

FCC Test Report (Part 96 – NR B48/B78)

Report No.: RFBEIH-WTW-P23120633-1

FCC ID: P27SCO5165P

Test Model: SCO5165P

Received Date: Feb. 20, 2024

Test Date: Apr. 08 ~ Apr. 15, 2024

Issued Date: May 14, 2024

Applicant: Sercomm Corp.

Address: 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location (1): No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

Test Location (2): No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

FCC Registration / 788550 / TW0003

Designation Number: 281270 / TW0032



This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Test Mode Applicability and Tested Channel Detail	9
3.3 Description of Support Units	12
3.3.1 Configuration of System under Test	12
3.4 General Description of Applied Standards and References.....	13
4 Test Types and Results	14
4.1 Maximum Output Power Measurement	14
4.1.1 Limits of Maximum Output Power Measurement	14
4.1.2 Test Setup.....	14
4.1.3 Test Instruments	14
4.1.4 Test Procedures.....	15
4.1.5 Deviation from Test Standard	15
4.1.6 EUT Operating Conditions.....	15
4.1.7 Test Results	16
4.2 Maximum Power Spectral Density Measurement	20
4.2.1 Limits of Maximum Power Spectral Density Measurement	20
4.2.2 Test Setup.....	20
4.2.3 Test Instruments	20
4.2.4 Test Procedure	20
4.2.5 Deviation from Test Standard	20
4.2.6 EUT Operating Condition	20
4.2.7 Test Results	21
4.3 Modulation Characteristics Measurement.....	23
4.3.1 Limits of Modulation Characteristics.....	23
4.3.2 Test Setup.....	23
4.3.3 Test Instruments	23
4.3.4 Deviation from Test Standard	23
4.3.5 EUT Operating Conditions.....	23
4.3.6 Test Results	24
4.4 Frequency Stability Measurement.....	25
4.4.1 Limits of Frequency Stability Measurement.....	25
4.4.2 Test Setup.....	25
4.4.3 Test Instruments	25
4.4.4 Test Procedure	25
4.4.5 Test Results	26
4.5 Emission Bandwidth Measurement.....	36
4.5.1 Limits of Emission Bandwidth Measurement.....	36
4.5.2 Test Setup.....	36
4.5.3 Test Instruments	36
4.5.4 Test Procedure	36
4.5.5 Deviation from Test Standard	36
4.5.6 EUT Operating Conditions.....	36
4.5.7 Test Result.....	37
4.6 Peak to Average Ratio Measurement	43
4.6.1 Limits of Peak to Average Ratio Measurement	43
4.6.2 Test Setup.....	43

4.6.3	Test Instruments	43
4.6.4	Test Procedures.....	43
4.6.5	Deviation from Test Standard	43
4.6.6	EUT Operating Conditions.....	43
4.6.7	Test Results	44
4.7	Conducted Spurious Emissions	47
4.7.1	Limits of Conducted Spurious Emissions Measurement	47
4.7.2	Test Setup.....	47
4.7.3	Test Instruments	47
4.7.4	Test Procedure	47
4.7.5	Deviation from Test Standard	47
4.7.6	EUT Operating Conditions.....	47
4.7.7	Test Results	48
4.8	Radiated Emission Measurement	88
4.8.1	Limits of Radiated Emission Measurement	88
4.8.2	Test Set Up	88
4.8.3	Test Instruments	89
4.8.4	Test Procedures.....	90
4.8.5	Deviation from Test Standard	90
4.8.6	EUT Operating Conditions.....	90
4.8.7	Test Results	91
5	Pictures of Test Arrangements.....	125
	Appendix – Information of the Testing Laboratories	126

Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P23120633-1	Original release	May 14, 2024

1 Certificate of Conformity

Product: Bridgestone HP, Canopy 5GOD1

Brand: Sercomm, Mosolabs

Test Model: SCO5165P

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Apr. 08 ~ Apr. 15, 2024

Standards: 47 CFR FCC Part 96

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :

Pettie Chen

Date:

May 14, 2024

Pettie Chen / Senior Specialist

Approved by :

Jeremy Lin

Date:

May 14, 2024

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 96			
FCC Clause	Test Item	Result	Remarks
2.1046 96.41(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047 96.41(a)	Modulation Characteristics	Pass	Meet the requirement of limit.
2.1046 96.41(b)	Maximum Power Spectral Density	Pass	Meet the requirement of limit.
96.41(g)	Peak to Average Ration	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1055	Frequency Stability	Pass	Meet the requirement of limit.
2.1051 96.41(e)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 96.41(e)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -0.13dB at 7110.00MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~ 1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Bridgestone HP, Canopy 5G0D1			
Brand	Sercomm, Mosolabs			
Test Model	SCO5165P			
Sample Status	Engineering sample			
Power Supply Rating	48Vdc			
Modulation Type	QPSK, 64QAM, 256QAM			
Operating Frequency	NR Band 48 (Channel Bandwidth 10MHz)	3555.00MHz ~ 3694.98MHz		
	NR Band 48 (Channel Bandwidth 20MHz)	3560.01MHz ~ 3690.00MHz		
	NR Band 48 (Channel Bandwidth 40MHz)	3570.00MHz ~ 3679.98MHz		
	NR Band 48 (Channel Bandwidth 60MHz)	3580.02MHz ~ 3669.99MHz		
	NR Band 48 (Channel Bandwidth 100MHz)	3600.00MHz ~ 3649.98MHz		
	NR Band 78 (Channel Bandwidth 10MHz)	3555.00MHz ~ 3694.98MHz		
	NR Band 78 (Channel Bandwidth 20MHz)	3560.01MHz ~ 3690.00MHz		
	NR Band 78 (Channel Bandwidth 40MHz)	3570.00MHz ~ 3679.98MHz		
	NR Band 78 (Channel Bandwidth 60MHz)	3580.02MHz ~ 3669.99MHz		
	NR Band 78 (Channel Bandwidth 100MHz)	3600.00MHz ~ 3649.98MHz		
Max. EIRP Power (Per 10M Power)		QPSK	64QAM	256QAM
	NR Band 48/78 (Channel Bandwidth 10MHz)	14723.125mW (41.68dBm /10MHz)	14387.986mW (41.58dBm /10MHz)	13677.288mW (41.36dBm /10MHz)
	NR Band 48/78 (Channel Bandwidth 20MHz)	13899.526mW (41.43dBm /10MHz)	13708.818mW (41.37dBm /10MHz)	13458.604mW (41.29dBm /10MHz)
	NR Band 48/78 (Channel Bandwidth 40MHz)	7870.458mW (38.96dBm /10MHz)	7568.329mW (38.79dBm /10MHz)	7261.060mW (38.61dBm /10MHz)
	NR Band 48/78 (Channel Bandwidth 60MHz)	4775.293mW (36.79dBm /10MHz)	4518.559mW (36.55dBm /10MHz)	4497.799mW (36.53dBm /10MHz)
	NR Band 48/78 (Channel Bandwidth 100MHz)	2576.321mW (34.11dBm /10MHz)	2426.610mW (33.85dBm /10MHz)	2365.920mW (33.74dBm /10MHz)
Max. EIRP Power (Full power)		QPSK	64QAM	256QAM
	NR Band 48/78 (Channel Bandwidth 10MHz)	14723.125mW (41.68dBm/ Channel Bandwidth)	14387.986mW (41.58dBm/ Channel Bandwidth)	13677.288mW (41.36dBm/ Channel Bandwidth)
	NR Band 48/78 (Channel Bandwidth 20MHz)	24210.290mW (43.84dBm/ Channel Bandwidth)	23067.472mW (43.63dBm/ Channel Bandwidth)	22335.722mW (43.49dBm/ Channel Bandwidth)
	NR Band 48/78 (Channel Bandwidth 40MHz)	28575.905mW (44.56dBm/ Channel Bandwidth)	27415.742mW (44.38dBm/ Channel Bandwidth)	27101.916mW (44.33dBm/ Channel Bandwidth)
	NR Band 48/78 (Channel Bandwidth 60MHz)	27542.287mW (44.40dBm/ Channel Bandwidth)	26424.088mW (44.22dBm/ Channel Bandwidth)	26181.830mW (44.18dBm/ Channel Bandwidth)
	NR Band 48/78 (Channel Bandwidth 100MHz)	23933.158mW (43.79dBm/ Channel Bandwidth)	23280.913mW (43.67dBm/ Channel Bandwidth)	21330.449mW (43.29dBm/ Channel Bandwidth)
Emission Designator		QPSK	64QAM	256QAM
	NR Band 48/78 (Channel Bandwidth 10MHz)	8M57G7D	8M57D7W	8M56D7W
	NR Band 48/78 (Channel Bandwidth 20MHz)	18M2G7D	18M2D7W	18M2D7W
	NR Band 48/78 (Channel Bandwidth 40MHz)	37M8G7D	37M8D7W	37M8D7W
	NR Band 48/78 (Channel Bandwidth 60MHz)	57M8G7D	57M8D7W	57M8D7W
	NR Band 48/78 (Channel Bandwidth 100MHz)	97M4G7D	97M4D7W	97M3D7W

Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	N/A
Cable Supplied	N/A

Note:

1. All models are listed as below.

Product	Brand	Model	Difference
Bridgestone HP	Sercomm	SCO5165P	For marketing purpose.
Canopy 5GOD1	Mosolabs		

2. 5G NR n48 (3550 ~ 3700 MHz) overlaps the entire frequency range of n78 (3550 ~ 3700MHz). Therefore, test data provided in this report covers n78 as well as n48.

3. The EUT supports the following configuration.

5G NR	FCC 5G FR1
	SCS_30kHz
Bandwidth (MHz)	10/20/40/60/100

4. List of Accessory:

Item	Brand	Model	Specification
POE	PHIHONG	POE60U-BTA	Input Power: 100-240Vac ~, 1.5A, 50-60Hz Output Power: 56Vdc, 0.535A, 30W
AC Power Cord	-	-	1.8m non-shielded cord

5. The antenna information is listed as below.

Single antenna port peak gains:

Antenna Type	Patch	
Antenna Connector	N-Type	
Ant. No.	Ant. 0 (Port 1)	Ant. 1 (Port 2)
Band	Gain (dBi)	
Band 48/78	11.8	11.5

Note:

- * Port 1 and 2 are cross-polarized with fixed orientations. Per KDB 662911 D01, directional gain is the (larger) gain of a single antenna.
- * The external & internal antennas are identical.
- * Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.2 Test Mode Applicability and Tested Channel Detail

Test results are presented in the report as below.

Test Mode	Test Condition
A	EUT with internal antenna
B	EUT with external antenna

Note: The EUT's antenna had been pre-tested on the positioned of each 3 axis (X-axis/ Y-axis/ Z-axis). The worst case was found when on **Z axis (for Test Mode A)** and **Y axis (for Test Mode B)**.

Following channel(s) was (were) selected for the final test as listed below:

Test Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
A	Maximum Output Power	637000 to 646332	637000 (3555.00MHz), 641666 (3624.99MHz), 646332 (3694.98MHz)	10MHz	QPSK / 64QAM / 256QAM
A		637334 to 646000	637334 (3560.01MHz), 641666 (3624.99MHz), 646000 (3690.00MHz)	20MHz	QPSK / 64QAM / 256QAM
A		638000 to 645332	638000 (3570.00MHz), 641666 (3624.99MHz), 645332 (3679.98MHz)	40MHz	QPSK / 64QAM / 256QAM
A		638668 to 644666	638668 (3580.02MHz), 641666 (3624.99MHz), 644666 (3669.99MHz)	60MHz	QPSK / 64QAM / 256QAM
A		640000 to 643332	640000 (3600.00MHz), 641666 (3624.99MHz), 643332 (3649.98MHz)	100MHz	QPSK / 64QAM / 256QAM
A	Maximum Power Spectral Density	637000 to 646332	637000 (3555.00MHz), 641666 (3624.99MHz), 646332 (3694.98MHz)	10MHz	QPSK
A		637334 to 646000	637334 (3560.01MHz), 641666 (3624.99MHz), 646000 (3690.00MHz)	20MHz	QPSK
A		638000 to 645332	638000 (3570.00MHz), 641666 (3624.99MHz), 645332 (3679.98MHz)	40MHz	QPSK
A		638668 to 644666	638668 (3580.02MHz), 641666 (3624.99MHz), 644666 (3669.99MHz)	60MHz	QPSK
A		640000 to 643332	640000 (3600.00MHz), 641666 (3624.99MHz), 643332 (3649.98MHz)	100MHz	QPSK
A	Modulation Characteristics	640000 to 643332	641666 (3624.99MHz)	100MHz	QPSK / 64QAM / 256QAM
A	Frequency Stability	637000 to 646332	637000 (3555.00MHz), 646332 (3694.98MHz)	10MHz	QPSK
A		637334 to 646000	637334 (3560.01MHz), 646000 (3690.00MHz)	20MHz	QPSK
A		638000 to 645332	638000 (3570.00MHz), 645332 (3679.98MHz)	40MHz	QPSK
A		638668 to 644666	638668 (3580.02MHz), 644666 (3669.99MHz)	60MHz	QPSK
A		640000 to 643332	640000 (3600.00MHz), 643332 (3649.98MHz)	100MHz	QPSK

