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Radio Test report – Radio 4495HP 44B71 44B85A

Report ID
REP090083

Project ID
PRJ0076313

Applicant:
Ericsson AB

Product name:
Radio Unit

Model (PMN):
Radio 4495HP 44B71 44B85A C

Part number:
KRC 161 0056/31

FCC ID:
TA8AKRC1610056

ISED certification number:
IC: 287AB-AS1610056

HVIN:
AS1610056

Requirements/Summary:

Standard	Environmental phenomenon	Compliance
FCC 47 CFR Part 27	Miscellaneous wireless communications services (698-746 MHz band)	Yes
RSS-130 Issue 2, April 2019	Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz	Yes

Date of issue: May 20, 2025

Dhara Patel, EMC/RF Test Specialist

Tested by

Signature

Andrey Adelberg, Senior RF/EMC 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.

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Table of contents	Section 1	Report summary	4
1.1	Applicant		4
1.2	Manufacturer		4
1.3	Test specifications		4
1.4	Test method		4
1.5	Statement of compliance		4
1.6	Test report revision history		4
Section 2.	Summary of test results		5
2.1	Testing location		5
2.2	Testing period		5
2.3	Sample information		5
2.4	FCC Part 27 test results		6
2.5	RSS-130/Gen test results		6
Section 3.	Equipment under test (EUT) details		7
3.1	EUT information		7
3.2	Product description and theory of operation		8
3.3	EUT test details		10
3.4	EUT setup diagram		12
3.5	Setup photographs		13
Section 4.	Engineering considerations		17
4.1	Modifications incorporated in the EUT		17
4.2	Technical judgment		17
4.3	Deviations from laboratory tests procedures		17
Section 5.	Test conditions		18
5.1	Atmospheric conditions		18
5.2	Power supply range		18
Section 6.	Measurement uncertainty		19
6.1	Uncertainty of measurement		19
Section 7.	Test equipment		20
7.1	Test equipment list		20
Section 8.	Testing data		21
8.1	Maximum output power at RF antenna connector (B71)		21
8.2	Maximum output power at RF antenna connector (B85A)		42
8.3	Spurious emissions at RF antenna connector (B71)		58
8.4	Spurious emissions at RF antenna connector (B85A)		117
8.5	Radiated spurious emissions		157
8.6	Frequency stability		162
8.7	Occupied bandwidth (B71)		164
8.8	Occupied bandwidth (B85A)		168
Section 9.	Block diagrams of test setups		172
9.1	Radiated emissions set-up for frequencies below 1 GHz		172
9.2	Radiated emissions set-up for frequencies above 1 GHz		172
9.3	Conducted emissions set-up		173

Section 1. Report summary

1.1 Applicant

Company name	Ericsson AB
Address	PEU Radio Torshamnsgatan 23, Stockholm, Sweden 164 80

1.2 Manufacturer

Company name	Ericsson AB
Address	PEU Radio Torshamnsgatan 23, Stockholm, Sweden 164 80

1.3 Test specifications

FCC 47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
FCC 47 CFR Part 27	Miscellaneous wireless communications services (698-746 MHz band)
RSS-130 Issue 2, April 2019	Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz
SRSP-518, Issue 2, February 2019	Technical Requirements in the Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz
RSS-Gen, Issue 5, April 2018	General Requirements for Compliance of Radio Apparatus

1.4 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

1.5 Statement of compliance

In the configurations 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 (**REP090083**) applies to the *Radio 4495HP 44B71 44B85A C* with part number *KRC 161 0056/31*. See "Summary of test results" for full details.

EUT Configuration(s) SRO/MRO: refer to Section 3.

1.6 Test report revision history

Table 1.6-1: Test report revision history

Report ID	Date of issue	Details of changes made to test report
REP090083	May 20, 2025	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 25, 2025 Test end date May 14, 2025

2.3 Sample information

Receipt date March 25, 2025 Nemko sample ID number PRJ00763130001

2.4 FCC Part 27 test results

Table 2.4-1: FCC results summary

Part	Test description	Verdict
§27.5(c)	Frequencies (698-746 MHz band)	Pass
§27.50(c)	Maximum output power at RF antenna connector	Pass
§27.53(g)	Spurious emissions at RF antenna connector	Pass
§27.53(g)	Radiated spurious emissions	Pass
§27.54	Frequency stability	Pass
§2.1049	Occupied bandwidth	Pass

Notes: None

2.5 RSS-130/Gen test results

Table 2.5-1: ISED results summary

Section	Test description	Verdict
RSS-130, 4.2	Types of modulation	Pass ¹
RSS-130, 4.3	Frequency block	Pass ²
RSS-130, 4.4	Interoperability requirement for Mobile and portable stations in the bands 617-652 MHz and 663-698 MHz	Not applicable ³
RSS-130, 4.5	Transmitter frequency stability	Pass
RSS-130, 4.6.3	Transmitter output power and effective radiated power (e.r.p.)	Pass
RSS-130, 4.7.1	Transmitter unwanted emissions	Pass
RSS-Gen, 6.7	Occupied bandwidth	Pass

Notes: ¹EUT employs digital modulation (QPSK)
²EUT transmits within 617–652 MHz (for band 71) frequency range, and within 728–745 MHz (for band 85A) frequency range.
³The EUT is a fixed base station.

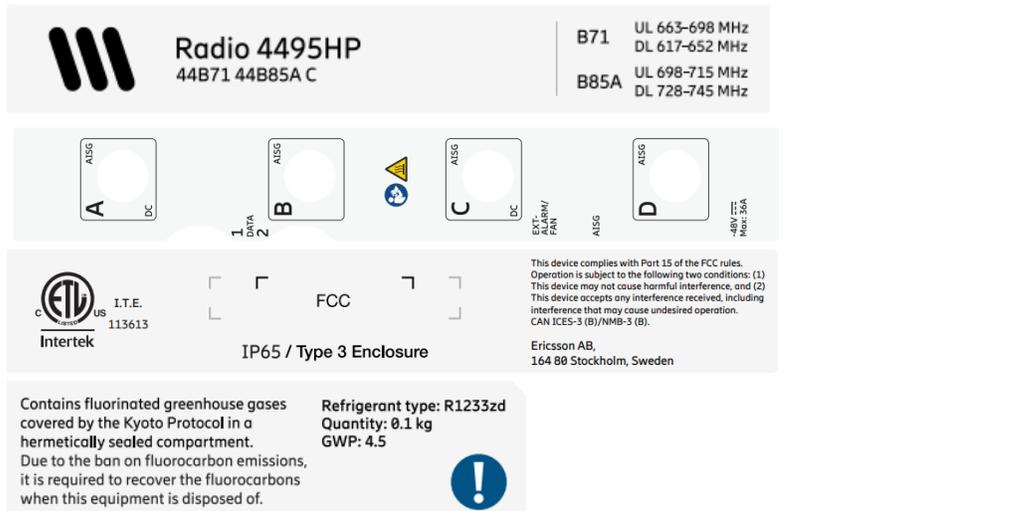
Section 3. Equipment under test (EUT) details

3.1 EUT information

Product name	Radio Unit	
Model	Radio 4495HP 44B71 44B85A C	
Part number (tested unit)	KRC 161 0056/3	
Revision	R1C	
Serial number	E23G284949	
Antenna ports	4 TX/ 4 RX	
RF BW / IBW	B71: 35 MHz	B85A: 17 MHz
Duplex mode	FDD	FDD
Frequency	B71: Uplink 663–698 MHz B71 Downlink: 617–652 MHz	B85A: Uplink 698–715 MHz B85A: Downlink: 728–745 MHz
Nominal O/P per Antenna port	120 W (4×80 W for B71 and 4×40 W for B85A)	
Accuracy (nominal)	±0.1 ppm	
Nominal voltage	-48 VDC (-36 to -58.5 VDC)	
RAT	LTE, NR & NB-IoT (SA, IB, GB)	
Modulation	QPSK, 16 QAM, 64 QAM, 256 QAM	
Channel bandwidth	B71 NR: 5, 10, 15, 20, 25, 30, 35 MHz B71 LTE: 5, 10, 15, 20 MHz B71 NB-IoT SA: 0.4 MHz	B85A NR: 3, 5, 10, 15 MHz B85A LTE: 5, 10, 15 MHz B85A NB-IoT SA: 0.4 MHz
CPRI	2.5 – 24.3 Gbps (Data 1, 2)	
Channel raster	15 & 30 kHz	
Supported Configurations	Single Antenna, TX Diversity, MIMO, Carrier Aggregation, Ericsson Spectrum Sharing	
Operating temperature	-40 °C to +55 °C	
Max RF Power	480 W total / radio (4 ports x 120W)	
Supported carriers /band/ port SRO/MRO	B71 LTE & NR : Max 6 carriers per port B71 NB-IoT : Max 1 carriers per port	B85A LTE : Max 3 carriers per port B85A NR : Max 5 carriers per port B85A NB-IoT : Max 1 carriers per port
Carrier Configurations:	SRO: LTE, NR, NB-IoT (SA) MRO: Combinations of LTE, NR and NB-IoT (SA)	
RAT SC Carrier Power (max)	B71 & B85A: LTE & NR 5 MHz: 40 W B71: NR 10, 15, 20, 25, 30, 35 MHz: 80 W B71: LTE 10, 15, 20 MHz: 80W	B85A NR 3 MHz: 20W B85A: NR & LTE 5, 10, 15: 40W B71 & B85A: NB-IoT SA: 20 W

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	<p>Radio 4495HP is an outdoor 4T4R FDD multi-band radio with 4x80W (B71) and 4x40W (B85A) output power. It supports 4G, 5G and Ericsson Spectrum Sharing with full band capabilities for both Instantaneous Bandwidth (IBW) and Channel Bandwidth (CBW). It supports eCPRI and CPRI, enabling both full RAN Compute support as well as native Cloud RAN support. Radio 4495HP is part of the Ericsson Radio System portfolio with excellent radio performance and power efficiency for wide-area 3GPP radio products.</p> <p>Radio product is KRC 161 005/31 which is a SW locked customer deliverable. Tests were executed on the KRC 161 0056/3 which is a SW unlocked variant of the KRC 161 0056/31 radio to enable efficient testing for compliance. Both variants are electrically identical.</p>												
Ports/Interface	<table border="1"> <thead> <tr> <th>Port</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>A, B, C, D</td> <td>RF Ports</td> </tr> <tr> <td>Data 1, 2</td> <td>Optical Interface</td> </tr> <tr> <td>Alarm / Fan</td> <td>Alarm / Fan Control</td> </tr> <tr> <td>AISG</td> <td>AISG communiton port</td> </tr> <tr> <td>-48VDC</td> <td>DC Input</td> </tr> </tbody> </table>	Port	Description	A, B, C, D	RF Ports	Data 1, 2	Optical Interface	Alarm / Fan	Alarm / Fan Control	AISG	AISG communiton port	-48VDC	DC Input
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A, B, C, D	RF Ports												
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Alarm / Fan	Alarm / Fan Control												
AISG	AISG communiton port												
-48VDC	DC Input												
Physical	<table border="1"> <tbody> <tr> <td>Dimensions (H x W x D)</td> <td>522mm x 397mm x 190mm</td> </tr> <tr> <td>Weight</td> <td>30 kg</td> </tr> <tr> <td>Operating Temperature</td> <td>-40 °C to +55 °C</td> </tr> <tr> <td>Mounting</td> <td>Rail, wall and pole Vertical: portrait and bookshelf mounting are supported Horizontal: Rail</td> </tr> <tr> <td>Cooling</td> <td>Natural convection; fan unit optional</td> </tr> </tbody> </table>	Dimensions (H x W x D)	522mm x 397mm x 190mm	Weight	30 kg	Operating Temperature	-40 °C to +55 °C	Mounting	Rail, wall and pole Vertical: portrait and bookshelf mounting are supported Horizontal: Rail	Cooling	Natural convection; fan unit optional		
Dimensions (H x W x D)	522mm x 397mm x 190mm												
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Operating Temperature	-40 °C to +55 °C												
Mounting	Rail, wall and pole Vertical: portrait and bookshelf mounting are supported Horizontal: Rail												
Cooling	Natural convection; fan unit optional												
Software details	CXP2021113_1/R23C165												
Product Identification / Markings and Labels	 <p>Radio 4495HP 44B71 44B85A C</p> <p>B71 UL 663-698 MHz DL 617-652 MHz</p> <p>B85A UL 698-715 MHz DL 728-745 MHz</p> <p>Ports: A (AISG, DC), B (AISG, DATA 1, 2), C (AISG, DC, Alarm/Fan), D (AISG, DC, Mod-36A)</p> <p>Intertek I.T.E. 113613 FCC IP65 / Type 3 Enclosure</p> <p>This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device accepts any interference received, including interference that may cause undesired operation. CAN ICES-3 (B)/NMB-3 (B).</p> <p>Ericsson AB, 164 80 Stockholm, Sweden</p> <p>Contains fluorinated greenhouse gases covered by the Kyoto Protocol in a hermetically sealed compartment. Due to the ban on fluorocarbon emissions, it is required to recover the fluorocarbons when this equipment is disposed of.</p> <p>Refrigerant type: R1233zd Quantity: 0.1 kg GWP: 4.5</p>												

Product description and theory of operation, continued

SFP Tested Unit Information**SFP Slot 0**

- Ericsson Product Number = RDH10275/2
- Ericsson Product Revision = R1A
- sfpProductNumber = RTX330-205-C24
- sfpProductRevision = 1.0
- sfpSerialNumber = CU821LORUX

SFP Slot 1

- Ericsson Product Number = RDH10275/3
 - Ericsson Product Revision = R1A
 - sfpProductNumber = SEP6200LH-E2-W
 - sfpProductRevision = A
 - sfpSerialNumber = EA611L082B
-

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

B71

LTE Test Configurations: B71 (617 – 652 MHz) Operating Bandwidth (35MHz)

Config	BW (MHz)	Bottom (MHz)	Middle (MHz)	Top (MHz)
LTE 1C	5	619.5	634.5	649.5
LTE 1C IB	5	619.5	634.5	649.5
LTE 1C GB	10	622	634.5	647
LTE 1C GB	15	624.5	634.5	644.5
LTE 1C GB	20	627	634.5	642
LTE 2C [IB]	5	619.5+624.5	632+637	644.5+649.5
LTE 2C [GB]	15	624.5+639.5	627+642	644.5+629.5
LTE 6C [IB]	5	619.5+624.5+629.5+ 634.5+639.5+644.5	622+627+632+637+ 642+647	649.5+644.5+639.5+ 634.5+629.5+624.5
LTE Non-contiguous 2C [IB]	5		619.5_644.5	

NR Test Configurations: B71 (617 – 652 MHz) Operating Bandwidth (35MHz)

Config	BW (MHz)	Bottom (MHz)	Middle (MHz)	Top (MHz)
NR 1C	5	619.5	634.5	649.5
	10	622	634.5	647
	15	624.5	634.5	644.5
	20	627	634.5	642
	25	629.5	634.5	639.5
	30	632	634.5	637
	35	n/a	634.5	n/a
NR 2C	5	619.5+624.5	632+637	649.5 + 644.5
NR 2C	15	624.5+639.5	627+642	644.5+629.5
NR 6C	5	619.5+624.5+629.5+ 634.5+639.5+644.5	622+627+632+637+ 642+647	649.5+644.5+639.5+ 634.5+629.5+624.5
NR Non-contiguous 2C	5		619.5_644.5	

NB-IoT SA Test Configurations:

Config	BW (MHz)	Bottom (MHz)	Middle (MHz)	Top (MHz)
NB-IoT SA	0.4	617.2	634.5	651.8

EUT test details, continued

Multi-RAT Test Configurations:

Config	Bottom (MHz)	Middle (MHz)	Top (MHz)
1N5+1L5IB	619.5+624.5	632+637	649.5 + 644.5
1N15+1L15(GB)	624.5+339.5	627+642	629.5+644.5
3N5+3L5	619.5+624.5+629.5+ 634.5+639.5+644.5	622+627+632+ 637+642+647	649.5+644.5+639.5+ 634.5+629.5+624.5
1SA+1N5 Non-contiguous		617.2_649.5	
1N5+1L5 Non-contiguous		619.5_649.5	
1L5+1SA Non-contiguous		619.5_651.8	
1N5+1SA Non-contiguous		619.5_651.8	
1SA+1L5 Non-contiguous		617.2_649.5	
3N5_3L5 Non-contiguous		619.5+624.5+629.5 _639.5+644.5M+649.5	

B85A

LTE Test Configurations: B85 (728-745 MHz) Operating Bandwidth (17 MHz)

Config	BW (MHz)	Bottom (MHz)	Middle (MHz)	Top (MHz)
LTE 1C IB	5	730.5	736.5	742.5
LTE 1C GB	10	733	736.5	740
LTE 1C GB	15	735.5	736.5	737.5
LTE 2C [IB]	5	730.5+735.3	734+739	737.5+742.5
LTE 3C [IB]	5	730.5+735.5+740.5	731.5+736.5+741.5	732.5+737.5+742.5

NR Test Configurations: B85 (728-745 MHz) Operating Bandwidth (17 MHz)

