

TEST REPORT

Applicant: Balena Ltd.

Address of Applicant: 6th Floor, One London Wall London, London, EC2Y 5EB
United Kingdom

Equipment Under Test (EUT)

Product Name: balenaFin

Model No.: v1.1

Trade mark: balenaFin

Applicable standards: EN 55032:2015
EN 55035:2017
EN 61000-3-2:2014, EN 61000-3-3:2013

Date of sample receipt: 23 Aug., 2019

Date of Test: 24 Aug., 2019 to 21 Aug., 2020

Date of report issue: 24 Aug., 2020

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	05 Aug., 2020	Original
01	24 Aug., 2020	Update Page 5, 24~29, 32~33

Tested by: Carey Chen
Test Engineer

Date: 24 Aug., 2020

Reviewed by: Winner Zhang
Project Engineer

Date: 24 Aug., 2020

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4 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission	EN 55032	EN 55032	Class B	PASS
Conducted Emission	EN 55032	EN 55032	Class B	PASS
Harmonic Emission	EN 61000-3-2	EN 61000-3-2	N/A	N/A
Flicker Emission	EN61000-3-3	EN61000-3-3	Clause 5 of EN 61000-3-3	N/A
ESD	EN 55035	EN61000-4-2:2009	Contact ± 4 Kv Air ± 8 kV	PASS
Continuous RF electromagnetic radiated field disturbances	EN 55035	EN61000-4-3: 2006+A1:2007+A2:2010	80MHz-1000MHz, 1800MHz,2600MHz, 3500MHz, 5000MHz: 3Vrms (emf), 80%, 1kHz Amp. Mod. Audio output function: 80MHz-1000MHz: 0dB	PASS
Electrical Fast Transients (EFT)	EN 55035	EN61000-4-4:2012	AC ± 1.0 kV	N/A
Surge	EN 55035	EN 61000-4-5: 2014+A1:2017	Line-line: ± 1 kV Line-earth: ± 2 kV	N/A
Continuous induced RF disturbances	EN 55035	EN61000-4-6: 2014+AC:2015	0.15-10MHz: 3V 10-30MHz: 3-1V 30-80MHz: 1V 80%, 1kHz, AM Audio output function: 0.15MHz-30MHz: -20dB, 30MHz-80MHz: -10dB	N/A
Power frequency magnetic field	EN 55035	EN 61000-4-8:2010	50/60 Hz 1A/m	N/A
Voltage Dips and Interruptions	EN 55035	EN61000-4-11: 2004+A1:2017	0 % U_T^* for 0.5per 0 % U_T^* for 250per 70 % U_T^* for 25per	N/A
Remark: 1. U_T is the nominal supply voltage. 2. Pass: Meet the requirements. 3. N/A: not applicable.				

5 General Information

5.1 Client Information

Applicant:	Balena Ltd.
Address:	6th Floor, One London Wall London, London, EC2Y 5EB United Kingdom
Manufacturer:	Balena Ltd.
Address:	6th Floor, One London Wall London, London, EC2Y 5EB United Kingdom
Factory:	Fae Technology S.p.a.
Address:	Via C. Battisti, 136 Gazzaniga (BG) 24025 - Italia

5.2 General Description of E.U.T.

Product Name:	balenaFin
Model No.:	v1.1
Hardware version:	v10
Software version:	v2.51
Power supply:	DC6V-30V

5.3 Test mode and voltage and test samples plans

Working:	Keep the EUT in Working mode
LAN:	Keep the EUT in LAN Link mode
Test voltage:	AC 230V/50Hz
Remark:	1. During the test, pre-scan 120Vac/60Hz and 230Vac/50Hz of the Power supply, found 230Vac/50Hz was worse case mode. 2. The report only reflects the worst mode.

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
MERCURY	Wireless router	MW150R	12922104015	FCC ID
NAKAMICHI	Bluetooth earphone	T8	N/A	FCC ID
Skyworth	Color LCD TV	24E12HR	K026709	N/A
HUAWEI	Wireless Router	HiRouter-H1	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)	±4.32 dB
Radiated Emission (1GHz ~ 18GHz)	±5.16 dB
Radiated Emission (18GHz ~ 26.5GHz)	±3.20 dB

5.6 Description of Cable Used

N/A

5.7 Laboratory Facility

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

● **FCC- Designation No.: CN1211**

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

● **ISED – CAB identifier.: CN0021**

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

● **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 ZhongjianNanfang Testing Co., Ltd.

Address: No.110~116, Building B, Jinyuan Business Building, 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 Monitoring of EUT for the Immunity Test

Visual:	Monitored the display of EUT
Sound:	Monitored the sound of EUT
Other:	Monitored the data link of EUT

5.10 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
				07-22-2020	07-21-2023
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-07-2019	03-06-2020
				03-07-2020	03-06-2021
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-07-2019	03-06-2020
				03-07-2020	03-06-2021
EMI Test Software	AUDIX	E3	Version:6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-07-2019	03-06-2020
				03-07-2020	03-06-2021
Pre-amplifier	CD	PAP-1G18	11804	03-07-2019	03-06-2020
				03-07-2020	03-06-2021
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Simulated Station	Anritsu	MT8820C	6201026545	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2019	03-06-2020
				03-07-2020	03-06-2021
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2019	03-06-2020
				03-07-2020	03-06-2021
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2019	03-06-2020
				03-07-2020	03-06-2021

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
LISN	CHASE	MN2050D	1447	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2020
				07-21-2020	07-20-2021
ISN	Schwarzbeck	CAT3 8158	#96	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
ISN	Schwarzbeck	CAT5 8158	#166	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
ISN	Schwarzbeck	NTFM 8158	#126	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Cable	HP	10503A	N/A	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
EMI Test Software	AUDIX	E3	Version:6.110919b		

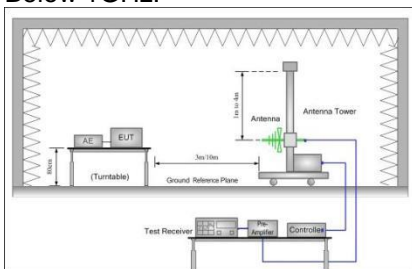
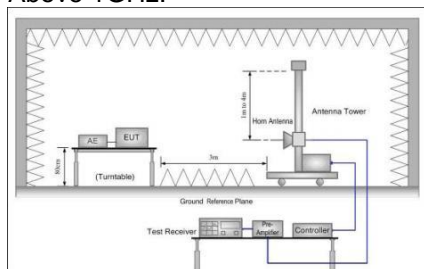
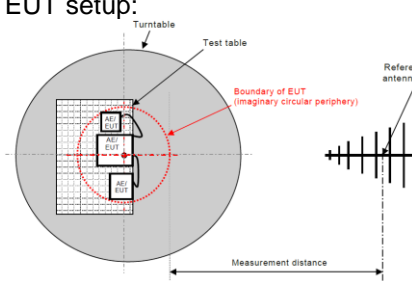
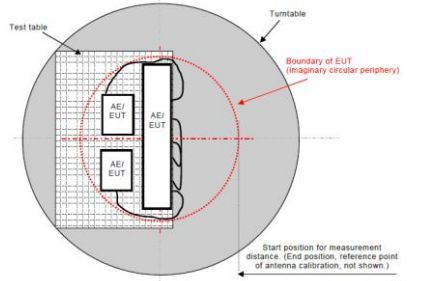
ESD:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
ESD Simulator	Haefely	ONYX30	183900	03-17-2019	03-16-2020
				03-17-2020	03-16-2021

