FCC RF Test Report

(LTE)

Applicant:	Baicells Technologies Co., Ltd.
Address of Applicant:	9-10F, 1stBldg., No.81BeiqingRoad, Haidian District, Beijing, China
Equipment Under Test (EUT)	
Product Name:	LTE Indoor CPE
Model No.:	EG3015M-M30-HP, EG3015M-M11-HP
Trade Mark:	Baicells
FCC ID:	2AG32EG3015MM30HP
Applicable Standards:	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part 96 FCC CFR Title 47 Part 27 Subpart M
Date of Sample Receipt:	03 Aug., 2022
Date of Test:	04 Aug., to 14 Sep., 2022
Date of Report Issued:	11 Oct., 2022
Test Result:	PASS

Tested by:	Mike.ou ***Test Engineer***	***Date:***	*11 Oct., 2022*
Reviewed by:	Winner Zhang ***Project Engineer***	***Date:***	*11 Oct., 2022*
Approved by:	***Manager***	***Date:***	*11 Oct., 2022*

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.

1 Version

Version No.	Date	Description
00	*15 Sep., 2022*	*Original*
01	*11 Oct., 2022*	*Update Page 6.*

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3 General Information

3.1 Client Information

Applicant:	Baicells Technologies Co., Ltd.
Address:	9-10F, 1stBldg., No.81BeiqingRoad, Haidian District, Beijing, China
Manufacturer:	Baicells Technologies Co., Ltd.
Address:	9-10F, 1stBldg., No.81BeiqingRoad, Haidian District, Beijing, China

3.2 General Description of E.U.T.

Product Name:	LTE Indoor CPE	
Model No.:	EG3015M-M30-HP, EG3015M-M11-HP	
Operation Frequency Range:	LTE Band 41: 2496MHz~2690MHz	
	LTE Band 48: 3550MHz~3700MHz	
Modulation Type:	Uplink: QPSK, 16QAM, 64QAM	
	Downlink: QPSK, 16QAM, 64QAM	
Category device:	Category A device	
Antenna Type:	Internal Antenna	
Antenna Mode:	MIMO(2TX*4RX): ANT 1, ANT 3 support TXRX ANT 2, ANT 4 only support RX	
Antenna Gain:	LTE band 41:	3.5 dBi (declare by Applicant)
	LTE band 48:	5.5 dBi (declare by Applicant)
AC Adapter:	Model: S24B72-120A200-0K Input: AC100-240V, 50/60Hz, 0.8A Output: DC 12.0V, 2.0A	
Remark:	Model No.: EG3015M-M11-HP are identical on external structure, circuitry design, PCB layout, electrical components used, internal wiring and functions with the model; EG3015M-M30-HP which we chose to be tested and only different on LTE Band. Different model (s) and LTE band: EG3015M-M30-HP: B41/B48 EG3015M-M11-HP: B48.	
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
64QAM mode:	Keep the EUT communication with simulated station in 64QAM mode

Remark:

1. *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.*
2. *2. Pre-scan all modulation type (QPSK, 16-QAM, 64-QAM), and found the QPKS and 64-QAM was the worst case.)*

Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: -10℃ ~ +45℃
Humidity:	5 % ~ 95 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: 120Vac, Extreme: Low 102Vac, High 138Vac

3.4 Description of Test Auxiliary Equipment

Test Equipment	Manufacturer	Model No.	Manage No.
Simulated Station	CMW500	WXJ081	WXJ081

3.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB
Radiated Emission (18GHz ~ 40GHz) (3m SAC)	±5.34 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	03-07-2022	03-06-2023
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-08-2022	03-07-2023
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	07-02-2021	07-01-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	04-07-2022	04-06-2023
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	04-07-2022	04-06-2023
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-6	04-07-2022	04-06-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	01-20-2022	01-19-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	01-20-2022	01-19-2023
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	03-30-2022	03-29-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-05-2022	03-04-2023
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	01-20-2022	01-19-2023
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	10-27-2021	10-26-2022
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-20-2022	01-19-2023
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-20-2022	01-19-2023
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	01-20-2022	01-19-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Conducted method:

Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ081-1	06-29-2022	06-28-2023
Vector Signal Generator	Keysight	N5182B	WXJ091-1	06-29-2022	06-28-2023
Vector Signal Generator	Keysight	N5182B	WXJ091-2	06-29-2022	06-28-2023
Signal Generator	Keysight	N5173B	WXJ091-3	06-29-2022	06-28-2023
Network Analyzer	Keysight	E5071C	WXJ091	03-30-2022	03-29-2023
RF Control Unit	Tonscend	JS0806-1	WXG010-2	N/A	N/A
RF Control Unit	Tonscend	JS0806-1	WXG010-3	N/A	N/A
Band Reject Filter Group	Tonscend	JS0806-F	WXG010-4	N/A	N/A
Test Software	Tonscend	TS+	Version: 2.6.9.0526		

4 Measurement Setup and Procedure

4.1 Test Channel

Regards to the operating frequency range, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channels as below:

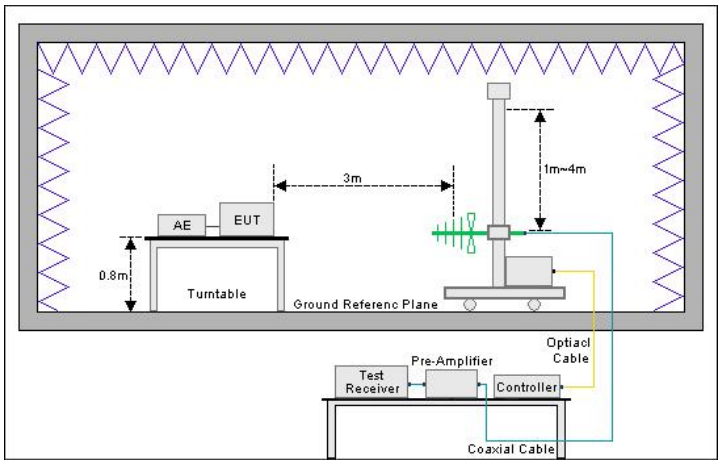
LTE band 41(2496MHz ~ 2690MHz)					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
5 MHz			**10 MHz**		
Lowest channel	39675	2498.5	Lowest channel	39700	2501.0
Middle channel	40620	2593.0	Middle channel	40620	2593.0
Highest channel	41565	2687.5	Highest channel	41540	2685.0
15 MHz			**20 MHz**		
Lowest channel	39725	2503.5	Lowest channel	39750	2506.0
Middle channel	40620	2593.0	Middle channel	40620	2593.0
Highest channel	41515	2682.5	Highest channel	41490	2680.0

LTE band 48(3550MHz ~ 3700MHz)					
Channels		Frequency (MHz)	Channels		Frequency (MHz)
10 MHz			**20 MHz**		
Lowest channel	55290	3555.0	Lowest channel	55340	3560.0
Middle channel	55990	3625.0	Middle channel	55990	3625.0
Highest channel	56690	3695.0	Highest channel	56640	3690.0

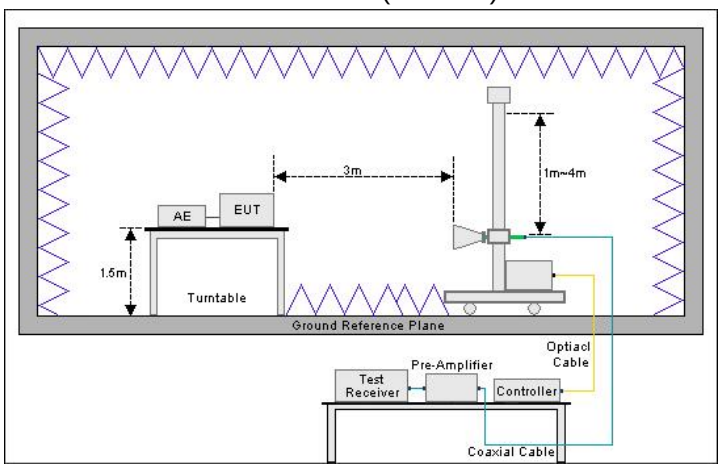
4.2 Test Setup

1) Radiated emission measurement:

