TEST REPORT FOR NR TESTING

Report No.: PBJ-NQN2412130113RF02

Product Name: Industrial Cellular Router

Product Model: IR624 Series Model: IR654, IR694

HVIN:NRQ3-WLAN-S Brand Name: inhand

Applicant: Beijing InHand Networks Technology Co., Ltd.

Manufacturer: Beijing InHand Networks Technology Co., Ltd.

Specification: FCC Part 2, Part 24E, Part 22H, Part 27, Part 90, FCC Part 96, Part 96.47 (2023)

FCC ID: 2AANY-IR624

Prepared by Simon Wang Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
Simon Wang Date: Dec. 02, 2024	Luke Lu Date: Dec. 02, 2024

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1. GENERAL INFORMATION

1.1 Notes of the test report

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1.2 Information about the testing laboratory

Company:	BV 7Layers Communications Technology (Shenzhen) Co., Ltd
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Designation Number:	CN1171
Registration number:	525120

1.3 Applicant's details

Company:	Beijing InHand Networks Technology Co., Ltd.
Address:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing
City:	Beijing
Country or Region:	China
Contacted person:	GuJichi
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1.4 Manufacturer's details

Company:	Beijing InHand Networks Technology Co., Ltd.
Address:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing
City:	Beijing
Country or Region:	China
Contacted person:	GuJichi
Tel:	15281366255
Email:	gujc@inhand.com.cn

1.5 Test Environment

Date of Receipt of test sample:	2024/11/11
Testing Start Date:	2024/11/12
Testing End Date:	2024/12/6

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	40
Maximum Extreme	75	---
Minimum Extreme	-20	---

Normal Supply Voltage (V d.c.):	12
Maximum Extreme Supply Voltage (V d.c.):	36
Minimum Extreme Supply Voltage (V d.c.):	9

2. DESCRIPTION OF THE EQUIPMENT UNDER TEST

2.1 Final Equipment Build Status

Frequency Range:	n2: Tx:1850~1910 MHz Rx:1930~1990 MHz n5: Tx: 824~849 MHz Rx:869~894 MHz n7: Tx:2500~2570 MHz Rx:2620~2690 MHz n12: Tx: 699~716 MHz Rx:729~746 MHz n13: Tx: 777~787 MHz Rx:746~756 MHz n14: Tx: 788~798 MHz Rx:758~768 MHz n25: Tx: 1850~1915 MHz Rx:1930~1995 MHz n26: Tx: 814~849 MHz Rx:859~894 MHz n30: Tx: 2305~2315 MHz Rx:2350~2360 MHz n38: Tx: 2570~2620 MHz Rx:2570~2620 MHz n41: Tx:2496~2690 MHz Rx: 2496~2690 MHz n48: Tx: 3550~3700 MHz Rx:3550~3700 MHz n66: Tx:1710~1780 MHz Rx:1995~2020 MHz n70: Tx: 1695~1710 MHz Rx:617~652 MHz n71: Tx: 663~698 MHz Rx:617~652 MHz n77: Tx: 3450~3550 MHz Rx:3450~3550 MHz 3700~3980 MHz Rx:3700~3980 MHz n78: Tx: 3450~3550 MHz Rx:3450~3800 MHz 3700~3800 MHz Rx:3700~3800 MHz
Frequency Range:(CA)	UL: n25A-n41A;n41A-n66A;n41A-n71A;n7A-n78A;n5A-n78An66A-n78A:n7A-n77A:n2A-n77A:n5A-n77A:n66A-n77An30A-n77A;n71A-n77A:n71A-n78A:n25A-n78A:n38A-n66An25A-n77A;n25A-n38A;n13A-n77A; n2A-n41A
Single band single SCS single carrier	n2/n5/n7/n12/ n13/n14/n25/ n26/n30/ n38/n41/n48/n66/ n70/n71/n77/n78

Single band single SCS HPUE	n41/n77/n78		
SA Bandwidth	n2: 5MHz/ 10MHz/ 15MHz/ 20MHz n5: 5MHz/ 10MHz/ 15MHz/ 20MHz n7: 5MHz/ 10MHz/ 15MHz/ 20MHz/ 25MHz/ 30MHz/ 40MHz n12: 5MHz/ 10MHz/ 15MHz n13: 5MHz/ 10MHz n14: 5MHz/ 10MHz n25: 5MHz/ 10MHz/ 15MHz/ 20MHz/ 25MHz/ 30MHz/ 40MHz n26: 5MHz/ 10MHz/ 15MHz/ 20MHz n30: 5MHz/ 10MHz n38: 10MHz/ 15MHz/ 20MHz/ 30MHz/ 40MHz n41: 20MHz/ 30MHz/ 40MHz/ 50MHz/ 60MHz/ 70MHz/ 80MHz/ 90MHz/ 100MHz n48: 10MHz/ 20MHz/ 30MHz/ 40MHz n66: 5MHz/ 10MHz/ 15MHz/ 20MHz/ 30MHz/ 40MHz n70: 5MHz/ 10MHz/ 15MHz n71: 5MHz/ 10MHz/ 15MHz/ 20MHz n77: 10MHz/ 15MHz/ 20MHz/ 30MHz/ 40MHz/ 50MHz/ 60MHz/70MHz/ 80MHz/90MHz/100MHz n78: 10MHz/ 15MHz/20MHz/ 30MHz/ 40MHz/ 50MHz/ 60MHz/ 70MHz/ 80MHz/ 90MHz/ 100MHz		
NSA Band	See note2		
Modulation Type:	PI/2 BPSK, QPSK,16QAM,64QAM,256QAM		
Antenna Type:	External antenna		
Antenna Gain:	n2: 0.8dBi	n5: -2.5dBi	n7: 0.4dBi(Max)
	n12: -0.7dBi	n13: -0.7dBi(Max)	n14: :-0.7dBi(Max)
	n25: 0.8dBi	n26: -2.5dBi	n30: -0.6dBi(Max)
	n38: -0.1dBi	n41: -0.1dBi	n48: -0.7dBi
	n66: 0dBi(Max)	n70:-0.3dBi	n71: -3.5dBi
	n77:-0.7dBi	n78:-0.7dBi	
	ERP = EIRP(Power +Gain) – 2.15 (dB)		
Power Supply:	DC supply		
Software Revision:	V3.0		
Hardware Revision:	V1.1		
IMEI/SN:	866407060011582/RN6242408PWEZ7N		

Note1: Test Model No.: IR624
Series Model：IR654, IR694

These models are the same in these: appearance, PCB layout and basic software function; The only difference is that the products are used in different markets.

