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Radio Test report – LPRU 4420 B25B66

Type of assessment:

FCC: Class II Permissive Change

ISED: Class III Permissive Change

Report ID

REP033400

Project ID

PRJ0054747

Applicant:

Ericsson Canada Inc.

Product name:

Radio Unit

Model (PMN):

LPRU 4420 B25B66

Part number:

KRC 161 906/1

FCC Identifier

TA8AKRC161906-1

ISED certification number:

IC: 287AB-AS1619061

HVIN:

AS1619061

Requirements/Summary:

Standard	Environmental phenomenon	Compliance
FCC 47 CFR Part 24, Subpart E	Broadband Personal Communications Services (PCS)	Yes
RSS-133 Issue 6 A1, Jan 18, 2018	2 GHz Personal Communications Services	Yes

Date of issue: April 1, 2024

Nimish Kapoor, EMC/RF Test Specialist

Tested by

Signature

Kevin Rose, EMC/RF Test Specialist

Reviewed by

Signature

Two test locations

Company name	Nemko Canada Inc.	
Address	303 River Road	349 Terry Fox
City	Ottawa	Ottawa
Province	Ontario	Ontario
Postal code	K1V 1H2	K2K 2V6
Country	Canada	Canada
Telephone	+1 613 737 9680	+1 613 963 8000
Facsimile	+1 613 737 9691	
Toll free	+1 800 563 6336	
Website	www.nemko.com	
Site number	FCC test site registration number: CA2040, IC: 2040A-4 (3 m semi anechoic chamber)	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

Table of contents

Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Ericsson Canada Inc.
Address	349 Terry Fox Drive, Ottawa, ON, Canada, K2K 2V6

1.2 Test specifications

FCC 47 CFR Part 2	Frequency Allocations and Radio Treaty Maters; General Rules and Regulations
FCC 47 CFR Part 24, Subpart E	Broadband Personal Communications Services (PCS)
RSS-133 Issue 6 A1, Jan. 18, 2018	2 GHz Personal Communications Services
SRSP-510, Issue 5, February 2009	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850–1915 MHz and 1930–1995 MHz
RSS-Gen, Issue 5, April 2018	General Requirements for Compliance of Radio Apparatus

1.3 Test method

ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 662911 D01	Multiple Transmitter Output v02r01
KDB 662911 D02	MIMO with Cross-Polarized Antennas v01

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant. Testing was completed against customer test plan. Results obtained indicate that the product under test complies in full with the requirements tested.

This test report (**REP033400**) applies to the *LPRU 4420 B25B66* with part number *KRC 161 906/1.* See "Summary of test results" for full details.

EUT Configuration(s) SRO/MRO:
B25:
NR : 25, 30, 35, 40 MHz, Max 3 Carriers per branch

1.5 Test report revision history

Table 1.5-1: *Test report revision history*

Report ID	Date of issue	Details of changes made to test report
REP033400	April 1, 2024	Original report issued

Section 2. Summary of test results

2.1 Testing location

Test location (s)	Ottawa

2.2 Testing period

Test start date	March 20, 2024	Test end date	March 20, 2024

2.3 Sample information

Receipt date	March 20, 2024	Nemko sample ID number	PRJ00547470001

2.4 FCC Part 24 test results

Table 2.4-1: *FCC results summary*

Part	Test description	Verdict
§24.229	Frequencies	Pass[1]
§24.232(a)(2)	Power and antenna height limits for base stations with BW greater than 1 MHz	Pass
§24.238(a)	Emission limitations for Broadband PCS equipment – out of band emissions (conducted)	Pass
§2.1049	Occupied bandwidth	Pass

Notes: Only tests requested by the client have been performed

[1]EUT transmits within 1930–1995 MHz frequency range

2.5 RSS-133 test results

Table 2.5-1: *ISED results summary*

Part	Test description	Verdict
RSS-133, 6.1	Frequency Plan	Pass[1]
RSS-133, 6.2	Types of Modulation	Pass[2]
RSS-133, 6.4	Transmitter Output Power and Equivalent Isotropically Radiated Power	Pass
RSS-133, 6.5	Transmitter Unwanted Emissions (conducted and radiated)	Pass
RSS-Gen, 6.7	Occupied bandwidth	Pass

Notes: Only tests requested by the client have been performed

[1]EUT transmits within 1930–1995 MHz frequency range

[2]EUT employs digital modulation (QPSK)

Section 3. Equipment under test (EUT) details

3.1 EUT information

Product name	Radio Unit	
Model	LPRU 4420 B25B66	
Part number	KRC 161 906/1	
Revision	R2A	
Serial number	TD3F090346	
Antenna ports	4 TX/RX for B25 4 TX/RX for B66	
RF BW / IBW	B25 IBW DL: 65 MHz B25 IBW UL: 65 MHz	B66 IBW DL: 70 MHz B66 IBW UL: 70 MHz
FDD	B25: 80 MHz	B66: 400 MHz
Frequency	B25 TX (DL): 1930 – 1995 MHz B25 RX (UL): 1850 – 1915 MHz	B66 TX (DL): 2110 – 2200 MHz B66 RX (UL): 1710 – 1780 MHz
Nominal O/P per Antenna port	0.159 W (22 dBm)	
Accuracy (nominal)	±0.1 ppm	
Nominal voltage	110 VAC or -48 VDC	
RAT	B25: LTE (LTE+NB-IoT), NR	B66: LTE (LTE+NB-IoT), NR
Modulation	LTE: QPSK, 16QAM, 64QAM, 256QAM NR: QPSK, 16QAM, 64QAM, 256QAM	
Channel bandwidth	LTE: 5, 10, 15, 20 MHz NR: 5, 10, 15, 20, 25, 30, 35, 40 MHz	
Channel bandwidth LTE + NB-IoT	LTE with NB-IoT GB: 10, 15, 20 MHz	
Maximum combined OBW per port	B25: 65 MHz	B66: 70 MHz
CPRI	10.1 Gbps	
Channel raster	LTE: 100 kHz NR: 100 kHz	
Regulatory requirements	Radio: FCC Part 2, 24, 27, RSS-Gen, RSS-133, RSS-139	
	EMC: FCC Part 15, ICES-003	
	Safety: IEC/EN 62368-1, UL/CSA 62368-1	
Emission Designator	LTE: 5M00W7D, 10M0W7D, 15M00W7D, 20M0W7D NR: 5M00F9W, 10M0F9W, 15M0F9W, 20M0F9W, 25M0F9W, 30M0F9W, 35M0F9W, 40M0F9W	
Supported Configurations	Single Antenna, TX Diversity, MIMO, Carrier Aggregation	
Operating temperature	0 °C to 55 °C	
Max RF Power	8 x 0.159 W (22 dBm)	
Supported carriers /band/ port SRO/MRO	Up to 3 carriers per branch	
Carrier Configuration:	B25: SRO: LTE, NR MRO: NR + LTE	B66: SRO: LTE, NR MRO: NR + LTE

RAT SC Carrier Power (max)	RAT	BW	PWR/Port
	LTE	5, 10, 15, 20 MHz	22 dBm
	NR	5, 10, 15, 20, 25, 30, 35, 40 MHz	22 dBm

3.2 Product description and theory of operation

EUT description of the methods used to exercise the EUT and all relevant ports:

Description/theory of operation	LPRU 4420 B25B66 (KRC 161 906/1) is a Remote Radio Unit forming part of the Ericsson Radio Base Station (RBS) equipment. The LPRU provides radio access for mobile and fixed devices and is intended for the indoor environment. The radio operates over 8 Transmit ports in MRO (LTE, NBIoT, and NR); Single, and Multi-Carrier transmission with a maximum rated RF Output of 0.159W per port over an operational temperature of 0°C to +55°C. The unit is designed to be rack mounted.
Ports/Interface	**Port** / **Description** AC-IN / AC Power Supply DC-IN-A/B / DC Power Supply, A and B feed inputs Alarm / External Alarm Input 1 and 2 Data-1/2 / CPRI 1 & 2 dRDI 1-8 / Proprietary ports 1A / 1B / 1C / 1D / RF I/O ports - Band 25 2A / 2B / 2C / 2D / RF I/O ports - Band 66
Physical	**Dimensions** / 132 x 442 x 366 mm **Weight** / 13.6 kg **Operating Temperature** / 0 °C to 55 °C **Mounting** / Rack mounted
Software details	CXP2030045/28_R18C294
Product Identification / Markings and Labels	 

