

Ericsson AB

RF TEST REPORT

Report Type:

RF report

PRODUCT NAME:

Radio 4480 44B2/B25 44B66A C

REPORT NUMBER:

2407B1220SHA-001

ISSUE DATE:

July 29, 2024

DOCUMENT CONTROL NUMBER:

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TEST REPORT

Report no.: 2407B1220SHA-001

Applicant: Ericsson AB
Isafjordsgatan 10 SE-164 80 Stockholm 16480 Sweden

Manufacturer: Ericsson AB
Isafjordsgatan 10 SE-164 80 Stockholm 16480 Sweden

FCC ID: TA8AKRC161844

IC: 287AB-AS161844

SUMMARY:

The equipment is tested according to the following standard(s) or Specification:

FCC CFR 47 Part 27 (2023): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

ISED RSS-139 Issue 4: Advanced Wireless Services Equipment Operating in the Bands 1710-1780 MHz and 2110-2200 MHz

PREPARED BY:

REVIEWED BY:



Project Engineer
Victor Yang

Reviewer
Jackson Huang

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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
2407B1220SHA-001	Rev. 01	Initial issue of report	July 29, 2024

Measurement result summary

TEST ITEM	FCC REFERENCE	IC REFERENCE	RESULT
Max Output Power and Peak to Average Power Ratio and EIRP	27.50(d)	RSS-139 5.5	Pass
Occupied Bandwidth	27.53(h) 2.1049	RSS-GEN 6.7	Pass
Unwanted Emissions at Band Edge	27.53(h)	RSS-139 5.6	Pass
Conducted Unwanted Emission	27.53(h)	RSS-139 5.6	Pass
Frequency Stability	27.54	RSS-139 5.4	Pass

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Description:	Remote Radio Unit
Product name:	Radio 4480 44B2/B25 44B66A C
Product number:	KRC 161 844/1 and KRC 161 844/3
HVIN	AS161844
Serial Number(s)	E23D966016
Rating:	-48VDC
Software Version:	CXP9024418_16-R2A231
Hardware Version:	R2D
Sample received date:	July 5, 2024
Date of test:	July 5, 2024 ~ July 11, 2024

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1.2 Technical Specification

Frequency Range:	B2: TX: 1930-1990 MHz, RX: 1850-1910 MHz B25: TX: 1930-1995 MHz, RX: 1850-1915 MHz B66A: TX: 2110-2180 MHz, RX: 1710-1780 MHz
Number of Antenna ports:	4 TX/RX
Supported RAT:	B2: Single RAT: GSM, W, L, NB IoT, NR Multi RAT: G+W+NB IoT; G+L+NB IoT; W+L+NB IoT NR+L+NB IoT; G+L+NR; W+L+NR B25: Single RAT: W, L, NB IoT, NR Multi RAT: W+L+NB IoT; NR+L+NB IoT; W+L+NR B66A: Single RAT: W, L, NB IoT, NR Multi RAT: W+L+NB IoT; NR+L+NB IoT; W+L+NR
Max RF bandwidth (IBW):	B2: 60MHz, B25: 65MHz, B66A: 70MHz
Supported Number of Carriers:	WCDMA/LTE/NR: Max 6 carriers per port GSM: Max 4 carriers per port NB IoT SA: Max 2 carriers per port MRO: Max 12 carriers per port
Supported modulation:	LTE/NR: QPSK, 16QAM, 64QAM and 256QAM WCDMA: QPSK, 16QAM and 64QAM GSM: GMSK, AQPSK and 8-PSK NB IoT: QPSK, BPSK (BPSK is for up link only)
Supported Channel Bandwidth:	LTE: 1.4, 3, 5, 10, 15, 20MHz NR: 5, 10, 15, 20, 25, 30, 35, 40MHz WCDMA: 5MHz GSM: 200kHz NB-IoT: 200kHz
Declaration output power per port:	4*60W per band, Total 4*80W (without FAN), 4*100W (with FAN)

Note: Information in the 1.2 sheet declared by the manufacturer and Intertek has no responsibility of its accuracy.

1.3 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address 1:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Address 2:	No. 5 Lize East Street, Ericsson Tower, Chaoyang District, Beijing 100102 P.R.C.
Telephone:	+86 21 61278200
Telefax:	+86 21 54262353
The test facility is recognized, certified, or accredited by these organizations:	FCC Registration Lab Designation Number: CN0175
	IC Registration Lab CAB identifier.: CN0014
	A2LA Accreditation Lab Certificate Number: 3309.02

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2 TEST SPECIFICATIONS

2.1 Related documents

FCC Part 27 (2023)
FCC Part 2 (2023)
ISED RSS-139 issue 4 September 29, 2022
ISED RSS-Gen issue 5 March 2019 Amendment 1
ANSI C63.26:2015
KDB 971168 D01 v03r01
KDB 662911 D01 v02r01

2.2 Product Information

The Equipment Under Test (EUT) is an Ericsson Radio Unit working in the wireless communications services 2100MHz band which provides communication connections to network in WCDMA/LTE/NB IoT/NR modes and MSR modes. Radio 4480 44B2/B25 44B66A C operates from a -48VDC.

The EUT includes 4 TX/RX ports and it can be configured to transmit in MIMO mode, and MIMO mode was used for measurements as the worst configuration. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

The EUT has two product number and KRC 161 844/3 is physically and electrically identical to KRC 161 844/1. KRC 161 844/3 product is subject to additional product integrity testing qualified against NEBS. We test KRC 161 844/1 as a typical model and list the worst data.

A full technical description can be found in the Manufacturer's documentation.

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2.3 Configuration Description

The following settings were used to represent all traffic scenarios. The output power was measured on the bottom, middle and top channel of all applicable antenna ports. By measuring the output power of QPSK, 16QAM, 64QAM, 256QAM on one of the antenna ports, it was determined that 64QAM for NR was the worst-case modulation schemes as data listed below and were used for all testing.

4TX/RX mode	Port	QPSK	16QAM	64QAM	256QAM
NR-1C 40M Middle	Port B	46.71dBm	46.68dBm	46.73dBm	46.72dBm

Complete testing was carried out on the worst-case antenna port which was established as being the highest output power from the 4 measured ports on worst case modulation scheme as data listed below. This antenna port was Port B for all modes.

4TX/RX mode	modulation	Port A	Port B	Port C	Port D
NR-1C 40M Middle	64QAM	46.72dBm	46.73dBm	46.71dBm	46.70dBm

The settings below were used for all measurements unless otherwise noted:

NR

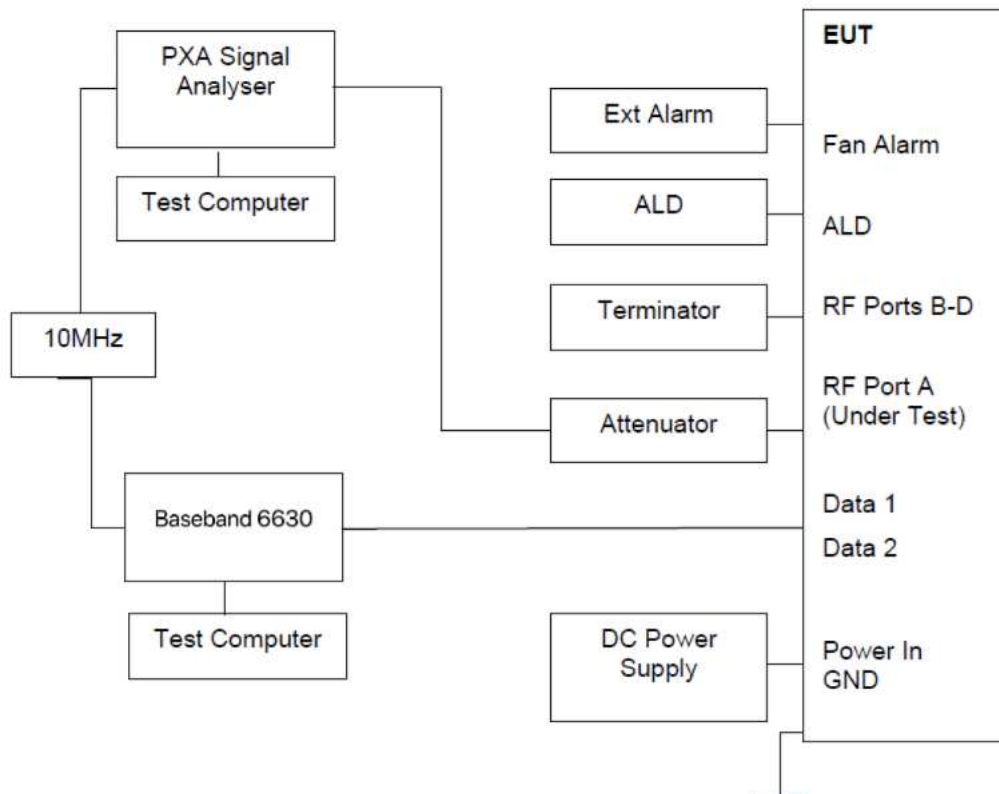
Configuration	No. of Carriers	NR Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
NR-1C	1NR	25	2122.5	2145	2167.5
		30	2125	2145	2165
		35	2127.5	2145	2162.5
		40	2130	2145	2160
NR-2C	2NR	25	-	2122.5+2167.5	-
		30	-	2125+2165	-
		35	-	2127.5+2162.5	-

NR

Configuration	No. of Carriers	NR Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
NR-1C-BE	1NR	25	2122.5	-	2167.5
		30	2125	-	2165
		35	2127.5	-	2162.5
		40	2130	-	2160
NR-2C-BE	2NR	25	2122.5+2147.5	-	2142.5+2167.5
		30	2125+2155	-	2135+2165
		35	-	2127.5+2162.5	-

2.4 Test Setup

Conducted Measurement:



No.	Auxiliary Equipment	Product Number / Model Type	Version
1	SFP	RDH 102 75/3	R1A
2	SFP	RDH 102 75/3	R1A
3	Power Supply	N5768A	--
4	Terminator	WTF150-6G-C-HF TFZ150R-3NF TFZ100R-4NM	--
5	Attenuator	HBTE-CA100-6-40-N-55	--
6	Switch Box	1017018157	--
7	Digital unit	Baseband 6630	--

Proper Attenuator/Switch Box will be chosen to use in relative test case. And the cable loss of specified Attenuator/Switch Box with connect cable will be calibrated before test for relative frequency range and the worst reading will be used as offset in the relative test case.

2.5 Test environment condition:

Test items	Temperature	Humidity
Max Output Power and Peak to Average Power Ratio and EIRP	23°C	54% RH
Occupied Bandwidth		
Unwanted Emissions at Band Edge		
Conducted Unwanted Emission		
Frequency Stability	Please refer to clause 7	

2.6 Instrument list

RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	PXA Signal Analyzer	Keysight	N9030A	EC1046	2025.4.7
☐	Signal Generator	R&S	SMU200A	EC1050	2025.5.26
☐	Power Meter	R&S	NRX	EC1126	2025.5.13
☒	Climatic Chamber	赛宝	CEEC-WR16H-50W	EC1052	2024.7.31
☒	Humiture meter	托普	TPJ-20	EC1053	2025.1.24
☐	Power Sensor	R&S	NRP-Z11	EC1125	2025.5.13
☐	PXA Signal Analyzer	Keysight	N9030A	EC1124	2024.11.2

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2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum output power	0.73dB
Occupied Bandwidth	0.88%
Unwanted Emissions at Band Edge	3.03dB
Conducted Unwanted Emission	3.03dB
Frequency stability	0.77×10^{-7}

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3 Maximum Output Power and Peak to Average Power Ratio and EIRP

Test result: Pass

3.1 Limit

Output Power:

FCC (EIRP) 1640 W(62.15dBm) or 3280W(65.16dBm) for emission bandwidth ≤ 1 MHz

1640 W/MHz(62.15dBm/MHz) or 3280W/MHz(65.16dBm/MHz) for emission bandwidth > 1 MHz

IC 65 dBm e.i.r.p./MHz

Peak to Average Ratio: ≤ 13 dB

Note: Stricter limit is applied.

