



TEST REPORT

FOR

AC to DC Power Supply

BRAND : The logo for TRACO POWER, featuring the words 'TRACO' and 'POWER' in white capital letters on a dark blue rectangular background.

MODEL : TPI 50-148A-J

SERIES MODEL : Refer to item 5.1 for more details.

REPORT NUMBER: 4790076959A-EN-E0-V0

ISSUE DATE: Sep. 8, 2021

Prepared for

TRACO ELECTRONIC AG

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	Sep. 8, 2021	Initial Issue	Cindy Hsin

Summary of Test Results				
EMISSION				
Standard	Test Item	Limit	Result	Remark
EN 55032:2015 / A11: 2020	Conducted disturbance at mains terminals ports	Class B	PASS	(Note 3)
	Conducted common mode (asymmetric mode) disturbance telecommunication ports	Class B	N/A	(Note 1)
	Radiated disturbance below 1GHz	Class B	PASS	(Note 3)
	Radiated disturbance above 1 GHz	Class B	N/A	(Note 2)
EN IEC 61000-3-2 : 2019	Harmonic current disturbance	Class A	PASS	(Note 3)
EN 61000-3-3 : 2013 / A1: 2019	Voltage Fluctuations & Flicker	Refer to 6.5.1	PASS	(Note 3)

Note 1: Since the EUT does not contain asymmetric port, the test is unnecessary.

Note 2: Since the highest frequency of EUT is less than 108 MHz, the measurement above 1 GHz is unnecessary.

Note 3: All test data are copied from 4789712967A-EN-E0-V0 report.

Summary of Test Results (EN 55024)				
IMMUNITY				
Basic Standard	Test Item	Class / Severity	Require Performance Criteria	Result
IEC 61000-4-2: 2008 EN 61000-4-2: 2009	Electrostatic discharge immunity	Contact ±4 kV Air ±8 kV	B	PASS (Note 6)
IEC 61000-4-3: 2006+ A1: 2007+A2: 2010 EN 61000-4-3: 2006+ A1: 2008+A2: 2010	Radiated, radio frequency electromagnetic field immunity	3V/m 80%, 1kHz, AM	A	PASS (Note 6)
IEC 61000-4-4: 2012 EN 61000-4-4: 2012	Electrical fast transient/burst immunity	1kV(AC Mains) 5/50ns, 5kHz	B	PASS (Note 6)
		0.5kV(DC port) 5/50ns, 5kHz	B	N/A (Note 4)
		0.5kV(Signal Lines) 5/50ns, 5kHz or 100kHz (Note 3)	B	N/A (Note 5)
IEC 61000-4-5: 2014 / A1: 2017 EN 61000-4-5: 2014 / A1: 2017	Surge immunity	AC Mains 2.0kV(Common) 1.0kV(Differential) 1.2/50us	B	PASS (Note 6)
		DC power port 0.5kV Line to ground 1.2/50us	B	N/A (Note 4)
		Signal port 1.0kV(w/o primary protector) 4.0kV(w primary protector) 1.2/50us or 10/700us (Note 1)	C	N/A (Note 5)
IEC 61000-4-6: 2013 / COR1: 2015 EN 61000-4-6: 2014 / AC: 2015	Immunity to conducted disturbances, induced by radio-frequency fields	AC Mains 3V (e.m.f), 80%, 1kHz Amp. Mod. (Note 2)	A	PASS (Note 6)
		DC power port 3V (e.m.f), 80%, 1kHz Amp. Mod (Note 2)	A	N/A (Note 4)
		Signal line 3V (e.m.f), 80%, 1kHz Amp. Mod. (Note 2)	A	N/A (Note 5)
IEC 61000-4-8: 2009 EN 61000-4-8: 2010	Power frequency magnetic field immunity (Continuous)	50 Hz, 1 A/m(r.m.s)	A	PASS (Note 6)

Summary of Test Results (EN 55024)				
IMMUNITY				
Basic Standard	Test Item	Class / Severity	Require Performance Criteria	Result
IEC 61000-4-11: 2020 EN IEC 61000-4-11: 2020	Voltage dips, short interruptions and voltage variations immunity	Voltage dips, >95% reduction with 0.5 period	B	PASS (Note 6)
		Voltage dips, 30% reduction with 25 periods	C	
		Voltage interruptions >95% reduction with 250 periods	C	

Note 1: Where the coupling network for the 10/700 μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) μ s waveform and appropriate coupling network.

Note 2: The frequency range is scanned as specified. However, when specified in EN 55024 Annex A, an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted tests are: 0,2; 1; 7,1; 13,56; 21; 27,12 and 40,68 MHz (± 1 %).

Note 3: For xDSL equipment, the repetition frequency for EFT testing shall be 100 kHz .

Note 4: Since the EUT does not contain DC power port, the test is unnecessary.

Note 5: Since the EUT does not contain signal port, the test is unnecessary.

Note 6: All test data are copied from 4789712967A-EN-E0-V0 report.

Summary of Test Results (EN 55035)				
IMMUNITY				
Basic Standard	Test Item	Class / Severity	Require Performance Criteria	Result
IEC 61000-4-2: 2008 EN 61000-4-2: 2009	Electrostatic discharge immunity	Contact ±4 kV Air ±8 kV	B	PASS (Note 6)
IEC 61000-4-3: 2006+ A1: 2007+A2: 2010 EN 61000-4-3: 2006+ A1: 2008+A2: 2010	Continuous RF electromagnetic field disturbances, swept test	80-1000MHz 3V/m 80%, 1kHz, AM	A	PASS (Note 6)
	Continuous RF electromagnetic field disturbances, spot test	1800 ;2600 ;3500 5000 MHz (±1%) 3V/m 80%, 1kHz, AM (Note 2)	A	PASS (Note 6)
	immunity levels to common wireless communication devices	Refer to Table I.1	A	PASS (Note 6)
IEC 61000-4-4: 2012 EN 61000-4-4: 2012	Electrical fast transient/burst immunity	1kV(AC Mains) 5/50ns, 5kHz	B	PASS (Note 6)
		0.5kV(DC power port) 5/50ns, 5kHz	B	N/A (Note 4)
		0.5kV(Signal Lines) 5/50ns, 5kHz or 100kHz (Note 3)	B	N/A (Note 5)
IEC 61000-4-5: 2014 / A1: 2017 EN 61000-4-5: 2014 / A1: 2017	Surge immunity	AC Mains 2.0kV(Common) 1.0kV(Differential) 1.2/50us	B	PASS (Note 6)
		DC power port 0.5kV Line to ground 1.2/50us	B	N/A (Note 4)
		Signal port 1.0kV (w/o primary protector) 4.0kV (w primary protector) 1.2/50us or 10/700us 0.5kV Coaxial or shielded to ground 1.2/50 (8/20) us (Note 1)	C	N/A (Note 5)

Summary of Test Results (EN 55035)				
IMMUNITY				
Basic Standard	Test Item	Class / Severity	Require Performance Criteria	Result
IEC 61000-4-6: 2013+ COR1: 2015 EN 61000-4-6: 2014 / AC:2015	Continuous induced RF disturbances	AC Mains 0.15~10MHz, 3V 10~30MHz, 3~1V 30-80MHz, 1V with 1kHz 80% AM (Note 2)	A	PASS (Note 6)
		DC Ports 0.15~10MHz, 3V 10~30MHz, 3~1V 30-80MHz, 1V with 1kHz 80% AM (Note 2)	A	N/A (Note 4)
		Signal Line 0.15~10MHz, 3V 10~30MHz, 3~1V 30-80MHz, 1V with 1kHz 80% AM (Note 2)	A	N/A (Note 5)
IEC 61000-4-8: 2009 EN 61000-4-8: 2010	Power frequency magnetic field immunity (Continuous)	50 Hz, 1 A/m(r.m.s)	A	PASS (Note 6)
IEC 61000-4-11: 2020 EN IEC 61000-4-11: 2020	Voltage dips, short interruptions and voltage variations immunity	Voltage dips, <5% residual with 0.5cycles	B	PASS (Note 6)
		Voltage dips, 70% residual with 25 cycles	C	
		Voltage interruptions, <5% residual with 250 cycles	C	

Note 1: Where the coupling network for the 10/700 μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) μ s waveform and appropriate coupling network.

Note 2: The frequency range is scanned as specified. However, when specified in EN 55035 , an additional EUT contains telephony functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted immunity tests are: 0,2; 1; 7,1; 13,56; 21; 27,12 and 40,68 MHz (± 1 %) and radiated immunity tests are 80; 120; 160; 230; 434; 460; 600; 863 and 900MHz (± 1 %).

Note 3: For xDSL equipment, the repetition frequency for EFT testing shall be 100 kHz .

Note 4: Since the EUT does not contain DC power port, the test is unnecessary.

Note 5: Since the EUT does not contain signal port, the test is unnecessary.

Note 6: All test data are copied from 4789712967A-EN-E0-V0 report.

Table I.1 – Guidance on the selection of immunity levels to common wireless communication devices

Table clause	Approximate protection distance (m)	Calculated RF field strength in V/m for frequencies and protection distances simulating different radio transmission types, assuming a given ERP						
		LTE/UMTS (0,2 W)	GSM		WiMAX/3 G (1,26 W)	WiMAX (1,26 W)	Wi-Fi (1 W)	Maximum RF field strength at any frequency
			(2 W)	(1 W)				
		800 MHz	900 MHz	1,8 GHz	2,6 GHz	3,5 GHz	5 GHz	
I.1.1	3,0	0,6	1,8	1,3	1,5	1,5	1,3	3
I.1.2	1,5	1,2	3,7	2,6	2,9	2,9	2,6	4
I.1.3	1,0	1,7	5,5	3,9	4,4	4,4	3,9	6
I.1.4	0,5	3,3	10,5	10,5	11,8	11,8	10,5	12
I.1.5	0,2	8,3	26,4	26,4	29,6	29,6	26,4	30

The protection distance is not the test distance as defined in IEC 61000-4-3:2006/AMD1:2007/AMD2:2010, but the shortest expected operating distance between the EUT and the interfering wireless communication device at which the immunity performance criteria will be satisfied.

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: TRACO ELECTRONIC AG
Sihlbruggstrasse 111 CH-6340 Baar Switzerland

MANUFACTURER: TRACO ELECTRONIC AG
Sihlbruggstrasse 111 CH-6340 Baar Switzerland

EUT DESCRIPTION: AC to DC Power Supply

BRAND: 

MODEL: TPI 50-148A-J

SERIES MODEL: Refer to item 5.1 for more details

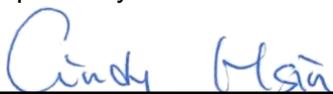
DATE of TESTED: Mar. 19, 2021 ~ Jul. 28, 2021

APPLICABLE STANDARDS	
STANDARDS	TEST RESULTS
EN 55032 :2015 / A11: 2020 EN 55024: 2010+A1: 2015 EN 55035: 2017 EN IEC 61000-3-2: 2019 EN 61000-3-3 : 2013 / A1: 2019	PASS

Underwriters Laboratories Taiwan Co., Ltd. Tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. Based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. And all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. Will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:



Cindy Hsin
Project Handler

Date : Sep. 8, 2021

Approved and Authorized By:



Roy Chen
Operations Manager

Date : Sep. 8, 2021

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented EN 55032, EN 55024, EN55035, EN IEC 61000-3-2 and EN 61000-3-3.

3. FACILITIES AND ACCREDITATION

Test Location	Underwriters Laboratories Taiwan Co., Ltd.,
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Description	All measurement facilities use to collect the measurement data are located at Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

4. CALIBRATION AND UNCERTAINTY

4.1. Measuring Instrument Calibration

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Electromagnetic interference:

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	1.5
966-1 Test Site			
Radiated disturbance below 1 GHz	30MHz ~ 1000MHz	2	5.7

Test Item	K	Voltage(%)	Current(%)
Harmonic&Flicker	2	0.1	0.15

Electromagnetic sensitivity:

Test Item	Measurement Frequency Range	K	U(dB)
Radiated, radio frequency electromagnetic field immunity	80MHz ~ 6000MHz	2	1.9
Immunity to conducted disturbances, induced by radio-frequency fields (CDN)	0.15MHz ~ 80MHz	2	2.4

Test Item	K	Voltage(%)	Rise Time(%)	First Peak Current (%)	Current @ 30ns (%)	Current @ 60ns (%)
Electrostatic discharge immunity	2	2.6	6.9	3.9	4.0	4.0

Test Item	K	Peak Voltage(%)	Rise Time(%)	Pulse width(%)	Burst duration & Period (%)	Repetition rate (%)
Electrical fast transient/burst immunity	2	1.0	2.4	5.1	0.74	0.22

Test Item	K	Phase Shifting (%)	Voltage (%)	Current (%)	Front Time & Duration(For waveform of the surge voltage)(%)	Front Time & Duration(For waveform of the surge current)(%)
Surge immunity	2	0.31	3.6	2.7	1.5	5.9

Test Item	K	Magnetic field Strength(%)
Power Frequency Magnetic Field Immunity Test	2	10.0

Test Item	K	Voltage(%)	Time (%)	Phase Angle (%)
Voltage dips, short interruptions and voltage variations immunity	2	1.8	6.5	2.4

5. EQUIPMENT UNDER TEST

5.1. Description of EUT

EUT Name:	AC to DC Power Supply
Brand:	
Model:	TPI 50-148A-J
Series Model:	TPI 50-105Awy, TPI 50-107Awy, TPI 50-109Awy, TPI 50-112Awy, TPI 50-115Awy, TPI 50-118Awy, TPI 50-124Awy, TPI 50-136Awy, TPI 50-148Awy, TPI 50-153Awy
Power Rating:	From AC power
Highest Frequency within EUT:	Less than 108MHz
Condition of EUT:	Production Unit
Date Of Receipt Of Sample:	Mar. 31, 2021

Note :

1. This report was issued base on original report which report number is 4789712967A-EN-E0-V0, the differences were only change models' name and the applicant. There is no additional test shall be verified. For the test data, copied from original report 4789712967A-EN-E0-V0 show on this report.
2. The models difference table as below:

Model Number	Input Range	Output Voltage
	VDC	VDC
TPI 50-105Awy	85 ~ 264	5
TPI 50-107Awy	85 ~ 264	7.5
TPI 50-109Awy	85 ~ 264	9
TPI 50-112Awy	85 ~ 264	12
TPI 50-115Awy	85 ~ 264	15
TPI 50-118Awy	85 ~ 264	18
TPI 50-124Awy	85 ~ 264	24
TPI 50-136Awy	85 ~ 264	36
TPI 50-148Awy	85 ~ 264	48
TPI 50-153Awy	85 ~ 264	53

“w” can be B or blank
“B” represents protective earthing, blank represents no provision for protective earthing.
“y” can be -M, -T or -J
when y = -M represents Molex connector
when y = -T represents terminal block
when y = -J represents JST connector

Note: The customer only provided TPI 50-148AB-J, TPI 50-148A-J for the EMI pretest and choose the worst mode do the EMI and EMS final test.

5.2. Test Mode

The Pre-test modes :

Mode	Description	Conducted Emission	Radiated Emission
Mode 1	Full Load (TPI 50-148AB-J)	v	v
Mode 2	Full Load (TPI 50-148A-J)	v	v

After pre-testing, the final test mode was displayed as below table.

Test Items		Test Mode
Emission	Conducted Emission	Mode 2
	Radiated Emission	Mode 2
	Harmonic & Flicker	Mode 2
Immunity	Electrostatic Discharge	Mode 1~2
	Radio Frequency Electromagnetic Field	Mode 2
	Electrical Fast Transient	Mode 2
	Surge Immunity	Mode 1~2
	Immunity to conducted disturbances, induced by radio-frequency fields	Mode 2
	Power frequency magnetic field immunity	Mode 2
	Voltage Dips and Interruptions	Mode 2

Note: The customer requested to add test mode 1 to the "Surge" project.

Note: The customer requires mode 1 in the "ESD" test item. Simulate the test when the open type product is installed in the system, using the base plate as the system chassis.

5.3. EUT Operation Test Setup

For Emission test :

- a. The EUT was linked to resistance load with full load during the testing.
- b. Power on the EUT and run test.

For Immunity test :

- a. The EUT was linked to resistance load with full load and the resistance load was connected with a meter during the testing.
- b. Power on the EUT and run test.

