Ericsson AB

RF TEST REPORT

Report Type:
FCC Part 27 RF report

PRODUCT NAME:
Radio 4449 B71 B85A

REPORT NUMBER:
2403B0616SHA-001

ISSUE DATE:
March 15, 2024

DOCUMENT CONTROL NUMBER:
TTRFFCC Part 27_V1 © 2018 Intertek

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TEST REPORT

Report no.: 2403B0616SHA-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:	TA8AKRC161756-1
IC:	287AB-AS1617561

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

FCC CFR 47 Part 27: MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

RSS-130 Issue 2: Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz

PREPARED BY:	**REVIEWED BY:**
Victor Yang	Jackson Huang
Project Engineer	Reviewer
Victor Yang	Jackson Huang

Content

TEST REPORT

Revision History

Report No.	Version	Description	Issued Date
2403B0616SHA-001	Rev. 01	Initial issue of report	March 15, 2024

TEST REPORT

Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Max Output Power and Peak to Average Power Ratio and EIRP	27.50(d)	RSS-130 4.6	Pass
Occupied Bandwidth	27.53(g) 2.1049	RSS-GEN 6.7	Pass
Unwanted Emissions at Band Edge	27.53(g)	RSS-130 4.7	Pass
Conducted Unwanted Emission	27.53(g)	RSS-130 4.7	Pass
Frequency Stability	27.54	RSS-130 4.5	Pass

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Description:	Remote Radio Unit
Product name:	Radio 4449 B71 B85A
Product number:	KRC 161756/1
HVIN	AS1617561
Serial Number(s)	E23A690755
Rating:	-48V DC
Software Version:	CXP9013268%15_R98AV
Hardware Version:	R1F
Sample received date:	February 29, 2024
Date of test:	February 29, 2024 ~ March 4, 2024

1.2 Technical Specification

Frequency Range:	B71: TX (DL): 617-652MHz; RX (UL): 663-698MHz B85A: TX (DL): 728-745MHz; RX (UL): 698-715MHz IoT:728.2-744.8 MHz
Number of Antenna ports:	4 TX/RX
Supported RAT:	Single RAT: LTE, NR, NB-IoT (IB, GB, SA) Multi RAT: LTE+ NR; LTE+ NB-IoT SA; NR +NB-IoT SA, LTE+ NR + NB-IoT SA
Max RF bandwidth (IBW):	B71:35MHz B85A:17MHz
Supported Number of Carriers:	Max 6 carriers
Supported modulation:	LTE/NR: QPSK, 16QAM, 64QAM, 256QAM NB IoT SA/GB/IB: QPSK
Supported Channel Bandwidth:	B71: NR: 5MHz, 10MHz, 15MHz, 20MHz, 25MHz, 30MHz, 35MHz; LTE:5MHz, 10MHz, 15MHz, 20MHz; GB_IoT:10MHz,15MHz,20MHz NB-IoT(SA): 200 kHz B85A: NR: 5MHz, 10MHz, 15MHz LTE:5MHz, 10MHz NB-IoT(SA): 200 kHz
Declaration output power:	80W(49.03 dBm) B71:40W per band B85A:40 W per band

Note: Information in the 1.2 sheet declared by the manufacturer.

1.3 Description of Test Facility

Conducted testing:

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 Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier.: CN0014
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Related documents

FCC Part 27 (2022)
FCC Part 2 (2022)
RSS-130 issue 2 February 2019
ISED RSS-Gen issue 5 March 2019 Amendment 1 February 2021 Amendment 2
ANSI C63.26:2015
KDB 971168 D01 v03r01
KDB 662911 D01 v02r01

2.2 Product Information

The Equipment Under Test (EUT) is an Ericsson Remote Radio Unit working in the wireless communications services 617-652MHz & 728-745MHz band which provides communication connections to network in LTE, NR, NB-IoT (IB, GB, SA) modes and MSR modes. The Radio 4449 B71 B85A operates from a -48V DC power supply.

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.

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

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 and 256QAM on one of the antenna ports, it was determined that 64QAM for NR was the worst case modulation schemes and were used for all testing.
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. This antenna port was Port A for all modes.
The settings below were used for all measurements unless otherwise noted:

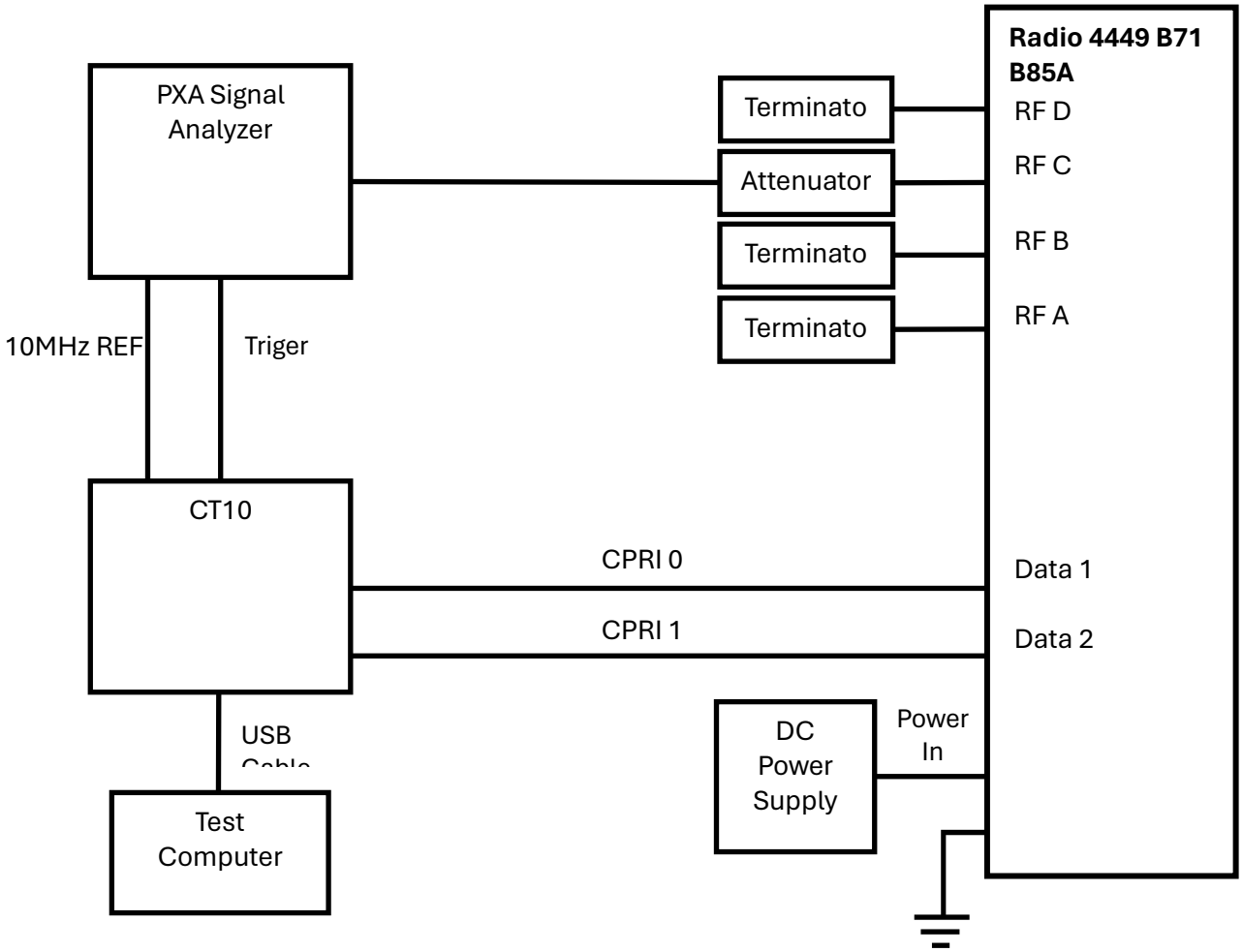
B71 NR

Configuration	Carrier	NR Carrier BW(MHz)	Carrier Frequency Configuration		
			Bottom	Middle	Top
NR-1C	1	25	629.5	634.5	639.5
		30	632	634.5	637
		35	-	634.5	-

Configuration	Carrier	NR Carrier BW(MHz)	Carrier Frequency Configuration		
			Bottom	Middle	Top
NR-1C-BE	1	25	629.5	-	639.5
		30	632	-	637
		35	-	634.5	-

2.4 Test Setup

Conducted Measurement:



No.	Auxiliary Equipment	Product Number / Model Type	Version
1	Test computer	Precision 3560	-
2	CT10	LPC 102487/1	R1C
3	DC Power Supply N8737A	US21E7359S	-
4	300W 40db Attenuator	20111834	-
5	250W Terminator	A220320235	-
6	250W Terminator	A220320237	-
7	250W Terminator	A220320242	-
8	SPE Test Kit Box	BAMS-1017018157	-
9	PXA-SignalAnalyzer N9030A	MY54490502	-

Proper Attenuator will be chosen to use in relative test case. And the cable loss of specified Attenuator 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	21°C	54% RH
Occupied Bandwidth		
Unwanted Emissions at Band Edge		
Conducted Unwanted Emission		
Frequency Stability	Please refer to clause 8	

2.6 Instrument list

Intertek Testing Services					
Used	Equipment	Manufacturer	Type	S/N	Due date
☒	PXA Signal Analyzer	Keysight	N9030A	EC1046	2024.4.7
☐	Signal Generator	R&S	SMU200A	EC1050	2024.4.2
☒	Multi-meter	Fluke	117	EC1051	2025.1.15
☒	Climatic Chamber	赛宝	CEEC-WR16H-50W	EC1052	2024.7.31
☒	Humiture meter	托普	TPJ-20	EC1053	2025.1.24

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}

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

Test result: **Pass**

3.1 Limit

FCC CFR 47 Part 27:
(1) Fixed and base stations transmitting a signal with an emission bandwidth of 1 MHz or less must not exceed an effective radiated power (ERP) of 1000 watts and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section;

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts)
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

(2) Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section;

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) per MHz (watts/MHz)
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

RSS-130 Issue 2:
For fixed and base stations transmitting in accordance with section 4, the maximum permissible equivalent isotropically radiated power (e.i.r.p.) is 1640 watts and 1640 watts/MHz for a channel bandwidth less than or equal to 1 MHz and greater than 1 MHz, respectively. These e.i.r.p. limits apply for stations with an antenna height above average terrain (HAAT) up to 305 metres.

Peak to Average Ratio: ≤13 dB

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.

3.3 Measurement result

NR-1C

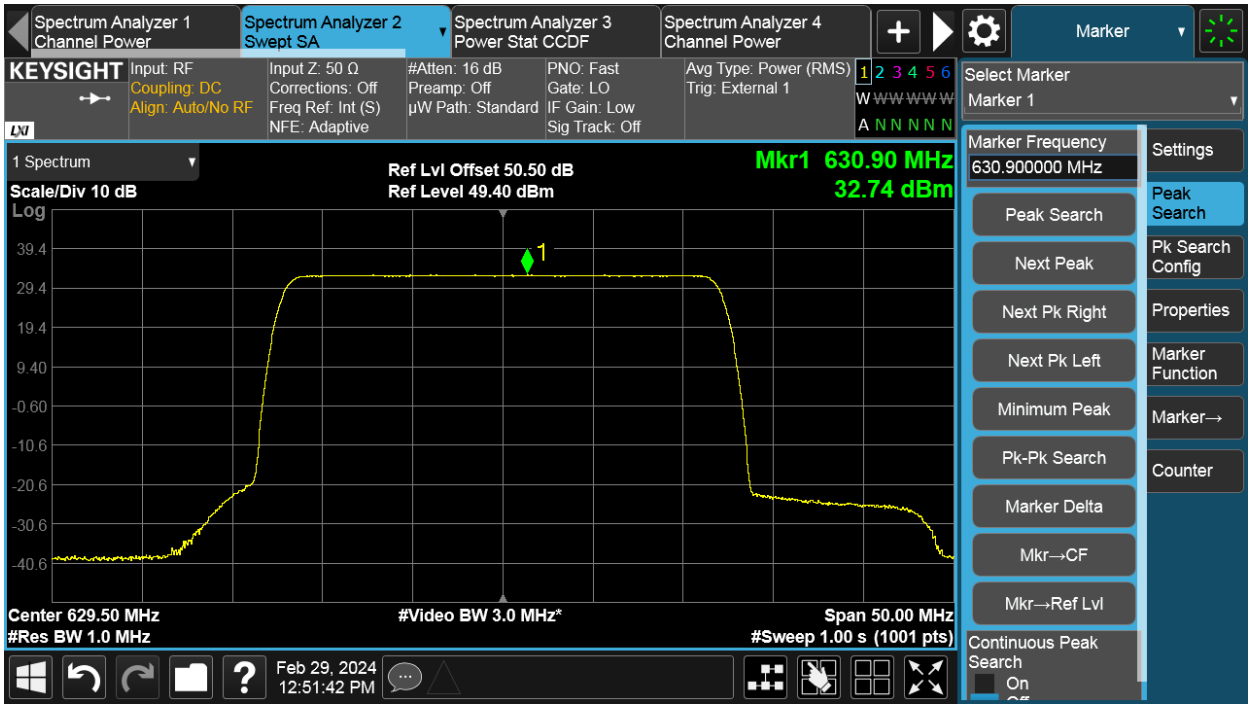
Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	25	46.12	32.74	7.35	46.16	32.95	7.47	45.92	32.74	7.84
B	64QAM	25	45.99	32.63	7.35	46.11	32.90	7.47	45.91	32.75	7.83
C	64QAM	25	45.97	32.63	7.35	45.96	32.72	7.48	45.80	32.65	7.83
D	64QAM	25	46.03	32.62	7.35	45.84	32.56	7.48	45.81	32.67	7.85
Total			52.05	38.68	-	52.04	38.81	-	51.88	38.72	-
Limit			-	62.15	13	-	62.15	13	-	62.15	13
Max antenna gain			-	23.47	-	-	23.34	-	-	23.43	-

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	46.10	32.06	7.45	46.14	32.09	7.59	46.06	32.06	7.87
B	64QAM	30	46.09	31.98	7.44	46.15	32.04	7.59	46.07	32.07	7.87
C	64QAM	30	45.91	31.82	7.44	45.92	31.89	7.58	45.86	31.86	7.86
D	64QAM	30	45.75	31.69	7.45	45.98	31.89	7.61	45.92	31.94	7.89
Total			51.99	37.91	-	52.07	38.00	-	52.00	38.00	-
Limit			-	62.15	13	-	62.15	13	-	62.15	13
Max antenna gain			-	24.24	-	-	24.15	-	-	24.15	-

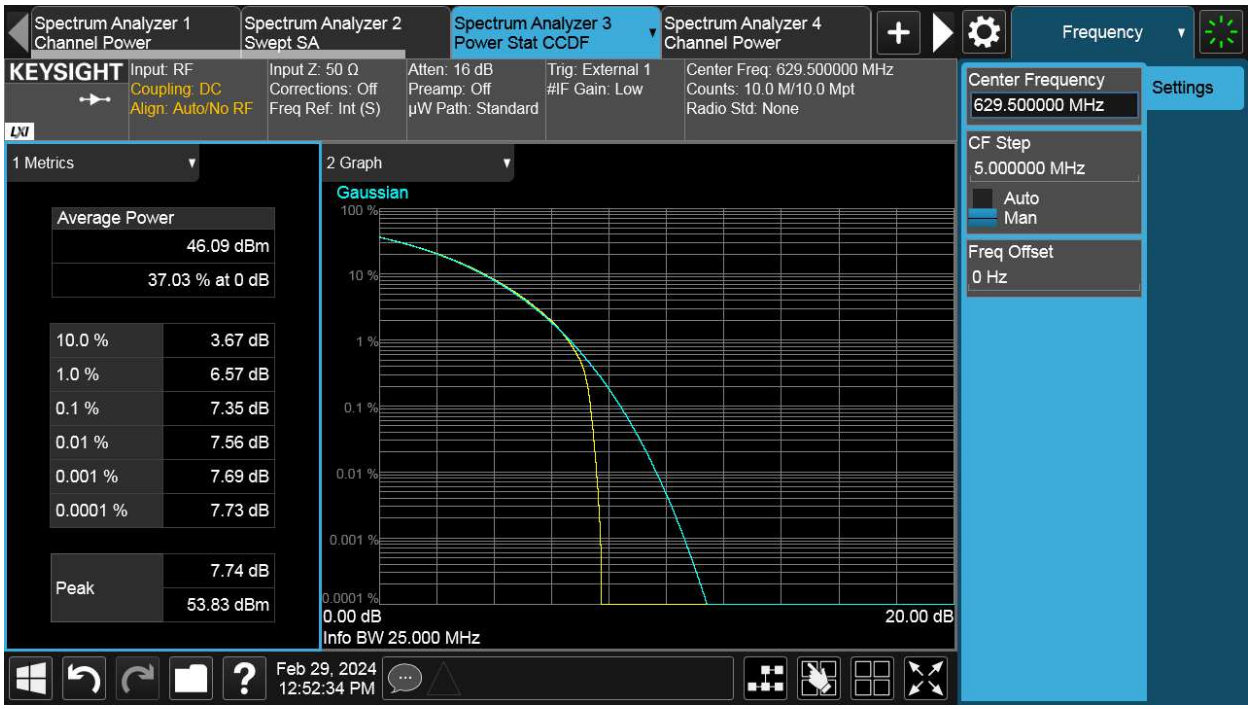
Antenna Port	NR Modulation	NR Carrier Bandwidth (MHz)	Output power / Peak-to-Average Ratio (PAR)								
			Channel position B			Channel position M			Channel position T		
			Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)	Power (dBm)	Power (dBm /MHz)	PAR (dB)
A	64QAM	35	-	-	-	46.18	31.47	7.76	-	-	-
B	64QAM	35	-	-	-	46.07	31.36	7.76	-	-	-
C	64QAM	35	-	-	-	45.92	31.20	7.76	-	-	-
D	64QAM	35	-	-	-	45.95	31.26	7.81	-	-	-
Total			-	-	-	52.05	37.34	-	-	-	-
Limit			-	-		-	62.15	13	-	-	-
Max antenna gain			-	-	-	-	24.81	-	-	-	-

