EMC Test Report

For

Power and Energy Meter

AIWAA SYSTEMS PVT LTD

ULR – TC1200124000000205F

Test Report No.: CCTL/EMC/TRP/CML/2425/ 211

TC - 12001

For any Complaints / Suggestions please email to

emc@cosmictestlab.com

Submitted by

Cosmic Compliance Test Lab

A-1, Sy No 192/1, III Phase Bommasandra,

Bengaluru - 560099.

Amendment History:

Revision No.	Date of Amend.	Amendment made	Reasons	Approved by
-NA-	-NA-	-NA-	-NA-	-NA-

Laboratory Accreditation Details:

The accreditation details in the below table.

Accreditation Bodies	Certificate Number
National Accreditation Board for Testing and Calibration Laboratories (NABL) as per ISO/IEC 17025:2017 Agreement for use of NABL Accredited CAB combined ILAC MRA Mark	TC-12001

General acronyms for the report

EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ESD	Electro Static Discharge
BCI	Bulk Current Injection
NA	Not Applicable
EUT	Equipment Under Test
ISO	International Organization for Standardization
CISPR	International Special Committee on Radio Interference
AMN	Artificial Mains Network
S / Sec	Second
min	Minute
h, hrs	Hours
Hz	Hertz
dB	Decibel
VSWR	Voltage Standing Wave Ratio
RBW	Resolution Bandwidth
VBW	Video Bandwidth
CW	Continuous Wave
AM	Amplitude Modulation
CCC	Capacitive Coupling Clamp
ICC	Inductive Coupling Clamp
DCC	Direct Capacitive Coupling
GRP	Ground Reference Plane
HCP	Horizontal Coupling Plane
VCP	Vertical Coupling Plane
CAN	Controlled Area Network
NB	Narrowband
BB	Broadband
ESA	Electrical / Electronic Sub Assembly
mA	milli Ampere
V/m	**V**olts **/ m**eter

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1. General Information

Name of the Applicant	AIWAA SYSTEMS PVT LTD
Contact Name	Mr. Vamsi Krishna V
Contact No	+91-9036755571
Email id	vamsireddy@aiwaasystems.com
EUT Manufacturer Name and Address	AIWAA SYSTEMS PVT LTD No 109, 2 Floor, BTM 4 Stage 80 Feet Road, Bangalore, Bengaluru (Bangalore) Urban, Karnataka, Bangalore Karnataka, 560076
EUT Name	Power and Energy Meter
Model No	PEA5486
Serial No	2400000060
Name of the Laboratory	**Cosmic Compliance Test Lab. Pvt. Ltd.**
Laboratory Address	SyNo.192/1, A-1, Munireddy Industrial Estate, 3rd Phase, Bommasandra, Bangalore - 560099
Test(s) Conducted	Refer test summary.
Test(s) Standard	Refer test summary.
Status of EUT on receipt	EUT was received in Good Condition.
EUT Received on	16-09-2024
Test Report Issued on	28-01-2025
Test witnessed by	Mr. Vamsi Krishna V
Test Result	Refer test summary.
Statement of conformity	Declaration of conformity of the results is based as per the standard limits.
Report prepared by	Sreeyesh T Sreedhar

Test Engineer and Reviewer Details		
Tested by	**Reviewed by**	**Authorized by**
Mr. Jayanth SS **Test Engineer**	**Mr. Anil R** **Lab in Charge**	**Mrs. Senthamarai R** **Technical Manager**

Note: This report is digitally signed by the approving authority through a secured workflow

2. Test result summary:

Annexure	Test Carried Out	Standard Number	Test Date	Test Result	Remarks
EMISSION TEST					
Annexure A	Radiated Emission Test	CISPR 11	02-01-2025	PASS	-
IMMUNITY TESTS					
Annexure B	Electro Static Discharge Test	IEC 61000-4-2	19-12-2024	PASS	-
Annexure C	Radiated Immunity Test	IEC 61000-4-3	17-09-2024	PASS	-
Annexure D	Electrical Fast Transient Test	EC 61000-4-4	16-09-2024	PASS	-
Annexure E	Surge Test	IEC 61000-4-5	17-09-2024	PASS	-
Annexure F	Conducted Susceptibility Test	IEC 61000-4-6	18-09-2024	PASS	-
Annexure G	Power Frequency Magnetic Field	IEC 61000-4-8	19-09-2024	PASS	-
Annexure H	Voltage Dips & Short Interruption Test	IEC 61000-4-11	19-09-2024	PASS	-

Conclusion: All indications of PASS/FAIL in this report are opinion expressed by test laboratory based on interpretations and/or observations of test results. Please refer individual annexures for detailed test results/observations.

Remarks: *Additional remarks if any*

2.1 Test performed in subcontract lab:

Annexure	Test carried out	Test date	Result / Observation	Remarks
N/A	N/A	N/A	N/A	N/A

2.2 Measurement uncertainty

The following common measurement uncertainties are applicable to the relevant tests that are mentioned below:

Test	Uncertainty (±)	
Commercial		
Conducted Emission	9kHz-150kHz	± 2.92 dB
	150kHz-30MHz	± 3.00 dB
Radiated Emission	30MHz-1GHz	± 4.26 dB
	1GHz-18GHz	± 5.54 dB

2.3 Opinions & interpretation

None

2.4 Deviation from Standard

None

3. Equipment Under Test Information

Equipment Name:		Power and Energy meter
Make:		AIWAA SYSTEMS PVT LTD
Model No. / Part No.:		PEA5486
Serial No.:		2400000060
Input Rating	**Power, P:**	< 8 VA
	Voltage, V:	80 – 277 VLN AC / 100 – 277 VDC
Type of Equipment:		☐ Floor standing ☒ Table top ☐ Wall mount or Fixed equipment
Accessories:		☒ Y / ☐ N

3.1 Description of EUT

PEA54xx series LCD meters are Power and Energy meters with following features:
True RMS electrical parameters: phase wise voltage, current, demand, W, VA, VAR
Integrated parameters: KWh, VAh, VARh, timer and Counter
4 Quadrant energy: bi-directional, Total and net
Demand, Rate counters, multi-tariff,
Real time clock, Alarms,
Sag Swell and Waveform Capture
Maximum Minimum value with time stamp
THD, Crest Factor, K-Factor, TDD
Harmonics measurement up to 63rd Order
RS485 with Modbus protocol
2 Digtial Input
2 Digital Output
2 Relay Output
PEA5486 is superset model in PEA54xx series LCD meters `

Applications

- Control Panes
- Power Distribution Panels
- Connection to Plant Monitoring & Control Systems
- Gen-set Panels
- Original Equipment Manufacturers (OEMs)
- Building Management System

Figure 1: Equipment Under test Photo

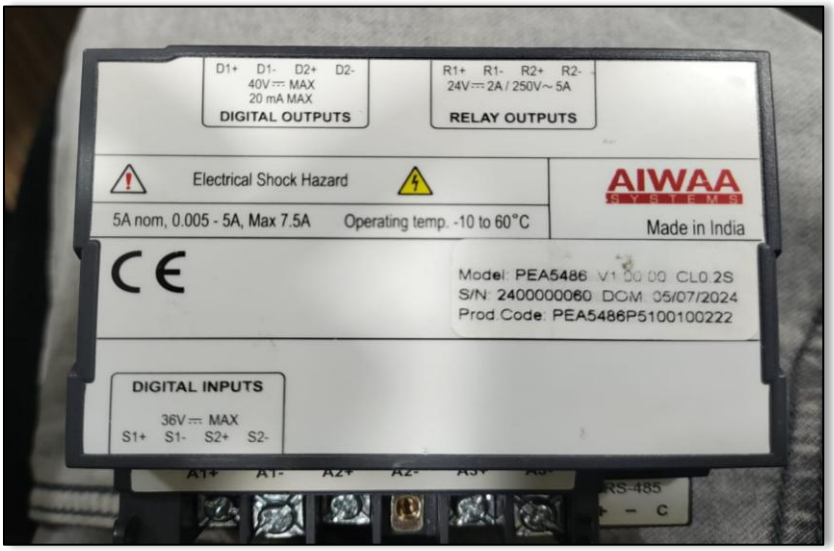


Figure 2: Marking Label of EUT

3.2 Accessories details

Sl No.	Equipment	Brand	Model No.	Serial No.	Remarks, if any
1	NA	NA	NA	NA	NA

4. Performance Monitoring Parameters

For monitoring the continuous functionality of EUT,

- Observing the pinging is happening using communication equipment with Laptop.
- Observing the screen is having any kind of flickering or going complete OFF.