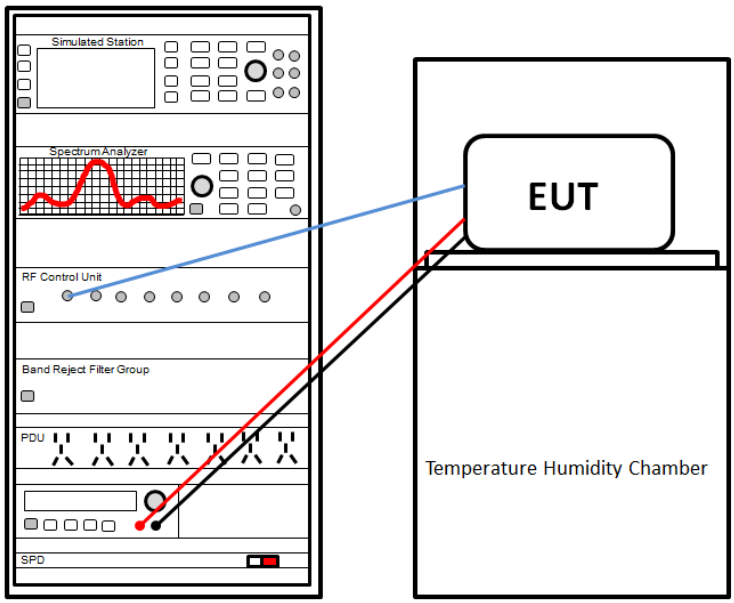
Below 1GHz (3m SAC)



Above 1GHz (3m SAC)



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 2.1091	See Report: JYTSZ-R12-2201515	Pass
RF Output Power	Part 2.1046 Part 27.50 (h)(1) Part 96.41(b)	Appendix – LTE band 41 Appendix – LTE band 48	Pass
Power Spectral Density (PSD)	Part 96.41(b)	Appendix – LTE band 48	Pass
Peak-to-Average Power Ratio	Part 96.41(g) Band 41:N/A report only	Appendix – LTE band 41 Appendix – LTE band 48	Pass
26dB Emission Bandwidth 99% Occupied Bandwidth	Part 2.1049 Part 27.53(m) Part 96.41(e)(3)	Appendix – LTE band 41 Appendix – LTE band 48	Pass
Out of Band Emission at Antenna Terminals	Part 2.1051 Part 27.53(m) Part 96.41(e)(1)(2)	Appendix – LTE band 41 Appendix – LTE band 48	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 27.53(m) Part 96.41(e)(1)(2)	See Section 6.2	Pass
Frequency Stability vs. Temperature	Part 2.1055 (a)(1)(b) Part 27.54	Appendix – LTE band 41 Appendix – LTE band 48	Pass
Frequency Stability vs. Voltage	Part 2.1055 (d)(2) Part 27.54	Appendix – LTE band 41 Appendix – LTE band 48	Pass

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. *Offset Ext Gain = ATT loss + Cable loss + Duty cycle correction(For Band 48)*

Test Method:	*ANSI/TIA-603-E-2016* *ANSI C63.26-2015* *KDB 971168 D01 Power Meas License Digital Systems v03r01* *KDB 940660 D01 Part 96 CBRS Eqpt v03* *KDB 662911 D01 Multiple Transmitter Output v02r01*

5.1.2 Test Limit

<table>
<tr><th>Test items</th><th>Limit</th></tr>
<tr><td>RF Output Power</td><td rowspan="2">LTE band41:
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.