Note2:
NSA Band

DC_13A_n66A	DC_66A_n71A	DC_13A_n2A	DC_66A_n41A	DC_66A_n30A
DC_5A_n2A	DC_66A_n25A	DC_7A_n66A	DC_2A_n7A	DC_71A_n7A
DC_14A_n2A	DC_25A_n41A	DC_4A_n78A	DC_7A_n2A	DC_7A_n12A
DC_30A_n2A	DC_12A_n78A	DC_20A_n77A	DC_5A_n40A	DC_5A_n77A
DC_2A_n5A	DC_13A_n78A	DC_5A_n78A	DC_30A_n77A	DC_66A_n77A
DC_30A_n5A	DC_25A_n78A	DC_4A_n41A	DC_41A_n77A	DC_71A_n77A
DC_66A_n5A	DC_12A_n77A	DC_66A_n38A	DC_7A_n78A	DC_4A_n2A
DC_2A_n12A	DC_13A_n77A	DC_2A_n38A	DC_66A_n28A	DC_7A_n25A
DC_66A_n12A	DC_14A_n77A	DC_12A_n38A	DC_71A_n41A	DC_71A_n25A
DC_2A_n66A	DC_26A_n78A	DC_4A_n38A	DC_28A_n66A	DC_5A_n25A
DC_5A_n66A	DC_2A_n78A	DC_5A_n38A	DC_30A_n12A	DC_26A_n25A
DC_12A_n66A	DC_26A_n41A	DC_66A_n78A	DC_2A_n14A	DC_4A_n7A
DC_14A_n66A	DC_2A_n41A	DC_12A_n25A	DC_30A_n14A	DC_13A_n25A
DC_30A_n66A	DC_7A_n5A	DC_25A_n77A	DC_66A_n14A	DC_7A_n77A
DC_12A_n2A	DC_38A_n78A	DC_2A_n77A	DC_2A_n30A	DC_12A_n7A
DC_66A_n2A	DC_7A_n71A	DC_71A_n78A	DC_5A_n30A	DC_66A_n7A
DC_71A_n2A	DC_41A_n78A	DC_71A_n38A	DC_12A_n30A	DC_5A_n41A
DC_12A_n41A	DC_5A_n7A	DC_13A_n7A	DC_14A_n30A	DC_71A_n66A
DC_2A_n71A				

Note：The combination of the above frequency bands is not the worst case, and the evaluated data for the relevant individual frequency bands are shown in Appendix A. Therefore, data for the CA frequency band will not be displayed

2.2 Support Equipment

NA

Note3: This product uses the module model RM520N-GL and supports NR frequency bands 2/5/7/12/13/14/25/26/30/38/41/48/66/70/71/77/78. Therefore, for this product, we referred to the test data reported by the RM520N-GL module and revaluated the spe ctrum of radiated emissions and EIRP.
For module RM520N-GL: Report No.: SEWM2304000122RG02
FCC ID：XMR2023RM520NGL

Note4： The manufacturer asks to reverify the manufacturer B48, Therefore, we tested the B48 frequency band of the entire machine, and the data for other frequency bands came from the module report. But Part96.47 refers to module data.

2.3 Test Frequencies

Reference test frequencies for NR operating band n2

Test frequencies for NR operating band n2 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	1932.5	386500	15
		Mid	1960	392000	
		High	1987.5	397500	
	Uplink	Low	1852.5	370500	-
		Mid	1880	376000	
		High	1907.5	381500	
10	Downlink	Low	1935	387000	15
		Mid	1960	392000	
		High	1985	397000	
	Uplink	Low	1855	371000	-
		Mid	1880	376000	
		High	1905	381000	
15	Downlink	Low	1937.5	387500	15
		Mid	1960	392000	
		High	1982.5	396500	
	Uplink	Low	1857.5	371500	-
		Mid	1880	376000	
		High	1902.5	380500	
20	Downlink	Low	1940	388000	15
		Mid	1960	392000	
		High	1980	396000	
	Uplink	Low	1860	372000	-
		Mid	1880	376000	
		High	1900	380000	

Reference test frequencies for NR operating band n5

Test frequencies for NR operating band n5 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	871.5	174300	15
		Mid	881.5	176300	
		High	891.5	178300	
	Uplink	Low	826.5	165300	-
		Mid	836.5	167300	
		High	846.5	169300	
10	Downlink	Low	874	174800	15
		Mid	881.5	176300	
		High	889	177800	
	Uplink	Low	829	165800	-
		Mid	836.5	167300	
		High	844	168800	
15	Downlink	Low	876.5	175300	15
		Mid	881.5	176300	
		High	886.5	177300	
	Uplink	Low	831.5	166300	-
		Mid	836.5	167300	
		High	841.5	168300	
20	Downlink	Low	879	175800	15
		Mid	881.5	176300	
		High	884	176800	
	Uplink	Low	834	166800	-
		Mid	836.5	167300	
		High	839	167800	

Reference test frequencies for NR operating band n7

Test frequencies for NR operating band n7 and SCS 15 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	2622.5	524500	15
		Mid	2655	531000	
		High	2687.5	537500	
	Uplink	Low	2502.5	500500	--
		Mid	2535	507000	
		High	2567.5	513500	
10	Downlink	Low	2625	525000	15
		Mid	2655	531000	
		High	2685	537000	
	Uplink	Low	2505	501000	--
		Mid	2535	507000	
		High	2565	513000	
15	Downlink	Low	2627.5	525500	15
		Mid	2655	531000	
		High	2682.5	536500	
	Uplink	Low	2507.5	501500	--
		Mid	2535	507000	
		High	2562.5	512500	
20	Downlink	Low	2630	526000	15
		Mid	2655	531000	
		High	2680	536000	
	Uplink	Low	2510	502000	--
		Mid	2535	507000	
		High	2560	512000	
25	Downlink	Low	2632.5	526500	15
		Mid	2655	531000	
		High	2677.5	535500	
	Uplink	Low	2512.5	502500	--
		Mid	2535	507000	
		High	2557.5	511500	
30	Downlink	Low	2635	52700	15
		Mid	2655	531000	
		High	2675	535000	
	Uplink	Low	2515	503000	--
		Mid	2535	507000	
		High	2555	511000	
40	Downlink	Low	2640	528000	15
		Mid	2655	531000	
		High	2670	534000	
	Uplink	Low	2520	504000	--
		Mid	2535	507000	
		High	2550	510000	

Reference test frequencies for NR operating band n12

Test frequencies for NR operating band n12 and SCS 15 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	731.5	146300	15
		Mid	737.5	147500	
		High	743.5	148700	
	Uplink	Low	701.5	140300	--
		Mid	707.5	141500	
		High	713.5	142700	
10	Downlink	Low	734	146800	15
		Mid	737.5	147500	
		High	741	148200	
	Uplink	Low	704	140800	--
		Mid	707.5	141500	
		High	711	142200	
15	Downlink	Low	736.5	147300	15
		Mid	737.5	147500	
		High	738.5	147700	
	Uplink	Low	706.5	141300	--
		Mid	707.5	141500	
		High	708.5	141700	

