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## TEST REPORT FOR RF TESTING

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Report No.: SRTC2020-9004(F)-20062303(C)

Product Name: WCDMA/LTE Multi-mode Digital Mobile Phone

Product Model: ZTE 8010

Applicant: ZTE CORPORATION

Manufacturer: ZTE CORPORATION

Specification: FCC Part 2, Part 24E, Part 22H, Part 27 (2019)

FCC ID: SRQ-ZTE8010

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

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

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## **1. GENERAL INFORMATION**

### **1.1 Notes of the test report**

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### **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
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Country or Region:	P.R.China
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### **1.3 Applicant's details**

Company:	ZTE CORPORATION
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City:	Shenzhen
Country or Region:	Guangdong, China
Contacted person:	Ren Shijia
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Email:	ren.shijia@zte.com.cn

### **1.4 Manufacturer's details**

Company:	ZTE CORPORATION
Address:	Electronic Testing Building, No. 43 Shahe Road, Xili street, Nanshan District
City:	Shenzhen
Country or Region:	Guangdong, China
Contacted person:	Ren Shijia
Tel:	13709193069
Fax:	---
Email:	ren.shijia@zte.com.cn

### 1.5 Test Environment

Date of Receipt of test sample at SRTC:	2020-06-23
Testing Start Date:	2020-06-23
Testing End Date:	2020-07-03

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30
Maximum Extreme	55	---
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	3.85
Maximum Extreme Supply Voltage (V d.c.):	3.4
Minimum Extreme Supply Voltage (V d.c.):	4.4

## **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 26: Tx:824~849 MHz Rx:869 ~894MHz LTE Band 66: Tx:1710~1780 MHz Rx:2110~2200 MHz
Modulation Type	QPSK/16QAM/64QAM
Antenna Type	Fixed Internal Antenna
Antenna Gain	LTE Band2:-3.3dBi LTE Band4:-0.19dBi LTE Band5:-1.1dBi LTE Band7:-0.6dBi LTE Band26:-1.1dBi LTE Band66:-0.19dBi
Power Supply	Battery/Charger
Hardware Version	z10A
Software Version	TEL_MX_ZTE_8010V1.0
IMEI	867805050001761

## 2.2 Support Equipment

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

Equipment	Battery 1
Manufacturer	SCUD (Fujian) Electronics Co., Ltd.
Model Number	Li3949T44P8h906450

Equipment	Battery 2
Manufacturer	Ningde Amperex Technology Ltd.
Model Number	Li3949T44P8h906450

Equipment	Charger
Manufacturer	JIANGSU CHENYANG ELECTRON CO LTD
Model Number	STC-A520A-Z

Equipment	Headset 1
Manufacturer	JUWEI ELECTRONICS CO.,LTD
Model Number	JWEP1036-Z01R

Equipment	Headset 2
Manufacturer	Shen zhen FDC Electronic Co.,Ltd
Model Number	DEM-66

