



TEST REPORT

PART 24, 27 MEASUREMENT REPORT

Applicant Name:
 Samsung Electronics Co., Ltd.
 129, Samsung-ro,
 Yeongtong-gu, Suwon-si
 Gyeonggi-do, 16677, Korea

Date of Testing:
 03/18/2024 - 04/29/2024
Test Site/Location:
 Element Lab., Suwon,
 Yongin-si, Gyeonggi-do, Korea
Test Report Serial No.:
 8K24022601-00.A3L

FCC ID:	A3LRF4439D-25A
APPLICANT:	Samsung Electronics Co., Ltd.

Application Type: Class II Permissive Change
Model: RF4439d-25A
EUT Type: RRU(RF4439d)
FCC Classification: PCS Licensed Transmitter
FCC Rule Part(s): §24, §27
Test Procedure(s): ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.




Prepared by DuJin Kim
 Test Engineer



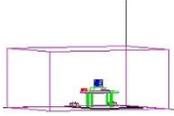
Reviewed by Jayden Kwak
 Technical Manager

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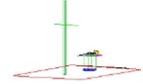
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FCC Part 24, 27



Mode	FCC Rule Part	Tx Frequency (MHz)	Total Power		Emission Designator	Modulation
			Max. Power (dBm)	Max. Power (W)		
n2_1C_25M_2T	24	n2/B2 1930 MHz – 1990 MHz	50.71	117.64	23M9G7D	QPSK
			50.80	120.24	23M9W7D	QAM
n2_2C_25M+5M_2T			50.94	124.04	29M0G7D	QPSK
			50.92	123.47	29M1W7D	QAM
n2/B2_2C_NR_25M+LTE_5M_2T			50.88	122.35	29M1G7D	QPSK
			50.87	122.07	29M1W7D	QAM
n66_1C_25M_2T	27	n66/B66 2110 MHz – 2180 MHz	52.29	169.51	23M8G7D	QPSK
			52.29	169.49	24M0W7D	QAM
n66_1C_30M_2T			52.13	163.21	28M6G7D	QPSK
			52.24	167.57	28M7W7D	QAM
n66_3C_25M+10M+5M_2T			52.23	167.13	39M2G7D	QPSK
			52.31	170.07	39M1W7D	QAM
n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T			52.41	174.21	39M2G7D	QPSK
			52.46	176.04	39M2W7D	QAM
n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T			52.19	165.61	44M0G7D	QPSK
			52.32	170.47	44M0W7D	QAM

EUT Overview_2T

Mode	FCC Rule Part	Tx Frequency (MHz)	Total Power		Emission Designator	Modulation
			Max. Power (dBm)	Max. Power (W)		
n2_1C_25M_4T	24	n2/B2 1930 MHz – 1990 MHz	51.96	157.20	23M8G7D	QPSK
			51.95	156.53	23M9W7D	QAM
n2_2C_25M+5M_4T			51.90	154.91	29M1G7D	QPSK
			51.92	155.71	29M1W7D	QAM
n2/B2_2C_NR_25M+LTE_5M_4T			52.05	160.04	29M1G7D	QPSK
			51.74	149.40	29M1W7D	QAM
n66_1C_25M_4T	27	n66/B66 2110 MHz – 2180 MHz	53.69	233.78	23M9G7D	QPSK
			53.96	249.07	23M9W7D	QAM
n66_1C_30M_4T			54.01	251.70	28M7G7D	QPSK
			54.04	253.57	28M7W7D	QAM
n66_3C_25M+10M+5M_4T			53.66	232.33	39M2G7D	QPSK
			54.00	251.43	39M2W7D	QAM
n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T			54.06	254.77	39M2G7D	QPSK
			53.99	250.72	39M2W7D	QAM
n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T			54.07	255.12	44M0G7D	QPSK
			54.10	257.32	44M0W7D	QAM

EUT Overview_4T

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1.0 REVISION RECORD

Issue Number	Issued Date	Revision History
8K24022201-00.A3L	04/29/2024	Initial Issue

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2.0 INTRODUCTION

2.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

2.2 Element Test Location

These measurement tests were conducted at the Element Materials Technology Suwon. Ltd. facility located at (P143) 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do 16954, Korea.

2.3 Test Facility / Accreditation

Measurements were performed at Element Materials Technology Suwon Lab located in Yongin-si, Gyeonggi, Korea.

- Element Materials Technology Suwon is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation(A2LA) with Certificate number 2041.04 for Specific Absorption Rate (SAR), where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Materials Technology Suwon facility is accredited, designated, and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.
 - Designation Number / CABID: KR0169
 - Test Firm Registration Number of FCC: 417945
 - Test Firm Registration Number of IC: 26168

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3.0 PRODUCT INFORMATION

3.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung RRU(RF4439d) FCC ID: A3LRF4439D-25A**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 24, 27.

3.2 Device Capabilities

This device supports the following conditional features and filter information declared by the manufacture.

EUT Type:	RRU (RF4439d)		
Model Name:	RF4439d-25A		
Test Device Serial No.:	S618528039		
Device Capabilities:	LTE, DSS, NR		
Operating Band/Frequency Range:	Band	Tx (Downlink)	Rx (Uplink)
	B2:	1930 MHz to 1990 MHz	1850 MHz to 1910 MHz
	B66:	2110 MHz to 2180 MHz	1710 MHz to 1780 MHz
Supported Modulation:	QPSK, 16QAM, 64QAM, 256QAM		
PCS Band 2 Supported Number of Carriers and Channel Bandwidth:	# LTE: 5, 10, 15, 20MHz bandwidth modes for LTE Band 2 with up to 3CC aggregated of Max. Bandwidth 30 MHz # DSS: 10, 15, 20MHz bandwidth modes for B2/n2 with up to 3CC aggregated of Max. Bandwidth 30 MHz # NR: 5, 10, 15, 20, 25MHz bandwidth modes for NR n2 with up to 3CC aggregated of Max. Bandwidth 30 MHz # Multi-RAT: LTE, DSS, NR modes for B2/n2 Up to 3CC aggregated of Max. Bandwidth 30 MHz		
AWS Band 66 Supported Number of Carriers and Channel Bandwidth:	# LTE: 5, 10, 15, 20MHz bandwidth modes for LTE Band 66 with up to 4CC aggregated of Max. Bandwidth 40 MHz # DSS: 10, 15, 20MHz bandwidth modes for B66/n66 with up to 3CC aggregated of Max. Bandwidth 40 MHz # NR: 5, 10, 15, 20, 25, 30MHz bandwidth modes for NR n66 with up to 3CC aggregated of Max. Bandwidth 45 MHz # Multi-RAT: LTE, DSS, NR modes for B66/n66 Up to 4CC aggregated of Max. Bandwidth 45 MHz		
PCS Band 2 Maximum Output Power	Max 60W/Path in 2TX Configuration, Max 40W/Path in 4TX Configuration		
AWS Band 66 Maximum Output Power	Max 80W/Path in 2TX Configuration, Max 60W/Path in 4TX Configuration		
Number of Antenna ports	8 ports (PCS 4 ports / AWS 4 ports)		
Supported Configurations:	2TX, 4TX Single carrier, Multi-carrier, Multi-RAT		
Input Voltage:	-48 VDC		
Antenna:	Antenna is not provided by manufacture		

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3.3 Test Configuration

The setup is as follows:

- a) The EUT (“RRU(RF4439d)”) and a Data Unit (DU) are each powered by -48V DC power supply.
- b) The DU is connected to a test laptop via an ethernet cable acting as backhaul.
- c) DU connects to the EUT through a fiber optic cable.
- d) An RF cable connects the signal analyzer and the EUT Ports for respective measurement.

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 971168 D01 v03r01. See Section 8.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

Distribution unit (DU) which were used in test, that authorized under the SDoC procedure.

The following information is about configurations of carrier frequency and output power per port declared by the manufacturer.

* Abbreviations:

- 1C: Single carrier operation
- 2C: Single carrier operation
- 3C: Single carrier operation
- NC: Non-Contiguous

Configuration	No. of Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)			Rated Power (W/path)	
			Low	Middle	High	2TX	4TX
n5_1C_25M	1	25	1942.5	1960.0	1977.5	60	40
n2_2C_25M+5M	2	30	1945.0	1960.0	1975.0		
n2_2NC_25M+5M			1945.0 + 1975.0				
B2/n2_2C_NR_25M+LTE_5M_2T	2	30	1945.0	1960.0	1975.0		
B2/n2_2NC_NR_25M+LTE_5M_2T			1945.0 + 1975.0				
n66_1C_25M	1	25	2112.5	2145.0	2167.5	80	60
n66_1C_30M	1	30	2125.0	2145.0	2165.0		
n66_3C_25M+10M+5M	3	40	2130.0	2145.0	2160.0		
n66_3NC_25M+10M+5M			2130.0 + 2160.0				
B66/n66_3C_NR_25M+LTE_10M+NR_5M	3	40	2130.0	2145.0	2160.0		
B66/n66_3NC_NR_25M+LTE_10M+NR_5M			2130.0 + 2160.0				
B66/n66_3C_NR_30M+LTE_10M+NR_5M	3	45	2132.5	2145.0	2157.5		
B66/n66_3NC_NR_30M+LTE_10M+NR_5M			2132.5 + 2157.5				

Notes:

1. To add Channel Bandwidth of 25MHz on n2 and add Channel Bandwidth of 25MHz, 30MHz on n66 as described in this Class II Permissive Change test report.

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3.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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4.0 DESCRIPTION OF TESTS

4.1 Measurement Procedure

The measurement procedures described in the document titled “American National Standard for Compliance Testing of Transmitter Used in Licensed Radio Service” (ANSI C63.26-2015) and the guidance provided in KDB 842590 D01 v01r01 were used in the measurement of the EUT.

Occupied Bandwidth:

KDB 971168 D01 v03r01 – Section 4.3
ANSI C63.26-2015 – Section 5.4.4

Conducted Power Measurement and EIRP and PSD

KDB 971168 D01 v03r01 – Section 5.3
KDB 971168 D01 v03r01 – Section 5.4
KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements
ANSI C63.26-2015 – Section 5.2.5
ANSI C63.26-2015 – Section 5.2.4

Peak-to-Average Power Ratio:

KDB 971168 D01 v03r01 – Section 5.7
ANSI C63.26-2015 – Section 5.2.3.4

Channel Edge Emissions at Antenna Terminal

KDB 971168 D01 v03r01 – Section 6
KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements
a) Absolute Emission Limits
iii) Measure and add $10 \log(N_{ANT})$ dB
ANSI C63.26-2015 – Section 5.7

Spurious and Harmonic Emissions at Antenna Terminal

KDB 971168 D01 v03r01 – Section 6
KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements
a) Absolute Emission Limits
iii) Measure and add $10 \log(N_{ANT})$ dB
ANSI C63.26-2015 – Section 5.7

Radiated unwanted emission

KDB 971168 D01 v03r01 – Section 7
ANSI C63.26-2015 – Section 5.8

Frequency Stability / Temperature Variation

KDB 971168 D01 v03r01 – Section 9
ANSI C63.26-2015 – Section 5.6

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4.2 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi- anechoic chamber which is shielded from any ambient interference.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. For frequencies above 1GHz, linearly polarized Vivaldi antennas were used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and Vivaldi antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the polarity of the receive antenna to produce the worst-case emissions

4.3 Measurement Software

Test item	Name	Version
Conducted Measurement	Node B automation	1.0

4.4 Enviromental Conditions

The temperature is controlled within the range of 15°C to 35°C. The relative humidity is controlled within the range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (\pm dB)
Conducted Bench Top Measurements	1.95
Radiated Disturbance (<1GHz)	4.10
Radiated Disturbance (<18GHz)	4.82
Radiated Disturbance (<40GHz)	4.96

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6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurement antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacture	Model	Description	Cal Date	Cal interval	Cal Due	Serial Number
ROHDE&SCH WARZ	FSW43	Signal Analyzer	04/08/2024	Annual	04/07/2025	101250
AC POWER KOREA	ACPD-60150	DC Power Supply	01/10/2024	Annual	01/09/2025	DC-1
SUKSAN TECHNOLOGY	SE-CT-10	Temperature Chamber	07/05/2023	Annual	07/04/2024	191021
Rohde & Schwarz	TS-SFUNIT-Rx	Shielded Filter Unit	01/11/2024	Annual	01/10/2025	102131
Schwarzbeck	VULB9162	Broadband TRILOG Antenna	06/01/2023	Biennial	05/31/2025	9162-217
Sunol sciences	DRH-118	Horn Antenna	07/13/2023	Biennial	07/12/2025	A102416-1
K&L MICROWAVE	50140	High Pass Filter	07/05/2023	Annual	07/04/2024	3
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0288
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0289
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0290
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0291
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0292
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0293
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0294
Reachline	250W18NN-40	Attenuator	01/10/2024	Annual	01/09/2025	PK0295

Table 6-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. All testing was performed before the calibration due date.

