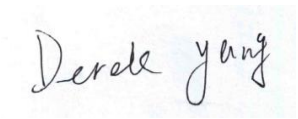
FCC TEST REPORT

Application No:	ZR/2020/70017
Applicant:	Fibocom Wireless Inc.
Address of Applicant	5/F,Tower A,Technology Building II,1057 Nanhai Avenue,Shenzhen,China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer:	5/F,Tower A,Technology Building II,1057 Nanhai Avenue,Shenzhen,China
Factory:	Shenzhen Eternity Technology Co., Ltd
Address of Factory:	1F, 2F, 4F Building A2, Yingzhan Industrial Zone, Longtian Community, Longtian Road, Pingshan District, Shenzhen, Guangdong Province, P.R. China
EUT Description:	LTE Module
Model No.:	NL952-NA
Trade Mark:	Fibocom
FCC ID:	ZMONL952NA
Standards:	47 CFR Part 2 47 CFR Part 22 subpart H 47 CFR Part 24 subpart E 47 CFR Part 27 subpart C 47 CFR Part 90 subpart R 47 CFR Part 90 subpart S 47 CFR Part 96 subpart E
Test Method:	FCC KDB 971168 D01 Power Meas License Digital Systems V03r01 C63.26 (2015)
Date of Receipt:	2020/7/10
Date of Test:	2020/7/10 to 2020/8/30
Date of Issue:	2021/8/15
Test Result:	**PASS ***

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

Authorized Signature:

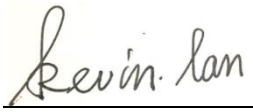


Derek Yang
Wireless Laboratory Manager

1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2020/9/1		Original
02		2021/6/5	Stephen liang	1. Add test site Information 2. Update equipment list
03		2021/8/15	Kevin.Lan	1.Add antenna height and angle for 'Field Strength of Spurious Radiation'

*This test report supersedes the original report (report No.: ZR/2020/7001701, issue date: 2020/9/1), original report shall be invalid.

Authorized for issue by:		
Prepared By		 **(Kevin.Lan) /Engineer**
Checked By		 **(Jim Huang) /Reviewer**

Content

2 Test Summary

2.1 UMTS Band 5 & LTE Band 5 / 26

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913	FCC: ERP ≤ 7 W	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	---	Limit≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
Band Edges Compliance	§2.1051, §22.917	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 5 of Appendix B	Pass	A
Spurious Emission at Antenna Terminals	§2.1051, §22.917	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: ≤ -13 dBm/100 kHz.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.2 UMTS Band 2 /LTE Band 2 /25

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

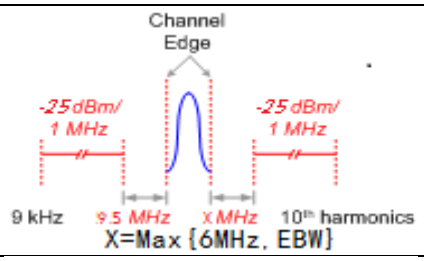
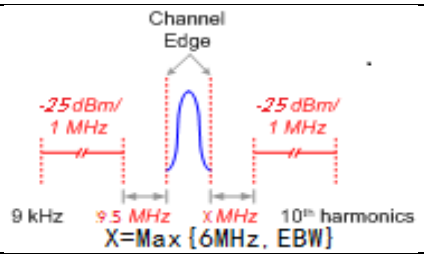
Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Field Strength of Spurious Radiation	§2.1053, §24.238	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §24.235	≤ ±2.5 ppm.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.3 UMTS Band 4 /LTE Band 4 /66

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)	EIRP ≤ 1 W	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§2.1046, §27.50(d)	Limit≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
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	A
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	A
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §27.54	≤ ±2.5 ppm.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.4 LTE Band 7/41

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)	EIRP ≤ 2W	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§27.50(a)	≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit.	Section 4 of	Pass	A

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
		EBW: No limit.	Appendix B		
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	A
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)		Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §27.53(m)		Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.5 LTE Band 12/17

Test Item	FCC Rule No	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§27.50(c)	FCC: ERP ≤ 3 W.	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§2.1046, §27.50(c)	Limit≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A

Test Item	FCC Rule No	Requirements	Test Result	Verdict	Test Lab*
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	A
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	FCC: ≤ -13 dBm/100 kHz.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §27.54	≤ ±2.5ppm.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.6 LTE Band 13

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(b)	FCC: ERP ≤ 3 W.	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§27.50	Limit≤13 dB	Section 2 of Appendix B	N/T	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049,	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
Band Edges Compliance	§2.1051, §27.53(c)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 5 of Appendix B	Pass	A
Spurious Emission at Antenna Terminals	§2.1051, §27.53(c) §27.53(f)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations. For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions 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	Section 6 of Appendix B	Pass	A

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
		than 700 Hz bandwidth.			
Field Strength of Spurious Radiation	§2.1053, §27.53(c) §27.53(f)	FCC: ≤ -13 dBm/100 kHz. For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions 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.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.7 LTE Band 14

Test Item	FCC Rule No	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§90.365	FCC: ERP ≤ 3 W.	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§2.1046, §27.50(c)	Limit≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
Emission Mask	§90.210(n)	Transmitters designed for operation under this part on frequencies other than listed in this section must meet the emission mask requirements of Emission Mask B. Equipment operating under this part on frequencies allocated to but shared with the Federal Government, must meet the applicable Federal Government technical standards (b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows: (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth:	Section 5 of Appendix B	Pass	A

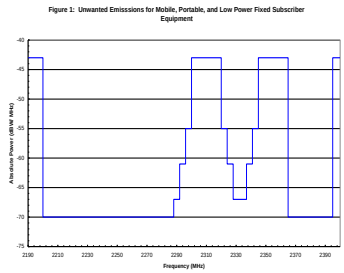
Test Item	FCC Rule No	Requirements	Test Result	Verdict	Test Lab*
		At least 25 dB.(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB..(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.			
Band Edges Compliance	§2.1051, §90.543(e)	(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.	Section 6 of Appendix B	Pass	A
Spurious Emission at Antenna Terminals	§2.1051, §90.543(c) §90.543(f)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. 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.	Section 7 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §90.543(c) §90.543(f)	FCC: ≤ -13 dBm/100 kHz. 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.	Section 8 of Appendix B	Pass	A
Frequency Stability	§2.1055, §90.213	≤ ±2.5ppm.	Section 9 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.8 LTE Band 26

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Transmitter Conducted Power Output	§2.1046, §90.635	< 100 W.	Section 1 of Appendix B	PASS	A
Peak-Average Ratio	---	FCC: Limit≤13 dB	Section 2 of Appendix B	N/T	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	PASS	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	PASS	A
Emission Mask	§2.1051 § 90.691	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 Log10(f/6.1) decibels or 50+10Log10(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.	Section 5 of Appendix B	PASS	A
Spurious Emission at Antenna Terminals	§2.1051, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions	Section 6 of Appendix B	PASS	A
Field Strength of Spurious Radiation	§2.1053, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions	Section 7 of Appendix B	PASS	A
Frequency Stability	§2.1055, §90.213	< ±2.5ppm.	Section 8 of Appendix B	PASS	A
Remark: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".					

