



FCC TEST REPORT

**Test report
On Behalf of
SHENZHEN TRANSCAN TECHNOLOGY LIMITED
For
CPE
Model No.: TR251**

FCC ID: 2A5RQ-TR251

Prepared for : SHENZHEN TRANSCAN TECHNOLOGY LIMITED
Room 03,23F,Unit B Building,No 9,Shenzhen Bay Eco-Technology Park,Yuehai
Street, Nanshan District City Shenzhen

Prepared By : Shenzhen Tongzhou Testing Co.,Ltd
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street,
Longhua, Shenzhen, China

Date of Test: 03 July 2023~ 07 August 2023

Date of Report: 07 August 2023

Report Number: TZ230804740-E4

The test report apply only to the specific sample(s) tested under stated test conditions
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TEST RESULT CERTIFICATION

Applicant's name : **SHENZHEN TRANSCAN TECHNOLOGY LIMITED**
Address..... : Room 03,23F,Unit B Building,No 9,Shenzhen Bay Eco-
 Technology Park,Yuehai Street, Nanshan District City Shenzhen
Manufacture's Name : **SHENZHEN TRANSCAN TECHNOLOGY LIMITED**
Address..... : Room 03,23F,Unit B Building,No 9,Shenzhen Bay Eco-
 Technology Park,Yuehai Street, Nanshan District City Shenzhen

Product description

Trade Mark : VIMOQ
Product name..... : CPE
Model and/or type reference . : TR251

Standards : FCC Rules and Regulations Part 27 O&Q
 ANSI C63.26:2015

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Date of Test :
Date (s) of performance of tests : **03 July 2023 ~ 02 August 2023**
Date of Issue : **07 August 2023**
Test Result : **Pass**

Testing Engineer : Anna Hu
 (Anna Hu)

Technical Manager : Hugo Chen
 (Hugo Chen)

Authorized Signatory : Andy Zhang
 (Andy Zhang)



Revision History

Revision	Issue Date	Revisions	Revised By
000	07 August 2023	Initial Issue	Andy Zhang



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1 TEST STANDARDS

The tests were performed according to following standards:

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

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

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

[FCC Part 27:](#) Miscellaneous Wireless Communications Services.

[FCC Part 90:](#) PRIVATE LAND MOBILE RADIO SERVICES

[ANSI/TIA-603-E-2016:](#) Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[ANSI C63.26-2015:](#) IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[FCC KDB 971168D01](#) Power Meas License Digital Systems



Channel Separation : 0.1 MHz
Modulation Technology : OFDM (16QAM, QPSK)

Antenna Type And Gain : Internal Antenna
FDD Band 4: 4.21dBi,
FDD Band 5: 3.57dBi,
FDD Band 7: 4.85dBi,
FDD Band 66: 4.53dBi,

NR

E-UTRA FCC Operation Frequency : Band n78 (UL: 3450 - 3550 MHz/DL: 3450 - 3550 MHz)
: Band n78 (UL: 3700 - 3800 MHz/DL: 3700 - 3800 MHz)

Channel Separation : 0.1 MHz

Modulation Technology : DFT-s-OFDM (Pi/2-BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
: CP-OFDM (QPSK, 16-QAM, 64-QAM, 256-QAM)

Network Mode : SA
: NSA

Antenna Type And Gain : Internal Antenna
: Band n78: 4.67dBi

Note 1: Antenna position refer to EUT Photos.

Note 2: the above information was supplied by the applicant.



2.2 Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate

2.3 Short description of the Equipment under Test (EUT)

2.3.1 General Description

EUT is subscriber equipment in the LTE/WCDMA/GSM system. Support bands as list in section 2.1 of this report.


2.5 Normal Accessory setting

Fully charged battery was used during the test.

2.6 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- - supplied by the lab

●	Adapter	Model:	KA2401A-1202000US
		Input:	100-240V-50/60Hz 0.65A Max
		Output:	12V  2000A

2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: #FCCID** filing to comply with FCC Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.



