FCC
RF Test Report

Product Name: Smart Phone

Model Number: NEN-LX3

Report No.: SYBH(Z-RF)20201128017001-2001

FCC ID：2ATEYNEN-LX3

Authorized	Name	Date
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※ ※ Notice ※ ※

1. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01

2. The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.

3. The laboratory has been recognized by the Innovation, Science and Economic Development Canada (ISED) to test to Canadian radio equipment requirements. The CAB identifier is CN0003, and the ISED# is 21741.

4. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.

5. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

6. The test report is invalid if there is any evidence of erasure and/or falsification.

7. The test report is only valid for the test samples.

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9. If any question about this report, please contact the laboratory (PublicGCTC@huawei.com).

MODIFICATION RECORD

No.	Report No	Modification Description
1	SYBH(Z-RF) 20201128017001-2001	First release.

DECLARATION

Type	Description
Multiple Models Applications	☒ The present report applies to single model. ☐ The present report applies to several models. The practical measurements are performed with the model. The present report only presents the worst test case of all modes, see relevant test results for detailed.

1 Table of contents

2 General Information

2.1 Test standard/s

Applied Rules :	47 CFR FCC Part 02 47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90
Test Method :	FCC KDB 971168 D01 Power Meas License Digital Systems v03r01 ANSI C63.26

2.2 Test Environment

Temperature :	TN	15 to 30	°C during room temperature tests	
Ambient Relative Humidity:	25 to 75 %			
Atmospheric Pressure:	Not applicable			
Power supply :	VL	3.6	V	DC by Battery
	VN	3.87	V	
	VH	4.45	V	

NOTE: 1) VN= nominal voltage, VL= low extreme test voltage, VH= High extreme test voltage;

TN= normal temperature, TL= low extreme test temperature, TH= High extreme test temperature.

NOTE: 2) The values used in the test report may be stringent than the declared.

2.3 Test Laboratories

Test Location 1 :	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Address of Test Location 1 :	No.2, New City Avenue, Songshan Lake Sci. & Tech. Industry Park, Dongguan, 523808, P.R.C
Temperature of Test Location 1 :	25℃
Relative humidity of Test Location 1 :	55 %

2.4 Applicant and Manufacturer

Company Name :	Huawei Device Co., Ltd.
Address :	No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China

2.5 Application details

2.5.1 Current Test Project/Report

Date of Receipt Sample:	2021-01-18
Start of test:	2021-01-19
End of test:	2021-03-02

3 Test Summary

3.1 Cellular Band (824-849 MHz paired with 869-894 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913	FCC: ERP ≤ 7 W.	Appendix A	Pass	Test Location 1
Peak-Average Ratio	---	Limit≤13 dB	Appendix B	Pass	Test Location 1
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass	Test Location 1
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass	Test Location 1
Band Edges Compliance	§2.1051, §22.917	FCC: ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. _____ Note 1): EBW is -26 dBc EBW.	Appendix E	Pass	Test Location 1
Spurious Emission at Antenna Terminals	§2.1051, §22.917	FCC: ≤ -13 dBm/RefBW, from max(lowest internal frequency, 9 kHz) to min(10 * highest fundamental frequency, 40 GHz), after 1 MHz bands immediately outside and adjacent to the frequency block. (RefBW: ≥100 kHz for frequency below 1 GHz, and =1 MHz above 1 GHz)	Appendix F	Pass	Test Location 1
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: ≤ -13 dBm/RefBW, from max(lowest internal frequency, 9 kHz) to min(10 * highest fundamental frequency, 40 GHz), after 1 MHz bands immediately outside and adjacent to the frequency block. (RefBW: ≥100 kHz for frequency below 1 GHz, and =1 MHz above 1 GHz)	Appendix G	Pass	Test Location 1
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm	Appendix H	Pass	Test Location 1

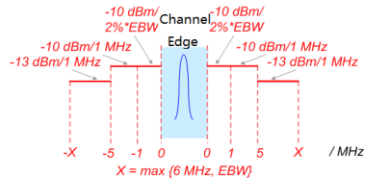
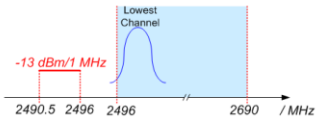
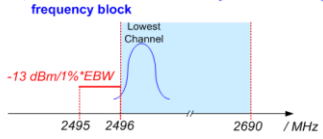
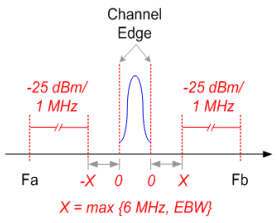
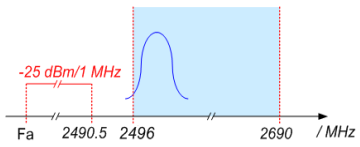
3.2 PCS Band (1850-1915 MHz paired with 1930-1995 MHz)

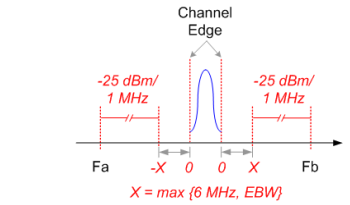
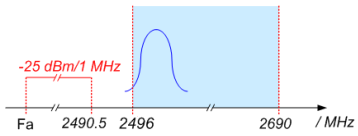
Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232	EIRP ≤ 2 W	Appendix A	Pass	Test Location 1
Peak-Average Ratio	§2.1046, §24.232	Limit≤13 dB	Appendix B	Pass	Test Location 1
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass	Test Location 1
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass	Test Location 1
Band Edges Compliance	§2.1051, §24.238	FCC:≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. _____ Note 1): EBW is -26 dBc EBW.	Appendix E	Pass	Test Location 1
Spurious Emission at Antenna Terminals	§2.1051, §24.238	FCC: ≤ -13 dBm/1 MHz, from max(lowest internal frequency, 9 kHz) to min(10 * highest fundamental frequency, 40 GHz) but outside authorized operating frequency blocks. ISED: ≤ -13 dBm/1 MHz, from max(min(lowest internal frequency, 30 MHz), 9 kHz) to min(10 * highest fundamental frequency, 40 GHz) but outside authorized operating frequency blocks.	Appendix F	Pass	Test Location 1
Field Strength of Spurious Radiation	§2.1053, §24.238	FCC: ≤ -13 dBm/1 MHz, from max(lowest internal frequency, 9 kHz) to min(10 * highest fundamental frequency, 40 GHz) but outside authorized operating frequency blocks.	Appendix G	Pass	Test Location 1
Frequency Stability	§2.1055, §24.235	FCC:Within authorized bands of operation/frequency block.	Appendix H	Pass	Test Location 1

