TEST REPORT

Product Name	:	AC Combiner Box
Brand Name	:	ESol
Model	:	QDCS-ACTRI-10
Series Model	:	QDCS-ACTRI-8,QDCS-ACTRI-6,QDCS-ACMONO-L, QDCS-ACMONO-S,QDCS-MONOOVATS-63
Applicant	:	**CESol d.o.o.**
Address	:	Krpanova ulica 7, SI-6000 Koper – Capodistria Slovenia
Manufacturer	:	**Guorui Intelligent Manufacturing (Shenzhen) Electric Co., Ltd.**
Address	:	No. 3, Dayang 2nd Road, Yulv Community, Yutang Subdistrict, Guangming District, Shenzhen City, Guangdong Province, P.R.China
Standard(s)	:	EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019, EN IEC 61000-3-2:2019+A2:2024 EN 61000-3-3:2013+A2:2021+AC:2022-01
Date of Receipt	:	Jun.08, 2026
Date of Test	:	Jun.08, 2026~ Jun.09, 2026
Issued Date	:	Jun.10, 2026

Issued By: **Guangdong Asia Hongke Test Technology Limited**

B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Tel.: +86 0755-230967639 Fax.: +86 0755-230967639

Reviewed by: James.Pan **Approved by:** Allen.Wang

Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Guangdong Asia Hongke Test Technology Limited. If there is a need to alter or revise this document, the right belongs to Guangdong Asia Hongke Test Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.

Report Revise Record

Report Version	Issued Date	Notes
M0	Jun.10, 2026	Initial Release

Contents

1 TEST SUMMARY 4

1.1 TEST STANDARDS 4
1.2 TEST SUMMARY 4
1.3 TEST FACILITY 5
1.4 MEASUREMENT UNCERTAINTY 5

2 GENERAL INFORMATION 6

2.1 ENVIRONMENTAL CONDITIONS 6
2.2 GENERAL DESCRIPTION OF EUT 6
2.3 DESCRIPTION OF TEST MODES 6
2.4 SPECIAL ACCESSORIES 7
2.5 EQUIPMENT LIST FOR THE TEST 7

3 TEST CONDITIONS AND RESULTS 10

3.1 EMC EMISSION TEST 10
3.1.1 Conducted Emission 10
3.1.2 Radiated Emission 13
3.1.3 Harmonic Current Emissions 17
3.1.4 Voltage Fluctuations and Flicker 19
3.2 EMC IMMUNITY TEST 20
3.2.1 Immunity Performance criteria 20
3.2.2 Monitoring EUT during Immunity Test 20
3.2.3 Electrostatic Discharge 21
3.2.4 Fast Transients Common Mode 27
3.2.5 Surge Testing 30
3.2.6 RF Common Mode 32
3.2.7 Voltage Dips and Interruptions 34

4 TEST SETUP PHOTOS 35

5 PHOTOS OF THE EUT 38

1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

EN IEC 61000-6-4:2019 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

EN IEC 61000-6-2:2019 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments

EN IEC 61000-3-2:2019+A2:2024: Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase).

EN 61000-3-3:2013+A2:2021+AC:2022-01: Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection

1.2 Test Summary

Test Items	Test Method	Result
Conducted Emission	EN IEC 61000-6-4:2019	PASS
Radiated Emission	EN IEC 61000-6-4:2019	PASS
Harmonic Current Emissions	EN IEC 61000-3-2:2019+A2:2024	PASS
Voltage Fluctuations and Flicker	EN 61000-3-3:2013+A2:2021+AC:2022-01	PASS
Electrostatic Discharge	EN 61000-4-2: 2009 EN IEC 61000-6-2:2019	PASS
RF Electromagnetic Field	EN IEC 61000-4-3:2020 EN IEC 61000-6-2:2019	PASS
Fast Transients Common Mode	EN 61000-4-4: 2012 EN IEC 61000-6-2:2019	PASS
Surges	EN 61000-4-5: 2014+A1: 2017 EN IEC 61000-6-2:2019	PASS
RF Common Mode 0,15 MHz to 80 MHz	EN 61000-4-6: 2014+AC:2015 EN IEC 61000-6-2:2019	PASS
Voltage Dips and Interruptions	EN IEC 61000-4-11:2020+AC:2022 EN IEC 61000-6-2:2019	PASS
Power Frequency magnetic Field	EN 61000-4-8:2010 EN IEC 61000-6-2:2019	N/A

1.3 Test Facility

Test Laboratory:
Guangdong Asia Hongke Test Technology Limited
B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified or accredited by the following organizations:
FCC-Registration No.: 251906 Designation Number: CN1376
Guangdong Asia Hongke Test Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 31737 CAB identifier: CN0165
The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737

A2LA-Lab Cert. No.: 7133.01
Guangdong Asia Hongke Test Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the Guangdong Asia Hongke Test Technology Limited’s quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for Asia Hongke laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Power Line Conducted Emission	150KHz~30MHz	±1.20 dB	(1)
Disturbance Power Emission	30MHz~300MHz	±2.96 dB	(1)
Radiated Emission Test	30MHz~1GHz	±3.75 dB	(1)
Radiated Emission Test	1GHz~18GHz	±3.88 dB	(1)

The report uncertainty of measurement y ± U, where expanded uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of k=2 , providing a level of confidence of approximately 95%

2 GENERAL INFORMATION

2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	15°C -35°C
Relative Humidity	35%-55 %
Air Pressure	101KPa

2.2 General Description of EUT

Product Name:	AC Combiner Box
Model/Type reference:	QDCS-ACTRI-10
Serial Model:	QDCS-ACTRI-8,QDCS-ACTRI-6,QDCS-ACMONO-L, QDCS-ACMONO-S,QDCS-MONOOVATS-63
Model difference:	All model names and appearances are different from the samples, but the structure and circuit are the same.
Power Ratings:	3PH, AC380V~, 25A
Hardware Version:	N/A
Software Version:	N/A

2.3 Description of Test Modes

Equipment under test was operated during the measurement under the following conditions:

Test mode	Description
Mode 1	Working（maximum power）
Mode 2	Idle

Scan above all test mode, found below test mode which it was worse case mode. Test results reported represents the worst-case condition.

Test item	Test mode
Conducted emission	Mode 1
Radiated emission	Mode 1
EMS	All modes

2.4 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Serial No.	Provided by	Other
/	/	/	/	/	/
/	/	/	/	/	/

2.5 Equipment List for the Test

☒ **Radiation Emission Test Equipment (AiT 966 chamber)**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	EMI Measuring Receiver	R&S	ESR	101160	2025.09.23	2026.09.22
2	Low Noise Pre Amplifier	SCHWARZBECK	BBV 9745	00282	2025.09.23	2026.09.22
3	Low Noise Pre Amplifier	COM-MW	DLAN8-18000-40000-1066	08233242	2025.06.26	2026.06.25
4	Low Noise Pre Amplifier	COM-MW	DLAN8-1000-18000-1021	05231256	2025.06.26	2026.06.25
5	Spectrum Analyzer	R&S	FSV40	101470	2025.09.23	2026.09.22
6	Passive Loop	ETS	6512	00165355	2024.08.29	2026.08.28
7	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9168	01434	2024.08.29	2026.08.28
8	Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	452	2024.08.29	2026.08.28
9	6dB Attenuator	JFW	50FPE-006	4360846-949-1	2025.09.23	2026.09.22
10	Filter	MICRO-TRONICS	BRM50702-02	16	2025.09.23	2026.09.22
11	Filter	MICRO-TRONICS	BRC50703-02	17	2025.09.23	2026.09.22
12	Filter	MICRO-TRONICS	BRC50705-02	18	2025.09.23	2026.09.22
13	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A

☒ **Conducted Emission Test Equipment (AiT shiled room)**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESPI	100771	2025.09.23	2026.09.22
2	LISN	R&S	NNLK 8129	8130179	2025.09.23	2026.09.22
3	ISN	TESEQ	T800	29429	2025.09.23	2026.09.22
4	Pulse Limiter	R&S	ESH3-Z2	102789	2025.09.23	2026.09.22
5	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A

☒ **H/F Test Equipment**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Signal Conditioning Unit	Schaffner	CCN1000-1	72472	2025.09.23	2026.09.22
2	5KV AC Power Source	Schaffner	NSG1007-5-208-413	57227	2025.09.23	2026.09.22

3	H/F Software	Schaffner	LMG600	3.140	N/A	N/A

☒ ESD Test Equipment						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	ESD Simulator	Schloder	SESD 30000	509325	2025.09.23	2026.09.22

☒ R/S Test Equipment						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	MXG analog signal generator	Agilent	N5181A	MY46240859	2025.09.23	2026.09.22
2	Power Amplifier	Schaffner	CBA9433	T43574	2025.09.23	2026.09.22
3	Power Amplifier	Schaffner	CBA9409	T43605	2025.09.23	2026.09.22
4	Power Amplifier	Micotop	MPA-3000-6000-50	MPA03724	2025.09.23	2026.09.22
5	Logarithmic-periodic Antenna	Schwarzbeck	VULP9118E	820	2025.09.23	2026.09.22
6	Broadband Horn Antenna	Schwarzbeck	BBHA 9120LF	255	2025.09.23	2026.09.22
7	Power meter	Agilent	E4419B	MY45102079	2025.09.23	2026.09.22
8	Power sensor	Agilent	8481A	MY41097696	2025.09.23	2026.09.22
9	Power sensor	Agilent	8481A	MY41097697	2025.09.23	2026.09.22
10	RF Relay matrix	tsj	RFM-S621	04261	2025.09.23	2026.09.22
11	R/S Software	TEPTO	TEPTP-RS	4.07.0017	N/A	N/A

