TEST REPORT

Applicant:	Particle Industries, Inc.
EUT Description:	Tachyon
Model:	TACH4ROW, TACH8ROW
Brand:	Particle
Standards:	ETSI EN 300 440 V2.2.1
Date of Receipt:	2025/06/25
Date of Test:	2025/06/25 to 2025/08/27
Date of Issue:	2025/08/28

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	2025/08/28	Original	Carey Chen

Summary of Test Results

Test Item	Test Requirement	Test Method	Result
Equivalent isotropically radiated power (e.i.r.p.)	Clause 4.2.2	Clause 4.2.2.3	Reference report 2406RSU046-E10
Permitted range of operating frequencies	Clause 4.2.3	Clause 4.2.3.3	
Duty cycle	Clause 4.2.5	Clause 4.2.5.3	
Blocking or desensitization	Clause 4.3.4	Clause 4.3.4.3	
Unwanted emissions in the spurious domain	Clause 4.2.4	Clause 4.2.4.3	Pass
Receiver spurious radiations	Clause 4.3.5	Clause 4.3.5.3	Pass

Remark: In this report the Radiated Spurious Emissions was tested, and the other data please refer to the previous report with report number 2406RSU046-E10 issued by MRT Technology (Suzhou) Co., Ltd.
Reference data from antenna 1, Antenna 2 is shielded through software.

Table of Contents

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. 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:	Tachyon		
Model:	TACH4ROW, TACH8ROW		
Brand:	Particle		
Hardware Version:	V1.2		
Software Version:	1.0.160		
IMEI:	863174060029047		
Modulation Type:	802.11a/n:	OFDM-BPSK, QPSK, 16QAM, 64QAM	
	802.11ac:	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM	
	802.11ax:	OFDM/OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM	
Smart System:	☒SISO	802.11a/n/ac/ax	/
	☐MIMO	802.11n/ac/ax	( )TX( )RX
	☐CDD	802.11a	( )TX( )RX
TPC Function:	☒With TPC		☐Without TPC
Frequency Range:	5725MHz ~ 5850MHz		
Channel Frequency:	20M Bandwidth Channel:	5745 ~ 5825MHz	5 Channels
	40M Bandwidth Channel:	5755 ~ 5795MHz	2 Channels
	80M Bandwidth Channel:	5775MHz	1 Channel
Receiver Category:	☐Receiver Category 1	☐Receiver Category 2	☒Receiver Category 3
Antenna Type:	☐ External, ☒ Integrated		
Antenna Gain:	Ant (dBi)		
	2.3		

Remark:
1. The above EUT's information was declared by applicant, please refer to the specifications or user's manual for more detailed description.
2. According to the customer's Letter of model difference, TACH4ROW and TACH8ROW are identical with each other, except for RAM and model number difference.

2 Test Configuration

2.1 Standards Specification

Reference Standards	Standards Title
ETSI EN 300 440 V2.2.1	Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum

2.2 Test Channel

Modulation Type	Test Channel	Test Frequency
802.11a/n20/ac20/ax20	The Lowest channel (CH149)	5745MHz
	The Middle channel (CH157)	5785MHz
	The Highest channel (CH165)	5825MHz
Modulation Type	**Test Channel**	**Test Frequency**
802.11n40/ac40/ax40	The Lowest channel (CH151)	5755MHz
	The Highest channel (CH159)	5795MHz
Modulation Type	**Test Channel**	**Test Frequency**
802.11ac80/ax80	The Middle channel (CH155)	5775MHz

2.3 Test Mode

Modulation Type	SISO - Data Rate	CDD/MIMO( )TX( )RX Data Rate
802.11a	6 Mbps	N/A
802.11n20	MCS0 (6.5 Mbps)	N/A
802.11n40	MCS0 (13.5 Mbps)	N/A
802.11ac20	MCS0 (6.5 Mbps)	N/A
802.11ac40	MCS0 (13.5 Mbps)	N/A
802.11ac80	MCS0 (29.3 Mbps)	N/A
802.11ax20	MCS0 (8.6 Mbps)	N/A
802.11ax40	MCS0 (17.2 Mbps)	N/A
802.11ax80	MCS0 (36.0 Mbps)	N/A
Transmitting mode:	Keep the EUT was programmed to be in continuously transmitting mode.	
Normal Link:	Keep the EUT operation to normal function.	