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7.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 23M9G7D

Occupied Bandwidth = 23.87 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 23M9W7D

Occupied Bandwidth = 23.90 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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8.0 TEST RESULTS

8.1 Summary

Company Name: SAMSUNG Electronics Co., Ltd.
 FCC ID: A3LRF4439D-25A
 FCC Classification: PCS Licensed Transmitter
 Mode(s): LTE, NR, DSS

FCC Part Section(s)	Test Description	Limit	Test Condition	Test Result	Reference
§ 2.1046	Conducted Average Output Power	N/A	CONDUCTED	PASS	Annex A
§ 2.1049	Occupied Bandwidth	N/A		PASS	Section 8.2
§ 2.1046, § 24.232, § 27.50(d)	Equivalent Isotropic Radiated Power (Power Spectral Density)	< 1640 W/MHz		PASS	Section 8.3 (Note 4)
§ 2.1046, § 24.232, § 27.50(d)	Peak-to-average ratio	≤ 13 dB		PASS	Section 8.4
§ 2.1051, § 24.238, § 27.53(h)	Band Edge Emissions at Antenna Terminal	< 43 + log ₁₀ (P[Watts]) at Band Edge and all out-of-band emissions		PASS	Section 8.5
§ 2.1051, § 24.238, § 27.53(h)	Spurious and Harmonic Emissions at Antenna Terminal			PASS	Section 8.6
§ 2.1055, § 24.235, § 27.54	Frequency Stability	Fundamental emissions stay within authorized frequency block	N/A	Section 8.8	
§ 2.1055, § 24.238, § 27.53(h)	Radiated unwanted emission	< 43 + log ₁₀ (P[Watts]) at Band Edge and all out-of-band emissions	RADIATED	PASS	Section 8.7

Table 8-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) The maximum antenna gain and Limit are determined at the time of licensing depending on the geographical Location of the base station.
- 5) This is a variant report for Carrier power changed by software without hardware change. The test item does not affect those operation. And it was performed in the original report.

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8.2 Occupied Bandwidth

Test Overview

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 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 4.3

ANSI C63.26-2015 – Section 5.4.4

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW \geq 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

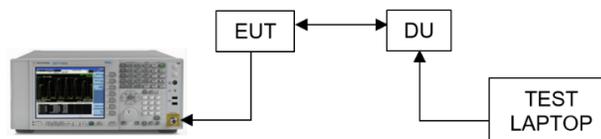


Figure 8-1. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	23.77	23.90	23.77	23.82
	1	23.80	23.90	23.80	23.76
Middle	0	23.78	23.89	23.86	23.81
	1	23.81	23.87	23.80	23.84
High	0	23.87	23.88	23.82	23.84
	1	23.79	23.90	23.83	23.78

Table 8-2. Occupied Bandwidth Summary Data (n2_1C_25M_2T)

Channel	Port	OBW (MHz)			
		n2_2C_25M+5M_2T		n2/B2_2C_NR_25M+LTE_5M_2T	
		QPSK	QAM	QPSK	QAM
Middle	0	29.00	29.06	29.07	29.08
	1	29.03	29.03	28.99	29.08

Table 8-3. Occupied Bandwidth Summary Data (n2/B2_Multi-carrier_2T)

Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	23.78	23.84	23.81	23.75
	1	23.79	23.85	23.76	23.83
	2	23.80	23.90	23.85	23.78
	3	23.79	23.90	23.81	23.81
Middle	0	23.80	23.94	23.81	23.81
	1	23.81	23.89	23.84	23.76
	2	23.80	23.90	23.83	23.82
	3	23.81	23.89	23.80	23.80
High	0	23.83	23.86	23.85	23.79
	1	23.81	23.87	23.83	23.77
	2	23.79	23.91	23.82	23.78
	3	23.83	23.90	23.81	23.80

Table 8-4. Occupied Bandwidth Summary Data (n2_1C_25M_4T)

Channel	Port	OBW (MHz)			
		n2_2C_25M+5M_4T		n2/B2_2C_NR_25M+LTE_5M_4T	
		QPSK	QAM	QPSK	QAM
Middle	0	29.03	29.04	29.00	29.06
	1	29.02	29.07	29.05	29.12
	2	29.05	29.07	29.06	29.03
	3	29.01	29.02	29.02	29.05

Table 8-5. Occupied Bandwidth Summary Data (n2/B2_Multi-carrier_4T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	23.80	23.83	23.80	23.83
	1	23.78	23.97	23.81	23.83
Middle	0	23.81	23.89	23.81	23.81
	1	23.81	23.94	23.83	23.85
High	0	23.80	23.87	23.82	23.87
	1	23.83	23.86	23.85	23.86

Table 8-6. Occupied Bandwidth Summary Data (n66_1C_25M_2T)

Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	28.58	28.39	28.61	28.61
	1	28.56	28.45	28.61	28.61
Middle	0	28.60	28.46	28.65	28.60
	1	28.62	28.45	28.61	28.56
High	0	28.61	28.41	28.66	28.60
	1	28.60	28.37	28.61	28.64

Table 8-7. Occupied Bandwidth Summary Data (n66_1C_30M_2T)

Channel	Port	OBW (MHz)					
		n66_3C_25M+10M+5M_2T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T	
		QPSK	QAM	QPSK	QAM	QPSK	QAM
Middle	0	39.20	39.10	39.14	39.12	43.97	44.04
	1	39.11	39.09	39.16	39.15	43.92	43.98

Table 8-8. Occupied Bandwidth Summary Data (n66/B66_Multi-carrier_2T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	23.87	23.85	23.82	23.77
	1	23.78	23.88	23.80	23.82
	2	23.76	23.85	23.81	23.78
	3	23.74	23.88	23.76	23.76
Middle	0	23.84	23.87	23.83	23.81
	1	23.76	23.90	23.85	23.82
	2	23.78	23.87	23.84	23.87
	3	23.80	23.88	23.80	23.82
High	0	23.82	23.87	23.85	23.80
	1	23.83	23.89	23.86	23.85
	2	23.85	23.91	23.84	23.85
	3	23.78	23.87	23.78	23.75

Table 8-9. Occupied Bandwidth Summary Data (n66_1C_25M_4T)

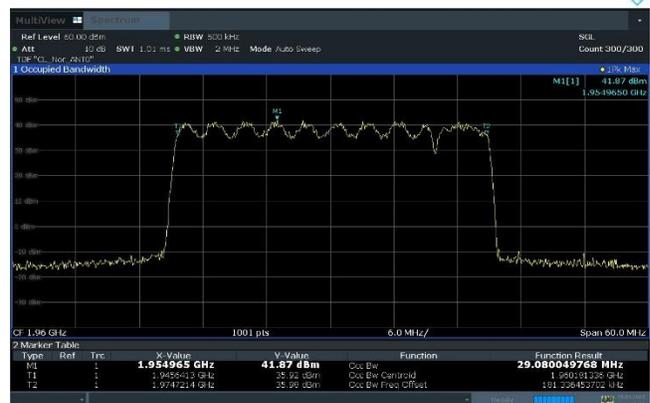
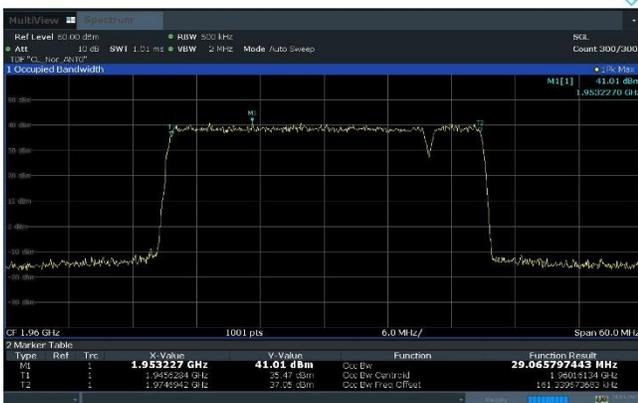
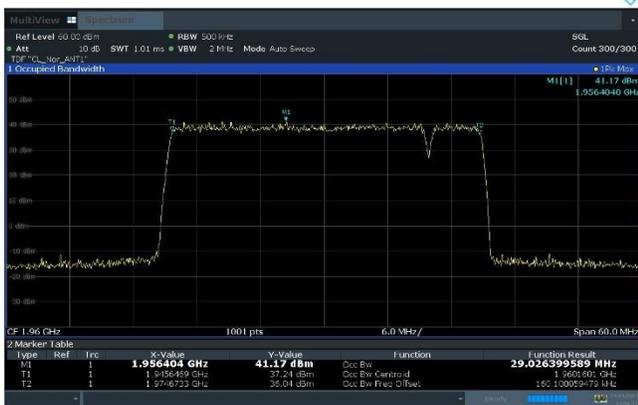
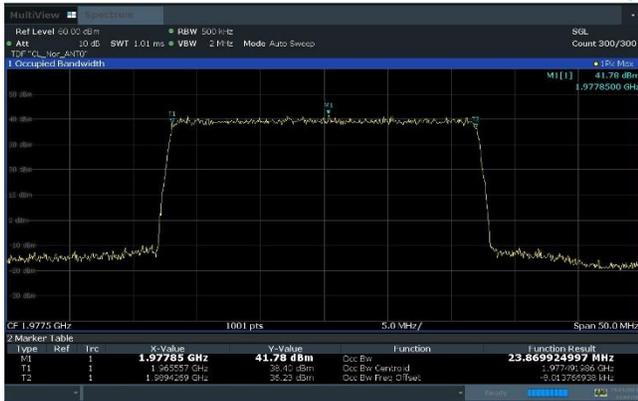
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	28.56	28.40	28.53	28.57
	1	28.56	28.43	28.54	28.53
	2	28.55	28.37	28.57	28.58
	3	28.60	28.42	28.58	28.59
Middle	0	28.68	28.46	28.57	28.61
	1	28.58	28.44	28.61	28.56
	2	28.65	28.43	28.62	28.62
	3	28.56	28.41	28.60	28.57
High	0	28.56	28.40	28.66	28.62
	1	28.54	28.45	28.62	28.66
	2	28.64	28.35	28.64	28.64
	3	28.55	28.49	28.60	28.60

Table 8-10. Occupied Bandwidth Summary Data (n66_1C_30M_4T)

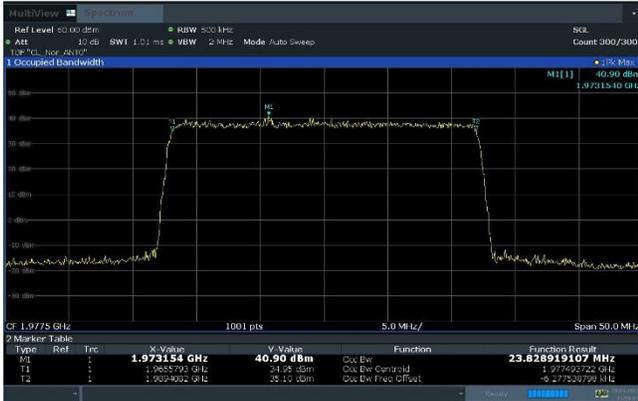
Channel	Port	OBW (MHz)					
		n66_3C_25M+10M+5M_4T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T	
		QPSK	QAM	QPSK	QAM	QPSK	QAM
Middle	0	39.19	39.12	39.09	39.09	43.94	43.95
	1	39.11	39.20	39.16	39.09	43.85	43.92
	2	39.16	39.16	39.18	39.15	43.96	43.94
	3	39.14	39.07	39.07	39.04	43.95	43.92

Table 8-11. Occupied Bandwidth Summary Data (n66/B66_Multi-carrier_4T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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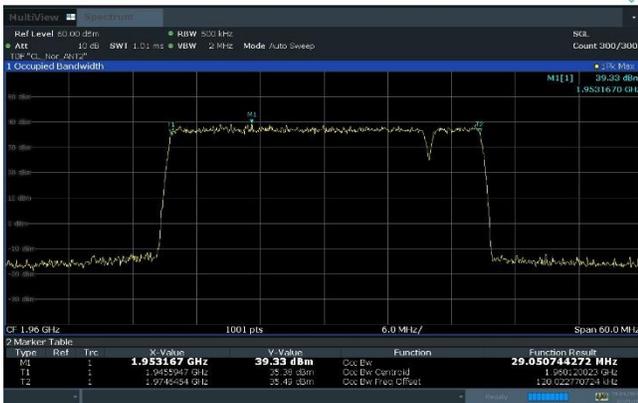
FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
Test Report S/N: 8K24022601-00.A3L	Test Dates: 03/18/2024 - 04/29/2024	EUT Type: RRU(RF4439d)		Page 19 of 114



