TEST REPORT

Report Number: R5286738.1286651-E1

Applicant	:	Eberle Equipamentos e processos AS Rua Ana Catharina Canali, 1101 Bairro: Sao Cristovao CEP: 95.058-030 Caxias do Sul, RS, Brazil
Model	:	MSK-SM901W
FCC ID	:	2A2VKMSM-SM901W
EUT Description	:	Smart Knife Sharpener
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2021 ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5 + A2

Date Of Issue:
2021-09-13

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

ACCREDITED
CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2021-09-13	Initial Issue	Noah Bennett

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Eberle Equipamentos e processos AS
Rua Ana Catharina Canali, 1101
Bairro: Sao Cristovao
CEP: 95.058-030
Caxias do Sul, RS, Brazil

EUT DESCRIPTION: Smart Knife Shapener

MODEL: MSK-SM901W

SERIAL NUMBER: Non-Serialized

SAMPLE RECEIPT DATE: 2021-07-23

DATE TESTED: 2021-08-02 to 2021-08-19

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A2	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC. By:

Brian T. Kiewra
Project Engineer
Consumer Technology Division
UL LLC.

Prepared By:

Noah Bennett
Engineer
Consumer Technology Division
UL LLC.

2. TEST RESULTS SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 11.6.
See Comment	RSS-GEN 6.7	20dB BW/99% OBW	Reporting purposes only	ANSI C63.10 Sections 6.9.2 and 6.9.3
15.247 (a)(1)	RSS-247 (5.1) (b)	Hopping Frequency Separation	Complies	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Number of Hopping Channels	Complies	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Average Time of Occupancy	Reporting purposes only	None.
15.247 (b)(1)	RSS-247 (5.4) (b)	Output Power	Complies	None.
See Comment		Average Power	Complies	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (d)	RSS-247 (5.5)	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

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

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r01, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	703469
☒	Building: 2800 Perimeter Park Dr Morrisville, NC 27560, U.S.A			

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a smart knife sharpener that supports a 900MHZ RFID and 2.4GHz WLAN radio. This report covers testing for the 900MHz radio only.

6.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
902.75	Basic GFSK	16.98	49.89

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a ceramic patch antenna, with a maximum gain of 1.5 dBi.

6.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was UHFReader86 Demo V1.0

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated Emissions below 30 MHz and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output fundamental field strength as worst-case scenario.

Radiated emissions below and above 1GHz were performed with the EUT set to transmit at power setting 3 as worst case for frequencies 902.75 MHz, 915.25 MHz, and Power setting 2 for 927.25 MHz. Note all data aside from Pk/Avg Power and RSE high channel was run at Power setting 3 to represent worst case.

The EUT only operates in one orientation, therefore, all final radiated testing was performed with the EUT in intended orientation of operation.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T450a	PC0BHFNX	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Serial	1	Serial	Serial to USB	<3m	Used to configure the EUT before testing.

TEST SETUP

The EUT was configured by a support laptop before the tests.

SETUP DIAGRAM

Please refer to R5286738.1286651-EP1 for setup diagrams

7. MEASUREMENT METHOD

Duty Cycle: ANSI C63.10-2013 Section 11.6

20dB Bandwidth: ANSI C63.10-2013 Section 6.9.2

Occupied Bandwidth: ANSI C63.10-2013 Subclause 6.9.3

Emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

General Radiated Spurious Emissions: ANSI C63.10-2013, Section 6.3, 6.5, 6.6

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

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8. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2021-04-05	2022-04-05
HI0094	Environmental Meter	Fisher Scientific	06-662-4	2020-01-21	2022-01-21
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2020-08-18	2021-08-18
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2020-08-18	2021-08-18
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2021-04-05	2022-04-05
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 2021)		

Test Equipment Used - Wireless Conducted Measurement Equipment (Morrisville – Conducted 2)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2021-04-01	2022-04-01
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
SOFTEMI	Antenna Port Software	UL	Version 2021.05.28	NA	NA
PWM003	RF Power Meter	Keysight Technologies	N1911A	2020-08-28	2021-08-28
PWM001	RF Power Meter	Keysight Technologies	N1912A	2021-07-16	2022-07-16
PWS003	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2021-05-27	2022-05-27
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2020-08-12	2021-08-12

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer/ Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0059	Active Loop Antenna	EMCO	6502	2020-08-06	2021-08-31
	30-1000 MHz				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2021-02-19	2022-02-19
	1-18 GHz				
AT0078	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-11-19	2021-11-19
	Gain-Loss Chains				
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2021-07-20	2022-07-20
N-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2021-07-20	2022-07-20
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-07-20	2022-07-20
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
SOFTEMI	EMI Software	UL	Version 9.5 (24 Jun 2021)		
	Additional Equipment used				
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2020-08-06	2021-08-06
HPF012	1GHz high-pass filter, 2W, F_{high} =18GHz	Micro-Tronics	HPM18129	2021-02-15	2022-02-15
BRF007	902-928MHz notch filter	Micro-Tronics	BRC17691	2021-07-21	2022-07-21

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
915.25MHz	30.800	102.000	0.302	30.20%	5.20	0.032

DUTY CYCLE PLOT

DUTY CYCLE 915.25 MHz

9.2. 99% AND 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

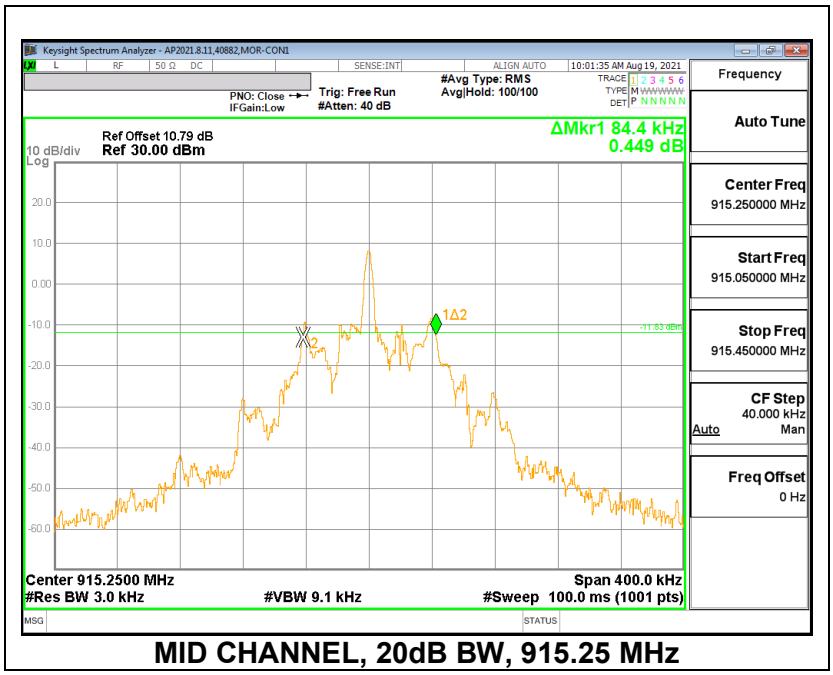
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the OBW. The VBW is set to approximately 3x the RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	902.75	0.0836
Mid	915.25	0.0844
High	927.25	0.0840

HIGH CHANNEL, 20dB BW, 927.25 MHz



MID CHANNEL, 20dB BW, 915.25 MHz

LOW CHANNEL, 20dB BW, 902.75 MHz

9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

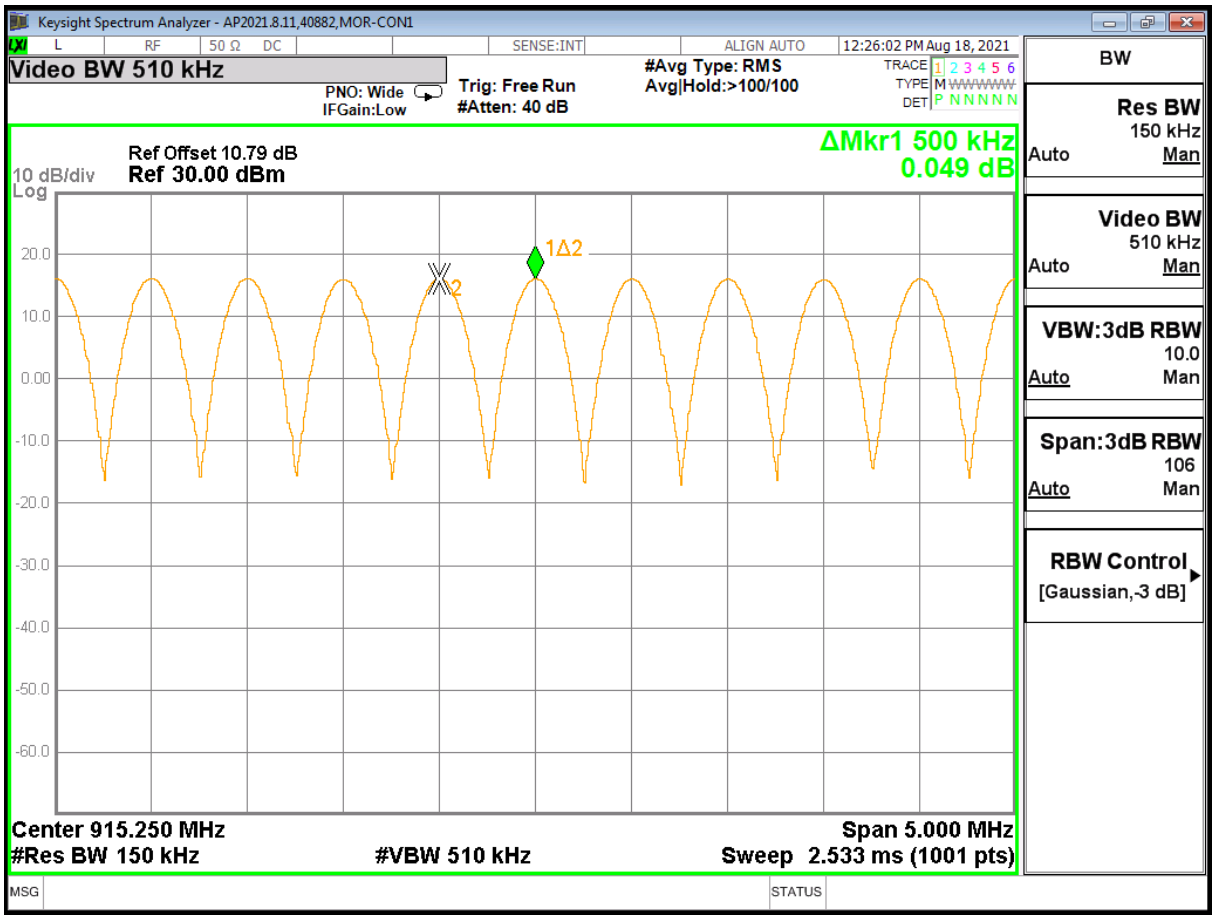
RSS-247 (5.1) (b)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 30% of channel spacing (150 kHz) and the VBW is set to VBW >= RBW. The sweep time is coupled.