2.4 Test Environment

Relative Humidity	45-56 % RH Ambient	
Condition	**Temperature(℃)**	**Voltage(V)**
NTNV	25	4.00
LTLV	-20	3.55
LTHV	-20	4.40
HTLV	60	3.55
HTHV	60	4.40
Remark: Refer to sections 5.7 of standard ETSI 300 440		
NTNV Normal Temperature Normal Voltage LTLV Low Temperature Low Voltage LTHV Low Temperature High Voltage HTLV High Temperature Low Voltage HTHV High Temperature High Voltage		

2.5 Support Unit used in test

The EUT has been tested as an independent unit.

2.6 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.

2.7 Modifications

No modifications were made during testing.

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	2025/03/11	2026/03/10
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
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	Ulab
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 in the spurious domain

Test Requirement:	ETSI EN 300 440 Clause 4.2.4
Test Method:	ETSI EN 300 440 Clause 4.2.4.3

Limit:

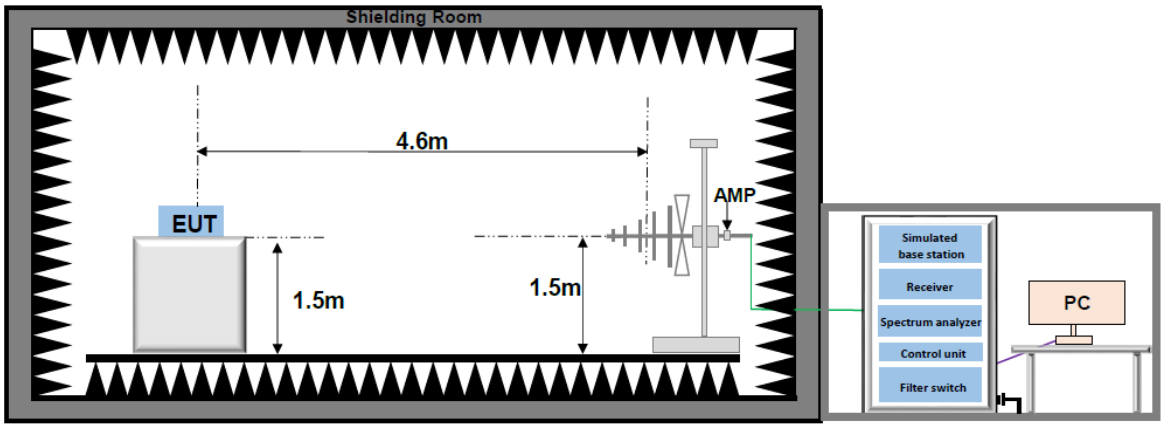
The maximum power limits of any unwanted emissions in the spurious domain are given in table 3.

Table 3: Spurious emissions

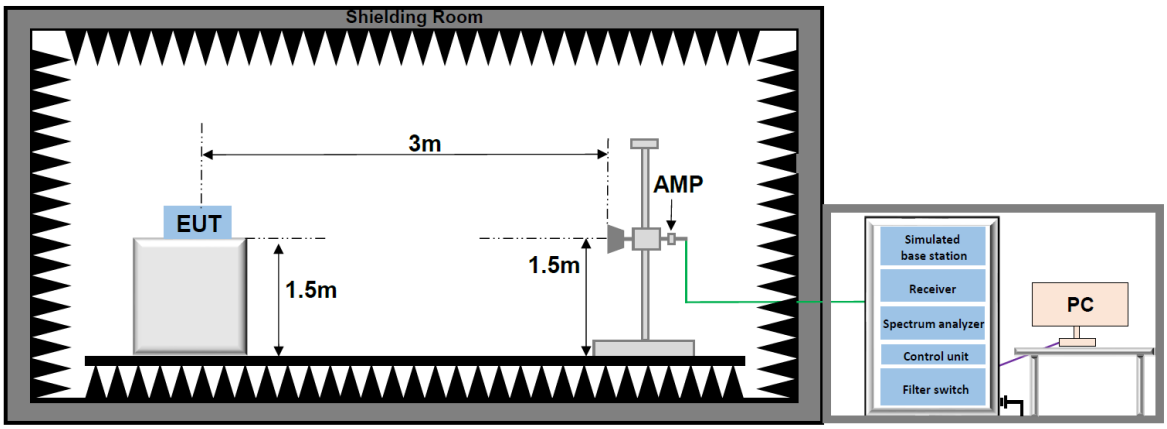
Frequency ranges	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤1 000 MHz	Frequencies >1 000 MHz
Operating	4nW (-54dBm)	250nW (-36dBm)	1uW (-30dBm)
Standby	2nW (-57dBm)	2nW (-57dBm)	20nW (-47dBm)