Reference test frequencies for NR operating band n13

Test frequencies for NR operating band n13 and SCS 15 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	748.5	149700	15
		Mid	751	150200	
		High	753.5	150700	
	Uplink	Low	779.5	155900	--
		Mid	782	156400	
		High	784.5	156900	
10	Downlink	Low	/	/	15
		Mid	751	150200	
		High	/	/	
	Uplink	Low	/	/	--
		Mid	779.5	156400	
		High	/	/	

Reference test frequencies for NR operating band n14

Test frequencies for NR operating band n14 and SCS 15 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	760.5	151200	15
		Mid	763	152600	
		High	765.5	153100	
	Uplink	Low	790.5	158100	--
		Mid	793	158600	
		High	795.5	159100	
10	Downlink	Low	/	/	15
		Mid	793	158600	
		High	/	/	
		Low	/	/	
		Mid	793	158600	

	Uplink	High	/	/	--

Reference test frequencies for NR operating band n25

Test frequencies for NR operating band n25 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	1932.5	386500	15
		Mid	1962.5	392500	
		High	1992.5	398500	
	Uplink	Low	1852.5	370500	-
		Mid	1882.5	376500	
		High	1912.5	382500	
10	Downlink	Low	1935	387000	15
		Mid	1962.5	392500	
		High	1990	398000	
	Uplink	Low	1855	371000	-
		Mid	1882.5	376500	
		High	1910	382000	
15	Downlink	Low	1937.5	387500	15
		Mid	1962.5	392500	
		High	1987.5	397500	
	Uplink	Low	1857.5	371500	-
		Mid	1882.5	376500	
		High	1907.5	381500	
20	Downlink	Low	1940	388000	15
		Mid	1962.5	392500	
		High	1985	397000	
	Uplink	Low	1860	372000	-
		Mid	1882.5	376500	
		High	1905	381000	
25	Downlink	Low	1942.5	388500	15
		Mid	1962.5	392500	
		High	1982.5	396500	
	Uplink	Low	1862.5	372500	-
		Mid	1882.5	376500	
		High	1902.5	380500	
30	Downlink	Low	1945	389000	15
		Mid	1962.5	392500	
		High	1980	396000	
	Uplink	Low	1865	373000	-
		Mid	1882.5	376500	
		High	1900	380000	
40	Downlink	Low	1950	390000	15
		Mid	1962.5	392500	
		High	1975	395000	
	Uplink	Low	1870	374000	-
		Mid	1882.5	376500	
		High	1895	379000	

Reference test frequencies for NR operating band n26

Test frequencies for NR operating band n26 and SCS 15 kHz

814-824:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	861.5	172300	15
		Mid	864	172800	
		High	866.5	173300	
	Uplink	Low	816.5	163300	-
		Mid	819	163800	
		High	821.5	164300	
10	Downlink	Low	/	/	15
		Mid	864	172800	
		High	/	/	
	Uplink	Low	/	/	-
		Mid	819	163800	
		High	/	/	

824-849:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	871.5	174300	15
		Mid	881.5	176300	
		High	891.5	178300	
	Uplink	Low	826.5	165300	-
		Mid	836.5	167300	
		High	846.5	169300	
10	Downlink	Low	874	174800	15
		Mid	881.5	176300	
		High	889	177800	
	Uplink	Low	829	165800	-
		Mid	836.5	167300	
		High	844	168800	
15	Downlink	Low	876.5	175300	15
		Mid	881.5	176300	
		High	886.5	177300	
	Uplink	Low	831.5	166300	-
		Mid	836.5	167300	
		High	841.5	168300	
20	Downlink	Low	879	175800	15
		Mid	881.5	176300	
		High	884	176800	
	Uplink	Low	834	166800	-
		Mid	836.5	167300	
		High	839	167800	

Reference test frequencies for NR operating band n30

Test frequencies for NR operating band n30 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	2352.5	470500	15
		Mid	2355	471000	
		High	2357.5	471500	
	Uplink	Low	2307.5	461500	-
		Mid	2310	462000	
		High	2312.5	462500	
10	Downlink	Low	2355	471000	15
		Mid	2355	471000	
		High	2355	471000	
	Uplink	Low	2310	462000	-
		Mid	2310	462000	
		High	2310	462000	

Reference test frequencies for NR operating band n38

Test frequencies for NR operating band n38 and SCS 30 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	2575	515000	30
		Mid	2595	519000	
		High	2615	523000	
15	Downlink & Uplink	Low	2577.5	515500	30
		Mid	2595	519000	
		High	2612.5	522500	
20	Downlink & Uplink	Low	2580	516000	30
		Mid	2595	519000	
		High	2610	522000	
30	Downlink & Uplink	Low	2585	517000	30
		Mid	2595	519000	
		High	2605	521000	
40	Downlink & Uplink	Low	2590	518000	30
		Mid	2595	519000	
		High	2600	520000	

Reference test frequencies for NR operating band n41

Test frequencies for NR operating band n41 and SCS 30 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
20	Downlink & Uplink	Low	2506.02	501204	30
		Mid	2592.99	518598	
		High	2670	534000	
30	Downlink & Uplink	Low	2511	502200	30
		Mid	2592.99	518598	
		High	2675	535000	
40	Downlink & Uplink	Low	2516.01	503202	30
		Mid	2592.99	518598	
		High	2670	534000	
50	Downlink & Uplink	Low	2521.02	504204	30
		Mid	2592.99	518598	
		High	2664.99	532998	
60	Downlink & Uplink	Low	2526	505200	30
		Mid	2592.99	518598	
		High	2659.98	531996	
70	Downlink & Uplink	Low	2531	506200	30
		Mid	2592.29	518598	
		High	2655	531000	
80	Downlink & Uplink	Low	2536.02	507204	30
		Mid	2592.99	518598	
		High	2649.99	529998	
90	Downlink & Uplink	Low	2541	508200	30
		Mid	2592.99	518598	
		High	2644.98	528996	
100	Downlink & Uplink	Low	2546.01	509202	30
		Mid	2592.99	518598	
		High	2640	528000	

Reference test frequencies for NR operating band n48

Test frequencies for NR operating band n48 and SCS 30 kHz

3550-3700:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3555	637000	30
		Mid	3624.99	641666	
		High	3694.98	646332	
20	Downlink & Uplink	Low	3560.01	637334	30
		Mid	3624.99	641666	
		High	3690	646000	
30	Downlink & Uplink	Low	3565.02	637668	30
		Mid	3624.99	641666	
		High	3684.99	645666	
40	Downlink & Uplink	Low	3570	638000	30
		Mid	3624.99	641666	
		High	3679.98	645332	

