TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 27** **47 CFR FCC Part 2**
Report No.:	RFBHQC-WTW-P21100439D R1
FCC ID:	2AQ68RPQN7801
Product:	5G NR indoor O-RU RPQN-7801
Model No.:	RPQN-7801E, RPQN-7801I
Received Date:	2023/7/18
Test Date:	2023/8/1 ~ 2023/10/4
Issued Date:	2023/10/23
Applicant:	HON LIN Technology Co., Ltd.
Address:	11F., No. 32, Jihu Rd., Neihu Dist, Taipei City 114, Taiwan R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN
FCC Registration / Designation Number:	788550 / TW0003

Approved by: Jeremy Lin , **Date:** 2023/10/23

Jeremy Lin / Project Engineer

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Prepared by : Pettie Chen / Senior Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBHQC-WTW-P21100439D	Original release.	2023/10/13
RFBHQC-WTW-P21100439D R1	Add PSD plot	2023/10/23

1 Certificate

Product:	5G NR indoor O-RU RPQN-7801
Test Model:	RPQN-7801E, RPQN-7801I
Sample Status:	Mass Production
Applicant:	HON LIN Technology Co., Ltd.
Test Date:	2023/8/1 ~ 2023/10/4
Standard:	47 CFR FCC Part 27 47 CFR FCC Part 2
Measurement procedure:	ANSI/TIA/EIA-603-E 2016 ANSI C63.26-2015 KDB 971168 D01 Power Meas License Digital Systems v03r01 KDB 971168 D02 Misc Rev Approv License Devices v02r02 KDB 662911 D01 Multiple Transmitter Output v02r01

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2 Summary of Test Results

47 CFR FCC Part 27 47 CFR FCC Part 2			
Standard / Clause	Test Item	Result	Remark
FCC 47 CFR Part 2.1046 FCC 47 CFR Part 27.50(j)	Effective Radiated Power and Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1049	Bandwidth	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1051 FCC 47 CFR Part 27.53(l)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 27.53(l)	Radiated Spurious Emissions below 1GHz	Pass	Minimum passing margin is -25.02 dB at 163.86 MHz
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 27.53(l)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -17.01 dB at 7500.00 MHz
FCC 47 CFR Part 2.1055 FCC 47 CFR Part 27.54	Frequency Stability	Pass	Meet the requirement of limit.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)
Radiated Spurious Emissions below 1GHz	9 kHz ~ 30 MHz	3.00 dB
	30 MHz ~ 1 GHz	2.93 dB
Radiated Spurious Emissions above 1GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	5G NR indoor O-RU RPQN-7801
Test Model	RPQN-7801E, RPQN-7801I
Status of EUT	Mass Production
Power Supply Rating	12Vdc (Adapter)

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of BV CPS report no.: RFBHQC-WTW-P21100439 R1. Difference compared with the original report is PMIC change and add BW(40MHz/20MHz/10MHz). Therefore, the EUT was tested and presented in the test report.
2. All models are listed as below.

Model	Difference
RPQN-7801E	With external antenna
RPQN-7801I	With internal antenna

3. EUT Overview.

Band / Bandwidth	TX Frequency Range (MHz)	Max. EIRP Power			
		QPSK	16QAM	64QAM	256QAM
n78 (Channel Bandwidth 10MHz)	3705.00-3795.00	9.71W/MHz	9.58W/MHz	9.60W/MHz	9.58W/MHz
n78 (Channel Bandwidth 20MHz)	3710.01-3789.99	9.59W/MHz	9.55W/MHz	9.54W/MHz	9.57W/MHz
n78 (Channel Bandwidth 40MHz)	3720.00-3780.00	9.66W/MHz	9.62W/MHz	9.55W/MHz	9.62W/MHz
Band / Bandwidth	TX Frequency Range (MHz)	Emission Designator			
		QPSK	16QAM	64QAM	256QAM
n78 (Channel Bandwidth 10MHz)	3705.00-3795.00	8M01G7D	7M84D7W	8M01D7W	8M03D7W
n78 (Channel Bandwidth 20MHz)	3710.01-3789.99	18M0G7D	18M0D7W	18M0D7W	18M0D7W
n78 (Channel Bandwidth 40MHz)	3720.00-3780.00	35M3G7D	35M3D7W	35M3D7W	35M3D7W

4. The EUT contains following accessory devices and PoE.

AC Adapter	Brand	DVE
	Model	DSA-60PFE-12 1 120500
	AC Input	100-240Vac, 50/60Hz, 2.0A
	DC Output	12Vdc/5A
	DC Output Cable	1.2 m

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	Brand	Model	Antenna Gain(dBi)	Frequency range	Antenna Type	Connector Type
1. External	Whayu	C107-511850-A	5.15	n78 (3300-3800MHz)	Dipole	SMA
2. Internal	Grand Tek	103EG00000030	5.3	n78 (3300-3800MHz)	PIFA	i-pex(MHF)

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	X-axis/ Y-axis/ Z-axis Worst Condition: X-axis

For NR n78

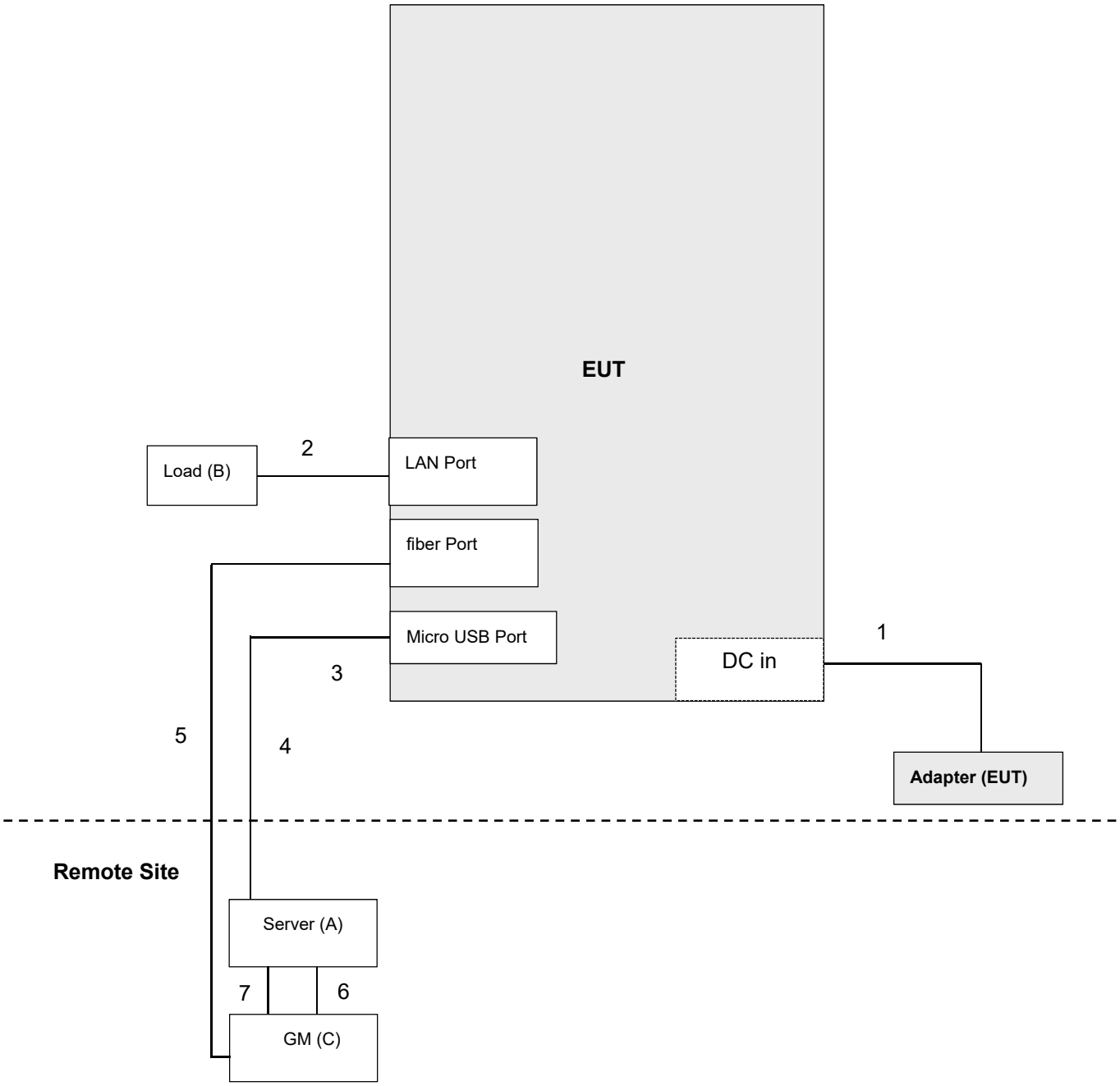
Test Item	EUT Configure Mode	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	A, B	647000 (3705.00 MHz) 650000 (3750.00 MHz) 653000 (3795.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	A, B	647334 (3710.01 MHz) 650000 (3750.00 MHz) 652666 (3789.99 MHz)	20 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	A, B	648000 (3720.00 MHz) 650000 (3750.00 MHz) 652000 (3780.00 MHz)	40 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
Modulation Characteristics	A	650000 (3750.00 MHz)	40 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
Peak to Average Ratio	A	647000 (3705.00 MHz) 650000 (3750.00 MHz) 653000 (3795.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	A	647334 (3710.01 MHz) 650000 (3750.00 MHz) 652666 (3789.99 MHz)	20 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	A	648000 (3720.00 MHz) 650000 (3750.00 MHz) 652000 (3780.00 MHz)	40 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
Bandwidth	A	647000 (3705.00 MHz) 650000 (3750.00 MHz) 653000 (3795.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	A	647334 (3710.01 MHz) 650000 (3750.00 MHz) 652666 (3789.99 MHz)	20 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	A	648000 (3720.00 MHz) 650000 (3750.00 MHz) 652000 (3780.00 MHz)	40 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB

Test Item	EUT Configure Mode	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Emission	A	647000 (3705.00 MHz) 650000 (3750.00 MHz) 653000 (3795.00 MHz)	10 MHz	QPSK	Full RB
	A	647334 (3710.01 MHz) 650000 (3750.00 MHz) 652666 (3789.99 MHz)	20 MHz	QPSK	Full RB
	A	648000 (3720.00 MHz) 650000 (3750.00 MHz) 652000 (3780.00 MHz)	40 MHz	QPSK	Full RB
RE Below 1GHz	A	650000 (3750.00 MHz)	10 MHz	QPSK	Full RB
	B	653000 (3795.00 MHz)	10 MHz	QPSK	Full RB
RE Above 1GHz	A, B	647000 (3705.00 MHz) 650000 (3750.00 MHz) 653000 (3795.00 MHz)	10 MHz	QPSK	Full RB
	A, B	647334 (3710.01 MHz) 650000 (3750.00 MHz) 652666 (3789.99 MHz)	20 MHz	QPSK	Full RB
	A, B	648000 (3720.00 MHz) 650000 (3750.00 MHz) 652000 (3780.00 MHz)	40 MHz	QPSK	Full RB
Frequency Stability	A	647000 (3705.00 MHz) 653000 (3795.00 MHz)	10 MHz	QPSK	Full RB
	A	647334 (3710.01 MHz) 652666 (3789.99 MHz)	20 MHz	QPSK	Full RB
	A	648000 (3720.00 MHz) 652000 (3780.00 MHz)	40 MHz	QPSK	Full RB
EUT Configure Mode	Mode	EUT Model			
	A	RPQN-7801I			
	B	RPQN-7801E			

3.4 Test Program Used and Operation Descriptions

Controlling software(Terminal) during the test,and the EUT was set up for the maximum power and link up with Spectrum Analyzer.

3.5 Connection Diagram of EUT and Peripheral Devices



3.6 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Server	HON LIN	NA	NA	NA	Supplied by applicant
B.	Load	NA	NA	NA	NA	Provided by Lab
C.	GM	HON LIN	NA	NA	NA	Supplied by applicant

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A, C acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1	No	0	Accessory of EUT
2.	RJ-45 Cable	2	1.5	No	0	Supplied by applicant
3.	Micro USB Cable	1	1	No	0	Supplied by applicant
4.	USB Cable Extend	1	2	No	0	Provided by Lab
5.	fiber	1	6	No	0	Supplied by applicant
6.	fiber	1	12	No	0	Supplied by applicant
7.	RJ-45 Cable	1	1.5	No	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY57140488	2023/3/6	2024/3/5
5G Wireless Test Platforms Keysight	E7515B	MY60102114	2023/5/18	2024/5/17
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/9/21 ~ 2023/10/20

4.2 Modulation Characteristics

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY57140488	2023/3/6	2024/3/5
5G Wireless Test Platforms Keysight	E7515B	MY60102114	2023/5/18	2024/5/17
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/8/1 ~ 2023/10/4

4.3 Peak to Average Ratio

Refer to section 4.2 to get information of the instruments.

4.4 Bandwidth

Refer to section 4.2 to get information of the instruments.

4.5 Conducted Spurious Emissions

Refer to section 4.2 to get information of the instruments.

4.6 Radiated Spurious Emissions below 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Max-Full	MF-7802BS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208674	NA	NA
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Signal & Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
Loop Antenna Electro-Metrics	EM-6879	269	2022/9/19	2023/9/18
Preamplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
Preamplifier EMCI	EMC330N	980782	2023/1/16	2024/1/15
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1213	2022/10/20	2023/10/19
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-500	201233	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-3000	201235	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-9000	201236(with PAD)	2023/1/16	2024/1/15

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2023/8/10

4.7 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Max-Full	MF-7802BS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208674	NA	NA
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Signal & Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Horn Antenna RFSPIN	DRH18-E	210103A18E	2022/11/13	2023/11/12
Preamplifier EMCI	EMC118A45SE	980808	2022/12/29	2023/12/28
RF Coaxial Cable EMCI	EMC104-SM-SM-1000	210102	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC104-SM-SM-3000	201231	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC104-SM-SM-9000	201243	2023/1/16	2024/1/15
Preamplifier EMCI	EMC184045SE	980788	2023/1/16	2024/1/15
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2022/11/13	2023/11/12
RF Coaxial Cable EMCI	EMC101G-KM-KM-5000	201260	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC101G-KM-KM-3000	201257	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2023/1/16	2024/1/15

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2023/8/10

4.8 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
AC Power Supply Extech	CFW-105	E000603	NA	NA
Digital Multimeter Fluke	87-III	70360742	2023/7/6	2024/7/5
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	101544	2023/5/9	2024/5/8
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2022/12/27	2023/12/26
5G Wireless Test Platforms Keysight	E7515B	MY60102114	2023/5/18	2024/5/17

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/8/1 ~ 2023/8/11

5 Limits of Test Items

5.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

For NR n78:

The power of each fixed or base station transmitting in the 3700-3980 MHz band, located in any geographic location other than any geographic location described under FCC Part 27.50(j)(2), with an EIRP limit of 1640 W/MHz. This limit applies to the total power of all antenna elements in any given sector of the base station.

5.2 Modulation Characteristics

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

5.3 Peak to Average Ratio

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.4 Bandwidth

According to FCC 47 CFR part 2.1049, the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.

5.5 Conducted Spurious Emissions

For NR n78:

According to FCC 47 CFR part 27.53(l), for base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.
Note: The device has MIMO function, so the limit of conducted spurious emissions need to be reduced by $10\log(Numbers_{ANT})$ according to FCC KDB 662911 D01 guidance.

5.6 Radiated Spurious Emissions below 1GHz

For NR n78:

According to FCC 47 CFR part 27.53(l), for mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

5.7 Radiated Spurious Emissions above 1GHz

For NR n78:

According to FCC 47 CFR part 27.53(l), for mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

5.8 Frequency Stability

For NR n78:

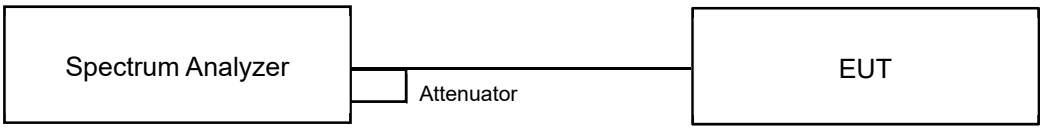
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

6 Test Arrangements

6.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

6.1.1 Test Setup

Conducted Power Measurement:



6.1.2 Test Procedure

Conducted Power Measurement:

The EUT is configured by test software or key-in commands to set data modulation and maximum power using WWAN technology and link to spectrum analyzer measurements. Set the EUT to transmit under low, middle and high channel and record the power level shown on spectrum analyzer. Power measurements use detector average (rms).

Measurement method refers to ANSI C63.26 section 5.2.4.4.

a. Set span to 2 × to 3 × the OBW.
b. Set RBW = 1% to 5% of the OBW.
c. Set VBW ≥ 3 × RBW.
d. Set number of measurement points in sweep ≥ 2 × span / RBW.
e. Set Sweep time = auto-couple.
f. Detector = power averaging (rms).
g. Set sweep trigger to “free run.”
h. Trace average at least 100 traces in power averaging (rms) mode.
i. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW band edges.
j. If Duty cycle < 98%, Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$EIRP = P_{Meas} + G_T$

$ERP = P_{Meas} + G_T - 2.15$

where

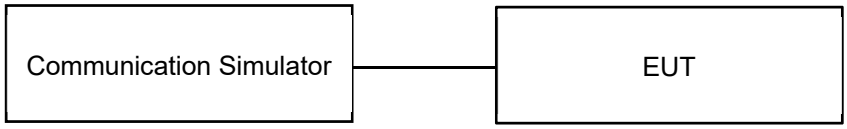
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively
(expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

6.2 Modulation Characteristics

6.2.1 Test Setup

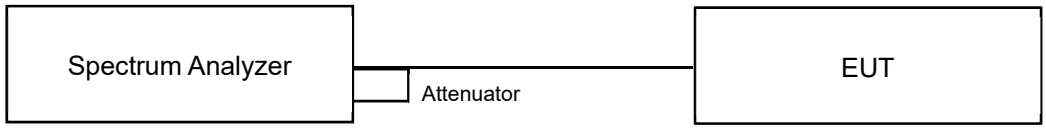


6.2.2 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector, the frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

6.3 Peak to Average Ratio

6.3.1 Test Setup

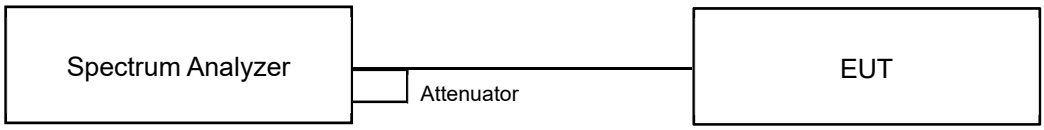


6.3.2 Test Procedure

a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b. Set the number of counts to a value that stabilizes the measured CCDF curve;
c. Record the maximum PAPR level associated with a probability of 0.1%.