### 2.3 Summary table

FCC Rule Part	Frequency Range(MHz)	EIRP/ERP (W)	Frequency Tolerance (ppm)	Emission Designator	Emission Bandwidth (MHz)	Measured 26dBC Bandwidth (MHz)	Communication Type
LTE BAND2							
24E	1850.7-1909.3	0.350	-0.048	1M08G7D	1.4M	1.269	QPSK
	1850.7-1909.3	0.300	-0.048	1M08D7W	1.4M	1.241	16QAM
	1850.7-1909.3	0.250	-0.048	1M08W7D	1.4M	1.238	64QAM
	1851.5-1908.5	0.310	0.050	2M70G7D	3M	3.030	QPSK
	1851.5-1908.5	0.290	0.050	2M70D7W	3M	3.104	16QAM
	1851.5-1908.5	0.240	0.050	2M71W7D	3M	3.093	64QAM
	1852.5-1907.5	0.320	-0.048	4M48G7D	5M	5.209	QPSK
	1852.5-1907.5	0.260	-0.048	4M48D7W	5M	5.168	16QAM
	1852.5-1907.5	0.260	-0.048	4M48W7D	5M	5.157	64QAM
	1855-1905	0.310	-0.049	8M96G7D	10M	9.889	QPSK
	1855-1905	0.260	-0.049	8M95D7W	10M	9.783	16QAM
	1855-1905	0.260	-0.049	8M97W7D	10M	9.813	64QAM
	1857.5-1902.5	0.320	-0.045	13M4G7D	15M	14.64	QPSK
	1857.5-1902.5	0.270	-0.045	13M4D7W	15M	14.84	16QAM
	1857.5-1902.5	0.250	-0.045	13M4W7D	15M	14.71	64QAM
	1860-1900	0.340	-0.050	17M9G7D	20M	19.63	QPSK
	1860-1900	0.280	-0.050	17M9D7W	20M	19.59	16QAM
	1860-1900	0.260	-0.050	17M9W7D	20M	19.64	64QAM
LTE BAND4							
27	1710.7-1754.3	0.340	0.048	1M08G7D	1.4M	1.267	QPSK
	1710.7-1754.3	0.240	0.048	1M08D7W	1.4M	1.259	16QAM
	1710.7-1754.3	0.250	0.048	1M08W7D	1.4M	1.246	64QAM
	1711.5-1753.5	0.350	0.049	2M68G7D	3M	2.929	QPSK
	1711.5-1753.5	0.260	0.049	2M68D7W	3M	2.919	16QAM
	1711.5-1753.5	0.260	0.049	2M68W7D	3M	2.914	64QAM
	1712.5-1752.5	0.340	0.049	4M47G7D	5M	4.997	QPSK
	1712.5-1752.5	0.250	0.049	4M47D7W	5M	5.050	16QAM
	1712.5-1752.5	0.270	0.049	4M48W7D	5M	5.098	64QAM
	1715-1750	0.330	0.050	8M96G7D	10M	9.804	QPSK
	1715-1750	0.280	0.050	8M96D7W	10M	9.949	16QAM
	1715-1750	0.230	0.050	8M95W7D	10M	9.836	64QAM
	1717.5-1747.5	0.320	0.046	13M4G7D	15M	14.66	QPSK
	1717.5-1747.5	0.250	0.046	13M4D7W	15M	14.78	16QAM
	1717.5-1747.5	0.240	0.046	13M4W7D	15M	14.69	64QAM
	1720-1745	0.340	0.050	17M9G7D	20M	19.53	QPSK
	1720-1745	0.270	0.050	17M9D7W	20M	19.34	16QAM
	1720-1745	0.280	0.050	17M9W7D	20M	19.24	64QAM

