



Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

EMC TEST REPORT

PRODUCT	BLE TAG 1600
BRAND	PUI
MODEL	BT1600
APPLICANT	Positioning Universal Inc
FCC ID	2AHRH-BT1600
ISSUE DATE	January 16, 2025
STANDARD(S)	FCC Part 15, Subpart B, ANSI C63.4-2014.

Prepared by: Li Liukai

Reviewed by: Qin Yabin

Approved by: Zhang Min

CAUTION:

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.

CONTENTS

1	SUMMARY OF TEST REPORT	3
1.1	TEST STANDARD (S)	3
1.2	SUMMARY OF TEST RESULTS	3
2	GENERAL INFORMATION OF THE LABORATORY	4
2.1	TESTING LABORATORY	4
2.2	LABORATORY ENVIRONMENTAL REQUIREMENTS	4
2.3	PROJECT INFORMATION	4
3	GENERAL INFORMATION OF THE CUSTOMER	5
3.1	APPLICANT	5
3.2	MANUFACTURER	5
3.3	FACTORY	5
4	GENERAL INFORMATION OF THE PRODUCT	6
4.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	6
4.2	DESCRIPTION FOR AUXILIARY EQUIPMENT (AE)	6
5	TEST CONFIGURATION INFORMATION	7
5.1	LABORATORY ENVIRONMENTAL CONDITIONS	7
5.2	DECISION OF FINAL TEST MODE	8
5.3	EUT SYSTEM OPERATION	8
5.4	EUT CONNECTION DIAGRAM OF TEST SYSTEM	8
5.5	TEST EQUIPMENT UTILIZED	8
5.6	MEASUREMENT UNCERTAINTY	9
6	TEST RESULTS	10
6.1	RADIATED EMISSION	10
ANNEX A: MEASUREMENT DATA		12
ANNEX B: REVISED HISTORY		15
ANNEX C: ACCREDITATION CERTIFICATE		16

1 Summary of Test Report

1.1 Test Standard (s)

No.	Test Standard(s)	Title
1	FCC Part 15, Subpart B	Radio frequency devices
2	ANSI C63.4	Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
NOTE: According to customer requirements, test and report using the latest version of the standard.		

1.2 Summary of Test Results

No.	Item(s)	FCC Standard(s)	Verdicts for Single Item	Detailed Results
1	Radiated Emission	15.109(a)	Pass	See section 6.1
2	AC Conducted Emission	15.107(a)	N/A	See Note2 below

Note1:

The BT1600, manufactured by Positioning Universal Inc is a new product for testing. Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 1.3. Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 4 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 1 of this test report.

Note2:

Because the EUT is battery powered, adapter-related tests cannot be performed. Therefore, Verdicts for Single Item is N/A.

2 General Information of The Laboratory

2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4, No. 766, Jingang Road, Pudong, Shanghai, China
Telephone	021-68866880
FCC Registration No.	708870
FCC Designation No.	CN1364

2.2 Laboratory Environmental Requirements

Temperature	15℃~35℃
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	86kPa~106kPa
Supply Voltage	3V from Battery

2.3 Project Information

Project Manager	Wei Hanyu
Test Date	January 02, 2025 to January 09, 2025

3 General Information of The Customer

3.1 Applicant

Company	Positioning Universal Inc
Address	4660 La Jolla Village Drive, Suite 1100, San Diego , CA92122
Telephone	8583428458

3.2 Manufacturer

Company	Positioning Universal Inc
Address	4660 La Jolla Village Drive, Suite 1100, San Diego , CA92122
Telephone	8583428458

3.3 Factory

Company	N/A
Address	N/A

4 General Information of The Product

4.1 Product Description for Equipment under Test (EUT)

Product	BLE TAG 1600
Model	BT1600
Date of Receipt	December 23, 2024
EUT ID*	S13aa
SN/IMEI	N/A
Supported Radio Technology and Bands	BT 5.1 BLE 1M/2M/S2/S8
Hardware Version	P1.0
Software Version	1.0
Power Rating	DC 3V from battery
NOTE1: EUT ID is the internal identification code of the laboratory. NOTE2: Photographs of EUT are shown in ANNEX A of this test report. NOTE3: Samples in the test report are provided by the customer. The test results are only applicable to the samples received by the laboratory.	

