FCC RF Test Report

(LTE)

Applicant:	Connected Cycle
Address of Applicant:	3 square Desaix - 75015 PARIS - FRANCE
Equipment Under Test (EUT)	
Product Name:	GPS tracker
Model No.:	cc521
Trade Mark:	N/A
FCC ID:	2BCLTCC521
Applicable Standards:	FCC CFR Title 47 Part 2, 22H, 24E, 27L&F & H, 90S
Date of Sample Receipt:	21 Aug., 2023
Date of Test:	22 Aug., to 15 Sep., 2023
Date of Report Issued:	18 Sep., 2023
Test Result:	PASS

Tested by:	Harper pan ***Test Engineer***	***Date:***	*18 Sep., 2023*
Reviewed by:	Janet Wu ***Project Engineer***	***Date:***	*18 Sep., 2023*
Approved by:	Jason Zhang ***Manager***	***Date:***	*18 Sep., 2023*

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

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1 Version

Version No.	Date	Description
00	*18 Sep., 2023*	*Original*

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3 General Information

3.1 Client Information

Applicant:	Connected Cycle
Address:	3 square Desaix - 75015 PARIS - FRANCE
Manufacturer:	Connected Cycle
Address:	3 square Desaix - 75015 PARIS - FRANCE
Factory:	KONKA Smart Technology Co., Ltd.
Address:	No.12, West Section of Gangyuan Road, Guoxing Avenue, Lingang Economic Development Zone Yibin, Sicuan, P.R.CHINA

3.2 General Description of E.U.T.

Product Name:	GPS tracker		
Model No.:	cc521		
Operation Frequency Range:	LTE band 2:	Tx: 1850 MHz - 1910 MHz	Rx: 1930 MHz - 1990 MHz
	LTE band 4:	Tx: 1710 MHz - 1755 MHz	Rx: 2110 MHz - 2155 MHz
	LTE band 5:	Tx: 824 MHz - 849 MHz	Rx: 869 MHz - 894 MHz
	LTE band 12:	Tx: 699 MHz - 716 MHz	Rx: 729 MHz - 746 MHz
	LTE band 13:	Tx: 777 MHz - 787 MHz	Rx: 746 MHz - 756 MHz
	LTE band 25:	Tx: 1850 MHz - 1915 MHz	Rx: 1930 MHz - 1995 MHz
	LTE band 26:	Tx: 814 MHz - 849 MHz	Rx: 859 MHz - 894 MHz
	LTE band 66:	Tx: 1710 MHz - 1780 MHz	Rx: 2110 MHz - 2200 MHz
	LTE band 85:	Tx: 698 MHz - 716 MHz	Rx: 728 MHz - 746 MHz
Modulation Type:	☒QPSK	☒16QAM	
LTE Category:	M1		
Antenna Type:	Internal Antenna		
Antenna Gain:	LTE band 2:	1.26 dBi (declare by Applicant)	
	LTE band 4:	0.77 dBi (declare by Applicant)	
	LTE band 5:	-1.29dBi (declare by Applicant)	
	LTE band 12:	-5.68dBi (declare by Applicant)	
	LTE band 13:	-0.27dBi (declare by Applicant)	
	LTE band 25:	1.26 dBi (declare by Applicant)	
	LTE band 26:	-1.29dBi (declare by Applicant)	
	LTE band 66:	0.77 dBi (declare by Applicant)	
	LTE band 85:	-5.68 dBi (declare by Applicant)	
Power Supply:	DC 5~55V		
Test Sample Condition:	The test samples were provided in good working order with no visible defects.		

3.3 Test Mode and Environment

Test Mode:	
QPSK mode:	Keep the EUT communication with simulated station in QPSK mode
16QAM mode:	Keep the EUT communication with simulated station in 16QAM mode
Remark: *The EUT has been tested under continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing. The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for these modes. Just the worst case position (H mode) shown in report.*	
Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: -30℃ ~ +50℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: 12 Vdc, Extreme: Low 5 Vdc, High 55 Vdc

3.4 Description of Test Auxiliary Equipment

Test Equipment	Manufacturer	Model No.	Serial No.
Simulated Station	Anritsu	MT8820C	6201026545
Simulated Station	Rohde & Schwarz	CMW500	108209

