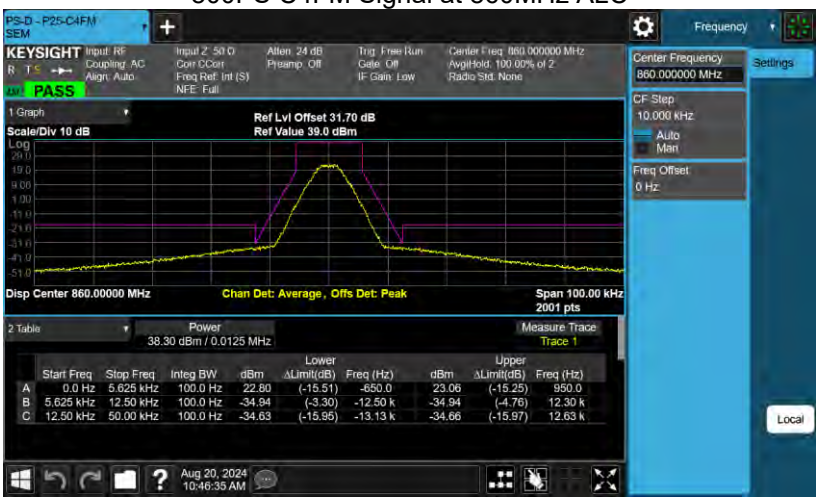
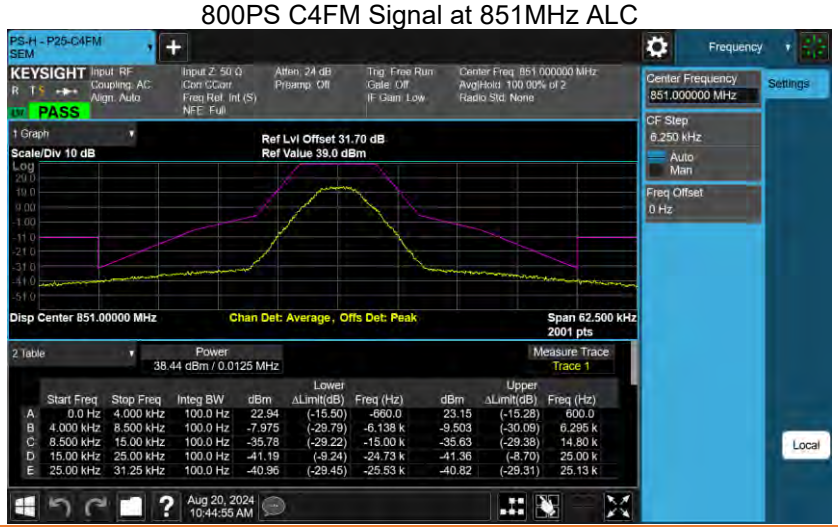
800PS C4FM Signal at 869MHz ALC

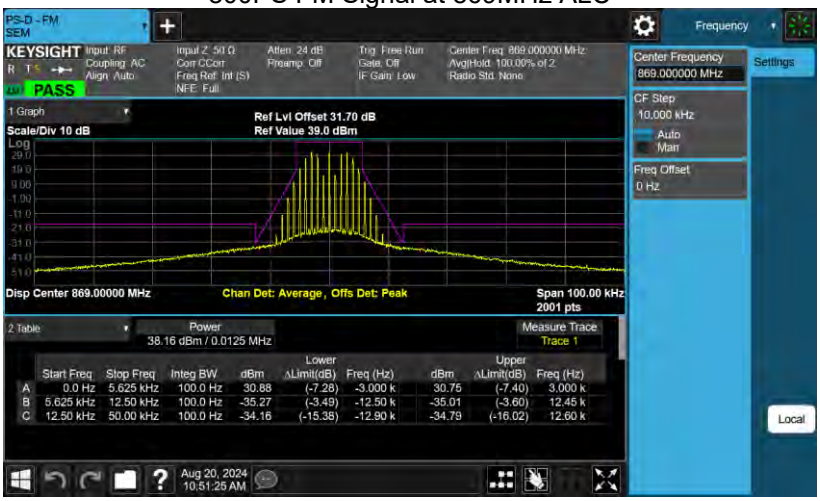
800PS C4FM Signal at 860MHz ALC



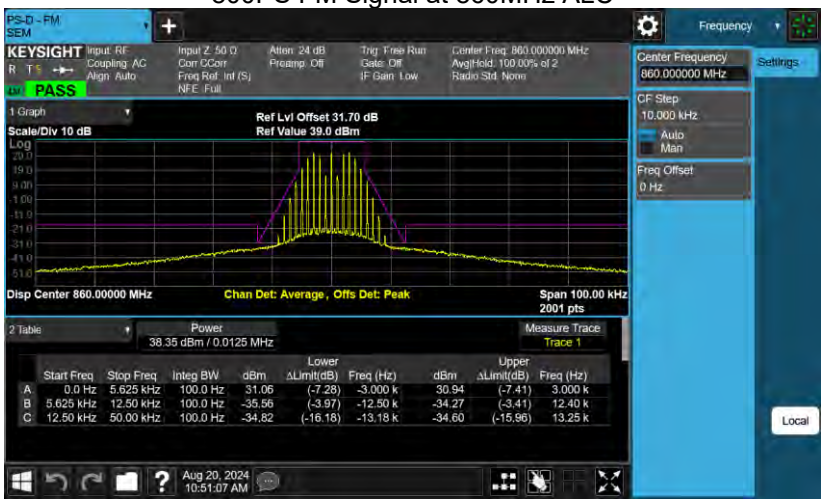
800PS C4FM Signal at 851MHz ALC



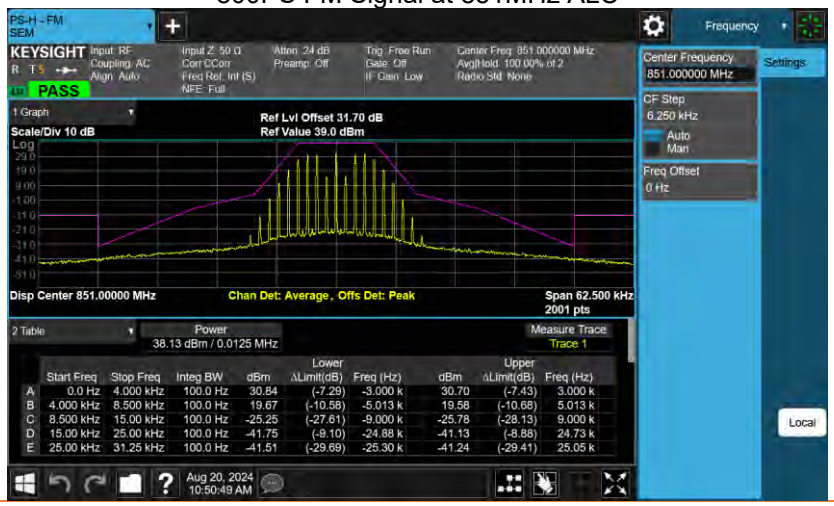
800PS FM Signal at 869MHz ALC



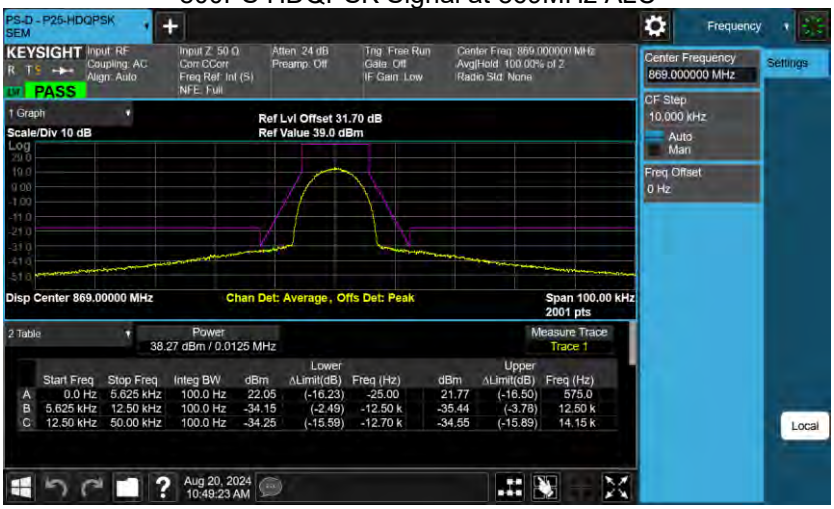
800PS FM Signal at 860MHz ALC



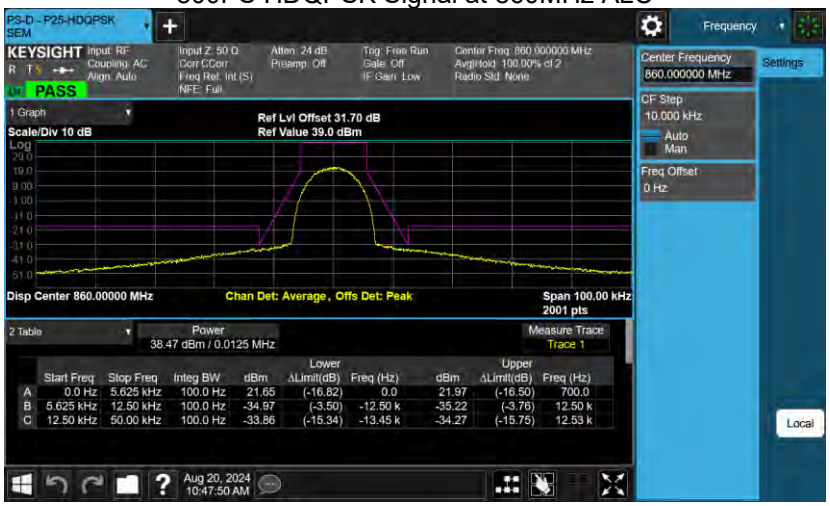
800PS FM Signal at 851MHz ALC



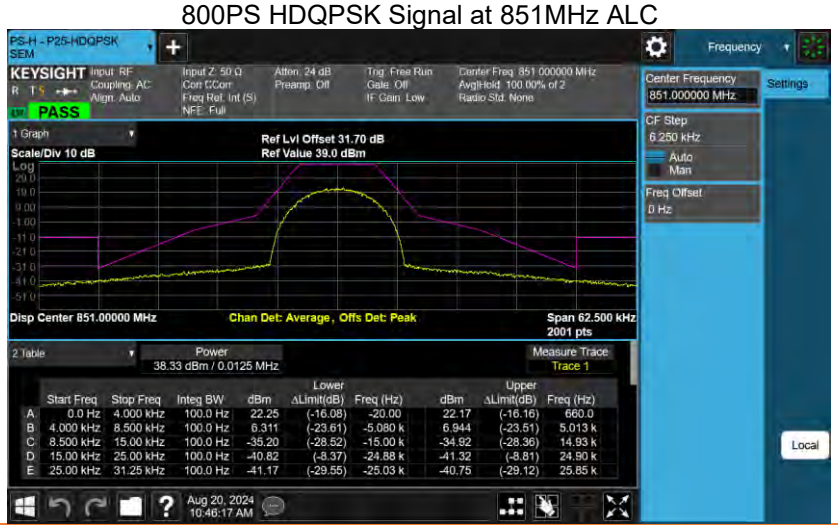
800PS HDQPSK Signal at 869MHz ALC



800PS HDQPSK Signal at 860MHz ALC



800PS HDQPSK Signal at 851MHz ALC



3.5 Input/Output Power and Amplifier/Booster Gain

Governing Doc	RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90	Room Temperature (°C)	20.5
Test Procedure	ANSI C63.26-2015, Section 7.2.3.4 KDB 935210 D05, v01r04, Clause 3.5, 4.5	Relative Humidity (%)	38.6
Test Location	Bench top, Richmond Lab	Barometric Pressure (kPa)	101.8
Test Engineer	Zara Vali	Date	August 20, 2024
EUT Voltage	☒ +48VDC	☐ 120VAC @ 60Hz	

Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	Calibration due
Signal Generator	Keysight	N5172B-506	MY53050270	Dec 12, 2023	Dec 12, 2026
Spectrum Analyzer	Keysight	N9020B-526	MY62153079	Aug 1, 2023	Aug 1, 2025

Span:	☒ Max Gain Frequency ± 1500kHz
Detector:	☒ Peak
RBW/VBW:	☒100k Hz/ 300 kHz
Type of Facility:	☒ Tabletop
Distance:	☒ Direct

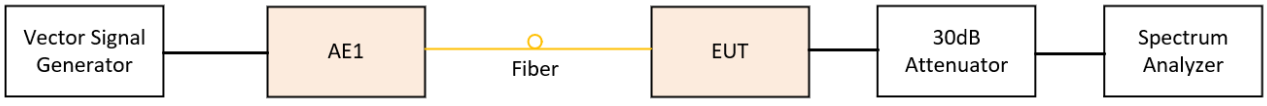
Maximum booster gain is 49.57 dB.