3.3 EUT test details

EUT setup/configuration rationale for Down link:

RAT	Modulation	Test Model / Configuration
LTE	QPSK	TM1.1
LTE	16QAM	TM3.2
LTE	64QAM	TM3.1
LTE	256QAM	TM3.1a
NR	QPSK	TM1.1
NR	16QAM	TM3.2
NR	64QAM	TM3.1
NR	256QAM	TM3.1a

NR Single Carrier B25

Bandwidth, MHz	Transmit / DL, MHz					
	B	NR-ARFCN	M	NR-ARFCN	T	NR-ARFCN
5	1932.5	*386500*	1962.5	*392500*	1992.5	*398500*
10	1935.0	*387000*	1962.5	*392500*	1990.0	*398000*
15	1937.5	*387500*	1962.5	*392500*	1987.5	*397500*
20	1940.0	*388000*	1962.5	*392500*	1985.0	*397000*
25	1942.5	*388500*	1962.5	*392500*	1982.5	*396500*
30	1945.0	*389000*	1962.5	*392500*	1980.0	*396000*
35	1947.5	*389500*	1962.5	*392500*	1977.5	*395500*
40	1950.0	*390000*	1962.5	*392500*	1975.0	*395000*

Bandwidth, MHz	Receive / UL, MHz					
	B	NR-ARFCN	M	NR-ARFCN	T	NR-ARFCN
5	1852.5	*370500*	1882.5	*376500*	1912.5	*382500*
10	1855.0	*371000*	1882.5	*376500*	1910.0	*382000*
15	1857.5	*371500*	1882.5	*376500*	1907.5	*381500*
20	1860.0	*372000*	1882.5	*376500*	1905.0	*381000*
25	1862.5	*372500*	1882.5	*376500*	1902.5	*380500*
30	1865.0	*373000*	1882.5	*376500*	1900.0	*380000*
35	1867.5	*373500*	1882.5	*376500*	1897.5	*379500*
40	1870.0	*374000*	1882.5	*376500*	1895.0	*379000*

EUT test details, continued

B25 NR Configurations Tested:

Carrier configurations	Transmit / DL, MHz
SC, 25MHz, Bottom	1942.5
SC, 25MHz, Middle	1962.5
SC, 25MHz, Top	1982.5
SC, 30MHz, Bottom	1945.0
SC, 30MHz, Middle	1962.5
SC, 30MHz, Top	1980.0
SC, 35MHz, Bottom	1947.5
SC, 35MHz, Middle	1962.5
SC, 35MHz, Top	1977.5
SC, 40MHz, Bottom	1950.0
SC, 40MHz, Middle	1962.5
SC, 40MHz, Top	1975.0
2C, 25MHz, Bottom	1942.5+1967.5
2C, 25MHz, Middle	1950.0+1975.0
2C, 25MHz, Top	1957.5+1982.5