RESULTS



HOPPING FREQUENCY SEPARATION PLOT

9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

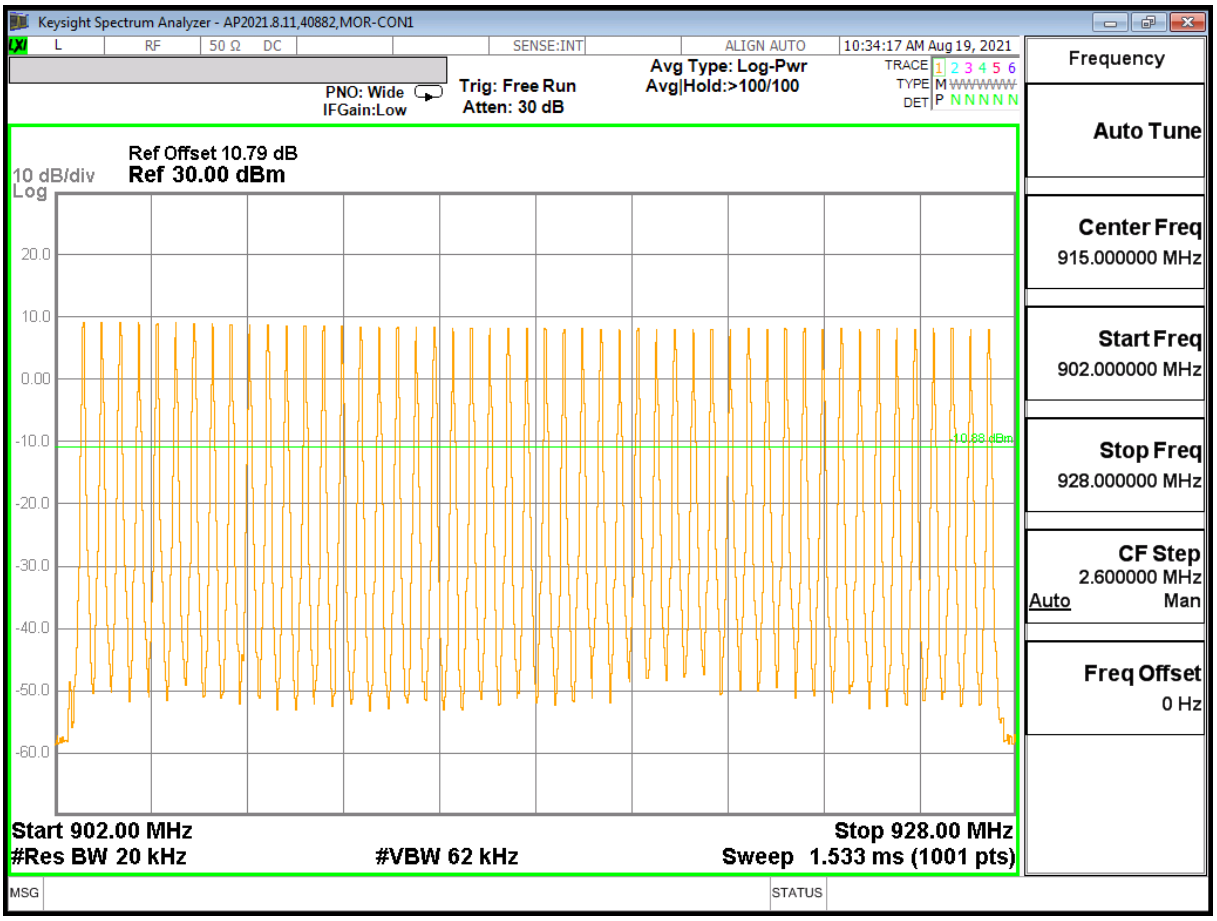
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz

TEST PROCEDURE

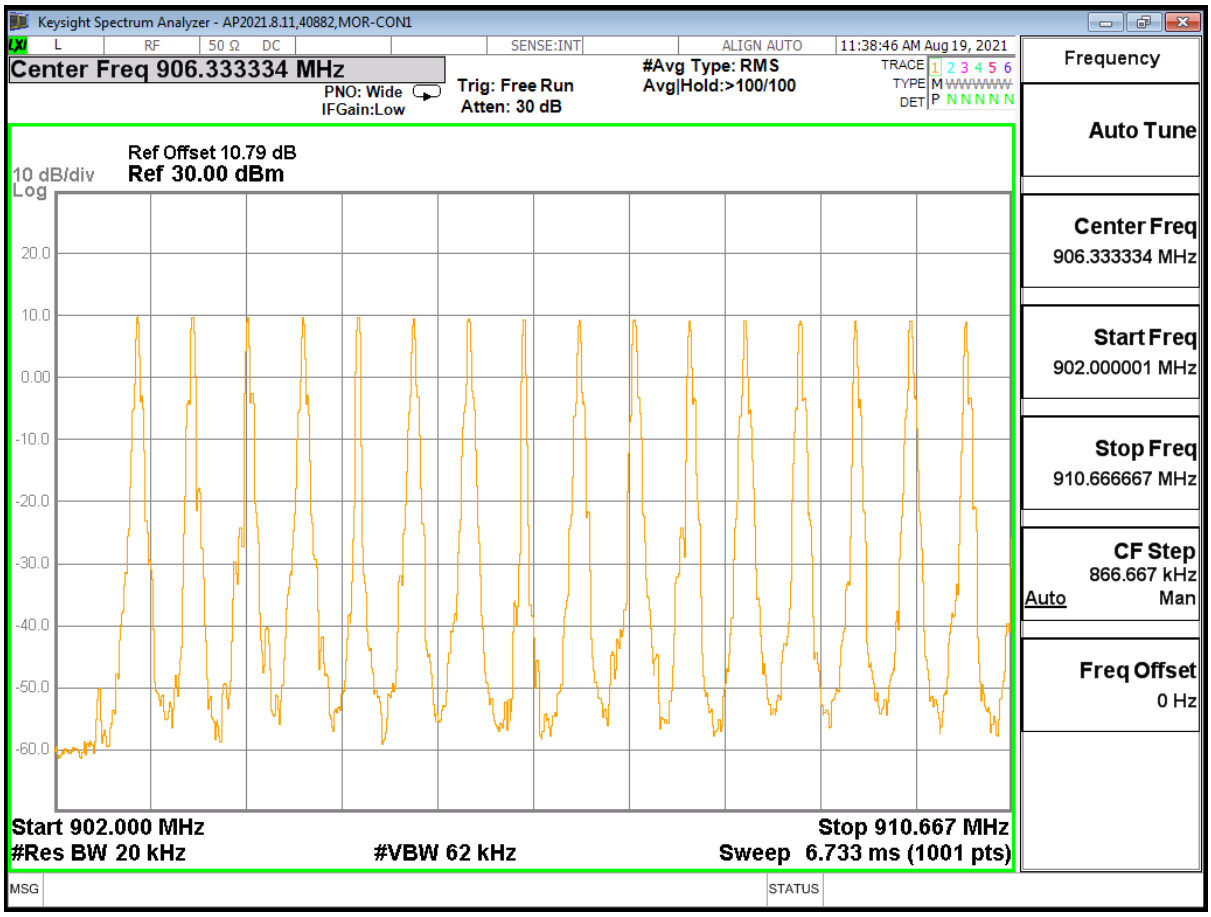
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the channel spacing (approx. 150kHz). The analyzer is set to Max Hold.