Config	BW (MHz)	Bottom (MHz)	Middle (MHz)	Top (MHz)
NR 1C	3	729.5	736.5	743.5
	5	730.5	736.5	742.5
	10	733	736.5	740
	15	735.5	736.5	737.5
NR 2C	3	729.5+732.5	735+738	740.5+743.5
NR 2C	5	730.5+735.5	734+739	737.5+742.5
NR 5C	3	729.5+732.5+735.5+ 738.5+741.5	730.5+733.5+736.5+739.5+742.5	731.5+734.5+737.5+ 740.5+743.5

NB-IoT SA Test Configurations:

Config	BW (MHz)	Bottom (MHz)	Middle (MHz)	Top (MHz)
NB-IoT SA	0.4	728.2	736.5	744.8

Multi-RAT Test Configurations:

Config	Bottom (MHz)	Middle (MHz)	Top (MHz)
1N3+1L5IB	729.5+733.5	734+738	738.5+742.5
2xNR3+SA+2xL50	-	729.8M+732.8+734.5+ 737.2+742.2	-
1xNR3+1xL5(1B) Non-contiguous		729.5_742.5	
1xSA+1xL5 Non-contiguous		728.2_742.5	
1xN3+1xSA Non-contiguous		729.5_744.8	
2xN3_2xL5 Non-contiguous		729.5+732.5_737.5+742.5	

EUT test details, continued

Radiated Emissions Test Configurations:

#	Configuration	Frequencies (MHz)
RSE1	B71 Port AB: L5+L5 B71 Port CD: L5 B85A Port ABC: L5 B85A Port D: SA+L5	644.5+649.5 649.5 730.5 728.2_742.5
RSE 2	B71 Port A: SA B71 Port BCD: N5+L5 B85A Port AB: N3+N3 B85A Port CD: L5+L5	634.5 644.5+649.5 729.5+732.5 734+739
RSE3	B71 Port A: NC SA_L5 Non-Contiguous B71 Port BCD: L5 B85A Port A: N3_SA Non-Contiguous B85A Port BCD: 3xL5	617.2_649.5 634.5 729.5_744.8 730.5+ 735.5+ 740.5
RSE 4	B71 Port A: SA B71 Port BCD: N5_L5 Non-Contiguous B85A Port ABC: N5 B85A Port D: SA	617.2 619.5_649.5 736.5 728.2

3.4 EUT setup diagram

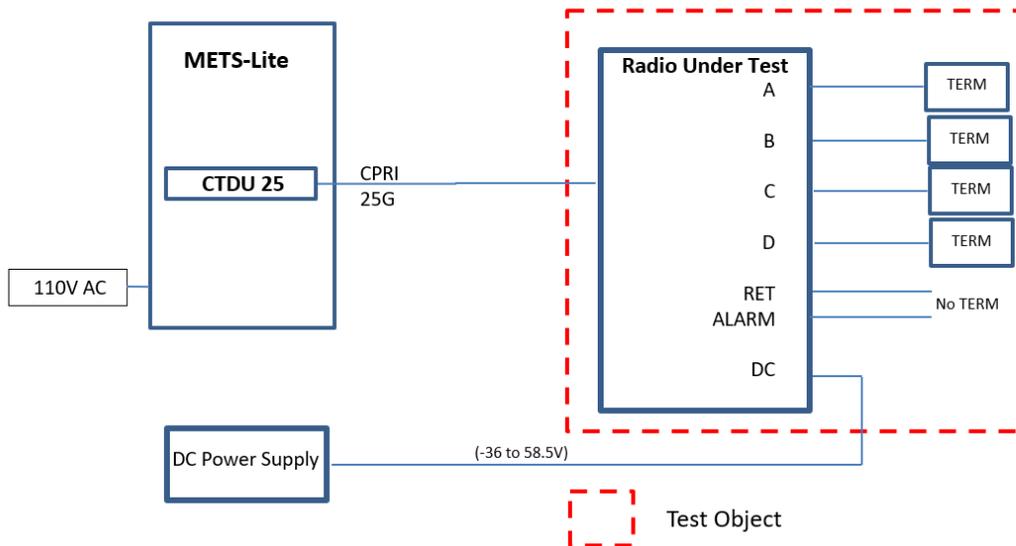


Figure 3.4-1: Setup diagram – Radio Compliance

3.5 Setup photographs



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

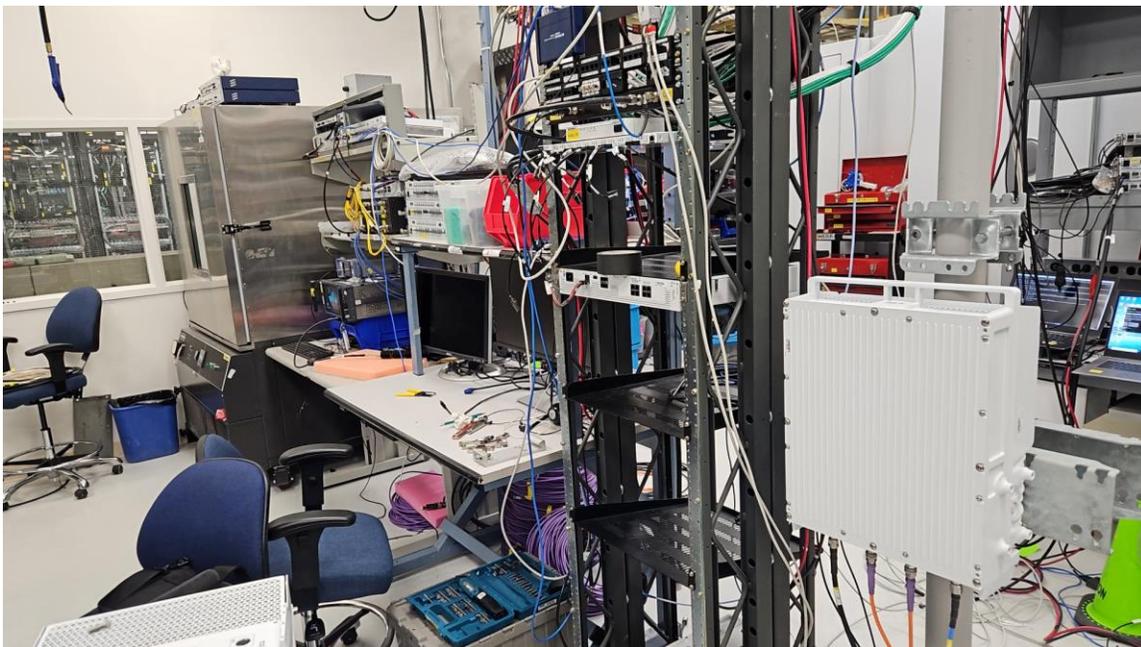


Figure 3.5-2: Set up photo for Radio Compliance Testing

Setup photographs, continued



Figure 3.5-3: EUT Set-up photo for Thermal Radio Compliance Testing

Setup photographs, continued

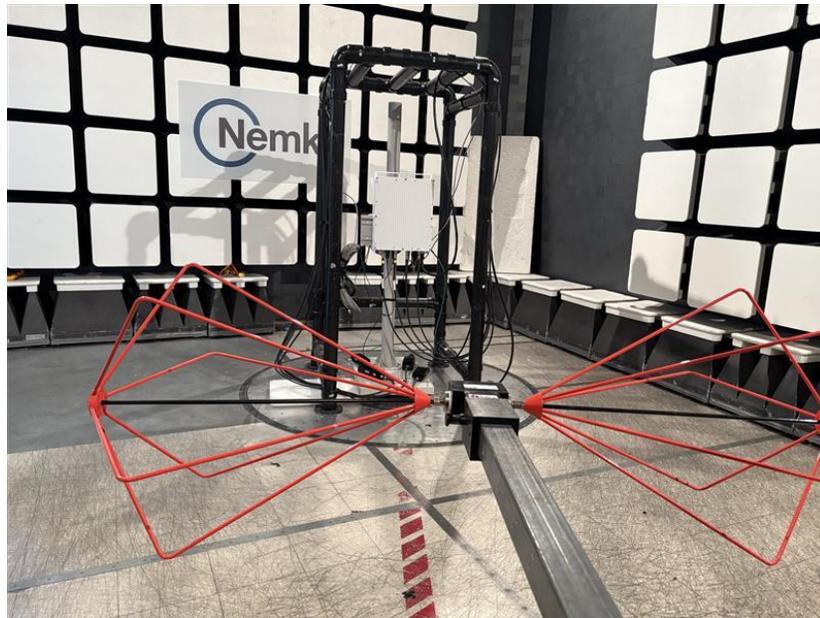


Figure 3.5-4: EUT Set-up photos for Radiated Emissions below 30 to 200 MHz

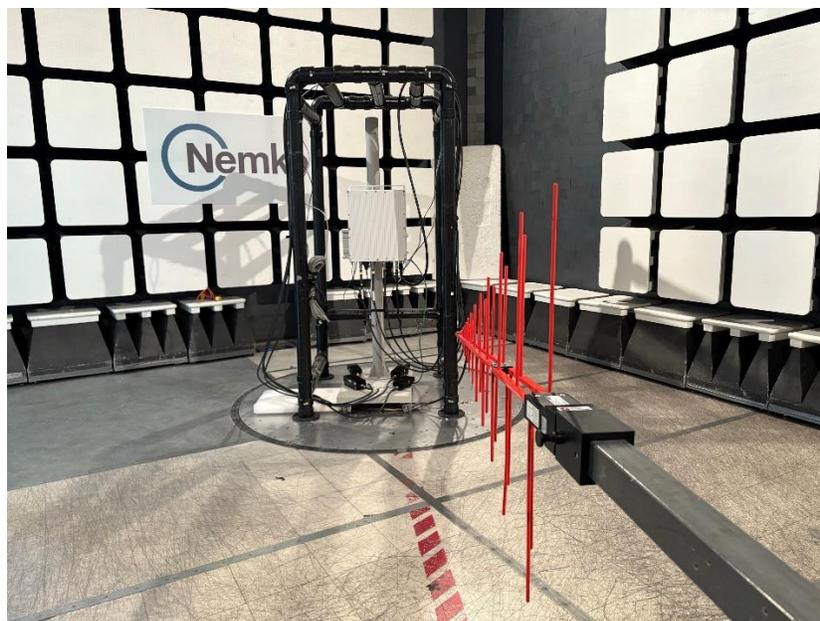


Figure 3.5-5: EUT Set-up photos for Radiated Emissions below 200 to 1000 MHz

Setup photographs, continued

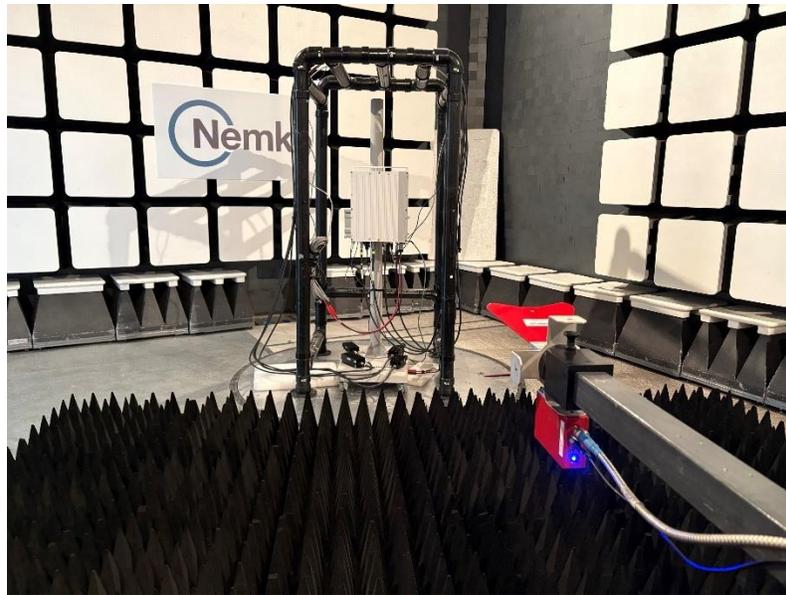


Figure 3.5-6: EUT Set-up photos for Radiated Emissions above 1 GHz

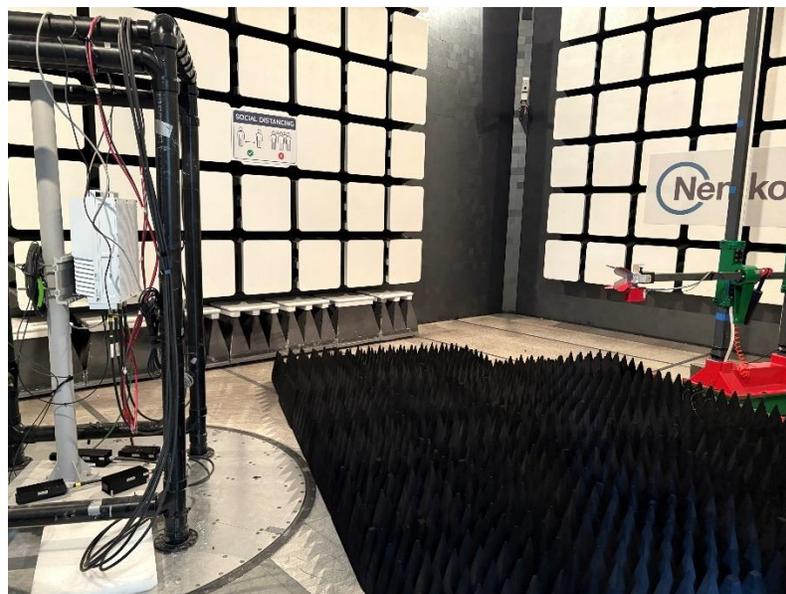


Figure 3.5-7: EUT Set-up photos for Radiated Emissions above 1 GHz

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 EUT is DC-powered and supports voltage inputs ranging from -36 VDC to -58 VDC. Testing was conducted at -52 VDC, which corresponds to typical field voltage conditions.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Measurement	Measurement uncertainty, \pm dB
Radiated spurious emissions (30 MHz to 1 GHz)	5.8
Radiated spurious emissions (1 GHz to 6 GHz)	4.7
Radiated spurious emissions (6 GHz to 18 GHz)	5.0
Radiated spurious emissions (18 GHz to 26 GHz)	5.0
Radiated spurious emissions (18 GHz to 40 GHz)	5.2
RF Output power measurement using Spectrum Analyzer ¹	0.71
RF Output power measurement using Power Meter	0.54
Conducted spurious emissions	0.90
Other antenna port measurements	0.81

Notes: UKAS Lab 34, TIA-603 and ETSI TR 100 028-1&2 have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products. Measurement uncertainty calculations assume a coverage factor of $K = 2$ with 95% certainty.

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.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	April 18, 2025
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
DC Power source	Ametek	SGA80X125C-0AAA	FA002737	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	February 7, 2026
Spectrum analyzer	Rohde & Schwarz	FSV 40	FA002731	1 year	March 25, 2026
Horn (1–18 GHz)	ETS Lindgren	3117	FA002840	1 year	March 7, 2026
Preamp (1–18 GHz)	ETS Lindgren	124334	FA002877	1 year	November 19, 2025
Biconical antenna (30–300 MHz)	Sunol	BC2	FA002078	1 year	June 5, 2025
Log periodic antenna (200–5000 MHz)	Sunol	LP5	FA002077	1 year	June 5, 2025
50 Ω coax cable	Carlisle	WHU18-1818-072	FA002391	1 year	October 18, 2025
50 Ω coax cable	Huber+Suhner	104B11NX2/11000	FA003441	1 year	October 18, 2025
PXA Signal Analyzer	Keysight	N9030B	MY57144347	1 year	April 3, 2025
Power Meter	Rohde & Schwarz	NRP2	101814	2 years	March 31, 2025
Power Sensor	Rohde & Schwarz	NRP-Z11	100070	2 years	March 31, 2025
30 dB Attenuator	Weinschel Associates	WA66-30-33	1001278743	—	VOU
10 dB Attenuator (x2)	Mini-Circuits	BW-K10-2W44+	—	—	VOU
CT-DU25*	Ericsson	LPC 102 500/1	T01G525053	—	NCR
ENA Network Analyzer	Keysight	E5080B	MY59202549	1 year	April 22, 2025
DC Power Supply	Xantrex	XKW 60-50	E00109863	—	VOU

Notes: NCR - no calibration required, VOU - verify on use.

* CT-DU25 is the test equipment that drives the radios traffic.

Section 8. Testing data

8.1 Maximum output power at RF antenna connector (B71)

8.1.1 Definitions and limits

FCC §27.50(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698-746 MHz band:

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

RSS-130, Section 4.6: Transmitter output power and effective radiated power (e.r.p.)

The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.

SRSP-518, Section 5: Technical Criteria

5.1 Radiated power and antenna height limits for fixed and base stations

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

5.4 Stations with multiple antennas using multiple-input, multiple-output (MIMO) technology

29. If a fixed or base station is equipped with multiple antennas, the following rules regarding e.i.r.p. and antenna height shall apply.

