TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 27** **47 CFR FCC Part 2**
Report No.:	RFBCUN-WTW-P23110664
FCC ID:	H8N60156A
Product:	5G small cell
Brand:	ASKEY
Model No.:	NR xCell 60156A
Received Date:	2023/11/24
Test Date:	2024/1/26 ~ 2024/4/3
Issued Date:	2024/4/24
Applicant:	ASKEY COMPUTER CORP.
Address:	10F, NO. 119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY 23585, 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 (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number (1):	788550 / TW0003
Test Location (2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number (2):	281270 / TW0032

Approved by: Jeremy Lin , **Date:** **2024/4/24**

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
RFBCUN-WTW-P23110664	Original release.	2024/4/24

1 Certificate

Product:	5G small cell
Brand:	ASKEY
Test Model:	NR xCell 60156A
Sample Status:	Engineering sample
Applicant:	ASKEY COMPUTER CORP.
Test Date:	2024/1/26 ~ 2024/4/3
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.
FCC 47 CFR Part 27.50(j)(4)	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 -23.41 dB at 41.64 MHz
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 27.53(l)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -26.43 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 small cell
Brand	ASKEY
Test Model	NR xCell 60156A
Status of EUT	Engineering sample
Power Supply Rating	100-240 Vac

Note:

1. EUT Overview.

Band / Bandwidth	TX Frequency Range (MHz)	Max. EIRP Power		
		QPSK	64QAM	256QAM
For Part 27O (Per 1MHz Power)				
n77 (Channel Bandwidth 40MHz)	3720.00-3960.00	59.566mW (17.75dBm/MHz)	50.350mW (17.02dBm/MHz)	42.462mW (16.28dBm/MHz)
n77 (Channel Bandwidth 50MHz)	3725.01-3954.99	40.926mW (16.12dBm/MHz)	31.842mW (15.03dBm/MHz)	31.769mW (15.02dBm/MHz)
n77 (Channel Bandwidth 60MHz)	3730.02-3949.98	34.674mW (15.40dBm/MHz)	26.546mW (14.24dBm/MHz)	24.604mW (13.91dBm/MHz)
n77 (Channel Bandwidth 70MHz)	3735.00-3945.00	28.576mW (14.56dBm/MHz)	23.388mW (13.69dBm/MHz)	22.387mW (13.50dBm/MHz)
n77 (Channel Bandwidth 80MHz)	3740.01-3939.99	25.468mW (14.06dBm/MHz)	19.320mW (12.86dBm/MHz)	18.493mW (12.67dBm/MHz)
n77 (Channel Bandwidth 90MHz)	3745.02-3934.98	25.003mW (13.98dBm/MHz)	20.230mW (13.06dBm/MHz)	19.187mW (12.83dBm/MHz)
n77 (Channel Bandwidth 100MHz)	3750.00-3930.00	21.135mW (13.25dBm/MHz)	16.406mW (12.15dBm/MHz)	17.219mW (12.36dBm/MHz)
For Part 27O (Full Power)				
n77 (Channel Bandwidth 40MHz)	3720.00-3960.00	2208.005mW (33.44dBm)	1606.941mW (32.06dBm)	1541.700mW (31.88dBm)
n77 (Channel Bandwidth 50MHz)	3725.01-3954.99	2023.019mW (33.06dBm)	1545.254mW (31.89dBm)	1448.772mW (31.61dBm)
n77 (Channel Bandwidth 60MHz)	3730.02-3949.98	2032.357mW (33.08dBm)	1588.547mW (32.01dBm)	1584.893mW (32.00dBm)
n77 (Channel Bandwidth 70MHz)	3735.00-3945.00	1972.423mW (32.95dBm)	1659.587mW (32.20dBm)	1655.770mW (32.19dBm)
n77 (Channel Bandwidth 80MHz)	3740.01-3939.99	1949.845mW (32.90dBm)	1592.209mW (32.02dBm)	1534.617mW (31.86dBm)
n77 (Channel Bandwidth 90MHz)	3745.02-3934.98	2223.310mW (33.47dBm)	1633.052mW (32.13dBm)	1682.674mW (32.26dBm)
n77 (Channel Bandwidth 100MHz)	3750.00-3930.00	2074.914mW (33.17dBm)	1545.254mW (31.89dBm)	1566.751mW (31.95dBm)
Band / Bandwidth	TX Frequency Range (MHz)	Emission Designator		
		QPSK	64QAM	256QAM
For Part 27O				
n77 (Channel Bandwidth 40MHz)	3720.00-3960.00	37M8G7D	37M8D7W	37M8D7W
n77 (Channel Bandwidth 50MHz)	3725.01-3954.99	47M5G7D	47M5D7W	47M4D7W
n77 (Channel Bandwidth 60MHz)	3730.02-3949.98	57M8G7D	57M8D7W	57M8D7W
n77 (Channel Bandwidth 70MHz)	3735.00-3945.00	67M4G7D	67M5D7W	67M4D7W
n77 (Channel Bandwidth 80MHz)	3740.01-3939.99	77M4G7D	77M4D7W	77M4D7W
n77 (Channel Bandwidth 90MHz)	3745.02-3934.98	87M4G7D	87M4D7W	87M4D7W
n77 (Channel Bandwidth 100MHz)	3750.00-3930.00	97M4G7D	97M4D7W	97M3D7W

2. The EUT contains following accessory devices.

AC Adapter	Brand	MEAN WELL
	Model	LRS-100-12
	AC Input	85~264V 12V/8.5A
	DC Output	36V 2.8A 100.8W
	DC Output Cable	2.75m non-shielded cable without core

3. The EUT device does not support 16QAM modulation and only supports Full RB mode.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type	Antenna Gain(dBi)			Connector Type
	Frequency (MHz)	Ant 1	Ant 2	
PCB	3300	3.38	5.20	SMA
	3800	3.89	4.63	
	4300	4.18	5.55	
	4400	5.66	5.50	
	4700	3.87	5.57	
	5000	4.66	4.39	

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

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: Z-axis

For NR n77 (3700-3980 MHz)

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	648000 (3720.00 MHz) 656000 (3840.00 MHz) 664000 (3960.00 MHz)	40 MHz	QPSK / 64QAM / 256QAM	Full RB
	648334 (3725.01 MHz) 656000 (3840.00 MHz) 663666 (3954.99 MHz)	50 MHz	QPSK / 64QAM / 256QAM	Full RB
	648668 (3730.02 MHz) 656000 (3840.00 MHz) 663332 (3949.98 MHz)	60 MHz	QPSK / 64QAM / 256QAM	Full RB
	649000 (3735.00 MHz) 656000 (3840.00 MHz) 663000 (3945.00 MHz)	70 MHz	QPSK / 64QAM / 256QAM	Full RB
	649334 (3740.01 MHz) 656000 (3840.00 MHz) 662666 (3939.99 MHz)	80 MHz	QPSK / 64QAM / 256QAM	Full RB
	649668 (3745.02 MHz) 656000 (3840.00 MHz) 662332 (3934.98 MHz)	90 MHz	QPSK / 64QAM / 256QAM	Full RB
	650000 (3750.00 MHz) 656000 (3840.00 MHz) 662000 (3930.00 MHz)	100 MHz	QPSK / 64QAM / 256QAM	Full RB
Modulation Characteristics	656000 (3840.00 MHz)	100 MHz	QPSK / 64QAM / 256QAM	Full RB
Frequency Stability	648000 (3720.00 MHz) 664000 (3960.00 MHz)	40 MHz	QPSK	Full RB
	648334 (3725.01 MHz) 663666 (3954.99 MHz)	50 MHz	QPSK	Full RB
	648668 (3730.02 MHz) 663332 (3949.98 MHz)	60 MHz	QPSK	Full RB
	649000 (3735.00 MHz) 663000 (3945.00 MHz)	70 MHz	QPSK	Full RB
	649334 (3740.01 MHz) 662666 (3939.99 MHz)	80 MHz	QPSK	Full RB
	649668 (3745.02 MHz) 662332 (3934.98 MHz)	90 MHz	QPSK	Full RB
	650000 (3750.00 MHz) 662000 (3930.00 MHz)	100 MHz	QPSK	Full RB

