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## TEST REPORT FOR RF TESTING

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Report No.: SRTC2019-9004(F)-19032001(C)

Product Name: Mobile Phone

Marketing Name: Hisense H30 Lite/Hisense F19/Hisense V5/Hisense F16

Product Model: HLTE223E/HLTE223E.40/HLTE221E/HLTE221E.20

Applicant: Hisense International Co., Ltd.

Manufacturer: Hisense Communications Co., Ltd.

Specification: FCC CFR47 PART 2, 22, 24, 27 (2019)

FCC ID: 2ADOBHLTE223E

The State Radio\_monitoring\_center Testing Center (SRTC)

15th Building, No.30, Shixing Street, Shijingshan District,

Beijing, P.R.China

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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
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### 1.3 Applicant's details

Company:	Hisense International Co., Ltd.
Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
City:	Qingdao
Country or Region:	China
Contacted person:	Geng Ruifeng
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Fax:	---
Email:	gengruifeng@hisense.com

### 1.4 Manufacturer's details

Company:	Hisense Communications Co., Ltd.
Address:	218 Qianwangang Road, Qingdao Economic & Technological Development Zone, Qingdao, China
City:	Qingdao
Country or Region:	China
Contacted person:	Geng Ruifeng
Tel:	+86-532-80877742
Fax:	---
Email:	gengruifeng@hisense.com

## 1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019-03-20
Testing Start Date:	2019-03-21
Testing End Date:	2019-04-29

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30
Maximum Extreme	55	---
Minimum Extreme	0	---

Normal Supply Voltage (V d.c.):	3.80
Maximum Extreme Supply Voltage (V d.c.):	4.35
Minimum Extreme Supply Voltage (V d.c.):	3.50

## 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 12: Tx:699~716 MHz Rx:729~746 MHz
Modulation Type	QPSK 16QAM 64QAM
Duplex Mode	FDD
Antenna Type	PIFA Antenna
Antenna Gain	LTE B2:-1.6dBi LTE B4:-1.5dBi LTE B5:-2.2dB LTE B2:-2.4dB LTE B2:-2.4dB
Power Supply	Battery/Charger
IMEI	863718040026737

Model Name	HLTE223E	HLTE223E	HLTE223E.40	HLTE221E	HLTE221E	HLTE221E.20
Marketing Name	Hisense H30 Lite	Hisense H30 Lite	Hisense F19	Hisense V5	Hisense V5	Hisense F16
HW Version	V1.0	V1.0	V1.0	V1.0	V1.0	V1.0
SW Version	Hisense_HL TE223E_10 _MX01_L10 1.07	Hisense_HL TE223E_MX 03_L301.03	Hisense_HLT E223E_40_M X02_L201.02	Hisense_HL TE221E_10 _MX01_L10 1.08	Hisense_HL TE221E_MX 03_L301.03	Hisense_HLT E221E_20_M X02_L201.03

