

# TEST REPORT

FCC Test for RT4424-77A  
Certification

**APPLICANT**  
SAMSUNG Electronics Co., Ltd.

**REPORT NO.**  
HCT-RF-2303-FC007-R2

**DATE OF ISSUE**  
April 11, 2023

**Tested by**  
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**TEST  
REPORT**  
FCC Test for  
RT4424-77A

**REPORT NO.**  
HCT-RF-2303-FC007-R2

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**Additional Model**  
-

<b>Applicant</b>	<b>SAMSUNG Electronics Co., Ltd.</b> 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
<b>EUT Type</b>	RRU(RT4424)
<b>Model Name</b>	RT4424-77A
<b>FCC ID</b>	A3LRT4424-77A
<b>Date of Test</b>	February 21, 2023 ~ April 04, 2023
<b>FCC Rule Parts:</b>	CFR 47 Part 2, Part 27

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.  
This test results were applied only to the test methods required by the standard.

## REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	April 04, 2023	Initial Release
1	April 10, 2023	<ul style="list-style-type: none"><li>- Add the note in section 3.2.</li><li>- Updated the antenna specification in section 1.2.</li></ul>
2	April 11, 2023	<ul style="list-style-type: none"><li>- Revised the 'EUT Type' on page 2 and 5.</li></ul>

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

If this report is required to confirmation of authenticity, please contact to [www.hct.co.kr](http://www.hct.co.kr)

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## 1. GENERAL INFORMATION

### 1.1. APPLICANT INFORMATION

Company Name	Samsung Electronics Co., Ltd.
Company Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

### 1.2. PRODUCT INFORMATION

EUT Type	RRU(RT4424)					
EUT Serial Number	S619120518					
Power Supply	-48 VDC					
Output Power	Band	Carrier	Bandwidth	Power		
	(4 Port) 5G NR n77	1	40 MHz	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77	1	60 MHz	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77	1	80 MHz	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77	1	100 MHz	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous)	2	100 MHz + 40 MHz (10 W/path + 10 W/path)	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous, Asymmetric)	2	100 MHz + 40 MHz (16 W/path + 4 W/path)	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous)	2	100 MHz + 100 MHz (10 W/path + 10 W/path)	20 W/path, Total: 80 W		
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous, Asymmetric)	2	100 MHz + 100 MHz (16 W/path + 4 W/path)	20 W/path, Total: 80 W		
Frequency Range	3.7 GHz Service : 3 700 MHz ~ 3 980 MHz					
Emission Designator	Mode	Bandwidth	Emission Designator			
			QPSK (G7D)	Conducted (W)	16/64/256 QAM (W7D)	Conducted (W)
	(4 Port) 5G NR n77	40 MHz	38M0G7D	81.29	38M1W7D	82.64
	(4 Port) 5G NR n77	60 MHz	58M0G7D	81.22	58M1W7D	83.47
	(4 Port) 5G NR n77	80 MHz	77M7G7D	81.97	77M7W7D	82.61
	(4 Port) 5G NR n77	100 MHz	97M7G7D	79.30	97M9W7D	80.60
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous)	100 MHz + 40 MHz	137MG7D	74.44	137MW7D	75.95
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous, Asymmetric)	100 MHz + 40 MHz	137MG7D	74.36	137MW7D	76.25
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous)	100 MHz + 100 MHz	197MG7D	75.95	197MW7D	75.61
	(4 Port) 5G NR n77 + 5G NR n77 (Contiguous, Asymmetric)	100 MHz + 100 MHz	196MG7D	74.82	196MW7D	75.12
Modulation Type	QPSK, 16QAM, 64QAM, 256QAM					

Antenna Specification	Directional Peak Gain: 21 dBi * Directional Gain was calculated according to KDB 662911 D01 v02r01. Directional Gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi Directional Peak Gain = (14 dBi + 1 dB(tolerance)) + 10 log(4) dBi = 21 dBi
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### 1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 27
Measurement standards	ANSI C63.26-2015, KDB 662911 D01 v02r01, KDB 971168 D01 v03r01
Place of Test	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

## 2. FACILITIES AND ACCREDITATIONS

### 2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

### 2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 3. TEST SPECIFICATIONS

#### 3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 27

Description	Reference	Results
RF Output Power and PSD	§ 2.1046, § 27.50(j)(2)	Compliant
PAPR	§ 27.50(j)(4)	Compliant
Occupied Bandwidth	§ 2.1049	Compliant
Out-of-band Unwanted Emissions	§ 2.1051, § 27.53(l)(1)	Compliant
Spurious Unwanted Emissions		Compliant
Radiated Emissions	§ 2.1053, § 27.53(l)(1)	Compliant
Frequency Stability	§ 2.1055, § 27.54	Compliant



### 3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

- The EUT was operated in a manner representative of the typical usage of the equipment.
- During all testing, system components were manipulated within the confines of typical usage to maximize each emission.
- All NR modulation types (QPSK, 16QAM, 64QAM, 256QAM) have been tested.
- All mode of operation, supporting bandwidth and frequencies were investigated. The test plots shown in the following sections represent the worst case emissions.
- Test was performed the carrier case having maximum output power, maximum PSD, and widest bandwidth(It means the worst case).
- The measurement has performed for NR Carrier in the mode of full resource Block size as worst case to transmitt maximum output power condition.
- The dummy loads were connected to the RF output ports for radiated spurious emission testing.
- Because of the EUT using TDD technology, it cannot be configured to transmit continuously and measurement instrument cannot be configured to measure only during active transmissions. So, we performed the measurement using duty cycle method.

Measurement Result of RT4424-77A Transmit On/Off Timing



- The EUT duty cycle is calculated according to ANSI C63.26 - 5.2.4.3.4.

$$\text{Duty Cycle} = \text{On-time} / \text{Transmitter period} = 3.7 \text{ ms} / 5.0 \text{ ms} = 0.74$$

$$\text{Duty Correction} = 10 \log (1/\text{duty cycle}) = 10 \log (1/0.74) = 1.307 \text{ dB}$$

- The tests results in plots are already including the actual value of loss for the attenuator and cable combination. Please check correction factors below table.

**ANT0**

**Correction factor table**

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.335	11 000	37.083
600	30.681	12 000	37.378
800	30.954	13 000	36.922
1 000	31.301	14 000	37.614
1 200	31.080	15 000	37.780
1 400	31.384	16 000	38.269
1 620	31.574	17 000	39.397
1 800	31.656	18 000	39.304
2 000	31.901	19 000	38.564
2 200	32.001	20 000	39.331
2 400	32.243	21 000	39.383
2 600	32.382	22 000	40.341
2 800	32.618	23 000	40.864
3 000	32.916	24 000	40.965
3 100	32.836	25 000	41.502
3 200	32.888	26 000	41.024
3 300	32.990	27 000	43.115
3 400	33.021	28 000	41.877
3 500	33.080	29 000	41.782
3 600	33.223	30 000	42.455
3 700	33.392	31 000	41.569
3 800	33.525	32 000	42.478
3 900	33.585	33 000	42.081
4 000	33.573	34 000	41.549
5 000	34.107	35 000	41.887
6 000	34.676	36 000	41.651
7 000	35.839	37 000	41.495
8 000	36.269	38 000	42.130
9 000	36.471	39 000	41.962
10 000	36.806	40 000	42.715

**ANT1****Correction factor table**

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.189	11 000	36.043
600	30.472	12 000	36.405
800	30.679	13 000	36.490
1 000	30.999	14 000	37.100
1 200	31.083	15 000	37.124
1 400	31.296	16 000	37.816
1 620	31.510	17 000	38.569
1 800	31.490	18 000	38.296
2 000	31.691	19 000	38.366
2 200	31.691	20 000	38.925
2 400	31.837	21 000	39.248
2 600	31.935	22 000	40.014
2 800	32.148	23 000	40.198
3 000	32.330	24 000	39.439
3 100	32.319	25 000	40.515
3 200	32.338	26 000	40.320
3 300	32.429	27 000	42.479
3 400	32.451	28 000	42.457
3 500	32.508	29 000	41.142
3 600	32.963	30 000	42.228
3 700	32.820	31 000	40.953
3 800	32.868	32 000	43.056
3 900	32.855	33 000	41.821
4 000	32.987	34 000	41.844
5 000	33.433	35 000	41.830
6 000	33.762	36 000	42.185
7 000	34.557	37 000	40.562
8 000	34.714	38 000	41.591
9 000	35.190	39 000	41.489
10 000	35.611	40 000	42.435

**ANT2****Correction factor table**

<b>Frequency (MHz)</b>	<b>Factor (dB)</b>	<b>Frequency (MHz)</b>	<b>Factor (dB)</b>
400	30.357	11 000	36.696
600	30.695	12 000	37.057
800	30.909	13 000	37.485
1 000	31.217	14 000	38.111
1 200	31.322	15 000	38.374
1 400	31.547	16 000	38.956
1 620	31.773	17 000	39.924
1 800	31.808	18 000	39.711
2 000	32.028	19 000	39.307
2 200	32.042	20 000	40.254
2 400	32.228	21 000	39.626
2 600	32.319	22 000	40.719
2 800	32.526	23 000	41.170
3 000	32.795	24 000	40.583
3 100	32.734	25 000	41.376
3 200	32.772	26 000	41.047
3 300	32.858	27 000	43.146
3 400	32.902	28 000	42.199
3 500	32.972	29 000	42.004
3 600	33.339	30 000	42.111
3 700	33.268	31 000	42.089
3 800	33.222	32 000	42.475
3 900	33.265	33 000	42.648
4 000	33.211	34 000	41.493
5 000	33.698	35 000	41.542
6 000	34.488	36 000	41.704
7 000	35.295	37 000	41.641
8 000	35.880	38 000	42.241
9 000	36.118	39 000	42.201
10 000	36.282	40 000	42.486

**ANT3****Correction factor table**

Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
400	30.850	11 000	36.879
600	31.151	12 000	37.293
800	31.389	13 000	37.447
1 000	31.740	14 000	38.180
1 200	31.853	15 000	38.537
1 400	32.142	16 000	39.076
1 620	32.297	17 000	39.757
1 800	32.364	18 000	39.741
2 000	32.599	19 000	39.600
2 200	32.379	20 000	40.268
2 400	32.568	21 000	39.269
2 600	32.682	22 000	40.473
2 800	32.876	23 000	40.464
3 000	33.189	24 000	40.565
3 100	33.080	25 000	41.102
3 200	33.137	26 000	40.624
3 300	33.233	27 000	42.715
3 400	33.248	28 000	41.477
3 500	33.332	29 000	41.382
3 600	33.413	30 000	42.055
3 700	33.404	31 000	41.169
3 800	33.721	32 000	42.078
3 900	33.523	33 000	41.681
4 000	33.422	34 000	41.149
5 000	34.370	35 000	41.487
6 000	34.584	36 000	41.251
7 000	35.500	37 000	41.095
8 000	36.088	38 000	41.730
9 000	36.552	39 000	41.562
10 000	36.205	40 000	42.315

### 3.3. MAXIMUM MEASUREMENT UNCERTAINTY

Description	Condition	Uncertainty
Radiated Disturbance	9 kHz ~ 30 MHz	4.14 dB
	30 MHz ~ 1 GHz	5.82 dB
	1 GHz ~ 18 GHz	5.74 dB
	18 GHz ~ 40 GHz	5.76 dB

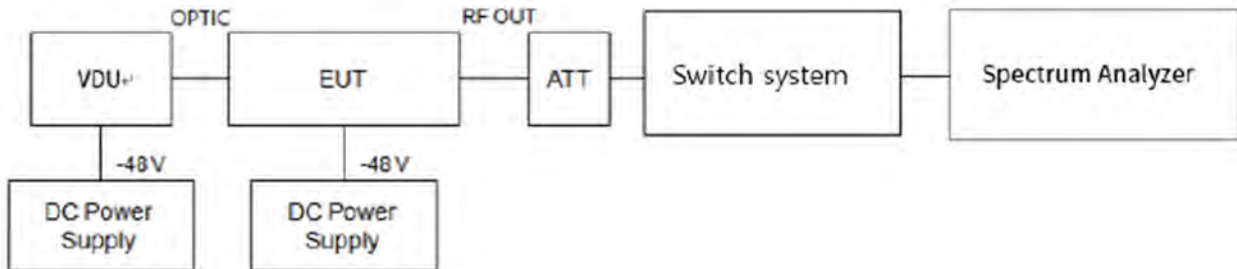
Coverage factor  $k=2$ , Confidence levels of 95 %

### 3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+15 °C to +35 °C
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

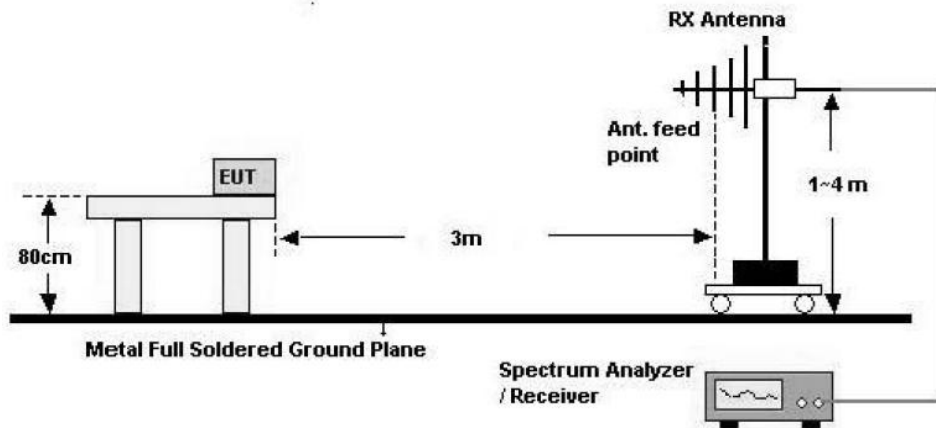
## 3.5. TEST DIAGRAMS

## Conducted Test

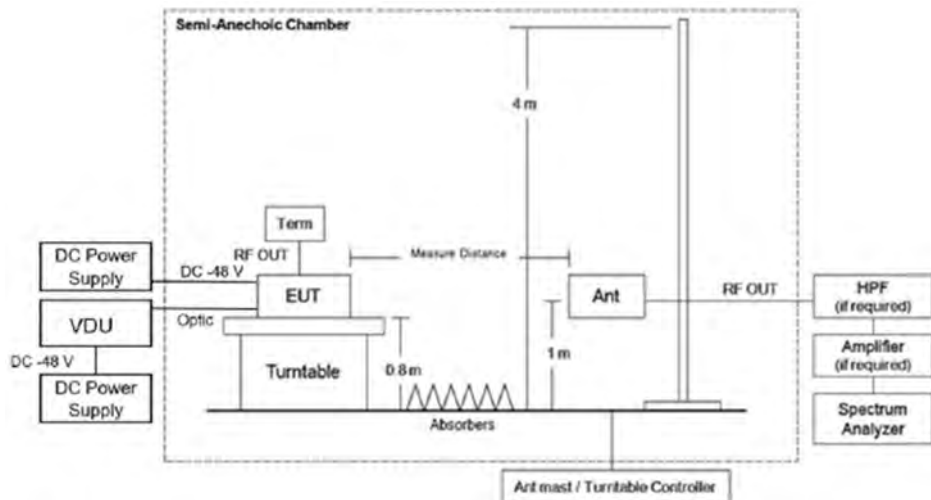


## Radiated Test

30 MHz ~ 1 GHz



Above 1 GHz

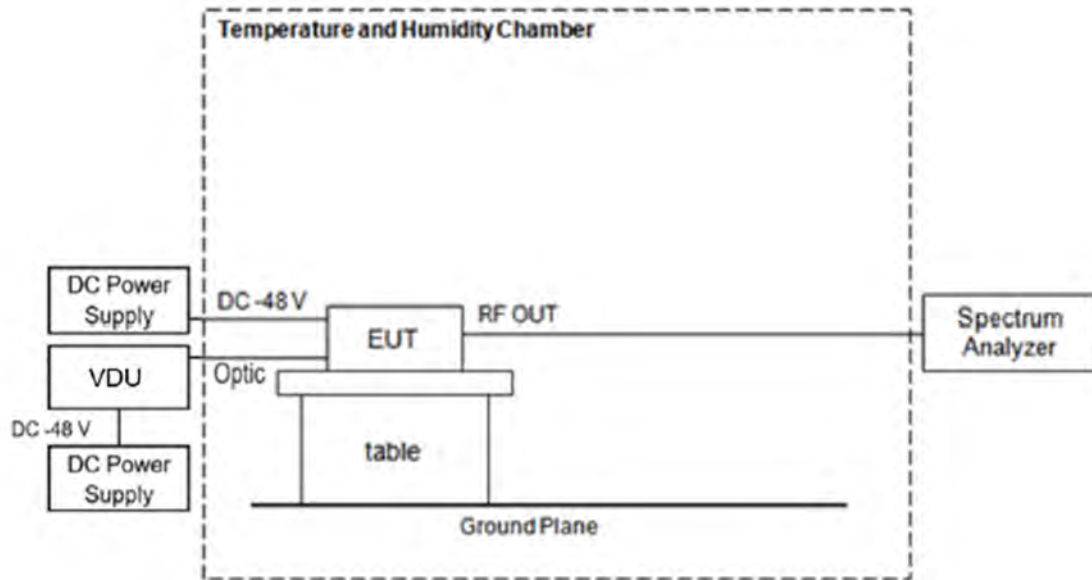


**\*Note:** Measurement distance for Above 1 GHz is 3m.

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### Frequency Stability

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**Note:** All modulations(QPSK, 16QAM, 64QAM, 256QAM) were investigated and the worst case configuration channel results are reported.



#### 4. TEST EQUIPMENTS

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
PXA Signal Analyzer	N9030A	Keysight	MY49431434	2024-01-02	Annual
MXA Signal Analyzer	N9020A	Agilent	MY46471250	2023-07-22	Annual
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
*30 dB Attenuator	TWAN-300-18G	Teleworld	N/A	2023-08-22	Annual
*50Ω Termination	908A	H.P.	N/A	N/A	N/A
*30 dB Attenuator	WA93-30-33	Weinschel, Inc.	0184	2023-11-21	Annual
Coaxial Attenuator	FAS-23-20	MCLI	103756	2024-01-03	Annual
DC Power Supply	PCR4000M	KIKUSUI	VM002269	2023-09-30	Annual
DC Power Supply	6674A	Agilent	MY41003340	2023-07-06	Annual
Temperature and Humidity Chamber	NY-THR18750	NANGYEAL	NY-200912201A	2024-01-26	Annual
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090002	N/A	N/A
Controller(Antenna mast & Turn Table)	CO3000	Innco systems	CO3000/1251/48920320/P	N/A	N/A
Antenna Position Tower	MA4640/800-XP-ET	Innco systems	N/A	N/A	N/A
Turn Table	DS2000-S	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Schwarzbeck	1513-333	2024-03-17	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	01039	2023-07-14	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	02296	2024-05-18	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170342	2024-09-29	Biennial
HPF(7 ~ 18 GHz) + LNA(6 ~ 18 GHz)	FBSR-04C	TNM system	N/A	2023-08-23	Annual
Low Noise Amplifier	LLA06185030Q	LTC Microwave	102	2023-08-23	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	86	2023-08-23	Annual
Power Amplifier	CBL18265035	CERNEX	22966	2023-12-01	Annual
Power Amplifier	CBL26405040	CERNEX	25956	2024-03-02	Annual

\*This equipment has been used to each port, but we only listed one equipment for simplicity.

#### Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date, or will be tested after the calibration is completed.

## 5. TEST RESULT

### 5.1. RF OUTPUT POWER and PSD

#### Test Requirements:

##### § 2.1046 Measurements required: RF power output.

- (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.
- (b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.
- (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

##### § 27.50 Power limits and duty cycle.

- (j) The following power requirements apply to stations transmitting in the 3700-3980 MHz band:
  - (1) The power of each fixed or base station transmitting in the 3700-3980 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.
  - (2) The power of each fixed or base station transmitting in the 3700-3980 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.
  - (4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. 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.

**Test Procedures:**

The measurement is performed in accordance with Section 5.2.4.4.1 of ANSI C63.26.

The EUT is considered to transmit continuously if it can be configured to transmit at a burst duty cycle of greater than or equal to 98 % throughout the duration of the measurement. If this condition can be achieved, then the following procedure can be used to measure the average output power of the EUT.

- a) Set span to  $2 \times$  to  $3 \times$  the OBW.
- b) Set RBW = 1 % to 5 % of the OBW.
- c) Set VBW  $\geq 3 \times$  RBW.
- d) Set number of measurement points in sweep  $\geq 2 \times$  span / RBW.
- e) Sweep time:
  - 1) Set = auto-couple, or
  - 2) Set  $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$  for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
- f) Detector = power averaging (rms).
- g) If the EUT can be configured to transmit continuously, then set the trigger to free run.
- h) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
- i) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.
- j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The measurement is performed in accordance with Section 5.2.4.5 of ANSI C63.26.

Some regulatory requirements specify the RF output power limits in terms of maximum or average PSD, (i.e., the output power or unwanted emissions power limits are defined within a specified reference bandwidth).

When average PSD limits are specified, the same fundamental measurement condition applies as previously discussed (i.e., averaging is to be performed only over durations of active transmissions at maximum output power level). Thus, when performing this measurement, the EUT must either be configured to transmit continuously at full power while the compliance measurement is performed, or else the measurement instrumentation must be configured to acquire data only over durations when the EUT is actively transmitting at full power. In circumstances where neither of these conditions can be realized, then alternative procedures are provided for both constant duty cycle and non-constant duty cycle transmissions.

The PSD is measured following the same procedures described in 5.2.4.4 for measuring the total average power, but with the

RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected, based on whether the transmitter duty cycle is constant (variations  $\leq \pm 2\%$ ) or non-constant (variations  $> \pm 2\%$ ), respectively.

**Note:** The results of the Conducted output power and PSD test shown above the frequency measured values are very small and similar trend for each port, so we attach only the worst case plot.

**Test Results:**
**Tabular Data of RF output power**
**(4 Port) 5G NR n77 40 MHz [1 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 720.00	43.06	20.23
		Middle	3 840.00	42.95	19.73
		High	3 960.00	42.82	19.13
	16QAM	Low	3 720.00	43.06	20.23
		Middle	3 840.00	42.93	19.63
		High	3 960.00	42.98	19.85
	64QAM	Low	3 720.00	43.11	20.47
		Middle	3 840.00	43.03	20.09
		High	3 960.00	42.89	19.47
	256QAM	Low	3 720.00	43.12	20.51
		Middle	3 840.00	43.02	20.05
		High	3 960.00	42.92	19.57
1	QPSK	Low	3 720.00	43.04	20.14
		Middle	3 840.00	43.14	20.63
		High	3 960.00	42.90	19.49
	16QAM	Low	3 720.00	43.11	20.45
		Middle	3 840.00	43.14	20.59
		High	3 960.00	42.92	19.60
	64QAM	Low	3 720.00	43.12	20.52
		Middle	3 840.00	43.21	20.95
		High	3 960.00	42.92	19.57
	256QAM	Low	3 720.00	43.03	20.10
		Middle	3 840.00	43.21	20.96
		High	3 960.00	42.87	19.38

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
2	QPSK	Low	3 720.00	43.05	20.20
		Middle	3 840.00	42.87	19.38
		High	3 960.00	42.90	19.49
	16QAM	Low	3 720.00	43.03	20.11
		Middle	3 840.00	42.90	19.51
		High	3 960.00	43.01	20.01
	64QAM	Low	3 720.00	43.01	20.01
		Middle	3 840.00	42.99	19.89
		High	3 960.00	42.91	19.56
	256QAM	Low	3 720.00	43.00	19.93
		Middle	3 840.00	42.96	19.76
		High	3 960.00	42.96	19.78
3	QPSK	Low	3 720.00	43.17	20.73
		Middle	3 840.00	43.22	20.97
		High	3 960.00	42.99	19.91
	16QAM	Low	3 720.00	43.18	20.80
		Middle	3 840.00	43.31	21.42
		High	3 960.00	43.08	20.31
	64QAM	Low	3 720.00	43.15	20.63
		Middle	3 840.00	43.37	21.71
		High	3 960.00	42.97	19.84
	256QAM	Low	3 720.00	43.17	20.73
		Middle	3 840.00	43.35	21.63
		High	3 960.00	43.01	20.02

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 720.00	81.29	81.59	81.63	81.28
3 840.00	80.72	81.15	82.64	82.40
3 960.00	78.02	79.78	78.44	78.74

**(4 Port) 5G NR n77 60 MHz [1 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 730.00	42.86	19.32
		Middle	3 840.00	42.97	19.83
		High	3 950.00	42.96	19.76
	16QAM	Low	3 730.00	42.92	19.57
		Middle	3 840.00	42.91	19.54
		High	3 950.00	42.92	19.60
	64QAM	Low	3 730.00	43.06	20.21
		Middle	3 840.00	43.08	20.34
		High	3 950.00	43.06	20.23
	256QAM	Low	3 730.00	42.88	19.42
		Middle	3 840.00	43.04	20.12
		High	3 950.00	43.00	19.95
1	QPSK	Low	3 730.00	42.93	19.62
		Middle	3 840.00	43.18	20.80
		High	3 950.00	42.89	19.44
	16QAM	Low	3 730.00	42.90	19.52
		Middle	3 840.00	43.25	21.14
		High	3 950.00	42.89	19.44
	64QAM	Low	3 730.00	43.02	20.05
		Middle	3 840.00	43.29	21.35
		High	3 950.00	42.98	19.86
	256QAM	Low	3 730.00	42.98	19.88
		Middle	3 840.00	43.25	21.13
		High	3 950.00	42.95	19.72

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
2	QPSK	Low	3 730.00	42.89	19.44
		Middle	3 840.00	42.89	19.45
		High	3 950.00	42.85	19.27
	16QAM	Low	3 730.00	42.87	19.37
		Middle	3 840.00	42.97	19.81
		High	3 950.00	42.89	19.44
	64QAM	Low	3 730.00	42.93	19.63
		Middle	3 840.00	43.01	19.98
		High	3 950.00	43.04	20.15
	256QAM	Low	3 730.00	42.94	19.70
		Middle	3 840.00	42.97	19.81
		High	3 950.00	43.00	19.95
3	QPSK	Low	3 730.00	43.06	20.24
		Middle	3 840.00	43.25	21.13
		High	3 950.00	42.89	19.44
	16QAM	Low	3 730.00	43.08	20.33
		Middle	3 840.00	43.25	21.14
		High	3 950.00	42.93	19.65
	64QAM	Low	3 730.00	43.21	20.93
		Middle	3 840.00	43.39	21.80
		High	3 950.00	43.01	19.98
	256QAM	Low	3 730.00	43.15	20.68
		Middle	3 840.00	43.33	21.55
		High	3 950.00	42.97	19.80

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 730.00	78.62	78.79	80.83	79.67
3 840.00	81.22	81.63	83.47	82.61
3 950.00	77.90	78.14	80.21	79.42



**(4 Port) 5G NR n77 80 MHz [1 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 740.00	43.01	20.01
		Middle	3 840.00	42.99	19.93
		High	3 940.00	42.88	19.40
	16QAM	Low	3 740.00	42.86	19.33
		Middle	3 840.00	42.97	19.83
		High	3 940.00	42.76	18.89
	64QAM	Low	3 740.00	43.13	20.57
		Middle	3 840.00	43.02	20.03
		High	3 940.00	42.92	19.60
	256QAM	Low	3 740.00	43.08	20.33
		Middle	3 840.00	43.00	19.96
		High	3 940.00	42.85	19.26
1	QPSK	Low	3 740.00	43.08	20.32
		Middle	3 840.00	43.20	20.89
		High	3 940.00	42.95	19.74
	16QAM	Low	3 740.00	42.99	19.90
		Middle	3 840.00	43.17	20.76
		High	3 940.00	42.79	18.99
	64QAM	Low	3 740.00	43.17	20.74
		Middle	3 840.00	43.16	20.68
		High	3 940.00	42.97	19.82
	256QAM	Low	3 740.00	43.10	20.42
		Middle	3 840.00	43.15	20.67
		High	3 940.00	42.86	19.30

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
2	QPSK	Low	3 740.00	42.98	19.84
		Middle	3 840.00	42.93	19.62
		High	3 940.00	42.81	19.11
	16QAM	Low	3 740.00	42.80	19.07
		Middle	3 840.00	42.90	19.48
		High	3 940.00	42.66	18.43
	64QAM	Low	3 740.00	43.01	20.02
		Middle	3 840.00	42.89	19.46
		High	3 940.00	42.85	19.26
	256QAM	Low	3 740.00	42.94	19.69
		Middle	3 840.00	42.91	19.53
		High	3 940.00	42.78	18.98
3	QPSK	Low	3 740.00	43.17	20.73
		Middle	3 840.00	43.33	21.53
		High	3 940.00	42.84	19.24
	16QAM	Low	3 740.00	43.07	20.26
		Middle	3 840.00	43.15	20.63
		High	3 940.00	42.71	18.66
	64QAM	Low	3 740.00	43.28	21.29
		Middle	3 840.00	43.31	21.42
		High	3 940.00	42.84	19.23
	256QAM	Low	3 740.00	43.14	20.62
		Middle	3 840.00	43.32	21.48
		High	3 940.00	42.79	19.03

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 740.00	80.91	78.56	82.61	81.06
3 840.00	81.97	80.71	81.59	81.64
3 940.00	77.50	74.98	77.91	76.57

**(4 Port) 5G NR n77 100 MHz [1 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 750.00	42.84	19.23
		Middle	3 840.00	42.80	19.05
		High	3 930.00	42.74	18.81
	16QAM	Low	3 750.00	42.91	19.55
		Middle	3 840.00	42.87	19.37
		High	3 930.00	42.81	19.11
	64QAM	Low	3 750.00	42.89	19.46
		Middle	3 840.00	42.85	19.28
		High	3 930.00	42.71	18.68
	256QAM	Low	3 750.00	42.95	19.72
		Middle	3 840.00	42.93	19.63
		High	3 930.00	42.72	18.72
1	QPSK	Low	3 750.00	42.92	19.57
		Middle	3 840.00	42.97	19.82
		High	3 930.00	42.70	18.63
	16QAM	Low	3 750.00	42.89	19.47
		Middle	3 840.00	43.03	20.07
		High	3 930.00	42.73	18.77
	64QAM	Low	3 750.00	42.91	19.55
		Middle	3 840.00	43.01	20.02
		High	3 930.00	42.72	18.73
	256QAM	Low	3 750.00	42.94	19.70
		Middle	3 840.00	43.10	20.42
		High	3 930.00	42.76	18.89

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
2	QPSK	Low	3 750.00	43.05	20.18
		Middle	3 840.00	42.78	18.97
		High	3 930.00	42.70	18.60
	16QAM	Low	3 750.00	43.05	20.18
		Middle	3 840.00	42.81	19.12
		High	3 930.00	42.70	18.61
	64QAM	Low	3 750.00	42.98	19.87
		Middle	3 840.00	42.82	19.13
		High	3 930.00	42.71	18.68
	256QAM	Low	3 750.00	43.05	20.19
		Middle	3 840.00	42.89	19.43
		High	3 930.00	42.72	18.69
3	QPSK	Low	3 750.00	43.08	20.31
		Middle	3 840.00	43.15	20.64
		High	3 930.00	42.77	18.92
	16QAM	Low	3 750.00	43.09	20.35
		Middle	3 840.00	43.15	20.63
		High	3 930.00	42.73	18.76
	64QAM	Low	3 750.00	43.03	20.11
		Middle	3 840.00	43.17	20.73
		High	3 930.00	42.81	19.11
	256QAM	Low	3 750.00	43.14	20.60
		Middle	3 840.00	43.25	21.12
		High	3 930.00	42.80	19.07

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 750.00	79.30	79.55	78.99	80.21
3 840.00	78.49	79.20	79.17	80.60
3 930.00	74.97	75.25	75.20	75.37

**Tabular Data of RF Contiguous output power**
**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 770.00	42.63	18.34
	16QAM	Low	3 770.00	42.60	18.19
	64QAM	Low	3 770.00	42.71	18.65
	256QAM	Low	3 770.00	42.70	18.62
1	QPSK	Low	3 770.00	42.60	18.21
	16QAM	Low	3 770.00	42.68	18.54
	64QAM	Low	3 770.00	42.72	18.73
	256QAM	Low	3 770.00	42.69	18.59
2	QPSK	Low	3 770.00	42.64	18.34
	16QAM	Low	3 770.00	42.69	18.59
	64QAM	Low	3 770.00	42.72	18.72
	256QAM	Low	3 770.00	42.76	18.87
3	QPSK	Low	3 770.00	42.91	19.53
	16QAM	Low	3 770.00	42.96	19.79
	64QAM	Low	3 770.00	42.98	19.85
	256QAM	Low	3 770.00	42.96	19.76

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 770.00	74.44	75.11	75.95	75.83

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric)**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 770.00	42.58	18.12
	16QAM	Low	3 770.00	42.58	18.12
	64QAM	Low	3 770.00	42.65	18.39
	256QAM	Low	3 770.00	42.72	18.70
1	QPSK	Low	3 770.00	42.59	18.15
	16QAM	Low	3 770.00	42.65	18.41
	64QAM	Low	3 770.00	42.68	18.53
	256QAM	Low	3 770.00	42.69	18.57
2	QPSK	Low	3 770.00	42.68	18.56
	16QAM	Low	3 770.00	42.67	18.51
	64QAM	Low	3 770.00	42.74	18.80
	256QAM	Low	3 770.00	42.81	19.12
3	QPSK	Low	3 770.00	42.91	19.54
	16QAM	Low	3 770.00	42.88	19.41
	64QAM	Low	3 770.00	42.93	19.65
	256QAM	Low	3 770.00	42.98	19.87

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 770.00	74.36	74.44	75.37	76.25

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 800.00	42.67	18.49
	16QAM	Low	3 800.00	42.66	18.47
	64QAM	Low	3 800.00	42.62	18.30
	256QAM	Low	3 800.00	42.65	18.39
1	QPSK	Low	3 800.00	42.76	18.88
	16QAM	Low	3 800.00	42.73	18.75
	64QAM	Low	3 800.00	42.74	18.79
	256QAM	Low	3 800.00	42.72	18.69
2	QPSK	Low	3 800.00	42.67	18.51
	16QAM	Low	3 800.00	42.70	18.62
	64QAM	Low	3 800.00	42.64	18.37
	256QAM	Low	3 800.00	42.59	18.14
3	QPSK	Low	3 800.00	43.03	20.08
	16QAM	Low	3 800.00	42.96	19.76
	64QAM	Low	3 800.00	43.02	20.05
	256QAM	Low	3 800.00	42.93	19.61

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 800.00	75.95	75.61	75.51	74.83

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric)**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	3 800.00	42.59	18.16
	16QAM	Low	3 800.00	42.64	18.37
	64QAM	Low	3 800.00	42.60	18.21
	256QAM	Low	3 800.00	42.60	18.19
1	QPSK	Low	3 800.00	42.65	18.40
	16QAM	Low	3 800.00	42.71	18.64
	64QAM	Low	3 800.00	42.65	18.39
	256QAM	Low	3 800.00	42.67	18.51
2	QPSK	Low	3 800.00	42.73	18.74
	16QAM	Low	3 800.00	42.68	18.54
	64QAM	Low	3 800.00	42.67	18.47
	256QAM	Low	3 800.00	42.68	18.55
3	QPSK	Low	3 800.00	42.91	19.52
	16QAM	Low	3 800.00	42.91	19.56
	64QAM	Low	3 800.00	42.90	19.49
	256QAM	Low	3 800.00	42.85	19.29

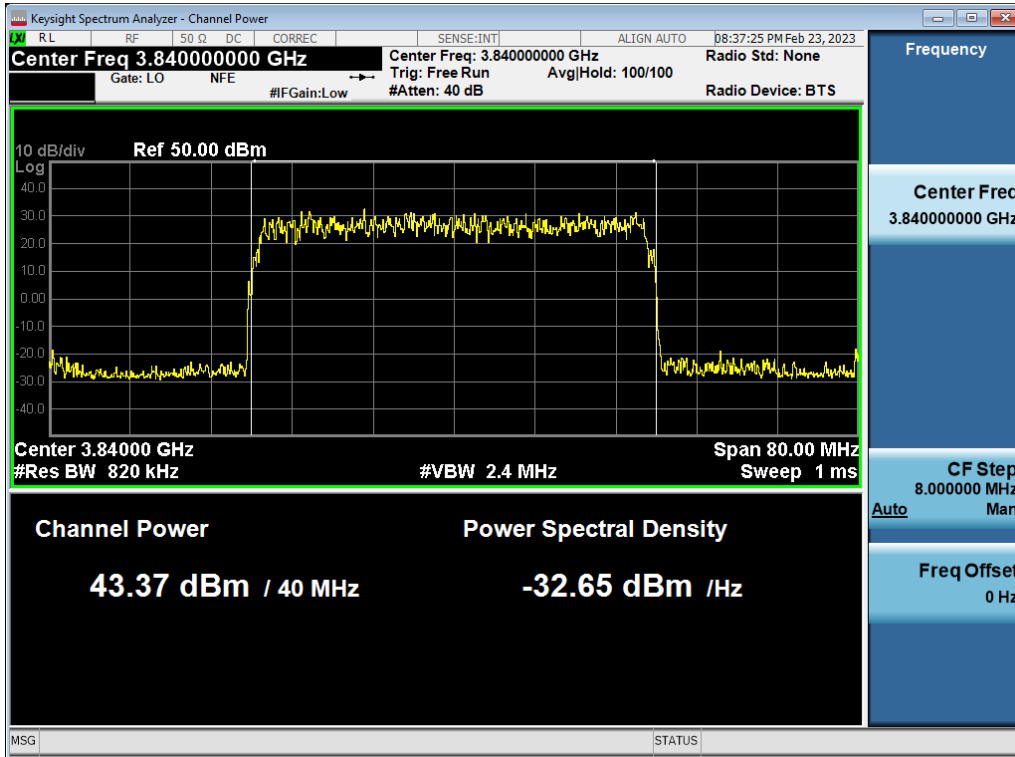
**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	Output Power(Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 800.00	74.82	75.12	74.57	74.54

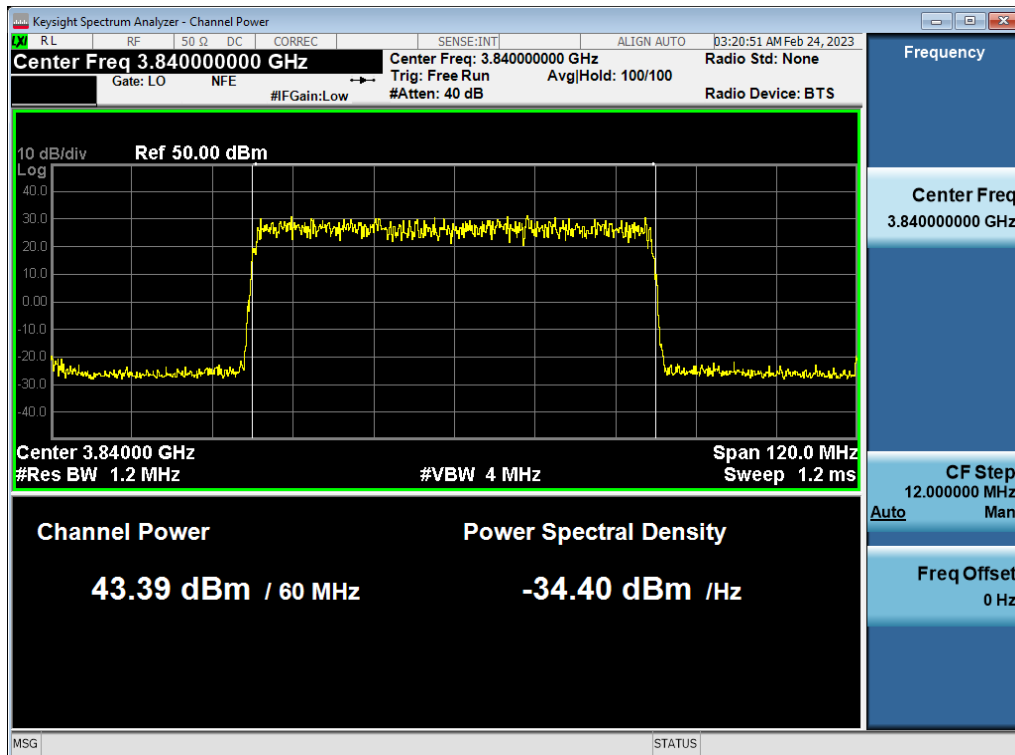


## Plot Data of RF Output Power

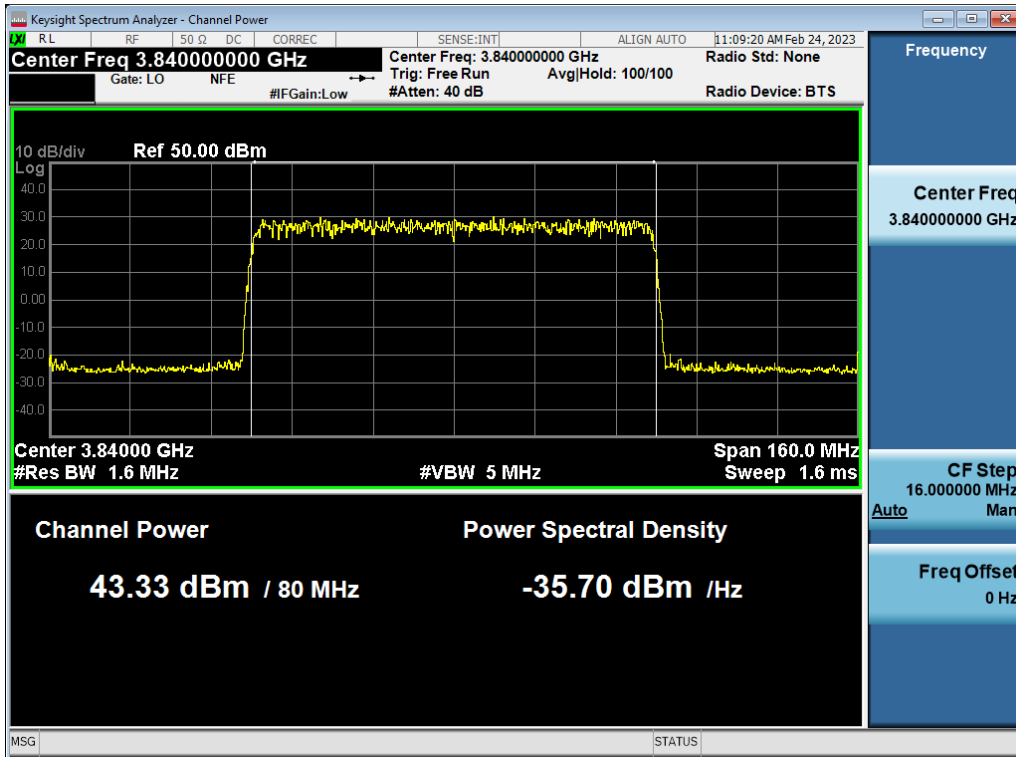
## Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 64QAM / Middle



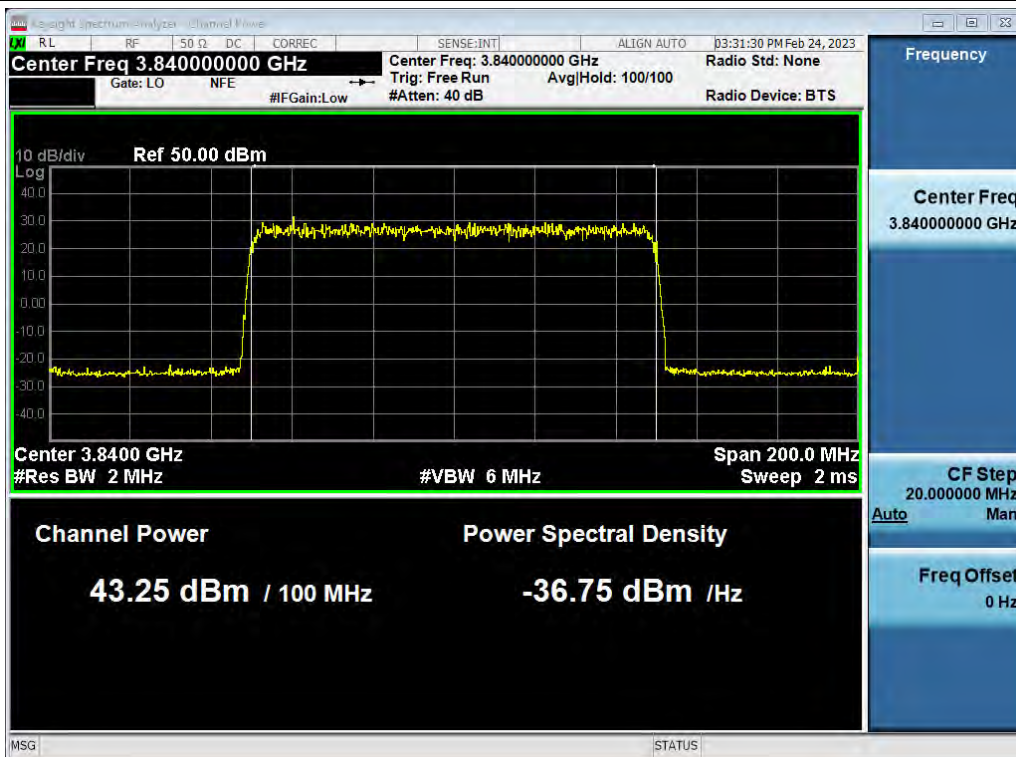
## Antenna 3 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 64QAM / Middle



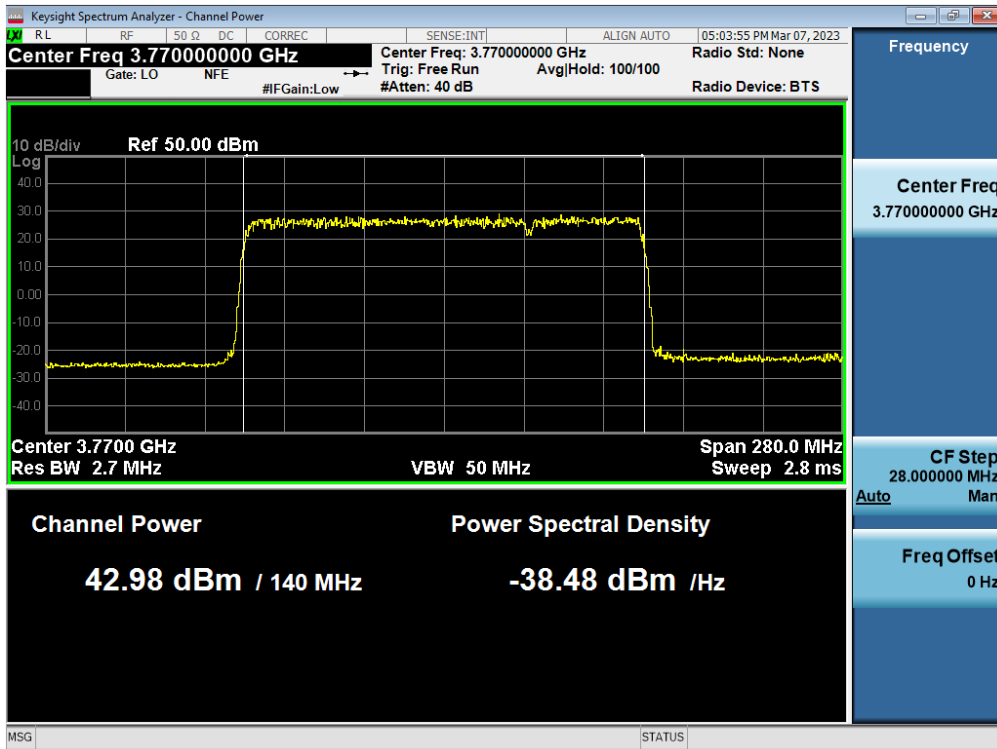
### Antenna 3 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / QPSK / Middle



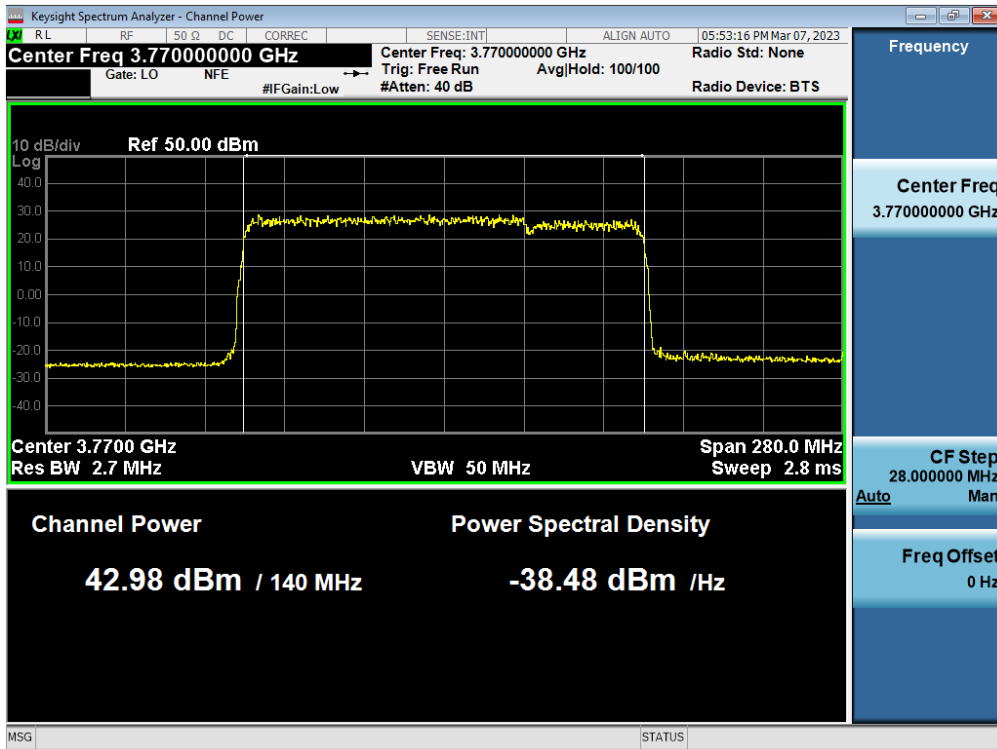
### Antenna 3 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 256QAM / Middle