RESULTS

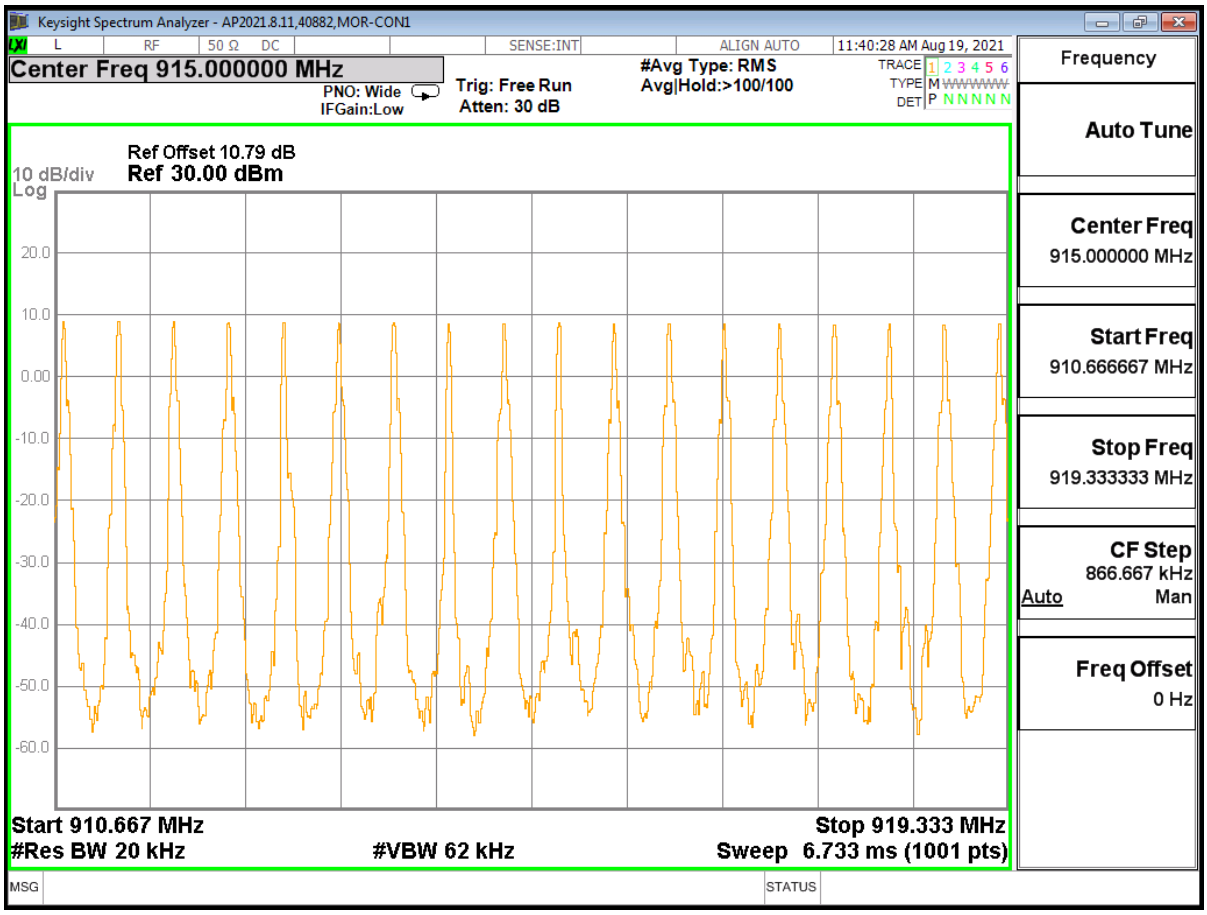
Normal Mode: 50 Channels Observed



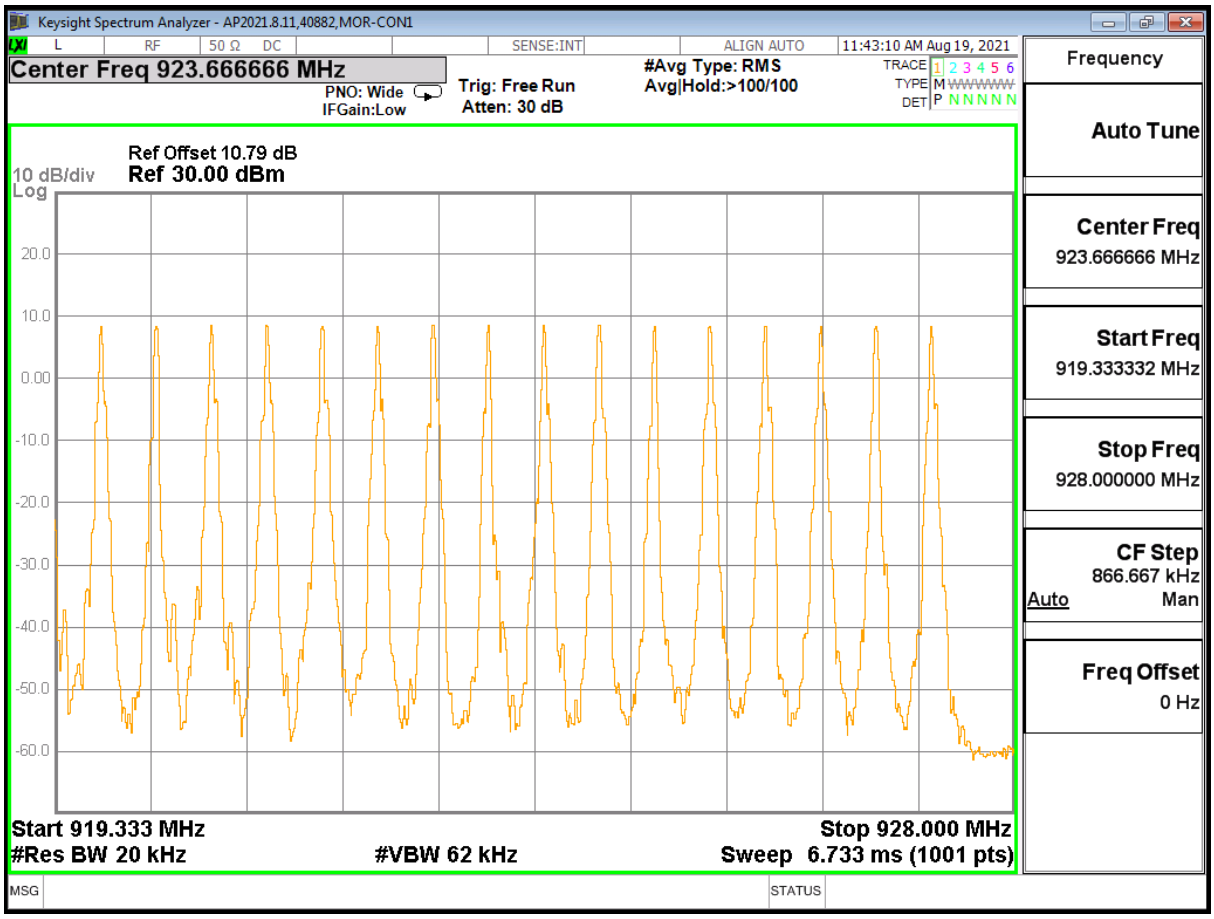
26MHz SPAN



8.667MHz SPAN, SEGMENT 1 OF 3



8.667MHz SPAN, SEGMENT 2 OF 3



8.667MHz SPAN, SEGMENT 3 OF 3

9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

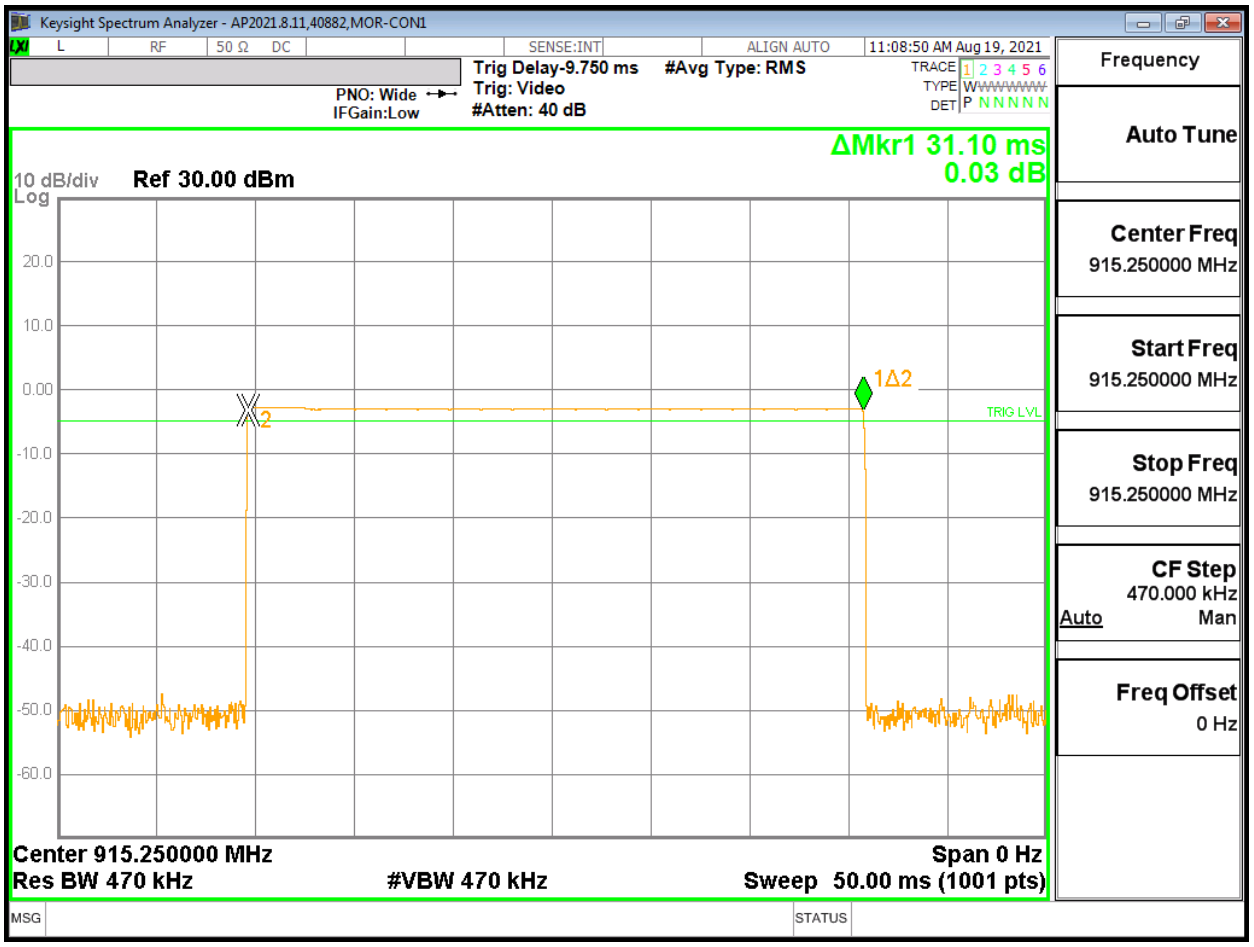
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The 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 2 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 2 second period (50 channels * 0.4 s) is equal to 10 * (# of pulses in 2 s) * pulse width.

RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 2 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
AFH Mode					
	31.100	1	0.3110	0.4	-0.0890



PULSE WIDTH

NUMBER OF PULSES IN 2 SECOND OBSERVATION PERIOD

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (2)

RSS-247 (5.4) (a)

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

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.29 dB (including 9.79 dB pad and 0.50 dB cable) was entered as an offset in the power meter.

RESULTS

Tested By:	84740/40882
Date:	2021-08-04

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.75	16.98	30	-13.02
Middle	915.25	15.99	30	-14.01
High	927.25	16.32	30	-13.68

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.29 dB (including 9.79 dB pad and 0.50 dB cable) was entered as an offset in the power meter.

RESULTS

Tested By:	84740/40882
Date	2021-08-04

Channel	Frequency (MHz)	Average Power (dBm)
Low	902.75	16.51
Middle	915.25	15.51
High	927.25	15.83

9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

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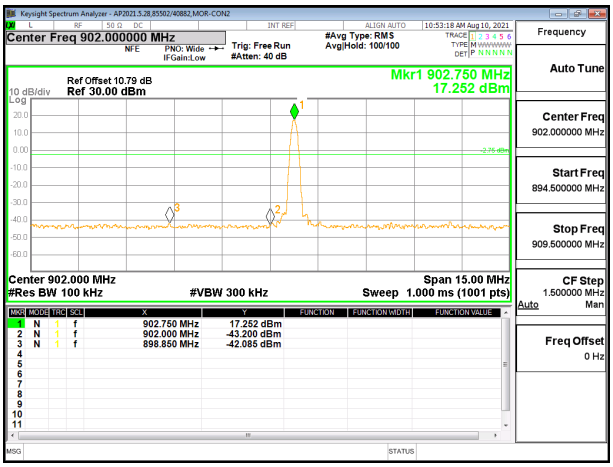
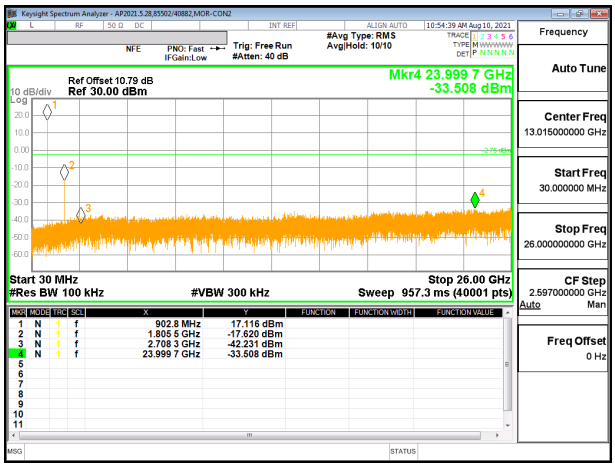
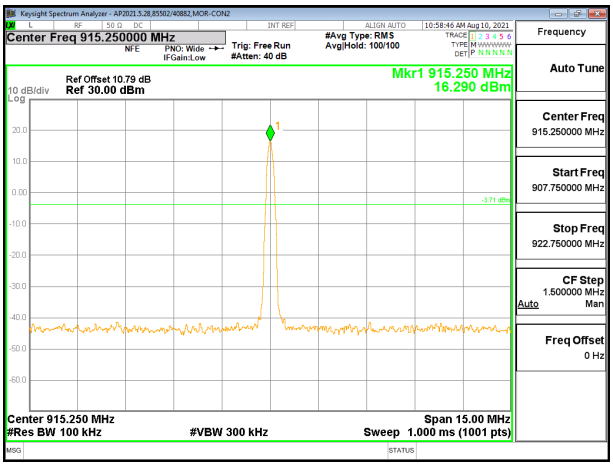