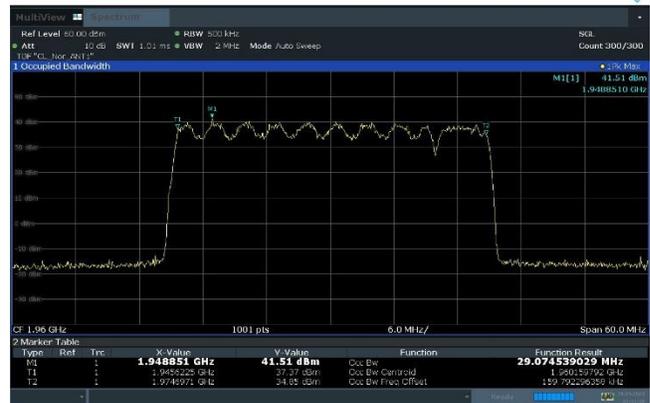
Plot 8-7. Occupied Bandwidth Plot
(n2_1C_25M_4T_QPSK - High Channel, Port 0)



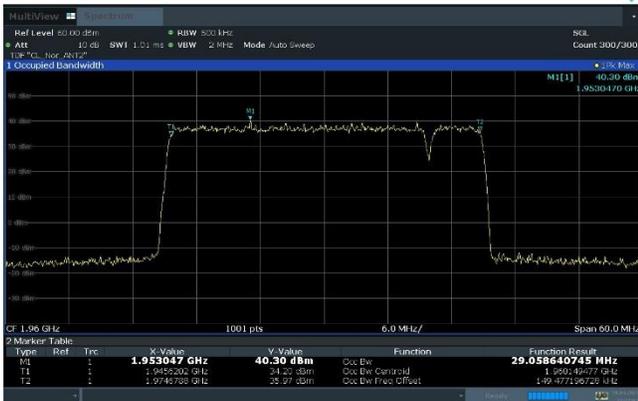
Plot 8-8. Occupied Bandwidth Plot
(n2_1C_25M_4T_16QAM - Mid Channel, Port 0)



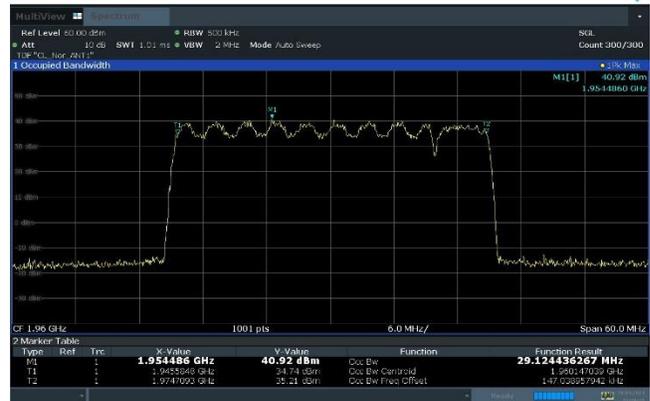
Plot 8-9. Occupied Bandwidth Plot
(n2_2C_25M+5M_4T_QPSK - Mid Channel, Port 2)



Plot 8-10. Occupied Bandwidth Plot
(n2_2C_25M+5M_4T_16QAM - Mid Channel, Port 1)



Plot 8-11. Occupied Bandwidth Plot
(n2/B2_2C_NR_25M+LTE_5M_4T_QPSK - Mid Channel, Port 2)



Plot 8-12. Occupied Bandwidth Plot
(n2/B2_2C_NR_25M+LTE_5M_4T_16QAM - Mid Channel, Port 1)

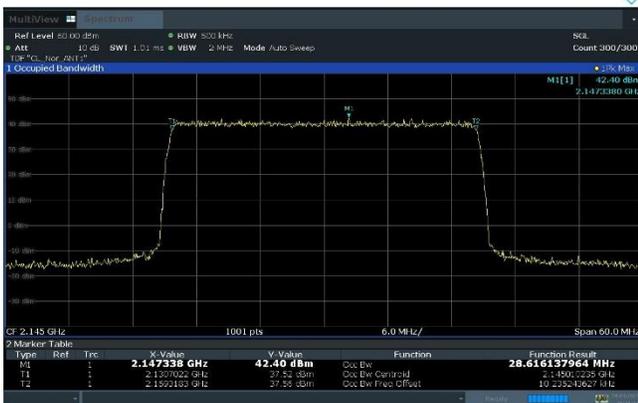
FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
Test Report S/N: 8K24022601-00.A3L	Test Dates: 03/18/2024 - 04/29/2024	EUT Type: RRU(RF4439d)		Page 20 of 114



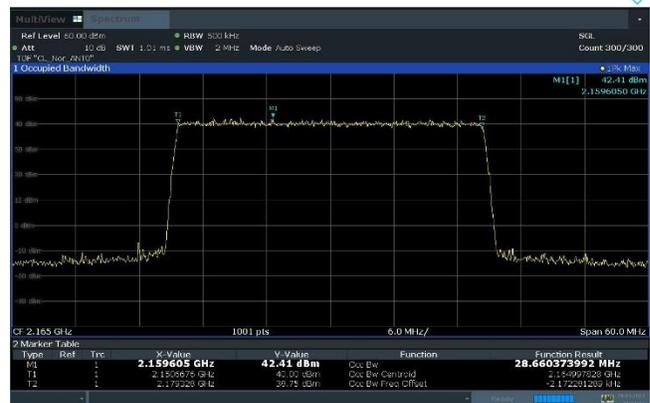
Plot 8-13. Occupied Bandwidth Plot
(n66_1C_25M_2T_QPSK - High Channel, Port 1)



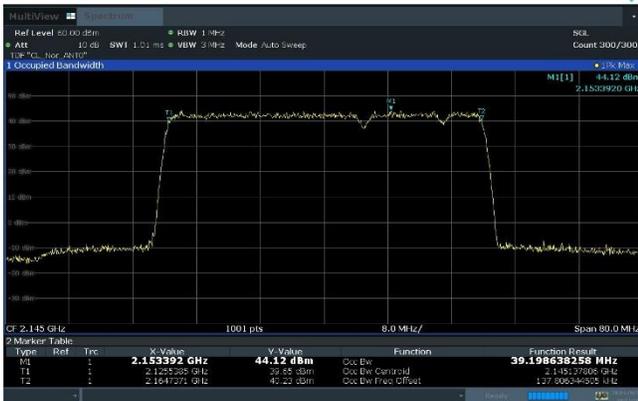
Plot 8-14. Occupied Bandwidth Plot
(n66_1C_25M_2T_16QAM - Low Channel, Port 1)



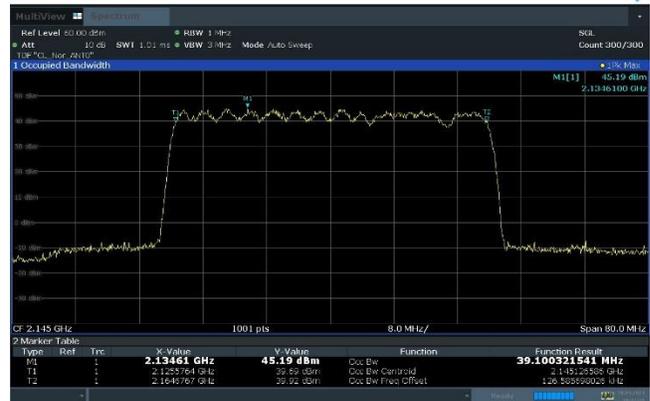
Plot 8-15. Occupied Bandwidth Plot
(n66_1C_NR_30M_2T_QPSK - Mid Channel, Port 1)



Plot 8-16. Occupied Bandwidth Plot
(n66_1C_NR_30M_2T_64QAM - High Channel, Port 0)

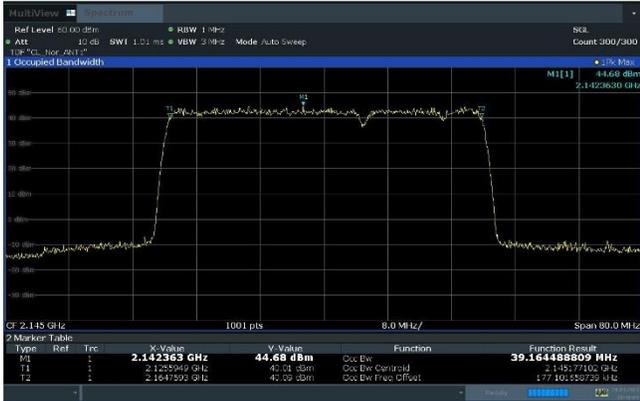


Plot 8-17. Occupied Bandwidth Plot
(n66_3C_NR_25M+10M+5M_2T_QPSK - Mid Channel, Port 0)



Plot 8-18. Occupied Bandwidth Plot
(n66_3C_NR_25M+10M+5M_2T_16QAM - Mid Channel, Port 0)

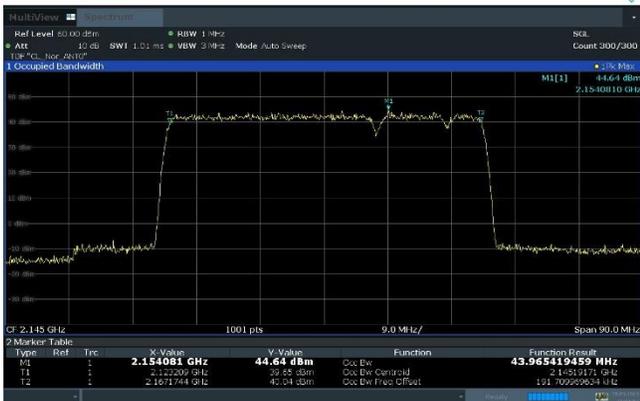
FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
Test Report S/N: 8K24022601-00.A3L	Test Dates: 03/18/2024 - 04/29/2024	EUT Type: RRU(RF4439d)		Page 21 of 114



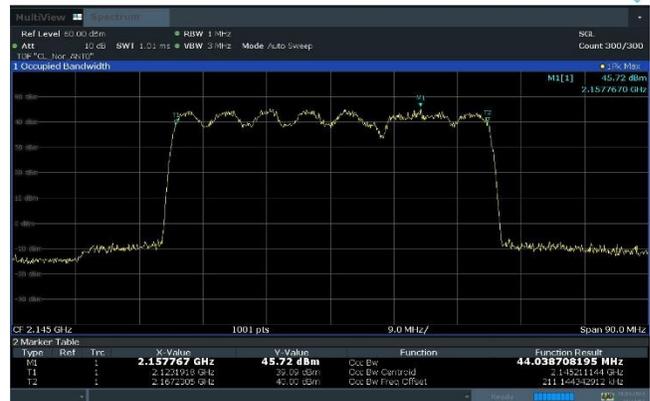
Plot 8-19. Occupied Bandwidth Plot
(n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T_QPSK
- Mid Channel, Port 1)



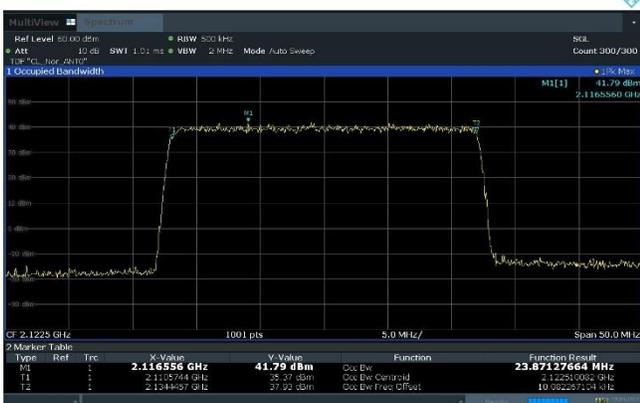
Plot 8-20. Occupied Bandwidth Plot
(n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T_16QAM
- Mid Channel, Port 1)



Plot 8-21. Occupied Bandwidth Plot
(n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T_QPSK
- Mid Channel, Port 0)



Plot 8-22. Occupied Bandwidth Plot
(n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T_16QAM
- Mid Channel, Port 0)

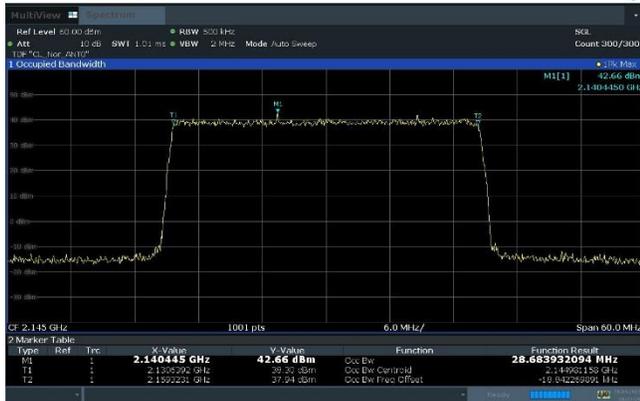


Plot 8-23. Occupied Bandwidth Plot
(n66_1C_NR_25M_4T_QPSK - Low Channel, Port 0)