3.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radiated Emission (30MHz ~ 200MHz) (3m SAC)	4.6 dB
Radiated Emission (200MHz ~ 1000MHz) (3m SAC)	5.8 dB
Radiated Emission (1GHz ~ 6GHz) (3m FAR)	4.95 dB
Radiated Emission (6GHz ~ 18GHz) (3m FAR)	5.23 dB
Radiated Emission (18GHz ~ 40GHz) (3m FAR)	5.32 dB
Note: *All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.*	

3.6 Additions to, Deviations, or Exclusions from the Method

No

3.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

3.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://jyt.lets.com

3.9 Test Instruments List

Radiated Emission(3m SAC):					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2024
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	02-09-2023	02-08-2024
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	02-09-2023	02-08-2024
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	07-02-2021	07-01-2024
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	01-10-2023	01-09-2024
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	01-11-2023	01-10-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-18-2023	01-17-2024
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Radiated Emission(3m FAR):					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m FAR	YUNYI	9m*6m*6m	WXJ097	06-15-2023	06-14-2028
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ097-2	07-13-2023	07-12-2024
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	07-02-2021	07-01-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ097-3	07-14-2023	07-13-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	01-09-2023	01-08-2024
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	01-09-2023	01-08-2024
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-6	01-09-2023	01-08-2024
Pre-amplifier (30MHz ~ 1GHz)	YUNYI	PAM-310N	WXJ097-5	05-14-2023	05-13-2024
Pre-amplifier (1GHz ~ 18GHz)	YUNYI	PAM-118N	WXJ097-6	05-14-2023	05-13-2024
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	01-11-2023	01-10-2024
EMI Test Receiver	Rohde & Schwarz	ESCI3	WXJ003	01-10-2023	01-09-2024
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	01-10-2023	01-09-2024
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ081-1	06-13-2023	06-12-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-13M	WXG097-1	08-01-2023	07-31-2024
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG097-2	08-01-2023	07-31-2024
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG097-3	08-01-2023	07-31-2024
High Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Low Band Reject Filter Group	Tonscend	JS0806-F	WXJ097-4	N/A	
Test Software	Tonscend	TS+	Version: 5.0.0		

Conducted Method:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Spectrum Analyzer	Keysight	N9020A	WXJ094	10-26-2022	10-25-2023
Simulated Station	Rohde & Schwarz	CMW500	WXJ081	06-13-2023	06-12-2024
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	01-09-2023	01-08-2025
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	
RF Control Unit	Tonscend	JS0806-1	WXG010	N/A	
Band Reject Filter Group	Tonscend	JS0806-F	WXG010-1	N/A	
Test Software	Tonscend	TS+	Version: 2.6.9.0526		

4 Measurement Setup and Procedure

4.1 Test Channel

According to ANSI C63.26-2015 chapter 5.1.2.1 Table 2 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:

LTE band 2

Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	18607	1850.7	Lowest channel	18915	1851.5
Middle channel	18900	1880.0	Middle channel	18900	1880.0
Highest channel	19193	1909.3	Highest channel	19185	1908.5
5 MHz			**10 MHz**		
Lowest channel	18625	1852.5	Lowest channel	18650	1855.0
Middle channel	18900	1880.0	Middle channel	18900	1880.0
Highest channel	19175	1907.5	Highest channel	19150	1905.0
15 MHz			**20 MHz**		
Lowest channel	18675	1857.5	Lowest channel	18700	1860.0
Middle channel	18900	1880.0	Middle channel	18900	1880.0
Highest channel	19125	1902.5	Highest channel	19100	1900.0

LTE band 4

Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	19957	1710.7	Lowest channel	19965	1711.5
Middle channel	20175	1732.5	Middle channel	20175	1732.5
Highest channel	20393	1754.3	Highest channel	20385	1753.5
5 MHz			**10 MHz**		
Lowest channel	19975	1712.5	Lowest channel	20000	1715.0
Middle channel	20175	1732.5	Middle channel	20175	1732.5
Highest channel	20375	1752.5	Highest channel	20350	1750.0
15 MHz			**20 MHz**		
Lowest channel	20025	1717.5	Lowest channel	20050	1720.0
Middle channel	20175	1732.5	Middle channel	20175	1732.5
Highest channel	20325	1747.5	Highest channel	20300	1745.0

LTE band 5

Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	20407	824.7	Lowest channel	20415	825.5
Middle channel	20525	836.5	Middle channel	20525	836.5
Highest channel	20643	848.3	Highest channel	20635	847.5
5 MHz			**10 MHz**		
Lowest channel	20425	826.5	Lowest channel	20450	829.0
Middle channel	20525	836.5	Middle channel	20525	836.5
Highest channel	20625	846.5	Highest channel	20600	844.0