5. Test requirements

EMISSION TESTS

Annexure A: Radiated Emission Test (RE)

Common information:

Test Date	: 02-01-2025
Temperature	: 24.5° C
Humidity	: 58 % RH

Test Specification:

Reference Standard	: CISPR 11: 2024
Frequency Range	: 30MHz to 1GHz
Polarity of Antenna	: Horizontal and Vertical
Resolution Band Width	: 120kHz / 1MHz
Step size	: Half of RBW
Test Distance between	
Antenna and EUT	: 3 m
Antenna Height	: 1 to 4 m

Test Limits:

Table A.2 – Requirements for radiated emissions at frequencies up to 1 GHz for class A equipment

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A2.1	30 to 230	OATS/SAC	10	Quasi Peak / 120 kHz	40
	230 to 1 000				47
A2.2	30 to 230	OATS/SAC	3		50
	230 to 1 000				57
A2.3	30 to 230	FAR	10	Quasi Peak / 120 kHz	42 to 35
	230 to 1 000				42
A2.4	30 to 230	FAR	3		52 to 45
	230 to 1 000				52
Apply only A2.1 or A2.2 or A2.3 or A2.4 across the entire frequency range.					

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq$ 500 MHz	2 GHz
500 MHz $< F_x \leq$ 1 GHz	5 GHz
$F_x >$ 1 GHz	$5 \times F_x$ up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

NOTE 2 F_x is defined in 3.1.18.

NOTE 3 For outdoor units of home satellite receiving systems highest measured frequency shall be 18 GHz.

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

NOTE:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m) = 20log Emission level (uV/m).

(3) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain (if use)

Margin Level = Measurement Value - Limit Value

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	Semi Anechoic Chamber	Tekiknow	TEK3MSAC	TTI3MSACCTL	12-05-2025
2.	EMI Receiver	Rohde-Schwarz	ESW44	101594	16-12-2024
3.	Pre amplifier	Compower	PAM118A	18040136	17-05-2025
4.	RF cable	Srinar communication	RG 144	CCTL/EMC/RFC/004	NA
5.	RF cable	Srinar communication	RG 144	CCTL/EMC/RFC/007	NA
6.	Combilog Antenna	COM-POWER	AC-220	10030074	05-01-2025

REMARK:

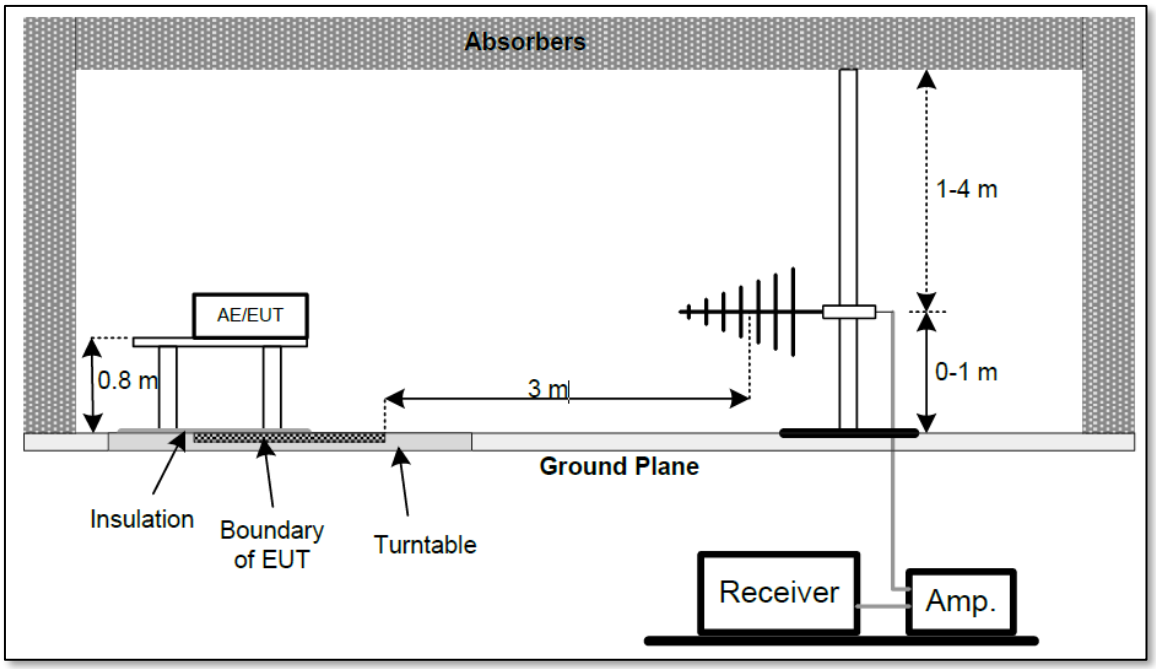
(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

The separation distance of 3 m was used for measurements up to 1 GHz. The EUT was placed on the top of a table 0.8 m above the rotating ground in a 3 m semi-anechoic chamber.

A. Cables connecting to AE located outside the measurement area drop directly to, but be insulated from the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer's recommendation.
B. The rotating ground was rotated 360 degrees to determine the position of the highest radiation.
C. The height of the receive antenna was varied between 1 m and 4 m. Both horizontal and vertical Polarizations of the antenna were checked.
D. For each suspected emission, the EUT was arranged at its worst case and then the antenna was scanned in height to find the maximum.
E. The receiver was set to quasi-peak detect function and specified bandwidth with maximum hold mode.
F. For the actual test configuration, please refer to the related Item - TEST PHOTOS.

Test Setup:



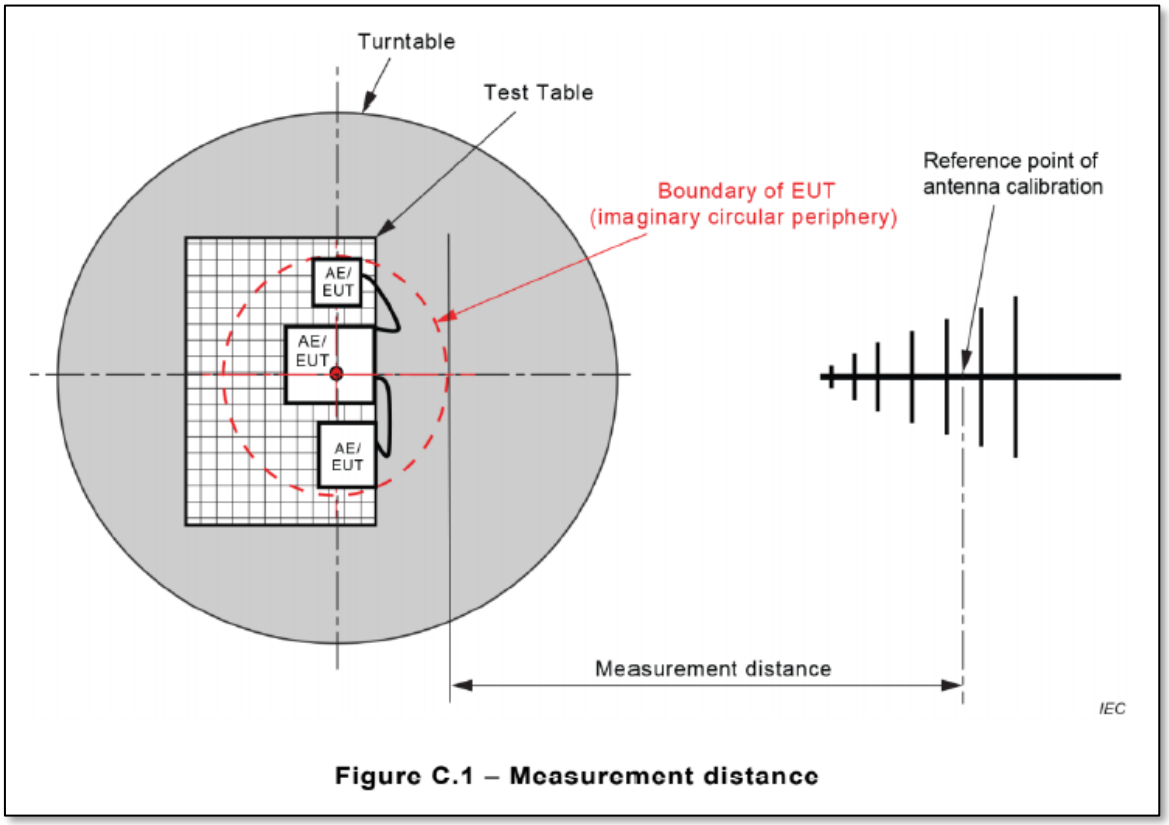


Figure C.1 – Measurement distance

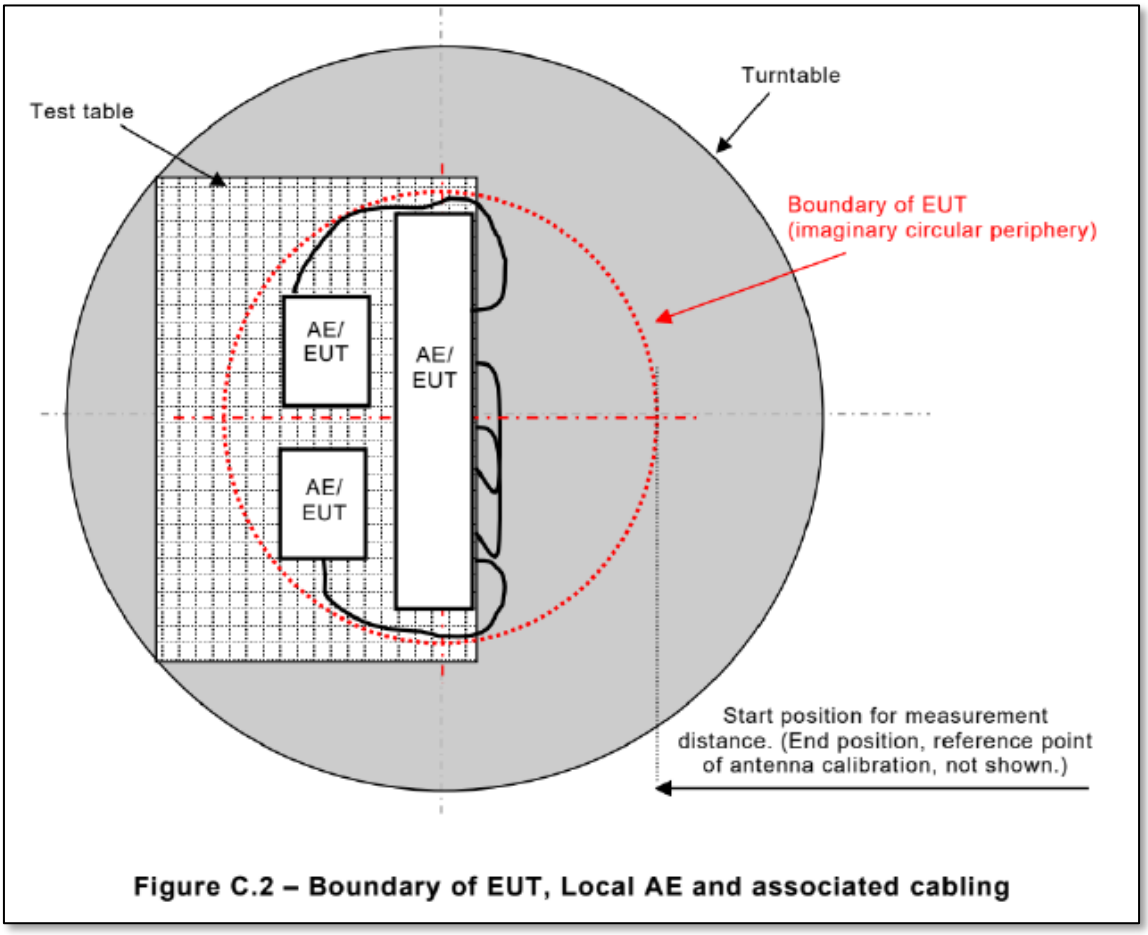
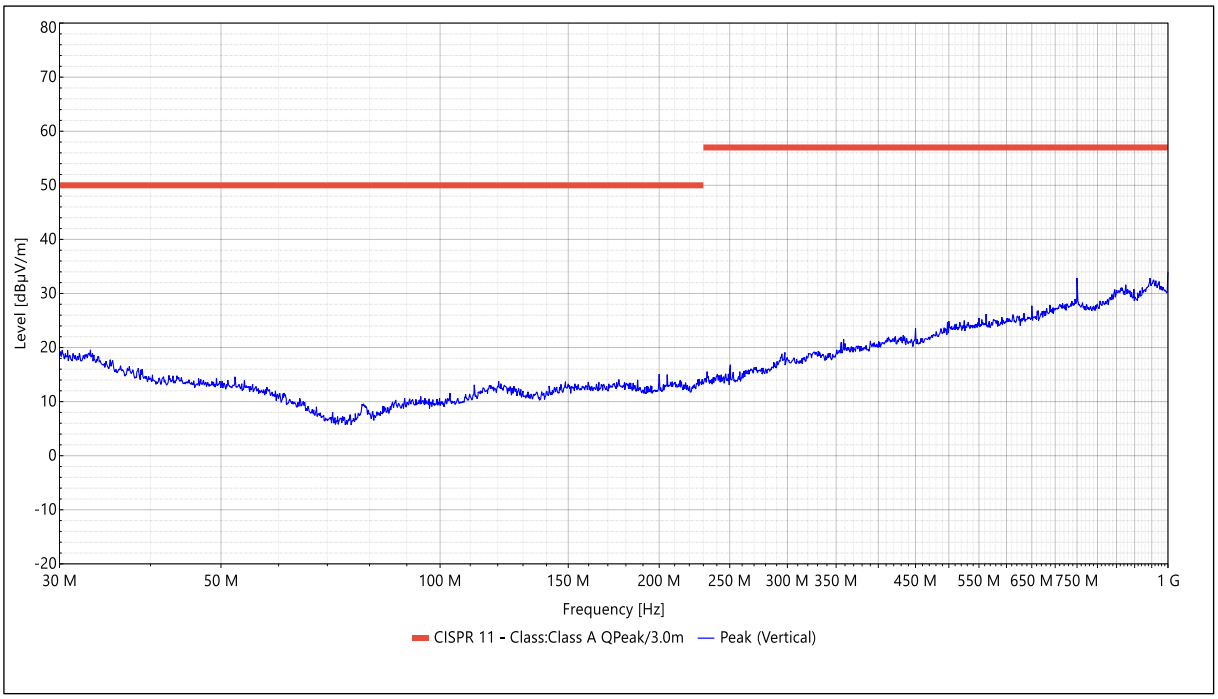


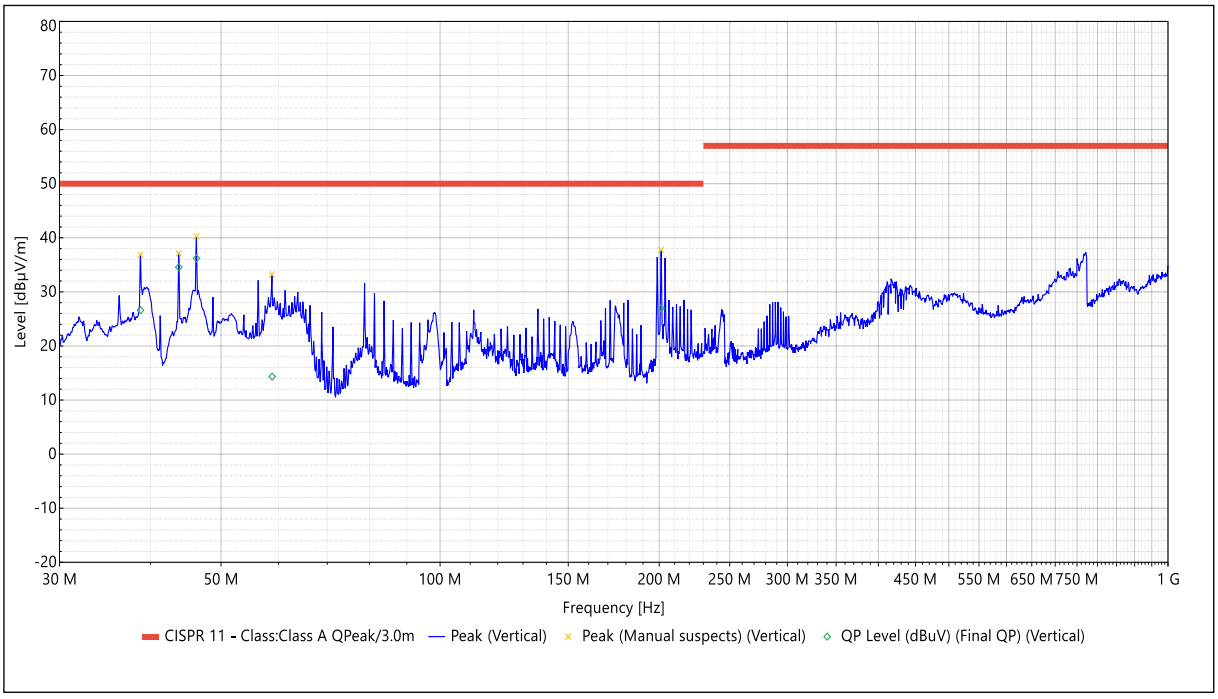
Figure C.2 – Boundary of EUT, Local AE and associated cabling

