TEST REPORT

FCC Test for WEH37-TM24B
Certification

APPLICANT
Wave Electronics co.,Ltd

REPORT NO.
HCT-RF-2412-FC048-R2

DATE OF ISSUE
December 27, 2024

Tested by
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Applicant	**Wave Electronics co.,Ltd** 402, 114-6, Central town-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Product Name Model Name	5G O-RU WEH37-TM24B
FCC ID	2BKZBWEH37-TM24B
Date of Test	November 19, 2024 ~ December 17, 2024
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)
Test Standard Used	CFR 47 Part 2, Part 96
Test Results	PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	December 17, 2024	Initial Release
1	December 24, 2024	Updated section 5.5 - Revised note 2. - Changed the unit of the measured level in the result table from dBm to dBm/MHz. - Added the limit to the result table.
2	December 27, 2024	Revised the Applicant Address.

Notice

Content
Engineering Statement: 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. The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. When confirmation of authenticity of this test report is required, please contact www.hct.co.kr The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	Wave Electronics co.,Ltd
Company Address	402, 114-6, Central town-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea

1.2. PRODUCT INFORMATION

EUT Type	5G O-RU
EUT Serial Number	1DT012249B00015
Power Supply	DC -12 V
Frequency Range	3 550 MHz ~ 3 700 MHz
Modulation Type	QPSK, 16QAM, 64QAM, 256QAM

Output Power

Band	Carrier	Bandwidth	Power
(4 Port) 5G NR n48	1	10 MHz	0.025 W/path, Total: 0.1 W
(4 Port) 5G NR n48	1	20 MHz	0.05 W/path, Total: 0.2 W
(4 Port) 5G NR n48	1	40 MHz	0.1 W/path, Total: 0.4 W

Emission Designator

Mode	Bandwidth	Emission Designator			
		QPSK (G7D)	E.I.R.P. (W)	16/64/256 QAM (W7D)	E.I.R.P. (W)
(4 Port) 5G NR n48	10 MHz	8M72G7D	0.41	8M73W7D	0.41
(4 Port) 5G NR n48	20 MHz	18M4G7D	0.80	18M5W7D	0.82
(4 Port) 5G NR n48	40 MHz	38M1G7D	1.62	38M3W7D	1.66

CBSD Category	Category A CBSD
Antenna Gain	Peak Gain: 6 dBi (Directional Gain = G_{ANT}, because it is completely uncorrelated.)

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 96
Measurement standards	ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 662911 D01 v02r01, KDB 940660 D01 v03
Test Location	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic 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 Publication22.
Detailed description of test facility was submitted to the Commission and accepted dated March 11, 2024 (CAB identifier: 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

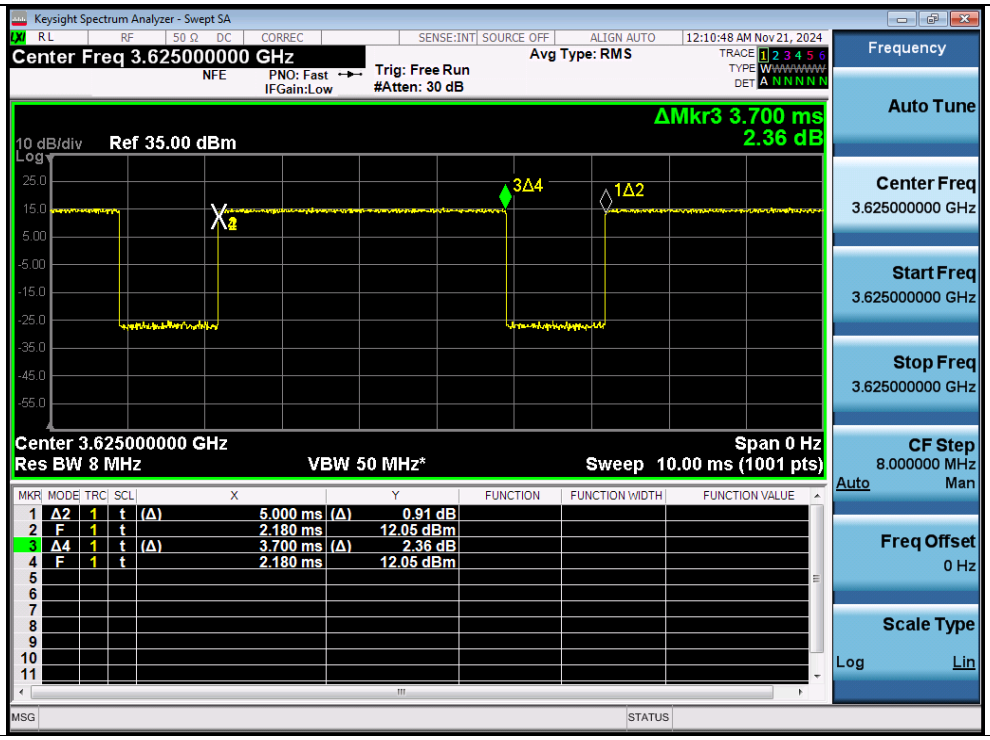
The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 96

Description	Reference	Results
RF Output Power and PSD	§ 2.1046, § 96.41(b)	Compliant
PAPR	§ 2.1046, § 96.41(g)	Compliant
Occupied Bandwidth	§ 2.1049	Compliant
Out-of-band Unwanted Emissions	§ 96.41(e)	Compliant
Spurious Unwanted Emissions	§ 96.41(e)	Compliant
Radiated Emissions	§ 96.41(e)	Compliant
Frequency Stability	§ 2.1055	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 5G NR modulation types (QPSK, 16QAM, 64QAM, 256QAM) supported by the EUT have been tested.
- Both wall mount and ceiling mount were investgated during pre-scan testing, and the results for the worst case(wall-mounted) were reported.
- 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 WEH37-TM24B Transmit On/Off Timing



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

  Duty Cycle = On-time / Transmitter period = 3.700 ms / 5.000 ms = 0.74

  Duty Correction = 10 log (1/duty cycle) = 1.31 dB (1.307... dB)#

  # The value 1.31 is an approximate value, and actual values(1.307...) have been used in all calculations.

- 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)
0.009	29.344	14 000	39.011
20	29.376	15 000	38.791
40	29.340	16 000	36.533
60	29.343	17 000	37.648
80	29.214	18 000	28.044
100	29.307	19 000	28.470
200	30.061	20 000	28.968
300	29.975	21 000	28.759
400	30.191	22 000	29.758
500	30.630	23 000	29.134
600	30.430	24 000	29.637
700	30.582	25 000	29.379
800	30.660	26 000	30.419
900	31.013	27 000	32.482
1 000	31.145	28 000	32.581
2 000	32.462	29 000	32.848
3 000	32.916	30 000	31.151
4 000	33.209	31 000	33.064
5 000	34.111	32 000	32.087
6 000	34.671	33 000	32.759
7 000	35.617	34 000	29.027
8 000	36.781	35 000	33.574
9 000	36.743	36 000	37.841
10 000	33.735	37 000	31.962
11 000	37.809	38 000	28.895
12 000	38.694	39 000	30.177
13 000	38.325	40 000	27.887

ANT1

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.309	14 000	39.444
20	29.304	15 000	38.964
40	29.287	16 000	36.783
60	29.306	17 000	37.858
80	29.130	18 000	28.044
100	29.242	19 000	28.470
200	30.001	20 000	28.968
300	29.907	21 000	28.759
400	30.127	22 000	29.758
500	30.557	23 000	29.134
600	30.361	24 000	29.637
700	30.519	25 000	29.379
800	30.609	26 000	30.419
900	30.934	27 000	32.482
1 000	31.065	28 000	32.581
2 000	32.385	29 000	32.848
3 000	32.901	30 000	31.151
4 000	33.119	31 000	33.064
5 000	33.946	32 000	32.087
6 000	34.430	33 000	32.759
7 000	35.453	34 000	29.027
8 000	36.526	35 000	33.574
9 000	36.204	36 000	37.841
10 000	33.104	37 000	31.962
11 000	37.747	38 000	28.895
12 000	39.550	39 000	30.177
13 000	38.156	40 000	27.887

ANT2

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.540	14 000	39.435
20	29.223	15 000	38.016
40	29.175	16 000	36.018
60	29.192	17 000	37.918
80	29.029	18 000	28.044
100	29.139	19 000	28.470
200	29.866	20 000	28.968
300	29.780	21 000	28.759
400	29.997	22 000	29.758
500	30.426	23 000	29.134
600	30.231	24 000	29.637
700	30.393	25 000	29.379
800	30.481	26 000	30.419
900	30.809	27 000	32.482
1 000	30.930	28 000	32.581
2 000	32.238	29 000	32.848
3 000	32.722	30 000	31.151
4 000	33.078	31 000	33.064
5 000	33.865	32 000	32.087
6 000	34.323	33 000	32.759
7 000	35.311	34 000	29.027
8 000	35.947	35 000	33.574
9 000	36.491	36 000	37.841
10 000	32.706	37 000	31.962
11 000	37.042	38 000	28.895
12 000	38.201	39 000	30.177
13 000	37.791	40 000	27.887

ANT3

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.389	14 000	39.628
20	29.339	15 000	38.361
40	29.311	16 000	36.466
60	29.309	17 000	37.548
80	29.167	18 000	28.044
100	29.298	19 000	28.470
200	30.037	20 000	28.968
300	29.965	21 000	28.759
400	30.196	22 000	29.758
500	30.632	23 000	29.134
600	30.461	24 000	29.637
700	30.617	25 000	29.379
800	30.689	26 000	30.419
900	31.052	27 000	32.482
1 000	31.205	28 000	32.581
2 000	32.580	29 000	32.848
3 000	33.014	30 000	31.151
4 000	33.420	31 000	33.064
5 000	34.195	32 000	32.087
6 000	34.521	33 000	32.759
7 000	35.220	34 000	29.027
8 000	35.972	35 000	33.574
9 000	36.384	36 000	37.841
10 000	32.593	37 000	31.962
11 000	37.737	38 000	28.895
12 000	38.920	39 000	30.177
13 000	37.920	40 000	27.887

3.3. MAXIMUM MEASUREMENT UNCERTAINTY

Description	Condition	Uncertainty
Radiated Disturbance	9 kHz ~ 30 MHz	± 4.36 dB
	30 MHz ~ 1 GHz	± 5.70 dB
	1 GHz ~ 18 GHz	± 5.52 dB
	18 GHz ~ 40 GHz	± 5.66 dB

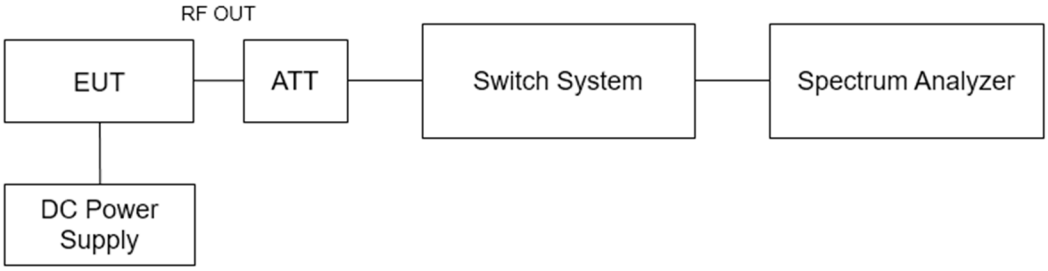
Coverage factor k = 2, Confidence levels of 95 %

