TEST REPORT

Application No.:	SHEM2206003921BA
Applicant:	Shanghai PYTES Energy Co., Ltd.
Address of Applicant:	No.3492 Jinqian Road, Fengxian District, Shanghai, China
Manufacturer:	Shanghai PYTES Energy Co., Ltd.
Address of Manufacturer:	No.3492 Jinqian Road, Fengxian District, Shanghai, China
Factory:	Shanghai PYTES Energy Co., Ltd.
Address of Factory:	No.3492 Jinqian Road, Fengxian District, Shanghai, China
Equipment Under Test (EUT):	
EUT Name:	Lithium ion Battery Pack
Model No.:	E-BOX-48100R
Standard(s) :	EN 61000-6-3:2007 +A1:2011
	EN IEC 61000-6-1:2019
Date of Receipt:	2021-08-30
Date of Test:	2021-09-06 to 2021-09-10
Date of Issue:	2022-06-13
Test Result:	**Pass***

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

Parlam Zhan
Laboratory Manager

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center EMC Laboratory
NO.588 West Jindu Road,Songjiang District,Shanghai,China 201612
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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Update company information	2022-06-13	Based on SHEM210800997401

Authorized for issue by:				
		Bruce Tang		
		Bruce Tang / Project Engineer		
		Parlam Zhan		
		Parlam Zhan /Reviewer		

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2 Test Summary

Emission Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at Telecommunication Port (150kHz-30MHz)	EN 61000-6-3:2007 +A1:2011	CISPR 22	N/A	Pass
Radiated Emissions (30MHz-1GHz)	EN 61000-6-3:2007 +A1:2011	CISPR 16-2-3	N/A	Pass
Radiated Emissions (above 1GHz)	EN 61000-6-3:2007 +A1:2011	CISPR 16-2-3	N/A	Pass
Conducted Emissions at DC Terminals (150kHz-30MHz)	EN 61000-6-3:2007 +A1:2011	CISPR 16-2-1	N/A	Pass

N/A: Not applicable

Immunity Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Electrostatic Discharge	EN IEC 61000-6-1:2019	EN 61000-4-2:2009	4kV Contact Discharge 8kV Air Discharge	Pass
Electrical Fast Transients/Burst at Signal Port	EN IEC 61000-6-1:2019	EN 61000-4-4:2012	0.5kV 5/50ns Tr/Td 5kHz Repetition Frequency	Pass
Conducted Immunity at Signal Port (150kHz-80MHz)	EN IEC 61000-6-1:2019	EN 61000-4-6:2014	3Vrms (emf),80%,1kHz Amp. Mod.	Pass
Electrical Fast Transients/Burst at DC port	EN IEC 61000-6-1:2019	EN 61000-4-4:2012	0.5kV 5/50ns Tr/Td 5kHz Repetition Frequency	Pass
Surge at DC Port	EN IEC 61000-6-1:2019	EN 61000-4-5:2014 +A1:2017	1.2/50μs Tr/Td 0.5kV Line to Line 1kV Line to Ground	Pass
Conducted Immunity at DC Port (150kHz-80MHz)	EN IEC 61000-6-1:2019	EN 61000-4-6:2014	3Vrms (emf),80%,1kHz Amp. Mod.	Pass
Radiated Immunity (80MHz-1GHz, 1.4GHz-6GHz)	EN IEC 61000-6-1:2019	EN 61000-4-3:2006 +A1:2008+A2:2010	3V/m, 80%, 1kHz Amp. Mod. 3V/m, 80%, 1kHz Amp. Mod.	Pass

N/A: Not applicable

Note: The report is copied from SHEM2108009974 to update company information.

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3 Contents

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4 General Information

4.1 Details of E.U.T.

Power supply: DC51.2V 100Ah
Test voltage: DC51.2V

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	LENOVO	R400	/
Resistance load	Supplied by SGS	/	/

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Emission at mains port using AMN	2.6dB (9kHz to 150kHz)
		2.4dB (150kHz to 30MHz)
2	Conducted Emission at mains port using VP	1.8 dB (9kHz to 30MHz)
3	Conducted Emission at telecommunication port using AAN	4.2 dB (150kHz to 30MHz)
4	Radiated Power	3.2dB
5	Radiated Emission	4.5dB (30MHz-1GHz)
		5.1dB (1GHz-6GHz)
		5.4dB (6GHz-18GHz)
6	Radiated Disturbance (disturbance current in a LLAS)	2.4dB (9kHz to 30MHz)

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

4.5 Test Facility

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

• CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 6332.01)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

• FCC (Designation Number: CN1301)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

• ISED (CAB Identifier: CN0020)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 8617A

• VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

4.8 Monitoring of EUT for All Immunity Test

Visual: Monitor work status

5 Equipment List

Conducted Emissions at Telecommunication Port (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2020-12-20	2021-12-19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2020-12-20	2021-12-19
Line impedance stabilization network	EMCO	3816/2	SHEM019-1	2020-12-20	2021-12-19
8-wire ISN cat 5	SCHWARZBECK	CAT5 8158	SHEM137-1	2020-12-20	2021-12-19
8-wire ISN cat 3	SCHWARZBECK	CAT3 8158	SHEM137-2	2020-12-20	2021-12-19
8-wire ISNcat 6	SCHWARZBECK	NTFM8158	SHEM137-3	2020-12-20	2021-12-19
2-wire ISN	Schwarzbeck - Mess-Elektronik	NTFM 8131	SHEM139-1	2020-12-20	2021-12-19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2020-12-20	2021-12-19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020-12-20	2023-12-19
CE test Cable	/	/	CE01	2020-12-20	2021-12-19

Radiated Emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2020-12-20	2021-12-19
CONTROLLER	INNCO	CO200	SHEM047-1	N/A	N/A
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	N/A	N/A
TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	N/A	N/A
Broadband UHF-VHF ANTENNA	SCHWARZBECK	VULB9168	SHEM048-1	2019-10-14	2021-10-13
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
Pre-Amplifier	HP	8447D	SHEM236-1	2021-05-27	2022-05-26

Radiated Emissions (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2020-12-20	2021-12-19
CONTROLLER	INNCO	CO200	SHEM047-1	N/A	N/A
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	N/A	N/A
TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	N/A	N/A
Double ridged broadband horn ANTENNA	SCHWARZBECK	BBHA9120D	SHEM050-1	2019-10-14	2021-10-13
High-amplifier	SCHWARZBECK	SCU-F0118-G40-BZ4-CS	SHEM050-2	2020-12-20	2021-12-19
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24

Electrostatic Discharge					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Electrostatic Discharge Simulator	TESEQ	NSG 437	SHEM041-2	2021-08-13	2022-08-12

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Electrical Fast Transients/Burst at Signal Port					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2020-12-20	2021-12-19
Test software	EMC PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021-04-15	2022-04-14
Capacitive coupling clamp	EM test	HFK	SHEM026-2	2020-12-20	2021-12-19
Data coupling network 4 line	EM test	CNV 504	SHEM026-3	2020-12-20	2021-12-19

Conducted Immunity at Signal Port (150kHz-80MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Signal generator	Rohde & Schwarz	SMJ100A	SHEM141-1	2021-08-13	2022-08-12
Power Amplifier	HAEFFLY	PAMP250	SHEM023-1	2020-12-20	2021-12-19
6dB Attenuator	HUAXIANG	DTS50-6dB-1G-A	SHEM123-2	2020-12-20	2021-12-19
Coupling clamp	LUTHI	EM 101	SHEM027-1	2020-12-20	2021-12-19
Shielding Room	ZHONGYU	5*5*3M	SHEM079-6	2019-12-20	2022-12-19

Electrical Fast Transients/Burst at DC port					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2020-12-20	2021-12-19
Test software	EMC PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021-04-15	2022-04-14
Capacitive coupling clamp	EM test	HFK	SHEM026-2	2020-12-20	2021-12-19
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021-04-15	2022-04-14

Conducted Emissions at DC Terminals (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2020-12-20	2021-12-19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2020-12-20	2021-12-19
Line impedance stabilization network	EMCO	3816/2	SHEM019-1	2020-12-20	2021-12-19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2020-12-20	2021-12-19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020-12-20	2023-12-19
CE test Cable	/	/	CE01	2020-12-20	2021-12-19

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Surge at DC Port					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2020-12-20	2021-12-19
Test software	EMC PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021-04-15	2022-04-14
Data coupling network 4 line	EM test	CNV 504	SHEM026-3	2020-12-20	2021-12-19
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021-04-15	2022-04-14

Conducted Immunity at DC Port (150kHz-80MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Signal generator	Rohde & Schwarz	SMJ100A	SHEM141-1	2021-08-13	2022-08-12
Power Amplifier	HAEFFLY	PAMP250	SHEM023-1	2020-12-20	2021-12-19
6dB Attenuator	HUAXIANG	DTS50-6dB-1G-A	SHEM123-2	2020-12-20	2021-12-19
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M1	SHEM023-5	2020-12-20	2021-12-19
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M2/M3	SHEM023-6	2020-12-20	2021-12-19
RF Generator	SCHAFFNER	NSG 2070	SHEM221-1	2021-05-27	2022-05-26
Shielding Room	ZHONGYU	5*5*3M	SHEM079-6	2019-12-20	2022-12-19
Coupling and Decoupling Network	Teseq	CDN M016	SHEM168-1	2021-08-13	2022-08-12

Radiated Immunity (80MHz-1GHz, 1.4GHz-6GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Signal generator	Rohde & Schwarz	SMJ100A	SHEM141-1	2021-08-13	2022-08-12
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2021-04-15	2022-04-14
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-2	2021-04-15	2022-04-14
Antenna	SCHWARZBECK	STLP9128D	SHEM130-1	N/A	N/A
Amplifier	MILMEGA	AS0840-55-55	SHEM133-1	2020-12-20	2021-12-19
Power meter sensor	Rohde & Schwarz	NRP-Z22	SHEM136-1	2021-04-15	2022-04-14
ElectroMagnetic Field Probe	ETS-Lindgren	HI-6105	SHEM134-1	2021-08-06	2022-08-05

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Digital pressure meter	YONGZHI	DYM3-01	SHEM082-1	2021-01-22	2024-01-21
Temperature&humidity recorder	ShangHai weather meter work	ZJ 1-2B	SHEM042-1~6	2021-09-07	2022-09-06
Digital Multimeter	FLUKE	17B	SHEM043-3	2021-09-04	2022-09-03
Autoformer regulator	Guangzhou bao de	TDGC2-5KVA	SHEM150-1	N/A	N/A
Multi-purpose tong tester	FLUKE	316	SHEM001-1	2020-12-20	2021-12-19

6 Emission Test Results

6.1 Conducted Emissions at Telecommunication Port (150kHz-30MHz)

Test Requirement: EN 61000-6-3:2007 +A1:2011

Test Method: CISPR 22

Frequency Range: 150kHz to 30MHz

Limit:

0.15M-0.5MHz(Voltage)	84-74(dBμV) quasi-peak; 74-64(dBμV) average
0.5M-30MHz(Voltage)	74(dBμV) quasi-peak; 64(dBμV) average

Detector: 9kHz resolution bandwidth 0.15M to 30MHz

Remark: The voltage measured shall be corrected at each frequency of interest as follows:

if the current margin with respect to the current limit is ≤ 6 dB, the actual current margin shall be subtracted from the measured voltage;

if the current margin with respect to the current limit is > 6 dB, 6 dB shall be subtracted from the measured voltage.