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

Test setup

The procedure used was ANSI C63.26-2015:. A CW tone was input at the frequency where the system gain is the maximum in the pass band, with the nominal input power level. The spectrum analyzer was connected to the output RF port via a 50 Ohm 30 dB attenuator. The maximum hold trace and peak detector was used to capture the output power. The output power minus the input power equals to the booster gain in dB.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**



Results

Test Band	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
415 PS	415.55	-11.0	36.99	47.99
465 PS	465	-12.6	36.97	49.57
700 PS	766.5	-12.2	37.06	49.26
800 PS	860	-10.8	36.99	47.79

3.6 Out-Of-Band / Out-Of-Block Intermodulation and Spurious Emissions

Governing Doc	RSS-131, Issue 4, 2022 S10.5 RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90	Room Temperature (°C)	20.5
Test Procedure	ANSI C63.26-2015, Section 7.2.3.6 Section 7.2.3.7 KDB 935210 D05, v01r04, Clause 3.6, 4.7	Relative Humidity (%)	38.6
Test Location	Bench top, Richmond Lab	Barometric Pressure (kPa)	101.8
Test Engineer	Zara Vali	Date	August 20, 2024
EUT Voltage	☒ +48VDC	☐ 120VAC @ 60Hz	

Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	Calibration due
Signal Generator	Keysight	N5172B-506	MY53050270	Dec 12, 2023	Dec 12, 2026
Spectrum Analyzer	Keysight	N9020B-526	MY62153079	Aug 1, 2023	Aug 1, 2025

Frequency Range:	☒ Max Gain Frequency ± 50kHz
Detector:	☒ Average
RBW/VBW:	☒100/910Hz
Type of Facility:	☒ Tabletop
Distance:	☒ Direct

As per RSS-Gen, Spurious Emissions include intermodulation products. Test procedures are carried out according to the ANSI C63.36-2015. Spurious Emissions requirements are specified in RSS-131 Section 10.5. RSS-131 section 10.3 also states the requirement that the effective radiated power (ERP) of intermodulation products shall not exceed -30dBm in a 10kHz measurement bandwidth. This requirement is related to deployment practice similar to FCC 47 CFR 90.219 which specifies the following good engineering practice. It is not a standard.

"Good engineering practice must be used in regard to the radiation of intermodulation products and noise, such that interference to licensed communications systems is avoided. In the event of harmful interference caused by any given deployment, the FCC may require additional attenuation or filtering of the emissions and/or noise from signal boosters or signal booster systems, as necessary to eliminate the interference."

As part of the system commissioning practice, professional Zone Enhancer installer/field technician measures the intermodulation products by attaching a spectrum analyser to the output of the Remote Unit in the field. Since every deployment is different with different passive distribution network, field technician is required to assess the ERP of the intermodulation products at the antenna by taking into account the total passive component losses and make the necessary adjustments to meet the -30dBm requirement. For some jurisdiction, lower than -30dBm is required.

The intermodulation product of 2 tone is below the -13dBm emission limit with input power
- 0.5 dB below AGC threshold
- 2 dB below AGC threshold
- 3 dB above AGC threshold

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

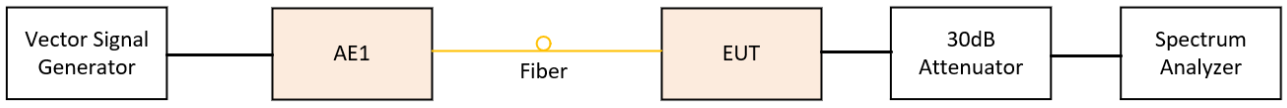
Test setup

The procedure used was ANSI C63.26-2015. Two tones (CW) method was used. The input power to the amplifier was set at maximum drive level by combining the two tones. The two tones were chosen in such a way (1) the third order intermodulation product frequencies are located within the pass band of the DUT and (2) they produce the worst-case emissions out of band.

Based on ANSI C63.26-2015, the two tone was located on either side of the maximum gain frequence in the passing band, and separated with the available spacing, which is 12.5kHz.

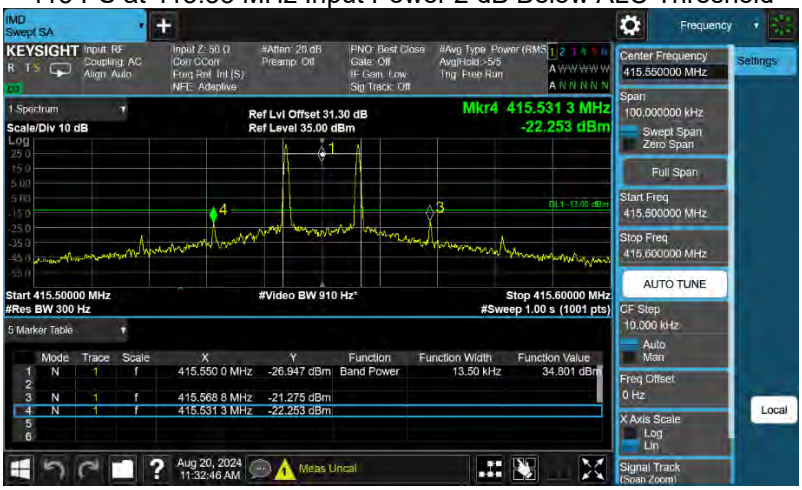
Measurements were performed with modulated -tone at identical input amplitude which produced integrated maximum rated output power.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**



Results

415 PS at 415.55 MHz Input Power 2 dB Below ALC Threshold



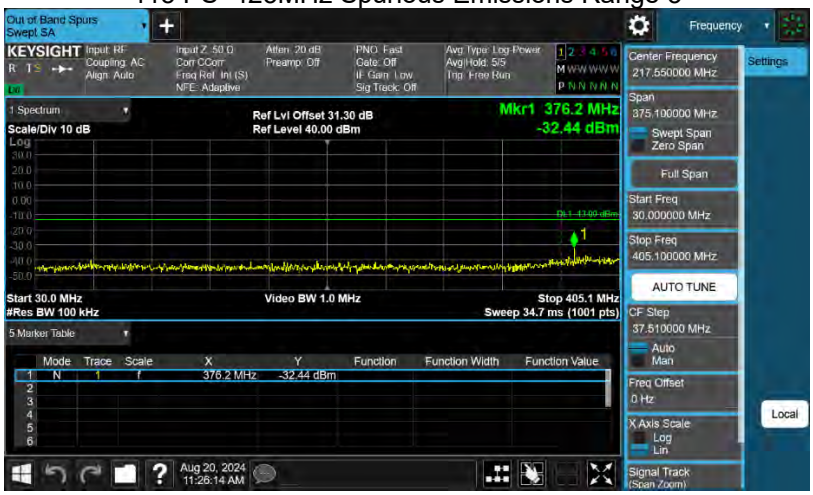
415 PS at 415.55 MHz Input Power 3 dB Above ALC Threshold

415 PS at 415.55 MHz Input Power 0.5 dB Below ALC Threshold

415 PS 425MHz Spurious Emissions Range 1

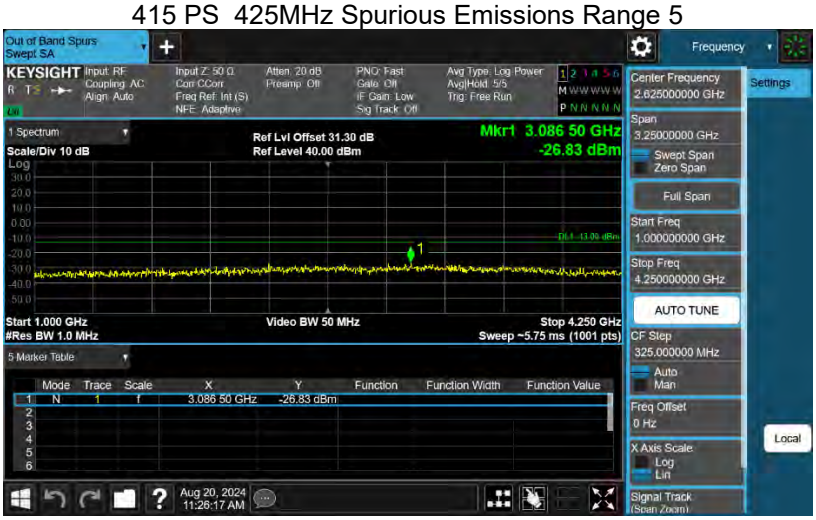
415 PS 425MHz Spurious Emissions Range 2

415 PS 425MHz Spurious Emissions Range 3

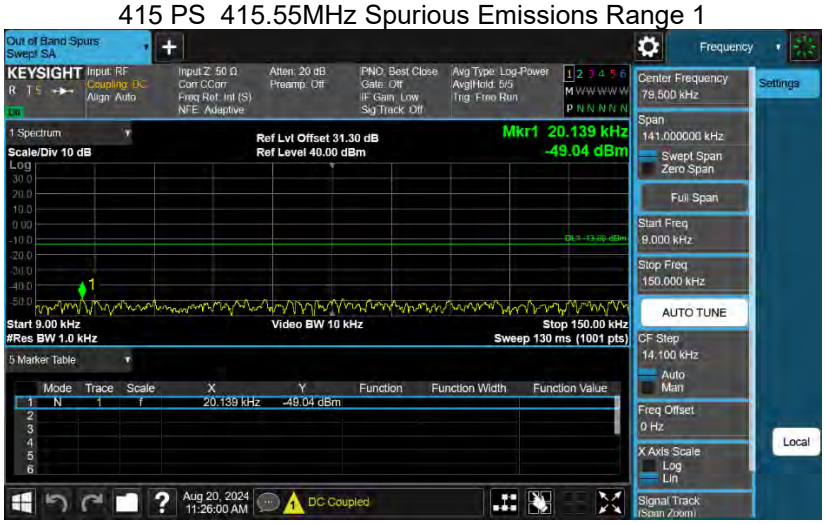


415 PS 425MHz Spurious Emissions Range 4

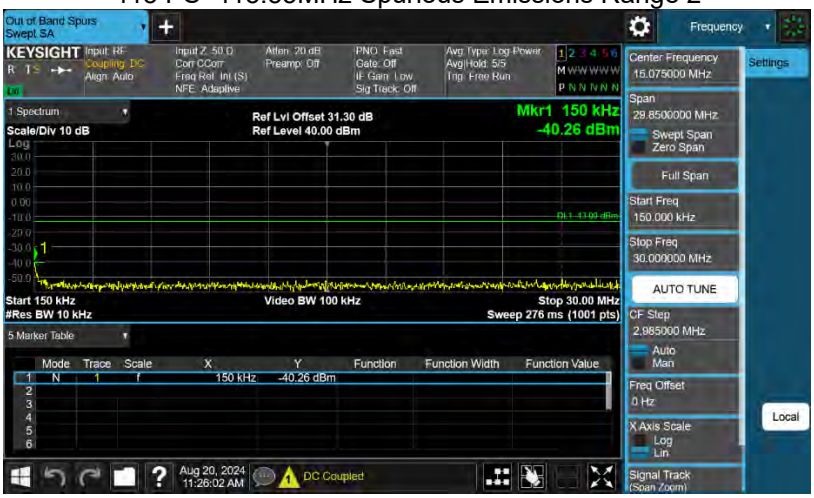
415 PS 425MHz Spurious Emissions Range 5



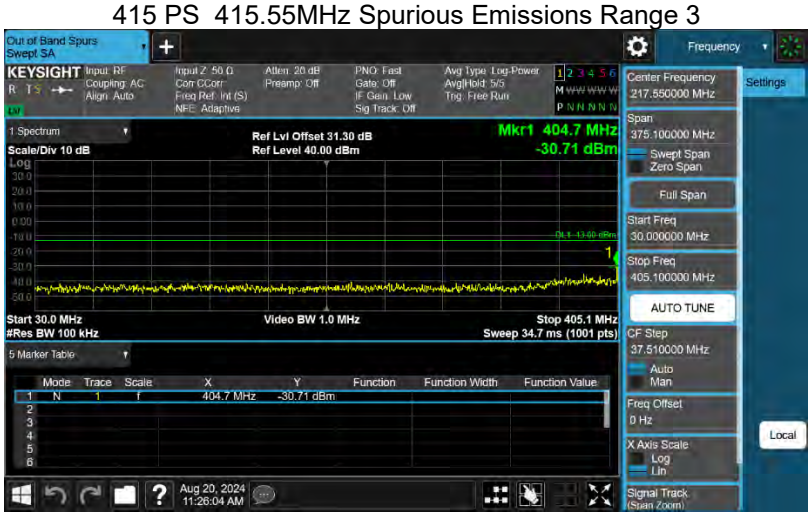
415 PS 415.55MHz Spurious Emissions Range 1



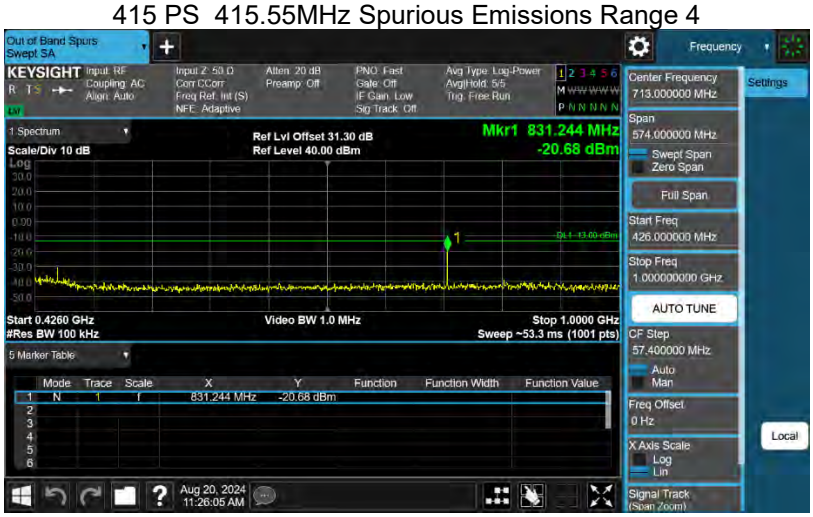
415 PS 415.55MHz Spurious Emissions Range 2



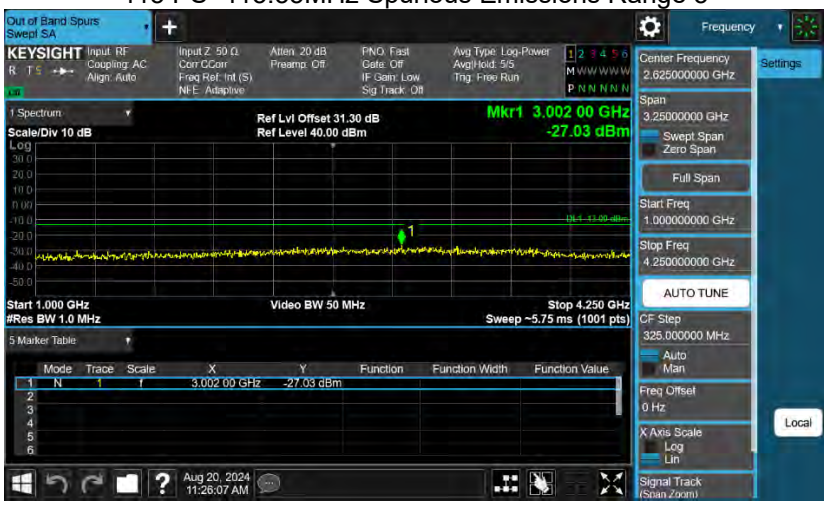
415 PS 415.55MHz Spurious Emissions Range 3