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

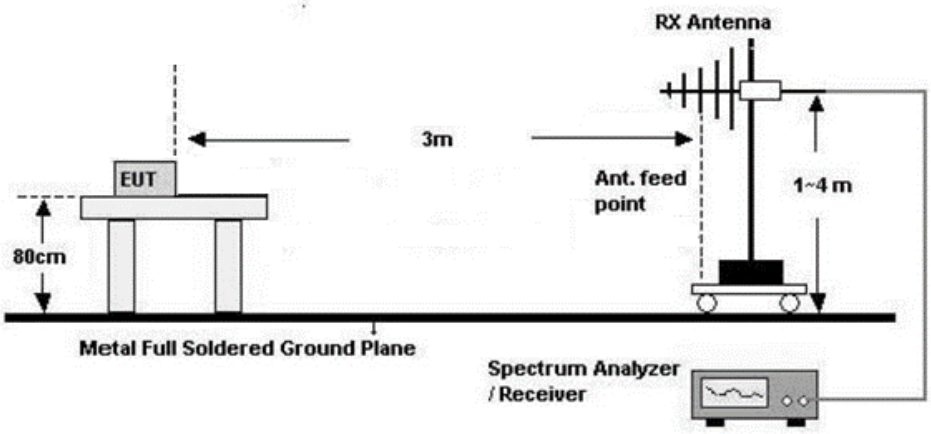
3.5. TEST DIAGRAMS

Conducted Test

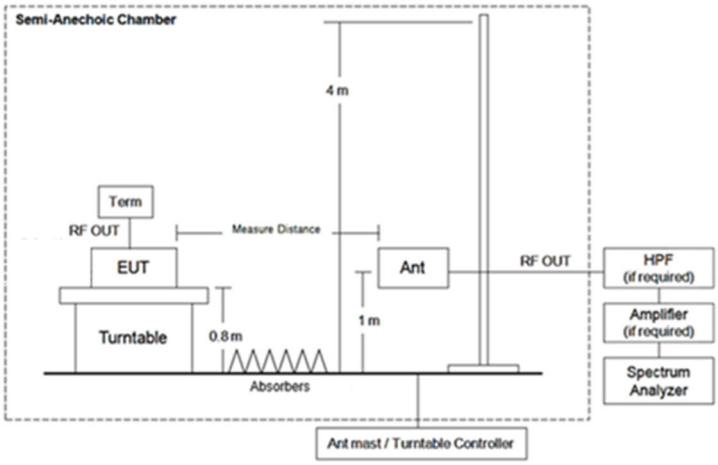


Radiated Test

30 MHz ~ 1 GHz

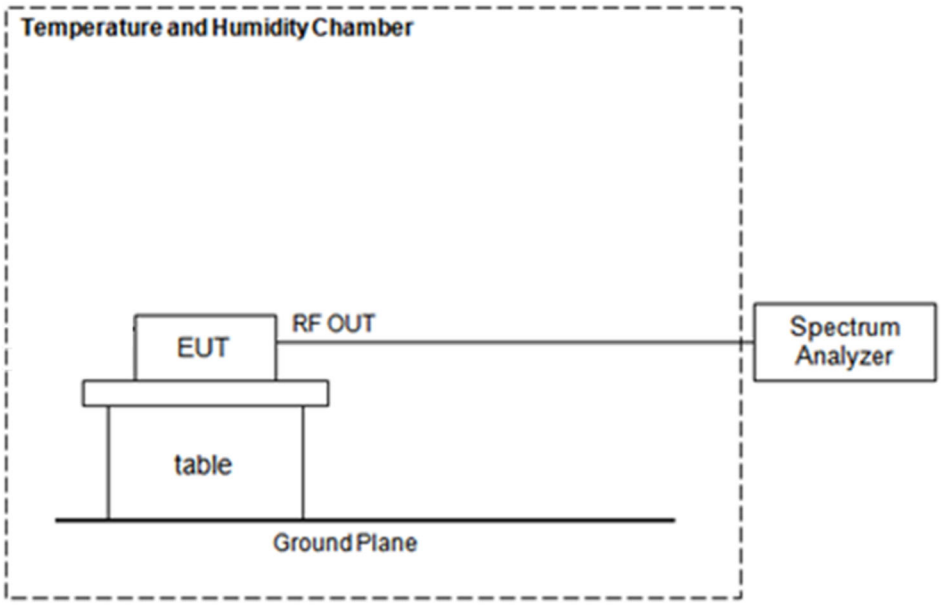


Above 1 GHz



※ Measure distance for Above 1 GHz is 3 m

Frequency Stability



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	07/19/2025	Annual
PXA Signal Analyzer	N9030B	Keysight	MY60070602	04/26/2025	Annual
RF Switch System	TMX0108	TNM System	TM21100001	N/A	N/A
20 dB Attenuator	FAS-23-20	MCLI	103756	01/02/2025	Annual
#30 dB Attenuator	TWAN-300-18G	Teleworld	N/A	08/12/2025	Annual
#50Ω Termination	908A	H.P.	N/A	N/A	N/A
DC Power Supply	EX 60-40	ODA	ODA-02-0923-01601	02/23/2025	Annual
Temperature and Humidity Chamber	NY-THR18750	NANGYEAL	NY-200912201A	01/04/2025	Annual
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090002	N/A	N/A
Controller(Antenna Mast & Turn Table)	CO3000	Innco system	CO3000/1251/48920320/P	N/A	N/A
Antenna Mast	MA4640	Innco system	S4AM	08/07/2025	Annual
Turn Table	DS2000-S	Innco system	N/A	N/A	N/A
Turn Table	N/A	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/07/2026	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/28/2026	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-937	02/13/2025	Biennial
Horn Antenna	BBHA9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
RF Switching System	FBSR-04C (10 dB ATT + LNA)	TNM system	S4L2	04/11/2025	Annual
RF Switching System	FBSR-04C (3 dB ATT + LNA)	TNM system	S4L3	04/11/2025	Annual
RF Switching System	FBSR-04C (LNA)	TNM system	S4L4	04/11/2025	Annual
RF Switching System	FBSR-04C (7 GHz HPF + LNA)	TNM system	S4L5	04/11/2025	Annual
RF Switching System	FBSR-04C (Thru)	TNM system	S4L6	04/11/2025	Annual
LOW NOISE AMPLIFIER	TK-PA1840H	TESTEK	170011-L	10/11/2025	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.

§ 96.41(b) General radio requirements: Power limits.

(b) Unless otherwise specified in this section, the maximum effective isotropic radiated power (EIRP) and maximum Power Spectral Density (PSD) of any CBSD and End User Device must comply with the limits shown in the table in this paragraph (b):

Device	Maximum EIRP (dBm/10megahertz)	Maximum PSD (dBm/MHz)
End User Device	23	n/a
Category A CBSD	30	20
Category B CBSD[1]	47	37

[1] Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with § § 96.15 and 96.67.

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 × to 3 × the OBW.

b) Set RBW = 1 % to 5 % of the OBW.

c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time:

   1) Set = auto-couple, or

   2) Set ≥ [10 × (number of points in sweep) × (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 ≤ ±2%) or non-constant (variations > ±2%), respectively.

Note:

1. Because the test equipment does not support RBW of RBW narrower than reference bandwidth is used. So following correction factor is applied.
   - 10 log [(reference bandwidth)/(resolution bandwidth)]
     : All other NR signals applied 1 MHz RBW, 10 log (10 MHz / 1 MHz) = 10 dB
2. E.I.R.P. (dBm/10 MHz) Sample Calculation:
   - For greater or equal to 10 MHz NR Signal,
     6.39 dBm/MHz (Measured Value) + 6 dBi (Directional Gain) + 10 dB (RBW Correction)
     = 22.39 dBm/10 MHz (Final E.I.R.P.)
     The measured value already includes the duty correction value.
3. The results of the Conducted output power and PSD test shown below 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 RF Output Power

(4 Port) 5G NR n48 10 MHz 1 Carrier

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
0	QPSK	Low	3 555.00	14.11	0.03	6.00	20.11	0.10
		Middle	3 625.00	14.09	0.03	6.00	20.09	0.10
		High	3 695.00	13.96	0.02	6.00	19.96	0.10
	16QAM	Low	3 555.00	14.10	0.03	6.00	20.10	0.10
		Middle	3 625.00	14.04	0.03	6.00	20.04	0.10
		High	3 695.00	13.93	0.02	6.00	19.93	0.10
	64QAM	Low	3 555.00	14.09	0.03	6.00	20.09	0.10
		Middle	3 625.00	14.07	0.03	6.00	20.07	0.10
		High	3 695.00	13.93	0.02	6.00	19.93	0.10
	256QAM	Low	3 555.00	14.19	0.03	6.00	20.19	0.10
		Middle	3 625.00	14.08	0.03	6.00	20.08	0.10
		High	3 695.00	13.99	0.03	6.00	19.99	0.10
1	QPSK	Low	3 555.00	14.09	0.03	6.00	20.09	0.10
		Middle	3 625.00	14.02	0.03	6.00	20.02	0.10
		High	3 695.00	14.07	0.03	6.00	20.07	0.10
	16QAM	Low	3 555.00	14.05	0.03	6.00	20.05	0.10
		Middle	3 625.00	14.06	0.03	6.00	20.06	0.10
		High	3 695.00	14.11	0.03	6.00	20.11	0.10
	64QAM	Low	3 555.00	14.20	0.03	6.00	20.20	0.10
		Middle	3 625.00	14.01	0.03	6.00	20.01	0.10
		High	3 695.00	14.02	0.03	6.00	20.02	0.10
	256QAM	Low	3 555.00	14.10	0.03	6.00	20.10	0.10
		Middle	3 625.00	14.03	0.03	6.00	20.03	0.10
		High	3 695.00	14.17	0.03	6.00	20.17	0.10
2	QPSK	Low	3 555.00	14.15	0.03	6.00	20.15	0.10
		Middle	3 625.00	14.07	0.03	6.00	20.07	0.10
		High	3 695.00	14.06	0.03	6.00	20.06	0.10
	16QAM	Low	3 555.00	14.07	0.03	6.00	20.07	0.10
		Middle	3 625.00	14.07	0.03	6.00	20.07	0.10
		High	3 695.00	14.09	0.03	6.00	20.09	0.10
	64QAM	Low	3 555.00	14.11	0.03	6.00	20.11	0.10
		Middle	3 625.00	14.06	0.03	6.00	20.06	0.10
		High	3 695.00	14.05	0.03	6.00	20.05	0.10
	256QAM	Low	3 555.00	14.09	0.03	6.00	20.09	0.10
		Middle	3 625.00	14.10	0.03	6.00	20.10	0.10
		High	3 695.00	14.11	0.03	6.00	20.11	0.10
3	QPSK	Low	3 555.00	14.05	0.03	6.00	20.05	0.10
		Middle	3 625.00	14.00	0.03	6.00	20.00	0.10
		High	3 695.00	14.00	0.03	6.00	20.00	0.10
	16QAM	Low	3 555.00	14.03	0.03	6.00	20.03	0.10
		Middle	3 625.00	13.96	0.02	6.00	19.96	0.10
		High	3 695.00	13.99	0.03	6.00	19.99	0.10
	64QAM	Low	3 555.00	14.04	0.03	6.00	20.04	0.10
		Middle	3 625.00	13.98	0.03	6.00	19.98	0.10
		High	3 695.00	14.00	0.03	6.00	20.00	0.10
	256QAM	Low	3 555.00	14.08	0.03	6.00	20.08	0.10
		Middle	3 625.00	14.01	0.03	6.00	20.01	0.10
		High	3 695.00	14.10	0.03	6.00	20.10	0.10

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

Frequency (MHz)	Output Power (Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 555.00	0.41	0.41	0.41	0.41
3 625.00	0.40	0.40	0.40	0.41
3 695.00	0.40	0.40	0.40	0.41

(4 Port) 5G NR n48 20 MHz 1 Carrier

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
0	QPSK	Low	3 560.00	17.04	0.05	6.00	23.04	0.20
		Middle	3 625.00	16.95	0.05	6.00	22.95	0.20
		High	3 690.00	16.99	0.05	6.00	22.99	0.20
	16QAM	Low	3 560.00	17.02	0.05	6.00	23.02	0.20
		Middle	3 625.00	16.92	0.05	6.00	22.92	0.20
		High	3 690.00	17.04	0.05	6.00	23.04	0.20
	64QAM	Low	3 560.00	17.09	0.05	6.00	23.09	0.20
		Middle	3 625.00	16.94	0.05	6.00	22.94	0.20
		High	3 690.00	17.03	0.05	6.00	23.03	0.20
	256QAM	Low	3 560.00	17.18	0.05	6.00	23.18	0.21
		Middle	3 625.00	16.94	0.05	6.00	22.94	0.20
		High	3 690.00	17.20	0.05	6.00	23.20	0.21
1	QPSK	Low	3 560.00	16.98	0.05	6.00	22.98	0.20
		Middle	3 625.00	17.17	0.05	6.00	23.17	0.21
		High	3 690.00	17.00	0.05	6.00	23.00	0.20
	16QAM	Low	3 560.00	16.99	0.05	6.00	22.99	0.20
		Middle	3 625.00	16.96	0.05	6.00	22.96	0.20
		High	3 690.00	17.11	0.05	6.00	23.11	0.20
	64QAM	Low	3 560.00	17.00	0.05	6.00	23.00	0.20
		Middle	3 625.00	17.08	0.05	6.00	23.08	0.20
		High	3 690.00	17.15	0.05	6.00	23.15	0.21
	256QAM	Low	3 560.00	17.02	0.05	6.00	23.02	0.20
		Middle	3 625.00	17.09	0.05	6.00	23.09	0.20
		High	3 690.00	17.18	0.05	6.00	23.18	0.21
2	QPSK	Low	3 560.00	17.03	0.05	6.00	23.03	0.20
		Middle	3 625.00	17.03	0.05	6.00	23.03	0.20
		High	3 690.00	16.96	0.05	6.00	22.96	0.20
	16QAM	Low	3 560.00	16.91	0.05	6.00	22.91	0.20
		Middle	3 625.00	16.96	0.05	6.00	22.96	0.20
		High	3 690.00	17.00	0.05	6.00	23.00	0.20
	64QAM	Low	3 560.00	16.96	0.05	6.00	22.96	0.20
		Middle	3 625.00	17.05	0.05	6.00	23.05	0.20
		High	3 690.00	17.07	0.05	6.00	23.07	0.20
	256QAM	Low	3 560.00	16.95	0.05	6.00	22.95	0.20
		Middle	3 625.00	17.00	0.05	6.00	23.00	0.20
		High	3 690.00	17.09	0.05	6.00	23.09	0.20
3	QPSK	Low	3 560.00	17.00	0.05	6.00	23.00	0.20
		Middle	3 625.00	16.93	0.05	6.00	22.93	0.20
		High	3 690.00	17.08	0.05	6.00	23.08	0.20
	16QAM	Low	3 560.00	16.98	0.05	6.00	22.98	0.20
		Middle	3 625.00	16.93	0.05	6.00	22.93	0.20
		High	3 690.00	17.04	0.05	6.00	23.04	0.20
	64QAM	Low	3 560.00	16.98	0.05	6.00	22.98	0.20
		Middle	3 625.00	16.97	0.05	6.00	22.97	0.20
		High	3 690.00	17.04	0.05	6.00	23.04	0.20
	256QAM	Low	3 560.00	17.01	0.05	6.00	23.01	0.20
		Middle	3 625.00	16.98	0.05	6.00	22.98	0.20
		High	3 690.00	17.10	0.05	6.00	23.10	0.20

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

Frequency (MHz)	Output Power (Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 560.00	0.80	0.79	0.80	0.81
3 625.00	0.80	0.79	0.80	0.80
3 690.00	0.80	0.81	0.81	0.82

