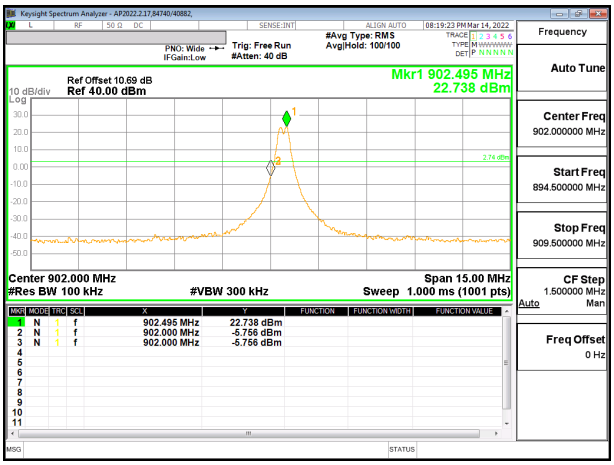
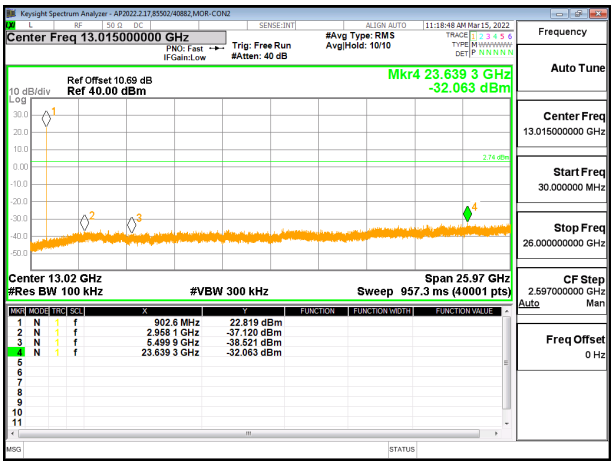
## 9.8.1. 35.56 kbps DATA RATE

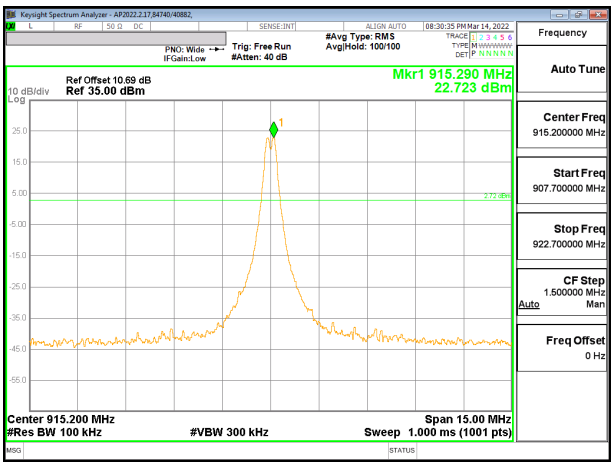
**Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING**



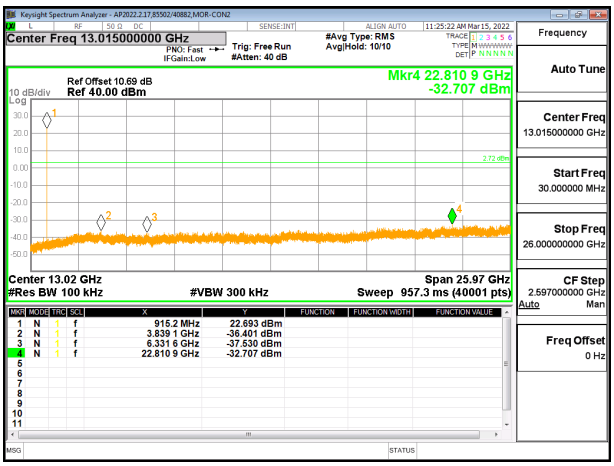

**LOW CHANNEL BANDEDGE**



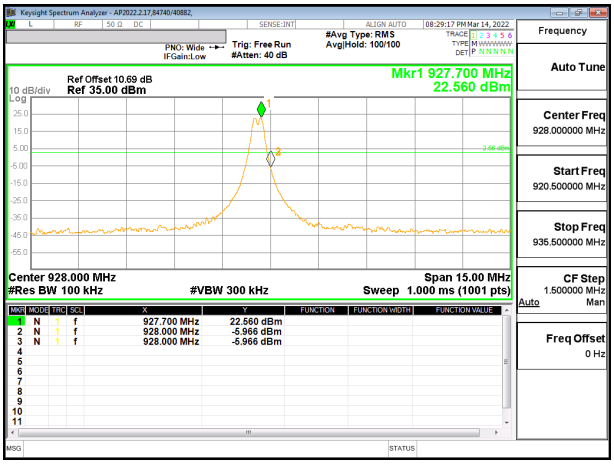

**OUT-OF-BAND LOW CHANNEL**



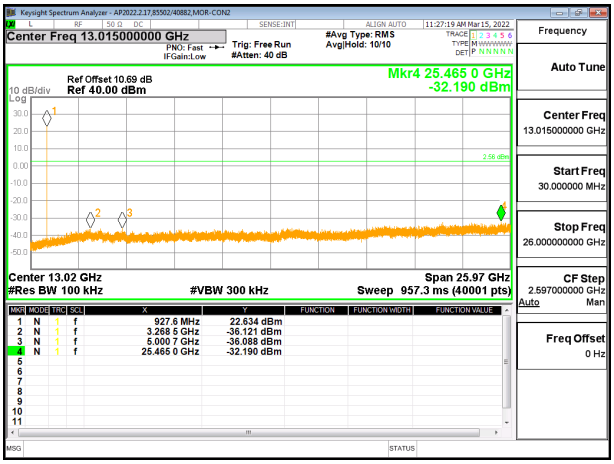

**IN-BAND REFERENCE LEVEL**




**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**



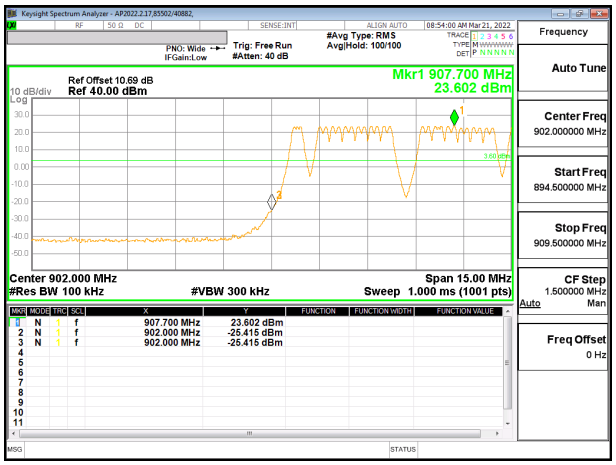

**OUT-OF-BAND HIGH CHANNEL**



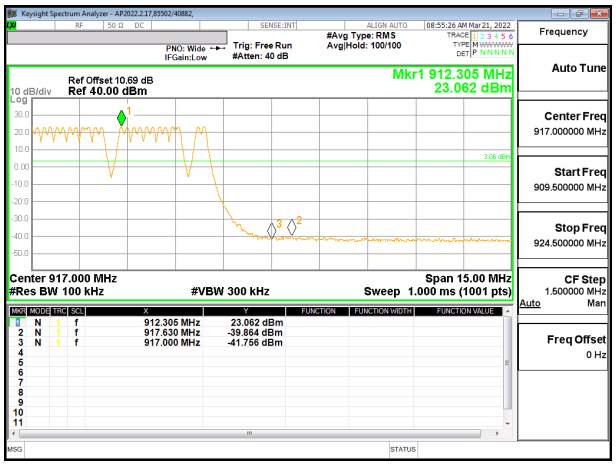
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

*This report shall not be reproduced except in full, without the written approval of UL LLC*

**Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**




**LOW BANDEDGE**




**HIGH BANDEDGE**

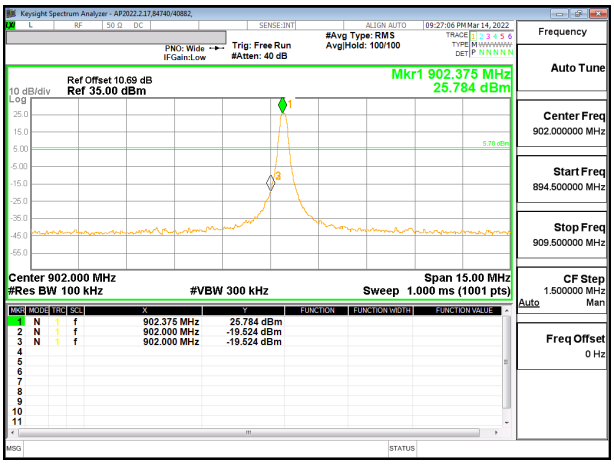


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

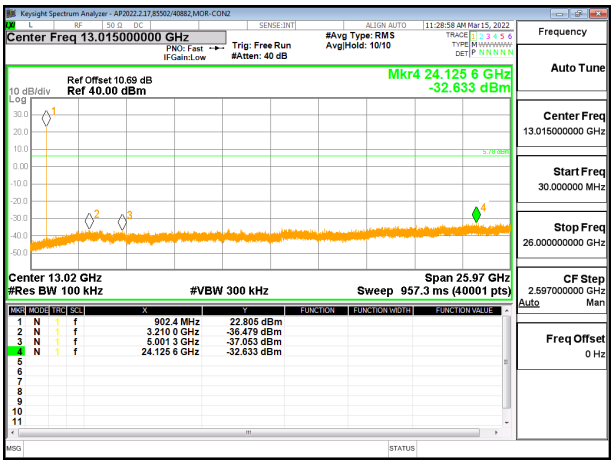
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 9.8.2. 50 kbps DATA RATE

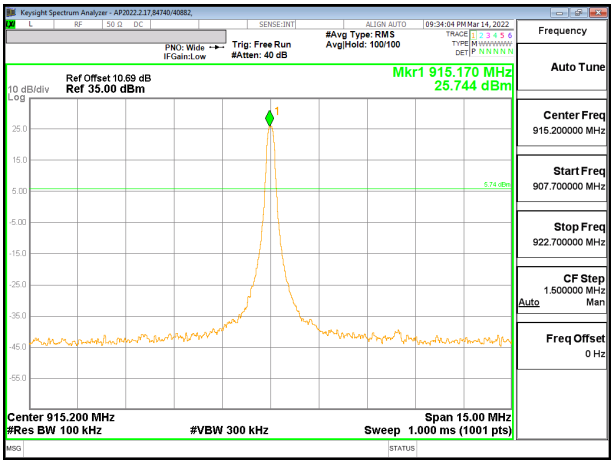
**Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING**