5.4. Monitoring of EUT for All Immunity Test

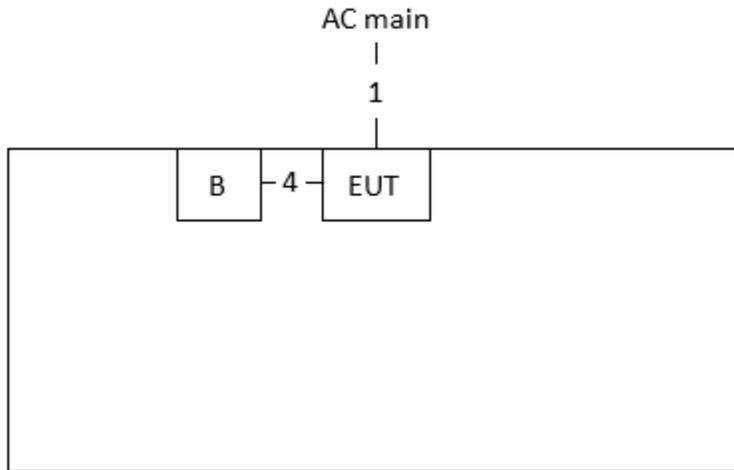
Audio	N/A
Visual	Monitor the output voltage through the meter.

5.5. Accessory

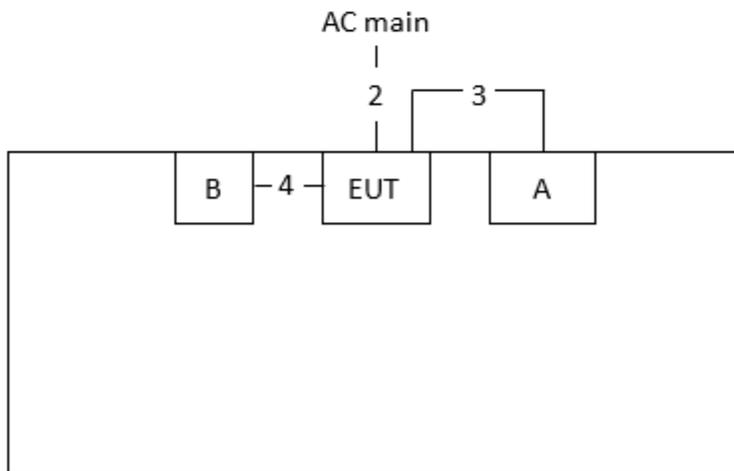
N/A

5.6. Block diagram showing the configuration of system tested

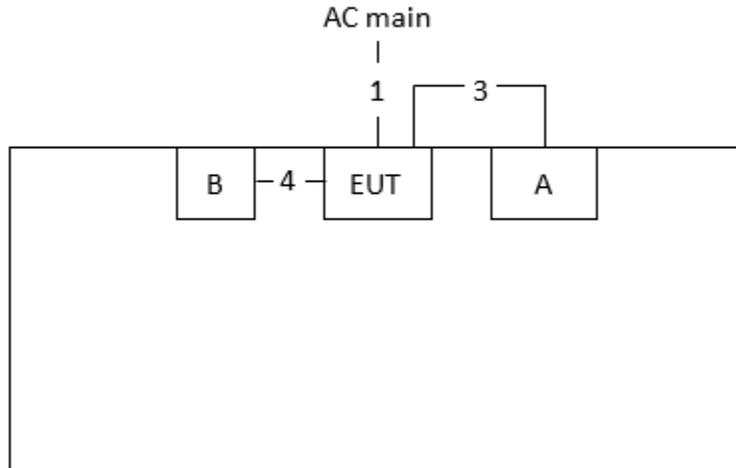
For Emission test :



For Immunity test : (Mode 1)



For Immunity test : (Mode 2)



5.7. Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	FCC ID	Note
A	Meter	CNSCKJ	C85C1-V	N/A	N/A	N/A
B	Load	N/A	N/A	N/A	N/A	N/A

Item	Connection	Shielded Type	Note
1	AC power cable (2 Pin)	Non-shielded	Provide by customer
2	AC power cable (3 Pin)	Non-shielded	Provide by customer
3	Power Wire*2	Non-shielded	N/A
4	Power wire *2	Non-shielded	Provide by customer

5.8. Measuring Instrument List

Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
Conducted Disturbance					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2020/8/19	2021/8/18
Two-Path V-LISN	SCHWARZBECK	NSLK 8127	8127-946	2020/11/3	2021/11/2
RF Current Probe	FCC	F-52	171502	2021/1/19	2022/1/18
Coupling and Decoupling Network	TESEQ	ISN ST08	45105	2021/1/19	2022/1/18
Impedance Stabilization Network	TESEQ	ISN T800	42830	2021/3/2	2022/3/1
Impedance Stabilization Network	TESEQ	ISN T8-Cat6	39923	2021/1/27	2022/1/26
Capacitive Voltage Probe	TESEQ	CVP 2200A	44922	2021/1/31	2022/1/30
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2020/8/12	2021/8/11
Cable	TITAN	CFD200	T0732ACFD20020A300-1	2021/3/2	2022/3/1
Measurement Software	Farad	EZ-EMC Ver: UL-3A1.2	N/A	N/A	N/A
Radiated Disturbance					
966-1					
EMI Test Receiver	Rohde & Schwarz	ESR7	101755	2020/12/4	2021/12/3
Trilog-Broadband Antena with 5dB Attenuator	SCHWARZBECK	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	1686	2020/12/23	2021/12/22
Preamplifier	EMC Instrument	EMC330E	980404	2020/6/4	2021/6/3
Preamplifier	EMC Instrument	EMC051835BE	980407	2021/1/20	2022/1/19
Cables	UltraPhase&EMC Instrument	A1K50-UP0358-A1K50-1500&EMC106-NM-SM-2500/8000	170111-3&170104/170223	2021/2/3	2022/2/2
Measurement Software	Farad	EZ-EMC Ver: UL-3A1	N/A	N/A	N/A
Voltage Harmonic & Flicker					
single phase coupling unit	TESEQ	CCN1000-1	1652A01270	2020/4/15	2021/4/14
Programmable AC and DC Power Sources	TESEQ	NSG1007	1652A00760	2020/4/15	2021/4/14
Measurement Software	TESEQ	WIN2100(4.14.0)	N/A	N/A	N/A

Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
Electrostatic discharge					
ESD Generator	TESEQ	NSG 437	1125	2020/12/3	2021/12/2
Barometer	TFA	DIVA PLUS	35.1078.10.IT	2020/6/12	2021/6/11
Radio frequency electromagnetic field immunity					
RF and Microwave Signal Generator	Rohde & Schwarz	SMB100A	113793	2021/2/20	2022/2/19
Power amplifier	Milmega	80RF1000-300	1077558	N/A	N/A
Power amplifier	Milmega	AS0860B	1077559	N/A	N/A
Directional coupler	Werlatone	C10117-10	111786	N/A	N/A
Directional coupler	Werlatone	C8719-20	111759	N/A	N/A
Antenna	AR	ATR80M6G	346008	N/A	N/A
Antenna	SCHWARZBECK	STLP 9149	00441	N/A	N/A
RF switch	OSP	OSP	N/A	N/A	N/A
Power Meter	Rohde & Schwarz	NRP2	105524	2020/9/16	2021/9/15
Power Sensor	Rohde & Schwarz	NRP-Z91	103732	2020/9/16	2021/9/15
Power Sensor	Rohde & Schwarz	NRP-Z91	103733	2020/9/16	2021/9/15
Sound Calibrator	Bruel&Kjaer	Type 4231	3016784	2020/2/14	2023/2/12
Audio Analyzer	Rohde & Schwarz	UPV	104227	2020/11/23	2021/11/22
Pressure-field 1/2" Microphone	Bruel&Kjaer	Type 4192	3069928	2020/3/13	2023/3/12
Mouth Simulator	Bruel&Kjaer	Type 4227	3078961	2020/3/6	2023/3/5
GPS signal generator	Keysight Technologies	N5172B	MY56200315	2021/1/15	2022/1/14
Radio Communication Analyzer	Rohde & Schwarz	CMW500	161254	2020/12/13	2021/12/12
Measurement Software	Rohde & Schwarz	EMC32, VER.10.20.01	N/A	N/A	N/A
Electrical fast transient					
Ultra Compact Simulator	EM TEST	UCS 500N7	P1628180275	2020/12/2	2021/12/1
Capacitive Coupling Clamp	EM TEST	HFK	P1642185790	2020/11/19	2021/11/18
Measurement Software	TESEQ	IEC.control, VER.7.1.5	N/A	N/A	N/A

Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
Surge					
Ultra Compact Simulator	EM TEST	UCS 500N7	P1628180275	2020/12/2	2021/12/1
Telecom Surge Generator	EM TEST	TSurge7	P1620180015	2020/12/4	2021/12/3
Coupling and Decoupling Network	EM TEST	CNV 508T5	P1637184038	2020/12/7	2021/12/6
Coupling and Decoupling Network	TESEQ	CDN HSS-2	45091	2020/12/7	2021/12/6
Measurement Software	TESEQ	IEC.control, VER.7.1.5	N/A	N/A	N/A
Immunity to conducted disturbances, induced by radio-frequency fields					
Signal Generator	Rohde & Schwarz	SMC100A	105811	2020/10/6	2021/10/5
Power amplifier	Rohde & Schwarz	BBA150-A125B125	102340	N/A	N/A
Coupling and Decoupling Network	TESEQ	CDN M016	45073	2021/3/19	2022/3/18
Coupling and Decoupling Network	TESEQ	CDN T2-10	45003	2021/3/19	2022/3/18
Coupling and Decoupling Network	TESEQ	CDN T4-10	44939	2021/3/19	2022/3/18
Coupling and Decoupling Network	TESEQ	CDN T8-10	49203	2020/12/14	2021/12/13
EM Injection Clamp	TESEQ	CAL 801A & KEMZ 801A	75454.1, 75454.2 & 45181	2021/3/23	2022/3/22
Current Injection Probe	TESEQ	CIP 9136A	44618	2020/10/25	2021/10/24
Power - Sensor	Rohde & Schwarz	NRP-Z91	103730	2020/12/9	2021/12/8
Power - Sensor	Rohde & Schwarz	NRP-Z91	103731	2020/12/9	2021/12/8
Sound Calibrator	Bruel&Kjaer	Type 4231	3016784	2020/2/14	2023/2/12
Audio Analyzer	Rohde & Schwarz	UPV	104227	2020/11/23	2021/11/22
Radio Communication Analyzer	Rohde & Schwarz	CMW500	161254	2020/12/13	2021/12/12
Pressure-field 1/2" Microphone	Bruel&Kjaer	Type 4192	3069928	2020/3/13	2023/3/12
Mouth Simulator	Bruel&Kjaer	Type 4227	3078961	2020/3/6	2023/3/5
Measurement Software	Rohde & Schwarz	EMC32, VER.10.20.01	N/A	N/A	N/A
Power frequency magnetic field immunity					
Ultra Compact Simulator	EM TEST	UCS 500N7	P1628180275	2020/12/2	2021/12/1
Current Transformer	EM TEST	MC 2630	P1644186773	2020/9/4	2021/9/3
Magnetic Field Test Antena	EM TEST	MS 100N	P1627181324	2020/9/4	2021/9/3
Current Transformer	EM TEST	MFT100	P2025241594	2020/9/4	2021/9/3
Motorized Variac	EM TEST	MV 2616 (varic NX1-260-16)	P1643186426	2020/12/2	2021/12/1

Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
Voltage dips and interruptions					
Ultra Compact Simulator	EM TEST	UCS 500N7	P1628180275	2020/12/2	2021/12/1
Motorized Variac	EM TEST	MV 2616 (varic NX1-260-16)	P1643186426	2020/12/2	2021/12/1
Measurement Software	TESEQ	IEC.control, VER.7.1.5	N/A	N/A	N/A

6. EMISSION TEST

6.1. Conducted Disturbance Measurement

6.1.1. Limits of conducted disturbance voltage and common mode disturbance.

AC mains port:

FREQUENCY (MHz)	<input type="checkbox"/> Class A (dB μ V)		<input checked="" type="checkbox"/> Class B (dB μ V)	
	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

Telecommunications/network port:

FREQUENCY (MHz)	<input type="checkbox"/> Class A			
	Voltage limit (dB μ V)		Current limit(dB μ A)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	97 - 87 *	84 - 74*	53 - 43 *	40 - 30*
0.50 -30.0	87.00	74.00	43.00	30.00
FREQUENCY (MHz)	<input type="checkbox"/> Class B			
	Voltage limit (dB μ V)		Current limit(dB μ A)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	84 - 74 *	74 - 64*	40 - 30 *	30 - 20*
0.50 -30.0	74.00	64.00	30.00	20.00

Note:

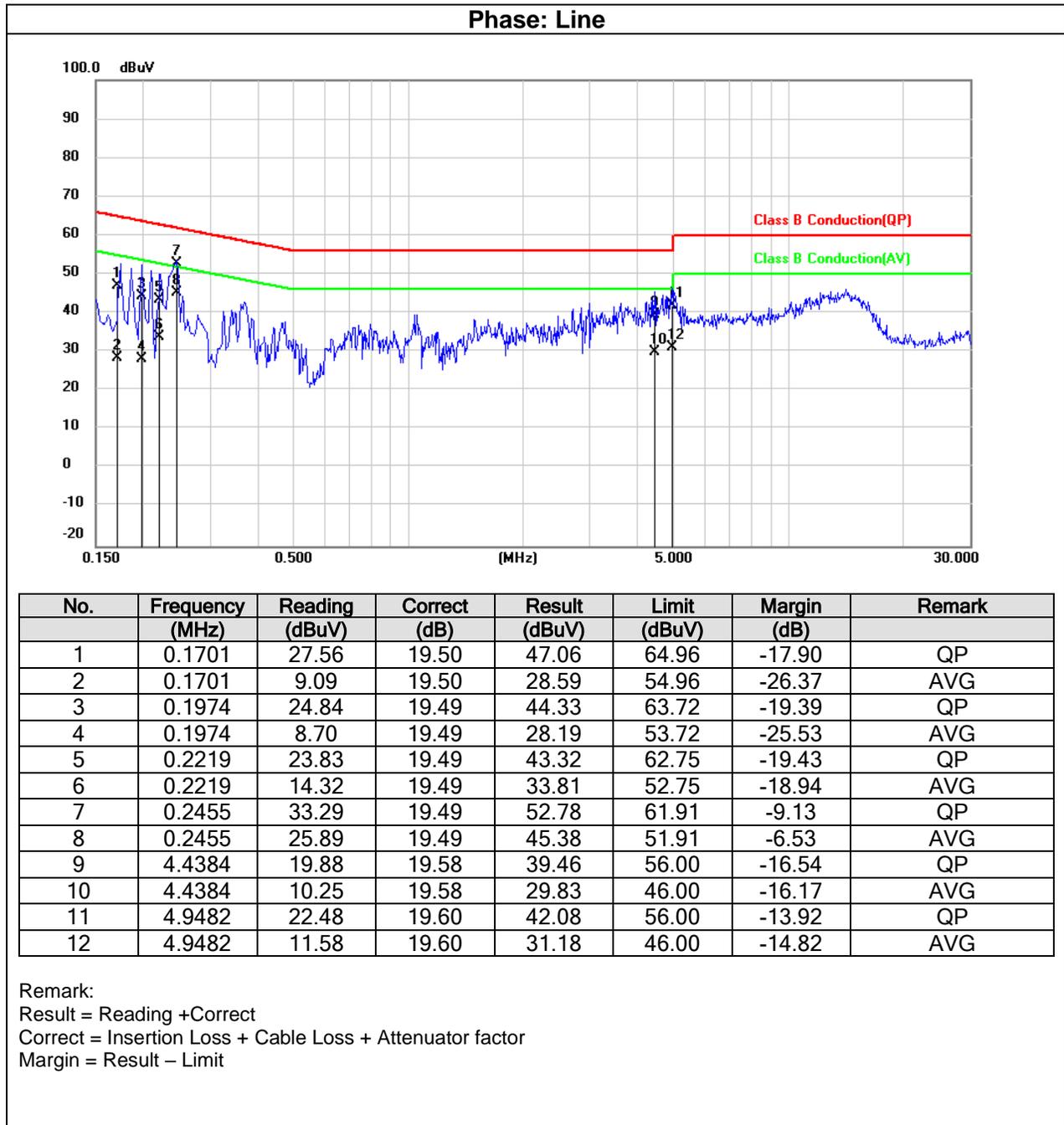
- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

