

TEST REPORT

Applicant: Particle Industries, Inc.

EUT Description: M-SoM LTE-M/2G/Satellite + Wi-Fi for Global

Model: M635e

Brand: Particle

Standards: ETSI EN 301 681 V2.1.2

Date of Receipt: 2026/05/14

Date of Test: 2026/05/14 to 2026/06/11

Date of Issue: 2026/06/11

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of the model are manufactured with identical electrical and mechanical components. All sample tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.



Jim Huang
Approved By:



Carey Chen
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2026/06/11	Original	Carey Chen

Summary of Test Results

Test Item	Test Requirement	Test Method	Result
Unwanted emissions outside the band	Clause 4.2.1	Clause 5.2.2	Pass
Unwanted emissions within the band	Clause 4.2.2	Clause 5.2.3	Reference report SUCR240700023201
Unwanted emissions in carrier-off state	Clause 4.2.3	Clause 5.2.4	
MES Control and Monitoring Functions (CMF)	Clause 4.2.4	Clause 5.2.5	
Equipment identity	Clause 4.2.5	Clause 5.2.6	
Fellow radio stations in a dual-mode or multi-mode terminal	Clause 4.2.6	Clause 5.2.5.4.1	
Receiver Adjacent Channel Selectivity	Clause 4.2.7	Clause 5.2.7	
Receiver Blocking Characteristics	Clause 4.2.8	Clause 5.2.8	

Remark:

The Radiated Emissions were tested in this report, and other items data please refer to the previous report with report number SUCR240700023201 issued by SGS-CSTC Standards Technical Services Co., Ltd. Suzhou Branch.

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1 General Description

1.1 Lab Information

1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China.

Tel.: +86-755-27212361

Contact Email: info@towewireless.com

1.1.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)

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. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory.

Test Firm Registration Number: 684095

Designation Number: CN1353.

ISED CAB identifier: CN0152

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0152

Company Number: 31000

1.2 Client Information

1.2.1 Applicant

Applicant:	Particle Industries, Inc.
Address:	548 Market St, PMB 34833, San Francisco, CA 94104, USA

1.2.2 Manufacturer

Manufacturer:	Particle Industries, Inc.
Address:	548 Market St, PMB 34833, San Francisco, CA 94104, USA

1.3 Product Information

EUT Description:	M-SoM LTE-M/2G/Satellite + Wi-Fi for Global		
Model:	M635e		
Brand:	Particle		
Hardware Version:	v0.2		
Software Version:	v6.4.1		
IMEI:	862063070036368		
Operating frequency bands:	Band	TX Frequency	RX Frequency
	NB-IoT NTN Band 255	1626.6MHz to 1660.4MHz	1525.1MHz to 1558.9MHz
Type Modulation:	BPSK, QPSK		
Subcarriers Spacing:	3.75kHz, 15kHz		
Nominated Bandwidth:	200 kHz		
Antenna Type:	Internal: Dipole Antenna External: Omnidirectional Antenna		
Antenna Gain:	Band	Ant1 Internal (dBi)	Ant4 External (dBi)
	NB-IoT NTN Band 255	3.91	1.2
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user's manual for more detailed description.			

2 Test Configuration

2.1 Standards Specification

No.	Reference Standards	Standards Title
1	ETSI EN 301 681 V2.1.1	Satellite Earth Stations and Systems (SES); Harmonised Standard for Mobile Earth Stations (MES) of Geostationary mobile satellite systems, including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) under the Mobile Satellite Service (MSS), operating in the 1,5 GHz and 1,6 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU

2.2 Test Mode

Modulation Type	Description
TM 1 mode:	Keep the EUT communication with simulated station in BPSK mode
TM 2 mode:	Keep the EUT communication with simulated station in QPSK mode

2.3 Test Environment

Relative Humidity	45-56 % RH Ambient	
Condition	Temperature(°C)	Voltage(V)
NTNV	25	3.8
NTLV	25	3.3
NTHV	25	4.4
Remark:		
NTNV Normal Temperature Normal Voltage		
NTLV Normal Temperature Low Voltage		
NTHV Normal Temperature High Voltage		

2.4 Support Unit used in test

The EUT has been tested as an independent unit.

