

FCC Test Report

Report No.: RWAQ202400272B

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: Share cycling smart lock

Product Model: OC33

Multiple Models: N/A

Trade Mark: N/A

FCC ID: 2AI2O-OC33

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

Test Date: 2024-04-23 to 2024-05-09

Test Result: Complied

Issue Date: 2024-05-09

Reviewed by:

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Approved by:

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Revision History

Version No.	Issued Date	Description
00	2024-05-09	Original

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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 a Share cycling smart lock that contains BLE(1M), WCDMA, LTE radios, this report covers the full testing of the WCDMA, LTE radios.

Sample Serial number	77-4 for RE test, 77-5 for RF test conducted test(assigned by WATC)				
Sample Received Date	2024-03-29				
Sample Status	Good Condition				
Frequency Range	Band	TX Frequency (MHz)	RX Frequency (MHz)	Max. Conducted Power (dBm)	Antenna Gain# (dBi)
Maximum Conducted Power	WCDMA B2	1850-1910	1920-1980	23.51	-1.25dBi
Antenna Gain	WCDMA B5	824-849	869-894	25.71	-0.87dBi
	LTE B2	1850-1910	1920-1980	23.43	-1.25dBi
	LTE B4	1710-1755	2110-2155	22.89	-0.86dBi
	LTE B5	824-849	869-894	23.97	-0.87dBi
	LTE B12	699-716	729-746	23.86	-0.72dBi
Modulation Technology	BPSK, QPSK, 16QAM				
Power Supply	DC 3.7V from battery or charging by type-c or charging by DC port(solar power)				
Operating temperature#	-20 deg.C to +60 deg.C				
Adapter Information	N/A				
Modification	Sample No Modification by the test lab				

1.3 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment Class: DTS, FCC ID: 2AI2O-OC33
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1.4 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%
<p>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.</p> <p>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.)</p>		

1.5 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.

1.6 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)
WCDMA B2	4.8	1852.4	1880	1907.6
WCDMA B5	4.8	826.4	836.6	846.6
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

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	√	√	√	√	-	-	√	√	√	√	√	√	√	√
Peak-to-Average Ratio	2				√			√	√	√		√	√	√	√
	4				√			√	√	√		√	√	√	√
	5				√	-	-	√	√	√		√	√	√	√
	12				√	-	-	√	√	√		√	√	√	√
26dB and 99% Bandwidth	2	√	√	√	√	√	√	√	√			√	√	√	√
	4	√	√	√	√	√	√	√	√			√	√	√	√
	5	√	√	√	√	-	-	√	√			√	√	√	√
	12	√	√	√	√	-	-	√	√			√	√	√	√
Band Edge	2	√	√	√	√	√	√	√	√	√		√	√		√
	4	√	√	√	√	√	√	√	√	√		√	√		√
	5	√	√	√	√	-	-	√	√	√		√	√		√
	12	√	√	√	√	-	-	√	√	√		√	√		√

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

Note:

1. "√" means the configuration was chosen for testing
2. "-" means the not support the bandwidth

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.

The LTE UE Category of the EUT is UE Category 1, for 16QAM modulation, support maximum 27RB.

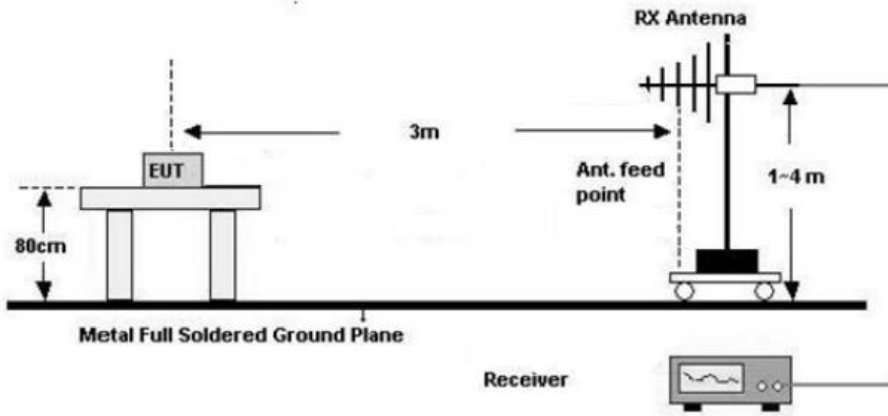
2.3 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
Shenzhen Huajin Electronics Co.,Ltd	AC Power Adapter	HJ-0502000W2-US	Unknown
Unknown	USB cable	Unknown	Unknown

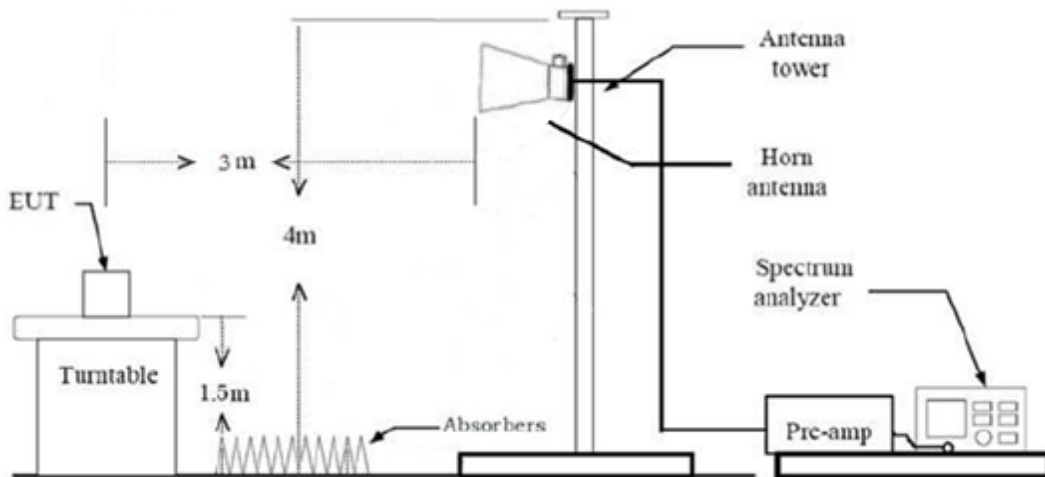
2.4 Test Setup

1) Radiated emission measurement:

30MHz-1GHz (3m SAC)