LTE band 12					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	23017	699.70	Lowest channel	23025	700.50
Middle channel	23095	707.50	Middle channel	23095	707.50
Highest channel	23173	715.30	Highest channel	23165	714.50
5 MHz			**10 MHz**		
Lowest channel	23035	701.50	Lowest channel	23060	704.00
Middle channel	23095	707.50	Middle channel	23095	707.50
Highest channel	23155	713.50	Highest channel	23130	711.00
LTE band 13					
5 MHz			**10 MHz**		
Lowest channel	23205	779.5	Lowest channel	/	/
Middle channel	23230	782.0	Middle channel	23230	782.00
Highest channel	23255	784.5	Highest channel	/	/
LTE band 25					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	26047	1850.70	Lowest channel	26055	1851.50
Middle channel	26365	1882.50	Middle channel	26365	1882.50
Highest channel	26683	1914.30	Highest channel	26675	1913.50
5 MHz			**10 MHz**		
Lowest channel	26065	1852.50	Lowest channel	26090	1855.00
Middle channel	26365	1882.50	Middle channel	26365	1882.50
Highest channel	26665	1912.50	Highest channel	26640	1910.00
15 MHz			**20 MHz**		
Lowest channel	26115	1857.50	Lowest channel	26140	1860.00
Middle channel	26365	1882.50	Middle channel	26365	1882.50
Highest channel	26615	1907.50	Highest channel	26590	1905.00

LTE band 26 For Part 22					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	26797	824.7	Lowest channel	26805	825.5
Middle channel	26915	836.5	Middle channel	26915	836.5
Highest channel	27033	848.3	Highest channel	27025	847.5
5 MHz			**10 MHz**		
Lowest channel	26815	826.5	Lowest channel	26840	829.0
Middle channel	26915	836.5	Middle channel	26915	836.5
Highest channel	27015	846.5	Highest channel	26990	844.0
15 MHz					
Lowest channel	26865	831.5			
Middle channel	26915	836.5			
Highest channel	26965	841.5			

LTE band 26 For Part 90					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	26697	814.7	Lowest channel	26705	815.5
Middle channel	26740	819.0	Middle channel	26740	819.0
Highest channel	26783	823.3	Highest channel	26775	822.5
5 MHz			**10 MHz**		
Lowest channel	26715	816.5	Lowest channel	/	/
Middle channel	26740	819.0	Middle channel	26740	819.0
Highest channel	26765	821.5	Highest channel	/	/

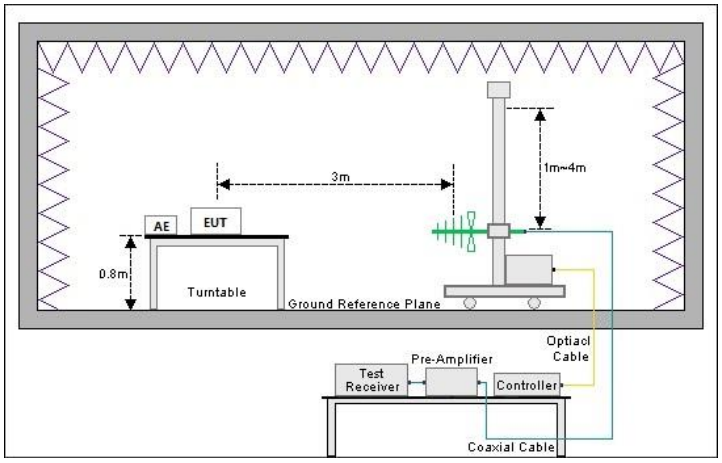
LTE band 66					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
1.4 MHz			**3 MHz**		
Lowest channel	131979	1710.7	Lowest channel	131987	1711.5
Middle channel	132322	1745.0	Middle channel	132322	1745.0
Highest channel	132665	1779.3	Highest channel	132657	1778.5
5 MHz			**10 MHz**		
Lowest channel	131997	1712.5	Lowest channel	132022	1715.0
Middle channel	132322	1745.5	Middle channel	132322	1745.0
Highest channel	132647	1777.5	Highest channel	132622	1775.0
15 MHz			**20 MHz**		
Lowest channel	132047	1717.5	Lowest channel	132072	1720.0
Middle channel	132322	1745.0	Middle channel	132322	1745.0
Highest channel	132597	1772.5	Highest channel	132572	1770.0