Reference test frequencies for NR operating band n66

Test frequencies for NR operating band n66 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	2112.5	422500	15
		Mid	2155	431000	
		High	2197.5	439500	
	Uplink	Low	1712.5	342500	-
		Mid	1745	349000	
		High	1777.5	355500	
10	Downlink	Low	2115	423000	15
		Mid	2155	431000	
		High	2195	439000	
	Uplink	Low	1715	343000	-
		Mid	1745	349000	
		High	1775	355000	
15	Downlink	Low	2117.5	423500	15
		Mid	2155	431000	
		High	2192.5	438500	
	Uplink	Low	1717.5	343500	-
		Mid	1745	349000	
		High	1772.5	354500	
20	Downlink	Low	2120	424000	15
		Mid	2155	431000	
		High	2190	438000	
	Uplink	Low	1720	344000	-
		Mid	1745	349000	
		High	1770	354000	
30	Downlink	Low	2125	425000	15
		Mid	2155	431000	
		High	2185	437000	
	Uplink	Low	1725	345000	-
		Mid	1745	349000	
		High	1765	353000	
40	Downlink	Low	2130	426000	15
		Mid	2155	431000	
		High	2180	436000	
	Uplink	Low	1730	346000	-
		Mid	1745	349000	
		High	1760	352000	

Reference test frequencies for NR operating band n70

Test frequencies for NR operating band n70 and SCS 15 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	1997.5	399500	15
		Mid	2002.5	400500	
		High	2007.5	401500	
	Uplink	Low	1697.5	339500	--
		Mid	1702.5	340500	
		High	1707.7	341500	
10	Downlink	Low	2000	400000	15
		Mid	2002.5	400500	
		High	2005	401000	
	Uplink	Low	1700	340000	--
		Mid	1702.5	340500	
		High	1705	341000	
15	Downlink	Low	/	/	15
		Mid	2002.5	400500	
		High	/	/	
	Uplink	Low	/	/	--
		Mid	1702.5	340500	
		High	/	/	

Reference test frequencies for NR operating band n71

Test frequencies for NR operating band n71 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	619.5	123900	15
		Mid	634.5	126900	
		High	649.5	129900	
	Uplink	Low	665.5	133100	-
		Mid	680.5	136100	
		High	695.5	139100	
10	Downlink	Low	622	124400	15
		Mid	634.5	126900	
		High	647	129400	
	Uplink	Low	668	133600	-
		Mid	680.5	136100	
		High	693	138600	
15	Downlink	Low	624.5	124900	15
		Mid	634.5	126900	
		High	644.5	128900	
	Uplink	Low	670.5	134100	-
		Mid	680.5	136100	
		High	690.5	138100	
20	Downlink	Low	627	125400	15
		Mid	634.5	126900	
		High	642	128400	
	Uplink	Low	673	134600	-
		Mid	680.5	136100	
		High	688	137600	

Reference test frequencies for NR operating band n77

Test frequencies for NR operating band n77 and SCS 30 kHz

3700-3980:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3705	647000	30
		Mid	3840	656000	
		High	3975	665000	
15	Downlink & Uplink	Low	3707.52	647168	30
		Mid	3840	656000	
		High	3972.48	664832	
20	Downlink & Uplink	Low	3710.01	647334	30
		Mid	3840	656000	
		High	3969.99	664666	
30	Downlink & Uplink	Low	3714.99	647666	30
		Mid	3840	656000	
		High	3965.01	664334	
40	Downlink & Uplink	Low	3720	648000	30
		Mid	3840	656000	
		High	3960	664000	
50	Downlink & Uplink	Low	3725.01	648334	30
		Mid	3840	656000	
		High	3954.99	663666	
60	Downlink & Uplink	Low	3730.02	648668	30
		Mid	3840	656000	
		High	3949.98	663332	
70	Downlink & Uplink	Low	3735	649000	30
		Mid	3840	656000	
		High	3945	663000	
80	Downlink & Uplink	Low	3740.01	649334	30
		Mid	3840	656000	
		High	3939.99	662666	
90	Downlink & Uplink	Low	3745.02	649668	30
		Mid	3840	656000	
		High	3934.98	662332	
100	Downlink & Uplink	Low	3750	650000	30
		Mid	3840	656000	
		High	3930	662000	

3450-3550:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3455.01	630334	30
		Mid	3500.01	633334	
		High	3545.01	636334	
15	Downlink & Uplink	Low	3457.5	630500	30
		Mid	3500.01	633334	
		High	3542.49	636166	
20	Downlink & Uplink	Low	3460.02	630668	30
		Mid	3500.01	633334	
		High	3540	636000	
30	Downlink & Uplink	Low	3465	631000	30
		Mid	3500.01	633334	
		High	3534.99	635666	
40	Downlink & Uplink	Low	3470.01	631334	30
		Mid	3500.01	633334	
		High	3530.01	635334	
50	Downlink & Uplink	Low	3475.02	631668	30
		Mid	3500.01	633334	
		High	3525	635000	
60	Downlink & Uplink	Low	3480	632000	30
		Mid	3500.01	633334	
		High	3519.99	634666	
70	Downlink & Uplink	Low	3485.01	632334	30
		Mid	3500.01	633334	
		High	3515.01	634334	
80	Downlink & Uplink	Low	3490.02	632668	30
		Mid	3500.01	633334	
		High	3510	634000	
90	Downlink & Uplink	Low	3495	633000	30
		Mid	3500.01	633334	
		High	3504.99	633666	
100	Downlink & Uplink	Low	\	\	30
		Mid	3500.01	633334	
		High	\	\	

Reference test frequencies for NR operating band n78

Test frequencies for NR operating band n78 and SCS 30 kHz

3700-3800:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3705	647000	30
		Mid	3750	650000	
		High	3795	653000	
15	Downlink & Uplink	Low	3707.52	647168	30
		Mid	3750	650000	
		High	3792.48	652832	
20	Downlink & Uplink	Low	3710.01	647334	30
		Mid	3750	650000	
		High	3789.99	652666	
30	Downlink & Uplink	Low	3715.02	647668	30
		Mid	3750	650000	
		High	3785.01	652334	
40	Downlink & Uplink	Low	3720	648000	30
		Mid	3750	650000	
		High	3780	652000	
50	Downlink & Uplink	Low	3725.01	648334	30
		Mid	3750	650000	
		High	3774.99	651666	
60	Downlink & Uplink	Low	3730.02	648668	30
		Mid	3750	650000	
		High	3769.98	651332	
70	Downlink & Uplink	Low	3735	649000	30
		Mid	3750	650000	
		High	3765	651000	
80	Downlink & Uplink	Low	3740.01	649334	30
		Mid	3750	650000	
		High	3759.99	650666	
90	Downlink & Uplink	Low	3745.02	649668	30
		Mid	3750	650000	
		High	3754.98	650332	
100	Downlink & Uplink	Low	/	/	30
		Mid	3750	650000	
		High	/	/	

