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Radio Test report – Radio 4460 B2/25 B66 C

Project number:

454153-1TRFWL-R1

Applicant:

Ericsson Canada Inc.

Product name:	Model (PMN):	Part number:
Radio 4460	Radio 4460 44B2/25 44B66 C	KRC 161 912/3
FCC ID:	**ISED Reg. Number:**	**HVIN:**
TA8AKRC161912-3	287AB-AS1619123	AS1619123

Requirements/Summary:

Standard	Environmental phenomenon	Compliance
FCC 47 CFR Part 27	Miscellaneous wireless communications services	Yes
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
RSS-139 Issue 3, July 16, 2015	Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710–1780 MHz and 2110–2180 MHz	Yes
RSS-170 Issue 3, July 9, 2015	Ancillary Terrestrial Component (ATC) Equipment Operating in the Mobile-Satellite Service (MSS) Bands AWS-4 (2180–2200MHz) Limitation as per IC P9 Licensing Agreement https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11536.html	Yes

Date of issue: January 9, 2022

Andrey Adelberg, Senior EMC/Wireless Specialist
Tested by

Signature

David Duchesne, Senior EMC/Wireless 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 reAnt Are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

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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)
FCC 47 CFR Part 27	Miscellaneous wireless communications services (2110–2200 MHz)
RSS-133 Issue 6 A1, Jan. 18, 2018	2 GHz Personal Communications Services
RSS-139 Issue 3, July 16, 2015	Advanced Wireless Services (AWS) equipment operating in the bands 1710–1780 MHz and 2110–2180 MHz
SRSP-510, Issue 5, February 2009	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850–1915 MHz and 1930–1995 MHz
RSS-170 Issue 3, July 9, 2015*	Ancillary Terrestrial Component (ATC) Equipment Operating in the Mobile-Satellite Service (MSS) Bands
RSS-Gen, Issue 5, April 2018	General Requirements for Compliance of Radio Apparatus

*Equipment operating in the ancillary terrestrial component (ATC) of the frequency bands 2000–2020 MHz and 2180–2200 MHz is certified under RSS-170. Limitations specified under Industry Canada P9 Licensing Agreement applied as per https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11536.html

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 (454153-1TRFWL-R1 is a C2PC to the 421910-1TRFWL-R1 report) applies to the Radio 4460 44B2/25 44B66 C with part number KRC 161 912/3. See “Summary of test results” for full details.

EUT Configuration(s) SRO/MRO:

B2/B25:
LTE/NR: 5, 10, 15, 20 MHz, Max 6 Carriers
WCDMA/CDMA/GSM: Max 1 Carrier
LTE + NR
LTE/NR + WCDMA/CDMA/GSM
WCDMA+GSM

B66:
LTE/NR: 5, 10, 15, 20 MHz (Max 6 Carriers)
WCDMA: Max 1 Carrier
LTE + NR
LTE/NR + WCDMA

1.5 Test report revision history

Table 1.5-1: *Test report revision history*

Revision #	Date of issue	Details of changes made to test report
TRF	January 9, 2022	Original report issued

Section 2. Summary of test results

2.1 Testing location

Test location (s)	Ottawa

2.2 Testing period

Test start date	December 3, 2021	Test end date	December 8, 2021

2.3 Sample information

Receipt date	December 3, 2021	Nemko sample ID number	1

2.4 FCC Part 27/24 test results

Table 2.4-1: *FCC results summary*

Part	Test description	Verdict
§27.50(b)	Maximum output power at RF antenna connector	Pass
§27.53	Spurious emissions at RF antenna connector	Pass
§27.53	Radiated spurious emissions (conducted and radiated)	Pass
§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 and radiated)	Pass
§2.1049	Occupied bandwidth	Pass

Notes: Only tests applicable to C2PC have been performed

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

2.5 RSS-133/139/170 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-139, 4.1	Transmitter output power and Equivalent Isotropic Radiated Power (e.i.r.p.)	Pass
RSS-139, 4.2	Spurious emissions at RF antenna connector	Pass
RSS-139, 4.2	Radiated spurious emissions (conducted and radiated)	Pass
RSS-170, 5.3	Transmitter output power and Equivalent Isotropic Radiated Power (e.i.r.p.)	Pass
RSS-170, 5.4	Spurious emissions at RF antenna connector	Pass
RSS-170, 5.4	Radiated spurious emissions (conducted and radiated)	Pass
RSS-Gen, 6.7	Occupied bandwidth	Pass

Notes: Only tests applicable to C2PC have been performed

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

[2]EUT employs digital modulation (QPSK to 256-QAM)

ATC Base Station Equipment operating in bands 2000–2020 MHz and 2180–2200 MHz

The unwanted emissions of ATC base station equipment transmitting in the bands 2000–2020 MHz and 2180–2200 MHz shall comply with the following:	(1)	The power of any unwanted emissions at frequencies outside the equipment's operating frequency block shall be attenuated below the transmitter power P (dBW), by 43 + 10 log p (watts), dB.
	(2)	For equipment operating in the band 2180–2200 MHz, in addition to (1), the power of any emissions on all frequencies between 2200 MHz and 2290 MHz shall not exceed an e.i.r.p. of –100.6 dBW/4 kHz (–70.6 dBm/4 kHz).*

*** This requirement is for implementation and is enforced at the time of licensing. Therefore, results are not included in this report.**

Note: Requirement number (2) above is amended as detailed in the following ISED document: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11536.html

Section 3. Equipment under test (EUT) details

3.1 EUT information

Product name	Radio 4460	
Model	Radio 4460 44B2/25 44B66 C	
Part number	KRC 161 912/3	
Revision	R3B	
Serial number	E23D452220	
Antenna ports	4 TX/RX Ports	
RF BW / IBW	B2 IBW DL: 60 MHz B2 IBW UL: 60 MHz B25 IBW DL: 65 MHz B25 IBW UL: 65 MHz	B66 IBW DL: 90 MHz B66 IBW UL: 70 MHz
FDD	B2/25: 80 MHz	B66: 400 MHz
Frequency	B2 TX (DL): 1930 – 1990 MHz B2 RX (UL): 1850 – 1910 MHz 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	140 W (51.46 dBm): 80 W per Band	
Nominal O/P per Anternna port per Band	Single Carrier: 1 × 80 W (49.03 dBm/Carrier) 2 Carrier: 2 × 40 W (46.02 dBm/Carrier total) 3 Carrier: 3 × 26.7 W (44.26 dBm/Carrier total)	
Accuracy (nominal)	±0.1 ppm	
Nominal voltage	−48 V_{DC} @ 40 A	
RAT	B2: LTE, (LTE+NB-IoT (IB, GB)), NR, GSM, WCDMA, CDMA B25: LTE, (LTE+NB-IoT (IB, GB)), NR	B66: LTE, (LTE+NB-IoT (IB, GB)), NR, WCDMA (B4)
Modulation	LTE: QPSK, 16 QAM, 64 QAM, 256 QAM NR: QPSK, 16 QAM, 64 QAM, 256 QAM NB-IoT: QPSK WCDMA: QPSK, 16 QAM, 64 QAM GSM: GMSK, 8-PSK, AQPSK CDMA: QPSK, 8-PSK, 16 QAM	
Channel bandwidth	LTE: 5, 10, 15, 20 MHz NR: 5, 10, 15, 20 MHz WCDMA: 5 MHz CDMA: 1.25MHz GSM: 200 kHz	
Channel bandwidth LTE + NB-IoT	LTE+NB-IoT IB: 5, 10, 15, 20 MHz LTE+NB-IoT GB: 10, 15, 20 MHz NB-IoT (GB, IB): 200 kHz	
Maximum combined OBW per port	B25: 65 MHz	B66: 90 MHz
CPRI	2.5G, 4.9G, 9.8G, 10.1 Gbps	

Channel raster	LTE: 100 kHz NR: 100 kHz WCDMA / GSM: 200 kHz CDMA: 50 kHz			
Regulatory requirements	Radio: FCC Part 2, 24, 27, RSS-Gen, RSS-133, RSS-139, (RSS-170 / IC P9 Licensing Agreement AWS-4) EMC: FCC Part 15, ICES-003 Safety: IEC/EN 62368-1, UL/CSA 62368-1 IEC/EN 60950-22, UL 50E /CAN/CSA, IEC/EN 60529, Type 3 Enclosure			
Emission Designator	LTE: 5M00W7D, 10M0W7D, 15M0W7D, 20M0W7D NR: 5M00W7D, 10M0W7D, 15M0W7D, 20M0W7D WCDMA: 5M00F9W GSM: 200KG7W CDMA: 1M25F9W			
Supported Configurations	Single Antenna, TX Diversity, MIMO, Carrier Aggregation, Ericsson Spectral Sharing (ESS)			
Operating temperature	−40 °C to +55 °C			
Total Power based on IBW	560 W total / radio (4 ports × 140 W)			
Supported carriers /band/ port SRO/MRO	Up to 6 carriers. LTE: Max 6 NR: Max 6 LTE + NB-IoT: GB Max 2, IB Max 2 WCDMA/CDMA/GSM: Max 1			
Carrier Configuration: B2/25: W, G, C are limited to B2 B66: W is limited to B4	B2/25 SRO: LTE, NR, W, G, C MRO: L+NR, L+W, L+G, L+C, NR+W, NR+G, NR+C, C+NR+L, G+NR+L, W+NR+L			B66 SRO: LTE, NR, WCDMA MRO: L+NR, L+W, NR+W, W+NR+L
Total Power based on IBW	560 W (57.48 dBm) Total / Radio			140 W / Port (max)
Radio Band Power (max.)	Configurations /Port:	B2/25:	B66:	
	1	80 W	60 W	
	2	60 W	80 W	
	3	70 W	70 W	
RAT SC Carrier Power (max)	RAT	BW	PWR/Carrier(max) 4W/MHz Configuration	PWR/Carrier(max) 6W/MHz Configuration
	LTE/NR	5 MHz	20 W	30 W
	LTE/NR	10 MHz	40 W	60 W
	LTE/NR	15 MH	60 W	80 W
	LTE/NR	20 MHz	80 W	80 W
	WCDMA	5 MHz	20 W	20 W
	GSM	200 kHz	20 W	20 W
	CDMA	1.25 MHz	20 W	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	Radio 4460 44B2B/B25 44B66 C (KRC 161 912/3) is a multi-standard remote Dual Band radio forming part of the Ericsson RBS (Radio Base Station) equipment. Radio 4460 provides radio access for mobile and fixed devices and is designed for the outdoor environment. Radio 4460 operates over 2 bands (Band 2/25 and Band 66) via 4 TX/RX ports connected directly into an integrated antenna. Radio unit installation is designed for pole, wall or rail mount options. A fiber optic interface (4) provides the RRU/RBS control and digital interface between the Radio and the RBS. Radio 4460 product is convection cooled and shall be mounted vertically. Output RF Power is rated at 4 x 140 W. Altitude during operation: Below 4000 m Radio 4460 is a synthesized Transceiver designed for use in the 3GPP (Third Generation Partnership Project) for LTE (Long Term Evolution) - E-UTRA Base Station, NR (New Radio), WCDMA, GSM and CDMA. Radio 4460 B2/25 B66 C is a 4TX/4RX remote radio unit (RRU). This RRU operates in Band 2/25 as defined by 3GPP. TX (DL): 1930–1995 MHz, RX (UL): 1850–1915 MHz and Band 66 TX (DL): 2110–2200 MHz, RX (UL): 1710–1780 MHz For LTE/NR, Radio 4460 B2/25 B66 supports modulations QPSK, 16QAM, 64QAM and 256QAM. Channel Bandwidth is configurable for 5, 10, 15 or 20 MHz. For WCDMA: QPSK, 16QAM, 64QAM; for GSM: GMSK, 8-PSK, AQPSK; for CDMA: QPSK, 8-PSK, 16QAM. The Radio transmits SRO/MRO in single carrier mode and multi carrier mode within the Band Specific IBW (Instantaneous Band Width). LTE NB-IoT is supported for IB and GB. Radio 4460 supports single and multi-beam FD MIMO (Multiple Input Multiple Output), Carrier Aggregation and ESS/DSS).

Ports/Interface

Port	Description
ANT 1–16	RF Output ports from 1 to 4
Alarm	Alarm
ALD	Antenna Line Device
Data 1	Optical Interface Data 1
Data 2	Optical Interface Data 2
Data 3	Optical Interface Data 3
Data 4	Optical Interface Data 4
DC Input 1-2	−48 V_{DC}
MMI	Display - Radio Status
GND	Ground

Physical

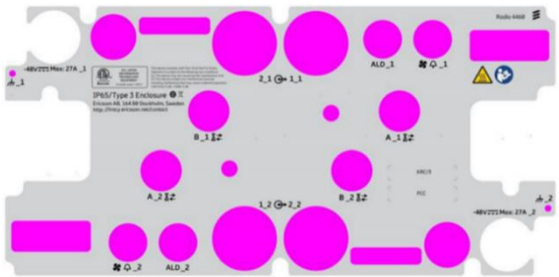
Dimensions	398 mm × 494 mm × 316 mm (H × W × D)
Weight	49 kg
Operating Temperature	−40 to +55 °C
Mounting	Pole, Wall, Rail Mount
Cooling	Convection (forced air)

Software details: CXP9013268%15_R86KC

Radio Hardware Configuration

Product: KRC 161 912/3	R3B	Description
NTB 101 1912/1	R1E	Parts
NTB 101 1913/1	R1C	Parts
1/KRC 161 912/3	R3B	Radio Unit (2)
ROA 128 8480/1	R1J	Radio PCP
ROZ 104 8488/1	R3A	DC-DC Circuit
ROR 101 8480/25	R1F	PAM B25 (2)
ROR 101 8480/66	R1C	PAM B66 (2)
KRF 901 591	R1F	Filter Unit
NTB 101 1914/1	R1E	Parts
..NTB 101 1915/1	R1D	Parts

Product Identification / Markings and Labels



3.3 EUT test details

EUT setup/configuration rationale for Down link:

RAT	Modulation	Performance Requirement	Test Model / Configuration
LTE/NR	QPSK	N/A	E-TM1.1
LTE/NR	16QAM	N/A	E-TM3.2
LTE/NR	64QAM	N/A	E-TM3.1
LTE/NR	256QAM	N/A	E-TM3.1a
WCDMA	QPSK	N/A	TM1
WCDMA	16QAM	N/A	TM5
WCDMA	64QAM	N/A	TM6
CDMA	QPSK	N/A	TM2
GSM	GMSK	N/A	TM1

LTE Single Carrier B25

Bandwidth, MHz	LTE Transmit / DL, MHz					
	B	EARFCN	M	EARFCN	T	EARFCN
5	1932.5	*8065*	1962.5	*8365*	1992.5	*8665*
10	1935.0	*8090*	1962.5	*8365*	1990.0	*8640*
15	1937.5	*8115*	1962.5	*8365*	1987.5	*8615*
20	1940.0	*8140*	1962.5	*8365*	1985.0	*8590*

Bandwidth, MHz	LTE Receive / UL, MHz					
	B	EARFCN	M	EARFCN	T	EARFCN
5	1852.5	*26065*	1882.5	*26365*	1912.5	*26665*
10	1855.0	*26090*	1882.5	*26365*	1910.0	*26640*
15	1857.5	*26115*	1882.5	*26365*	1907.5	*26615*
20	1860.0	*26140*	1882.5	*26365*	1905.0	*26590*

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*

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*

WCDMA Single Carrier B2

Bandwidth, MHz	Transmit / DL, MHz					
	B	UARFCN	M	UARFCN	T	UARFCN
5	1932.4	9662	1960	9800	1987.6	9938

Bandwidth, MHz	Receive / UL, MHz					
	B	Channel	M	EARFCN	T	Channel
1.25	1851.250	25	1880.000	600	1908.750	1175

EUT test details, continued

GSM Single Carrier B2

Bandwidth, MHz	Transmit / DL, MHz					
	B	ARFCN	M	ARFCN	T	ARFCN
0.2	1930.2	512	1960	661	1989.8	810

Bandwidth, MHz	Receive / UL, MHz					
	B	ARFCN	M	ARFCN	T	ARFCN
0.2	1850.2	512	1880.0	661	1909.8	810

CDMA Single Carrier B2

Bandwidth, MHz	Transmit / DL, MHz					
	B	Channel	M	Channel	T	Channel
1.25	1931.250	25	1960.000	600	1988.750	1175

Bandwidth, MHz	Receive / UL, MHz					
	B	Channel	M	EARFCN	T	Channel
1.25	1851.250	25	1880.000	600	1908.750	1175