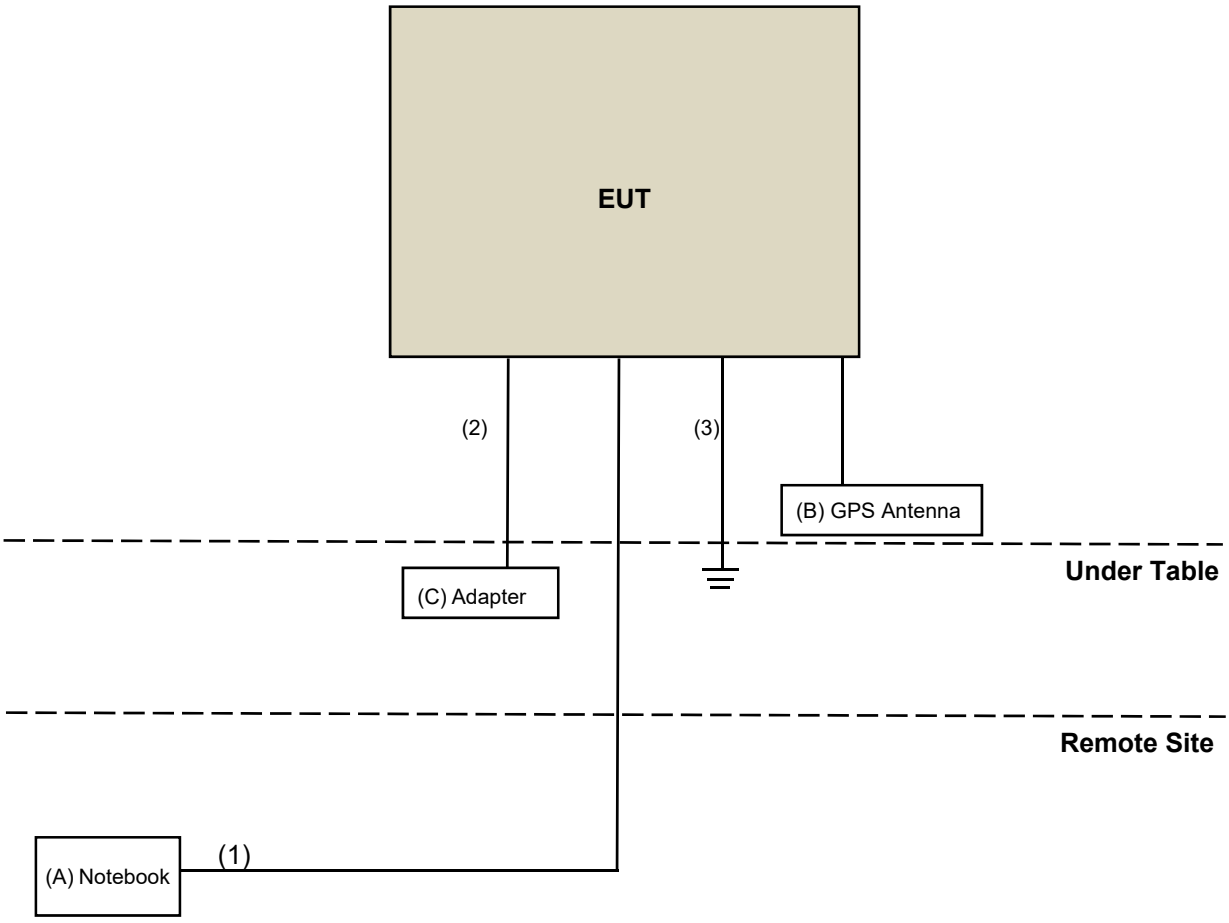
Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Occupied Bandwidth	648000 (3720.00 MHz) 656000 (3840.00 MHz) 664000 (3960.00 MHz)	40 MHz	QPSK / 64QAM / 256QAM	Full RB
	648334 (3725.01 MHz) 656000 (3840.00 MHz) 663666 (3954.99 MHz)	50 MHz	QPSK / 64QAM / 256QAM	Full RB
	648668 (3730.02 MHz) 656000 (3840.00 MHz) 663332 (3949.98 MHz)	60 MHz	QPSK / 64QAM / 256QAM	Full RB
	649000 (3735.00 MHz) 656000 (3840.00 MHz) 663000 (3945.00 MHz)	70 MHz	QPSK / 64QAM / 256QAM	Full RB
	649334 (3740.01 MHz) 656000 (3840.00 MHz) 662666 (3939.99 MHz)	80 MHz	QPSK / 64QAM / 256QAM	Full RB
	649668 (3745.02 MHz) 656000 (3840.00 MHz) 662332 (3934.98 MHz)	90 MHz	QPSK / 64QAM / 256QAM	Full RB
	650000 (3750.00 MHz) 656000 (3840.00 MHz) 662000 (3930.00 MHz)	100 MHz	QPSK / 64QAM / 256QAM	Full RB
Peak to Average Ratio	648000 (3720.00 MHz) 656000 (3840.00 MHz) 664000 (3960.00 MHz)	40 MHz	QPSK / 64QAM / 256QAM	Full RB
	648334 (3725.01 MHz) 656000 (3840.00 MHz) 663666 (3954.99 MHz)	50 MHz	QPSK / 64QAM / 256QAM	Full RB
	648668 (3730.02 MHz) 656000 (3840.00 MHz) 663332 (3949.98 MHz)	60 MHz	QPSK / 64QAM / 256QAM	Full RB
	649000 (3735.00 MHz) 656000 (3840.00 MHz) 663000 (3945.00 MHz)	70 MHz	QPSK / 64QAM / 256QAM	Full RB
	649334 (3740.01 MHz) 656000 (3840.00 MHz) 662666 (3939.99 MHz)	80 MHz	QPSK / 64QAM / 256QAM	Full RB
	649668 (3745.02 MHz) 656000 (3840.00 MHz) 662332 (3934.98 MHz)	90 MHz	QPSK / 64QAM / 256QAM	Full RB
	650000 (3750.00 MHz) 656000 (3840.00 MHz) 662000 (3930.00 MHz)	100 MHz	QPSK / 64QAM / 256QAM	Full RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Emission	648000 (3720.00 MHz) 656000 (3840.00 MHz) 664000 (3960.00 MHz)	40 MHz	QPSK	Full RB
	648334 (3725.01 MHz) 656000 (3840.00 MHz) 663666 (3954.99 MHz)	50 MHz	QPSK	Full RB
	648668 (3730.02 MHz) 656000 (3840.00 MHz) 663332 (3949.98 MHz)	60 MHz	QPSK	Full RB
	649000 (3735.00 MHz) 656000 (3840.00 MHz) 663000 (3945.00 MHz)	70 MHz	QPSK	Full RB
	649334 (3740.01 MHz) 656000 (3840.00 MHz) 662666 (3939.99 MHz)	80 MHz	QPSK	Full RB
	649668 (3745.02 MHz) 656000 (3840.00 MHz) 662332 (3934.98 MHz)	90 MHz	QPSK	Full RB
	650000 (3750.00 MHz) 656000 (3840.00 MHz) 662000 (3930.00 MHz)	100 MHz	QPSK	Full RB
RE Below 1GHz	650000 (3750.00 MHz)	100 MHz	QPSK	Full RB
RE Above 1GHz	648000 (3720.00 MHz) 656000 (3840.00 MHz) 664000 (3960.00 MHz)	40 MHz	QPSK	Full RB
	649000 (3735.00 MHz) 656000 (3840.00 MHz) 663000 (3945.00 MHz)	70 MHz	QPSK	Full RB
	650000 (3750.00 MHz) 656000 (3840.00 MHz) 662000 (3930.00 MHz)	100 MHz	QPSK	Full RB

3.4 Test Program Used and Operation Descriptions

Controlling software (QRCT V4.0.00198.0) 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	Notebook	Lenovo	L470	NA	NA	Provided by Lab
B	GPS Antenna	NA	NA	NA	NA	Supplied by applicant
D	Adapter	MEAN WELL	LRS-100-12	NA	NA	Accessory of EUT

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	RJ-45 Cable	1	10	No	0	Provided by Lab
2	AC Cable	1	3	No	0	Supplied by applicant
3	Ground Cable	1	2	No	0	Supplied by applicant

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
			2024/3/6	2025/3/5
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: 2024/2/7 ~ 2024/4/3

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
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: 2024/2/19

4.3 Peak to Average Ratio

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY57140488	2023/3/6	2024/3/5
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: 2024/1/30 ~ 2024/2/11

4.4 Bandwidth

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY57140488	2023/3/6	2024/3/5
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: 2024/2/6 ~ 2024/2/20

4.5 Conducted Spurious Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY57140488	2023/3/6	2024/3/5
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: 2024/1/26 ~ 2024/2/2

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	2023/12/7	2024/12/6
MXA Signal Analyzer Keysight	N9020B	MY60110513	2023/12/22	2024/12/21
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Preamplifier EMCI	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-3000	201235	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-9000	201236(with PAD)	2024/1/15	2025/1/14
Preamplifier EMCI	EMC330N	980782	2024/1/15	2025/1/14
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1213	2023/10/13	2024/10/12
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-500	201233	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-3000	201235	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-9000	201236(with PAD)	2024/1/15	2025/1/14

Notes:

1. The test was performed in HY - 966 chamber 8.
2. Tested Date: 2024/3/12

4.7 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Horn Antenna RFSPIN	DRH18-E	210103A18E	2023/11/12	2024/11/11
Preamplifier EMCI	EMC118A45SE	980808	2023/12/28	2024/12/27
RF Coaxial Cable EMCI	EMC104-SM-SM-1000	210102	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC104-SM-SM-3000	201231	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC104-SM-SM-9000	201243	2024/1/15	2025/1/14
Preamplifier EMCI	EMC184045SE	980788	2024/1/15	2025/1/14
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2023/11/12	2024/11/11
RF Coaxial Cable EMCI	EMC101G-KM-KM-5000	201261	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC101G-KM-KM-3000	201258	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2024/1/15	2025/1/14
Boresight antenna tower fixture BV	BAF-02	5	NA	NA

Notes:

1. The test was performed in HY - 966 chamber 8.
2. Tested Date: 2024/3/12

4.8 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
AC Power Supply Extech	CFW-105	E000603	N/A	N/A
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	100980	2023/5/3	2024/5/2
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2023/12/19	2024/12/18

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/2/21

5 Limits of Test Items

5.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

For NR n77 (3700-3980 MHz):

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 n77 (3700-3980 MHz):

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.