## 2.2 Summary table

FCC Rule Part	Frequency Range(MHz)	EIRP/ERP (dBm)	EIRP/ERP (W)	Frequency Tolerance (ppm)	Emission Designator	Emission Bandwidth (MHz)	Measured 26dBC Bandwidth (MHz)	Communication Type
LTE BAND2								
24E	1850.7-1909.3	22.65	0.184	0.024	1M40G7D	1.4M	1.379	QPSK
	1850.7-1909.3	22.40	0.174	0.024	1M40D7W	1.4M	1.360	16QAM
	1850.7-1909.3	22.40	0.174	0.024	1M40W7D	1.4M	1.379	64QAM
	1851.5-1908.5	22.73	0.187	0.022	3M00G7D	3M	3.094	QPSK
	1851.5-1908.5	22.52	0.179	0.022	3M00D7W	3M	3.101	16QAM
	1851.5-1908.5	22.50	0.178	0.022	3M00W7D	3M	3.035	64QAM
	1852.5-1907.5	22.77	0.189	0.014	5M00G7D	5M	5.033	QPSK
	1852.5-1907.5	22.48	0.177	0.014	5M00D7W	5M	5.035	16QAM
	1852.5-1907.5	22.51	0.178	0.014	5M00W7D	5M	4.966	64QAM
	1855-1905	22.81	0.191	0.015	10M0G7D	10M	10.75	QPSK
	1855-1905	22.56	0.180	0.015	10M0D7W	10M	10.60	16QAM
	1855-1905	22.54	0.179	0.015	10M0W7D	10M	10.50	64QAM
	1857.5-1902.5	22.87	0.194	0.015	15M0G7D	15M	15.23	QPSK
	1857.5-1902.5	22.59	0.182	0.015	15M0D7W	15M	15.22	16QAM
	1857.5-1902.5	22.60	0.182	0.015	15M0W7D	15M	15.08	64QAM
	1860-1900	22.98	0.199	0.022	20M0G7D	20M	20.19	QPSK
	1860-1900	22.71	0.187	0.022	20M0D7W	20M	20.09	16QAM
	1860-1900	22.71	0.187	0.022	20M0W7D	20M	19.86	64QAM
LTE BAND4								
27	1710.7-1754.3	22.56	0.180	0.025	1M40G7D	1.4M	1.340	QPSK
	1710.7-1754.3	22.46	0.176	0.025	1M40D7W	1.4M	1.339	16QAM
	1710.7-1754.3	22.38	0.173	0.025	1M40W7D	1.4M	1.326	64QAM
	1711.5-1753.5	22.63	0.183	0.024	3M00G7D	3M	3.521	QPSK
	1711.5-1753.5	22.52	0.179	0.024	3M00D7W	3M	3.479	16QAM
	1711.5-1753.5	22.44	0.175	0.024	3M00W7D	3M	3.451	64QAM
	1712.5-1752.5	22.69	0.186	0.020	5M00G7D	5M	5.422	QPSK
	1712.5-1752.5	22.56	0.180	0.020	5M00D7W	5M	5.396	16QAM
	1712.5-1752.5	22.51	0.178	0.020	5M00W7D	5M	5.107	64QAM
	1715-1750	22.76	0.189	0.019	10M0G7D	10M	10.21	QPSK
	1715-1750	22.66	0.185	0.019	10M0D7W	10M	10.13	16QAM
	1715-1750	22.58	0.181	0.019	10M0W7D	10M	10.05	64QAM
	1717.5-1747.5	22.80	0.191	0.013	15M0G7D	15M	15.51	QPSK
	1717.5-1747.5	22.70	0.186	0.013	15M0D7W	15M	15.55	16QAM
	1717.5-1747.5	22.70	0.186	0.013	15M0W7D	15M	15.31	64QAM
	1720-1745	22.89	0.195	0.014	20M0G7D	20M	19.93	QPSK
	1720-1745	22.79	0.190	0.014	20M0D7W	20M	20.05	16QAM
	1720-1745	22.73	0.187	0.014	20M0W7D	20M	19.94	64QAM