LTE Single Carrier B66

Bandwidth, MHz	LTE Transmit / DL, MHz					
	B	EARFCN	M	EARFCN	T	EARFCN
5	2112.5	*66461*	2155.0	*66886*	2197.5	*67311*
10	2115.0	*66486*	2155.0	*66886*	2195.0	*67286*
15	2117.5	*66511*	2155.0	*66886*	2192.5	*67261*
20	2120.0	*66536*	2155.0	*66886*	2190.0	*67236*

Bandwidth, MHz	LTE Receive / UL, MHz					
	B	EARFCN	M	EARFCN	T	EARFCN
5	1712.5	*131997*	1745.0	*132322*	n/a	*n/a*
10	1715.0	*132022*	1745.0	*132322*	n/a	*n/a*
15	1717.5	*132047*	1745.0	*132322*	n/a	*n/a*
20	1720.0	*132072*	1745.0	*132322*	n/a	*n/a*

NR Single Carrier B66

Bandwidth, MHz	Transmit / DL, MHz					
	B	NR-ARFCN	M	NR-ARFCN	T	NR-ARFCN
5	2112.5	*422500*	2155.0	*431000*	2197.5	*439500*
10	2115.0	*423000*	2155.0	*431000*	2195.0	*439000*
15	2117.5	*423500*	2155.0	*431000*	2192.5	*438500*
20	2120.0	*424000*	2155.0	*431000*	2190.0	*438000*

Bandwidth, MHz	Receive / UL, MHz					
	B	NR-ARFCN	M	NR-ARFCN	T	NR-ARFCN
5	1712.5	*342500*	1755.0	*351000*	n/a	*n/a*
10	1715.0	*343000*	1755.0	*351000*	n/a	*n/a*
15	1717.5	*343500*	1755.0	*351000*	n/a	*n/a*
20	1720.0	*344000*	1755.0	*351000*	n/a	*n/a*

EUT test details, continued

WCDMA Single Carrier B66 (B4 portion)

Bandwidth, MHz	Transmit / DL, MHz					
	B	UARFCN	M	UARFCN	T	UARFCN
5	2112.4	1537	2132.6	1638	2152.6	1738

Bandwidth, MHz	Receive / UL, MHz					
	B	UARFCN	M	UARFCN	T	UARFCN
5	1712.4	1312	1732.6	1413	1752.6	1513

B25 LTE Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz								
	B1	EARFCN	B2	EARFCN		T2	EARFCN	T1	EARFCN
10	1935.0	*8090*	1945.0	*8190*		1980.0	*8540*	1990.0	*8640*

Bandwidth, MHz	Receive / UL, MHz								
	B1	EARFCN	B2	EARFCN		T2	EARFCN	T1	EARFCN
10	1855.0	*26090*	1865.0	*26190*		1900.0	*26540*	1910.0	*26640*

B25 LTE Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz											
	B1	EARFCN	B2	EARFCN	B3	EARFCN		T3	EARFCN	T2	EARFCN	T1	EARFCN
10	1935.0	*8090*	1945.0	*8190*	1955.0	*8290*		1970.0	8440	1980.0	*8540*	1990.0	*8640*

Bandwidth, MHz	Receive / UL, MHz											
	B1	EARFCN	B2	EARFCN	B3	EARFCN		T3	EARFCN	T2	EARFCN	T1	EARFCN
10	1855.0	*26090*	1865.0	*26190*	1875.0	*26290*		1890.0	26440	1900.0	*26540*	1910.0	*26640*

B25 LTE Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz							
	B1	B2	B3	B4		T4	T3	T2	T1
5	1932.5	1937.5	1942.5	1947.5		1977.5	1982.5	1987.5	1992.5

Bandwidth, MHz	Receive / UL, MHz								
	B1	B2	B3	B4		T4	T3	T2	T1
5	1852.5	1857.5	1862.5	1867.5		1897.5	1902.5	1907.5	1912.5

B25 NR Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz								
	B1	NR-ARFCN	B2	NR-ARFCN		T2	NR-ARFCN	T1	NR-ARFCN
10	1935.0	*387000*	1945.0	*389000*		1980.0	*396000*	1990.0	*398000*

Bandwidth, MHz	Receive / UL, MHz								
	B1	NR-ARFCN	B2	NR-ARFCN		T2	NR-ARFCN	T1	NR-ARFCN
10	1855.0	*371000*	1865.0	1855.0		1900.0	*380000*	1910.0	*382000*

EUT test details, continued

B25 NR Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz												
	B1	NR-ARFCN	B2	NR-ARFCN	B3	NR-ARFCN		T3	NR-ARFCN	T2	NR-ARFCN	T1	NR-ARFCN
10	1935.0	*387000*	1945.0	*389000*	1955.0	*391000*		1970.0	*394000*	1980.0	*396000*	1990.0	*398000*

Bandwidth, MHz	Receive / UL, MHz												
	B1	NR-ARFCN	B2	NR-ARFCN	B3	NR-ARFCN		T3	NR-ARFCN	T2	NR-ARFCN	T1	NR-ARFCN
10	1855.0	*371000*	1865.0	*373000*	1875.0	*375000*		1890.0	*378000*	1900.0	*380000*	1910.0	*382000*

B25 NR Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz								
	B1	B2	B3	B4		T4	T3	T2	T1
5	1932.5	1937.5	1942.5	1947.5		1977.5	1982.5	1987.5	1992.5

Bandwidth, MHz	Receive / UL, MHz								
	B1	B2	B3	B4		T4	T3	T2	T1
5	1852.5	1857.5	1862.5	1867.5		1897.5	1902.5	1907.5	1912.5

B66 LTE Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz							
	B1	EARFCN	B2	EARFCN		T2	EARFCN	T1	EARFCN
10	2115.0	*66486*	2125.0	*66586*		2185.0	***67186***	2195.0	***67286***

Bandwidth, MHz	Receive / UL, MHz								
	B1	EARFCN	B2	EARFCN		T2	EARFCN	T1	EARFCN
10	1715.0	*132022*	1725.0	*132122*		n/a	*n/a*	n/a	*n/a*

B66 LTE Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz											
	B1	EARFCN	B2	EARFCN	B3	EARFCN		T3	EARFCN	T2	EARFCN	T1	EARFCN
10	2115.0	*66486*	2125.0	*66586*	2135.0	*66686*		2175.0	67086	2185.0	*67186*	2195.0	*67286*

Bandwidth, MHz	Receive / UL, MHz											
	B1	EARFCN	B2	EARFCN	B3	EARFCN		T3	EARFCN	T2	EARFCN	T1	EARFCN
10	1715.0	*132022*	1725.0	*132122*	1735.0	*132122*		1775.0	*132622*	n/a	*n/a*	n/a	*n/a*

B66 LTE Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz							
	B1	B2	B3	B4		T4	T3	T2	T1
5	2112.5	2117.5	2122.5	2127.5		2182.5	2187.5	2192.5	2197.5

Bandwidth, MHz	Receive / UL, MHz								
	B1	B2	B3	B4		T4	T3	T2	T1
5	1712.5	1717.5	1722.5	1727.5		n/a	n/a	n/a	n/a

EUT test details, continued

B66 NR Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz								
	B1	NR-ARFCN	B2	NR-ARFCN		T2	NR-ARFCN	T1	NR-ARFCN
10	2115.0	*423000*	2125.0	*425000*		2185.0	*437000*	2195.0	*439000*

Bandwidth, MHz	Receive / UL, MHz							
	B1	NR-ARFCN	B2	NR-ARFCN	T2	NR-ARFCN	T1	NR-ARFCN
10	1715.0	*343000*	1725.0	*345000*	n/a	*n/a*	n/a	*n/a*

B66 NR Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz											
	B1	EARFCN	B2	EARFCN	B3	EARFCN		T3	EARFCN	T2	EARFCN	T1	EARFCN
10	2115.0	*423000*	2125.0	*425000*	2135.0	*427000*		2175.0	*435000*	2185.0	*437000*	2195.0	*439000*

Bandwidth, MHz	Receive / UL, MHz											
	B1	EARFCN	B2	EARFCN	B3	EARFCN		T3	EARFCN	T2	EARFCN	T1	EARFCN
10	1715.0	*343000*	1725.0	*345000*	1735.0	*347000*		1775.0	*355000*	n/a	*n/a*	n/a	*n/a*

B66 NR Multiple-Carriers for Band Edge and Spurious Emissions:

Bandwidth, MHz	Transmit / DL, MHz							
	B1	B2	B3	B4	T4	T3	T2	T1
5	2112.5	2117.5	2122.5	2127.5	2182.5	2187.5	2192.5	2197.5

Bandwidth, MHz	Receive / UL, MHz							
	B1	B2	B3	B4	T4	T3	T2	T1
5	1712.5	1717.5	1722.5	1727.5	n/a	n/a	n/a	n/a

B25 LTE Multiple-Carriers for spurious emissions (IBW=65MHz):

Bandwidth (MHz)	Transmit / DL (MHz)			
	C1	*EARFCN*	C2	*EARFCN*
10	1935.0	*8090*	1990.0	*8640*
15	1937.5	*8115*	1987.5	*8615*
20	1940.0	*8140*	1985.0	*8590*
10	1957.5	*8315*	1967.5	*8415*

Bandwidth (MHz)	Receive / UL (MHz)			
	C1	*EARFCN*	C2	*EARFCN*
10	1855.0	*26090*	1910.0	*26640*
15	1857.5	*26115*	1907.5	*26615*
20	1860.0	*26140*	1905.0	*26590*
10	1877.5	*26315*	1887.5	*26415*

EUT test details, continued

B25 LTE Multiple-Carriers for spurious emissions (IBW=65MHz):

Bandwidth (MHz)	Transmit / DL (MHz)					
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*
10	1935.0	*8090*	1945.0	*8190*	1990.0	*8640*
15	1937.5	*8115*	1952.5	*8265*	1987.5	*8615*
20	1940.0	*8140*	1960.0	*8340*	1985.0	*8590*
10	1952.5	*8265*	1962.5	*8365*	1972.5	8465

Bandwidth (MHz)	Receive / UL (MHz)					
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*
10	1855.0	*26090*	1865.0	*26190*	1910.0	*26640*
15	1857.5	*26115*	1872.5	*26265*	1907.5	*26615*
20	1860.0	*26140*	1880.0	*26340*	1905.0	*26590*
10	1872.5	*26265*	1882.5	*26365*	1892.5	*26465*

B25 LTE Multiple-Carriers for spurious emissions (IBW=65MHz):

Bandwidth (MHz)	Transmit / DL (MHz)							
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*	C4	*EARFCN*
5	1932.5	*8065*	1937.5	*8115*	1962.5	*8365*	1992.5	*8665*
5	1955.0	*8290*	1960.0	*8340*	1965.0	*8390*	1970.0	*8440*

Bandwidth (MHz)	Receive / UL (MHz)							
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*	C4	*EARFCN*
5	1852.5	*26065*	1857.5	*26115*	1882.5	*26365*	1912.5	*26665*
5	1875.0	*26290*	1880.0	*26340*	1885.0	*26390*	1890.0	*26440*

B25 NR Multiple-Carriers for spurious emissions (IBW=65MHz):

Bandwidth (MHz)	Transmit / DL (MHz)			
	C1	*NR-ARFCN*	C2	*NR-ARFCN*
10	1935.0	*387000*	1990.0	*398000*
15	1937.5	*387500*	1987.5	*397500*
20	1940.0	*388000*	1985.0	*397000*
10	1957.5	*391500*	1967.5	*393500*

Bandwidth (MHz)	Receive / UL (MHz)			
	C1	*NR-ARFCN*	C2	*NR-ARFCN*
10	1855.0	*371000*	1910.0	*382000*
15	1857.5	*371500*	1907.5	*381500*
20	1860.0	*372000*	1905.0	*381000*
10	1877.5	*375500*	1887.5	*377500*

B25 NR Multiple-Carriers for spurious emissions (IBW=65MHz):

Bandwidth (MHz)	Transmit / DL (MHz)					
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*
10	1935.0	*387000*	1945.0	*389000*	1990.0	*398000*
15	1937.5	*387500*	1952.5	*390500*	1987.5	*397500*
20	1940.0	*388000*	1960.0	*392000*	1985.0	*397000*
10	1952.5	*390500*	1962.5	*392500*	1972.5	*394500*

Bandwidth (MHz)	Receive / UL (MHz)					
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*
10	1855.0	*371000*	1865.0	*373000*	1910.0	*382000*
15	1857.5	*371500*	1872.5	*374500*	1907.5	*381500*
20	1860.0	*372000*	1880.0	*376000*	1905.0	*381000*
10	1872.5	*374500*	1882.5	*376500*	1892.5	*378500*

EUT test details, continued

B25 NR Multiple-Carriers for spurious emissions (IBW=65MHz):

Bandwidth (MHz)	Transmit / DL (MHz)							
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*	C4	*NR-ARFCN*
5	1932.5	*386500*	1937.5	*387500*	1962.5	*392500*	1992.5	*398500*
5	1955	*391000*	1960	*392000*	1965	*393000*	1970	*394000*

Bandwidth (MHz)	Receive / UL (MHz)							
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*	C4	*NR-ARFCN*
5	1852.5	*370500*	1857.5	*371500*	1882.5	*376500*	1912.5	*382500*
5	1875.0	*375000*	1880.0	*376000*	1885.0	*377000*	1890.0	*378000*

B66 LTE Multiple-Carriers for spurious emissions (IBW=90MHz)

Bandwidth (MHz)	Transmit / DL (MHz)			
	C1	*EARFCN*	C2	*EARFCN*
10	2115.0	*66486*	2175.0	*67086*
15	2117.5	*66511*	2172.5	*67061*
20	2120.0	*66536*	2170.0	*67036*
10	2150.0	*66836*	2160.0	*66936*

Bandwidth (MHz)	Receive / UL (MHz)			
	C1	*EARFCN*	C2	*EARFCN*
5	1712.5	*131997*	n/a	*n/a*
10	1715.0	*132022*	n/a	*n/a*
15	1717.5	*132047*	n/a	*n/a*
20	1720.0	*132072*	n/a	*n/a*
10	1750.0	*132372*	1760.0	132472

B66 LTE Multiple-Carriers for spurious emissions (IBW=90MHz):

Bandwidth (MHz)	Transmit / DL (MHz)					
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*
10	2115.0	*66486*	2125.0	*66586*	2195.0	*67286*
15	2117.5	*66511*	2132.5	*66661*	2192.5	*67261*
20	2120.0	*66536*	2140.0	*66736*	2190.0	*67236*
10	2145.0	*66786*	2155.0	*66886*	2165.0	*66986*

Bandwidth (MHz)	Receive / UL (MHz)					
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*
10	1715.0	*132022*	1725.0	*132122*	n/a	*n/a*
15	1717.5	*132047*	1732.5	*132197*	n/a	*n/a*
20	1720.0	*132072*	1740.0	*132272*	n/a	*n/a*
10	1745.0	*132322*	1755.0	*132422*	1765.0	*132522*

EUT test details, continued

B66 LTE Multiple-Carriers for spurious emissions (IBW=90MHz):

Bandwidth (MHz)	Transmit / DL (MHz)							
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*	C4	*EARFCN*
5	2112.5	*66461*	2117.5	*66511*	2155.0	*66886*	2197.5	*67311*
5	2147.5	*66811*	2152.5	*66861*	2157.5	*66911*	2162.5	*66961*

Bandwidth (MHz)	Receive / UL (MHz)							
	C1	*EARFCN*	C2	*EARFCN*	C3	*EARFCN*	C4	*EARFCN*
5	1712.5	*131997*	1717.5	*132047*	1755.0	*132422*	n/a	*n/a*
5	1747.5	*132347*	1752.5	*132397*	1757.5	*132447*	1762.5	*132497*

B66 NR Multiple-Carriers for spurious emissions (IBW=90MHz):

Bandwidth (MHz)	Transmit / DL (MHz)			
	C1	*NR-ARFCN*	C2	*NR-ARFCN*
10	2115.0	*423000*	2195.0	*439000*
15	2117.5	*423500*	2192.5	*438500*
20	2120.0	*424000*	2190.0	*438000*
10	2150.0	*430000*	2160.0	*432000*

Bandwidth (MHz)	Receive / UL (MHz)			
	C1	*NR-ARFCN*	C2	*NR-ARFCN*
10	1715.0	*343000*	n/a	*n/a*
15	1717.5	*343500*	n/a	*n/a*
20	1720.0	*344000*	n/a	*n/a*
10	1750.0	*350000*	1760.0	*352000*

B66 NR Multiple-Carriers for spurious emissions (IBW=90MHz):

Bandwidth (MHz)	Transmit / DL (MHz)					
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*
10	2115.0	*423000*	2125.0	*425000*	2195.0	*439000*
15	2117.5	*423500*	2132.5	*426500*	2192.5	*438500*
20	2120.0	*424000*	2140.0	*428000*	2190.0	*438000*
10	2145.0	*429000*	2155.0	*431000*	2165.0	433000