3.2 Measurement Procedure

The EUT was configured to transmit on maximum power and proper modulation. The transmitter power shall be measured in terms of a root-mean-square (RMS) average value. In case of the EUT was configured to MIMO mode, since the EUT transmits on all antennas simultaneously in the same frequency range, using the Measure-and-Sum approach, the output power at all antennas were tested, and the total output power were then summed mathematically in linear power units according to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier for single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

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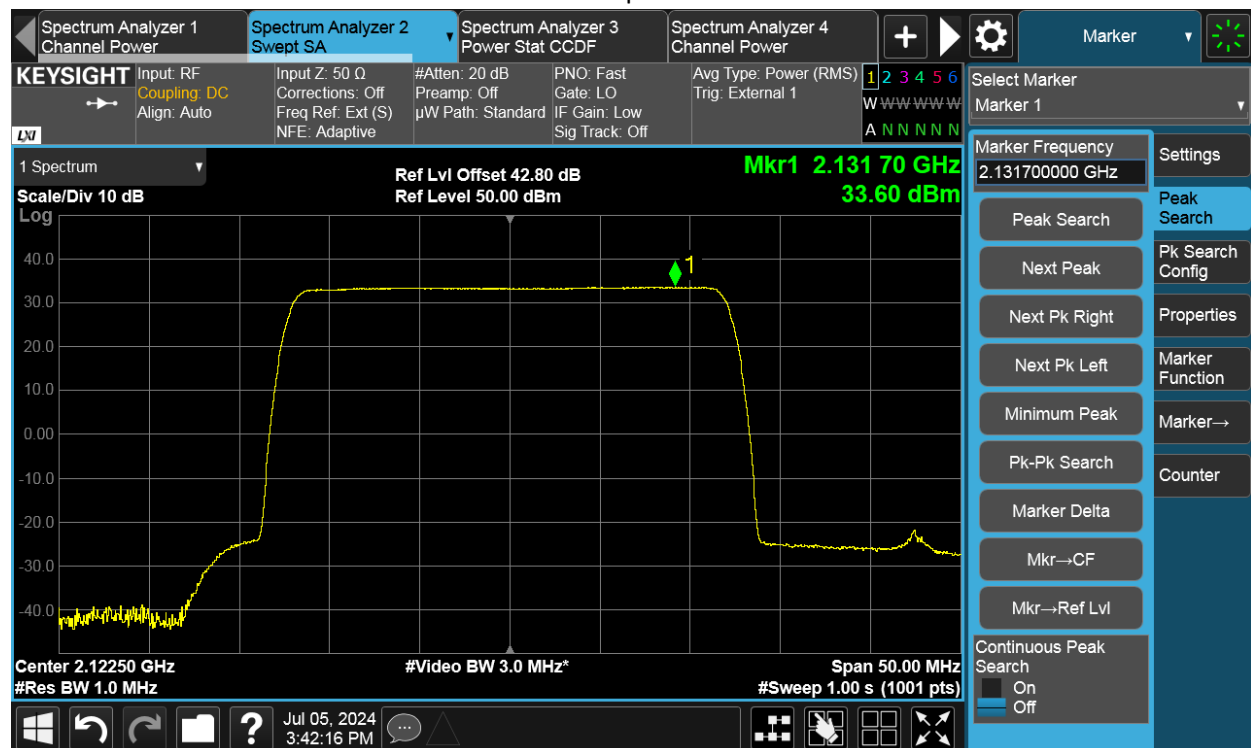
3.3 Measurement result

According to the following test results, 22.57dBi is applied as maximum allowed antenna gain to comply with the e.i.r.p. limit.

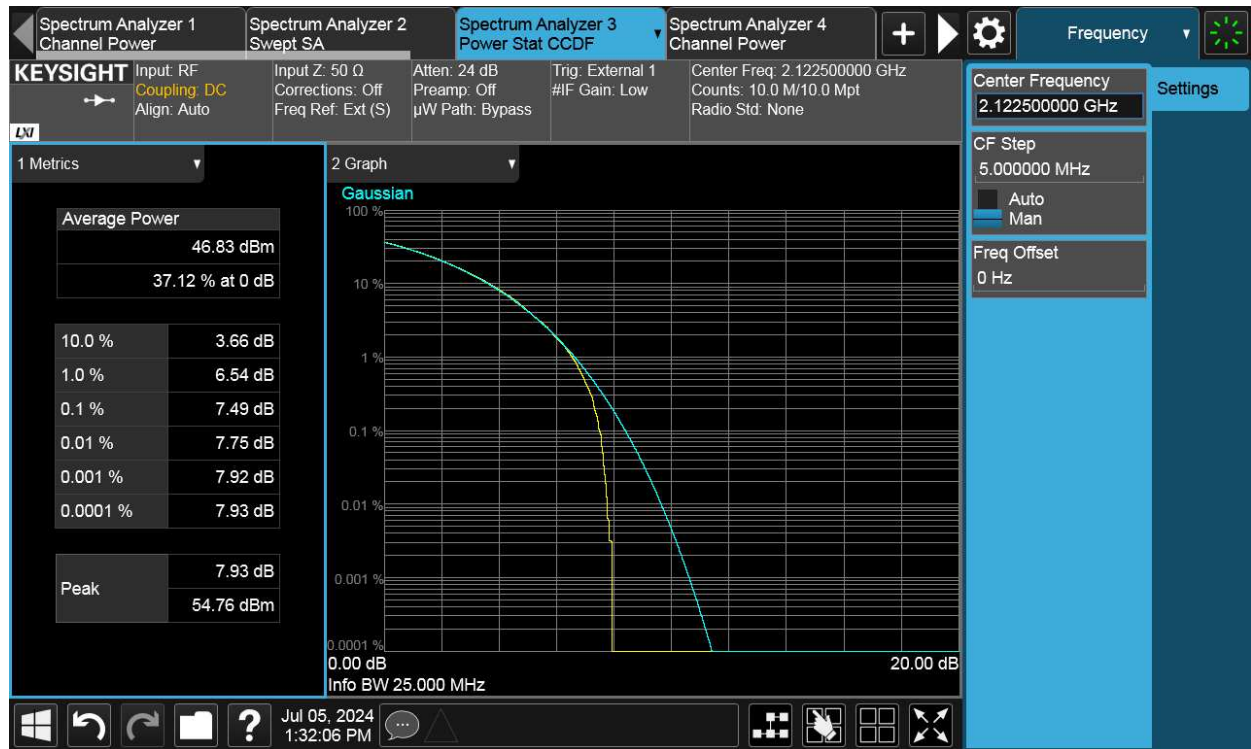
NR-1C

Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	25	46.74	33.50	7.49	46.70	33.40	7.37	46.79	33.50	7.50
B	64QAM	25	46.93	33.60	7.45	46.76	33.32	7.39	46.83	33.45	7.46
C	64QAM	25	46.76	33.53	7.49	46.55	33.33	7.39	46.78	33.50	7.50
D	64QAM	25	46.85	33.59	7.48	46.67	33.30	7.39	46.92	33.54	7.54
Total conducted power			52.84	39.58	-	52.69	39.36	-	52.85	39.52	-
EIRP limit			-	62.15	13.00	-	62.15	13.00	-	62.15	13.00
Max antenna gain			-	22.57	-	-	22.78	-	-	22.63	-

