

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 96
47 CFR FCC Part 2

Report No.: RFBCM-N-WTW-P23100614-14

FCC ID: Q3N-RS38

Product: Mobile Computer

Brand: CIPHERLAB

Model No.: RS38

Received Date: 2023/11/12

Test Date: 2024/2/1 ~ 2024/8/1

Issued Date: 2024/8/20

Applicant: Cipherlab Co., Ltd.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / 788550 / TW0003 for Test Location(1)

Designation Number: 281270 / TW0032 for Test Location(2)

Approved by: Jeremy Lin, Date: 2024/8/20
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Prepared by : Pettie Chen / Senior Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBCM-N-WTW-P23100614-14	Original release.	2024/8/20

1 Certificate

Product: Mobile Computer

Brand: CIPHERLAB

Test Model: RS38

Sample Status: Engineering sample

Applicant: Cipherlab Co., Ltd.

Test Date: 2024/2/1 ~ 2024/8/1

Standard: 47 CFR FCC Part 96
47 CFR FCC Part 2

Measurement procedure: ANSI/TIA/EIA-603-E 2016
ANSI C63.26-2015
KDB 971168 D01 Power Meas License Digital Systems v03r01
KDB 940660 D01 Part 96 CBRS Eqpt v03
KDB 662911 D01 Multiple Transmitter Output v02r01

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.

2 Summary of Test Results

Standard / Clause	Test Item	Result	Remark
Part 2.1046 Part 96.41(b)	Maximum EIRP	Pass	Meet the requirement of limit.
Part 2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
Part 2.1046 Part 96.41(b)	Maximum Power Spectral Density	N/A	This device is End User Device.
Part 96.41(g)	Peak to Average Ratio	Pass	Meet the requirement of limit.
Part 2.1049	Bandwidth	Pass	Meet the requirement of limit.
Part 2.1051 Part 96.41(e)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
Part 2.1053 Part 96.41(e)	Radiated Spurious Emissions below 1GHz	Pass	Minimum passing margin is -3.14 dB at 44.55 MHz
Part 2.1053 Part 96.41(e)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -0.15 dB at 7380.00 MHz
Part 2.1055	Frequency Stability	Pass	Meet the requirement of limit.

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:

Parameter	Specification	Uncertainty (±)
Effective Radiated Power and Equivalent Isotropically Radiated Power	-	1.371 dB
Peak to Average Ratio	-	0.920 dB
Bandwidth	-	960 Hz
Conducted Spurious Emissions	-	2.12 dB
Radiated Spurious Emissions below 1GHz	9 kHz ~ 30 MHz	3 dB
	30 MHz ~ 1 GHz	2.93 dB
Radiated Spurious Emissions above 1GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 dB
Frequency Stability	-	0.176 ppm

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Mobile Computer
Brand	CIPHERLAB
Test Model	RS38
Status of EUT	Engineering sample
Power Supply Rating	3.87 Vdc (from battery) 5 Vdc (from adapter or host equipment)

Note:

1. EUT Overview

Mode	Bandwidth	TX Frequency Range (MHz)	Modulation	Max. EIRP (W)	Max. EIRP (dBm)	Emission Designator
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) (SISO)	20 MHz	3560.01 ~ 3690	DFT-S BPSK	0.119	20.77	18M0G7D
			DFT-S QPSK	0.123	20.90	-
			DFT-S 16QAM	0.097	19.87	-
			DFT-S 64QAM	0.068	18.32	-
			DFT-S 256QAM	0.043	16.32	-
			CP QPSK	0.076	18.83	-
	40 MHz	3570 ~ 3679.98	DFT-S BPSK	0.120	20.79	37M6G7D
			DFT-S QPSK	0.124	20.93	-
			DFT-S 16QAM	0.099	19.97	-
			DFT-S 64QAM	0.069	18.39	-
			DFT-S 256QAM	0.044	16.39	-
			CP QPSK	0.077	18.88	-
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) (MIMO)	20 MHz	3560.01 ~ 3690	QPSK	0.187	22.73	18M2G7D
			16QAM	0.147	21.66	18M2D7W
			64QAM	0.104	20.17	18M2D7W
			256QAM	0.062	17.91	18M2D7W
	40 MHz	3570 ~ 3679.98	QPSK	0.189	22.77	37M8G7D
			16QAM	0.149	21.73	37M9D7W
			64QAM	0.105	20.20	37M9D7W
			256QAM	0.063	17.97	37M9D7W

2. 5GNR n48 support SISO and MIMO mode. After pretesting, MIMO mode was the worst for final tests.

3. The EUT uses following accessories.

Item	Brand	Model	Specification
Adapter	Channel WELL Technology	2AEA010BC3D	AC Input: 100-240 Vac, 50/60 Hz, 0.35 A DC Output: 5.0 Vdc, 2.0 A, 10.0 W
Reader 1	Zebra	SE4770	-
Reader 2	Zebra	SE4100	-
Reader 3	Zebra	SE5500	-
1st Battery	CIPHERLAB	BA-0174A5	3.87 Vdc, 4500 mAh, 17.42 Wh
2nd Battery	Chongqing VDL Electronics Co., Ltd	341322PM4	3.85 Vdc, 90 mAh
USB To Type C Cable	SUNCA CO., LTD	1Q11512211-XJ	0.9 m

* After pretesting, Reader 1 and 1st Battery were the worst case and chosen for final test.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type	LDS					
Antenna Connector	spring					
Item	Band	Freq. Range (MHz)	Gain (dBi)			
			Ant. 0	Ant. 5	Ant. 6	Ant. 7
	5GNR n48	3550~3700	-	-1	-	-2.5

*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.3 Test Mode Applicability and Tested Channel Detail

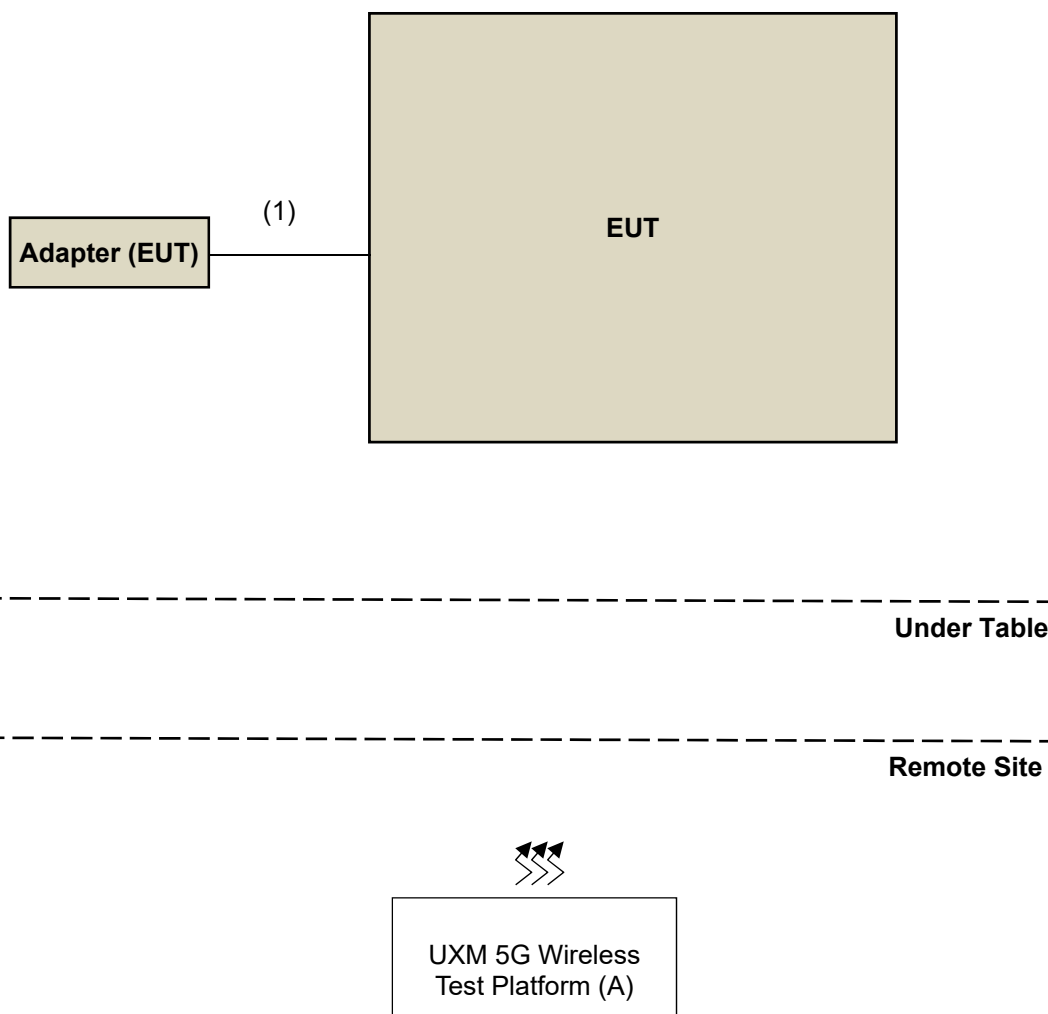
3.3.1 NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz)

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Maximum EIRP	637334 (3560.01 MHz) 641666 (3624.99 MHz) 646000 (3690.00 MHz)	20 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB
	638000 (3570.00 MHz) 641666 (3624.99 MHz) 645332 (3679.98 MHz)	40 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB
Modulation Characteristics	641666 (3624.99 MHz)	40 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	Full RB
Peak to Average Ratio	637334 (3560.01 MHz) 641666 (3624.99 MHz) 646000 (3690.00 MHz)	20 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB
	638000 (3570.00 MHz) 641666 (3624.99 MHz) 645332 (3679.98 MHz)	40 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	1 RB
Bandwidth	637334 (3560.01 MHz) 641666 (3624.99 MHz) 646000 (3690.00 MHz)	20 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	Full RB
	638000 (3570.00 MHz) 641666 (3624.99 MHz) 645332 (3679.98 MHz)	40 MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	Full RB
Conducted Spurious Emissions	637334 (3560.01 MHz) 641666 (3624.99 MHz) 646000 (3690.00 MHz)	20 MHz	QPSK	1 RB Full RB
	638000 (3570.00 MHz) 641666 (3624.99 MHz) 645332 (3679.98 MHz)	40 MHz	QPSK	1 RB Full RB
Radiated Spurious Emissions below 1GHz	646000 (3690.00 MHz)	20 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	637334 (3560.01 MHz) 641666 (3624.99 MHz) 646000 (3690.00 MHz)	20 MHz	QPSK	1 RB
	638000 (3570.00 MHz) 641666 (3624.99 MHz) 645332 (3679.98 MHz)	40 MHz	QPSK	1 RB
Frequency Stability	637334 (3560.01 MHz) 646000 (3690.00 MHz)	20 MHz	QPSK	Full RB
	638000 (3570.00 MHz) 645332 (3679.98 MHz)	40 MHz	QPSK	Full RB

3.4 Test Program Used and Operation Descriptions

There is no need to controlling software during the test, and the EUT can be paired with the Radio Communication Analyzer to test the connection when it is powered on.

3.5 Connection Diagram of EUT and Peripheral Devices



3.6 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	UXM 5G Wireless Test Platform	Keysight	E7515B	MY58300759	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB To Type C Cable	1	0.9	Y	0	Accessory of EUT

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Maximum EIRP

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030B	MY57140938	2023/3/16 2024/3/20	2024/3/15 2025/3/19
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A
UXM 5G Wireless Test Platform Keysight	E7515B	MY60102115	2023/5/25 2024/5/26	2024/5/24 2025/5/25

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/2/1 ~ 2024/8/1

4.2 Modulation Characteristics

Refer to section 4.1 to get the tested date and information of the instruments.

4.3 Peak to Average Ratio

Refer to section 4.1 to get the tested date and information of the instruments.

4.4 Bandwidth

Refer to section 4.1 to get the tested date and information of the instruments.

4.5 Conducted Spurious Emissions

Refer to section 4.1 to get the tested date and information of the instruments.

4.6 Radiated Spurious Emissions below 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1213	2023/10/13	2024/10/12
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
MXA Signal Analyzer Keysight	N9020B	MY60110513	2023/12/22	2024/12/21
Preamplifier EMCI	EMC330N	980782	2024/1/15	2025/1/14
	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-500	201233	2024/1/15	2025/1/14
	EMCCFD400-NM-NM-3000	201235	2024/1/15	2025/1/14
	EMCCFD400-NM-NM-9000	201236(with PAD)	2024/1/15	2025/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2024/7/19

4.7 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Horn Antenna RFSPIN	DRH18-E	210103A18E	2023/11/12	2024/11/11
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2023/11/12	2024/11/11
MXA Signal Analyzer Keysight	N9020B	MY60110513	2023/12/22	2024/12/21
Preamplifier EMCI	EMC118A45SE	980808	2023/12/28	2024/12/27
	EMC184045SE	980788	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2024/1/15	2025/1/14
	EMC101G-KM-KM-3000	201258	2024/1/15	2025/1/14
	EMC101G-KM-KM-5000	201261	2024/1/15	2025/1/14
	EMC104-SM-SM-1000	210102	2024/1/15	2025/1/14
	EMC104-SM-SM-3000	201231	2024/1/15	2025/1/14
	EMC104-SM-SM-9000	201243	2024/1/15	2025/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2024/7/18

4.8 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
3-channel DC power supply JIN YIH Technology	ODP3033	ODP30332128138	N/A	N/A
Digital Multimeter Fluke	8050A	4660081	2024/6/14	2025/6/13
PXA Signal Analyzer Keysight	N9030B	MY57140938	2024/3/20	2025/3/19
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber Terchy	HRM-120RF	931022	2023/12/19	2024/12/18
UXM 5G Wireless Test Platform Keysight	E7515B	MY60102115	2024/5/26	2025/5/25

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/8/1

5 Limits of Test Items

5.1 Maximum EIRP

Device		Maximum EIRP (dBm/10 MHz)
☒	End User Device	23
☐	Category A CBSD	30
☐	Category B CBSD	47

5.2 Modulation Characteristics

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

5.3 Peak to Average Ratio

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.

5.4 Bandwidth

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.

5.5 Conducted Spurious Emissions

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 to B MHz (where B is the bandwidth in MHz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B MHz below the lower CBSD-assigned channel edge. At all frequencies greater than B MHz above the upper CBSD assigned channel edge and less than B MHz below the lower CBSD-assigned channel edge, the conducted power of any end user device emission shall not exceed -25 dBm/MHz.

Additional protection levels: The conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

5.6 Radiated Spurious Emissions below 1GHz

The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

5.7 Radiated Spurious Emissions above 1GHz

The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

5.8 Frequency Stability

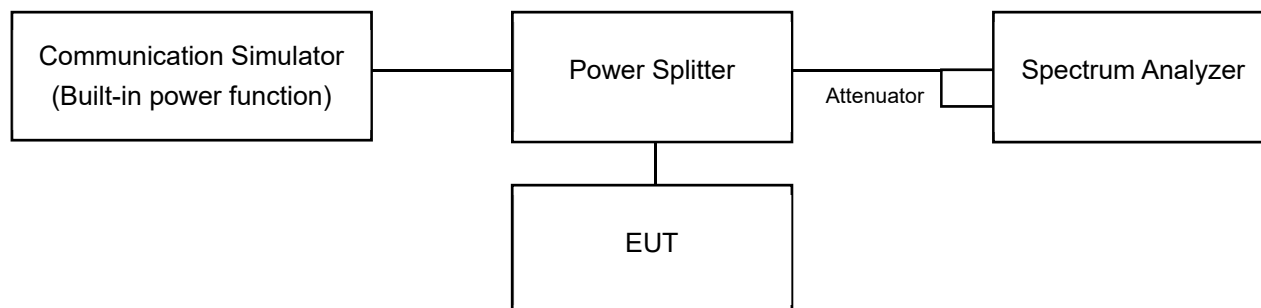
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

6 Test Arrangements

6.1 Maximum EIRP

6.1.1 Test Setup

Conducted Power Measurement:



6.1.2 Test Procedure

Conducted Power Measurement:

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology and link to spectrum analyzer measurements. Set the EUT to transmit under low, middle and high channel and record the power level shown on spectrum analyzer. Power measurements use detector average (rms).

Measurement method refers to ANSI C63.26 section 5.2.4.4.