2.5 Test RF Cable

For all conducted test items: The offset level is set spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

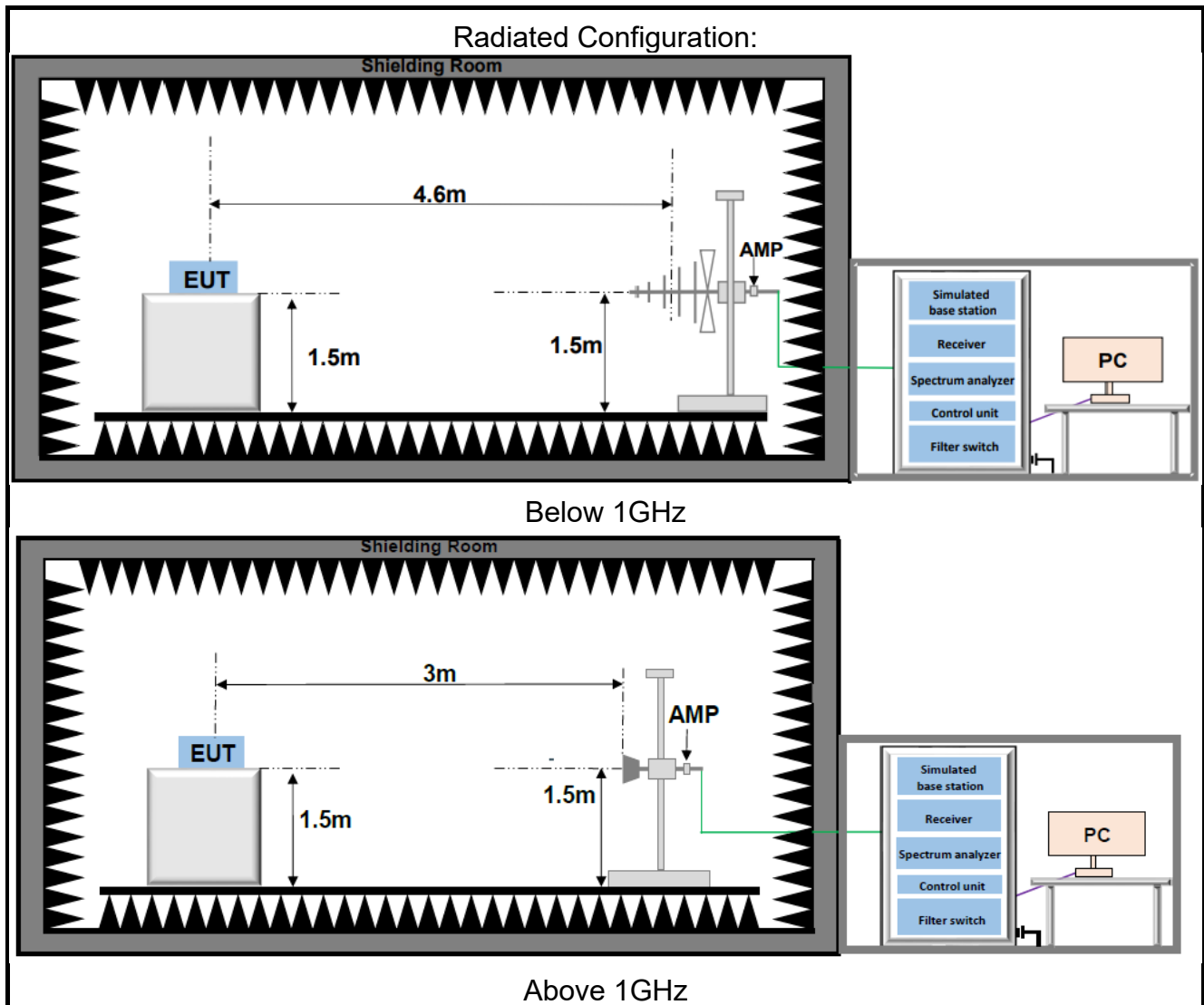
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

2.6 Modifications

No modifications were made during testing.

2.7 Test Setup Diagram



3 Equipment and Measurement Uncertainty

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, whichever is less, and where applicable is traceable to recognized national standards.

3.1 Test Equipment List

Radiated Emission					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1461	2023/06/25	2026/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2814	2023/06/25	2026/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1291	2023/06/25	2026/06/24
Signal Analyzer	Keysight	N9020A	US46470366	2026/03/06	2027/03/05
Radio Communication Analyzer	Anritsu	MT8821C	6262170436	2026/03/05	2027/03/04
Wideband Radio Communication Tester	R&S	CMW500	150645	2026/03/06	2027/03/05
Low Noise Amplifier	Tonscend	TAP9K3G40	AP23A8060274	2025/03/11	2027/03/10
Low Noise Amplifier	Tonscend	TAP01018050	AP23A8060268	2025/03/11	2027/03/10
Low Noise Amplifier	Tonscend	TAP18040048	AP22G806249	2025/03/11	2027/03/10
Hygrometer	BINGYU	HTC-1	N/A	2025/07/25	2026/07/24
Band Reject Filter Group	Tonscend	JS0806-F	23A806F0654	N/A	N/A
Test Software	Tonscend	TS+	Version: 5.0.0	N/A	N/A