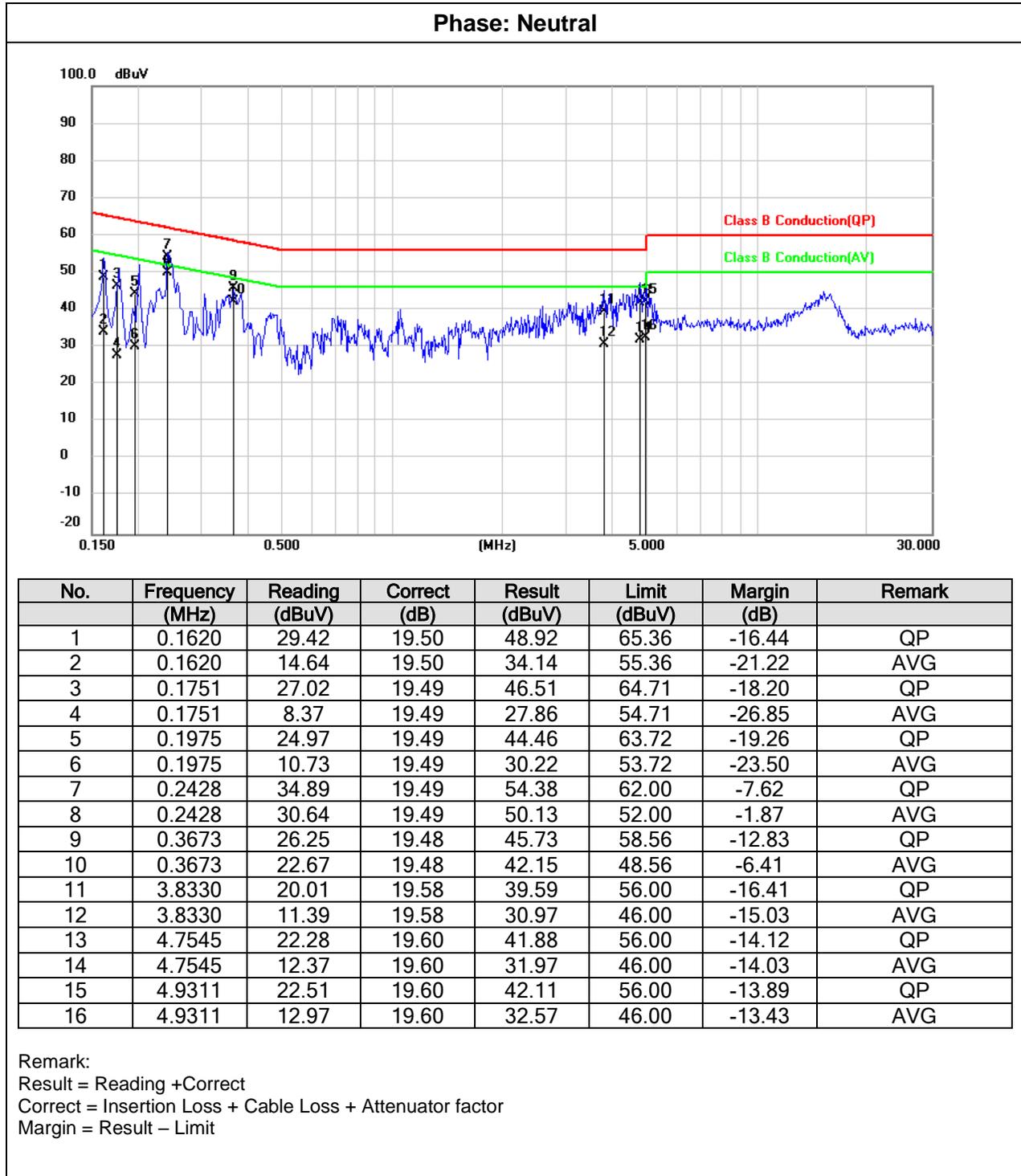
Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

6.1.4. Test Result

Test Mode:	Mode 2	Temperature:	23°C
Test Voltage:	AC 230V/50Hz	Humidity:	53%RH
Tested By:	Eric T. Fan	Test Date:	Mar. 31, 2021



Test Mode:	Mode 2	Temperature:	23°C
Test Voltage:	AC 230V/50Hz	Humidity:	53%RH
Tested By:	Eric T. Fan	Test Date:	Mar. 31, 2021



6.2. Radiated Disturbance Measurement(below 1GHz)

6.2.1. Limits of radiated disturbance measurement

FREQUENCY (MHz)	<input type="checkbox"/> Class A		<input checked="" type="checkbox"/> Class B	
	<input type="checkbox"/> At 10m	<input type="checkbox"/> At 3m	<input type="checkbox"/> At 10m	<input checked="" type="checkbox"/> At 3m
	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m
30 – 230	40	50	30	40
230 – 1000	47	57	37	47

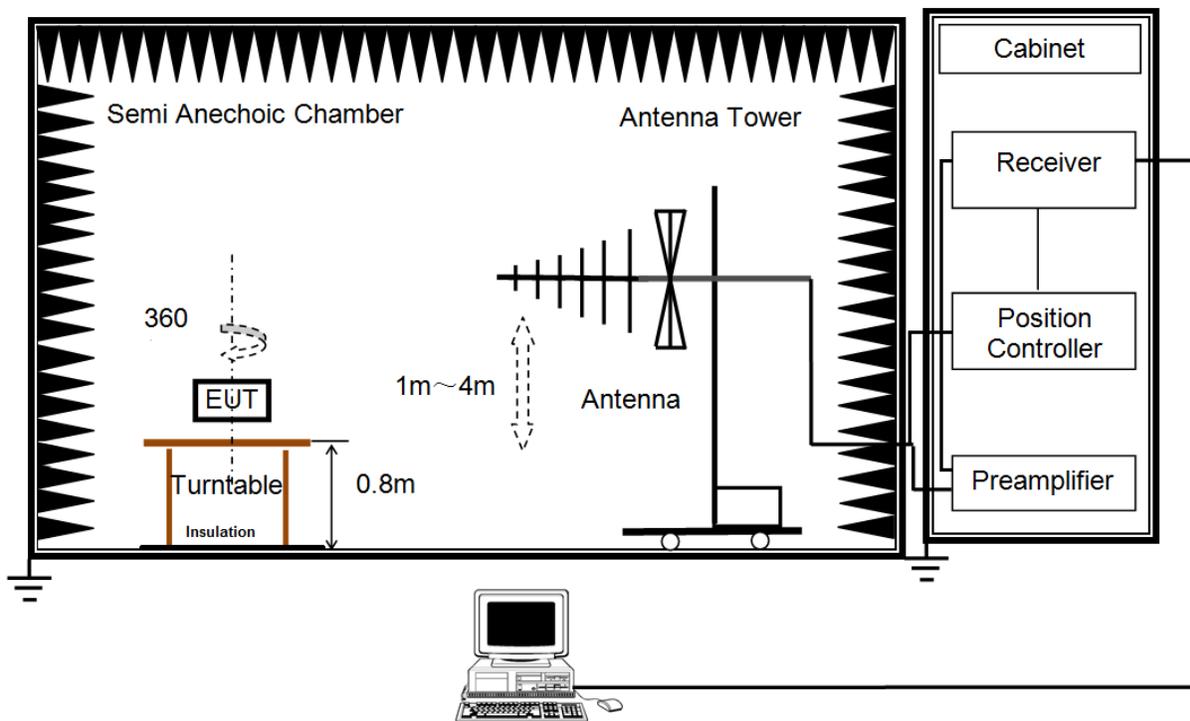
NOTE:

- (1) The limit for radiated test was performed according to EN55032.
- (2) The tighter limit applies at the band edges.
- (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.

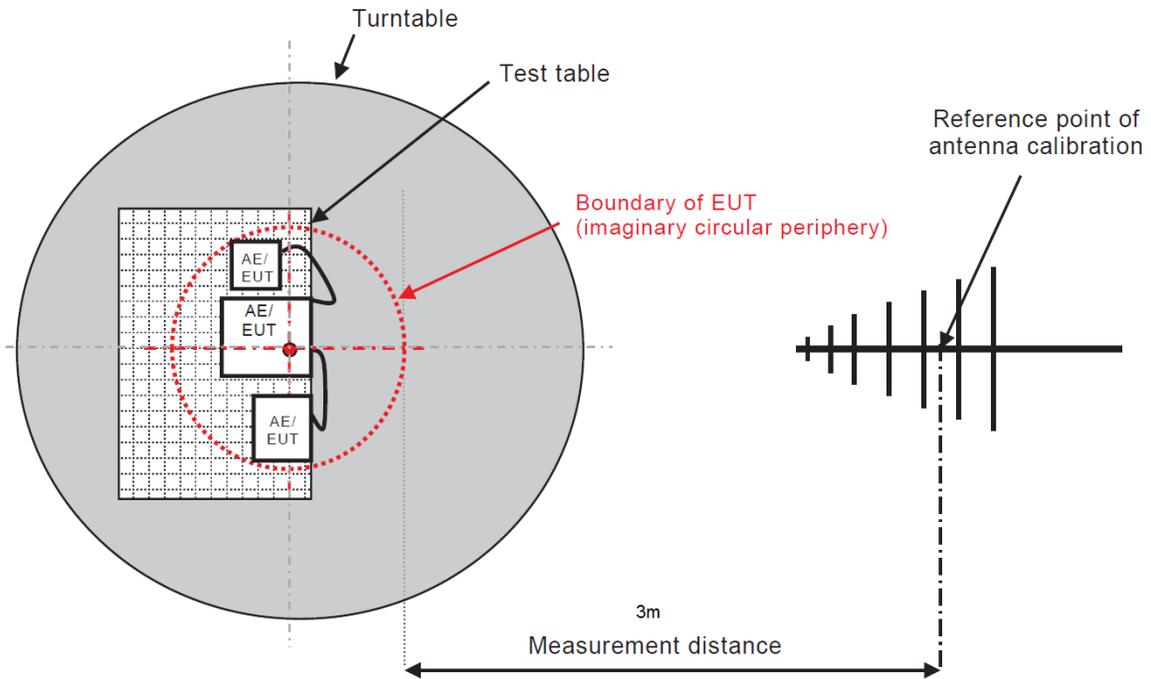
6.2.2. Test Procedure

- a. The measuring distance of at 3m shall be used for measurements at frequency from 30 to 1000MHz.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment shall be set at 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.
- d. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item:EUT Test Photos.

6.2.3. Test Setup

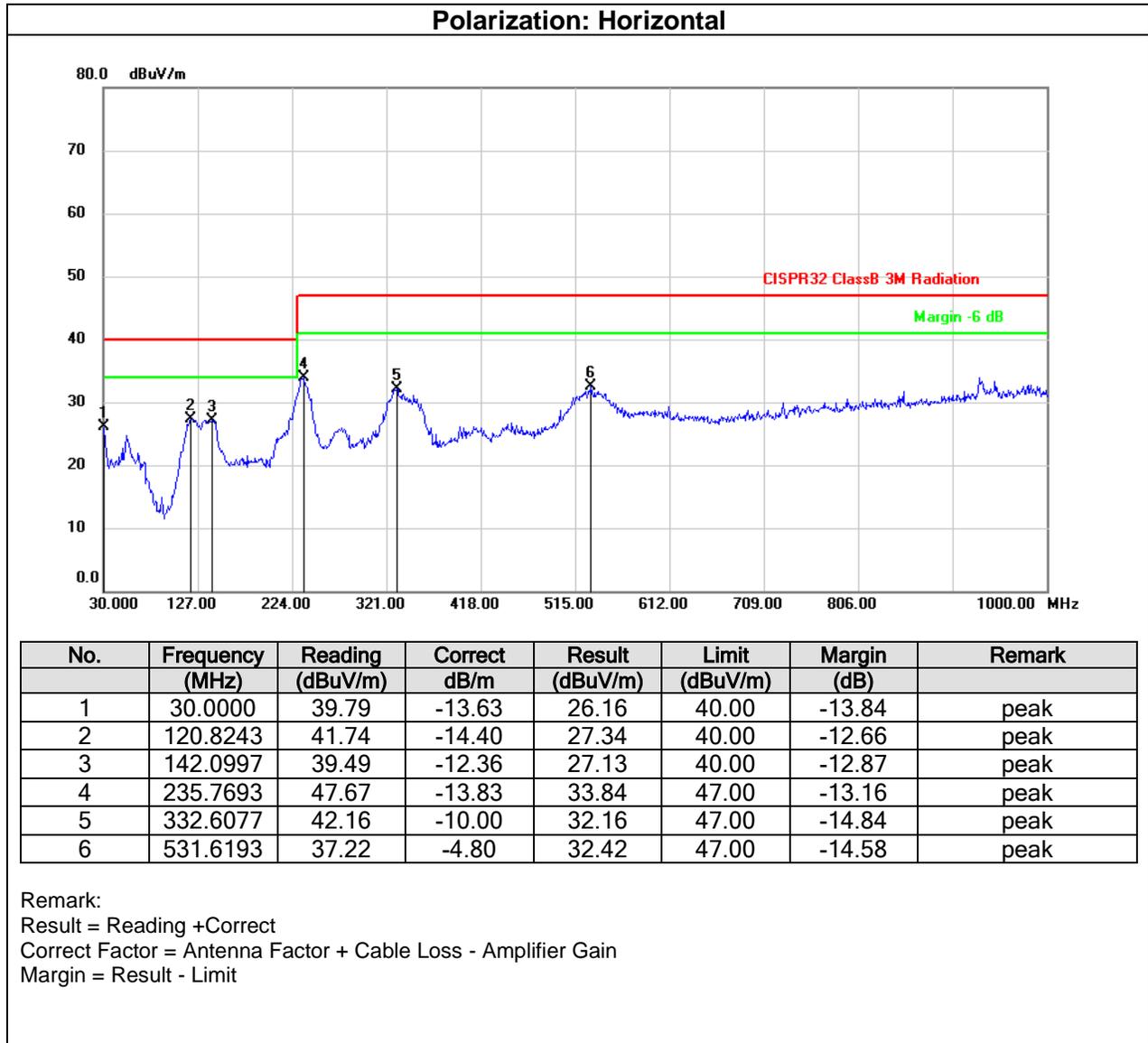


For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

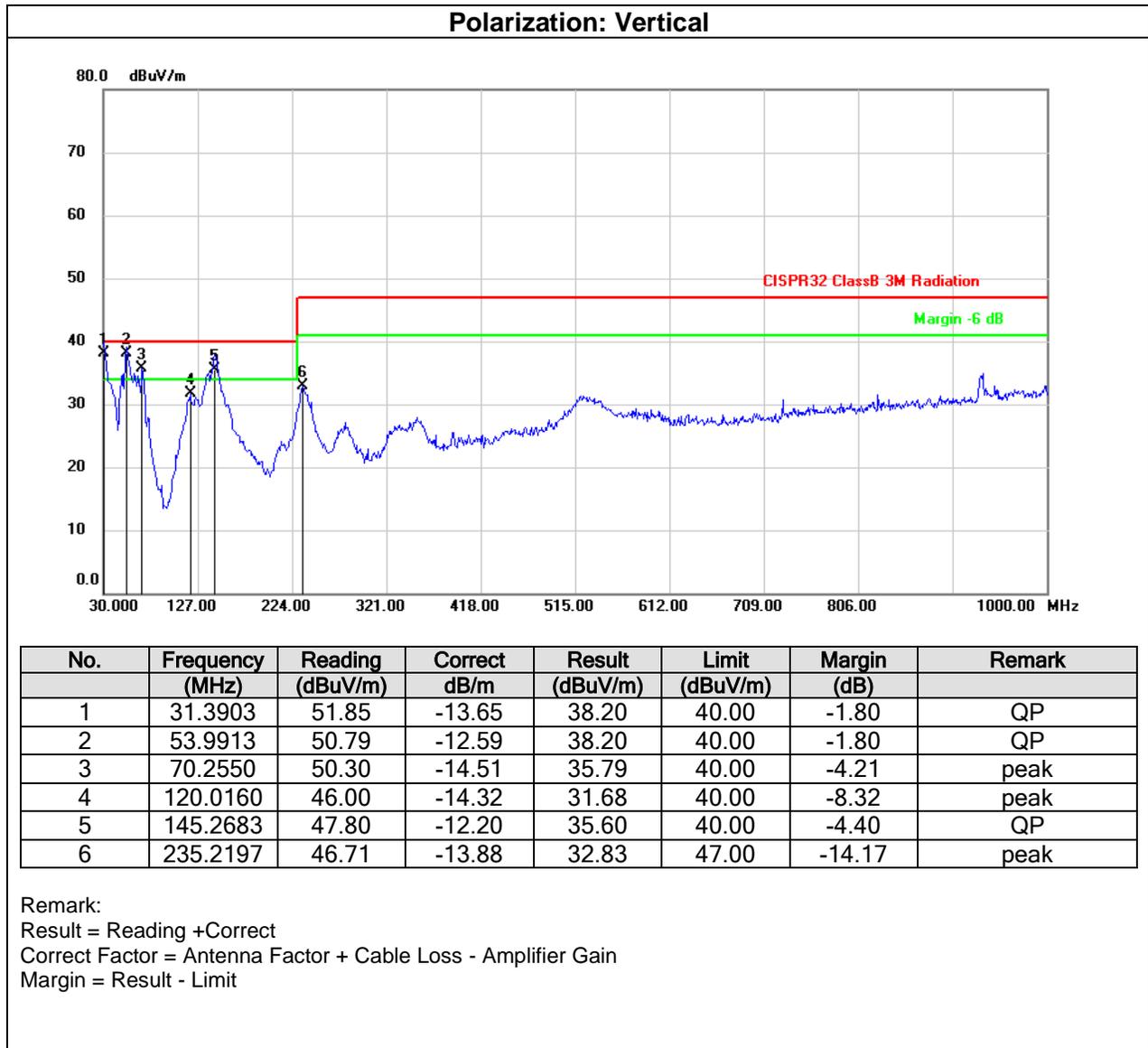


6.2.4. Test Result

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 230V/50Hz	Humidity:	59%RH
Tested By:	Rupert Huang	Test Date:	Mar. 19, 2021



Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 230V/50Hz	Humidity:	59%RH
Tested By:	Rupert Huang	Test Date:	Mar. 19, 2021



6.3. Harmonic Current Disturbance Measurement

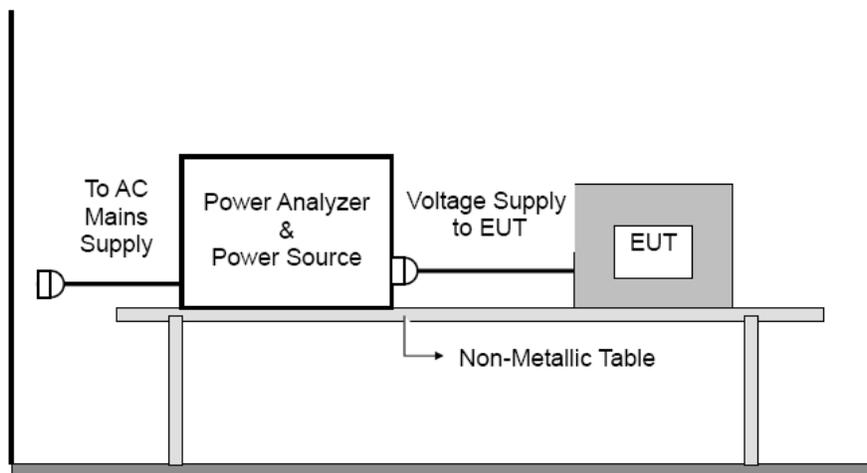
6.3.1. Limits of Harmonic Current

EN 61000-3-2/ IEC 61000-3-2						
Equipment Category	Harmonic Order	Max. Permissible Harmonic Current	Equipment Category	Harmonic Order	Max. Permissible Harmonic Current	
	n	A		n	A mA/w	
Class A	Odd Harmonics		Class D	Odd Harmonics only		
	3	2.30		3	2.30	3.4
	5	1.14		5	1.14	1.9
	7	0.77		7	0.77	1.0
	9	0.40		9	0.40	0.5
	11	0.33		11	0.33	0.35
	13	0.21		13	0.21	0.296
	15 ≤ n ≤ 39	0.15 x 15/n		15 ≤ n ≤ 39	0.15 x 15/n	3.85/n
	Even Harmonics					
	2	1.08				
	4	0.43				
	6	0.30				
	8 ≤ n ≤ 40	0.23 x 8/n				

6.3.2. Test Procedure

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce under normal conditions
- b. Tests was performed according to the Test the measured values of the harmonics components of the input current in Clause 7 of IEC/EN 61000-3-2 depend on which standard adopted for compliance measurement.

6.3.3. Test Setup



For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

6.3.4. Test Condition

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	62%RH
Tested By:	Eric T. Fan	Test Date:	Mar. 31, 2021

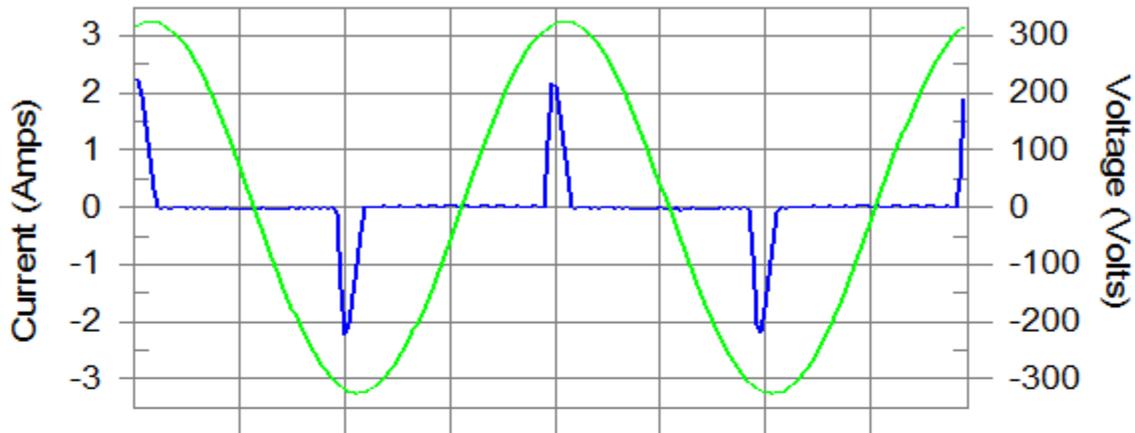
6.3.5. Test Result

Mode 2 :

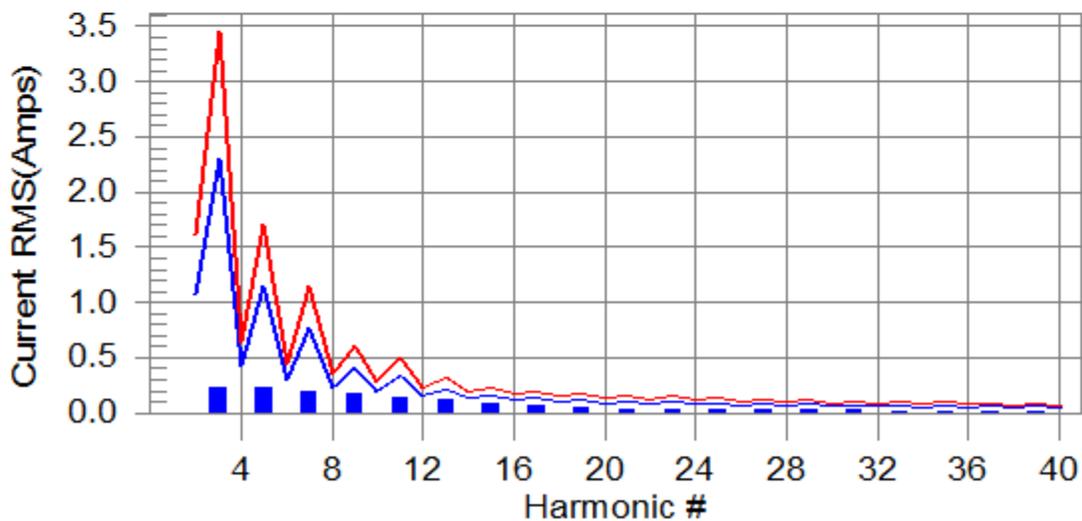
Harmonics – Class-A per Ed. 4.0 (2014)(Run time) incl. inter-harmonics

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonics H15-40.5% of 150% limit, H15-60% of 100% limit

Current Test Result Summary (Run time)

Test Result: Pass Source qualification: Normal
 THC(A): 0.479 I-THD(%): 190.9 POHC(A): 0.075 POHC Limit(A): 0.251

Highest parameter values during test:

V RMS (Volts):	229.93	Frequency(Hz):	50.00
I Peak (Amps):	2.280	I RMS (Amps):	0.542
I Fund (Amps):	0.251	Crest Factor:	4.248
P Power (Watts):	56.3	Power Factor:	0.454

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.235	2.300	10.2	0.240	3.450	6.9	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.220	1.140	19.3	0.224	1.710	13.1	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.199	0.770	25.9	0.201	1.155	17.4	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.174	0.400	43.5	0.175	0.600	29.2	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.146	0.330	44.3	0.146	0.495	29.6	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.117	0.210	55.9	0.118	0.315	37.5	Pass
14	0.002	0.131	N/A	0.002	0.197	N/A	Pass
15	0.090	0.150	60.0	0.091	0.225	40.5	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.066	0.132	49.9	0.067	0.198	34.0	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.047	0.118	39.7	0.048	0.178	27.2	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.035	0.107	32.8	0.036	0.161	22.4	Pass
22	0.002	0.084	N/A	0.002	0.125	N/A	Pass
23	0.030	0.098	31.0	0.031	0.147	20.8	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.029	0.090	32.5	0.030	0.135	21.9	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.028	0.083	34.1	0.029	0.125	23.2	Pass
28	0.002	0.066	N/A	0.002	0.099	N/A	Pass
29	0.026	0.078	33.7	0.027	0.116	22.8	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.022	0.073	30.7	0.023	0.109	21.0	Pass
32	0.002	0.058	N/A	0.002	0.086	N/A	Pass
33	0.017	0.068	25.5	0.018	0.102	17.7	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.012	0.064	19.4	0.013	0.096	13.5	Pass
36	0.000	0.051	N/A	0.001	0.077	N/A	Pass
37	0.009	0.061	14.2	0.009	0.091	9.9	Pass
38	0.000	0.048	N/A	0.001	0.073	N/A	Pass
39	0.007	0.058	12.5	0.008	0.087	8.9	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Voltage Source Verification Data (Run time)

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.93	Frequency(Hz):	50.00
I Peak (Amps):	2.280	I RMS (Amps):	0.542
I Fund (Amps):	0.251	Crest Factor:	4.248
Power (Watts):	56.3	Power Factor:	0.454

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.029	0.460	6.28	OK
3	0.377	2.069	18.21	OK
4	0.016	0.460	3.51	OK
5	0.051	0.920	5.55	OK
6	0.012	0.460	2.60	OK
7	0.050	0.690	7.23	OK
8	0.011	0.460	2.40	OK
9	0.062	0.460	13.42	OK
10	0.009	0.460	1.93	OK
11	0.068	0.230	29.51	OK
12	0.014	0.230	5.88	OK
13	0.055	0.230	23.97	OK
14	0.006	0.230	2.44	OK
15	0.052	0.230	22.54	OK
16	0.005	0.230	2.11	OK
17	0.043	0.230	18.85	OK
18	0.009	0.230	4.12	OK
19	0.034	0.230	14.77	OK
20	0.010	0.230	4.29	OK
21	0.027	0.230	11.72	OK
22	0.003	0.230	1.44	OK
23	0.026	0.230	11.10	OK
24	0.003	0.230	1.12	OK
25	0.028	0.230	12.29	OK
26	0.002	0.230	0.82	OK
27	0.032	0.230	14.04	OK
28	0.002	0.230	0.99	OK
29	0.029	0.230	12.77	OK
30	0.004	0.230	1.66	OK
31	0.027	0.230	11.88	OK
32	0.002	0.230	0.90	OK
33	0.024	0.230	10.51	OK
34	0.002	0.230	0.99	OK
35	0.020	0.230	8.50	OK
36	0.002	0.230	1.07	OK
37	0.016	0.230	6.93	OK
38	0.002	0.230	0.81	OK
39	0.012	0.230	5.43	OK
40	0.006	0.230	2.67	OK

6.4. Voltage Fluctuation and Flick Measurement

6.4.1. Limits of Voltage Fluctuation and Flick

Test items	Limits	Descriptions
P_{st}	$\leq 1.0, T_p=10\text{min}$	short-term flicker indicator
P_{lt}	$\leq 0.65, T_p=2\text{h}$	long-term flicker indicator
d_c	$\leq 3.3\%$	relative steady-state voltage change
d_{max}	$\leq 4\%$ (or 6% ^{Note(1)} , 7% ^{Note(2)})	maximum relative voltage change:
$d_{(t)}$	$\leq 3.3\%$, more than 500ms	relative voltage change characteristic

Note:

(1)6 % for equipment which is:

- a. switched manually, or
- b. switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

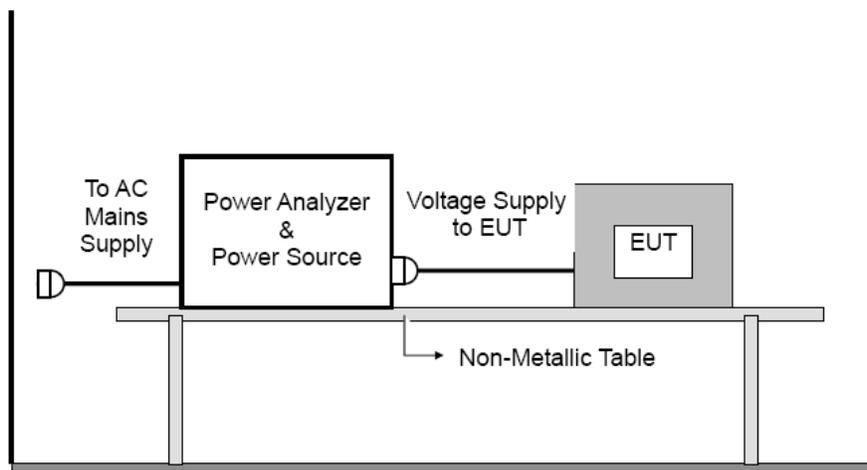
(2)7 % for equipment which is

- a. attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- b. switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

6.4.2. 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 most unfavorable sequence of voltage changes under normal conditions
- b. During the flick measurement, the measure time shall include that part of whole operation changes according to IEC/EN 61000-3-3 Annex A for each product type has different requirement.
- c. Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.
- d. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

6.4.3. Test Setup



For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

6.4.4. Test Condition

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	62%RH
Tested By:	Eric T. Fan	Test Date:	Mar. 31, 2021

6.4.5. Test Result

Mode 2 :

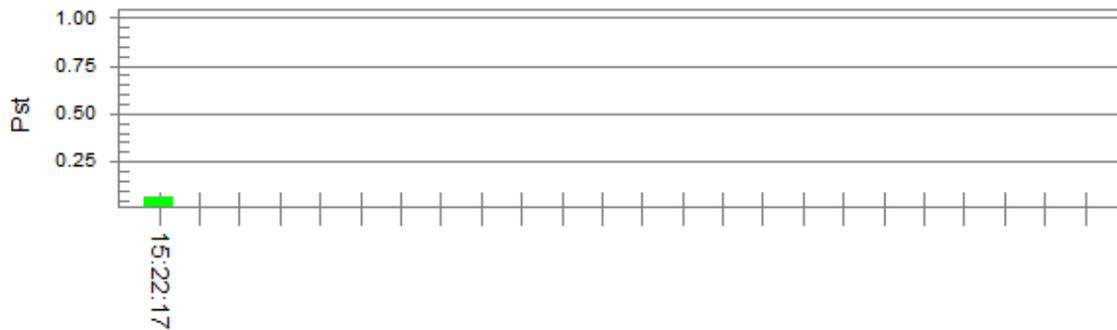
Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

Test Result: Pass

Status: Test Completed

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.79		
Highest dt (%):	0.00	Test limit (%):	N/A N/A
T-max (mS):	0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

7. IMMUNITY TEST

7.1. Performance Criteria

According to EN 55024/ EN 55035 standard, the general performance criteria as following:

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

7.2. Electrostatic Discharge Immunity Test

7.2.1. Test Specification

For EN 55024 & EN 55035

Standard:	EN 55024(Note)/ EN 55035 (refer to IEC/EN 61000-4-2)
Discharge Impedance:	330(1±10%)Ω / 150(1±10%)pF
Discharge Voltage:	Air Discharge: ±2kV/±4kV/±8kV (Direct)
Polarity:	Contact Discharge: ±2kV/±4kV (Direct/Indirect) Positive and Negative
Discharge Mode of Operation:	Single discharges
Discharge Period:	1 second minimum

7.2.2. 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. On each pre-selected point at least 10 single discharges (at each polarity) shall be applied. 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):

