
CONFORMANCE TEST REPORT FOR EMC TESTING

Report No.: SRTC2019-9003(R)-0024

Product Name: nBlue Bluetooth® 5.0 Module

Product Model: BR-LE5.0-S1A

Applicant: BlueRadios, Inc.

Manufacturer: BlueRadios, Inc.

Specification: Draft ETSI EN 301 489-1 V2.2.0(2017-03)

Draft ETSI EN 301 489-17 V3.2.0(2017-03)

The State Radio_monitoring_center Testing Center (SRTC)
15th Building, No.30 Shixing Street, Shijingshan District, Beijing, China
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1. General information

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company: The State Radio_monitoring_center Testing Center (SRTC)
Address: 15th Building, No.30 Shixing Street, Shijingshan District
Testing location: No.80, Zhaojiachang, Beizangcun, Daxing District.
City: Beijing
Country or Region: China
Contacted person: Liu Jia
Tel: +86-10-57996183
Fax: +86-10-57996388
Email: liujiaf@srtc.org.cn

1.3 Applicant's details

Company: BlueRadios, Inc.
Address: 8310 S. Valley Highway, Suite 275, USA
City: Englewood
Country or Region: USA
Contacted person: Mark Kramer
Tel: 303-957-1003
Fax: 303.845.7134
Email: mkramer@blueradios.com

1.4 Manufacturer's details

Company: BlueRadios, Inc.
Address: 8310 S. Valley Highway, Suite 275,USA
City: Englewood
Country or Region: USA
Contacted person: Mark Kramer
Tel: 303-957-1003
Fax: 303.845.7134
Email: mkramer@blueradios.com

1.5 Application details

Date of reception of test sample: 25th Jan. 2019

Date of test: 25th Jan. 2019 to 31th Jan. 2019

1.6 Reference specification

Specification	Version	Title
Draft ETSI EN 301 489-1	V 2.2.0	Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
Draft ETSI EN 301 489-17	V3.2.0	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

1.7 Information of EUT

1.7.1 General information

Name of EUT	nBlue Bluetooth® 5.0 Module
Model of EUT	BR-LE5.0-S1A
Operating Frequency Range	Bluetooth: 2.4~2.48GHz
Power Supply	USB
Test condition of declaration	Normal
Telecommunication Center	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
IMEI	/

1.7.2 EUT details

Internal Control Number	DESCRIPTION	Marketing Name	Model	HW Hardware status	SW Software status
EUT	Bluetooth	nBlue Bluetooth® 5.0 Module	BR-LE5.0-S1A	OD	OD

1.7.3 Auxiliary equipment details

Internal Control Number	Description	Model	PN	Manufacturer
AE1	PCB	/	/	/
AE2	CHARGER	STC-A505D-A	/	AOHAI

Note1: Not for sale.

Note2: AE2 was selected by testing laboratory and was only cooperated with this test.
See details in Annex C Pic1 to Pic3

1.7.4 Operating mode

EUT operating mode no.	Description of operating mode	Additional information
Op.1	Bluetooth Link	Force the EUT to transmit Bluetooth signal

1.7.5 Performance criteria

Performance criteria for Continuous phenomena applied to Transmitters (CT)

Performance criteria for Transient phenomena applied to Transmitters (TT)

Performance criteria for Continuous phenomena applied to Receiver (CR)

Performance criteria for Transient phenomena applied to Receiver (TR)

Bluetooth Mode Refer to Clause 6 in ETSI EN 301 489-17 V3.2.0

Observation of the following functions	CT	CR	TT	TR
Performance criteria	A	A	B	B
NOTE: For TT and TR, for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.				

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases, the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases, the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

2. Test information

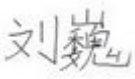
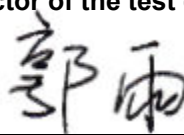
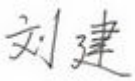
2.1 Summary of the test results

2.1.1 Emission test

Emission Phenomenon	Port	Results
Radiated Emission 30MHz~6000MHz	Enclosure	Complied

2.1.2 Immunity test

Immunity Phenomenon	Port	Results
RF-electromagnetic Field 80MHz~6000MHz	Enclosure	Complied
Electrostatic discharge (ESD)	Enclosure	Complied