☒ EFT/B Test equipment						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Transient integrated immunity generator	HTEC	HCOMPACT 51	231801	2025.09.23	2026.09.22
2	coupling clamp	HTEC	H3C	/	2025.09.23	2026.09.22
3	EFT Software	HTEC	HCOMPACT-5	174501	N/A	N/A

☒ Surge Test equipment						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Transient integrated immunity generator	HTEC	HCOMPACT 51	231801	2025.09.23	2026.09.22
2	Three-phase coupling and decoupling network	HTEC	HCOUPLER 100	233304	2025.09.23	2026.09.22
3	Surge Software	HTEC	HCOMPACT-5	174501	N/A	N/A

☒ C/S Test Equipment						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	RF field induction conduction test system	HTEC	HCS 75	230207	2025.09.23	2026.09.22
2	6dB Attenuator	Aeroflex / Weinschel	CDG 7006-100W	220308034	2025.09.23	2026.09.22
3	CDN	HTEC	HCDN M2+M3-16	07010	2025.09.23	2026.09.22

4	Current injection clamp	TSJ	TSIC-23	535	2025.09.23	2026.09.22
5	CS Software	HTEC	CS5045	VER2.01	N/A	N/A

☒ **Dips Test Equipment**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Three Phase Voltage Dips & Interrupts Generator	HTEC	HPFS 1003P	204801	2025.09.23	2026.09.22
2	Dips Software	HTEC	HPFS303P	161903	N/A	N/A

☐ **PFMF Test Equipment**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Magnetic field Power frequency magnetic field test system	HTEC	HMFG 1000	233104	2025.09.23	2026.09.22
2	PFMF Software	HTEC	HMFG100	233104 V2.11	N/A	N/A

☐ **Others Test Equipment**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	Wideband communication tester	R&S	CMW500	1201.000 2K50	2025.09.23	2026.09.22

Note: ☐ is not applicable in this Test Report. ☒ is applicable in this test report.

3 TEST CONDITIONS AND RESULTS

3.1 EMC EMISSION TEST

3.1.1 Conducted Emission

LIMIT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

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

(2)The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

TEST PROCEDURE

a) The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

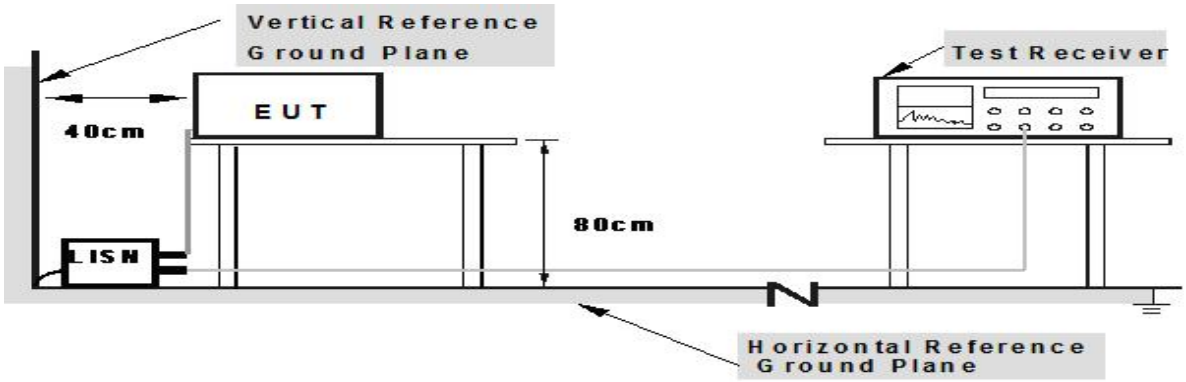
b) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

c) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

d) LISN at least 80 cm from nearest part of EUT chassis.

e) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP



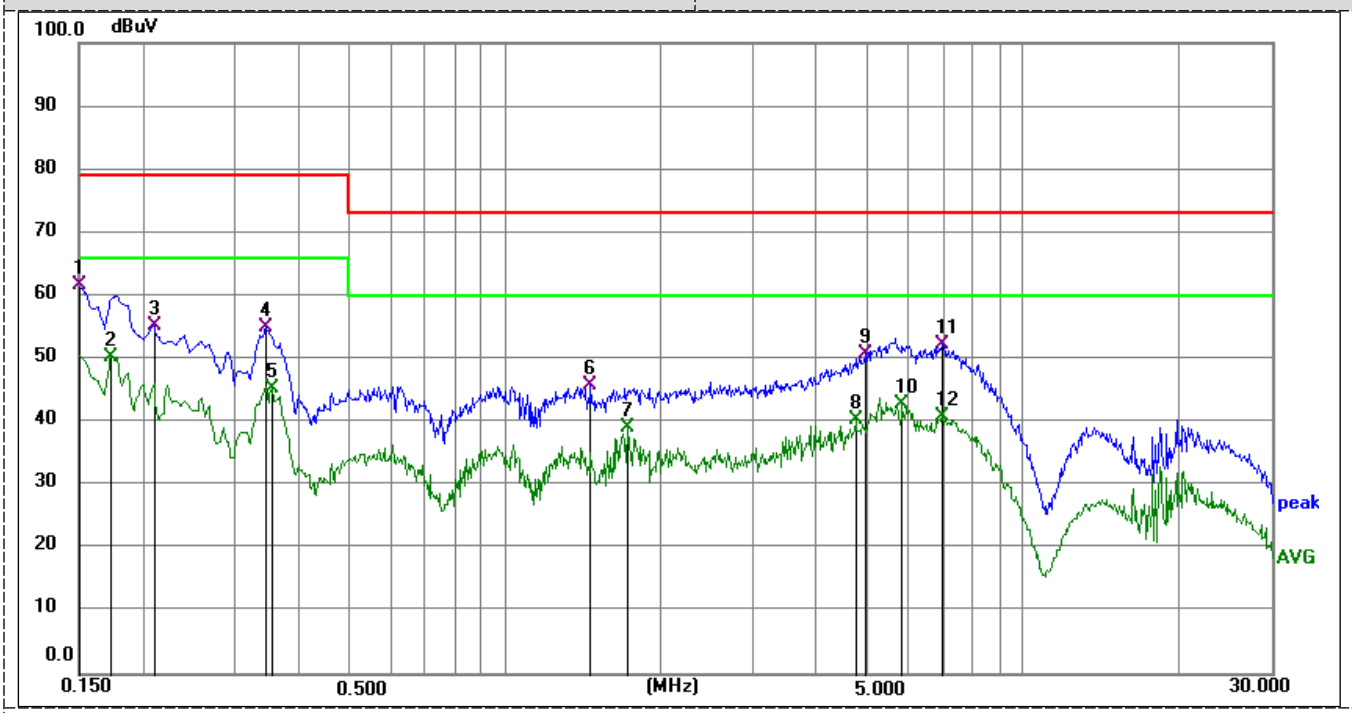
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

TEST RESULTS

------Passed------

Please refer to the below test data:

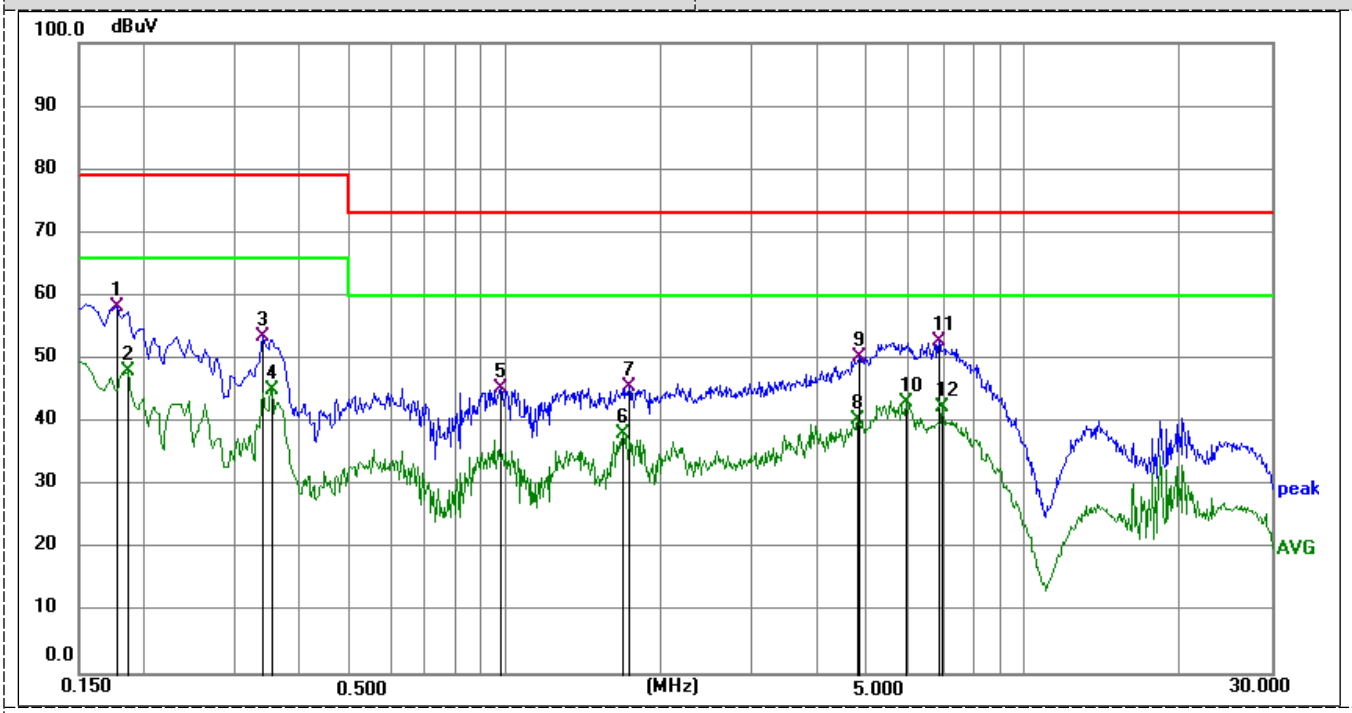
Line:	L



Remark: Correct Factor = Insertion loss of LISN + Cable loss + Insertion loss of Pulse Limiter;
Measurement Result = Reading Level +Correct Factor;
Margin = Measurement Result- Limit