3.3 AWS Band (1710-1780 MHz paired with 2110-2180 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)	EIRP ≤ 1 W	Appendix A	Pass	Test Location 1
Peak-Average Ratio	§2.1046, §27.50(d)	Limit≤13 dB	Appendix B	Pass	Test Location 1
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass	Test Location 1
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass	Test Location 1
Band Edges Compliance	§2.1051, §27.53(h)	FCC:≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. _____ Note 1): EBW is -26 dBc EBW.	Appendix E	Pass	Test Location 1
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	FCC: ≤ -13 dBm/1 MHz, from max(lowest internal frequency, 9 kHz) to min(10 * highest fundamental frequency, 40 GHz) but outside authorized operating frequency ranges.	Appendix F	Pass	Test Location 1
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	FCC: ≤ -13 dBm/1 MHz, from max(lowest internal frequency, 9 kHz) to min(10 * highest fundamental frequency, 40 GHz) but outside authorized operating frequency ranges.	Appendix G	Pass	Test Location 1
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Appendix H	Pass	Test Location 1

3.4 BRS&EBS Band (2496-2690 MHz paired with 2496-2690 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)	EIRP ≤ 2W	Appendix A	Pass	Test Location 1
Peak-Average Ratio	§27.50(a)	Limit≤13 dB	Appendix B	Pass	Test Location 1
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass	Test Location 1
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass	Test Location 1
Band Edges Compliance	§2.1051, §27.53(m4)	FCC:  AND  AND, if 2495-2496MHz is immediately outside and adjacent to the frequency block  Note 1): EBW is -26 dBc EBW.	Appendix E	Pass	Test Location 1
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	FCC:  AND  Fa = max(lowest internal frequency, 9 kHz) Fb = min(10 * highest fundamental frequency, 40 GHz) Note 1): EBW is -26 dBc EBW. Note 2): MeasFrom: max(lowest internal	Appendix F	Pass	Test Location 1

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
		frequency, 9 kHz). Note 3): MeasTo: min(10 * highest fundamental frequency, 40 GHz).			
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	FCC:  AND  Fa = max(lowest internal frequency, 9 kHz) Fb = min(10 * highest fundamental frequency, 40 GHz) _____ Note 1): EBW is -26 dBc EBW. Note 2): MeasFrom: max(lowest internal frequency, 9 kHz). Note 3): MeasTo: min(10 * highest fundamental frequency, 40 GHz).	Appendix G	Pass	Test Location 1
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Appendix H	Pass	Test Location 1

3.5 MBS Lower 700 MHz band (698-716MHz paired with 728-746 MHz)

Test Item	FCC Rule No	Requirements	Test Result	Verdict	Testing location
Effective (Isotropic) Radiated Power Output Data	§27.50(c)	FCC: ERP ≤ 3 W.	Appendix A	Pass	Test Location 1
Peak-Average Ratio	§2.1046, §27.50(c)	Limit≤13 dB	Appendix B	Pass	Test Location 1
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass	Test Location 1
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass	Test Location 1
Band Edges Compliance	§2.1051, §27.53(g)	≤ -13 dBm/30 kHz, in 100 kHz bands immediately outside and adjacent to the frequency blocks.	Appendix	Pass	Test Location 1
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix F	Pass	Test Location 1
Field Strength of Spurious Radiation	§2.1051, §27.53(g)	≤ -13 dBm/100 kHz.	Appendix G	Pass	Test Location 1
Frequency Stability	§2.1055, §27.54	Within authorized bands of operation/frequency block.	Appendix H	Pass	Test Location 1

3.6 Band (814-824 MHz paired with 859-869MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
Transmitter Conducted Power Output	§2.1046, §90.635	< 100 W.	Appendix A	PASS	Test Location 1
Peak-Average Ratio	---	Limit≤13 dB	Appendix B	PASS	Test Location 1
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	PASS	Test Location 1
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	PASS	Test Location 1
Band Edges Compliance	§2.1051, §90.691	< 50 + 10Log10(P[Watts]]) at Band Edge and for all out-of-band emissions wthin 37.5kHz of Block Edge	Appendix E	PASS	Test Location 1
Spurious Emission at Antenna Terminals	§2.1051, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions	Appendix F	PASS	Test Location 1
Field Strength of Spurious Radiation	§2.1053, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions	Appendix G	PASS	Test Location 1
Frequency Stability	§2.1055, §90.213	< ±2.5ppm.	Appendix H	PASS	Test Location 1

4 Description of the Equipment under Test (EUT)

4.1 General Description

NEN-LX3 is subscriber equipment in the GSM/WCDMA/LTE system. The GSM frequency bands include GSM850, GSM900, DCS1800 and PCS1900. The UMTS frequency band includes band I, band II, band IV, band V and band VIII. The LTE frequency bands include band 1,band 2,band 3,band 4,band 5,band 7,band 8,band 12,band 17,band 26,band 28 and band 66. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS, Wi-Fi etc. Externally it provides earphone port (to provide voice service), and dual SIM/single SIM card interface. NEN-LX3 is dual/single SIM smart phone. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

Note1: Only GSM850 and PCS1900 and UMTS frequency Band II and Band IV and Band V and LTE frequency B2 and B4 and B5 and B7 and B12 and B17 and B26 and B66 test data include in this report.

4.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

4.2.1 Board

Board		
Description	Software Version	Hardware Version
Main Board	11.0.1.103(C900E48R1P2)	HL1NTNM

4.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-110600E02	Huawei Device Co., Ltd.	Input voltage: 100-240Vac, 50/60Hz,1.8A Output voltage: 5V2A/10V4A/11V6A max
Adapter	HW-110600B02	Huawei Device Co., Ltd.	Input voltage: 100-240Vac, 50/60Hz,1.8A Output voltage: 5V2A/10V4A/11V6A max
Adapter	HW-110600U02	Huawei Device Co., Ltd.	Input voltage: 100-240Vac, 50/60Hz,1.8A Output voltage: 5V2A/10V4A/11V6A max
Adapter	HW-110600A02	Huawei Device Co., Ltd.	Input voltage: 100-240Vac, 50/60Hz,1.8A Output voltage: 5V2A/10V4A/11V6A max
Battery	HB466589EFW	Huawei Device Co., Ltd.	Rated capacity: 4200mAh Nominal Voltage: ⎓ +3.87V Charging Voltage: ⎓ +4.45V

4.3 Technical Specification

NOTE: For the detailed technical descriptions, see the applicant/manufacturer's specifications or user manual.