Approved By: Mr. Liu Wei Director of the test department 	Checked By: Mr. Guo Yu Vice director of the test department 
Tested By: Mr Liu Jian Test engineer 	Issued date: <p style="text-align: center;">2019.02.20</p>

2.2 Test items

2.2.1 Emission: Radiated emission (Enclosure)

Clause 8.2 in ETSI EN 301 489-1 V 2.2.0

Clause 7.1 in ETSI EN 301 489-17 V3.2.0

2.2.1.1 Ambient condition

Temperature	Relative humidity	Pressure
24.2°C	39.1%	101.2kPa

2.2.1.2 Operating Modes

Worst cases: Op1

2.2.1.3 Test configuration

position

■table top: 80cm distance to ground plane. In semi anechoic chamber

grounding:

- ☐with power supply
- none
- ☐direct connecting

link to test system(if used)

- ☐air link
- cable connection

See details in Annex B Pic1.

2.2.1.4 Limit (Measurement distance 10m)

Frequency range	Limits
30MHz to 230MHz	30dBμV/m
230MHz to 1000MHz	37dBμV/m

Frequency range	Limits	
	Average Limit	Peak Limit
1000MHz to 3000MHz	50dBμV/m	70dBμV/m
3000MHz to 6000MHz	54dBμV/m	74dBμV/m

2.2.1.5 Test result

Note1: The test results beyond the limit or below the limit within 6dB are recorded in the test report, otherwise NF is used.

NF stands for “NOT FOUND”

For transmitter or transmitter section of transceiver (Bluetooth), the exclusion band is from 2.402GHz-2.480GHz;

Op1

Frequency MHz	Quasi Peak (dB μ V/m)	Margin (dB)
NF		

Please refer to Pic1 and Pic2 of Annex A for details

2.2.1.6 Uncertainty

30 MHz~200MHz 4.73dB
200 MHz~1000MHz 4.73dB
1000MHz~6000MHz 4.58dB

(For Test Equipments used see test equipment listing Annex D)

2.2.2 Immunity: RF-electromagnetic Field (enclosure)

Clause 9.2 in ETSI EN 301 489-1 V 2.2.0

Clause 7.2 in ETSI EN 301 489-17 V3.2.0

2.2.2.1 Ambient condition

Temperature	Relative humidity	Pressure
24.2°C	39.1%	101.2kPa

2.2.2.2 Operating Modes

Worst cases: Op1

2.2.2.3 Test configuration

The distance between turntable-axis and TX-antenna-tip is 3m.

position:

■table top: 80cm distance to reference ground plane

□floor standing: 10cm distance to reference ground plane

grounding:

□with power supply

■none

□direct connecting

link to test system(if used)

□air link

■cable connection

Observation:

-Electric: Link-mode: Equipment signal transmission were observed with the ESW.

Test condition	Field strength	Start frequency	Stop frequency	Frequency step	Modulation
dwel time 3s	3V/m	80MHz	6000MHz	Log 1%	AM,1kHz, 80%(modulation depth)

Exclusion band for receiver or receiver section of receiver (Bluetooth) is from 2.402 GHz -2.480GHz.

For transmitter or transmitter section of transceiver (Bluetooth), the exclusion band is from 2.402 GHz -2.480GHz.

.See details in Annex B Pic2.

2.2.2.4 Test result

Observation of the following functions	CT	CR
TCH/Link mode		
RXQUAL	---	---
TCH/Link mode maintained	X	X
No loss of user control function	X	X
No loss of stored data	---	---
Idle mode		
No unintentionally operate	X	---
No loss of user control function	X	X
No loss of stored data	---	---

Observation of the following functions	Operating Mode	CT	CR
Performance criteria	Op1	A	A

Operating Mode	Polarization	RESULT
Op1	H	Complied
	V	Complied

Before the test, the level of the transmission signal was 67.41dBuV, which was measured by EMI receiver. After and during the test, the EUT operated as intended with no loss of user control functions, and the communication link had been maintained. After the test, the level of the transmission signal was 67.26dBuV.

When the test is performed in idle mode, the transmitter is no unintentionally operating. The test result is complied.

The test result is complied.