TEST REPORT

NR 25MHz, Channel B, Power

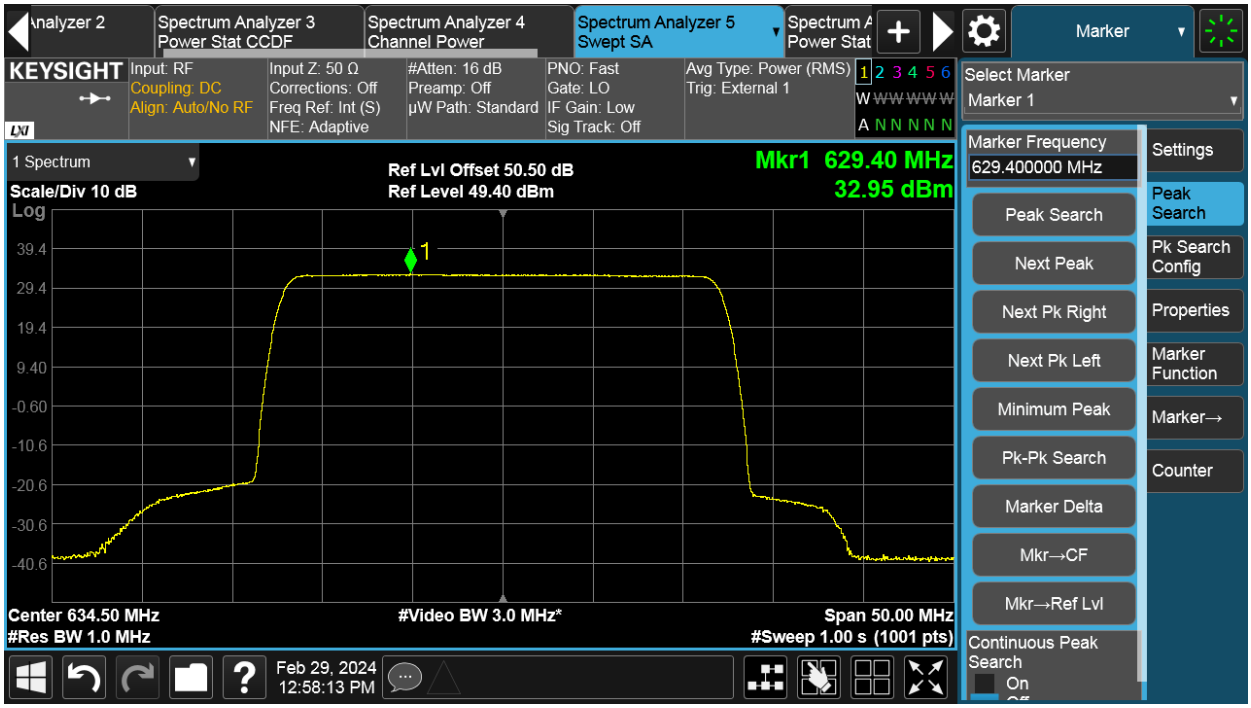


NR 25MHz, Channel B, PAR

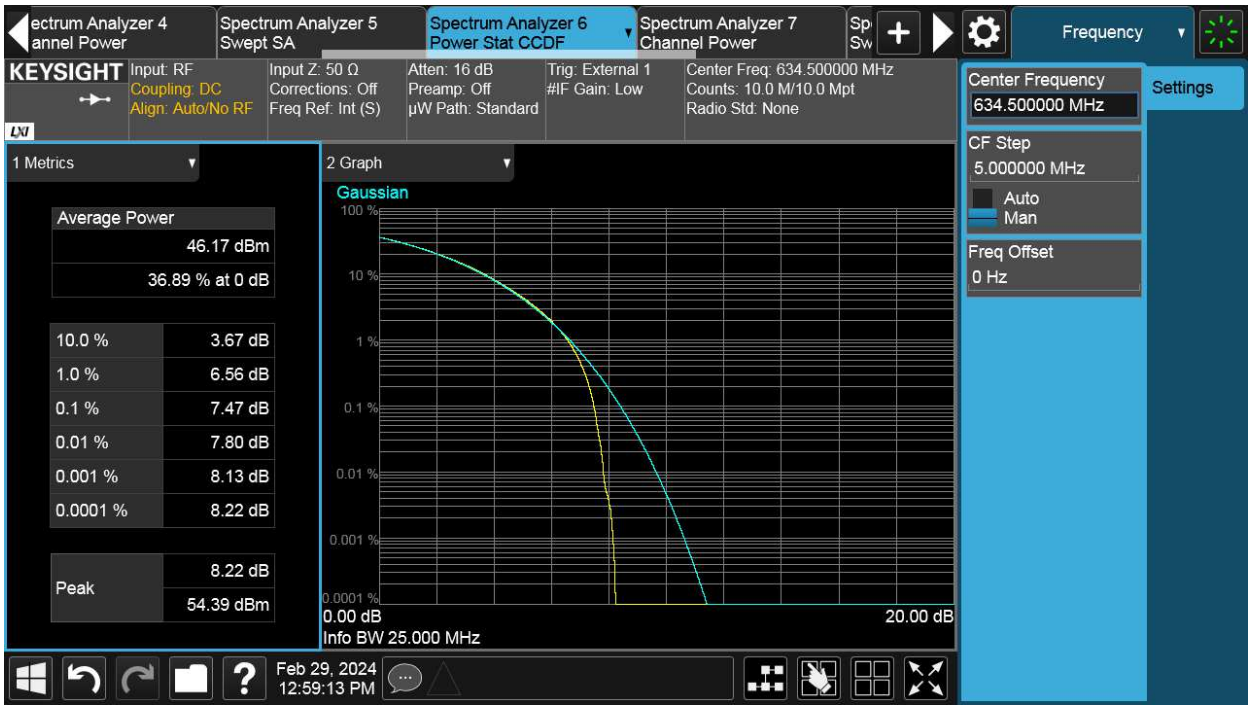


TEST REPORT

NR 25MHz, Channel M, Power

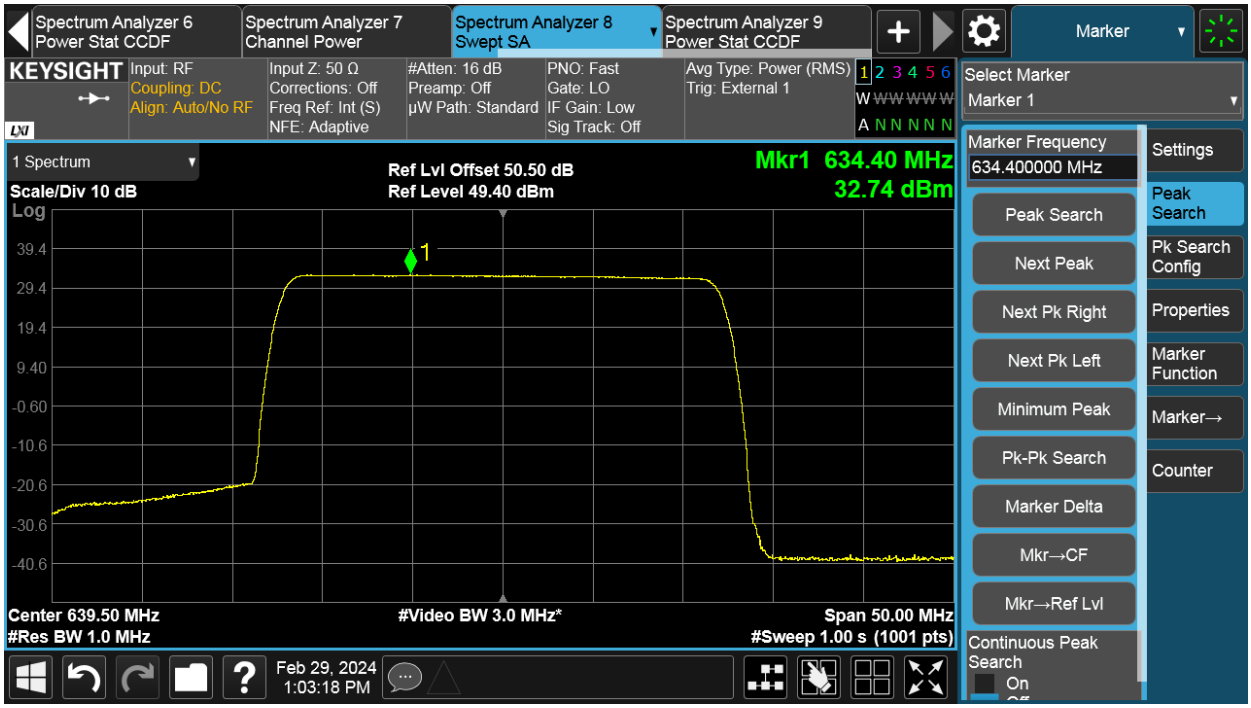


NR 25MHz, Channel M, PAR



TEST REPORT

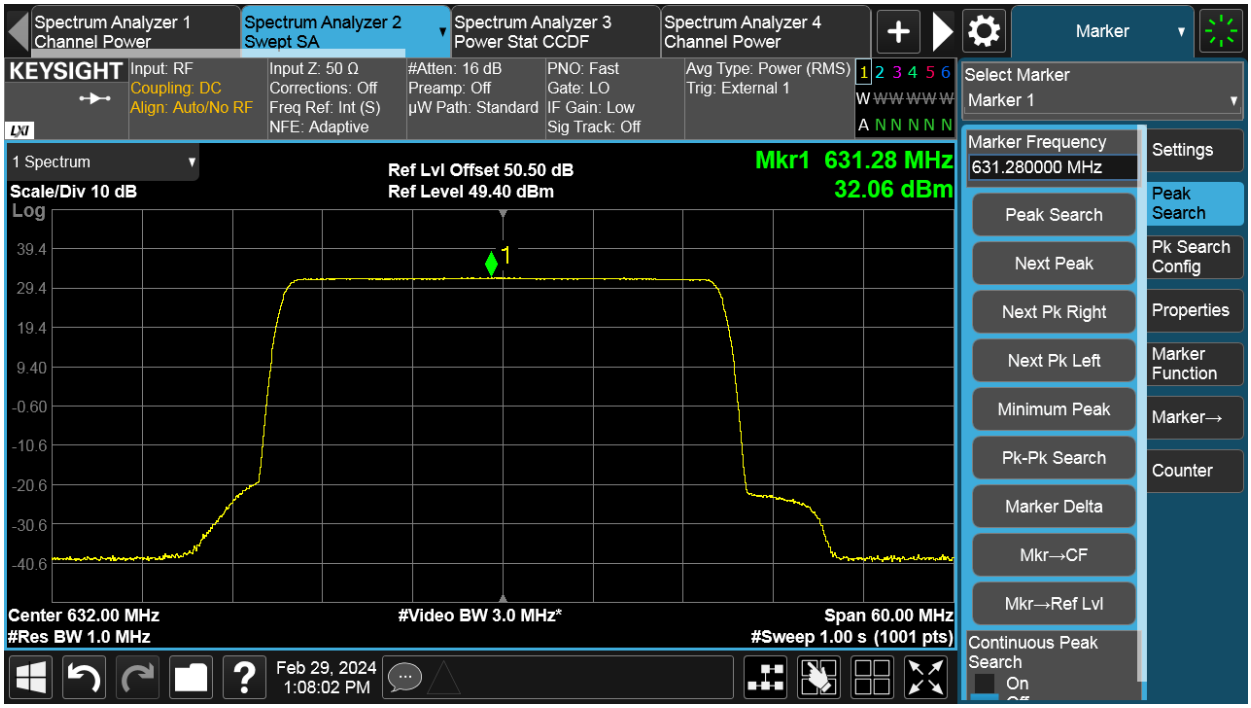
NR 25MHz, Channel T, Power



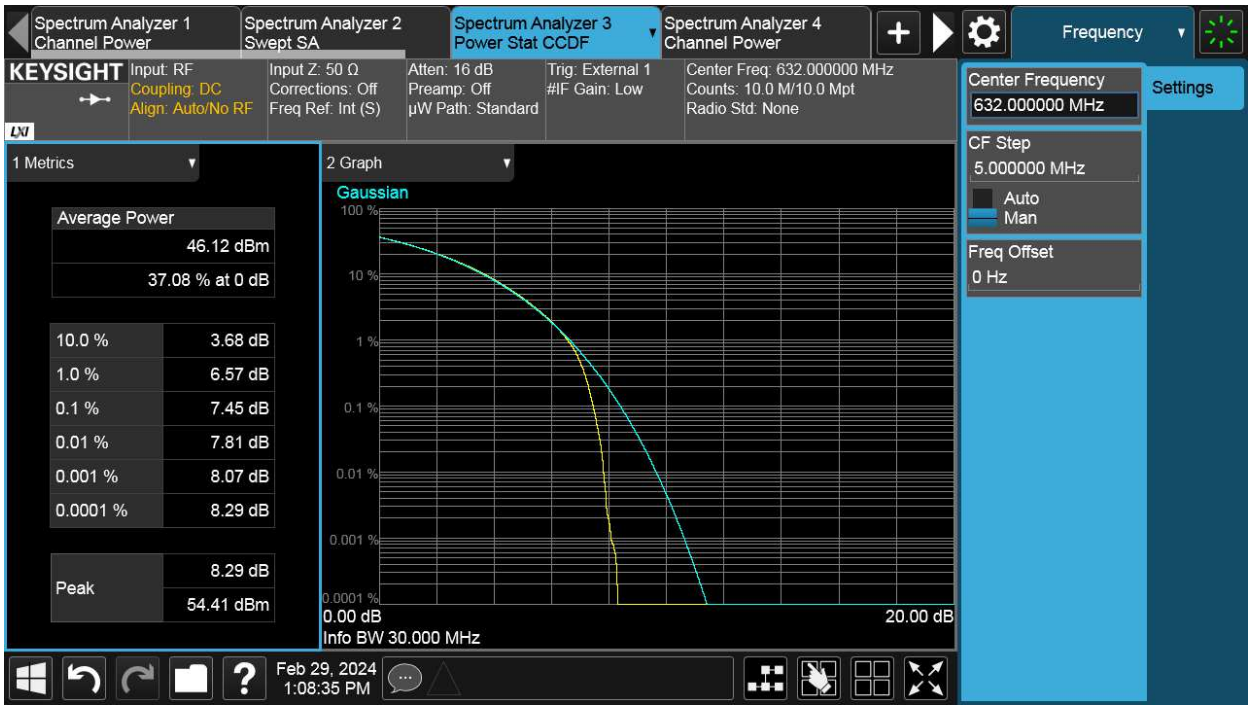
NR 25MHz, Channel T, PAR

TEST REPORT

NR 30MHz, Channel B, Power

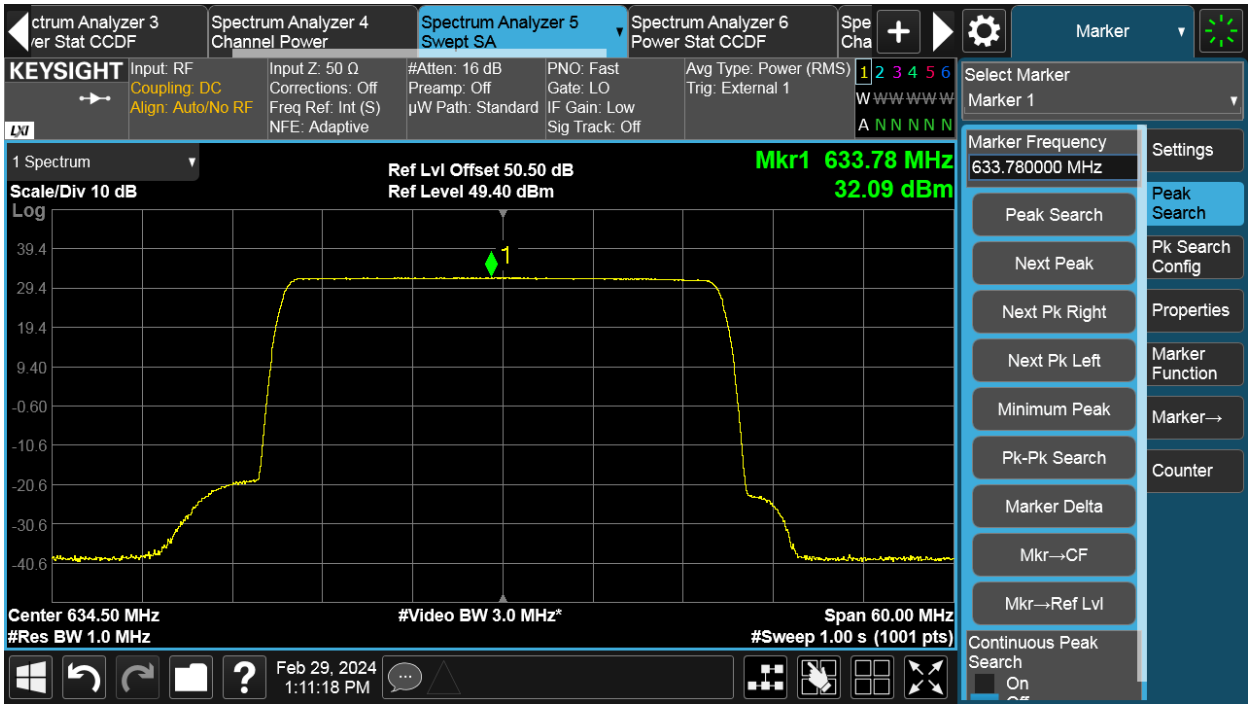


NR 30MHz, Channel B, PAR

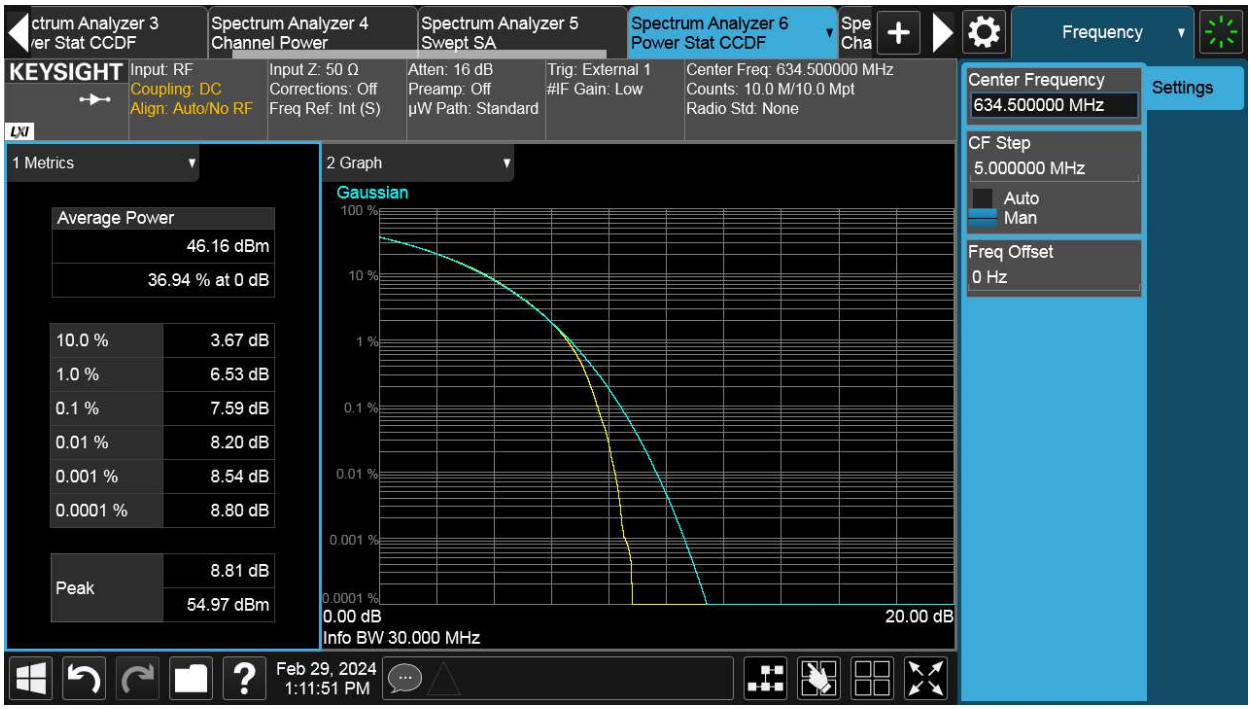


TEST REPORT

NR 30MHz, Channel M, Power

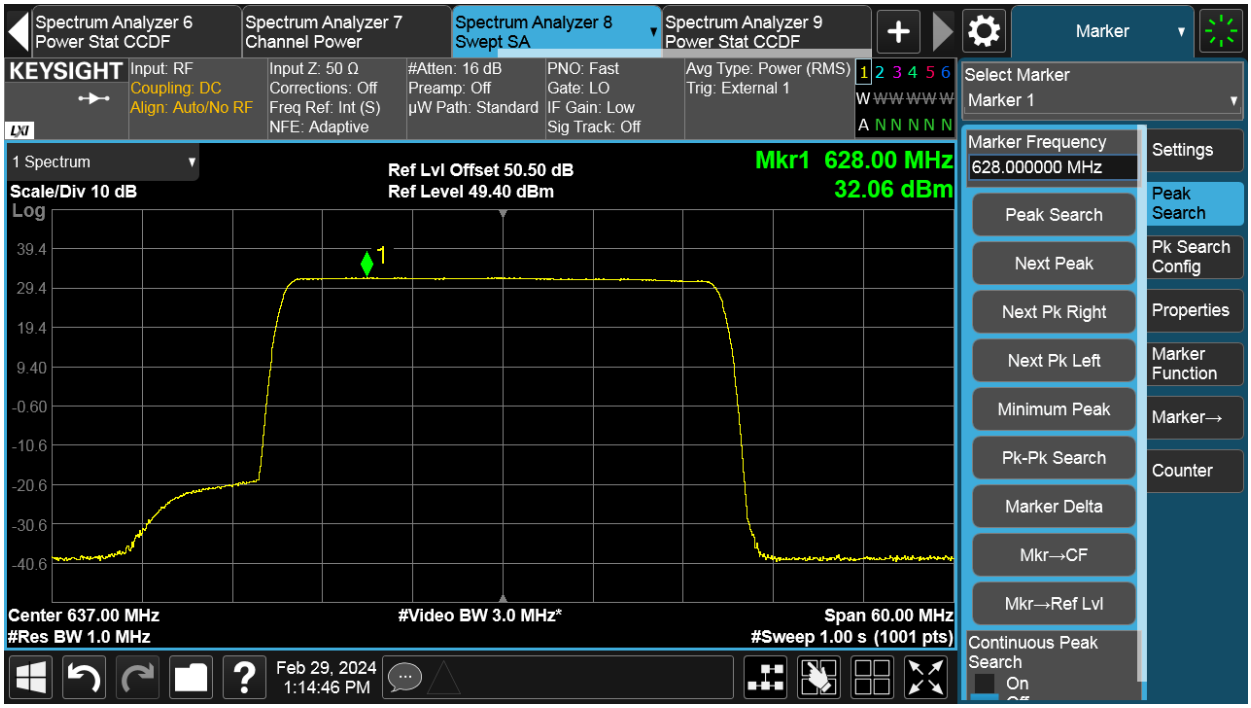


NR 30MHz, Channel M, PAR



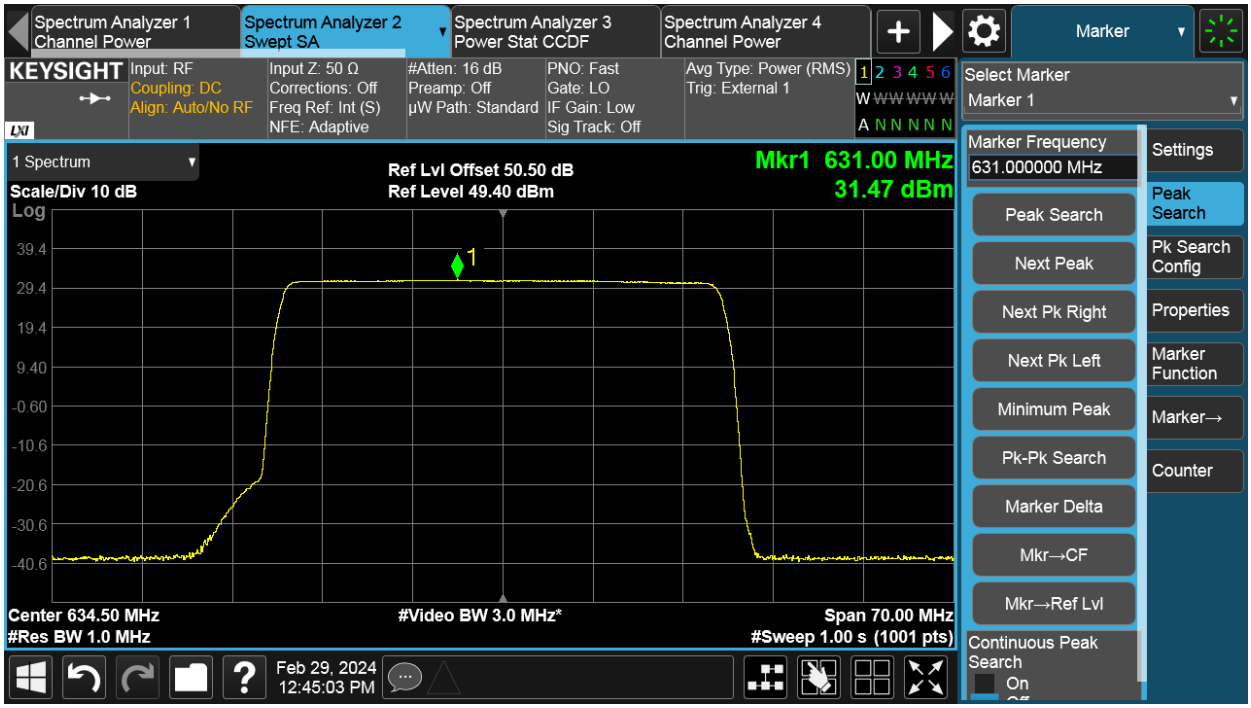
TEST REPORT

NR 30MHz, Channel T, Power

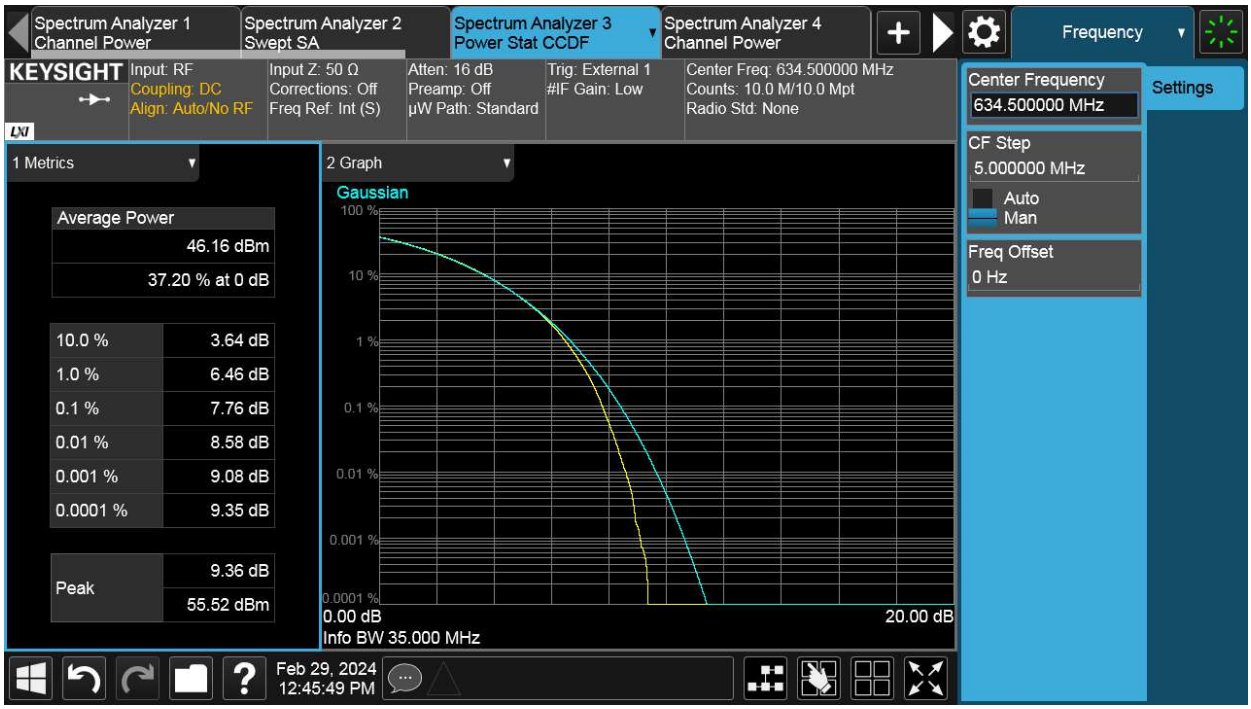