(4 Port) 5G NR n48 40 MHz 1 Carrier

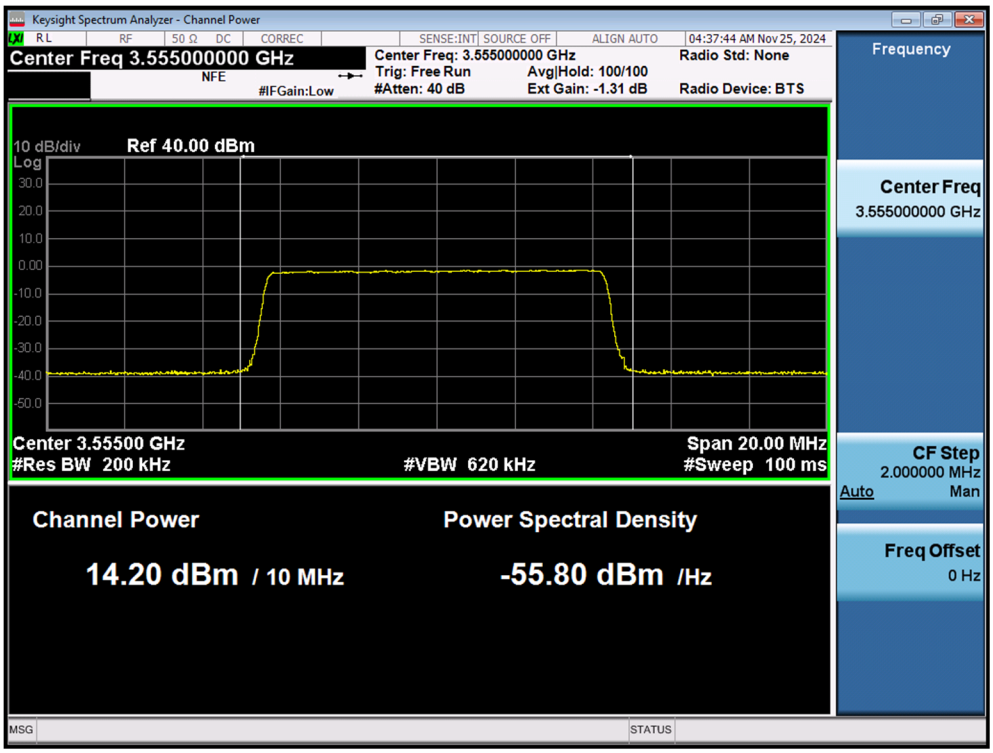
Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
0	QPSK	Low	3 570.00	20.00	0.10	6.00	26.00	0.40
		Middle	3 625.00	20.02	0.10	6.00	26.02	0.40
		High	3 680.00	20.05	0.10	6.00	26.05	0.40
	16QAM	Low	3 570.00	19.90	0.10	6.00	25.90	0.39
		Middle	3 625.00	19.98	0.10	6.00	25.98	0.40
		High	3 680.00	20.13	0.10	6.00	26.13	0.41
	64QAM	Low	3 570.00	20.10	0.10	6.00	26.10	0.41
		Middle	3 625.00	19.95	0.10	6.00	25.95	0.39
		High	3 680.00	20.09	0.10	6.00	26.09	0.41
	256QAM	Low	3 570.00	19.98	0.10	6.00	25.98	0.40
		Middle	3 625.00	19.99	0.10	6.00	25.99	0.40
		High	3 680.00	20.04	0.10	6.00	26.04	0.40
1	QPSK	Low	3 570.00	20.06	0.10	6.00	26.06	0.40
		Middle	3 625.00	20.01	0.10	6.00	26.01	0.40
		High	3 680.00	20.06	0.10	6.00	26.06	0.40
	16QAM	Low	3 570.00	20.12	0.10	6.00	26.12	0.41
		Middle	3 625.00	20.00	0.10	6.00	26.00	0.40
		High	3 680.00	20.33	0.11	6.00	26.33	0.43
	64QAM	Low	3 570.00	20.08	0.10	6.00	26.08	0.41
		Middle	3 625.00	19.96	0.10	6.00	25.96	0.39
		High	3 680.00	20.26	0.11	6.00	26.26	0.42
	256QAM	Low	3 570.00	20.13	0.10	6.00	26.13	0.41
		Middle	3 625.00	19.97	0.10	6.00	25.97	0.40
		High	3 680.00	20.29	0.11	6.00	26.29	0.43
2	QPSK	Low	3 570.00	20.04	0.10	6.00	26.04	0.40
		Middle	3 625.00	20.02	0.10	6.00	26.02	0.40
		High	3 680.00	20.15	0.10	6.00	26.15	0.41
	16QAM	Low	3 570.00	20.11	0.10	6.00	26.11	0.41
		Middle	3 625.00	20.10	0.10	6.00	26.10	0.41
		High	3 680.00	20.22	0.11	6.00	26.22	0.42
	64QAM	Low	3 570.00	20.14	0.10	6.00	26.14	0.41
		Middle	3 625.00	20.01	0.10	6.00	26.01	0.40
		High	3 680.00	20.27	0.11	6.00	26.27	0.42
	256QAM	Low	3 570.00	20.13	0.10	6.00	26.13	0.41
		Middle	3 625.00	20.03	0.10	6.00	26.03	0.40
		High	3 680.00	20.23	0.11	6.00	26.23	0.42
3	QPSK	Low	3 570.00	19.96	0.10	6.00	25.96	0.39
		Middle	3 625.00	19.96	0.10	6.00	25.96	0.39
		High	3 680.00	20.07	0.10	6.00	26.07	0.40
	16QAM	Low	3 570.00	20.11	0.10	6.00	26.11	0.41
		Middle	3 625.00	20.03	0.10	6.00	26.03	0.40
		High	3 680.00	20.00	0.10	6.00	26.00	0.40
	64QAM	Low	3 570.00	20.14	0.10	6.00	26.14	0.41
		Middle	3 625.00	19.95	0.10	6.00	25.95	0.39
		High	3 680.00	20.05	0.10	6.00	26.05	0.40
	256QAM	Low	3 570.00	20.14	0.10	6.00	26.14	0.41
		Middle	3 625.00	20.05	0.10	6.00	26.05	0.40
		High	3 680.00	20.05	0.10	6.00	26.05	0.40

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

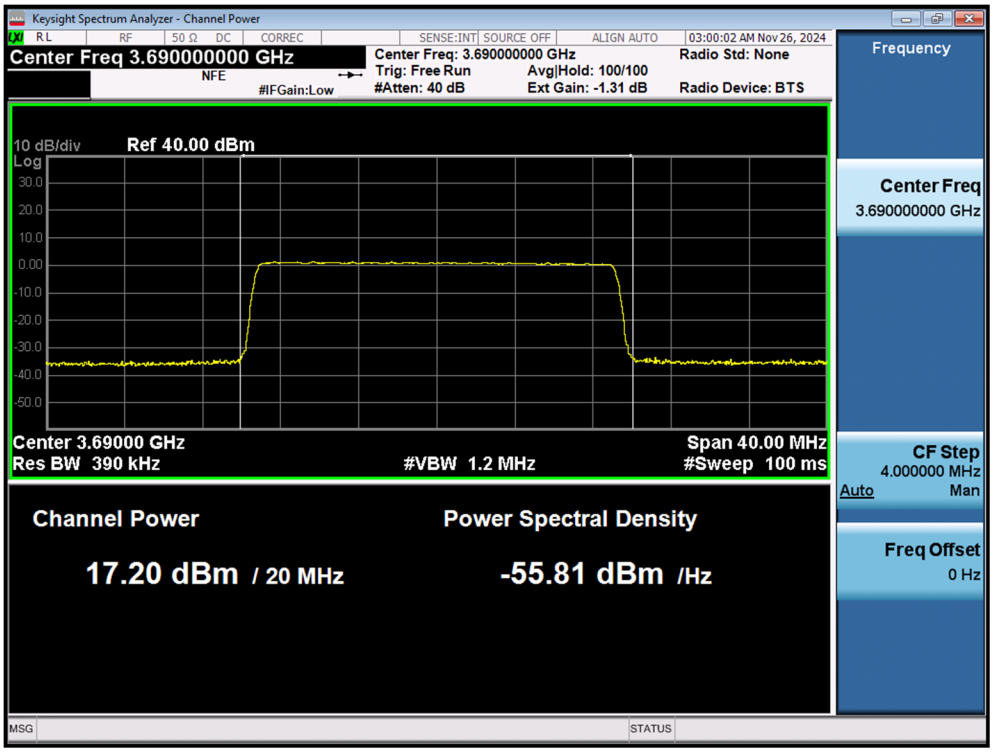
Frequency (MHz)	Output Power (Conducted)			
	QPSK	16QAM	64QAM	256QAM
	W			
3 570.00	1.60	1.61	1.64	1.63
3 625.00	1.59	1.60	1.58	1.60
3 680.00	1.62	1.66	1.65	1.65

Plot Data of RF Output Power

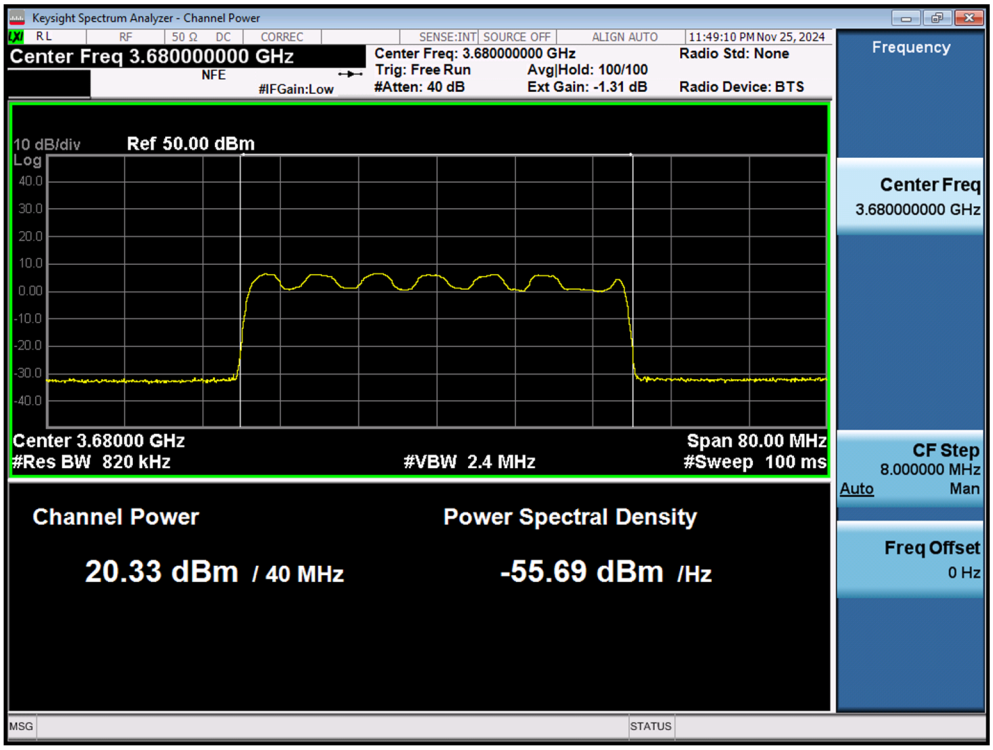
Antenna 1 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 64QAM / Low



Antenna 0 / (4 Port) 5G NR n48 20 MHz 1 Carrier / 256QAM / High



Antenna 1 / (4 Port) 5G NR n48 40 MHz 1 Carrier / 16QAM / High



Test Results:
Tabular Data of RF PSD
(4 Port) 5G NR n48 10 MHz 1 Carrier

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Gain (dBi)	PSD (dBm/MHz)	Limit (dBm/MHz)	E.I.R.P. (dBm/10 MHz)	Limit (dBm/10 MHz)
0	QPSK	Low	3 555.00	5.51	6.00	11.51	20	21.51	30
		Middle	3 625.00	5.34	6.00	11.34		21.34	
		High	3 695.00	5.35	6.00	11.35		21.35	
	16QAM	Low	3 555.00	6.24	6.00	12.24		22.24	
		Middle	3 625.00	6.08	6.00	12.08		22.08	
		High	3 695.00	6.12	6.00	12.12		22.12	
	64QAM	Low	3 555.00	5.63	6.00	11.63		21.63	
		Middle	3 625.00	5.46	6.00	11.46		21.46	
		High	3 695.00	5.32	6.00	11.32		21.32	
	256QAM	Low	3 555.00	5.68	6.00	11.68		21.68	
		Middle	3 625.00	5.33	6.00	11.33		21.33	
		High	3 695.00	5.30	6.00	11.30		21.30	
1	QPSK	Low	3 555.00	5.71	6.00	11.71		21.71	
		Middle	3 625.00	5.39	6.00	11.39		21.39	
		High	3 695.00	5.32	6.00	11.32		21.32	
	16QAM	Low	3 555.00	6.31	6.00	12.31		22.31	
		Middle	3 625.00	6.08	6.00	12.08		22.08	
		High	3 695.00	6.11	6.00	12.11		22.11	
	64QAM	Low	3 555.00	5.71	6.00	11.71		21.71	
		Middle	3 625.00	5.31	6.00	11.31		21.31	
		High	3 695.00	5.42	6.00	11.42		21.42	
	256QAM	Low	3 555.00	5.43	6.00	11.43		21.43	
		Middle	3 625.00	5.28	6.00	11.28		21.28	
		High	3 695.00	5.43	6.00	11.43		21.43	
2	QPSK	Low	3 555.00	5.44	6.00	11.44		21.44	
		Middle	3 625.00	5.38	6.00	11.38		21.38	
		High	3 695.00	5.29	6.00	11.29		21.29	
	16QAM	Low	3 555.00	6.39	6.00	12.39		22.39	
		Middle	3 625.00	6.19	6.00	12.19		22.19	
		High	3 695.00	5.98	6.00	11.98		21.98	
	64QAM	Low	3 555.00	5.46	6.00	11.46		21.46	
		Middle	3 625.00	5.40	6.00	11.40		21.40	
		High	3 695.00	5.35	6.00	11.35		21.35	
	256QAM	Low	3 555.00	5.50	6.00	11.50		21.50	
		Middle	3 625.00	5.42	6.00	11.42		21.42	
		High	3 695.00	5.31	6.00	11.31		21.31	
3	QPSK	Low	3 555.00	5.54	6.00	11.54		21.54	
		Middle	3 625.00	5.21	6.00	11.21		21.21	
		High	3 695.00	5.42	6.00	11.42		21.42	
	16QAM	Low	3 555.00	6.27	6.00	12.27		22.27	
		Middle	3 625.00	5.96	6.00	11.96		21.96	
		High	3 695.00	5.98	6.00	11.98		21.98	
	64QAM	Low	3 555.00	5.42	6.00	11.42		21.42	
		Middle	3 625.00	5.22	6.00	11.22		21.22	
		High	3 695.00	5.42	6.00	11.42		21.42	
	256QAM	Low	3 555.00	5.56	6.00	11.56		21.56	
		Middle	3 625.00	5.30	6.00	11.30		21.30	
		High	3 695.00	5.23	6.00	11.23		21.23	