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	49.27	12.29	61.56	79.00	-17.44	QP
2	0.1724	39.28	11.09	50.37	66.00	-15.63	AVG
3	0.2084	44.12	11.06	55.18	79.00	-23.82	QP
4	0.3435	43.98	11.06	55.04	79.00	-23.96	QP
5	0.3524	34.33	11.07	45.40	66.00	-20.60	AVG
6	1.4595	34.67	11.06	45.73	73.00	-27.27	QP
7	1.7250	27.97	11.05	39.02	60.00	-20.98	AVG
8	4.7220	29.26	11.14	40.40	60.00	-19.60	AVG
9	4.9335	39.70	11.13	50.83	73.00	-22.17	QP
10	5.8290	31.60	11.15	42.75	60.00	-17.25	AVG
11	6.9764	41.07	11.17	52.24	73.00	-20.76	QP
12	6.9764	29.60	11.17	40.77	60.00	-19.23	AVG

Line:	N



Remark: Correct Factor = Insertion loss of LISN + Cable loss + Insertion loss of Pulse Limiter;
Measurement Result = Reading Level +Correct Factor;
Margin = Measurement Result- Limit

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1770	47.23	10.98	58.21	79.00	-20.79	QP
2	0.1860	36.92	10.98	47.90	66.00	-18.10	AVG
3	0.3390	42.54	10.99	53.53	79.00	-25.47	QP
4	0.3524	34.16	11.00	45.16	66.00	-20.84	AVG
5	0.9825	34.27	11.00	45.27	73.00	-27.73	QP
6	1.6890	27.11	10.99	38.10	60.00	-21.90	AVG
7	1.7340	34.65	10.99	45.64	73.00	-27.36	QP
8	4.7760	29.18	11.07	40.25	60.00	-19.75	AVG
9	4.8075	39.09	11.07	50.16	73.00	-22.84	QP
10	5.9100	32.07	11.07	43.14	60.00	-16.86	AVG
11	6.8414	41.59	11.08	52.67	73.00	-20.33	QP
12	6.9810	31.23	11.09	42.32	60.00	-17.68	AVG

3.1.2 Radiated Emission

LIMIT

LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

FREQUENCY (MHz)	Class B(at 3m)	Class B (at 3m)
	dBuV/m	dBuV/m
30 – 230	50	40
230 – 1000	57	47

LIMITS OF RADIATED EMISSION MEASUREMENT(Above 1000MHz)

FREQUENCY (MHz)	Class A (at 3m) dBuV/m		Class B (at 3m) dBuV/m	
	Peak	Avg	Peak	Avg
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Notes: (1)The limit for radiated test was performed according to as following:
EN IEC 61000-6-4:2019
(2)The tighter limit applies at the band edges.

TEST PROCEDURE

a) The EUT was placed on the top of a rotating table 3 meters away from the receiver antenna and 0.8 meters above the ground at a 9X9X6 anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The height of the equipment shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

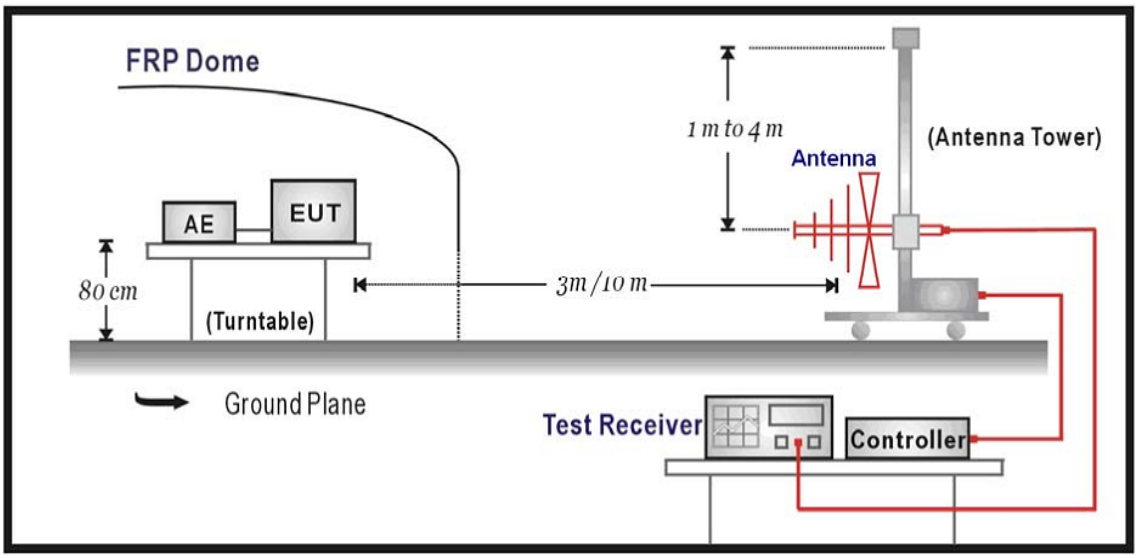
c) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak/Average detector mode re-measured.

d) If the Peak Mode measured value compliance with and lower than Quasi Peak/Average Mode Limit, the EUT shall be deemed to meet QP/AV Limits and then no additional QP/AV Mode measurement performed.

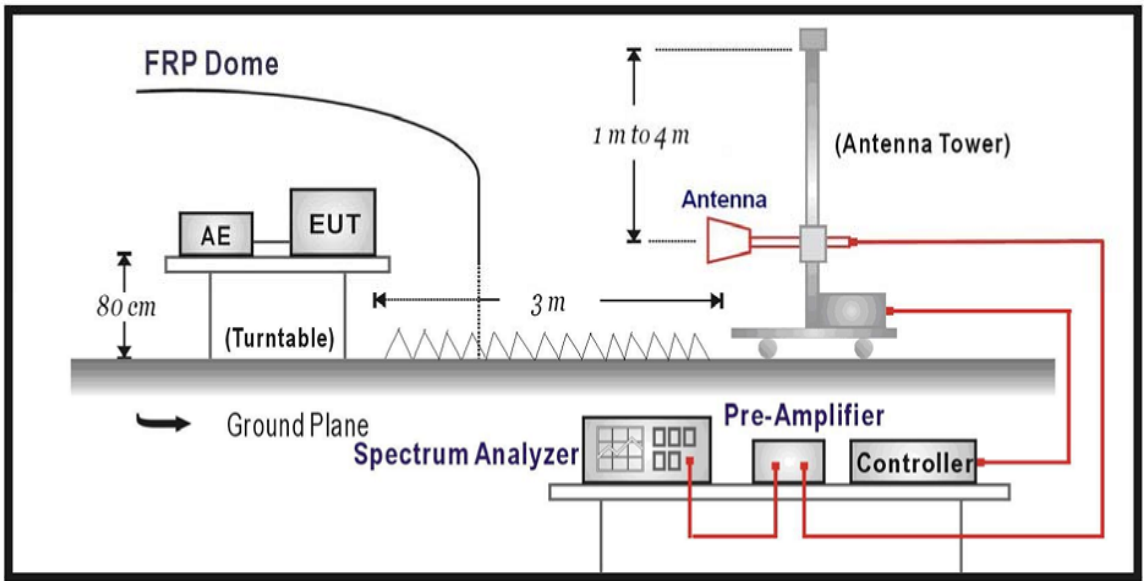
e) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP

Below 1GHz



Above 1GHz



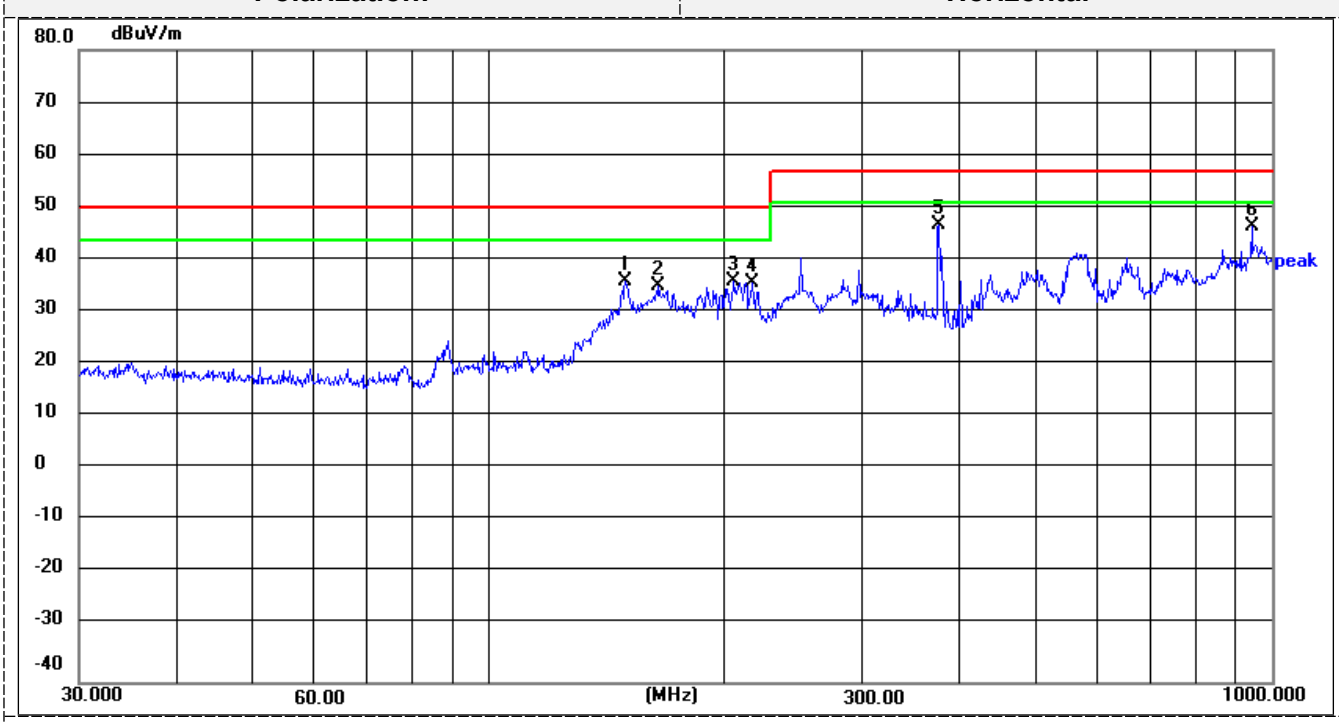
TEST RESULTS

------Passed------

Please refer to the below test data:

30MHz-1GHz

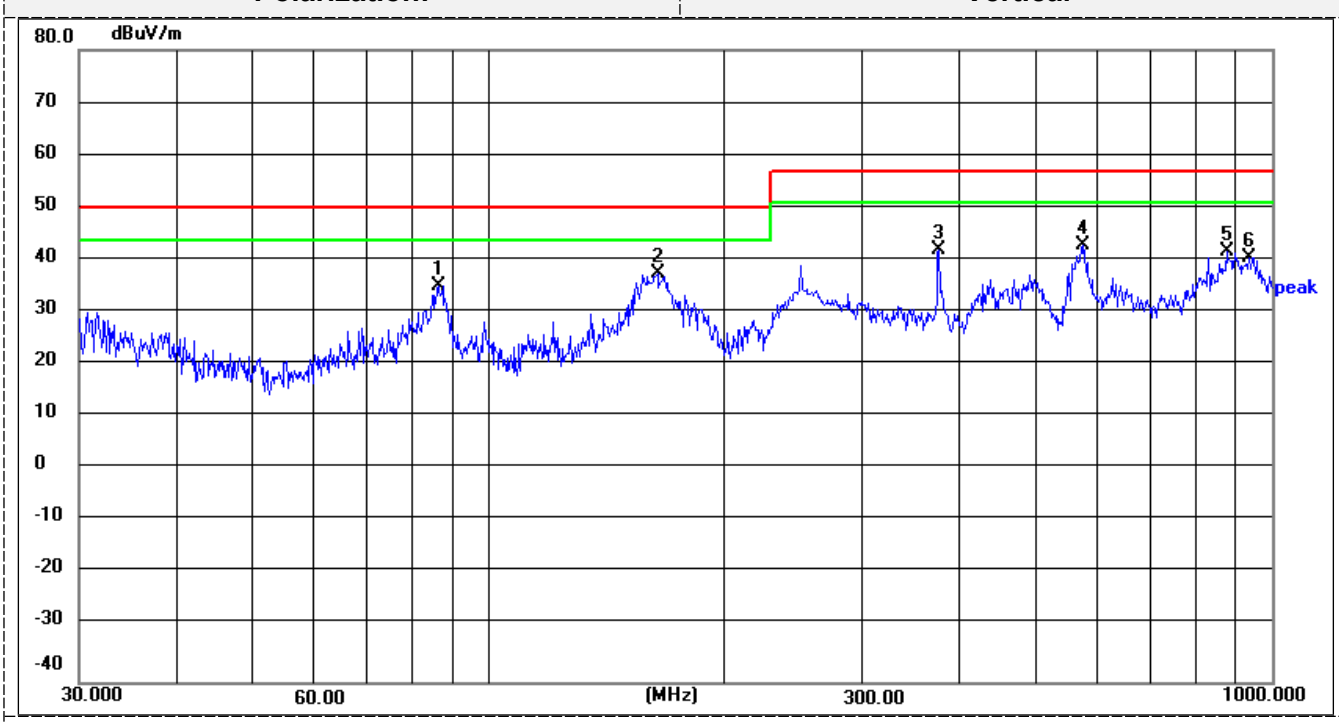
Polarization:	Horizontal



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Measurement Result=Reading Level +Correct Factor;
Over Limit= Measurement Result- Limit;

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	149.4857	45.28	-9.01	36.27	50.00	-13.73	QP
2	164.9074	44.51	-9.28	35.23	50.00	-14.77	QP
3	205.6750	48.18	-11.98	36.20	50.00	-13.80	QP
4	217.5443	47.18	-11.37	35.81	50.00	-14.19	QP
5	375.9385	52.97	-5.99	46.98	57.00	-10.02	QP
6	942.1304	40.80	5.70	46.50	57.00	-10.50	QP

Polarization:	Vertical



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Measurement Result=Reading Level +Correct Factor;
Margin = Measurement Result- Limit;

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	86.2000	48.91	-13.66	35.25	50.00	-14.75	QP
2	164.3301	46.76	-9.23	37.53	50.00	-12.47	QP
3	375.9385	48.07	-5.99	42.08	57.00	-14.92	QP
4	574.6258	44.81	-1.66	43.15	57.00	-13.85	QP
5	875.2470	36.74	5.01	41.75	57.00	-15.25	QP
6	935.5463	35.19	5.53	40.72	57.00	-16.28	QP

3.1.3 Harmonic Current Emissions

LIMITS

IEC 555-2					
Table - I			Table - II		
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Ampers)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Ampers)
Non Portable Tools or TV Receivers	Odd Harmonics		TV Receivers	Odd Harmonics	
	3	2.30		3	0.80
	5	1.14		5	0.60
	7	0.77		7	0.45
	9	0.40		9	0.30
	11	0.33		11	0.17
	13	0.21		13	0.12
	15≤n≤39	0.15 · 15/n		15≤n≤39	0.10 · 15/n
	Even Harmonics			Even Harmonics	
	2	1.08		2	0.30
	4	0.43		4	0.15
	8	0.30			
	8≤n≤40	0.23 · 8/n		DC	0.05

EN 61000-3-2/IEC 61000-3-2					
Equipment Category	Max. Permissible Harmonic Current (in Ampers)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in A)	(mA/w)
Class A	Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required	Class D	3	2.30	3.4
			5	1.14	1.9
			7	0.77	1.0
			9	0.40	0.5
			11	0.33	0.35
			13≤n≤39	see Table I	3.85/n
			only odd harmonics required		

TEST PROCEDURE

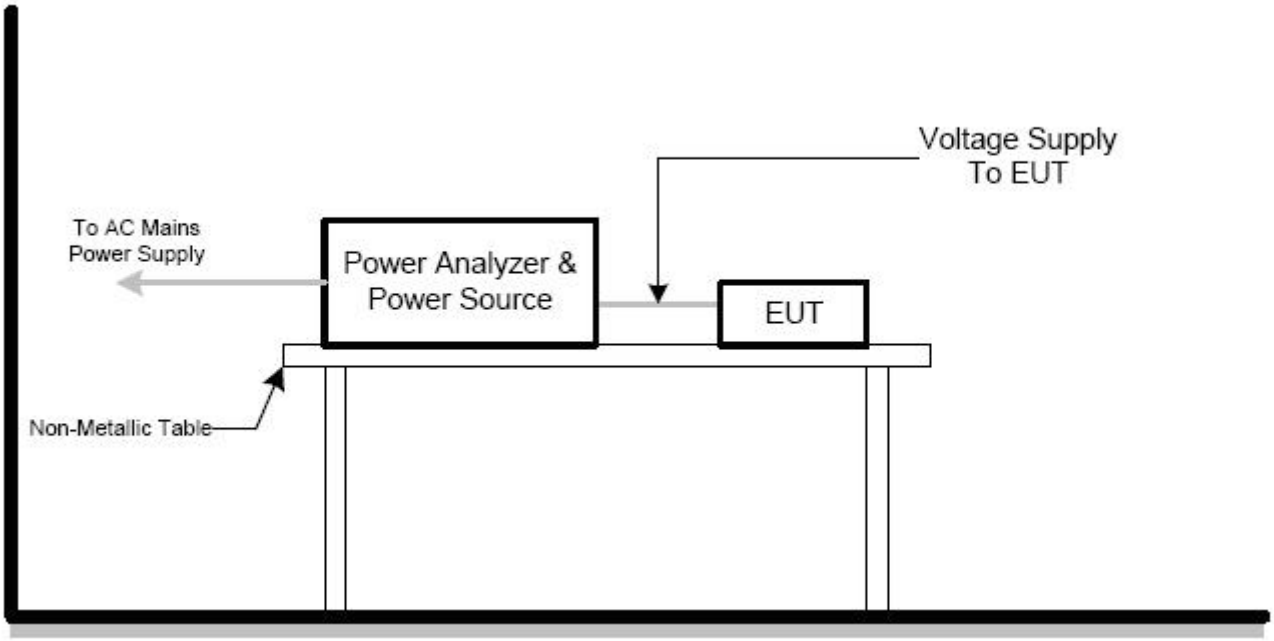
a) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b) The classification of EUT is according to EN 61000-3-2.The EUT is classified as follows:
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
Class B: Portable tools. Portable tools. Arc welding equipment which is not professional equipment.
Class C: Lighting equipment.
Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

c) The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

d) For the actual test configuration, please refer to the related item –EUT Test Photos.

