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Rev.: 01
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TEST REPORT

Application No:	ZR/2021/C0014
Applicant:	Fibocom Wireless Inc.
Address of Applicant:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen, China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen, China
EUT Description:	5G module
Model No.:	FG360-NA
Trade Mark:	Fibocom
FCC ID:	ZMOFG360NA05
Standards:	47 CFR Part 2 47 CFR Part 24 subpart E 47 CFR Part 27 subpart L 47 CFR Part 27 subpart M 47 CFR Part 27 subpart N
Date of Receipt:	2021/12/16
Date of Test:	2021/12/17 to 2022/3/1
Date of Issue:	2022/3/2
Test Result:	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Panta Sun

Panta Sun
Wireless Laboratory Manager

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd. Wireless Laboratory

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1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2022/3/2		Original

Prepared By		Weller Liu **(Weller Liu) / Engineer**
Checked By		Well Wei **(Well Wei) / Reviewer**

Content

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2 Test Summary

2.1 NR Band n25(ENDC DC_12A-n25A/ DC_66A-n25A)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232(c)	EIRP ≤ 2 W	Section 1 of Appendix B	Pass
Peak-Average Ratio	§24.232(d)	Limit≤13 dB	Section 2 of Appendix B	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass
Band Edges Compliance	§2.1051, §24.238(a)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 5 of Appendix B	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238(a)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(1) §24.235	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass

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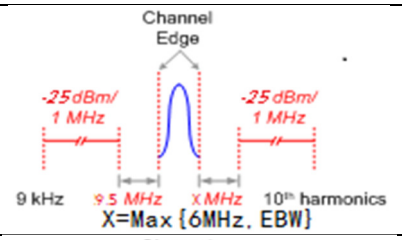
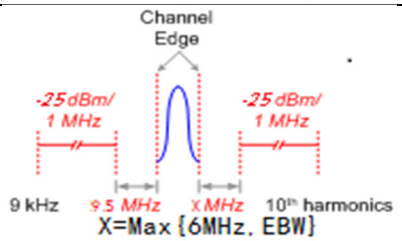
2.2 NR Band n41(ENDC DC_2A_n41A/ DC_41A_n41A/ DC_66A_n41A)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)(2)	EIRP ≤ 2W	Section 1 of Appendix B	Pass
Peak-Average Ratio	---	≤13 dB	Section 2 of Appendix B	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass
Band Edges Compliance	§2.1051, §27.53(m4)	For mobile digital stations, 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 as de□ned in paragraph (m)(6) of this section. 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 2490.5 MHz.	Section 5 of Appendix B	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)		Section 6 of Appendix B	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)		Section 7 of Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(1) §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass

2.3 NR Band n66(ENDC DC_2A-n66A/ DC_12A-n66A)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)(4)	EIRP ≤ 1 W	Section 1 of Appendix B	Pass
Peak-Average Ratio	§27.50(d)(5)	Limit≤13 dB	Section 2 of Appendix B	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass
Band Edges Compliance	§2.1051, §27.53(h)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 5 of Appendix B	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(1) §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass

2.4 NR Band n71(ENDC DC_2A-n71A/ DC_66A-n71A)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046 §27.50(c)(10)	EIRP ≤ 3 W	Section 1 of Appendix B	Pass
Peak-Average Ratio	---	Limit≤13 dB	Section 2 of Appendix B	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass
Band Edges Compliance	§2.1051, §27.53(g)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 5 of Appendix B	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(1) §27.54	within the authorized bands of operation.	Section 8 of Appendix B	Pass

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3 General Information

3.1 Client Information

Applicant:	Fibocom Wireless Inc.
Address of Applicant:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen, China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen, China

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Weller Liu, King-p Li, Nature Shen, Tizzy Song

3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number:717327

3.4 General Description of EUT

EUT Description:	5G module		
Model No.:	FG360-NA		
Trade Mark:	Fibocom		
Hardware Version:	V1.0		
Software Version:	81105.7000.00.08.01.08		
Sample Type:	☐Portable Device, ☒Module		
Antenna Type:	☒External, ☐Integrated		
Antenna Gain*:	☒Provided by client		
	n25:	2.63dBi (ANT0);	
	n41:	1.52dBi (ANT0);	
	n66:	2.76dBi (ANT0);	
	n71:	1.39dBi (ANT0);	
Power Class 2(only for n41 UL MIMO):	☒Support	☐Not Support	
RF Cable*:	☒Provided by client		
	10.5dB (below 1GHz)	11dB (1~2GHz)	11.5dB (above 2GHz)
Remark: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.			