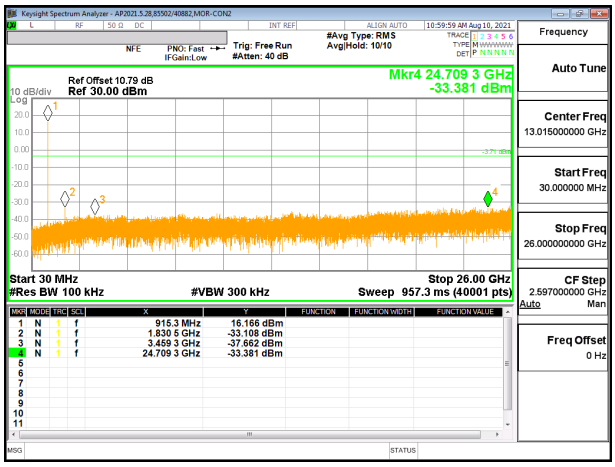
LOW CHANNEL BANDEDGE



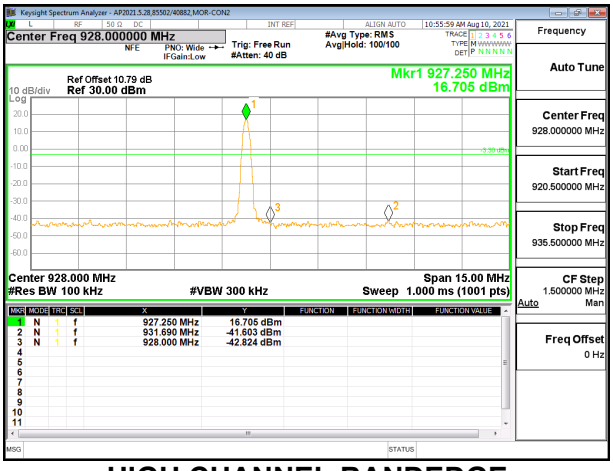
OUT-OF-BAND LOW CHANNEL



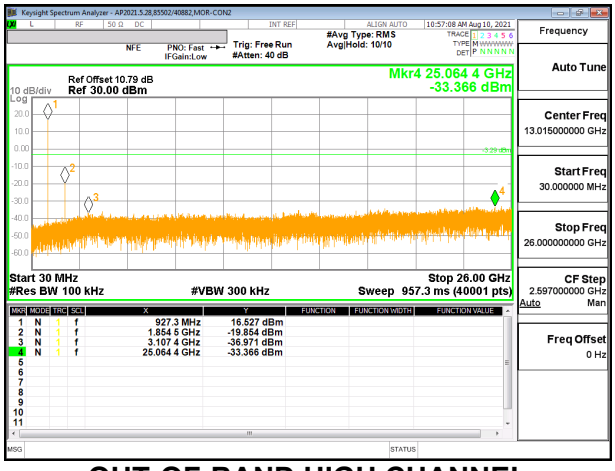
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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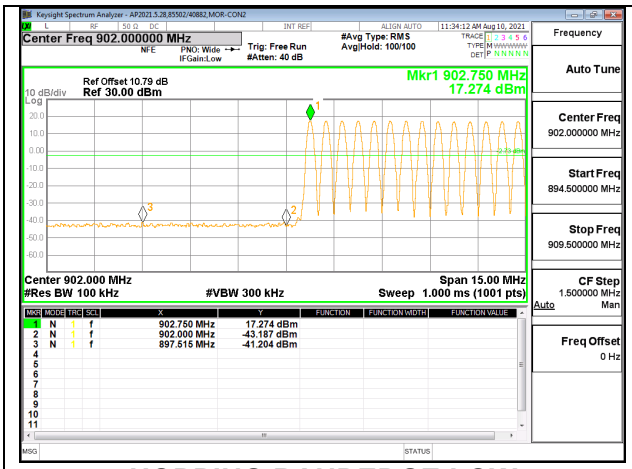
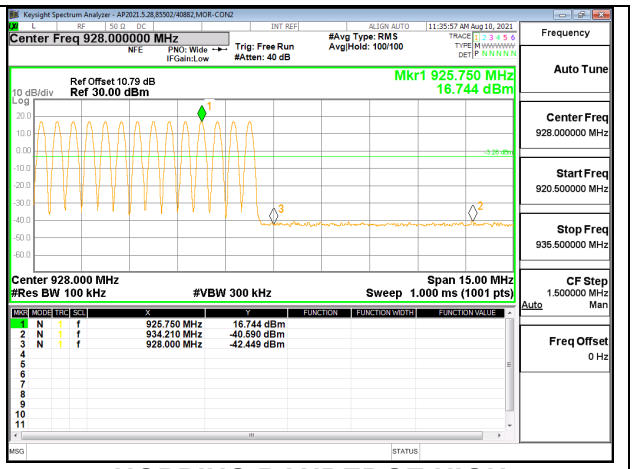


HOPPING BANDEDGE LOW



HOPPING BANDEDGE HIGH

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for linear voltage averaging measurements.

The spectrum from 1 GHz to 18 GHz and 30-1000MHz is investigated with the transmitter set to 902.75 MHz, 915.25 MHz, and 927.25 MHz.

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.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

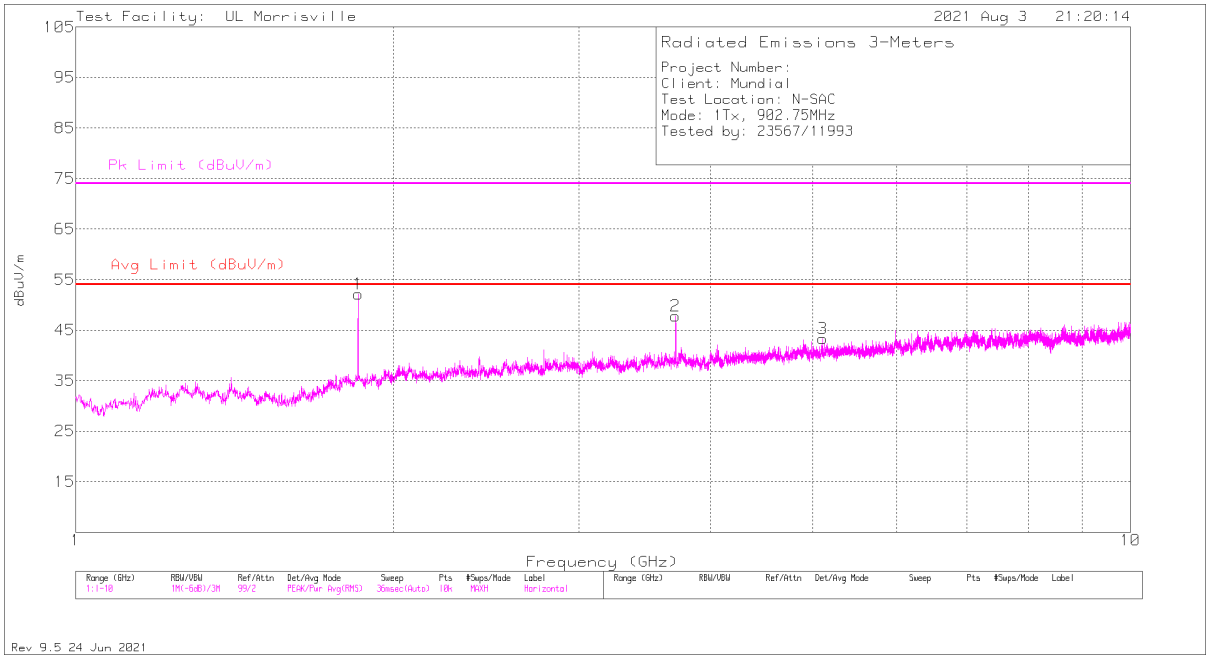
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

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

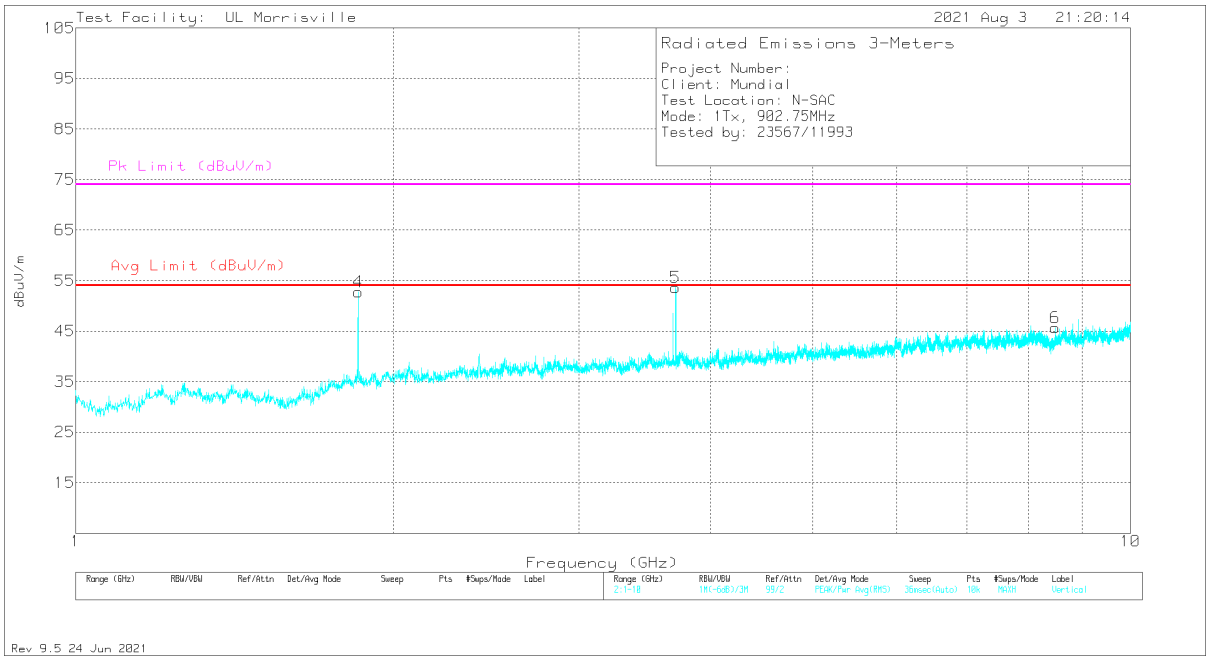
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