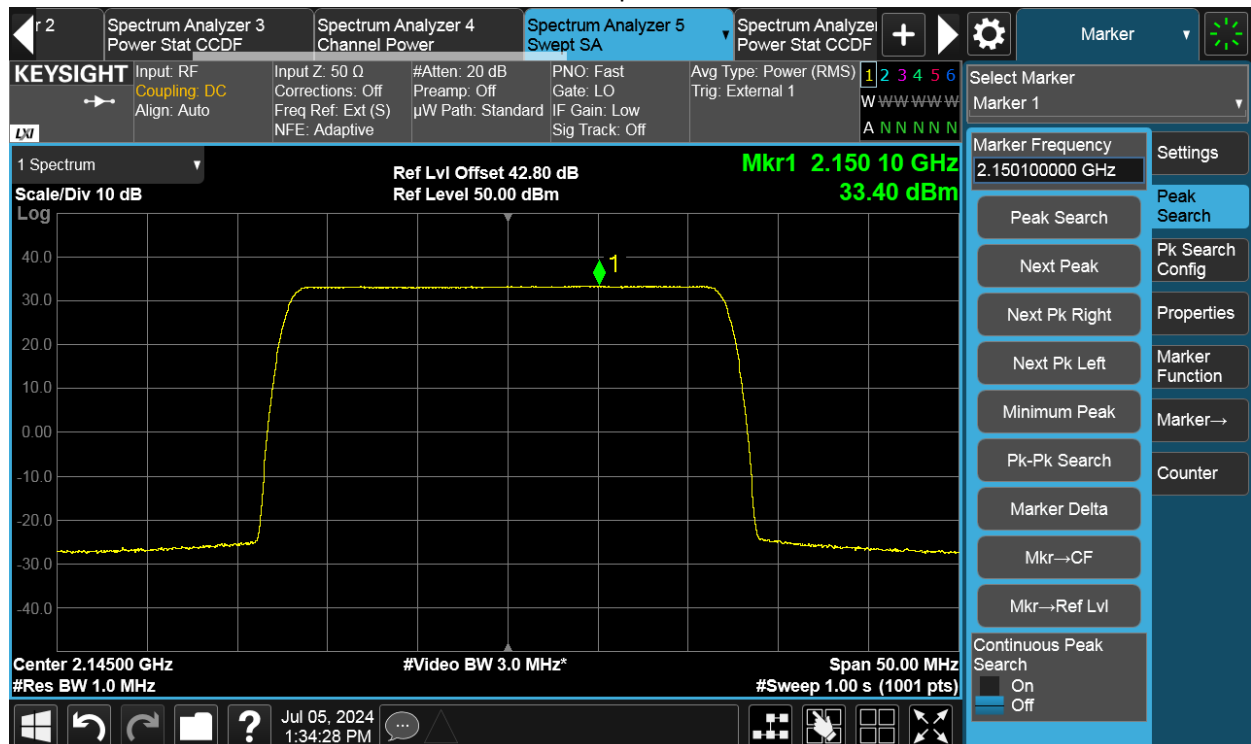
Channel position B



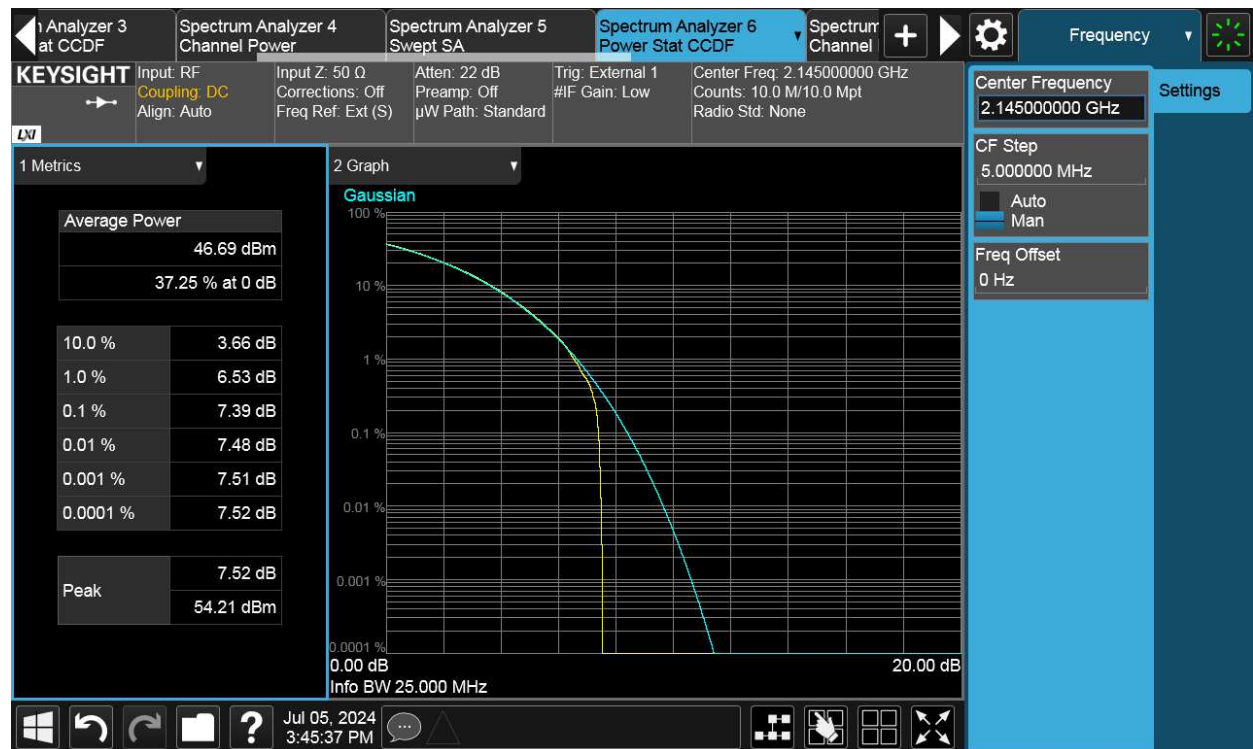
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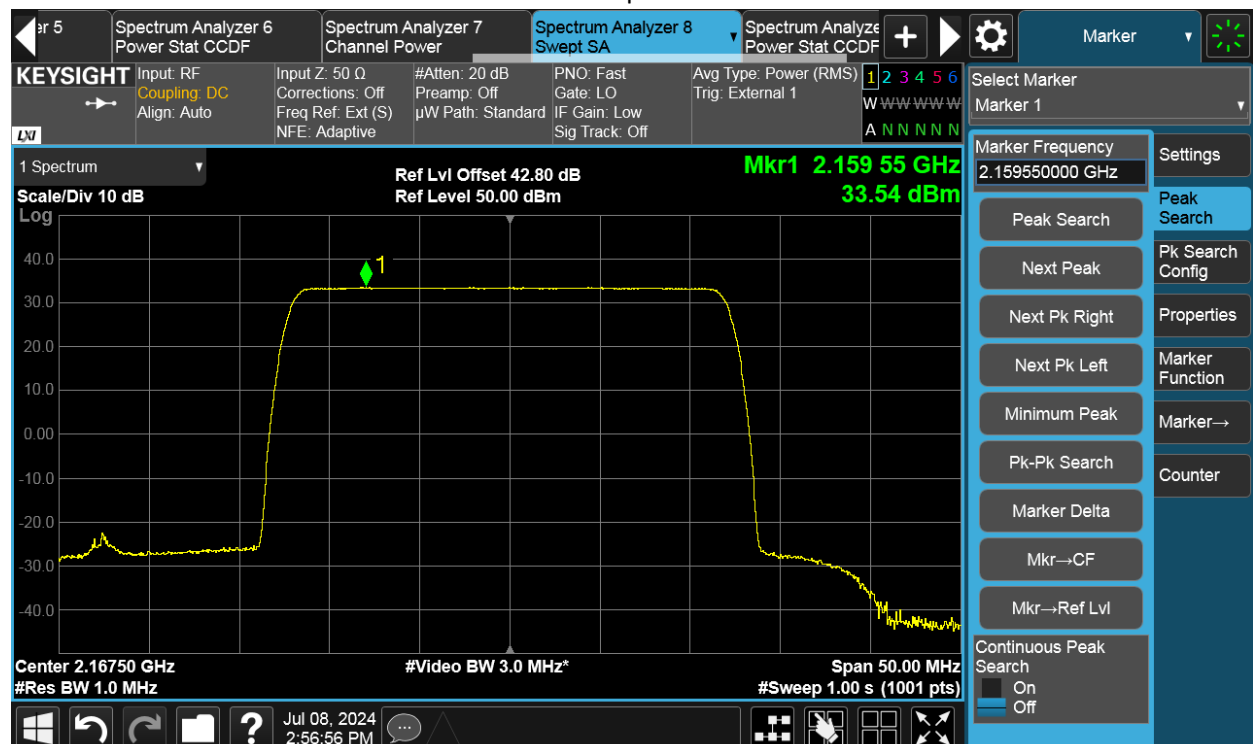
Channel position M



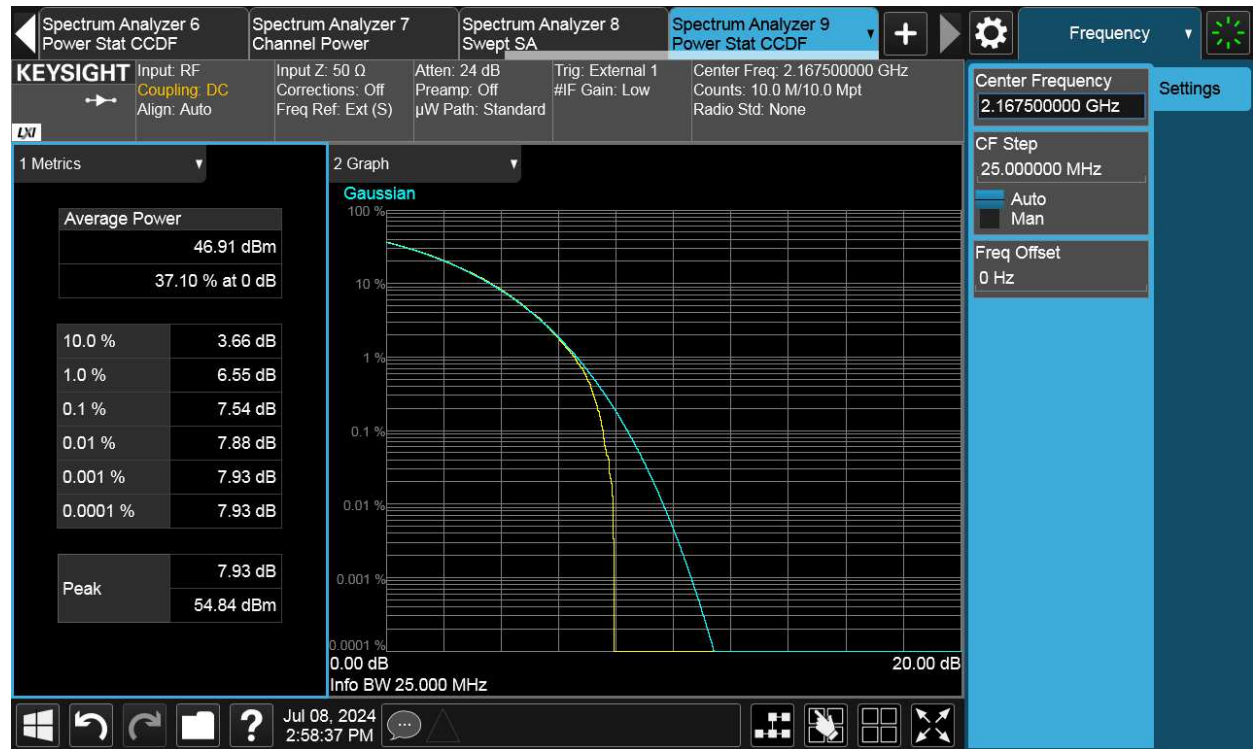
TEST REPORT



Channel position T

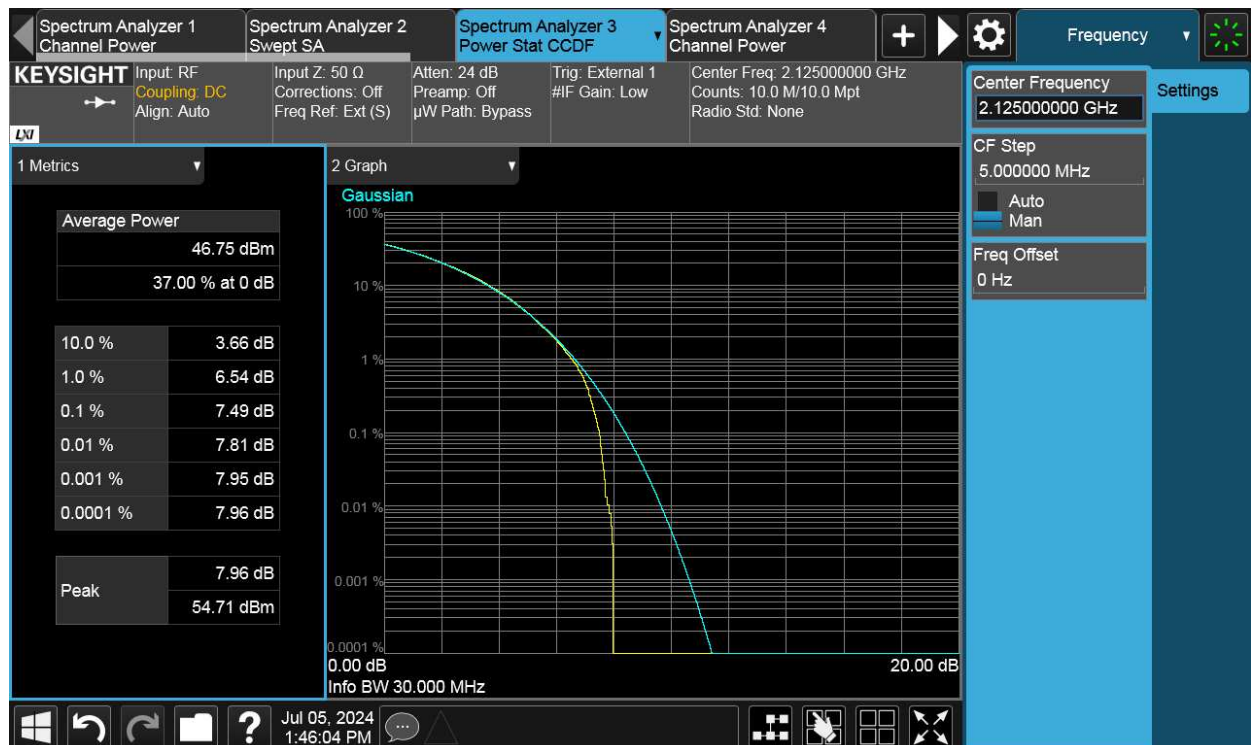
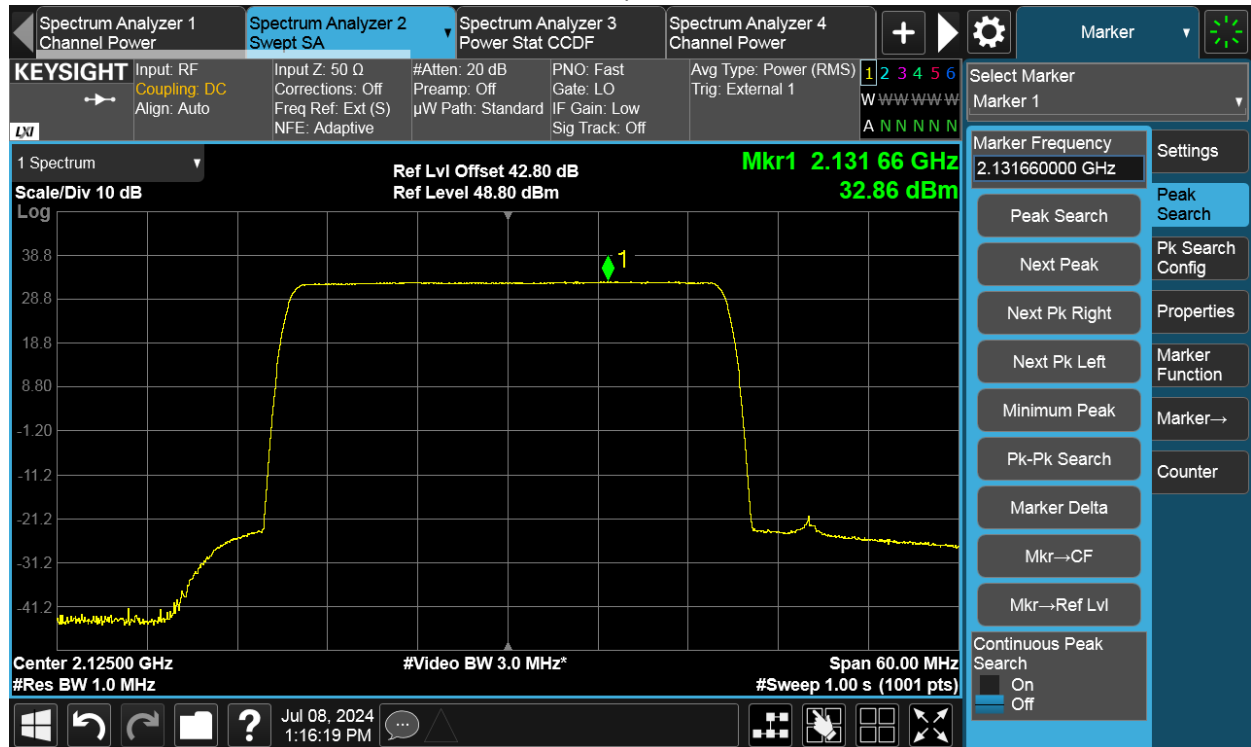