2.9 LTE Band 30

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.53(a)	EIRP ≤ 250mW/5MHz	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§27.50(a),	FCC: Limit≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049, §27.53(a)	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
Band Edges	§2.1051,	≤ -13 dBm/1%*EBW, in 1 MHz bands	Section 5	Pass	A

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Compliance	§27.53(a)	immediately outside and adjacent to the frequency block.	of Appendix B		
Spurious Emission at Antenna Terminals	§2.1051, §27.53(a)	 For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands: (i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz; (ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §27.53(a)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §27.54	within the range of the operating frequency blocks	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.10 LTE Band 48

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §96.41	Reporting only	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§96.41	FCC: Limit≤13 dB	Section 2 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
Band Edges Compliance	§2.1051, §96.41	for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge.	Section 5 of Appendix B	Pass	A
Spurious Emission at Antenna Terminals	§2.1051, §96.41	for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz. (2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §96.41	for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not	Section 7 of Appendix B	Pass	B

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
		exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz. (2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.			
Frequency Stability	§2.1055, §96.41	Within authorized bands of operation/ frequency block.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

2.11 LTE Band 71

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(c)	EIRP ≤ 3 W	Section 1 of Appendix B	Pass	A
Peak-Average Ratio	§2.1046,	Limit≤13 dB	Section 2 of Appendix B	Pass	A
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B	Pass	A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
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	A
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	Pass	A

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
			B		
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	B
Frequency Stability	§2.1055, §27.54	within the authorized bands of operation.	Section 8 of Appendix B	Pass	A
Remark: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

Remark:
All test were performed by Lab A and B.
Parts of test items above were subcontracted to Lab B.
Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Lab B SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.

3 General Information

3.1 Client Information

Applicant:	Fibocom Wireless Inc.
Address of Applicant:	5/F,Tower A,Technology Building II,1057 Nanhai Avenue,Shenzhen,China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer:	5/F,Tower A,Technology Building II,1057 Nanhai Avenue,Shenzhen,China
Factory:	Shenzhen Eternity Technology Co., Ltd
Address of Factory:	1F, 2F, 4F Building A2, Yingzhan Industrial Zone, Longtian Community, Longtian Road, Pingshan District, Shenzhen, Guangdong Province, P.R. China

3.2 Test Location

Lab A:

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
Test engineer:	Dee Zheng,Mike Hu

Lab B:

Company:	SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.
Address:	1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China
Post code:	710086
Test engineer:	Ben Huang, Leah Chen

3.3 Test Facility

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

Lab A:

• 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.

• Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

Lab B:

• A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

• FCC –Designation Number: CN1271.

3.4 General Description of EUT

EUT Description::	LTE Module
Model No.:	NL952-NA
Trade Mark:	Fibocom
Hardware Version:	V1.0.2
Software Version:	19602.7000.00.02.02.16
Sample Type:	☐ Portable Device, ☒Module
Antenna Type:	☒ External, ☐ Integrated
Antenna Gain:	WCDMA Band II:4dBi WCDMA Band VI:4dBi WCDMA Band V:3dBi LTE Band 2:4dBi; LTE Band 4:4dBi; LTE Band 5:3dBi; LTE Band 7: 4dBi; LTE Band 12:3dBi; LTE Band 13:2dBi; LTE Band 14:2dBi; LTE Band 17:3dBi; LTE Band 25:4dBi; LTE Band 26:3dBi; LTE Band 30:1dBi; LTE Band 41:3dBi; LTE Band 48:1dBi; LTE Band 66:4dBi; LTE Band 71:4dBi;

3.5 Test Mode

Test Mode	Test Modes Description
UMTS/TM1	UMTS system, WCDMA, QPSK modulation
UMTS/TM2	UMTS system, WCDMA, 16QAM modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation
LTE/TM3	LTE system, 64QAM 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	52%	
Atmospheric Pressure:	101.32 KPa	
Temperature	NT	25 °C
Voltage:	LV	3.3V
	NV	3.8V
	HV	4.4V

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	☒ UMTS		
	☒ LTE		
Supported Frequency Range	Band	TX	RX
	UMTS Band II	1850 to 1910 MHz	1930 to 1990 MHz
	UMTS Band IV	1710 to 1755 MHz	2110 to 2155 MHz
	UMTS Band V	824 to 849 MHz	869 to 894 MHz
	LTE Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE Band 5	824 to 849 MHz	869 to 894 MHz
	LTE Band 7	2500 to 2570 MHz	2620 to 2690 MHz
	LTE Band 12	699 to 716 MHz	729 to 746 MHz
	LTE Band 13	777 to 787 MHz	746 to 756 MHz
	LTE Band 14	788 to 798 MHz	758 to 768 MHz
	LTE Band 17	704 to 716 MHz	734 to 746 MHz
	LTE Band 25	1850 to 1915MHz	1930 to 1995 MHz
	LTE Band 26 (814 to 824 MHz)	814 to 824MHz	859 to 869 MHz
	LTE Band 26 (824 to 849 MHz)	824 to 849 MHz	869 to 894 MHz
	LTE Band 30	2305 to 2315 MHz	2350 to 2360 MHz
	LTE Band 41	2496 to 2690MHz	2496 to 2690MHz
	LTE Band 48	3550 to 3700 MHz	3550 to 3700 MHz
	LTE Band 66	1710 to 1780 MHz	2110 to 2200 MHz
	LTE Band 71	663 to 698 MHz	617 to 652 MHz