Test Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
A	Occupied Bandwidth	637000 to 646332	637000 (3555.00MHz), 641666 (3624.99MHz), 646332 (3694.98MHz)	10MHz	QPSK / 64QAM / 256QAM
A		637334 to 646000	637334 (3560.01MHz), 641666 (3624.99MHz), 646000 (3690.00MHz)	20MHz	QPSK / 64QAM / 256QAM
A		638000 to 645332	638000 (3570.00MHz), 641666 (3624.99MHz), 645332 (3679.98MHz)	40MHz	QPSK / 64QAM / 256QAM
A		638668 to 644666	638668 (3580.02MHz), 641666 (3624.99MHz), 644666 (3669.99MHz)	60MHz	QPSK / 64QAM / 256QAM
A		640000 to 643332	640000 (3600.00MHz), 641666 (3624.99MHz), 643332 (3649.98MHz)	100MHz	QPSK / 64QAM / 256QAM
A	Peak to Average Ratio	637000 to 646332	637000 (3555.00MHz), 641666 (3624.99MHz), 646332 (3694.98MHz)	10MHz	QPSK / 64QAM / 256QAM
A		637334 to 646000	637334 (3560.01MHz), 641666 (3624.99MHz), 646000 (3690.00MHz)	20MHz	QPSK / 64QAM / 256QAM
A		638000 to 645332	638000 (3570.00MHz), 641666 (3624.99MHz), 645332 (3679.98MHz)	40MHz	QPSK / 64QAM / 256QAM
A		638668 to 644666	638668 (3580.02MHz), 641666 (3624.99MHz), 644666 (3669.99MHz)	60MHz	QPSK / 64QAM / 256QAM
A		640000 to 643332	640000 (3600.00MHz), 641666 (3624.99MHz), 643332 (3649.98MHz)	100MHz	QPSK / 64QAM / 256QAM
A	Conducted Emission	637000 to 646332	637000 (3555.00MHz), 641666 (3624.99MHz), 646332 (3694.98MHz)	10MHz	QPSK
A		637334 to 646000	637334 (3560.01MHz), 641666 (3624.99MHz), 646000 (3690.00MHz)	20MHz	QPSK
A		638000 to 645332	638000 (3570.00MHz), 641666 (3624.99MHz), 645332 (3679.98MHz)	40MHz	QPSK
A		638668 to 644666	638668 (3580.02MHz), 641666 (3624.99MHz), 644666 (3669.99MHz)	60MHz	QPSK
A		640000 to 643332	640000 (3600.00MHz), 641666 (3624.99MHz), 643332 (3649.98MHz)	100MHz	QPSK

Test Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
A	Radiated Emission Below 1GHz	637000 to 646332	637000 (3555.00MHz)	10MHz	QPSK
B		637334 to 646000	637334 (3560.01MHz)	20MHz	QPSK
A, B	Radiated Emission Above 1GHz	637000 to 646332	637000 (3555.00MHz), 641666 (3624.99MHz), 646332 (3694.98MHz)	10MHz	QPSK
A, B		637334 to 646000	637334 (3560.01MHz), 641666 (3624.99MHz), 646000 (3690.00MHz)	20MHz	QPSK
A, B		638000 to 645332	638000 (3570.00MHz), 641666 (3624.99MHz), 645332 (3679.98MHz)	40MHz	QPSK
A, B		638668 to 644666	638668 (3580.02MHz), 641666 (3624.99MHz), 644666 (3669.99MHz)	60MHz	QPSK
A, B		640000 to 643332	640000 (3600.00MHz), 641666 (3624.99MHz), 643332 (3649.98MHz)	100MHz	QPSK

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. The output power for QPSK, 64QAM, and 256QAM, measured value of is QPSK higher than 64QAM, and 256QAM mode. Therefore, only occupied bandwidth and Peak to average ratio items had been tested under QPSK, 64QAM, and 256QAM modes, the other test items were performed under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Maximum Output Power	25deg. C, 60%RH	48Vdc	Kevin Kuo
Maximum Power Spectral Density	25deg. C, 60%RH	48Vdc	Kevin Kuo
Modulation Characteristics	25deg. C, 60%RH	48Vdc	Kevin Kuo
Frequency Stability	25deg. C, 60%RH	48Vdc	Kevin Kuo
Occupied Bandwidth	25deg. C, 60%RH	48Vdc	Kevin Kuo
Peak To Average Ratio	25deg. C, 60%RH	48Vdc	Kevin Kuo
Conducted Emission	25deg. C, 60%RH	48Vdc	Kevin Kuo
Radiated Emission	23deg. C, 67%RH	48Vdc	Wade Huang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	ASUS	B2402CV	NA	NA	Supplied by applicant
B.	POE	PHIHONG	POE60U-BTA	NA	NA	Accessory of EUT
C.	Load	NA	NA	NA	NA	Provided by Lab

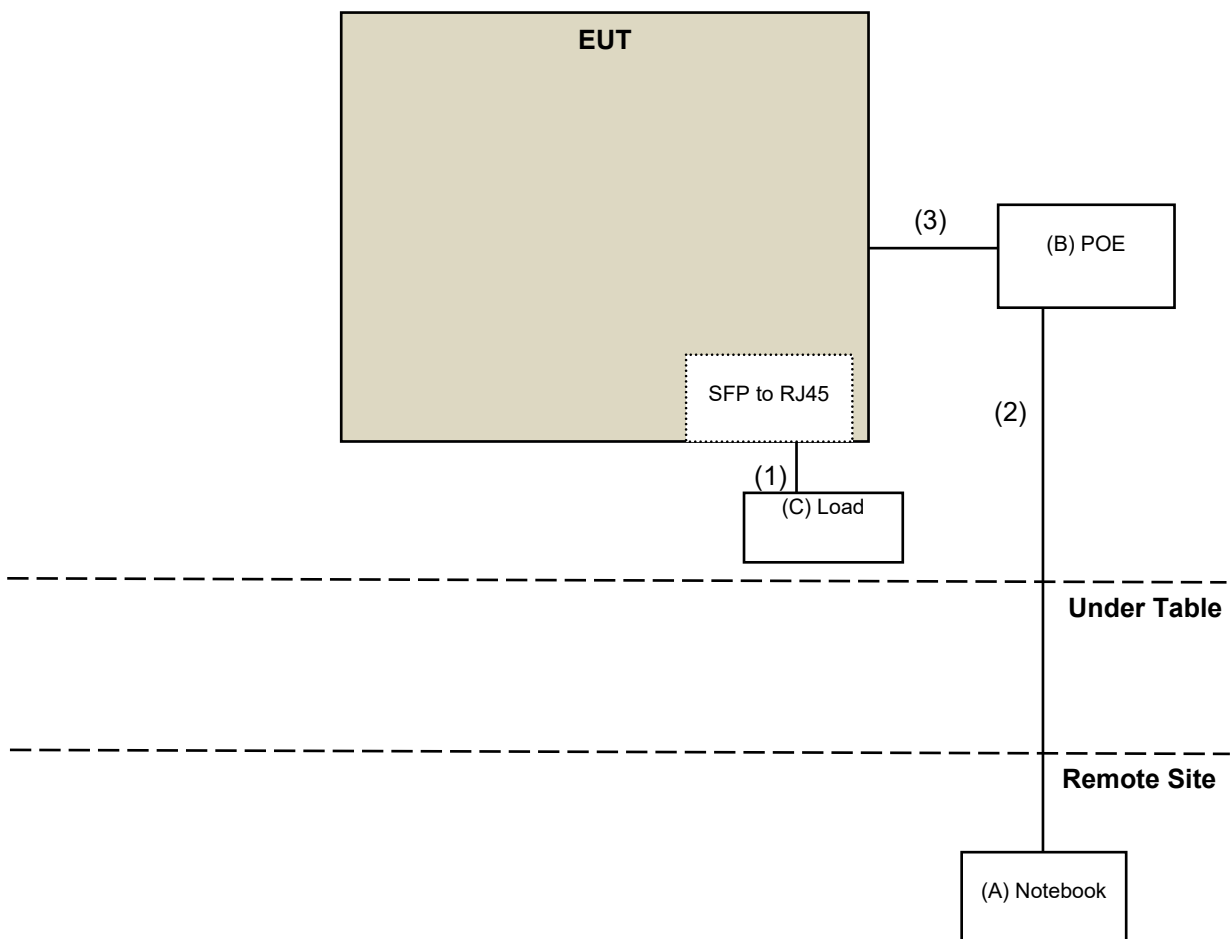
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

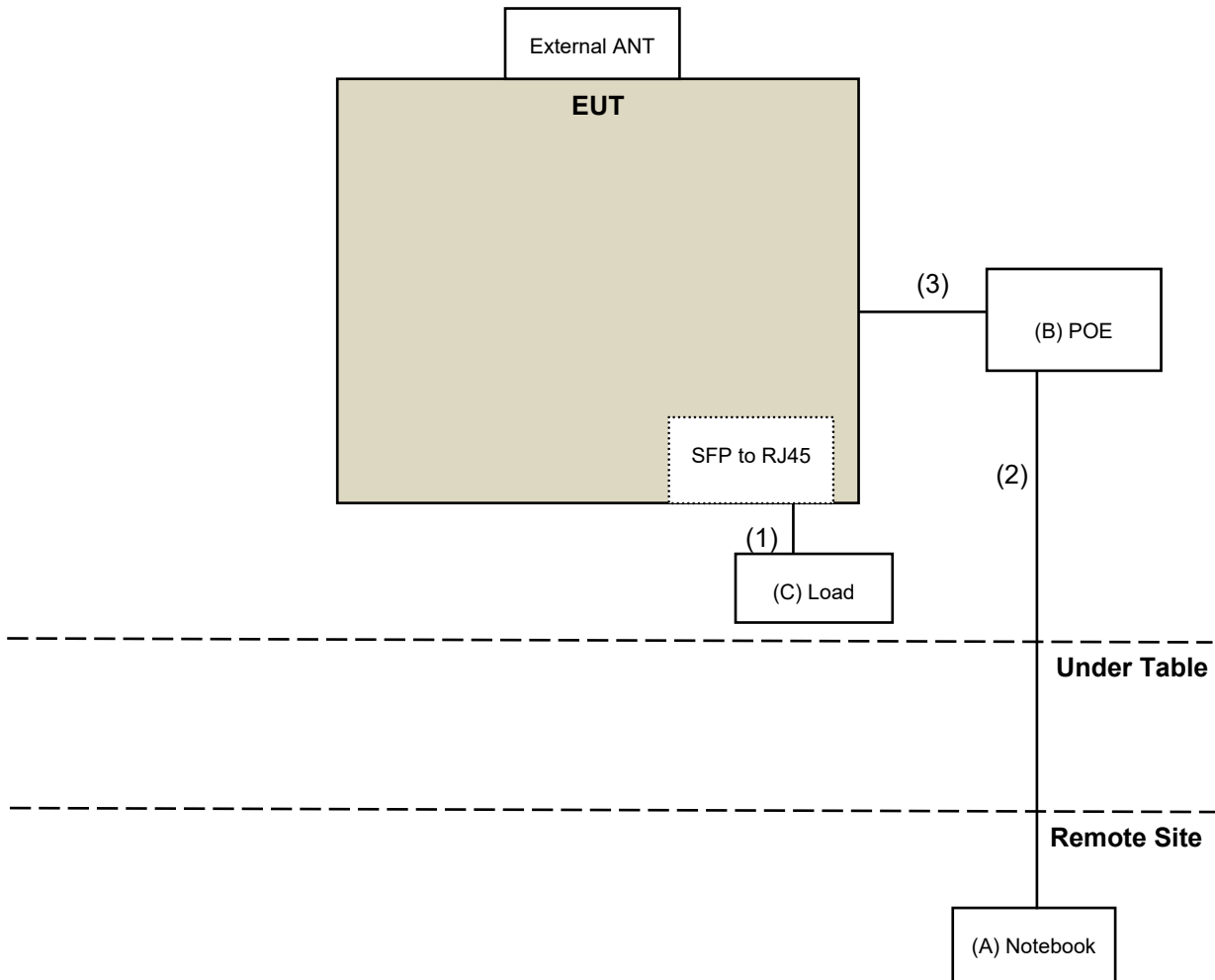
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45(CAT 7)	1	3	Yes	0	Provided by Lab
2.	RJ45	1	5	No	0	Provided by Lab
3.	RJ45	1	1.5	No	0	Provided by Lab

3.3.1 Configuration of System under Test

Test Mode A



Test Mode B



3.4 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 96

ANSI/TIA/EIA-603-E-2016

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 940660 D01 Part 96 CBRS Eqpt v03

All test items have been performed as a reference to the above KDB test guidance.

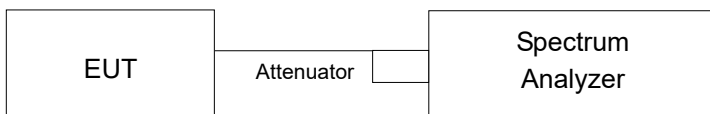
4 Test Types and Results

4.1 Maximum Output Power Measurement

4.1.1 Limits of Maximum Output Power Measurement

Device		Maximum EIRP (dBm/10 MHz)
<input type="checkbox"/>	End User Device	23
<input type="checkbox"/>	Category A CBSD	30
<input checked="" type="checkbox"/>	Category B CBSD	47

4.1.2 Test Setup



4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer KEYSIGHT	N9030B	MY57140488	Mar. 06, 2024	Mar. 05, 2025
RF cable	JB200	Cable-OVEN-02	NA	NA
DC-6GHz 20dB 50W Fixed attenuator Woken	MDC9331N-20	0724	Jul. 01, 2022	Jun. 30, 2024
STANDARD TEMPERATURE & HUMIDITY CHAMBER TERCHY	MHU-225AU	911033	Nov. 16, 2023	Nov. 15, 2024
DC Power Supply Keysight	U8002A	MY56330015	NA	NA
Digital Multimeter Fluke	87-III	70360742	Jun. 06, 2023	Jun. 05, 2024

Note: 1. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1.4 Test Procedures

Conducted output power measurement

- a. Connect the DUT transmitter output to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
- b. Set span to at least 1.5 times the OBW.
- c. Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
- d. Set VBW $\geq 3 \times$ RBW.
- e. Set number of points in sweep $\geq 2 \times$ span / RBW.
- f. Sweep time = auto-couple.
- g. Detector = RMS (power averaging).
- h. If the EUT can be configured to transmit continuously (i.e., burst duty cycle $\geq 98\%$), then set the trigger to free run.
- i. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle $< 98\%$), 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. Ensure that the sweep time is less than or equal to the transmission burst duration.
- j. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- k. 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.
- l. For per 10MHz method, channel power integrating bandwidth 10MHz is used for bandwidth 10M, 20M, 40M, 60M and 100M. For full power method, channel power integrating bandwidth 10MHz is used for bandwidth 10M, integrating bandwidth 20MHz is used for bandwidth 20M, integrating bandwidth 40MHz is used for bandwidth 40M, integrating bandwidth 60MHz is used for bandwidth 60M, integrating bandwidth 100MHz is used for bandwidth 100M.