3 TEST ENVIRONMENT

3.1 Test Facility

FCC

Designation Number: CN1275

Test Firm Registration Number: 167722

Shenzhen Tongzhou Testing Co.,Ltd has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements

A2LA

Certificate Number: 5463.01

Shenzhen Tongzhou Testing Co.,Ltd has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

IC

ISED#: 22033

CAB identifier: CN0099

Shenzhen Tongzhou Testing Co.,Ltd has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

3.2 Environmental conditions

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

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.3 Test Description

Band n78(3450 – 3550 MHz) [Part 27]

Test Item	FCC Rule No.	Requirements	Judgement	Sample ID
Effective (Isotropic) Radiated Power	2.1046, 27.50(k)(2)	EIRP ≤ 1W(30dBm)	Pass	TZ230804740-1#
Occupied Bandwidth	2.1049	OBW: No limit.	Pass	TZ230804740-1#
Emission Bandwidth	2.1049	EBW: No limit.	Pass	TZ230804740-1#
Band Edges(Out of Band Emission) Compliance	2.1051, 27.53(n)	-13dBm/MHz	Pass	TZ230804740-1#
Spurious Emission at Antenna Terminals	2.1051, 27.53(n)	-13dBm/MHz	Pass	TZ230804740-1#
Field Strength of Spurious Radiation	2.1053, 27.53(n)	-13dBm/MHz	Pass	TZ230804740-2#
Frequency Stability	2.1055, 27.54	the fundamental emissions stay within the authorized bands of operation. (2.5ppm)	Pass	TZ230804740-1#
Peak to average ratio	2.1046, 27.53(k)	<13dB	Pass	TZ230804740-1#

Remark: The measurement uncertainty is not included in the test result.

**Band n78(3700 – 3800 MHz) [Part 27]**

Test Item	FCC Rule No.	Requirements	Judgement	Sample ID
Effective (Isotropic) Radiated Power	2.1046, 27.50(j)(3)	EIRP \leq 1W(30dBm)	Pass	TZ230804740-1#
Occupied Bandwidth	2.1049	OBW: No limit.	Pass	TZ230804740-1#
Emission Bandwidth	2.1049	EBW: No limit.	Pass	TZ230804740-1#
Band Edges(Out of Band Emission) Compliance	2.1051, 27.53(i)	-13dBm/MHz	Pass	TZ230804740-1#
Spurious Emission at Antenna Terminals	2.1051, 27.53(i)	-13dBm/MHz	Pass	TZ230804740-1#
Field Strength of Spurious Radiation	2.1053, 27.53(i)	-13dBm/MHz	Pass	TZ230804740-2#
Frequency Stability	2.1055, 27.54	the fundamental emissions stay within the authorized bands of operation. (2.5ppm)	Pass	TZ230804740-1#
Peak to average ratio	2.1046, 27.53(j)	<13dB	Pass	TZ230804740-1#

Remark: The measurement uncertainty is not included in the test result.



3.4 Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2022/12/28	2023/12/27
2	Power Sensor	Agilent	U2021XA	MY5365004	2022/12/28	2023/12/27
3	Loop Antenna	schwarzbeck	FMZB1519 B	00023	2022/11/13	2025/11/12
4	Wideband Antenna	schwarzbeck	VULB 9163	958	2022/11/13	2025/11/12
5	Horn Antenna	schwarzbeck	BBHA 9120D	01989	2022/11/13	2025/11/12
6	EMI Test Receiver	R&S	ESCI	100849/003	2022/12/28	2023/12/27
7	Controller	MF	MF7802	N/A	N/A	N/A
8	Amplifier	schwarzbeck	BBV 9743	209	2022/12/28	2023/12/27
9	Amplifier	Tonscend	TSAMP-0518SE	--	2022/12/28	2023/12/27
10	RF Cable(below 1GHz)	HUBER+SUHNER	RG214	N/A	2022/12/28	2023/12/27
11	RF Cable(above 1GHz)	HUBER+SUHNER	RG214	N/A	2022/12/28	2023/12/27
12	RE test software	Tonscend	JS32-RE	V2.0.2.0	N/A	N/A
12	Test Software	Tonscend	JS1120-3	V2.5.77.0418	N/A	N/A
14	Horn Antenna	A-INFO	LB-180400-KF	J211020657	2022/12/28	2023/12/27
15	Amplifier	CDSA	PAP-1840	17021	2022/12/28	2023/12/27
16	Spectrum Analyzer	R&S	FSP40	100550	2023/1/10	2024/1/9
17	UNIVERSAL RADIO COMMUNICATION	R&S	CMW500	101855	2022/12/28	2023/12/27
18	Signal Generator	Keysight	N5182A	MY4620709	2022/12/28	2023/12/27
19	H & T Chamber	Guangzhou gongwen	GDJS-500-40	0329	11/05/2022	11/04/2023
20	UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY60192341	11/05/2022	11/04/2023
21	Spectrum Analyzer	KEYSIGHT	N9010B	MY60241089	2023/1/10	2024/1/9