	LTE Band CA_5B	824 to 849 MHz	869 to 894 MHz
	LTE Band CA_66C	1710 to 1780 MHz	2110 to 2200 MHz
Target TX Output Power	UMTS Band II: 24.5dBm UMTS Band IV: 24.5dBm UMTS Band V: 24.5dBm LTE Band 2: 24dBm LTE Band 4: 24dBm LTE Band 5: 24dBm LTE Band 7: 24dBm LTE Band 12: 24dBm LTE Band 13: 24dBm LTE Band 14: 24dBm LTE Band 17: 24dBm LTE Band 25: 24dBm LTE Band 26: 24dBm LTE Band 30: 23dBm LTE Band 41: 24dBm LTE Band 48: 22dBm LTE Band 66: 24dBm LTE Band 71: 24dBm LTE Band CA_5B: 24dBm LTE Band CA_66C: 24dBm LTE Band CA_2A-4A:24dBm LTE Band CA_2A-12A:24dBm LTE Band CA_2A-13A:24dBm LTE Band CA_2A-66A:24dBm LTE Band CA_4A-5A:24dBm LTE Band CA_4A-12A:24dBm LTE Band CA_4A-13A:24dBm LTE Band CA_4A-66A:24dBm		
Supported Channel Bandwidth	UMTS system:	☒5 MHz	
	LTE Band 2	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band 4	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band 5	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz	
	LTE Band 7	☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band 12	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz	
	LTE Band 13	☒5 MHz; ☒10 MHz	
	LTE Band 14	☒5 MHz; ☒10 MHz	
	LTE Band 17	☒5 MHz; ☒10 MHz	
	LTE Band 25	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band 26(814-824)	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz;	
	LTE Band 26(824-849)	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz	
	LTE Band30	☒5 MHz; ☒10 MHz;	
	LTE Band41	☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band48	☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band66	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE Band71	☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	

	LTE Band CA_5B	☒3MHz+5MHz ☒10MHz+5MHz ☒10MHz+10MHz
	LTE Band CA_66C	☒5MHz+20MHz ☒10MHz+15MHz ☒10MHz+20MHz ☒15MHz+15MHz ☒15MHz+20MHz ☒20MHz+20MHz
Characteristics	Description	
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.)	UMTS Band II	4M15F9W;
	UMTS Band IV	4M16F9W;
	UMTS Band V	4M14F9W;
	LTE Band 2	1M09G7D;1M09W7D; 1M09W7D 2M70G7D;2M69W7D; 2M69W7D 4M48G7D;4M49W7D; 4M47W7D 8M93G7D;8M93W7D; 8M95W7D 13M5G7D;13M5W7D; 13M5W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 4	1M09G7D;1M09W7D; 1M09W7D 2M70G7D;2M69W7D; 2M70W7D 4M48G7D;4M50W7D; 4M48W7D 8M95G7D;8M95W7D; 8M93W7D 13M5G7D;13M5W7D; 13M5W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 5	1M09G7D;1M09W7D; 1M09W7D 2M70G7D;2M69W7D; 2M69W7D 4M49G7D;4M49W7D; 4M48W7D 8M95G7D;8M95W7D; 8M93W7D
	LTE Band 7	4M48G7D;4M49W7D; 4M50W7D 8M93G7D;8M93W7D; 8M95W7D 13M5G7D;13M5W7D; 13M5W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 12	1M09G7D;1M09W7D; 1M09W7D 2M70G7D;2M69W7D; 2M69W7D 4M48G7D;4M50W7D; 4M48W7D 8M97G7D;8M97W7D; 8M95W7D
	LTE Band13	4M47G7D;4M49W7D; 4M49W7D 8M91G7D;8M93W7D; 8M89W7D
	LTE Band 14	4M48G7D;4M49W7D; 4M48W7D; 8M93G7D;8M95W7D; 8M91W7D;
	LTE Band 17	4M48G7D;4M50W7D; 4M48W7D 8M91G7D;8M91W7D; 8M91W7D
	LTE Band 25	1M09G7D;1M09W7D; 1M10W7D 2M70G7D;2M69W7D; 2M69W7D 4M48G7D;4M49W7D; 4M48W7D 8M93G7D;8M93W7D; 8M93W7D 13M5G7D;13M5W7D; 13M5W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 26 （814-824）	1M09G7D;1M09W7D; 1M09W7D 2M70G7D;2M69W7D; 2M69W7D 4M48G7D;4M50W7D; 4M48W7D

		8M93G7D;8M95W7D; 8M93W7D
	LTE Band 26 （824-849）	1M09G7D;1M09W7D; 1M09W7D 2M70G7D;2M69W7D; 2M69W7D 4M49G7D;4M50W7D; 4M48W7D 8M95G7D;8M95W7D; 8M93W7D 13M5G7D;13M5W7D; 13M4W7D
	LTE Band 30	4M48G7D;4M50W7D; 4M48W7D 8M93G7D;8M95W7D; 8M93W7D
	LTE Band 41	4M48G7D;4M50W7D; 4M47W7D 8M91G7D;8M91W7D; 8M91W7D 13M5G7D;13M5W7D; 13M4W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 48	4M49G7D;4M48W7D; 4M49W7D 8M95G7D;8M93W7D; 8M95W7D 13M5G7D;13M5W7D; 13M4W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 66	1M09G7D;1M09W7D; 1M10W7D 2M70G7D;2M69W7D; 2M69W7D 4M48G7D;4M50W7D; 4M48W7D 8M95G7D;8M93W7D; 8M95W7D 13M5G7D;13M5W7D; 13M5W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band 71	4M47G7D;4M49W7D; 4M47W7D 8M95G7D;8M95W7D; 8M95W7D 13M5G7D;13M5W7D; 13M5W7D 17M9G7D;17M9W7D; 17M9W7D
	LTE Band CA_5B	15RB+25RB:7M5G7D;7M5W7D; 7M5W7D 25RB+50RB:13M9G7D;13M9W7D; 13M9W7D 50RB+50RB:18M9G7D;18M9W7D; 18M9W9D
	LTE Band CA_66C	25RB+100RB:23M2G7D;23M0W7D; 23M1W7D 50RB+75RB:23M3G7D;23M4W7D; 23M2W7D 50RB+100RB:27M8G7D;27M8W7D; 27M8W7D 75RB+75RB:28M3G7D;28M2W7D; 28M2W7D 75RB+100RB:32M9G7D;32M7W7D; 32M8W7D 100RB+100RB:37M6G7D;37M6W7D; 37M6W7D

