Certificate Number: 5055.02

TEST REPORT FOR RF TESTING

Report No.: SRTC2021-9004(F)-21042502(C)

Product Name: LTE/WCDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone

Product model: ZTE A2022L

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 2, Part 24E, Part 22H, Part 27 (2020)

FCC ID: SRQ-ZTEA2022L

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District, Beijing, P.R.China

Tel: 86-10-57996183 Fax: 86-10-57996388

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1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).The test results relate only to individual items of the samples which have been tested. The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
Tel:	+86 10 57996183
Fax:	+86 10 57996388
Email:	liujiaf@srtc.org.cn

1.3 Applicant's details

Company:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong
City:	Shenzhen
Country or Region:	China
Contacted person:	Gong Yu
Tel:	86-21-68895397
Fax:	---
Email:	gongyu@zte.com.cn

1.4 Manufacturer's details

Company:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong
City:	Shenzhen
Country or Region:	China
Contacted person:	Gong Yu
Tel:	86-21-68895397
Fax:	---
Email:	gongyu@zte.com.cn

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2021-04-25
Testing Start Date:	2021-04-25
Testing End Date:	2021-05-31

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient:	25	40
Maximum Extreme:	55	---
Minimum Extreme:	-10	---

Normal Supply Voltage (V d.c.):	3.8
Maximum Extreme Supply Voltage (V d.c.):	3.6
Minimum Extreme Supply Voltage (V d.c.):	4.2

2 DESCRIPTION OF THE EQUIPMENT UNDER TEST

2.1 Final Equipment Build Status

Frequency Range:	LTE Band 2: Tx:1850~1910MHz Rx:1930~1990MHz LTE Band 4: Tx:1710~1755MHz Rx:2110~2155MHz LTE Band 5: Tx:824~849 MHz Rx:869 ~894MHz LTE Band 7: Tx:2500~2570MHz Rx:2620~2690MHz LTE Band CA_7C: Tx:2500~2570MHz Rx:2620~2690MHz LTE Band 12: Tx:699~716MHz Rx:729~746MHz LTE Band 13: Tx:777~787 MHz Rx:746~756MHz LTE Band 26: Tx:814~849 MHz Rx:859~893MHz LTE Band 66: Tx:1710~1780 MHz Rx:2110~2200MHz
Modulation Type:	QPSK/16QAM/64QAM
Antenna Type:	Fixed Internal Antenna
Antenna Gain:	LTE2: -1.3dBi, LTE4/66: -1.1dBi LTE5/26: -5.1dBi, LTE7/CA_7C:-1.0 dBi LTE12:-7dBi, LTE13:-7.6dBi
Power Supply:	Battery or Charger
Hardware Version:	zj9A
Software Version:	MyOS11.0.Y_A2022L_TEL
IMEI:	864522050001443

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Equipment:	Battery
Manufacturer:	ZTE Corporation
Model Number:	Li3941T44PGh836548
Equipment:	Charger
Manufacturer:	SHENZHEN KUNXING TECHNOLOGY CO., LTD.
Model Number:	FC69U
Equipment:	Headset 1
Manufacturer:	King Power Electronics Co.Ltd.
Model Number:	DEM-66C
Equipment:	Headset 2
Manufacturer:	JUWEI ELECTRONICS CO.,LTD
Model Number:	JWEP1183-Z01R
Equipment:	USB Cable 1
Manufacturer:	Luxshare-ICT Co., Ltd
Model Number:	TC20-TC20-W-100-M-6A-HSF
Equipment:	USB Cable 2
Manufacturer:	King Power Electronics Co., Ltd
Model Number:	TC20-TC20-W-100-M-6A-HSF
Equipment:	Headphone adapter
Manufacturer:	JUWEI ELECTRONICS CO.,LTD
Model Number:	JWUB1389-Z01