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

Frequency (MHz)	PSD				Limit
	QPSK	16QAM	64QAM	256QAM	
	dBm/MHz				
3 555.00	17.57	18.32	17.58	17.56	20
3 625.00	17.35	18.10	17.37	17.35	
3 695.00	17.37	18.07	17.40	17.34	

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	dBm/10 MHz				
3 555.00	27.57	28.32	27.58	27.56	30
3 625.00	27.35	28.10	27.37	27.35	
3 695.00	27.37	28.07	27.40	27.34	

(4 Port) 5G NR n48 20 MHz 1 Carrier

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Gain (dBi)	PSD (dBm/MHz)	Limit (dBm/MHz)	E.I.R.P. (dBm/10 MHz)	Limit (dBm/10 MHz)
0	QPSK	Low	3 560.00	5.08	6.00	11.08	20	21.08	30
		Middle	3 625.00	4.97	6.00	10.97		20.97	
		High	3 690.00	5.01	6.00	11.01		21.01	
	16QAM	Low	3 560.00	6.79	6.00	12.79		22.79	
		Middle	3 625.00	6.27	6.00	12.27		22.27	
		High	3 690.00	6.58	6.00	12.58		22.58	
	64QAM	Low	3 560.00	5.43	6.00	11.43		21.43	
		Middle	3 625.00	5.14	6.00	11.14		21.14	
		High	3 690.00	5.16	6.00	11.16		21.16	
	256QAM	Low	3 560.00	5.38	6.00	11.38		21.38	
		Middle	3 625.00	5.05	6.00	11.05		21.05	
		High	3 690.00	5.50	6.00	11.50		21.50	
1	QPSK	Low	3 560.00	5.07	6.00	11.07		21.07	
		Middle	3 625.00	5.18	6.00	11.18		21.18	
		High	3 690.00	5.21	6.00	11.21		21.21	
	16QAM	Low	3 560.00	6.43	6.00	12.43		22.43	
		Middle	3 625.00	6.31	6.00	12.31		22.31	
		High	3 690.00	6.45	6.00	12.45		22.45	
	64QAM	Low	3 560.00	5.32	6.00	11.32		21.32	
		Middle	3 625.00	5.10	6.00	11.10		21.10	
		High	3 690.00	5.13	6.00	11.13		21.13	
	256QAM	Low	3 560.00	5.20	6.00	11.20		21.20	
		Middle	3 625.00	5.08	6.00	11.08		21.08	
		High	3 690.00	5.38	6.00	11.38		21.38	
2	QPSK	Low	3 560.00	5.08	6.00	11.08		21.08	
		Middle	3 625.00	5.08	6.00	11.08		21.08	
		High	3 690.00	5.03	6.00	11.03		21.03	
	16QAM	Low	3 560.00	6.57	6.00	12.57		22.57	
		Middle	3 625.00	6.27	6.00	12.27		22.27	
		High	3 690.00	6.47	6.00	12.47		22.47	
	64QAM	Low	3 560.00	5.03	6.00	11.03		21.03	
		Middle	3 625.00	5.05	6.00	11.05		21.05	
		High	3 690.00	5.02	6.00	11.02		21.02	
	256QAM	Low	3 560.00	5.17	6.00	11.17		21.17	
		Middle	3 625.00	4.97	6.00	10.97		20.97	
		High	3 690.00	5.21	6.00	11.21		21.21	
3	QPSK	Low	3 560.00	5.17	6.00	11.17		21.17	
		Middle	3 625.00	5.17	6.00	11.17		21.17	
		High	3 690.00	5.21	6.00	11.21		21.21	
	16QAM	Low	3 560.00	6.53	6.00	12.53		22.53	
		Middle	3 625.00	6.32	6.00	12.32		22.32	
		High	3 690.00	6.43	6.00	12.43		22.43	
	64QAM	Low	3 560.00	5.37	6.00	11.37		21.37	
		Middle	3 625.00	5.13	6.00	11.13		21.13	
		High	3 690.00	5.15	6.00	11.15		21.15	
	256QAM	Low	3 560.00	5.49	6.00	11.49		21.49	
		Middle	3 625.00	5.23	6.00	11.23		21.23	
		High	3 690.00	5.25	6.00	11.25		21.25	

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

Frequency (MHz)	PSD				Limit
	QPSK	16QAM	64QAM	256QAM	
	dBm/MHz				
3 560.00	17.12	18.60	17.31	17.33	20
3 625.00	17.12	18.31	17.12	17.11	
3 690.00	17.14	18.51	17.14	17.36	

Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	dBm/10 MHz				
3 560.00	27.12	28.60	27.31	27.33	30
3 625.00	27.12	28.31	27.12	27.11	
3 690.00	27.14	28.51	27.14	27.36	

(4 Port) 5G NR n48 40 MHz 1 Carrier

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm/MHz)	Directional Gain (dBi)	PSD (dBm/MHz)	Limit (dBm/MHz)	E.I.R.P. (dBm/10 MHz)	Limit (dBm/10 MHz)
0	QPSK	Low	3 570.00	5.10	6.00	11.10	20	21.10	30
		Middle	3 625.00	4.97	6.00	10.97		20.97	
		High	3 680.00	5.10	6.00	11.10		21.10	
	16QAM	Low	3 570.00	7.02	6.00	13.02		23.02	
		Middle	3 625.00	6.71	6.00	12.71		22.71	
		High	3 680.00	7.06	6.00	13.06		23.06	
	64QAM	Low	3 570.00	5.36	6.00	11.36		21.36	
		Middle	3 625.00	4.78	6.00	10.78		20.78	
		High	3 680.00	5.12	6.00	11.12		21.12	
	256QAM	Low	3 570.00	5.07	6.00	11.07		21.07	
		Middle	3 625.00	4.87	6.00	10.87		20.87	
		High	3 680.00	5.15	6.00	11.15		21.15	
1	QPSK	Low	3 570.00	5.05	6.00	11.05		21.05	
		Middle	3 625.00	4.81	6.00	10.81		20.81	
		High	3 680.00	5.01	6.00	11.01		21.01	
	16QAM	Low	3 570.00	6.94	6.00	12.94		22.94	
		Middle	3 625.00	6.74	6.00	12.74		22.74	
		High	3 680.00	7.39	6.00	13.39		23.39	
	64QAM	Low	3 570.00	5.00	6.00	11.00		21.00	
		Middle	3 625.00	4.93	6.00	10.93		20.93	
		High	3 680.00	5.36	6.00	11.36		21.36	
	256QAM	Low	3 570.00	5.06	6.00	11.06		21.06	
		Middle	3 625.00	4.88	6.00	10.88		20.88	
		High	3 680.00	5.42	6.00	11.42		21.42	
2	QPSK	Low	3 570.00	5.13	6.00	11.13		21.13	
		Middle	3 625.00	4.83	6.00	10.83		20.83	
		High	3 680.00	5.28	6.00	11.28		21.28	
	16QAM	Low	3 570.00	7.24	6.00	13.24		23.24	
		Middle	3 625.00	6.84	6.00	12.84		22.84	
		High	3 680.00	7.21	6.00	13.21		23.21	
	64QAM	Low	3 570.00	5.36	6.00	11.36		21.36	
		Middle	3 625.00	5.00	6.00	11.00		21.00	
		High	3 680.00	5.53	6.00	11.53		21.53	
	256QAM	Low	3 570.00	5.38	6.00	11.38		21.38	
		Middle	3 625.00	4.71	6.00	10.71		20.71	
		High	3 680.00	5.34	6.00	11.34		21.34	
3	QPSK	Low	3 570.00	5.27	6.00	11.27		21.27	
		Middle	3 625.00	5.13	6.00	11.13		21.13	
		High	3 680.00	5.61	6.00	11.61		21.61	
	16QAM	Low	3 570.00	7.32	6.00	13.32		23.32	
		Middle	3 625.00	6.86	6.00	12.86		22.86	
		High	3 680.00	7.04	6.00	13.04		23.04	
	64QAM	Low	3 570.00	5.51	6.00	11.51		21.51	
		Middle	3 625.00	5.13	6.00	11.13		21.13	
		High	3 680.00	5.36	6.00	11.36		21.36	
	256QAM	Low	3 570.00	5.45	6.00	11.45		21.45	
		Middle	3 625.00	5.11	6.00	11.11		21.11	
		High	3 680.00	5.26	6.00	11.26		21.26	

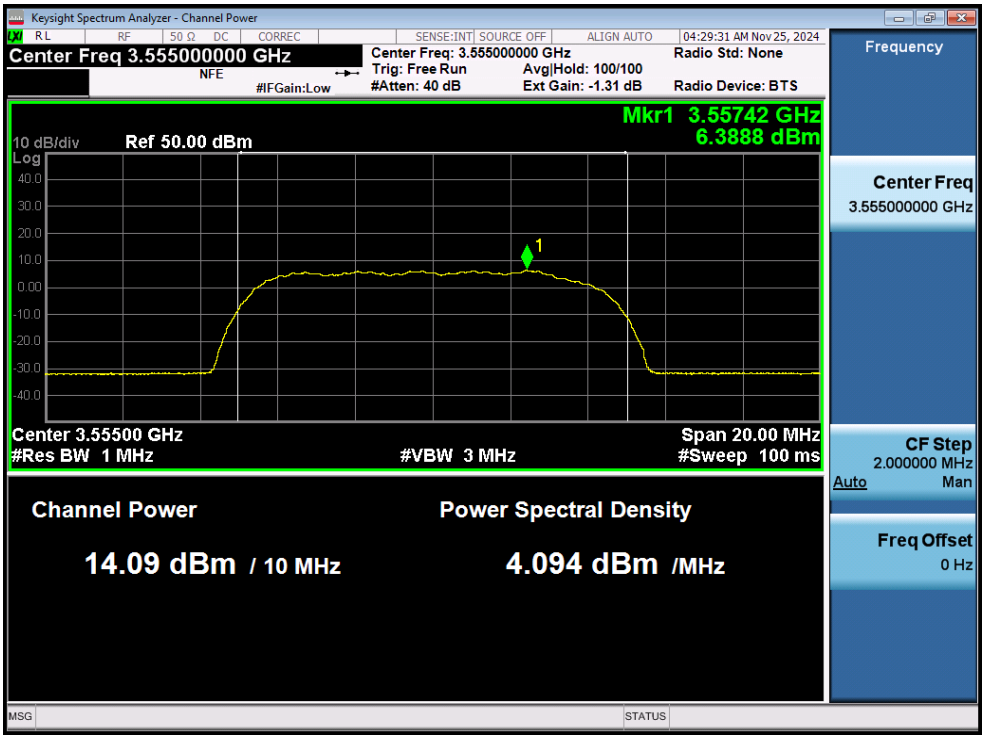
Sum Data of Port 0, Port 1, Port 2 and Port 3

Frequency (MHz)	PSD				Limit
	QPSK	16QAM	64QAM	256QAM	
	dBm/MHz				
3 570.00	17.16	19.15	17.33	17.27	20
3 625.00	16.96	18.81	16.98	16.92	
3 680.00	17.28	19.20	17.37	17.31	