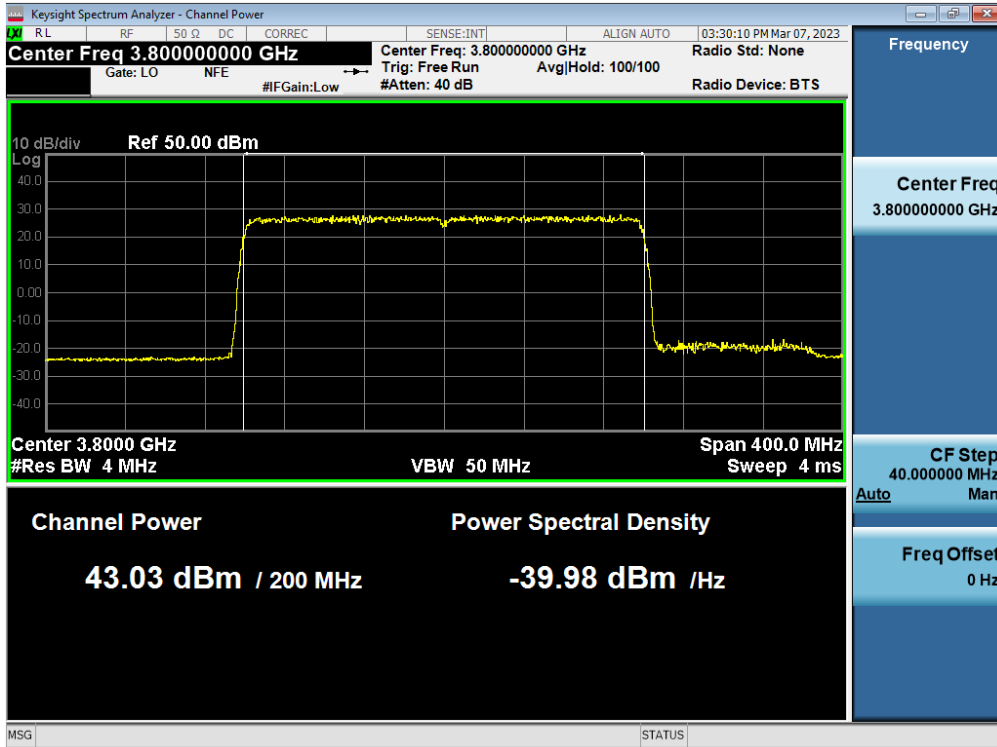
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 64QAM / Low / Contiguous



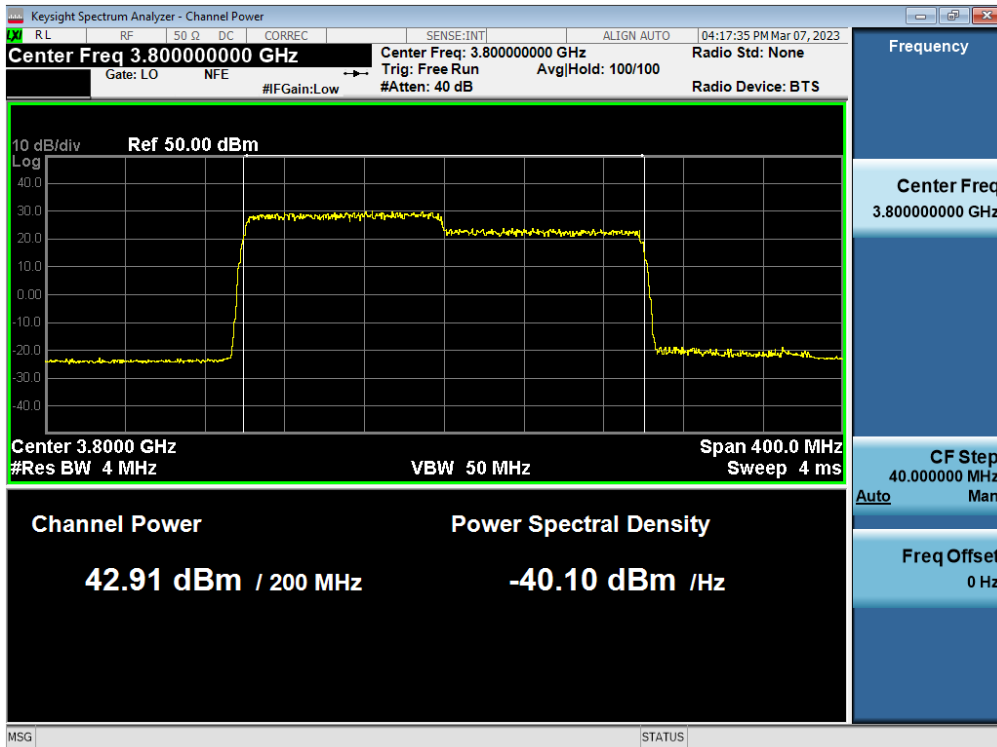
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 256QAM / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / QPSK / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 16QAM / Low / Contiguous



## Tabular Data of PSD

## (4 Port) 5G NR n77 40 MHz [1 Carrier]

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Direciotnal Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 720.00	32.74	21.0	53.74	236.77	1640
		Middle	3 840.00	32.64	21.0	53.64	231.14	
		High	3 960.00	32.62	21.0	53.62	229.89	
	16QAM	Low	3 720.00	32.15	21.0	53.15	206.64	
		Middle	3 840.00	31.93	21.0	52.93	196.54	
		High	3 960.00	31.82	21.0	52.82	191.39	
	64QAM	Low	3 720.00	34.20	21.0	55.20	330.80	
		Middle	3 840.00	34.10	21.0	55.10	323.24	
		High	3 960.00	32.26	21.0	53.26	211.86	
	256QAM	Low	3 720.00	32.43	21.0	53.43	220.49	
		Middle	3 840.00	32.29	21.0	53.29	213.24	
		High	3 960.00	32.07	21.0	53.07	202.78	
1	QPSK	Low	3 720.00	32.85	21.0	53.85	242.77	
		Middle	3 840.00	33.16	21.0	54.16	260.58	
		High	3 960.00	32.76	21.0	53.76	237.61	
	16QAM	Low	3 720.00	32.22	21.0	53.22	209.66	
		Middle	3 840.00	32.48	21.0	53.48	223.03	
		High	3 960.00	31.72	21.0	52.72	187.06	
	64QAM	Low	3 720.00	33.77	21.0	54.77	299.84	
		Middle	3 840.00	34.32	21.0	55.32	340.51	
		High	3 960.00	32.46	21.0	53.46	221.78	
256QAM	Low	3 720.00	32.31	21.0	53.31	214.23		
	Middle	3 840.00	32.56	21.0	53.56	227.24		
	High	3 960.00	32.02	21.0	53.02	200.52		

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
2	QPSK	Low	3 720.00	32.86	21.0	53.86	243.50	1640
		Middle	3 840.00	32.72	21.0	53.72	235.43	
		High	3 960.00	32.86	21.0	53.86	243.42	
	16QAM	Low	3 720.00	32.14	21.0	53.14	206.02	
		Middle	3 840.00	31.75	21.0	52.75	188.49	
		High	3 960.00	31.84	21.0	52.84	192.40	
	64QAM	Low	3 720.00	34.05	21.0	55.05	319.54	
		Middle	3 840.00	34.55	21.0	55.55	358.89	
		High	3 960.00	32.17	21.0	53.17	207.60	
	256QAM	Low	3 720.00	32.31	21.0	53.31	214.25	
		Middle	3 840.00	32.17	21.0	53.17	207.60	
		High	3 960.00	32.14	21.0	53.14	206.05	
3	QPSK	Low	3 720.00	33.16	21.0	54.16	260.71	
		Middle	3 840.00	32.90	21.0	53.90	245.25	
		High	3 960.00	32.88	21.0	53.88	244.44	
	16QAM	Low	3 720.00	32.45	21.0	53.45	221.50	
		Middle	3 840.00	32.32	21.0	53.32	214.56	
		High	3 960.00	31.88	21.0	52.88	193.94	
	64QAM	Low	3 720.00	34.39	21.0	55.39	346.12	
		Middle	3 840.00	34.34	21.0	55.34	341.79	
		High	3 960.00	32.20	21.0	53.20	208.81	
	256QAM	Low	3 720.00	32.30	21.0	53.30	213.84	
		Middle	3 840.00	32.58	21.0	53.58	228.00	
		High	3 960.00	32.18	21.0	53.18	207.96	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 720.00	983.75	843.83	1296.30	862.82	1640
3 840.00	972.40	822.62	1364.43	876.08	
3 960.00	955.36	764.78	850.05	817.31	

## (4 Port) 5G NR n77 60 MHz [1 Carrier]

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 730.00	29.57	21.0	50.57	114.06	1640
		Middle	3 840.00	29.87	21.0	50.87	122.08	
		High	3 950.00	29.87	21.0	50.87	122.20	
	16QAM	Low	3 730.00	30.18	21.0	51.18	131.35	
		Middle	3 840.00	30.05	21.0	51.05	127.33	
		High	3 950.00	30.14	21.0	51.14	130.10	
	64QAM	Low	3 730.00	30.86	21.0	51.86	153.44	
		Middle	3 840.00	30.84	21.0	51.84	152.68	
		High	3 950.00	31.04	21.0	52.04	159.87	
	256QAM	Low	3 730.00	29.96	21.0	50.96	124.86	
		Middle	3 840.00	30.70	21.0	51.70	147.77	
		High	3 950.00	30.60	21.0	51.60	144.59	
1	QPSK	Low	3 730.00	29.69	21.0	50.69	117.31	
		Middle	3 840.00	29.79	21.0	50.79	120.07	
		High	3 950.00	29.83	21.0	50.83	120.94	
	16QAM	Low	3 730.00	30.17	21.0	51.17	131.00	
		Middle	3 840.00	30.32	21.0	51.32	135.44	
		High	3 950.00	29.90	21.0	50.90	123.03	
	64QAM	Low	3 730.00	30.94	21.0	51.94	156.20	
		Middle	3 840.00	31.17	21.0	52.17	164.75	
		High	3 950.00	30.86	21.0	51.86	153.32	
256QAM	Low	3 730.00	30.12	21.0	51.12	129.38		
	Middle	3 840.00	31.00	21.0	52.00	158.31		
	High	3 950.00	30.20	21.0	51.20	131.89		

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
2	QPSK	Low	3 730.00	29.57	21.0	50.57	114.09	1640
		Middle	3 840.00	29.67	21.0	50.67	116.65	
		High	3 950.00	29.89	21.0	50.89	122.86	
	16QAM	Low	3 730.00	30.09	21.0	51.09	128.51	
		Middle	3 840.00	30.08	21.0	51.08	128.15	
		High	3 950.00	30.03	21.0	51.03	126.64	
	64QAM	Low	3 730.00	30.80	21.0	51.80	151.29	
		Middle	3 840.00	30.71	21.0	51.71	148.16	
		High	3 950.00	30.99	21.0	51.99	158.09	
	256QAM	Low	3 730.00	29.65	21.0	50.65	116.16	
		Middle	3 840.00	30.25	21.0	51.25	133.33	
		High	3 950.00	30.70	21.0	51.70	147.90	
3	QPSK	Low	3 730.00	29.66	21.0	50.66	116.48	
		Middle	3 840.00	30.11	21.0	51.11	129.08	
		High	3 950.00	29.80	21.0	50.80	120.25	
	16QAM	Low	3 730.00	30.23	21.0	51.23	132.80	
		Middle	3 840.00	30.50	21.0	51.50	141.26	
		High	3 950.00	30.02	21.0	51.02	126.51	
	64QAM	Low	3 730.00	31.05	21.0	52.05	160.47	
		Middle	3 840.00	31.05	21.0	52.05	160.44	
		High	3 950.00	30.79	21.0	51.79	150.89	
	256QAM	Low	3 730.00	29.83	21.0	50.83	120.98	
		Middle	3 840.00	30.68	21.0	51.68	147.09	
		High	3 950.00	30.51	21.0	51.51	141.42	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 730.00	461.94	523.66	621.40	491.38	1640
3 840.00	487.88	532.18	626.02	586.50	
3 950.00	486.25	506.27	622.17	565.80	



## (4 Port) 5G NR n77 80 MHz [1 Carrier]

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 740.00	28.81	21.0	49.81	95.76	1640
		Middle	3 840.00	29.04	21.0	50.04	100.97	
		High	3 940.00	29.14	21.0	50.14	103.39	
	16QAM	Low	3 740.00	28.30	21.0	49.30	85.13	
		Middle	3 840.00	28.58	21.0	49.58	90.78	
		High	3 940.00	28.41	21.0	49.41	87.28	
	64QAM	Low	3 740.00	29.27	21.0	50.27	106.44	
		Middle	3 840.00	29.03	21.0	50.03	100.59	
		High	3 940.00	28.50	21.0	49.50	89.20	
	256QAM	Low	3 740.00	28.90	21.0	49.90	97.70	
		Middle	3 840.00	29.11	21.0	50.11	102.60	
		High	3 940.00	29.01	21.0	50.01	100.22	
1	QPSK	Low	3 740.00	28.95	21.0	49.95	98.94	
		Middle	3 840.00	29.07	21.0	50.07	101.55	
		High	3 940.00	29.25	21.0	50.25	105.92	
	16QAM	Low	3 740.00	28.42	21.0	49.42	87.43	
		Middle	3 840.00	28.62	21.0	49.62	91.66	
		High	3 940.00	28.68	21.0	49.68	92.93	
	64QAM	Low	3 740.00	29.22	21.0	50.22	105.13	
		Middle	3 840.00	29.21	21.0	50.21	105.04	
		High	3 940.00	28.72	21.0	49.72	93.85	
256QAM	Low	3 740.00	28.98	21.0	49.98	99.44		
	Middle	3 840.00	29.45	21.0	50.45	111.01		
	High	3 940.00	29.00	21.0	50.00	100.01		

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
2	QPSK	Low	3 740.00	28.82	21.0	49.82	95.96	1640
		Middle	3 840.00	28.72	21.0	49.72	93.83	
		High	3 940.00	28.78	21.0	49.78	95.07	
	16QAM	Low	3 740.00	28.46	21.0	49.46	88.26	
		Middle	3 840.00	28.26	21.0	49.26	84.34	
		High	3 940.00	28.32	21.0	49.32	85.43	
	64QAM	Low	3 740.00	29.14	21.0	50.14	103.28	
		Middle	3 840.00	28.90	21.0	49.90	97.76	
		High	3 940.00	28.40	21.0	49.40	87.19	
	256QAM	Low	3 740.00	28.89	21.0	49.89	97.46	
		Middle	3 840.00	29.01	21.0	50.01	100.13	
		High	3 940.00	28.89	21.0	49.89	97.58	
3	QPSK	Low	3 740.00	28.97	21.0	49.97	99.22	
		Middle	3 840.00	29.30	21.0	50.30	107.24	
		High	3 940.00	28.70	21.0	49.70	93.37	
	16QAM	Low	3 740.00	28.36	21.0	49.36	86.26	
		Middle	3 840.00	29.04	21.0	50.04	100.94	
		High	3 940.00	28.49	21.0	49.49	88.94	
	64QAM	Low	3 740.00	29.42	21.0	50.42	110.20	
		Middle	3 840.00	29.24	21.0	50.24	105.77	
		High	3 940.00	28.38	21.0	49.38	86.77	
	256QAM	Low	3 740.00	29.00	21.0	50.00	100.00	
		Middle	3 840.00	29.28	21.0	50.28	106.55	
		High	3 940.00	28.98	21.0	49.98	99.64	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 740.00	389.88	347.07	425.06	394.60	1640
3 840.00	403.59	367.72	409.16	420.30	
3 940.00	397.74	354.58	357.01	397.45	

## (4 Port) 5G NR n77 100 MHz [1 Carrier]

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 750.00	27.27	21.0	48.27	67.10	1640
		Middle	3 840.00	27.29	21.0	48.29	67.41	
		High	3 930.00	27.30	21.0	48.30	67.55	
	16QAM	Low	3 750.00	27.03	21.0	48.03	63.51	
		Middle	3 840.00	27.13	21.0	48.13	65.02	
		High	3 930.00	27.15	21.0	48.15	65.38	
	64QAM	Low	3 750.00	27.19	21.0	48.19	65.96	
		Middle	3 840.00	27.01	21.0	48.01	63.25	
		High	3 930.00	26.84	21.0	47.84	60.79	
	256QAM	Low	3 750.00	29.36	21.0	50.36	108.76	
		Middle	3 840.00	29.45	21.0	50.45	110.96	
		High	3 930.00	29.36	21.0	50.36	108.68	
1	QPSK	Low	3 750.00	27.34	21.0	48.34	68.22	
		Middle	3 840.00	27.62	21.0	48.62	72.73	
		High	3 930.00	27.28	21.0	48.28	67.28	
	16QAM	Low	3 750.00	27.18	21.0	48.18	65.70	
		Middle	3 840.00	27.22	21.0	48.22	66.38	
		High	3 930.00	26.92	21.0	47.92	61.99	
	64QAM	Low	3 750.00	27.24	21.0	48.24	66.69	
		Middle	3 840.00	27.47	21.0	48.47	70.26	
		High	3 930.00	27.08	21.0	48.08	64.33	
256QAM	Low	3 750.00	29.45	21.0	50.45	110.81		
	Middle	3 840.00	29.44	21.0	50.44	110.61		
	High	3 930.00	29.34	21.0	50.34	108.02		

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
2	QPSK	Low	3 750.00	27.46	21.0	48.46	70.21	1640
		Middle	3 840.00	27.23	21.0	48.23	66.46	
		High	3 930.00	27.24	21.0	48.24	66.73	
	16QAM	Low	3 750.00	27.19	21.0	48.19	65.84	
		Middle	3 840.00	26.82	21.0	47.82	60.51	
		High	3 930.00	27.08	21.0	48.08	64.30	
	64QAM	Low	3 750.00	27.31	21.0	48.31	67.69	
		Middle	3 840.00	26.86	21.0	47.86	61.06	
		High	3 930.00	26.95	21.0	47.95	62.44	
	256QAM	Low	3 750.00	29.47	21.0	50.47	111.42	
		Middle	3 840.00	29.43	21.0	50.43	110.31	
		High	3 930.00	29.35	21.0	50.35	108.50	
3	QPSK	Low	3 750.00	27.52	21.0	48.52	71.15	1640
		Middle	3 840.00	27.61	21.0	48.61	72.68	
		High	3 930.00	27.29	21.0	48.29	67.53	
	16QAM	Low	3 750.00	27.16	21.0	48.16	65.42	
		Middle	3 840.00	27.46	21.0	48.46	70.07	
		High	3 930.00	27.04	21.0	48.04	63.69	
	64QAM	Low	3 750.00	27.36	21.0	48.36	68.49	
		Middle	3 840.00	27.38	21.0	48.38	68.85	
		High	3 930.00	26.92	21.0	47.92	61.88	
	256QAM	Low	3 750.00	29.47	21.0	50.47	111.37	
		Middle	3 840.00	29.86	21.0	50.86	121.85	
		High	3 930.00	29.56	21.0	50.56	113.68	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 750.00	276.69	260.47	268.83	442.36	1640
3 840.00	279.28	261.98	263.42	453.73	
3 930.00	269.09	255.36	249.44	438.88	

**Tabular Data of Contiguous PSD**
**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 770.00	24.91	21.0	45.91	38.97	1640
	16QAM	Low	3 770.00	24.68	21.0	45.68	37.02	
	64QAM	Low	3 770.00	25.82	21.0	46.82	48.11	
	256QAM	Low	3 770.00	25.45	21.0	46.45	44.18	
1	QPSK	Low	3 770.00	24.77	21.0	45.77	37.72	
	16QAM	Low	3 770.00	24.71	21.0	45.71	37.26	
	64QAM	Low	3 770.00	25.62	21.0	46.62	45.88	
	256QAM	Low	3 770.00	25.71	21.0	46.71	46.90	
2	QPSK	Low	3 770.00	25.02	21.0	46.02	40.03	
	16QAM	Low	3 770.00	25.05	21.0	46.05	40.23	
	64QAM	Low	3 770.00	25.63	21.0	46.63	46.02	
	256QAM	Low	3 770.00	25.63	21.0	46.63	45.99	
3	QPSK	Low	3 770.00	25.17	21.0	46.17	41.43	
	16QAM	Low	3 770.00	24.93	21.0	45.93	39.13	
	64QAM	Low	3 770.00	25.92	21.0	46.92	49.20	
	256QAM	Low	3 770.00	25.72	21.0	46.72	47.01	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 770.00	158.15	153.63	189.21	184.08	1640

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric)**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 770.00	25.38	21.0	46.38	43.44	1640
	16QAM	Low	3 770.00	24.80	21.0	45.80	38.01	
	64QAM	Low	3 770.00	26.27	21.0	47.27	53.31	
	256QAM	Low	3 770.00	26.20	21.0	47.20	52.44	
1	QPSK	Low	3 770.00	25.52	21.0	46.52	44.85	
	16QAM	Low	3 770.00	25.18	21.0	46.18	41.47	
	64QAM	Low	3 770.00	26.25	21.0	47.25	53.12	
	256QAM	Low	3 770.00	26.44	21.0	47.44	55.50	
2	QPSK	Low	3 770.00	25.87	21.0	46.87	48.60	
	16QAM	Low	3 770.00	25.31	21.0	46.31	42.73	
	64QAM	Low	3 770.00	26.44	21.0	47.44	55.49	
	256QAM	Low	3 770.00	26.54	21.0	47.54	56.69	
3	QPSK	Low	3 770.00	25.72	21.0	46.72	46.99	
	16QAM	Low	3 770.00	25.17	21.0	46.17	41.36	
	64QAM	Low	3 770.00	26.60	21.0	47.60	57.58	
	256QAM	Low	3 770.00	26.46	21.0	47.46	55.72	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 770.00	183.88	163.57	219.50	220.36	1640

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier]**

Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 800.00	22.90	21.0	43.90	24.54	1640
	16QAM	Low	3 800.00	23.67	21.0	44.67	29.33	
	64QAM	Low	3 800.00	23.87	21.0	44.87	30.69	
	256QAM	Low	3 800.00	24.17	21.0	45.17	32.88	
1	QPSK	Low	3 800.00	23.30	21.0	44.30	26.90	
	16QAM	Low	3 800.00	23.69	21.0	44.69	29.44	
	64QAM	Low	3 800.00	23.80	21.0	44.80	30.17	
	256QAM	Low	3 800.00	23.78	21.0	44.78	30.06	
2	QPSK	Low	3 800.00	23.04	21.0	44.04	25.32	
	16QAM	Low	3 800.00	23.75	21.0	44.75	29.84	
	64QAM	Low	3 800.00	24.04	21.0	45.04	31.91	
	256QAM	Low	3 800.00	23.97	21.0	44.97	31.42	
3	QPSK	Low	3 800.00	23.52	21.0	44.52	28.29	
	16QAM	Low	3 800.00	24.10	21.0	45.10	32.34	
	64QAM	Low	3 800.00	24.06	21.0	45.06	32.04	
	256QAM	Low	3 800.00	24.19	21.0	45.19	33.01	

**Sum Data of Port 0, Port 1, Port 2 and Port 3**

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 800.00	105.06	120.95	124.81	127.37	1640

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric)**

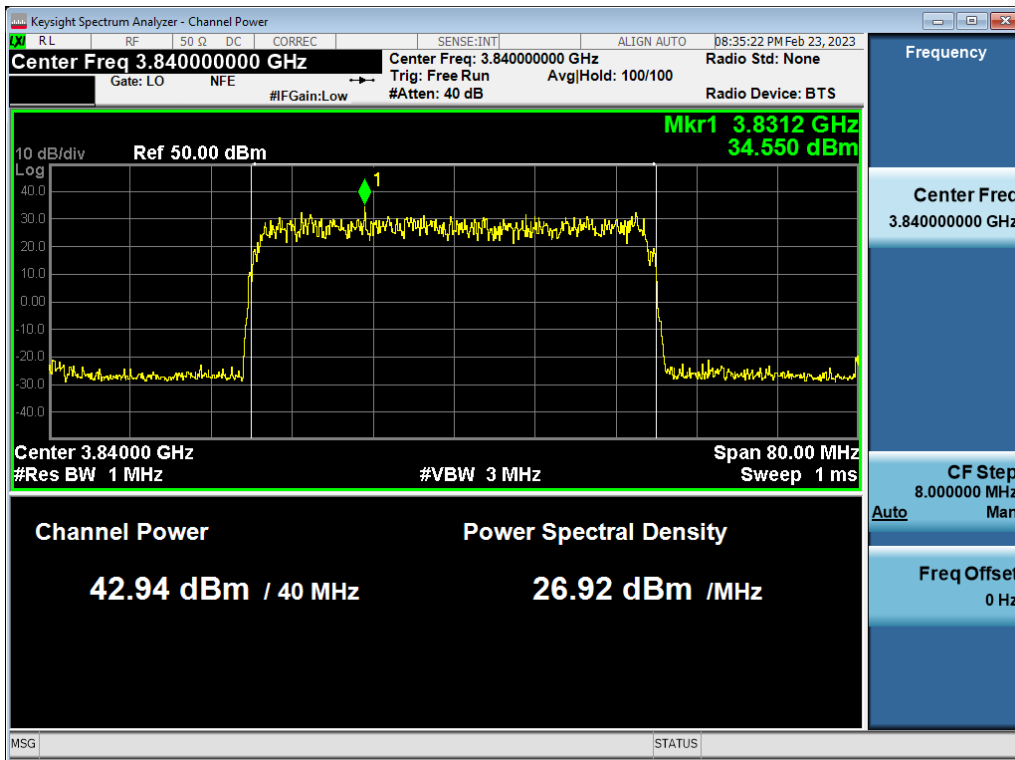
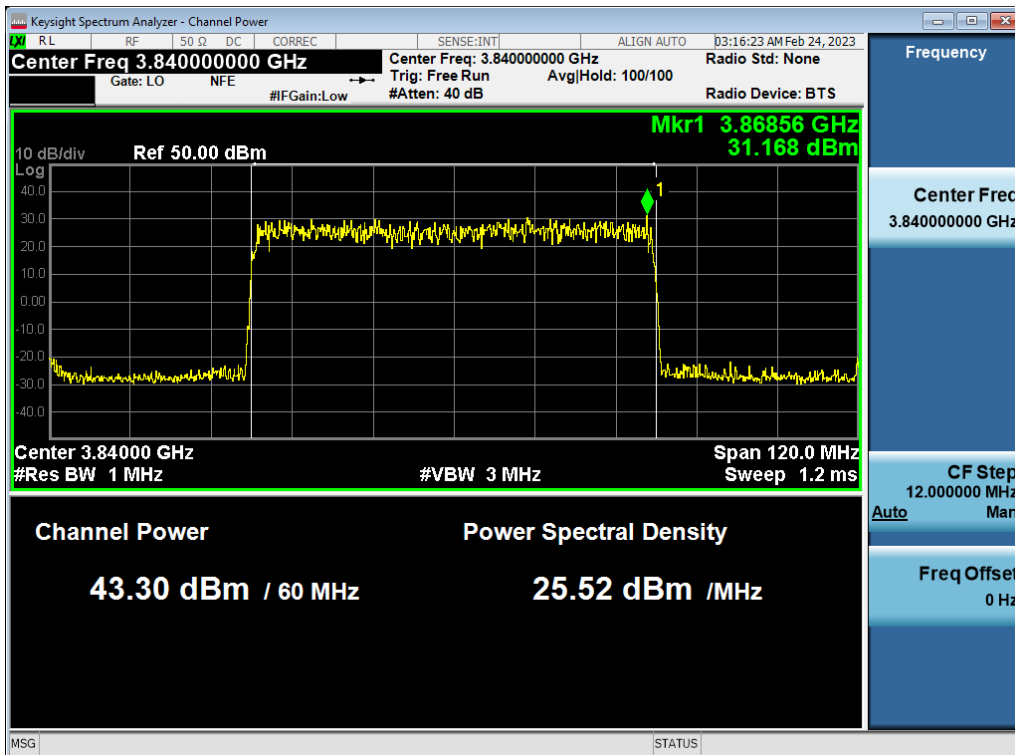
Ant.	Mod	Ch	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Ant. Gain (dBi)	E.I.R.P. (dBm/MHz)	Calculated (W/MHz)	Limit (W/MHz)
0	QPSK	Low	3 800.00	24.89	21.0	45.89	38.78	1640
	16QAM	Low	3 800.00	24.72	21.0	45.72	37.30	
	64QAM	Low	3 800.00	25.11	21.0	46.11	40.86	
	256QAM	Low	3 800.00	25.67	21.0	46.67	46.47	
1	QPSK	Low	3 800.00	24.84	21.0	45.84	38.38	
	16QAM	Low	3 800.00	24.78	21.0	45.78	37.81	
	64QAM	Low	3 800.00	25.08	21.0	46.08	40.56	
	256QAM	Low	3 800.00	25.80	21.0	46.80	47.85	
2	QPSK	Low	3 800.00	25.02	21.0	46.02	39.97	
	16QAM	Low	3 800.00	24.87	21.0	45.87	38.61	
	64QAM	Low	3 800.00	25.43	21.0	46.43	43.97	
	256QAM	Low	3 800.00	25.81	21.0	46.81	48.00	
3	QPSK	Low	3 800.00	24.96	21.0	45.96	39.46	
	16QAM	Low	3 800.00	25.04	21.0	46.04	40.21	
	64QAM	Low	3 800.00	25.44	21.0	46.44	44.07	
	256QAM	Low	3 800.00	25.99	21.0	46.99	50.02	

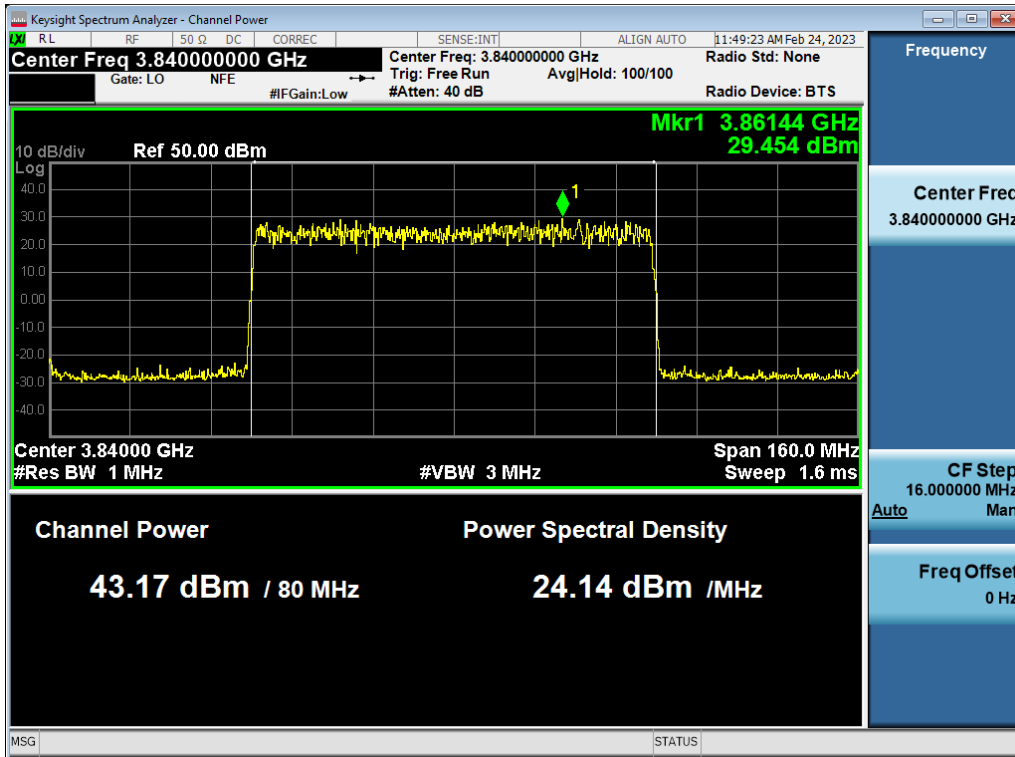
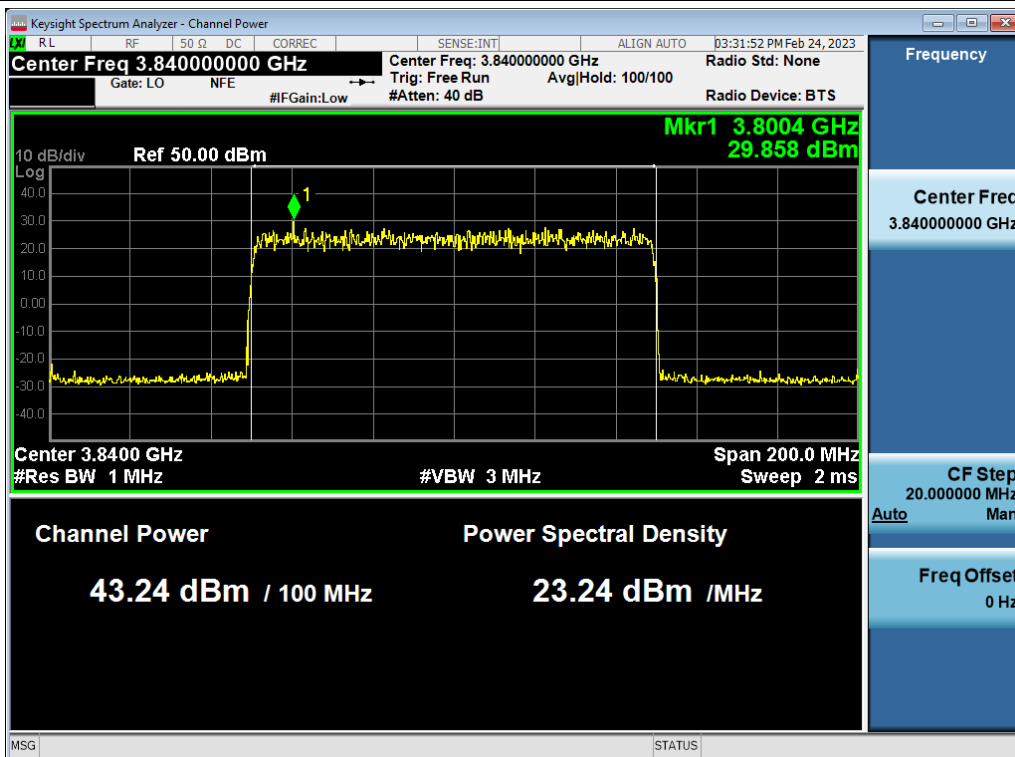
**Sum Data of Port 0, Port 1, Port 2 and Port 3**

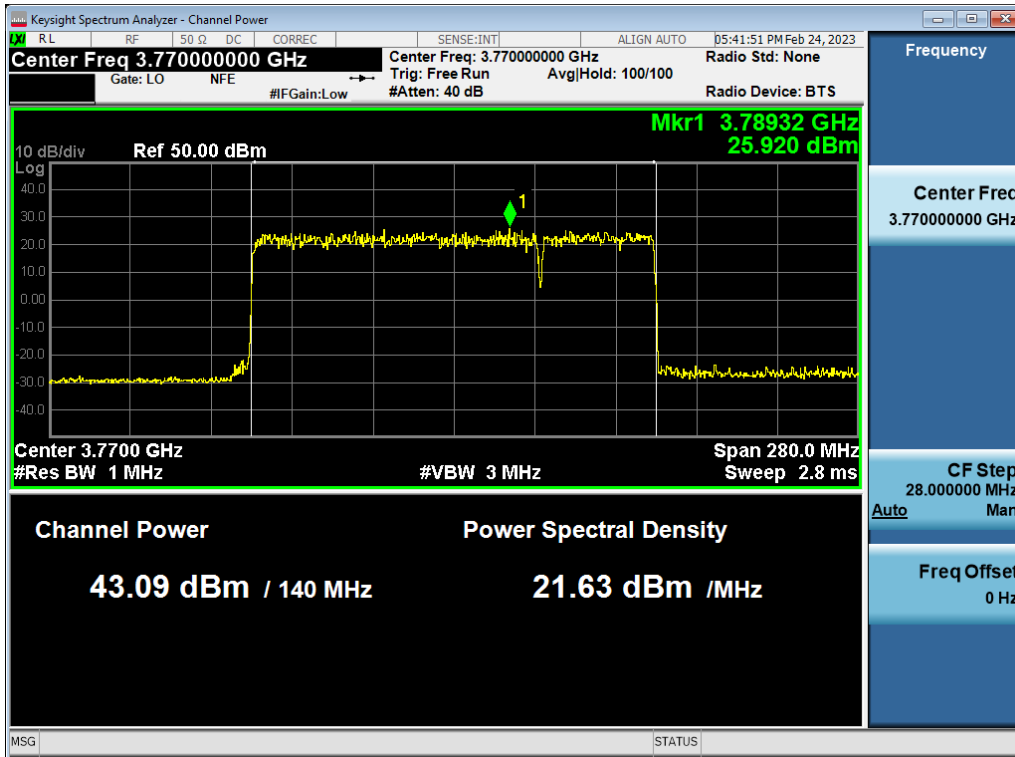
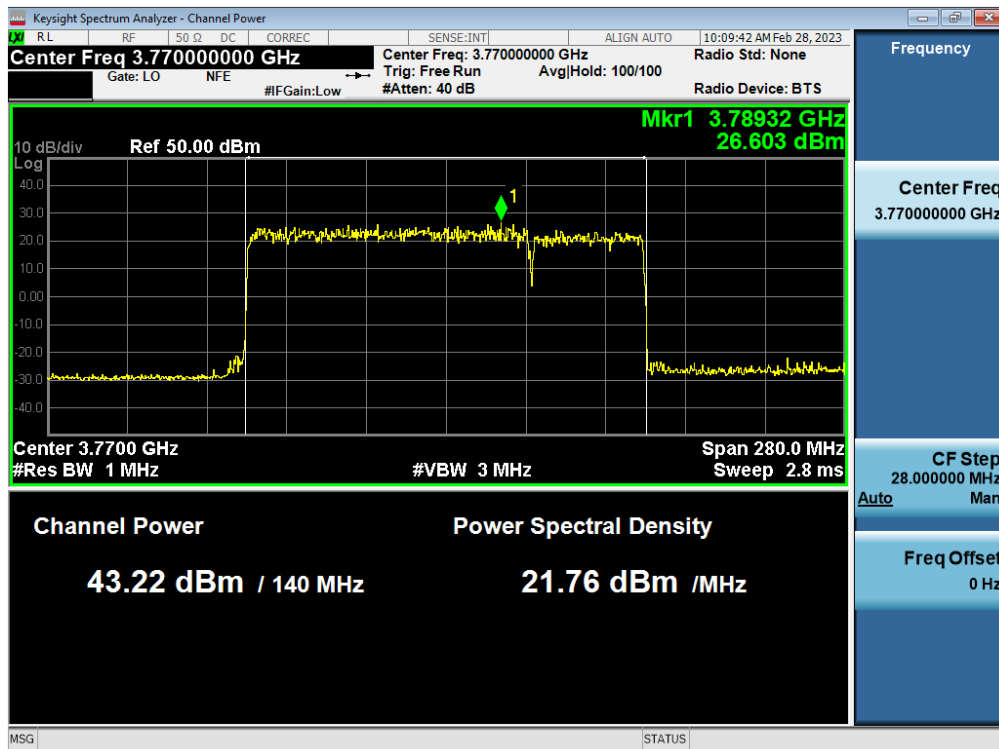
Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	W/MHz				
3 800.00	156.59	153.92	169.46	192.34	1640



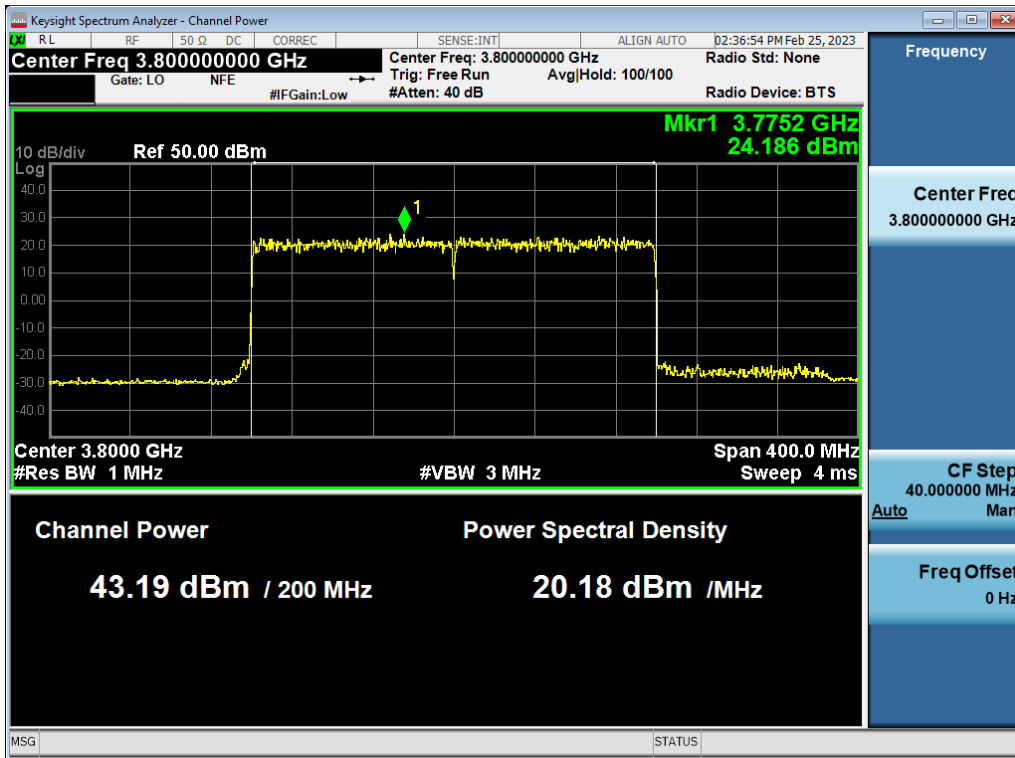
## Plot Data of PSD

**Antenna 2 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 64QAM / Middle**

**Antenna 1 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 64QAM / Middle**


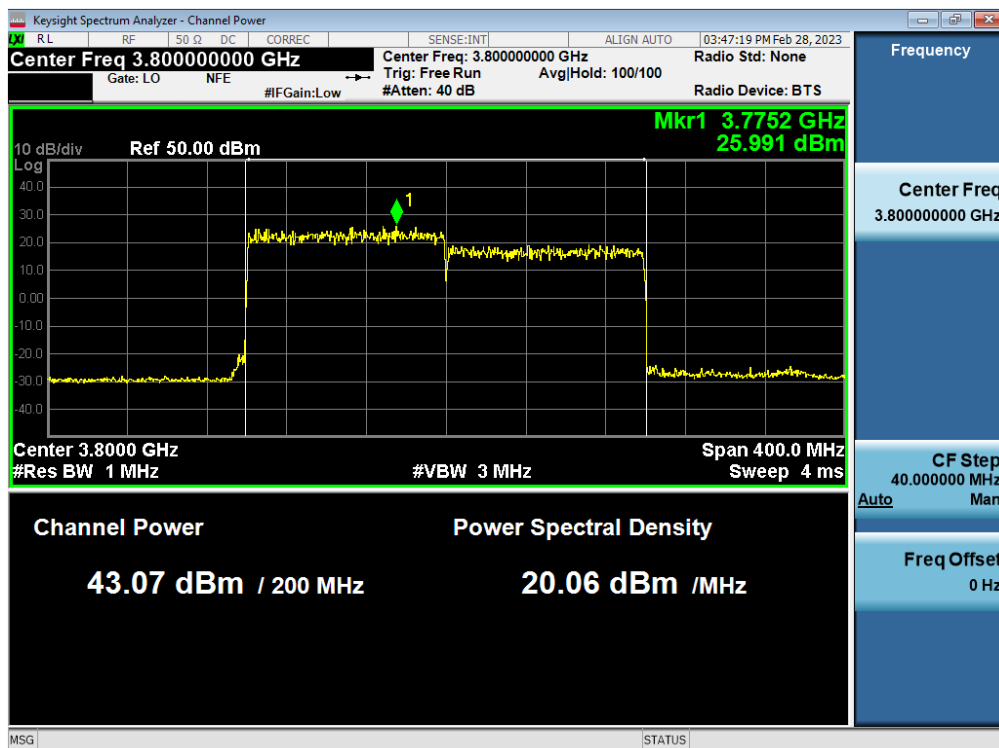
**Antenna 1 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 256QAM / Middle**

**Antenna 3 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 256QAM / Middle**


**Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 64QAM / Low / Contiguous**

**Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 64QAM / Low / Contiguous**


Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 256QAM / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 256QAM / Low / Contiguous



## 5.2. PAPR

### Test Requirements:

#### § 27.50 Power limits and duty cycle.

- (j) The following power requirements apply to stations transmitting in the 3700-3980 MHz band:
  - (4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. 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.

### Test Procedures:

The measurement is performed in accordance with Section 5.2.3.4 of ANSI C63.26.

The following guidelines are offered for performing a CCDF measurement..

- a) Set resolution/measurement bandwidth  $\geq$  OBW or specified reference bandwidth.
- b) Set the number of counts to a value that stabilizes the measured CCDF curve.
- c) Set the measurement interval as follows:
  - 1) For continuous transmissions, set to the greater of  $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$  or 1 ms.
  - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
  - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d) Record the maximum PAPR level associated with a probability of 0.1 %.
- e) The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

**Note:** The results of PAPR test shown above the frequency measured values are very small and similar trend for each port, so we attach only the worst case plot.