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3.5 Test Mode

Test Mode	Test Modes Description
NR/TM1	NR system, DFT-s-Pi/2-BPSK modulation
NR/TM2	NR system, DFT-s-QPSK modulation
NR/TM3	NR system, DFT-s-16QAM modulation
NR/TM4	NR system, DFT-s-64QAM modulation
NR/TM5	NR system, DFT-s-256QAM modulation
NR/TM6	NR system, CP-QPSK modulation
NR/TM7	NR system, CP-16QAM modulation
NR/TM8	NR system, CP-64QAM modulation
NR/TM9	NR system, CP-256QAM modulation
Remark: The test mode(s) are selected according to relevant radio technology specifications.	

3.6 Test Environment

Environment Parameter	101.0 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(℃)	Voltage(V)
NTNV	22~23	3.8
LTLV	-30	3.3
LTHV	-30	4.4
HTLV	50	3.3
HTHV	50	4.4

Remark:
NV: Normal Voltage
NT: Normal Temperature
LT: Low Extreme Test Temperature
HT: High Extreme Test Temperature
LV: Low Extreme Test Voltage
HV: High Extreme Test Voltage

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3.7 Technical Specification

Characteristics	Description			
Radio System Type	☒ SA ☒ NSA			
Supported Frequency Range	Band	TX	RX	
	NR Band n25	1850 to 1915MHz	1930 to 1995 MHz	
	NR Band n41	2496 to 2690 MHz	2496 to 2690 MHz	
	NR Band n66	1710 to 1780 MHz	2110 to 2180 MHz	
	NR Band n71	663 to 698 MHz	617 to 652 MHz	
	NR CA_n25A-n41A	1850 to 1915MHz 2496 to 2690 MHz	1930 to 1995 MHz 2496 to 2690 MHz	
	NR CA_n25A-n66A	1850 to 1915MHz 1710 to 1780 MHz	1930 to 1995 MHz 2110 to 2180 MHz	
	NR CA_n25A-n71A	1850 to 1915MHz 663 to 698 MHz	1930 to 1995 MHz 617 to 652 MHz	
	NR CA_n41A-n66A	2496 to 2690 MHz 1710 to 1780 MHz	2496 to 2690 MHz 2110 to 2180 MHz	
	NR CA_n41A-n71A	2496 to 2690 MHz 663 to 698 MHz	2496 to 2690 MHz 617 to 652 MHz	
	NR CA_n66A-n71A	1710 to 1780 MHz 663 to 698 MHz	2110 to 2180 MHz 617 to 652 MHz	
Supported Channel Bandwidth	NR Band n25	SCS 15kHz:		
		☒5 MHz	☒10 MHz	☒15 MHz	☒20 MHz
		☒25 MHz	☒30 MHz	☒40 MHz	
		SCS 30kHz:		
		☒10 MHz	☒15 MHz	☒20 MHz	☒25 MHz
		☒30 MHz	☒40 MHz		
	NR Band n41	SCS 15kHz:		
		☒10 MHz	☒15 MHz	☒20 MHz	☒30 MHz
		☒40 MHz	☒50 MHz		
		SCS 30kHz:		
		☒10 MHz	☒15 MHz	☒20 MHz	☒30 MHz
		☒40 MHz	☒50 MHz	☒60 MHz	☒70 MHz
		☒80 MHz	☒90 MHz	☒100 MHz	
	NR Band n66	SCS 15kHz:			

		☒5 MHz	☒10 MHz	☒15 MHz	☒20 MHz
		☒25 MHz	☒30 MHz	☒40 MHz	
		SCS 30kHz:			
		☒10 MHz	☒15 MHz	☒20 MHz	☒25 MHz
		☒30 MHz	☒40 MHz		
	NR Band n71	SCS 15kHz:			
		☒5 MHz	☒10 MHz	☒15 MHz	☒20 MHz
		SCS 30kHz:			
		☒10 MHz	☒15 MHz	☒20 MHz	
Designation of Emissions (Remark: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	NR Band n25	DFT-s-Pi/2-BPSK		CP-16QAM	
		SCS 15kHz:			
		4M46G7D		4M47W7D	
		8M92G7D		9M29W7D	
		13M4G7D		14M1W7D	
		17M9G7D		19M0W7D	
		22M9G7D		23M7W7D	
		28M6G7D		28M6W7D	
		38M9G7D		39M0W7D	
	NR Band n41	SCS 30kHz:			
		8M59G7D		8M59W7D	
		12M9G7D		13M6W7D	
		17M9G7D		18M2W7D	
		26M8G7D		27M9W7D	
		35M7G7D		37M9W7D	
		45M7G7D		47M5W7D	
		57M7G7D		57M8W7D	
		64M2G7D		67M5W7D	
		77M0G7D		77M6W7D	
		85M6G7D		87M4W7D	
		96M3G7D		97M3W7D	
	NR Band n66	SCS 15kHz:			
		4M48G7D		4M47W7D	
		8M93G7D		9M29W7D	
		13M4G7D		14M1W7D	