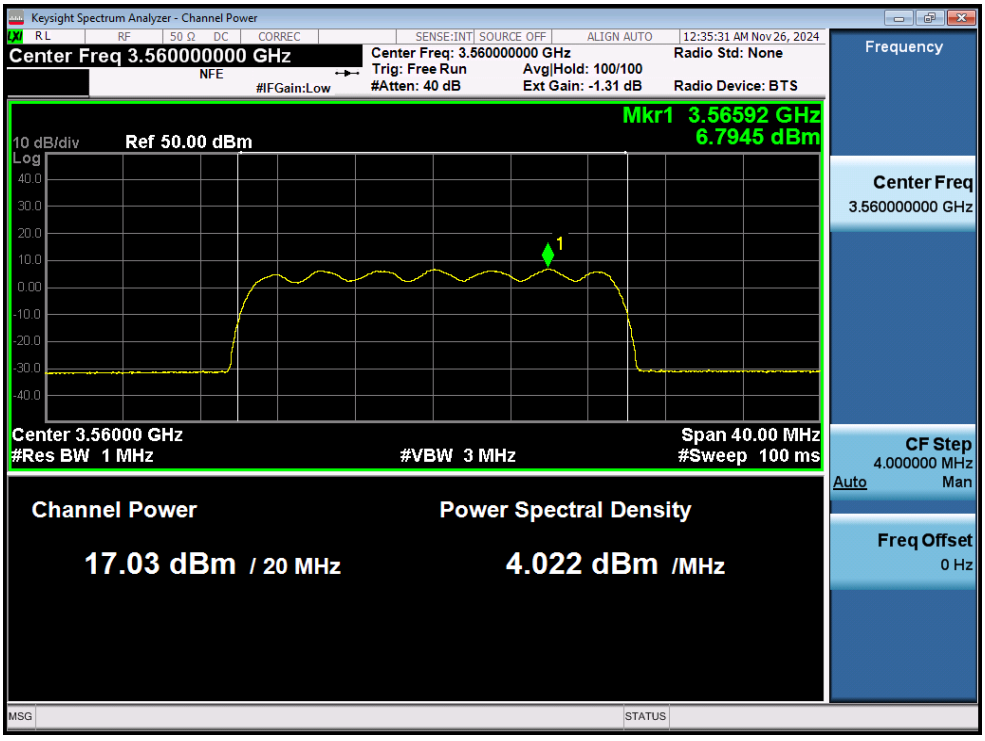
Frequency (MHz)	E.I.R.P.				Limit
	QPSK	16QAM	64QAM	256QAM	
	dBm/10 MHz				
3 570.00	27.16	29.15	27.33	27.27	30
3 625.00	26.96	28.81	26.98	26.92	
3 680.00	27.28	29.20	27.37	27.31	

Plot Data of PSD

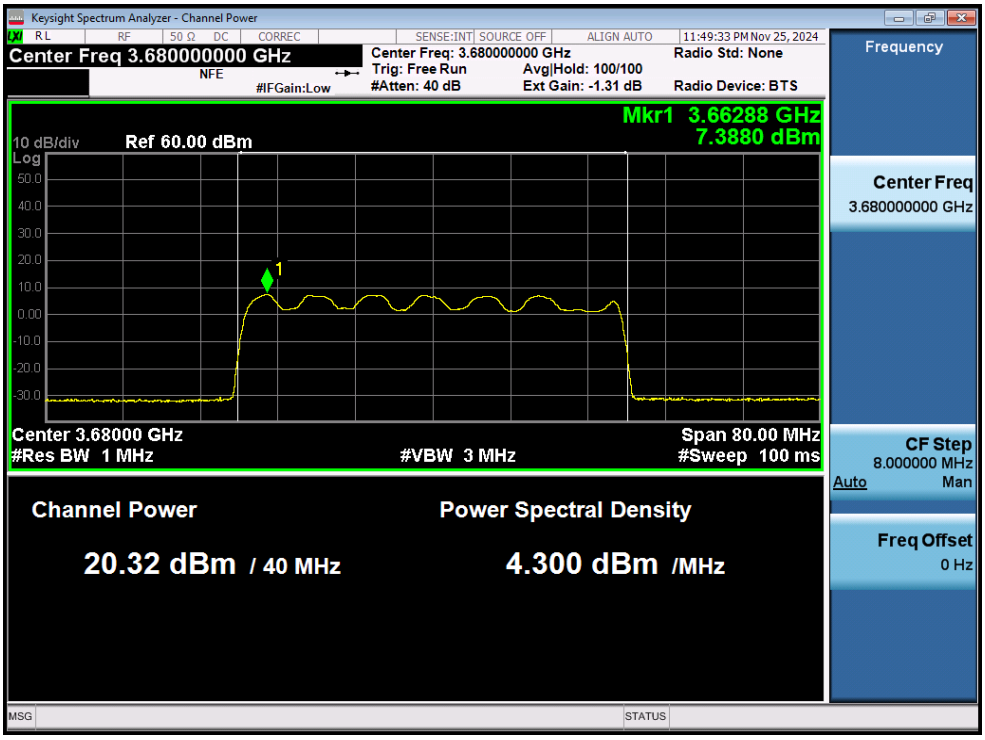
Antenna 2 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 16QAM / Low



Antenna 0 / (4 Port) 5G NR n48 20 MHz 1 Carrier / 16QAM / Low



Antenna 1 / (4 Port) 5G NR n48 40 MHz 1 Carrier / 16QAM / High



5.2. PAPR

Test Requirements:

§ 96.41(g) General radio requirements: Power measurement.

The peak-to-average power ratio (PAPR) of any CBSD transmitter output power must not exceed 13 dB. PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities or another Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

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 ≥ 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 × (number of points in sweep) × (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 form the sum of the PAPR value from step d) to the measured average power.

Note:

The results of PAPR test shown below 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 RF PAPR
(4 Port) 5G NR n48 10 MHz 1 Carrier

Antenna	Moddulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 555.00	9.57
		Middle	3 625.00	9.48
		High	3 695.00	9.54
	16QAM	Low	3 555.00	9.49
		Middle	3 625.00	9.57
		High	3 695.00	9.46
	64QAM	Low	3 555.00	9.51
		Middle	3 625.00	9.53
		High	3 695.00	9.35
	256QAM	Low	3 555.00	9.53
		Middle	3 625.00	9.53
		High	3 695.00	9.37
1	QPSK	Low	3 555.00	9.52
		Middle	3 625.00	9.53
		High	3 695.00	9.50
	16QAM	Low	3 555.00	9.50
		Middle	3 625.00	9.49
		High	3 695.00	9.50
	64QAM	Low	3 555.00	9.43
		Middle	3 625.00	9.54
		High	3 695.00	9.52
	256QAM	Low	3 555.00	9.57
		Middle	3 625.00	9.55
		High	3 695.00	9.41
2	QPSK	Low	3 555.00	9.56
		Middle	3 625.00	9.54
		High	3 695.00	9.50
	16QAM	Low	3 555.00	9.45
		Middle	3 625.00	9.49
		High	3 695.00	9.48
	64QAM	Low	3 555.00	9.42
		Middle	3 625.00	9.52
		High	3 695.00	9.44
	256QAM	Low	3 555.00	9.49
		Middle	3 625.00	9.55
		High	3 695.00	9.35
3	QPSK	Low	3 555.00	9.56
		Middle	3 625.00	9.54
		High	3 695.00	9.54
	16QAM	Low	3 555.00	9.49
		Middle	3 625.00	9.49
		High	3 695.00	9.48
	64QAM	Low	3 555.00	9.51
		Middle	3 625.00	9.53
		High	3 695.00	9.43
	256QAM	Low	3 555.00	9.55
		Middle	3 625.00	9.54
		High	3 695.00	9.65

(4 Port) 5G NR n48 20 MHz 1 Carrier

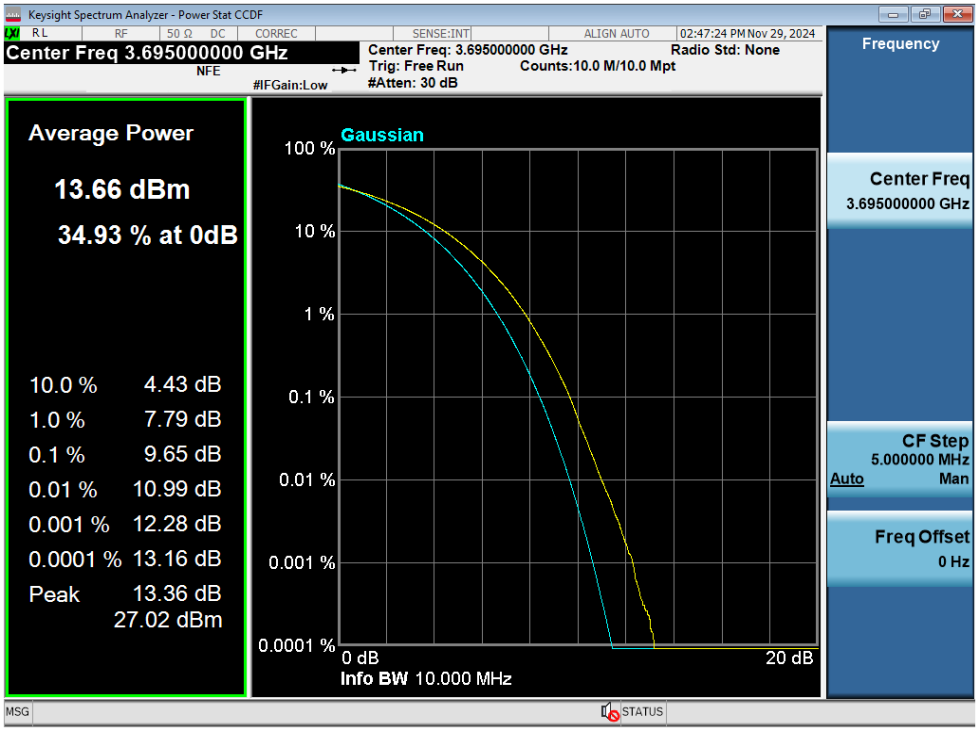
Antenna	Moddulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 560.00	9.56
		Middle	3 625.00	9.58
		High	3 690.00	9.48
	16QAM	Low	3 560.00	9.56
		Middle	3 625.00	9.59
		High	3 690.00	9.45
	64QAM	Low	3 560.00	9.57
		Middle	3 625.00	9.49
		High	3 690.00	9.53
	256QAM	Low	3 560.00	9.62
		Middle	3 625.00	9.52
		High	3 690.00	9.53
1	QPSK	Low	3 560.00	9.51
		Middle	3 625.00	9.41
		High	3 690.00	9.61
	16QAM	Low	3 560.00	9.62
		Middle	3 625.00	9.50
		High	3 690.00	9.60
	64QAM	Low	3 560.00	9.48
		Middle	3 625.00	9.48
		High	3 690.00	9.47
	256QAM	Low	3 560.00	9.58
		Middle	3 625.00	9.51
		High	3 690.00	9.53
2	QPSK	Low	3 560.00	9.48
		Middle	3 625.00	9.51
		High	3 690.00	9.54
	16QAM	Low	3 560.00	9.58
		Middle	3 625.00	9.55
		High	3 690.00	9.57
	64QAM	Low	3 560.00	9.49
		Middle	3 625.00	9.58
		High	3 690.00	9.59
	256QAM	Low	3 560.00	9.51
		Middle	3 625.00	9.51
		High	3 690.00	9.58
3	QPSK	Low	3 560.00	9.62
		Middle	3 625.00	9.55
		High	3 690.00	9.57
	16QAM	Low	3 560.00	9.58
		Middle	3 625.00	9.50
		High	3 690.00	9.51
	64QAM	Low	3 560.00	9.40
		Middle	3 625.00	9.57
		High	3 690.00	9.50
	256QAM	Low	3 560.00	9.56
		Middle	3 625.00	9.53
		High	3 690.00	9.58

(4 Port) 5G NR n48 40 MHz 1 Carrier

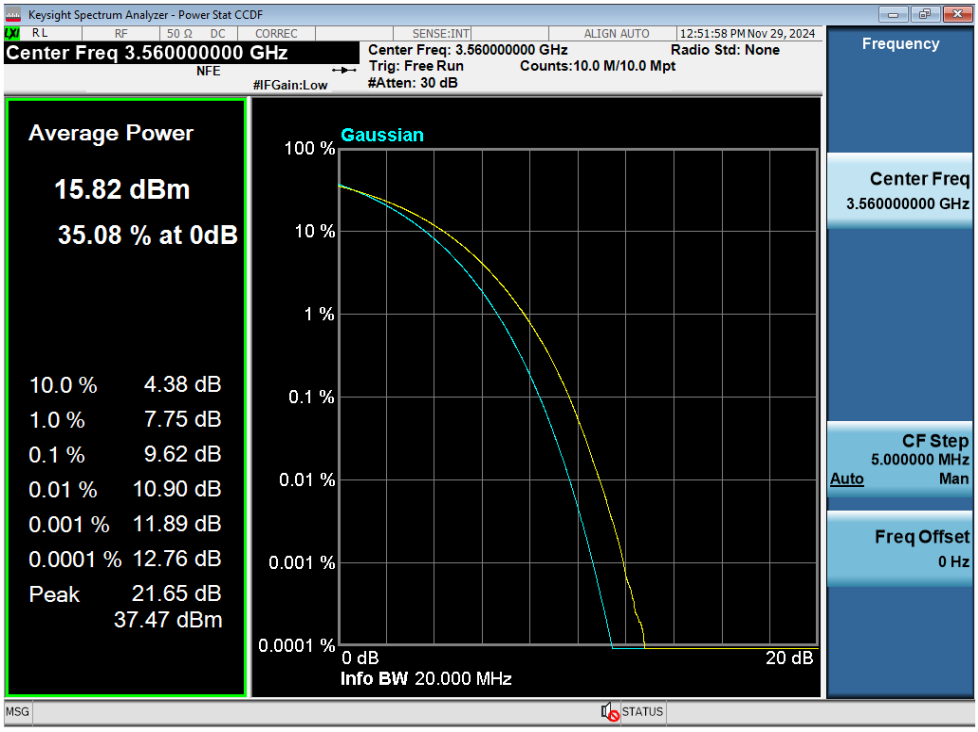
Antenna	Moddulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	3 570.00	9.52
		Middle	3 625.00	9.41
		High	3 680.00	9.44
	16QAM	Low	3 570.00	9.40
		Middle	3 625.00	9.53
		High	3 680.00	9.42
	64QAM	Low	3 570.00	9.42
		Middle	3 625.00	9.46
		High	3 680.00	9.32
	256QAM	Low	3 570.00	9.44
		Middle	3 625.00	9.42
		High	3 680.00	9.51
1	QPSK	Low	3 570.00	9.38
		Middle	3 625.00	9.41
		High	3 680.00	9.30
	16QAM	Low	3 570.00	9.66
		Middle	3 625.00	9.45
		High	3 680.00	9.49
	64QAM	Low	3 570.00	9.37
		Middle	3 625.00	9.38
		High	3 680.00	9.46
	256QAM	Low	3 570.00	9.53
		Middle	3 625.00	9.36
		High	3 680.00	9.30
2	QPSK	Low	3 570.00	9.33
		Middle	3 625.00	9.45
		High	3 680.00	9.49
	16QAM	Low	3 570.00	9.48
		Middle	3 625.00	9.44
		High	3 680.00	9.53
	64QAM	Low	3 570.00	9.47
		Middle	3 625.00	9.53
		High	3 680.00	9.39
	256QAM	Low	3 570.00	9.68
		Middle	3 625.00	9.39
		High	3 680.00	9.40
3	QPSK	Low	3 570.00	9.46
		Middle	3 625.00	9.33
		High	3 680.00	9.56
	16QAM	Low	3 570.00	9.59
		Middle	3 625.00	9.59
		High	3 680.00	9.62
	64QAM	Low	3 570.00	9.23
		Middle	3 625.00	9.54
		High	3 680.00	9.44
	256QAM	Low	3 570.00	9.37
		Middle	3 625.00	9.46
		High	3 680.00	9.41

