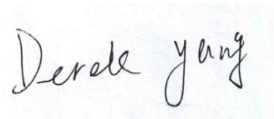
FCC TEST REPORT

Application No:	AR/2021/10008
Applicant:	Xiaomi Communications Co., Ltd.
Address of Applicant	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Manufacturer:	Xiaomi Communications Co., Ltd.
Address of Manufacturer:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
EUT Description:	Mobile Phone
Model No.:	M2103K19G / M2103K19PG
Trade Mark:	Redmi / POCO
FCC ID:	2AFZZK19G
Standards:	47 CFR Part 2 47 CFR Part 27 subpart C
Test Method:	FCC KDB 971168 D01 Power Meas License Digital Systems V03r01 C63.26 (2015)
Date of Receipt:	2021/2/8
Date of Test:	2021/2/8 to 2021/4/2
Date of Issue:	2021/4/2
Test Result:	**PASS ***

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

Authorized Signature:



Derek Yang
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1 Version

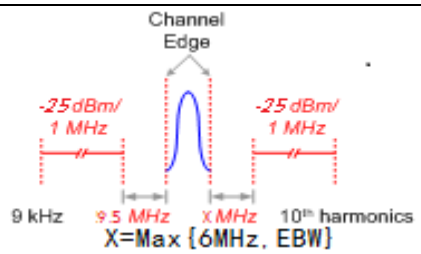
Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2021/4/2		Original

Authorized for issue by:		
Prepared By		Dee.Zheng **(Dee Zheng) /Engineer**
Checked By		David Chen **(David Chen) /Reviewer**

Content

2 Test Summary

2.1 NR Band N7/N38/N41

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)	EIRP ≤ 2W	Section 1 of Appendix B	Pass
Peak-Average Ratio	§27.50(a)	≤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 defined in paragraph (m)(6) of this section.	Section 5 of Appendix B	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)		Section 6 of Appendix B	Pass
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

2.2 NR Band N66(ENDC DC_7A_N66A)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)	EIRP ≤ 1 W	Section 1 of Appendix B	Pass
Peak-Average Ratio	§2.1046, §27.50(d)	Limit≤13 dB	Section 2 of	Pass

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
			Appendix B	
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
Frequency Stability	§2.1055, §27.54	≤ ±2.5 ppm.	Section 8 of Appendix B	Pass
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

2.3 NR Band N77/N78

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(j)	EIRP ≤ 1W	Section 1 of Appendix B	Pass
Peak-Average Ratio	§27.50(a)	≤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(l2)	(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.	Section 5 of Appendix B	Pass

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Spurious Emission at Antenna Terminals	§2.1051, §27.53(l)	not exceed -13 dBm/MHz.	Section 6 of Appendix B	Pass
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

Note: The differences between M2103K19G（K19）and M2103K19PG （K19P）are as below:

Model name	Brand Name	rear cover
M2103K19G	Redmi	The material is the same, drawing is different, laser engraving is different
M2103K19PG	POCO	

Except listings above, the others are all the same as previous version.

Based on the above differences, the main test only performs M2103K19G

Remark：

Because the product is a multi-TX antenna, the antenna with the max conducted power is selected for conducted testing，EIRP and RSE require all antennas to be tested.

3 General Information

3.1 Client Information

Applicant:	Xiaomi Communications Co., Ltd.
Address of Applicant:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Manufacturer:	Xiaomi Communications Co., Ltd.
Address of Manufacturer:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057

3.3 Test Facility

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

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

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3.4 General Description of EUT

EUT Description::	Mobile Phone
Model No.:	M2103K19G / M2103K19PG
Trade Mark:	Redmi / POCO
Hardware Version:	P2
Software Version:	MIUI 12
Sample Type:	☒ Portable Device, ☐Module
Antenna Type:	PIFA Antenna
Antenna Gain:	N7: 3.09dBi (Ant1); -2.2dBi (Ant2); -1.7dBi (Ant4) N38: 3.05dBi (Ant1); -2.2dBi (Ant2); -2dBi (Ant4) N41: 3.14dBi (Ant1); -2.3dBi (Ant2); -1.6dBi (Ant4) N66: -1.5dBi (Ant1); -2.4dBi (Ant4) N77: -1.57dBi (Ant2) N78: -1.95dBi (Ant2)