6.1.1 E.U.T. Operation

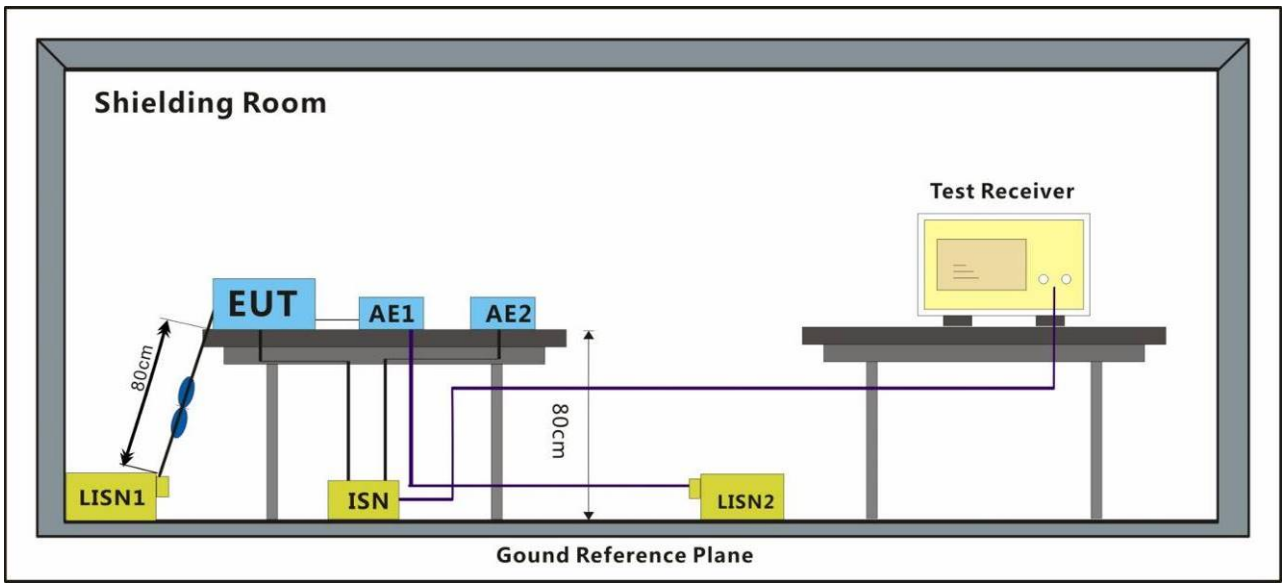
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode: a: keep battery charging continual.

b: keep battery discharging continual.

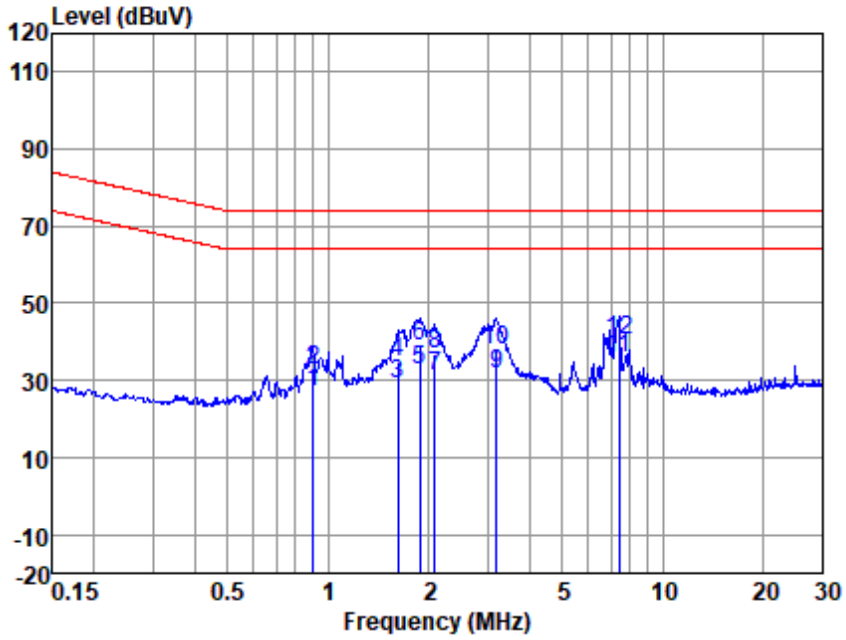
6.1.2 Test Setup Diagram



6.1.3 Measurement Data

An initial pre-scan was performed with peak detector.Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

Mode:a

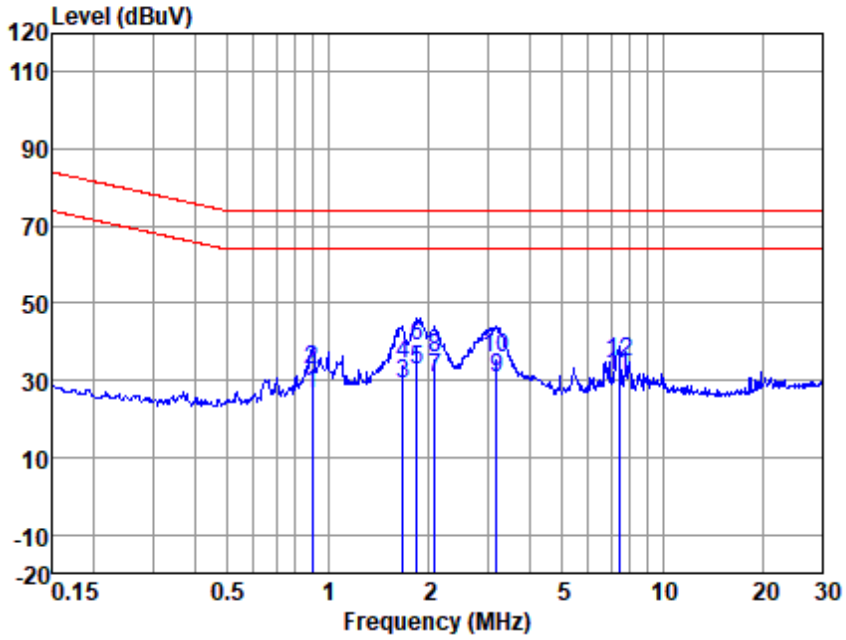


ISN : CAT5-2021
EUT/Project No : 9974BA
Test Mode : a

	Freq (MHz)	Read level (dBuV)	ISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.90	7.66	9.60	9.90	27.16	64.00	-36.84	Average
2	0.90	13.26	9.60	9.90	32.76	74.00	-41.24	QP
3	1.62	9.53	9.60	9.93	29.06	64.00	-34.94	Average
4	1.62	15.35	9.60	9.93	34.88	74.00	-39.12	QP
5	1.88	13.20	9.60	9.94	32.74	64.00	-31.26	Average
6	1.88	19.40	9.60	9.94	38.94	74.00	-35.06	QP
7	2.09	11.53	9.60	9.94	31.07	64.00	-32.93	Average
8	2.09	17.24	9.60	9.94	36.78	74.00	-37.22	QP
9	3.19	12.32	9.58	9.98	31.88	64.00	-32.12	Average
10	3.19	18.53	9.58	9.98	38.09	74.00	-35.91	QP
11	7.41	16.43	9.50	10.05	35.98	64.00	-28.02	Average
12	7.41	21.11	9.50	10.05	40.66	74.00	-33.34	QP

Notes: Emission Level = Read Level +ISN Factor + Cable loss

Mode:b



ISN : CAT5-2021
EUT/Project No : 9974BA
Test Mode : b

	Freq (MHz)	Read level (dBuV)	ISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.90	6.94	9.60	9.90	26.44	64.00	-37.56	Average
2	0.90	13.33	9.60	9.90	32.83	74.00	-41.17	QP
3	1.67	9.50	9.60	9.93	29.03	64.00	-34.97	Average
4	1.67	14.86	9.60	9.93	34.39	74.00	-39.61	QP
5	1.85	13.05	9.60	9.93	32.58	64.00	-31.42	Average
6	1.85	19.58	9.60	9.93	39.11	74.00	-34.89	QP
7	2.09	11.02	9.60	9.94	30.56	64.00	-33.44	Average
8	2.09	16.14	9.60	9.94	35.68	74.00	-38.32	QP
9	3.19	10.90	9.58	9.98	30.46	64.00	-33.54	Average
10	3.19	16.46	9.58	9.98	36.02	74.00	-37.98	QP
11	7.41	11.60	9.50	10.05	31.15	64.00	-32.85	Average
12	7.41	15.31	9.50	10.05	34.86	74.00	-39.14	QP

Notes: Emission Level = Read Level +ISN Factor + Cable loss

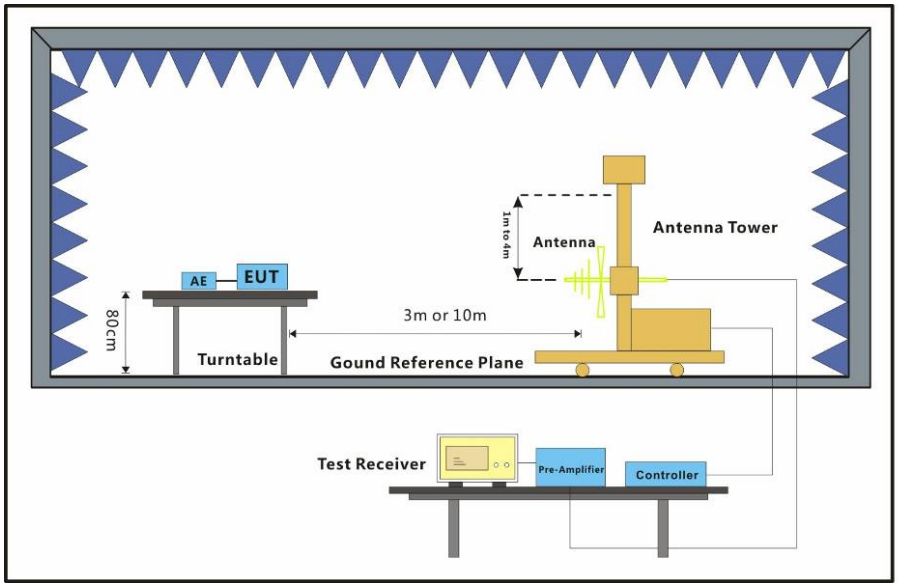
6.2 Radiated Emissions (30MHz-1GHz)