Bandwidth (MHz)	Receive / UL (MHz)					
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*
10	1715.0	*343000*	1725.0	*345000*	n/a	*n/a*
15	1717.5	*343500*	1732.5	*346500*	n/a	*n/a*
20	1720.0	*344000*	1740.0	*348000*	n/a	*n/a*
10	1745.0	*349000*	1755.0	*351000*	1765.0	353000

B66 NR Multiple-Carriers for spurious emissions (IBW=90MHz):

Bandwidth (MHz)	Transmit / DL (MHz)							
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*	C4	*NR-ARFCN*
5	2112.5	*422500*	2117.5	*423500*	2155.0	*431000*	2197.5	*439500*
5	2147.5	*429500*	2152.5	*430500*	2157.5	*431500*	2162.5	*432500*

Bandwidth (MHz)	Receive / UL (MHz)							
	C1	*NR-ARFCN*	C2	*NR-ARFCN*	C3	*NR-ARFCN*	C4	*NR-ARFCN*
5	1712.5	*342500*	1717.5	*343500*	1755.0	*351000*	n/a	*n/a*
5	1747.5	*349500*	1752.5	*350500*	1757.5	*351500*	1762.5	*352500*

EUT test details, continued

B25 Carrier Configurations for PWR/PSD, BE, CSE, OBW:

B25 - Single Carrier LTE, NR

Carrier configurations	Transmit / DL, MHz
5MHz, Bottom	1932.5
5MHz, Middle	1962.5
5MHz, Top	1992.5
10MHz, Bottom	1935
10MHz, Middle	1962.5
10MHz, Top	1990
15MHz, Bottom	1937.5
15MHz, Middle	1962.5
15MHz, Top	1987.5

B25 - Multiple-Carriers LTE, NR, LTE+NR

Carrier configurations	Transmit / DL, MHz
2C, LTE + LTE 5MHz, Bottom	1932.5 + 1942.5
2C, LTE + LTE 5MHz, Middle	1957.5 + 1967.5
2C, LTE + LTE 5MHz, Top	1982.5 +1992.5
2C, NR + NR 5MHz, Bottom	1932.5 + 1942.5
2C, NR + NR 5MHz, Middle	1957.5 + 1967.5
2C, NR + NR 5MHz, Top	1982.5 +1992.5
3C, LTE + LTE 5MHz, Bottom	1932.5 + 1937.5 + 1947.5
3C, LTE + LTE 5MHz, Middle	1957.5 + 1962.5 + 1972.5
3C, LTE + LTE 5MHz, Top	1977.5 + 1987.5 + 1992.5
3C, NR + NR 5MHz, Bottom	1932.5 + 1937.5 + 1947.5
3C, NR + NR 5MHz, Middle	1957.5 + 1962.5 + 1972.5
3C, NR + NR 5MHz, Top	1977.5 + 1987.5 + 1992.5
2C, LTE + NR 5MHz, Bottom	1932.5 + 1942.5
2C, LTE + NR 5MHz, Middle	1957.5 + 1967.5
2C, LTE + NR 5MHz, Top	1982.5 +1992.5

EUT test details, continued

B66 Carrier Configurations for PWR/PSD, BE, CSE, OBW:

B66 - Single Carrier LTE, NR

Carrier configurations	Transmit / DL, MHz
5MHz, Bottom	2112.5
5MHz, Middle	2155
5MHz, Top	2197.5
10MHz, Bottom	2115
10MHz, Middle	2155
10MHz, Top	2195
15MHz, Bottom	2117.5
15MHz, Middle	2155
15MHz, Top	2192.5

B66 - Multiple-Carriers LTE, NR, LTE+NR

Carrier configurations	Transmit / DL, MHz
2C, LTE + LTE 5MHz, Bottom	2112.5 + 2122.5
2C, LTE + LTE 5MHz, Middle	2150 + 2160
2C, LTE + LTE 5MHz, Top	2187.5 +2197.5
2C, NR + NR 5MHz, Bottom	2112.5 + 2122.5
2C, NR + NR 5MHz, Middle	2150 + 2160
2C, NR + NR 5MHz, Top	2187.5 +2197.5
3C, LTE + LTE 5MHz, Bottom	2112.5 + 2117.5 + 2127.5
3C, LTE + LTE 5MHz, Middle	2150 + 2155 + 2165
3C, LTE + LTE 5MHz, Top	2182.5 + 2192.5 + 2197.5
3C, NR + NR 5MHz, Bottom	2112.5 + 2117.5 + 2127.5
3C, NR + NR 5MHz, Middle	2150 + 2155 + 2165
3C, NR + NR 5MHz, Top	2182.5 + 2192.5 + 2197.5
2C, LTE + NR 5MHz, Bottom	2112.5 + 2122.5
2C, LTE + NR 5MHz, Middle	2150 + 2160
2C, LTE + NR 5MHz, Top	2187.5 +2197.5

3.4 EUT setup diagram

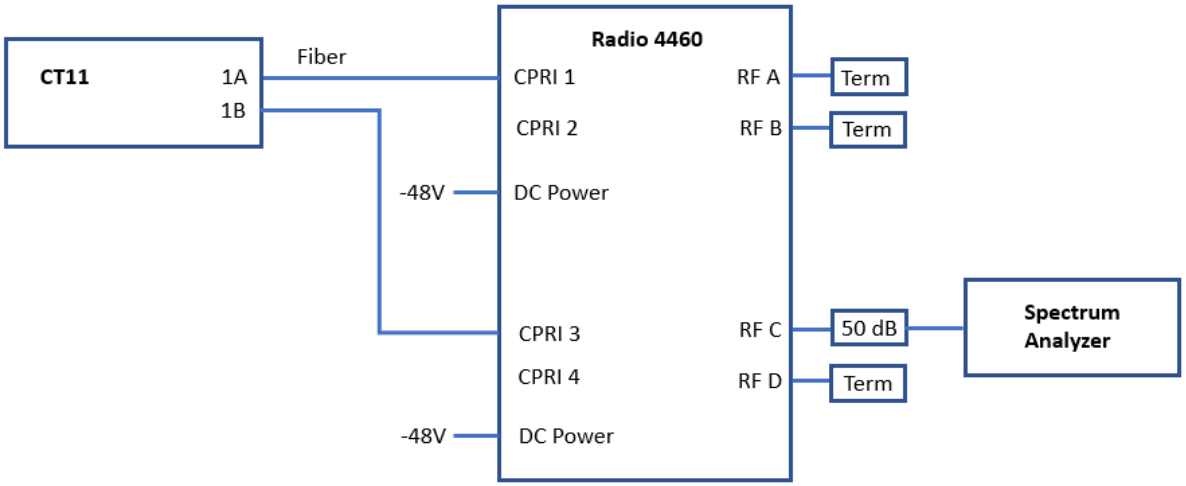


Figure 3.4-1: *Setup diagram – Radio Compliance*

3.5 Setup photographs

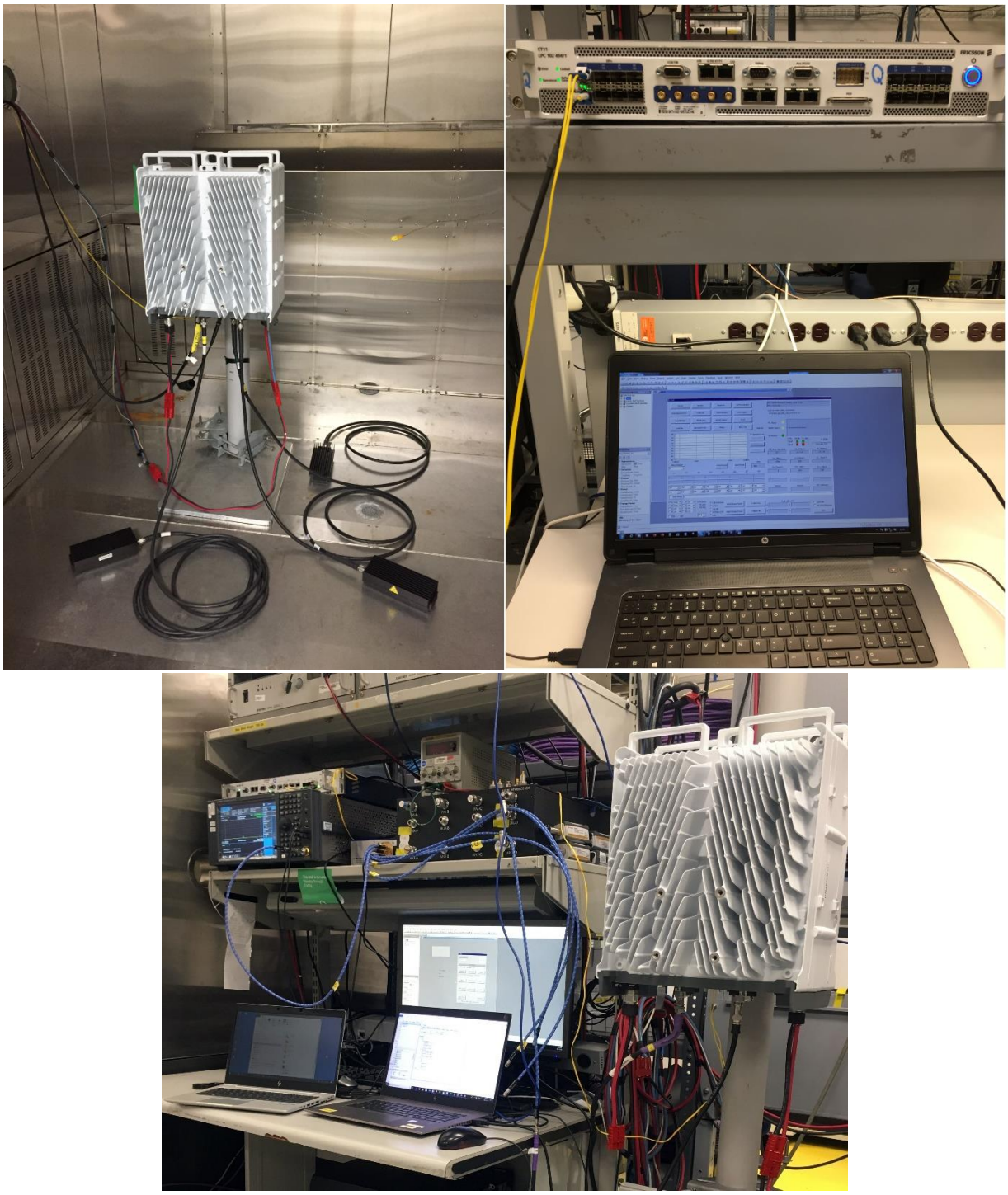


Figure 3.5-1: *Set up photo for Radio Compliance Testing*

3.6 Setup photographs, continued

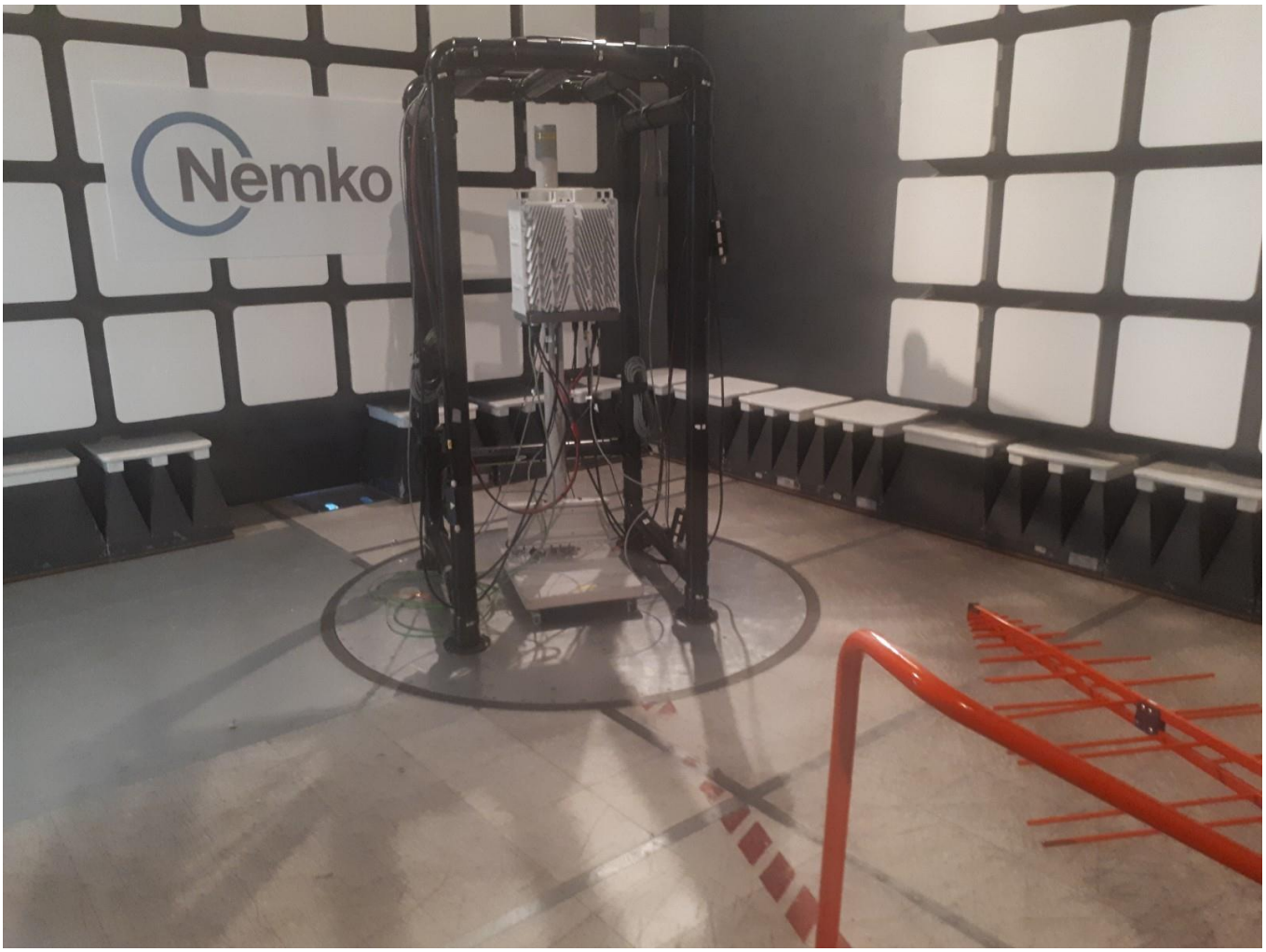


Figure 3.6-1: *EUT Set-up photo for Radiated Compliance Testing*

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
Radiated spurious emissions	3.78

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	March 26, 2022
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	November 25, 2022
Horn (1–18 GHz)	ETS Lindgren	3117	FA002840	1 year	February 2, 2022
Preamp (1–18 GHz)	ETS Lindgren	124334	FA002873	1 year	September 22, 2022
50 Ω coax cable	C.C.A.	None	FA002556	1 year	March 24, 2022
Horn antenna (18–40 GHz)	EMCO	3116	FA001847	1 year	May 11, 2022
Pre-amplifier (18–26 GHz)	Narda	BBS-1826N612	FA001550	—	VOU
High pass filter (3-18 GHz)	Thilithic Inc.	6HC3000/18000-1.3-KK	FA002231	—	VOU
Power sensor	Rohde & Schwarz	NRP-Z91	FA002488	1 year	May 27, 2022
PXA Signal Analyzer	Keysight	N9030B	BAMS-1002036362	1 year	March 23, 2022
Testing Equipment*	Ericsson	CT11	T01G495060	—	NCR

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

* Testing equipment (CT11) is the test equipment that drives the radios traffic.

Section 8. Testing data

8.1 Maximum output power at RF antenna connector (Band 66)

8.1.1 Definitions and limits

FCC §27.50(d) Operation within the bands: 2110–2155 MHz and 2155–2180 MHz.

(1) The power of each fixed or base station transmitting in the 1995–2000 MHz, 2110–2155 MHz, 2155–2180 MHz or 2180–2200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;

(ii) An EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(2) The power of each fixed or base station transmitting in the 1995–2000 MHz, the 2110–2155 MHz 2155–2180 MHz band, or 2180–2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;

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

(3) A licensee operating a base or fixed station in the 2110–2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025–2110 MHz band. A licensee operating a base or fixed station in the 2110–2180 MHz band utilizing power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers (75 miles) of the base or fixed station operating in this band: All Broadband Radio Service (BRS) licensees authorized under this part in the 2155–2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110–2180 MHz band.

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. 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 (d)(6) of this section. 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.