5.4.1 E.i.r.p. for correlated transmission

30. When multiple antennas are used at a station to transmit the same digital data in a given symbol period (even with different coding or phase shifts) for transmit diversity or to steer signal energy towards a particular direction for enhanced directional gain (i.e. beamforming) or to devise any other transmission mode where signals from different antennas are correlated, the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and resulting directional gain of $10 \log_{10}(N) + G_{\max}(\text{dBi})$. Here, N is the number of antennas and G_{\max} is the highest gain in dBi among all antennas.

5.4.2 E.i.r.p. for uncorrelated transmission

31. When multiple antennas are used at a station in which each antenna transmits different digital data during any given symbol period (i.e. space-time block codes) or independent parallel data stream over the same frequency bandwidth in order to increase data rates (i.e. spatial multiplexing), or forms any other transmission mode where signals from different antennas are completely uncorrelated, the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain G_{\max} .

5.4.3 Antenna height

32. The HAAT of a fixed or a base station with multiple antennas shall be calculated with reference to the highest antenna.

8.1.2 Test summary

Test date	March 25, 2025 to March 27, 2025
Test engineer	Dhara Patel

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.

- Sample Selection: A random sample of devices was selected for testing to ensure representative results.
- Antenna Port Selection: The device under test (EUT) has four antenna ports. Port D was identified as the port with the highest transmit power and was selected for all subsequent measurements.
- Modulation Selection: The EUT supports multiple Quadrature Amplitude Modulation (QAM) schemes. QPSK was chosen as the worst-case modulation due to its higher power output.
- MIMO Power Calculation:
 - For New Radio (NR) and Long-Term Evolution (LTE) modes, the Total MIMO Power Spectral Density (PSD) was calculated by adding 6 dB to the PSD of a single antenna port to account for the 4x4 MIMO configuration.
 - For IoT SA mode, the Total MIMO PSD was calculated by adding 3 dB to the PSD of a single antenna port to account for the 2x2 MIMO configuration.
- Radio Base Station (RBS) EIRP Limits: RBS EIRP limits vary depending on deployment scenarios. To ensure compliance with regulatory limits, specific RBS setups and carrier configurations are considered during site commissioning.
- Test Conditions: The EUT was tested under maximum rated output power conditions to assess worst-case emission levels.
- Antenna and Deployment Considerations: The EUT was tested without an antenna. Licensees are responsible for evaluating installation and deployment factors, including maximum power settings, antenna gain, and feeder loss, to ensure compliance with Equivalent Isotropically Radiated Power (EIRP) limits as defined by the FCC and ISED regulations.
- EIRP Calculation Example: For Radio 4472HP B71B85A, EIRP was calculated using an antenna gain of 15.7 dBi and a feeder loss of 3.0 dB. Power settings and carrier configurations will be adjusted as necessary to meet regulatory requirements based on specific deployment scenarios.
- The FCC and ISED regulatory limits for Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) are 1000 W (60 dBm) and 1640 W (62.15 dBm), respectively. As EIRP is calculated as ERP + 2.15 dB, compliance with either limit ensures compliance with the other. The tables below present measurement results evaluated against the EIRP limit, with the margin of compliance being identical for both ERP and EIRP.

Spectrum analyzer settings for PSD:

Detector mode	RMS
Resolution bandwidth	1 MHz
Video bandwidth	>RBW
Trace mode	Averaging
Measurement time	Auto

8.1.4 Test data

Table 8.1-1: 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
634.5	40.66	46.66	3.0	15.7	59.36	62.15	2.79

Table 8.1-2: RF power density measurement results of a single-carrier operation for IoT SA (Stand Alone)

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
617.2	42.22	45.22	3.0	15.7	57.92	62.15	4.23
634.5	43.12	46.12	3.0	15.7	58.82	62.15	3.33
651.8	42.13	45.13	3.0	15.7	57.83	62.15	4.32

Table 8.1-3: RF power density measurement results of a single-carrier operation for LTE on 5 MHz channel with IB

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
619.5	40.41	46.41	3.0	15.7	59.11	62.15	3.04
634.5	40.34	46.34	3.0	15.7	59.04	62.15	3.11
649.5	40.66	46.66	3.0	15.7	59.36	62.15	2.79

Table 8.1-4: RF power density measurement results of a single-carrier operation for LTE on 10 MHz channel with GB

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
622.0	38.93	44.93	3.0	15.7	57.63	62.15	4.52
634.5	39.14	45.14	3.0	15.7	57.84	62.15	4.31
647.0	39.48	45.48	3.0	15.7	58.18	62.15	3.97

Table 8.1-5: RF power density measurement results of a single-carrier operation for LTE on 15 MHz channel with GB

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
624.5	37.96	43.96	3.0	15.7	56.66	62.15	5.49
634.5	38.00	44.00	3.0	15.7	56.70	62.15	5.45
644.5	37.93	43.93	3.0	15.7	56.63	62.15	5.52

Table 8.1-6: RF power density measurement results of a single-carrier operation for LTE on 20 MHz channel with GB

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
627.0	36.70	42.70	3.0	15.7	55.40	62.15	6.75
634.5	36.43	42.43	3.0	15.7	55.13	62.15	7.02
642.0	36.82	42.82	3.0	15.7	55.52	62.15	6.63

Table 8.1-7: RF power density measurement results of a single-carrier operation for NR on 5 MHz channel

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
619.5	39.56	45.56	3.0	15.7	58.26	62.15	3.89
634.5	40.04	46.04	3.0	15.7	58.74	62.15	3.41
649.5	39.93	45.93	3.0	15.7	58.63	62.15	3.52

Test data, continued

Table 8.1-8: RF power density measurement results of a single-carrier operation for NR on 10 MHz channel

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
622.0	39.24	45.24	3.0	15.7	57.94	62.15	4.21
634.5	39.44	45.44	3.0	15.7	58.14	62.15	4.01
647.0	39.88	45.88	3.0	15.7	58.58	62.15	3.57

Table 8.1-9: RF power density measurement results of a single-carrier operation for NR on 15 MHz channel

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
624.5	37.72	43.72	3.0	15.7	56.42	62.15	5.73
634.5	38.10	44.10	3.0	15.7	56.80	62.15	5.35
644.5	37.86	43.86	3.0	15.7	56.56	62.15	5.59

Table 8.1-10: RF power density measurement results of a single-carrier operation for NR on 20 MHz channel

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
627.0	36.34	42.34	3.0	15.7	55.04	62.15	7.11
634.5	36.39	42.39	3.0	15.7	55.09	62.15	7.06
642.0	36.77	42.77	3.0	15.7	55.47	62.15	6.68

Table 8.1-11: 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	Cable loss, dB	Antenna gain, dBi	EIRP PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
629.5	35.46	41.46	3.0	15.7	54.16	62.15	7.99
634.5	35.76	41.76	3.0	15.7	54.46	62.15	7.69
639.5	34.97	40.97	3.0	15.7	53.67	62.15	8.48

Table 8.1-12: 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	Cable loss, dB	Antenna gain, dBi	EIRP PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
632.0	34.95	40.95	3.0	15.7	53.65	62.15	8.50
634.5	35.13	41.13	3.0	15.7	53.83	62.15	8.32
637.0	35.32	41.32	3.0	15.7	54.02	62.15	8.13

Table 8.1-13: RF power density measurement results of a single-carrier operation for NR on 35 MHz channel with IB

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
634.5	34.50	40.50	3.0	15.7	53.20	62.15	8.95

Table 8.1-14: RF power density measurement results of a multi-carrier operation for LTE on 5 MHz channel (2C)

Notes	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
2 Carriers	40.05	46.05	3.0	15.7	58.75	62.15	3.40
2 Carriers	39.78	45.78	3.0	15.7	58.48	62.15	3.67
2 Carriers	40.24	46.24	3.0	15.7	58.94	62.15	3.21

Test data, continued

Table 8.1-15: RF power density measurement results of a multi-carrier operation for LTE on 15 MHz channel (2C)

Notes	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
2 Carriers	34.86	40.86	3.0	15.7	53.56	62.15	8.59
2 Carriers	35.47	41.47	3.0	15.7	54.17	62.15	7.98
2 Carriers	35.12	41.12	3.0	15.7	53.82	62.15	8.33

Table 8.1-16: RF power density measurement results of a multi-carrier operation for LTE on 5 MHz channel (6C)

Notes	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
6 Carriers	34.78	40.78	3.0	15.7	53.48	62.15	8.67
6 Carriers	35.18	41.18	3.0	15.7	53.88	62.15	8.27
6 Carriers	35.21	41.21	3.0	15.7	53.91	62.15	8.24

Table 8.1-17: RF power density measurement results of a multi-carrier operation for NR on 5 MHz channel (2C)

Notes	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
2 Carriers	39.09	45.09	3.0	15.7	57.79	62.15	4.36
2 Carriers	39.36	45.36	3.0	15.7	58.06	62.15	4.09
2 Carriers	39.77	45.77	3.0	15.7	58.47	62.15	3.68

Table 8.1-18: RF power density measurement results of a multi-carrier operation for NR on 15 MHz channel (2C)

Notes	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
2 Carriers	34.92	40.92	3.0	15.7	53.62	62.15	8.53
2 Carriers	35.04	41.04	3.0	15.7	53.74	62.15	8.41
2 Carriers	35.00	41.00	3.0	15.7	53.70	62.15	8.45

Table 8.1-19: RF power density measurement results of a multi-carrier operation for NR on 5 MHz channel (6C)

Notes	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
6 Carriers	34.65	40.65	3.0	15.7	53.35	62.15	8.80
6 Carriers	35.32	41.32	3.0	15.7	54.02	62.15	8.13
6 Carriers	35.19	41.19	3.0	15.7	53.89	62.15	8.26

Table 8.1-20: RF power density measurement results of a multi-RAT operation for NR 5 MHz and LTE 5 MHz

Notes	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
2 Carriers	39.93	45.93	3.0	15.7	58.63	62.15	3.52
2 Carriers	40.06	46.06	3.0	15.7	58.76	62.15	3.39
2 Carriers	40.20	46.20	3.0	15.7	58.90	62.15	3.25

Test data, continued

Table 8.1-21: RF power density measurement results of a multi-RAT operation for NR 15 MHz and LTE 15 MHz

Notes	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
2 Carriers	34.77	40.77	3.0	15.7	53.47	62.15	8.68
2 Carriers	34.98	40.98	3.0	15.7	53.68	62.15	8.47
2 Carriers	35.12	41.12	3.0	15.7	53.82	62.15	8.33

Table 8.1-22: RF power density measurement results of a multi-RAT operation for 3 x NR 5 MHz and 3 x LTE 5 MHz

Notes	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
6 Carriers	34.72	40.72	3.0	15.7	53.42	62.15	8.73
6 Carriers	34.78	40.78	3.0	15.7	53.48	62.15	8.67
6 Carriers	35.38	41.38	3.0	15.7	54.08	62.15	8.07

Table 8.1-23: RF power density measurement results of a multi-RAT operation for NR 5 MHz and LTE 5 MHz with IB [Non-contiguous]

Notes	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
2 Carriers	39.86	45.86	3.0	15.7	58.56	62.15	3.59

Table 8.1-24: RF power density measurement results of a multi-RAT operation for 3 x NR 5 MHz and 3 x LTE 5 MHz [Non-contiguous]

Notes	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
6 Carriers	35.35	41.35	3.0	15.7	54.05	62.15	8.10

Table 8.1-25: RF power density measurement results of a multi-RAT operation for IoT SA and NR 5 MHz [Non-contiguous]

Notes	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
2 Carriers	42.88	48.88	3.0	15.7	61.58	62.15	0.57

Table 8.1-26: RF power density measurement results of a multi-RAT operation for NR 5 and IoT SA MHz [Non-contiguous]

Notes	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
2 Carriers	41.93	47.93	3.0	15.7	60.63	62.15	1.52

Table 8.1-27: RF power density measurement results of a multi-RAT operation for IoT SA and LTE 5 MHz [Non-contiguous]

Notes	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
2 Carriers	42.84	48.84	3.0	15.7	61.54	62.15	0.61

Table 8.1-28: RF power density measurement results of a multi-RAT operation for LTE 5 MHz and IoT SA [Non-contiguous]

Notes	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
2 Carriers	42.16	48.16	3.0	15.7	60.86	62.15	1.29

Test data, continued

Table 8.1-29: RF total channel power measurement results for SA IoT [400 kHz]

Remarks	Total RF power, dBm
Low channel, QPSK - 0.4 MHz channel	42.43
Mid channel, QPSK - 0.4 MHz channel	42.47
Top channel, QPSK - 0.4 MHz channel	42.23

Table 8.1-30: RF total channel power measurement results for LTE [5 MHz with IoT]

Remarks	Total RF power, dBm
Low channel, QPSK - 5 MHz channel	45.91
Mid channel, QPSK - 5 MHz channel	45.92
Top channel, QPSK - 5 MHz channel	45.89

Table 8.1-31: RF total channel power measurement results for LTE [10 MHz with IoT]

Remarks	Total RF power, dBm
Low channel, QPSK - 10 MHz channel	48.68
Mid channel, QPSK - 10 MHz channel	48.67
Top channel, QPSK - 10 MHz channel	48.64

Table 8.1-32: RF total channel power measurement results for LTE [15 MHz with IoT]

Remarks	Total RF power, dBm
Low channel, QPSK - 15 MHz channel	48.73
Mid channel, QPSK - 15 MHz channel	48.72
Top channel, QPSK - 15 MHz channel	48.61

Table 8.1-33: RF total channel power measurement results for LTE [20 MHz with IoT]

Remarks	Total RF power, dBm
Low channel, QPSK - 20 MHz channel	48.68
Mid channel, QPSK - 20 MHz channel	48.65
Top channel, QPSK - 20 MHz channel	48.65

Table 8.1-34: RF total channel power measurement results for NR [5 MHz]

Remarks	Total RF power, dBm
Low channel, QPSK - 5 MHz channel	45.86
Mid channel, QPSK - 5 MHz channel	45.87
Top channel, QPSK - 5 MHz channel	45.83

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

Remarks	Total RF power, dBm
Low channel, QPSK - 10 MHz channel	48.76
Mid channel, QPSK - 10 MHz channel	48.74
Top channel, QPSK - 10 MHz channel	48.69

Test data, continued

Table 8.1-36: RF total channel power measurement results for NR [15 MHz with IoT]

Remarks	Total RF power, dBm
Low channel, QPSK – 15 MHz channel	48.74
Mid channel, QPSK – 15 MHz channel	48.75
Top channel, QPSK – 15 MHz channel	48.67

Table 8.1-37: RF total channel power measurement results for NR [20 MHz with IoT]

Remarks	Total RF power, dBm
Low channel, QPSK – 20 MHz channel	48.71
Mid channel, QPSK – 20 MHz channel	48.73
Top channel, QPSK – 20 MHz channel	48.71

Table 8.1-38: RF total channel power measurement results for NR [25 MHz]

Remarks	Total RF power, dBm
Low channel, QPSK – 25 MHz channel	48.71
Mid channel, QPSK – 25 MHz channel	48.70
Top channel, QPSK – 25 MHz channel	48.71

Table 8.1-39: RF total channel power measurement results for NR [30 MHz]

Remarks	Total RF power, dBm
Low channel, QPSK – 30 MHz channel	48.73
Mid channel, QPSK – 30 MHz channel	48.76
Top channel, QPSK – 30 MHz channel	48.74

Table 8.1-40: RF total channel power measurement results for NR [35 MHz]

Remarks	Total RF power, dBm
Mid channel, QPSK – 35 MHz channel	48.79

Test data, continued

Table 8.1-41: RF total channel power measurement results for LTE Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Low Channel	48.56
	Middle Channel	48.54
	Top Channel	48.54

Table 8.1-42: RF total channel power measurement results for LTE Multi-carrier [15 MHz bandwidth Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Low Channel	48.65
	Middle Channel	48.65
	Top Channel	48.66

Table 8.1-43: RF total channel power measurement results for LTE Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	Total RF power, dBm
6 Carriers, QPSK	Low Channel	48.67
	Middle Channel	48.64
	Top Channel	48.68

Table 8.1-44: RF total channel power measurement results for NR Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Low Channel	48.63
	Middle Channel	48.64
	Top Channel	48.59

Table 8.1-45: RF total channel power measurement results for NR Multi-carrier [15 MHz bandwidth Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Low Channel	48.74
	Middle Channel	48.72
	Top Channel	48.72

Table 8.1-46: RF total channel power measurement results for NR Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	Total RF power, dBm
6 Carriers, QPSK	Low Channel	48.73
	Middle Channel	48.71
	Top Channel	48.69

Table 8.1-47: RF total channel power measurement results of multi-carrier operation for NR 5 MHz channel and LTE 5 MHz channel [Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Low Channel	48.53
	Middle Channel	48.55
	Top Channel	48.51

Test data, continued

Table 8.1-48: RF total channel power measurement results of multi-carrier operation for NR 15 MHz channel and LTE 15 MHz channel [Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Low Channel	48.67
	Middle Channel	48.66
	Top Channel	48.67

Table 8.1-49: RF total channel power measurement results of multi-carrier operation for 3 x NR 5 MHz channel and 3 x LTE 5 MHz channel [Contiguous]