Continuous RF electromagnetic radiated field disturbances					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Signal Generator	Rohde & Schwarz	SMR27	1104.002.20	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
RF Amplifier 80M-1GHz	Amplifier Research	AR 150W1000	115243	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
RF Amplifier 1GHz-4.2GHz	Amplifier Research	AR 25S1G4AM1	145863	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
RF Amplifier 4GHz-6GHz	Amplifier Research	35S4G8A	247443	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Power Meter	Rohde & Schwarz	NRVS	1020.1809.02	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Power Sensor	Rohde & Schwarz	URV5-Z2	N/A	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Power Sensor	Rohde & Schwarz	URV5-Z2	3654	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Software EMC32	Rohde & Schwarz	EMC32-S	7412	N/A	N/A
Log-periodic Antenna	Amplifier Research	AT1080	6987	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Antenna Tripod	Amplifier Research	TP1000A	3003552	N/A	N/A
High Gain Horn Antenna	Amplifier Research	AT4002A	N/A	03-05-2019	03-04-2020
				03-05-2020	03-04-2021
Nexus Conduiting Amplifier	B&K	2690	N/A	N/A	N/A
MUTH Simulator	B&K	4227	100150	N/A	N/A
Sound Level Calibrator	B&K	4231	1104.002.20	N/A	N/A
Audio Analyzer	Rohde & Schwarz	UPL 16	115243	03-05-2019	03-04-2020
				03-05-2020	03-04-2021

6 TestResults

6.1 EMI (Emission)

6.1.1 Radiated Emission

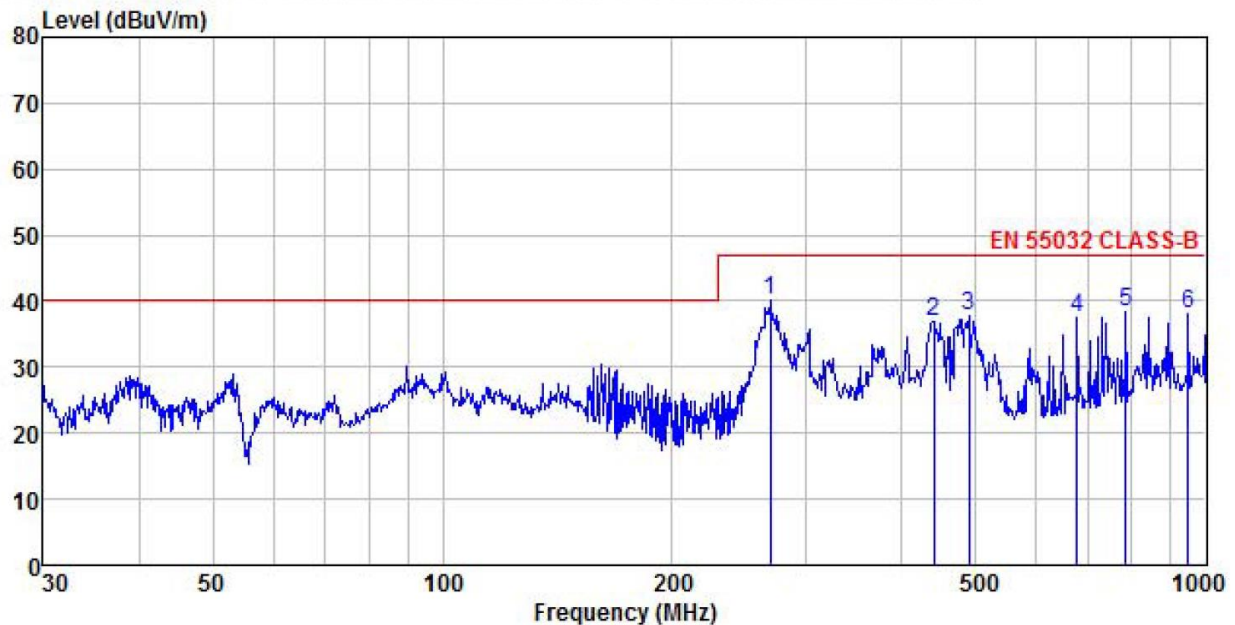
Test Requirement:	EN55032				
Test Method:	EN55032				
TestFrequencyRange:	30MHz to 6GHz				
TestDistance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	QP Value
	Above 1GHz	Peak	1MHz	3MHz	PK Value
		Average	1MHz	3MHz	AV Value
ITE Limit:	Frequency	Limit (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		
FM Receiver limit:	Frequency	Limit (dBuV/m @3m)		Remark	
		Fundamental	Harmonics		
	30MHz-230MHz	60	52	QP Value	
	230MHz-300MHz		52	QP Value	
	300MHz-1000MHz		56	QP Value	
Test setup:	Below 1GHz:		Above 1GHz:		
					
EUT setup:					
Test Procedure:	<p>30MHz to 1GHz:</p> <ol style="list-style-type: none">1. The radiated emissions test was conducted in a semi-anechoic chamber.2. The tabletop 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				

	<p>performed for both horizontal and vertical antenna polarization.</p> <p>Above 1GHz:</p> <ol style="list-style-type: none">1. The radiated emissions test was conducted in a fully-anechoic chamber.2. The tabletop 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 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 5.10 for details
Test Mode:	Refer to section 5.3 for details
Test Results:	Passed

Measurement Data:

Below 1GHz:

Product Name:	balenaFin	Product Model:	v1.1
Test By:	Carey	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24°C Humi: 57%

