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# TEST REPORT

## FCC Part 22 Subpart H / Part 24 Subpart E/ Part 27

Report Reference No. .... : **CTL2110275011-WF01**

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**Product Name** ..... : Sapphire Tablet

**Model/Type reference** ..... : S\_TAB

**List Model(s)**..... : N/A

**Trade Mark**..... : TravelWifi

**FCC ID**..... : **2ALSN-S-TAB**

**Applicant's name** ..... : **DHI Telecom Group**

**Address of applicant** ..... : 711 E. 20th St, Houston, Tx, 77008 United States

**Test Firm**..... : **Shenzhen CTL Testing Technology Co., Ltd.**

**Address of Test Firm** ..... : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

**Test specification**..... :

Standard ..... : **FCC CFR Title 47 Part 2, Part 22H, Part 24E, and Part 27  
ANSI C63.26:2015  
KDB 971168 D01**

TRF Originator ..... : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF ..... : Dated 2011-01

**Date of receipt of test item** ..... : Oct. 27, 2021

**Date of sampling** ..... : Oct. 28, 2021

**Date of Test Date** ..... : Oct. 28, 2021- Nov. 18, 2021

**Date of Issue** ..... : Nov. 19, 2021

**Result**..... : **Pass**

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# TEST REPORT

<b>Test Report No. :</b>	<b>CTL2110275011-WF01</b>	Nov. 19, 2021
		Date of issue

Equipment under Test : Sapphire Tablet

Sample No. CTL2110275011-S001, CTL2110275011-S002

Model /Type : S\_TAB

Listed Models : N/A

**Applicant** : **DHI Telecom Group**

Address : 711 E. 20th St, Houston, Tx, 77008 United States

**Manufacturer** : **DHI Telecom Group**

Address : 711 E. 20th St, Houston, Tx, 77008 United States

<b>Test result</b>	<b>Pass *</b>
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\* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## \*\* Modified History \*\*

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# 1 SUMMARY

## 1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 22](#): PRIVATE LAND MOBILE RADIO SERVICES.

[FCC Part 24](#): PUBLIC MOBILE SERVICES

[Part 27](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[ANSI C63.26:2015](#): American National Standard of procedures for compliance testing of transmitters used in licensed radio services.

[ANSI C63.10-2013](#): Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

[KDB971168 D01:v03r01](#) MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

## 1.2 Test Description

Test Item	Section of Regulations	Result
RF Output Power	2.1046	Pass
Effective Radiated Power	22.913 (a)(5), 24.232 (c), 27.50(d)(4)	Pass
Peak-to-Average Ratio	24.232 (d), 27.50(d)(5)	Pass
99% & -26 dB Occupied Bandwidth	2.1049,	Pass
Out of band emission, Band Edge	22.917(a), 24.238 (a), 27.53(h)	Pass
Spurious Emissions at Antenna Terminal	2.1051, 22.917(a), 24.238(a), 27.53(h)	Pass
Radiates Spurious Emission	2.1053, 22.917(a), 24.238(a), 27.53(h)	Pass
Frequency stability	2.1055, 22.355, 24.235, 27.54	Pass

## 1.3 Test Facility

### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10 and CISPR 32/EN 55032 requirements.

### 1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### IC Registration No.: 9618B CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

#### FCC-Registration No.: 399832 Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

## 1.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance 0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 2 GENERAL INFORMATION

### 2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

### 2.2 General Description of EUT

Product Name:	Sapphire Tablet
Model/Type reference:	S_TAB
Power supply:	DC 3.8V form battery
Hardware version:	01EBOAIRMAIN_V1_06
Software version:	V1.0

#### 2G

Operation Band:	GSM850, PCS1900
Supported Type:	GSM/GPRS/EGPRS
Power Class:	GSM850:Power Class 4 PCS1900:Power Class 1
Modulation Type:	GMSK for GPRS, 8-PSK for EGPRS
GSM Release Version	R99
GPRS Multislot Class	12
EGPRS Multislot Class	12
Antenna type:	FPC antenna
Antenna gain:	-4.36dBi for GSM850 -3.76dBi for PCS1900

#### WCDMA

Operation Band:	FDD Band II, FDD Band IV, FDD Band V
Power Class:	Power Class 3
Modulation Type:	QPSK for WCDMA/HSUPA/HSDPA
WCDMA Release Version:	Release 7
HSDPA Category:	Category 14
HSUPA Category:	Category 6
Antenna type:	FPC antenna
Antenna gain:	-4.36dBi for Band V -2.67dBi for Band IV -3.76dBi for Band II

Note: For more details, refer to the user's manual of the EUT.

## 2.3 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

### Test Frequency:

GSM 850		PCS1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

FDD Band II		FDD Band IV		FDD Band V	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
9262	1852.4	1312	1712.4	4132	826.40
9400	1880.0	1413	1732.6	4182	836.60
9538	1907.6	1513	1752.6	4233	846.60

### Test Modes:

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

Test Mode	Test Modes Description
Mode 1	GSM system, GSM, GMSK modulation
Mode 2	GSM system, GPRS, GMSK modulation
Mode 3	GSM system, EDGE, GMSK modulation
Mode 4	WCDMA system, QPSK modulation
Mode 5	HSDPA system, QPSK modulation
Mode 6	HSUPA system, QPSK modulation

Exploratory scan all test mode above, found below test mode which it was worse case mode reported in this report.