LTE BAND5								
22H	824.7-848.3	22.63	0.183	0.024	1M40G7D	1.4M	1.268	QPSK
	824.7-848.3	22.19	0.166	0.024	1M40D7W	1.4M	1.264	16QAM
	824.7-848.3	22.19	0.166	0.024	1M40W7D	1.4M	1.265	64QAM
	825.5-847.5	22.60	0.182	0.014	3M00G7D	3M	3.262	QPSK
	825.5-847.5	22.17	0.165	0.014	3M00D7W	3M	3.284	16QAM
	825.5-847.5	22.18	0.165	0.014	3M00W7D	3M	3.233	64QAM
	826.5-846.5	22.62	0.183	0.018	5M00G7D	5M	5.051	QPSK
	826.5-846.5	22.20	0.166	0.018	5M00D7W	5M	5.060	16QAM
	826.5-846.5	22.21	0.166	0.018	5M00W7D	5M	5.096	64QAM
	829-844	23.65	0.184	0.014	10M0G7D	10M	10.16	QPSK
	829-844	22.24	0.167	0.014	10M0D7W	10M	10.28	16QAM
	829-844	22.23	0.167	0.014	10M0W7D	10M	10.22	64QAM
LTE BAND7								
27	2502.5-2567.5	22.60	0.182	0.025	5M00G7D	5M	5.298	QPSK
	2502.5-2567.5	22.50	0.178	0.025	5M00D7W	5M	5.284	16QAM
	2502.5-2567.5	22.55	0.180	0.025	5M00W7D	5M	5.311	64QAM
	2505-2565	22.71	0.187	0.023	10M0G7D	10M	10.77	QPSK
	2505-2565	22.63	0.183	0.023	10M0D7W	10M	10.59	16QAM
	2505-2565	22.68	0.185	0.023	10M0W7D	10M	10.88	64QAM
	2507.5-2562.5	24.50	0.178	0.015	15M0G7D	15M	15.26	QPSK
	2507.5-2562.5	22.44	0.175	0.015	15M0D7W	15M	15.12	16QAM
	2507.5-2562.5	22.45	0.176	0.015	15M0W7D	15M	15.05	64QAM
	2510-2560	22.57	0.181	0.015	20M0G7D	20M	20.84	QPSK
	2510-2560	22.47	0.177	0.015	20M0D7W	20M	20.66	16QAM
	2510-2560	22.52	0.179	0.015	20M0W7D	20M	20.17	64QAM
LTE BAND12								
27	699.7-715.3	22.42	0.175	0.022	1M40G7D	1.4M	1.393	QPSK
	699.7-715.3	22.38	0.173	0.022	1M40D7W	1.4M	1.393	16QAM
	699.7-715.3	22.34	0.171	0.022	1M40W7D	1.4M	1.404	64QAM
	700.5-714.5	22.47	0.177	0.025	3M00G7D	3M	3.673	QPSK
	700.5-714.5	22.42	0.175	0.025	3M00D7W	3M	3.590	16QAM
	700.5-714.5	22.38	0.173	0.025	3M00W7D	3M	3.469	64QAM
	701.5-713.5	22.50	0.178	0.014	5M00G7D	5M	5.367	QPSK
	701.5-713.5	22.44	0.175	0.014	5M00D7W	5M	5.329	16QAM
	701.5-713.5	22.40	0.174	0.014	5M00W7D	5M	5.423	64QAM
	704-711	22.62	0.183	0.019	10M0G7D	10M	10.19	QPSK
	704-711	22.56	0.180	0.019	10M0D7W	10M	10.27	16QAM
	704-711	22.51	0.178	0.019	10M0W7D	10M	10.10	64QAM

## 2.3 Support Equipment

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

Equipment	Battery
Manufacturer	ShenZhen Teamgiant New Energy Tech.Limited Liability Co.,LTD
Model Number	LPW38300H
Serial Number	---

Equipment	Charger
Manufacturer	SHENZHEN TIANYIN ELECTRONICS CO., LTD.
Model Number	TPA-46050200UU
Serial Number	---

Equipment	Charger
Manufacturer	SHENZHEN TIANYIN ELECTRONICS CO., LTD.
Model Number	TPA-97050100UU
Serial Number	---

Equipment	Headset
Manufacturer	Shenzhen Jinchuangju Electronic Technology Co.,Ltd.
Model Number	EM6050-56
Serial Number	---

Equipment	USB Cable
Manufacturer	SHENZHEN KOAR ELECTIC CO.,LTD
Model Number	A106-0027-S
Serial Number	---

Equipment	USB Cable
Manufacturer	SHENZHEN KOAR ELECTIC CO.,LTD
Model Number	A106-0015-S
Serial Number	---



### **3 REFERENCE SPECIFICATION**

The tests documented in this report were performed in accordance with ANSI C63.26:2015, FCC CFR 47 Part 2, FCC KDB 971168 D01 v02r02, KDB 971168 D02 v01, Part 22, Part 24, Part 27.

Specification	Version	Title
ANSI C63.26:2015	11 December 2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
FCC CFR 47 Part 2	2019	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
FCC CFR 47 Part 22	2019	PUBLIC MOBILE SERVICES
FCC CFR 47 Part 24	2019	PERSONAL COMMUNICATIONS SERVICES
FCC CFR 47 Part 27	2019	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
KDB 971168 D01	v03r01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS
KDB 971168 D02	v02r01	MISCELLANEOUS AND BASIC REVIEW AND APPROVAL ITEMS FOR TRANSMITTING EQUIPMENT USED IN LICENSED RADIO 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

## 4 KEY TO NOTES AND RESULT CODES

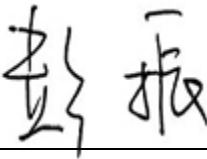

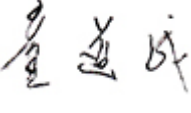
The following are the definition of the test result.