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	Selected Values During Tests	
Relative Humidity	49%	
Atmospheric Pressure:	102.46 KPa	
Temperature	NT	25 °C
Voltage:	LV	3.6V
	NV	3.87V
	HV	4.45V

Remark: LV= lower extreme test voltage; NV= nominal voltage
HV= upper extreme test voltage; NT= normal temperature

3.7 Technical Specification

Characteristics	Description		
Radio System Type	☒ SA ☒ NSA		
Supported Frequency Range	Band	TX	RX
	NR Band N7	2500 to 2570 MHz	2620 to 2690 MHz
	NR Band N38	2570 to 2620 MHz	2570 to 2620 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 N77	3700 to 3980 MHz	3700 to 3980 MHz
	NR Band N78	3700 to 3800 MHz	3700 to 3800 MHz
Supported Channel Bandwidth	NR Band N7	SCK 15k: ☒5 MHz; ☒10 MHz; ☒15 MHz; ☒20 MHz	
	NR Band N38	SCK 30k: ☒20 MHz	
	NR Band N41	SCK 30k: ☒10 MHz; ☒15 MHz; ☒20 MHz; ☒40 MHz; ☒50 MHz; ☒60 MHz; ☒80 MHz; ☒90 MHz; ☒100 MHz	
	NR Band N66	SCK 15k: ☒5 MHz; ☒10 MHz; ☒15 MHz; ☒20 MHz	
	NR Band N77	SCK 30k: ☒10 MHz; ☒15 MHz; ☒20 MHz; ☒40 MHz; ☒50 MHz; ☒60 MHz; ☒80 MHz; ☒90 MHz; ☒100 MHz	
	NR Band N78	SCK 30k: ☒10 MHz; ☒15 MHz; ☒20 MHz; ☒40 MHz; ☒50 MHz; ☒60 MHz; ☒80 MHz; ☒90 MHz; ☒100 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 N7	SCK 15k: 4M47G7D;4M47W7D; 9M27G7D;9M30W7D; 14M1G7D;14M1W7D 18M9G7D;18M9W7D	
	NR Band N38	SCK 30k: 18M2G7D;18M3W7D	
	NR Band N41	SCK 30k: 8M58G7D;8M60W7D; 13M6G7D;13M6W7D 18M2G7D;18M3W7D 37M8G7D;37M8W7D 47M5G7D;47M5W7D 57M8G7D;57M9W7D 77M5G7D;77M7W7D 87M4G7D;87M5W7D 97M4G7D;97M3W7D	
	NR Band N66	SCK 15k: 4M51G7D;4M47W7D; 9M27G7D;9M29W7D; 14M1G7D;14M1W7D	

		18M9G7D;18M9W7D
	NR Band N77	SCK 30k: 8M57G7D;8M58W7D; 12M8G7D;12M9W7D 18M2G7D;18M2W7D 35M8G7D;35M7W7D 47M5G7D;47M6W7D 57M9G7D;57M9W7D 77M6G7D;77M6W7D 87M4G7D;87M5W7D 97M3G7D;97M4W7D
	NR Band N78	SCK 30k: 8M58G7D;8M58W7D; 13M6G7D;13M6W7D 18M3G7D;18M3W7D 37M8G7D;37M9W7D 47M4G7D;47M5W7D 57M9G7D;57M9W7D 77M5G7D;77M7W7D 87M6G7D;87M7W7D 97M2G7D;97M3W7D

