

TEST REPORT

FCC Test for WEH37-TM24B
Class II Permissive Change

APPLICANT
Wave Electronics co.,Ltd

REPORT NO.
HCT-RF-2602-FC007

DATE OF ISSUE
February 23, 2026

Tested by
Kyung Soo Kang



Technical Manager
Jong Seok Lee



HCT CO., LTD.
BongJai Huh
BongJai Huh / CEO

**HCT CO.,LTD.**

2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea
Tel. +82 31 645 6300 Fax. +82 31 645 6401

TEST REPORT

REPORT NO.

HCT-RF-2602-FC007

DATE OF ISSUE

February 23, 2026

Additional Model

WEHn48-TX24B-I, WEHn48-TX24B-E

Applicant

Wave Electronics co.,Ltd

402, 114-6, Central town-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea

Product Name

5G O-RU

Model Name

WEH37-TM24B

FCC ID

2BKZBWEH37-TM24B

Date of Test

January 20, 2026 ~ February 23, 2026

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	February 23, 2026	Initial Release

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	1CT10225CE00010					
Power Supply	DC -48 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	0.40	8M73W7D	0.40
	(4 Port) 5G NR n48	20 MHz	18M4G7D	0.80	18M5W7D	0.84
	(4 Port) 5G NR n48	40 MHz	38M1G7D	1.64	38M3W7D	1.64
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, Republic 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 March 11, 2024 (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 96

Description	Reference	Results
RF Output Power and PSD	§ 2.1046, § 96.41(b)	Compliant ^{#note2}
PAPR	§ 2.1046, § 96.41(g)	Compliant ^{#note2}
Occupied Bandwidth	§ 2.1049	Not tested ^{#note3}
Out-of-band Unwanted Emissions	§ 96.41(e)	Not tested ^{#note3}
Spurious Unwanted Emissions	§ 96.41(e)	Not tested ^{#note3}
Radiated Emissions	§ 96.41(e)	Compliant ^{#note2}
Frequency Stability	§ 2.1055	Compliant ^{#note2}

Notes:

1. The decision rule applies 'simple acceptance'.
2. The C2PC models have been verified to ensure that no performance degradation results from the changes described in the manufacturer's change note.
3. The data from the application has been verified through appropriate spot checks to demonstrate compliance of this device, as shown in the test results.

4. Original model

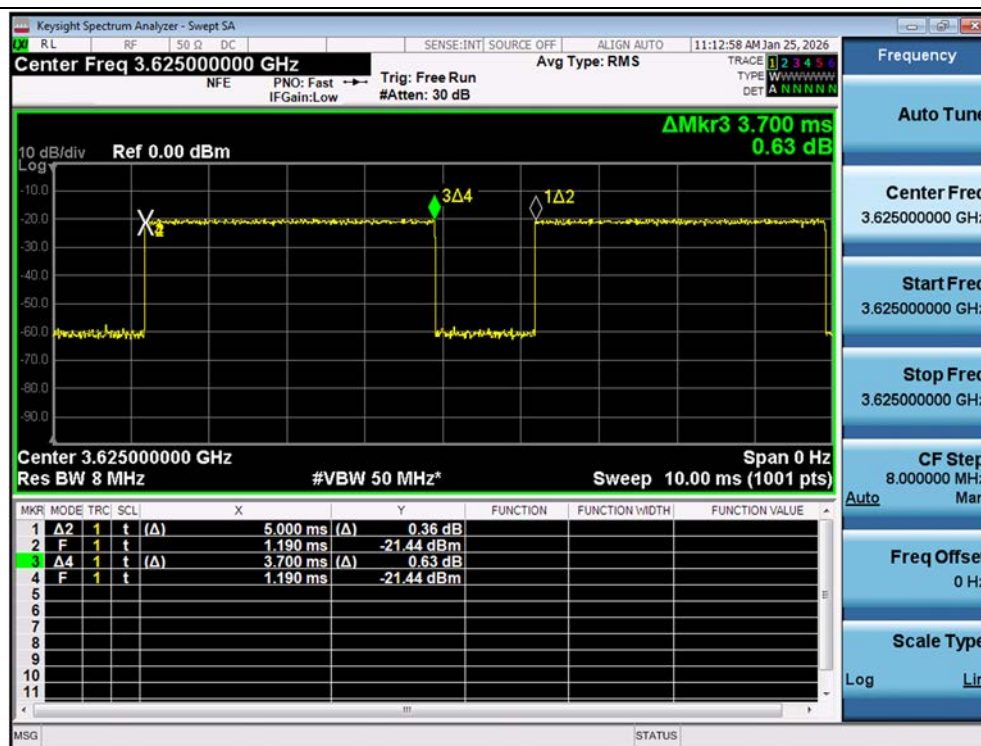
FCC ID : 2BKZBWEH37-TM24B

Original Report No. HCT-RF-2412-FC048-R2

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 modulation types (QPSK, 16QAM, 64QAM, 256QAM) supported by the EUT have been tested.
- Both wall mount and ceiling mount were investigated during pre-scan testing, and the results for the worst case(wall-mounted) were reported.
- The measurement has been performed for each carrier in the mode of full resource block size as worst-case to transmit 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 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 = $10 \log (1/\text{duty cycle}) = 1.31 \text{ dB}$ (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.

ANTO

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.119	3 900	34.198
100	29.444	4 000	34.669
200	29.756	5 000	35.373
300	29.978	6 000	36.117
400	30.143	7 000	36.501
500	30.308	8 000	37.155
600	30.433	9 000	38.307
700	30.622	10 000	32.625
800	30.781	11 000	32.897
900	30.870	12 000	33.040
1 000	31.023	13 000	33.271
1 100	31.162	14 000	34.034
1 200	31.278	15 000	34.316
1 300	31.342	16 000	34.425
1 400	31.461	17 000	34.352
1 500	31.492	18 000	34.972
1 600	31.639	19 000	34.786
1 700	31.653	20 000	36.682
1 800	31.746	21 000	37.714
1 900	31.879	22 000	39.336
2 000	32.072	23 000	40.502
2 100	32.149	24 000	39.228
2 200	32.230	25 000	42.200
2 300	32.346	26 000	40.451
2 400	32.363	27 000	44.241
2 500	32.397	28 000	29.670
2 600	32.487	29 000	30.085
2 700	32.598	30 000	29.627
2 800	32.613	31 000	29.562
2 900	32.703	32 000	29.777
3 000	32.989	33 000	29.392
3 100	33.030	34 000	29.646
3 200	33.037	35 000	30.253
3 300	33.102	36 000	30.637
3 400	33.254	37 000	29.936
3 500	33.335	38 000	30.365
3 600	34.152	39 000	30.853
3 700	34.086	39 500	30.765
3 800	34.187	40 000	31.024

ANT1

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.201	3 900	34.179
100	29.434	4 000	34.665
200	29.736	5 000	35.494
300	30.014	6 000	35.871
400	30.224	7 000	36.412
500	30.331	8 000	37.069
600	30.498	9 000	37.758
700	30.681	10 000	33.962
800	30.802	11 000	34.382
900	30.917	12 000	34.735
1 000	31.153	13 000	35.118
1 100	31.289	14 000	35.400
1 200	31.374	15 000	36.283
1 300	31.494	16 000	39.577
1 400	31.613	17 000	38.352
1 500	31.636	18 000	37.714
1 600	31.778	19 000	37.634
1 700	31.817	20 000	38.614
1 800	31.935	21 000	39.582
1 900	32.061	22 000	40.954
2 000	32.189	23 000	41.770
2 100	32.256	24 000	39.707
2 200	32.353	25 000	43.317
2 300	32.466	26 000	39.320
2 400	32.510	27 000	43.517
2 500	32.537	28 000	29.670
2 600	32.650	29 000	30.085
2 700	32.780	30 000	29.627
2 800	32.784	31 000	29.562
2 900	32.895	32 000	29.777
3 000	33.010	33 000	29.392
3 100	32.967	34 000	29.646
3 200	33.075	35 000	30.253
3 300	33.059	36 000	30.637
3 400	33.177	37 000	29.936
3 500	33.206	38 000	30.365
3 600	34.136	39 000	30.853
3 700	34.316	39 500	30.765
3 800	34.277	40 000	31.024

ANT2

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.244	3 900	34.495
100	29.493	4 000	34.978
200	29.816	5 000	36.111
300	30.102	6 000	36.265
400	30.346	7 000	36.805
500	30.469	8 000	37.423
600	30.671	9 000	38.283
700	30.877	10 000	34.751
800	31.017	11 000	35.158
900	31.169	12 000	35.437
1 000	31.467	13 000	35.708
1 100	31.574	14 000	36.281
1 200	31.735	15 000	36.599
1 300	31.821	16 000	36.950
1 400	32.115	17 000	36.824
1 500	32.583	18 000	37.333
1 600	34.950	19 000	37.667
1 700	35.691	20 000	38.857
1 800	32.962	21 000	39.613
1 900	32.734	22 000	42.340
2 000	32.681	23 000	40.156
2 100	32.737	24 000	38.191
2 200	32.810	25 000	41.369
2 300	32.879	26 000	39.586
2 400	32.912	27 000	46.423
2 500	32.877	28 000	29.670
2 600	33.044	29 000	30.085
2 700	33.113	30 000	29.627
2 800	33.097	31 000	29.562
2 900	33.215	32 000	29.777
3 000	33.325	33 000	29.392
3 100	33.320	34 000	29.646
3 200	33.321	35 000	30.253
3 300	33.388	36 000	30.637
3 400	33.494	37 000	29.936
3 500	33.614	38 000	30.365
3 600	34.440	39 000	30.853
3 700	34.672	39 500	30.765
3 800	34.684	40 000	31.024

