

FCC Test Report

Report No.: RWAQ202400273C

Applicant: Shenzhen Omni Intelligent Technology Co., Ltd.

Address: 11th Floor, Building 31, Phase III, Lianchuang Technology Park,
Nanwan street, Longgang District, Shenzhen, China

Product Name: Sharing scooter IOT

Product Model: M154-IOT

Multiple Models: N/A

Trade Mark: N/A

FCC ID: 2AI2O-M154IOT

Standards: FCC CFR Title 47 Part 2, 22H, 24E, 27

Test Date: 2024-06-03 to 2024-06-18

Test Result: Complied

Issue Date: 2024-06-18

Reviewed by:

Abel chen

Approved by:

Jacob Kong

Abel Chen
Project Engineer

Jacob Kong
Manager

Prepared by:

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen,
Guangdong, People's Republic of China



This report may contain data that are not covered by the NVLAP accreditation and shall be marked with an asterisk “★”

Announcement

1. This test report shall not be reproduced except in full, without the written approval of World Alliance Testing & Certification (Shenzhen) Co., Ltd
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.
5. The information marked “#” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

Revision History

Version No.	Issued Date	Description
00	2024-06-18	Original

Contents

1	General Information	4
1.1	Client Information.....	4
1.2	Product Description of EUT	4
1.3	Measurement Uncertainty	4
1.4	Laboratory Location	5
1.5	Test Methodology.....	5
2	Description of Measurement.....	6
2.1	Test Frequency of Low/Middle/High Channels	6
2.2	Test Configuration for LTE bands	6
2.3	Test Auxiliary Equipment	7
2.4	Test Setup	8
2.5	Test Procedure.....	10
2.6	Measurement Method.....	11
2.7	Measurement Equipment	12
3	Test Results	13
3.1	Test Summary.....	13
3.2	Limit	14
3.3	RF Conducted Test Data	19
3.3.1	RF Output Power&ERP/EIRP.....	19
3.3.2	Peak-to-average ratio (PAR)	28
3.3.3	26dB and 99% Bandwidth	30
3.3.4	Conducted Spurious Emissions.....	32
3.3.5	Out of band emission, Band Edge.....	32
3.3.6	FREQUENCY STABILITY	33
3.4	Radiated Spurious emission Test Data.....	39
4	Test Setup Photo.....	41
5	E.U.T Photo	42

1 General Information

1.1 Client Information

Applicant:	Shenzhen Omni Intelligent Technology Co., Ltd.
Address:	11th Floor, Building 31, Phase III, Lianchuang Technology Park, Nanwan street, Longgang District, Shenzhen, China
Manufacturer:	Shenzhen Omni Intelligent Technology Co., Ltd.
Address:	11th Floor, Building 31, Phase III, Lianchuang Technology Park, Nanwan street, Longgang District, Shenzhen, China

1.2 Product Description of EUT

The EUT is an Sharing scooter IOT that contains BLE and LTE radios, this report covers the full testing of the LTE radios.

Sample Serial number	78-4 for RE test, 78-5 for RF test conducted test (assigned by WATC)				
Sample Received Date	2024-05-28				
Sample Status	Good Condition				
Frequency Range	Band	TX Frequency (MHz)	RX Frequency (MHz)	Max. Conducted Power (dBm)	Antenna Gain [#] (dBi)
Maximum Conducted Power	LTE Band 2	1850-1910	1930-1990	22.50	-1.25
Antenna Gain	LTE Band 4	1710-1755	2110-2155	22.50	-0.86
	LTE Band 5	824-849	869-894	22.50	-0.87
	LTE Band 12	699-716	729-746	22.49	-0.72
	LTE Band 13	777-787	746-756	22.50	-0.91
Modulation Technology	QPSK, 16QAM				
UE Category	LTE Cat M1				
Power Supply	DC 3.7V from battery or DC 12~72V				
Adapter Information	N/A				
Modification	Sample No Modification by the test lab				

1.3 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Emissions, Radiated	Below 30MHz	±2.78dB
	Below 1GHz	±4.84dB
	Above 1GHz	±5.44dB
Emissions, Conducted		1.75dB
Conducted Power		0.74dB
Frequency Error		150Hz
Bandwidth		0.34%
Note 1: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.		
Note 2: The Decision Rule is based on simple acceptance with ISO Guide 98-4:2012 Clause 8.2 (Measurement		

uncertainty is not taken into account when stating conformity with a specified requirement.)

1.4 Laboratory Location

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: qa@watc.com.cn

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

1.5 Test Methodology

FCC CFR Title 47 Part 2, 22H, 24E, 27

ANSI C63.26-2015

FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

FCC KDB 971168 D02 Misc Rev Approv License Devices v02r02

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

2 Description of Measurement

2.1 Test Frequency of Low/Middle/High Channels

Band	Bandwidth (MHz)	Low Channel (MHz)	Middle Channel (MHz)	High Channel (MHz)
LTE B2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE B4	1.4	1710.7	1732.5	1754.3
	3	1711.5	1732.5	1753.5
	5	1712.5	1732.5	1752.5
	10	1715	1732.5	1750
	15	1717.5	1732.5	1747.5
	20	1720	1732.5	1745
LTE B5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844
LTE B12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704	707.5	711
LTE B13	5	779.5	782	784.5
	10	/	782	/

2.2 Test Configuration for LTE bands

Test Items	Band	Bandwidth (MHz)						Modulation		RB#			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
RF Output Power ERP/EIRP	2	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	4	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	5	√	√	√	√	-	-	√	√	√	√	√	√	√	√
	12	√	√	√	√	-	-	√	√	√	√	√	√	√	√
	13	-	-	√	√	-	-	√	√	√	√	√	√	√	√
Peak-to-Average Ratio	2				√			√	√	√		√	√	√	√
	4				√			√	√	√		√	√	√	√
	5				√	-	-	√	√	√		√	√	√	√
	12				√	-	-	√	√	√		√	√	√	√
	13	-	-		√	-	-	√	√	√		√		√	
26dB and 99% Bandwidth	2	√	√	√	√	√	√	√	√			√	√	√	√
	4	√	√	√	√	√	√	√	√			√	√	√	√
	5	√	√	√	√	-	-	√	√			√	√	√	√
	12	√	√	√	√	-	-	√	√			√	√	√	√
	13	-	-	√	√	-	-	√	√			√	√	√	√
Band Edge	2	√	√	√	√	√	√	√	√	√		√	√		√
	4	√	√	√	√	√	√	√	√	√		√	√		√
	5	√	√	√	√	-	-	√	√	√		√	√		√
	12	√	√	√	√	-	-	√	√	√		√	√		√
	13	-	-	√	√	-	-	√	√	√		√	√		√

Conducted Spurious Emission	2	√	√	√	√	√	√	√		√			√	√	√
	4	√	√	√	√	√	√	√		√			√	√	√
	5	√	√	√	√	-	-	√		√			√	√	√
	12	√	√	√	√	-	-	√		√			√	√	√
	13	-	-	√	√	-	-	√		√			√	√	√
Frequency Stability	2				√			√	√			√	√		√
	4				√			√	√			√	√		√
	5				√	-	-	√	√			√		√	
	12				√	-	-	√	√			√	√		√
	13	-	-		√	-	-	√	√			√	√		√
Radiated Spurious Emission	2	√						√		√			√	√	√
	4	√						√		√			√	√	√
	5	√				-	-	√		√			√	√	√
	12	√				-	-	√		√			√	√	√
	13	-	-	√		-	-	√		√			√	√	√

Note:

1. "√" means the configuration was chosen for testing
2. "-" means the not support the bandwidth
3. black cells in the table above means the configuration not test

Worst-Case Configuration:

For radiated emissions, EUT was investigated in three orthogonal orientation, the worst-case orientation was recorded in report

For radiated emissions, measurement was investigated from 30MHz to 10 times of fundamental, the worst case bandwidth, RB size and modulation test data was recorded.