3.2 Measurement Uncertainty

Parameter	U _{lab}
Radiation 30MHz~1GHz(FAR)	4.48dB
Radiation 1GHz~18GHz(FAR)	5.30dB
Radiation 18GHz~40GHz(FAR)	5.26dB

Uncertainty figures are valid to a confidence level of 95%

4 Test Results

4.1 Unwanted emissions outside the band

Test Requirement:	ETSI EN 301 681 Clause 4.2.1
Test Method:	ETSI EN 301 681 Clause 5.2.2
Limit:	Unwanted emissions from Mobile Earth Stations (LMESs) outside the band 1 626,5 MHz to 1 660,5 MHz and outside the band 1 668 MHz to 1 675 MHz shall be below the following limits. Unless otherwise stated the specification in this clause shall apply to all types of MESs notwithstanding their transmitting capabilities within the frequency bands as defined in table 1: 1) For MES that are capable of transmitting within only the sub-band 1 frequency band as defined in table 1, the maximum EIRP spectral density of the unwanted emissions from the MES outside the band 1 626,5 MHz to 1 660,5 MHz shall not exceed the limits in either table 3 or table 3a. The applicant shall declare which alternative shall be used. 2) For MES that are capable of transmitting within only sub-band 2 frequency band or within both the sub-band 1 and sub-band 2 frequency bands, the maximum EIRP spectral density of the unwanted emissions from the MES outside the bands 1 626,5 MHz to 1 660,5 MHz and 1 668,0 MHz to 1 675,0 MHz shall not exceed the limits in table 3a. In tables 3 and 3a, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

Table 3: Unwanted emissions outside the band 1 626,5 MHz to 1 660,5 MHz for MES only capable of transmitting within sub-band 1 frequency band as defined in table 1

Frequency (MHz)	Carrier - on state		
	EIRP (dBW)	Measurement bandwidth	Measurement method (see note 6)
30 to 1 000	-66	100 kHz	Peak Hold
1 000 to 1 559	-61	1 MHz	Average
1 559 to 1 605,0	-70	1 MHz (see note 3)	Average (see note 2)
1 605,0 to 1 612,5	-70 to -58,5 (see note 4)	1 MHz (see note 3)	Average
1 612,5 to 1 616,5	-55 to -50 (see note 4)	1 MHz	Average
1 616,5 to 1 621,5	-50 to -46 (see note 4)	1 MHz	Average
1 621,5 to 1 624,5	-60	30 kHz	Average
1 624,5 to 1 625,0	-60 to -57,5 (see notes 4, 5, 7)	30 kHz	Average
1 625,0 to 1 625,125	-57,5 to -57,2 (see notes 4, 5, 7)	30 kHz	Average
1 625,125 to 1 625,8	-57,2 to -50 (see notes 4, 5, 7)	30 kHz	Average
1 625,8 to 1 626,0	-50 to -47 (see notes 4, 5, 7)	30 kHz	Average
1 626,0 to 1 626,2	-47 to -40 (see notes 4, 5, 7)	30 kHz	Average
1 626,2 to 1 626,5	-40 (see notes 5, 7)	30 kHz	Average
1 626,5 to 1 660,5	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
1 660,5 to 1 662,5	The levels in table 4a shall apply from 1 660,5 MHz to 1 662,5 MHz		
1 662,5 to 1 665,5	-60	30 kHz	Average
1 665,5 to 1 670,5	-60	100 kHz	Average
1 670,5 to 1 680,5	-60	300 kHz	Average
1 680,5 to 1 690,5	-60	1 MHz	Average
1 690,5 to 2 250	-60	3 MHz	Average
2 250 to 12 750 (see note 1)	-60	3 MHz	Peak Hold

NOTE 1: In the band 3 253,0 MHz to 3 321,0 MHz the maximum EIRP in one, and only one, 3 MHz measurement bandwidth shall not exceed -38 dBW. Elsewhere in this band the power limit in table 3 shall be applied.
In each of the bands 4 879,5 MHz to 4 981,5 MHz, 6 506,0 MHz to 6 642,0 MHz and 8 132,5 MHz to 8 302,5 MHz the maximum EIRP in one, and only one, 3 MHz measurement bandwidth shall not exceed -48 dBW. Elsewhere in this band the power limit in table 3 shall be applied.

NOTE 2: The average measurement method defined in clause 5.2.2.3 shall apply except that an averaging period of 20 ms shall be used in the sub-band 1 573,42 MHz to 1 580,42 MHz.

NOTE 3: Measurement bandwidths less than 1 MHz are allowable provided the power in the narrower bandwidth is integrated over 1 MHz.

NOTE 4: Linearly interpolated in dBW vs. Frequency.

NOTE 5: The power limits specified in the band 1 624,5 MHz to 1 626,5 MHz require further study. This study is important to determine whether less stringent limits may enhance spectrum efficiency and utilization immediately above 1 626,5 MHz.