(6) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

8.1.1 Definitions and limits, continued

RSS-139, Section 4.1

The transmitter power shall be measured in terms of a root-mean-square (RMS) average value.

RSS-139, Section 6.5

Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the band 2110–2180 MHz.

In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

RSS-170, Section 5.3.1

Consult SRSP-519 for e.i.r.p. limits on ATC base stations operating in the bands 2000–2020 MHz and 2180–2200 MHz.

SRSP-513, Section 5.1

5.1.1 Fixed and base stations

5.1.1.1 For fixed and base stations operating within the frequency range 2110–2180 MHz with a channel bandwidth equal to or less than 1 MHz, the maximum permissible equivalent isotropically radiated power (e.i.r.p.) is 1640 watts with an antenna height above average terrain (HAAT) up to 300 metres.

5.1.1.2 For fixed and base stations operating within the frequency range 2110–2180 MHz with a channel bandwidth greater than 1 MHz, the maximum permissible e.i.r.p. is 1640 watts/MHz e.i.r.p. (i.e. no more than 1640 watts e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT) up to 300 metres.

5.1.1.3 Fixed and base stations located in geographic areas at a distance greater than 26 km from large or medium population centres, and transmitting within the frequency range 2110–2180 MHz, may increase their e.i.r.p. up to a maximum of 3280 watts/MHz (i.e. no more than 3280 watts e.i.r.p. in any 1 MHz band segment), with an antenna HAAT up to 300 metres.

Within 26 km of any large or medium population centre, fixed and base stations may operate at increased e.i.r.p. if more than 50% of the population within a particular sector's coverage is located outside these large and medium population centres.

Fixed and base stations with increased e.i.r.p. must not be used to provide coverage to large and medium population centres. However, some incidental coverage of these large and medium population centres by stations with increased e.i.r.p. is permitted.

This provision also applies for fixed and base stations with a channel bandwidth equal to or less than 1 MHz (i.e. the e.i.r.p. may be increased up to a maximum of 3280 watts).

5.1.1.4 Fixed and base station antenna heights above average terrain may exceed 300 metres with a reduction in e.i.r.p. The maximum permissible e.i.r.p. for installations with antenna HAAT in excess of 300 metres is given in 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 (or 3280[1])
300 < HAAT ≤ 500	1070
500 < HAAT ≤ 1000	490
1000 < HAAT ≤ 1500	270
1500 < HAAT ≤ 2000	160

Note: [1]for fixed and base stations with a channel bandwidth equal to or less than 1 MHz

8.1.1 Definitions and limits, continued

SRSP-519, Section 5.1

The equivalent isotropically radiated power (e.i.r.p.) of base stations shall not exceed 1640 W when transmitting with an emission bandwidth of 1 MHz or less, and 1640 W/MHz when transmitting with an emission bandwidth greater than 1 MHz.

Base stations located outside of large or medium population may increase their e.i.r.p. to a maximum of 3280 W when transmitting with an emission bandwidth of 1 MHz or less, and to 3280 W/MHz when transmitting with an emission bandwidth greater than 1 MHz.

A licensee operating a base station utilizing an e.i.r.p greater than 1640 W/MHz must coordinate in advance with all AWS–4 licensees authorized to operate on adjacent frequency blocks within the same band.

Base station antenna heights above average terrain may exceed 300 m with a corresponding reduction in e.i.r.p. in accordance with Table above

8.1.2 Test summary

Test date	December 3, 2021
Test engineer	Andrey Adelberg

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 8.1.1, 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.
- **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 Radio 4460 44B2/25 44B66 C for band 66 is 18 dBi with 1 dB path loss.**

Spectrum analyzer settings for PSD:

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

8.1.4 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
2155.0	39.13	45.15	-1.00	18.00	62.15	62.15	0.00

Table 8.1-3: *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	EIRP limit, dBm/MHz	Margin, dB
2112.5	38.84	44.86	62.15	17.29
2155.0	**39.07**	45.09	62.15	17.06
2197.5	38.81	44.83	62.15	17.32

Table 8.1-4: *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	EIRP limit, dBm/MHz	Margin, dB
2112.5	38.99	45.01	62.15	17.14
2155.0	**39.08**	45.10	62.15	17.05
2197.5	38.94	44.96	62.15	17.19

Table 8.1-5: *RF power density measurement results of a single-carrier operation for LTE on 10 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
2115.0	**38.74**	44.76	62.15	17.39
2155.0	38.68	44.70	62.15	17.45
2195.0	38.73	44.75	62.15	17.40

Table 8.1-6: *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	EIRP limit, dBm/MHz	Margin, dB
2115.0	38.69	44.71	62.15	17.44
2155.0	**38.85**	44.87	62.15	17.28
2195.0	38.63	44.65	62.15	17.50

Table 8.1-7: *RF power density measurement results of a single-carrier operation for LTE on 15 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
2117.5	38.44	44.46	62.15	17.69
2155.0	**38.50**	44.52	62.15	17.63
2192.5	38.24	44.26	62.15	17.89

Table 8.1-8: *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	EIRP limit, dBm/MHz	Margin, dB
2117.5	38.06	44.08	62.15	18.07
2155.0	**38.49**	44.51	62.15	17.64
2192.5	38.05	44.07	62.15	18.08

Test data, continued

Table 8.1-9: *RF power density measurement results of a two-carrier operation for LTE on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	38.96	44.98	62.15	17.17
Middle	**38.97**	44.99	62.15	17.16
Top	38.92	44.94	62.15	17.21

Table 8.1-10: *RF power density measurement results of a three-carrier operation for LTE on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	37.82	43.84	62.15	18.31
Middle	**38.01**	44.03	62.15	18.12
Top	37.90	43.92	62.15	18.23

Table 8.1-11: *RF power density measurement results of a two-carrier operation for NR on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	38.87	44.89	62.15	17.26
Middle	**39.13**	45.15	62.15	17.00
Top	38.83	44.85	62.15	17.30

Table 8.1-12: *RF power density measurement results of a three-carrier operation for NR on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	37.93	43.95	62.15	18.20
Middle	**38.08**	44.10	62.15	18.05
Top	37.81	43.83	62.15	18.32

Table 8.1-13: *RF power density measurement results of a multi-RAT operation for LTE and NR on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	38.84	44.86	62.15	17.29
Middle	**39.00**	45.02	62.15	17.13
Top	38.82	44.84	62.15	17.31

Test data, continued

Table 8.1-14: *RF total channel power measurement results for LTE*

Remarks	5 MHz channel		10 MHz channel		15 MHz channel	
	dBm	W	dBm	W	dBm	W
Low channel	44.55	28.510	47.52	56.494	48.78	75.509
Mid channel	44.56	28.576	47.55	56.885	48.86	76.913
Top channel	44.37	27.353	47.46	55.719	48.60	72.444
2 carriers - bottom	47.68	58.614				
2 carriers - middle	47.75	59.566				
2 carriers - top	47.58	57.280				
3 carriers - bottom	48.38	68.865				
3 carriers - middle	48.56	71.779				
3 carriers - top	48.30	67.608				

Table 8.1-15: *RF total channel power measurement results for NR*

Remarks	5 MHz channel		10 MHz channel		15 MHz channel	
	dBm	W	dBm	W	dBm	W
Low channel	44.60	28.840	47.55	56.885	48.76	75.162
Mid channel	44.61	28.907	47.62	57.810	48.95	78.524
Top channel	44.34	27.164	47.51	56.364	48.62	72.778
2 carriers - bottom	47.71	59.020				
2 carriers - middle	47.76	59.704				
2 carriers - top	47.63	57.943				
3 carriers - bottom	48.41	69.343				
3 carriers - middle	48.60	72.444				
3 carriers - top	48.32	67.920				

Table 8.1-16: *RF total channel power measurement results for multi-RAT operation*

Remarks	Power, dBm	Power, W
LTE 5 MHz and NR 5 MHz - bottom	47.68	58.614
LTE 5 MHz and NR 5 MHz - middle	47.75	59.566
LTE 5 MHz and NR 5 MHz - top	47.62	57.810

Test data, continued

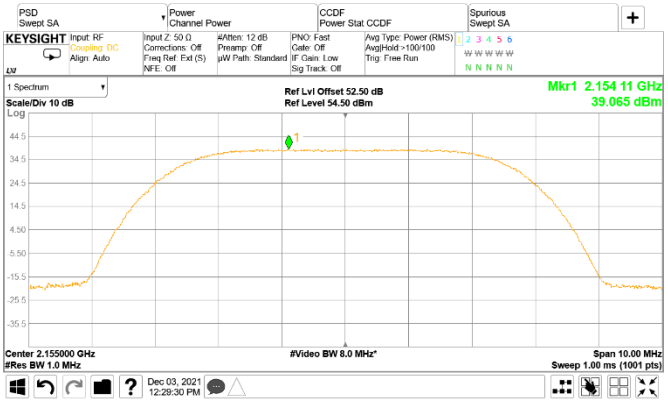


Figure 8.1-1: *PSD of LTE 5 MHz channel bandwidth, single carrier operation, sample plot*

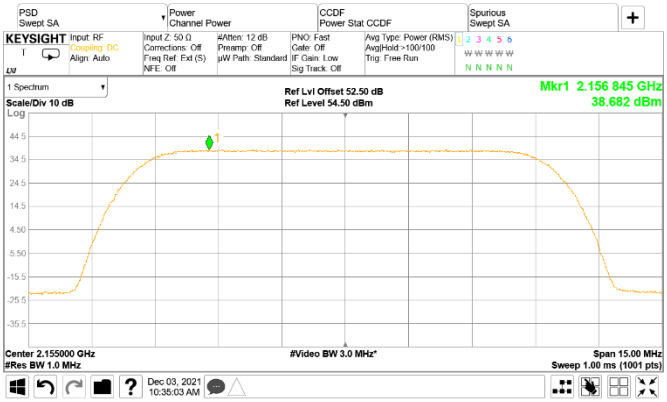


Figure 8.1-2: *PSD of LTE 10 MHz channel bandwidth, single carrier operation, sample plot*

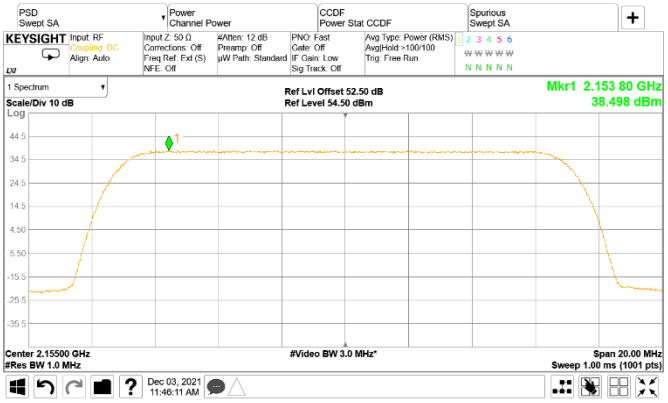


Figure 8.1-3: *PSD of LTE 15 MHz channel bandwidth, single carrier operation, sample plot*

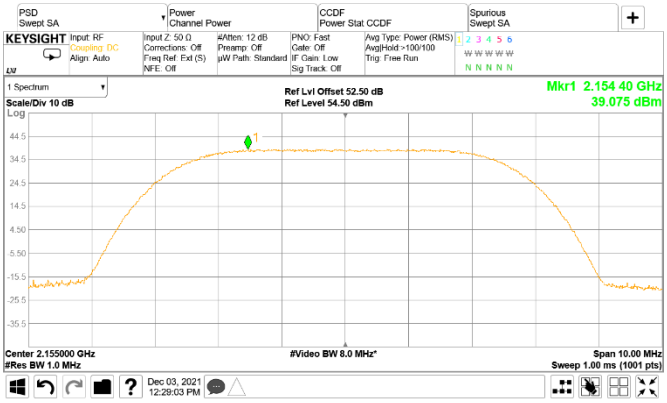


Figure 8.1-4: *PSD of NR 5 MHz channel bandwidth, single carrier operation, sample plot*

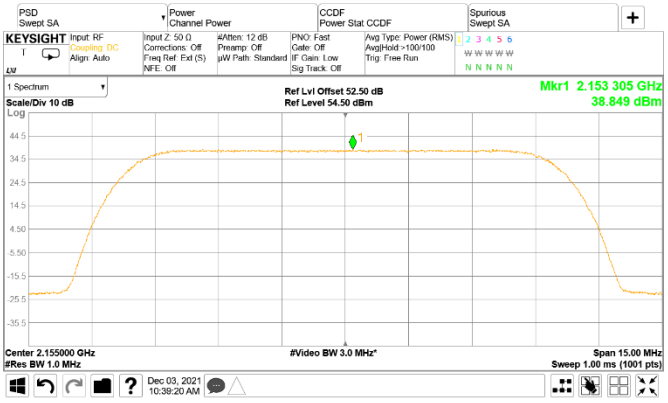


Figure 8.1-5: *PSD of NR 10 MHz channel bandwidth, single carrier operation, sample plot*

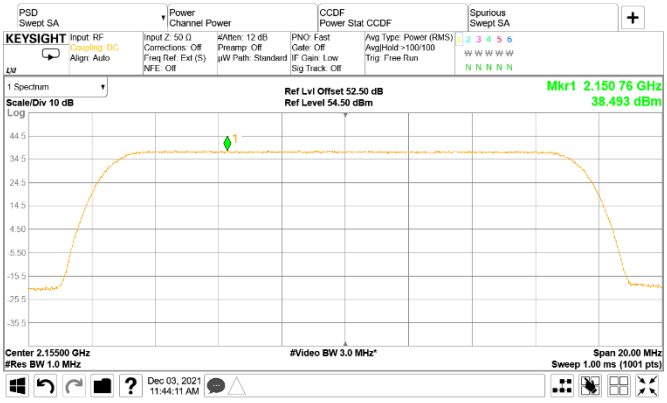


Figure 8.1-6: *PSD of NR 15 MHz channel bandwidth, single carrier operation, sample plot*

Test data, continued

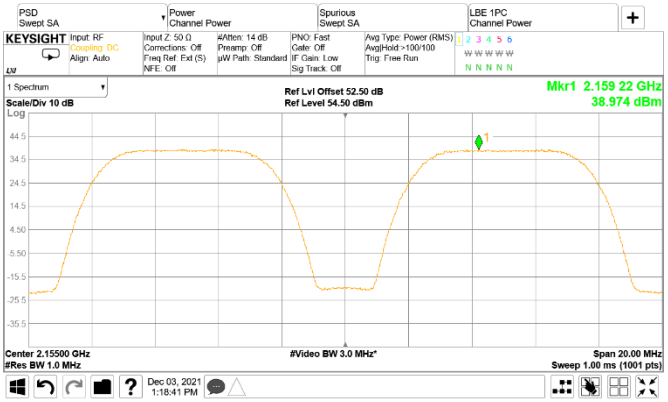


Figure 8.1-7: *PSD of LTE two-carrier operation, sample plot*

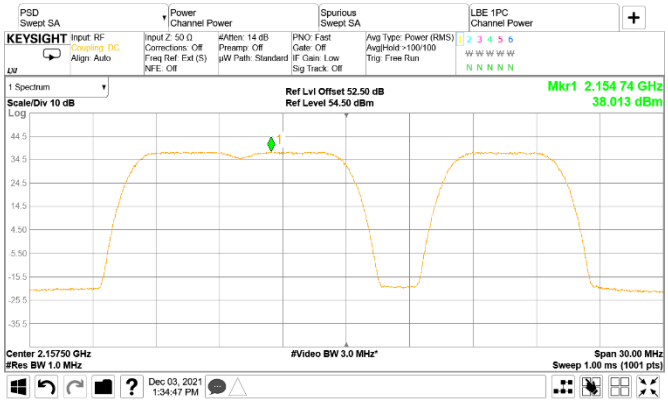


Figure 8.1-8: *PSD of LTE three-carrier operation, sample plot*

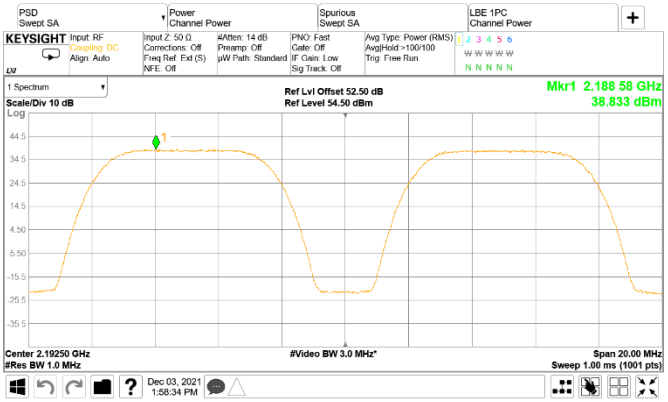


Figure 8.1-9: *PSD of NR two-carrier operation, sample plot*

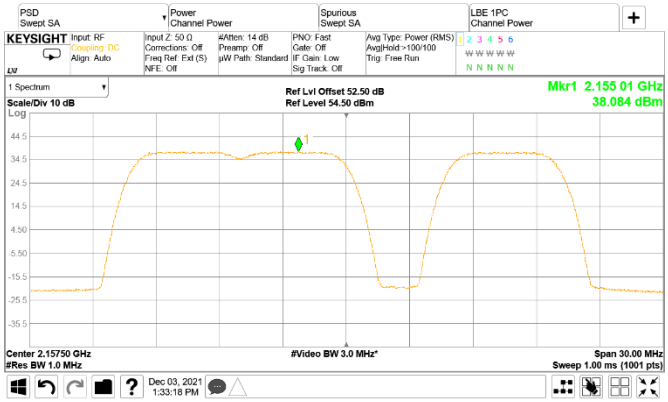


Figure 8.1-10: *PSD of NR three-carrier operation, sample plot*

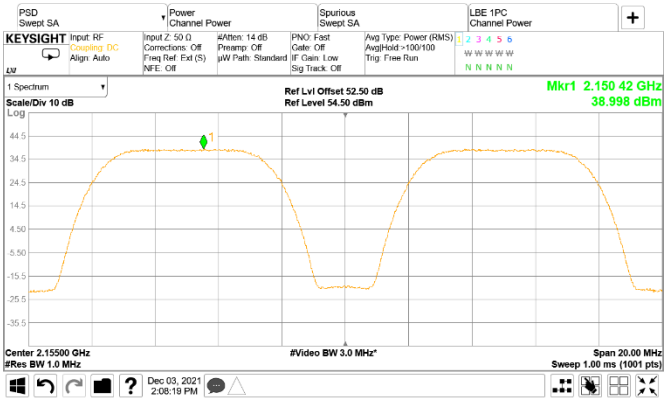


Figure 8.1-11: *PSD of multi-RAT operation, sample plot*

Test data, continued

Table 8.1-17: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 5 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	2112.5	8.11	13.00	4.89
5 MHz, Mid channel	2155.0	8.11	13.00	4.89
5 MHz, Top channel	2197.5	8.15	13.00	4.85