Test item	Test mode (Worse case operation mode)
RF Output Power	ALL mode
Effective Radiated Power	ALL mode
Peak-to-Average Ratio	ALL mode
99% & -26 dB Occupied Bandwidth	ALL mode
Out of band emission, Band Edge	ALL mode
Spurious Emissions at Antenna Terminal	ALL mode
Radiates Spurious Emission	Mode 1, Mode4

## 2.4 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2021/04/08	2022/04/07
Bilog Antenna	Sunol Sciences Corp.	JB1	A061714	2021/04/08	2022/04/07
EMI Test Receiver	R&S	ESCI	1166.5950.03	2021/05/18	2022/05/17
Spectrum Analyzer	Agilent	N9020	US46220290	2021/05/14	2022/05/13
Spectrum Analyzer	RS	FSP	1164.4391.38	2021/05/15	2022/05/14
Controller	EM Electronics	Controller EM 1000	060859	2021/05/19	2022/05/18
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/05/19	2022/05/18
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062014	2021/05/19	2022/05/18
Active Loop Antenna	Da Ze	ZN30900A	/	2021/05/19	2022/05/18
Amplifier	Agilent	8449B	3008A02306	2021/05/15	2022/05/14
Amplifier	Agilent	8447D	2944A10176	2021/05/15	2022/05/14
Temperature/Humidity Meter	Gangxing	CTH-608	02	2021/05/16	2022/05/15
Radio Communication Tester	R&S	CMW500	101184	2021/05/19	2022/05/18
High-Pass Filter	K&L	9SH10-2700/X1 2750-O/O	N/A	2021/05/19	2022/05/18
High-Pass Filter	K&L	41H10-1375/U1 2750-O/O	N/A	2021/05/19	2022/05/18
Coaxial Cables	HUBER+SUHN ER	SUCOFLEX 104PEA-10M	10m	2021/05/19	2022/05/18
Coaxial Cables	HUBER+SUHN ER	SUCOFLEX 104PEA-3M	3m	2021/05/19	2022/05/18
Coaxial Cables	HUBER+SUHN ER	SUCOFLEX 104PEA-3M	3m	2021/05/19	2022/05/18
RF Cable	Megalon	RF-A303	N/A	2021/05/19	2022/05/18
Climate Chamber	ESPEC	EL-10KA	A20120523	2021/05/19	2022/05/18
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2021/05/19	2022/05/18
Directional Coupler	Agilent	87300B	3116A03638	2021/05/19	2022/05/18

## 2.5 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with of FCC Part 22 Subpart H, Part 24 Subpart E.

## 2.6 Modifications

No modifications were implemented to meet testing criteria.

### 3 TEST CONDITIONS AND RESULTS

#### 3.1 Output Power

##### LIMIT

GSM850/WCDMA Band V: 7W ERF

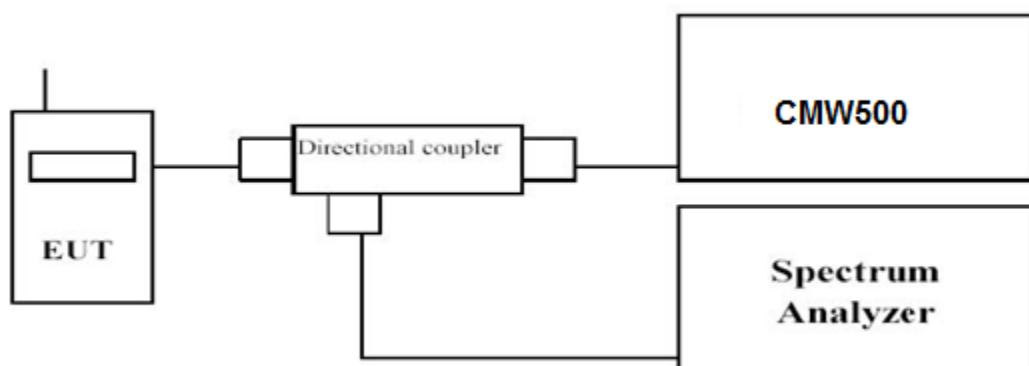
PCS1900/WCDMA Band II: 2W EIRP

WCDMA Band IV: 1W EIRP

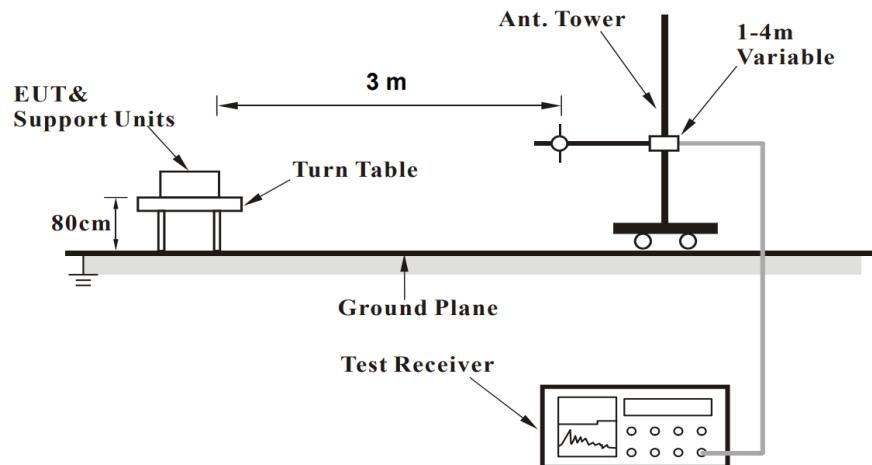
The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