For Peak-to-Average Ratio test, the worst case 10MHz bandwidth was tested and recorded in report.

For Frequency Stability test, the worst case 10MHz bandwidth was tested and recorded in report.

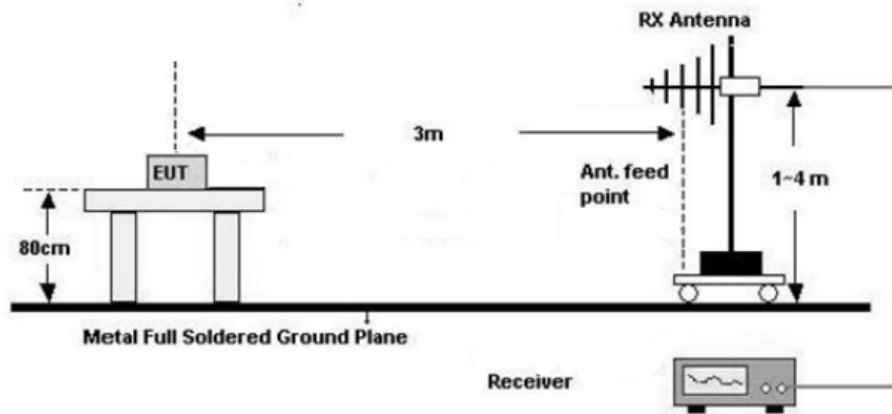
2.3 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
UNI-TREND Technology (CHINA) Co., Ltd.	DC Power Supply	UTP1310S	unknown

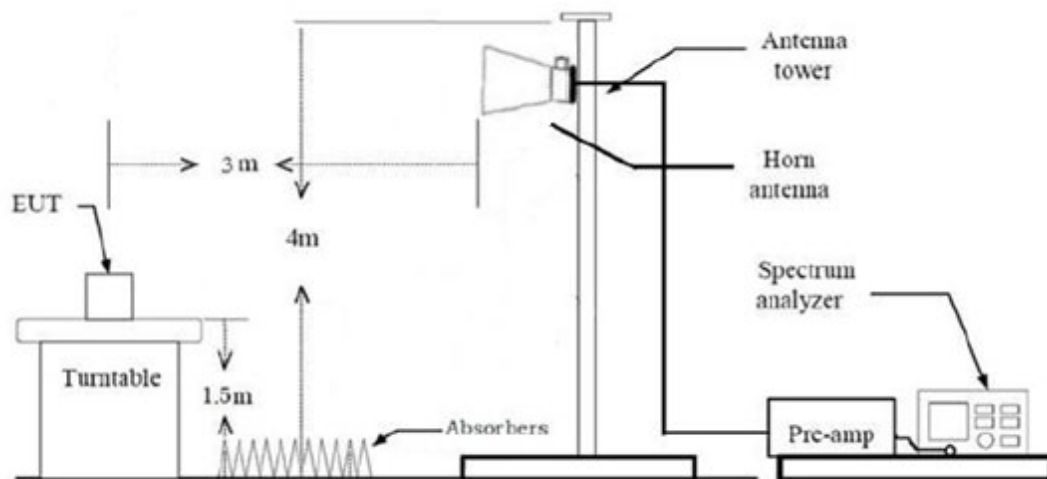
2.4 Test Setup

1) Radiated emission measurement:

30MHz-1GHz (3m SAC)

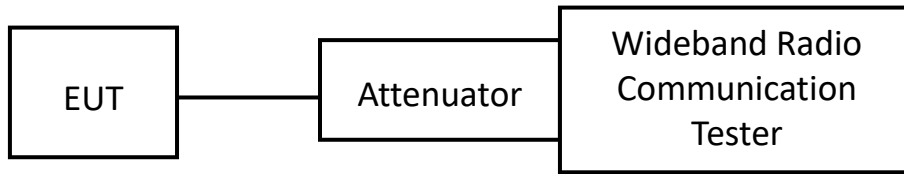


Above 1GHz (3m FAC)

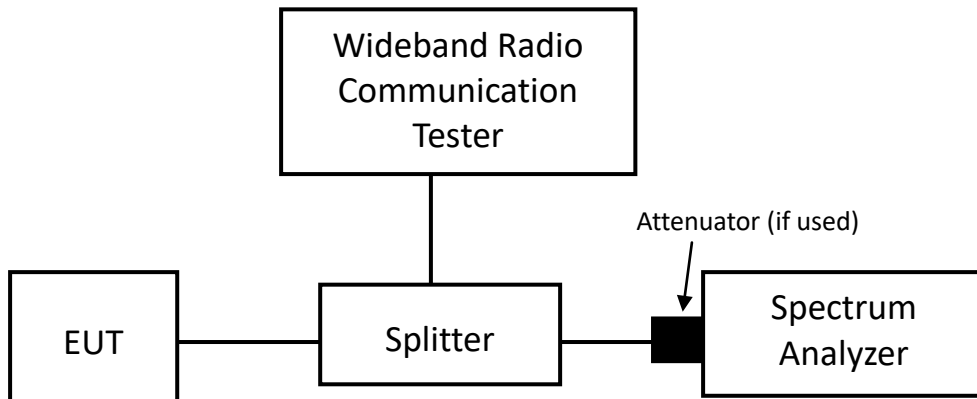


2) RF Conducted Test

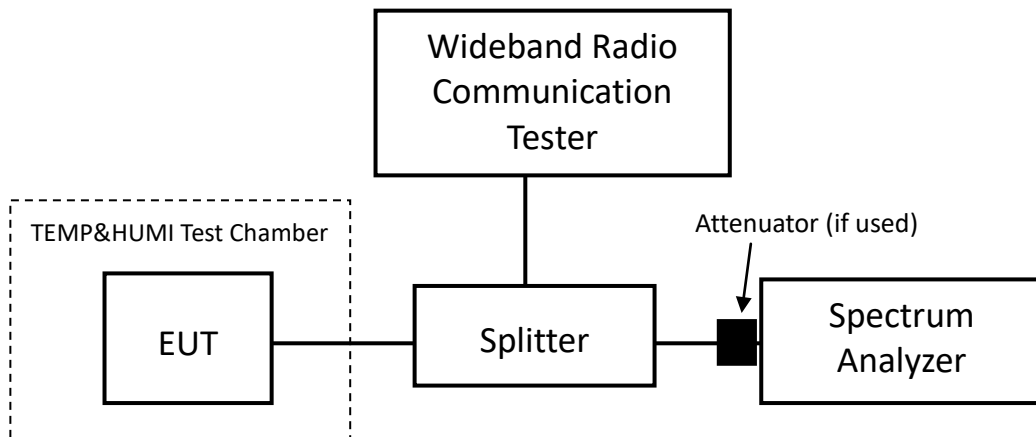
For RF Output Power test



For Bandwidth/Band edge/ PAR/Conducted spurious emissions Test



For Frequency Stability test



2.5 Test Procedure

Radiated Emission Procedure:

a) For 30MHz-1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

b) For above 1GHz:

1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

RF Conducted Test:

1. The antenna port of EUT was connected to the RF port of the test equipment (Wideband Radio Communication Tester or Spectrum analyzer) through Attenuator and RF cable.
2. The cable assembly insertion loss of 7dB (including 6.0 dB Splitter and 1.0 dB cable) was entered as an offset in the power meter. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 1.0dB was assumed as worst case. This was later verified to be true by laboratory. (if the RF cable provided by client, the cable loss declared by client)
3. The EUT is keeping in continuous transmission mode and tested in all modulation modes.