Test Environment:	Refer to section 2.4.
Measuring Instruments:	Refer to section 3.1
Test Procedure:	1. The test distance between the receiving antenna and the EUT is 4.6m below 1GHz frequency range, and 3m which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna scanning 1.5m height. 2. The EUT was placed on a turntable with 1.5m height (FAR). 3. Set EUT in continuous transmitting with maximum output power. 4. The table was rotated from 0 to 360 degree to search the highest radiated emission. 5. Repeat above step for each polarization and channel to find the worst emission level. 6. The results obtained are compared to the limits in order to prove compliance with the requirement.

Test Setup:



Below 1GHz

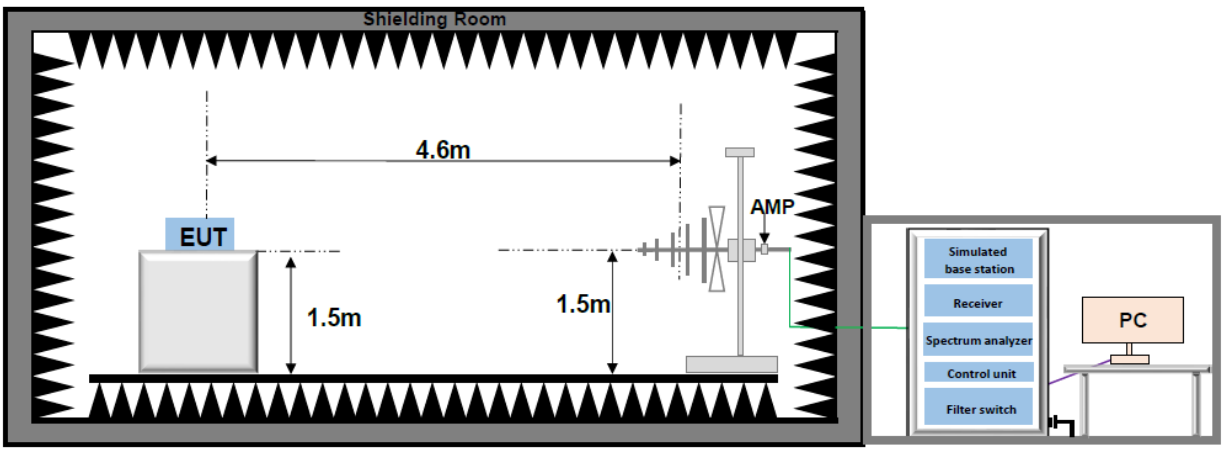


Above 1GHz

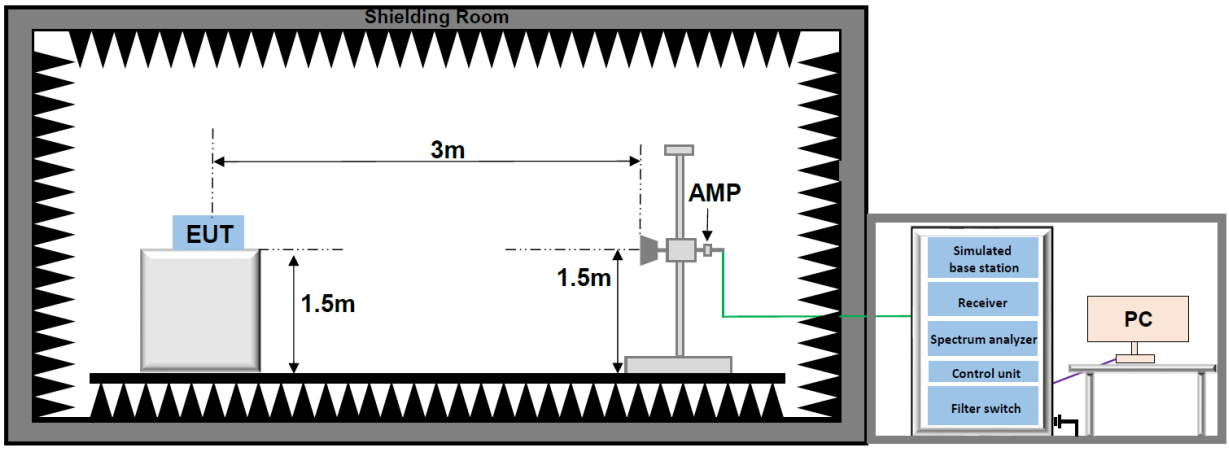
Test Result:	Appendix
Remark[1]:	Radiated spurious emissions were measured from 30MHz to 40GHz. The disturbance between 18GHz to 40GHz was very low. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be recorded.
Remark[2]:	Unwanted emissions in the spurious domain were performed with the EUT set to transmit at the worst-case mode/channel based on power.