2.3 Summary table

FCC Rule Part	Frequency Range (MHz)	EIRP/ ERP (W)	Frequency Tolerance (ppm)	Emission Designator	BW (MHz)	Measured 26dBC Bandwidth (MHz)	Communication Type
LTE BAND2							
24E	1850.7-1909.3	0.187	-0.021	1M09G7D	1.4M	1.240	QPSK
	1850.7-1909.3	0.157	-0.021	1M09W7D	1.4M	1.234	16QAM/64QAM
	1851.5-1908.5	0.186	-0.025	2M68G7D	3M	2.996	QPSK
	1851.5-1908.5	0.156	-0.025	2M70W7D	3M	3.022	16QAM/64QAM
	1852.5-1907.5	0.196	0.012	4M47G7D	5M	4.928	QPSK
	1852.5-1907.5	0.166	0.012	4M47W7D	5M	4.928	16QAM/64QAM
	1855-1905	0.200	0.023	8M94G7D	10M	9.682	QPSK
	1855-1905	0.185	0.023	8M99W7D	10M	9.812	16QAM/64QAM
	1857.5-1902.5	0.193	-0.019	13M4G7D	15M	14.718	QPSK
	1857.5-1902.5	0.184	-0.019	13M4W7D	15M	14.783	16QAM/64QAM
	1860-1900	0.191	0.022	17M9G7D	20M	19.363	QPSK
	1860-1900	0.165	0.022	18M0W7D	20M	19.363	16QAM/64QAM
LTE BAND4							
27	1710.7-1754.3	0.164	-0.022	1M09G7D	1.4M	1.234	QPSK
	1710.7-1754.3	0.143	-0.022	1M09W7D	1.4M	1.240	16QAM/64QAM
	1711.5-1753.5	0.166	0.017	2M70G7D	3M	2.983	QPSK
	1711.5-1753.5	0.144	0.017	2M71W7D	3M	2.996	16QAM/64QAM
	1712.5-1752.5	0.157	-0.022	4M47G7D	5M	4.906	QPSK
	1712.5-1752.5	0.128	-0.022	4M47W7D	5M	4.928	16QAM/64QAM
	1715-1750	0.165	-0.028	8M94G7D	10M	9.725	QPSK
	1715-1750	0.148	-0.028	8M94W7D	10M	9.812	16QAM/64QAM
	1717.5-1747.5	0.166	-0.015	13M5G7D	15M	14.783	QPSK
	1717.5-1747.5	0.145	-0.015	13M4W7D	15M	14.913	16QAM/64QAM
	1720-1745	0.163	-0.018	17M9G7D	20M	19.276	QPSK
	1720-1745	0.146	-0.018	17M9W7D	20M	19.276	16QAM/64QAM
LTE BAND5							
22H	824.7-848.3	0.042	-0.037	1M08G7D	1.4M	1.234	QPSK
	824.7-848.3	0.041	-0.037	1M09W7D	1.4M	1.228	16QAM/64QAM
	825.5-847.5	0.041	-0.047	2M68G7D	3M	2.983	QPSK
	825.5-847.5	0.040	-0.047	2M70W7D	3M	3.009	16QAM/64QAM
	826.5-846.5	0.044	-0.044	4M47G7D	5M	4.906	QPSK
	826.5-846.5	0.040	-0.044	4M47W7D	5M	4.906	16QAM/64QAM
	829-844	0.045	-0.034	8M94G7D	10M	9.725	QPSK
	829-844	0.040	-0.034	8M94W7D	10M	9.725	16QAM/64QAM