2.6 Measurement Method

Description of Test	Measurement Method
RF Output Power	ANSI C63.26-2015 section 5.2
ERP/EIRP	ANSI C63.26-2015 section 5.2.5.5
Peak-to-Average Ratio	ANSI C63.26-2015 section 5.2.3.4
26dB and 99% Bandwidth	ANSI C63.26-2015 section 5.4
Band Edge	ANSI C63.26-2015 section 5.7.3
Conducted Spurious Emissions	ANSI C63.26-2015 section 5.7.4
Frequency Stability	ANSI C63.26-2015 section 5.6
Radiated Spurious Emissions	ANSI C63.26-2015 section 5.5.4

2.7 Measurement Equipment

Manufacturer	Description	Model	Management No.	Calibration Date	Calibration Due Date
Radiated Emission Test					
R&S	EMI test receiver	ESR3	102758	2023/7/3	2024/7/2
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2023/7/3	2024/7/2
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2023/7/12	2024/7/11
COM-POWER	PREAMPLIFIER	PAM-118A	18040152	2023/8/21	2024/8/20
COM-POWER	Amplifier	PAM-840A	461306	2023/8/8	2024/8/7
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2024/7/6
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2024/7/5
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2023/7/10	2024/7/9
ROHDE& SCHWARZ	WIDEBAND RADIO COMMUNICATION TESTER	CMW500	116218	2023/9/12	2024/9/11
N/A	Coaxial Cable	N/A	NO.9	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.10	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.11	2023/8/8	2024/8/7
Audix	Test Software	E3	191218 V9	/	/
RF Conducted Test					
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSU-26	200680/026	2023/7/12	2024/7/11
BACL	TEMP&HUMI Test Chamber	BTH-150	30022	2023/7/12	2024/7/11
HP	Power Splitter	11667A	1610A	2023/7/26	2024/7/25
FLUKE	Digital Multimeter	15B+	N/A	2023/7/12	2024/7/11
ROHDE& SCHWARZ	WIDEBAND RADIO COMMUNICATION TESTER	CMW500	116218	2023/9/12	2024/9/11

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.

3 Test Results

3.1 Test Summary

FCC Rules	Description of Test	Result
FCC§2.1046; § 22.913; § 24.232; §27.50	RF Output Power	Compliance
FCC§ 2.1047	Modulation Characteristics	Compliance
FCC§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	26dB and 99% Bandwidth	Compliance
FCC§ 2.1051; § 22.917; § 24.238; §27.53	Conducted Spurious Emissions	Compliance
FCC§ 22.917; § 24.238; §27.53	Out of band emission, Band Edge	Compliance
FCC§ 2.1055; § 22.355; § 24.235; §27.54	Frequency stability	Compliance
FCC§ 2.1053; § 22.917; § 24.238; §27.53	Radiated Spurious Emissions	Compliance

3.2 Limit

Test items	Limit																																				
RF Output Power	FCC §22.913: (a)(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts. (d) Power measurement. Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to average ratio (PAR) of the transmission must not exceed 13 dB. Power measurements for base transmitters and repeaters must be made in accordance with either of the following: (1) A Commission-approved average power technique (see FCC Laboratory's Knowledge Database); or (2) For purposes of this section, peak transmit power must be measured over an 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, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.																																				
Unwanted Emissions (Out of band emission and spurious)	FCC §22.917: (a) Out of band emissions. 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. (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows: (1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). 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) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz																																				
Frequency stability	FCC §22.355: Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section. <table><tr><th colspan="4">Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services</th></tr><tr><th>Frequency range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile >3 watts (ppm)</th><th>Mobile ≤3 watts (ppm)</th></tr><tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr><tr><td>50 to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr><tr><td>450 to 512</td><td>2.5</td><td>5.0</td><td>5.0</td></tr><tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr><tr><td>928 to 929</td><td>5.0</td><td>n/a</td><td>n/a</td></tr><tr><td>929 to 960</td><td>1.5</td><td>n/a</td><td>n/a</td></tr><tr><td>2110 to 2220</td><td>10.0</td><td>n/a</td><td>n/a</td></tr></table>	Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services				Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)	25 to 50	20.0	20.0	50.0	50 to 450	5.0	5.0	50.0	450 to 512	2.5	5.0	5.0	821 to 896	1.5	2.5	2.5	928 to 929	5.0	n/a	n/a	929 to 960	1.5	n/a	n/a	2110 to 2220	10.0	n/a	n/a
Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services																																					
Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)																																		
25 to 50	20.0	20.0	50.0																																		
50 to 450	5.0	5.0	50.0																																		
450 to 512	2.5	5.0	5.0																																		
821 to 896	1.5	2.5	2.5																																		
928 to 929	5.0	n/a	n/a																																		
929 to 960	1.5	n/a	n/a																																		
2110 to 2220	10.0	n/a	n/a																																		

Test items	Limit
RF Output Power	FCC §24.232: (c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications. (d) 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 (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. 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.
Unwanted Emissions (Out of band emission and spurious)	FCC §24.238: The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service. (a) Out of band emissions. 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. (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). 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. (c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC. (d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.
Frequency stability	FCC §24.235: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test items	Limit
RF Output Power	FCC §27.50: (a)(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off. (ii) Mobile and portable stations are not permitted to transmit in the 2315-2320 MHz and 2345-2350 MHz bands. (iii) Automatic transmit power control. Mobile and portable stations transmitting in the 2305-2315 MHz band or in the 2350-2360 MHz band must employ automatic transmit power control when operating so the stations operate with the minimum power necessary for successful communications. (iv) Prohibition on external vehicle-mounted antennas. The use of external vehicle-mounted antennas for mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band is prohibited. (b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP. (c)(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP. (d)(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications. (h) The following power limits shall apply in the BRS and EBS: (2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Unwanted Emissions (Out of band emission and spurious)	FCC §27.53: (a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts: (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands: (i) By a factor of not less than: $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log (P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log (P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log (P)$ dB on all frequencies between 2328 and 2337 MHz; (ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log (P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log (P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log (P)$ dB below 2288 MHz; (iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz. (c) For operations in the 746-758 MHz band and the 776-788 MHz band, 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 any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB; (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB; (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations; (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations; (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) 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 at least 30 kHz may be employed; (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) 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.
--	---

	(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions 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. (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. (h) AWS emission limits (1) <i>General protection levels.</i> Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB. (m)(4) For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
Frequency stability	FCC §27.54: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

3.3 RF Conducted Test Data

Test Date:	2024-06-03~2024-06-18	Test By:	Ryan Zhang
Environment condition:	Temperature: 23.3~24.5°C; Relative Humidity: 58~64%; ATM Pressure: 101.2~101.6kPa		

3.3.1 RF Output Power&ERP/EIRP

LTE Band 2:

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	22.16	22.17	22.01	19.91	19.92	19.76
		RB1#3	22.23	22.47	22.02	19.98	20.22	19.77
		RB1#5	22.50	22.12	22.40	20.25	19.87	20.15
		RB3#0	22.31	22.16	22.05	20.06	19.91	19.80
		RB3#3	22.15	22.14	22.40	19.90	19.89	20.15
		RB6#0	22.36	22.24	22.33	20.11	19.99	20.08
	16QAM	RB1#0	22.23	22.25	22.45	19.98	20.00	20.20
		RB1#3	22.37	22.47	22.16	20.12	20.22	19.91
		RB1#5	22.08	22.44	22.32	19.83	20.19	20.07
		RB3#0	22.05	22.44	22.30	19.80	20.19	20.05
		RB3#3	22.32	22.30	22.38	20.07	20.05	20.13
		RB5#0	22.36	22.30	22.24	20.11	20.05	19.99
3.0	QPSK	RB1#1	22.05	22.07	22.46	19.80	19.82	20.21
		RB1#4	22.43	22.03	22.42	20.18	19.78	20.17
		RB1#6	22.14	22.06	22.42	19.89	19.81	20.17
		RB3#1	22.29	22.15	22.06	20.04	19.90	19.81
		RB3#4	22.06	22.34	22.06	19.81	20.09	19.81
		RB6#1	22.40	22.32	22.02	20.15	20.07	19.77
	16QAM	RB1#1	22.15	22.16	22.48	19.90	19.91	20.23
		RB1#4	22.18	22.20	22.18	19.93	19.95	19.93
		RB1#6	22.41	22.30	22.15	20.16	20.05	19.90
		RB3#1	22.14	22.30	22.19	19.89	20.05	19.94
		RB3#4	22.39	22.01	22.48	20.14	19.76	20.23
		RB5#1	22.27	22.20	22.10	20.02	19.95	19.85
5.0	QPSK	RB1#0	22.03	22.39	22.50	19.78	20.14	20.25
		RB1#3	22.39	22.45	22.48	20.14	20.20	20.23

		RB1#5	22.15	22.47	22.05	19.90	20.22	19.80
		RB3#0	22.35	22.40	22.24	20.10	20.15	19.99
		RB3#3	22.15	22.41	22.04	19.90	20.16	19.79
		RB6#0	22.50	22.24	22.28	20.25	19.99	20.03
	16QAM	RB1#0	22.16	22.17	22.13	19.91	19.92	19.88
		RB1#3	22.05	22.41	22.43	19.80	20.16	20.18
		RB1#5	22.45	22.33	22.34	20.20	20.08	20.09
		RB3#0	22.15	22.37	22.30	19.90	20.12	20.05
		RB3#3	22.23	22.29	22.03	19.98	20.04	19.78
		RB5#0	22.42	22.19	22.06	20.17	19.94	19.81
10.0	QPSK	RB1#1	22.06	22.23	22.43	19.81	19.98	20.18
		RB1#4	22.07	22.45	22.48	19.82	20.20	20.23
		RB1#6	22.32	22.13	22.23	20.07	19.88	19.98
		RB3#1	22.24	22.20	22.30	19.99	19.95	20.05
		RB3#4	22.11	22.13	22.42	19.86	19.88	20.17
		RB6#1	22.10	22.18	22.32	19.85	19.93	20.07
	16QAM	RB1#1	22.14	22.14	22.45	19.89	19.89	20.20
		RB1#4	22.42	22.17	22.19	20.17	19.92	19.94
		RB1#6	22.18	22.13	22.04	19.93	19.88	19.79
		RB3#1	22.40	22.07	22.31	20.15	19.82	20.06
		RB3#4	22.25	22.43	22.25	20.00	20.18	20.00
		RB5#1	22.15	22.01	22.50	19.90	19.76	20.25
15.0	QPSK	RB1#1	22.31	22.34	22.30	20.06	20.09	20.05
		RB1#4	22.07	22.04	22.44	19.82	19.79	20.19
		RB1#6	22.39	22.15	22.39	20.14	19.90	20.14
		RB3#1	22.38	22.43	22.01	20.13	20.18	19.76
		RB3#4	22.14	22.44	22.45	19.89	20.19	20.20
		RB6#1	22.22	22.16	22.25	19.97	19.91	20.00
	16QAM	RB1#1	22.49	22.29	22.31	20.24	20.04	20.06
		RB1#4	22.21	22.04	22.27	19.96	19.79	20.02
		RB1#6	22.49	22.40	22.10	20.24	20.15	19.85
		RB3#1	22.25	22.27	22.28	20.00	20.02	20.03
		RB3#4	22.20	22.14	22.13	19.95	19.89	19.88
		RB5#1	22.26	22.30	22.42	20.01	20.05	20.17
20.0	QPSK	RB1#2	22.49	22.25	22.01	20.24	20.00	19.76
		RB1#4	22.31	22.46	22.38	20.06	20.21	20.13
		RB1#7	22.28	22.25	22.45	20.03	20.00	20.20
		RB3#2	22.19	22.07	22.27	19.94	19.82	20.02
		RB3#5	22.16	22.32	22.07	19.91	20.07	19.82
		RB6#2	22.37	22.11	22.37	20.12	19.86	20.12

	16QAM	RB1#2	22.16	22.02	22.04	19.91	19.77	19.79
		RB1#5	22.22	22.04	22.28	19.97	19.79	20.03
		RB1#7	22.30	22.04	22.45	20.05	19.79	20.20
		RB3#2	22.32	22.12	22.41	20.07	19.87	20.16
		RB3#5	22.12	22.50	22.14	19.87	20.25	19.89
		RB5#2	22.37	22.24	22.03	20.12	19.99	19.78
Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable Loss(dB) For Band2: Antenna Gain = -1.25dBi 1GHz-2GHz : Cable Loss=1.0dB [#] (provided by the applicant) Limit: EIRP≤33dBm								

LTE Band 4:

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	22.26	22.32	22.25	20.40	20.46	20.39
		RB1#3	22.02	22.02	22.28	20.16	20.16	20.42
		RB1#5	22.21	22.48	22.43	20.35	20.62	20.57
		RB3#0	22.42	22.50	22.02	20.56	20.64	20.16
		RB3#3	22.19	22.07	22.15	20.33	20.21	20.29
		RB6#0	22.10	22.23	22.35	20.24	20.37	20.49
	16QAM	RB1#0	22.42	22.17	22.31	20.56	20.31	20.45
		RB1#3	22.43	22.09	22.50	20.57	20.23	20.64
		RB1#5	22.02	22.39	22.12	20.16	20.53	20.26
		RB3#0	22.12	22.05	22.09	20.26	20.19	20.23
		RB3#3	22.37	22.32	22.26	20.51	20.46	20.40
		RB5#0	22.45	22.30	22.21	20.59	20.44	20.35
3.0	QPSK	RB1#1	22.41	22.45	22.21	20.55	20.59	20.35
		RB1#4	22.29	22.45	22.22	20.43	20.59	20.36
		RB1#6	22.15	22.40	22.18	20.29	20.54	20.32
		RB3#1	22.12	22.18	22.31	20.26	20.32	20.45
		RB3#4	22.30	22.30	22.07	20.44	20.44	20.21
		RB6#1	22.42	22.23	22.46	20.56	20.37	20.60
	16QAM	RB1#1	22.33	22.03	22.31	20.47	20.17	20.45
		RB1#4	22.31	22.21	22.23	20.45	20.35	20.37
		RB1#6	22.02	22.41	22.05	20.16	20.55	20.19
		RB3#1	22.23	22.24	22.47	20.37	20.38	20.61
		RB3#4	22.10	22.07	22.21	20.24	20.21	20.35