Carriers	Channel	Total RF power, dBm
6 Carriers, QPSK	Low Channel	48.67
	Middle Channel	48.66
	Top Channel	48.66

Table 8.1-50: RF total channel power measurement results of multi-carrier operation for NR 5 MHz channel and LTE 5 MHz channel [Non-Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Mid Channel	48.35

Table 8.1-51: RF total channel power measurement results of multi-carrier operation for 3 x NR 5 MHz channel and 3 x LTE 5 MHz channel [Non-Contiguous]

Carriers	Channel	Total RF power, dBm
6 Carriers, QPSK	Middle Channel	48.61

Table 8.1-52: RF total channel power measurement results of multi-carrier operation for NR 5 MHz channel and SA IoT channel [Non-Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Mid Channel	47.30

Table 8.1-53: RF total channel power measurement results of multi-carrier operation for SA IoT and NR 5 MHz channel [Non-Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Mid Channel	47.08

Table 8.1-54: RF total channel power measurement results of multi-carrier operation for LTE 5 MHz channel and SA IoT channel [Non-Contiguous]

Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Mid Channel	47.35

Table 8.1-55: RF total channel power measurement results of multi-carrier operation for SA IoT and LTE 5 MHz channel [Non-Contiguous]

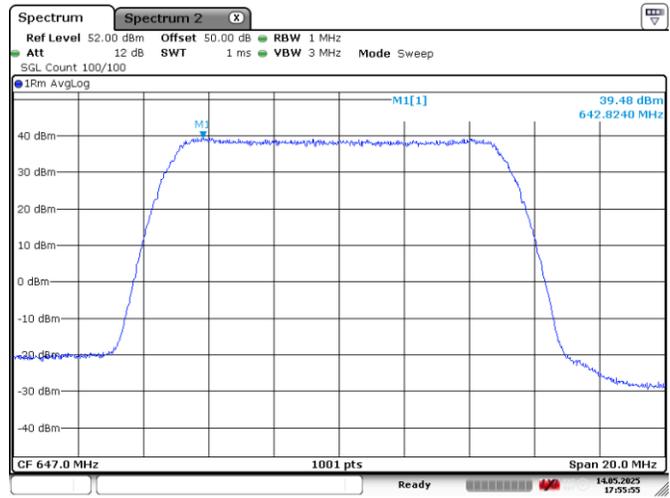
Carriers	Channel	Total RF power, dBm
2 Carriers, QPSK	Mid Channel	47.16

Test data, continued



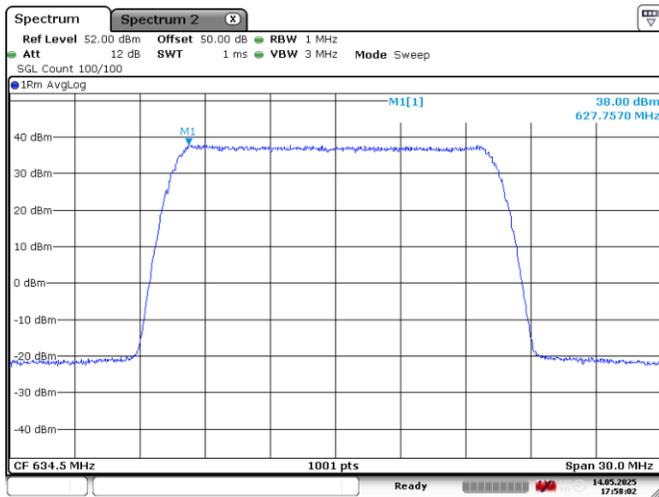
Date: 14.MAY.2025 17:53:17

Figure 8.1-1: PSD of LTE 5 MHz channel bandwidth, single carrier operation, sample plot



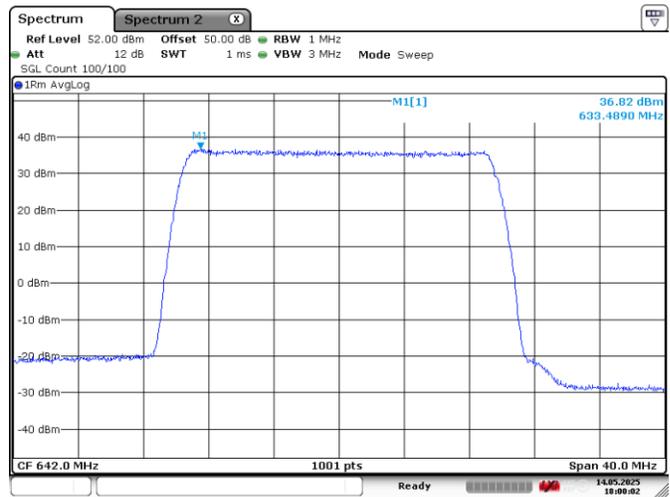
Date: 14.MAY.2025 17:55:56

Figure 8.1-2: PSD of LTE 10 MHz channel bandwidth, single carrier operation, sample plot



Date: 14.MAY.2025 17:58:03

Figure 8.1-3: PSD of LTE 15 MHz channel bandwidth, single carrier operation, sample plot.



Date: 14.MAY.2025 18:00:02

Figure 8.1-4: PSD of LTE 20 MHz channel bandwidth, single carrier operation, sample plot

Test data, continued

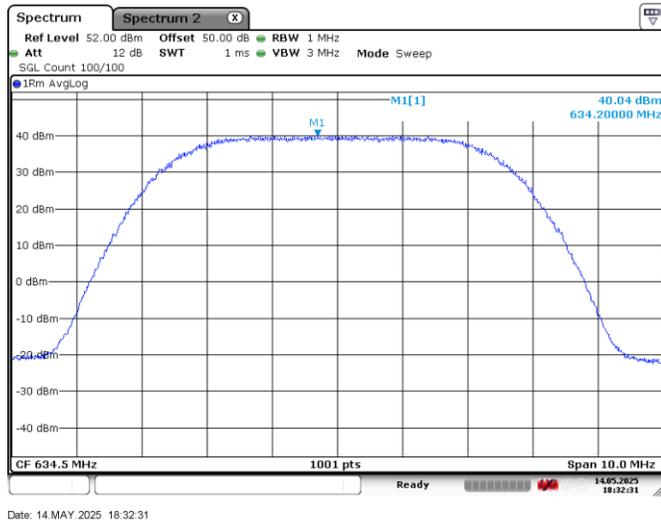


Figure 8.1-5: PSD of NR 5 MHz channel bandwidth, single carrier operation, sample plot.

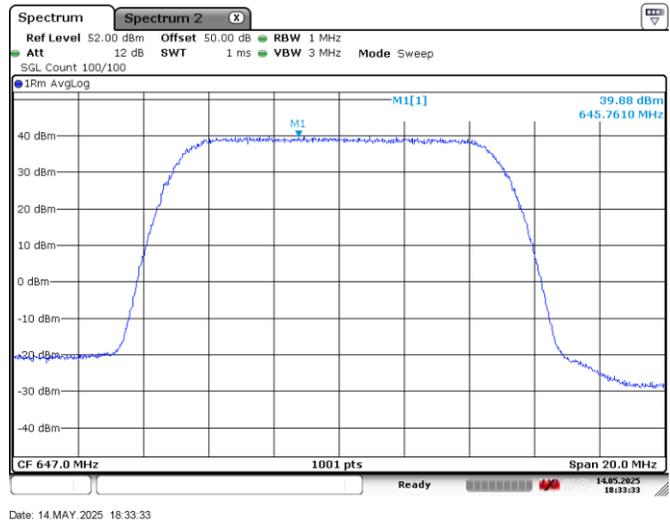


Figure 8.1-6: PSD of NR 10 MHz channel bandwidth, single carrier operation, sample plot

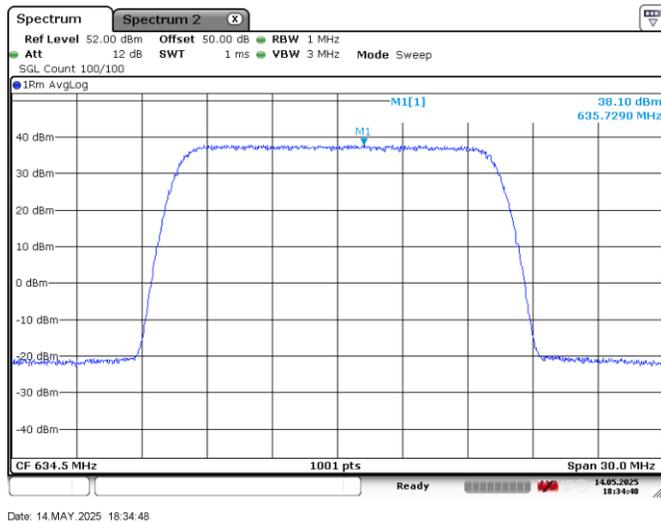


Figure 8.1-7: PSD of NR 15 MHz channel bandwidth, single carrier operation, sample plot

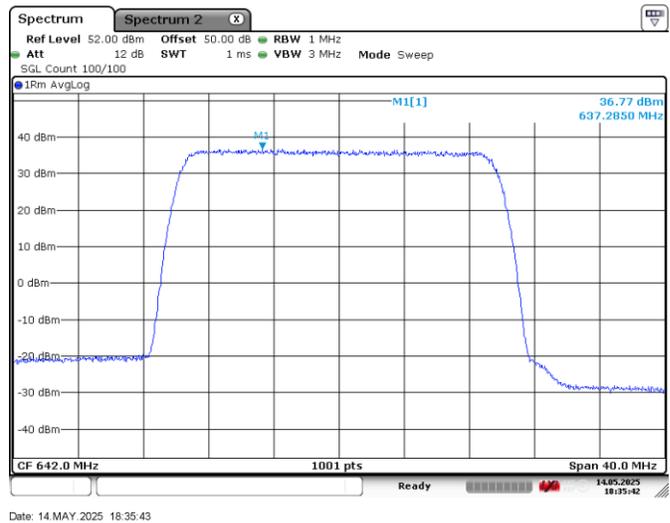


Figure 8.1-8: PSD of NR 20 MHz channel bandwidth, single carrier operation, sample plot

Test data, continued

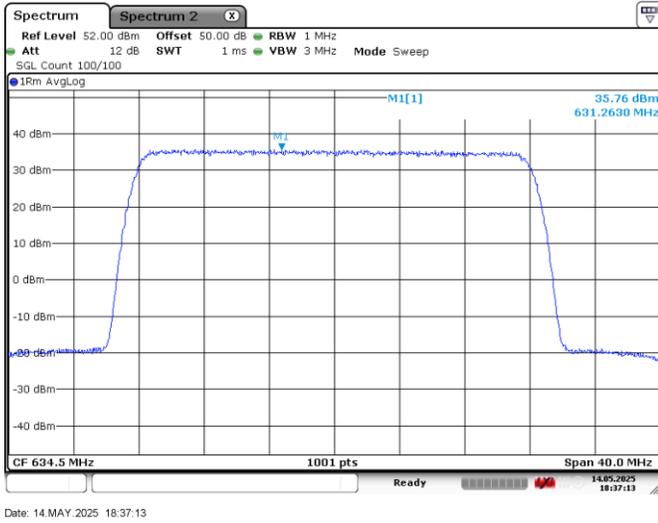


Figure 8.1-9: PSD of NR 25 MHz channel bandwidth, single carrier operation, sample plot.

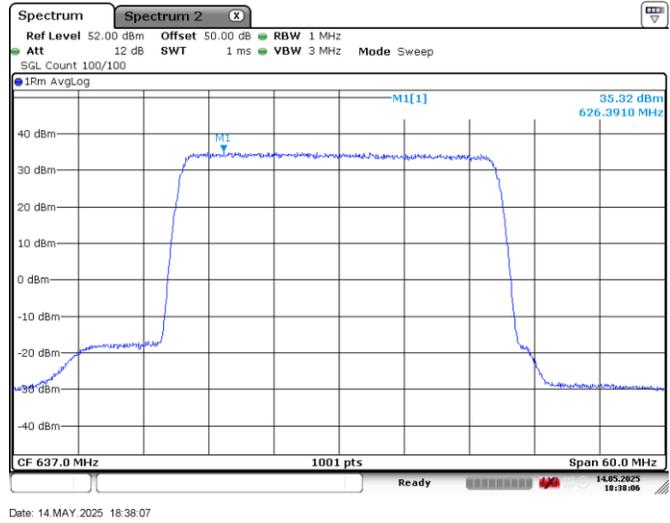


Figure 8.1-10: PSD of NR 30 MHz channel bandwidth, single carrier operation, sample plot

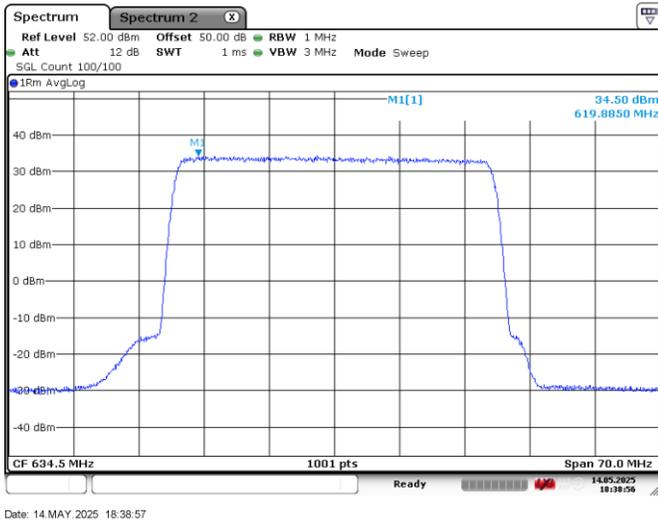


Figure 8.1-11: PSD of NR 35 MHz channel bandwidth, single carrier operation, sample plot

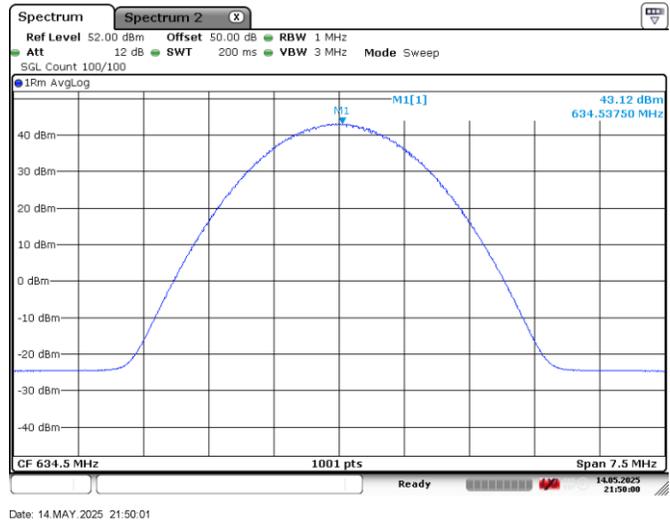
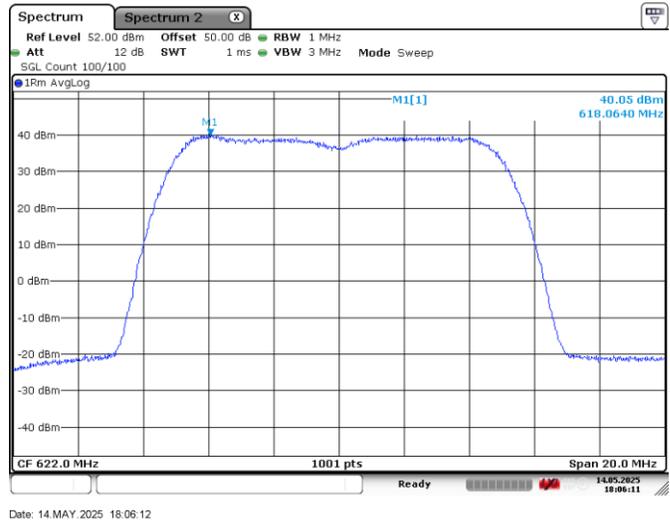
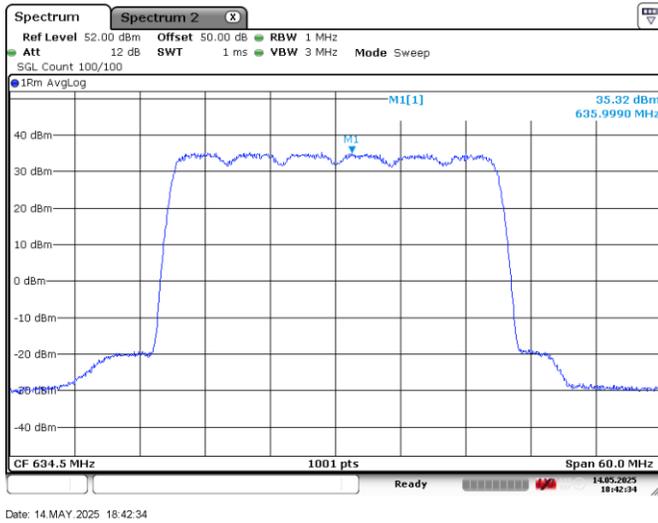
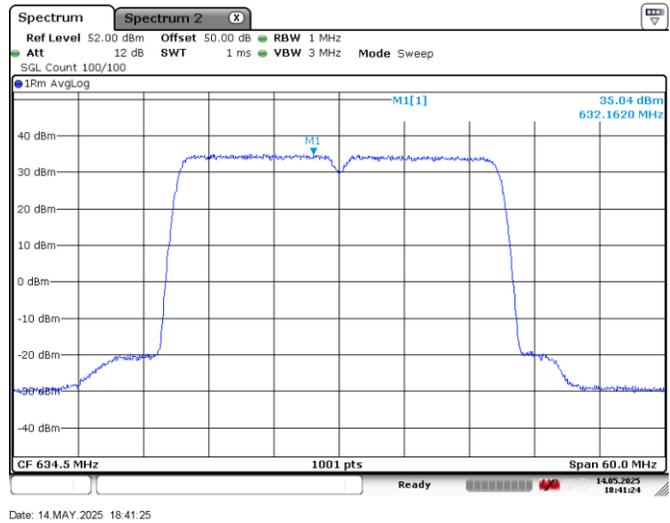
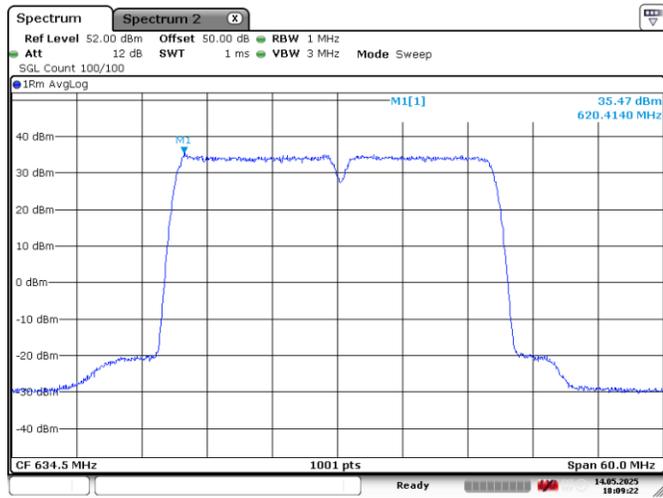