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.
N/T	Test case is not tested.
NTNV	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

## 5 RESULT SUMMARY

The following table summarizes the test results obtained.

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913, 24.232, 27.50	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Peak-Average Ratio	22.913, 24.232, 27.50	Pass
5	Emission Bandwidth	2.1049	Pass
6	Spurious Emissions at antenna terminals	2.1051, 22.901, 22.917, 24.238, 27.53	Pass
7	Band Edges Compliance	2.1051, 22.359, 22.917, 24.238, 27.53	Pass
8	Frequency Stability	2.1055, 22.355, 24.235, 27.54	Pass
9	Radiated Spurious Emissions	2.1053, 22.917, 24.238, 27.53	Pass

This Test Report Is Issued by: Mr.Peng Zhen 	Checked by: Mr.Li Bin 
Tested by: Tong Daocheng 	Issued date: 20190516

## **6 TEST RESULT**

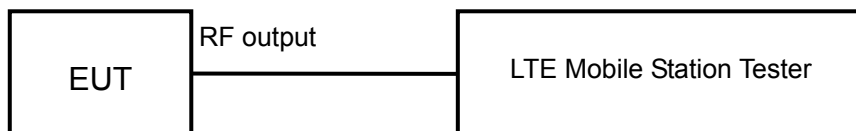
### **6.1 RF Power Output**

Rule Part(s)  
FCC: 2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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	≤30dBm
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Test result:

The test results are shown in Appendix A.

## 6.2 Effective Radiated Power

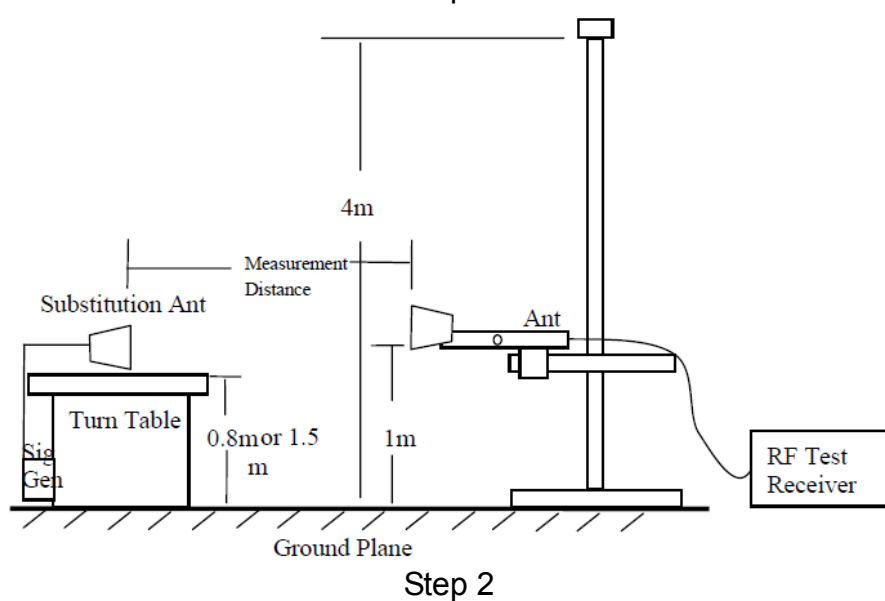
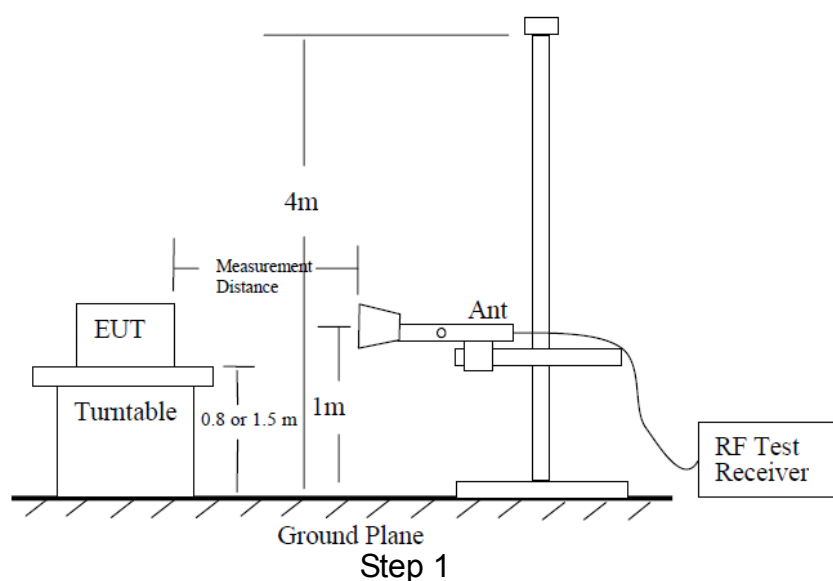
Rule Part(s)