		RB5#1	22.42	22.19	22.49	20.56	20.33	20.63
5.0	QPSK	RB1#0	22.34	22.06	22.32	20.48	20.20	20.46
		RB1#3	22.27	22.47	22.27	20.41	20.61	20.41
		RB1#5	22.43	22.21	22.13	20.57	20.35	20.27
		RB3#0	22.49	22.22	22.10	20.63	20.36	20.24
		RB3#3	22.33	22.04	22.17	20.47	20.18	20.31
	16QAM	RB6#0	22.07	22.39	22.33	20.21	20.53	20.47
		RB1#0	22.27	22.38	22.41	20.41	20.52	20.55
		RB1#3	22.10	22.18	22.01	20.24	20.32	20.15
		RB1#5	22.45	22.49	22.32	20.59	20.63	20.46
		RB3#0	22.15	22.46	22.09	20.29	20.60	20.23
		RB3#3	22.04	22.26	22.40	20.18	20.40	20.54
10.0	QPSK	RB5#0	22.46	22.34	22.04	20.60	20.48	20.18
		RB1#1	22.48	22.35	22.24	20.62	20.49	20.38
		RB1#4	22.34	22.18	22.31	20.48	20.32	20.45
		RB1#6	22.32	22.25	22.49	20.46	20.39	20.63
		RB3#1	22.38	22.19	22.03	20.52	20.33	20.17
		RB3#4	22.33	22.35	22.43	20.47	20.49	20.57
	16QAM	RB6#1	22.12	22.10	22.39	20.26	20.24	20.53
		RB1#1	22.04	22.37	22.38	20.18	20.51	20.52
		RB1#4	22.48	22.12	22.32	20.62	20.26	20.46
		RB1#6	22.27	22.41	22.23	20.41	20.55	20.37
		RB3#1	22.40	22.26	22.39	20.54	20.40	20.53
		RB3#4	22.42	22.44	22.26	20.56	20.58	20.40
15.0	QPSK	RB5#1	22.24	22.37	22.29	20.38	20.51	20.43
		RB1#1	22.41	22.09	22.28	20.55	20.23	20.42
		RB1#4	22.48	22.33	22.08	20.62	20.47	20.22
		RB1#6	22.27	22.40	22.03	20.41	20.54	20.17
		RB3#1	22.02	22.25	22.17	20.16	20.39	20.31
		RB3#4	22.24	22.36	22.42	20.38	20.50	20.56
	16QAM	RB6#1	22.01	22.47	22.25	20.15	20.61	20.39
		RB1#1	22.43	22.29	22.01	20.57	20.43	20.15
		RB1#4	22.07	22.15	22.19	20.21	20.29	20.33
		RB1#6	22.18	22.27	22.47	20.32	20.41	20.61
		RB3#1	22.46	22.43	22.46	20.60	20.57	20.60
		RB3#4	22.18	22.35	22.35	20.32	20.49	20.49
20.0	QPSK	RB5#1	22.06	22.23	22.27	20.20	20.37	20.41
		RB1#2	22.12	22.43	22.19	20.26	20.57	20.33
		RB1#4	22.03	22.36	22.47	20.17	20.50	20.61
		RB1#7	22.47	22.30	22.47	20.61	20.44	20.61

		RB3#2	22.02	22.49	22.05	20.16	20.63	20.19
		RB3#5	22.24	22.35	22.07	20.38	20.49	20.21
		RB6#2	22.10	22.44	22.49	20.24	20.58	20.63
	16QAM	RB1#2	22.13	22.08	22.45	20.27	20.22	20.59
		RB1#5	22.34	22.04	22.38	20.48	20.18	20.52
		RB1#7	22.22	22.16	22.26	20.36	20.30	20.40
		RB3#2	22.18	22.21	22.22	20.32	20.35	20.36
		RB3#5	22.34	22.20	22.33	20.48	20.34	20.47
		RB5#2	22.47	22.09	22.21	20.61	20.23	20.35
	Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable Loss(dB) For Band2: Antenna Gain = -0.86dBi 1GHz-2GHz : Cable Loss=1.0dB[#] (provided by the applicant) Limit: EIRP≤30dBm							

LTE Band 5:

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	22.02	22.33	22.50	18.40	18.71	18.88
		RB1#3	22.29	22.14	22.40	18.67	18.52	18.78
		RB1#5	22.49	22.41	22.43	18.87	18.79	18.81
		RB3#0	22.12	22.44	22.16	18.50	18.82	18.54
		RB3#3	22.01	22.33	22.47	18.39	18.71	18.85
		RB6#0	22.17	22.25	22.05	18.55	18.63	18.43
	16QAM	RB1#0	22.17	22.06	22.43	18.55	18.44	18.81
		RB1#3	22.18	22.07	22.36	18.56	18.45	18.74
		RB1#5	22.07	22.05	22.50	18.45	18.43	18.88
		RB3#0	22.23	22.07	22.34	18.61	18.45	18.72
		RB3#3	22.26	22.24	22.11	18.64	18.62	18.49
		RB5#0	22.30	22.42	22.40	18.68	18.80	18.78
3.0	QPSK	RB1#1	22.09	22.15	22.20	18.47	18.53	18.58
		RB1#4	22.22	22.05	22.14	18.60	18.43	18.52
		RB1#6	22.41	22.22	22.09	18.79	18.60	18.47
		RB3#1	22.27	22.46	22.34	18.65	18.84	18.72
		RB3#4	22.03	22.43	22.40	18.41	18.81	18.78
		RB6#1	22.47	22.49	22.49	18.85	18.87	18.87
	16QAM	RB1#1	22.49	22.22	22.28	18.87	18.60	18.66
		RB1#4	22.31	22.01	22.46	18.69	18.39	18.84

		RB1#6	22.14	22.18	22.44	18.52	18.56	18.82
		RB3#1	22.39	22.35	22.38	18.77	18.73	18.76
		RB3#4	22.19	22.30	22.11	18.57	18.68	18.49
		RB5#1	22.11	22.30	22.10	18.49	18.68	18.48
5.0	QPSK	RB1#0	22.20	22.38	22.02	18.58	18.76	18.40
		RB1#3	22.32	22.15	22.44	18.70	18.53	18.82
		RB1#5	22.12	22.48	22.30	18.50	18.86	18.68
		RB3#0	22.13	22.48	22.40	18.51	18.86	18.78
		RB3#3	22.10	22.30	22.47	18.48	18.68	18.85
		RB6#0	22.24	22.07	22.44	18.62	18.45	18.82
	16QAM	RB1#0	22.21	22.39	22.05	18.59	18.77	18.43
		RB1#3	22.47	22.26	22.02	18.85	18.64	18.40
		RB1#5	22.21	22.05	22.40	18.59	18.43	18.78
		RB3#0	22.11	22.49	22.31	18.49	18.87	18.69
		RB3#3	22.36	22.02	22.18	18.74	18.40	18.56
		RB5#0	22.39	22.01	22.35	18.77	18.39	18.73
10.0	QPSK	RB1#1	22.17	22.01	22.35	18.55	18.39	18.73
		RB1#4	22.21	22.47	22.15	18.59	18.85	18.53
		RB1#6	22.20	22.42	22.50	18.58	18.80	18.88
		RB3#1	22.13	22.40	22.20	18.51	18.78	18.58
		RB3#4	22.12	22.34	22.17	18.50	18.72	18.55
		RB6#1	22.42	22.02	22.41	18.80	18.40	18.79
	16QAM	RB1#1	22.50	22.15	22.27	18.88	18.53	18.65
		RB1#4	22.02	22.09	22.34	18.40	18.47	18.72
		RB1#6	22.22	22.16	22.07	18.60	18.54	18.45
		RB3#1	22.09	22.15	22.12	18.47	18.53	18.50
		RB3#4	22.40	22.39	22.22	18.78	18.77	18.60
		RB5#1	22.40	22.05	22.49	18.78	18.43	18.87

