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TEST REPORT

FCC Part 90R

Report Reference No. ..... : **CTL2104092051-WF05**

Compiled by: (position+printed name+signature)	Happy Guo (File administrators)	Happy Guo
Tested by: (position+printed name+signature)	Gray Gao (Test Engineer)	Gary Gao
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

Product Name ..... :	TD0301 LTE Wi-Fi Hotspot
Model/Type reference ..... :	TD0301
List Model(s)..... :	N/A
Trade Mark..... :	JACS
FCC ID..... :	**2AGCDJACSTD0301**
Applicant's name ..... :	**JACS Solutions, Inc.**
Address of applicant ..... :	809 Pinnacle Drive, Suite R, Linthicum Heights, MD 21090
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 90R** **ANSI/TIA/EIA-603-E:2016** **KDB 971168 D01**
TRF Originator ..... :	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF..... :	Dated 2011-01
Date of receipt of test item ..... :	May. 18, 2021
Date of sampling..... :	May. 18, 2021
Date of Test Date..... :	May. 18, 2021-June. 22, 2021
Data of Issue..... :	June. 25, 2021
Result..... :	Pass

TEST REPORT

Test Report No. :	CTL2104092051-WF05	June. 25, 2021 Date of issue

Equipment under Test	:	TD0301 LTE Wi-Fi Hotspot
Sample No	:	CTL210409205-1-S002
Model /Type	:	TD0301
Listed Models	:	N/A
Applicant	:	**JACS Solutions, Inc.**
Address	:	809 Pinnacle Drive, Suite R, Linthicum Heights, MD 21090
Manufacturer	:	**JACS Solutions, Inc.**
Address	:	809 Pinnacle Drive, Suite R, Linthicum Heights, MD 21090

Test result	Pass *

*In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2021-06-25	CTL2104092051-WF05	Tracy Qi

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:
FCC Part 90: PRIVATE LAND MOBILE RADIO SERVICES
ANSI/TIA/EIA-603-E March 2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
KDB971168 D01:v02r02 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
Test Description

Test Item	Section in CFR 47	Result
RF Output Power	Part 2.1046 Part 90.542(a)(7)	Pass
Spurious Emission	Part 2.1053 Part 90.543(e)(f)	Pass
Peak-to-Average Ratio (PAR)	KDB 971168 D01	Pass
Occupied Bandwidth	Part 2.1049 Part 90.209	Pass
Band Edge compliance	Part 2.1051 Part 90.543	Pass
Frequency Stability	Part 90.539(c)	Pass

1.2. 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 C63.4 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.

1.3. 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	Range	Measurement Uncertainty	Notes
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:	TD0301 LTE Wi-Fi Hotspot		
Model/Type reference:	TD0301		
Power supply:	For AC Adapter Input: AC100-240V~50/60Hz 150mA Output: 5V,1000mA DC 3.7V by Rechargeable Battery 2000mAh/7.4Wh		
Hardware version:	V2.0		
Software version:	TD0301_JACS_V1.0.0		
LTE			
Mode:	LTE Band 14；		
Modulation Type:	QPSK 16QAM		
Operating Frequency Range(S)	Band	Tx(MHz)	Rx(MHz)
	LTE Band14	788~798	758~769
Release Version:	Release 9		
Category:	Cat 4		
Antenna type:	PIFA Antenna		
Antenna gain:	1.0dBi		

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.

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	E4407B	MY41440676	2021/05/19	2022/05/18
Spectrum Analyzer	Agilent	N9020	US46220290	2021/05/19	2022/05/18
Spectrum Analyzer	Keysight	N9020A	MY53420874	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
Wideband Radio Communication Tester	R&S	CMW500	101814	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
RF Cable	HUBER+SUHNER	RG214	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
Power Sensor	Agilent	U2021XA	MY5365004	2021/05/19	2022/05/18
Power Meter	Agilent	U2531A	TW53323507	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 90 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