3.8 Test Frequencies

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA Band II	TX	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz
	RX	Channel 9662	Channel 9800	Channel 9938
		1932.4 MHz	1960.0 MHz	1987.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA Band IV	TX	Channel 1312	Channel 1413	Channel 1513
		1712.4MHz	1732.6 MHz	1752.6 MHz
	RX	Channel 1537	Channel 1638	Channel 1738
		2112.4 MHz	2132.6 MHz	2152.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA Band V	TX	Channel 4132	Channel 4182	Channel 4233
		826.4MHz	836.4 MHz	846.6 MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4 MHz	881.4 MHz	891.6 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 2	1.4MHz	TX	Channel 18607	Channel 18900	Channel 19193
			1850.7 MHz	1880 MHz	1909.3 MHz
		RX	Channel 607	Channel 900	Channel 1193
			1930.7 MHz	1960 MHz	1989.3 MHz
	3MHz	TX	Channel 18615	Channel 18900	Channel 19185
			1851.5 MHz	1880 MHz	1908.5 MHz
		RX	Channel 615	Channel 900	Channel 1185
			1931.5 MHz	1960 MHz	1988.5 MHz
	5MHz	TX	Channel 18625	Channel 18900	Channel 19175
			1852.5 MHz	1880 MHz	1907.5 MHz
		RX	Channel 625	Channel 900	Channel1175
			1932.5 MHz	1960 MHz	1987.5 MHz
	10MHz	TX	Channel 18650	Channel 18900	Channel 19150
			1855 MHz	1880 MHz	1905 MHz
		RX	Channel 650	Channel 900	Channel 1150
			1935 MHz	1960 MHz	1985 MHz
	15MHz	TX	Channel 18675	Channel 18900	Channel 19125
			1857.5 MHz	1880 MHz	1902.5 MHz
		RX	Channel 675	Channel 900	Channel 1125
			1937.5 MHz	1960 MHz	1982.5 MHz
	20MHz	TX	Channel 18700	Channel 18900	Channel 19100
			1860 MHz	1880 MHz	1900 MHz
		RX	Channel 700	Channel 900	Channel 1100
			1940 MHz	1960 MHz	1980 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 4	1.4MHz	TX	Channel 19957	Channel 20175	Channel 20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	3MHz	TX	Channel 19965	Channel 20175	Channel 20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	5MHz	TX	Channel 19975	Channel 20175	Channel 20375
			1712.5 MHz	1732.5 MHz	1752.5 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	10MHz	TX	Channel 20000	Channel 20175	Channel 20350
			1715 MHz	1732.5 MHz	1750 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	15MHz	TX	Channel 20025	Channel 20175	Channel 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz
		RX	Channel 2025	Channel 2175	Channel 2325
			2117.5 MHz	2132.5MHz	2147.5 MHz
	20MHz	TX	Channel 20050	Channel 20175	Channel 20300
			1720 MHz	1732.5 MHz	1745 MHz
		RX	Channel 2050	Channel 2175	Channel 2300
			2120 MHz	2132.5MHz	2145 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 5	1.4MHz	TX	Channel 20407	Channel 20525	Channel 20643
			824.7 MHz	836.5 MHz	848.3 MHz
		RX	Channel 2407	Channel 2525	Channel 2643
			869.7 MHz	881.5 MHz	893.3 MHz
	3MHz	TX	Channel 20415	Channel 20525	Channel 20635
			825.5 MHz	836.5 MHz	847.5 MHz
		RX	Channel 2415	Channel 2525	Channel 2635
			870.5 MHz	881.5 MHz	892.5 MHz
	5MHz	TX	Channel 20425	Channel 20525	Channel 20625
			826.5 MHz	836.5 MHz	846.5 MHz
		RX	Channel 2425	Channel 2525	Channel 2625
			871.5 MHz	881.5 MHz	891.5 MHz
	10MHz	TX	Channel 20450	Channel 20525	Channel 20600
			829 MHz	836.5 MHz	844 MHz
		RX	Channel 2450	Channel 2525	Channel 2600
			874 MHz	881.5 MHz	889 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 7	5MHz	TX	Channel 20775	Channel 21100	Channel 21425
			2502.5 MHz	2535 MHz	2567.5 MHz
		RX	Channel 2775	Channel 3100	Channel 5825
			2622.5 MHz	2655 MHz	2687.5 MHz
	10MHz	TX	Channel 20800	Channel 21100	Channel 21400
			2505 MHz	2535 MHz	2565 MHz
		RX	Channel 2800	Channel 3100	Channel 3400
			2625 MHz	2655 MHz	2685 MHz
	15MHz	TX	Channel 20825	Channel 21100	Channel 21375
			2507.5 MHz	2535 MHz	2562.5 MHz
		RX	Channel 2825	Channel 3100	Channel 3375
			2627.5 MHz	2655 MHz	2682.5 MHz
	20MHz	TX	Channel 20850	Channel 21100	Channel 21350
			2510 MHz	2535 MHz	2560 MHz
		RX	Channel 2850	Channel 3100	Channel 3350
			2630 MHz	2655 MHz	2680 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band12	1.4MHz	TX	Channel 23017	Channel 23095	Channel 23173
			699.7 MHz	707.5 MHz	715.3 MHz
		RX	Channel 5017	Channel 5095	Channel 5173
			729.7 MHz	737.5 MHz	745.3 MHz
	3MHz	TX	Channel 23025	Channel 23095	Channel 23165
			700.5 MHz	707.5 MHz	714.5 MHz
		RX	Channel 5025	Channel 5095	Channel 5165
			730.5 MHz	737.5 MHz	744.5 MHz
	5MHz	TX	Channel 23035	Channel 23095	Channel 23155
			701.5 MHz	707.5 MHz	713.5 MHz
		RX	Channel 5035	Channel 5095	Channel 5155
			731.5 MHz	737.5 MHz	743.5 MHz
	10MHz	TX	Channel 23060	Channel 23095	Channel 23130
			704 MHz	707.5 MHz	711 MHz
		RX	Channel 5060	Channel 5095	Channel 5130
			734 MHz	737.5 MHz	741 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 13	5MHz	TX	Channel 23025	Channel 23230	Channel 23255
			779.5 MHz	782 MHz	784.5 MHz
		RX	Channel 5205	Channel 5230	Channel 5255
			748.5 MHz	751 MHz	753.5 MHz
	10MHz	TX	Channel 23230	Channel 23230	Channel 23230
			782 MHz	782 MHz	782 MHz
		RX	Channel 5230	Channel 5230	Channel 5230
			751 MHz	751 MHz	751 MHz