FCC: 22.913, 24.232, 27.50

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



Test procedure:

The measurements procedures in TIA-603-E are used.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters 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 is 2.4m 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 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and 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. And the maximum value of the receiver should be recorded as (Pr).

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. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT 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).

The measurement results are obtained as described below:

Power (EIRP) = Pmea+ Pca+ Ga

### **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,  $ERP = EIRP - 2.15 \text{ (dB)}$ .

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP

27.50 (h) The following power limits shall apply in the BRS and EBS: (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.

Antenna height (ATT) meters (feet)	Effective radiated power (watts) <sup>1 2 4</sup>
Above 1,372 (4,500)	65
Above 1,220 (4,000) to 1,372 (4,500)	70
Above 1,067 (3,500) to 1,220 (4,000)	75
Above 915 (3,000) to 1,067 (3,500)	100
Above 763 (2,500) to 915 (3,000)	140
Above 610 (2,000) to 763 (2,500)	200
Above 458 (1,500) to 610 (2,000)	350
Above 305 (1,000) to 458 (1,500)	600
Up to 305 (1,000)	<sup>3</sup> 1,000

1Power is given in terms of effective radiated power (ERP).

2Applicants in the Los Angeles, CA, area who demonstrate a need to serve both the downtown and fringe areas will be permitted to utilize an ERP of 1 kw at the following mountaintop sites: Santiago Park, Sierra Peak, Mount Lukens, and Mount Wilson.

3Stations with antennas below 305 m (1,000 ft) (AAT) will be restricted to a maximum power of 1 kw (ERP).

4Licensees in San Diego, CA, will be permitted to utilize an ERP of 500 watts at the following mountaintop sites: Palomar, Otay, Woodson and Miguel.

Test result:

The test results are shown in Appendix B.

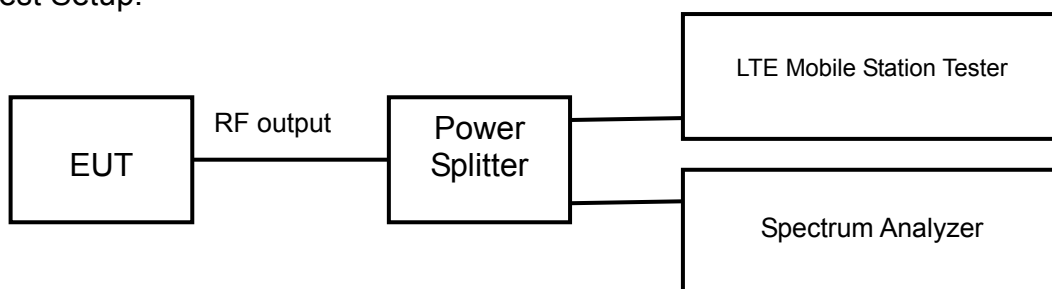
### 6.3 Occupied Bandwidth

Rule Part(s)  
FCC: 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

The measurement will be conducted at three channels (Bottom, middle and top channels of LTE band)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

The test results are shown in Appendix A.