LTE band 85					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
5 MHz			**10 MHz**		
Lowest channel	134027	700.5	Lowest channel	134052	703.0
Middle channel	134092	707.0	Middle channel	134092	707.0
Highest channel	134157	713.0	Highest channel	134132	711.0

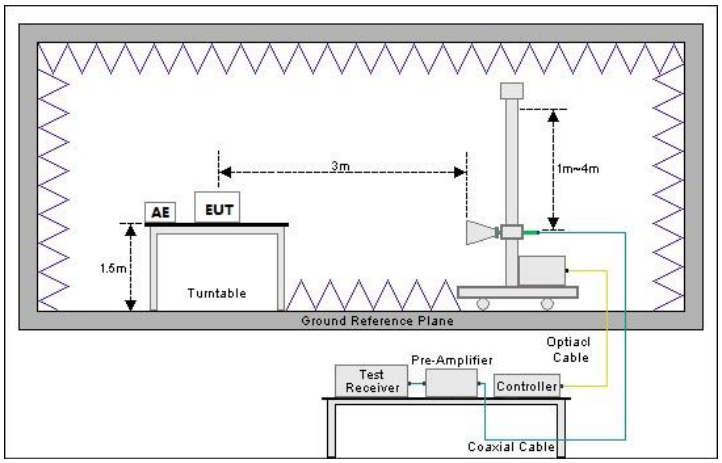
4.2 Test Setup

1) Radiated emission measurement:

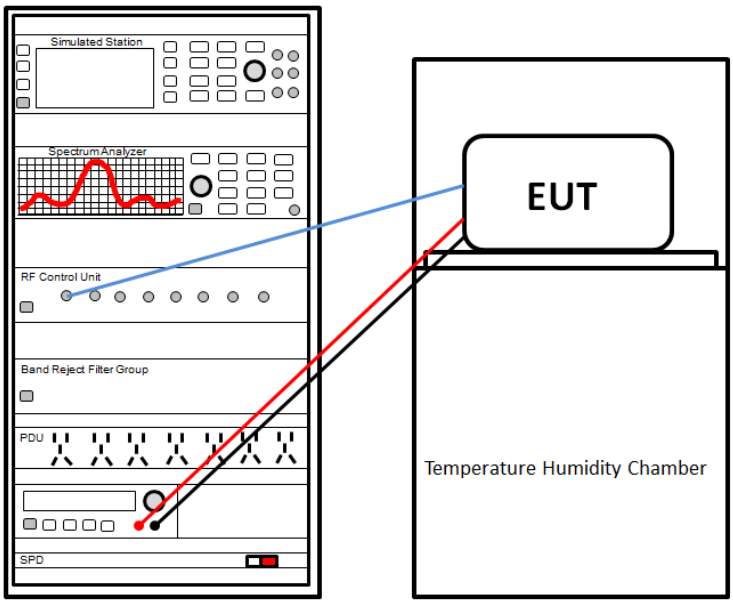
Below 1GHz (3m SAC)



Above 1GHz (3m FAR)



2) Conducted test method



4.3 Test Procedure

Test method	Test step
Radiated emission	**For below 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，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. 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. **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, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. 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.
Conducted test method	1. The LTE antenna port of EUT was connected to the test port of the test system through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. Open the test software, prepare a test plan, and control the system through the software. After the test is completed, the test report is exported through the test software.

5 Test Results

5.1 Summary

5.1.1 Clause and Data Summary

Test items	Standard clause	Test data	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	See SAR Report	Pass
RF Output Power	Part 2.1046 Part 22.913 (a)(5) Part 24.232 (c) Part 27.50 (c)(10) Part 27.50 (d)(4)	Appendix – LTE	Pass
Peak-to-Average Power Ratio	Part 24.232 (d) Part 27.50 (d)(5)	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.
Modulation Characteristics	Part 2.1047	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.
26dB Emission Bandwidth 99% Occupied Bandwidth	Part 2.1049	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.
Out of Band Emission at Antenna Terminals	Part 2.1051 Part 22.917 (a) Part 24.238 (a) Part 27.53 (g) Part 27.53 (c) Part 27.53 (h)	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a) Part 27.53 (c) Part 27.53 (g) Part 27.53 (h)	See Section 5.2	Pass

Frequency Stability vs. Temperature	Part 2.1055 (a)(1)(b) Part 22.355 Part 24.235 Part 27.54	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.
Frequency Stability vs. Voltage	Part 2.1055 (d)(2) Part 22.355 Part 24.235 Part 27.54	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.	Please refer to FCC ID: XMR201910BG95M3, report R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8.