4.3.1 General Technical Data

Characteristics	Description	
Operating Band for GSM	☒ GSM850:Uplink:824-849MHz,Downlink:869-894MHz ☒ PCS1900:Uplink:1850-1910MHz,Downlink:1930-1990MHz	
Operating Band for WCDMA	☒ BAND II: Uplink 1850-1910MHz,Downlink:1930-1990MHz ☒ BAND IV: Uplink 1710-1755MHz,Downlink:2110-2155MHz ☒ BAND V:Uplink:824-849MHz,Downlink:869-894MHz	
E-UTRA Operating Band for Single Carrier	☒ E-UTRA BAND 2: Uplink:1850-1910MHz,Downlink:1930-1990MHz ☒ E-UTRA BAND 4: Uplink:1710-1755MHz,Downlink:2110-2155MHz ☒ E-UTRA BAND 5:Uplink:824-849MHz,Downlink:869-894MHz ☒ E-UTRA BAND 7:Uplink:2500-2570MHz,Downlink:2620-2690MHz ☒ E-UTRA BAND 12:Uplink:699-716MHz,Downlink:729-746MHz ☒ E-UTRA BAND 17:Uplink:704-716MHz,Downlink:734-746MHz ☒ E-UTRA BAND 26:Uplink:814-849MHz,Downlink:859-894MHz ☒ E-UTRA BAND 66:Uplink:1710-1780MHz,Downlink:2110-2180MHz	
Power Supply	Power Supply Type:	☐ External DC mains, ☒ Battery, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE). ☐ USB ☐ Other_____
	Input Rated Voltage	3.87V
	Operating Voltage Range	3.6V~4.45V
Operating temperature Range	0°C~ +35°C	
Antenna Type	☒ Integral (permanent fixed antenna, which may be built-in, designed as an indispensable part of EUT) ☐ Dedicated (removable antenna supplied with EUT, designed as an indispensable part of EUT)	

4.3.2 Special Technical Data for GSM

Characteristics	Description	
Downlink Frequency (as UE Receiver)	GSM850	869 MHz~894 MHz
	PCS1900	1930 MHz~1990 MHz
Uplink Frequency (as UE Transmitter)	GSM850	824 MHz~849 MHz
	PCS1900	1850 MHz~1910 MHz
GPRS Class	GPRS Multi-slot class [12]	
EDGE Class	EDGE Multi-slot class [12]	
Type of Modulation	GMSK(GSM/GPRS/EGPRS), 8PSK(EGPRS)	
Channel separation	200 kHz	
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO	
UE Power Class for GSM	GSM850	Class 4
	PCS1900	Class 1
Gain	GSM850: -0.6 dBi (per antenna port, max) PCS1900: -3.1 dBi (per antenna port, max)	
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.	
TX Maximum Output Power(ERP/EIRP)	GSM850(ERP): 30.25 dBm GSM1900(EIRP): 26.67 dBm	
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	GSM850:	246KGXW, 245KG7W
	PCS1900:	247KGXW, 250KG7W

4.3.3 Special Technical Data for WCDMA

Characteristics	Description	
Downlink Frequency (as UE Receiver)	BAND II	1930 MHz~1990 MHz
	BAND IV	2110 MHz~2155 MHz
	BAND V	869 MHz~894 MHz
Uplink Frequency (as UE Transmitter)	BAND II	1850 MHz~1910 MHz
	BAND IV	1710 MHz ~1755 MHz
	BAND V	824 MHz ~849 MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM(only for HSPA+) ☐ 64QAM	
Type of Modulation for downlink	☒ QPSK ☒ 16QAM ☐ 64QAM	

Channel separation:	200 kHz	
State the minimum channel spacing:	5 MHz	
Support Date Service	☒HSDPA ☒HSUPA ☐ DC-HSUPA ☐ UL-OLTD ☐ CL-OLTD	
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO	
UE Power Class for WCDMA	Class 3	
Gain	BAND II : -3.1 dBi (per antenna port, max) BAND IV: -1.0 dBi (per antenna port, max) BAND V: -1.0 dBi (per antenna port, max)	
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.	
TX Maximum Output Power(ERP/EIRP)	BAND II(EIRP) : 20.32 dBm BAND IV(EIRP): 22.10 dBm BAND V(ERP): 21.26 dBm	
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	BAND II:	4M15F9W
	BAND IV:	4M15F9W
	BAND V:	4M13F9W

4.3.4 Special Technical Data for LTE

4.3.4.1 BAND 2

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 2
Downlink Frequency (as UE Receiver)	F_{DL_low}: 1930 MHz F_{DL_high}: 1990 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 1850 MHz F_{UL_high}: 1910 MHz
Channel Bandwidth	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz ☒ 15MHz ☒ 20MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM

Characteristics	Description
	☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
UE Power Class for LTE	Class 3
Gain	-3.1 dBi (per antenna port, max)
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
TX Maximum Output Power(EIRP)	20.28 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	1M11G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M72G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M54G7D (5 MHz QPSK modulation), 4M51W7D (5 MHz 16QAM modulation) 8M99G7D (10 MHz QPSK modulation), 9M00W7D (10 MHz 16QAM modulation) 13M5G7D (15 MHz QPSK modulation), 13M5W7D (15 MHz 16QAM modulation) 17M9G7D (20 MHz QPSK modulation), 18M0W7D (20 MHz 16QAM modulation)

4.3.4.2 BAND 4

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 4
Downlink Frequency (as UE Receiver)	F_{DL_low}: 2110 MHz F_{DL_high}: 2155 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 1710 MHz F_{UL_high}: 1755 MHz
Channel Bandwidth	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz ☒ 15MHz ☒ 20MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO

Characteristics	Description
UE Power Class for LTE	Class 3
Gain	-1.0 dBi (per antenna port, max)
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
TX Maximum Output Power(EIRP)	22.33 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	1M11G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M71G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M54G7D (5 MHz QPSK modulation), 4M52W7D (5 MHz 16QAM modulation) 9M01G7D (10 MHz QPSK modulation), 8M99W7D (10 MHz 16QAM modulation) 13M5G7D (15 MHz QPSK modulation), 13M5W7D (15 MHz 16QAM modulation) 18M0G7D (20 MHz QPSK modulation), 18M0W7D (20 MHz 16QAM modulation)

4.3.4.3 BAND 5

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 5
Downlink Frequency (as UE Receiver)	F_{DL_low}: 869 MHz F_{DL_high}: 894 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 824 MHz F_{UL_high}: 849 MHz
Channel Bandwidth	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
UE Power Class for LTE	Class 3
Gain	-0.6 dBi (per antenna port, max)
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.