3.4 EUT setup diagram

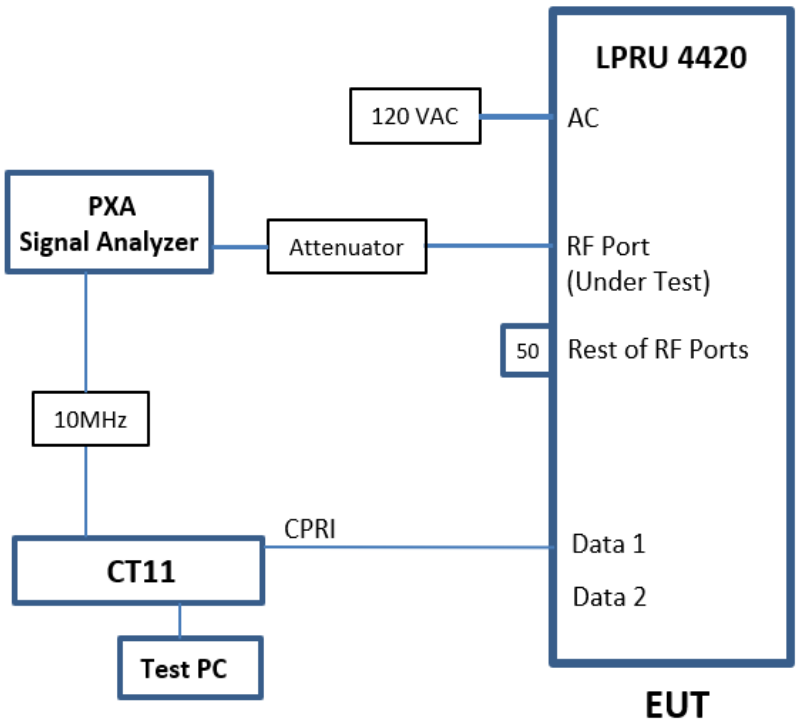

Figure 3.4-1: *Setup diagram – Radio Compliance*

3.5 Setup photographs

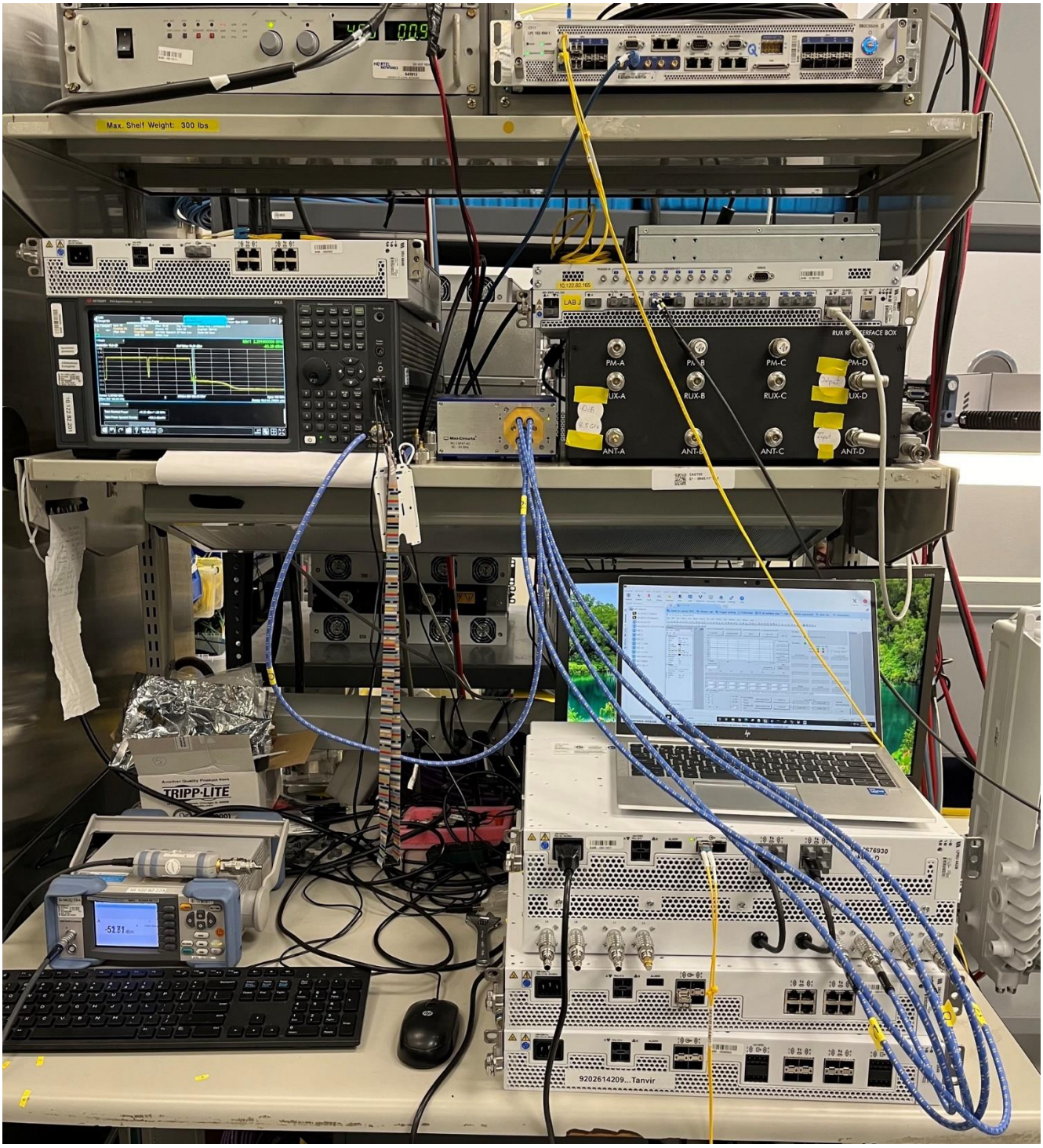

Figure 3.5-1: *Set up photo for Radio Compliance Testing*

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
PXA Signal Analyzer	Keysight	N9030B	MY57144347	1 year	30-Mar-24
Power Meter	Rohde & Schwarz	NRP2	101814	1 year	21-Mar-25
Power Sensor	Rohde & Schwarz	NRP-Z11	100070	1 year	31-Mar-25
CT11*	Ericsson	LPC 102 494/1	T01G495060	—	NCR

Notes: NCR - no calibration required.

* CT11 is the test equipment that drives the radios traffic.

Section 8. Testing data

8.1 Transmitter output power (EIRP) and antenna height (Band 2/25)

8.1.1 Definitions and limits

FCC §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.
(2) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; see table below.
(b)(1) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth of 1 MHz or less are limited to 3280 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.
(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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.

RSS-133, Section 6.4
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510.
In addition, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.
SRSP-510, Section 5.1
5.1.1 Base stations
For base stations with a channel bandwidth greater than 1 MHz, the maximum e.i.r.p. is limited to 3280 watts/MHz e.i.r.p. (i.e., no more than 3280 watts e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT) up to 300 metres. Fixed or base stations operating in urban areas are limited to a maximum allowable e.i.r.p. of 1640 watts/MHz e.i.r.p. Base station antenna heights above average terrain may exceed 300 metres with a corresponding reduction in e.i.r.p. according to the following table.

Table 8.1-1: *Reduction to Maximum Allowable E.I.R.P. for HAAT > 300 m*

HAAT (m)	Maximum EIRP, W/MHz
HAAT ≤ 300	1640
300 < HAAT ≤ 500	1070
500 < HAAT ≤ 1000	490
1000 < HAAT ≤ 1500	270
1500 < HAAT ≤ 2000	160

8.1.2 Test summary

Test date	March 20, 2024
Test engineer	Nimish Kapoor

8.1.3 Observations, settings, and special notes

Output power was measured with RMS power meter per ANSI C63.26 Paragraph 5.2.4.2 method. PSD was measured using method described in paragraph 5.2.4.4.

- Randomly selected sample plots provided for information and settings only
- Total MIMO PSD was calculated as follows: PSD from one antenna port + 10 × Log_{10} (4)
- RBS (Radio Base Station) EIRP Limits are deployment dependent. To ensure compliance with legal limits detailed in section 8.1.2, RBS set up and carrier configurations are addressed during site commissioning.
- Report results are compiled for the maximum output rated power for worst case emission assessment. EIRP, based on possible beam configuration, indicate the maximum power / worst case beam configuration based on ideal antenna parameters. Customer carrier configuration and power will be limited to comply with legal limits of 1640 W/MHz or 3280 W/MHz during RBS site set up and commissioning. Non-compliant configurations will be restricted to lower carrier power to ensure compliance.
- The LPRU 4420 B25B66 product will only be installed with its RF output ports connected to Active Distributed Antenna Systems (DAS). The product will not be directly connected to antennas.
- **To ensure compliance under worst case conditions with maximum output power based on a MIMO configuration, the maximum antenna gain for an RBS (Radio Base Station) system with LPRU 4420 B25B66 is 0.00 dBi with 2.50 dB path loss. Maximum measured PSD to EIRP margin 48.76 dB.**

Spectrum analyzer settings for PSD:

Detector mode	RMS
Resolution bandwidth	1 MHz
Video bandwidth	>RBW
Measurement mode	Power over emission bandwidth
Trace mode	Averaging

8.1.1 Test data

Table 8.1-2: *EIRP calculation based on the* ***worst-case PSD measurement.***

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	Cable loss, dB	Antenna gain, dBi	EIRP PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1982.5	9.87	15.89	2.50	0.00	13.39	62.15	48.76

Table 8.1-3: *RF power density measurement results of a single-carrier operation for NR on 25 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1942.5	9.74	15.76	62.15	46.39
1962.5	9.53	15.55	62.15	46.60
1982.5	**9.87**	15.89	62.15	46.26

Table 8.1-4: *RF power density measurement results of a single-carrier operation for NR on 30 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1945.0	8.93	14.95	62.15	47.20
1962.5	8.74	14.76	62.15	47.39
1980.0	**9.21**	15.23	62.15	46.92

Table 8.1-5: *RF power density measurement results of a single-carrier operation for NR on 35 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1947.5	8.18	14.20	62.15	47.95
1962.5	8.14	14.16	62.15	47.99
1977.5	**8.35**	14.37	62.15	47.78

Table 8.1-6: *RF power density measurement results of a single-carrier operation for NR on 40 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1950.0	7.76	13.78	62.15	48.37
1962.5	**7.95**	13.97	62.15	48.18
1975.0	7.94	13.96	62.15	48.19

Table 8.1-7: *RF power density measurement results of a multi-carrier operation for NR on 25 MHz channel [Contiguous]*

Notes	Channel	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
2 carriers	Bottom	6.80	12.82	62.15	49.33
	Middle	**7.26**	13.28	62.15	48.87
	Top	7.05	13.07	62.15	49.08

Test data, continued

Table 8.1-8: *RF total channel power measurement results for NR [25 MHz]*

Remarks	25 MHz channel (0.159 W)
Low channel, QPSK	22.00
Mid channel, QPSK	22.10
Top channel, QPSK	22.16

Note: all results in the table are in dBm units

Table 8.1-9: *RF total channel power measurement results for NR [30 MHz]*

Remarks	30 MHz channel (0.159 W)
Low channel, QPSK	22.05
Mid channel, QPSK	22.16
Top channel, QPSK	22.25

Note: all results in the table are in dBm units

Table 8.1-10: *RF total channel power measurement results for NR [35 MHz]*

Remarks	35 MHz channel (0.159 W)
Low channel, QPSK	22.04
Mid channel, QPSK	22.14
Top channel, QPSK	22.16

Note: all results in the table are in dBm units

Table 8.1-11: *RF total channel power measurement results for NR [40 MHz]*

Remarks	40 MHz channel (0.159 W)
Low channel, QPSK	22.04
Mid channel, QPSK	22.12
Top channel, QPSK	22.18

Note: all results in the table are in dBm units

Table 8.1-12: *RF total channel power measurement results for NR Multi-carrier [25 MHz bandwidth Contiguous]*

Carriers	Channel	25 MHz channel (0.159 W)
2 Carriers, QPSK	Low Channel	22.14
	Middle Channel	22.23
	Top Channel	22.26