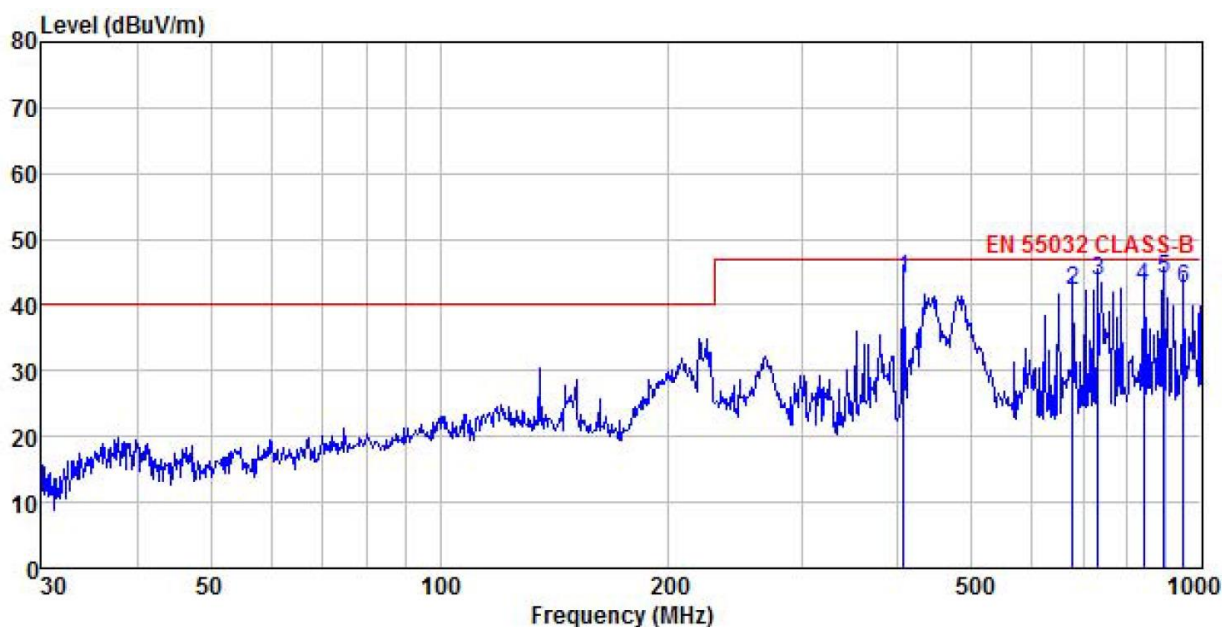


	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	268.485	52.75	13.06	2.86	28.51	40.16	47.00	-6.84 QP
2	440.196	46.26	16.29	3.18	28.85	36.88	47.00	-10.12 QP
3	489.027	45.24	17.86	3.53	28.93	37.70	47.00	-9.30 QP
4	677.580	41.97	20.09	4.04	28.72	37.38	47.00	-9.62 QP
5	785.093	41.13	21.22	4.35	28.28	38.42	47.00	-8.58 QP
6	948.761	38.79	22.68	4.20	27.73	37.94	47.00	-9.06 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.
3. The Aux Factor is a notch filter switch box loss, this item is not used.

Product Name:	balenaFin	Product Model:	v1.1
Test By:	Carey	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Humi: 57%



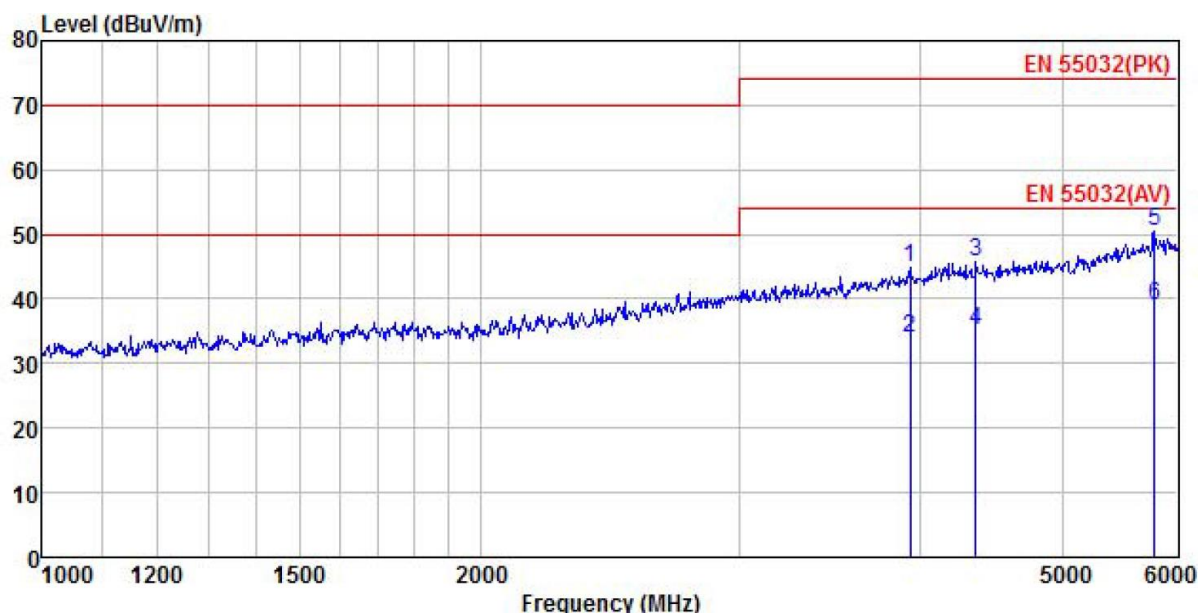
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Line	Limit	
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	406.088	54.39	15.43	3.09	28.79	44.12	47.00	-2.88 QP
2	677.580	46.95	20.09	4.04	28.72	42.36	47.00	-4.64 QP
3	731.920	47.31	20.54	4.29	28.55	43.59	47.00	-3.41 QP
4	839.182	44.25	22.36	4.22	28.04	42.79	47.00	-4.21 QP
5	893.857	45.51	22.51	3.77	27.89	43.90	47.00	-3.10 QP
6	948.761	43.32	22.68	4.20	27.73	42.47	47.00	-4.53 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.
3. The Aux Factor is a notch filter switch box loss, this item is not used.

Above 1GHz:

Product Name:	balenaFin	Product Model:	v1.1
Test By:	Carey	Test mode:	Working mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Vertical
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24°C Humi: 57%

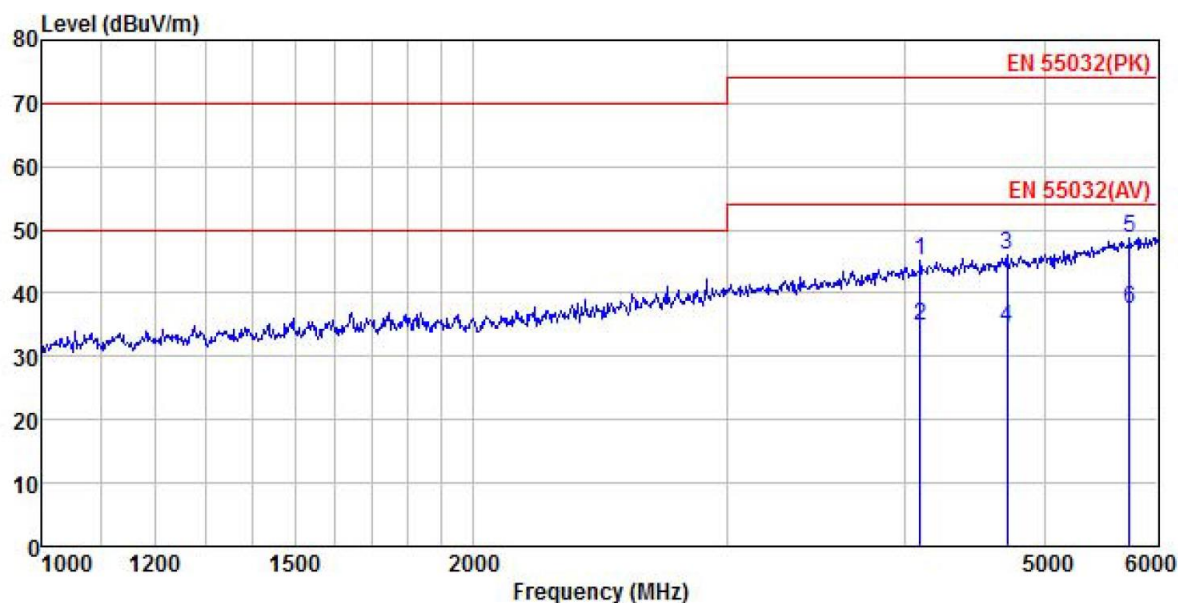


	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Line	Limit	Remark
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	3931.041	48.28	30.08	6.10	41.80	44.86	74.00	-29.14 Peak
2	3931.041	37.44	30.08	6.10	41.80	34.02	54.00	-19.98 Average
3	4361.545	48.26	30.38	6.65	41.94	45.66	74.00	-28.34 Peak
4	4361.545	37.79	30.38	6.65	41.94	35.19	54.00	-18.81 Average
5	5788.796	49.16	32.66	7.89	42.02	50.42	74.00	-23.58 Peak
6	5788.796	37.58	32.66	7.89	42.02	38.84	54.00	-15.16 Average