Maximum EIRP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively
(expressed in the same units as P_{Meas} , e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_{T} gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

4.1.5 Deviation from Test Standard

No deviation.

4.1.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.1.7 Test Results

Conducted Output Power and EIRP Power (dBm/10MHz)

Bandwidth	Frequency (MHz)	Modulation	Ant.0	Ant.1	Total	EIRP (dBm/10MHz)	Verdict
10M	3555	QPSK	24.87	24.71	27.80	39.60	PASS
		64QAM	24.85	24.69	27.78	39.58	PASS
		256QAM	24.75	24.58	27.68	39.48	PASS
	3624.99	QPSK	27.01	26.72	29.88	41.68	PASS
		64QAM	26.77	26.77	29.78	41.58	PASS
		256QAM	26.42	26.68	29.56	41.36	PASS
	3694.98	QPSK	23.70	24.01	26.87	38.67	PASS
		64QAM	23.45	23.48	26.48	38.28	PASS
		256QAM	23.36	23.35	26.37	38.17	PASS
20M	3560.01	QPSK	18.89	19.21	22.06	33.86	PASS
		64QAM	18.66	19.13	21.91	33.71	PASS
		256QAM	18.59	19.08	21.85	33.65	PASS
	3624.99	QPSK	26.54	26.69	29.63	41.43	PASS
		64QAM	26.47	26.64	29.57	41.37	PASS
		256QAM	26.38	26.58	29.49	41.29	PASS
	3690	QPSK	19.19	19.33	22.27	34.07	PASS
		64QAM	19.15	19.30	22.24	34.04	PASS
		256QAM	19.12	19.21	22.18	33.98	PASS
40M	3570	QPSK	16.80	15.63	19.26	31.06	PASS
		64QAM	16.76	15.56	19.21	31.01	PASS
		256QAM	16.64	15.58	19.15	30.95	PASS
	3624.99	QPSK	23.84	24.44	27.16	38.96	PASS
		64QAM	23.59	24.34	26.99	38.79	PASS
		256QAM	23.53	24.05	26.81	38.61	PASS
	3679.98	QPSK	16.53	16.99	19.78	31.58	PASS
		64QAM	15.85	16.37	19.13	30.93	PASS
		256QAM	15.75	16.21	19.00	30.80	PASS
60M	3580.02	QPSK	14.92	14.55	17.75	29.55	PASS
		64QAM	14.05	14.37	17.22	29.02	PASS
		256QAM	14.90	14.24	17.59	29.39	PASS
	3624.99	QPSK	21.85	22.11	24.99	36.79	PASS
		64QAM	21.39	22.07	24.75	36.55	PASS
		256QAM	21.36	22.06	24.73	36.53	PASS
	3669.99	QPSK	15.07	16.27	18.72	30.52	PASS
		64QAM	14.72	15.43	18.10	29.90	PASS
		256QAM	14.58	15.04	17.83	29.63	PASS
100M	3600	QPSK	9.31	9.14	12.24	24.04	PASS
		64QAM	9.03	8.89	11.97	23.77	PASS
		256QAM	8.85	8.45	11.66	23.46	PASS
	3624.99	QPSK	19.14	19.46	22.31	34.11	PASS
		64QAM	19.03	19.04	22.05	33.85	PASS
		256QAM	18.87	18.98	21.94	33.74	PASS
	3649.98	QPSK	11.33	12.10	14.74	26.54	PASS
		64QAM	11.23	11.49	14.37	26.17	PASS
		256QAM	10.98	11.48	14.25	26.05	PASS

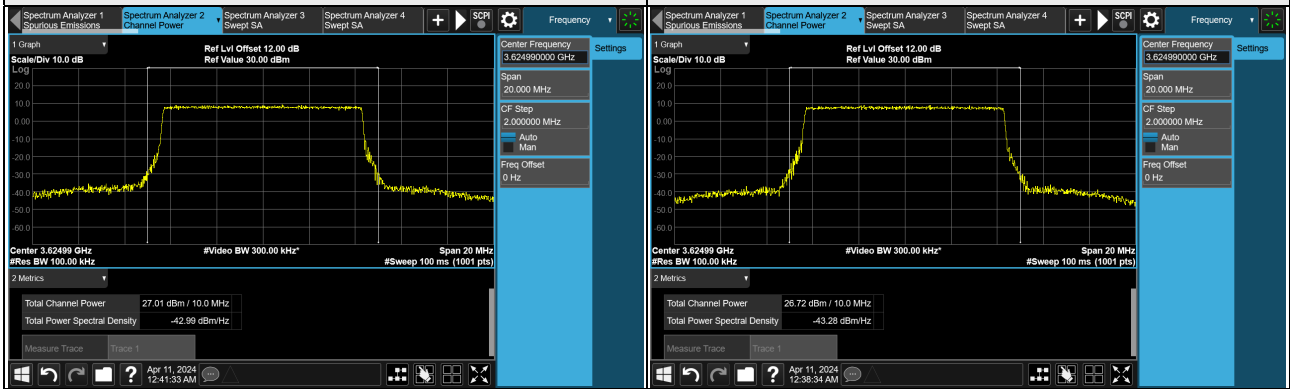
Note: EIRP (dBm/10MHz) = Total Conducted Output Power (dBm/10MHz) + Gain

Spectrum Plot of Worst Value

10MHz / QPSK

Ant.0

Ant.1



Full Conducted Output Power and Full EIRP Power (dBm/Channel Bandwidth)

Bandwidth	Frequency (MHz)	Modulation	Ant.0	Ant.1	Total	EIRP (dBm/Channel Bandwidth)	Verdict
10M	3555	QPSK	24.87	24.71	27.80	39.60	PASS
		64QAM	24.85	24.69	27.78	39.58	PASS
		256QAM	24.75	24.58	27.68	39.48	PASS
	3624.99	QPSK	27.01	26.72	29.88	41.68	PASS
		64QAM	26.77	26.77	29.78	41.58	PASS
		256QAM	26.42	26.68	29.56	41.36	PASS
	3694.98	QPSK	23.70	24.01	26.87	38.67	PASS
		64QAM	23.45	23.48	26.48	38.28	PASS
		256QAM	23.36	23.35	26.37	38.17	PASS
20M	3560.01	QPSK	21.47	21.30	24.40	36.20	PASS
		64QAM	21.44	21.19	24.33	36.13	PASS
		256QAM	21.37	21.06	24.23	36.03	PASS
	3624.99	QPSK	29.01	29.05	32.04	43.84	PASS
		64QAM	28.68	28.96	31.83	43.63	PASS
		256QAM	28.51	28.84	31.69	43.49	PASS
	3690	QPSK	21.61	21.76	24.70	36.50	PASS
		64QAM	21.46	21.61	24.55	36.35	PASS
		256QAM	21.38	21.46	24.43	36.23	PASS
40M	3570	QPSK	21.78	21.65	24.73	36.53	PASS
		64QAM	21.76	21.53	24.66	36.46	PASS
		256QAM	21.75	21.46	24.62	36.42	PASS
	3624.99	QPSK	29.72	29.78	32.76	44.56	PASS
		64QAM	29.46	29.68	32.58	44.38	PASS
		256QAM	29.38	29.66	32.53	44.33	PASS
	3679.98	QPSK	22.35	22.77	25.58	37.38	PASS
		64QAM	21.72	22.12	24.93	36.73	PASS
		256QAM	21.65	22.11	24.90	36.70	PASS
60M	3580.02	QPSK	22.16	22.20	25.19	36.99	PASS
		64QAM	21.66	22.03	24.86	36.66	PASS
		256QAM	21.52	21.61	24.58	36.38	PASS
	3624.99	QPSK	29.42	29.76	32.60	44.40	PASS
		64QAM	29.12	29.69	32.42	44.22	PASS
		256QAM	29.08	29.65	32.38	44.18	PASS
	3669.99	QPSK	22.83	23.95	26.44	38.24	PASS
		64QAM	22.43	23.14	25.81	37.61	PASS
		256QAM	22.36	22.71	25.55	37.35	PASS
100M	3600	QPSK	18.90	18.94	21.93	33.73	PASS
		64QAM	18.53	18.66	21.61	33.41	PASS
		256QAM	18.52	18.25	21.40	33.20	PASS
	3624.99	QPSK	28.82	29.14	31.99	43.79	PASS
		64QAM	28.61	29.10	31.87	43.67	PASS
		256QAM	27.96	28.95	31.49	43.29	PASS
	3649.98	QPSK	21.33	21.98	24.68	36.48	PASS
		64QAM	21.09	21.46	24.29	36.09	PASS
		256QAM	21.04	21.42	24.24	36.04	PASS

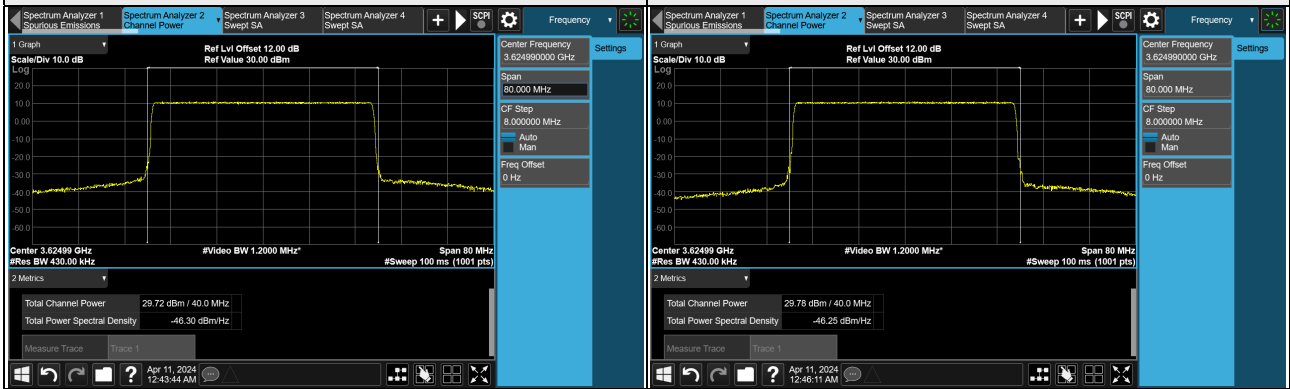
Note: EIRP (dBm/Channel Bandwidth) = Total Conducted Output Power (dBm/Channel Bandwidth) + Gain

Spectrum Plot of Worst Value

40MHz / QPSK

Ant.0

Ant.1

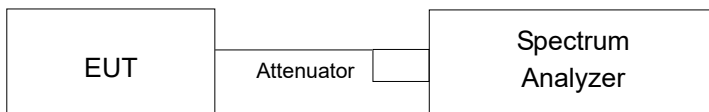


4.2 Maximum Power Spectral Density Measurement

4.2.1 Limits of Maximum Power Spectral Density Measurement

Device		Maximum PSD (dBm/MHz)
<input type="checkbox"/>	End User Device	n/a
<input type="checkbox"/>	Category A CBSD	20
<input checked="" type="checkbox"/>	Category B CBSD	37

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.2.4 Test Procedure

- a. Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
- b. Set instrument center frequency to OBW center frequency.
- c. Set span to $2 \times$ to $3 \times$ the OBW.
- d. Set the RBW to the specified reference bandwidth (often 1 MHz).
- e. Set VBW $\geq 3 \times$ RBW.
- f. Detector = RMS (power averaging).
- g. Ensure that the number of measurement points in the sweep $\geq 2 \times$ span/RBW.
- h. Sweep time = auto couple.
- i. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- j. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Results

Power Spectral Density (dBm/MHz)