Note: all results in the table are in dBm units

Test data, continued

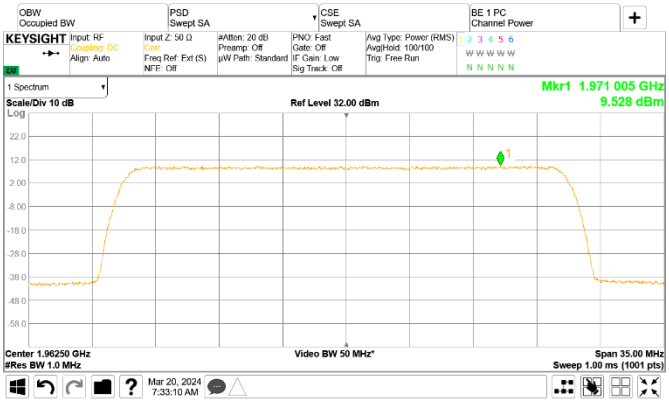

Figure 8.1-1: *PSD of NR 25 MHz channel bandwidth, single carrier operation, sample plot*

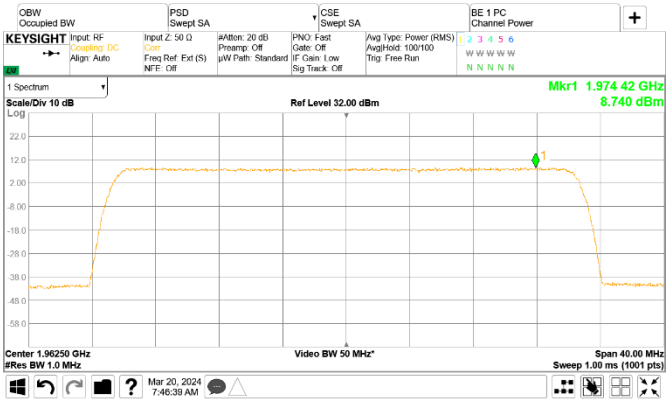

Figure 8.1-2: *PSD of NR 30 MHz channel bandwidth, single carrier operation, sample plot*

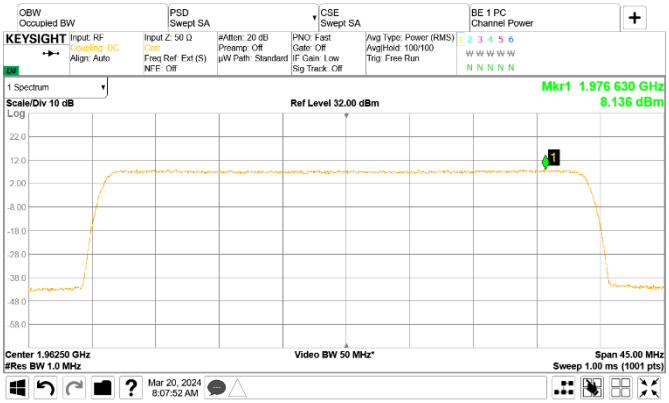

Figure 8.1-3: *PSD of NR 35 MHz channel bandwidth, single carrier operation, sample plot*

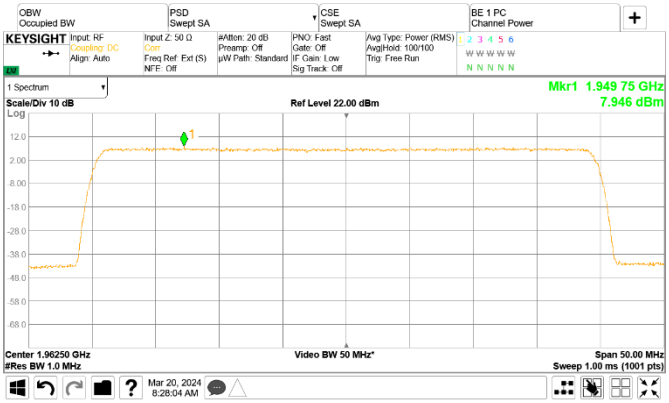

Figure 8.1-4: *PSD of NR 40 MHz channel bandwidth, single carrier operation, sample plot*

Test data, continued

Figure 8.1-5: *PSD of NR 25 MHz channel bandwidth, multi-carrier operation, sample plot, Contiguous*

Test data, continued

Table 8.1-13: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 25 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
Low channel	1942.5	8.31	13.00	4.69
Mid channel	1962.5	8.29	13.00	4.71
Top channel	1982.5	8.28	13.00	4.72

Table 8.1-14: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 30 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
Low channel	1945.0	8.31	13.00	4.69
Mid channel	1962.5	8.34	13.00	4.66
Top channel	1980.0	8.28	13.00	4.72

Table 8.1-15: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 35 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
Low channel	1947.5	8.30	13.00	4.70
Mid channel	1962.5	8.32	13.00	4.68
Top channel	1977.5	8.32	13.00	4.68

Table 8.1-16: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 40 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
Low channel	1950.0	8.26	13.00	4.74
Mid channel	1962.5	8.30	13.00	4.70
Top channel	1975.0	8.28	13.00	4.72

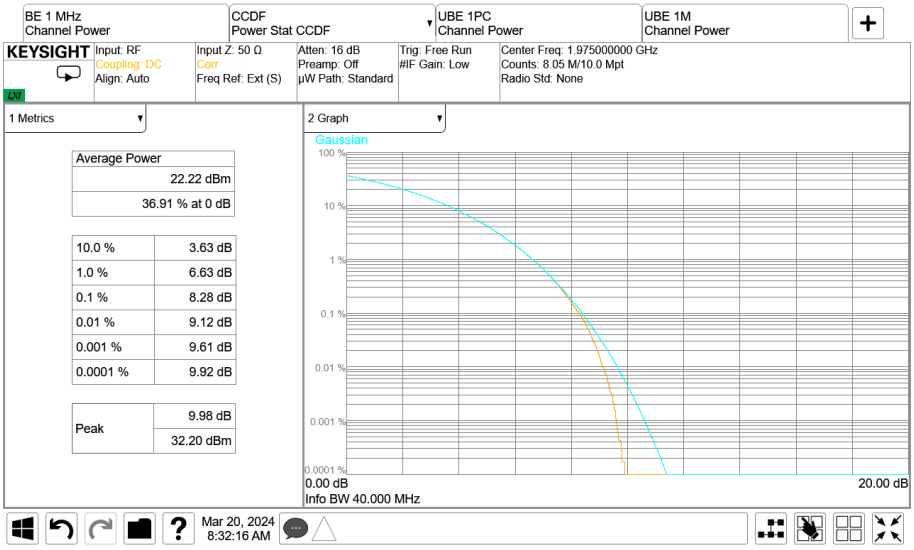

Figure 8.1-6: *CCDF sample plot, NR*

8.2 Spurious out-of-band emissions (Band 2/25)

8.2.1 Definitions and limits

FCC §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.

(b) Measurement procedure. 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.

RSS-133, Section 6.5.1:
i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.
ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB. If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

8.2.2 Test summary

Test date	March 20, 2024
Test engineer	Nimish Kapoor

8.2.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to the 10th harmonic.
- All measurements were performed using an average (RMS) detector per ANSI C63.26 Paragraph 5.7.2 method.
- Limit line (43 + 10 $\log_{10}$ (P) or −13 dBm) was adjusted for MIMO operation by 6 dB*: −13 dBm – 6 dB = −19 dBm
  *MIMO correction factor for 4 antenna ports: 10 × Log_{10}(4) = 6 dB
- RBW 1 MHz, VBW was wider than RBW.