LTE BAND7							
27	2502.5-2567.5	0.121	0.018	4M47G7D	5M	4.928	QPSK
	2502.5-2567.5	0.099	0.018	4M47W7D	5M	4.906	16QAM/64QAM
	2505-2565	0.127	-0.022	8M94G7D	10M	9.768	QPSK
	2505-2565	0.111	-0.022	8M94W7D	10M	9.768	16QAM/64QAM
	2507.5-2562.5	0.123	0.016	13M5G7D	15M	14.718	QPSK
	2507.5-2562.5	0.104	0.016	13M5W7D	15M	14.783	16QAM/64QAM
	2510-2560	0.129	0.020	18M0G7D	20M	19.450	QPSK
	2510-2560	0.114	0.020	17M9W7D	20M	19.450	16QAM/64QAM
LTE BAND CA_7C							
27	2512.7-2552.8	0.192	---	27M7G7D	10M+20M	29.30	QPSK
	2512.7-2552.8	0.106	---	27M7W7D	10M+20M	29.22	16QAM/64QAM
	2517.2-2557.3	0.195	---	27M7G7D	20M+10M	29.21	QPSK
	2517.2-2557.3	0.108	---	27M7W7D	20M+10M	29.16	16QAM/64QAM
	2513.5-2558.7	0.198	---	23M2G7D	15M+10M	24.59	QPSK
	2513.5-2558.7	0.109	---	23M2W7D	15M+10M	24.53	16QAM/64QAM
	2515-2555	0.196	---	28M4G7D	15M+15M	30.05	QPSK
	2515-2555	0.108	---	28M4W7D	15M+15M	30.00	16QAM/64QAM
	2516.35-2551.45	0.199	---	32M6G7D	15M+20M	34.44	QPSK
	2516.35-2551.45	0.110	---	32M6W7D	15M+20M	34.42	16QAM/64QAM
	2518.55-2553.65	0.200	---	32M6G7D	20M+15M	34.49	QPSK
	2518.55-2553.65	0.110	---	32M7W7D	20M+15M	34.41	16QAM/64QAM
	2519.9-2550.1	0.197	---	37M5G7D	20M+20M	39.63	QPSK
	2519.9-2550.1	0.108	---	37M6W7D	20M+20M	39.65	16QAM/64QAM
LTE BAND12							
27	699.7-715.3	0.026	-0.054	1M09G7D	1.4M	1.234	QPSK
	699.7-715.3	0.023	-0.054	1M09W7D	1.4M	1.240	16QAM/64QAM
	700.5-714.5	0.025	-0.047	2M68G7D	3M	2.996	QPSK
	700.5-714.5	0.024	-0.047	2M71W7D	3M	3.009	16QAM/64QAM
	701.5-713.5	0.025	-0.054	4M47G7D	5M	4.906	QPSK
	701.5-713.5	0.023	-0.054	4M47W7D	5M	4.906	16QAM/64QAM
	704-711	0.025	-0.036	8M94G7D	10M	9.725	QPSK
	704-711	0.022	-0.036	8M99W7D	10M	9.768	16QAM/64QAM
LTE BAND13							
27	779.5-784.5	0.025	0.013	4M47G7D	5M	4.906	QPSK
	779.5-784.5	0.023	0.013	4M47W7D	5M	4.928	16QAM/64QAM
	782	0.024	0.011	8M94G7D	10M	9.725	QPSK
	782	0.023	0.011	8M94W7D	10M	9.812	16QAM/64QAM
LTE BAND26(814-824MHz)							
90	814.7-823.3	0.040	-0.037	1M09G7D	1.4M	1.228	QPSK
	814.7-823.3	0.037	-0.037	1M09W7D	1.4M	1.228	16QAM/64QAM
	815.5-822.5	0.040	-0.034	2M70G7D	3M	2.983	QPSK
	815.5-822.5	0.038	-0.034	2M70W7D	3M	2.996	16QAM/64QAM
	816.5-821.5	0.040	-0.046	4M47G7D	5M	4.906	QPSK
	816.5-821.5	0.038	-0.046	4M49W7D	5M	4.906	16QAM/64QAM
	819	0.038	0.030	8M99G7D	10M	9.725	QPSK
	819	0.037	0.030	8M94W7D	10M	9.725	16QAM/64QAM

