TEST REPORT

Applicant:	Nebra Ltd
Address of Applicant:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Kent, TN3 9BJ, United Kindgom

Equipment Under Test (EUT)

Product Name:	JustBoom DAC Cape
Model No.:	v1.0
Applicable standards:	AS/NZS 61000.6.3:2012
Date of sample receipt:	20 May, 2019
Date of Test:	21 May, to 18 Jun., 2019
Date of report issue:	21 Jun., 2019
Test Result:	PASS*

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/30/EU are considered.

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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2 Version

Version No.	Date	Description
00	*21 Jun., 2019*	*Original*

Tested by: Yoyo Wu ***Date:*** *21 Jun., 2019*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *21 Jun., 2019*

Project Engineer

3 Contents

4 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission	AS/NZS 61000.6.3	AS/NZS 61000.6.3	See Table 1	PASS
Conducted Emission	AS/NZS 61000.6.3	AS/NZS 61000.6.3	See Table 1	N/A

Remark:
** UT is the nominal supply voltage.*
Pass: Meet the requirements, N/A: not applicable.

5 General Information

5.1 Client Information

Applicant:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Kent, TN3 9BJ, United Kindgom
Manufacturer:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Kent, TN3 9BJ, United Kindgom
Factory	Sunsoar Tech Co. Ltd
Address:	9F, A block, Nanchang Huafeng The Second Industrial Zone, Hangkong Road, Xixiang Town, Bao'an District, Shenzhen City, China

5.2 General Description of E.U.T.

Product Name:	JustBoom DAC Cape
Model No.:	v1.0
Hardware version:	v1.0
Software version:	v1.0
Power supply:	5V

5.3 Test mode and voltage

On mode:	Keep the EUT in working mode
Test voltage:	AC 240V/50Hz

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
BeagleBoard.org	BeagleBone Black	BeagleBone Black	N/A	N/A
JUKE	AC/DC Adapter	JK050300-S04JP	N/A	N/A

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB
Radiated Emission (30MHz ~ 1000MHz)	±4.54 dB
Radiated Emission (1GHz ~ 18GHz)	±5.84 dB
Radiated Emission (18GHz ~ 26.5GHz)	±3.36 dB

5.6 Description of Cable Used

Cable Type	Description	Length	From	To
N/A	N/A	N/A	N/A	N/A

5.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.8 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

5.9 Test Instruments list

Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Simulated Station	Anritsu	MT8820C	6201026545	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020

6 Test Results

6.1 EMI (Emission)

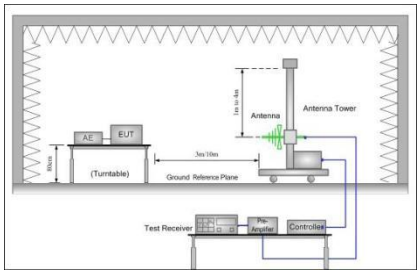
6.1.1 Radiated Emission

Test Requirement:	AS/NZS 61000.6.3				
Test Method:	AS/NZS 61000.6.3				
Test Frequency Range:	30MHz to 6GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	QP Value
	Above 1GHz	Peak	1MHz	3MHz	PK Value
		Average	1MHz	3MHz	AV Value

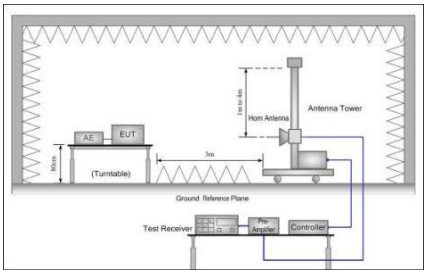
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-230MHz	40.0	QP Value
	230MHz-1GHz	47.0	QP Value
	1GHz-3GHz	50.0	AV Value
		70.0	PK Value
	3GHz-6GHz	54.0	AV Value
		74.0	PK Value

Test setup:

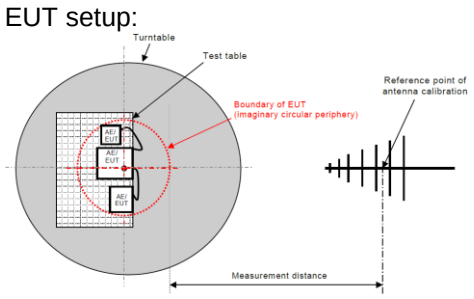
Below 1GHz:

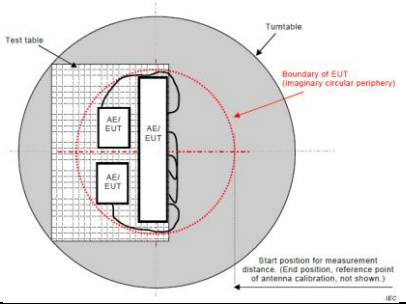


Above 1GHz:



EUT setup:





Test Procedure:

30MHz to 1GHz:

1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The table top EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.
4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

Above 1GHz:

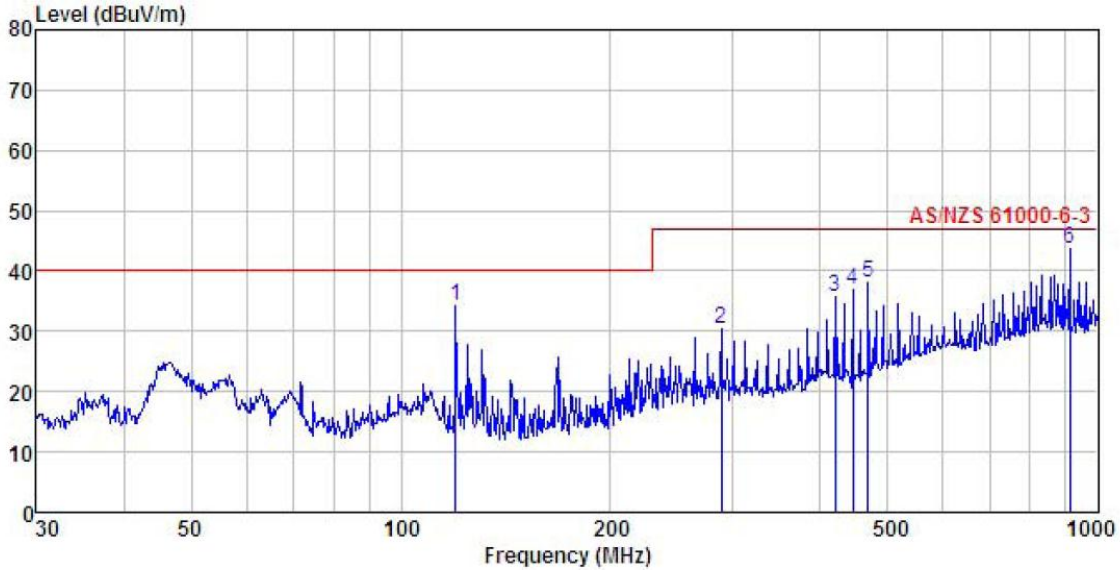
1. The radiated emissions test was conducted in a fully-anechoic chamber.
2. The table top EUT was placed upon anon-metallic table 0.8m above the

	ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Below 1GHz:

Product Name:	JustBoom DAC Cape	**Product Model:**	v1.0
Test By:	Yaro	**Test mode:**	On mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 240/50Hz	**Environment:**	Temp: 24℃ Huni: 57%