5.6 Radiated Spurious Emissions below 1GHz

For NR n77 (3700-3980 MHz):

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 n77 (3700-3980 MHz):

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 n77 (3700-3980 MHz):

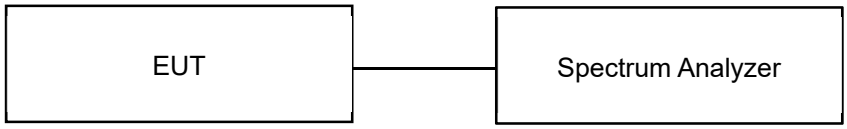
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

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

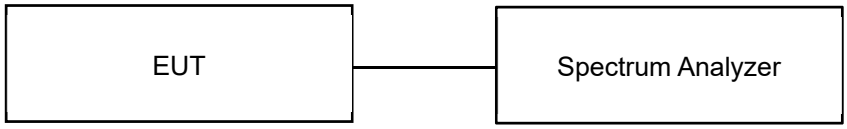
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

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

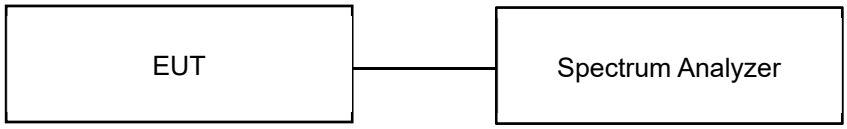


6.2.2 Test Procedure

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

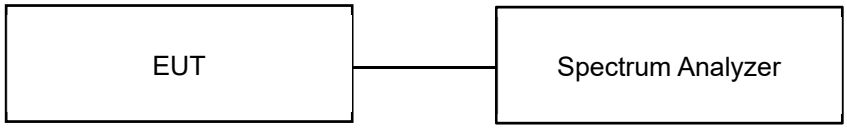


6.3.2 Test Procedure

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.

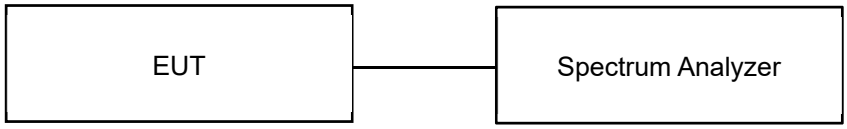
a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and 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



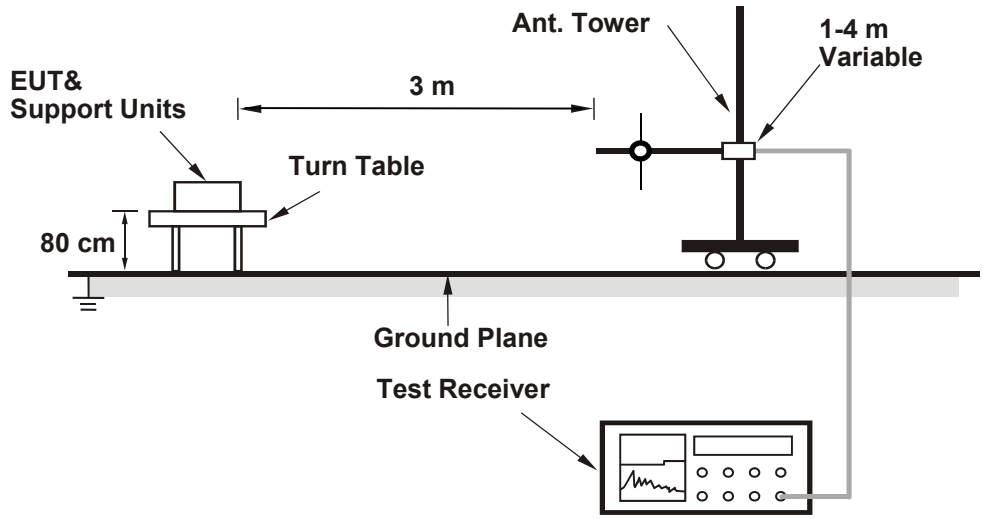
6.5.2 Test Procedure

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.
g. Ref Lvl offset=12+3.01=15.01, $10\log(Numbers_{ANT})=3.01$

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.

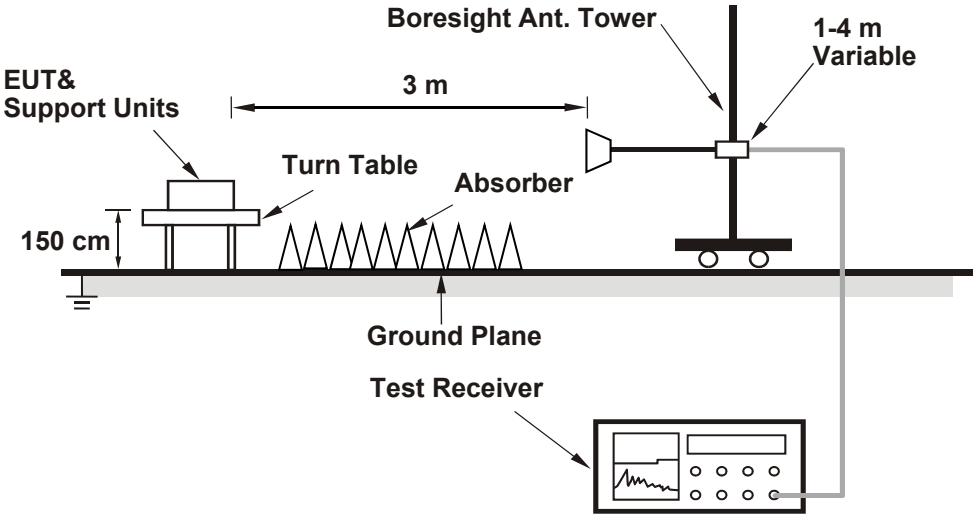
Note:

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.

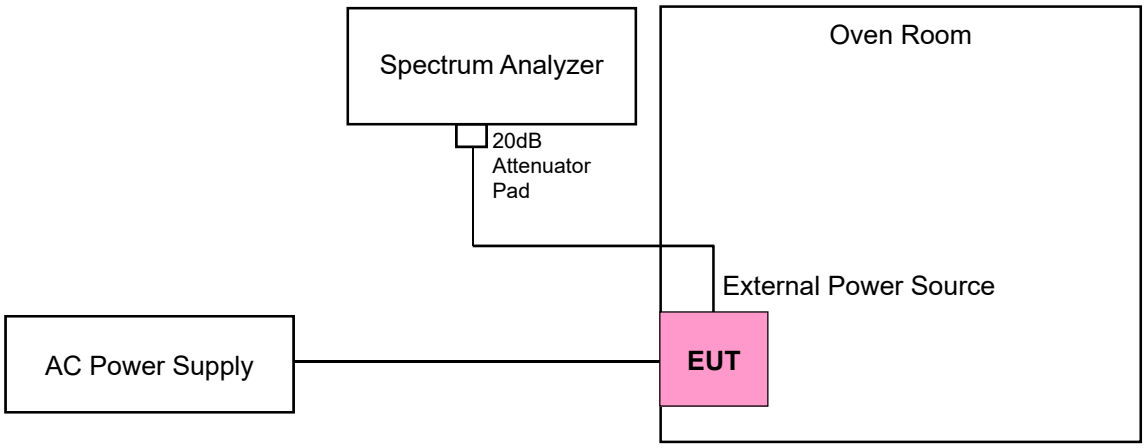
f. ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

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:	Kevin Kuo

Per 1MHz Power

NR Band 77_Per 1MHz power								
Bandwidth	Channel / Frequency	Setting	Modulation	Chain 0	Chain 1	Total (dBm/MHz)	e.i.r.p. (dBm/MHz)	e.i.r.p. (W/MHz)
40M	CH 648000 3720 MHz	240	QPSK	6.72	6.81	9.78	17.36	0.05
			64QAM	6.26	5.12	8.74	16.32	0.04
			256QAM	6.01	5.30	8.68	16.26	0.04
	CH 656000 3840 MHz	240	QPSK	7.35	6.97	10.17	17.75	0.06
			64QAM	6.28	6.58	9.44	17.02	0.05
			256QAM	5.80	5.57	8.70	16.28	0.04
	CH 664000 3960 MHz	240	QPSK	6.66	6.50	9.59	17.17	0.05
			64QAM	5.53	5.14	8.35	15.93	0.04
			256QAM	5.05	5.23	8.15	15.73	0.04
50M	CH 648334 3725.01 MHz	240	QPSK	5.32	4.76	8.06	15.64	0.04
			64QAM	5.25	3.45	7.45	15.03	0.03
			256QAM	5.23	3.46	7.44	15.02	0.03
	CH 656000 3840 MHz	240	QPSK	5.85	5.18	8.54	16.12	0.04
			64QAM	3.98	3.35	6.69	14.27	0.03
			256QAM	3.42	3.33	6.39	13.97	0.02
	CH 663666 3954.99 MHz	240	QPSK	4.74	5.00	7.88	15.46	0.04
			64QAM	4.36	3.32	6.88	14.46	0.03
			256QAM	4.15	3.42	6.81	14.39	0.03
60M	CH 648668 3730.02 MHz	240	QPSK	4.57	3.80	7.21	14.79	0.03
			64QAM	3.67	3.15	6.43	14.01	0.03
			256QAM	3.21	3.04	6.14	13.72	0.02
	CH 656000 3840 MHz	240	QPSK	5.10	4.49	7.82	15.40	0.03
			64QAM	4.42	2.71	6.66	14.24	0.03
			256QAM	4.10	2.38	6.33	13.91	0.02
	CH 663332 3949.98 MHz	240	QPSK	4.51	4.49	7.51	15.09	0.03
			64QAM	4.35	2.75	6.63	14.21	0.03
			256QAM	3.88	2.45	6.23	13.81	0.02