8.2.4 Test data

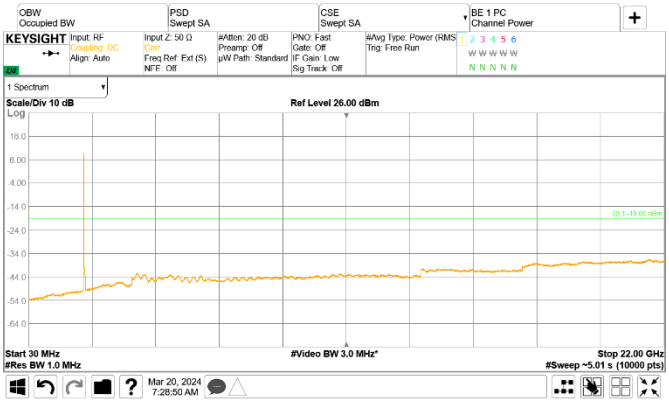

Figure 8.2-1: *Conducted spurious emissions of NR 25 MHz low channel, single-carrier operation*

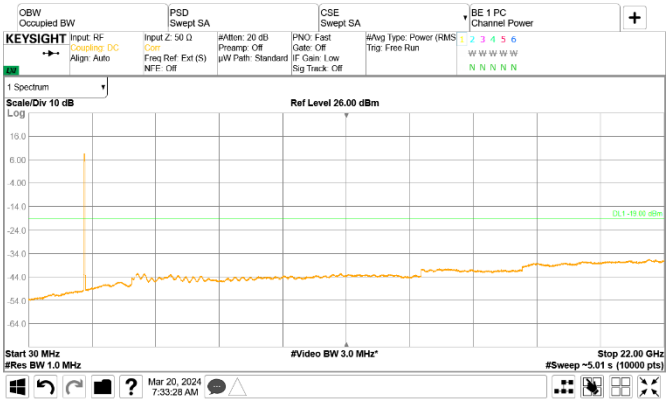

Figure 8.2-2: *Conducted spurious emissions of NR 25 MHz mid channel, single-carrier operation*

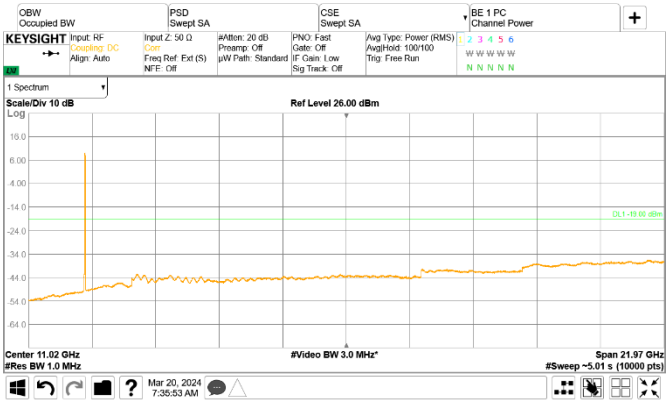

Figure 8.2-3: *Conducted spurious emissions of NR 25 MHz top channel, single-carrier operation*

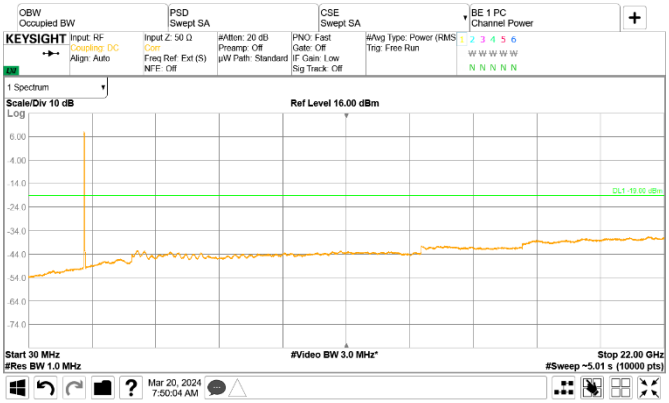

Figure 8.2-4: *Conducted spurious emissions of NR 30 MHz low channel, single-carrier operation*

Test data, continued

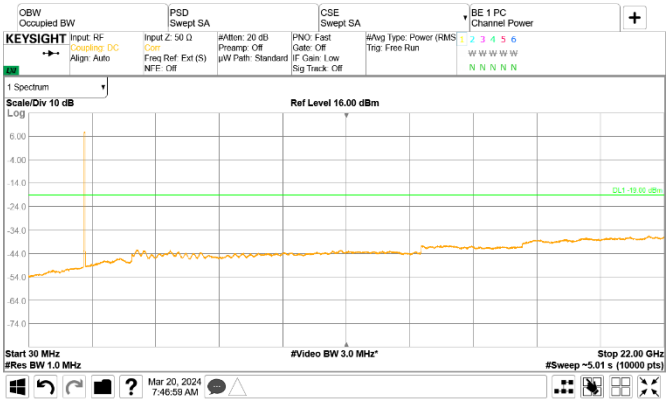

Figure 8.2-5: *Conducted spurious emissions of NR 30 MHz mid channel, single-carrier operation*

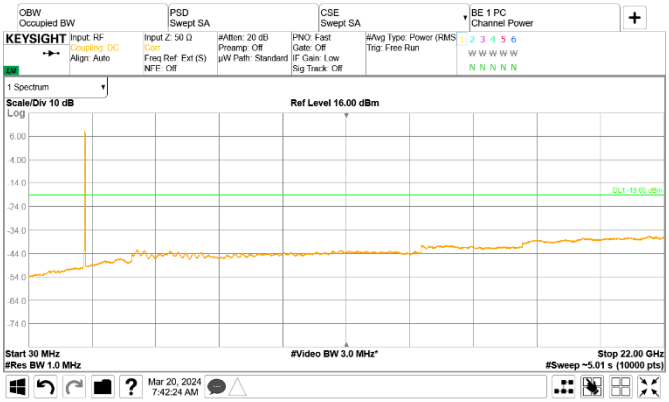

Figure 8.2-6: *Conducted spurious emissions of NR 30 MHz top channel, single-carrier operation*

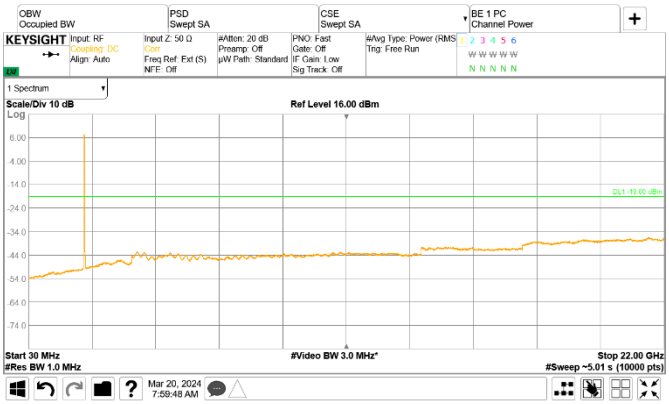

Figure 8.2-7: *Conducted spurious emissions of NR 35 MHz low channel, single-carrier operation*

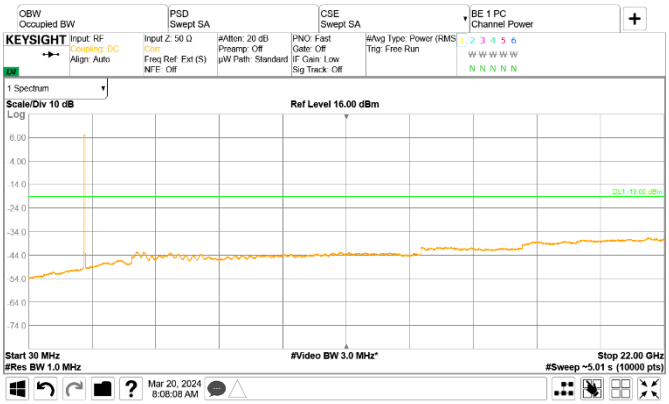

Figure 8.2-8: *Conducted spurious emissions of NR 35 MHz mid channel, single-carrier operation*

