271	22.47	Avg	35.8	-22.2	36.07	54	-17.93	-	-	85	251	V
* 9.19	33.06	Pk	36.3	-20	49.36	-	-	74	-24.64	91	141	V
* 9.192	19.76	Avg	36.3	-20	36.06	54	-17.94	-	-	91	141	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

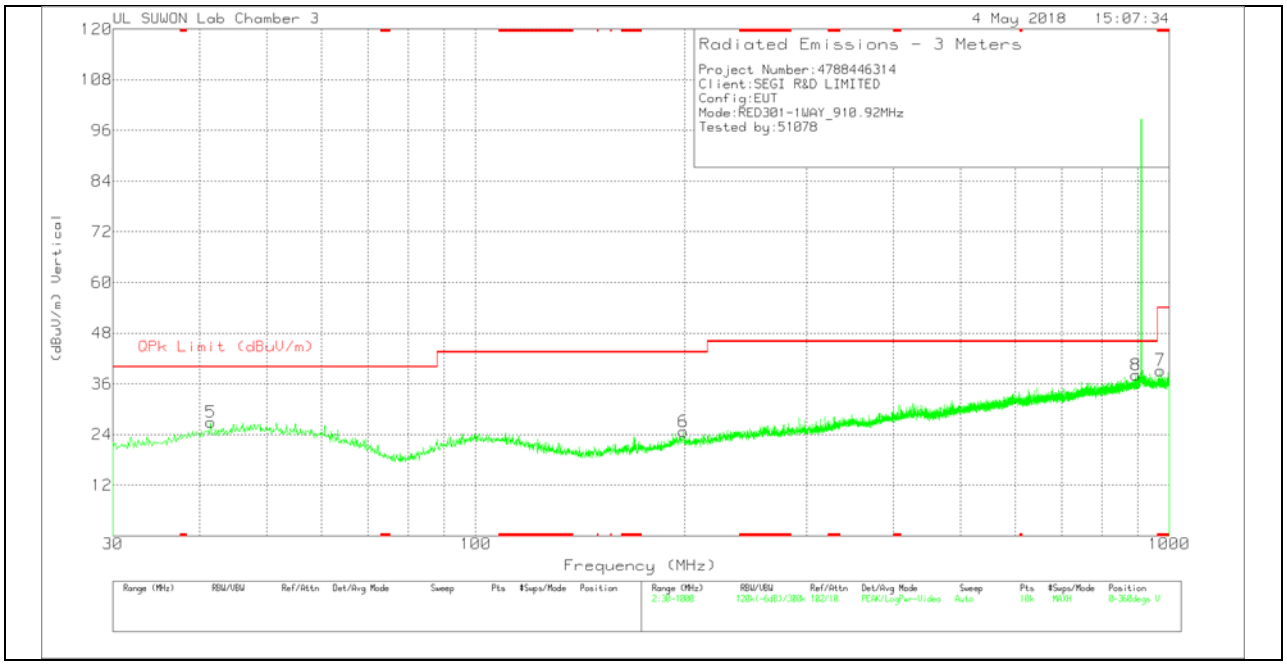
10.3. WORST-CASE BELOW 1 GHz

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	VULB9163-845	30-1000MHz[dB]	10dB_ATT	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	52.9914	29.1	Pk	19.8	-31.8	10	27.1	40	-12.9	0-360	300	H
2	100.8173	28.55	Pk	17.8	-31.5	10	24.85	43.52	-18.67	0-360	100	H
3	878.9345	30.32	Pk	27.8	-28.7	10	39.42	46.02	-6.6	0-360	100	H
4	942.8641	29.19	Pk	28.2	-28.1	10	39.29	46.02	-6.73	0-360	100	H
5	41.5442	29.54	Pk	19.3	-31.9	10	26.94	40	-13.06	0-360	200	V
6	199.2825	28.8	Pk	16.9	-31	10	24.7	43.52	-18.82	0-360	400	V
7	* 969.9299	28.81	Pk	28.3	-27.9	10	39.21	53.97	-14.76	0-360	400	V
8	894.2621	28.33	Pk	28	-28.2	10	38.13	46.02	-7.89	0-360	100	V

