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### **FCC TEST REPORT**

47 CFR Part 27 subpart C 47 CFR Part 90 subpart R 47 CFR Part 90 subpart S 2021/4/12 2021/4/12 to 2021/5/5 2021/5/6
47 CFR Part 90 subpart R 47 CFR Part 90 subpart S 2021/4/12
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47 CER Part 27 subpart C
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47 CFR Part 22 subpart H
47 CFR Part 2
XMR2021EM05G
Quectel
EM05-G
LTE Module
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Quectel Wireless Solutions Co., Ltd.
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Quectel Wireless Solutions Co., Ltd.
HR/2021/30007

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

Authorized Signature:

Derde yang

Derek Yang Wireless Laboratory Manager



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### 1 Version

Revision Record						
Version	Modifier	Remark				
01		2021-05-06		Original		

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



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### 2 Test Summary

### 2.1 UMTS Band 5 & LTE Band 5 / 26(824~849 MHz)

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	А			
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	В			
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm.	Section 8 of Appendix B	Pass	А			
Remark: For the ve	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	А
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



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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 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §24.238	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	В
Frequency Stability	§2.1055, §24.235	≤ ±2.5 ppm.	Section 8 of Appendix B	Pass	А
Remark: For the ve	erdict, the "N/A"	denotes "not applicable", the "N/T" deno	otes "not tested		

### 2.3 UMTS Band 4 /LTE Band 4 /66

				Lab*
046, 50(d)	EIRP ≤ 1 W	Section 1 of Appendix B	Pass	A
046, 50(d)	Limit≤13 dB	Section 2 of Appendix B	Pass	А
047	Digital modulation	Section 3 of Appendix B	Pass	A
049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B	Pass	A
051, 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
051, <sup>:</sup> 53(h)	<ul> <li>-13 dBm/1 MHz, from 9 kHz to 10<sup>th</sup> harmonics but outside authorized operating frequency ranges.</li> </ul>	Section 6 of Appendix B	Pass	A
053, 53(h)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	В
055, 7.54	≤ ±2.5 ppm.	Section 8 of Appendix B	Pass	А
	50(d) 046, 50(d) 047 049 051, 53(h) 051, 53(h) 055, 54	EIRP $\leq$ 1 W60(d)Limit $\leq$ 13 dB046, 50(d)Limit $\leq$ 13 dB047Digital modulation049OBW: No limit. EBW: No limit.051, 53(h) $\leq$ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.051, 53(h) $\leq$ -13 dBm/1 MHz, from 9 kHz to 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges.053, 53(h) $\leq$ -13 dBm/1 MHz.055, .54 $\leq$ ±2.5 ppm.	$50(d)$ EIRP S TWAppendix B $046,$ $50(d)$ Limit<13 dB	$50(d)$ EIRPS TWAppendix BPass $046$ , $50(d)$ Limit≤13 dBSection 2 of Appendix BPass $047$ Digital modulationSection 3 of Appendix BPass $047$ Digital modulationSection 4 of Appendix BPass $049$ OBW: No limit. EBW: No limit.Section 4 of Appendix BPass $051$ , $53(h)$ $\leq -13  dBm/1\%^*EBW$ , in 1 MHz bands immediately outside and adjacent to the frequency block.Section 5 of Appendix BPass $051$ , $53(h)$ $\leq -13  dBm/1  MHz$ , from 9 kHz to 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges.Section 7 of Appendix BPass $053$ , $53(h)$ $\leq -13  dBm/1  MHz$ .Section 7 of Appendix BPass $053$ , $53(h)$ $\leq -13  dBm/1  MHz$ .Section 7 of Appendix BPass $055$ , $055$ , $055$ , $\leq +25  pnm$ Section 8 of Appendix BPass

### 2.4 LTE Band 7/38/41

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

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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. EBW: No limit.	Section 4 of Appendix B	Pass	А
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)	Channel Edge -25dBm/ 1 MHz 9 kHz 25 dBm/ 1 MHz 9 kHz 3 5 MHz X=Max {6MHz, EBW}	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	P kHz 9 5 MHz X=Max {6MHz, EBW}	Section 7 of Appendix B	Pass	В
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass	A
Remark: For the ve	erdict, the "N/A"	denotes "not applicable", the "N/T" den	otes "not tested		

### 2.5 LTE Band 12

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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





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Peak-Average Ratio	§2.1046, §27.50(c)	Limit≤13 dB	Section 2 of Appendix B	Pass	А
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	А
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	А
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10 <sup>th</sup> 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	В
Frequency Stability	§2.1055, §27.54	≤ ±2.5ppm.	Section 8 of Appendix B	Pass	А
Remark: For the ve	erdict, the "N/A"	denotes "not applicable", the "N/T" den	otes "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	Pass	А
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	А
Spurious Emission at Antenna Terminals	§2.1051, §27.53(c) §27.53(f)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10 <sup>th</sup> 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.	Section 6 of Appendix B	Pass	A



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		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.			
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	В
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B	Pass	А
Remark: For the ve	erdict, the "N/A"	denotes "not applicable", the "N/T" deno	otes "not tested"		



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### 2.7 LTE Band 14

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Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Effective (Isotropic) Radiated Power Output Data	§2.1046 §90.542	FCC: ERP ≤ 3 W.	Section 1 of Appendix B	Pass	A
Peak-Average Ratio		Limit≤13 dB	Section 2 of Appendix B	Pass	А
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	А
Emission Mask	§2.1051 §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: 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 35 dB(3) On any frequency removed from the assigned frequency by 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.	Section 5 of Appendix B	Pass	А
Band Edges Compliance	§2.1051 §90.543(e)(2)(3)	(1) On all frequencies between 769- 775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P)	Section 6 of Appendix B	Pass	А

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		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.			
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		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	В
Frequency Stability	§2.1055, §90.213	≤ ±2.5ppm.	Section 9 of Appendix B	Pass	А
Remark: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".					