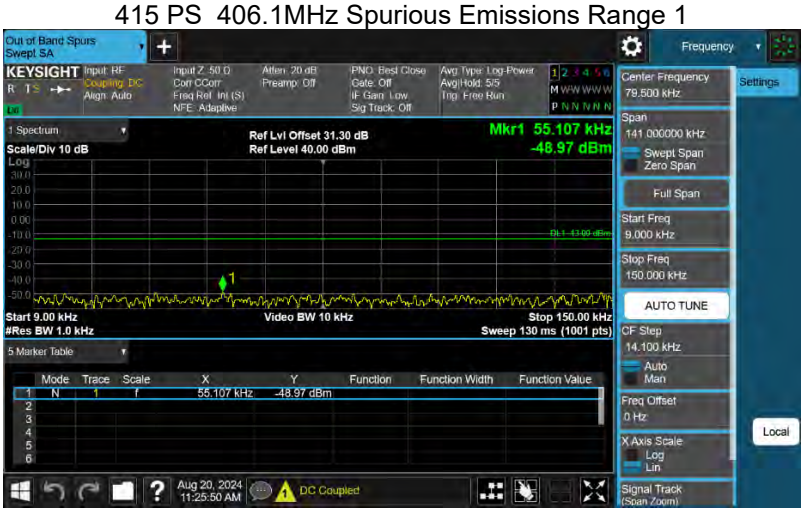
415 PS 415.55MHz Spurious Emissions Range 4



415 PS 415.55MHz Spurious Emissions Range 5

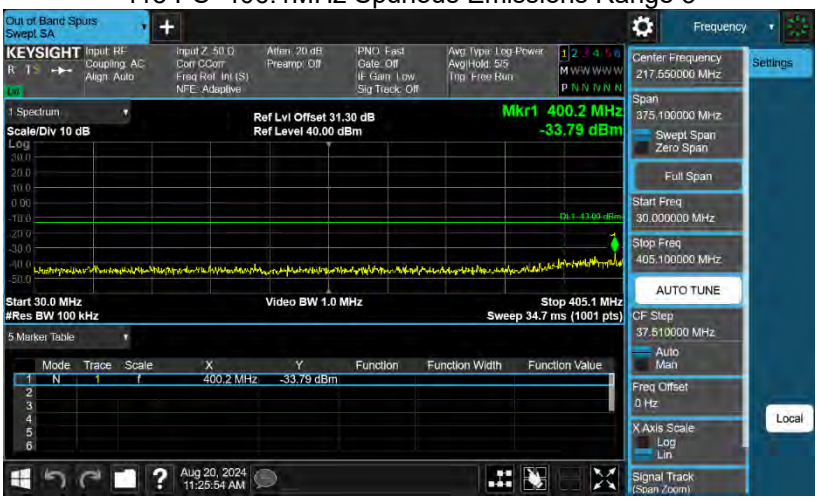


415 PS 406.1MHz Spurious Emissions Range 1

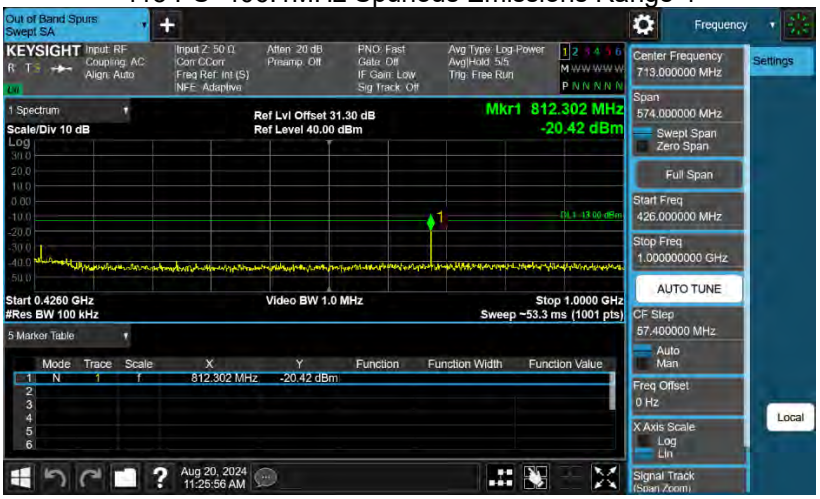


415 PS 406.1MHz Spurious Emissions Range 2

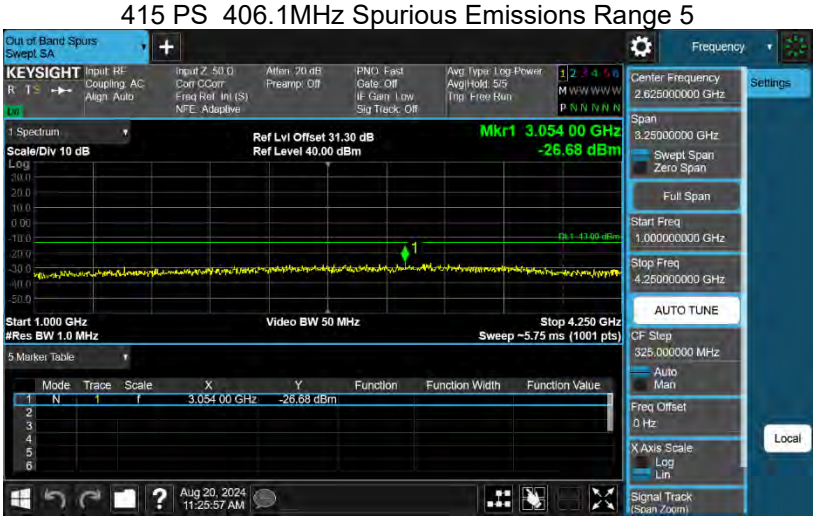
415 PS 406.1MHz Spurious Emissions Range 3



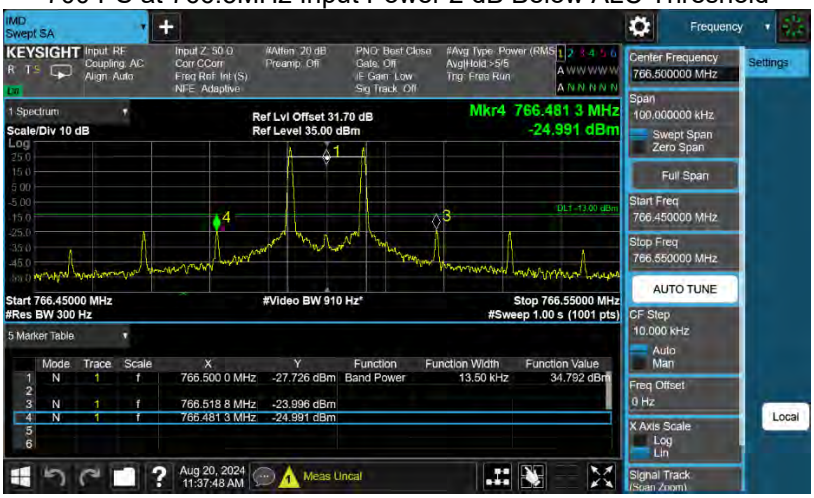
415 PS 406.1MHz Spurious Emissions Range 4



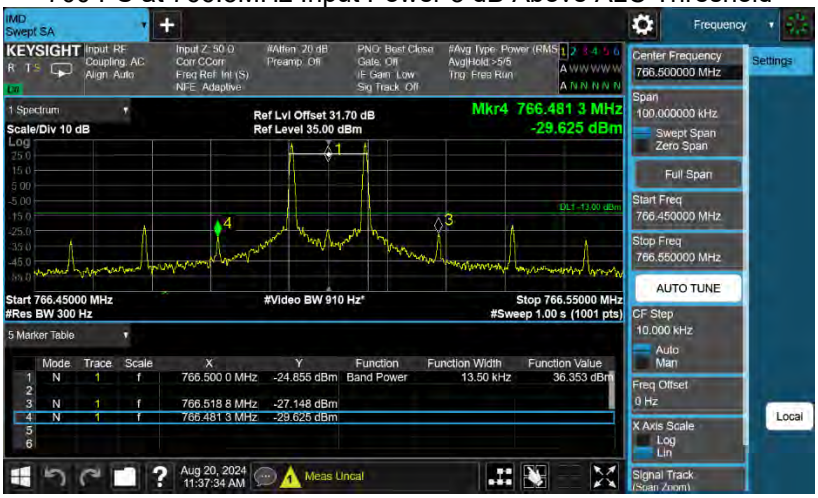
415 PS 406.1MHz Spurious Emissions Range 5



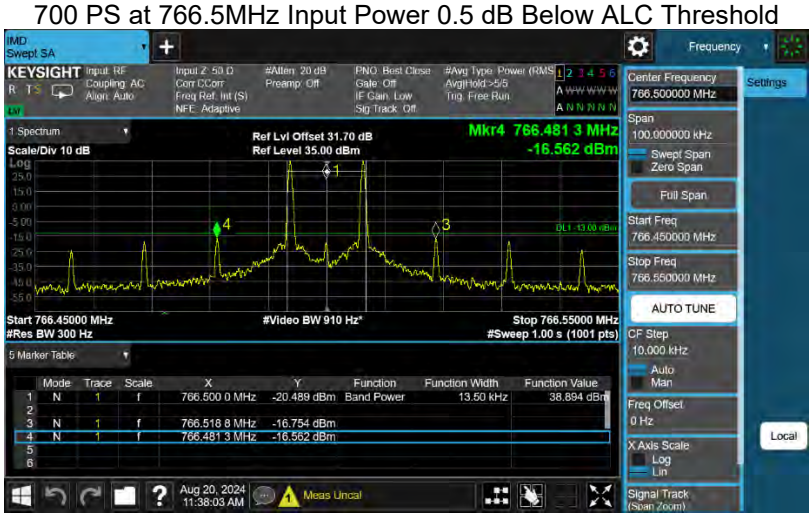
700 PS at 766.5MHz Input Power 2 dB Below ALC Threshold



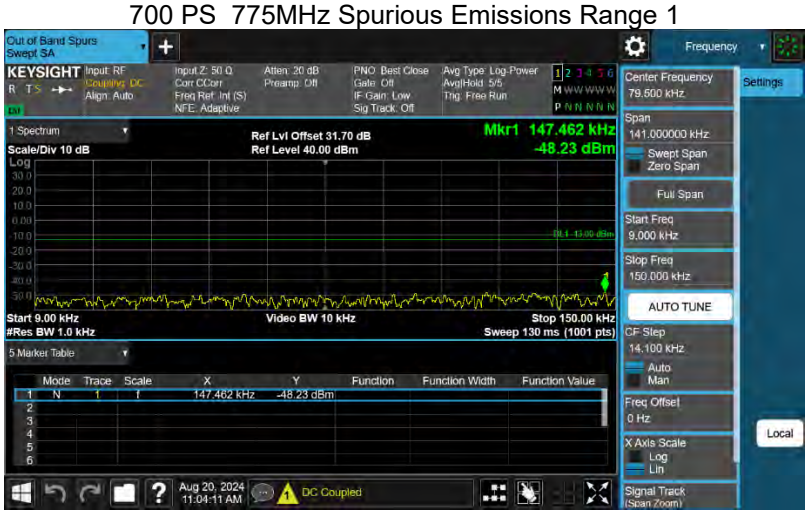
700 PS at 766.5MHz Input Power 3 dB Above ALC Threshold