Table 8.1-18: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 10 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	2115.0	8.08	13.00	4.92
10 MHz, Mid channel	2155.0	8.14	13.00	4.86
10 MHz, Top channel	2195.0	8.05	13.00	4.95

Table 8.1-19: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 15 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	2117.5	7.33	13.00	5.67
15 MHz, Mid channel	2155.0	7.29	13.00	5.71
15 MHz, Top channel	2192.5	7.43	13.00	5.57

Table 8.1-20: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 5 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	2112.5	7.95	13.00	5.05
5 MHz, Mid channel	2155.0	7.91	13.00	5.09
5 MHz, Top channel	2197.5	7.89	13.00	5.11

Table 8.1-21: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 10 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	2115.0	7.95	13.00	5.05
10 MHz, Mid channel	2155.0	8.09	13.00	4.91
10 MHz, Top channel	2195.0	8.11	13.00	4.89

Table 8.1-22: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 15 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	2117.5	7.37	13.00	5.63
15 MHz, Mid channel	2155.0	7.33	13.00	5.67
15 MHz, Top channel	2192.5	7.50	13.00	5.50

Test data, continued

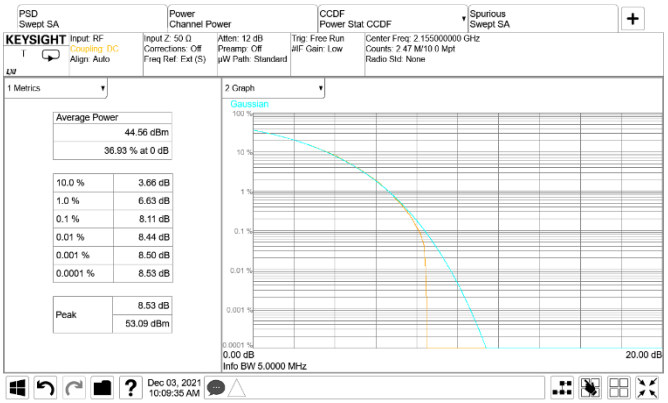


Figure 8.1-12: *CCDF sample plot, LTE*

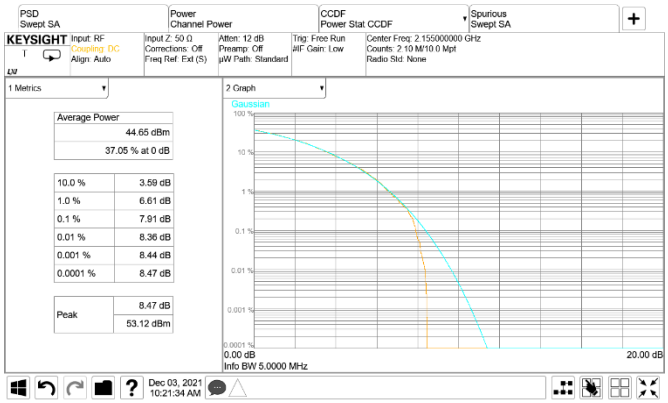


Figure 8.1-13: *CCDF sample plot, NR*

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

8.2.1 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 8.2-1: *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

8.2.2 Test summary

Test date	December 3, 2021
Test engineer	Andrey Adelberg

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.

- 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)
- There is no MIMO operation with GSM and CDMA
- 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.
- **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 Radio 4460 44B2/25 44B66 C for band 2/25 is 17.5 dBi with 1 dB path loss.**

Spectrum analyzer settings for PSD:

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

8.2.1 Test data

Table 8.2-2: *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
1962.5	39.42	45.44	-1.00	17.50	61.94	62.15	0.21

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	EIRP limit, dBm/MHz	Margin, dB
1932.5	38.92	44.94	62.15	17.21
1962.5	**39.28**	45.30	62.15	16.85
1992.5	39.23	45.25	62.15	16.90

Table 8.2-4: *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	EIRP limit, dBm/MHz	Margin, dB
1932.5	38.98	45.00	62.15	17.15
1962.5	39.17	45.19	62.15	16.96
1992.5	**39.35**	45.37	62.15	16.78

Table 8.2-5: *RF power density measurement results of a single-carrier operation for LTE on 10 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1935.0	39.02	45.04	62.15	17.11
1962.5	**39.42**	45.44	62.15	16.71
1990.0	**39.42**	45.44	62.15	16.71

Table 8.2-6: *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	EIRP limit, dBm/MHz	Margin, dB
1935.0	38.92	44.94	62.15	17.21
1962.5	39.27	45.29	62.15	16.86
1990.0	**39.27**	45.29	62.15	16.86

Table 8.2-7: *RF power density measurement results of a single-carrier operation for LTE on 15 MHz channel*

Frequency, MHz	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
1937.5	**38.63**	44.65	62.15	17.50
1962.5	38.59	44.61	62.15	17.54
1987.5	38.44	44.46	62.15	17.69

Table 8.2-8: *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	EIRP limit, dBm/MHz	Margin, dB
1937.5	38.25	44.27	62.15	17.88
1962.5	**38.39**	44.41	62.15	17.74
1987.5	38.36	44.38	62.15	17.77

Test data, continued

Table 8.2-9: *RF power density measurement results of a two-carrier operation for LTE on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	**39.44**	45.46	62.15	16.69
Middle	39.18	45.20	62.15	16.95
Top	39.19	45.21	62.15	16.94

Table 8.2-10: *RF power density measurement results of a three-carrier operation for LTE on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	38.12	44.14	62.15	18.01
Middle	**38.32**	44.34	62.15	17.81
Top	38.29	44.31	62.15	17.84

Table 8.2-11: *RF power density measurement results of a two-carrier operation for NR on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	39.23	45.25	62.15	16.90
Middle	**39.40**	45.42	62.15	16.73
Top	39.28	45.30	62.15	16.85

Table 8.2-12: *RF power density measurement results of a three-carrier operation for NR on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	38.10	44.12	62.15	18.03
Middle	**38.26**	44.28	62.15	17.87
Top	38.25	44.27	62.15	17.88

Table 8.2-13: *RF power density measurement results of a multi-RAT operation for LTE and NR on 5 MHz channel*

Notes	RF power density, dBm/MHz	Total MIMO PSD, dBm/MHz	EIRP limit, dBm/MHz	Margin, dB
Bottom	**39.37**	45.39	62.15	16.76
Middle	39.12	45.14	62.15	17.01
Top	39.36	45.38	62.15	16.77

Test data, continued

Table 8.2-14: *RF total channel power measurement results for LTE*

Remarks	5 MHz channel		10 MHz channel		15 MHz channel	
	dBm	W	dBm	W	dBm	W
Low channel	44.60	28.840	47.64	58.076	48.82	76.208
Mid channel	44.92	31.046	47.96	62.517	49.09	81.096
Top channel	45.12	32.509	47.97	62.661	48.96	78.705
2 carriers - bottom	47.92	61.944				
2 carriers - middle	47.97	62.661				
2 carriers - top	48.00	63.096				
3 carriers - bottom	48.55	71.614				
3 carriers - middle	48.78	75.509				
3 carriers - top	48.70	74.131				

Table 8.2-15: *RF total channel power measurement results for NR*

Remarks	5 MHz channel		10 MHz channel		15 MHz channel	
	dBm	W	dBm	W	dBm	W
Low channel	44.55	28.510	47.69	58.749	48.82	76.208
Mid channel	45.15	32.734	47.96	62.517	49.06	80.538
Top channel	44.79	30.130	48.02	63.387	48.95	78.524
2 carriers - bottom	47.92	61.944				
2 carriers - middle	48.00	63.096				
2 carriers - top	48.02	63.387				
3 carriers - bottom	48.52	71.121				
3 carriers - middle	48.82	76.208				
3 carriers - top	48.71	74.302				

Table 8.2-16: *RF total channel power measurement results for multi-RAT operation*

Remarks	Power, dBm	Power, W
LTE 5 MHz and NR 5 MHz - bottom	47.88	61.376
LTE 5 MHz and NR 5 MHz - middle	47.95	62.373
LTE 5 MHz and NR 5 MHz - top	47.95	62.373

Test data, continued

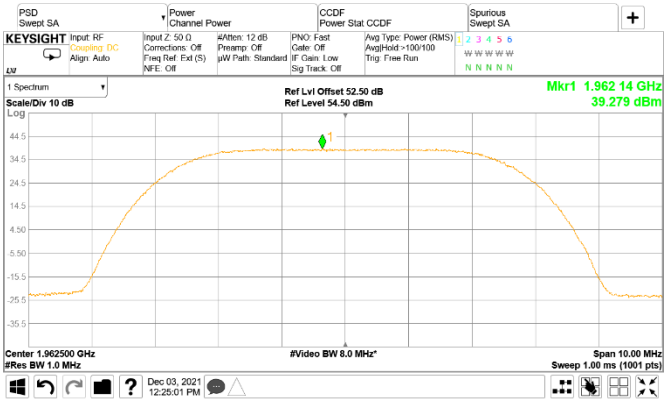


Figure 8.2-1: *PSD of LTE 5 MHz channel bandwidth, single carrier operation, sample plot*

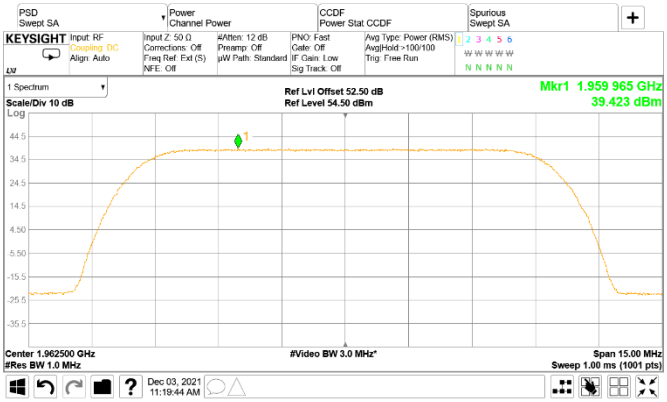


Figure 8.2-2: *PSD of LTE 10 MHz channel bandwidth, single carrier operation, sample plot*

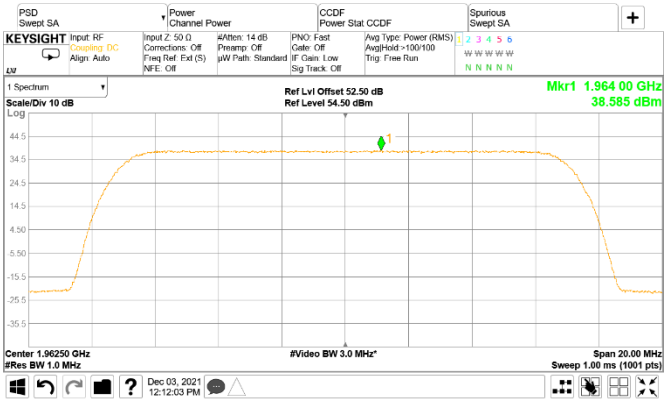


Figure 8.2-3: *PSD of LTE 15 MHz channel bandwidth, single carrier operation, sample plot*

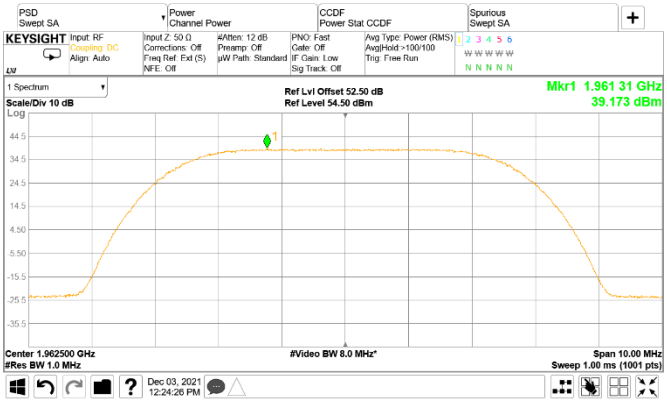


Figure 8.2-4: *PSD of NR 5 MHz channel bandwidth, single carrier operation, sample plot*

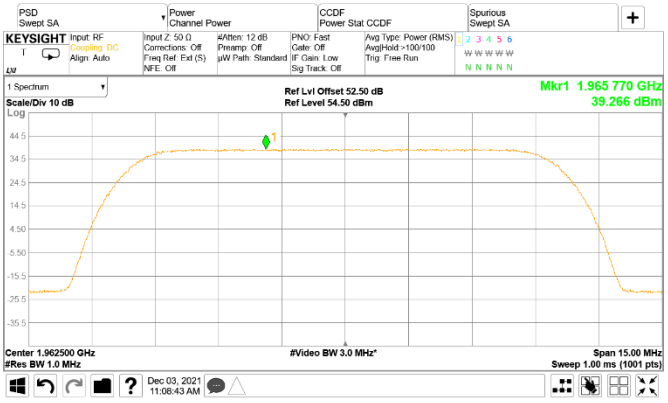


Figure 8.2-5: *PSD of NR 10 MHz channel bandwidth, single carrier operation, sample plot*

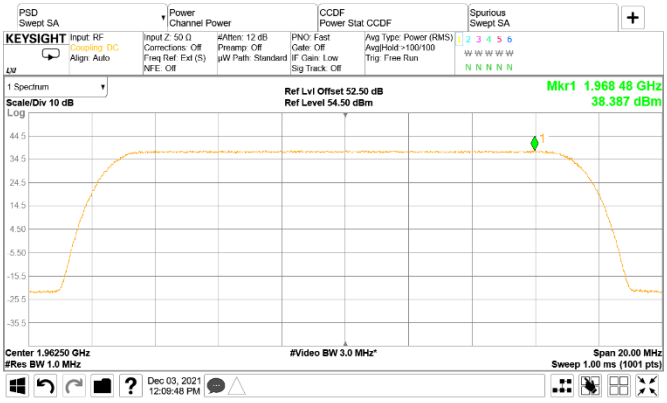


Figure 8.2-6: *PSD of NR 15 MHz channel bandwidth, single carrier operation, sample plot*