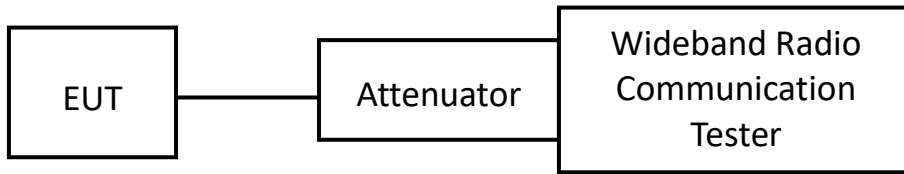


Above 1GHz (3m FAC)

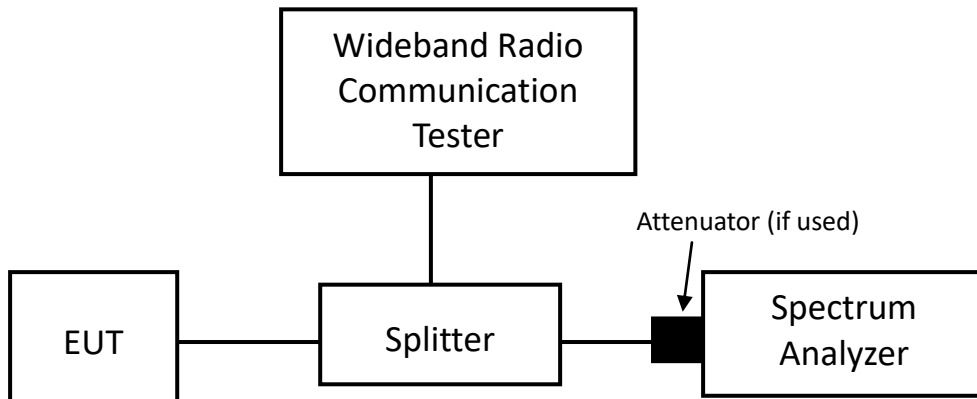


2) RF Conducted Test

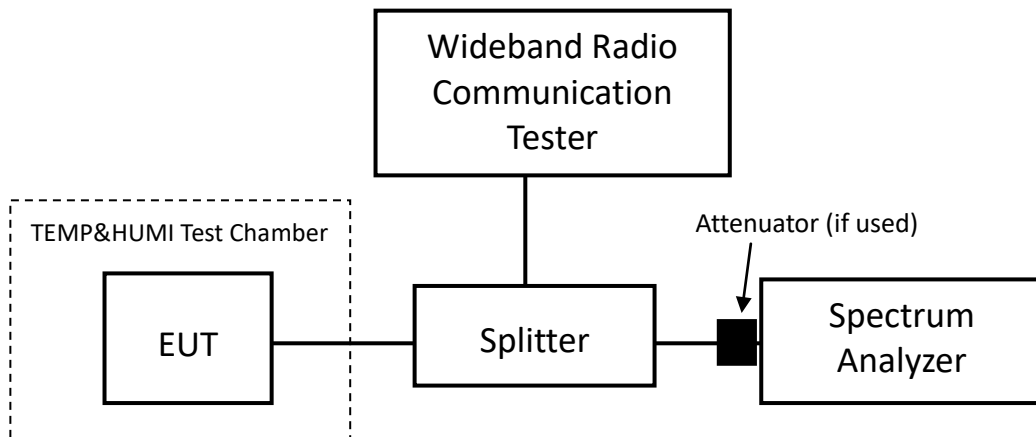
For RF Output Power test



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
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	<p>FCC §22.913:</p> <p>(a)(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts.</p> <p>(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:</p> <p>(1) A Commission-approved average power technique (see FCC Laboratory's Knowledge Database); or</p> <p>(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.</p>																																
Unwanted Emissions (Out of band emission and spurious)	<p>FCC §22.917:</p> <p>(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.</p> <p>(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:</p> <p>(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.</p> <p>(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz</p>																																
Frequency stability	<p>FCC §22.355:</p> <p>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.</p> <div style="text-align: center; margin: 10px 0;"> <p>Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 35%;">Frequency range (MHz)</th> <th style="width: 15%;">Base, fixed (ppm)</th> <th style="width: 15%;">Mobile >3 watts (ppm)</th> <th style="width: 35%;">Mobile ≤3 watts (ppm)</th> </tr> </thead> <tbody> <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> </tbody> </table> </div>	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
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	<p>FCC §24.232:</p> <p>(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.</p> <p>(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.</p>
Unwanted Emissions (Out of band emission and spurious)	<p>FCC §24.238:</p> <p>The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p>
Frequency stability	<p>FCC §24.235:</p> <p>The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.</p>

Test items	Limit
RF Output Power	<p>FCC §27.50:</p> <p>(a)(3) Mobile and portable stations.</p> <p>(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.</p> <p>(ii) Mobile and portable stations are not permitted to transmit in the 2315-2320 MHz and 2345-2350 MHz bands.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p>

<p>Unwanted Emissions (Out of band emission and spurious)</p>	<p>FCC §27.53:</p> <p>(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:</p> <p>(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:</p> <p>(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;</p> <p>(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;</p> <p>(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.</p> <p>(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:</p> <p>(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;</p> <p>(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;</p> <p>(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;</p> <p>(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;</p> <p>(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;</p> <p>(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.</p>
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	<p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p>
<p>Frequency stability</p>	<p>FCC §27.54:</p> <p>The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.</p>

3.3 RF Conducted Test Data

Test Date:	2024-04-23~2024-05-09	Test By:	Ryan Zhang
Environment condition:	Temperature: 20.5~27.4°C; Relative Humidity: 57.1~68.2%; ATM Pressure: 100.7~101.0kPa		

3.3.1 RF Output Power&ERP/EIRP

Cellular Band

Mode	Test Mode	3GPP Sub Test	Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
WCDMA (Band 5)	RMC12.2k		25.59	25.59	25.71	22.57	22.57	22.69
	HSDPA	1	24.26	24.29	23.90	21.24	21.27	20.88
		2	24.15	24.12	23.95	21.13	21.1	20.93
		3	23.98	24.09	24.05	20.96	21.07	21.03
		4	24.07	24.21	24.18	21.05	21.19	21.16
	HSUPA	1	23.67	23.62	23.67	20.65	20.6	20.65
		2	23.52	23.59	23.55	20.5	20.57	20.53
		3	23.62	23.74	23.72	20.6	20.72	20.7
		4	23.61	23.67	23.60	20.59	20.65	20.58
		5	23.67	23.63	23.54	20.65	20.61	20.52