3.5 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 ETSI TR 100 028 “ Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics” and is documented in the Shenzhen Tongzhou Testing 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 Shenzhen Tongzhou Testing Co.,Ltd is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.10 dB	(1)
Radiated Emission	1~18GHz	3.70 dB	(1)
Radiated Emission	18-40GHz	3.90 dB	(1)
Conducted Disturbance	0.15~30MHz	1.63 dB	(1)
Conducted Power	9KHz~18GHz	0.61 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.22 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.22 dB	(1)
Occupied Bandwidth	9KHz~40GHz	-	(1)
Frequency Error	9KHz~40GHz	1×10^{-7}	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.



4 TEST CONDITIONS AND RESULTS

4.1 Conducted Output Power / E.I.R.P / E.R.P / Peak-to-Average Ratio (PAR)

TEST APPLICABLE

During the process of testing, the EUT was controlled via Radio Communication tester (E7515B) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

LIMIT

For Conducted Power

Within Tune-up Value

For Radiated Power

This is the test for the maximum radiated power from the EUT.

Per Part 27.50(j) The following power requirements apply to stations transmitting in the 3700–3980 MHz band:

(1) The power of each fixed or base station transmitting in the 3700–3980 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3700–3980 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(3) Mobile and portable stations are limited to 1 Watt EIRP. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(5) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, and any other relevant factors, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Per Part 27.50 (k) The following power requirements apply to stations transmitting in the 3450–3550 MHz band:

(1) The power of each fixed or base station transmitting in the 3450–3550 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3450–3550 MHz band and situated in any geographic location other than that described in paragraph (k)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(3) Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.



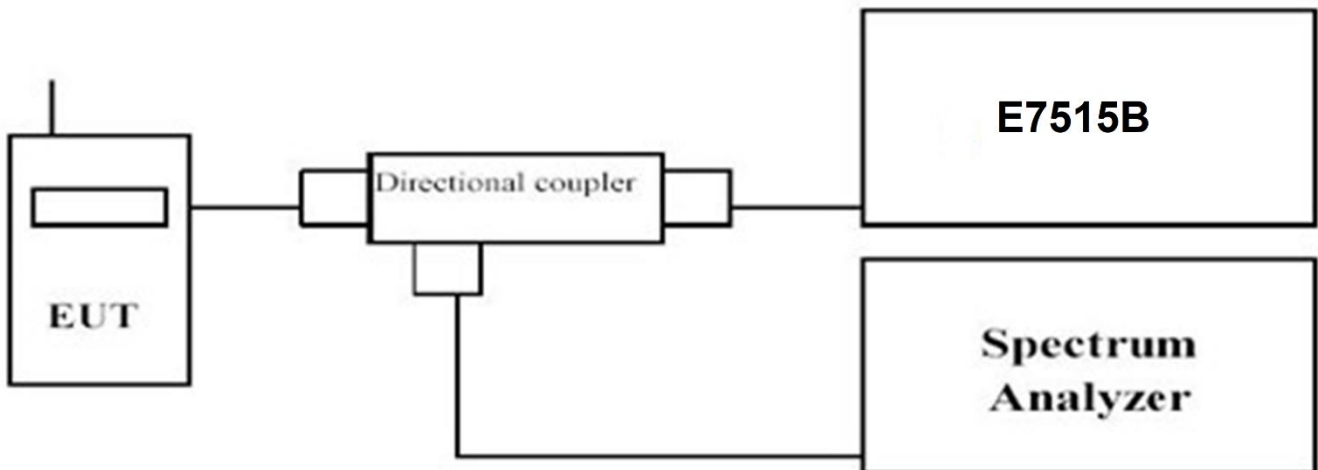
(4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (k)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(5) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, and any other relevant factors, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

