
TEST REPORT

Report No.: SRTC2019-9003(F)-0004
Product Name: nBlue Bluetooth® 5.0 Module
Model Name: BR-LE5.0-S1A
Applicant: BlueRadios, Inc.
Manufacturer: BlueRadios, Inc.
Specification: FCC Part15B (Certification)
(2019 edition)
FCC ID: XDULE50-S1A

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District,

Beijing, China

Tel: 86-10-57996183 Fax: 86-10-57996388

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1. General information

1.1 Notes of the test report

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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

FCC Part 15B, 2019 (Certification)

1.7 Information of EUT

1.7.1 General information

Name of EUT	nBlue Bluetooth® 5.0 Module
FCC ID	XDULE50-S1A
Frequency Range	Bluetooth: 2.4~2.48GHz
Equipment Class	Class B
Antenna Type	Fixed Internal Antenna
Power Supply	USB
Rated Power Supply Voltage	3.3V
Extreme Temperature	Lowest: -40°C Highest: +85°C
Extreme Voltage	Minimum: 1.7V Maximum: 3.6V
HW Version	OD
SW Version	OD

1.7.2EUT details

Product Name	Model Name	IMEI
nBlue Bluetooth® 5.0 Module	BR-LE5.0-S1A	/

1.7.3 Auxiliary equipment details

AE (Auxiliary Equipment) 1#: PCB

Manufacturer	/
Model Number	/
S/N	/
Input Voltage	5V
Frequency	/

AE (Auxiliary Equipment) 2#: charger

Manufacturer	AOHAI
Model Number	STC-A505D-A
S/N	/
Input Voltage	AC100-240V
Frequency	50/60

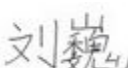

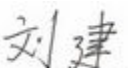
Note1: Not for sale.

Note2: AE2 was selected by testing laboratory and was only cooperated with this test, not for sale.

2. Test information

2.1 Summary of the test results

No.	Test case	FCC reference	Verdict
1	Conducted emissions	15.107	Pass
2	Radiated emissions	15.109	Pass

Approved by Mr. LiuWei 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: 2019.02.20

2.2 Test result

2.2.1 Conducted Emissions-FCC Part15.107

Ambient condition:

Temperature	Relative humidity	Pressure
23.8°C	37.9%	101.2kPa

Test Setup with charger:

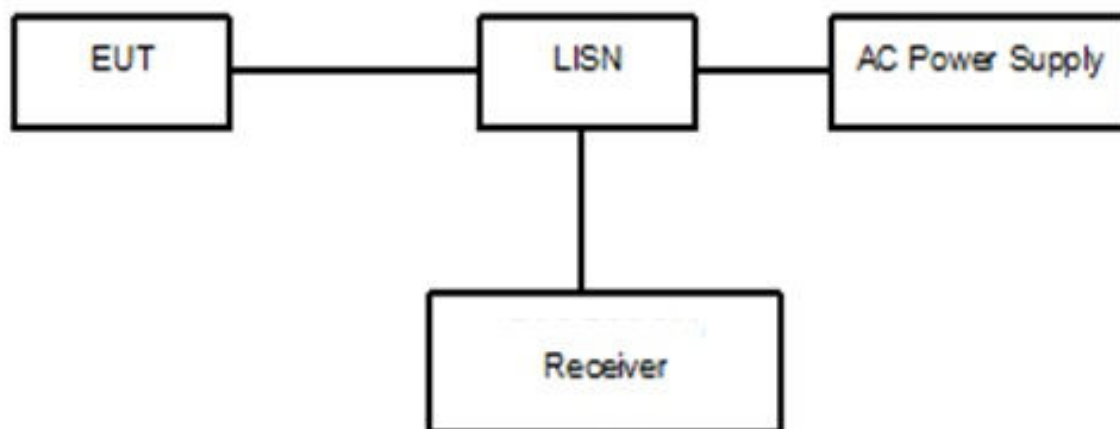


Figure 1

Test Procedure:

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The EUT is connected with LISN via the charger. The LISN is connected to the reference ground.

The test set-up and the test methods are performed according to ANSI C63.4:2014. Then start the test software EMC32. Sweep the whole frequency band through the range from 150 KHz to 30 MHz with RBW 9KHz, VBW: 30kHz. The measurement should be done for both L line and N line. During pre-test, the receiver uses both peak detector and average detector. And the final test, the receiver uses both average detector and Quasi-peak detector.

The data of cable loss has been calibrated in full testing frequency range before the testing.

The “reference path loss”, using Corr. as symbol, includes the cable loss, the attenuation of the attenuator and the voltage division factor of AMN.

