



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

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHEM230900594901

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TEST REPORT

Application No.: SHEM2309005949BA
Applicant: Shinson Technology Co.,Ltd
Address of Applicant: Block#201,No.9 Chuangye Road,Changzhou,Jiangsu,PRC

Manufacturer: Shinson Technology Co.,Ltd
Address of Manufacturer: Block#201,No.9 Chuangye Road,Changzhou,Jiangsu,PRC

Factory: Shinson Technology Co.,Ltd
Address of Factory: Block#201,No.9 Chuangye Road,Changzhou,Jiangsu,PRC

Equipment Under Test (EUT):

EUT Name: Stackable Lithium Ion Battery System
Model No.: SNE-SLBS5, SNE-SLBS10, SNE-SLBS15, SNE-SLBS20, SNE-SLBS25, SNE-SLBS30, SNE-SLBS35, SNE-SLBS40
Remark: Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark: 
Standard(s) : EN IEC 61000-6-3: 2021
EN IEC 61000-6-1: 2019
Date of Receipt: 2023-09-18
Date of Test: 2023-09-21 to 2023-10-09
Date of Issue: 2023-10-11

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Remark: sample source: sent by customer

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



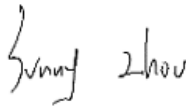
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Revision Record			
Version	Description	Date	Remark
00	Original	2023-10-11	/

Authorized for issue by:				
Tested By				
		Sunny Zhou/Project Engineer		
Approved By				
		Jim Xu/Reviewer		

2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at DC Power Port (150kHz-30MHz)	EN IEC 61000-6-3: 2021	CISPR 16-2-1	Table 5	Pass
Conducted Emissions at Other Wired Port (150kHz-30MHz)		CISPR 32	Table 6	Pass
Radiated Emissions (30MHz-1GHz)		CISPR 16-2-3	Table 3.1	Pass

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
Radiated Immunity (80MHz-1GHz, 1.4GHz-6GHz)		EN IEC 61000-4-3: 2020	3V/m, 80%, 1kHz Amp. Mod.	Pass
Electrical Fast Transients Burst at DC Power Port		EN 61000-4-4:2012	0.5kV 5/50ns Tr/Td 5kHz Repetition Frequency	Pass
Electrical Fast Transients Burst at Signal Port		EN 61000-4-4:2012	0.5kV 5/50ns Tr/Td 5kHz Repetition Frequency	Pass
Surge at DC Port		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 Power Port (150kHz-80MHz)		EN 61000-4-6:2014	3Vrms (emf), 80%, 1kHz Amp. Mod.	Pass
Conducted Immunity at Signal Port (150kHz-80MHz)		EN 61000-4-6:2014	3Vrms (emf), 80%, 1kHz Amp. Mod.	Pass
Power Frequency Magnetic Field		EN 61000-4-8:2010	50/60Hz 3A/m	Pass

Note: There are series models mentioned in this report and they are the similar in electrical and electronic characters. Only the model SNE-SLBS5 was tested since their difference was model number and appearance.

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4 General Information

4.1 Details of E.U.T.

Power supply:	102.4V 30A Test voltage: DC102.4V
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4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Resistance load	NA	NA	NA
DC power supply	HP	HP6674A	-
Laptop	LENOVO	L460	-

4.3 Measurement Uncertainty & Decision Rule

Measurement Uncertainty:

No.	Item	Measurement Uncertainty (U_{Lab})	U_{CISPR}
1	Conducted Emission at mains port using AMN	3.4dB (9kHz to 150kHz)	3.8dB (9kHz to 150kHz)
		2.9dB (150kHz to 30MHz)	3.4dB (150kHz to 30MHz)
2	Conducted Emission at mains port using VP	2.2dB (9kHz to 30MHz)	2.9dB (9kHz to 30MHz)
3	Conducted Emission at telecommunication port using AAN	4.6dB (150kHz to 30MHz)	5.0dB (150kHz to 30MHz)
4	Radiated Power	3.4dB (30MHz to 300MHz)	4.5dB (30MHz to 300MHz)
5	Radiated emission	5.7dB (30MHz-1GHz)	6.3dB (30MHz-1GHz)
		4.8dB (1GHz-6GHz)	5.2dB (1GHz-6GHz)
		5.0dB (6GHz-18GHz)	5.5dB (6GHz-18GHz)
6	Radiated disturbance (disturbance current in a LLAS)	2.6dB (9kHz to 30MHz)	3.3dB (9kHz to 30MHz)

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

Decision Rule:

• CISPR 16-4-2 for emission measurements is as below described.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

U_{LAB} less than U_{CISPR} , therefore:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).
3. Sample source: sent by customer.

4.5 Test Facility

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

- **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 EMS Monitor

Visual: Monitor the work status

5 Equipment List

Conducted Emissions at DC Power Port (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2022/12/20	2023/12/19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2022/12/20	2023/12/19
Line impedance stabilization network	EMCO	3816_2	SHEM019-1	2022/12/20	2023/12/19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2022/12/20	2023/12/19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020/12/20	2023/12/19
CE test Cable	/	/	SHEM172-1	2022/12/20	2023/12/19
Test Software	ESE	e3	Version: 6.191211	N/A	N/A

Conducted Emissions at Other Wired Port (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2022/12/20	2023/12/19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2022/12/20	2023/12/19
Line impedance stabilization network	EMCO	3816_2	SHEM019-1	2022/12/20	2023/12/19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2022/12/20	2023/12/19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020/12/20	2023/12/19
CE test Cable	/	/	SHEM172-1	2022/12/20	2023/12/19
8-wire ISN cat 5	SCHWARZBECK	CAT5 8158	SHEM137-1	2022/12/20	2023/12/19
8-wire ISN cat 3	SCHWARZBECK	CAT3 8158	SHEM137-2	2022/12/20	2023/12/19
8-wire ISN cat 6	SCHWARZBECK	NTFM8158	SHEM137-3	2022/12/20	2023/12/19
2-wire ISN	SCHWARZBECK	NTFM 8131	SHEM139-1	2022/12/20	2023/12/19
Passive Voltage probe	Rohde & Schwarz	ESH2-Z3	SHEM028-1	2023/9/28	2024/9/27
Capacitive Voltage Probe	SCHWARZBECK	CVP9222 B	SHEM169-1	2023/8/01	2024/7/31
Current Probe	SCHWARZBECK	SW9605	SHEM170-1	2023/8/01	2024/7/31
Test Software	ESE	e3	Version: 6.191211	N/A	N/A

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2022/12/20	2023/12/19
EMI test receiver	Rohde & Schwarz	ESR7	SHEM201-1	2023/8/01	2024/7/31
CONTROLLER	INNCO	CO2000	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	2023/9/3	2025/9/2
Broadband UHF-VHF ANTENNA	SCHWARZBECK	VULB9168	SHEM202-1	2023/4/17	2025/4/16
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2023/5/6	2026/5/5

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Pre-amplifier	HP	8447D	SHEM236-1	2022/12/22	2023/12/21
Pre-amplifier	HP	8447D	SHEM143-1	2022/12/20	2023/12/19
RE test Cable	/	/	SHEM217-2	2023/5/9	2024/5/8
Test Software	ESE	e3	Version: 6.191211	N/A	N/A
Semi/Fully Anechoic	TIANDE	9*6*6M	SHEM198-1	2021/05/27	2024/05/26

Electrostatic Discharge

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Electrostatic Discharge Simulator	TESEQ	NSG 437	SHEM041-2	2023/8/01	2024/7/31
Electrostatic Discharge Simulator	3CTEST	EDS20H	SHEM199-1	2022/12/20	2023/12/19

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

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMB100A	SHEM194-1	2022/12/20	2023/12/19
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2023/8/01	2024/7/31
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-3	2023/8/01	2024/7/31
Antenna	SCHWARZBECK	STLP9128D	SHEM130-1	N/A	N/A
Antenna	SCHWARZBECK	STLP9149	SHEM131-1	N/A	N/A
Amplifier	MILMEGA	AS0840-55-55	SHEM133-1	2022/12/20	2023/12/19
Amplifier	MILMEGA	80RF1000-250	SHEM132-1	2022/12/20	2023/12/19
Amplifier	Rohde & Schwarz	BBA150-E60	SHEM171-1	2022/12/20	2023/12/19
Power meter sensor	Rohde & Schwarz	NRP-Z22	SHEM136-1	2023/8/01	2024/7/31
ElectroMagnetic Field Probe	ETS-Lindgren	HI-6105	SHEM134-1	2023/8/24	2024/8/23
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2023/5/6	2026/5/5
Test Software	Rohde & Schwarz	EMC32	Version: 10.20.01	N/A	N/A

Electrical Fast Transients Burst at DC Power Port

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2022/12/20	2023/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2023/8/01	2024/7/31
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2023/8/01	2024/7/31
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2023/9/28	2024/9/27
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2023/9/28	2024/9/27
Capacitive coupling clamp	PRIMA	EFT-CLAMP	SHEM200-4	2022/12/20	2023/12/19