## Tabular data of PAPR

## (4 Port) 5G NR n77 40 MHz [1 Carrier]

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 720.00	7.92
		Middle	3 840.00	7.92
		High	3 960.00	7.88
	16QAM	Low	3 720.00	7.94
		Middle	3 840.00	7.88
		High	3 960.00	7.92
	64QAM	Low	3 720.00	7.89
		Middle	3 840.00	7.87
		High	3 960.00	7.94
	256QAM	Low	3 720.00	7.78
		Middle	3 840.00	7.83
		High	3 960.00	7.95
1	QPSK	Low	3 720.00	7.90
		Middle	3 840.00	7.77
		High	3 960.00	7.88
	16QAM	Low	3 720.00	7.90
		Middle	3 840.00	7.81
		High	3 960.00	7.90
	64QAM	Low	3 720.00	7.88
		Middle	3 840.00	7.83
		High	3 960.00	7.94
	256QAM	Low	3 720.00	7.92
		Middle	3 840.00	7.79
		High	3 960.00	7.84

2	QPSK	Low	3 720.00	7.92
		Middle	3 840.00	7.85
		High	3 960.00	7.87
	16QAM	Low	3 720.00	7.92
		Middle	3 840.00	7.88
		High	3 960.00	7.91
	64QAM	Low	3 720.00	7.91
		Middle	3 840.00	7.88
		High	3 960.00	8.00
256QAM	Low	3 720.00	7.91	
	Middle	3 840.00	7.86	
	High	3 960.00	7.94	
3	QPSK	Low	3 720.00	7.91
		Middle	3 840.00	7.90
		High	3 960.00	7.88
	16QAM	Low	3 720.00	7.91
		Middle	3 840.00	7.89
		High	3 960.00	7.93
	64QAM	Low	3 720.00	7.86
		Middle	3 840.00	7.90
		High	3 960.00	7.94
256QAM	Low	3 720.00	7.87	
	Middle	3 840.00	7.86	
	High	3 960.00	7.93	

## (4 Port) 5G NR n77 60 MHz [1 Carrier]

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 730.00	8.01
		Middle	3 840.00	7.97
		High	3 950.00	7.90
	16QAM	Low	3 730.00	7.93
		Middle	3 840.00	7.89
		High	3 950.00	7.98
	64QAM	Low	3 730.00	7.90
		Middle	3 840.00	7.87
		High	3 950.00	7.93
	256QAM	Low	3 730.00	7.93
		Middle	3 840.00	7.86
		High	3 950.00	8.02
1	QPSK	Low	3 730.00	7.91
		Middle	3 840.00	7.80
		High	3 950.00	7.99
	16QAM	Low	3 730.00	7.95
		Middle	3 840.00	7.84
		High	3 950.00	7.91
	64QAM	Low	3 730.00	7.91
		Middle	3 840.00	7.84
		High	3 950.00	7.92
	256QAM	Low	3 730.00	7.92
		Middle	3 840.00	7.86
		High	3 950.00	8.01



2	QPSK	Low	3 730.00	7.97
		Middle	3 840.00	7.88
		High	3 950.00	7.96
	16QAM	Low	3 730.00	7.94
		Middle	3 840.00	7.88
		High	3 950.00	7.92
	64QAM	Low	3 730.00	7.98
		Middle	3 840.00	7.88
		High	3 950.00	7.91
	256QAM	Low	3 730.00	7.91
		Middle	3 840.00	7.87
		High	3 950.00	7.98
3	QPSK	Low	3 730.00	7.99
		Middle	3 840.00	7.94
		High	3 950.00	7.97
	16QAM	Low	3 730.00	7.94
		Middle	3 840.00	7.88
		High	3 950.00	7.92
	64QAM	Low	3 730.00	7.97
		Middle	3 840.00	7.88
		High	3 950.00	7.94
	256QAM	Low	3 730.00	7.91
		Middle	3 840.00	7.88
		High	3 950.00	7.97

## (4 Port) 5G NR n77 80 MHz [1 Carrier]

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 740.00	8.12
		Middle	3 840.00	7.91
		High	3 940.00	8.02
	16QAM	Low	3 740.00	7.99
		Middle	3 840.00	7.86
		High	3 940.00	7.96
	64QAM	Low	3 740.00	7.98
		Middle	3 840.00	7.87
		High	3 940.00	7.97
	256QAM	Low	3 740.00	8.00
		Middle	3 840.00	7.89
		High	3 940.00	8.02
1	QPSK	Low	3 740.00	8.00
		Middle	3 840.00	7.79
		High	3 940.00	8.10
	16QAM	Low	3 740.00	8.01
		Middle	3 840.00	7.83
		High	3 940.00	8.06
	64QAM	Low	3 740.00	7.99
		Middle	3 840.00	7.87
		High	3 940.00	7.95
	256QAM	Low	3 740.00	8.00
		Middle	3 840.00	7.86
		High	3 940.00	7.99

2	QPSK	Low	3 740.00	7.95
		Middle	3 840.00	7.86
		High	3 940.00	8.09
	16QAM	Low	3 740.00	8.02
		Middle	3 840.00	7.87
		High	3 940.00	8.06
	64QAM	Low	3 740.00	8.01
		Middle	3 840.00	7.88
		High	3 940.00	8.01
	256QAM	Low	3 740.00	8.00
		Middle	3 840.00	7.89
		High	3 940.00	7.99
3	QPSK	Low	3 740.00	7.95
		Middle	3 840.00	7.93
		High	3 940.00	8.08
	16QAM	Low	3 740.00	8.03
		Middle	3 840.00	7.87
		High	3 940.00	7.98
	64QAM	Low	3 740.00	8.01
		Middle	3 840.00	7.89
		High	3 940.00	7.97
	256QAM	Low	3 740.00	8.00
		Middle	3 840.00	7.88
		High	3 940.00	7.99

## (4 Port) 5G NR n77 100 MHz [1 Carrier]

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 750.00	8.14
		Middle	3 840.00	7.92
		High	3 930.00	8.06
	16QAM	Low	3 750.00	8.08
		Middle	3 840.00	7.89
		High	3 930.00	8.06
	64QAM	Low	3 750.00	8.03
		Middle	3 840.00	7.84
		High	3 930.00	8.01
	256QAM	Low	3 750.00	8.09
		Middle	3 840.00	7.91
		High	3 930.00	7.99
1	QPSK	Low	3 750.00	8.08
		Middle	3 840.00	7.76
		High	3 930.00	8.05
	16QAM	Low	3 750.00	8.05
		Middle	3 840.00	7.86
		High	3 930.00	8.05
	64QAM	Low	3 750.00	8.04
		Middle	3 840.00	7.84
		High	3 930.00	8.00
	256QAM	Low	3 750.00	8.03
		Middle	3 840.00	7.87
		High	3 930.00	8.03

2	QPSK	Low	3 750.00	7.97
		Middle	3 840.00	7.88
		High	3 930.00	8.05
	16QAM	Low	3 750.00	8.01
		Middle	3 840.00	7.88
		High	3 930.00	8.05
	64QAM	Low	3 750.00	7.99
		Middle	3 840.00	7.85
		High	3 930.00	8.02
	256QAM	Low	3 750.00	8.07
		Middle	3 840.00	7.88
		High	3 930.00	8.02
3	QPSK	Low	3 750.00	8.05
		Middle	3 840.00	7.89
		High	3 930.00	8.05
	16QAM	Low	3 750.00	8.05
		Middle	3 840.00	7.89
		High	3 930.00	8.08
	64QAM	Low	3 750.00	8.03
		Middle	3 840.00	7.85
		High	3 930.00	7.99
	256QAM	Low	3 750.00	8.03
		Middle	3 840.00	7.88
		High	3 930.00	7.99

**Tabular data of Contiguous PAPR**
**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier]**

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 770.00	8.17
	16QAM	Low	3 770.00	8.12
	64QAM	Low	3 770.00	8.05
	256QAM	Low	3 770.00	8.08
1	QPSK	Low	3 770.00	8.12
	16QAM	Low	3 770.00	8.13
	64QAM	Low	3 770.00	8.13
	256QAM	Low	3 770.00	8.06
2	QPSK	Low	3 770.00	8.10
	16QAM	Low	3 770.00	8.11
	64QAM	Low	3 770.00	8.07
	256QAM	Low	3 770.00	8.06
3	QPSK	Low	3 770.00	8.11
	16QAM	Low	3 770.00	8.10
	64QAM	Low	3 770.00	8.05
	256QAM	Low	3 770.00	8.06

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric)**

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 770.00	8.13
	16QAM	Low	3 770.00	8.16
	64QAM	Low	3 770.00	8.07
	256QAM	Low	3 770.00	8.12
1	QPSK	Low	3 770.00	8.06
	16QAM	Low	3 770.00	8.14
	64QAM	Low	3 770.00	8.14
	256QAM	Low	3 770.00	8.14
2	QPSK	Low	3 770.00	8.12
	16QAM	Low	3 770.00	8.14
	64QAM	Low	3 770.00	8.13
	256QAM	Low	3 770.00	8.12
3	QPSK	Low	3 770.00	8.05
	16QAM	Low	3 770.00	8.13
	64QAM	Low	3 770.00	8.13
	256QAM	Low	3 770.00	8.12

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier]**

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 750.00	8.24	3 850.00	8.27
	16QAM	Low	3 750.00	8.29	3 850.00	8.28
	64QAM	Low	3 750.00	8.28	3 850.00	8.25
	256QAM	Low	3 750.00	8.24	3 850.00	8.26
1	QPSK	Low	3 750.00	8.33	3 850.00	8.31
	16QAM	Low	3 750.00	8.33	3 850.00	8.27
	64QAM	Low	3 750.00	8.28	3 850.00	8.23
	256QAM	Low	3 750.00	8.31	3 850.00	8.25
2	QPSK	Low	3 750.00	8.22	3 850.00	8.23
	16QAM	Low	3 750.00	8.38	3 850.00	8.27
	64QAM	Low	3 750.00	8.36	3 850.00	8.25
	256QAM	Low	3 750.00	8.30	3 850.00	8.26
3	QPSK	Low	3 750.00	8.23	3 850.00	8.23
	16QAM	Low	3 750.00	8.38	3 850.00	8.25
	64QAM	Low	3 750.00	8.34	3 850.00	8.28
	256QAM	Low	3 750.00	8.29	3 850.00	8.22

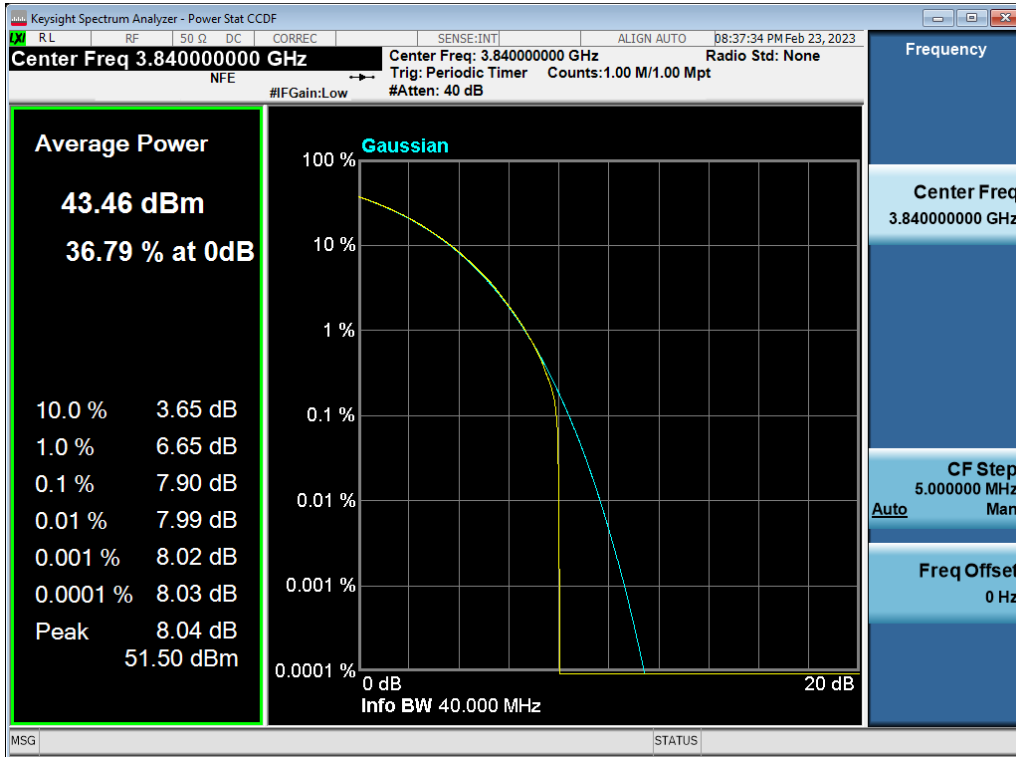


**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric)**

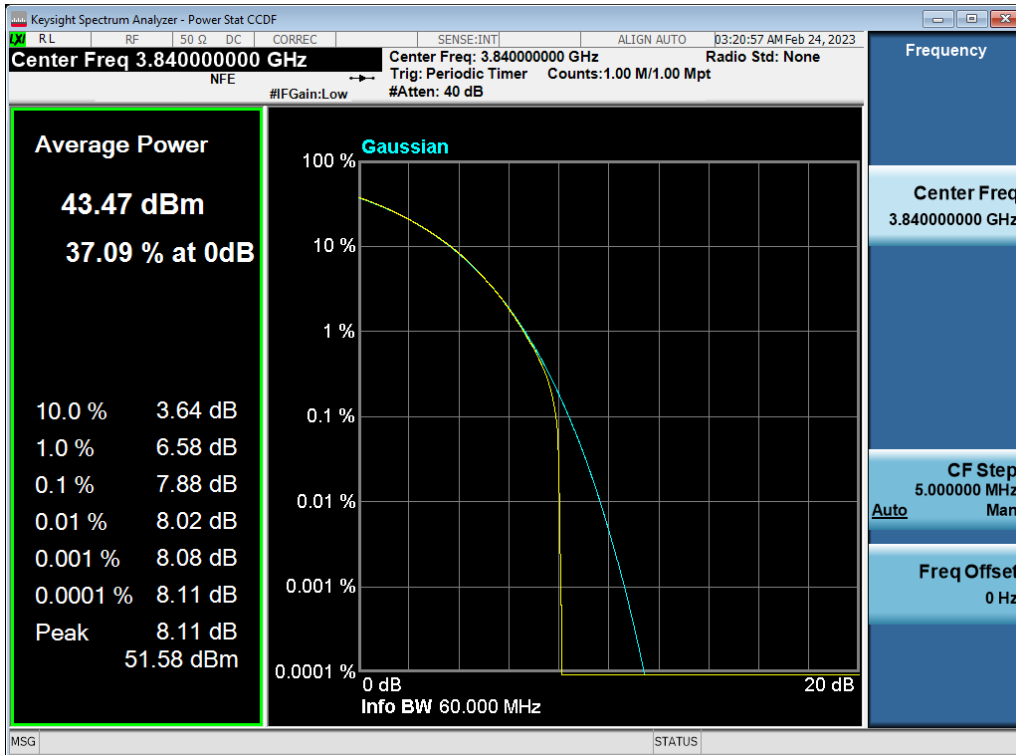
Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 750.00	8.20	3 850.00	8.38
	16QAM	Low	3 750.00	8.22	3 850.00	8.46
	64QAM	Low	3 750.00	8.15	3 850.00	8.39
	256QAM	Low	3 750.00	8.20	3 850.00	8.38
1	QPSK	Low	3 750.00	8.13	3 850.00	8.35
	16QAM	Low	3 750.00	8.22	3 850.00	8.41
	64QAM	Low	3 750.00	8.09	3 850.00	8.30
	256QAM	Low	3 750.00	8.23	3 850.00	8.36
2	QPSK	Low	3 750.00	8.18	3 850.00	8.37
	16QAM	Low	3 750.00	8.22	3 850.00	8.43
	64QAM	Low	3 750.00	8.19	3 850.00	8.29
	256QAM	Low	3 750.00	8.21	3 850.00	8.35
3	QPSK	Low	3 750.00	8.18	3 850.00	8.38
	16QAM	Low	3 750.00	8.21	3 850.00	8.36
	64QAM	Low	3 750.00	8.18	3 850.00	8.29
	256QAM	Low	3 750.00	8.09	3 850.00	8.39

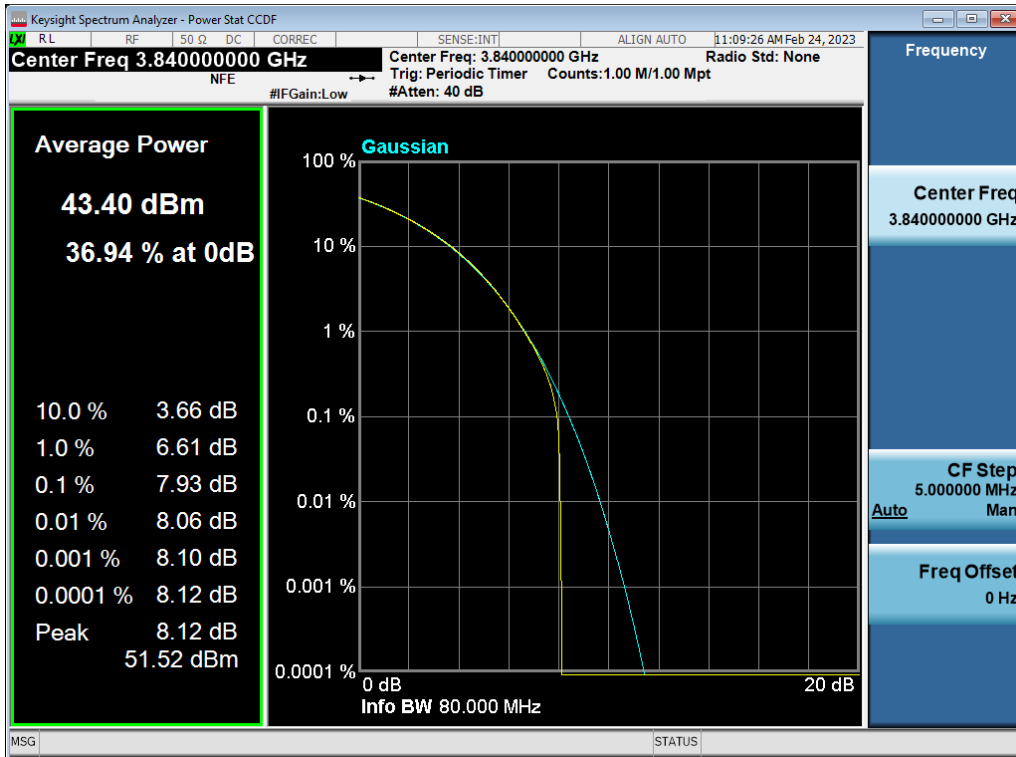
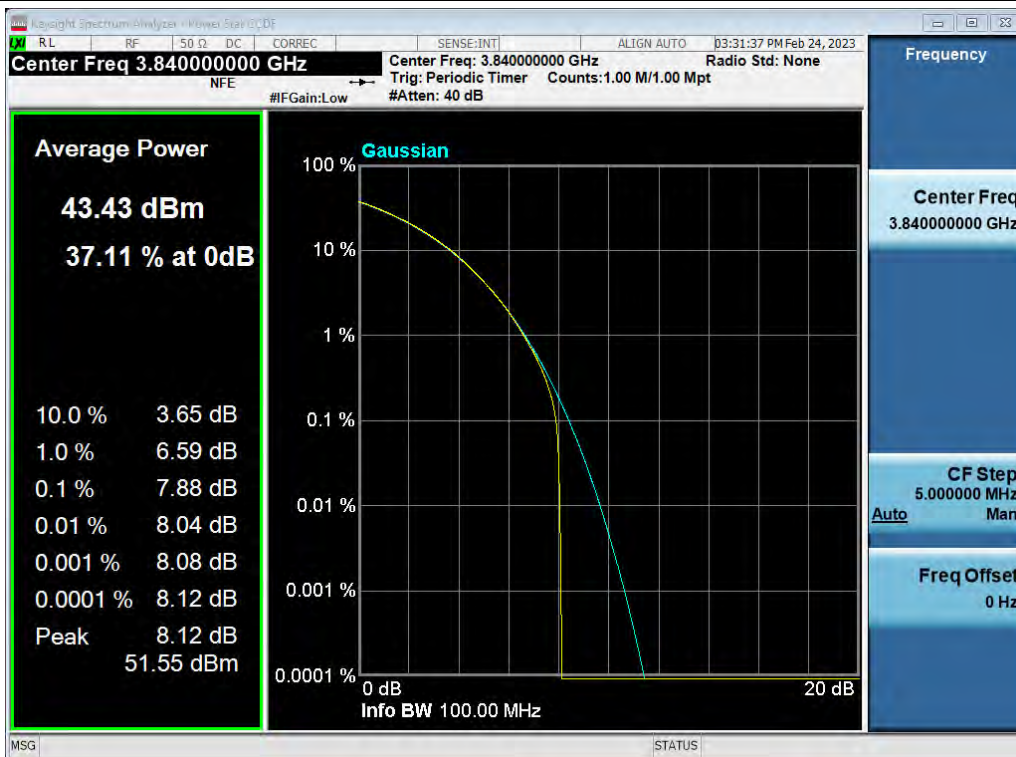
Plot Data of PAPR

Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 64QAM / Middle

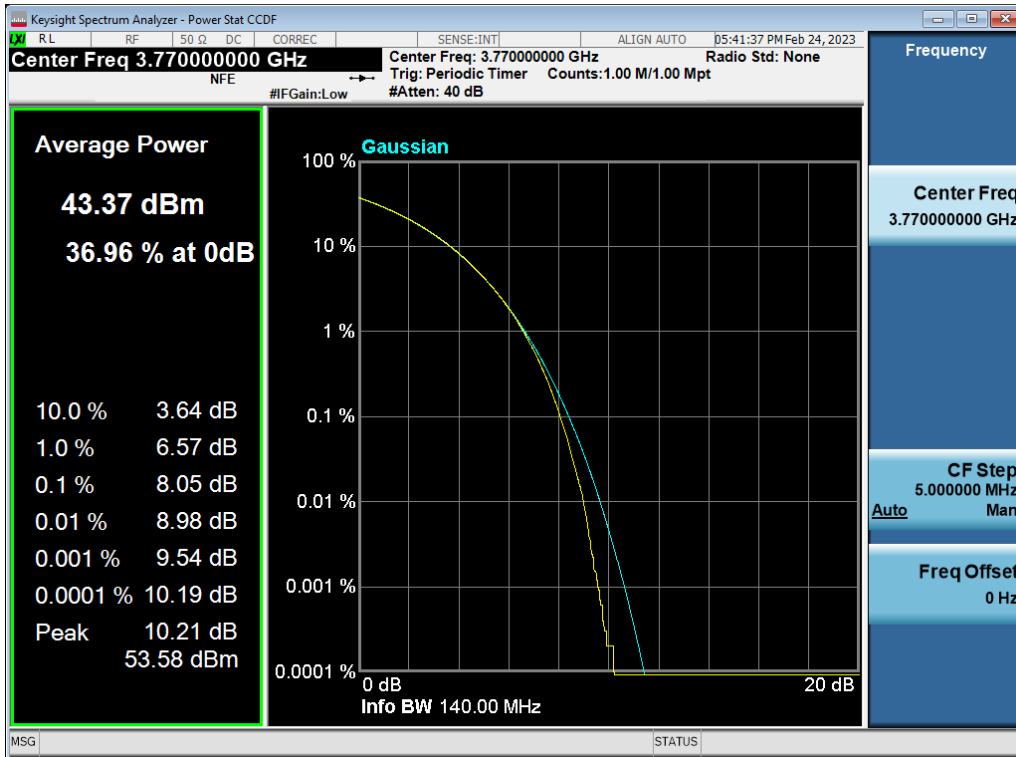


Antenna 3 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 64QAM / Middle

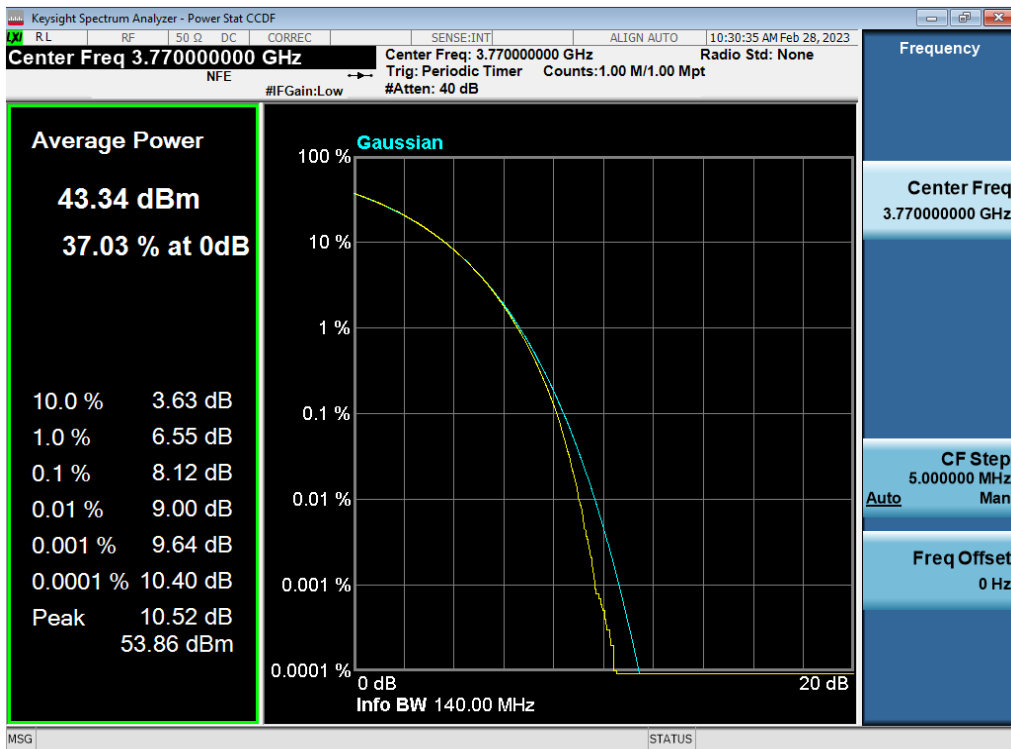


**Antenna 3 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / QPSK / Middle**

**Antenna 3 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 256QAM / Middle**


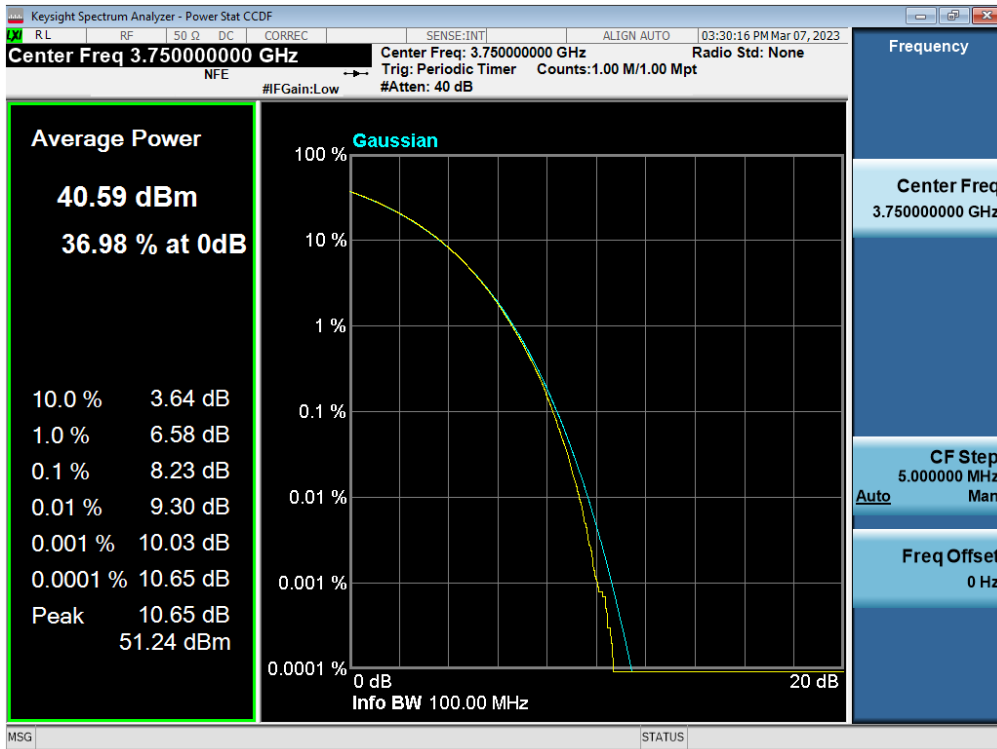
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 64QAM / Low / Contiguous



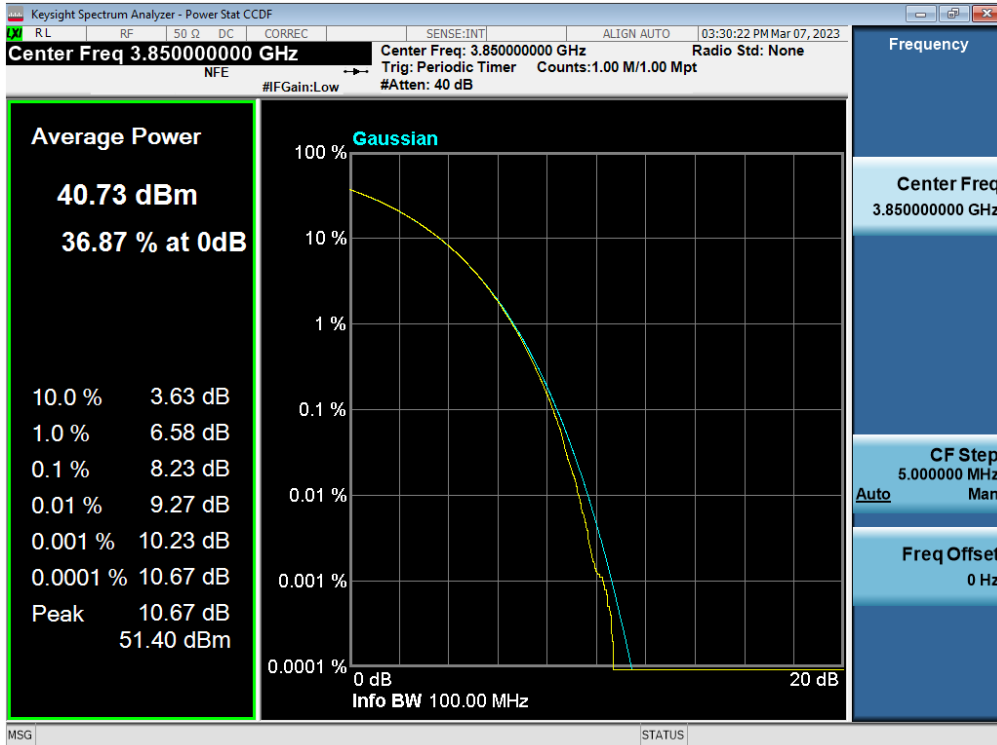
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 256QAM / Low / Contiguous



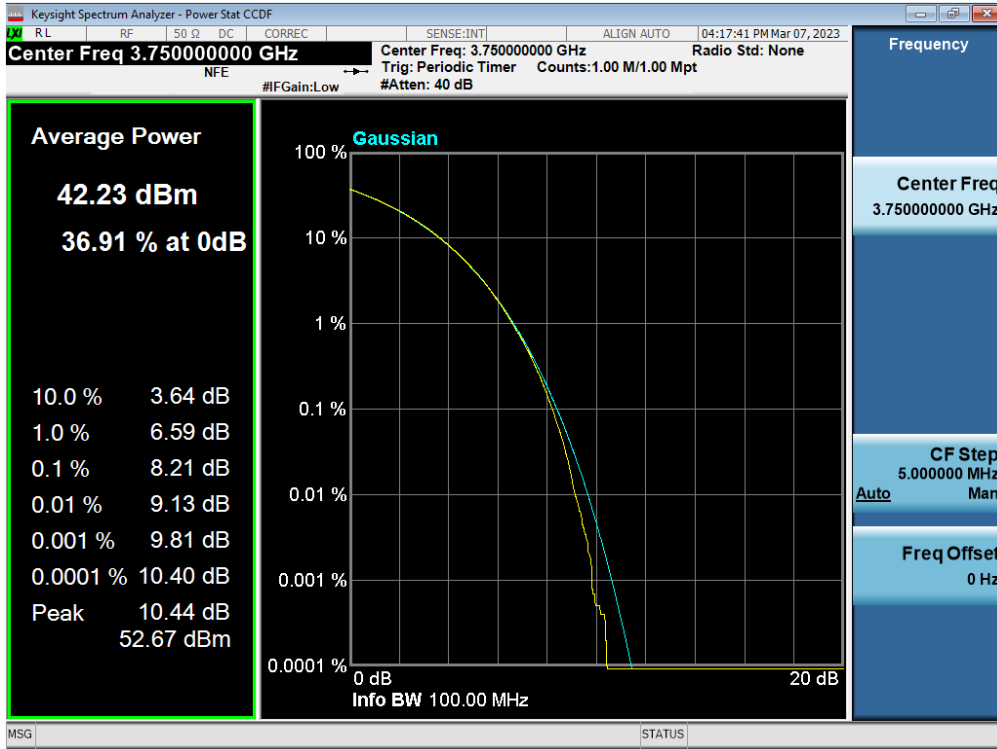
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / QPSK / Low / Contiguous



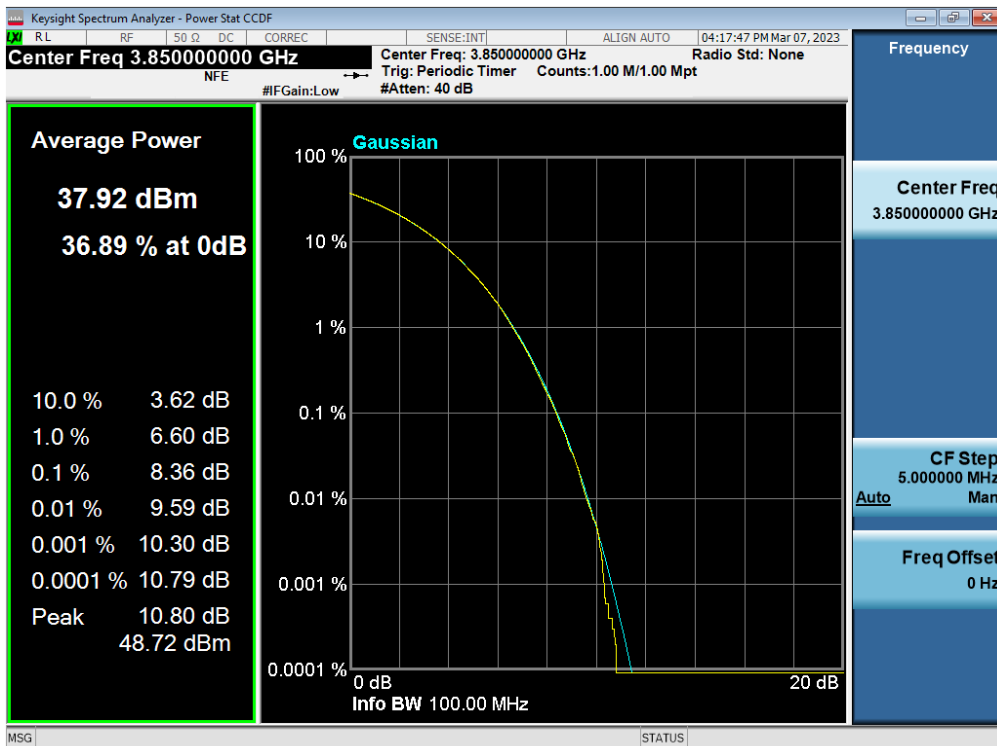
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / QPSK / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 16QAM / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 16QAM / Low / Contiguous



### 5.3. OCCUPIED BANDWIDTH

#### Test Requirements:

##### § 2.1049 Measurements required: Occupied bandwidth.

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 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

#### Test Procedures:

The measurement is performed in accordance with Section 5.4.3 and 5.4.4 of ANSI C63.26.

##### 5.4.3 Occupied bandwidth—Relative measurement procedure

The OBW is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). The typical ratio for transmitters is  $-26$  dB, corresponding to the 26 dB BW; however, other ratios can be specified. In this subclause, the ratio is designated by “ $-X$  dB.”

- 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  $\geq 3 \times$  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.  
NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.
- 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:
  - 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).
  - 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- 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) 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).
- i) 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.”

- j) 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).

#### 5.4.4 Occupied bandwidth—Power bandwidth (99 %) measurement procedure

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission.

The following procedure shall be used for measuring (99 %) power bandwidth:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of  $1.5 \times \text{OBW}$  is sufficient).
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set  $\geq 3 \times \text{RBW}$ .
- 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.  
NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.
- d) Set the detection mode to peak, and the trace mode to max-hold.
- e) If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference these two frequencies.
- f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

**Note:** The results of the Occupied Bandwidth test shown above the frequency measured values are very small and similar trend for each port, so we attach only the worst case plot.



**Test Results:**
**Tabular Data of Occupied Bandwidth**
**(4 Port) 5G NR n77 40 MHz [1 Carrier]**

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 720.00	37.991
		Middle	3 840.00	37.964
		High	3 960.00	37.953
	16QAM	Low	3 720.00	37.887
		Middle	3 840.00	38.008
		High	3 960.00	38.026
	64QAM	Low	3 720.00	37.857
		Middle	3 840.00	38.010
		High	3 960.00	37.855
	256QAM	Low	3 720.00	37.890
		Middle	3 840.00	37.940
		High	3 960.00	38.042
1	QPSK	Low	3 720.00	37.915
		Middle	3 840.00	37.964
		High	3 960.00	37.958
	16QAM	Low	3 720.00	37.990
		Middle	3 840.00	38.043
		High	3 960.00	37.903
	64QAM	Low	3 720.00	37.967
		Middle	3 840.00	37.981
		High	3 960.00	37.903
	256QAM	Low	3 720.00	37.839
		Middle	3 840.00	38.019
		High	3 960.00	38.010

2	QPSK	Low	3 720.00	37.917
		Middle	3 840.00	37.912
		High	3 960.00	37.922
	16QAM	Low	3 720.00	38.002
		Middle	3 840.00	38.037
		High	3 960.00	37.923
	64QAM	Low	3 720.00	37.942
		Middle	3 840.00	37.936
		High	3 960.00	37.906
	256QAM	Low	3 720.00	37.993
		Middle	3 840.00	37.970
		High	3 960.00	37.969
3	QPSK	Low	3 720.00	37.898
		Middle	3 840.00	37.969
		High	3 960.00	37.837
	16QAM	Low	3 720.00	37.945
		Middle	3 840.00	38.059
		High	3 960.00	38.072
	64QAM	Low	3 720.00	37.921
		Middle	3 840.00	37.952
		High	3 960.00	37.931
	256QAM	Low	3 720.00	37.980
		Middle	3 840.00	37.943
		High	3 960.00	37.924

## (4 Port) 5G NR n77 60 MHz [1 Carrier]

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 730.00	57.915
		Middle	3 840.00	57.916
		High	3 950.00	57.983
	16QAM	Low	3 730.00	57.984
		Middle	3 840.00	58.103
		High	3 950.00	57.886
	64QAM	Low	3 730.00	57.805
		Middle	3 840.00	57.977
		High	3 950.00	57.867
	256QAM	Low	3 730.00	57.836
		Middle	3 840.00	57.955
		High	3 950.00	57.935
1	QPSK	Low	3 730.00	58.044
		Middle	3 840.00	57.904
		High	3 950.00	57.844
	16QAM	Low	3 730.00	57.933
		Middle	3 840.00	57.914
		High	3 950.00	57.927
	64QAM	Low	3 730.00	57.876
		Middle	3 840.00	57.813
		High	3 950.00	57.867
	256QAM	Low	3 730.00	57.918
		Middle	3 840.00	57.869
		High	3 950.00	57.909

2	QPSK	Low	3 730.00	57.928
		Middle	3 840.00	57.957
		High	3 950.00	57.886
	16QAM	Low	3 730.00	57.994
		Middle	3 840.00	57.863
		High	3 950.00	57.887
	64QAM	Low	3 730.00	57.881
		Middle	3 840.00	57.941
		High	3 950.00	57.838
	256QAM	Low	3 730.00	57.956
		Middle	3 840.00	57.871
		High	3 950.00	57.858
3	QPSK	Low	3 730.00	58.004
		Middle	3 840.00	57.948
		High	3 950.00	57.898
	16QAM	Low	3 730.00	57.925
		Middle	3 840.00	58.122
		High	3 950.00	57.870
	64QAM	Low	3 730.00	58.035
		Middle	3 840.00	57.973
		High	3 950.00	57.953
	256QAM	Low	3 730.00	57.909
		Middle	3 840.00	57.848
		High	3 950.00	57.856

## (4 Port) 5G NR n77 80 MHz [1 Carrier]

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 740.00	77.638
		Middle	3 840.00	77.742
		High	3 940.00	77.587
	16QAM	Low	3 740.00	77.529
		Middle	3 840.00	77.566
		High	3 940.00	77.591
	64QAM	Low	3 740.00	77.410
		Middle	3 840.00	77.540
		High	3 940.00	77.502
	256QAM	Low	3 740.00	77.545
		Middle	3 840.00	77.522
		High	3 940.00	77.535
1	QPSK	Low	3 740.00	77.557
		Middle	3 840.00	77.548
		High	3 940.00	77.644
	16QAM	Low	3 740.00	77.721
		Middle	3 840.00	77.434
		High	3 940.00	77.529
	64QAM	Low	3 740.00	77.560
		Middle	3 840.00	77.511
		High	3 940.00	77.495
	256QAM	Low	3 740.00	77.607
		Middle	3 840.00	77.462
		High	3 940.00	77.674

2	QPSK	Low	3 740.00	77.726
		Middle	3 840.00	77.594
		High	3 940.00	77.517
	16QAM	Low	3 740.00	77.597
		Middle	3 840.00	77.662
		High	3 940.00	77.514
	64QAM	Low	3 740.00	77.640
		Middle	3 840.00	77.559
		High	3 940.00	77.623
	256QAM	Low	3 740.00	77.540
		Middle	3 840.00	77.634
		High	3 940.00	77.477
3	QPSK	Low	3 740.00	77.593
		Middle	3 840.00	77.619
		High	3 940.00	77.482
	16QAM	Low	3 740.00	77.566
		Middle	3 840.00	77.641
		High	3 940.00	77.513
	64QAM	Low	3 740.00	77.493
		Middle	3 840.00	77.645
		High	3 940.00	77.520
	256QAM	Low	3 740.00	77.518
		Middle	3 840.00	77.481
		High	3 940.00	77.338

## (4 Port) 5G NR n77 100 MHz [1 Carrier]

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 750.00	97.736
		Middle	3 840.00	97.662
		High	3 930.00	97.459
	16QAM	Low	3 750.00	97.522
		Middle	3 840.00	97.609
		High	3 930.00	97.736
	64QAM	Low	3 750.00	97.426
		Middle	3 840.00	97.761
		High	3 930.00	97.429
	256QAM	Low	3 750.00	97.582
		Middle	3 840.00	97.800
		High	3 930.00	97.504
1	QPSK	Low	3 750.00	97.583
		Middle	3 840.00	97.472
		High	3 930.00	97.553
	16QAM	Low	3 750.00	97.511
		Middle	3 840.00	97.688
		High	3 930.00	97.507
	64QAM	Low	3 750.00	97.444
		Middle	3 840.00	97.643
		High	3 930.00	97.494
	256QAM	Low	3 750.00	97.451
		Middle	3 840.00	97.351
		High	3 930.00	97.701

2	QPSK	Low	3 750.00	97.605
		Middle	3 840.00	97.700
		High	3 930.00	97.499
	16QAM	Low	3 750.00	97.582
		Middle	3 840.00	97.911
		High	3 930.00	97.595
	64QAM	Low	3 750.00	97.450
		Middle	3 840.00	97.516
		High	3 930.00	97.539
	256QAM	Low	3 750.00	97.722
		Middle	3 840.00	97.737
		High	3 930.00	97.658
3	QPSK	Low	3 750.00	97.561
		Middle	3 840.00	97.564
		High	3 930.00	97.567
	16QAM	Low	3 750.00	97.663
		Middle	3 840.00	97.677
		High	3 930.00	97.639
	64QAM	Low	3 750.00	97.684
		Middle	3 840.00	97.640
		High	3 930.00	97.663
	256QAM	Low	3 750.00	97.513
		Middle	3 840.00	97.683
		High	3 930.00	97.675



**Tabular Data of Contiguous Occupied Bandwidth**
**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier]**

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 770.00	136.82
	16QAM	Low	3 770.00	137.05
	64QAM	Low	3 770.00	137.23
	256QAM	Low	3 770.00	137.12
1	QPSK	Low	3 770.00	136.95
	16QAM	Low	3 770.00	137.23
	64QAM	Low	3 770.00	137.06
	256QAM	Low	3 770.00	137.27
2	QPSK	Low	3 770.00	137.16
	16QAM	Low	3 770.00	137.26
	64QAM	Low	3 770.00	137.27
	256QAM	Low	3 770.00	137.20
3	QPSK	Low	3 770.00	137.04
	16QAM	Low	3 770.00	137.32
	64QAM	Low	3 770.00	137.39
	256QAM	Low	3 770.00	137.19

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric)**

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 770.00	136.92
	16QAM	Low	3 770.00	136.95
	64QAM	Low	3 770.00	137.09
	256QAM	Low	3 770.00	137.03
1	QPSK	Low	3 770.00	136.95
	16QAM	Low	3 770.00	136.78
	64QAM	Low	3 770.00	136.98
	256QAM	Low	3 770.00	136.94
2	QPSK	Low	3 770.00	136.80
	16QAM	Low	3 770.00	136.65
	64QAM	Low	3 770.00	136.83
	256QAM	Low	3 770.00	136.73
3	QPSK	Low	3 770.00	136.77
	16QAM	Low	3 770.00	136.83
	64QAM	Low	3 770.00	136.86
	256QAM	Low	3 770.00	136.76

(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier]

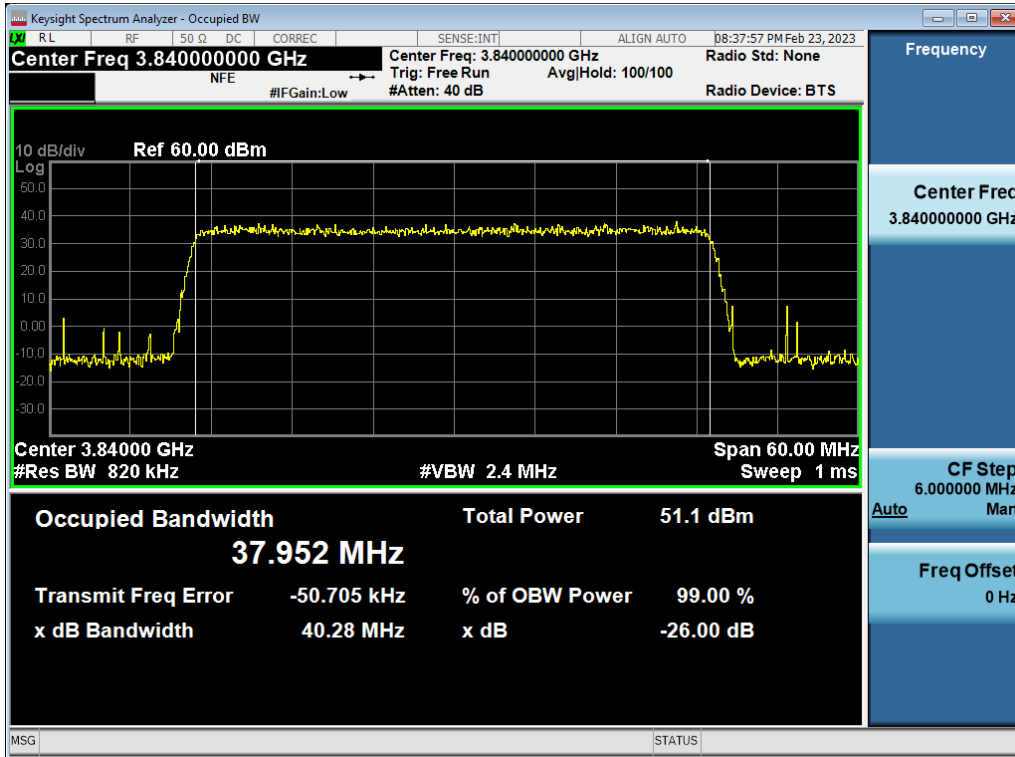
Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 800.00	196.76
	16QAM	Low	3 800.00	196.80
	64QAM	Low	3 800.00	196.77
	256QAM	Low	3 800.00	196.87
1	QPSK	Low	3 800.00	196.37
	16QAM	Low	3 800.00	196.62
	64QAM	Low	3 800.00	196.96
	256QAM	Low	3 800.00	196.66
2	QPSK	Low	3 800.00	196.49
	16QAM	Low	3 800.00	196.69
	64QAM	Low	3 800.00	196.77
	256QAM	Low	3 800.00	196.42
3	QPSK	Low	3 800.00	196.63
	16QAM	Low	3 800.00	196.43
	64QAM	Low	3 800.00	196.71
	256QAM	Low	3 800.00	196.85

(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric)

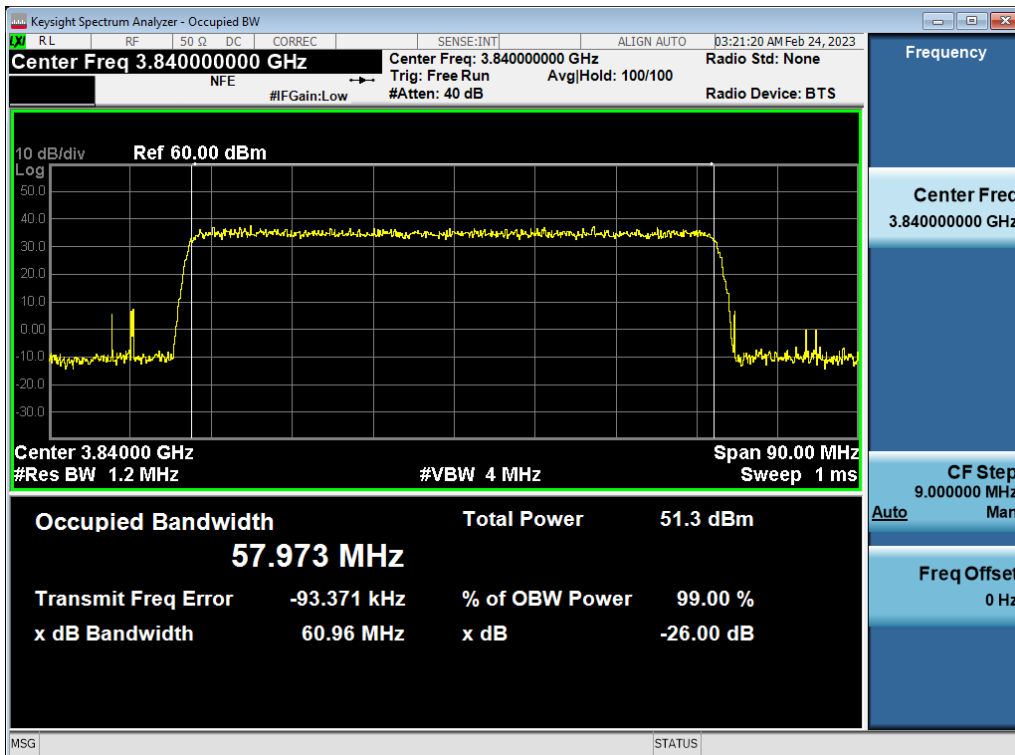
Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 800.00	195.55
	16QAM	Low	3 800.00	195.85
	64QAM	Low	3 800.00	195.44
	256QAM	Low	3 800.00	195.72
1	QPSK	Low	3 800.00	195.62
	16QAM	Low	3 800.00	195.57
	64QAM	Low	3 800.00	195.27
	256QAM	Low	3 800.00	195.61
2	QPSK	Low	3 800.00	195.48
	16QAM	Low	3 800.00	195.21
	64QAM	Low	3 800.00	195.34
	256QAM	Low	3 800.00	195.83
3	QPSK	Low	3 800.00	195.55
	16QAM	Low	3 800.00	195.49
	64QAM	Low	3 800.00	195.93
	256QAM	Low	3 800.00	195.41