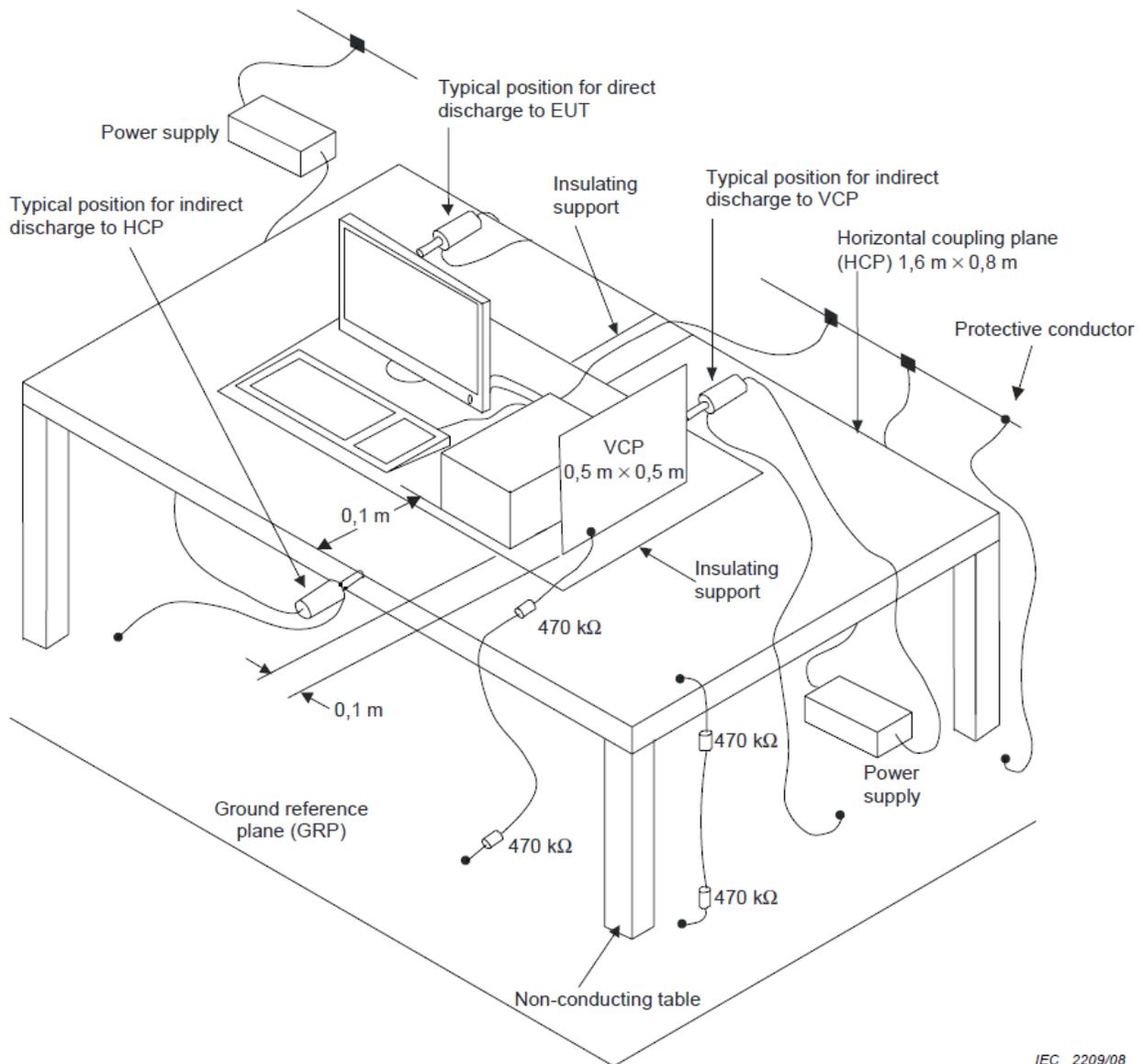
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

For EN 55024, Step a shall be change to 25 single discharges at each polarity.

- b. Air discharges at insulation surfaces of the EUT.
It was at least 10 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.

7.2.3. Test Setup



IEC 2209/08

A distance of 0,8 m minimum shall be provided between the EUT and the walls of the laboratory and any other metallic structure.

For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.2.4. Test Result

EN 55024 :

Test Mode:	Mode 1	Temperature:	23°C
Test Voltage:	AC 230V/50Hz	Humidity:	45%RH
Discharge of times:	Air: 10 times Contact: 25 times	ATM pressure:	1005 hpa
Tested By:	Rupert Huang	Test Date:	Jul. 28, 2021

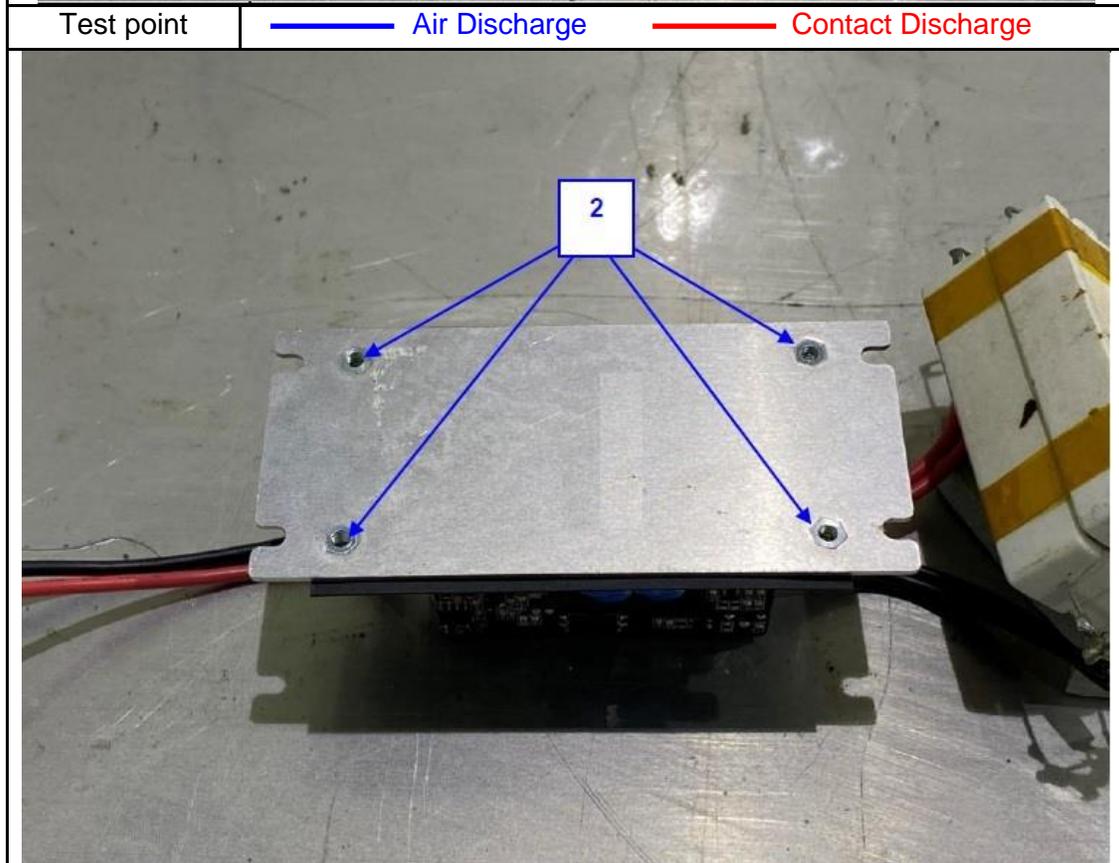
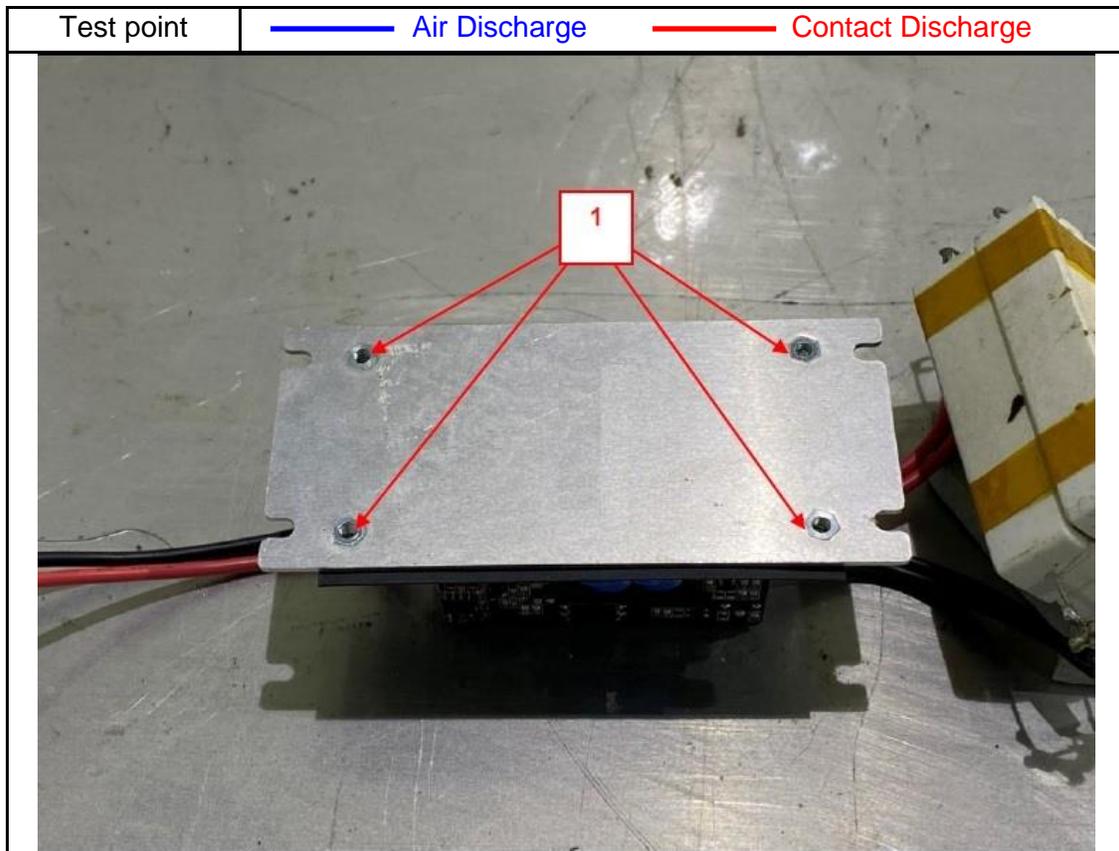
Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1	-	-	-	-	-	-	-	-	A	A	A	A	-	-	-	-
2	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-
Criteria	B								B							
Results	A								A							
Judgment	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		-kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
rear	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
left	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
right	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
Criteria	B				-				B				-			
Results	A				-				A				-			
Judgment	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															

Customer Request:

Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		-15kV		2kV		4kV		6kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1	-	-	-	-	-	-	-	-	-	-	-	-	A	A	-	-
Criteria	B								B							
Results	-								A							
Judgment	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		6kV		-kV		2kV		4kV		6kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
rear	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
left	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
right	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
Criteria	B								B							
Results	A								A							
Judgment	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															



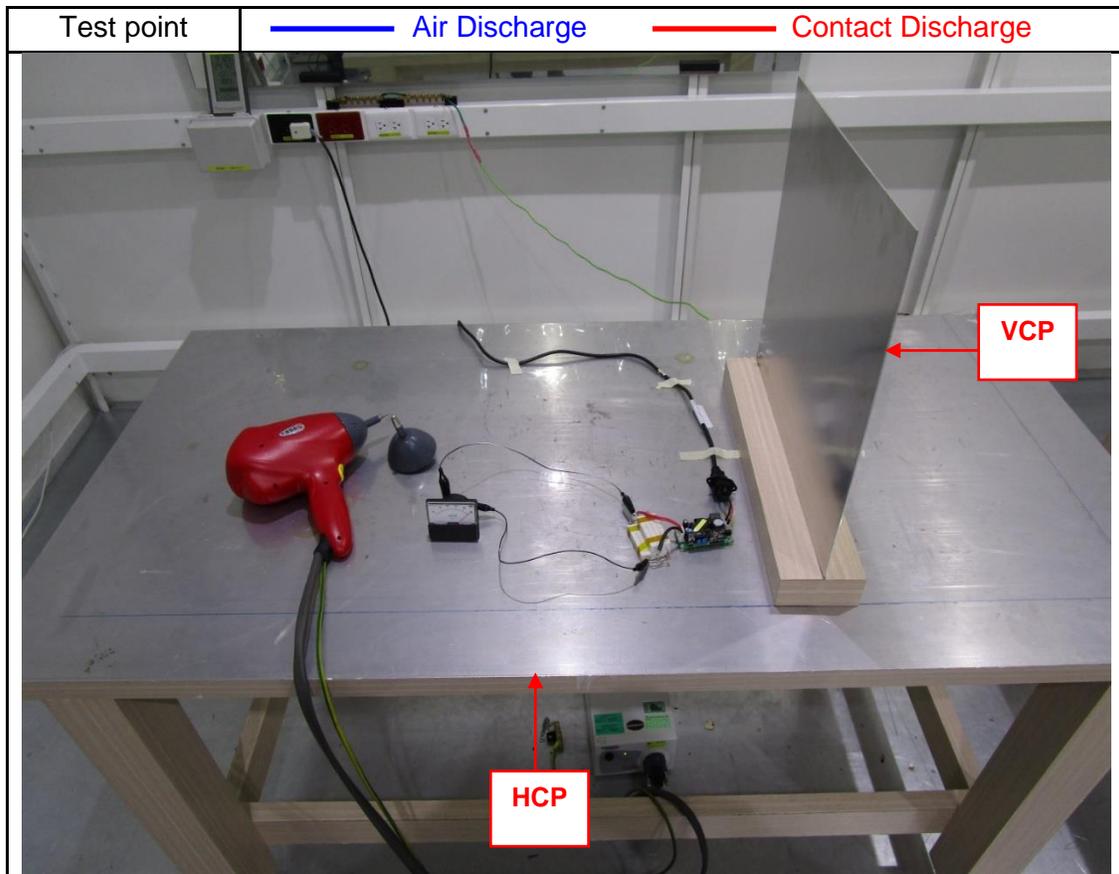
Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	50%RH
Discharge of times:	Air: 10 times Contact: 25 times	ATM pressure:	1020 hpa
Tested By:	Eric T. Fan	Test Date:	Apr. 14, 2021

Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
-	NA	NA	NA	NA	NA	NA	-	-	NA	NA	NA	NA	-	-	-	-
Criteria	B								B							
Results	-								-							
Judgment	-															
Note	NA: This product is an internal component of system. Contact & Air discharge cannot be performed on this component after assembly, so the test is not applicable.															

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		-kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
rear	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
left	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
right	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
Criteria	B				-				B				-			
Results	A				-				A				-			
Judgment	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															

Customer Request:

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		6kV		-kV		2kV		4kV		6kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
rear	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
left	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
right	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
Criteria	B								B							
Results	A								A							
Judgment	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															



EN 55035:

Test Mode:	Mode 1	Temperature:	23°C
Test Voltage:	230V/50Hz	Humidity:	45%RH
Discharge of times:	Air: 10 times Contact: 10 times	ATM pressure:	1005 hpa
Tested By:	Rupert Huang	Test Date:	Jul. 28, 2021

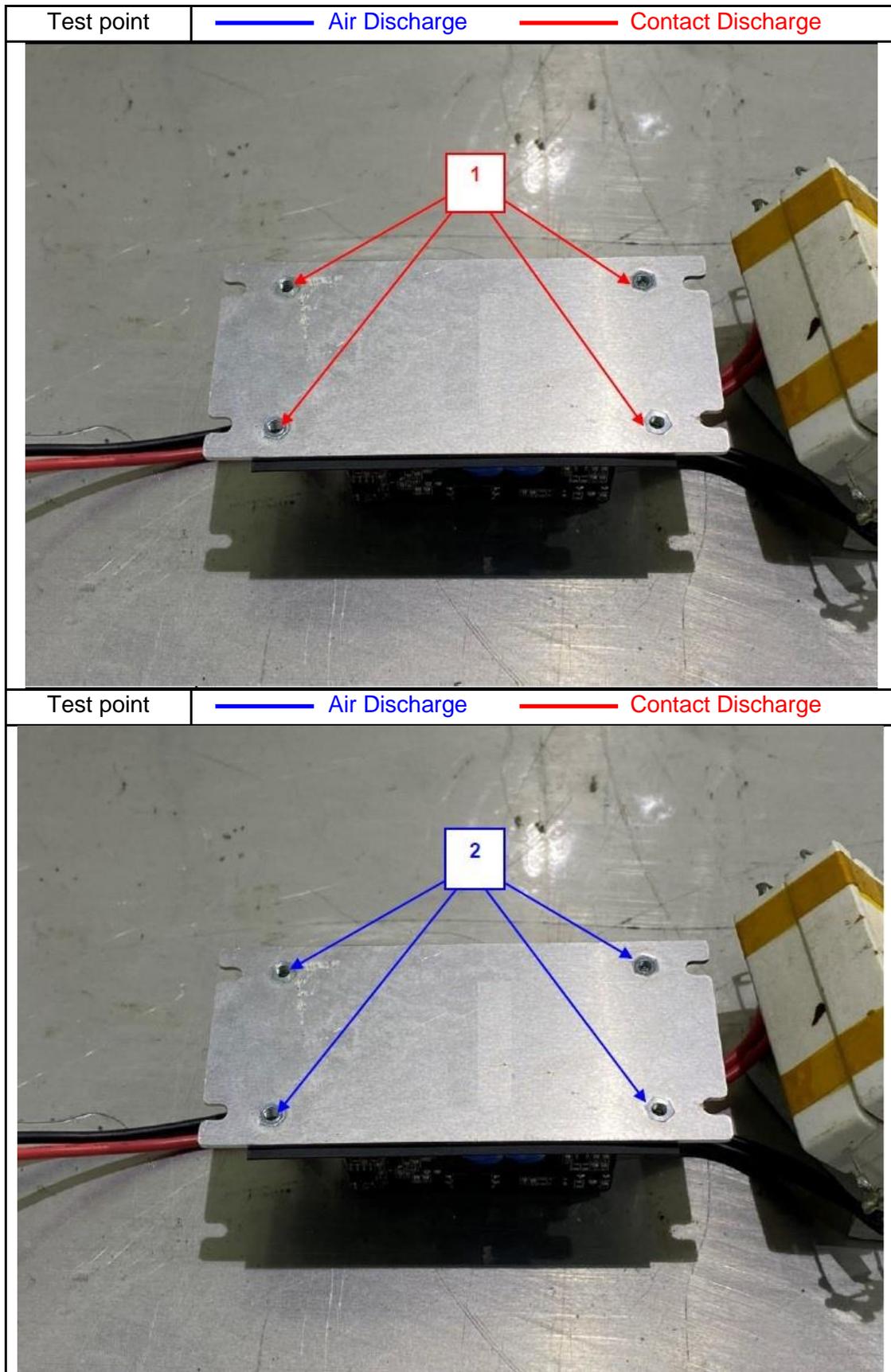
Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1	-	-	-	-	-	-	-	-	A	A	A	A	-	-	-	-
2	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-
Criteria	B								B							
Results	A								A							
Judgement	-															
Note	There was no abnormal situation during the test compared with initial operation.															