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	2022/12/20	2023/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2023/8/01	2024/7/31
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2023/8/01	2024/7/31
Capacitive Coupling Clamp	EM TEST	HFK	SHEM026-2	2022/12/20	2023/12/19
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2023/9/28	2024/9/27
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2023/9/28	2024/9/27
Capacitive coupling clamp	PRIMA	EFT-CLAMP	SHEM200-4	2022/12/20	2023/12/19

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	2022/12/20	2023/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2023/8/01	2024/7/31
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2023/8/01	2024/7/31
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2023/9/28	2024/9/27
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2023/9/28	2024/9/27
Data coupling network 4 line	EM TEST	CNV 504	SHEM026-3	2022/12/20	2023/12/19
CDN for unsymmetrical interconnection lines (1.2/50us)	SCHAFFNER	CDN 117	SHEM224-5	2023/8/01	2024/7/31
CDN for symmetric datalines & Resistor network (Surge 1.2/50 or 10/700 us)	SCHAFFNER	CDN 118 & INA172	SHEM224-6 & SHEM224-7	2023/8/01	2024/7/31

Conducted Immunity at DC Power Port (150kHz-80MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMB100A	SHEM194-1	2022/12/20	2023/12/19
Power Amplifier	HAEFFLY	PAMP250	SHEM023-1	2022/12/20	2023/12/19
6dB Attenuator	HUAXIANG	DTS50-6dB-1G-A	SHEM123-2	2022/12/20	2023/12/19
Coupling clamp	LUTHI	EM 101	SHEM027-1	2023/06/05	2024/06/04
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2023/8/01	2024/7/31
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-3	2023/8/01	2024/7/31
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M1	SHEM023-5	2022/12/20	2023/12/19
Coupling and	LUTHI	L-801 M2/M3	SHEM023-6	2022/12/20	2023/12/19

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Decoupling Network (CDN)					
Shielding Room	ZHONGYU	5*3*3M	SHEM079-6	2022/12/20	2025/12/19
Coupling and Decoupling Network	Teseq	CDN M016	SHEM168-1	2023/8/01	2024/7/31
RF Generator	SCHAFFNER	NSG 2070	SHEM221-1	2022/8/02	2024/8/01
Test Software	Rohde & Schwarz	EMC32	Version: 10.20.01	N/A	N/A
Current Clamp	PRANA	IP-DR250	SHEM273-1	2023/02/03	2024/02/02

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

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMB100A	SHEM194-1	2022/12/20	2023/12/19
Power Amplifier	HAEFFLY	PAMP250	SHEM023-1	2022/12/20	2023/12/19
6dB Attenuator	HUAXIANG	DTS50-6dB-1G-A	SHEM123-2	2022/12/20	2023/12/19
Coupling clamp	LUTHI	EM 101	SHEM027-1	2023/06/05	2024/06/04
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2023/8/01	2024/7/31
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-3	2023/8/01	2024/7/31
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M1	SHEM023-5	2022/12/20	2023/12/19
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M2/M3	SHEM023-6	2022/12/20	2023/12/19
Shielding Room	ZHONGYU	5*3*3M	SHEM079-6	2022/12/20	2025/12/19
Coupling and Decoupling Network	Teseq	CDN M016	SHEM168-1	2023/8/01	2024/7/31
RF Generator	SCHAFFNER	NSG 2070	SHEM221-1	2022/8/02	2024/8/01
Test Software	Rohde & Schwarz	EMC32	Version: 10.20.01	N/A	N/A
Current Clamp	PRANA	IP-DR250	SHEM273-1	2023/02/03	2024/02/02

Power Frequency Magnetic Field

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Compliance Test System	AMETEK	PACS-1	SHEM024-2	2023/8/01	2024/7/31
AC Power Source 5KVA	AMETEK	5001iX	SHEM025-2	2023/8/01	2024/7/31
Current transformer for magnetic field coil	EM TEST	MC2630	SHEM026-7	2023/06/05	2024/06/04
Current transformer for magnetic field coil	EM TEST	MC26100	SHEM026-8	2023/06/05	2024/06/04
Magnetic field coil	EM TEST	MS100	SHEM026-9	2023/06/05	2024/06/04



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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	SHEM042-9~10	2022-12-31	2023-12-30
Temperature&humidity recorder	ShangHai weather meter work	ZJ 1-2B	SHEM042-5	2023-07-23	2024-07-22
Digital Temperature& humidity recorder	Jianda Renke	RS-WS-N01-6J	SHEM247-1~8	2023-01-13	2024-01-12
Digital Multimeter	FLUKE	17B+	SHEM271-1	2023-07-19	2024-07-18
Autoformer regulator	Guangzhou bao de	TDGC2-5KVA	SHEM150-1	N/A	N/A
Multi-purpose tong tester	FLUKE	317	SHEM001-2	2022-11-14	2023-11-13

6 Emission Test Results

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

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: CISPR 16-2-1

Limit:

0.15M-0.5MHz 79dB(μV) quasi-peak, 66dB(μV) average

0.5M-30MHz 73dB(μV) quasi-peak, 60dB(μV) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

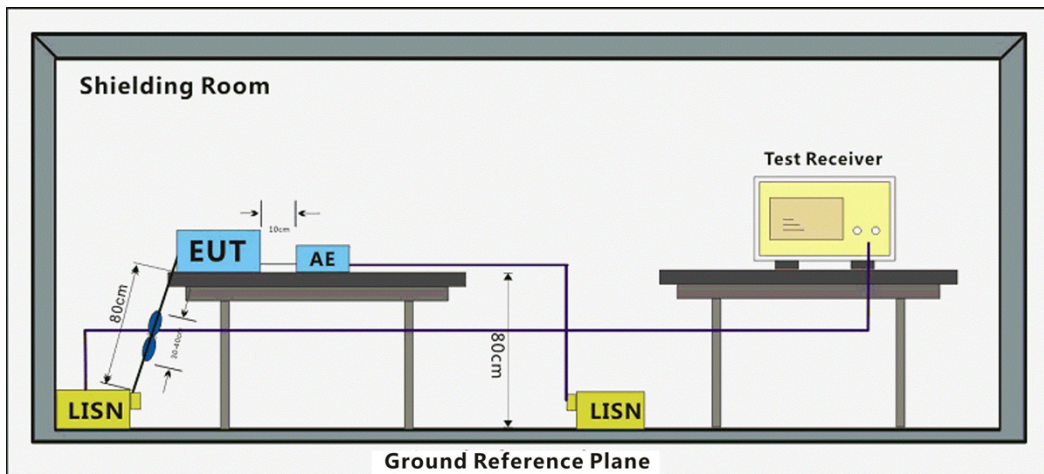
Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

6.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

6.1.3 Test Setup Diagram



6.1.4 Measurement Procedure and Data

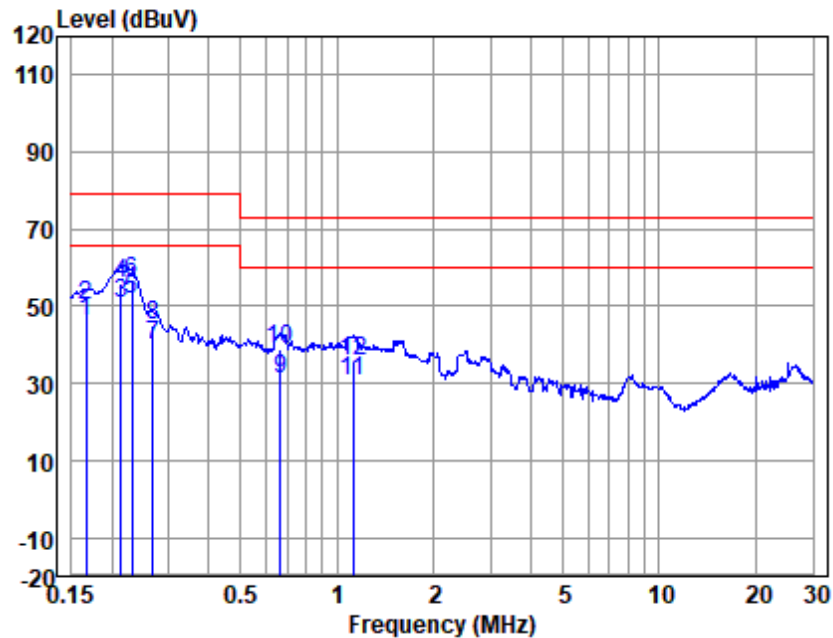
Frequency range: 150KHz-30MHz

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.

The red line show in graphic is the limit in standard used in this section.