*EIRP (dBm) = Conducted Output Power (dBm) + Directional Gain (dBi)

*Directional Gain (dBi) = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/2$] = 10 log[$(10^{3.89/20} + 10^{5.2/20})^2/2$] = 7.58 dBi

NR Band 77_Per 1MHz power								
Bandwidth	Channel / Frequency	Setting	Modulation	Chain 0	Chain 1	Total (dBm/MHz)	e.i.r.p. (dBm/MHz)	e.i.r.p. (W/MHz)
70M	CH 649000 3735 MHz	240	QPSK	3.75	3.22	6.50	14.08	0.03
			64QAM	2.96	2.31	5.66	13.24	0.02
			256QAM	2.55	2.43	5.50	13.08	0.02
	CH 656000 3840 MHz	240	QPSK	4.30	3.62	6.98	14.56	0.03
			64QAM	3.77	2.31	6.11	13.69	0.02
			256QAM	3.31	2.46	5.92	13.50	0.02
	CH 663000 3945 MHz	240	QPSK	3.75	3.31	6.55	14.13	0.03
			64QAM	3.11	2.22	5.70	13.28	0.02
			256QAM	2.85	2.22	5.56	13.14	0.02
80M	CH 649334 3740.01 MHz	240	QPSK	2.46	2.88	5.69	13.27	0.02
			64QAM	2.21	1.54	4.90	12.48	0.02
			256QAM	2.23	1.31	4.80	12.38	0.02
	CH 656000 3840 MHz	240	QPSK	3.88	3.02	6.48	14.06	0.03
			64QAM	2.49	1.88	5.21	12.79	0.02
			256QAM	2.04	1.51	4.79	12.37	0.02
	CH 662666 3939.99 MHz	240	QPSK	3.09	3.01	6.06	13.64	0.02
			64QAM	2.41	2.12	5.28	12.86	0.02
			256QAM	2.15	2.01	5.09	12.67	0.02
90M	CH 649668 3745.02 MHz	240	QPSK	2.88	2.61	5.76	13.34	0.02
			64QAM	2.76	2.14	5.47	13.05	0.02
			256QAM	2.01	1.36	4.71	12.29	0.02
	CH 656000 3840 MHz	240	QPSK	3.70	3.05	6.40	13.98	0.02
			64QAM	3.13	1.68	5.48	13.06	0.02
			256QAM	2.62	1.82	5.25	12.83	0.02
	CH 662332 3934.98 MHz	240	QPSK	2.71	2.92	5.83	13.41	0.02
			64QAM	2.21	2.00	5.12	12.70	0.02
			256QAM	2.39	0.81	4.68	12.26	0.02
100M	CH 650000 3750 MHz	200	QPSK	-1.35	-1.64	1.52	9.10	0.01
			64QAM	-2.53	-3.11	0.20	7.78	0.01
			256QAM	-1.69	-2.84	0.78	8.36	0.01
	CH 656000 3840 MHz	240	QPSK	2.77	2.54	5.67	13.25	0.02
			64QAM	2.25	0.75	4.57	12.15	0.02
			256QAM	2.75	0.49	4.78	12.36	0.02
	CH 662000 3930 MHz	210	QPSK	-1.66	-2.38	1.01	8.59	0.01
			64QAM	-1.33	-1.67	1.51	9.09	0.01
			256QAM	-0.89	-1.26	1.94	9.52	0.01

*EIRP (dBm) = Conducted Output Power (dBm) + Directional Gain (dBi)

*Directional Gain (dBi) = 10 log[($10^{G1/20}$ + $10^{G2/20}$ + ... + $10^{GN/20}$)^2/2] = 10 log[($10^{3.89/20}$ +$10^{5.2/20}$)^2/2] = 7.58 dBi

Full Power

NR Band 77_Full power (dBm)								
Bandwidth	Channel / Frequency	Setting	Modulation	Chain 0	Chain 1	Total (dBm/MHz)	e.i.r.p. (dBm/MHz)	e.i.r.p. (W/MHz)
40M	CH 648000 3720 MHz	240	QPSK	23.11	22.58	25.86	33.44	2.21
			64QAM	21.56	20.91	24.26	31.84	1.53
			256QAM	21.57	20.98	24.30	31.88	1.54
	CH 656000 3840 MHz	240	QPSK	23.08	22.58	25.85	33.43	2.20
			64QAM	21.71	21.21	24.48	32.06	1.61
			256QAM	20.98	20.35	23.69	31.27	1.34
	CH 664000 3960 MHz	240	QPSK	22.52	22.66	25.60	33.18	2.08
			64QAM	21.23	20.71	23.99	31.57	1.43
			256QAM	21.06	20.37	23.74	31.32	1.35
50M	CH 648334 3725.01 MHz	240	QPSK	22.07	21.75	24.92	32.50	1.78
			64QAM	21.89	20.62	24.31	31.89	1.55
			256QAM	21.81	20.06	24.03	31.61	1.45
	CH 656000 3840 MHz	240	QPSK	22.62	22.32	25.48	33.06	2.02
			64QAM	21.09	20.46	23.80	31.38	1.37
			256QAM	20.94	20.14	23.57	31.15	1.30
	CH 663666 3954.99 MHz	240	QPSK	22.11	21.45	24.80	32.38	1.73
			64QAM	20.79	20.47	23.64	31.22	1.33
			256QAM	20.72	20.06	23.41	30.99	1.26
60M	CH 648668 3730.02 MHz	240	QPSK	22.19	21.64	24.93	32.51	1.78
			64QAM	21.19	20.93	24.07	31.65	1.46
			256QAM	21.07	20.68	23.89	31.47	1.40
	CH 656000 3840 MHz	240	QPSK	22.82	22.13	25.50	33.08	2.03
			64QAM	22.06	20.66	24.43	32.01	1.59
			256QAM	22.16	20.50	24.42	32.00	1.58
	CH 663332 3949.98 MHz	240	QPSK	22.14	22.33	25.25	32.83	1.92
			64QAM	21.68	20.72	24.24	31.82	1.52
			256QAM	21.65	20.37	24.07	31.65	1.46

*EIRP (dBm) = Conducted Output Power (dBm) + Directional Gain (dBi)

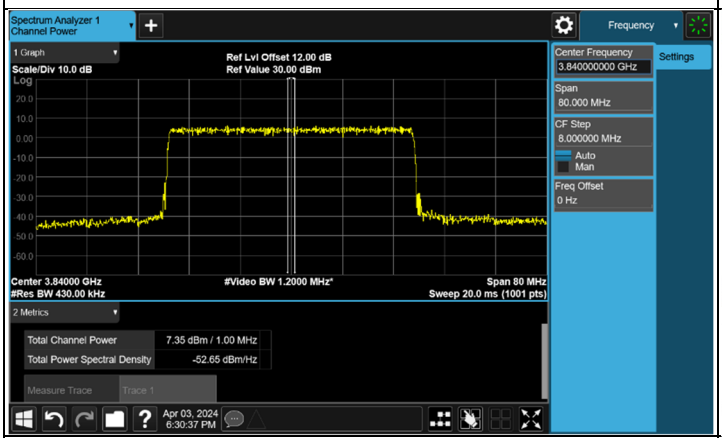
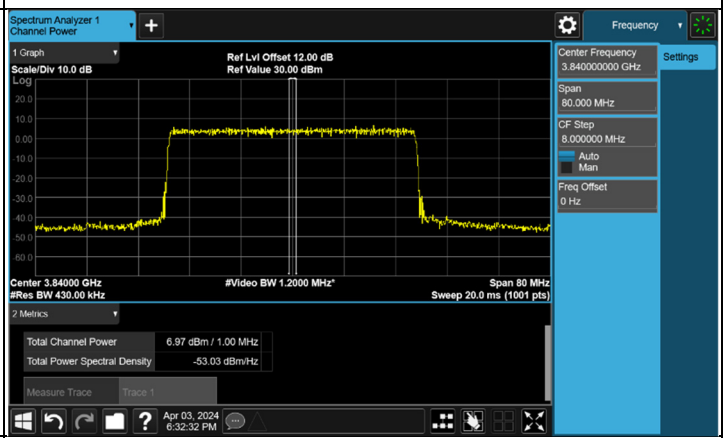
*Directional Gain (dBi) = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/2$] = 10 log[$(10^{3.89/20} + 10^{5.2/20})^2/2$] = 7.58 dBi