## Plot Data of Occupied bandwidth

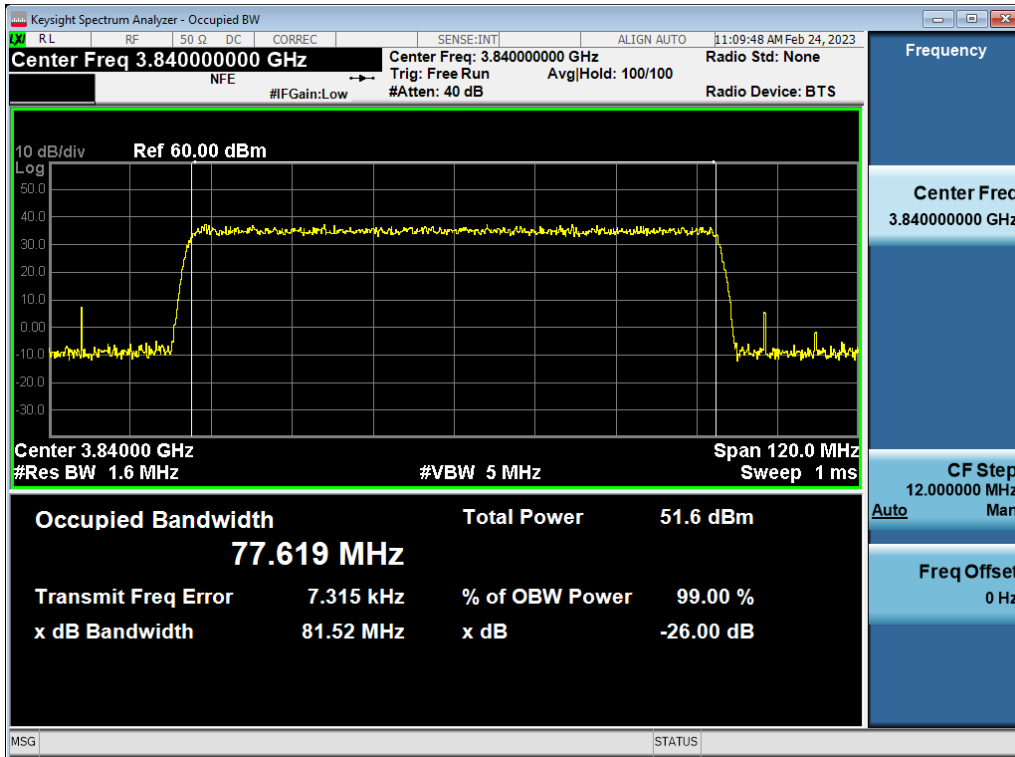
## Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 64QAM / Middle



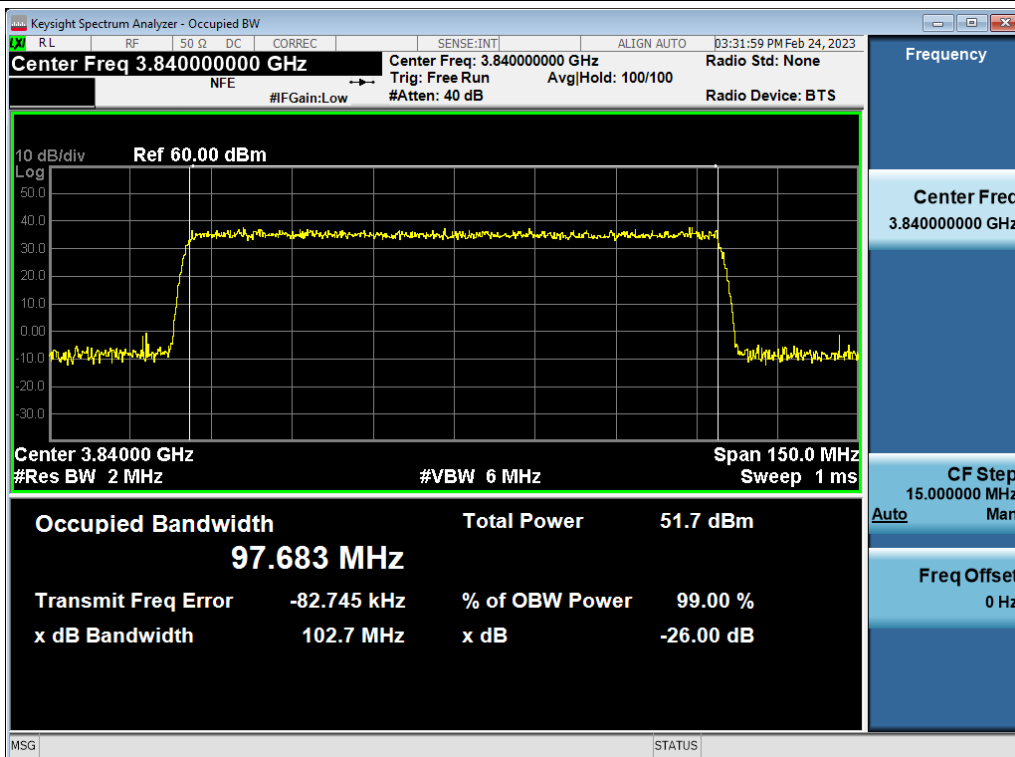
## Antenna 3 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 64QAM / Middle

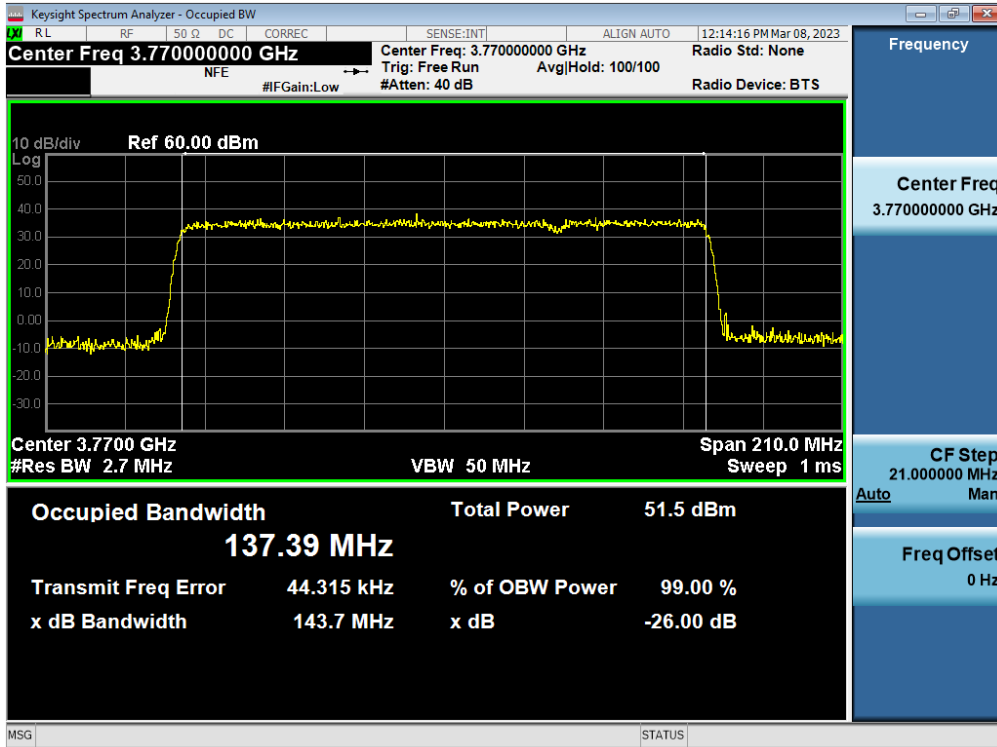
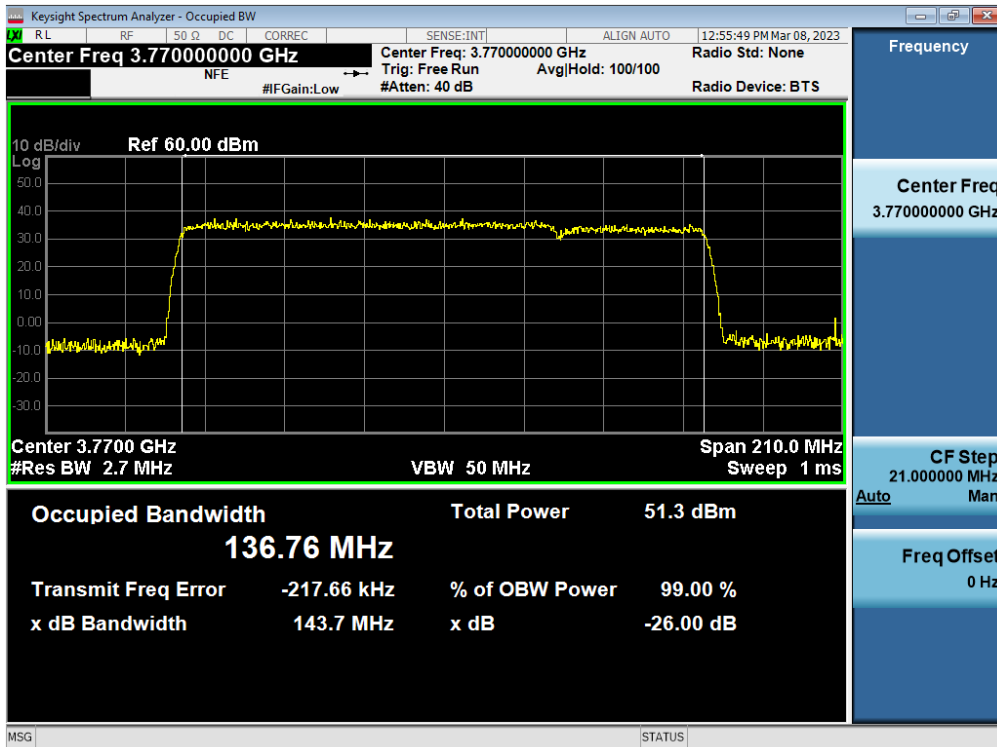


## Antenna 3 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / QPSK / Middle

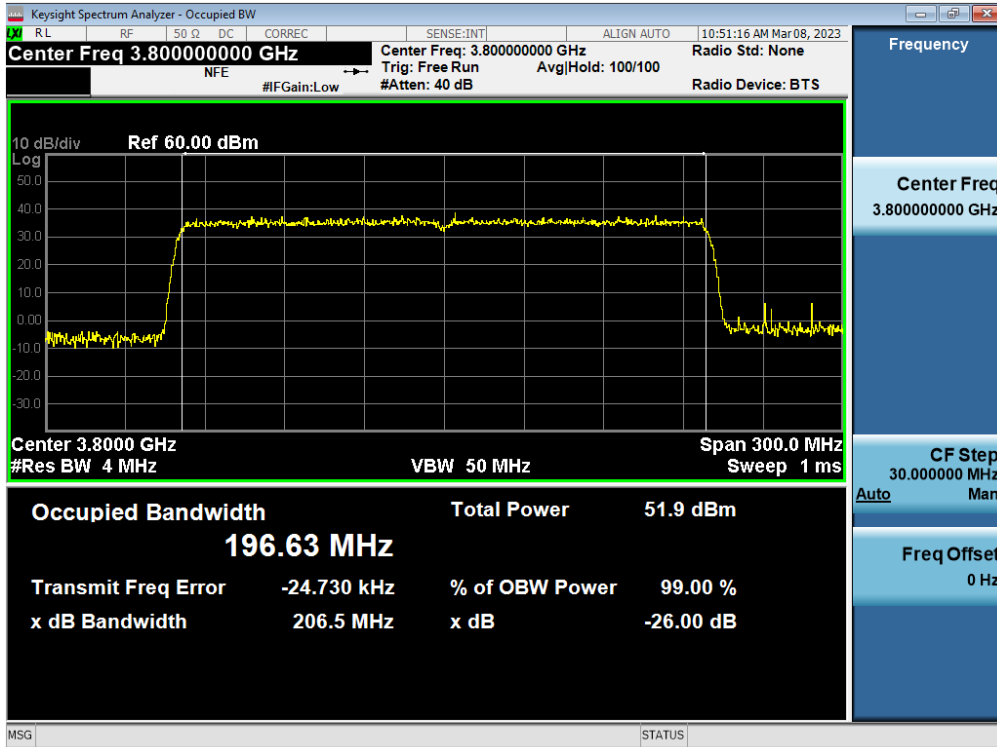


## Antenna 3 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 256QAM / Middle

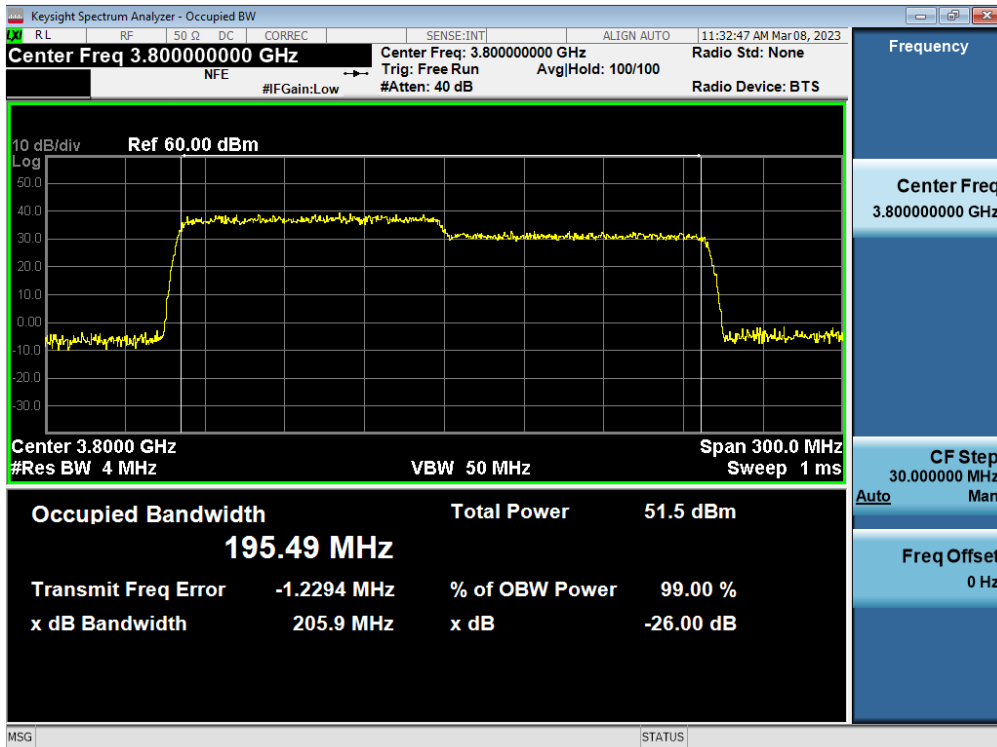


**Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 64QAM / Low / Contiguous**

**Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 256QAM / Low / Contiguous**


Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / QPSK / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 16QAM / Low / Contiguous





## 5.4. OUT-OF-BAND UNWANTED EMISSIONS

### Test Requirements:

#### § 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

#### § 27.53 Emission limits.

(l) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:

- (1) 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### Test Procedures:

The measurement is performed in accordance with Section 5.7.2, 5.7.3 of ANSI C63.26.

#### 5.7.2 Basic guidelines for unwanted emissions conducted measurements

- a) For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer's channel power, adjacent channel power, or band power functions. When using the integration method at the channel/block/band edge, the starting frequency of the integration shall be centered at one-half of the RBW away from the band/channel/block edge.

#### 5.7.3 Out-of-band unwanted emissions measurements

- a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.
- b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.
- c) Set the number of points in sweep  $\geq 2 \times \text{span} / \text{RBW}$ .

- d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:
- 1) If the device can be configured to transmit continuously (duty cycle  $\geq 98\%$ ), set the (sweep time)  $>$  (number of points in sweep)  $\times$  (symbol period) (e.g., by a factor of  $10 \times$  symbol period  $\times$  number of points). Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols
  - 2) If the device cannot be configured to transmit continuously (duty cycle  $< 98\%$ ) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time  $>$  (number of points in sweep)  $\times$  (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by  $[10 \log (1/\text{duty cycle})]$ . This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation  $\leq \pm 2\%$ ).
  - 3) If the device cannot be configured to transmit continuously (duty cycle  $< 98\%$ ) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time  $>$  (number of points in sweep)  $\times$  (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by  $[10 \log (1/\text{duty cycle})]$ . This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation  $\leq \pm 2\%$ ).
  - 4) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations  $> \pm 2\%$ ), set the sweep time so that the averaging is performed over the on-period by setting the sweep time  $>$  (symbol period)  $\times$  (number of points), while also maintaining the sweep time  $<$  (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold are necessary to ensure that the maximum power is measured.
- e) The test report shall include the plots of the measuring instrument display and the measured data.
- f) See Annex I for example emission mask plots.

**Note:**

1. Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.
  - 4Tx MIMO correction:  $10 \log(N_{\text{ANT}}) = 10 \log(4) = 6.02 \text{ dB} // -13 \text{ dBm} - 10 \cdot \log(4) = -19.02 \text{ dBm}$
2. Sample Calculations:
  - $-21.428 \text{ dBm (Measured value)} + 1.307 \text{ dB (Duty cycle factor)} = -20.12 \text{ dBm}$
3. Calculated Values in the table below are already added with duty cycle factor. Measured Values shown in the plot do not include duty cycle factor.
4. The results of the Out-of-band Unwanted Emissions test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

**Test Results:**
**Tabular Data of Out-of-band Unwanted Emissions**
**(4 Port) 5G NR n77 40 MHz [1 Carrier]**

Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.29	-20.95
		High	3 980.26	-20.14
	16QAM	Low	3 699.80	-21.84
		High	3 980.20	-21.95
	64QAM	Low	3 699.80	-23.70
		High	3 980.20	-21.49
	256QAM	Low	3 699.80	-22.33
		High	3 980.20	-20.65
1	QPSK	Low	3 699.78	-21.15
		High	3 980.22	-20.46
	16QAM	Low	3 699.80	-23.74
		High	3 980.20	-21.36
	64QAM	Low	3 699.80	-20.12
		High	3 980.20	-21.75
	256QAM	Low	3 699.80	-22.95
		High	3 980.20	-21.72
2	QPSK	Low	3 699.37	-20.59
		High	3 980.20	-22.63
	16QAM	Low	3 699.80	-23.55
		High	3 980.20	-22.43
	64QAM	Low	3 699.80	-23.05
		High	3 980.20	-20.13
	256QAM	Low	3 699.80	-22.07
		High	3 980.20	-21.39
3	QPSK	Low	3 699.80	-20.12
		High	3 980.20	-21.64
	16QAM	Low	3 699.12	-20.76
		High	3 980.20	-20.04
	64QAM	Low	3 699.80	-22.55
		High	3 980.20	-21.18
	256QAM	Low	3 699.80	-20.61
		High	3 980.20	-20.57

**(4 Port) 5G NR n77 60 MHz [1 Carrier]**

Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.31	-21.17
		High	3 980.45	-20.21
	16QAM	Low	3 699.70	-22.41
		High	3 980.45	-22.49
	64QAM	Low	3 699.70	-26.23
		High	3 980.39	-21.29
256QAM	Low	3 699.70	-24.09	
	High	3 980.51	-22.03	
1	QPSK	Low	3 699.70	-24.87
		High	3 981.00	-23.33
	16QAM	Low	3 699.70	-23.27
		High	3 980.30	-23.00
	64QAM	Low	3 699.70	-25.85
		High	3 980.82	-22.81
256QAM	Low	3 699.70	-24.80	
	High	3 980.45	-22.91	
2	QPSK	Low	3 699.12	-24.72
		High	3 980.88	-24.77
	16QAM	Low	3 699.70	-25.02
		High	3 980.30	-24.32
	64QAM	Low	3 699.06	-26.52
		High	3 980.30	-25.90
256QAM	Low	3 699.70	-24.45	
	High	3 980.30	-23.02	
3	QPSK	Low	3 699.37	-25.82
		High	3 980.30	-22.75
	16QAM	Low	3 699.70	-25.44
		High	3 980.30	-22.76
	64QAM	Low	3 699.55	-25.34
		High	3 980.30	-23.11
256QAM	Low	3 699.70	-23.79	
	High	3 980.30	-22.43	

## (4 Port) 5G NR n77 80 MHz [1 Carrier]

Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.60	-20.66
		High	3 980.40	-20.42
	16QAM	Low	3 699.60	-21.15
		High	3 980.40	-20.33
	64QAM	Low	3 699.57	-20.65
		High	3 980.40	-20.60
256QAM	Low	3 699.60	-22.15	
	High	3 980.40	-21.00	
1	QPSK	Low	3 699.60	-20.34
		High	3 980.45	-21.06
	16QAM	Low	3 699.60	-21.63
		High	3 980.48	-20.46
	64QAM	Low	3 699.49	-20.22
		High	3 980.40	-22.05
256QAM	Low	3 699.60	-20.14	
	High	3 980.55	-21.83	
2	QPSK	Low	3 699.60	-21.26
		High	3 980.45	-20.93
	16QAM	Low	3 699.60	-21.08
		High	3 980.40	-20.74
	64QAM	Low	3 699.60	-20.45
		High	3 980.50	-21.75
256QAM	Low	3 699.60	-20.23	
	High	3 980.48	-20.60	
3	QPSK	Low	3 699.60	-21.31
		High	3 980.40	-21.14
	16QAM	Low	3 699.60	-21.00
		High	3 980.94	-20.30
	64QAM	Low	3 699.60	-21.18
		High	3 980.53	-21.08
256QAM	Low	3 699.60	-20.33	
	High	3 980.60	-23.69	

## (4 Port) 5G NR n77 100 MHz [1 Carrier]

Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.50	-22.75
		High	3 980.50	-20.31
	16QAM	Low	3 699.50	-20.91
		High	3 980.50	-23.01
	64QAM	Low	3 699.50	-24.65
		High	3 980.50	-23.87
256QAM	Low	3 699.50	-24.99	
	High	3 980.50	-23.72	
1	QPSK	Low	3 699.50	-25.33
		High	3 980.50	-25.93
	16QAM	Low	3 699.50	-25.75
		High	3 980.50	-25.98
	64QAM	Low	3 699.50	-24.20
		High	3 980.50	-26.11
256QAM	Low	3 699.50	-24.81	
	High	3 980.50	-26.16	
2	QPSK	Low	3 699.50	-23.56
		High	3 980.50	-27.37
	16QAM	Low	3 699.50	-21.43
		High	3 980.50	-27.96
	64QAM	Low	3 699.50	-20.75
		High	3 980.50	-27.91
256QAM	Low	3 699.50	-21.56	
	High	3 980.50	-27.92	
3	QPSK	Low	3 699.50	-24.47
		High	3 980.50	-25.18
	16QAM	Low	3 699.50	-23.34
		High	3 980.50	-25.46
	64QAM	Low	3 699.50	-23.50
		High	3 980.50	-25.38
256QAM	Low	3 699.50	-24.31	
	High	3 980.50	-25.83	

**Tabular Data of Contiguous Out-of-band Unwanted Emissions**
**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier]**

Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.50	-21.59
	16QAM	Low	3 699.50	-24.46
	64QAM	Low	3 699.50	-24.00
	256QAM	Low	3 699.50	-24.58
1	QPSK	Low	3 699.50	-24.62
	16QAM	Low	3 699.50	-23.98
	64QAM	Low	3 699.50	-22.90
	256QAM	Low	3 699.50	-23.85
2	QPSK	Low	3 699.50	-22.67
	16QAM	Low	3 699.50	-20.88
	64QAM	Low	3 699.50	-20.44
	256QAM	Low	3 699.50	-20.66
3	QPSK	Low	3 699.50	- 22.72
	16QAM	Low	3 699.50	- 22.14
	64QAM	Low	3 699.50	- 23.09
	256QAM	Low	3 699.50	- 23.18

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric)**

Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.50	-24.25
	16QAM	Low	3 699.50	-24.42
	64QAM	Low	3 699.50	-24.24
	256QAM	Low	3 699.50	-24.37
1	QPSK	Low	3 699.50	-23.62
	16QAM	Low	3 699.50	-23.69
	64QAM	Low	3 699.50	-23.55
	256QAM	Low	3 699.50	-22.43
2	QPSK	Low	3 699.50	-20.84
	16QAM	Low	3 699.50	-21.04
	64QAM	Low	3 699.50	-20.37
	256QAM	Low	3 699.50	-20.61
3	QPSK	Low	3 699.50	- 23.26
	16QAM	Low	3 699.50	- 23.44
	64QAM	Low	3 699.50	- 22.50
	256QAM	Low	3 699.50	- 22.81



**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier]**

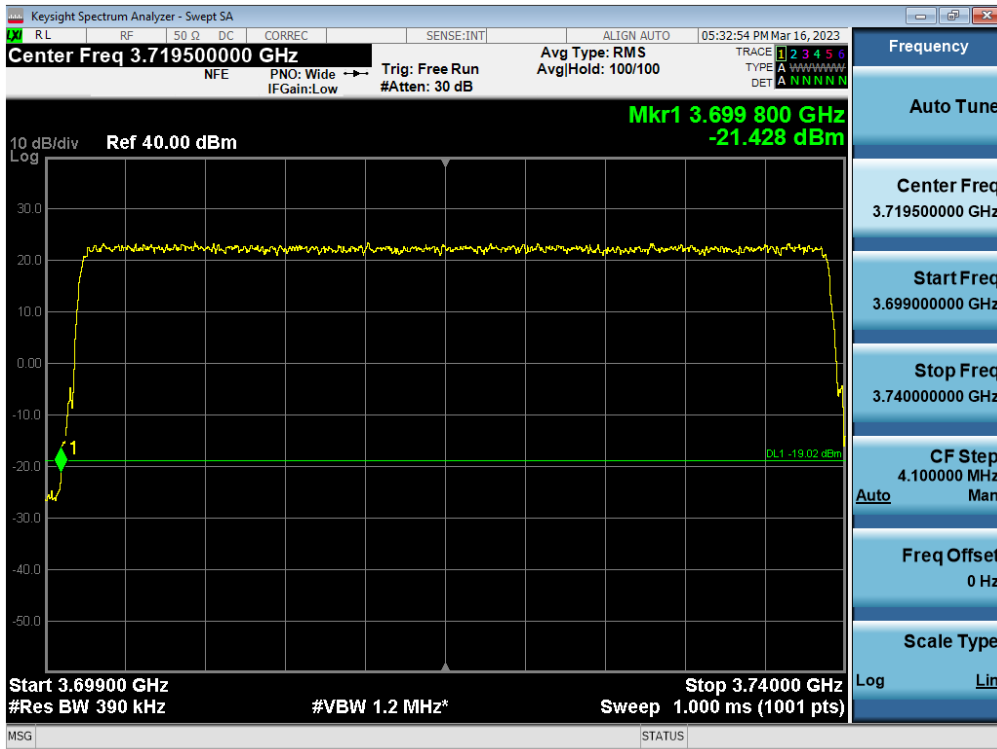
Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.50	-23.06
	16QAM	Low	3 699.50	-23.06
	64QAM	Low	3 699.50	-23.01
	256QAM	Low	3 699.50	-22.98
1	QPSK	Low	3 699.50	-22.51
	16QAM	Low	3 699.50	-23.04
	64QAM	Low	3 699.50	-22.08
	256QAM	Low	3 699.50	-22.37
2	QPSK	Low	3 699.50	-20.27
	16QAM	Low	3 699.50	-20.24
	64QAM	Low	3 699.50	-20.21
	256QAM	Low	3 699.50	-20.32
3	QPSK	Low	3 699.50	- 22.17
	16QAM	Low	3 699.50	- 20.72
	64QAM	Low	3 699.50	- 22.02
	256QAM	Low	3 699.50	- 22.42

**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric)**

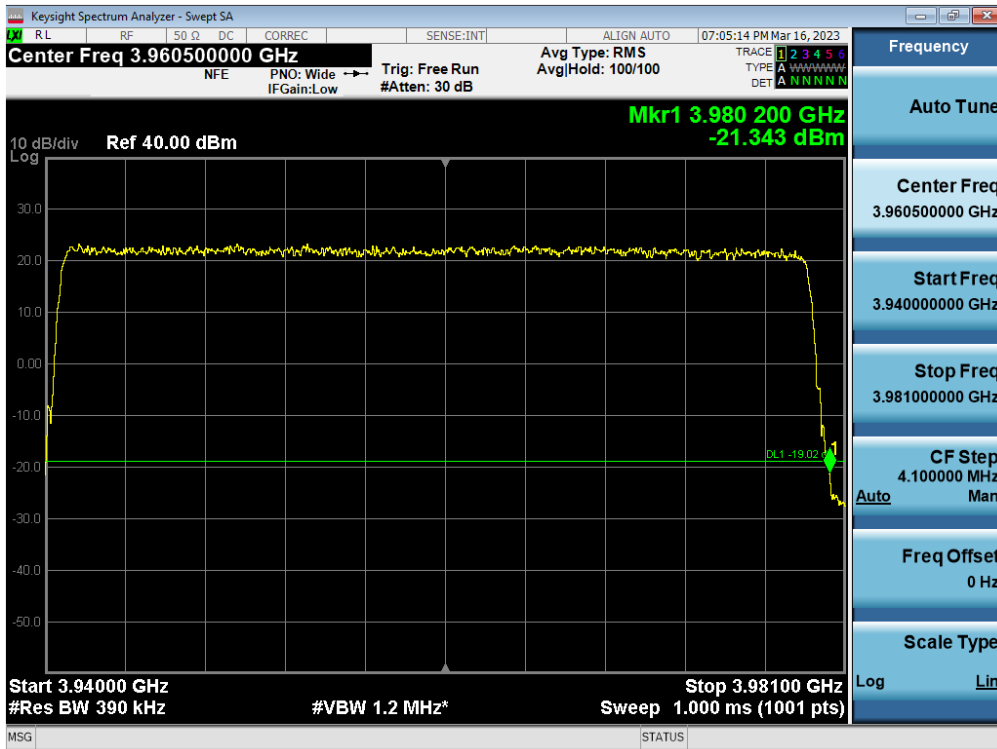
Ant.	Mod.	Channel	Frequency (MHz)	Calculated Value (dBm)
0	QPSK	Low	3 699.50	-20.46
	16QAM	Low	3 699.50	-24.26
	64QAM	Low	3 699.50	-23.39
	256QAM	Low	3 699.50	-24.18
1	QPSK	Low	3 699.50	-22.22
	16QAM	Low	3 699.50	-23.08
	64QAM	Low	3 699.50	-23.10
	256QAM	Low	3 699.50	-20.85
2	QPSK	Low	3 699.50	-20.55
	16QAM	Low	3 699.50	-20.71
	64QAM	Low	3 699.50	-20.34
	256QAM	Low	3 699.50	-20.33
3	QPSK	Low	3 699.50	- 23.24
	16QAM	Low	3 699.50	- 23.38
	64QAM	Low	3 699.50	- 22.34
	256QAM	Low	3 699.50	- 22.16

Plot Data of Out-of-band Unwanted Emissions

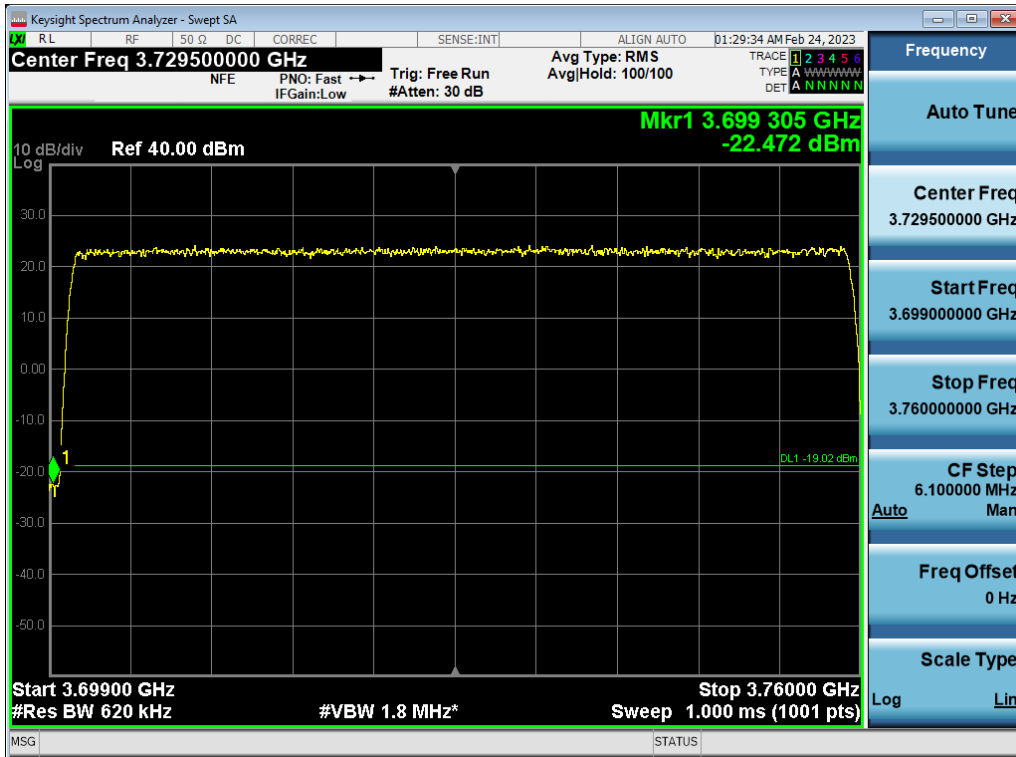
Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / QPSK / Low



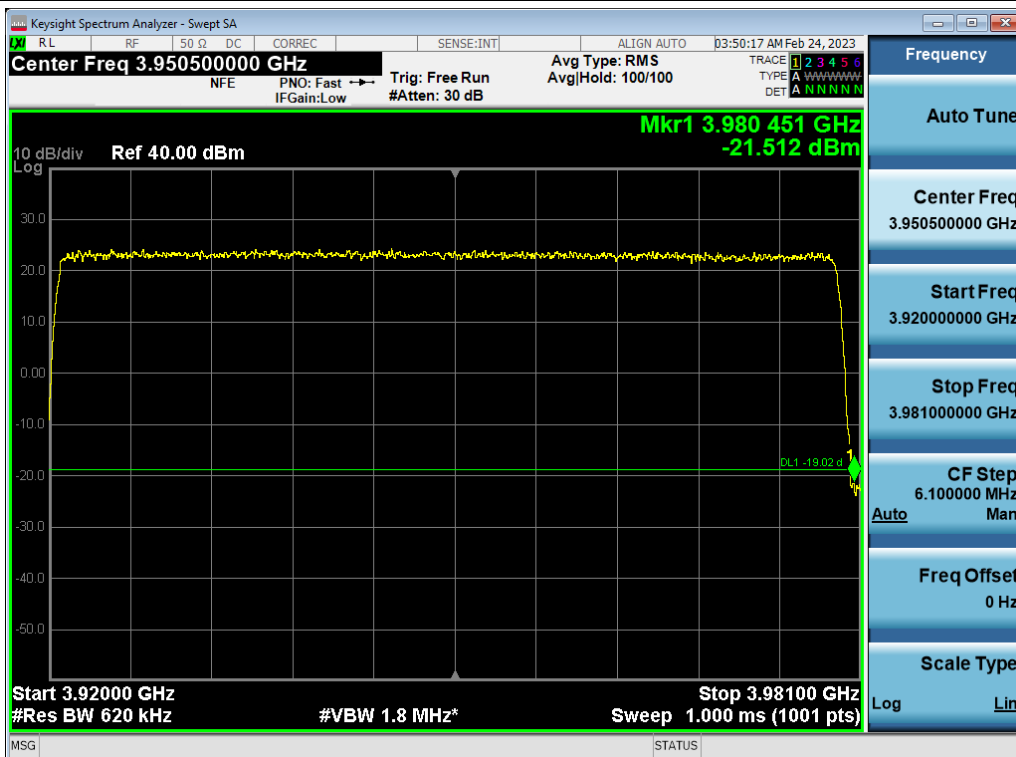
Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 16QAM / High



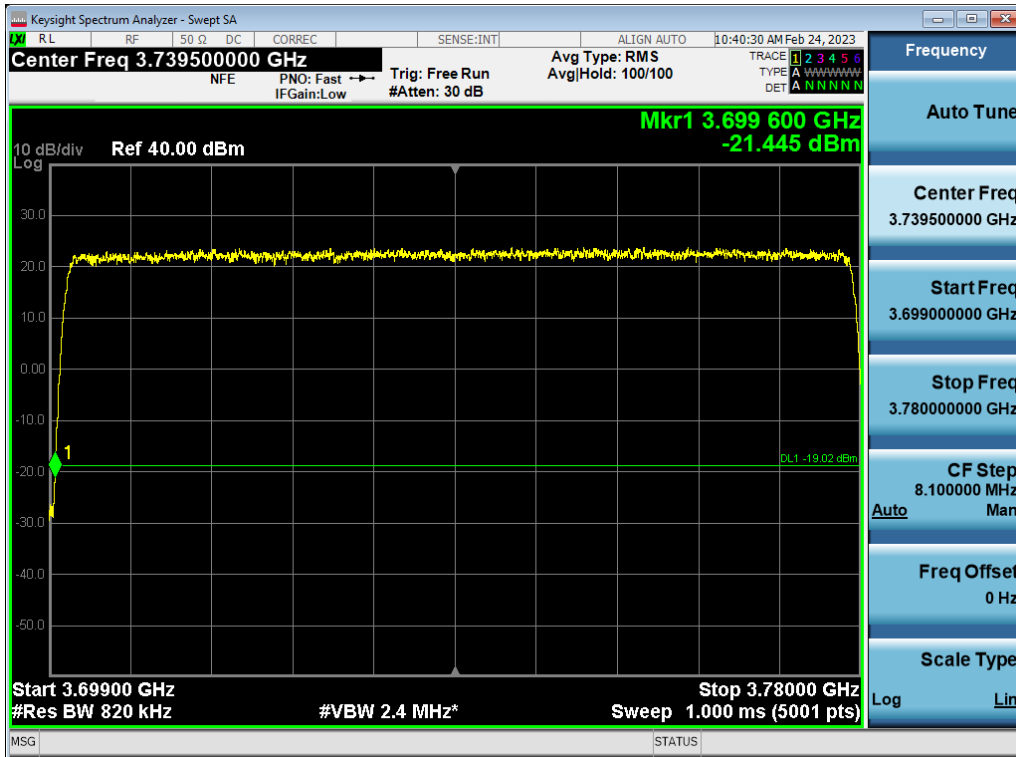
## Antenna 0 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / QPSK / Low



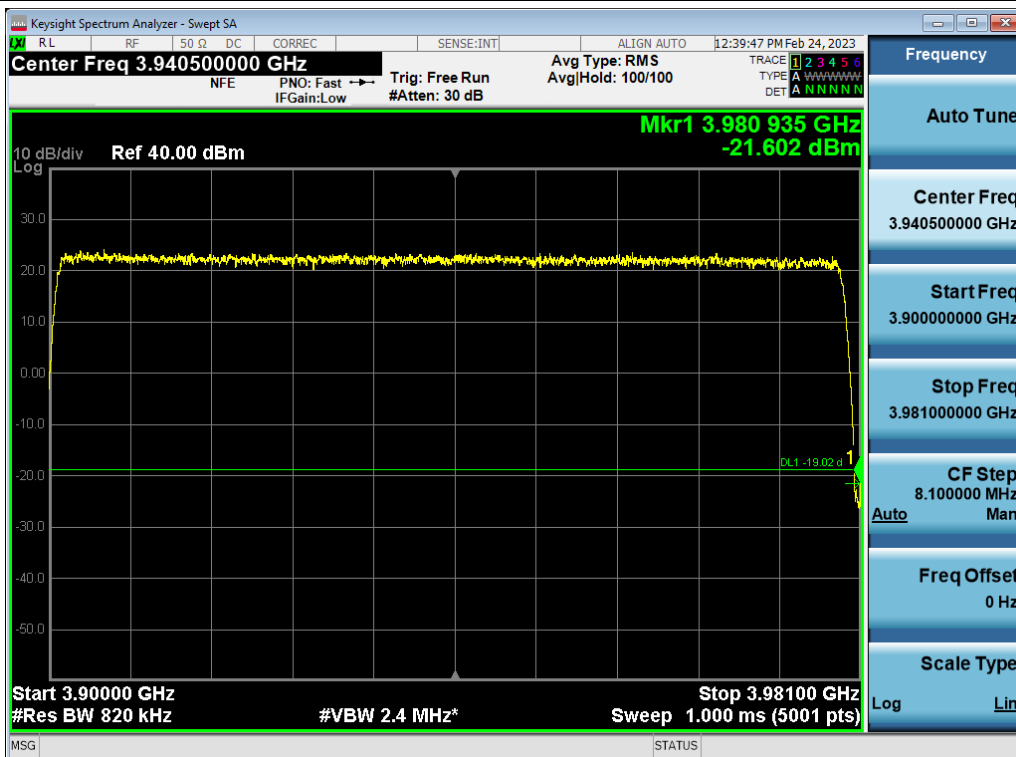
## Antenna 0 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / QPSK / High



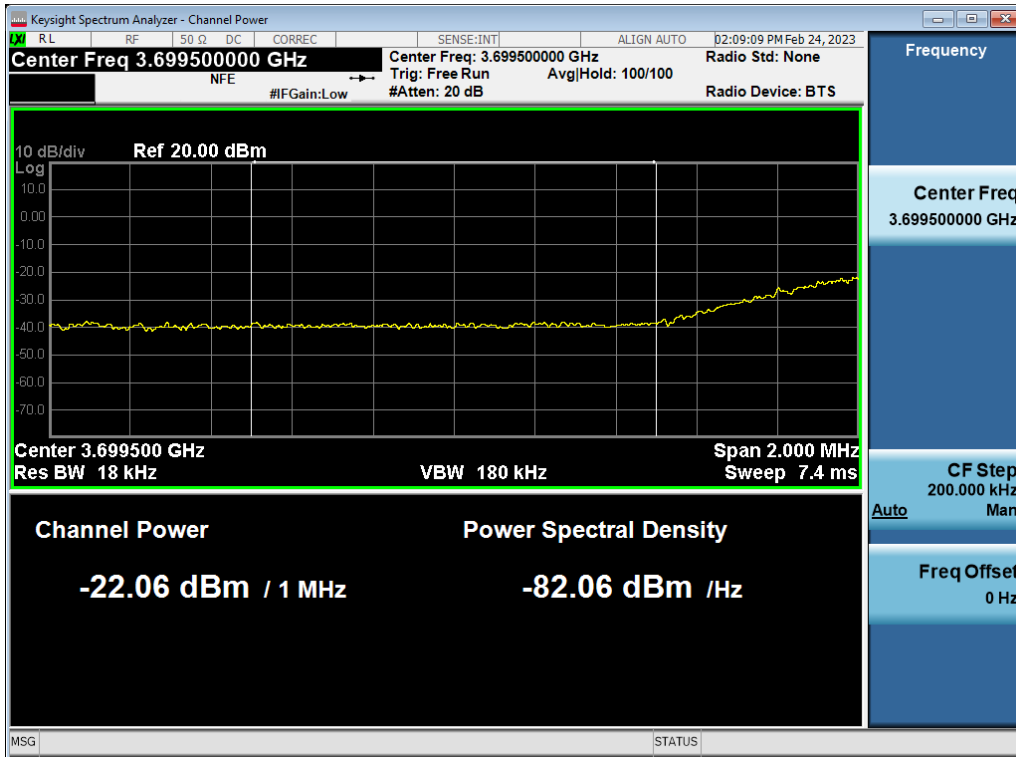
Antenna 1 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 256QAM / Low



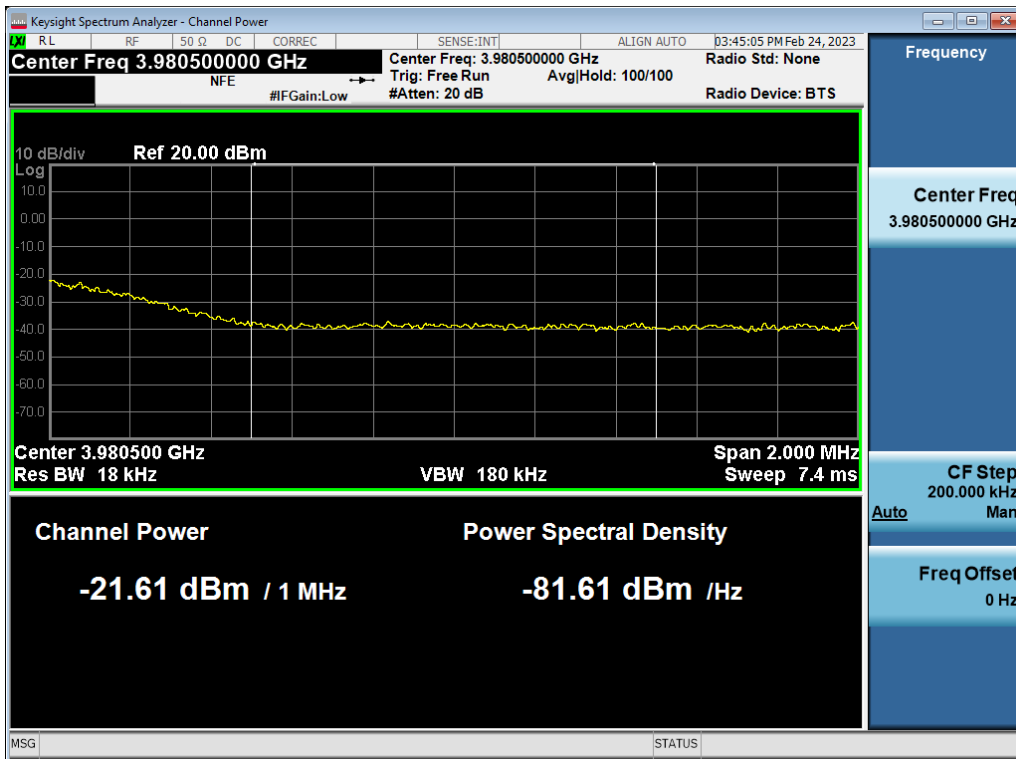
Antenna 3 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 16QAM / High



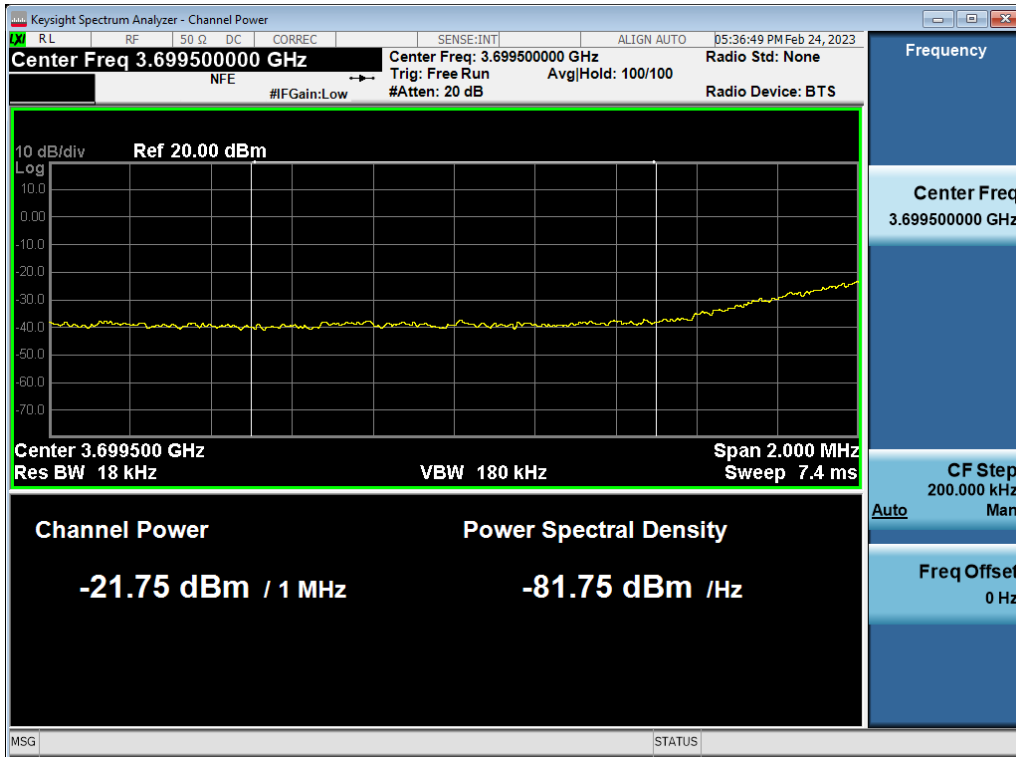
Antenna 2 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 64QAM / Low