Measured Level = Read level + Cable Loss + LISN Factor

Test Mode: 00; Line: Live line

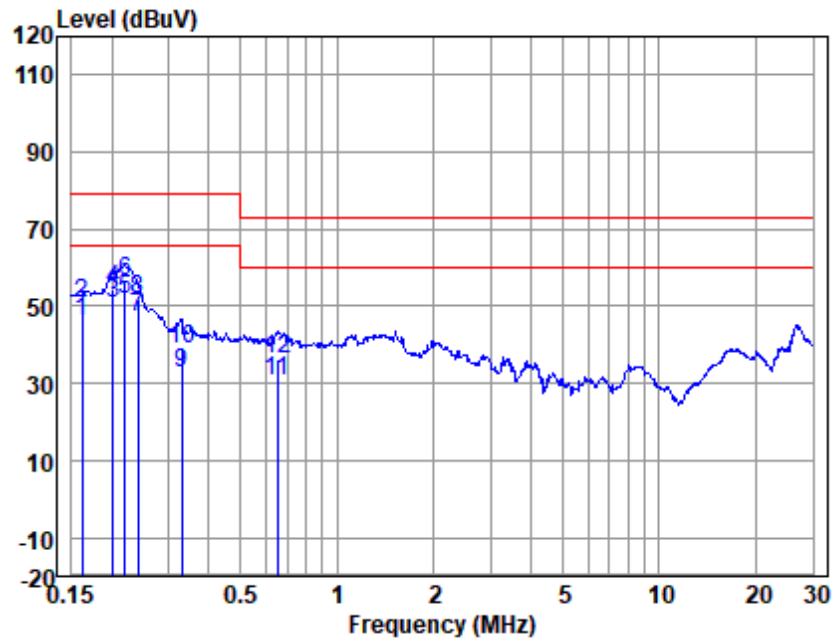


LISN : LINE
EUT/Project No : 05949BA
Test Mode : 00

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.17	35.90	0.10	9.87	45.87	66.00	-20.13	Average
2	0.17	40.49	0.10	9.87	50.46	79.00	-28.54	QP
3	0.21	40.58	0.09	9.87	50.54	66.00	-15.46	Average
4	0.21	45.81	0.09	9.87	55.77	79.00	-23.23	QP
5	0.23	42.05	0.08	9.87	52.00	66.00	-14.00	Average
6	0.23	46.34	0.08	9.87	56.29	79.00	-22.71	QP
7	0.27	30.18	0.07	9.87	40.12	66.00	-25.88	Average
8	0.27	35.08	0.07	9.87	45.02	79.00	-33.98	QP
9	0.67	21.16	0.09	9.86	31.11	60.00	-28.89	Average
10	0.67	29.00	0.09	9.86	38.95	73.00	-34.05	QP
11	1.12	20.54	0.13	9.86	30.53	60.00	-29.47	Average
12	1.12	25.74	0.13	9.86	35.73	73.00	-37.27	QP

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

Test Mode: 00; Line: Neutral Line

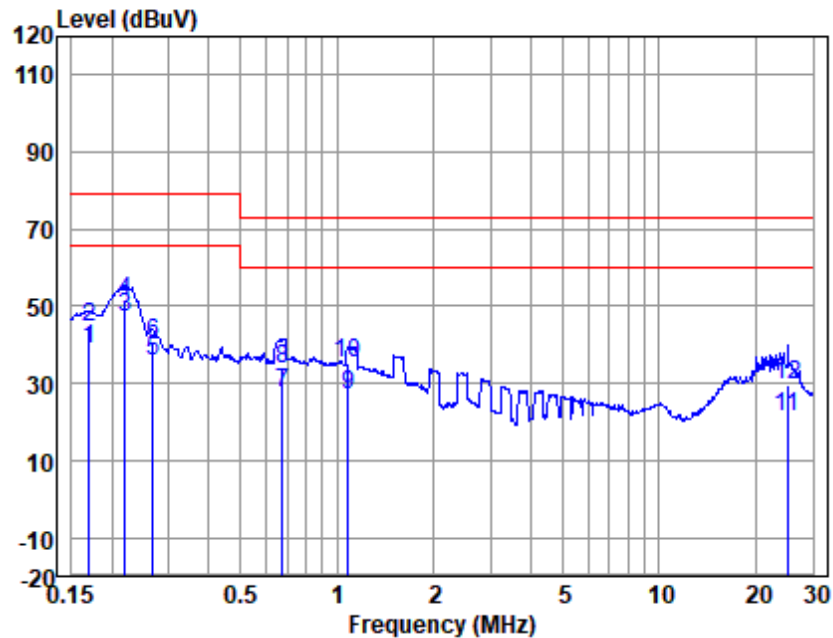


LISN : NEUTRAL
EUT/Project No : 05949BA
Test Mode : 00

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.16	36.45	0.00	9.87	46.32	66.00	-19.68	Average
2	0.16	41.00	0.00	9.87	50.87	79.00	-28.13	QP
3	0.20	41.01	0.00	9.87	50.88	66.00	-15.12	Average
4	0.20	44.74	0.00	9.87	54.61	79.00	-24.39	QP
5	0.22	42.11	0.01	9.87	51.99	66.00	-14.01	Average
6	0.22	46.47	0.01	9.87	56.35	79.00	-22.65	QP
7	0.24	37.14	0.02	9.87	47.03	66.00	-18.97	Average
8	0.24	42.10	0.02	9.87	51.99	79.00	-27.01	QP
9	0.33	22.95	0.04	9.87	32.86	66.00	-33.14	Average
10	0.33	28.80	0.04	9.87	38.71	79.00	-40.29	QP
11	0.65	20.71	0.09	9.86	30.66	60.00	-29.34	Average
12	0.65	26.25	0.09	9.86	36.20	73.00	-36.80	QP

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

Test Mode: 01; Line: Live line

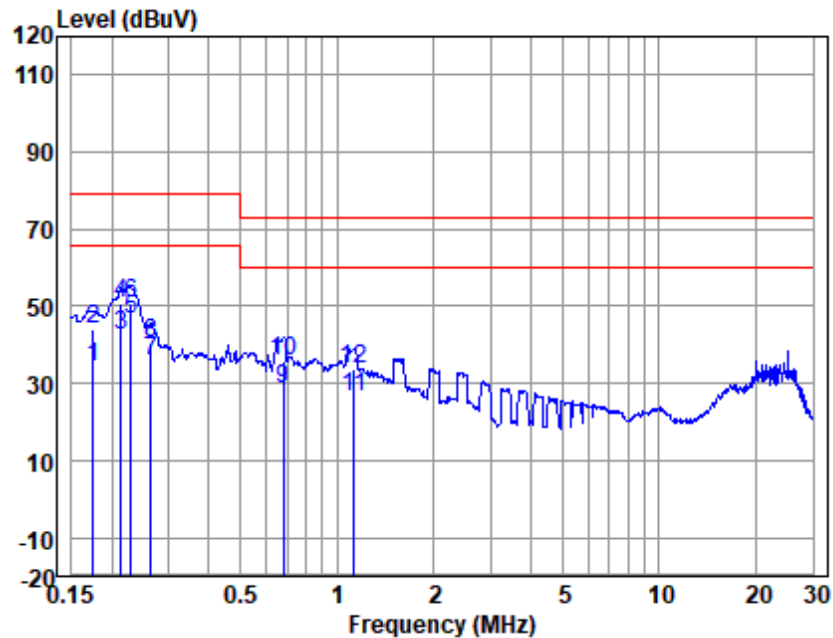


LISN : LINE
EUT/Project No : 05949BA
Test Mode : 01

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.17	28.67	0.10	9.87	38.64	66.00	-27.36	Average
2	0.17	34.78	0.10	9.87	44.75	79.00	-34.25	QP
3	0.22	37.10	0.09	9.87	47.06	66.00	-18.94	Average
4	0.22	41.57	0.09	9.87	51.53	79.00	-27.47	QP
5	0.27	25.98	0.07	9.87	35.92	66.00	-30.08	Average
6	0.27	30.45	0.07	9.87	40.39	79.00	-38.61	QP
7	0.68	17.75	0.09	9.86	27.70	60.00	-32.30	Average
8	0.68	23.99	0.09	9.86	33.94	73.00	-39.06	QP
9	1.08	17.20	0.12	9.86	27.18	60.00	-32.82	Average
10	1.08	25.05	0.12	9.86	35.03	73.00	-37.97	QP
11	25.05	11.36	0.00	10.08	21.44	60.00	-38.56	Average
12	25.05	19.31	0.00	10.08	29.39	73.00	-43.61	QP