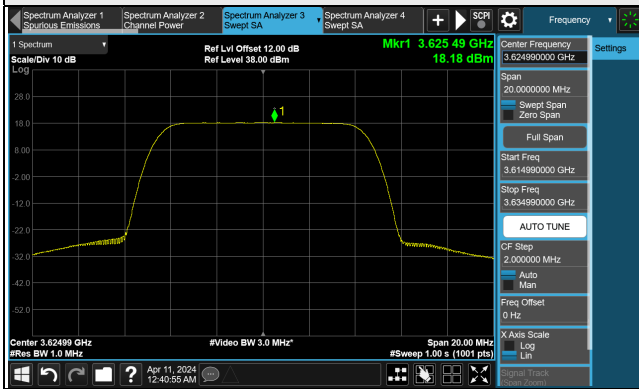
Bandwidth	Frequency (MHz)	Modulation	Ant.0	Ant.1	Total	EIRP (dBm/MHz)	Verdict
10M	3555	QPSK	15.98	15.71	18.86	30.66	PASS
		64QAM	15.86	15.70	18.79	30.59	PASS
		256QAM	15.79	15.54	18.68	30.48	PASS
	3624.99	QPSK	18.18	18.04	21.12	32.92	PASS
		64QAM	18.12	18.02	21.08	32.88	PASS
		256QAM	17.86	18.01	20.95	32.75	PASS
	3694.98	QPSK	14.82	14.99	17.92	29.72	PASS
		64QAM	14.75	14.80	17.79	29.59	PASS
		256QAM	14.66	14.72	17.70	29.50	PASS
20M	3560.01	QPSK	10.02	9.64	12.84	24.64	PASS
		64QAM	9.96	9.61	12.80	24.60	PASS
		256QAM	9.93	9.56	12.76	24.56	PASS
	3624.99	QPSK	17.13	17.22	20.19	31.99	PASS
		64QAM	16.71	17.12	19.93	31.73	PASS
		256QAM	16.64	17.02	19.84	31.64	PASS
	3690	QPSK	9.30	9.65	12.49	24.29	PASS
		64QAM	9.45	9.53	12.50	24.30	PASS
		256QAM	9.43	9.42	12.44	24.24	PASS
40M	3570	QPSK	7.11	6.97	10.05	21.85	PASS
		64QAM	7.08	6.67	9.89	21.69	PASS
		256QAM	6.90	6.47	9.70	21.50	PASS
	3624.99	QPSK	14.33	15.35	17.88	29.68	PASS
		64QAM	14.26	14.54	17.41	29.21	PASS
		256QAM	14.08	14.47	17.29	29.09	PASS
	3679.98	QPSK	7.12	7.37	10.26	22.06	PASS
		64QAM	6.70	6.84	9.78	21.58	PASS
		256QAM	6.47	6.81	9.65	21.45	PASS
60M	3580.02	QPSK	6.02	5.78	8.91	20.71	PASS
		64QAM	5.95	5.65	8.81	20.61	PASS
		256QAM	5.62	5.63	8.64	20.44	PASS
	3624.99	QPSK	12.28	12.76	15.54	27.34	PASS
		64QAM	12.20	12.69	15.46	27.26	PASS
		256QAM	12.04	12.64	15.36	27.16	PASS
	3669.99	QPSK	6.00	6.74	9.40	21.20	PASS
		64QAM	5.59	6.06	8.84	20.64	PASS
		256QAM	5.45	5.65	8.56	20.36	PASS
100M	3600	QPSK	-0.27	-0.34	2.71	14.51	PASS
		64QAM	-0.4	-0.48	2.57	14.37	PASS
		256QAM	-0.53	-0.61	2.44	14.24	PASS
	3624.99	QPSK	9.36	9.74	12.56	24.36	PASS
		64QAM	9.32	9.63	12.49	24.29	PASS
		256QAM	9.26	9.55	12.42	24.22	PASS
	3649.98	QPSK	2.13	2.51	5.33	17.13	PASS
		64QAM	2.12	2.03	5.09	16.89	PASS
		256QAM	1.95	2.01	4.99	16.79	PASS

Note: EIRP Power Spectral Density (dBm/MHz) = Total Power Spectral Density (dBm/MHz) + Directional Gain

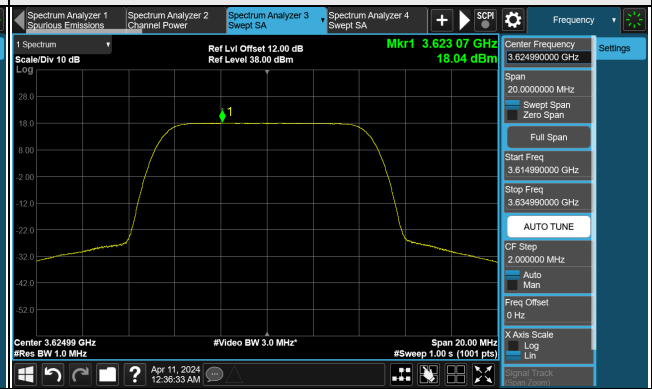
Spectrum Plot of Worst Value

10MHz / QPSK

Ant.0



Ant.1



4.3 Modulation Characteristics Measurement

4.3.1 Limits of Modulation Characteristics

N/A

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

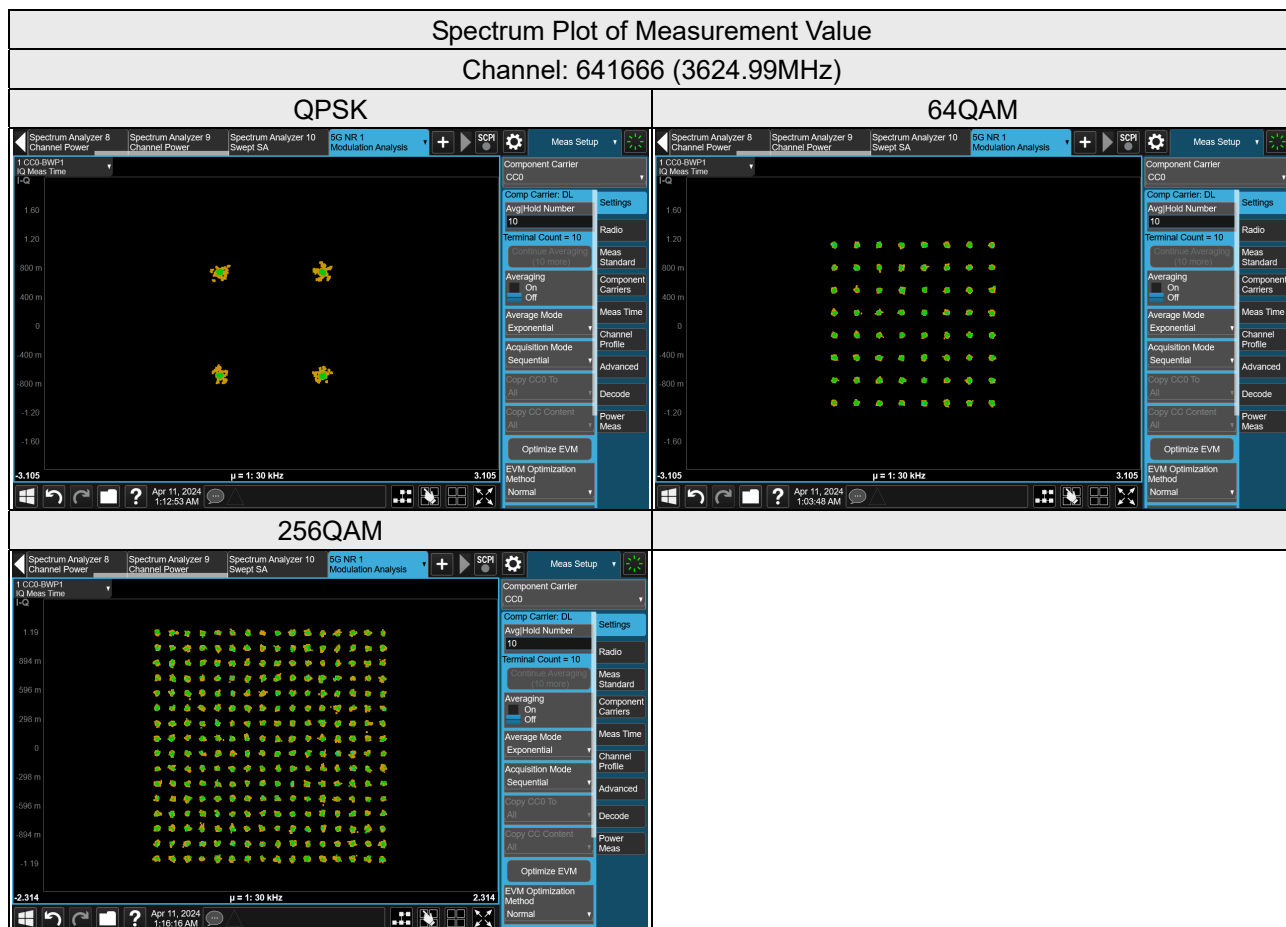
4.3.4 Deviation from Test Standard

No deviation.

4.3.5 EUT Operating Conditions

Connect the EUT to Communication Simulator via the antenna connector, the frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.3.6 Test Results

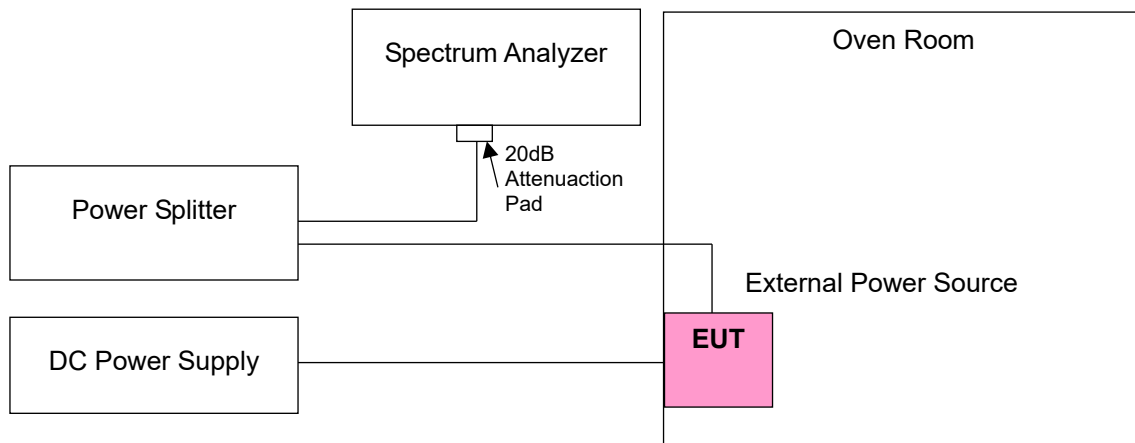


4.4 Frequency Stability Measurement

4.4.1 Limits of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band.

4.4.2 Test Setup



4.4.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer KEYSIGHT	N9030B	MY57140938	Mar. 20, 2024	Mar. 19, 2025
STANDARD TEMPERATURE & HUMIDITY CHAMBER TERCHY	MHU-225AU	911033	Nov. 16, 2023	Nov. 15, 2024
Three-phase coupling / decoupling network TESEQ	CDN 3063	4006	Mar. 07, 2024	Mar. 06, 2025
DC Power Supply Keysight	U8002A	MY56330015	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.4 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.4.5 Test Results

Antenna 0

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3555.000002	0.000563	3694.980003	0.000812
41	3555.000004	0.001125	3694.979996	-0.001083
57	3555.000003	0.000844	3694.980002	0.000541

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3555.000002	0.000563	3694.980003	0.000812
-30	3554.999998	-0.000563	3694.979999	-0.000271
-20	3555.000001	0.000281	3694.980003	0.000812
-10	3554.999997	-0.000844	3694.979998	-0.000541
0	3554.999998	-0.000563	3694.980001	0.000271
10	3555.000004	0.001125	3694.980004	0.001083
20	3554.999996	-0.001125	3694.980001	0.000271
30	3555.000002	0.000563	3694.980002	0.000541
40	3555.000001	0.000281	3694.979998	-0.000541
50	3555.000002	0.000563	3694.979996	-0.001083
55	3554.999998	-0.000563	3694.979996	-0.001083

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3560.010001	0.000281	3689.999996	-0.001084
41	3560.010003	0.000843	3690.000001	0.000271
57	3560.009997	-0.000843	3690.000003	0.000813

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3560.010004	0.001124	3690.000001	0.000271
-30	3560.010001	0.000281	3689.999996	-0.001084
-20	3560.010004	0.001124	3689.999999	-0.000271
-10	3560.010002	0.000562	3690.000003	0.000813
0	3560.009998	-0.000562	3690.000001	0.000271
10	3560.010002	0.000562	3690.000003	0.000813
20	3560.009998	-0.000562	3690.000004	0.001084
30	3560.009996	-0.001124	3690.000001	0.000271
40	3560.010002	0.000562	3690.000004	0.001084
50	3560.010004	0.001124	3690.000002	0.000542
55	3560.009998	-0.000562	3690.000004	0.001084

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 40MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3570.000001	0.000280	3679.979998	-0.000543
41	3570.000001	0.000280	3679.980001	0.000272
57	3569.999997	-0.000840	3679.979996	-0.001087

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 40MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3570.000002	0.000560	3679.979998	-0.000543
-30	3570.000001	0.000280	3679.979996	-0.001087
-20	3570.000001	0.000280	3679.980003	0.000815
-10	3570.000003	0.000840	3679.979999	-0.000272
0	3570.000003	0.000840	3679.979996	-0.001087
10	3570.000003	0.000840	3679.980003	0.000815
20	3570.000002	0.000560	3679.979997	-0.000815
30	3570.000002	0.000560	3679.980004	0.001087
40	3570.000001	0.000280	3679.979997	-0.000815
50	3569.999997	-0.000840	3679.979998	-0.000543
55	3569.999998	-0.000560	3679.979998	-0.000543

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 60MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3580.020003	0.000840	3669.989996	-0.001087
41	3580.020001	0.000280	3669.990004	0.001087
57	3580.020002	0.000560	3669.989996	-0.001087

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 60MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3580.019999	-0.000280	3669.990003	0.000815
-30	3580.020001	0.000280	3669.989999	-0.000272
-20	3580.019998	-0.000560	3669.989998	-0.000543
-10	3580.020003	0.000840	3669.989997	-0.000815
0	3580.020001	0.000280	3669.990003	0.000815
10	3580.020002	0.000560	3669.990003	0.000815
20	3580.020003	0.000840	3669.990001	0.000272
30	3580.020001	0.000280	3669.989996	-0.001087
40	3580.019997	-0.000840	3669.990001	0.000272
50	3580.020003	0.000840	3669.990002	0.000543
55	3580.019998	-0.000560	3669.989997	-0.000815