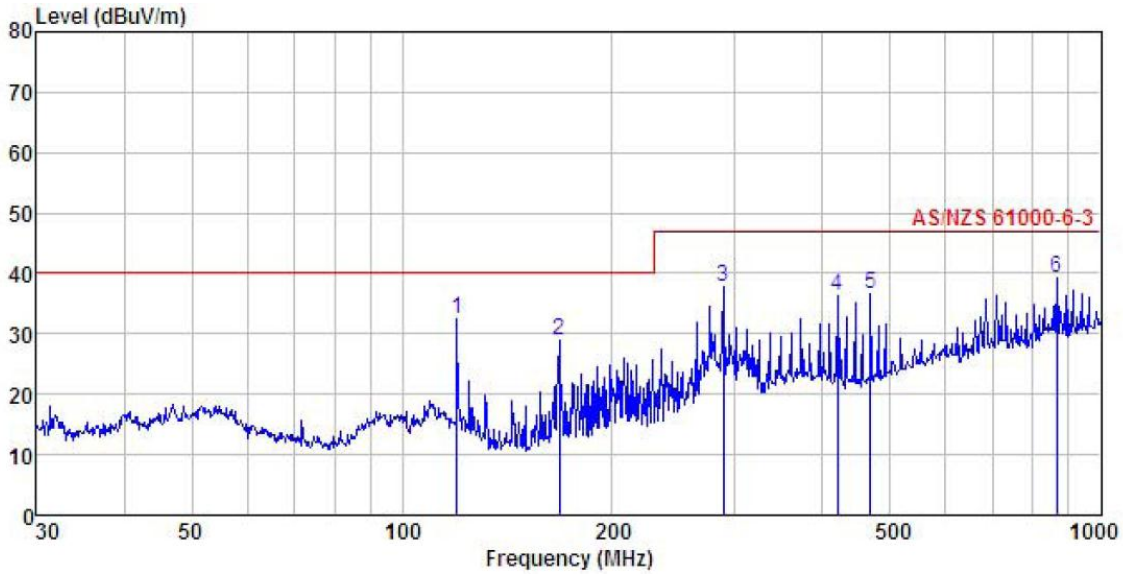


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	119.856	50.60	10.89	2.17	29.39	34.27	40.00	-5.73	QP
2	287.990	42.70	13.41	2.91	28.47	30.55	47.00	-16.45	QP
3	420.580	45.67	15.81	3.13	28.82	35.79	47.00	-11.21	QP
4	444.851	46.13	16.37	3.19	28.86	36.83	47.00	-10.17	QP
5	468.876	46.37	17.18	3.36	28.90	38.01	47.00	-8.99	QP
6	912.862	45.07	22.55	3.84	27.84	43.62	47.00	-3.38	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	JustBoom DAC Cape	Product Model:	v1.0
Test By:	Yaro	Test mode:	On mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 240/50Hz	Environment:	Temp: 24℃ Huni: 57%