Test data, continued

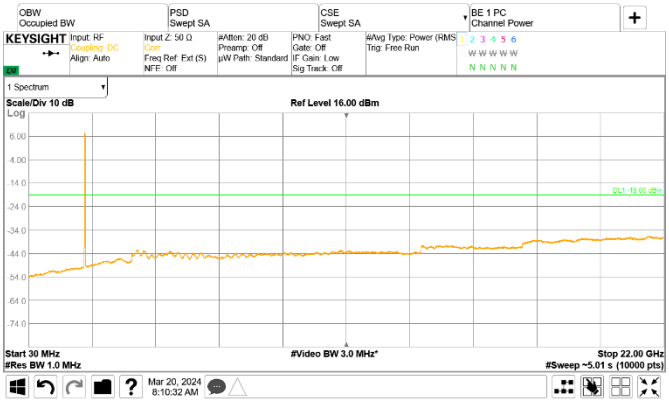

Figure 8.2-9: *Conducted spurious emissions of NR 35 MHz top channel, single-carrier operation*

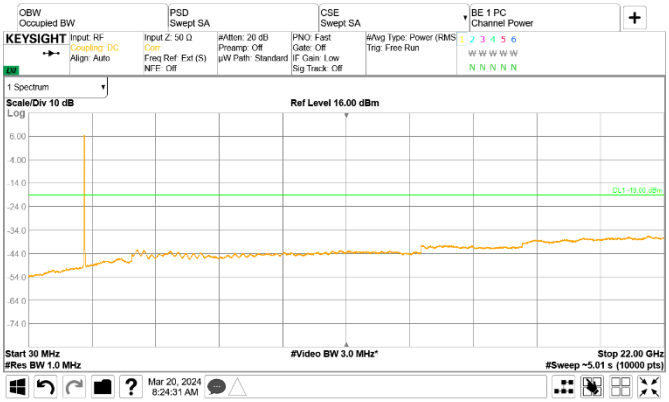

Figure 8.2-10: *Conducted spurious emissions of NR 40 MHz low channel, single-carrier operation*

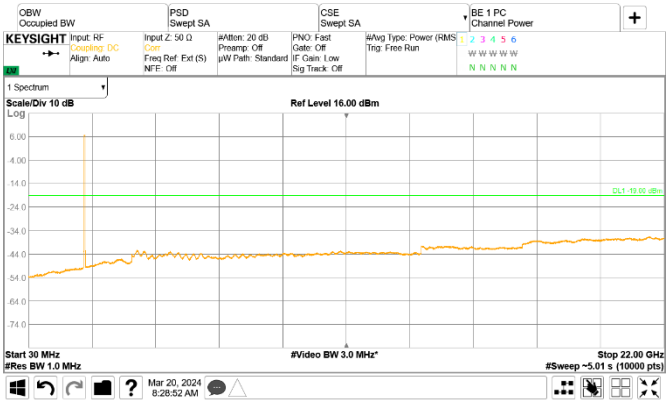

Figure 8.2-11: *Conducted spurious emissions of NR 40 MHz mid channel, single-carrier operation*

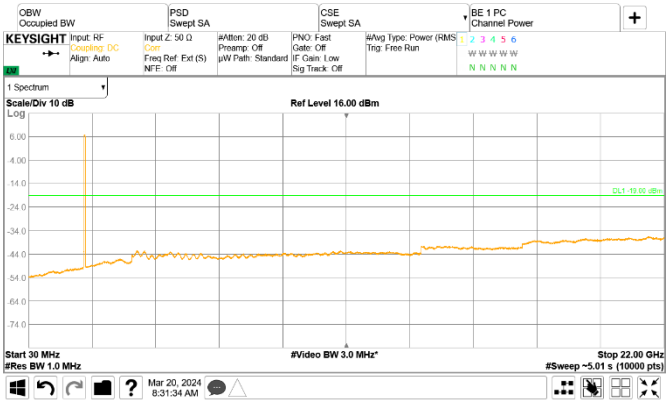

Figure 8.2-12: *Conducted spurious emissions of NR 40 MHz top channel, single-carrier operation*

Test data, continued

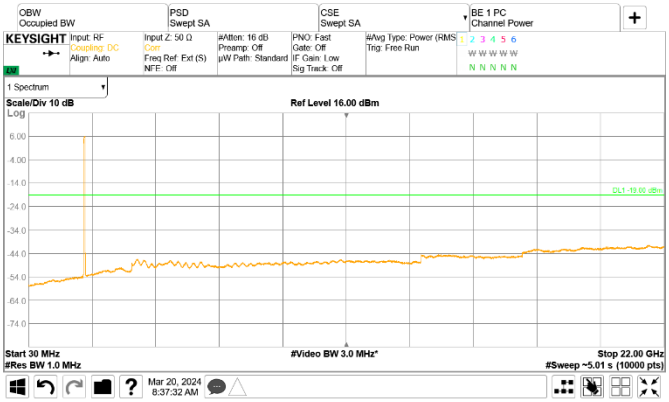

Figure 8.2-13: *Conducted spurious emissions of NR 25 MHz two contiguous low channels, two-carrier operation*

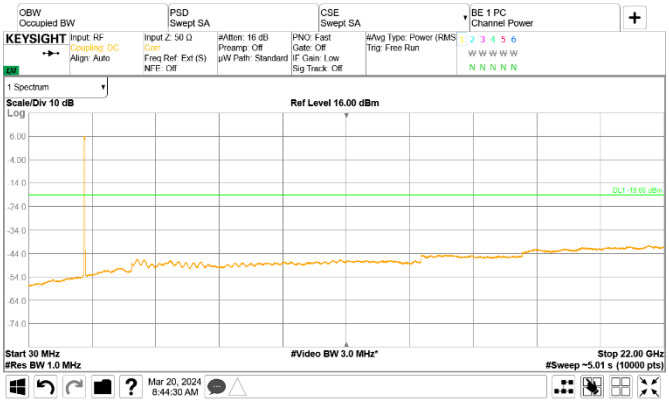

Figure 8.2-14: *Conducted spurious emissions of NR 25 MHz two contiguous mid channels, two-carrier operation*

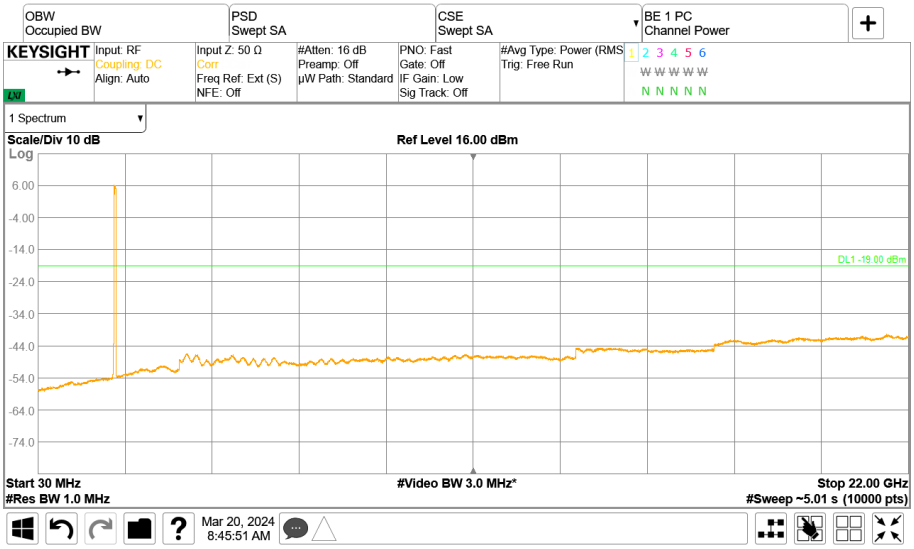

Figure 8.2-15: *Conducted spurious emissions of NR 25 MHz two contiguous top channels, two-carrier operation*

Test data, continued

On the plots below the measured *Channel Power* value in the "*Total Channel Power*" column must be −19 dBm and lower.

