Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC Part 24 Subpart E

Report Reference No. ..... :	**CTL2110275011-WF03**	
Compiled by: (position+printed name+signature)	Happy Guo (File administrators)	Happy Guo
Tested by: (position+printed name+signature)	Gary Gao (Test Engineer)	Gary Gao
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

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 24E** **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**

TEST REPORT

Test Report No. :	CTL2110275011-WF03	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

Test result	Pass *

*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 **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2021-11-19	CTL2110275011-WF03	Tracy Qi

Table of Contents Page

1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:
FCC Part 24: PUBLIC MOBILE SERVICES
ANSI C63.26:2015: American National Standard of procedures for compliance testing of transmitters used in licensed radio services.
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
KDB971168 D01:v03r01 MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS
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

1.2. Test Description

Test Item	Section in CFR 47	Result
RF Output Power	2.1046	Pass
Effective Radiated Power	24.232 (c)	
Peak-to-Average Ratio	24.232 (d)	Pass
99% & -26 dB Occupied Bandwidth	2.1049	Pass
Spurious Emissions at Antenna Terminal	2.1051 24.238 (a)	Pass
Field Strength of Spurious Radiation	2.1053 24.238 (a)	Pass
Out of band emission, Band Edge	24.238 (a)	Pass
Frequency stability	2.1055 24.235	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. 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 Disturbance0.15~30MHz	±3.20dB	(1)

(2) 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
LTE	
Operation Band:	FDD-LTE:Band 2/4/5/7/12/13/17/26 TDD-LTE:Band 41
Modulation Type:	QPSK, 16QAM
Release Version:	Release 9
Category:	Cat 4
Antenna Type:	FPC antenna
Antenna gain:	LTE band 2: -3.76dBi LTE band 4: -2.67dBi LTE band 5/26: -4.36dBi LTE band 7: -6.03dBi LTE band 12/17:-6.71dBi LTE band 13:-6.00dBi LTE band 41:-5.54dBi

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

2.3. Description of Test Modes

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.

Exploratory scan was performed at the EUT configured in each combination of channel, channel bandwidth, RB Configuration and RB location refer to 3GPP TS136 521. And found the test configuration list below was the worst-case mode for each item and reported in this report.

Test Items		Nodulation		Bandwidth						RB			Test Channel		
		QPSK	16 QAM	1.4	3	5	10	15	20	1	50 %	100 %	L	M	H
RF Output Power	LTE B2	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Effective Radiated Power	LTE B2	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Peak-to-Average Ratio	LTE B2	■	■	■	■	■	■	■	■	■		■	■	■	■
99% & -26 dB Occupied Bandwidth	LTE B2	■	■	■	■	■	■	■	■			■	■	■	■
Spurious Emissions at Antenna Terminal	LTE B2	■	■	■	■	■	■	■	■	■			■	■	■
Field Strength of Spurious Radiation	LTE B2	■		■					■	■			■	■	■
Out of band emission, Band Edge	LTE B2	■	■	■	■	■	■	■	■			■	■	■	■
Frequency stability	LTE B2	■	■	■	■	■	■	■	■			■	■	■	■

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	2021/05/19	2022/05/18
Bilog Antenna	Sunol Sciences Corp.	JB1	A061714	2021/05/19	2022/05/18
EMI Test Receiver	R&S	ESCI	103710	2021/05/19	2022/05/18
Spectrum Analyzer	Agilent	N9020	US46220290	2021/05/19	2022/05/18
Controller	EM Electronics	Controller EM 1000	N/A	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	SCHWARZBECK	FMZB1519	1519-037	2021/05/19	2022/05/18
Amplifier	Agilent	8349B	3008A02306	2021/05/19	2022/05/18
Amplifier	Agilent	8447D	2944A10176	2021/05/19	2022/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2021/05/19	2022/05/18
Radio Communication Tester	R&S	CMW500	101184	2021/05/19	2022/05/18
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2021/05/19	2022/05/18
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2021/05/19	2022/05/18
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	2021/05/19	2022/05/18
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2021/05/19	2022/05/18
Coaxial Cables	HUBER+SUHNER	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 the Part 24 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