ANT3

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	29.324	3 900	34.212
100	29.476	4 000	34.788
200	29.812	5 000	35.504
300	30.101	6 000	36.256
400	30.346	7 000	36.785
500	30.463	8 000	37.476
600	30.651	9 000	38.286
700	30.848	10 000	33.830
800	30.959	11 000	34.033
900	31.083	12 000	34.220
1 000	31.368	13 000	34.512
1 100	32.835	14 000	34.993
1 200	32.603	15 000	35.171
1 300	31.626	16 000	35.290
1 400	31.573	17 000	35.404
1 500	31.570	18 000	36.119
1 600	31.687	19 000	36.557
1 700	31.706	20 000	38.090
1 800	31.824	21 000	38.604
1 900	31.965	22 000	40.900
2 000	32.109	23 000	41.030
2 100	32.136	24 000	39.226
2 200	32.251	25 000	41.952
2 300	32.320	26 000	41.197
2 400	32.356	27 000	46.553
2 500	32.408	28 000	29.670
2 600	32.509	29 000	30.085
2 700	32.613	30 000	29.627
2 800	32.630	31 000	29.562
2 900	32.702	32 000	29.777
3 000	33.076	33 000	29.392
3 100	33.120	34 000	29.646
3 200	33.156	35 000	30.253
3 300	33.193	36 000	30.637
3 400	33.375	37 000	29.936
3 500	33.387	38 000	30.365
3 600	34.186	39 000	30.853
3 700	34.167	39 500	30.765
3 800	34.283	40 000	31.024

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

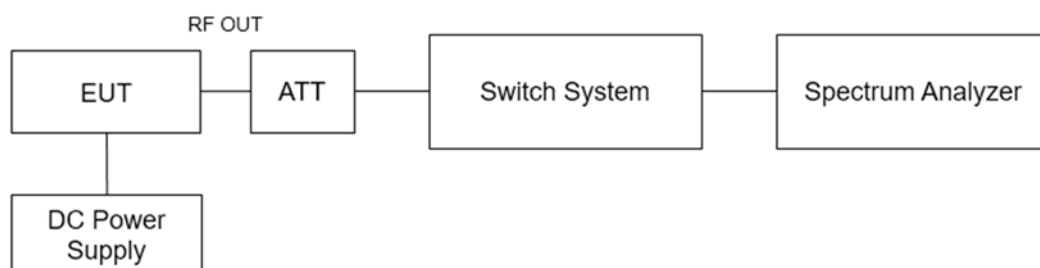
Coverage factor $k=2$, Confidence levels of 95 %

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

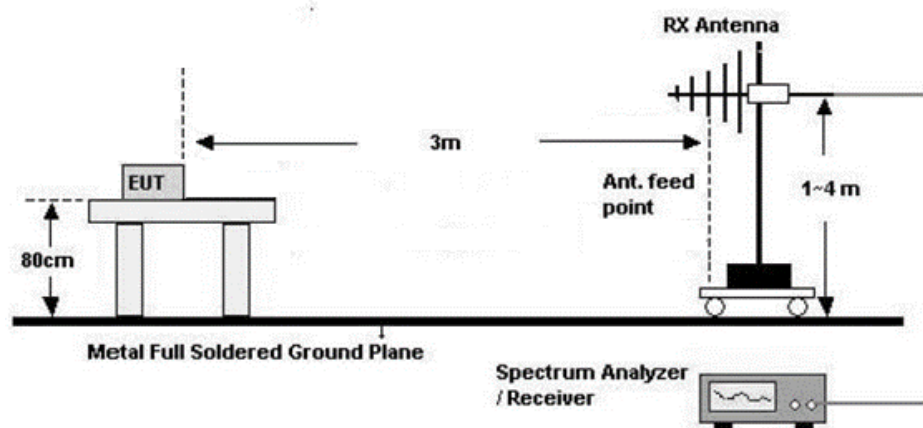
3.5. TEST DIAGRAMS

Conducted Test

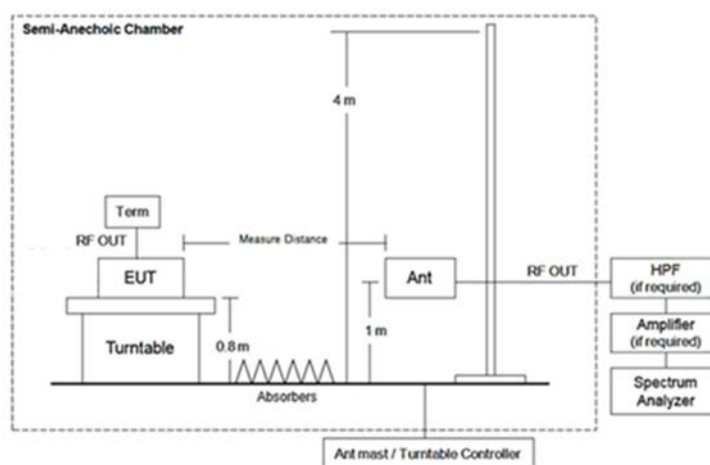


Radiated Test

30 MHz ~ 1 GHz

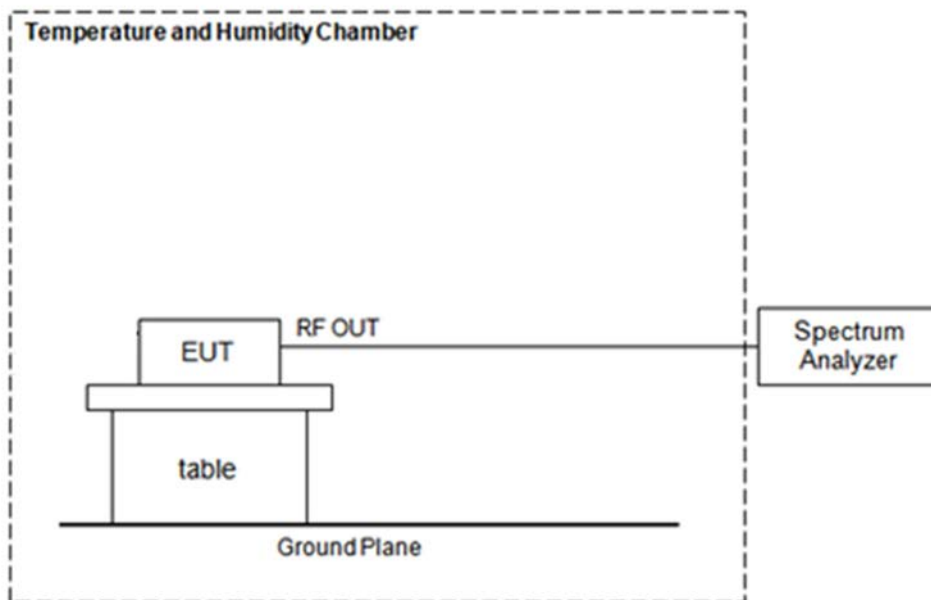


Above 1 GHz



※ 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	07/10/2026	Annual
PXA Signal Analyzer	N9030B	Keysight	MY55480110	01/13/2027	Annual
RF Switch System	TMX0108	TNM System	TM21100001	N/A	N/A
20 dB Attenuator	FAS-23-20	MCLI	103756	12/16/2026	Annual
#30 dB Attenuator	67-30-33	API Weinschel, Inc.	CL4338	04/29/2026	Annual
#50Ω Termination	908A	H.P.	N/A	N/A	N/A
#20 dB Fixed Attenuator	8493C	Keysight	90544	08/07/2026	Annual
DC Power Supply	PWR800L	KIKUSUI	RE001149	03/11/2026	Annual
Temperature and Humidity Chamber	NY-THR18750	NANGYEAL	NY-200912201A	12/16/2026	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	08/01/2026	Annual
Turn Table	N/A	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	06/23/2027	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/28/2026	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-937	02/07/2027	Biennial
Horn Antenna	BBHA9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
RF Switching System	FBSR-04C (10 dB ATT + LNA)	TNM system	S4L2	03/12/2026	Annual
RF Switching System	FBSR-04C (3 dB ATT + LNA)	TNM system	S4L3	03/12/2026	Annual
RF Switching System	FBSR-04C (LNA)	TNM system	S4L4	03/12/2026	Annual
RF Switching System	FBSR-04C (7 GHz HPF + LNA)	TNM system	S4L5	03/12/2026	Annual
RF Switching System	FBSR-04C (Thru)	TNM system	S4L6	03/12/2026	Annual
LOW NOISE AMPLIFIER	TK-PA1840H	TESTEK	170011-L	09/29/2026	Annual

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

Note: All test equipment was within its valid calibration period at the time of testing.

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 $2 \times$ 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.

Notes:

1. For the PSD measurement, since the test equipment cannot be configured to the specified reference bandwidth (10 MHz), the measurement was performed using a narrower RBW. Therefore, the following correction factor was applied:
 - $10 \log [(reference\ bandwidth)/(resolution\ bandwidth)]$
: $10 \log (10\ MHz / 1\ MHz) = 10\ dB$
 - E.I.R.P. (dBm/10 MHz) Sample Calculation:
 $5.33\ dBm/MHz\ (Measured\ Value) + 6\ dBi\ (Directional\ Gain) + 10\ dB\ (RBW\ Correction)$
 $= 21.33\ dBm/10\ MHz\ (Final\ E.I.R.P.)$
The measured value already includes the duty correction value.
2. The results of the Conducted Output Power and PSD tests show a similar trend across all ports, and all measured levels fall within the allowable tolerance; therefore, only the worst-case plots are attached.
3. The sum data of Port 0, Port 1, Port 2, and Port 3 were calculated using the highest values measured for QPSK and QAM.