LTE BAND5							
22H	824.7-848.3	0.290	0.048	1M08G7D	1.4M	1.264	QPSK
	824.7-848.3	0.250	0.048	1M08D7W	1.4M	1.225	16QAM
	824.7-848.3	0.260	0.048	1M08W7D	1.4M	1.246	64QAM
	825.5-847.5	0.320	0.042	2M70G7D	3M	3.022	QPSK
	825.5-847.5	0.240	0.042	2M70D7W	3M	3.035	16QAM
	825.5-847.5	0.250	0.042	2M70W7D	3M	3.037	64QAM
	826.5-846.5	0.320	-0.044	4M48G7D	5M	5.060	QPSK
	826.5-846.5	0.190	-0.044	4M48D7W	5M	5.076	16QAM
	826.5-846.5	0.240	-0.044	4M48W7D	5M	5.188	64QAM
	829-844	0.330	-0.045	8M97G7D	10M	9.959	QPSK
	829-844	0.230	-0.045	8M95D7W	10M	9.924	16QAM
829-844	0.230	-0.045	8M96W7D	10M	9.876	64QAM	
LTE BAND7							
27	2502.5-2567.5	0.290	-0.046	4M48G7D	5M	5.172	QPSK
	2502.5-2567.5	0.270	-0.046	4M47D7W	5M	5.012	16QAM
	2502.5-2567.5	0.240	-0.046	4M47W7D	5M	5.196	64QAM
	2505-2565	0.270	-0.048	8M95G7D	10M	9.789	QPSK
	2505-2565	0.260	-0.048	8M96D7W	10M	9.913	16QAM
	2505-2565	0.230	-0.048	8M95W7D	10M	9.898	64QAM
	2507.5-2562.5	0.270	-0.043	13M4G7D	15M	14.64	QPSK
	2507.5-2562.5	0.260	-0.043	13M4D7W	15M	14.68	16QAM
	2507.5-2562.5	0.230	-0.043	13M4W7D	15M	14.68	64QAM
	2510-2560	0.300	-0.050	17M9G7D	20M	19.61	QPSK
	2510-2560	0.240	-0.050	17M9D7W	20M	19.62	16QAM
2510-2560	0.240	-0.050	17M9W7D	20M	19.38	64QAM	
LTE BAND26							
22H	824.7-848.3	0.270	0.044	1M08G7D	1.4M	1.252	QPSK
	824.7-848.3	0.210	0.044	1M08D7W	1.4M	1.261	16QAM
	824.7-848.3	0.210	0.044	1M08W7D	1.4M	1.240	64QAM
	825.5-847.5	0.300	-0.043	2M70G7D	3M	3.034	QPSK
	825.5-847.5	0.220	-0.043	2M70D7W	3M	3.028	16QAM
	825.5-847.5	0.250	-0.043	2M70W7D	3M	3.033	64QAM
	826.5-846.5	0.300	0.046	4M47G7D	5M	5.101	QPSK
	826.5-846.5	0.260	0.046	4M48D7W	5M	5.128	16QAM
	826.5-846.5	0.240	0.046	4M47W7D	5M	5.034	64QAM
	829-844	0.310	0.043	8M95G7D	10M	9.933	QPSK
	829-844	0.240	0.043	8M95D7W	10M	9.892	16QAM
	829-844	0.230	0.043	8M94W7D	10M	9.874	64QAM
	831.5-841.5	0.300	-0.045	13M4G7D	15M	14.55	QPSK
	831.5-841.5	0.240	-0.045	13M4D7W	15M	14.65	16QAM
831.5-841.5	0.250	-0.045	13M4W7D	15M	14.54	64QAM	
LTE BAND66							
27	1710.7-1779.3	0.330	-0.041	1M08G7D	1.4M	1.263	QPSK
	1710.7-1779.3	0.290	-0.041	1M08D7W	1.4M	1.238	16QAM
	1710.7-1779.3	0.260	-0.041	1M08W7D	1.4M	1.251	64QAM
	1711.5-1778.5	0.330	-0.043	2M70G7D	3M	3.017	QPSK
	1711.5-1778.5	0.260	-0.043	2M70D7W	3M	3.022	16QAM
	1711.5-1778.5	0.230	-0.043	2M70W7D	3M	3.008	64QAM
	1712.5-1777.5	0.310	0.040	4M48G7D	5M	5.168	QPSK
	1712.5-1777.5	0.260	0.040	4M47D7W	5M	4.992	16QAM
	1712.5-1777.5	0.250	0.040	4M47W7D	5M	5.151	64QAM
	1715-1775	0.320	0.042	8M96G7D	10M	9.902	QPSK
	1715-1775	0.270	0.042	8M96D7W	10M	9.836	16QAM



	1715-1775	0.260	0.042	8M95W7D	10M	9.833	64QAM
	1717.5-1772.5	0.300	-0.050	13M4G7D	15M	14.98	QPSK
	1717.5-1772.5	0.260	-0.050	13M4D7W	15M	14.59	16QAM
	1717.5-1772.5	0.230	-0.050	13M4W7D	15M	14.58	64QAM
	1720-1770	0.350	0.046	17M9G7D	20M	19.53	QPSK
	1720-1770	0.270	0.046	17M9D7W	20M	19.36	16QAM
	1720-1770	0.240	0.046	17M9W7D	20M	19.33	64QAM

### **3 REFERENCE SPECIFICATION**

Specification	Version	Title
FCC Part 2	2019	Frequency allocations and radio treaty matters; general rules and regulations
FCC Part 22	2019	Public mobile services
FCC Part 24	2019	Personal communications services
FCC Part 27	2019	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

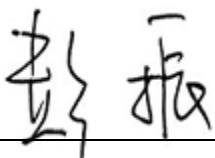


### **4 KEY TO NOTES AND RESULT CODES**

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)	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)	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)	Pass
8	Frequency Stability	2.1055, 22.355, 24.235, 27.54	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)	Pass

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Miss Jin Wanqing 	Issued date: 20200706

## **6 TEST RESULT**

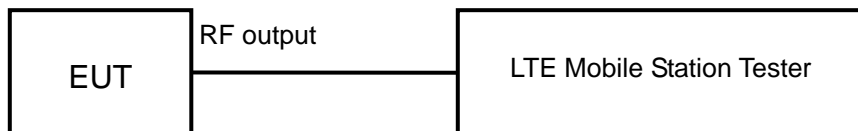
### **6.1 RF Power Output**

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: 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