Remark:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (Fundamental Frequency below 1GHz)/1.0dB (Fundamental Frequency above 1GHz) (provided by the customer).*
3. *Please refer to FCC ID : XMR201910BG95M3 , report No. : R1907A0446-R1V1, R1907A0446-R2, R1907A0446-R3V1, R1907A0446-R7, R1907A0446-R8 issue by TA Technology (Shanghai) Co., Ltd.*

Test Method:	*ANSI/TIA-603-E-2016* *ANSI C63.26-2015*

5.1.2 Test Limit

<table>
<tr><th>Test items</th><th>Limit</th></tr>
<tr><td>RF Output Power</td><td>LTE band 2/25: 2W EIRP
LTE band 4/66: 1W EIRP
LTE band 5/26: 7W ERP
LTE band 12/13/85: 3W ERP</td></tr>
<tr><td>Peak-to-Average Power Ratio</td><td>LTE band 2/4/5/12/13/25/26/66/85:The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB
Other bands: N/A report only</td></tr>
<tr><td>Modulation Characteristics</td><td>N/A</td></tr>
<tr><td>26dB Emission Bandwidth
99% Occupied Bandwidth</td><td>N/A</td></tr>
<tr><td>Out of Band Emission at Antenna Terminals

Field Strength of Spurious Radiation</td><td>LTE band 2, 4, 5, 12, 13, 25, 26, 66, 85:
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.</td></tr>
<tr><td>Frequency Stability vs. Temperature

Frequency Stability vs. Voltage</td><td>LTE band 2:
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

LTE band 4, 12, 13, 25, 26, 66, 85:
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

LTE band 5:
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 C-1—FREQUENCY TOLERANCE FOR TRANSMITTERS IN THE PUBLIC MOBILE SERVICES
<table>
<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></td></tr>
</table>

5.2 Field Strength of Spurious Radiation Measurement

Note: All bandwidths, modulation types and RB configurations were pretested, and it was found that minimum bandwidths, QPSK modulation and 1RB0 were the worst modes, and only the worst modes were reflected in the report.

LTE band 2 – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3701.40	-32.18	-1.20	-33.38	-13.00	20.38	Vertical
5552.10	-56.17	4.26	-51.91	-13.00	38.91	Vertical
7402.00	-50.85	9.05	-41.80	-13.00	28.80	Vertical
3701.40	-30.61	-1.20	-31.81	-13.00	18.81	Horizontal
5552.10	-52.02	4.26	-47.76	-13.00	34.76	Horizontal
7402.00	-49.63	9.05	-40.58	-13.00	27.58	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.00	-32.14	-0.13	-32.27	-13.00	19.27	Vertical
5640.00	-56.38	4.33	-52.05	-13.00	39.05	Vertical
7520.00	-51.18	7.49	-43.69	-13.00	30.69	Vertical
3760.00	-30.97	-0.13	-31.10	-13.00	18.10	Horizontal
5640.00	-51.88	4.33	-47.55	-13.00	34.55	Horizontal
7520.00	-49.97	7.49	-42.48	-13.00	29.48	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3816.60	-31.88	1.02	-30.86	-13.00	17.86	Vertical
5724.90	-56.76	4.09	-52.67	-13.00	39.67	Vertical
7633.20	-50.95	8.06	-42.89	-13.00	29.89	Vertical
3816.60	-30.84	1.02	-29.82	-13.00	16.82	Horizontal
5724.90	-51.84	4.09	-47.75	-13.00	34.75	Horizontal
7633.20	-49.71	8.06	-41.65	-13.00	28.65	Horizontal
Remark:						
1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.						