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		-kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
rear	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
left	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
right	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
Criteria	B				-				B				-			
Results	A				-				A				-			
Judgement	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															

Customer Request:

Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		15kV		2kV		4kV		6kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1	-	-	-	-	-	-	-	-	-	-	-	-	A	A	-	-
Criteria	B								B							
Results	-								A							
Judgement	-															
Note	There was no abnormal situation during the test compared with initial operation.															

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		6kV		-kV		2kV		4kV		6kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
rear	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
left	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
right	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
Criteria	B								B							
Results	A								A							
Judgement	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															



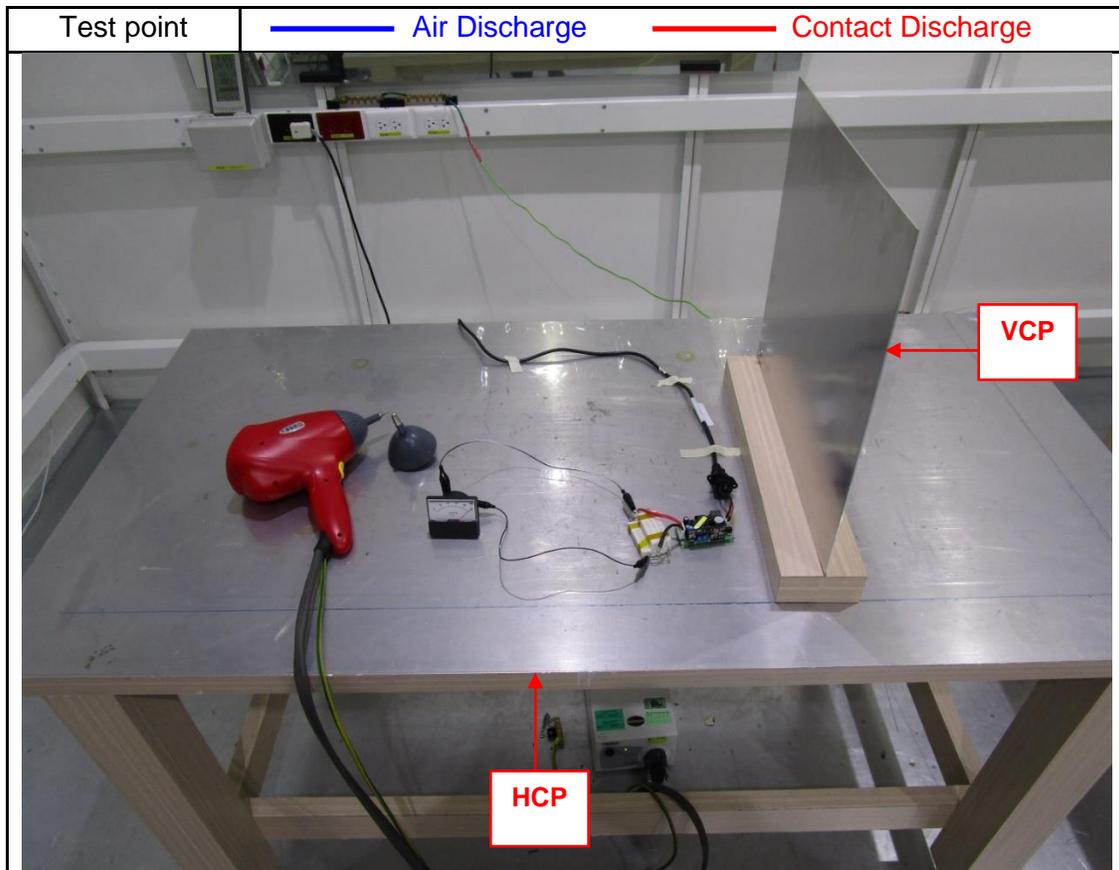
Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	230V/50Hz	Humidity:	55%RH
Discharge of times:	Air: 10 times Contact: 10 times	ATM pressure:	1020 hpa
Tested By:	Eric T. Fan	Test Date:	Apr. 14, 2021

Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
-	NA	NA	NA	NA	NA	NA	-	-	NA	NA	NA	NA	-	-	-	-
Criteria	B								B							
Results	-								-							
Judgement	-															
Note	NA: This product is an internal component of system. Contact & Air discharge cannot be performed on this component after assembly, so the test is not applicable.															

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		-kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
rear	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
left	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
right	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
Criteria	B				-				B				-			
Results	A				-				A				-			
Judgement	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															

Customer Request:

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		6kV		-kV		2kV		4kV		6kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
rear	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
left	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
right	-	-	-	-	A	A	-	-	-	-	-	-	A	A	-	-
Criteria	B								B							
Results	A								A							
Judgement	PASS															
Note	There was no abnormal situation during the test compared with initial operation.															



7.3. Radio Frequency Electromagnetic Field Immunity Test

7.3.1. Test Specification

For Standard EN 55024 :

Standard:	EN 55024 (refer to IEC/EN 61000-4-3)
Frequency Range:	80 MHz to 1000MHz
Field Strength:	3V/m (unmodulated)
Modulation:	80%, AM(1 kHz)
Frequency Step:	1%
Polarity of Antenna	Vertical and Horizontal
Test Distance:	3 meters
Antenna Height:	1.55 meters
Dwell Time:	3 s

For Standard EN 55035 :

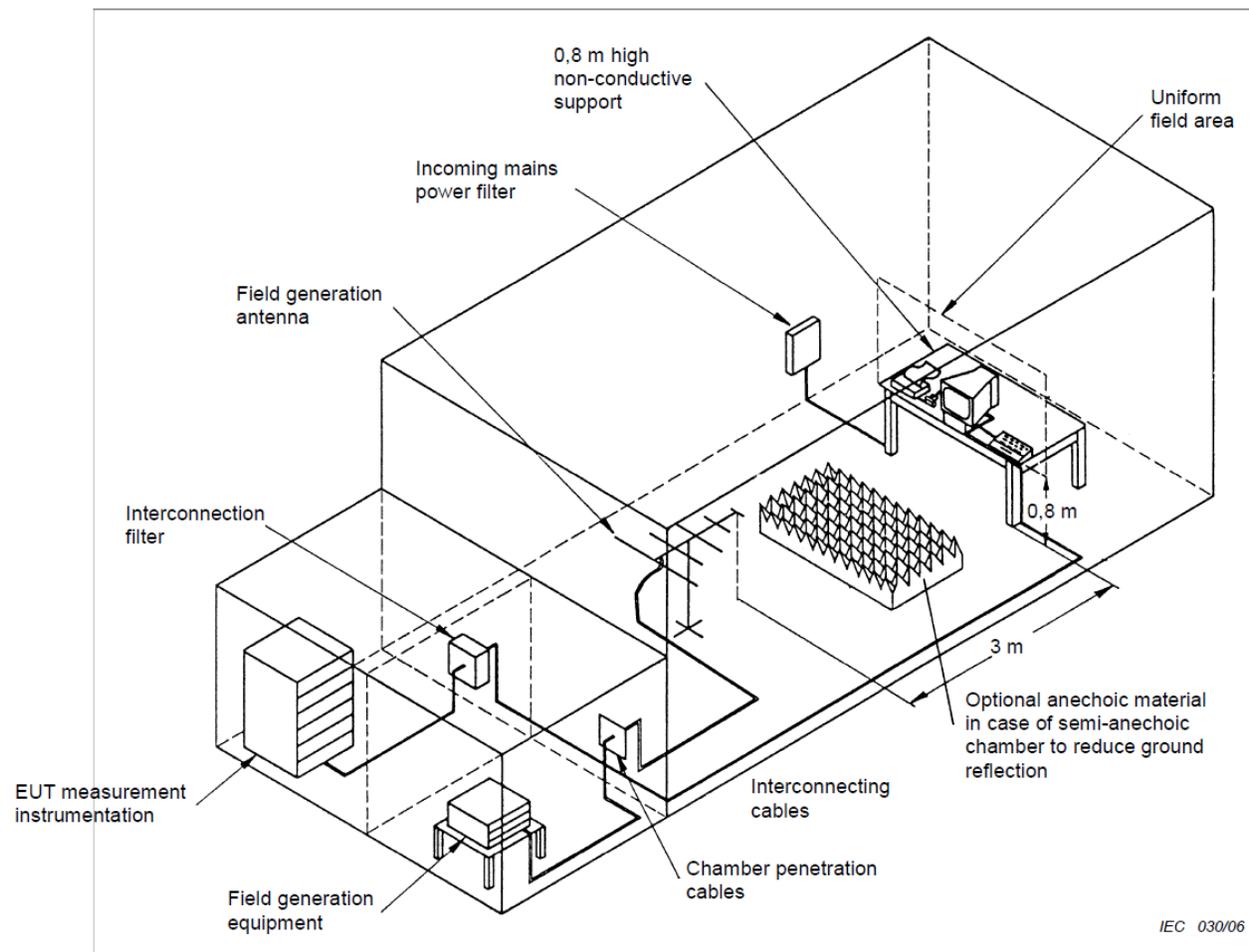
Standard:	EN 55035 (refer to IEC/EN 61000-4-3)
Frequency Range:	80 MHz to 1000MHz
Spot Frequency:	1800, 2600, 3500, 5000 MHz($\pm 1\%$)
Field Strength:	3V/m (unmodulated)
Immunity level to common wireless communication:	See Table I.1 for test frequency and level
Modulation:	80%, AM(1 kHz)
Frequency Step:	1%
Polarity of Antenna	Vertical and Horizontal
Test Distance:	3 meters
Antenna Height:	1.55 meters
Dwell Time:	3 s

7.3.2. Test Procedure

The test procedure was in accordance with IEC/EN 61000-4-3.

- a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- b. The frequency range is swept from 80 MHz to 1000MHz with the signal 80% amplitude modulated with a 1 KHz sine wave. The rate of sweep did not exceed 1.5×10^{-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 field strength level from 80 MHz to 1000MHz was 3V/m.
- e. A special spot frequency test point are 1800, 2600, 3500 and 5000MHz ($\pm 1\%$)
- f. Wireless communication devices are considered to be the most significant sources of interference for MME in the range 800 MHz to 5 GHz. Consequently testing is only required at relevant spot frequencies refer to EN 55035 Annex I.
- g. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

7.3.3. Test Setup



For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.3.4. Test Result

EN 55024 :

Test Mode:	Mode 2	Temperature:	21°C
Test Voltage:	AC 230V/50Hz	Humidity:	54%RH
Tested By:	Rupert Huang	Test Date:	Apr. 7, 2021

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criteria	Results	Judgment
80-1000	Front	H / V	3V/m	A	A	PASS
80-1000	Left	H / V	3V/m	A	A	PASS
80-1000	Right	H / V	3V/m	A	A	PASS
80-1000	Rear	H / V	3V/m	A	A	PASS

Note	There was no abnormal situation during the test compared with initial operation.
------	--

Customer Request:

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criteria	Results	Judgment
80-1000	Front	H / V	10V/m	A	A	PASS
80-1000	Left	H / V	10V/m	A	A	PASS
80-1000	Right	H / V	10V/m	A	A	PASS
80-1000	Rear	H / V	10V/m	A	A	PASS

Note	There was no abnormal situation during the test compared with initial operation.
------	--

EN 55035 :

Test Mode:	Mode 2	Temperature:	21°C
Test Voltage:	AC 230V/50Hz	Humidity:	54%RH
Tested By:	Rupert Huang	Test Date:	Apr. 7, 2021

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criteria	Results	Judgement
80-1000	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
1800(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
2600(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
3500(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
5000(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

Immunity Level to common wireless communication						
Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criteria	Results	Judgement
800(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
900(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
1800(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
2600(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
3500(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
5000(±1%)	Front / Left / Right / Rear	H / V	3V/m	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

Customer Request:

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criteria	Results	Judgement
80-1000	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
1800(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
2600(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
3500(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
5000(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

Immunity Level to common wireless communication						
Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criteria	Results	Judgement
800(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
900(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
1800(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
2600(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
3500(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
5000(±1%)	Front / Left / Right / Rear	H / V	10V/m	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

7.4. Electrical Fast Transient/Burst Immunity Test

7.4.1. Test Specification

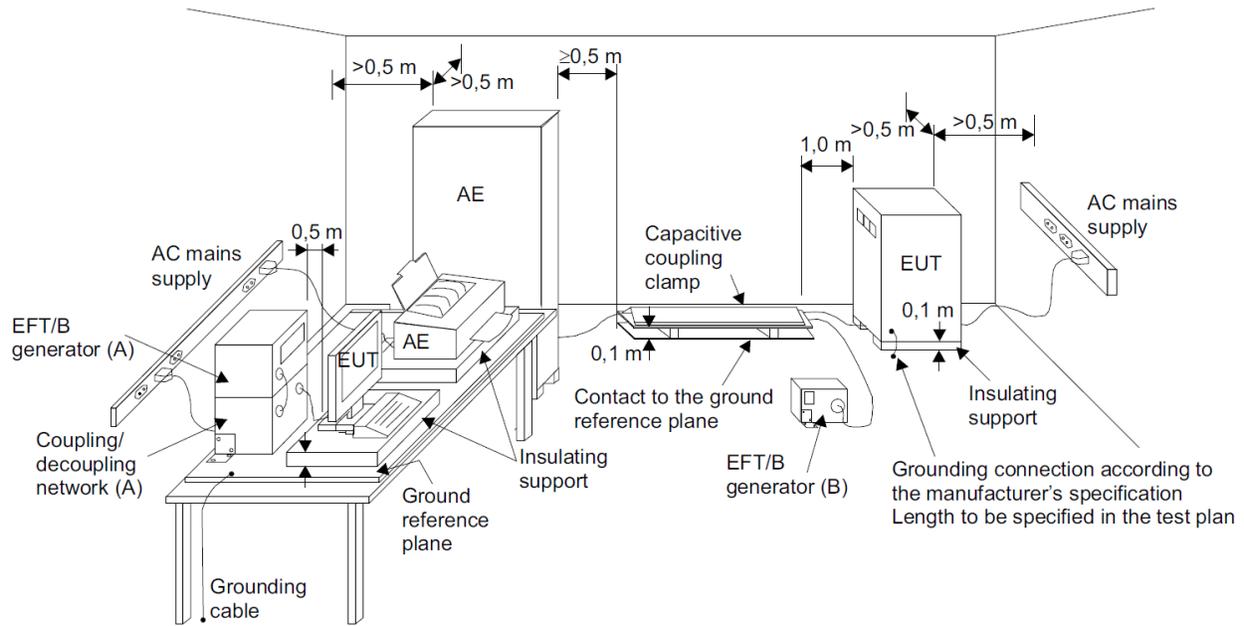
For Standard EN 55024 & EN 55035 :

Standard:	EN 55024/ EN55035 (refer to IEC/EN 61000-4-4)
Test Voltage:	0.5,1 kV(Peak)
Polarity:	Positive and Negative
Impulse Frequency:	5 or 100 kHz
Impulse wave shape:	5/50 Tr/Th ns
Burst Duration:	15ms or 0.75ms
Burst Period:	300ms
Test Duration:	1 Minute

7.4.2. Test Procedure

- a. The EUT was tested with 1000 volt discharges to the AC power input leads, 500 volt discharges to the signal/control ports.
- b. Both positive and negative polarity discharges were applied.
- c. Table-top equipment and equipment normally mounted on ceilings or walls as well as built-in equipment shall be tested with the EUT located $(0,1 \pm 0,01)$ m above the ground reference plane.
- d. The EUT and the auxiliary equipment were placed on a table of 0.8 m heights above a metal ground reference plane. The size of ground plane is greater than 0.8m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The minimum distance between the EUT and all other conductive structures (including the generator, AE and the walls of a shielded room), except the ground reference plane, shall be more than 0,5 m.
- e. The duration time of each test sequential was 1 minute.
- f. The transient/burst waveform was in accordance with IEC/EN 61000-4-4, 5/50ns.