4.2 Receiver spurious emissions

Test Requirement:	ETSI EN 300 440 Clause 4.3.5
Test Method:	ETSI EN 300 440 Clause 4.3.5.3
Limit:	The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.
Test Environment:	Refer to section 2.4.
Measuring Instruments:	Refer to section 3.1
Test Procedure:	1. The test distance between the receiving antenna and the EUT is 4.6m below 1GHz frequency range, and 3m which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna scanning 1.5m height. 2. The EUT was placed on a turntable with 1.5m height (FAR). 3. Set EUT in continuous transmitting with maximum output power. 4. The table was rotated from 0 to 360 degree to search the highest radiated emission. 5. Repeat above step for each polarization and channel to find the worst emission level. 6. The results obtained are compared to the limits in order to prove compliance with the requirement.
Test Setup:	



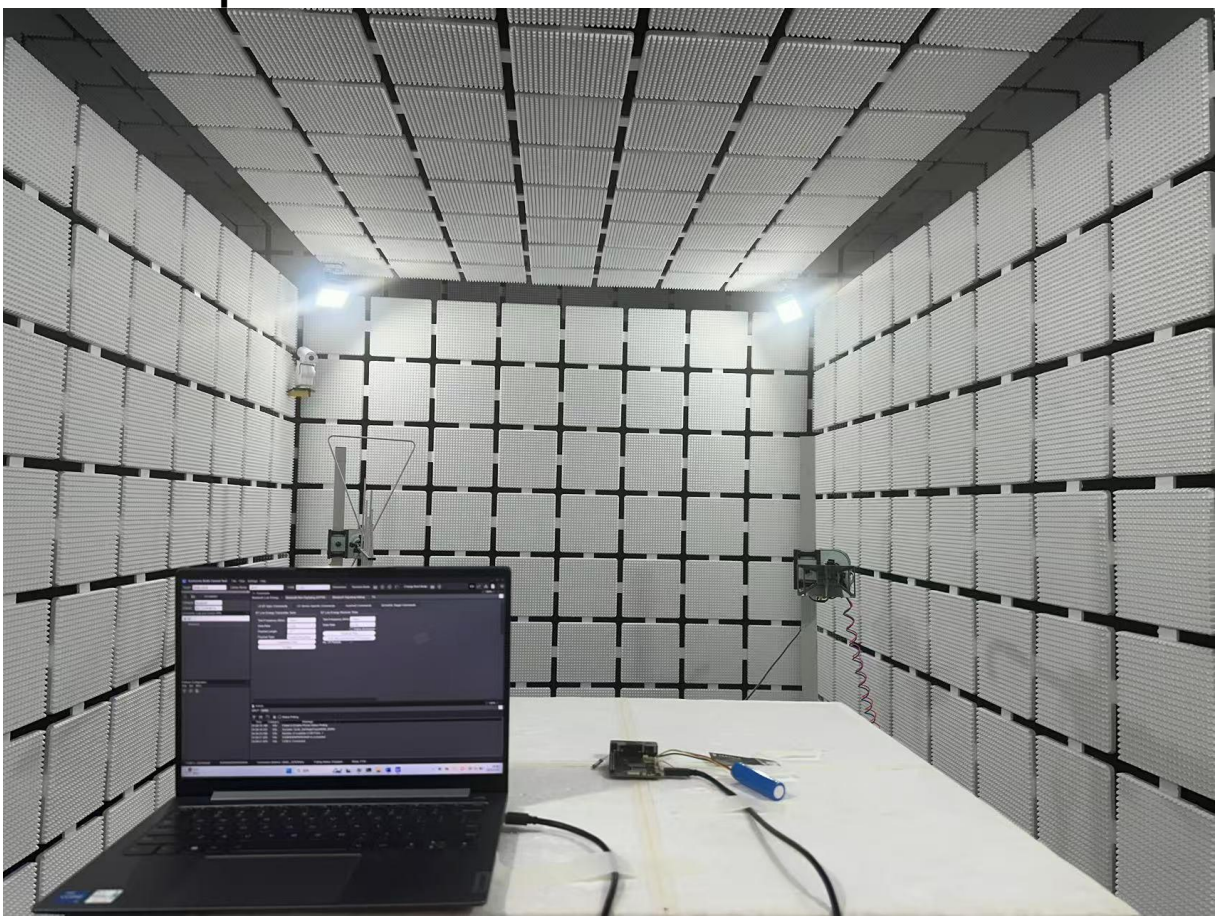
Below 1GHz



Above 1GHz

Test Result:	Appendix
Remark:	Radiated spurious emissions were measured from 30MHz to 40GHz. The disturbance between 18GHz to 40GHz was very low. The 18GHz to 40GHz data not be recorded.

5 Test Setup Photos

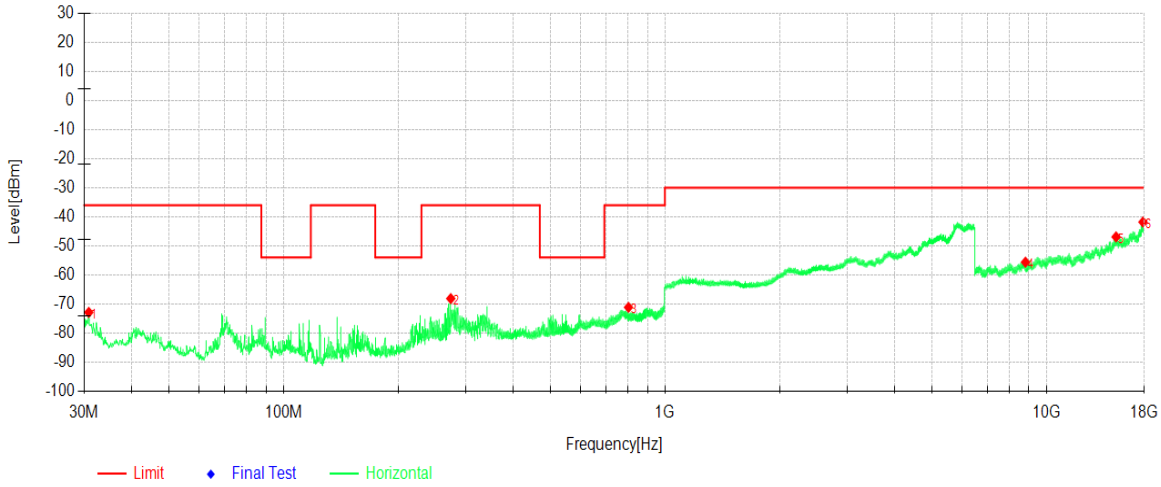


Appendix

Unwanted emissions in the spurious domain

Project Information			
Mode:	802.11a	Band:	5725-5850MHz
Bandwidth:	-	Channel:	Low
IMEI:	863174060029047	Engineer:	Zhang Weizhi
Remark:			