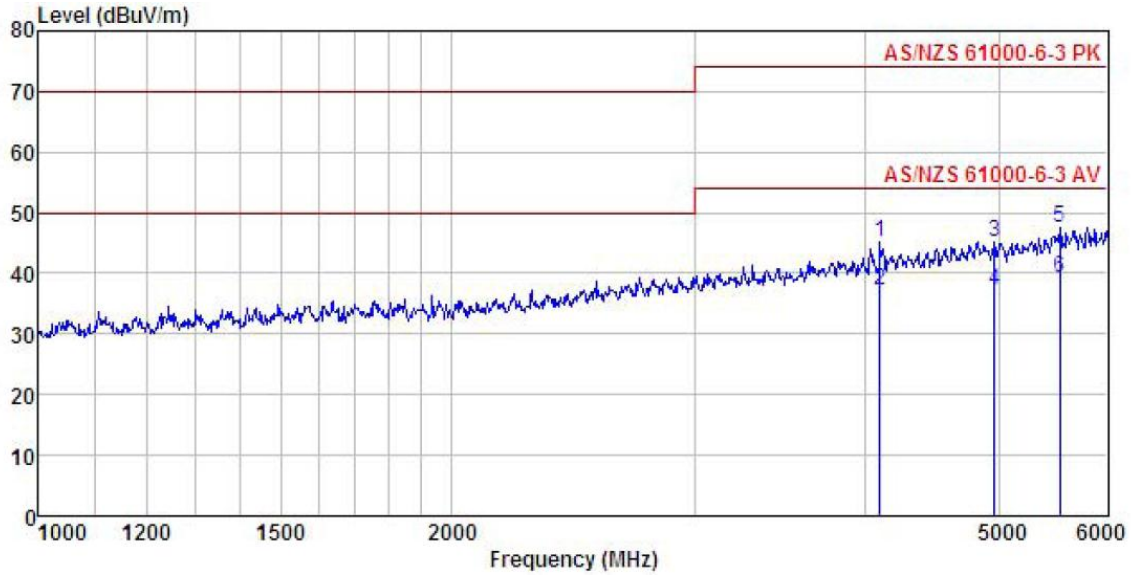
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	119.856	48.80	10.89	2.17	29.39	32.47	40.00	-7.53	QP
2	167.824	45.85	9.57	2.64	29.07	28.99	40.00	-11.01	QP
3	287.990	49.94	13.41	2.91	28.47	37.79	47.00	-9.21	QP
4	420.580	46.07	15.81	3.13	28.82	36.19	47.00	-10.81	QP
5	468.876	45.03	17.18	3.36	28.90	36.67	47.00	-10.33	QP
6	866.088	40.59	22.56	4.04	27.96	39.23	47.00	-7.77	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Above 1GHz:

Product Name:	JustBoom DAC Cape	**Product Model:**	v1.0
Test By:	Yaro	**Test mode:**	On mode
Test Frequency:	1 GHz ~ 6 GHz	**Polarization:**	Vertical
Test Voltage:	AC 240/50Hz	**Environment:**	Temp: 24℃ Huni: 57%