Remark: For the verdict, the "N/A" denotes "not applicable", the "N/I" denotes "not teste



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### 2.8 LTE Band 26(814~824 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Test Lab*
Transmitter Conducted	§2.1046, §90.635	< 100 W.	Section 1 of	Pass	A
Power Output	300.000		Appendix B		
Peak-Average Ratio		FCC: Limit≤13 dB	Section 2 of Appendix B	Pass	А
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of	Pass	A
Characteristics			Appendix B		
Bandwidth	§2.1049	OBW: No limit.	Section 4 of	Pass	А
	U	EBW: No limit.	Appendix B		
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 Reference SZCR210602131701
Frequency Stability	§2.1055, §90.213	< ±2.5ppm.	Section 8 of Appendix B	Pass	А
Remark: For the	e verdict, the	"N/A" denotes "not applicable", the "	N/T" denotes "n	ot tested".	



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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	А
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	А
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 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges.	Section 6 of Appendix B	Pass	A
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B	Pass	В
Frequency Stability	§2.1055, §27.54	within the authorized bands of operation. denotes "not applicable", the "N/T" deno	Section 8 of Appendix B	Pass	А

### 2.9 LTE Band 71

Remark : All test were performed by Lab A and B.

Lab A SGS-CSTC Standards Technical Services Co., Ltd.

Lab B SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.



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### **3** General Information

### 3.1 Details of Client

Applicant:	Quectel Wireless Solutions Co., Ltd.
Address of Applicant	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Manufacturer:	Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233

### 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,Swing Hu,Habit Zeng

### 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 3rd Road, Fengdong New City, Xi'an, Shaanxi China	
Post code:	710086
Test engineer:	Leah Chen,Ken Liu,Andy Yao



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# SGS

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### 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.



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### 3.4 General Description of EUT

EUT Description:	LTE Module		
Model No.:	EM05-G		
Trade Mark:	Quectel		
Hardware Version:	R1.0		
Software Version:	EM05GFAR07A05M1G		
Sample Type:	Portable Device,      Module		
Antenna Type:	🖾 External, 🔲 Integrated		
Antenna Gain:	WCDMA Band II:1.59dBi(ANT1); 3.07dBi(ANT2); WCDMA Band IV:1.94dBi(ANT1); 3.38dBi(ANT2); WCDMA Band V:2.29dBi(ANT1); 3.96dBi(ANT2); LTE Band 2:1.59 dBi(ANT1); 3.07dBi(ANT2); LTE Band 4:1.94dBi(ANT1); 3.07dBi(ANT2); LTE Band 5:2.29dBi(ANT1); 3.96dBi(ANT2); LTE Band 7:2.68dBi(ANT1); 3.15dBi(ANT2); LTE Band 12:2.26dBi(ANT1); 3.6dBi(ANT2); LTE Band 13:4.45dBi(ANT1); 3.55dBi(ANT2); LTE Band 14:3.65dBi(ANT1); 3.55dBi(ANT2); LTE Band 25:1.59dBi(ANT1); 3.07dBi(ANT2); LTE Band 26:2.53dBi(ANT1); 3.96dBi(ANT2); LTE Band 26:2.53dBi(ANT1); 3.96dBi(ANT2); LTE Band 26:2.53dBi(ANT1); 3.97dBi(ANT2); LTE Band 38:2.06dBi(ANT1); 3.22dBi(ANT2); LTE Band 41:2.68dBi(ANT1); 3.7dBi(ANT2); LTE Band 41:2.68dBi(ANT1); 3.7dBi(ANT2); LTE Band 66:1.94dBi(ANT1); 3.07dBi(ANT2);		

Remark:ANT1=External Antenna;ANT2=PIFA Antenna

### 3.5 Test Mode

Test Mode	Test Modes Description		
UMTS/TM1	UMTS system, WCDMA, QPSK modulation		
LTE/TM1	LTE system, QPSK modulation		
LTE/TM2	LTE system, 16QAM modulation		

Remark: The test mode(s) are selected according to relevant radio technology specifications.