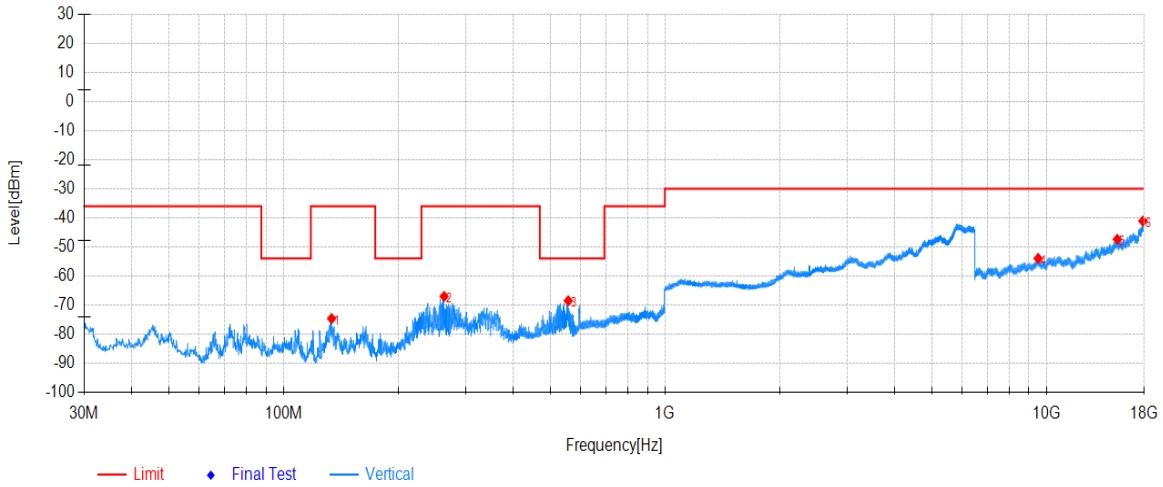
Test Graph



Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	30.87	-61.88	-72.88	-36.00	36.88	-11.00	Horizontal
2	274.56	-57.36	-68.14	-36.00	32.14	-10.78	Horizontal
3	802.59	-71.55	-71.15	-36.00	35.15	0.40	Horizontal
4	8813.11	-67.80	-55.61	-30.00	25.61	12.19	Horizontal
5	15228.41	-68.43	-46.90	-30.00	16.90	21.53	Horizontal
6	17916.05	-70.19	-41.80	-30.00	11.80	28.39	Horizontal

Project Information			
Mode:	802.11a	Band:	5725-5850MHz
Bandwidth:	-	Channel:	Low
IMEI:	863174060029047	Engineer:	Zhang Weizhi
Remark:			

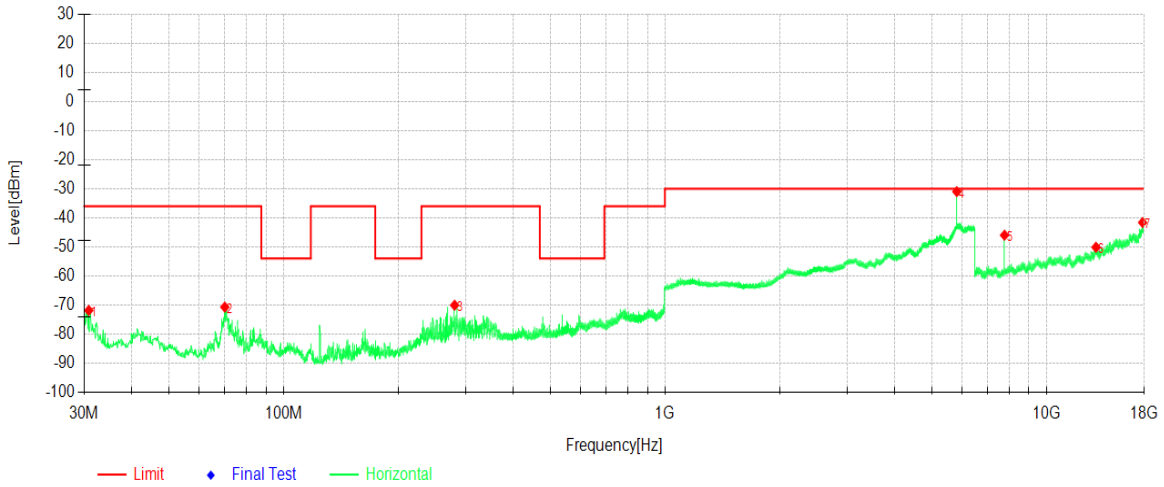
Test Graph



Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	133.70	-58.04	-74.66	-36.00	38.66	-16.62	Vertical
2	263.70	-55.07	-67.03	-36.00	31.03	-11.96	Vertical
3	557.93	-63.65	-68.55	-54.00	14.55	-4.90	Vertical
4	9513.87	-67.52	-53.96	-30.00	23.96	13.56	Vertical
5	15341.11	-68.72	-47.38	-30.00	17.38	21.34	Vertical
6	17903.01	-69.97	-41.10	-30.00	11.10	28.87	Vertical

Project Information			
Mode:	802.11a	Band:	5725-5850MHz
Bandwidth:	-	Channel:	High
IMEI:	863174060029047	Engineer:	Zhang Weizhi
Remark:			