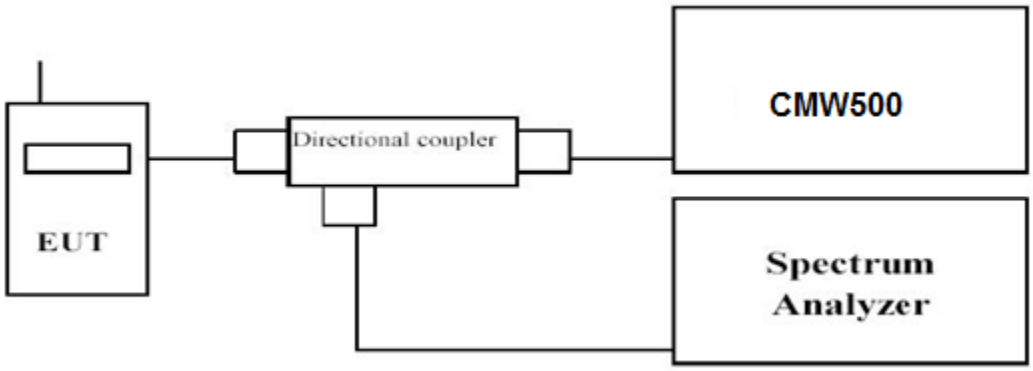
3.1. Output Power

LIMIT

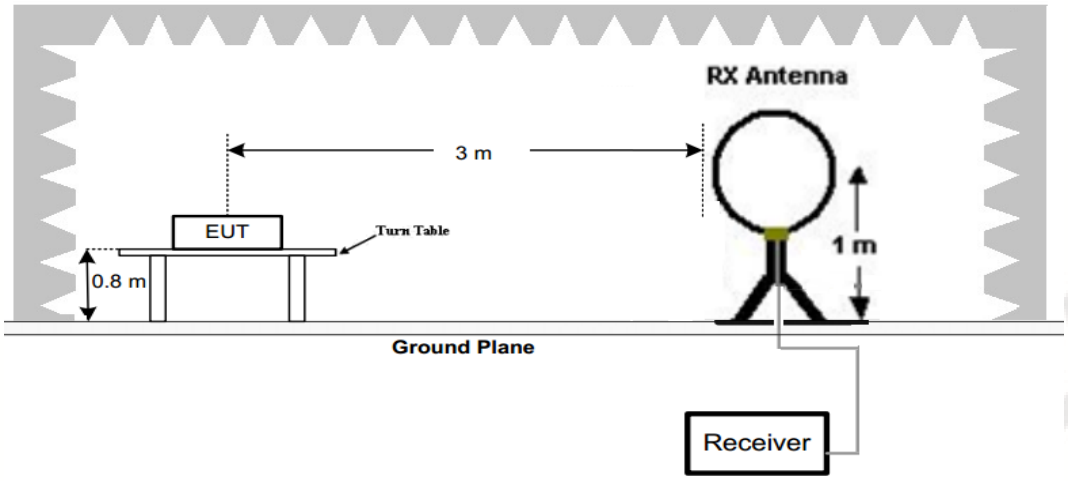
According to §90.542(a) specifies “Control stations and mobile stations transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.”