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### **3.6 Test Environment**

Operating Environment:				
Humidity:	50 % RH			
Atmospheric Pressure:	101.30 KPa			
Temperature	NT	25 °C		
	LV	3.135V		
Voltage:	NV	3.3V		
	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				
Padia System Type	⊠ UMTS				
Radio System Type	🖾 LTE				
	Band	ТХ	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		
Supported Frequency Range	LTE Band 13	777 to 787 MHz	746 to 756 MHz		
	LTE Band 14	788 to 798 MHz	758 to 768 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 38	2570 to 2620 MHz	2570 to 2620 MHz		
	LTE Band 41	2496 to 2690MHz	2496 to 2690MHz		
	LTE Band 66	1710 to 1780 MHz	2110 to 2200 MHz		
	LTE Band 71	663 to 698 MHz	617 to 652 MHz		



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	UMTS system:	⊠5 MHz	
	LTE Band 2	│	
	LTE Band 4	⊠1.4 MHz;⊠3 MHz; ⊠5 10 MHz; ⊠15 MHz, ⊠20	
	LTE Band 5	☐ 1.4 MHz; ☐ 3 MHz; ☐5 10 MHz	
	LTE Band 7		5 MHz, 🛛
	LTE Band 12	☐1.4 MHz;⊠3 MHz; ⊠5 10 MHz	MHz; 🛛
	LTE Band 13	⊠5 MHz; ⊠10 MHz	
	LTE Band 14	5 MHz; 10 MHz	
	LTE Band 25	⊠1.4 MHz;⊠3 MHz; ⊠5 10 MHz; ⊠15 MHz, ⊠20	
Supported Channel Bandwidth	LTE Band 26(814-824)	⊠1.4 MHz;⊠3 MHz; ⊠5 10 MHz;	
	LTE Band 26(824-849)	☐1.4 MHz;⊠3 MHz; ⊠5 10 MHz; ⊠15 MHz	MHz; 🖂
	LTE Band38	∑5 MHz; ⊠10 MHz; ⊠1 20 MHz	5 MHz, 🔀
	LTE Band41	∑5 MHz; ⊠10 MHz; ⊠1 20 MHz	5 MHz, 🛛
	LTE Band66	⊠1.4 MHz;⊠3 MHz; ⊠5 10 MHz; ⊠15 MHz, ⊠20	
	LTE Band71	⊠5 MHz; ⊠10 MHz; ⊠1 20 MHz	
	Note1: WCDMA supports HSUPA, HSDPA, DS-HSDPA, HSPA+ but only the		
	worst case was tested and	the data displayed in this report.	
Characteristics	Description		
	UMTS Band II	4M14F9W;	
	UMTS Band IV	4M15F9W;	
	UMTS Band V	4M15F9W;	
		1M09G7D;1M09W7D;	
		2M70G7D;2M69W7D;	
	LTE Band 2	4M48G7D;4M49W7D;	
Designation of Emissions		8M93G7D;8M91W7D;	
(Remark: the necessary		13M5G7D;13M4W7D;	
bandwidth of which is the		17M9G7D;17M9W7D;	
worst value from the		1M09G7D;1M09W7D;	
		2M70G7D;2M69W7D;	
measured occupied bandwidths for each type of	LTE Band 4	4M48G7D;4M50W7D;	
channel bandwidth		8M93G7D;8M93W7D;	
configuration.)		13M4G7D;13M4W7D;	
comguration.		17M9G7D;17M9W7D;	
		1M09G7D;1M09W7D;	
	LTE Band 5	2M70G7D;2M69W7D;	
	LIE Dallu 5	4M48G7D;4M49W7D;	
		8M91G7D;8M93W7D;	
	LTE Band 7	4M48G7D;4M49W7D; 8M93G7D;8M91W7D;	
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		13M5G7D;13M4W7D;	
		17M9G7D;17M9W7D;	
		1M09G7D;1M09W7D;	
		2M70G7D;2M69W7D;	
	LTE Band 12	4M48G7D;4M49W7D;	
		8M93G7D;8M93W7D;	
		4M48G7D;4M49W7D;	
	LTE Band13	8M91G7D;8M91W7D;	
		4M48G7D;4M49W7D;	
	LTE Band 14	8M89G7D;8M89W7D;	
		1M09G7D;1M09W7D;	
		2M70G7D;2M69W7D;	
		4M48G7D;4M49W7D;	
	LTE Band 25	8M93G7D;8M91W7D;	
		13M4G7D;13M4W7D;	
		17M9G7D;17M9W7D;	
		1M09G7D;1M09W7D;	
	LTE Band 26	2M70G7D;2M70W7D;	
	(814-824)	4M48G7D;4M48W7D;	
	(011021)	8M93G7D;8M91W7D;	
-		1M09G7D;1M09W7D;	
		2M70G7D;2M69W7D;	
	LTE Band 26 (824-849)	4M48G7D;4M48W7D;	
		8M93G7D;8M91W7D;	
		13M4G7D;13M4W7D;	
		4M48G7D;4M50W7D;	
		8M91G7D;8M91W7D;	
	LTE Band 38	13M5G7D;13M5W7D;	
		17M9G7D;17M9W7D;	
		4M48G7D;4M50W7D;	
		8M91G7D;8M93W7D;	
	LTE Band 41	13M5G7D;13M5W7D;	
		17M9G7D;17M9W7D;	
		1M09G7D;1M09W7D;	
		2M70G7D;2M69W7D;	
		4M48G7D;4M49W7D;	
	LTE Band 66	8M93G7D;8M93W7D;	
		13M4G7D;13M4W7D;	
		17M9G7D;17M9W7D;	
		4M48G7D;4M49W7D;	
		8M97G7D;8M93W7D;	
	LTE Band 71	13M5G7D;13M5W7D;	
		17M8G7D;17M8W7D;	