7.4.3. Test Setup



IEC 645/12

- (A) location for supply line coupling
- (B) location for signal lines coupling

For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.4.4. Test Result

EN 55024 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T Fan	Test Date:	Apr. 12, 2021

Repetition Frequency		5kHz						Criteria	Results	Judgement
Test Port		Test Levels (kV)								
		+0.5	-0.5	+1.0	-1.0	-	-			
AC power Port	L	-	-	A	A	-	-	B	A	PASS
	N	-	-	A	A	-	-			
	L + N	-	-	A	A	-	-			
Note		There was no abnormal situation during the test compared with initial operation.								

Customer Request:

Repetition Frequency		5kHz						Criteria	Results	Judgement
Test Port		Test Levels (kV)								
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0			
AC power Port	L	-	-	-	-	A	A	B	A	PASS
	N	-	-	-	-	A	A			
	L + N	-	-	-	-	A	A			
Note		There was no abnormal situation during the test compared with initial operation.								

EN 55035 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T Fan	Test Date:	Apr. 12, 2021

Repetition Frequency		5kHz						Criteria	Results	Judgement
Test Port		Test Levels (kV)								
		+0.5	-0.5	+1.0	-1.0	-	-			
AC power Port	L	-	-	A	A	-	-	B	A	PASS
	N	-	-	A	A	-	-			
	L + N	-	-	A	A	-	-			
Note		There was no abnormal situation during the test compared with initial operation.								

Customer Request:

Repetition Frequency		5kHz						Criteria	Results	Judgement
Test Port		Test Levels (kV)								
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0			
AC power Port	L	-	-	-	-	A	A	B	A	PASS
	N	-	-	-	-	A	A			
	L + N	-	-	-	-	A	A			
Note		There was no abnormal situation during the test compared with initial operation.								

7.5. Surge Immunity Test

7.5.1. Test Specification

For Standard EN 55024 :

Standard:	EN 55024 (refer to IEC/EN 61000-4-5)
Waveform:	1.2/50 (8/20) Tr/Th μ s , 10/700 Tr/Th μ s
Test Voltage:	0.5,1 kV(Line to Line) 0.5,1,2 kV(Line to Earth)
Polarity:	Positive and Negative
Phase Angle:	0°/90°/180°/270°
Repetition Rate:	1 per minute
Times:	5 times each polarity

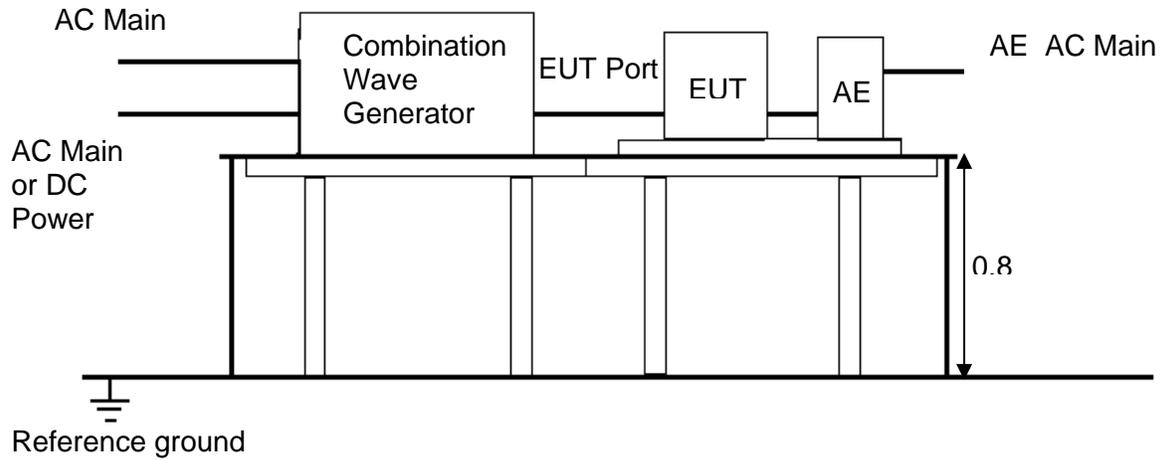
For Standard EN 55035 :

Standard:	EN 55035 (refer to IEC/EN 61000-4-5)
Waveform:	1.2/50 (8/20) Tr/Th μ s , 10/700 Tr/Th μ s
Test Voltage:	0.5,1 kV(Line to Line) 0.5,1,2 kV(Line to Earth)
Polarity:	Positive and Negative
Phase Angle:	90°/270°
Repetition Rate:	1 per minute
Times:	5 times each polarity

7.5.2. Test Procedure

- a. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT shall not exceed 2 meters (provided by the manufacturer).
- b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- c. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.
- d. If EUT was included telecom port and connected to outdoor directly, test shall be applied to line to earth test using 10/700 surge wave form. If the wave form affects the functioning of high speed data port, the test shall be carried out using 1.2/50 wave form do the test.

7.5.3. Test Setup



For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.5.4. Test Result

EN 55024 :

Test Mode:	Mode 1	Temperature:	21°C
Test Voltage:	AC 230V/50Hz	Humidity:	51%RH
Tested By:	Rupert Huang	Test Date:	May 5, 2021

Wave Form EUT Ports Tested	1.2/50(8/20)Ti/Th us						Criteria	Results	Judgment
	Polarity	Phase	Voltage						
			0.5kV	1kV	2kV	-kV			
L - N	+	0°	A	A	-	-	B	A	PASS
	-		A	A	-	-			
	+	90°	A	A	-	-			
	-		A	A	-	-			
	+	180°	A	A	-	-			
	-		A	A	-	-			
	+	270°	A	A	-	-			
	-		A	A	-	-			
L - PE	+	0°	A	A	A	-	B	A	
	-		A	A	A	-			
	+	90°	A	A	A	-			
	-		A	A	A	-			
	+	180°	A	A	A	-			
	-		A	A	A	-			
	+	270°	A	A	A	-			
	-		A	A	A	-			
N - PE	+	0°	A	A	A	-	B	A	
	-		A	A	A	-			
	+	90°	A	A	A	-			
	-		A	A	A	-			
	+	180°	A	A	A	-			
	-		A	A	A	-			
	+	270°	A	A	A	-			
	-		A	A	A	-			
Note	There was no abnormal situation during the test compared with initial operation.								

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 12, 2021

Wave Form EUT Ports Tested	1.2/50(8/20)Ti/Th us						Criteria	Results	Judgment
	Polarity	Phase	Voltage						
			0.5kV	1kV	2kV	-kV			
L - N	+	0°	A	A	-	-	B	A	PASS
	-		A	A	-	-			
	+	90°	A	A	-	-			
	-		A	A	-	-			
	+	180°	A	A	-	-			
	-		A	A	-	-			
	+	270°	A	A	-	-			
	-		A	A	-	-			
Note	There was no abnormal situation during the test compared with initial operation.								

EN 55035 :

Test Mode:	Mode 1	Temperature:	21°C
Test Voltage:	AC 230V/50Hz	Humidity:	51%RH
Tested By:	Rupert Huang	Test Date:	May 5, 2021

Wave Form EUT Ports Tested	1.2/50(8/20)Ti/Th us						Criteria	Results	Judgement	
	Polarity	Phase	Voltage							
			0.5kV	1kV	2kV	-				
L - N	+	90°	A	A	-	-	B	A	PASS	
	-	270°	A	A	-	-				
L - PE	+	90°	A	A	A	-	B	A		
	-		A	A	A	-				
	+	270°	A	A	A	-				
	-		A	A	A	-				
N - PE	+	90°	A	A	A	-	B	A		
	-		A	A	A	-				
	+	270°	A	A	A	-				
	-		A	A	A	-				
Note	There was no abnormal situation during the test compared with initial operation.									

Test Mode:	Mode 2	Temperature:	24°C
Test Voltage:	AC 230V/50Hz	Humidity:	61%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 12, 2021

Wave Form EUT Ports Tested	1.2/50(8/20)Ti/Th us						Criteria	Results	Judgement
	Polarity	Phase	Voltage						
			0.5kV	1kV	2kV	-			
L - N	+	90°	A	A	-	-	B	A	PASS
	-	270°	A	A	-	-			
Note	There was no abnormal situation during the test compared with initial operation.								

7.6. Immunity to Conducted Disturbances Induced by RF Fields

7.6.1. Test Specification

For Standard EN 55024 :

Standard:	EN 55024 (refer to IEC/EN 61000-4-6)
Frequency Range:	0.15-80MHz
Field Strength:	3V (unmodulated, r.m.s.)
Modulation:	80% AM (1 kHz)
Frequency Step:	1%
Dwell Time:	3s

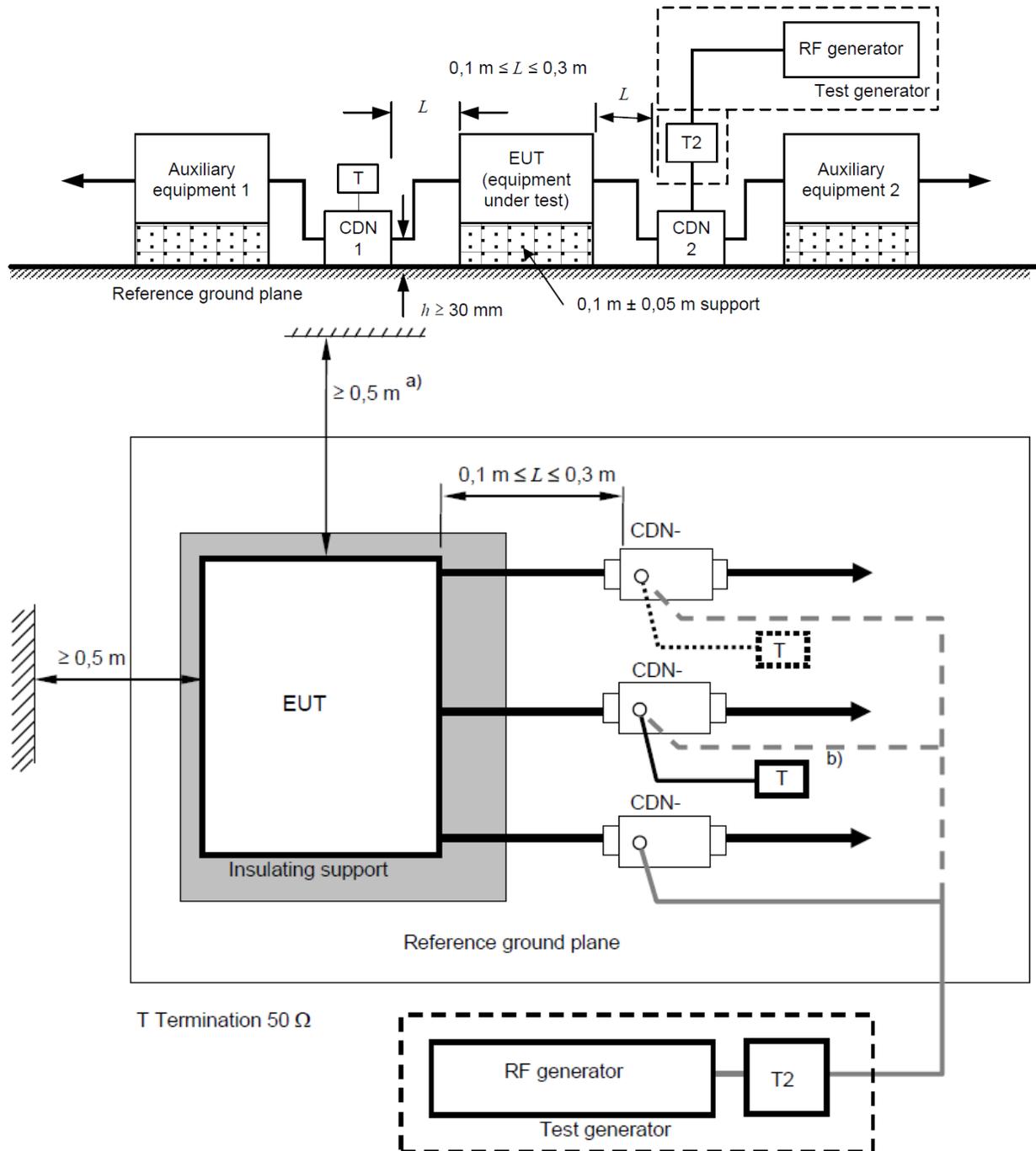
For Standard EN 55035 :

Standard:	EN 55035 (refer to IEC/EN 61000-4-6)
Frequency Range:	0.15-10; 10-30; 30-80MHz
Field Strength:	3V; 3 to 1V; 1V (unmodulated, r.m.s.)
Modulation:	80% AM (1 kHz)
Frequency Step:	1%
Dwell Time:	3s

7.6.2. Test Procedure

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- c. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.
- d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.
- e. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

7.6.3. Test Setup



- a) The EUT clearance from any metallic objects other than test equipment shall be at least 0,5 m.
- b) Only one of the CDNs not used for injection shall be terminated with 50 Ω, providing only a return path. All other CDNs shall be configured as decoupling networks.

For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.6.4. Test Result

EN 55024 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 9, 2021

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	CDN	Criteria	Results	Judgment
AC Power Port	0.15 --- 80	3V	M016(M2)	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

Customer Request:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	CDN	Criteria	Results	Judgment
AC Power Port	0.15 --- 80	10V	M016(M2)	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

EN 55035 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 9, 2021

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	CDN	Criteria	Results	Judgement
AC Power Port	0.15 --- 10	3V	M016(M2)	A	A	PASS
	10 --- 30	3 to 1V		A	A	PASS
	30 --- 80	1V		A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

Customer Request:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	CDN	Criteria	Results	Judgement
AC Power Port	0.15 --- 80	10V	M016(M2)	A	A	PASS
Note	There was no abnormal situation during the test compared with initial operation.					

7.7. Power frequency magnetic field immunity Test

7.7.1. Test Specification

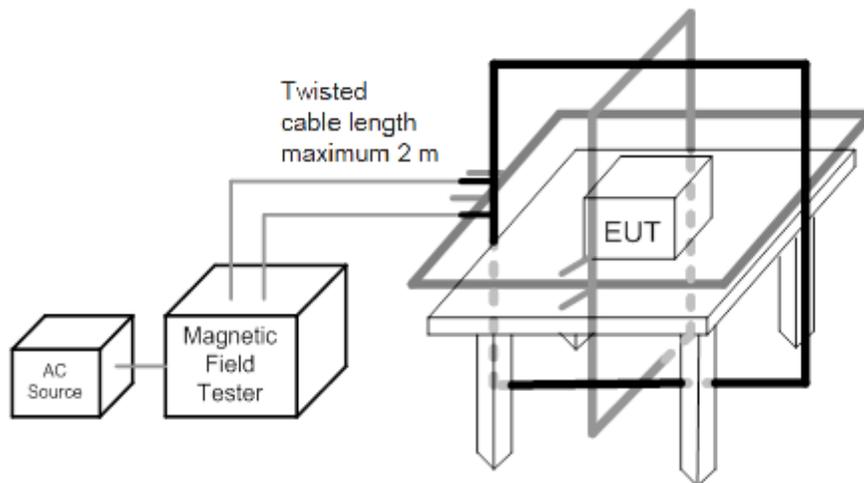
For Standard EN 55024 & EN 55035 :

Standard:	EN 55024/ EN 55035 (refer to IEC/EN 61000-4-8)
Frequency Range:	50 Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1m x 1m

7.7.2. Test Procedure

- a. 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.
- b. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- c. The cables supplied or recommended by the equipment manufacturer shall be used 1 meter of all cables used shall be exposed to the magnetic field.
- d. The EUT with coil shall be leave all magnetic material and wall 1m away in any axis during the test.
- e. The cable length from generator to coil shall be less than 2m
- f. The background noise shall be 20dB less than test field strength.
- g. Test shall be applied to three axis X, Y, Z and disturbance over 1 minute.
- h. All cables shall be exposed to the magnetic field for 1m of their length.