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Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 14	5MHz	TX	Channel 23305	Channel 23330	Channel 23355
			790.5 MHz	793 MHz	795.5 MHz
		RX	Channel 5305	Channel 5330	Channel 5355
			760.5 MHz	763 MHz	765.5 MHz
	10MHz	TX	Channel 23330	Channel 23330	Channel 23330
			793MHz	793 MHz	793 MHz
		RX	Channel 5330	Channel 5330	Channel 5330
			763MHz	763 MHz	763 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 17	5MHz	TX	Channel 23755	Channel 23790	Channel 23825
			706.5 MHz	710 MHz	713.5 MHz
		RX	Channel 5755	Channel 5790	Channel 5825
			736.5 MHz	740 MHz	743.5 MHz
	10MHz	TX	Channel 23780	Channel 23790	Channel 23800
			709 MHz	710 MHz	711 MHz
		RX	Channel 5780	Channel 5790	Channel 5800
			739 MHz	740 MHz	741 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 25	1.4MHz	TX	Channel 26047	Channel 26365	Channel 26683
			1850.7 MHz	1882.5 MHz	1914.3 MHz
		RX	Channel 8047	Channel 8365	Channel 8683
			1930.7 MHz	1962.5 MHz	1994.3 MHz
	3MHz	TX	Channel 26055	Channel 26365	Channel 26675
			1851.5 MHz	1882.5 MHz	1913.5 MHz
		RX	Channel 8055	Channel 8365	Channel 8675
			1931.5 MHz	1962.5 MHz	1993.5 MHz
	5MHz	TX	Channel 26065	Channel 26365	Channel 26665
			1852.5 MHz	1882.5 MHz	1912.5 MHz
		RX	Channel 8065	Channel 8365	Channel 8665
			1932.5 MHz	1962.5 MHz	1992.5 MHz
	10MHz	TX	Channel 26090	Channel 26365	Channel 26640
			1855 MHz	1882.5 MHz	1910 MHz
		RX	Channel 8090	Channel 8365	Channel 8640
			1935 MHz	1962.5 MHz	1990 MHz
	15MHz	TX	Channel 26115	Channel 26365	Channel 26615
			1857.5 MHz	1882.5 MHz	1907.5 MHz
		RX	Channel 8115	Channel 8365	Channel 8615
			1937.5 MHz	1962.5 MHz	1987.5 MHz
	20MHz	TX	Channel 26140	Channel 26365	Channel 26590
			1860 MHz	1882.5 MHz	1905 MHz
		RX	Channel 8140	Channel 8365	Channel 8590
			1940 MHz	1962.5 MHz	1985 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band26 (814-824)	1.4MHz	TX	Channel 26697	Channel 26740	Channel 26783
			814.7 MHz	819 MHz	823.3 MHz
		RX	Channel 8697	Channel 8740	Channel 8783
			859.7 MHz	864MHz	868.3 MHz
	3MHz	TX	Channel 26705	Channel 26740	Channel 26775
			815.5 MHz	819 MHz	822.5 MHz
		RX	Channel 8705	Channel 8740	Channel 8775
			860.5 MHz	864MHz	867.5 MHz
	5MHz	TX	Channel 26715	Channel 26740	Channel 26765
			816.5 MHz	819 MHz	821.5 MHz
		RX	Channel 8715	Channel 8740	Channel 8755
			861.5 MHz	864MHz	866.5 MHz
	10MHz	TX	Channel 26740	Channel 26740	Channel 26740
			819 MHz	819 MHz	819 MHz
		RX	Channel 8740	Channel 8740	Channel 8740
			864MHz	864MHz	864MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band26 (824-849)	1.4MHz	TX	Channel 26797	Channel 26915	Channel 27033
			824.7 MHz	836.5 MHz	848.3 MHz
		RX	Channel 8697	Channel 8915	Channel 9033
			859.7 MHz	881.5 MHz	893.3 MHz
	3MHz	TX	Channel 26805	Channel 26915	Channel 27025
			825.5 MHz	836.5 MHz	847.5 MHz
		RX	Channel 8805	Channel 8915	Channel 9025
			860.5 MHz	881.5 MHz	892.5 MHz
	5MHz	TX	Channel 26815	Channel 26915	Channel 27015
			826.5 MHz	836.5 MHz	846.5 MHz
		RX	Channel 8815	Channel 8915	Channel 9015
			871.5 MHz	881.5 MHz	891.5 MHz
	10MHz	TX	Channel 26840	Channel 26915	Channel 26990
			829 MHz	836.5 MHz	844 MHz
		RX	Channel 8840	Channel 8915	Channel 8990
			874 MHz	881.5 MHz	889 MHz
	15MHz	TX	Channel 26865	Channel 26915	Channel 26965
			831.5 MHz	836.5 MHz	841.5 MHz
		RX	Channel 8865	Channel 8915	Channel 8965
			876.5 MHz	881.5 MHz	886.5 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 30	5MHz	TX	Channel 27685	Channel27710	Channel 27735
			2307.5 MHz	2310MHz	2312.5 MHz
		RX	Channel 9795	Channel 9820	Channel 9845
			2352.5MHz	2355 MHz	2357.5MHz
	10MHz	TX	Channel 27710	Channel27710	Channel27710
			2310 MHz	2310MHz	2310MHz
		RX	Channel 9820	Channel 9820	Channel 9820

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			2355 MHz	2355 MHz	2355 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 41	5MHz	TX/RX	Channel 39675	Channel40620	Channel 41565
			2498.5 MHz	2593 MHz	2687.5 MHz
	10MHz	TX/RX	Channel 39700	Channel40620	Channel 41540
			2501 MHz	2593 MHz	2685 MHz
	15MHz	TX/RX	Channel 39725	Channel40620	Channel 41515
			2503.5 MHz	2593 MHz	2682.5 MHz
	20MHz	TX/RX	Channel 39750	Channel40620	Channel 41490
			2506 MHz	2593 MHz	2680 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 48	5MHz	TX/RX	Channel 55265	Channel55990	Channel 56715
			3552.5 MHz	3625.0 MHz	3697.5 MHz
	10MHz	TX/RX	Channel 55290	Channel55990	Channel 56690
			3555.0 MHz	3625.0 MHz	3695.0 MHz
	15MHz	TX/RX	Channel 55315	Channel55990	Channel 56665
			3557.5 MHz	3625.0 MHz	3692.5 MHz
	20MHz	TX/RX	Channel 55340	Channel55990	Channel 56640
			3560.0 MHz	3625.0 MHz	3690.0 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 66	1.4MHz	TX	Channel 131979	Channel 132322	Channel 132665
			1710.7 MHz	1745 MHz	1779.3 MHz
		RX	Channel 66443	Channel 66786	Channel 67329
			2110.7 MHz	2145MHz	2199.3 MHz
	3MHz	TX	Channel 131987	Channel 132322	Channel 132657
			1711.5 MHz	1745 MHz	1778.5MHz
		RX	Channel 66451	Channel 66786	Channel 67121
			2111.5 MHz	2145MHz	2198.5MHz
	5MHz	TX	Channel 131997	Channel 132322	Channel 132647
			1712.5 MHz	1745 MHz	1777.5 MHz
		RX	Channel 66461	Channel 66786	Channel 67311
			2112.5 MHz	2145MHz	2197.5 MHz
	10MHz	TX	Channel 132022	Channel 132322	Channel 132622
			1715 MHz	1745 MHz	1775 MHz
		RX	Channel 66486	Channel 66786	Channel 67286
			2115 MHz	2145MHz	2195 MHz
	15MHz	TX	Channel 132047	Channel 132322	Channel 132597
			1717.5 MHz	1745 MHz	1772.5 MHz
		RX	Channel 66511	Channel 66786	Channel 67261
			2117.5 MHz	2145MHz	2192.5 MHz
	20MHz	TX	Channel 132072	Channel 132322	Channel 132572
			1720 MHz	1745 MHz	1770 MHz
		RX	Channel 66536	Channel 66786	Channel 67236
			2120 MHz	2145MHz	2190 MHz