NR Band 77_Full power (dBm)								
Bandwidth	Channel / Frequency	Setting	Modulation	Chain 0	Chain 1	Total (dBm/MHz)	e.i.r.p. (dBm/MHz)	e.i.r.p. (W/MHz)
70M	CH 649000 3735 MHz	240	QPSK	22.03	21.57	24.82	32.40	1.74
			64QAM	21.47	20.72	24.12	31.70	1.48
			256QAM	21.71	20.64	24.22	31.80	1.51
	CH 656000 3840 MHz	240	QPSK	22.65	22.05	25.37	32.95	1.97
			64QAM	22.18	20.95	24.62	32.20	1.66
			256QAM	22.15	20.96	24.61	32.19	1.65
	CH 663000 3945 MHz	240	QPSK	22.25	22.21	25.24	32.82	1.91
			64QAM	21.67	20.80	24.27	31.85	1.53
			256QAM	21.28	20.63	23.98	31.56	1.43
80M	CH 649334 3740.01 MHz	240	QPSK	21.98	21.62	24.81	32.39	1.74
			64QAM	21.51	20.41	24.01	31.59	1.44
			256QAM	21.02	20.04	23.57	31.15	1.30
	CH 656000 3840 MHz	240	QPSK	22.80	21.75	25.32	32.90	1.95
			64QAM	21.87	20.94	24.44	32.02	1.59
			256QAM	21.30	21.02	24.17	31.75	1.50
	CH 662666 3939.99 MHz	240	QPSK	22.05	21.76	24.92	32.50	1.78
			64QAM	21.77	20.95	24.39	31.97	1.57
			256QAM	21.44	21.09	24.28	31.86	1.53
90M	CH 649668 3745.02 MHz	240	QPSK	22.25	21.96	25.12	32.70	1.86
			64QAM	21.69	21.05	24.39	31.97	1.57
			256QAM	21.40	20.67	24.06	31.64	1.46
	CH 656000 3840 MHz	240	QPSK	23.20	22.54	25.89	33.47	2.22
			64QAM	22.23	20.72	24.55	32.13	1.63
			256QAM	22.01	21.30	24.68	32.26	1.68
	CH 662332 3934.98 MHz	240	QPSK	22.20	22.45	25.34	32.92	1.96
			64QAM	21.53	21.06	24.31	31.89	1.55
			256QAM	21.67	20.42	24.10	31.68	1.47
100M	CH 650000 3750 MHz	200	QPSK	18.23	18.06	21.16	28.74	0.75
			64QAM	17.35	16.52	19.97	27.55	0.57
			256QAM	17.98	16.89	20.48	28.06	0.64
	CH 656000 3840 MHz	240	QPSK	22.70	22.45	25.59	33.17	2.07
			64QAM	21.91	20.59	24.31	31.89	1.55
			256QAM	22.36	20.07	24.37	31.95	1.57
	CH 662000 3930 MHz	210	QPSK	18.67	17.73	21.24	28.82	0.76
			64QAM	18.86	18.33	21.61	29.19	0.83
			256QAM	18.92	18.50	21.73	29.31	0.85

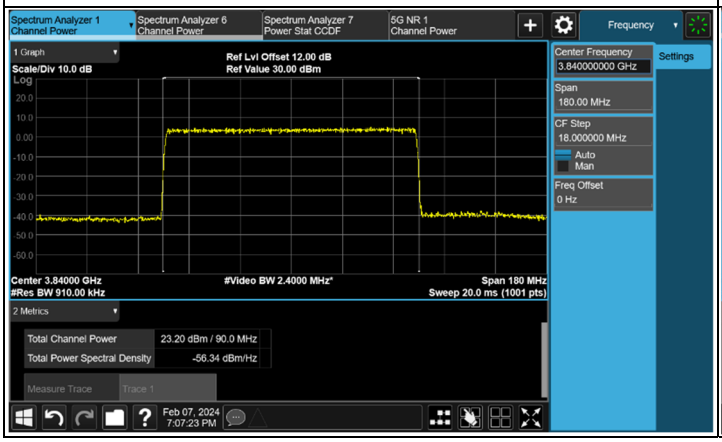
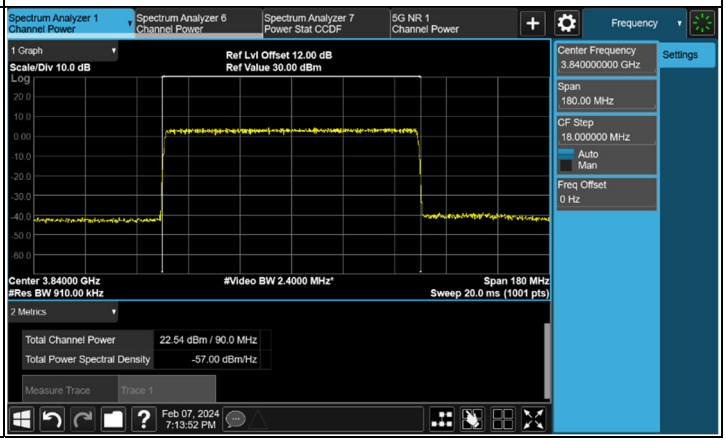
*EIRP (dBm) = Conducted Output Power (dBm) + Directional Gain (dBi)

*Directional Gain (dBi) = 10 log[($10^{G1/20}$ + $10^{G2/20}$ + ... + $10^{GN/20}$)^2/2] = 10 log[($10^{3.89/20}$ +$10^{5.2/20}$)^2/2] = 7.58 dBi

Per 1MHz Power

Spectrum Plot of Worst Value	
BW: 40 MHz (Ch 656000, 3840MHz)	
Chain 0	Chain 1
	

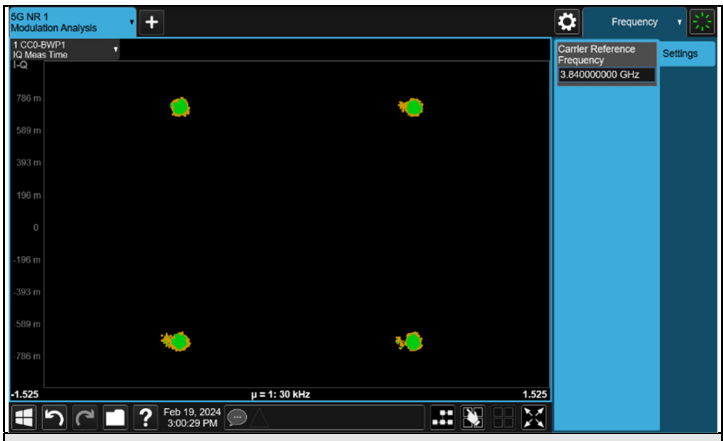
Full Power

Spectrum Plot of Worst Value	
BW: 90 MHz (Ch 656000, 3840MHz)	
Chain 0	Chain 1
	

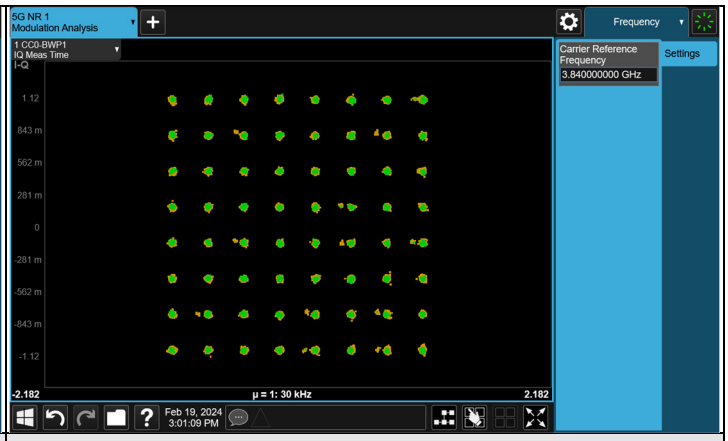
7.2 Modulation Characteristics

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

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 100 MHz



QPSK CH 656000 (3840 MHz)



64QAM CH 656000 (3840 MHz)

256QAM CH 656000 (3840 MHz)

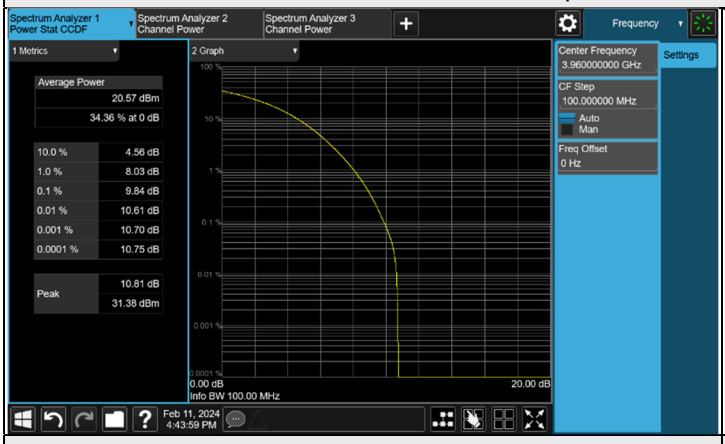
7.3 Peak to Average Ratio

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

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 40 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
648000	3720	9.59	9.36	9.09	9.12	9.55	9.16	13.00
656000	3840	9.17	9.06	9.14	9.28	9.33	9.42	
664000	3960	9.56	9.20	9.28	8.51	9.27	9.84	