Remark:

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

Product Name:	balenaFin	Product Model:	v1.1
Test By:	Carey	Test mode:	Working mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Humi: 57%

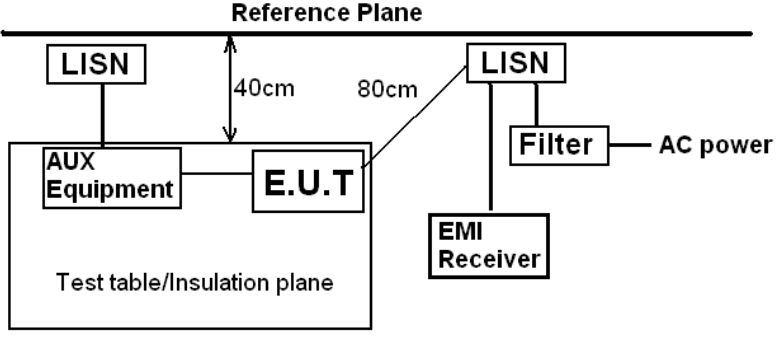


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4096.425	48.08	30.32	6.25	41.81	45.07	74.00	-28.93	Peak
2	4096.425	37.82	30.32	6.25	41.81	34.81	54.00	-19.19	Average
3	4710.867	47.93	30.83	6.85	41.96	46.07	74.00	-27.93	Peak
4	4710.867	36.31	30.83	6.85	41.96	34.45	54.00	-19.55	Average
5	5737.167	47.50	32.65	7.69	41.94	48.62	74.00	-25.38	Peak
6	5737.167	36.46	32.65	7.69	41.94	37.58	54.00	-16.42	Average

Remark:

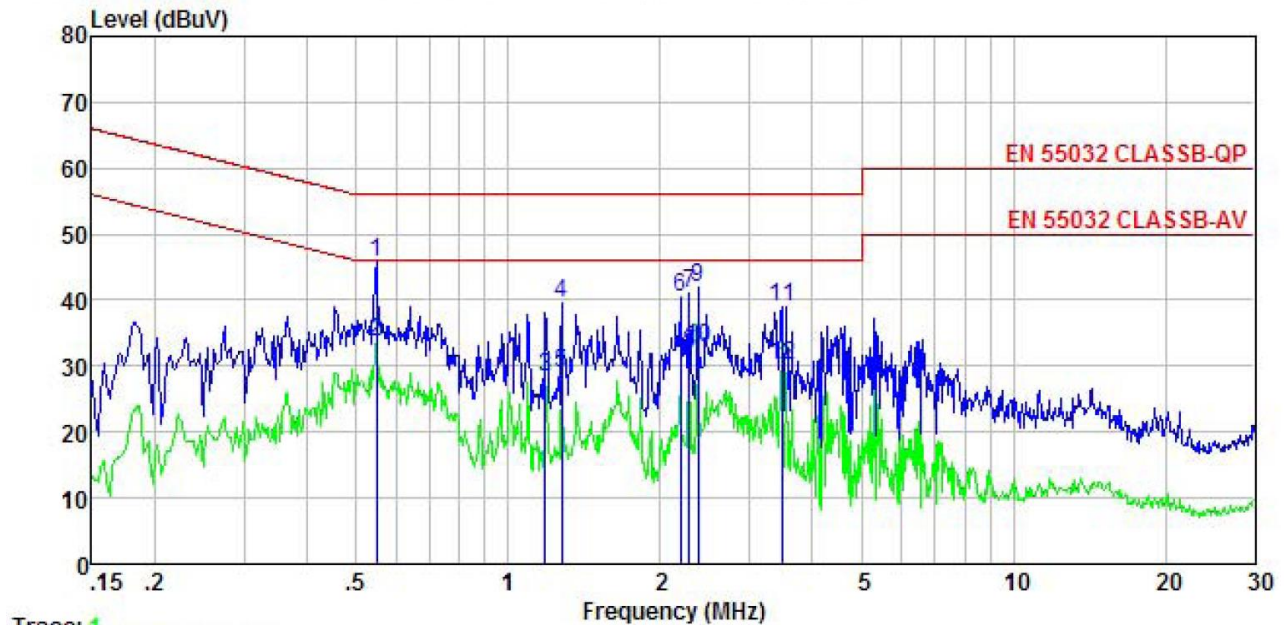
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss + Aux Factor – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

6.1.2 Conducted Emission

Test Requirement:	EN 55032		
Test Method:	EN 55032		
TestFrequencyRange:	150kHz to 30MHz		
Class / Severity: Class B	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test setup:	 <p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test procedure	<p>The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). Which provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to EN55032 Class B on conducted measurement.</p>		
Test Instruments:	Refer to section 5.10 for details		
Test Instruments:	Refer to section 5.3 for details		
Test Mode:	Passed		

Measurement Data:

Product name:	balenaFin	Product model:	v1.1
Test by:	Carey	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5°C Humi: 55%