TEST CONFIGURATION

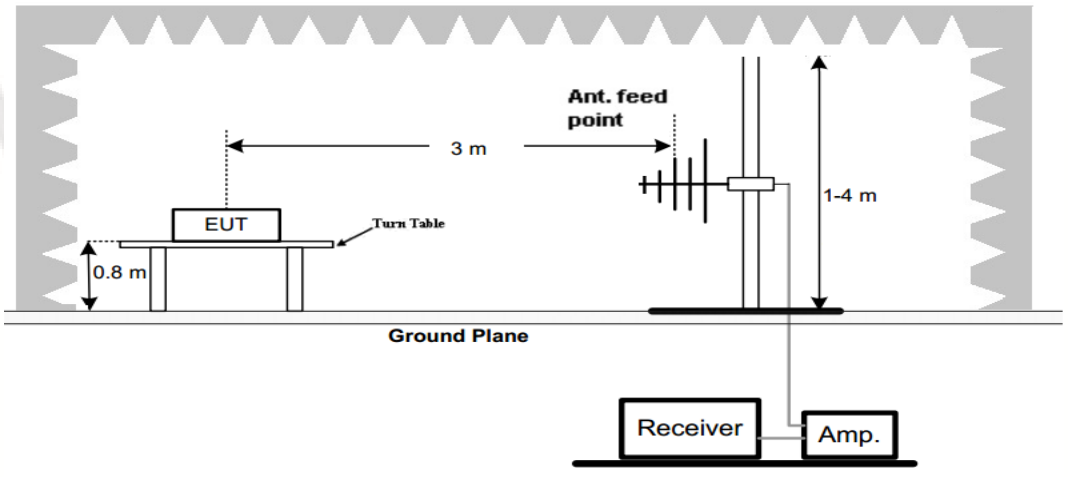
Conducted Power Measurement



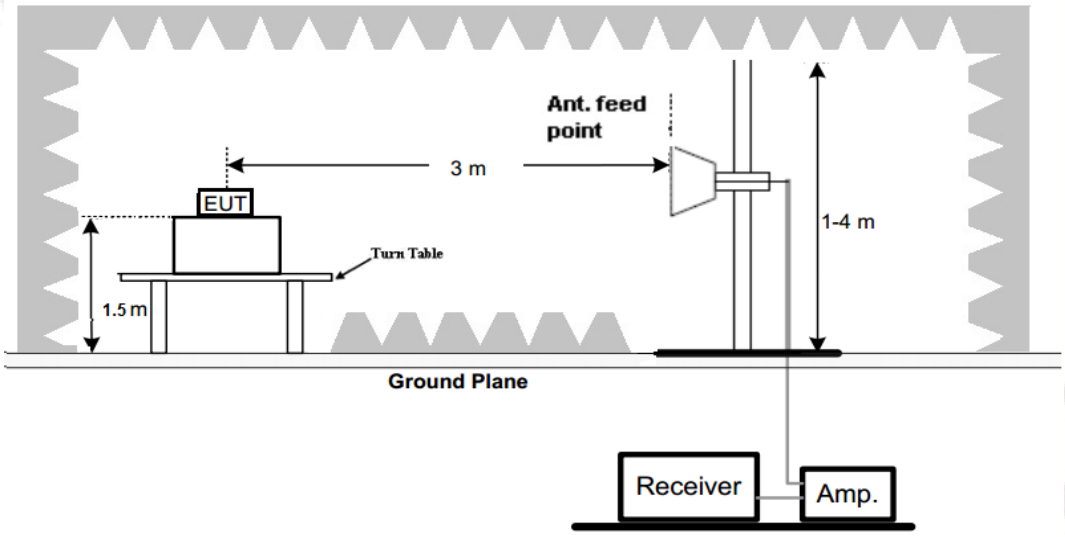
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

The EUT was setup according to ANSI/TIA/EIA-603-E

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 thefrequency 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 Measurement:

please refer to Appendix I: Section I.1

Radiated Measurement:

Channel Bandwidth 5MHz/QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor(dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
Z	20407	790.5	0.21	20.73	18.79	75.68	H
	20525	793.0	-0.14	20.73	18.44	69.82	
	20643	795.5	-1.28	20.73	17.30	53.70	
	20407	790.5	7.28	20.73	25.86	385.48	V
	20525	793.0	7.31	20.73	25.89	388.15	
	20643	795.5	7.07	20.73	25.65	367.28	
Channel Bandwidth 5MHz/16QAM							
Z	20407	790.5	-0.48	20.73	18.10	64.57	H
	20525	793.0	-0.27	20.73	18.31	67.76	
	20643	795.5	-0.45	20.73	18.13	65.01	
	20407	790.5	7.31	20.73	25.89	388.15	V
	20525	793.0	6.96	20.73	25.54	358.10	
	20643	795.5	5.44	20.73	24.02	252.35	

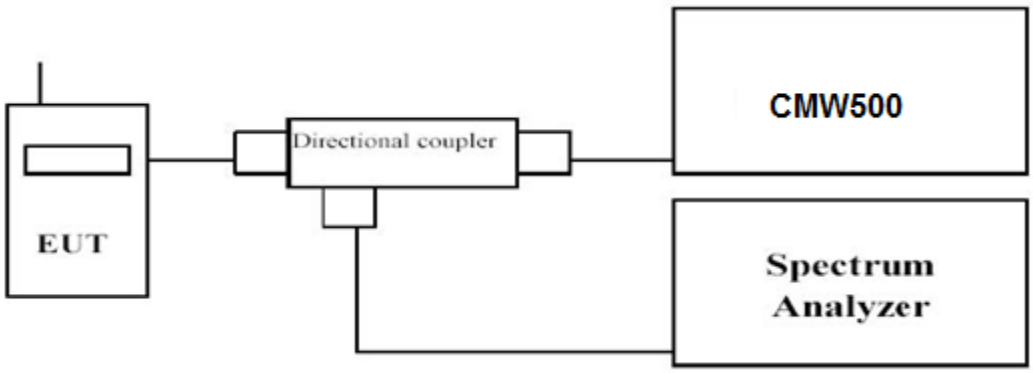
Note: ERP(dBm)= Reading(dBm)+ Correction Factor(dB)-2.15