TEST REPORT

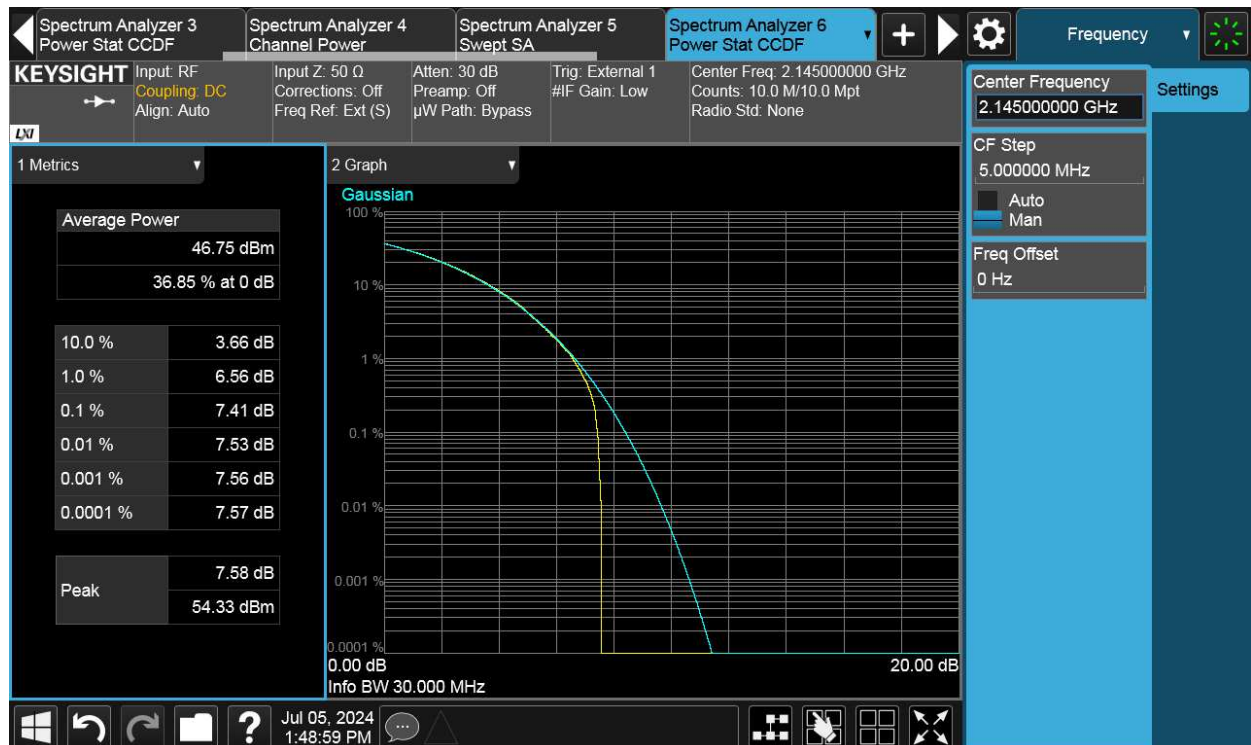
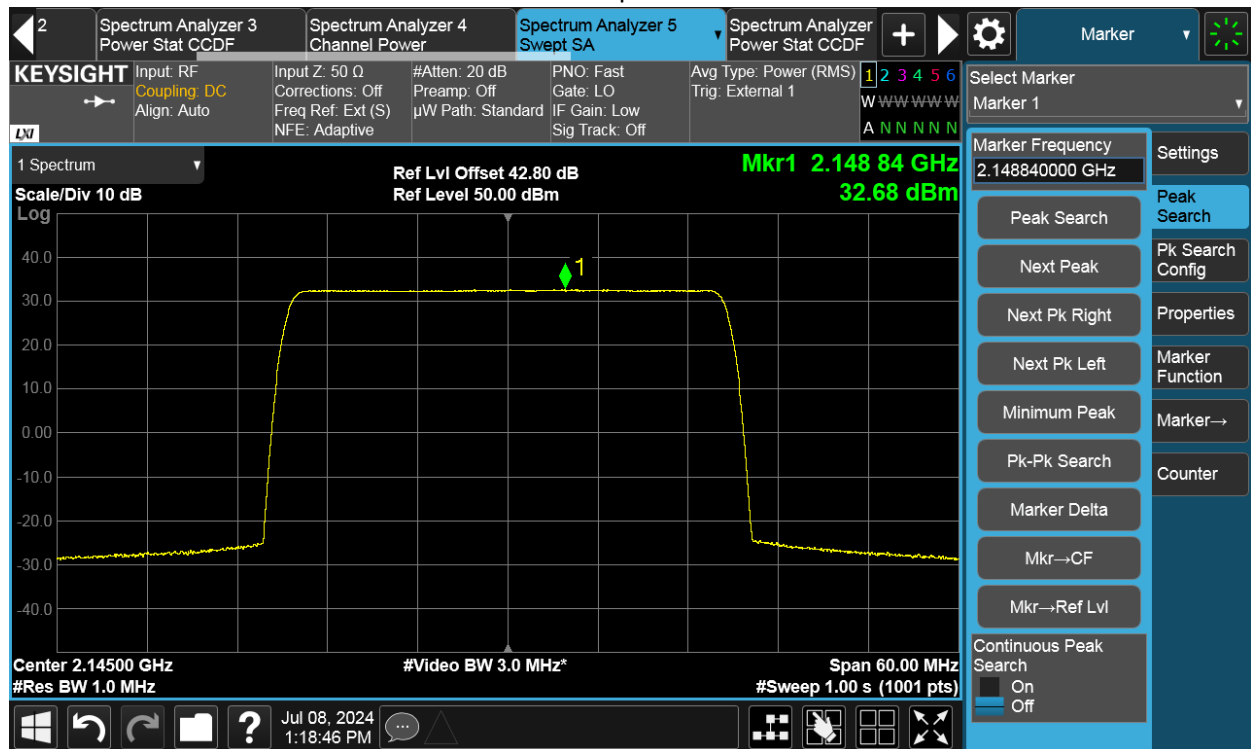


Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	30	46.78	32.83	7.49	46.80	32.68	7.41	46.83	32.73	7.58
B	64QAM	30	46.91	32.85	7.42	46.82	32.66	7.37	46.91	32.79	7.46
C	64QAM	30	46.96	32.86	7.45	46.83	32.68	7.38	46.94	32.81	7.53
D	64QAM	30	46.93	32.84	7.45	46.82	32.68	7.37	46.84	32.88	7.56
Total conducted power			52.92	38.87	-	52.84	38.70	-	52.90	38.82	-
EIRP limit			-	62.15	13.00	-	62.15	13.00	-	62.15	13.00
Max antenna gain			-	23.28	-	-	23.45	-	-	23.33	-

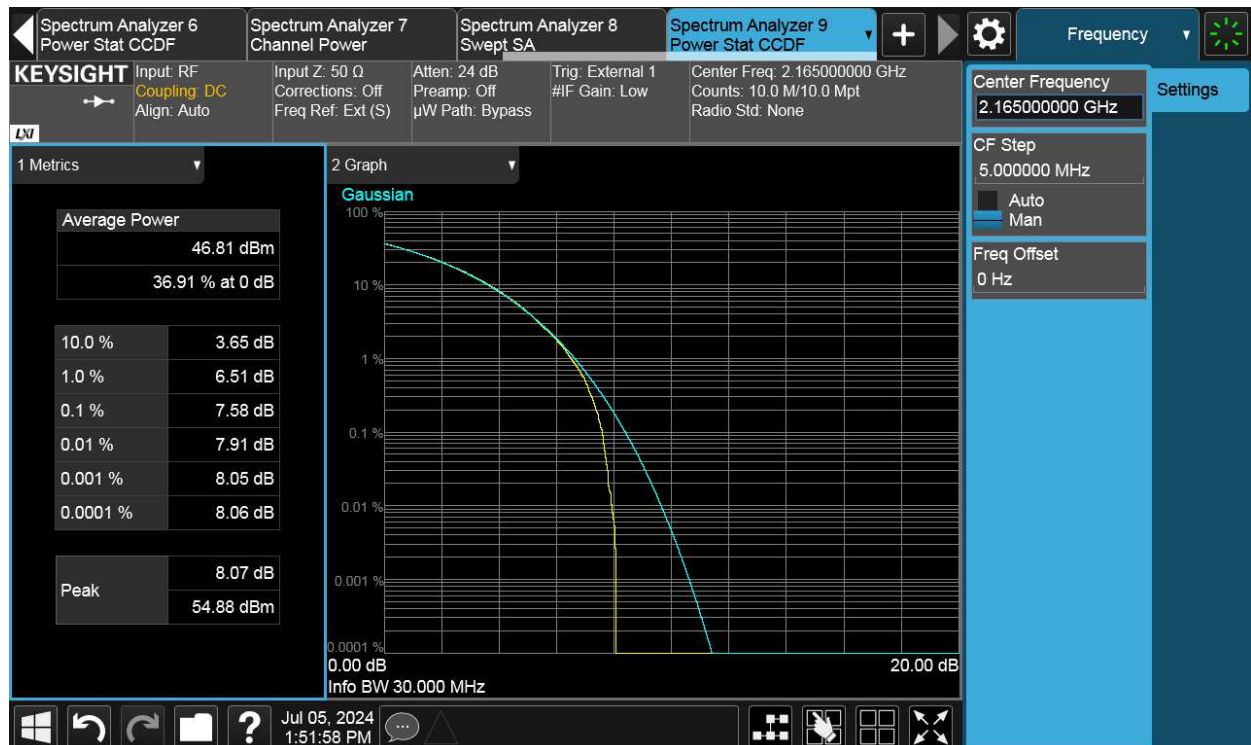
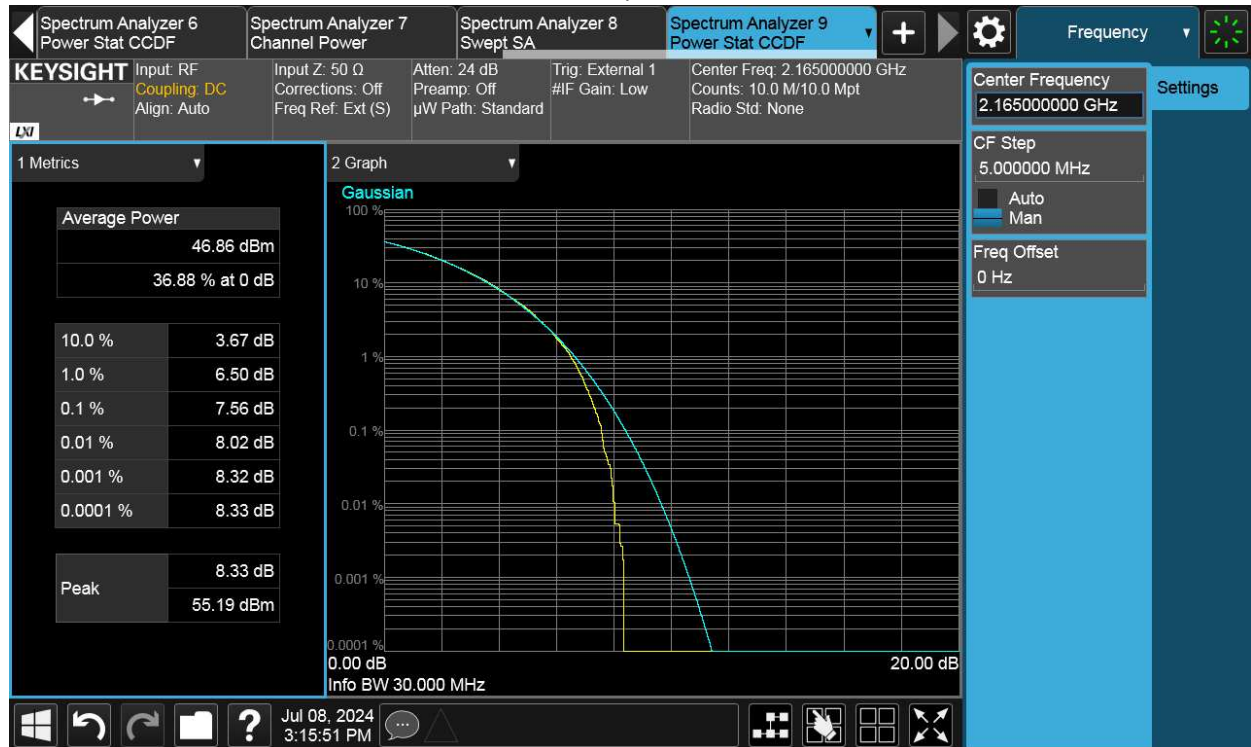
Channel position B