LTE BAND26(824-849MHz)							
22H	824.7-848.3	0.042	-0.031	1M09G7D	1.4M	1.228	QPSK
	824.7-848.3	0.041	-0.031	1M09W7D	1.4M	1.228	16QAM/64QAM
	825.5-847.5	0.041	-0.045	2M68G7D	3M	2.996	QPSK
	825.5-847.5	0.040	-0.045	2M70W7D	3M	2.996	16QAM/64QAM
	826.5-846.5	0.043	-0.038	4M47G7D	5M	4.884	QPSK
	826.5-846.5	0.037	-0.038	4M47W7D	5M	4.906	16QAM/64QAM
	829-844	0.042	-0.034	8M99G7D	10M	9.725	QPSK
	829-844	0.039	-0.034	8M94W7D	10M	9.768	16QAM/64QAM
	831.5-841.5	0.042	-0.032	13M4G7D	15M	14.718	QPSK
	831.5-841.5	0.040	-0.032	13M5W7D	15M	14.848	16QAM/64QAM
LTE BAND66							
27	1710.7-1779.3	0.178	-0.019	1M08G7D	1.4M	1.234	QPSK
	1710.7-1779.3	0.142	-0.019	1M09W7D	1.4M	1.234	16QAM/64QAM
	1711.5-1778.5	0.160	-0.019	2M68G7D	3M	3.009	QPSK
	1711.5-1778.5	0.144	-0.019	2M68W7D	3M	3.009	16QAM/64QAM
	1712.5-1777.5	0.165	-0.021	4M47G7D	5M	4.884	QPSK
	1712.5-1777.5	0.140	-0.021	4M49W7D	5M	4.928	16QAM/64QAM
	1715-1775	0.170	-0.031	8M99G7D	10M	9.768	QPSK
	1715-1775	0.125	-0.031	8M94W7D	10M	9.768	16QAM/64QAM
	1717.5-1772.5	0.169	-0.025	13M5G7D	15M	14.783	QPSK
	1717.5-1772.5	0.147	-0.025	13M5W7D	15M	14.783	16QAM/64QAM
	1720-1770	0.173	-0.023	17M9G7D	20M	19.363	QPSK
	1720-1770	0.160	-0.023	17M9W7D	20M	19.450	16QAM/64QAM

3 REFERENCE SPECIFICATION

Specification	Version	Title
FCC Part 2	2020	Frequency allocations and radio treaty matters; general rules and regulations
FCC Part 22	2020	Public mobile services
FCC Part 24	2020	Personal communications services
FCC Part 27	2020	Miscellaneous wireless communications services
ANSI C63.26	2015	American national standard for compliance testing of transmitters used in licensed radio services
KDB 971168 D01	April 9, 2018	Measurement guidance for certification of licensed digital transmitters
TIA-603-E-2016	March 2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

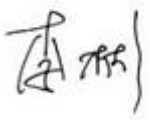
4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
NT	Normal Temperature
NV	Nominal voltage
HV	High voltage
LV	Low voltage

5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)(5), 24.232(c), 27.50(b)(10), 27.50(c)(10), 27.50(h)(2), 27.50(d)(4), 27.50(a)(3),90.635(b)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Peak-Average Ratio	24.232(d), 27.50(d)(5)	Pass
5	Emission Bandwidth	2.1049	Pass
6	Spurious Emissions at antenna terminals	2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a),90.691	Pass
7	Band Edges Compliance	2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a),90.691	Pass
8	Frequency Stability	2.1055, 22.355, 24.235, 27.54.90.213	Pass
9	Radiated Spurious Emissions	2.1053, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(f), 27.53(a), 27.53(m),90.691	Pass

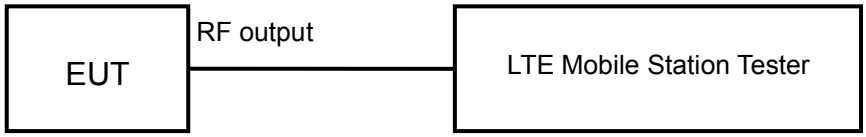
This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. Tong Daocheng 	Issued date: 20210531

6 TEST RESULT

6.1 RF Power Output

Rule Part(s)
FCC: 2.1046

Test Setup:



Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

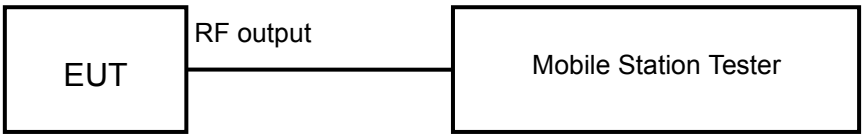
Limits: No RF Power Output requirements in part 2.1046.

Test result:
The test results are shown in Appendix A.