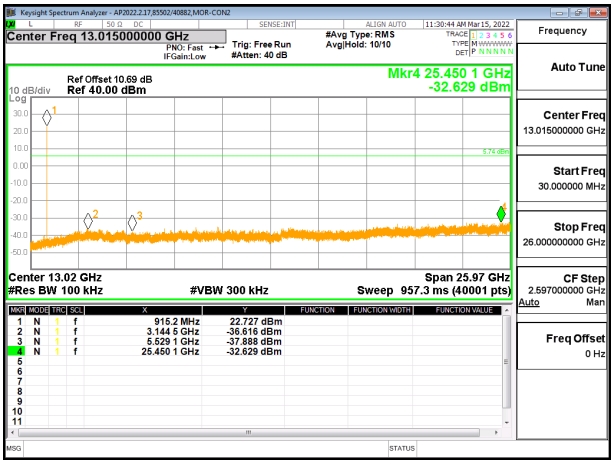

LOW CHANNEL BANDEDGE



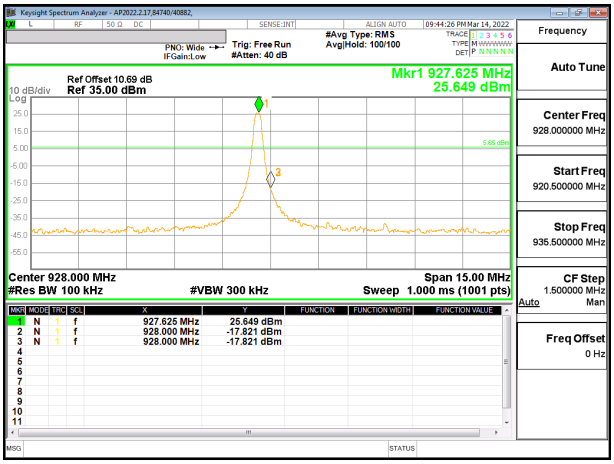

OUT-OF-BAND LOW CHANNEL



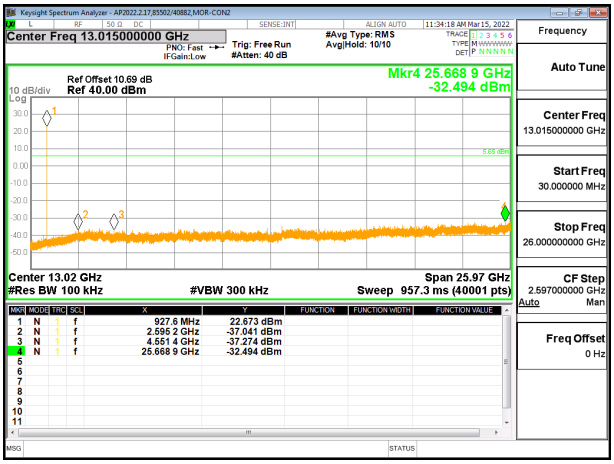

IN-BAND REFERENCE LEVEL




OUT-OF-BAND MID CHANNEL




HIGH CHANNEL BANDEDGE



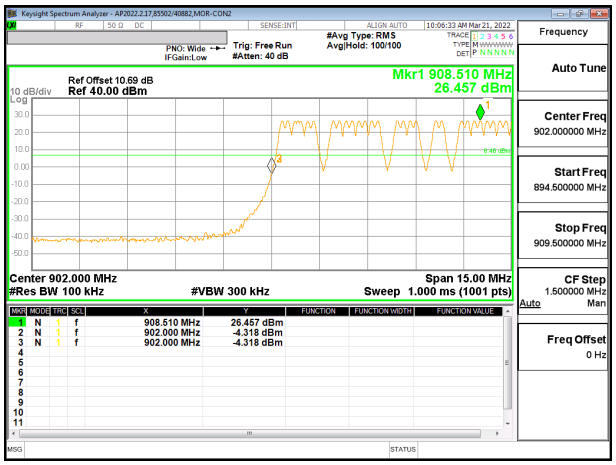

OUT-OF-BAND HIGH CHANNEL



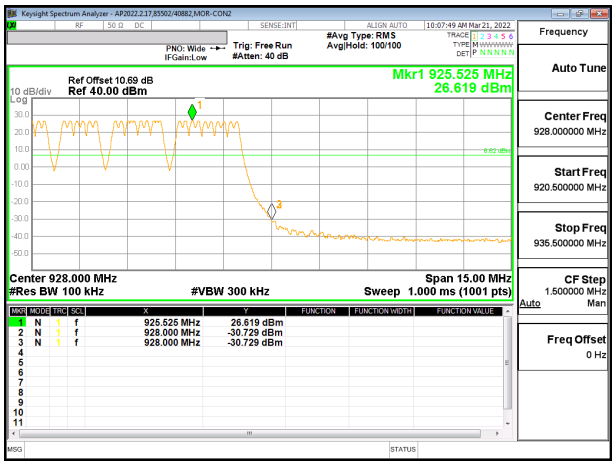
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

*This report shall not be reproduced except in full, without the written approval of UL LLC*

**Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**




**LOW BANDEDGE**




**HIGH BANDEDGE**

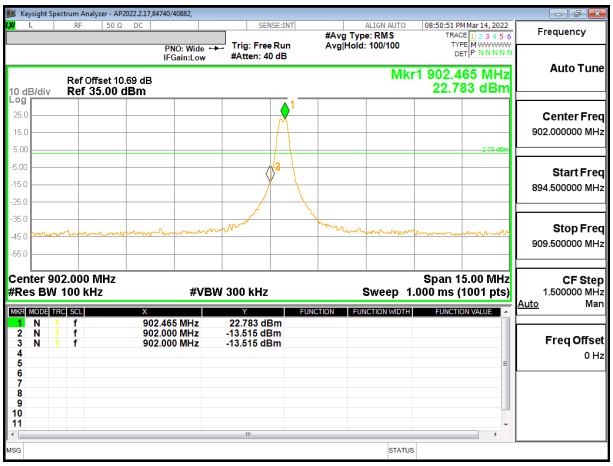


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

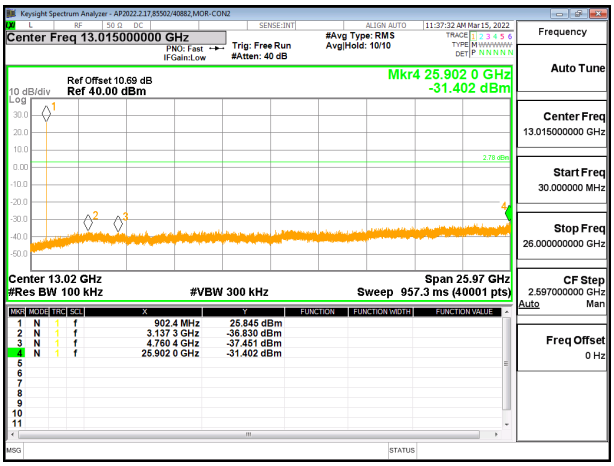
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 9.8.3. 142.22 kbps DATA RATE

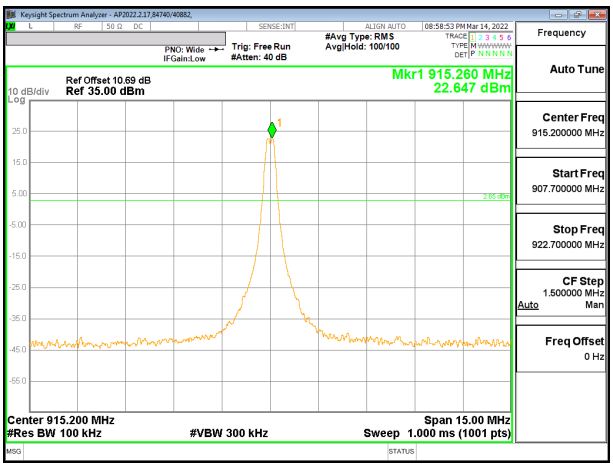
**Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING**



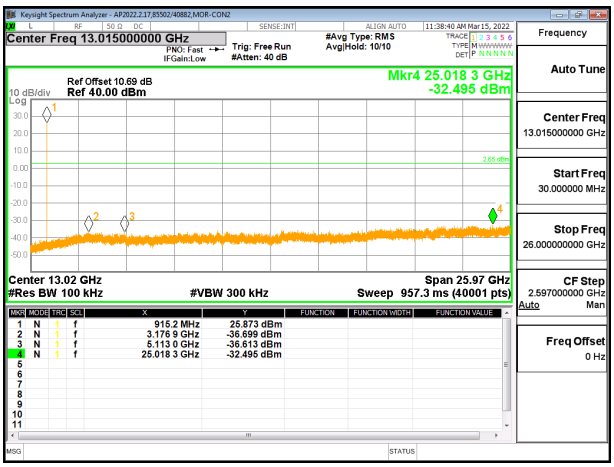

**LOW CHANNEL BANDEDGE**



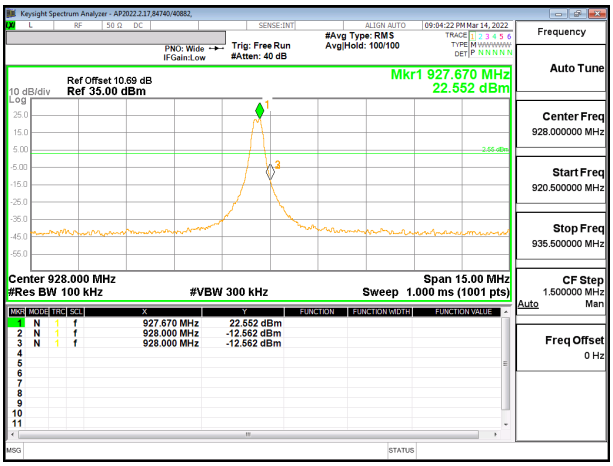

**OUT-OF-BAND LOW CHANNEL**



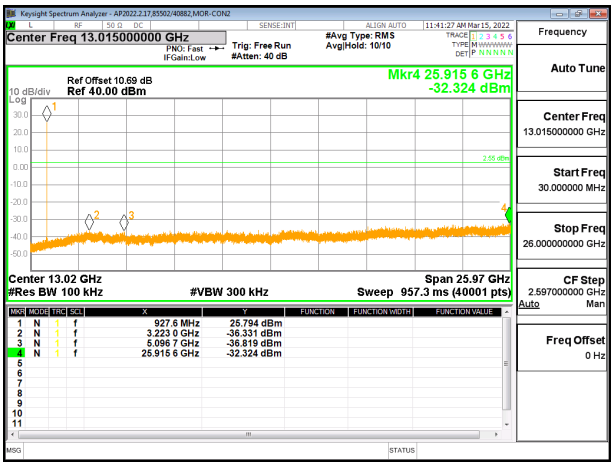

**IN-BAND REFERENCE LEVEL**




**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**



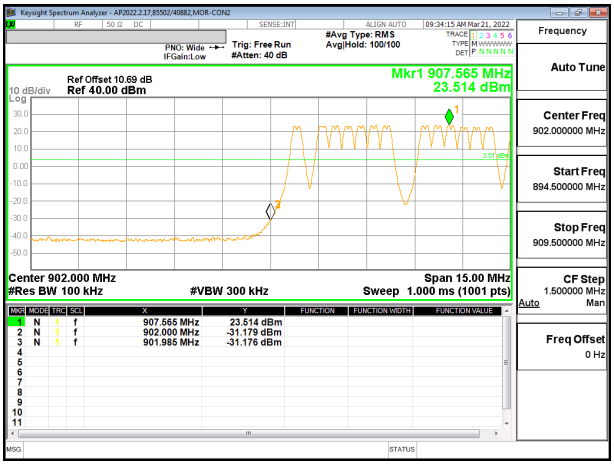

**OUT-OF-BAND HIGH CHANNEL**



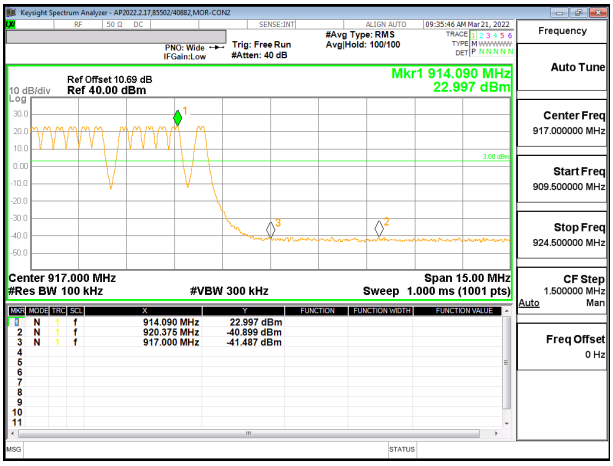
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

*This report shall not be reproduced except in full, without the written approval of UL LLC*

## Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON




**LOW BANDEDGE**




**HIGH BANDEDGE**

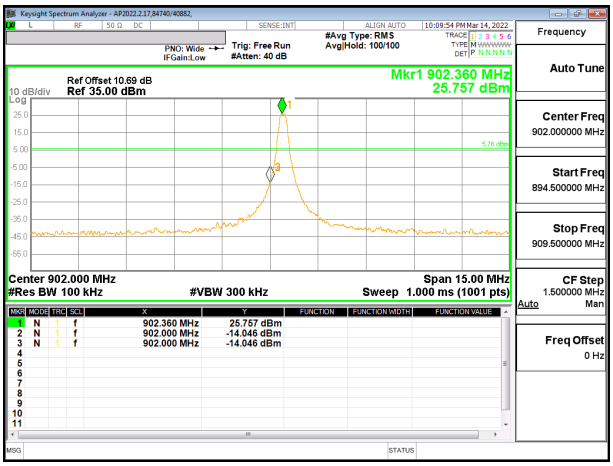


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

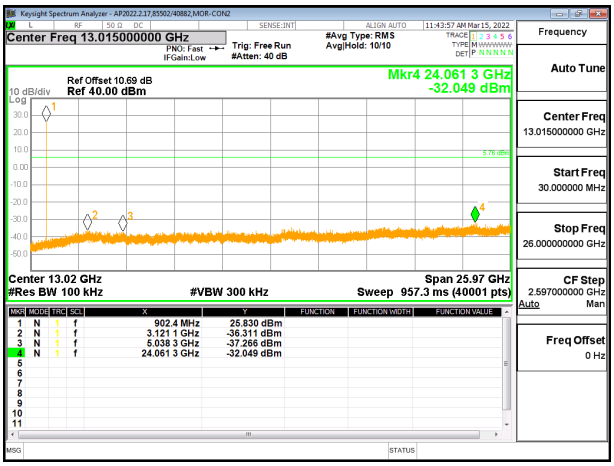
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 9.8.4. 150 kbps DATA RATE

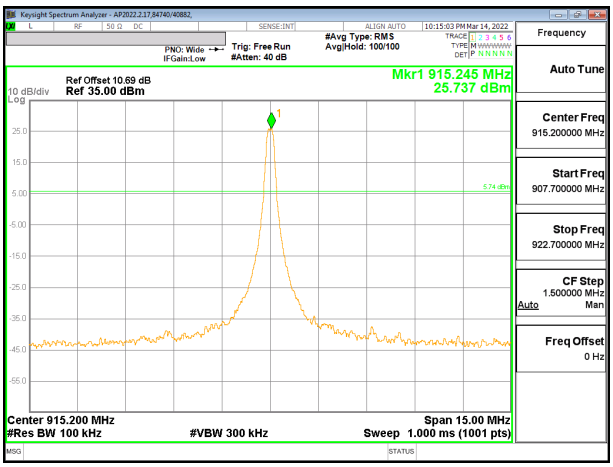
**Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING**



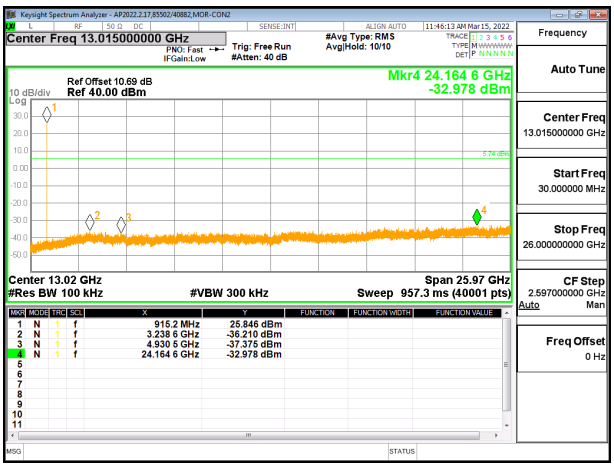

**LOW CHANNEL BANDEDGE**



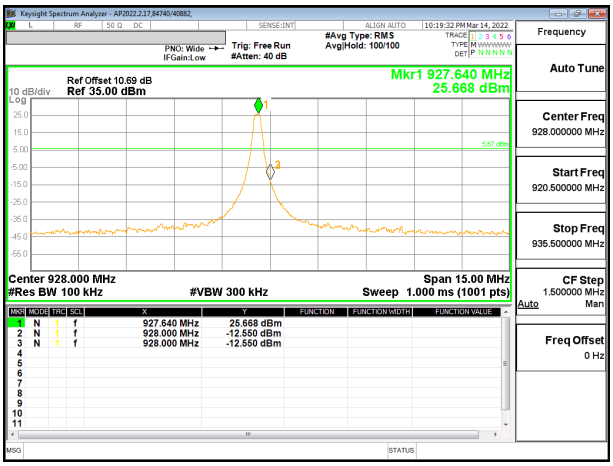

**OUT-OF-BAND LOW CHANNEL**



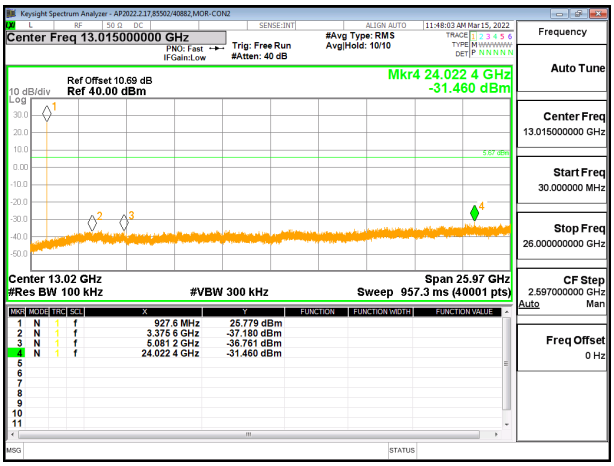

**IN-BAND REFERENCE LEVEL**




**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**



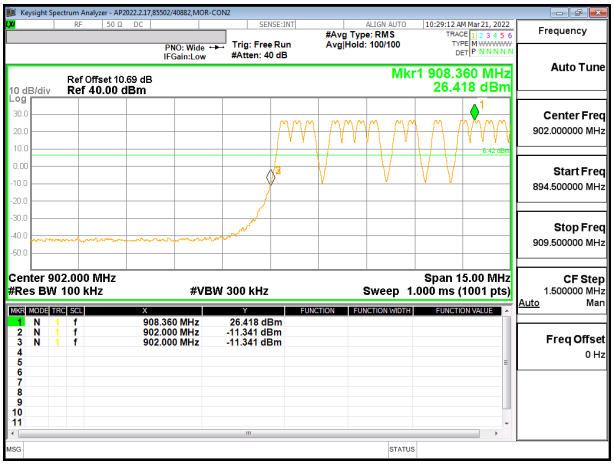

**OUT-OF-BAND HIGH CHANNEL**



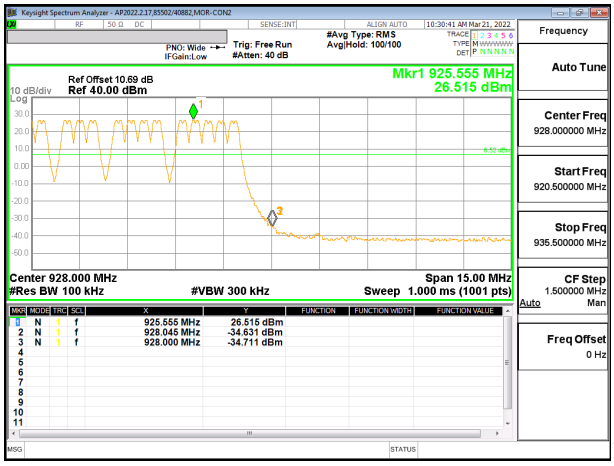
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

*This report shall not be reproduced except in full, without the written approval of UL LLC*

## Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON




**LOW BANDEDGE**

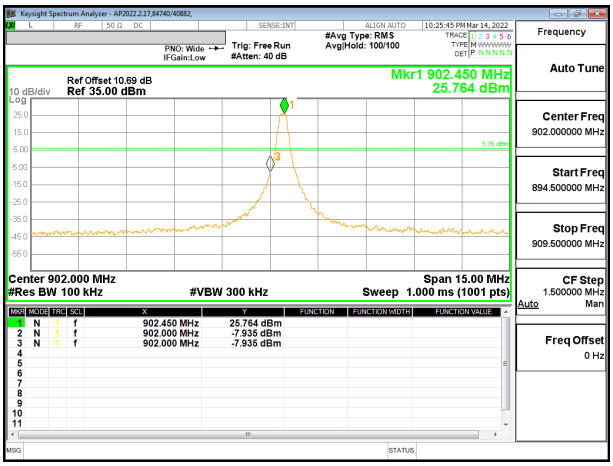



**HIGH BANDEDGE**

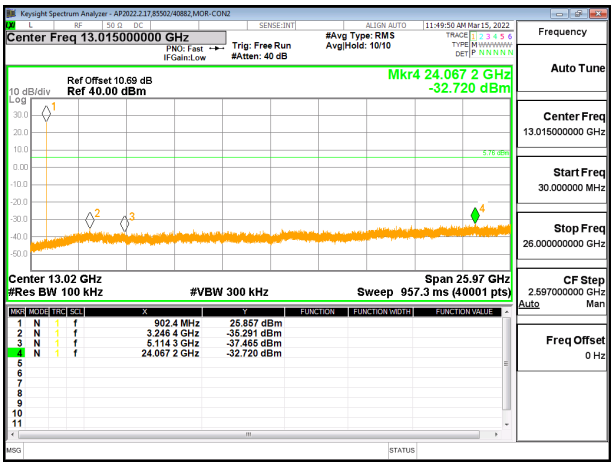

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 9.8.5. 200 kbps DATA RATE

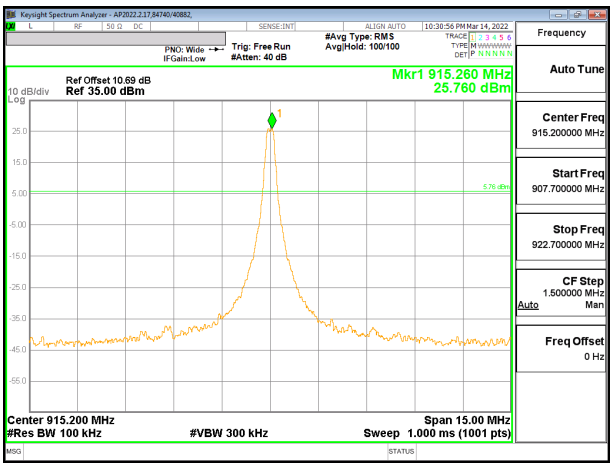
**Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING**