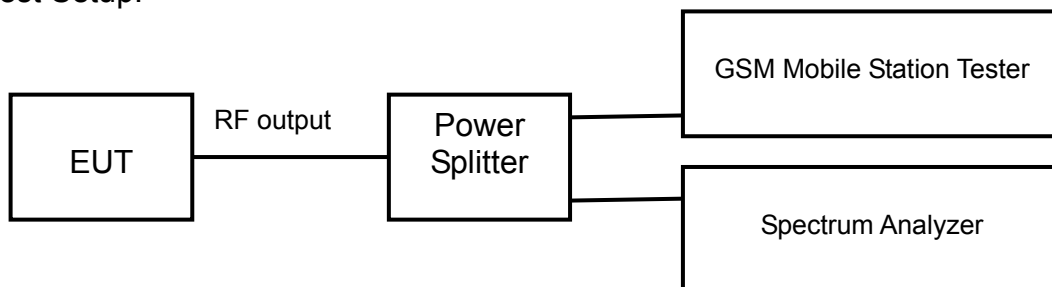
## 6.4 Emission Bandwidth

Rule Part(s)  
FCC: 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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. The emission bandwidth is measured using spectrum analyzer. RBW is set to 3 kHz on spectrum analyzer. The bandwidth of -26dB transmitter power can be read on spectrum analyzer.

Limits: No specific emission bandwidth requirements in part 22.917(b)

Test result:

The test results are shown in Appendix A.

## 6.5 Peak-Average Ratio

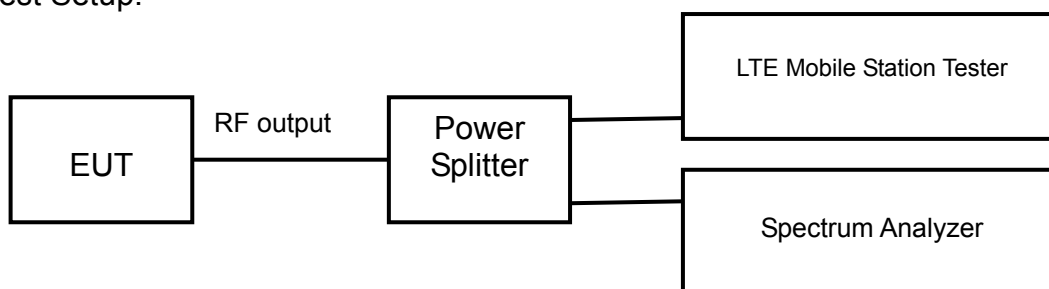
Rule Part(s)

FCC: 22.913, 24.232, 27.50

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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. The Peak-Average Ratio is measured using spectrum analyzer. RBW is set to 30 kHz on spectrum analyzer. The Peak-Average Ratio can be read on spectrum analyzer.

Limits	≤13dB
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Test result:

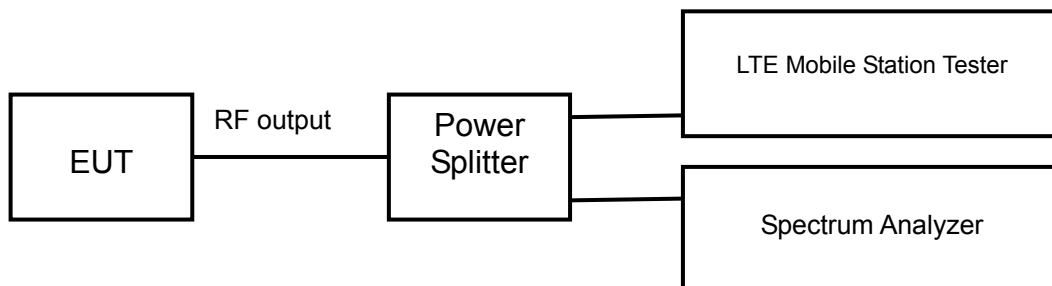
The test results are shown in Appendix A.

## 6.6 Spurious Emissions at antenna terminal

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

Limits	≤-13dBm
--------	---------

Test result:

The test results are shown in Appendix A.