LTE band 4 – 1.4 MHz bandwidth

Lowest channel

Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3421.40	-27.88	-1.85	-29.73	-13.00	16.73	Vertical
5132.10	-56.89	4.23	-52.66	-13.00	39.66	Vertical
6842.80	-56.98	7.50	-49.48	-13.00	36.48	Vertical
3421.40	-27.22	-1.85	-29.07	-13.00	16.07	Horizontal
5132.10	-55.98	4.23	-51.75	-13.00	38.75	Horizontal
6842.80	-56.09	7.50	-48.59	-13.00	35.59	Horizontal

Middle channel

Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.00	-27.66	-1.03	-28.69	-13.00	15.69	Vertical
5197.50	-56.72	3.68	-53.04	-13.00	40.04	Vertical
6930.00	-56.56	6.95	-49.61	-13.00	36.61	Vertical
3465.00	-27.62	-1.03	-28.65	-13.00	15.65	Horizontal
5197.50	-56.40	3.68	-52.72	-13.00	39.72	Horizontal
6930.00	-56.38	6.95	-49.43	-13.00	36.43	Horizontal

Highest channel

Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3508.60	-27.96	-0.67	-28.63	-13.00	15.63	Vertical
5262.90	-56.81	3.45	-53.36	-13.00	40.36	Vertical
7017.20	-56.66	7.55	-49.11	-13.00	36.11	Vertical
3508.60	-28.09	-0.67	-28.76	-13.00	15.76	Horizontal
5262.90	-56.30	3.45	-52.85	-13.00	39.85	Horizontal
7017.20	-56.49	7.55	-48.94	-13.00	35.94	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 5 – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.40	-27.96	-9.31	-37.27	-13.00	24.27	Vertical
2474.10	-42.34	-9.74	-52.08	-13.00	39.08	Vertical
3298.80	-46.16	-1.71	-47.87	-13.00	34.87	Vertical
1649.40	-12.91	-9.31	-22.22	-13.00	9.22	Horizontal
2474.10	-43.95	-9.74	-53.69	-13.00	40.69	Horizontal
3298.80	-46.54	-1.71	-48.25	-13.00	35.25	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.30	-28.22	-8.43	-36.65	-13.00	23.65	Vertical
2509.50	-42.63	-9.45	-52.08	-13.00	39.08	Vertical
3346.00	-46.29	-2.15	-48.44	-13.00	35.44	Vertical
1673.30	-13.27	-8.43	-21.70	-13.00	8.70	Horizontal
2509.50	-43.67	-9.45	-53.12	-13.00	40.12	Horizontal
3346.00	-46.24	-2.15	-48.39	-13.00	35.39	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.60	-28.68	-7.58	-36.26	-13.00	23.26	Vertical
2544.90	-42.68	-9.10	-51.78	-13.00	38.78	Vertical
3393.20	-46.50	-2.40	-48.90	-13.00	35.90	Vertical
1696.60	-12.97	-7.58	-20.55	-13.00	7.55	Horizontal
2544.90	-43.89	-9.10	-52.99	-13.00	39.99	Horizontal
3393.20	-46.20	-2.40	-48.60	-13.00	35.60	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 12 – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1399.40	-35.47	-9.65	-45.12	-13.00	32.12	Vertical
2099.10	-44.66	-7.33	-51.99	-13.00	38.99	Vertical
2798.80	-46.71	-5.16	-51.87	-13.00	38.87	Vertical
1399.40	-37.39	-9.65	-47.04	-13.00	34.04	Horizontal
2099.10	-45.54	-7.33	-52.87	-13.00	39.87	Horizontal
2798.80	-50.56	-5.16	-55.72	-13.00	42.72	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.00	-35.25	-9.64	-44.89	-13.00	31.89	Vertical
2122.50	-44.38	-6.67	-51.05	-13.00	38.05	Vertical
2830.00	-47.01	-4.96	-51.97	-13.00	38.97	Vertical
1415.00	-37.63	-9.64	-47.27	-13.00	34.27	Horizontal
2122.50	-45.34	-6.67	-52.01	-13.00	39.01	Horizontal
2830.00	-50.50	-4.96	-55.46	-13.00	42.46	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1430.60	-35.13	-9.83	-44.96	-13.00	31.96	Vertical
2145.90	-44.32	-6.87	-51.19	-13.00	38.19	Vertical
2861.20	-47.36	-5.01	-52.37	-13.00	39.37	Vertical
1430.60	-37.32	-9.83	-47.15	-13.00	34.15	Horizontal
2145.90	-45.22	-6.87	-52.09	-13.00	39.09	Horizontal
2861.20	-50.01	-5.01	-55.02	-13.00	42.02	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 13 – 5 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1559.00	-26.21	-10.08	-36.29	-13.00	23.29	Vertical
2338.50	-43.57	-7.43	-51.00	-13.00	38.00	Vertical
3118.00	-53.52	-1.71	-55.23	-13.00	42.23	Vertical
1559.00	-14.09	-10.08	-24.17	-13.00	11.17	Horizontal
2338.50	-31.48	-7.43	-38.91	-13.00	25.91	Horizontal
3118.00	-47.54	-1.71	-49.25	-13.00	36.25	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1564.00	-26.04	-10.02	-36.06	-13.00	23.06	Vertical
2346.00	-43.60	-7.41	-51.01	-13.00	38.01	Vertical
3128.00	-53.96	-1.79	-55.75	-13.00	42.75	Vertical
1564.00	-13.87	-10.02	-23.89	-13.00	10.89	Horizontal
2346.00	-31.48	-7.41	-38.89	-13.00	25.89	Horizontal
3128.00	-47.54	-1.79	-49.33	-13.00	36.33	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1569.00	-26.07	-9.94	-36.01	-13.00	23.01	Vertical
2353.50	-43.92	-7.39	-51.31	-13.00	38.31	Vertical
3138.00	-54.21	-1.87	-56.08	-13.00	43.08	Vertical
1569.00	-13.78	-9.94	-23.72	-13.00	10.72	Horizontal
2353.50	-31.75	-7.39	-39.14	-13.00	26.14	Horizontal