700 PS at 766.5MHz Input Power 0.5 dB Below ALC Threshold

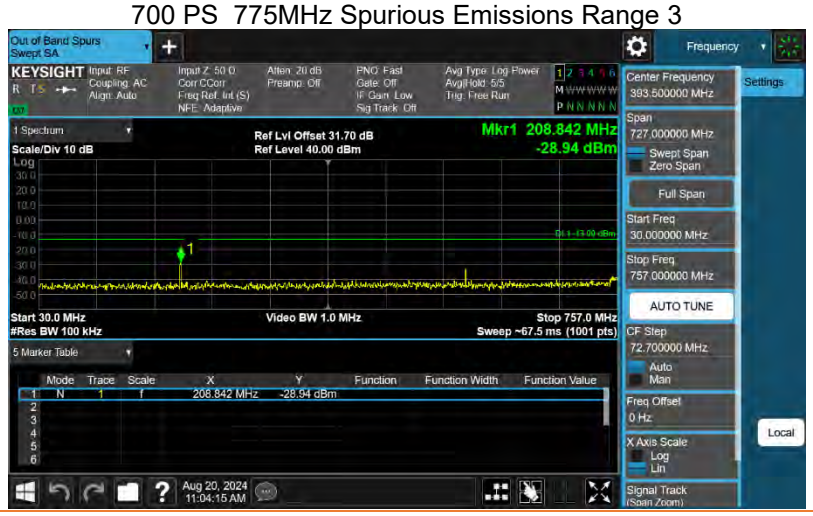


700 PS 775MHz Spurious Emissions Range 1

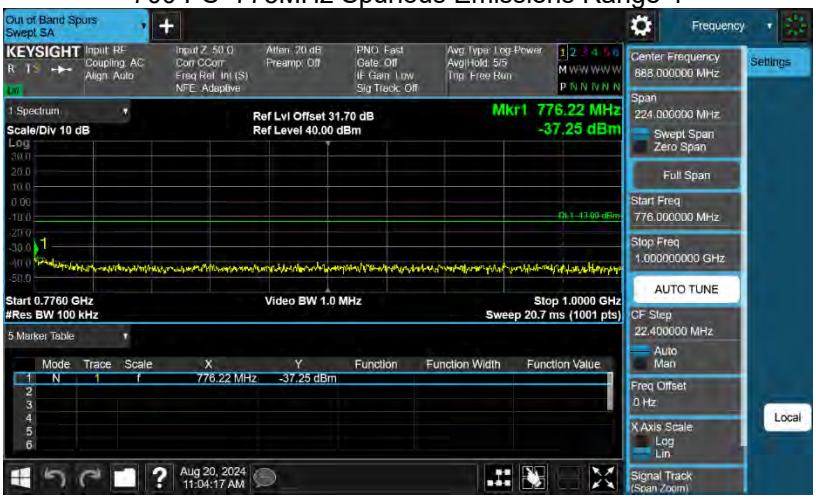


700 PS 775MHz Spurious Emissions Range 2

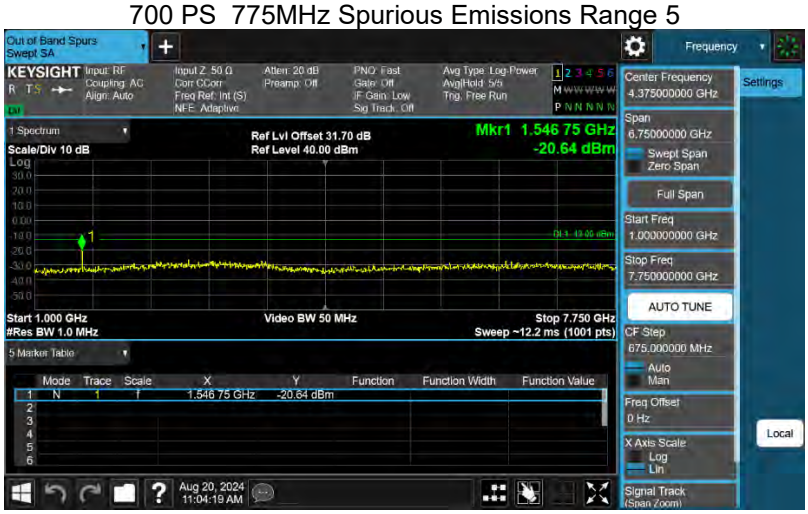
700 PS 775MHz Spurious Emissions Range 3



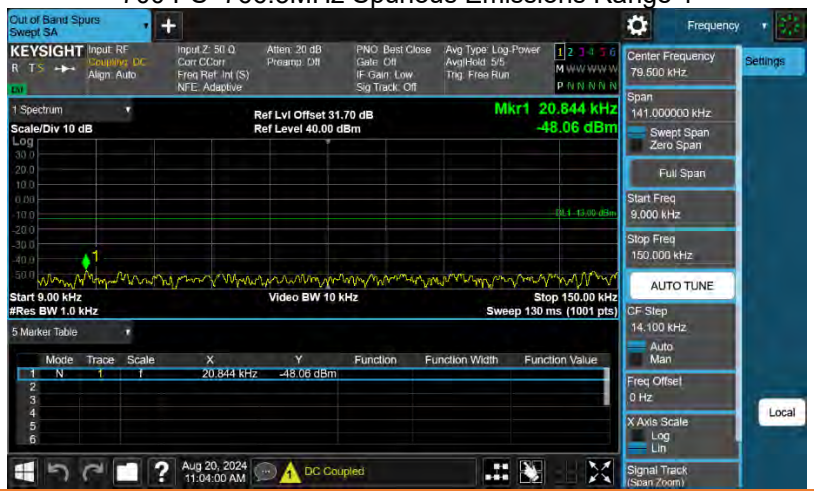
700 PS 775MHz Spurious Emissions Range 4



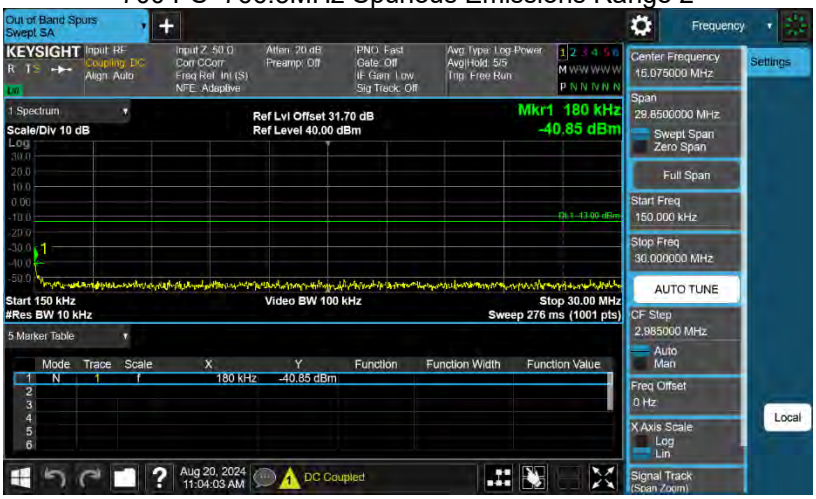
700 PS 775MHz Spurious Emissions Range 5



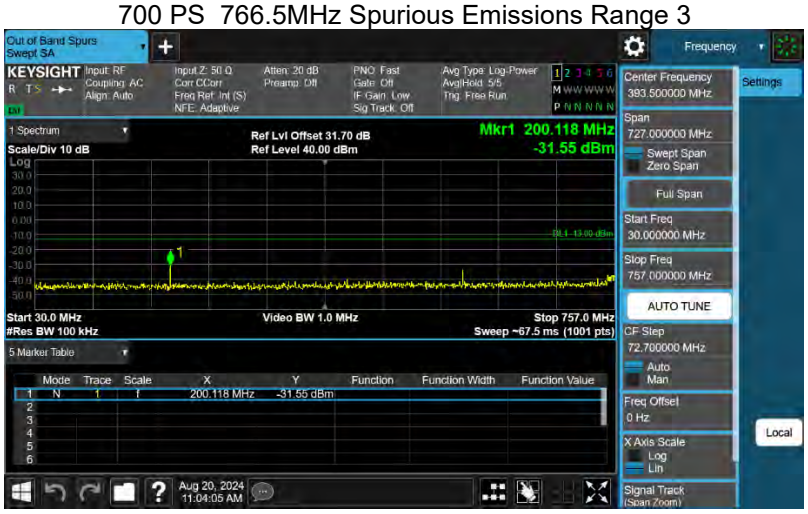
700 PS 766.5MHz Spurious Emissions Range 1



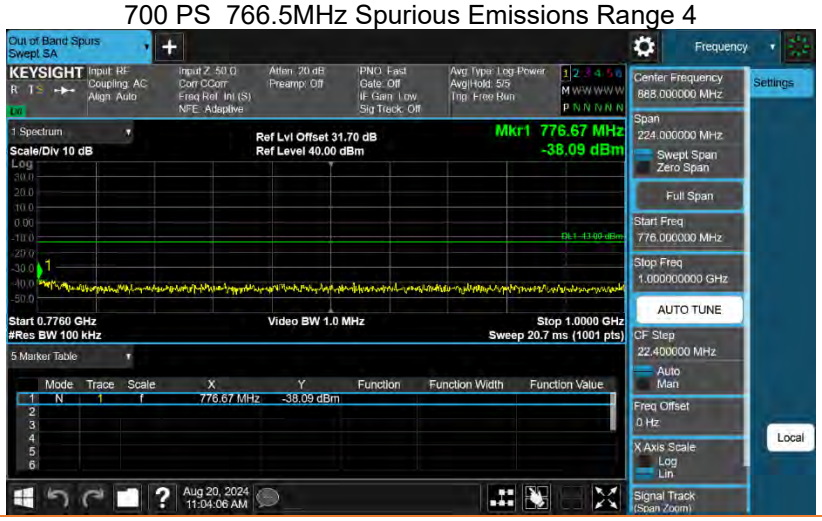
700 PS 766.5MHz Spurious Emissions Range 2



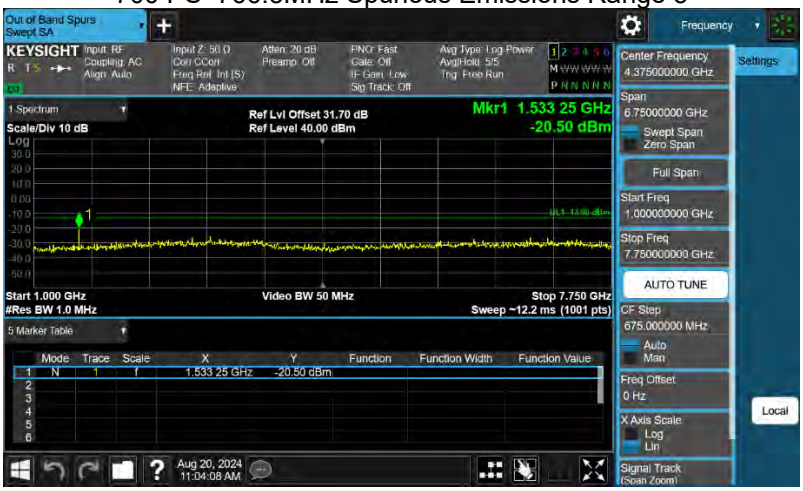
700 PS 766.5MHz Spurious Emissions Range 3



700 PS 766.5MHz Spurious Emissions Range 4



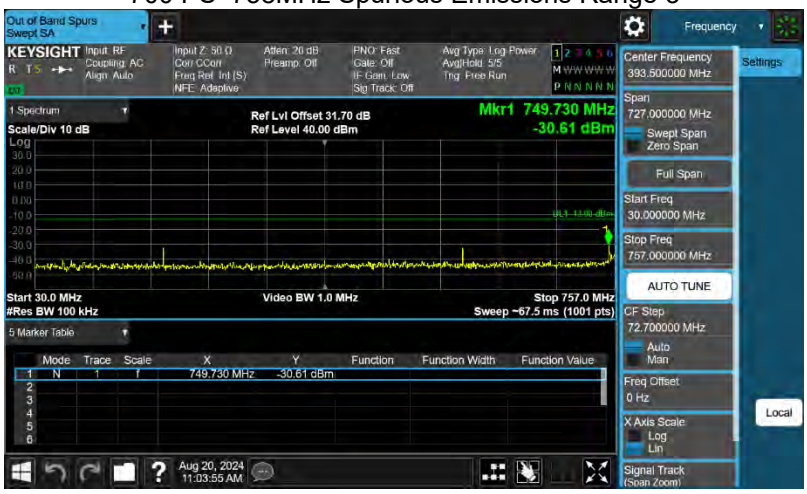
700 PS 766.5MHz Spurious Emissions Range 5



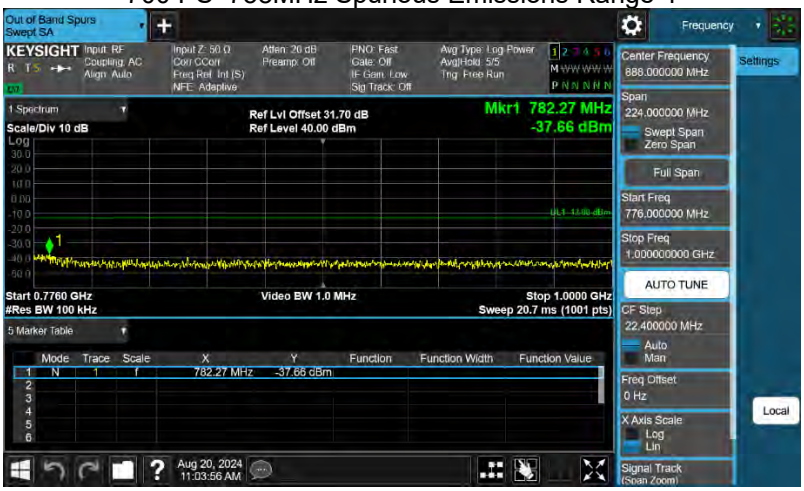
700 PS 758MHz Spurious Emissions Range 1

700 PS 758MHz Spurious Emissions Range 2

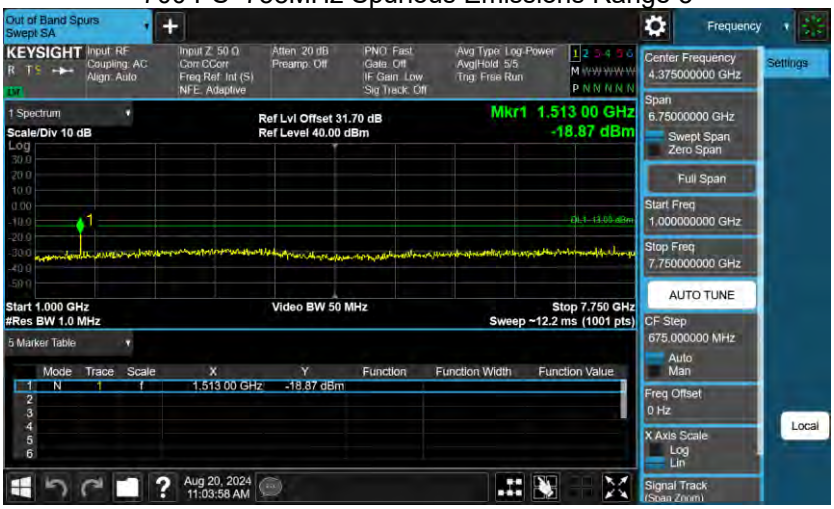
700 PS 758MHz Spurious Emissions Range 3