3450-3550:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3455.01	630334	30
		Mid	3500.01	633334	
		High	3545.01	636334	
15	Downlink & Uplink	Low	3457.5	630500	30
		Mid	3500.01	633334	
		High	3542.49	636166	
20	Downlink & Uplink	Low	3460.02	630668	30
		Mid	3500.01	633334	
		High	3540	636000	
30	Downlink & Uplink	Low	3465	631000	30
		Mid	3500.01	633334	
		High	3534.99	635666	
40	Downlink & Uplink	Low	3470.01	631334	30
		Mid	3500.01	633334	
		High	3530.01	635334	
50	Downlink & Uplink	Low	3475.02	631668	30
		Mid	3500.01	633334	
		High	3525	635000	
60	Downlink & Uplink	Low	3480	632000	30
		Mid	3500.01	633334	
		High	3519.99	634666	
70	Downlink & Uplink	Low	3485.01	632334	30
		Mid	3500.01	633334	
		High	3515.01	634334	
80	Downlink & Uplink	Low	3490.02	632668	30
		Mid	3500.01	633334	
		High	3510	634000	
90	Downlink & Uplink	Low	3495	633000	30
		Mid	3500.01	633334	
		High	3504.99	633666	
100	Downlink & Uplink	Low	\	\	30
		Mid	3500.01	633334	
		High	\	\	

3. REFERENCE SPECIFICATION

Specification	Version	Title
FCC Part 2	2023	Frequency allocations and radio treaty matters; general rules and regulations
FCC Part 22	2023	Public mobile services
FCC Part 24	2023	Personal communications services
FCC Part 27	2023	Miscellaneous wireless communications services
FCC Part 90	2023	Private Land Mobile Radio Services
FCC Part 96	2023	Citizens Broadband Radio Service
FCC Part 96.47	2023	End user device additional requirements
ANSI C63.26	2015	American national standard for compliance testing of transmitters used in licensed radio services
KDB 971168 D01	April 9, 2018	Measurement guidance for certification of licensed digital transmitters
TIA-603-E-2016	March 2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

4. KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
NT	Normal Temperature
NV	Nominal voltage
HV	High voltage
LV	Low voltage

5. RESULT SUMMARY

No.	Test case	FCC reference	Verdict	Test Lab
1	RF Power Output	2.1046	Pass	A
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)(5), 24.232(c) 27.50(b)(10), 27.50(c)(10), 27.50(h)(2), 27.50(d)(4), 27.50(a)(3),27.50(j)(3),27.50(k)(3) ,90.542(a),90.635(b),96.41(b)	Pass	A
3	Occupied Bandwidth	2.1049	Pass	A
4	Peak-Average Ratio	22.913(d), 24.232(d) 27.50(d) (5),27.50(k)(4),96.41(g)	Pass	A
5	Emission Bandwidth	2.1049	Pass	A
6	Spurious Emissions at antenna terminals	2.1051, 22.917(a), 24.238(a) 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a)，27.53(l)(2)，27.50(n)(2)， 90.543(e)(f),90.691(a),96.41(e)	Pass	A
7	Band Edges Compliance	2.1051, 22.917(a), 24.238(a) 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a),27.53(l)(2)，27.50(n)(2)， 90.543(e)(f), 90.691(a),96.41(e)	Pass	A
8	Frequency Stability	2.1055, 22.355, 24.235， 27.54,90.539,90.213	Pass	A
9	Radiated Spurious Emissions	2.1053, 22.917(a),24.238(a) 27.53(c), 27.53(g), 27.53(h), 27.53(f), 27.53(a), 27.53(m),27.53(l)(2),27.50(n)(2) ,90.543(e)(f),90.691(a), 96.41(e)	Pass	A

Lab A:
BV 7Layers Communications Technology (Shenzhen) Co. Ltd
Lab Address:
Room B37, Warehouse A5, No.3 Chiwan 4th Road, Zhaoshang Street, Nanshan District Shenzhen, Guangdong, People's Republic of China
Accredited Test Lab Cert 3939.01

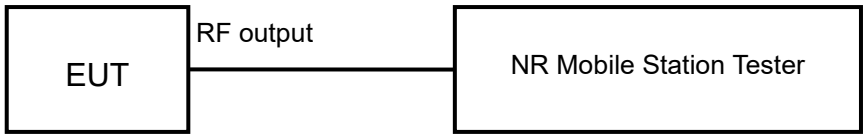
The FCC Site Registration No. is 525120; The Designation No. is CN1171.

6. TEST RESULT

6.1 RF Power Output

Rule Part(s)
FCC: 2.1046

Test Setup:



Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

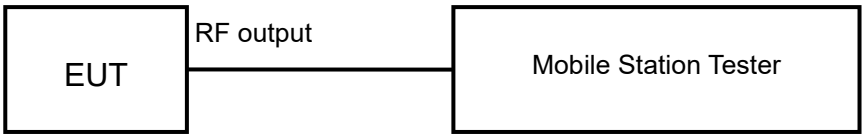
Limits: No RF Power Output requirements in part 2.1046.

Test result:
The test results are shown in Appendix A.

6.2 Effective Radiated Power and Effective Isotropic Radiated Power

Rule Part(s)
FCC: 22.913(a) (5), 24.232(c), 27.50(b) (10), 27.50(c) (10), 27.50(h) (2), 27.50(d) (4), 27.50(a) (3), ,27.50(j)(3),27.50(k)(3),90.542(a),90.635(b),96.41(b)

Test setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 5.6
Test Settings
Subclause 5.2.5.5 of ANSI C63.26-2015 is applicable, along with the following provisions. For personal/portable radios utilizing an integral antenna, the factor LC is typically negligible. However, in a fixed station transmit system that utilizes a long cable run between the transmitter and the transmitting antenna, this factor can be significant. The minimum cable loss should be used in this equation.
The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:
ERP/EIRP = PMeas – LC + GT
Where:
ERP/EIRP = effective or equivalen radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm)
PMeas = measured transmitter output power or PSD, in dBW or dBm
LC = signal attenuation in the connecting cable between the transmitter and antenna in dB
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)
ERP/EIRP LIMIT
The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
24.232(c)
Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
27.50(b) (10)
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.
27.50(c) (10)
Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
27.50(h) (2)
Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
27.50(d) (4)
Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

27.50(a) (3)
Mobile and portable stations (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP NR standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.