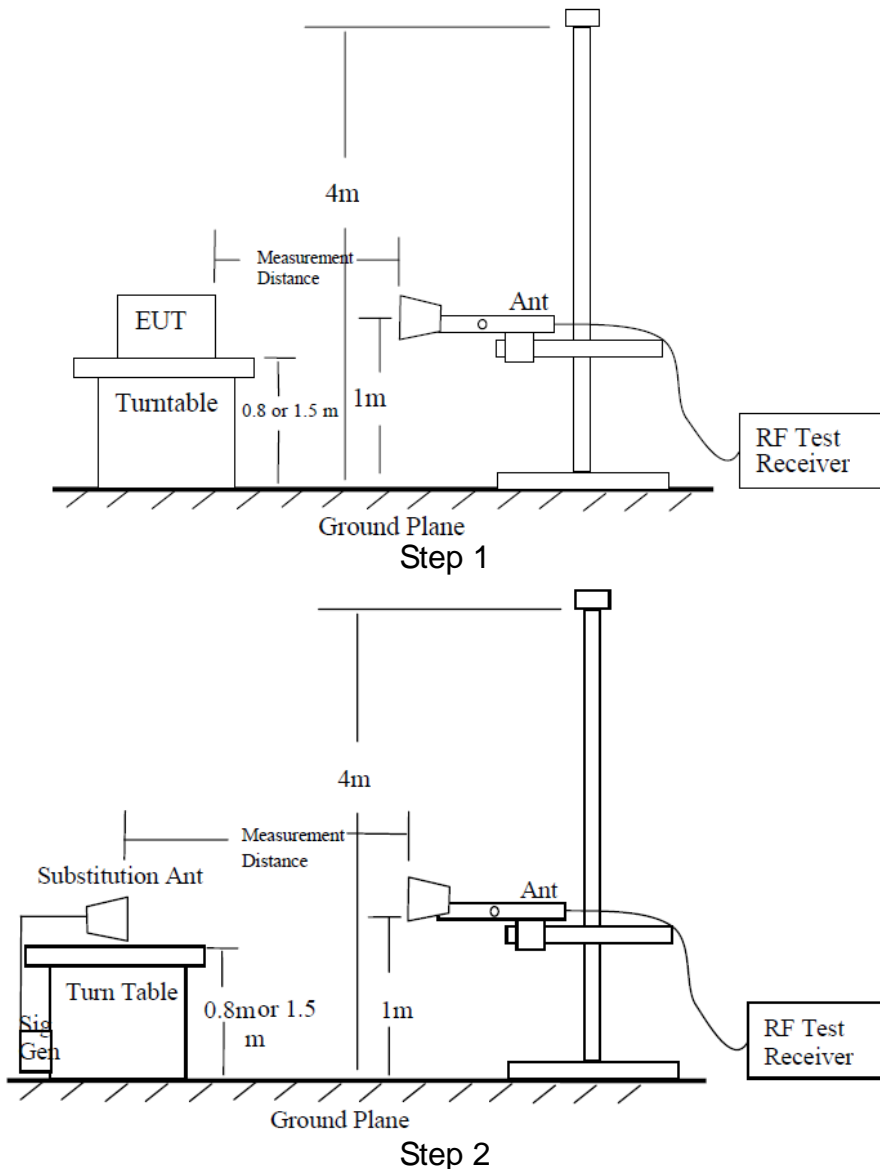
Rule Part(s)

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)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



Test procedure:

The measurements procedures in TIA-603-E-2016 are used.

Step 1:

The measurement is carried out in the chamber. EUT was placed on a 0.8m ( $f < 1\text{GHz}$ )/1.5m ( $f > 1\text{GHz}$ ) 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 100KHz( $f < 1\text{GHz}$ )/1MHz ( $f > 1\text{GHz}$ ). 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.

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 (Pr). 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 ( $G_a$ ).