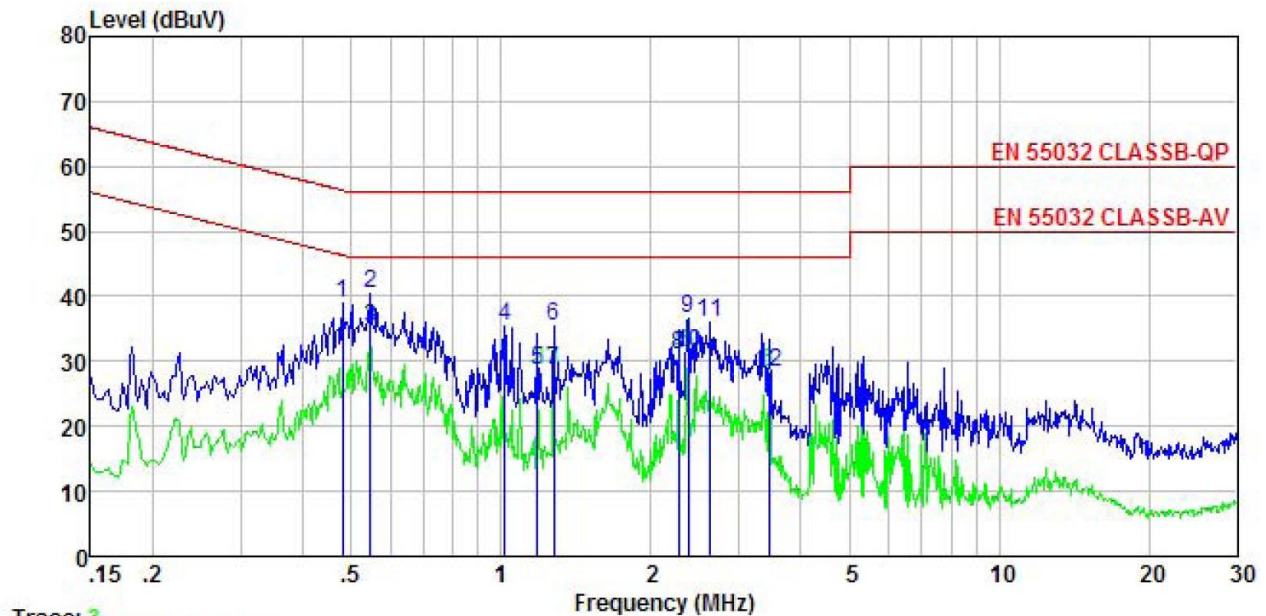


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.549	35.64	-0.39	-0.36	10.76	45.65	56.00	-10.35	QP
2	0.549	23.76	-0.39	-0.36	10.76	33.77	56.00	-22.23	Average
3	1.184	17.66	-0.39	0.27	10.89	28.43	56.00	-27.57	Average
4	1.276	28.87	-0.39	0.18	10.90	39.56	56.00	-16.44	QP
5	1.276	18.19	-0.39	0.18	10.90	28.88	56.00	-27.12	Average
6	2.190	30.34	-0.42	-0.30	10.95	40.57	56.00	-15.43	QP
7	2.285	30.85	-0.42	-0.28	10.95	41.10	56.00	-14.90	QP
8	2.285	21.76	-0.42	-0.28	10.95	32.01	56.00	-23.99	Average
9	2.371	31.58	-0.42	-0.27	10.94	41.83	56.00	-14.17	QP
10	2.371	22.39	-0.42	-0.27	10.94	32.64	56.00	-23.36	Average
11	3.472	28.67	-0.45	-0.13	10.91	39.00	56.00	-17.00	QP
12	3.472	19.73	-0.45	-0.13	10.91	30.06	56.00	-25.94	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss + Aux Factor.

Product name:	balenaFin	Product model:	v1.1
Test by:	Carey	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5°C Humi: 55%



	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.481	28.76	-0.65	0.02	10.75	38.88	56.32	-17.44	QP
2	0.546	30.43	-0.65	0.03	10.76	40.57	56.00	-15.43	QP
3	0.546	24.96	-0.65	0.03	10.76	35.10	56.00	-20.90	Average
4	1.016	25.20	-0.63	0.08	10.87	35.52	56.00	-20.48	QP
5	1.184	18.30	-0.64	0.10	10.89	28.65	56.00	-27.35	Average
6	1.276	25.16	-0.64	0.11	10.90	35.53	56.00	-20.47	QP
7	1.276	25.31	-0.64	0.11	10.90	28.68	56.00	-27.32	Average
8	2.273	20.40	-0.67	0.21	10.95	30.89	56.00	-25.11	Average
9	2.371	26.05	-0.67	0.23	10.94	36.55	56.00	-19.45	QP
10	2.371	20.75	-0.67	0.23	10.94	31.25	56.00	-24.75	Average
11	2.636	25.38	-0.67	0.27	10.93	35.91	56.00	-20.09	QP
12	3.454	17.63	-0.68	0.41	10.91	28.27	56.00	-27.73	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss + Aux Factor.

6.1.3 Harmonics Test Result

Test Requirement:	EN 61000-3-2
Test Method:	N/A: See Remark Below
Remark	There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN 61000-3-2. For further details, please refer to Clause 7, Note 1 of EN 61000-3-2 which states: "For the following categories of equipment limits are not specified in this edition of the standard. Note 1: Equipment with a rated power of 75W or less, other than lighting equipment."

6.1.4 Flicker Test Result

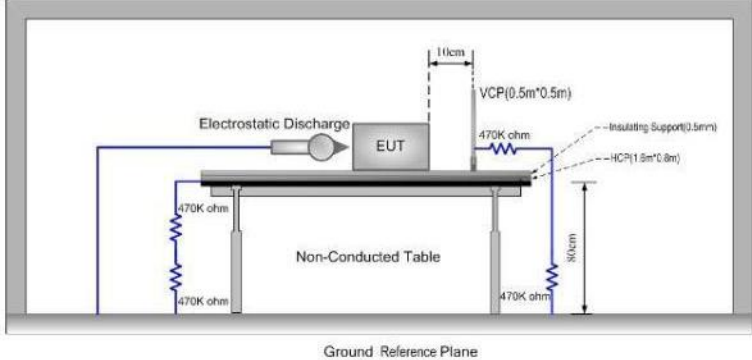
Test Requirement:	EN 61000-3-3
Test Method:	EN 61000-3-3
Remark:	As the section 6.1 of EN 61000-3-3, "Devices and Equipment that do(with the utmost probability) not generate relevant voltage fluctuations or flicker need not to be tested".

6.2 EMS (Immunity)

6.2.1 Performance Criteria Description in EN 55035

Criterion A:	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
Criterion B:	<p>After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.</p> <p>If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
Criterion C:	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

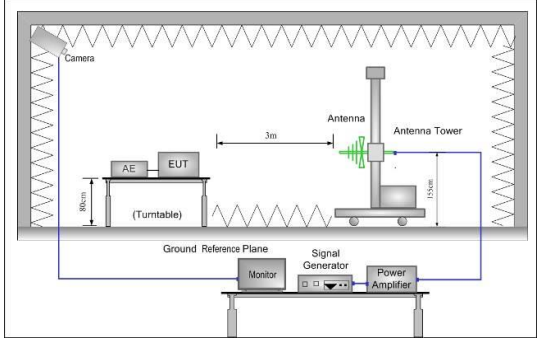
6.2.2 Electrostatic Discharge

Test Requirement:	EN 55035
Test Method:	EN61000-4-2
Discharge Voltage:	Contact Discharge, HCP and VCP: $\pm 2\text{kV}$, $\pm 4\text{kV}$, Air Discharge: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$
Polarity:	Positive & Negative
Number of Discharge:	Contact Discharge: Minimum 25 times at each test point, Air Discharge: Minimum 10 times at each test point.
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Testsetup:	
Test Procedure:	<p>1) Air discharge: The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure was repeated until all the air discharge completed</p> <p>2) Contact discharge: The test was applied on conductive surfaces of EUT. the generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. the tip of the discharge electrode was touch the EUT before the discharge switch was operated.</p> <p>3) Indirect discharge for horizontal coupling plane At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge. Consideration should be given to exposing all sides of the EUT.</p> <p>4) Indirect discharge for vertical coupling plane At least 10 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.</p>
Testenvironment:	Temp.: 26°C Humid.: 54% Press.: 101kPa
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode:	Working mode			
Test points:	I: N/A			
	II: N/A			
Direct discharge				
Discharge Voltage (KV)	Type of discharge	Test points	Observations (Performance Criterion)	Result
± 2, ± 4	Contact	II	A	N/A
± 2, ± 4,± 8	Air	I	A	N/A
Indirect discharge				
Discharge Voltage (KV)	Type of discharge	Test points	Observation Performance	Result
± 2, ± 4	HCP-Bottom/Top/ Front/Back/Left/Right	Edge of the HCP	A	Pass
± 2, ± 4	VCP-Front/Back /Left/Right	Center of the VCP	A	Pass