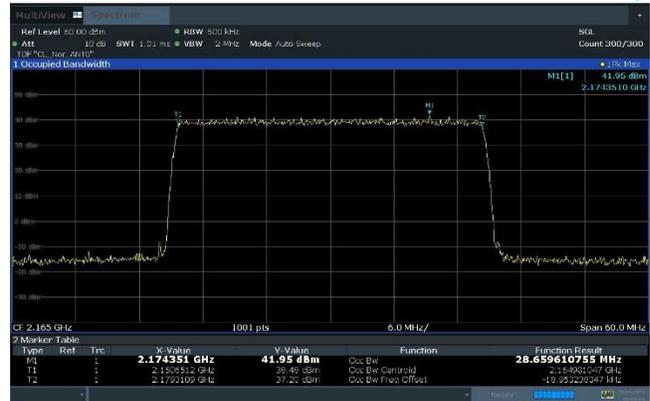


Plot 8-24. Occupied Bandwidth Plot
(n66_1C_NR_25M_4T_16QAM - High Channel, Port 2)

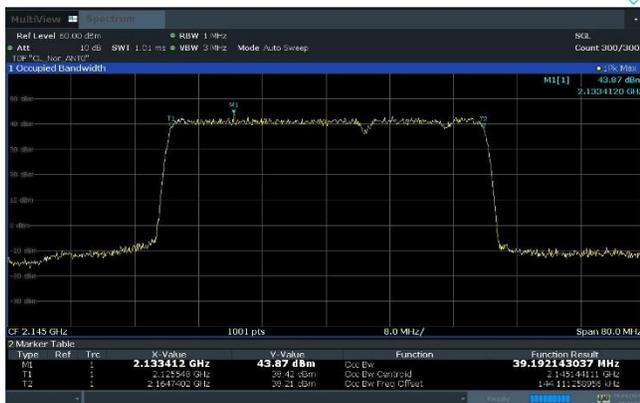
FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
Test Report S/N: 8K24022601-00.A3L	Test Dates: 03/18/2024 - 04/29/2024	EUT Type: RRU(RF4439d)		Page 22 of 114



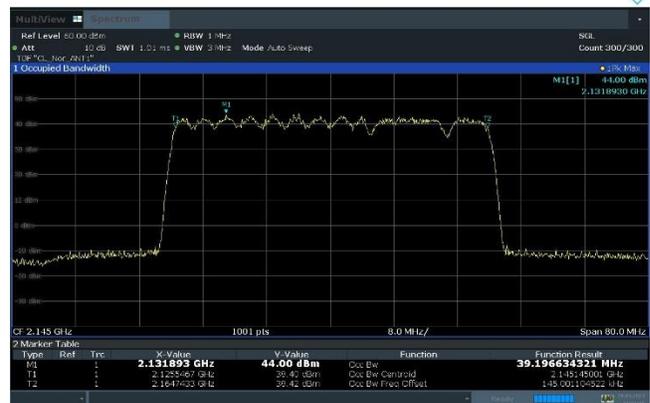
Plot 8-25. Occupied Bandwidth Plot
(n66_1C_NR_30M_4T_QPSK - Mid Channel, Port 0)



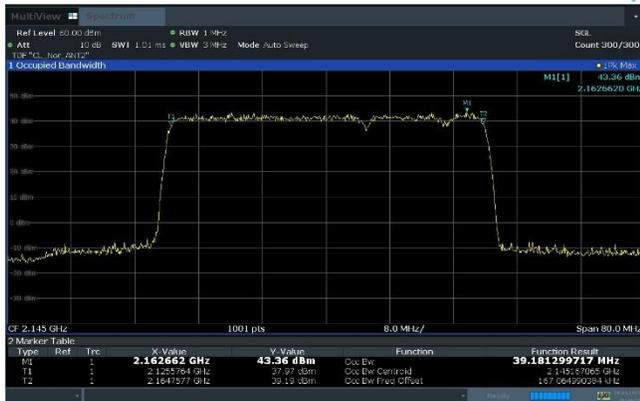
Plot 8-26. Occupied Bandwidth Plot
(n66_1C_NR_30M_4T_64QAM - High Channel, Port 0)



Plot 8-27. Occupied Bandwidth Plot
(n66_3C_NR_25M+10M+5M_4T_QPSK - Mid Channel, Port 0)



Plot 8-28. Occupied Bandwidth Plot
(n66_3C_NR_25M+10M+5M_4T_16QAM - Mid Channel, Port 1)

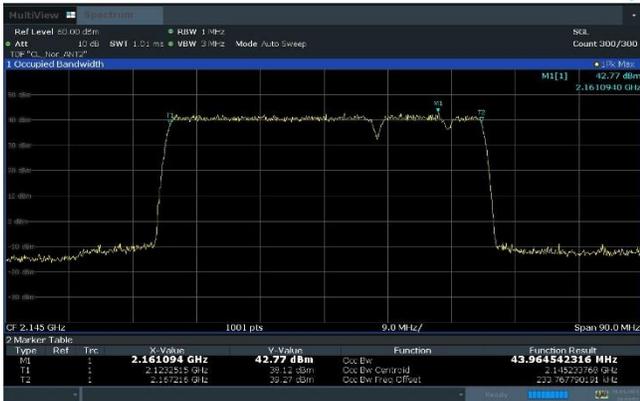


Plot 8-29. Occupied Bandwidth Plot
(n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T_QPSK - Mid Channel, Port 2)

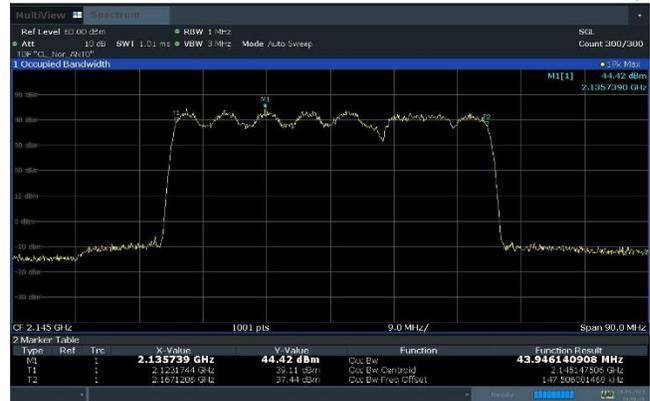


Plot 8-30. Occupied Bandwidth Plot
(n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T_16QAM - Mid Channel, Port 2)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Plot 8-31. Occupied Bandwidth Plot
(n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T_QPSK
- Mid Channel, Port 2)



Plot 8-32. Occupied Bandwidth Plot
(n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T_16QAM
- Mid Channel, Port 0)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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8.3 Equivalent Isotropically Radiated Power

Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Description

KDB 971168 D01 v03r01 – Section 5
 KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements
 ANSI C63.26-2015 – Section 5.2.4.4.1

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. Conducted power measurements are performed using the signal analyzer’s “SA” measurement capability for signals with continuous operation.
2. Set span to 2 × to 3 × the OBW.
3. Set RBW = 1 MHz (the reference bandwidth)
4. Set VBW ≥ 3 × RBW.
5. Set number of measurement points in sweep ≥ 2 × span / RBW.
6. Sweep time:
 - a) Set ≥ auto-couple, and enable trace averaging, or
 - b) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] and enable a single sweep (automation-compatible) measurement. The sweep time should never be faster than the auto-coupled sweep time.
7. Detector = power averaging (rms).
8. The trace was allowed to stabilize
9. Use the peak marker function to determine the maximum amplitude level. (=P_{Meas})
10. The relevant equation for determining the maximum EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_T$$
 where
 G_T: gain of the transmitting antenna, in dBi (EIRP).

Test Setup

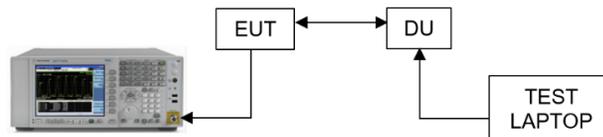


Figure 8-2. Test Instrument & Measurement Setup

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Limit

Band(n) 2 operation under Part 24

§ 24.232(a) (2)

Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

Band(n) 66 operation under Part 27

§ 24.232(d) (2) (ii)

An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

Note: The maximum antenna gain and ERP limit are determined at the time of licensing depending on the geographical location of the base station. For limit, an estimated calculate maximum permissible ERP reported.

Test Notes

1. For test results, an estimated calculated maximum permissible EIRP reported. And the required reduction measurements will be performed when after the installation.
2. Consider the following factors for MIMO:
The output power per each port is measured as dBm/MHz or dBm, the output powers are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01 - Section E) 2).
3. The output power per port (dBm/MHz or dBm) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO Conducted Power (mW). We convert this back to logarithmic scale for further output power calculations.
4. Sample Calculation:
Let us assume the following numbers:
 - a) Total MIMO Conducted Power as 5768.31 milliWatts
 - b)

	Factors	Value	Unit
Summed MIMO Conducted Power (linear sum)		5768.31	mW/
Summed MIMO Conducted Power (dBm)	= 10 * log (5768.31) =	37.61	dBm

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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.56	35.88	34.51	34.80
	1	34.64	36.28	34.42	34.68
Total MIMO PSD (mW/MHz)		5768.31	8118.77	5591.82	5957.60
Total MIMO PSD (dBm/MHz)		37.61	39.09	37.48	37.75
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.56	35.72	34.47	34.68
	1	34.59	35.78	34.39	34.39
Total MIMO PSD (mW/MHz)		5734.99	7516.93	5546.88	5685.54
Total MIMO PSD (dBm/MHz)		37.59	38.76	37.44	37.55
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.56	36.17	34.73	34.65
	1	34.59	35.98	34.77	34.51
Total MIMO PSD (mW/MHz)		5734.99	8102.78	5970.83	5742.31
Total MIMO PSD (dBm/MHz)		37.59	39.09	37.76	37.59

Table 8-12. Power Spectral Density Table (n2_1C_25M_2T)

Low Channel	Port	n2_2C_25M+5M_2T		n2/B2_2C_NR_25M+LTE_5M_2T	
		QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	34.27	35.71	34.17	35.56
	1	34.07	35.42	34.02	35.46
Total MIMO PSD (mW/MHz)		5225.71	7207.29	5135.64	7113.10
Total MIMO PSD (dBm/MHz)		37.18	38.58	37.11	38.52
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.01	35.44	33.92	35.27
	1	33.83	35.17	33.60	34.96
Total MIMO PSD (mW/MHz)		4933.14	6787.97	4756.91	6498.40
Total MIMO PSD (dBm/MHz)		36.93	38.32	36.77	38.13
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.00	35.21	33.85	35.31
	1	33.83	35.07	33.83	35.16
Total MIMO PSD (mW/MHz)		4927.35	6532.61	4842.07	6677.21
Total MIMO PSD (dBm/MHz)		36.93	38.15	36.85	38.25

Table 8-13. Power Spectral Density Table (n2/B2_Multi-carrier_2T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	32.84	34.07	32.68	32.74
	1	32.76	33.79	32.56	32.59
	2	32.80	34.07	32.95	32.89
	3	32.91	34.09	32.82	32.93
Total MIMO PSD (mW/MHz)		7670.88	10063.20	7543.23	7603.55
Total MIMO PSD (dBm/MHz)		38.85	40.03	38.78	38.81
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	32.79	34.21	32.88	32.81
	1	32.63	33.98	32.71	32.66
	2	32.61	33.92	32.76	32.62
	3	32.75	34.11	32.72	32.71
Total MIMO PSD (mW/MHz)		7440.94	10179.04	7565.94	7449.35
Total MIMO PSD (dBm/MHz)		38.72	40.08	38.79	38.72
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	32.89	34.30	32.92	32.86
	1	32.97	34.10	32.75	32.80
	2	32.67	34.12	32.75	32.61
	3	32.87	34.12	32.75	32.73
Total MIMO PSD (mW/MHz)		7712.58	10426.45	7609.79	7536.32
Total MIMO PSD (dBm/MHz)		38.87	40.18	38.81	38.77

Table 8-14. Power Spectral Density Table (n2_1C_25M_4T)