Channel position M

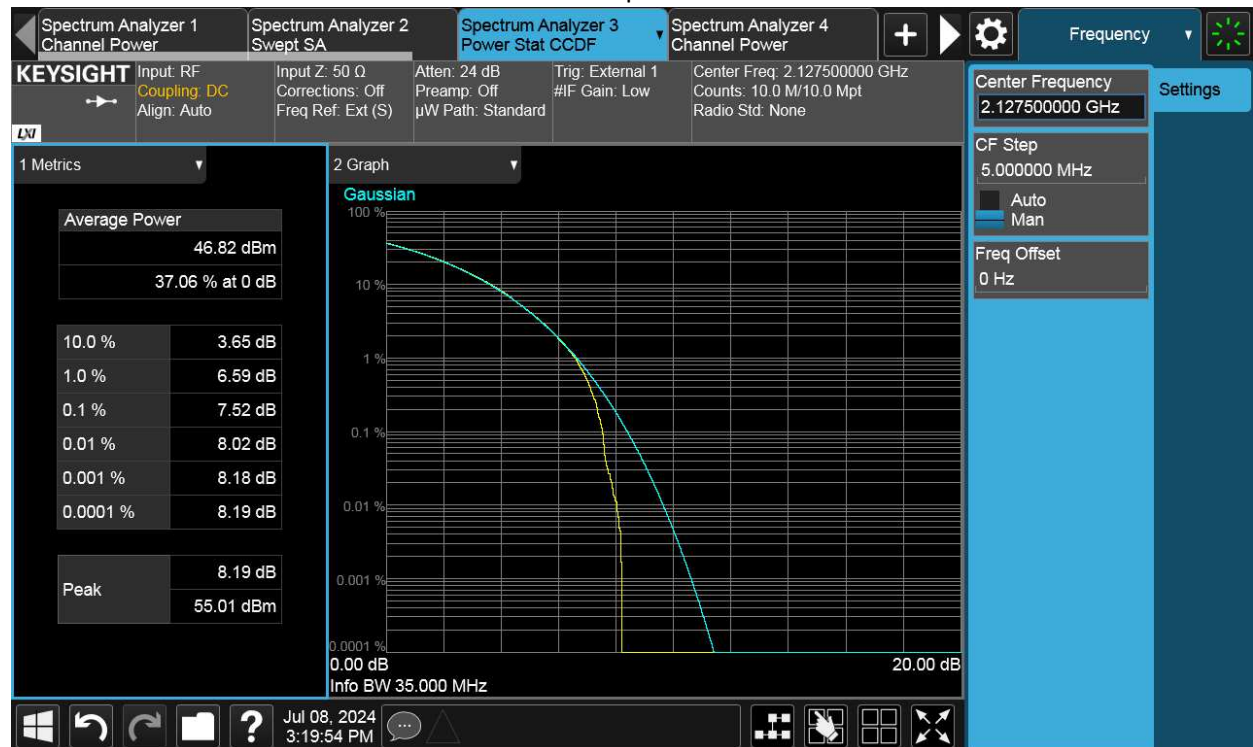


Channel position T

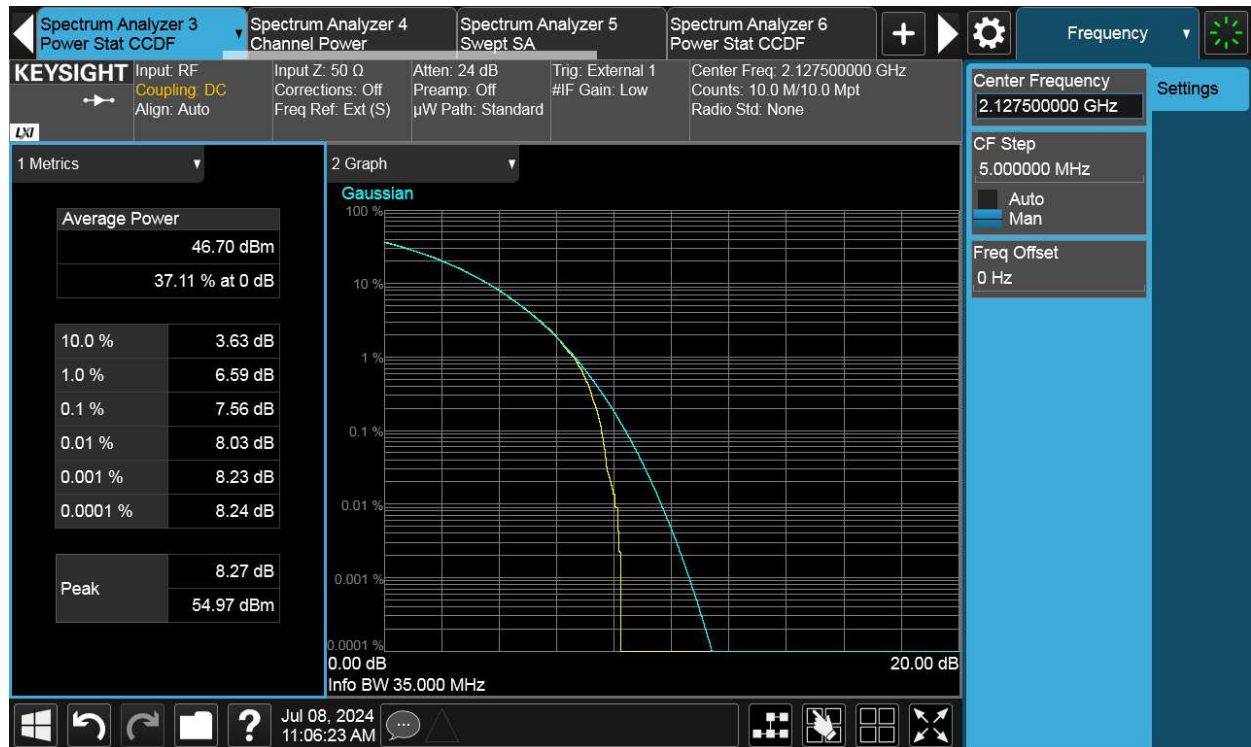


Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	35	46.87	32.03	7.56	46.51	31.93	7.43	46.88	31.94	7.56
B	64QAM	35	46.89	32.13	7.49	46.74	31.94	7.41	46.80	31.99	7.59
C	64QAM	35	46.88	32.11	7.51	46.77	31.94	7.43	46.84	31.95	7.58
D	64QAM	35	46.87	32.20	7.52	46.76	31.88	7.42	46.82	31.98	7.57
Total conducted power			52.90	38.14	-	52.72	37.94	-	52.86	37.99	-
EIRP limit			-	62.15	13.00	-	62.15	13.00	-	62.15	13.00
Max antenna gain			-	24.01	-	-	24.21	-	-	24.16	-