The measurement results are obtained as described below:

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

#### **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) (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.

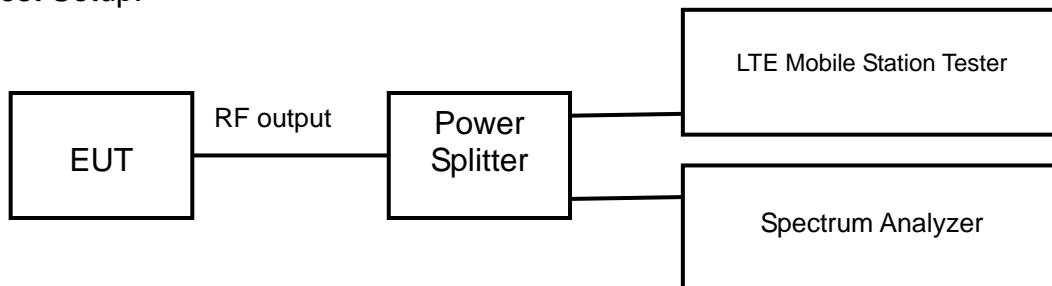
### 6.3 Occupied Bandwidth

Rule Part(s)  
FCC: 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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.



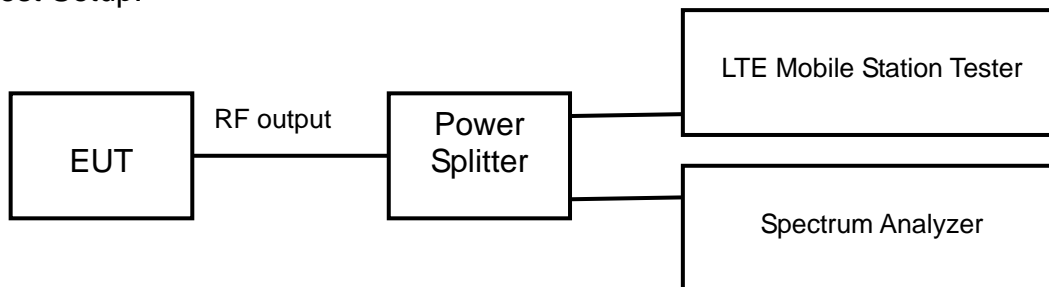
## 6.4 Emission Bandwidth

Rule Part(s)  
FCC: 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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  $\geq$  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.

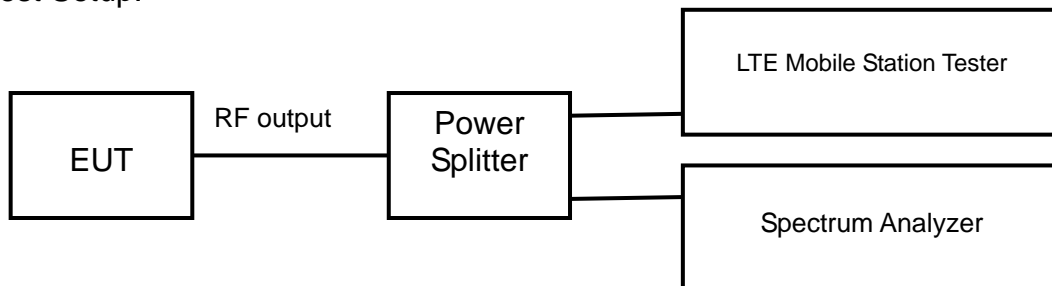
## 6.5 Peak-Average Ratio

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

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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

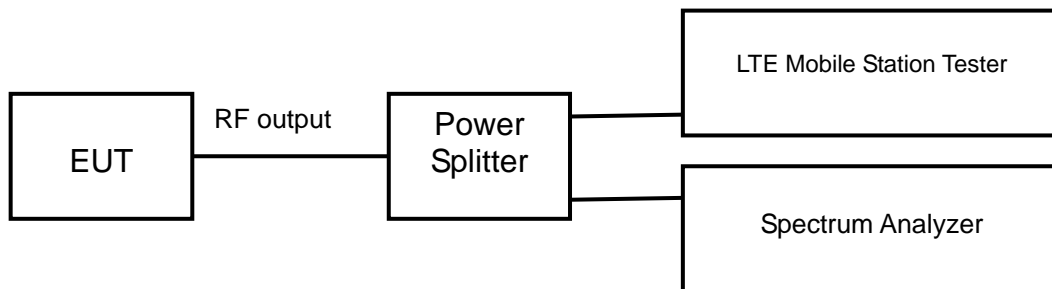
Rule Part(s)

FCC: 2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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  $43 + \log_{10}(P)$  (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  $70 + \log_{10}(P)$  (P [Watts]).