3.2. Peak-to-Average Ratio (PAR)

LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.in 24.232（d）

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

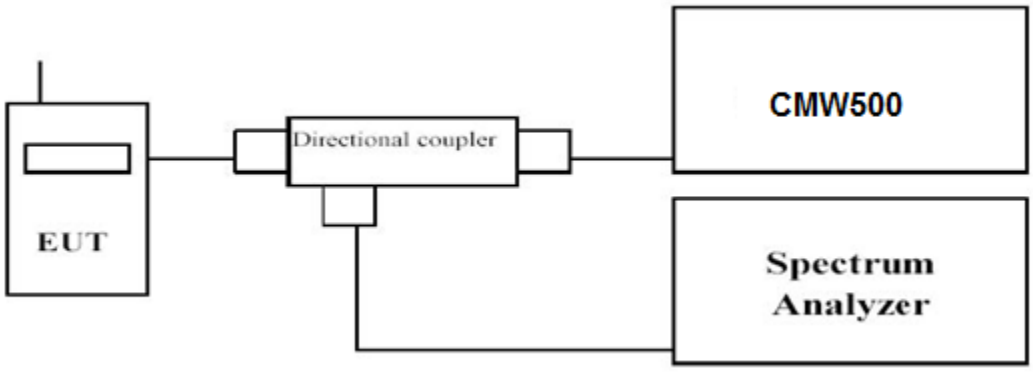
please refer to Appendix I: Section I.4

3.3. Occupied Bandwidth and Emission Bandwidth

LIMIT

No specific occupied bandwidth requirements in part 2.1049.
Part 90.209 (a) Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission at any instant. In those cases where part 2.202 of this chapter does not provide a formula for the computation of necessary bandwidth, the occupied bandwidth, as defined in part 2 of this chapter, may be used in lieu of the necessary bandwidth.

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

please refer to Appendix I: Section I.3

3.4. Band Edge compliance

LIMIT

90.543 Emission limitations (e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.
(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

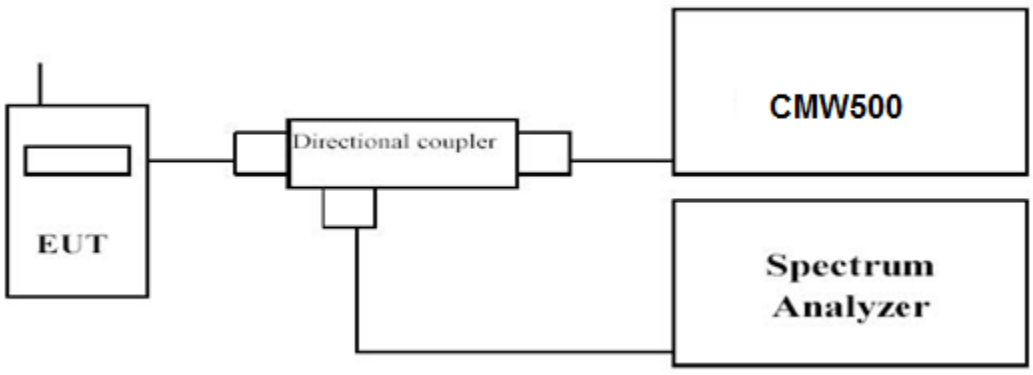
(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