27.50(j)(3)

Mobile and portable stations are limited to 1 Watt EIRP. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

27.50(k)(3)

According to the specific rule Part 27.50 (k)(3) Mobile devices are limited to 1Watt (30 dBm) EIRP, Mobile devices operating inl these bands must employ a means for limiting power to the minimum necessary for successful communications.

90.542(a)
47 CFR 90.542(a)(6)
Control stations and mobile stations transmitting in the 758–768 MHz band and the 788–798 MHz band are limited to 30 watts ERP.
47 CFR 90.542(a)(7)
Portable stations (hand-held devices) transmitting in the 758–768 MHz band and the 788–798 MHz band are limited to 3 watts ERP.

90.635(a)(b)
The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

96.41(b)

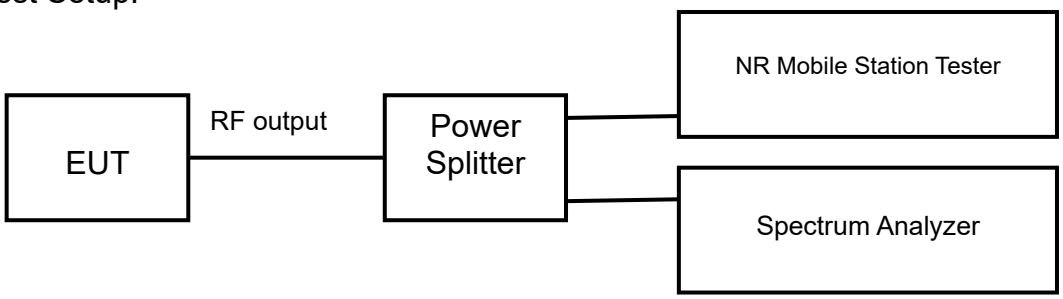
Device	Maximum EIRP (dBm/10 MHz)
End User Device	23
Category A CBSD	30
Category B CBSD	47

Test result:
The test results are shown in Appendix A.

6.3 Occupied Bandwidth

Rule Part(s)
FCC: 2.1049

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 4.2

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

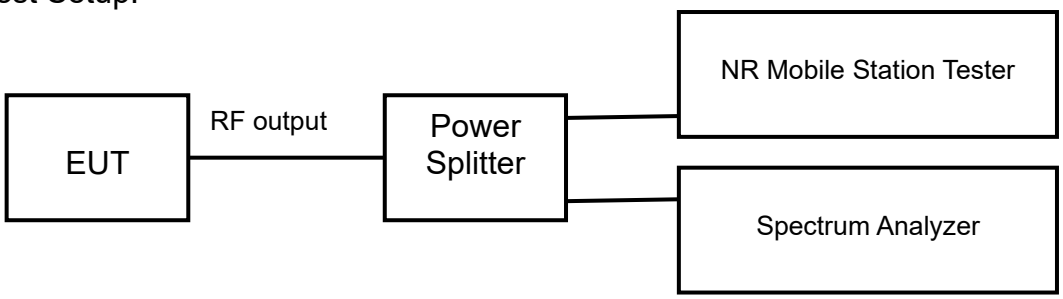
Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:
The test results are shown in Appendix A.

6.4 Emission Bandwidth

Rule Part(s)
FCC: 2.1049

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 4.2

Test Setting:

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

2. RBW = 1 – 5% of the expected OBW

3. VBW ≥ 3 x RBW

4. Detector = Peak

5. Trace mode = max hold

6. Sweep = auto couple

7. The trace was allowed to stabilize

8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of 26dB bandwidth observed in Step 7

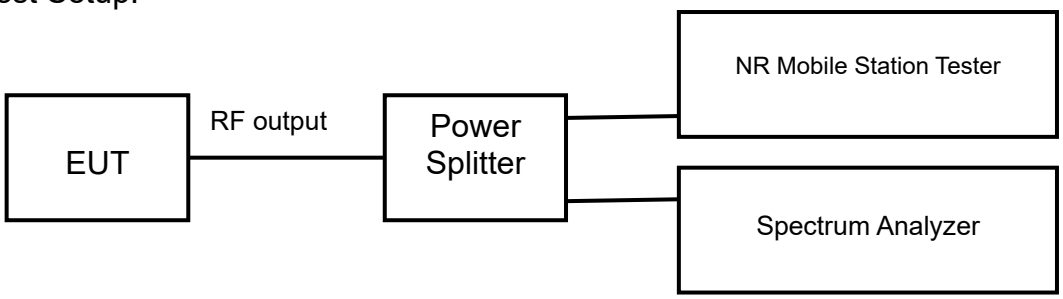
Limits: No specific emission bandwidth requirements in part 2.1049.

Test result:
The test results are shown in Appendix A.

6.5 Peak-Average Ratio

Rule Part(s)
FCC: 22.913(d), 24.232(d), 27.50(d) (5),96.41(g)

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 5.7.1

Test Setting:
1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW ≥ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

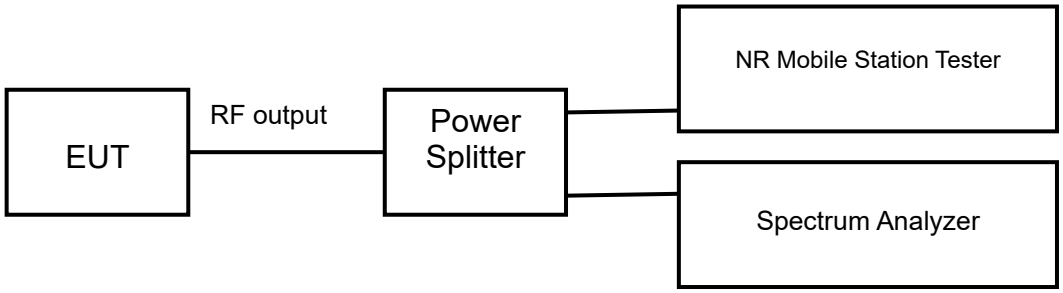
Limits

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.

Test result:
The test results are shown in Appendix A.