TEST SETUP



TEST RESULTS

------Passed------

3.1.4 Voltage Fluctuations and Flicker

LIMITS

Tests	Limits		Descriptions
	IEC555-3	IEC/EN 61000-3-3	
Pst	≤ 1.0, Tp= 10 min.	≤ 1.0, Tp= 10 min.	Short Term Flicker Indicator
Plt	N/A	≤ 0.65, Tp=2 hr.	Long Term Flicker Indicator
dc	≤ 3%	≤ 3.3%	Relative Steady-State V-Chang
dmax	≤ 4%	≤ 4%	Maximum Relative V-change
d (t)	N/A	≤ 3.3% for > 500 ms	Relative V-change characteristic

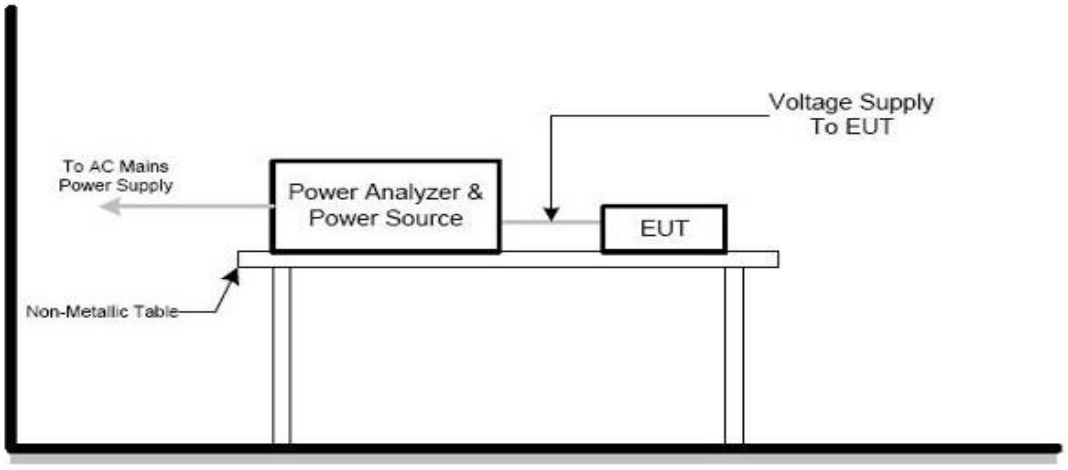
TEST PROCEDURE

a) Fluctuation and Flickers Test:
Tests was performed according to the Test Conditions Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

b) All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

c) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP



TEST RESULTS

Test Parameter	EUT values	Limit	Result
Pst	0.038	1.00	PASS
Plt	0.026	0.65	PASS
dc [%]	0.000	3.30%	PASS
dmax [%]	0.116	4.00%	PASS
dt [s]	0.000	0.50	PASS

3.2 EMC IMMUNITY TEST

3.2.1 Immunity Performance criteria

EN IEC 61000-6-2:2019

General performance criteria

General performance criteria are defined in Clauses 8.2, 8.3 and 8.4. These criteria shall be used during the testing of primary functions where no relevant annex is applicable.

When assessing the impact of a disturbance on a function, the assessment should take into consideration the function's performance prior to the application of the disturbance and only indentify is failures those changes in performance that are a result of the disturbance.

Performance criterion A

The equipment shall continue to operate as intended without operator interception. No degradation of performance, loss of function or change of operation state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, the either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3.2.2 Monitoring EUT during Immunity Test

Monitoring for Continuous Phenomena Applied to the EUT

During and after the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

Monitoring for Transient Phenomena Applied to the EUT

After the test, observe the Screen status by eyes or monitor to see whether there is degration of performance.

3.2.3 Electrostatic Discharge

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance	B
Discharge Voltage:	Air Discharge:2kV/4kV/8kV (Direct) Contact Discharge:2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Period:	1 second minimum

TEST PROCEDURE

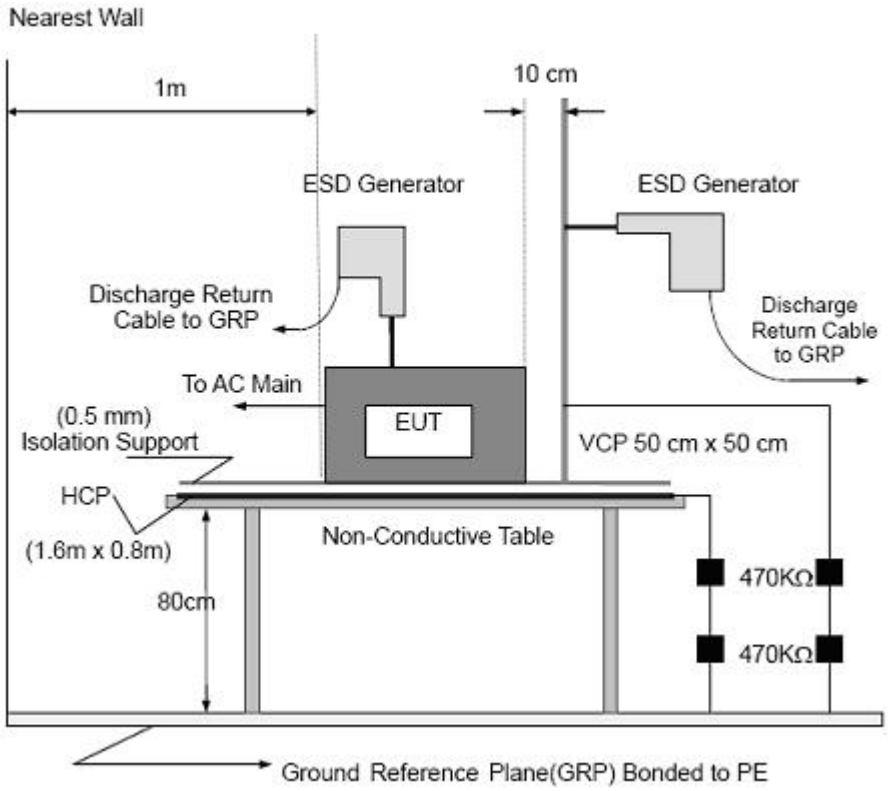
The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a) Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.
If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.
Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

b) Air discharges at insulation surfaces of the EUT. It was at least ten single discharges with positive and negative at the same selected point.

c) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

TEST RESULTS

------Passed------

Please refer to the below test data:

Direct discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Limit	Result
Contact discharge	±2	A*	B	Pass
	±4	B*	B	
Air discharge	±2	A*	B	
	±4	A *	B	
	±8	B*	B	
Indirect discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Limit	Result
HCP (6 sides)	±2	A*	B	Pass
	±4	A*	B	
VCP (4 sides)	±2	A*	B	
	±4	A*	B	

Note:

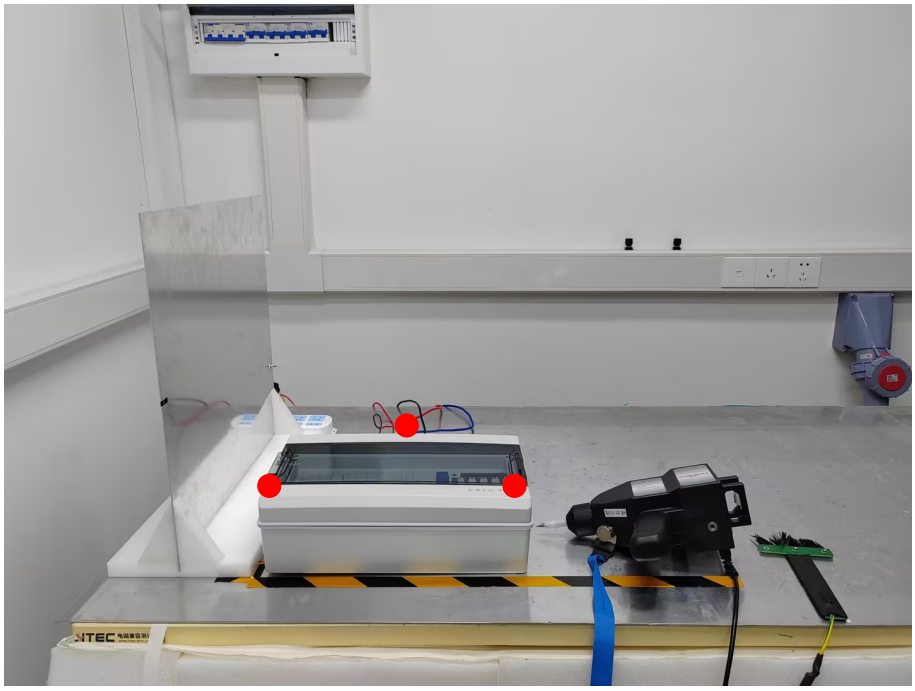
*A** *The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.*

*B** *The EUT loss communication link a while and not operate unintentionally during the test also can link can be self-recoverable after test.*

*C** *The EUT loss communication link a while and not operate unintentionally during the test also can link can manually recovered after test.*

*N/A** *No such discharge point found.*

● Contact discharge ● Air discharge



RF Electromagnetic Field

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance	A
Frequency Range:	80 MHz -1000 MHz, 1400 MHz -6000 MHz
Field Strength:	10 V/m, 3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3m
Antenna Height:	1.5 m
Dwell Time:	at least 3 seconds

TEST PROCEDURE

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters. The other condition as following manner:

a) The field strength level was 3V/m.