6.2.3 Continuous RF electromagnetic radiated field disturbances

Test Requirement:	EN 55035
Test Method:	EN61000-4-3
Frequency range:	Swept test: 80MHz to 1GHz Spot test: 1800MHz, 2600MHz, 3500MHz, 5000MHz
Test Level:	3V/m Audio output function: 80MHz-1000MHz: 0dB
Modulation:	80%, 1kHz Amplitude Modulation
Performance Criterion:	Criteria A
Test setup:	
Test Procedure:	<ol style="list-style-type: none"> 1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items. 2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length. 3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area). 4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value. 5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 5 s. 6. The test normally was performed with the generating antenna facing each side of the EUT. 7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. 8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT.
Test environment:	Temp.: 25°C Humid.: 52% Press.: 1012mbar
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

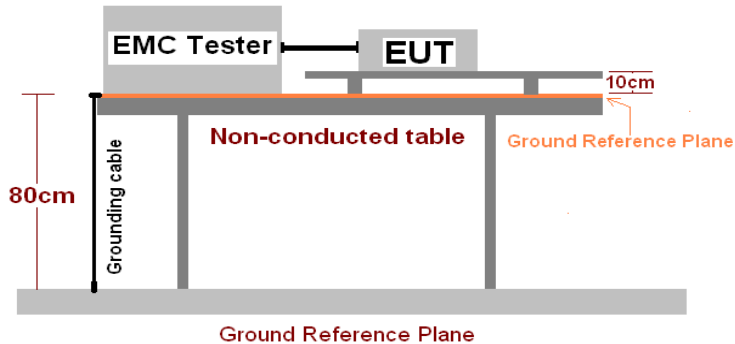
Measurement Record:

Working mode

Continuous RF electromagnetic radiated field disturbances swept test

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80 MHz-1 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=5seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass
Remarks: A: No degradation in the performance of the E.U.T. was observed.						

6.2.4 Electrical Fast Transients

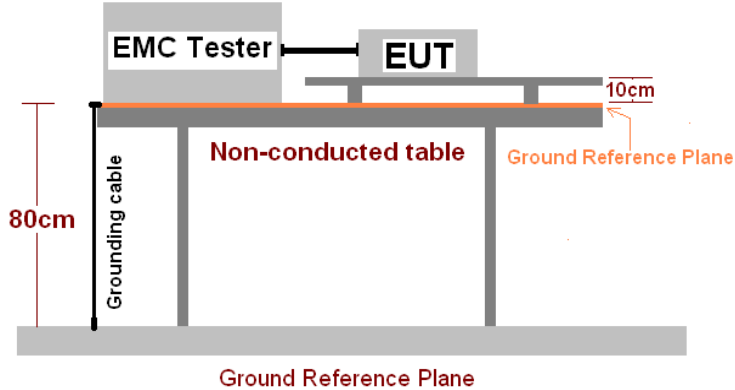
Test Requirement:	EN 55035
Test Method:	EN61000-4-4
Test Level:	1.0kV on AC port ±0.5kV on wired network ports
Polarity:	Positive & Negative
Repetition Frequency:	5kHz
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	2 minute per level & polarity
Performance Criterion:	B
Test setup:	 <p>The diagram illustrates the test setup. An EMC Tester is connected to an EUT (Equipment Under Test) via a cable. Both are placed on a non-conducted table. The table is supported by a wood support 0.1m + 0.01m thick. A ground reference plane is shown below the table, with a 10cm gap between the table and the plane. A grounding cable is connected to the table, with a height of 80cm indicated. The ground reference plane is a 1m*1m metallic sheet with 0.65mm minimum thickness, project beyond the EUT by at least 0.1m on all sides.</p>
Test Procedure:	<p>The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.</p> <p>Test on Signal Ports, Telecommunication Ports and Control Ports: The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT with burst noise for 2 minutes.</p> <p>Test on power supply ports: The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal. Each of the Line and Neutral conductors is impressed with burst noise for 2 minutes. The length of the signal and power lines between the coupling device and the EUT is 0.5m</p>
Test environment:	Temp.: 25°C Humid.: 63% Press.: 1050mbar
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode: LAN mode

Lead under Test	Level (\pm kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
LAN port	± 0.5	Direct	A	Pass
<i>Remark:</i> A: No degradation in the performance of the E.U.T. was observed.				

6.2.5 Surge

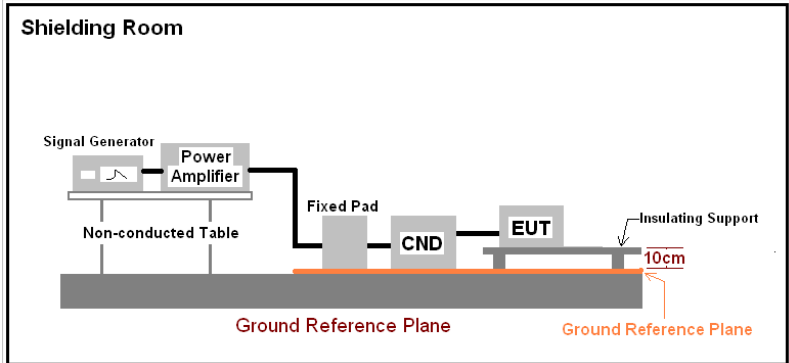
Test Requirement:	EN 55035
Test Method:	EN61000-4-5
Test Level:	± 1 kV Live to Neutral: Differential mode ± 2 kV Live to Earth or Neutral to Earth: Common mode ±0.5kV on wired network ports
Polarity:	Positive & Negative
Generator source impedance:	2Ω (line-line coupling)
Test Interval:	60s between each surge
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.
Performance Criterion:	B
Test setup:	 <p>The diagram illustrates the test setup. An EMC Tester and an EUT (Equipment Under Test) are positioned on a non-conducted table. The table is 80cm high. A grounding cable is connected to the table. The EUT is 10cm above the table surface. A ground reference plane is indicated at the base of the table.</p>
Test Procedure:	<ol style="list-style-type: none"> 1) For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV. 2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/minrepetition rate are applied during test. 3) Different phase angles are done individually. 4) Record the EUT operating situation during compliance test and decide the EUTimmunity criterion for above each test.
Test environment:	Temp.: 26°C Humid.: 53% Press.: 1012mbar
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode: LAN mode

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)	Result
LAN port	± 0.5	5	60s	/	A	Pass
<i>Remark:</i> <i>A: During the test, The EUT works normal, and after the test, the function of the EUT is normal.</i>						