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 100MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3600.000003	0.000840	3649.979997	-0.000815
41	3599.999998	-0.000560	3649.979996	-0.001087
57	3599.999999	-0.000280	3649.980002	0.000543

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 100MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3599.999999	-0.000280	3649.980001	0.000272
-30	3600.000003	0.000840	3649.979998	-0.000543
-20	3599.999999	-0.000280	3649.980002	0.000543
-10	3599.999999	-0.000280	3649.979999	-0.000272
0	3599.999999	-0.000280	3649.980004	0.001087
10	3599.999997	-0.000840	3649.980001	0.000272
20	3600.000001	0.000280	3649.980001	0.000272
30	3600.000002	0.000560	3649.980003	0.000815
40	3600.000003	0.000840	3649.980004	0.001087
50	3600.000002	0.000560	3649.980002	0.000543
55	3600.000003	0.000840	3649.980002	0.000543

Antenna 1

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3555.000001	0.000281	3694.980003	0.000820
41	3555.000004	0.001125	3694.980001	0.000214
57	3555.000003	0.000844	3694.979999	-0.000143

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3555.000001	0.000281	3694.979998	-0.000428
-30	3554.999998	-0.000563	3694.979996	-0.001004
-20	3555.000001	0.000281	3694.979996	-0.001053
-10	3555.000001	0.000281	3694.980003	0.000828
0	3554.999998	-0.000563	3694.980003	0.000682
10	3555.000003	0.000844	3694.980003	0.000696
20	3554.999996	-0.001125	3694.980002	0.000430
30	3554.999996	-0.001125	3694.980001	0.000349
40	3555.000001	0.000281	3694.980002	0.000533
50	3555.000003	0.000844	3694.980002	0.000617
55	3554.999999	-0.000281	3694.979997	-0.000942

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3560.010004	0.001000	3689.999998	-0.000450
41	3560.010001	0.000180	3690.000002	0.000596
57	3560.009996	-0.001067	3689.999999	-0.000374

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3560.010003	0.000826	3690.000003	0.000780
-30	3560.009998	-0.000430	3689.999999	-0.000401
-20	3560.009996	-0.001062	3690.000001	0.000404
-10	3560.009998	-0.000626	3689.999997	-0.000940
0	3560.009999	-0.000329	3690.000001	0.000282
10	3560.010002	0.000607	3690.000003	0.000827
20	3560.009996	-0.001096	3689.999997	-0.000737
30	3560.009997	-0.000907	3690.000003	0.000767
40	3560.010003	0.000756	3689.999997	-0.000748
50	3560.009999	-0.000289	3689.999997	-0.000919
55	3560.010002	0.000539	3689.999998	-0.000569

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 40MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3570.000001	0.000280	3679.979997	-0.000764
41	3569.999998	-0.000560	3679.979996	-0.000954
57	3570.000001	0.000280	3679.979997	-0.000875

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 40MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3570.000001	0.000280	3679.979997	-0.000799
-30	3569.999997	-0.000840	3679.979996	-0.001000
-20	3569.999999	-0.000280	3679.979999	-0.000258
-10	3570.000003	0.000840	3679.980003	0.000938
0	3569.999996	-0.001120	3679.979996	-0.001033
10	3569.999997	-0.000840	3679.980001	0.000318
20	3569.999997	-0.000840	3679.979997	-0.000899
30	3569.999998	-0.000560	3679.980002	0.000573
40	3570.000001	0.000280	3679.979997	-0.000755
50	3569.999996	-0.001120	3679.979997	-0.000823
55	3569.999996	-0.001120	3679.980001	0.000375

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 60MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3580.019998	-0.000560	3669.990003	0.000688
41	3580.020003	0.000840	3669.989997	-0.000709
57	3580.020001	0.000280	3669.990004	0.000976

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

Temp. (°C)	NR Band 48, Channel Bandwidth: 60MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3580.020004	0.001120	3669.989999	-0.000212
-30	3580.020004	0.001120	3669.990003	0.000840
-20	3580.020002	0.000560	3669.989998	-0.000628
-10	3580.020001	0.000280	3669.989999	-0.000160
0	3580.020002	0.000560	3669.989997	-0.000929
10	3580.019999	-0.000280	3669.990001	0.000291
20	3580.020003	0.000840	3669.989999	-0.000361
30	3580.020002	0.000560	3669.990001	0.000190
40	3580.019999	-0.000280	3669.989997	-0.000870
50	3580.020001	0.000280	3669.989998	-0.000611
55	3580.020002	0.000560	3669.989996	-0.000992

Frequency Error vs. Voltage

Voltage (Vdc)	NR Band 48, Channel Bandwidth: 100MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
48	3600.000001	0.000280	3649.980004	0.001087
41	3600.000002	0.000560	3649.980004	0.001022
57	3600.000001	0.000280	3649.979998	-0.000543

Note: The applicant defined the normal working voltage is from 41Vdc to 57Vdc.

Frequency Error vs. Temperature

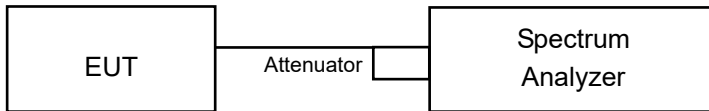
Temp. (°C)	NR Band 48, Channel Bandwidth: 100MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	3600.000001	0.000280	3649.980002	0.000492
-30	3600.000004	0.001120	3649.979997	-0.000777
-20	3600.000003	0.000840	3649.980003	0.000918
-10	3600.000002	0.000560	3649.980004	0.000976
0	3600.000003	0.000840	3649.980002	0.000576
10	3599.999998	-0.000560	3649.980004	0.001027
20	3600.000004	0.001120	3649.979997	-0.000918
30	3599.999997	-0.000840	3649.979996	-0.000976
40	3599.999997	-0.000840	3649.980002	0.000446
50	3600.000003	0.000840	3649.980004	0.001057
55	3600.000004	0.001120	3649.979998	-0.000584

4.5 Emission Bandwidth Measurement

4.5.1 Limits of Emission Bandwidth Measurement

According to FCC 47 CFR part 2.1049, the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.5.4 Test Procedure

Occupied Bandwidth & 26dBc Bandwidth

- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
NOTE—Step 1), step 2), and step 3) may require iteration to adjust within the specified tolerances.
- d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f. Determine the reference value by either of the following:
 - a) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
 - b) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- g. Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Result

Occupied Bandwidth

NR Band 48, Channel Bandwidth 10MHz							
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
637000	3555.00	8.5613	8.5499	8.5626	8.5626	8.5688	8.5642
641666	3624.99	8.5496	8.5498	8.5611	8.5684	8.5706	8.5607
646332	3694.98	8.5608	8.5477	8.5624	8.5615	8.5703	8.5576
NR Band 48, Channel Bandwidth 20MHz							
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
637334	3560.01	18.1850	18.1870	18.1800	18.1860	18.1810	18.1800
641666	3624.99	18.1800	18.1860	18.1740	18.1870	18.1750	18.1790
646000	3690.00	18.1860	18.1850	18.1850	18.1870	18.1760	18.1780
NR Band 48, Channel Bandwidth 40MHz							
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
638000	3570.00	37.7910	37.7870	37.7820	37.8180	37.8060	37.7990
641666	3624.99	37.8050	37.8030	37.7990	37.8120	37.8100	37.7980
645332	3679.98	37.8140	37.8060	37.8070	37.8170	37.8190	37.8040

NR Band 48, Channel Bandwidth 60MHz

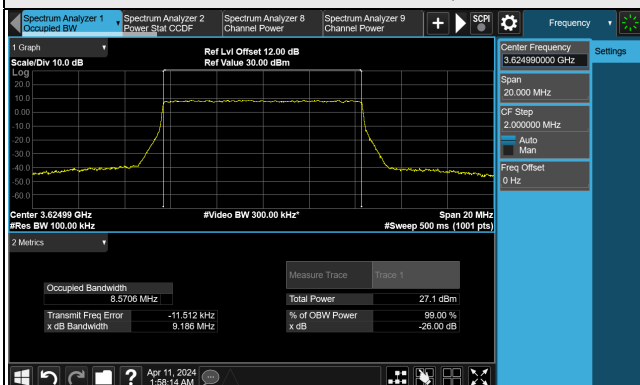
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
638668	3580.02	57.7320	57.7320	57.6880	57.7800	57.7830	57.7320
641666	3624.99	57.7810	57.7910	57.7380	57.7910	57.7790	57.7310
644666	3669.99	57.8040	57.8070	57.7640	57.7980	57.7900	57.7530

NR Band 48, Channel Bandwidth 100MHz

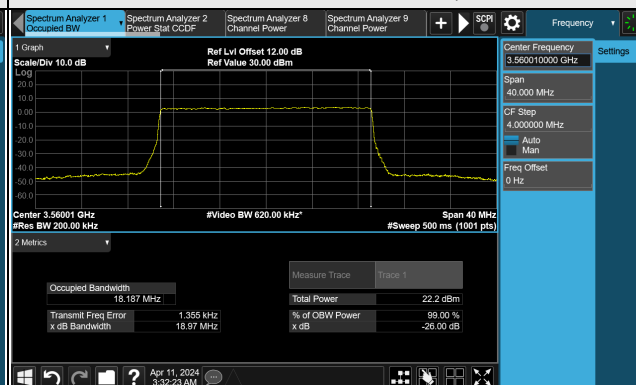
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
640000	3600.00	97.1610	97.1990	97.0880	97.2840	97.3140	97.2160
641666	3624.99	97.2060	97.2940	97.2170	97.2150	97.3080	97.2160
643332	3649.98	97.3810	97.4110	97.3120	97.3410	97.3550	97.3120

Spectrum Plot of Worst Value

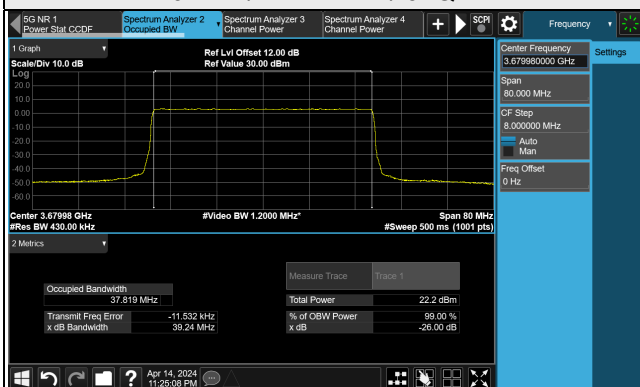
10MHz / Antenna 1 / 64QAM



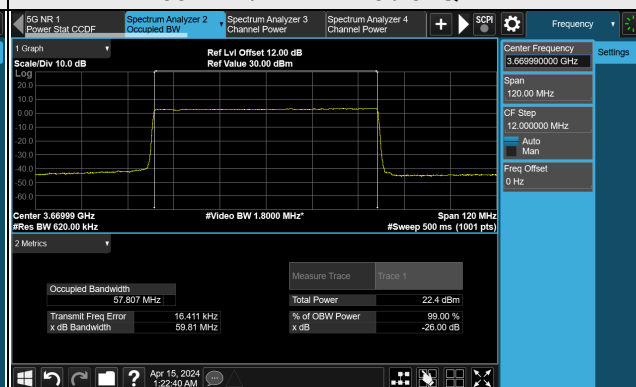
20MHz / Antenna 0 / 64QAM



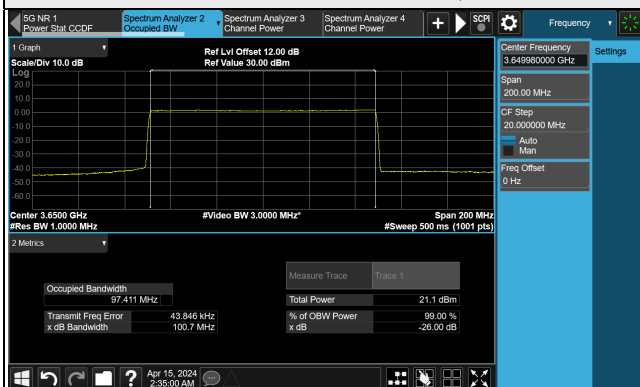
40MHz / Antenna 1 / 64QAM



60MHz / Antenna 0 / 64QAM



100MHz / Antenna 0 / 64QAM



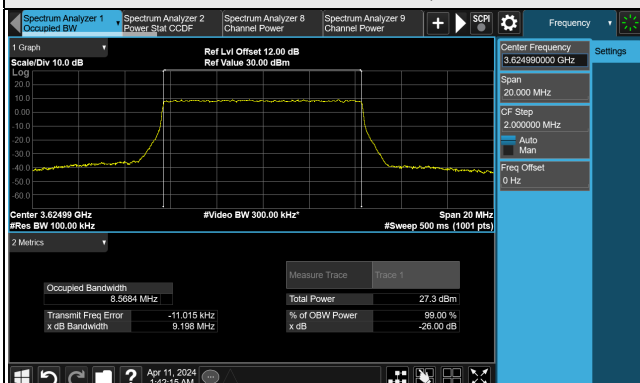
26dB Bandwidth

NR Band 48, Channel Bandwidth 10MHz							
Channel	Frequency (MHz)	26dB Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
637000	3555.00	9.14	9.09	9.01	9.10	9.16	9.12
641666	3624.99	9.09	9.11	9.01	9.20	9.19	9.09
646332	3694.98	9.12	9.11	9.01	9.12	9.18	9.11
NR Band 48, Channel Bandwidth 20MHz							
Channel	Frequency (MHz)	26dB Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
637334	3560.01	19.02	18.97	18.90	18.94	19.02	18.94
641666	3624.99	18.97	18.99	18.91	18.98	19.02	18.91
646000	3690.00	19.05	19.01	19.00	19.06	18.91	18.93
NR Band 48, Channel Bandwidth 40MHz							
Channel	Frequency (MHz)	26dB Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
638000	3570.00	39.20	39.19	39.20	39.23	39.25	39.22
641666	3624.99	39.22	39.21	39.24	39.22	39.25	39.23
645332	3679.98	39.22	39.21	39.23	39.22	39.24	39.23