##### TEST CONFIGURATION

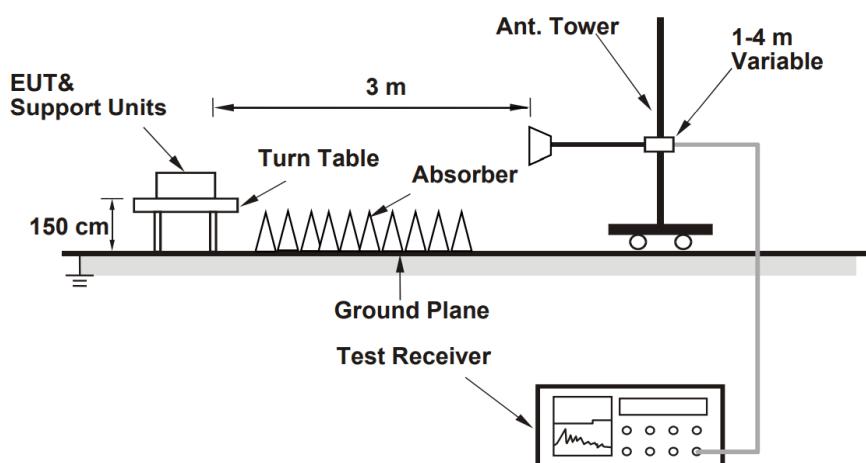
###### Conducted Power Measurement



###### Radiated Measurement below 1GHz:



###### Radiated Measurement above 1GHz:



## **TEST PROCEDURE**

The EUT was setup according to ANSI C63.26:2015

### **Conducted Power Measurement:**

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- c) EUT Communicate with CMW500 then selects a channel for testing.
- d) Add a correction factor to the display of spectrum, and then test.

### **Radiated Power Measurement:**

- a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

## **TEST RESULTS**

### **Conducted output power: Pass**

Raw data reference to the appendix.

**Radiated output power: pass**

Note: 1. The field strength of radiation emission was measured in the following position: EUT stand-up position (Zaxis), lie-down position (X, Y axis). The data show in this report only with the worst case setup. After exploratory measurement the worst case of Z axis was reported.

Note: 2 We test the H direction and V direction and V direction is worse.

**GSM850**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	-10.45	2.42	8.45	2.15	36.82	30.25	38.45	8.20	V
190	-10.22	2.46	8.45	2.15	36.82	30.44	38.45	8.01	V
251	-10.21	2.53	8.36	2.15	36.82	30.29	38.45	8.16	V

**GPRS850**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	-10.56	2.42	8.45	2.15	36.82	30.14	38.45	8.31	V
190	-10.40	2.46	8.45	2.15	36.82	30.26	38.45	8.19	V
251	-10.43	2.53	8.36	2.15	36.82	30.07	38.45	8.38	V

**EGPRS850**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	-18.02	2.42	8.45	2.15	36.82	22.68	38.45	15.77	V
190	-17.88	2.46	8.45	2.15	36.82	22.78	38.45	15.67	V
251	-18.14	2.53	8.36	2.15	36.82	22.36	38.45	16.09	V

**PCS1900**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
512	-13.38	3.41	10.24	33.6	27.05	33.01	5.96	V
661	-12.80	3.49	10.24	33.6	27.55	33.01	5.46	V
810	-12.92	3.55	10.23	33.6	27.36	33.01	5.65	V

**GPRS1900**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
512	-13.45	3.41	10.24	33.6	26.98	33.01	6.03	V
661	-13.34	3.49	10.24	33.6	27.01	33.01	6.00	V
810	-13.41	3.55	10.23	33.6	26.87	33.01	6.14	V

**EGPRS1900**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
512	-17.78	3.41	10.24	33.6	22.65	33.01	10.36	V
661	-17.57	3.49	10.24	33.6	22.78	33.01	10.23	V
810	-17.69	3.55	10.23	33.6	22.59	33.01	10.42	V

**WCDMA BAND II**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
9262	-20.67	3.42	10.24	33.6	19.75	33.01	13.26	V
9400	-20.37	3.49	10.24	33.6	19.98	33.01	13.03	V
9538	-20.62	3.54	10.23	33.6	19.67	33.01	13.34	V

**WCDMA BAND IV**

Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1312	-21.05	3.15	9.58	33.6	18.98	30	11.02	V
1413	-20.87	3.17	9.62	33.6	19.18	30	10.82	V
1513	-21.27	3.26	9.71	33.6	18.78	30	11.22	V

**WCDMA BAND V**

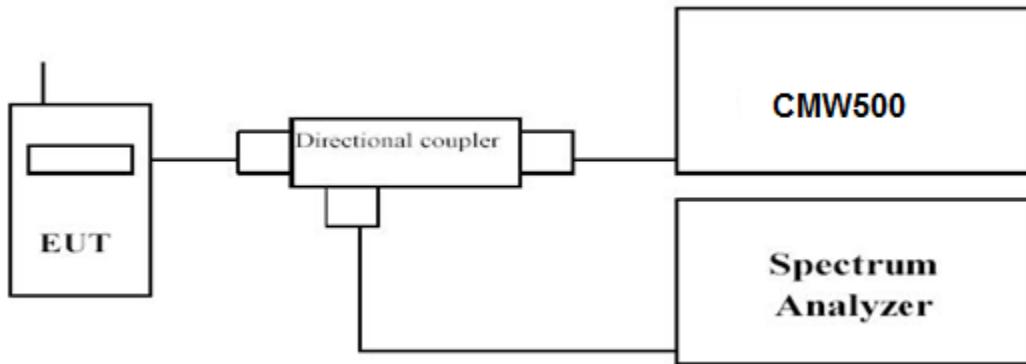
Channel	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4132	-21.63	2.43	8.45	2.15	36.82	19.06	38.45	19.39	V
4183	-21.55	2.46	8.45	2.15	36.82	19.11	38.45	19.34	V
4233	-21.27	2.52	8.36	2.15	36.82	19.24	38.45	19.21	V