3.8 Test Frequencies

3.8.1Reference test frequencies for NR operating band n7

3.8.1.1 Test frequencies for NR operating band n7 and SCS 15 kHz

Band width [MHz]	*carrier Bandwidth* [PRBs]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	point A [MHz]	*absoluteFrequency PointA* [ARFCN]	*offsetToCarrier* [PRBs]	SS block SCS [kHz]	GSCN	*absoluteFrequencySSB* [ARFCN]
5	25	Downlink	Low	2622.5	524500	2620.25	524050	0	15	6554	524410
			Mid	2655	531000	2634.39	526878	102		6636	530910
			High	2687.5	537500	2594.53	518906	504		6718	537410
		Uplink	Low	2502.5	500500	2500.25	500050	0	-	-	-
			Mid	2535	507000	2442.03	488406	504		-	-
			High	2567.5	513500	2564.17	512834	6		-	-
10	52	Downlink	Low	2625	525000	2620.32	524064	0	15	6555	524430
			Mid	2655	531000	2631.96	526392	102		6630	530430
			High	2685	537000	2589.6	517920	504		6705	536430
		Uplink	Low	2505	501000	2500.32	500064	0	-	-	-
			Mid	2535	507000	2439.6	487920	504		-	-
			High	2565	513000	2559.24	511848	6		-	-
15	79	Downlink	Low	2627.5	525500	2620.39	524078	0	15	6556	524450
			Mid	2655	531000	2629.53	525906	102		6624	529950
			High	2682.5	536500	2584.67	516934	504		6692	535450
		Uplink	Low	2507.5	501500	2500.39	500078	0	-	-	-
			Mid	2535	507000	2437.17	487434	504		-	-
			High	2562.5	512500	2554.31	510862	6		-	-
20	106	Downlink	Low	2630	526000	2620.46	524092	0	15	6557	524650
			Mid	2655	531000	2627.1	525420	102		6618	529470
			High	2680	536000	2579.74	515948	504		6682	534530
		Uplink	Low	2510	502000	2500.46	500092	0	-	-	-
			Mid	2535	507000	2434.74	486948	504		-	-
			High	2560	512000	2549.38	509876	6		-	-

3.8.2Reference test frequencies for NR operating band n38

3.8.2.1 Test frequencies for NR operating band n38 and SCS 30 kHz

Band width [MHz]	*carrier Bandwidth* [PRBs]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	point A [MHz]	*absoluteFrequency PointA* [ARFCN]	*offsetToCarrier* [PRBs]	SS block SCS [kHz]	GSCN	*absoluteFrequencySSB* [ARFCN]
20	51	Downlink & Uplink	Low	2580	516000	2570.82	514164	0	30	6438	515070
			Mid	2595	519000	2549.1	509820	102		6474	517950
			High	2610	522000	2419.38	483876	504		6513	521070