6.4 Bandwidth

6.4.1 Test Setup



6.4.2 Test Procedure

For the 26 dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

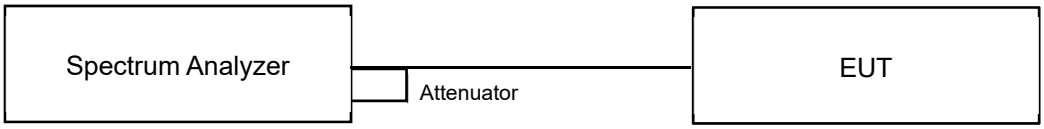
a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “−X dB” requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f. Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
g. Determine the “−X dB amplitude” as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
h. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “−X dB amplitude” determined in step f). If a marker is below this “−X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
i. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f. Determine the reference value by either of the following:
g. 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h. 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
i. Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
j. If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
k. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."
l. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.5 Conducted Spurious Emissions

6.5.1 Test Setup



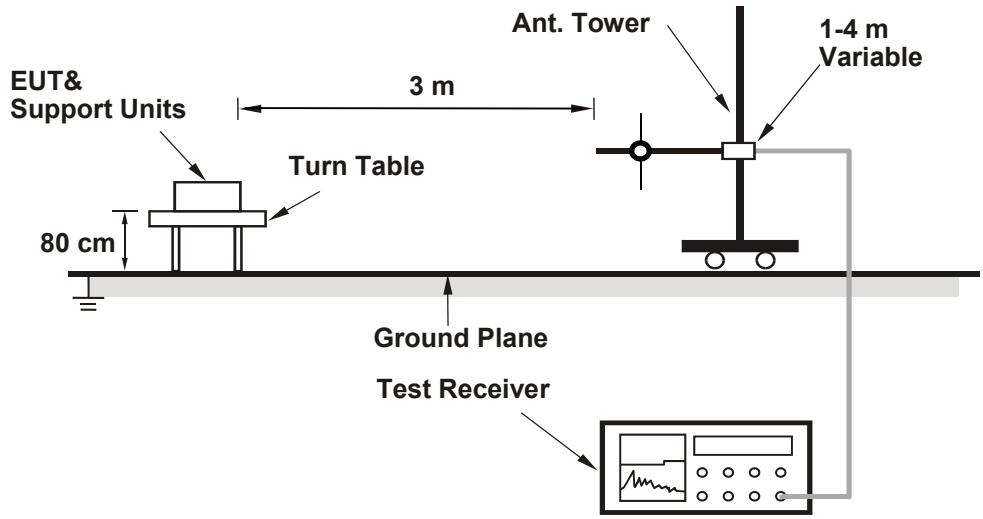
6.5.2 Test Procedure

a. Measurement refer to ANSI C63.26 section 5.7.
b. All measurements were done at 3 channels: low, middle and high operational frequency range.
c. Measuring frequency range is from 9 kHz up to the tenth harmonic of the hightest fundamental frequency or to 40 GHz, whichever is lower. 20 dB attenuation pad is connected with spectrum.
d. The fundamental frequency above 1 GHz, the spectrum set RBW = 1 MHz, VBW = 3 MHz, Detector = Average.
e. The fundamental frequency below 1 GHz, the spectrum set RBW ≥ 100 kHz, VBW ≥ 3 x RBW, Detector = Average.
f. Measuring frequency band edge, narrow RBW (no less than 1% of the OBW) is used for conducted emission measurement.

6.6 Radiated Spurious Emissions below 1GHz

6.6.1 Test Setup

For radiated emission 30 MHz to 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.6.2 Test Procedure

The EUT is configured by test software or key-in commands to set data modulation and maximum power using WWAN technology.

a. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

f. ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

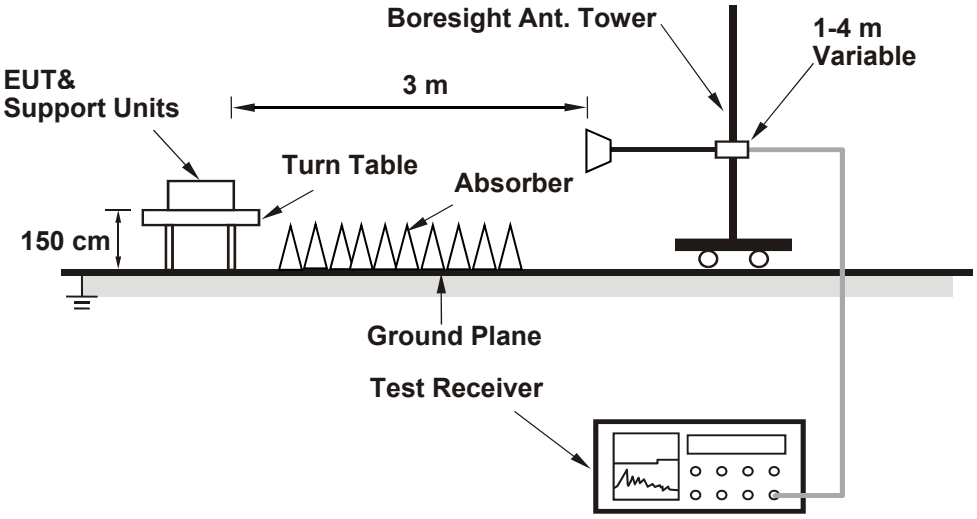
Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

6.7 Radiated Spurious Emissions above 1GHz

6.7.1 Test Setup

For radiated emission above 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.7.2 Test Procedure

The EUT is configured by test software or key-in commands to set data modulation and maximum power using WWAN technology.

a. In the semi-anechoic chamber, EUT placed on the 1.5 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

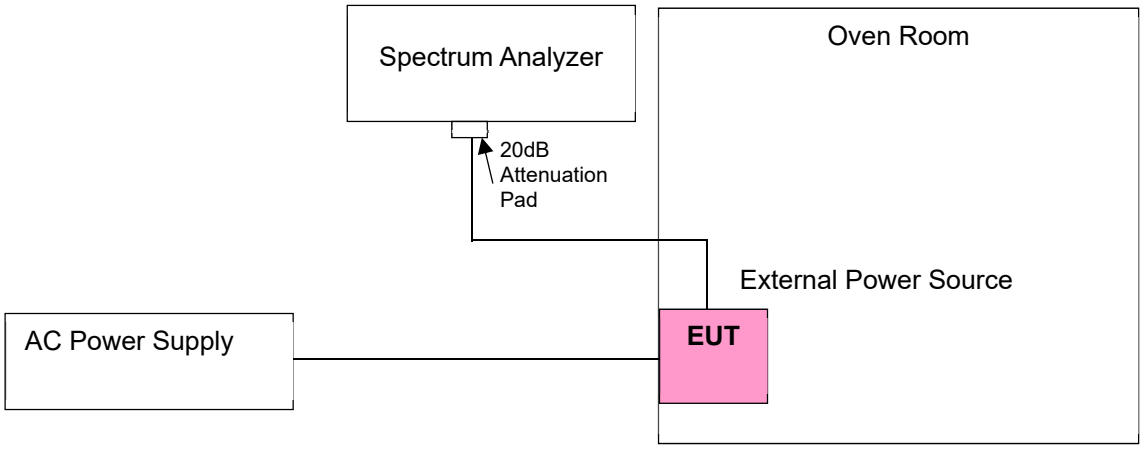
f. ERP (dBm) = E (dBµV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.

6.8 Frequency Stability

6.8.1 Test Setup



6.8.2 Test Procedure

The EUT is configured by test software or key-in commands to set data modulation and maximum power using WWAN technology.