- Set span to 2 × to 3 × the OBW.
- Set RBW = 1% to 5% of the OBW.
- Set VBW ≥ 3 × RBW.
- Set number of measurement points in sweep ≥ 2 × span / RBW.
- Set Sweep time = auto-couple.
- Detector = power averaging (rms).
- Set sweep trigger to “free run.”
- Trace average at least 100 traces in power averaging (rms) mode.
- Use the Band/Channel Power function to determine the integrated power per 10 MHz bandwidth and full bandwidth, according to the 47 CFR FCC Part 96 standard.
- If Duty cycle < 98%, Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

Maximum EIRP / ERP

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

$$\text{EIRP} = P_{\text{Meas}} + G_T$$

$$\text{ERP} = P_{\text{Meas}} + G_T - 2.15$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively

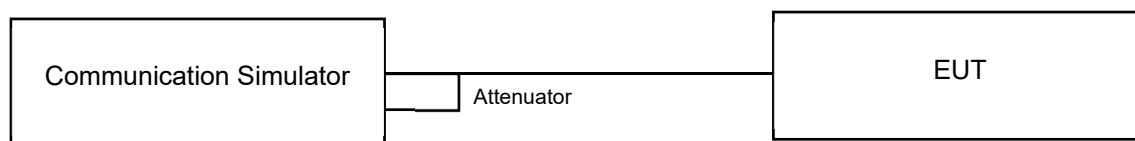
(expressed in the same units as P_{Meas} , e.g., dBm or dBW)

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)

6.2 Modulation Characteristics

6.2.1 Test Setup

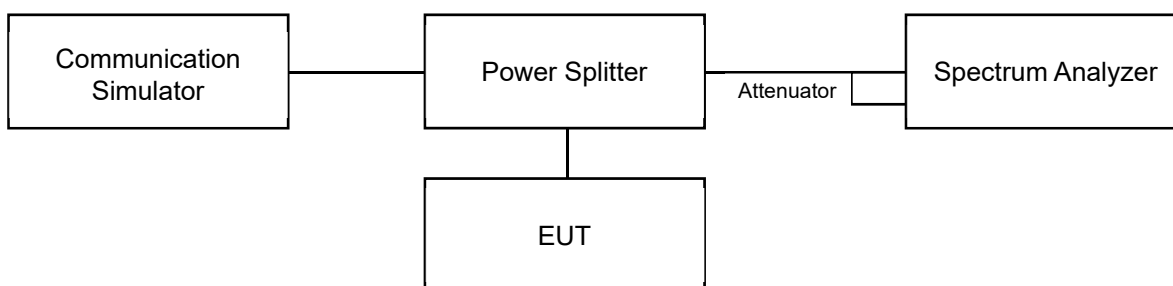


6.2.2 Test Procedure

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.

6.3 Peak to Average Ratio

6.3.1 Test Setup

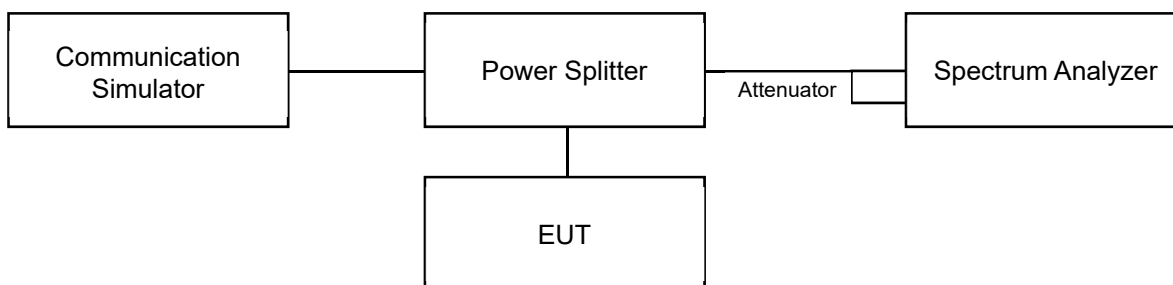


6.3.2 Test Procedure

- 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%.

6.4 Bandwidth

6.4.1 Test Setup



6.4.2 Test Procedure

For the 26 dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

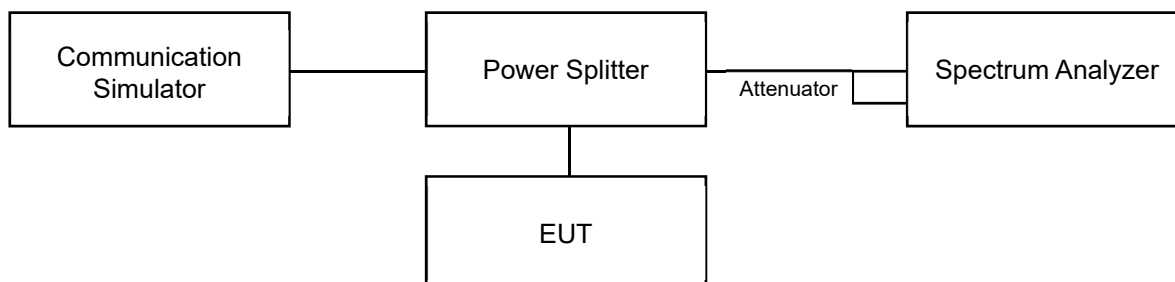
- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- 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.
- Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- Determine the following reference values: 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).
- 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.
- Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

- 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 $\geq 3 \times$ RBW.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- 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:
 - g. 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
 - h. 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- i. 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.
- j. If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
- k. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the “-X dB amplitude” at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “-X dB amplitude.”
- l. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.5 Conducted Spurious Emissions

6.5.1 Test Setup



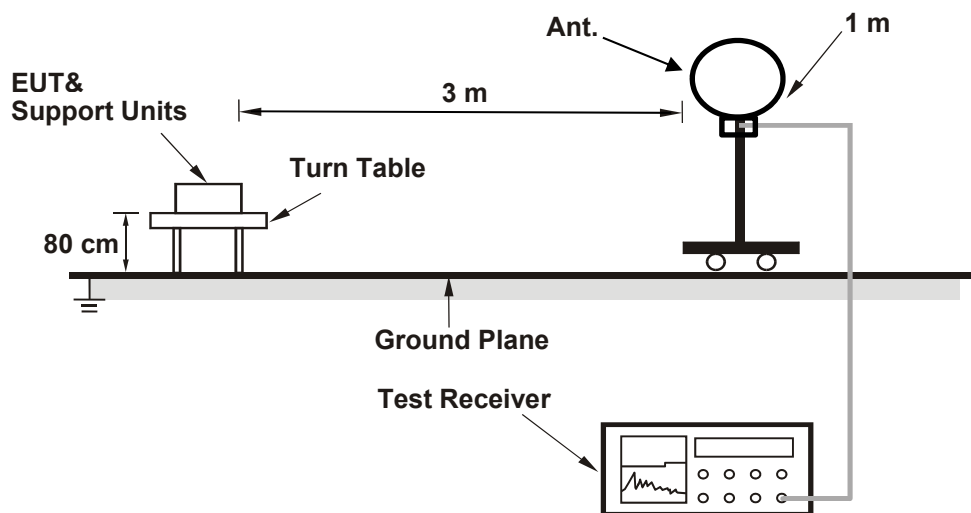
6.5.2 Test Procedure

- a. Measurement refer to ANSI C63.26 section 5.7.
- b. All measurements were done at 3 channels: low, middle and high operational frequency range.
- c. Measuring frequency range is from 9 kHz up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. 20 dB attenuation pad is connected with spectrum.
- d. The fundamental frequency above 1 GHz, the spectrum set RBW = 1 MHz, VBW = 3 MHz, Detector = Average.
- e. The fundamental frequency below 1 GHz, the spectrum set RBW $\geq$ 100 kHz, VBW $\geq$ 3 x RBW, Detector = Average.
- f. Measuring frequency band edge, narrow RBW (no less than 1% of the OBW) is used for conducted emission measurement.
- g. For the emissions measurement method, certain channel BW modes demonstrate compliance by integrating with the smaller RBW allowed by the rule.
- h. e.g. Where Reference RBW = 1 MHz and a smaller RBW = 100 kHz is used, worst-case integrated BW power = [Max Measured Value (dBm) with RBW = 100 kHz] + $10 \cdot \log(1000/100)$. To compensate for this integration before comparison to the limit, the limit line was reduced by 10 dB accordingly.
- i. The device has MIMO function, so the limit of conducted spurious emissions need to be measurement add $10\log(\text{Numbers}_{\text{ANT}})$ according to FCC KDB 662911 D01 guidance. Therefore, the $10\log(\text{Numbers}_{\text{ANT}})$ value is added to the spectrum Ref. level offset during testing.
- j. Record the maximum power value test plot.

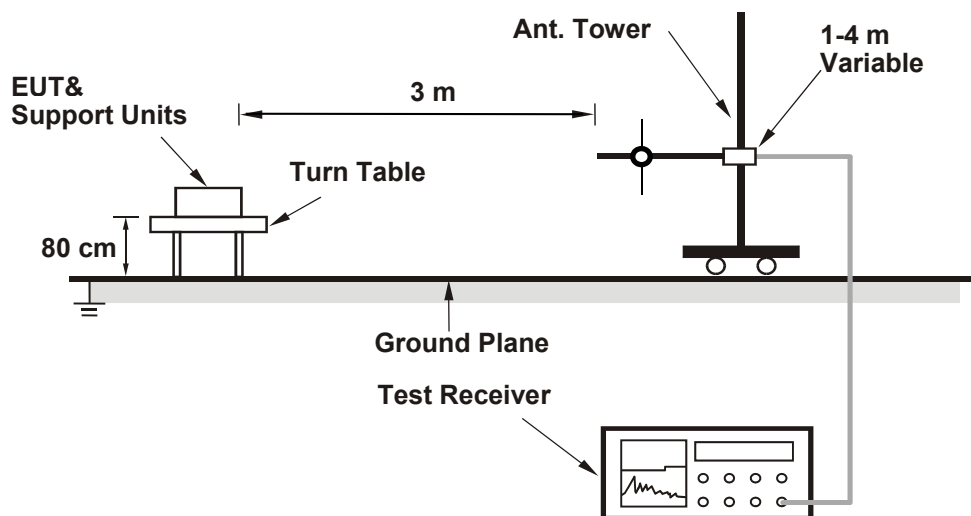
6.6 Radiated Spurious Emissions below 1GHz

6.6.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.6.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- Following ANSI C63.26 section 5.5 and 5.2.7
- $EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
- $ERP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

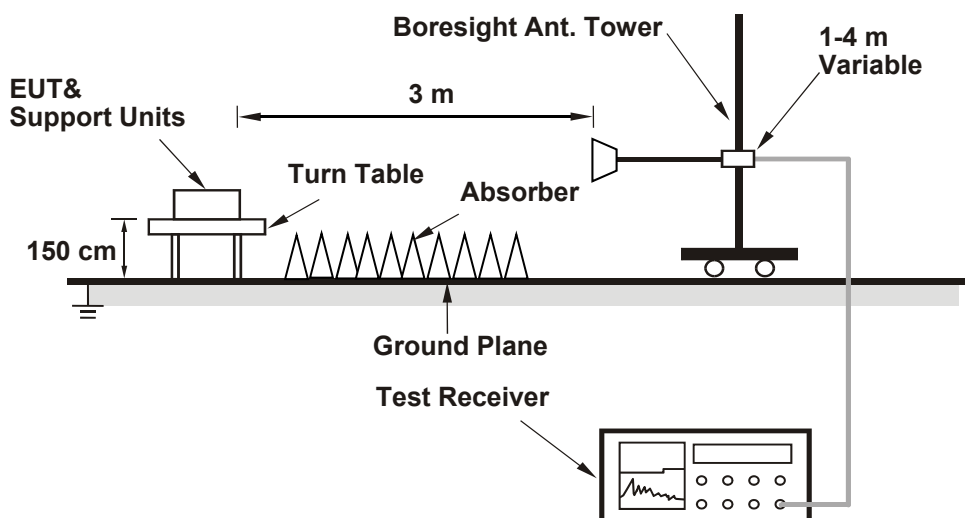
Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.
- The amplitude of spurious emissions in the range 9 kHz to 30 MHz which are attenuated more than 20 dB below the permissible value need not be reported.

6.7 Radiated Spurious Emissions above 1GHz

6.7.1 Test Setup

For radiated emission above 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.7.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

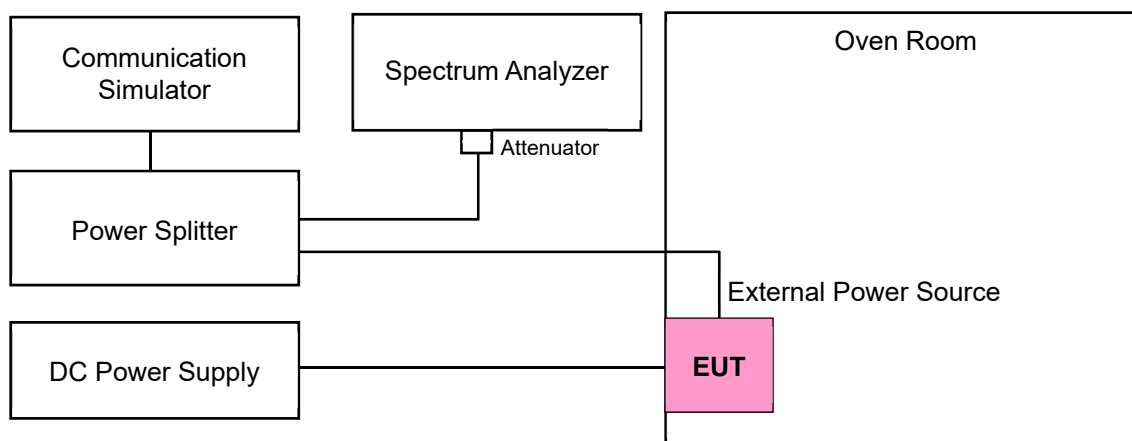
- In the semi-anechoic chamber, EUT placed on the 1.5 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- Following ANSI C63.26 section 5.5 and 5.2.7
- $EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
- $ERP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.

6.8 Frequency Stability

6.8.1 Test Setup



6.8.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- 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 $\pm 0.5^{\circ}C$ 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.