3.8.3Reference test frequencies for NR operating band n41

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

Band width [MHz]	*carrier Bandwidth* [PRBs]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	point A [MHz]	*absoluteFrequency PointA* [ARFCN]	*offsetToCarrier* [PRBs]	SS block SCS [kHz]	GSCN	*absoluteFrequencySSB* [ARFCN]
10	24	Downlink & Uplink	Low	2501.01	500202	2496.69	499338	0	30	6252	500190
			Mid	2592.99	518598	2551.95	510390	102		6483	518670
			High	2685	537000	2499.24	499848	504		6711	536910
15	38	Downlink & Uplink	Low	2503.5	500700	2496.66	499332	0	30	6252	500190
			Mid	2592.99	518598	2549.43	509886	102		6474	517950
			High	2682.48	536496	2494.2	498840	504		6699	535950
20	51	Downlink & Uplink	Low	2506.02	501204	2496.84	499368	0	30	6252	500190
			Mid	2592.99	518598	2547.09	509418	102		6471	517710
			High	2670	534000	2469.48	493896	504		6636	530910
40	106	Downlink & Uplink	Low	2516.01	503202	2496.93	499386	0	30	6252	500190
			Mid	2592.99	518598	2537.19	507438	102		6444	515550
			High	2670	534000	2469.48	493896	504		6636	530910
50	133	Downlink & Uplink	Low	2521.02	504204	2497.08	499416	0	30	6252	500190
			Mid	2592.99	518598	2532.33	506466	102		6432	514590
			High	2664.99	532998	2459.61	491922	504		6612	528990
60	162	Downlink & Uplink	Low	2526	505200	2496.84	499368	0	30	6252	500190
			Mid	2592.99	518598	2527.11	505422	102		6420	513630
			High	2659.98	531996	2449.38	489876	504		6588	527070
80	217	Downlink & Uplink	Low	2536.02	507204	2496.96	499392	0	30	6252	500190
			Mid	2592.99	518598	2517.21	503442	102		6396	511710
			High	2649.99	529998	2429.49	485898	504		6537	522990
90	245	Downlink & Uplink	Low	2541	508200	2496.9	499380	0	30	6252	500190
			Mid	2592.99	518598	2512.17	502434	102		6381	510510
			High	2644.98	528996	2419.44	483888	504		6513	521070
100	273	Downlink & Uplink	Low	2546.01	509202	2496.87	499374	0	30	6252	500190
			Mid	2592.99	518598	2507.13	501426	102		6369	509550
			High	2640	528000	2409.42	481884	504		6486	518910

3.8.4Reference test frequencies for NR operating band n66

3.8.4.1 Test frequencies for NR operating band n66 and SCS 15 kHz

Band width [MHz]	*carrier Bandwidth* [PRBs]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	point A [MHz]	*absoluteFrequency PointA* [ARFCN]	*offsetToCarrier* [PRBs]	SS block SCS [kHz]	GSCN	*absoluteFrequencySSB* [ARFCN]
5	25	Downlink	Low	2112.5	422500	2110.25	422050	0	15	5279	422410
			Mid	2145	429000	2124.39	424878	102		5361	428910
			High	2177.5	435500	2084.53	416906	504		5443	435410
		Uplink	Low	1712.5	342500	1710.25	342050	0	-	-	-
			Mid	1745	349000	1652.03	330406	504		-	-
			High	1777.5	355500	1774.17	354834	6		-	-
10	52	Downlink	Low	2115	423000	2110.32	422064	0	15	5280	422430
			Mid	2145	429000	2121.96	424392	102		5355	428430
			High	2175	435000	2079.6	415920	504		5430	434430
		Uplink	Low	1715	343000	1710.32	342064	0	-	-	-
			Mid	1745	349000	1649.6	329920	504		-	-
			High	1775	355000	1769.24	353848	6		-	-
15	79	Downlink	Low	2117.5	423500	2110.39	422078	0	15	5281	422450
			Mid	2145	429000	2119.53	423906	102		5349	427950
			High	2172.5	434500	2074.67	414934	504		5417	433450
		Uplink	Low	1717.5	343500	1710.39	342078	0	-	-	-
			Mid	1745	349000	1647.17	329434	504		-	-
			High	1772.5	354500	1764.31	352862	6		-	-
20	106	Downlink	Low	2120	424000	2110.46	422092	0	15	5282	422650
			Mid	2145	429000	2117.1	423420	102		5343	427470
			High	2170	434000	2069.74	413948	504		5407	432530
		Uplink	Low	1720	344000	1710.46	342092	0	-	-	-
			Mid	1745	349000	1644.74	328948	504		-	-
			High	1770	354000	1759.38	351876	6			