Plot Data of PAPR

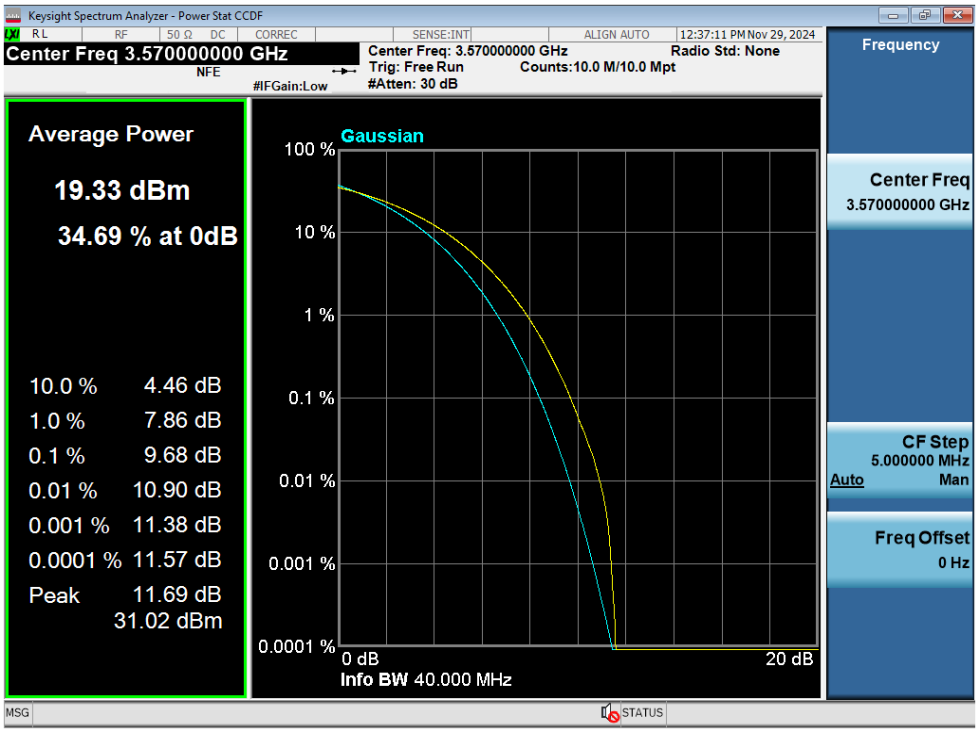
Antenna 3 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 256QAM / High



Antenna 3 / (4 Port) 5G NR n48 20 MHz 1 Carrier / QPSK / Low



Antenna 2 / (4 Port) 5G NR n48 40 MHz 1 Carrier / 256QAM / Low



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 ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
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 × 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 ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
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:

1. The results of the Occupied Bandwidth test shown below the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.
2. All power supply of operation were investigated and the worst case configuration results are reported.

Test Results:
Tabular Data of Occupied Bandwidth
(4 Port) 5G NR n48 10 MHz 1 Carrier

Antenna	Moddulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 555.00	8.6819
		Middle	3 625.00	8.6727
		High	3 695.00	8.6781
	16QAM	Low	3 555.00	8.6561
		Middle	3 625.00	8.6496
		High	3 695.00	8.6279
	64QAM	Low	3 555.00	8.7000
		Middle	3 625.00	8.6582
		High	3 695.00	8.6661
	256QAM	Low	3 555.00	8.6875
		Middle	3 625.00	8.6908
		High	3 695.00	8.6835
1	QPSK	Low	3 555.00	8.6895
		Middle	3 625.00	8.6575
		High	3 695.00	8.6697
	16QAM	Low	3 555.00	8.6621
		Middle	3 625.00	8.6272
		High	3 695.00	8.6078
	64QAM	Low	3 555.00	8.7074
		Middle	3 625.00	8.6510
		High	3 695.00	8.6786
	256QAM	Low	3 555.00	8.6867
		Middle	3 625.00	8.6600
		High	3 695.00	8.7146
2	QPSK	Low	3 555.00	8.7196
		Middle	3 625.00	8.6532
		High	3 695.00	8.6807
	16QAM	Low	3 555.00	8.6384
		Middle	3 625.00	8.6033
		High	3 695.00	8.6098
	64QAM	Low	3 555.00	8.6798
		Middle	3 625.00	8.6720
		High	3 695.00	8.6679
	256QAM	Low	3 555.00	8.6745
		Middle	3 625.00	8.6746
		High	3 695.00	8.6558
3	QPSK	Low	3 555.00	8.7108
		Middle	3 625.00	8.6773
		High	3 695.00	8.6882
	16QAM	Low	3 555.00	8.6470
		Middle	3 625.00	8.6368
		High	3 695.00	8.6194
	64QAM	Low	3 555.00	8.7318
		Middle	3 625.00	8.6556
		High	3 695.00	8.6833
	256QAM	Low	3 555.00	8.7276
		Middle	3 625.00	8.7002
		High	3 695.00	8.6782

(4 Port) 5G NR n48 20 MHz 1 Carrier

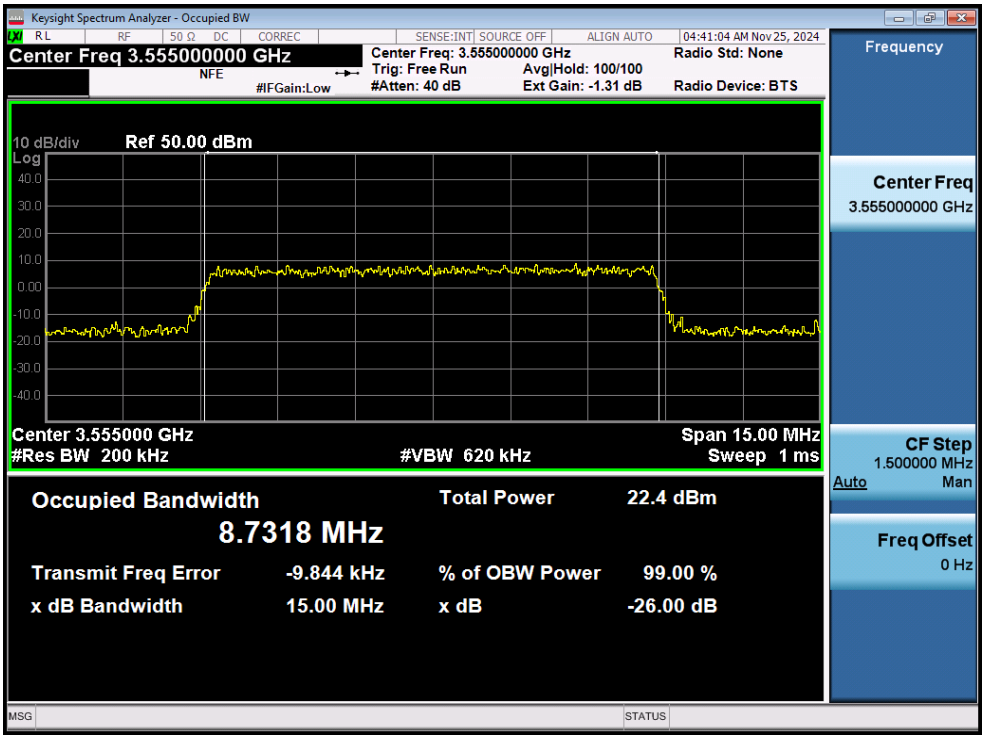
Antenna	Moddulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 560.00	18.369
		Middle	3 625.00	18.345
		High	3 690.00	18.353
	16QAM	Low	3 560.00	18.411
		Middle	3 625.00	18.399
		High	3 690.00	18.403
	64QAM	Low	3 560.00	18.369
		Middle	3 625.00	18.327
		High	3 690.00	18.339
	256QAM	Low	3 560.00	18.370
		Middle	3 625.00	18.357
		High	3 690.00	18.347
1	QPSK	Low	3 625.00	18.359
		Middle	3 625.00	18.303
		High	3 690.00	18.316
	16QAM	Low	3 560.00	18.440
		Middle	3 625.00	18.435
		High	3 690.00	18.383
	64QAM	Low	3 560.00	18.346
		Middle	3 625.00	18.341
		High	3 690.00	18.313
	256QAM	Low	3 560.00	18.412
		Middle	3 625.00	18.406
		High	3 690.00	18.364
2	QPSK	Low	3 625.00	18.372
		Middle	3 625.00	18.373
		High	3 690.00	18.346
	16QAM	Low	3 560.00	18.456
		Middle	3 625.00	18.422
		High	3 690.00	18.390
	64QAM	Low	3 560.00	18.436
		Middle	3 625.00	18.343
		High	3 690.00	18.320
	256QAM	Low	3 560.00	18.405
		Middle	3 625.00	18.337
		High	3 690.00	18.350
3	QPSK	Low	3 625.00	18.368
		Middle	3 625.00	18.351
		High	3 690.00	18.359
	16QAM	Low	3 560.00	18.449
		Middle	3 625.00	18.456
		High	3 690.00	18.434
	64QAM	Low	3 560.00	18.368
		Middle	3 625.00	18.324
		High	3 690.00	18.364
	256QAM	Low	3 560.00	18.379
		Middle	3 625.00	18.351
		High	3 690.00	18.380

(4 Port) 5G NR n48 40 MHz 1 Carrier

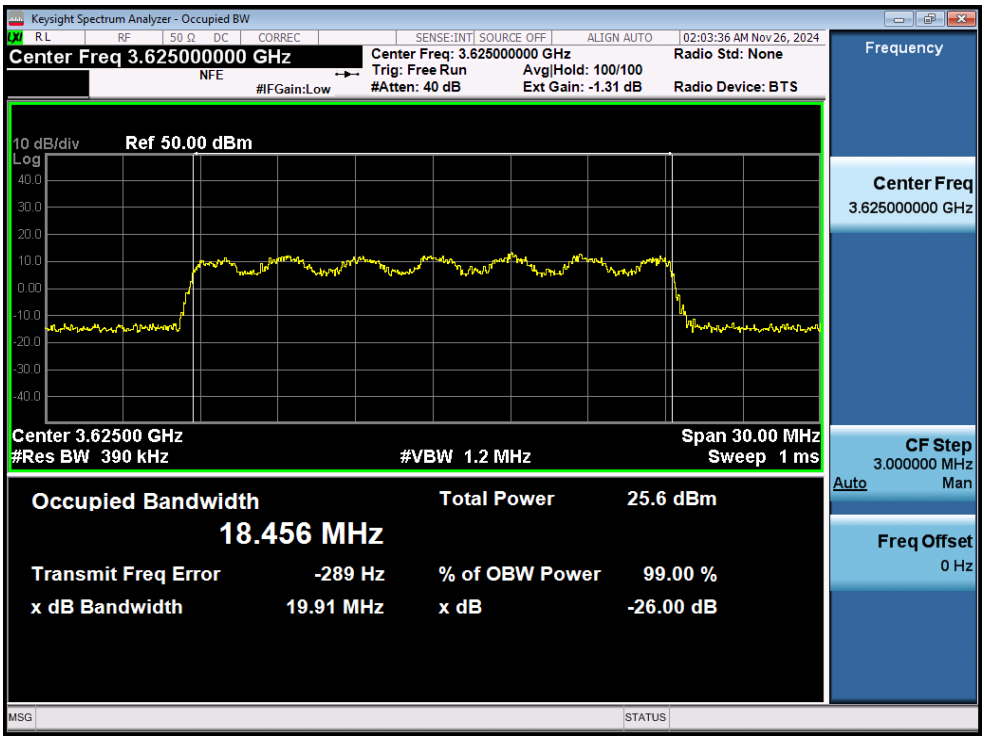
Antenna	Moddulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	3 570.00	38.107
		Middle	3 625.00	38.123
		High	3 680.00	38.020
	16QAM	Low	3 570.00	38.242
		Middle	3 625.00	38.156
		High	3 680.00	38.185
	64QAM	Low	3 570.00	38.032
		Middle	3 625.00	38.044
		High	3 680.00	38.030
	256QAM	Low	3 570.00	38.187
		Middle	3 625.00	38.126
		High	3 680.00	38.116
1	QPSK	Low	3 570.00	38.086
		Middle	3 625.00	38.054
		High	3 680.00	38.068
	16QAM	Low	3 570.00	38.227
		Middle	3 625.00	38.134
		High	3 680.00	38.126
	64QAM	Low	3 570.00	38.061
		Middle	3 625.00	38.057
		High	3 680.00	38.072
	256QAM	Low	3 570.00	38.111
		Middle	3 625.00	38.179
		High	3 680.00	38.095
2	QPSK	Low	3 570.00	38.077
		Middle	3 625.00	38.075
		High	3 680.00	38.103
	16QAM	Low	3 570.00	38.229
		Middle	3 625.00	38.250
		High	3 680.00	38.260
	64QAM	Low	3 570.00	38.167
		Middle	3 625.00	38.108
		High	3 680.00	38.031
	256QAM	Low	3 570.00	38.110
		Middle	3 625.00	38.032
		High	3 680.00	38.057
3	QPSK	Low	3 570.00	38.024
		Middle	3 625.00	38.023
		High	3 680.00	38.088
	16QAM	Low	3 570.00	38.241
		Middle	3 625.00	38.171
		High	3 680.00	38.245
	64QAM	Low	3 570.00	38.049
		Middle	3 625.00	38.205
		High	3 680.00	38.091
	256QAM	Low	3 570.00	38.092
		Middle	3 625.00	38.139
		High	3 680.00	38.152