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

Test Mode: 01; Line: Neutral Line



LISN : NEUTRAL
EUT/Project No : 05949BA
Test Mode : 01

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.17	24.33	0.00	9.87	34.20	66.00	-31.80	Average
2	0.17	34.12	0.00	9.87	43.99	79.00	-35.01	QP
3	0.21	32.87	0.01	9.87	42.75	66.00	-23.25	Average
4	0.21	41.05	0.01	9.87	50.93	79.00	-28.07	QP
5	0.23	36.55	0.01	9.87	46.43	66.00	-19.57	Average
6	0.23	40.78	0.01	9.87	50.66	79.00	-28.34	QP
7	0.26	26.03	0.02	9.87	35.92	66.00	-30.08	Average
8	0.26	30.39	0.02	9.87	40.28	79.00	-38.72	QP
9	0.68	18.58	0.10	9.86	28.54	60.00	-31.46	Average
10	0.68	25.96	0.10	9.86	35.92	73.00	-37.08	QP
11	1.13	16.30	0.12	9.86	26.28	60.00	-33.72	Average
12	1.13	23.64	0.12	9.86	33.62	73.00	-39.38	QP

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

6.2 Conducted Emissions at Other Wired Port (150kHz-30MHz)

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: CISPR 32

Limit:

0.15M-0.5MHz 84dB(μV)-74dB(μV) quasi-peak, 74dB(μV)-64dB(μV) average

0.5M-30MHz 74dB(μV) quasi-peak, 64dB(μV) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

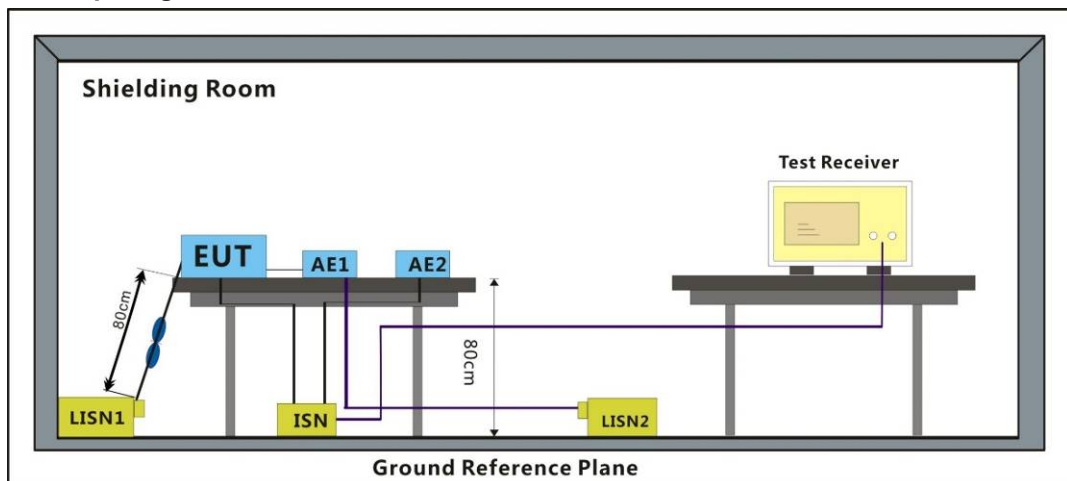
Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

6.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

6.2.3 Test Setup Diagram



6.2.4 Measurement Procedure and Data

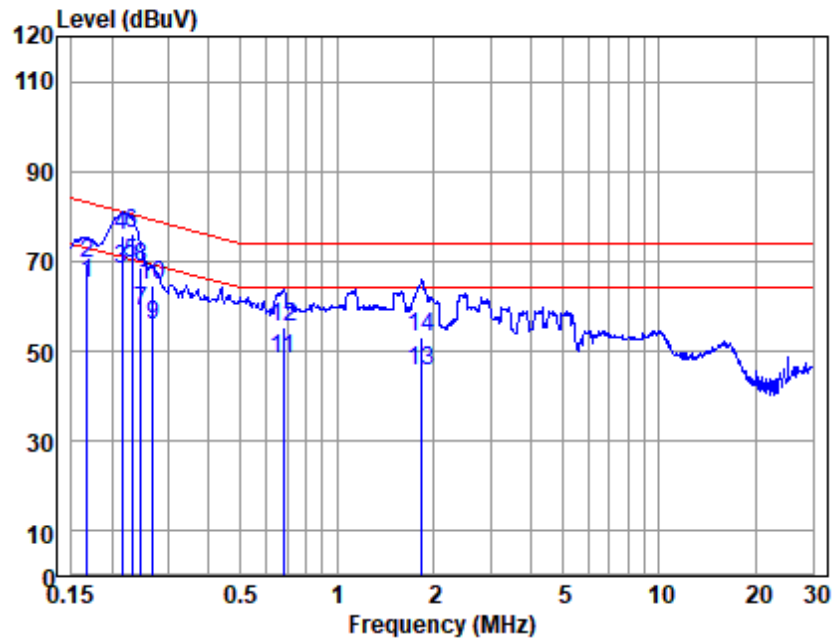
Frequency range: 150KHz-30MHz

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.

The red line show in graphic is the limit in standard used in this section.

Measured Level = Read level + Cable Loss + LISN Factor

Test Mode: 00

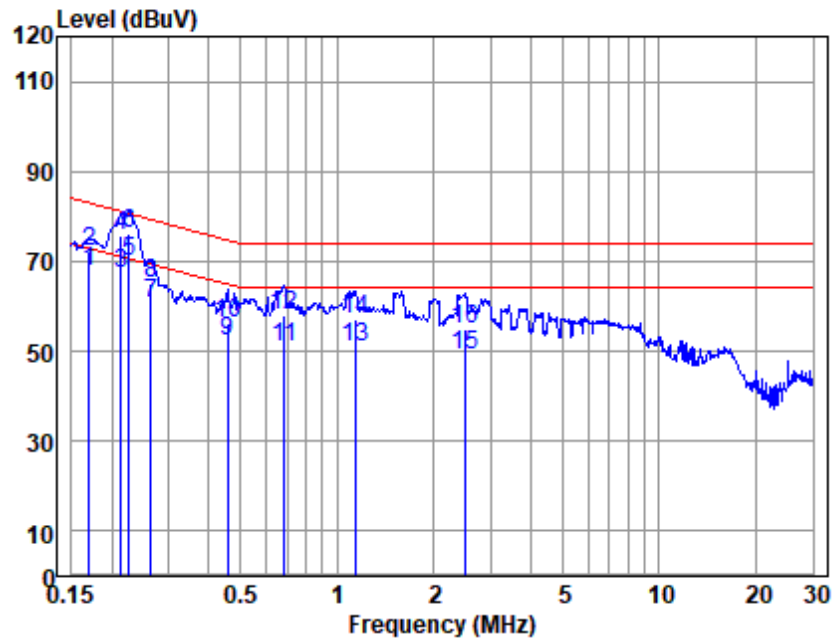


ISN : CAT5-2023
EUT/Project No : 05949BA
Test Mode : 00

	Freq (MHz)	Read level (dBuV)	ISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.17	45.16	9.90	9.87	64.93	73.08	-8.15	Average
2	0.17	49.60	9.90	9.87	69.37	83.08	-13.71	QP
3	0.22	48.43	9.90	9.87	68.20	71.01	-2.81	Average
4	0.22	56.12	9.90	9.87	75.89	81.01	-5.12	QP
5	0.23	49.67	9.90	9.87	69.44	70.44	-1.00	Average
6	0.23	56.24	9.90	9.87	76.01	80.44	-4.43	QP
7	0.25	39.22	9.90	9.87	58.99	69.91	-10.92	Average
8	0.25	48.76	9.90	9.87	68.53	79.91	-11.38	QP
9	0.27	36.07	9.90	9.87	55.84	69.20	-13.36	Average
10	0.27	44.81	9.90	9.87	64.58	79.20	-14.62	QP
11	0.68	28.85	9.60	9.86	48.31	64.00	-15.69	Average
12	0.68	35.80	9.60	9.86	55.26	74.00	-18.74	QP
13	1.84	26.49	9.40	9.86	45.75	64.00	-18.25	Average
14	1.84	33.67	9.40	9.86	52.93	74.00	-21.07	QP

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

Test Mode: 01



ISN : CAT5-2023
EUT/Project No : 05949BA
Test Mode : 01

	Freq (MHz)	Read level (dBuV)	ISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.17	48.14	9.90	9.87	67.91	72.94	-5.03	Average
2	0.17	52.41	9.90	9.87	72.18	82.94	-10.76	QP
3	0.21	47.43	9.90	9.87	67.20	71.10	-3.90	Average
4	0.21	55.96	9.90	9.87	75.73	81.10	-5.37	QP
5	0.23	49.98	9.90	9.87	69.75	70.57	-0.82	Average
6	0.23	56.52	9.90	9.87	76.29	80.57	-4.28	QP
7	0.26	40.80	9.90	9.87	60.57	69.29	-8.72	Average
8	0.26	45.31	9.90	9.87	65.08	79.29	-14.21	QP
9	0.46	32.94	9.62	9.86	52.42	64.76	-12.34	Average
10	0.46	36.75	9.62	9.86	56.23	74.76	-18.53	QP
11	0.69	31.63	9.60	9.86	51.09	64.00	-12.91	Average
12	0.69	38.53	9.60	9.86	57.99	74.00	-16.01	QP
13	1.15	31.64	9.40	9.86	50.90	64.00	-13.10	Average
14	1.15	38.08	9.40	9.86	57.34	74.00	-16.66	QP
15	2.50	29.99	9.40	9.87	49.26	64.00	-14.74	Average
16	2.50	35.85	9.40	9.87	55.12	74.00	-18.88	QP