7 Test Results of Test Item

7.1 Maximum EIRP

Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 71% RH	Tested By:	James Yang
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7.1.1 NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 20 MHz, Output Power: Full Power

NR n48 SCS 30 kHz 20M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
DFT-S BPSK	1	1	21.77	21.61	21.54
DFT-S QPSK	1	1	21.90	21.73	21.67
	1	26	21.73	21.71	21.61
	1	49	21.60	21.52	21.49
	25	0	20.74	20.75	20.68
	25	13	21.76	21.63	21.55
	25	26	20.67	20.64	20.54
	50	0	20.79	20.77	20.69
DFT-S 16QAM	1	1	20.87	20.86	20.87
DFT-S 64QAM	1	1	19.32	19.26	19.18
DFT-S 256QAM	1	1	17.32	17.31	17.22
CP QPSK	1	1	19.83	19.79	19.81

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.54	21.77	20.54	20.77	23
DFT-S QPSK	20.54	21.90	19.54	20.90	23
DFT-S 16QAM	20.86	20.87	19.86	19.87	23
DFT-S 64QAM	19.18	19.32	18.18	18.32	23
DFT-S 256QAM	17.22	17.32	16.22	16.32	23
CP QPSK	19.79	19.83	18.79	18.83	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 40 MHz, Output Power: Full Power

NR n48 SCS 30 kHz 40M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
DFT-S BPSK	1	1	21.79	21.61	21.54
DFT-S QPSK	1	1	21.93	21.73	21.67
	1	53	21.81	21.71	21.61
	1	104	21.69	21.52	21.49
	50	0	20.82	20.75	20.68
	50	28	21.78	21.63	21.55
	50	56	20.76	20.64	20.54
	100	0	20.85	20.77	20.69
DFT-S 16QAM	1	1	20.97	20.86	20.87
DFT-S 64QAM	1	1	19.39	19.26	19.18
DFT-S 256QAM	1	1	17.39	17.31	17.22
CP QPSK	1	1	19.88	19.79	19.81

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.54	21.79	20.54	20.79	23
DFT-S QPSK	20.54	21.93	19.54	20.93	23
DFT-S 16QAM	20.86	20.97	19.86	19.97	23
DFT-S 64QAM	19.18	19.39	18.18	18.39	23
DFT-S 256QAM	17.22	17.39	16.22	16.39	23
CP QPSK	19.79	19.88	18.79	18.88	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 20 MHz, Output Power: dBm/10 MHz

NR n48 SCS 30 kHz 20M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
DFT-S BPSK	1	1	21.65	21.50	21.34
DFT-S QPSK	1	1	21.79	21.61	21.57
	1	26	21.53	21.56	21.50
	1	49	21.44	21.41	21.38
	25	0	20.64	20.64	20.50
	25	13	21.65	21.43	21.35
	25	26	20.53	20.54	20.38
	50	0	20.63	20.59	20.57
DFT-S 16QAM	1	1	20.69	20.72	20.73
DFT-S 64QAM	1	1	19.12	19.09	18.98
DFT-S 256QAM	1	1	16.16	16.18	16.10
CP QPSK	1	1	19.71	19.59	19.64

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.34	21.65	20.34	20.65	23
DFT-S QPSK	20.38	21.79	19.38	20.79	23
DFT-S 16QAM	20.69	20.73	19.69	19.73	23
DFT-S 64QAM	18.98	19.12	17.98	18.12	23
DFT-S 256QAM	16.10	16.18	15.10	15.18	23
CP QPSK	19.59	19.71	18.59	18.71	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 40 MHz, Output Power: dBm/10 MHz

NR n48 SCS 30 kHz 40M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
DFT-S BPSK	1	1	21.68	21.49	21.42
DFT-S QPSK	1	1	21.80	21.57	21.57
	1	53	21.70	21.60	21.45
	1	104	21.50	21.33	21.29
	50	0	20.72	20.57	20.52
	50	28	21.66	21.53	21.38
	50	56	20.63	20.52	20.42
	100	0	20.65	20.63	20.59
DFT-S 16QAM	1	1	20.81	20.75	20.70
DFT-S 64QAM	1	1	19.27	19.10	19.03
DFT-S 256QAM	1	1	13.19	13.11	13.02
CP QPSK	1	1	19.72	19.64	19.61

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.42	21.68	20.42	20.68	23
DFT-S QPSK	20.42	21.80	19.42	20.80	23
DFT-S 16QAM	20.70	20.81	19.70	19.81	23
DFT-S 64QAM	19.03	19.27	18.03	18.27	23
DFT-S 256QAM	13.02	13.19	12.02	12.19	23
CP QPSK	19.61	19.72	18.61	18.72	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 20 MHz, Output Power: Full Power

NR n48 SCS 30 kHz 20M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
DFT-S BPSK	1	1	21.55	21.57	21.75
DFT-S QPSK	1	1	21.62	21.63	21.74
	1	26	21.47	21.59	21.58
	1	49	21.45	21.64	21.77
	25	0	20.40	20.44	20.63
	25	13	21.51	21.61	21.67
	25	26	20.42	20.50	20.60
	50	0	20.41	20.46	20.50
DFT-S 16QAM	1	1	20.64	20.73	20.88
DFT-S 64QAM	1	1	19.36	19.34	19.44
DFT-S 256QAM	1	1	17.25	17.29	17.38
CP QPSK	1	1	20.18	20.29	20.32

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.55	21.75	19.05	19.25	23
DFT-S QPSK	20.40	21.77	17.90	19.27	23
DFT-S 16QAM	20.64	20.88	18.14	18.38	23
DFT-S 64QAM	19.34	19.44	16.84	16.94	23
DFT-S 256QAM	17.25	17.38	14.75	14.88	23
CP QPSK	20.18	20.32	17.68	17.82	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 40 MHz, Output Power: Full Power

NR n48 SCS 30 kHz 40M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
DFT-S BPSK	1	1	21.59	21.65	21.82
DFT-S QPSK	1	1	21.68	21.73	21.83
	1	53	21.56	21.59	21.65
	1	104	21.51	21.68	21.77
	50	0	20.43	20.45	20.64
	50	28	21.58	21.62	21.73
	50	56	20.45	20.52	20.67
	100	0	20.42	20.52	20.59
DFT-S 16QAM	1	1	20.73	20.76	20.89
DFT-S 64QAM	1	1	19.43	19.43	19.43
DFT-S 256QAM	1	1	17.31	17.38	17.41
CP QPSK	1	1	20.27	20.33	20.42

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.59	21.82	19.09	19.32	23
DFT-S QPSK	20.42	21.83	17.92	19.33	23
DFT-S 16QAM	20.73	20.89	18.23	18.39	23
DFT-S 64QAM	19.43	19.43	16.93	16.93	23
DFT-S 256QAM	17.31	17.41	14.81	14.91	23
CP QPSK	20.27	20.42	17.77	17.92	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 20 MHz, Output Power: dBm/10 MHz

NR n48 SCS 30 kHz 20M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
DFT-S BPSK	1	1	21.41	21.40	21.64
DFT-S QPSK	1	1	21.51	21.50	21.63
	1	26	21.33	21.47	21.42
	1	49	21.35	21.49	21.67
	25	0	20.23	20.25	20.46
	25	13	21.41	21.45	21.52
	25	26	20.24	20.39	20.42
	50	0	20.28	20.36	20.34
DFT-S 16QAM	1	1	20.48	20.61	20.70
DFT-S 64QAM	1	1	19.20	19.22	19.26
DFT-S 256QAM	1	1	16.15	16.14	16.23
CP QPSK	1	1	20.03	20.12	20.15

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.40	21.64	18.90	19.14	23
DFT-S QPSK	20.23	21.67	17.73	19.17	23
DFT-S 16QAM	20.48	20.70	17.98	18.20	23
DFT-S 64QAM	19.20	19.26	16.70	16.76	23
DFT-S 256QAM	16.14	16.23	13.64	13.73	23
CP QPSK	20.03	20.15	17.53	17.65	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 40 MHz, Output Power: dBm/10 MHz

NR n48 SCS 30 kHz 40M					
Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
DFT-S BPSK	1	1	21.44	21.49	21.72
DFT-S QPSK	1	1	21.54	21.62	21.73
	1	53	21.40	21.46	21.52
	1	104	21.31	21.54	21.60
	50	0	20.25	20.27	20.54
	50	28	21.41	21.46	21.56
	50	56	20.28	20.42	20.51
	100	0	20.30	20.35	20.43
DFT-S 16QAM	1	1	20.53	20.61	20.72
DFT-S 64QAM	1	1	19.25	19.29	19.24
DFT-S 256QAM	1	1	13.13	13.22	13.23
CP QPSK	1	1	20.08	20.20	20.23

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
DFT-S BPSK	21.44	21.72	18.94	19.22	23
DFT-S QPSK	20.25	21.73	17.75	19.23	23
DFT-S 16QAM	20.53	20.72	18.03	18.22	23
DFT-S 64QAM	19.24	19.29	16.74	16.79	23
DFT-S 256QAM	13.13	13.23	10.63	10.73	23
CP QPSK	20.08	20.23	17.58	17.73	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO, Channel Bandwidth: 20 MHz, Output Power: Full Power

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)								
			CH 637334			CH 641666			CH 646000		
			3560.01 MHz			3624.99 MHz			3690 MHz		
			TX 1	TX 2	Total	TX 1	TX 2	Total	TX 1	TX 2	Total
QPSK	1	1	18.39	18.4	21.41	18.36	18.34	21.36	18.46	18.39	21.44
	1	26	18.31	18.32	21.33	18.28	18.29	21.30	18.28	18.4	21.35
	1	49	18.31	18.24	21.29	18.2	18.24	21.23	18.32	18.37	21.36
	25	0	17.36	17.42	20.40	17.34	17.34	20.35	17.41	17.41	20.42
	25	13	18.21	18.24	21.24	18.12	18.28	21.21	18.28	18.28	21.29
	25	26	16.91	16.72	19.83	16.77	16.79	19.79	17.1	17.21	20.17
	50	0	17.35	17.08	20.23	17.4	17.23	20.33	17.44	17.22	20.34
16QAM	1	1	17.34	17.38	20.37	17.27	17.29	20.29	17.37	17.31	20.35
64QAM	1	1	15.84	15.75	18.81	15.8	15.76	18.79	15.89	15.85	18.88
256QAM	1	1	13.61	13.55	16.59	13.58	13.55	16.58	13.59	13.63	16.62

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
QPSK	19.79	21.44	21.08	22.73	23
16QAM	20.29	20.37	21.58	21.66	23
64QAM	18.79	18.88	20.08	20.17	23
256QAM	16.58	16.62	17.87	17.91	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO, Channel Bandwidth: 40 MHz, Output Power: Full Power

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)								
			CH 638000			CH 641666			CH 645332		
			3570 MHz			3624.99 MHz			3679.98 MHz		
			TX 1	TX 2	Total	TX 1	TX 2	Total	TX 1	TX 2	Total
QPSK	1	1	18.43	18.43	21.44	18.36	18.41	21.40	18.46	18.47	21.48
	1	53	18.35	18.36	21.37	18.32	18.33	21.34	18.38	18.41	21.41
	1	104	18.32	18.34	21.34	18.26	18.29	21.29	18.35	18.38	21.38
	50	0	17.41	17.44	20.44	17.35	17.37	20.37	17.43	17.47	20.46
	50	28	18.25	18.31	21.29	18.21	18.28	21.26	18.29	18.35	21.33
	50	56	16.93	16.82	19.89	16.85	16.89	19.88	17.11	17.23	20.18
	100	0	17.43	17.15	20.30	17.46	17.23	20.36	17.47	17.24	20.37
16QAM	1	1	17.42	17.43	20.44	17.37	17.32	20.36	17.45	17.39	20.43
64QAM	1	1	15.91	15.84	18.89	15.86	15.78	18.83	15.92	15.88	18.91
256QAM	1	1	13.71	13.58	16.66	13.59	13.61	16.61	13.66	13.68	16.68

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
QPSK	19.88	21.48	21.17	22.77	23
16QAM	20.36	20.44	21.65	21.73	23
64QAM	18.83	18.91	20.12	20.20	23
256QAM	16.61	16.68	17.90	17.97	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO, Channel Bandwidth: 20 MHz, Output Power: dBm/10 MHz

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)								
			CH 637334			CH 641666			CH 646000		
			3560.01 MHz			3624.99 MHz			3690 MHz		
			TX 1	TX 2	Total	TX 1	TX 2	Total	TX 1	TX 2	Total
QPSK	1	1	18.39	18.4	21.41	18.36	18.34	21.36	18.46	18.39	21.44
	1	26	18.31	18.32	21.33	18.28	18.29	21.30	18.28	18.4	21.35
	1	49	18.31	18.24	21.29	18.2	18.24	21.23	18.32	18.37	21.36
	25	0	17.36	17.42	20.40	17.34	17.34	20.35	17.41	17.41	20.42
	25	13	18.21	18.24	21.24	18.12	18.28	21.21	18.28	18.28	21.29
	25	26	16.91	16.72	19.83	16.77	16.79	19.79	17.1	17.21	20.17
	50	0	14.35	14.08	17.23	14.4	14.23	17.33	14.44	14.22	17.34
16QAM	1	1	17.34	17.38	20.37	17.27	17.29	20.29	17.37	17.31	20.35
64QAM	1	1	15.84	15.75	18.81	15.8	15.76	18.79	15.89	15.85	18.88
256QAM	1	1	13.61	13.55	16.59	13.58	13.55	16.58	13.59	13.63	16.62

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
QPSK	17.23	21.44	18.52	22.73	23
16QAM	20.29	20.37	21.58	21.66	23
64QAM	18.79	18.88	20.08	20.17	23
256QAM	16.58	16.62	17.87	17.91	23

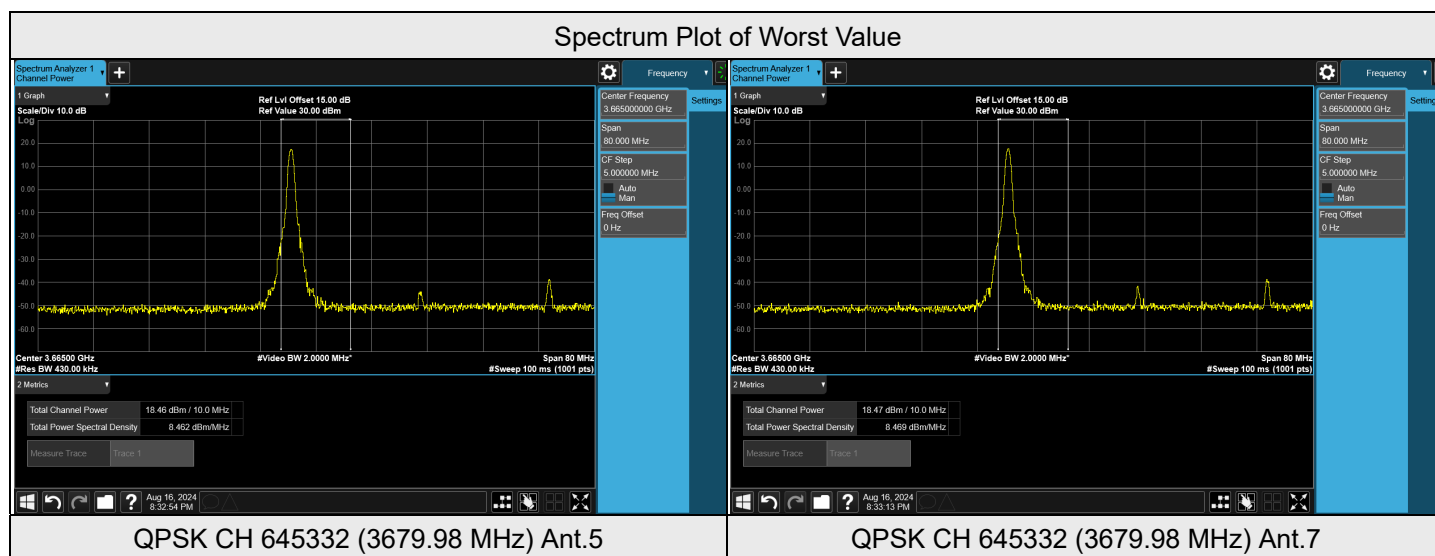
Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO, Channel Bandwidth: 40 MHz, Output Power: dBm/10 MHz

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)								
			CH 638000			CH 641666			CH 645332		
			3570 MHz			3624.99 MHz			3679.98 MHz		
			TX 1	TX 2	Total	TX 1	TX 2	Total	TX 1	TX 2	Total
QPSK	1	1	18.43	18.43	21.44	18.36	18.41	21.40	18.46	18.47	21.48
	1	53	18.35	18.36	21.37	18.32	18.33	21.34	18.38	18.41	21.41
	1	104	18.32	18.34	21.34	18.26	18.29	21.29	18.35	18.38	21.38
	50	0	17.41	17.44	20.44	17.35	17.37	20.37	17.43	17.47	20.46
	50	28	18.25	18.31	21.29	18.21	18.28	21.26	18.29	18.35	21.33
	50	56	16.93	16.82	19.89	16.85	16.89	19.88	17.11	17.23	20.18
	100	0	12.43	12.15	15.30	12.46	12.23	15.36	12.47	12.24	15.37
16QAM	1	1	17.42	17.43	20.44	17.37	17.32	20.36	17.45	17.39	20.43
64QAM	1	1	15.91	15.84	18.89	15.86	15.78	18.83	15.92	15.88	18.91
256QAM	1	1	13.71	13.58	16.66	13.59	13.61	16.61	13.66	13.68	16.68

Output Power					
Modulation	Minimum Cond. Power (dBm)	Maximum Cond. Power (dBm)	Minimum EIRP (dBm)	Maximum EIRP (dBm)	EIRP Limit (dBm)
QPSK	15.30	21.48	16.59	22.77	23
16QAM	20.36	20.44	21.65	21.73	23
64QAM	18.83	18.91	20.12	20.20	23
256QAM	16.61	16.68	17.90	17.97	23