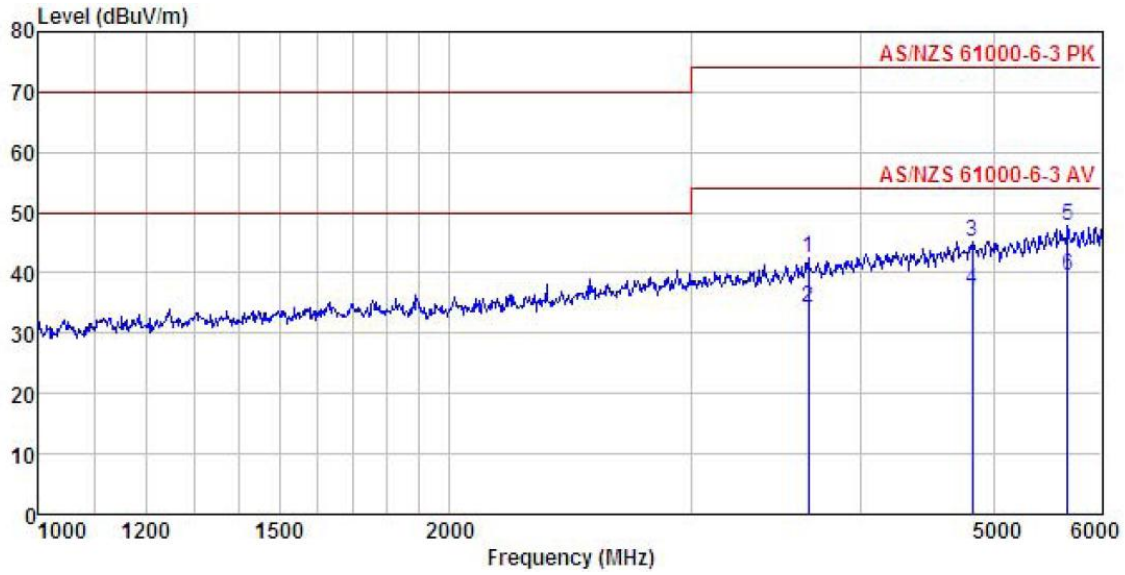


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4096.425	48.03	30.32	6.25	41.81	45.02	74.00	-28.98	Peak
2	4096.425	40.11	30.32	6.25	41.81	37.10	54.00	-16.90	Average
3	4962.120	46.44	31.32	6.91	41.87	45.29	74.00	-28.71	Peak
4	4962.120	38.33	31.32	6.91	41.87	37.18	54.00	-16.82	Average
5	5535.214	46.69	32.61	7.24	41.81	47.39	74.00	-26.61	Peak
6	5535.214	38.52	32.61	7.24	41.81	39.22	54.00	-14.78	Average

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	JustBoom DAC Cape	Product Model:	v1.0
Test By:	Yaro	Test mode:	On mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 240/50Hz	Environment:	Temp: 24℃ Huni: 57%



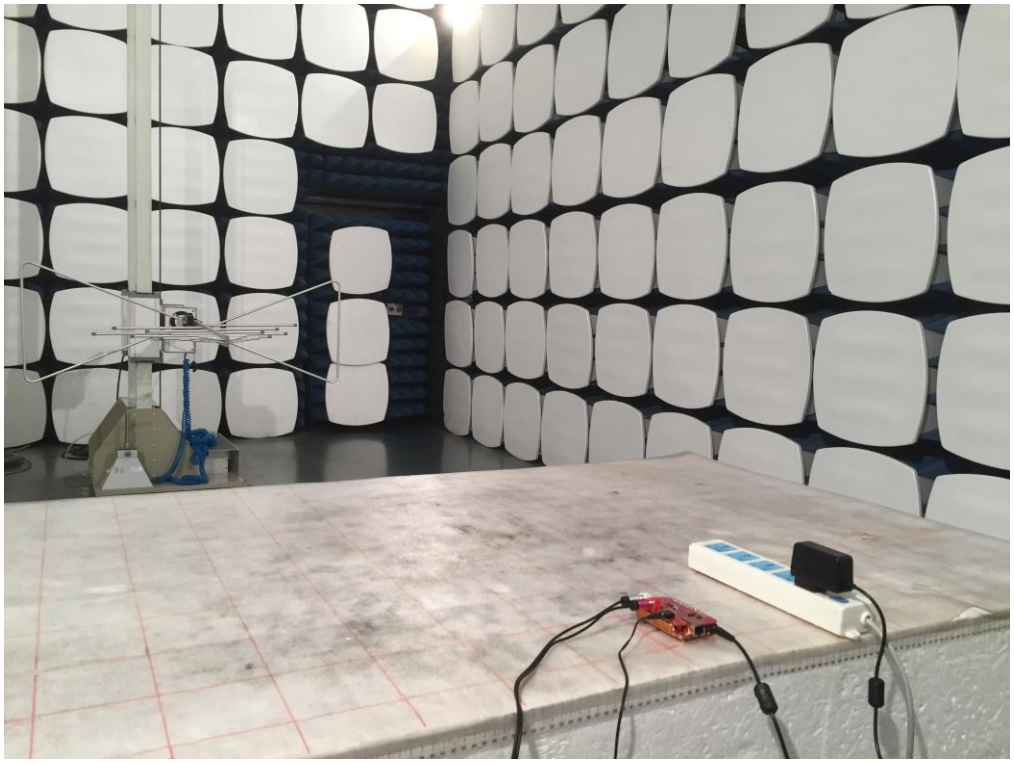
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	3659.161	46.72	29.17	5.95	41.62	42.42	74.00	-31.58	Peak
2	3659.161	38.63	29.17	5.95	41.62	34.33	54.00	-19.67	Average
3	4821.884	46.73	31.06	6.81	41.82	45.22	74.00	-28.78	Peak
4	4821.884	38.62	31.06	6.81	41.82	37.11	54.00	-16.89	Average
5	5665.659	46.94	32.63	7.50	41.87	47.90	74.00	-26.10	Peak
6	5665.659	38.67	32.63	7.50	41.87	39.63	54.00	-14.37	Average