Test Requirement: EN 61000-6-3:2007 +A1:2011
Test Method: CISPR 16-2-3
Frequency Range: 30MHz to 1GHz
Measurement Distance: 3m
Limit:
30MHz-230MHz 40 dB(μV/m) quasi-peak
230MHz-1GHz 47 dB(μV/m) quasi-peak
Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz

6.2.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

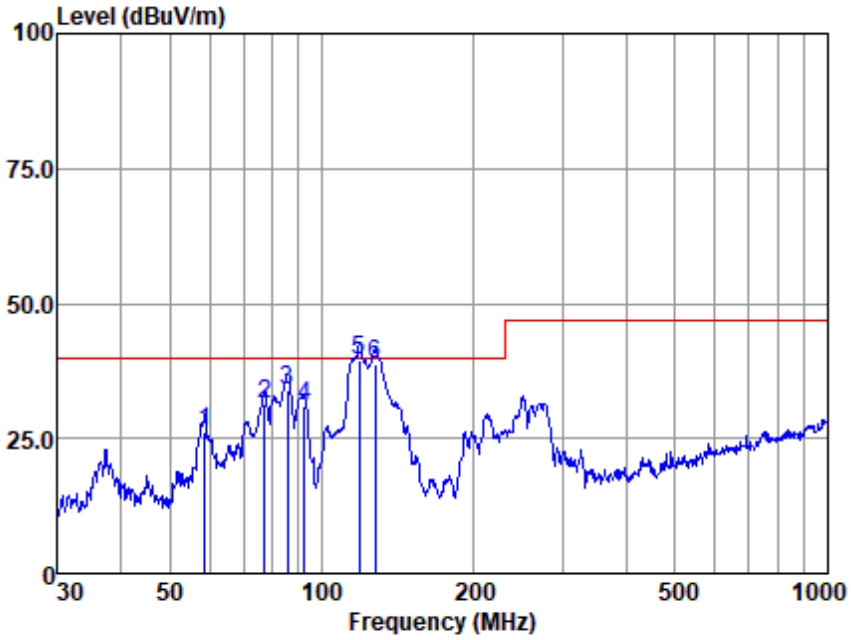
6.2.2 Test Setup Diagram



6.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by broadband antenna with 2 orthogonal polarities.

Mode:a; Polarization:Horizontal

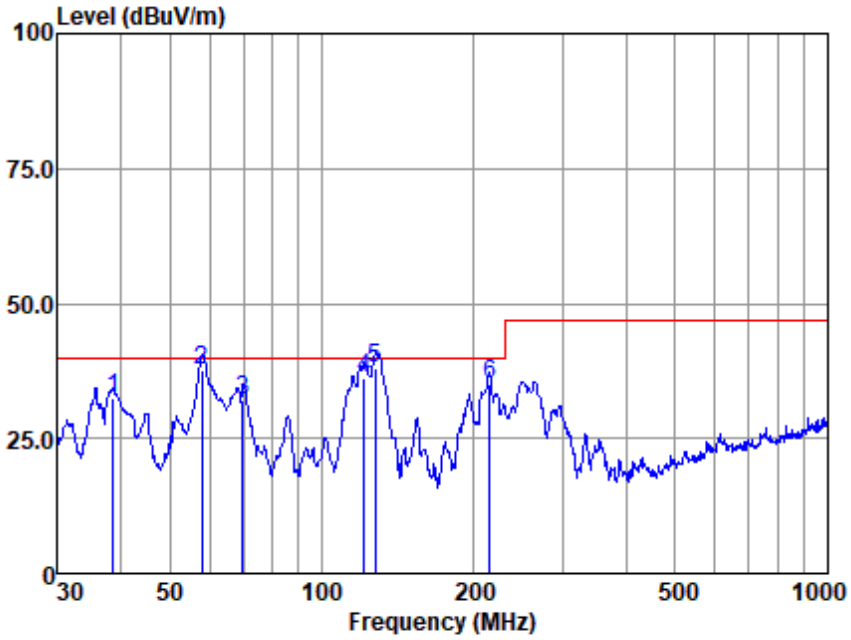


Antenna Polarity :HORIZONTAL
EUT/Project :9974BA
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	58.613	43.77	13.18	1.10	31.67	26.38	40.00	-13.62	QP
2	77.051	51.65	9.92	1.28	31.43	31.42	40.00	-8.58	QP
3	85.598	55.88	8.34	1.36	31.51	34.07	40.00	-5.93	QP
4	92.462	53.05	7.97	1.43	31.56	30.89	40.00	-9.11	QP
5	118.749	58.70	10.89	1.64	31.60	39.63	40.00	-0.37	QP
6	127.665	56.96	11.63	1.70	31.66	38.63	40.00	-1.37	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:a; Polarization:Vertical

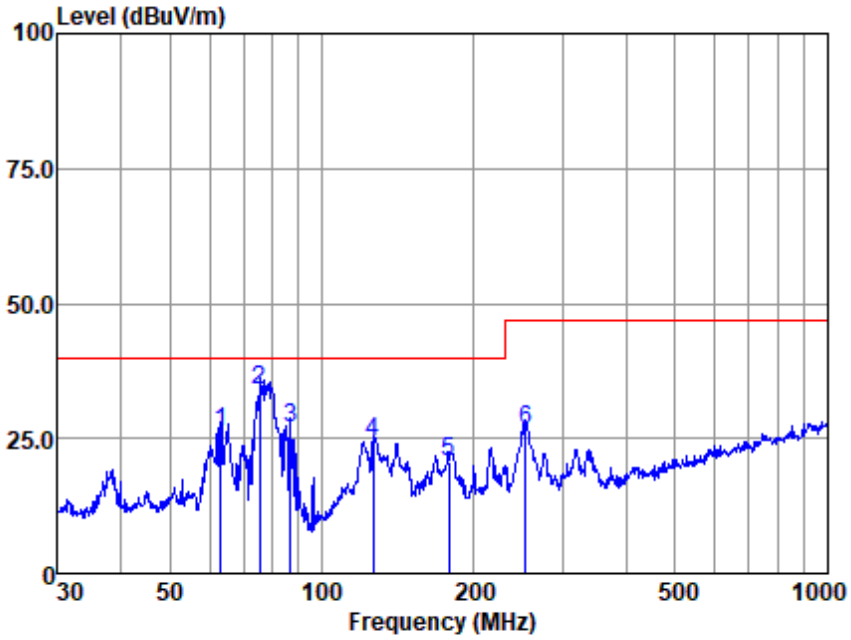


Antenna Polarity :VERTICAL
EUT/Project :9974BA
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	38.616	50.46	12.99	0.86	31.97	32.34	40.00	-7.66	QP
2	57.999	54.87	13.22	1.10	31.71	37.48	40.00	-2.52	QP
3	69.845	49.84	11.73	1.21	30.80	31.98	40.00	-8.02	QP
4	121.549	54.82	11.14	1.66	31.61	36.01	40.00	-3.99	QP
5	127.665	56.31	11.63	1.70	31.66	37.98	40.00	-2.02	QP
6	214.514	54.32	9.72	2.36	31.22	35.18	40.00	-4.82	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal

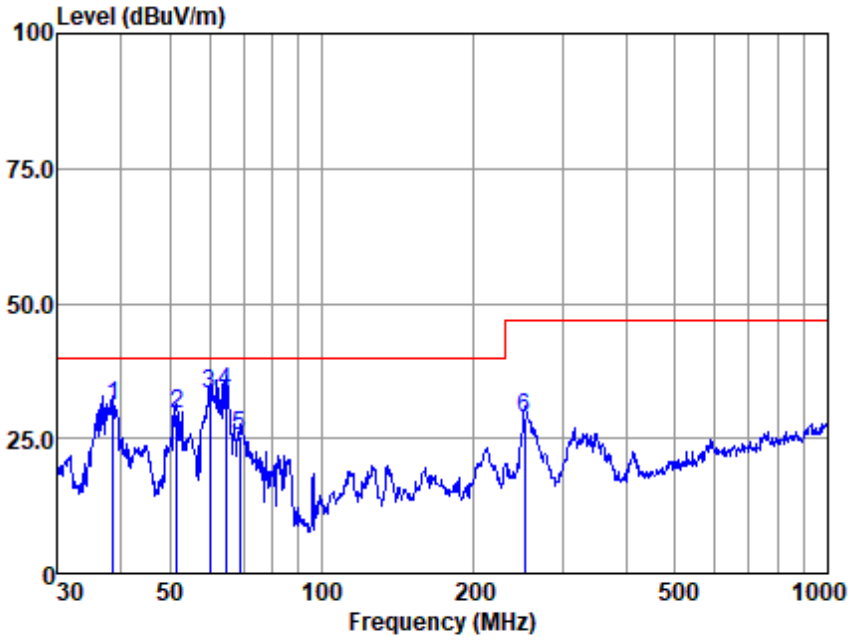


Antenna Polarity :HORIZONTAL
EUT/Project :9974BA
Test mode :b

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	63.092	43.93	12.65	1.14	31.49	26.23	40.00	-13.77	QP
2	75.446	53.32	10.32	1.27	30.92	33.99	40.00	-6.01	QP
3	86.503	48.87	8.20	1.37	31.54	26.90	40.00	-13.10	QP
4	126.329	42.77	11.52	1.69	31.65	24.33	40.00	-15.67	QP
5	178.758	38.13	11.93	2.06	31.63	20.49	40.00	-19.51	QP
6	252.948	43.05	11.81	2.61	31.07	26.40	47.00	-20.60	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical



Antenna Polarity :VERTICAL
EUT/Project :9974BA
Test mode :b

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	38.616	49.09	12.99	0.86	31.97	30.97	40.00	-9.03	QP
2	51.662	46.81	13.60	1.03	31.99	29.45	40.00	-10.55	QP
3	60.069	50.52	13.10	1.12	31.67	33.07	40.00	-6.93	QP
4	64.433	51.52	12.46	1.16	31.44	33.70	40.00	-6.30	QP
5	68.631	43.88	11.89	1.20	31.43	25.54	40.00	-14.46	QP
6	252.063	45.61	11.77	2.61	31.07	28.92	47.00	-18.08	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