NR 30MHz, Channel T, PAR

NR 35MHz, Channel M, Power



NR 35MHz, Channel M, PAR



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 product s 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 10log (OBW / 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.

4.2 Measurement result

NR-1C

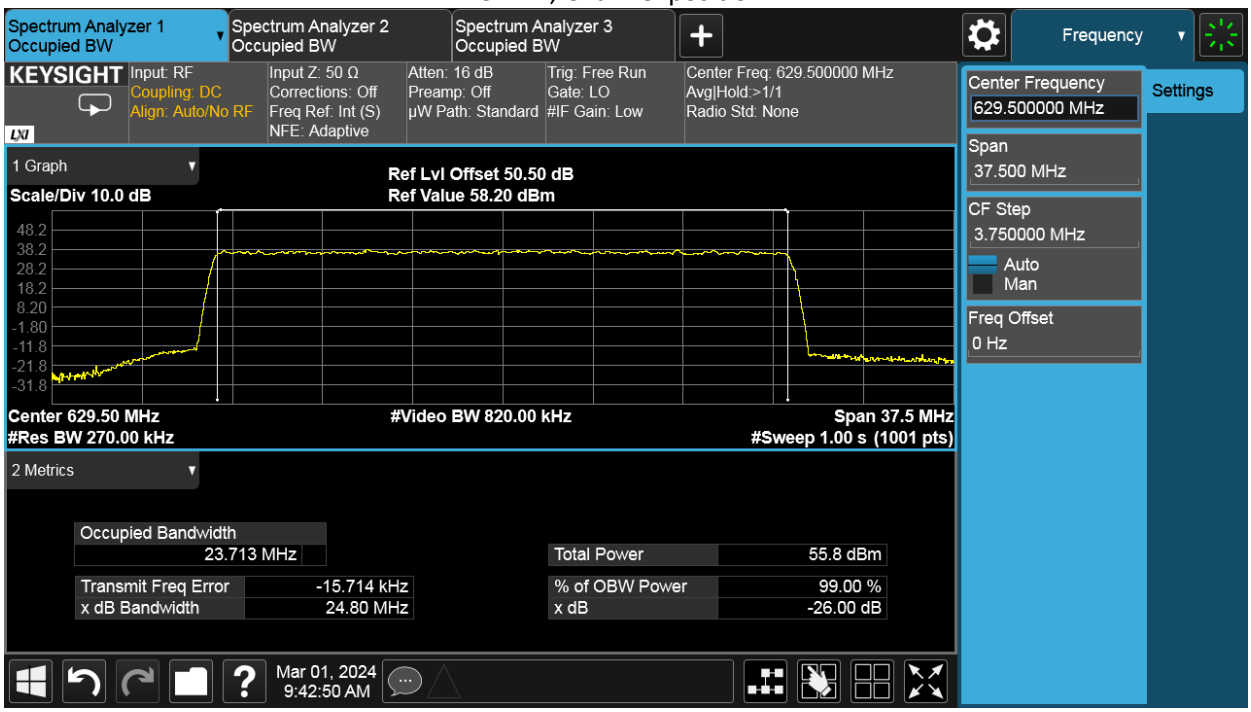
99% Occupied Bandwidth

Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	64QAM	25MHz	23.713	23.711	23.701
A	64QAM	30MHz	28.539	28.535	28.515
A	64QAM	35MHz	-	33.550	-

-26dBc Occupied Bandwidth

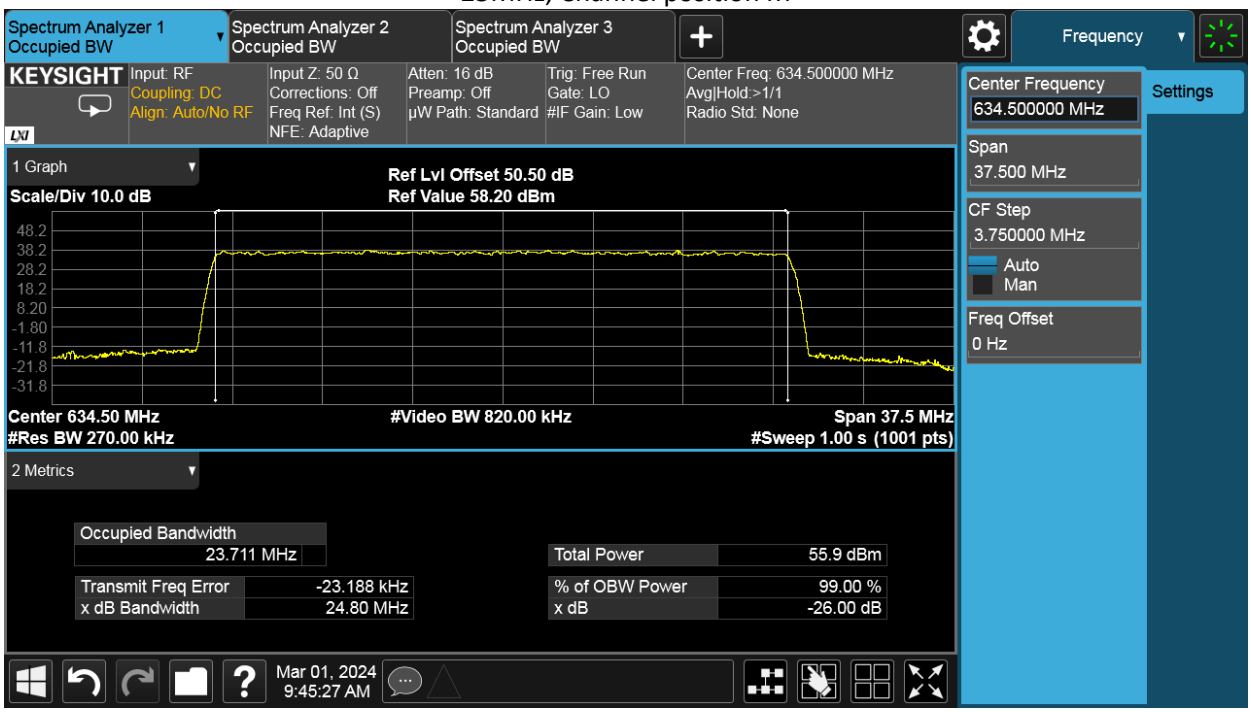
Antenna Port	Modulation	Bandwidth	Occupied Bandwidth (MHz)		
			Channel Position B	Channel Position M	Channel Position T
A	64QAM	25MHz	24.80	24.80	24.79
A	64QAM	30MHz	29.58	29.58	29.54
A	64QAM	35MHz	-	34.70	-