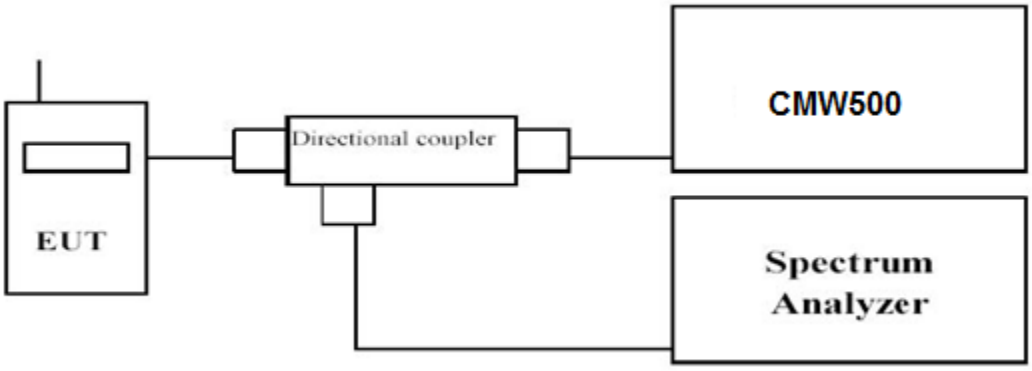
3.1. Output Power

LIMIT

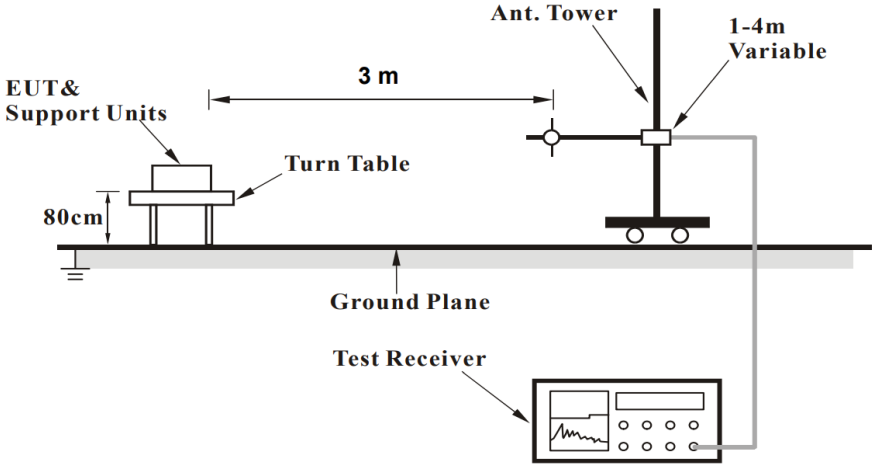
Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications

TEST CONFIGURATION

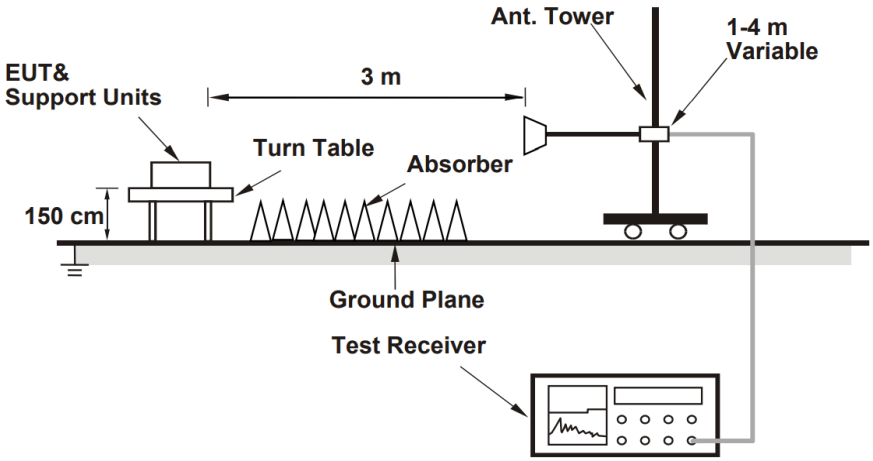
Conducted Power Measurement



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.
q) Test site anechoic chamber refer to ANSI C63.4.

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.