The measurement results are obtained as described below:

Result= Reading + Corr.

Sample calculation: $(20.26 \text{ dB}\mu\text{V}) = (-9.64 \text{ dB}\mu\text{V}) + (29.9 \text{ dB})$, the corresponding frequency is 1.457068MHz.

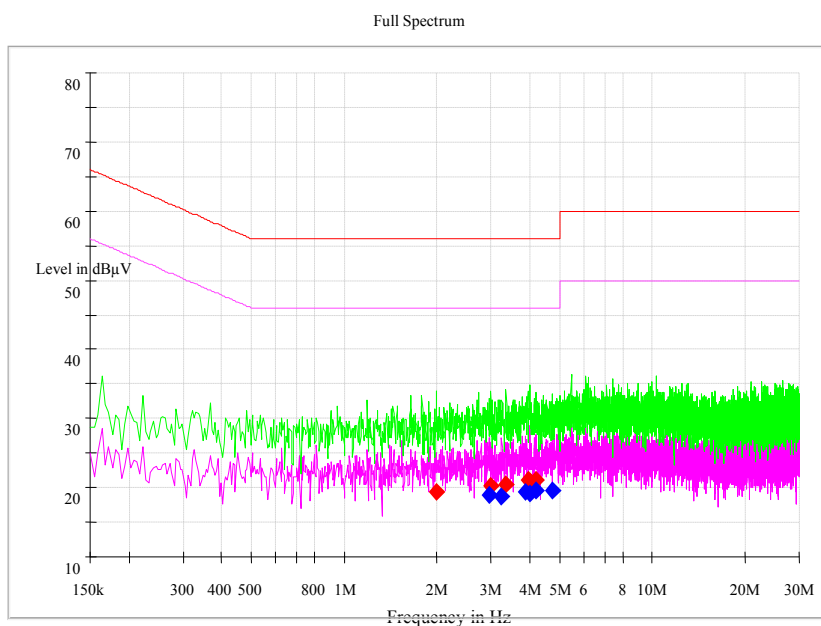
Limit:

Frequency of Emission(MHz)	Limits(dB μ V)	
	Quasi-peak	Average
0.15~0.5	66 to 56*	56 to 46*
0.5~5	56	46
5~30	60	50

Note: * Decreases with the logarithm of the frequency

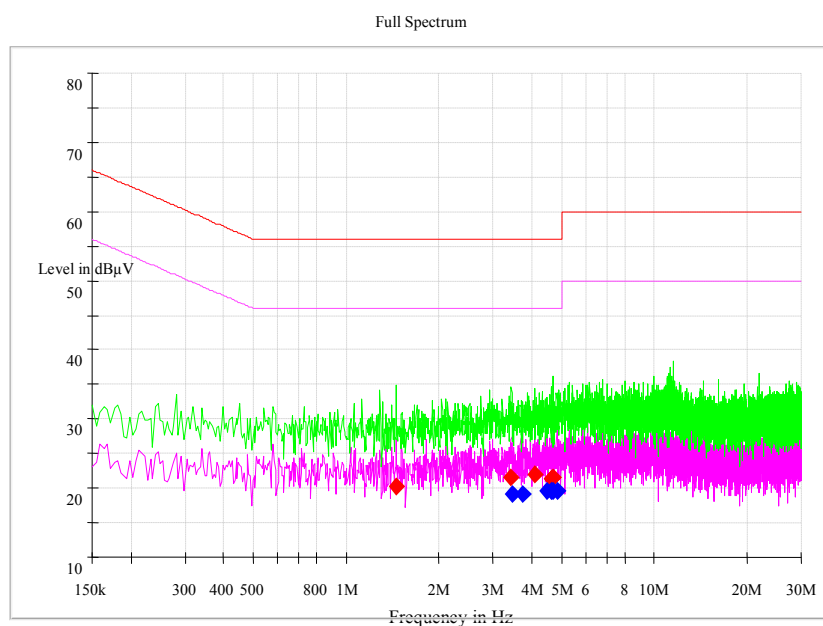
Test result:

Noise Level of the Measuring Instrument



Pic1.Conducted emission L and N Line

EUT+ charger



Pic2. Conducted emission L+N Line

MEASUREMENT RESULT:

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	MaxPeak Reading (dBμV)	Average Reading (dBμV)	Limit (dBμV)	Line	Corr. (dB)
1.457068	20.26	---	-9.64	---	56.00	L1	29.9
3.438023	21.53	---	-8.37	---	56.00	L1	29.9
3.442545	---	19.20	---	-10.7	46.00	L1	29.9
3.727477	---	19.22	---	-10.68	46.00	N	29.9
4.107386	21.99	---	-7.91	---	56.00	L1	29.9
4.469205	---	19.50	---	-10.4	46.00	L1	29.9
4.618455	21.43	---	-8.47	---	56.00	L1	29.9
4.636545	---	19.54	---	-10.36	46.00	N	29.9
4.636545	21.38	---	-8.52	---	56.00	N	29.9
4.677250	---	19.56	---	-10.34	46.00	L1	29.9
4.677250	21.46	---	-8.44	---	56.00	L1	29.9
4.826500	---	19.58	---	-10.32	46.00	L1	29.9

2.2.2 Radiated Emissions-FCC Part15.109

Ambient condition:

Temperature	Relative humidity	Pressure
23.8°C	37.9%	101.2kPa

Test Setup:

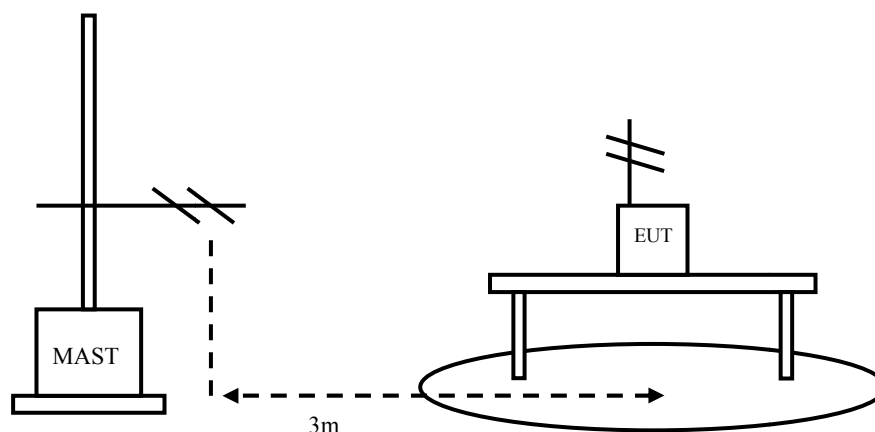


Figure 2

Test Procedure:

EUT+Charger:

The EUT should be placed on a non-metallic table 80cm above the ground plane. The receive antennas shall be moved from 1 to 4 meters. The distance between EUT and receive antenna should be 3 meters.

The EUT should work in idle mode. The test set-up and the test methods are performed according to ANSI C63.4:2014.

Then start the test software EMC 32. Sweep the whole frequency band through the range from 30MHz to 1GHz, using receive log period antenna HL562.

During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The EUT is laid in two modes as follow:
1. put the EUT in horizontal direction; 2. put the EUT in vertical direction.

The data of cable loss and antenna factor have been calibrated in full testing frequency range before the testing.

RBW=120kHz, VBW=300kHz, when the test frequency: $30\text{MHz} < f < 1\text{GHz}$
RBW=1MHz, VBW=3MHz, when the test frequency: $f > 1\text{GHz}$

The “reference path loss”, using A_{Rpl} as symbol, includes the factor of receive antenna, the gain of the preamplifier and the cable loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{mea}} + A_{Rpl}$$

Sample calculation: $(11.48 \text{ dBuV/m}) = (27.48 \text{ dBuV}) + (-16.0 \text{ dB/m})$, the corresponding frequency is 35.617917MHz.

Limit:

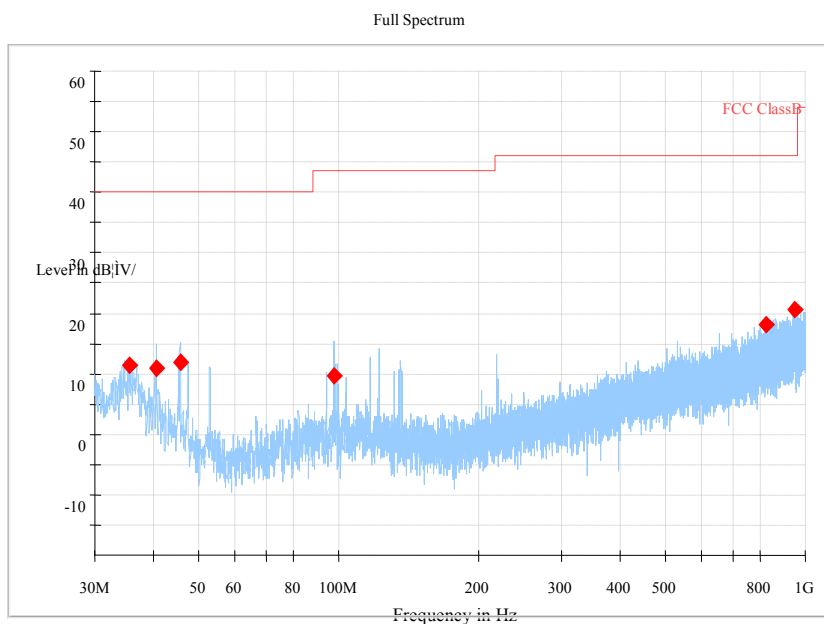
Frequency of Emission(MHz)	Limits	
	Detector	Unit (dB μ V/m)
30~88	Quasi-peak	40
88~216	Quasi-peak	43.5
216~960	Quasi-peak	46
960~1000	Quasi-peak	54
1000~5th harmonic of the highest frequency or 40GHz, whichever is lower	Average Peak	54 74