## 3.2 Occupied Bandwidth

### LIMIT

N/A

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW,  $VBW \geq 3$  times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

### TEST RESULTS

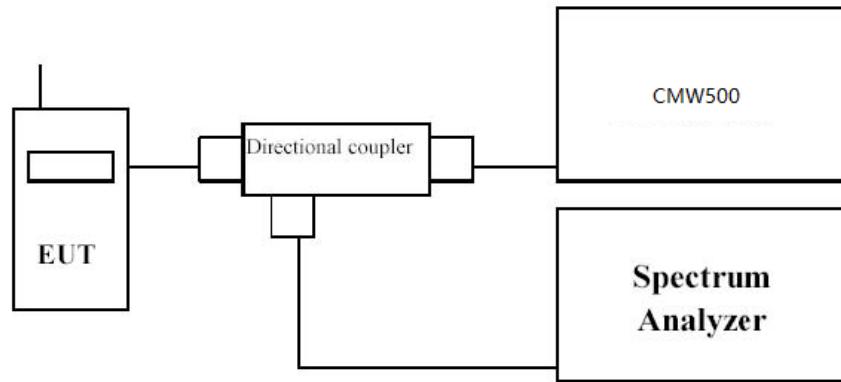
Raw data reference to the appendix.

### 3.3 Band Edge compliance

#### LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10\log (P)$  dB.

#### TEST CONFIGURATION



#### TEST PROCEDURE

In the 1MHz 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 measure the out of band Emissions.

#### TEST RESULTS

Raw data reference to the appendix.

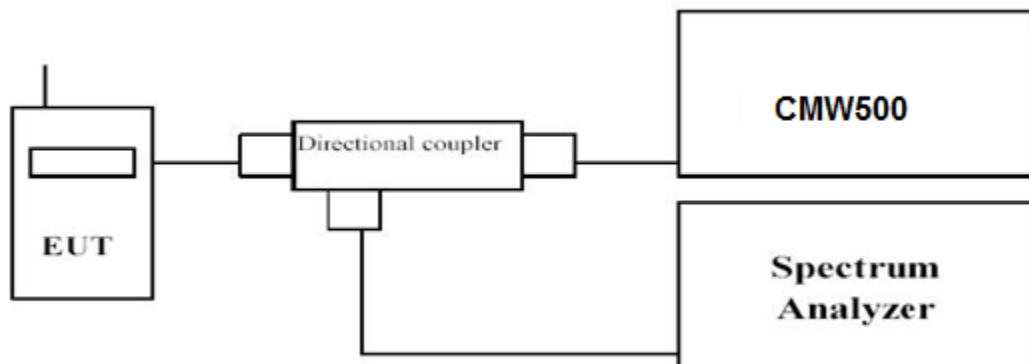
## 3.4 Spurious Emission

### LIMIT

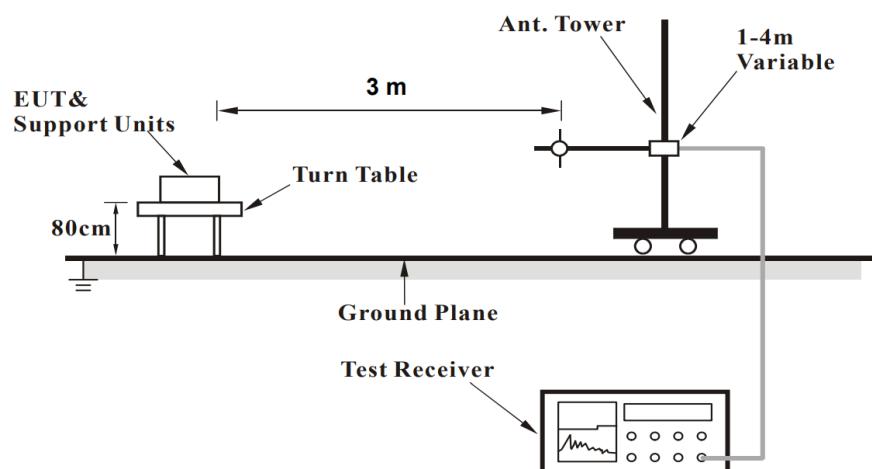
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10\log(P)$  dB.

### TEST CONFIGURATION

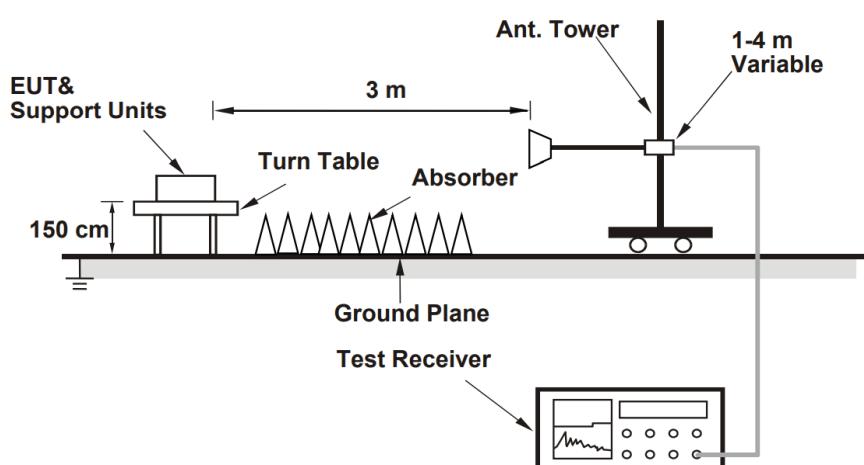
Conducted Spurious Measurement:



Radiated Measurement below 1GHz:



Radiated Measurement above 1GHz:



## **TEST PROCEDURE**

The EUT was setup according to ANSI C63.26:2015

### **Conducted Spurious Measurement:**

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- c) EUT Communicate with CMW500 then selects a channel for testing.
- d) Add a correction factor to the display of spectrum, and then test.
- e) The resolution bandwidth of the spectrum analyzer was set at 1MHz for Part 22 and 1MHz for Part 24, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

### **Radiated Spurious Measurement:**

- a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q) The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.