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### 3.8 Test Frequencies

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

Test Mode TX / RX		RF Channel			
I EST MOUE		Low (L)	Middle (M)	High (H)	
		Channel 1312	Channel 1413	Channel 1513	
WCDMA Band IV	TX	1712.4MHz	1732.6 MHz	1752.6 MHz	
	RX	Channel 1537	Channel 1638	Channel 1738	
	۲A	2112.4 MHz	2132.6 MHz	2152.6 MHz	

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



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



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Toot Mada	Dondwidth	TX/RX		RF Channel	
Test Mode	Bandwidth		Low (L)	Middle (M)	High (H)
			Channel 19957	Channel 20175	Channel 20393
		ТХ	1710.7 MHz	1732.5 MHz	1754.3 MHz
	1.4MHz	RX	Channel 1975	Channel 2175	Channel 2375
		КЛ	2112.5 MHz	2132.5MHz	2152.5 MHz
			Channel 19965	Channel 20175	Channel 20385
		ТХ	1711.5 MHz	1732.5 MHz	1753.5 MHz
	3MHz	RX	Channel 2000	Channel 2175	Channel 2350
		КЛ	2115 MHz	2132.5MHz	2150 MHz
			Channel 19975	Channel 20175	Channel 20375
		TX	1712.5 MHz	1732.5 MHz	1752.5 MHz
	R	DV	Channel 1975	Channel 2175	Channel 2375
		RX	2112.5 MHz	2132.5MHz	2152.5 MHz
LTE Band 4			Channel 20000	Channel 20175	Channel 20350
		ТХ	1715 MHz	1732.5 MHz	1750 MHz
	5MHz 10MHz	RX	Channel 2000	Channel 2175	Channel 2350
		КЛ	2115 MHz	2132.5MHz	2150 MHz
			Channel 20025	Channel 20175	Channel 20325
		ТХ	1717.5 MHz	1732.5 MHz	1747.5 MHz
	15MHz	RX	Channel 2025	Channel 2175	Channel 2325
		2117.5 MHz	2132.5MHz	2147.5 MHz	
			Channel 20050	Channel 20175	Channel 20300
		ТХ	1720 MHz	1732.5 MHz	1745 MHz
	20MHz	RX	Channel 2050	Channel 2175	Channel 2300
		٢٨	2120 MHz	2132.5MHz	2145 MHz

Test Mode	Pondwidth	TV / DV		RF Channel	
Test Mode	Danuwiuun		Low (L)	Middle (M)	High (H)
			Channel 20407	Channel 20525	Channel 20643
		ТХ	824.7 MHz	836.5 MHz	848.3 MHz
	1.4MHz	DV	Channel 2407	Channel 2525	Channel 2643
		ΓA	869.7 MHz	881.5 MHz	893.3 MHz
			Channel 20415	Channel 20525	Channel 20635
	3MHz	TX	825.5 MHz	836.5 MHz	847.5 MHz
		ΒV	Channel 2415	Channel 2525	Channel 2635
		ΓA	870.5 MHz	881.5 MHz	892.5 MHz
LTE Band 5		$\frac{Bandwidth}{TX / RX}$ $\frac{TX}{RX}$ $\frac{1.4MHz}{RX}$ $\frac{TX}{RX}$	Channel 20425	Channel 20525	Channel 20625
			826.5 MHz	836.5 MHz	846.5 MHz
	5MHZ	DV	Channel 2425	Channel 2525	Channel 2625
		КЛ	871.5 MHz	881.5 MHz	891.5 MHz
			Channel 20450	Channel 20525	Channel 20600
	10MHz	ТХ	829 MHz	836.5 MHz	844 MHz
		ΡY	Channel 2450	Channel 2525	Channel 2600
		RX - TX - RX - TX -	874 MHz	881.5 MHz	889 MHz



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Test Mode	Bandwidth	RF Channel			
Test Mode	Danuwiuun	TX / RX	Low (L)	Middle (M)	High (H)
			Channel 20775	Channel 21100	Channel 21425
		ТХ	2502.5 MHz	2535 MHz	2567.5 MHz
	5MHz	DV	Channel 2775	Channel 3100	Channel 5825
		ΓΛ	2622.5 MHz	2655 MHz	2687.5 MHz
			Channel 20800	Channel 21100	Channel 21400
		TX	2505 MHz	2535 MHz	2565 MHz
	10MHz	DV	Channel 2800	Channel 3100	Channel 3400
		ΓΛ	2625 MHz	2655 MHz	2685 MHz
LTE Band 7			Channel 20825	Channel 21100	Channel 21375
		ТХ	RX         2622.5 MHz         2655 MHz           Channel 20800         Channel 21100           TX         2505 MHz         2535 MHz           RX         Channel 2800         Channel 3100           2625 MHz         2655 MHz         2655 MHz           Channel 2800         Channel 3100         2625 MHz           Channel 20825         Channel 21100	2562.5 MHz	
	15MHz	TX         Channel 20800         Channel 21100           2505 MHz         2535 MHz           RX         Channel 2800         Channel 3100           2625 MHz         2655 MHz           2625 MHz         2655 MHz           Channel 20825         Channel 21100           TX         2507.5 MHz         2535 MHz           RX         Channel 2825         Channel 3100	Channel 3375		
		КЛ	2627.5 MHz	2655 MHz	2682.5 MHz
			Channel 20850	Channel 21100	Channel 21350
		ТХ	2510 MHz	2535 MHz	2560 MHz
	20MHz	RX	Channel 2850	Channel 3100	Channel 3350
		٢٨	2630 MHz	2655 MHz	2680 MHz