Test data, continued

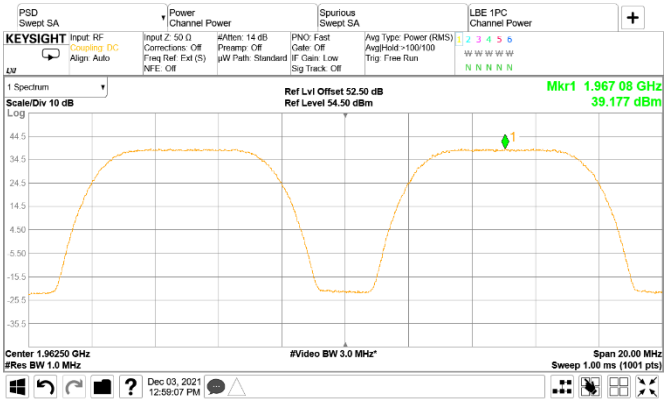


Figure 8.2-7: *PSD of LTE 5 MHz channel bandwidth, two-carrier operation, sample plot*

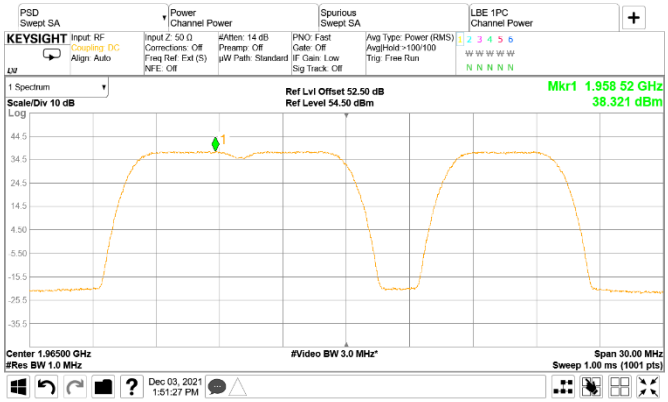


Figure 8.2-8: *PSD of LTE 5 MHz channel bandwidth, three-carrier operation, sample plot*

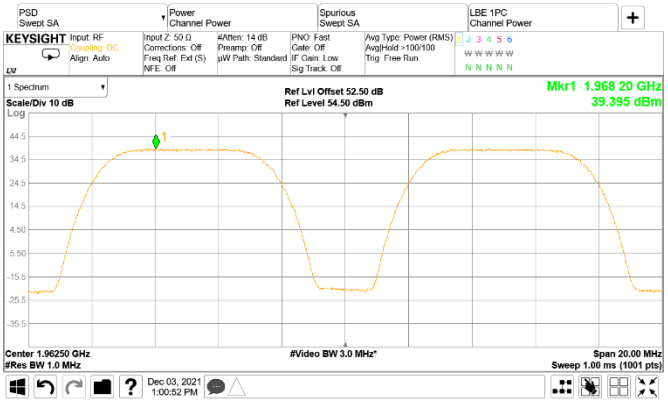


Figure 8.2-9: *PSD of NR 5 MHz channel bandwidth, two-carrier operation, sample plot*

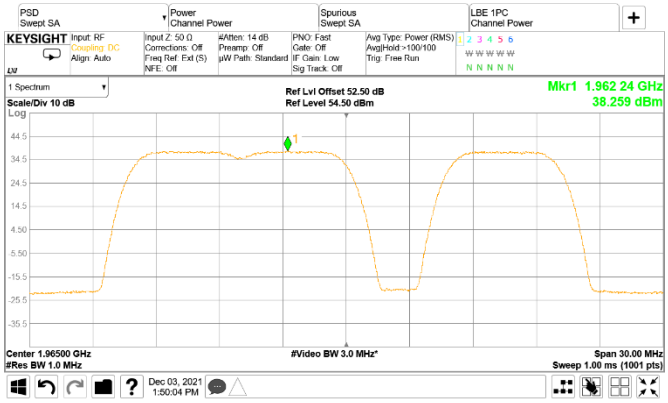


Figure 8.2-10: *PSD of NR 5 MHz channel bandwidth, three-carrier operation, sample plot*

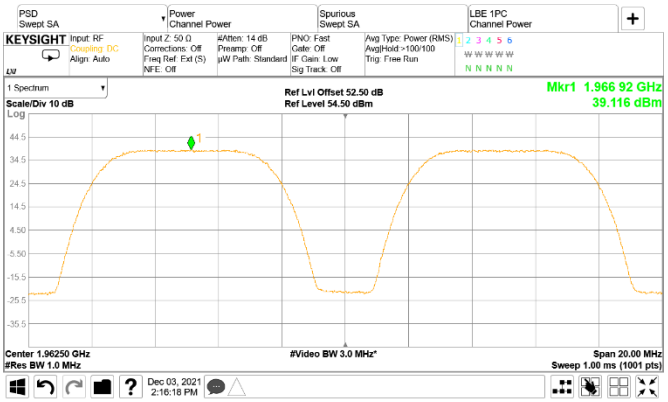


Figure 8.2-11: *PSD of LTE and NR 5 MHz channel bandwidth, multi-RAT operation, sample plot*

Test data, continued

Table 8.2-17: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 5 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	1932.5	8.18	13.00	4.82
5 MHz, Mid channel	1962.5	8.13	13.00	4.87
5 MHz, Top channel	1992.5	8.15	13.00	4.85

Table 8.2-18: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 10 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	1935.0	8.08	13.00	4.92
10 MHz, Mid channel	1962.5	8.14	13.00	4.86
10 MHz, Top channel	1990.0	8.09	13.00	4.91

Table 8.2-19: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for LTE 15 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	1937.5	7.44	13.00	5.56
15 MHz, Mid channel	1962.5	7.28	13.00	5.72
15 MHz, Top channel	1987.5	7.33	13.00	5.67

Table 8.2-20: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 5 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
5 MHz, Low channel	1932.5	8.13	13.00	4.87
5 MHz, Mid channel	1962.5	7.96	13.00	5.04
5 MHz, Top channel	1992.5	7.96	13.00	5.04

Table 8.2-21: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 10 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
10 MHz, Low channel	1935.0	8.10	13.00	4.90
10 MHz, Mid channel	1962.5	8.01	13.00	4.99
10 MHz, Top channel	1990.0	8.14	13.00	4.86

Table 8.2-22: *Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for single carrier operation for NR 15 MHz*

Remarks	Frequency, MHz	0.1% CCDF, dB	PAPR reduction limit, dB	Margin, dB
15 MHz, Low channel	1937.5	7.54	13.00	5.46
15 MHz, Mid channel	1962.5	7.31	13.00	5.69
15 MHz, Top channel	1987.5	7.41	13.00	5.59

Test data, continued

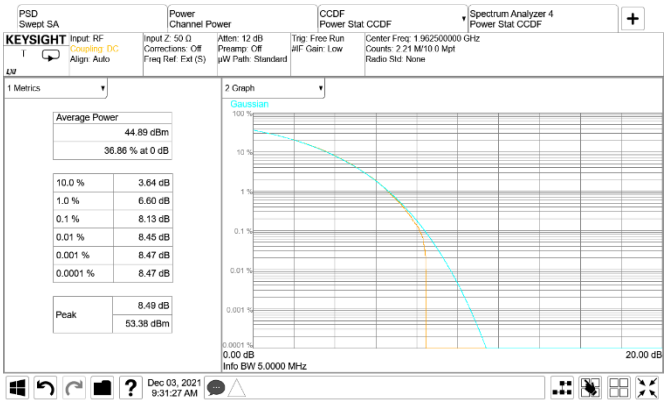


Figure 8.2-12: *CCDF sample plot, LTE*

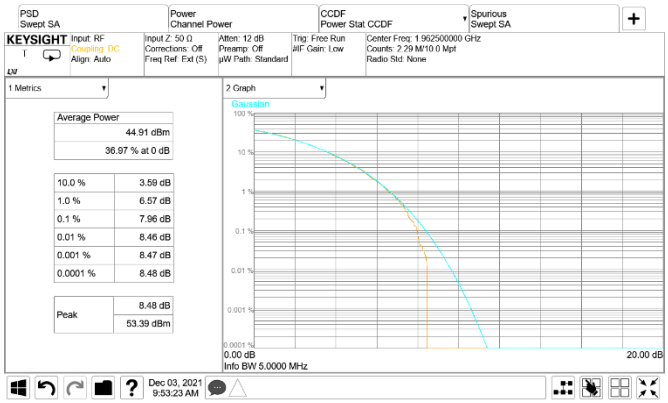


Figure 8.2-13: *CCDF sample plot, NR*

8.3 Spurious emissions at RF antenna connector (Band 66)

8.3.1 Definitions and limits

FCC §27.53:
(h) AWS emission limits
(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}$ (P) dB.

(3) Measurement procedure.

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1-megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

RSS-139, Section 6.6:
i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, 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 outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, 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.

RSS-170, Section 5.4:
The transmitter unwanted emissions shall be measured for all channel bandwidths with the carrier frequency set at both the highest and lowest channels in which the equipment is designed to operate.

The e.i.r.p. density of unwanted and carrier-off state emissions outlined in this section (Section 5.4) shall be averaged over any 2-ms active transmission using an RMS detector with a resolution bandwidth of 1 MHz for broadband emissions and a resolution bandwidth of 1 kHz for discrete emissions, unless stated otherwise.

For ATC equipment operating in the bands 2000–2020 MHz and 2180–2200 MHz, the unwanted emission limits shall be determined using a measurement bandwidth of 1 MHz or greater. However, in the 1 MHz band immediately outside and adjacent to the equipment's operating frequency block, a resolution bandwidth of at least 1% of the occupied bandwidth may be employed.
5.4.1.2 ATC Base Station Equipment operating in bands 2000–2020 MHz and 2180–2200 MHz
The unwanted emissions of ATC base station equipment transmitting in the bands 2000-2020 MHz and 2180-2200 MHz shall comply with the following:

(1) The power of any unwanted emissions at frequencies outside the equipment's operating frequency block shall be attenuated below the transmitter power P (dBW), by 43 + 10 log p (watts), dB.
(2) *For equipment operating in the band 2180–2200 MHz, in addition to (1), the power of any emissions on all frequencies between 2200 MHz and 2290 MHz shall not exceed an e.i.r.p. of −100.6 dBW/4 kHz (−70.6 dBm/4 kHz).

**** This requirement is for implementation and is enforced at the time of licensing. Therefore, results are not included in this report.***
Requirement number 2 above is amended as detailed in the following ISED document...
https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11536.html

8.3.2 Test summary

Test date	December 3, 2021
Test engineer	Andrey Adelberg

8.3.3 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 × $\text{Log}_{10}(4)$ = 6 dB
- RBW 1 MHz, VBW was wider than RBW

8.3.4 Test data

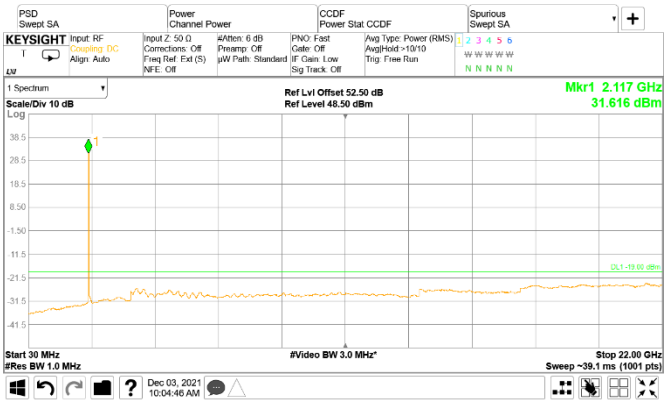


Figure 8.3-1: *Conducted spurious emissions of LTE 5 MHz low channel, single carrier operation*

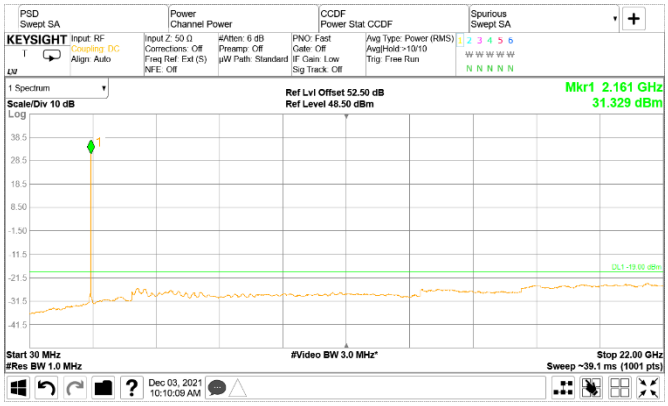


Figure 8.3-2: *Conducted spurious emissions of LTE 5 MHz mid channel, single carrier operation*

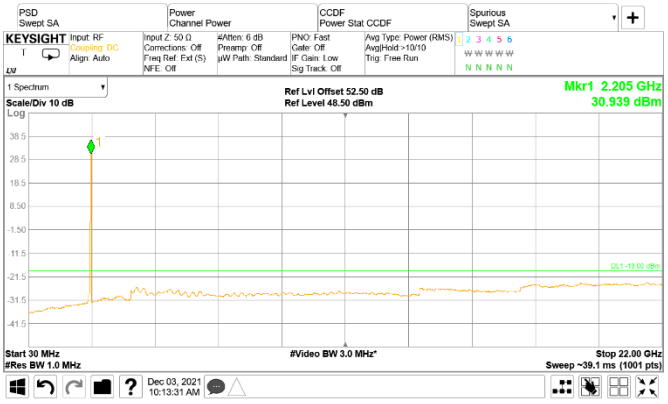


Figure 8.3-3: *Conducted spurious emissions of LTE 5 MHz top channel, single carrier operation*

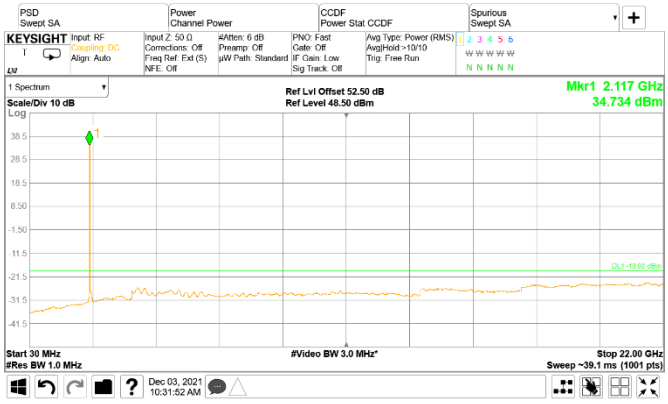


Figure 8.3-4: *Conducted spurious emissions of LTE 10 MHz low channel, single carrier operation*

Test data, continued

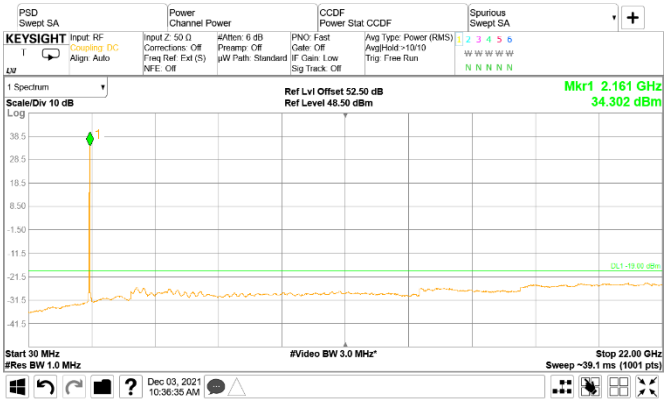


Figure 8.3-5: *Conducted spurious emissions of LTE 10 MHz mid channel, single carrier operation*

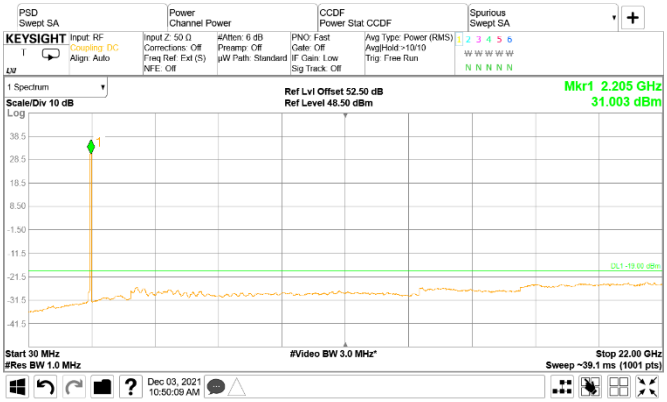


Figure 8.3-6: *Conducted spurious emissions of LTE 10 MHz top channel, single carrier operation*

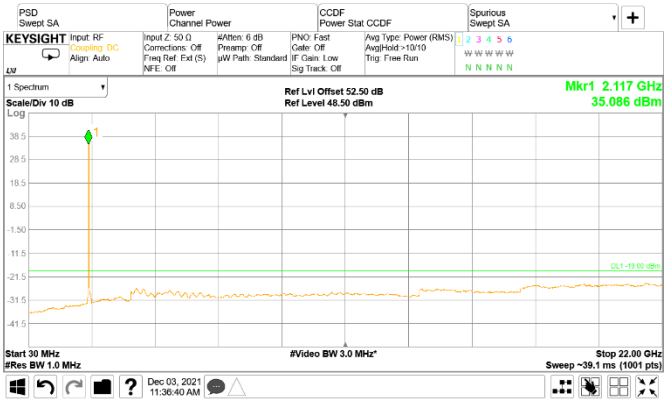


Figure 8.3-7: *Conducted spurious emissions of LTE 15 MHz low channel, single carrier operation*