Plot Data of Occupied bandwidth

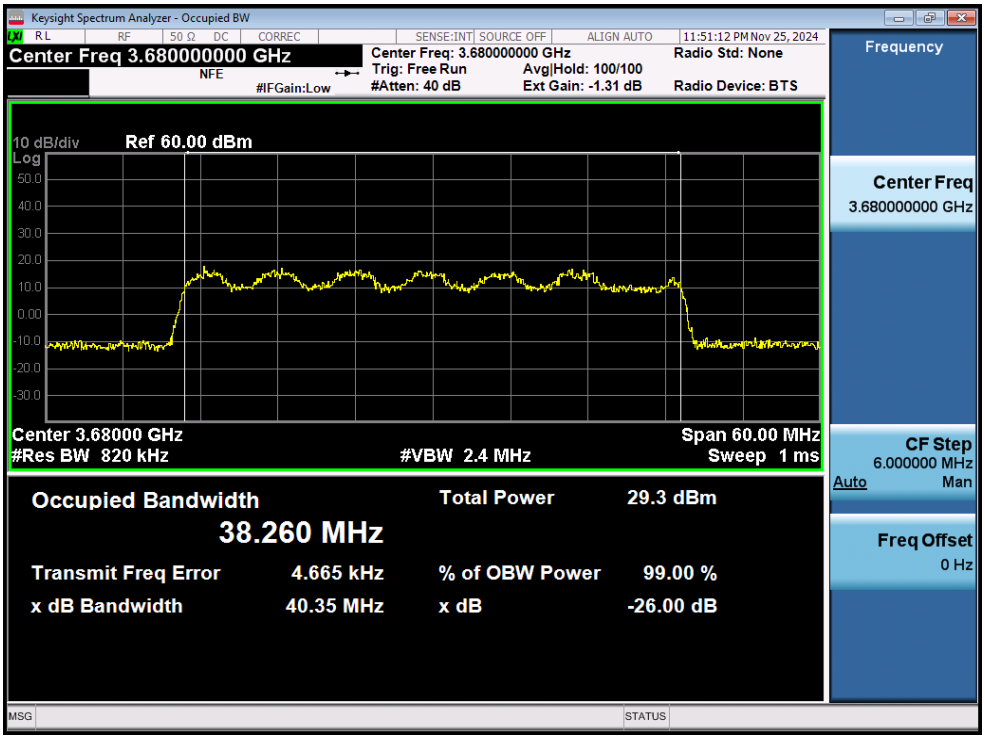
Antenna 3 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 64QAM / Low



Antenna 3 / (4 Port) 5G NR n48 20 MHz 1 Carrier / 16QAM / Middle



Antenna 2 / (4 Port) 5G NR n48 40 MHz 1 Carrier / 16QAM / High



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.

96.41(e) General radio requirement: 3.5 GHz Emissions and Interference Limits.

(1) General protection levels.

(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed −25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed −25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) Additional protection levels.

Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

(3) Measurement procedure.

(i) Compliance with this provision 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 authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full reference bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). The fundamental 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.

(ii) When measuring unwanted emissions to demonstrate compliance with the limits, the CBSD and End User Device nominal carrier frequency/channel shall be adjusted as close to the licensee's authorized frequency block edges, both upper and lower, as the design permits.

(iii) Compliance with emission limits shall be demonstrated using either average (RMS)-detected or peak-detected power measurement techniques.

(4) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Test Procedures:

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

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 $\geq 2 \times$ span / 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) × (symbol period) (e.g., by a factor of 10 × symbol period × 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) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/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) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±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 > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (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_{ANT}) = 10 log(4) = 6.02 dB // -13 dBm – 10xlog (4) = -19.02 dBm
2. The measured value already includes the duty correction value.
3. The results of the Out-of-band Unwanted Emissions test shown below 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 n48 10 MHz 1 Carrier

Antenna	Modulation	Channel	Edge Position	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	Left	3 549.42	-38.08
			Right	3 560.55	-37.16
		Middle	Left	3 619.95	-36.63
			Right	3 630.32	-36.02
		High	Left	3 689.99	-37.16
			Right	3 700.05	-36.79
	16QAM	Low	Left	3 549.91	-38.39
			Right	3 560.05	-38.29
		Middle	Left	3 619.95	-33.58
			Right	3 630.84	-35.71
		High	Left	3 689.70	-35.07
			Right	3 700.05	-36.82
	64QAM	Low	Left	3 549.95	-37.08
			Right	3 560.08	-35.79
		Middle	Left	3 619.95	-36.42
			Right	3 630.04	-36.96
		High	Left	3 689.87	-35.49
			Right	3 700.05	-36.79
	256QAM	Low	Left	3 549.97	-36.50
			Right	3 560.46	-34.37
		Middle	Left	3 619.89	-36.51
			Right	3 630.58	-36.58
		High	Left	3 689.70	-36.45
			Right	3 700.05	-36.29
1	QPSK	Low	Left	3 549.72	-37.69
			Right	3 560.46	-37.90
		Middle	Left	3 619.70	-36.53
			Right	3 630.29	-36.44
		High	Left	3 689.95	-34.90
			Right	3 700.40	-37.35
	16QAM	Low	Left	3 549.10	-37.21
			Right	3 560.21	-37.77
		Middle	Left	3 619.92	-35.90
			Right	3 631.00	-36.79
		High	Left	3 689.04	-36.58
			Right	3 700.99	-35.07
	64QAM	Low	Left	3 549.98	-36.41
			Right	3 560.87	-38.25
		Middle	Left	3 619.37	-37.41
			Right	3 630.10	-36.79
		High	Left	3 689.95	-36.96
			Right	3 700.05	-37.38
	256QAM	Low	Left	3 549.97	-38.40
			Right	3 560.98	-37.92
		Middle	Left	3 619.25	-38.07
			Right	3 630.12	-37.59
		High	Left	3 689.65	-36.36
			Right	3 700.46	-37.32

Antenna	Modulation	Channel	Edge Position	Frequency (MHz)	Measured Value (dBm)
2	QPSK	Low	Left	3 549.89	-34.61
			Right	3 560.01	-36.52
		Middle	Left	3 619.22	-37.01
			Right	3 630.19	-37.21
		High	Left	3 689.83	-37.43
			Right	3 700.75	-37.00
	16QAM	Low	Left	3 549.85	-36.06
			Right	3 560.12	-39.44
		Middle	Left	3 619.92	-35.65
			Right	3 630.16	-39.11
		High	Left	3 689.35	-36.87
			Right	3 700.53	-38.13
	64QAM	Low	Left	3 549.58	-37.64
			Right	3 560.32	-36.12
		Middle	Left	3 619.95	-36.07
			Right	3 630.05	-36.25
		High	Left	3 689.28	-35.57
			Right	3 700.29	-35.95
	256QAM	Low	Left	3 549.56	-41.11
			Right	3 560.18	-36.74
		Middle	Left	3 619.11	-36.20
			Right	3 630.41	-37.30
		High	Left	3 689.32	-36.68
			Right	3 700.62	-35.56
3	QPSK	Low	Left	3 549.81	-37.80
			Right	3 560.05	-36.50
		Middle	Left	3 619.65	-37.17
			Right	3 630.33	-38.45
		High	Left	3 689.62	-37.34
			Right	3 700.64	-36.46
	16QAM	Low	Left	3 549.81	-37.36
			Right	3 560.08	-37.45
		Middle	Left	3 619.55	-36.83
			Right	3 630.35	-37.40
		High	Left	3 689.91	-37.08
			Right	3 700.93	-36.29
	64QAM	Low	Left	3 549.20	-38.14
			Right	3 560.05	-38.21
		Middle	Left	3 619.61	-35.48
			Right	3 630.23	-37.17
		High	Left	3 689.97	-35.50
			Right	3 700.96	-37.17
	256QAM	Low	Left	3 549.15	-37.88
			Right	3 560.05	-39.25
		Middle	Left	3 619.95	-36.52
			Right	3 630.86	-36.56
		High	Left	3 689.13	-37.88
			Right	3 700.29	-38.14

(4 Port) 5G NR n48 20 MHz 1 Carrier

Antenna	Modulation	Channel	Edge Position	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	Low	3 549.76	-33.29
			High	3 570.50	-34.24
		Middle	Low	3 614.84	-34.84
			High	3 635.94	-33.95
		High	Low	3 679.36	-33.75
			High	3 700.60	-36.06
	16QAM	Low	Low	3 549.23	-34.34
			High	3 570.77	-32.45
		Middle	Low	3 614.38	-34.26
			High	3 636.00	-35.67
		High	Low	3 679.17	-33.16
			High	3 700.58	-33.26
	64QAM	Low	Low	3 549.90	-31.99
			High	3 570.39	-33.54
		Middle	Low	3 614.46	-35.30
			High	3 635.37	-35.63
		High	Low	3 679.82	-32.83
			High	3 700.77	-32.63
	256QAM	Low	Low	3 549.27	-36.48
			High	3 570.31	-35.35
		Middle	Low	3 614.88	-34.87
			High	3 635.10	-33.31
		High	Low	3 679.84	-32.92
			High	3 700.10	-34.42
1	QPSK	Low	Low	3 614.82	-34.33
			High	3 635.50	-33.98
		Middle	Low	3 614.57	-32.76
			High	3 635.64	-35.94
		High	Low	3 679.08	-34.26
			High	3 700.50	-34.47
	16QAM	Low	Low	3 549.90	-34.73
			High	3 570.69	-33.07
		Middle	Low	3 614.46	-35.56
			High	3 635.20	-35.45
		High	Low	3 679.92	-35.46
			High	3 700.58	-32.72
	64QAM	Low	Low	3 549.95	-35.71
			High	3 570.92	-35.09
		Middle	Low	3 614.99	-36.02
			High	3 635.64	-35.14
		High	Low	3 679.61	-33.37
			High	3 700.01	-35.10
	256QAM	Low	Low	3 549.21	-34.72
			High	3 570.31	-34.32
		Middle	Low	3 614.88	-34.88
			High	3 635.03	-34.27
		High	Low	3 679.90	-34.58
			High	3 701.00	-35.49

Antenna	Modulation	Channel	Edge Position	Frequency (MHz)	Measured Value (dBm)
2	QPSK	Low	Low	3 614.86	-33.28
			High	3 635.98	-33.76
		Middle	Low	3 614.86	-33.28
			High	3 635.98	-33.76
		High	Low	3 679.69	-33.73
			High	3 700.37	-33.56
	16QAM	Low	Low	3 549.88	-35.16
			High	3 570.10	-35.20
		Middle	Low	3 614.25	-35.46
			High	3 635.10	-35.99
		High	Low	3 679.80	-34.34
			High	3 700.27	-32.93
	64QAM	Low	Low	3 549.50	-32.28
			High	3 570.16	-34.64
		Middle	Low	3 614.88	-34.05
			High	3 635.87	-36.71
		High	Low	3 679.02	-35.26
			High	3 700.58	-34.90
	256QAM	Low	Low	3 549.90	-39.21
			High	3 570.43	-34.80
		Middle	Low	3 614.19	-33.50
			High	3 635.10	-35.60
		High	Low	3 679.06	-33.66
			High	3 700.50	-34.38
3	QPSK	Low	Low	3 614.90	-34.29
			High	3 635.60	-34.47
		Middle	Low	3 614.90	-35.68
			High	3 635.35	-35.65
		High	Low	3 679.61	-32.81
			High	3 700.03	-33.68
	16QAM	Low	Low	3 549.57	-32.49
			High	3 570.10	-32.48
		Middle	Low	3 614.80	-33.49
			High	3 635.20	-34.28
		High	Low	3 679.63	-33.80
			High	3 700.22	-33.36
	64QAM	Low	Low	3 549.90	-36.11
			High	3 570.92	-34.71
		Middle	Low	3 614.69	-35.62
			High	3 635.22	-33.88
		High	Low	3 679.99	-34.76
			High	3 700.08	-34.52
	256QAM	Low	Low	3 549.55	-35.41
			High	3 570.06	-35.56
		Middle	Low	3 614.50	-35.27
			High	3 635.10	-33.73
		High	Low	3 679.90	-33.71
			High	3 700.22	-32.74