Test Results:

Tabular Data of RF Output Power

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

[External Antenna Type]

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
2	QPSK	Low	3 555.00	13.95	0.02	6.00	19.95	0.10
		Middle	3 625.00	14.10	0.03	6.00	20.10	0.10
		High	3 695.00	14.12	0.03	6.00	20.12	0.10
1	64QAM	Low	3 555.00	14.01	0.03	6.00	20.01	0.10
		Middle	3 625.00	14.17	0.03	6.00	20.17	0.10
		High	3 695.00	14.17	0.03	6.00	20.17	0.10

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

Frequency (MHz)	Output Power (Conducted)	
	QPSK	QAM
	W	
3 555.00	0.40	0.40
3 625.00	0.40	0.40
3 695.00	0.40	0.40

[Internal Antenna Type]

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
2	QPSK	Low	3 555.00	13.82	0.02	6.00	19.82	0.10
		Middle	3 625.00	14.02	0.03	6.00	20.02	0.10
		High	3 695.00	13.94	0.02	6.00	19.94	0.10
1	64QAM	Low	3 555.00	14.01	0.03	6.00	20.01	0.10
		Middle	3 625.00	13.97	0.02	6.00	19.97	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	QAM
	W	
3 555.00	0.40	0.40
3 625.00	0.40	0.40
3 695.00	0.40	0.40

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

[External Antenna Type]

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
1	QPSK	Low	3 560.00	17.01	0.05	6.00	23.01	0.20
		Middle	3 625.00	16.51	0.04	6.00	22.51	0.18
		High	3 690.00	16.77	0.05	6.00	22.77	0.19
0	256QAM	Low	3 560.00	16.72	0.05	6.00	22.72	0.19
		Middle	3 625.00	17.00	0.05	6.00	23.00	0.20
		High	3 690.00	16.64	0.05	6.00	22.64	0.18

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

Frequency (MHz)	Output Power (Conducted)	
	QPSK	QAM
	W	
3 560.00	0.80	0.76
3 625.00	0.72	0.80
3 690.00	0.76	0.72

[Internal Antenna Type]

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
1	QPSK	Low	3 560.00	16.86	0.05	6.00	22.86	0.19
		Middle	3 625.00	17.07	0.05	6.00	23.07	0.20
		High	3 690.00	17.07	0.05	6.00	23.07	0.20
0	256QAM	Low	3 560.00	17.00	0.05	6.00	23.00	0.20
		Middle	3 625.00	16.96	0.05	6.00	22.96	0.20
		High	3 690.00	17.12	0.05	6.00	23.12	0.21

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

Frequency (MHz)	Output Power (Conducted)	
	QPSK	QAM
	W	
3 560.00	0.76	0.80
3 625.00	0.80	0.80
3 690.00	0.80	0.84

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

[External Antenna Type]

Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
2	QPSK	Low	3 570.00	20.11	0.10	6.00	26.11	0.41
		Middle	3 625.00	19.83	0.10	6.00	25.83	0.38
		High	3 680.00	19.97	0.10	6.00	25.97	0.40
1	16QAM	Low	3 570.00	19.75	0.09	6.00	25.75	0.38
		Middle	3 625.00	19.90	0.10	6.00	25.90	0.39
		High	3 680.00	20.13	0.10	6.00	26.13	0.41

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

Frequency (MHz)	Output Power (Conducted)	
	QPSK	QAM
	W	
3 570.00	1.64	1.52
3 625.00	1.52	1.56
3 680.00	1.60	1.64

[Internal Antenna Type]

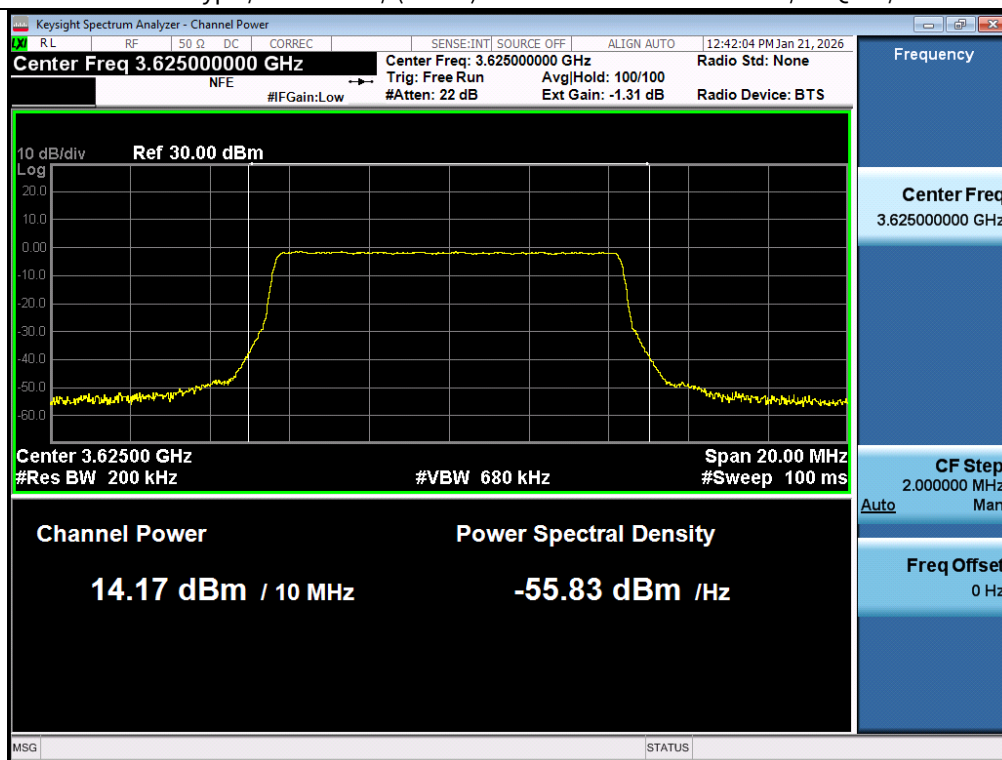
Antenna	Modulation	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)	Directional Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
2	QPSK	Low	3 570.00	19.92	0.10	6.00	25.92	0.39
		Middle	3 625.00	19.99	0.10	6.00	25.99	0.40
		High	3 680.00	19.95	0.10	6.00	25.95	0.39
1	16QAM	Low	3 570.00	20.07	0.10	6.00	26.07	0.40
		Middle	3 625.00	19.99	0.10	6.00	25.99	0.40
		High	3 680.00	20.15	0.10	6.00	26.15	0.41

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

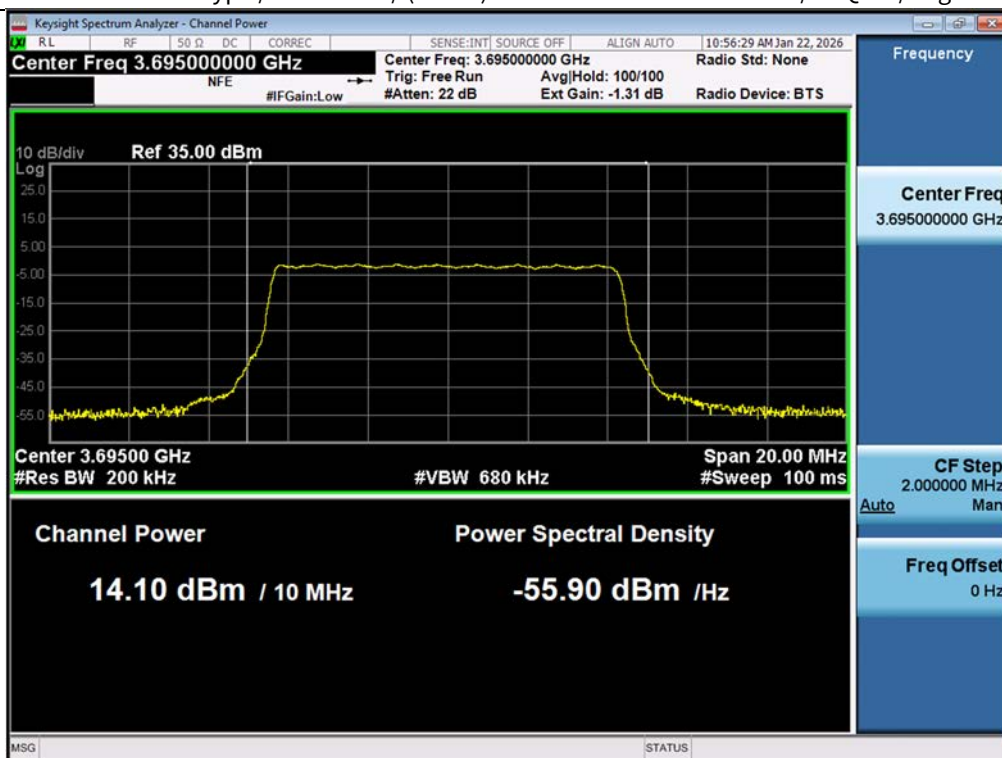
Frequency (MHz)	Output Power (Conducted)	
	QPSK	QAM
	W	
3 570.00	1.56	1.60
3 625.00	1.60	1.60
3 680.00	1.56	1.64

Plot Data of RF Output Power

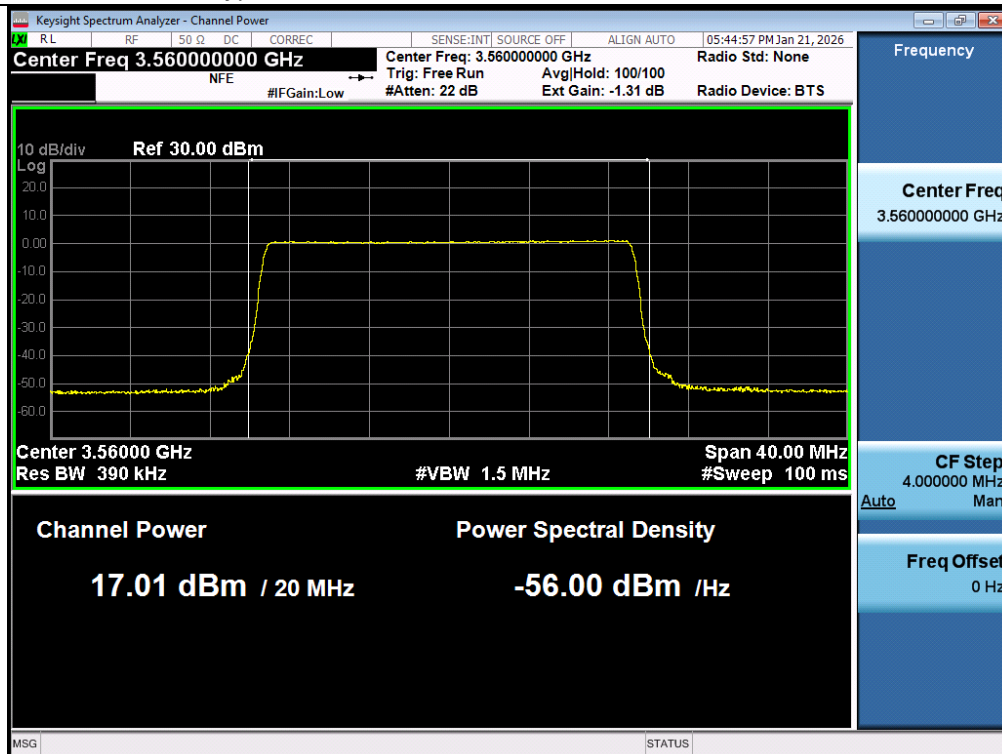
External Ant. Type / Antenna 1 / (4 Port) n48 5G NR 10 MHz 1 Carrier / 64QAM / Middle