Low Channel	Port	n2_2C_25M+5M_4T		n2/B2_2C_NR_25M+LTE_5M_4T	
		QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	32.08	33.45	32.17	33.21
	1	31.97	33.39	32.02	33.24
	2	31.99	33.39	32.51	33.36
	3	32.24	33.43	32.58	33.24
Total MIMO PSD (mW/MHz)		6444.53	8781.48	6834.09	8479.07
Total MIMO PSD (dBm/MHz)		38.09	39.44	38.35	39.28
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	32.00	33.49	32.30	33.24
	1	31.93	33.28	31.96	33.06
	2	31.89	33.24	32.05	33.11
	3	32.01	33.12	32.30	33.21
Total MIMO PSD (mW/MHz)		6278.25	8521.50	6570.10	8272.20
Total MIMO PSD (dBm/MHz)		37.98	39.31	38.18	39.18
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	32.10	33.41	32.19	33.34
	1	32.10	33.32	31.95	33.25
	2	31.85	33.11	31.88	33.17
	3	32.04	33.34	32.01	33.14
Total MIMO PSD (mW/MHz)		6374.27	8544.82	6352.77	8406.78
Total MIMO PSD (dBm/MHz)		38.04	39.32	38.03	39.25

Table 8-15. Power Spectral Density Table (n2/B2_Multi-carrier_4T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)			Approved by: Technical Manager
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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	36.37	37.63	36.13	36.16
	1	36.13	37.44	35.99	35.85
Total MIMO PSD (mW/MHz)		8437.15	11340.54	8073.96	7976.39
Total MIMO PSD (dBm/MHz)		39.26	40.55	39.07	39.02
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	36.25	37.59	36.06	36.18
	1	35.93	37.36	35.86	35.94
Total MIMO PSD (mW/MHz)		8134.38	11186.19	7891.24	8075.99
Total MIMO PSD (dBm/MHz)		39.10	40.49	38.97	39.07
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	36.21	37.37	36.04	36.03
	1	35.92	37.27	35.85	35.86
Total MIMO PSD (mW/MHz)		8086.71	10790.93	7863.83	7863.45
Total MIMO PSD (dBm/MHz)		39.08	40.33	38.96	38.96

Table 8-16. Power Spectral Density Table (n66_1C_25M_2T)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	35.50	37.24	35.42	35.45
	1	35.08	36.87	35.28	35.18
Total MIMO PSD (mW/MHz)		6769.20	10160.71	6856.25	6803.62
Total MIMO PSD (dBm/MHz)		38.31	40.07	38.36	38.33
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	35.27	37.31	35.33	35.31
	1	34.93	36.80	34.98	35.11
Total MIMO PSD (mW/MHz)		6476.83	10169.00	6559.68	6639.65
Total MIMO PSD (dBm/MHz)		38.11	40.07	38.17	38.22
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	35.32	37.02	35.24	35.23
	1	34.86	36.75	35.02	34.95
Total MIMO PSD (mW/MHz)		6466.05	9766.52	6518.82	6460.34
Total MIMO PSD (dBm/MHz)		38.11	39.90	38.14	38.10

Table 8-17. Power Spectral Density Table (n66_1C_30M_2T)

Low Channel	Port	n66_3C_25M+10M+5M_2T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T	
		QPSK	QAM	QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	34.23	35.74	34.42	35.74	33.80	35.50
	1	34.12	35.46	34.43	35.52	33.68	35.49
Total MIMO PSD (mW/MHz)		5230.76	7265.33	5540.26	7314.24	4732.29	7088.11
Total MIMO PSD (dBm/MHz)		37.19	38.61	37.44	38.64	36.75	38.51
Middle Channel	Port	QPSK	QAM	QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	34.27	35.68	34.35	35.52	33.75	35.48
	1	33.99	35.56	34.18	35.37	33.55	35.18
Total MIMO PSD (mW/MHz)		5179.12	7295.78	5340.88	7008.01	4636.02	6827.93
Total MIMO PSD (dBm/MHz)		37.14	38.63	37.28	38.46	36.66	38.34
High Channel	Port	QPSK	QAM	QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	34.18	35.64	34.29	35.33	33.73	35.40
	1	34.00	35.33	34.11	35.13	33.43	35.02
Total MIMO PSD (mW/MHz)		5130.07	7076.30	5261.67	6670.30	4563.40	6644.24
Total MIMO PSD (dBm/MHz)		37.10	38.50	37.21	38.24	36.59	38.22

Table 8-18. Power Spectral Density Table (n66/B66_Multi-carrier_2T)

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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.97	36.11	34.84	35.03
	1	34.34	35.83	34.43	34.53
	2	34.59	36.20	34.73	34.84
	3	34.76	36.16	34.89	34.94
Total MIMO PSD (mW/MHz)		11726.61	16210.61	11876.07	12188.90
Total MIMO PSD (dBm/MHz)		40.69	42.10	40.75	40.86
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.63	36.33	34.99	35.05
	1	34.25	35.84	34.45	34.52
	2	34.49	35.67	34.75	34.86
	3	34.55	36.10	34.82	34.89
Total MIMO PSD (mW/MHz)		11227.67	15896.02	11960.40	12175.44
Total MIMO PSD (dBm/MHz)		40.50	42.01	40.78	40.85
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.69	36.27	34.97	35.10
	1	34.19	35.74	34.29	34.55
	2	34.39	35.95	34.75	34.82
	3	34.56	36.08	34.66	34.82
Total MIMO PSD (mW/MHz)		11174.12	15976.75	11735.39	12154.74
Total MIMO PSD (dBm/MHz)		40.48	42.03	40.69	40.85

Table 8-19. Power Spectral Density Table (n66_1C_25M_4T)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.23	35.65	33.98	34.20
	1	34.04	35.89	34.06	34.06
	2	34.05	35.62	33.93	34.23
	3	34.09	35.76	33.98	34.13
Total MIMO PSD (mW/MHz)		10289.09	14968.90	10019.25	10413.81
Total MIMO PSD (dBm/MHz)		40.12	41.75	40.01	40.18
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.33	36.10	34.09	34.30
	1	34.11	35.75	34.15	34.15
	2	33.90	35.55	33.89	34.23
	3	33.93	35.70	33.97	34.07
Total MIMO PSD (mW/MHz)		10212.95	15136.75	10108.30	10492.90
Total MIMO PSD (dBm/MHz)		40.09	41.80	40.05	40.21
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Power Spectral Density (dBm/MHz)	0	34.45	36.12	34.24	34.28
	1	34.02	35.74	34.25	34.13
	2	33.97	35.77	33.96	33.96
	3	33.98	35.95	33.84	33.85
Total MIMO PSD (mW/MHz)		10304.54	15553.56	10225.22	10182.85
Total MIMO PSD (dBm/MHz)		40.13	41.92	40.10	40.08

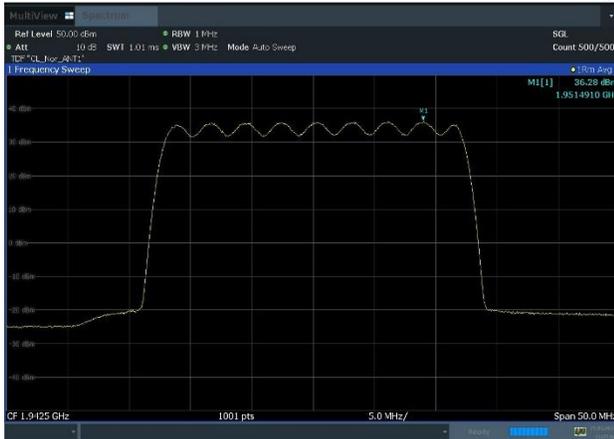
Table 8-20. Power Spectral Density Table (n66_1C_30M_4T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)			Approved by: Technical Manager
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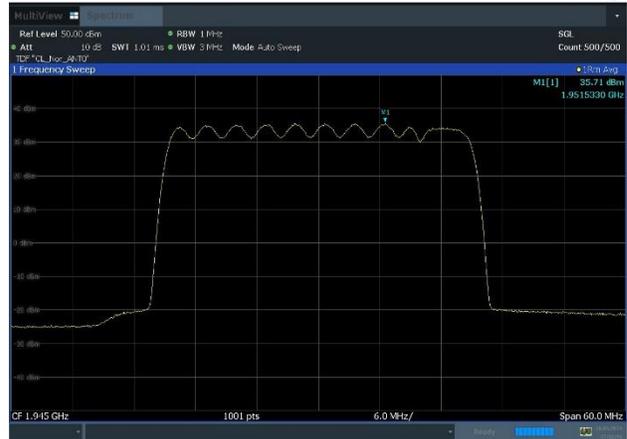
Low Channel	Port	n66_3C_25M+10M+5M_4T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T	
		QPSK	QAM	QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	33.26	34.12	33.28	34.49	32.67	34.44
	1	33.28	34.14	33.02	34.18	32.28	33.92
	2	33.13	34.17	33.18	34.22	32.68	34.19
	3	33.12	34.22	33.27	34.69	32.65	34.48
Total MIMO PSD (mW/MHz)		8353.55	10431.01	8335.55	11016.91	7234.01	10675.40
Total MIMO PSD (dBm/MHz)		39.22	40.18	39.21	40.42	38.59	40.28
Middle Channel	Port	QPSK	QAM	QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	33.24	34.02	33.38	34.11	32.67	34.33
	1	33.15	34.12	32.94	33.81	32.38	33.86
	2	33.29	34.21	32.92	34.19	32.31	33.83
	3	33.01	34.26	33.06	34.64	32.59	33.96
Total MIMO PSD (mW/MHz)		8306.92	10408.93	8127.46	10515.62	7096.76	10046.71
Total MIMO PSD (dBm/MHz)		39.19	40.17	39.10	40.22	38.51	40.02
High Channel	Port	QPSK	QAM	QPSK	QAM	QPSK	QAM
Power Spectral Density (dBm/MHz)	0	32.93	34.13	33.37	34.40	32.43	34.04
	1	32.62	33.97	33.10	33.83	32.12	33.74
	2	32.54	34.01	32.89	33.87	32.42	34.08
	3	32.58	34.10	33.03	34.00	32.43	34.09
Total MIMO PSD (mW/MHz)		7397.53	10170.88	8168.89	10119.39	6874.81	10024.12
Total MIMO PSD (dBm/MHz)		38.69	40.07	39.12	40.05	38.37	40.01

Table 8-21. Power Spectral Density Table (n66/B66_Multi-carrier_4T)

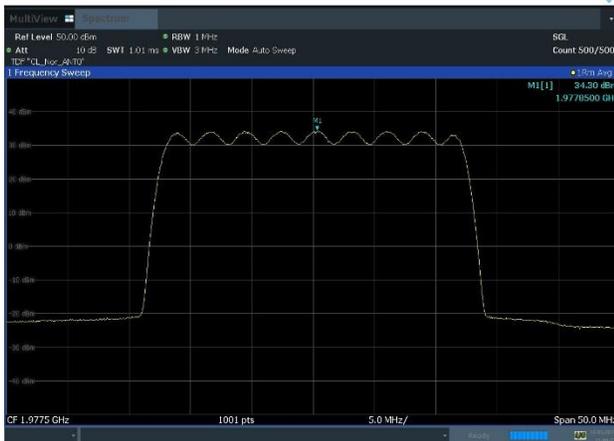
FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)			Approved by: Technical Manager
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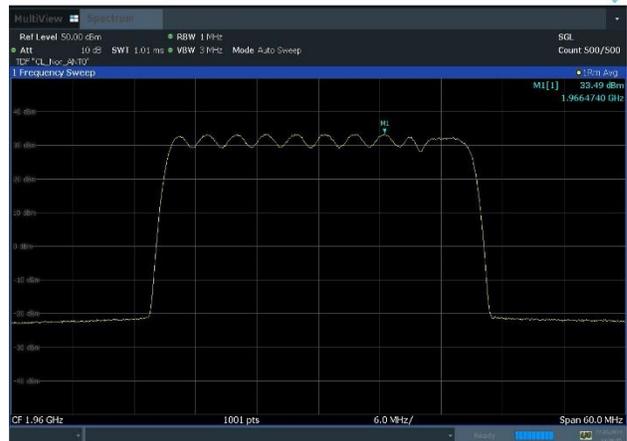
Plot 8-33. Equivalent Radiated Power Plot
(n2_1C_25M_2T_16QAM - Low Channel, Port 1)