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable loss(dB)
 Antenna Gain[#] = -0.87dBi = -3.02dBd (0dBd=2.15dBi)
 Cable Loss[#]=0dB (provided by the applicant)
 Limit: ERP≤38.45dBm

PCS Band

Mode	Test Mode	3GPP Sub Test	Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
WCDMA (Band 2)	RMC12.2k		23.51	23.44	23.29	22.26	22.19	22.04
	HSDPA	1	21.79	22.03	21.89	20.54	20.78	20.64
		2	21.89	22.09	21.90	20.64	20.84	20.65
		3	21.87	22.02	21.82	20.62	20.77	20.57
		4	21.82	21.99	21.88	20.57	20.74	20.63
	HSUPA	1	21.98	21.94	21.73	20.73	20.69	20.48
		2	21.75	21.62	21.31	20.5	20.37	20.06
		3	21.88	21.93	21.85	20.63	20.68	20.6
		4	22.78	21.05	21.95	21.53	19.8	20.7
		5	21.82	21.91	21.93	20.57	20.66	20.68

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable loss(dB)
 Antenna Gain[#] = -1.25dBi
 Cable Loss[#]=0dB (provided by the applicant)
 Limit: EIRP≤33dBm

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	22.53	22.60	22.27	21.28	21.35	21.02
		RB1#3	22.39	22.54	22.22	21.14	21.29	20.97
		RB1#5	22.49	22.37	22.18	21.24	21.12	20.93
		RB3#0	22.68	22.29	22.09	21.43	21.04	20.84
		RB3#3	22.31	22.22	22.17	21.06	20.97	20.92
		RB6#0	21.38	21.61	22.12	20.13	20.36	20.87
	16QAM	RB1#0	21.22	21.82	21.63	19.97	20.57	20.38
		RB1#3	21.15	21.62	21.56	19.90	20.37	20.31
		RB1#5	21.05	21.41	21.77	19.80	20.16	20.52
		RB3#0	20.90	21.34	21.48	19.65	20.09	20.23
		RB3#3	21.11	21.20	21.23	19.86	19.95	19.98
		RB6#0	20.45	20.60	20.81	19.20	19.35	19.56
3.0	QPSK	RB1#0	22.45	22.61	22.57	21.20	21.36	21.32
		RB1#8	22.44	22.50	22.44	21.19	21.25	21.19
		RB1#14	21.98	22.32	22.13	20.73	21.07	20.88
		RB6#0	21.73	21.88	21.89	20.48	20.63	20.64
		RB6#9	21.61	21.61	21.81	20.36	20.36	20.56
		RB15#0	21.52	21.55	21.62	20.27	20.30	20.37
	16QAM	RB1#0	21.12	22.30	21.67	19.87	21.05	20.42
		RB1#8	21.03	22.17	21.88	19.78	20.92	20.63
		RB1#14	20.82	22.14	22.21	19.57	20.89	20.96
		RB6#0	20.76	21.71	20.55	19.51	20.46	19.30
		RB6#9	20.30	21.02	20.44	19.05	19.77	19.19
		RB15#0	20.17	20.21	20.21	18.92	18.96	18.96
5.0	QPSK	RB1#0	22.96	23.26	22.88	21.71	22.01	21.63
		RB1#13	22.79	23.10	22.65	21.54	21.85	21.40
		RB1#24	22.50	22.73	22.61	21.25	21.48	21.36
		RB15#0	22.35	22.66	22.40	21.10	21.41	21.15
		RB15#10	22.33	22.43	22.33	21.08	21.18	21.08
		RB25#0	21.92	21.51	22.00	20.67	20.26	20.75
	16QAM	RB1#0	21.40	21.60	21.59	20.15	20.35	20.34
		RB1#13	21.11	21.73	21.67	19.86	20.48	20.42
		RB1#24	21.01	21.30	21.54	19.76	20.05	20.29
		RB15#0	20.99	21.21	21.36	19.74	19.96	20.11
		RB15#10	20.30	21.33	21.48	19.05	20.08	20.23
		RB25#0	20.38	20.80	20.93	19.13	19.55	19.68

10.0	QPSK	RB1#0	22.72	22.77	22.45	21.47	21.52	21.2
		RB1#25	22.66	22.66	22.42	21.41	21.41	21.17
		RB1#49	22.42	22.40	22.20	21.17	21.15	20.95
		RB25#0	21.4	21.42	21.19	20.15	20.17	19.94
		RB25#25	21.52	21.34	21.37	20.27	20.09	20.12
		RB50#0	21.46	21.26	21.23	20.21	20.01	19.98
	16QAM	RB1#0	21.10	22.12	21.69	19.85	20.87	20.44
		RB1#13	20.77	22.00	21.89	19.52	20.75	20.64
		RB1#26	20.60	21.08	21.00	19.35	19.83	19.75
		RB13#0	20.43	20.88	21.03	19.18	19.63	19.78
		RB13#14	20.60	20.75	20.84	19.35	19.50	19.59
RB27#0	20.21	20.45	20.67	18.96	19.20	19.42		
15.0	QPSK	RB1#0	23.43	22.88	23.03	22.18	21.63	21.78
		RB1#38	22.80	22.75	22.81	21.55	21.50	21.56
		RB1#74	22.76	22.40	22.45	21.51	21.15	21.20
		RB36#0	22.56	22.37	22.05	21.31	21.12	20.80
		RB36#39	22.21	22.41	22.01	20.96	21.16	20.76
		RB75#0	21.56	21.71	21.52	20.31	20.46	20.27
	16QAM	RB1#0	21.40	21.48	21.56	20.15	20.23	20.31
		RB1#13	21.47	21.61	21.21	20.22	20.36	19.96
		RB1#26	21.08	21.34	21.29	19.83	20.09	20.04
		RB13#0	20.93	21.25	21.36	19.68	20.00	20.11
		RB13#14	21.50	20.98	21.48	20.25	19.73	20.23
RB27#0	20.48	20.70	20.78	19.23	19.45	19.53		
20.0	QPSK	RB1#0	22.72	22.57	22.75	21.47	21.32	21.50
		RB1#50	22.61	22.67	22.47	21.36	21.42	21.22
		RB1#99	22.30	22.41	22.35	21.05	21.16	21.10
		RB50#0	21.42	22.25	22.05	20.17	21.00	20.80
		RB50#50	21.31	21.50	21.71	20.06	20.25	20.46
		RB100#0	21.02	21.31	21.34	19.77	20.06	20.09
	16QAM	RB1#0	20.98	21.23	21.63	19.73	19.98	20.38
		RB1#13	20.87	21.17	22.45	19.62	19.92	21.20
		RB1#26	20.70	21.59	22.33	19.45	20.34	21.08
		RB13#0	20.24	20.79	21.57	18.99	19.54	20.32
		RB13#14	20.30	20.40	20.46	19.05	19.15	19.21
RB27#0	20.17	20.12	20.23	18.92	18.87	18.98		