For Peak-to-Average Ratio (PAR)

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

TEST CONFIGURATION



TEST PROCEDURE

1. Place the EUT on a bench and set it in transmitting mode.
2. Connect a low loss RF cable from the antenna port to Radio Communication tester (E7515B) by an Att.
3. EUT Communicate with Radio Communication tester (E7515B) then selects a channel for testing.
4. Add a correction factor to the display Radio Communication tester (E7515B), and then test.
5. Record the Peak power(P1) and Average power(P2).
6. Peak-to-Average Ratio (PAR) = Peak power(P1) - Average power(P2)
7. EIRP = Average power(P2) + Antenna Gain(dBi), ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST RESULTS

Pass

Remark:

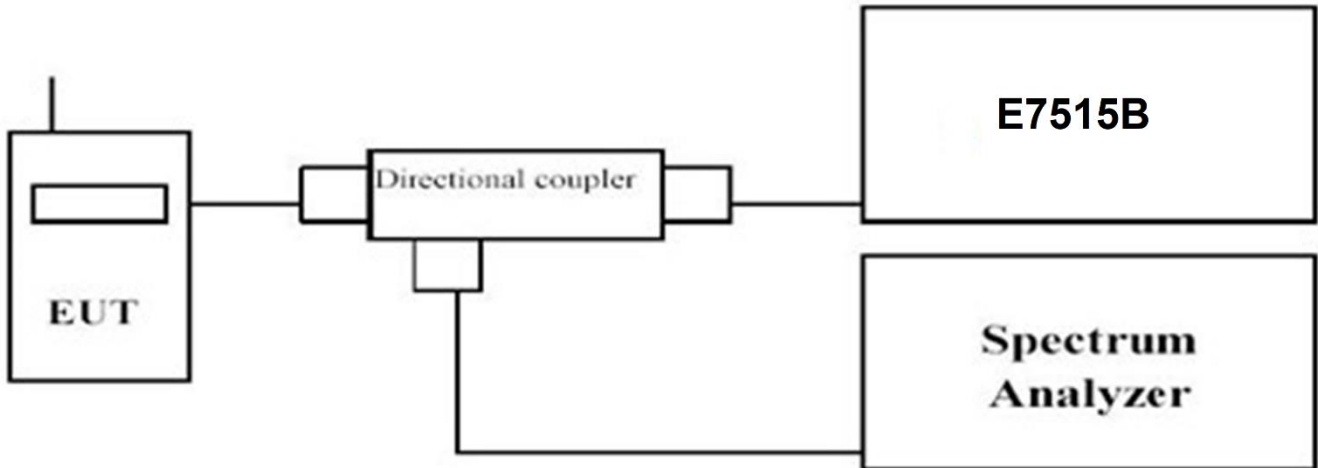
1. We were tested all RB Configuration refer 3GPP TS138.521 for each Channel Bandwidth as list in section 3.3 of this report;
2. please refer to Output Power and Peak-to-Average Ratio (PAR) in Appendix Test data for Band n78.

4.2 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 \geq 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

Remark:

1. We were tested full RB Configuration refer 3GPP TS138.521 for each Channel Bandwidth as list in section 3.3 of this report;
2. please refer to Emission bandwidth and OBW in Appendix Test data for Band n78.