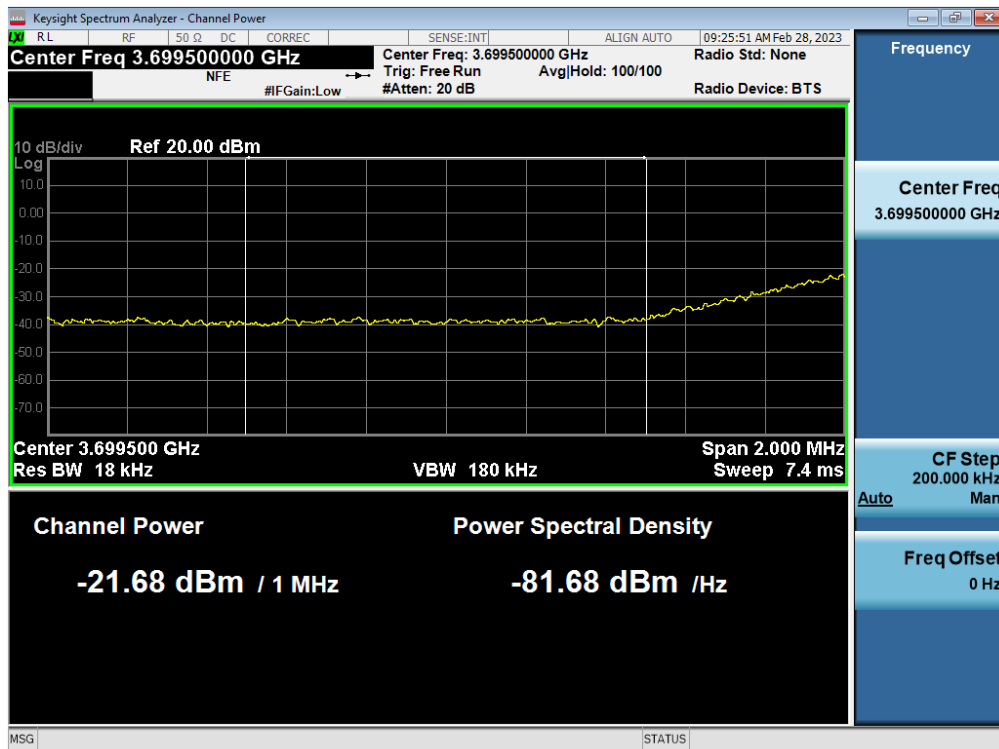
Antenna 0 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / QPSK / High



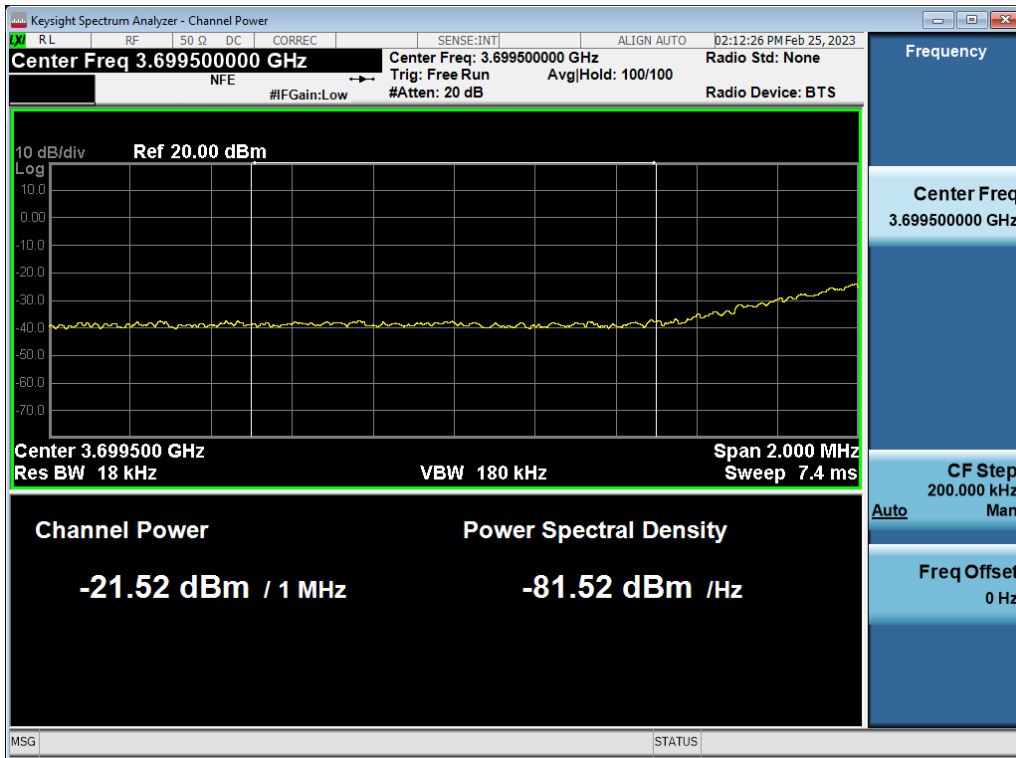
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 64QAM / Low / Contiguous



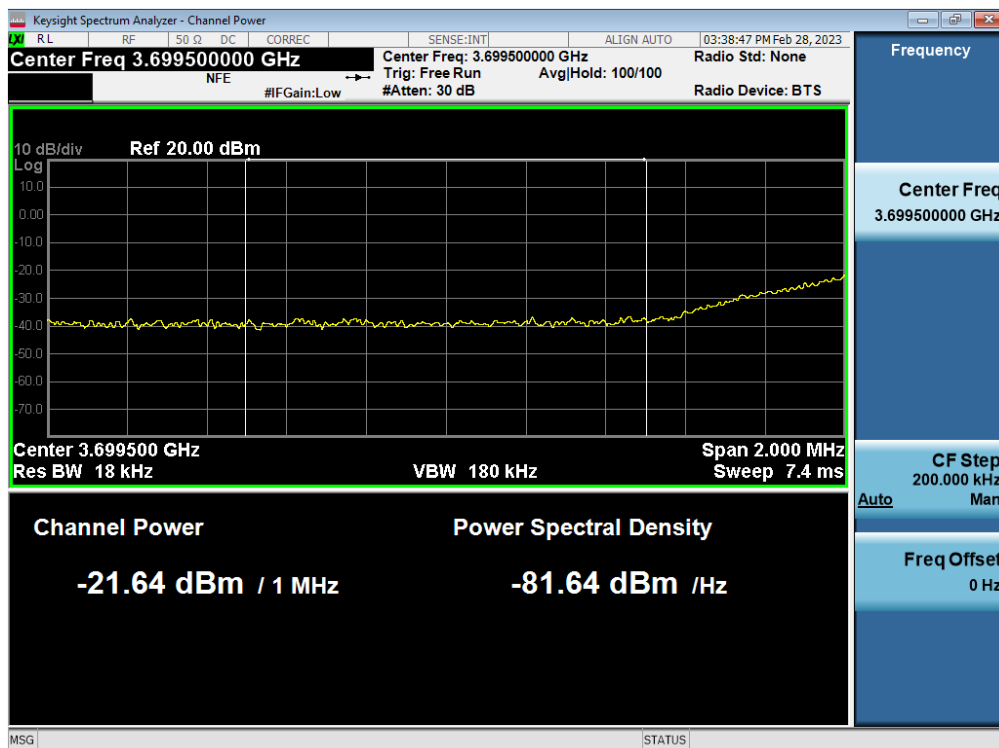
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 64QAM / Low / Contiguous



Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 64QAM / Low / Contiguous



Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 256QAM / Low / Contiguous





## 5.5. SPURIOUS UNWANTED EMISSIONS

### Test Requirements:

#### § 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

#### § 27.53 Emission limits.

(l) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:

- (1) 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### Test Procedures:

The measurement is performed in accordance with Section 5.7.4 of ANSI C63.26.

#### 5.7.4 Spurious unwanted emission measurements

- a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.
- b) When using an average power (rms) detector, ensure that the number of points in the sweep  $\geq 2 \times (\text{span} / \text{RBW})$ . This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.
- c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

- d) Identify and measure the Highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.
- e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.
- f) Compare the results with the corresponding limit in the applicable regulation.
- g) The test report shall include the data plots of the measuring instrument display and the measured data.

**Note:**

1. In 9 kHz to 30 MHz band, RBW narrower than reference bandwidth is used. So following correction factor is applied.
  - $10 \log [(reference\ bandwidth)/(resolution\ bandwidth)]$   
: 9 kHz to 150 kHz applied 1 kHz RBW,  $10 \log (1\ kHz / 1\ MHz) = -30\ dB$   
: 150 kHz to 30 MHz applied 10 kHz RBW,  $10 \log (10\ kHz / 1\ MHz) = -20\ dB$   
: Edge freq. to edge  $\pm 100\ MHz$  applied 100 kHz RBW,  $10 \log (100\ kHz / 1\ MHz) = -10\ dB$
2. Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.
  - 4Tx MIMO correction:  $10 \log(N_{ANT}) = 10 \log(4) = 6.02\ dB // -13\ dBm - 10 * \log(4) = -19.02\ dBm$
3. Calculated Levels in the table below are already added with duty cycle factor. Measured values shown in the plot do not include duty cycle factor.
4. The results of the Spurious Unwanted Emissions shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.
5. Sample Calculation
  - $-52.513\ dBm$  (Measured value) +  $30\ dB$  (RBW correction) +  $1.307\ dB$  (Duty cycle factor)  
 $= -21.206\ dBm$  (Final value)

**Test Results:**
**Tabular Data of Spurious Unwanted Emissions**

(4 Port) 5G NR n77 40 MHz [1 Carrier]

**Test Result for Output Port 0**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-24.604	-39.079	-23.165	-23.845	-22.167	-29.028	-23.071	-23.190
	Middle	-23.996	-38.803	-23.632	-26.824	-25.486	-28.411	-23.479	-22.819
	High	-23.263	-38.677	-23.941	-31.546	-20.197	-28.785	-23.685	-22.595
16QAM	Low	-23.883	-38.204	-23.302	-23.427	-22.561	-28.675	-23.712	-23.132
	Middle	-23.728	-39.097	-22.863	-26.369	-25.494	-28.587	-23.418	-23.140
	High	-26.220	-39.328	-24.075	-31.078	-20.527	-28.405	-22.979	-22.580
64QAM	Low	-25.227	-38.528	-23.711	-23.746	-22.918	-28.655	-23.642	-22.522
	Middle	-24.642	-38.712	-23.434	-26.989	-25.310	-28.831	-23.180	-22.881
	High	-24.234	-38.319	-23.325	-32.516	-20.267	-27.881	-23.573	-21.381
256QAM	Low	-24.097	-38.661	-23.211	-25.023	-23.172	-28.652	-23.606	-22.911
	Middle	-23.498	-38.436	-23.397	-26.928	-25.648	-28.715	-23.760	-22.127
	High	-22.802	-38.529	-23.779	-32.614	-21.338	-28.743	-22.999	-23.433

**Test Result for Output Port 1**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.146	-36.785	-24.647	-23.676	-25.286	-29.963	-24.571	-21.852
	Middle	-23.452	-37.588	-23.168	-26.153	-25.119	-30.518	-24.651	-24.119
	High	-23.062	-37.265	-24.604	-31.902	-21.122	-29.579	-23.763	-23.117
16QAM	Low	-23.683	-37.258	-23.405	-24.549	-24.898	-29.969	-23.675	-22.724
	Middle	-22.668	-36.969	-23.643	-26.732	-25.975	-30.867	-23.879	-23.709
	High	-22.108	-37.209	-23.172	-32.046	-21.406	-30.031	-23.685	-22.695
64QAM	Low	-23.182	-36.747	-23.749	-24.002	-24.583	-30.245	-23.735	-22.526
	Middle	-22.978	-36.865	-23.513	-26.568	-25.261	-30.507	-24.300	-22.879
	High	-23.467	-37.170	-22.771	-32.742	-21.814	-30.104	-23.042	-22.109
256QAM	Low	-24.613	-37.026	-23.771	-26.451	-24.874	-29.660	-24.629	-23.050
	Middle	-21.881	-37.234	-22.209	-25.686	-24.814	-29.802	-23.276	-23.623
	High	-21.823	-37.356	-23.544	-31.050	-22.356	-29.909	-22.627	-22.631

**Test Result for Output Port 2**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-24.175	-37.484	-23.158	-22.797	-25.481	-28.128	-23.846	-22.744
	Middle	-23.639	-38.504	-23.157	-27.774	-26.497	-29.965	-24.275	-23.151
	High	-22.309	-38.427	-21.854	-30.269	-24.169	-28.605	-23.120	-22.401
16QAM	Low	-24.334	-37.587	-23.069	-24.161	-25.848	-27.887	-22.806	-22.869
	Middle	-23.964	-38.303	-23.440	-28.762	-26.448	-29.593	-23.772	-22.239
	High	-23.459	-38.910	-22.365	-31.309	-22.101	-28.705	-23.169	-21.793
64QAM	Low	-23.466	-38.248	-22.587	-21.848	-26.269	-28.825	-22.923	-22.913
	Middle	-23.625	-37.680	-23.497	-27.909	-26.888	-29.750	-23.475	-22.089
	High	-24.035	-38.685	-22.547	-31.330	-20.946	-28.279	-23.405	-22.314
256QAM	Low	-23.133	-38.409	-22.685	-23.038	-26.089	-29.114	-23.217	-22.512
	Middle	-23.822	-38.618	-20.995	-27.633	-25.963	-29.046	-22.258	-22.129
	High	-22.759	-38.601	-23.499	-29.913	-20.508	-29.434	-23.701	-21.475

**Test Result for Output Port 3**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.371	-37.590	-23.058	-20.435	-24.899	-27.900	-24.011	-22.719
	Middle	-22.047	-37.741	-23.918	-30.683	-31.017	-28.082	-24.648	-24.173
	High	-22.521	-37.173	-23.171	-31.526	-20.832	-28.589	-24.209	-22.755
16QAM	Low	-22.987	-37.567	-23.709	-21.913	-26.035	-28.138	-24.425	-22.615
	Middle	-23.797	-37.832	-22.516	-30.100	-32.070	-28.674	-24.921	-23.063
	High	-23.132	-37.371	-23.675	-32.071	-21.740	-28.805	-24.010	-22.660
64QAM	Low	-22.838	-36.733	-23.768	-23.044	-27.298	-28.780	-24.525	-22.116
	Middle	-22.653	-37.075	-22.516	-29.709	-31.665	-28.403	-24.207	-23.304
	High	-21.206	-38.206	-22.575	-32.633	-21.591	-29.171	-23.776	-22.598
256QAM	Low	-23.614	-37.906	-22.665	-25.091	-29.401	-28.305	-24.399	-22.592
	Middle	-22.783	-37.649	-23.685	-29.885	-31.704	-27.548	-24.471	-22.321
	High	-23.815	-37.694	-24.093	-32.087	-22.495	-28.654	-22.675	-22.289

## (4 Port) 5G NR n77 60 MHz [1 Carrier]

## Test Result for Output Port 0

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-25.038	-38.770	-24.672	-22.404	-29.950	-28.016	-23.589	-23.046
	Middle	-23.420	-37.756	-23.535	-27.314	-27.175	-28.469	-23.640	-22.335
	High	-23.412	-39.442	-23.930	-31.723	-21.836	-28.786	-23.809	-22.144
16QAM	Low	-24.953	-38.559	-22.784	-23.906	-27.799	-29.129	-22.849	-21.928
	Middle	-23.255	-38.546	-23.853	-26.412	-26.883	-29.192	-24.075	-21.876
	High	-22.541	-37.650	-23.597	-32.694	-22.224	-29.130	-24.259	-22.038
64QAM	Low	-25.506	-38.495	-24.159	-20.825	-27.498	-28.357	-23.744	-22.063
	Middle	-24.683	-37.869	-23.324	-26.989	-26.084	-28.716	-22.705	-21.134
	High	-23.975	-38.588	-22.786	-31.368	-21.880	-29.138	-22.794	-21.565
256QAM	Low	-25.000	-38.631	-22.363	-26.776	-26.804	-28.821	-23.508	-22.807
	Middle	-23.700	-38.268	-23.546	-25.662	-26.007	-28.530	-23.712	-22.451
	High	-23.716	-38.694	-23.213	-32.004	-22.837	-28.058	-23.408	-21.744

## Test Result for Output Port 1

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-24.457	-37.516	-23.084	-24.554	-33.146	-29.686	-23.183	-21.882
	Middle	-23.725	-36.829	-23.343	-29.080	-29.201	-30.180	-24.110	-22.854
	High	-23.066	-37.924	-23.727	-32.969	-23.346	-29.653	-23.876	-23.150
16QAM	Low	-23.883	-37.370	-24.214	-26.456	-32.525	-29.946	-24.333	-22.726
	Middle	-23.987	-37.296	-24.873	-28.471	-29.119	-30.457	-23.842	-22.382
	High	-23.481	-37.117	-24.382	-30.964	-22.752	-30.466	-24.483	-22.491
64QAM	Low	-22.829	-37.524	-23.924	-24.749	-31.391	-30.079	-23.596	-22.339
	Middle	-22.487	-38.227	-24.992	-28.392	-28.277	-30.439	-23.670	-22.026
	High	-23.679	-37.169	-24.115	-32.339	-23.332	-30.677	-23.911	-22.311
256QAM	Low	-23.069	-37.544	-24.243	-25.002	-31.351	-30.540	-23.040	-22.181
	Middle	-23.693	-37.752	-24.792	-28.166	-27.748	-30.356	-23.727	-22.995
	High	-23.954	-37.620	-24.564	-30.819	-22.284	-29.808	-24.058	-22.378

**Test Result for Output Port 2**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 100 MHz	Low Edge – 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-21.955	-38.142	-23.495	-24.804	-32.419	-29.143	-22.441	-20.467
	Middle	-22.605	-37.639	-23.509	-29.052	-28.889	-28.762	-22.820	-21.416
	High	-22.510	-38.731	-23.213	-32.868	-25.018	-28.840	-23.637	-22.063
16QAM	Low	-24.412	-38.206	-24.148	-24.821	-30.861	-28.382	-22.389	-22.584
	Middle	-25.052	-38.293	-23.725	-27.683	-27.648	-29.090	-22.771	-20.913
	High	-22.974	-38.318	-22.563	-30.428	-25.357	-29.285	-24.198	-21.736
64QAM	Low	-21.390	-37.772	-22.659	-20.196	-29.777	-28.961	-22.267	-22.417
	Middle	-23.364	-38.924	-23.625	-27.373	-27.201	-29.312	-23.056	-21.433
	High	-24.392	-38.404	-23.276	-30.393	-25.238	-28.605	-23.328	-21.807
256QAM	Low	-23.891	-39.121	-23.734	-24.428	-30.325	-28.659	-23.318	-21.289
	Middle	-23.153	-36.929	-24.182	-27.024	-26.794	-28.933	-23.651	-22.510
	High	-23.099	-39.393	-23.811	-30.999	-25.768	-29.267	-23.430	-22.372

**Test Result for Output Port 3**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge – 100 MHz	Low Edge – 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.474	-37.413	-23.338	-26.140	-32.598	-29.376	-24.519	-22.378
	Middle	-23.379	-37.979	-23.239	-29.663	-31.298	-28.077	-24.189	-23.066
	High	-22.356	-37.565	-23.534	-30.797	-23.212	-29.277	-24.541	-22.455
16QAM	Low	-23.507	-37.500	-22.636	-25.858	-32.890	-28.662	-22.871	-21.631
	Middle	-22.308	-38.297	-23.440	-29.468	-30.975	-28.565	-23.144	-20.796
	High	-23.603	-36.449	-23.773	-31.828	-23.738	-28.274	-23.043	-22.653
64QAM	Low	-23.401	-37.777	-23.281	-21.655	-32.740	-28.672	-23.794	-22.673
	Middle	-21.321	-38.577	-23.362	-29.346	-31.024	-29.052	-23.370	-22.871
	High	-22.612	-37.700	-24.448	-31.327	-23.624	-29.039	-24.291	-21.930
256QAM	Low	-22.362	-38.351	-23.043	-21.275	-31.502	-28.634	-23.614	-22.820
	Middle	-22.728	-38.465	-23.040	-28.665	-29.481	-28.621	-23.787	-22.497
	High	-22.465	-37.746	-23.684	-31.581	-23.371	-29.204	-24.618	-22.608

## (4 Port) 5G NR n77 80 MHz [1 Carrier]

## Test Result for Output Port 0

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.390	-38.267	-23.355	-24.148	-28.033	-28.629	-22.569	-22.773
	Middle	-23.830	-38.222	-23.038	-27.853	-27.208	-28.442	-23.604	-22.384
	High	-22.583	-39.138	-23.548	-31.340	-21.668	-29.078	-23.616	-23.170
16QAM	Low	-24.591	-38.815	-22.488	-23.634	-28.870	-28.841	-23.224	-22.473
	Middle	-23.534	-38.579	-24.178	-27.824	-27.697	-28.468	-22.877	-21.138
	High	-24.006	-38.590	-22.328	-30.907	-22.276	-29.077	-23.095	-22.218
64QAM	Low	-24.772	-36.654	-23.916	-24.801	-27.818	-27.961	-22.793	-22.262
	Middle	-23.219	-38.013	-23.588	-27.610	-27.267	-28.384	-22.786	-22.317
	High	-24.641	-39.016	-22.710	-29.982	-22.461	-28.289	-23.532	-22.646
256QAM	Low	-23.333	-38.470	-22.620	-26.538	-26.967	-26.967	-22.962	-22.938
	Middle	-22.356	-37.713	-23.207	-26.613	-26.662	-28.509	-22.737	-22.541
	High	-22.077	-38.293	-22.400	-31.035	-22.161	-28.920	-23.929	-22.937

## Test Result for Output Port 1

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-24.241	-37.482	-23.501	-23.506	-32.552	-30.102	-23.126	-22.906
	Middle	-22.673	-37.742	-22.646	-29.111	-29.842	-29.703	-23.210	-22.503
	High	-22.951	-37.045	-23.273	-31.890	-24.497	-29.550	-22.395	-23.355
16QAM	Low	-22.969	-37.134	-24.110	-26.137	-31.561	-29.572	-24.278	-23.097
	Middle	-20.823	-37.999	-23.729	-28.230	-28.322	-29.672	-23.076	-22.357
	High	-24.300	-38.154	-24.502	-32.192	-24.284	-30.204	-24.042	-22.784
64QAM	Low	-24.028	-38.101	-23.370	-25.622	-30.978	-29.408	-23.551	-23.016
	Middle	-23.261	-36.626	-23.956	-29.014	-29.067	-29.890	-23.787	-23.662
	High	-22.570	-37.110	-23.617	-31.750	-24.472	-30.016	-23.889	-23.085
256QAM	Low	-22.577	-37.469	-23.123	-26.259	-31.365	-28.962	-23.630	-23.339
	Middle	-23.353	-37.169	-23.565	-28.391	-27.698	-30.689	-24.090	-22.939
	High	-23.025	-38.052	-23.530	-31.595	-24.076	-29.862	-23.632	-23.295

**Test Result for Output Port 2**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.497	-38.040	-23.970	-23.961	-31.562	-28.522	-22.842	-21.787
	Middle	-23.654	-38.481	-23.898	-28.018	-28.612	-29.532	-22.780	-22.992
	High	-23.264	-38.345	-23.039	-32.266	-25.615	-29.539	-23.811	-22.676
16QAM	Low	-25.176	-38.688	-23.094	-24.124	-30.428	-28.957	-23.916	-22.484
	Middle	-24.195	-38.270	-24.255	-28.046	-28.724	-29.210	-23.327	-23.056
	High	-22.840	-39.117	-23.474	-31.292	-26.607	-29.281	-23.254	-22.488
64QAM	Low	-22.660	-38.280	-23.049	-23.250	-30.828	-28.110	-22.981	-22.289
	Middle	-23.164	-39.149	-23.433	-28.891	-28.353	-29.323	-23.757	-22.401
	High	-22.389	-36.979	-22.881	-32.008	-26.878	-28.858	-23.285	-22.941
256QAM	Low	-24.392	-38.758	-24.013	-24.161	-30.047	-28.623	-22.889	-22.410
	Middle	-21.686	-38.014	-23.477	-27.932	-27.943	-28.949	-22.837	-22.296
	High	-22.510	-38.656	-23.596	-31.180	-26.042	-28.615	-24.009	-22.871

**Test Result for Output Port 3**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.478	-37.705	-23.091	-24.845	-31.154	-28.676	-23.842	-23.813
	Middle	-21.543	-37.940	-23.256	-29.902	-30.708	-28.896	-24.080	-22.374
	High	-23.241	-37.478	-23.631	-30.371	-23.394	-28.801	-24.800	-22.588
16QAM	Low	-22.616	-36.442	-22.847	-24.792	-30.850	-28.609	-23.452	-22.335
	Middle	-21.485	-38.047	-22.250	-29.281	-30.367	-28.402	-24.054	-22.821
	High	-22.537	-37.615	-23.823	-30.835	-24.710	-29.126	-24.103	-23.498
64QAM	Low	-21.676	-37.950	-23.218	-25.666	-29.638	-28.084	-23.384	-22.786
	Middle	-23.395	-37.476	-23.406	-29.728	-30.034	-27.615	-24.132	-22.813
	High	-22.482	-37.847	-22.960	-29.980	-23.618	-28.625	-24.112	-23.081
256QAM	Low	-24.239	-38.070	-23.207	-24.238	-31.074	-29.080	-23.183	-23.147
	Middle	-22.971	-37.532	-22.337	-29.864	-30.113	-27.641	-23.111	-22.698
	High	-23.317	-37.268	-22.382	-31.049	-24.214	-28.527	-22.783	-23.889



## (4 Port) 5G NR n77 100 MHz [1 Carrier]

## Test Result for Output Port 0

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-22.963	-38.510	-22.674	-22.780	-30.716	-28.415	-23.876	-22.699
	Middle	-23.046	-38.339	-23.400	-28.469	-28.257	-28.408	-24.322	-23.512
	High	-22.666	-38.879	-23.742	-30.089	-21.531	-28.926	-23.894	-23.090
16QAM	Low	-24.758	-38.481	-23.694	-20.659	-30.761	-29.079	-23.759	-23.144
	Middle	-23.422	-38.359	-22.850	-29.200	-29.701	-28.253	-24.416	-23.383
	High	-22.756	-38.657	-22.302	-31.046	-22.375	-28.628	-22.929	-22.437
64QAM	Low	-23.762	-38.561	-23.059	-23.935	-29.713	-29.201	-23.279	-23.530
	Middle	-22.739	-38.193	-23.633	-28.144	-28.131	-28.948	-24.473	-23.471
	High	-23.635	-38.682	-23.391	-29.765	-23.134	-28.686	-24.134	-23.461
256QAM	Low	-23.695	-38.969	-23.164	-22.915	-29.858	-27.906	-24.250	-23.179
	Middle	-24.302	-37.910	-22.946	-28.635	-27.902	-28.365	-24.136	-23.545
	High	-25.397	-36.616	-21.868	-30.777	-23.657	-28.337	-24.224	-22.291

## Test Result for Output Port 1

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-21.625	-38.167	-23.125	-24.198	-32.293	-30.420	-23.810	-23.110
	Middle	-22.839	-38.037	-24.086	-29.064	-29.382	-30.056	-24.352	-23.559
	High	-23.476	-36.784	-22.920	-32.555	-24.726	-30.259	-23.984	-23.566
16QAM	Low	-23.444	-37.532	-23.962	-24.410	-33.023	-30.573	-23.639	-23.259
	Middle	-22.012	-37.626	-24.001	-28.768	-29.460	-30.580	-24.385	-24.785
	High	-23.468	-38.110	-24.430	-32.274	-25.579	-30.396	-23.291	-24.555
64QAM	Low	-22.935	-37.214	-23.726	-22.799	-32.968	-30.352	-24.499	-23.037
	Middle	-23.480	-37.391	-23.498	-28.071	-29.597	-29.234	-24.034	-23.828
	High	-23.313	-36.940	-23.528	-32.082	-25.889	-29.628	-24.908	-23.928
256QAM	Low	-23.600	-37.828	-24.626	-23.742	-31.215	-30.131	-24.513	-24.226
	Middle	-22.749	-38.037	-23.906	-28.607	-28.665	-30.321	-23.677	-22.855
	High	-23.450	-38.580	-23.631	-31.378	-25.126	-30.368	-24.463	-23.722

**Test Result for Output Port 2**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-23.792	-38.573	-23.357	-21.290	-32.070	-29.262	-24.195	-22.843
	Middle	-22.808	-38.282	-23.825	-28.586	-29.687	-29.903	-23.028	-23.928
	High	-22.803	-38.554	-23.678	-31.400	-26.724	-28.386	-23.511	-23.154
16QAM	Low	-21.909	-38.305	-23.769	-20.557	-31.113	-29.323	-24.051	-23.778
	Middle	-23.832	-38.260	-24.062	-28.374	-28.199	-29.721	-23.966	-23.674
	High	-22.076	-39.176	-23.233	-31.385	-28.018	-28.993	-24.158	-23.613
64QAM	Low	-23.178	-37.681	-22.465	-20.272	-31.150	-29.845	-23.847	-23.495
	Middle	-23.236	-38.671	-23.020	-29.011	-28.341	-28.861	-23.950	-23.589
	High	-21.715	-38.650	-23.811	-30.926	-27.415	-29.209	-24.244	-23.782
256QAM	Low	-23.358	-37.807	-23.527	-20.429	-30.330	-29.998	-23.693	-22.946
	Middle	-22.711	-37.779	-21.879	-28.051	-28.450	-29.052	-24.133	-23.127
	High	-23.499	-38.281	-23.487	-30.057	-26.640	-29.254	-24.089	-21.815

**Test Result for Output Port 3**

Mod.	Channel	Calculated Level (dBm)							
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
QPSK	Low	-22.526	-37.236	-22.611	-22.768	-31.149	-29.364	-24.206	-23.145
	Middle	-22.079	-37.363	-22.969	-30.026	-31.268	-28.904	-24.119	-24.257
	High	-23.025	-38.054	-21.985	-29.439	-24.310	-28.466	-24.588	-23.484
16QAM	Low	-23.114	-37.971	-22.757	-22.964	-31.005	-28.850	-24.272	-23.583
	Middle	-21.435	-38.163	-22.223	-29.676	-31.438	-28.971	-24.275	-23.062
	High	-23.509	-38.520	-22.043	-29.855	-24.090	-29.117	-23.064	-23.737
64QAM	Low	-23.066	-37.945	-22.756	-21.938	-30.825	-28.710	-24.108	-23.504
	Middle	-21.948	-36.511	-22.616	-29.970	-29.292	-28.976	-23.993	-23.200
	High	-21.575	-37.087	-22.769	-30.467	-25.538	-27.969	-24.753	-24.211
256QAM	Low	-22.861	-38.471	-22.815	-21.395	-31.823	-28.669	-24.972	-24.146
	Middle	-22.402	-37.753	-23.167	-29.040	-28.439	-28.371	-24.655	-23.218
	High	-22.882	-37.870	-23.327	-30.008	-25.600	-28.271	-24.620	-23.961

**Tabular Data of RF Contiguous Spurious Unwanted Emissions**
**(4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier]**

Ant.	Mod.	Channel	Calculated Level (dBm)							
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
0	QPSK	Low	-22.777	-39.007	-23.659	-21.733	-28.119	-28.127	-23.350	-22.450
	16QAM	Low	-24.162	-39.158	-22.986	-23.799	-29.495	-27.125	-23.301	-22.679
	64QAM	Low	-23.019	-39.068	-23.333	-23.263	-30.217	-29.663	-24.166	-23.120
	256QAM	Low	-23.341	-37.976	-22.887	-23.558	-29.184	-29.028	-24.236	-23.107
1	QPSK	Low	-21.808	-37.847	-24.252	-24.378	-29.976	-29.826	-23.787	-22.924
	16QAM	Low	-22.221	-38.733	-22.283	-23.020	-29.512	-29.757	-23.247	-22.126
	64QAM	Low	-22.640	-37.903	-24.914	-21.335	-29.517	-30.778	-24.018	-24.253
	256QAM	Low	-23.631	-38.625	-25.019	-22.885	-30.972	-30.699	-23.749	-23.530
2	QPSK	Low	-22.618	-38.733	-24.065	-20.733	-29.524	-29.082	-23.305	-22.967
	16QAM	Low	-24.104	-37.973	-22.944	-20.263	-28.059	-29.418	-24.007	-21.667
	64QAM	Low	-22.706	-38.276	-23.116	-20.139	-29.712	-29.216	-23.437	-22.324
	256QAM	Low	-23.416	-38.641	-23.958	-20.117	-28.422	-30.300	-23.694	-23.266
3	QPSK	Low	-22.841	-38.168	-22.919	-21.341	-28.548	-28.236	-23.474	-23.232
	16QAM	Low	-21.994	-38.456	-23.028	-21.320	-31.200	-29.621	-24.650	-23.491
	64QAM	Low	-22.030	-37.598	-24.203	-21.550	-29.646	-29.630	-24.615	-23.545
	256QAM	Low	-23.281	-37.584	-23.253	-21.923	-30.235	-28.924	-24.811	-23.358

## (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric)

Ant.	Mod.	Channel	Calculated Level (dBm)							
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
0	QPSK	Low	-23.755	-38.406	-23.787	-20.701	-25.187	-28.187	-23.594	-22.137
	16QAM	Low	-22.973	-38.172	-23.370	-22.807	-24.524	-28.756	-23.509	-23.110
	64QAM	Low	-22.058	-38.507	-22.749	-22.635	-24.553	-29.033	-23.243	-23.316
	256QAM	Low	-23.284	-38.337	-23.580	-21.589	-24.834	-28.882	-24.397	-23.290
1	QPSK	Low	-22.970	-37.868	-24.154	-22.586	-25.320	-29.354	-22.449	-21.802
	16QAM	Low	-22.209	-38.352	-23.362	-22.047	-25.636	-30.478	-24.897	-23.265
	64QAM	Low	-21.966	-38.003	-22.312	-21.794	-24.495	-29.260	-23.932	-24.347
	256QAM	Low	-22.263	-36.946	-24.598	-21.383	-25.206	-30.023	-24.186	-23.294
2	QPSK	Low	-23.365	-39.371	-23.588	-20.349	-26.676	-29.386	-22.922	-22.876
	16QAM	Low	-22.316	-38.675	-23.216	-20.395	-26.985	-29.782	-23.599	-22.792
	64QAM	Low	-22.556	-37.612	-23.422	-20.993	-26.989	-29.844	-23.419	-22.174
	256QAM	Low	-22.520	-36.683	-22.371	-20.438	-25.912	-28.911	-23.845	-22.784
3	QPSK	Low	-22.833	-38.377	-22.922	-21.093	-27.520	-28.486	-22.976	-22.635
	16QAM	Low	-23.929	-38.399	-23.926	-21.610	-27.667	-28.779	-23.925	-24.279
	64QAM	Low	-21.782	-37.521	-23.946	-21.340	-28.048	-29.368	-24.516	-24.156
	256QAM	Low	-23.662	-37.962	-22.968	-21.761	-27.787	-29.048	-23.957	-23.060

## (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier]

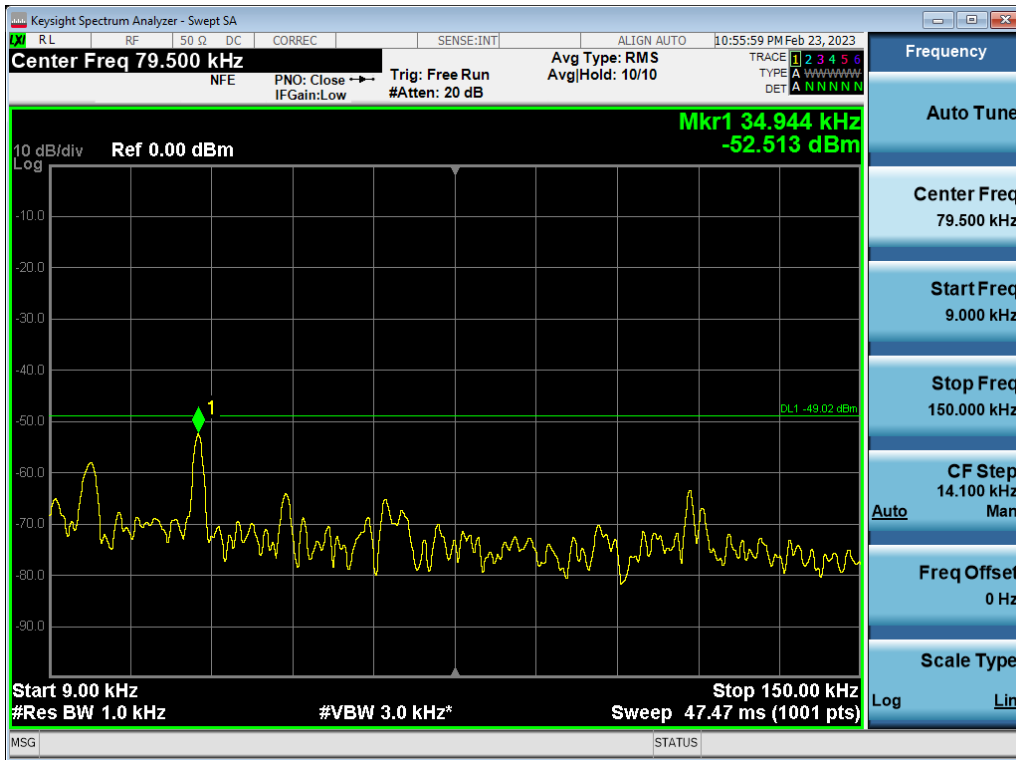
Ant.	Mod.	Channel	Calculated Level (dBm)							
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
0	QPSK	Low	-23.313	-38.599	-23.796	-21.235	-25.091	-29.351	-24.109	-22.719
	16QAM	Low	-23.553	-38.742	-23.454	-22.454	-25.101	-29.031	-24.497	-23.212
	64QAM	Low	-23.513	-39.102	-23.014	-22.034	-24.430	-29.548	-24.409	-22.302
	256QAM	Low	-23.156	-38.928	-23.177	-22.068	-24.303	-29.186	-24.259	-21.641
1	QPSK	Low	-22.832	-39.612	-24.415	-20.948	-23.723	-31.348	-24.733	-23.161
	16QAM	Low	-22.356	-38.126	-23.701	-22.180	-23.328	-30.186	-24.217	-22.593
	64QAM	Low	-22.701	-39.119	-23.780	-20.501	-23.709	-30.179	-23.879	-22.757
	256QAM	Low	-21.207	-37.899	-23.172	-20.998	-24.148	-30.106	-24.159	-22.831
2	QPSK	Low	-22.034	-38.913	-23.390	-20.612	-24.626	-29.954	-24.043	-22.084
	16QAM	Low	-21.929	-37.940	-22.917	-20.197	-24.030	-29.735	-24.056	-21.866
	64QAM	Low	-23.942	-37.966	-23.789	-20.357	-23.940	-29.457	-23.212	-22.038
	256QAM	Low	-23.044	-38.937	-24.112	-20.251	-24.037	-29.450	-23.807	-23.256
3	QPSK	Low	-21.774	-38.220	-21.692	-20.835	-25.730	-29.091	-25.147	-23.314
	16QAM	Low	-23.891	-38.590	-23.497	-20.449	-22.390	-29.626	-25.113	-23.065
	64QAM	Low	-22.648	-38.551	-24.007	-20.972	-25.212	-28.683	-23.677	-22.749
	256QAM	Low	-21.495	-38.498	-23.740	-20.437	-25.617	-29.527	-24.514	-23.151

## (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric)

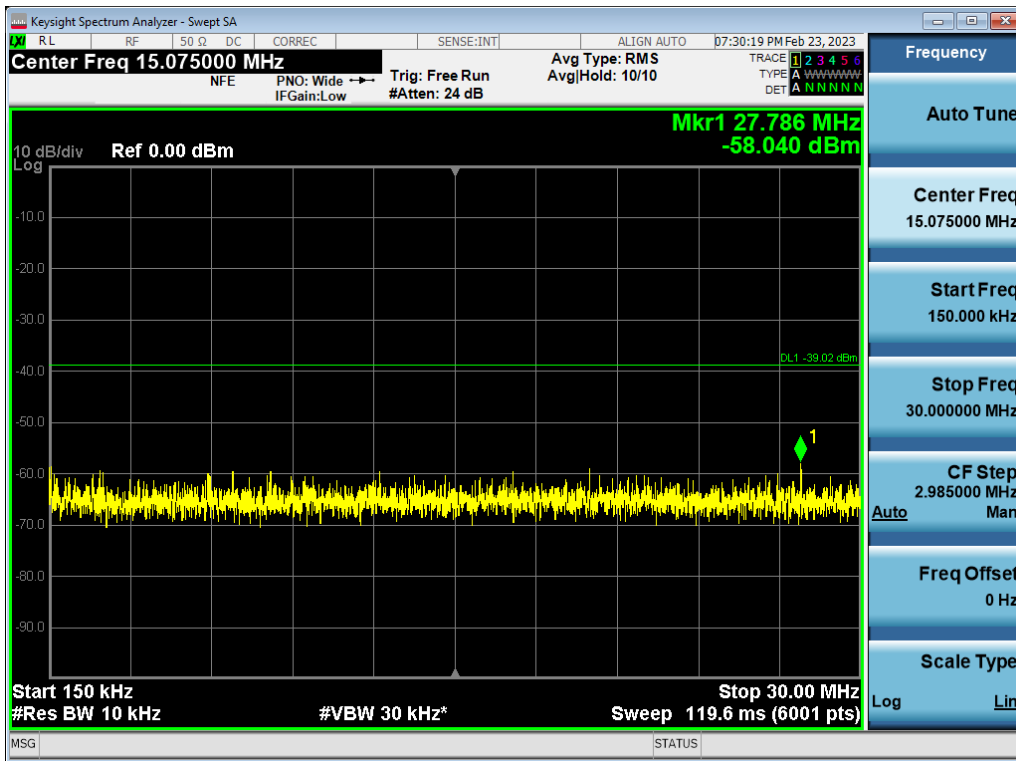
Ant.	Mod.	Channel	Calculated Level (dBm)							
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge - 100 MHz	Low Edge - 100 MHz ~ Low Edge	High Edge ~ High Edge + 100 MHz	High Edge + 100 MHz ~ 10 GHz	10 GHz ~ 26.5 GHz	26.5 GHz ~ 40 GHz
0	QPSK	Low	-22.767	-38.857	-23.278	-20.616	-26.913	-27.662	-23.701	-21.710
	16QAM	Low	-25.503	-38.819	-22.931	-22.444	-27.634	-28.934	-23.857	-23.717
	64QAM	Low	-26.686	-38.954	-23.759	-22.977	-26.259	-28.754	-24.554	-22.486
	256QAM	Low	-26.564	-38.598	-23.241	-22.696	-26.090	-28.707	-23.335	-23.452
1	QPSK	Low	-23.146	-37.906	-24.702	-20.957	-25.484	-29.414	-23.313	-21.935
	16QAM	Low	-25.462	-37.819	-23.241	-22.031	-27.505	-30.764	-25.413	-23.313
	64QAM	Low	-26.633	-38.095	-23.022	-21.171	-26.646	-30.491	-24.698	-22.730
	256QAM	Low	-24.064	-37.299	-24.077	-20.644	-26.208	-30.378	-24.413	-23.551
2	QPSK	Low	-23.445	-37.758	-22.502	-20.156	-25.226	-29.276	-23.484	-23.919
	16QAM	Low	-25.434	-38.252	-22.716	-20.512	-26.753	-29.789	-24.441	-22.569
	64QAM	Low	-25.814	-38.713	-21.587	-20.371	-26.538	-29.807	-24.254	-22.769
	256QAM	Low	-26.077	-38.368	-23.177	-20.311	-26.023	-28.451	-23.765	-23.117
3	QPSK	Low	-25.635	-37.428	-23.347	-22.490	-27.396	-29.141	-24.634	-23.250
	16QAM	Low	-25.484	-38.127	-23.176	-22.397	-28.278	-28.302	-25.279	-24.168
	64QAM	Low	-26.927	-38.475	-22.147	-20.277	-27.306	-29.095	-25.211	-23.741
	256QAM	Low	-25.141	-37.361	-22.298	-21.870	-27.720	-27.960	-24.860	-23.621

Plot Data of Spurious Unwanted Emissions

Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 9 kHz ~ 150 kHz / 64QAM / High



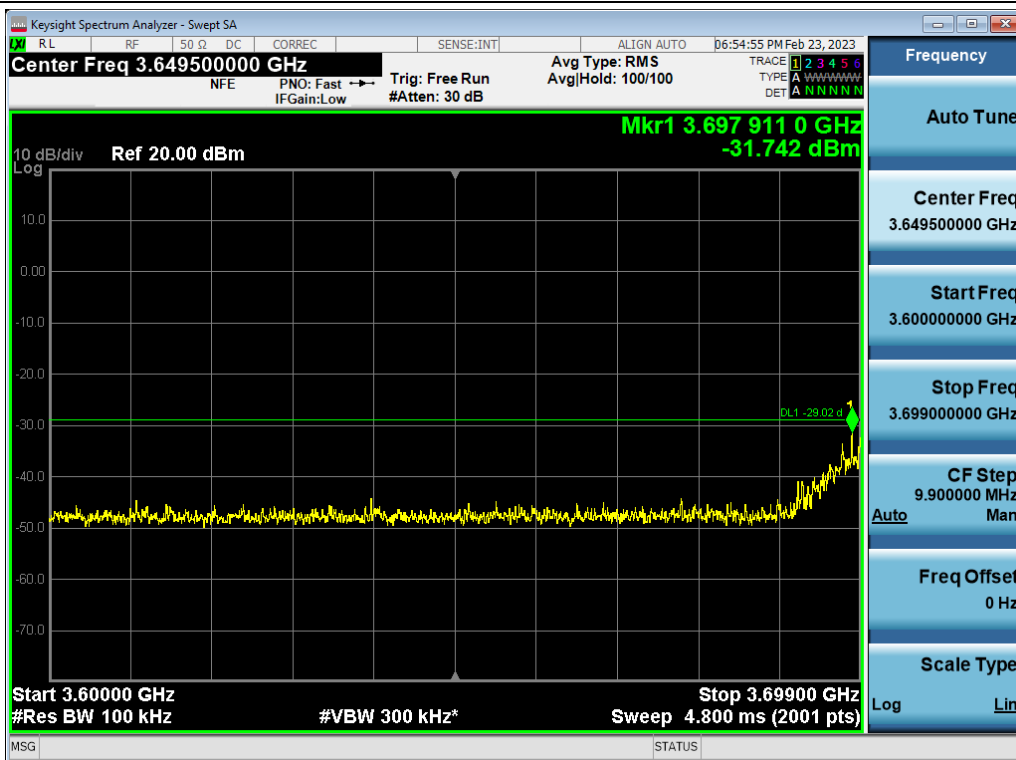
Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 150 kHz ~ 30 MHz / 64QAM / Low



Antenna 2 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 30 MHz ~ Low Edge - 100 MHz / 256QAM / Middle

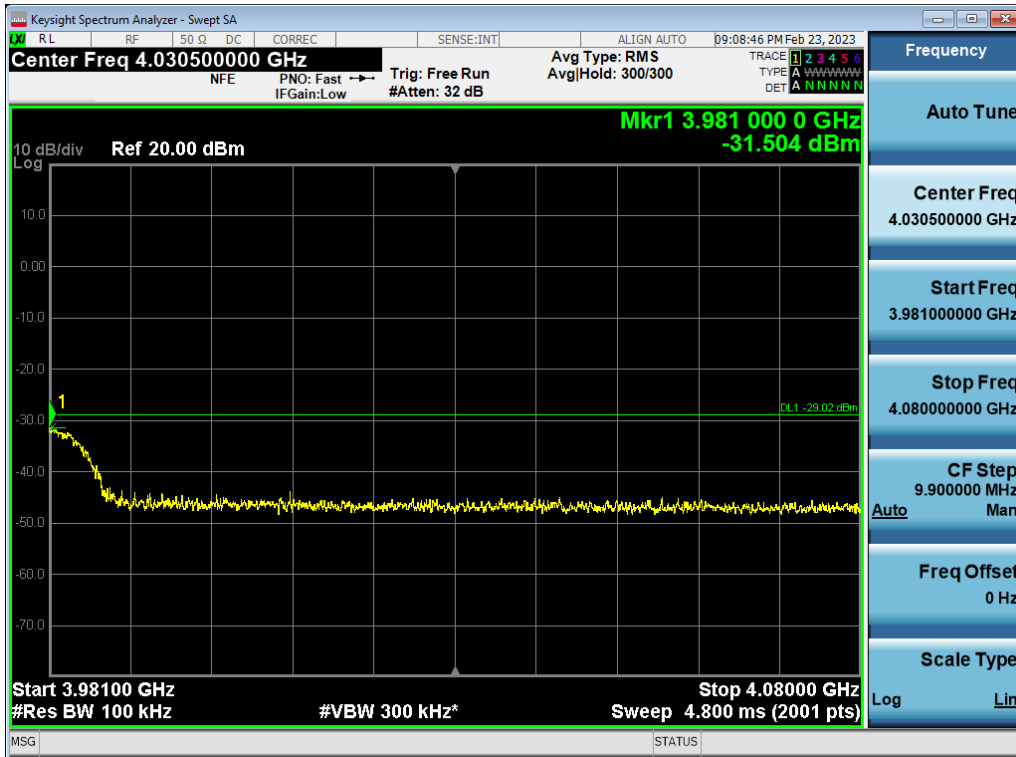


Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / Low Edge - 100 MHz ~ Low Edge / QPSK / Low