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable Loss(dB)

For Band5: Antenna Gain = -0.87dBi = -3.02dBd (0dBd=2.15dBi)

<1GHz: Cable Loss=0.6dB# (provided by the applicant)

Limit: ERP≤38.45dBm

LTE Band 12

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	22.31	22.42	22.04	18.84	18.95	18.57
		RB1#3	22.01	22.08	22.16	18.54	18.61	18.69
		RB1#5	22.05	22.42	22.43	18.58	18.95	18.96
		RB3#0	22.14	22.35	22.38	18.67	18.88	18.91
		RB3#3	22.12	22.07	22.49	18.65	18.60	19.02
		RB6#0	22.48	22.31	22.10	19.01	18.84	18.63
	16QAM	RB1#0	22.10	22.28	22.16	18.63	18.81	18.69
		RB1#3	22.15	22.14	22.07	18.68	18.67	18.60
		RB1#5	22.12	22.08	22.37	18.65	18.61	18.90
		RB3#0	22.35	22.13	22.24	18.88	18.66	18.77
		RB3#3	22.29	22.25	22.06	18.82	18.78	18.59
		RB5#0	22.11	22.10	22.24	18.64	18.63	18.77
3.0	QPSK	RB1#1	22.23	22.12	22.33	18.76	18.65	18.86
		RB1#4	22.08	22.07	22.22	18.61	18.60	18.75
		RB1#6	22.18	22.47	22.18	18.71	19.00	18.71
		RB3#1	22.26	22.07	22.23	18.79	18.60	18.76
		RB3#4	22.40	22.48	22.11	18.93	19.01	18.64
		RB6#1	22.17	22.02	22.37	18.70	18.55	18.90
	16QAM	RB1#1	22.31	22.34	22.23	18.84	18.87	18.76
		RB1#4	22.26	22.07	22.44	18.79	18.60	18.97
		RB1#6	22.16	22.04	22.43	18.69	18.57	18.96
		RB3#1	22.11	22.30	22.24	18.64	18.83	18.77
		RB3#4	22.19	22.02	22.40	18.72	18.55	18.93
		RB5#1	22.25	22.22	22.44	18.78	18.75	18.97
5.0	QPSK	RB1#0	22.39	22.45	22.11	18.92	18.98	18.64
		RB1#3	22.22	22.19	22.01	18.75	18.72	18.54
		RB1#5	22.16	22.43	22.09	18.69	18.96	18.62
		RB3#0	22.15	22.07	22.37	18.68	18.60	18.90
		RB3#3	22.37	22.41	22.22	18.90	18.94	18.75
		RB6#0	22.29	22.29	22.16	18.82	18.82	18.69
	16QAM	RB1#0	22.48	22.35	22.36	19.01	18.88	18.89
		RB1#3	22.32	22.44	22.13	18.85	18.97	18.66
		RB1#5	22.44	22.22	22.17	18.97	18.75	18.70
		RB3#0	22.12	22.08	22.01	18.65	18.61	18.54
		RB3#3	22.07	22.08	22.23	18.60	18.61	18.76

		RB5#0	22.18	22.25	22.28	18.71	18.78	18.81
10.0	QPSK	RB1#1	22.13	22.03	22.09	18.66	18.56	18.62
		RB1#4	22.18	22.49	22.27	18.71	19.02	18.80
		RB1#6	22.07	22.26	22.41	18.60	18.79	18.94
		RB3#1	22.07	22.37	22.05	18.60	18.90	18.58
		RB3#4	22.21	22.07	22.16	18.74	18.60	18.69
		RB6#1	22.22	22.44	22.43	18.75	18.97	18.96
	16QAM	RB1#1	22.16	22.10	22.28	18.69	18.63	18.81
		RB1#4	22.29	22.17	22.42	18.82	18.70	18.95
		RB1#6	22.41	22.45	22.25	18.94	18.98	18.78
		RB3#1	22.45	22.48	22.21	18.98	19.01	18.74
		RB3#4	22.43	22.14	22.48	18.96	18.67	19.01
		RB5#1	22.32	22.41	22.19	18.85	18.94	18.72
Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable Loss(dB) For Band12: Antenna Gain = -0.72dBi = -2.87dBd (0dBd=2.15dBi) <1GHz: Cable Loss=0.6dB [#] (provided by the applicant) Limit: ERP≤34.77dBm								

LTE Band 13:

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	22.35	22.37	22.34	18.69	18.71	18.68
		RB1#3	22.14	22.08	22.09	18.48	18.42	18.43
		RB1#5	22.19	22.45	22.32	18.53	18.79	18.66
		RB3#0	22.34	22.49	22.08	18.68	18.83	18.42
		RB3#3	22.32	22.25	22.44	18.66	18.59	18.78
		RB6#0	22.32	22.08	22.08	18.66	18.42	18.42
	16QAM	RB1#0	22.17	22.50	22.36	18.51	18.84	18.70
		RB1#3	22.48	22.26	22.31	18.82	18.60	18.65
		RB1#5	22.04	22.16	22.32	18.38	18.50	18.66
		RB3#0	22.02	22.14	22.27	18.36	18.48	18.61
		RB3#3	22.28	22.32	22.40	18.62	18.66	18.74
		RB5#0	22.33	22.31	22.02	18.67	18.65	18.36
10.0	QPSK	RB1#1	/	22.30	/	/	18.64	/
		RB1#4	/	22.35	/	/	18.69	/
		RB1#6	/	22.19	/	/	18.53	/
		RB3#1	/	22.15	/	/	18.49	/
		RB3#4	/	22.05	/	/	18.39	/
		RB6#1	/	22.28	/	/	18.62	/
	16QAM	RB1#1	/	22.27	/	/	18.61	/
		RB1#4	/	22.42	/	/	18.76	/
		RB1#6	/	22.06	/	/	18.40	/
		RB3#1	/	22.29	/	/	18.63	/
		RB3#4	/	22.04	/	/	18.38	/
		RB5#1	/	22.18	/	/	18.52	/
Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable Loss(dB) For Band 13: Antenna Gain = -0.91dBi = -3.06dBd (0dBd=2.15dBi) <1GHz: Cable Loss=0.6dB [#] (provided by the applicant) Limit: ERP≤34.77dBm								

3.3.2 Peak-to-average ratio (PAR)

LTE Band 2 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	9.49	9.90	7.50	13	Pass
QPSK (6RB Size)	9.97	8.94	8.40	13	Pass
16QAM (1RB Size)	9.29	7.82	9.46	13	Pass
16QAM (5RB Size)	7.37	8.65	9.36	13	Pass

LTE Band 4 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.73	6.22	9.71	13	Pass
QPSK (6RB Size)	7.66	8.21	7.40	13	Pass
16QAM (1RB Size)	7.37	8.33	8.11	13	Pass
16QAM (5RB Size)	8.01	6.89	9.87	13	Pass

LTE Band 5 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	9.07	6.09	10.13	13	Pass
QPSK (6RB Size)	7.98	10.96	6.89	13	Pass
16QAM (1RB Size)	9.29	10.45	9.52	13	Pass
16QAM (5RB Size)	8.88	10.23	7.63	13	Pass

LTE Band 12 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.19	6.70	9.78	13	Pass
QPSK (6RB Size)	5.45	6.54	7.40	13	Pass
16QAM (1RB Size)	9.20	8.69	8.56	13	Pass
16QAM (5RB Size)	8.85	9.26	7.69	13	Pass