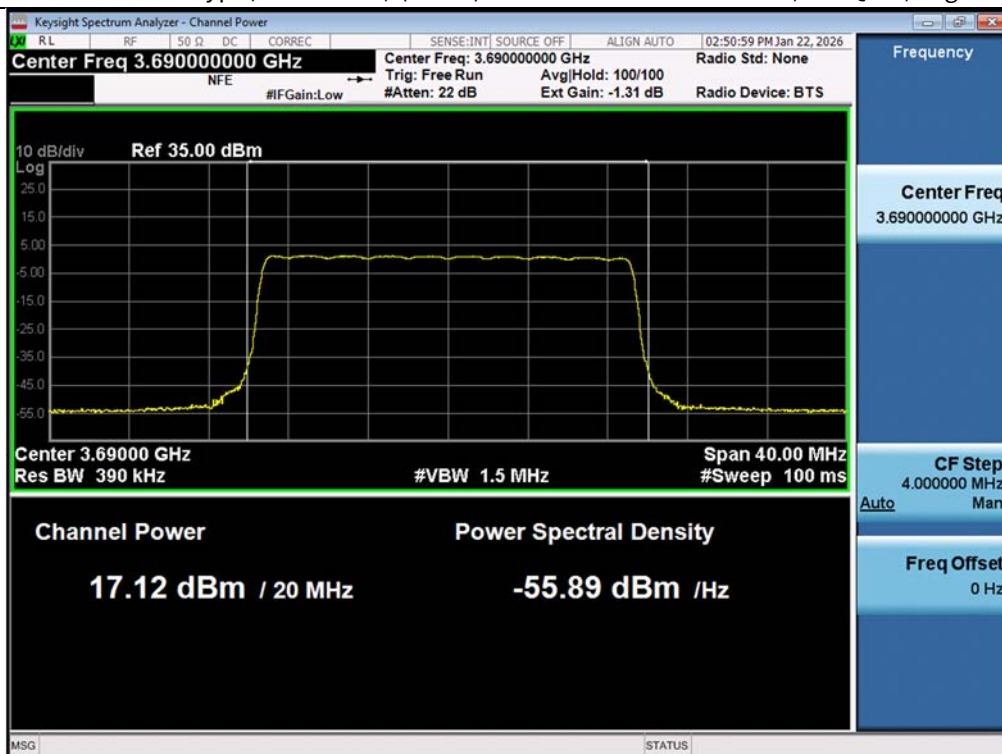
Internal Ant. Type / Antenna 1 / (4 Port) n48 5G NR 10 MHz 1 Carrier / 64QAM / High



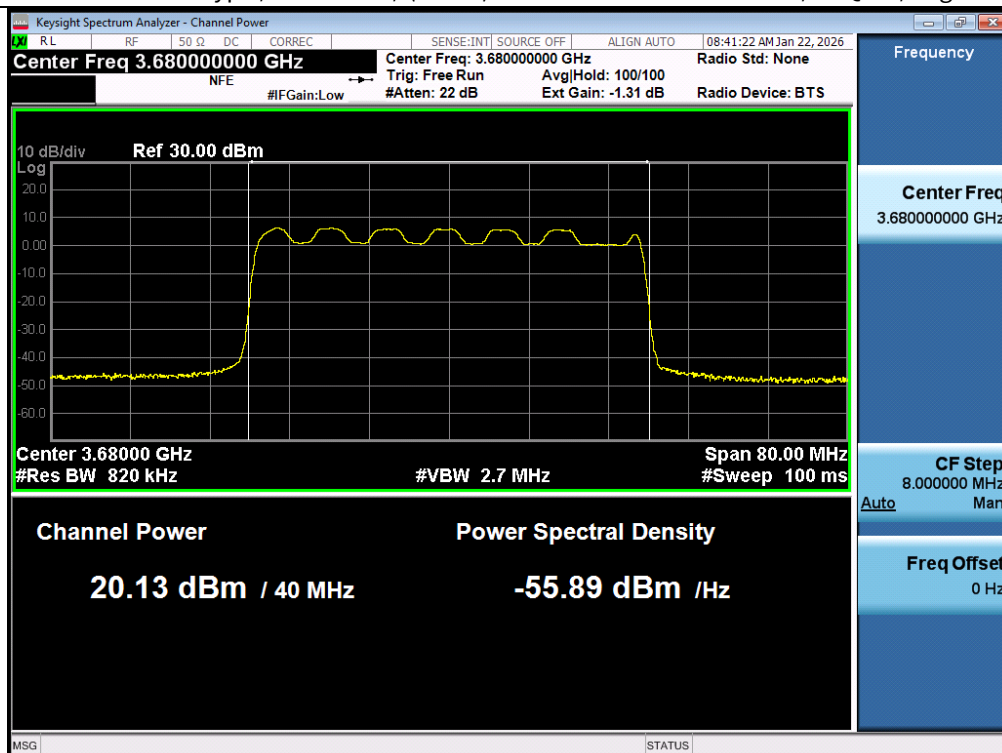
External Ant. Type / Antenna 1 / (4 Port) n48 5G NR 20 MHz 1 Carrier / QPSK / Low



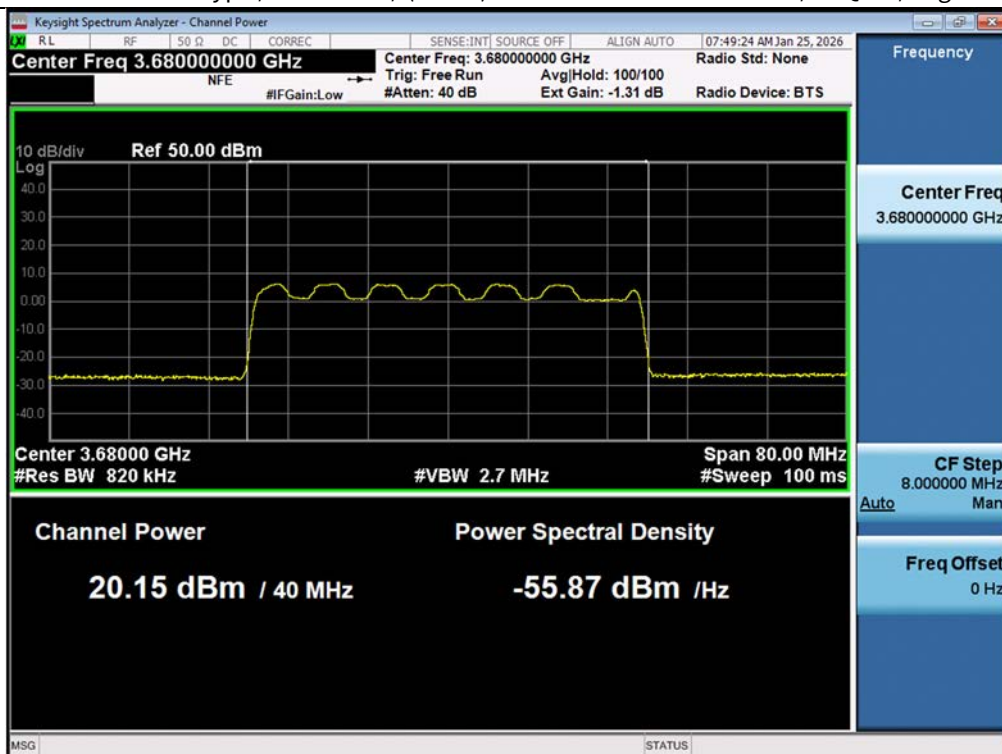
Internal Ant. Type / Antenna 0 / (4 Port) n48 5G NR 20 MHz 1 Carrier / 256QAM / High



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



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



Test Results:

Tabular Data of RF PSD

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

[External Antenna Type]

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)
1	QPSK	Low	3 555.00	5.33	6.00	11.33	20	21.33	30
		Middle	3 625.00	5.51	6.00	11.51		21.51	
		High	3 695.00	5.67	6.00	11.67		21.67	
2	16QAM	Low	3 555.00	5.94	6.00	11.94		21.94	
		Middle	3 625.00	6.12	6.00	12.12		22.12	
		High	3 695.00	6.21	6.00	12.21		22.21	

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

Frequency (MHz)	PSD			E.I.R.P.		
	QPSK	QAM	Limit	QPSK	QAM	Limit
	dBm/MHz			dBm/10 MHz		
3 555.00	17.35	17.96	20	27.35	27.96	30
3 625.00	17.53	18.14		27.53	28.14	
3 695.00	17.66	18.23		27.69	28.23	

[Internal Antenna Type]

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)
1	QPSK	Low	3 555.00	5.60	6.00	11.60	20	21.60	30
		Middle	3 625.00	5.32	6.00	11.32		21.32	
		High	3 695.00	5.38	6.00	11.38		21.38	
2	16QAM	Low	3 555.00	6.03	6.00	12.03		22.03	
		Middle	3 625.00	6.27	6.00	12.27		22.27	
		High	3 695.00	5.89	6.00	11.89		21.89	

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

Frequency (MHz)	PSD			E.I.R.P.		
	QPSK	QAM	Limit	QPSK	QAM	Limit
	dBm/MHz			dBm/10 MHz		
3 555.00	17.62	18.05	20	27.62	28.05	30
3 625.00	17.34	18.29		27.34	28.29	
3 695.00	17.40	17.91		27.40	27.91	

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

[External Antenna Type]

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)
3	QPSK	Low	3 560.00	5.04	6.00	11.04	20	21.04	30
		Middle	3 625.00	5.17	6.00	11.17		21.17	
		High	3 690.00	5.16	6.00	11.16		21.16	
0	16QAM	Low	3 560.00	6.26	6.00	12.26		22.26	
		Middle	3 625.00	6.02	6.00	12.02		22.02	
		High	3 690.00	6.32	6.00	12.32		22.32	

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

Frequency (MHz)	PSD			E.I.R.P.		
	QPSK	QAM	Limit	QPSK	QAM	Limit
	dBm/MHz			dBm/10 MHz		
3 560.00	17.06	18.28	20	27.06	28.28	30
3 625.00	17.19	18.04		27.19	28.04	
3 690.00	17.18	18.34		27.18	28.34	

[Internal Antenna Type]