6.6 Spurious Emissions at antenna terminal

Rule Part(s)
FCC: 2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a), 27.53(l)(2)，27.50(n)(2)，90.543(e)(f),90.691(a),96.41(e)
Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 6.0

Test Setting:
1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency
2. Detector = RMS
3. RBW=1MHz
4. VBW=3MHz
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. Sweep time = auto couple
7. The trace was allowed to stabilize

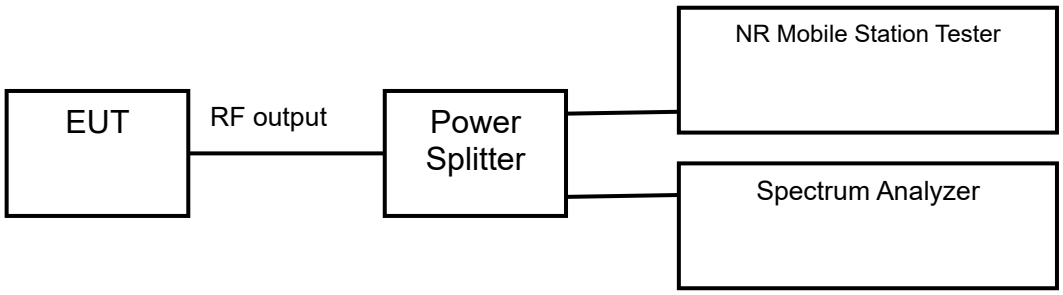
Limits
The minimum permissible attenuation level of any spurious emission is 43 + log10 (P [Watts]), where P is the transmitter power in Watts.
For Band 30, the minimum permissible attenuation level of any spurious emission <2288MHz and >2365MHz is 70 + log10 (P [Watts]).
For Band 7 and 41, the minimum permissible attenuation level of any spurious emission is 55 + log10 (P [Watts]).

Test result:
The test results are shown in Appendix A.

6.7 Band Edges Compliance

Rule Part(s)
FCC: 2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a), 27.53(l)(2)，27.50(n)(2)，90.543(e)(f), 90.691(a),96.41(e)

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 6.0

Test Setting:
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Limits
The minimum permissible attenuation level of any spurious emission is 43 + log10 (P [Watts]), where P is the transmitter power in Watts.
The minimum permissible attenuation level for Band 30 is > 43 + 10log10 (P [Watts] at 2300-2305MHz & 2345-2360MHz, > 55 + 10log10 (P [Watts]) at 2320-2324MHz & 2341-2345MHz, > 61 + 10log10 (P [Watts]) at 2324-2328MHz & 2337-2341MHz, > 67 + 10log10 (P [Watts]) at 2288-2292MHz & 2328- 2337MHz, and > 70 + 10log10 (P [Watts]) at frequencies < 2288MHz &>2365MHz.
Per 24.238(a) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. 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 emission are attenuated at least 26 dB below the transmitter power.
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may

be employed to demonstrate compliance with the out-of-band emissions limit.
Per 27.53(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is 65 + 10log10(P) = -35dBm in a 6.25kHz bandwidth.
Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). 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.
Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5MHz.

27.50(n)(2):
According to FCC Part 27.53 (n)(2)For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed-13 dBm/MHz.Compliance with this paragraph is based on the use of measurement instrumentation employing a lresolution 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, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.

27.53(l)(2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (l)(2) 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, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. 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.

90.543

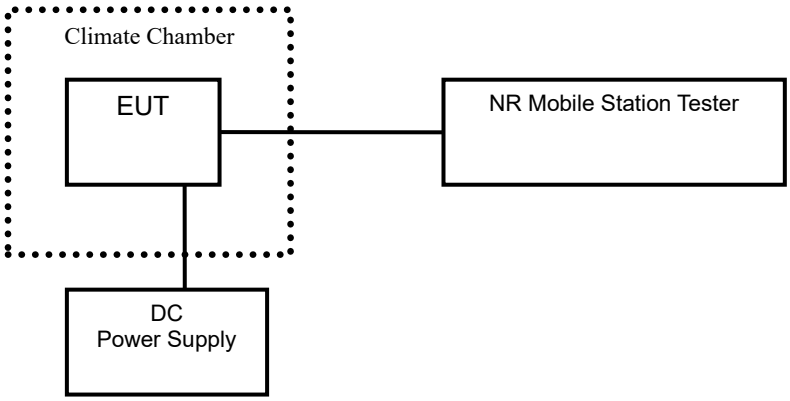
(e)
Click to open paragraph tools
For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.
(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.
(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.
(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.
(f) For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

90.691(a)
(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or 50 + 10 $Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + $10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz
96.41(e)
The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.
Test result:
The test results are shown in Appendix A.

6.8 Frequency Stability

Rule Part(s)
FCC: 2.1055, 22.355, 24.235, 27.54, 90.539,90.213

Test setup:



Test Procedure:
ANSI/TIA-603-E-2016

Test Settings
1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C (The temperature range can be declared by the manufacturer). A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

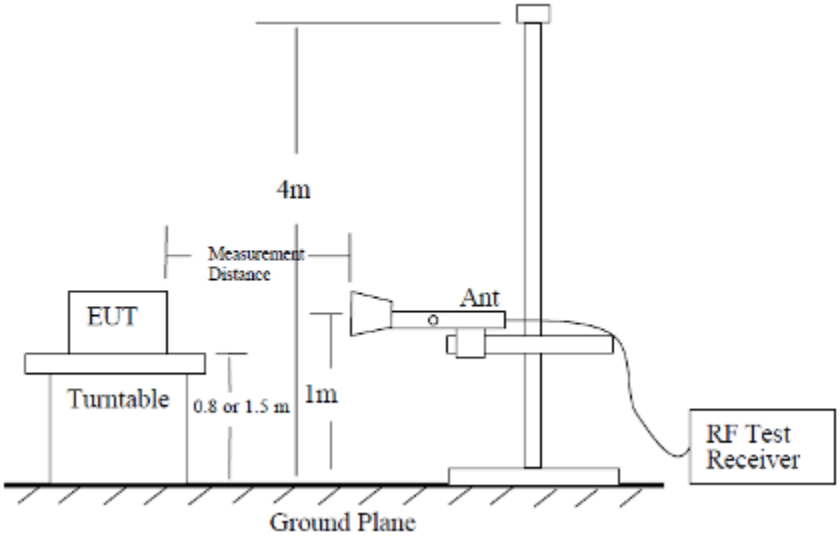
Limits: For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test result:
The test results are shown in Appendix A.

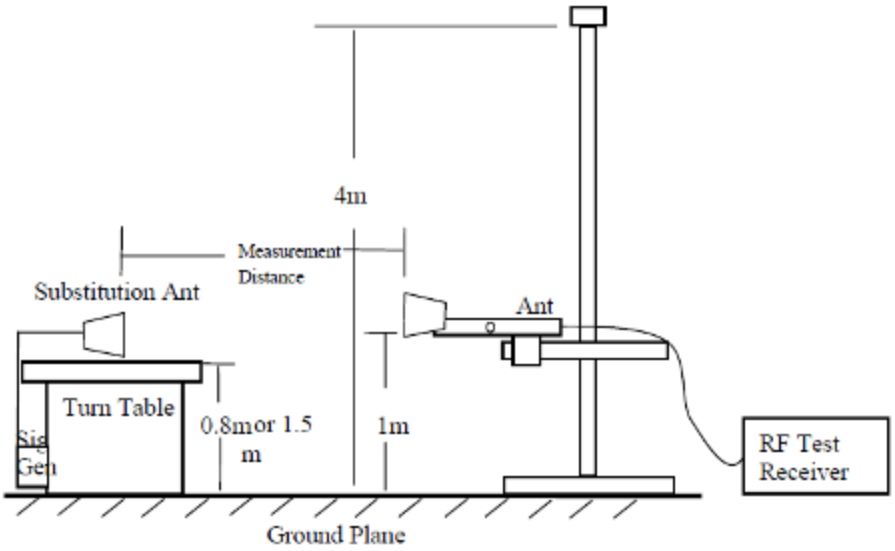
6.9 Radiated Spurious Emissions

Rule Part(s)
FCC: 2.1053, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(f), 27.53(a), 27.53(m), 27.53(l)(2),27.50(n)(2),90.543(e)(f),90.691(a), 96.41(e)