For Band 7 and 41, the minimum permissible attenuation level of any spurious emission is  $55 + \log_{10}(P)$  (P [Watts]).

Test result:

The test results are shown in Appendix A.

## 6.7 Band Edges Compliance

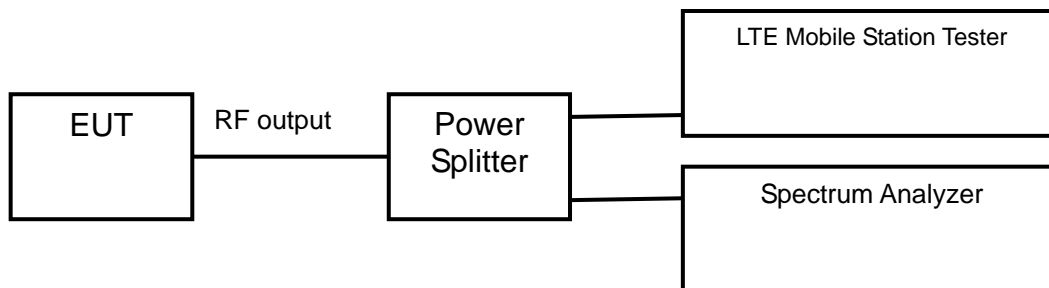
Rule Part(s)

FCC: 2.1051, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(m), 27.53(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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  $\geq 2 \times \text{Span/RBW}$
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  $43 + \log_{10}(P)$  [Watts], where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 30 is  $> 43 + 10\log_{10}(P)$  [Watts] at 2300-2305MHz & 2345-2360MHz,  $> 55 + 10\log_{10}(P)$  [Watts] at 2320-2324MHz & 2341-2345MHz,  $> 61 + 10\log_{10}(P)$  [Watts] at 2324-2328MHz & 2337-2341MHz,  $> 67 + 10\log_{10}(P)$  [Watts] at 2288-2292MHz & 2328- 2337MHz, and  $> 70 + 10\log_{10}(P)$  [Watts] at frequencies  $< 2288\text{MHz}$  &  $> 2365\text{MHz}$ .

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  $65 + 10\log_{10}(P) = -35\text{dBm}$  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.

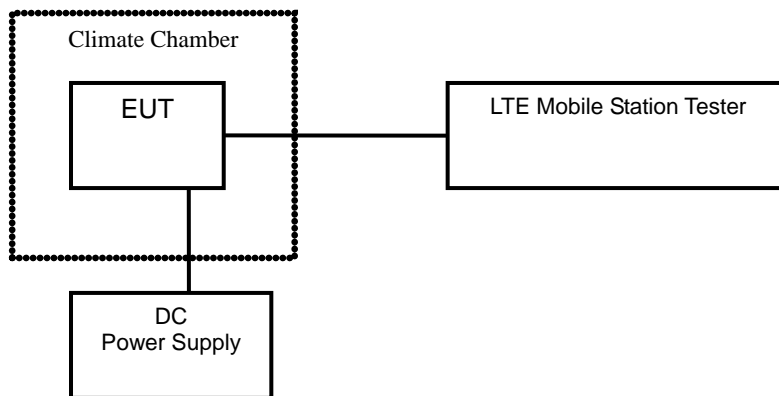
## 6.8 Frequency Stability

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

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

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  $\pm 0.00025\%$  ( $\pm 2.5$  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