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

6.3 Radiated Emissions (30MHz-1GHz)

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: CISPR 16-2-3

Limit:

Test Distance: 10m

30MHz-230MHz 30 dB(μV/m) quasi-peak

230MHz-1GHz 37 dB(μV/m) quasi-peak

Detector: Peak for pre-scan (120kHz resolution bandwidth) 30MHz to 1000MHz

Test Distance: 3m

30MHz-230MHz 40 dB(μV/m) quasi-peak

230MHz-1GHz 47 dB(μV/m) quasi-peak

Detector: Peak for pre-scan (120kHz resolution bandwidth) 30MHz to 1000MHz

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

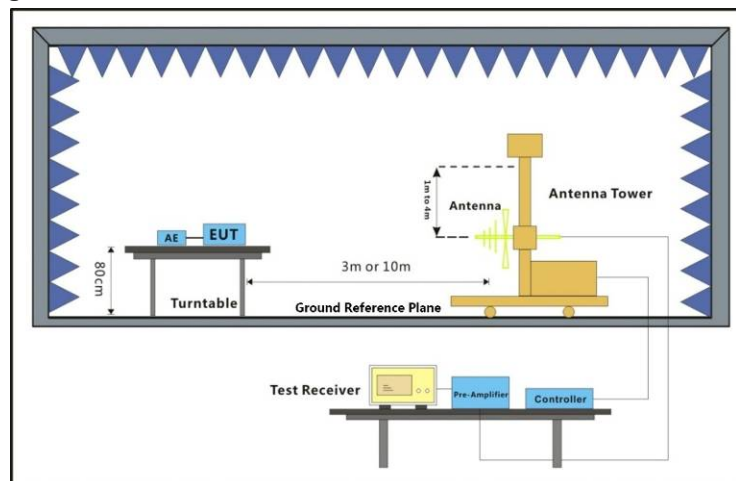
Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

6.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

6.3.3 Test Setup Diagram



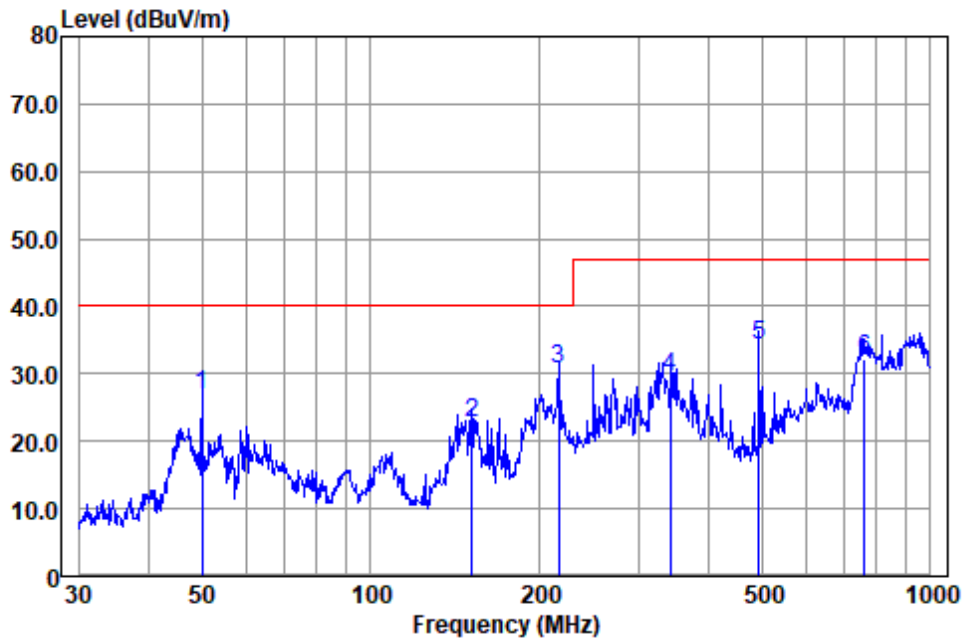
6.3.4 Measurement Procedure and Data

Frequency range: 30MHz-1GHz

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 BiConiLog antenna with 2 orthogonal polarities. The red line show in graphic is the limit in standard used in this section.

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor

Test Mode: 00; Polarity: Horizontal



Antenna Polarity :HORIZONTAL

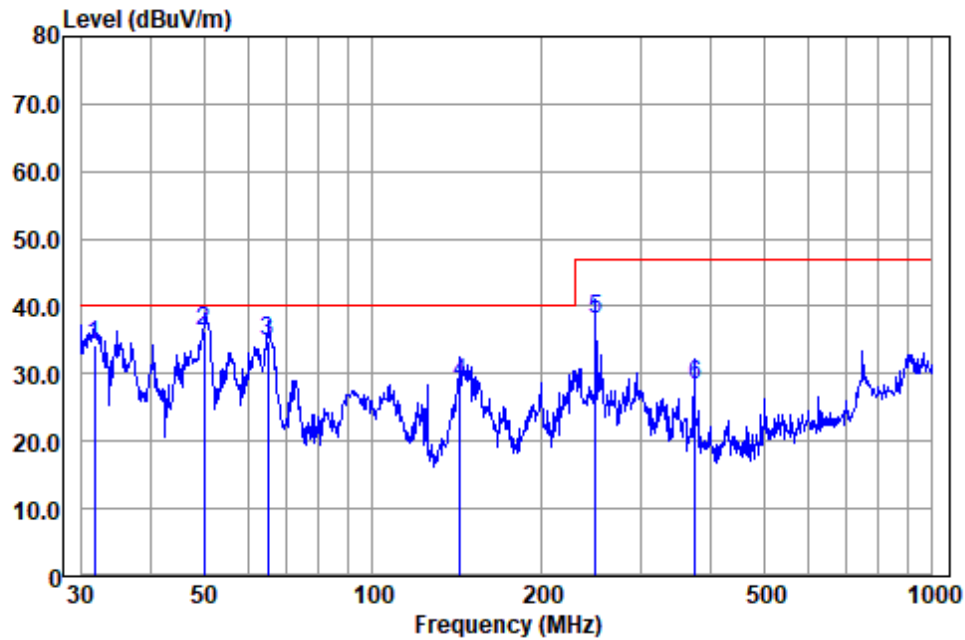
EUT/Project :5949BA

Test mode :00

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	49.881	45.71	13.92	1.02	33.70	26.95	40.00	-13.05	QP
2	151.597	40.02	13.80	2.45	33.49	22.78	40.00	-17.22	QP
3	216.783	50.68	9.87	3.22	33.22	30.55	40.00	-9.45	QP
4	343.180	43.89	14.60	4.15	33.00	29.64	47.00	-17.36	QP
5	494.199	44.83	17.88	4.57	33.00	34.28	47.00	-12.72	QP
6	760.704	35.90	22.60	6.39	32.67	32.22	47.00	-14.78	QP

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

Test Mode: 00; Polarity: Vertical

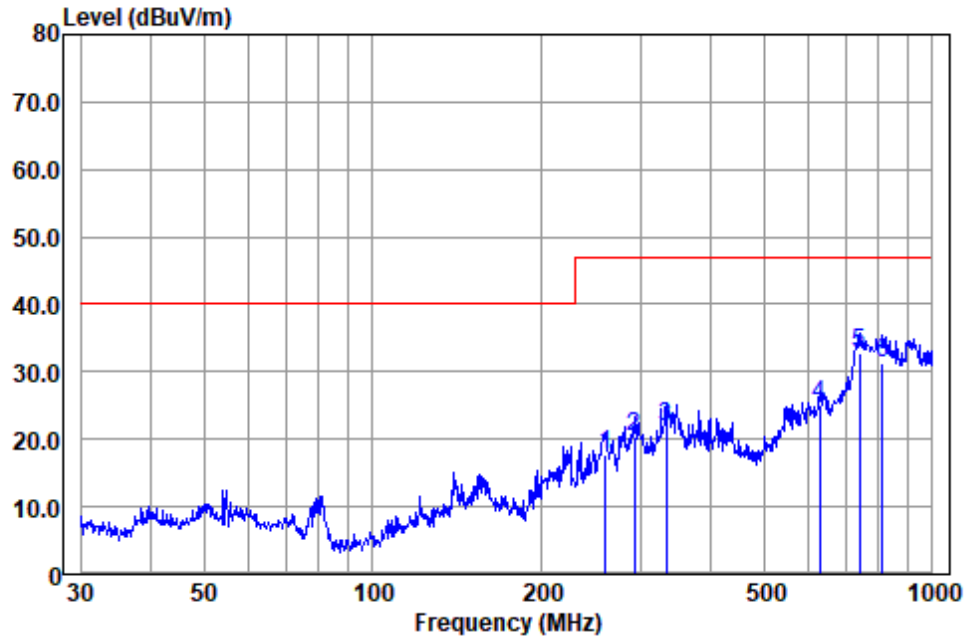


Antenna Polarity :VERTICAL
EUT/Project :5949BA
Test mode :00

	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	31.843	54.92	12.20	0.94	33.70	34.36	40.00	-5.64	QP
2	50.024	55.20	13.90	1.02	33.70	36.42	40.00	-3.58	QP
3	64.887	54.90	12.20	1.30	33.60	34.80	40.00	-5.20	QP
4	143.326	46.23	13.40	2.47	33.51	28.59	40.00	-11.41	QP
5	250.301	56.26	11.70	3.20	33.10	38.06	47.00	-8.94	QP
6	375.939	41.68	15.15	4.37	32.95	28.25	47.00	-18.75	QP