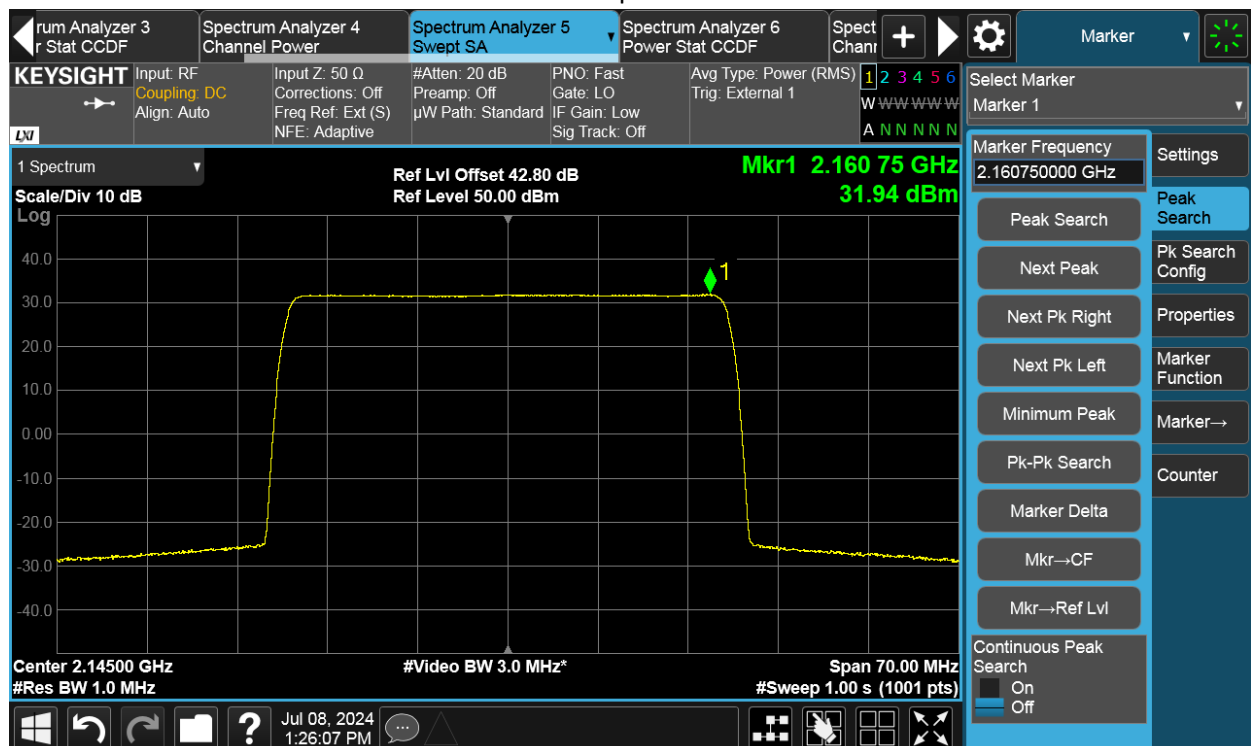
Channel position B



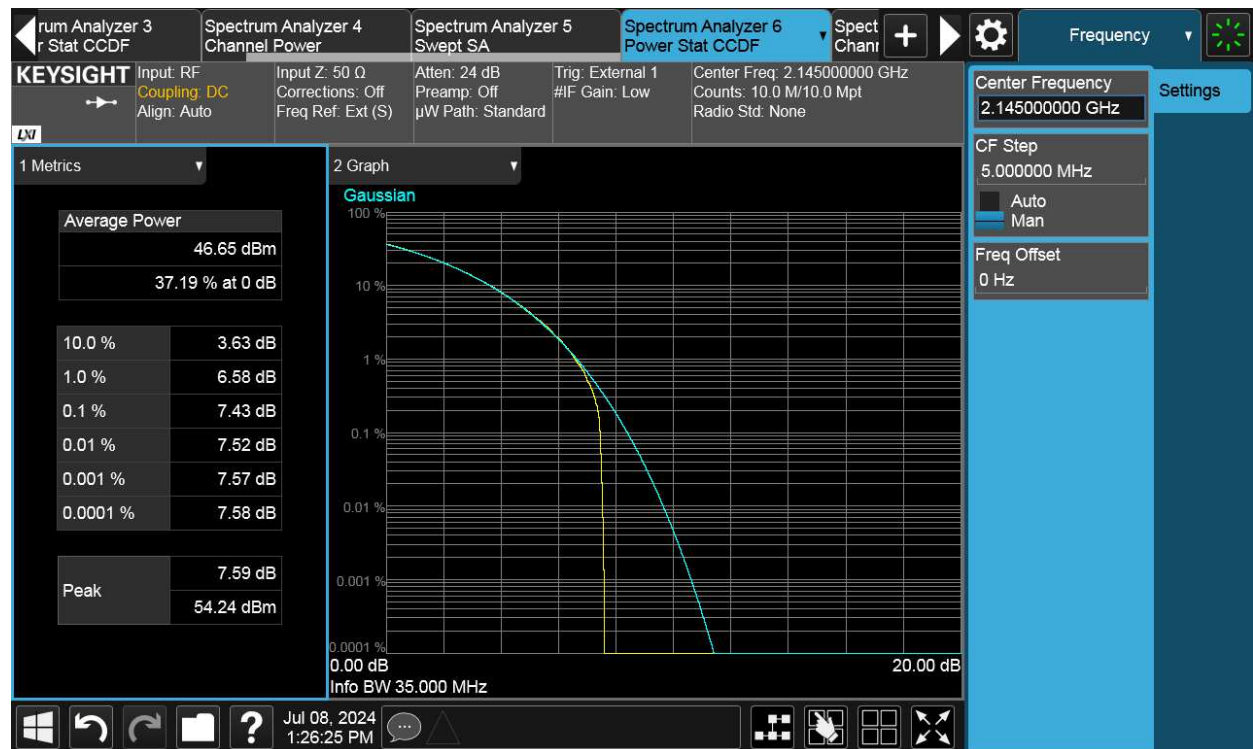
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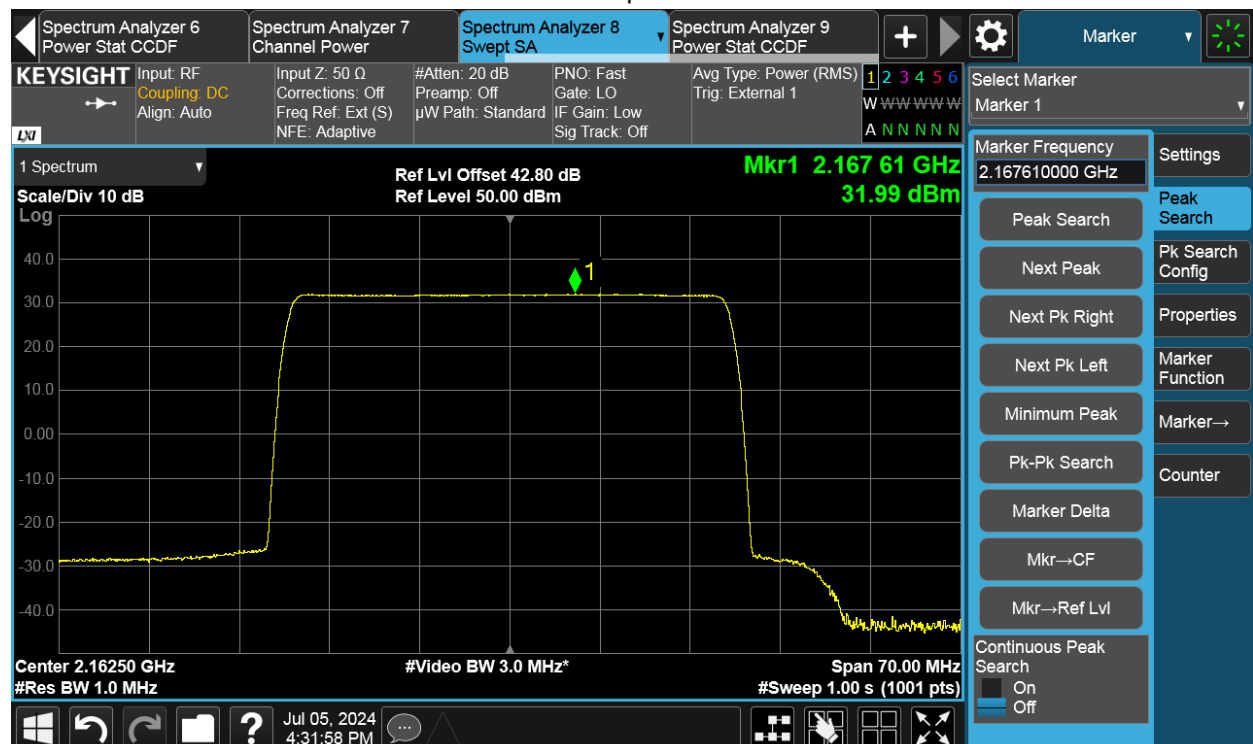
Channel position M



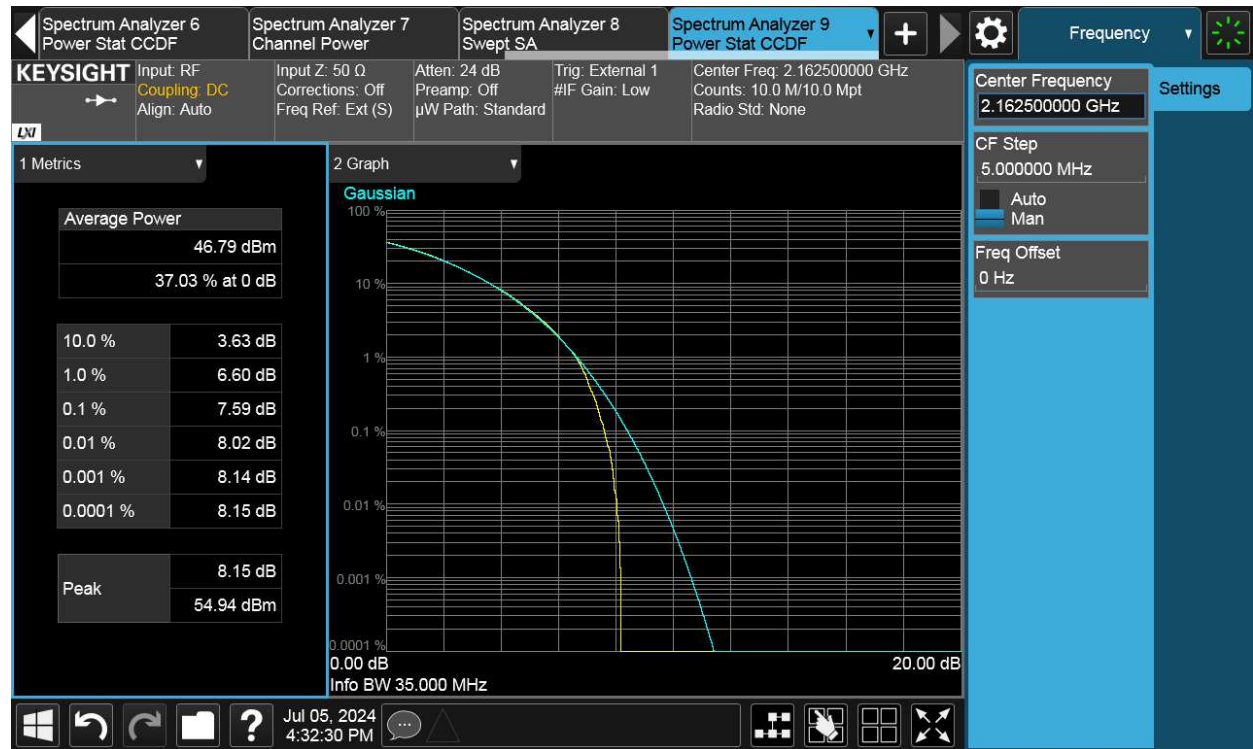
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Channel position T

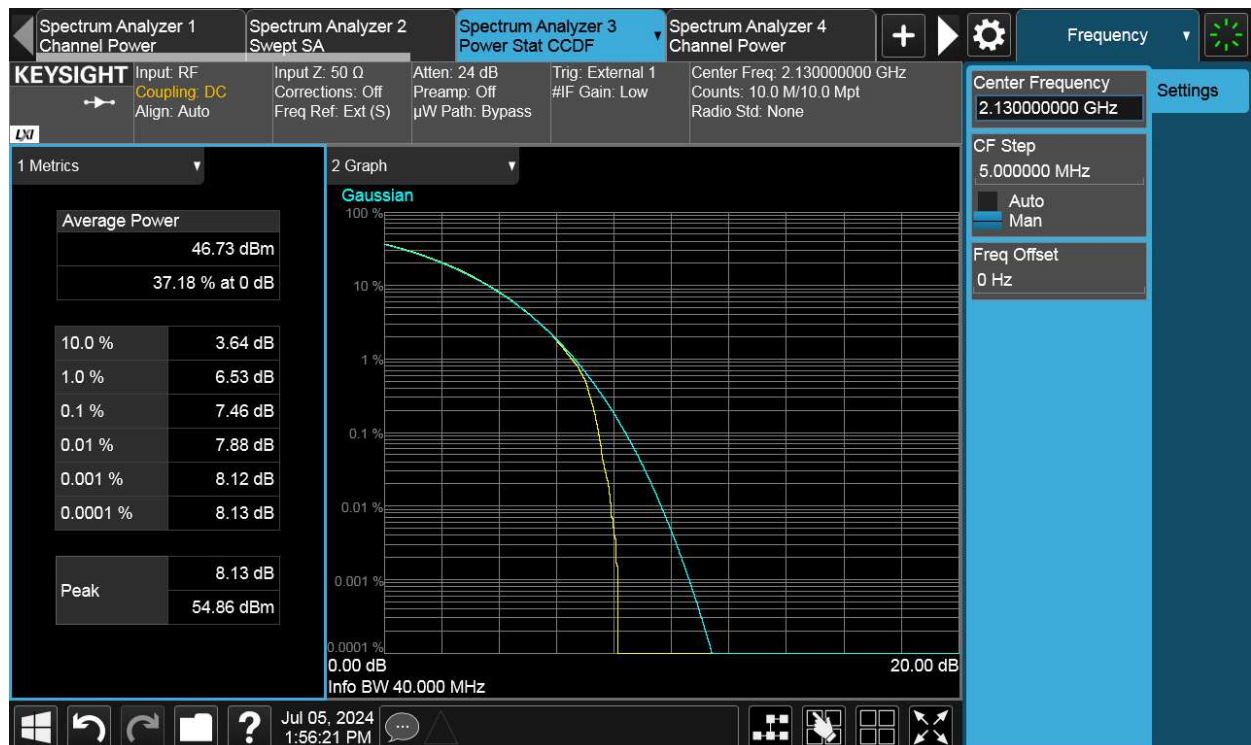
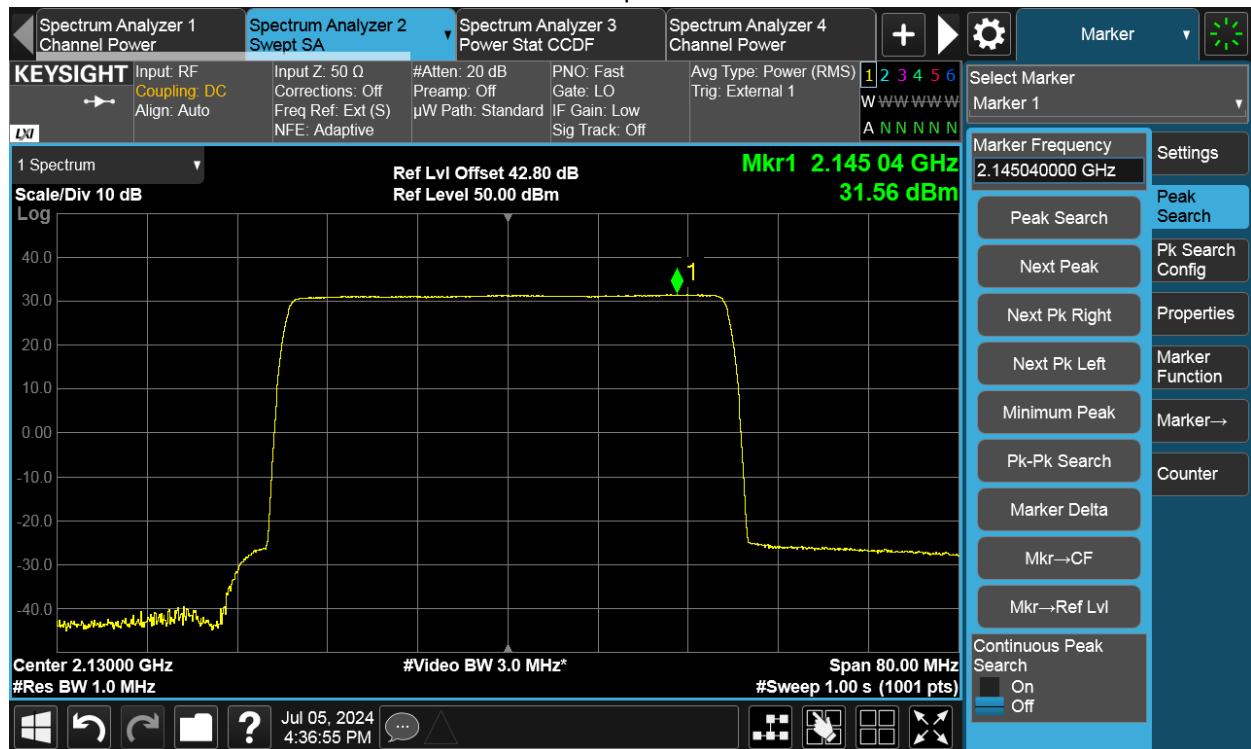