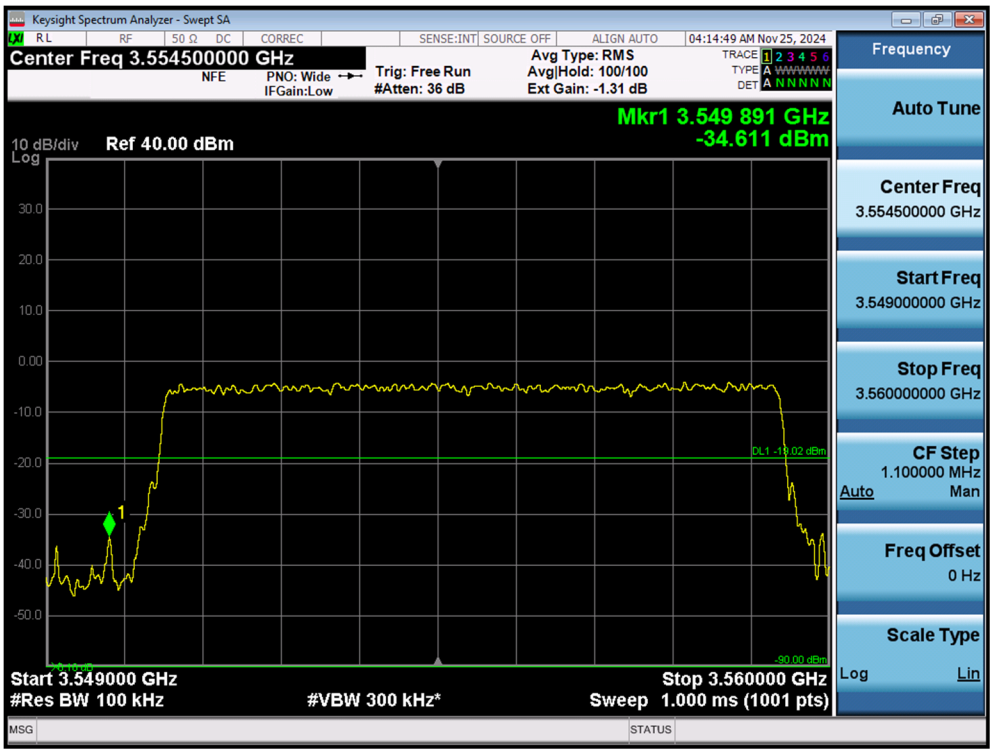
(4 Port) 5G NR n48 40 MHz 1 Carrier

Antenna	Modulation	Channel	Edge Position	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	Left	3 549.53	-33.15
			Right	3 590.10	-29.92
		Middle	Left	3 604.80	-29.04
			Right	3 645.71	-30.79
		High	Left	3 659.37	-33.97
			Right	3 700.55	-31.42
	16QAM	Low	Left	3 549.90	-31.00
			Right	3 590.10	-28.19
		Middle	Left	3 604.57	-31.29
			Right	3 645.20	-30.72
		High	Left	3 659.57	-31.98
			Right	3 700.34	-33.41
	64QAM	Low	Left	3 549.94	-32.51
			Right	3 590.20	-31.10
		Middle	Left	3 604.80	-32.42
			Right	3 645.20	-29.21
		High	Left	3 659.94	-31.00
			Right	3 700.26	-30.20
	256QAM	Low	Left	3 549.70	-30.77
			Right	3 590.71	-30.66
		Middle	Left	3 604.80	-28.80
			Right	3 645.06	-30.11
		High	Left	3 659.94	-30.59
			Right	3 700.71	-30.84
1	QPSK	Low	Left	3 549.94	-34.62
			Right	3 591.00	-32.56
		Middle	Left	3 604.94	-31.02
			Right	3 645.20	-28.72
		High	Left	3 659.86	-30.16
			Right	3 700.06	-31.67
	16QAM	Low	Left	3 549.78	-34.69
			Right	3 590.20	-29.66
		Middle	Left	3 604.82	-30.16
			Right	3 645.20	-31.15
		High	Left	3 659.70	-31.31
			Right	3 700.18	-30.74
	64QAM	Low	Left	3 549.12	-32.36
			Right	3 590.47	-32.19
		Middle	Left	3 604.41	-30.39
			Right	3 645.20	-32.63
		High	Left	3 659.82	-32.41
			Right	3 700.14	-30.32
	256QAM	Low	Left	3 549.16	-32.70
			Right	3 590.18	-29.81
		Middle	Left	3 604.94	-29.96
			Right	3 645.22	-32.96
		High	Left	3 659.70	-31.14
			Right	3 700.20	-30.29

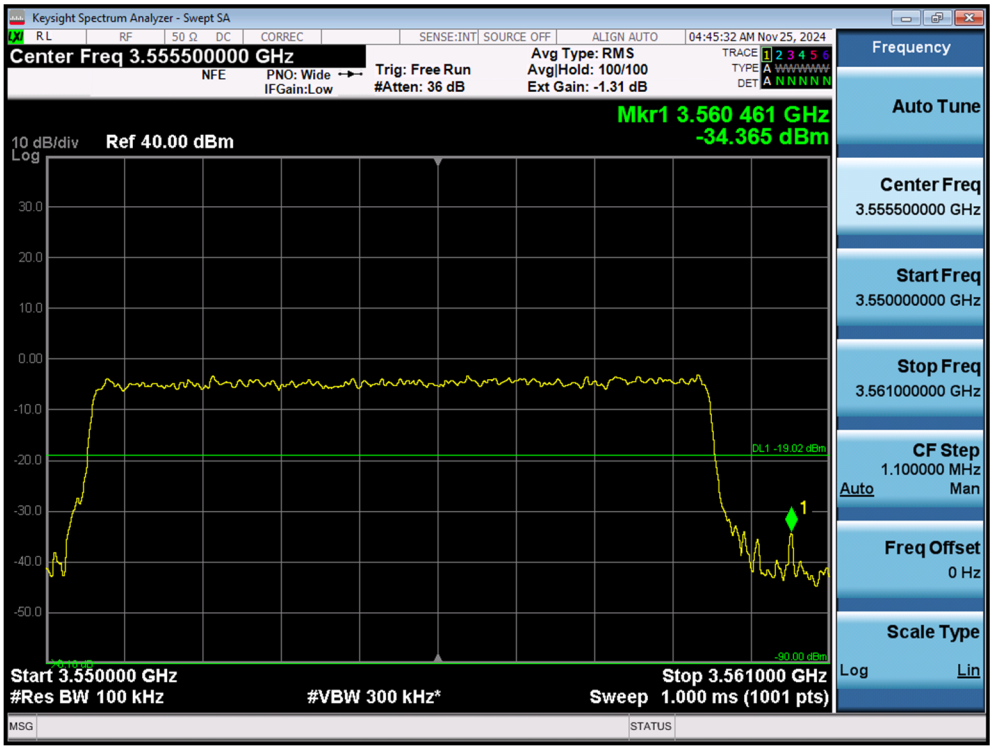
Antenna	Modulation	Channel	Edge Position	Frequency (MHz)	Measured Value (dBm)
2	QPSK	Low	Left	3 549.66	-31.38
			Right	3 590.14	-30.06
		Middle	Left	3 604.45	-30.16
			Right	3 645.10	-31.92
		High	Left	3 659.41	-31.90
			Right	3 700.88	-33.27
	16QAM	Low	Left	3 549.86	-32.84
			Right	3 590.47	-31.01
		Middle	Left	3 604.80	-30.92
			Right	3 645.14	-32.26
		High	Left	3 659.90	-28.81
			Right	3 700.18	-30.22
	64QAM	Low	Left	3 549.53	-32.22
			Right	3 590.06	-29.78
		Middle	Left	3 604.80	-31.11
			Right	3 645.51	-31.54
		High	Left	3 659.82	-30.75
			Right	3 700.06	-30.39
	256QAM	Low	Left	3 549.21	-32.04
			Right	3 590.20	-30.33
		Middle	Left	3 604.94	-31.01
			Right	3 645.39	-32.84
		High	Left	3 659.94	-30.98
			Right	3 700.10	-30.64
3	QPSK	Low	Left	3 549.80	-32.52
			Right	3 590.96	-33.30
		Middle	Left	3 604.90	-31.24
			Right	3 645.43	-31.79
		High	Left	3 659.80	-28.40
			Right	3 700.30	-31.25
	16QAM	Low	Left	3 549.53	-30.34
			Right	3 590.30	-30.95
		Middle	Left	3 604.94	-29.88
			Right	3 645.43	-31.10
		High	Left	3 659.04	-31.57
			Right	3 700.06	-29.29
	64QAM	Low	Left	3 549.21	-31.08
			Right	3 590.10	-31.40
		Middle	Left	3 604.80	-29.89
			Right	3 645.18	-29.55
		High	Left	3 659.29	-30.97
			Right	3 700.55	-31.47
	256QAM	Low	Left	3 549.86	-34.31
			Right	3 590.18	-28.48
		Middle	Left	3 604.80	-30.31
			Right	3 645.20	-30.88
		High	Left	3 659.74	-31.14
			Right	3 700.34	-30.15

Plot Data of Out-of-band Unwanted Emissions

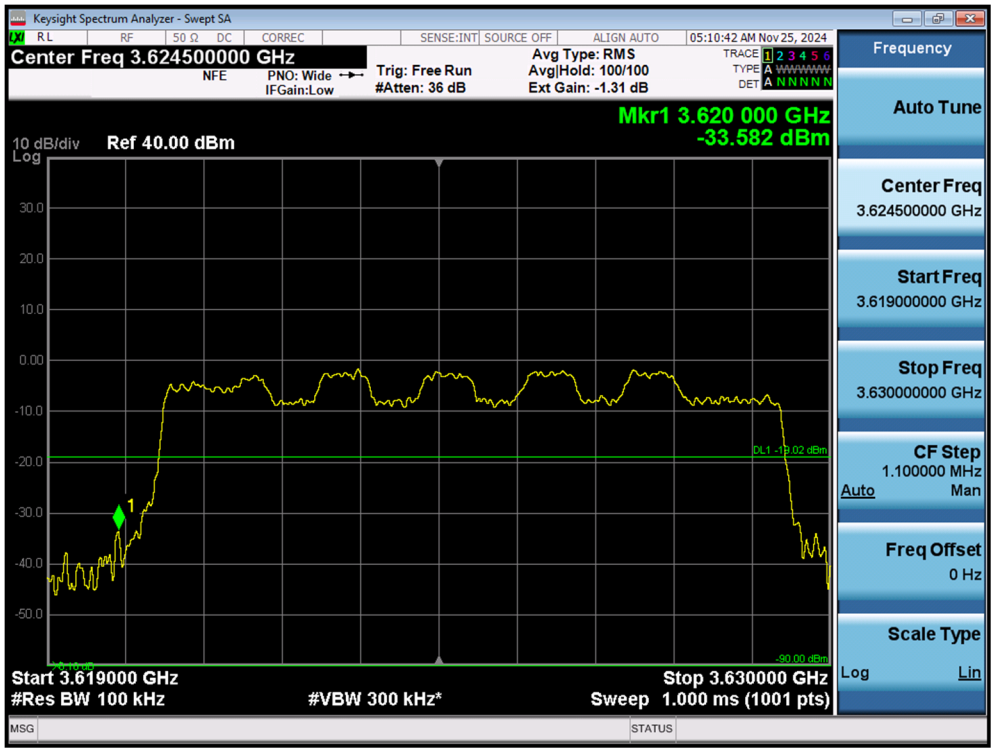
Antenna 2 / (4 Port) 5G NR n48 10 MHz 1 Carrier / QPSK / Low / Left



Antenna 0 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 256QAM / Low / Right

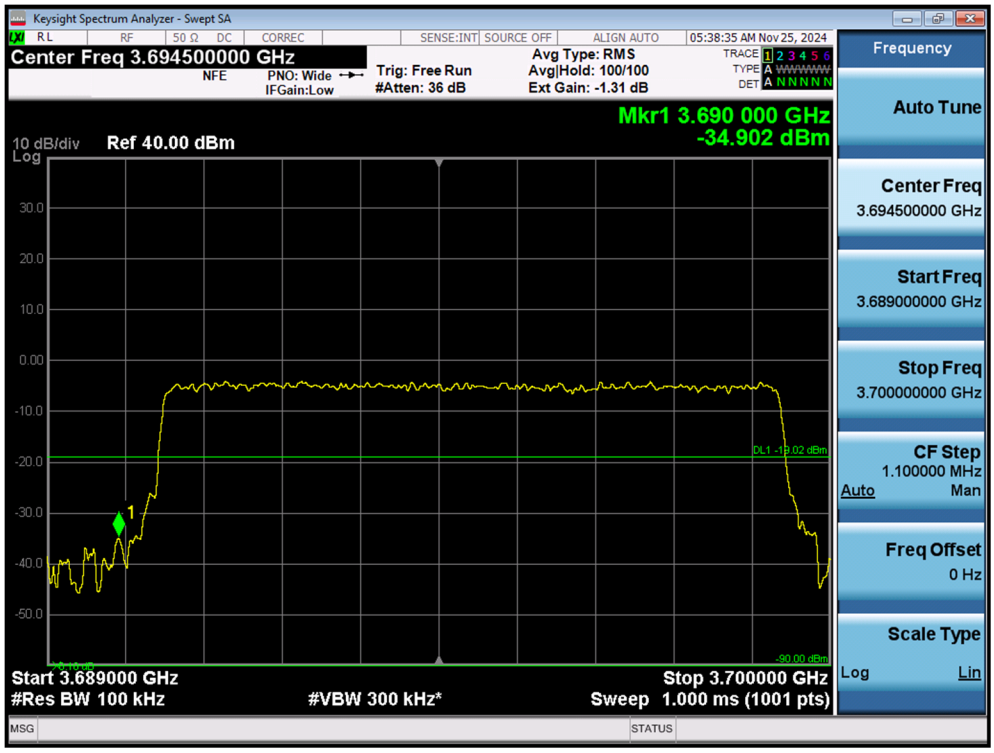


Antenna 0 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 16QAM / Middle / Left



Antenna 0 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 16QAM / Middle / Right

Antenna 1 / (4 Port) 5G NR n48 10 MHz 1 Carrier / QPSK / High / Left



Antenna 1 / (4 Port) 5G NR n48 10 MHz 1 Carrier / 16QAM / High / Right