NOTE 6: Peak Hold and Average measurements shall be performed as specified in clauses 5.2.2.2 and 5.2.2.3.

NOTE 7: For systems employing CDMA, the EIRP limits shall be decreased by 10 log (N) dB, where N is the maximum number of MESs in the receive beam of the satellite to which these MESs are communicating and which are expected to transmit simultaneously in the same frequency band within that same beam. This number shall be declared by the manufacturer (N = 1 in a TDMA system).

Table 3a: Unwanted emissions outside the bands 1 626,5 MHz to 1 660,5 MHz and 1 668,0 MHz to 1 675,0 MHz for MES capable of transmitting within all or any part of sub-band 1 and sub-band 2 frequency bands as defined in table 1

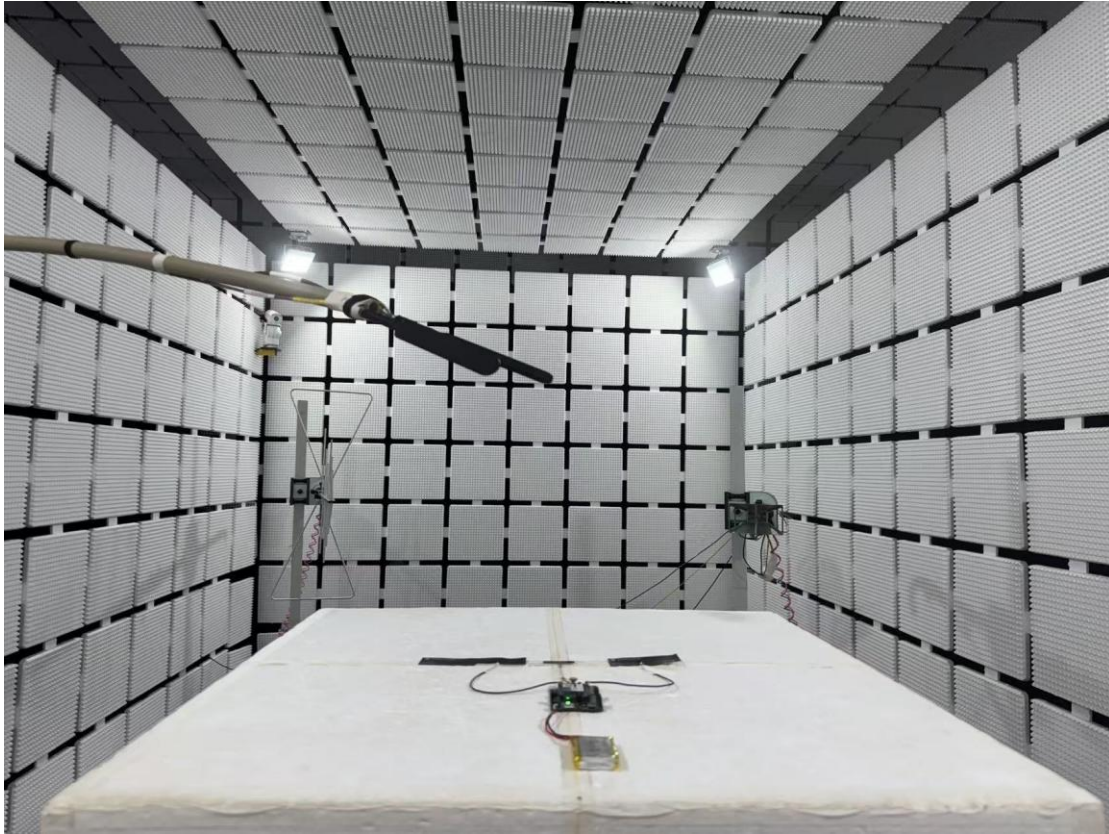
Frequency (MHz)	Carrier - on state		
	EIRP (dBW)	Measurement bandwidth	Measurement method (see note 8)
30 to 1 000	-66	100 kHz	Peak Hold
1 000 to 1 559	-61	1 MHz	Average
1 559 to 1 605,0	-70	1 MHz (see note 5)	Average (see note 2)
1 605,0 to 1 612,5	-70 to -58,5 (see note 6)	1 MHz (see note 5)	Average
1 612,5 to 1 616,5	-55 to -50 (see note 6)	1 MHz	Average
1 616,5 to 1 621,5	-50 to -46 (see note 6)	1 MHz	Average
1 621,5 to 1 624,5	-60	30 kHz	Average
1 624,5 to 1 625,0	-60 to -57,5 (see notes 6, 7, 9)	30 kHz	Average
1 625,0 to 1 625,125	-57,5 to -57,2 (see notes 6, 7, 9)	30 kHz	Average
1 625,125 to 1 625,8	-57,2 to -50 (see notes 6, 7, 9)	30 kHz	Average
1 625,8 to 1 626,0	-50 to -47 (see notes 6, 7, 9)	30 kHz	Average
1 626,0 to 1 626,2	-47 to -40 (see notes 6, 7, 9)	30 kHz	Average
1 626,2 to 1 626,5	-40 (see notes 7, 9)	30 kHz	Average
1 626,5 to 1 660,5	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
1 660,5 to 1 662,5	note 1	note 1	note 1
1 662,5 to 1 666,0	-55	30 kHz	Average
1 666,0 to 1 668,0	note 2	note 2	note 2
1 668,0 to 1 675,0	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
1 675,0 to 1 677,0	note 2	note 2	note 2
1 677,0 to 1 680,0	-60	30 kHz	Average
1 680,0 to 1 685,0	-60	100 kHz	Average
1 685,0 to 1 695,0	-60	300 kHz	Average
1 695,0 to 1 705,0	-60	1 MHz	Average
1 705,0 to 2 250	-60	3 MHz	Average
2 250 to 12 750 (see note 3)	-60	3 MHz	Peak Hold