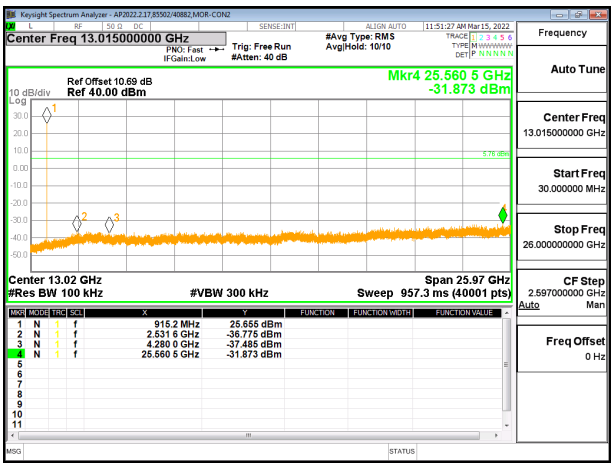

**LOW CHANNEL BANDEDGE**



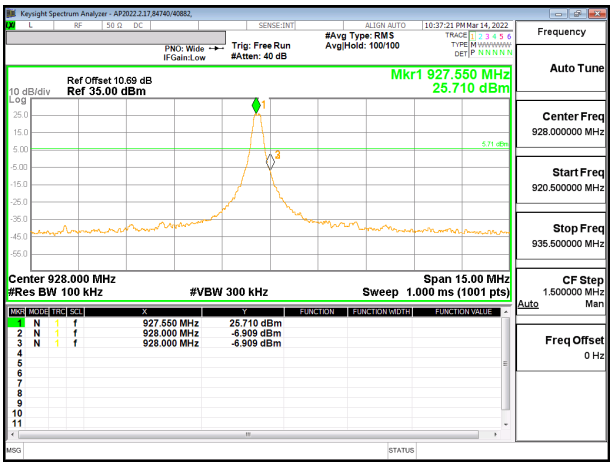

**OUT-OF-BAND LOW CHANNEL**



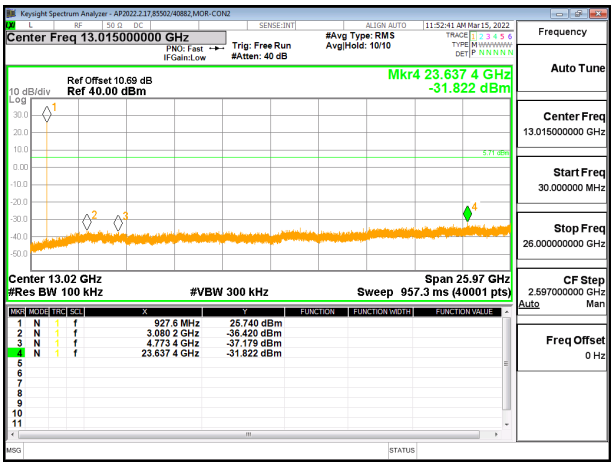

**IN-BAND REFERENCE LEVEL**




**OUT-OF-BAND MID CHANNEL**




**HIGH CHANNEL BANDEDGE**



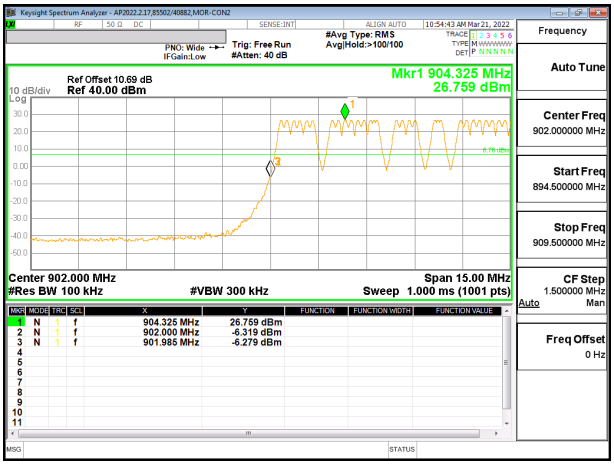

**OUT-OF-BAND HIGH CHANNEL**



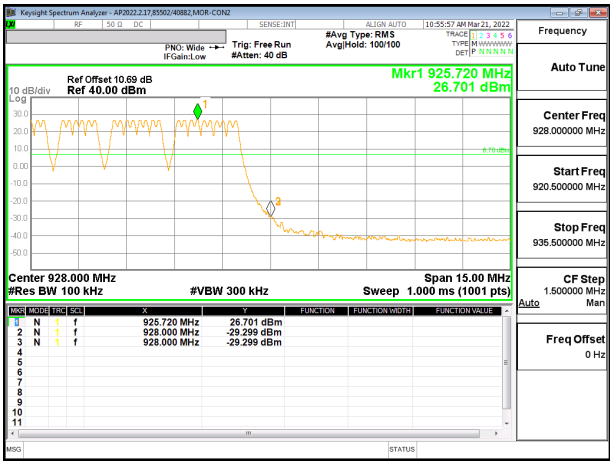
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

*This report shall not be reproduced except in full, without the written approval of UL LLC*

## Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON




**LOW BANDEDGE**




**HIGH BANDEDGE**


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# 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 |

RSS-GEN, Section 8.9 and 8.10.

| Frequency Range (MHz) | Field Strength Limit (uA/m) at 3 m | Field Strength Limit (dBuA/m) at 3 m |
|---|---|---|
| 0.009-0.490 | 6.37/F(kHz) @ 300 m | - |
| 0.490-1.705 | 63.7/F(kHz) @ 30 m | - |
| 1.705 - 30 | 0.08 @ 30m | - |
| **Frequency Range (MHz)** | **Field Strength Limit (uV/m) at 3 m** | **Field Strength Limit (dBuV/m) at 3 m** |
| 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 or average (9-90kHz and 110-490kHz).

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 linear averaging measurements.


*This report shall not be reproduced except in full, without the written approval of UL LLC*

The spectrum from 30 MHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the worse-case data rate. Below 30 MHz, the channel with the highest output power was tested.

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.

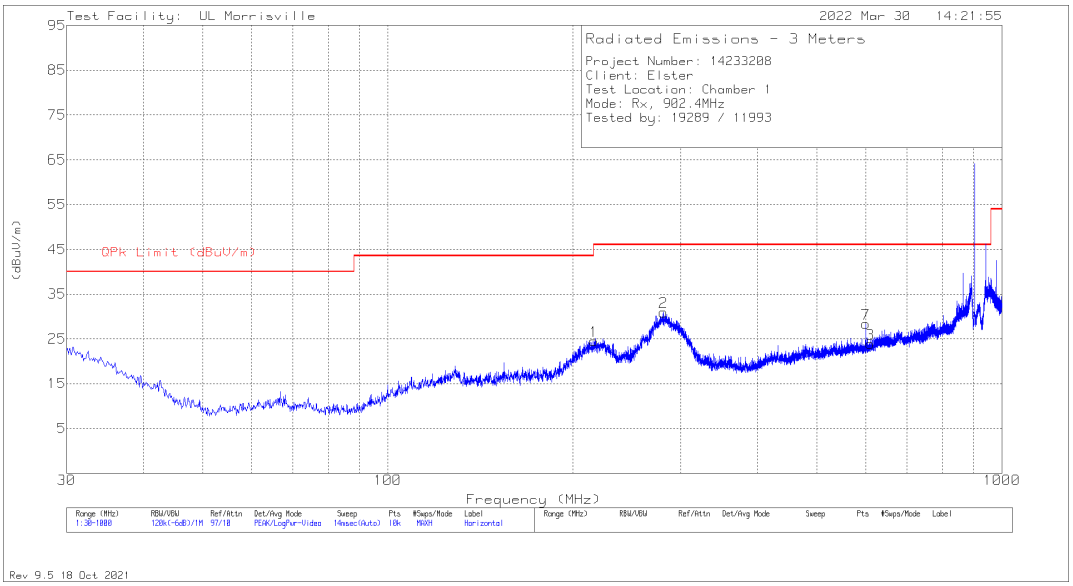

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 10.1. TRANSMITTER BELOW 1 GHz

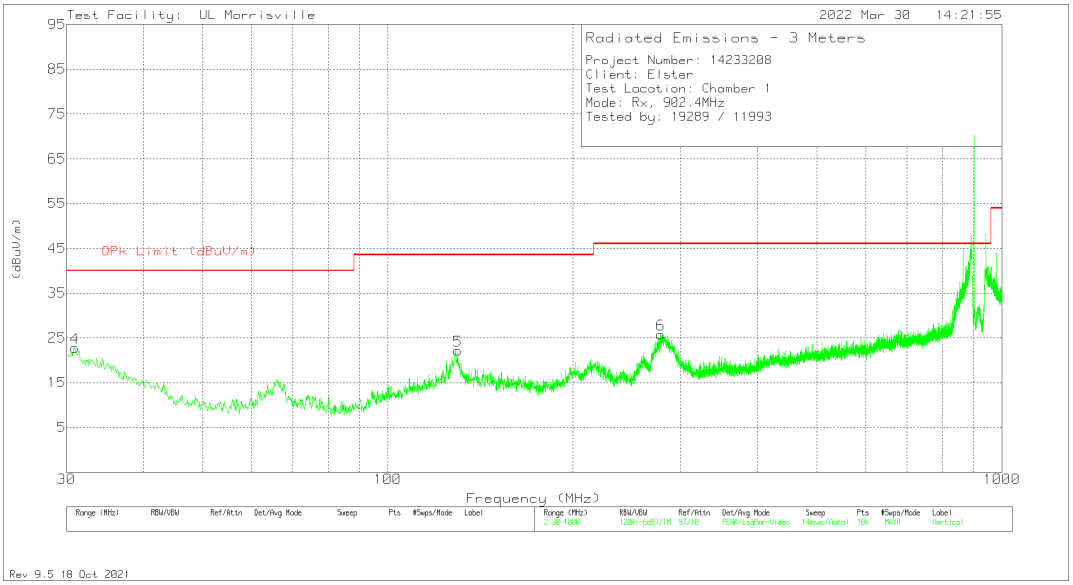
### 10.1.1. 50 kbps DATA RATE

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL RESULTS**




**HORIZONTAL**




**VERTICAL**


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

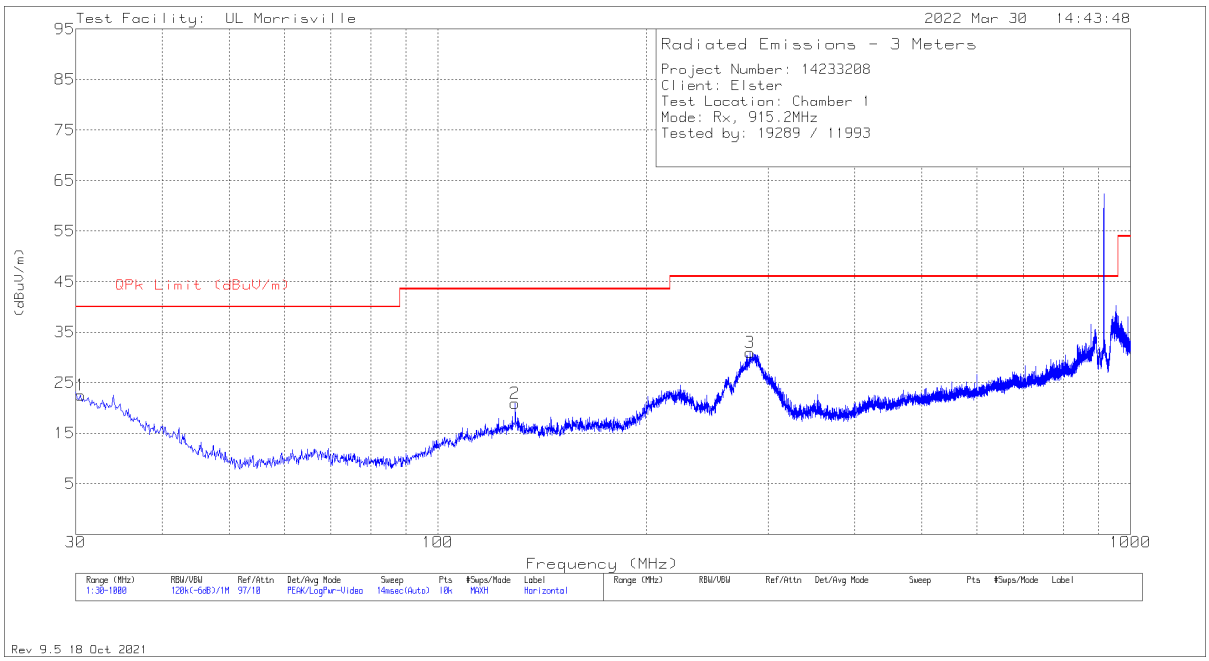
## RADIATED EMISSIONS

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0066 (dB/m) | Amp/Cbl/Pad (dB) | Filter (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * ** 281.036 | 40.01 | Pk | 19.3 | -28.7 | .3 | 30.91 | 46.02 | -15.11 | 0-360 | 100 | H |
| 3 | * ** 610.739 | 25.14 | Pk | 24.7 | -26.5 | .6 | 23.94 | 46.02 | -22.08 | 0-360 | 400 | H |
| 5 | * ** 129.91 | 32.37 | Pk | 19.6 | -29.9 | .1 | 22.17 | 43.52 | -21.35 | 0-360 | 100 | V |
| 6 | * ** 278.417 | 34.88 | Pk | 19.2 | -28.6 | .3 | 25.78 | 46.02 | -20.24 | 0-360 | 100 | V |
| 4 | 30.97 | 27.35 | Pk | 26.6 | -31.3 | .1 | 22.75 | - | - | 0-360 | 100 | V |
| 1 | 216.822 | 36.81 | Pk | 16.3 | -29 | .4 | 24.51 | - | - | 0-360 | 100 | H |
| 7 | 600.069 | 30.05 | Pk | 24.2 | -26.5 | .6 | 28.35 | - | - | 0-360 | 100 | H |