Test Made	Dondwidth			RF Channel		
Test Wode	Danuwidin	TX / RX	Low (L)	Middle (M)	High (H)	
			Channel 23017	Channel 23095	Channel 23173	
		TX	699.7 MHz	707.5 MHz	715.3 MHz	
	1.4MHz	DV	Channel 5017	Channel 5095	Channel 5173	
		КЛ	729.7 MHz	737.5 MHz	745.3 MHz	
			Channel 23025	Channel 23095	Channel 23165	
	Test Mode     Bandwidth       1.4MHz     1       3MHz     1       LTE Band 12     5MHz       10MHz     1	ТХ	700.5 MHz	707.5 MHz	714.5 MHz	
		БV	Channel 5025	Channel 5095	Channel 5165	
			ΓA	730.5 MHz	737.5 MHz	744.5 MHz
LIE Band 12				Channel 23035	Channel 23095	Channel 23155
			701.5 MHz	707.5 MHz	713.5 MHz	
	5MHz	TX         Channel 23025 700.5 MHz           RX         Channel 5025 730.5 MHz           TX         Channel 23035           TX         Channel 23035           TX         701.5 MHz           RX         Channel 5035           TX         731.5 MHz           Channel 23060         Channel 23060	Channel 5095	Channel 5155		
		КЛ	731.5 MHz	737.5 MHz	743.5 MHz	
			Channel 23060	Channel 23095	Channel 23130	
		ТХ	704 MHz	707.5 MHz	711 MHz	
	10MHz	DV	Channel 5060	Channel 5095	Channel 5130	
		RX - TX -	734 MHz	737.5 MHz	741 MHz	

Test Mode	Bandwidth	Bandwidth TX / RX - 5MHz TX RX - 10MHz RX -	RF Channel		
Test Mode	Danuwiuun		Low (L)	Middle (M)	High (H)
			Channel 23025	Channel 23230	Channel 23255
		TX	779.5 MHz	782 MHz	784.5 MHz
	5MHz	DV	Channel 5205	Channel 5230	Channel 5255
LTE Band 13		КЛ	748.5 MHz	751 MHz	753.5 MHz
LIE Dallu 13			Channel 23230	Channel 23230	Channel 23230
		TX	782 MHz	782 MHz	782 MHz
	10MHz	BV	Channel 5230	Channel 5230	Channel 5230
		κ۸	751 MHz	751 MHz	751 MHz



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

	Dondwidth	TX/RX		RF Channel	
Test Mode	Bandwidth	17/67	Low (L)	Middle (M)	High (H)
			Channel 26047	Channel 26365	Channel 26683
		IX / RX         Low (L)         Middle (M)           TX         Channel 26047         Channel 26365           TX         1850.7 MHz         1882.5 MHz           RX         Channel 8047         Channel 8365           RX         1930.7 MHz         1962.5 MHz           Channel 26055         Channel 26365           TX         1851.5 MHz         1882.5 MHz           Channel 26055         Channel 26365           TX         1851.5 MHz         1882.5 MHz           RX         Channel 8055         Channel 8365           RX         1931.5 MHz         1962.5 MHz           RX         Channel 8055         Channel 8365           TX         1852.5 MHz         1962.5 MHz           RX         Channel 26065         Channel 26365           TX         1852.5 MHz         1882.5 MHz           RX         Channel 8065         Channel 8365           TX         1855 MHz         1962.5 MHz           RX         Channel 8090         Channel 8365           TX         1855 MHz         1962.5 MHz           RX         Channel 8090         Channel 8365           TX         1935 MHz         1962.5 MHz           RX         Chan	1914.3 MHz		
	1.4MHz	υV	Channel 8047	Channel 8365	Channel 8683
		KΛ	1930.7 MHz	1962.5 MHz	1994.3 MHz
			Channel 26055	Channel 26365	Channel 26675
		TX	1851.5 MHz	1882.5 MHz	1913.5 MHz
	3MHz	υV	Channel 8055	Channel 8365	Channel 8675
		KΛ	1931.5 MHz	1962.5 MHz	1993.5 MHz
			Channel 26065	Channel 26365	Channel 26665
	5MHz	TX	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
LTE Band 25			Channel 26090	Channel 26365	Channel 26640
		TX	1855 MHz	1882.5 MHz	1910 MHz
	10MHz	DV	Channel 8090	Channel 8365	Channel 8640
		ΓΛ	Low (L)         Middle (M)           TX         Channel 26047         Channel 26365           TX         1850.7 MHz         1882.5 MHz           RX         Channel 8047         Channel 8365           1930.7 MHz         1962.5 MHz         1930.7 MHz           TX         Channel 26055         Channel 26365           TX         1851.5 MHz         1882.5 MHz           RX         Channel 8055         Channel 8365           TX         1851.5 MHz         1882.5 MHz           RX         Channel 8055         Channel 8365           TX         1852.5 MHz         1962.5 MHz           RX         Channel 26065         Channel 26365           TX         1852.5 MHz         1882.5 MHz           RX         Channel 8065         Channel 8365           TX         1852.5 MHz         1962.5 MHz           RX         Channel 8065         Channel 8365           TX         1855 MHz         1882.5 MHz           RX         Channel 26090         Channel 8365           TX         1855 MHz         1882.5 MHz           RX         Channel 8090         Channel 8365           TX         1857.5 MHz         1882.5 MHz	1990 MHz	
			Channel 26115	Channel 26365	Channel 26615
		TX	1857.5 MHz	1882.5 MHz	1907.5 MHz
	15MHz	RX	Channel 8115	Channel 8365	Channel 8615
			1937.5 MHz	1962.5 MHz	1987.5 MHz
			Channel 26140	Channel 26365	Channel 26590
		ΤX	1860 MHz	1882.5 MHz	1905 MHz
	20MHz	DV	Channel 8140	Channel 8365	Channel 8590
		RX TX RX TX RX TX TX	1940 MHz	1962.5 MHz	1985 MHz