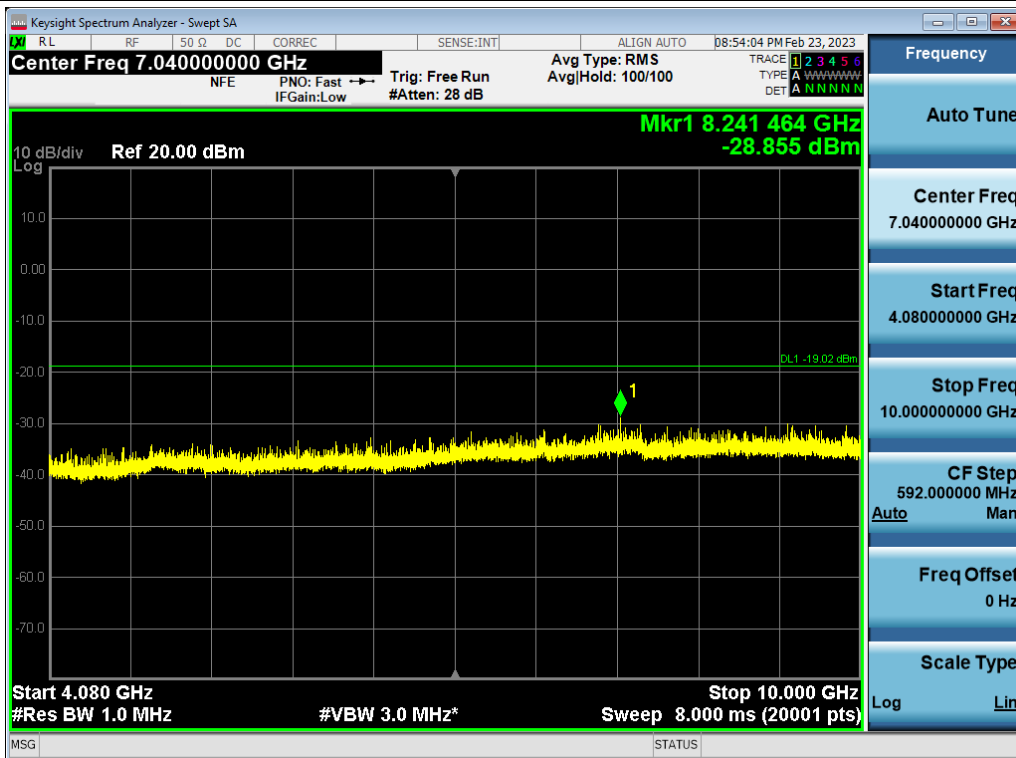




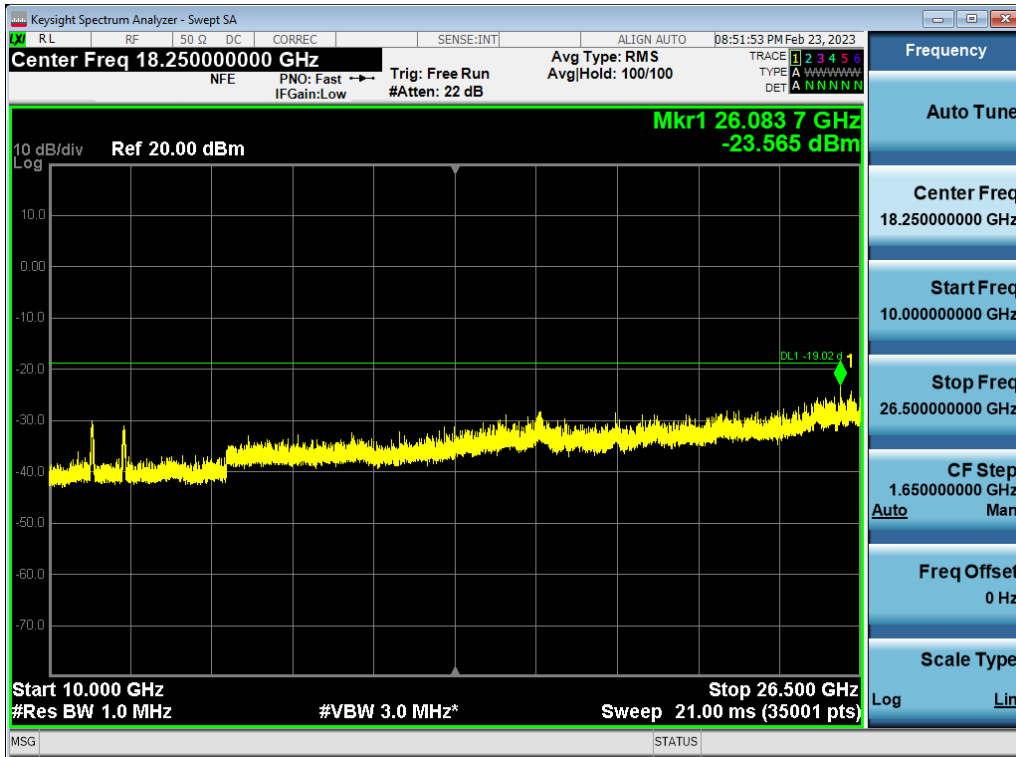
Antenna 0 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / High Edge ~ High Edge + 100 MHz / QPSK / High



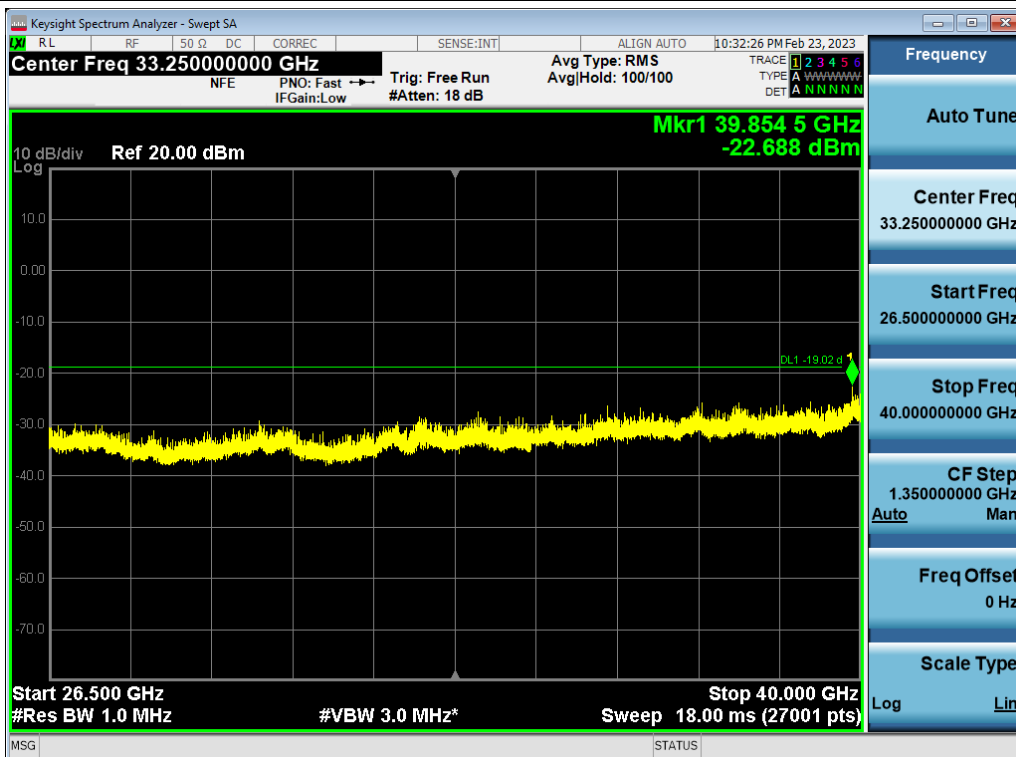
Antenna 3 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / High Edge + 100 MHz ~ 10 GHz / 256QAM / Middle



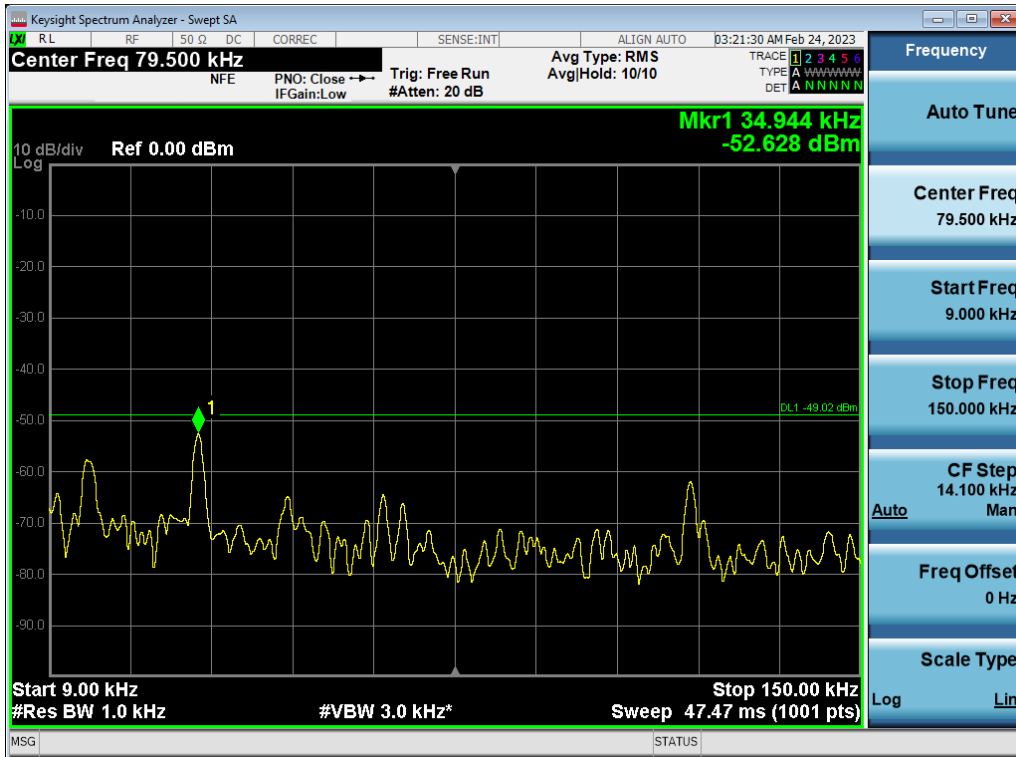
Antenna 2 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 10 GHz ~ 26.5 GHz / 256QAM / Middle



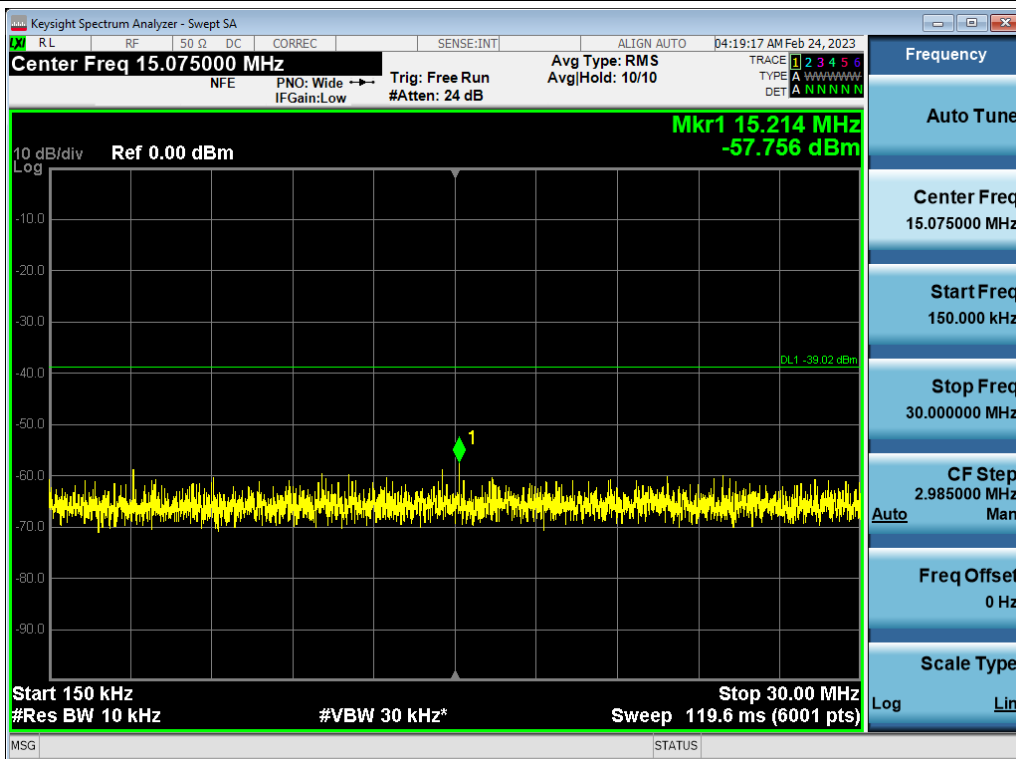
Antenna 0 / (4 Port) 5G NR n77 40 MHz [1 Carrier] / 26.5 GHz ~ 40 GHz / 64QAM / High



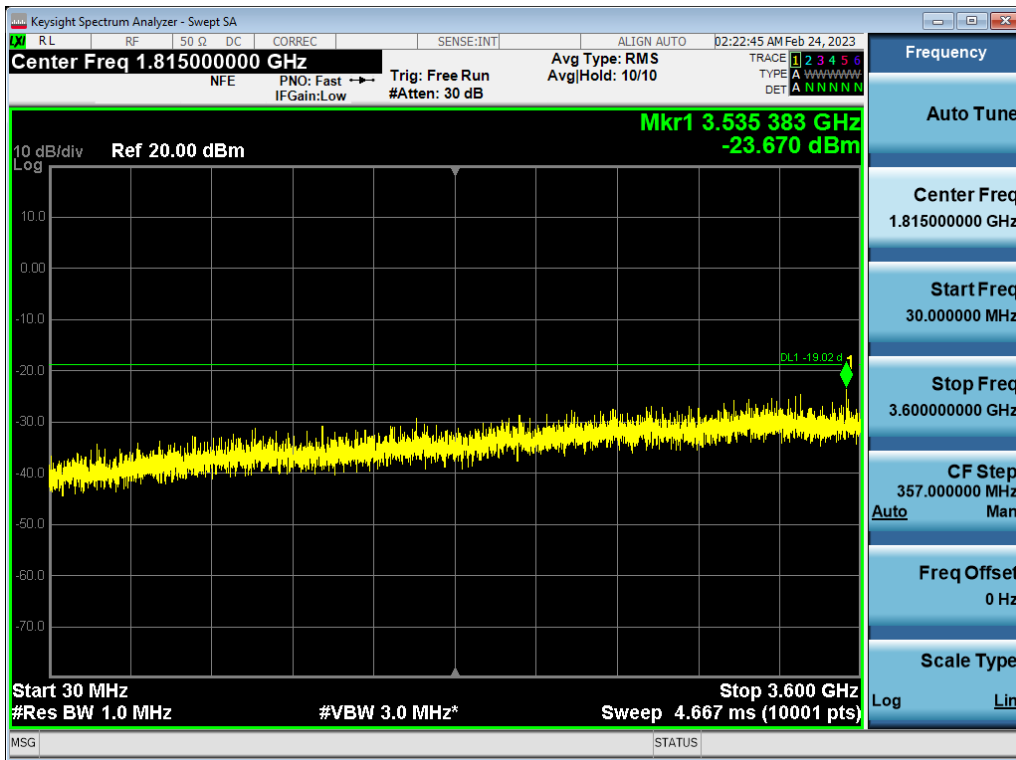
Antenna 3 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 9 kHz ~ 150 kHz / 64QAM / Middle



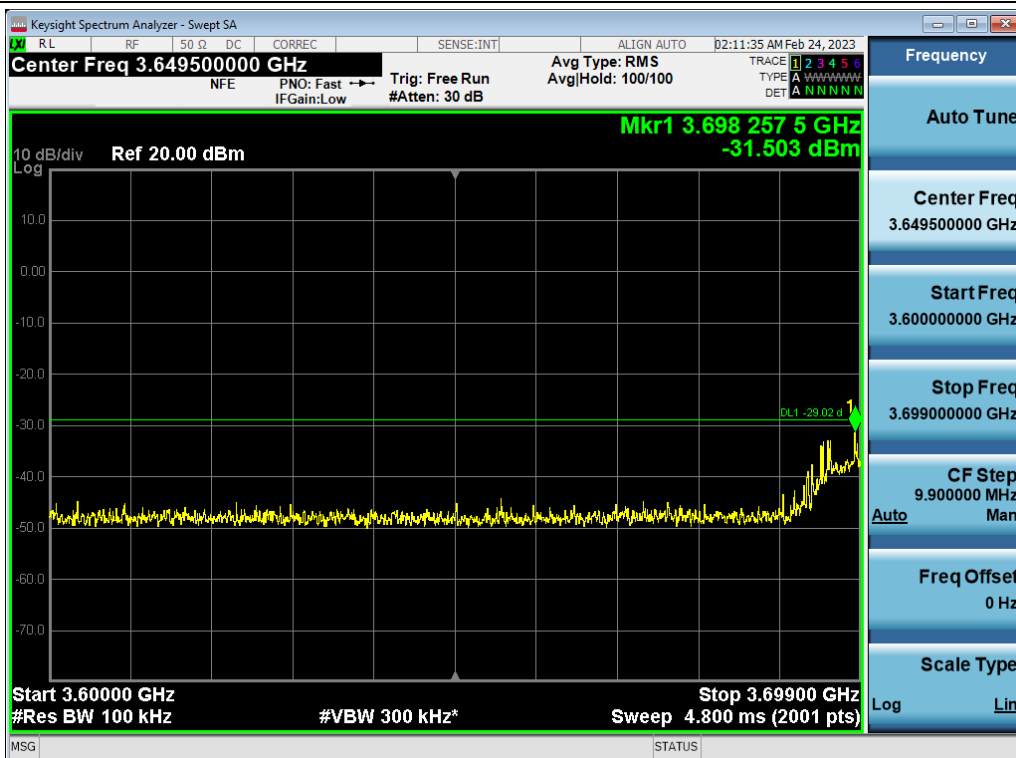
Antenna 3 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 150 kHz ~ 30 MHz / 16QAM / High



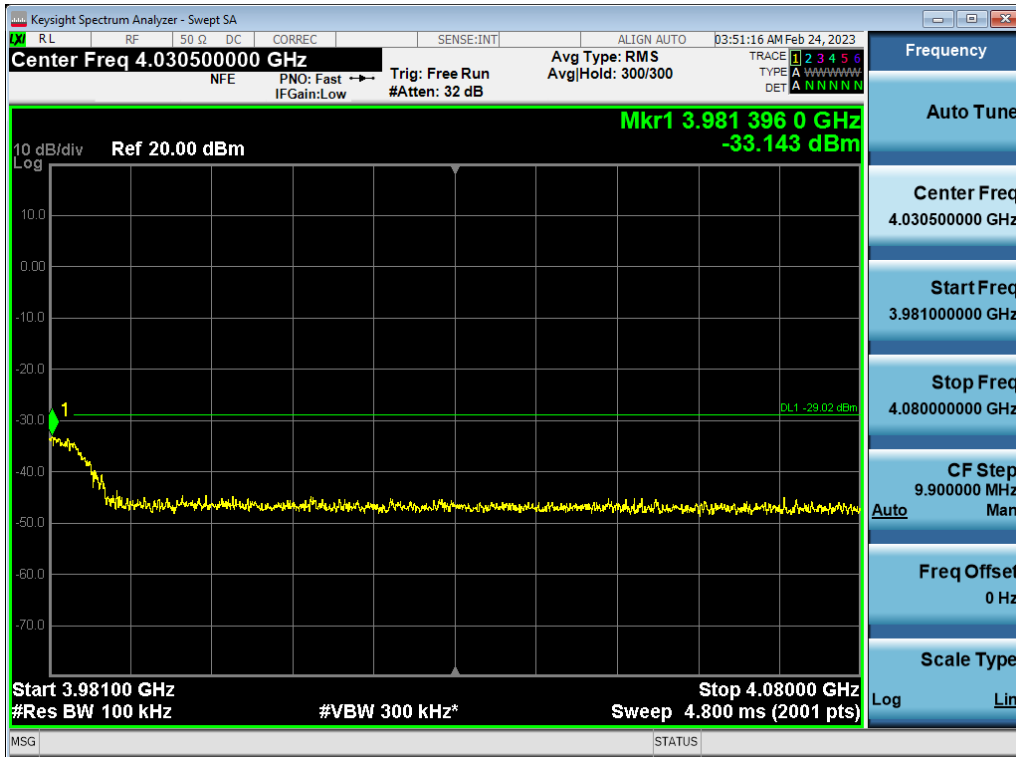
Antenna 0 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 30 MHz ~ Low Edge - 100 MHz / 256QAM / Low



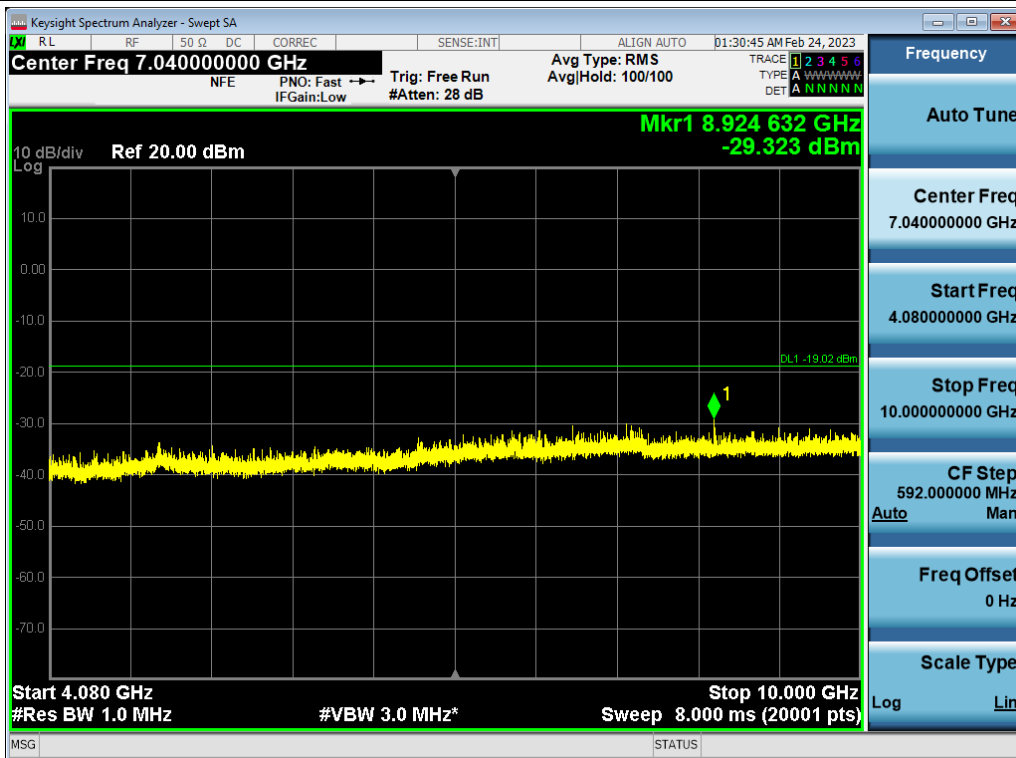
Antenna 2 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / Low Edge - 100 MHz ~ Low Edge / 64QAM / Low



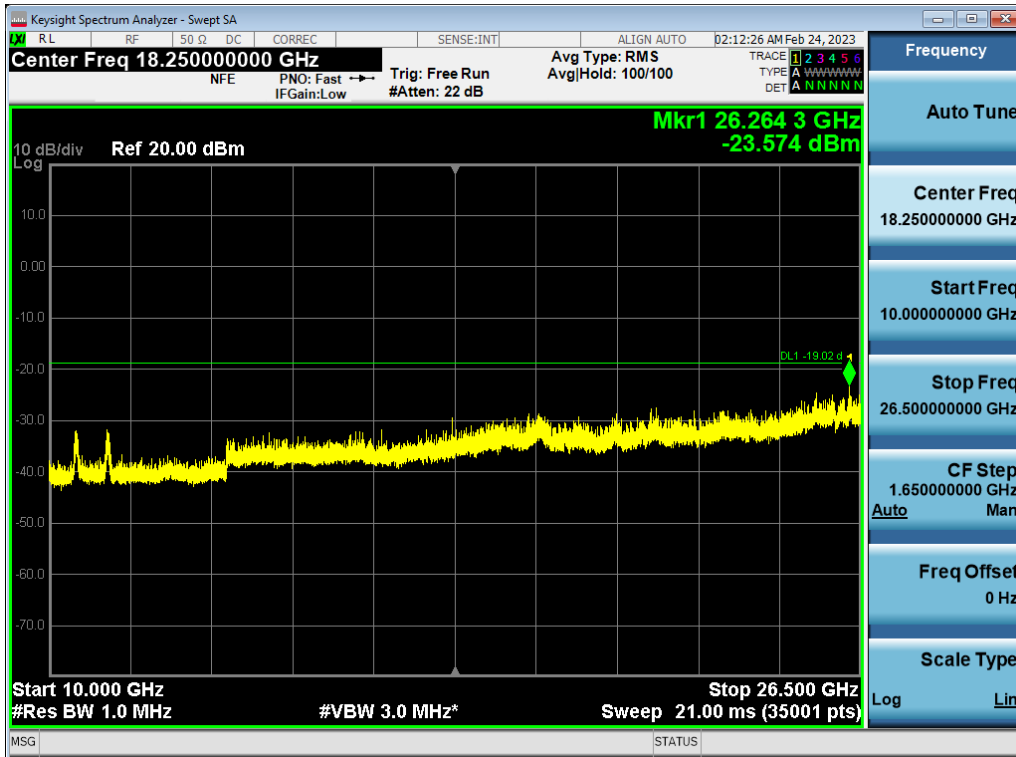
Antenna 0 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / High Edge ~ High Edge + 100 MHz / QPSK / High



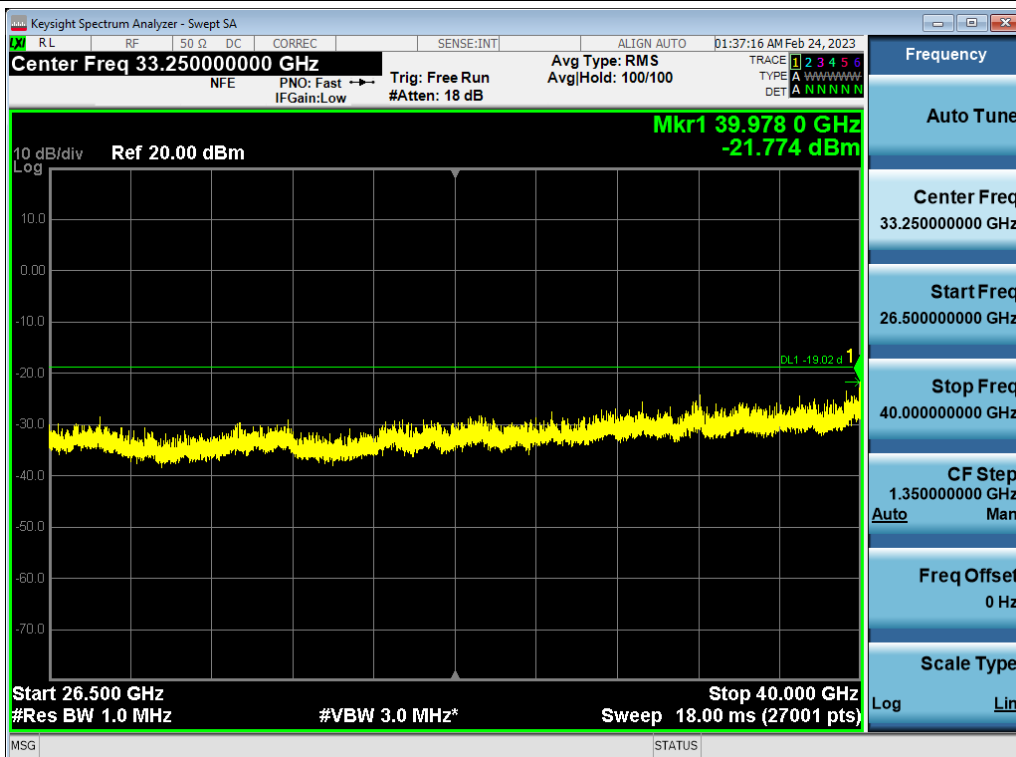
Antenna 0 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / High Edge + 100 MHz ~ 10 GHz / QPSK / Low



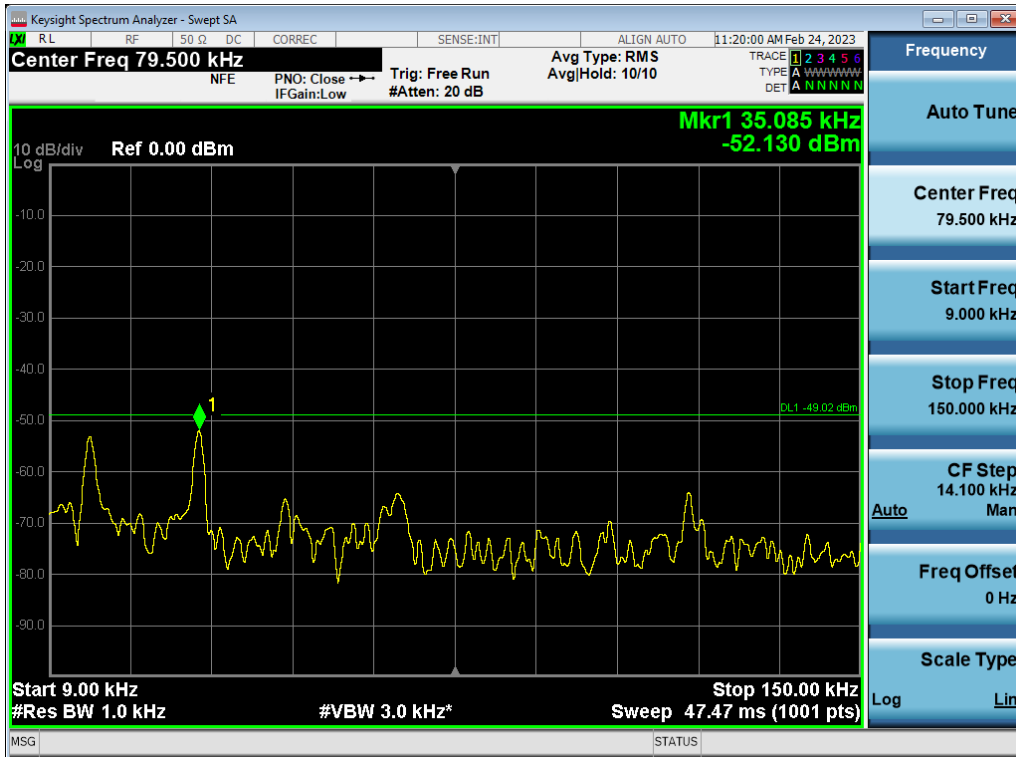
Antenna 2 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 10 GHz ~ 26.5 GHz / 64QAM / Low



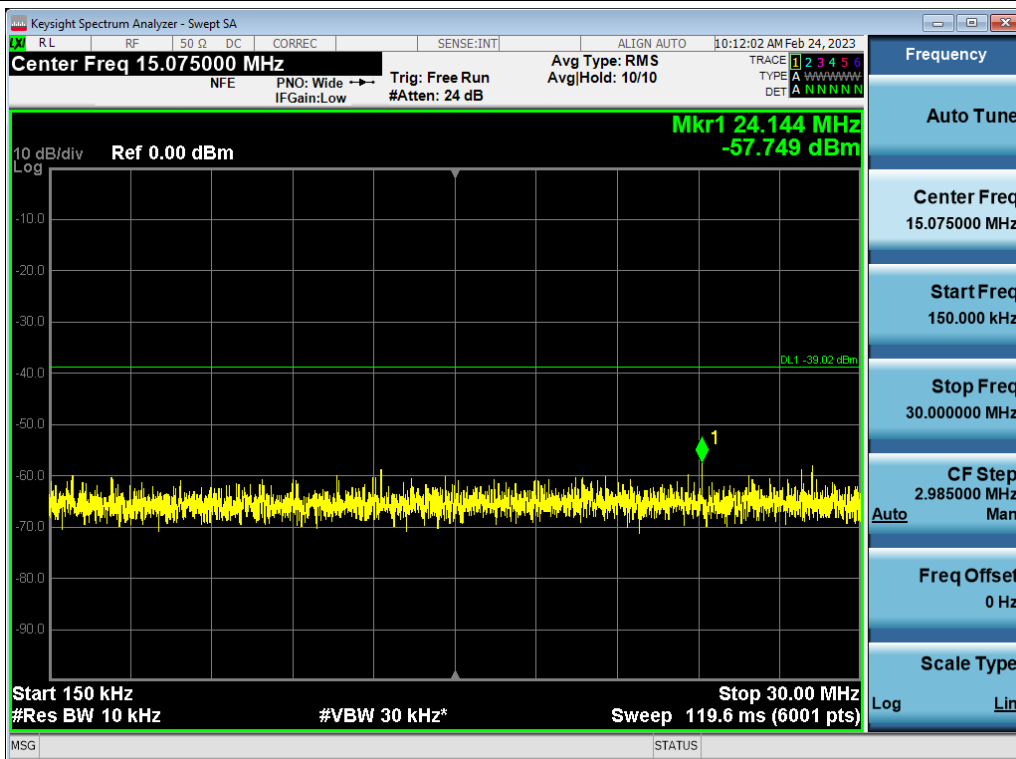
Antenna 2 / (4 Port) 5G NR n77 60 MHz [1 Carrier] / 26.5 GHz ~ 40 GHz / QPSK / Low



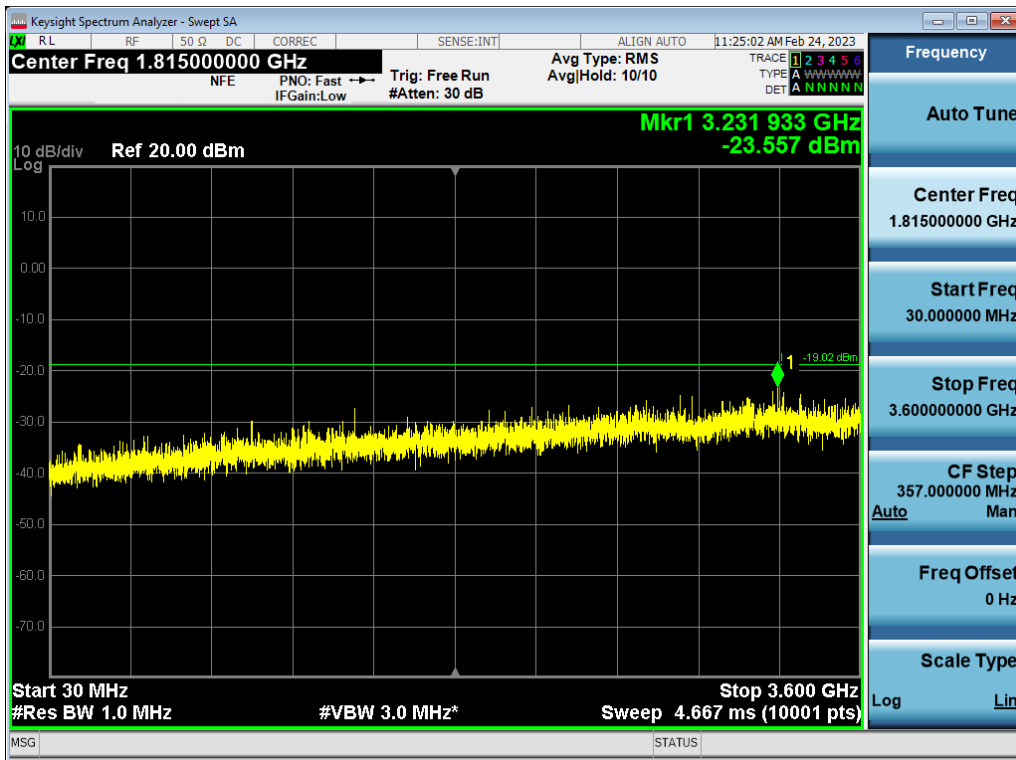
Antenna 1 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 9 kHz ~ 150 kHz / 16QAM / Middle



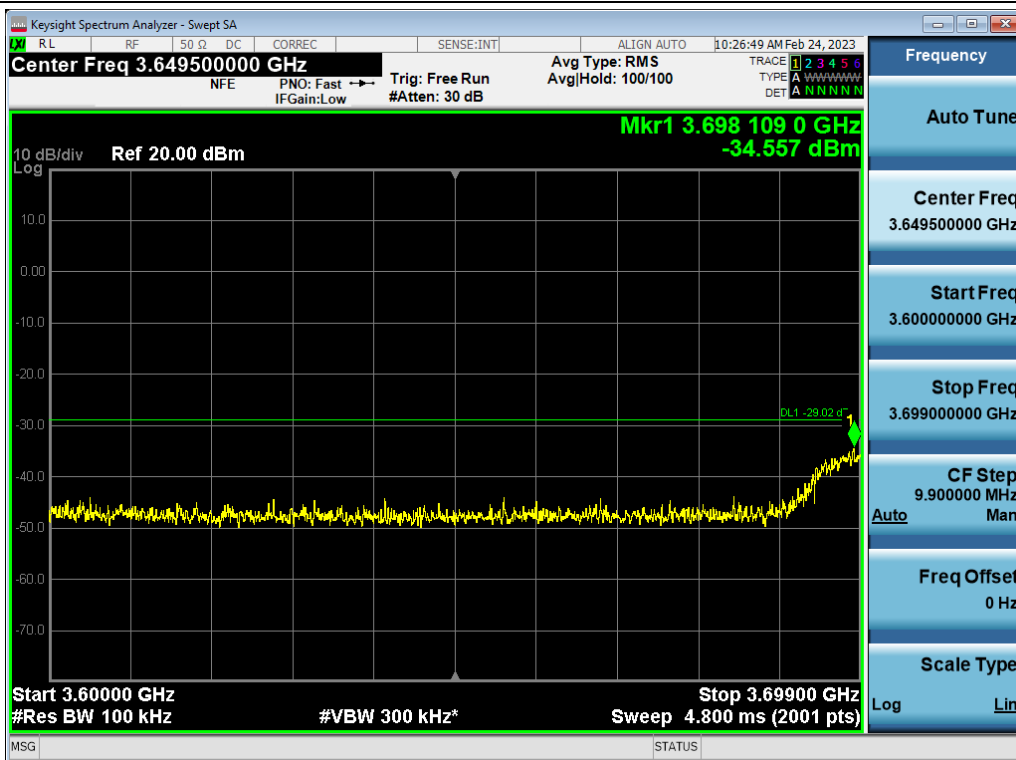
Antenna 3 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 150 kHz ~ 30 MHz / 16QAM / Low



Antenna 3 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 30 MHz ~ Low Edge - 100 MHz / 16QAM / Middle

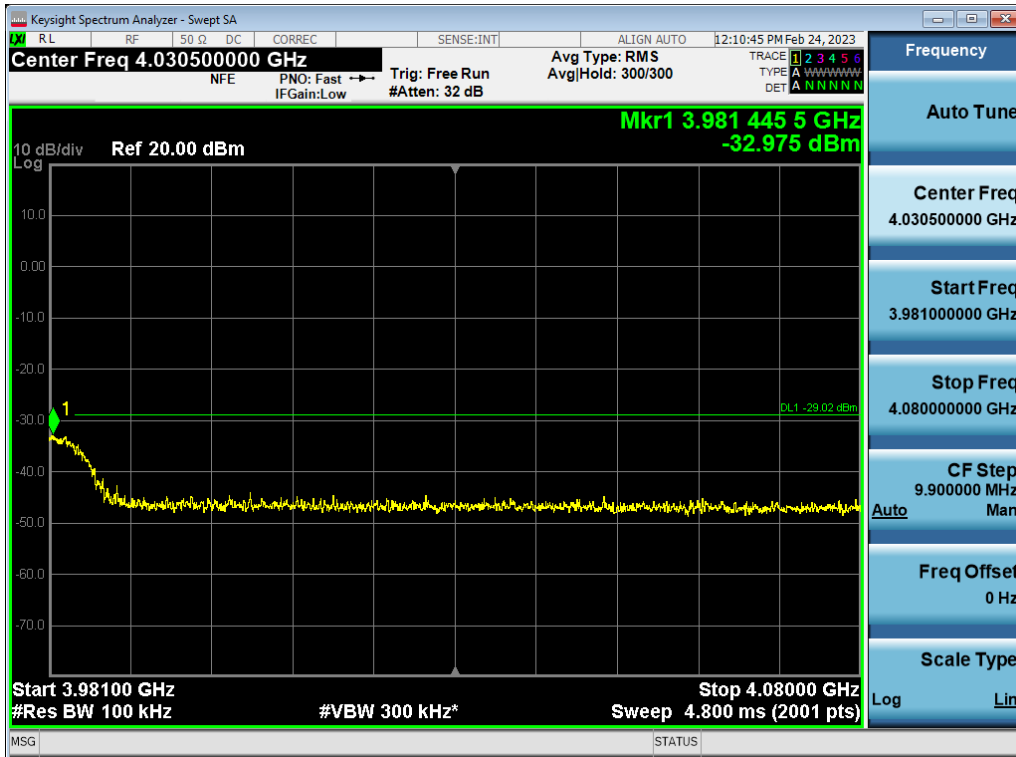


Antenna 2 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / Low Edge - 100 MHz ~ Low Edge / 64QAM / Low

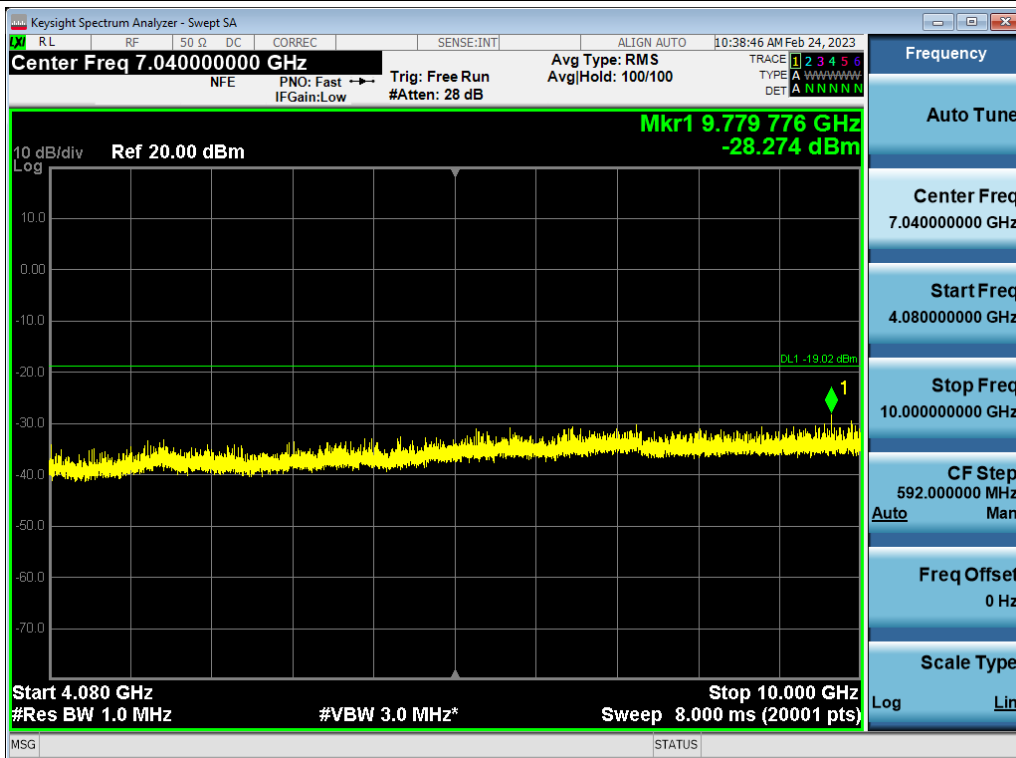




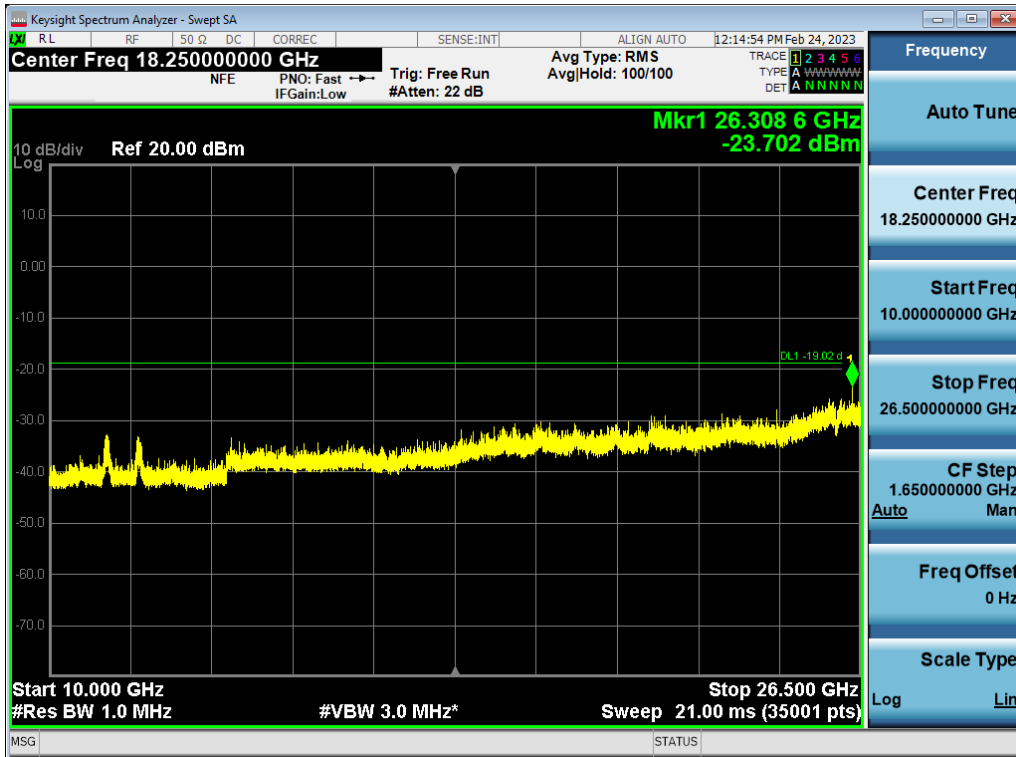
Antenna 0 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / High Edge ~ High Edge + 100 MHz / QPSK / High



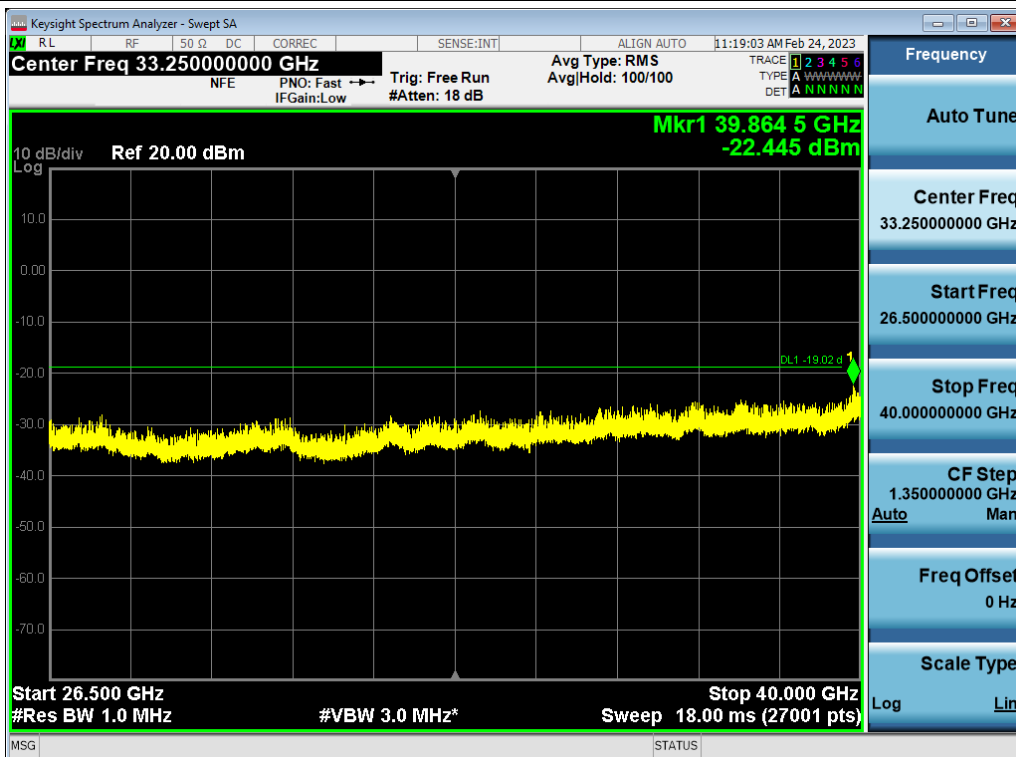
Antenna 0 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / High Edge + 100 MHz ~ 10 GHz / 256QAM / Low