Test result:

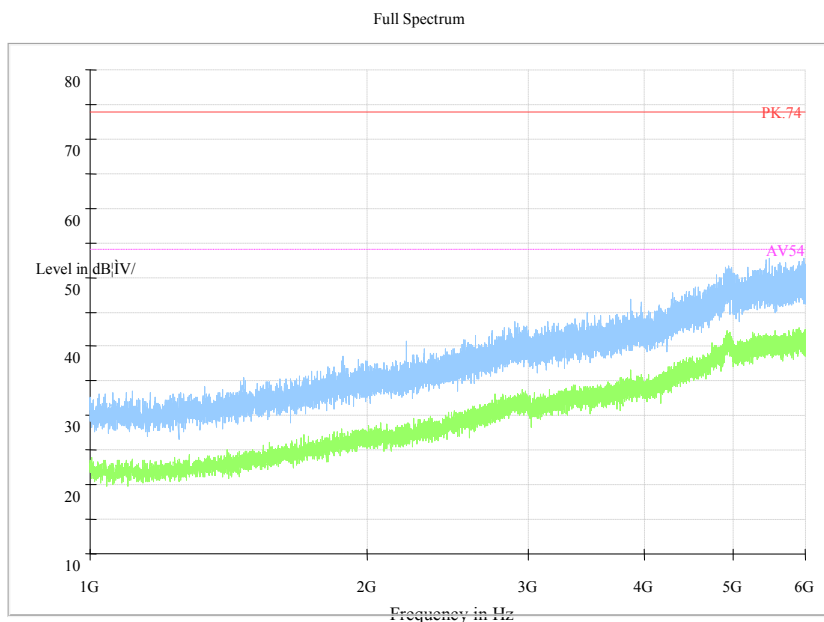
EUT+ charger

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity
35.617917	11.48	-16.0	27.48	V
40.670000	10.80	-18.4	29.2	V
45.681667	11.87	-21.4	33.27	V
97.576667	9.71	-21.9	31.61	V
826.774167	18.20	-5.9	24.1	H
948.266667	20.67	-4.2	24.87	H

EUT+ charger:



Pic3. Radiated emission(30MHz – 1GHz)



Pic4. Radiated emission (1GHz – 6GHz)

2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Due Date	Calibration Date
1	23.18m×16.88m×9.60mS emi-AnechoicChamber	FRANKONIA	-----	20th Aug. 2019	20th Aug. 2018
2	ESW EMI test receiver	R&S	101574	20th Aug. 2019	20th Aug. 2018
3	E5515C(8960) Mobile Station Tester	Agilent	GB4405090 4	20th Aug. 2019	20th Aug. 2018
4	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	20th Aug. 2019	20th Aug. 2018
5	ESR EMI test receiver	R&S	102361	20th Aug. 2019	20th Aug. 2018
6	HL562Ultra log test antenna	R&S	100016	20th Aug. 2019	20th Aug. 2018
7	ENV216 AMN	R&S	3560.6550. 12	20th Aug. 2019	20th Aug. 2018
8	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	25 th May. 2019	25 th May. 2018
9	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	20th Aug. 2019	20th Aug. 2018
10	PS2000 Turn Table	FRANKONIA	-----	20th Aug. 2019	20th Aug. 2018
11	MA260 Antenna Master	FRANKONIA	-----	20th Aug. 2019	20th Aug. 2018
12	EMC32EMI test software	R&S	-----	20th Aug. 2019	20th Aug. 2018
13	HL562 Receive antenna	R&S	100167	20th Aug. 2019	20th Aug. 2018