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

Test Mode: 01; Polarity: Horizontal

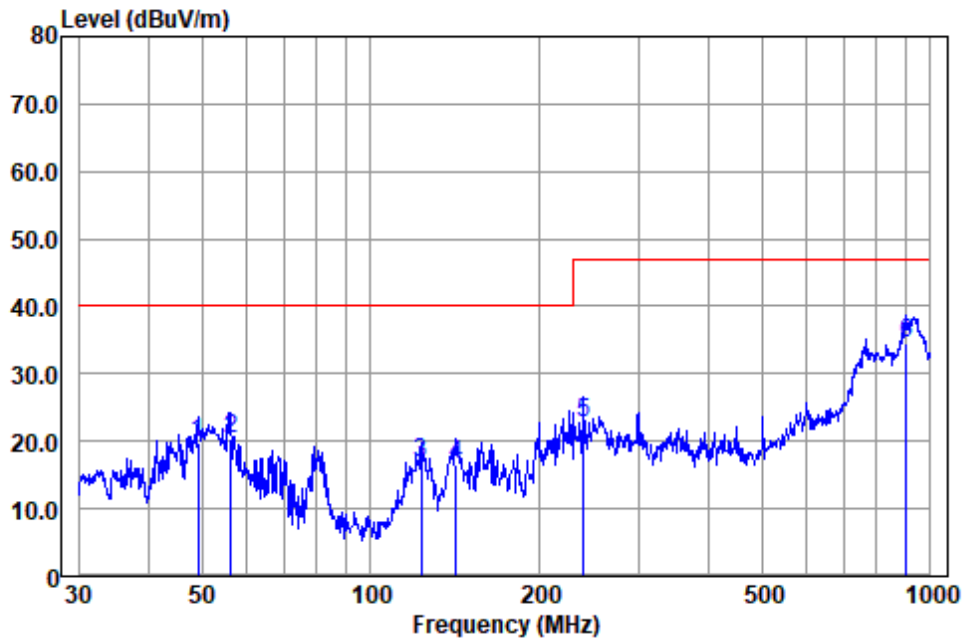


Antenna Polarity :HORIZONTAL
EUT/Project :5949BA
Test mode :01

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	260.144	35.34	12.00	3.41	33.08	17.67	47.00	-29.33	QP
2	293.084	36.64	13.19	3.59	33.01	20.41	47.00	-26.59	QP
3	333.687	36.56	14.41	4.01	33.00	21.98	47.00	-25.02	QP
4	627.274	31.95	20.45	5.75	32.94	25.21	47.00	-21.79	QP
5	739.661	36.88	22.10	6.45	32.73	32.70	47.00	-14.30	QP
6	813.112	34.74	22.67	6.45	32.48	31.38	47.00	-15.62	QP

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

Test Mode: 01; Polarity: Vertical



Antenna Polarity :VERTICAL
EUT/Project :5949BA
Test mode :01

	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	49.187	38.38	13.98	1.00	33.70	19.66	40.00	-20.34	QP
2	56.197	39.25	13.58	1.13	33.64	20.32	40.00	-19.68	QP
3	122.834	36.99	11.30	2.11	33.55	16.85	40.00	-23.15	QP
4	141.826	34.35	13.20	2.47	33.51	16.51	40.00	-23.49	QP
5	239.987	41.67	11.00	3.15	33.13	22.69	47.00	-24.31	QP
6	906.482	35.70	23.97	7.06	32.08	34.65	47.00	-12.35	QP

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

7 Immunity Test Results

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

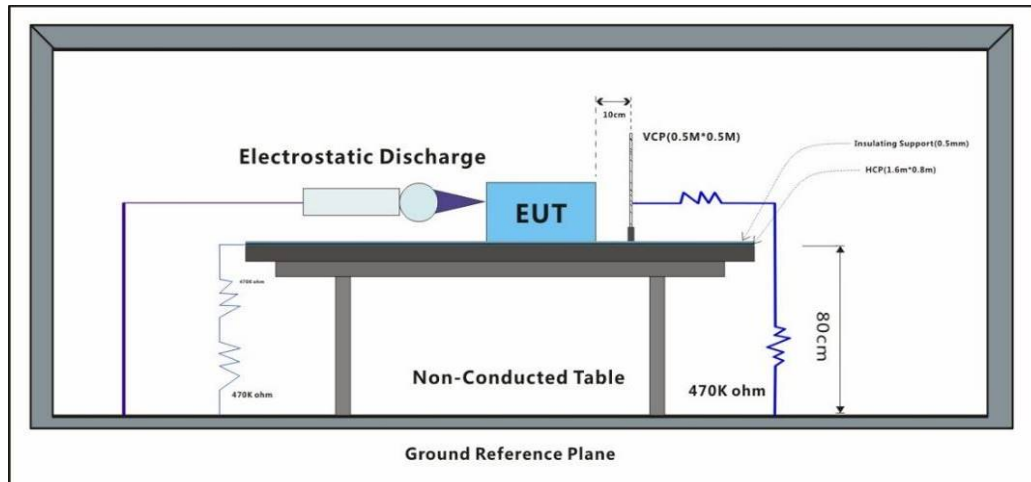
Criterion A	The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this 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.

7.1 Electrostatic Discharge

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-2:2009

7.1.1 Test Setup Diagram



7.1.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

Humidity: 50 % RH

Atmospheric Pressure: 1020 mbar

7.1.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.1.4 Test Condition and Results:

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

Test Point: 1. All insulated enclosure and seams.

2. All accessible metal parts of the enclosure.

3. All side



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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

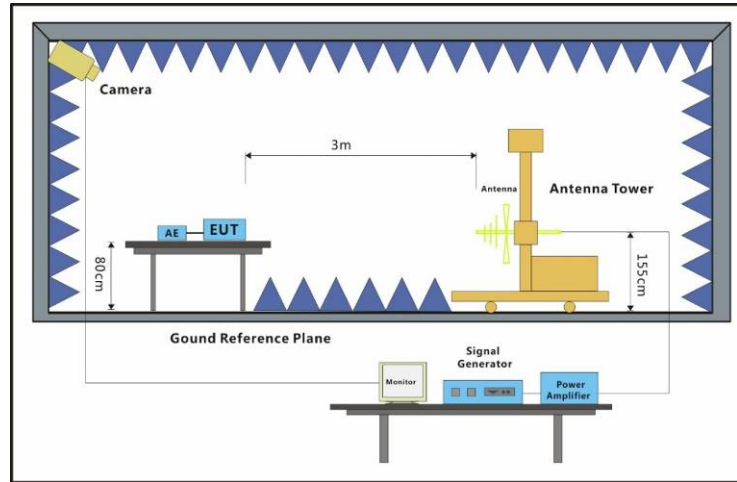
A: No degradation in the performance of the EUT was observed

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

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN IEC 61000-4-3: 2020

7.2.1 Test Setup Diagram



7.2.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

7.2.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.2.4 Test Condition and Results:

Performance Criterion:A

Antenna Polarisation:Vertical and Horizontal

Modulation:1kHz,80% Amp. Mod,1% increment

Frequency Range:80MHz to 1GHz, 1.4GHz to 6GHz

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
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