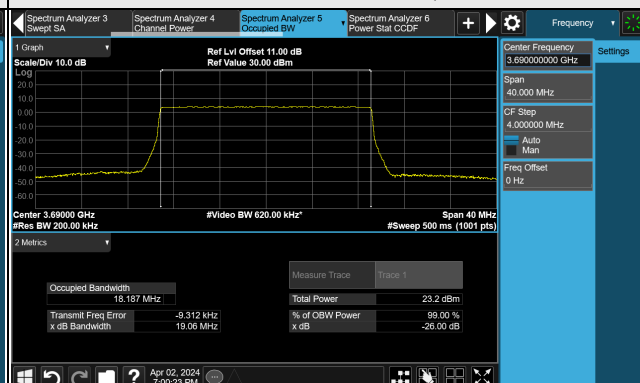
NR Band 48, Channel Bandwidth 60MHz							
Channel	Frequency (MHz)	26dB Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
638668	3580.02	59.77	59.77	59.76	59.79	59.78	59.78
641666	3624.99	59.80	59.82	59.78	59.82	59.81	59.77
644666	3669.99	59.78	59.81	59.79	59.81	59.82	59.79
NR Band 48, Channel Bandwidth 100MHz							
Channel	Frequency (MHz)	26dB Bandwidth (MHz)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
640000	3600.00	100.60	100.60	100.60	100.60	100.60	100.60
641666	3624.99	100.60	100.60	100.60	100.60	100.70	100.60
643332	3649.98	100.70	100.70	100.60	100.70	100.60	100.60

Spectrum Plot of Worst Value

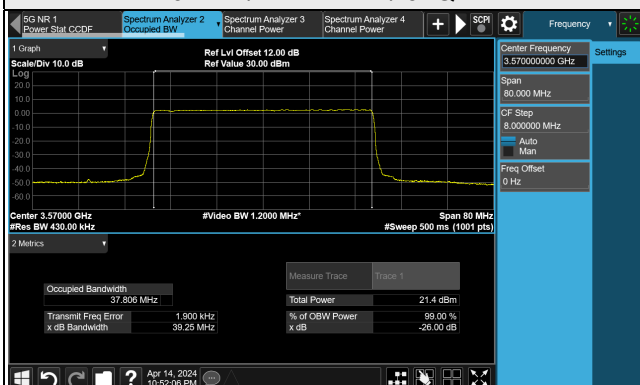
10MHz / Antenna 1 / QPSK



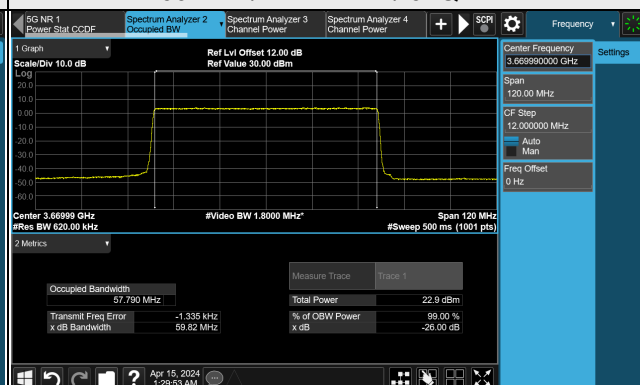
20MHz / Antenna 1 / QPSK



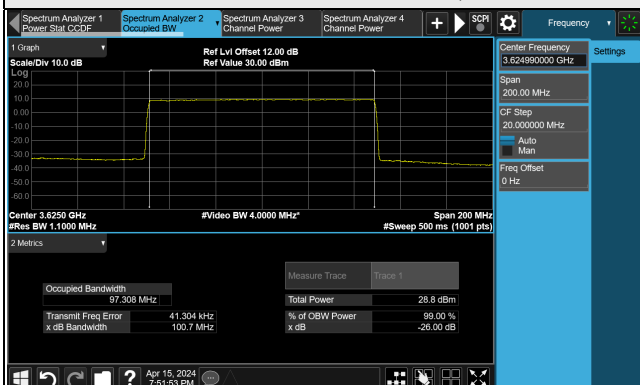
40MHz / Antenna 1 / 64QAM



60MHz / Antenna 1 / 64QAM



100MHz / Antenna 1 / 64QAM

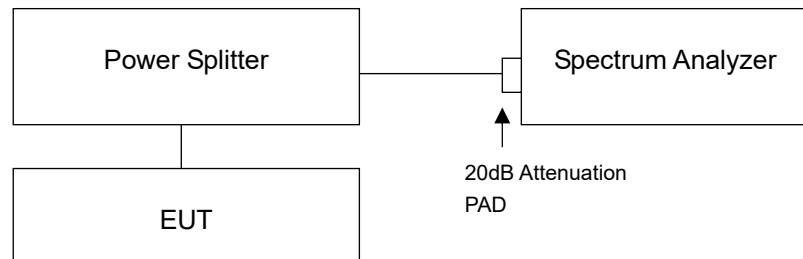


4.6 Peak to Average Ratio Measurement

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.6.4 Test Procedures

- Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.6.7 Test Results

NR Band 48, Channel Bandwidth 10MHz							
Channel	Frequency (MHz)	Peak To Average Ratio (dB)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
637000	3555.00	9.60	9.56	9.15	9.40	9.36	9.18
641666	3624.99	9.55	9.86	8.48	8.92	8.34	8.30
646332	3694.98	9.20	8.86	8.81	8.53	8.87	9.02
NR Band 48, Channel Bandwidth 20MHz							
Channel	Frequency (MHz)	Peak To Average Ratio (dB)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
637334	3560.01	9.80	8.66	8.89	10.02	9.09	9.33
641666	3624.99	8.94	8.21	8.78	9.71	8.84	9.02
646000	3690.00	9.36	8.87	8.59	8.74	9.02	8.70
NR Band 48, Channel Bandwidth 40MHz							
Channel	Frequency (MHz)	Peak To Average Ratio (dB)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
638000	3570.00	9.50	9.60	8.70	9.47	9.58	9.28
641666	3624.99	10.07	9.12	8.71	9.82	9.76	8.71
645332	3679.98	9.20	8.99	9.71	9.33	9.15	9.18

NR Band 48, Channel Bandwidth 60MHz

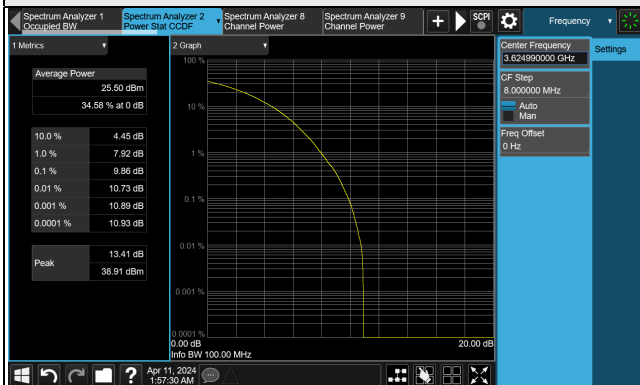
Channel	Frequency (MHz)	Peak To Average Ratio (dB)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
638668	3580.02	9.16	9.18	9.40	9.78	9.84	10.71
641666	3624.99	9.18	9.04	9.29	9.32	9.27	8.39
644666	3669.99	9.13	8.64	8.89	9.32	9.34	9.43

NR Band 48, Channel Bandwidth 100MHz

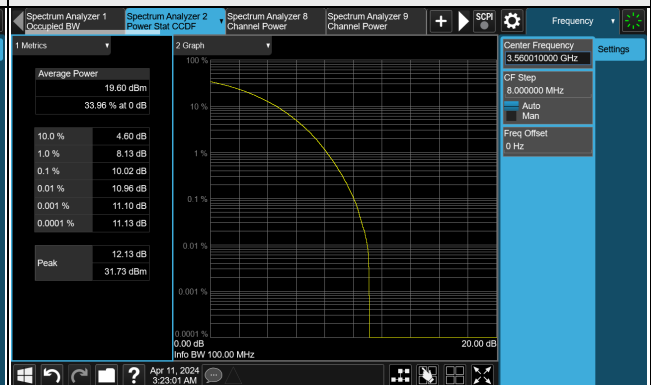
Channel	Frequency (MHz)	Peak To Average Ratio (dB)					
		Antenna 0			Antenna 1		
		QPSK	64QAM	256QAM	QPSK	64QAM	256QAM
640000	3600.00	9.29	9.51	8.80	8.75	8.82	9.47
641666	3624.99	10.58	9.13	8.55	9.27	9.59	9.55
643332	3649.98	9.95	8.90	9.29	9.39	8.98	8.74

Spectrum Plot of Worst Value

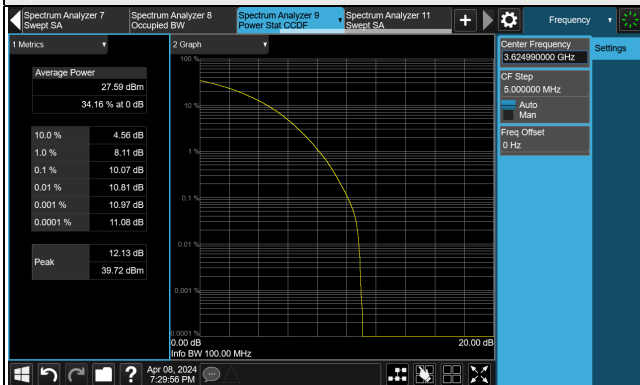
10MHz / Antenna 0 / 64QAM



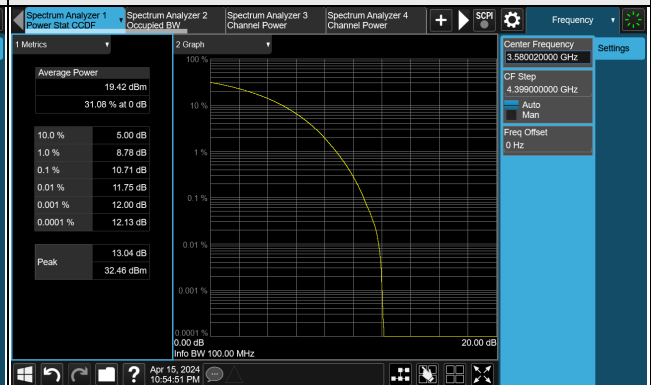
20MHz / Antenna 1 / QPSK



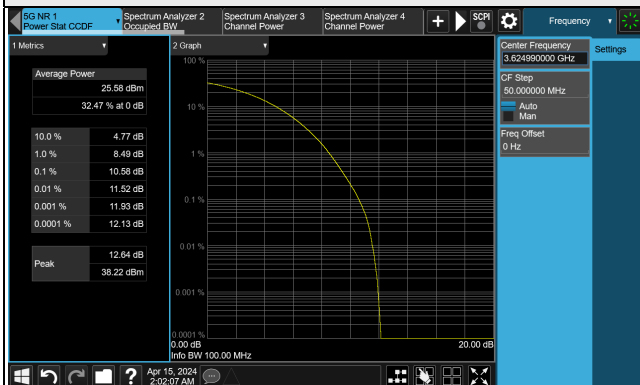
40MHz / Antenna 0 / QPSK



60MHz / Antenna 1 / 256QAM



100MHz / Antenna 0 / QPSK

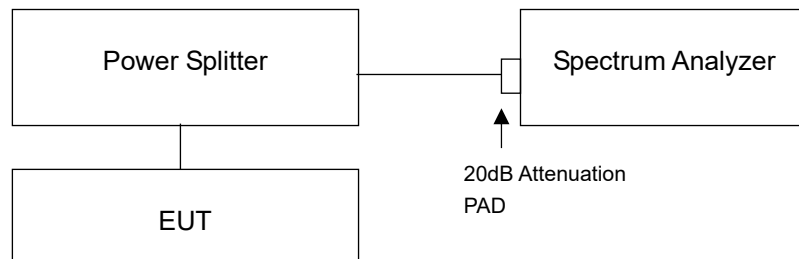


4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

Power of any emissions outside the Fundamental	Limit
Within 0-10MHz above the Assigned Channel	-13 dBm/MHz
Within 0-10MHz below the Assigned Channel	
Greater than 10MHz above the Assigned Channel	-25 dBm/MHz
Greater than 10MHz below the Assigned Channel	
Power of any emission below 3530MHz	-40 dBm/MHz
Power of any emission above 3720MHz	

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.7.4 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range are from 9 kHz to 40GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement. Detector = Average.
- Measuring frequency band edge, 20dB attenuation pad is connected with spectrum. 1% of the fundamental emission bandwidth is used for conducted emission measurement.