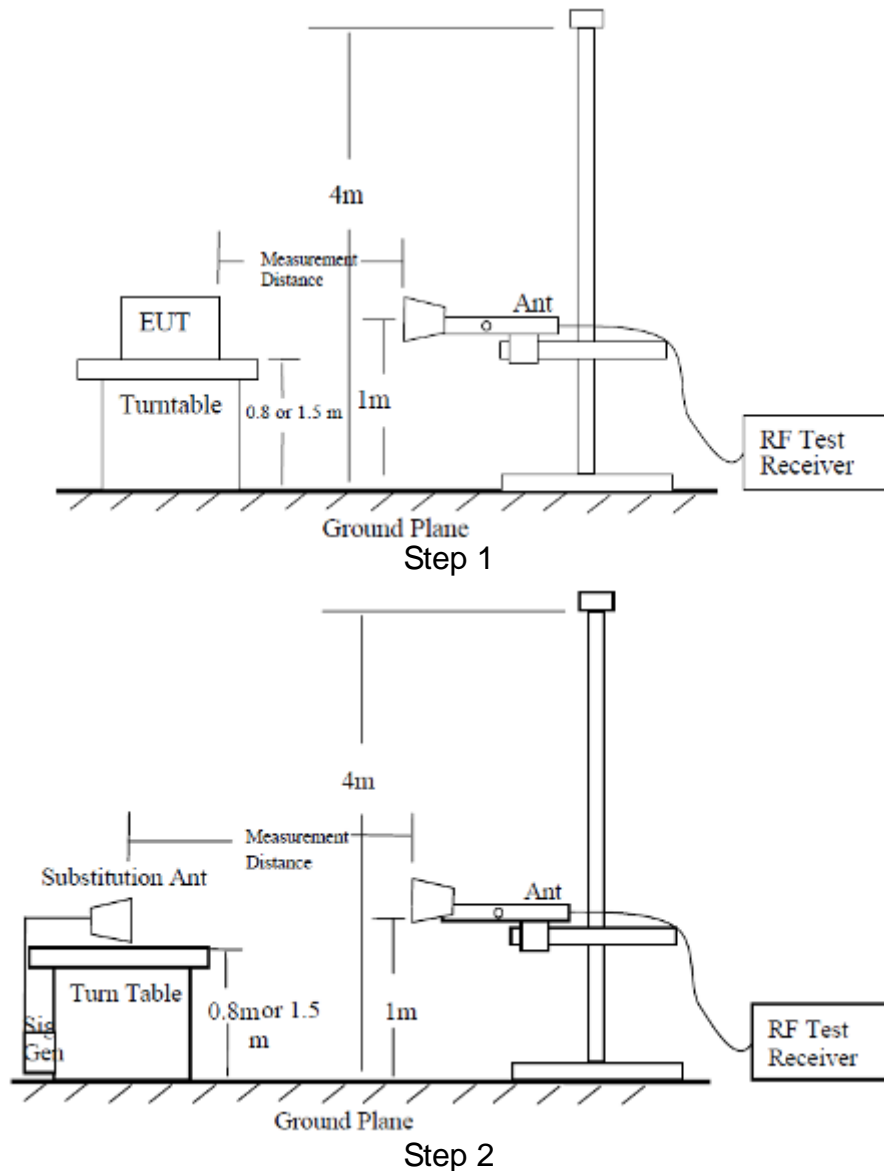
Rule Part(s)

FCC: 2.1053, 22.917(a), 24.238(a), 27.53(c), 27.53(g), 27.53(h), 27.53(f), 27.53(a), 27.53(m)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



**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 (P<sub>mea</sub>) 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<sub>r</sub>). The power of signal source (P<sub>mea</sub>) 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<sub>ca</sub>) and the Substitution Antenna Gain (G<sub>a</sub>).

**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:

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

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 (dB).

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

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

**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	2019.08.20	2020.08.19
2	FSV40 Spectrum Analyzer	R&S	101065	2019.08.20	2020.08.19
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2019.08.20	2020.08.19
3	6007 Power Divider	Weinschel	6007-GJ-1	2019.08.20	2020.08.19
4	DC Power Supply E3645A	Agilent	MY40000741	2020.03.01	2021.02.28
5	Temperature chamber SH241	ESPEC	92013758	2019.08.20	2020.08.19
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	2019.08.20	2020.08.19
14	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	2019.08.20	2020.08.19
15	HL562 Ultra log antenna	R&S	100016	2019.08.20	2020.08.19
16	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2019.08.20	2020.08.19
17	ESI 40 EMI test receiver	R&S	100015	2019.08.20	2020.08.19
18	ESCS30 EMI test receiver	R&S	100029	2019.08.20	2020.08.19
19	HL562 Receive antenna	R&S	100167	2019.08.20	2020.08.19
20	ENV216 AMN	R&S	3560.6550.12	2019.08.20	2020.08.19

**APPENDIX A – TEST DATA OF CONDUCTED EMISSION**

Please refer to the attachment.

**APPENDIX B – TEST DATA OF RADIATED EMISSION**

Please refer to the attachment.