4.2 Description for Auxiliary Equipment (AE)

AE ID*	Description	Model	SN/Remark
AE1	Battery	N/A	N/A
AE2	Mobile	ZTX	N/A
AE3	Software	nRF Connect	N/A
NOTE: *AE ID is the internal identification code of the laboratory.			

5 Test Configuration Information

5.1 Laboratory Environmental Conditions

5.1.1 Permanent Facilities

Semi-anechoic chamber SAC3-1 (9 m*8m*6.2m) & SAC3-2 (9.8m*6.7m*6.7m)	
Shielding effectiveness	0.014MHz ~1MHz, >60dB; 1MHz~1000MHz, >90dB.
Electrical insulation	> 2MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (SVSWR)	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

Shielded room	
Shielding effectiveness	0.014MHz~1MHz, >60dB; 1MHz~1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω

5.2 Decision of final test mode

The EUT was tested in conjunction with the accessories in Section 4.2. We tested all of the following test modes and selected the worst mode from the test results and recorded them in the report.

The test configuration modes are as the following:

Test Item	Test setup and operating modes
Radiated emission	30MHz-18GHz frequency range: Mode 1: BLE mode+ AE1+ AE2+ AE3

5.3 EUT System Operation

1. Connect the EUT with AE.
2. Setup the EUT according to the standard, connect the EUT and Phone with nRF connect APK.
3. Start testing and monitoring the function.

5.4 EUT Connection Diagram of Test System



<Figure 5.4-1> Mode 1

5.5 Test Equipment Utilized

No.	Name	Model	S/N	SW Version	HW Version	Manufacturer	Cal. Date	Cal. Interval
1	Test Receiver	ESR7	102399	1.4	00	R&S	2024-06-07	1 year
2	Test Receiver	FSW43	101943	1.12	00	R&S	2024-08-21	1 year
3	Trilog Antenna	VULB9162	00426	N/A	N/A	Schwarzbeck	2024-08-02	1 year
4	Double Ridged Guide Antenna	BBHA9120 D	02112	N/A	N/A	Schwarzbeck	2024-08-03	1 year
5	EMI Test Software	EMC32 V10.60.20	N/A	N/A	N/A	R&S	N/A	N/A
6	Preamplifier	SCU08F1	8320024	N/A	N/A	R&S	2024-10-09	1 year
7	Preamplifier	SCU18	10155	N/A	N/A	R&S	2024-10-09	1 year

5.6 Measurement Uncertainty

Item (s)	Uncertainty
Radiated Emission 30MHz-1000MHz	4.92 dB
Radiated Emission 1000MHz-18000MHz	5.66 dB
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.	

6 Test Results

6.1 Radiated Emission

6.1.1 Method of Measurement

- a. For 30MHz -1000MHz, the EUT was placed on the top of a rotating 0.8m table above the ground at a semi-anechoic chamber. The distance between the EUT and the received antenna was 3 meters. The table was rotated 360 degree and the received antenna mounted on a variable-height antenna tower was varied from 1m to 4m to find the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement.
- b. For 1000MHz -18000MHz, the EUT was placed on the top of a 0.8m table above the ground at a 3m fully anechoic chamber. The maximal emission value was acquired by adjusting the antenna height, The table was rotated 360 degrees to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement

6.1.2 EUT Connection Diagram of Test System

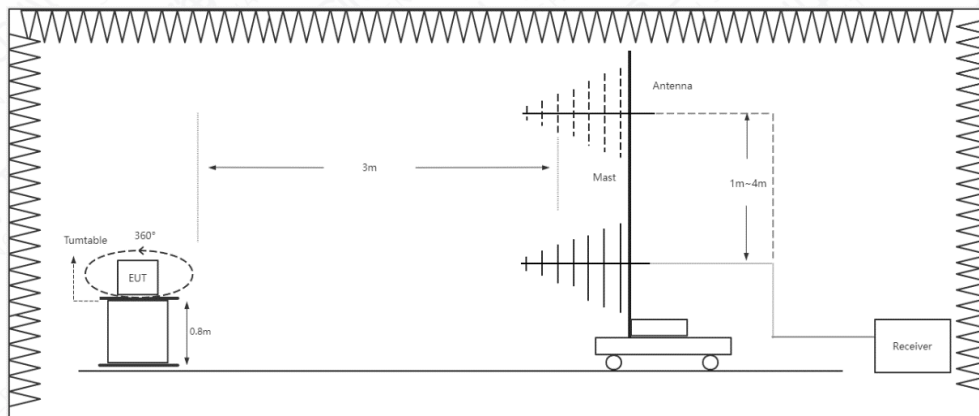


Figure 6.1.2-1 RE 30MHz-1GHz Connection Diagram

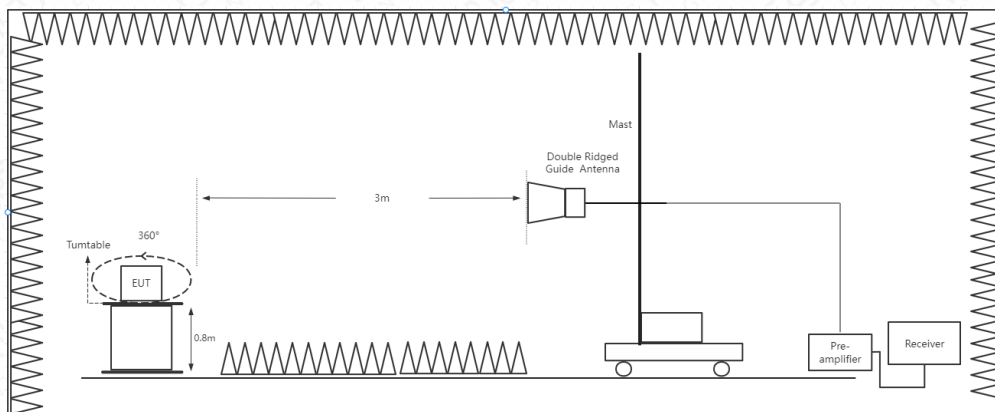


Figure 6.1.2-2 RE Above 1GHz Connection Diagram

6.1.3 Test Condition

Frequency Range (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	AUTO
1000-18000	1MHz/3MHz	AUTO

6.1.4 Limit/Criterion

Frequency Range (MHz)	Quasi-Peak (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
30-88	40	N/A	N/A
88-216	43.5	N/A	N/A
216-960	46	N/A	N/A
Above 960	54	N/A	N/A
Above 1000	N/A	74	54

6.1.5 Test environmental conditions

Temperature	21.2℃
Relative Humidity	32.1%RH
Atmospheric Pressure	101.2 kPa

6.1.6 Test Results

Mode	Frequency (MHz)	Test Results	Verdicts
Mode 1: BLE mode+ AE1+ AE2+ AE3	30-1000	See Annex A.1-1	Pass
Mode 1: BLE mode+ AE1+ AE2+ AE3	1000-18000	See Annex A.1-2 &A.1-3	Pass
NOTE Abbreviations used in this clause: Pass—P; Fail—F; Not applicable—N/A			