**TEST RESULTS****Conducted Measurement result: Pass**

Raw data reference to the appendix.

**Radiated Measurement:****GSM850**

Channel	Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	1648.40	-30.32	3.00	3.00	9.58	-23.74	-13.00	10.74	H
	2472.60	-33.25	3.47	3.00	10.72	-26.00	-13.00	13.00	H
	1648.40	-28.73	3.00	3.00	9.68	-22.05	-13.00	9.05	V
	2472.60	-31.74	3.47	3.00	10.72	-24.49	-13.00	11.49	V
190	1673.20	-32.67	3.14	3.00	9.61	-26.20	-13.00	13.20	H
	2509.80	-36.37	3.59	3.00	10.77	-29.19	-13.00	16.19	H
	1673.20	-30.33	3.14	3.00	9.61	-23.86	-13.00	10.86	V
	2509.80	-34.93	3.59	3.00	10.77	-27.75	-13.00	14.75	V
251	1697.60	-31.35	3.26	3.00	9.77	-24.84	-13.00	11.84	H
	2546.40	-35.46	3.69	3.00	10.89	-28.26	-13.00	15.26	H
	1697.60	-29.21	3.26	3.00	9.77	-22.70	-13.00	9.70	V
	2546.40	-34.43	3.69	3.00	10.89	-27.23	-13.00	14.23	V

**PCS1900**

Channel	Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
512	3700.40	-32.40	4.25	3.00	12.34	-24.31	-13.00	11.31	H
	5550.60	-36.86	4.97	3.00	13.52	-28.31	-13.00	15.31	H
	3700.40	-31.05	4.25	3.00	12.34	-22.96	-13.00	9.96	V
	5550.60	-35.78	4.97	3.00	13.52	-27.23	-13.00	14.23	V
661	3760.00	-31.59	4.38	3.00	12.34	-23.63	-13.00	10.63	H
	5640.00	-35.26	5.01	3.00	13.58	-26.69	-13.00	13.69	H
	3760.00	-30.24	4.38	3.00	12.34	-22.28	-13.00	9.28	V
	5640.00	-33.72	5.01	3.00	13.58	-25.15	-13.00	12.15	V
810	3819.60	-33.37	4.49	3.00	12.45	-25.41	-13.00	12.41	H
	5729.40	-36.41	5.26	3.00	13.66	-28.01	-13.00	15.01	H
	3819.60	-32.18	4.49	3.00	12.45	-24.22	-13.00	11.22	V
	5729.40	-34.92	5.26	3.00	13.66	-26.52	-13.00	13.52	V

**WCDMA Band II**

Channel	Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
9262	3704.80	-37.88	4.27	3.00	12.34	-29.81	-13.00	16.81	H
	5557.20	-41.40	4.99	3.00	13.52	-32.87	-13.00	19.87	H
	3704.80	-35.49	4.27	3.00	12.34	-27.42	-13.00	14.42	V
	5557.20	-38.98	4.99	3.00	13.52	-30.45	-13.00	17.45	V
9400	3760.00	-37.72	4.38	3.00	12.34	-29.76	-13.00	16.76	H
	5640.00	-40.57	5.01	3.00	13.58	-32.00	-13.00	19.00	H
	3760.00	-36.53	4.38	3.00	12.34	-28.57	-13.00	15.57	V
	5640.00	-39.50	5.01	3.00	13.58	-30.93	-13.00	17.93	V
9538	3815.20	-38.87	4.47	3.00	12.45	-30.89	-13.00	17.89	H
	5722.80	-42.85	5.23	3.00	13.66	-34.42	-13.00	21.42	H
	3815.20	-36.52	4.47	3.00	12.45	-28.54	-13.00	15.54	V
	5722.80	-40.35	5.23	3.00	13.66	-31.92	-13.00	18.92	V

**WCDMA Band IV**

Channel	Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1312	3424.80	-38.62	3.98	3.00	10.98	-31.62	-13.00	18.62	H
	5137.20	-41.90	4.11	3.00	11.47	-34.54	-13.00	21.54	H
	3424.80	-37.30	3.98	3.00	10.98	-30.30	-13.00	17.30	V
	5137.20	-40.16	4.11	3.00	11.47	-32.80	-13.00	19.80	V
1413	3465.20	-37.42	4.01	3.00	11.25	-30.18	-13.00	17.18	H
	5197.80	-40.61	4.15	3.00	11.58	-33.18	-13.00	20.18	H
	3465.20	-35.97	4.01	3.00	11.25	-28.73	-13.00	15.73	V
	5197.80	-38.66	4.15	3.00	11.58	-31.23	-13.00	18.23	V
1513	3505.20	-37.94	4.07	3.00	11.33	-30.68	-13.00	17.68	H
	5275.80	-42.09	4.21	3.00	11.67	-34.63	-13.00	21.63	H
	3505.20	-36.41	4.07	3.00	11.33	-29.15	-13.00	16.15	V
	5275.80	-40.91	4.21	3.00	11.67	-33.45	-13.00	20.45	V