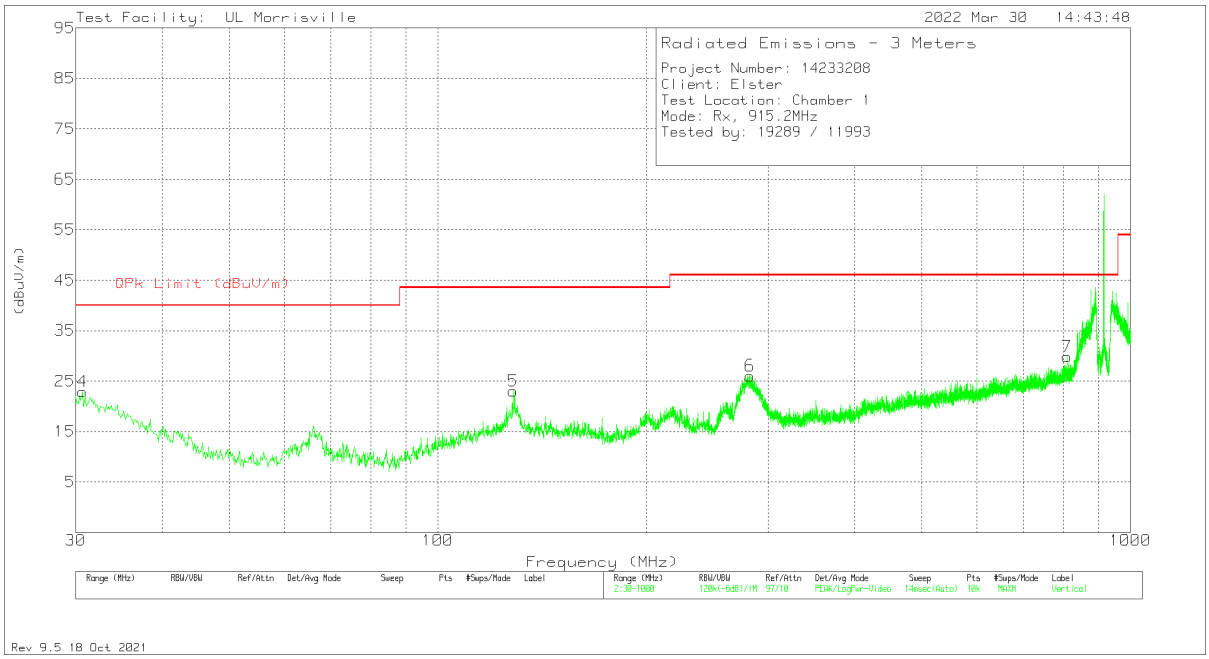
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# MID CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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

*This report shall not be reproduced except in full, without the written approval of UL LLC*

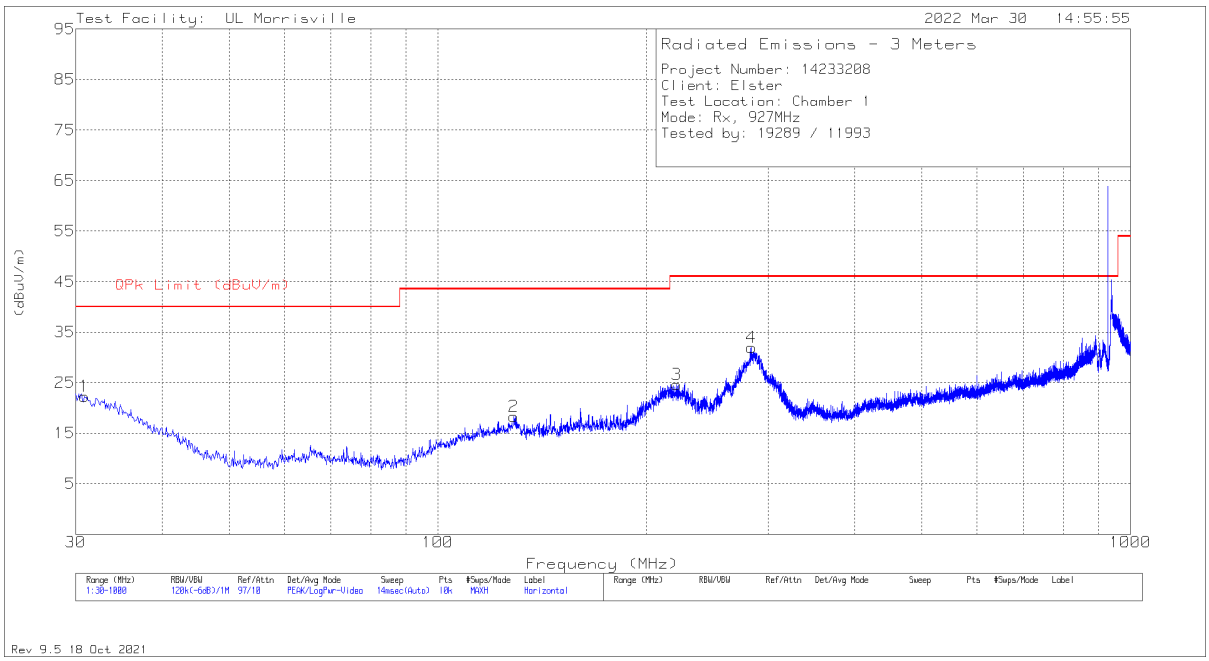
## RADIATED EMISSIONS

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0066 (dB/m) | Amp/Cbl/Pad (dB) | Filter (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * ** 129.328 | 31.22 | Pk | 19.6 | -30 | .1 | 20.92 | 43.52 | -22.6 | 0-360 | 400 | H |
| 3 | * ** 282.491 | 39.91 | Pk | 19.3 | -28.5 | .3 | 31.01 | 46.02 | -15.01 | 0-360 | 100 | H |
| 5 | * ** 128.455 | 33.28 | Pk | 19.7 | -30.1 | .1 | 22.98 | 43.52 | -20.54 | 0-360 | 100 | V |
| 6 | * ** 282.006 | 35.06 | Pk | 19.3 | -28.6 | .3 | 26.06 | 46.02 | -19.96 | 0-360 | 100 | V |
| 1 | 30.485 | 26.98 | Pk | 26.7 | -31.2 | .1 | 22.58 | - | - | 0-360 | 100 | H |
| 4 | 30.679 | 27.26 | Pk | 26.6 | -31.1 | .1 | 22.86 | - | - | 0-360 | 100 | V |
| 7 | 809.88 | 27.08 | Pk | 27.3 | -25.1 | .6 | 29.88 | - | - | 0-360 | 100 | V |

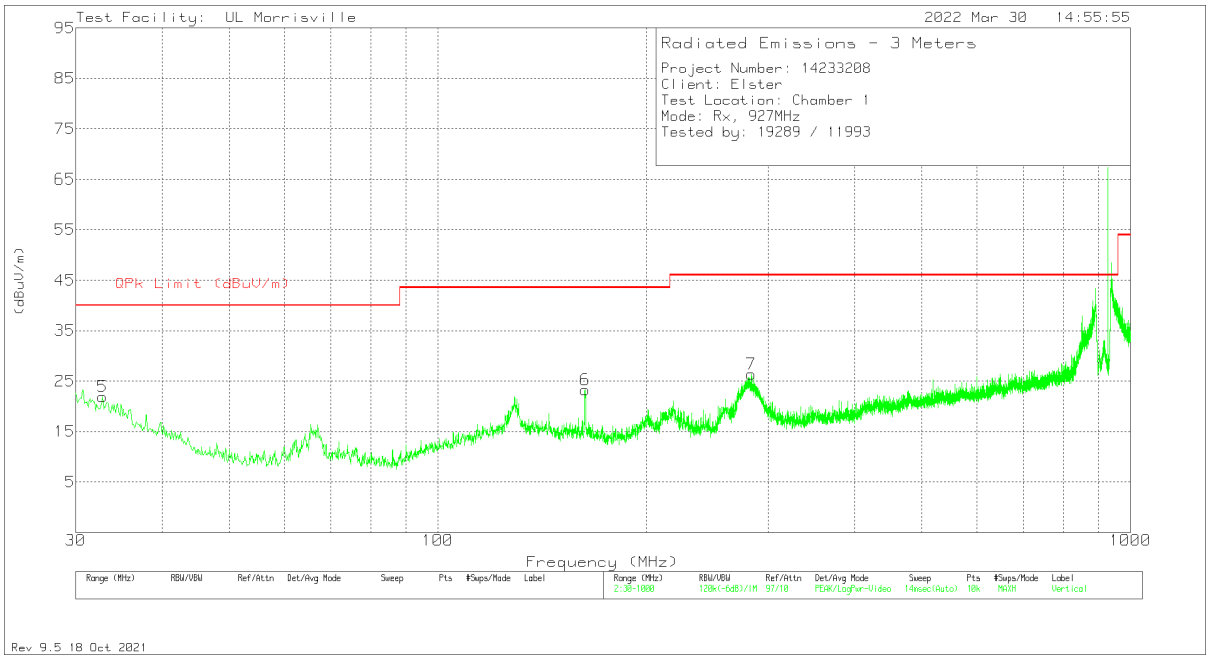
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# HIGH CHANNEL RESULTS




## HORIZONTAL




## VERTICAL



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

*This report shall not be reproduced except in full, without the written approval of UL LLC*

## RADIATED EMISSIONS

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0066 (dB/m) | Amp/Cbl/Pad (dB) | Filter (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * ** 128.746 | 28.65 | Pk | 19.6 | -30 | .1 | 18.35 | 43.52 | -25.17 | 0-360 | 199 | H |
| 4 | * ** 283.752 | 40.8 | Pk | 19.3 | -28.4 | .3 | 32 | 46.02 | -14.02 | 0-360 | 100 | H |
| 6 | * ** 163.084 | 34.72 | Pk | 17.8 | -29.5 | .3 | 23.32 | 43.52 | -20.2 | 0-360 | 100 | V |
| 7 | * ** 283.558 | 35.16 | Pk | 19.3 | -28.4 | .3 | 26.36 | 46.02 | -19.66 | 0-360 | 100 | V |
| 1 | 30.873 | 26.83 | Pk | 26.6 | -31.2 | .1 | 22.33 | - | - | 0-360 | 400 | H |
| 5 | 32.813 | 27.71 | Pk | 25.4 | -31.3 | .1 | 21.91 | - | - | 0-360 | 100 | V |
| 3 | 221.381 | 36.96 | Pk | 16.5 | -29.2 | .4 | 24.66 | - | - | 0-360 | 100 | H |

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

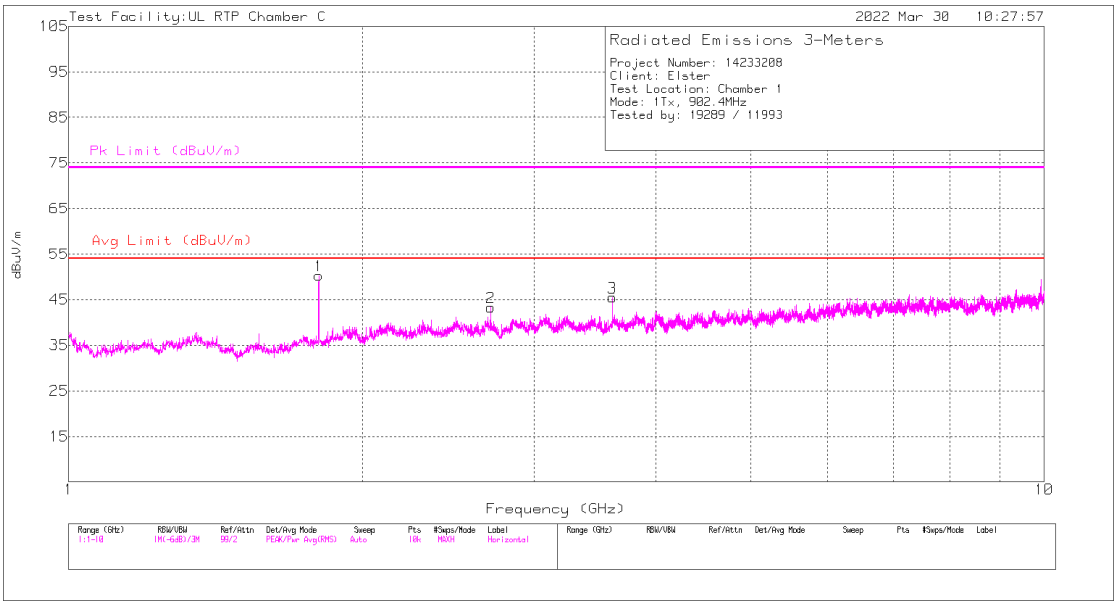

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 10.1. TRANSMITTER ABOVE 1 GHz