3138.00	-47.74	-1.87	-49.61	-13.00	36.61	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 25 – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3701.40	-33.63	-1.20	-34.83	-13.00	21.83	Vertical
5552.10	-46.95	4.26	-42.69	-13.00	29.69	Vertical
7402.80	-51.99	9.02	-42.97	-13.00	29.97	Vertical
3701.40	-37.43	-1.20	-38.63	-13.00	25.63	Horizontal
5552.10	-47.61	4.26	-43.35	-13.00	30.35	Horizontal
7402.80	-50.62	9.02	-41.60	-13.00	28.60	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3765.00	-34.04	0.01	-34.03	-13.00	21.03	Vertical
5647.50	-46.96	4.29	-42.67	-13.00	29.67	Vertical
7530.00	-51.78	7.45	-44.33	-13.00	31.33	Vertical
3765.00	-37.28	0.01	-37.27	-13.00	24.27	Horizontal
5647.50	-47.40	4.29	-43.11	-13.00	30.11	Horizontal
7530.00	-50.82	7.45	-43.37	-13.00	30.37	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3828.60	-34.02	1.00	-33.02	-13.00	20.02	Vertical
5742.90	-46.94	4.15	-42.79	-13.00	29.79	Vertical
7657.20	-51.30	8.30	-43.00	-13.00	30.00	Vertical
3828.60	-37.59	1.00	-36.59	-13.00	23.59	Horizontal
5742.90	-47.50	4.15	-43.35	-13.00	30.35	Horizontal
7657.20	-51.26	8.30	-42.96	-13.00	29.96	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 26(Part 22H) – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.40	-27.27	-8.61	-35.88	-13.00	22.88	Vertical
2474.10	-38.02	-7.58	-45.60	-13.00	32.60	Vertical
3298.80	-43.02	-1.59	-44.61	-13.00	31.61	Vertical
1649.40	-19.25	-8.61	-27.86	-13.00	14.86	Horizontal
2474.10	-39.85	-7.58	-47.43	-13.00	34.43	Horizontal
3298.80	-45.77	-1.59	-47.36	-13.00	34.36	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.00	-27.16	-8.02	-35.18	-13.00	22.18	Vertical
2509.50	-37.59	-7.41	-45.00	-13.00	32.00	Vertical
3346.00	-43.19	-2.23	-45.42	-13.00	32.42	Vertical
1673.00	-19.50	-8.02	-27.52	-13.00	14.52	Horizontal
2509.50	-40.26	-7.41	-47.67	-13.00	34.67	Horizontal
3346.00	-45.74	-2.23	-47.97	-13.00	34.97	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.60	-26.96	-7.42	-34.38	-13.00	21.38	Vertical
2544.90	-37.18	-7.06	-44.24	-13.00	31.24	Vertical
3393.20	-43.34	-2.65	-45.99	-13.00	32.99	Vertical
1696.60	-19.63	-7.42	-27.05	-13.00	14.05	Horizontal
2544.90	-40.36	-7.06	-47.42	-13.00	34.42	Horizontal
3393.20	-45.91	-2.65	-48.56	-13.00	35.56	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 26(90S) – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1629.40	-17.59	-9.13	-26.72	-13.00	13.72	Vertical
2444.10	-33.95	-7.48	-41.43	-13.00	28.43	Vertical
3258.80	-33.80	-1.91	-35.71	-13.00	22.71	Vertical
1629.40	-19.61	-9.13	-28.74	-13.00	15.74	Horizontal
2444.10	-34.46	-7.48	-41.94	-13.00	28.94	Horizontal
3258.80	-34.09	-1.91	-36.00	-13.00	23.00	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1638.00	-17.87	-8.90	-26.77	-13.00	13.77	Vertical
2457.00	-33.67	-7.54	-41.21	-13.00	28.21	Vertical
3276.00	-33.47	-1.77	-35.24	-13.00	22.24	Vertical
1638.00	-19.65	-8.90	-28.55	-13.00	15.55	Horizontal
2457.00	-34.90	-7.54	-42.44	-13.00	29.44	Horizontal
3276.00	-34.43	-1.77	-36.20	-13.00	23.20	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1646.60	-17.89	-8.69	-26.58	-13.00	13.58	Vertical
2469.90	-33.93	-7.60	-41.53	-13.00	28.53	Vertical
3293.20	-33.90	-1.63	-35.53	-13.00	22.53	Vertical
1646.60	-19.34	-8.69	-28.03	-13.00	15.03	Horizontal
2469.90	-34.46	-7.60	-42.06	-13.00	29.06	Horizontal
3293.20	-34.06	-1.63	-35.69	-13.00	22.69	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 66 – 1.4 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3421.40	-32.42	-1.85	-34.27	-13.00	21.27	Vertical
5132.10	-55.82	4.23	-51.59	-13.00	38.59	Vertical
6842.80	-55.65	7.50	-48.15	-13.00	35.15	Vertical
3421.40	-32.32	-1.85	-34.17	-13.00	21.17	Horizontal
5132.10	-55.72	4.23	-51.49	-13.00	38.49	Horizontal
6842.80	-56.39	7.50	-48.89	-13.00	35.89	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.00	-32.05	-0.74	-32.79	-13.00	19.79	Vertical
5235.00	-55.90	3.54	-52.36	-13.00	39.36	Vertical
6980.00	-55.70	7.17	-48.53	-13.00	35.53	Vertical
3490.00	-32.76	-0.74	-33.50	-13.00	20.50	Horizontal
5235.00	-56.00	3.54	-52.46	-13.00	39.46	Horizontal
6980.00	-55.93	7.17	-48.76	-13.00	35.76	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
3558.60	-32.00	-0.57	-32.57	-13.00	19.57	Vertical
5337.90	-56.08	3.78	-52.30	-13.00	39.30	Vertical
7117.20	-55.67	7.30	-48.37	-13.00	35.37	Vertical
3558.60	-33.01	-0.57	-33.58	-13.00	20.58	Horizontal
5337.90	-56.24	3.78	-52.46	-13.00	39.46	Horizontal
7117.20	-55.45	7.30	-48.15	-13.00	35.15	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