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		17M9G7D	18M9W7D
		22M8G7D	23M7W7D
		28M6G7D	28M6W7D
		38M6G7D	38M7W7D
	NR Band n71	SCS 15kHz:	
		4M47G7D	4M47W7D
		8M89G7D	9M26W7D
		13M4G7D	14M1W7D
		17M8G7D	18M9W7D

3.8 Test Frequencies

3.8.1 Reference test frequencies for NR operating band n25

3.8.1.1 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	

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3.8.1.2 Test frequencies for NR operating band n25 and SCS 30 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
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	

3.8.2 Reference test frequencies for NR operating band n41

3.8.2.1 Test frequencies for NR operating band n41 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	2501.01	500202	15
		Mid	2593.005	518601	
		High	2685	537000	
15	Downlink & Uplink	Low	2503.5	500700	15
		Mid	2593.005	518601	
		High	2682.495	536499	
20	Downlink & Uplink	Low	2506.005	501201	15
		Mid	2593.005	518601	
		High	2679.99	535998	
30	Downlink & Uplink	Low	2511	502200	15
		Mid	2593.005	518601	
		High	2674.995	534999	
40	Downlink & Uplink	Low	2516.01	503202	15
		Mid	2593.005	518601	
		High	2670	534000	
50	Downlink & Uplink	Low	2521.005	504201	15
		Mid	2593.005	518601	
		High	2664.99	532998	

3.8.2.2 Test frequencies for NR operating band n41 and SCS 30 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	2501.01	500202	30
		Mid	2592.99	518598	
		High	2685	537000	
15	Downlink & Uplink	Low	2503.5	500700	30
		Mid	2592.99	518598	
		High	2682.48	536496	
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	2536.02	507204	30
		Mid	2592.99	518598	
		High	2649.99	529998	
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	

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3.8.3 Reference test frequencies for NR operating band n66

3.8.3.1 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	2145	429000	
		High	2177.5	435500	
	Uplink	Low	1712.5	342500	-
		Mid	1745	349000	
		High	1777.5	355500	
10	Downlink	Low	2115	423000	15
		Mid	2145	429000	
		High	2175	435000	
	Uplink	Low	1715	343000	-
		Mid	1745	349000	
		High	1775	355000	
15	Downlink	Low	2117.5	423500	15
		Mid	2145	429000	
		High	2172.5	434500	
	Uplink	Low	1717.5	343500	-
		Mid	1745	349000	
		High	1772.5	354500	
20	Downlink	Low	2120	424000	15
		Mid	2145	429000	
		High	2170	434000	
	Uplink	Low	1720	344000	-
		Mid	1745	349000	
		High	1770	354000	
25	Downlink	Low	2122.5	424500	15
		Mid	2145	429000	
		High	2167.5	433500	
	Uplink	Low	1722.5	344500	-
		Mid	1745	349000	
		High	1767.5	353500	
30	Downlink	Low	2125	425000	15
		Mid	2145	429000	
		High	2165	433000	
	Uplink	Low	1725	345000	-
		Mid	1745	349000	
		High	1765	353000	
40	Downlink	Low	2130	426000	15
		Mid	2145	429000	
		High	2160	432000	
	Uplink	Low	1730	346000	-
		Mid	1745	349000	
		High	1760	352000	

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3.8.3.2 Test frequencies for NR operating band n66 and SCS 30 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink	Low	2115	423000	15
		Mid	2145	429000	
		High	2175	435000	
	Uplink	Low	1715	343000	-
		Mid	1745	349000	
		High	1775	355000	
15	Downlink	Low	2117.5	423500	15
		Mid	2145	429000	
		High	2172.5	434500	
	Uplink	Low	1717.5	343500	-
		Mid	1745	349000	
		High	1772.5	354500	
20	Downlink	Low	2120	424000	15
		Mid	2145	429000	
		High	2170	434000	
	Uplink	Low	1720	344000	-
		Mid	1745	349000	
		High	1770	354000	
25	Downlink	Low	2122.5	424500	15
		Mid	2145	429000	
		High	2167.5	433500	
	Uplink	Low	1722.5	344500	-
		Mid	1745	349000	
		High	1767.5	353500	
30	Downlink	Low	2125	425000	15
		Mid	2145	429000	
		High	2165	433000	
	Uplink	Low	1725	345000	-
		Mid	1745	349000	
		High	1765	353000	
40	Downlink	Low	2130	426000	15
		Mid	2145	429000	
		High	2160	432000	
	Uplink	Low	1730	346000	-
		Mid	1745	349000	
		High	1760	352000	