10.1. SPURIOUS EMISSIONS ABOVE 1GHz

10.1.1. Low Channel – 902.75MHz



HORIZONTAL

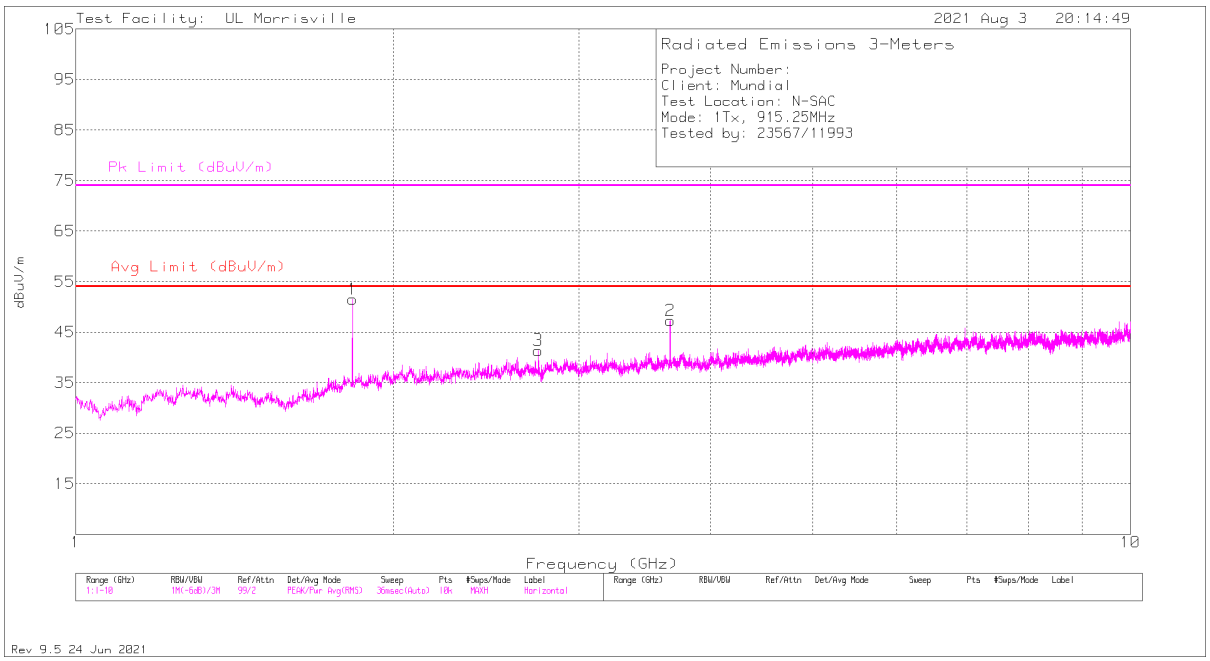


VERTICAL

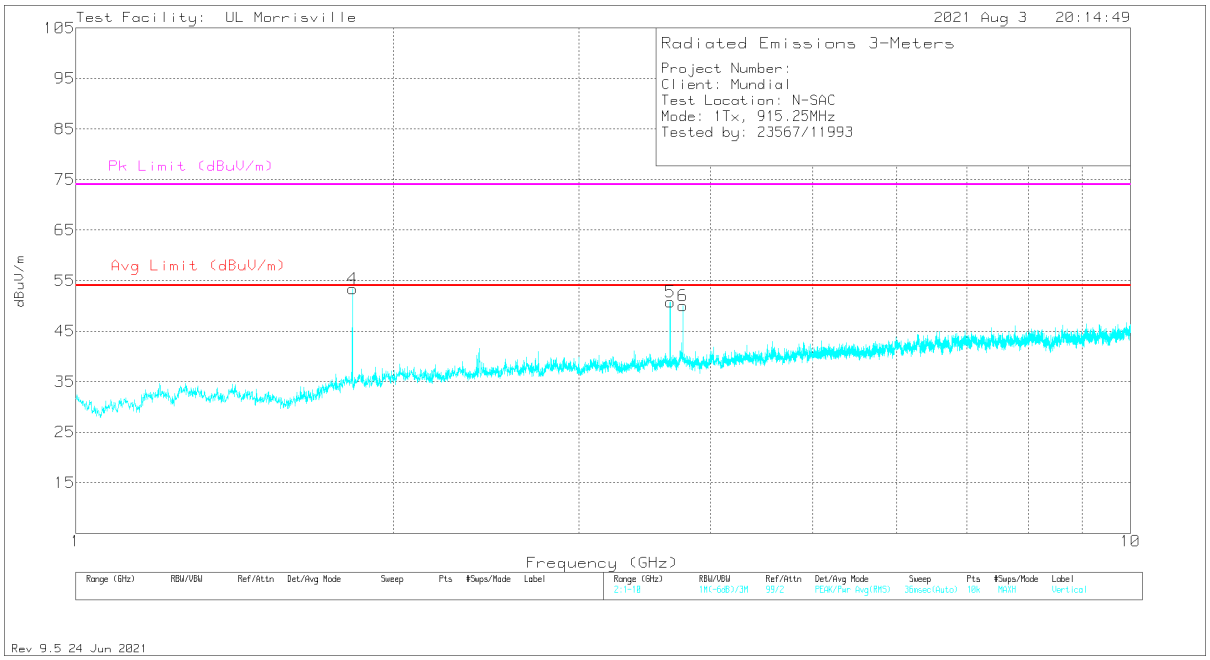
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0078 (db/m)	Amp/Cbl (dB)	Filter (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.85295	48.38	PK2	31.5	-35.4	.4	44.88	-	-	74	-29.12	24	359	H
	** 1.85279	43.6	V1TV	31.5	-35.4	.4	40.1	54	-13.9	-	-	24	359	H
4	** 1.85294	57.13	PK2	31.5	-35.4	.4	53.63	-	-	74	-20.37	90	301	V
	** 1.85275	55.16	V1TV	31.5	-35.4	.4	51.66	54	-2.34	-	-	90	301	V
5	* ** 3.70563	54.81	PK2	33.3	-33.1	.5	55.51	-	-	74	-18.49	335	265	V
	* ** 3.70558	53.06	V1TV	33.3	-33.1	.5	53.76	54	-.24	-	-	335	265	V
2	* ** 3.7054	47.06	Pk	33.3	-33.1	.5	47.76	54	-6.24	74	-26.24	0-360	300	H
3	* ** 5.1049	40.76	Pk	34.4	-32.2	.4	43.36	54	-10.64	74	-30.64	0-360	101	H
6	* ** 8.4889	38.27	Pk	35.9	-29	.5	45.67	54	-8.33	74	-28.33	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK2 - Maximum Peak
V1TV -VB=1/Ton, Linear Voltage Average where: Ton is packet duration
Pk - Peak detector