## 6.7 Band Edges Compliance

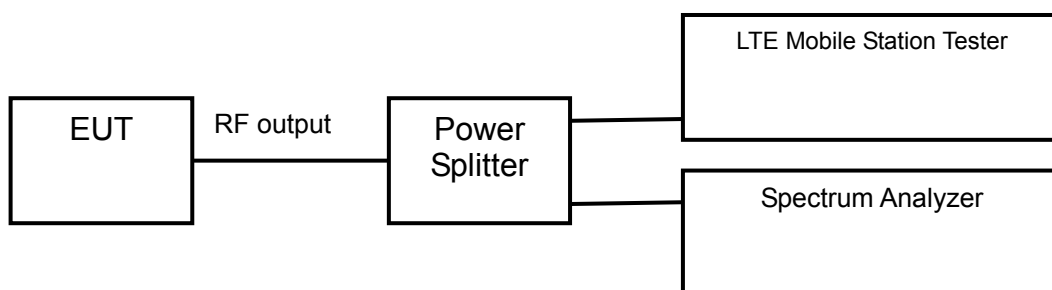
Rule Part(s)

FCC: 2.1051, 22.359, 22.917, 24.238, 27.53

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

Limits	$\leq -13\text{dBm}$
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Test result:

The test results are shown in Appendix A.

## 6.8 Frequency Stability

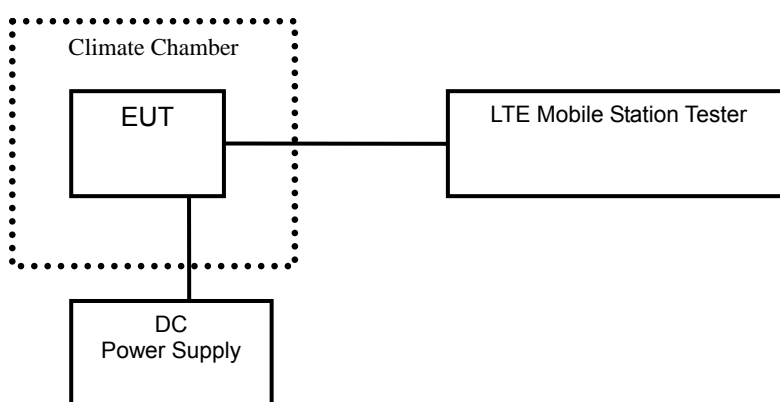
Rule Part(s)

FCC: 2.1055, 22.355, 24.235, 27.54

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three channels No18100, No18300 and No18500 (Bottom, middle and top channels of LTE band I).

Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

Test result:

The test results are shown in Appendix A.

## 6.9 Radiated Spurious Emissions

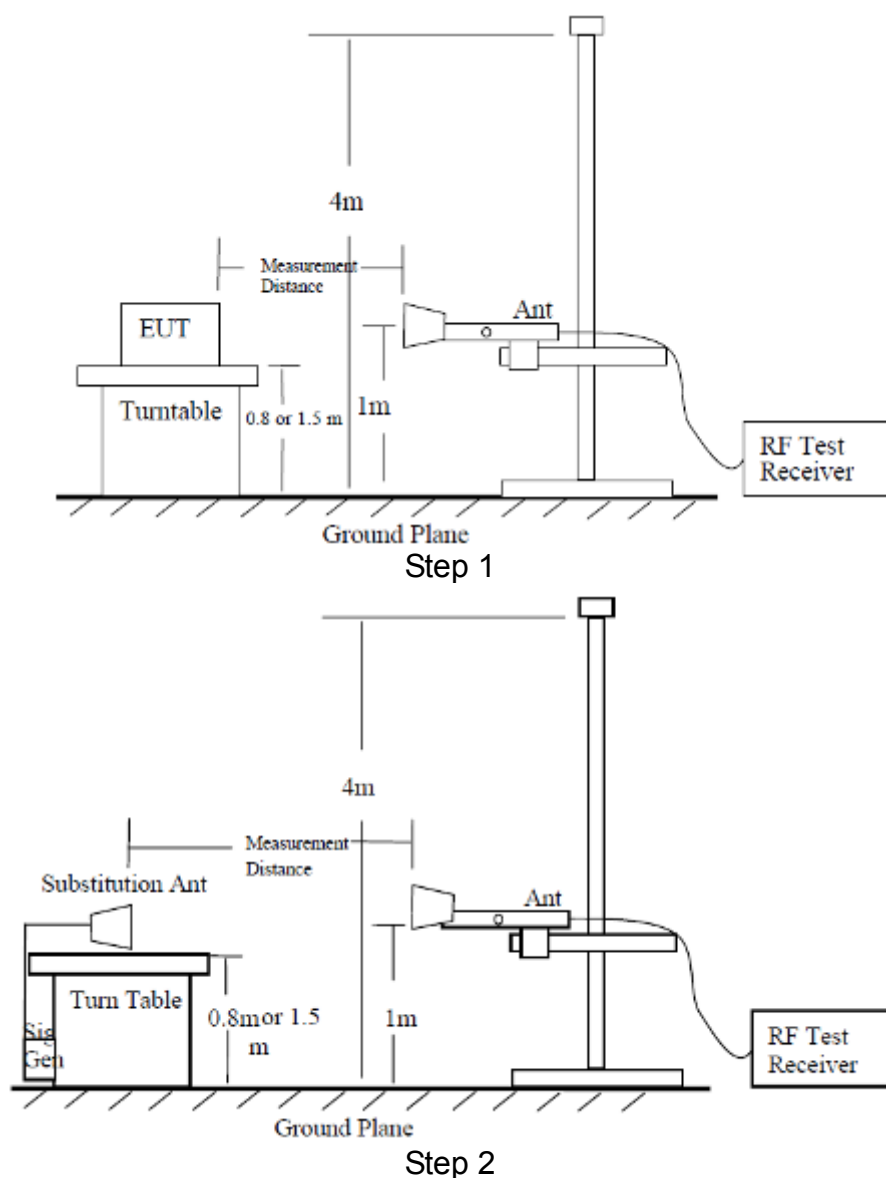
Rule Part(s)