Test Graph

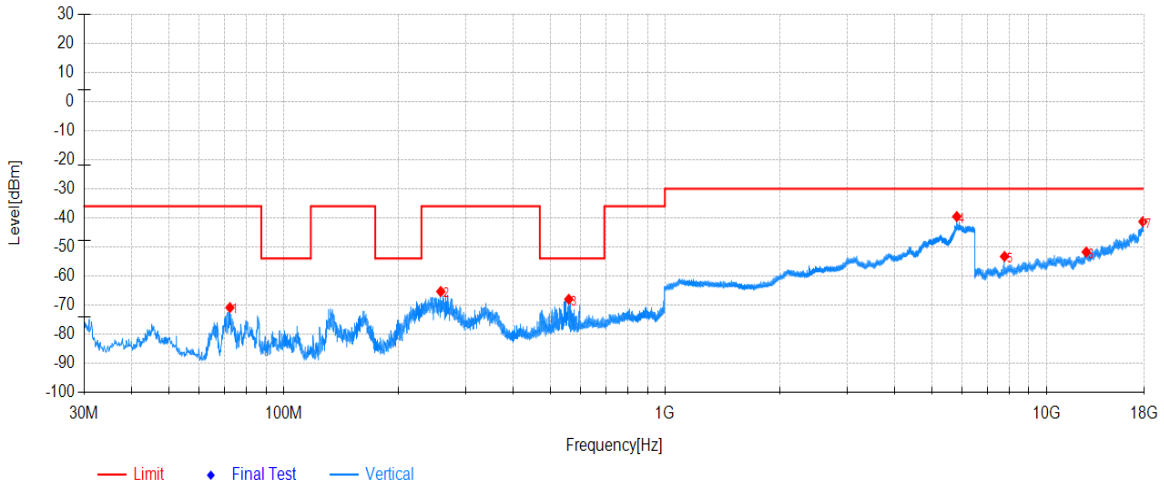


Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	30.87	-60.88	-71.88	-36.00	35.88	-11.00	Horizontal
2	70.16	-52.78	-70.72	-36.00	34.72	-17.94	Horizontal
3	280.96	-59.20	-70.07	-36.00	34.07	-10.87	Horizontal
4	5822.64	-62.49	-30.98	-	-	31.51	Horizontal
5	7766.58	-56.01	-45.97	-30.00	15.97	10.04	Horizontal
6	13491.47	-69.48	-50.12	-30.00	20.12	19.36	Horizontal
7	17878.86	-69.71	-41.62	-30.00	11.62	28.09	Horizontal

Project Information			
Mode:	802.11a	Band:	5725-5850MHz
Bandwidth:	-	Channel:	High
IMEI:	863174060029047	Engineer:	Zhang Weizhi
Remark:			