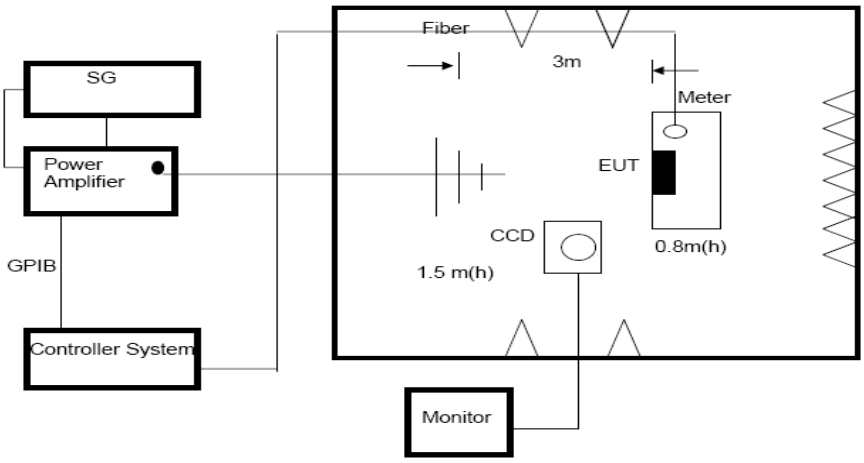
b) The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

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.

e) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

TEST RESULTS

------Passed------

Please refer to the below test data:

All other modes:

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observations Performance	Criteria Limit	Result
80~1000	H / V	10 V/m (rms) AM Modulated 1000Hz, 80%	Front	A*	A	PASS
			Rear	A*	A	
			Left	A*	A	
			Right	A*	A	
1400~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A*	A	PASS
			Rear	A*	A	
			Left	A*	A	
			Right	A*	A	

Note:

A The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.*

B The EUT loss communication link a while and not operate unintentionally during the test also can link can be self-recoverable after test.*

C The EUT loss communication link a while and not operate unintentionally during the test also can link can manually recovered after test.*

3.2.4 Fast Transients Common Mode

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance	B
Test Voltage:	Power Line:2 kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min. The other condition as following manner:

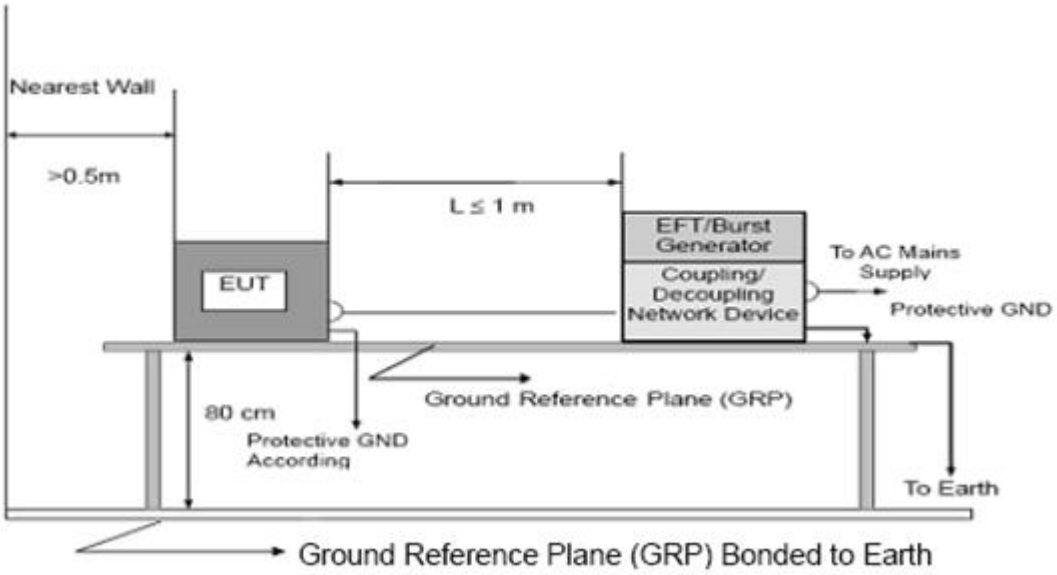
a) The length of power cord between the coupling device and the EUT should not exceed 1 meter.

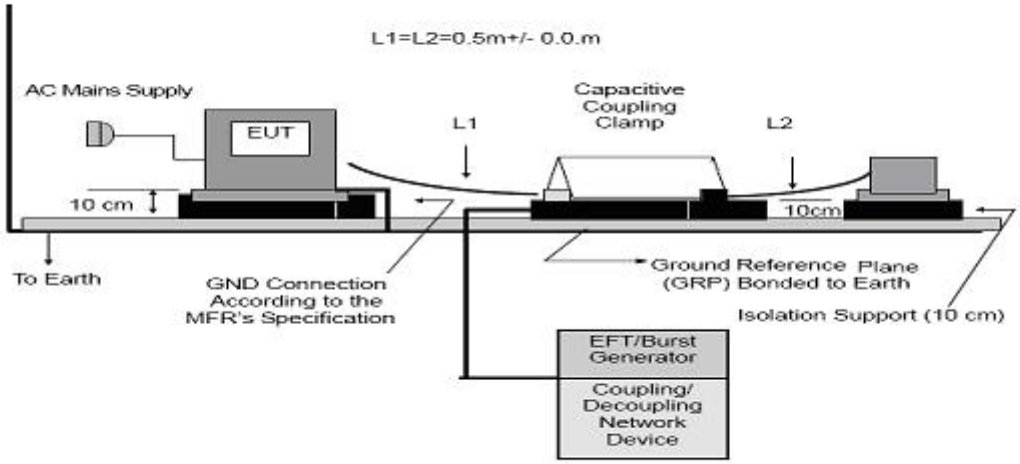
b) Both positive and negative polarity discharges were applied.

c) The duration time of each test sequential was 1 minute

d) For the actual test configuration, please refer to the related Item –EUT Test Photos.

EST SETUP





Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

TEST RESULTS

------Passed------

Please refer to the below test data:

Lead under Test	Level (±kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L1	±2	Direct	A	Pass
L2	±2	Direct	A	Pass
L3	±2	Direct	A	Pass
PE	±2	Direct	A	Pass
L1+L2	±2	Direct	A	Pass
L1+L3	±2	Direct	A	Pass
L2+L3	±2	Direct	A	Pass
L1+PE	±2	Direct	A	Pass
L2+PE	±2	Direct	A	Pass
L3+PE	±2	Direct	A	Pass
L1+L2+L3	±2	Direct	A	Pass

L1+L2+PE	±2	Direct	A	Pass
L1+L3+PE	±2	Direct	A	Pass
L2+L3+PE	±2	Direct	A	Pass
L1+L2+L3+PE	±2	Direct	A	Pass

Note:

A The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.*

B The EUT loss communication link a while and not operate unintentionally during the test also can link can be self-recoverable after test.*

C The EUT loss communication link a while and not operate unintentionally during the test also can link can manually recovered after test.*

3.2.5 Surge Testing

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Port ~ Line to line: 1Kv,Line to ground: 2Kv
Surge Input /Output:	L1- L2, L1- L3, L2- L3, L1-PE, L2-PE, L3-PE
Generator Source:	2 ohm between networks
Impedance:	12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

TEST PROCEDURE

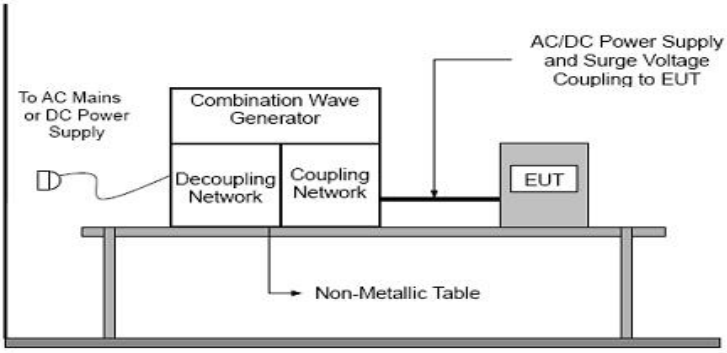
a) For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

b) For test applied to unshielded unsymmetrical operated interconnection lines of EUT:
The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

c) For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT: The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

d) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP



TEST RESULTS

------Passed------

Please refer to the below test data:

Location	Level (kV)	Pulse No	Surge Interval	Phase (deg)	Observations (Performance Criterion)	Result
L1- L2	± 1	5	60s	0°,90°,180°,270°	A	Pass
L1- L3	± 1	5	60s	0°,90°,180°,270°	A	Pass
L2- L3	± 1	5	60s	0°,90°,180°,270°	A	Pass
L1-PE	± 2	5	60s	0°,90°,180°,270°	A	Pass
L2-PE	± 2	5	60s	0°,90°,180°,270°	A	Pass
L3-PE	± 2	5	60s	0°,90°,180°,270°	A	Pass

Note:

*A** *The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.*

*B** *The EUT loss communication link a while and not operate unintentionally during the test also can link can be self-recoverable after test.*

*C** *The EUT loss communication link a while and not operate unintentionally during the test also can link can manually recovered after test.*

3.2.6 RF Common Mode

TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	10 V rms
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min. The other condition as following manner:

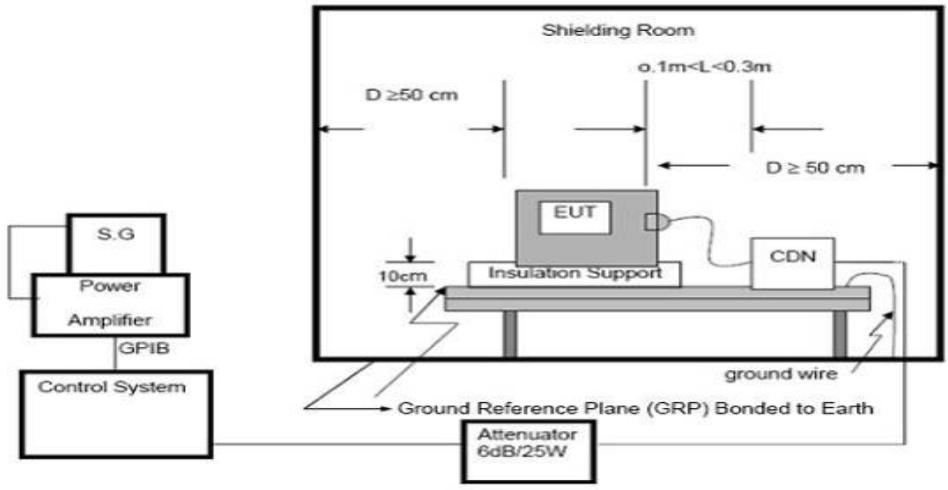
a) The field strength level was 3V.

b) The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 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) For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST SETUP



For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE:

FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

TEST RESULTS

------Passed------

Please refer to the below test data:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Coupling type	Observations Performance	Perform. Criteria	Results
AC Power Port	0.15-80	10V(rms) AM Modulated 1000Hz, 80%	CDN	A	A	PASS

Note

1: The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.