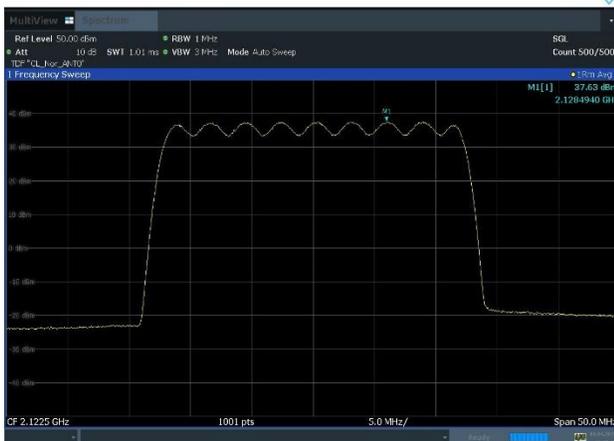
Plot 8-34. Equivalent Radiated Power Plot
(n2_2C_25M+5M_2T_16QAM - Low Channel, Port 0)



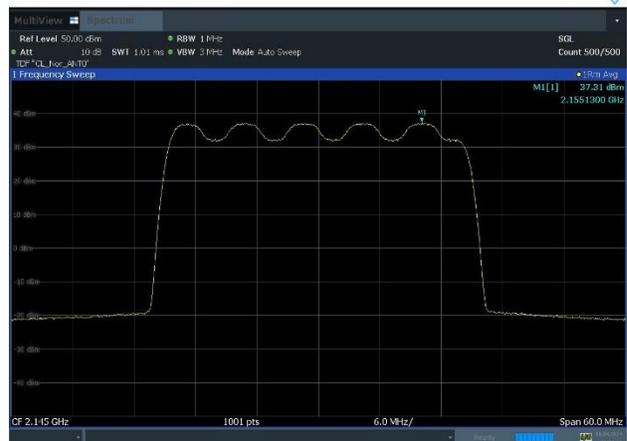
Plot 8-35. Equivalent Radiated Power Plot
(n2_1C_25M_4T_16QAM - High Channel, Port 0)



Plot 8-36. Equivalent Radiated Power Plot
(n2_2C_25M+5M_4T_16QAM - Mid Channel, Port 0)

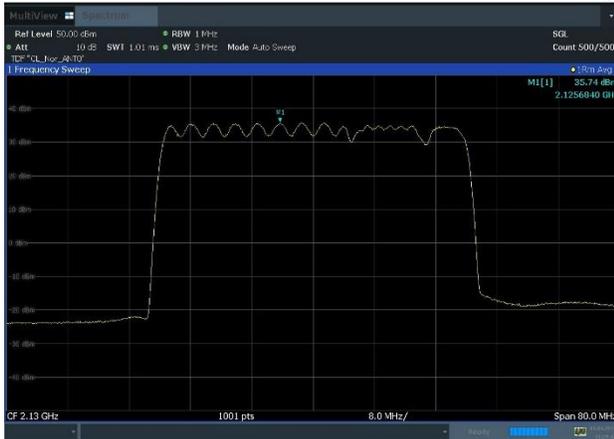


Plot 8-37. Equivalent Radiated Power Plot
(n66_1C_25M_2T_16QAM - Low Channel, Port 0)

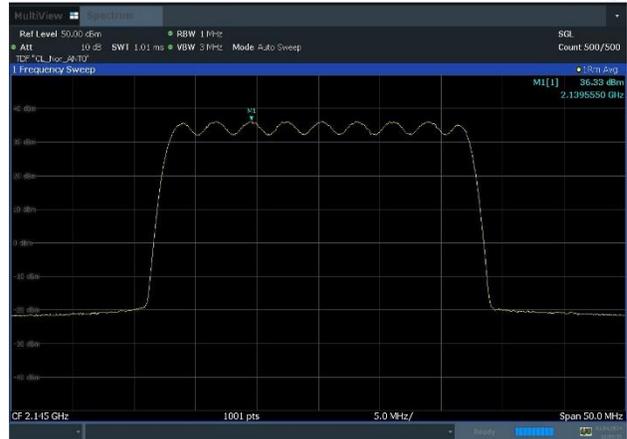


Plot 8-38. Equivalent Radiated Power Plot
(n66_1C_30M_2T_16QAM - Mid Channel, Port 0)

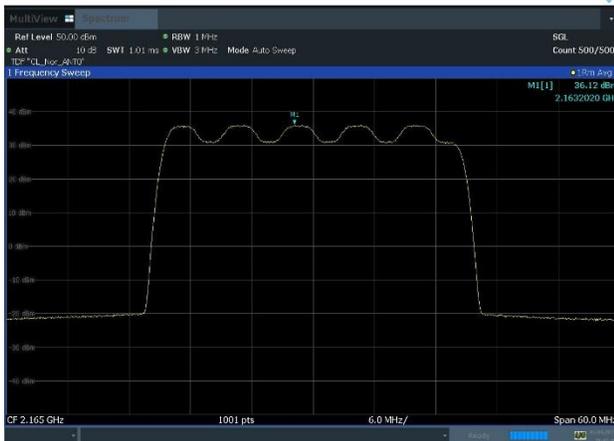
FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
Test Report S/N: 8K24022601-00.A3L	Test Dates: 03/18/2024 - 04/29/2024	EUT Type: RRU(RF4439d)	Page 32 of 114	



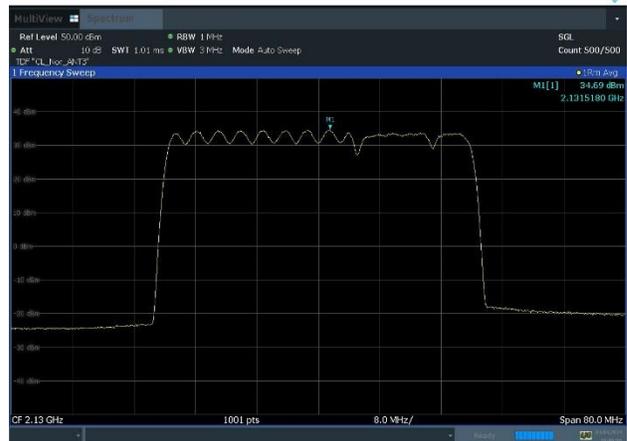
Plot 8-39. Equivalent Radiated Power Plot (n66_3C_NR_25M+10M+5M_2T_16QAM - Low Channel, Port 0)



Plot 8-40. Equivalent Radiated Power Plot (n66_1C_NR_25M_4T_16QAM - Mid Channel, Port 0)



Plot 8-41. Equivalent Radiated Power Plot (n66_1C_NR_30M_4T_16QAM - High Channel, Port 0)



Plot 8-42. Equivalent Radiated Power Plot (n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T_16QAM - Low Channel, Port 3)

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8.4 Peak To Average Ratio

Test Overview

The peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7

ANSI C63.26-2015 – Section 5.2.3.4

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. The signal analyzer's CCDF function is enabled.
2. Frequency = carrier center frequency
3. Measurement BW \geq OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

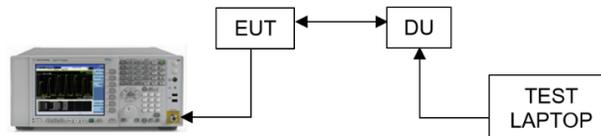


Figure 8-3. Test Instrument & Measurement Setup

Limit

§ 24.232,
§ 27.50(d)

The peak-to-average power ratio (PAPR) limit shall not exceed 13 dB for more than 0.1% of the time.

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Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	7.96	8.02	8.00	8.00
	1	7.98	8.02	8.00	8.00
Middle	0	7.98	7.94	7.96	8.00
	1	7.98	7.96	7.96	8.00
High	0	7.94	7.94	7.94	8.00
	1	7.94	7.94	7.94	7.98

Table 8-22. Peak To Average Power Ratio Summary Data (n2_1C_25M_2T)

Channel	Port	OBW (MHz)			
		n2_2C_25M+5M_2T		n2/B2_2C_NR_25M+LTE_5M_2T	
		QPSK	QAM	QPSK	QAM
Low	0	7.94	7.98	7.90	7.86
	1	7.94	7.98	7.96	7.98
Middle	0	7.92	7.92	7.92	7.92
	1	7.94	7.96	7.98	7.98
High	0	7.94	7.96	7.94	7.92
	1	7.94	7.96	7.96	7.96

Table 8-23. Peak To Average Power Ratio Summary Data (n2/B2_Multi-carrier_2T)

Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	7.96	8.02	8.00	8.00
	1	7.96	8.04	8.00	8.00
	2	7.96	8.04	8.02	8.02
	3	7.96	8.04	8.00	8.02
Middle	0	7.94	7.96	7.96	7.96
	1	7.94	7.98	7.96	7.98
	2	7.98	8.00	7.98	8.02
	3	7.98	8.00	7.98	8.02
High	0	7.94	7.94	7.94	7.98
	1	7.94	7.94	7.94	7.98
	2	7.94	7.98	7.96	8.00
	3	7.94	7.98	7.96	8.00

Table 8-24. Occupied Bandwidth Summary Data (n2_1C_25M_4T)

Channel	Port	OBW (MHz)			
		n2_2C_25M+5M_4T		n2/B2_2C_NR_25M+LTE_5M_4T	
		QPSK	QAM	QPSK	QAM
Low	0	8.02	8.02	8.00	8.00
	1	8.04	8.04	8.08	8.08
	2	7.94	8.00	7.98	7.98
	3	7.96	8.00	7.98	8.00
Middle	0	7.92	7.94	7.94	7.92
	1	7.98	7.98	8.00	7.98
	2	7.92	7.94	7.96	7.94
	3	7.96	7.96	7.96	7.96
High	0	7.94	7.96	7.94	7.94
	1	7.96	7.98	7.98	7.98
	2	7.94	7.98	7.96	7.94
	3	7.98	7.98	7.98	7.98

Table 8-25. Peak To Average Power Ratio Summary Data (n2/B2_Multi-carrier_4T)

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Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	8.00	8.00	8.02	7.98
	1	8.00	7.98	8.00	7.98
Middle	0	8.02	7.96	8.00	7.96
	1	8.02	7.96	8.00	7.98
High	0	8.02	7.96	8.00	7.98
	1	8.02	7.96	8.02	7.98

Table 8-26. Peak To Average Power Ratio Summary Data (n66_1C_25M_2T)

Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	8.02	8.00	8.00	8.04
	1	8.04	8.02	8.02	8.04
Middle	0	8.00	7.98	8.00	8.00
	1	8.02	8.00	8.00	8.00
High	0	8.00	8.00	8.00	7.98
	1	8.02	8.02	8.00	8.00

Table 8-27. Peak To Average Power Ratio Summary Data (n66_1C_30M_2T)

Channel	Port	OBW (MHz)					
		n66_3C_25M+10M+5M_2T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T	
		QPSK	QAM	QPSK	QAM	QPSK	QAM
Low	0	8.00	7.98	8.00	8.02	8.02	8.00
	1	8.00	7.98	8.02	8.04	8.02	7.88
Middle	0	8.00	7.86	8.02	8.00	7.96	7.96
	1	8.02	7.96	8.04	8.04	8.00	8.00
High	0	8.04	8.00	8.04	8.02	8.02	8.00
	1	8.06	8.00	8.06	8.06	8.06	8.04

Table 8-28. Peak To Average Power Ratio Summary Data (n66/B66_Multi-carrier_2T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	8.02	8.00	8.00	7.98
	1	8.02	7.98	8.00	7.98
	2	7.98	7.80	7.98	7.96
	3	7.96	7.92	7.96	7.92
Middle	0	8.02	7.96	8.02	7.96
	1	8.02	7.96	8.00	7.98
	2	7.98	7.84	7.96	7.94
	3	7.98	7.92	7.96	7.94
High	0	8.00	7.96	8.00	7.96
	1	8.00	7.94	8.00	7.96
	2	7.98	7.84	7.98	7.94
	3	7.98	7.92	7.96	7.94

Table 8-29. Peak To Average Power Ratio Summary Data (n66_1C_25M_4T)

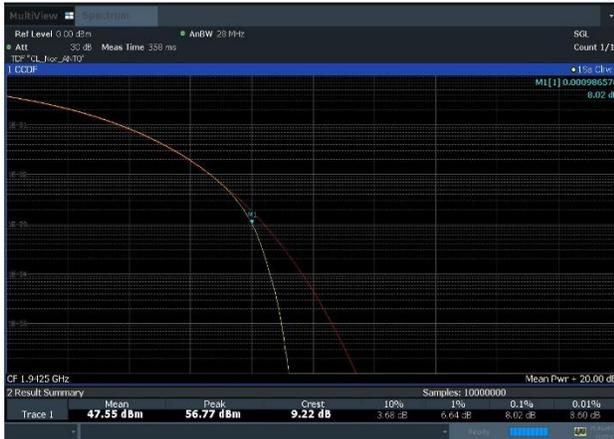
Channel	Port	OBW (MHz)			
		QPSK	16QAM	64QAM	256QAM
Low	0	8.04	8.00	8.00	8.04
	1	8.02	8.00	8.00	8.02
	2	8.02	7.98	7.98	8.02
	3	8.00	7.98	7.98	8.00
Middle	0	8.00	8.00	7.98	8.00
	1	7.92	7.98	7.98	7.98
	2	7.98	7.98	7.96	7.98
	3	7.98	7.98	7.96	7.96
High	0	7.98	7.98	7.98	8.00
	1	8.00	7.98	7.98	7.98
	2	7.98	7.96	7.96	7.96
	3	7.96	7.96	7.94	7.96