Test Mode		TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 71	5MHz	TX	Channel 133147	Channel 133297	Channel 133447
			665.5 MHz	680.5 MHz	695.5 MHz
		RX	Channel 68611	Channel 68761	Channel 68911
			619.5 MHz	634.5 MHz	649.5 MHz
	10MHz	TX	Channel 133172	Channel 133297	Channel 133422
			668 MHz	680.5 MHz	693 MHz
		RX	Channel 68636	Channel 68761	Channel 68886
			622 MHz	634.5 MHz	647 MHz
	15MHz	TX	Channel 133197	Channel 133297	Channel 133397
			670.5 MHz	680.5 MHz	690.5 MHz
		RX	Channel 68661	Channel 68761	Channel 68861
			624.5 MHz	634.5 MHz	644.5 MHz
	20MHz	TX	Channel 133222	Channel 133297	Channel 133372
			673 MHz	680.5 MHz	688 MHz
		RX	Channel 68686	Channel 68761	Channel 68836
			627 MHz	634.5 MHz	642 MHz

Table 4.3.1.1.5A-1: Test frequencies for CA_5B

Range	CC-Combo / N_{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]	BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]
Low	15+25	15	20416	825.6	2416	870.6	25	20455	829.5	2455	874.5
		25	20425	826.5	2425	871.5	15	20464	830.4	2464	875.4
	25+50	25	20428	826.8	2428	871.8	50	20500	834	2500	879
	50+25	50	20450	829	2450	874	25	20522	836.2	2522	881.2
	50+50	50	20450	829	2450	874	50	20549	838.9	2549	883.9
Mid	15+25	15	20501	834.1	2501	879.1	25	20540	838.0	2540	883.0
		25	20510	835.0	2510	880.0	15	20549	838.9	2549	883.9
	25+50	25	20478	831.8	2478	876.8	50	20550	839	2550	884
	50+25	50	20500	834	2500	879	25	20572	841.2	2572	886.2
	50+50	50	20476	831.6	2476	876.6	50	20575	841.5	2575	886.5
High	15+25	15	20586	842.6	2586	887.6	25	20625	846.5	2625	891.5
		25	20595	843.5	2595	888.5	15	20634	847.4	2634	892.4
	25+50	25	20528	836.8	2528	881.8	50	20600	844	2600	889
	50+25	50	20550	839	2550	884	25	20622	846.2	2622	891.2
	50+50	50	20501	834.1	2501	879.1	50	20600	844	2600	889
Note 1: Carriers in increasing frequency order.											

Table 4.3.1.1.66A-2: Test frequencies for CA_66C

Range	CC-Combo / N_{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]	BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]
Low	50+75	50	132025	1715.3	66489	2115.3	75	132145	1727.3	66609	2127.3
		75	132047	1717.5	66511	2117.5	50	132167	1729.5	66631	2129.5
	50+100	50	132027	1715.5	66491	2115.5	100	132171	1729.9	66635	2129.9
		100	132072	1720	66536	2120	50	132216	1734.4	66680	2134.4
	75+75	75	132047	1717.5	66511	2117.5	75	132197	1732.5	66661	2132.5
	75+100	75	132050	1717.8	66514	2117.8	100	132221	1734.9	66685	2134.9
		100	132072	1720	66536	2120	75	132243	1737.1	66707	2137.1
	100+25	100	132072	1720	66536	2120	25	132189	1731.7	66653	2131.7
		25	132005	1713.3	66469	2113.3	100	132122	1725.0	66586	2125.0
	100+100	100	132072	1720	66536	2120	100	132270	1739.8	66734	2139.8
Mid	50+75	50	132351	1747.9	66815	2147.9	75	132471	1759.9	66935	2159.9
		75	132373	1750.1	66837	2150.1	50	132493	1762.1	66957	2162.1
	50+100	50	132328	1745.6	66792	2145.6	100	132472	1760	66936	2160
		100	132373	1750.1	66837	2150.1	50	132517	1764.5	66981	2164.5
	75+75	75	132347	1747.5	66811	2147.5	75	132497	1762.5	66961	2162.5
	75+100	75	132325	1745.3	66789	2145.3	100	132496	1762.4	66960	2162.4
		100	132348	1747.6	66812	2147.6	75	132519	1764.7	66983	2164.7
	100+25	100	132397	1752.5	66861	2152.5	25	132514	1764.2	66978	2164.2
		25	132330	1745.8	66794	2145.8	100	132447	1757.5	66911	2157.5
	100+100	100	132323	1745.1	66787	2145.1	100	132521	1764.9	66985	2164.9
High[2]	50+75	50	132622	1775	67086	2175	75	NA	NA	67206	2187
		75	132597	1772.5	67061	2172.5	50	NA	NA	67181	2184.5
	50+100	50	132622	1775	67086	2175	100	NA	NA	67230	2189.4
		100	132572	1770	67036	2170	50	NA	NA	67180	2184.4
	75+75	75	132597	1772.5	67061	2172.5	75	NA	NA	67211	2187.5
	75+100	75	132597	1772.5	67061	2172.5	100	NA	NA	67232	2189.6
		100	132572	1770	67036	2170	75	NA	NA	67207	2187.1
	100+25	100	132572	1770	67036	2170	25	NA	NA	67153	2181.7
		25	132647	1777.5	67111	2177.5	100	NA	NA	67228	2189.2
	100+100	100	132572	1770	67036	2170	100	NA	NA	67234	2189.8
High[3]	50+75	50	132477	1760.5	66941	2160.5	75	132597	1772.5	67061	2172.5
		75	132499	1762.7	66963	2162.7	50	132619	1774.7	67083	2174.7
	50+100	50	132428	1755.6	66892	2155.6	100	132572	1770	67036	2170
		100	132473	1760.1	66937	2160.1	50	132617	1774.5	67081	2174.5
	75+75	75	132447	1757.5	66911	2157.5	75	132597	1772.5	67061	2172.5
	75+100	75	132401	1752.9	66885	2152.9	100	132572	1770	67036	2170
		100	132423	1755.1	66887	2155.1	75	132594	1772.2	67058	2172.2
	100+25	100	132522	1765	66986	2165	25	132639	1776.7	67103	2176.7

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

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 0.8m 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 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). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8). Calculate power in dBm by the following formula:

ERP (dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pg is the generator output power into the substitution antenna.