3.8.5Reference test frequencies for NR operating band n77

3.8.5.1 Test frequencies for NR operating band n77 and SCS 30 kHz

Band width [MHz]	carrier Bandwidth [PRBs]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	point A [MHz]	absoluteFrequency PointA [ARFCN]	offsetToCarrier [Carrier PRBs]	SS block SCS [kHz]	GSCN	absoluteFrequencySSB [ARFCN]
10	24	Downlink & Uplink	Low	3705	647000	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3975	665000	\	\	504		\	\
15	38	Downlink & Uplink	Low	3707.52	647168	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3972.48	664832	\	\	504		\	\
20	51	Downlink & Uplink	Low	3710.01	647334	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3969.99	664666	\	\	504		\	\
40	106	Downlink & Uplink	Low	3720	648000	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3960	664000	\	\	504		\	\
50	133	Downlink & Uplink	Low	3725.01	648334	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3954.99	663666	\	\	504		\	\
60	162	Downlink & Uplink	Low	3730.02	648668	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3949.98	663332	\	\	504		\	\
80	217	Downlink & Uplink	Low	3740.01	649334	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3939.99	662666	\	\	504		\	\
90	245	Downlink & Uplink	Low	3745.02	649668	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3934.98	662332	\	\	504		\	\
100	273	Downlink & Uplink	Low	3750	650000	\	\	0	30	\	\
			Mid	3840	656000	\	\	102		\	\
			High	3930	662000	\	\	504		\	\

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3.8.1 Reference test frequencies for NR operating band n78

3.8.1.1 Test frequencies for NR operating band n78 and SCS 30 kHz

Band width [MHz]	carrier Bandwidth [PRBs]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	point A [MHz]	absoluteFrequency PointA [ARFCN]	offsetToCarrier [Carrier PRBs]	SS block SCS [kHz]	GSCN	absoluteFrequencySSB [ARFCN]
10	24	Downlink & Uplink	Low	3705	647000	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3795	653000	\	\	504		\	\
15	38	Downlink & Uplink	Low	3707.52	647168	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3792.48	652832	\	\	504		\	\
20	51	Downlink & Uplink	Low	3710.01	647334	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3789.99	652666	\	\	504		\	\
40	106	Downlink & Uplink	Low	3720	648000	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3780	652000	\	\	504		\	\
50	133	Downlink & Uplink	Low	3725.01	648334	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3774.99	651666	\	\	504		\	\
60	162	Downlink & Uplink	Low	3730.02	648668	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3769.98	651332	\	\	504		\	\
80	217	Downlink & Uplink	Low	3740.01	649334	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3759.99	650666	\	\	504		\	\
90	245	Downlink & Uplink	Low	3745.02	649668	\	\	0	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	3754.98	650332	\	\	504		\	\
100	273	Downlink & Uplink	Low	\	\	\	\	\	30	\	\
			Mid	3750	650000	\	\	102		\	\
			High	\	\	\	\	\		\	\

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 ; 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

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

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 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°C to +50°C in 10°C 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.

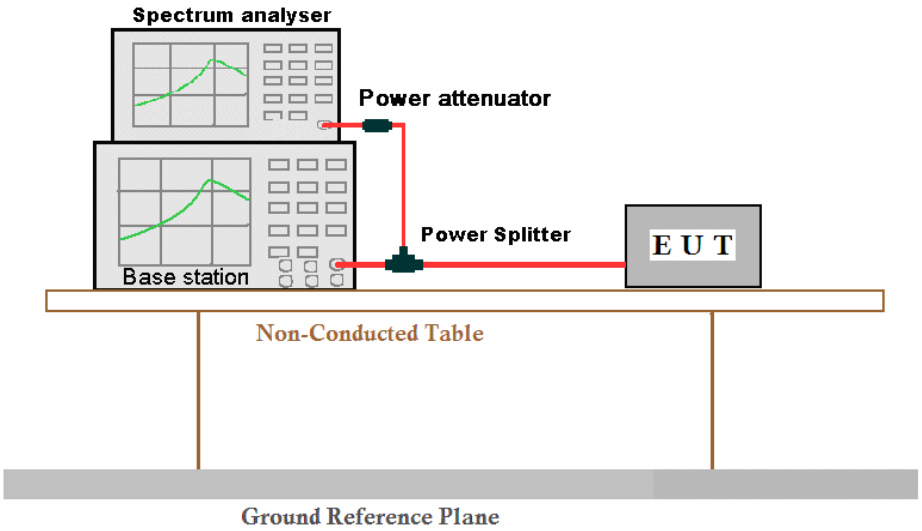
Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°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. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Remark: Reference test setup 4