Remark:

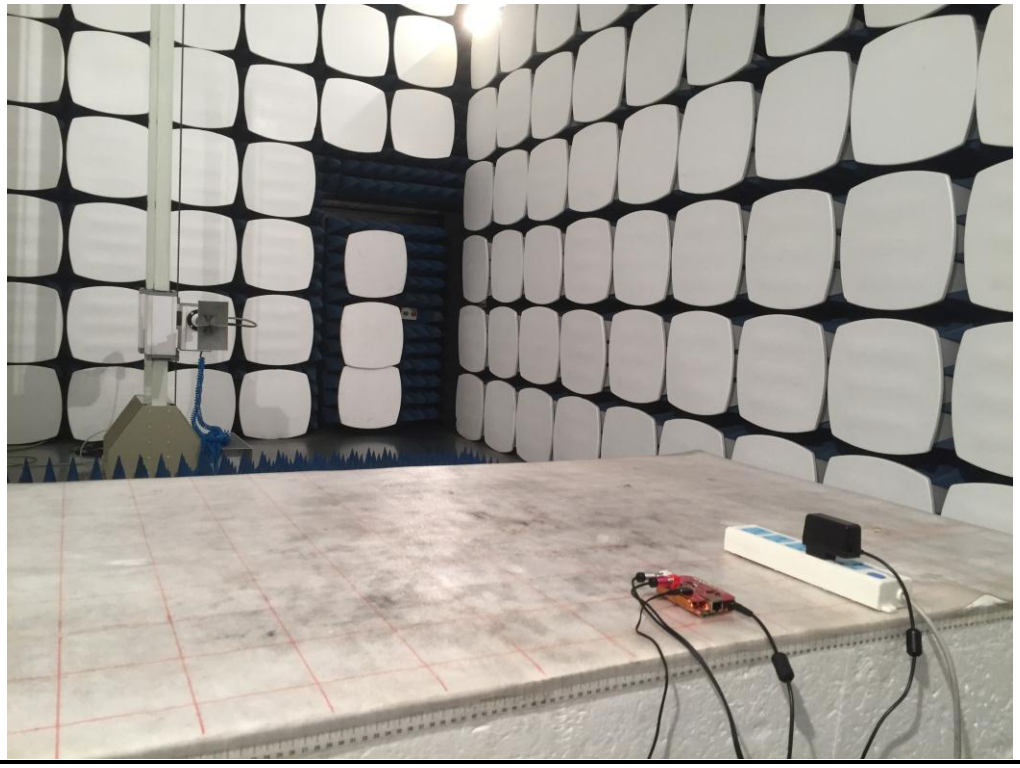
1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7 Test Setup Photo