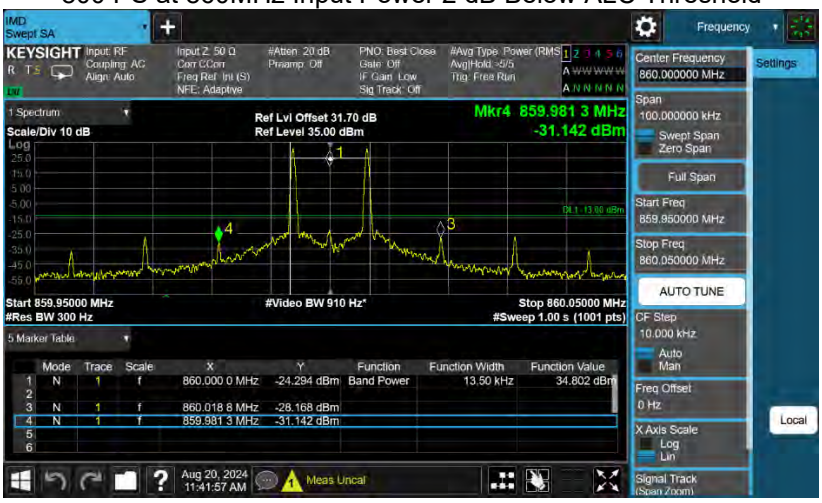
700 PS 758MHz Spurious Emissions Range 4



700 PS 758MHz Spurious Emissions Range 5



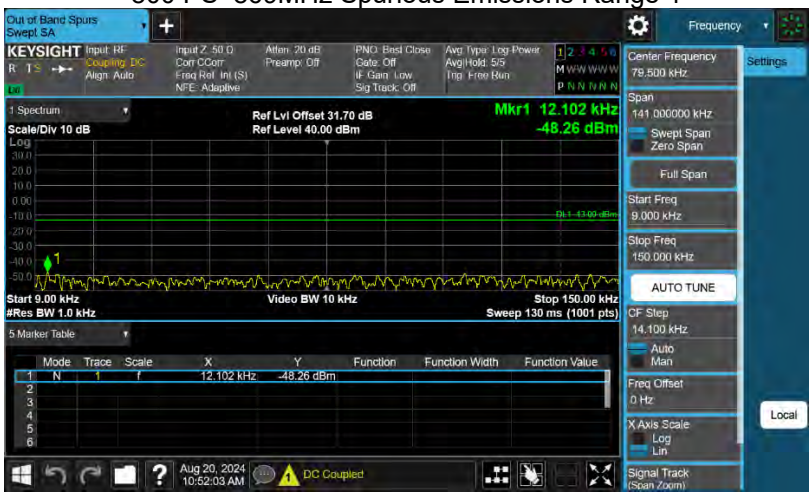
800 PS at 860MHz Input Power 2 dB Below ALC Threshold



800 PS at 860MHz Input Power 3 dB Above ALC Threshold

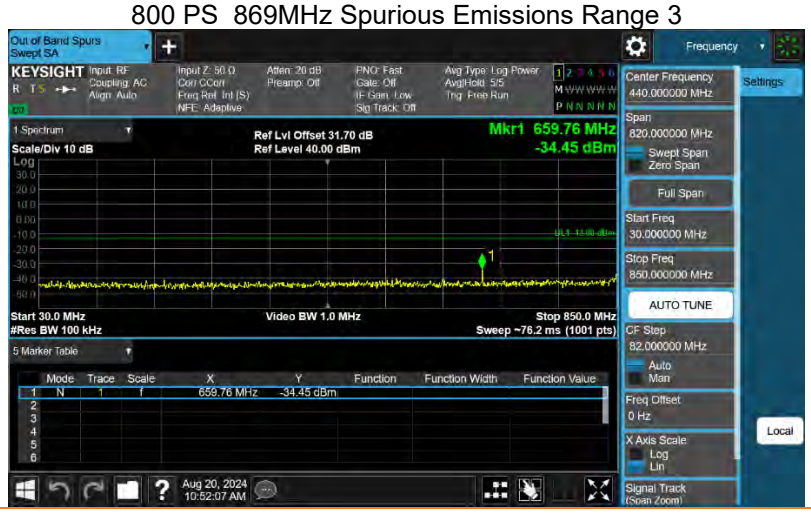
800 PS at 860MHz Input Power 0.5 dB Below ALC Threshold

800 PS 869MHz Spurious Emissions Range 1

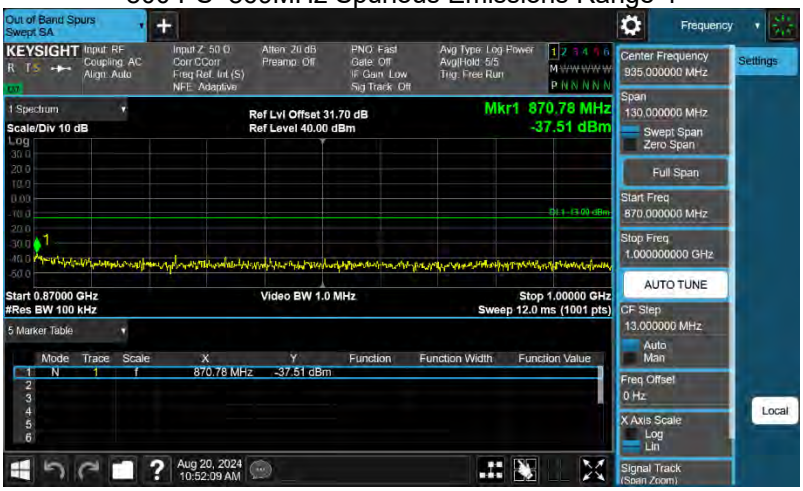


800 PS 869MHz Spurious Emissions Range 2

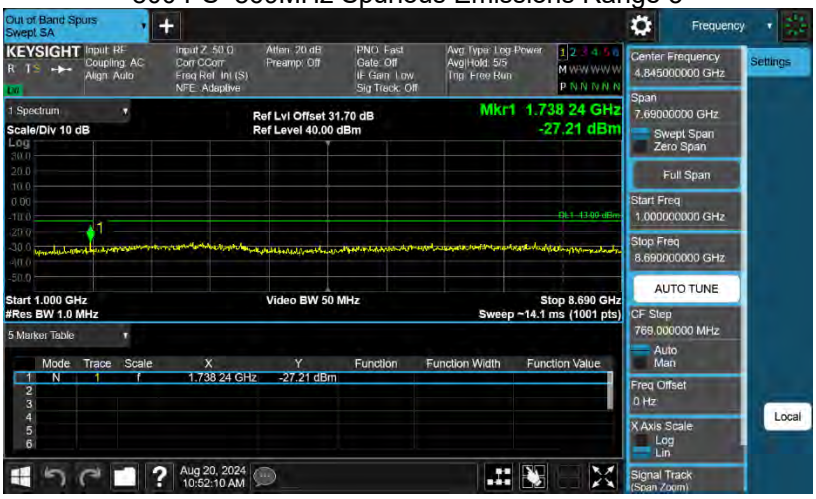
800 PS 869MHz Spurious Emissions Range 3



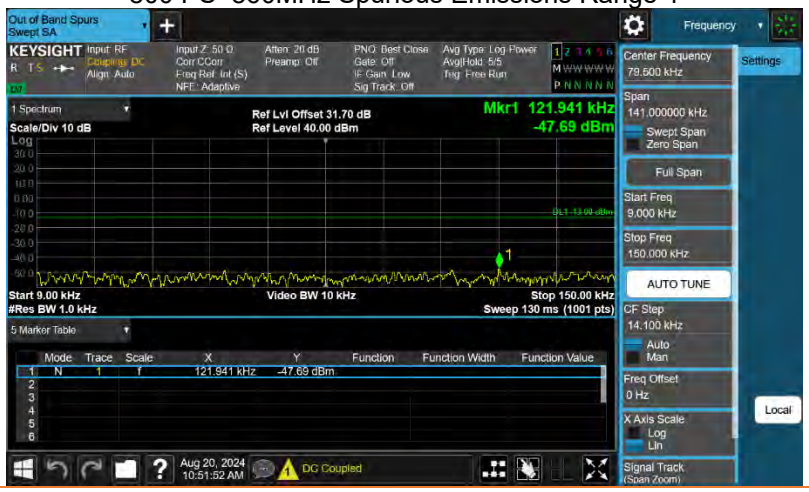
800 PS 869MHz Spurious Emissions Range 4



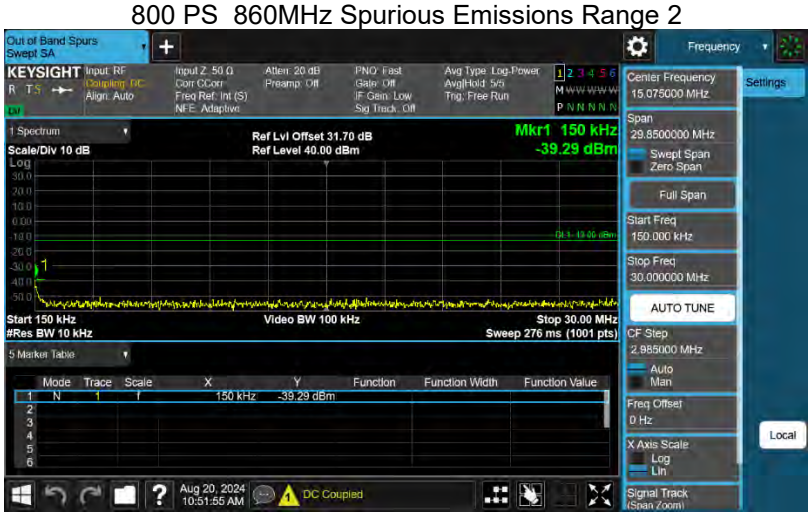
800 PS 869MHz Spurious Emissions Range 5



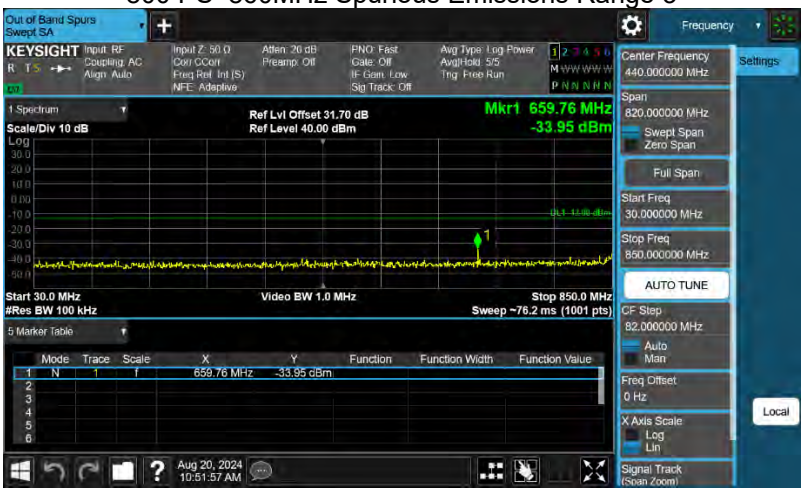
800 PS 860MHz Spurious Emissions Range 1



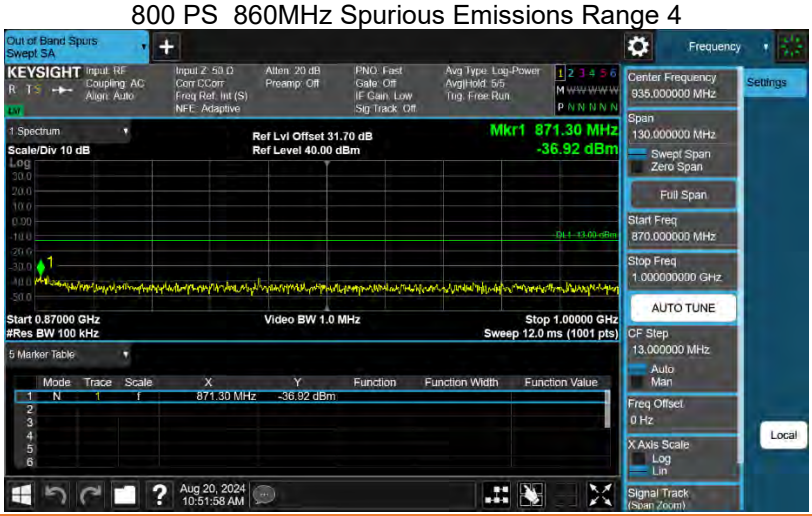
800 PS 860MHz Spurious Emissions Range 2