10.1.2. Mid Channel – 915.25MHz



HORIZONTAL

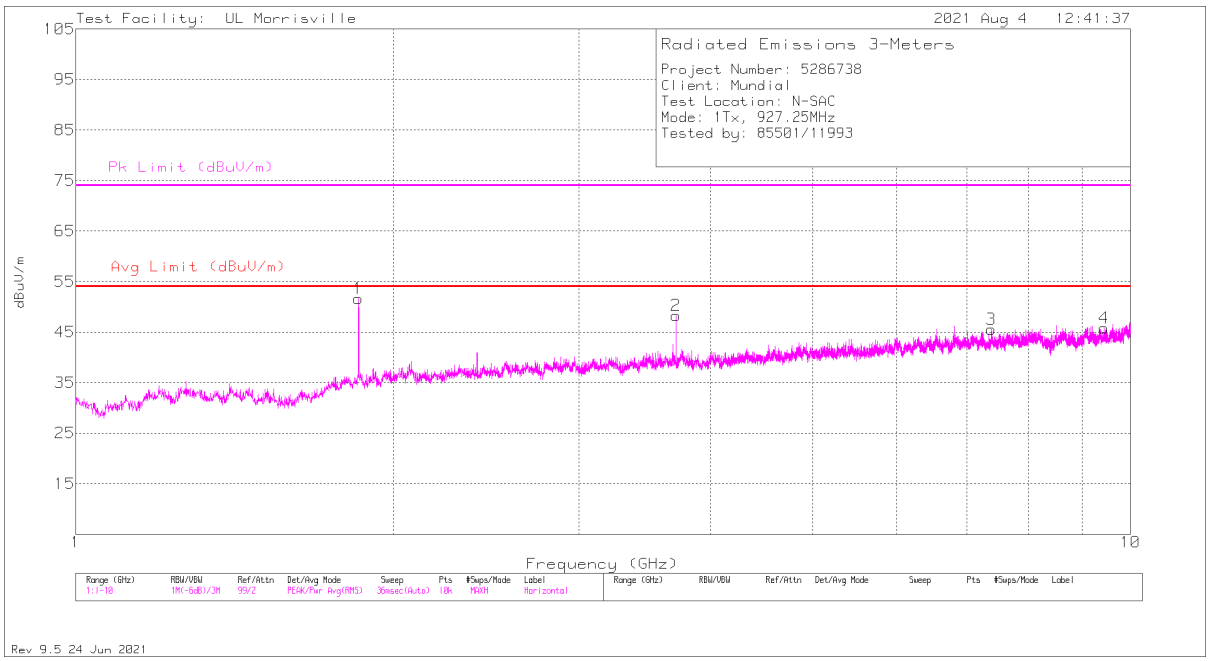


VERTICAL

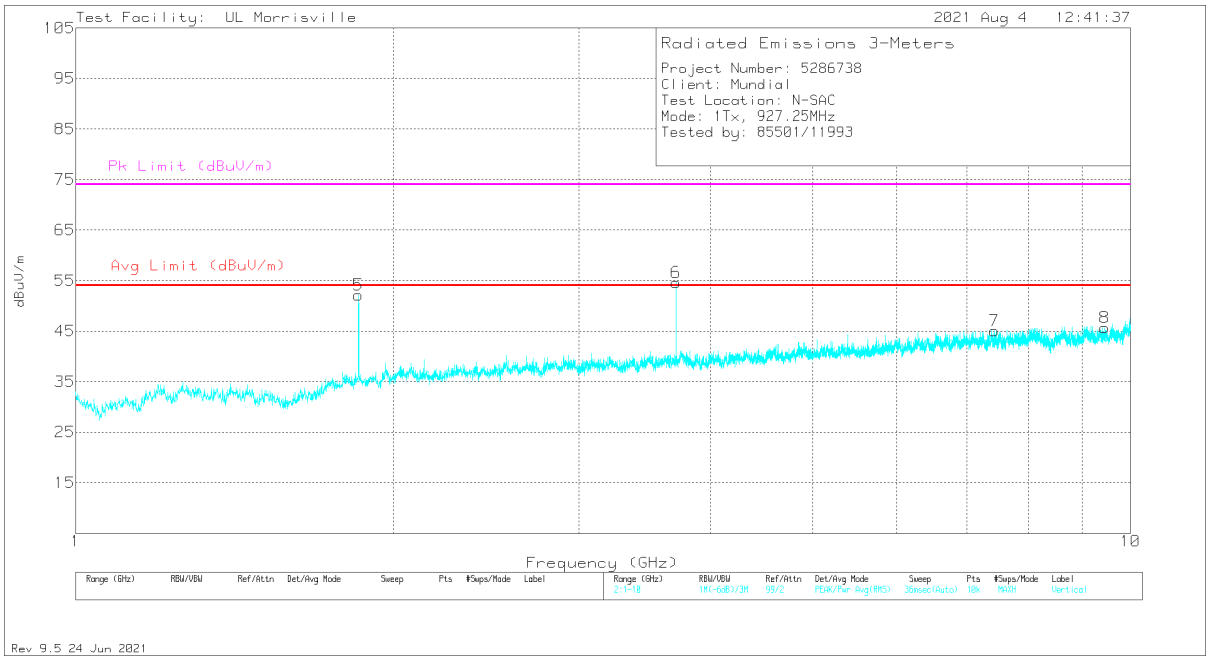
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0078 (db/m)	Amp/Cbl (dB)	Filter (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.83048	50.39	PK2	31.2	-35.3	.4	46.69	-	-	74	-27.31	70	359	H
	** 1.8305	47.33	V1TV	31.2	-35.3	.4	43.63	54	-10.37	-	-	70	359	H
4	** 1.83059	53.29	PK2	31.2	-35.3	.4	49.59	-	-	74	-24.41	84	124	V
	** 1.83048	50.8	V1TV	31.2	-35.3	.4	47.1	54	-6.9	-	-	84	124	V
5	* ** 3.66096	52.4	PK2	33.4	-33.1	.5	53.2	-	-	74	-20.8	345	103	V
	* ** 3.66098	45.48	V1TV	33.4	-33.1	.5	46.28	54	-7.72	-	-	345	103	V
6	* ** 3.7638	41.24	PK2	33.5	-32.8	.5	42.44	-	-	74	-31.56	237	125	V
	* ** 3.76276	26.63	V1TV	33.5	-32.7	.5	27.93	54	-26.07	-	-	237	125	V
2	* ** 3.6613	46.49	Pk	33.4	-33.1	.5	47.29	54	-6.71	74	-26.71	0-360	300	H
3	* ** 2.746	42.2	Pk	32.6	-33.9	.5	41.4	54	-12.6	74	-32.6	0-360	101	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK2 - Maximum Peak
V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration
Pk - Peak detector

10.1.3. High Channel – 927.25MHz



HORIZONTAL



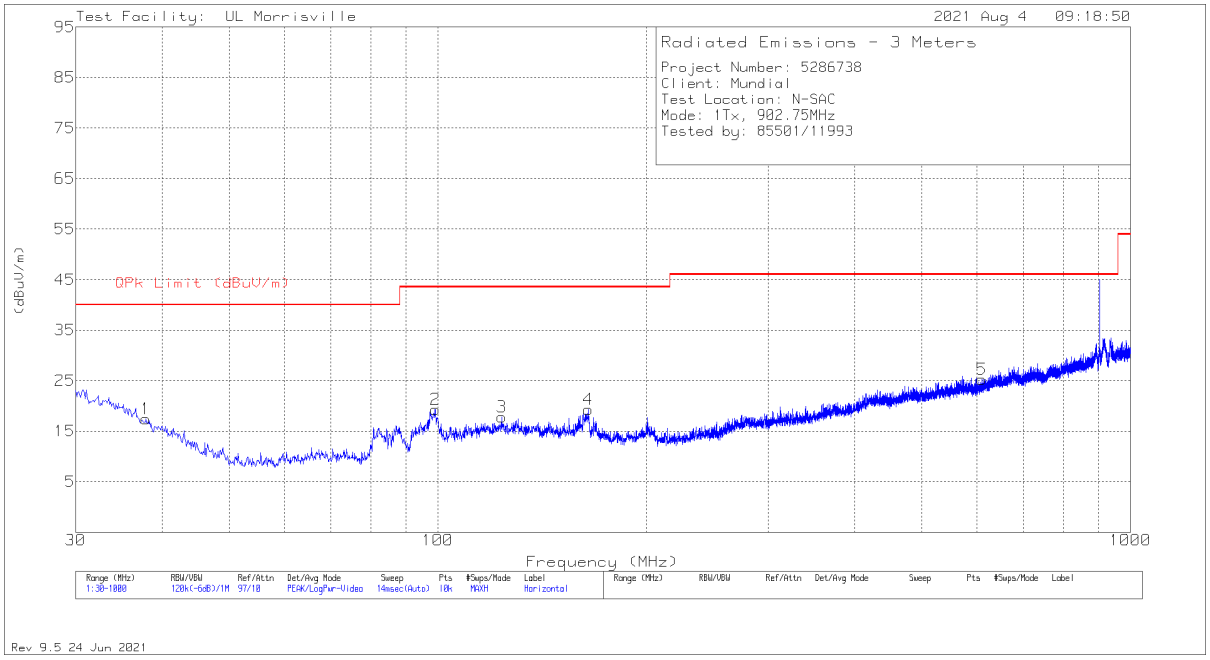
VERTICAL

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0078 (db/m)	Amp/Cbl (dB)	Filter (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.8541	55.12	Pk	31.5	-35.4	.4	51.62	-	-	-	-	0-360	200	H
2	* ** 3.70855	40.9	PK2	33.3	-33.3	.5	41.4	54	-12.6	74	-32.6	283	224	H
	* ** 3.70927	25.9	V1TV	33.3	-33.2	.5	26.5	54	-27.5	-	-	283	224	H
3	* ** 7.3819	38.7	Pk	35.6	-29.3	.6	45.6	54	-8.4	74	-28.4	0-360	200	H
4	* ** 9.4429	37.58	Pk	36.3	-28.8	.7	45.78	54	-8.22	74	-28.22	0-360	200	H
5	** 1.8541	55.61	Pk	31.5	-35.4	.4	52.11	-	-	-	-	0-360	301	V
6	* ** 3.70897	40.55	PK2	33.3	-33.3	.5	41.05	54	-12.95	74	-32.95	226	224	V
	* ** 3.70965	25.9	V1TV	33.3	-33.2	.5	26.5	54	-27.5	-	-	226	224	V
7	* ** 7.4314	38.15	Pk	35.7	-29.4	.6	45.05	54	-8.95	74	-28.95	0-360	400	V
8	* ** 9.4537	37.46	Pk	36.3	-28.8	.7	45.66	54	-8.34	74	-28.34	0-360	400	V

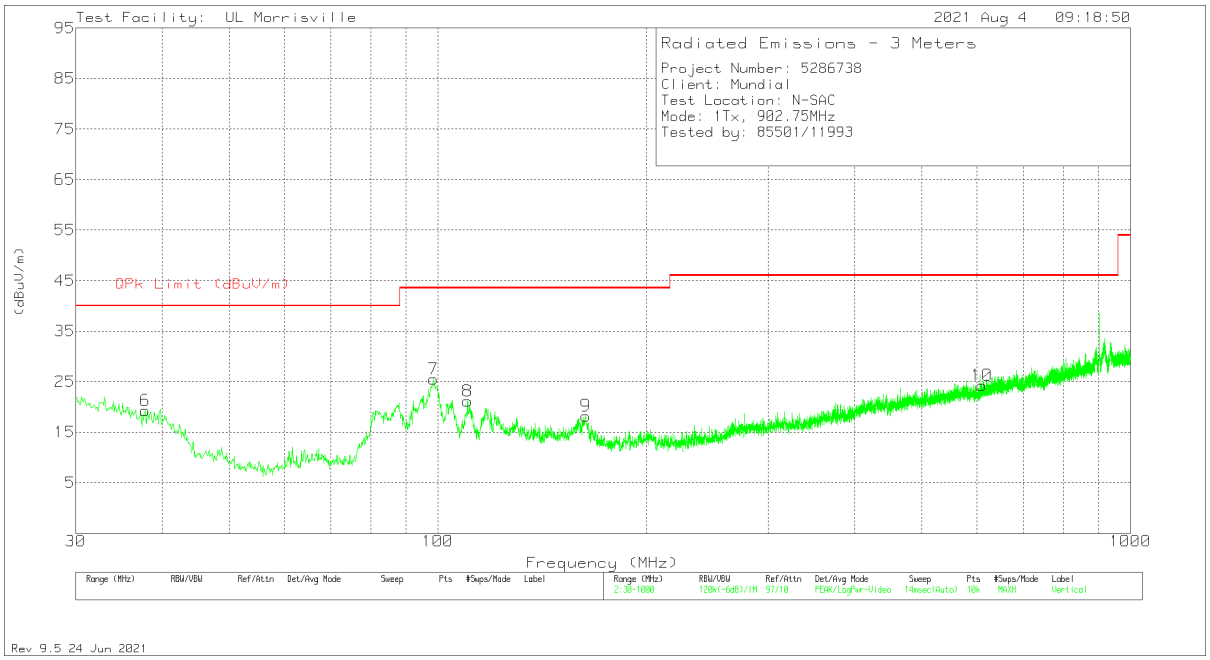
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