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable Loss(dB)

For Band2: Antenna Gain = -1.25dBi

Cable Loss=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	22.44	22.57	22.51	21.58	21.71	21.65
		RB1#3	22.49	22.60	22.21	21.63	21.74	21.35
		RB1#5	22.38	22.56	22.25	21.52	21.70	21.39
		RB3#0	22.32	22.36	22.15	21.46	21.50	21.29
		RB3#3	22.35	22.55	22.32	21.49	21.69	21.46
		RB6#0	21.53	21.51	21.39	20.67	20.65	20.53
	16QAM	RB1#0	21.43	21.80	21.59	20.57	20.94	20.73
		RB1#3	21.11	21.73	21.77	20.25	20.87	20.91
		RB1#5	21.08	21.60	22.00	20.22	20.74	21.14
		RB3#0	20.93	21.63	21.36	20.07	20.77	20.50
		RB3#3	21.50	21.48	21.58	20.64	20.62	20.72
		RB6#0	20.48	20.60	20.68	19.62	19.74	19.82
3.0	QPSK	RB1#0	22.33	22.42	22.26	21.47	21.56	21.40
		RB1#8	22.16	22.24	22.42	21.30	21.38	21.56
		RB1#14	22.32	22.35	22.25	21.46	21.49	21.39
		RB6#0	21.56	21.41	21.25	20.70	20.55	20.39
		RB6#9	21.46	21.4	21.31	20.60	20.54	20.45
		RB15#0	21.46	21.41	21.33	20.60	20.55	20.47
	16QAM	RB1#0	21.01	22.23	21.84	20.15	21.37	20.98
		RB1#8	20.80	22.18	21.99	19.94	21.32	21.13
		RB1#14	20.82	22.09	22.47	19.96	21.23	21.61
		RB6#0	20.37	20.73	20.37	19.51	19.87	19.51
		RB6#9	20.30	20.52	20.46	19.44	19.66	19.60
		RB15#0	20.63	20.33	20.23	19.77	19.47	19.37
5.0	QPSK	RB1#0	22.64	22.62	22.43	21.78	21.76	21.57
		RB1#13	22.29	22.57	22.33	21.43	21.71	21.47
		RB1#24	22.48	22.51	22.31	21.62	21.65	21.45
		RB15#0	22.52	22.36	22.16	21.66	21.50	21.30
		RB15#10	22.21	22.49	22.29	21.35	21.63	21.43
		RB25#0	21.62	21.61	22.01	20.76	20.75	21.15
	16QAM	RB1#0	21.52	21.82	21.36	20.66	20.96	20.50
		RB1#13	21.27	21.63	21.56	20.41	20.77	20.70
		RB1#24	21.08	21.25	21.99	20.22	20.39	21.13
		RB15#0	20.93	21.45	21.12	20.07	20.59	20.26
		RB15#10	21.12	21.33	21.43	20.26	20.47	20.57
		RB25#0	20.43	20.59	20.75	19.57	19.73	19.89

10.0	QPSK	RB1#0	22.42	22.65	22.46	21.56	21.79	21.60
		RB1#25	22.33	22.54	22.43	21.47	21.68	21.57
		RB1#49	22.31	22.12	22.12	21.45	21.26	21.26
		RB25#0	21.73	21.85	21.88	20.87	20.99	21.02
		RB25#25	21.72	21.66	21.53	20.86	20.80	20.67
		RB50#0	21.55	21.61	21.21	20.69	20.75	20.35
	16QAM	RB1#0	21.12	22.33	21.67	20.26	21.47	20.81
		RB1#13	20.92	22.12	21.88	20.06	21.26	21.02
		RB1#26	20.71	22.02	22.46	19.85	21.16	21.60
		RB13#0	20.35	21.73	20.24	19.49	20.87	19.38
		RB13#14	20.40	20.32	20.21	19.54	19.46	19.35
		RB27#0	20.12	20.11	20.16	19.26	19.25	19.30
15.0	QPSK	RB1#0	22.89	22.75	22.81	22.03	21.89	21.95
		RB1#38	22.65	22.70	22.34	21.79	21.84	21.48
		RB1#74	22.42	22.69	22.30	21.56	21.83	21.44
		RB36#0	22.56	22.42	22.17	21.70	21.56	21.31
		RB36#39	22.39	22.61	22.22	21.53	21.75	21.36
		RB75#0	21.67	22.11	21.89	20.81	21.25	21.03
	16QAM	RB1#0	21.66	21.90	21.64	20.80	21.04	20.78
		RB1#13	21.52	21.73	21.00	20.66	20.87	20.14
		RB1#26	21.16	21.61	21.86	20.30	20.75	21.00
		RB13#0	21.01	21.55	21.72	20.15	20.69	20.86
		RB13#14	21.40	21.43	21.22	20.54	20.57	20.36
		RB27#0	20.39	20.77	20.35	19.53	19.91	19.49
20.0	QPSK	RB1#0	22.48	22.60	22.87	21.62	21.74	22.01
		RB1#50	22.46	22.34	22.45	21.60	21.48	21.59
		RB1#99	22.30	22.24	22.32	21.44	21.38	21.46
		RB50#0	21.89	21.80	21.67	21.03	20.94	20.81
		RB50#50	21.84	21.40	21.65	20.98	20.54	20.79
		RB100#0	21.74	21.69	21.33	20.88	20.83	20.47
	16QAM	RB1#0	21.13	22.25	21.49	20.27	21.39	20.63
		RB1#13	20.72	22.17	21.98	19.86	21.31	21.12
		RB1#26	20.60	22.03	22.09	19.74	21.17	21.23
		RB13#0	20.44	21.23	20.67	19.58	20.37	19.81
		RB13#14	20.30	20.83	20.53	19.44	19.97	19.67
		RB27#0	20.12	20.30	20.17	19.26	19.44	19.31