Frequency (MHz)	Carrier - on state		
	EIRP (dBW)	Measurement bandwidth	Measurement method (see note 8)
NOTE 1: For an MES transmitting in sub-band 1 (as defined in table 1) the limits defined in table 4a shall apply for the band 1 660,5 MHz to 1 662,5 MHz. For an MES transmitting in sub-band 2 (as defined in table 1) a limit of -55 dBW in 30 kHz shall apply for the band 1 660,5 MHz to 1 662,5 MHz.			
NOTE 2: For an MES transmitting in sub-band 2 (as defined in table 1) the limits defined in table 4a shall apply for the bands 1 666,0 MHz to 1 668,0 MHz and 1 675,0 MHz to 1 677,0 MHz. For an MES transmitting in sub-band 1 (as defined in table 1) a limit of -55 dBW in 30 kHz shall apply for the bands 1 666,0 MHz to 1 668,0 MHz and 1 675,0 MHz to 1 677,0 MHz.			
NOTE 3: In the bands 3 253,0 MHz to 3 321,0 MHz and 3 336,0 MHz to 3 350,0 MHz the maximum EIRP in one, and only one, 3 MHz measurement bandwidth shall not exceed -38 dBW. Elsewhere in this band the power limit in table 3a shall be applied. In the bands 4 879,5 MHz to 4 981,5 MHz and 5 004,0 MHz to 5 025,0 MHz the maximum EIRP in one, and only one, 3 MHz measurement bandwidth shall not exceed -48 dBW. Elsewhere in this band the power limit in table 3a shall be applied. In the bands 6 506,0 MHz to 6 642,0 MHz and 6 672,0 MHz to 6 700,0 MHz the maximum EIRP in one, and only one, 3 MHz measurement bandwidth shall not exceed -48 dBW. Elsewhere in this band the power limit in table 3a shall be applied. In the bands 8 132,5 MHz to 8 302,5 MHz and 8 340,0 MHz to 8 375,0 MHz the maximum EIRP in one, and only one, 3 MHz measurement bandwidth shall not exceed -48 dBW. Elsewhere in this band the power limit in table 3a shall be applied.			
NOTE 4: The average measurement method defined in clause 5.2.2.3 shall apply except that an averaging period of 20 ms shall be used in the sub-band 1 573,42 MHz to 1 580,42 MHz.			
NOTE 5: Measurement bandwidths less than 1 MHz are allowable provided the power in the narrower bandwidth is integrated over 1 MHz.			
NOTE 6: Linearly interpolated in dBW vs. Frequency.			
NOTE 7: The power limits specified in the band 1 624,5 MHz to 1 626,5 MHz require further study. This study is important to determine whether less stringent limits may enhance spectrum efficiency and utilization immediately above 1 626,5 MHz.			
NOTE 8: Peak Hold and Average measurements shall be performed as specified in clauses 5.2.2.2 and 5.2.2.3.			
NOTE 9: For systems employing CDMA, the EIRP limits shall be decreased by 10 log (N) dB, where N is the maximum number of MESs in the receive beam of the satellite to which these MESs are communicating and which are expected to transmit simultaneously in the same frequency band within that same beam. This number shall be declared by the manufacturer (N = 1 in a TDMA system).			