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

Pk - Peak detector

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

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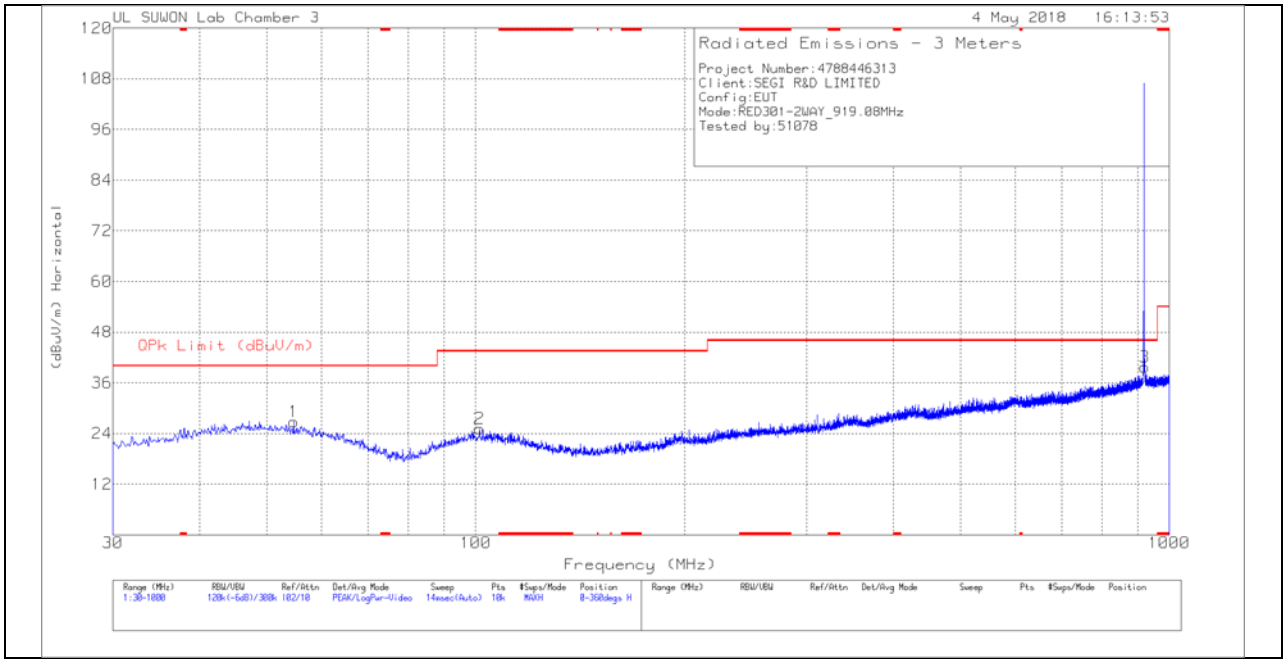
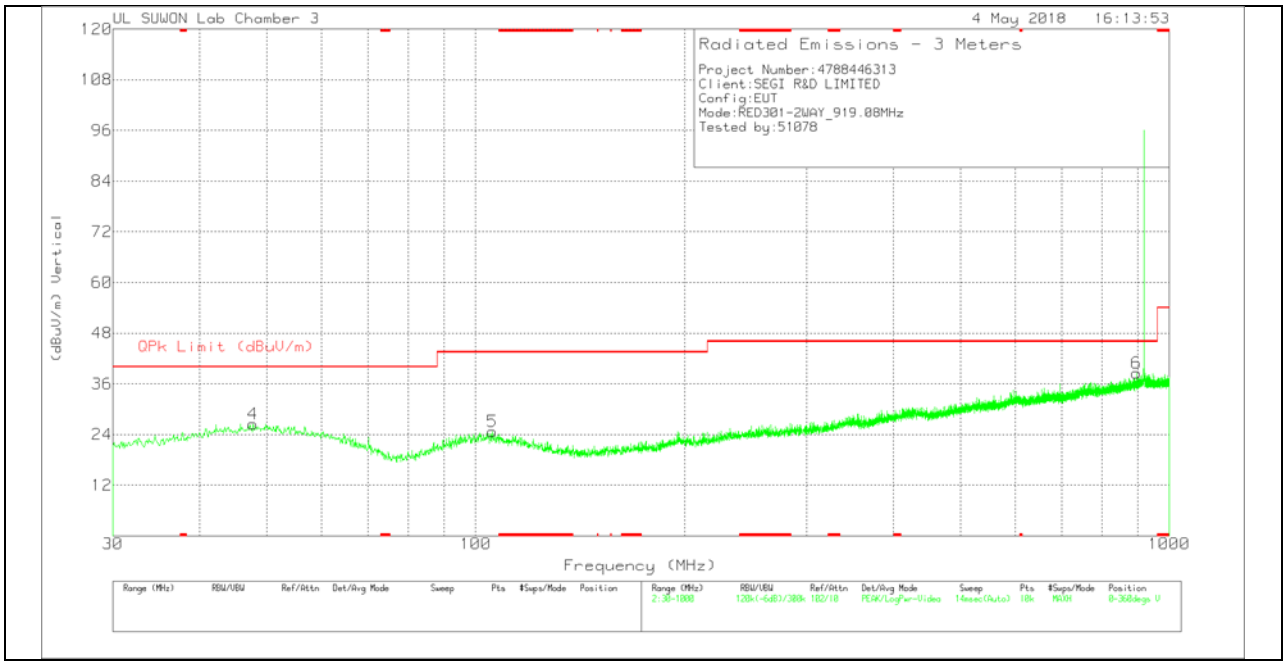
SPURIOUS EMISSIONS 30 TO 1000 MHz (Highest Channel)