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable Loss(dB)

For Band2: Antenna Gain = -0.86dBi

Cable Loss=0dB*(provided by the applicant)

Limit: EIRP≤33dBm

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	23.95	23.97	23.79	20.93	20.95	20.77
		RB1#3	23.93	23.75	23.91	20.91	20.73	20.89
		RB1#5	23.68	23.62	23.58	20.66	20.60	20.56
		RB3#0	23.49	23.62	23.52	20.47	20.60	20.5
		RB3#3	23.25	23.85	22.89	20.23	20.83	19.87
		RB6#0	22.64	22.61	22.59	19.62	19.59	19.57
	16QAM	RB1#0	22.58	22.57	22.51	19.56	19.55	19.49
		RB1#3	22.52	22.23	22.45	19.50	19.21	19.43
		RB1#5	22.46	22.14	22.23	19.44	19.12	19.21
		RB3#0	22.31	22.01	22.19	19.29	18.99	19.17
		RB3#3	21.85	21.89	21.93	18.83	18.87	18.91
		RB6#0	21.71	21.79	21.75	18.69	18.77	18.73
3.0	QPSK	RB1#0	23.45	23.61	23.64	20.43	20.59	20.62
		RB1#8	23.31	23.27	23.63	20.29	20.25	20.61
		RB1#14	23.13	23.17	23.39	20.11	20.15	20.37
		RB6#0	23.09	22.62	23.13	20.07	19.60	20.11
		RB6#9	22.86	22.62	22.79	19.84	19.60	19.77
		RB15#0	22.78	22.59	22.57	19.76	19.57	19.55
	16QAM	RB1#0	22.41	22.26	22.53	19.39	19.24	19.51
		RB1#8	22.38	22.19	22.51	19.36	19.17	19.49
		RB1#14	22.29	22.18	22.49	19.27	19.16	19.47
		RB6#0	22.12	22.15	22.49	19.10	19.13	19.47
		RB6#9	21.89	22.11	22.22	18.87	19.09	19.20
		RB15#0	21.77	21.98	22.14	18.75	18.96	19.12
5.0	QPSK	RB1#0	23.77	23.73	23.59	20.75	20.71	20.57
		RB1#13	23.48	23.64	23.46	20.46	20.62	20.44
		RB1#24	23.41	23.59	23.46	20.39	20.57	20.44
		RB15#0	23.23	23.23	23.14	20.21	20.21	20.12
		RB15#10	23.16	23.18	23.02	20.14	20.16	20.00
		RB25#0	23.09	23.02	22.92	20.07	20.00	19.90
	16QAM	RB1#0	22.48	22.73	22.44	19.46	19.71	19.42
		RB1#13	22.36	22.54	22.11	19.34	19.52	19.09
		RB1#24	22.31	22.39	22.10	19.29	19.37	19.08
		RB15#0	22.21	22.36	21.95	19.19	19.34	18.93
		RB15#10	21.98	22.26	21.82	18.96	19.24	18.80

		RB25#0	21.83	21.84	21.72	18.81	18.82	18.70
10.0	QPSK	RB1#0	23.59	23.39	23.62	20.57	20.37	20.60
		RB1#25	23.58	23.33	23.62	20.56	20.31	20.60
		RB1#49	23.11	23.24	23.59	20.09	20.22	20.57
		RB25#0	22.89	23.22	23.52	19.87	20.20	20.5
		RB25#25	22.88	23.15	23.08	19.86	20.13	20.06
		RB50#0	22.81	23.11	23.03	19.79	20.09	20.01
	16QAM	RB1#0	22.74	23.04	22.91	19.72	20.02	19.89
		RB1#13	22.67	22.88	22.76	19.65	19.86	19.74
		RB1#26	22.59	22.66	22.75	19.57	19.64	19.73
		RB13#0	22.44	22.36	22.45	19.42	19.34	19.43
		RB13#14	22.41	22.33	22.34	19.39	19.31	19.32
		RB27#0	22.16	22.27	22.32	19.14	19.25	19.30
<p>Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable Loss(dB) For Band5: Antenna Gain = -0.87dBi = -3.02dBd (0dBd=2.15dBi) Cable Loss=0dB* (provided by the applicant) Limit: ERP≤38.45dBm</p>								

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	23.78	23.82	23.67	20.91	20.95	20.80
		RB1#3	23.57	23.76	23.65	20.70	20.89	20.78
		RB1#5	23.54	23.73	23.35	20.67	20.86	20.48
		RB3#0	23.44	23.63	23.31	20.57	20.76	20.44
		RB3#3	23.36	23.34	23.04	20.49	20.47	20.17
		RB6#0	23.34	23.29	22.82	20.47	20.42	19.95
	16QAM	RB1#0	22.56	22.61	22.47	19.69	19.74	19.60
		RB1#3	22.51	22.54	22.37	19.64	19.67	19.50
		RB1#5	22.49	22.14	22.35	19.62	19.27	19.48
		RB3#0	22.31	21.97	22.06	19.44	19.10	19.19
		RB3#3	22.11	21.81	21.78	19.24	18.94	18.91
		RB6#0	22.04	21.69	21.76	19.17	18.82	18.89
3.0	QPSK	RB1#0	23.73	23.67	23.54	20.86	20.80	20.67
		RB1#8	23.55	23.62	23.45	20.68	20.75	20.58
		RB1#14	23.38	23.55	23.38	20.51	20.68	20.51
		RB6#0	23.21	23.49	23.26	20.34	20.62	20.39
		RB6#9	23.12	23.49	23.25	20.25	20.62	20.38