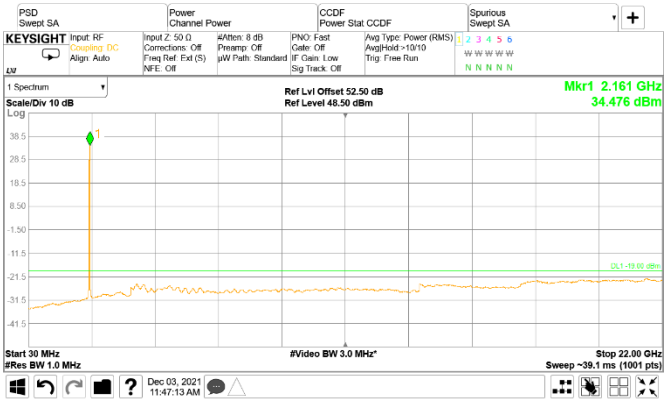


Figure 8.3-8: *Conducted spurious emissions of LTE 15 MHz mid channel, single carrier operation*

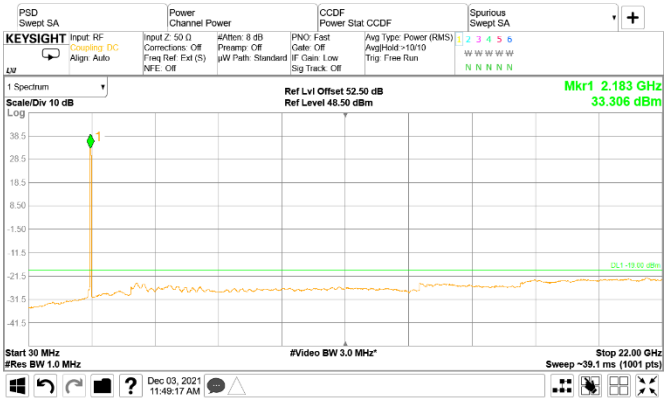


Figure 8.3-9: *Conducted spurious emissions of LTE 15 MHz top channel, single carrier operation*

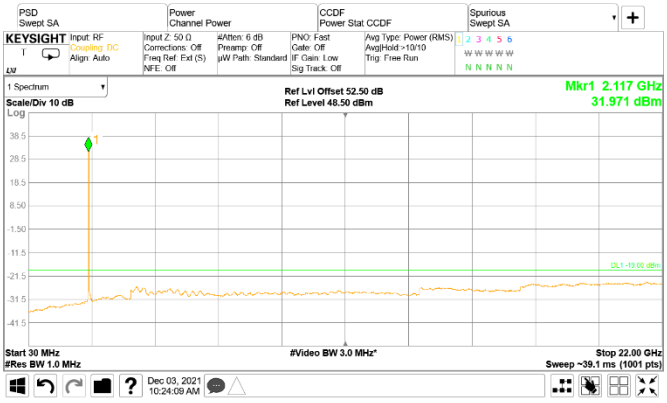


Figure 8.3-10: *Conducted spurious emissions of NR 5 MHz low channel, single carrier*

Test data, continued

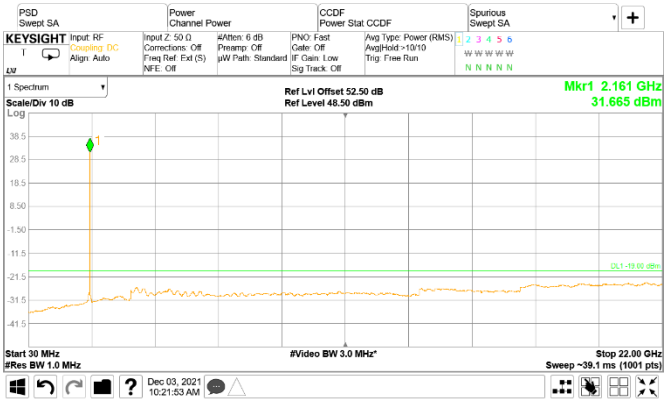


Figure 8.3-11: *Conducted spurious emissions of NR 5 MHz mid channel, single carrier*

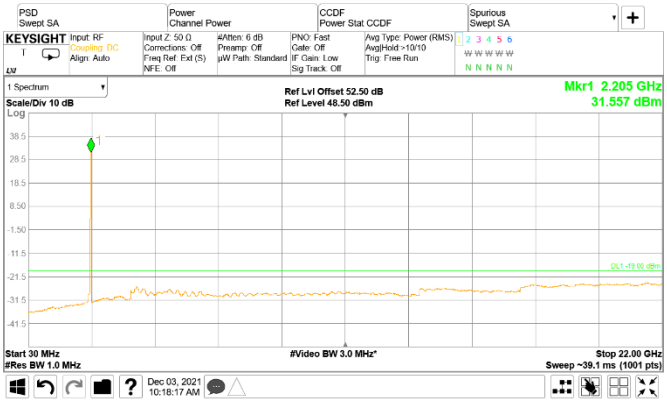


Figure 8.3-12: *Conducted spurious emissions of NR 5 MHz top channel, single carrier*

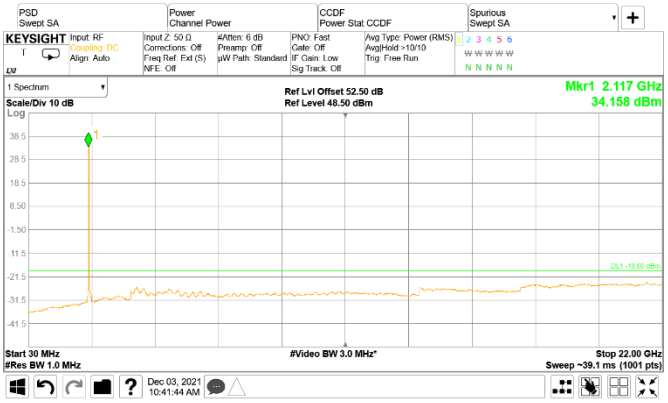


Figure 8.3-13: *Conducted spurious emissions of NR 10 MHz low channel, single carrier*

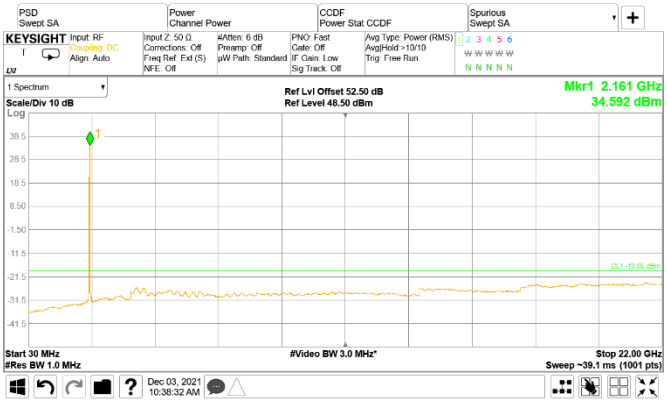


Figure 8.3-14: *Conducted spurious emissions of NR 10 MHz mid channel, single carrier*

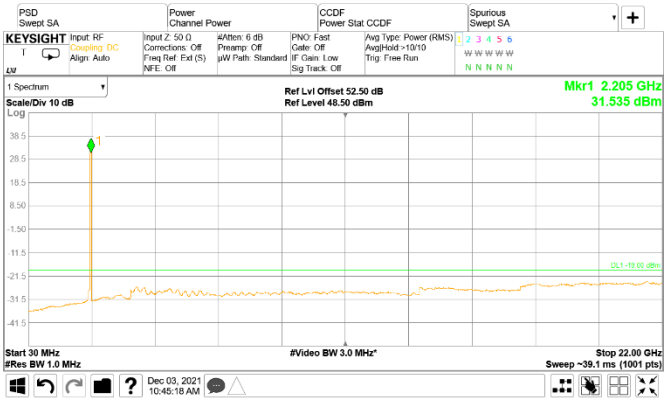


Figure 8.3-15: *Conducted spurious emissions of NR 10 MHz top channel, single carrier*

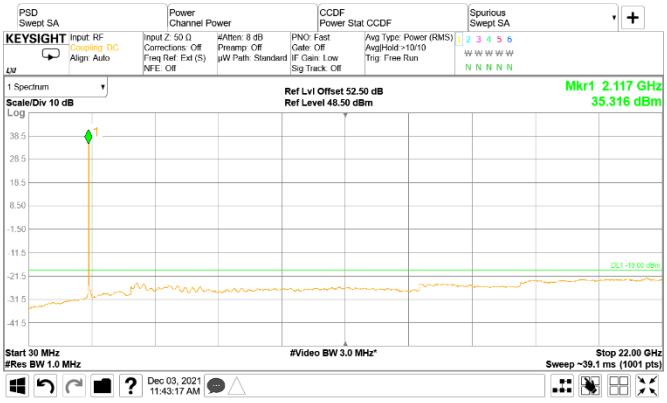


Figure 8.3-16: *Conducted spurious emissions of NR 15 MHz low channel, single carrier*

Test data, continued

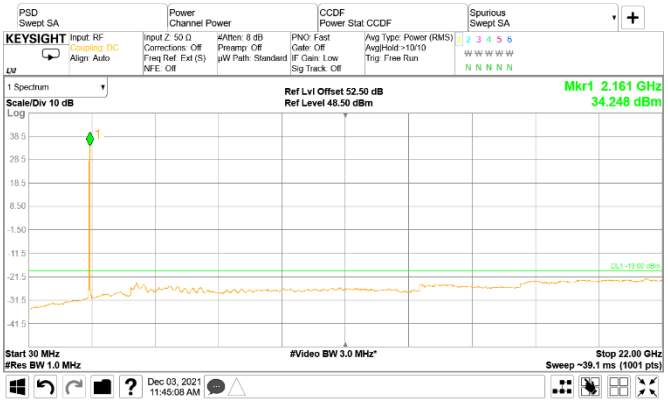


Figure 8.3-17: *Conducted spurious emissions of NR 15 MHz mid channel, single carrier*

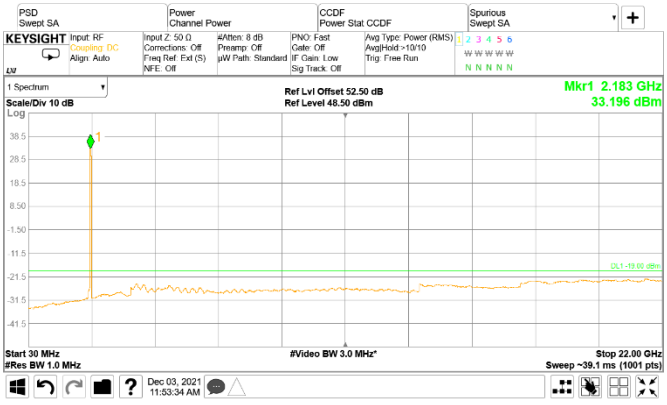


Figure 8.3-18: *Conducted spurious emissions of NR 15 MHz top channel, single carrier*

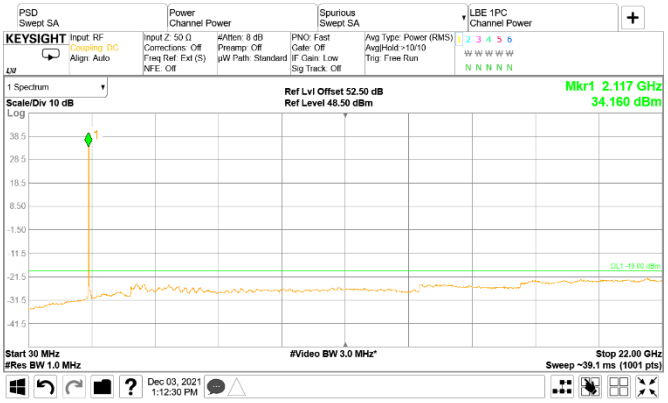


Figure 8.3-19: *Conducted spurious emissions of LTE 5 MHz two-carrier operation, bottom*

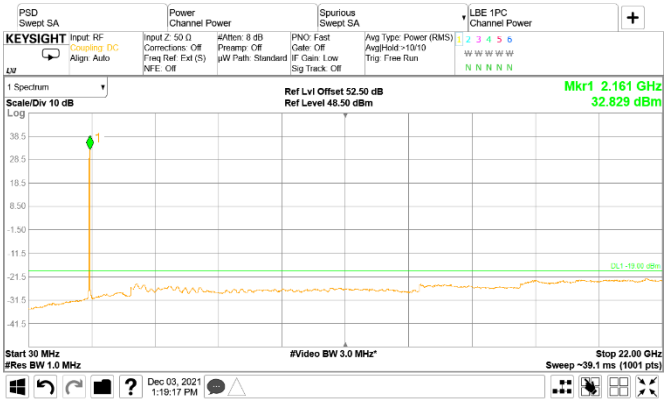


Figure 8.3-20: *Conducted spurious emissions of LTE 5 MHz two-carrier operation, middle*

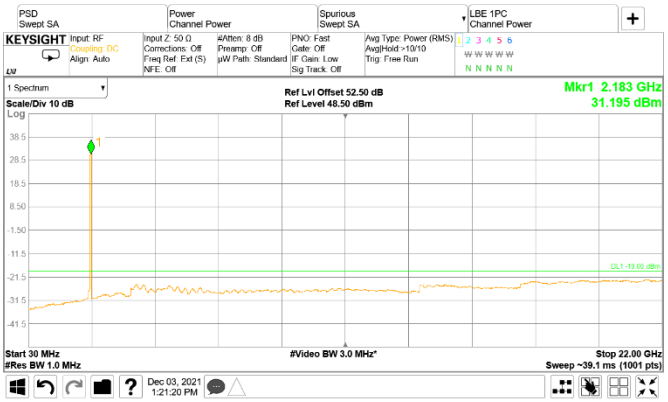


Figure 8.3-21: *Conducted spurious emissions of LTE 5 MHz two-carrier operation, top*

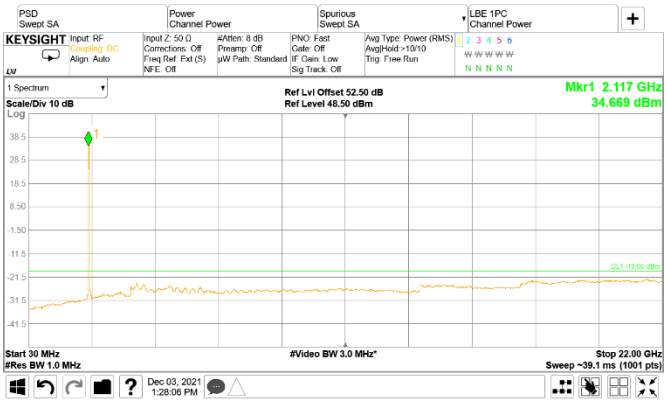


Figure 8.3-22: *Conducted spurious emissions of LTE 5 MHz three-carrier operation, bottom*

Test data, continued

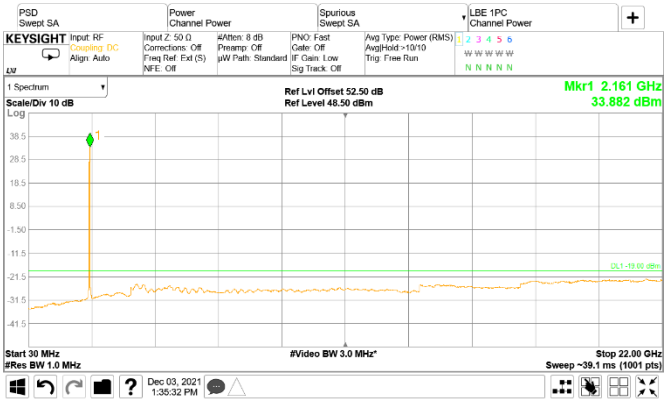


Figure 8.3-23: *Conducted spurious emissions of LTE 5 MHz three-carrier operation, middle*