2.2.2.5 Uncertainty

1.48dB

(For Test Equipments used see test equipment listing Annex D)

2.2.3 Immunity: Electrostatic discharge (enclosure)

Clause 9.3 in ETSI EN 301 489-1 V 2.2.0

Clause 7.2 in ETSI EN 301 489-17 V3.2.0

2.2.3.1 Ambient condition

Temperature	Relative humidity	Pressure
24.2°C	39.1%	101.2kPa

2.2.3.2 Operating Mode

Worst cases: Op1

2.2.3.3 Test configuration

position:

■table top: 80cm distance to reference ground plane

□ floor standing:10cm distance to reference ground plane

grounding:

□with power supply

■None

□direct connecting

link to test system(if used)

□air link

■Cable connection

See details in Annex B Pic3

2.2.3.4 Test result

10 single impulses at each test point and for each test voltage

The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second.

Observation of the following functions	TT	TR
TCH/Link mode		
RXQUAL	---	---
TCH/Link mode maintained	X	X
No loss of user control function	X	X
No loss of stored data	---	---
Idle mode		
No unintentionally operate	X	---
No loss of user control function	X	X
No loss of stored data	---	---

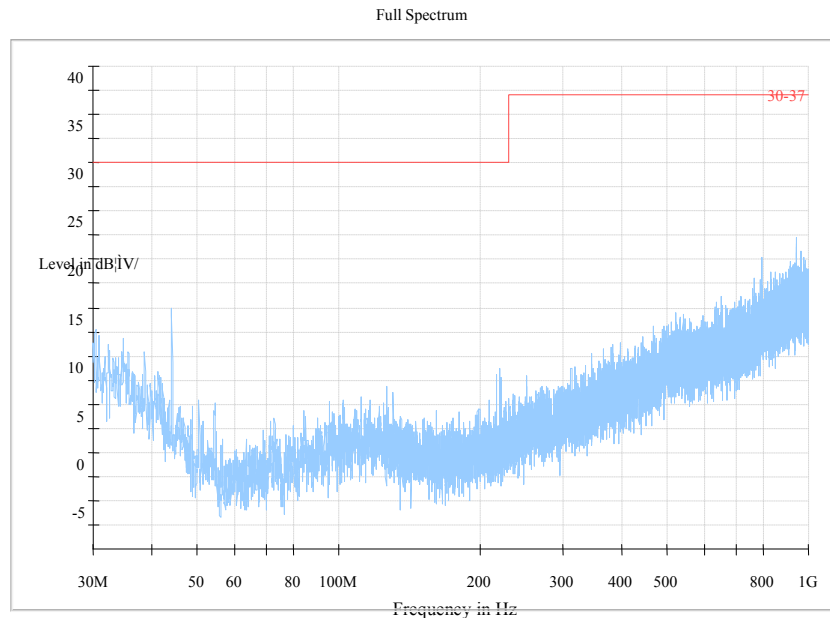
Observation of the following functions	Operating Mode	TT	TR
Performance criteria	Op1	B	B

Operating Mode	Test voltage	Direct Application		Indirect Application
		Air discharge	Contact discharge	Contact discharge
		Reaction of EUT/ results	Reaction of EUT/ results	Reaction of EUT/ results
Op1	+2kV	N/A	N/A	Complied
	-2kV	N/A	N/A	Complied
	+4kV	N/A	N/A	Complied
	-4kV	N/A	N/A	Complied
	+8kV	N/A	N/A	N/A
	-8kV	N/A	N/A	N/A

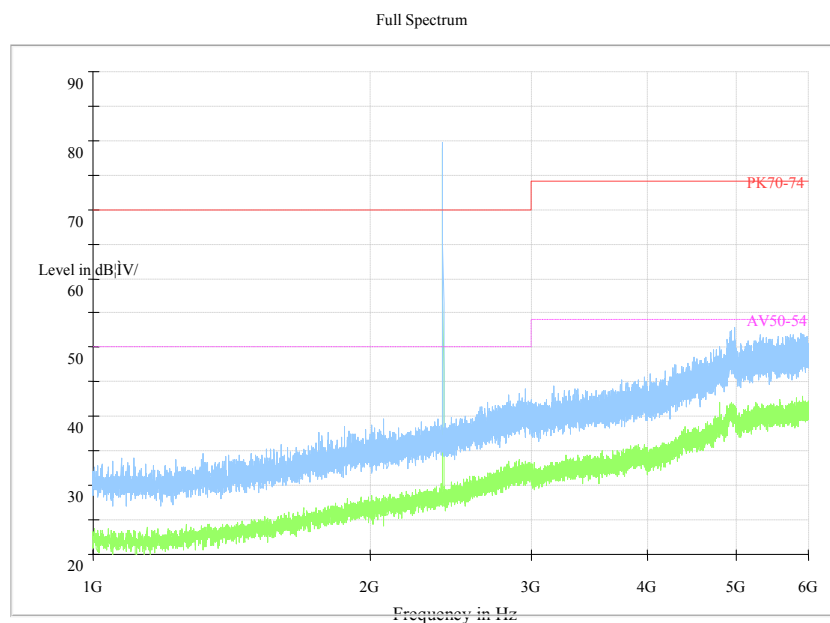
After and during the test, the EUT operated as intended with no loss of user control functions, and the communication link had been maintained. When the test is performed in idle mode, the transmitter is no unintentionally operating.