Characteristics	Description
TX Maximum Output Power(ERP)	21.43 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	1M11G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M71G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M55G7D (5 MHz QPSK modulation), 4M51W7D (5 MHz 16QAM modulation) 9M00G7D (10 MHz QPSK modulation), 8M98W7D (10 MHz 16QAM modulation)

4.3.4.4 BAND 7

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 7
Downlink Frequency (as UE Receiver)	F_{DL_low}: 2620 MHz F_{DL_high}: 2690 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 2500 MHz F_{UL_high}: 2570 MHz
Channel Bandwidth	☒ 5MHz ☒ 10MHz ☒ 15MHz ☒ 20MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
UE Power Class for LTE	Class 3
Gain	-1.4 dBi (per antenna port, max) Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
TX Maximum Output Power(EIRP)	20.54 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	4M54G7D (5 MHz QPSK modulation), 4M52W7D (5 MHz 16QAM modulation) 8M99G7D (10 MHz QPSK modulation), 8M99W7D (10 MHz 16QAM modulation) 13M5G7D (15 MHz QPSK modulation), 13M5W7D (15 MHz 16QAM modulation) 18M0G7D (20 MHz QPSK modulation), 18M0W7D (20 MHz 16QAM modulation)

4.3.4.5 BAND 12

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 12
Downlink Frequency (as UE Receiver)	F_{DL_low}: 729 MHz F_{DL_high}: 746 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 699 MHz F_{UL_high}: 716 MHz
Channel Bandwidth	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
UE Power Class for LTE	Class 3
Gain	-0.6 dBi (per antenna port, max)
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
TX Maximum Output Power(ERP)	20.91 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	1M11G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M71G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M55G7D (5 MHz QPSK modulation), 4M51W7D (5 MHz 16QAM modulation) 9M02G7D (10 MHz QPSK modulation), 9M00W7D (10 MHz 16QAM modulation)

4.3.4.6 BAND 17

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 17
Downlink Frequency (as UE Receiver)	F_{DL_low}: 734 MHz F_{DL_high}: 746 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 704 MHz F_{UL_high}: 716 MHz

Characteristics	Description
Channel Bandwidth	☒ 5MHz ☒ 10MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
UE Power Class for LTE	Class 3
Gain	-0.6 dBi (per antenna port, max)
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
TX Maximum Output Power(ERP)	20.26 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	4M55G7D (5 MHz QPSK modulation), 4M52W7D (5 MHz 16QAM modulation) 9M02G7D (10 MHz QPSK modulation), 9M01W7D (10 MHz 16QAM modulation)

4.3.4.7 BAND 26

Characteristics	Description	
E-UTRA Operating Band	E-UTRA BAND 26	
Downlink Frequency (as UE Receiver)	F_{DL_low}: 859 MHz F_{DL_high}: 894 MHz	
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 814 MHz F_{UL_high}: 849 MHz	
Channel Bandwidth	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz ☒ 15MHz	
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM	
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO	
UE Power Class for LTE	Class 3	
Gain	-0.6 dBi (per antenna port, max)	
	Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.	
TX Maximum Output Power(ERP)	LTE BAND26(814-824):20.96 dBm LTE BAND26(824-849):21.2 dBm	
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	LTE BAND26: 814-824	1M10G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M71G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M54G7D (5 MHz QPSK modulation), 4M51W7D (5 MHz 16QAM modulation) 8M99G7D (10 MHz QPSK modulation), 8M99W7D (10 MHz 16QAM modulation)
	LTE BAND26: 824-849	1M10G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M71G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M53G7D (5 MHz QPSK modulation), 4M52W7D (5 MHz 16QAM modulation) 8M99G7D (10 MHz QPSK modulation), 9M00W7D (10 MHz 16QAM modulation) 13M5G7D (15 MHz QPSK modulation),

Characteristics	Description	
		13M5W7D (15 MHz 16QAM modulation)

4.3.4.8 BAND 66

Characteristics	Description
E-UTRA Operating Band	E-UTRA BAND 66
Downlink Frequency (as UE Receiver)	F_{DL_low}: 2110 MHz F_{DL_high}: 2180 MHz
Uplink Frequency (as UE Transmitter)	F_{UL_low}: 1710 MHz F_{UL_high}: 1780 MHz
Channel Bandwidth	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz ☒ 15MHz ☒ 20MHz
Type of Modulation for uplink	☒ QPSK ☒ 16QAM ☐ 64QAM
Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
UE Power Class for LTE	Class 3
Gain	-1.0 dBi (per antenna port, max) Remark : When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
TX Maximum Output Power(EIRP)	20.08 dBm
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	1M10G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M71G7D (3 MHz QPSK modulation), 2M71W7D (3 MHz 16QAM modulation) 4M55G7D (5 MHz QPSK modulation), 4M51W7D (5 MHz 16QAM modulation) 8M98G7D (10 MHz QPSK modulation), 8M99W7D (10 MHz 16QAM modulation) 13M5G7D (15 MHz QPSK modulation), 13M5W7D (15 MHz 16QAM modulation) 18M0G7D (20 MHz QPSK modulation), 17M9W7D (20 MHz 16QAM modulation)

5 General Test Conditions / Configurations

5.1 Test Modes

NOTE1: The test mode(s) are selected according to relevant radio technology specifications.

NOTE2: The modulation for WCDMA, HSUPA, HSDPA, DC-HSDPA is the same, which is QPSK, and the WCDMA is the worst, so we test the WCDMA only.

NOTE3: The power of HSPA+ system with 16QAM modulation is lower than that of QPSK, so we did not test 16QAM modulation.

Test Mode	Test Modes Description
GSM/TM1	GSM system, GSM/GPRS, GMSK modulation
GSM/TM2	GSM system, EDGE, 8PSK modulation
UMTS/TM1	WCDMA system, QPSK modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation

5.2 Test Frequency

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM850	TX	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6MHz	848.8MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2MHz	881.6MHz	893.8MHz
WCDMA850	TX	Channel 4132	Channel 4182	Channel 4233
		826.4MHz	836.4MHz	846.6MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4MHz	881.4MHz	891.6MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM1900	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0MHz	1909.8MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz
WCDMA1900	TX	Channel 9262	Channel9400	Channel9538
		1852.4MHz	1880.0MHz	1907.6MHz
	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)
WCDMA1700	TX	Channel1312	Channel1413	Channel1513
		1712.4MHz	1732.6MHz	1752.6MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
	RX	Channel 1537	Channel 1638	Channel 1738
		2112.4 MHz	2132.6 MHz	2152.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 2	TX(1.4M)	Channel 18607	Channel 18900	Channel 19193
		1850.7 MHz	1880 MHz	1909.3 MHz
	TX(3M)	Channel 18615	Channel 18900	Channel 19185
		1851.5 MHz	1880 MHz	1908.5 MHz
	TX(5M)	Channel 18625	Channel 18900	Channel 19175
		1852.5 MHz	1880 MHz	1907.5 MHz
	TX(10M)	Channel 18650	Channel 18900	Channel 19150
		1855 MHz	1880 MHz	1905 MHz
	TX(15M)	Channel 18675	Channel 18900	Channel 19125
		1857.5 MHz	1880 MHz	1902.5 MHz
	TX(20M)	Channel 18700	Channel 18900	Channel 19100
		1860 MHz	1880 MHz	1900 MHz
	RX(1.4M)	Channel 607	Channel 900	Channel 1193
		1930.7 MHz	1960 MHz	1989.3 MHz
	RX(3M)	Channel 615	Channel 900	Channel 1185
		1931.5 MHz	1960 MHz	1988.5 MHz
	RX(5M)	Channel 625	Channel 900	Channel 1175
		1932.5 MHz	1960 MHz	1987.5 MHz
	RX(10M)	Channel 650	Channel 900	Channel 1150

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
		1935 MHz	1960 MHz	1985 MHz
	RX(15M)	Channel 675	Channel 900	Channel 1125
		1937.5 MHz	1960 MHz	1982.5 MHz
	RX(20M)	Channel 700	Channel 900	Channel 1100
		1940 MHz	1960 MHz	1980 MHz

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

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
	RX(5M)	Channel 1975	Channel 2175	Channel 2375
		2112.5 MHz	2132.5MHz	2152.5 MHz
	RX(10M)	Channel 2000	Channel 2175	Channel 2350
		2115 MHz	2132.5MHz	2150 MHz
	RX(15M)	Channel 2025	Channel 2175	Channel 2325
		2117.5 MHz	2132.5MHz	2147.5 MHz
	RX(20M)	Channel 2050	Channel 2175	Channel 2300
		2120 MHz	2132.5MHz	2145 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 66	TX(1.4M)	Channel 131979	Channel 132322	Channel 132665
		1710.7 MHz	1745 MHz	1779.3 MHz
	TX(3M)	Channel 131987	Channel 132322	Channel 132657
		1711.5 MHz	1745 MHz	1778.5 MHz
	TX(5M)	Channel 131997	Channel 132322	Channel 132647
		1712.5 MHz	1745 MHz	1777.5 MHz
	TX(10M)	Channel 132022	Channel 132322	Channel 132622
		1715 MHz	1745 MHz	1775MHz
	TX(15M)	Channel 132047	Channel 132322	Channel 132597
		1717.5 MHz	1745 MHz	1772.5 MHz
	TX(20M)	Channel 132072	Channel 132322	Channel 132572
		1720 MHz	1745 MHz	1770 MHz
	RX(1.4M)	Channel 66443	Channel 66786	Channel 67129

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
		2110.7 MHz	2145 MHz	2179.3 MHz
	RX(3M)	Channel 66451	Channel 66786	Channel 67121
		2111.5 MHz	2145 MHz	2178.3 MHz
	RX(5M)	Channel 66461	Channel 66786	Channel 67111
		2112.5 MHz	2145 MHz	2177.5 MHz
	RX(10M)	Channel 66486	Channel 66786	Channel 67086
		2115 MHz	2145 MHz	2175 MHz
	RX(15M)	Channel 66511	Channel 66786	Channel 67061
		2117.5 MHz	2145 MHz	2172.5 MHz
	RX(20M)	Channel 66536	Channel 66786	Channel 67036
		2120 MHz	2145 MHz	2170 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 5	TX(1.4M)	Channel 20407	Channel 20525	Channel 20643
		824.7 MHz	836.5 MHz	848.3 MHz
	TX(3M)	Channel 20415	Channel 20525	Channel 20635
		825.5 MHz	836.5 MHz	847.5 MHz
	TX(5M)	Channel 20425	Channel 20525	Channel 20625
		826.5 MHz	836.5 MHz	846.5 MHz
	TX(10M)	Channel 20450	Channel 20525	Channel 20600
		829 MHz	836.5 MHz	844 MHz
	RX(1.4M)	Channel 2407	Channel 2525	Channel 2643
		869.7 MHz	881.5 MHz	893.3 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
	RX (3M)	Channel 2415	Channel 2525	Channel 2635
		870.5 MHz	881.5 MHz	892.5 MHz
	RX(5M)	Channel 2425	Channel 2525	Channel 2625
		871.5 MHz	881.5 MHz	891.5 MHz
	RX (10M)	Channel 2450	Channel 2525	Channel 2600
		874 MHz	881.5 MHz	889 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 7	TX (5M)	Channel 20775	Channel 21100	Channel 21425
		2502.5 MHz	2535 MHz	2567.5 MHz
	TX (10M)	Channel 20800	Channel 21100	Channel 21400
		2505 MHz	2535 MHz	2565 MHz
	TX (15M)	Channel 20825	Channel 21100	Channel 21375
		2507.5 MHz	2535 MHz	2562.5 MHz
	TX (20M)	Channel 20850	Channel 21100	Channel 21350
		2510 MHz	2535 MHz	2560 MHz
	RX (5M)	Channel 2775	Channel 3100	Channel 3425
		2622.5 MHz	2655 MHz	2687.5 MHz
	RX (10M)	Channel 2800	Channel 3100	Channel 3400
		2625 MHz	2655 MHz	2685 MHz
	RX (15M)	Channel 2825	Channel 3100	Channel 3375
		2627.5 MHz	2655 MHz	2682.5 MHz
	RX (20M)	Channel 2850	Channel 3100	Channel 3350

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
		2630 MHz	2655 MHz	2680 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 12	TX(1.4M)	Channel 23017	Channel 23095	Channel 23173
		699.7 MHz	707.5 MHz	715.3 MHz
	TX(3M)	Channel 23025	Channel 23095	Channel 23165
		700.5 MHz	707.5 MHz	714.5 MHz
	TX(5M)	Channel 23035	Channel 23095	Channel 23155
		701.5 MHz	707.5 MHz	713.5 MHz
	TX(10M)	Channel 23060	Channel 23095	Channel 23130
		704 MHz	707.5 MHz	711 MHz
	RX(1.4M)	Channel 5017	Channel 5095	Channel 5173
		729.7 MHz	737.5 MHz	745.3 MHz
	RX (3M)	Channel 5025	Channel 5095	Channel 5165
		730.5 MHz	737.5 MHz	744.5 MHz
	RX(5M)	Channel 5035	Channel 5095	Channel 5155
		731.5 MHz	737.5 MHz	743.5 MHz
	RX (10M)	Channel 5060	Channel 5095	Channel 5130
		734 MHz	737.5 MHz	741 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 17	TX (5M)	Channel 23755	Channel 23790	Channel 23825