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

7 Test Results of Test Item

7.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

Input Power:	120 Vac, 60Hz	Environmental Conditions:	21°C, 70% RH	Tested By:	James Yang

Test Mode A

Unit: dBm/MHz

BW	Channel	Modulation	Chain 1	Chain 2	Chain 3	Chain 4	Total (dBm/MHz)	EIRP (W/MHz)	Limit (W/MHz)
10M	3705	QPSK	14.04	13.53	13.77	13.59	19.76	1.28	1640.00
		16QAM	13.84	13.50	13.65	13.60	19.67	1.26	1640.00
		64QAM	13.96	13.41	13.80	13.67	19.74	1.28	1640.00
		256QAM	14.02	13.56	13.81	13.54	19.76	1.28	1640.00
	3750	QPSK	13.96	14.05	13.92	14.08	20.02	1.36	1640.00
		16QAM	14.02	13.89	13.93	14.02	19.99	1.35	1640.00
		64QAM	13.88	13.96	13.96	13.94	19.96	1.34	1640.00
		256QAM	14.02	13.90	13.79	13.91	19.93	1.33	1640.00
	3795	QPSK	14.05	13.98	13.34	13.94	19.86	1.31	1640.00
		16QAM	14.01	13.97	13.28	13.93	19.83	1.30	1640.00
		64QAM	13.89	13.83	13.21	13.89	19.73	1.28	1640.00
		256QAM	13.92	13.83	13.35	13.79	19.75	1.28	1640.00
20M	3710.01	QPSK	10.23	9.95	10.10	9.84	16.05	0.55	1640.00
		16QAM	10.13	9.89	9.92	9.73	15.94	0.53	1640.00
		64QAM	10.18	9.78	10.04	9.91	16.00	0.54	1640.00
		256QAM	10.33	9.90	9.95	9.72	16.00	0.54	1640.00
	3750	QPSK	10.19	9.98	9.82	9.81	15.97	0.54	1640.00
		16QAM	10.12	9.86	9.84	9.61	15.88	0.53	1640.00
		64QAM	10.01	9.97	9.80	9.73	15.90	0.53	1640.00
		256QAM	10.29	10.05	9.62	9.65	15.93	0.53	1640.00
	3789.99	QPSK	10.17	10.61	9.65	10.27	16.21	0.57	1640.00
		16QAM	10.05	10.68	9.55	10.29	16.18	0.56	1640.00
		64QAM	10.03	10.59	9.60	10.31	16.17	0.56	1640.00
		256QAM	10.07	10.48	9.74	10.31	16.18	0.56	1640.00
40M	3720	QPSK	6.88	6.92	6.92	6.73	12.88	0.26	1640.00
		16QAM	6.82	6.78	6.97	6.75	12.85	0.26	1640.00
		64QAM	6.68	6.74	7.02	6.78	12.83	0.26	1640.00
		256QAM	6.80	6.99	6.88	6.82	12.89	0.26	1640.00
	3750	QPSK	7.04	6.85	7.28	6.68	12.99	0.27	1640.00
		16QAM	7.09	6.83	7.32	6.68	13.01	0.27	1640.00
		64QAM	6.98	6.95	7.14	6.70	12.97	0.27	1640.00
		256QAM	7.13	6.77	7.28	6.51	12.95	0.27	1640.00
	3780	QPSK	6.65	7.12	6.90	6.58	12.84	0.26	1640.00
		16QAM	6.48	7.12	6.75	6.66	12.78	0.26	1640.00
		64QAM	6.60	7.08	6.91	6.39	12.77	0.26	1640.00
		256QAM	6.64	7.10	6.90	6.45	12.80	0.26	1640.00

*EIRP = Conducted Power + Directional gain (11.32 dBi)

*Directional gain=5.3 dBi +Array Gain(6.02)= 11.32 dBi

Unit: dBm

BW	Channel	Modulation	Chain 1	Chain 2	Chain 3	Chain 4	Total (dBm)	EIRP (W)
10M	3705	QPSK	22.40	22.39	22.32	22.60	28.45	9.48
		16QAM	22.32	22.45	22.44	22.49	28.45	9.48
		64QAM	22.40	22.48	22.35	22.42	28.43	9.45
		256QAM	22.37	22.38	22.32	22.48	28.41	9.40
	3750	QPSK	22.50	22.49	22.52	22.61	28.55	9.71
		16QAM	22.42	22.40	22.43	22.55	28.47	9.53
		64QAM	22.51	22.34	22.42	22.56	28.48	9.55
		256QAM	22.35	22.44	22.52	22.57	28.49	9.58
	3795	QPSK	22.51	22.48	22.53	22.43	28.51	9.61
		16QAM	22.49	22.38	22.50	22.52	28.49	9.58
		64QAM	22.37	22.53	22.52	22.51	28.50	9.60
		256QAM	22.35	22.45	22.52	22.36	28.44	9.47
20M	3710.01	QPSK	22.46	22.42	22.44	22.45	28.46	9.51
		16QAM	22.44	22.41	22.34	22.37	28.41	9.40
		64QAM	22.35	22.33	22.34	22.46	28.39	9.36
		256QAM	22.34	22.49	22.31	22.39	28.40	9.38
	3750	QPSK	22.44	22.47	22.52	22.45	28.49	9.57
		16QAM	22.40	22.54	22.43	22.47	28.48	9.55
		64QAM	22.34	22.53	22.58	22.36	28.47	9.54
		256QAM	22.35	22.38	22.36	22.39	28.39	9.36
	3789.99	QPSK	22.42	22.53	22.49	22.47	28.50	9.59
		16QAM	22.38	22.39	22.47	22.41	28.43	9.45
		64QAM	22.41	22.52	22.33	22.53	28.47	9.53
		256QAM	22.42	22.49	22.47	22.49	28.49	9.57
40M	3720	QPSK	22.51	22.55	22.50	22.47	28.53	9.66
		16QAM	22.33	22.54	22.57	22.50	28.51	9.61
		64QAM	22.38	22.39	22.43	22.39	28.42	9.42
		256QAM	22.50	22.50	22.45	22.37	28.48	9.54
	3750	QPSK	22.55	22.52	22.55	22.35	28.51	9.63
		16QAM	22.42	22.54	22.60	22.39	28.51	9.62
		64QAM	22.52	22.51	22.48	22.33	28.48	9.55
		256QAM	22.36	22.37	22.36	22.43	28.40	9.38
	3780	QPSK	22.51	22.53	22.50	22.48	28.53	9.65
		16QAM	22.37	22.38	22.46	22.45	28.44	9.45
		64QAM	22.47	22.47	22.45	22.33	28.45	9.49
		256QAM	22.43	22.57	22.44	22.52	28.51	9.62

*EIRP = Conducted Power + Directional gain (11.32 dBi)
*Directional gain=5.3 dBi +Array Gain(6.02)= 11.32 dBi

Test Mode B

Unit: dBm/MHz

BW	Channel	Modulation	Chain 1	Chain 2	Chain 3	Chain 4	Total (dBm/MHz)	EIRP (W/MHz)	Limit (W/MHz)
10M	3705	QPSK	14.04	13.53	13.77	13.59	19.76	1.24	1640.00
		16QAM	13.84	13.50	13.65	13.60	19.67	1.21	1640.00
		64QAM	13.96	13.41	13.80	13.67	19.74	1.23	1640.00
		256QAM	14.02	13.56	13.81	13.54	19.76	1.24	1640.00
	3750	QPSK	13.96	14.05	13.92	14.08	20.02	1.32	1640.00
		16QAM	14.02	13.89	13.93	14.02	19.99	1.31	1640.00
		64QAM	13.88	13.96	13.96	13.94	19.96	1.30	1640.00
		256QAM	14.02	13.90	13.79	13.91	19.93	1.29	1640.00
	3795	QPSK	14.05	13.98	13.34	13.94	19.86	1.27	1640.00
		16QAM	14.01	13.97	13.28	13.93	19.83	1.26	1640.00
		64QAM	13.89	13.83	13.21	13.89	19.73	1.23	1640.00
		256QAM	13.92	13.83	13.35	13.79	19.75	1.24	1640.00
20M	3710.01	QPSK	10.23	9.95	10.10	9.84	16.05	0.53	1640.00
		16QAM	10.13	9.89	9.92	9.73	15.94	0.51	1640.00
		64QAM	10.18	9.78	10.04	9.91	16.00	0.52	1640.00
		256QAM	10.33	9.90	9.95	9.72	16.00	0.52	1640.00
	3750	QPSK	10.19	9.98	9.82	9.81	15.97	0.52	1640.00
		16QAM	10.12	9.86	9.84	9.61	15.88	0.51	1640.00
		64QAM	10.01	9.97	9.80	9.73	15.90	0.51	1640.00
		256QAM	10.29	10.05	9.62	9.65	15.93	0.51	1640.00
	3789.99	QPSK	10.17	10.61	9.65	10.27	16.21	0.55	1640.00
		16QAM	10.05	10.68	9.55	10.29	16.18	0.54	1640.00
		64QAM	10.03	10.59	9.60	10.31	16.17	0.54	1640.00
		256QAM	10.07	10.48	9.74	10.31	16.18	0.54	1640.00
40M	3720	QPSK	6.88	6.92	6.92	6.73	12.88	0.25	1640.00
		16QAM	6.82	6.78	6.97	6.75	12.85	0.25	1640.00
		64QAM	6.68	6.74	7.02	6.78	12.83	0.25	1640.00
		256QAM	6.80	6.99	6.88	6.82	12.89	0.25	1640.00
	3750	QPSK	7.04	6.85	7.28	6.68	12.99	0.26	1640.00
		16QAM	7.09	6.83	7.32	6.68	13.01	0.26	1640.00
		64QAM	6.98	6.95	7.14	6.70	12.97	0.26	1640.00
		256QAM	7.13	6.77	7.28	6.51	12.95	0.26	1640.00
	3780	QPSK	6.65	7.12	6.90	6.58	12.84	0.25	1640.00
		16QAM	6.48	7.12	6.75	6.66	12.78	0.25	1640.00
		64QAM	6.60	7.08	6.91	6.39	12.77	0.25	1640.00
		256QAM	6.64	7.10	6.90	6.45	12.80	0.25	1640.00

*EIRP = Conducted Power + Directional gain (11.17 dBi)