Annex A: Measurement Data

A.1 Radiated Emission

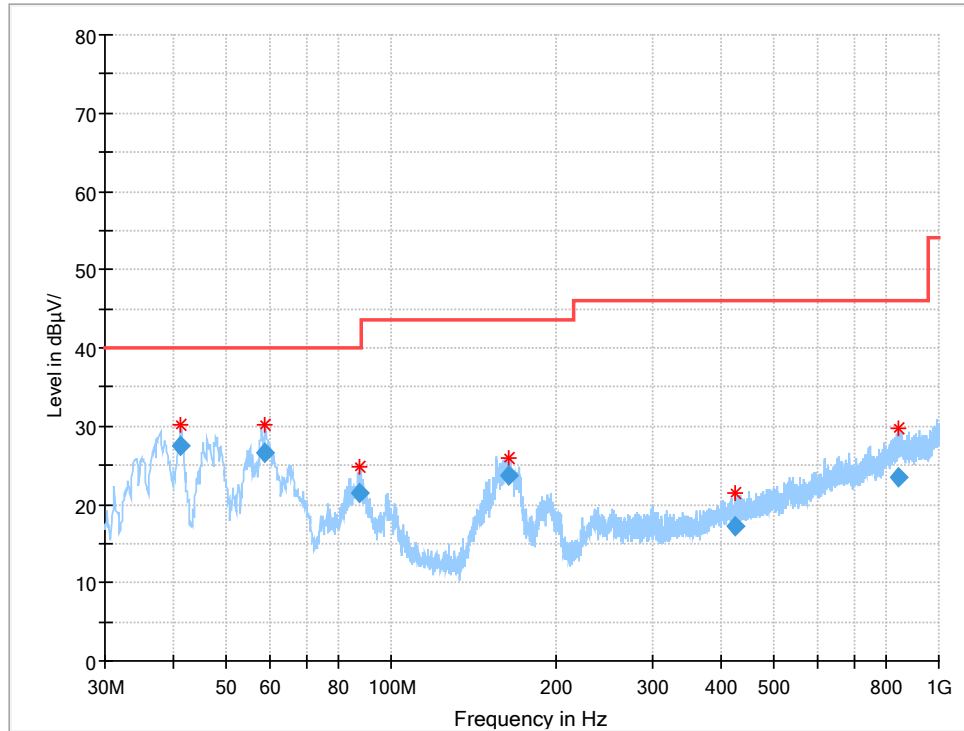


Figure A.1-1 Mode 1 (30M-1GHz)

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
41.248400	27.56	40.00	12.44	100.0	V	261.0	-12.6
58.828360	26.52	40.00	13.48	100.0	V	202.0	-12.5
87.724080	21.37	40.00	18.63	100.0	V	180.0	-15.8
163.761520	23.67	43.50	19.83	200.0	H	74.0	-15.5
425.544440	17.23	46.00	28.77	100.0	V	318.0	-6.7
846.230840	23.36	46.00	22.64	100.0	V	191.0	2.1

Note:

1.Horizontal and vertical polarity is all have been tested, the result of them is synthesized in the above data diagram.