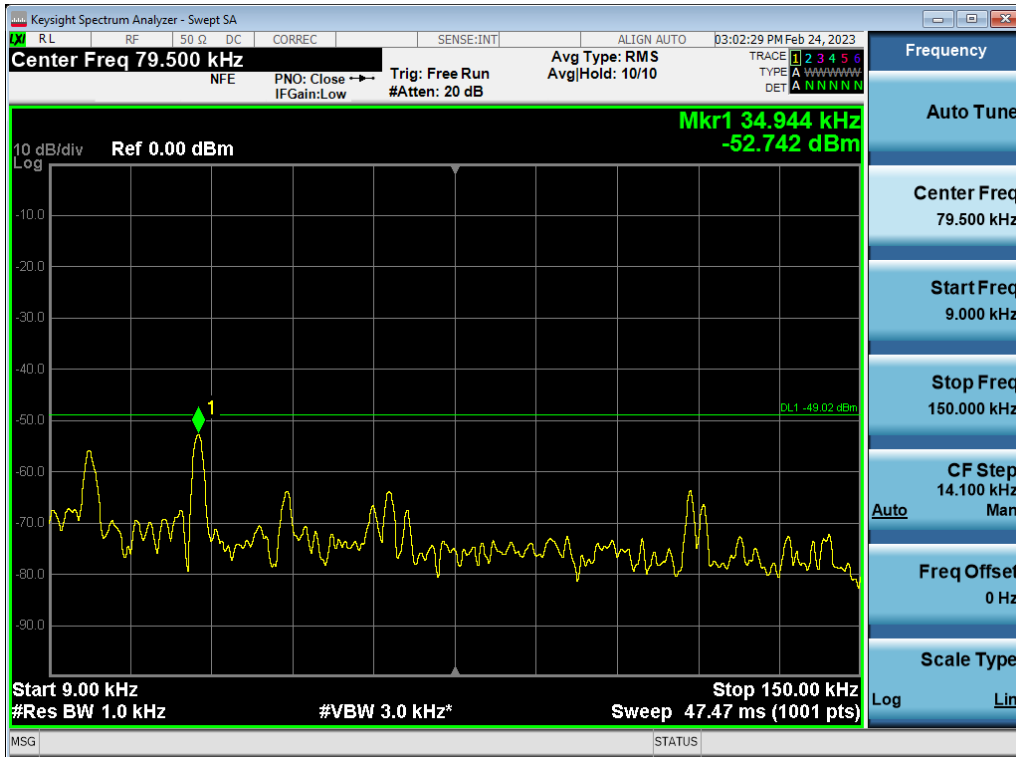
Antenna 1 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 10 GHz ~ 26.5 GHz / QPSK / High



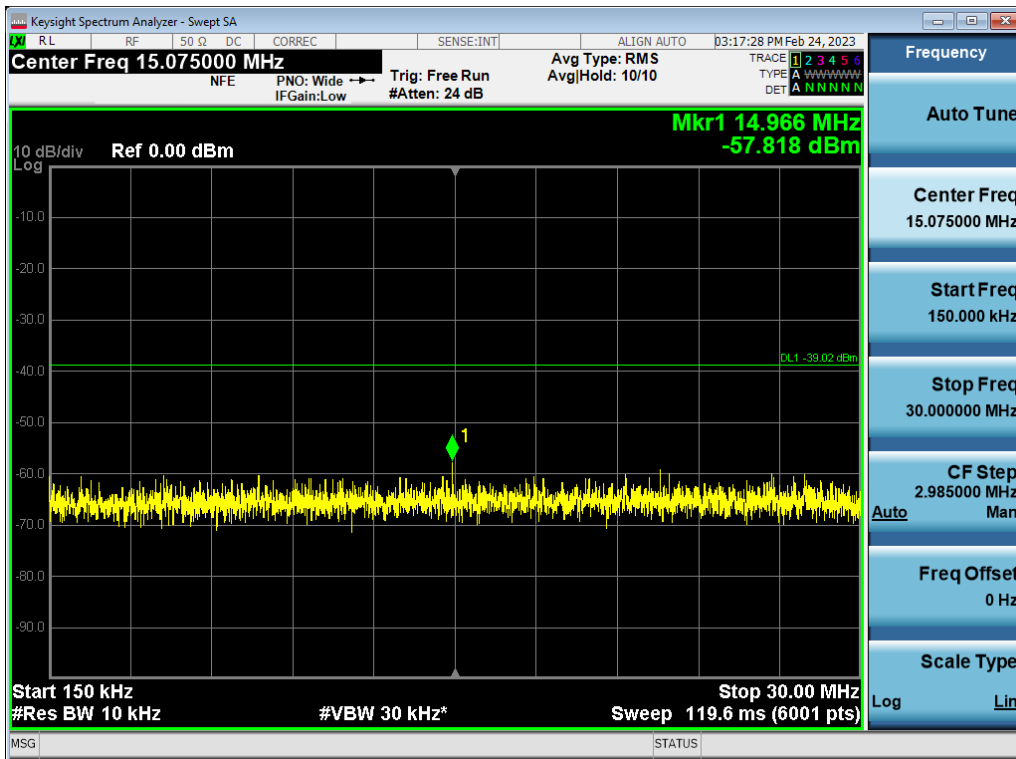
Antenna 0 / (4 Port) 5G NR n77 80 MHz [1 Carrier] / 26.5 GHz ~ 40 GHz / 16QAM / Middle



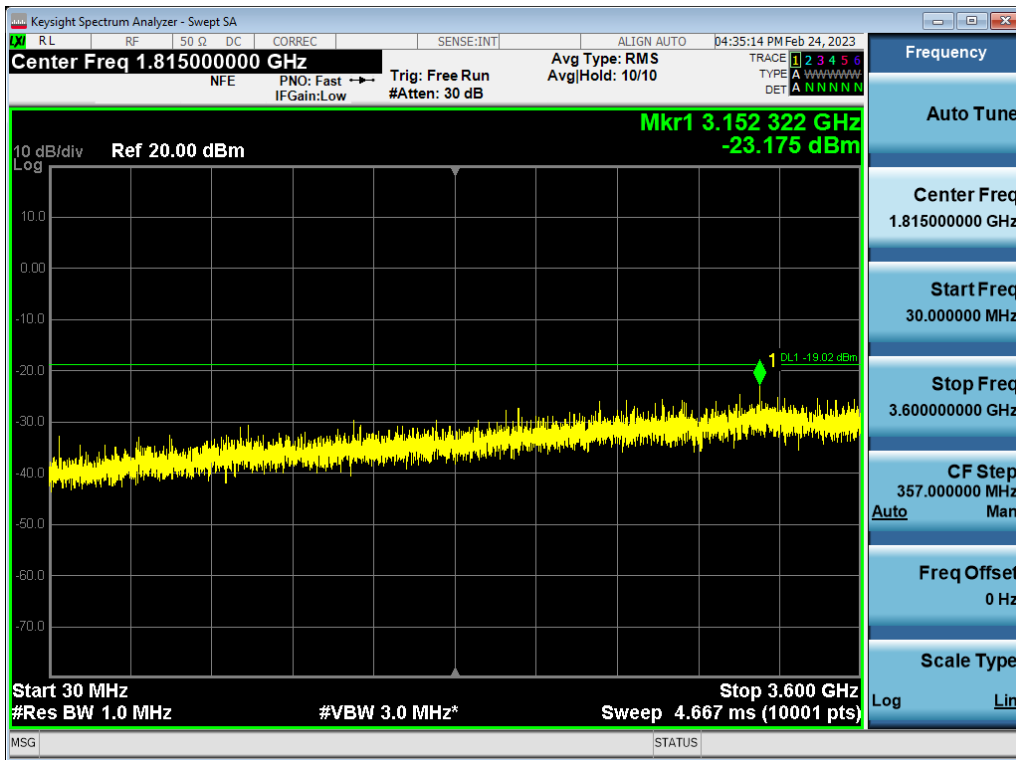
Antenna 3 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 9 kHz ~ 150 kHz / 16QAM / Middle



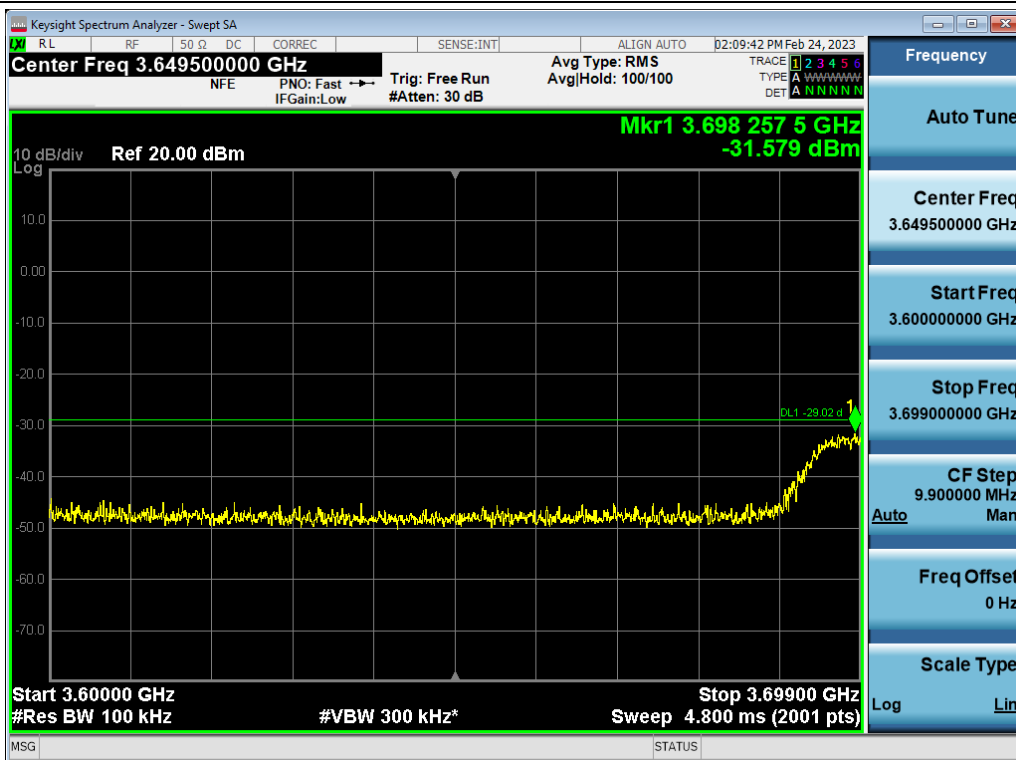
Antenna 3 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 150 kHz ~ 30 MHz / 64QAM / Middle



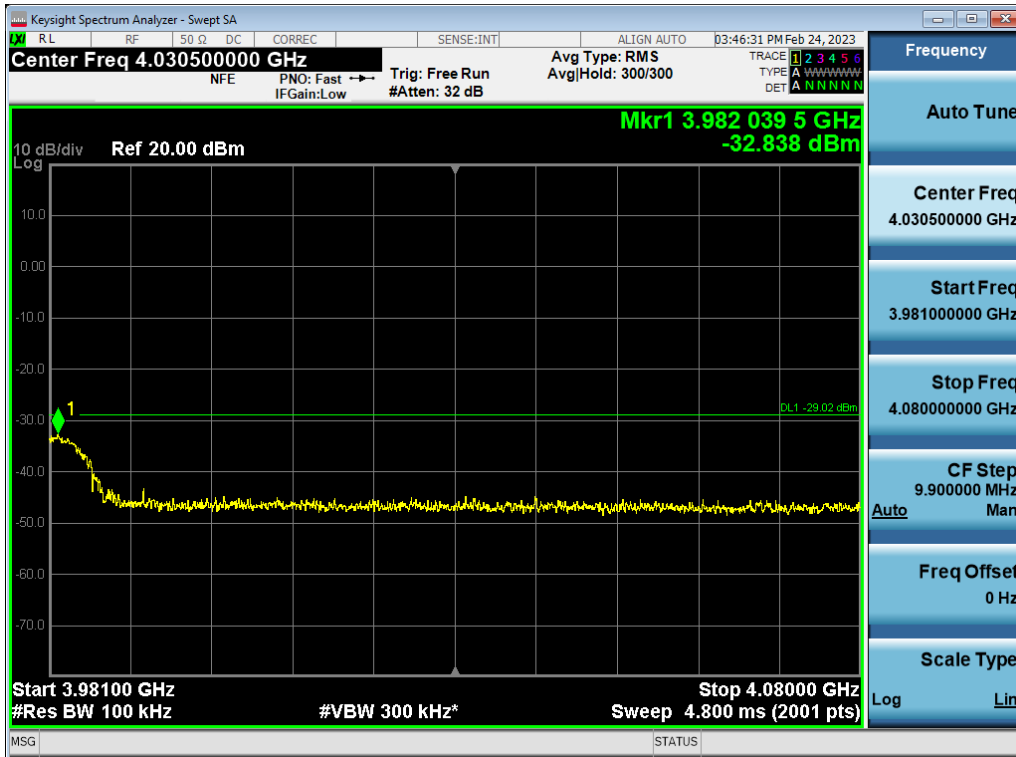
Antenna 0 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 30 MHz ~ Low Edge - 100 MHz / 256QAM / High



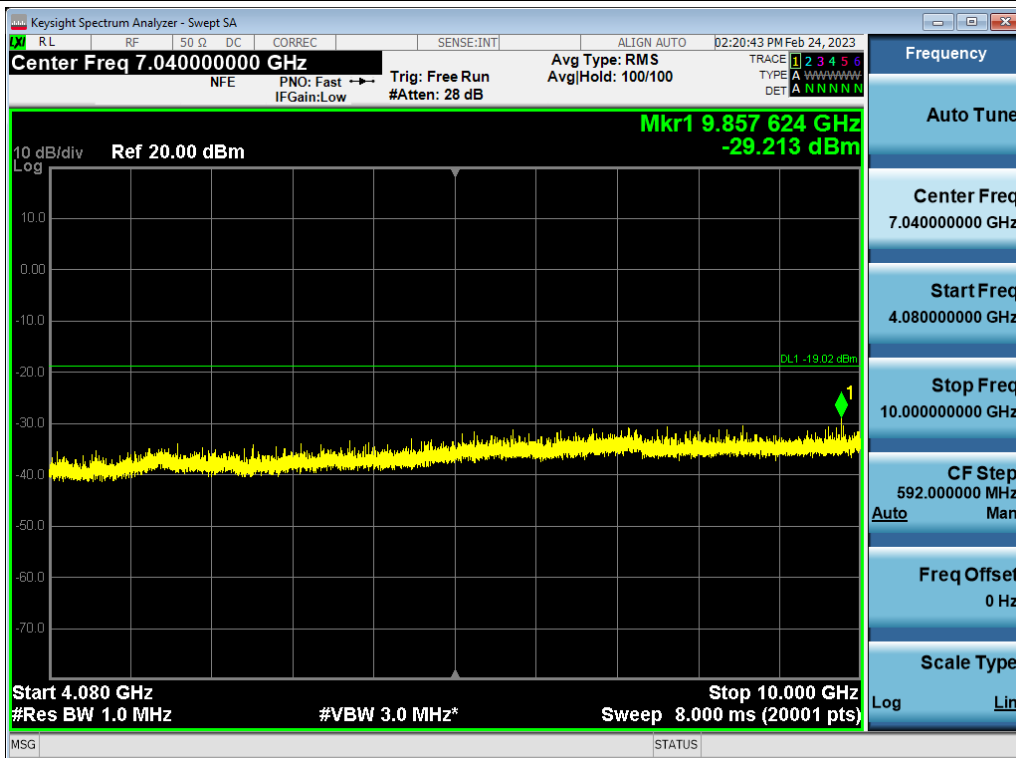
Antenna 2 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / Low Edge - 100 MHz ~ Low Edge / 64QAM / Low



Antenna 0 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / High Edge ~ High Edge + 100 MHz / QPSK / High



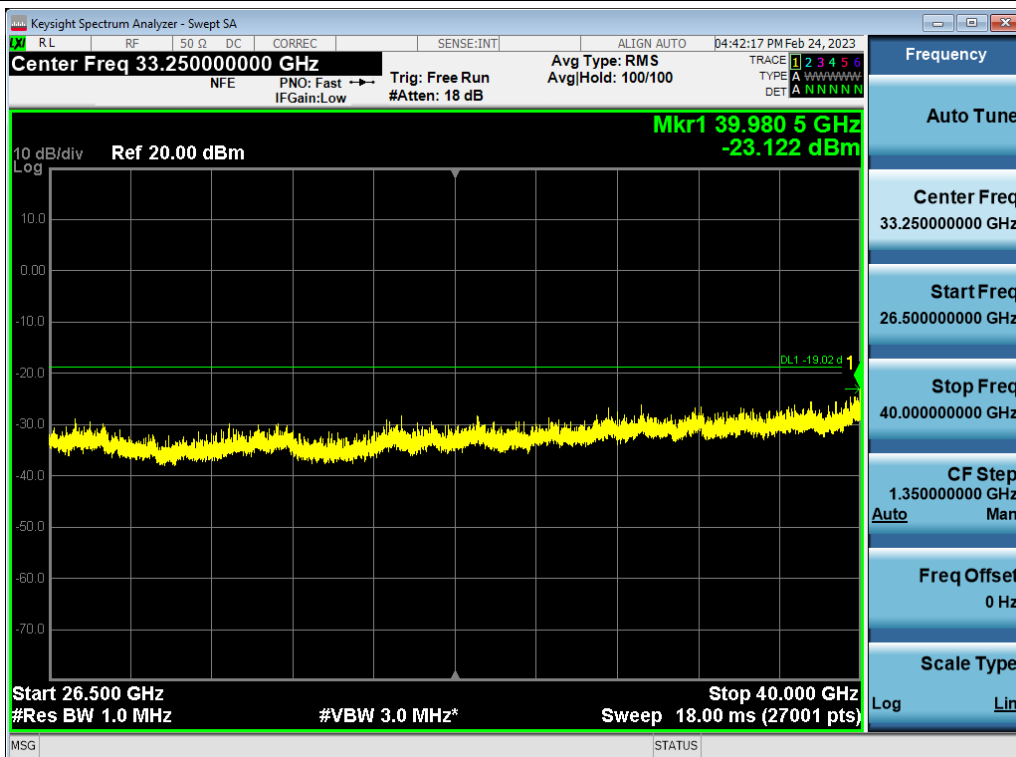
Antenna 0 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / High Edge + 100 MHz ~ 10 GHz / 256QAM / Low



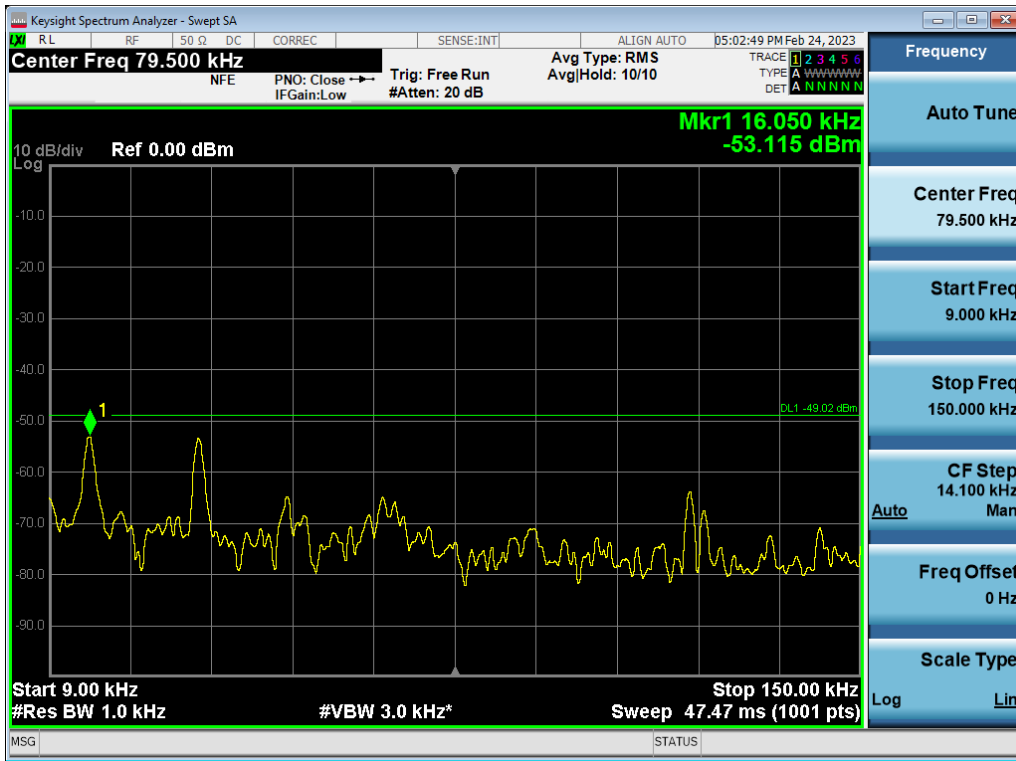
Antenna 0 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 10 GHz ~ 26.5 GHz / 16QAM / High



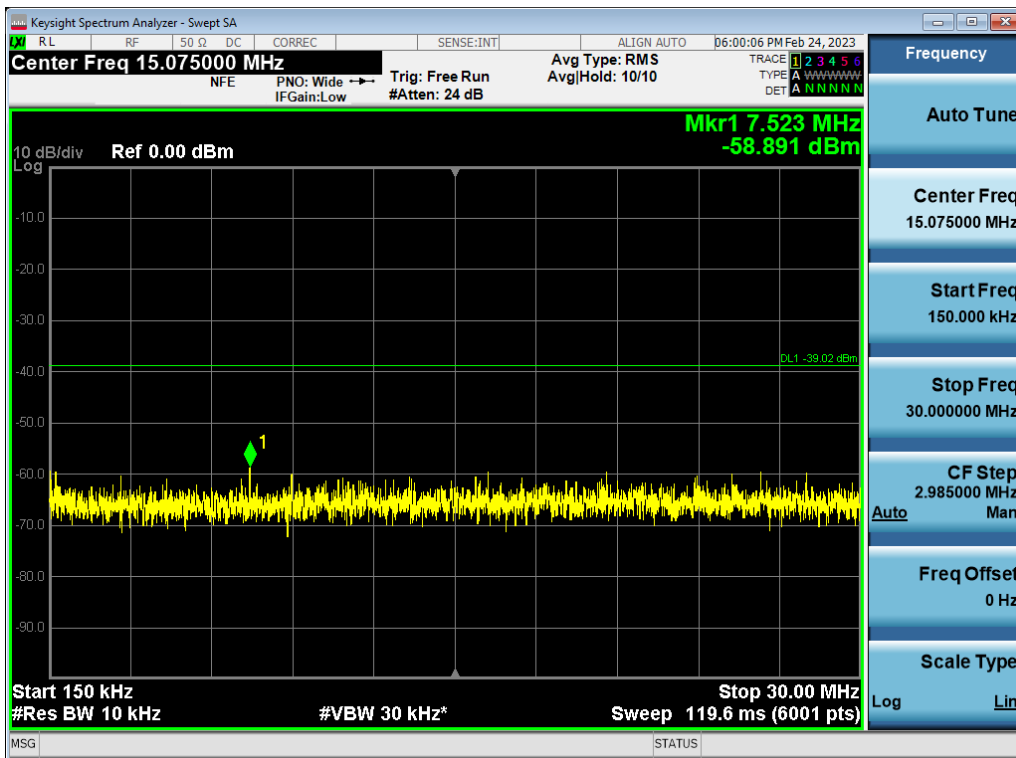
Antenna 2 / (4 Port) 5G NR n77 100 MHz [1 Carrier] / 26.5 GHz ~ 40 GHz / 256QAM / High



Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 9 kHz ~ 150 kHz / QPSK / Low / Contiguous



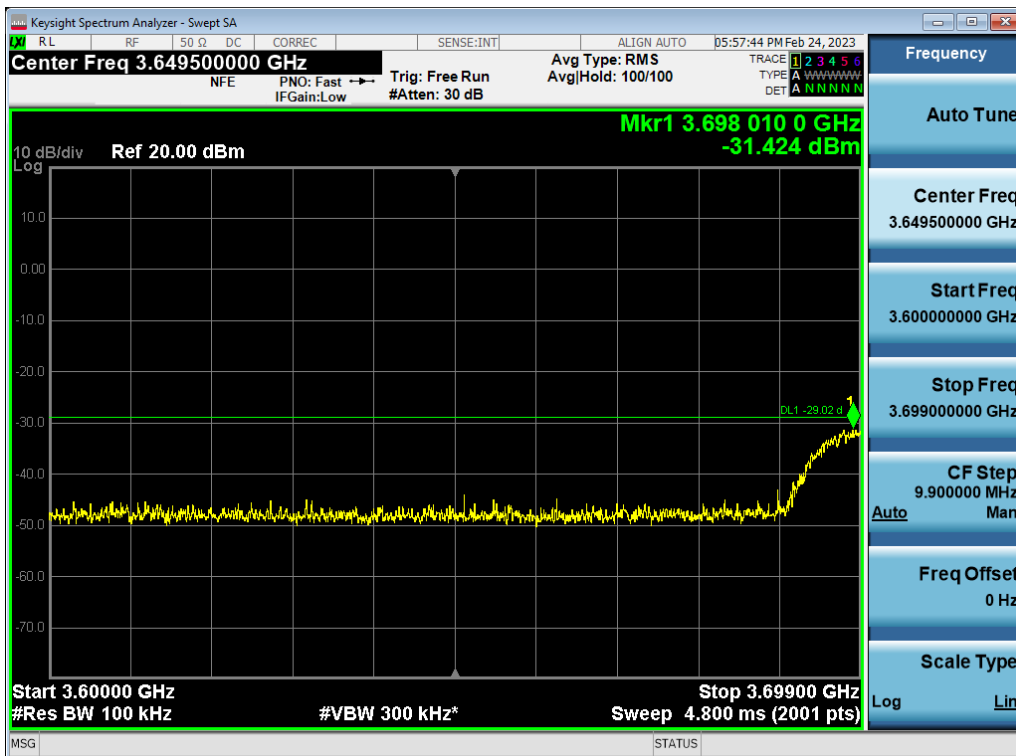
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 150 kHz ~ 30 MHz / 256QAM / Low / Contiguous



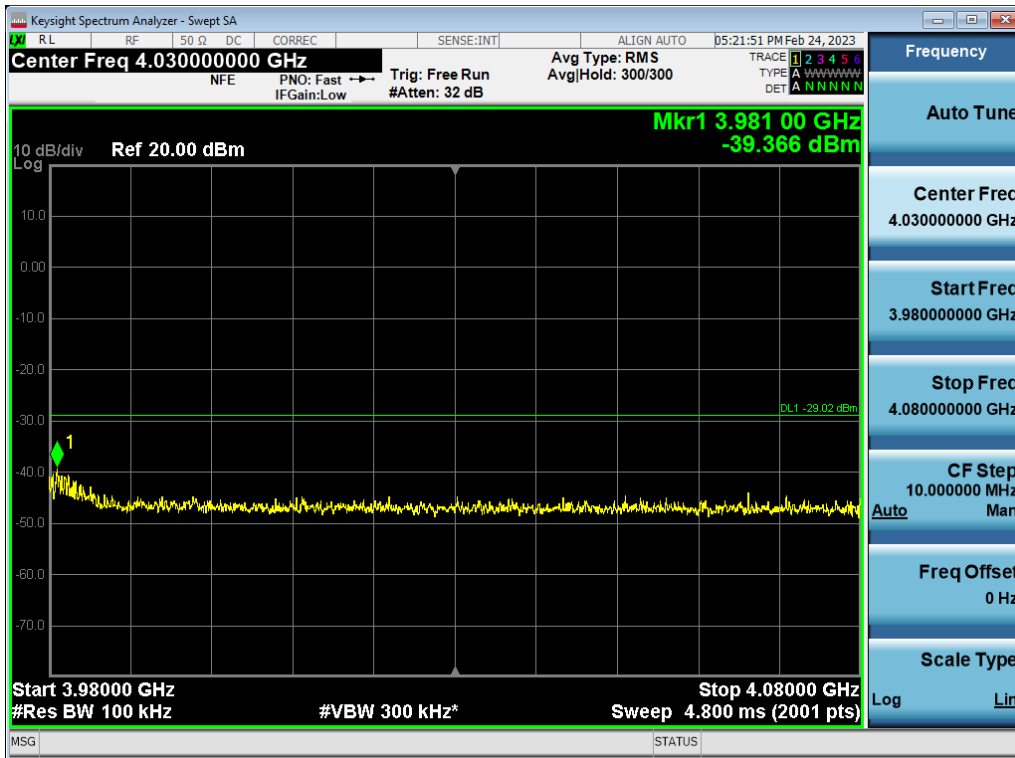
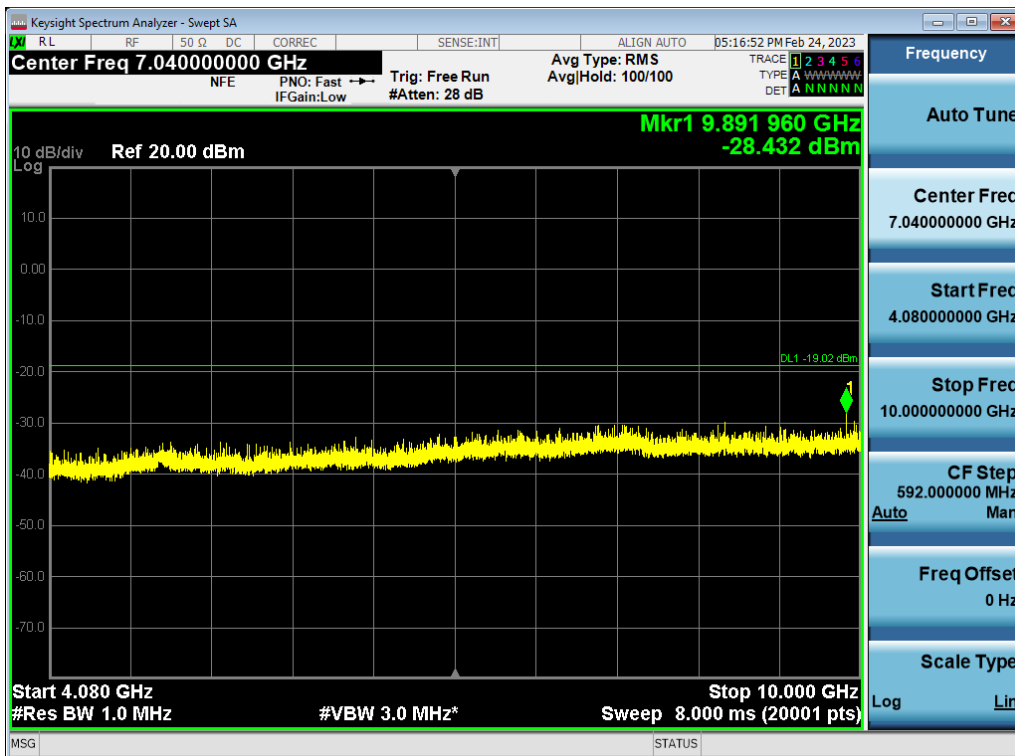
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 30 MHz ~ Low Edge - 100 MHz / 16QAM / Low / Contiguous



Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / Low Edge - 100 MHz ~ Low Edge / 256QAM / Low / Contiguous



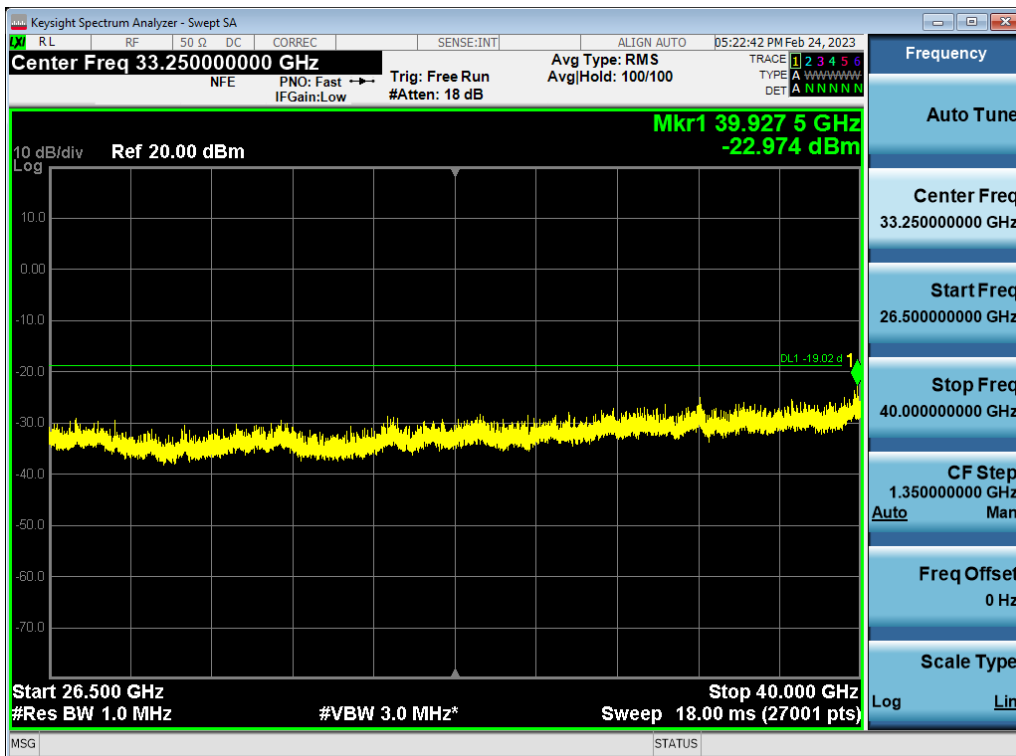


**Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / High Edge ~ High Edge + 100 MHz / 16QAM / Low / Contiguous**

**Antenna 0 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / High Edge + 100 MHz ~ 10 GHz / 16QAM / Low / Contiguous**


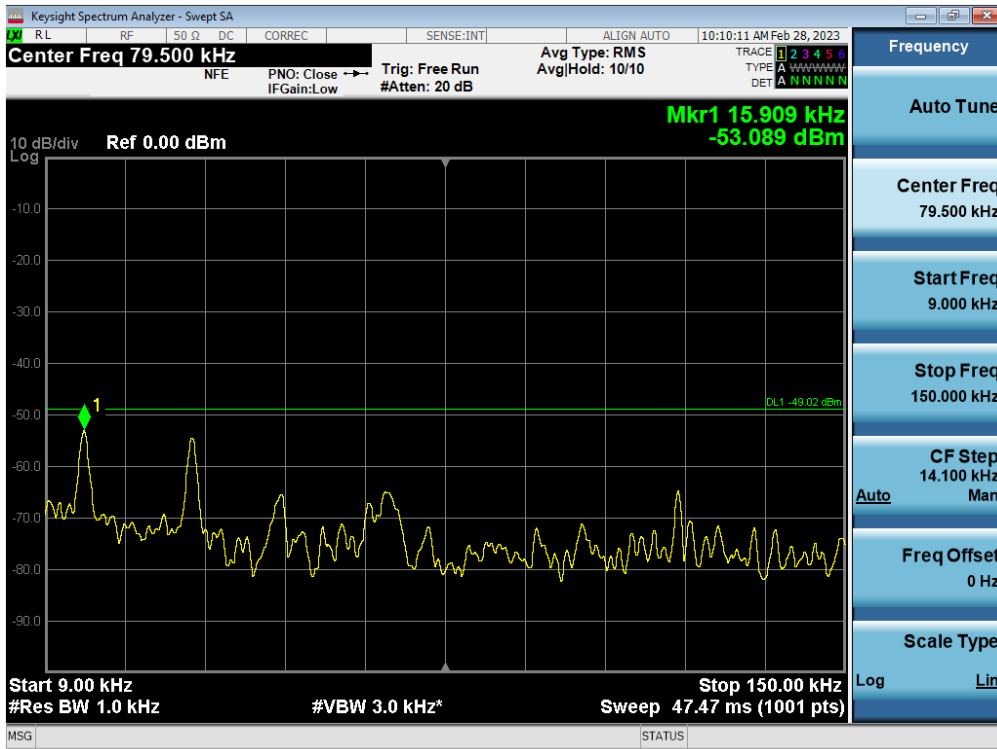
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 10 GHz ~ 26.5 GHz / 16QAM / Low / Contiguous



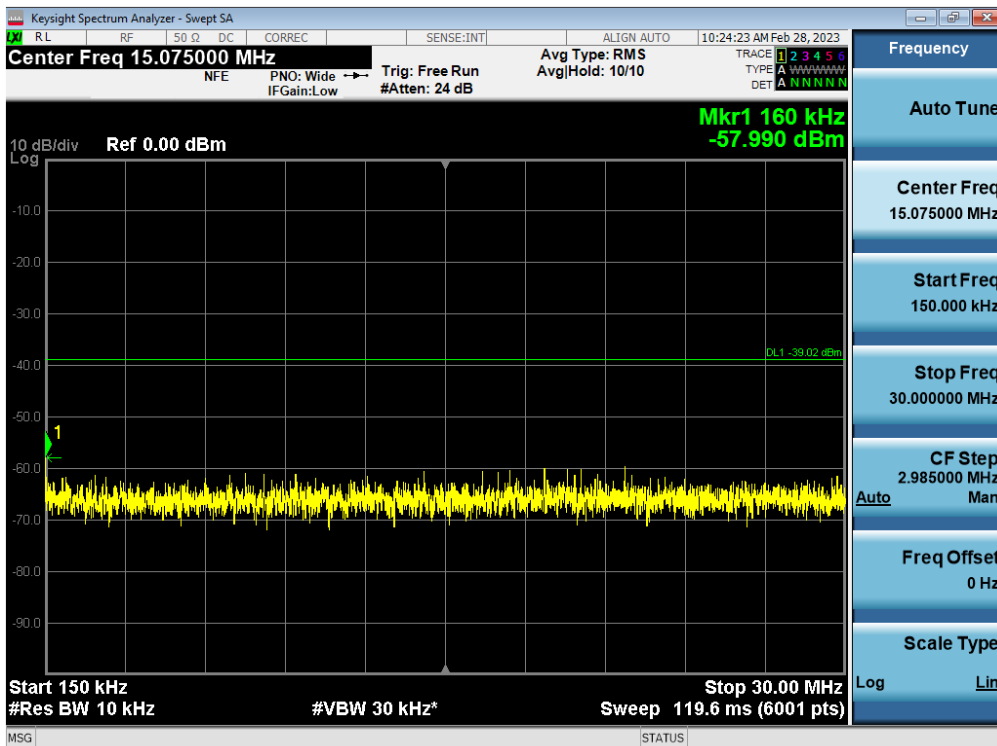
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] / 26.5 GHz ~ 40 GHz / 16QAM / Low / Contiguous



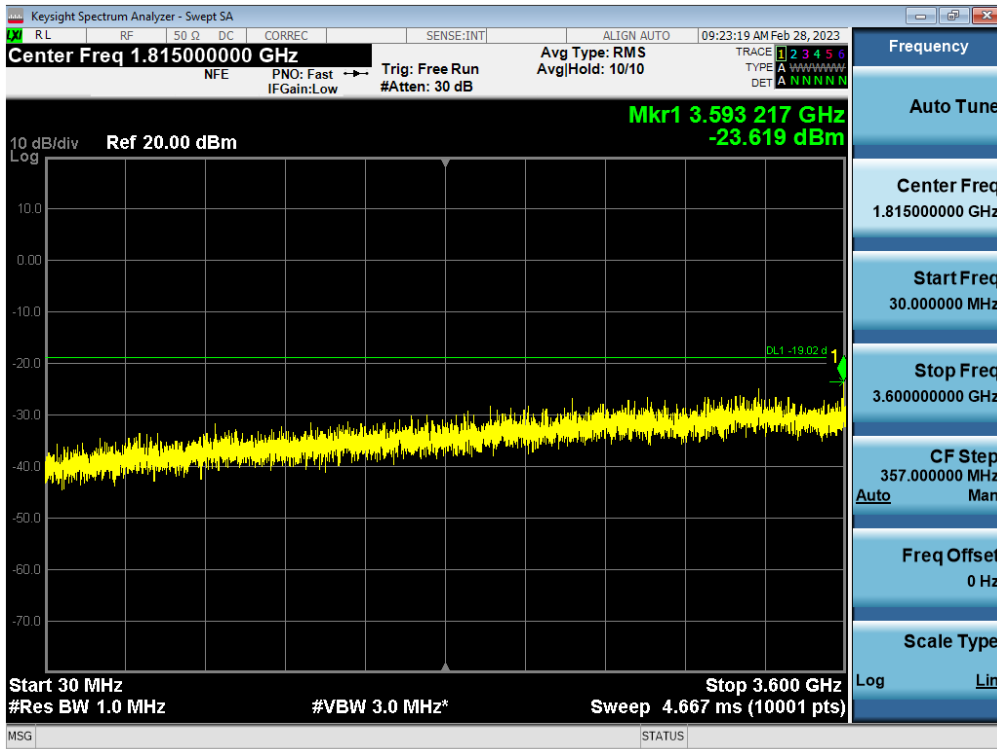
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 9 kHz ~ 150 kHz / 64QAM / Low / Contiguous



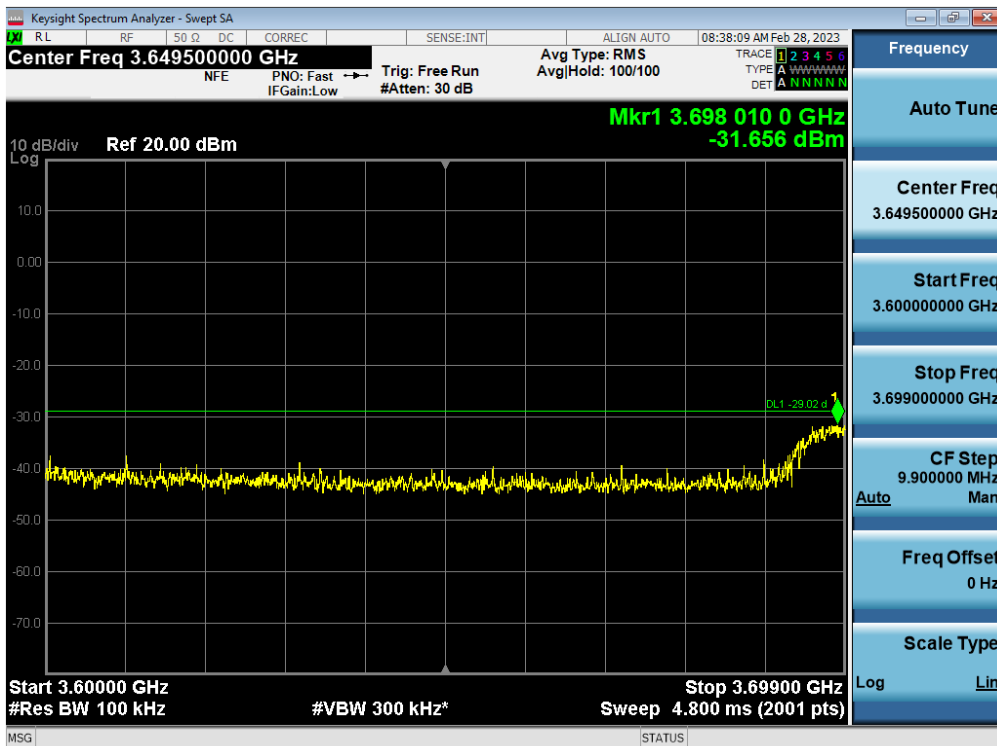
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 150 kHz ~ 30 MHz / 256QAM / Low / Contiguous



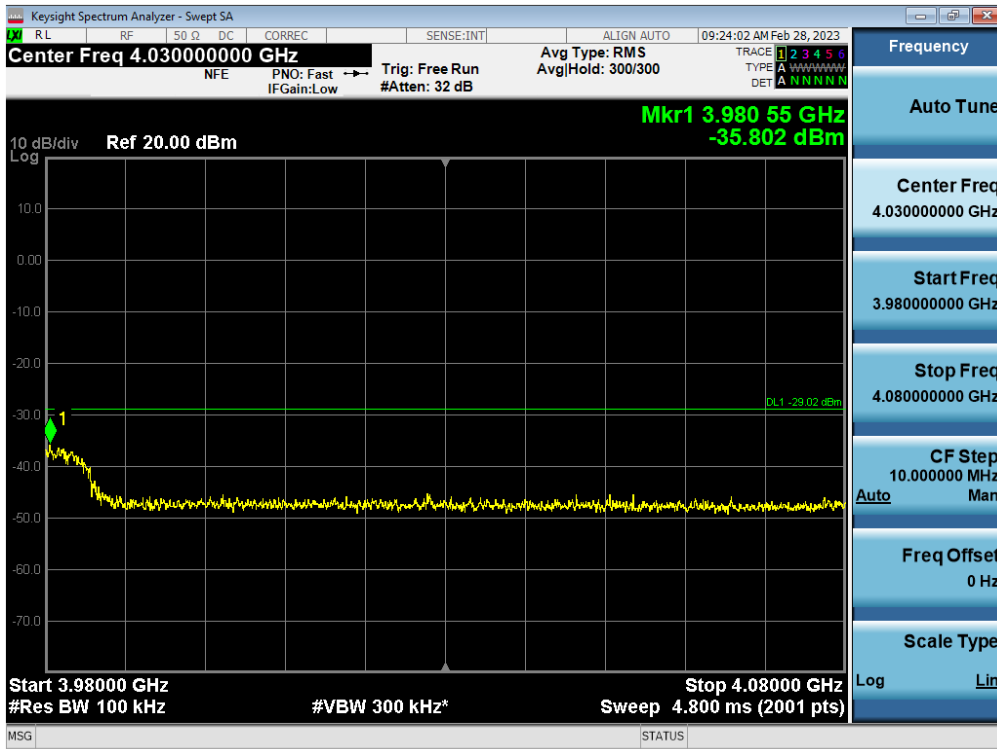
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 30 MHz ~ Low Edge - 100 MHz / 64QAM / Low / Contiguous



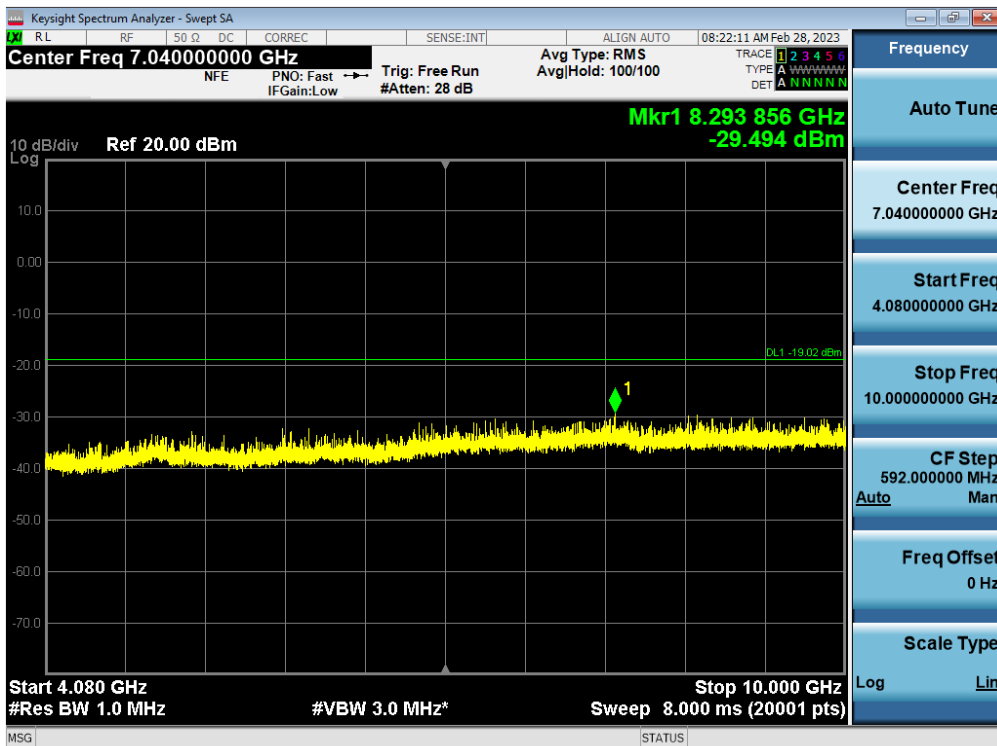
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / Low Edge - 100 MHz ~ Low Edge / QPSK / Low / Contiguous