LTE FDD Band 2_Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.7	-20.01	3.41	10.23	33.60	20.41	33.01	12.60	V
1880.0	-19.11	3.49	10.23	33.60	21.23	33.01	11.78	V
1909.3	-19.31	3.55	10.25	33.60	20.99	33.01	12.02	V

LTE FDD Band 2_Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.5	-19.56	3.41	10.23	33.60	20.86	33.01	12.15	V
1880.0	-19.16	3.49	10.23	33.60	21.18	33.01	11.83	V
1908.5	-19.62	3.55	10.25	33.60	20.68	33.01	12.33	V

LTE FDD Band 2_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.5	-19.24	3.41	10.23	33.60	21.18	33.01	11.83	V
1880.0	-19.36	3.49	10.23	33.60	20.98	33.01	12.03	V
1907.5	-18.91	3.55	10.25	33.60	21.39	33.01	11.62	V

LTE FDD Band 2_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.0	-19.91	3.41	10.23	33.60	20.51	33.01	7.60	V
1880.0	-19.01	3.49	10.23	33.60	21.33	33.01	7.65	V
1905.0	-19.42	3.55	10.25	33.60	20.88	33.01	7.49	V

LTE FDD Band 2_Channel Bandwidth 15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.5	-19.76	3.41	10.23	33.60	20.66	33.01	12.35	V
1880.0	-19.50	3.49	10.23	33.60	20.84	33.01	12.17	V
1902.5	-19.04	3.55	10.25	33.60	21.26	33.01	11.75	V

LTE FDD Band 2_Channel Bandwidth 20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.0	-19.76	3.41	10.23	33.60	20.66	33.01	12.35	V
1880.0	-19.52	3.49	10.23	33.60	20.82	33.01	12.19	V
1900.0	-19.83	3.55	10.25	33.60	20.47	33.01	12.54	V

LTE FDD Band 2_Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.7	-20.27	3.41	10.23	33.60	20.15	33.01	12.86	V
1880.0	-20.36	3.49	10.23	33.60	19.98	33.01	13.03	V
1909.3	-21.03	3.55	10.25	33.60	19.27	33.01	13.74	V

LTE FDD Band 2_Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.5	-20.82	3.41	10.23	33.60	19.60	33.01	13.41	V
1880.0	-20.26	3.49	10.23	33.60	20.08	33.01	12.93	V
1908.5	-20.64	3.55	10.25	33.60	19.66	33.01	13.35	V

LTE FDD Band 2_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.5	-21.22	3.41	10.23	33.60	19.2	33.01	13.81	V
1880.0	-21.19	3.49	10.23	33.60	19.15	33.01	13.86	V
1907.5	-20.81	3.55	10.25	33.60	19.49	33.01	13.52	V

LTE FDD Band 2_Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.0	-20.58	3.41	10.23	33.60	19.84	33.01	13.17	V
1880.0	-20.42	3.49	10.23	33.60	19.92	33.01	13.09	V
1905.0	-20.69	3.55	10.25	33.60	19.61	33.01	13.40	V

LTE FDD Band 2_Channel Bandwidth 15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.5	-20.48	3.41	10.23	33.60	19.94	33.01	13.07	V
1880.0	-20.51	3.49	10.23	33.60	19.83	33.01	13.18	V
1902.5	-20.88	3.55	10.25	33.60	19.42	33.01	13.59	V

LTE FDD Band 2_Channel Bandwidth 20MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.0	-21.09	3.41	10.23	33.60	19.33	33.01	13.68	V
1880.0	-20.44	3.49	10.23	33.60	19.90	33.01	13.11	V
1900.0	-20.30	3.55	10.25	33.60	20.00	33.01	13.01	V

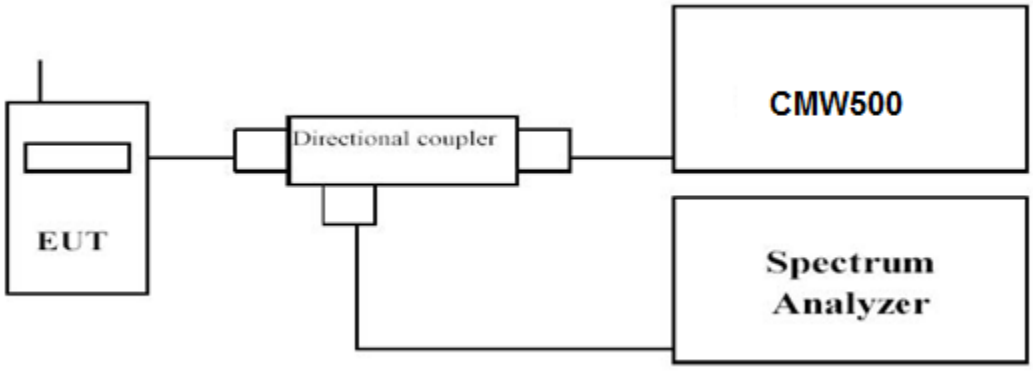
Remark: EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_a(dBi)