10.2. SPURIOUS EMISSIONS BELOW 1GHz

10.2.1. Low Channel – 902.75MHz



HORIZONTAL



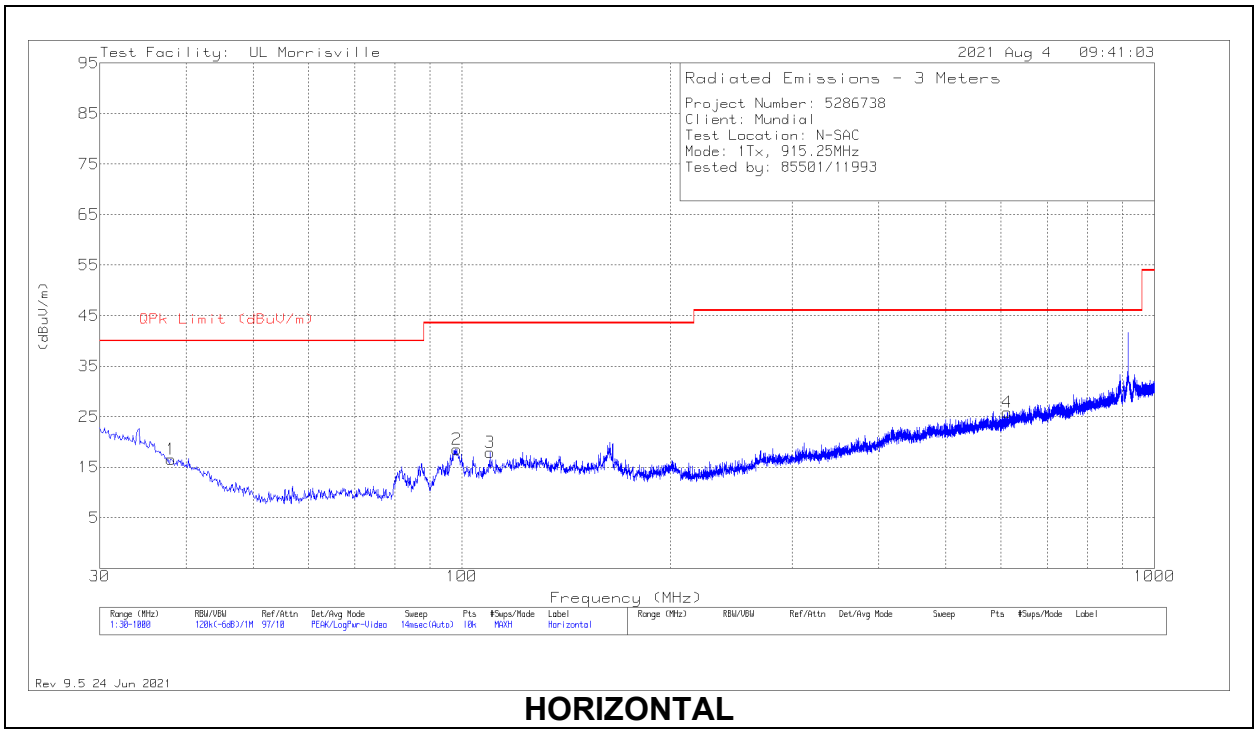
VERTICAL

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0066 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 37.857	26.65	Pk	21.9	-31.2	.1	17.45	40	-22.55	0-360	100	H
3	* ** 123.605	28.19	Pk	19.7	-30.3	.2	17.79	43.52	-25.73	0-360	100	H
4	* ** 164.927	30.62	Pk	17.9	-29.5	.3	19.32	43.52	-24.2	0-360	200	H
5	* ** 610.254	25.89	Pk	25.2	-26.4	.6	25.29	46.02	-20.73	0-360	300	H
6	* ** 37.76	28.51	Pk	22	-31.3	.1	19.31	40	-20.69	0-360	100	V
8	* ** 110.413	32.73	Pk	18.3	-30.1	.2	21.13	43.52	-22.39	0-360	100	V
9	* ** 163.375	29.54	Pk	18	-29.6	.3	18.24	43.52	-25.28	0-360	100	V
10	* ** 610.545	24.85	Pk	25.3	-26.5	.6	24.25	46.02	-21.77	0-360	100	V
7	98.482	39.75	Pk	16	-30.4	.2	25.55	43.52	-17.97	0-360	100	V
2	99.161	33.22	Pk	16.1	-30.2	.2	19.32	43.52	-24.2	0-360	200	H

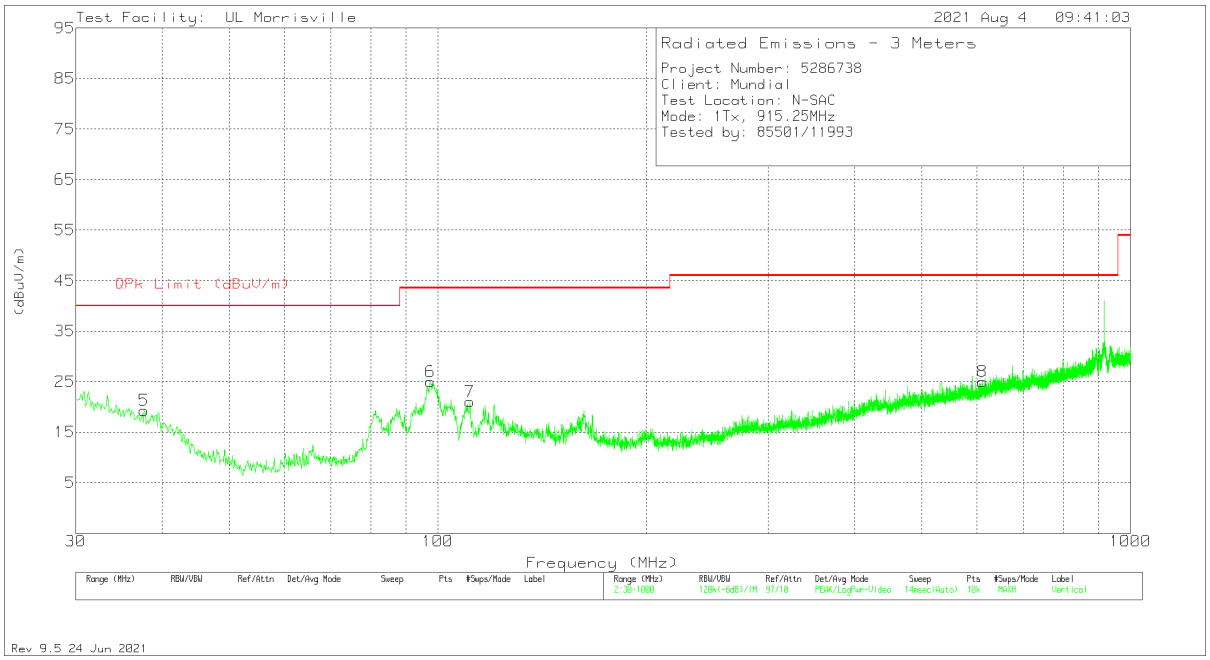
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL: (919) 549-1400

10.2.1. Mid Channel – 915.25MHz



HORIZONTAL



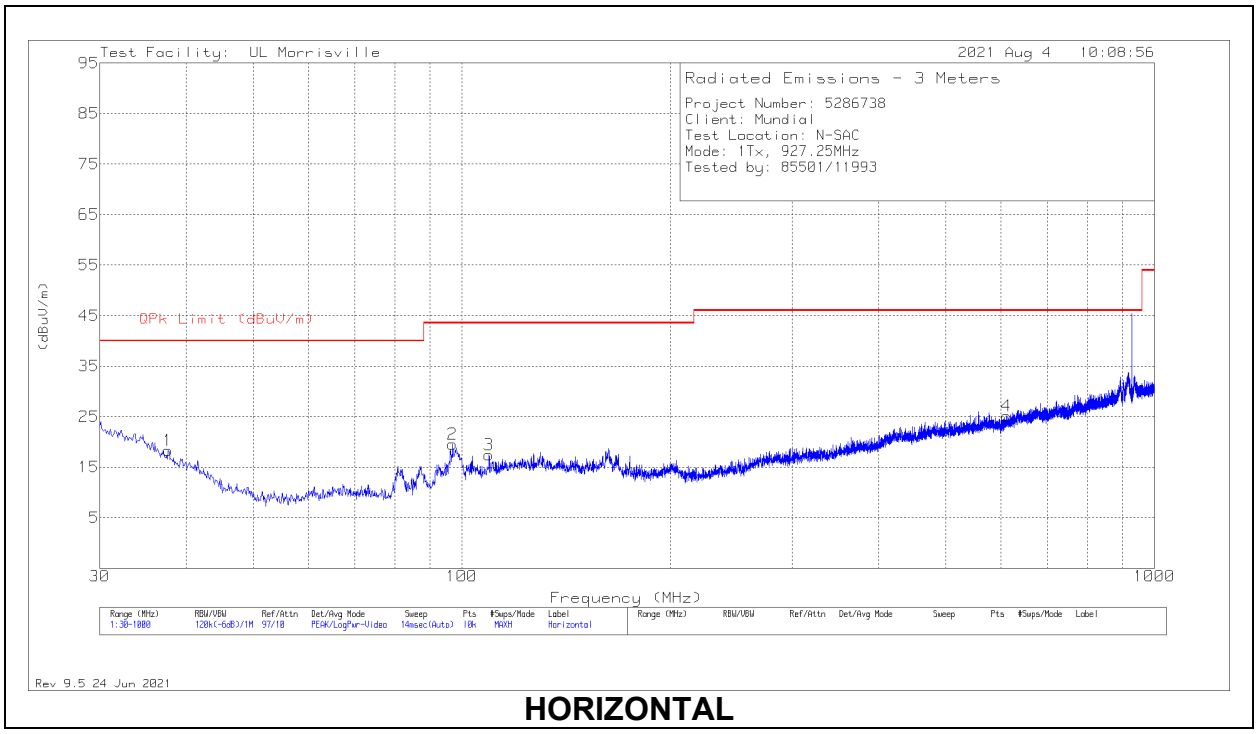
VERTICAL

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0066 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 38.051	25.77	Pk	21.8	-31.1	.1	16.57	40	-23.43	0-360	399	H
3	* ** 109.831	29.75	Pk	18.2	-30.2	.2	17.95	43.52	-25.57	0-360	399	H
4	* ** 613.067	26.24	Pk	25.3	-26.3	.6	25.84	46.02	-20.18	0-360	200	H
5	* ** 37.663	28.58	Pk	22	-31.4	.1	19.28	40	-20.72	0-360	101	V
7	* ** 111.286	32.79	Pk	18.4	-30.3	.2	21.09	43.52	-22.43	0-360	101	V
8	* ** 611.806	25.5	Pk	25.3	-26.4	.6	25	46.02	-21.02	0-360	101	V
6	97.512	39.48	Pk	15.8	-30.5	.2	24.98	43.52	-18.54	0-360	101	V
2	98.385	32.7	Pk	16	-30.4	.2	18.5	43.52	-25.02	0-360	200	H

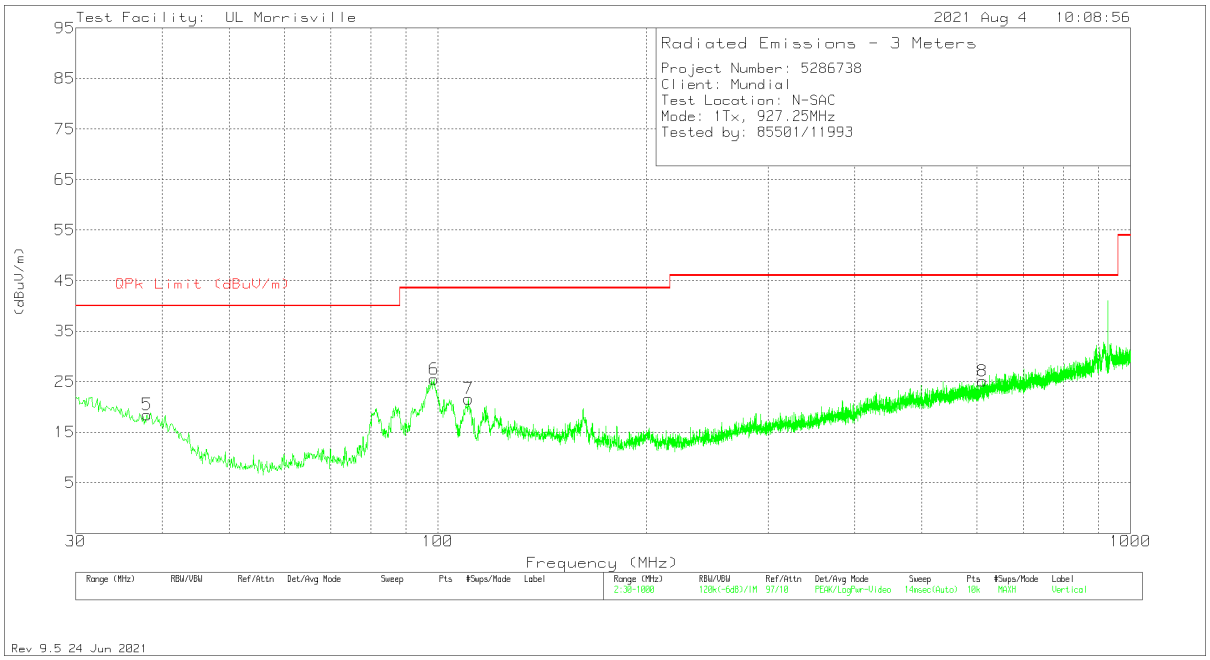
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL: (919) 549-1400