4.3 Band Edge compliance

LIMIT

For Band n78:

Per §27.53(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700–3980 MHz band:

(1) For base station operations in the 3700–3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

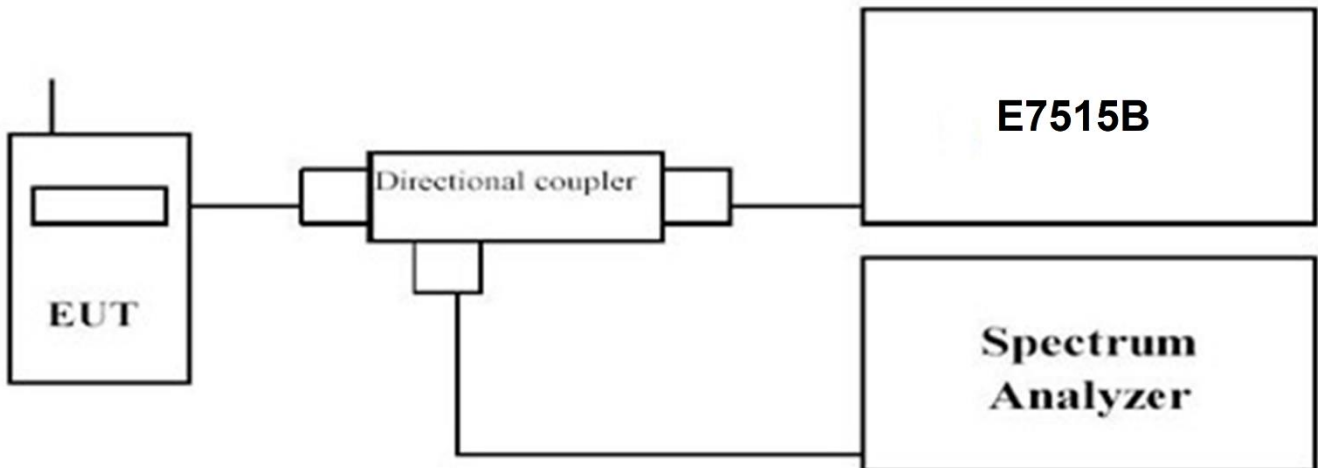
(2) For mobile operations in the 3700–3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power..

Per §27.53 (n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450–3550 MHz band:

(1) For base station operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz 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, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Notwithstanding the channel edge requirement of -13 dBm per megahertz, for base station operations in the 3450–3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed -40 dBm/MHz.

(2) For mobile operations in the 3450–3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz 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, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

TEST CONFIGURATION



TEST PROCEDURE

8. The transmitter output port was connected to base station.
9. 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.
10. Set EUT at maximum power through base station.
11. Select lowest and highest channels for each band and different modulation.
12. Measure Band edge using RMS (Average) detector by spectrum

TEST RESULTS

Pass

Remark:

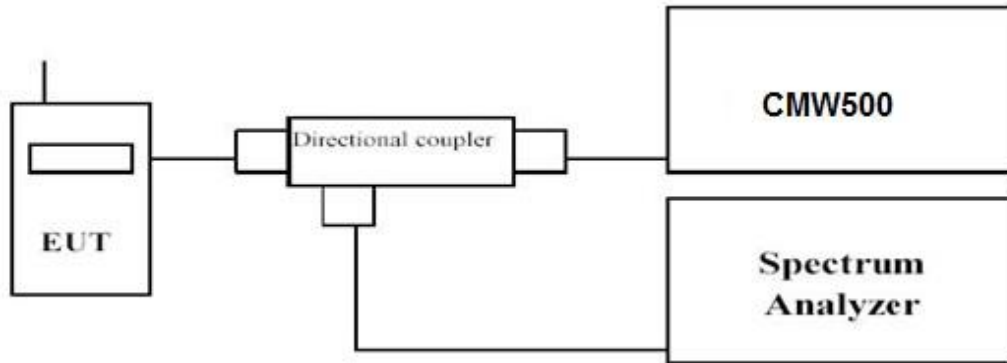
1. We were tested all RB Configuration refer 3GPP TS138.521 for each Channel Bandwidth as list in section 3.3 of this report;
2. please refer to Band Edge and Emission Mask in Appendix Test data for Band n78.

4.4 Spurious Emission on Antenna Port

LIMIT

Refer to section 3.3 of this report for each frequency band

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to ANSI C63.26

- 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 Radio Communication tester (E7515B) by a Directional Coupler.
- c. EUT Communicate with Radio Communication tester (E7515B), then select 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 to 10th harmonic.
- f. Please refer to following tables for test antenna conducted emissions.