LTE band 48:
<table><tr><th>Device</th><th>Maximum EIRP (dBm/10 megahertz)</th><th>Maximum PSD (dBm/MHz)</th></tr><tr><td>End User Device</td><td>23</td><td>n/a</td></tr><tr><td>Category A CBSD</td><td>30</td><td>20</td></tr><tr><td>Category B CBSD[1]</td><td>47</td><td>37</td></tr></table></td></tr>
<tr><td>Power Spectral Density (PSD)</td></tr>
<tr><td>Peak-to-Average Power Ratio</td><td>Band 41: N/A report only
LTE band 48:The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.</td></tr>
<tr><td>26dB Emission Bandwidth
99% Occupied Bandwidth</td><td>N/A: report only</td></tr>
<tr><td>Emission Mask</td><td>LTE band 48:
(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e) (3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed −25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed −25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.</td></tr>
</table>

Out of Band Emission at Antenna Terminals Field Strength of Spurious Radiation	**LTE band 41:** For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge. **LTE band 48:** -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz below 3530 MHz and above 3720 MHz ≤ -40dBm
Frequency Stability vs. Temperature Frequency Stability vs. Voltage	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

5.2 Field Strength of Spurious Radiation Measurement

LTE band 41 – 20 MHz bandwidth

Lowest channel

Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
5012.00	-37.13	3.70	-33.43	-13.00	20.43	Vertical
7518.00	-42.91	11.74	-31.17	-13.00	18.17	Vertical
10024.00	-36.36	17.18	-19.18	-13.00	6.18	Vertical
5012.00	-29.78	3.26	-26.52	-13.00	13.52	Horizontal
7518.00	-41.54	10.25	-31.29	-13.00	18.29	Horizontal
10024.00	-36.95	16.69	-20.26	-13.00	7.26	Horizontal

Middle channel

Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
5012.00	-37.13	3.70	-33.43	-13.00	20.43	Vertical
7518.00	-42.91	11.74	-31.17	-13.00	18.17	Vertical
10024.00	-36.36	17.18	-19.18	-13.00	6.18	Vertical
5012.00	-29.78	3.26	-26.52	-13.00	13.52	Horizontal
7518.00	-41.54	10.25	-31.29	-13.00	18.29	Horizontal
10024.00	-36.95	16.69	-20.26	-13.00	7.26	Horizontal

Highest channel

Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
5360.00	-37.12	3.87	-33.25	-13.00	20.25	Vertical
8040.00	-43.02	12.42	-30.60	-13.00	17.60	Vertical
10720.00	-35.43	19.45	-15.98	-13.00	2.98	Vertical
5360.00	-29.34	3.36	-25.98	-13.00	12.98	Horizontal
8040.00	-41.80	11.96	-29.84	-13.00	16.84	Horizontal
10720.00	-36.80	18.93	-17.87	-13.00	4.87	Horizontal

Remark:

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

LTE band 48 – 20 MHz bandwidth						
Lowest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
7120.00	-55.32	12.21	-43.11	-40.00	3.11	Vertical
10680.00	-63.89	19.02	-44.87	-40.00	4.87	Vertical
7120.00	-52.37	10.62	-41.75	-40.00	1.75	Horizontal
10680.00	-63.83	17.74	-46.09	-40.00	6.09	Horizontal
Middle channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
7250.00	-55.03	12.21	-42.82	-40.00	2.82	Vertical
10875.00	-64.84	19.02	-45.82	-40.00	5.82	Vertical
7250.00	-52.83	10.62	-42.21	-40.00	2.21	Horizontal
10875.00	-63.62	17.74	-45.88	-40.00	5.88	Horizontal
Highest channel						
Frequency (MHz)	Reading Level (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
7380.00	-55.13	12.21	-42.92	-40.00	2.92	Vertical
11070.00	-64.39	19.02	-45.37	-40.00	5.37	Vertical
7380.00	-52.74	10.62	-42.12	-40.00	2.12	Horizontal
11070.00	-63.03	17.74	-45.29	-40.00	5.29	Horizontal
Remark:						
1. The emission levels of below 1 GHz are lower than the limit 10dB, so not show in test report.						

Note: During the test, pre-scan all modulation and bandwidth, and found the QPSK modulation and bandwidth of 20MHz is the worst case.

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