25MHz, Channel position B

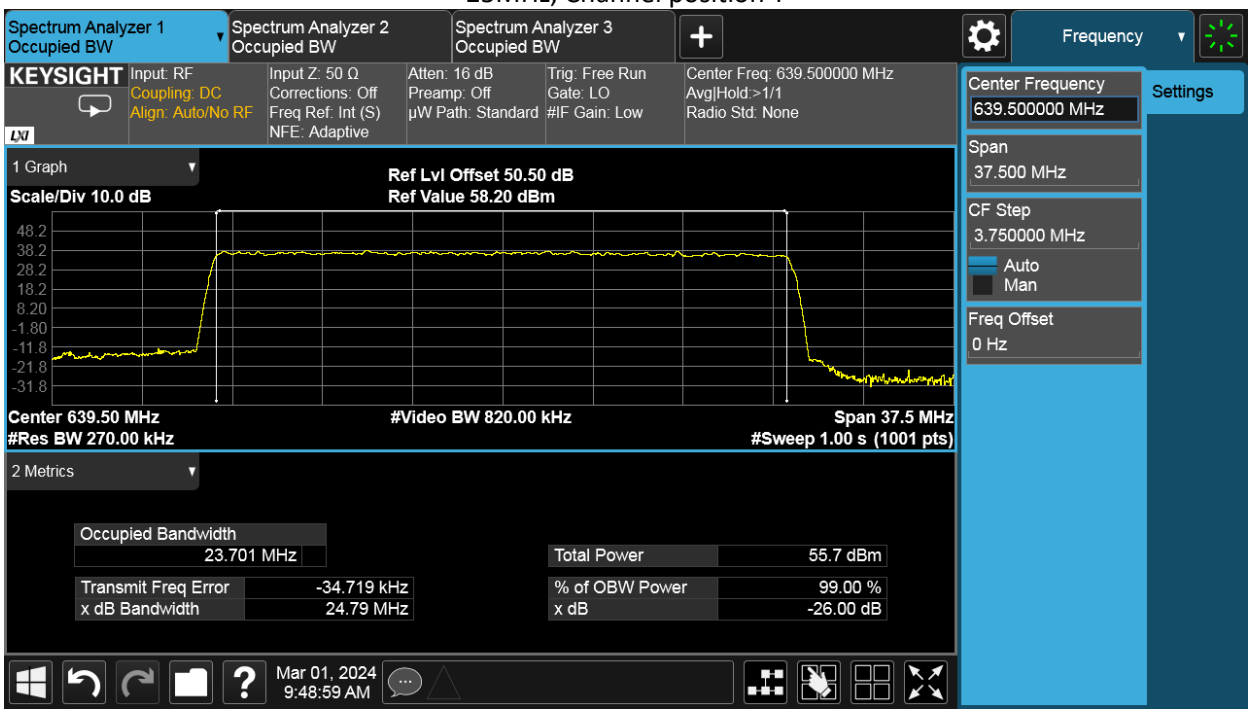


TEST REPORT

25MHz, Channel position M

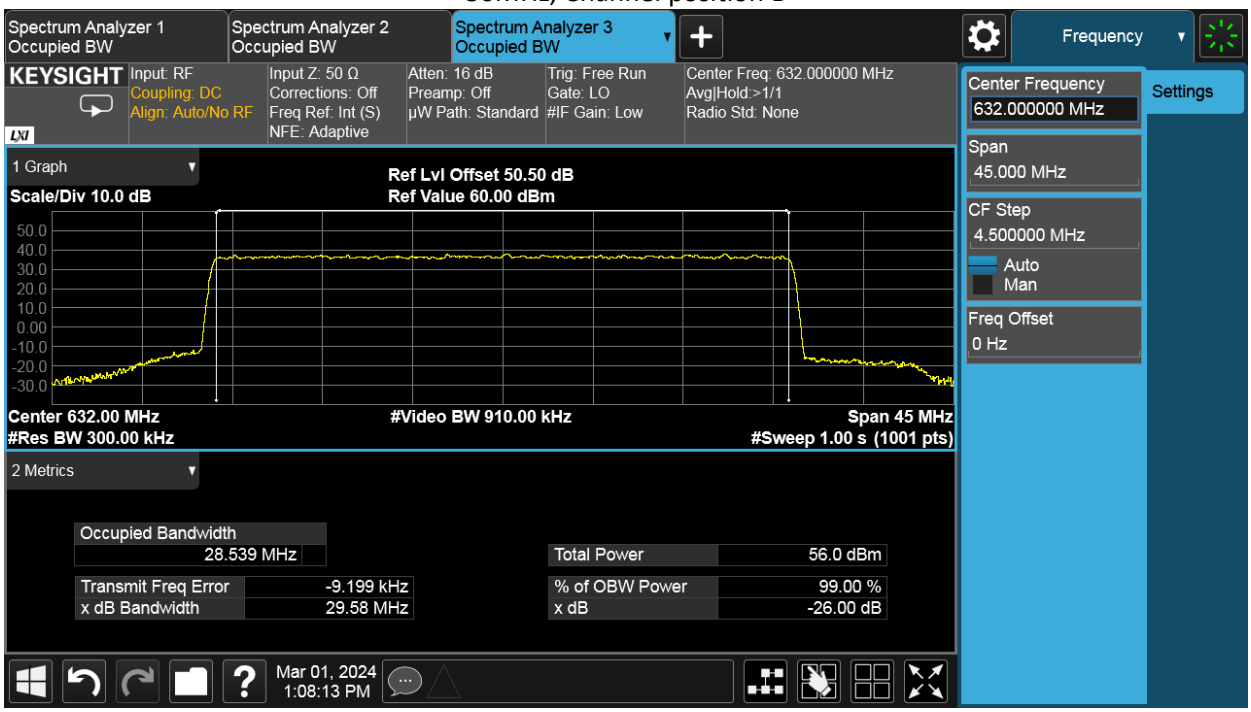


25MHz, Channel position T

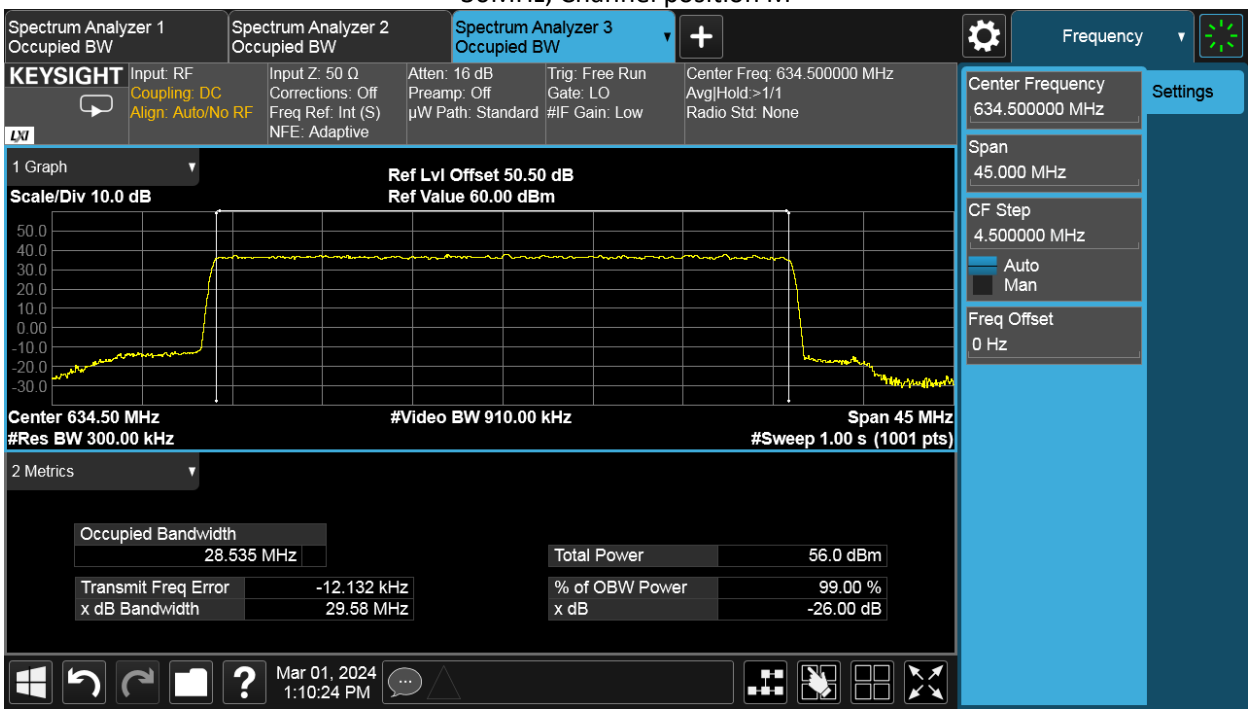


TEST REPORT

30MHz, Channel position B

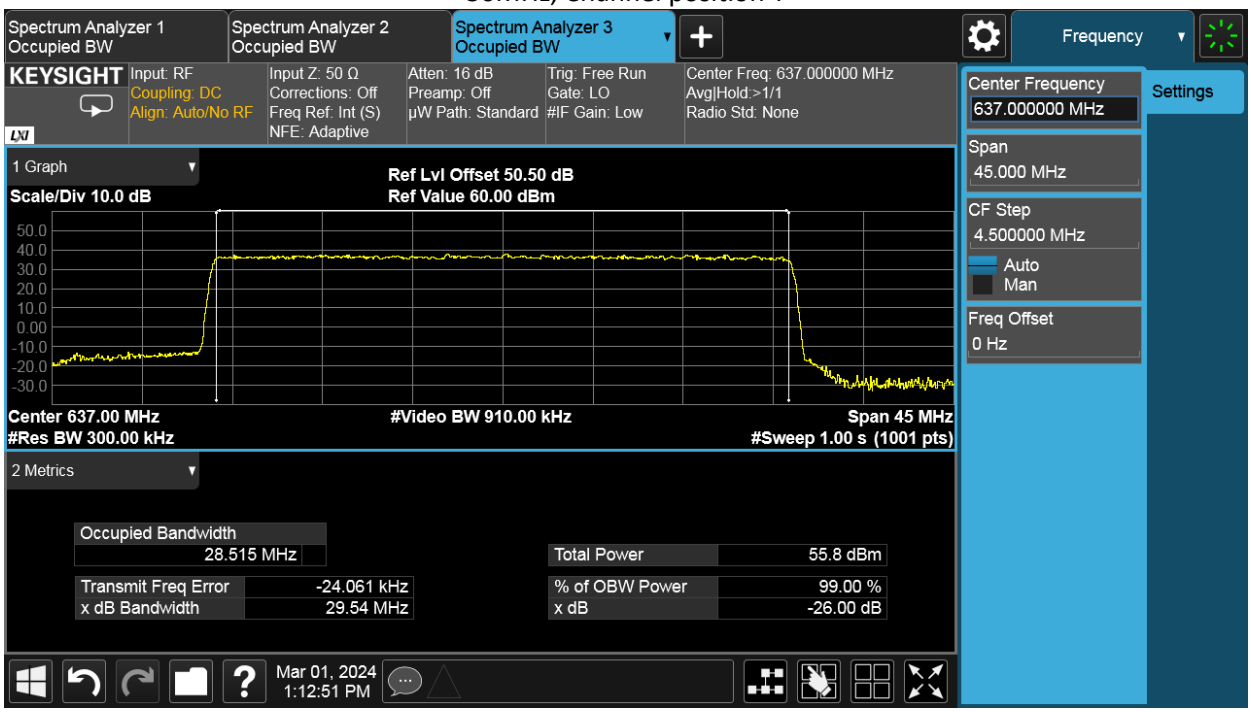


30MHz, Channel position M

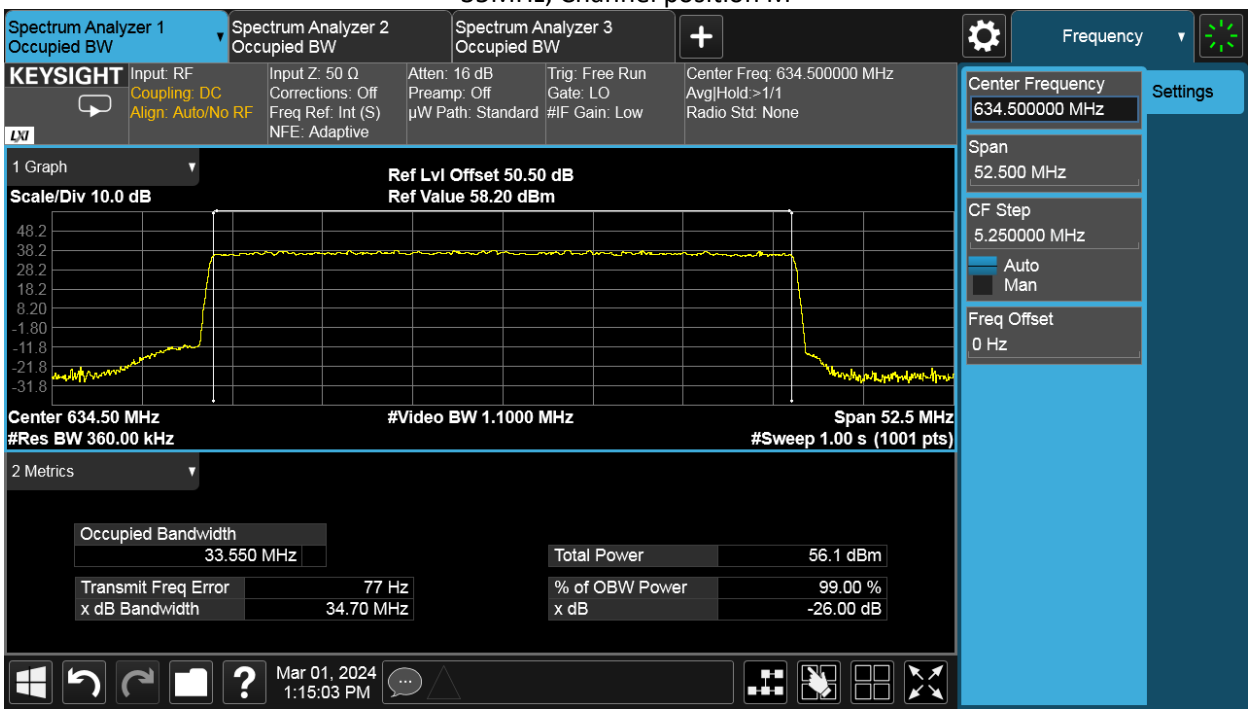


TEST REPORT

30MHz, Channel position T



35MHz, Channel position M



5 Unwanted Emissions at Band Edge

Test result: **Pass**

5.1 Limit

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

5.2 Measurement Procedure

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log(1/4)] by using the Measure and Add 10Log(N) dB technique according to KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports . Then the limit was adjusted to -19.02dBm.

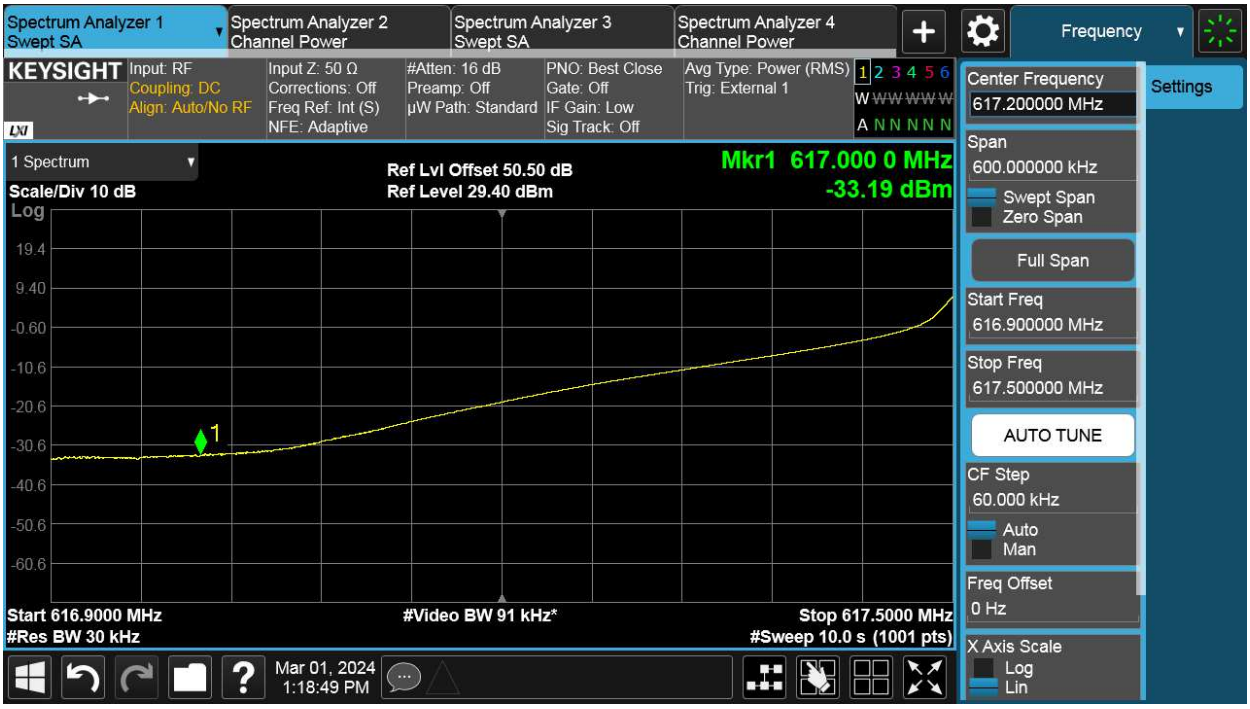
Spectrum analyzer detector was set as RMS.

5.3 Measurement result

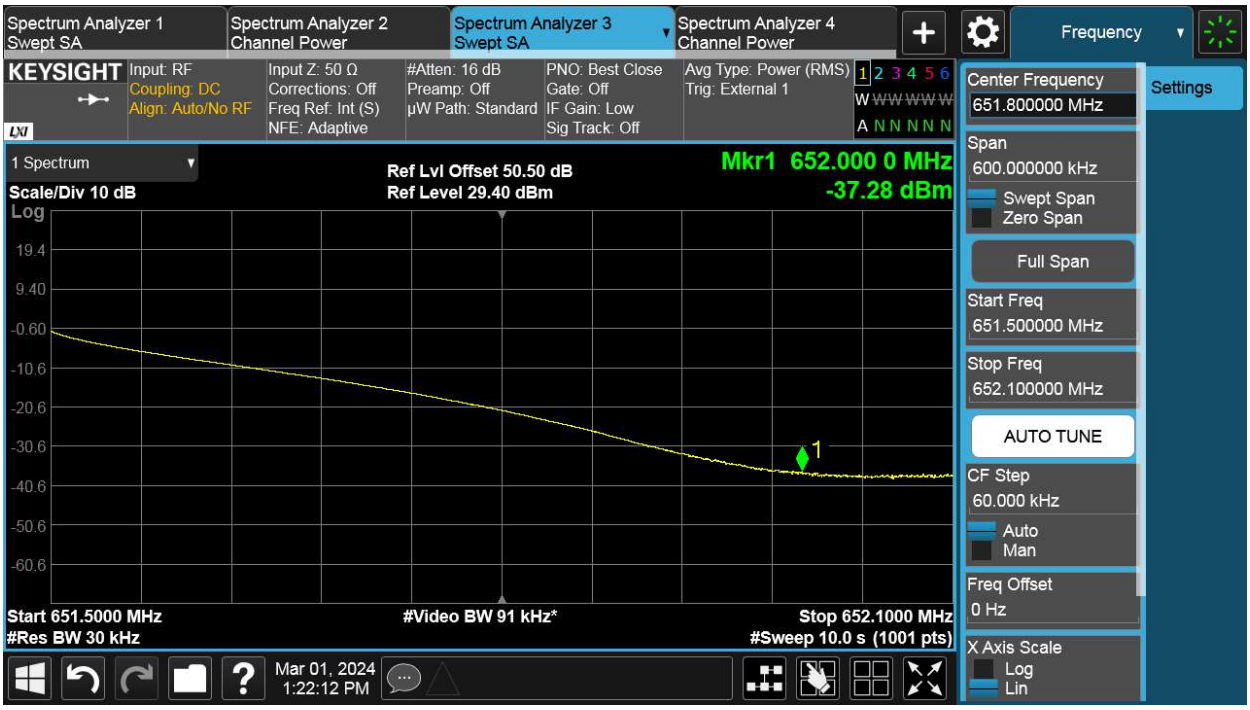
NR-1C-BE

Antenna Port	Channel Position	Modulation	Carrier Bandwidth (MHz)	RBW (kHz)	Limit (dBm)
A	B	64QAM	25	30	-19.02
A	T	64QAM	25	30	-19.02

Channel Position B

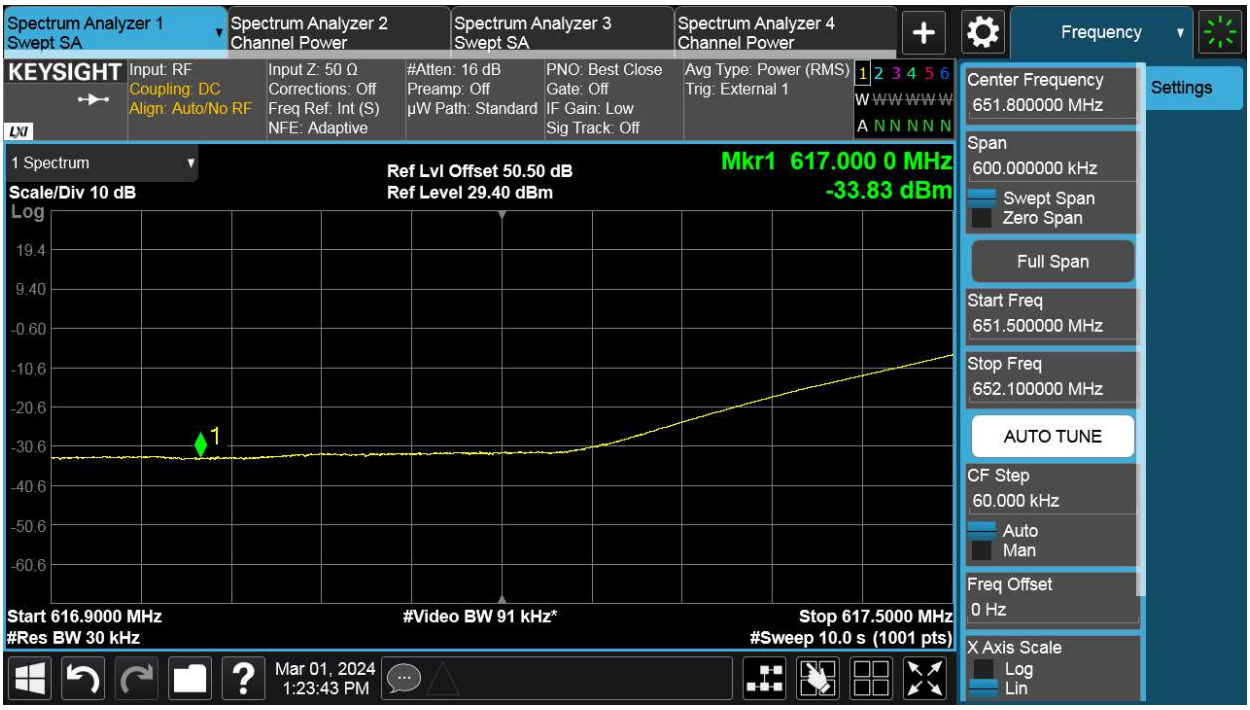


Channel Position T

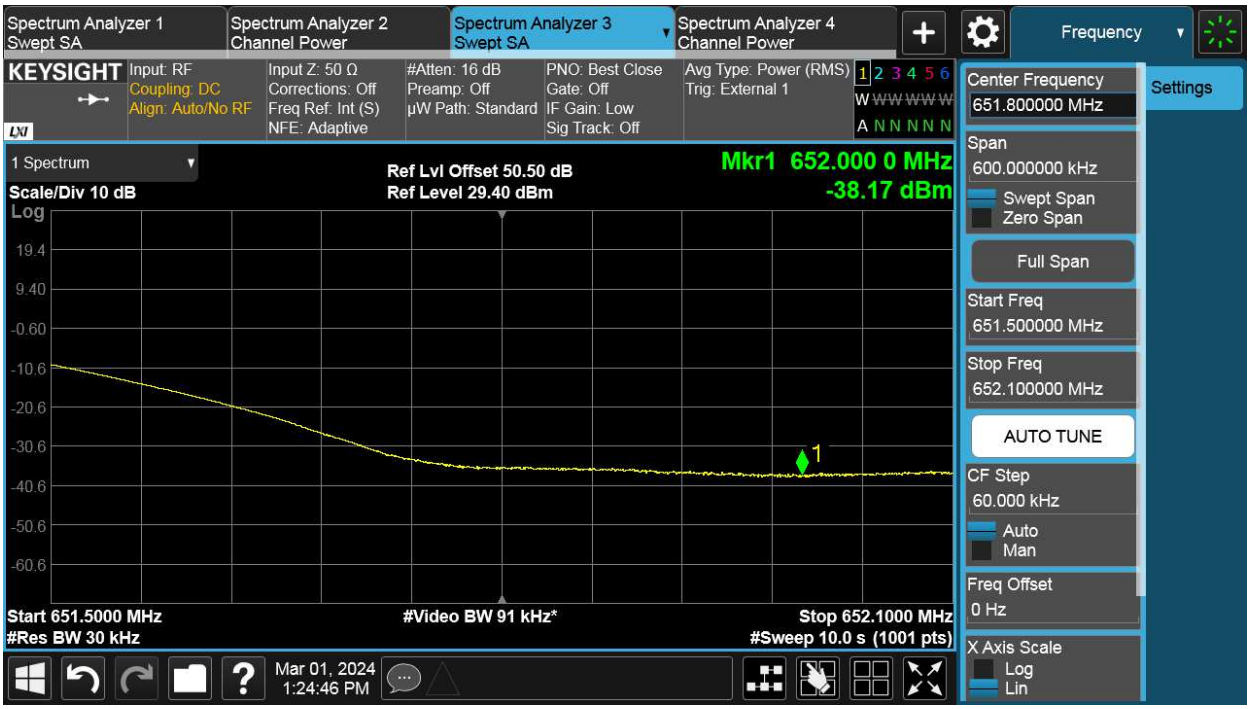


Antenna Port	Channel Position	Modulation	Carrier Bandwidth (MHz)	RBW (kHz)	Limit (dBm)
A	B	64QAM	30	30	-19.02
A	T	64QAM	30	30	-19.02