Test Graph

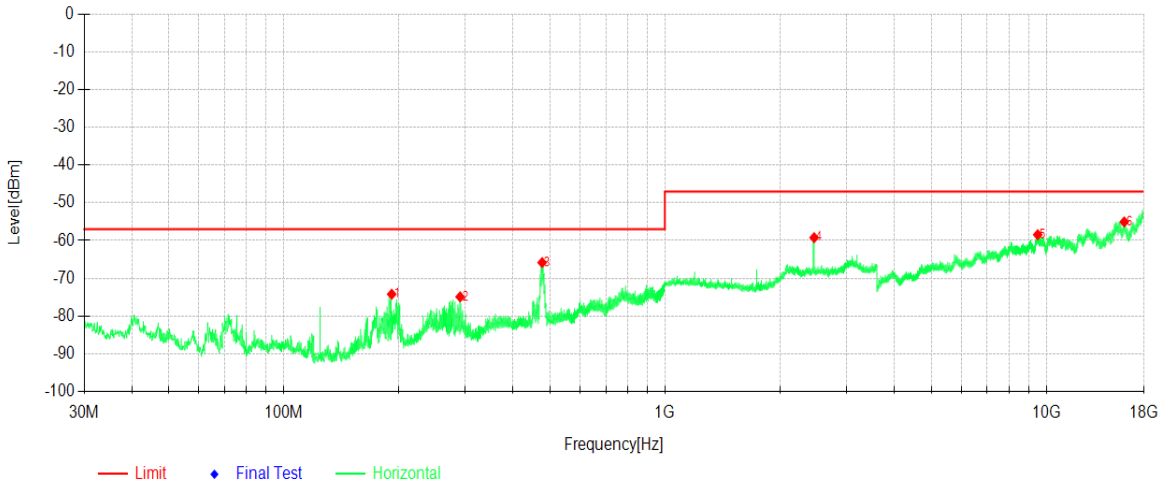


Data List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	72.39	-51.46	-70.90	-36.00	34.90	-19.44	Vertical
2	258.46	-53.57	-65.36	-36.00	29.36	-11.79	Vertical
3	559.77	-62.94	-68.04	-54.00	14.04	-5.10	Vertical
4	5822.37	-70.87	-39.57	-	-	31.30	Vertical
5	7766.58	-63.50	-53.28	-30.00	23.28	10.22	Vertical
6	12718.26	-69.00	-51.76	-30.00	21.76	17.24	Vertical
7	17909.15	-70.07	-41.30	-30.00	11.30	28.77	Vertical

Receiver spurious emissions (Worst case)

Project Information			
Mode:	802.11a	Band:	5725-5850MHz
Bandwidth:	-	Channel:	Low
IMEI:	863174060029047	Engineer:	Zhang Weizhi
Remark:			

Test Graph

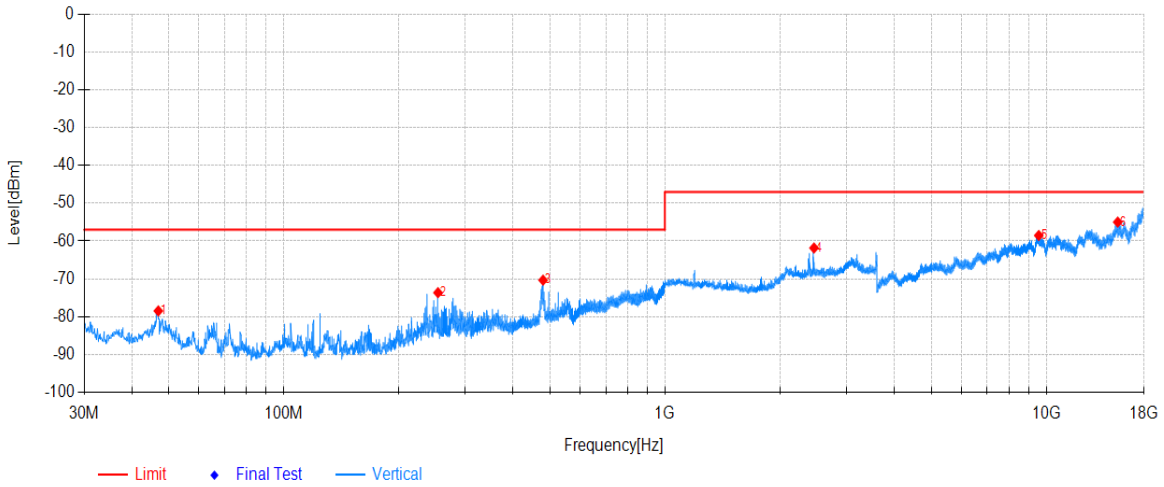


Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	192.20	-59.56	-74.23	-57.00	17.23	-14.67	Horizontal
2	290.47	-63.93	-74.92	-57.00	17.92	-10.99	Horizontal
3	476.63	-59.67	-65.83	-57.00	8.83	-6.16	Horizontal
4	2461.48	-52.30	-59.22	-47.00	12.22	-6.92	Horizontal
5	9493.48	-71.95	-58.45	-47.00	11.45	13.50	Horizontal
6	15998.47	-75.89	-55.04	-47.00	8.04	20.85	Horizontal

Project Information			
Mode:	802.11a	Band:	5725-5850MHz
Bandwidth:	-	Channel:	Low
IMEI:	863174060029047	Engineer:	Zhang Weizhi
Remark:			

Test Graph



Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	46.98	-67.33	-78.48	-57.00	21.48	-11.15	Vertical
2	254.09	-62.01	-73.66	-57.00	16.66	-11.65	Vertical
3	479.15	-64.31	-70.34	-57.00	13.34	-6.03	Vertical
4	2459.22	-54.69	-61.84	-47.00	14.84	-7.15	Vertical
5	9552.99	-71.82	-58.52	-47.00	11.52	13.30	Vertical
6	15383.61	-77.09	-54.97	-47.00	7.97	22.12	Vertical

~The End~