6.2 Effective Radiated Power and Effective Isotropic Radiated Power

Rule Part(s)
FCC: 22.913(a) (5), 24.232(c), 27.50(b) (10), 27.50(c) (10), 27.50(h) (2), 27.50(d) (4), 27.50(a) (3), 90.635(b)

Test setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 5.6
Test Settings
Subclause 5.2.5.5 of ANSI C63.26-2015 is applicable, along with the following provisions. For personal/portable radios utilizing an integral antenna, the factor LC is typically negligible. However, in a fixed station transmit system that utilizes a long cable run between the transmitter and the transmitting antenna, this factor can be significant. The minimum cable loss should be used in this equation.
The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:
ERP/EIRP = PMeas – LC + GT
Where:
ERP/EIRP = effective or equivalen radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm)
PMeas = measured transmitter output power or PSD, in dBW or dBm
LC = signal attenuation in the connecting cable between the transmitter and antenna in dB
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)
ERP/EIRP LIMIT
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).
22.913(a) (5)
The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
24.232(c)
Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
27.50(b) (10)
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.
27.50(c) (10)
Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
27.50(h) (2)
Mobile and other user stations.Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
27.50(d) (4)
Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and

mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

27.50(a) (3)

Mobile and portable stations (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.

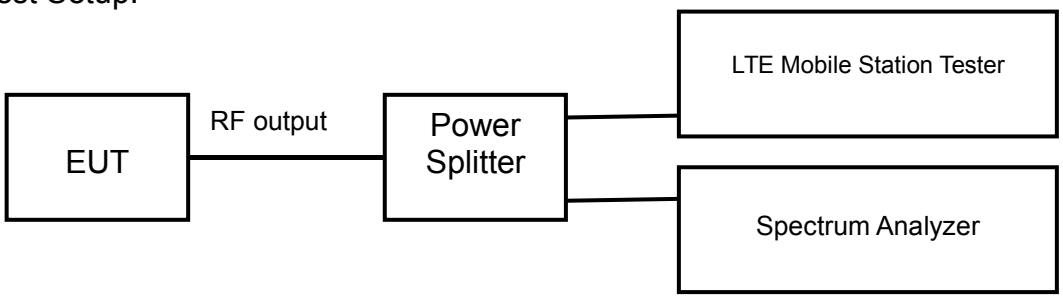
Test result:

The test results are shown in Appendix B.

6.3 Occupied Bandwidth

Rule Part(s)
FCC: 2.1049

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 4.2

Test Setting:
1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied 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

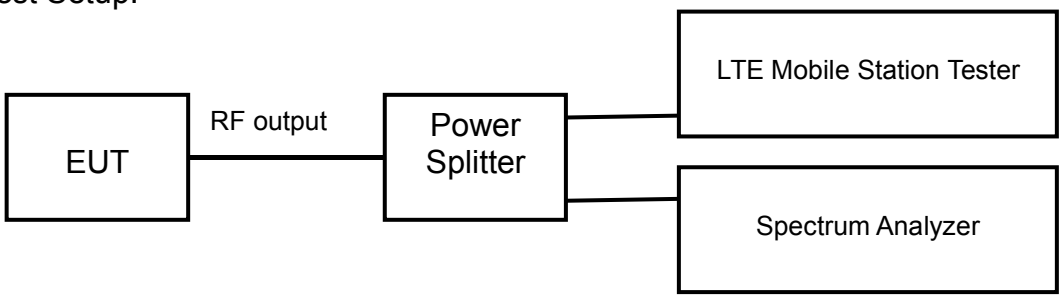
Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:
The test results are shown in Appendix A.

6.4 Emission Bandwidth

Rule Part(s)
FCC: 2.1049

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 4.2

Test Setting:

1. The signal analyzer's automatic bandwidth measurement capability was used to perform 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 26dB bandwidth observed in Step 7

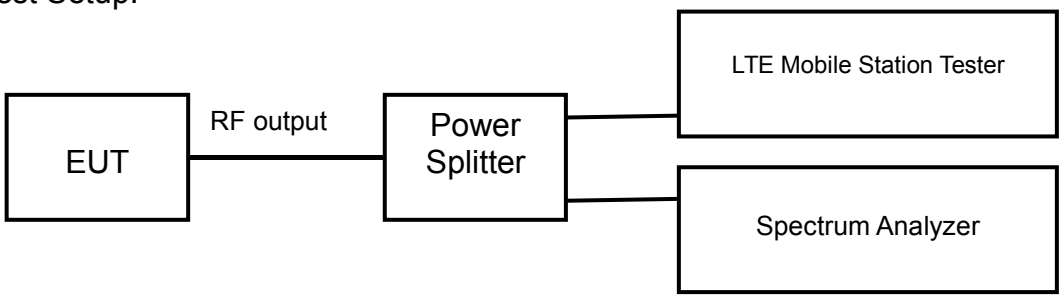
Limits: No specific emission bandwidth requirements in part 2.1049.