		RB15#0	22.98	23.37	23.07	20.11	20.50	20.20
	16QAM	RB1#0	22.66	22.83	22.38	19.79	19.96	19.51
		RB1#8	22.62	22.74	22.33	19.75	19.87	19.46
		RB1#14	22.57	22.63	22.27	19.70	19.76	19.40
		RB6#0	22.52	22.52	22.19	19.65	19.65	19.32
		RB6#9	22.17	22.49	22.04	19.30	19.62	19.17
		RB15#0	21.96	22.27	21.99	19.09	19.40	19.12
5.0	QPSK	RB1#0	23.86	23.72	23.74	20.99	20.85	20.87
		RB1#13	23.81	23.55	23.58	20.94	20.68	20.71
		RB1#24	23.54	23.46	23.55	20.67	20.59	20.68
		RB15#0	23.52	23.27	23.46	20.65	20.40	20.59
		RB15#10	23.45	23.13	23.42	20.58	20.26	20.55
		RB25#0	23.39	23.08	22.95	20.52	20.21	20.08
	16QAM	RB1#0	22.94	22.32	22.64	20.07	19.45	19.77
		RB1#13	22.87	22.27	22.55	20.00	19.40	19.68
		RB1#24	22.64	22.24	22.48	19.77	19.37	19.61
		RB15#0	22.31	22.23	22.33	19.44	19.36	19.46
		RB15#10	22.16	22.09	22.14	19.29	19.22	19.27
		RB25#0	21.95	22.06	21.95	19.08	19.19	19.08
10.0	QPSK	RB1#0	23.65	23.79	23.82	20.78	20.92	20.95
		RB1#25	23.29	23.62	23.73	20.42	20.75	20.86
		RB1#49	23.23	23.44	23.28	20.36	20.57	20.41
		RB25#0	23.11	23.37	23.24	20.24	20.50	20.37
		RB25#25	23.11	23.22	23.21	20.24	20.35	20.34
		RB50#0	22.73	23.16	23.20	19.86	20.29	20.33
	16QAM	RB1#0	22.34	22.76	22.38	19.47	19.89	19.51
		RB1#13	22.33	22.18	22.31	19.46	19.31	19.44
		RB1#26	22.19	21.91	22.02	19.32	19.04	19.15
		RB13#0	22.12	21.84	22.01	19.25	18.97	19.14
		RB13#14	21.97	21.83	21.90	19.10	18.96	19.03
		RB27#0	21.68	21.71	21.65	18.81	18.84	18.78
<p>Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable Loss(dB) For Band12: Antenna Gain = -0.72dBi = -2.87dBd (0dBd=2.15dBi) Cable Loss=0dB* (provided by the applicant) Limit: ERP≤34.77dBm</p>								

3.3.2 Peak-to-average ratio (PAR)

Cellular Band

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.17	13
	Middle	3.04	13
	High	2.98	13
HSDPA (16QAM)	Low	3.53	13
	Middle	3.11	13
	High	3.21	13
HSUPA (BPSK)	Low	5.26	13
	Middle	5.03	13
	High	4.97	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.65	13
	Middle	3.69	13
	High	3.65	13
HSDPA (16QAM)	Low	4.90	13
	Middle	4.68	13
	High	4.74	13
HSUPA (BPSK)	Low	5.77	13
	Middle	5.71	13
	High	5.74	13

LTE Band 2 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.62	5.10	5.03	13	Pass
QPSK (50RB Size)	5.83	5.99	5.83	13	Pass
16QAM (1RB Size)	5.74	5.99	6.06	13	Pass
16QAM (27RB Size)	6.76	6.79	6.79	13	Pass

LTE Band 4 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.06	5.00	5.03	13	Pass
QPSK (50RB Size)	7.05	6.03	5.96	13	Pass
16QAM (1RB Size)	6.41	5.99	6.09	13	Pass
16QAM (27RB Size)	6.63	6.51	6.89	13	Pass

LTE Band 5 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.01	4.94	4.29	13	Pass
QPSK (50RB Size)	5.54	5.96	5.61	13	Pass
16QAM (1RB Size)	4.78	5.67	5.26	13	Pass
16QAM (27RB Size)	6.15	6.41	6.76	13	Pass

LTE Band 12 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.71	4.65	5.00	13	Pass
QPSK (50RB Size)	5.90	6.03	5.71	13	Pass
16QAM (1RB Size)	5.83	5.67	5.96	13	Pass
16QAM (27RB Size)	6.25	6.41	6.60	13	Pass

3.3.3 26dB and 99% Bandwidth

Cellular Band

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
RMC	826.4	4.130	4.711
	836.6	4.160	4.730
	846.6	4.140	4.727
HSDPA	826.4	4.120	4.695
	836.6	4.140	4.707
	846.6	4.120	4.711
HSUPA	826.4	4.130	4.679
	836.6	4.140	4.711
	846.6	4.120	4.679

PCS Band

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
RMC	1852.4	4.130	4.666
	1880	4.140	4.675
	1907.6	4.140	4.725
HSDPA	1852.4	4.140	4.724
	1880	4.140	4.705
	1907.6	4.140	4.724
HSUPA	1852.4	4.140	4.708
	1880	4.130	4.721
	1907.6	4.150	4.708

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	1.085	1.264	1.092	1.284	1.082	1.228
	16QAM	1.092	1.284	1.085	1.267	1.085	1.284
3 MHz	QPSK	2.693	2.913	2.693	2.945	2.693	2.945
	16QAM	2.685	2.933	2.693	2.945	2.693	2.921
5 MHz	QPSK	4.503	4.952	4.463	4.891	4.462	4.868
	16QAM	4.503	4.968	4.475	4.887	4.487	4.872
10 MHz	QPSK	8.934	9.736	8.950	9.615	8.950	9.615
	16QAM	4.875	5.609	4.900	5.449	4.900	5.529
15 MHz	QPSK	13.425	14.303	13.425	14.375	13.387	14.603
	16QAM	5.025	5.889	5.048	5.950	4.988	5.769
20 MHz	QPSK	17.800	18.910	17.850	19.150	17.850	18.910
	16QAM	5.000	6.010	5.050	6.010	5.000	6.090

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	1.110	1.296	1.104	1.296	1.104	1.326
	16QAM	1.098	1.308	1.110	1.326	1.098	1.320
3 MHz	QPSK	2.688	2.964	2.688	2.928	2.712	2.940
	16QAM	2.700	2.940	2.700	2.976	2.700	2.976
5 MHz	QPSK	4.520	5.020	4.520	5.040	4.520	5.020
	16QAM	4.520	5.000	4.540	5.060	4.540	5.080
10 MHz	QPSK	8.960	9.720	8.960	9.720	8.960	9.760
	16QAM	4.920	5.774	4.920	5.720	4.920	5.680
15 MHz	QPSK	13.560	14.940	13.500	14.820	13.500	14.820
	16QAM	5.160	6.240	5.160	6.180	5.160	6.233
20 MHz	QPSK	18.000	19.360	17.840	19.360	18.000	19.360
	16QAM	5.280	6.627	5.280	6.400	5.200	6.547