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3.8.4 Reference test frequencies for NR operating band n71

3.8.4.1 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	

3.8.4.2 Test frequencies for NR operating band n71 and SCS 30 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
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	

3.8.5 Reference test frequencies for NR operating band n25A-n41A

NR CA Band	NR Band	CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
n25A-n41A	n25	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	
	n41	10	Downlink & Uplink	Low	2501.01	500202	30
				Mid	2592.99	518598	
				High	2685	537000	
		15	Downlink & Uplink	Low	2503.5	500700	30
				Mid	2592.99	518598	
				High	2682.48	536496	
		20	Downlink &	Low	2506.02	501204	30
				Mid	2592.99	518598	

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			Uplink	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	2536.02	507204	30
				Mid	2592.99	518598	
				High	2649.99	529998	
		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	

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3.8.6 Reference test frequencies for NR operating band n25A-n66A

NR CA Band	NR Band	CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
n25A-n66A	n25	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	
	n66	5	Downlink	Low	2112.5	422500	15
				Mid	2145	429000	
				High	2177.5	435500	
			Uplink	Low	1712.5	342500	-
				Mid	1745	349000	
				High	1777.5	355500	
		10	Downlink	Low	2115	423000	15
				Mid	2145	429000	

				High	2175	435000	
			Uplink	Low	1715	343000	-
				Mid	1745	349000	
				High	1775	355000	
		15	Downlink	Low	2117.5	423500	15
				Mid	2145	429000	
				High	2172.5	434500	
			Uplink	Low	1717.5	343500	-
				Mid	1745	349000	
				High	1772.5	354500	
		20	Downlink	Low	2120	424000	15
				Mid	2145	429000	
				High	2170	434000	
			Uplink	Low	1720	344000	-
				Mid	1745	349000	
				High	1770	354000	
		25	Downlink	Low	2122.5	424500	15
				Mid	2145	429000	
				High	2167.5	433500	
			Uplink	Low	1722.5	344500	-
				Mid	1745	349000	
				High	1767.5	353500	
		30	Downlink	Low	2125	425000	15
				Mid	2145	429000	
				High	2165	433000	
			Uplink	Low	1725	345000	-
				Mid	1745	349000	
				High	1765	353000	
		40	Downlink	Low	2130	426000	15
				Mid	2145	429000	
				High	2160	432000	
			Uplink	Low	1730	346000	-
				Mid	1745	349000	
				High	1760	352000	

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3.8.7 Reference test frequencies for NR operating band n25A-n71A

NR CA Band	NR Band	CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
n25A-n71A	n25	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	
	n71	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	

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3.8.8 Reference test frequencies for NR operating band n41A-n66A

NR CA Band	NR Band	CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
n41A-n66A	n41	10	Downlink & Uplink	Low	2501.01	500202	30
				Mid	2592.99	518598	
				High	2685	537000	
		15	Downlink & Uplink	Low	2503.5	500700	30
				Mid	2592.99	518598	
				High	2682.48	536496	
		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	2536.02	507204	30
				Mid	2592.99	518598	
				High	2649.99	529998	
		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	
	n66	5	Downlink	Low	2112.5	422500	15
				Mid	2145	429000	
				High	2177.5	435500	
			Uplink	Low	1712.5	342500	-
				Mid	1745	349000	
				High	1777.5	355500	
		10	Downlink	Low	2115	423000	15
				Mid	2145	429000	
				High	2175	435000	
			Uplink	Low	1715	343000	-
				Mid	1745	349000	
				High	1775	355000	
		15	Downlink	Low	2117.5	423500	15
				Mid	2145	429000	
				High	2172.5	434500	
			Uplink	Low	1717.5	343500	-
				Mid	1745	349000	

				High	1772.5	354500	
		20	Downlink	Low	2120	424000	15
				Mid	2145	429000	
				High	2170	434000	
			Uplink	Low	1720	344000	-
				Mid	1745	349000	
				High	1770	354000	
		25	Downlink	Low	2122.5	424500	15
				Mid	2145	429000	
				High	2167.5	433500	
			Uplink	Low	1722.5	344500	-
				Mid	1745	349000	
				High	1767.5	353500	
		30	Downlink	Low	2125	425000	15
				Mid	2145	429000	
				High	2165	433000	
			Uplink	Low	1725	345000	-
				Mid	1745	349000	
				High	1765	353000	
		40	Downlink	Low	2130	426000	15
				Mid	2145	429000	
				High	2160	432000	
			Uplink	Low	1730	346000	-
				Mid	1745	349000	
				High	1760	352000	