HORIZONTAL PLOT



VERTICAL PLOT



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BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-845	30-1000MHz[dB]	10dB_ATT	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	54.6405	29.12	Pk	19.6	-31.9	10	26.82	40	-13.18	0-360	300	H
2	101.3024	28.84	Pk	17.8	-31.5	10	25.14	43.52	-18.38	0-360	400	H
3	922.201	29.59	Pk	28.3	-28.2	10	39.69	46.02	-6.33	0-360	100	H
4	47.7528	28.35	Pk	20.1	-32	10	26.45	40	-13.55	0-360	100	V
5	105.7648	28.32	Pk	17.8	-31.5	10	24.62	43.52	-18.9	0-360	300	V
6	896.5903	28.76	Pk	28	-28.2	10	38.56	46.02	-7.46	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 limt.

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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: N/A

Note. EUT use Non-rechargeable battery.

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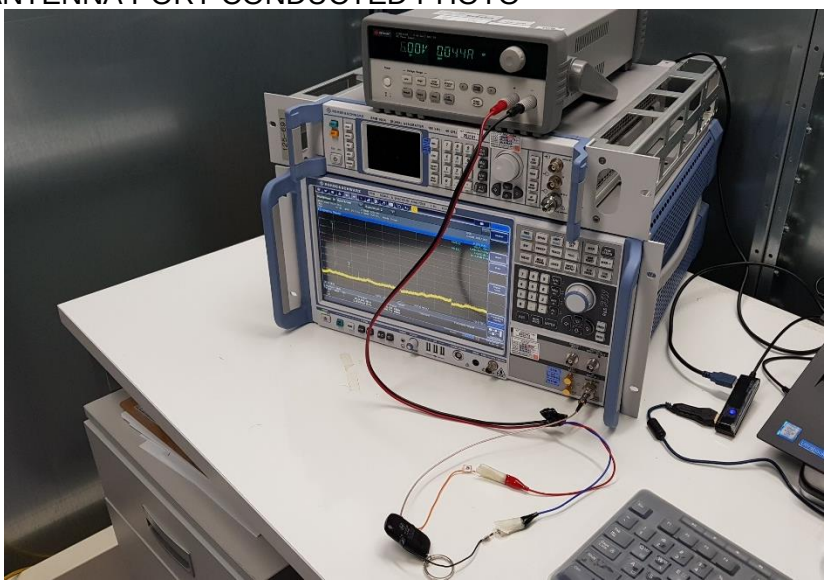
12. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