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)
3	QPSK	Low	3 560.00	5.19	6.00	11.19	20	21.19	30
		Middle	3 625.00	4.97	6.00	10.97		20.97	
		High	3 690.00	5.10	6.00	11.10		21.10	
0	16QAM	Low	3 560.00	6.69	6.00	12.69		22.69	
		Middle	3 625.00	6.62	6.00	12.62		22.62	
		High	3 690.00	6.66	6.00	12.66		22.66	

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

Frequency (MHz)	PSD			E.I.R.P.		
	QPSK	QAM	Limit	QPSK	QAM	Limit
	dBm/MHz			dBm/10 MHz		
3 560.00	17.21	18.71	20	27.21	28.71	30
3 625.00	16.99	18.64		26.99	28.64	
3 690.00	17.12	18.68		27.12	28.68	

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

[External Antenna Type]

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)
3	QPSK	Low	3 570.00	5.18	6.00	11.18	20	21.18	30
		Middle	3 625.00	5.22	6.00	11.22		21.22	
		High	3 680.00	6.27	6.00	12.27		22.27	
1	16QAM	Low	3 570.00	6.67	6.00	12.67		22.67	
		Middle	3 625.00	7.15	6.00	13.15		23.15	
		High	3 680.00	6.97	6.00	12.97		22.97	

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

Frequency (MHz)	PSD			E.I.R.P.		
	QPSK	QAM	Limit	QPSK	QAM	Limit
	dBm/MHz			dBm/10 MHz		
3 570.00	17.20	18.69	20	27.20	28.69	30
3 625.00	17.24	19.17		27.24	29.17	
3 680.00	18.29	18.99		28.29	28.99	

[Internal Antenna Type]

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)
3	QPSK	Low	3 570.00	4.94	6.00	10.94	20	20.94	30
		Middle	3 625.00	5.06	6.00	11.06		21.06	
		High	3 680.00	5.20	6.00	11.20		21.20	
1	16QAM	Low	3 570.00	6.93	6.00	12.93		22.93	
		Middle	3 625.00	6.59	6.00	12.59		22.59	
		High	3 680.00	6.94	6.00	12.94		22.94	

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

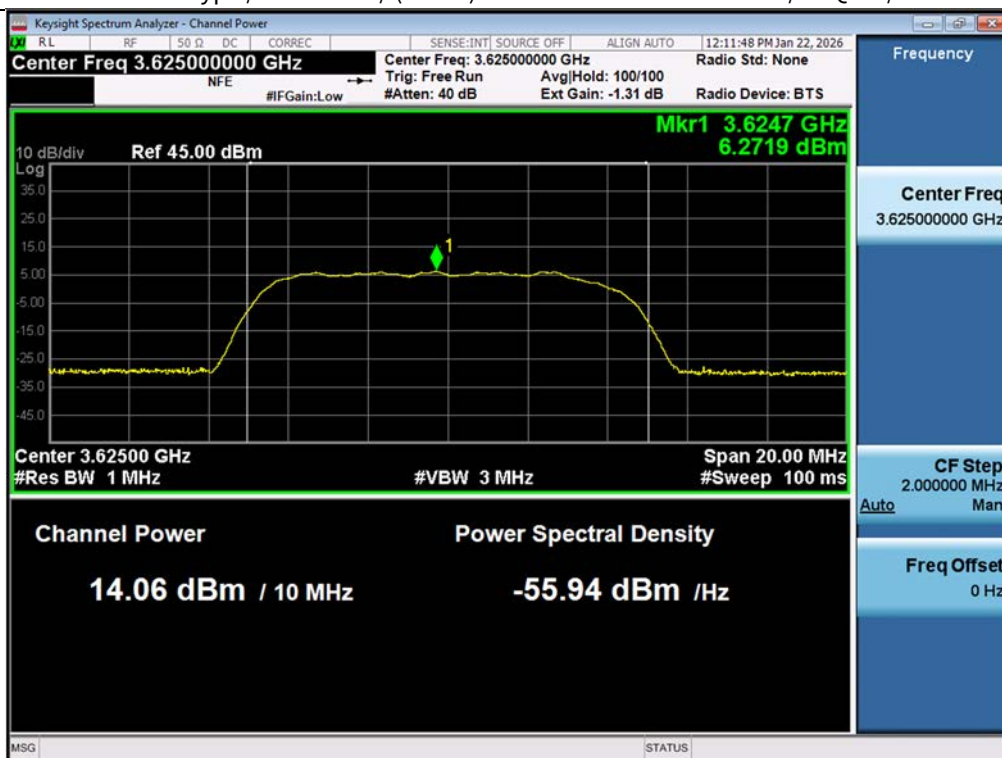
Frequency (MHz)	PSD			E.I.R.P.		
	QPSK	QAM	Limit	QPSK	QAM	Limit
	dBm/MHz			dBm/10 MHz		
3 560.00	16.96	18.95	20	26.96	28.95	30
3 625.00	17.08	18.61		27.08	28.61	
3 690.00	17.22	18.96		27.22	28.96	

Plot Data of PSD

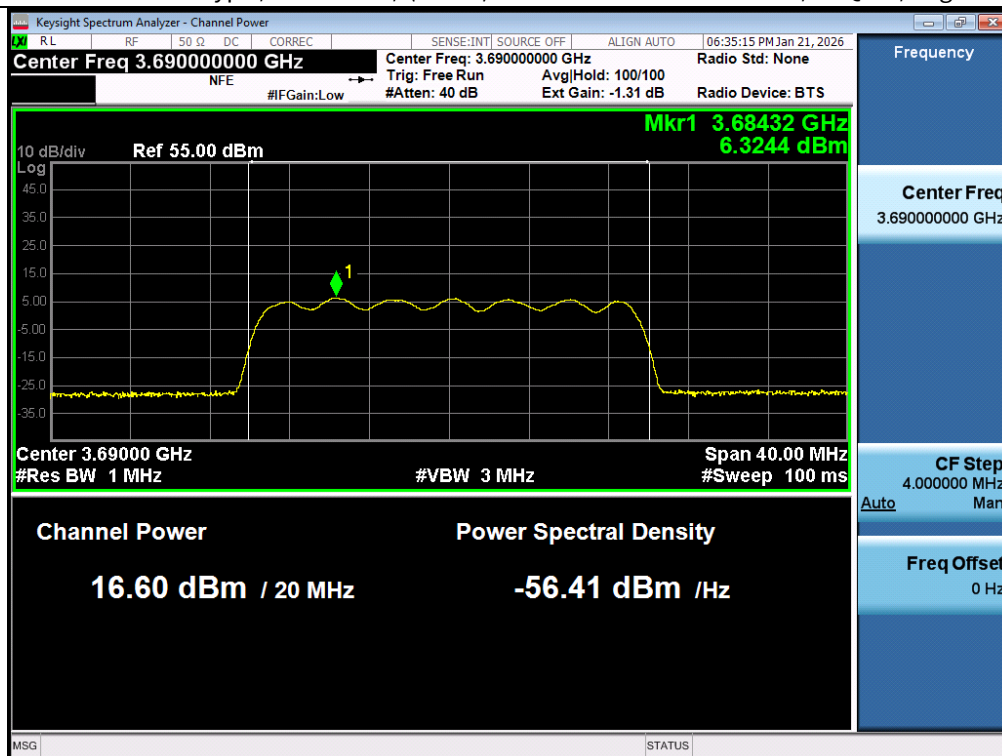
External Ant. Type / Antenna 2 / (4 Port) n48 5G NR 10 MHz 1 Carrier / 16QAM / High



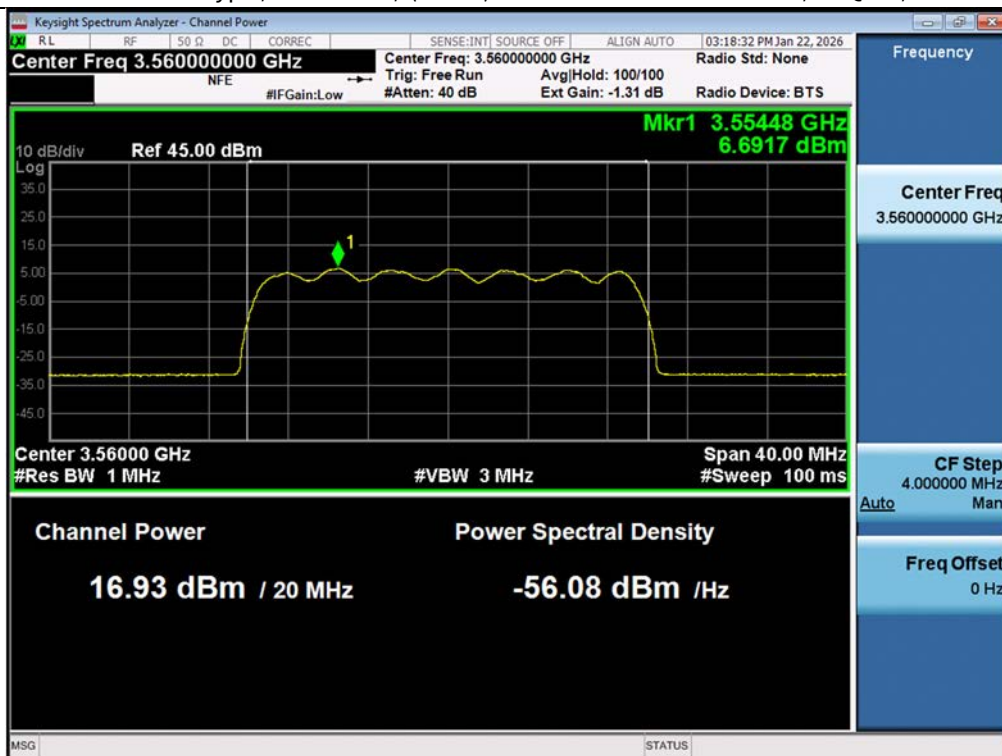
Internal Ant. Type / Antenna 2 / (4 Port) n48 5G NR 10 MHz 1 Carrier / 16QAM / Middle