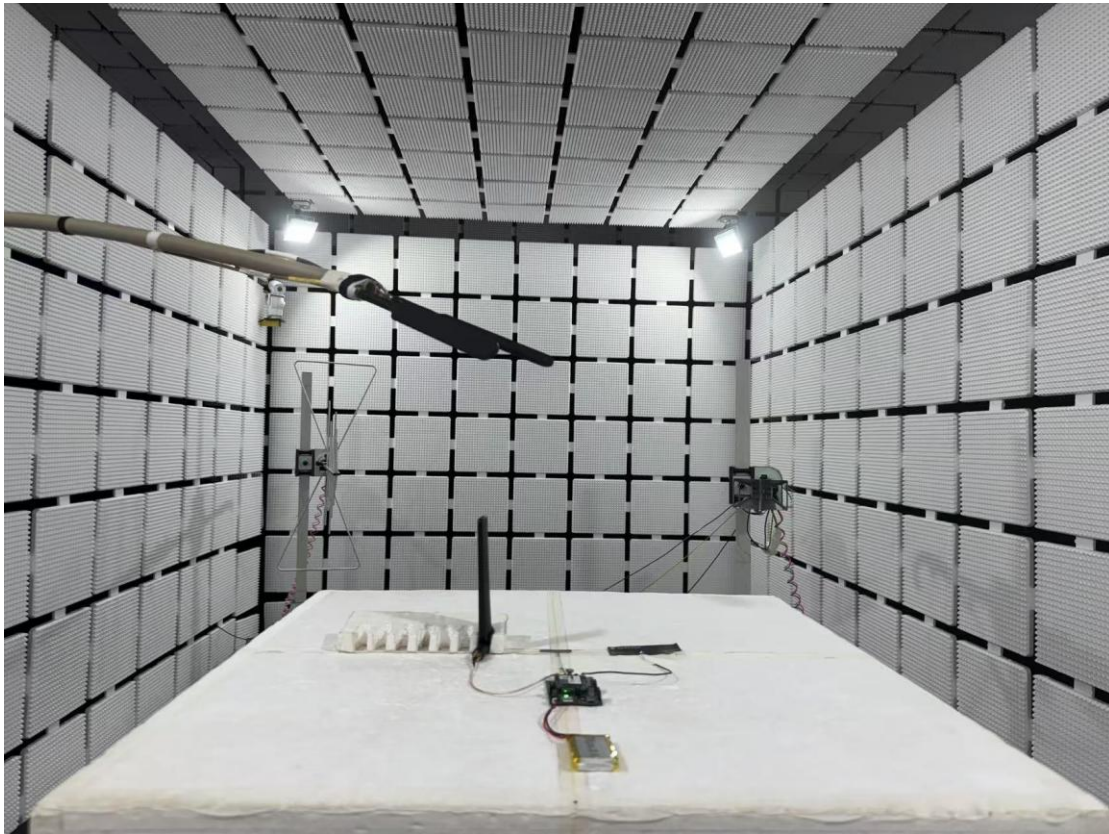
Test Environment:	Refer to section 2.3
Test Setup:	Refer to section 2.7
Measuring Instruments:	Refer to section 3.1
Test Result:	Appendix

5 Test Setup Photos

Dipole Antenna:



Omnidirectional Antenna:



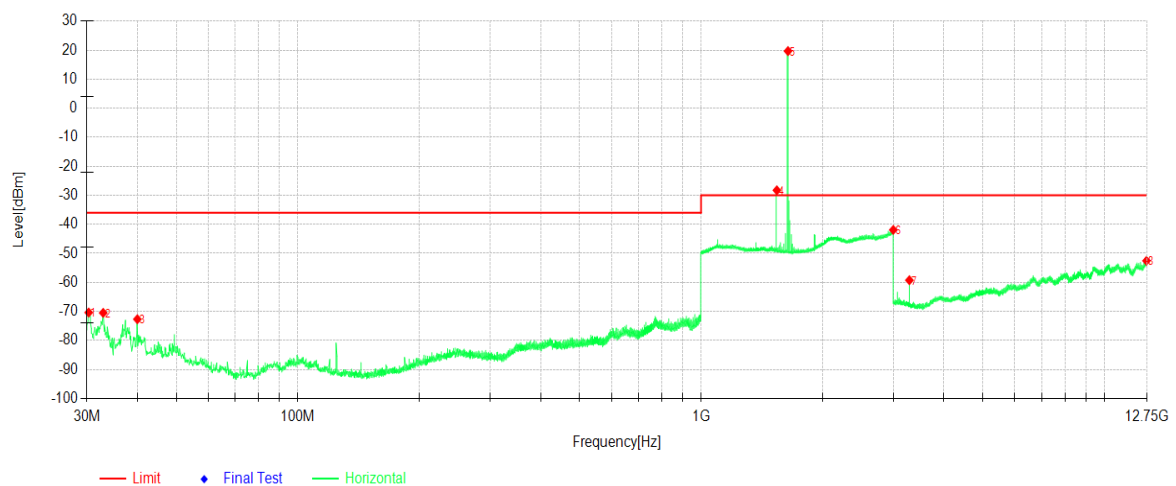
Appendix

Radiated Emissions

Test Results (Dipole Antenna)