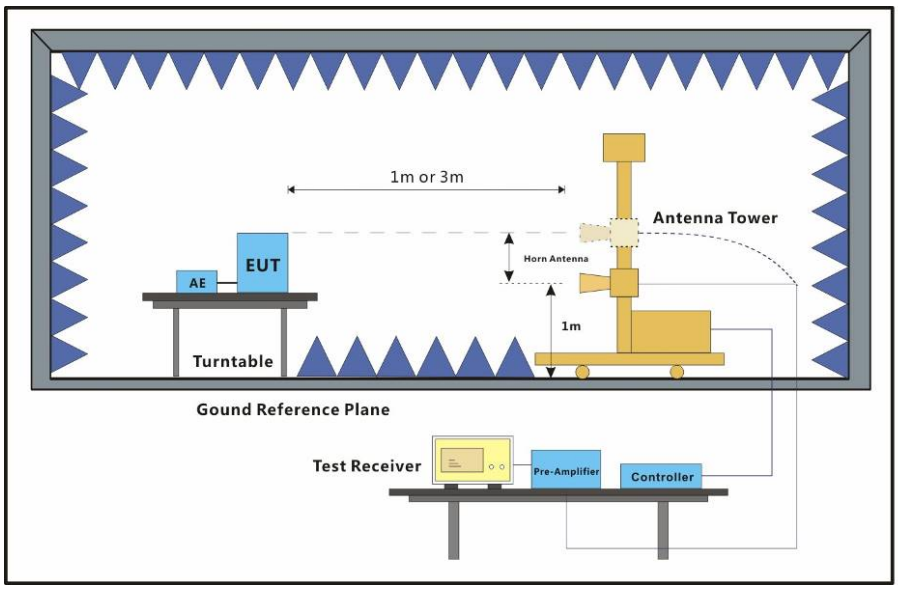
6.3 Radiated Emissions (above 1GHz)

Test Requirement: EN 61000-6-3:2007 +A1:2011
Test Method: CISPR 16-2-3
Frequency Range: Above 1GHz
Measurement Distance: 3m
Limit:
1GHz-3GHz 70 dB(μV/m) peak, 50 dB(μV/m) average
3GHz-6GHz 74 dB(μV/m) peak, 54dB(μV/m) average
Detector: Peak for pre-scan (1000kHz resolution bandwidth) 1000M to 6000MHz

6.3.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

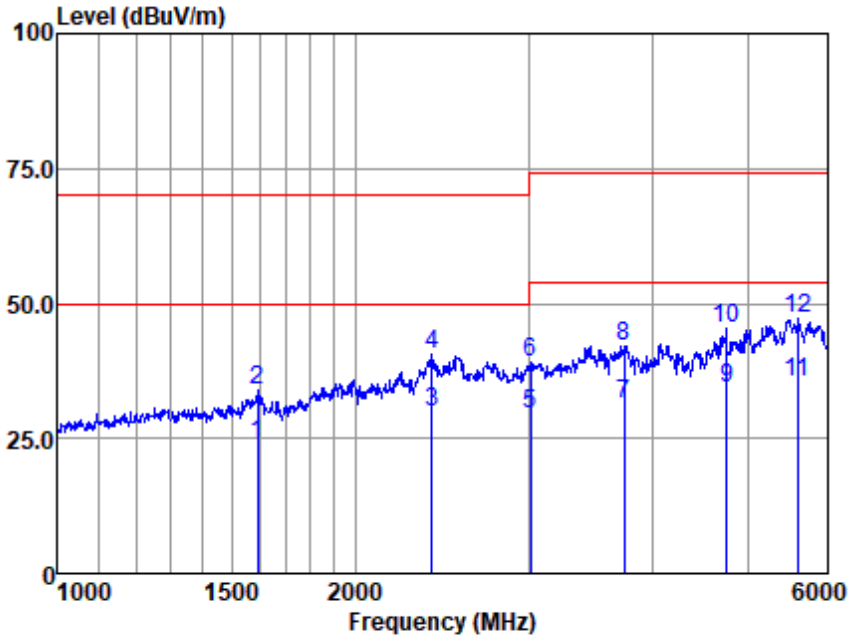
6.3.2 Test Setup Diagram



6.3.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.

Mode:a; Polarization:Horizontal

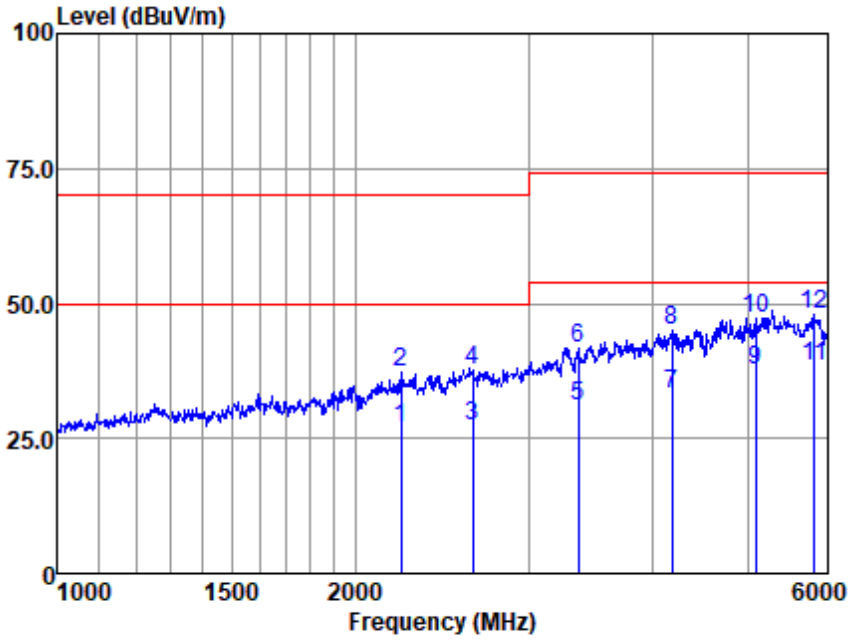


Antenna Polarity :HORIZONTAL
EUT/Project :9974BA
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1593.380	36.64	25.37	3.97	41.99	23.99	50.00	-26.01	Average
2	1593.380	46.75	25.37	3.97	41.99	34.10	70.00	-35.90	Peak
3	2388.809	39.82	27.11	5.17	42.18	29.92	50.00	-20.08	Average
4	2388.809	50.50	27.11	5.17	42.18	40.60	70.00	-29.40	Peak
5	3004.588	36.97	28.51	5.83	41.71	29.60	54.00	-24.40	Average
6	3004.588	46.47	28.51	5.83	41.71	39.10	74.00	-34.90	Peak
7	3738.689	37.58	29.24	6.60	41.91	31.51	54.00	-22.49	Average
8	3738.689	48.32	29.24	6.60	41.91	42.25	74.00	-31.75	Peak
9	4744.751	36.62	31.11	8.04	41.63	34.14	54.00	-19.86	Average
10	4744.751	47.81	31.11	8.04	41.63	45.33	74.00	-28.67	Peak
11	5605.076	37.13	32.04	8.34	41.97	35.54	54.00	-18.46	Average
12	5605.076	48.85	32.04	8.34	41.97	47.26	74.00	-26.74	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:a; Polarization:Vertical

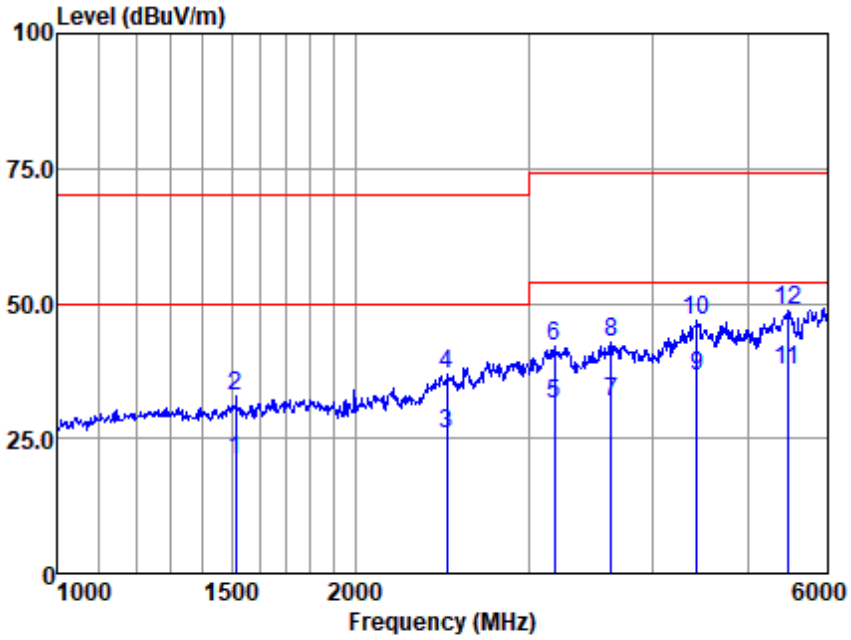


Antenna Polarity :VERTICAL
EUT/Project :9974BA
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2223.594	37.55	26.65	4.92	42.20	26.92	50.00	-23.08	Average
2	2223.594	47.97	26.65	4.92	42.20	37.34	70.00	-32.66	Peak
3	2626.779	36.31	27.70	5.47	42.05	27.43	50.00	-22.57	Average
4	2626.779	46.54	27.70	5.47	42.05	37.66	70.00	-32.34	Peak
5	3363.631	37.96	28.73	6.12	41.82	30.99	54.00	-23.01	Average
6	3363.631	48.74	28.73	6.12	41.82	41.77	74.00	-32.23	Peak
7	4185.457	37.55	30.04	7.32	41.85	33.06	54.00	-20.94	Average
8	4185.457	49.42	30.04	7.32	41.85	44.93	74.00	-29.07	Peak
9	5079.058	39.43	31.65	8.21	41.67	37.62	54.00	-16.38	Average
10	5079.058	49.21	31.65	8.21	41.67	47.40	74.00	-26.60	Peak
11	5819.996	39.49	32.34	8.38	41.90	38.31	54.00	-15.69	Average
12	5819.996	49.10	32.34	8.38	41.90	47.92	74.00	-26.08	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal

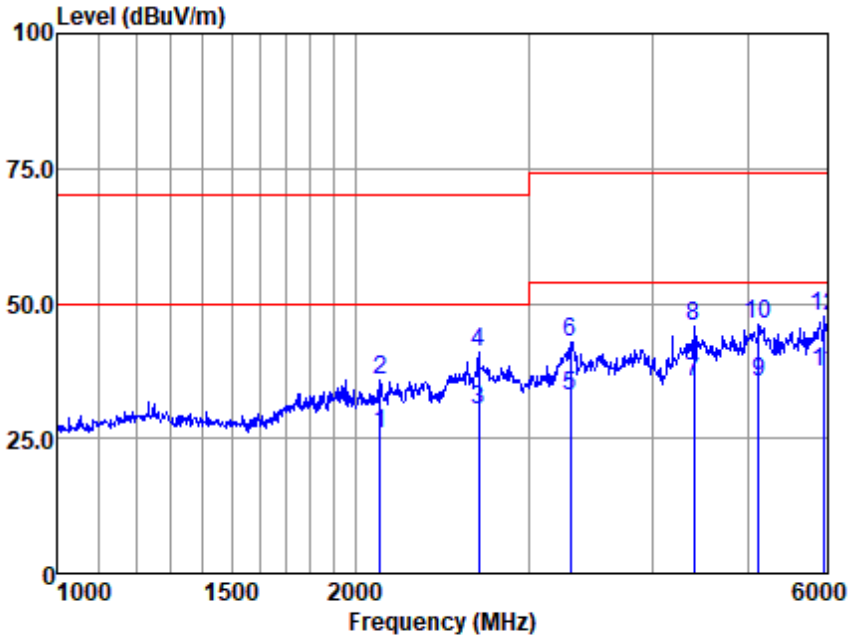


Antenna Polarity :HORIZONTAL
EUT/Project :9974BA
Test mode :b

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1515.413	32.58	25.23	5.78	42.42	21.17	50.00	-28.83	Average
2	1515.413	44.10	25.23	5.78	42.42	32.69	70.00	-37.31	Peak
3	2475.965	33.16	27.35	7.73	42.33	25.91	50.00	-24.09	Average
4	2475.965	44.11	27.35	7.73	42.33	36.86	70.00	-33.14	Peak
5	3181.894	36.07	28.61	9.05	42.32	31.41	54.00	-22.59	Average
6	3181.894	46.73	28.61	9.05	42.32	42.07	74.00	-31.93	Peak
7	3633.029	34.82	29.05	10.40	42.37	31.90	54.00	-22.10	Average
8	3633.029	45.72	29.05	10.40	42.37	42.80	74.00	-31.20	Peak
9	4432.448	37.26	30.49	11.10	42.45	36.40	54.00	-17.60	Average
10	4432.448	47.83	30.49	11.10	42.45	46.97	74.00	-27.03	Peak
11	5476.026	35.78	31.88	12.41	42.58	37.49	54.00	-16.51	Average
12	5476.026	47.15	31.88	12.41	42.58	48.86	74.00	-25.14	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical



Antenna Polarity :VERTICAL
EUT/Project :9974BA
Test mode :b

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2118.583	36.75	26.36	4.75	42.21	25.65	50.00	-24.35	Average
2	2118.583	46.85	26.36	4.75	42.21	35.75	70.00	-34.25	Peak
3	2664.703	38.98	27.78	5.52	42.01	30.27	50.00	-19.73	Average
4	2664.703	49.62	27.78	5.52	42.01	40.91	70.00	-29.09	Peak
5	3297.985	39.85	28.69	6.06	41.80	32.80	54.00	-21.20	Average
6	3297.985	49.80	28.69	6.06	41.80	42.75	74.00	-31.25	Peak
7	4400.794	38.96	30.44	7.64	41.71	35.33	54.00	-18.67	Average
8	4400.794	49.23	30.44	7.64	41.71	45.60	74.00	-28.40	Peak
9	5115.591	37.24	31.67	8.21	41.71	35.41	54.00	-18.59	Average
10	5115.591	47.92	31.67	8.21	41.71	46.09	74.00	-27.91	Peak
11	5967.835	38.16	32.55	8.42	41.84	37.29	54.00	-16.71	Average
12	5967.835	48.40	32.55	8.42	41.84	47.53	74.00	-26.47	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

6.4 Conducted Emissions at DC Terminals (150kHz-30MHz)

Test Requirement: EN 61000-6-3:2007 +A1:2011

Test Method: CISPR 16-2-1

Frequency Range: 150kHz to 30MHz

Limit:

0.15M-0.5MHz(Voltage) 84-74(dBμV) quasi-peak; 74-64(dBμV) average

0.5M-30MHz(Voltage) 74(dBμV) quasi-peak; 64(dBμV) average

Detector: 9kHz resolution bandwidth 0.15M to 30MHz

Remark: The voltage measured shall be corrected at each frequency of interest as follows:

if the current margin with respect to the current limit is ≤ 6 dB, the actual current margin shall be subtracted from the measured voltage;

if the current margin with respect to the current limit is > 6 dB, 6 dB shall be subtracted from the measured voltage.

6.4.1 E.U.T. Operation

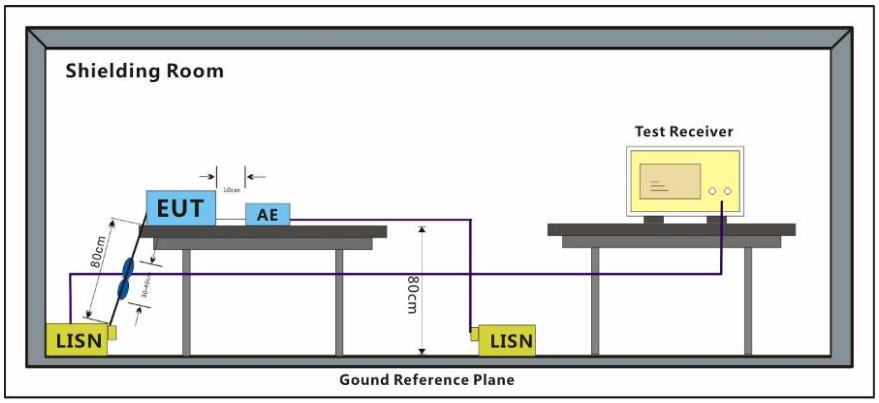
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode: a: keep battery charging continual.

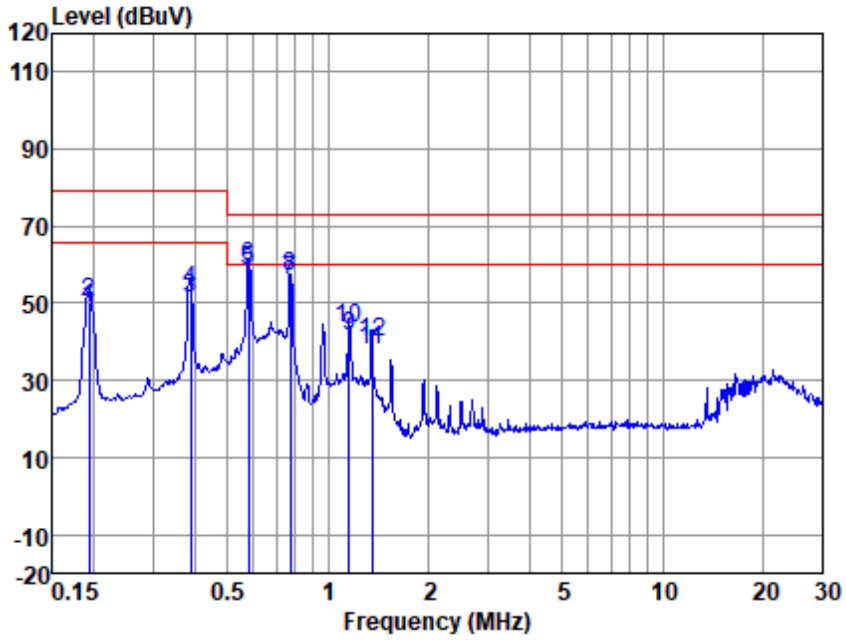
b: keep battery discharging continual.

6.4.2 Test Setup Diagram



6.4.3 Measurement Data

Mode:a

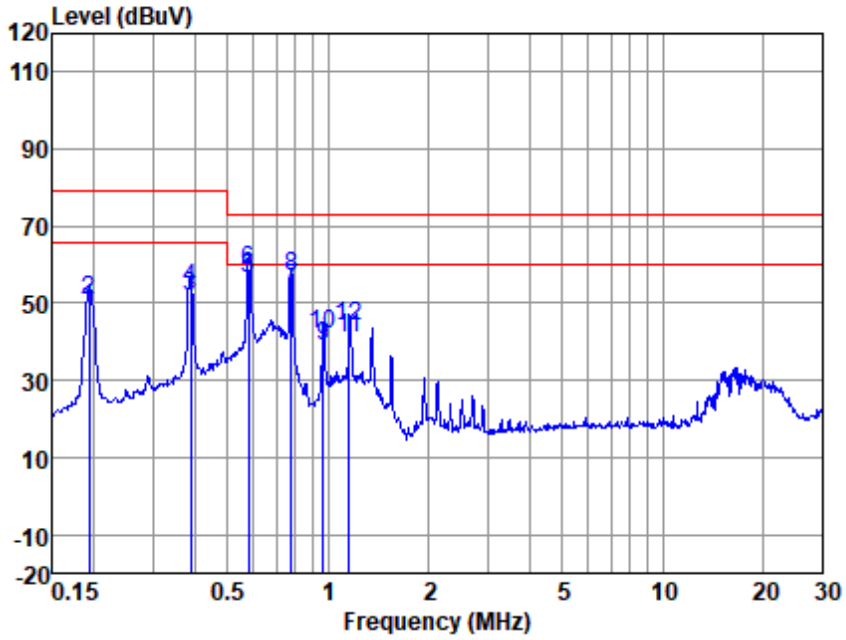


LISN : LINE
EUT/Project No : 9974BA
Test Mode : a

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.19	38.35	0.20	9.92	48.47	66.00	-17.53	Average
2	0.19	40.35	0.20	9.92	50.47	79.00	-28.53	QP
3	0.39	41.03	0.20	9.93	51.16	66.00	-14.84	Average
4	0.39	43.03	0.20	9.93	53.16	79.00	-25.84	QP
5	0.58	48.16	0.20	9.92	58.28	60.00	-1.72	Average
6	0.58	49.26	0.20	9.92	59.38	73.00	-13.62	QP
7	0.77	45.80	0.20	9.90	55.90	60.00	-4.10	Average
8	0.77	46.85	0.20	9.90	56.95	73.00	-16.05	QP
9	1.15	31.22	0.20	9.91	41.33	60.00	-18.67	Average
10	1.15	33.22	0.20	9.91	43.33	73.00	-29.67	QP
11	1.35	27.81	0.20	9.91	37.92	60.00	-22.08	Average
12	1.35	29.81	0.20	9.91	39.92	73.00	-33.08	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