Sub range (GHz)	RBW	VBW	Sweep time (s)
0.000009~0.000015	1KHz	3KHz	Auto
0.000015~0.03	10KHz	30KHz	Auto
0.03~26	1 MHz	3 MHz	Auto

TEST RESULTS

Pass

Remark:

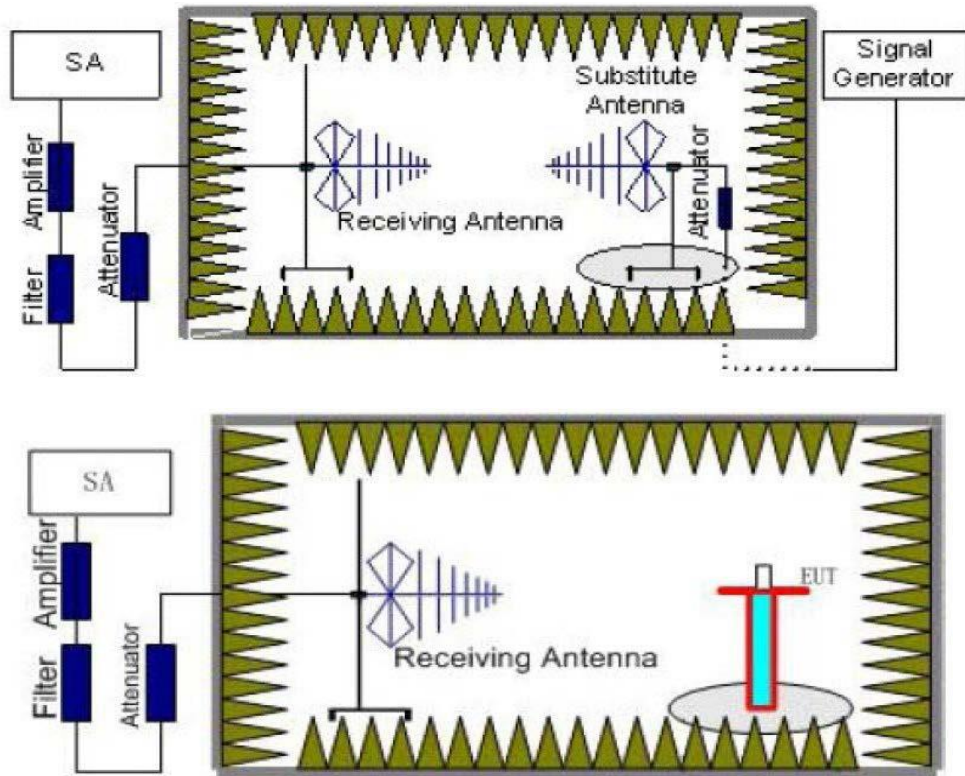
1. We were tested all RB Configuration refer 3GPP TS138.521 for each Channel Bandwidth as list in section 3.3 of this report;
1. please refer to Conducted Spurious Emission in Appendix Test data for Band n78.

4.5 Radiated Spurious Emission

LIMIT

Refer to section 3.3 of this report for each frequency band

TEST CONFIGURATION



TEST PROCEDURE

1. Setup as illustrated above the DUT placed on the 0.8m height (for frequencies < 1GHz) or 1.5m (for frequencies > 1GHz) of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$

It can omit power amplifier if signal generator level meets requirement;



6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.
8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

Subrange (GHz)	RBW	VBW	Sweep time (s)
0.00009~0.15	1KHz	3KHz	30
0.00015~0.03	10KHz	30KHz	10
0.03~1	100KHz	300KHz	10
1~2	1 MHz	3 MHz	2
2~5	1 MHz	3 MHz	3
5~8	1 MHz	3 MHz	3
8~10 th	1 MHz	3 MHz	3

TEST LIMITS

According to rules 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.