6.2.6 Continuous induced RF disturbances

Test Requirement:	EN 55035					
Test Method:	EN61000-4-6					
Frequency range:	0.15MHz to 80MHz					
Test Level:	0.15-10MHz:3V 10-30MHz:3-1V 30-80MHz:1V Audio output function: 0.15MHz-30MHz: -20dB, 30MHz-80MHz: -10dB					
Modulation:	80%, 1kHz Amplitude Modulation					
Performance Criterion:	Criteria A					
Test setup:						
Test Procedure:	<ol style="list-style-type: none"> Let the EUT work in test mode and test it. The EUT are placed on an insulating support 0.1m high above a groundreference plane. CDN (coupling and decoupling device) is placed on theground plane about 0.3m from EUT. Cables between CDN and EUT are asshort as possible, and their height above the ground reference plane shall bebetween 30 and 50 mm (where possible). The disturbance signal described below is injected to EUT through CDN. The EUT operates within its operational mode(s) under intended climaticconditions after power on. The frequency range is swept from 0.150MHz to 80MHz using 3V signal level,and with the disturbance signal 80% amplitude modulated with a 1 kHz sinewave. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency isswept incrementally; the step size shall not exceed 1% of the start andthereafter 1% of the preceding frequency value. Recording the EUT operating situation during compliance testing and decidethe EUT immunity criterion. 					
Test environment:	Temp.:	24°C	Humid.:	51%	Press.:	1012mbar
Test Instruments:	Refer to section 5.10 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					

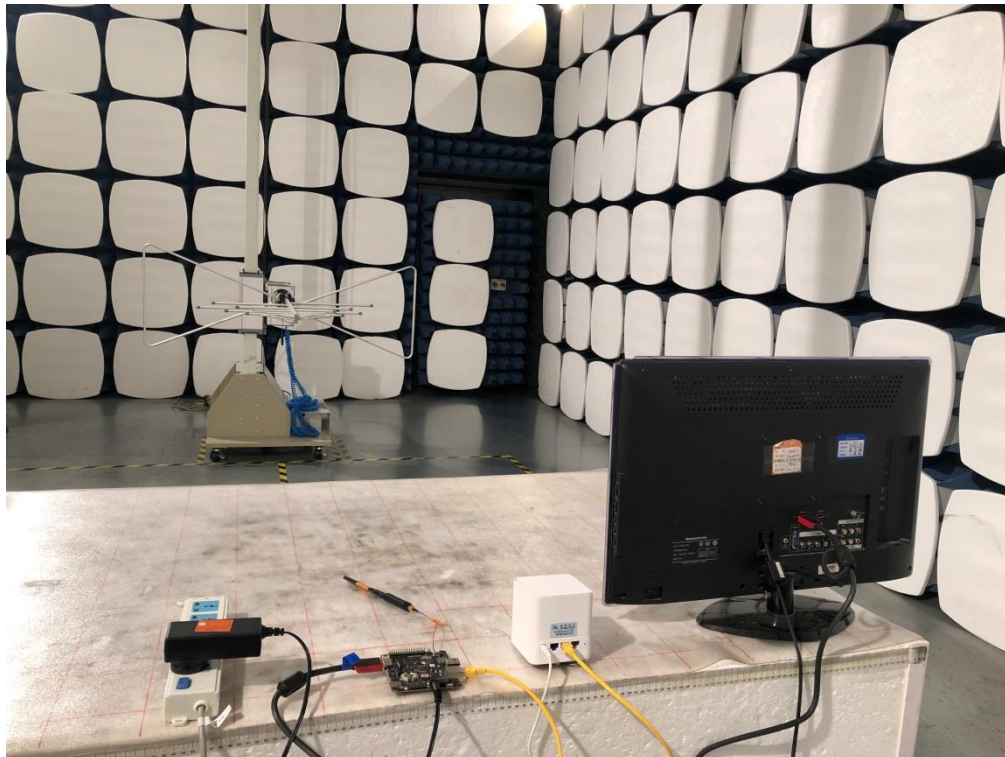
Measurement Record:

Test mode: LAN mode

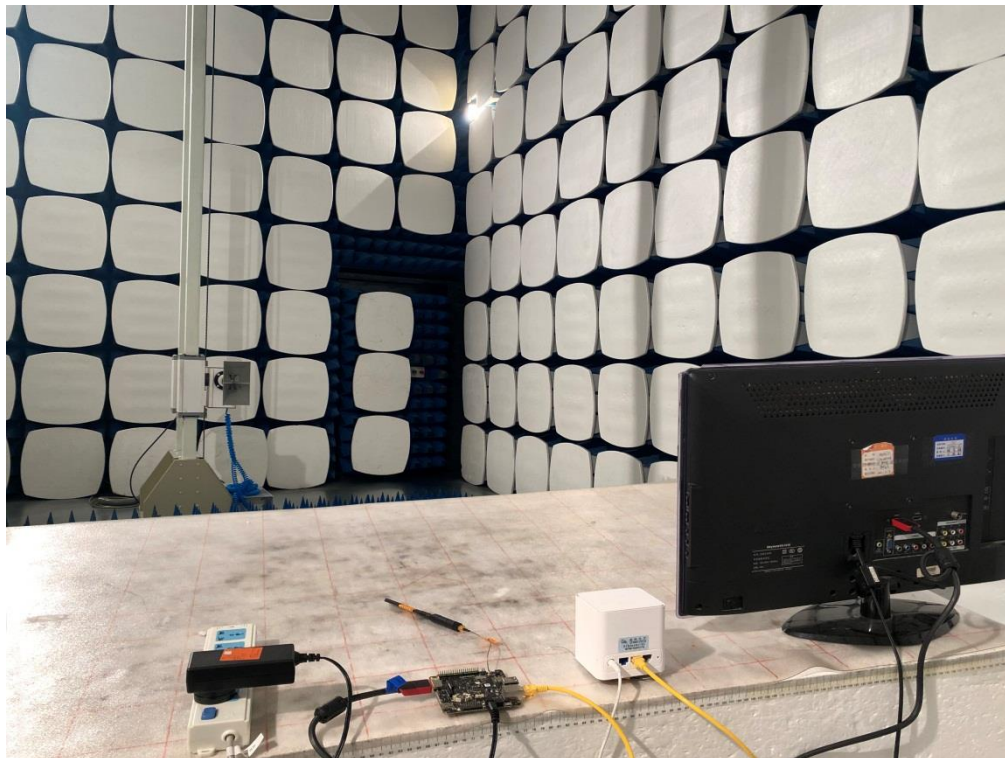
Frequency	Injected Position	Test Level	Modulation	Step Size	Dwell Time	Observations (Performance Criterion)	Result
150kHz to 10MHz	LAN port	3V	80%, 1kHz Amp. Mod.	1%	2s	A	Pass
10MHz to 30MHz		3V to1V				A	Pass
30MHz to 80MHz		1V				A	Pass
<i>Remark:</i> <i>A: No loss of function was observed.</i>							