Mode:a

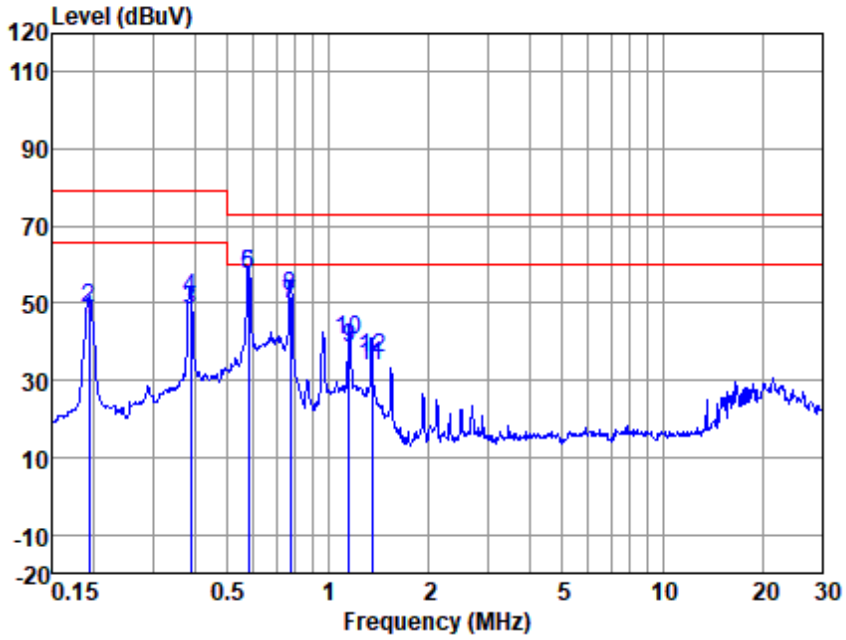


LISN : NEUTRAL
EUT/Project No : 9974BA
Test Mode : a

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.19	38.57	0.20	9.92	48.69	66.00	-17.31	Average
2	0.19	40.57	0.20	9.92	50.69	79.00	-28.31	QP
3	0.39	41.80	0.20	9.93	51.93	66.00	-14.07	Average
4	0.39	43.80	0.20	9.93	53.93	79.00	-25.07	QP
5	0.58	46.23	0.20	9.92	56.35	60.00	-3.65	Average
6	0.58	48.26	0.20	9.92	58.38	73.00	-14.62	QP
7	0.78	43.62	0.20	9.90	53.72	60.00	-6.28	Average
8	0.78	47.06	0.20	9.90	57.16	73.00	-15.84	QP
9	0.97	29.01	0.20	9.90	39.11	60.00	-20.89	Average
10	0.97	32.01	0.20	9.90	42.11	73.00	-30.89	QP
11	1.16	31.07	0.20	9.91	41.18	60.00	-18.82	Average
12	1.16	34.07	0.20	9.91	44.18	73.00	-28.82	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

Mode:b

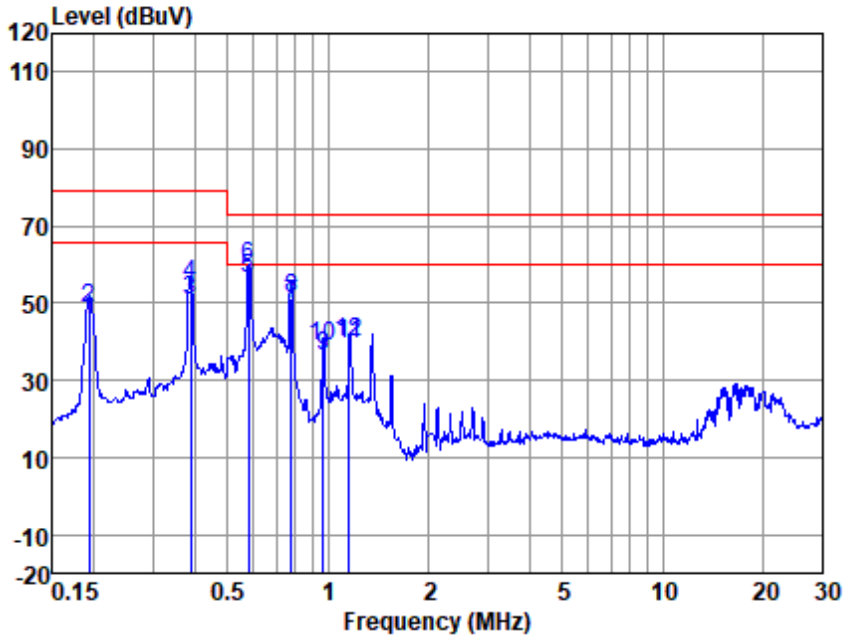


LISN : LINE
EUT/Project No : 9974BA
Test Mode : b

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.19	35.35	0.20	9.92	45.47	66.00	-20.53	Average
2	0.19	38.35	0.20	9.92	48.47	79.00	-30.53	QP
3	0.39	38.03	0.20	9.93	48.16	66.00	-17.84	Average
4	0.39	41.03	0.20	9.93	51.16	79.00	-27.84	QP
5	0.58	47.16	0.20	9.92	57.28	60.00	-2.72	Average
6	0.58	47.26	0.20	9.92	57.38	73.00	-15.62	QP
7	0.77	39.80	0.20	9.90	49.90	60.00	-10.10	Average
8	0.77	41.85	0.20	9.90	51.95	73.00	-21.05	QP
9	1.15	28.22	0.20	9.91	38.33	60.00	-21.67	Average
10	1.15	30.22	0.20	9.91	40.33	73.00	-32.67	QP
11	1.35	23.81	0.20	9.91	33.92	60.00	-26.08	Average
12	1.35	25.81	0.20	9.91	35.92	73.00	-37.08	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

Mode:b



LISN : NEUTRAL
EUT/Project No : 9974BA
Test Mode : b

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.19	35.57	0.20	9.92	45.69	66.00	-20.31	Average
2	0.19	38.57	0.20	9.92	48.69	79.00	-30.31	QP
3	0.39	40.80	0.20	9.93	50.93	66.00	-15.07	Average
4	0.39	44.80	0.20	9.93	54.93	79.00	-24.07	QP
5	0.58	46.23	0.20	9.92	56.35	60.00	-3.65	Average
6	0.58	49.26	0.20	9.92	59.38	73.00	-13.62	QP
7	0.78	39.62	0.20	9.90	49.72	60.00	-10.28	Average
8	0.78	41.06	0.20	9.90	51.16	73.00	-21.84	QP
9	0.97	26.01	0.20	9.90	36.11	60.00	-23.89	Average
10	0.97	29.01	0.20	9.90	39.11	73.00	-33.89	QP
11	1.16	29.07	0.20	9.91	39.18	60.00	-20.82	Average
12	1.16	30.07	0.20	9.91	40.18	73.00	-32.82	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

7 Immunity Test Results

7.1 Performance Criteria Description in EN IEC 61000-6-1:2019

Criterion A The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

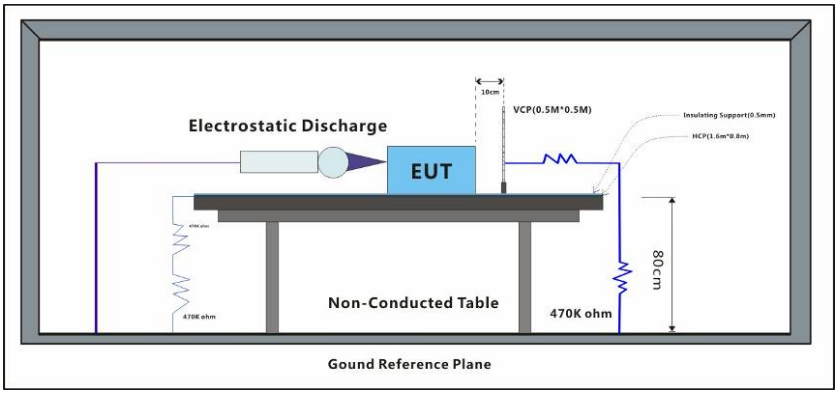
Criterion B The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Criterion C Temporary loss of function is allowed during the test, provided the function is self-recoverable or can be restored by the operation of the controls.

7.2 Electrostatic Discharge

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-2:2009
Performance Criterion: B
Discharge Impedance: 330Ω/150pF
Number of Discharge: Minimum 10 times at each test point
Discharge Mode: Single Discharge
Discharge Period: 1 second minimum

7.2.1 Test Setup Diagram



7.2.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.2.3 Test Results:

Observations: Test Point:
1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	2,4,8	+	1	A
Air Discharge	2,4,8	-	1	A
Contact Discharge	4	+	2	A
Contact Discharge	4	-	2	A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A

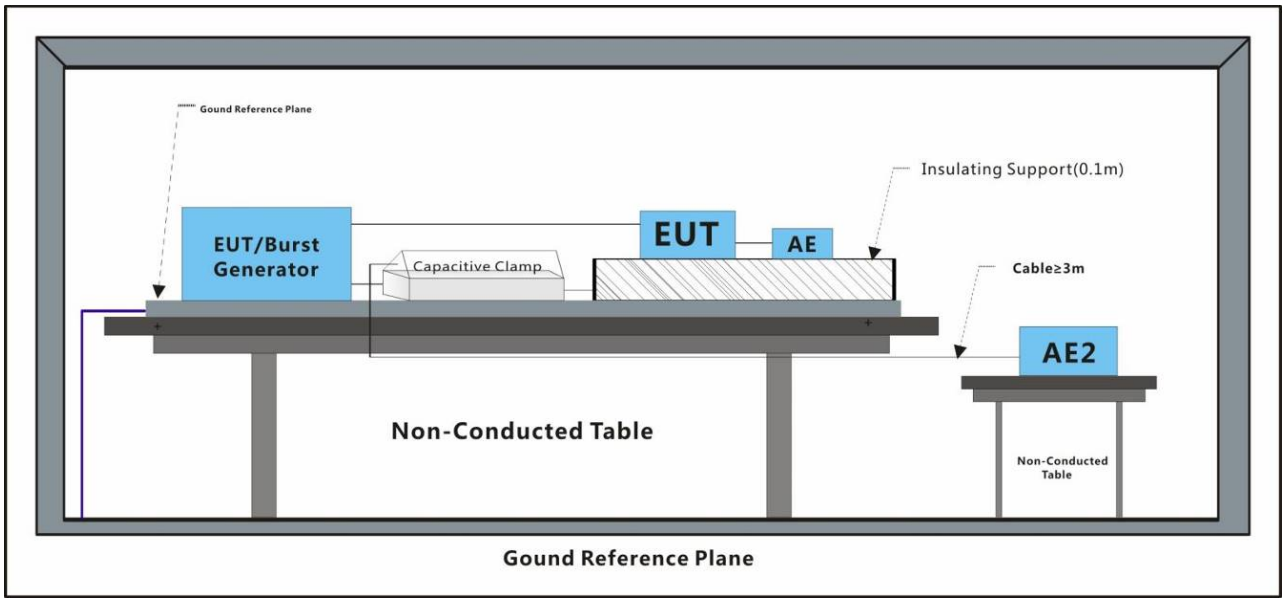
Results:

A: No degradation in the performance of the EUT was observed.