LTE Band 13 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	/	8.85	/	13	Pass
QPSK (6RB Size)	/	5.71	/	13	Pass
16QAM (1RB Size)	/	9.55	/	13	Pass
16QAM (5RB Size)	/	7.28	/	13	Pass

3.3.3 26dB and 99% Bandwidth

LTE Band 2:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.088	1.244	1.094	1.279	1.083	1.256
	16QAM	0.920	1.161	0.920	1.111	0.920	1.172
3 MHz	QPSK	1.118	1.322	1.118	1.286	1.106	1.286
	16QAM	0.950	1.142	0.950	1.142	0.950	1.250
5 MHz	QPSK	1.122	1.314	0.942	1.122	0.946	1.154
	16QAM	0.962	1.138	0.962	1.202	0.929	1.138
10 MHz	QPSK	1.122	1.282	1.122	1.282	1.122	1.314
	16QAM	0.962	1.218	0.962	1.154	0.962	1.218
15 MHz	QPSK	1.153	1.298	1.106	1.298	1.153	1.298
	16QAM	1.010	1.250	0.962	1.250	0.962	1.202
20 MHz	QPSK	1.090	1.346	1.090	1.346	1.090	1.346
	16QAM	0.962	1.218	0.962	1.218	0.962	1.218

LTE Band 4:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.104	1.314	1.104	1.290	1.098	1.284
	16QAM	0.930	1.146	0.942	1.140	0.936	1.236
3 MHz	QPSK	1.104	1.308	1.116	1.308	1.092	1.284
	16QAM	0.936	1.164	0.948	1.140	0.948	1.248
5 MHz	QPSK	1.120	1.320	1.120	1.240	1.100	1.300
	16QAM	0.940	1.160	0.960	1.180	0.940	1.160
10 MHz	QPSK	1.120	1.360	1.120	1.320	1.160	1.320
	16QAM	0.960	1.200	0.960	1.200	0.960	1.200
15 MHz	QPSK	1.140	1.380	1.140	1.320	1.140	1.380
	16QAM	0.960	1.140	0.960	1.200	0.960	1.200
20 MHz	QPSK	1.120	1.360	1.200	1.440	1.200	1.360
	16QAM	0.960	1.200	0.960	1.200	0.960	1.200

LTE Band 5:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.088	1.268	1.088	1.269	1.088	1.263
	16QAM	0.919	1.099	0.919	1.098	0.914	1.213
3 MHz	QPSK	1.106	1.315	1.106	1.279	1.118	1.334
	16QAM	0.950	1.147	0.938	1.226	0.938	1.130
5 MHz	QPSK	1.106	1.362	1.106	1.314	1.106	1.298
	16QAM	0.946	1.138	0.946	1.154	0.946	1.138
10 MHz	QPSK	1.122	1.314	1.122	1.314	1.122	1.314
	16QAM	0.962	1.218	0.962	1.186	0.962	1.122

LTE Band 12:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.098	1.284	1.104	1.296	1.098	1.278
	16QAM	0.942	1.218	0.936	1.140	0.936	1.212
3 MHz	QPSK	1.104	1.308	1.104	1.296	1.104	1.296
	16QAM	0.936	1.248	0.948	1.152	0.936	1.224
5 MHz	QPSK	1.120	1.320	1.120	1.320	1.100	1.320
	16QAM	0.940	1.160	0.960	1.160	0.940	1.160
10 MHz	QPSK	1.120	1.360	1.120	1.320	1.120	1.320
	16QAM	0.960	1.160	0.960	1.200	0.960	1.160

LTE Band 13:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
5 MHz	QPSK	1.120	1.320	1.120	1.320	1.120	1.340
	16QAM	0.960	1.180	0.940	1.140	0.940	1.160
10 MHz	QPSK	/	/	1.080	1.320	/	/
	16QAM	/	/	0.960	1.160	/	/

Note: Test Plots of 26dB and 99% bandwidth please refer Appendix A.

3.3.4 Conducted Spurious Emissions

Band	Result	Limit	Verdict
LTE B2	Refer test plot	Refer test plot	Pass
LTE B4	Refer test plot	Refer test plot	Pass
LTE B5	Refer test plot	Refer test plot	Pass
LTE B12	Refer test plot	Refer test plot	Pass
LTE B13	Refer test plot	Refer test plot	Pass

Note: Test Plots of Conducted Spurious Emissions please refer Appendix B.

3.3.5 Out of band emission, Band Edge

Band	Result	Limit	Verdict
LTE B2	Refer test plot	Refer test plot	Pass
LTE B4	Refer test plot	Refer test plot	Pass
LTE B5	Refer test plot	Refer test plot	Pass
LTE B12	Refer test plot	Refer test plot	Pass
LTE B13	Refer test plot	Refer test plot	Pass

Note: Test Plots of Band Edge please refer Appendix C.

3.3.6 FREQUENCY STABILITY

QPSK:

Band 2:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.7	1850.434556	1909.354839	1850	1910
-20		1850.578817	1909.999238	1850	1910
-10		1850.142916	1909.882857	1850	1910
0		1850.960223	1909.281606	1850	1910
10		1850.851881	1909.245425	1850	1910
20		1850.267196	1909.251480	1850	1910
30		1850.597504	1909.645506	1850	1910
40		1850.218718	1909.515395	1850	1910
50		1850.939866	1909.192384	1850	1910
20	4.3	1850.099428	1909.380836	1850	1910
	3.2	1850.251971	1909.190391	1850	1910

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.7	1710.881042	1754.780287	1710	1755
-20		1710.303362	1754.506502	1710	1755
-10		1710.462548	1754.155222	1710	1755
0		1710.159990	1754.449660	1710	1755
10		1710.209485	1754.558380	1710	1755
20		1710.878537	1754.525052	1710	1755
30		1710.928219	1754.782260	1710	1755
40		1710.284125	1754.919493	1710	1755
50		1710.174450	1754.552105	1710	1755
20	4.3	1710.458849	1754.025539	1710	1755
	3.2	1710.063154	1754.716004	1710	1755

Band 5:

10.0 MHz Middle Channel, $f_o = 836.5\text{MHz}$				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	471	0.56	2.5
-20		319	0.38	2.5
-10		395	0.47	2.5
0		324	0.39	2.5
10		467	0.56	2.5
20		301	0.36	2.5
30		304	0.36	2.5
40		475	0.57	2.5
50		496	0.59	2.5
20	4.3	489	0.58	2.5
	3.2	443	0.53	2.5

Band 12:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	3.7	699.661321	715.900736	699	716
-20		699.968540	715.955587	699	716
-10		699.540802	715.030400	699	716
0		699.757857	715.831456	699	716
10		699.655999	715.071705	699	716
20		699.217267	715.089044	699	716
30		699.564100	715.831761	699	716
40		699.734595	715.266841	699	716
50		699.594731	715.440591	699	716
20	4.3	699.133274	715.184413	699	716
	3.2	699.891801	715.892662	699	716

Band 13:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.7	777.746437	786.666282	777	787
-20		777.612892	786.637917	777	787
-10		777.246530	786.780048	777	787
0		777.305044	786.056322	777	787
10		777.350528	786.917504	777	787
20		777.650355	786.848022	777	787
30		777.652667	786.546642	777	787
40		777.693755	786.399098	777	787
50		777.119510	786.274383	777	787
20	4.3	777.590629	786.062346	777	787
	3.2	777.743026	786.908611	777	787

16QAM:

Band 2:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.7	1850.286856	1909.756562	1850	1910
-20		1850.686309	1909.128349	1850	1910
-10		1850.693446	1909.685331	1850	1910
0		1850.535571	1909.640915	1850	1910
10		1850.417941	1909.446368	1850	1910
20		1850.848391	1909.591323	1850	1910
30		1850.245471	1909.887463	1850	1910
40		1850.471256	1909.415111	1850	1910
50		1850.754063	1909.502994	1850	1910
20	4.3	1850.884127	1909.515344	1850	1910
	3.2	1850.271168	1909.425197	1850	1910

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.7	1710.259373	1754.851093	1710	1755
-20		1710.612827	1754.619459	1710	1755
-10		1710.069808	1754.909931	1710	1755
0		1710.894738	1754.032179	1710	1755
10		1710.936912	1754.865302	1710	1755
20		1710.892268	1754.069680	1710	1755
30		1710.384407	1754.970610	1710	1755
40		1710.584663	1754.649603	1710	1755
50		1710.750913	1754.630975	1710	1755
20	4.3	1710.552584	1754.059987	1710	1755
	3.2	1710.634831	1754.576546	1710	1755

Band 5:

10.0 MHz Middle Channel, $f_o = 836.5\text{MHz}$				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	343	0.41	2.5
-20		495	0.59	2.5
-10		391	0.47	2.5
0		437	0.52	2.5
10		443	0.53	2.5
20		369	0.44	2.5
30		460	0.55	2.5
40		397	0.47	2.5
50		393	0.47	2.5
20	4.3	372	0.44	2.5
	3.2	397	0.47	2.5

Band 12:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	3.7	699.320191	715.370752	699	716
-20		699.574307	715.010835	699	716
-10		699.031023	715.090292	699	716
0		699.718554	715.144018	699	716
10		699.638833	715.903137	699	716
20		699.736742	715.898636	699	716
30		699.325463	715.861540	699	716
40		699.612879	715.141623	699	716
50		699.151179	715.221584	699	716
20	4.3	699.015642	715.092318	699	716
	3.2	699.444868	715.682987	699	716

Band 13:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.7	777.068951	786.294661	777	787
-20		777.145453	786.549578	777	787
-10		777.892320	786.630259	777	787
0		777.179421	786.658145	777	787
10		777.720839	786.146894	777	787
20		777.763029	786.400828	777	787
30		777.763420	786.706369	777	787
40		777.857438	786.563283	777	787
50		777.556912	786.368313	777	787
20	4.3	777.876480	786.601172	777	787
	3.2	777.170895	786.218970	777	787

3.4 Radiated Spurious emission Test Data

Test Date:	2024-06-06	Test By:	Luke Li
Environment condition:	Temperature: 23.8°C; Relative Humidity:65%; ATM Pressure: 100.1kPa		

Frequency (MHz)	Reading level (dBμV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	EIRP CF	EIRP (dBm)	Limit (dBm)	Margin (dB)	Remark
LTE Band 2									
Low Channel									
3701.4	63.94	horizontal	-2.57	61.37	95.2	-33.83	-13	-20.83	Peak
3701.4	63.89	vertical	-2.57	61.32	95.2	-33.88	-13	-20.88	Peak
Middle Channel									
3760	53.14	horizontal	-2.69	50.45	95.2	-44.75	-13	-31.75	Peak
3760	53.99	vertical	-2.69	51.3	95.2	-43.9	-13	-30.9	Peak
High Channel									
3818.6	53.75	horizontal	-2.78	50.97	95.2	-44.23	-13	-31.23	Peak
3818.6	53.41	vertical	-2.78	50.63	95.2	-44.57	-13	-31.57	Peak
LTE Band 4									
Low Channel									
3421.4	64.72	horizontal	-2.63	62.09	95.2	-33.11	-13	-20.11	Peak
3421.4	63.1	vertical	-2.63	60.47	95.2	-34.73	-13	-21.73	Peak
Middle Channel									
3465	59.77	horizontal	-2.68	57.09	95.2	-38.11	-13	-25.11	Peak
3465	62.46	vertical	-2.68	59.78	95.2	-35.42	-13	-22.42	Peak
High Channel									
3508.6	62.66	horizontal	-2.71	59.95	95.2	-35.25	-13	-22.25	Peak
3508.6	61.22	vertical	-2.71	58.51	95.2	-36.69	-13	-23.69	Peak
LTE Band 5									
Low Channel									
1649.4	67.59	horizontal	-3.32	64.27	95.2	-30.93	-13	-17.93	Peak
1649.4	63.38	vertical	-3.32	60.06	95.2	-35.14	-13	-22.14	Peak
Middle Channel									
1673	63.29	horizontal	-3.19	60.1	95.2	-35.1	-13	-22.1	Peak
1673	59.55	vertical	-3.19	56.36	95.2	-38.84	-13	-25.84	Peak
High Channel									
1696.6	58.45	horizontal	-3.07	55.38	95.2	-39.82	-13	-26.82	Peak
1696.6	59.23	vertical	-3.07	56.16	95.2	-39.04	-13	-26.04	Peak

LTE Band 12									
Low Channel									
1399.4	60.31	horizontal	-4.66	55.65	95.2	-39.55	-13	-26.55	Peak
1399.4	55.67	vertical	-4.66	51.01	95.2	-44.19	-13	-31.19	Peak
Middle Channel									
2122.5	62.97	horizontal	-3.59	59.38	95.2	-35.82	-13	-22.82	Peak
2122.5	53.19	vertical	-3.59	49.6	95.2	-45.6	-13	-32.6	Peak
High Channel									
2145.9	66.75	horizontal	-3.53	63.22	95.2	-31.98	-13	-18.98	Peak
2145.9	56.45	vertical	-3.53	52.92	95.2	-42.28	-13	-29.28	Peak
LTE Band 13									
Low Channel									
1559	57.86	horizontal	-3.99	53.87	95.2	-41.33	-40	-1.33	Peak
1559	55.23	vertical	-3.99	51.24	95.2	-43.96	-40	-3.96	Peak
2338.5	66.52	horizontal	-2.8	63.72	95.2	-31.48	-13	-18.48	Peak
2338.5	60.53	vertical	-2.8	57.73	95.2	-37.47	-13	-24.47	Peak
Middle Channel									
1564	58.12	horizontal	-3.96	54.16	95.2	-41.04	-40	-1.04	Peak
1564	54.39	vertical	-3.96	50.43	95.2	-44.77	-40	-4.77	Peak
2346	65.43	horizontal	-2.79	62.64	95.2	-32.56	-13	-19.56	Peak
2346	58.66	vertical	-2.79	55.87	95.2	-39.33	-13	-26.33	Peak
High Channel									
1569	57.73	horizontal	-3.92	53.81	95.2	-41.39	-40	-1.39	Peak
1569	55.69	vertical	-3.92	51.77	95.2	-43.43	-40	-3.43	Peak
2353.5	67.21	horizontal	-2.79	64.42	95.2	-30.78	-13	-17.78	Peak
2353.5	60.38	vertical	-2.79	57.59	95.2	-37.61	-13	-24.61	Peak

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Result – Limit

According to ANSI C63.26-2015 section 5.2.7:

$EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.

Test was performed on 3meters distance, so

Result = Corrected Amplitude + $20\log(3) - 104.8$

= Corrected Amplitude - 95.2

The emission levels of other frequencies that were lower than the limit 20dB, not show in test report.

4 Test Setup Photo

Please refer to the attachment RWAQ202400273C Test Setup photo.

5 E.U.T Photo

Please refer to the attachment RWAQ202400273 External photo and RWAQ202400273 Internal photo.

---End of Report---