Note: Ref Lvl offset=12+3.01=15.01

$$10\log(\text{NumbersANT})=3.01$$

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Conditions

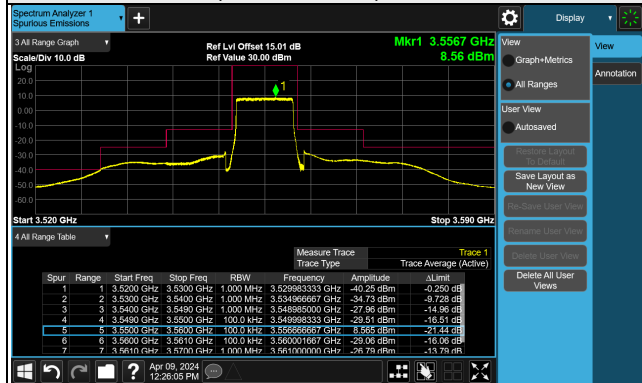
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

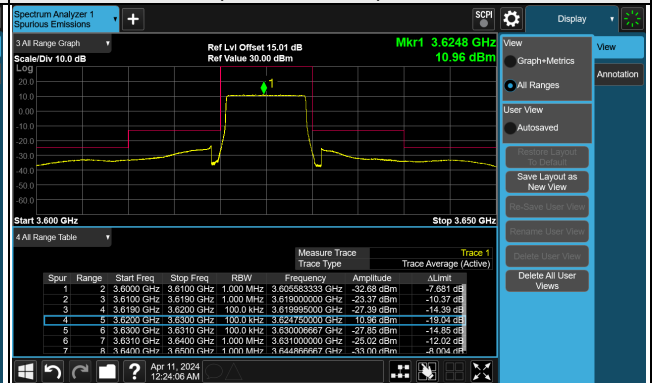
Antenna 0

NR Band 48, Channel Bandwidth 10MHz

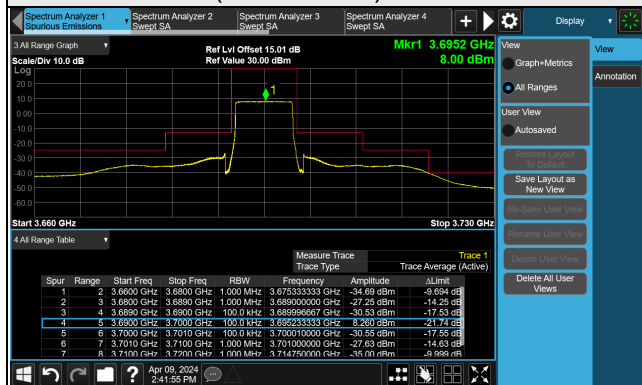
Channel 637000 (3555.00MHz)



Channel 641666 (3624.99MHz)



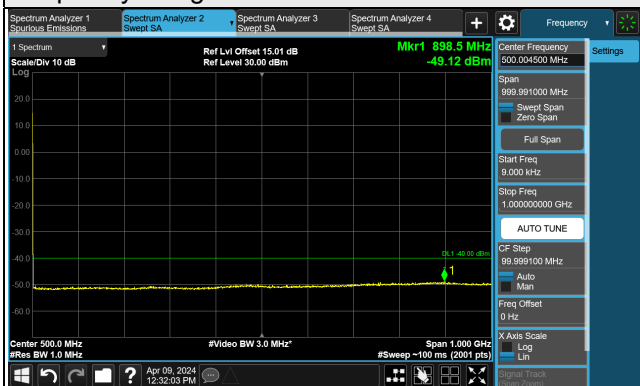
Channel 646332 (3694.98MHz)



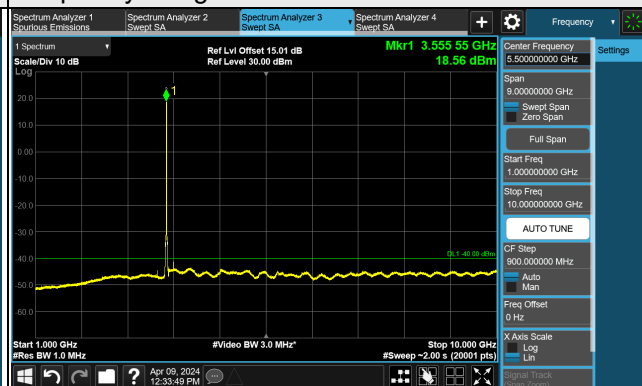
NR Band 48, Channel Bandwidth 10MHz

Channel 637000 (3555.00MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz

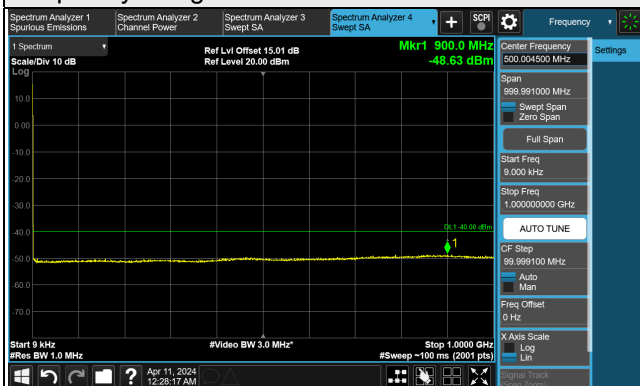


Note: The signal at 9 kHz is IF signal from spectrum analyzer.

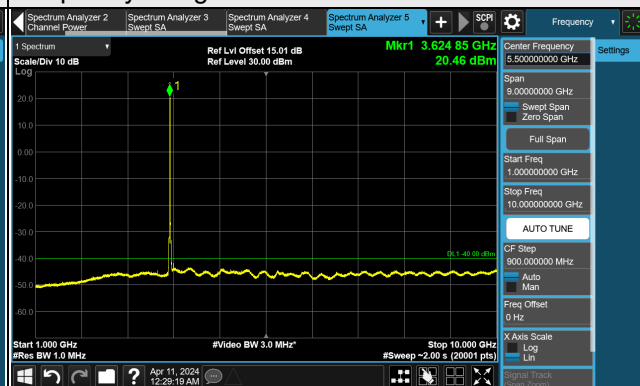
NR Band 48, Channel Bandwidth 10MHz

Channel 641666 (3624.99MHz)

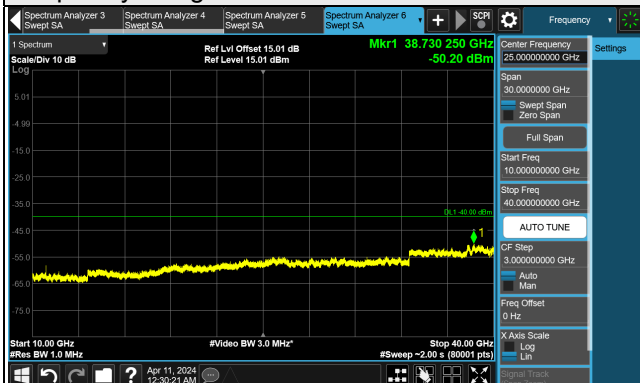
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz

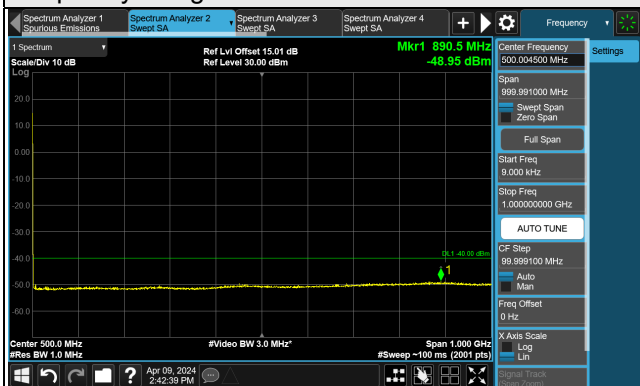


Note: The signal at 9 kHz is IF signal from spectrum analyzer.

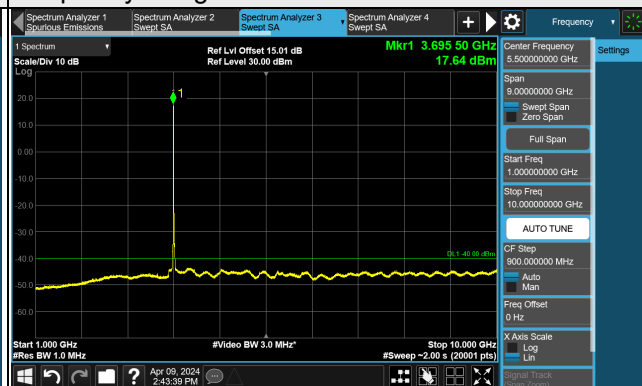
NR Band 48, Channel Bandwidth 10MHz

Channel 646332 (3694.98MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



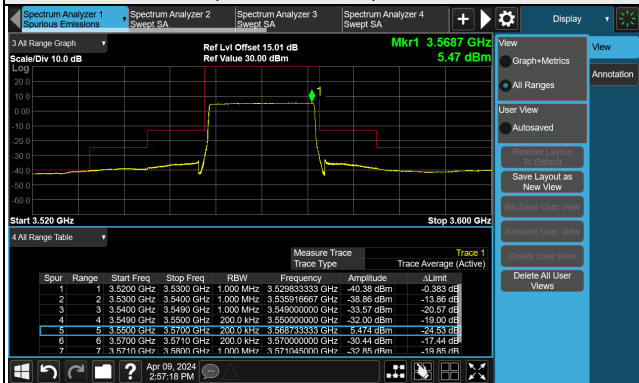
Frequency Range : 10GHz ~ 40GHz



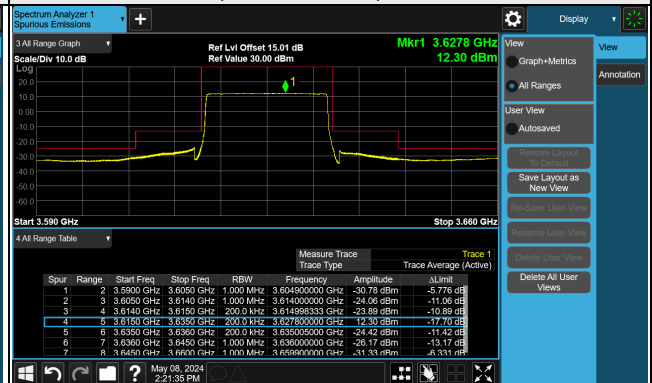
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

NR Band 48, Channel Bandwidth 20MHz

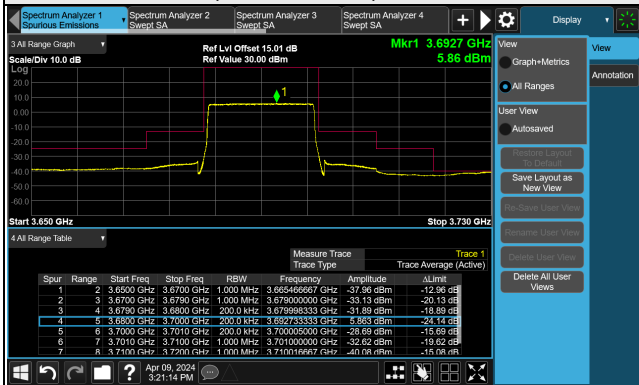
Channel 637334 (3560.01MHz)



Channel 641666 (3624.99MHz)



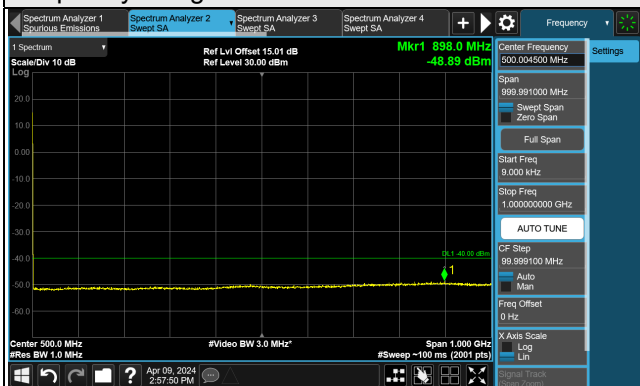
Channel 646000 (3690.00MHz)



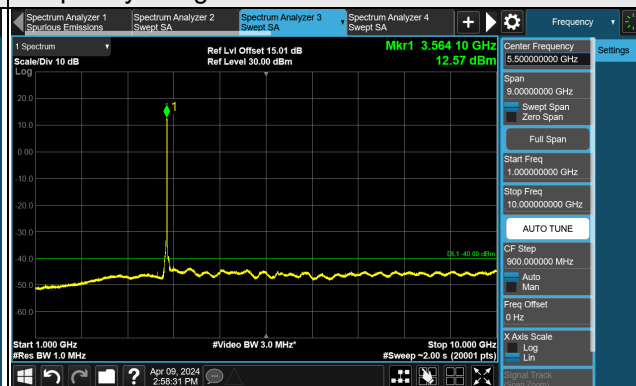
NR Band 48, Channel Bandwidth 20MHz

Channel 637334 (3560.01MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz



Note: The signal at 9 kHz is IF signal from spectrum analyzer.

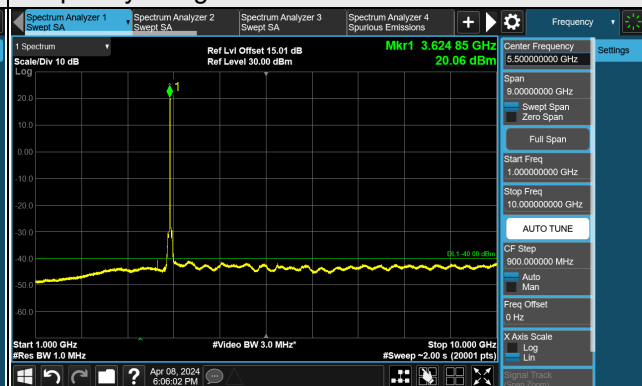
NR Band 48, Channel Bandwidth 20MHz

Channel 641666 (3624.99MHz)

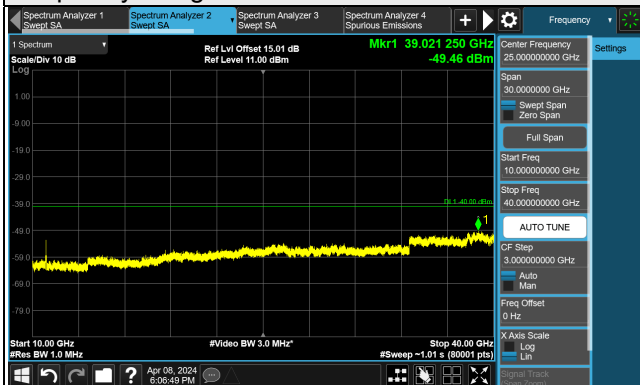
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz

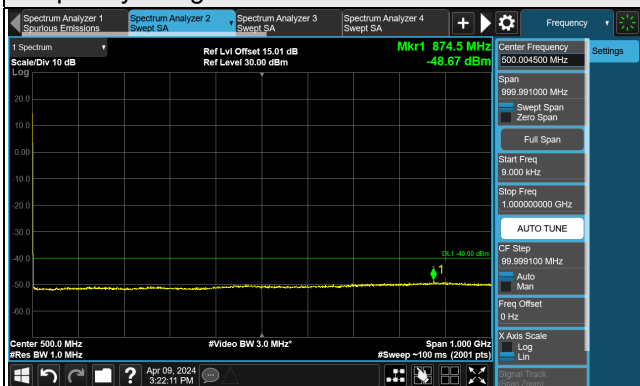


Note: The signal at 9 kHz is IF signal from spectrum analyzer.