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3.8.9 Reference test frequencies for NR operating band n41A-n71A

NR CA Band	NR Band	CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
n41A-n71A	n41	10	Downlink & Uplink	Low	2501.01	500202	30
				Mid	2592.99	518598	
				High	2685	537000	
		15	Downlink & Uplink	Low	2503.5	500700	30
				Mid	2592.99	518598	
				High	2682.48	536496	
		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	2536.02	507204	30
				Mid	2592.99	518598	
				High	2649.99	529998	
		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	
	n71	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	

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				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	

3.8.10 Reference test frequencies for NR operating band n66A-n71A

NR CA Band	NR Band	CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
n66A-n71A	n66	5	Downlink	Low	2112.5	422500	15
				Mid	2145	429000	
				High	2177.5	435500	
			Uplink	Low	1712.5	342500	-
				Mid	1745	349000	
				High	1777.5	355500	
		10	Downlink	Low	2115	423000	15
				Mid	2145	429000	
				High	2175	435000	
			Uplink	Low	1715	343000	-
				Mid	1745	349000	
				High	1775	355000	
		15	Downlink	Low	2117.5	423500	15
				Mid	2145	429000	
				High	2172.5	434500	
			Uplink	Low	1717.5	343500	-
				Mid	1745	349000	
				High	1772.5	354500	
		20	Downlink	Low	2120	424000	15
				Mid	2145	429000	
				High	2170	434000	
			Uplink	Low	1720	344000	-
				Mid	1745	349000	
				High	1770	354000	
		25	Downlink	Low	2122.5	424500	15
				Mid	2145	429000	
				High	2167.5	433500	
			Uplink	Low	1722.5	344500	-
				Mid	1745	349000	
				High	1767.5	353500	
		30	Downlink	Low	2125	425000	15
				Mid	2145	429000	
				High	2165	433000	
			Uplink	Low	1725	345000	-
				Mid	1745	349000	
				High	1765	353000	
		40	Downlink	Low	2130	426000	15
				Mid	2145	429000	
				High	2160	432000	
			Uplink	Low	1730	346000	-
				Mid	1745	349000	
				High	1760	352000	
	n71	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	

4 Description of Tests

4.1 Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 V03r01

The transmitter output was connected to a calibrated coaxial cable, attenuator and power meter, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the power reading. The tests were performed at three frequencies (low channel, middle channel and high channel) and on the highest power levels, which can be setup on the transmitters.

Remark: Reference test setup 1

4.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure: FCC KDB 971168 D01 V03r01; ANSI/C63.26 (2015)

Calculate power in dBm by the following formula:

ERP (dBm) = Conducted Power (dBm) + antenna gain (dBd)

EIRP (dBm) = Conducted Power (dBm) + antenna gain (dBi)

EIRP=ERP+2.15dB

Measurement Procedure: FCC KDB 971168 D01 V03r01; ANSI/C63.26 (2015)

Below 1GHz test procedure as below:

1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). Test the EUT in the lowest channel, the middle channel, the Highest channel.

5). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

6). Repeat above procedures until all frequencies measured was complete.

E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

ERP = EIRP – 2.15 (dB); where ERP and EIRP are expressed in consistent units.

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2) Calculate power in dBm by the following formula:

E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

3). Test the EUT in the lowest channel, the middle channel the Highest channel

4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5). Repeat above procedures until all frequencies measured was complete

Remark: Reference test setup 2

4.3 Occupied Bandwidth

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 4.2

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel, middle channel and high channel).The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

Remark: Reference test setup 1

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 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

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4.4 Band Edge at Antenna Terminals

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at two frequencies (low channel and high channel).in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 100kHz or 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. The EUT emission bandwidth is measured as the width of the signal between two points, outside of which all emission are attenuated at least 26dB below the transmitter power. The video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to peak or peak hold power.

Remark: Reference test setup 1

Test Settings

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

4.5 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure: FCC KDB 971168 D01 V03r01

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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.

Remark: Reference test setup 1

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

4.6 Peak-Average Ratio

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.7.1

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

Remark: Reference test setup 1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
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

4.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01

Below 1GHz test procedure as below:

1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). Test the EUT in the lowest channel, the middle channel, the Highest channel.

5). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

6). Repeat above procedures until all frequencies measured was complete.

E (dBμV/m) = Measured amplitude level (μV/m) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2) Calculate power in dBm by the following formula:

E (dBμV/m) = Measured amplitude level (dBμV) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

3). Test the EUT in the lowest channel, the middle channel the Highest channel

4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5). Repeat above procedures until all frequencies measured was complete

Remark1: Reference test setup 2

Remark2: The emission below 18G were measured at a 3m test distance, while emissions above 18GHz were measured at a 1m test distance.