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
		706.5 MHz	710 MHz	713.5 MHz
	TX (10M)	Channel 23780	Channel 23790	Channel 23800
		709 MHz	710 MHz	711 MHz
	RX (5M)	Channel 5755	Channel 5790	Channel 5825
		736.5 MHz	740 MHz	743.5 MHz
	RX (10M)	Channel 5780	Channel 5790	Channel 5800

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE Band 26 (814 to 824 MHz)	TX (1.4M)	Channel 26697	Channel 26740	Channel 26783
		814.7 MHz	819 MHz	823.3 MHz
	TX (3M)	Channel 26705	Channel 26740	Channel 26775
		815.5 MHz	819 MHz	822.5 MHz
	TX (5M)	Channel 26715	Channel 26740	Channel 26765
		816.5 MHz	819 MHz	821.5 MHz
	TX (10M)	Channel 26740	Channel 26740	Channel 26740
		819 MHz	819 MHz	819 MHz
	RX (1.4M)	Channel 8697	Channel 8740	Channel 8783
		859.7 MHz	864 MHz	868.3 MHz
	RX (3M)	Channel 8705	Channel 8740	Channel 8765
		860.5 MHz	864 MHz	867.5 MHz
	RX (5M)	Channel 8715	Channel 8740	Channel 8765
		861.5 MHz	864 MHz	866.5 MHz
	RX (10M)	Channel 8740	Channel 8740	Channel 8740

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
		864 MHz	864 MHz	864 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE Band 26 (824 to 849 MHz)	TX (1.4M)	Channel 26797	Channel 26915	Channel 27033
		824.7 MHz	836.5 MHz	848.3 MHz
	TX (3M)	Channel 26805	Channel 26915	Channel 27025
		825.5 MHz	836.5 MHz	847.5 MHz
	TX (5M)	Channel 26815	Channel 26915	Channel 27015
		826.5 MHz	836.5 MHz	846.5 MHz
	TX (10M)	Channel 26840	Channel 26915	Channel 26990
		829 MHz	836.5 MHz	844 MHz
	TX (15M)	Channel 26865	Channel 26915	Channel 26965
		831.5 MHz	836.5 MHz	841.5 MHz
	RX (1.4M)	Channel 8697	Channel 8915	Channel 9033
		859.7 MHz	881.5 MHz	893.3 MHz
	RX (3M)	Channel 8805	Channel 8915	Channel 9025
		860.5 MHz	881.5 MHz	892.5 MHz
	RX (5M)	Channel 8815	Channel 8915	Channel 9015
		871.5 MHz	881.5 MHz	891.5 MHz
	RX (10M)	Channel 8840	Channel 8915	Channel 8990
		874 MHz	881.5 MHz	889 MHz
	RX (15M)	Channel 8865	Channel 8915	Channel 8965
		876.5 MHz	881.5 MHz	886.5 MHz

5.3 DESCRIPTION OF TESTS

5.3.1 Radiated Power and Radiated Spurious Emissions

Radiated spurious emissions are investigated indoors in a full-anechoic chamber to determine the frequencies producing the worst case emissions. Final measurements for radiated power and radiated spurious emissions are performed on the 3 meter OATS per the guidelines of ANSI/TIA-603-E-2016. The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 150cm above the ground plane and 3 meters from the receive antenna. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Emissions are also investigated with the receive antenna horizontally and vertically polarized.
A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.
A half-wave dipole is then substituted in place of the EUT. For emissions above 3GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT.

The power of the emission is calculated using the following formula:

Pd [dBm] = Pg [dBm] – cable loss [dB] + antenna gain [dBd/dBi]

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]).

Test Procedures Used

KDB 971168 D01 v03-Section 5

ANSI/TIA-603-E-2016-Section 2.2.17 / ANSI/TIA-603-E-2016-Section 2.2.12

Note: Reference test setup 3

5.3.2 Peak-Average Ratio

A peak to average ratio measurement is performed at the conducted port of the EUT. 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.

Test Procedures Used

KDB 971168 D01 v03-Section 5.7.2

Test Settings

1、The signal analyzer's CCDF measurement profile enabled

2、Frequency= carrier center frequency

3、Measurement BW > EBW of signal

4、for continuous transmissions, set to 1ms

5、Record the maximum PAPR level associated with a probability of 0.1%.

Note: Reference test setup 1

5.3.3 Occupied Bandwidth

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 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.

Test Procedures Used

KDB 971168 D01 v03-Section 4.3

Test Settings

1、SET RBW=1-5% of OBW

2、SET VBW ≥ 3*RBW

3、Detector: Peak

4、Trace mode= max hold.

5、Sweep= auto couple

6、Steps 1-5 were repeated after it is stable

Note: Reference test setup 1.

5.3.4 Band Edge Compliance

The test complies with the requirements in clause 2 of the present report according to test procedures in KDB 971168 D01 v03-Section 6 with corresponding test settings.

Note: Reference test setup 1.

5.3.5 Spurious and Harmonic Emissions at Antenna Terminal

The test complies with the requirements in clause 2 of the present report according to test procedures in KDB 971168 D01 v03-Section 6 with corresponding test settings.

Note: Reference test setup 1.

5.3.6 Frequency Stability / Temperature Variation

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. 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.

Test Procedures Used

ANSI/TIA-603-E-2016

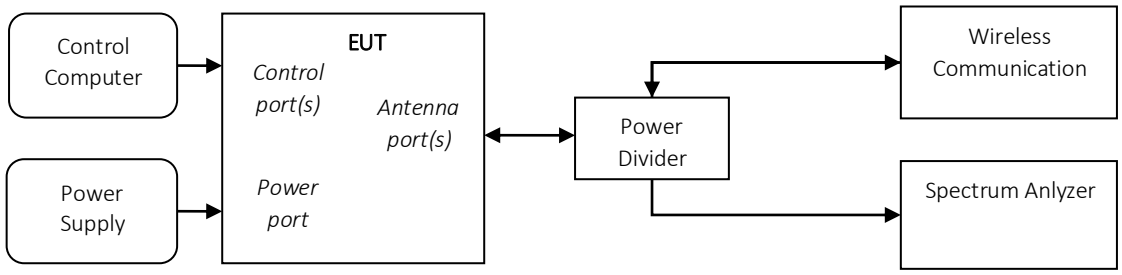
Note: Reference test setup 2.