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

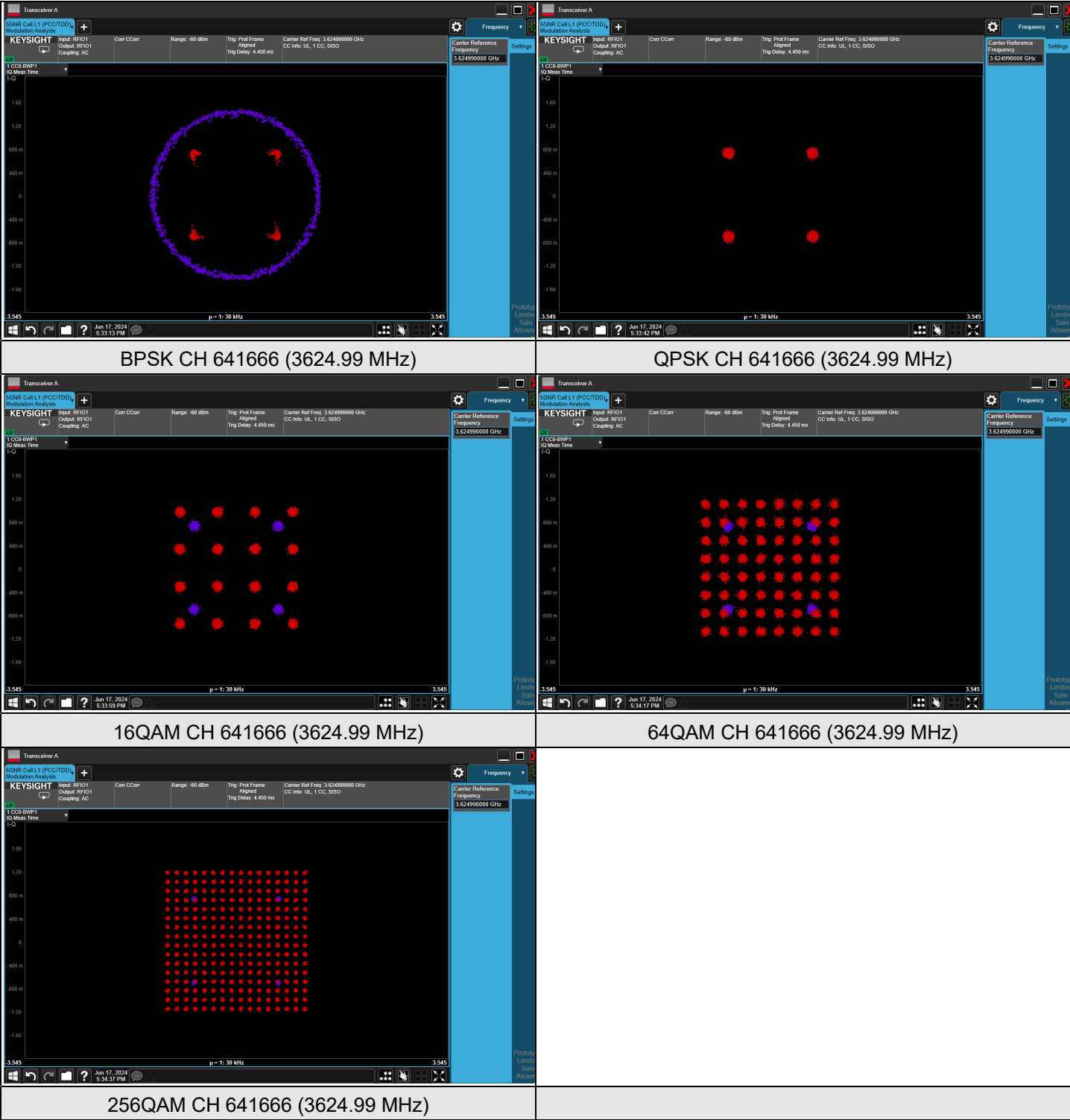


7.2 Modulation Characteristics

Input Power:	3.87 Vdc	Environmental Conditions:	22°C, 73% RH	Tested By:	James Yang
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7.2.1 NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 40 MHz



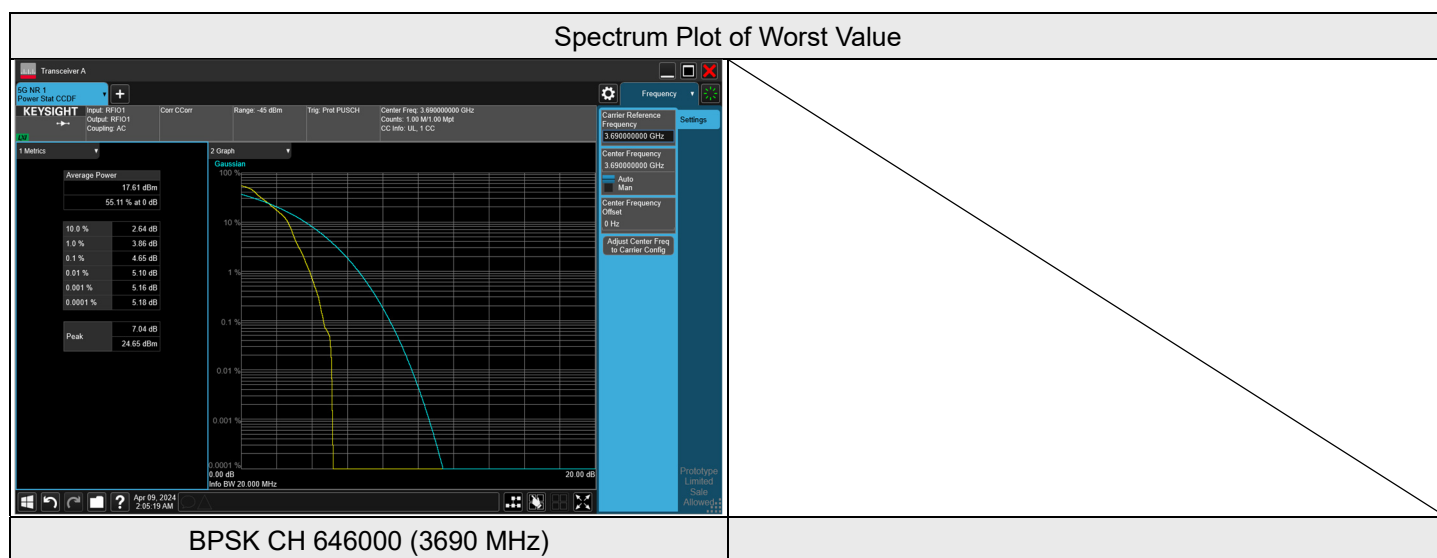
7.3 Peak to Average Ratio

Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 71% RH	Tested By:	James Yang
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7.3.1 NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz)

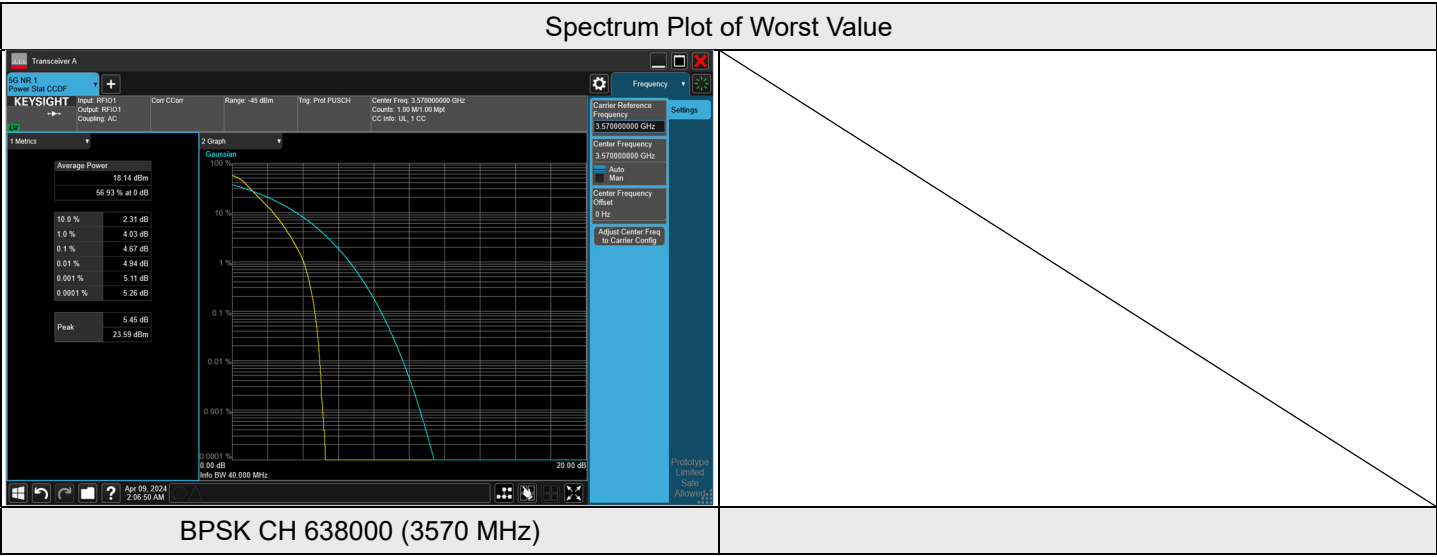
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 20 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
BPSK	1	50	4.20	4.30	4.35
	1	0	4.32	4.28	4.65
	50	0	4.43	4.41	4.54



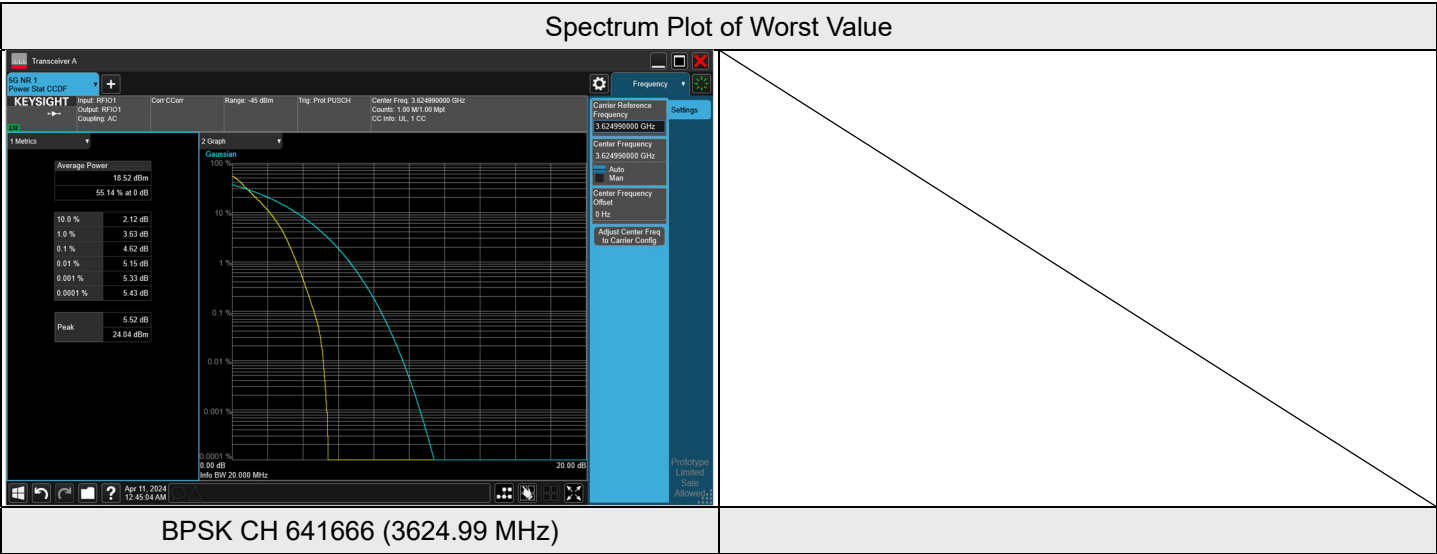
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 40 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
BPSK	1	105	4.55	4.19	4.25
	1	0	4.19	4.17	4.20
	100	0	4.67	4.40	4.13



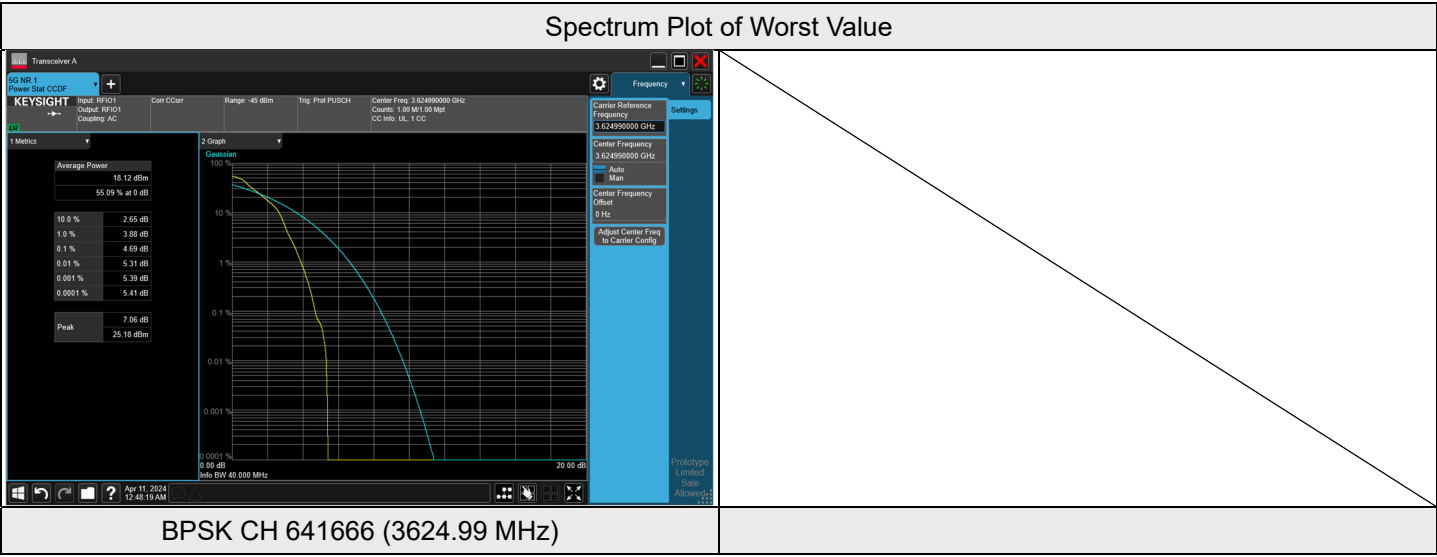
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 20 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
BPSK	1	50	4.32	4.47	4.33
	1	0	4.59	4.22	4.30
	50	0	4.45	4.62	4.38



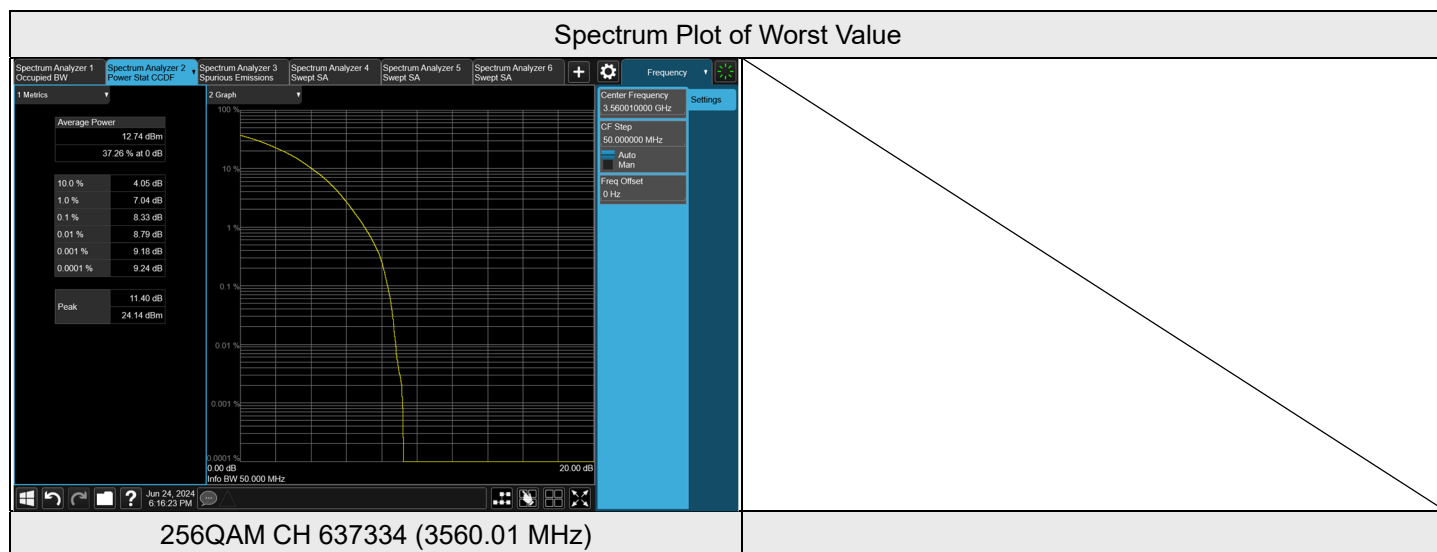
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 40 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
BPSK	1	105	4.57	4.69	4.41
	1	0	4.42	4.16	4.38
	100	0	4.16	4.37	4.31