Channel	Frequency Range	Verdict
Low	9 KHz – 10 th GHz	PASS
Middle	9 KHz – 10 th GHz	PASS
High	9 KHz – 10 th GHz	PASS

TEST RESULTS

Pass

Temperature	24.8°C	Humidity	58%
Test Engineer	Anna Hu		

NR Bands

This is the worst pattern data

n78(3450-3550Mhz):

Mode	Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Judgement
1	100	633034	3500	QPSK	100	LOW	Pass

n78(3700-3800Mhz):

Mode	Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Judgement
1	100	650000	3750	QPSK	100	LOW	Pass



NR Bands

n78(3450-3550Mhz):

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
7000	-56.52	2.24	-58.76	-13	Horizontal
7000	-51.36	2.24	-53.60	-13	Vertical
10500	-56.35	2.24	-58.59	-13	Horizontal
10500	-54.24	2.24	-56.48	-13	Vertical

n78(3700-3800Mhz):

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
7500	-48.82	2.24	-51.06	-13	Horizontal
7500	-52.53	2.24	-54.77	-13	Vertical
11250	-53.64	2.24	-55.88	-13	Horizontal
11250	-57.68	2.24	-59.92	-13	Vertical

Note:

1. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the AR_{pl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below:

$$\text{Power} = \text{P}_{\text{Mea}} + \text{AR}_{\text{pl}}$$

2. $\text{AR}_{\text{pl}} = \text{Cable loss} + \text{Antenna gain}$

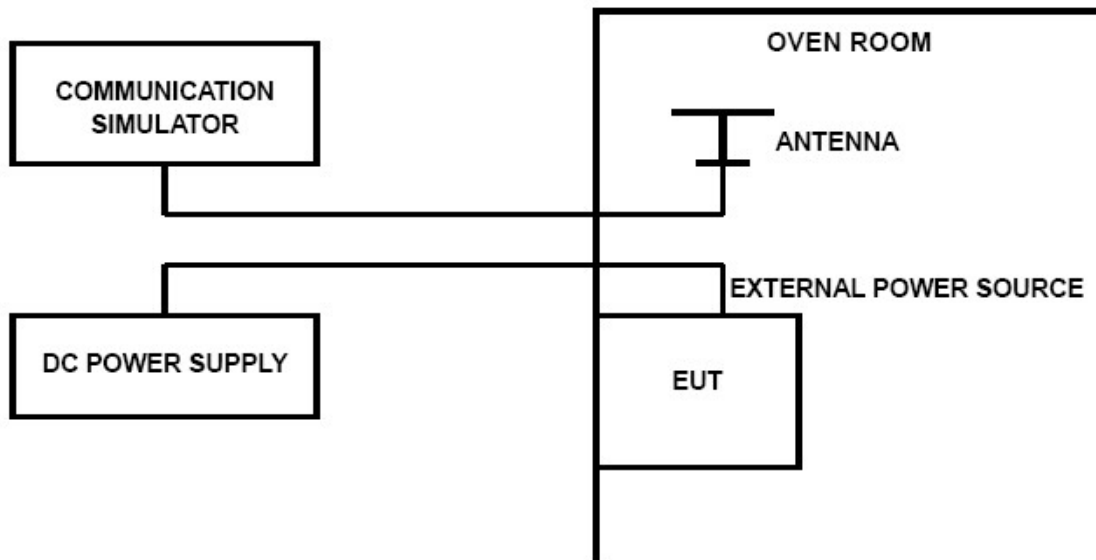


4.6 Frequency Stability under Temperature & Voltage Variations

LIMIT

According to FCC §2.1055, §22.355, §24.235 and §27.54 and §90.213 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to ANSI C63.26.

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 radio communication tester.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the radio communication tester and in a simulated call on middle channel for Specific band, 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°C increments from -30°C to +50°C. 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°C.
7. With the EUT, powered via nominal voltage, connected to the radio communication tester 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 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

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 (±15%) and endpoint, record the maximum frequency change.



TEST RESULTS

Pass

Remark:

2. *We tested all RB Configuration refer 3GPP TS138.521 for each Channel Bandwidth as list in section 3.3 of this report, and record the worst case in this report.*
3. *please refer to Frequency Stability in Appendix Test data for Band n78.*



5 Test Set up Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6 External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

7 Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.

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