Figure 8.2-16: *Conducted emission at the lower band edge*

Frequency:	*1930 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 25 MHz*
Limit:	*−19 dBm/250 kHz*	*Notes:*	*None*

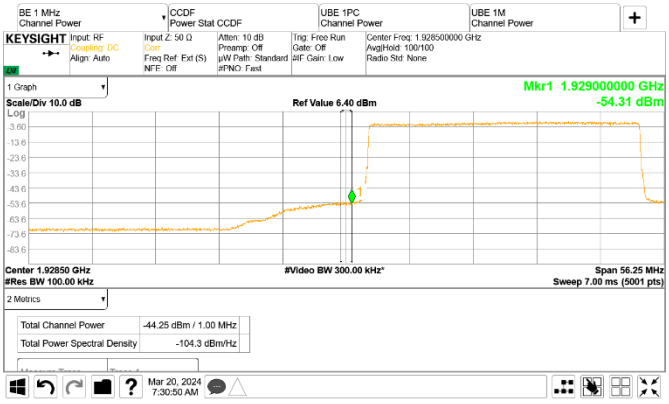

Figure 8.2-17: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*1929 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 25 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

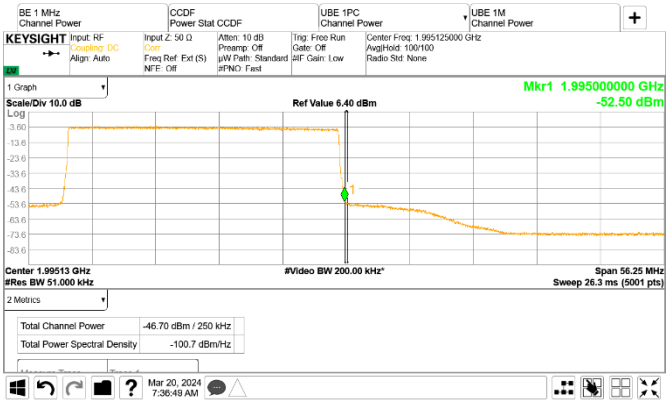

Figure 8.2-18: *Conducted emission at the upper band edge*

Frequency:	*1995 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 25 MHz*
Limit:	*−19 dBm/250 kHz*	*Notes:*	*None*

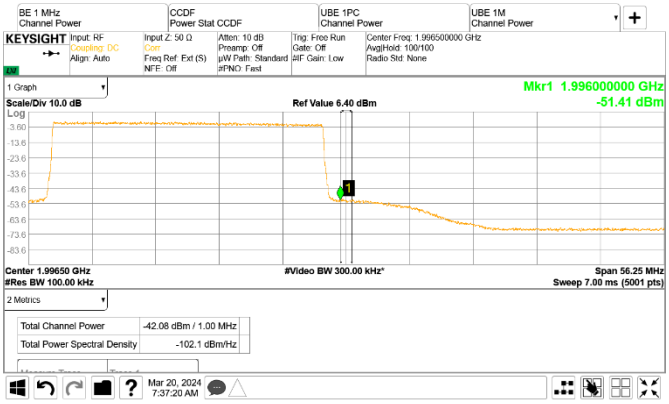

Figure 8.2-19: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*1996 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 25 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

Test data, continued

On the plots below the measured *Channel Power* value in the "*Total Channel Power*" column must be −19 dBm and lower.

Figure 8.2-20: *Conducted emission at the lower band edge*

Frequency:	*1930 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 30 MHz*
Limit:	*−19 dBm/300 kHz*	*Notes:*	*None*

Figure 8.2-21: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*1929 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 30 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

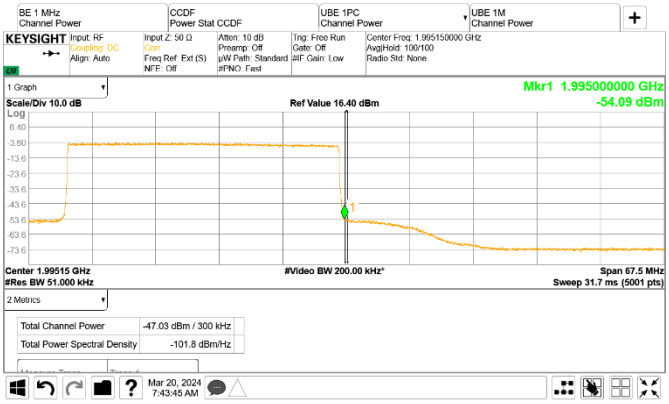

Figure 8.2-22: *Conducted emission at the upper band edge*

Frequency:	*1995 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 30 MHz*
Limit:	*−19 dBm/300 kHz*	*Notes:*	*None*

Figure 8.2-23: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*1996 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 30 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

Test data, continued

On the plots below the measured *Channel Power* value in the "*Total Channel Power*" column must be −19 dBm and lower.

Figure 8.2-24: *Conducted emission at the lower band edge*

Frequency:	*1930 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 35 MHz*
Limit:	*−19 dBm/350 kHz*	*Notes:*	*None*

Figure 8.2-25: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*1929 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 35 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

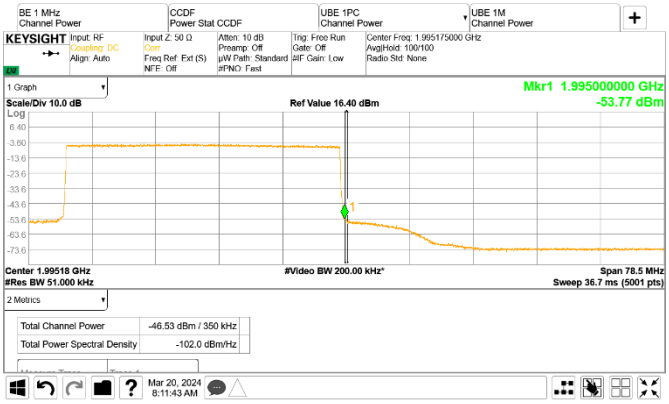

Figure 8.2-26: *Conducted emission at the upper band edge*

Frequency:	*1995 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 35 MHz*
Limit:	*−19 dBm/350 kHz*	*Notes:*	*None*

Figure 8.2-27: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*1996 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 35 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

Test data, continued

On the plots below the measured *Channel Power* value in the "*Total Channel Power*" column must be −19 dBm and lower.

Figure 8.2-28: *Conducted emission at the lower band edge*

Frequency:	*1930 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 40 MHz*
Limit:	*−19 dBm/400 kHz*	*Notes:*	*None*

Figure 8.2-29: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*1929 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 40 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

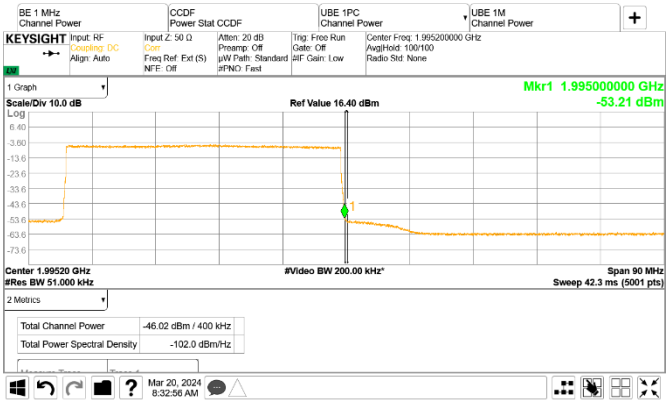

Figure 8.2-30: *Conducted emission at the upper band edge*

Frequency:	*1995 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*NR 40 MHz*
Limit:	*−19 dBm/400 kHz*	*Notes:*	*None*

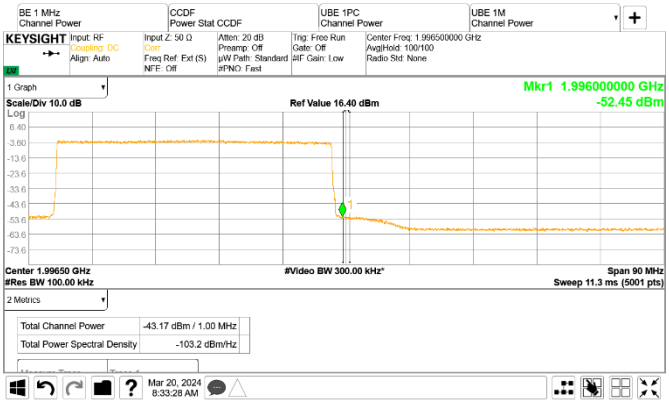

Figure 8.2-31: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*1996 MHz*	*Mode:*	*Single carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*NR 40 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

Test data, continued

On the plots below the measured *Channel Power* value in the "*Total Channel Power*" column must be −19 dBm and lower.