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	1.092	1.261	1.082	1.256	1.085	1.268
	16QAM	1.085	1.268	1.085	1.279	1.096	1.296
3 MHz	QPSK	2.685	2.957	2.685	2.959	2.700	2.969
	16QAM	2.685	2.925	2.685	2.946	2.685	2.945
5 MHz	QPSK	4.450	4.868	4.463	4.868	4.475	4.908
	16QAM	4.475	4.828	4.475	4.848	4.438	4.828
10 MHz	QPSK	8.925	9.615	8.950	9.696	8.925	9.736
	16QAM	4.875	5.409	4.875	5.630	4.900	5.646

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	1.104	1.308	1.104	1.308	1.110	1.302
	16QAM	1.110	1.320	1.104	1.296	1.098	1.308
3 MHz	QPSK	2.688	2.940	2.712	2.952	2.688	2.952
	16QAM	2.700	2.940	2.688	2.964	2.700	2.952
5 MHz	QPSK	4.520	5.000	4.520	4.980	4.500	5.020
	16QAM	4.520	4.980	4.540	5.000	4.520	5.020
10 MHz	QPSK	8.960	9.680	8.960	9.680	8.960	9.720
	16QAM	4.880	5.571	4.920	5.635	4.880	5.640

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

3.3.4 Conducted Spurious Emissions

Band	Result	Limit	Verdict
WCDMA B2	Refer test plot	Refer test plot	Pass
WCDMA B5	Refer test plot	Refer test plot	Pass
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

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

3.3.5 Out of band emission, Band Edge

Band	Result	Limit	Verdict
WCDMA B2	Refer test plot	Refer test plot	Pass
WCDMA B5	Refer test plot	Refer test plot	Pass
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

Note: Test Plots of Band Edge please refer Appendix C

3.3.6 FREQUENCY STABILITY

Cellular Band

WCDMA Mode

Middle Channel, $f_o = 836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	N.V.	-0.67	-0.0008	2.5
-20		-0.53	-0.0006	2.5
-10		-0.52	-0.0006	2.5
0		-0.47	-0.0006	2.5
10		-0.48	-0.0006	2.5
20		-0.44	-0.0005	2.5
30		-0.50	-0.0006	2.5
40		-0.54	-0.0007	2.5
50		-0.48	-0.0006	2.5
20		L.V.	-0.46	-0.0006
	H.V.	-0.40	-0.0005	2.5

PCS Band

WCDMA Mode

Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	1850.319	1850	1909.694	1910
-20		1850.324	1850	1909.685	1910
-10		1850.364	1850	1909.701	1910
0		1850.296	1850	1909.687	1910
10		1850.288	1850	1909.679	1910
20		1850.340	1850	1909.670	1910
30		1850.336	1850	1909.684	1910
40		1850.355	1850	1909.669	1910
50		1850.340	1850	1909.682	1910
20		L.V.	1850.309	1850	1909.692
	H.V.	1850.356	1850	1909.667	1910

LTE:

QPSK:

Band 2:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	1851.147	1850	1908.948	1910
-20		1851.152	1850	1908.960	1910
-10		1851.155	1850	1908.958	1910
0		1851.159	1850	1908.954	1910
10		1851.149	1850	1908.950	1910
20		1851.150	1850	1908.950	1910
30		1851.144	1850	1908.955	1910
40		1851.148	1850	1908.968	1910
50		1851.157	1850	1908.948	1910
20	L.V.	1851.158	1850	1908.952	1910
	H.V.	1851.142	1850	1908.954	1910

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	1711.051	1710	1754.051	1755
-20		1711.046	1710	1754.035	1755
-10		1711.037	1710	1754.043	1755
0		1711.041	1710	1754.048	1755
10		1711.045	1710	1754.054	1755
20		1711.040	1710	1754.040	1755
30		1711.049	1710	1754.058	1755
40		1711.052	1710	1754.062	1755
50		1711.033	1710	1754.039	1755
20	L.V.	1711.038	1710	1754.041	1755
	H.V.	1711.032	1710	1754.043	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	N.V.	-1.48	-0.002	2.5
-20		-2.01	-0.002	2.5
-10		-2.06	-0.002	2.5
0		-1.95	-0.002	2.5
10		-1.84	-0.002	2.5
20		-1.45	-0.002	2.5
30		-1.37	-0.002	2.5
40		-1.98	-0.002	2.5
50		-1.31	-0.002	2.5
20		L.V.	-1.08	-0.001
	H.V.	-1.07	-0.001	2.5

Band 12:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	699.501	699	715.440	716
-20		699.505	699	715.431	716
-10		699.517	699	715.465	716
0		699.531	699	715.478	716
10		699.524	699	715.434	716
20		699.520	699	715.480	716
30		699.526	699	715.448	716
40		699.511	699	715.465	716
50		699.500	699	715.475	716
20		L.V.	699.539	699	715.474
	H.V.	699.521	699	715.467	716

16QAM:

Band 2:

20 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	1850.899	1850	1909.133	1910
-20		1850.913	1850	1909.148	1910
-10		1850.888	1850	1909.130	1910
0		1850.873	1850	1909.175	1910
10		1850.997	1850	1909.146	1910
20		1851.000	1850	1909.135	1910
30		1850.948	1850	1909.188	1910
40		1850.982	1850	1909.164	1910
50		1850.001	1850	1909.179	1910
20	L.V.	1850.961	1850	1909.158	1910
	H.V.	1851.934	1850	1909.142	1910

Band 4:

20 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	1710.877	1710	1754.236	1755
-20		1710.881	1710	1754.230	1755
-10		1710.879	1710	1754.226	1755
0		1710.874	1710	1754.242	1755
10		1710.890	1710	1754.228	1755
20		1710.880	1710	1754.231	1755
30		1710.893	1710	1754.212	1755
40		1710.868	1710	1754.232	1755
50		1710.884	1710	1754.229	1755
20	L.V.	1710.876	1710	1754.238	1755
	H.V.	1710.858	1710	1754.224	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	N.V.	-1.48	-0.002	2.5
-20		-2.01	-0.002	2.5
-10		-2.06	-0.002	2.5
0		-1.95	-0.002	2.5
10		-1.84	-0.002	2.5
20		-1.45	-0.002	2.5
30		-1.37	-0.002	2.5
40		-1.98	-0.002	2.5
50		-1.31	-0.002	2.5
20		L.V.	-1.08	-0.001
	H.V.	-1.07	-0.001	2.5

Band 12:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
-30	N.V.	699.501	699	715.440	716
-20		699.505	699	715.431	716
-10		699.517	699	715.465	716
0		699.531	699	715.478	716
10		699.524	699	715.434	716
20		699.520	699	715.480	716
30		699.526	699	715.448	716
40		699.511	699	715.465	716
50		699.500	699	715.475	716
20		L.V.	699.539	699	715.474
	H.V.	699.521	699	715.467	716

3.4 Radiated Spurious emission Test Data

Test Date:	2024-05-06	Test By:	Bard Huang
Environment condition:	Temperature: 22.5°C; Relative Humidity: 62%; ATM Pressure: 101.2kPa		

Frequency (MHz)	Reading level (dBμV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Remark
WCDMA Band 2 (30MHz-20GHz)								
Low Channel(1852.4MHz)								
3704.800	49.83	horizontal	-1.59	48.24	-95.2	-13	-33.96	Peak
3704.800	49.22	vertical	-1.59	47.63	-95.2	-13	-34.57	Peak
Middle Channel(1880MHz)								
3760.000	49.96	horizontal	-1.75	48.21	-95.2	-13	-33.99	Peak
3760.000	49.08	vertical	-1.75	47.33	-95.2	-13	-34.87	Peak
High Channel(1907.6MHz)								
3815.200	49.61	horizontal	-1.89	47.72	-95.2	-13	-34.48	Peak
3815.200	49.64	vertical	-1.89	47.75	-95.2	-13	-34.45	Peak
WCDMA Band 5 (30MHz-10GHz)								
Low Channel(826.4MHz)								
1652.800	82.96	horizontal	-2.52	80.44	-95.2	-13	-1.76	Peak
1652.800	83.84	vertical	-2.52	81.32	-95.2	-13	-0.88	Peak
Middle Channel(836.6MHz)								
1673.200	82.33	horizontal	-2.46	79.87	-95.2	-13	-2.33	Peak
1673.200	81.63	vertical	-2.46	79.17	-95.2	-13	-3.03	Peak
High Channel(846.6MHz)								
1693.200	82.72	horizontal	-2.39	80.33	-95.2	-13	-1.87	Peak
1693.200	82.17	vertical	-2.39	79.78	-95.2	-13	-2.42	Peak
LTE Band 2 (30MHz-20GHz)								
Low Channel(1860MHz)								
3720.000	50.85	horizontal	-1.63	49.22	-95.2	-13	-32.98	Peak
3720.000	50.73	vertical	-1.63	49.10	-95.2	-13	-33.1	Peak
Middle Channel(1880MHz)								
3760.000	53.28	vertical	-1.75	51.53	-95.2	-13	-30.67	Peak
3760.000	53.46	horizontal	-1.75	51.71	-95.2	-13	-30.49	Peak
High Channel(1900MHz)								
3800.000	49.40	horizontal	-1.86	47.54	-95.2	-13	-34.66	Peak
3800.000	48.98	vertical	-1.86	47.12	-95.2	-13	-35.08	Peak
LTE Band 4 (30MHz-20GHz)								
Low Channel(1720MHz)								
3440.000	48.82	horizontal	-1.66	47.16	-95.2	-13	-35.04	Peak
3440.000	48.87	vertical	-1.66	47.21	-95.2	-13	-34.99	Peak

Middle Channel(1732.5MHz)								
3465.000	49.03	horizontal	-1.61	47.42	-95.2	-13	-34.78	Peak
3465.000	49.50	vertical	-1.61	47.89	-95.2	-13	-34.31	Peak
High Channel(1745MHz)								
3490.000	48.80	horizontal	-1.56	47.24	-95.2	-13	-34.96	Peak
3490.000	49.51	vertical	-1.56	47.95	-95.2	-13	-34.25	Peak
LTE Band 5 (30MHz-10GHz)								
Low Channel(829MHz)								
1658.000	84.18	horizontal	-2.51	81.67	-95.2	-13	-0.53	Peak
1658.000	82.24	vertical	-2.51	79.73	-95.2	-13	-2.47	Peak
Middle Channel(836.5MHz)								
1673.000	83.36	horizontal	-2.46	80.90	-95.2	-13	-1.3	Peak
1673.000	83.10	vertical	-2.46	80.64	-95.2	-13	-1.56	Peak
High Channel(844MHz)								
1688.000	81.15	horizontal	-2.41	78.74	-95.2	-13	-3.46	Peak
1688.000	80.77	vertical	-2.41	78.36	-95.2	-13	-3.84	Peak
LTE Band 12 (30MHz-10GHz)								
Low Channel(704MHz)								
1408.000	85.82	horizontal	-3.90	81.92	-95.2	-13	-0.28	Peak
1408.000	85.07	vertical	-3.90	81.17	-95.2	-13	-1.03	Peak
Middle Channel(707.5MHz)								
1415.000	84.39	horizontal	-3.86	80.53	-95.2	-13	-1.67	Peak
1415.000	85.81	vertical	-3.86	81.95	-95.2	-13	-0.25	Peak
High Channel(711MHz)								
1422.000	84.57	horizontal	-3.83	80.74	-95.2	-13	-1.46	Peak
1422.000	85.67	vertical	-3.83	81.84	-95.2	-13	-0.36	Peak

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Result – Limit

According to ANSI C63.26-2.15 section 5.2.7:

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

Test was performed on 3meters distance, so

$$\begin{aligned} \text{Result} &= \text{Corrected Amplitude} + 20\log(3) - 104.8 \\ &= \text{Corrected Amplitude} - 95.2 \end{aligned}$$

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 RWAQ202400272 FCC Part 22H 24E 27 90 (2&3&4G) Test Setup photo.

5 E.U.T Photo

Please refer to the attachment RWAQ202400272 External photo and RWAQ202400272 Internal photo.

---End of Report---