TEST REPORT

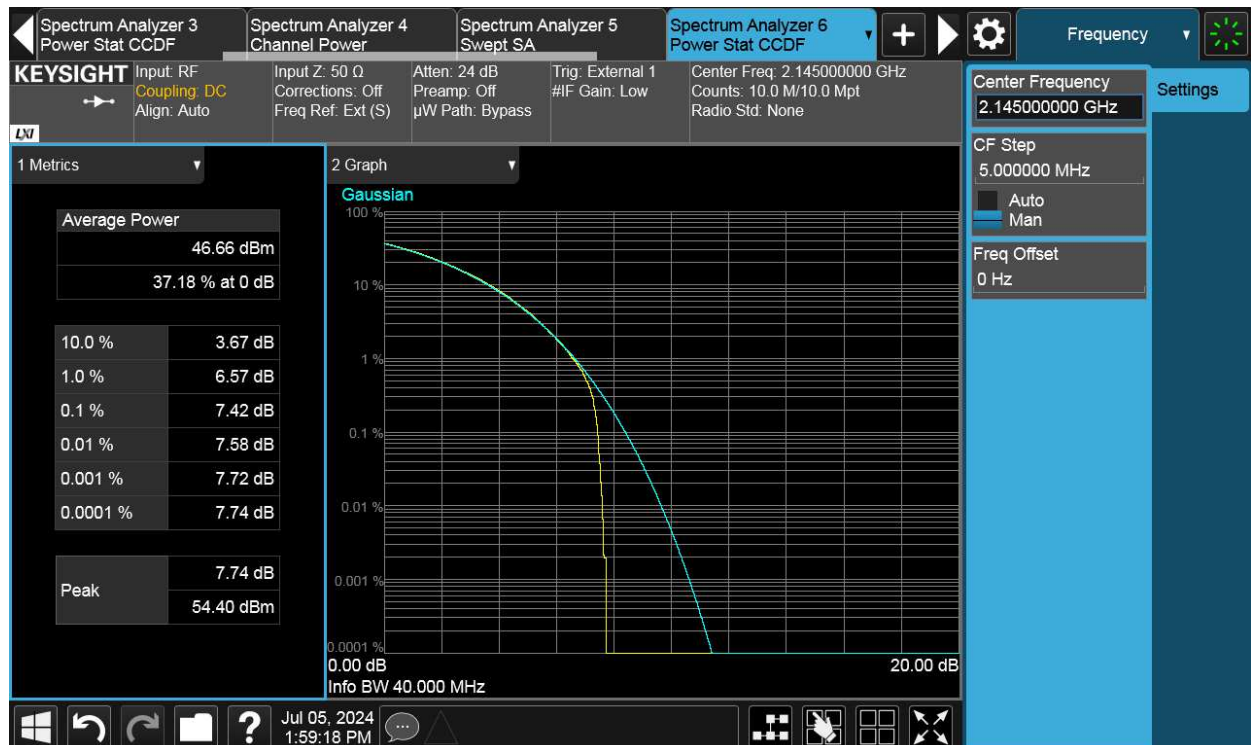
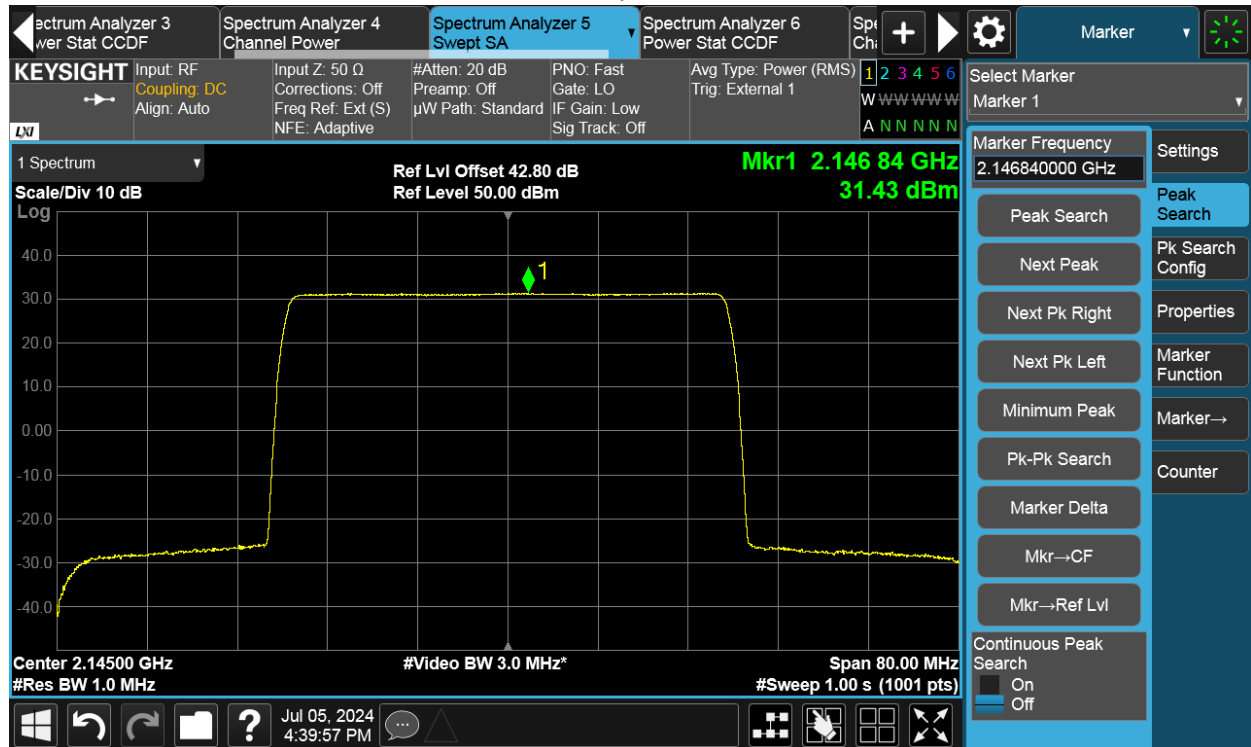


Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	40	46.74	31.48	7.64	46.72	31.31	7.42	46.79	31.34	7.59
B	64QAM	40	46.84	31.56	7.45	46.73	31.43	7.41	46.84	31.45	7.54
C	64QAM	40	46.75	31.51	7.46	46.71	31.32	7.40	46.72	31.38	7.57
D	64QAM	40	46.80	31.54	7.47	46.70	31.35	7.41	46.83	31.37	7.57
Total conducted power			52.80	37.54	-	52.74	37.37	-	52.82	37.41	-
EIRP limit			-	62.15	13.00	-	62.15	13.00	-	62.15	13.00
Max antenna gain			-	24.61	-	-	24.78	-	-	24.74	-

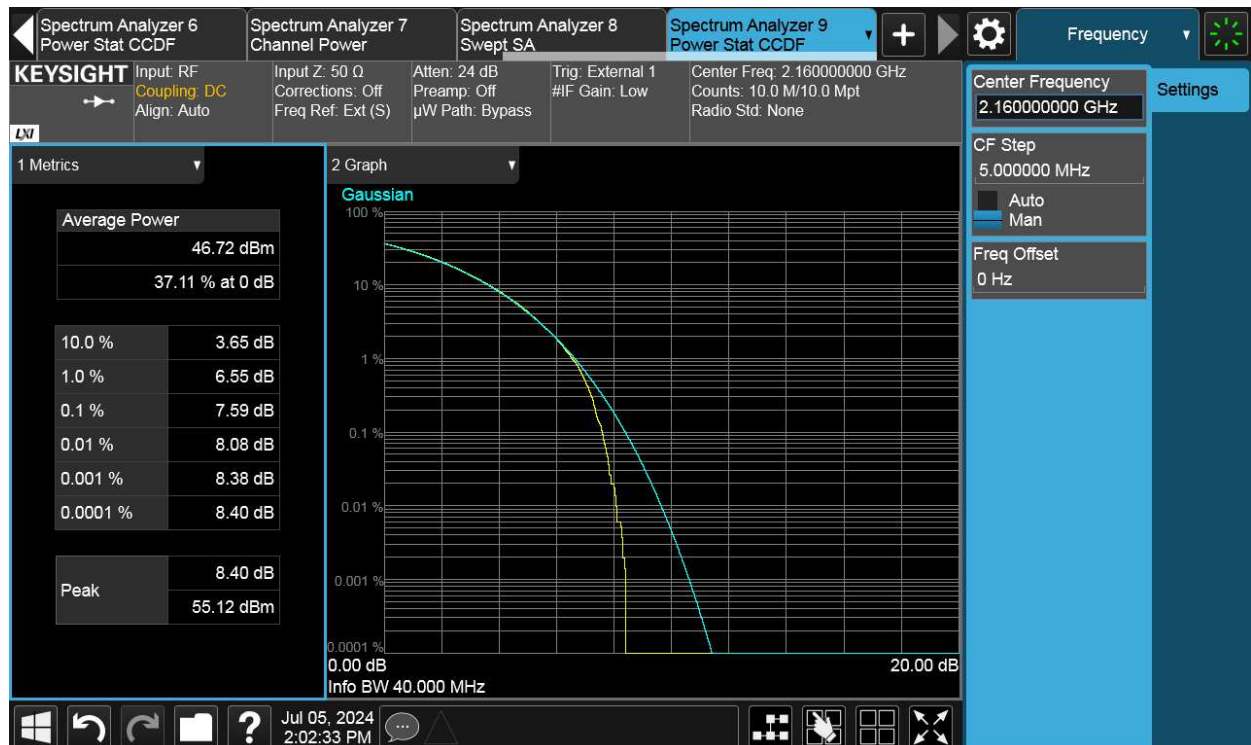
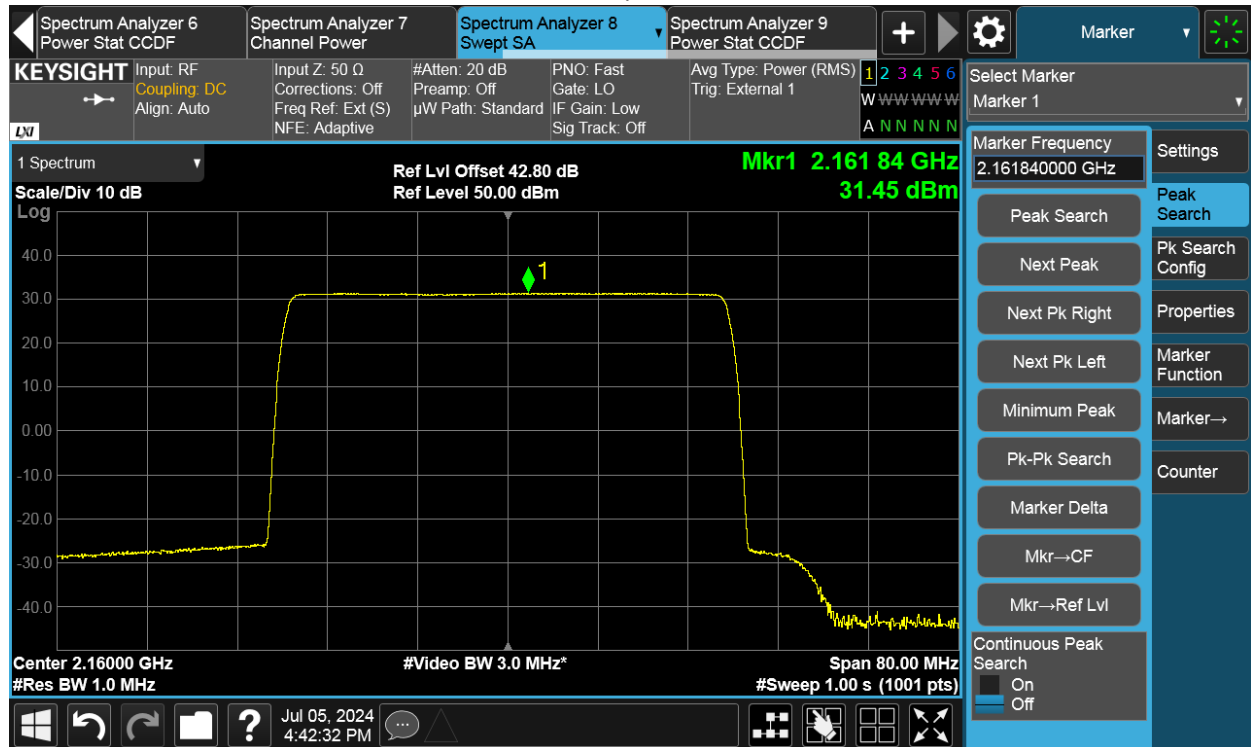
Channel position B