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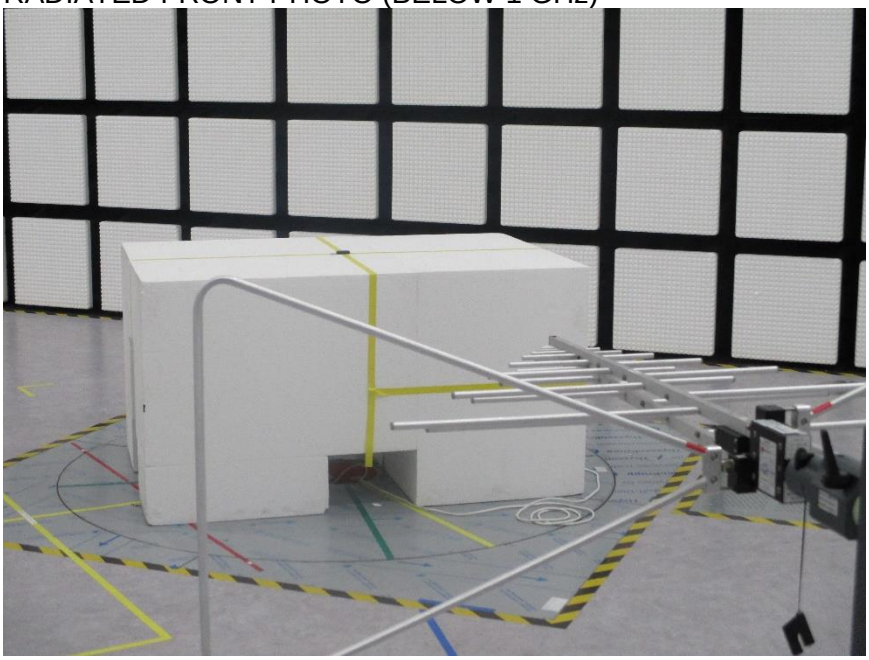
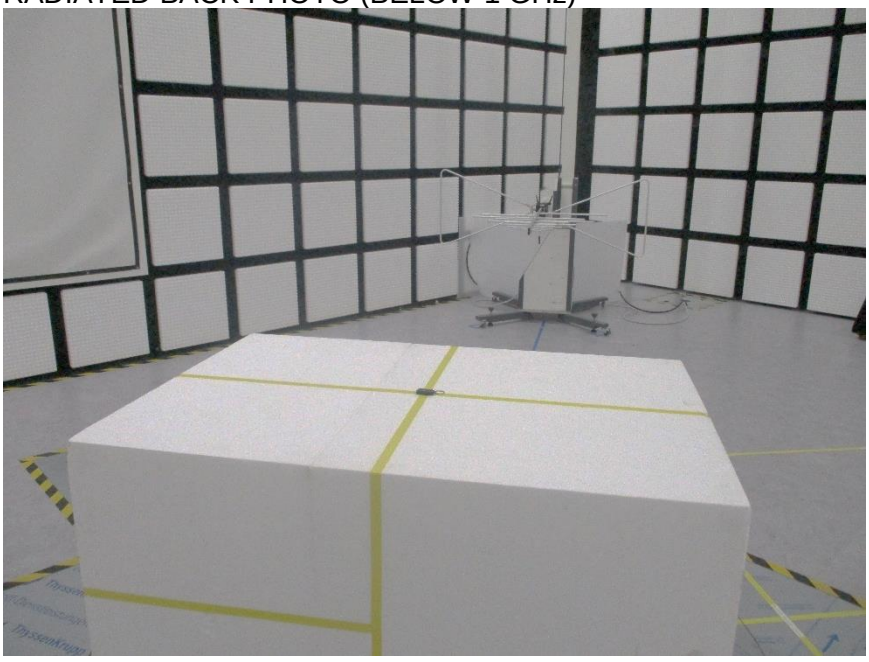
RADIATED RF MEASUREMENT SETUP (BELOW 1 GHz)

RADIATED FRONT PHOTO (BELOW 1 GHz)