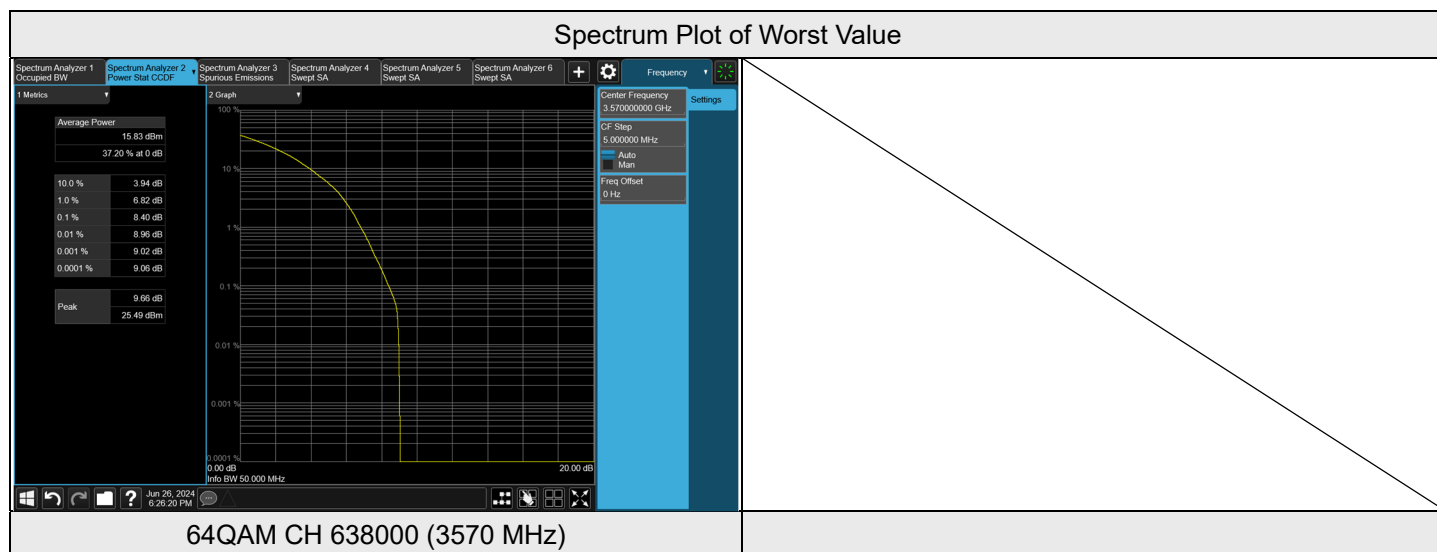
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant5, Channel Bandwidth: 20 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
QPSK	1	50	7	6.34	7.07
	1	0	7.08	6.4	7.15
	51	0	7.23	6.61	7.37
16QAM	1	50	6.65	7.06	7.6
	1	0	6.81	6.94	7.45
	51	0	6.94	7.18	7.75
64QAM	1	50	7.56	7.49	7.66
	1	0	7.53	7.58	7.6
	51	0	7.76	7.75	7.88
256QAM	1	50	8.08	7.72	7.95
	1	0	8.03	7.81	7.78
	51	0	8.33	8.02	8.06



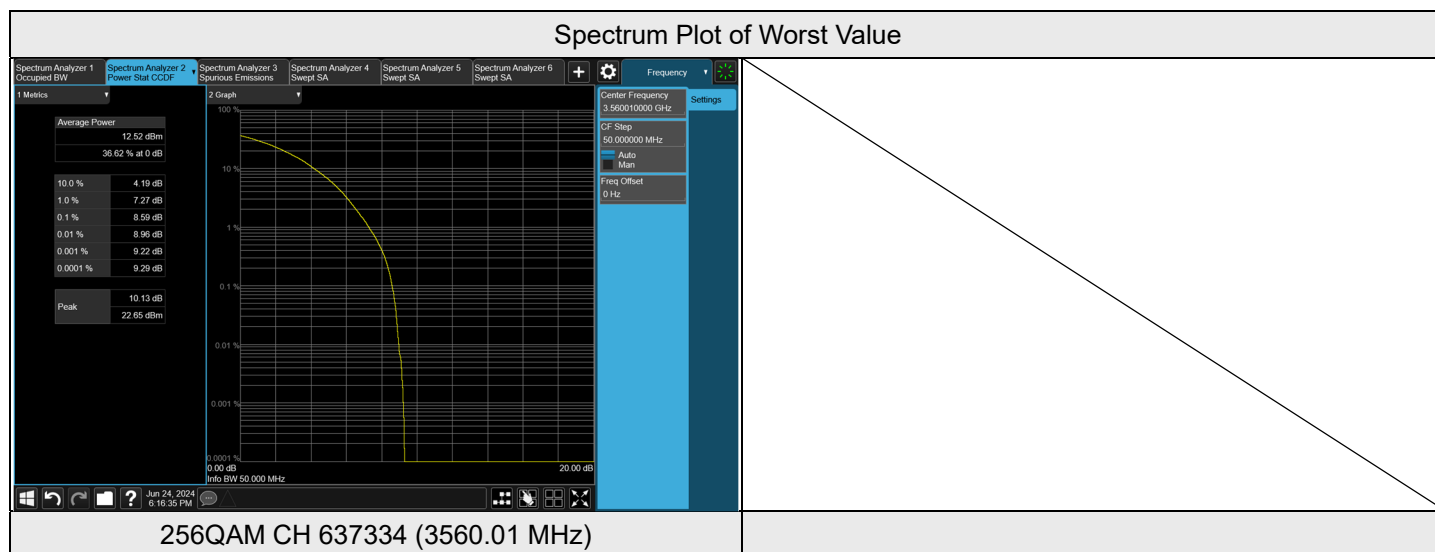
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant5, Channel Bandwidth: 40 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
QPSK	1	105	6.85	6.68	6.37
	1	0	6.99	6.7	6.53
	106	0	7.12	6.8	6.65
16QAM	1	105	7.57	7.21	6.96
	1	0	7.61	7.17	6.88
	106	0	7.85	7.34	7.12
64QAM	1	105	8.24	8.05	7.93
	1	0	8.19	8.01	7.88
	106	0	8.4	8.22	8.16
256QAM	1	105	7.98	8.23	8.04
	1	0	8.12	8.13	7.99
	106	0	8.24	8.35	8.19



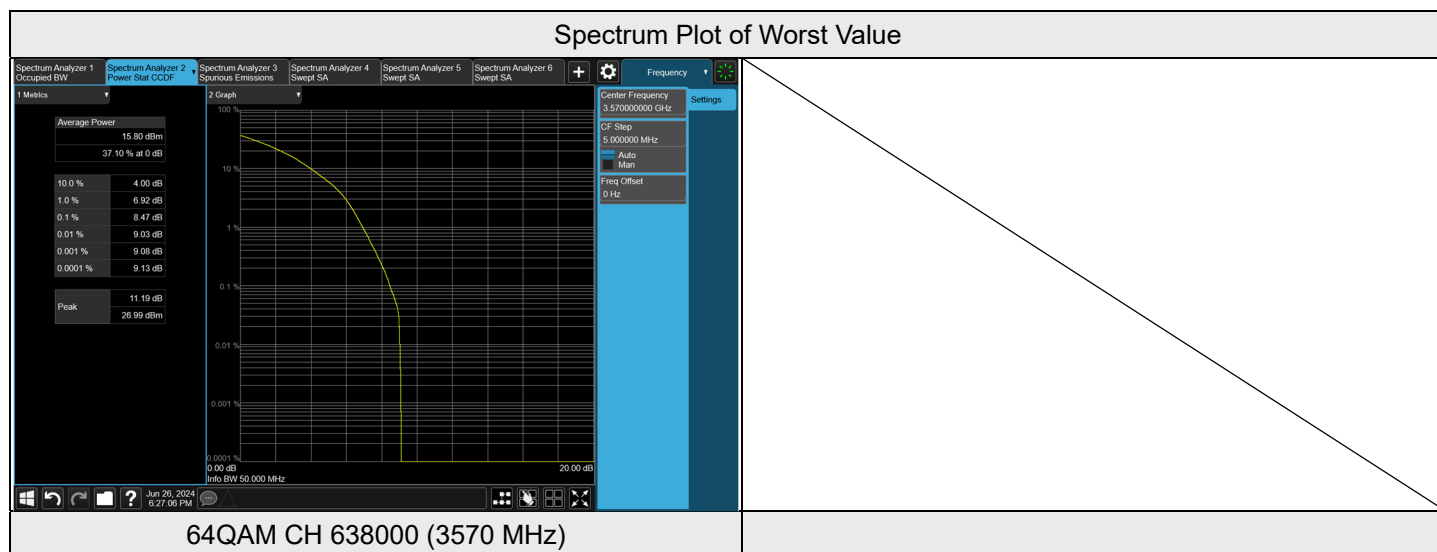
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant7, Channel Bandwidth: 20 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 637334	CH 641666	CH 646000
			3560.01 MHz	3624.99 MHz	3690 MHz
QPSK	1	50	6.96	6.72	7.13
	1	0	7.02	6.83	7.14
	51	0	7.15	6.96	7.28
16QAM	1	50	6.48	7.54	6.33
	1	0	6.43	7.62	6.39
	51	0	6.71	7.79	6.63
64QAM	1	50	8.01	7.69	7.51
	1	0	8.05	7.76	7.5
	51	0	8.29	7.95	7.66
256QAM	1	50	8.37	7.74	7.65
	1	0	8.49	7.83	7.76
	51	0	8.59	7.99	7.94



NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant7, Channel Bandwidth: 40 MHz

Modulation	RB Size	RB Offset	Peak To Average Ratio (dB)		
			CH 638000	CH 641666	CH 645332
			3570 MHz	3624.99 MHz	3679.98 MHz
QPSK	1	105	6.91	6.56	5.92
	1	0	7.01	6.57	5.92
	106	0	7.18	6.84	6.13
16QAM	1	105	7.35	7.47	6.75
	1	0	7.41	7.38	6.86
	106	0	7.57	7.65	6.98
64QAM	1	105	8.27	7.85	7.81
	1	0	8.35	7.84	7.78
	106	0	8.47	7.97	8.06
256QAM	1	105	8.12	7.86	8.08
	1	0	8.04	7.76	8.06
	106	0	8.25	7.98	8.24



7.4 Bandwidth

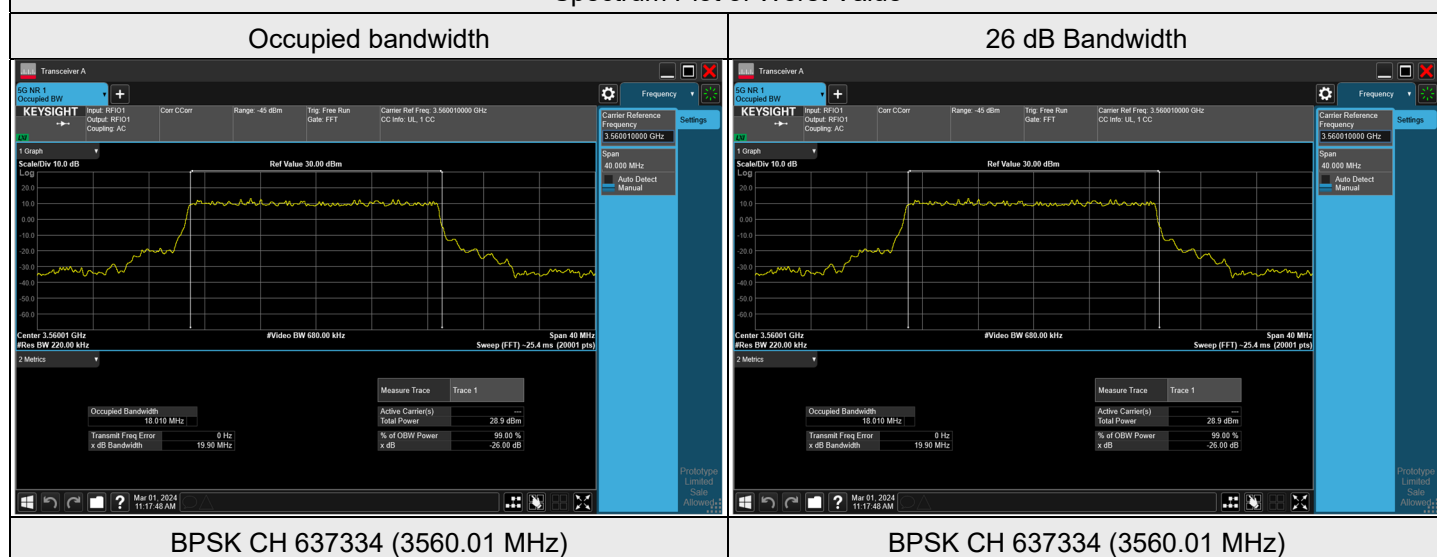
Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 71% RH	Tested By:	James Yang
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7.4.1 NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
BPSK	637334	3560.01	18.010	19.90
BPSK	641666	3624.99	18.004	19.35
BPSK	646000	3690	17.993	18.87

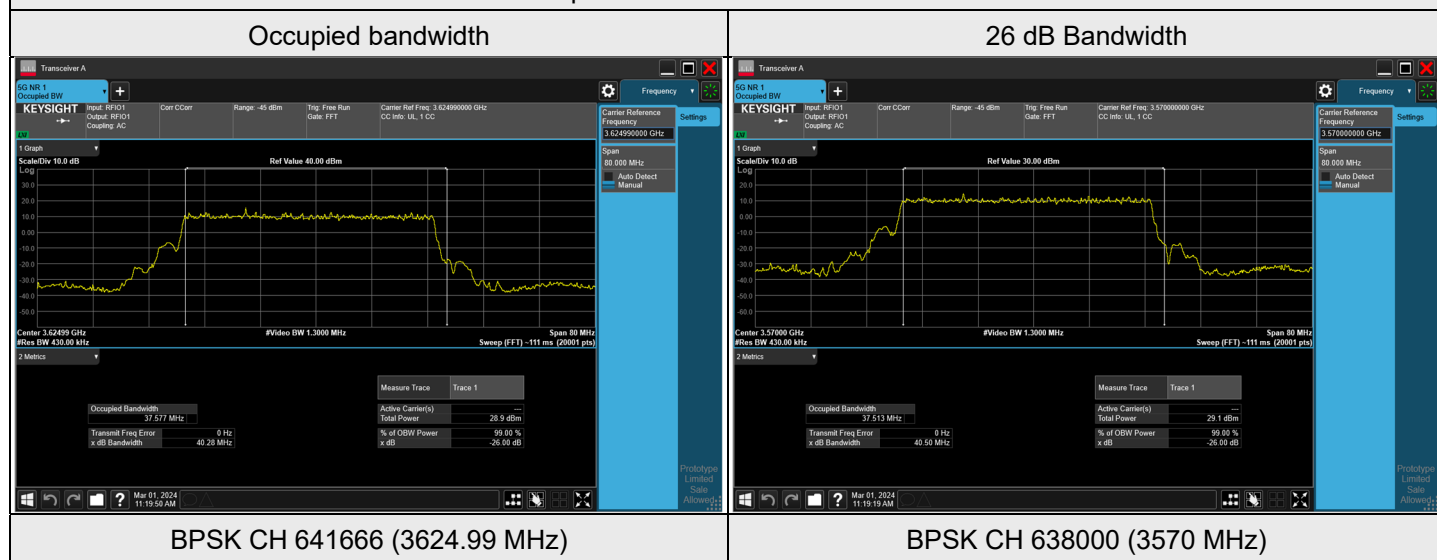
Spectrum Plot of Worst Value



NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 5, Channel Bandwidth: 40 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
BPSK	638000	3570	37.513	40.50
BPSK	641666	3624.99	37.577	40.28
BPSK	645332	3679.98	37.456	38.57