Channel position M



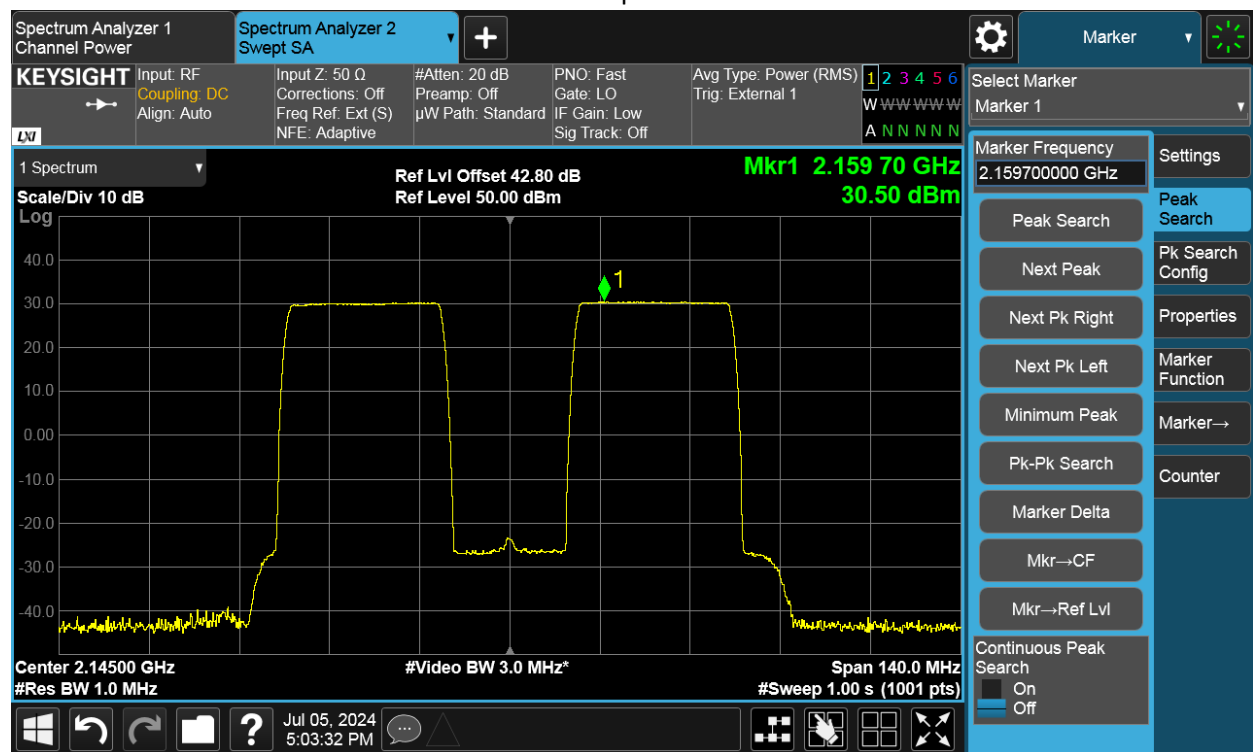
Channel position T



NR-2C

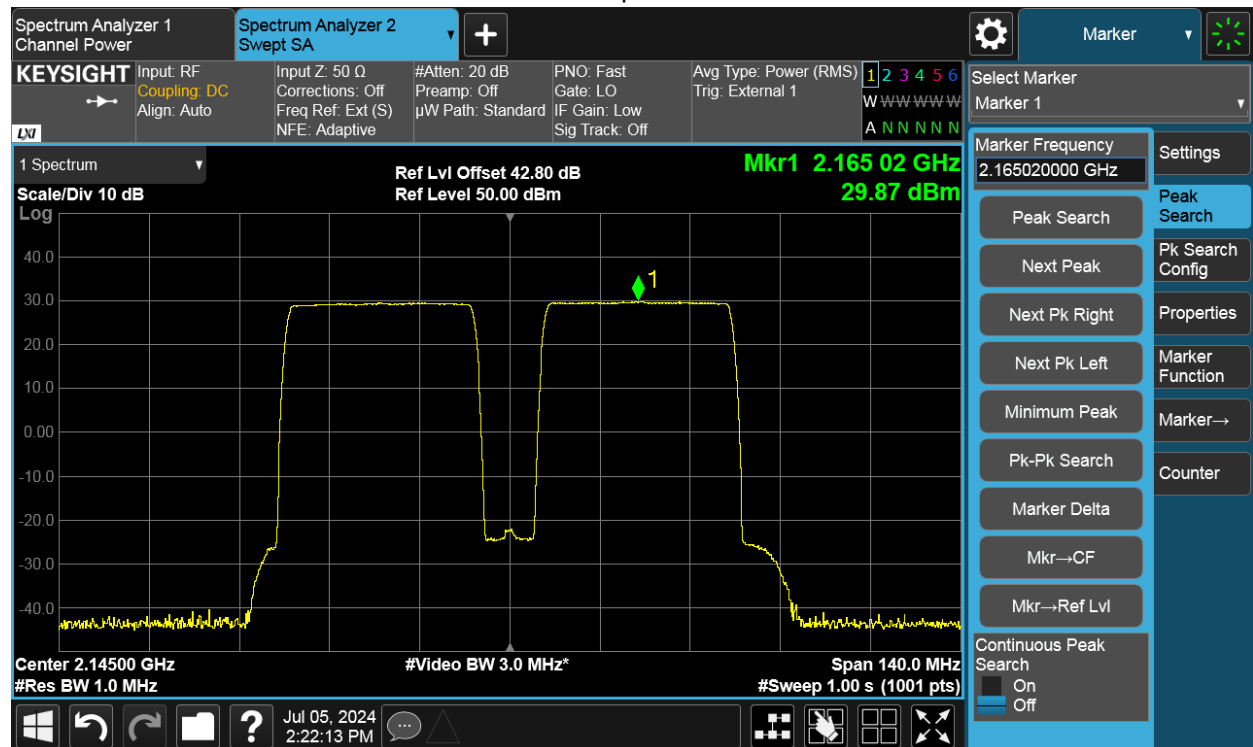
Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	25	-	-	-	46.64	30.49	-	-	-	-
B	64QAM	25	-	-	-	46.73	30.50	-	-	-	-
C	64QAM	25	-	-	-	46.70	30.41	-	-	-	-
D	64QAM	25	-	-	-	46.67	30.45	-	-	-	-
Total conducted power			-	-	-	52.71	36.48	-	-	-	-
EIRP limit			-	-	-	-	62.15	-	-	-	-
Max antenna gain			-	-	-	-	25.67	-	-	-	-

Channel position M



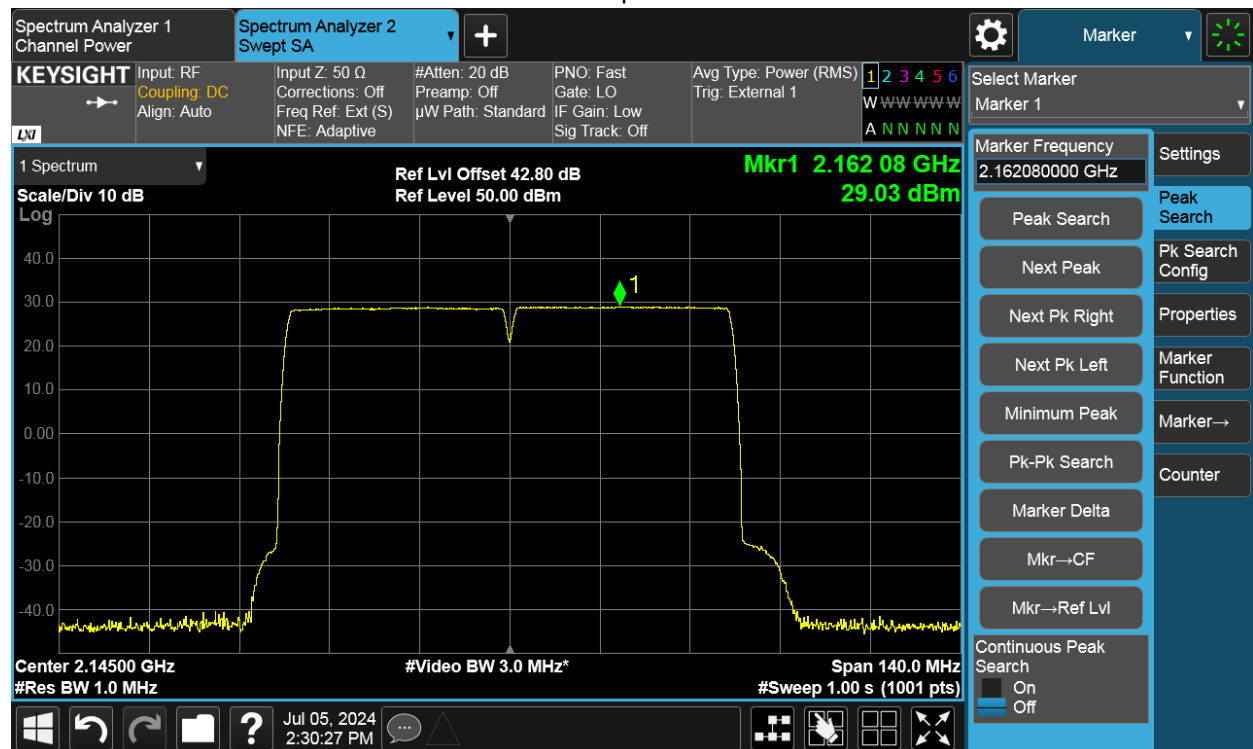
Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	30	-	-	-	46.72	29.87	-	-	-	-
B	64QAM	30	-	-	-	46.72	29.83	-	-	-	-
C	64QAM	30	-	-	-	46.66	29.85	-	-	-	-
D	64QAM	30	-	-	-	46.64	29.75	-	-	-	-
Total conducted power			-	-	-	52.71	35.85	-	-	-	-
EIRP limit			-	-	-	-	62.15	-	-	-	-
Max antenna gain			-	-	-	-	26.30	-	-	-	-

Channel position M



Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	35	-	-	-	46.71	29.03	-	-	-	-
B	64QAM	35	-	-	-	46.76	29.01	-	-	-	-
C	64QAM	35	-	-	-	46.75	28.99	-	-	-	-
D	64QAM	35	-	-	-	46.71	28.99	-	-	-	-
Total conducted power			-	-	-	52.75	35.03	-	-	-	-
EIRP limit			-	-	-	-	62.15	-	-	-	-
Max antenna gain			-	-	-	-	27.12	-	-	-	-

Channel position M



TEST REPORT**4 Occupied Bandwidth****Test result: Pass****4.1 Measurement Procedure**

The EUT was set to transmit at maximum power and testing was carried out on bottom, middle and top channels. Using the Occupied Bandwidth measurement function in the spectrum analyzer, the 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 Clause 4.2.

The measurement method is from KDB 971168 4.2:

- 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 (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least $10\log(\text{OBW} / \text{RBW})$ below the reference level.
- d) Set the detection mode to peak, and the trace mode to max hold.
- e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.