(f) For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

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

please refer to Appendix I: Section I.5

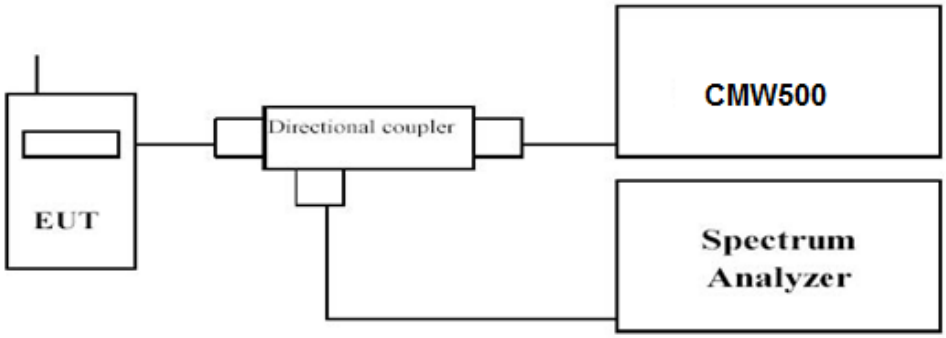
3.5. Spurious Emission

LIMIT

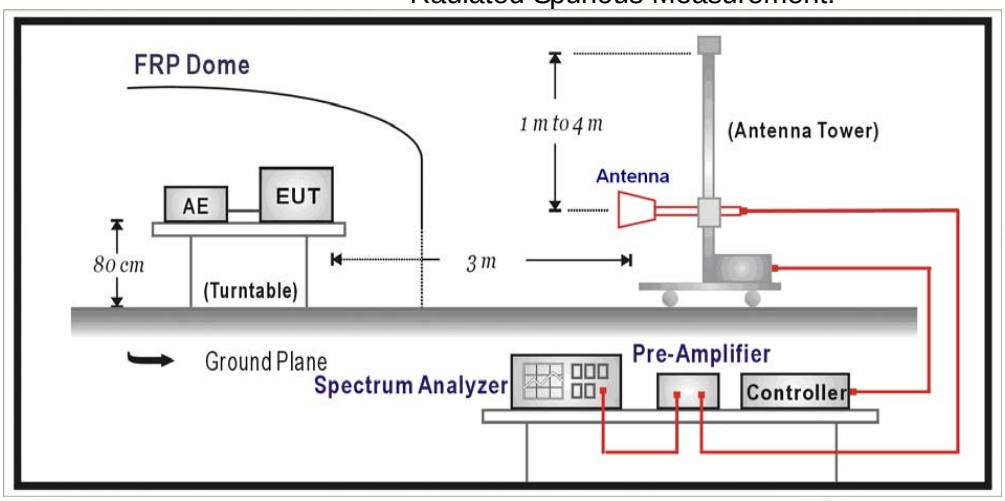
According to Part §22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

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:

please refer to Appendix I: Section I.5

Radiated Measurement:

1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case for each Channel Bandwidth of LTE FDD Band 14 @ QPSK*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)*
3. *We were not recorded other points as values lower than limits.*
4. *Margin = Limit - EIRP*

LTE FDD Band 14_Channel Bandwidth 5MHz_QPSK_ Low Channel

Frequency (MHz)	PMea (dBm)	Distance (m)	Correction Factor(dB) (dB)	Reading (dBm) (dBm)	Limit (dBm)	Margin (dB)	Polarization
1581.0	4.92	3.00	10.45	-38.32	-13.00	-25.32	H
2371.5	5.78	3.00	12.32	-46.10	-13.00	-33.10	H
1581.0	4.92	3.00	10.45	-35.52	-13.00	-22.52	V
2371.5	5.78	3.00	12.32	-46.00	-13.00	-33.00	V

LTE FDD Band 14_Channel Bandwidth 5MHz_QPSK_ Middle Channel

Frequency (MHz)	PMea (dBm)	Distance (m)	Correction Factor(dB) (dB)	Reading (dBm) (dBm)	Limit (dBm)	Margin (dB)	Polarization
1586.0	4.99	3.00	11.12	-38.80	-13.00	-25.80	H
2379.0	5.85	3.00	12.02	-45.54	-13.00	-32.54	H
1586.0	4.99	3.00	11.12	-34.09	-13.00	-21.09	V
2379.0	5.85	3.00	12.02	-41.10	-13.00	-28.10	V