7.3 Electrical Fast Transients/Burst at Signal Port

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-4:2012
Performance Criterion: B
Repetition Frequency: 5kHz
Burst Period: 300ms
Test Duration: 2 minute per level & polarity

7.3.1 Test Setup Diagram



7.3.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.3.3 Test Results:

Port	Level (kV)	Polarity	CDN/Clamp	Result / Observations
Signal port	0.5	+	Clamp	A
Signal port	0.5	-	Clamp	A

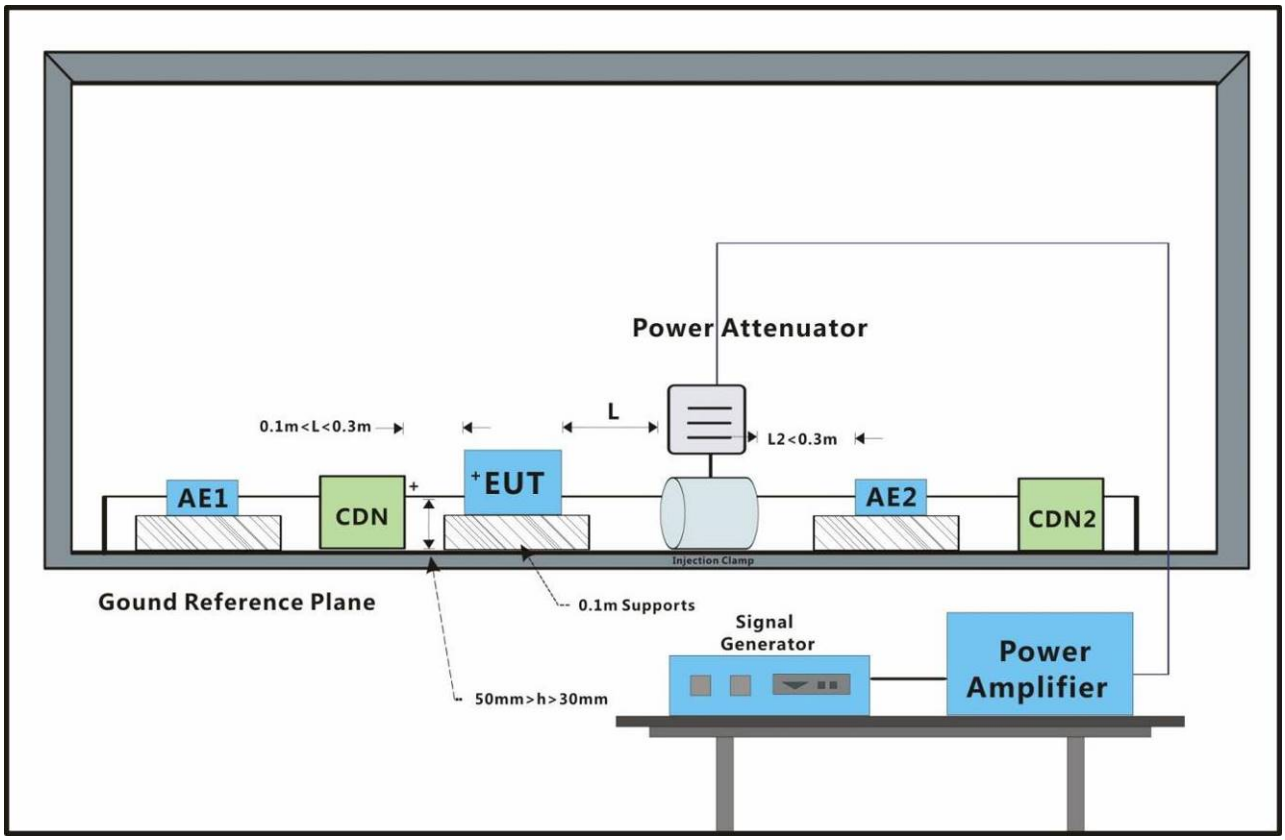
Results:

A: No degradation in the performance of the EUT was observed.

7.4 Conducted Immunity at Signal Port (150kHz-80MHz)

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-6:2014
Performance Criterion: A
Frequency Range: 0.15MHz to 80MHz
Modulation: 80%, 1kHz Amplitude Modulation
Step Size 1%

7.4.1 Test Setup Diagram



7.4.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.4.3 Test Results:

Port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
Signal Port	3	Coupling	3s	A

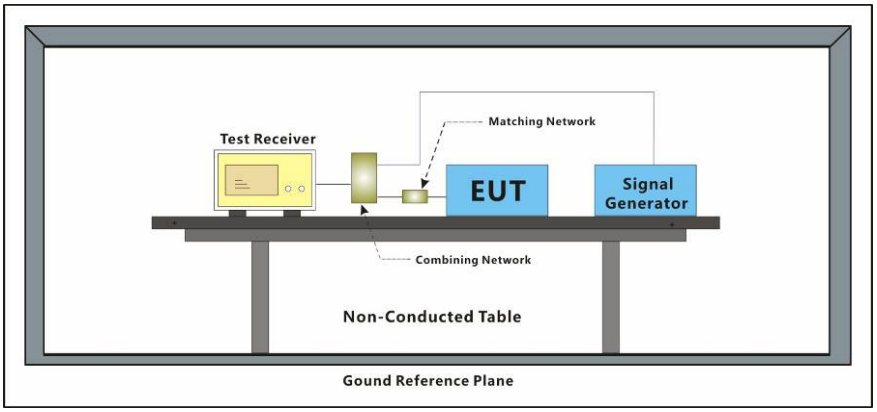
Results:

A: No degradation in the performance of the EUT was observed.

7.5 Electrical Fast Transients/Burst at DC port

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-4:2012
Performance Criterion: B
Test level: ±0.5kV (Line to Line); ±1kV (Line to Ground)
EFT repetition frequency: 5kHz or 100kHz

7.5.1 Test Setup Diagram



7.5.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.5.3 Test Results:

Port	Level (kV)	Polarity	CDN/Clamp	Result / Observations
DC power port	0.5	+	CDN	A
DC power port	0.5	-	CDN	A

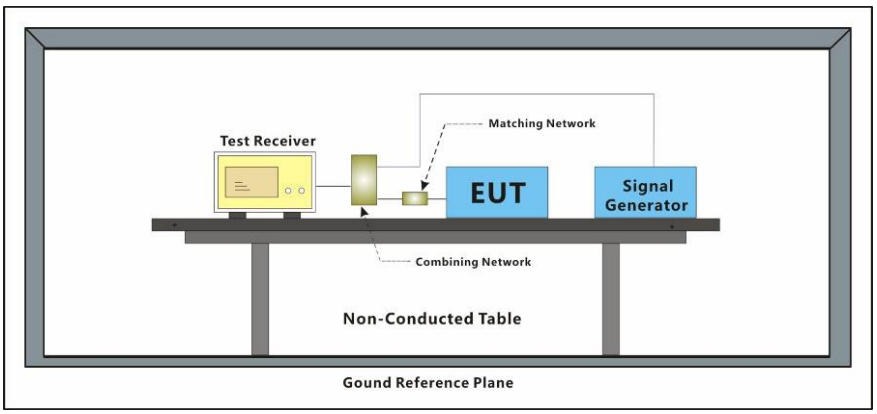
Results:

A: No degradation in the performance of the EUT was observed.

7.6 Surge at DC Port

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-5:2014 +A1:2017
Performance Criterion: B

7.6.1 Test Setup Diagram



7.6.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.6.3 Test Results:

Port	Line	Level (kV)	Polarity	Result / Observations
DC power port	Line-Line	0.5	+	A
DC power port	Line-Line	0.5	-	A
DC power port	Line-Ground	1	+	A
DC power port	Line-Ground	1	-	A

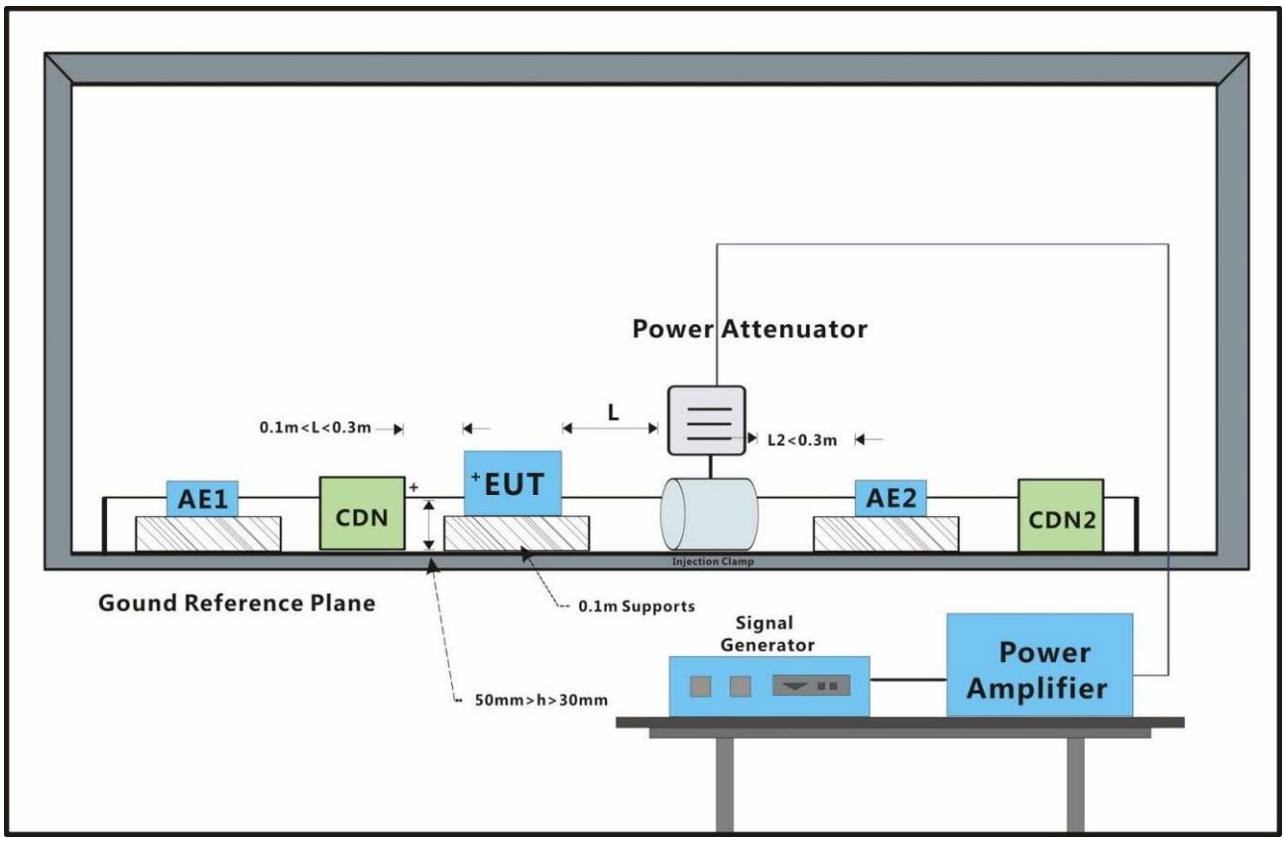
Results:

A: No degradation in the performance of the EUT was observed.