3.2. Peak-to-Average Ratio (PAR)

LIMIT

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

TEST CONFIGURATION



TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function.
2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth.
3. Set the number of counts to a value that stabilizes the measured CCDF curve.
4. Set the measurement interval as follows:
   1). for continuous transmissions, set to 1 ms,
   2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

TEST RESULTS

Pass

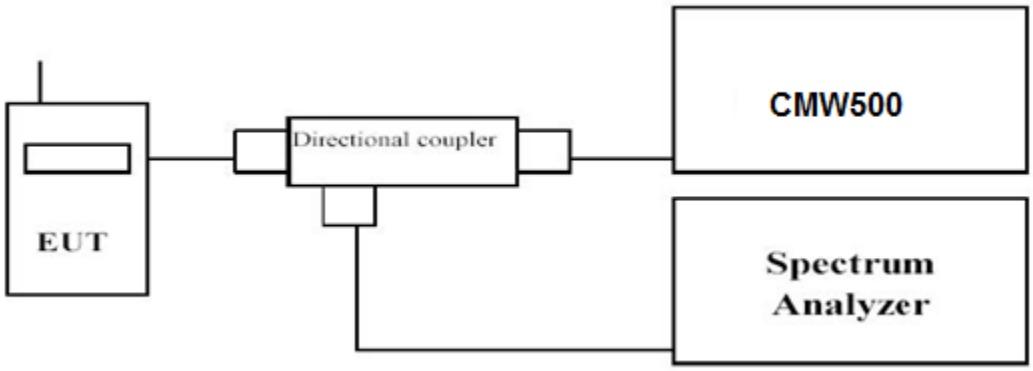
Raw data reference to the appendix.

3.3. Occupied Bandwidth and Emission Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded.
Set RBW was set to about 1% of emission BW, VBW≥3 times RBW.
-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

Pass

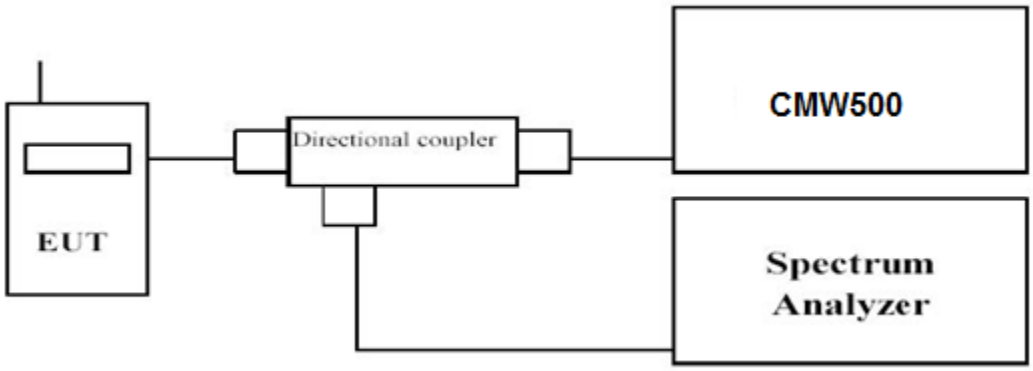
Raw data reference to the appendix.

3.4. Band Edge compliance

LIMIT

According to FCC section 24.238(a), for operations in the 1850–1910MHz bands, 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 in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest and highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum

TEST RESULTS

Pass

Raw data reference to the appendix.