Test result:
The test results are shown in Appendix A.

6.5 Peak-Average Ratio

Rule Part(s)
FCC: 24.232(d), 27.50(d) (5)

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 5.7.1

Test Setting:
1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW ≥ OBW or specified reference bandwidth
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

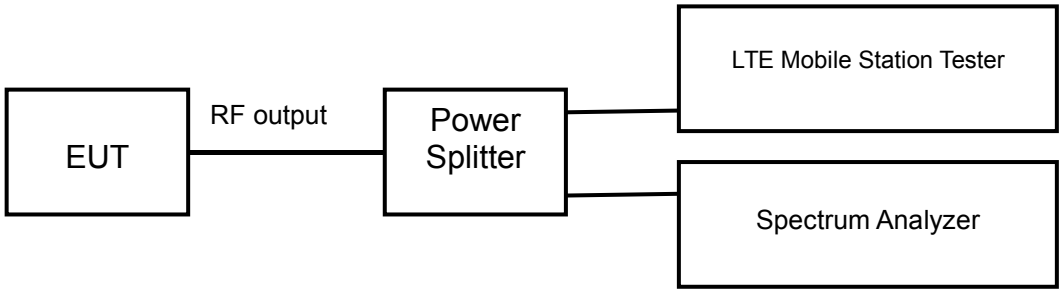
Limits
24.232(d), 27.50(d) (5)
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test result:
The test results are shown in Appendix A.

6.6 Spurious Emissions at antenna terminal

Rule Part(s)
FCC: 2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a), 90.691

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 6.0

Test Setting:
1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency
2. Detector = RMS
3. RBW=1MHz
4. VBW=3MHz
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. Sweep time = auto couple
7. The trace was allowed to stabilize

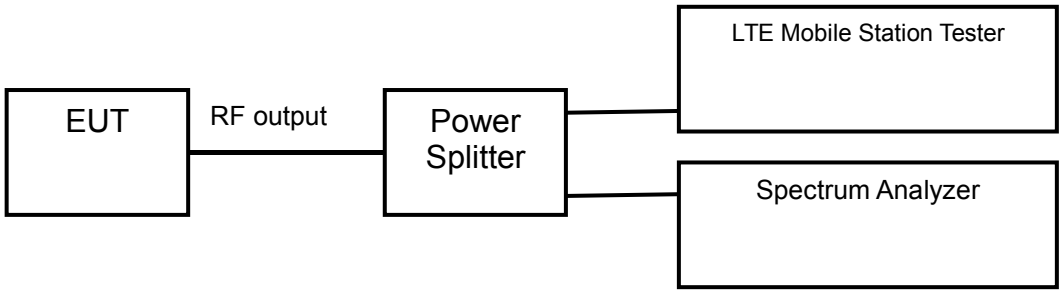
Limits
The minimum permissible attenuation level of any spurious emission is 43 + log10 (P [Watts]), where P is the transmitter power in Watts.
For Band 30, the minimum permissible attenuation level of any spurious emission <2288MHz and >2365MHz is 70 + log10 (P [Watts]).
For Band 7 and 41, the minimum permissible attenuation level of any spurious emission is 55 + log10 (P [Watts]).

Test result:
The test results are shown in Appendix A.

6.7 Band Edges Compliance

Rule Part(s)
FCC: 2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a), 90.691

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 6.0

Test Setting:
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Limits
The minimum permissible attenuation level of any spurious emission is 43 + log10 (P [Watts]), where P is the transmitter power in Watts.
The minimum permissible attenuation level for Band 30 is > 43 + 10log10 (P [Watts] at 2300-2305MHz & 2345-2360MHz, > 55 + 10log10 (P [Watts]) at 2320-2324MHz & 2341-2345MHz, > 61 + 10log10 (P [Watts]) at 2324-2328MHz & 2337-2341MHz, > 67 + 10log10 (P [Watts]) at 2288-2292MHz & 2328- 2337MHz, and > 70 + 10log10 (P [Watts]) at frequencies < 2288MHz &>2365MHz.
Per 22.917(b) 24.238(a) 27.53(h) 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 to demonstrate compliance with the out-of-band emissions limit. 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.
Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