7 Test Setup Photo

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



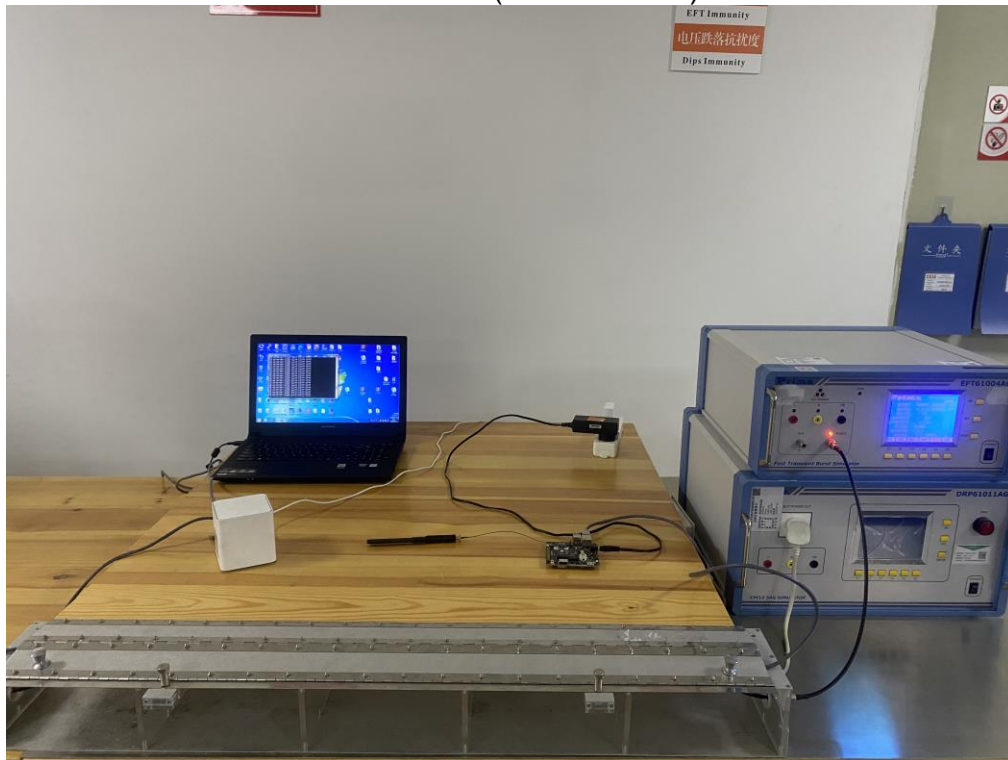
Conducted Emission



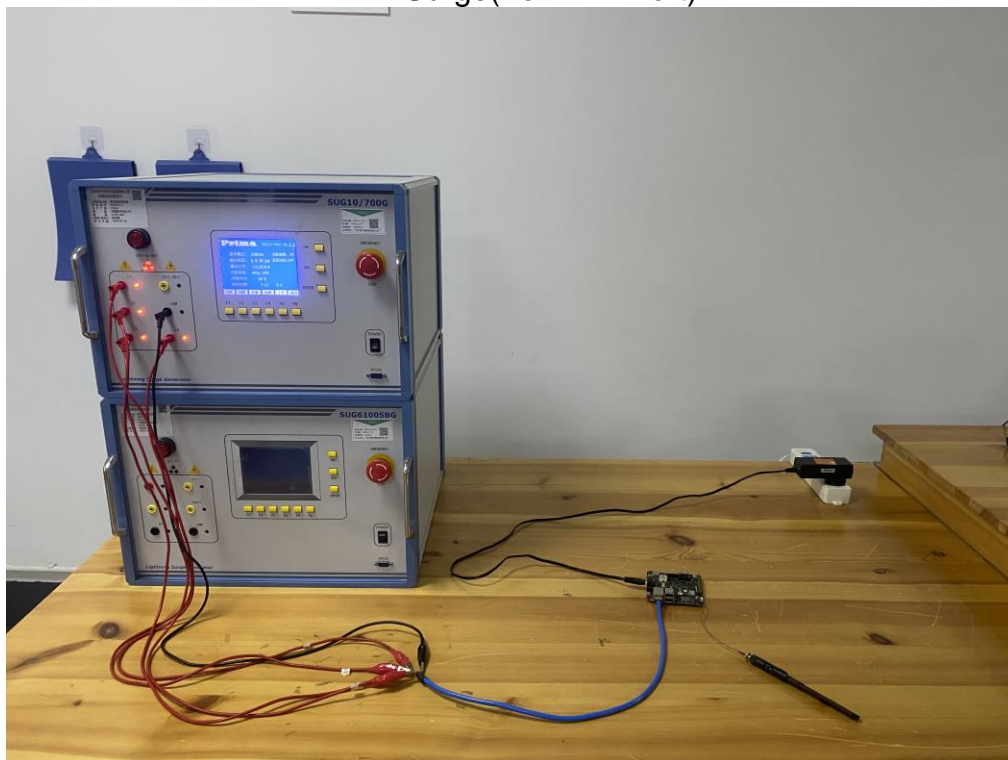
R/S



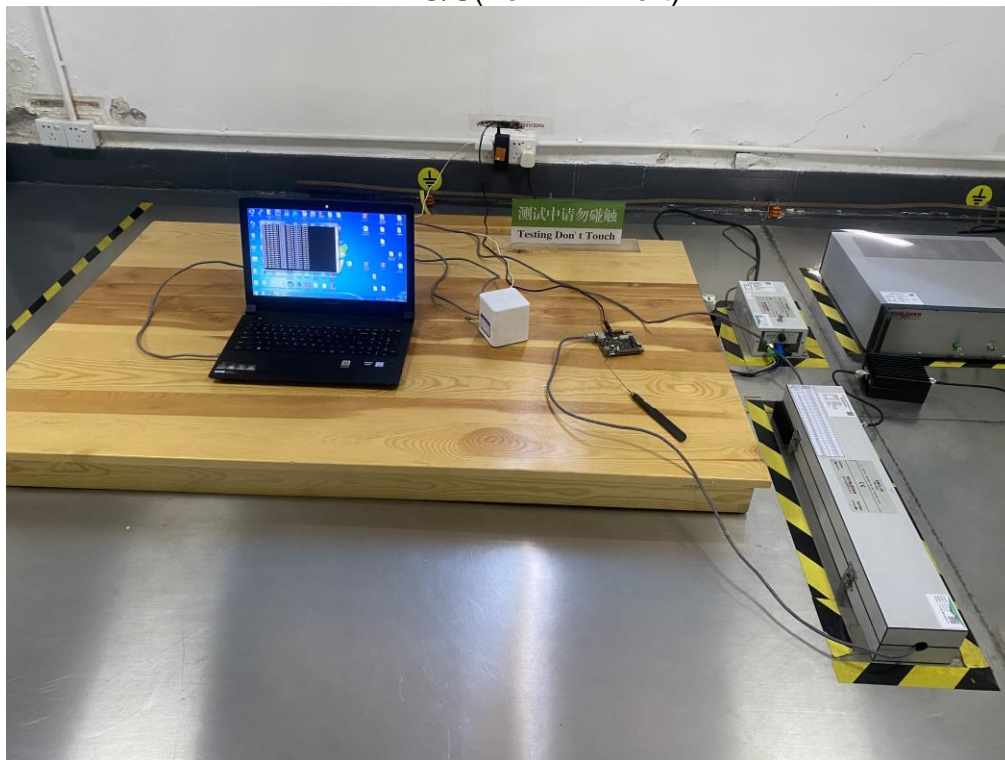
EFT/B(For LAN Port)



Surge(For LAN Port)



C/S(For LAN Port)



8 EUT Constructional Details

Reference to the test report No. CCISE190807901

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