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Test Mode	Bandwidth			RF Channel	
Test Mode	Danuwiuun	TX / RX	Low (L)	Middle (M)	High (H)
			Channel 26697	Channel 26740	Channel 26783
		TX	814.7 MHz	819 MHz	823.3 MHz
	1.4MHz	RX	Channel 8697	Channel 8740	Channel 8783
		КЛ	859.7 MHz	864MHz	868.3 MHz
			Channel 26705	Channel 26740	Channel 26775
	3MHz	TX	815.5 MHz	819 MHz	822.5 MHz
		RX	Channel 8705	Channel 8740	Channel 8775
LTE Band 26			860.5 MHz	864MHz	867.5 MHz
(814-824)			Channel 26715	Channel 26740	Channel 26765
(011021)		ТХ	816.5 MHz	819 MHz	821.5 MHz
	5MHz	RX	Channel 8715	Channel 8740	Channel 8755
		КЛ	861.5 MHz	864MHz	866.5 MHz
			Channel 26740	Channel 26740	Channel 26740
		TX	819 MHz	819 MHz	819 MHz
	10MHz	RX	Channel 8740	Channel 8740	Channel 8740
		ΓΛ	864MHz	864MHz	864MHz

Test Mode	Bandwidth	TX/RX		RF Channel	
Test Mode	Danuwidin	IA/KA	Low (L)	Middle (M)	High (H)
			Channel 26797	Channel 26915	Channel 27033
		TX	824.7 MHz	836.5 MHz	848.3 MHz
	1.4MHz	RX	Channel 8697	Channel 8915	Channel 9033
		КЛ	859.7 MHz	881.5 MHz	893.3 MHz
			Channel 26805	Channel 26915	Channel 27025
		ТХ	825.5 MHz	836.5 MHz	847.5 MHz
	3MHz	ΒV	Channel 8805	Channel 8915	Channel 9025
		КЛ	860.5 MHz	881.5 MHz	892.5 MHz
		ТХ	Channel 26815	Channel 26915	Channel 27015
LTE Band26			826.5 MHz	836.5 MHz	846.5 MHz
(824-849)	5MHz	DV	Channel 8815	Channel 8915	Channel 9015
(02:0:0)		КЛ	871.5 MHz	881.5 MHz	891.5 MHz
			Channel 26840	Channel 26915	Channel 26990
		ТХ	829 MHz	836.5 MHz	844 MHz
	10MHz	ΒV	Channel 8840	Channel 8915	Channel 8990
		ΓA	874 MHz	881.5 MHz	889 MHz
			Channel 26865	Channel 26915	Channel 26965
		ТХ	831.5 MHz	836.5 MHz	841.5 MHz
	15MHz	RX	Channel 8865	Channel 8915	Channel 8965
		TX RX TX RX TX RX TX RX RX	876.5 MHz	881.5 MHz	886.5 MHz



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Test Mode	Bandwidth	TX / RX		RF Channel	
Test Mode	Danuwiutii		Low (L)	Middle (M)	High (H)
	5MHz	TX/RX	Channel 37775	Channel38000	Channel 38225
			2572.5 MHz	2595 MHz	2617.5 MHz
	10MHz	TX/RX	Channel 37800	Channel38000	Channel 38200
LTE Band 38			2575 MHz	2595 MHz	2615 MHz
LIE Dallu So	15MHz	TX/RX	Channel 37825	Channel38000	Channel 38175
	TOIVINZ		2577.5 MHz	2595 MHz	2612.5 MHz
	20MHz	TX/RX	Channel 37850	Channel38000	Channel 38150
		170177	2580 MHz	2595 MHz	2610 MHz