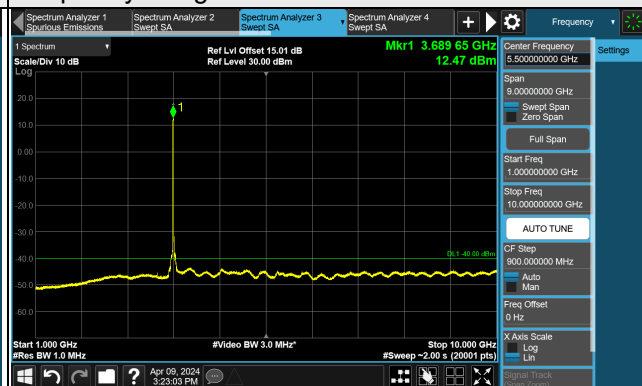
NR Band 48, Channel Bandwidth 20MHz

Channel 646000 (3690.00MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



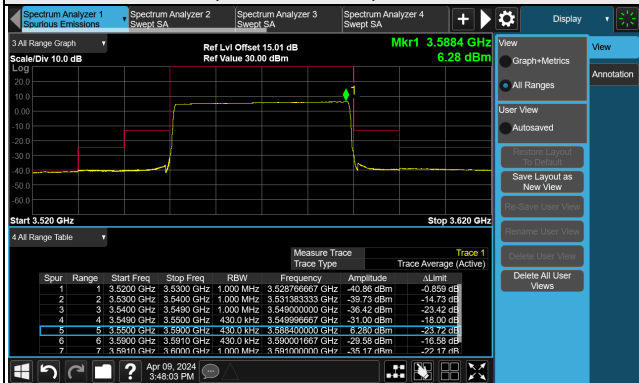
Frequency Range : 10GHz ~ 40GHz



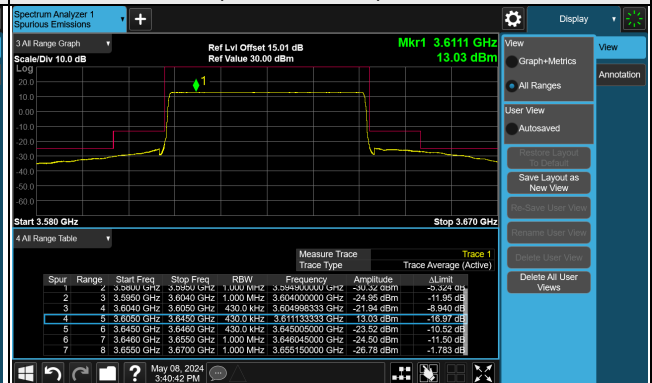
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

NR Band 48, Channel Bandwidth 40MHz

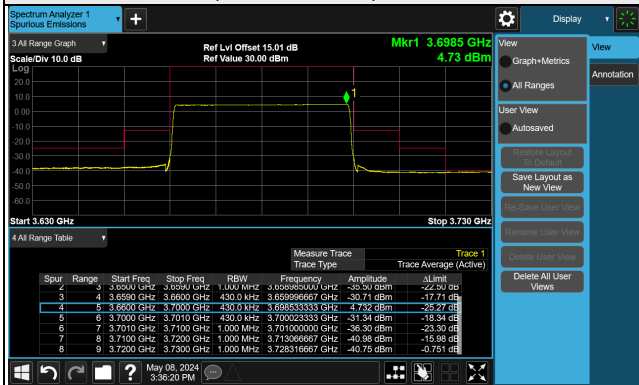
Channel 638000 (3570.00MHz)



Channel 641666 (3624.99MHz)



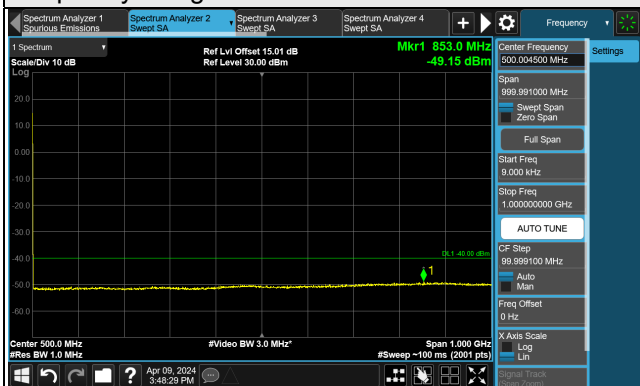
Channel 645332 (3679.98MHz)



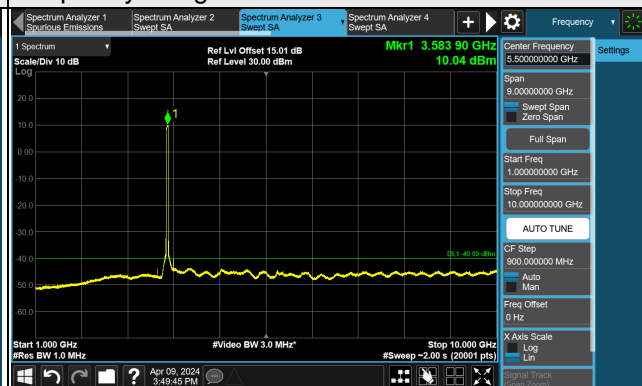
NR Band 48, Channel Bandwidth 40MHz

Channel 638000 (3570.00MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz



Note: The signal at 9 kHz is IF signal from spectrum analyzer.

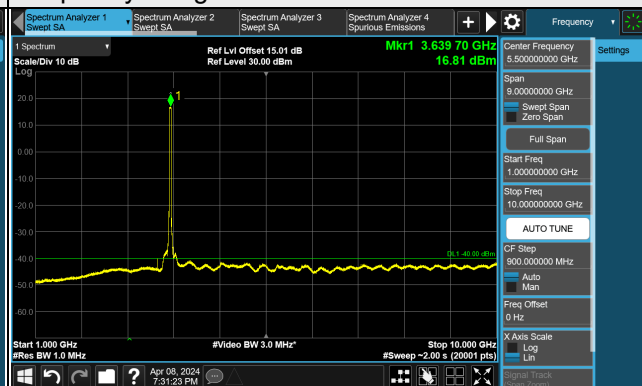
NR Band 48, Channel Bandwidth 40MHz

Channel 641666 (3624.99MHz)

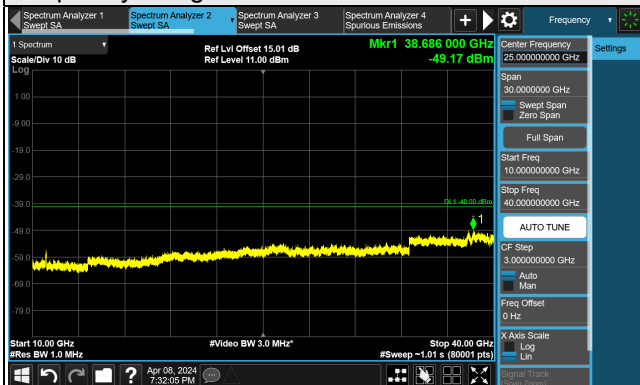
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz



Note: The signal at 9 kHz is IF signal from spectrum analyzer.

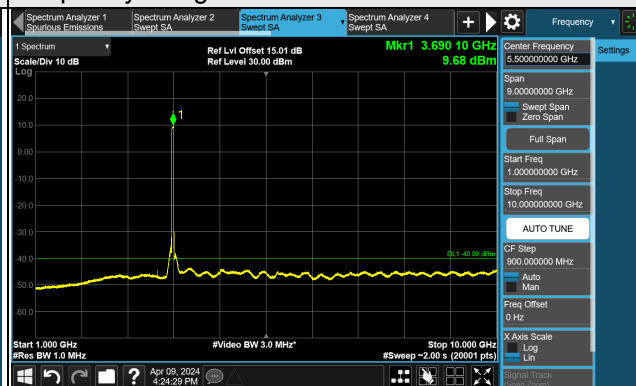
NR Band 48, Channel Bandwidth 40MHz

Channel 645332 (3679.98MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



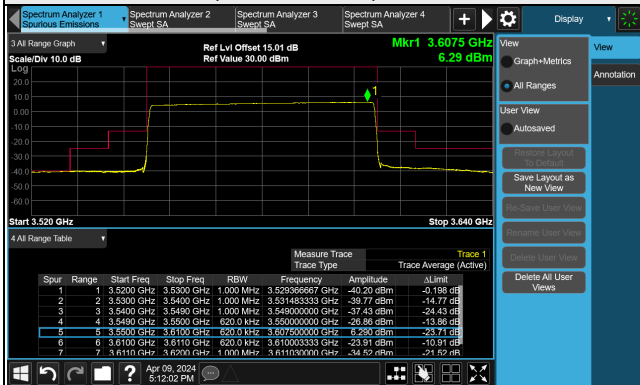
Frequency Range : 10GHz ~ 40GHz



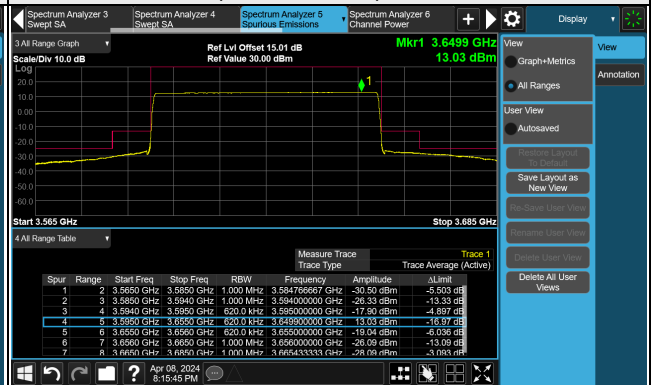
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

NR Band 48, Channel Bandwidth 60MHz

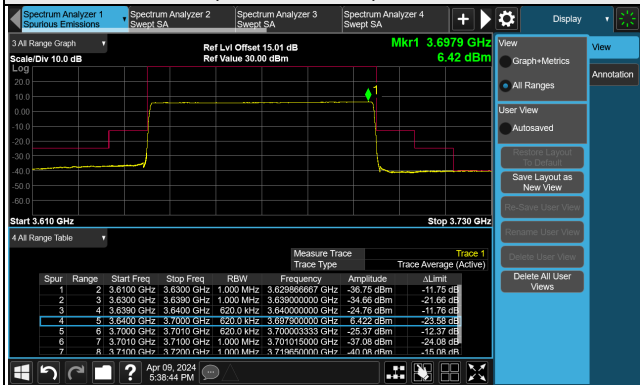
Channel 638668 (3580.02MHz)



Channel 641666 (3624.99MHz)



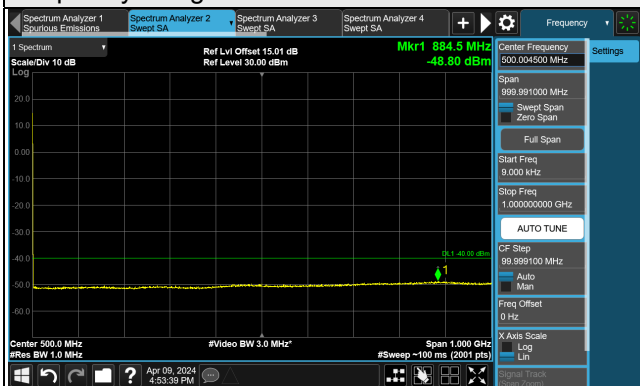
Channel 644666 (3669.99MHz)



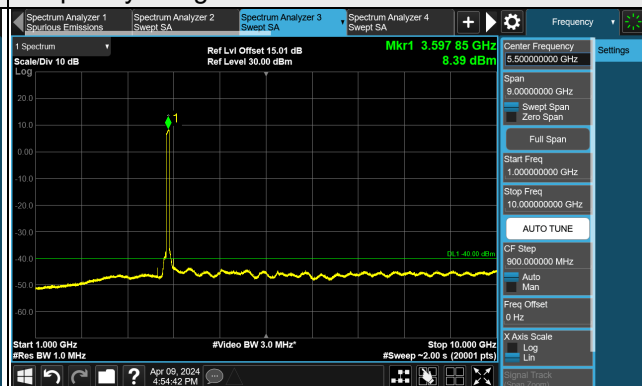
NR Band 48, Channel Bandwidth 60MHz

Channel 638668 (3580.02MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Frequency Range : 10GHz ~ 40GHz



Note: The signal at 9 kHz is IF signal from spectrum analyzer.