Spectrum Plot of Worst Value

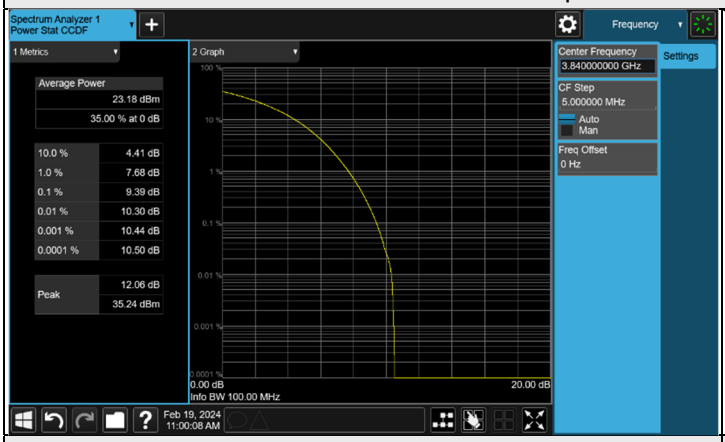


Chain 1 256QAM CH 664000 (3960 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 50 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
648334	3725.01	9.07	9.15	9.17	8.78	9.38	9.16	13.00
656000	3840	9.06	9.14	9.39	9.08	9.33	9.26	
663666	3954.99	9.07	9.20	8.98	9.05	9.14	9.10	

Spectrum Plot of Worst Value

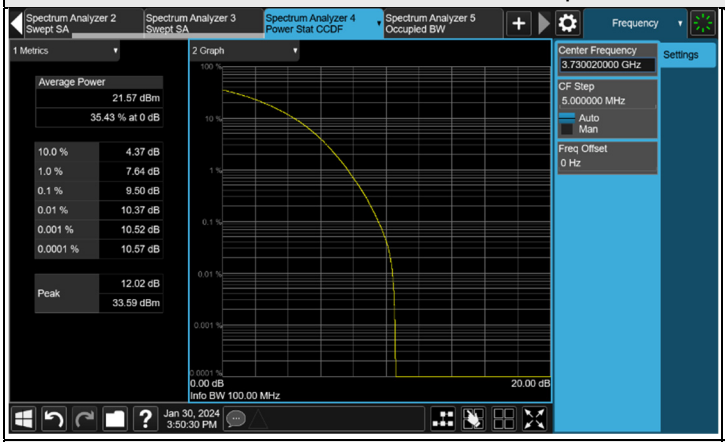


Chain 0 256QAM CH 656000 (3840 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 60 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
648668	3730.02	9.50	8.90	9.00	9.30	9.45	8.46	13.00
656000	3840	9.18	8.89	8.93	8.98	9.22	8.99	
663332	3949.98	9.32	8.92	8.95	8.87	9.31	9.03	

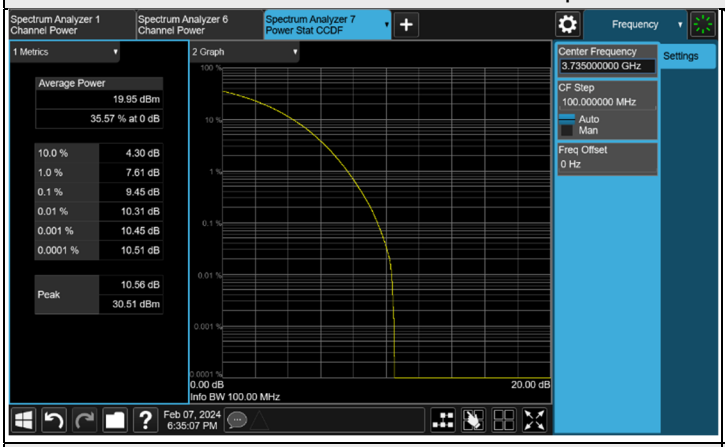
Spectrum Plot of Worst Value



Chain 0 QPSK CH 648668 (3730.02 MHz)

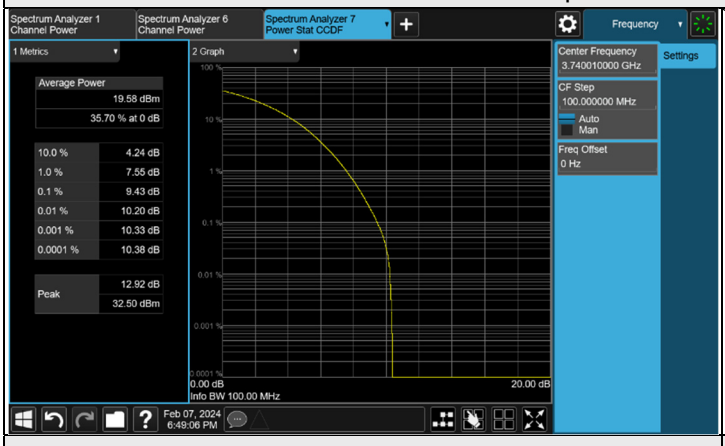
NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 70 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
649000	3735	9.12	9.08	9.21	9.34	9.45	9.19	13.00
656000	3840	9.10	9.01	9.26	8.96	9.06	9.02	
663000	3945	8.91	9.40	9.02	9.09	9.17	9.04	

Spectrum Plot of Worst Value	
	
Chain 1 64QAM CH 649000 (3735 MHz)	

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 80 MHz

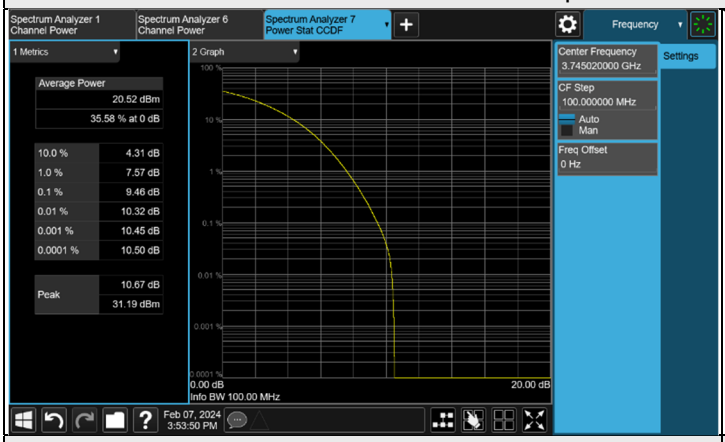
Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
649334	3740.01	9.08	9.13	8.90	8.97	9.43	8.98	13.00
656000	3840	9.12	9.12	9.34	9.14	9.33	9.02	
662666	3939.99	9.25	9.28	9.07	9.07	9.37	9.09	

Spectrum Plot of Worst Value	
	
Chain 1 64QAM CH 649334 (3740.01 MHz)	

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 90 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
649668	3745.02	9.14	9.09	9.46	9.06	9.39	9.42	13.00
656000	3840	9.33	9.20	9.11	9.06	9.12	9.12	
662332	3934.98	9.10	9.38	8.99	8.97	9.36	9.08	

Spectrum Plot of Worst Value

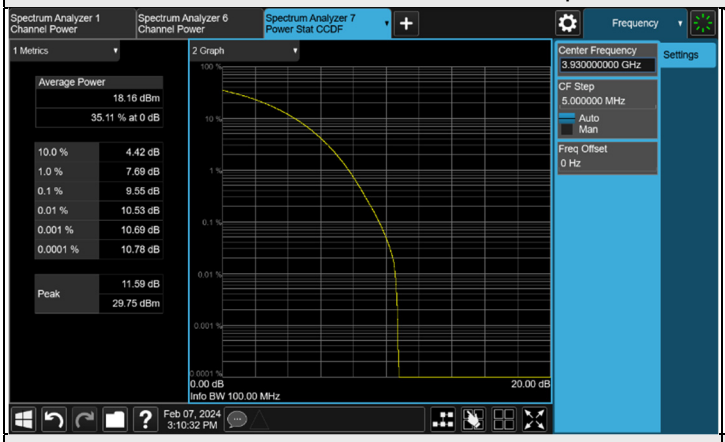


Chain 0 256QAM CH 649668 (3745.02 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 100 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)						Limit
		Chain 0			Chain 1			
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM	
650000	3750	8.98	9.50	9.08	9.44	9.31	8.97	13.00
656000	3840	9.09	9.10	9.17	9.21	9.30	9.47	
662000	3930	9.33	9.40	9.55	9.51	9.08	9.31	

Spectrum Plot of Worst Value



Chain 0 256QAM CH 662000 (3930 MHz)