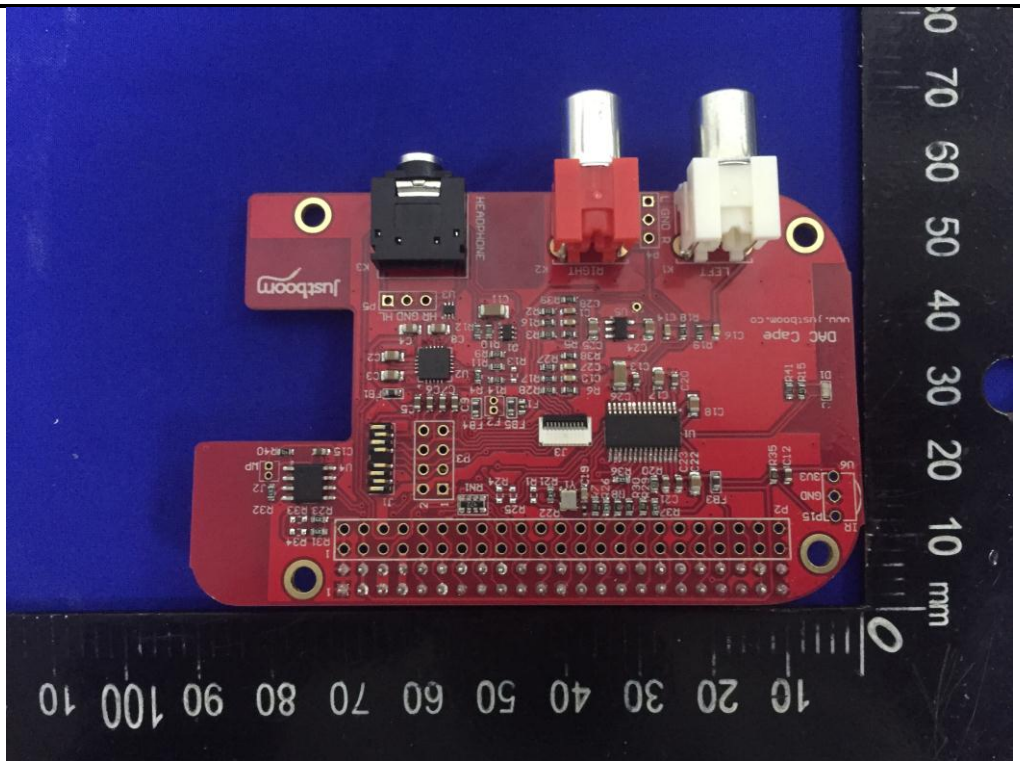
Radiated Emission Below 1GHz

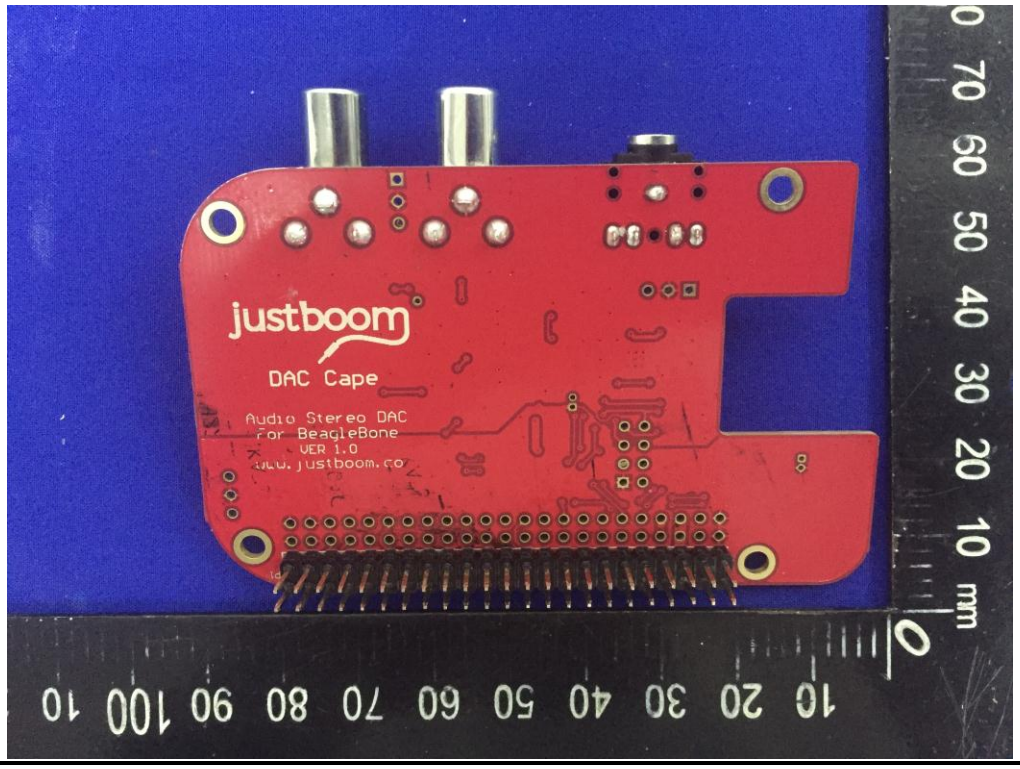