2: During and after test, the EUT's(WiFi) PER less than 10%, there is no any degradation of performance.

3.2.7 Voltage Dips and Interruptions

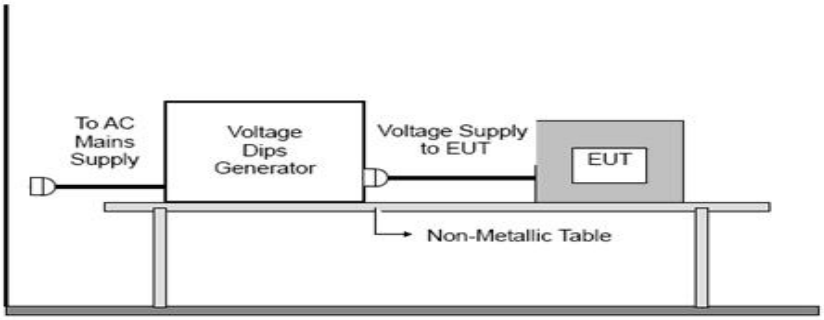
TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance	C (For 70% Voltage Dips) C (For 40% Voltage Dips) B (For 0% Voltage Interruptions)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

TEST SETUP



For the actual test configuration, please refer to the related Item –EUT Test Photos.

TEST RESULTS

------Passed------

Please refer to the below test data:

Voltage Reduction	Interruption & Dips ($\%U_T$)	Duration (Cyc)	Observations Performance	Perform Criteria	Results
Voltage dip 70%	30	25	B	C	PASS
Voltage dip 40%	60	10	A	C	PASS
Voltage dip 0%	100	250	A	C	PASS
Voltage interruptions	100	1	B	B	PASS

Note:

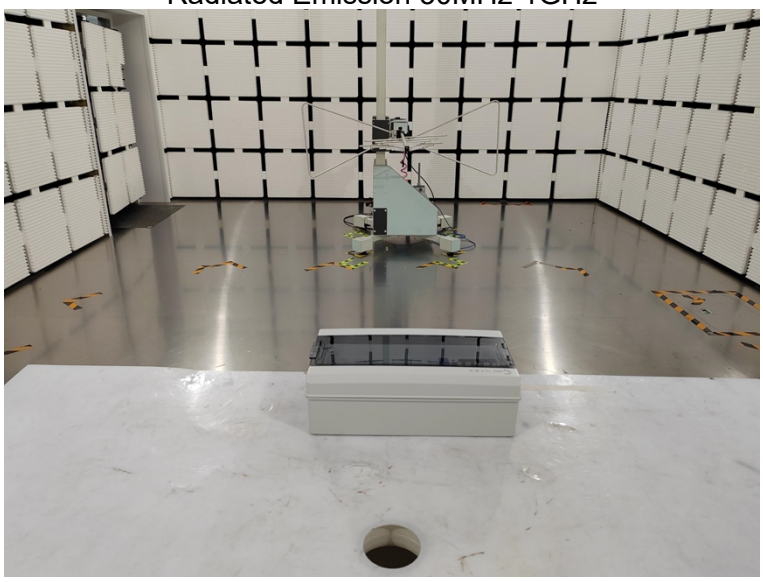
A The EUT can maintain communication link and not operate unintentionally during the test also can operate without any loss of user control functions after test.*

B The EUT loss communication link a while and not operate unintentionally during the test also can link can be self-recoverable after test.*

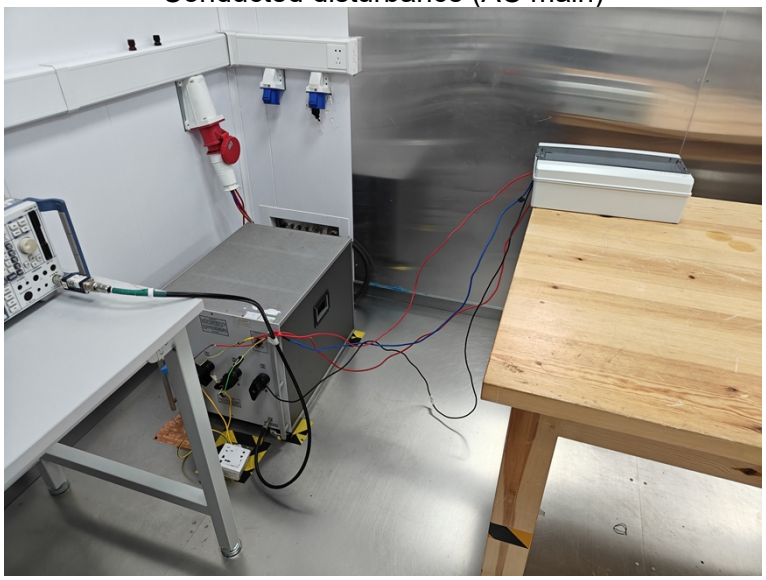
C The EUT loss communication link a while and not operate unintentionally during the test also can link can manually recovered after test.*

4 TEST SETUP PHOTOS

Radiated Emission 30MHz-1GHz



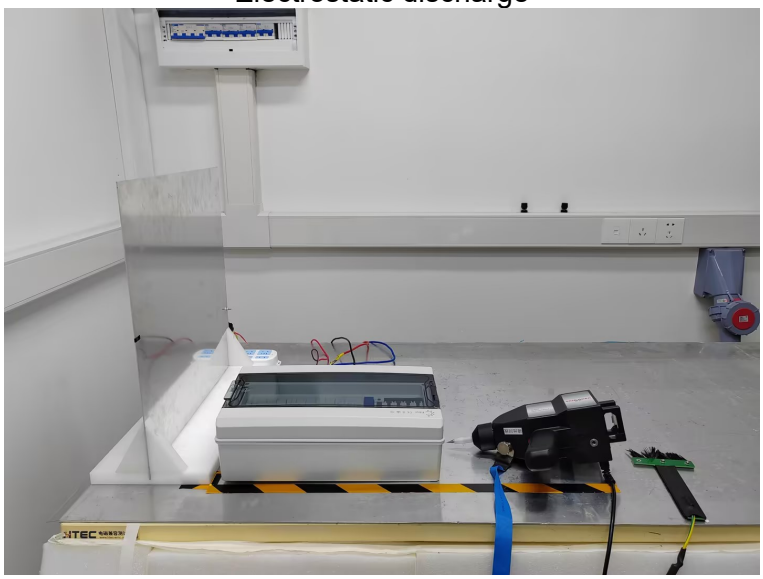
Conducted disturbance (AC main)