800 PS 860MHz Spurious Emissions Range 3

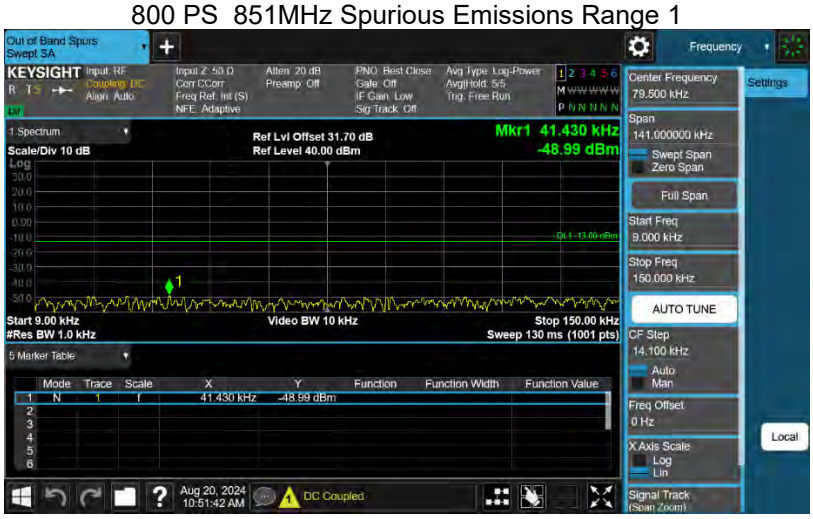


800 PS 860MHz Spurious Emissions Range 4

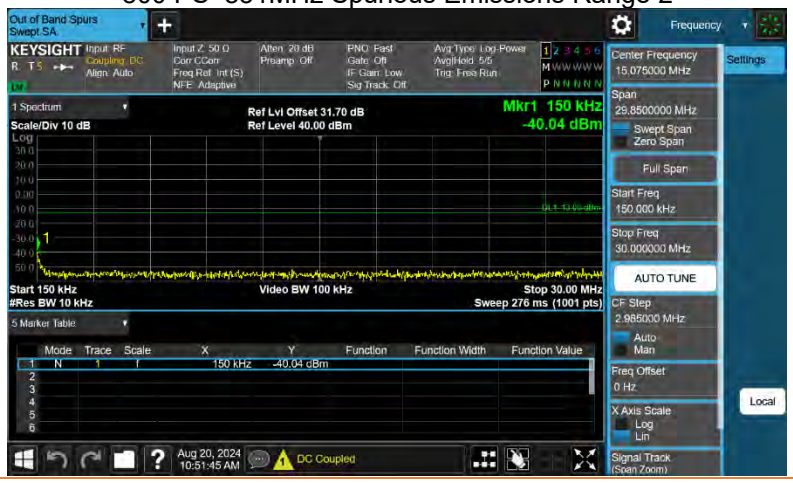


800 PS 860MHz Spurious Emissions Range 5

800 PS 851MHz Spurious Emissions Range 1

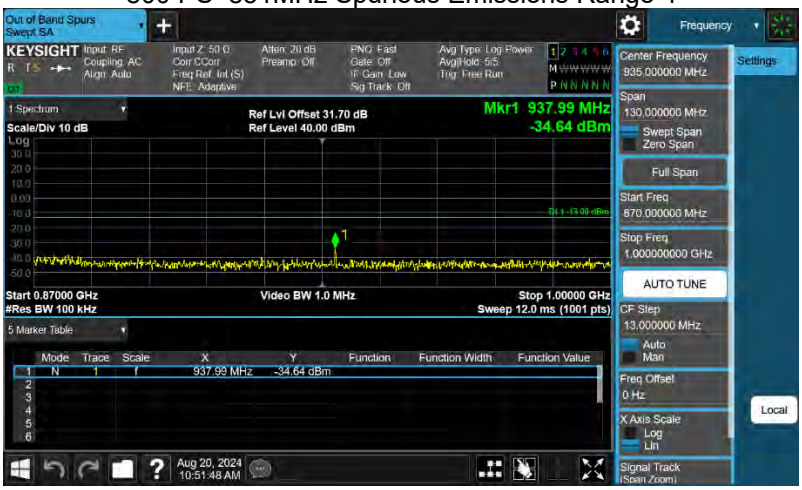


800 PS 851MHz Spurious Emissions Range 2



800 PS 851MHz Spurious Emissions Range 3

800 PS 851MHz Spurious Emissions Range 4



800 PS 851MHz Spurious Emissions Range 5

3.7 Noise Figure

Governing Doc	RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90	Room Temperature (°C)	20.5
Test Procedure	ANSI C63.26-2015, Section 7.2.3.5 KDB 935210 D05, v01r04, Clause 4.6	Relative Humidity (%)	38.6
Test Location	Bench top, Richmond Lab	Barometric Pressure (kPa)	101.8
Test Engineer	Zara Vali	Date	August 20, 2024
EUT Voltage	☒ +48VDC	☐ 120VAC @ 60Hz	

Test Equipment Used	Manufacturer	Model	Serial Number	Calibration date	Calibration due
Signal Generator	Keysight	N5172B-506	MY53050270	Dec 12, 2023	Dec 12, 2026
Spectrum Analyzer	Keysight	N9020B-526	MY62153079	Aug 1, 2023	Aug 1, 2025

Frequency Range:	☒ 2 times of the passband on each band
Detector:	☒ Average
RBW:	☒910 kHz
Type of Facility:	☒ Tabletop
Distance:	☒ Direct

Noise Figure on each band is less than the 9 dB required.

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

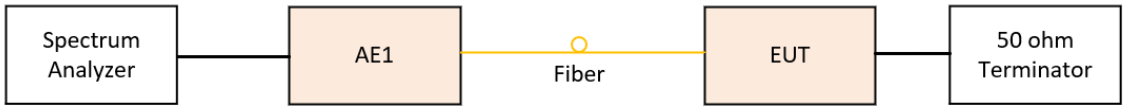
Test setup

Based on ANSI C63.26: 2015, the system maximum gain and the noise density is measured.Measurements were performed within the EUT's passband.

The noise figure is then calculated by NF = NP – Gain + KTB Noise; where NP is in band noise power per Herz,

Gain is measured at the maximum noise frequence with -55 dBm input signal in UL. KTB Noise is 174dB/Hz.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**



Results

Test Band	Gain (dB)	kTB (dBm/Hz)	Measured Value (dBm/Hz)	Noise Figure (dB)
415 PS	415.55	174	-112.3	5.76
465 PS	465	174	-113.2	5.57
700 PS	766.5	174	-111.1	5.11
800 PS	860	174	-111.6	3.87

3.8 Frequency Stability

The Quad-Band RU37 Remote Unit under test is sychronized to the reference clock of the Master Unit (DMU) over the optical link. Therefore there is no frequency error regardless of clock accuracy or temperature change. In addition, the RU37 Remote Unit is designed and verified to operate within ±15% of the rated 48V DC power input.

3.9 Radiated Spurious Emissions – Enclosure 9 kHz – 30 MHz

Standard	RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90 FCC Part 2.1053
Test method	ANSI C63.26-2015, Section 5.5 KDB 935210 D05, v01r04, Clause 3.8, 4.9 KDB Publication 971168
Tested by	Zara Vali
Test date	August 20, 2024
Test location	Richmond lab, stand #2

Applied limit

Radiated Emission FCC/ISED	
Frequency	**Field strength (microvolts/meter)**
9 - 490 kHz	2400/F(kHz) at 300 m
490 - 1705 kHz	24000/F(kHz) at 30 m
1.705 - 30 MHz	30 at 30 m
Note 1. The lower limit shall apply at the transition frequency Note 2. Additional provisions may be required for cases where interference occurs Note 3: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.	

RSS – Gen, Clause 8.10 Restricted frequency bands

a. The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7.
b. Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in the above table.
c. Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in the above table.

Test set-up description	☒	Equipment on a table of 80 cm height
	☐	Equipment on the floor (insulated from ground plane)
	☐	Other:
Test method applied	☒	SAC with measurement distance [m]: ☒3 ☐10
	☐	FAR CISPR 16-2-3 with measurement distance [m]: 3
	☐	FAR IEC 61000-4-22 with measurement distance [m]: 3
	☐	TEM Waveguide according to IEC 61000-4-20

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

Test Method

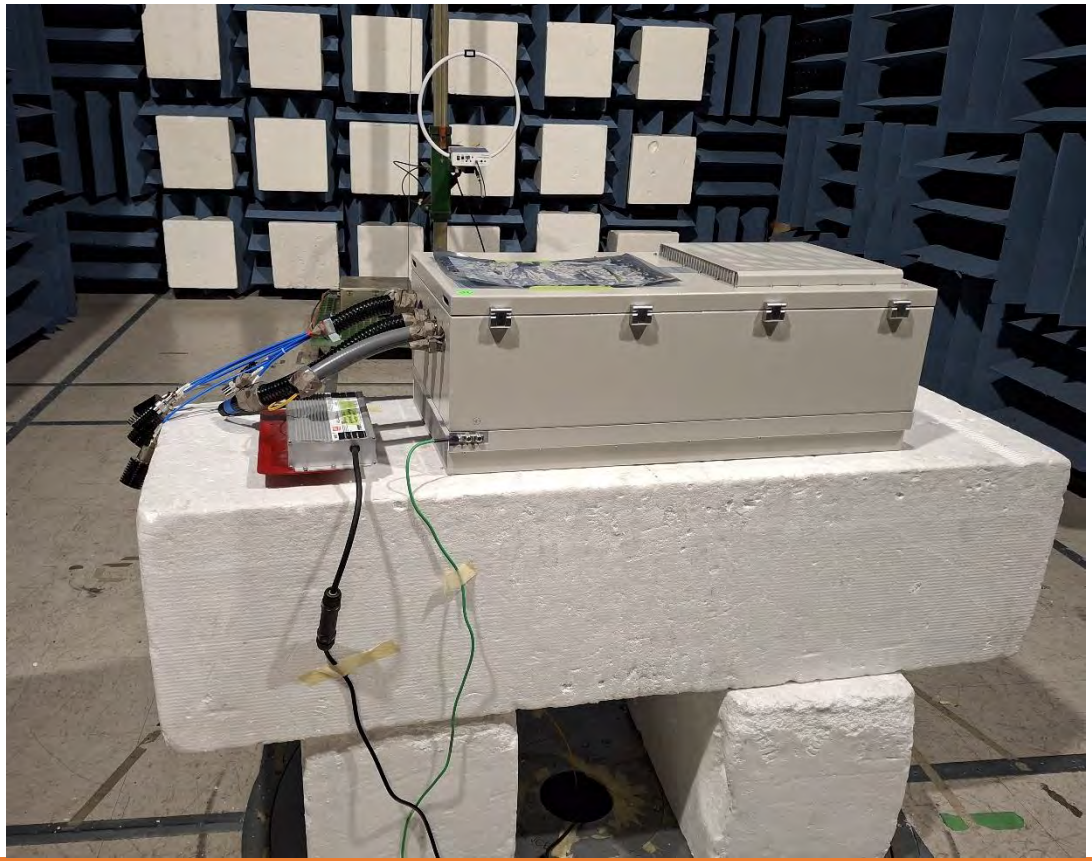
This test measures the radiating levels from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT.

A scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7! with the receiver in the peak mode. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters with both horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. Measurements were then made using CISPR quasi peak when the peak readings were within 20dB of the limit line. The numerical results are included herein to demonstrate compliance.

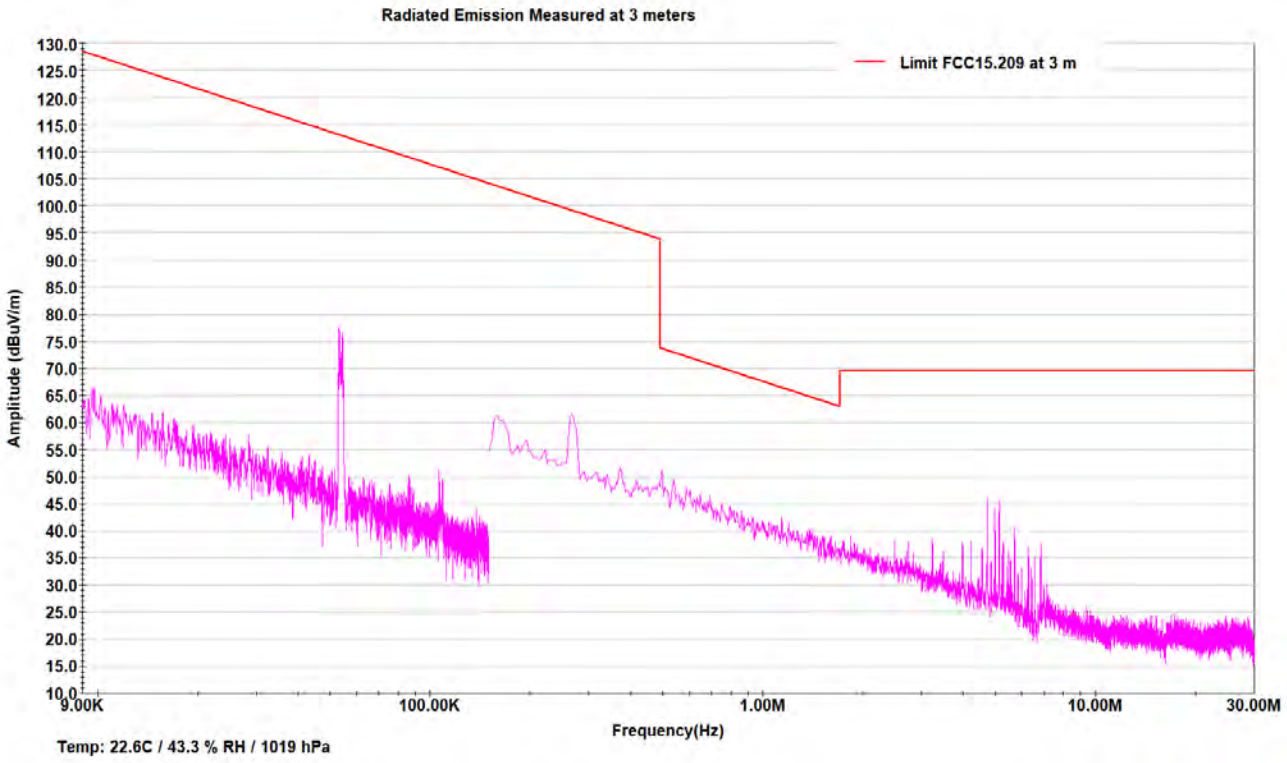
Test Setup

The EUT was placed on a 0.8 m non-conducting table above a Turn table in SAC.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**



Test Result



Note (1) No Qpeak measurements were conducted when the emission was identified as either ambient noise or 20 dB, or more, below the limit line.

3.10 Radiated Spurious Emissions – Enclosure 30 MHz – 1 GHz

Standard	RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90 FCC Part 2.1053
Test method	ANSI C63.26-2015, Section 5.5 KDB 935210 D05, v01r04, Clause 3.8, 4.9 KDB Publication 971168
Tested by	Zara Vali
Test date	August 20, 2024
Test location	Richmond lab, stand #2

Applied limit

Radiated Emission FCC/ISED Class B Limit at 3 Meters	
Frequency (MHz)	**Quasi-peak (dB µV/m)**
30 – 88	40
88 – 216	43.52
216 - 960	46.02
Above 960	53.98
Note 1. The lower limit shall apply at the transition frequency Note 2. Additional provisions may be required for cases where interference occurs Note 3. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.	