Remark: Reference test setup 2

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Factor (Antenna Factor + Cable Factor – Preamplifier Factor)

2) Scan from 9kHz to 40GHz, The disturbance between 9KHz to 30MHz and 18GHz to 40GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) All modes have been tested, but only the worst case data displayed in this report.

4.8 Frequency Stability / Temperature Variation

Measurement Procedure:
Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 V03r01; ANSI/C63.26 (2015)

. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30℃ to +50℃ in 10℃ increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

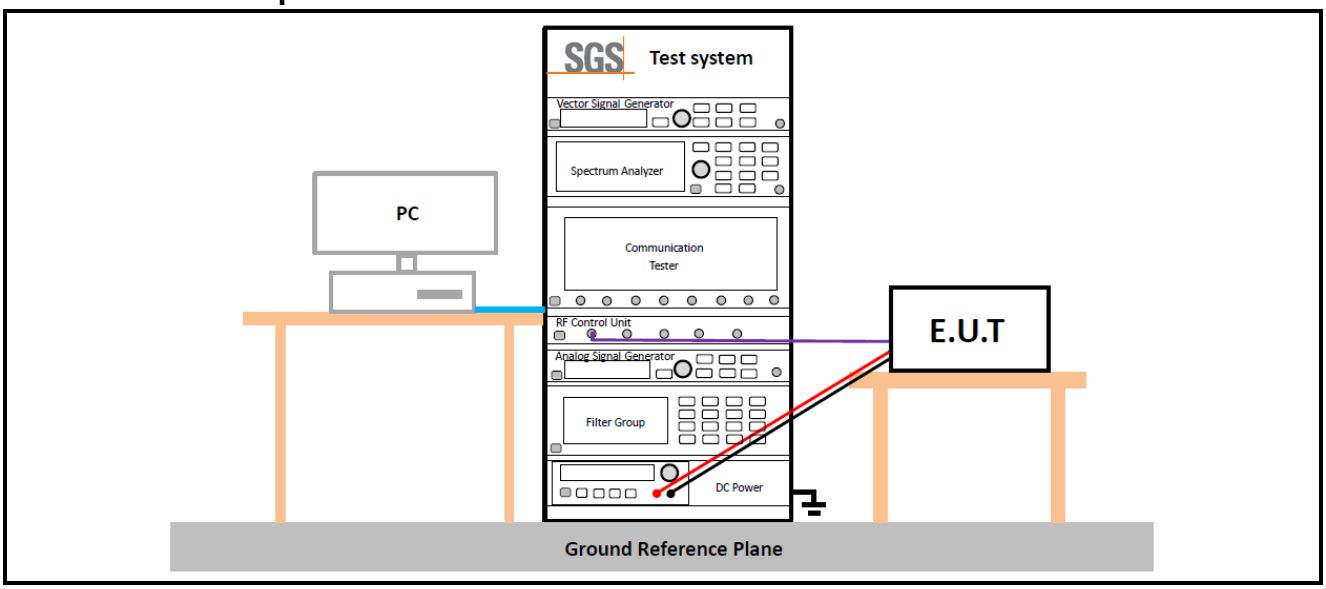
Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20℃ 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℃ intervals ranging from -30℃ to +50℃. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Remark: Reference test setup 3