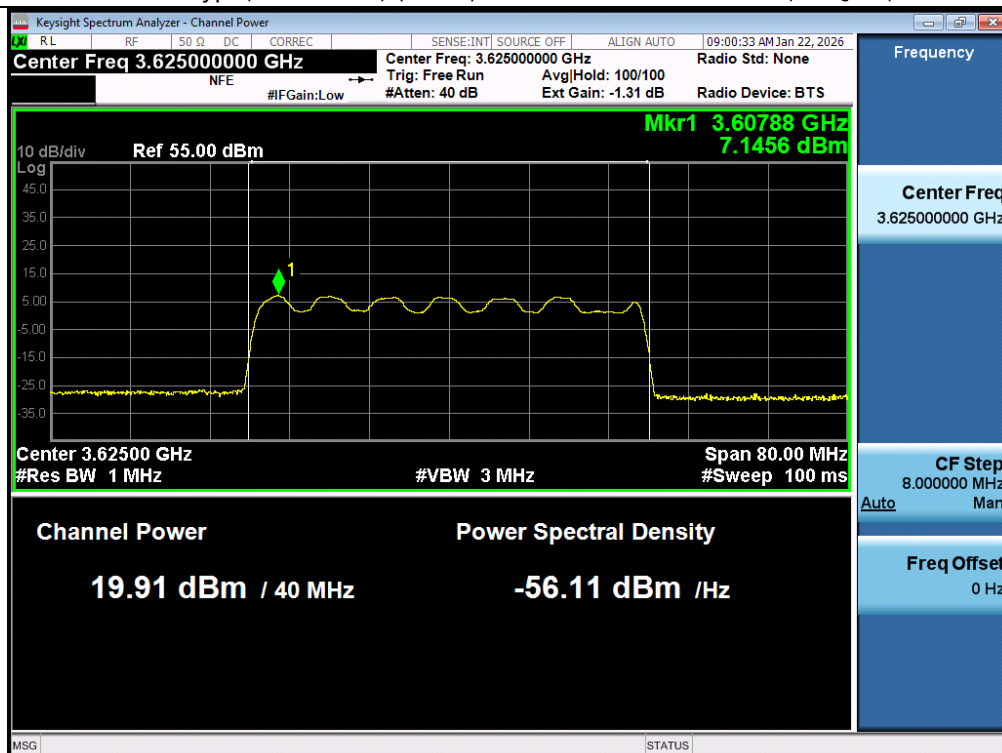
External Ant. Type / Antenna 0 / (4 Port) n48 5G NR 20 MHz 1 Carrier / 16QAM / High



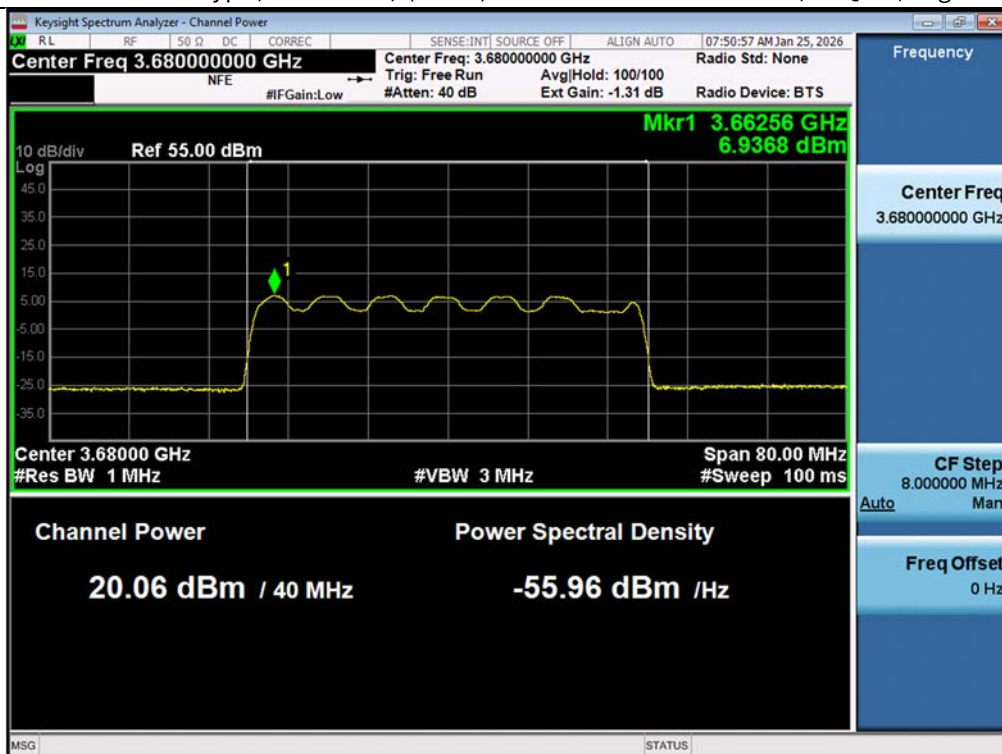
Internal Ant. Type / Antenna 0 / (4 Port) n48 5G NR 20 MHz 1 Carrier / 16QAM / Low



External Ant. Type / Antenna 1 / (4 Port) n48 5G NR 40 MHz 1 Carrier / 16QAM / Middle



Internal Ant. Type / Antenna 1 / (4 Port) n48 5G NR 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 $\geq$ 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 the PAPR tests show a similar trend across all ports; therefore, only the worst-case plots are attached.

Test Results:

Tabular Data of RF PAPR

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

Antenna	Moddulation	Channel	Frequency (MHz)	External Ant. Type	Internal Ant. Type
				0.1 % PAPR (dB)	
0	QPSK	Low	3 555.00	9.46	9.45
		Middle	3 625.00	9.48	9.26
		High	3 695.00	9.56	9.26
3	256QAM	Low	3 555.00	9.35	9.42
		Middle	3 625.00	9.47	9.20
		High	3 695.00	9.46	9.13

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

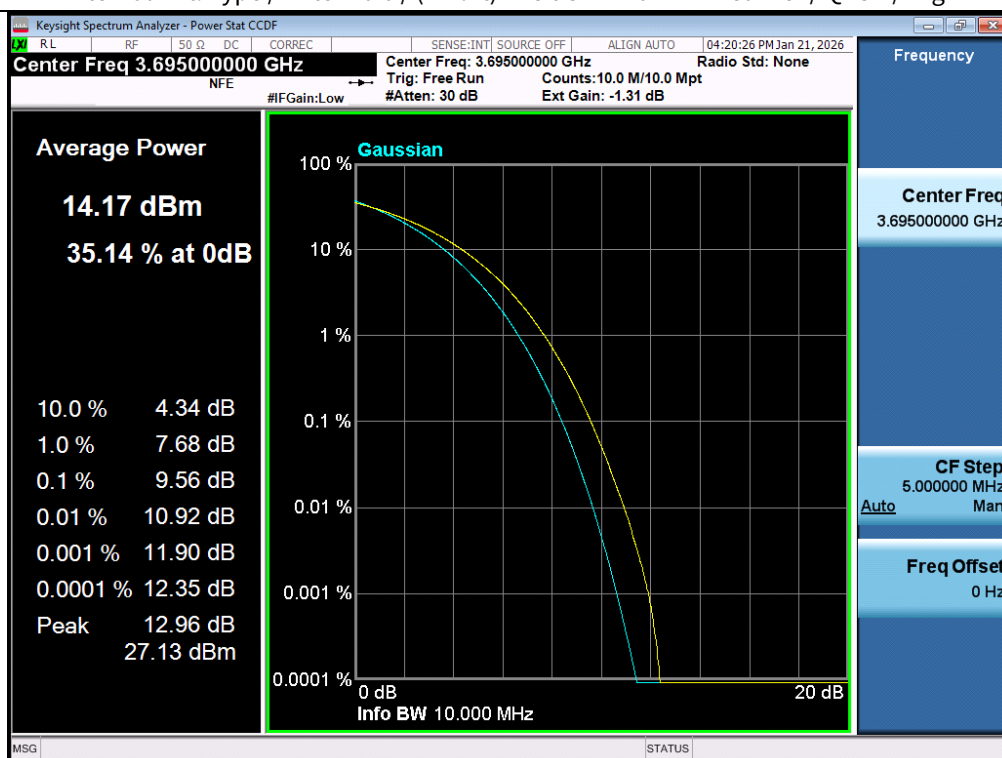
Antenna	Moddulation	Channel	Frequency (MHz)	External Ant. Type	Internal Ant. Type
				0.1 % PAPR (dB)	
3	QPSK	Low	3 560.00	9.54	9.42
		Middle	3 625.00	9.50	9.27
		High	3 690.00	9.44	9.24
1	16QAM	Low	3 560.00	9.41	9.40
		Middle	3 625.00	9.55	9.27
		High	3 690.00	9.49	9.24

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

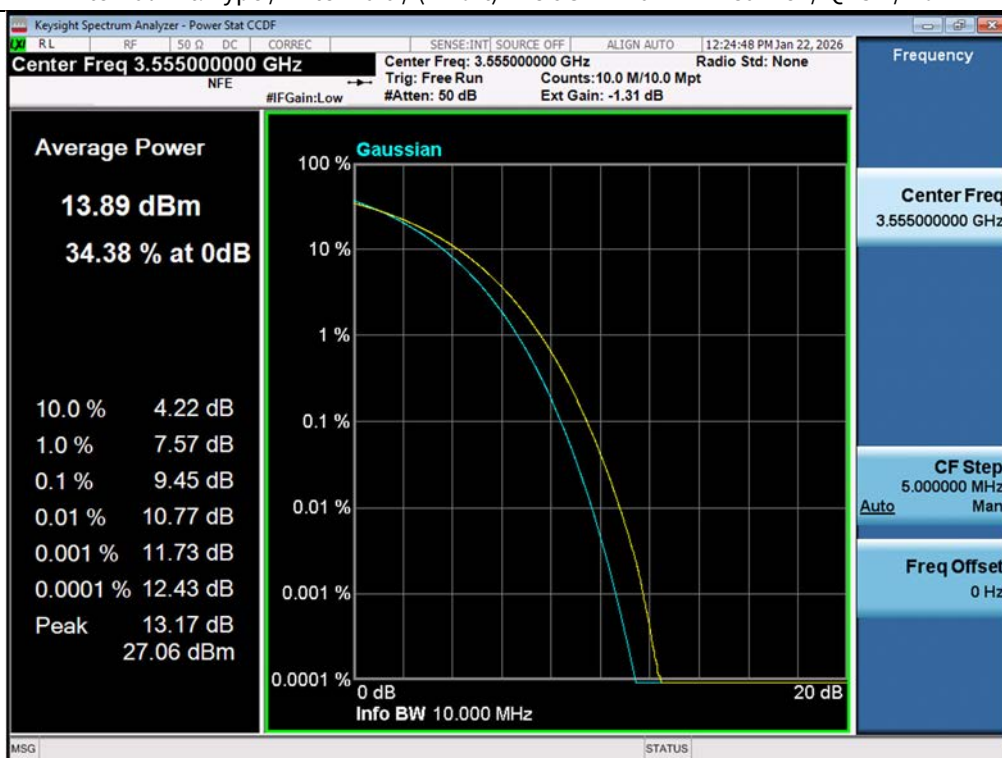
Antenna	Moddulation	Channel	Frequency (MHz)	External Ant. Type	Internal Ant. Type
				0.1 % PAPR (dB)	
3	QPSK	Low	3 570.00	9.26	9.33
		Middle	3 625.00	9.14	9.35
		High	3 680.00	9.29	9.42
2	256QAM	Low	3 570.00	9.48	9.24
		Middle	3 625.00	9.33	9.07
		High	3 680.00	9.31	9.24