7.4 Bandwidth

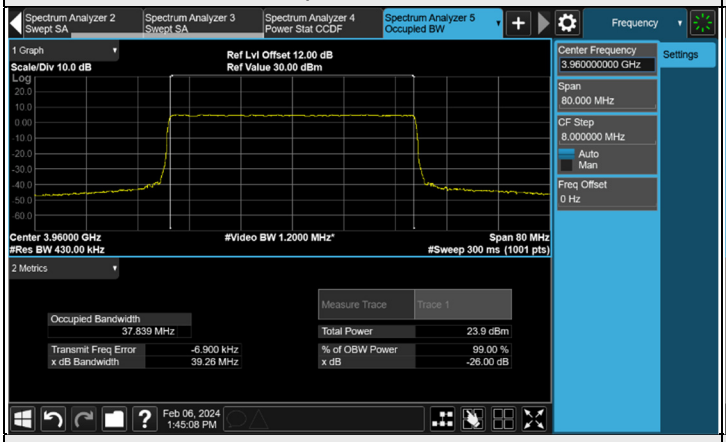
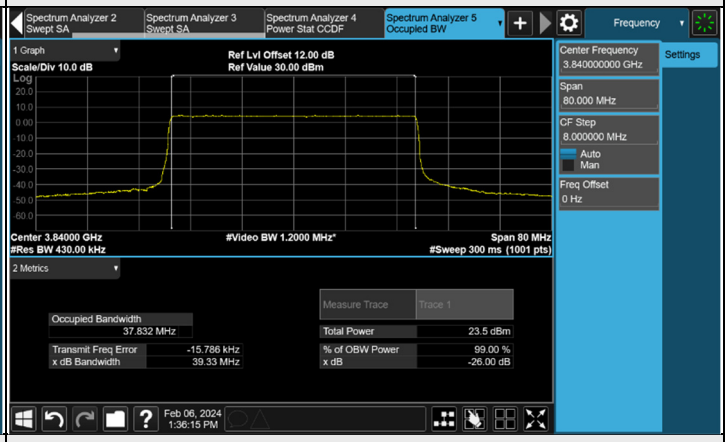
Input Power:	120 Vac, 60Hz	Environmental Conditions:	21°C, 70% RH	Tested By:	Kevin Kuo

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 40 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
648000	3720	37.821	37.816	37.810	37.825	37.830	37.811
656000	3840	37.814	37.816	37.810	37.826	37.832	37.810
664000	3960	37.815	37.818	37.800	37.827	37.839	37.803

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
648000	3720	39.28	39.26	39.28	39.32	39.32	39.29
656000	3840	39.27	39.25	39.30	39.27	39.33	39.29
664000	3960	39.27	39.26	39.18	39.31	39.26	39.18

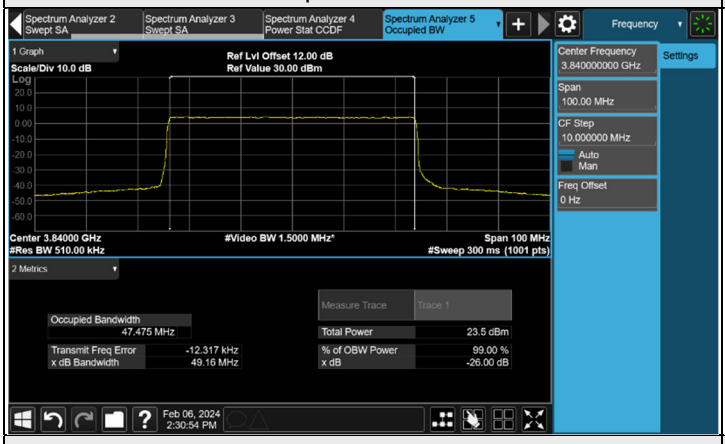
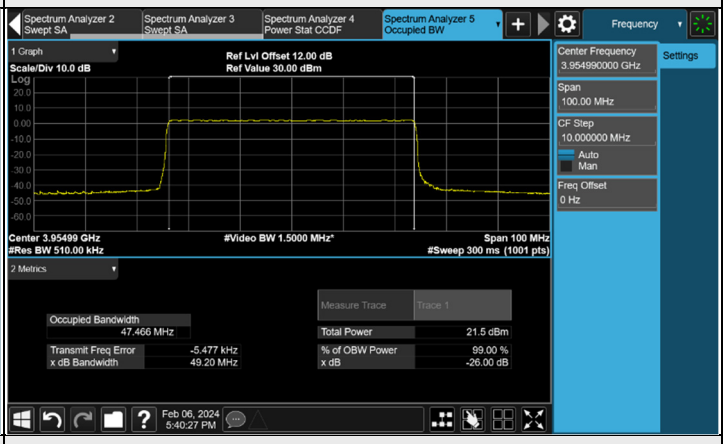
Spectrum Plot of Worst Value

Occupied bandwidth	26 dB Bandwidth
	
Chain 1 64QAM CH 664000 (3960 MHz)	Chain 1 64QAM CH 656000 (3840 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 50 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
648334	3725.01	47.439	47.468	47.430	47.440	47.468	47.431
656000	3840	47.442	47.467	47.436	47.448	47.475	47.437
663666	3954.99	47.444	47.469	47.433	47.452	47.466	47.429

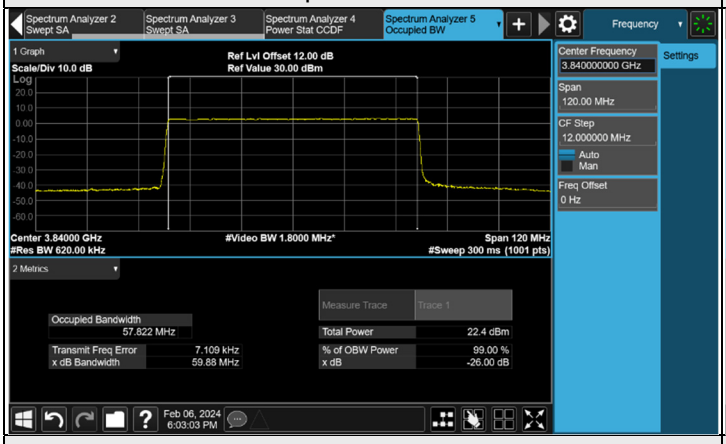
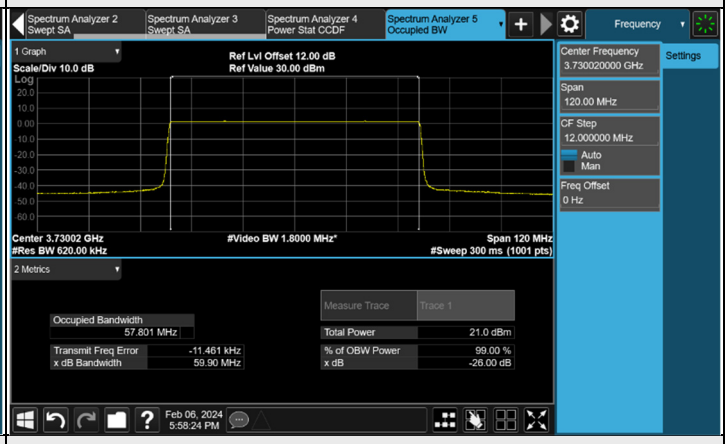
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
648334	3725.01	49.18	49.17	49.15	49.18	49.20	49.15
656000	3840	49.15	49.18	49.16	49.20	49.16	49.16
663666	3954.99	49.18	49.17	49.15	49.18	49.20	49.15

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Chain 1 64QAM CH 656000 (3840 MHz)	Chain 1 64QAM CH 663666 (3954.99 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 60 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
648668	3730.02	57.795	57.821	57.767	57.801	57.809	57.774
656000	3840	57.800	57.822	57.774	57.807	57.806	57.772
663332	3949.98	57.793	57.820	57.763	57.800	57.803	57.766

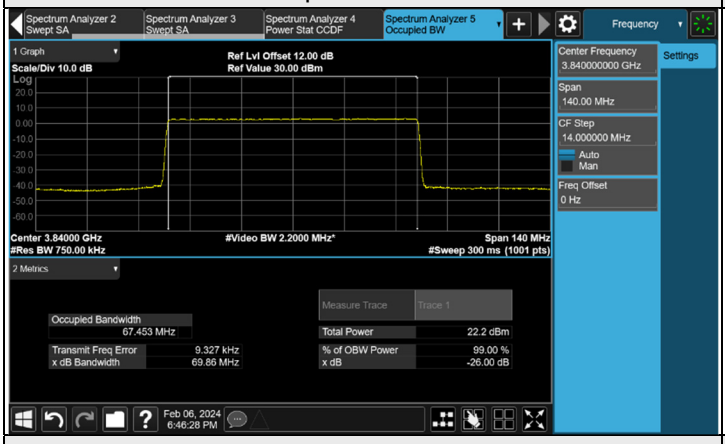
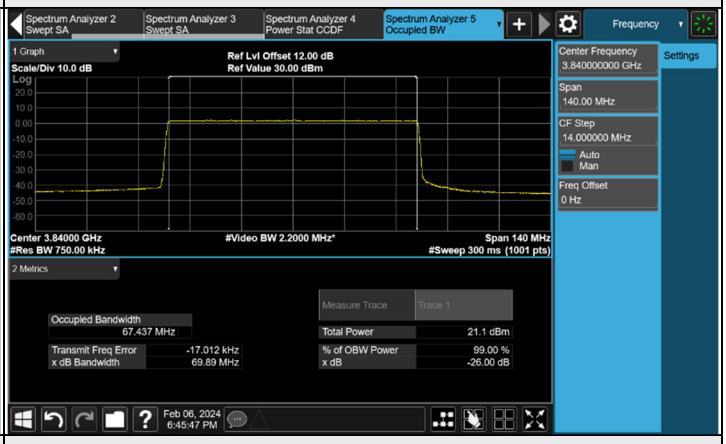
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
648668	3730.02	59.81	59.86	59.82	59.90	59.85	59.82
656000	3840	59.83	59.88	59.83	59.89	59.84	59.82
663332	3949.98	59.85	59.86	59.84	59.83	59.84	59.84