Figure 8.1-12: PSD of IoT SA, single carrier operation, sample plot

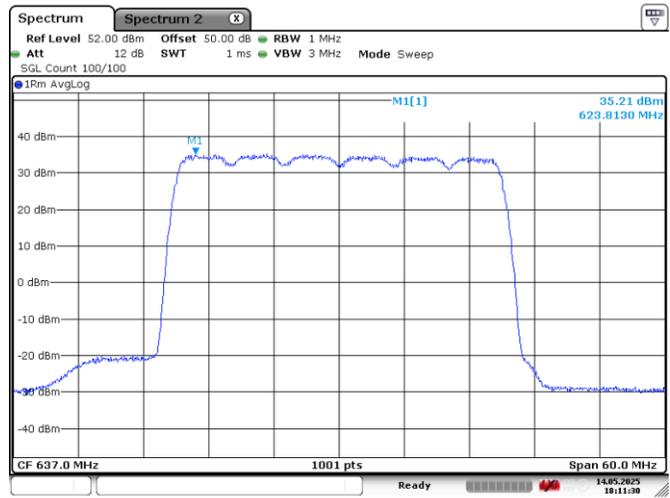
Test data, continued





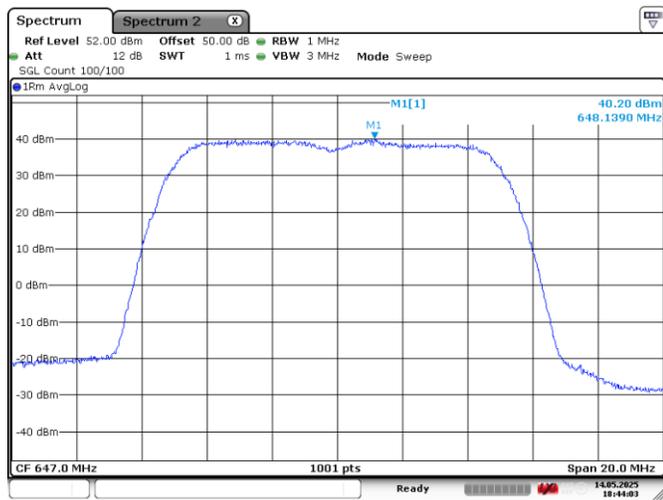
Date: 14.MAY.2025 18:09:22

Figure 8.1-17: PSD of LTE 15 MHz channel bandwidth, 2-carrier operation, sample plot



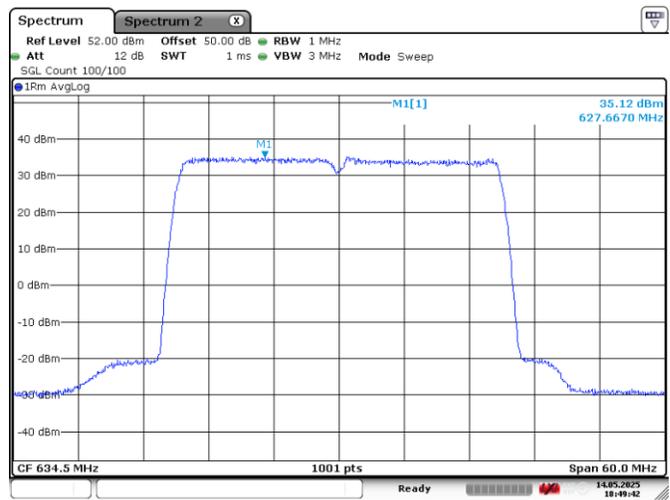
Date: 14 MAY.2025 18:11:30

Figure 8.1-18: PSD of LTE 5 MHz channel bandwidth, 6-carrier operation, sample plot



Date: 14.MAY.2025 18:44:04

Figure 8.1-19: PSD of NR 5 and LTE 5 MHz, 2-carrier operation, sample plot



Date: 14.MAY.2025 18:49:42

Figure 8.1-20: PSD of NR 15 and LTE 15 MHz, 2-carrier operation, sample plot

Test data, continued

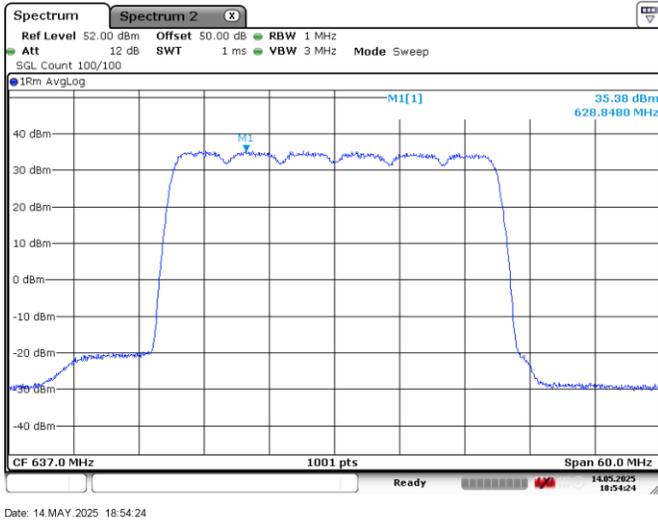


Figure 8.1-21: PSD of 3 x NR 5 and 3 x LTE 5 MHz, 2-carrier operation, sample plot

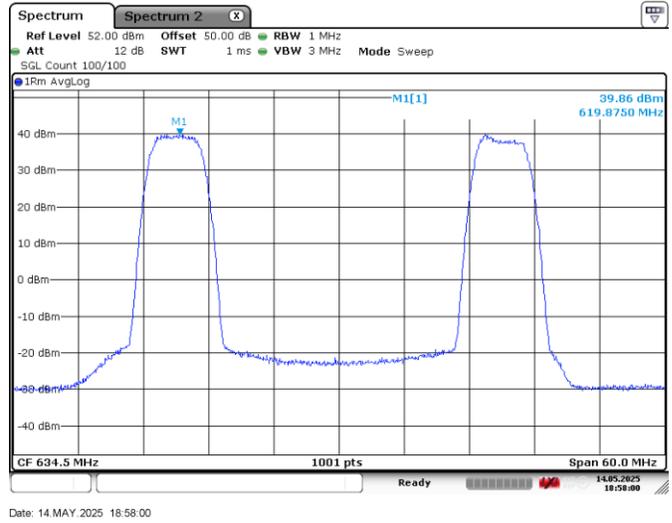


Figure 8.1-22: PSD of NR 5 and LTE 5 MHz, 2-carrier non-contiguous operation, sample plot

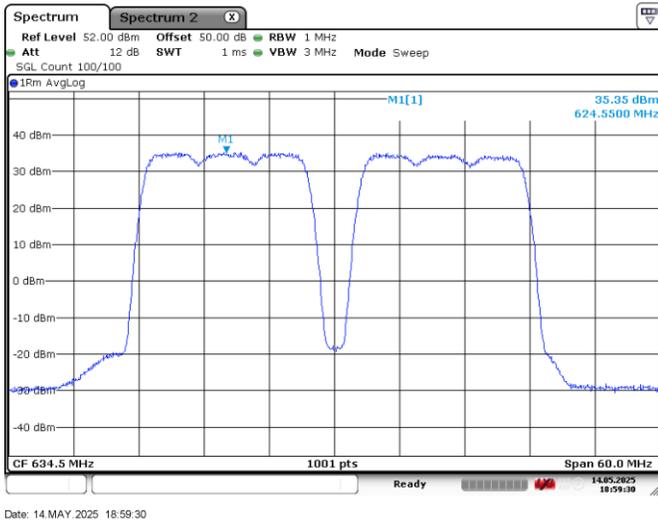


Figure 8.1-23: PSD of 3 x NR 5 and 3 x LTE 5 MHz, 6-carrier non-contiguous operation, sample plot

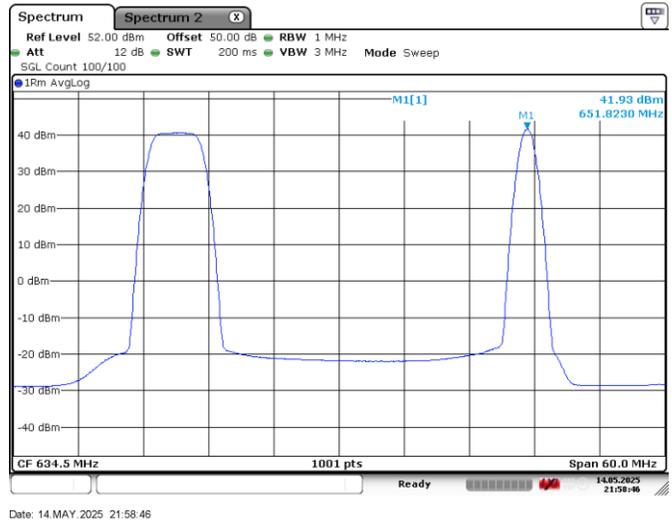
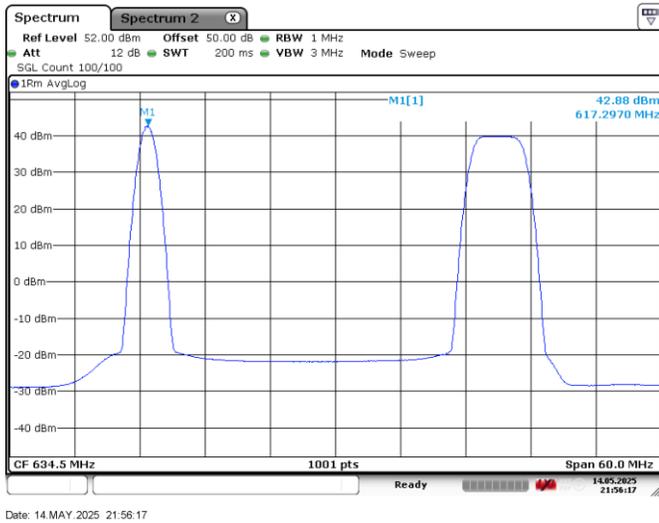


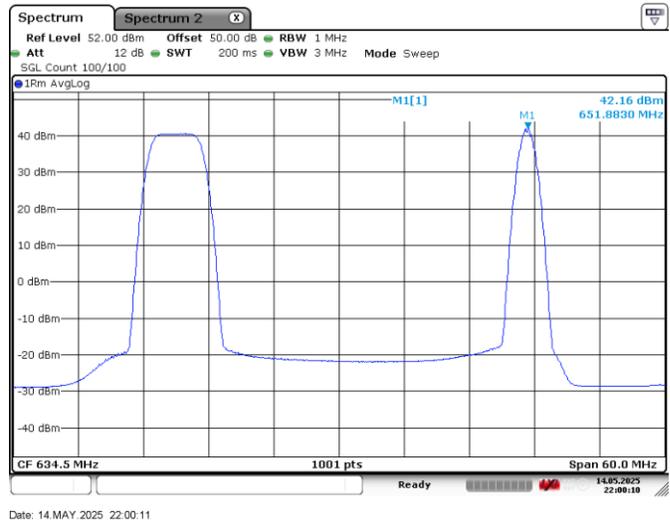
Figure 8.1-24: PSD of NR 5 MHz and SA IoT MHz, 2-carrier non-contiguous operation, sample plot

Test data, continued



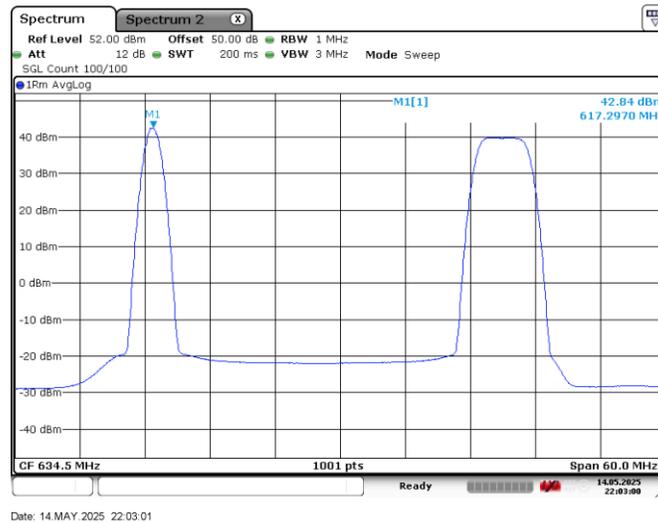
Date: 14.MAY.2025 21:58:17

Figure 8.1-25: PSD of SA IoT and NR 5 MHz, 2-carrier non-contiguous operation, sample plot



Date: 14.MAY.2025 22:00:11

Figure 8.1-26: PSD of LTE 5 MHz and SA IoT MHz, 2-carrier non-contiguous operation, sample plot



Date: 14.MAY.2025 22:03:01

Figure 8.1-27: PSD of SA IoT and LTE 5 MHz, 2-carrier non-contiguous operation, sample plot

Test data, continued

Table 8.1-56: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NB IoT 0.4 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
0.4 MHz, Low channel	617.2	4.60	13.00	8.40
0.4 MHz, Mid channel	634.5	4.59	13.00	8.41
0.4 MHz, Top channel	651.8	4.59	13.00	8.41

Table 8.1-57: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 5 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	619.5	8.07	13.00	4.93
5 MHz, Mid channel	634.5	8.09	13.00	4.91
5 MHz, Top channel	649.5	8.07	13.00	4.93

Table 8.1-58: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 10 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	622.0	7.31	13.00	5.69
10 MHz, Mid channel	634.5	7.32	13.00	5.68
10 MHz, Top channel	647.0	7.50	13.00	5.50

Table 8.1-59: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 15 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	624.5	7.28	13.00	5.72
15 MHz, Mid channel	634.5	7.31	13.00	5.69
15 MHz, Top channel	644.5	7.61	13.00	5.39

Table 8.1-60: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 20 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
20 MHz, Low channel	627.0	7.30	13.00	5.70
20 MHz, Mid channel	634.5	7.37	13.00	5.63
20 MHz, Top channel	642.0	7.69	13.00	5.31

Table 8.1-61: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 5 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	619.5	8.10	13.00	4.90
5 MHz, Mid channel	634.5	8.13	13.00	4.87
5 MHz, Top channel	649.5	8.12	13.00	4.88

Table 8.1-62: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 10 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	622.0	7.20	13.00	5.80
10 MHz, Mid channel	634.5	7.22	13.00	5.78
10 MHz, Top channel	647.0	7.41	13.00	5.59

Test data, continued

Table 8.1-63: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 15 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	624.5	7.24	13.00	5.76
15 MHz, Mid channel	634.5	7.25	13.00	5.75
15 MHz, Top channel	644.5	7.55	13.00	5.45

Table 8.1-64: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 20 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
20 MHz, Low channel	627.0	7.24	13.00	5.76
20 MHz, Mid channel	634.5	7.30	13.00	5.70
20 MHz, Top channel	642.0	7.64	13.00	5.36

Table 8.1-65: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 25 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
25 MHz, Low channel	629.5	7.25	13.00	5.75
25 MHz, Mid channel	634.5	7.40	13.00	5.60
25 MHz, Top channel	639.5	7.72	13.00	5.28