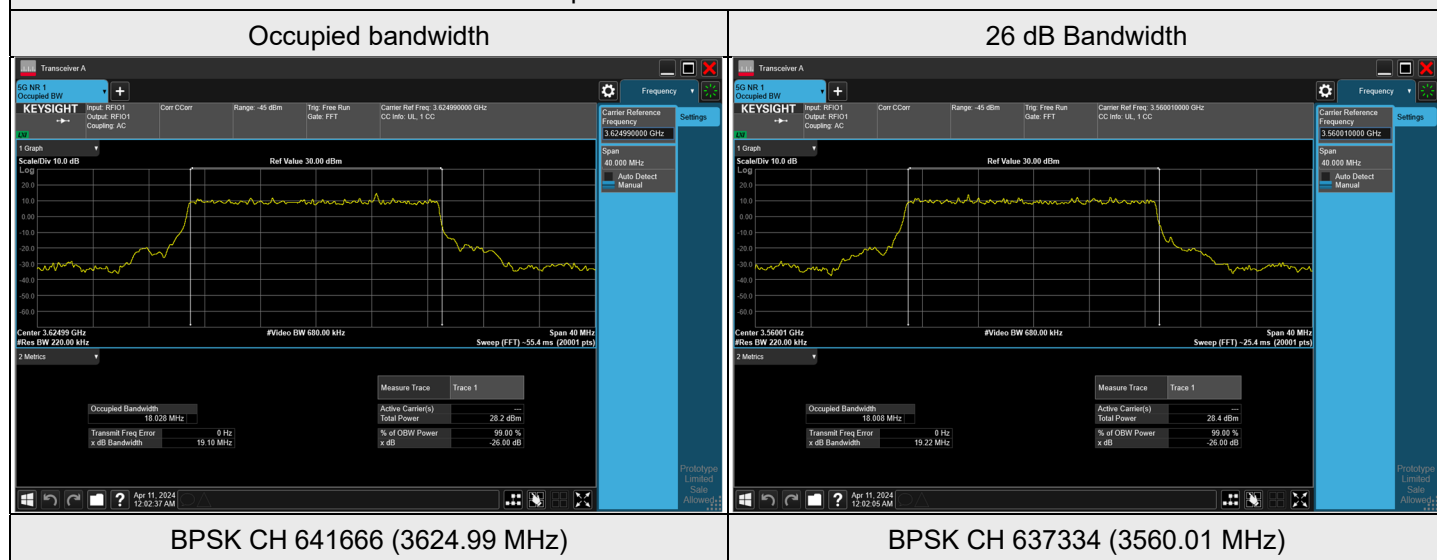
Spectrum Plot of Worst Value



NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
BPSK	637334	3560.01	18.008	19.22
BPSK	641666	3624.99	18.028	19.10
BPSK	646000	3690	18.018	18.86

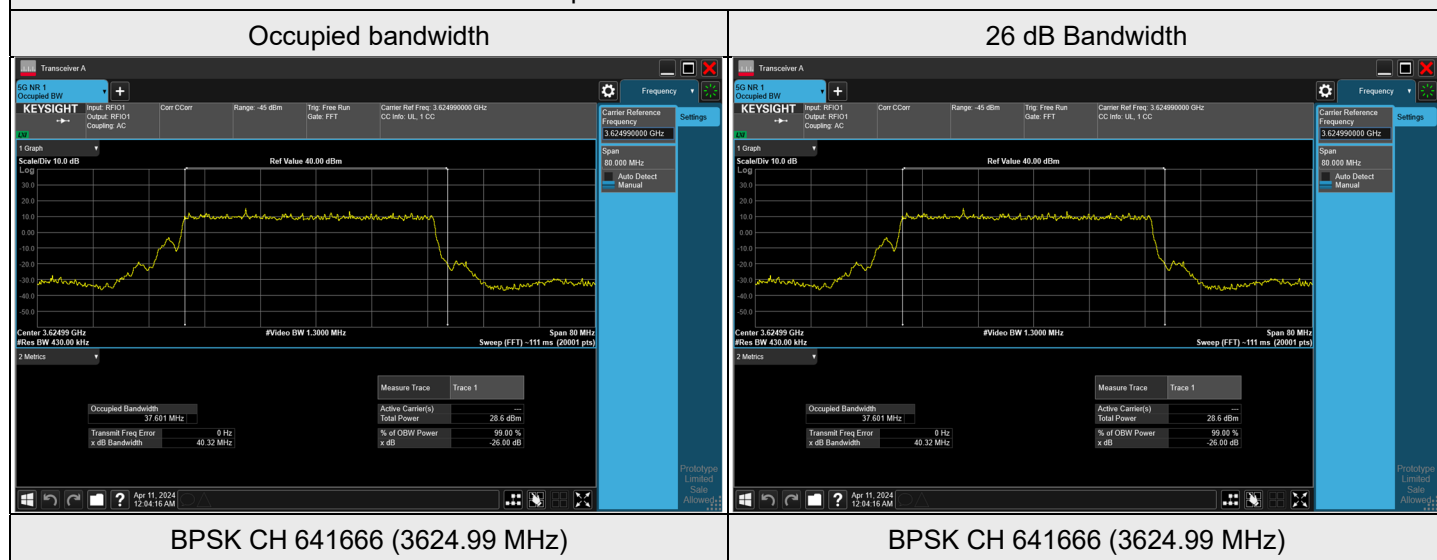
Spectrum Plot of Worst Value



NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - Ant 7, Channel Bandwidth: 40 MHz

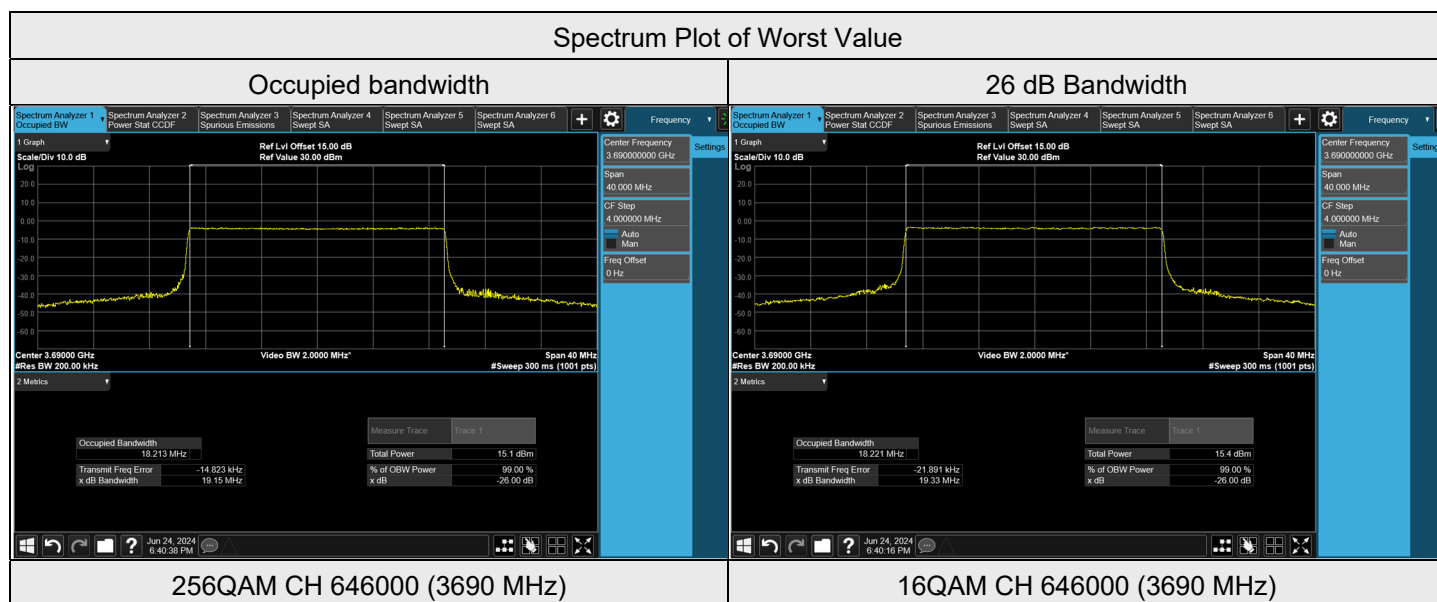
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
BPSK	638000	3570	37.491	38.70
BPSK	641666	3624.99	37.601	40.32
BPSK	645332	3679.98	37.315	37.74

Spectrum Plot of Worst Value



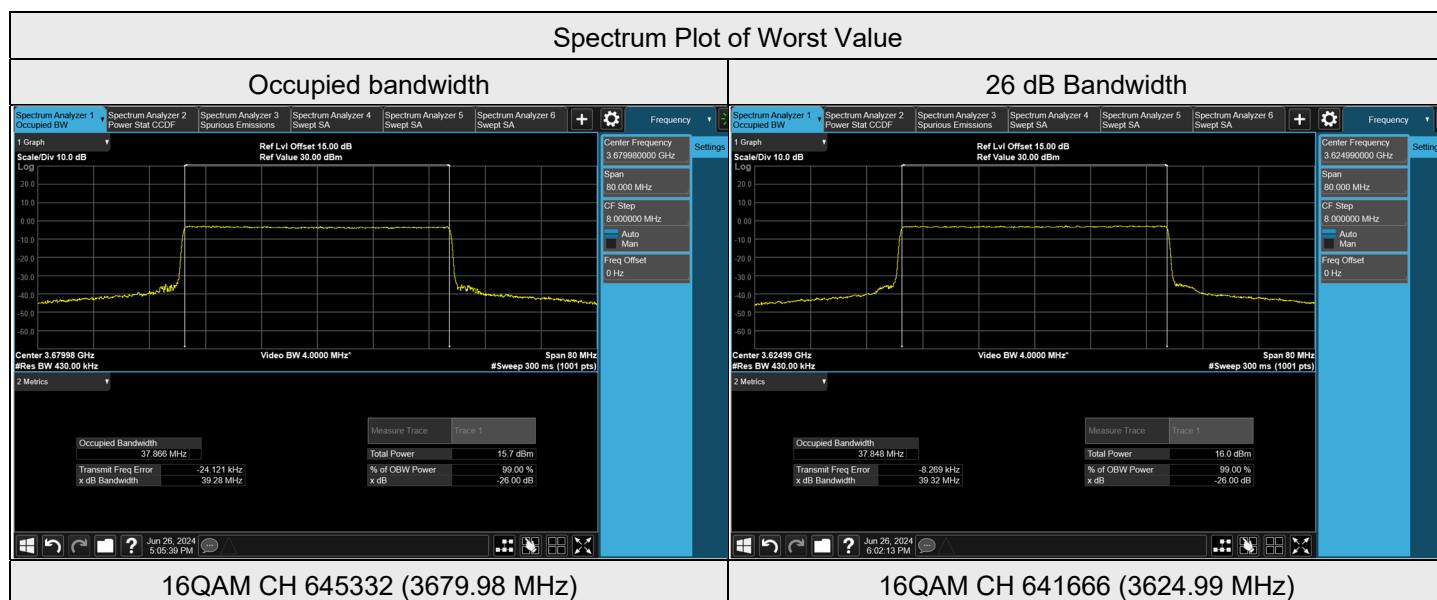
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant5, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	637334	3560.01	18.212	19.2
QPSK	641666	3624.99	18.21	19.19
QPSK	646000	3690	18.213	19.15
16QAM	637334	3560.01	18.218	19.03
16QAM	641666	3624.99	18.213	19.07
16QAM	646000	3690	18.221	19.33
64QAM	637334	3560.01	18.196	19.13
64QAM	641666	3624.99	18.206	19.2
64QAM	646000	3690	18.202	19.07
256QAM	637334	3560.01	18.221	19.13
256QAM	641666	3624.99	18.211	19.12
256QAM	646000	3690	18.226	19.18



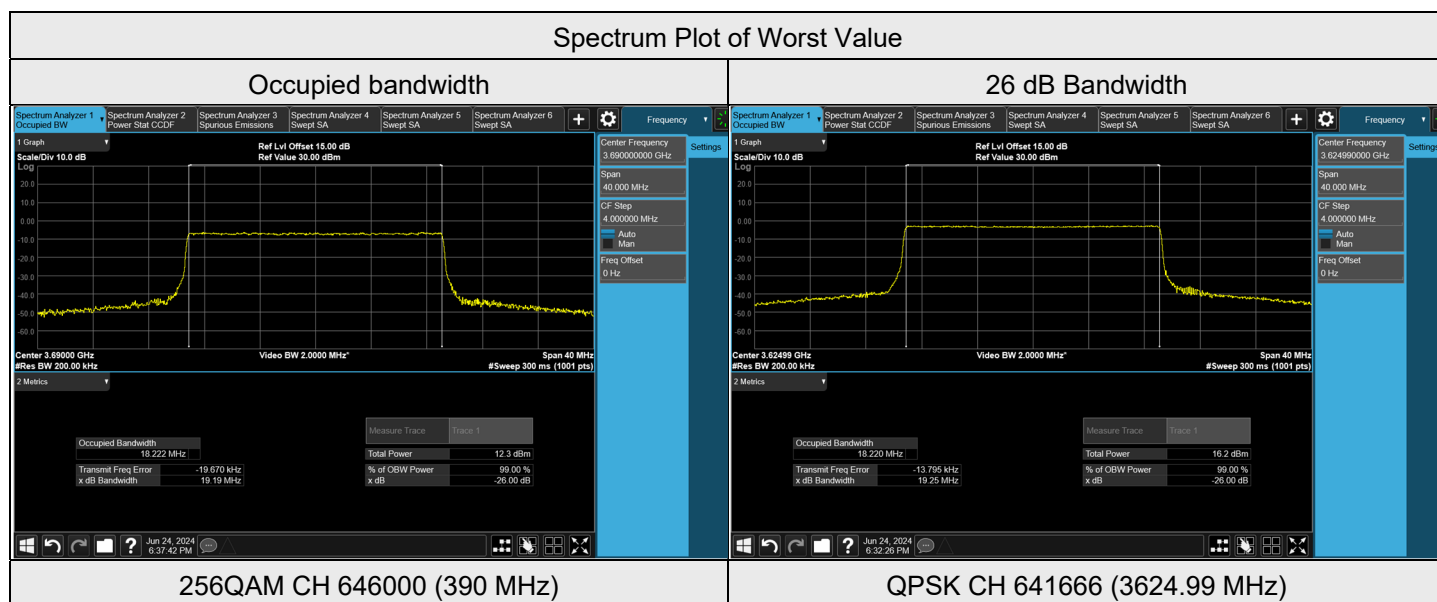
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant5, Channel Bandwidth: 40 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	638000	3570	37.83	39.29
QPSK	641666	3624.99	37.824	39.29
QPSK	645332	3679.98	37.839	39.29
16QAM	638000	3570	37.848	39.26
16QAM	641666	3624.99	37.848	39.32
16QAM	645332	3679.98	37.866	39.28
64QAM	638000	3570	37.834	39.25
64QAM	641666	3624.99	37.824	39.28
64QAM	645332	3679.98	37.845	39.27
256QAM	638000	3570	37.832	39.29
256QAM	641666	3624.99	37.833	39.31
256QAM	645332	3679.98	37.851	39.29



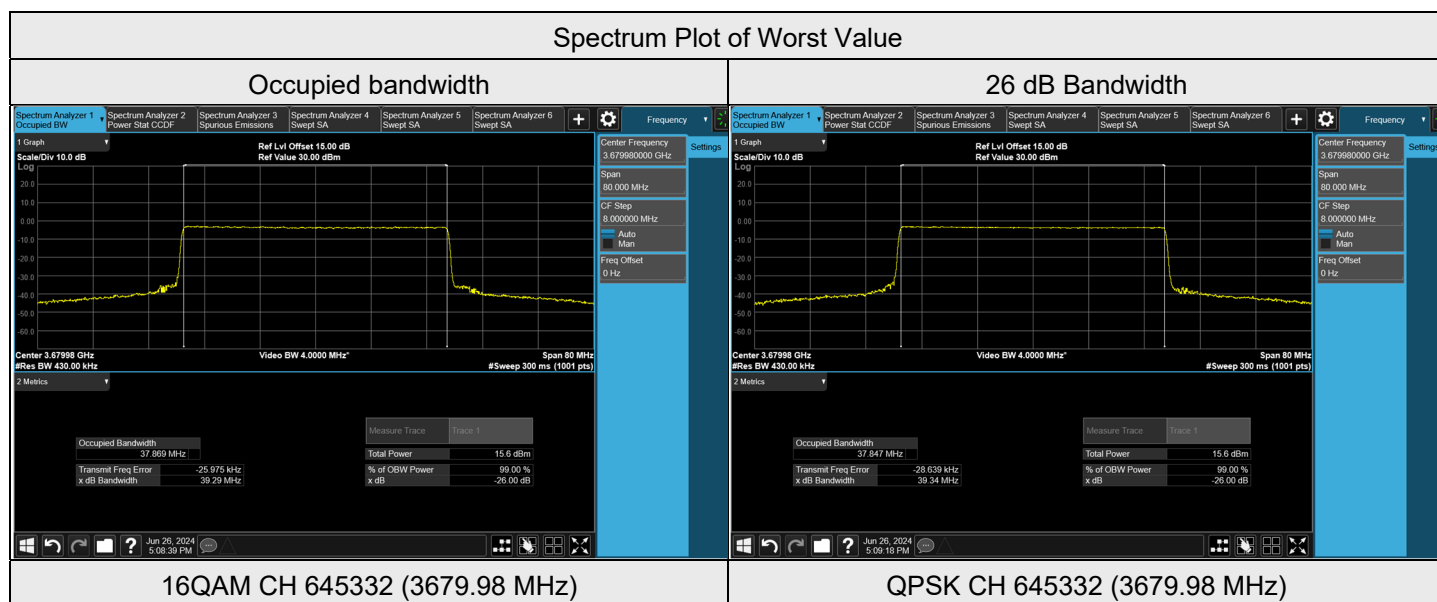
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant7, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	637334	3560.01	18.209	19.18
QPSK	641666	3624.99	18.22	19.25
QPSK	646000	3690	18.216	19.11
16QAM	637334	3560.01	18.213	19.05
16QAM	641666	3624.99	18.218	19.08
16QAM	646000	3690	18.219	19.18
64QAM	637334	3560.01	18.195	19.12
64QAM	641666	3624.99	18.206	19.2
64QAM	646000	3690	18.207	19.11
256QAM	637334	3560.01	18.219	19.08
256QAM	641666	3624.99	18.215	19.14
256QAM	646000	3690	18.222	19.19



NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO-Ant7, Channel Bandwidth: 40 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	638000	3570	37.834	39.33
QPSK	641666	3624.99	37.824	39.28
QPSK	645332	3679.98	37.847	39.34
16QAM	638000	3570	37.841	39.24
16QAM	641666	3624.99	37.86	39.29
16QAM	645332	3679.98	37.869	39.29
64QAM	638000	3570	37.838	39.26
64QAM	641666	3624.99	37.855	39.28
64QAM	645332	3679.98	37.852	39.26
256QAM	638000	3570	37.832	39.29
256QAM	641666	3624.99	37.824	39.25
256QAM	645332	3679.98	37.849	39.31

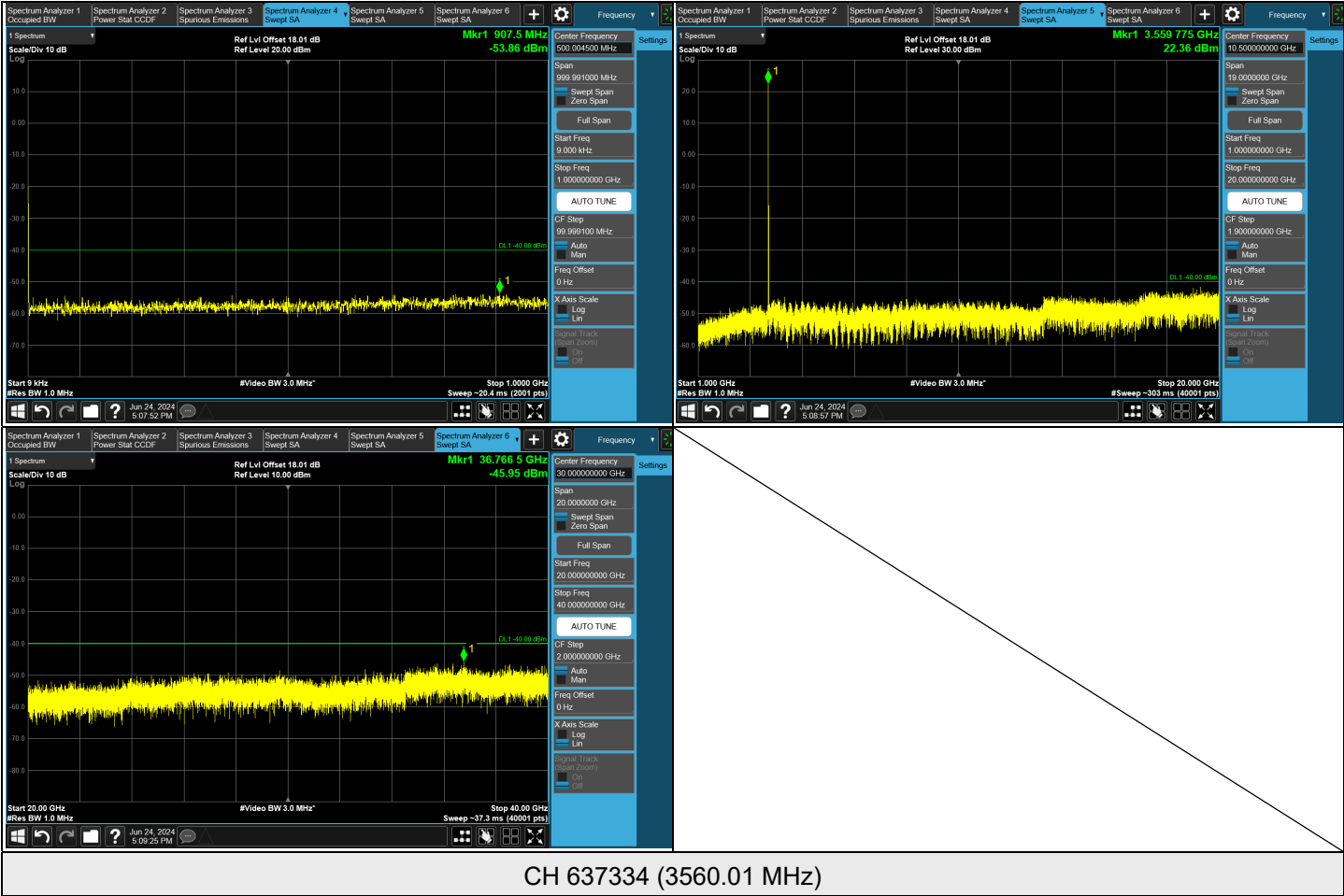


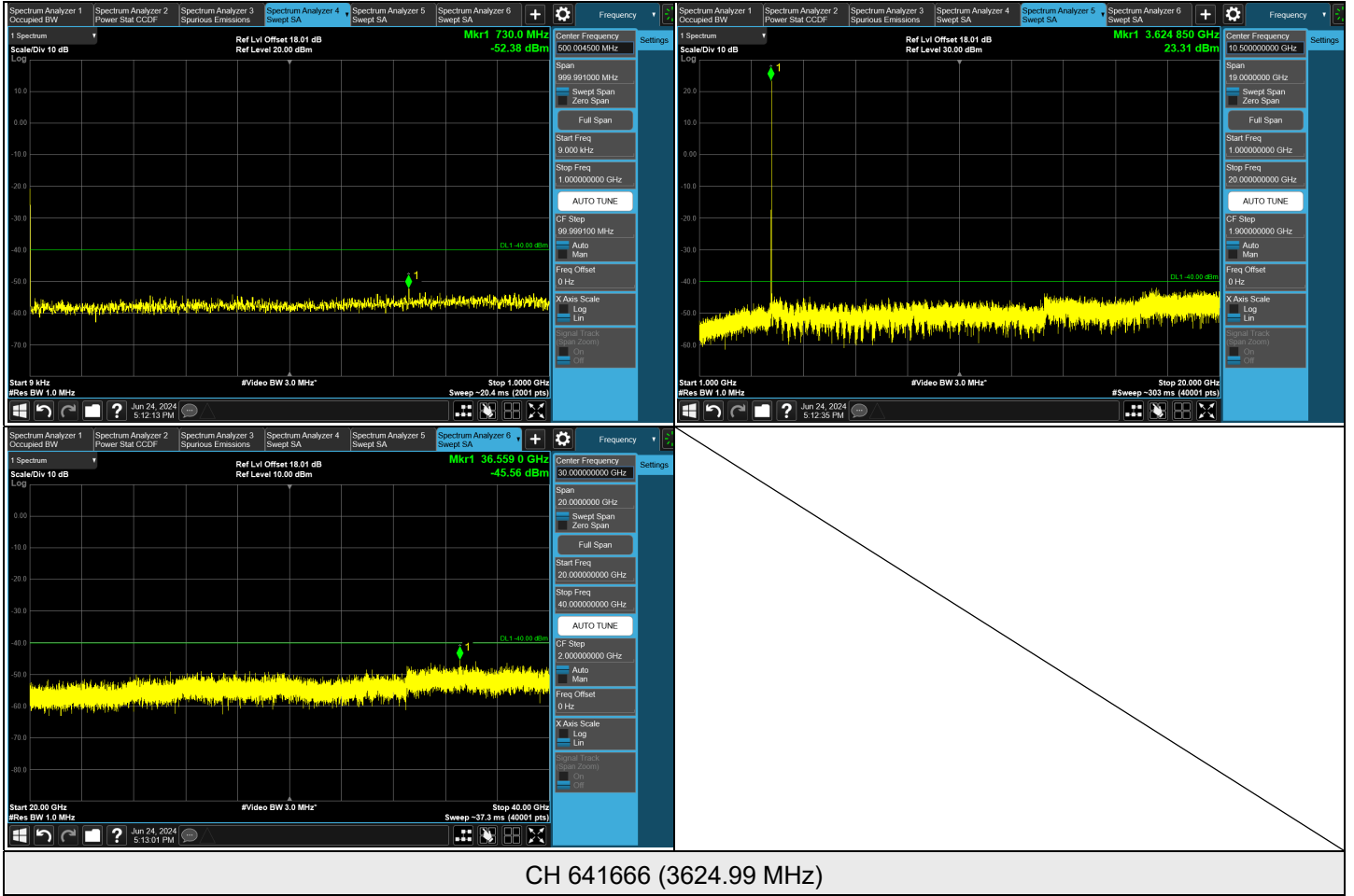
7.5 Conducted Spurious Emissions

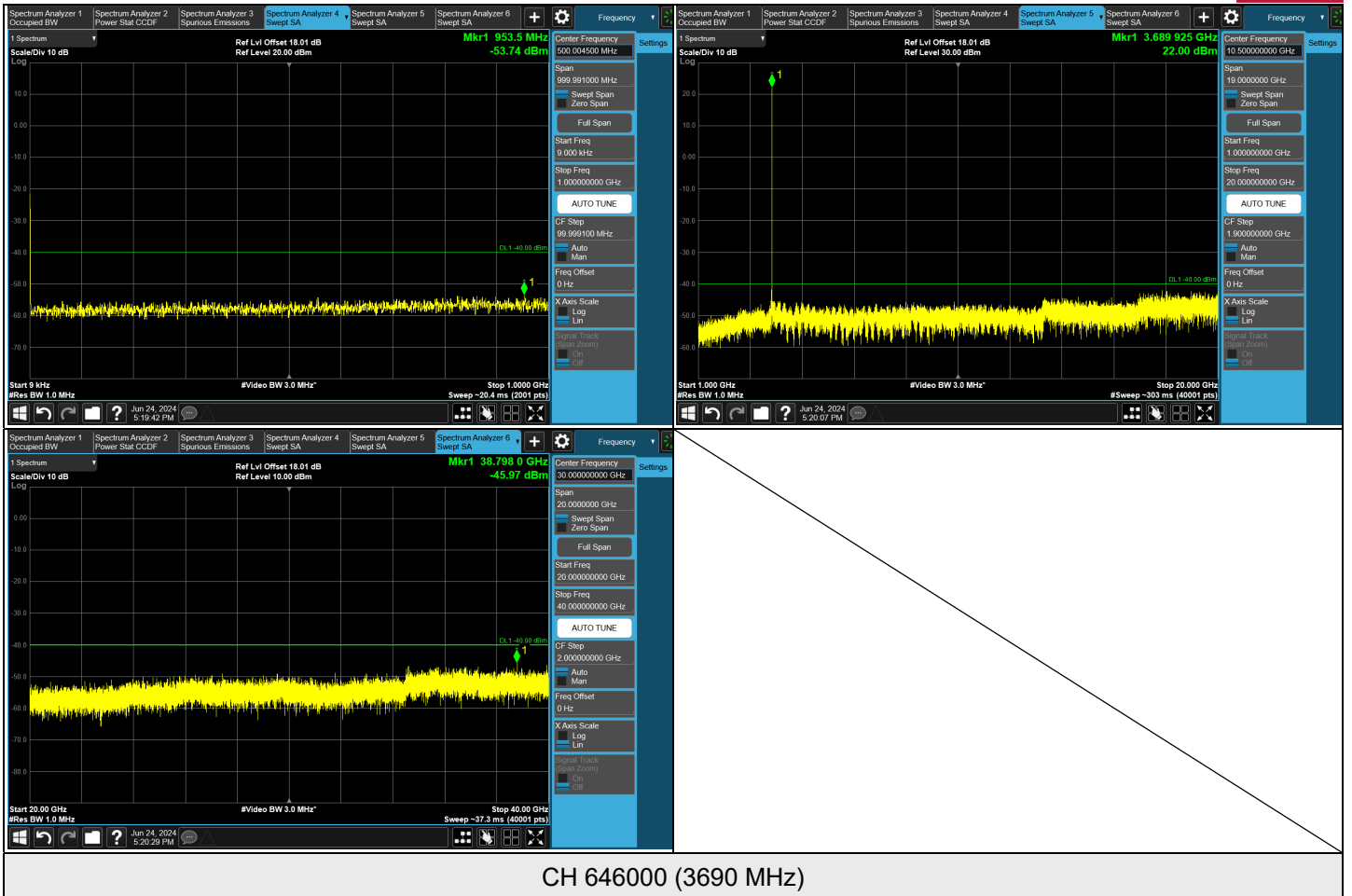
Input Power:	3.87 Vdc	Environmental Conditions:	24°C, 68% RH	Tested By:	James Yang
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7.5.1 NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz)

NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO_Ant 5, Channel Bandwidth: 20 MHz





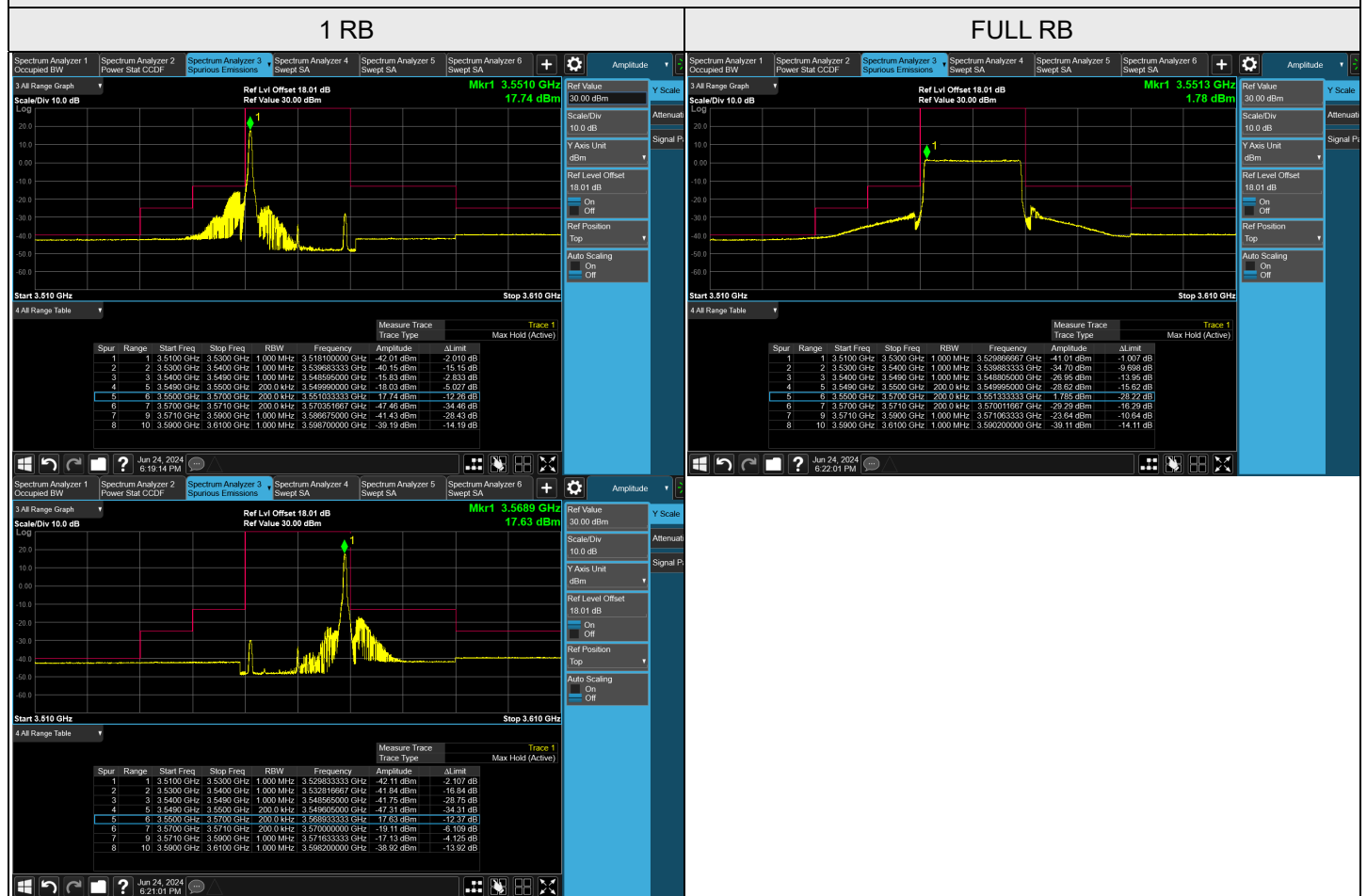


CH 646000 (3690 MHz)