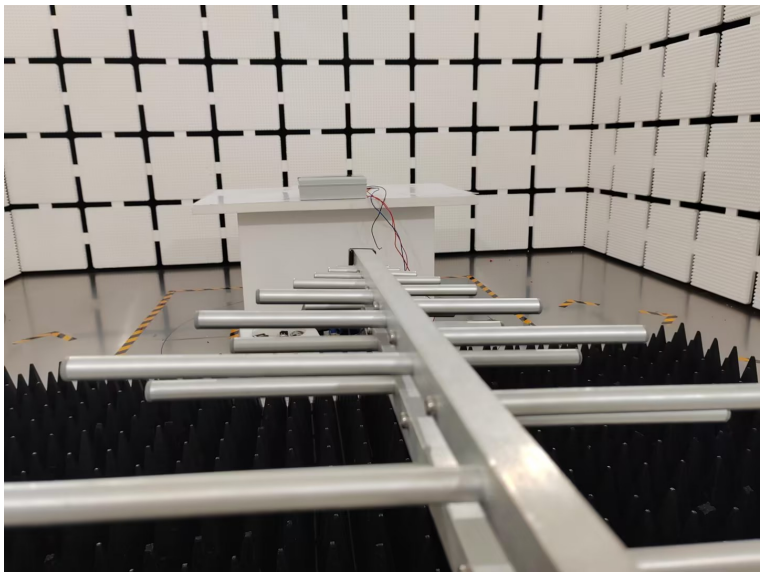
Voltage Fluctuation and Flicker



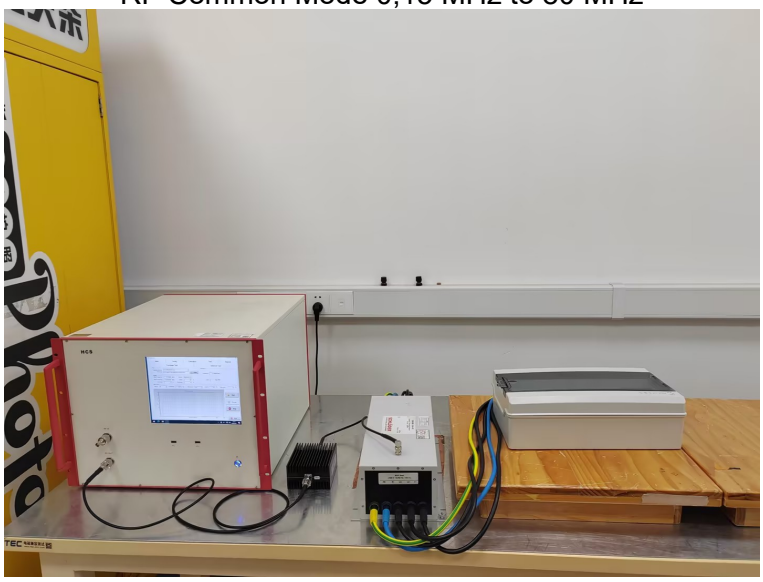
Electrostatic discharge



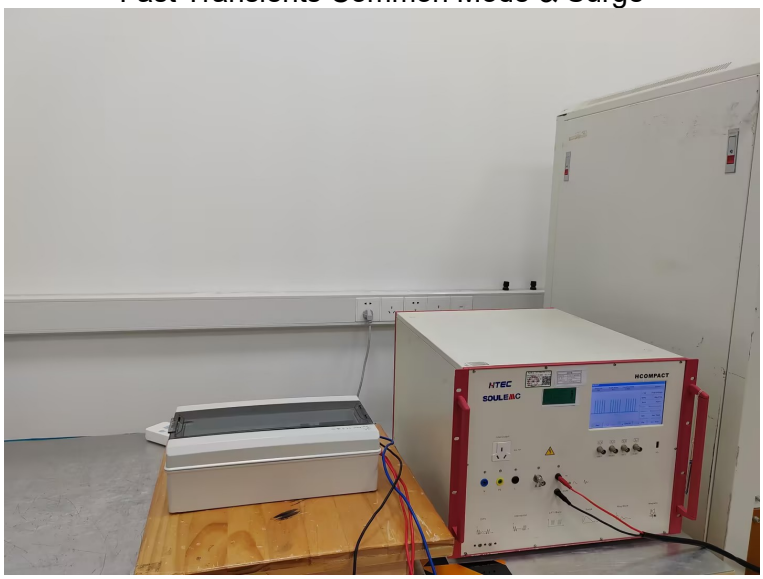
RF Electromagnetic Field



RF Common Mode 0,15 MHz to 80 MHz



Fast Transients Common Mode & Surge



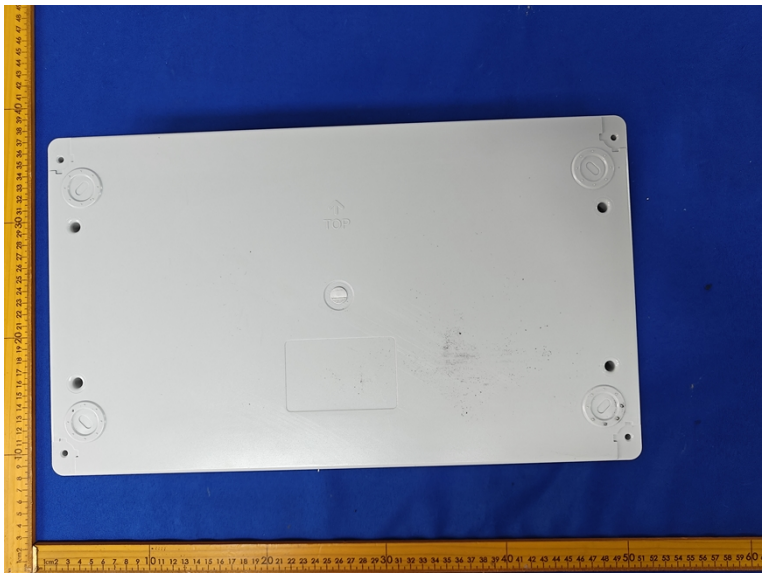
DIPS

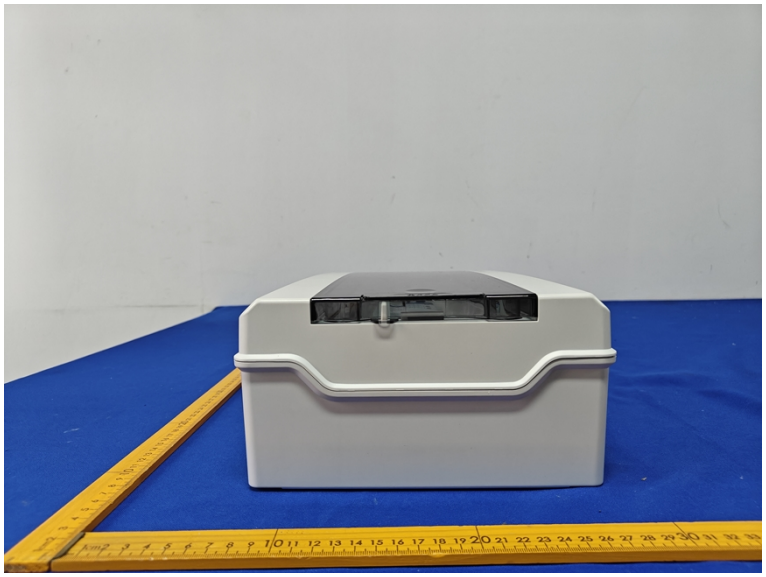


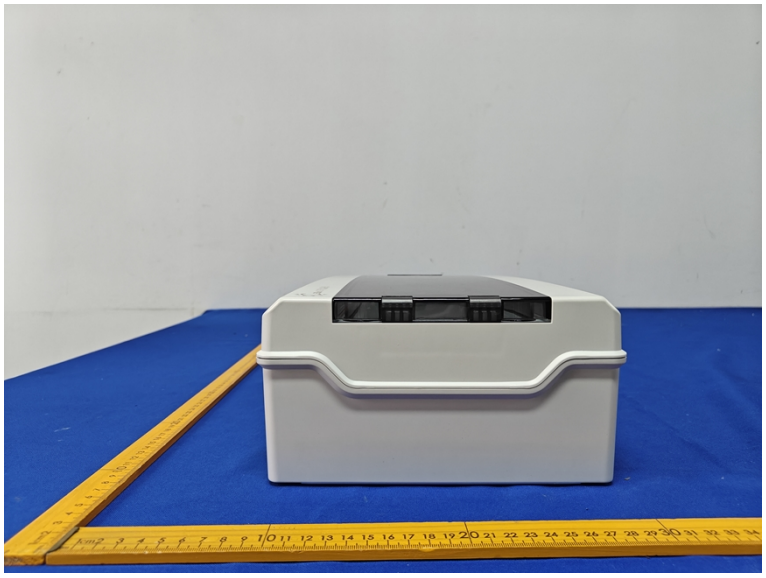
5 PHOTOS OF THE EUT

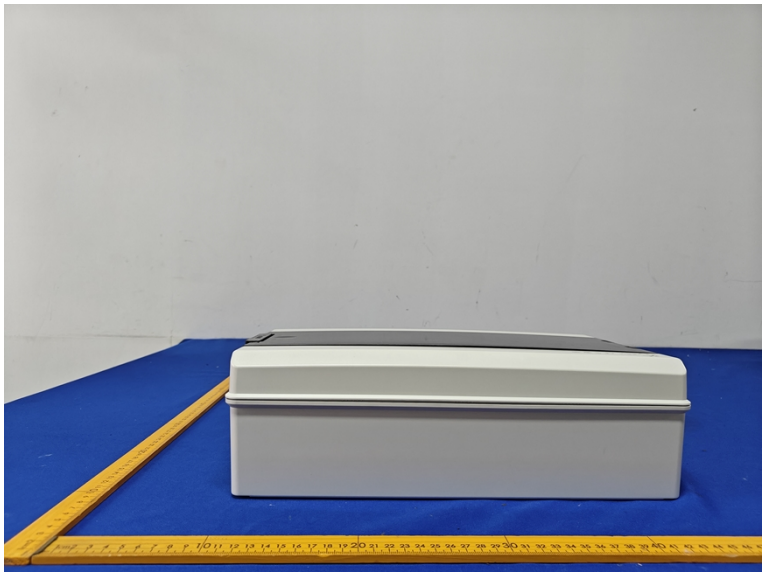
External Photos

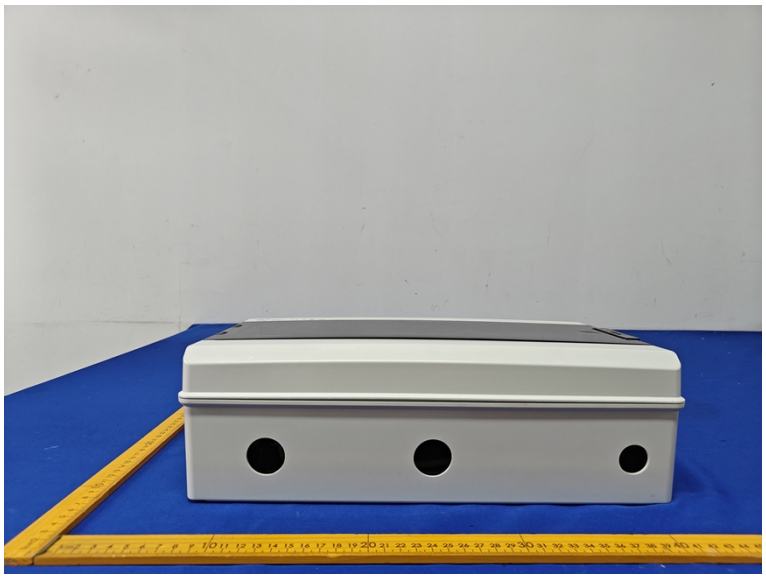












Internal photo

********** **End of Report** **********