Table 8.1-66: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 30 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
30 MHz, Low channel	632.0	7.39	13.00	5.61
30 MHz, Mid channel	634.5	7.56	13.00	5.44
30 MHz, Top channel	637.0	7.77	13.00	5.23

Table 8.1-67: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 35 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
35 MHz, Mid channel	634.5	7.80	13.00	5.20

Test data, continued

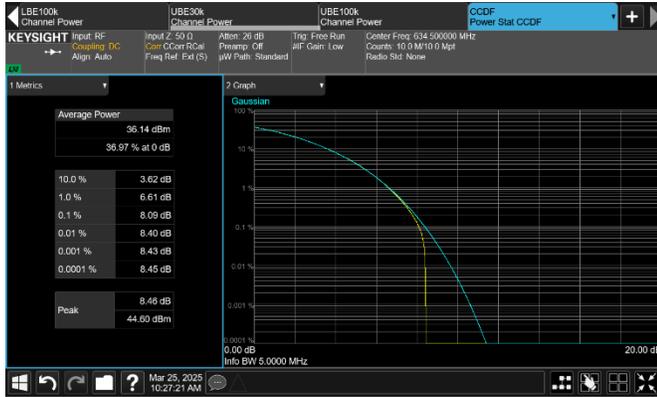


Figure 8.1-28: CCDF sample plot, LTE 5 MHz

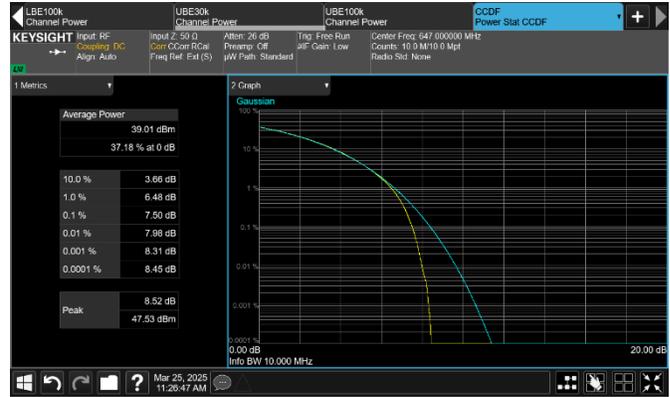


Figure 8.1-29: CCDF sample plot, LTE 10 MHz

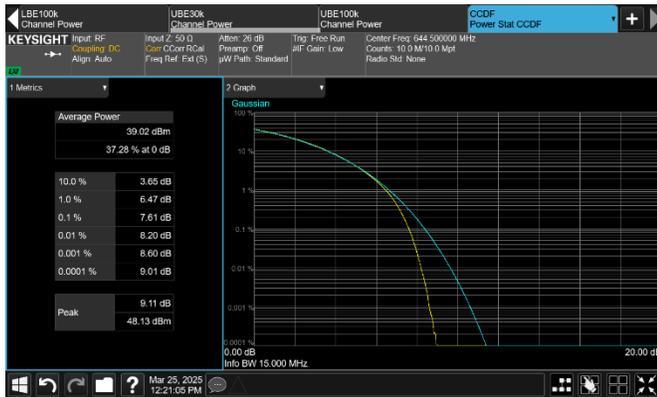


Figure 8.1-30: CCDF sample plot, LTE 15 MHz

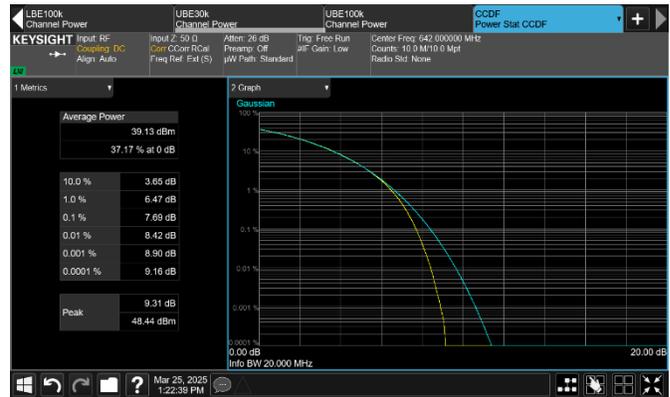


Figure 8.1-31: CCDF sample plot, LTE 20 MHz

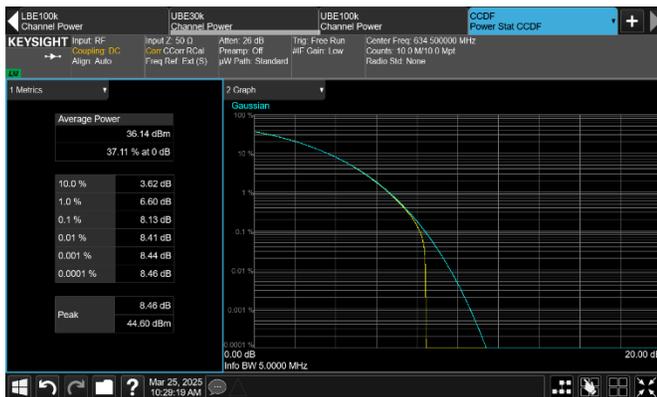


Figure 8.1-32: CCDF sample plot, NR 5 MHz

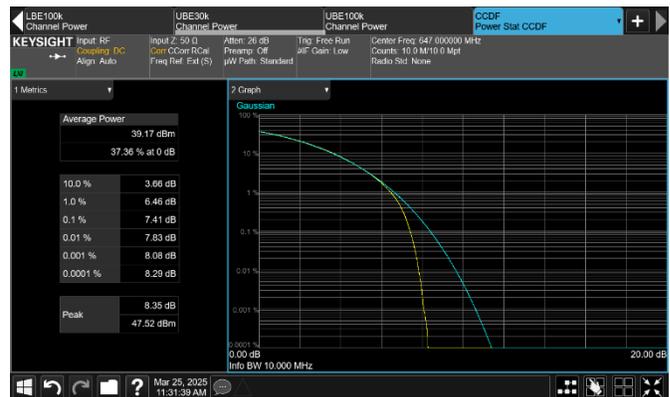


Figure 8.1-33: CCDF sample plot, NR 10 MHz

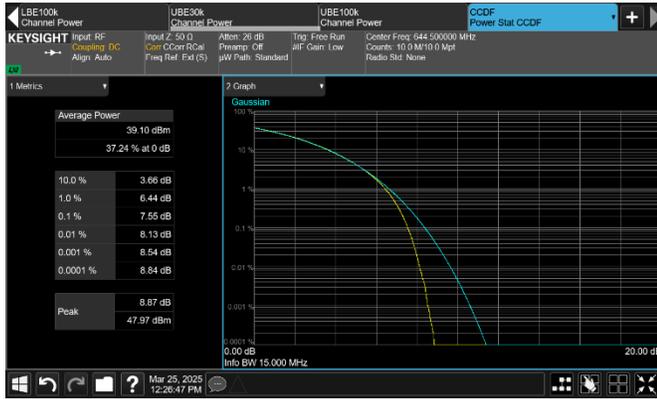


Figure 8.1-34: CCDF sample plot, NR 15 MHz

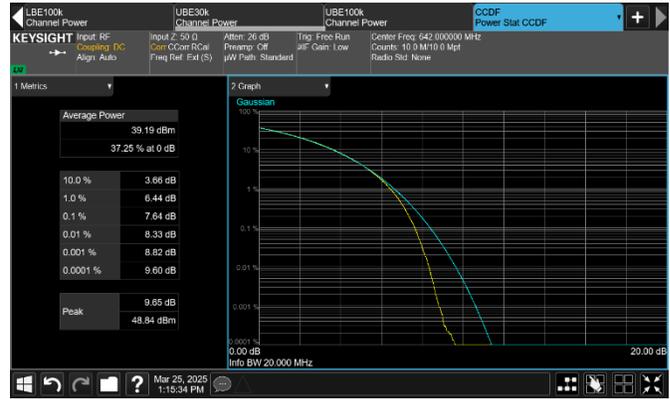


Figure 8.1-35: CCDF sample plot, NR 20 MHz

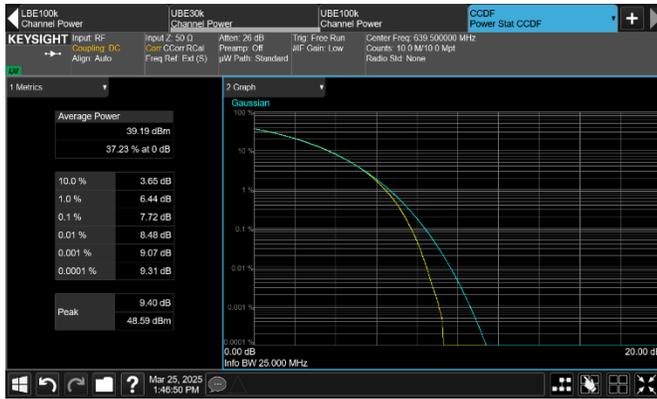


Figure 8.1-36: CCDF sample plot, NR 25 MHz

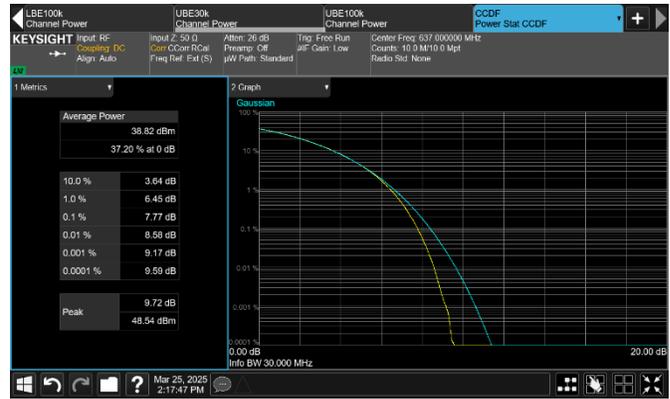


Figure 8.1-37: CCDF sample plot, NR 30 MHz

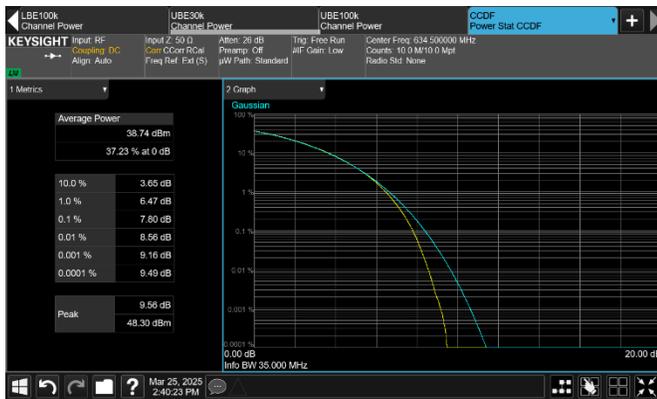


Figure 8.1-38: CCDF sample plot, NR 35 MHz

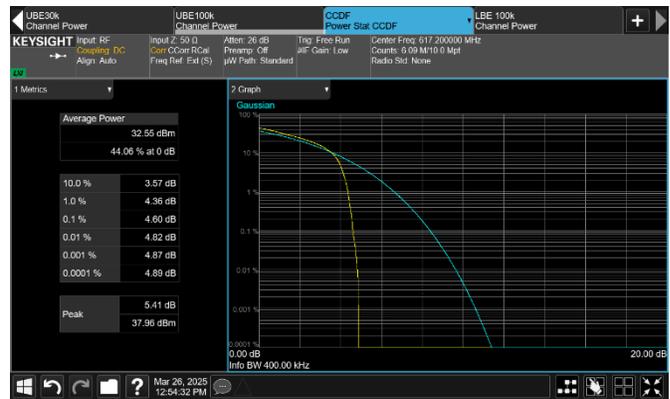


Figure 8.1-39: CCDF sample plot, IoT SA

8.2 Maximum output power at RF antenna connector (B85A)

8.2.1 Definitions and limits

FCC §27.50(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698-746 MHz band:

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

RSS-130, Section 4.6: Transmitter output power and effective radiated power (e.r.p.)

The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.

SRSP-518, Section 5: Technical Criteria

5.1 Radiated power and antenna height limits for fixed and base stations

21. For fixed and base stations transmitting in accordance with section 4, the maximum permissible equivalent isotropically radiated power (e.i.r.p.) is 1640 watts and 1640 watts/MHz for a channel bandwidth less than or equal to 1 MHz and greater than 1 MHz, respectively. These e.i.r.p. limits apply for stations with an antenna height above average terrain (HAAT)Footnote2 up to 305 metres.

5.4 Stations with multiple antennas using multiple-input, multiple-output (MIMO) technology

29. If a fixed or base station is equipped with multiple antennas, the following rules regarding e.i.r.p. and antenna height shall apply.

5.4.1 E.i.r.p. for correlated transmission

30. When multiple antennas are used at a station to transmit the same digital data in a given symbol period (even with different coding or phase shifts) for transmit diversity or to steer signal energy towards a particular direction for enhanced directional gain (i.e. beamforming) or to devise any other transmission mode where signals from different antennas are correlated, the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and resulting directional gain of $10 \log_{10}(N) + G_{\max}(\text{dBi})$. Here, N is the number of antennas and G_{\max} is the highest gain in dBi among all antennas.

5.4.2 E.i.r.p. for uncorrelated transmission

31. When multiple antennas are used at a station in which each antenna transmits different digital data during any given symbol period (i.e. space-time block codes) or independent parallel data stream over the same frequency bandwidth in order to increase data rates (i.e. spatial multiplexing), or forms any other transmission mode where signals from different antennas are completely uncorrelated, the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain G_{\max} .

5.4.3 Antenna height

32. The HAAT of a fixed or a base station with multiple antennas shall be calculated with reference to the highest antenna.

8.2.2 Test summary

Test date	March 25, 2025 to March 27, 2025
Test engineer	Dhara Patel

8.2.3 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.

- Sample Selection: A random sample of devices was selected for testing to ensure representative results.
- Antenna Port Selection: The device under test (EUT) has four antenna ports. Port D was identified as the port with the highest transmit power and was selected for all subsequent measurements.
- Modulation Selection: The EUT supports multiple Quadrature Amplitude Modulation (QAM) schemes. QPSK was chosen as the worst-case modulation due to its higher power output.
- MIMO Power Calculation:
 - For New Radio (NR) and Long-Term Evolution (LTE) modes, the Total MIMO Power Spectral Density (PSD) was calculated by adding 6 dB to the PSD of a single antenna port to account for the 4x4 MIMO configuration.
 - For IoT SA mode, the Total MIMO PSD was calculated by adding 3 dB to the PSD of a single antenna port to account for the 2x2 MIMO configuration.
- Radio Base Station (RBS) EIRP Limits: RBS EIRP limits vary depending on deployment scenarios. To ensure compliance with regulatory limits, specific RBS setups and carrier configurations are considered during site commissioning.
- Test Conditions: The EUT was tested under maximum rated output power conditions to assess worst-case emission levels.
- Antenna and Deployment Considerations: The EUT was tested without an antenna. Licensees are responsible for evaluating installation and deployment factors, including maximum power settings, antenna gain, and feeder loss, to ensure compliance with Equivalent Isotropically Radiated Power (EIRP) limits as defined by the FCC and ISED regulations.
- EIRP Calculation Example: For Radio 4472HP B71B85A, EIRP was calculated using an antenna gain of 15.7 dBi and a feeder loss of 3 dB. Power settings and carrier configurations will be adjusted as necessary to meet regulatory requirements based on specific deployment scenarios.
- The FCC and ISED regulatory limits for Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) are 1000 W (60 dBm) and 1640 W (62.15 dBm), respectively. As EIRP is calculated as ERP + 2.15 dB, compliance with either limit ensures compliance with the other. The tables below present measurement results evaluated against the EIRP limit, with the margin of compliance being identical for both ERP and EIRP.