Figure 3: Radiated Emission Test Setup

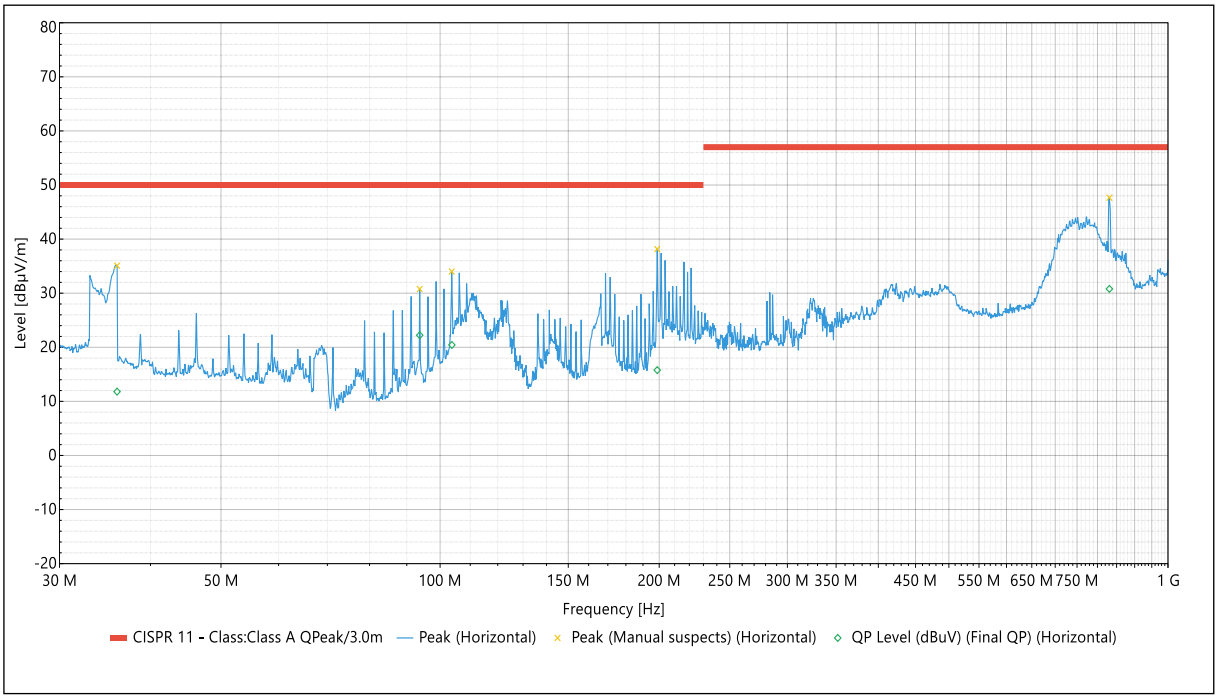
Test Graphs:



Graph 1: RE_ 30MHz to 1GHz_ Ambient



Graph 2: RE_ 30MHz to 1GHz_Vertical



Graph 3: RE_ 30MHz to 1GHz_Horizontal

Frequency	QP Level (dBuV)	QP Limit (dBuV)	QPeak Margin (dB)	Polarization
38.76 MHz	26.61	50	-23.38	Vertical
43.74 MHz	34.56	50	-15.43	Vertical
46.26 MHz	36.20	50	-13.79	Vertical
58.77 MHz	14.34	50	-35.65	Vertical
201.25 MHz	26.96	50	-23.03	Vertical
35.99 MHz	11.80	50	-38.19	Horizontal
93.75 MHz	22.23	50	-27.76	Horizontal
103.78 MHz	20.43	50	-29.57	Horizontal
198.75 MHz	15.78	50	-34.22	Horizontal
830.84 MHz	30.79	57	-26.20	Horizontal

Table 1: RE_ Plot Table_30 MHz to 1 GHz

Test Setup Photographs:

Figure 4: RE_ 30MHz to 1GHz_ Vertical

Figure 5: RE_ 30MHz to 1GHz_ Horizontal

Test Result: PASS

IMMUNITY TESTS

Annexure B: Electro Static Discharge Test (ESD)

Common information:

Test Date	: 16-09-2024
Temperature	: 22.5 ° C
Humidity	: 58 % RH
Atmospheric Pressure	: 910 mbar

Test Specification:

Reference Standard	: IEC 61000-6-2:2016
Test Standard	: IEC 61000-4-2
Discharge Network	: 150pF (Charging capacitance), 330Ω (Discharging impedance)
Polarity	: Positive & Negative
Number of discharges	: 10 Pulses for Each Point
Discharge Time	: 1 s

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	ESD Simulator	SHANGHAI SOSIN	RV ESD	SX33220916	05-01-2025
2.	Discharge Network	SHANGHAI SOSIN	EMCSOSIN	SX211222	05-01-2025

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

1. Contact discharge was applied to conductive surfaces of the EUT & Air discharge was applied only to non-conducted surfaces of the EUT.
2. Test performed as per table top test setup/ floor standing test setup. The table top EUT was placed on table at 0.8meter height. Floor standing EUT was placed on insulation at 0.1meter height from the ground reference plane (GRP).
3. The horizontal coupling plane (HCP), (1,6 ± 0,02) m × (0,8 ± 0,02) m, was placed on the table & grounded to the GRP with two 470k Ω resistor. The EUT and its cables were isolated from the coupling plane by an insulating support (0,5 ± 0,05) mm in thickness.
4. The vertical coupling plane (VCP), (0.5m × 0.5) m was grounded with two 470kΩ resistor to the ground reference plane.
5. For contact discharge, static charge directly injected on the metal contacts of the EUT. For air discharge, directly injected on the non-metallic part of the EUT.
6. For ungrounded product, a discharge cable with two 470kΩ resistances were used for discharging the static charge.
7. During the test performance of the EUT was monitored as per the criteria specified in the standard.

Test Setup:

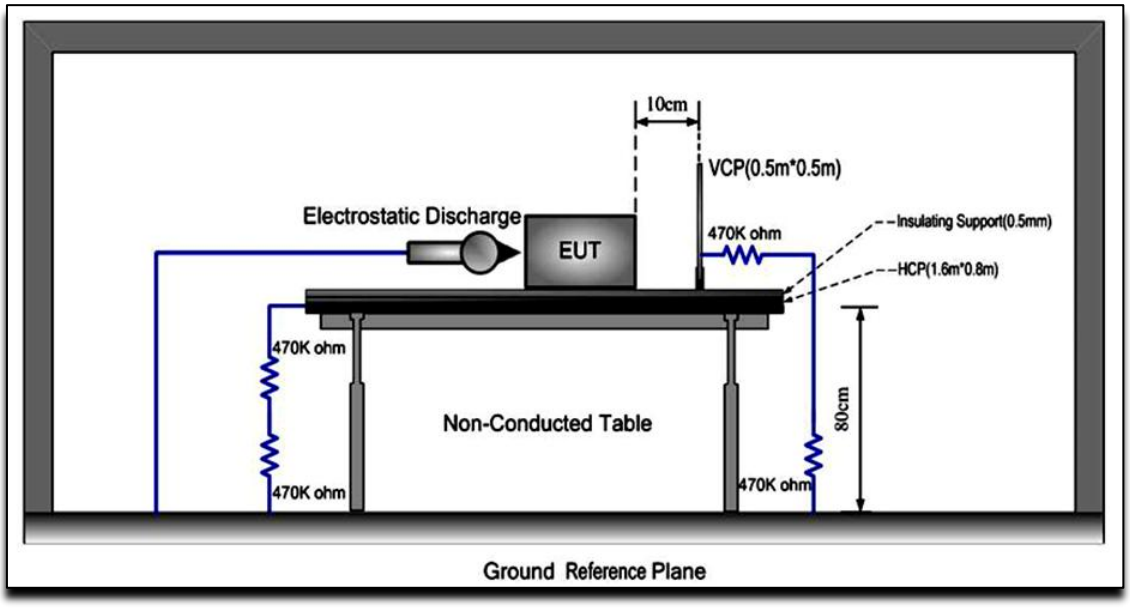


Figure 6: ESD Test Setup

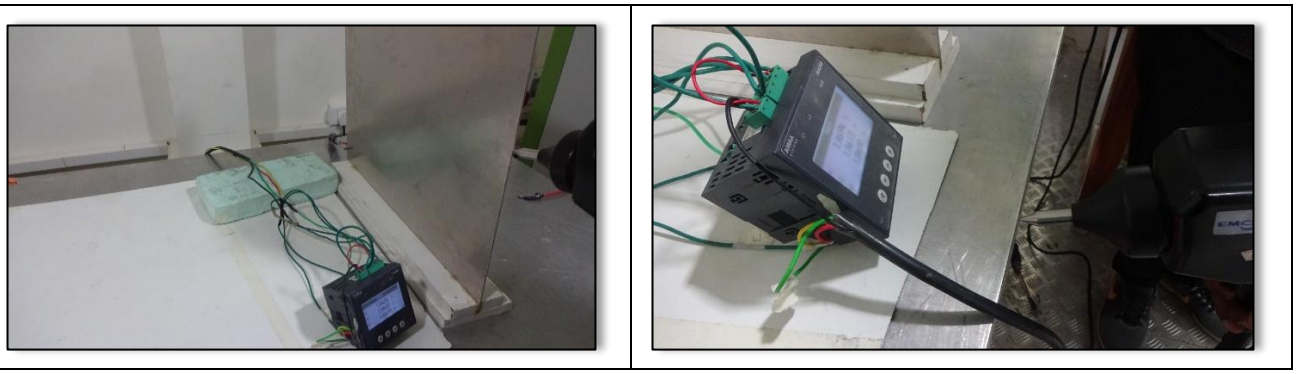
Test Results:

Indirect Discharge		Test Level, kV							
Sl. No	Test Points	+2	-2	+4	-4	+6	-6	+8	-8
1	HCP (Front)	A	A	A	A	A	A	A	A
2	HCP (Left)	A	A	A	A	A	A	A	A
3	HCP (Right)	A	A	A	A	A	A	A	A
4	HCP (Rear)	A	A	A	A	A	A	A	A
5	VCP (Front)	A	A	A	A	A	A	A	A
6	VCP (Left)	A	A	A	A	A	A	A	A
7	VCP (Right)	A	A	A	A	A	A	A	A
8	VCP (Rear)	A	A	A	A	A	A	A	A

Air Discharge		Test Level, kV							
Sl. No	Test Points	+2	-2	+4	-4	+8	-8	+15	-15
1	Display	A	A	A	A	A	A	A	A
2	Switch	A	A	A	A	A	A	A	A
3	Cables	A	A	A	A	A	A	A	A
4	Connectors	A	A	A	A	A	A	A	A

Table 2: ESD Test Results

Test Setup Photographs:



Indirect Discharge on VCP and HCP Test Setup Photo

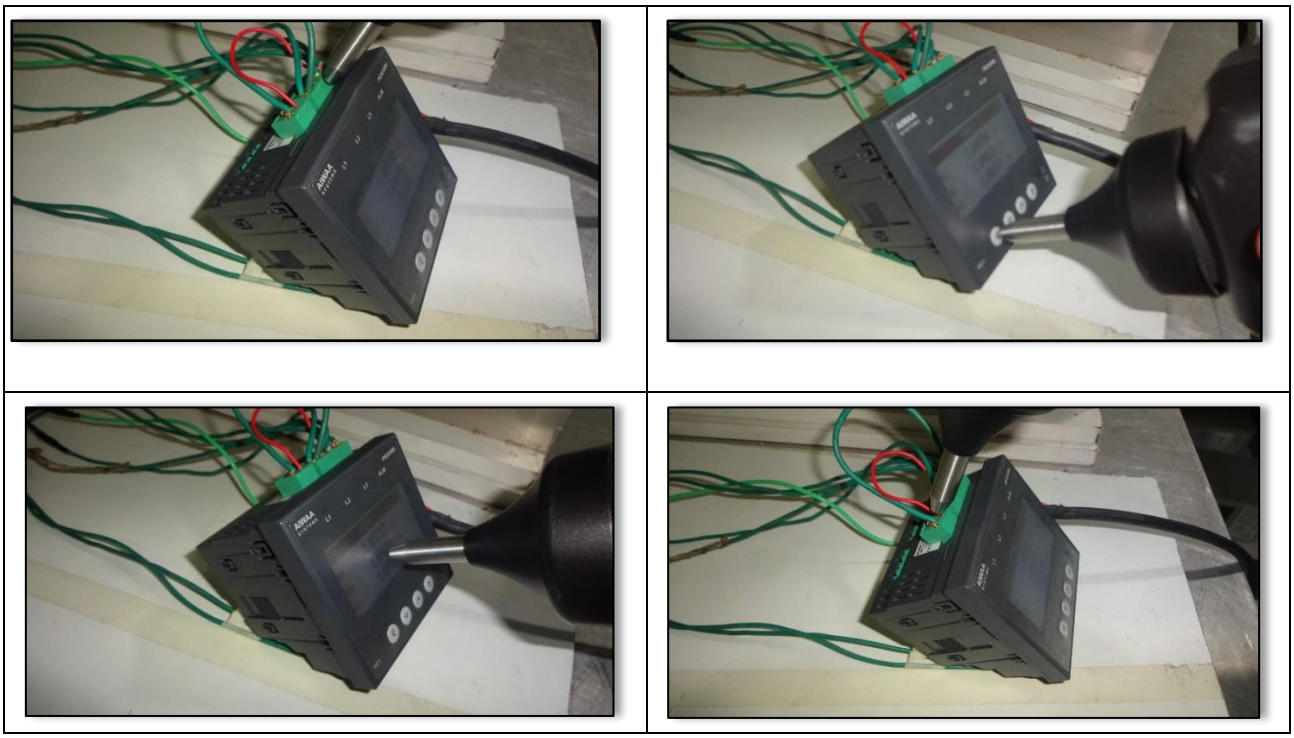


Figure 7: Test Setup Photos

Test Result: PASS

Annexure C: Radiated Immunity Test (RI)

Common information:

Test Date	: 19-12-2024
Temperature	: 24.8 ° C
Humidity	: 55.6 % RH

Test Specification:

Reference Standard	: IEC 61000-6-2:2016
Test Standard	: IEC 61000-4-3
Frequency Range	: 80MHz to 2.7GHz
Modulation	: 1kHz Sine Wave, 80 %, AM Modulation
Frequency Step	: 1 % of fundamental
Polarity of Antenna	: Horizontal and Vertical
Test Distance	: 3 m
Antenna Height	: 1.55 m
Dwell Time	: 3 s

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	Semi Anechoic Chamber	Tekiknow	TEK3MSAC	TTI3MSACCTL	12-05-2025
2.	RF Cable	Srinar communication	RG 144	CCTL/EMC/RFC/004	NA
3.	RF Cable	Srinar communication	RG 144	CCTL/EMC/RFC/007	NA
4.	Signal Generator	Rohde-Schwarz	SMB100A	182922	17-05-2026
5.	Power Amplifier (80MHz-1GHz)	Rohde-Schwarz	BBA150	104792	NA
6.	Power Amplifier (1GHz-6GHz)	amplifier research	75S1G6C	0361107	NA
7.	Log Periodic Antenna (80MHz-1GHz)	Amplifier research	ATL80M1G	361058	NA
8.	Horn Antenna (1GHz-6GHz)	Amplifier research	ATH800M6G	360721	NA

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

The testing was performed in a fully-anechoic chamber.
The testing distance from antenna to the EUT was 3 m.
The EUT and support equipment are installed in a representative system as described in EN IEC 61000-4-3 was placed on a non-conductive table 0.8 m in height. The system under test was connected to the power and signal wire according to relevant installation instructions.
The other condition as following manner:

A. The field strength is 3 V/m (unmodulated, rms).
B. The frequency range is swept from 80 MHz to 1000 MHz with the signal 80 % amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5 x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1 % of fundamental.
C. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
D. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

Test Setup:

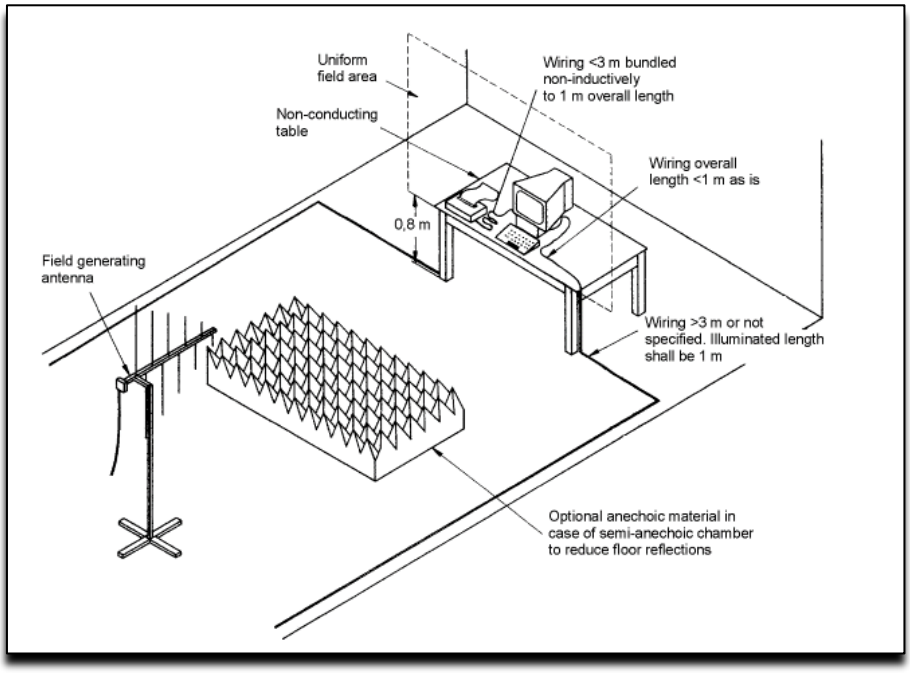


Figure 8: Radiated immunity Test Setup

Test Results:

Frequency (MHz)	Applied Voltage(V/m) – 80% AM 1kHz	Polarity	Azimuth	Criterion	Observation	Result
80MHz to 1GHz	10 V/m	V & H	Front	Criteria A	No degradation occurred	PASS
			Rear			
1.4GHz to 2GHz	3 V/m	V & H	Front	Criteria A	No degradation occurred	PASS
			Rear			
2GHz to 2.7GHz	1 V/m	V & H	Front	Criteria A	No degradation occurred	PASS
			Rear			

Table 3: Radiated immunity Test Results

Test Setup Photographs:

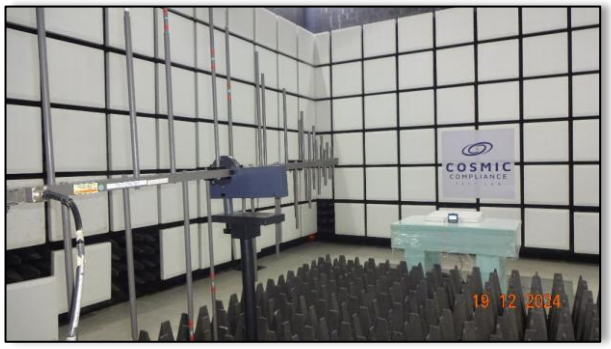


Figure 9: RI_80MHz to 1GHz_VP

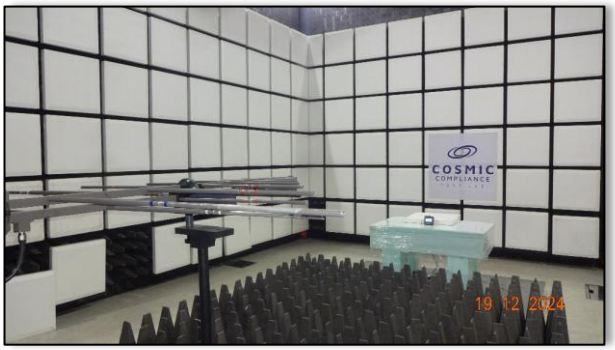


Figure 10: RI_80MHz to 1GHz_HP

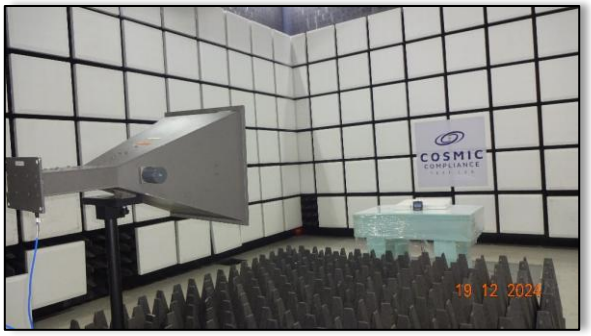


Figure 11: RI_1GHz to 2.7GHz_VP	**Figure 12: RI_1GHz to 2.7GHz_HP**

Test Result: **PASS**

Annexure D: Electrical Fast Transient Test (EFT)

Common information:

Test Date	: 16-09-2024
Temperature	: 25.8 ° C
Humidity	: 57.9 % RH

Test Specification:

Reference Standard	: IEC 61000-6-2:2016
Test Standard	: IEC 61000-4-4: 2012; Ed3.0
Type of pulse	: 5/50 ns
Burst duration	: 15ms
Burst Period	: 300ms
Test Duration	: At least 60sec
Repetition frequency rate	: 5kHz

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	EFT GENERATOR	SHANGHAI SOSIN	EFT T6	SX272104B4	05-06-2025

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

1. The tabletop EUT was placed on table at 0.8meter height with the help of 0.1m insulation, Floor standing EUT was placed on insulation at 0.1meter height.
2. The distance between the EUT and any other metallic surface except the GRP was greater than 0.5m.
3. The length of the power cable and signal cable maintained 0.5m, the excess length of this cable was folded to avoid a flat coil and placed at distance of 0.1m above the GRP.
4. Test performed with 60 seconds duration for both power line and signal line.
5. If the EUT contains identical ports, test shall be performed for one port (example; 50 pair telecommunication cable). Test is not applicable for signal line, If the cable length is less than 3 m.
6. During the test performance of the EUT was monitored as per the criteria specified in the standard.

Test Setup:

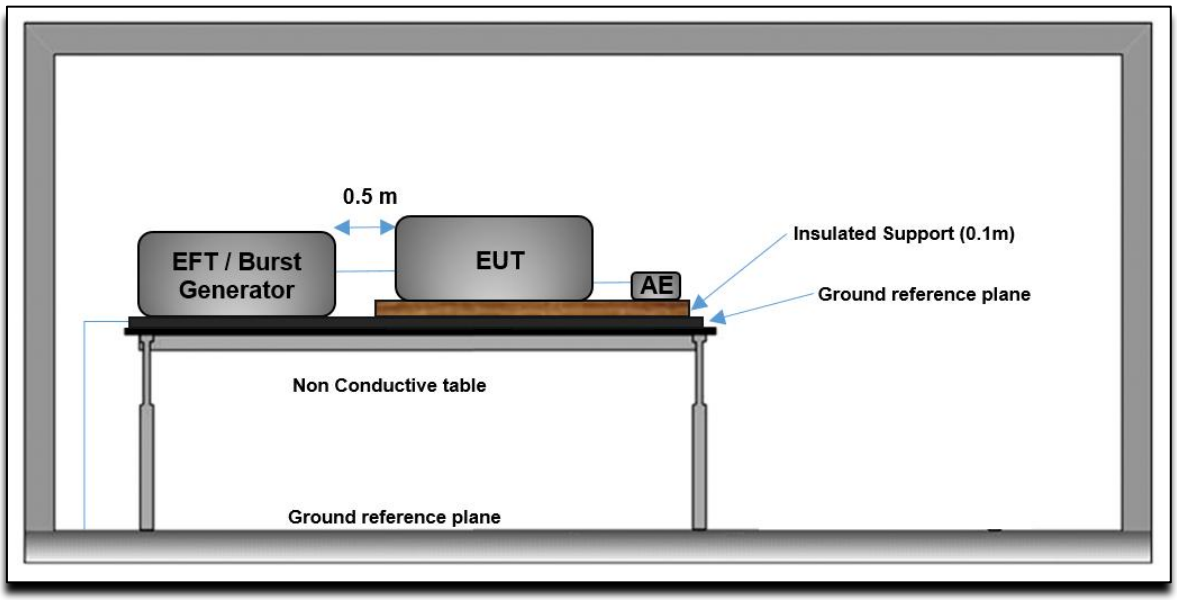


Figure 13: Electrical Fast Transient Test Setup

Test Results:

Power Line: Coupling Path/Line	Test Level (KV)							
	+0.5	-0.5	+1	-1	+2	-2	+4	-4
L1	A	A	A	A	B	B	B	B
L2	A	A	A	A	B	B	B	B
L3	A	A	A	A	B	B	B	B
N	A	A	A	A	B	B	B	B
L1-N	A	A	A	A	B	B	B	B
L2-N	A	A	A	A	B	B	B	B
L3-N	A	A	A	A	B	B	B	B
L1-L2-L3-N-PE	A	A	A	A	B	B	B	B

Signal Lines	Test Level (KV)							
	+0.25	-0.25	+0.5	-0.5	+1	-1	+2	-2
Communication Cable	A	A	A	A	A	A	A	A

Table 4: Electrical Fast Transient Test Results

Test Setup Photographs:

EFT Test setup_ Power Line

EFT Test setup_ Signal Port

Figure 14: Test Setup Photos

Test Result: PASS

Annexure E: Surge Test

Common information:

Test Date	: 18-09-2024
Temperature	: 25.5 ° C
Humidity	: 57.4 % RH

Test Specification:

Reference Standard	: IEC 61000-6-4:2018
Test Standard	: IEC 61000-4-5: 2017; Ed3.1
Port tested	: Power Port
Type of pulse	: 1.2/50 µ second
No of surges	: 5 surges/Phase angles
Phase angles	: 0º, 90º, 180º & 270º
Test interval	: 60 seconds
Source impedance for common mode	: 12 Ω
Source impedance for differential mode	: 2 Ω

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	Surge generator	EMCSOSIN	SUR T10	SX352201CC	05-06-2025

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

1. The tabletop EUT was placed on table at 0.8meter height with the help of 0.1m insulation, Floor standing EUT was placed on insulation at 0.1meter height.
2. The surge pulse (1.2/50 μ seconds) surge was applied to the EUT power port and signal port using coupling and decoupling networks (CDN). Generator and CDN were grounded directly to the GRP.
3. The power cord between the EUT and the coupling/decoupling network does not exceed 2m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2m in length. The EUT was conducted the below specified test voltages for line to neutral and line to earth and neutral to earth, five positive pulses and five negative pulses of each at 0º, 90º, 180º, and 270º for AC power ports. The test levels were applied on the EUT with a 2Ω generator source impedance for power supply terminals. The tests were done at repetition rate 1 per minute.
4. During the test performance of the EUT was monitored as per the criteria specified in the standard.