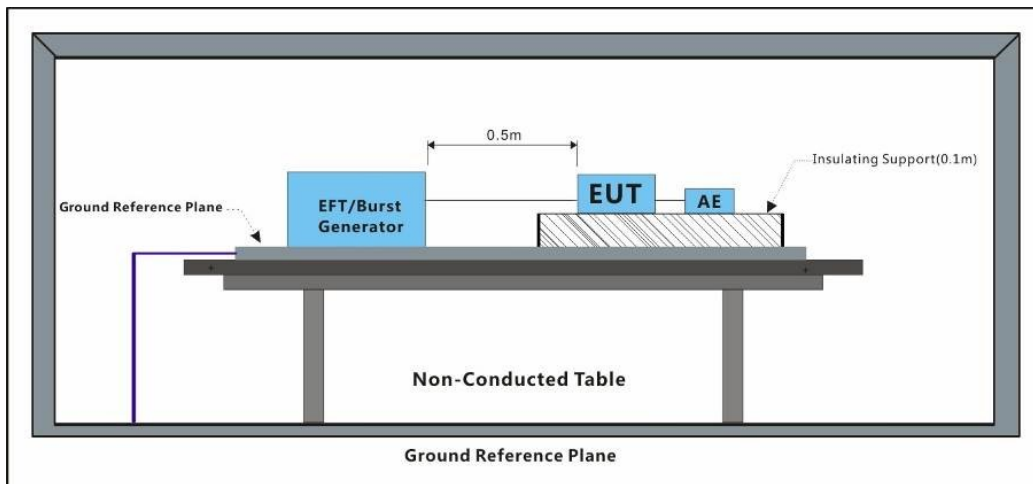
A: No degradation in the performance of the EUT was observed

7.3 Electrical Fast Transients Burst at DC Power Port

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-4:2012

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

7.3.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.3.4 Test Condition and Results:

Performance Criterion:

B

Repetition Frequency:

5kHz

Burst Period:

300ms

Test Duration:

2 minute per level & polarity

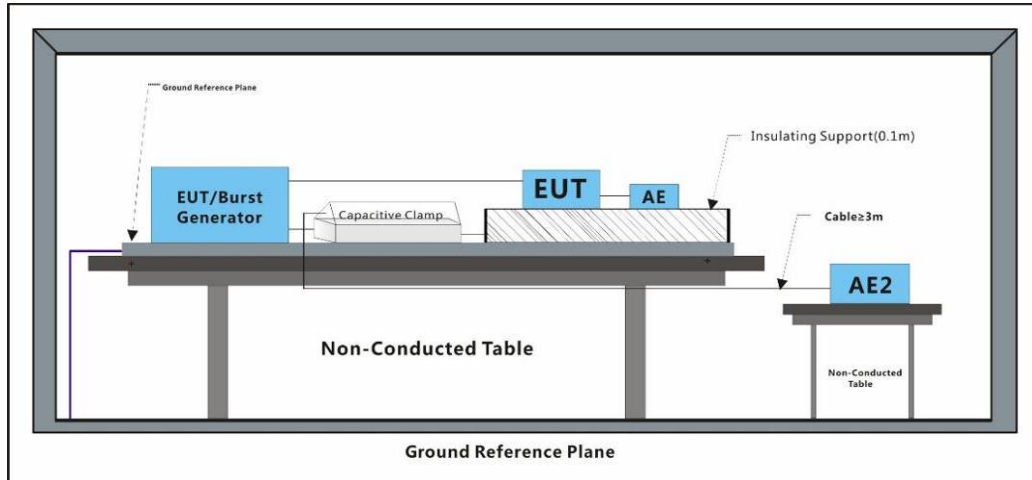
Test Line	Level (kV)	Polarity	CDN/Clamp	Result / Observations
DC power port	0.5	+	CDN	A
DC power port	0.5	-	CDN	A
A: No degradation in the performance of the EUT was observed				

7.4 Electrical Fast Transients Burst at Signal Port

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-4:2012

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

7.4.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.4.4 Test Condition and Results:

Performance Criterion:

B

Repetition Frequency:

5kHz

Burst Period:

300ms

Test Duration:

2 minute per level & polarity

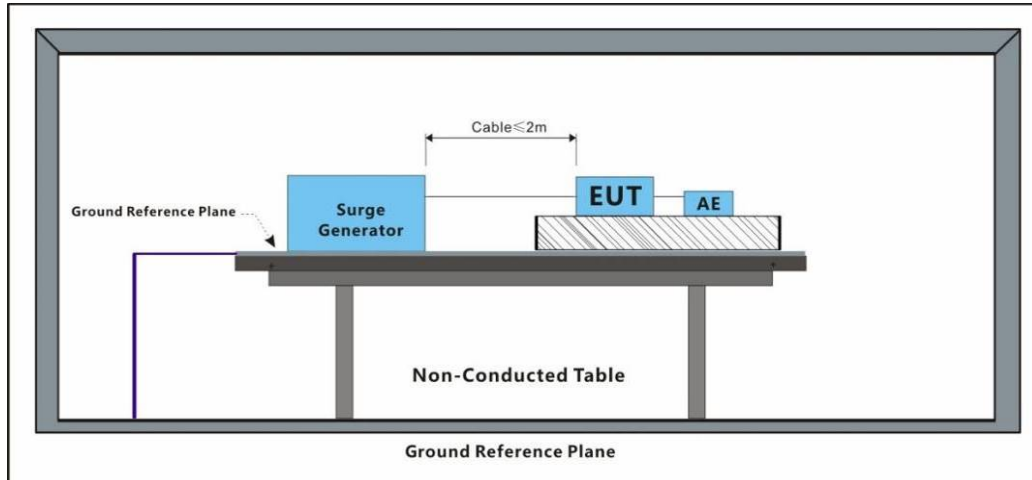
Port	Level (kV)	Polarity	CDN/Clamp	Result / Observations
Signal port	0.5	+	Clamp	A
Signal port	0.5	-	Clamp	A
A: No degradation in the performance of the EUT was observed				

7.5 Surge at DC Port

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-5:2014+A1:2017

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

7.5.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.5.4 Test Condition and Results:

Performance Criterion: B

Interval: 60s between each surge

No. of surges: 5 positive, 5 negative

Test Line	Level (kV)	Polarity	Result / Observations
P-N	0.5	+	A
P-N	0.5	-	A
P-G	0.5, 1	+	A
P-G	0.5, 1	-	A
N-G	0.5, 1	+	A
N-G	0.5, 1	-	A

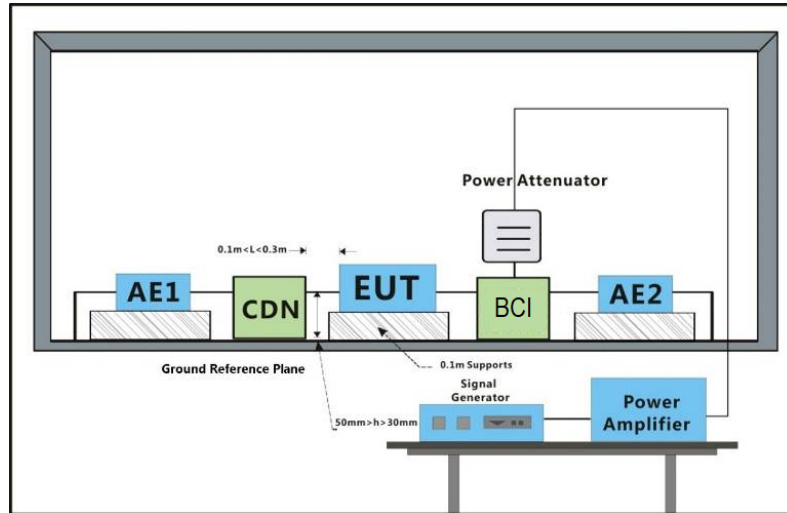
A: No degradation in the performance of the EUT was observed

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

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-6:2014

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

7.6.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.6.4 Test Condition and Results:

Performance Criterion:

A

Frequency Range:

0.15MHz to 80MHz

Modulation:

80%, 1kHz Amplitude Modulation

Step Size 1%

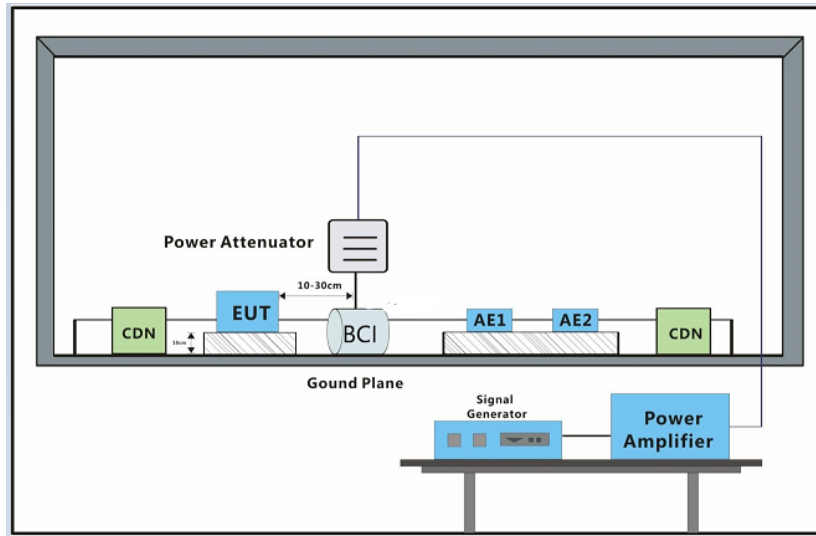
Port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
DC Network Power Port	3(0.15MHz-80MHz)	Current Clamp	3s	A
A: No degradation in the performance of the EUT was observed				