Test Mode	Bandwidth	TX / RX		RF Channel	
Test Mode	Danuwiuun		Low (L)	Middle (M)	High (H)
			Channel 39675	Channel40620	Channel 41565
	5MHz	TX / RX	2498.5 MHz	2593 MHz	2687.5 MHz
			Channel 39700	Channel40620	Channel 41540
LTE Band 41	10MHz	TX / RX	2501 MHz	2593 MHz	2685 MHz
(2496-2690)			Channel 39725	Channel40620	Channel 41515
, ,	15MHz	TX / RX	2503.5 MHz	2593 MHz	2682.5 MHz
			Channel 39750	Channel40620	Channel 41490
	20MHz	TX / RX	2506 MHz	2593 MHz	2680 MHz



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Test Mode	Bandwidth	TX / RX	RF Channel			
Test Mode	Danuwiuun		Low (L)	Middle (M)	High (H)	
		тх	Channel 131979	Channel 132322	Channel 132665	
			1710.7 MHz	1745 MHz	1779.3 MHz	
	1.4MHz	RX	Channel 66443	Channel 66786	Channel 67329	
			2110.7 MHz	2145MHz	2199.3 MHz	
			Channel 131987	Channel 132322	Channel 132657	
		ТХ	1711.5 MHz	1745 MHz	1778.5MHz	
	3MHz	RX	Channel 66451	Channel 66786	Channel 67121	
			2111.5 MHz	2145MHz	2198.5MHz	
	5MHz		Channel 131997	Channel 132322	Channel 132647	
		TX	1712.5 MHz	1745 MHz	1777.5 MHz	
		RX	Channel 66461	Channel 66786	Channel 67311	
			2112.5 MHz	2145MHz	2197.5 MHz	
LTE Band66	10MHz	тх	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	тх	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	
			Channel 132072	Channel 132322	Channel 132572	
		ТХ	1720 MHz	1745 MHz	1770 MHz	
	20MHz	DY	Channel 66536	Channel 66786	Channel 67236	
		RX	2120 MHz	2145MHz	2190 MHz	



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Test Mode			RF Channel				
Test Wode		TX/RX	Low (L)	Middle (M)	High (H)		
		тх	Channel 133147	Channel 133297	Channel 133447		
	5MHz		665.5 MHz	680.5 MHz	695.5 MHz		
	JIVITZ	RX	Channel 68611	Channel 68761	Channel 68911		
		ΓЛ	619.5 MHz	634.5 MHz	649.5 MHz		
		тх	Channel 133172	Channel 133297	Channel 133422		
	10MHz		668 MHz	680.5 MHz	693 MHz		
		RX	Channel 68636	Channel 68761	Channel 68886		
LTE Band 71			622 MHz	634.5 MHz	647 MHz		
LIE Dallu / I	15MHz	тх	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		
		тх	Channel 133222	Channel 133297	Channel 133372		
	001411-		673 MHz	680.5 MHz	688 MHz		
	20MHz	RX	Channel 68686	Channel 68761	Channel 68836		
			627 MHz	634.5 MHz	642 MHz		



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### 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** 



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### 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

- The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW ≥ 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within

1 - 5% of the 99% occupied bandwidth observed in Step 7



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### 4.4 Band Edge at Antenna Terminals

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

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

### 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
- 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



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### 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

- 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)
- 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



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### 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



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### 4.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01

### Below 1GHz test procedure as below:

- 1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.
- 2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4). 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
- 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

Remark1: Reference test setup 2

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





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### Test Settings:

- 1. RBW=100kHz for emission below 1GHz and 1MHz for emission above 1GHz
- 2. VBW≥3\*RBW
- 3. Number of sweep point≥2\*span/RBW
- 4. Detector=RMS
- 5. Trace mode=Average (Max Hold for pulsed emissions)
- 6. The trace was allowed to stabilize



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### 4.8 Frequency Stability / Temperature Variation

Measurement Procedure:

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

- . The frequency stability of the transmitter is measured by:
- a.) **Temperature:** The temperature is varied from -30°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  $\pm 0.00025\%$  ( $\pm 2.5$  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 3



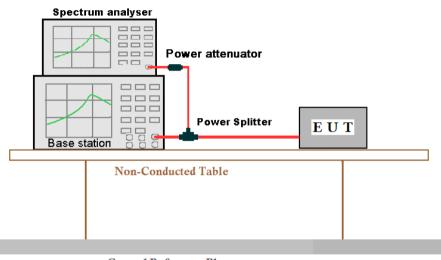
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### 4.9 Test Setups