RSS – Gen, Clause 8.10 Restricted frequency bands

a. The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7.

b. Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in the above table.

c. Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in the above table.

Test set-up description	☒	Equipment on a table of 80 cm height
	☐	Equipment on the floor (insulated from ground plane)
	☐	Other:
Test method applied	☒	SAC with measurement distance [m]: ☒3 ☐10
	☐	FAR CISPR 16-2-3 with measurement distance [m]: 3
	☐	FAR IEC 61000-4-22 with measurement distance [m]: 3
	☐	TEM Waveguide according to IEC 61000-4-20

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

Test Method

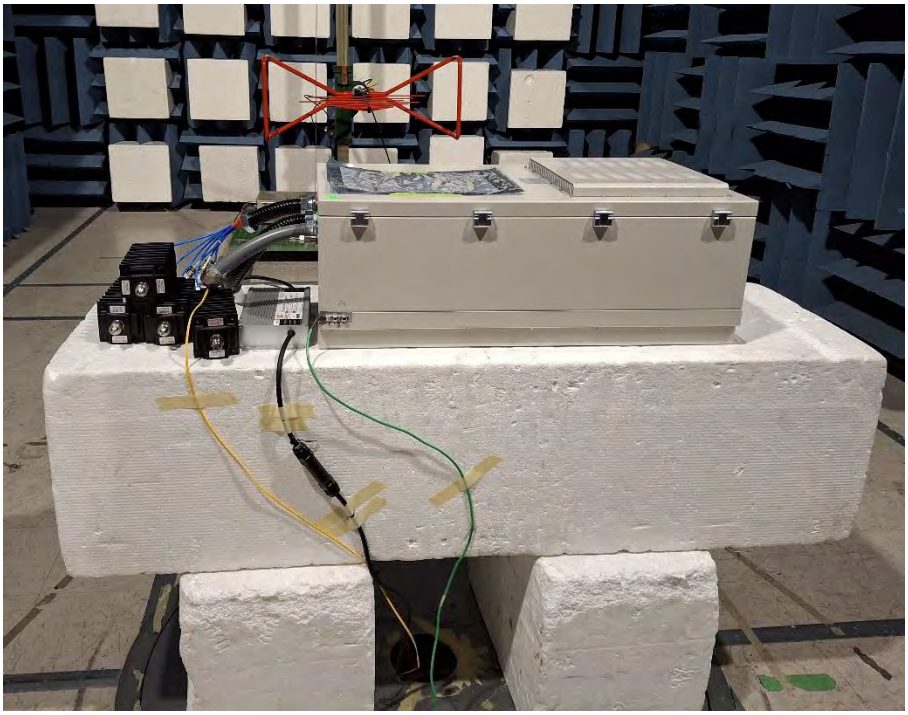
This test measures the radiating levels from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT.

A scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7! with the receiver in the peak mode. The receiver IF bandwidth was 120 kHz and scan step was less than 30kHz. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters with both horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. Measurements were then made using CISPR quasi peak when the peak readings were within 20dB of the limit line. The numerical results are included herein to demonstrate compliance.

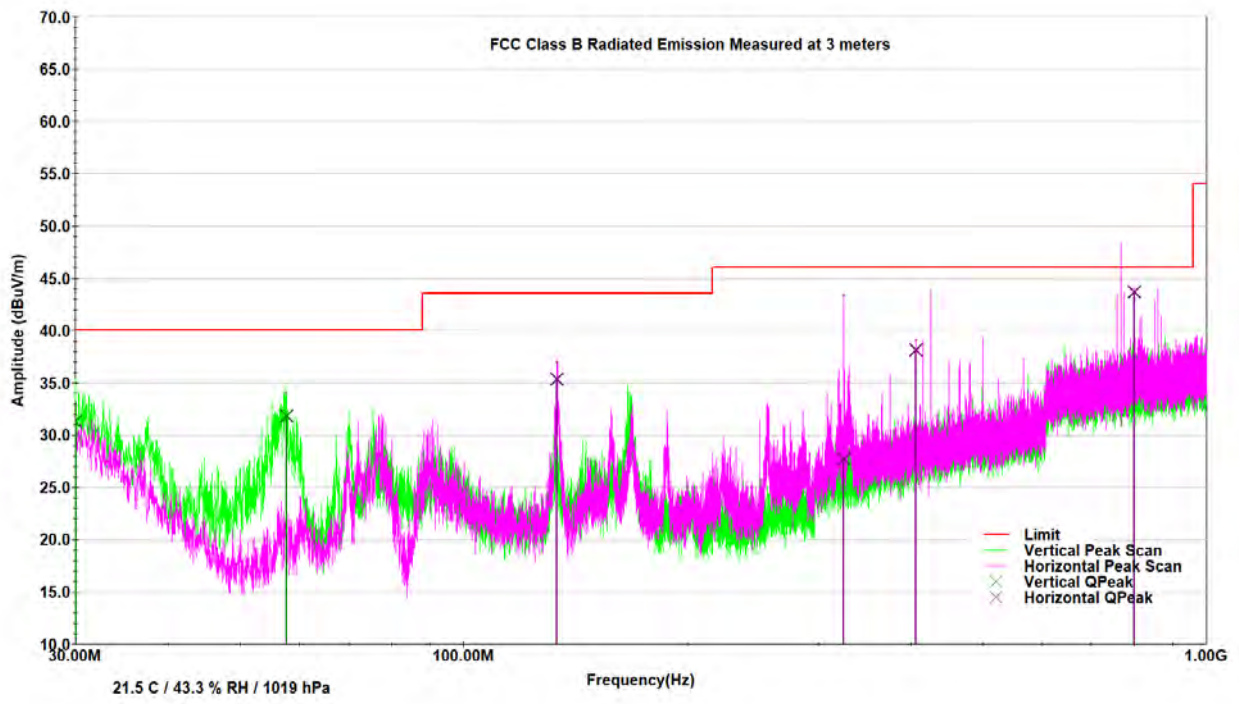
Test Setup

The EUT was placed on a 0.8 m non-conducting table above a Turn table in SAC.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**



Test Result



Frequency	Antenna Polarization	Raw QPeak	Antenna Factor	Correction Factor	QPeak	Margin	Limit
MHz	V/H	dBuV	dB/m	dB	dBuV/m	dB	dBuV/m
30.04	V	5.7	25	0.7	31.3	8.7	40
57.81503	V	19.8	11.2	0.8	31.8	8.2	40

Frequency	Antenna Polarization	Raw QPeak	Antenna Factor	Correction Factor	QPeak	Margin	Limit
MHz	V/H	dBuV	dB/m	dB	dBuV/m	dB	dBuV/m
133.428020	H	16.0	18.2	1.1	35.3	8.2	43.5
325.000372	H	7.4	18.6	1.7	27.7	18.3	46.0
406.066912	H	15.7	20.5	1.9	38.1	7.9	46.0
798.697196	H	15.0	25.9	2.8	43.7	2.3	46.0

Note (1)
Quasi-peak (dBuV/m) = Raw Quasi-peak (dBuV) + Antenna Factor (dB/m) + Correction Factor (dB)
Correction Factor (dB) = Cable loss(dB)
Note (2)
All other frequencies were not measured because they are either identified as ambient noise or 20dB, or greater, below the limit line or are transmit frequenices.

3.11 Radiated Spurious Emissions – Enclosure above 1 GHz

Standard	RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90 FCC Part 2.1053	
Test Method	ANSI C63.26-2015, Section 5.5 KDB 935210 D05, v01r04, Clause 3.8, 4.9 KDB Publication 971168	
Tested by	Zara Vali	
Test date	August 20, 2024	
Test location	Richmond, Stand #3	
Applied limit	Radiated Emission FCC/ISED Class B Limit at 3 Meters Frequency (GHz) / Average (dBµV/m) / Peak (dBµV/m) > 1 / 54 / 74 **RSS – Gen, Clause 8.10 Restricted frequency bands** a. The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7. b. Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in the above table. c. Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in the above table.	
Test set-up description	☒	Equipment on a table of 80 cm height
	☐	Equipment on the floor (insulated from ground plane)
	☐	Other:
Test method applied	☐	OATS or SAC with measurement distance [m]: ☒3 ☐10
	☒	FAR CISPR 16-2-3 with measurement distance [m]: 3
	☐	FAR IEC 61000-4-22 with measurement distance [m]: 3
	☐	TEM Waveguide according to IEC 61000-4-20
Compliant ☒	Non-Compliant ☐	Not Applicable ☐

Test Method

This test measures the radiating levels from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standards referenced in the test summary section of this report. The EUT was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT. A scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7 with the receiver in the peak mode. The receiver IF bandwidth was 1MHz and scan step was about 0.5 MHz. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters with both horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. Measurements were then made using CISPR averaging when the peak readings were within 20 dB of the peak limit line. The numerical results are included herein to demonstrate compliance.

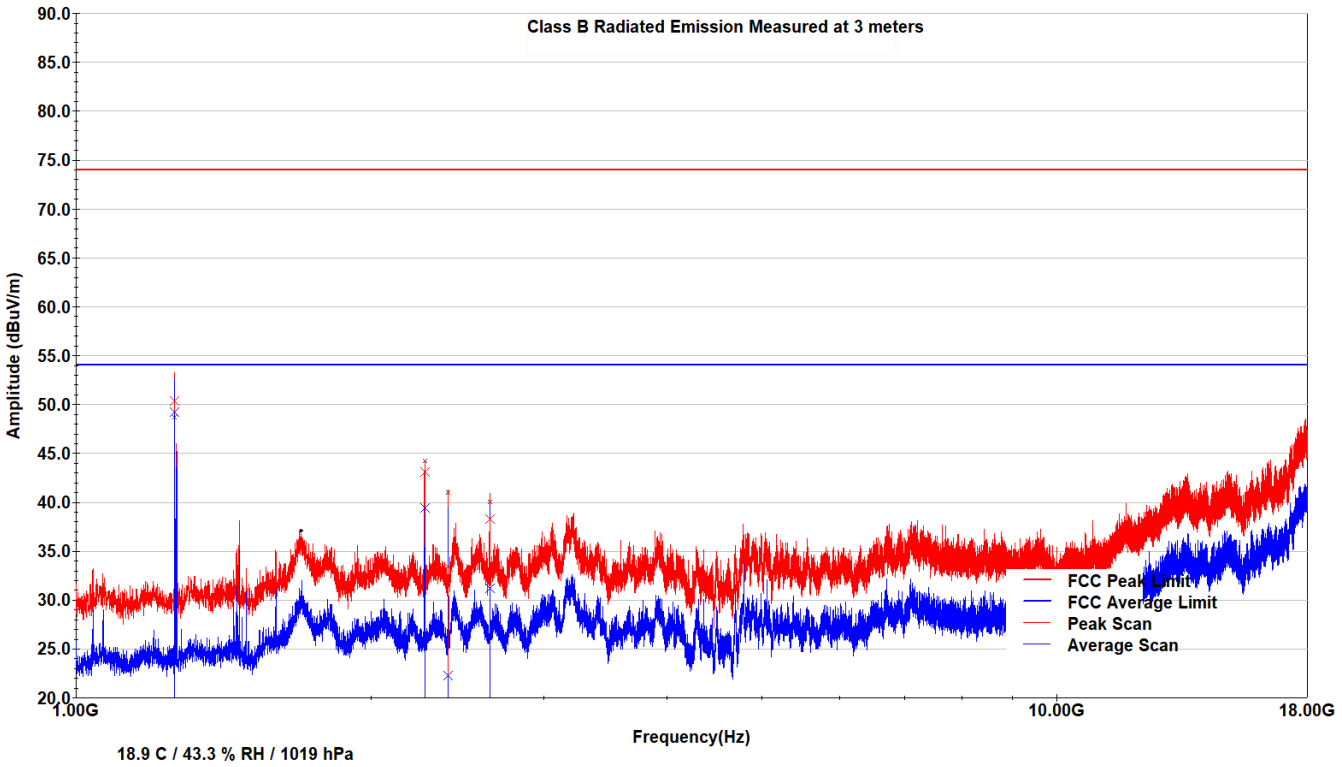
Test Setup

Description of test set-up:

The EUT was placed on a 1.5 m non-conducting table above a Turn table in SAC.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**

Test Result



Frequency	PoL	Antenna Factor	Correction Factor	Raw AVG	AVG	AVG Margin	FCC AVG Limit	RAW Peak	Peak	Peak Margin	FCC Peak Limit
MHz	V/H	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	dBuV	dBuV/m	dB	dBuV/m
1260.2	H	24.7	-29.7	54.2	49.2	4.8	54	55.325	50.35	23.65	74
2265.875	H	28.5	-26.9	37.8	39.4	14.6	54	41.49	43.116	30.884	74

Frequency	PoL	Antenna Factor	Correction Factor	Raw AVG	AVG	AVG Margin	FCC AVG Limit	RAW Peak	Peak	Peak Margin	FCC Peak Limit
MHz	V/H	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	dBuV	dBuV/m	dB	dBuV/m
2396.525	V	29.5	-26	18.8	22.3	31.7	54	29.939	33.414	40.586	74
2640.475	V	29.9	-26.4	27.7	31.2	22.8	54	34.774	38.274	35.726	74

Note (1)
Peak/AVG (dBuV/m) = Raw Peak/AVG (dBuV) + Antenna Factor (dB/m) + Correction Factor (dB)
Correction Factor (dB) = Cable loss(dB) + Preamp Gain(dB)

Note (2) No Spurious radiated emission were found above 18 GHz.