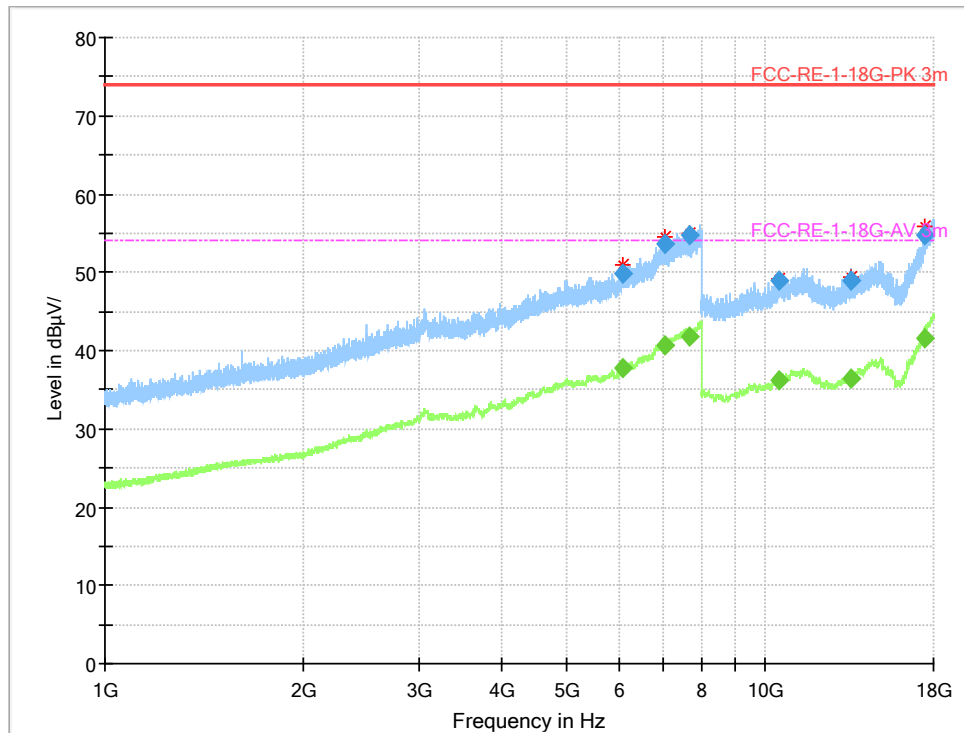


Figure A.1-2 Mode 1 (1GHz-18GHz)-H

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6089.951250	---	37.74	54.00	16.26	204.0	H	311.0	16.1
6089.951250	49.88	---	74.00	24.12	204.0	H	311.0	16.1
7055.407500	---	40.72	54.00	13.28	115.0	H	252.0	19.6
7055.407500	53.65	---	74.00	20.35	115.0	H	252.0	19.6
7661.613750	54.67	---	74.00	19.33	115.0	H	0.0	21.5
7661.613750	---	41.75	54.00	12.25	115.0	H	0.0	21.5
10483.937500	---	36.09	54.00	17.91	188.0	H	109.0	12.6
10483.937500	49.00	---	74.00	25.00	188.0	H	109.0	12.6
13524.095000	---	36.35	54.00	17.65	215.0	H	6.0	16.9
13524.095000	48.84	---	74.00	25.16	215.0	H	6.0	16.9
17426.020000	54.65	---	74.00	19.35	188.0	H	109.0	23.3
17426.020000	---	41.56	54.00	12.44	188.0	H	109.0	23.3

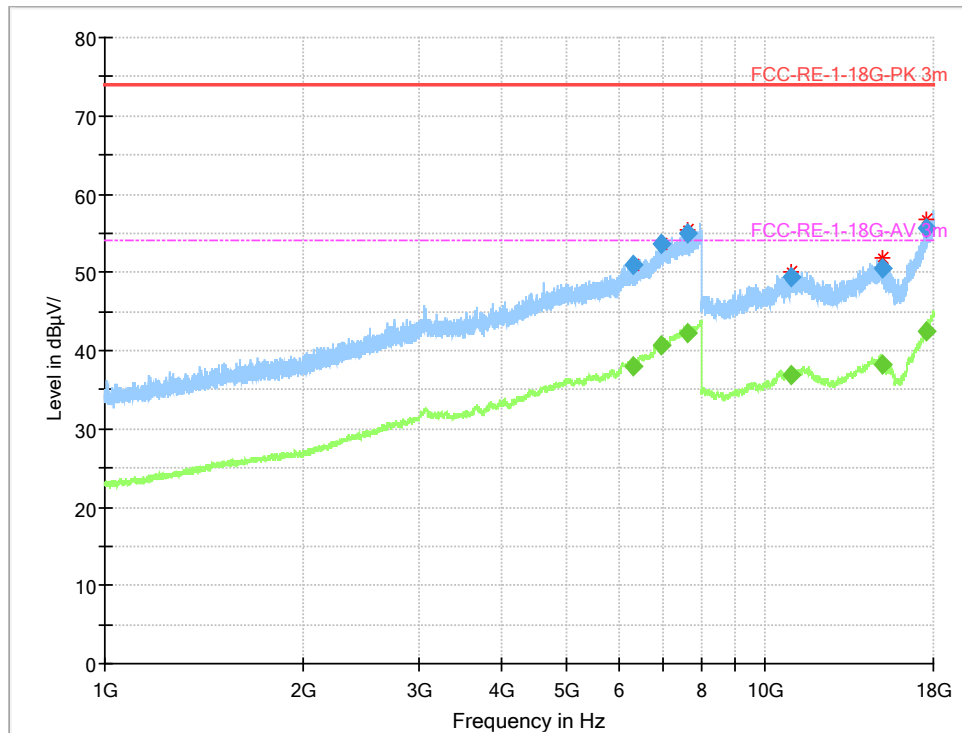


Figure A.1-3 Mode 1 (1GHz-18GHz)-V

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6300.051250	---	37.88	54.00	16.12	115.0	V	104.0	16.2
6300.051250	50.89	---	74.00	23.11	115.0	V	104.0	16.2
6966.143750	---	40.64	54.00	13.36	115.0	V	133.0	19.4
6966.143750	53.55	---	74.00	20.45	115.0	V	133.0	19.4
7619.572500	---	42.16	54.00	11.84	115.0	V	276.0	21.5
7619.572500	55.06	---	74.00	18.94	115.0	V	276.0	21.5
10988.515000	---	36.86	54.00	17.14	100.0	V	317.0	13.5
10988.515000	49.29	---	74.00	24.71	100.0	V	317.0	13.5
15041.140000	---	38.18	54.00	15.82	188.0	V	71.0	18.2
15041.140000	50.60	---	74.00	23.40	188.0	V	71.0	18.2
17570.621250	---	42.56	54.00	11.44	215.0	V	128.0	24.1
17570.621250	55.56	---	74.00	18.44	215.0	V	128.0	24.1

Annex B: Revised History

Version	Revised Content
V0	Initial

Annex C: Accreditation Certificate