Channel Position B

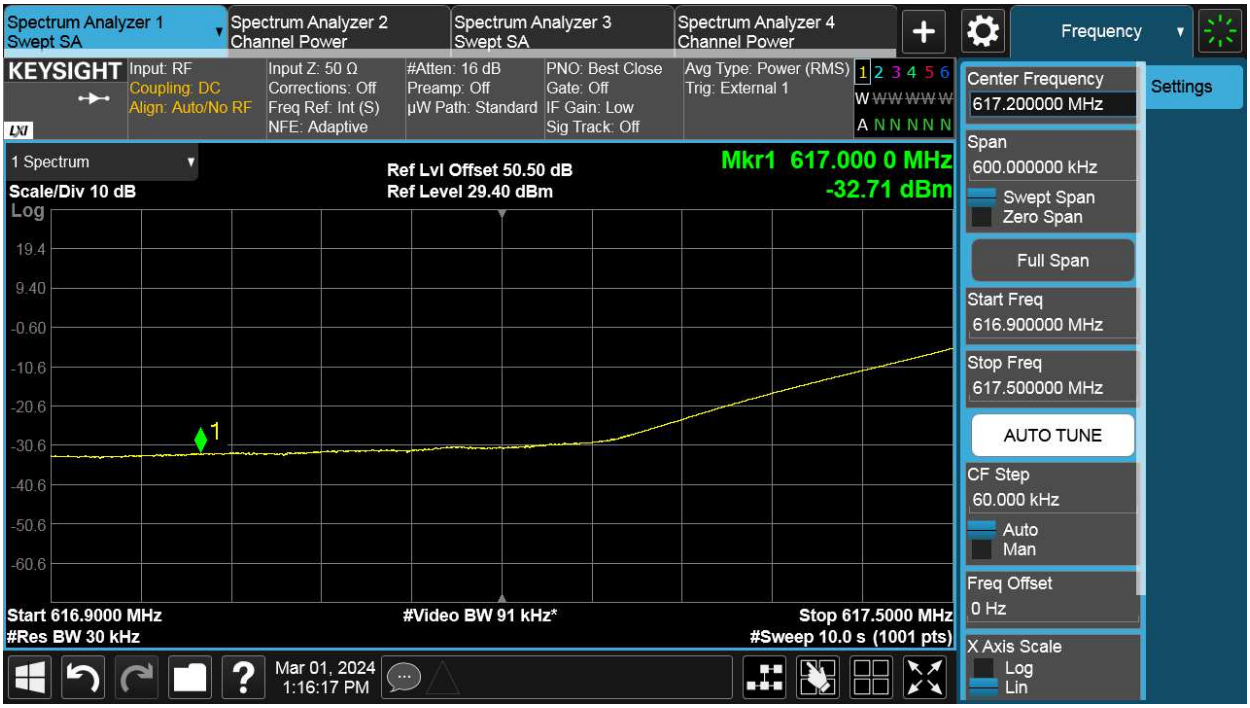


Channel Position T

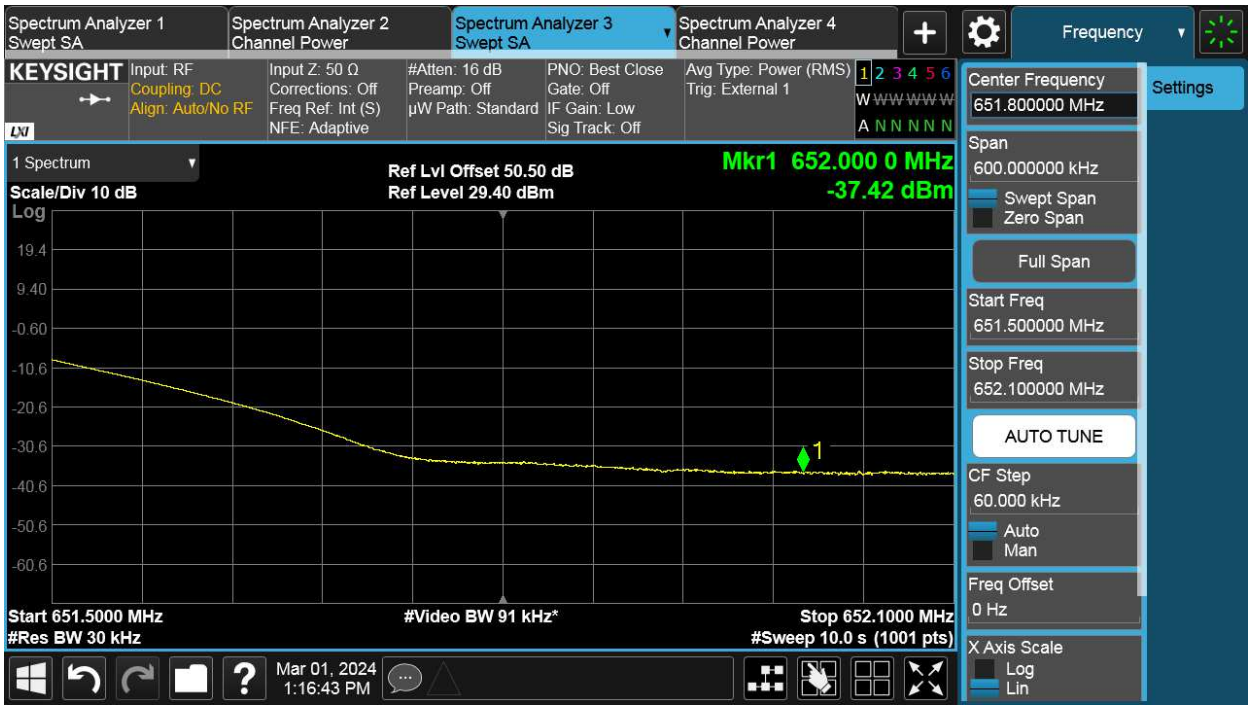


Antenna Port	Channel Position	Modulation	Carrier Bandwidth (MHz)	RBW (kHz)	Limit (dBm)
A	M	64QAM	35	30	-19.02

Channel Position M



TEST REPORT


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Swept SA
Spectrum Analyzer 4
Channel Power
Frequency
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
#Atten: 16 dB
Preamp: Off
µW Path: Standard
PNO: Best Close
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 50.50 dB
Ref Level 29.40 dBm
Mkr1 652.000 0 MHz
-37.42 dBm
Log
19.4
9.40
-0.60
-10.6
-20.6
-30.6
-40.6
-50.6
-60.6
Start 651.5000 MHz
#Res BW 30 kHz
#Video BW 91 kHz*
Stop 652.1000 MHz
#Sweep 10.0 s (1001 pts)
Mar 01, 2024
1:16:43 PM
Center Frequency
651.800000 MHz
Span
600.000000 kHz
Swept Span
Zero Span
Full Span
Start Freq
651.500000 MHz
Stop Freq
652.100000 MHz
AUTO TUNE
CF Step
60.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Settings

6 Conducted Unwanted Emission

Test result: **Pass**

6.1 Limit

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

6.2 Measurement Procedure

In accordance with FCC rules, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

The spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 7GHz. The resolution bandwidth of 100kHz was employed for frequency band 9kHz to 1GHz. The resolution bandwidth of 1MHz was employed for frequency band 1GHz to 7GHz. The spectrum analyzer detector was set to RMS.

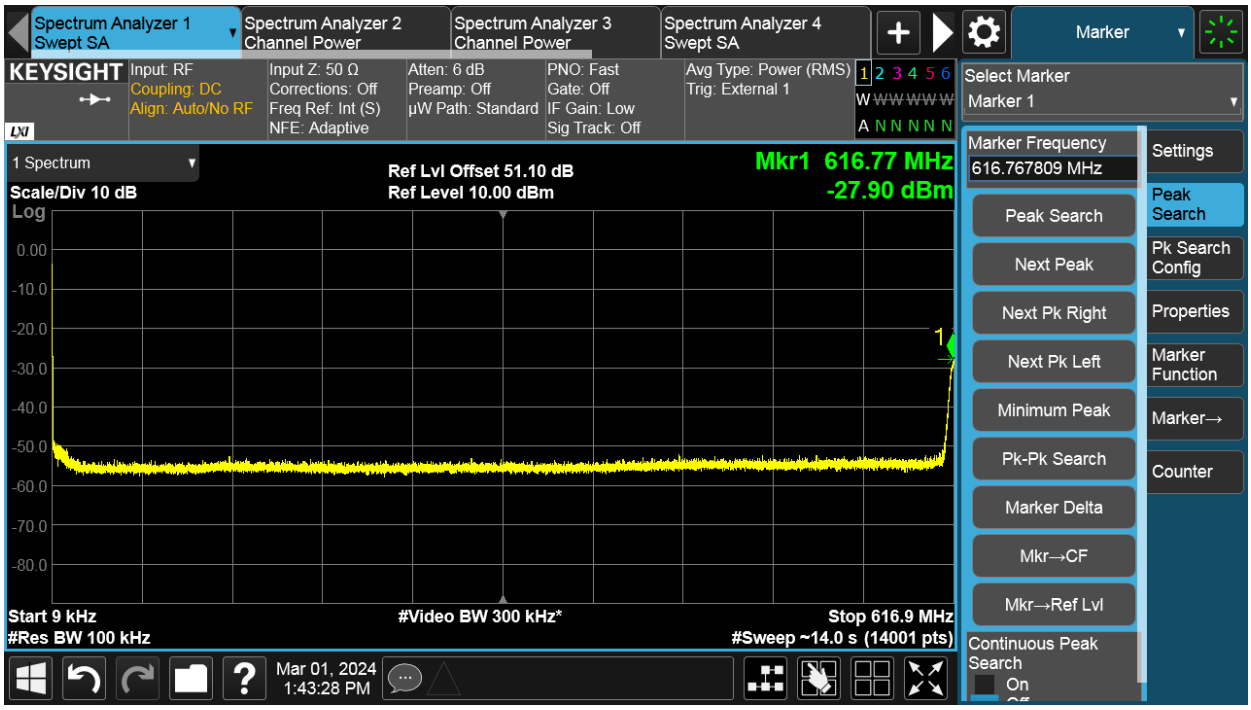
For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log(1/4)] by using the Measure and Add 10Log(N) dB technique according to KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports. Then the limit was adjusted to -19.02dBm.

6.3 Measurement result

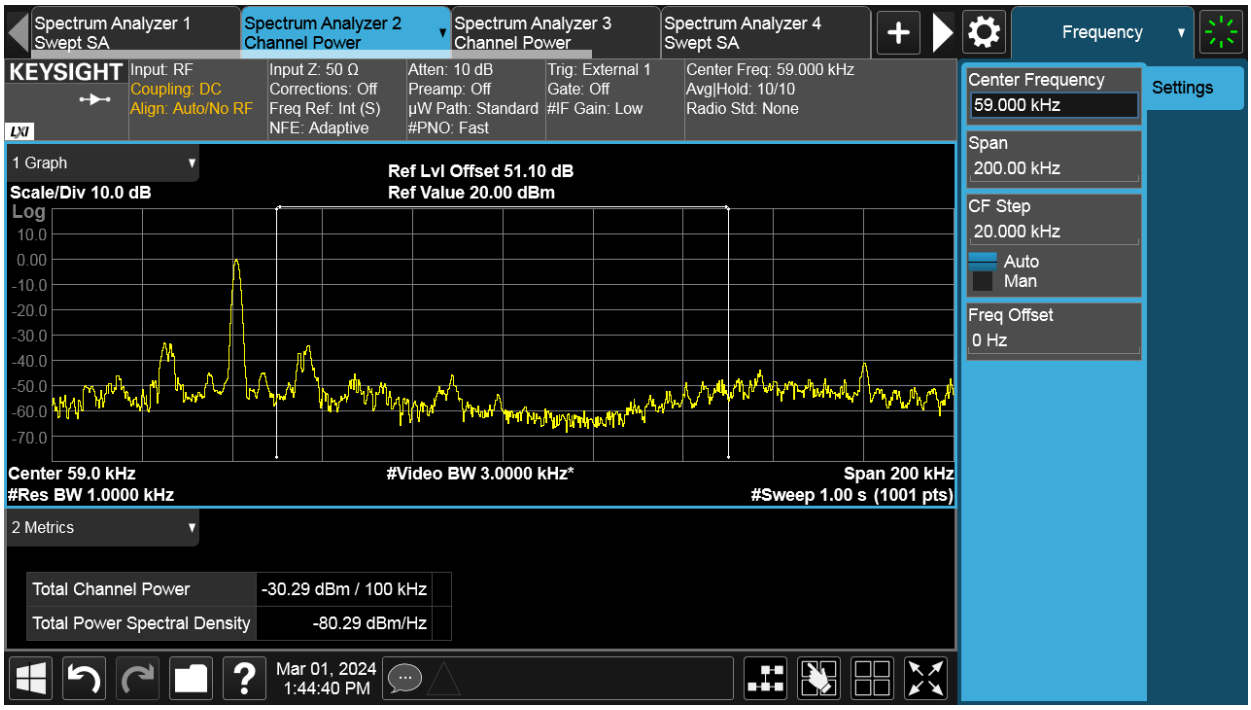
NR-1C

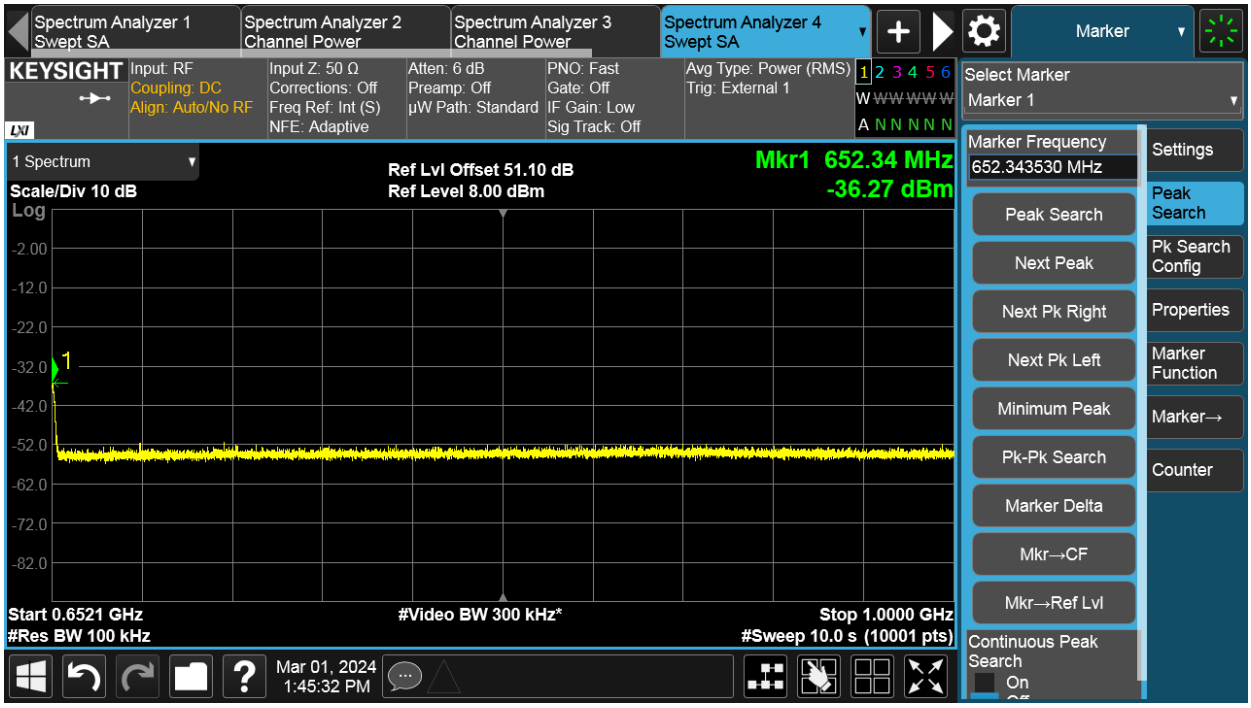
Antenna Port	Channel Position	NR Modulation	NR Channel BW (MHz)	Limit (dBm)
A	B	64QAM	25	-19.02
A	T	64QAM	25	-19.02