Plot Data of PAPR

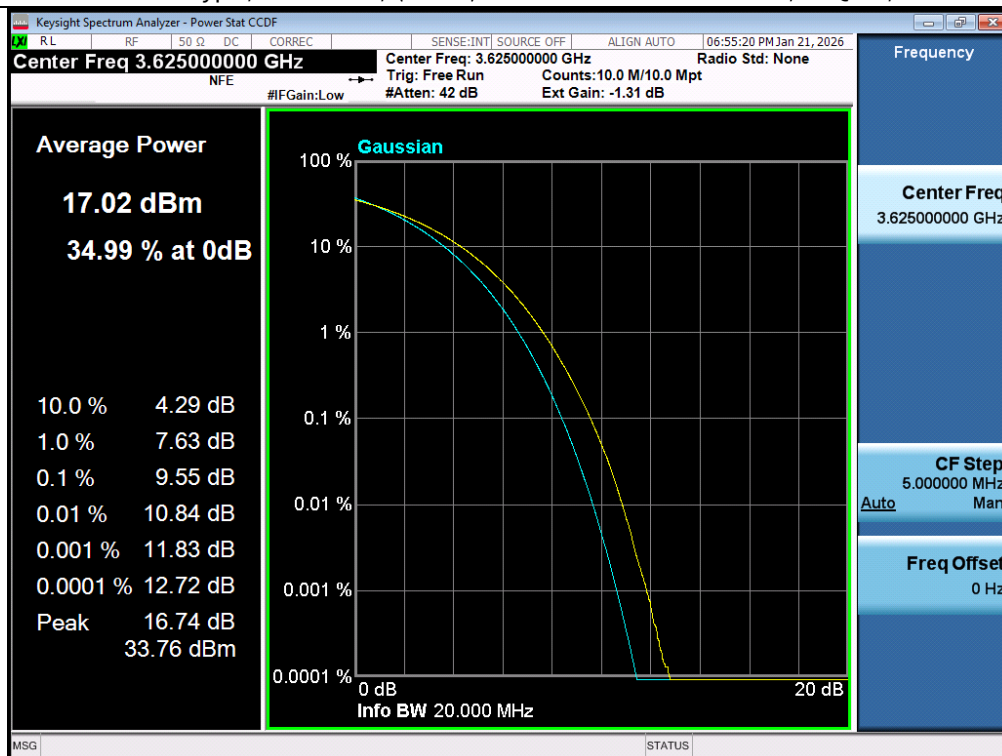
External Ant. Type / Antenna 0 / (4 Port) n48 5G NR 10 MHz 1 Carrier / QPSK / High



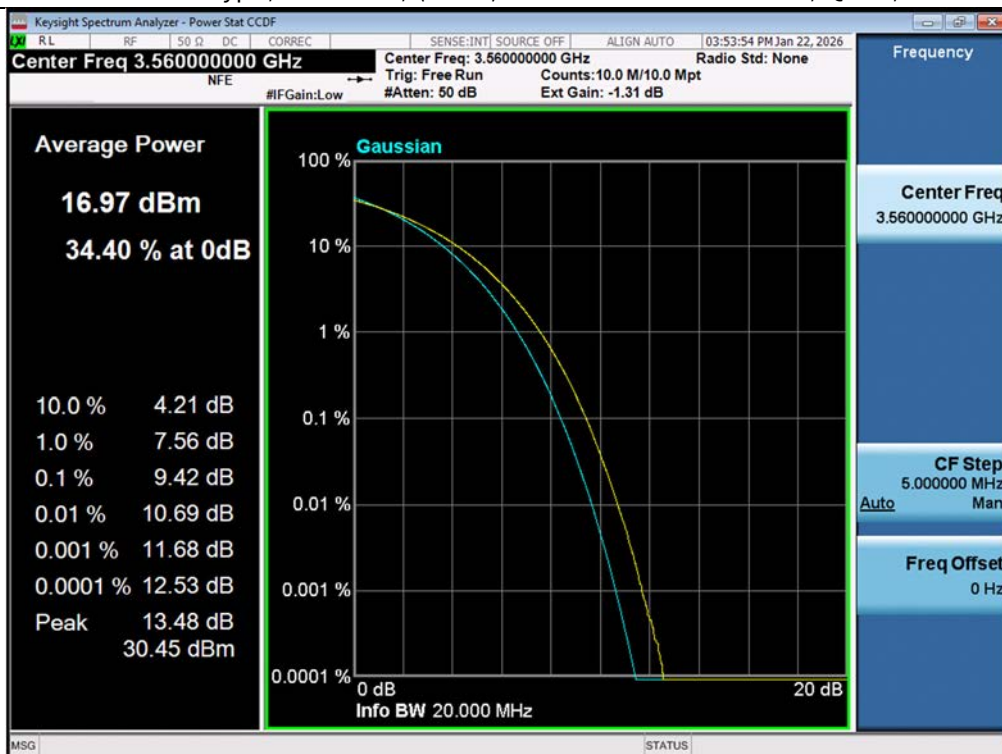
Internal Ant. Type / Antenna 0 / (4 Port) n48 5G NR 10 MHz 1 Carrier / QPSK / Low



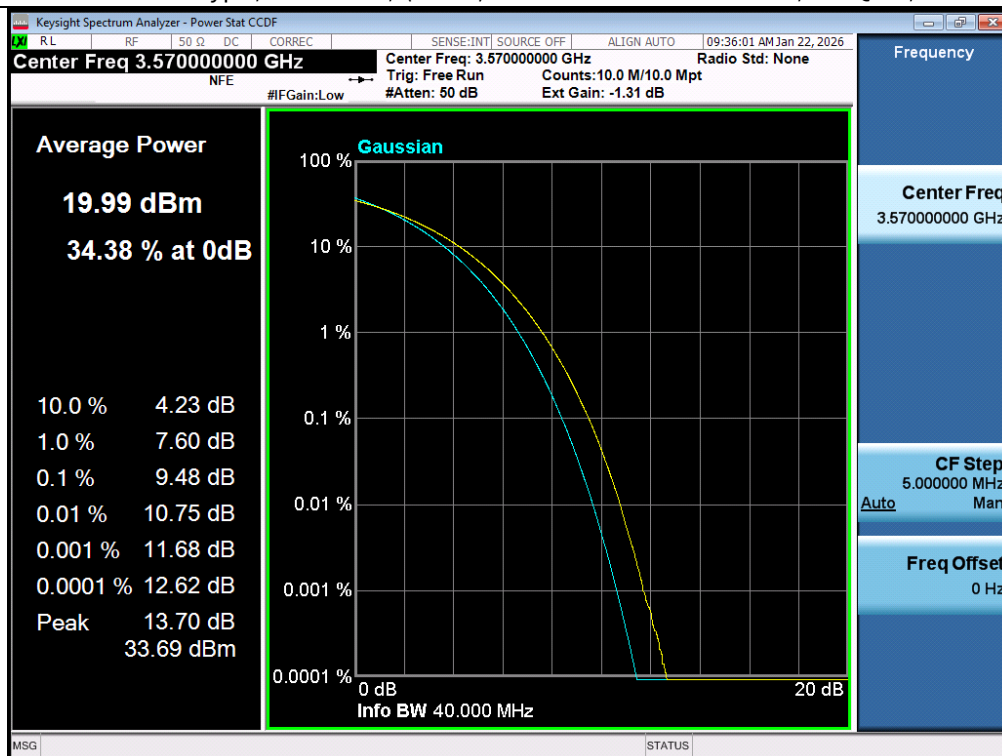
External Ant. Type / Antenna 1 / (4 Port) n48 5G NR 20 MHz 1 Carrier / 16QAM / Middle



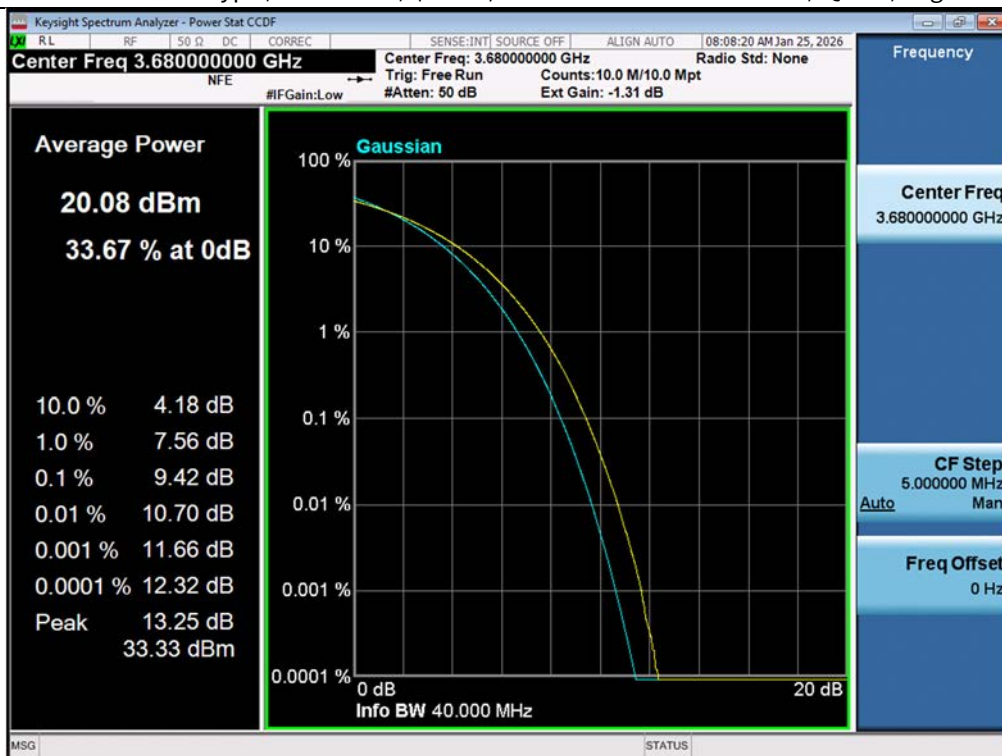
Internal Ant. Type / Antenna 2 / (4 Port) n48 5G NR 20 MHz 1 Carrier / QPSK / Low



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



Internal Ant. Type / Antenna 3 / (4 Port) n48 5G NR 40 MHz 1 Carrier / QPSK / High



5.3. 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.