Table 8-30. Peak To Average Power Ratio Summary Data (n66_1C_30M_4T)

Channel	Port	OBW (MHz)					
		n66_3C_25M+10M+5M_4T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T	
		QPSK	QAM	QPSK	QAM	QPSK	QAM
Low	0	8.24	8.02	8.04	8.04	8.06	8.04
	1	8.24	7.98	8.04	8.04	8.04	8.02
	2	8.28	8.00	8.04	8.04	8.06	8.02
	3	8.20	7.98	8.00	8.04	8.06	8.02
Middle	0	8.30	8.00	8.04	8.02	8.04	8.02
	1	8.28	8.00	8.06	8.06	8.06	8.06
	2	8.24	7.94	8.02	8.00	8.02	8.02
	3	8.26	7.96	8.02	8.02	8.00	8.00
High	0	8.08	8.04	8.08	8.06	8.08	8.06
	1	8.08	8.04	8.08	8.08	8.04	8.04
	2	8.04	8.00	8.04	8.04	8.06	8.04
	3	8.04	7.98	8.04	8.04	8.04	8.04

Table 8-31. Peak To Average Power Ratio Summary Data (n66/B66_Multi-carrier_4T)

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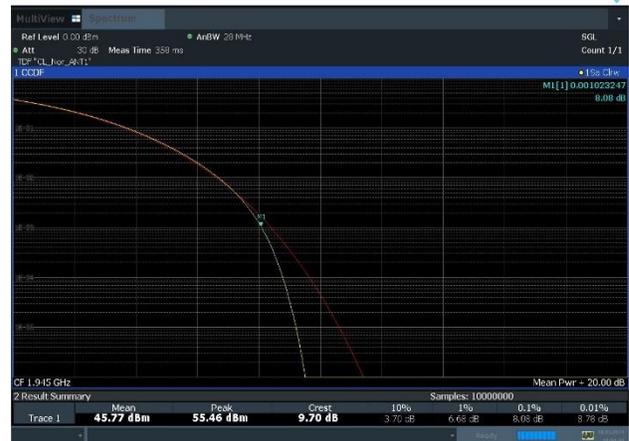
Plot 8-43. Peak To Average Power Ratio Plot (n2_1C_25M_2T_16QAM - Low Channel, Port 0)



Plot 8-44. Peak To Average Power Ratio Plot (n2_2C_25M+5M_2T_16QAM - Low Channel, Port 0)



Plot 8-45. Peak To Average Power Ratio Plot (n2_1C_25M_4T_16QAM - Low Channel, Port 1)



Plot 8-46. Peak To Average Power Ratio Plot (n2/B2_2C_NR_25M+LTE_5M_4T_QPSK - Low Channel, Port 1)

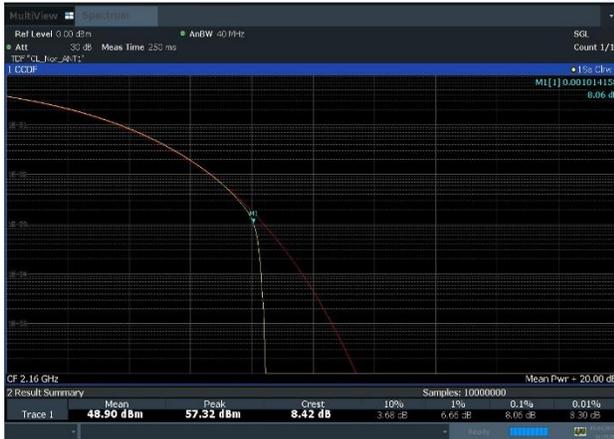


Plot 8-47. Peak To Average Power Ratio Plot (n66_1C_25M_2T_64QAM - Low Channel, Port 0)



Plot 8-48. Peak To Average Power Ratio Plot (n66_1C_30M_2T_256QAM - Low Channel, Port 0)

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Plot 8-49. Peak To Average Power Ratio Plot (n66_3C_NR_25M+10M+5M_2T_QPSK - High Channel, Port 1)



Plot 8-50. Peak To Average Power Ratio Plot (n66_1C_NR_25M_4T_64QAM - Mid Channel, Port 0)



Plot 8-51. Peak To Average Power Ratio Plot (n66_1C_NR_30M_4T_256QAM - Low Channel, Port 0)



Plot 8-52. Peak To Average Power Ratio Plot (n66_3C_NR_25M+10M+5M_4T_QPSK - Mid Channel, Port 0)

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8.5 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6

KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements

a) Absolute Emission Limits

iii) Measure and add $10 \log(N_{ANT})$ dB

ANSI C63.26-2015 – Section 5.7.3

Test Setting

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW: Please see test notes below.
4. VBW $\geq 3 \times$ RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times$ Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

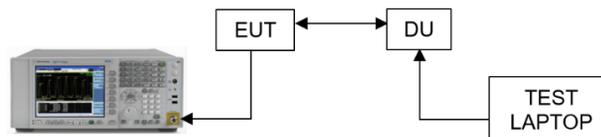


Figure 8-4. Test Instrument & Measurement Setup

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Limit

Band(n) 2 operation under Part 24

§ 24.238

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

Band(n) 66 operation under Part 27

§ 27.53

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

Test Notes

1. Per Part 24, Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
2. Per Part 27, Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
3. Detect with a margin of under 1dB to limit, the integration method was performed using the spectrum analyzer's band power functions according to ANSI C63.26-2015 – Section 5.7 and using the method KDB 971168 D01 v03r01 - Section E) 3) ii). The integration value was set to a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter.

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4. The limits were adjusted by a factor of $[-10 \cdot \log(2)]$ dB to account for the device operation as a 2 port MIMO transmitter, as per FCC KDB 622911. MIMO Factor calculation as below:
MIMO Factor = $10 \cdot \log(2) = 3.01$ dB

Frequency range	Basic Limit (dBm/MHz)	2Tx MIMO Factor (dB)	RBW Factor (dB)	Adjusted limit (dBm)
Low band edge – 1MHz	-13.00	3.01	0	-16.01
High band edge + 1MHz	-13.00	3.01	0	-16.01

Note: Adjusted limit (dBm/MHz) = Basic limit (dBm/1MHz) - MIMO Factor - RBW Factor

5. The limits were adjusted by a factor of $[-10 \cdot \log(4)]$ dB to account for the device operation as a 4 port MIMO transmitter, as per FCC KDB 622911. MIMO Factor calculation as below:
MIMO Factor = $10 \cdot \log(4) = 6.02$ dB

Frequency range	Basic Limit (dBm/MHz)	4Tx MIMO Factor (dB)	RBW Factor (dB)	Adjusted limit (dBm)
Low band edge – 1MHz	-13.00	6.02	0	-19.02
High band edge + 1MHz	-13.00	6.02	0	-19.02

Note: Adjusted limit (dBm/MHz) = Basic limit (dBm/1MHz) - MIMO Factor - RBW Factor

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Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM	256QAM		
Low	0	1929 to 1930 MHz	-21.02	-21.13	-21.34	-21.46	-16.01	-5.01
	1		-21.13	-20.52	-22.57	-22.04		-4.51
High	0	1990 to 1991 MHz	-21.53	-20.46	-21.10	-22.24		-4.45
	1		-21.72	-21.10	-21.01	-21.27		-5.00

Table 8-32. Band Edge Emission Summary Data (n2_1C_25M_2T)

Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			n2_2C_25M+5M_2T		n2/B2_2C_NR_25M+LTE_5M_2T			
			QPSK	QAM	QPSK	QAM		
Low	0	1929 to 1930 MHz	-21.75	-21.57	-21.21	-20.86	-16.01	-4.85
	1		-22.33	-21.04	-22.09	-21.89		-5.03
High	0	1990 to 1991 MHz	-22.58	-21.66	-21.62	-21.96		-5.61
	1		-22.17	-21.91	-20.88	-21.86		-4.87

Table 8-33. Band Edge Emission Summary Data (n2/B2_Multi-carrier_2T)

Edge	Port	Measured Range	Max. Value (dBm)		Limit (dBm)	Worst Margin (dB)
			n2_2C_25M+5M_2T	n2/B2_2C_NR_25M+LTE_5M_2T		
			QPSK	QPSK		
Low	0	1929 to 1930 MHz	-21.05	-21.62	-16.01	-5.04
	1		-20.15	-22.04		-4.14
High	0	1990 to 1991 MHz	-24.45	-24.28		-8.27
	1		-23.72	-24.11		-7.71

Table 8-34. Band Edge Emission Summary Data (n2/B2_Multi-carrier_Non-Contiguous_2T)

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Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM	256QAM		
Low	0	1929 to 1930 MHz	-23.48	-23.83	-25.36	-24.37	-19.02	-4.46
	1		-23.80	-24.25	-24.69	-24.35		-4.78
	2		-22.66	-22.97	-24.22	-23.22		-3.64
	3		-23.70	-23.11	-23.25	-23.97		-4.09
High	0	1990 to 1991 MHz	-23.27	-23.87	-23.01	-24.64		-3.99
	1		-23.56	-23.58	-23.13	-23.78		-4.11
	2		-23.79	-23.08	-23.40	-23.60		-4.06
	3		-23.31	-22.48	-22.42	-24.51		-3.40

Table 8-35. Band Edge Emission Summary Data (n2_1C_25M_4T)

Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			n2_2C_25M+5M_4T		n2/B2_2C_NR_25M+LTE_5M_4T			
			QPSK	16QAM	QPSK	16QAM		
Low	0	1929 to 1930 MHz	-22.90	-22.99	-23.16	-24.95	-19.02	-3.88
	1		-24.51	-22.73	-22.01	-22.76		-2.99
	2		-23.00	-22.25	-22.81	-23.63		-3.23
	3		-23.23	-21.56	-23.40	-21.80		-2.54
High	0	1990 to 1991 MHz	-22.24	-23.22	-21.73	-24.12		-2.71
	1		-22.92	-22.71	-22.27	-22.38		-3.25
	2		-24.26	-23.21	-23.57	-23.45		-4.19
	3		-22.97	-23.05	-22.97	-23.92		-3.95

Table 8-36. Band Edge Emission Summary Data (n2/B2_Multi-carrier_4T)

Edge	Port	Measured Range	Max. Value (dBm)		Limit (dBm)	Worst Margin (dB)
			n2_2C_25M+5M_4T	n2/B2_2C_NR_25M+LTE_5M_4T		
			QPSK	QPSK		
Low	0	1929 to 1930 MHz	-23.91	-23.79	-19.02	-4.77
	1		-23.59	-22.93		-3.84
	2		-22.11	-22.10		-1.20
	3		-21.94	-21.66		-1.77
High	0	1990 to 1991 MHz	-25.34	-25.63		-5.55
	1		-24.73	-24.44		-4.03
	2		-23.92	-24.61		-2.75
	3		-24.26	-24.18		-2.82

Table 8-37. Band Edge Emission Summary Data (n2/B2_Multi-carrier_Non-Contiguous_4T)

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Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM	256QAM		
Low	0	2109 to 2110 MHz	-23.25	-21.46	-22.98	-22.51	-16.01	-5.45
	1		-21.90	-22.90	-23.63	-22.53		-5.89
High	0	2180 to 2181 MHz	-21.58	-21.25	-20.41	-21.14		-4.40
	1		-21.07	-21.43	-21.77	-21.65		-5.06

Table 8-38. Band Edge Emission Summary Data (n66_1C_25M_2T)

Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM	256QAM		
Low	0	2109 to 2110 MHz	-26.62	-26.48	-26.57	-26.40	-16.01	-10.39
	1		-26.03	-26.10	-26.57	-26.47		-10.02
High	0	2180 to 2181 MHz	-24.29	-24.17	-24.18	-24.63		-8.16
	1		-24.45	-24.76	-23.83	-24.68		-7.82

Table 8-39. Band Edge Emission Summary Data (n66_1C_30M_2T)

Edge	Port	Measured Range	Max. Value (dBm)						Limit (dBm)	Worst Margin (dB)
			n66_3C_25M+10M+5M_2T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_2T			
			QPSK	QAM	QPSK	QAM	QPSK	16QAM		
Low	0	2109 to 2110 MHz	-22.65	-23.22	-22.31	-23.95	-24.94	-24.80	-16.01	-6.30
	1		-22.03	-23.45	-23.55	-21.92	-22.87	-24.63		-5.91
High	0	2180 to 2181 MHz	-21.69	-22.04	-22.57	-22.05	-21.47	-22.39		-5.46
	1		-21.74	-22.37	-22.58	-21.45	-22.66	-21.67		-5.44