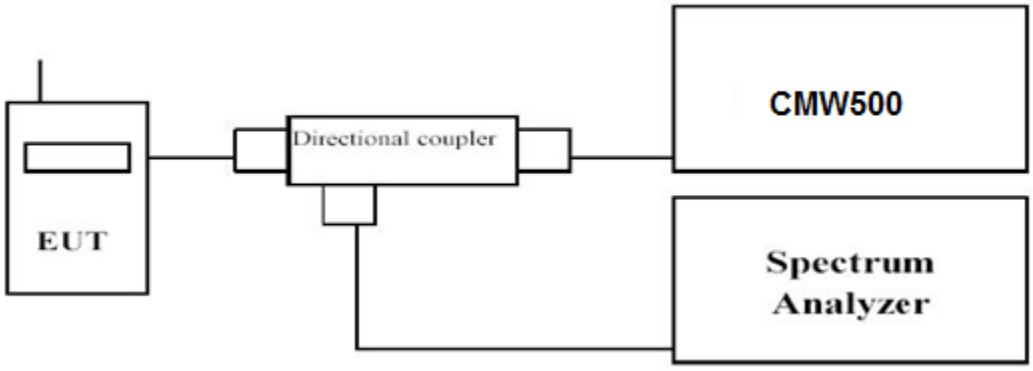
3.5. Spurious Emission

LIMIT

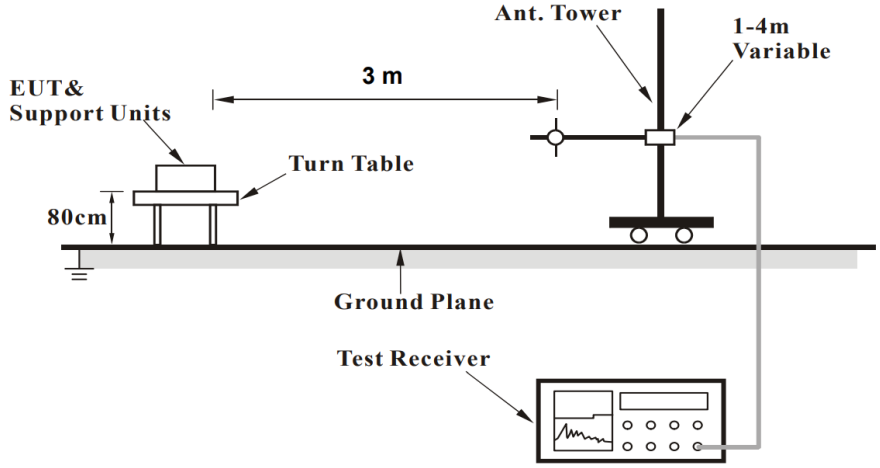
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

TEST CONFIGURATION

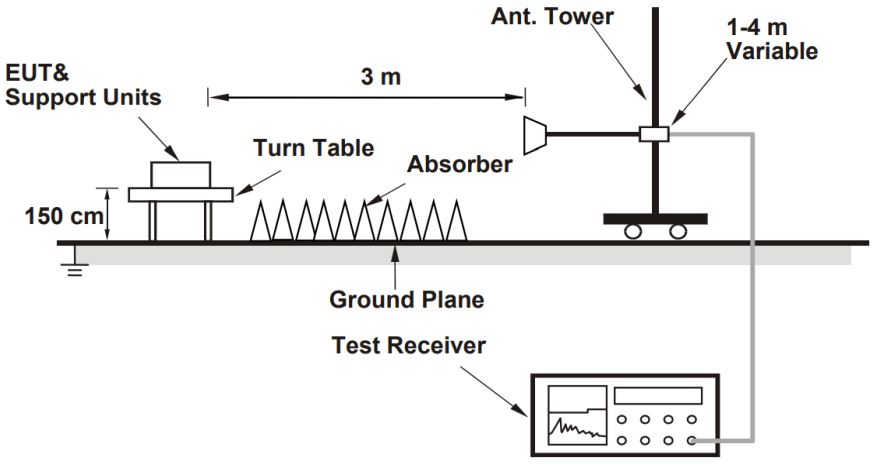
Conducted Power Measurement



Radiated Measurement below 1GHz:



Radiated Measurement above 1GHz:



TEST PROCEDURE

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

Conducted 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 sufficient scans were taken to show the out of band Emission if any up to10th 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.
r. Test site anechoic chamber refer to ANSI C63.

TEST RESULTS

Conducted Measurement result: Pass

Raw data reference to the appendix.

Radiated Measurement:

LTE FDD Band 2_Channel Bandwidth 1.4MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3701.4	-38.97	4.25	3.00	12.34	-30.88	-13.00	17.88	H
5552.1	-41.39	4.97	3.00	13.52	-32.84	-13.00	19.84	H
3701.4	-36.49	4.25	3.00	12.34	-28.40	-13.00	15.40	V
5552.1	-38.66	4.97	3.00	13.52	-30.11	-13.00	17.11	V

LTE FDD Band 2_Channel Bandwidth 1.4MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.0	-39.16	4.38	3.00	12.34	-31.20	-13.00	18.20	H
5640.0	-42.22	5.01	3.00	13.58	-33.65	-13.00	20.65	H
3760.0	-36.26	4.38	3.00	12.34	-28.30	-13.00	15.30	V
5640.0	-39.23	5.01	3.00	13.58	-30.66	-13.00	17.66	V