Test Setup:



Step 1



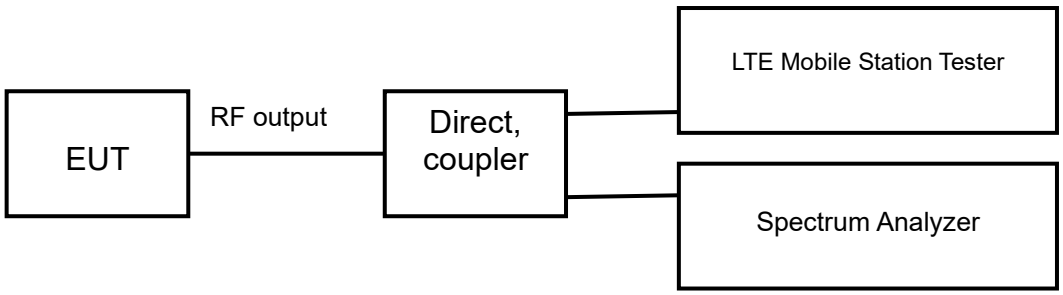
Step 2

Test procedure:
The measurements procedures in TIA-603-E-2016 are used.
The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.
Step 1:
The measurement is carried out in the chamber. EUT was placed on a 0.8m (f<1GHz)/ 1.5m (f>1GHz) high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna from 1m to 4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 100 kHz (f<1GHz)/1MHz (f>1GHz). The antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 10th harmonic of the carrier. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.
Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).
Calculation procedure:
The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.
The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:
Power (EIRP) = Pmea+ Pca + Ga
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).
Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
P=Pmea+Pca+Ga=(-20dBm)+(-30dB)+(11dB)= -39dBm
Note: We tested both horizontal and vertical polarization, but only the largest numerical polarity of the two polarities was recorded in the final report.

Test result:
The test results are shown in Appendix B.

6.10 End user device additional requirements

Rule Part(s)
Part96.47
Test Setup:



Test Procedure:
WINNF-18-IN-00178

Test Setting:
1. Setup with frequency and power level 20dBm/MHz
2. Enable AP service from Ruckus Cloud managementCheck
3. Check EUD Tx Frequency and power
4. Disable AP service from Ruckus Cloud management
5. Check EUD stops transmission within 10seconds.
6. Setup with frequency and power level 8dBm/MHz
7. Enable AP service from Ruckus Cloud management
8. Check EUD Tx Frequency and power
9. Disable AP service from Ruckus Cloud management
10. Check EUD stops transmission within 10seconds.

Test result:
The test results are shown in Appendix A.

7. MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
RF Power Output	0.6 dB	
Effective Radiated Power and Effective Isotropic Radiated Power	0.6 dB	
Occupied Bandwidth	3kHz	
Emission Bandwidth	3kHz	
Peak-Average Ratio	0.8dB	
Frequency Stability	48Hz	
Band Edges Compliance	1.2dB	
Spurious Emissions at antenna terminal	9kHz~2GHz	1.2dB
	2G~3.6GHz	1.4dB
	3.6G~8GHz	2.2dB
	8G~12.75GHz	2.7dB
Radiated Emission Measurement	30MHz～200MHz	4.88dB
	200MHz～1GHz	4.87dB
	1GHz～18GHz	4.58dB
	18GHz~40GHz	4.35dB

Note 1: According to the test specification limit (The test results fully compliance with the test standard limit requirements)

Note 2: According to test specification limits plus uncertainties (The test results exceed the standard limit requirements and meet the standard requirements after adding the system uncertainty)

Note 3: Test operation mode is Note 1

8. TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	Mobile Station Tester / MT8820C	Anritsu	6201300660	2024.06.21	2025.06.20
2	Radio Communication Station / CMW500	R&S	161702	2024.06.21	2025.06.20
3	Spectrum Analyzer / FSV40	R&S	101065	2024.06.21	2025.06.20
4	Spectrum Analyzer / N9020A	Agilent	MY48010771	2024.03.06	2025.03.05
5	Power Divider / 11667A	HP	19632	2024.06.21	2025.06.20
6	Switching box/CBOX-FULL	TSTPASS	SN5308466	2024.07.21	2025.07.20
7	DC Power Supply / E3645A	Agilent	MY40000741	2024.03.06	2025.03.05
8	Temperature chamber / SH241	ESPEC	92013758	2024.06.21	2025.06.20
9	Fully-Anechoic Chamber / 12.65m×8.03m×7.50m	FRANKONIA	-----	-----	-----
10	Semi-Anechoic/Chamber / 23.18m×16.88m×9.60m	FRANKONIA	---	-----	-----
11	Turn table Diameter:1m	FRANKONIA	-----	-----	-----
12	Turn table Diameter:5m	FRANKONIA	-----	-----	-----
13	Antenna master FAC(MA4.0)	MATURO	-----	-----	-----
14	Antenna master SAC(MA4.0)	MATURO	-----	-----	-----
15	Shielding room / 9.080m×5.255m×3.525m	FRANKONIA	-----	-----	-----
16	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100512	2024.06.21	2025.06.20
17	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100513	2024.06.21	2025.06.20
18	Ultra log antenna / HL562	R&S	100016	2024.06.21	2025.06.20
19	Receive antenna /3160-09	SCHWARZ-BECK	002058-002	2024.06.21	2025.06.20
20	EMI test receiver / ESI 40	R&S	100015	2024.06.21	2025.06.20
21	EMI test receiver / ESCS30	R&S	100029	2024.06.21	2025.06.20
22	Receive antenna / HL562	R&S	100167	2024.06.21	2025.06.20
23	AMN / ENV216	R&S	3560.6550.12	2024.06.21	2025.06.20
24	FCC auto test system / RT9100L-2	Radiosky	V1.0	/	/
25	EMI test software / EMC32	R&S	V10.20.01	/	/

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

The worst channel results are reflected in the report,Please refer to the attachment.

APPENDIX B – TEST DATA OF RADIATED EMISSION

The worst channel results are reflected in the report,Please refer to the attachment.

---End of Test Report---