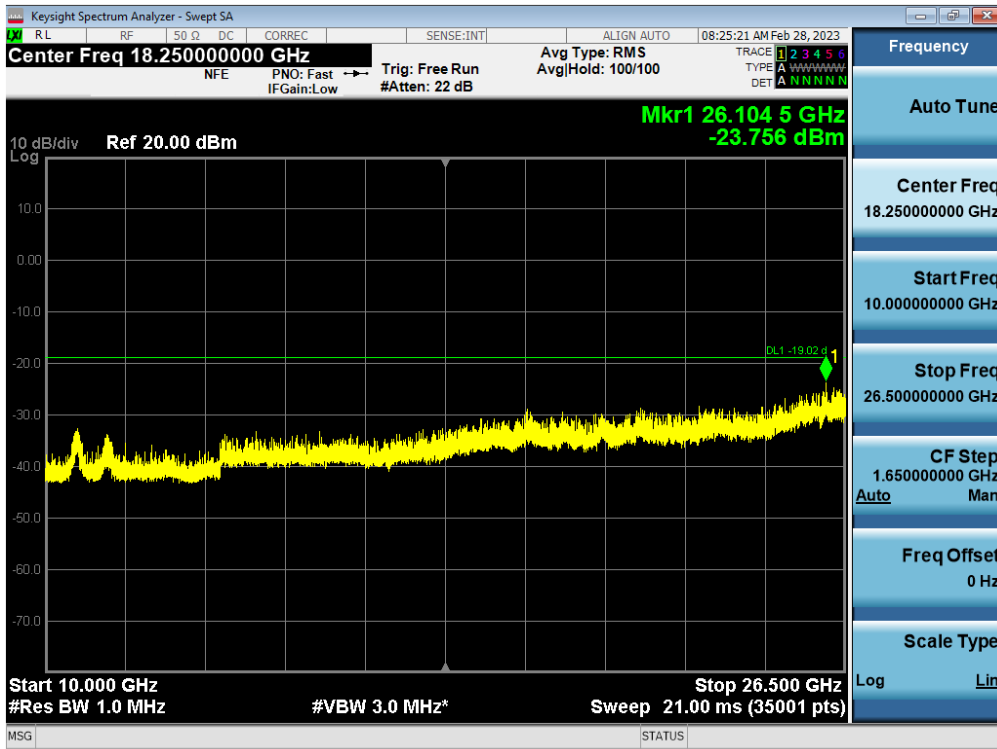
**Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / High Edge ~ High Edge + 100 MHz / 64QAM / Low / Contiguous**



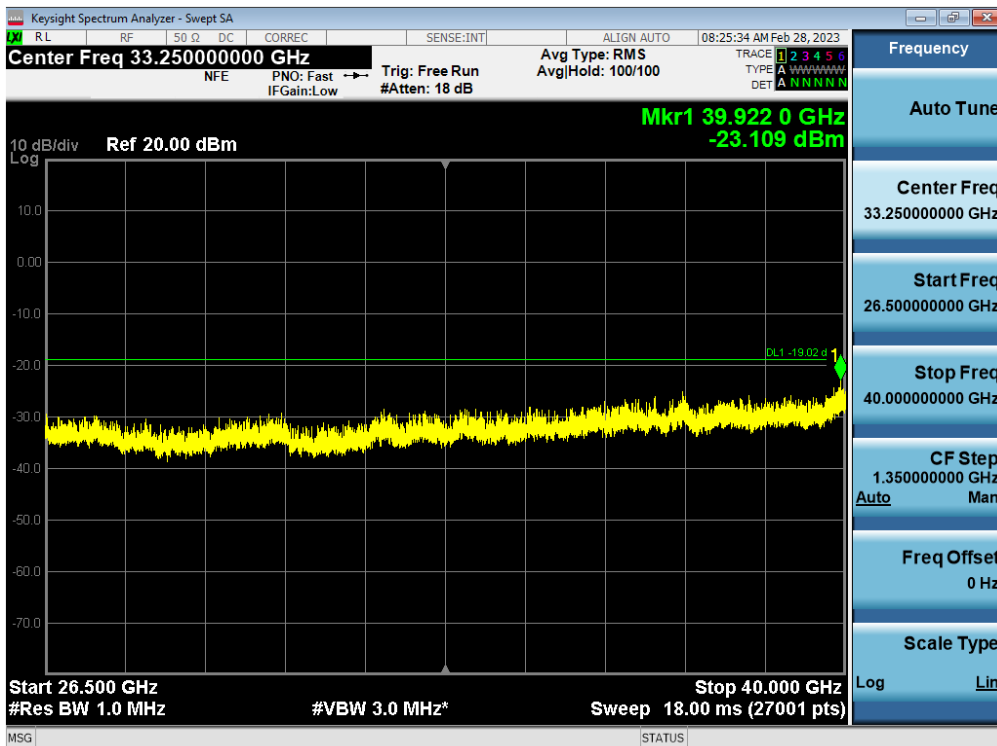
**Antenna 0 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / High Edge + 100 MHz ~ 10 GHz / QPSK / Low / Contiguous**



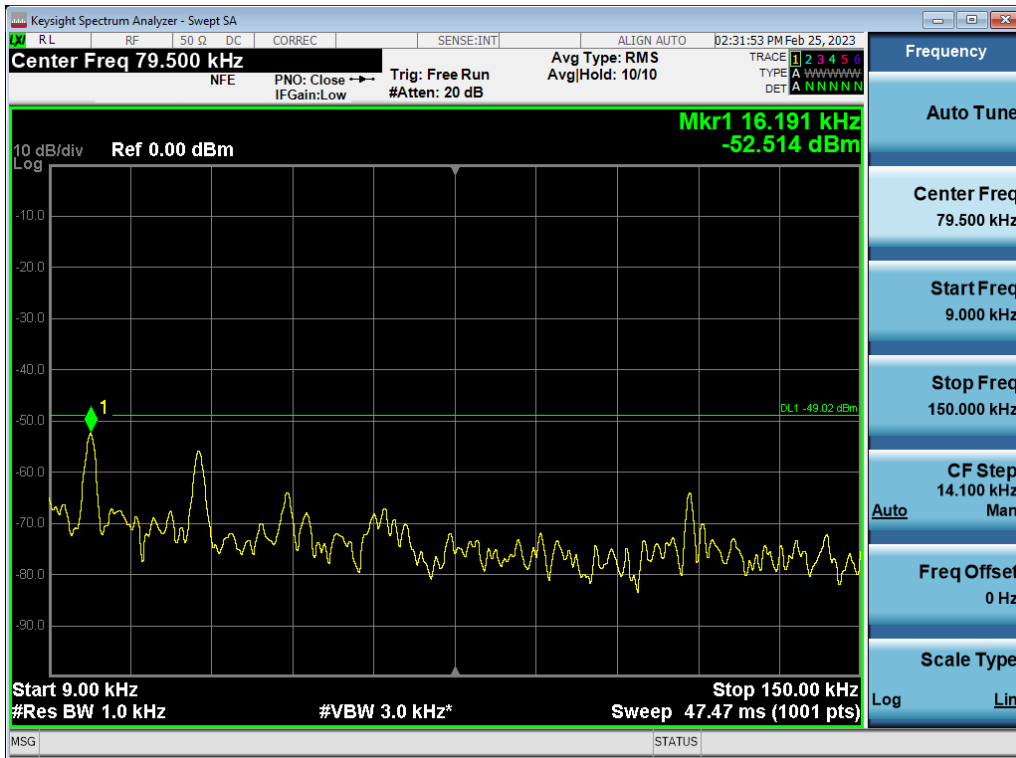
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 10 GHz ~ 26.5 GHz / QPSK / Low / Contiguous



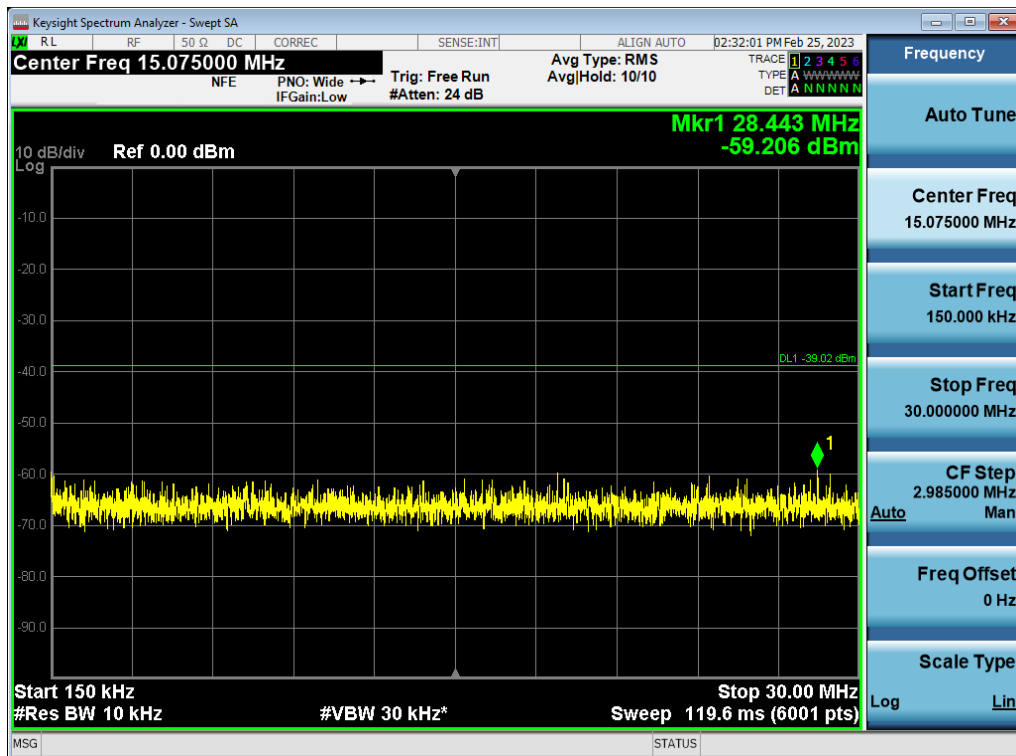
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 40 MHz 1 Carrier [2 Carrier] (Asymmetric) / 26.5 GHz ~ 40 GHz / QPSK / Low / Contiguous



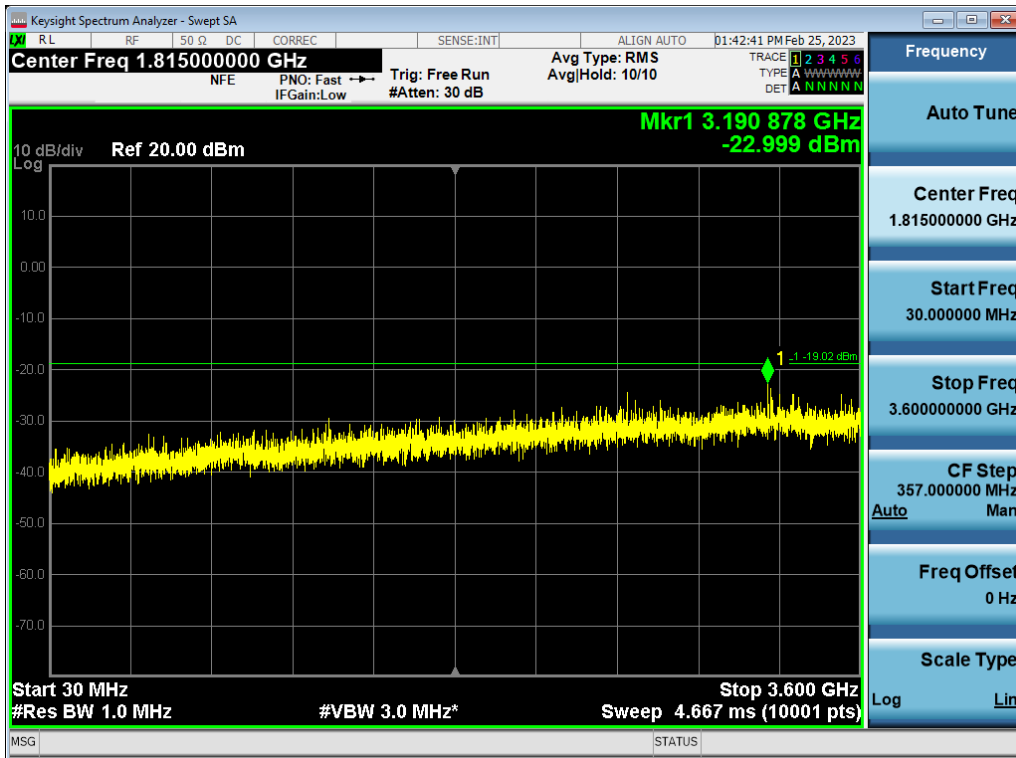
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 9 kHz ~ 150 kHz / 256QAM / Low / Contiguous



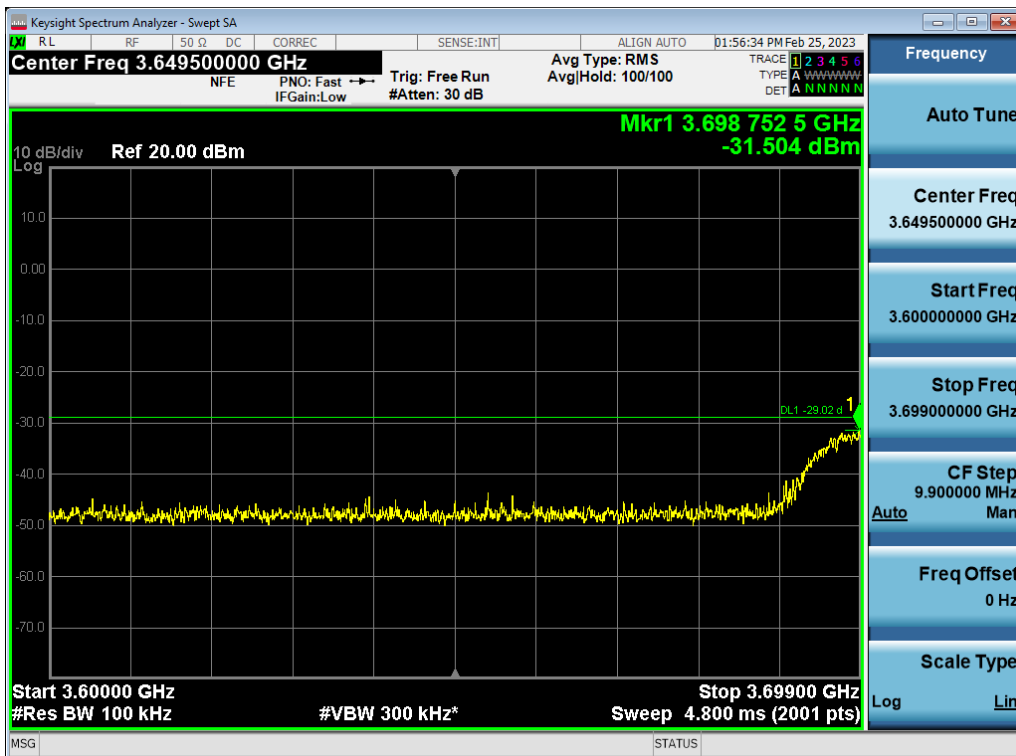
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 150 kHz ~ 30 MHz / 256QAM / Low / Contiguous



Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 30 MHz ~ Low Edge - 100 MHz / QPSK / Low / Contiguous

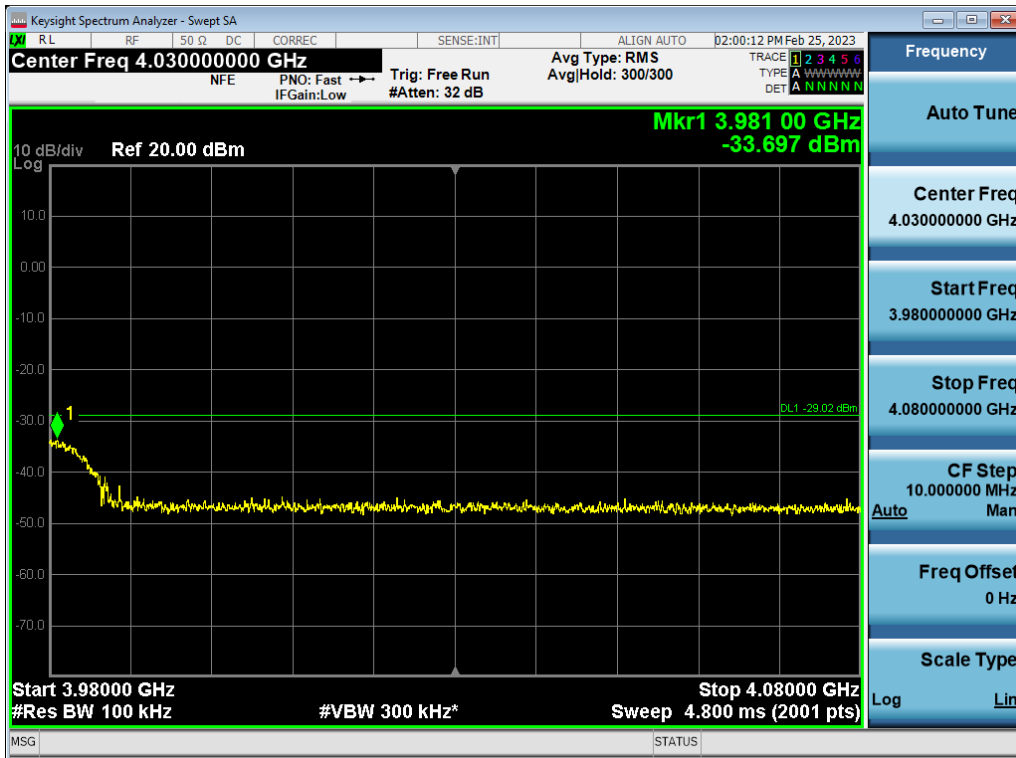


Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / Low Edge - 100 MHz ~ Low Edge / 16QAM / Low / Contiguous

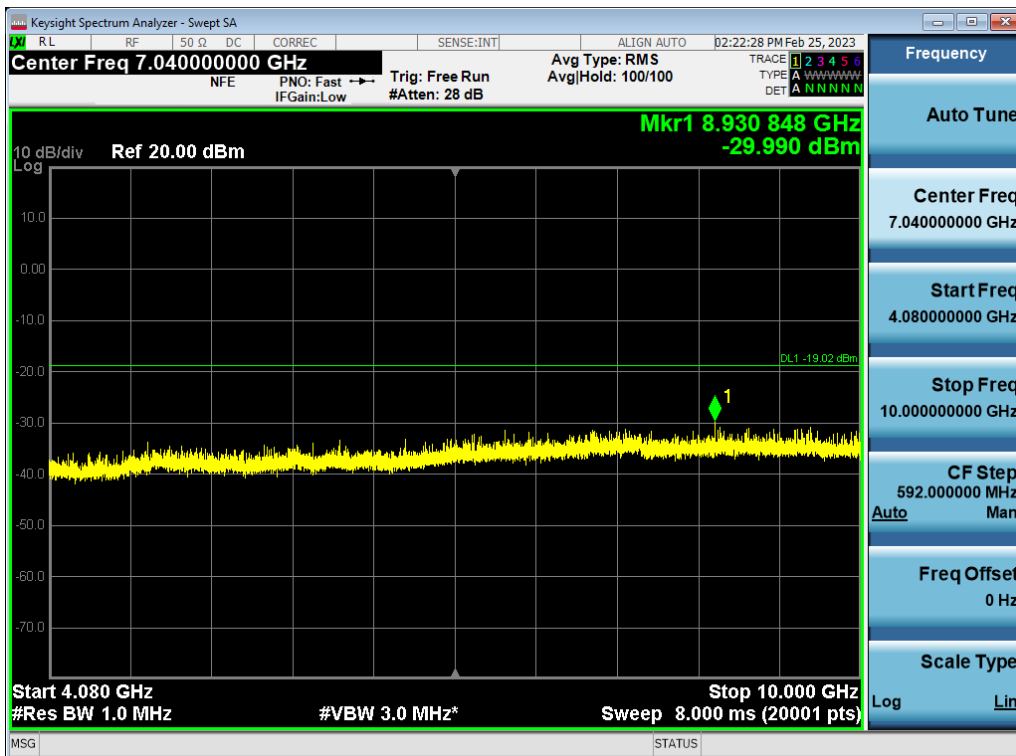




Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / High Edge ~ High Edge + 100 MHz / 16QAM / Low / Contiguous



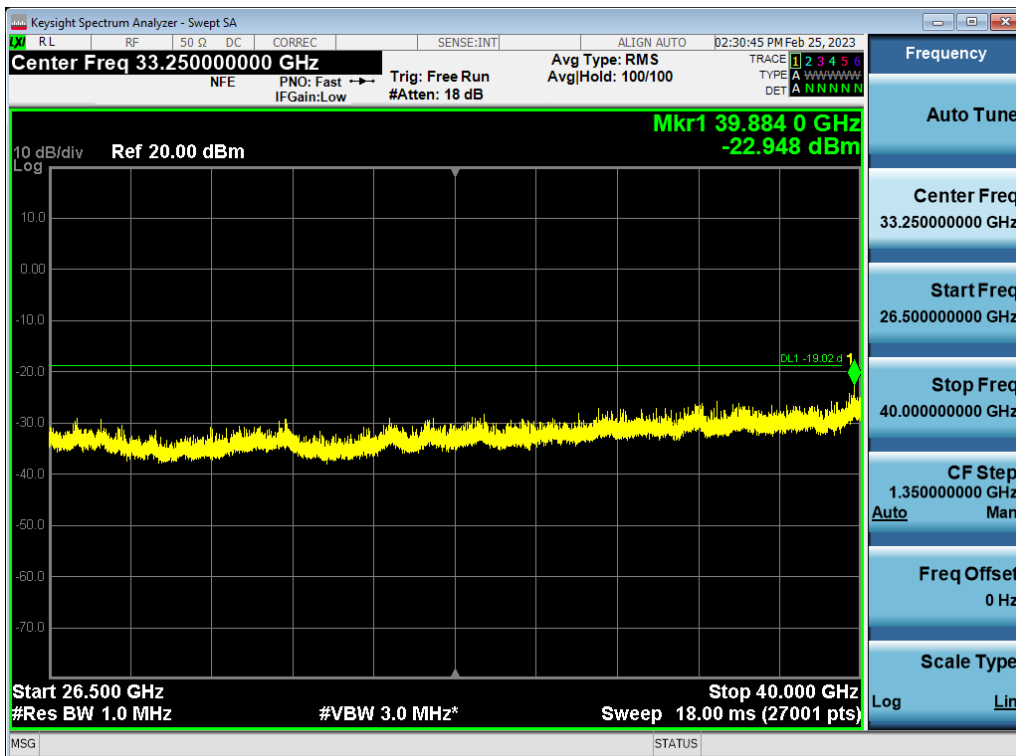
Antenna 3 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / High Edge + 100 MHz ~ 10 GHz / 64QAM / Low / Contiguous



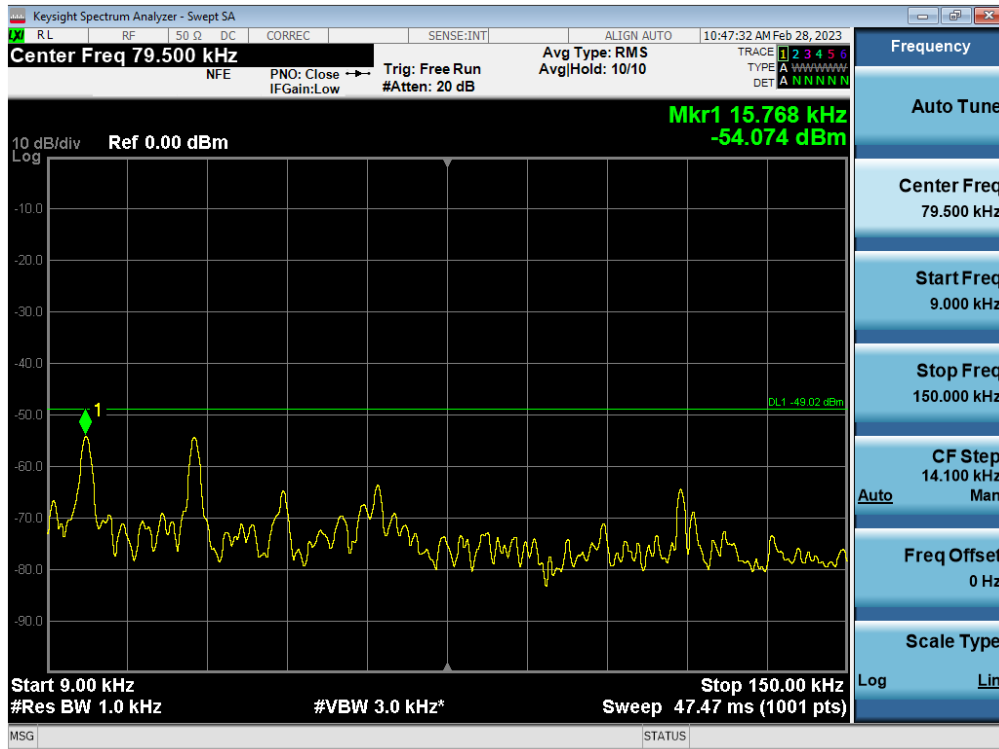
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 10 GHz ~ 26.5 GHz / 64QAM / Low / Contiguous



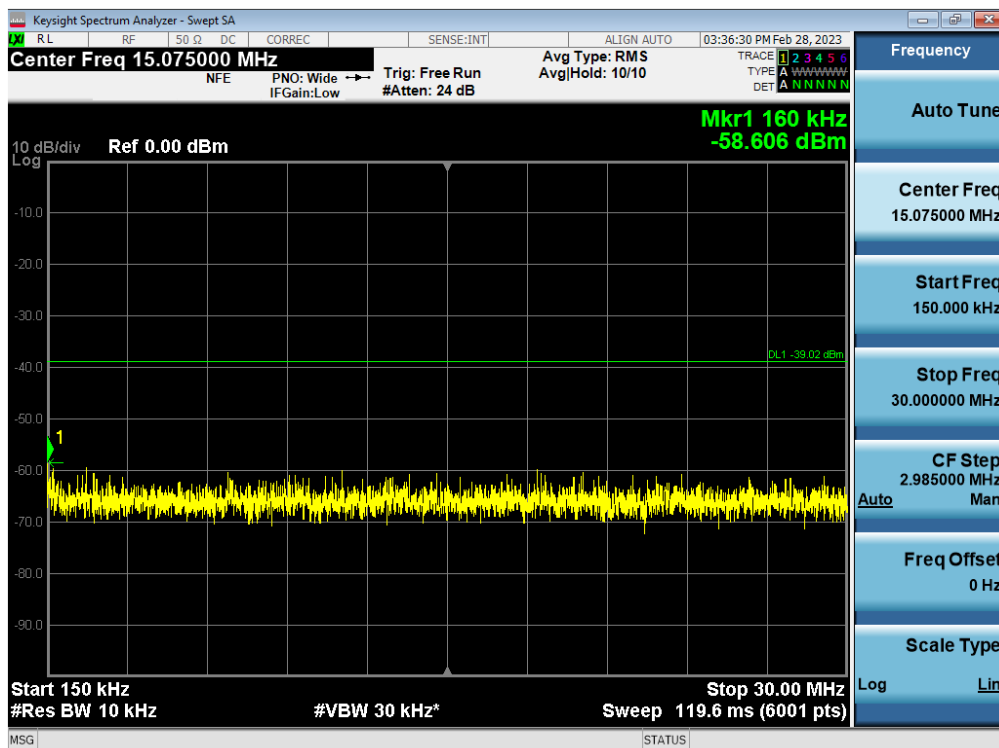
Antenna 0 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] / 26.5 GHz ~ 40 GHz / 256QAM / Low / Contiguous



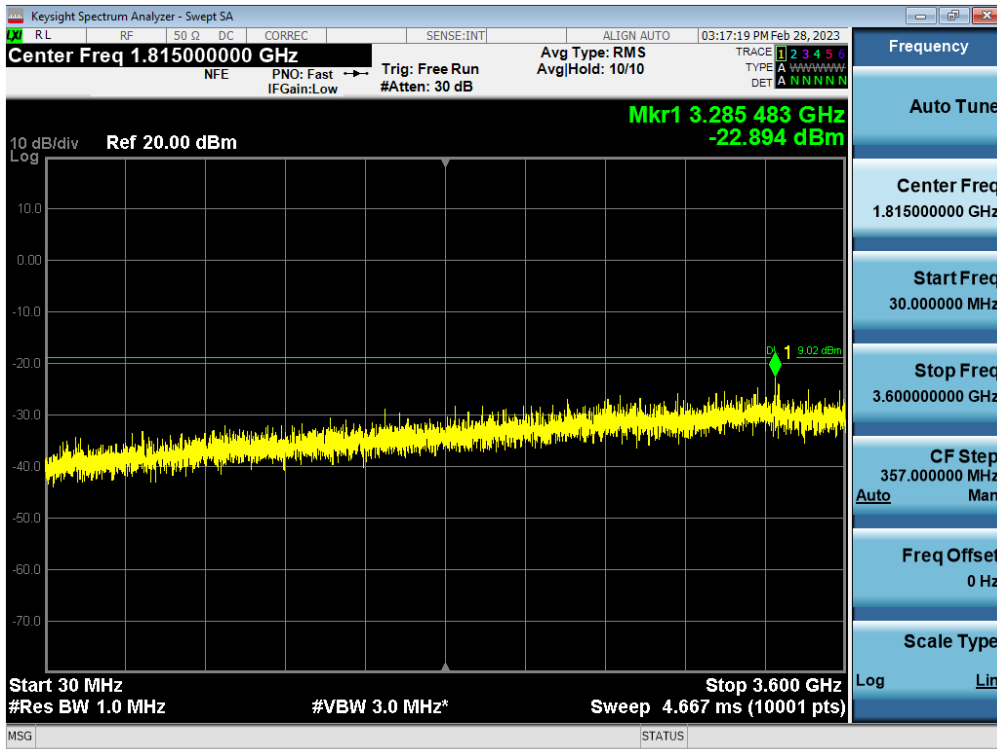
Antenna 0 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 9 kHz ~ 150 kHz / QPSK / Low / Contiguous



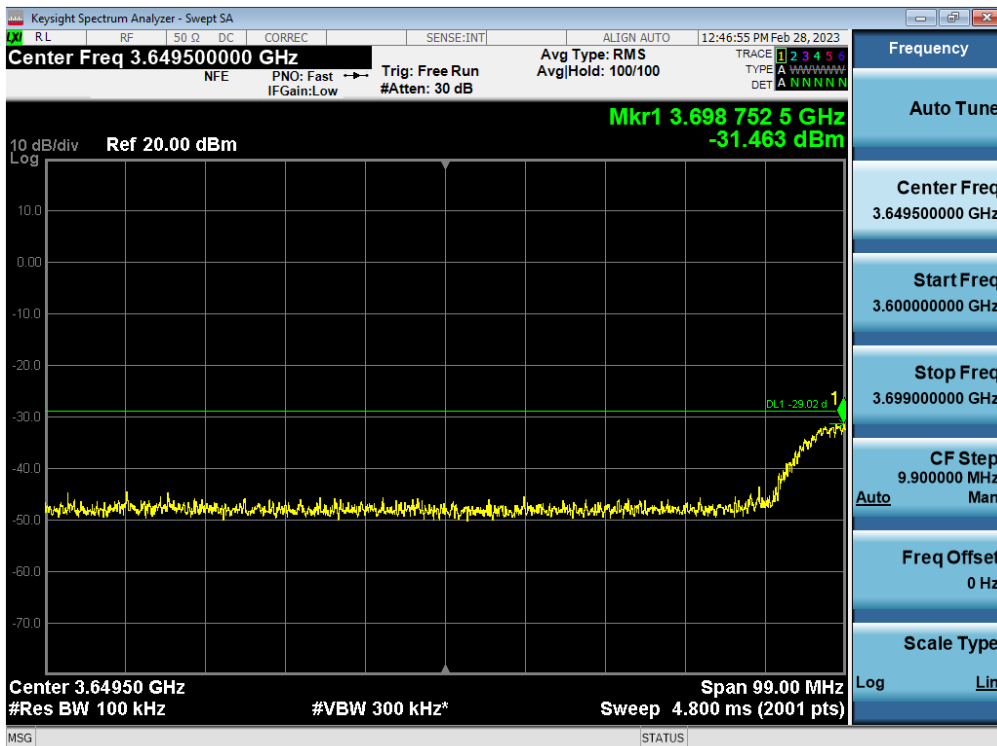
Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 150 kHz ~ 30 MHz / 256QAM / Low / Contiguous



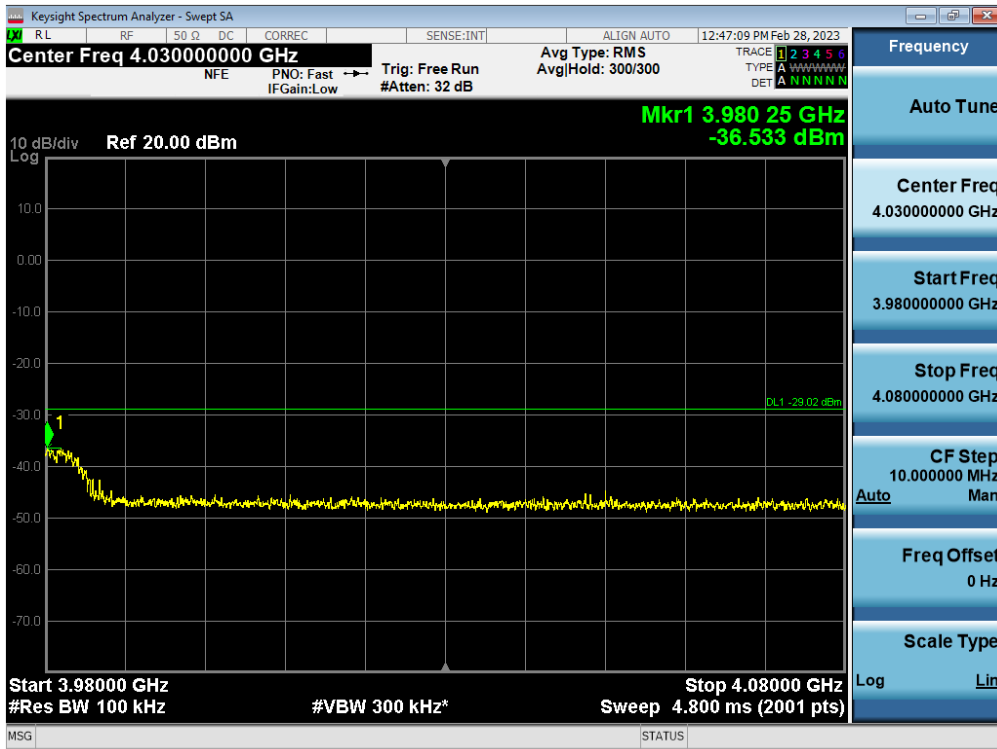
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 30 MHz ~ Low Edge - 100 MHz / 64QAM / Low / Contiguous



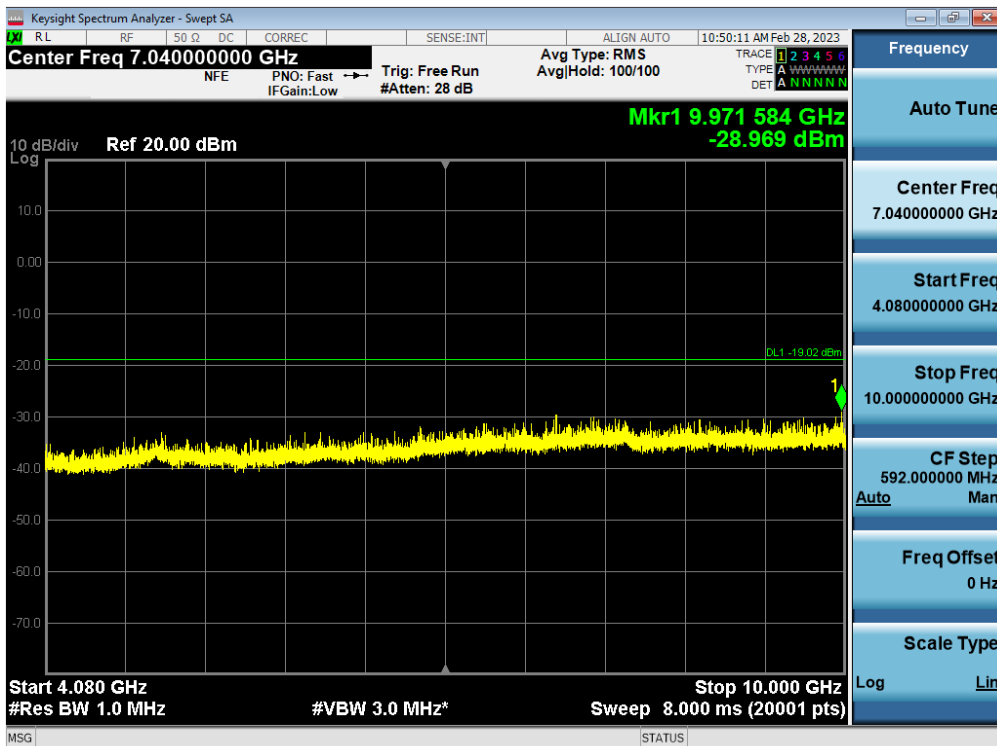
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / Low Edge - 100 MHz ~ Low Edge / QPSK / Low / Contiguous



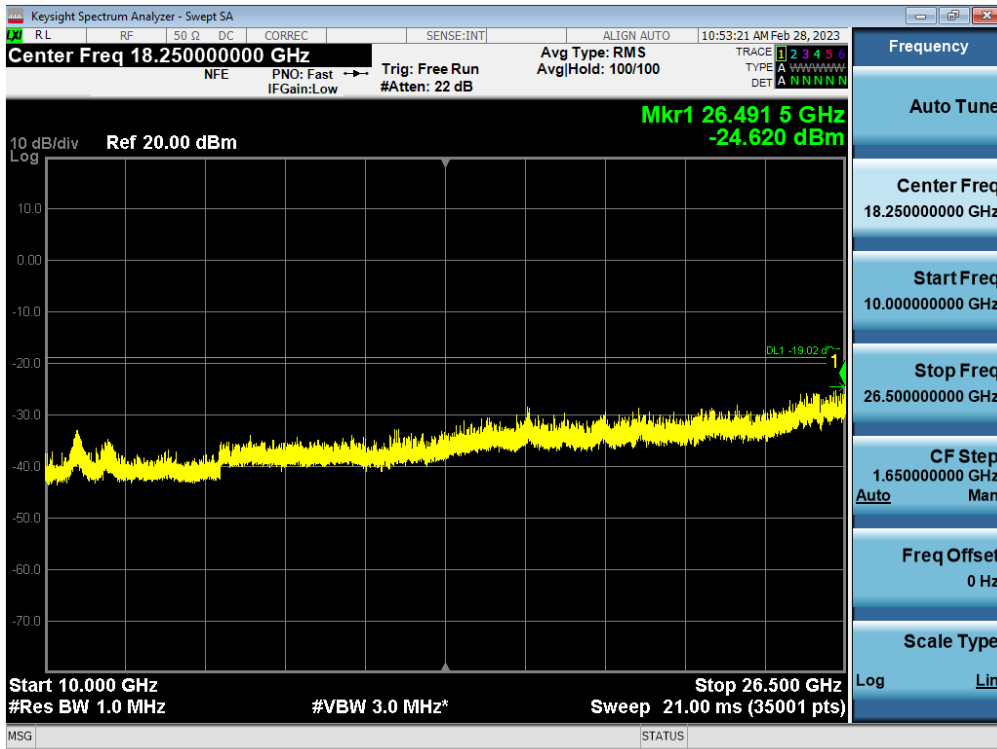
Antenna 2 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / High Edge ~ High Edge + 100 MHz / QPSK / Low / Contiguous



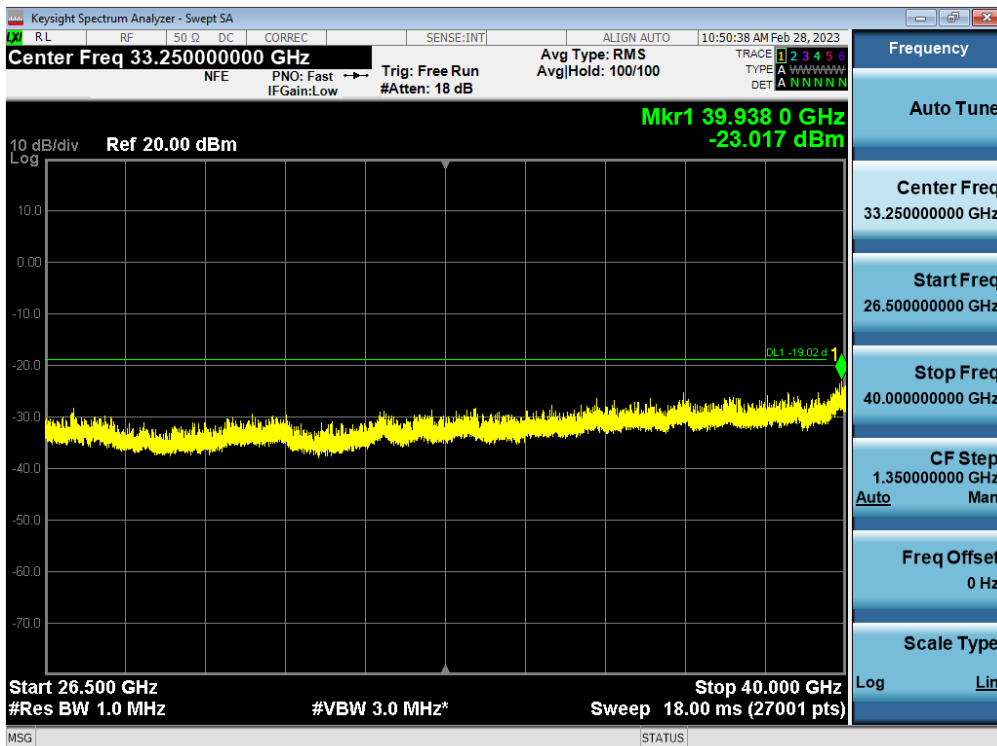
Antenna 0 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / High Edge + 100 MHz ~ 10 GHz / QPSK / Low / Contiguous



Antenna 1 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 10 GHz ~ 26.5 GHz / QPSK / Low / Contiguous



Antenna 0 / (4 Port) 5G NR n77 100 MHz 1 Carrier + 5G NR n77 100 MHz 1 Carrier [2 Carrier] (Asymmetric) / 26.5 GHz ~ 40 GHz / QPSK / Low / Contiguous



## 5.6. RADIATED EMISSIONS

### Test Requirements:

#### § 2.1053 Measurements required: Field strength of spurious radiation.

- (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
- (b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
  - (2) All equipment operating on frequencies higher than 25 MHz.
  - (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
  - (4) Other types of equipment as required, when deemed necessary by the Commission.

#### § 27.53 Emission limits.

- (l) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:
- (1) 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**Test Procedures:**

The measurement is performed in accordance with Section 5.5.3.2 of ANSI C63.26.

- a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.
- b) Each emission under consideration shall be evaluated:
  - 1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - 2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - 3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - 4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - 5) Record the measured emission amplitude level and frequency using the appropriate RBW.
- c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
- d) ~ j) Omitted
- k) Provide the complete measurement results as a part of the test report.

**Note:**

1. The results of the Radiated Emissions test shown above are measured at maximum power, and data values are attached only in the worst case.
2. The amplitude of the spurious domain emission attenuated by more than 20 dB over the permissible value was not recorded according to ANSI C63.26, clause 5.1.1., c).
3. Measure distance = 3 m
4. Among the data of simultaneous and single band emission conditions, the single emission condition is the worst.



**Test Results:**

Freq.(MHz)	Measured Level	Ant. Factor	A.G.+C.L.+H.P.F.	Pol.	Measured Power	Result
	[dBuV]	[dB/m]	[dB]		[dBm]	[dBm/m]

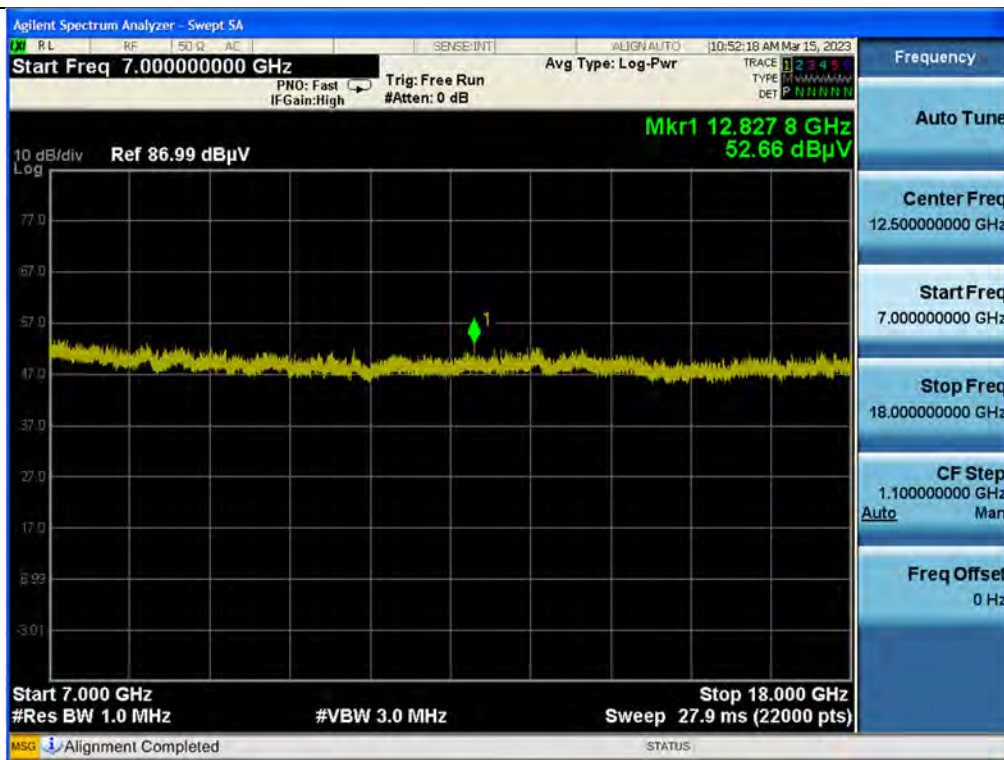
No Critical Peaks Found.

\* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

\*Result: (Measured Level – 95.2) + Ant. Factor – (A.G.+C.L.+H.P.F.)

**Plot data of Radiated Emissions**

(4 Port) 5G NR n77 40 MHz [1 Carrier]



**Note:** Only the worst case plots for Radiated Spurious Emissions.

## 5.7. FREQUENCY STABILITY

### Test Requirements:

#### § 2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From  $-30^{\circ}$  to  $+50^{\circ}$  centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

#### § 27.54 Frequency stability.

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

### Test Procedures:

The measurement is performed in accordance with Section 5.6.3, 5.6.4 and 5.6.5 of ANSI C63.26.

#### 5.6.3 Procedure for frequency stability testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at  $+20^{\circ}\text{C}$  and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

- a) At  $10^{\circ}\text{C}$  intervals of temperatures between  $-30^{\circ}\text{C}$  and  $+50^{\circ}\text{C}$  at the manufacturer's rated supply voltage, and
- b) At  $+20^{\circ}\text{C}$  temperature and  $\pm 15\%$  supply voltage variations. If a product is specified to operate over a range of input voltage then the  $-15\%$  variation is applied to the lowermost voltage and the  $+15\%$  is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy).

Full details on the choice of values shall be included in the test report.

#### 5.6.4 Frequency stability over variations in temperature

- a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.
- b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.
- c) Turn on the EUT, and tune it to the center frequency of the operating band.
- d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.
- e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.
- f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
- g) Set the temperature control on the chamber to the Highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50 °C.
- h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.
- i) Measure the frequency.
- j) Switch off the EUT, but do not switch off the oscillator heater.
- k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.
- l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be –30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and Highest channel of operation shall be identified as  $f_L$  and  $f_H$  respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of  $f_L$  and  $f_H$  and the resulting frequencies must remain within the band.
- m) Omitted

### 5.6.5 Frequency stability when varying supply voltage

- a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)
- b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.
- c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.
- d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

- e) Measure the frequency.
- f) Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.
- g) For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
- h) Repeat the frequency measurement.

NOTE—For band-edge compliance, it can be required to make these measurements at the low and High channel of the operating band.

**Note:** The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each port, so we are attached only the worst case data.

**Test Results:**

Reference: - 48 Vdc at 20°C Freq. = 3,840,000,000 Hz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100 %	+20(Ref)	3 840 000 002.675	2.675	0.000	0.00000
	-30	3 840 000 006.214	6.214	3.539	0.00092
	-20	3 840 000 004.431	4.431	1.756	0.00046
	-10	3 840 000 000.422	0.422	-2.253	-0.00059
	0	3 840 000 006.646	6.646	3.971	0.00103
	+10	3 840 000 001.253	1.253	-1.423	-0.00037
	+30	3 840 000 006.156	6.156	3.480	0.00091
	+40	3 840 000 004.119	4.119	1.443	0.00038
	+50	3 840 000 008.131	8.131	5.456	0.00142
115 %	+20	3 840 000 001.114	1.114	-1.561	-0.00041
85 %	+20	3 840 000 008.418	8.418	5.743	0.00150

**Note:** The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each port, so attached datas were only the port 0.

## 6. Annex B\_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2303-FC007-P