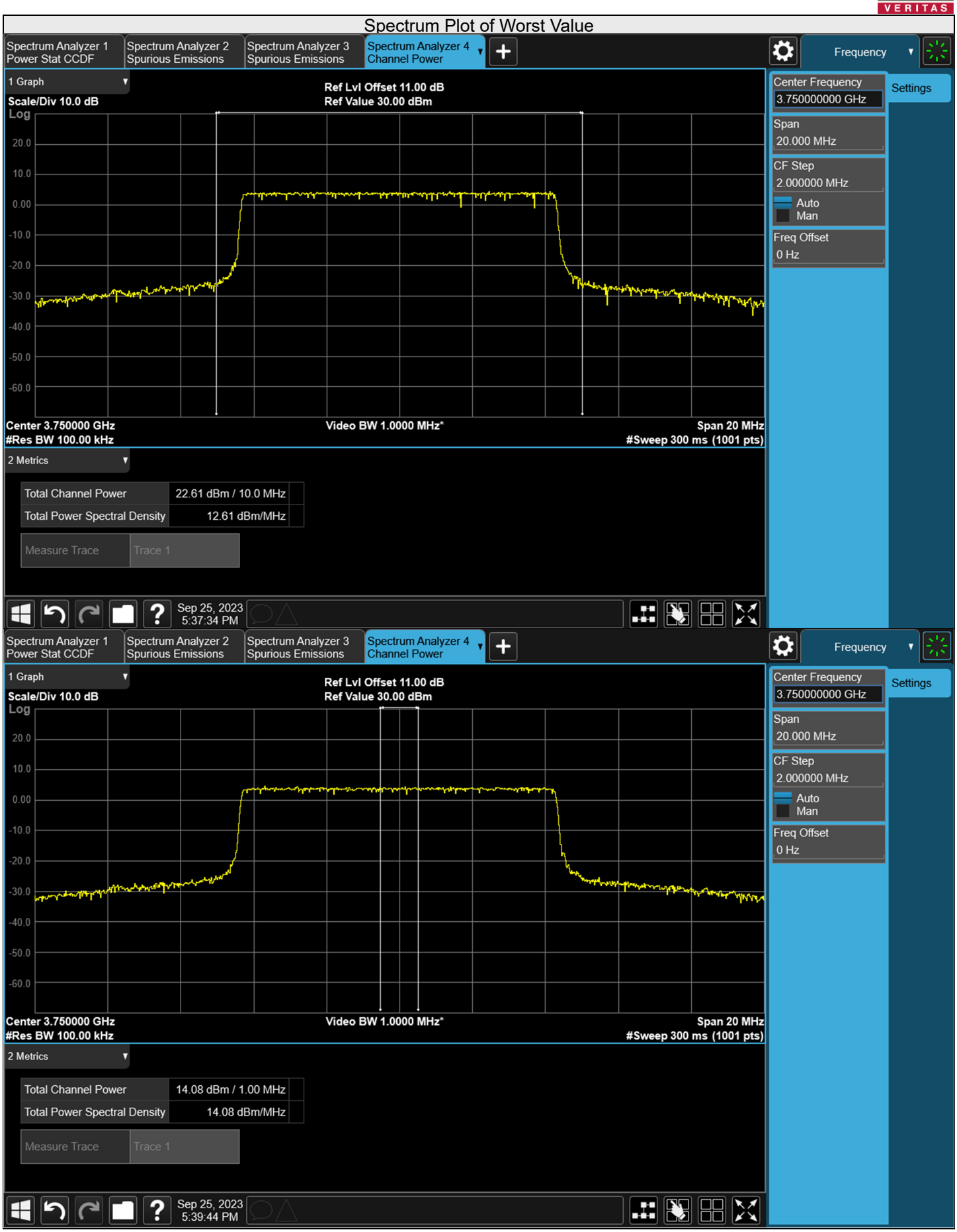
*Directional gain=5.15 dBi +Array Gain(6.02)= 11.17 dBi

Unit: dBm

BW	Channel	Modulation	Chain 1	Chain 2	Chain 3	Chain 4	Total (dBm)	EIRP (W)
10M	3705	QPSK	22.40	22.39	22.32	22.60	28.45	9.16
		16QAM	22.32	22.45	22.44	22.49	28.45	9.16
		64QAM	22.40	22.48	22.35	22.42	28.43	9.13
		256QAM	22.37	22.38	22.32	22.48	28.41	9.08
	3750	QPSK	22.50	22.49	22.52	22.61	28.55	9.38
		16QAM	22.42	22.40	22.43	22.55	28.47	9.21
		64QAM	22.51	22.34	22.42	22.56	28.48	9.22
		256QAM	22.35	22.44	22.52	22.57	28.49	9.25
	3795	QPSK	22.51	22.48	22.53	22.43	28.51	9.29
		16QAM	22.49	22.38	22.50	22.52	28.49	9.26
		64QAM	22.37	22.53	22.52	22.51	28.50	9.28
		256QAM	22.35	22.45	22.52	22.36	28.44	9.14
20M	3710.01	QPSK	22.46	22.42	22.44	22.45	28.46	9.19
		16QAM	22.44	22.41	22.34	22.37	28.41	9.08
		64QAM	22.35	22.33	22.34	22.46	28.39	9.04
		256QAM	22.34	22.49	22.31	22.39	28.40	9.07
	3750	QPSK	22.44	22.47	22.52	22.45	28.49	9.25
		16QAM	22.40	22.54	22.43	22.47	28.48	9.23
		64QAM	22.34	22.53	22.58	22.36	28.47	9.21
		256QAM	22.35	22.38	22.36	22.39	28.39	9.04
	3789.99	QPSK	22.42	22.53	22.49	22.47	28.50	9.27
		16QAM	22.38	22.39	22.47	22.41	28.43	9.13
		64QAM	22.41	22.52	22.33	22.53	28.47	9.20
		256QAM	22.42	22.49	22.47	22.49	28.49	9.24
40M	3720	QPSK	22.51	22.55	22.50	22.47	28.53	9.33
		16QAM	22.33	22.54	22.57	22.50	28.51	9.28
		64QAM	22.38	22.39	22.43	22.39	28.42	9.10
		256QAM	22.50	22.50	22.45	22.37	28.48	9.22
	3750	QPSK	22.55	22.52	22.55	22.35	28.51	9.30
		16QAM	22.42	22.54	22.60	22.39	28.51	9.29
		64QAM	22.52	22.51	22.48	22.33	28.48	9.23
		256QAM	22.36	22.37	22.36	22.43	28.40	9.06
	3780	QPSK	22.51	22.53	22.50	22.48	28.53	9.32
		16QAM	22.37	22.38	22.46	22.45	28.44	9.13
		64QAM	22.47	22.47	22.45	22.33	28.45	9.17
		256QAM	22.43	22.57	22.44	22.52	28.51	9.29

*EIRP = Conducted Power + Directional gain (11.17 dBi)
*Directional gain=5.15 dBi +Array Gain(6.02)= 11.17 dBi

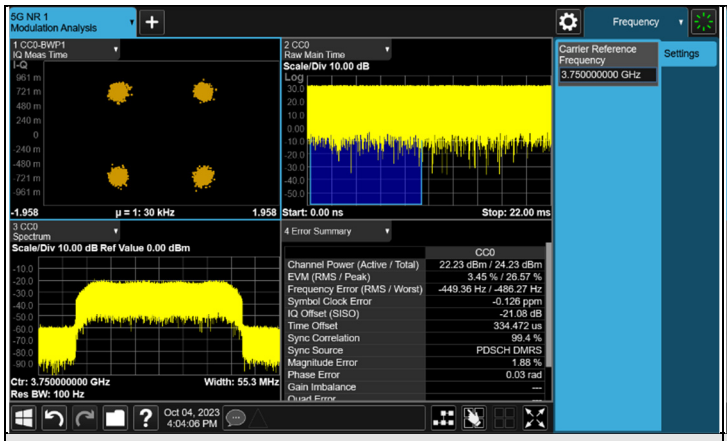
Spectrum Plot of Worst Value



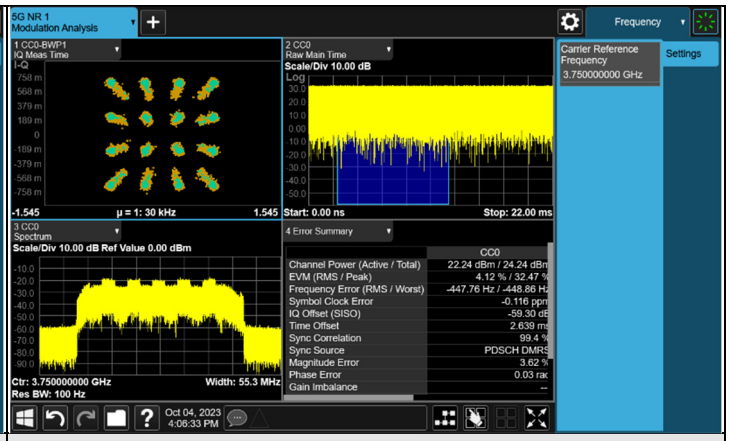
7.2 Modulation Characteristics

Input Power:	120 Vac, 60Hz	Environmental Conditions:	21°C, 70% RH	Tested By:	James Yang