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

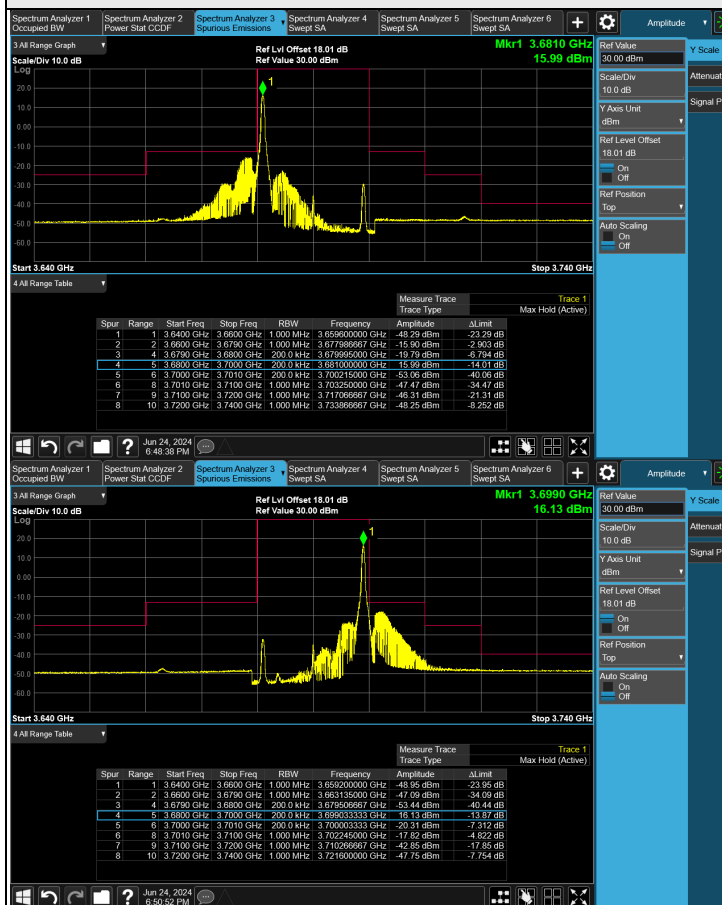
NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO_Ant 5, Channel Bandwidth: 20 MHz

CH 637334 (3560.01 MHz)

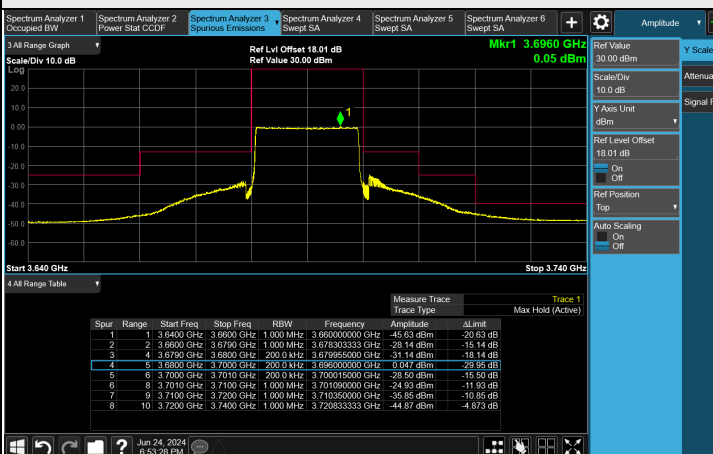


CH 646000 (3690 MHz)

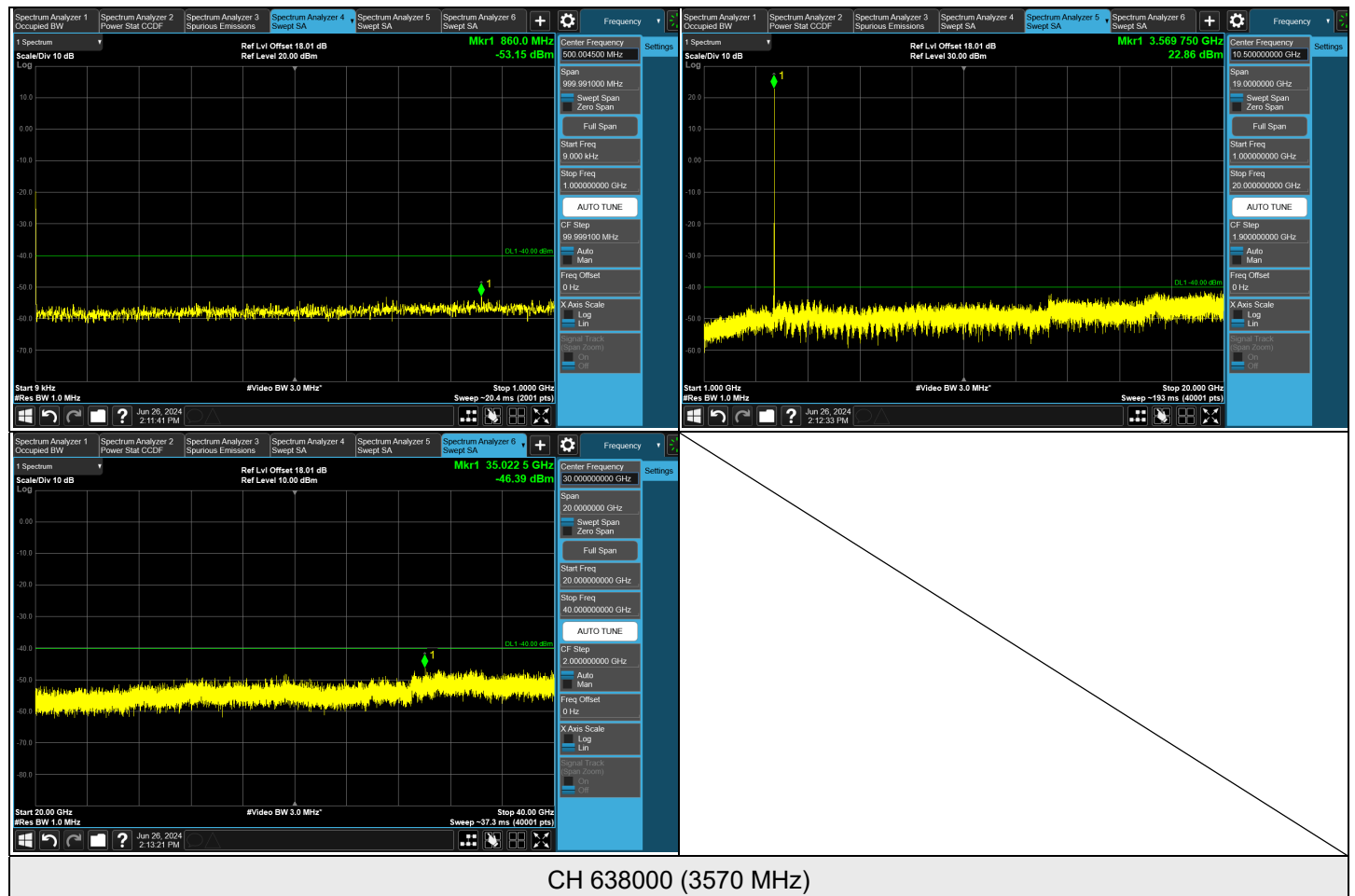
1 RB

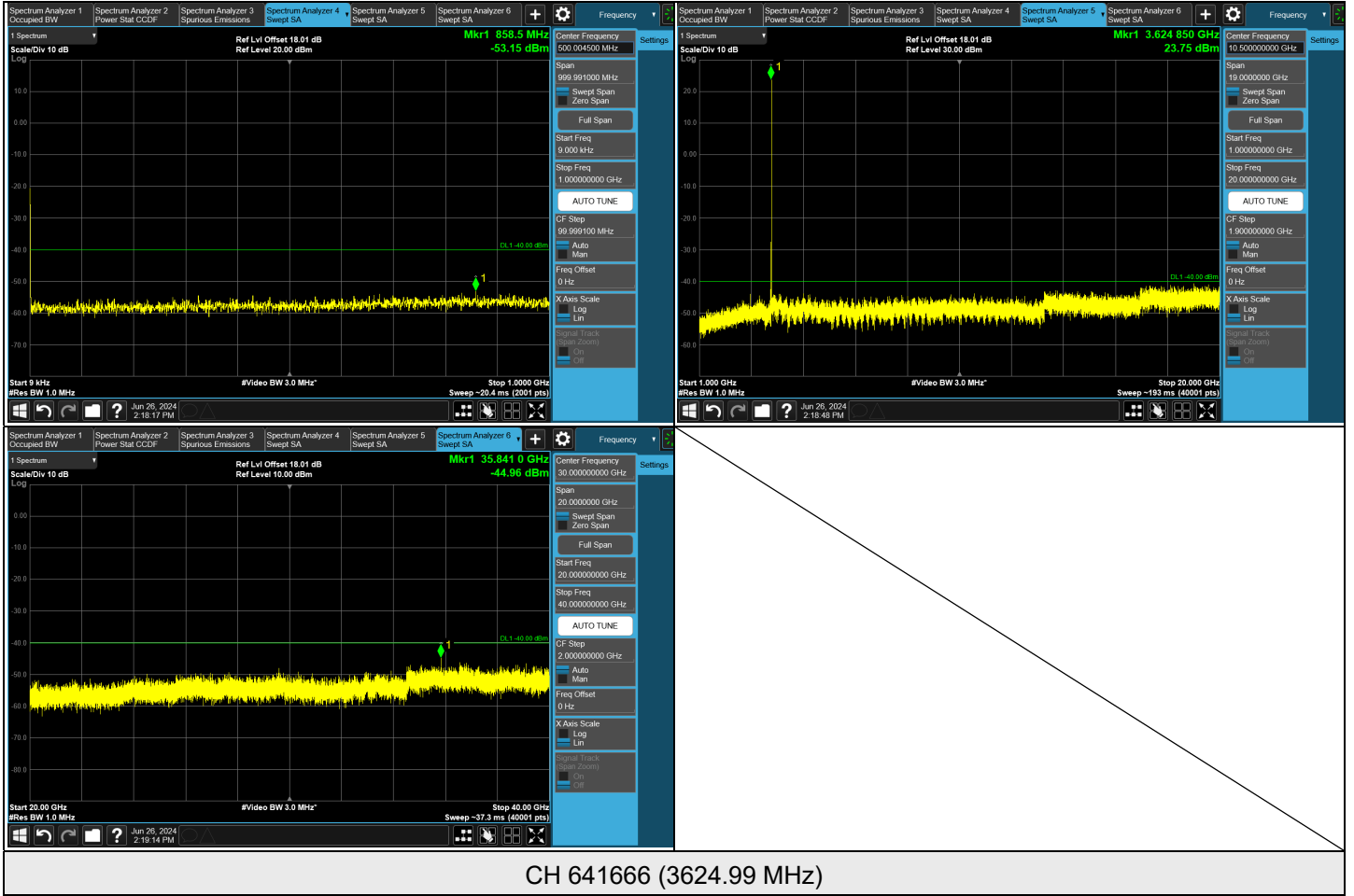


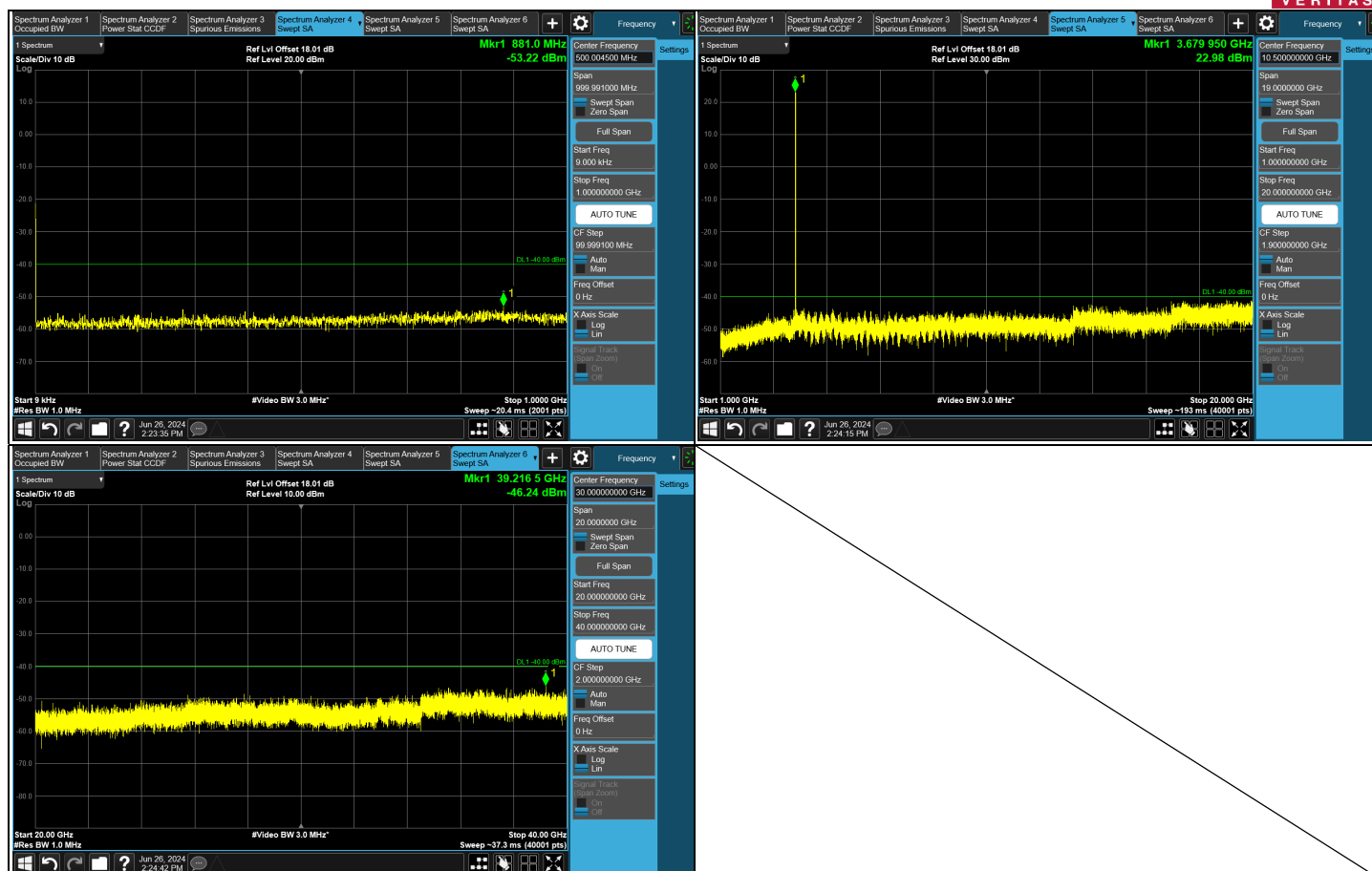
FULL RB



NR n48 SCS 30 kHz (3.55 GHz ~ 3.7 GHz) - MIMO_Ant 5, Channel Bandwidth: 40 MHz







CH 645332 (3679.98 MHz)

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