**WCDMA Band V**

Channel	Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4132	1652.80	-35.63	3.02	3.00	9.58	-29.07	-13.00	16.07	H
	2479.20	-39.98	3.51	3.00	10.72	-32.77	-13.00	19.77	H
	1652.80	-33.90	3.02	3.00	9.68	-27.24	-13.00	14.24	V
	2479.20	-38.19	3.51	3.00	10.72	-30.98	-13.00	17.98	V
4182	1673.20	-32.56	3.14	3.00	9.61	-26.09	-13.00	13.09	H
	2509.80	-35.83	3.59	3.00	10.77	-28.65	-13.00	15.65	H
	1673.20	-30.45	3.14	3.00	9.61	-23.98	-13.00	10.98	V
	2509.80	-34.57	3.59	3.00	10.77	-27.39	-13.00	14.39	V
4233	1693.20	-37.86	3.24	3.00	9.77	-31.33	-13.00	18.33	H
	2539.80	-40.74	3.65	3.00	10.89	-33.50	-13.00	20.50	H
	1693.20	-35.60	3.24	3.00	9.77	-29.07	-13.00	16.07	V
	2539.80	-38.37	3.65	3.00	10.89	-31.13	-13.00	18.13	V

**Remark:**

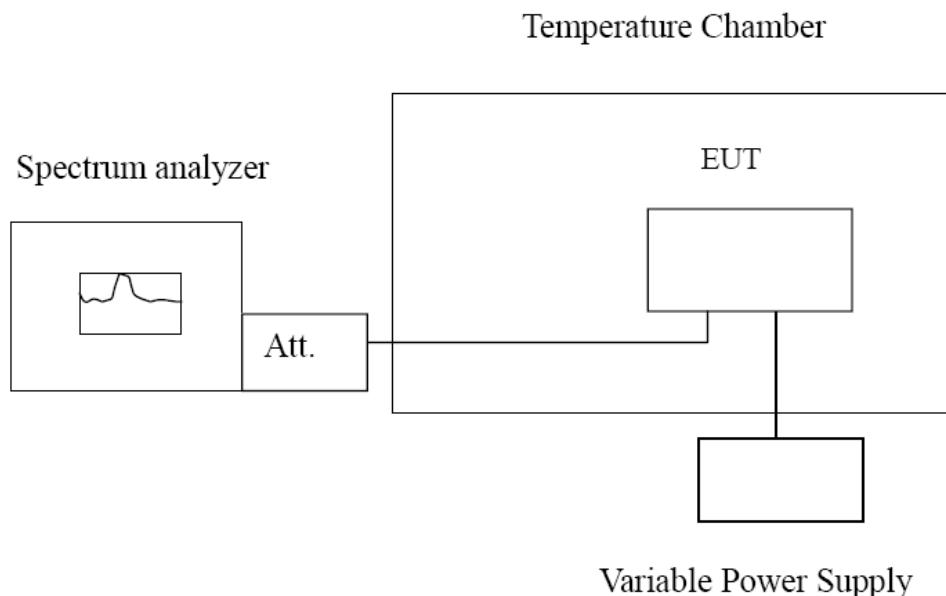
1.  $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)$
2. Margin = Limit – EIRP
3. Other emission levels are attenuated 20dB below the limit and not recorded in report.

### 3.5 Frequency Stability under Temperature & Voltage Variations

#### LIMIT

FCC: Cellular Band:  $\pm 2.5\text{ppm}$  PCS Band: Within the authorized frequency block

#### TEST CONFIGURATION



#### TEST PROCEDURE

The EUT was setup according to ANSI C63.26:2015

##### **Frequency Stability under Temperature Variations:**

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

##### **Frequency Stability under Voltage Variations:**

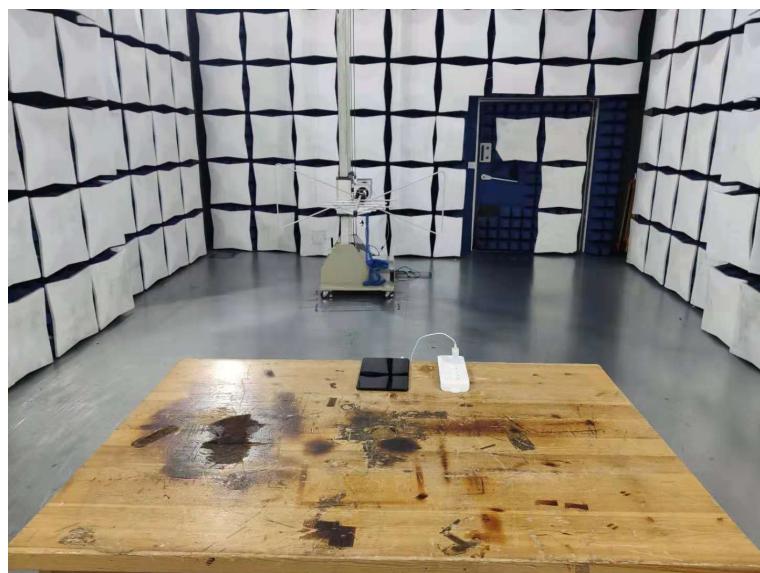
Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

#### TEST RESULTS

Raw data reference to the appendix.