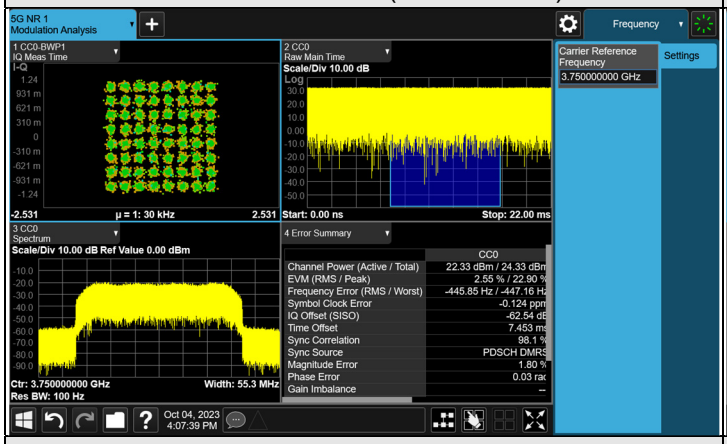
NR n78, Channel Bandwidth: 40 MHz



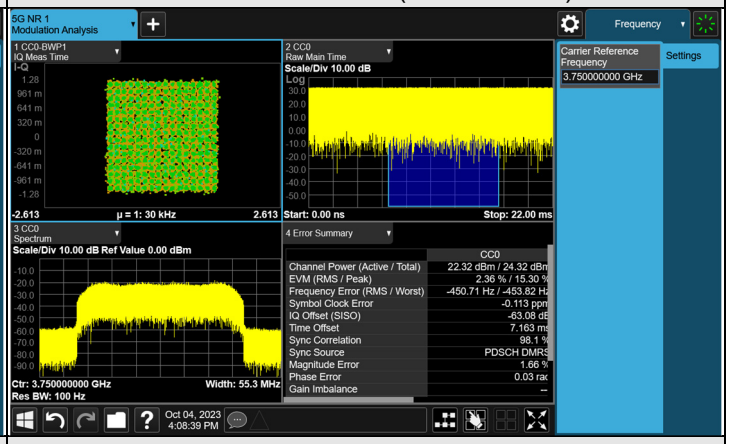
QPSK CH 650000 (3750.00 MHz)



16QAM CH 650000 (3750.00 MHz)



64QAM CH 650000 (3750.00 MHz)



256QAM CH 650000 (3750.00 MHz)

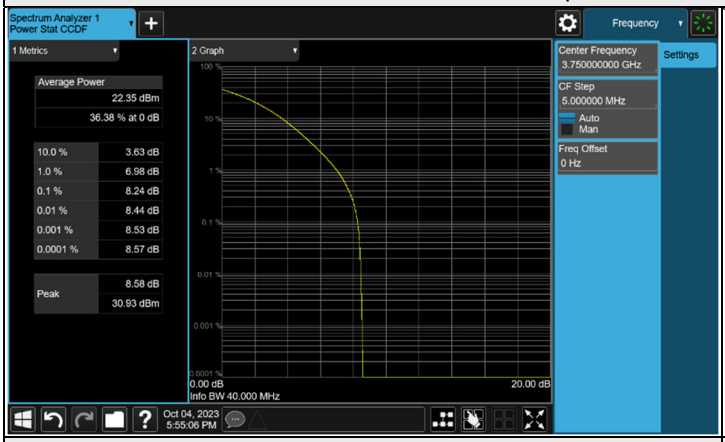
7.3 Peak to Average Ratio

Input Power:	120 Vac, 60Hz	Environmental Conditions:	21°C, 70% RH	Tested By:	James Yang

NR n78, Channel Bandwidth: 10 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)								Limit
		Ant. TX0				Ant. TX1				
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	
647000	3705	7.78	7.65	7.92	7.96	7.98	8.02	8.02	8.06	13.00
650000	3750	7.87	7.94	7.99	8.03	8.05	8.08	8.11	8.12	
653000	3795	7.72	7.84	7.88	7.92	7.95	7.98	8.00	8.04	
Channel	Frequency (MHz)	Peak to Average Ratio (dB)								Limit
		Ant. TX2				Ant. TX3				
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	
647000	3705	8.07	8.09	8.09	8.11	8.12	8.13	8.14	8.14	13.00
650000	3750	8.19	8.19	8.21	8.21	8.22	8.23	8.24	8.24	
653000	3795	8.02	8.05	8.06	8.09	8.10	8.11	8.13	8.12	

Spectrum Plot of Worst Value

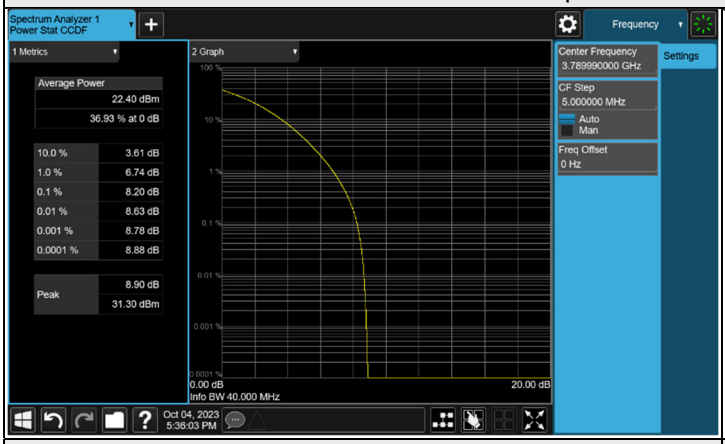


Ant. TX3 256QAM CH 650000 (3750 MHz)

NR n78, Channel Bandwidth: 20 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)								Limit
		Ant. TX0				Ant. TX1				
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	
647334	3710.01	7.25	7.36	7.40	7.42	7.44	7.47	7.47	7.50	13.00
650000	3750	7.24	7.36	7.41	7.45	7.55	7.57	7.58	7.60	
652666	3789.99	7.32	7.43	7.51	7.53	7.64	7.65	7.67	7.70	

Channel	Frequency (MHz)	Peak to Average Ratio (dB)								Limit
		Ant. TX2				Ant. TX3				
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	
647334	3710.01	7.50	7.51	7.52	7.53	7.54	7.55	7.56	7.56	13.00
650000	3750	7.60	7.61	7.61	7.61	7.62	7.61	7.63	7.62	
652666	3789.99	7.69	8.07	7.68	7.68	8.20	8.20	7.71	8.17	

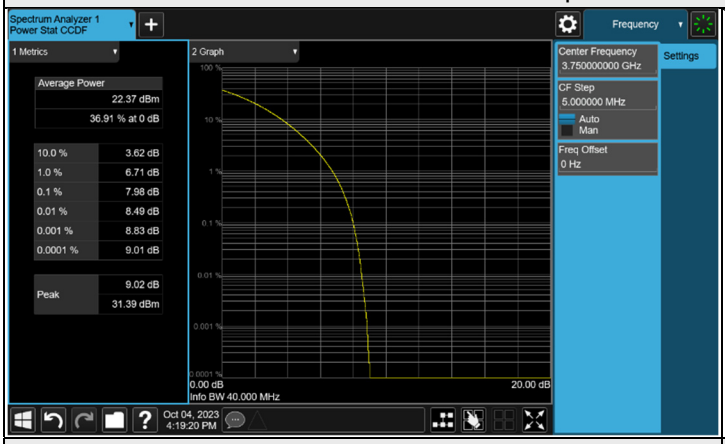
Spectrum Plot of Worst Value	
	
Ant. TX3 QPSK CH 652666 (3789.99 MHz)	

NR n78, Channel Bandwidth: 40 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)								Limit
		Ant. TX0				Ant. TX1				
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	
648000	3720	7.22	7.77	7.81	7.64	7.82	7.76	7.84	7.75	13.00
650000	3750	7.97	7.67	7.88	7.79	7.98	7.73	7.87	7.83	
652000	3780	7.82	7.62	7.71	7.63	7.84	7.67	7.87	7.78	

Channel	Frequency (MHz)	Peak to Average Ratio (dB)								Limit
		Ant. TX2				Ant. TX3				
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM	
648000	3720	7.84	7.35	7.85	7.87	7.87	7.79	7.69	7.54	13.00
650000	3750	7.94	7.81	7.88	7.83	7.75	7.75	7.83	7.85	
652000	3780	7.73	7.81	7.87	7.87	7.74	7.60	7.85	7.77	

Spectrum Plot of Worst Value



Ant. TX1 QPSK CH 650000 (3750 MHz)

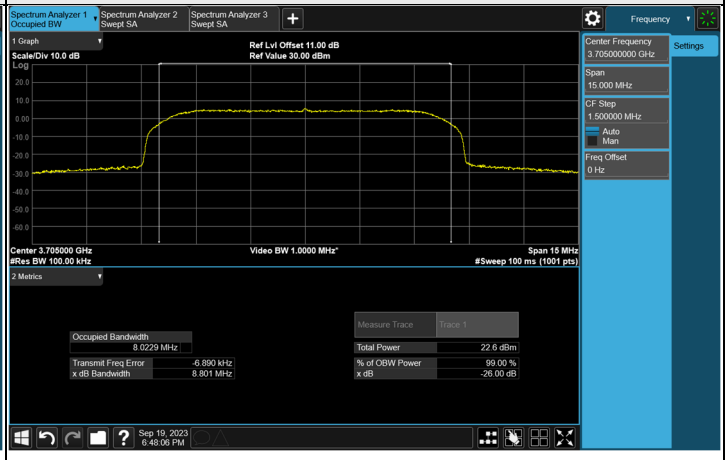
7.4 Bandwidth

Input Power:	120 Vac, 60Hz	Environmental Conditions:	21°C, 70% RH	Tested By:	James Yang