4.9 Test Setups

4.9.1 Test Setup 1



4.9.2 Test Setup 2

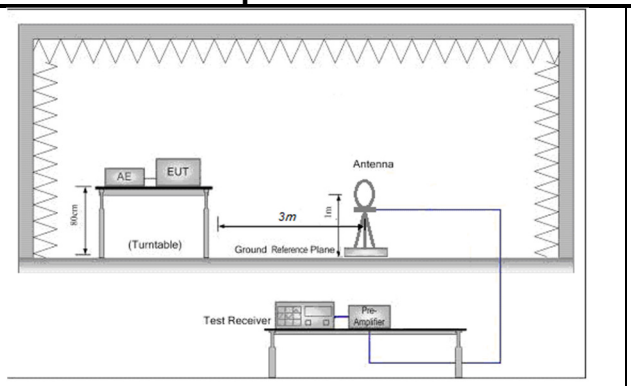


Figure 1. Below 30MHz

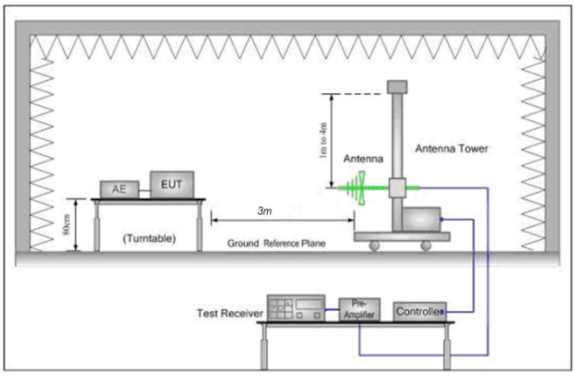


Figure 2. 30MHz to 1GHz

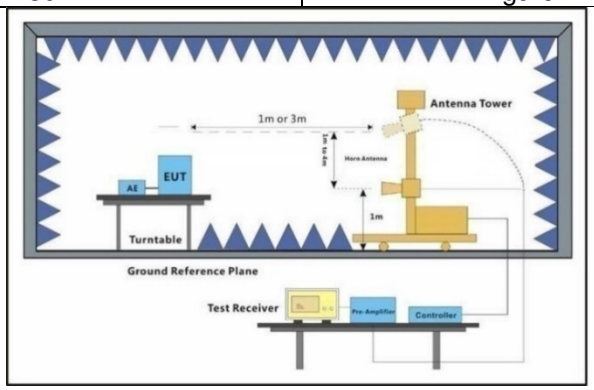
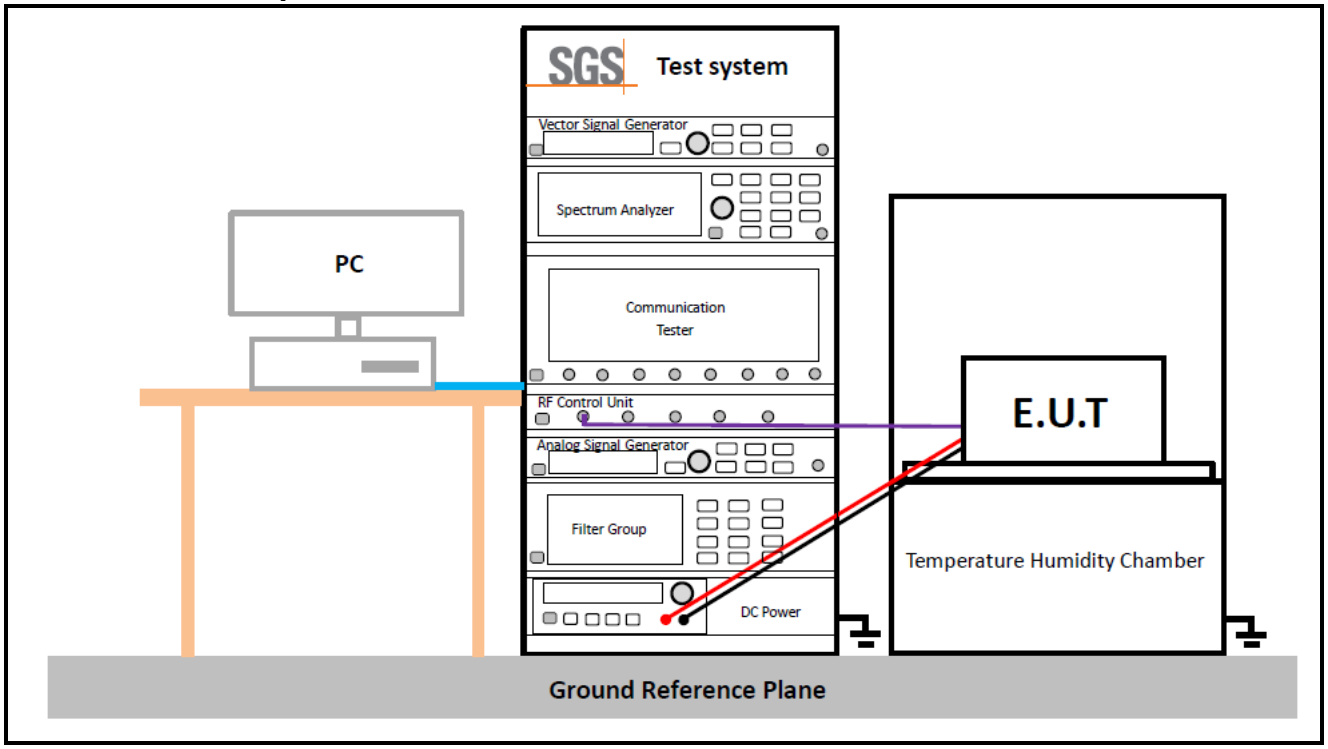