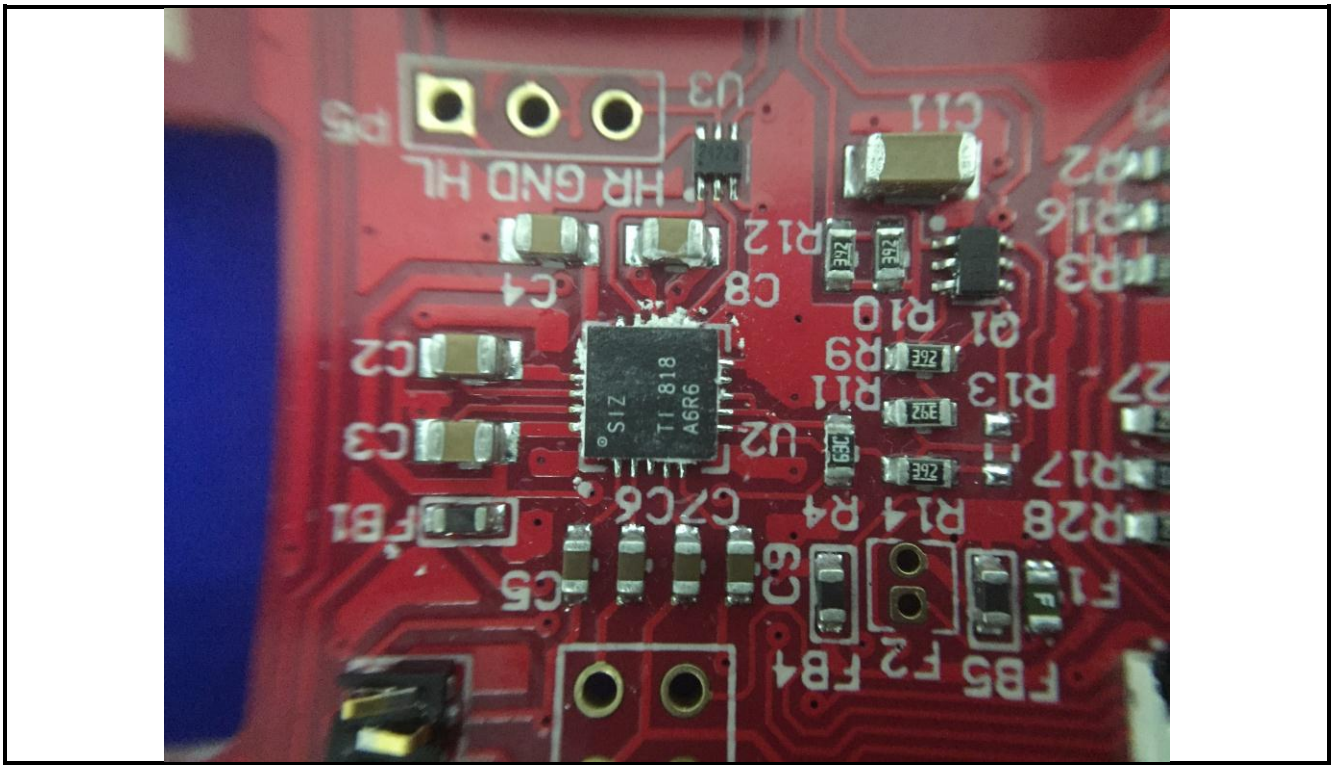
Radiated Emission Above 1GHz



8 EUT Constructional Details







------End of report------