(For Test Equipments used see test equipment listing Annex D)

Annex A. Test results figures



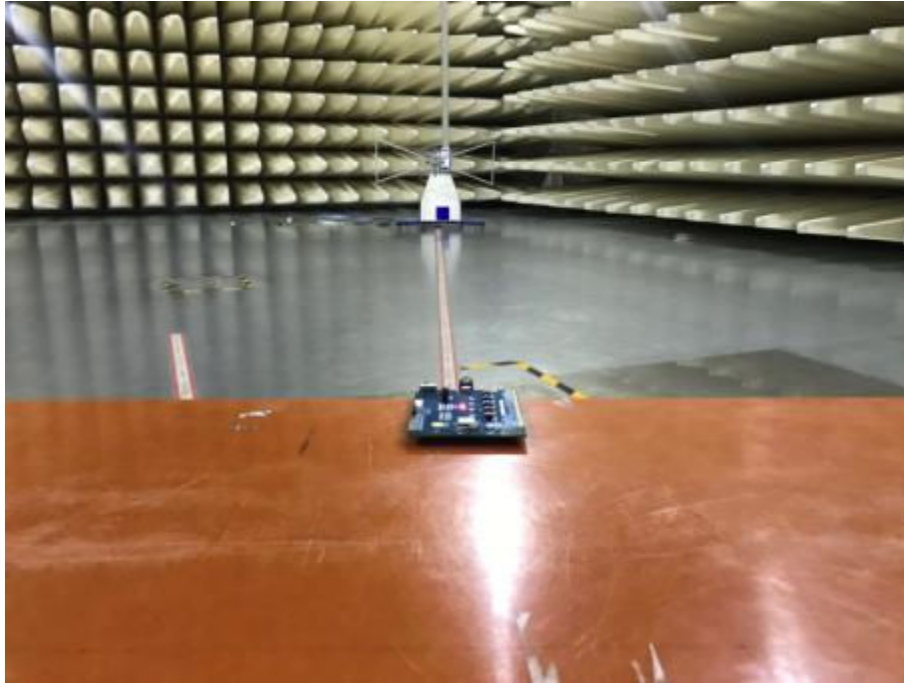
Pic1 Radiated emission Op1



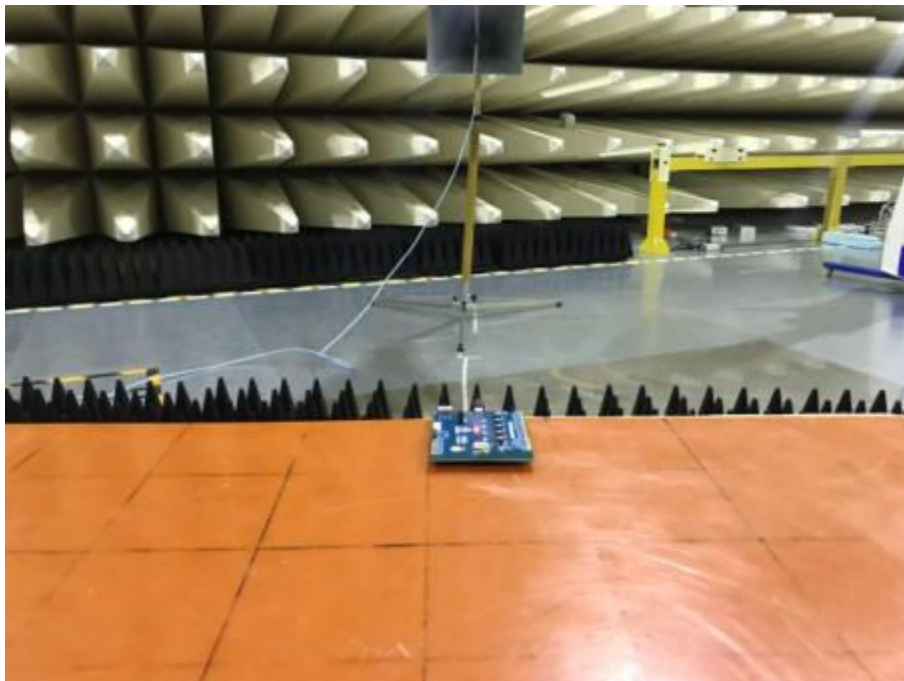
Pic2 Radiated emission Op1

NOTE: The Signals, which overtop the limit, line in the figures at the frequencies around 2.440GHz are the carrier waves of the EUT.