Project Information			
Mode:	NTN	Band:	B255
Bandwidth:	-	Channel:	Mid
IMEI:	862063070036368	Engineer:	Zhangweizhi
Remark:	SCS:3.75KHz Ant: Dipole		

Test Graph

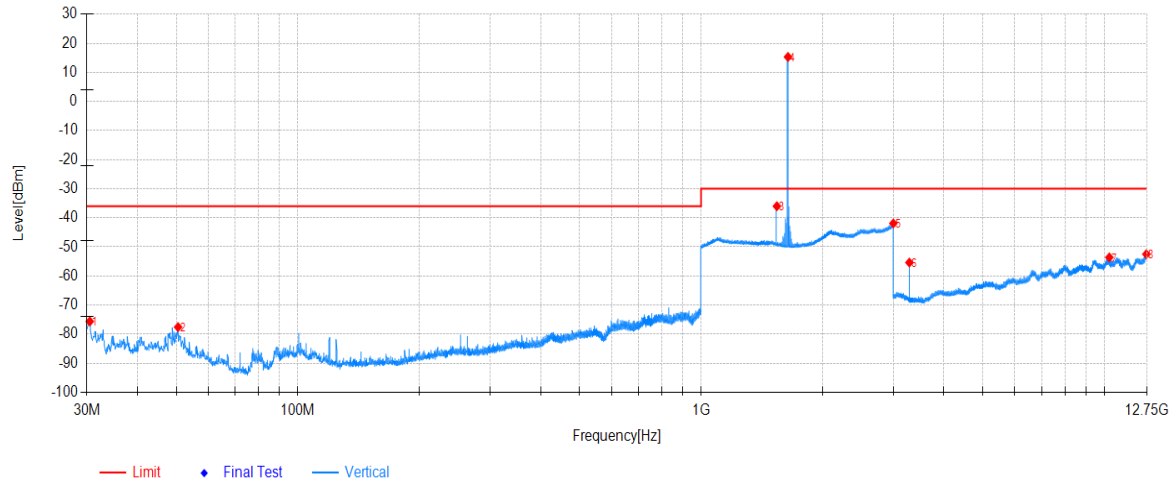


Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	30.29	-59.40	-70.38	-36.00	34.38	-10.98	Horizontal
2	32.91	-59.44	-70.51	-36.00	34.51	-11.07	Horizontal
3	39.99	-61.40	-72.70	-36.00	36.70	-11.30	Horizontal
4	1541.85	-54.60	-28.26	-	-	26.34	Horizontal
5	1643.46	-6.24	19.73	-	-	25.97	Horizontal
6	2997.80	-75.57	-41.91	-30.00	11.91	33.66	Horizontal
7	3286.66	-55.68	-59.25	-30.00	29.25	-3.57	Horizontal
8	12728.06	-69.10	-52.57	-30.00	22.57	16.53	Horizontal

Project Information

Mode:	NTN	Band:	B255
Bandwidth:	-	Channel:	Mid
IMEI:	862063070036368	Engineer:	Zhangweizhi
Remark:	SCS:3.75KHz Ant: Dipole		

Test Graph



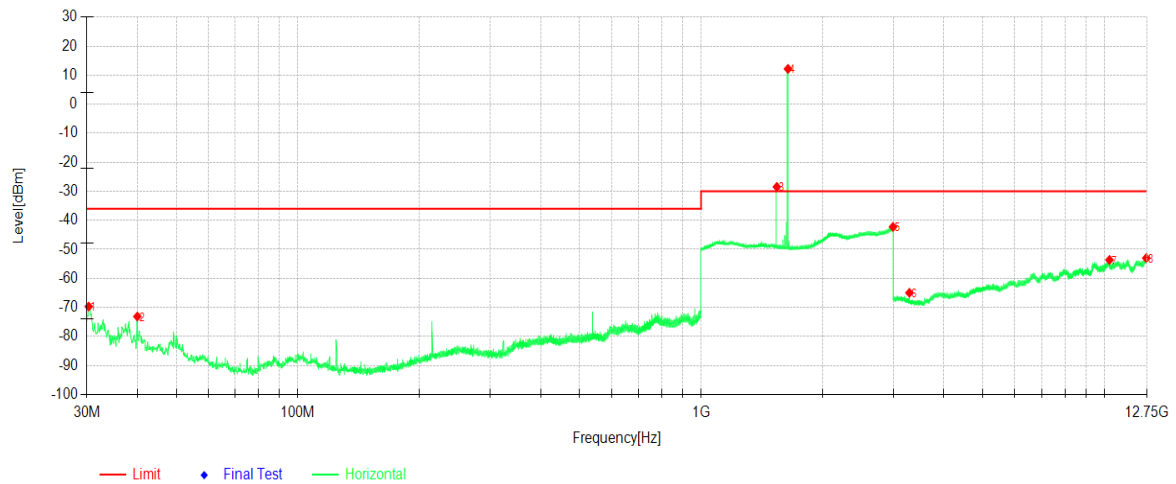
Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	30.49	-62.77	-75.65	-36.00	39.65	-12.88	Vertical
2	50.47	-66.59	-77.60	-36.00	41.60	-11.01	Vertical
3	1542.05	-62.26	-36.01	-	-	26.25	Vertical
4	1643.46	-10.39	15.35	-	-	25.74	Vertical
5	2998.80	-75.58	-41.92	-30.00	11.92	33.66	Vertical
6	3286.66	-51.59	-55.39	-30.00	25.39	-3.80	Vertical
7	10293.36	-67.91	-53.63	-30.00	23.63	14.28	Vertical
8	12721.24	-69.22	-52.51	-30.00	22.51	16.71	Vertical