Spectrum analyzer settings for PSD:

Detector mode	RMS
Resolution bandwidth	1 MHz
Video bandwidth	>RBW
Trace mode	Averaging
Measurement time	Auto

8.2.4 Test data

Table 8.2-1: 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
730.5	40.56	46.56	3.0	15.7	59.26	62.15	2.89

Table 8.2-2: RF power density measurement results of a single-carrier operation for SA IoT 0.4 MHz channel

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
728.2	43.33	46.33	3.0	15.7	59.03	62.15	3.12
736.5	43.08	46.08	3.0	15.7	58.78	62.15	3.37
744.8	43.17	46.17	3.0	15.7	58.87	62.15	3.28

Table 8.2-3: RF power density measurement results of a single-carrier operation for LTE on 5 MHz channel

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
730.5	40.56	46.56	3.0	15.7	59.26	62.15	2.89
736.5	40.44	46.44	3.0	15.7	59.14	62.15	3.01
742.5	40.04	46.04	3.0	15.7	58.74	62.15	3.41

Table 8.2-4: RF power density measurement results of a single-carrier operation for LTE on 10 MHz channel with GB

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
733.0	36.88	42.88	3.0	15.7	55.58	62.15	6.57
736.5	36.02	42.02	3.0	15.7	54.72	62.15	7.43
740.0	35.99	41.99	3.0	15.7	54.69	62.15	7.46

Table 8.2-5: RF power density measurement results of a single-carrier operation for LTE on 15 MHz channel with GB

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
735.5	35.10	41.10	3.0	15.7	53.80	62.15	8.35
736.5	35.24	41.24	3.0	15.7	53.94	62.15	8.21
737.5	35.17	41.17	3.0	15.7	53.87	62.15	8.28

Table 8.2-6: RF power density measurement results of a single-carrier operation for NR on 3 MHz channel

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
729.5	39.27	45.27	3.0	15.7	57.97	62.15	4.18
736.5	38.71	44.71	3.0	15.7	57.41	62.15	4.74
743.5	38.74	44.74	3.0	15.7	57.44	62.15	4.71

Table 8.2-7: RF power density measurement results of a single-carrier operation for NR on 5 MHz channel

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
730.5	40.24	46.24	3.0	15.7	58.94	62.15	3.21
736.5	39.54	45.54	3.0	15.7	58.24	62.15	3.91
742.5	39.18	45.18	3.0	15.7	57.88	62.15	4.27

Test data, continued

Table 8.2-8: RF power density measurement results of a single-carrier operation for NR on 10 MHz channel

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
733.0	36.77	42.77	3.0	15.7	55.47	62.15	6.68
736.5	36.74	42.74	3.0	15.7	55.44	62.15	6.71
740.0	36.98	42.98	3.0	15.7	55.68	62.15	6.47

Table 8.2-9: RF power density measurement results of a single-carrier operation for NR on 15 MHz channel

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
735.5	35.09	41.09	3.0	15.7	53.79	62.15	8.36
736.5	35.30	41.30	3.0	15.7	54.00	62.15	8.15
737.5	35.13	41.13	3.0	15.7	53.83	62.15	8.32

Table 8.2-10: RF power density measurement results of a multi-carrier operation for LTE on 5 MHz channel (2C)

Notes	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
2 Carriers	37.18	43.18	3.0	15.7	55.88	62.15	6.27
2 Carriers	36.88	42.88	3.0	15.7	55.58	62.15	6.57
2 Carriers	37.11	43.11	3.0	15.7	55.81	62.15	6.34

Table 8.2-11: RF power density measurement results of a multi-carrier operation for LTE on 5 MHz channel (3C)

Notes	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
3 Carriers	35.38	41.38	3.0	15.7	54.08	62.15	8.07
3 Carriers	35.40	41.40	3.0	15.7	54.10	62.15	8.05
3 Carriers	35.31	41.31	3.0	15.7	54.01	62.15	8.14

Table 8.2-12: RF power density measurement results of a multi-carrier operation for NR on 3 MHz channel (2C)

Notes	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
2 Carriers	39.25	45.25	3.0	15.7	57.95	62.15	4.20
2 Carriers	38.82	44.82	3.0	15.7	57.52	62.15	4.63
2 Carriers	39.13	45.13	3.0	15.7	57.83	62.15	4.32

Table 8.2-13: RF power density measurement results of a multi-carrier operation for NR on 5 MHz channel (2C)

Notes	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
2 Carriers	37.12	43.12	3.0	15.7	55.82	62.15	6.33
2 Carriers	36.90	42.90	3.0	15.7	55.60	62.15	6.55
2 Carriers	36.75	42.75	3.0	15.7	55.45	62.15	6.70

Test data, continued

Table 8.2-14: RF power density measurement results of a multi-carrier operation for NR on 3 MHz channel (5C)

Notes	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
5 Carriers	34.81	40.81	3.0	15.7	53.51	62.15	8.64
5 Carriers	35.19	41.19	3.0	15.7	53.89	62.15	8.26
5 Carriers	35.38	41.38	3.0	15.7	54.08	62.15	8.07

Table 8.2-15: RF power density measurement results of a multi-RAT operation for NR 3 MHz + LTE 5 MHz [Contiguous]

Notes	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
2 Carriers	39.29	45.29	3.0	15.7	57.99	62.15	4.16
2 Carriers	39.17	45.17	3.0	15.7	57.87	62.15	4.28
2 Carriers	39.08	45.08	3.0	15.7	57.78	62.15	4.37

Table 8.2-16: RF power density measurement results of a multi-RAT operation for 2 x NR 3 MHz + SA + 2 x LTE 5 MHz [Contiguous]

Notes	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
4 Carriers	39.51	45.51	3.0	15.7	58.21	62.15	3.94

Table 8.2-17: RF power density measurement results of a multi-RAT operation for NR 3 MHz and LTE 5 MHz [Non-contiguous]

Notes	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
2 Carriers	38.85	44.85	3.0	15.7	57.55	62.15	4.60

Table 8.2-18: RF power density measurement results of a multi-RAT operation for 2 x NR 3 MHz and 2 x LTE 5 MHz [Non-contiguous]

Notes	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
4 Carriers	36.30	42.30	3.0	15.7	55.00	62.15	7.15

Table 8.2-19: RF power density measurement results of a multi-RAT operation for IoT SA and LTE 5 MHz [Non-contiguous]

Notes	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
2 Carriers	42.19	48.19	3.0	15.7	60.89	62.15	1.26

Table 8.2-20: RF power density measurement results of a multi-RAT operation for NR 3 and IoT SA MHz [Non-contiguous]

Notes	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
2 Carriers	42.74	48.74	3.0	15.7	61.44	62.15	0.71

Test data, continued

Table 8.2-21: RF total channel power measurement results for SA IoT [0.4 MHz]

Remarks	RF total power, dBm
Low channel, QPSK	42.37
Mid channel, QPSK	42.41
Top channel, QPSK	42.31

Table 8.2-22: RF total channel power measurement results for LTE [5 MHz with IoT]

Remarks	RF total power, dBm
Low channel, QPSK	45.84
Mid channel, QPSK	45.80
Top channel, QPSK	45.79

Table 8.2-23: RF total channel power measurement results for LTE [10 MHz with IoT]

Remarks	RF total power, dBm
Low channel, QPSK	45.73
Mid channel, QPSK	45.66
Top channel, QPSK	45.67

Table 8.2-24: RF total channel power measurement results for LTE [15 MHz with IoT]

Remarks	RF total power, dBm
Low channel, QPSK	45.74
Mid channel, QPSK	45.70
Top channel, QPSK	45.68

Table 8.2-25: RF total channel power measurement results for NR [3 MHz with IoT]

Remarks	RF total power, dBm
Low channel, QPSK	42.91
Mid channel, QPSK	42.92
Top channel, QPSK	42.82

Table 8.2-26: RF total channel power measurement results for NR [5 MHz]

Remarks	RF total power, dBm
Low channel, QPSK	45.86
Mid channel, QPSK	45.84
Top channel, QPSK	45.80

Table 8.2-27: RF total channel power measurement results for NR [10 MHz with IoT]

Remarks	RF total power, dBm
Low channel, QPSK	45.86
Mid channel, QPSK	45.84
Top channel, QPSK	45.76

Test data, continued

Table 8.2-28: RF total channel power measurement results for NR [15 MHz with IoT]

Remarks	RF total power, dBm
Low channel, QPSK	45.75
Mid channel, QPSK	45.76
Top channel, QPSK	45.79

Table 8.2-29: RF total channel power measurement results for LTE Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Low Channel	45.59
	Middle Channel	45.57
	Top Channel	45.55

Table 8.2-30: RF total channel power measurement results for LTE Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	RF total power, dBm
3 Carriers, QPSK	Low Channel	45.73
	Middle Channel	45.68
	Top Channel	45.71

Table 8.2-31: RF total channel power measurement results for NR Multi-carrier [3 MHz bandwidth Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Low Channel	45.85
	Middle Channel	45.78
	Top Channel	45.79

Table 8.2-32: RF total channel power measurement results for NR Multi-carrier [5 MHz bandwidth Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Low Channel	45.64
	Middle Channel	45.55
	Top Channel	45.58

Table 8.2-33: RF total channel power measurement results for NR Multi-carrier [3 MHz bandwidth Contiguous]

Carriers	Channel	RF total power, dBm
5 Carriers, QPSK	Low Channel	45.73
	Middle Channel	45.72
	Top Channel	45.74

Table 8.2-34: RF total channel power measurement results of multi-carrier operation for NR 3 MHz channel and LTE 5 MHz channel [Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Low Channel	45.84
	Middle Channel	45.73
	Top Channel	45.75

Test data, continued

Table 8.2-35: RF total channel power measurement results of multi-carrier operation for 2 x NR 3 MHz +SA +2 x LTE 5 MHz channel [Contiguous]

Carriers	Channel	RF total power, dBm
5 Carriers, QPSK	Middle Channel	45.62

Table 8.2-36: RF total channel power measurement results of multi-carrier operation for NR 3 MHz channel and LTE 5 MHz channel [Non-Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Mid Channel	45.52

Table 8.2-37: RF total channel power measurement results of multi-carrier operation for 2 x NR 3 MHz channel and 2 x LTE 5 MHz channel [Non-Contiguous]

Carriers	Channel	RF total power, dBm
6 Carriers, QPSK	Middle Channel	45.73

Table 8.2-38: RF total channel power measurement results of multi-carrier operation for SA IoT and LTE 5 MHz channel [Non-Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Mid Channel	45.11

Table 8.2-39: RF total channel power measurement results of multi-carrier operation for NR 3 MHz channel and SA IoT channel [Non-Contiguous]

Carriers	Channel	RF total power, dBm
2 Carriers, QPSK	Mid Channel	45.40

Test data, continued

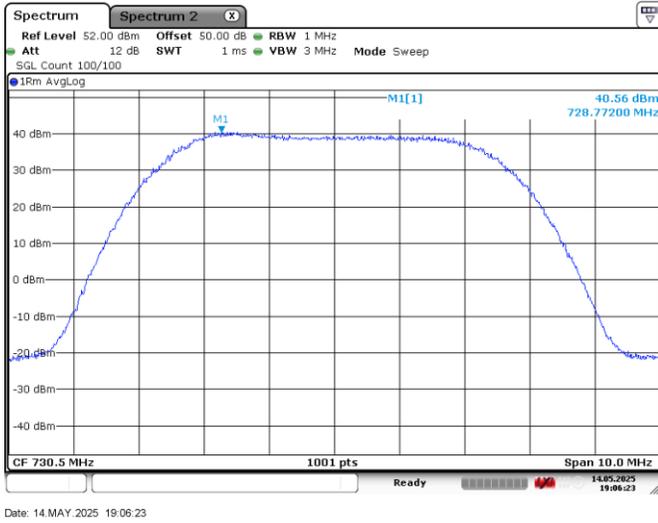


Figure 8.2-1: PSD of LTE 5 MHz channel bandwidth, single carrier operation, sample plot

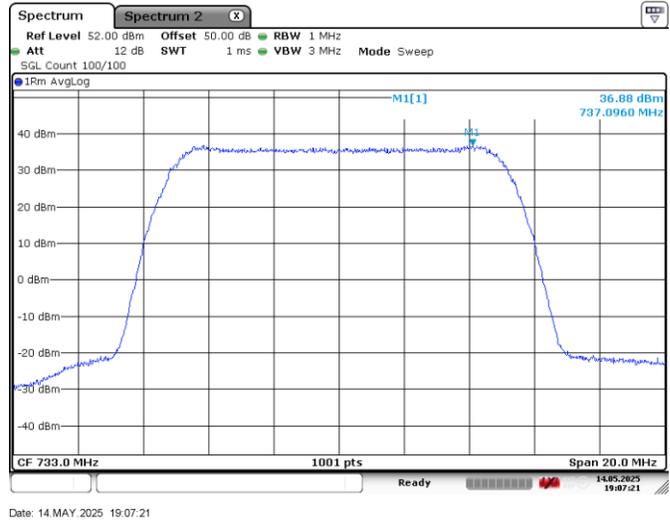


Figure 8.2-2: PSD of LTE 10 MHz channel bandwidth, single carrier operation, sample plot

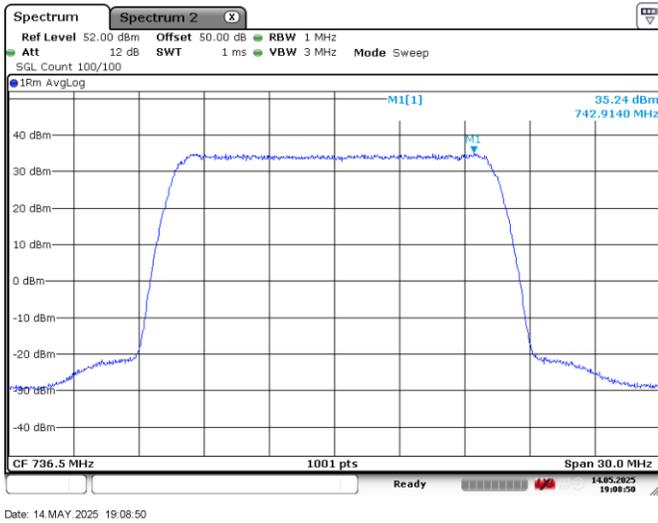


Figure 8.2-3: PSD of LTE 15 MHz channel bandwidth, single carrier operation, sample plot.

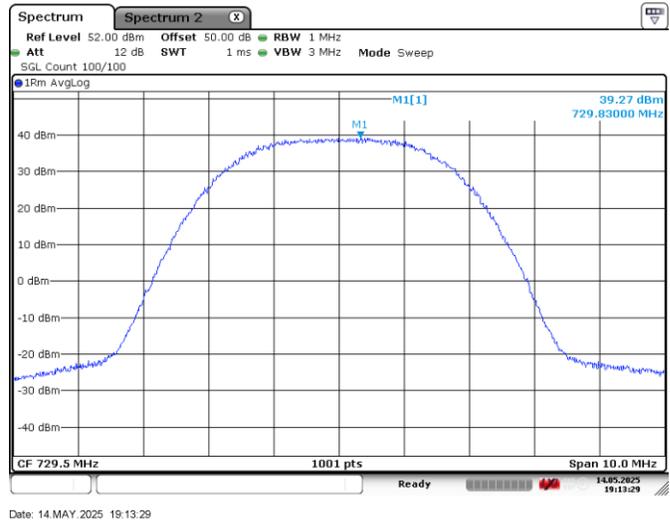


Figure 8.2-4: PSD of NR 3 MHz channel bandwidth, single carrier operation, sample plot

Test data, continued

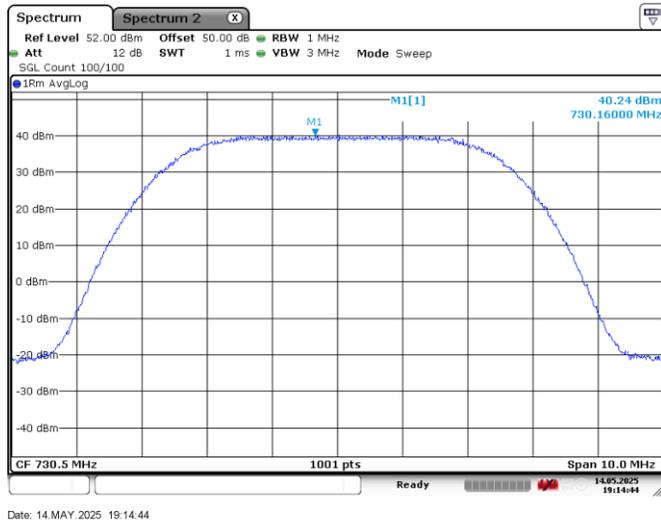


Figure 8.2-5: PSD of NR 5 MHz channel bandwidth, single carrier operation, sample plot.