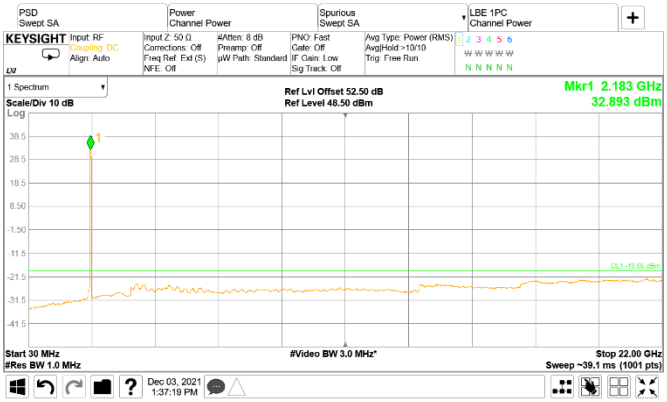


Figure 8.3-24: *Conducted spurious emissions of LTE 5 MHz three-carrier operation, top*

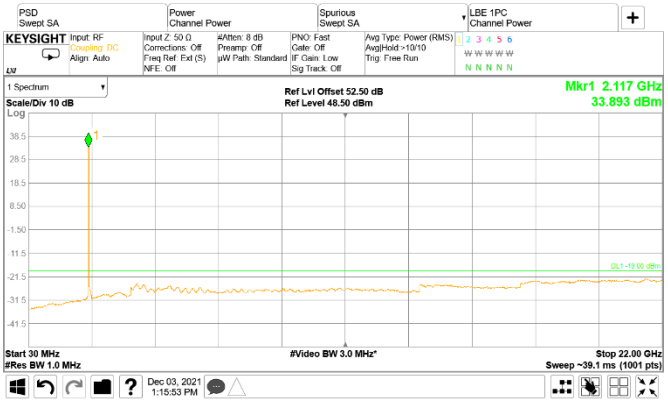


Figure 8.3-25: *Conducted spurious emissions of NR 5 MHz two-carrier operation, bottom*

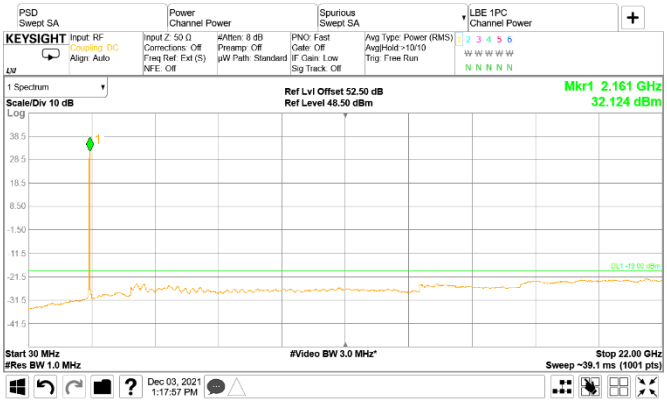


Figure 8.3-26: *Conducted spurious emissions of NR 5 MHz two-carrier operation, middle*

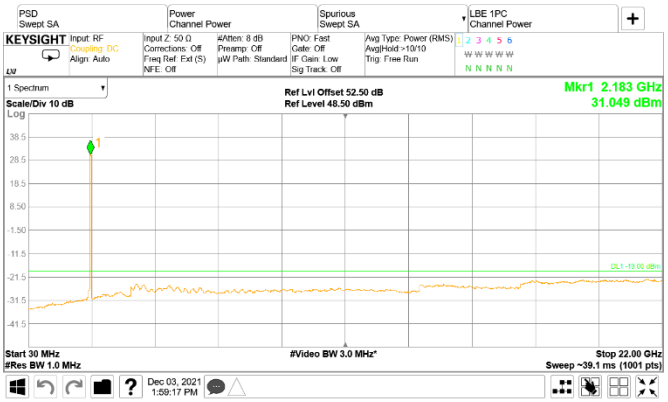


Figure 8.3-27: *Conducted spurious emissions of NR 5 MHz two-carrier operation, top*

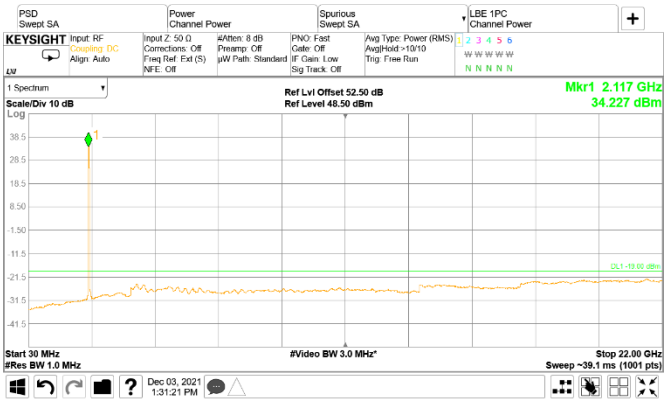


Figure 8.3-28: *Conducted spurious emissions of NR 5 MHz three-carrier operation, bottom*

Test data, continued

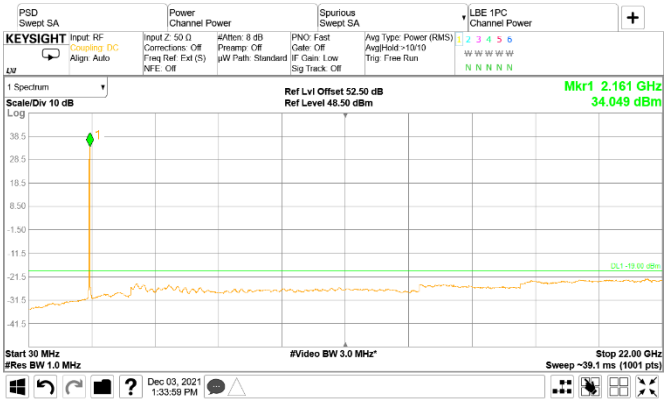


Figure 8.3-29: *Conducted spurious emissions of NR 5 MHz three-carrier operation, middle*

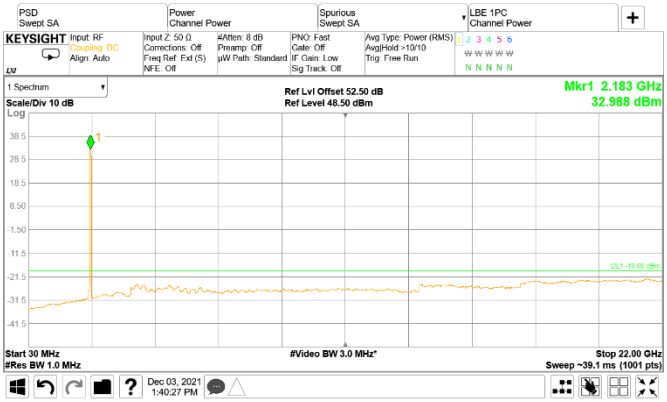


Figure 8.3-30: *Conducted spurious emissions of NR 5 MHz three-carrier operation, top*

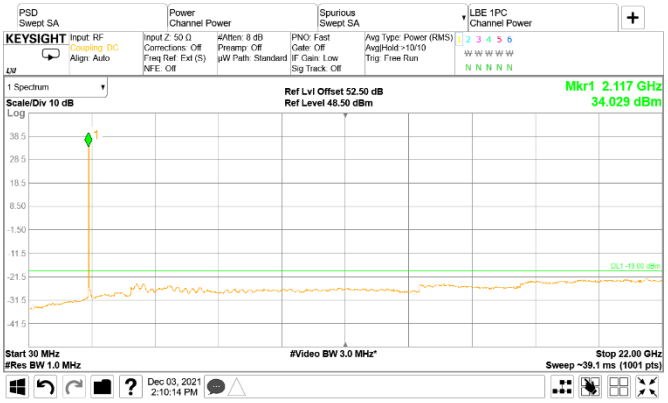


Figure 8.3-31: *Conducted spurious emissions of multi-RAT operation, LTE 5 MHz + NR 5 MHz, bottom*

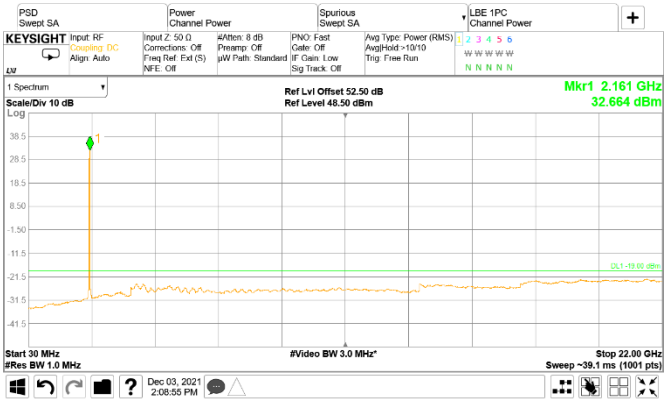


Figure 8.3-32: *Conducted spurious emissions of multi-RAT operation, LTE 5 MHz + NR 5 MHz, middle*

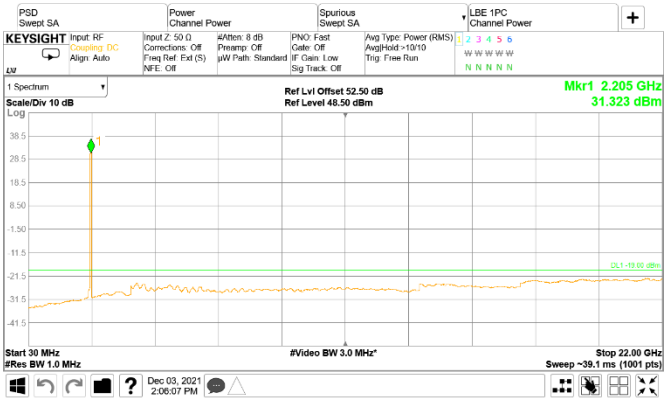


Figure 8.3-33: *Conducted spurious emissions of multi-RAT operation, LTE 5 MHz + NR 5 MHz, top*

Test data, continued

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

Figure 8.3-34: *Conducted emission at the lower band edge*

Frequency: *2110 MHz* *Mode:* *Single-carrier operation*
Meas. BW: *1% of EBW* *Tech.:* *LTE 5 MHz*
Limit: *−19 dBm/50 kHz* *Notes:* *None*

Figure 8.3-35: *Conducted emission 1 MHz away from the lower band edge*

Frequency: *2109 MHz* *Mode:* *Single-carrier operation*
Meas. BW: *1 MHz* *Tech.:* *LTE 5 MHz*
Limit: *−19 dBm/MHz* *Notes:* *None*

Figure 8.3-36: *Conducted emission at the upper band edge*

Frequency: *2200 MHz* *Mode:* *Single-carrier operation*
Meas. BW: *1% of EBW* *Tech.:* *LTE 5 MHz*
Limit: *−19 dBm/50 kHz* *Notes:* *None*

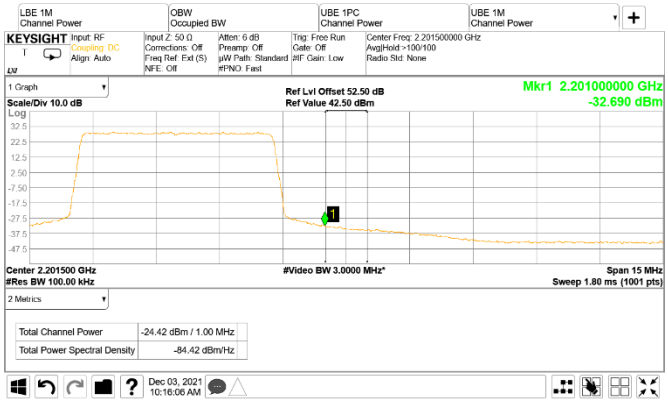


Figure 8.3-37: *Conducted emission 1 MHz away from the upper band edge*

Frequency: *2201 MHz* *Mode:* *Single-carrier operation*
Meas. BW: *1 MHz* *Tech.:* *LTE 5 MHz*
Limit: *−19 dBm/MHz* *Notes:* *None*

Test data, continued

Figure 8.3-38: *Conducted emission at the lower band edge*

Frequency:	*2110 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*LTE 10 MHz*
Limit:	*−19 dBm/100 kHz*	*Notes:*	*None*

Figure 8.3-39: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*2109 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*LTE 10 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

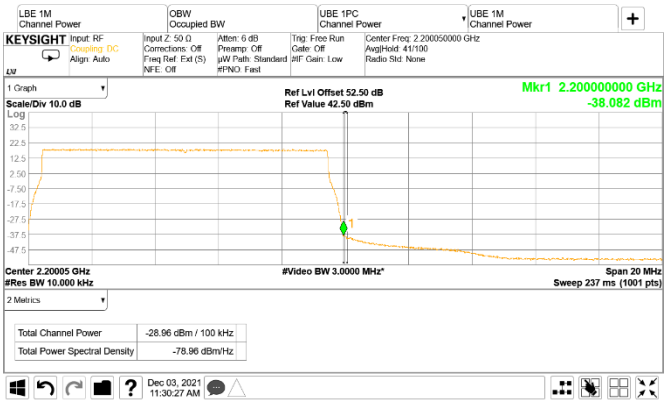


Figure 8.3-40: *Conducted emission at the upper band edge*

Frequency:	*2200 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*LTE 10 MHz*
Limit:	*−19 dBm/100 kHz*	*Notes:*	*None*

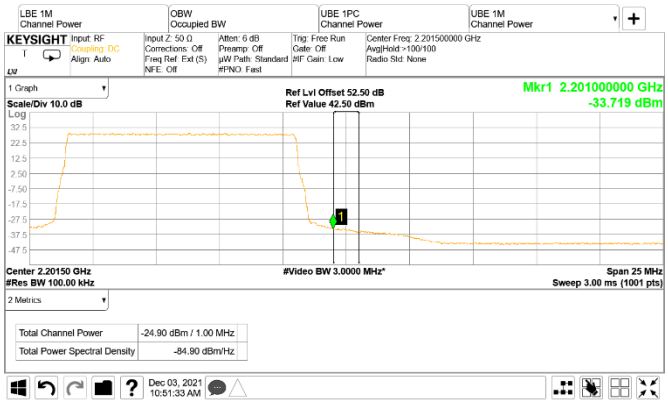


Figure 8.3-41: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*2201 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*LTE 10 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

Test data, continued

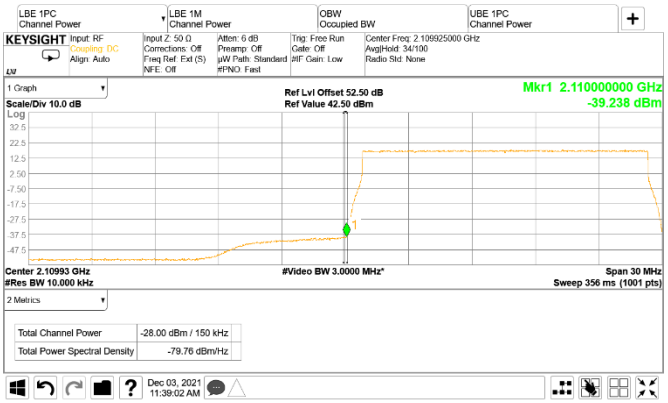


Figure 8.3-42: *Conducted emission at the lower band edge*

Frequency:	*2110 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*LTE 15 MHz*
Limit:	*−19 dBm/150 kHz*	*Notes:*	*None*

Figure 8.3-43: *Conducted emission 1 MHz away from the lower band edge*

Frequency:	*2109 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*LTE 15 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*

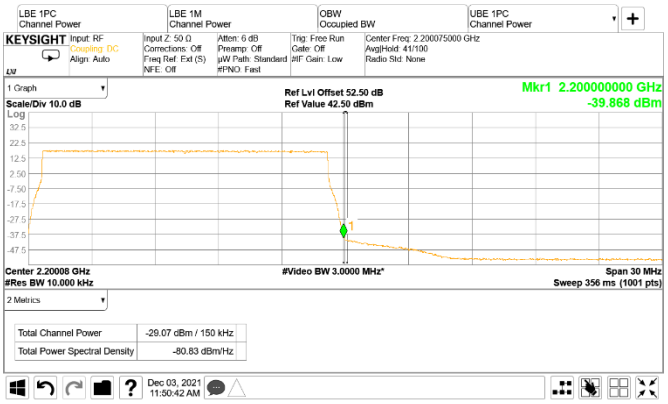


Figure 8.3-44: *Conducted emission at the upper band edge*

Frequency:	*2200 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1% of EBW*	*Tech.:*	*LTE 15 MHz*
Limit:	*−19 dBm/150 kHz*	*Notes:*	*None*

Figure 8.3-45: *Conducted emission 1 MHz away from the upper band edge*

Frequency:	*2201 MHz*	*Mode:*	*Single-carrier operation*
Meas. BW:	*1 MHz*	*Tech.:*	*LTE 15 MHz*
Limit:	*−19 dBm/MHz*	*Notes:*	*None*