Table 8-40. Band Edge Emission Summary Data (n66/B66_Multi-carrier_2T)

Edge	Port	Measured Range	Max. Value (dBm)			Limit (dBm)	Worst Margin (dB)
			n66_3C_25M+10M+5M_2T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T		
			QPSK	QAM	QPSK		
Low	0	2109 to 2110 MHz	-20.60		-22.39	-16.01	-4.29
	1		-21.72		-23.28		-3.46
High	0	2180 to 2181 MHz	-19.89		-18.46		-3.88
	1		-20.06		-20.71		-3.79

Table 8-41. Band Edge Emission Summary Data (n66/B66_Multi-carrier_Non-Contiguous 2T)

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Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM	256QAM		
Low	0	2109 to 2110 MHz	-24.84	-24.31	-25.18	-24.97	-19.02	-5.29
	1		-23.90	-23.66	-24.21	-24.66		-4.64
	2		-23.24	-24.43	-23.72	-25.47		-4.22
	3		-23.95	-23.62	-23.40	-23.69		-4.38
High	0	2180 to 2181 MHz	-21.41	-21.40	-23.51	-21.16		-2.14
	1		-20.54	-21.76	-22.66	-21.75		-1.52
	2		-21.71	-20.50	-21.59	-21.79		-1.48
	3		-22.61	-22.49	-22.69	-22.43		-3.41

Table 8-42. Band Edge Emission Summary Data (n66_1C_25M_4T)

Edge	Port	Measured Range	Max. Value (dBm)				Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM	256QAM		
Low	0	2109 to 2110 MHz	-26.98	-27.22	-26.99	-27.05	-19.02	-7.96
	1		-26.91	-26.81	-26.60	-27.44		-7.58
	2		-27.04	-27.32	-27.04	-26.95		-7.93
	3		-26.27	-26.34	-26.21	-26.59		-7.19
High	0	2180 to 2181 MHz	-24.51	-25.72	-25.69	-25.16		-5.49
	1		-25.73	-25.89	-25.79	-26.12		-6.71
	2		-24.84	-25.37	-24.87	-24.76		-5.74
	3		-24.66	-25.27	-25.73	-24.92		-5.64

Table 8-43. Band Edge Emission Summary Data (n66_1C_30M_4T)

Edge	Port	Measured Range	Max. Value (dBm)						Limit (dBm)	Worst Margin (dB)
			n66_3C_25M+10M+5M_4T		n66/B66_3C_NR_25M+LTE_10M+NR_5M_4T		n66/B66_3C_NR_30M+LTE_10M+NR_5M_4T			
			QPSK	QAM	QPSK	QAM	QPSK	16QAM		
Low	0	2109 to 2110 MHz	-23.47	-22.99	-24.31	-22.26	-25.13	-25.38	-19.02	-3.24
	1		-24.97	-24.93	-23.72	-23.99	-25.69	-25.17		-4.70
	2		-25.40	-24.41	-24.63	-22.97	-25.38	-24.62		-3.95
	3		-23.52	-22.92	-21.68	-22.35	-25.17	-23.67		-2.66
High	0	2180 to 2181 MHz	-23.73	-22.97	-22.52	-23.24	-22.57	-22.85		-3.50
	1		-23.90	-24.02	-23.46	-23.32	-23.47	-22.27		-3.25
	2		-23.86	-24.20	-23.92	-22.63	-23.24	-23.59		-3.61
	3		-23.76	-23.27	-23.66	-22.63	-22.78	-23.23		-3.61

Table 8-44. Band Edge Emission Summary Data (n66/B66_Multi-carrier_4T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Edge	Port	Measured Range	Max. Value (dBm)			Limit (dBm)	Worst Margin (dB)
			n66_3NC_25M+10M+5M_4T	n66/B66_3NC_NR_25M+LTE_10M+NR_5M_4T	n66/B66_3NC_NR_30M+LTE_10M+NR_5M_4T		
			QPSK	QPSK	QPSK		
Low	0	2109 to 2110 MHz	-21.66	-23.10	-24.74	-19.02	-2.64
	1		-22.79	-22.11	-23.67		-3.09
	2		-23.20	-24.51	-25.51		-4.18
	3		-23.36	-23.64	-24.64		-4.34
High	0	2180 to 2181 MHz	-21.57	-22.35	-22.41		-2.55
	1		-21.60	-22.73	-21.73		-2.58
	2		-22.94	-22.54	-22.62		-3.52
	3		-21.95	-22.62	-21.87		-2.85

Table 8-45. Band Edge Emission Summary Data (n66/B66_Multi-carrier_Non-Contiguous_4T)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Plot 8-53. Band Edge Emission Summary Data Plot (n2_1C_25M_2T_16QAM - Low Edge, Port 1)



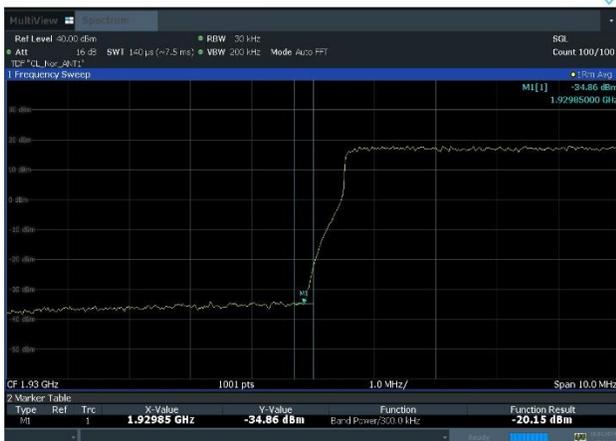
Plot 8-54. Band Edge Emission Summary Data Plot (n2_1C_25M_2T_16QAM - High Edge, Port 0)



Plot 8-55. Band Edge Emission Summary Data Plot (n2/B2_2C_NR_25M+LTE_5M_2T_16QAM - Low Edge, Port 0)



Plot 8-56. Band Edge Emission Summary Data Plot (n2/B2_2C_NR_25M+LTE_5M_2T_QPSK - High Edge, Port 1)

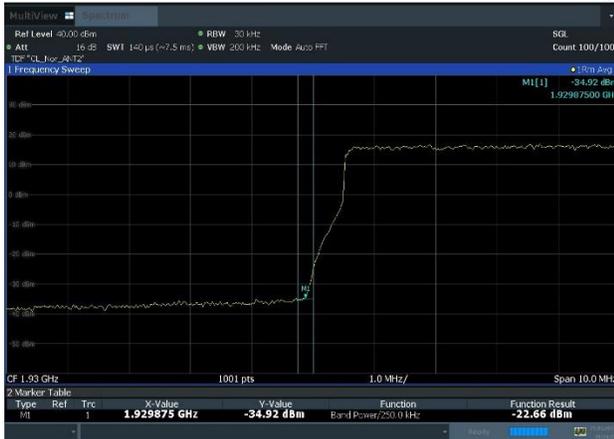


Plot 8-57. Band Edge Emission Summary Data Plot (n2_2NC_25M+5M_2T_QPSK - Low Edge, Port 1)



Plot 8-58. Band Edge Emission Summary Data Plot (n2_2NC_25M+5M_2T_QPSK - High Edge, Port 1)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Plot 8-59. Band Edge Emission Summary Data Plot (n2_1C_NR_25M_4T_QPSK - Low Edge, Port 2)



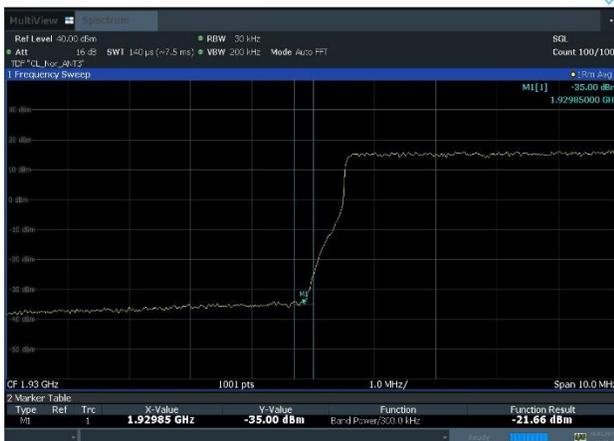
Plot 8-60. Band Edge Emission Summary Data Plot (n2_1C_NR_25M_4T_64QAM - High Edge, Port 3)



Plot 8-61. Band Edge Emission Summary Data Plot (n2_2C_25M+5M_4T_16QAM - Low Edge, Port 3)



Plot 8-62. Band Edge Emission Summary Data Plot (n2/B2_2C_NR_25M+LTE_5M_4T_QPSK - High Edge, Port 0)



Plot 8-63. Band Edge Emission Summary Data Plot (n2/B2_2NC_NR_25M+LTE_5M_4T_QPSK - Low Edge, Port 3)



Plot 8-64. Band Edge Emission Summary Data Plot (n2_2NC_NR_25M+5M_4T_QPSK - High Edge, Port 2)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Plot 8-65. Band Edge Emission Summary Data Plot (n66_1C_NR_25M_2T_16QAM - Low Edge, Port 0)



Plot 8-66. Band Edge Emission Summary Data Plot (n66_1C_NR_25M_2T_64QAM - High Edge, Port 0)



Plot 8-67. Band Edge Emission Summary Data Plot (n66_1C_NR_30M_2T_QPSK - Low Edge, Port 1)



Plot 8-68. Band Edge Emission Summary Data Plot (n66_1C_NR_30M_2T_64QAM - High Edge, Port 1)

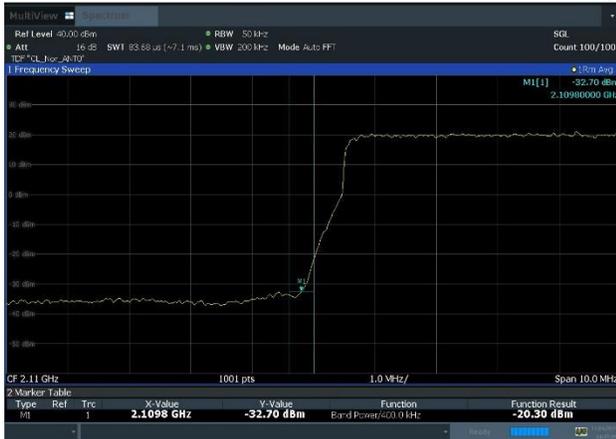


Plot 8-69. Band Edge Emission Summary Data Plot (n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T_16QAM - Low Edge, Port 1)



Plot 8-70. Band Edge Emission Summary Data Plot (n66/B66_3C_NR_25M+LTE_10M+NR_5M_2T_16QAM - High Edge, Port 1)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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Plot 8-71. Band Edge Emission Summary Data Plot (n66/B66_3NC_NR_25M+LTE_10M+NR_5M_2T_QPSK - Low Edge, Port 0)



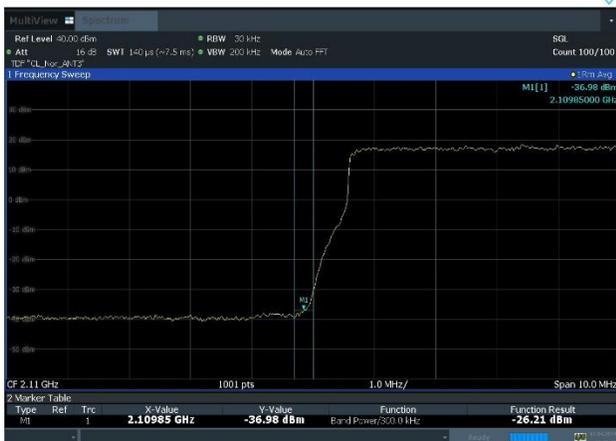
Plot 8-72. Band Edge Emission Summary Data Plot (n66/B66_3NC_NR_30M+LTE_10M+NR_5M_2T_QPSK - High Edge, Port 0)



Plot 8-73. Band Edge Emission Summary Data Plot (n66_1C_25M_4T_QPSK - Low Edge, Port 2)



Plot 8-74. Band Edge Emission Summary Data Plot (n66_1C_25M_4T_16QAM - High Edge, Port 2)



Plot 8-75. Band Edge Emission Summary Data Plot (n66_1C_30M_4T_64QAM - Low Edge, Port 3)



Plot 8-76. Band Edge Emission Summary Data Plot (n66_1C_30M_4T_QPSK - High Edge, Port 0)

FCC ID: A3LRF4439D-25A		MEASUREMENT REPORT (Class II Permissive Change)		Approved by: Technical Manager
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