4.8 Test Setups

4.8.1 Test Setup 1



4.8.2 Test Setup 2

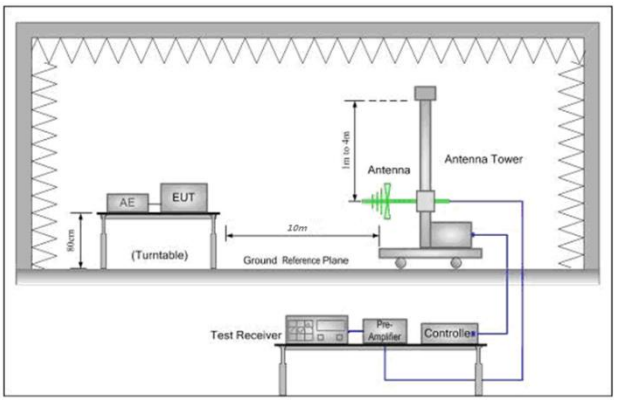


Figure 1. 30MHz to 1GHz

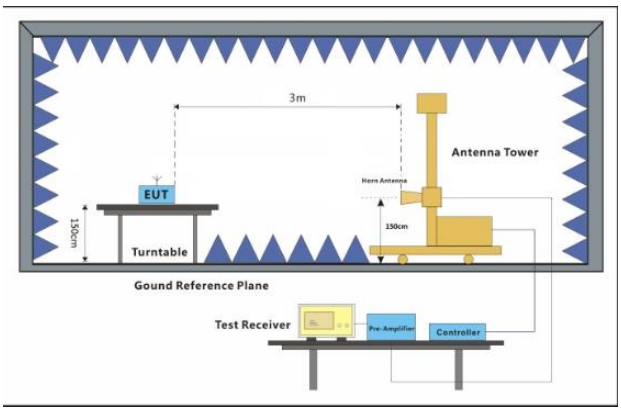


Figure 2. above 1GHz

4.8.3 Test Setup 3

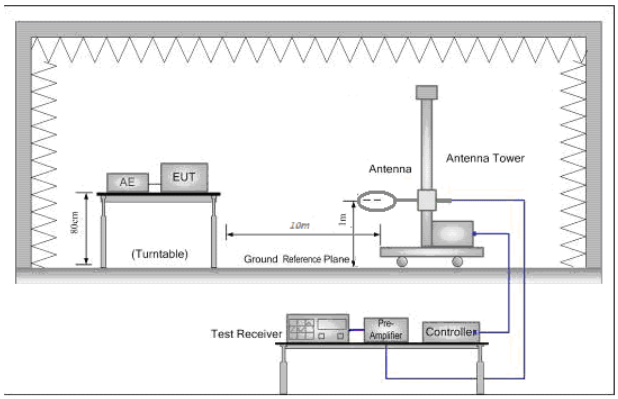


Figure 1. Below 30MHz

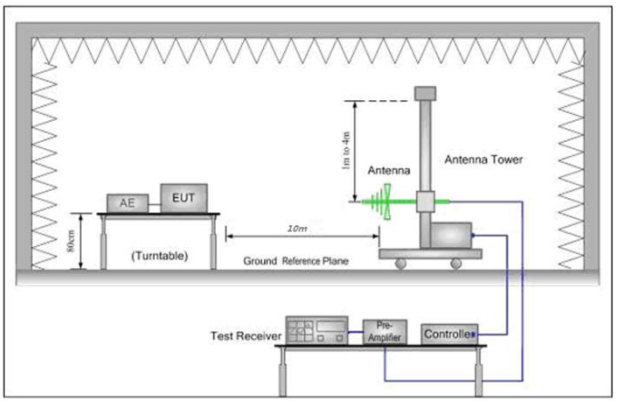


Figure 2. 30MHz to 1GHz

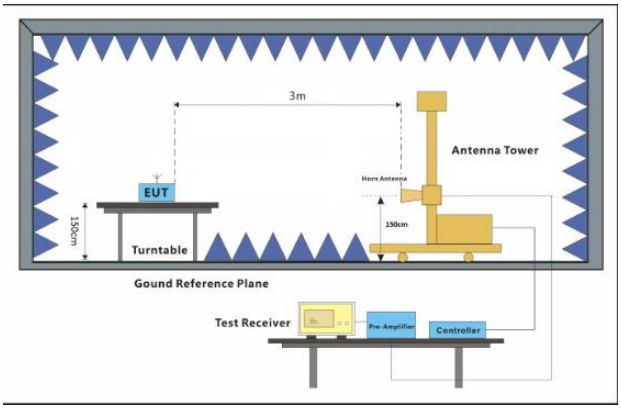
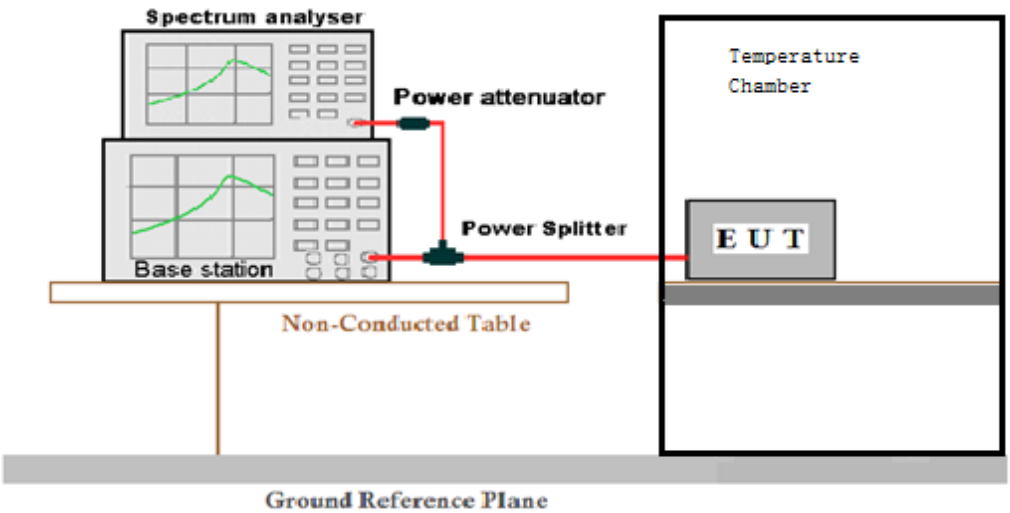


Figure 3. above 1GHz

4.8.4 Test Setup 4



4.9 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/TM6
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)

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	Test Mode	NR/TM1;NR/TM6
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
Frequency Stability	Test Environment	(1) -30 °C to +50 °C with step 10 °C 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 conducted test					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
Dual Output Mobile Communication DC Source	Agilent Technologies Inc	66311B	W009-09	2020/10/22	2021/10/21
Signal Analyzer	Rohde & Schwarz	FSV	W005-02	2020/4/16	2021/4/15
Signal Analyzer	KEYSIGHT	N9020A	MY48011756	2020/4/16	2021/4/15
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2020/10/22	2021/10/21
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2020/10/22	2021/10/21
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY59321333	2020/12/3	2021/12/3

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:

Test Item	Extended Uncertainty	Data
Transmit Output Power Data	Power [dBm]	U =±0.37 dB
Bandwidth	Magnitude [%]	U =± 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = ±2.0 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = ±2.0 dB
Frequency Stability	Frequency Accuracy [ppm]	U = ±0.24 ppm

7 Appendixes

Appendix A	Setup Photos
Appendix B.14	N7
Appendix B.15	N38
Appendix B.16	N41
Appendix B.17	N66
Appendix B.18	N77
Appendix B.19	N78

The End