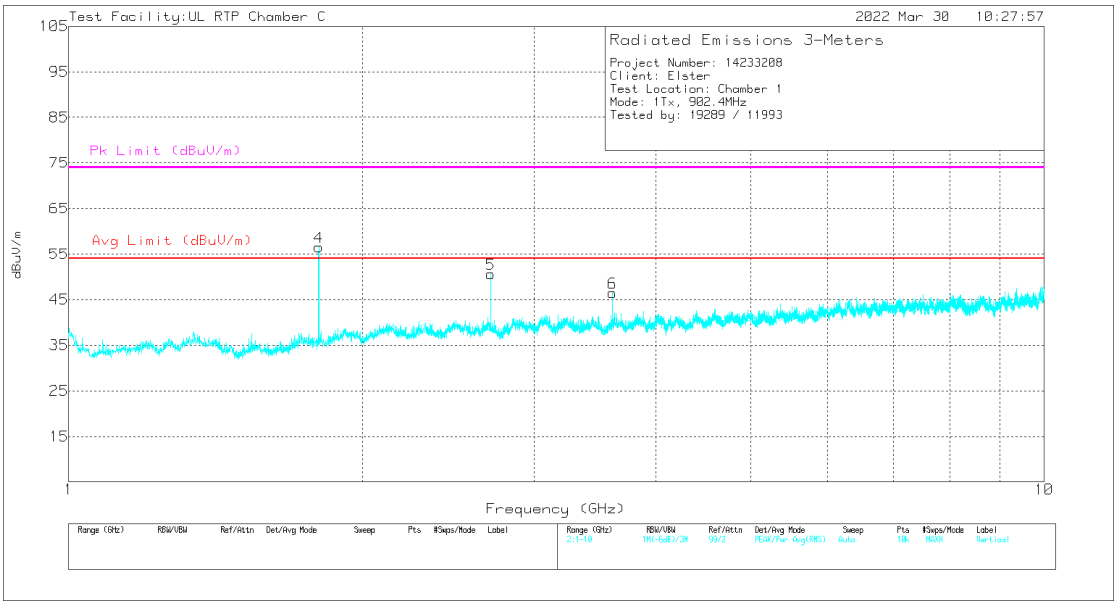
### 10.1.1. 50 kbps DATA RATE

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL RESULTS**




**HORIZONTAL**




**VERTICAL**


*This report shall not be reproduced except in full, without the written approval of UL LLC*

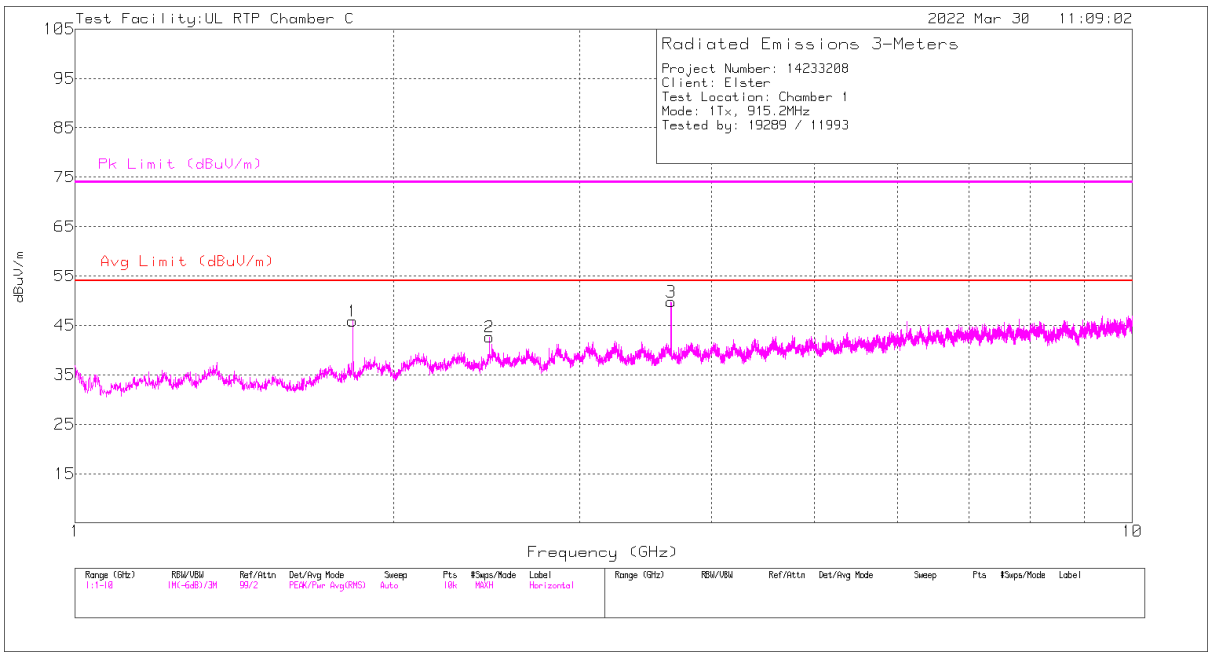
## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AT0067 (dB/m) | Amp/Cbl/ Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * ** 2.7073 | 44.64 | Pk | 32 | -33.8 | .5 | 43.34 | 54 | -10.66 | 74 | -30.66 | 0-360 | 200 | H |
| 3 | * ** 3.6091 | 45.19 | Pk | 33 | -33.3 | .6 | 45.49 | 54 | -8.51 | 74 | -28.51 | 0-360 | 200 | H |
| 5 | * ** 2.70728 | 55.14 | PK2 | 32 | -33.8 | .5 | 53.84 | - | - | 74 | -20.16 | 238 | 186 | V |
| 5 | * ** 2.70716 | 45.39 | ADV | 32 | -33.8 | .5 | 44.09 | 54 | -9.91 | - | - | 238 | 186 | V |
| 6 | * ** 3.6091 | 46.17 | Pk | 33 | -33.3 | .6 | 46.47 | 54 | -7.53 | 74 | -27.53 | 0-360 | 300 | V |
| 1 | 1.8046 | 55.12 | Pk | 30.3 | -35.5 | .4 | 50.32 | - | - | - | - | 0-360 | 99 | H |
| 4 | 1.8046 | 61.34 | Pk | 30.3 | -35.5 | .4 | 56.54 | - | - | - | - | 0-360 | 200 | V |

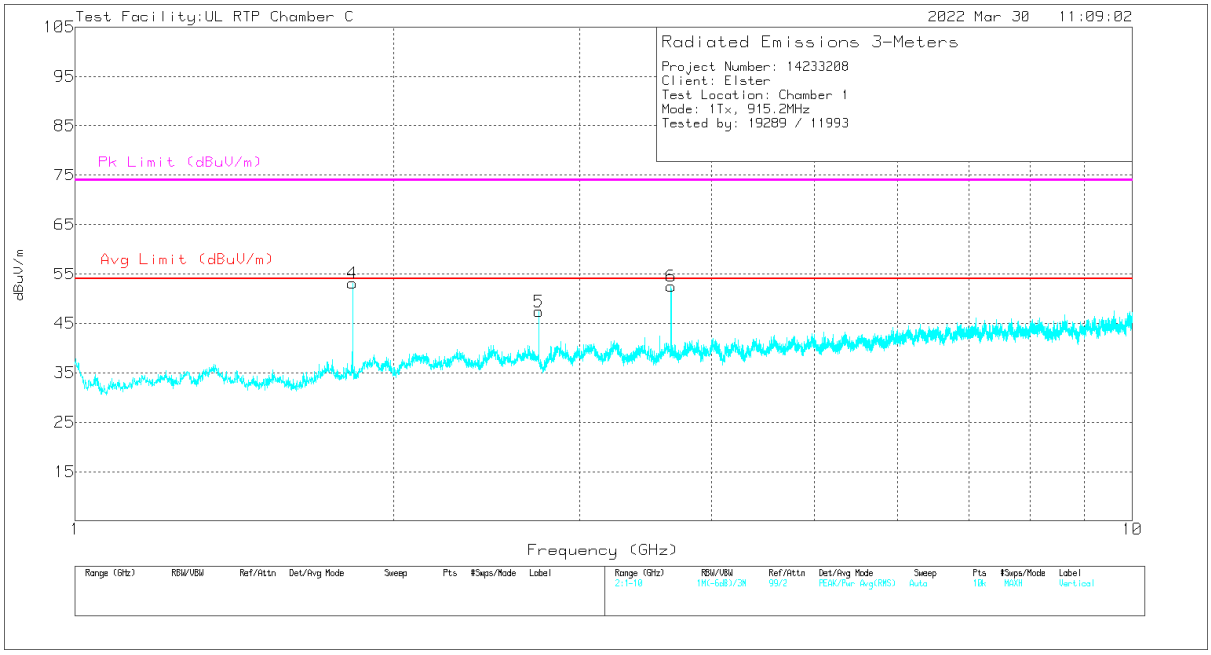
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# MID CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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

*This report shall not be reproduced except in full, without the written approval of UL LLC*

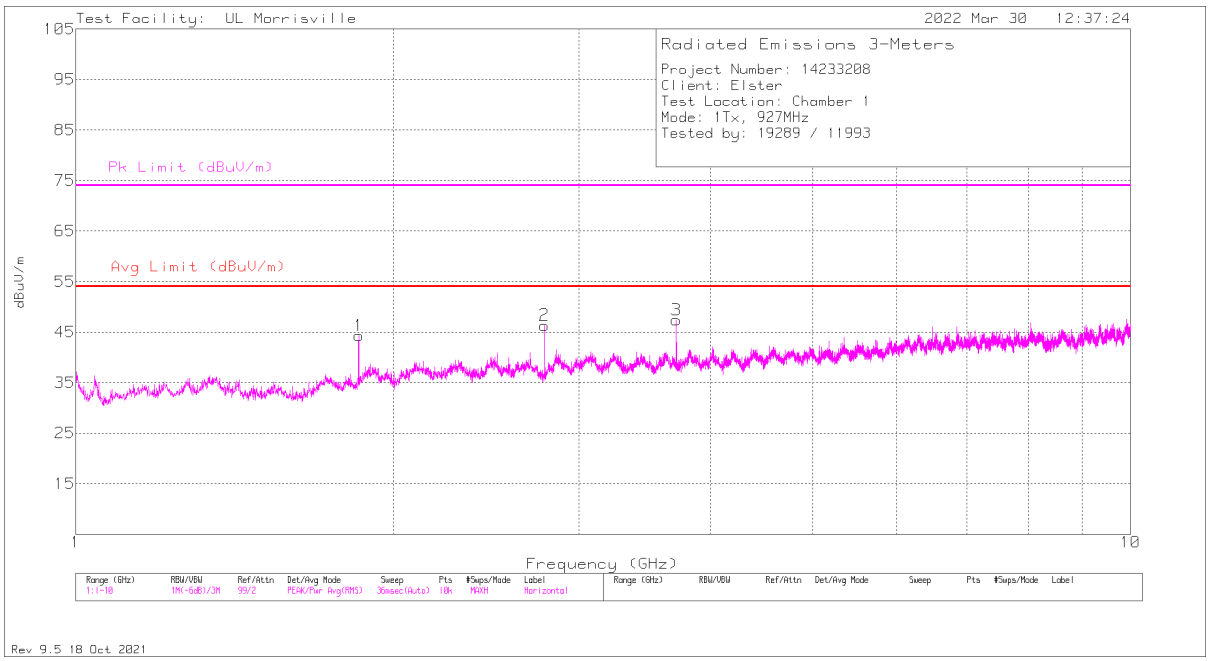
## RADIATED EMISSIONS

| Marker | Frequency(GHz) | MeterReading(dBuV) | Det | AT0067 (dB/m) | Amp/Cbl/Pad (dB) | Filter (dB) | CorrectedReadingdBuV/m | Avg Limit (dBuV/m) | Margin(dB) | Pk Limit (dBuV/m) | PK Margin(dB) | Azimuth(Degs) | Height(cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ** 1.8298 | 50.08 | Pk | 30.6 | -35.2 | .4 | 45.88 | - | - | - | - | 0-360 | 299 | H |
| 3 | * ** 3.66098 | 52.23 | PK2 | 33.1 | -33.1 | .3 | 52.53 | - | - | 74 | -21.47 | 357 | 236 | H |
| | * ** 3.66084 | 49.74 | ADV | 33.1 | -33.1 | .3 | 50.04 | 54 | -3.96 | - | - | 357 | 236 | H |
| 4 | ** 1.8298 | 57.34 | Pk | 30.6 | -35.2 | .4 | 53.14 | - | - | - | - | 0-360 | 301 | V |
| 5 | * ** 2.7451 | 48.7 | Pk | 32.2 | -33.9 | .4 | 47.4 | 54 | -6.6 | 74 | -26.6 | 0-360 | 200 | V |
| 6 | * ** 3.66065 | 50.09 | PK2 | 33.1 | -33.1 | .3 | 50.39 | - | - | 74 | -23.61 | 295 | 268 | V |
| | * ** 3.66083 | 46.41 | ADV | 33.1 | -33.1 | .3 | 46.71 | 54 | -7.29 | - | - | 295 | 268 | V |
| 2 | 2.4652 | 44.34 | Pk | 32.2 | -34.3 | .4 | 42.64 | - | - | - | - | 0-360 | 299 | H |