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

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-6:2014

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

7.7.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.7.4 Test Condition and Results:

Performance Criterion:

A

Frequency Range:

0.15MHz to 80MHz

Modulation:

80%, 1kHz Amplitude Modulation

Step Size 1%

Port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
Signal port	3(0.15MHz-80MHz)	Current Clamp	3s	A

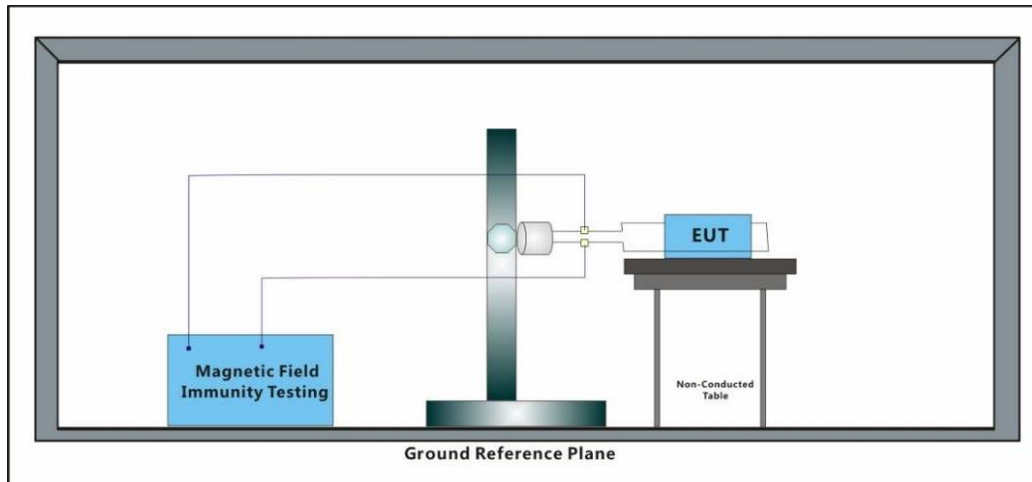
A: No degradation in the performance of the EUT was observed

7.8 Power Frequency Magnetic Field

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-8:2010

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

7.8.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Charging mode_keep the EUT charging continual
Final test	01	Discharging mode_keep the EUT discharging continual

7.8.4 Test Condition and Results:

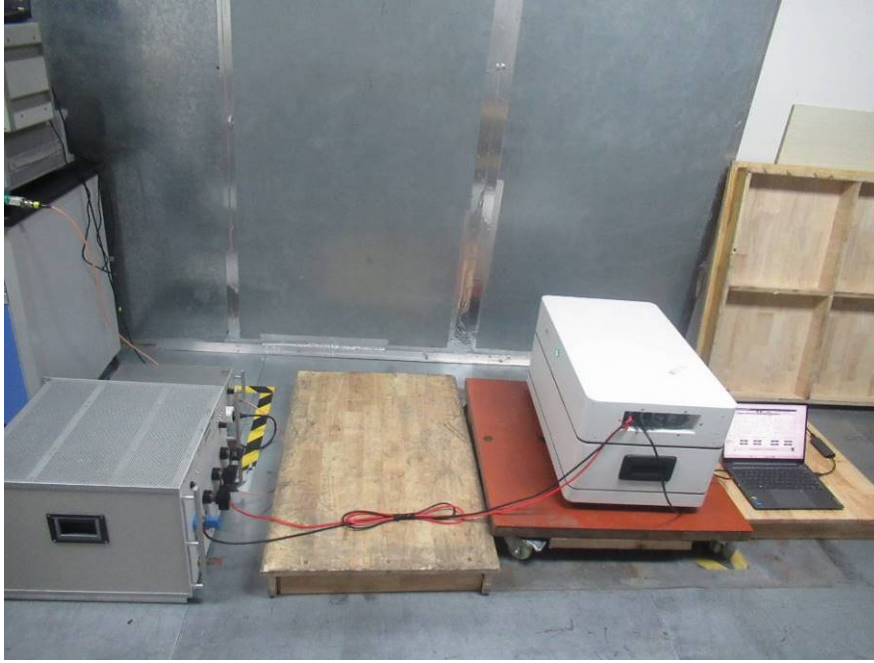
Performance Criterion: A

Frequency	Level (A/m)	Axial	Magnetic Field Type	Result / Observations
50/60 Hz	3	X	Continue	A
50/60 Hz	3	Y	Continue	A
50/60 Hz	3	Z	Continue	A

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

8 Test Setup Photo

Conducted Emissions at DC Power Port (150kHz-30MHz)



Conducted Emissions at Other Wired Port (150kHz-30MHz)



Radiated Emissions (30MHz-1GHz)



Electrostatic Discharge



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





Electrical Fast Transients Burst at DC Power Port



Electrical Fast Transients Burst at Signal Port



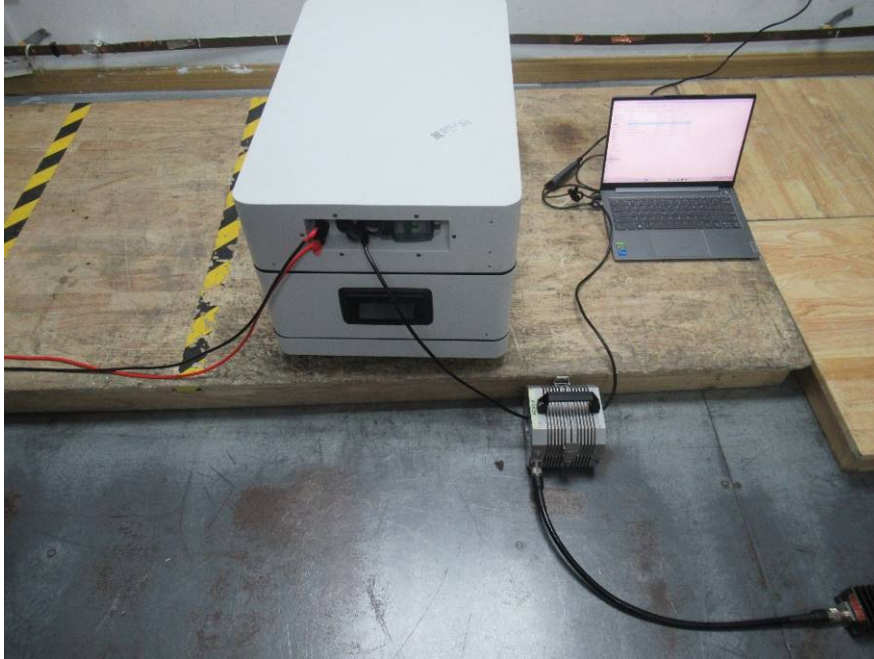
Surge at DC Port



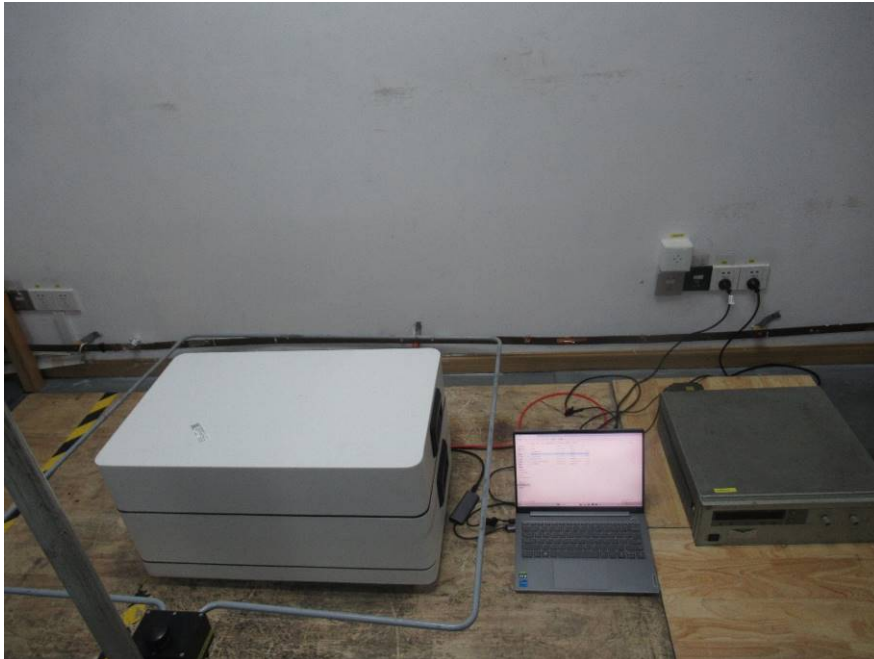
Conducted Immunity at DC Power Port (150kHz-80MHz)



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



Power Frequency Magnetic Field





9 EUT Constructional Details (EUT Photos)







- End of the Report -