LTE FDD Band 2_Channel Bandwidth 1.4MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3806.6	-35.57	4.49	3.00	12.45	-27.61	-13.00	14.61	H
5709.9	-37.74	5.26	3.00	13.66	-29.34	-13.00	16.34	H
3806.6	-33.06	4.49	3.00	12.45	-25.10	-13.00	12.10	V
5709.9	-35.54	5.26	3.00	13.66	-27.14	-13.00	14.14	V

LTE FDD Band 2_Channel Bandwidth 20MHz_QPSK_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3715.0	-39.47	4.25	3.00	12.34	-31.38	-13.00	18.38	H
5572.5	-42.64	4.97	3.00	13.52	-34.09	-13.00	21.09	H
3715.0	-36.88	4.25	3.00	12.34	-28.79	-13.00	15.79	V
5572.5	-39.76	4.97	3.00	13.52	-31.21	-13.00	18.21	V

LTE FDD Band 2_Channel Bandwidth 20MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3720.0	-37.03	4.38	3.00	12.34	-29.07	-13.00	16.07	H
5580.0	-39.71	5.01	3.00	13.58	-31.14	-13.00	18.14	H
3720.0	-35.23	4.38	3.00	12.34	-27.27	-13.00	14.27	V
5580.0	-37.90	5.01	3.00	13.58	-29.33	-13.00	16.33	V

LTE FDD Band 2_Channel Bandwidth 20MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3800.0	-37.44	4.49	3.00	12.45	-29.48	-13.00	16.48	H
5700.0	-40.46	5.26	3.00	13.66	-32.06	-13.00	19.06	H
3800.0	-34.82	4.49	3.00	12.45	-26.86	-13.00	13.86	V
5700.0	-37.90	5.26	3.00	13.66	-29.50	-13.00	16.50	V

Remark:

1. EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)

2. Margin = Limit - EIRP

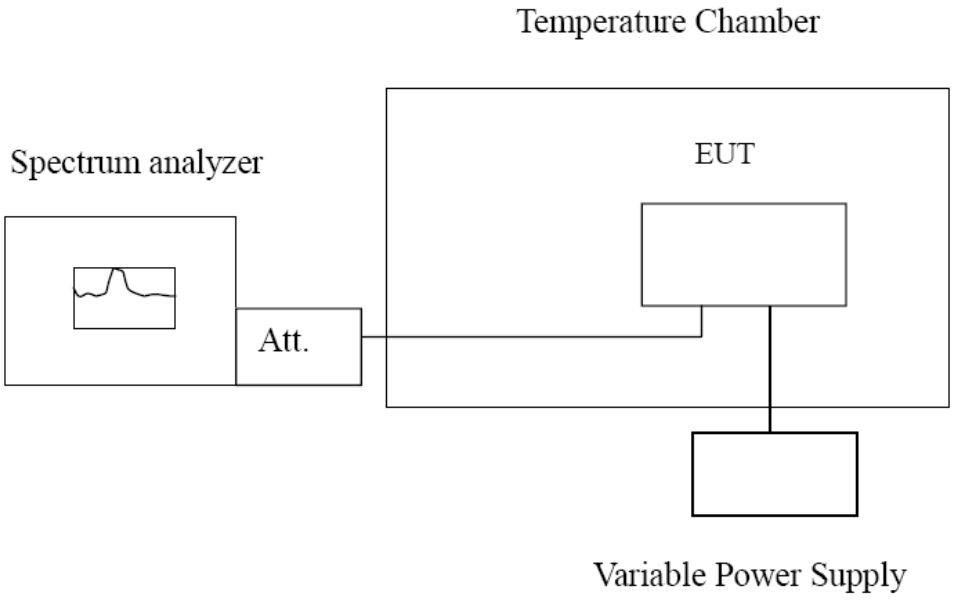
3. Other emission levels are attenuated 20dB below the limit and not recorded in report.

3.6. Frequency Stability under Temperature & Voltage Variations

LIMIT

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST CONFIGURATION



TEST PROCEDURE

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

Frequency Stability under Temperature Variations:
In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 2, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

Frequency Stability under Voltage Variations:
Set chamber temperature to 20℃. 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 (±15%) and endpoint, record the maximum frequency change.

TEST RESULTS

Pass

Raw data reference to the appendix.

4. Test Setup Photos of the EUT

5. Photos of the EUT

Reference to the test report No. CTL2110275011-WF01

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