LTE band 85 – 5 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1401.00	-37.40	-9.65	-47.05	-13.00	34.05	Vertical
2101.50	-41.80	-7.27	-49.07	-13.00	36.07	Vertical
2802.00	-49.22	-5.13	-54.35	-13.00	41.35	Vertical
1401.00	-39.81	-9.65	-49.46	-13.00	36.46	Horizontal
2101.50	-39.78	-7.27	-47.05	-13.00	34.05	Horizontal
2802.00	-51.01	-5.13	-56.14	-13.00	43.14	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1414.00	-37.67	-9.94	-47.61	-13.00	34.61	Vertical
2121.00	-42.21	-7.36	-49.57	-13.00	36.57	Vertical
2828.00	-48.95	-5.41	-54.36	-13.00	41.36	Vertical
1414.00	-39.50	-9.63	-49.13	-13.00	36.13	Horizontal
2121.00	-39.40	-6.70	-46.10	-13.00	33.10	Horizontal
2828.00	-51.03	-4.94	-55.97	-13.00	42.97	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
1427.00	-37.25	-9.75	-47.00	-13.00	34.00	Vertical
2140.50	-42.39	-6.81	-49.20	-13.00	36.20	Vertical
2854.00	-49.04	-5.00	-54.04	-13.00	41.04	Vertical
1427.00	-39.81	-9.75	-49.56	-13.00	36.56	Horizontal
2140.50	-39.61	-6.81	-46.42	-13.00	33.42	Horizontal
2854.00	-50.73	-5.00	-55.73	-13.00	42.73	Horizontal

Remark:

1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.

------End of report------