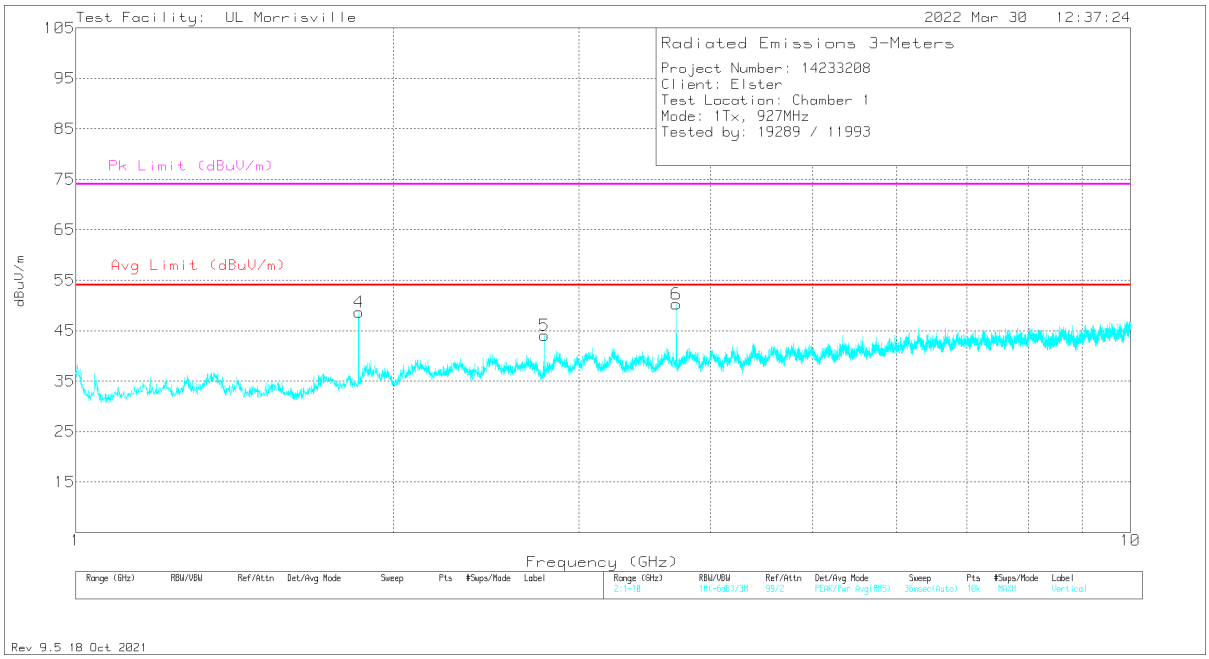
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# HIGH CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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

*This report shall not be reproduced except in full, without the written approval of UL LLC*

## RADIATED EMISSIONS

| Marker | Frequency(GHz) | MeterReading(dBuV) | Det | AT0067 (dB/m) | Amp/Cbl/Pad (dB) | Filter (dB) | CorrectedReadingdBuV/m | Avg Limit (dBuV/m) | Margin(dB) | Pk Limit (dBuV/m) | PK Margin(dB) | Azimuth(Degs) | Height(cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ** 1.855 | 48.45 | Pk | 30.8 | -35.3 | .4 | 44.35 | - | - | - | - | 0-360 | 300 | H |
| 2 | * ** 2.7829 | 47.57 | Pk | 32.3 | -34 | .5 | 46.37 | 54 | -7.63 | 74 | -27.63 | 0-360 | 300 | H |
| 3 | * ** 3.7108 | 46.67 | Pk | 33.3 | -33.1 | .6 | 47.47 | 54 | -6.53 | 74 | -26.53 | 0-360 | 101 | H |
| 4 | ** 1.855 | 52.78 | Pk | 30.8 | -35.3 | .4 | 48.68 | - | - | - | - | 0-360 | 101 | V |
| 5 | * ** 2.7829 | 45.27 | Pk | 32.3 | -34 | .5 | 44.07 | 54 | -9.93 | 74 | -29.93 | 0-360 | 200 | V |
| 6 | * ** 3.71044 | 48.46 | PK2 | 33.3 | -33.2 | .6 | 49.16 | - | - | 74 | -24.84 | 18 | 385 | V |
| | * ** 3.71045 | 45 | ADV | 33.3 | -33.2 | .6 | 45.7 | 54 | -8.3 | - | - | 18 | 385 | V |

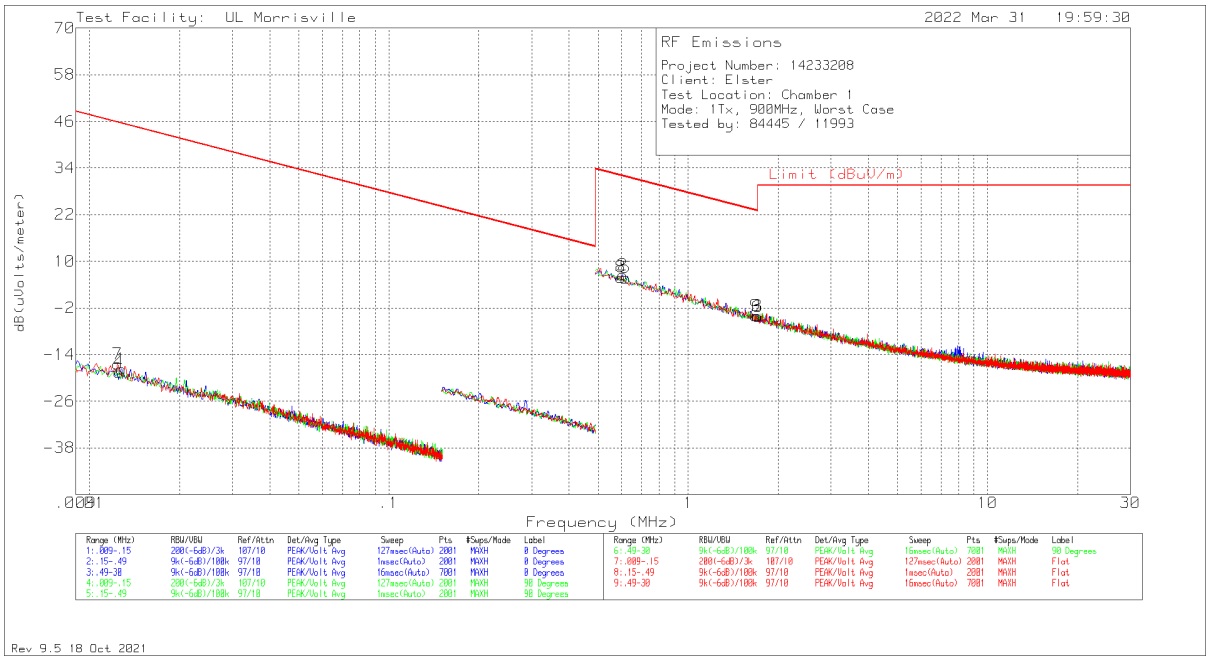
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

## 10.2. WORST CASE BELOW 30MHZ

Note: 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).

**SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION) – E-Field**




**ANTENNA- THREE ORIENTATIONS**

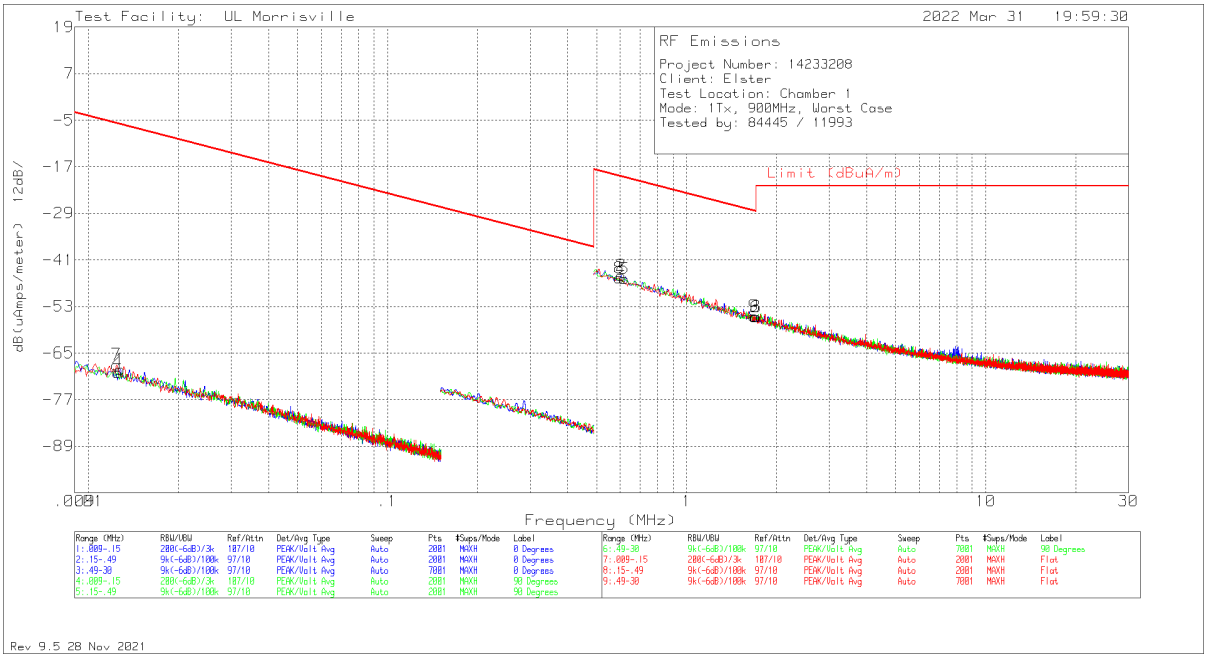
## Below 30MHz Data

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0079 (dB/m) | Amp/Cbl/Pad (dB) | Dist. Corr. Factor (dB) | Corrected Reading dB(uVolts/meter) | QP/AV Limit (dBuV/m) | PK Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Loop Angle |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | .01241 | 45.99 | Pk | 17.4 | .1 | -80 | -16.51 | 45.73 | 65.73 | -62.24 | 0-360 | Flat |
| 4 | .01255 | 44.08 | Pk | 17.3 | .1 | -80 | -18.52 | 45.63 | 65.63 | -64.15 | 0-360 | 90 degs |
| 1 | .01276 | 44.96 | Pk | 17.2 | .1 | -80 | -17.74 | 45.49 | 65.49 | -63.23 | 0-360 | 0 degs |
| 8 | .5954 | 34.51 | Pk | 11.2 | .2 | -40 | 5.91 | 32.11 | - | -26.2 | 0-360 | Flat |
| 2 | .60383 | 35.13 | Pk | 11.2 | .2 | -40 | 6.53 | 31.99 | - | -25.46 | 0-360 | 0 degs |
| 5 | .6207 | 34.35 | Pk | 11.2 | .2 | -40 | 5.75 | 31.75 | - | -26 | 0-360 | 90 degs |
| 9 | 1.67891 | 24.29 | Pk | 11.4 | .3 | -40 | -4.01 | 23.1 | - | -27.11 | 0-360 | Flat |
| 3 | 1.69999 | 24.22 | Pk | 11.4 | .3 | -40 | -4.08 | 23 | - | -27.08 | 0-360 | 0 degs |
| 6 | 1.70842 | 24.1 | Pk | 11.4 | .3 | -40 | -4.2 | 29.54 | - | -33.74 | 0-360 | 90 degs |