LTE FDD Band 14_Channel Bandwidth 5MHz_QPSK_ High Channel

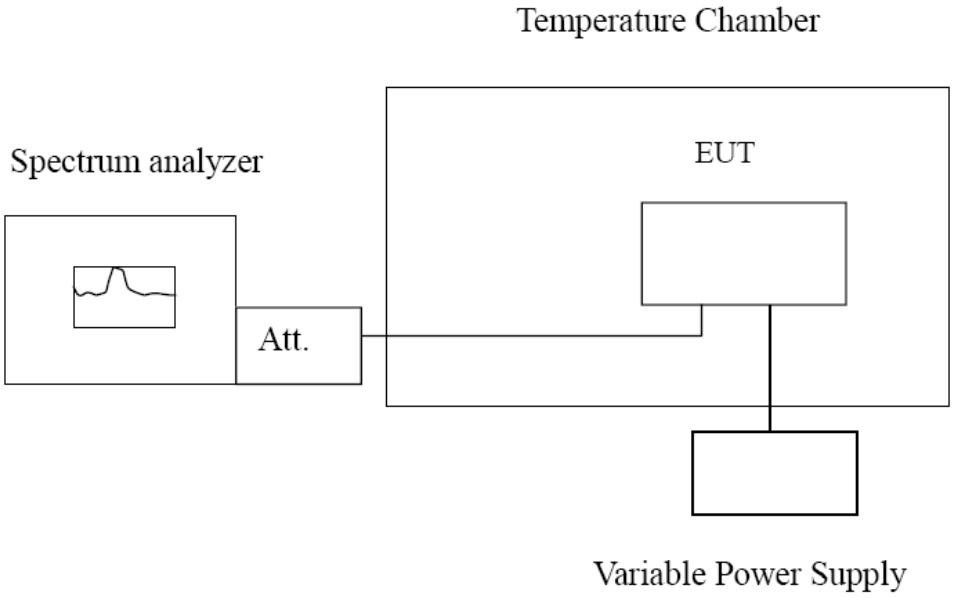
Frequency (MHz)	PMea (dBm)	Distance (m)	Correction Factor(dB) (dB)	Reading (dBm) (dBm)	Limit (dBm)	Margin (dB)	Polarization
1591.0	5.12	3.00	9.98	-40.05	-13.00	-27.05	H
2386.5	5.93	3.00	11.66	-49.21	-13.00	-36.21	H
1591.0	5.12	3.00	9.98	-36.36	-13.00	-23.36	V
2386.5	5.93	3.00	11.66	-49.40	-13.00	-36.40	V

3.6. Frequency Stability under Temperature & Voltage Variations

LIMIT

90.539 (c) The frequency stability of mobile, portable, and control transmitters operating in the narrowband segment must be 400 parts per billion or better when AFC is locked to the base station. When AFC is not locked to the base station, the frequency stability must be at least 1.0 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2 channel aggregate), and 2.5 ppm for 25 kHz (4 channel aggregate).

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

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 5, 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:

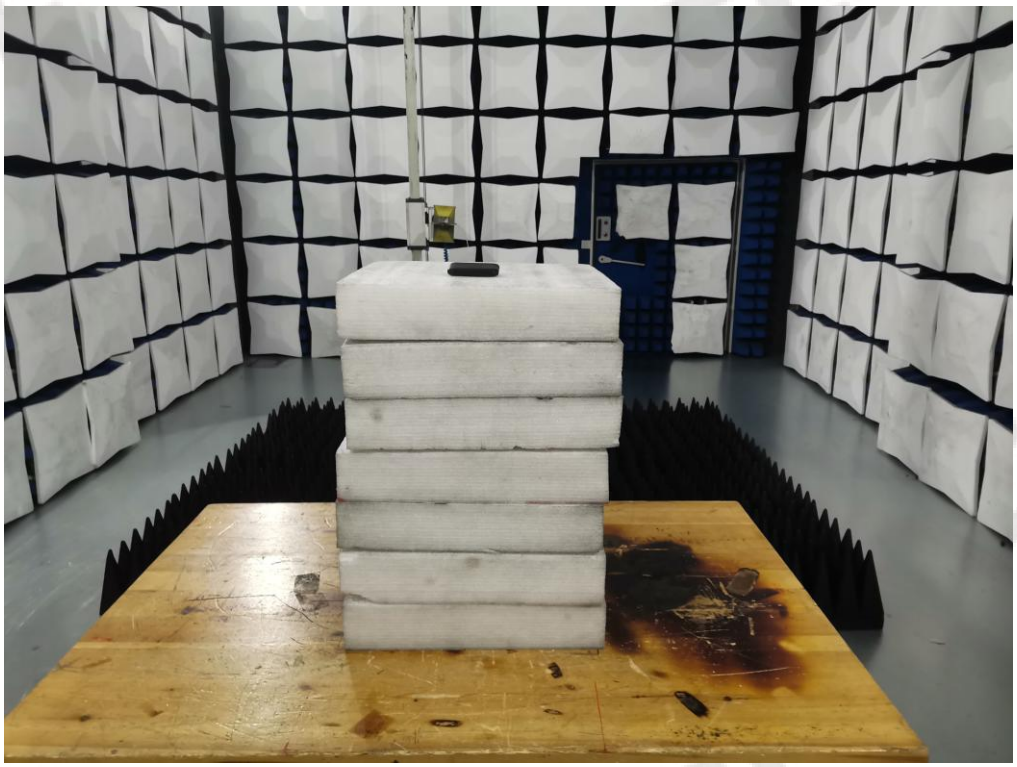
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the

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

please refer to Appendix I: Section I.2

4. Test Setup Photos of the EUT



5. External and Internal Photos of the EUT

Reference to the test report No. CTL2104092051-WF01

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