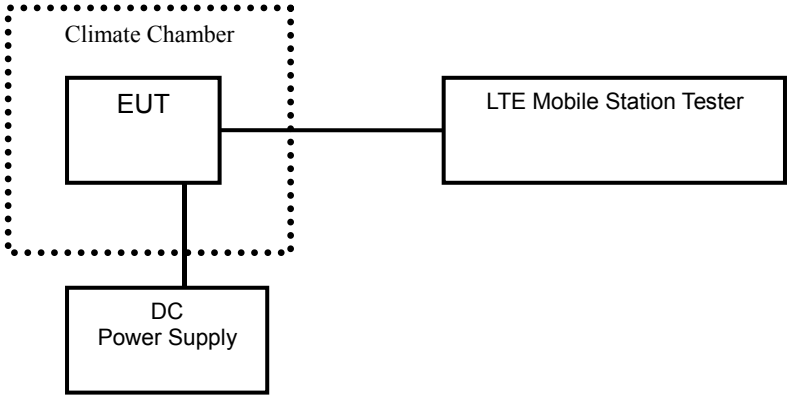
Per 27.53(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is 65 + 10log10(P) = -35dBm in a 6.25kHz bandwidth.
Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). 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 emissions are attenuated at least 26 dB below the transmitter power.
Per 27.53(m) for operations in the BRS/EBS bands, 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. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5MHz.

Test result:
The test results are shown in Appendix A.

6.8 Frequency Stability

Rule Part(s)
FCC: 2.1055, 22.355, 24.235, 27.54,90.213

Test setup:



Test Procedure:
ANSI/TIA-603-E-2016

Test Settings
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 (The temperature range can be declared by the manufacturer). A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

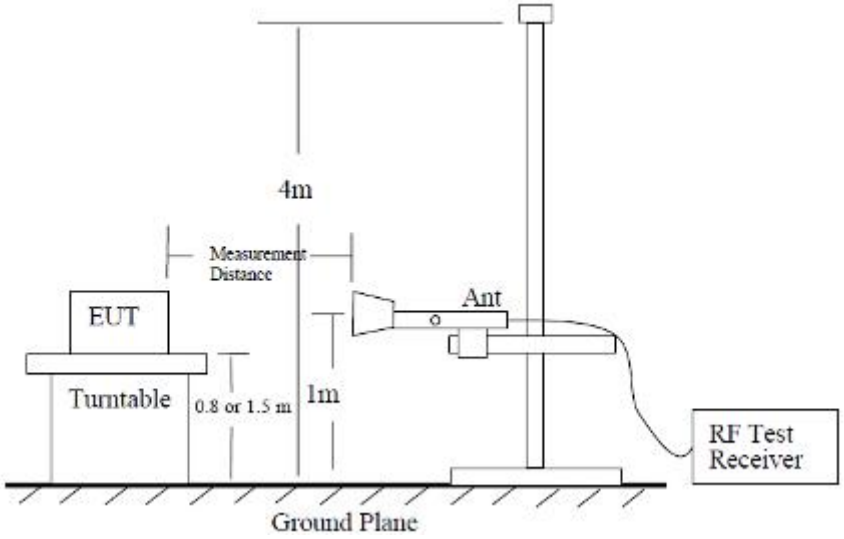
Limits: For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test result:
The test results are shown in Appendix A.