3.12 Conducted Emissions at AC Power Port

Standard	RSS-119, Issue 12 2015, Amendment (April 1, 2022) RSS-Gen, Issue 5 2018 FCC Part 90
Test Methods	ANSI C63.4: 2014
Tested by	Zara Vali
Test date	August 21 2024
Test location	Richmond Lab, Stand #1

Applied limit

AC Port Conducted Emission Class B Limit

Frequency (MHz)	Quasi-Peak (dBμV)	Average (dBμV)
0.15 - 0.50	66 to 56	56 to 46
0.50 – 5	56	46
5-30	60	50

Note 1. The lower limit shall apply at the transition frequencies.
Note 2. The limit decreases linearly with the logarithm of the frequency in the 0.15 to 0.50 MHz

Test set-up description	☒	Set-up Type B (80 cm distance to horizontal ground plane inside chamber)
	☐	Floor standing equipment set-up (10 cm over ground plane)
	☐	Other:
Voltage/Frequency	120V/60Hz	
Test method applied	☒	Artificial mains network (AMN)
	☐	Voltage Probe

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

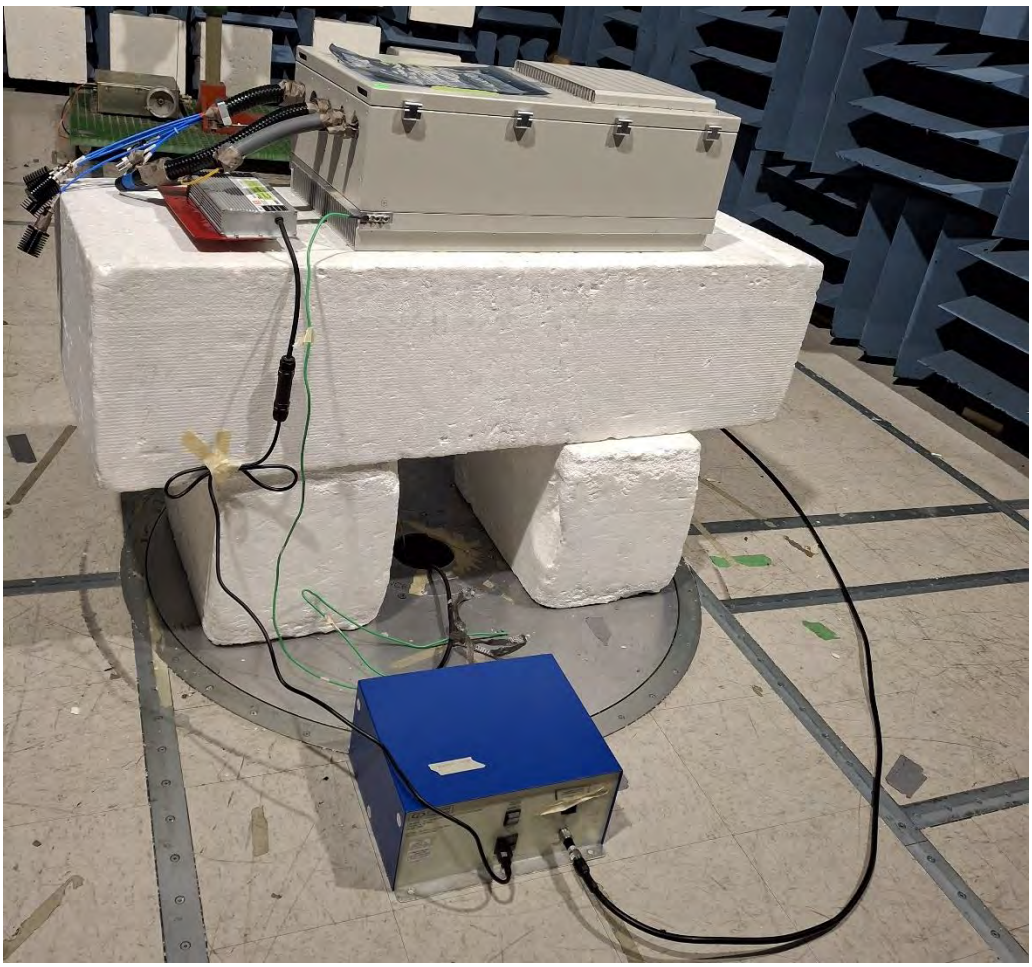
Test Method

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially a scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7!, from 150 kHz to 30 MHz on each phase with the receiver in the peak mode. The measuring bandwidth was set up to 9 kHz. Measurements were then made using CISPR16-1 quasi peak and averaging detectors when the peak readings were within 10dB of the Quasi-peak limit line.

Test Setup

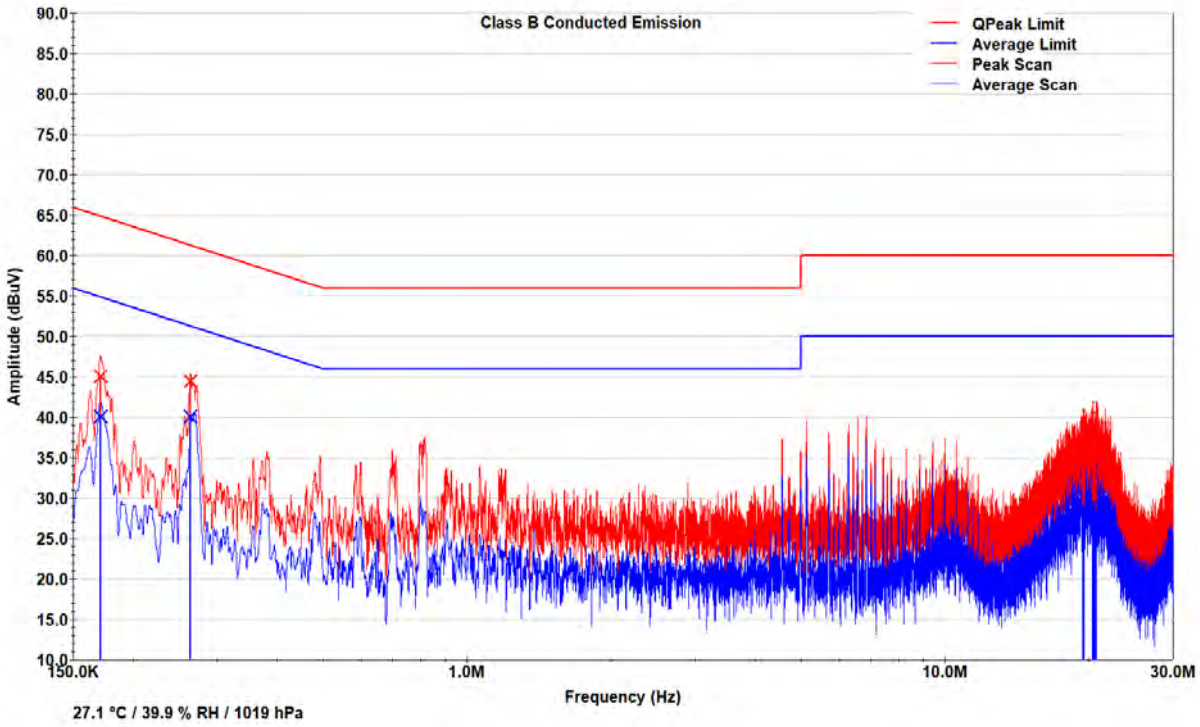
The EUT was placed on a 0.8 m non-conducting table above GRP.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**



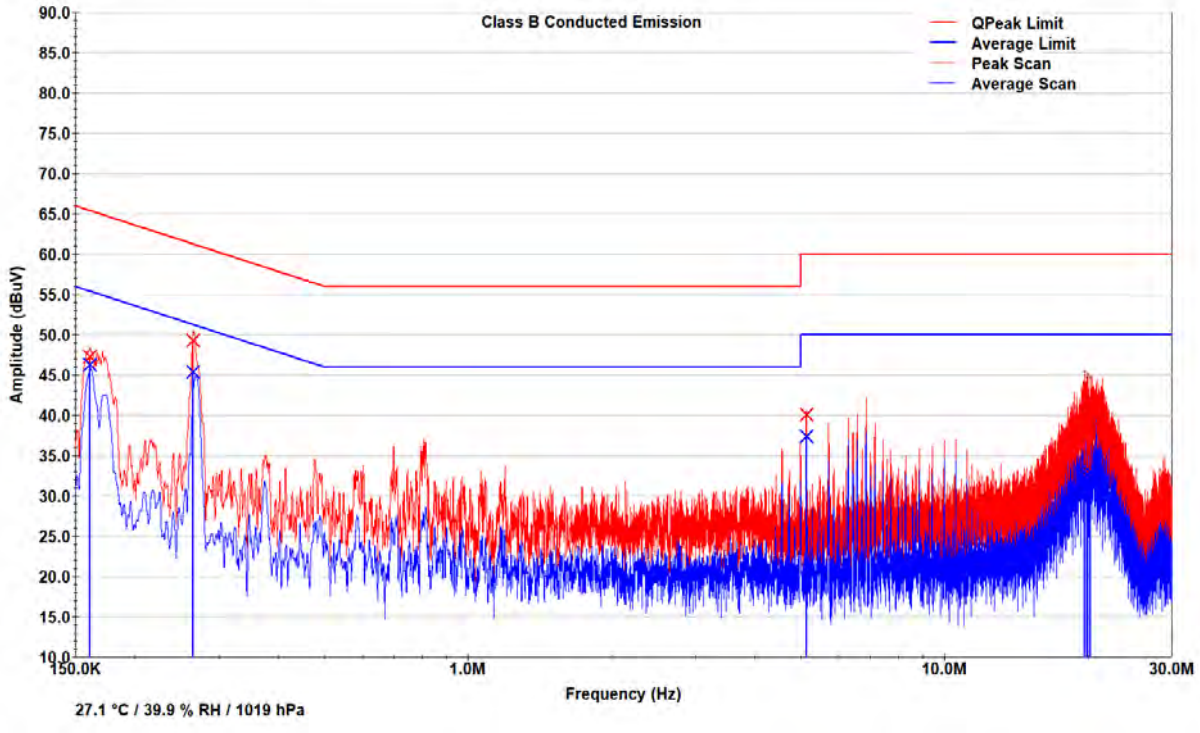
Test Results

Conducted Emission – Line 1



Frequency	Correction Factor	QPeak	QPeak Margin	QPeak Limit	Average	Average Margin	Average Limit
MHz	dB	dBuV	dB	dBuV	dBuV	dB	dBuV
0.171	20.627	45.15	19.76	64.91	40.147	14.76	54.91
0.264	20.617	44.49	16.81	61.3	40.11	11.19	51.3
19.469	21.055	35.27	24.73	60	28.755	21.25	50
19.557	21.06	35.34	24.66	60	28.905	21.09	50
20.375	21.09	35.25	24.75	60	28.891	21.11	50
20.524	21.097	35.53	24.47	60	29.261	20.74	50
20.752	21.087	34.78	25.22	60	28.28	21.72	50

Conducted Emission – Line 2



Frequency	Correction Factor	QPeak	QPeak Margin	QPeak Limit	Average	Average Margin	Average Limit
MHz	dB	dBuV	dB	dBuV	dBuV	dB	dBuV
0.161	20.627	47.32	18.09	65.41	46.337	9.07	55.41
0.265	20.617	49.31	11.94	61.26	45.434	5.82	51.26
5.129	20.66	40.13	19.87	60	37.372	12.63	50
19.729	21.063	38.91	21.09	60	32.416	17.58	50
19.927	21.063	39.26	20.74	60	32.589	17.41	50
20.022	21.064	39.32	20.68	60	32.704	17.3	50
20.241	21.09	39.61	20.39	60	32.886	17.11	50

Note (1)

Emission level is presented according to the below formula:
Conducted Emission (dBuV) = Measured Emission (dBuV) + Correction Factor (dB)
Correction Factor (dB) = LISN Transduce Factor (dB) + Cable loss(dB) + 20 dB limiter(dB)

Note (2)

All other frequencies were not measured because either they were ambient background noise, or their peak measurement was at least 20 dB below the limit line.

List of test equipment

Test Stand #1					
Equipment	**Manufacturer**	**Model**	**Labtest ID**	**Last calibration**	**Calibration due***
EMI Receiver	Keysight Technologies	N9038A	702	26 April, 2024	26 April, 2025
LISN	Com-Power	LIN-120C	920	23 July, 2023	23 July, 2025
RF Cable	MRO	n/a	n/a	IHC[2]	IHC[1]
Used Software	Tile! 7 v7.3.0.6				
Test Stand #2					
EMI Receiver	Keysight Technologies	N9038A	702	26 April, 2024	26 April, 2025
Broadband Antenna	Sunol	JB1	371	24 October, 2022	24 October, 2024
Motion Controller	Sunol	SC104V	235A	IHC[1]	IHC[1]
Antenna Tower	Sunol	TWR95-4	235B	IHC[1]	IHC[1]
Turn Table	Sunol	SM46C	235C	IHC[1]	IHC[1]
EMC Shielded Enclosure	USC	USC-26	374	IHC[1]	IHC[1]
RF Cable	MRO	n/a	n/a	IHC[2]	IHC[1]
Used Software	Tile! 7 v7.3.0.6				
Test Stand #3					
Horn Antenna	A.H Systems	SAS-571	227C	13-Sept-2022	13-Sept-2024
EMI Receiver	Keysight Technologies	N9038A	702	26 April, 2024	26 April, 2025
Motion Controller	Sunol	SC104V	235A	IHC[1]	IHC[1]
Antenna Tower	Sunol	TWR95-4	235B	IHC[1]	IHC[1]
Turn Table	Sunol	SM46C	235C	IHC[1]	IHC[1]
EMC Shielded Enclosure	USC	USC-26	374	IHC[1]	IHC[1]
RF Cable	A.H. Systems	SAC-26G-3	227D	IHC[2]	IHC[1]
RF Preamplifier	Agilent	8449B	273	IHC[2]	IHC[1]
Used Software	Tile! 7 v7.3.0.6				

Note 1) IHC: In House Calibration
Calibration interval extended based on enough calibration data and experience of use (see IECEE OD-5011:2015 clause 8.3)

Annex

Annex 1 - ISO 17025 ACCREDITATION CERTIFICATE

For complete scope of certification use

https://labtestcert.com/wp-content/uploads/2024/04/LabTest-Certification-Inc-Cert-and-Scope-File-03-12-2024_1710259791.pdf

END OF REPORT