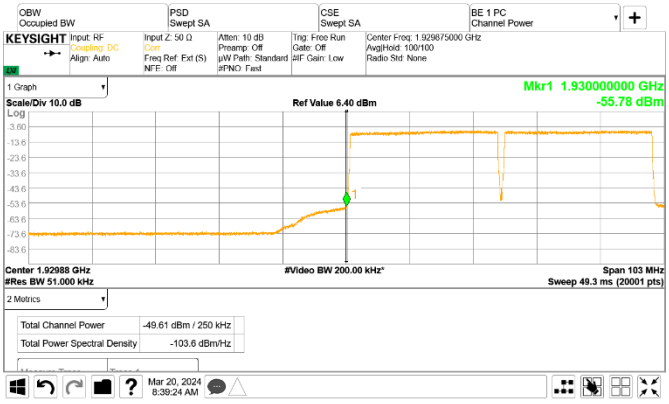

Figure 8.2-32: *Conducted emission at the lower band edge*

Frequency:	*1930 MHz*	*Mode:*	*Multi-carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*2× NR 25 MHz*
Limit:	*−19 dBm/250 kHz*	*Notes:*	*None*

Figure 8.2-33: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*1929 MHz*	*Mode:*	*Multi-carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*2× NR 25 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

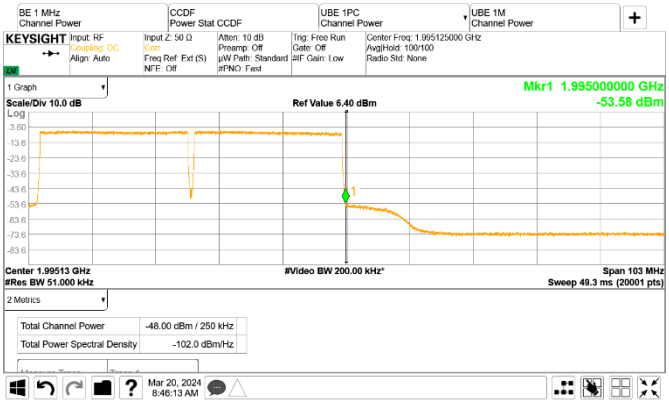

Figure 8.2-34: *Conducted emission at the upper band edge*

Frequency:	*1995 MHz*	*Mode:*	*Multi-carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*2× NR 25 MHz*
Limit:	*−19 dBm/250 kHz*	*Notes:*	*None*

Figure 8.2-35: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*1996 MHz*	*Mode:*	*Multi-carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*2× NR 25 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

8.3 Occupied bandwidth (Band 2/25)

8.3.1 Definitions and limits

FCC §2.1049:
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.

RSS-Gen, 6.7
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

8.3.2 Test summary

Test date	March 20, 2024
Test engineer	Nimish Kapoor

8.3.3 Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.4.3 and 5.4.4 methods.

Spectrum analyzer settings:

Detector mode	Peak
Resolution bandwidth	≥1 % of EBW
Video bandwidth	RBW × 3
Trace mode	Max Hold

8.3.4 Test data

Table 8.3-1: *Occupied bandwidth results for NR 25 MHz channel*

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
25 MHz, Low channel	1942.5	24.670	23.699
25 MHz, Mid channel	1962.5	24.670	23.698
25 MHz, Top channel	1982.5	24.670	23.696

Table 8.3-2: *Occupied bandwidth results for NR 30 MHz channel*

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
30 MHz, Low channel	1945.0	29.640	28.521
30 MHz, Mid channel	1962.5	29.670	28.520
30 MHz, Top channel	1980.0	29.630	28.415

Table 8.3-3: *Occupied bandwidth results for NR 35 MHz channel*

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
25 MHz, Low channel	1947.5	34.770	33.466
25 MHz, Mid channel	1962.5	34.780	33.524
25 MHz, Top channel	1977.5	34.760	33.472

Table 8.3-4: *Occupied bandwidth results for NR 40 MHz channel*

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
40 MHz, Low channel	1950.0	39.890	38.469
40 MHz, Mid channel	1962.5	39.890	38.482
40 MHz, Top channel	1975.0	39.880	38.374

Test data, continued

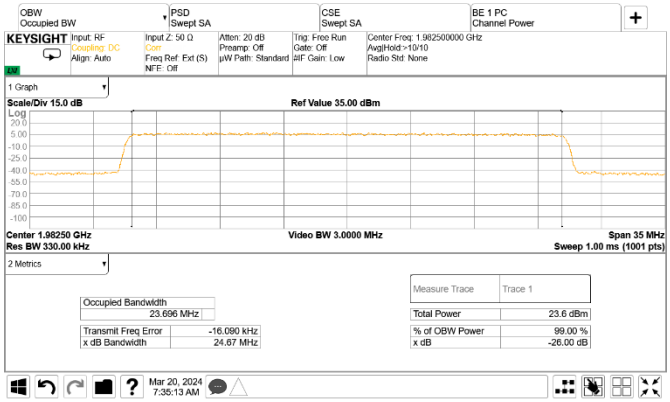

Figure 8.3-1: *Sample plot for NR 25 MHz channel*

Figure 8.3-2: *Sample plot for NR 30 MHz channel*

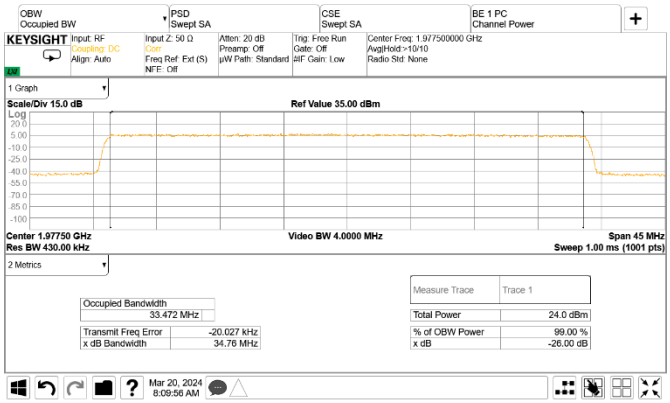

Figure 8.3-3: *Sample plot for NR 35 MHz channel*

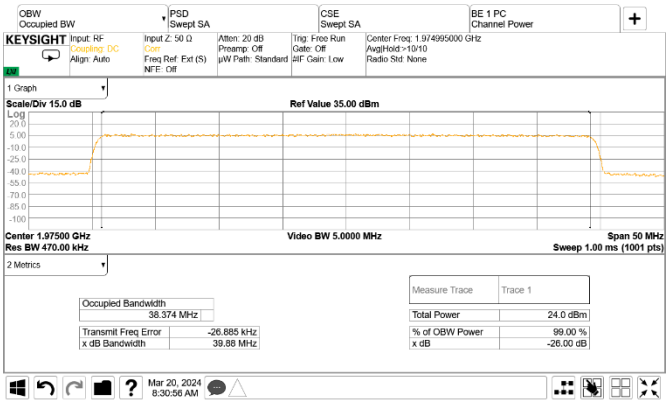

Figure 8.3-4: *Sample plot for NR 40 MHz channel*

End of report