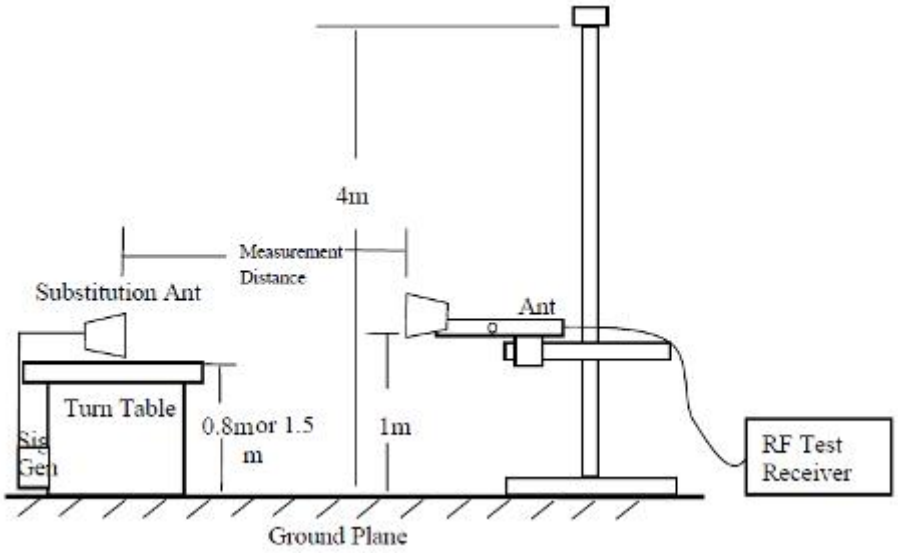
6.9 Radiated Spurious Emissions

Rule Part(s)
FCC: 2.1053, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(f), 27.53(a), 90.691 27.53(m)

Test Setup:



Step 1



Step 2

Test procedure:
The measurements procedures in TIA-603-E-2016 are used.
The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.
Step 1:
The measurement is carried out in the chamber. EUT was placed on a 0.8m (f<1GHz)/ 1.5m (f>1GHz) high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna from 1m to 4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 100 kHz (f<1GHz)/1MHz (f>1GHz). The antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 10th harmonic of the carrier. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.
Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).
Calculation procedure:
The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.
The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:
Power (EIRP) = Pmea+ Pca + Ga
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).
Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
P=Pmea+Pca+Ga=(-20dBm)+(-30dB)+(11dB)= -39dBm
Note: We tested both horizontal and vertical polarization, but only the largest numerical polarity of the two polarities was recorded in the final report.

Test result:
The test results are shown in Appendix B.

7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
RF Power Output	0.6 dB	
Effective Radiated Power and Effective Isotropic Radiated Power	0.6 dB	
Occupied Bandwidth	3kHz	
Emission Bandwidth	3kHz	
Peak-Average Ratio	0.8dB	
Frequency Stability	48Hz	
Band Edges Compliance	1.2dB	
Spurious Emissions at antenna terminal	9kHz~2GHz	1.2dB
	2G~3.6GHz	1.4dB
	3.6G~8GHz	2.2dB
	8G~12.75GHz	2.7dB
Radiated Emission Measurement	30MHz～200MHz	4.88dB
	200MHz～1GHz	4.87dB
	1GHz～18GHz	4.58dB
	18GHz~40GHz	4.35dB

8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	MT8820C Mobile Station Tester	Anritsu	6201300660	2020.08.20	2021.08.19
2	CMW500 RadioCommunication Station	R&S	161702	2020.08.20	2021.08.19
3	FSV40 Spectrum Analyzer	R&S	101065	2020.08.20	2021.08.19
4	N9020A Spectrum Analyzer	Agilent	MY48010771	2020.08.20	2021.08.19
5	6007 Power Divider	Weinschel	6007-GJ-1	2020.08.20	2021.08.19
6	DC Power Supply E3645A	Agilent	MY40000741	2021.04.22	2022.05.21
7	Temperature chamber SH241	ESPEC	92013758	2020.08.20	2021.08.19
8	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----	-----
9	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	-----	-----
10	Turn table Diameter:1m	FRANKONIA	-----	-----	-----
11	Turn table Diameter:5m	FRANKONIA	-----	-----	-----
12	Antenna master FAC(MA4.0)	MATURO	-----	-----	-----
13	Antenna master SAC(MA4.0)	MATURO	-----	-----	-----
14	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	-----	-----
15	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	2020.08.20	2021.08.19
16	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	2020.08.20	2021.08.19
17	HL562 Ultra log antenna	R&S	100016	2020.08.20	2021.08.19
18	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2020.08.20	2021.08.19
19	ESI 40 EMI test receiver	R&S	100015	2020.08.20	2021.08.19
20	ESCS30 EMI test receiver	R&S	100029	2020.08.20	2021.08.19
21	HL562 Receive antenna	R&S	100167	2020.08.20	2021.08.19
22	ENV216 AMN	R&S	3560.6550.12	2020.08.20	2021.08.19

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.