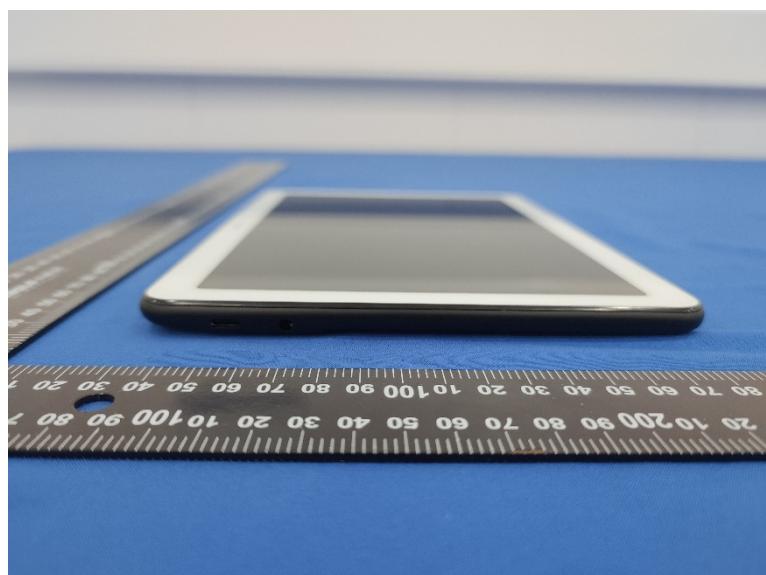
## 4 Test Setup Photos of the EUT

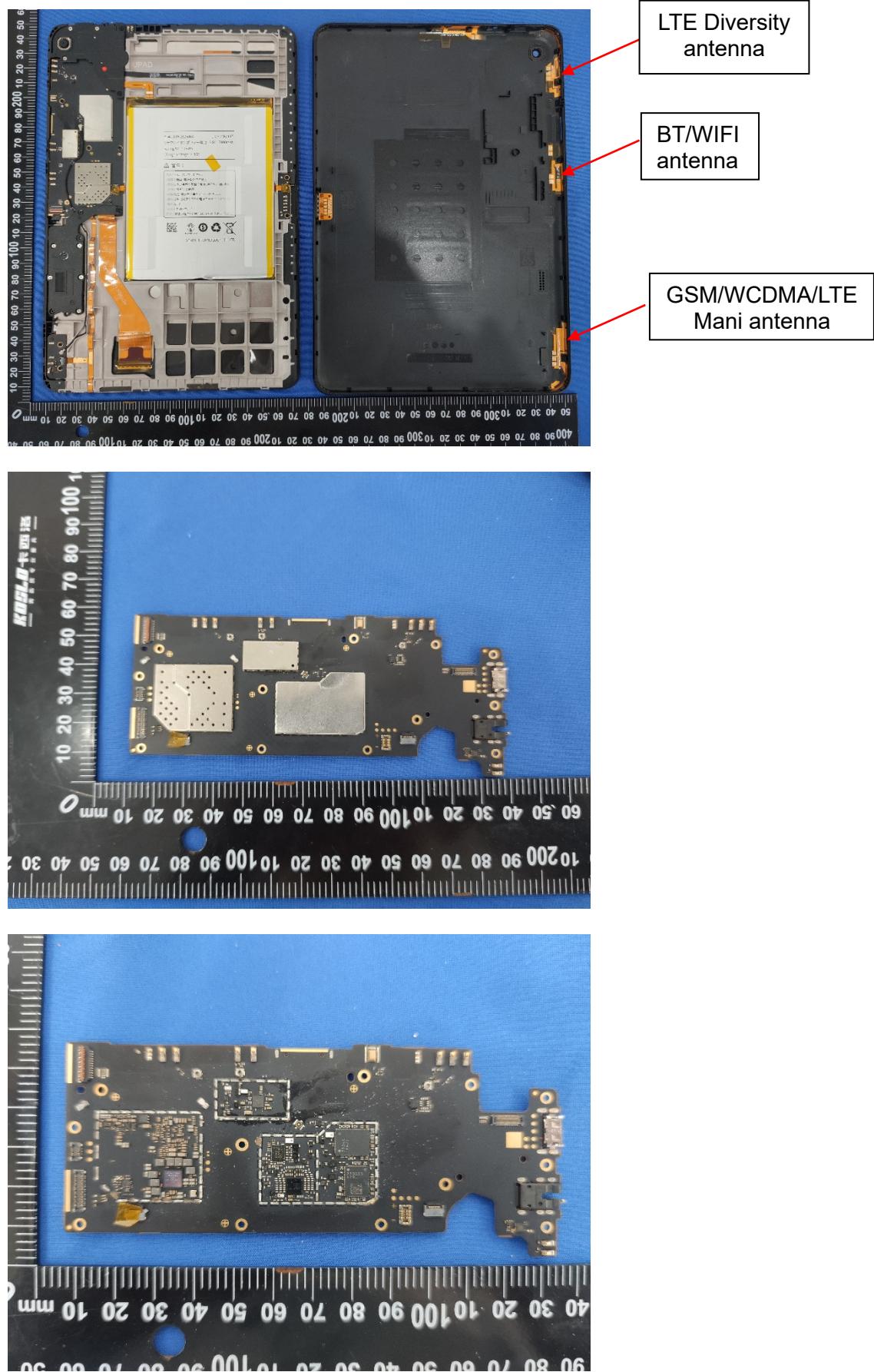


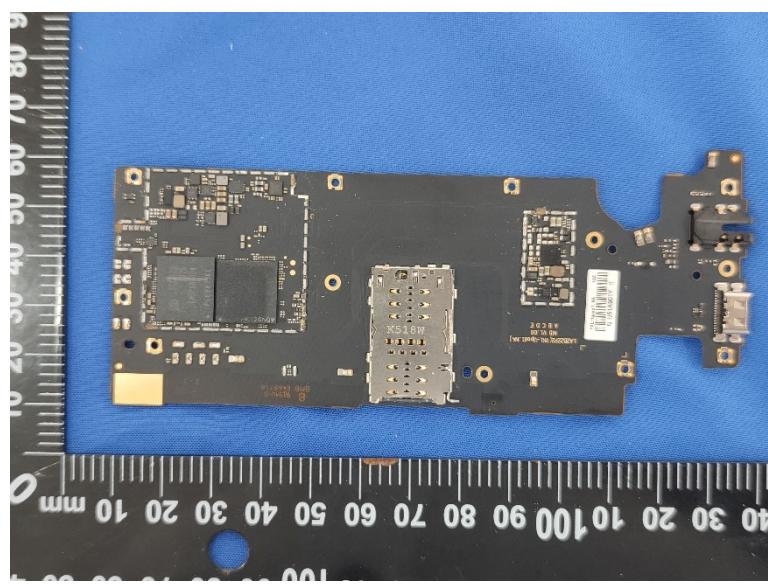
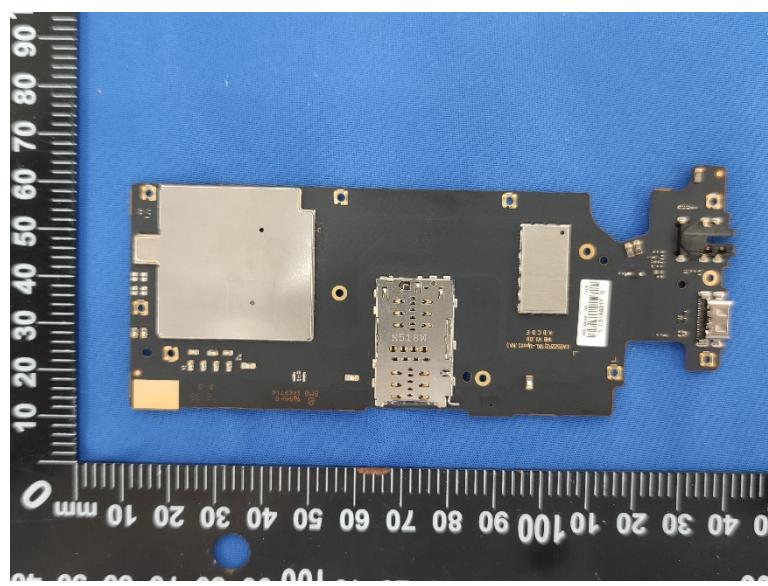