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Chain 0 64QAM CH 656000 (3840 MHz)	Chain 1 QPSK CH 648668 (3730.02 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 70 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
649000	3735	67.405	67.450	67.392	67.415	67.432	67.392
656000	3840	67.412	67.453	67.394	67.421	67.437	67.397
663000	3945	67.399	67.442	67.374	67.414	67.429	67.388

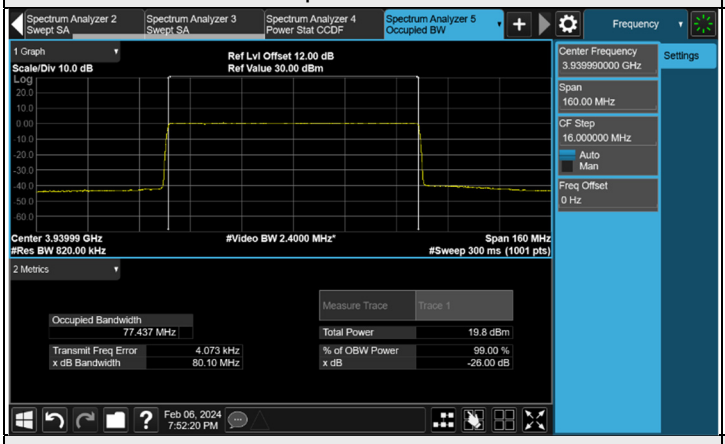
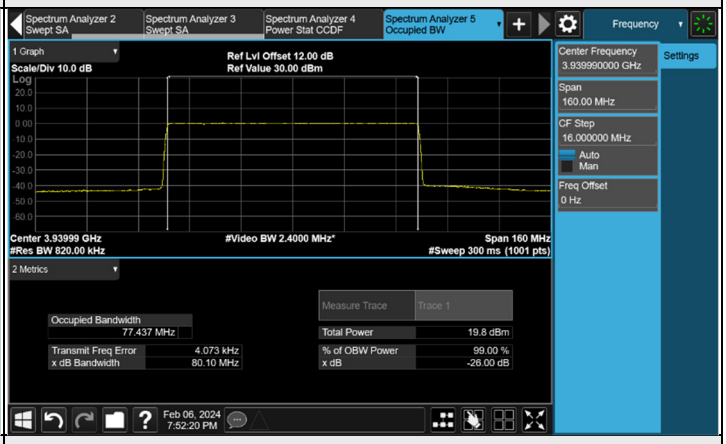
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
649000	3735	69.85	69.86	69.85	69.89	69.88	69.85
656000	3840	69.85	69.86	69.85	69.87	69.89	69.85
663000	3945	69.85	69.85	69.84	69.86	69.89	69.84

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Chain 0 64QAM CH 656000 (3840 MHz)	Chain 1 64QAM CH 656000 (3840 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 80 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
649334	3740.01	77.387	77.423	77.382	77.390	77.433	77.382
656000	3840	77.385	77.430	77.384	77.388	77.425	77.375
662666	3939.99	77.380	77.426	77.383	77.403	77.437	77.392

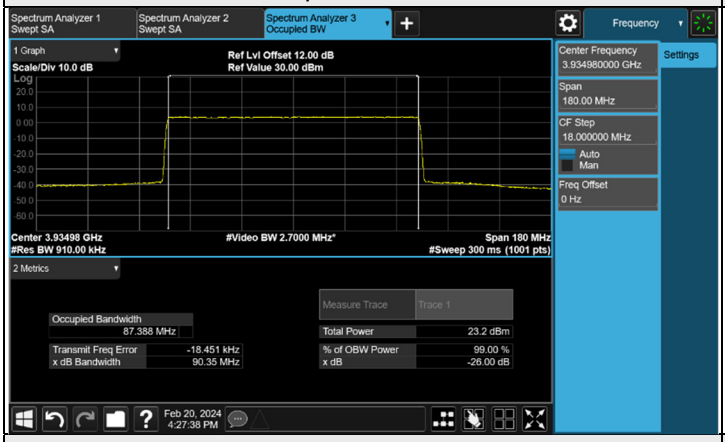
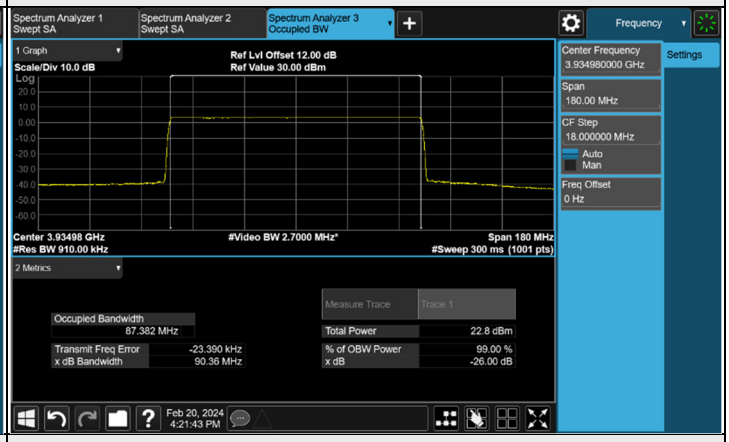
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
649334	3740.01	80.06	80.07	80.05	80.07	80.10	80.06
656000	3840	80.05	80.07	80.05	80.07	80.08	80.05
662666	3939.99	80.06	80.07	80.07	80.10	80.10	80.07

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Chain 1 64QAM CH 662666 (3939.99 MHz)	Chain 1 64QAM CH 662666 (3939.99 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 90 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
649668	3745.02	87.362	87.379	87.340	87.373	87.376	87.345
656000	3840	87.356	87.360	87.333	87.363	87.358	87.334
662332	3934.98	87.379	87.388	87.356	87.382	87.388	87.356

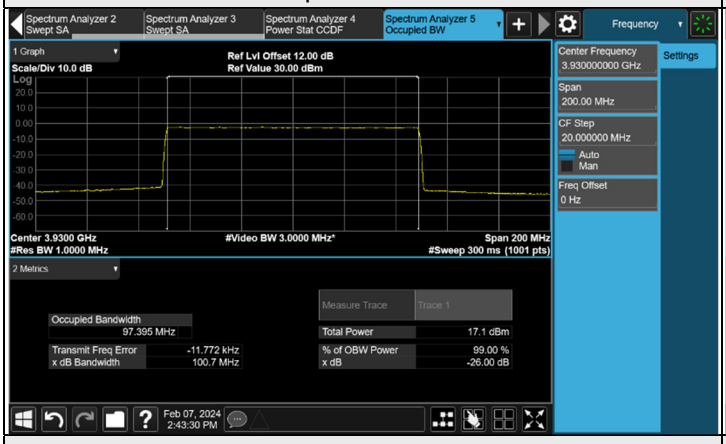
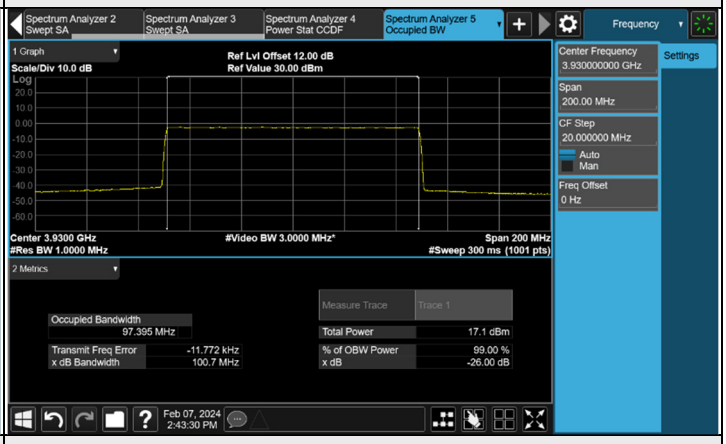
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
649668	3745.02	90.35	90.35	90.34	90.36	90.35	90.34
656000	3840	90.35	90.35	90.34	90.36	90.35	90.33
662332	3934.98	90.35	90.35	90.34	90.36	90.35	90.35

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Chain 1 64QAM CH 662332 (3934.98 MHz)	Chain 1 QPSK CH 662332 (3934.98 MHz)

NR n77 (3700-3980 MHz) SCS 30 kHz, Channel Bandwidth: 100 MHz

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
650000	3750	97.361	97.380	97.291	97.342	97.378	97.185
656000	3840	97.344	97.359	97.292	97.338	97.361	97.275
662000	3930	97.352	97.373	97.283	97.361	97.395	97.301

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)					
		Chain 0			Chain 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
650000	3750	100.70	100.70	100.70	100.70	100.70	100.70
656000	3840	100.70	100.70	100.70	100.70	100.70	100.70
662000	3930	100.70	100.70	100.70	100.70	100.70	100.70

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
Chain 1 64QAM CH 662000 (3930 MHz)	Chain 1 64QAM CH 662000 (3930 MHz)