Test Results (Omnidirectional Antenna)

Project Information			
Mode:	NTN	Band:	B255
Bandwidth:	-	Channel:	Mid
IMEI:	862063070036368	Engineer:	Zhangweizhi
Remark:	SCS:3.75KHz Ant: Omnidirectional		

Test Graph

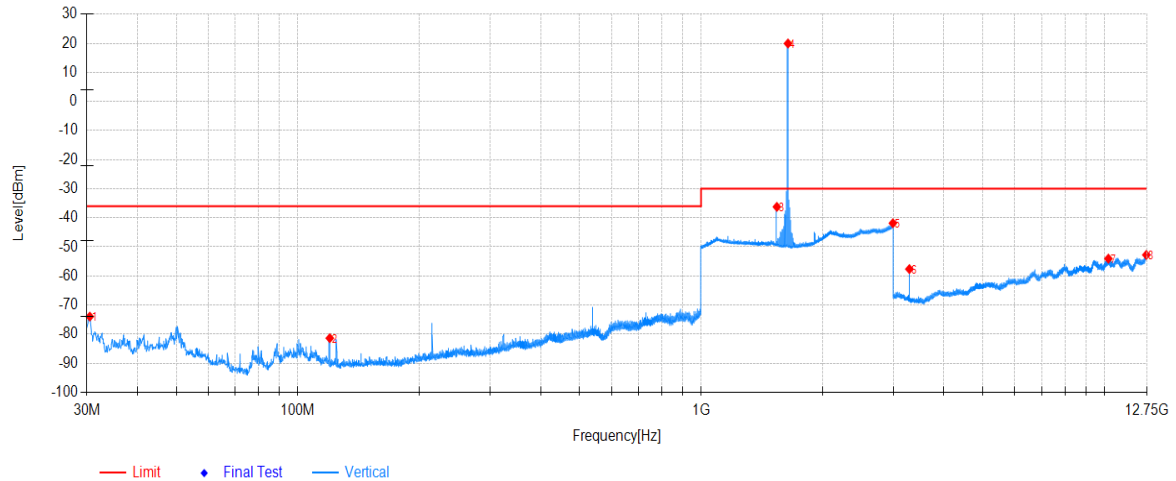


Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	30.29	-58.73	-69.71	-36.00	33.71	-10.98	Horizontal
2	39.99	-61.84	-73.14	-36.00	37.14	-11.30	Horizontal
3	1541.85	-54.79	-28.45	-	-	26.34	Horizontal
4	1643.46	-13.76	12.21	-	-	25.97	Horizontal
5	2992.20	-75.85	-42.26	-30.00	12.26	33.59	Horizontal
6	3286.66	-61.41	-64.98	-30.00	34.98	-3.57	Horizontal
7	10303.12	-68.35	-53.64	-30.00	23.64	14.71	Horizontal
8	12713.44	-69.46	-52.99	-30.00	22.99	16.47	Horizontal

Project Information

Mode:	NTN	Band:	B255
Bandwidth:	-	Channel:	Mid
IMEI:	862063070036368	Engineer:	Zhangweizhi
Remark:	SCS:3.75KHz Ant: Omnidirectional		

Test Graph



Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	30.49	-61.10	-73.98	-36.00	37.98	-12.88	Vertical
2	120.03	-65.49	-81.40	-36.00	45.40	-15.91	Vertical
3	1542.05	-62.48	-36.23	-	-	26.25	Vertical
4	1643.46	-5.76	19.98	-	-	25.74	Vertical
5	2990.80	-75.41	-41.87	-30.00	11.87	33.54	Vertical
6	3286.66	-53.84	-57.64	-30.00	27.64	-3.80	Vertical
7	10240.22	-68.22	-54.05	-30.00	24.05	14.17	Vertical
8	12716.85	-69.46	-52.77	-30.00	22.77	16.69	Vertical

~The End~