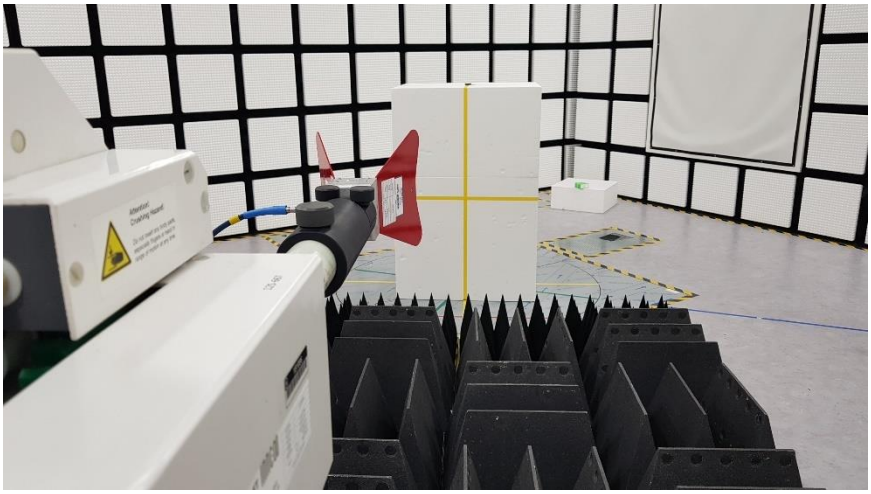


RADIATED BACK PHOTO (BELOW 1 GHz)

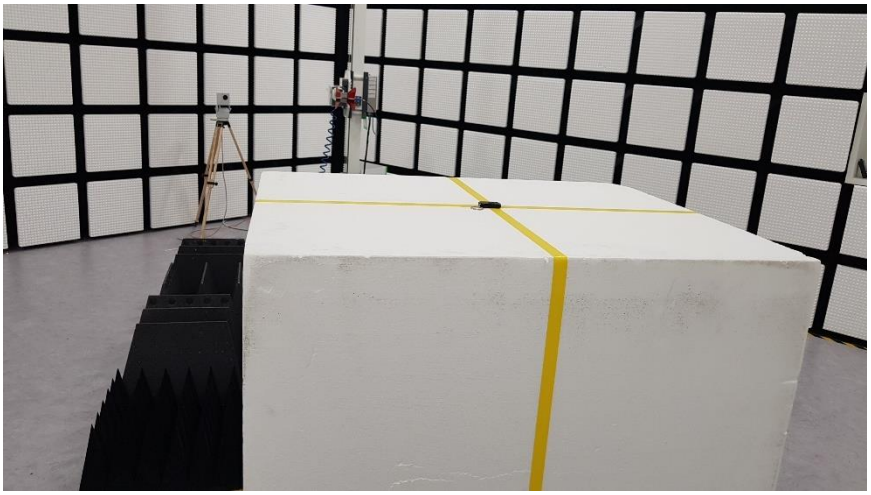


RADIATED RF MEASUREMENT SETUP (ABOVE 1 GHz)

RADIATED FRONT PHOTO (ABOVE 1 GHz)



RADIATED BACK PHOTO (ABOVE 1 GHz)

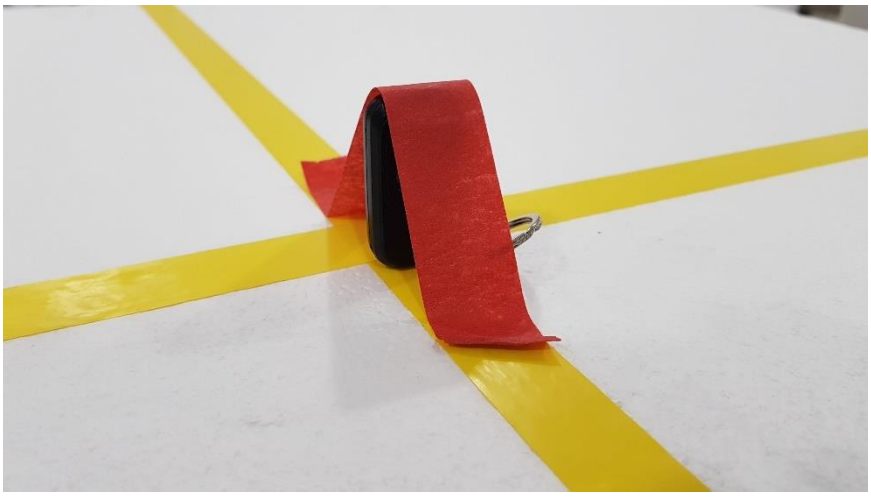


RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO

Y-AXIS FRONT PHOTO

Z-AXIS FRONT PHOTO



END OF REPORT