Test Setup:

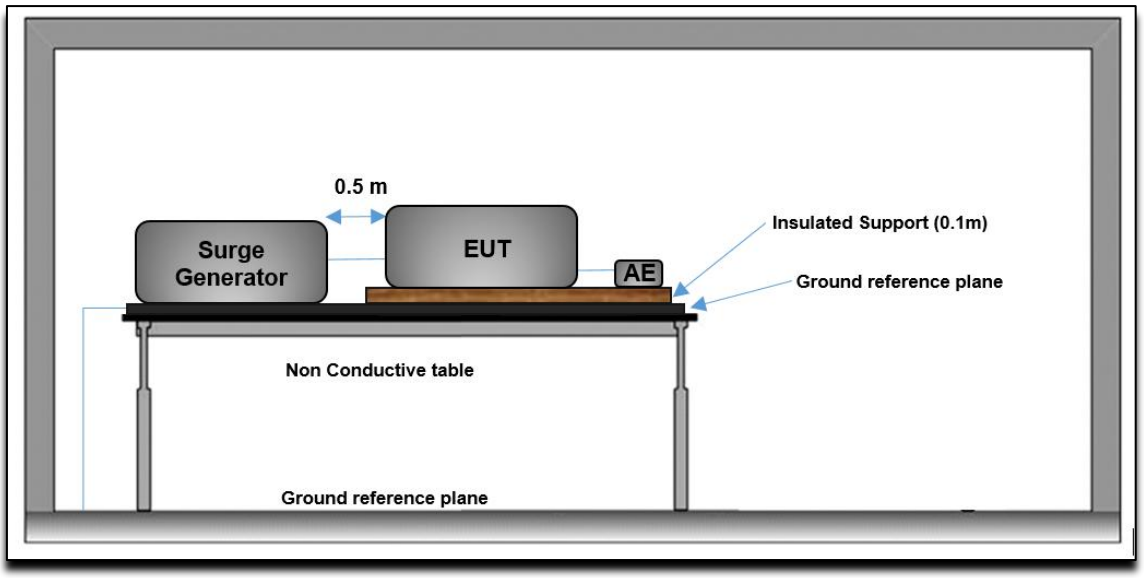


Figure 15: Surge immunity Test Setup

Test Results:

Power Port:

Test Level (KV)	Differential Mode			
	L-N			
	0°	90°	180°	270°
+0.5	A	A	A	A
-0.5	A	A	A	A
+1.0	A	A	A	A
-1.0	A	A	A	A
+2.0	A	A	A	A
+2.0	A	A	A	A

Note: *Where L denotes all the Phase lines, ie: L1, L2 & L3.*

Table 5: Surge immunity Test Results

Test Setup Photographs:

Figure 16: Test Setup Photos

Test Result: PASS

Annexure F: Conducted Susceptibility Test (CS)

Common information:

Test Date : 16-09-2024

Temperature : 24.9 ° C

Humidity : 58 % RH

Test Specification:

Reference Standard : IEC 61000-6-4:2018

Test Standard : IEC 61000-4-6: 2013; Ed4.0

Frequency Range : 150kHz to 80MHz

Modulation : 1kHz Sine Wave, 80 %, AW Modulation

Injection method : CDN method

Port tested : Power port

Dwell Time : at least 3 s

Frequency step size : 1%

Test Equipment Used:

	Description	Make	Model No.	Serial No.	Cal Due
1.	CDN	Compower	M325E	34090023	01-09-2025
2.	Power Amplifier	Rohde-Schwarz	BBA150	105654	NA
3.	Signal Generator	Rohde-Schwarz	SMB100A	182922	17-05-2026
4.	6dB attenuator	Srinar Communication	NA	NA	NA

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

A. The EUT was placed on insulation at 0,1 m ± 0,05 m meter height.

B. Coupling and decoupling network (CDN) connected to the ground reference plane (GRP) with the distance of 0.1 m to 0.3 m from the EUT.

C. The CDN was connected to the port intended to be tested and one CDN with 50 Ω termination was connected to another port. CDN was grounded to the GRP.

D. The frequency range was swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size did not exceed 1% of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

E. During the test performance of the EUT was monitored as per the criteria specified in the standard.

Test Setup:

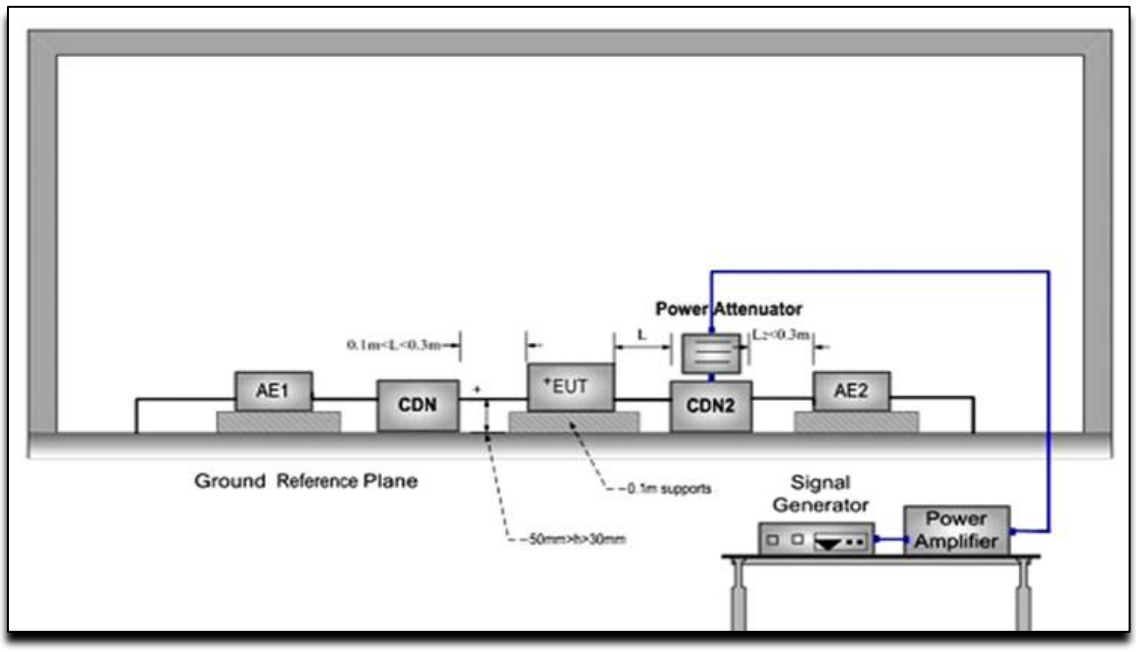


Figure 17: Conducted Immunity Test Setup

Test Results:

Test Frequency	Test Level	Modulation	Power / Signal Port Name	Coupling Method:	Observation
150kHz to 80MHz	10 Vrms	AM	Power port	CDN	Criteria A

Test Setup Photographs:

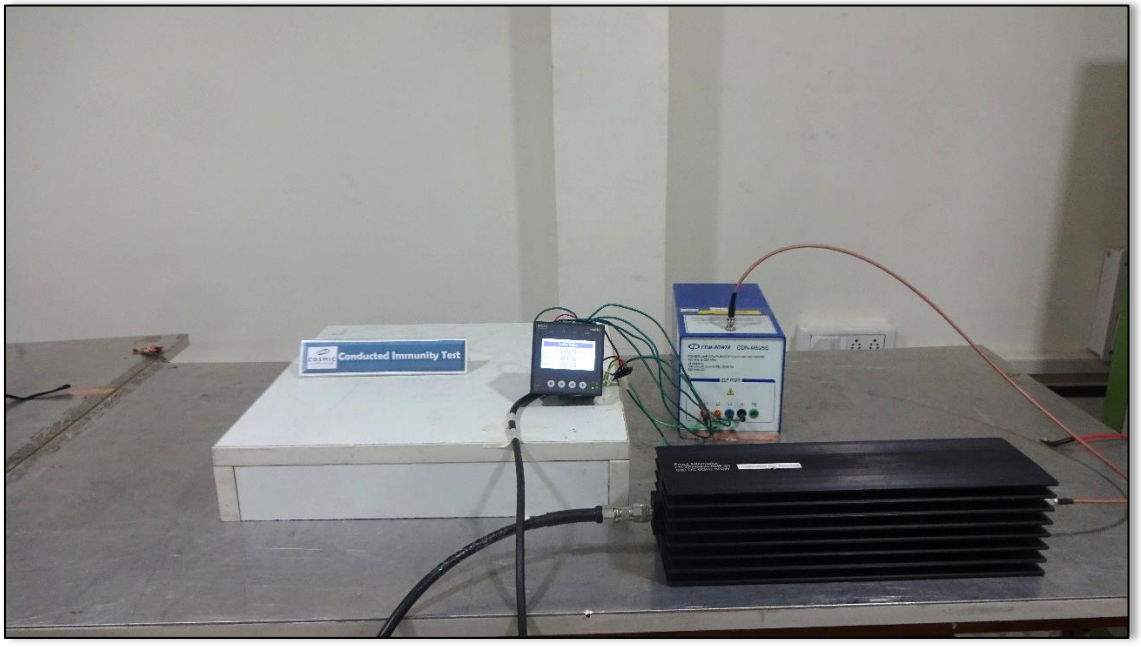


Figure 18: Test Setup Photos

Test Result: PASS

Annexure G: Power Frequency Magnetic Field Test

Common information:

Test Date : 16-09-2024

Temperature : 26.1 ° C

Humidity : 57.4 % RH

Test Specification:

Reference Standard : IEC 61000-6-4:2018

Test Standard : IEC 61000-4-8: 2009

Coil orientations : X, Y & Z

Test duration for short duration : 1 sec for each orientation.

Test duration of Continuous field : 60 sec for each orientation

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	Power frequency magnetic field generator	EMC SOSIN	PFM 1200	SX282206G1	14-02-2025

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

1. Tabletop EUT was placed on 0,5 ± 0,05-meter insulated table. Floor standing EUT was placed on GRP with the help of 0.1-meter insulation.
2. The test generator was directly grounded on the ground reference pane and connected to the magnetic field induction coil through a high voltage cable.
3. The current and frequency of the source was set according to the requirement specified in test plan.
4. The AC current generated from the generator was given through the magnetic induction coil & power frequency magnetic field (PFMF) was generated through the coil
5. The EUT was subjected to the test magnetic field by using the induction coil of standard dimensions (1m×1m) by the immersion method.
6. EUT and all cables were exposed to the magnetic field.
7. The coil was placed all the 4 sides of the EUT for proximity method. The induction coil was rotated 90 degree in order to expose all sides of the EUT to the magnetic field with different orientations. The test was repeated by moving and shifting the magnetic field coil in order to test all sides of the EUT.
8. The EUT placed X axis, Y axis, Z axis and immersed to the magnetic field induction coil.
9. During the test performance of the EUT was monitored as per the criteria specified in the standard

Test Setup:

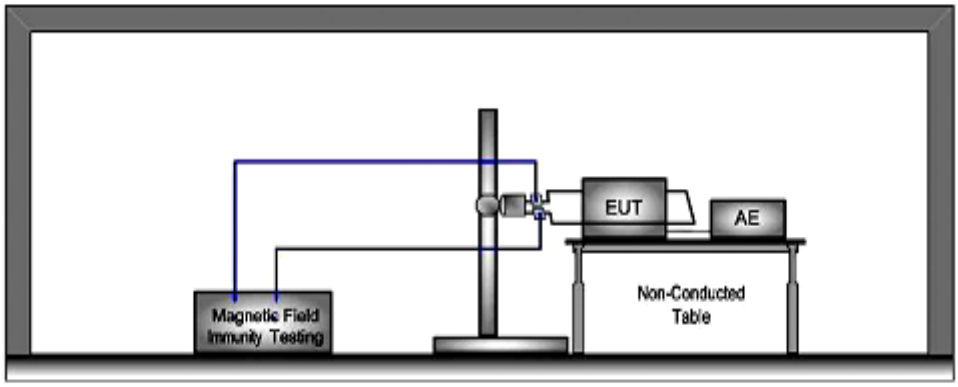


Figure 19: PFMF Test Setup

Test Results:

Test Level	EUT Face	Result / Observations
1 A/m	X	Criteria A
	Y	Criteria A
	Z	Criteria A

Table 6: PFMF Test Results

Test Setup Photographs:

Test setup photograph of X axis

Test setup photograph of Y axis

Test setup photograph of Z axis

Figure 20: Test Setup Photos

Test Result: PASS

Annexure H: Voltage Dips and Short Interruptions Test

Common information:

Test Date : 16-09-2024

Temperature : 24.9 ° C

Humidity : 57.6 % RH

Test Specification:

Reference Standard : IEC 61000-6-4:2018

Test Standard : IEC 61000-4-11: 2020; Ed3.0

Phase angle : 0º to 360º at the step of 45º

No. of Test Repetitions : 3

Test Equipment Used:

Sl. No.	Description	Make	Model No.	Serial No.	Cal Due
1.	Voltage Dips Generator	EMCSOSIN	VDT T20	SX342201D5	14-02-2025

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

Test Procedure:

1. Tabletop EUT was placed on 0,8-meter insulated table. Floor standing EUT was placed on GRP with the help of 0.1-meter insulation.
2. The power supply to the EUT was fed by compact NX generator.
3. The EUT was configured and connected to satisfy its functional requirements.
4. The EUT was subjected to voltage dips and short interruption according to the specification in standard.
5. Each test sequence with the below mentioned test level and duration was repeated 3 times with a minimum interval of 10 seconds.
6. Voltage dips test was done by synchronizing the dips at 0º to 360º phase angle in 45º steps. Interruption test was synchronized at 0º.
7. During the test performance of the EUT was monitored as per the criteria specified in the standard.

Test Setup:

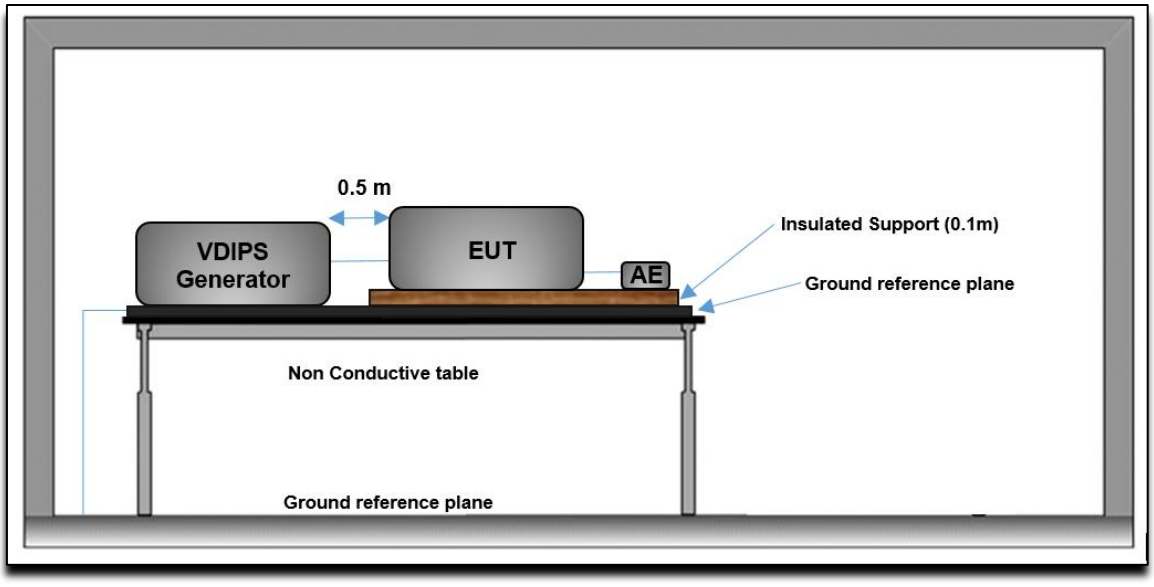


Figure 21: Voltage Dips and Short Interruption Test Setup

Test Results:

Test Level (%)	Reduction (%)	Duration (ms)	Cycles	Phase angle	No of dips	Observations
Voltage Dips						
0%	0V	10ms	0.5	45° 90° 135° 180° 225° 270° 315° 360°	3	No degradation occured
0%	0V	20ms	1		3	No degradation occured
70%	161V	500ms	25		3	No degradation occured
Short Interruptions						
0%	0V	5000ms	250	45° 90° 135° 180° 225° 270° 315° 360°	3	No degradation occured

Table 7: Voltage Dips and Short Interruption Test Results

Test Setup Photographs:

Figure 22: Test Setup Photos

Test Result: PASS

DISCLAIMER

1. The Released Test Report/s relates ONLY to the specific sample/s tested under the stated conditions and is issued in good faith. It is the Client / Customer's responsibility to ensure that additional production units of the tested sample/s are manufactured with identical electrical, mechanical and software/firmware components so as to meet the same specifications and quality as the tested sample/s.
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End of Test Report