### 4.9.1 Test Setup 1



Ground Reference Plane

### 4.9.2 Test Setup 2

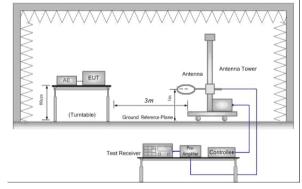


Figure 1. Below 30MHz



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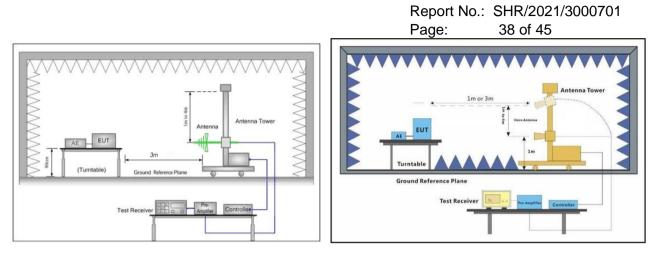
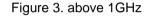
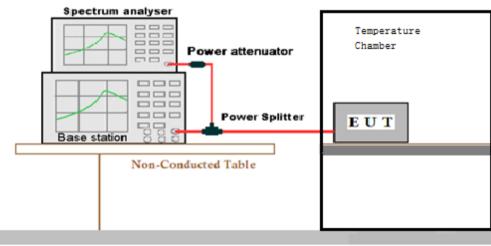


Figure 2. 30MHz to 1GHz



### 4.9.3 Test Setup 3



Ground Reference Plane

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### 4.10Test Conditions

Test Case	Test Case		tions
		Test Environm ent	Ambient Climate & Rated Voltage
	Average Power,	Test Setup	Test Setup 1
Transmit	Total	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel )
Output		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
Power Data	Average Power,	Test Environm ent	Ambient Climate & Rated Voltage
	Spectral Density	Test Setup	Test Setup 1
	(if required )	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel )
		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
			Ambient Climate & Rated Voltage
Peak-to-A Ratio	verage	Test Setup	Test Setup 1
(if required	(ל	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel )
		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
Modulation Characteristics		Test Environm ent	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (M= middle channel )
		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
Bandwid Occupie Test		Test	Ambient Climate & Rated Voltage



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			Fage. 40 01 45
th	th d Environm Bandwid ent th Test Setup		
			Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel )
		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
	Emissio n	Test Environm ent	Ambient Climate & Rated Voltage
	Bandwid th	Test Setup	Test Setup 1
	(if required )	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel )
		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
			Ambient Climate & Rated Voltage
Band Edg		Test Setup	Test Setup 1
Compliand	Compliance		L, H (L= low channel, H= high channel )
		Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2
		Test Environm ent	Ambient Climate & Rated Voltage
at Antenna	Spurious Emission at Antenna		Test Setup 1
(TX)		RF Channels (TX)	L,M, H (L= low channel, M= middle channel, H= high channel )
		Test Mode	UMTS/TM1; LTE/TM1
Field Strength of Spurious Radiation		Test Environm ent	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 2



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	Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2 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 )
	Test Environm ent	<ul> <li>(1) -30 °C to +50 °C with step 10 °C at Rated Voltage;</li> <li>(2) VL, VN and VH of Rated Voltage at Ambient Climate.</li> </ul>
Frequency Stability	Test Setup	Test Setup 3
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel )
	Test Mode	UMTS/TM1; LTE/TM1;LTE/TM2



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### 5 Main Test Instruments

RF conducted test						
Test Equipment	Manufacturer	Model No.	Inventory	Cal. date	Cal.Due date	
rest Equipment	Wanuacturer		No.	(yyyy-mm-dd)	(yyyy-mm-dd)	
Signal Applyzor	Rohde & Schwarz	FSV	W025-05	2020/4/16	2021/4/15	
Signal Analyzer	Ronue & Schwarz	FSV		2021/4/14	2022/4/13	
DC Power Supply	Rohde & Schwarz	HMP2020	W009-08	2020/7/15	2021/7/15	
Humidity/ Temperature	Shanghai Meteorological Industry Factory	HTC-1	W006-16	2020/4/21	2021/4/20	
Indicator				2021/4/15	2022/4/14	
Temperature Chamber	GIANT FORCE	ICT-150-40- CP-AR	W027-03	2020/11/20	2021/11/19	
Wideband Radio	Apriotu	MT8821C	W061-05	2020/4/16	2021/4/15	
Communication Tester	Anristu	IVI I 002 I C	0001-05	2021/4/14	2022/4/13	
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	W005-22	2020/10/22	2021/10/21	



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			i aye.	43 01 43		
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	2021-04-01	2022-03-31	
Radio communication analyzer	ROHDE&SCHWARZ	CMW 500	XAW01-03-02	2021-04-01	2022-03-31	
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10	
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	2020-10-26	2021-10-25	
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2020-10-26	2021-10-25	
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2020-10-27	2021-10-26	
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2020-10-26	2021-10-25	
5G UXM	Keysight	E7515B	XAW01-04-01	2020-09-11	2021-09-10	
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05	
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR	



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### 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:

No.	ltem	Measurement Uncertainty
1	Total RF power, conducted	±0.41dB
2	RF power density, conducted	±1.96dB
3	Spurious emissions, conducted	±0.41dB
4	Radio Frequency	±7.10 x 10 <sup>-8</sup>
5	Duty Cycle	±0.49%
6	Occupied Bandwidth	±0.2%

Lab B:

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



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### 7 Appendixes

Setup Photos
WCDMA
LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 12
LTE Band 13
LTE Band 14
LTE Band 25
LTE Band 26 (814-824)
LTE Band 26 (824-849)
LTE Band 38
LTE Band 41
LTE Band 66
LTE Band 71

The End



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