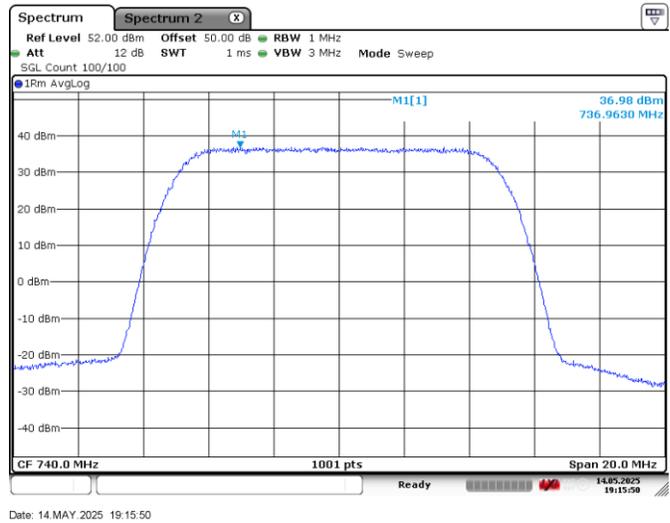


Figure 8.2-6: PSD of NR 10 MHz channel bandwidth, single carrier operation, sample plot

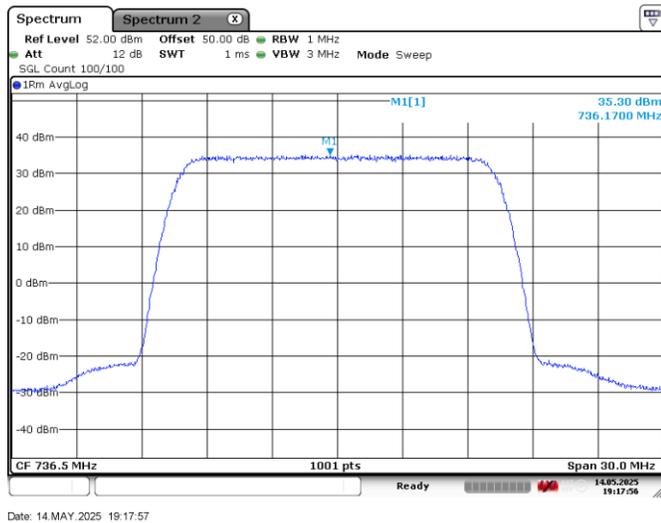
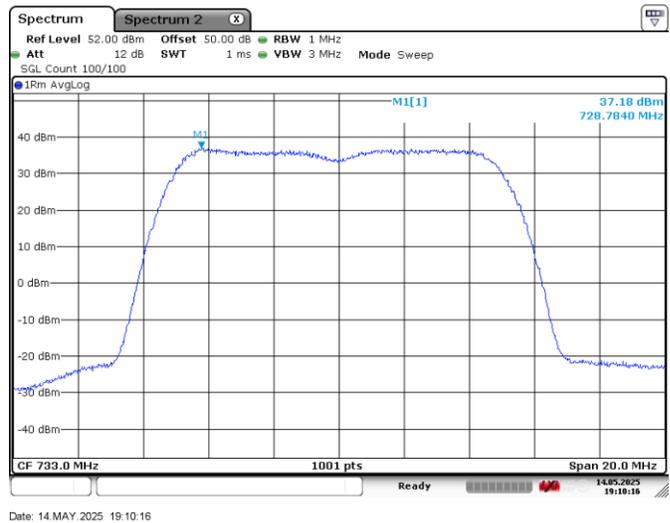
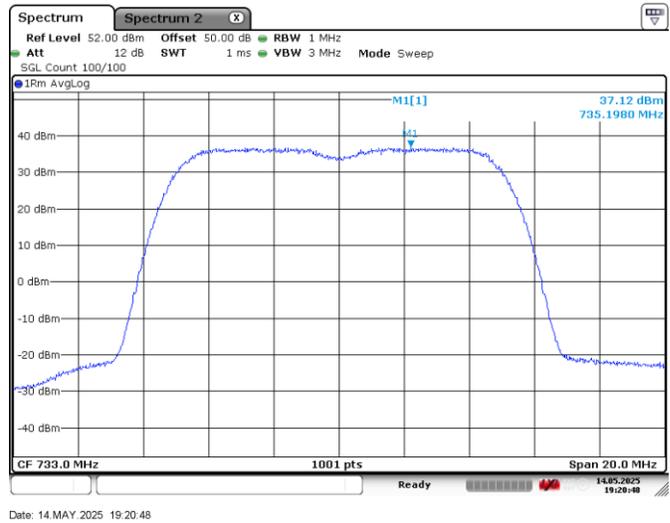


Figure 8.2-7: PSD of NR 15 MHz channel bandwidth, single carrier operation, sample plot



Figure 8.2-8: PSD of IoT SA, single carrier operation, sample plot

Test data, continued



Test data, continued



Figure 8.2-13: PSD of LTE 5 MHz channel bandwidth, 3-carrier operation, sample plot



Figure 8.2-14: PSD of NR 3 and LTE 5 MHz, 2-carrier operation, sample plot

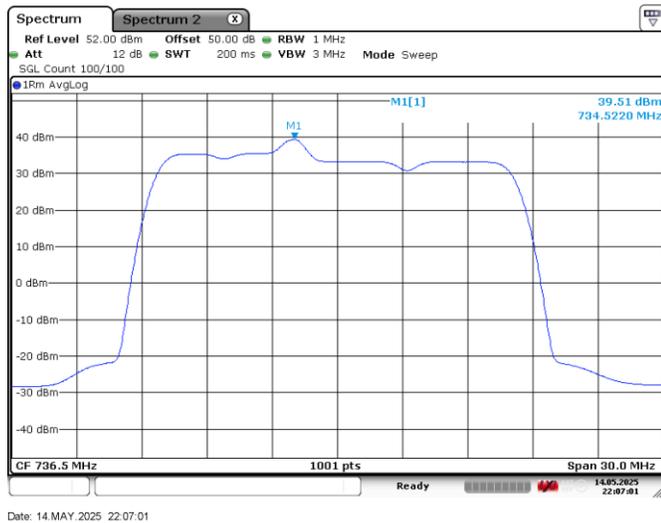


Figure 8.2-15: PSD of 2 x NR 3 + SA + 2 x LTE 15 MHz, 3-carrier operation, sample plot

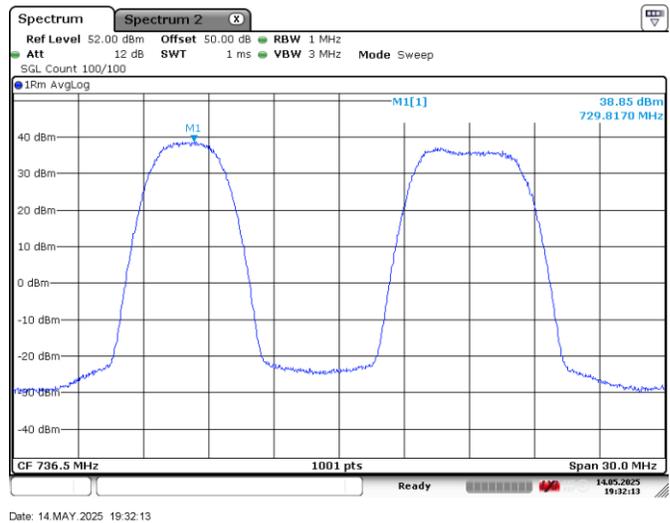


Figure 8.2-16: PSD of NR 3 and LTE 5 MHz, 2-carrier non-contiguous operation, sample plot

Test data, continued

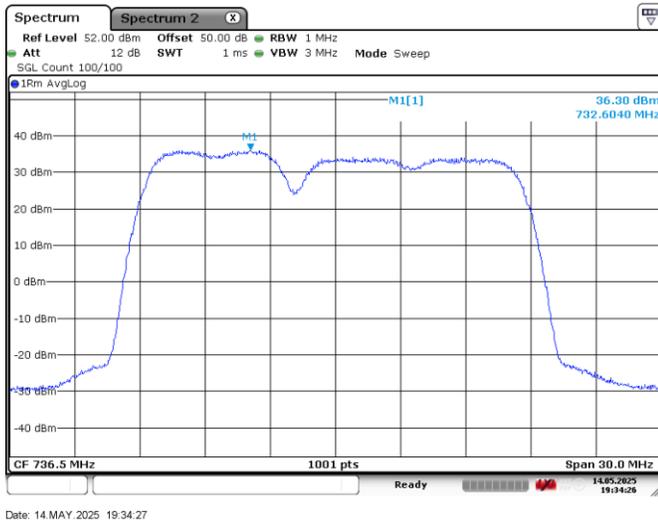


Figure 8.2-17: PSD of 2 x NR 3 and 2 x LTE 5 MHz, 2-carrier non-contiguous operation, sample plot

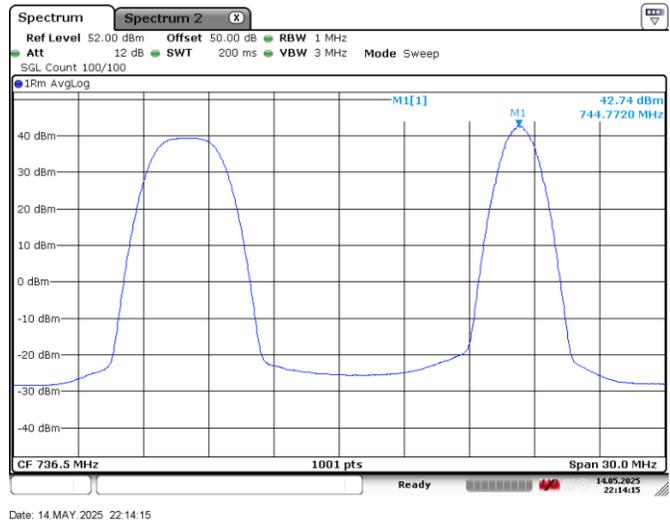


Figure 8.2-18: PSD of NR 3 and SA IoT MHz, 2-carrier non-contiguous operation, sample plot

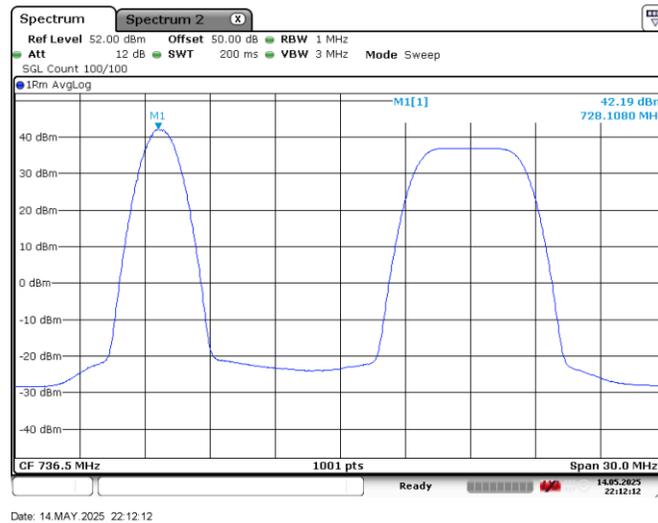


Figure 8.2-19: PSD of SA IoT and LTE 5 MHz, 2-carrier non-contiguous operation, sample plot

Test data, continued

Table 8.2-40: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NB IoT 0.4 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
0.4 MHz, Low channel	728.2	4.60	13.00	8.40
0.4 MHz, Mid channel	736.5	4.59	13.00	8.41
0.4 MHz, Top channel	744.8	4.60	13.00	8.40

Table 8.2-41: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 5 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	730.5	7.22	13.00	5.78
5 MHz, Mid channel	736.5	7.22	13.00	5.78
5 MHz, Top channel	742.5	7.23	13.00	5.77

Table 8.2-42: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 10 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	733.0	7.40	13.00	5.60
10 MHz, Mid channel	736.5	7.34	13.00	5.66
10 MHz, Top channel	740.0	7.33	13.00	5.67

Table 8.2-43: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 15 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	735.5	7.37	13.00	5.63
15 MHz, Mid channel	736.5	7.33	13.00	5.67
15 MHz, Top channel	737.5	7.30	13.00	5.70

Table 8.2-44: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 3 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
3 MHz, Low channel	729.5	8.09	13.00	4.91
3 MHz, Mid channel	736.5	8.09	13.00	4.91
3 MHz, Top channel	743.5	8.09	13.00	4.91

Table 8.2-45: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 5 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	730.5	7.23	13.00	5.77
5 MHz, Mid channel	736.5	7.22	13.00	5.78
5 MHz, Top channel	742.5	7.24	13.00	5.76

Table 8.2-46: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 10 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	733.0	7.29	13.00	5.71
10 MHz, Mid channel	736.5	7.23	13.00	5.77
10 MHz, Top channel	740.0	7.24	13.00	5.76

Table 8.2-47: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 15 MHz

Channel size, notes	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	735.5	7.34	13.00	5.66
15 MHz, Mid channel	736.5	7.29	13.00	5.71
15 MHz, Top channel	737.5	7.25	13.00	5.75

Test data, continued



Figure 8.2-20: CCDF sample plot, IoT SA

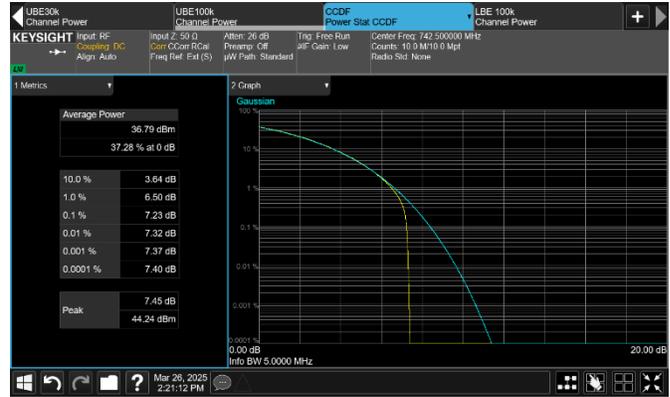


Figure 8.2-21: CCDF sample plot, LTE 5 MHz



Figure 8.2-22: CCDF sample plot, LTE 10 MHz

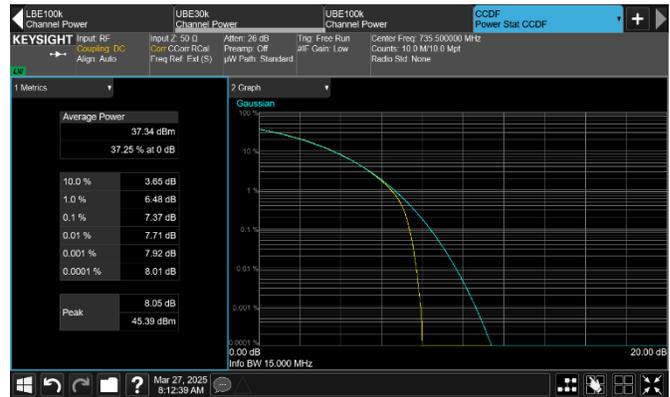


Figure 8.2-23: CCDF sample plot, LTE 15 MHz



Figure 8.2-24: CCDF sample plot, NR 3 MHz



Figure 8.2-25: CCDF sample plot, NR 5 MHz

Test data, continued

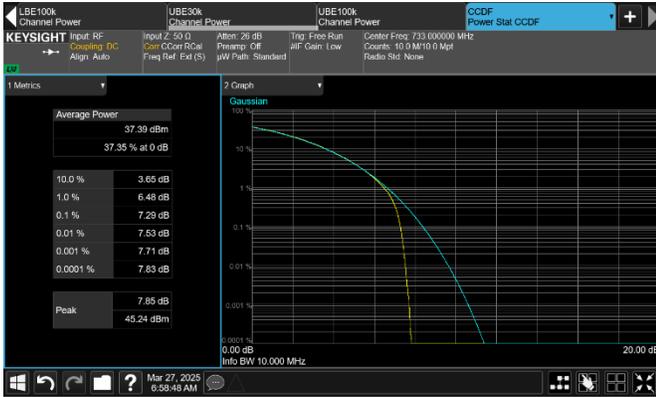


Figure 8.2-26: CCDF sample plot, NR 10 MHz

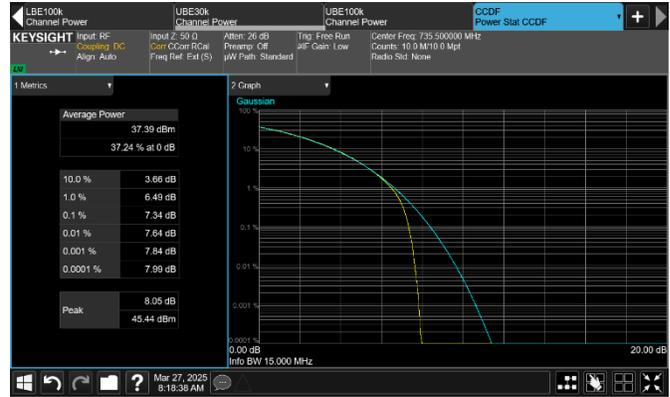


Figure 8.2-27: CCDF sample plot, NR 15 MHz

8.3 Spurious emissions at RF antenna connector (B71)

8.3.1 Definitions and limits

FCC §27.53: Emission limits

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

RSS-130, Section 4.7.1: Transmitter Unwanted Emissions

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

8.3.2 Test summary

Test date	March 25, 2025 to March 27, 2025
Test engineer	Dhara Patel

8.3.3 Observations, settings and special notes

The spectrum was analyzed from 30 MHz to the 10th harmonic. All measurements were conducted using an average (RMS) detector in accordance with ANSI C63.26 Paragraph 5.7.2.

All NR and LTE limit lines were adjusted for MIMO operation by 6 dB, for example: $-13 \text{ dBm} - 6 \text{ dB} = -19 \text{ dBm}$.
MIMO correction factor for 4 antenna ports: $10 \times \log_{10}(4) = 6 \text{ dB}$.

All NB-IoT SA limit lines were adjusted for MIMO operation by 3 dB, for example: $-13 \text{ dBm} - 3 \text{ dB} = -16 \text{ dBm}$.
MIMO correction factor for 2 antenna ports: $10 \times \log_{10}(2) = 3 \text{ dB}$.

For general scan, the RBW was set to 1 MHz, with the VBW set wider than the RBW.

Band edges were tested using the channel power function of the spectrum analyzer, which calculates the total power within a specific band. This method is correlated with the resolution bandwidths specified in the regulations.