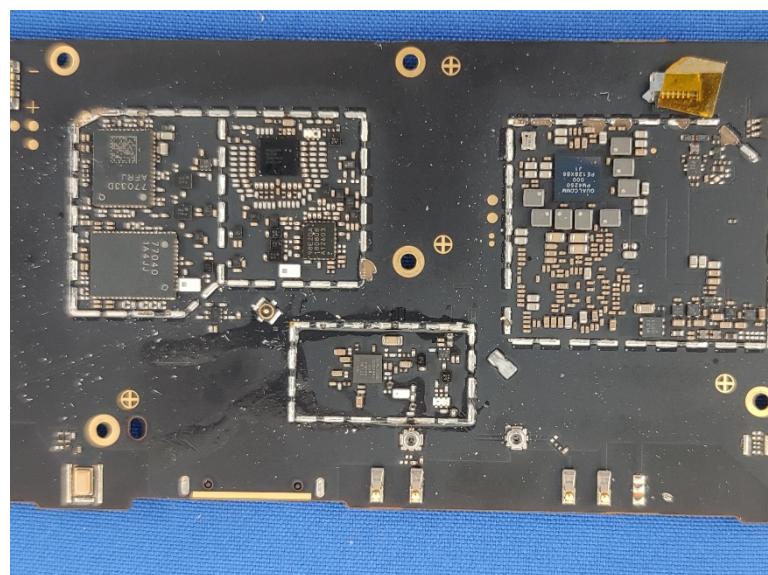
## 5 External and Internal Photos of the EUT

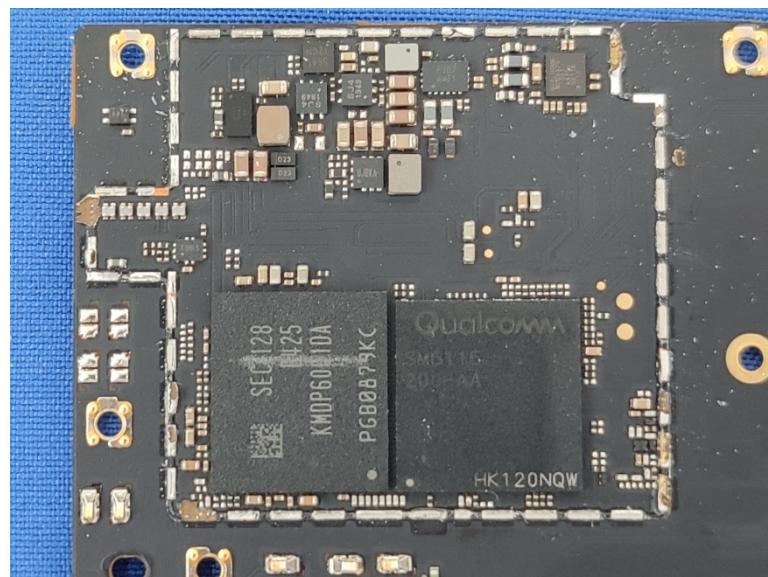
### External Photos of EUT





Internal Photos of EUT





\*\*\*\*\* End of Report \*\*\*\*\*