FCC: 2.1053, 22.917, 24.238, 27.53

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

The measurements procedures in TIA-603-E 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 fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter 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 is 2.4m 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. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. 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 ( $P_{mea}$ ) 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 ( $P_r$ ). The power of signal source ( $P_{mea}$ ) 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 ( $P_{ca}$ ) and the Substitution Antenna Gain ( $G_a$ ).

**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:

$$\text{Power(EIRP)} = P_{mea} + P_{ca} + G_a$$

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,  $ERP = EIRP - 2.15 \text{ (dB)}$ .

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{mea} + P_{ca} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

**Test result:**

The test results are shown in Appendix B.

## **7 MEASUREMENT UNCERTAINTIES**

Items	Uncertainty	
RF Power Output	0.6 dB	
Occupied Bandwidth	3 kHz	
Spurious Emissions	30MHz~1GHz	2.83 dB
	1GHz~12.75GHz	2.50 dB
	12.75GHz~25GHz	2.75 dB
Band Edges Compliance	1.2dB	
Frequency Stability	4 Hz	



## 8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	MT8820C Mobile Station Tester	Anritsu	6201300660	2018.08.20	2019.08.19
2	FSV40 Spectrum Analyzer	R&S	101065	2018.08.20	2019.08.19
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2018.08.20	2019.08.19
3	6007 Power Divider	Weinschel	6007-GJ-1	2018.08.20	2019.08.19
4	DC Power Supply E3645A	Agilent	MY40000741	2019.03.01	2020.02.28
5	Temperature chamber SH241	ESPEC	92013758	2018.08.20	2019.08.19
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	----	----	----
7	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	----	----
8	Turn table Diameter: 1m	FRANKONIA	----	----	----
9	Turn table Diameter: 5m	FRANKONIA	----	----	----
10	Antenna master FAC(MA4.0)	MATURO	----	----	----
11	Antenna master SAC(MA4.0)	MATURO	----	----	----
12	9.080m×5.255m×3.525m Shielding room	FRANKONIA	----	----	----
13	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	2018.08.20	2019.08.19
14	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	2018.08.20	2019.08.19
15	HL562 Ultra log antenna	R&S	100016	2018.08.20	2019.08.19
16	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2018.08.20	2019.08.19
17	ESI 40 EMI test receiver	R&S	100015	2018.08.20	2019.08.19
18	ESCS30 EMI test receiver	R&S	100029	2018.08.20	2019.08.19
19	HL562 Receive antenna	R&S	100167	2018.08.20	2019.08.19
20	ENV216 AMN	R&S	3560.6550.12	2018.08.20	2019.08.19

## APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

## APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.