NR n78, Channel Bandwidth: 10 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)							
		Ant. TX0				Ant. TX1			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647000	3705	8.0055	7.8397	8.0080	8.0256	8.0064	7.8393	8.0071	8.0229
650000	3750	8.0056	7.8401	7.9992	8.0060	8.0083	7.8348	8.0025	8.0049
653000	3795	8.0057	7.8448	8.0088	8.0134	8.0073	7.8439	8.0072	8.0113
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)							
		Ant. TX2				Ant. TX3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647000	3705	8.0062	7.8359	8.0038	8.0134	8.0049	7.8429	8.0073	8.0168
650000	3750	8.0064	7.8395	8.0014	8.0112	8.0071	7.8393	8.0022	8.0107
653000	3795	8.0055	7.8448	8.0115	8.0090	8.0066	7.8420	8.0059	8.0117

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)							
		Ant. TX0				Ant. TX1			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647000	3705	8.790	8.752	8.789	8.782	8.793	8.752	8.789	8.801
650000	3750	8.790	8.752	8.795	8.790	8.788	8.756	8.793	8.796
653000	3795	8.795	7.555	8.797	8.797	8.794	8.752	8.795	8.788
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)							
		Ant. TX2				Ant. TX3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647000	3705	8.800	8.754	8.788	8.789	8.794	8.758	8.796	8.793
650000	3750	8.799	8.753	8.793	8.796	8.795	8.756	8.791	8.792
653000	3795	8.798	8.753	8.797	8.790	8.798	8.748	8.794	8.795

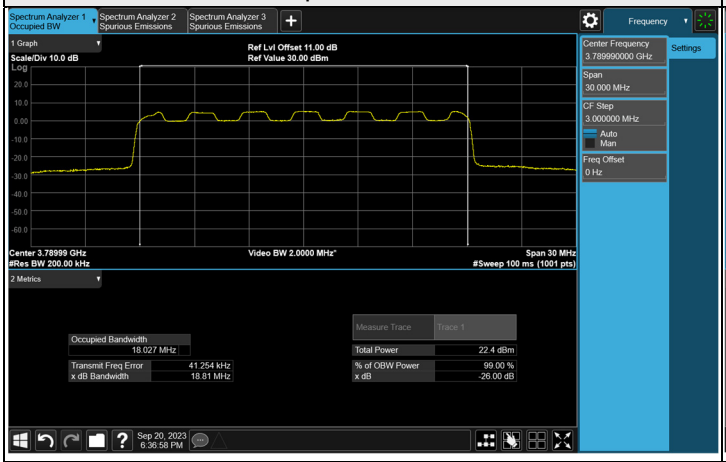
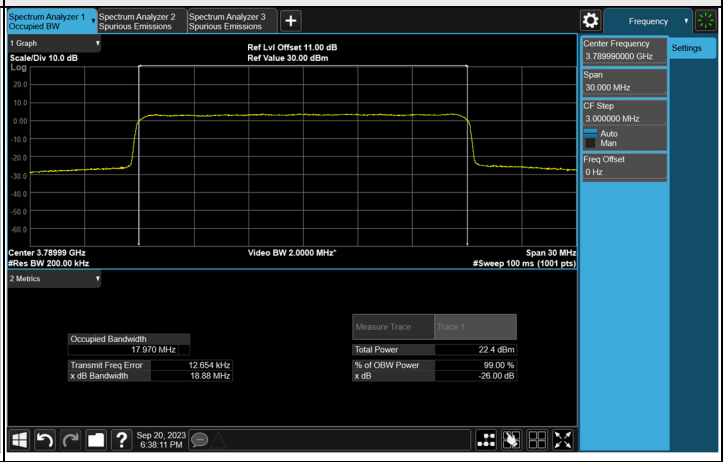
Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Ant. TX0 256QAM CH 647000 (3705 MHz)	Ant. TX1 256QAM CH 647000 (3705 MHz)

NR n78, Channel Bandwidth: 20 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)							
		Ant. TX0				Ant. TX1			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647334	3710.01	17.962	18.024	17.959	17.969	17.963	18.024	17.961	17.968
650000	3750	17.958	18.017	17.956	17.961	17.959	18.016	17.948	17.959
652666	3789.99	17.970	18.026	17.964	17.973	17.971	18.026	17.969	17.973
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)							
		Ant. TX2				Ant. TX3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647334	3710.01	17.963	18.025	17.962	17.964	17.964	18.025	17.960	17.965
650000	3750	17.958	18.017	17.953	17.963	17.958	18.016	17.952	17.964
652666	3789.99	17.970	18.026	17.968	17.971	17.972	18.027	17.970	17.975

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)							
		Ant. TX0				Ant. TX1			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647334	3710.01	18.830	18.800	18.820	18.830	18.840	18.800	18.830	18.840
650000	3750	18.840	18.800	18.830	18.830	18.840	18.810	18.840	18.840
652666	3789.99	18.850	18.820	18.870	18.860	18.870	18.810	18.850	18.860
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)							
		Ant. TX2				Ant. TX3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
647334	3710.01	18.840	18.810	18.830	18.830	18.840	18.800	18.840	18.830
650000	3750	18.850	18.800	18.830	18.830	18.850	18.800	18.840	18.830
652666	3789.99	18.860	18.820	18.860	18.860	18.870	18.810	18.880	18.870

Spectrum Plot of Worst Value

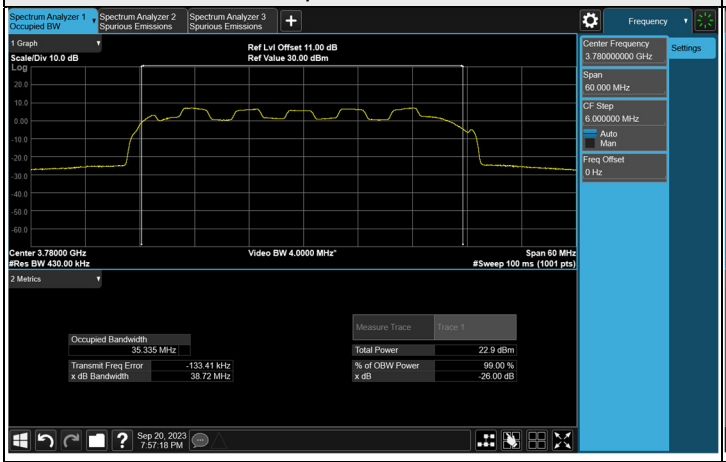
Occupied bandwidth	26 dB Bandwidth
	
Ant. TX3 16QAM CH 652666 (3789.99 MHz)	Ant. TX3 64QAM CH 652666 (3789.99 MHz)

NR n78, Channel Bandwidth: 40 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)							
		Ant. TX0				Ant. TX1			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
648000	3720	35.282	35.132	35.270	35.259	35.272	35.136	35.267	35.301
650000	3750	35.119	34.986	35.127	35.211	35.120	34.995	35.123	35.133
652000	3780	35.301	35.228	35.294	35.300	35.298	35.227	35.296	35.297
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)							
		Ant. TX2				Ant. TX3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
648000	3720	35.268	35.136	35.281	35.265	35.275	35.218	35.274	35.272
650000	3750	35.120	35.030	35.175	35.133	35.122	34.990	35.169	35.179
652000	3780	35.295	35.335	35.298	35.294	35.295	35.327	35.296	35.304

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)							
		Ant. TX0				Ant. TX1			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
648000	3720	38.710	38.650	38.690	38.700	38.700	38.640	38.690	38.720
650000	3750	38.680	38.640	38.690	38.750	38.690	38.640	38.690	38.690
652000	3780	38.710	38.660	38.690	38.700	38.700	38.660	38.700	38.700
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)							
		Ant. TX2				Ant. TX3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
648000	3720	38.690	38.640	38.700	38.690	38.700	38.690	38.680	38.690
650000	3750	38.690	38.660	38.730	38.690	38.690	38.640	38.710	38.730
652000	3780	38.700	38.720	38.680	38.700	38.700	38.710	38.700	38.690

Spectrum Plot of Worst Value

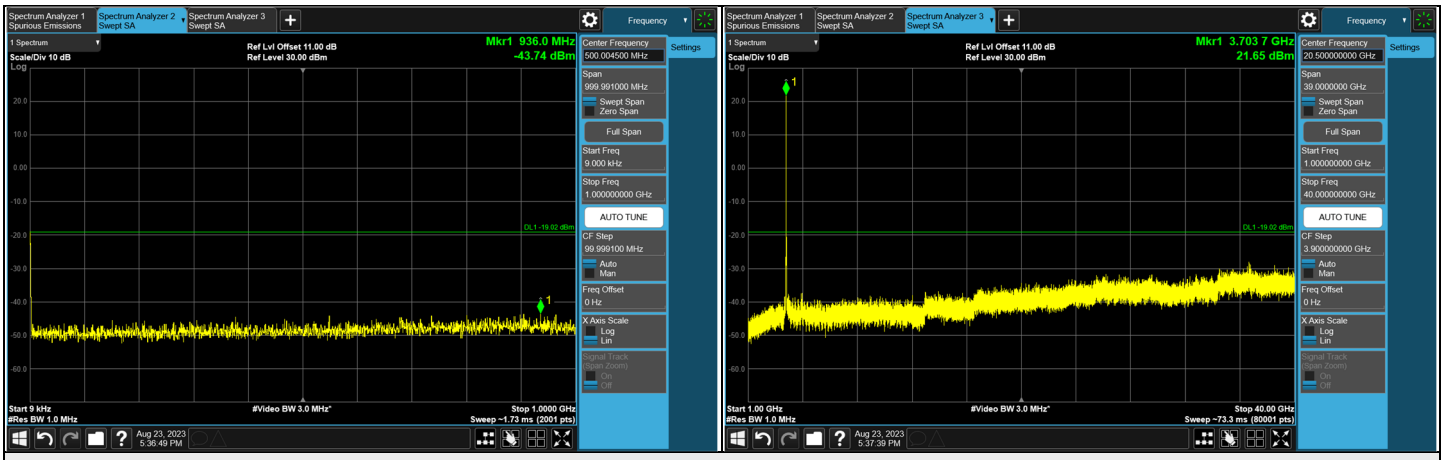
Occupied bandwidth	26 dB Bandwidth
	
Ant. TX2 16QAM CH 652000 (3780 MHz)	Ant. TX0 256QAM CH 650000 (3750 MHz)