§ 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 -40 dBm/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 5.5.3.2 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.

Notes:

- 1. Radiated emissions were measured at maximum output power, and only the worst-case data are provided.
- 2. Measurements were performed using both horizontal and vertical polarizations of the receiving antenna.
- 3. Spurious emissions attenuated by more than 20 dB below the permissible limit were not recorded in accordance with ANSI C63.26 Clause 5.1.1., c).
- 4. Measure distance = 3 m

Test Results:

[External Antenna Type]

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

Frequency [MHz]	Measured Level [dBμV]	Antenna Factor [dB/m]	A.G.+C.L.+H.P.F. [dB]	Polarization [H/V]	Measured Power [dBm]	Result [dBm]
8 191.96	43.840	36.6	40.20	H	-51.36	-54.96
10 875.00	40.540	40.5	40.25	H	-54.66	-54.41
8191.96	47.640	36.6	40.20	V	-47.56	-51.16
10 875.00	40.670	40.5	40.25	V	-54.53	-54.28
11 469.08	43.210	40.1	39.57	V	-51.99	-51.46
14 500.00	39.640	41.7	39.34	V	-55.56	-53.20

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

Frequency [MHz]	Measured Level [dBμV]	Antenna Factor [dB/m]	A.G.+C.L.+H.P.F. [dB]	Polarization [H/V]	Measured Power [dBm]	Result [dBm]
10 875.00	40.700	40.5	40.25	H	-54.50	-54.25
14 500.00	39.260	41.7	39.34	H	-55.94	-53.58
8 191.96	47.410	36.6	40.20	V	-47.79	-51.39
10 875.00	40.710	40.5	40.25	V	-54.49	-54.24
11 468.64	44.060	40.1	39.57	V	-51.14	-50.61
14 500.00	39.380	41.7	39.34	V	-55.82	-53.46

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

Frequency [MHz]	Measured Level [dBμV]	Antenna Factor [dB/m]	A.G.+C.L.+H.P.F. [dB]	Polarization [H/V]	Measured Power [dBm]	Result [dBm]
10 875.00	39.720	40.5	40.25	H	-55.48	-55.23
14 500.00	39.110	41.7	39.34	H	-56.09	-53.73
8 191.96	47.78	36.6	40.20	V	-47.42	-51.02
10 875.00	40.71	40.5	40.25	V	-54.49	-54.24
11 469.08	43.660	40.1	39.57	V	-51.54	-51.01
14 500.00	40.060	41.7	39.34	V	-55.14	-52.78

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

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

[Internal Antenna Type]

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

Frequency [MHz]	Measured Level [dBμV]	Antenna Factor [dB/m]	A.G.+C.L.+H.P.F. [dB]	Polarization [H/V]	Measured Power [dBm]	Result [dBm]
7 250.00	43.28	36	40.33	H	-51.92	-56.25
10 875.00	41.09	40.5	40.25	H	-54.11	-53.86
14 500.00	39.230	41.7	39.34	H	-55.97	-53.61
8 191.52	44.10	36.6	40.20	V	-51.10	-54.70
10 875.00	40.26	40.5	40.25	V	-54.94	-54.69
14 500.00	40.53	41.7	39.34	V	-54.67	-52.31

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

Frequency [MHz]	Measured Level [dBμV]	Antenna Factor [dB/m]	A.G.+C.L.+H.P.F. [dB]	Polarization [H/V]	Measured Power [dBm]	Result [dBm]
10 875.00	40.37	40.5	40.25	H	-54.83	-54.58
14 500.00	39.09	41.7	39.34	H	-56.11	-53.75
7 250.00	43.44	36	40.33	V	-51.76	-56.09
8 191.96	45.16	36.6	40.20	V	-50.04	-53.64
10 875.00	40.51	40.5	40.25	V	-54.69	-54.44
14 500.00	40.73	41.7	39.34	V	-54.47	-52.11

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

Frequency [MHz]	Measured Level [dBμV]	Antenna Factor [dB/m]	A.G.+C.L.+H.P.F. [dB]	Polarization [H/V]	Measured Power [dBm]	Result [dBm]
10 875.00	41.05	40.5	40.25	H	-54.15	-53.90
14 500.00	40.02	41.7	39.34	H	-55.18	-52.82
7 250.00	42.70	36	40.33	V	-52.50	-56.83
8 191.96	44.89	36.6	40.20	V	-50.31	-53.91
10 875.00	40.06	40.5	40.25	V	-55.14	-54.89
14 500.00	40.47	41.7	39.34	V	-54.73	-52.37

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

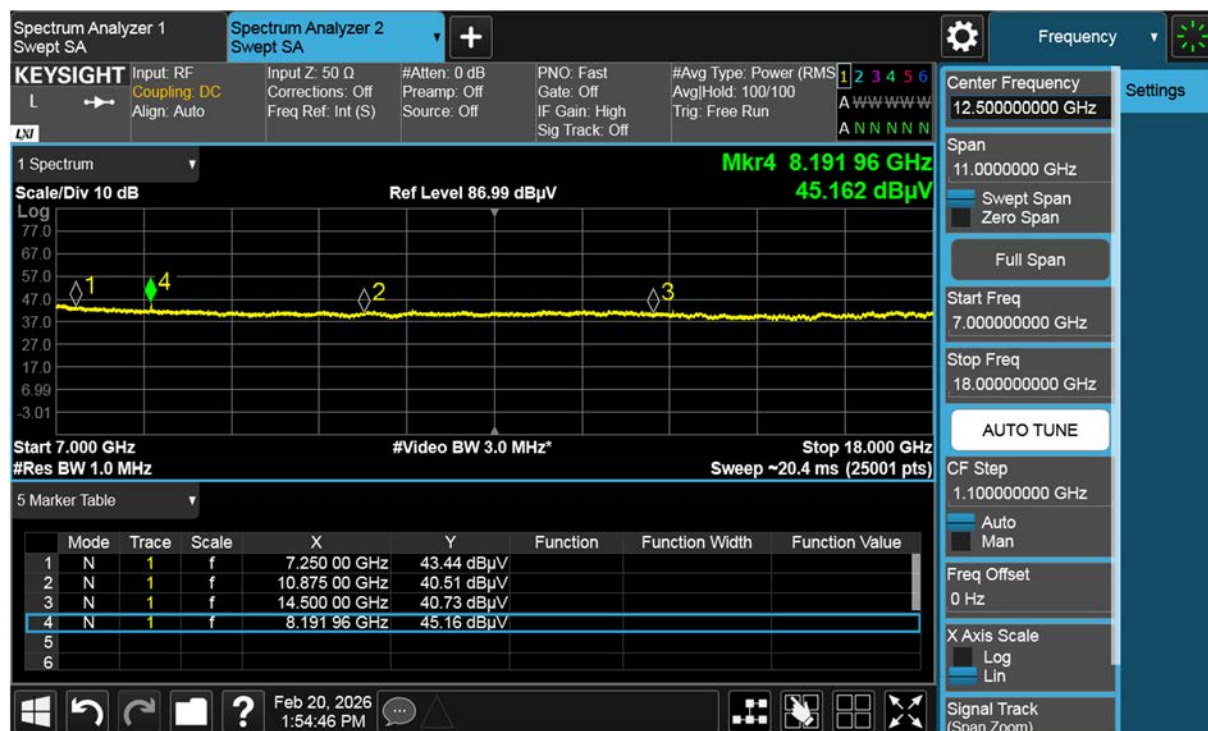
Result = (Measured Level – 95.2) + Ant. Factor – (A.G. + C.L. + H.P.F.)

Plot data of radiated spurious emissions

External Ant. Type / (4 Port) n48 5G NR 20 MHz 1 Carrier / QPSK / V



Internal Ant. Type / (4 Port) n48 5G NR 20 MHz 1 Carrier / QPSK / V



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

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

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°C intervals of temperatures between -30°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.

Notes:

1. The results of the Frequency Stability tests show a similar trend across all ports; therefore, only the worst-case data are attached.
2. This test was performed from -5° to $+45^{\circ}$ centigrade according to the manual.

Test Results:

[External Antenna Type]

Reference: DC -48 V at 20°C Freq. = 3,625,000,000 Hz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100 %	+20(Ref)	3 625 000 000.220	0.220	0.000	0.00000
	-5	3 625 000 002.950	2.730	2.510	0.00069
	0	3 625 000 004.697	4.477	4.257	0.00117
	+10	3 625 000 005.067	4.847	4.627	0.00128
	+30	3 625 000 009.339	9.119	8.899	0.00245
	+40	3 625 000 004.955	4.735	4.515	0.00125
	+45	3 625 000 002.886	2.666	2.446	0.00067
115 %	+20	3 625 000 005.068	4.848	4.628	0.00128
85 %	+20	3 625 000 008.298	8.078	7.858	0.00217

[Internal Antenna Type]

Reference: DC -48 V at 20°C Freq. = 3,625,000,000 Hz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100 %	+20(Ref)	3 625 000 000.214	0.214	0.000	0.00000
	-5	3 625 000 000.746	0.532	0.318	0.00009
	0	3 625 000 000.430	0.216	0.002	0.00000
	+10	3 625 000 005.006	4.792	4.578	0.00126
	+30	3 625 000 007.658	7.444	7.230	0.00199
	+40	3 625 000 001.362	1.148	0.934	0.00026
	+45	3 625 000 008.254	8.040	7.826	0.00216
115 %	+20	3 625 000 006.632	6.418	6.204	0.00171
85 %	+20	3 625 000 007.108	6.894	6.680	0.00184

6. Annex A_EUT AND TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2602-FC007-P