Channel Position B

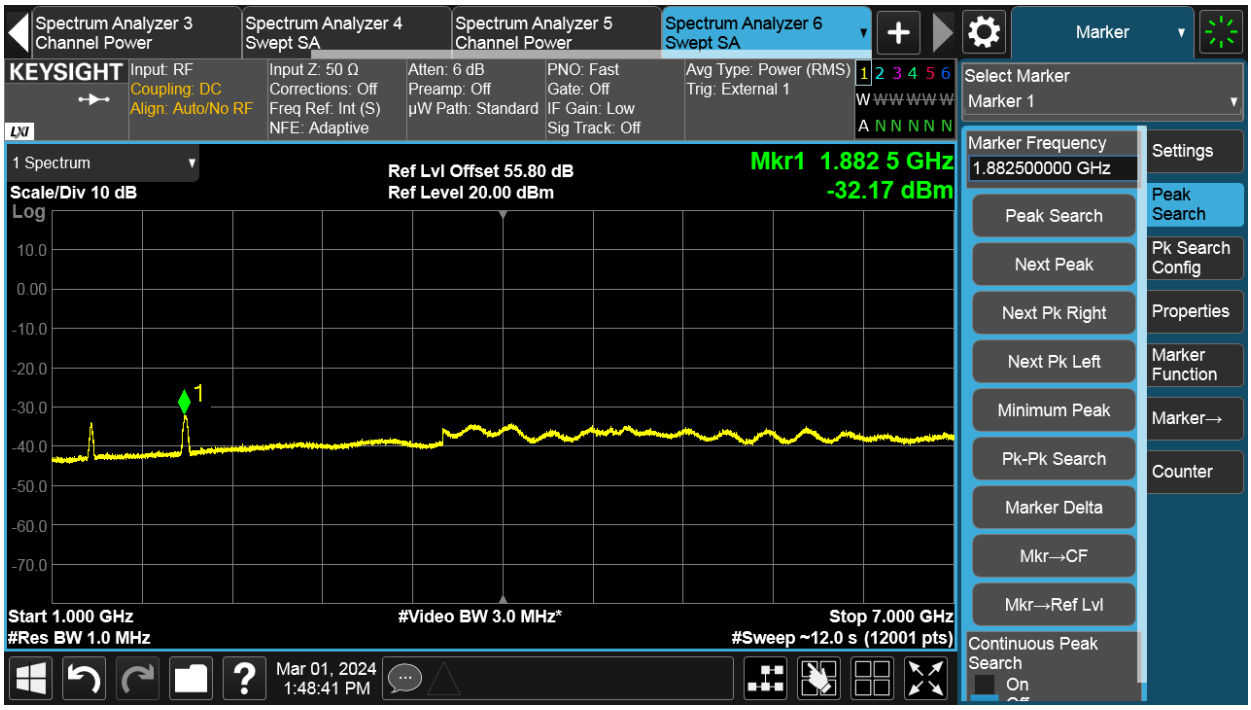


TEST REPORT

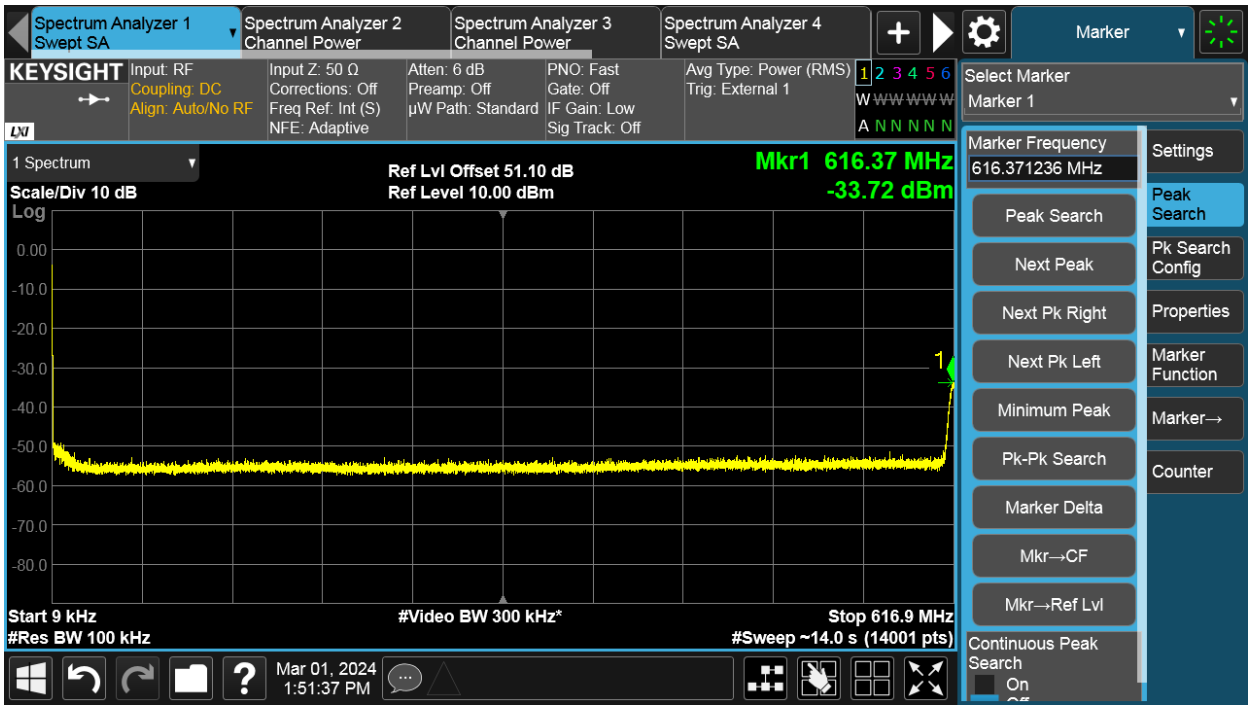

Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Frequency
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 10 dB
Preamp: Off
µW Path: Standard
#PNO: Fast
Trig: External 1
Gate: Off
#IF Gain: Low
Center Freq: 59.000 kHz
Avg|Hold: 10/10
Radio Std: None
1 Graph
Ref Lvl Offset 51.10 dB
Ref Value 20.00 dBm
Scale/Div 10.0 dB
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 59.0 kHz
#Res BW 1.0000 kHz
#Video BW 3.0000 kHz*
Span 200 kHz
#Sweep 1.00 s (1001 pts)
2 Metrics
Total Channel Power
-30.29 dBm / 100 kHz
Total Power Spectral Density
-80.29 dBm/Hz
Mar 01, 2024
1:44:40 PM
Center Frequency
59.000 kHz
Settings
Span
200.00 kHz
CF Step
20.000 kHz
Auto
Man
Freq Offset
0 Hz


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 6 dB
Preamp: Off
µW Path: Standard
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
1 Spectrum
Ref Lvl Offset 51.10 dB
Ref Level 8.00 dBm
Mkr1 652.34 MHz
-36.27 dBm
Scale/Div 10 dB
Log
-2.00
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
-82.0
Start 0.6521 GHz
#Res BW 100 kHz
#Video BW 300 kHz*
Stop 1.0000 GHz
#Sweep 10.0 s (10001 pts)
Mar 01, 2024
1:45:32 PM
Select Marker
Marker 1
Marker Frequency
652.343530 MHz
Settings
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Minimum Peak
Pk-Pk Search
Marker Delta
Mkr→CF
Mkr→Ref Lvl
Pk Search Config
Properties
Marker Function
Marker→
Counter
Continuous Peak Search
On

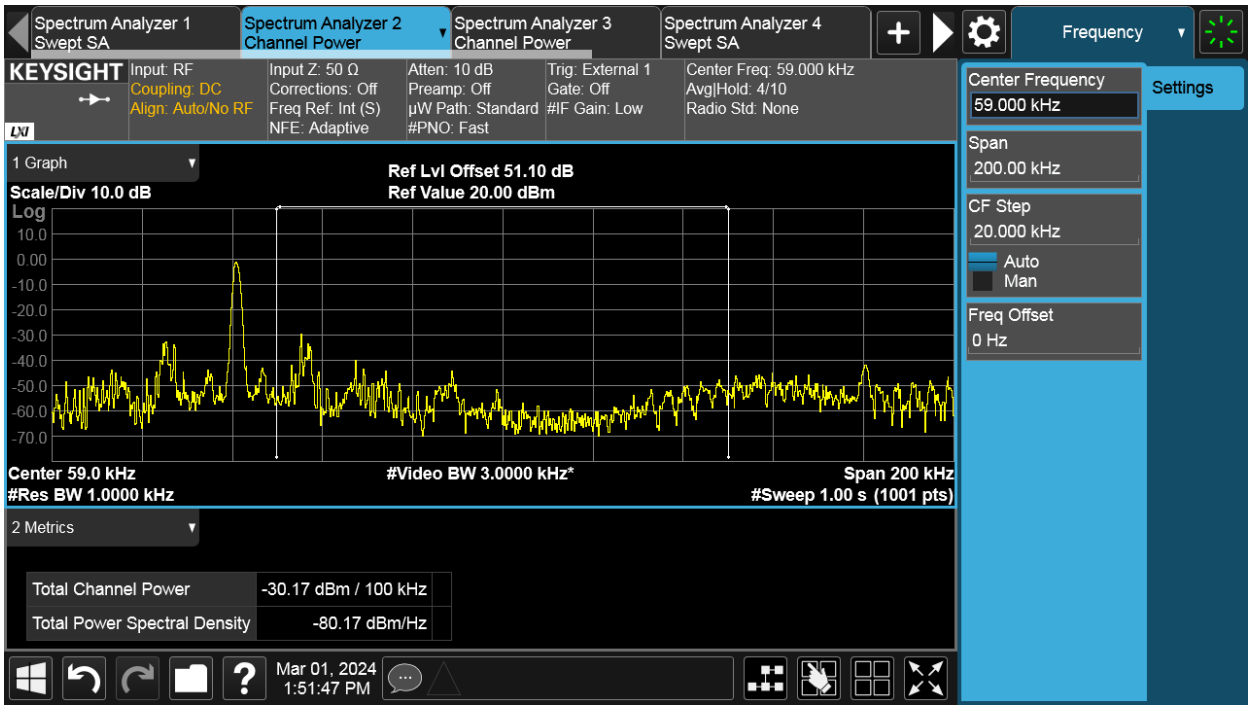
TEST REPORT

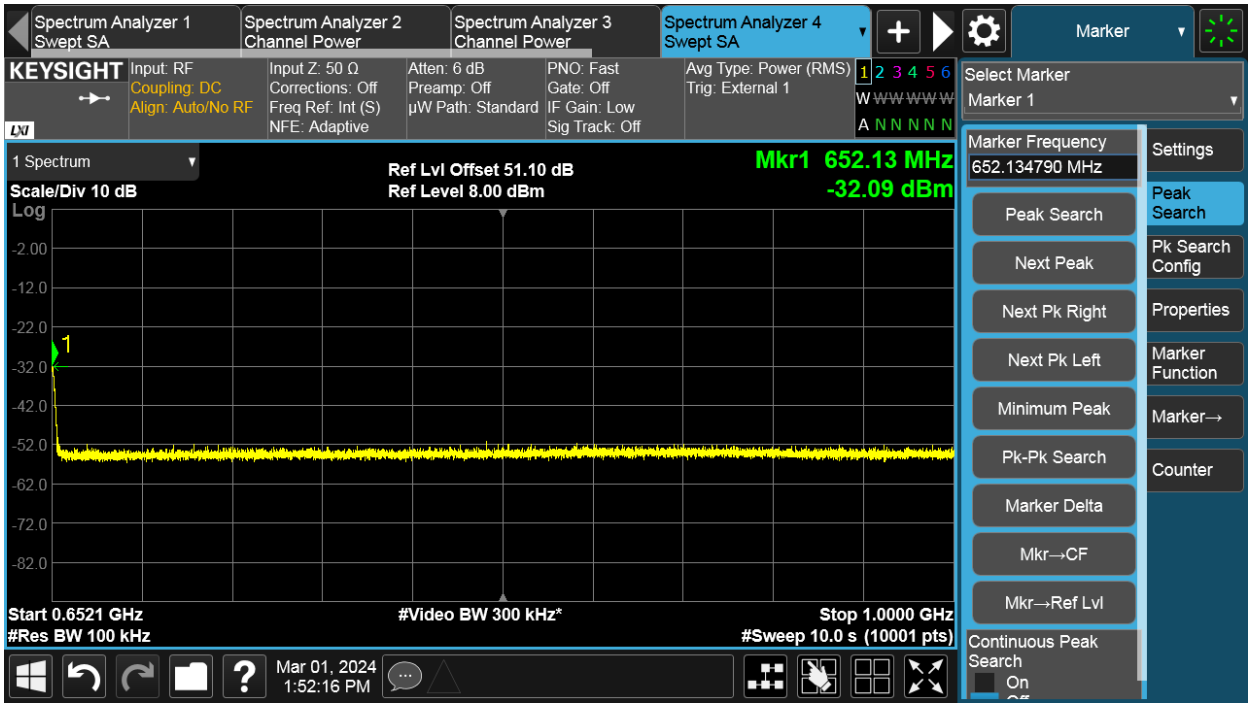


Channel Position T

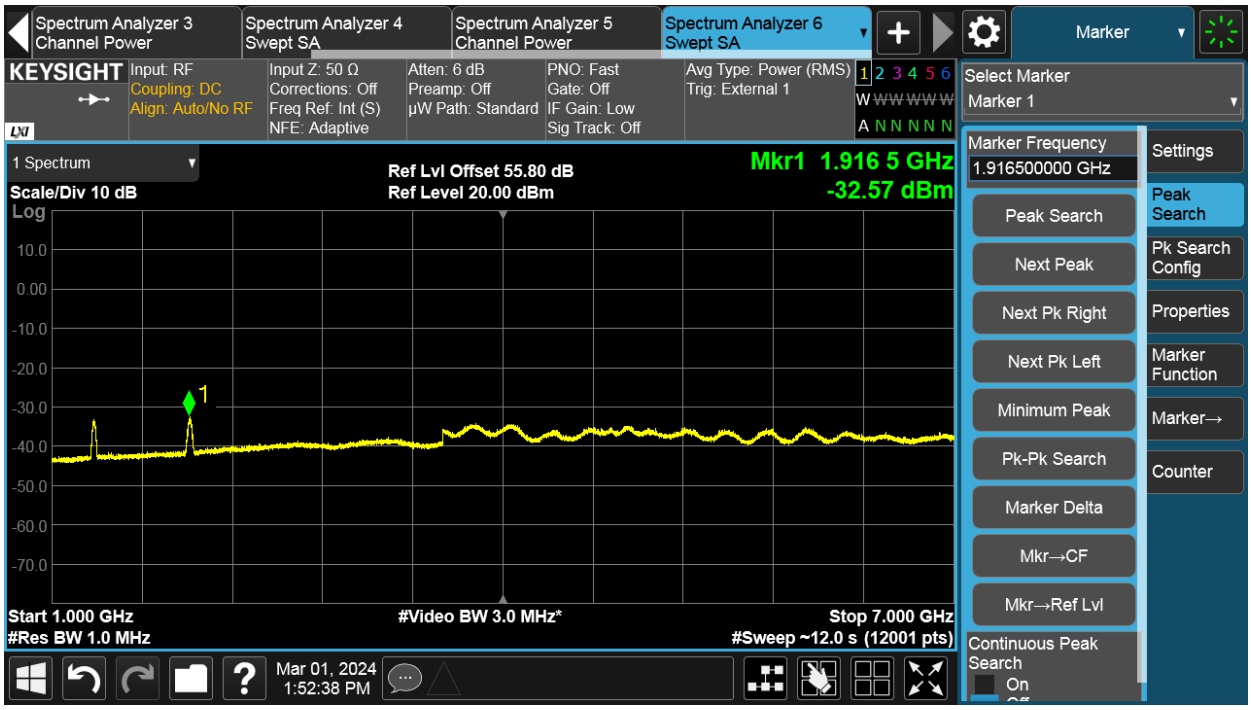


TEST REPORT


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Frequency
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 10 dB
Preamp: Off
µW Path: Standard
#PNO: Fast
Trig: External 1
Gate: Off
#IF Gain: Low
Center Freq: 59.000 kHz
Avg|Hold: 4/10
Radio Std: None
1 Graph
Ref Lvl Offset 51.10 dB
Ref Value 20.00 dBm
Scale/Div 10.0 dB
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 59.0 kHz
#Res BW 1.0000 kHz
#Video BW 3.0000 kHz*
Span 200 kHz
#Sweep 1.00 s (1001 pts)
2 Metrics
Total Channel Power
-30.17 dBm / 100 kHz
Total Power Spectral Density
-80.17 dBm/Hz
Mar 01, 2024
1:51:47 PM
Center Frequency
59.000 kHz
Span
200.00 kHz
CF Step
20.000 kHz
Auto
Man
Freq Offset
0 Hz
Settings

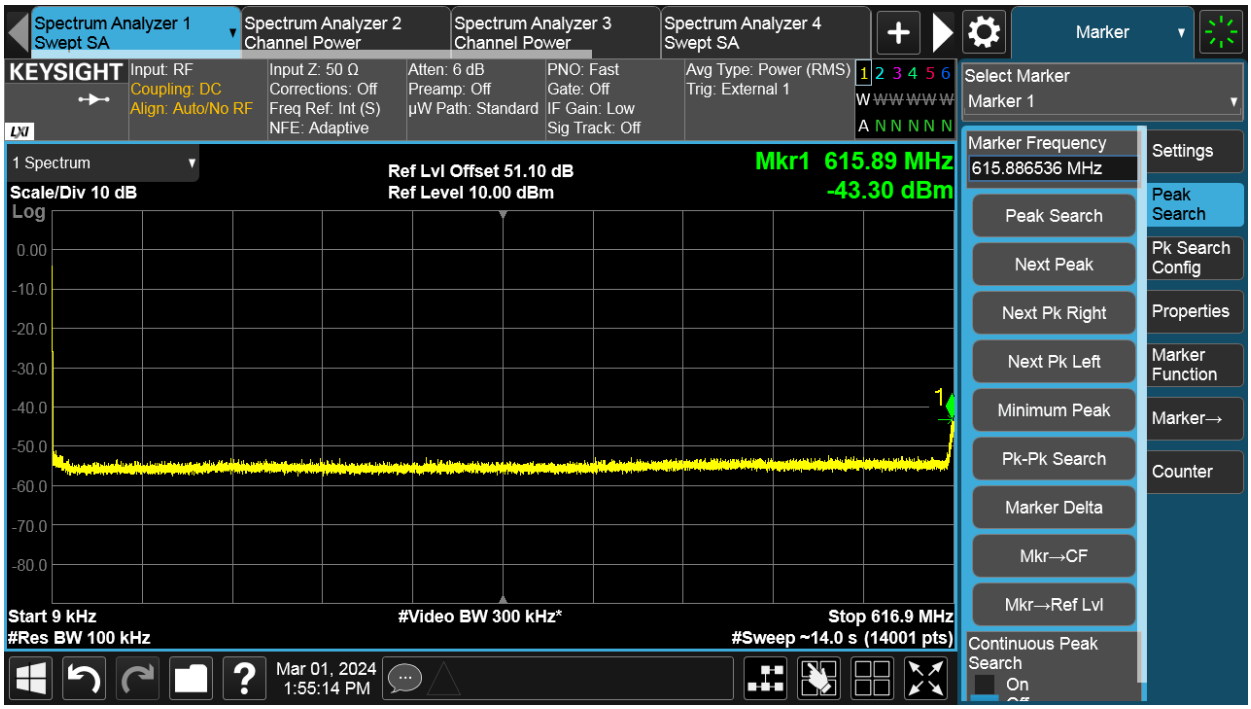

Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 6 dB
Preamp: Off
µW Path: Standard
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
1 Spectrum
Ref Lvl Offset 51.10 dB
Ref Level 8.00 dBm
Mkr1 652.13 MHz
-32.09 dBm
Scale/Div 10 dB
Log
-2.00
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
-82.0
Start 0.6521 GHz
#Res BW 100 kHz
#Video BW 300 kHz*
Stop 1.0000 GHz
#Sweep 10.0 s (10001 pts)
Mar 01, 2024
1:52:16 PM
Select Marker
Marker 1
Marker Frequency
652.134790 MHz
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Minimum Peak
Pk-Pk Search
Marker Delta
Mkr→CF
Mkr→Ref Lvl
Continuous Peak Search
On
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter

TEST REPORT

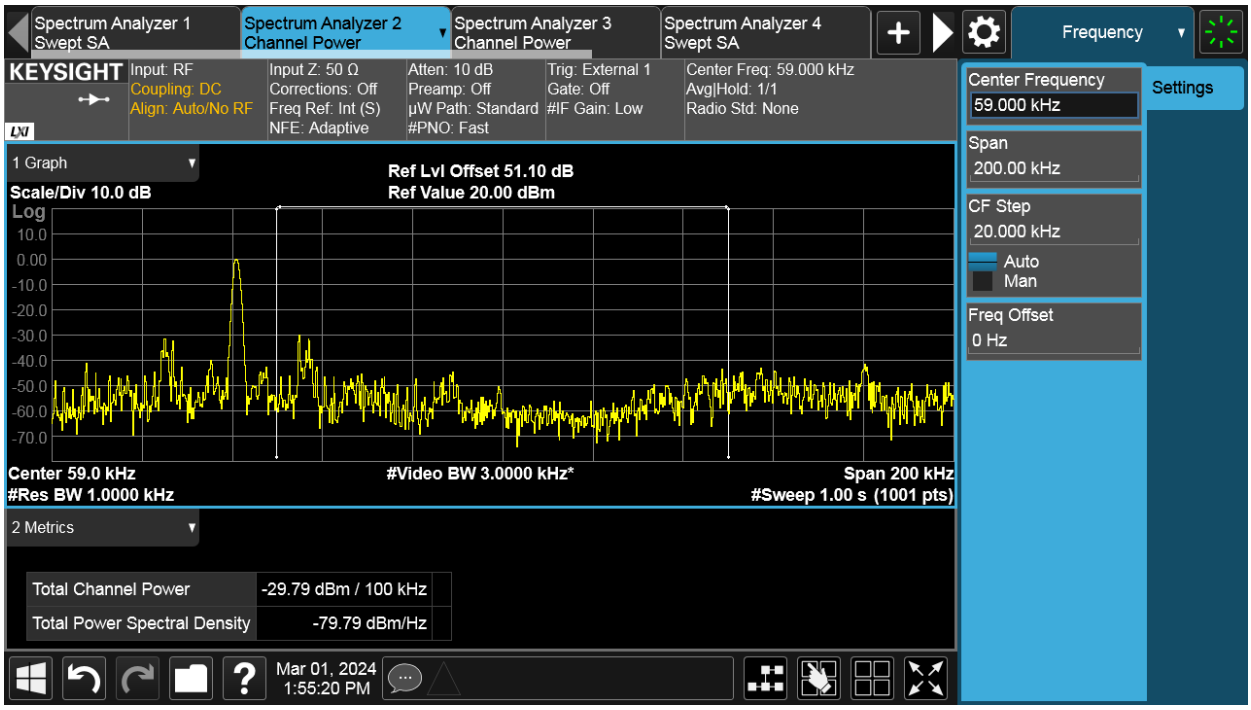


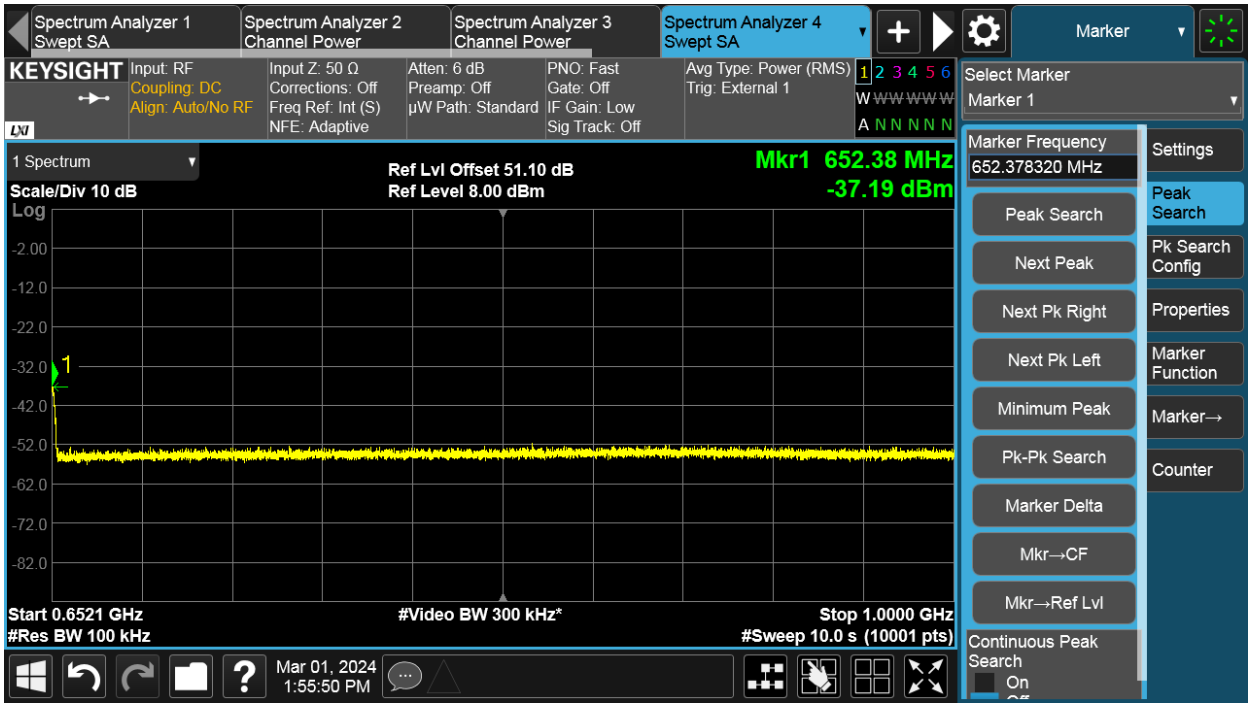
Antenna Port	Channel Position	NR Modulation	NR Channel Bandwidth (MHz)	Limit (dBm)
A	B	64QAM	30	-19.02
A	T	64QAM	30	-19.02

Channel Position B

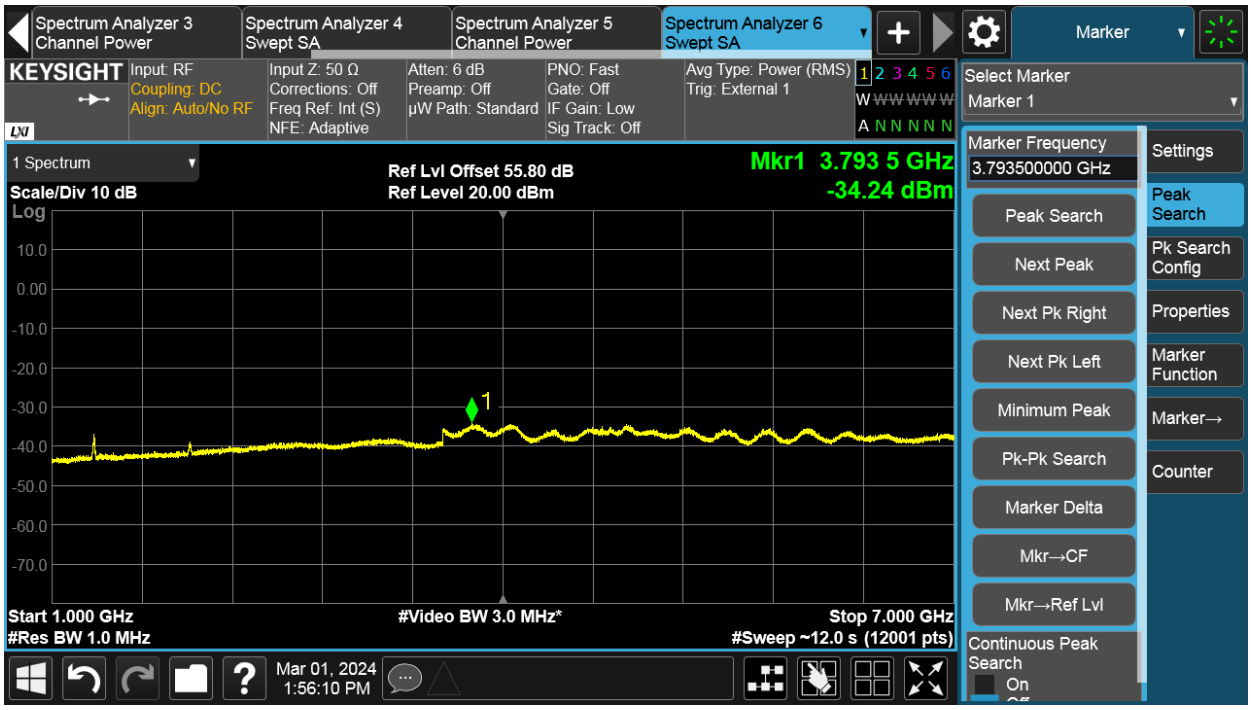


TEST REPORT

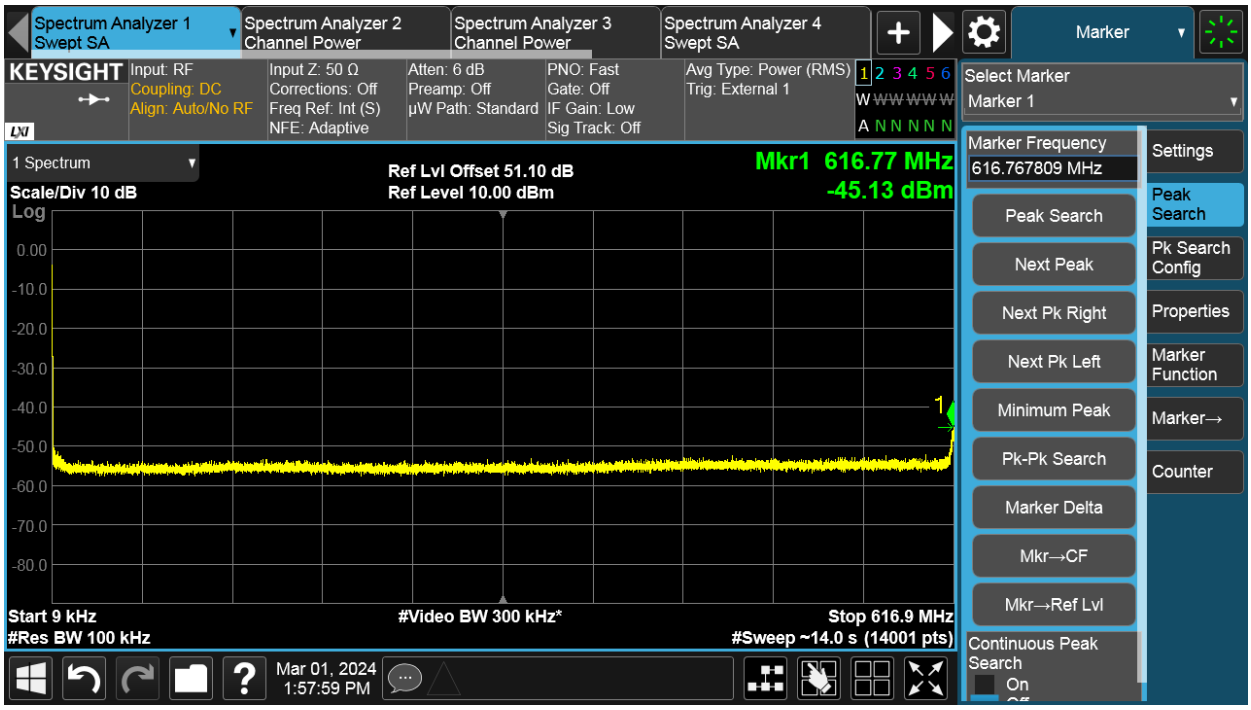

Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Frequency
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 10 dB
Preamp: Off
µW Path: Standard
#PNO: Fast
Trig: External 1
Gate: Off
#IF Gain: Low
Center Freq: 59.000 kHz
Avg|Hold: 1/1
Radio Std: None
1 Graph
Ref Lvl Offset 51.10 dB
Scale/Div 10.0 dB
Ref Value 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 59.0 kHz
#Res BW 1.0000 kHz
#Video BW 3.0000 kHz*
Span 200 kHz
#Sweep 1.00 s (1001 pts)
2 Metrics
Total Channel Power
-29.79 dBm / 100 kHz
Total Power Spectral Density
-79.79 dBm/Hz
Center Frequency
59.000 kHz
Span
200.00 kHz
CF Step
20.000 kHz
Auto
Man
Freq Offset
0 Hz
Settings
Mar 01, 2024
1:55:20 PM


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 6 dB
Preamp: Off
µW Path: Standard
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
1 Spectrum
Ref Lvl Offset 51.10 dB
Ref Level 8.00 dBm
Mkr1 652.38 MHz
-37.19 dBm
Scale/Div 10 dB
Log
-2.00
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
-82.0
Start 0.6521 GHz
#Res BW 100 kHz
#Video BW 300 kHz*
Stop 1.0000 GHz
#Sweep 10.0 s (10001 pts)
Select Marker
Marker 1
Marker Frequency
652.378320 MHz
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Minimum Peak
Pk-Pk Search
Marker Delta
Mkr→CF
Mkr→Ref Lvl
Continuous Peak Search
On
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter
Mar 01, 2024
1:55:50 PM