7.7 Conducted Immunity at DC Port (150kHz-80MHz)

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-6:2014
Performance Criterion: B
Performance Criterion: A
Frequency Range: 0.15MHz to 80MHz
Modulation: 80%, 1kHz Amplitude Modulation
Step Size 1%

7.7.1 Test Setup Diagram



7.7.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.7.3 Test Results:

Port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
DC power port	3	Clamp	3s	A

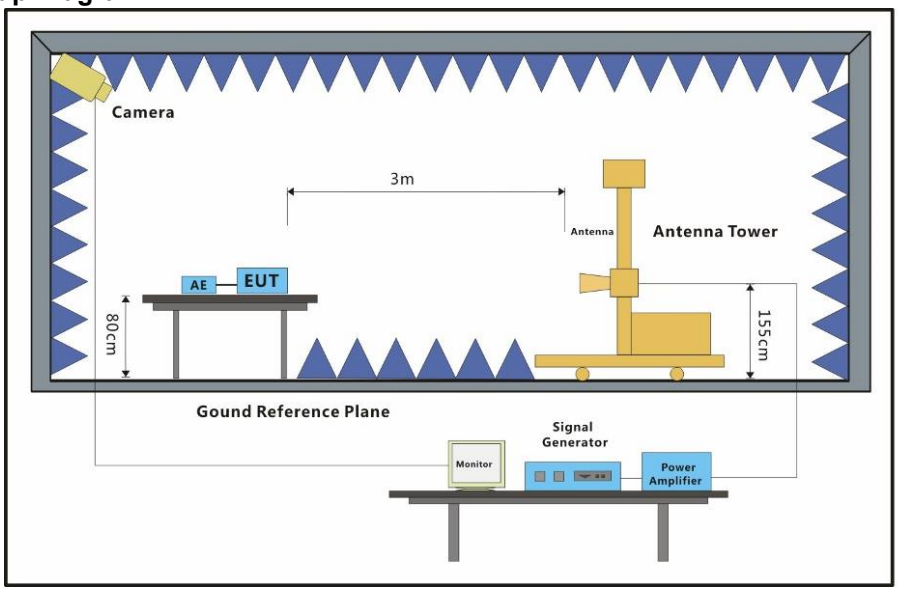
Results:

A: No degradation in the performance of the EUT was observed.

7.8 Radiated Immunity (80MHz-1GHz, 1.4GHz-6GHz)

Test Requirement: EN IEC 61000-6-1:2019
Test Method: EN 61000-4-3:2006 +A1:2008+A2:2010
Performance Criterion: A
Frequency Range: 80MHz to 1GHz, 1.4GHz to 6GHz
Antenna Polarisation: Vertical and Horizontal
Modulation: 1kHz,80% Amp. Mod,1% increment

7.8.1 Test Setup Diagram



7.8.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a: keep battery charging continual.
b: keep battery discharging continual.

7.8.3 Test Results:

Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	3	Front	3s	A
80MHz-1GHz	3	Back	3s	A
80MHz-1GHz	3	Left	3s	A
80MHz-1GHz	3	Right	3s	A
80MHz-1GHz	3	Top	3s	A
80MHz-1GHz	3	Underside	3s	A
1.4GHz-6GHz	3	Front	3s	A
1.4GHz-6GHz	3	Back	3s	A
1.4GHz-6GHz	3	Left	3s	A
1.4GHz-6GHz	3	Right	3s	A
1.4GHz-6GHz	3	Top	3s	A
1.4GHz-6GHz	3	Underside	3s	A

Results:
A: No degradation in the performance of the EUT was observed.

8 Photographs

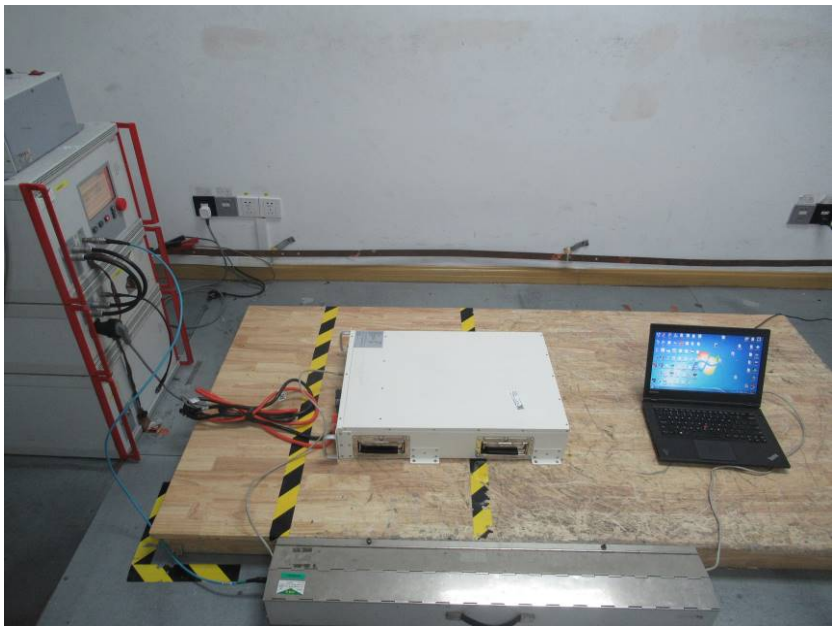
8.1 Conducted Emissions at Telecommunication Port (150kHz-30MHz) Test Setup

8.2 Radiated Emissions (30MHz-1GHz) Test Setup

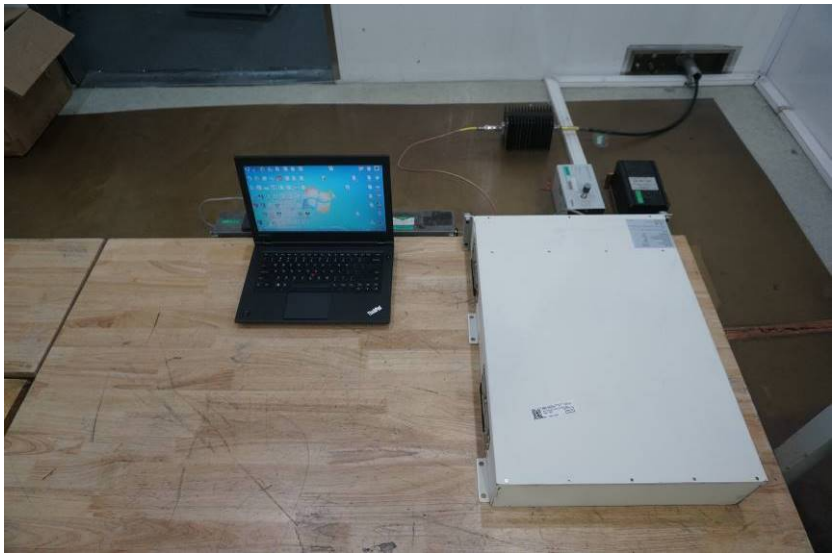
8.3 Radiated Emissions (above 1GHz) Test Setup

8.4 Electrostatic Discharge Test Setup

8.5 Electrical Fast Transients/Burst at Signal Port Test Setup



8.6 Conducted Immunity at Signal Port (150kHz-80MHz) Test Setup



8.7 Electrical Fast Transients/Burst at DC port Test Setup

8.8 Conducted Emissions at DC Terminals (150kHz-30MHz) Test Setup

8.9 Surge at DC Port Test Setup

8.10 Conducted Immunity at DC Port (150kHz-80MHz) Test Setup

8.11 Radiated Immunity (80MHz-1GHz, 1.4GHz-6GHz) Test Setup

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8.12 EUT Constructional Details (EUT Photos)

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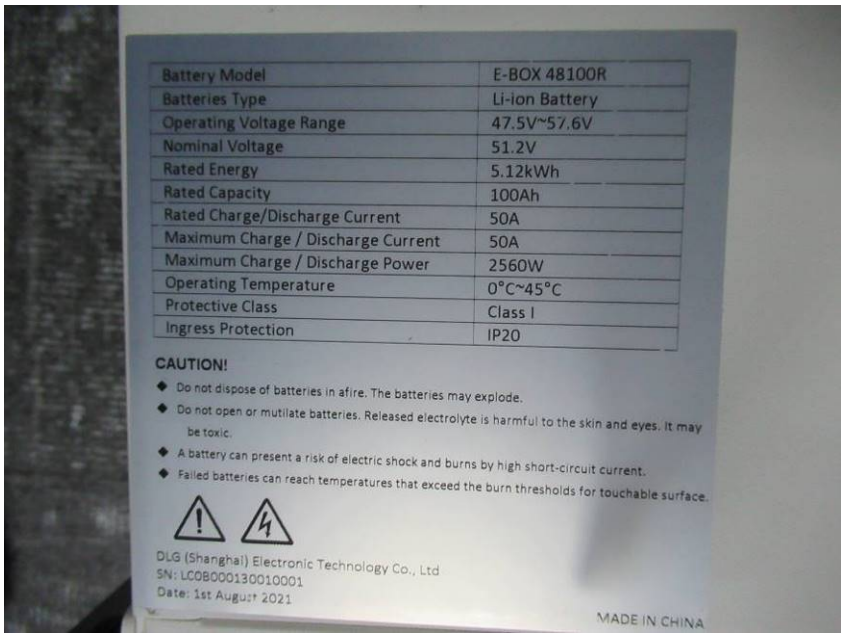

- End of the Report -