5.4 Test Setups

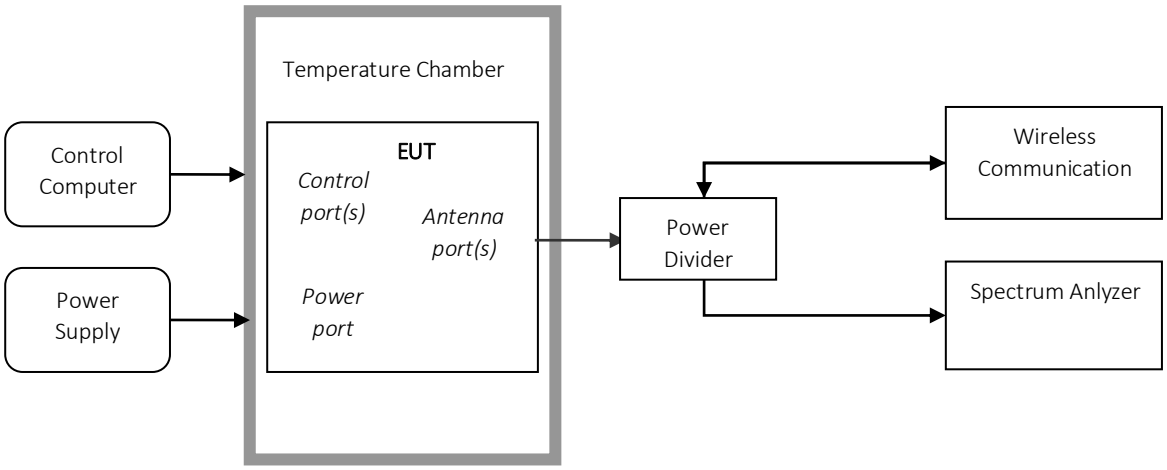
5.4.1 General Test Setup Configurations

Configuration	Description
Test Antenna Port	Until declared, all Transmitter tests are performed at TRX port of the EUT
Multiple RF Source	Other RF sources or functions of the EUT are disabled during testing for RF source.
Sensors and Antenna	Sensors and Antenna optimization function should be disabled during testing by software method to get the stable maximum power and avoid the influence of uncertain conditions

5.4.2 Test Setup 1



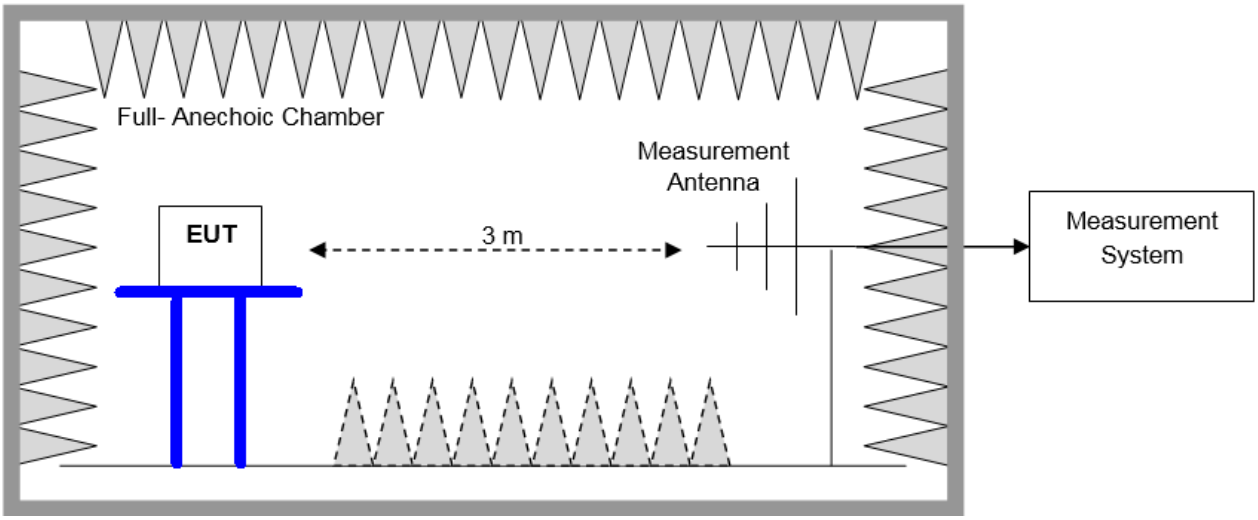
5.4.3 Test Setup 2



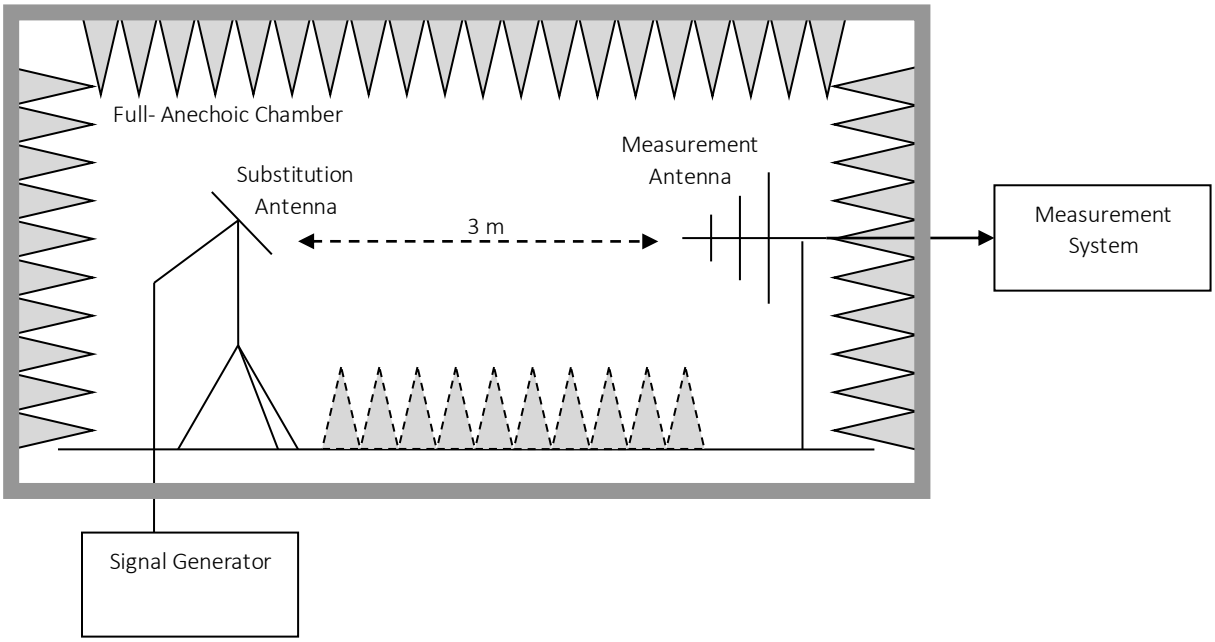
5.4.4 Test Setup 3

NOTE: Effective radiated power (ERP) and Equivalent Isotropic Radiated Power(EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