Pk - Peak detector


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

**SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION) – H-Field**




**ANTENNA- THREE ORIENTATIONS**

## Below 30MHz Data

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0079 (dB/m) | Amp/Cbl/Pad (dB) | Dist. Corr. Factor (dB) | Corrected Reading dB(uAmps/meter) | QPK/AV Limit (dBuA/m) | PK Limit (dBuA/m) | Margin (dB) | Azimuth (Degs) | Height (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | .0124 | 45.99 | Pk | -34.1 | .1 | -80 | -68.01 | -5.77 | 14.23 | -62.24 | 0-360 | 404 |
| 4 | .0126 | 44.08 | Pk | -34.2 | .1 | -80 | -70.02 | -5.87 | 14.22 | -64.15 | 0-360 | 404 |
| 1 | .0128 | 44.96 | Pk | -34.3 | .1 | -80 | -69.24 | -6.01 | 13.99 | -63.23 | 0-360 | 404 |
| 8 | .5954 | 34.51 | Pk | -40.3 | .2 | -40 | -45.59 | -19.39 | - | -26.2 | 0-360 | 404 |
| 2 | .6038 | 35.13 | Pk | -40.3 | .2 | -40 | -44.97 | -19.51 | - | -25.46 | 0-360 | 404 |
| 5 | .6207 | 34.35 | Pk | -40.3 | .2 | -40 | -45.75 | -19.75 | - | -26 | 0-360 | 404 |
| 9 | 1.6789 | 24.29 | Pk | -40.1 | .3 | -40 | -55.51 | -28.4 | - | -27.11 | 0-360 | 404 |
| 3 | 1.7 | 24.22 | Pk | -40.1 | .3 | -40 | -55.58 | -28.5 | - | -27.08 | 0-360 | 404 |
| 6 | 1.7084 | 24.1 | Pk | -40.1 | .3 | -40 | -55.7 | -21.96 | - | -33.74 | 0-360 | 404 |

Pk - Peak detector


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# 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 C63.4.

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

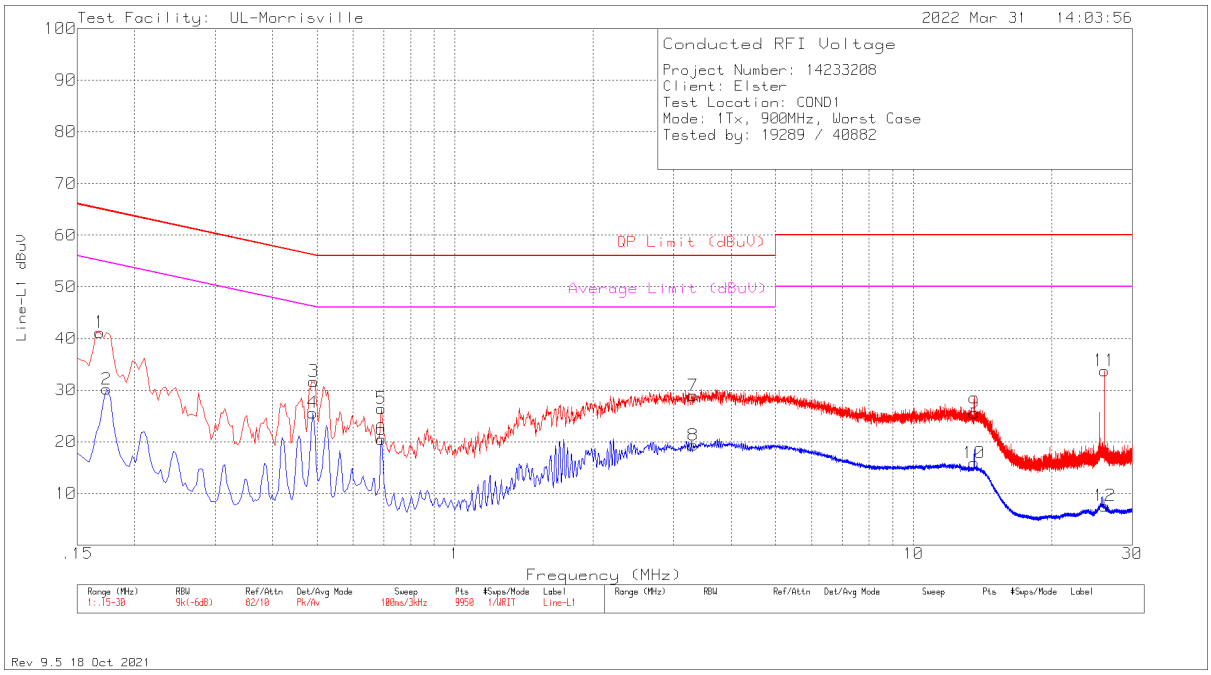
Line conducted data is recorded for both NEUTRAL and HOT lines.

**RESULTS**


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

### 11.1.1. AC Power Line Host

## LINE 1 RESULTS

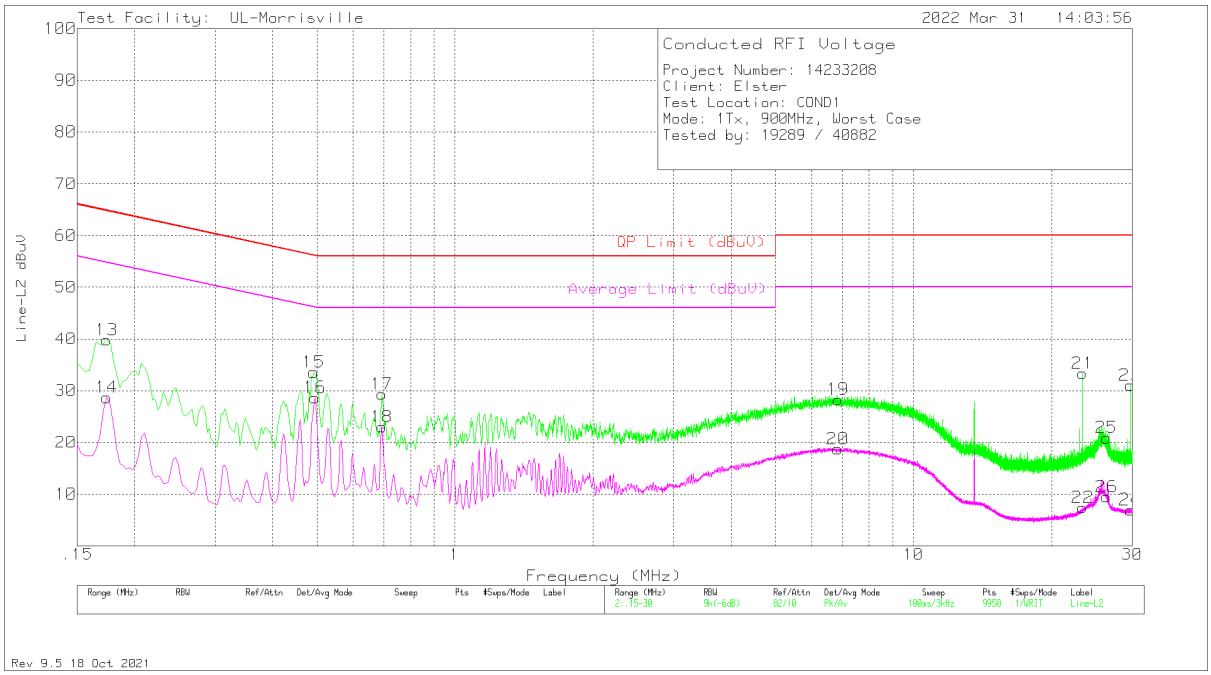



| Range 1: Line-L1 .15 - 30MHz | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN VCF (dB) | Cbl/Limiter (dB) | Corrected Reading dBuV | QP Limit (dBuV) | Margin (dB) | Average Limit (dBuV) | Margin (dB) |
| | | | | | | | | | | |
| 1 | .168 | 31.19 | Pk | .2 | 9.8 | 41.19 | 65.06 | -23.87 | - | - |
| 2 | .174 | 20.18 | Av | .2 | 9.8 | 30.18 | - | - | 54.77 | -24.59 |
| 4 | .489 | 15.82 | Av | 0 | 9.8 | 25.62 | - | - | 46.18 | -20.56 |
| 3 | .492 | 21.89 | Pk | 0 | 9.8 | 31.69 | 56.13 | -24.44 | - | - |
| 5 | .69 | 16.62 | Pk | 0 | 9.8 | 26.42 | 56 | -29.58 | - | - |
| 6 | .69 | 10.69 | Av | 0 | 9.8 | 20.49 | - | - | 46 | -25.51 |
| 7 | 3.309 | 19.06 | Pk | 0 | 9.9 | 28.96 | 56 | -27.04 | - | - |
| 8 | 3.309 | 9.45 | Av | 0 | 9.9 | 19.35 | - | - | 46 | -26.65 |
| 9 | 13.566 | 15.37 | Pk | .1 | 10.1 | 25.57 | 60 | -34.43 | - | - |
| 10 | 13.566 | 5.73 | Av | .1 | 10.1 | 15.93 | - | - | 50 | -34.07 |
| 12 | 26.118 | -2.91 | Av | .3 | 10.2 | 7.59 | - | - | 50 | -42.41 |
| 11 | 26.121 | 23.26 | Pk | .3 | 10.2 | 33.76 | 60 | -26.24 | - | - |

Pk - Peak detector
Av - Average detection


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# LINE 2 RESULTS




| 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 | .174 | 29.81 | Pk | .2 | 9.8 | 39.81 | 64.77 | -24.96 | - | - |
| 14 | .174 | 18.69 | Av | .2 | 9.8 | 28.69 | - | - | 54.77 | -26.08 |
| 15 | .492 | 23.76 | Pk | 0 | 9.8 | 33.56 | 56.13 | -22.57 | - | - |
| 16 | .495 | 18.84 | Av | 0 | 9.8 | 28.64 | - | - | 46.08 | -17.44 |
| 17 | .693 | 19.54 | Pk | 0 | 9.8 | 29.34 | 56 | -26.66 | - | - |
| 18 | .693 | 13.2 | Av | 0 | 9.8 | 23 | - | - | 46 | -23 |
| 20 | 6.837 | 8.62 | Av | .1 | 10 | 18.72 | - | - | 50 | -31.28 |
| 19 | 6.846 | 18.18 | Pk | .1 | 10 | 28.28 | 60 | -31.72 | - | - |
| 21 | 23.4 | 22.96 | Pk | .2 | 10.2 | 33.36 | 60 | -26.64 | - | - |
| 22 | 23.4 | -3.01 | Av | .2 | 10.2 | 7.39 | - | - | 50 | -42.61 |
| 25 | 26.361 | 10.38 | Pk | .3 | 10.2 | 20.88 | 60 | -39.12 | - | - |
| 26 | 26.37 | -1.02 | Av | .3 | 10.2 | 9.48 | - | - | 50 | -40.52 |
| 23 | 29.682 | 20.44 | Pk | .3 | 10.3 | 31.04 | 60 | -28.96 | - | - |
| 24 | 29.691 | -3.66 | Av | .3 | 10.3 | 6.94 | - | - | 50 | -43.06 |

Pk - Peak detector
Av - Average detection


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*

# 12. SETUP PHOTOS

Please refer to R14233208-EP1 for setup photos

# END OF TEST REPORT


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400
*This report shall not be reproduced except in full, without the written approval of UL LLC*