10.2.1. High Channel – 927.25MHz



HORIZONTAL



VERTICAL

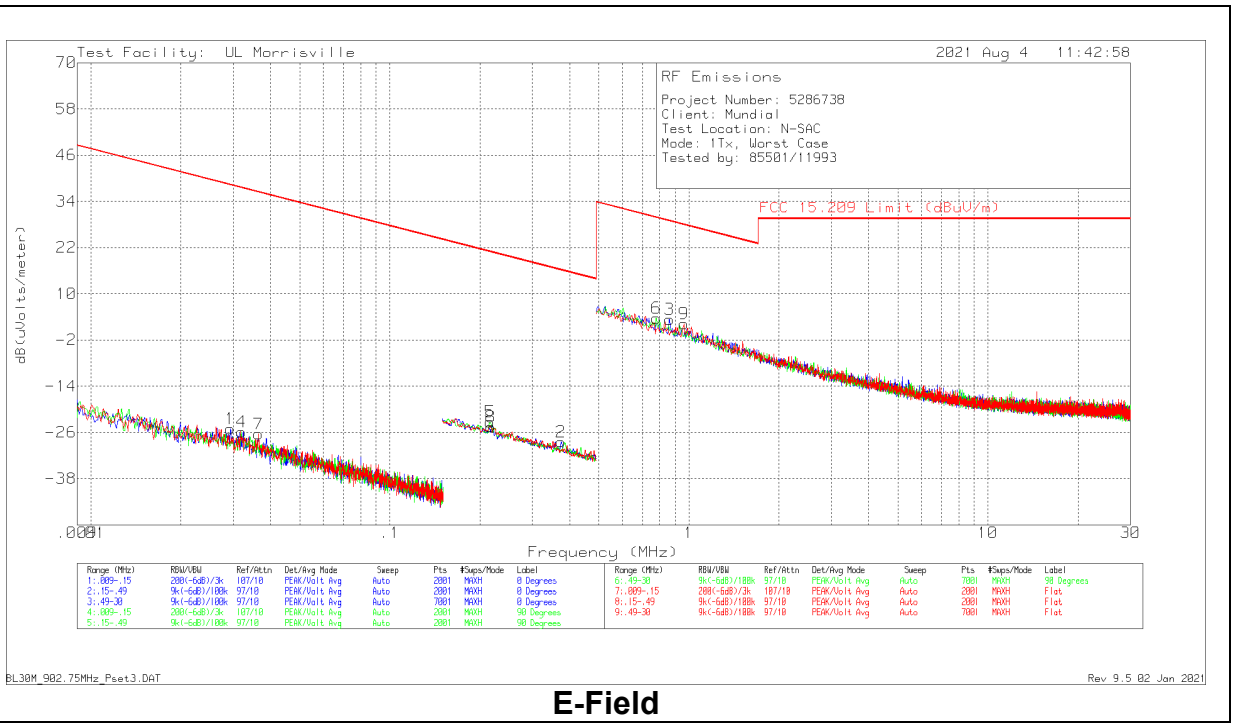
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0066 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 37.663	27.55	Pk	22	-31.4	.1	18.25	40	-21.75	0-360	199	H
3	* ** 109.443	29.35	Pk	18.1	-30.2	.2	17.45	43.52	-26.07	0-360	299	H
4	* ** 612.097	25.7	Pk	25.3	-26.5	.6	25.1	46.02	-20.92	0-360	199	H
5	* ** 38.051	27.69	Pk	21.8	-31.1	.1	18.49	40	-21.51	0-360	100	V
7	* ** 110.704	33.1	Pk	18.3	-30	.2	21.6	43.52	-21.92	0-360	100	V
8	* ** 611.03	25.6	Pk	25.3	-26.4	.6	25.1	46.02	-20.92	0-360	100	V
2	96.93	34.5	Pk	15.6	-30.7	.2	19.6	43.52	-23.92	0-360	299	H
6	98.676	39.6	Pk	16	-30.3	.2	25.5	43.52	-18.02	0-360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

10.3. SPURIOUS EMISSIONS BELOW 30 MHz

WORST-CASE CONFIGURATION

Note for below 30 MHz scans: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).



E-Field

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 Avg/Qp Limit (dBuV/m)	FCC 15.209 Pk Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	.02931	41.39	Pk	13.4	.1	-80	-25.11	38.27	58.27	-63.38	0-360	98	0 degs
4	.03193	40.8	Pk	13.2	.1	-80	-25.9	37.52	57.52	-63.42	0-360	98	90 degs
7	.03641	40.84	Pk	12.6	.1	-80	-26.46	36.38	56.38	-62.84	0-360	98	Flat
5	.21622	46.33	Pk	10.3	.1	-80	-23.27	20.91	40.91	-44.18	0-360	98	90 degs
8	.21732	45.08	Pk	10.3	.1	-80	-24.52	20.86	40.86	-45.38	0-360	98	Flat
2	.37457	41.16	Pk	10.2	.2	-80	-28.44	16.13	36.13	-44.57	0-360	98	0 degs
6	.7788	33.22	Pk	10.3	.2	-40	3.72	29.78	-	-26.06	0-360	98	90 degs
3	.86101	32.8	Pk	10.4	.2	-40	3.4	28.9	-	-25.5	0-360	98	0 degs
9	.96219	31.49	Pk	10.5	.2	-40	2.19	27.94	-	-25.75	0-360	98	Flat

Pk - Peak detector

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.

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.

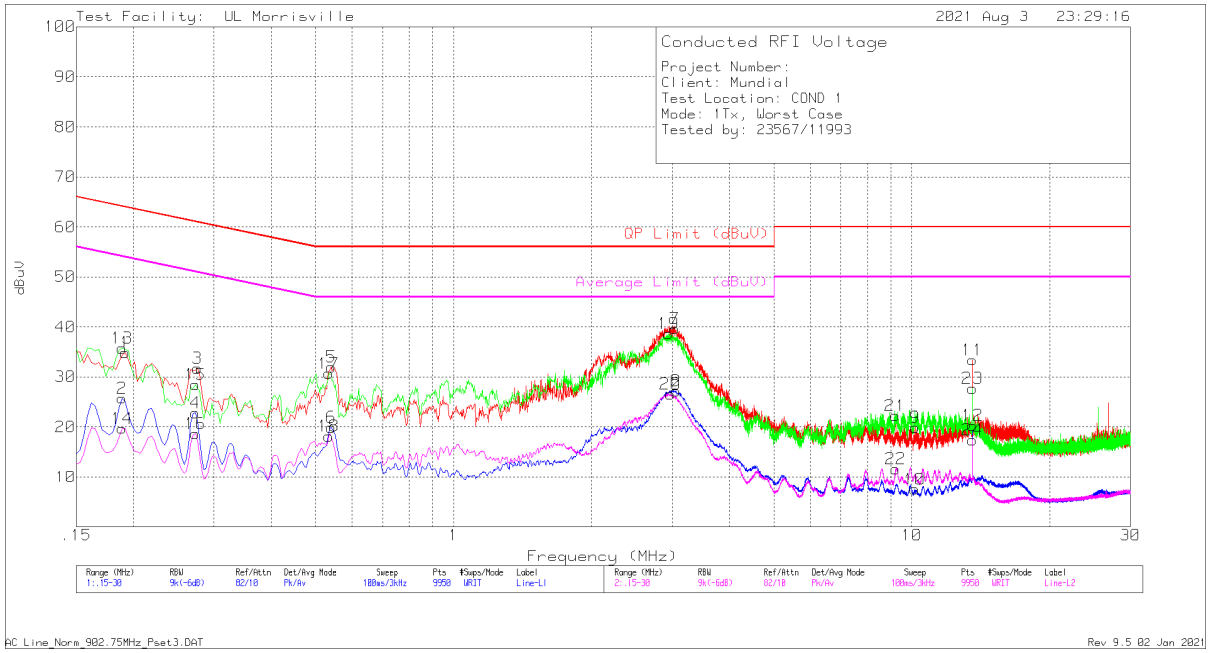
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

11.1.1. AC Power Line

LINE 1 and 2 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
2	.189	15.76	Av	.2	9.8	25.76	-	-	54.08	-28.32
1	.192	24.87	Pk	.2	9.8	34.87	63.95	-29.08	-	-
4	.273	12.94	Av	.1	9.8	22.84	-	-	51.03	-28.19
3	.276	21.84	Pk	.1	9.8	31.74	60.94	-29.2	-	-
5	.54	22.17	Pk	0	9.8	31.97	56	-24.03	-	-
6	.54	10.13	Av	0	9.8	19.93	-	-	46	-26.07
7	3.042	29.9	Pk	0	9.8	39.7	56	-16.3	-	-
8	3.057	17.41	Av	0	9.8	27.21	-	-	46	-18.79
10	10.152	-2.55	Av	.1	10	7.55	-	-	50	-42.45
9	10.164	9.82	Pk	.1	10	19.92	60	-40.08	-	-
11	13.56	23.23	Pk	.1	10.1	33.43	60	-26.57	-	-
12	13.56	10.13	Av	.1	10.1	20.33	-	-	50	-29.67

Pk - Peak detector
Av - Average detection

Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.189	25.73	Pk	.2	9.8	35.73	64.08	-28.35	-	-
14	.189	9.73	Av	.2	9.8	19.73	-	-	54.08	-34.35
15	.273	18.55	Pk	.1	9.8	28.45	61.03	-32.58	-	-
16	.273	8.79	Av	.1	9.8	18.69	-	-	51.03	-32.34
17	.534	20.78	Pk	.1	9.8	30.68	56	-25.32	-	-
18	.534	8.24	Av	.1	9.8	18.14	-	-	46	-27.86
19	2.943	28.85	Pk	0	9.8	38.65	56	-17.35	-	-
20	2.973	16.81	Av	0	9.8	26.61	-	-	46	-19.39
21	9.21	12.17	Pk	.1	10	22.27	60	-37.73	-	-
22	9.216	1.5	Av	.1	10	11.6	-	-	50	-38.4
24	13.56	7.26	Av	.1	10.1	17.46	-	-	50	-32.54
23	13.563	17.56	Pk	.1	10.1	27.76	60	-32.24	-	-

Pk - Peak detector
Av - Average detection

12. SETUP PHOTOS

Please refer to R5286738.1286651-EP1 for setup photos

END OF TEST REPORT