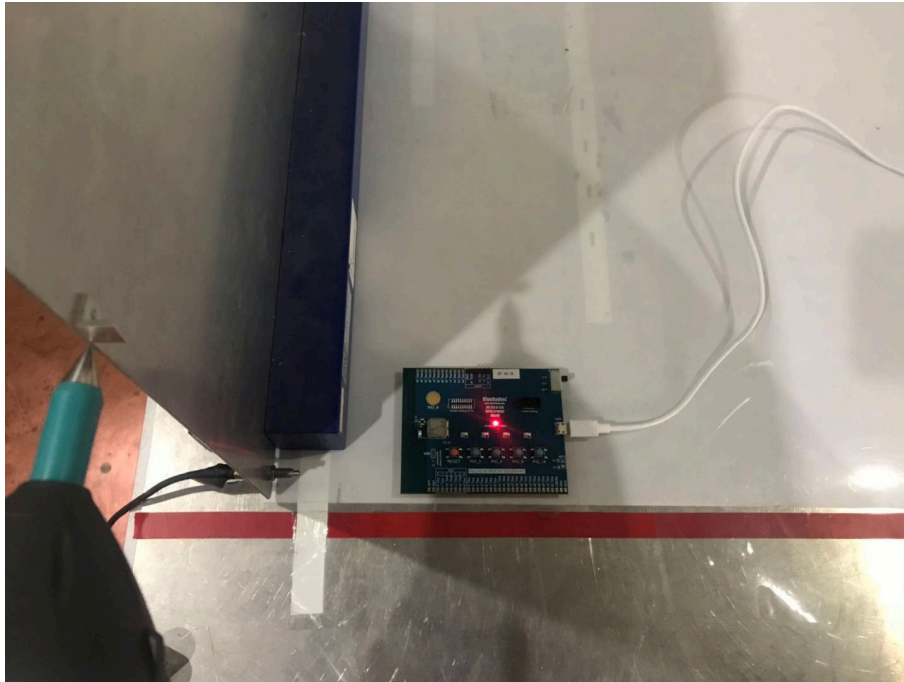
Annex B. Pictures for test set up



Pic1 Radiated emission Test Configuration

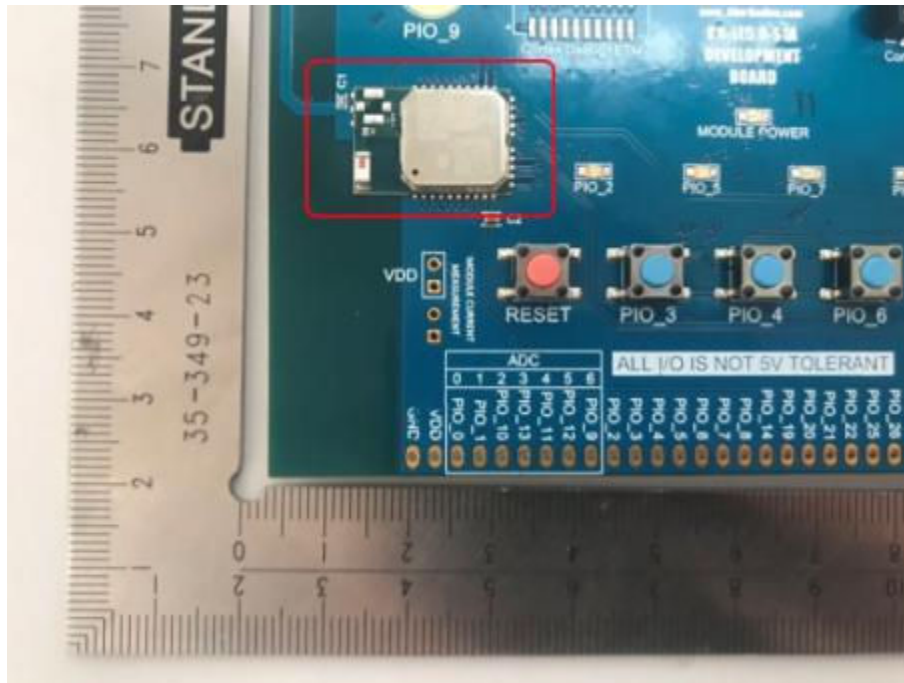


Pic2 RF-electromagnetic Field (enclosure) Test Configuration

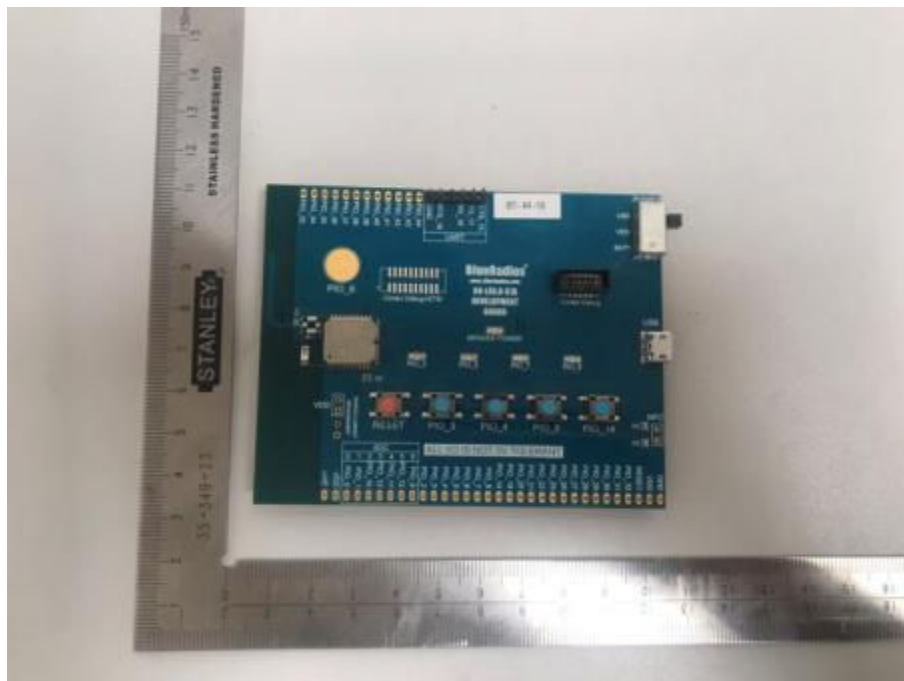


Pic3 ESD Test Configuration

Annex C. Pictures for EUT



Pic1 The front view of EUT



Pic2 The front view of AE1



Pic3 The rear view of AE1

Annex D. List of test equipments

NO.	Name	Model	Serial number	Calibration Date	Calibration Due Date
001	Semi-Anechoic Chamber	SAC: 23.18m×16.88m×9.60m	---	2016.9.5	2021.9.4
002	Turn table	Diameter:5m	---		---
003	Antenna master	SAC(MA4.0)	---		---
004	EMI test receiver	ESW	101574	2018.8.20	2019.8.19
005	Signal generator	SMB100A	179904	2018.8.20	2019.8.19
006	Radio tester	CMW 500	160132	2018.8.20	2019.8.19
007	Double-Ridged Waveguide Horn Antenna	HF 907	100512	2018.8.20	2019.8.19
008	Ultra log test antenna	HL562	100167	2018.8.20	2019.8.19
009	High Gain Log-Periodic Antenna	HL046	359952/002	2018.8.20	2019.8.19
010	Horn Antenna	9120E	391	2018.8.20	2019.8.19
011	ESD generator	ESS-S3011	ESS1519973	2018.8.20	2019.8.19

-----THE END-----