Figure 3. above 1GHz

4.9.3 Test Setup 3



4.10 Test Conditions

Test Case		Test Conditions	
Transmit Output Power Data	Average Power, Total	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	NR/TM1;NR/TM2;NR/TM3;NR/TM4;NR/TM5;NR/TM6; NR/TM7;NR/TM8; NR/TM9;
	Average Power, Spectral Density (if required)	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	NR/TM1;NR/TM2;NR/TM3;NR/TM4;NR/TM5;NR/TM6; NR/TM7;NR/TM8; NR/TM9;
Peak-to-Average Ratio (if required)		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (M= middle channel)
		Test Mode	NR/TM1;NR/TM6
Modulation Characteristics		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (M= middle channel)
		Test Mode	NR/TM1;NR/TM2;NR/TM3;NR/TM4;NR/TM5;NR/TM6; NR/TM7;NR/TM8; NR/TM9;
Bandwidth	Occupied Bandwidth	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	NR/TM1;NR/TM2;NR/TM3;NR/TM4;NR/TM5;NR/TM6; NR/TM7;NR/TM8; NR/TM9;
	Emission Bandwidth (if required)	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	NR/TM1;NR/TM2;NR/TM3;NR/TM4;NR/TM5;NR/TM6; NR/TM7;NR/TM8; NR/TM9;
Band Edges Compliance		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1

	RF Channels (TX)	L, H (L= low channel, H= high channel)
	Test Mode	NR/TM1;NR/TM2;NR/TM3;NR/TM4;NR/TM5;NR/TM6; NR/TM7;NR/TM8; NR/TM9;
Spurious Emission at Antenna Terminals	Test Environment	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	RF Channels (TX)	L,M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	NR/TM1
Field Strength of Spurious Radiation	Test Environment	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 2
	Test Mode	NR/TM1 Remark: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Frequency Stability	Test Environment	(1) -30 ℃ to +50 ℃ with step 10 ℃ at Rated Voltage; (2) VL, VN and VH of Rated Voltage at Ambient Climate.
	Test Setup	Test Setup 4
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	NR/TM1;NR/TM6

5 Main Test Instruments

RF Test Equipment					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/5/8	2024/5/7
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2021/2/20	2022/2/19
				2022/2/19	2023/2/18
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2021/5/28	2022/5/27
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2021/2/20	2022/2/19
				2022/2/19	2023/2/18
Measurement Software	Tonscend	JS1120-3 Test System V 2.6.88.0336	SUWI-02-09-09	NCR	NCR
Radio Communication Analyzer	Anritsu	MT8821C	SUWI-01-26-03	2021/9/29	2022/9/28
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-27-01	2021/9/28	2022/9/27
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2021/2/20	2022/2/19
				2022/2/19	2023/2/18

RSE Test Equipment					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-02	2021/11/25	2022/11/24
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-11	2021/2/20	2022/2/19
				2022/2/19	2023/2/18
Signal Analyzer	Keysight	N9020A	SUWI-01-02-05	2021/12/4	2022/12/3
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2021/2/20	2022/2/19
				2022/2/19	2023/2/18
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2021/2/20	2022/2/19
				2022/2/19	2023/2/18
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-04	2021/12/5	2022/12/4
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	2021/12/5	2022/12/4
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2021/5/14	2022/5/13
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-06	2021/12/4	2022/12/3
Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	2021/12/4	2022/12/3
Amplifier	Tonscend	TAP18040048	SUWI-01-14-05	2021/12/4	2022/12/3
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-12-01	NCR	NCR
Measurement Software	Tonscend	JS32-RSE V4.0.0.1	SUWI-02-12-02	NCR	NCR
Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-16-08	2021/2/20	2022/2/19
				2022/2/19	2023/2/18
Wideband Radio Communication Tester	Anritsu	MT8821C	SUWI-01-26-03	2021/12/4	2022/12/3

6 Measurement Uncertainty

For a 95% confidence level (k = 2), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.54dB
2	RF power density, conducted	±1.03dB
3	Spurious emissions, conducted	±0.54dB
4	Radio Frequency	$\pm 7.25 \times 10^{-8}$
5	Duty Cycle	±0.37%
6	Occupied Bandwidth	$\pm 7.25 \times 10^{-8}$
7	Radiated Emission	± 3.13dB (9kHz - 30MHz)
		± 4.8dB (30MHz - 1GHz)
		± 4.8dB (1GHz to 18GHz)
		± 4.8dB (Above 18GHz)

7 Appendixes

Appendix A.2	WWAN Setup Photos
Appendix B.11	n25
Appendix B.12	n41
Appendix B.13	n66
Appendix B.14	n71
Appendix B.15	NR UL Inter band CA

The End

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