5.4.4.1 Step 1: Pre-test



5.4.4.2 Step 2: Substitution method to verify the maximum ERP/EIRP



5.5 Test Conditions

Test Case		Test Conditions	
Transmit Output Power Data	Average Power, Total	Test Env.	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	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
	Average Power, Spectral Density (if required)	Test Env.	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	LTE/TM1,LTE/TM2
Peak-to-Average Ratio (if required)		Test Env.	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	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Modulation Characteristics		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Bandwidth	Occupied Bandwidth	Test Env.	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	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
	Emission Bandwidth (if required)	Test Env.	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	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Spurious Emission at Antenna Terminals		Test Env.	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 Case	Test Conditions	
	Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Field Strength of Spurious Radiation	Test Env.	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 3
	Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2 NOTE: 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 Env.	(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 2
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2

6 Main Test Instruments

6.1 Current Test Project/Report

Main Test Equipments(GSM/WCDMA/LTE test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Temperature Chamber	WEISS	WKL64	56246002940010	2020/11/02	2021/11/01
Universal Radio Communication Tester	R&S	CMW500	164698	2020/07/02	2021/07/01
Spectrum Analyzer	Agilent	N9020A	MY52090652	2020/11/09	2021/11/08
Spectrum Analyzer	Keysight	N9040B	MY57212529	2020/11/09	2021/11/08
Signal generator	Agilent	E8257D	MY49281095	2020/07/02	2021/07/01
Vector Signal Generator	R&S	SMW200A	103447	2020/11/10	2021/11/09

Main Test Equipments(RSE test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Universal Radio Communication Tester	R&S	CMU200	123299	2020/11/10	2021/11/09
Universal Radio Communication Tester	R&S	MT8821C	6261806786	2020/09/25	2021/09/24
Spectrum analyzer	R&S	FSW8	104470	2020/11/09	2021/11/08
Spectrum analyzer	R&S	FSW43	104070	2020/11/09	2021/11/08
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	001157	2019/03/11	2021/03/10
Double-Ridged Waveguide Horn Antenna (3G~18GHz)	SCHWARZBECK	BBHA 9120D	01931	2019/03/22	2021/03/21
Pyramidal Horn Antenna(18GHz-40GHz)	SCHWARZBECK	BBHA 9170	00863	2019/03/30	2021/03/29
Software Information					
Test Item	Software Name		Manufacturer		Version
RSE	EMC32		R&S		V8.40.0

Main Test Equipments(RE test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Test receiver	R&S	ESU26	100150	2020/11/06	2021/11/05
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100262	2019/07/05	2021/07/04
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100263	2019/03/15	2021/03/14
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-1330	2020/08/10	2022/08/09
Trilog Broadband Antenna (1GHz~18GHz)	SCHWARZBECK	HF907	100305	2019/03/15	2021/03/14
Trilog Broadband Antenna	SCHWARZB	BBHA 9170	BBHA9170644	2019/10/29	2021/10/28

(18GHz~40GHz)	ECK				
Software Information					
Test Item	Software Name		Manufacturer		Version
RE	EMC32		R&S		V9.25.0

7 Measurement Uncertainty

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

Test Item		Extended Uncertainty
Transmit Output Power Conducted	Power [dBm]	U = 0.38 dB
RF Power Density, Conducted	Power [dBm]	U = 0.66 dB
Bandwidth	Magnitude [kHz]	200kHz: U＝9.06kHz 1.4MHz: U＝9.48kHz 3MHz: U＝10.86kHz 5MHz: U=13.84kHz 10MHz: U=22.32kHz 15MHz: U=31.9kHz 20MHz: U=41.78kHz
Band Edge Compliance	Disturbance Power [dBm]	U = 0.9 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	20MHz~3.6GHz：U＝0.88dB 3.6GHz~8.4GHz：U＝1.08dB 8.4GHz~13.6GHz：U＝1.24dB 13.6GHz~22GHz：U＝1.34dB 22GHz~26.5GHz：U＝1.36dB
Field Strength of Spurious Radiation	ERP/EIRP [dBm]	For 3 m Chamber: U = 3.868 dB (9 kHz to 150 kHz) U = 3.872 dB (150 kHz to 30 MHz) U = 5.42 dB (30 MHz to 3GHz) U = 5.58 dB (3GHz to 18GHz) U = 5.08 dB (18GHz to 40GHz)
Frequency Stability	Frequency Accuracy [Hz]	800MHz: U＝24.08Hz 900MHz: U＝24.54Hz 1900MHz: U＝34.7Hz 2100MHz: U=36.96Hz 2300MHz: U=39.24Hz 2500MHz: U=41.58Hz 2600MHz: U=42.74Hz

8 Appendixes

Appendix No.	Description
SYBH(Z-RF) 20201128017001-2001-A	Appendix_for_GSM
SYBH(Z-RF) 20201128017001-2001-B	Appendix_for_WCDMA
SYBH(Z-RF) 20201128017001-2001-C	Appendix_for_LTE Band_2
SYBH(Z-RF) 20201128017001-2001-D	Appendix_for_LTE Band_4
SYBH(Z-RF) 20201128017001-2001-E	Appendix_for_LTE Band_5
SYBH(Z-RF) 20201128017001-2001-F	Appendix_for_LTE Band_7
SYBH(Z-RF) 20201128017001-2001-G	Appendix_for_LTE Band_12
SYBH(Z-RF) 20201128017001-2001-H	Appendix_for_LTE Band_17
SYBH(Z-RF) 20201128017001-2001-I	Appendix_for_LTE_Band_26(814-824)
SYBH(Z-RF) 20201128017001-2001-J	Appendix_for_LTE_Band_26(824-849)
SYBH(Z-RF) 20201128017001-2001-K	Appendix_for_LTE Band_66

Appendix	Description
Appendix A	Effective (Isotropic) Radiated Power Output Data
Appendix B	Peak-Average Ratio
Appendix C	Modulation Characteristics
Appendix D	Bandwidth
Appendix E	Band Edges Compliance
Appendix F	Spurious Emission at Antenna Terminals
Appendix G	Field Strength of Spurious Radiation
Appendix H	Frequency Stability

END