7.5 Conducted Spurious Emissions

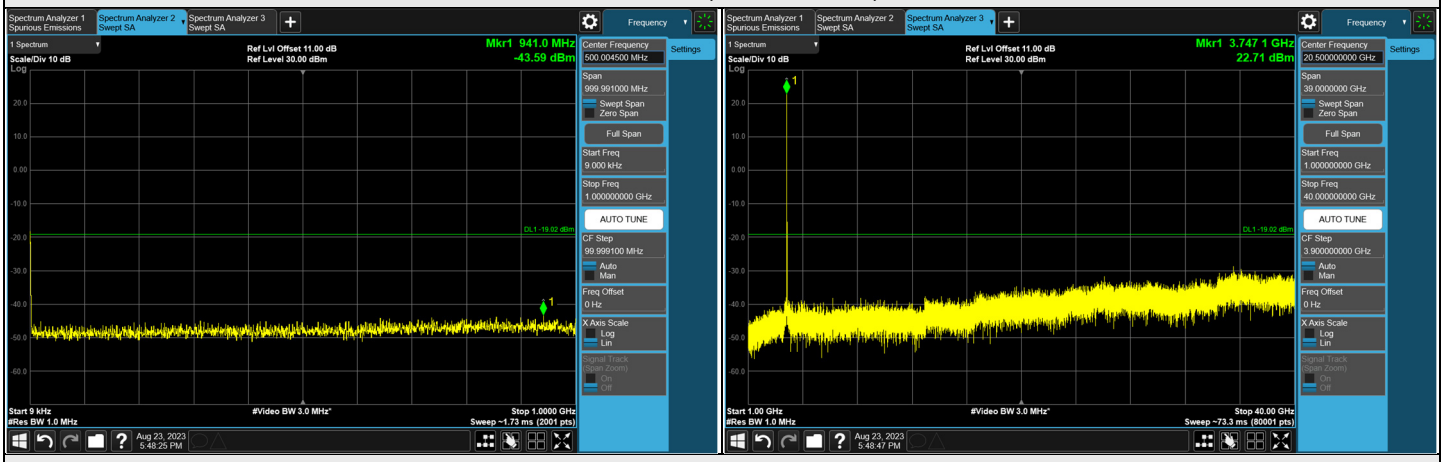
Input Power:	120 Vac, 60Hz	Environmental Conditions:	21°C, 70% RH	Tested By:	James Yang

NR n78, Channel Bandwidth: 10 MHz

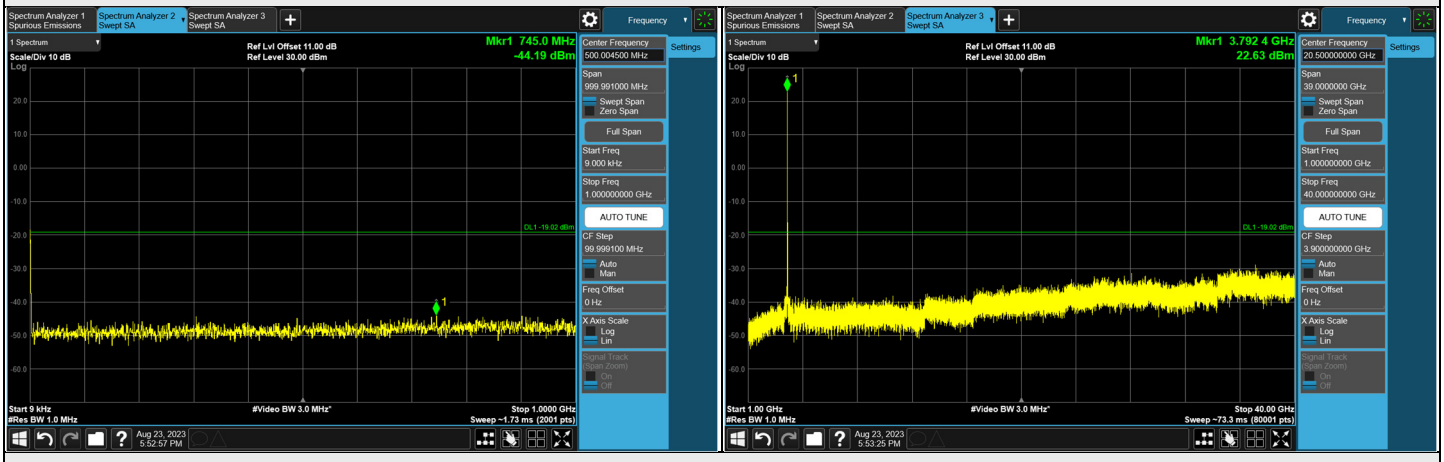
Ant. TX0



CH 647000 (3705.00 MHz)



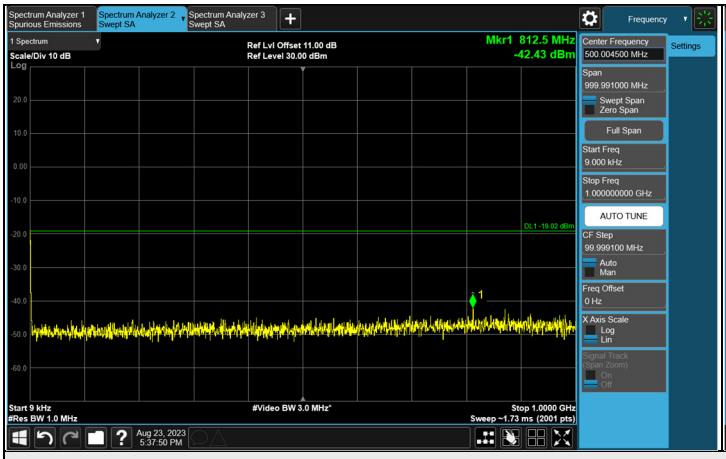
CH 650000 (3750.00 MHz)



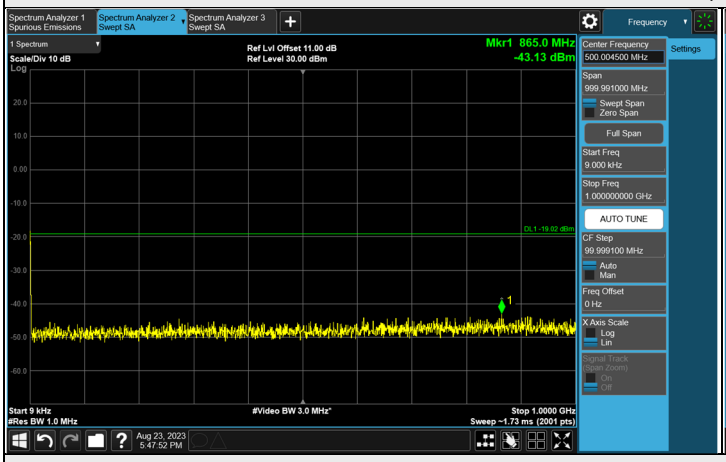
CH 653000 (3795.00 MHz)

*The 9kHz signal over the limit is from Spectrum.

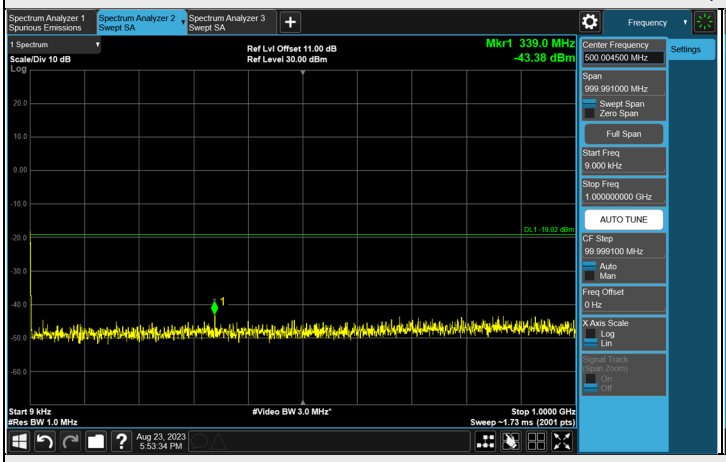
Ant. TX1



CH 647000 (3705.00 MHz)



CH 650000 (3750.00 MHz)



CH 653000 (3795.00 MHz)

*The 9kHz signal over the limit is from Spectrum.