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:
EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)
EIRP=ERP+2.15dB
Where:
Pg is the generator output power into the substitution antenna.

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 EIRP Power Density

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 LTE 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. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

Test Settings

1. Set instrument center frequency to OBW center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set VBW ≥ 3 × RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep ≥ 2 × span/RBW.
7. Sweep time = auto couple.
8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).

4.4 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

4.5 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

4.6 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

4.7 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

4.8 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). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pd is the dipole equivalent power, Pg is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB]. The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10log10(Power [Watts]).

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:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

Where:

Pg is the generator output power into the substitution antenna.

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 3

4.9 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.

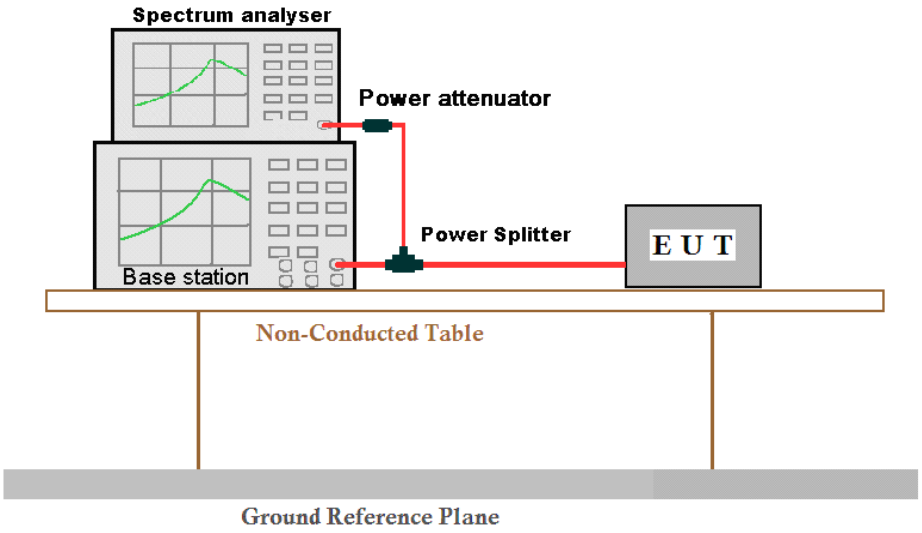
Time Period and Procedure:

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

4.10 Test Setups

4.10.1 Test Setup 1



4.10.2 Test Setup 2

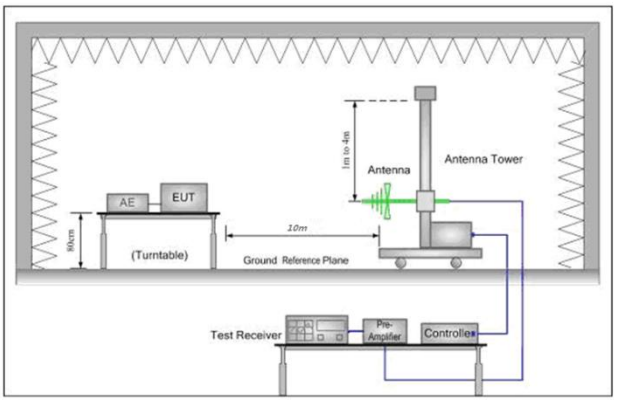


Figure 1. 30MHz to 1GHz

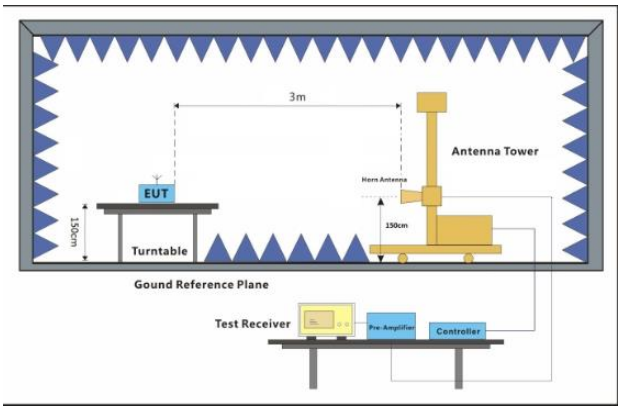


Figure 2. above 1GHz

4.10.3 Test Setup 3

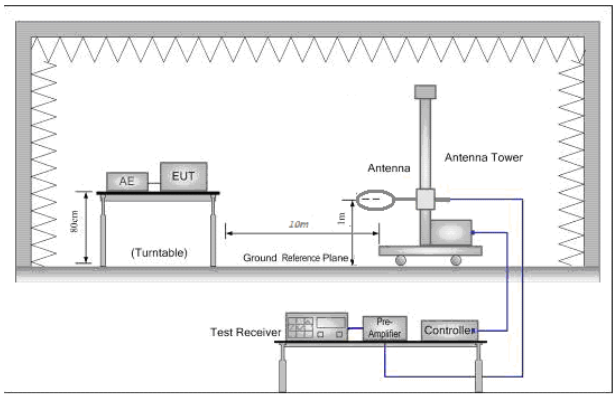


Figure 1. Below 30MHz

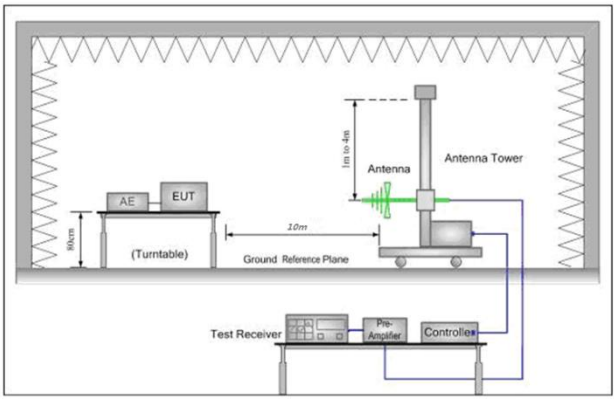


Figure 2. 30MHz to 1GHz

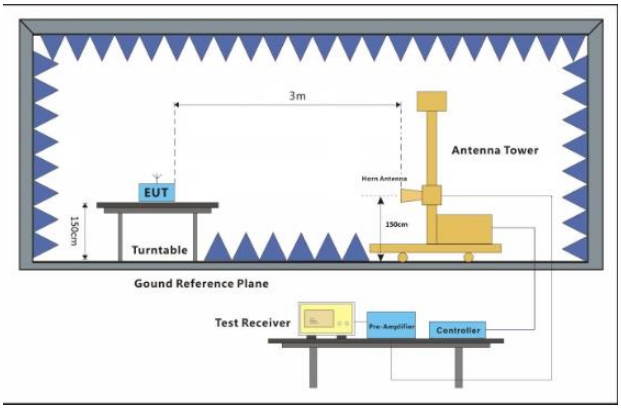
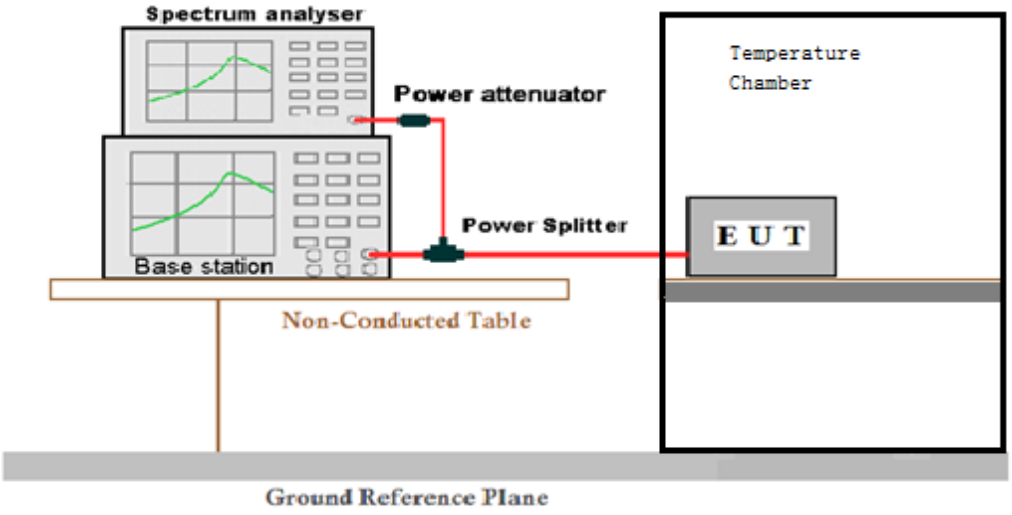


Figure 3. above 1GHz

4.10.4 Test Setup 4



4.11 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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
	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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
Peak-to-Average Ratio (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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
Modulation Characteristics		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (M= middle channel)
		Test Mode	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
	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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;
Field Strength of Spurious Radiation	Test Environment	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 2
	Test Mode	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3; 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 °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	UMTS/TM1;UMTS/TM2; LTE/TM1;LTE/TM2; LTE/TM3;

5 Main Test Instruments

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018/3/13	2021/3/12
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2020/4/16	2021/4/15
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2020/6/27	2023/6/26
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/413	2021/412
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017/10/17	2020/10/16
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2019/7/14	2020/7/14
				2020/7/14	2021/7/14
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2019/7/14	2020/7/14
				2020/7/14	2021/7/14
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	EMC2063	2019/9/20	2020/9/19
Pre-amplifier (26-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020/4/16	2021/4/15
Band filter	N/A	N/A	N/A	N/A	N/A
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2020/6/12	2021/6/11
Wideband Radio CommunicationTeste	Anristu	MT8821C	6201462742	2020/4/16	2021/4/15
Wideband Radio CommunicationTester	Rohde & Schwarz	CMW500	W005-02	2020/1/13	2021/1/2

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	2019/10/22	2020/10/21
Signal Analyzer	Rohde & Schwarz	FSV	W005-02	2020/4/16	2021/4/15
Coaxial Cable	SGS	N/A	SEM031-01	2020/6/12	2021/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019/10/22	2020/10/21
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2019/10/22	2020/10/21
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2019/10/22	2020/10/21
Wideband Radio CommunicationTeste	Anristu	MT8821C	6201462742	2020/4/16	2021/4/15
Wideband Radio CommunicationTester	Rohde & Schwarz	CMW500	W005-02	2019/10/22	2020/10/21

RSE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2020-04-02	2021-04-01
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2019-09-07	2020-09-06
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2019-11-18	2020-11-17
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2019-11-18	2020-11-17
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2019-12-03	2020-12-02
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2019-11-18	2020-11-17
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2019-12-06	2020-12-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR
Radio communication analyzer	ROHDE&SCHWARZ	CMW 500	XAW01-03-02	2020-04-02	2021-04-01

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Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2019-12-16	2020-12-15
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2020-04-09	2021-04-08
Universal Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-03	2020-04-01	2021-03-31

Radiated Emissions (above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Universal Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-03	2020-04-01	2021-03-31

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-4-07	2021-04-06

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:

Lab A:

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

Radiated Spurious Emissions Below 1GHz	± 4.5dB
Radiated Spurious Emissions Above 1GHz	± 4.8dB

Lab B:

No.	Item	Measurement Uncertainty
1	Radiated Emission	± 4.8dB (Below 1GHz)
		± 4.8dB (1GHz to 6GHz)
		± 4.5dB (6GHz to 18GHz)
		± 5.02dB (Above 18GHz)

7 Appendixes

Appendix A	Photographs of Set-Up for ZR/2020/70017
Appendix B.1	WCDMA Band II & IV & V
Appendix B.2	LTE Band 2
Appendix B.3	LTE Band 4
Appendix B.4	LTE Band 5
Appendix B.5	LTE Band 7
Appendix B.6	LTE Band 12
Appendix B.7	LTE Band 13
Appendix B.8	LTE Band 14
Appendix B.9	LTE Band 17
Appendix B.10	LTE Band 25
Appendix B.11	LTE Band 26（814-824）
Appendix B.12	LTE Band 26（824-849）
Appendix B.13	LTE Band 30
Appendix B.14	LTE Band 41
Appendix B.15	LTE Band 48
Appendix B.16	LTE Band 66
Appendix B.17	LTE Band 71
Appendix B.18	LTE Band CA_5B
Appendix B.19	LTE Band CA_66C
Appendix B.20	LTE Band CA_2A-4A
Appendix B.21	LTE Band CA_2A-12A
Appendix B.22	LTE Band CA_2A-13A
Appendix B.23	LTE Band CA_2A-66A
Appendix B.24	LTE Band CA_4A-5A
Appendix B.25	LTE Band CA_4A-12A
Appendix B.26	LTE Band CA_4A-13A
Appendix B.27	LTE Band CA_13A-66A

The End

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