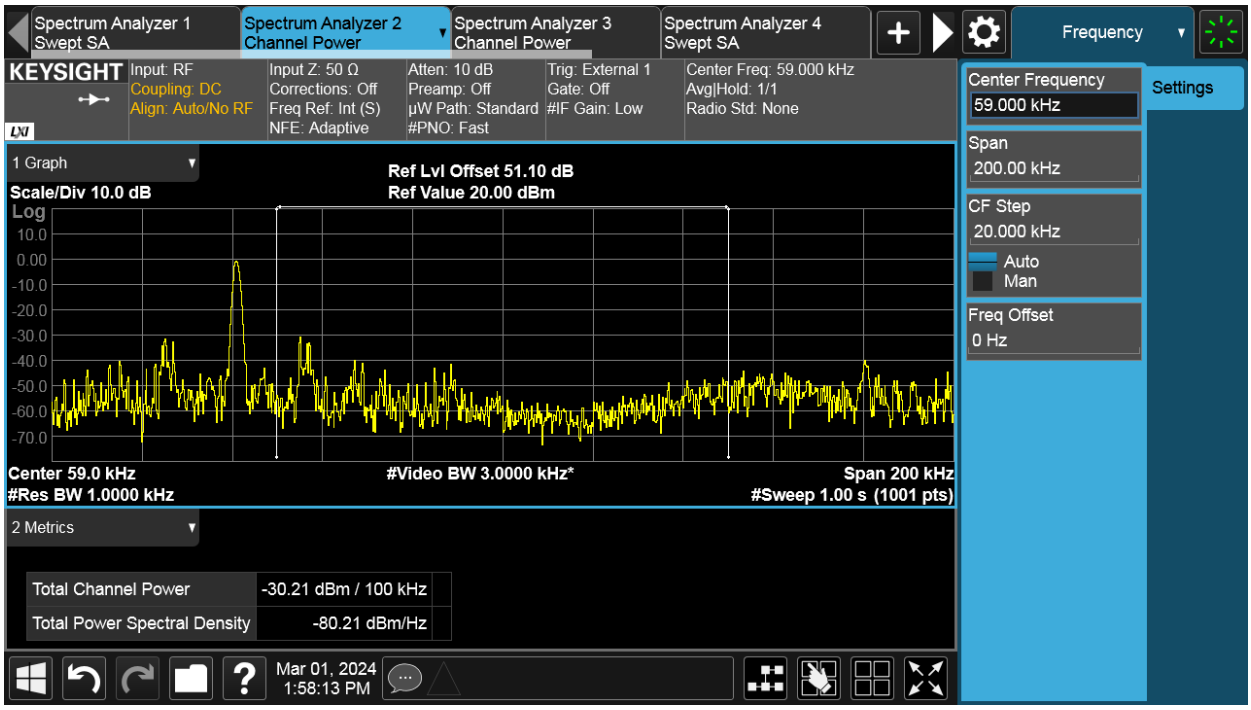
TEST REPORT

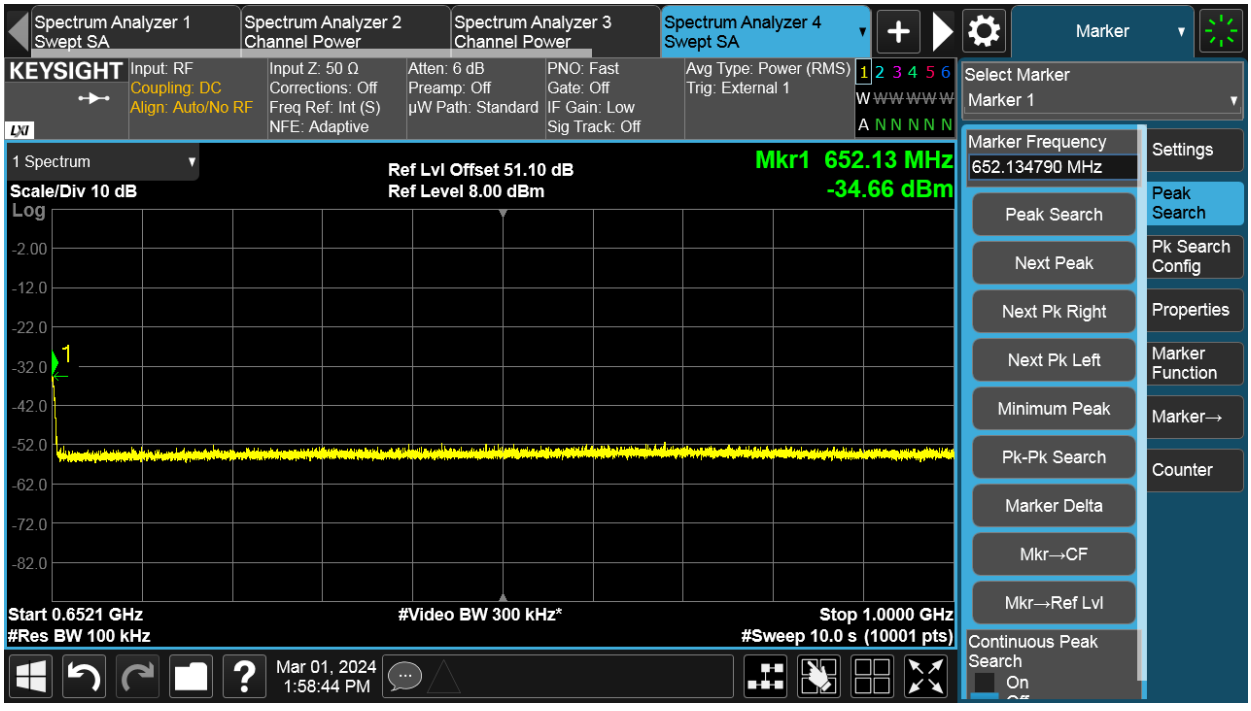


Channel Position T

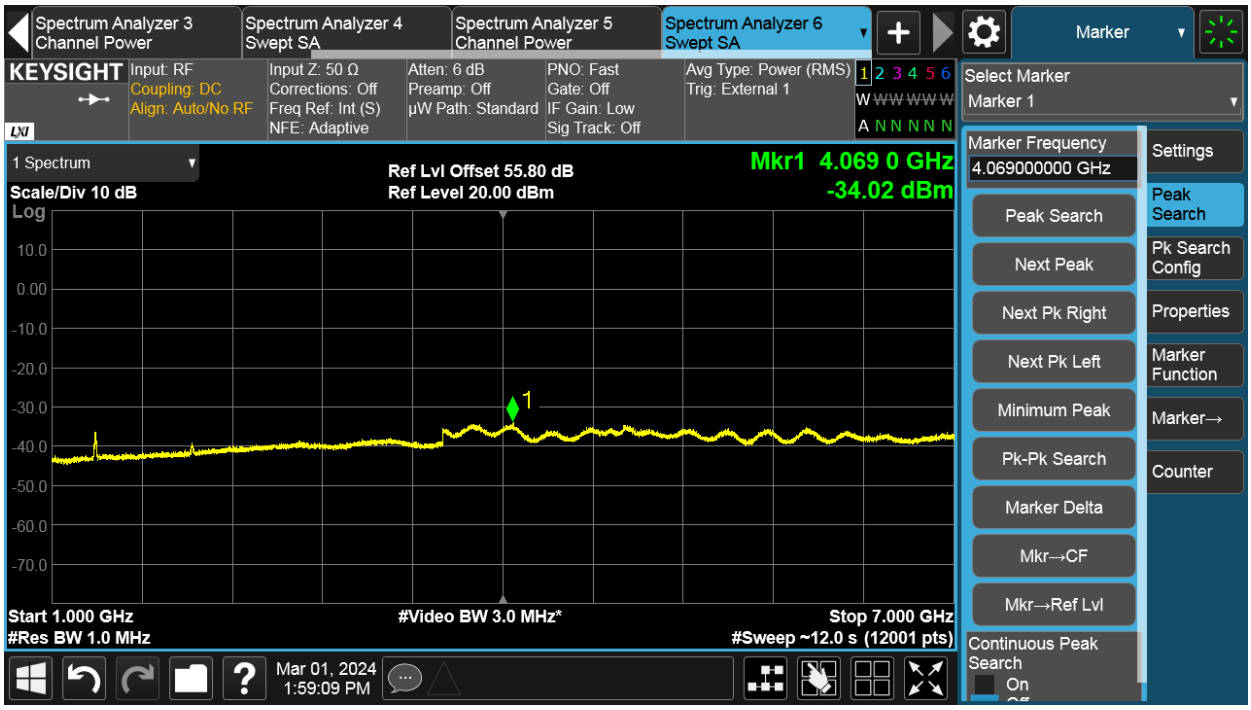


TEST REPORT


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Frequency
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 10 dB
Preamp: Off
µW Path: Standard
#PNO: Fast
Trig: External 1
Gate: Off
#IF Gain: Low
Center Freq: 59.000 kHz
Avg|Hold: 1/1
Radio Std: None
1 Graph
Ref Lvl Offset 51.10 dB
Scale/Div 10.0 dB
Ref Value 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 59.0 kHz
#Res BW 1.0000 kHz
#Video BW 3.0000 kHz*
Span 200 kHz
#Sweep 1.00 s (1001 pts)
2 Metrics
Total Channel Power
-30.21 dBm / 100 kHz
Total Power Spectral Density
-80.21 dBm/Hz
Mar 01, 2024
1:58:13 PM
Center Frequency
59.000 kHz
Span
200.00 kHz
CF Step
20.000 kHz
Auto
Man
Freq Offset
0 Hz
Settings

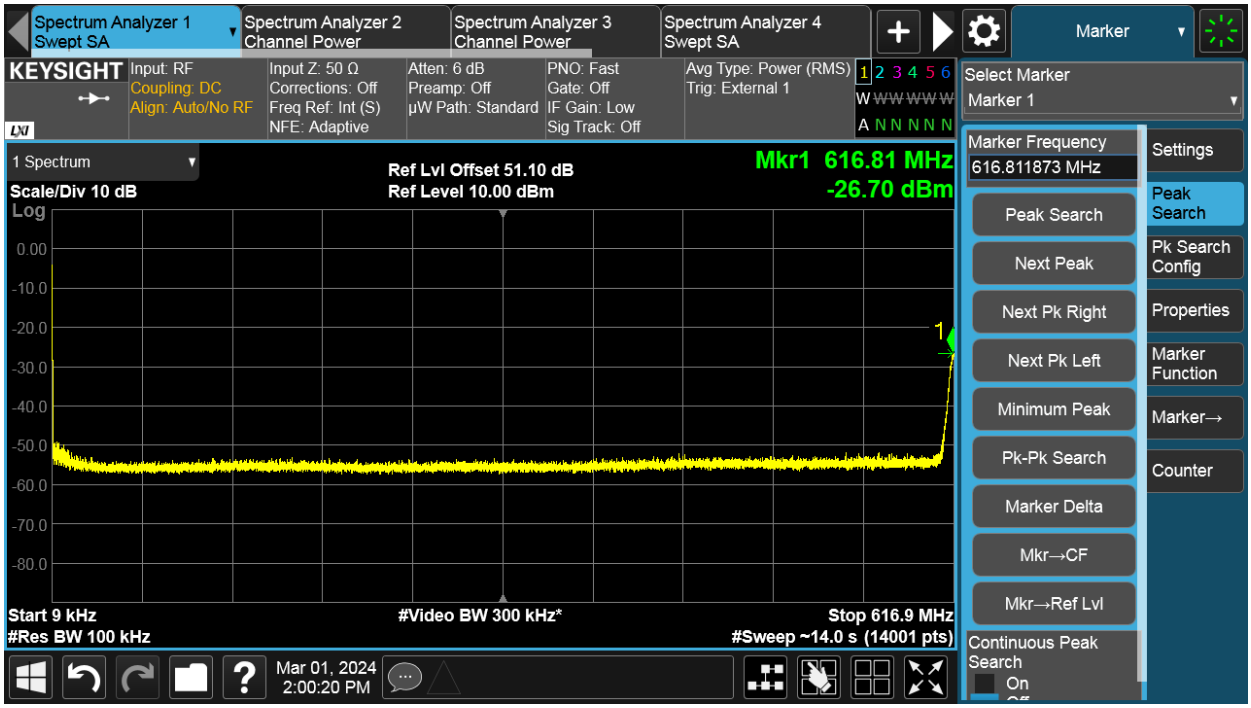

Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 6 dB
Preamp: Off
µW Path: Standard
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
1 Spectrum
Ref Lvl Offset 51.10 dB
Ref Level 8.00 dBm
Mkr1 652.13 MHz
-34.66 dBm
Scale/Div 10 dB
Log
-2.00
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
-82.0
Start 0.6521 GHz
#Res BW 100 kHz
#Video BW 300 kHz*
Stop 1.0000 GHz
#Sweep 10.0 s (10001 pts)
Mar 01, 2024
1:58:44 PM
Select Marker
Marker 1
Marker Frequency
652.134790 MHz
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Minimum Peak
Pk-Pk Search
Marker Delta
Mkr→CF
Mkr→Ref Lvl
Continuous Peak Search
On
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter

TEST REPORT

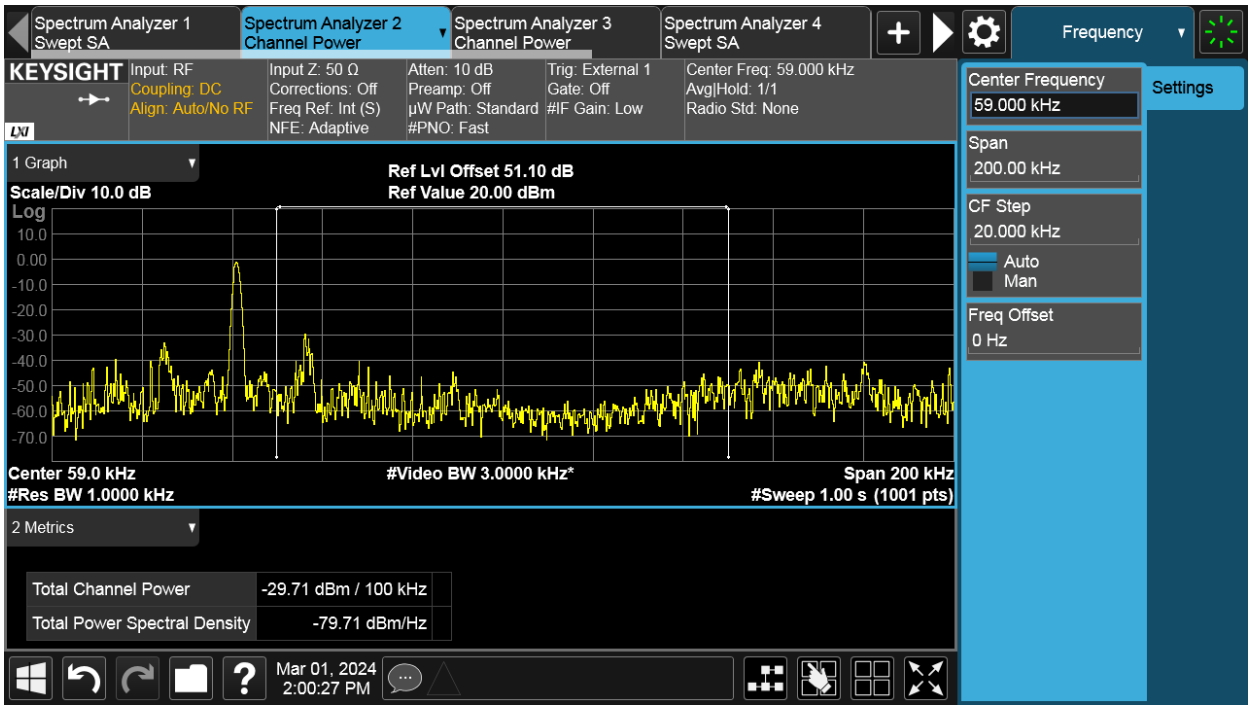


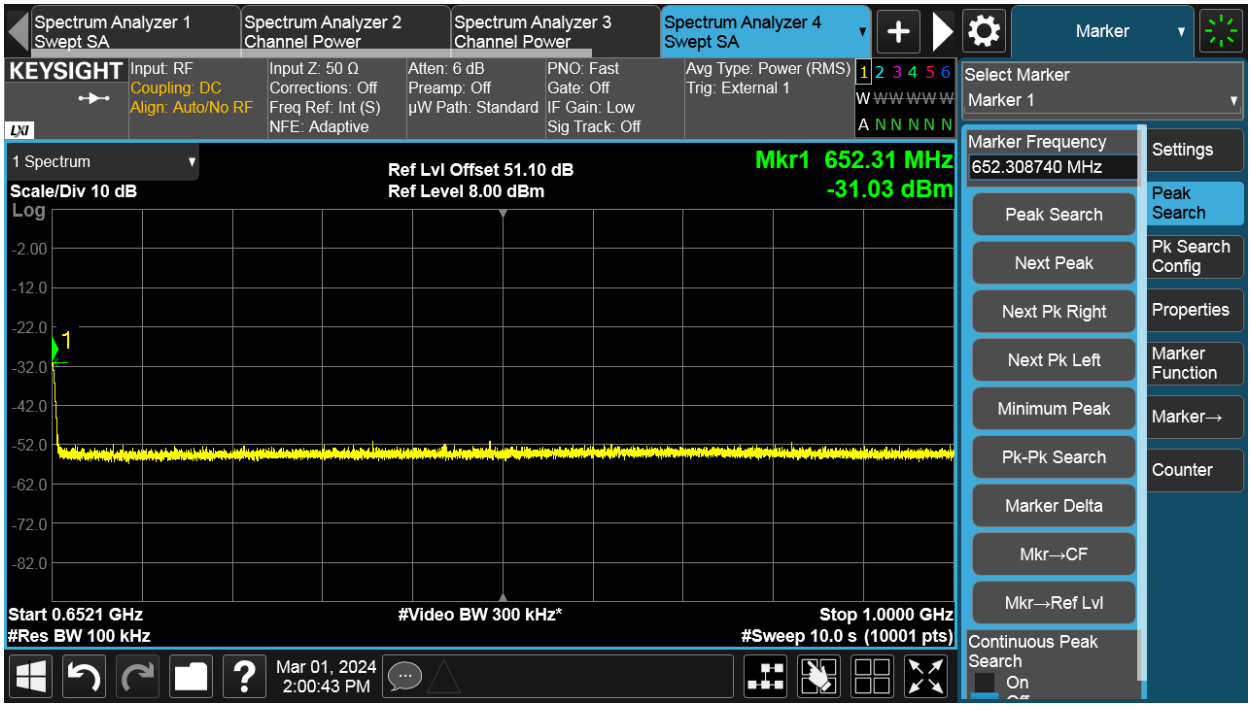
Antenna Port	Channel Position	NR Modulation	NR Channel Bandwidth (MHz)	Limit (dBm)
A	M	64QAM	35	-19.02

Channel Position M

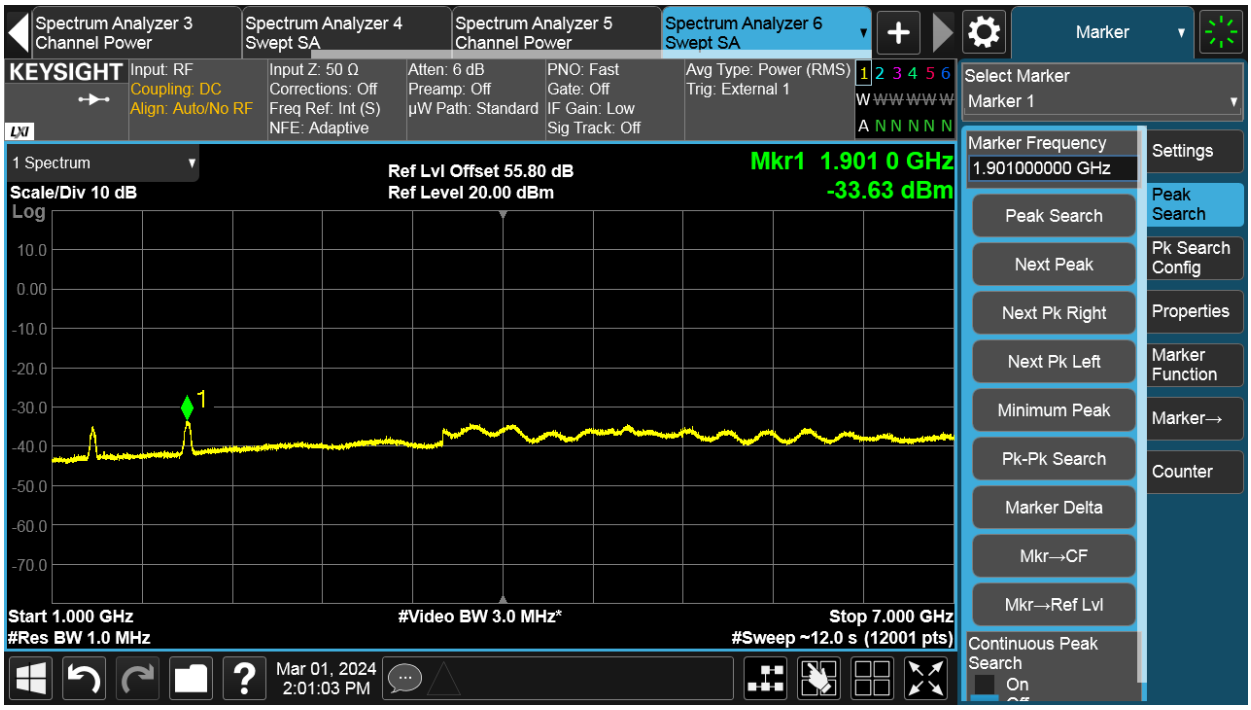


TEST REPORT


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Frequency
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 10 dB
Preamp: Off
µW Path: Standard
#PNO: Fast
Trig: External 1
Gate: Off
#IF Gain: Low
Center Freq: 59.000 kHz
Avg|Hold: 1/1
Radio Std: None
1 Graph
Ref Lvl Offset 51.10 dB
Scale/Div 10.0 dB
Ref Value 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 59.0 kHz
#Res BW 1.0000 kHz
#Video BW 3.0000 kHz*
Span 200 kHz
#Sweep 1.00 s (1001 pts)
2 Metrics
Total Channel Power
-29.71 dBm / 100 kHz
Total Power Spectral Density
-79.71 dBm/Hz
Mar 01, 2024
2:00:27 PM
Center Frequency
59.000 kHz
Settings
Span
200.00 kHz
CF Step
20.000 kHz
Auto
Man
Freq Offset
0 Hz


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Channel Power
Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 6 dB
Preamp: Off
µW Path: Standard
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
1 Spectrum
Ref Lvl Offset 51.10 dB
Ref Level 8.00 dBm
Mkr1 652.31 MHz
-31.03 dBm
Scale/Div 10 dB
Log
-2.00
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
-82.0
Start 0.6521 GHz
#Res BW 100 kHz
#Video BW 300 kHz*
Stop 1.0000 GHz
#Sweep 10.0 s (10001 pts)
Mar 01, 2024
2:00:43 PM
Select Marker
Marker 1
Marker Frequency
652.308740 MHz
Settings
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Minimum Peak
Pk-Pk Search
Marker Delta
Mkr→CF
Mkr→Ref Lvl
Pk Search Config
Properties
Marker Function
Marker→
Counter
Continuous Peak Search
On

TEST REPORT


Spectrum Analyzer 3
Channel Power
Spectrum Analyzer 4
Swept SA
Spectrum Analyzer 5
Channel Power
Spectrum Analyzer 6
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Adaptive
Atten: 6 dB
Preamp: Off
µW Path: Standard
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Power (RMS)
Trig: External 1
Select Marker
Marker 1
1 Spectrum
Ref Lvl Offset 55.80 dB
Ref Level 20.00 dBm
Mkr1 1.901 0 GHz
-33.63 dBm
Scale/Div 10 dB
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 1.000 GHz
#Res BW 1.0 MHz
#Video BW 3.0 MHz*
Stop 7.000 GHz
#Sweep ~12.0 s (12001 pts)
Marker Frequency
1.901000000 GHz
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Minimum Peak
Pk-Pk Search
Marker Delta
Mkr→CF
Mkr→Ref Lvl
Continuous Peak Search
On
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter
Mar 01, 2024
2:01:03 PM

7 Frequency Stability

Test result: **Tested**

7.1 Limit

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

7.2 Measurement Procedure

Temperature Variation
The EUT was tested over the temperature range -40°C to +55°C in 10°C steps with -48 VDC Power Supply. At each temperature step, the Base Station was configured to transmit at maximum power on the middle channel of the operating band.

Voltage Variation
The EUT was tested at the supplied voltages varied from 85 to 115 percent of the nominal values of -48 VDC. At +20°C, the Base Station was configured to transmit at maximum power on the middle channel of the frequency block.

7.3 Measurement result

Frequency Error – Temperature Variation

NR-1C, Channel Bandwidth: 35MHz

Antenna Port	Modulation	Temperature (°C)	Frequency Stability (Hz)		
			Channel Position B	Channel Position M	Channel Position T
A	64QAM	-40	-	-0.71	-
		-30	-	-0.92	-
		-20	-	-0.77	-
		-10	-	-0.75	-
		0	-	-0.81	-
		10	-	-0.72	-
		20	-	-0.76	-
		30	-	-0.76	-
		40	-	-0.72	-
		50	-	-0.82	-
		55	-	-0.81	-

Frequency Error – Voltage Variation

NR-1C, Channel Bandwidth: 35MHz

Antenna Port	Modulation	Temperature (°C)	Supply Voltage (V)	Frequency Stability (Hz)		
				Channel Position B	Channel Position M	Channel Position T
A	64QAM	20	-40.8	-	-0.86	-
			-48.0	-	-0.76	-
			-55.2	-	-0.72	-

********** END **********