7.7.3. Test Setup



Note:

TABLE-TOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50% of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.7.4. Test Results

EN 55024 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 14, 2021

Level	Magnetic Field Strength (A/m)	Criteria	Results			Judgement
			X	Y	Z	
1	1	A	A	A	A	PASS
2	3	/	/	/	/	
3	10	/	/	/	/	
4	30	/	/	/	/	
5	100	/	/	/	/	
X	Special	/	/	/	/	
Note	There was no abnormal situation during the test compared with initial operation.					

Customer Request:

Level	Magnetic Field Strength (A/m)	Criteria	Results			Judgement
			X	Y	Z	
1	1	/	/	/	/	PASS
2	3	/	/	/	/	
3	10	A	A	A	A	
4	30	/	/	/	/	
5	100	/	/	/	/	
X	Special	/	/	/	/	
Note	There was no abnormal situation during the test compared with initial operation.					

EN 55035 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V/50Hz	Humidity:	65%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 14, 2021

Level	Magnetic Field Strength (A/m)	Criteria	Results			Judgement
			X	Y	Z	
1	1	A	A	A	A	PASS
2	3	/	/	/	/	
3	10	/	/	/	/	
4	30	/	/	/	/	
5	100	/	/	/	/	
X	Special	/	/	/	/	
Note	There was no abnormal situation during the test compared with initial operation.					

Customer Request:

Level	Magnetic Field Strength (A/m)	Criteria	Results			Judgement
			X	Y	Z	
1	1	/	/	/	/	PASS
2	3	/	/	/	/	
3	10	A	A	A	A	
4	30	/	/	/	/	
5	100	/	/	/	/	
X	Special	/	/	/	/	
Note	There was no abnormal situation during the test compared with initial operation.					

7.8. Voltage Dips and Short Interruptions Immunity Test

7.8.1. Test Specification

For Standard EN 55024 :

Standard:	EN 55024 (refer to IEC/EN 61000-4-11)
Voltage Dips:	>95% reduction ; 30% reduction
Voltage Interruptions:	>95%
Voltage Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°

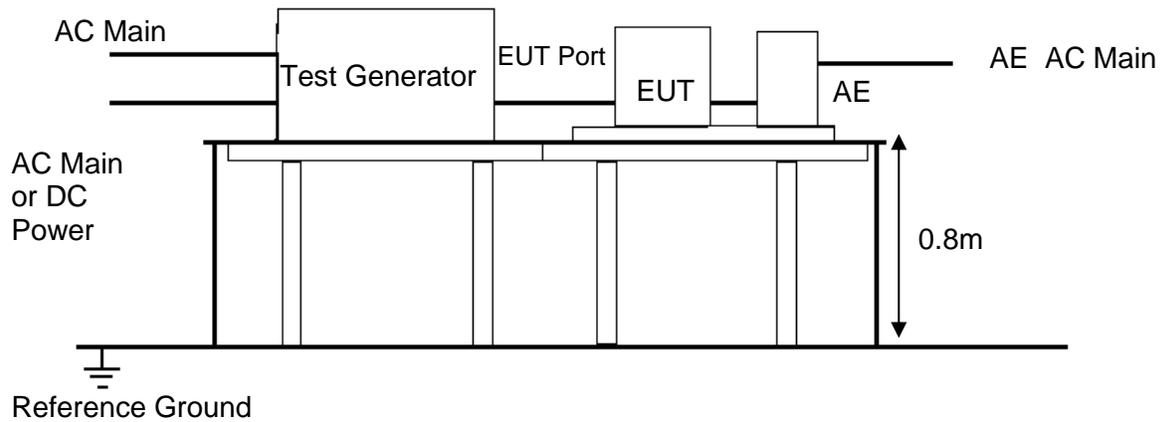
For Standard EN 55035 :

Standard:	EN 55035 (refer to IEC/EN 61000-4-11)
Voltage Dips:	<5% residual ; 70% residual
Voltage Interruptions:	<5%
Voltage Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°

7.8.2. Test Procedure

- a. The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.
- b. For voltage dips, changes in supply voltage shall occur at zero crossings of the voltage, and at additional angles considered critical by product committees or individual product specifications preferably selected from 45°, 90°, 135°, 180°, 225°, 270° and 315° on each phase.
- c. For short interruptions, the angle shall be defined by the product committee as the worst case. In the absence of definition, it is recommended to use 0° for one of the phases.

7.8.3. Test Setup



For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

7.8.4. Test Result

EN 55024 :

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 100V/50Hz, 240V/50Hz	Humidity:	65%RH
Tested By:	Eric T. Fan	Test Date:	Apr. 12, 2021

100V/50Hz					
Interruption & Dips	Duration (cycle)	Reduction voltage	Criteria	Results	Judgment
Voltage dips	0.5	>95%	B	A	PASS
	25	30%	C	A	
Voltage interruptions	250	>95%	C	B	
Note	Results A: The equipment continue to operate as intended without operator intervention. Results B: The output voltage was lost during the test, but it will automatically return to normal conditions after the test.				

240V/50Hz					
Interruption & Dips	Duration (cycle)	Reduction voltage	Criteria	Results	Judgment
Voltage dips	0.5	>95%	B	A	PASS
	25	30%	C	A	
Voltage interruptions	250	>95%	C	B	
Note	Results A: The equipment continue to operate as intended without operator intervention. Results B: The output voltage was lost during the test, but it will automatically return to normal conditions after the test.				

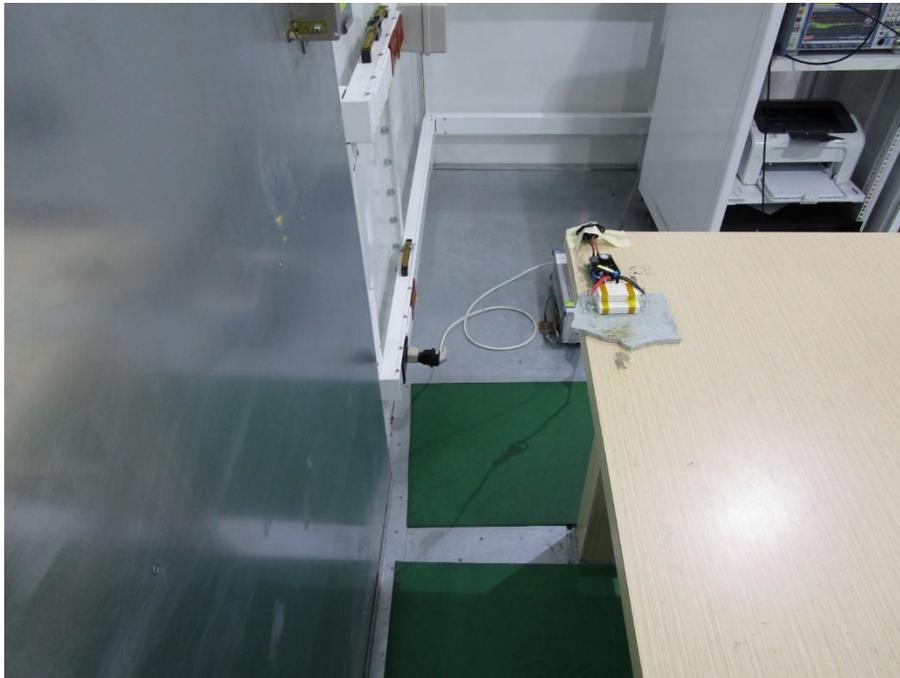
EN 55035 :

Test Mode:	Mode 2	Temperature:	22°C		
Test Voltage:	AC 100V/50Hz, 240V/50Hz	Humidity:	65%RH		
Tested By:	Eric T. Fan	Test Date:	Apr. 12, 2021		
100V/50Hz					
Interruption & Dips	Duration (cycle)	Residual voltage	Perform Criteria	Results	Judgment
Voltage dips	0.5	<5%	B	A	PASS
	25	70%	C	A	
Voltage interruptions	250	<5%	C	B	
Note	Results A: The equipment continue to operate as intended without operator intervention. Results B: The output voltage was lost during the test, but it will automatically return to normal conditions after the test.				

240V/50Hz					
Interruption & Dips	Duration (cycle)	Residual voltage	Perform Criteria	Results	Judgment
Voltage dips	0.5	<5%	B	A	PASS
	25	70%	C	A	
Voltage interruptions	250	<5%	C	B	
Note	Results A: The equipment continue to operate as intended without operator intervention. Results B: The output voltage was lost during the test, but it will automatically return to normal conditions after the test.				

Appendix I: Photographs of EMC Test Configuration

Conducted Disturbance



Radiated Disturbance
Below 1GHz

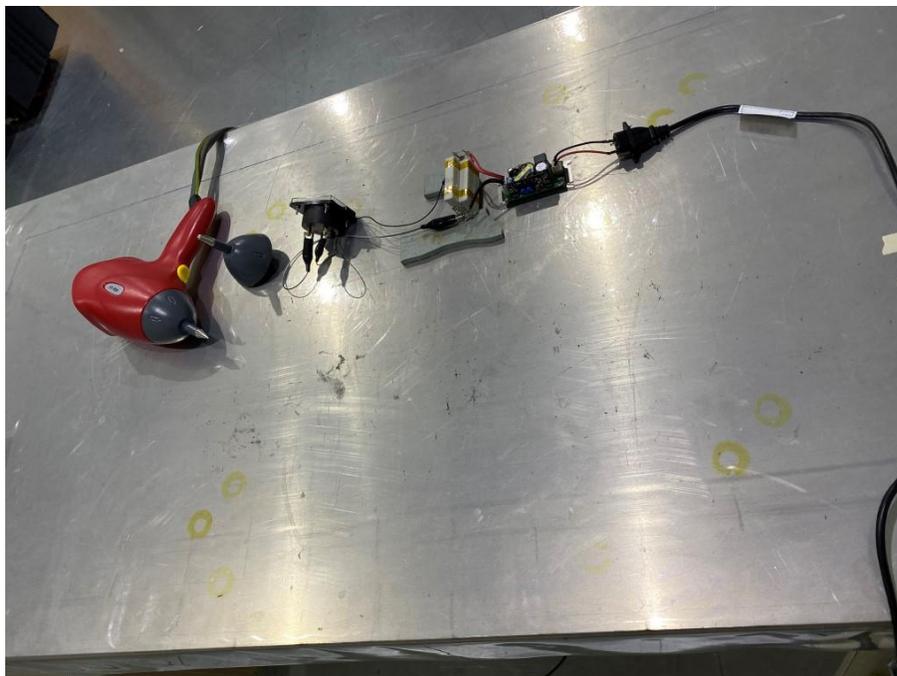
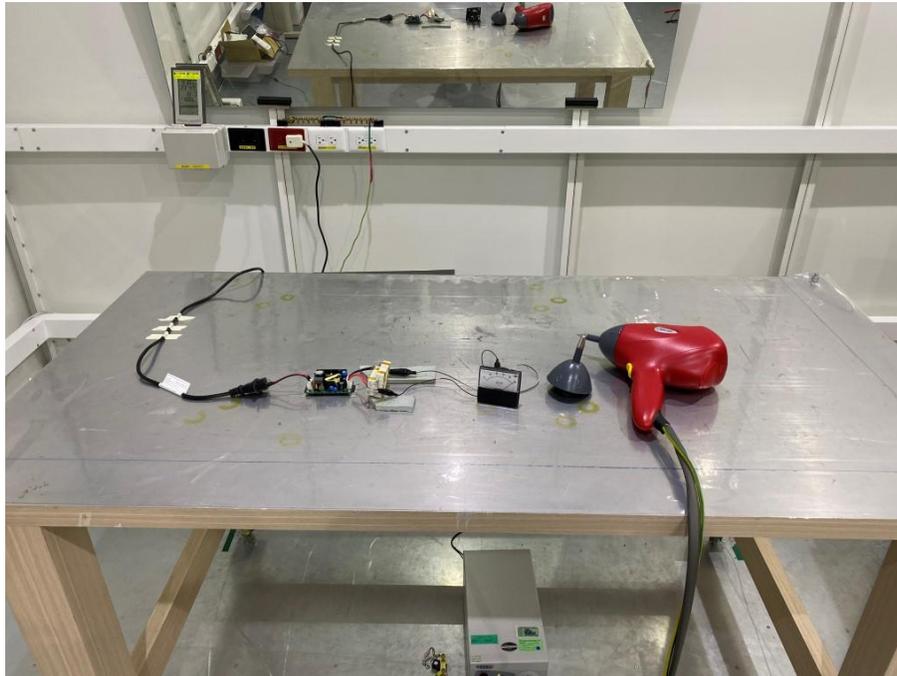


Harmonic and Flicker

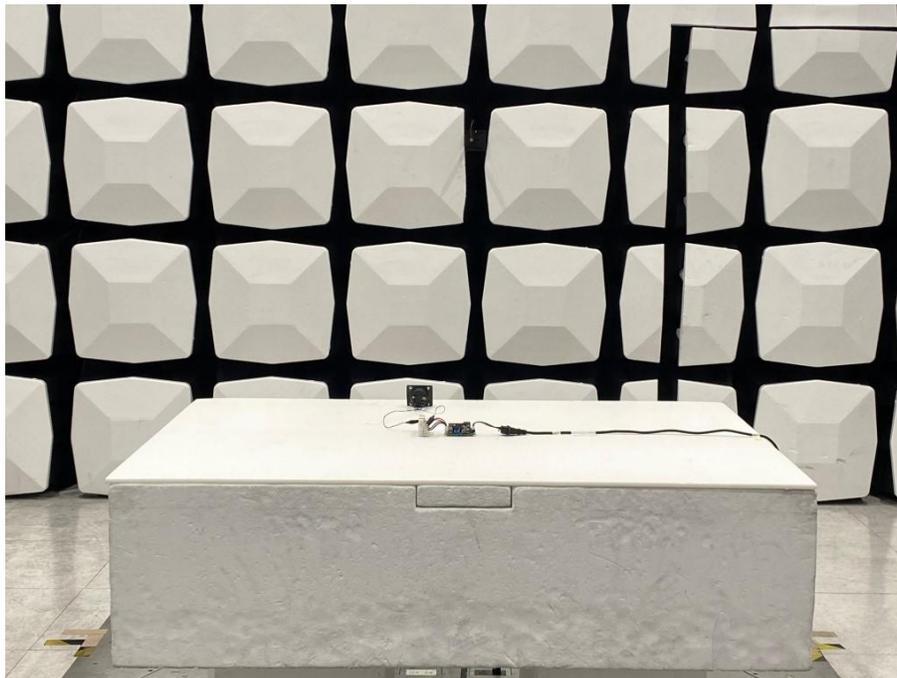


Electrostatic Discharge Immunity

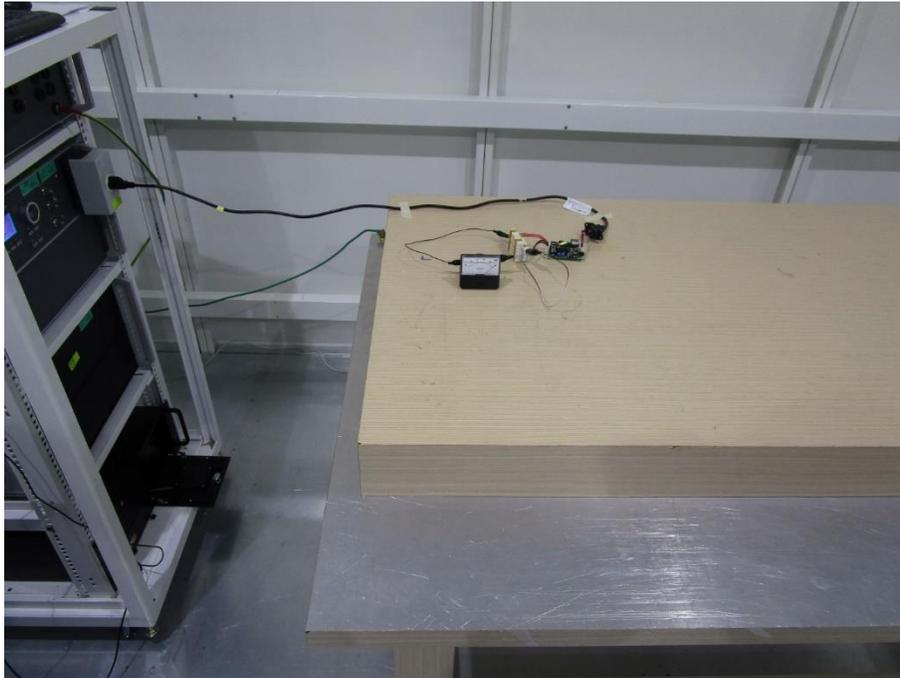
Mode 1~2



Radio Frequency Electromagnetic Field Immunity

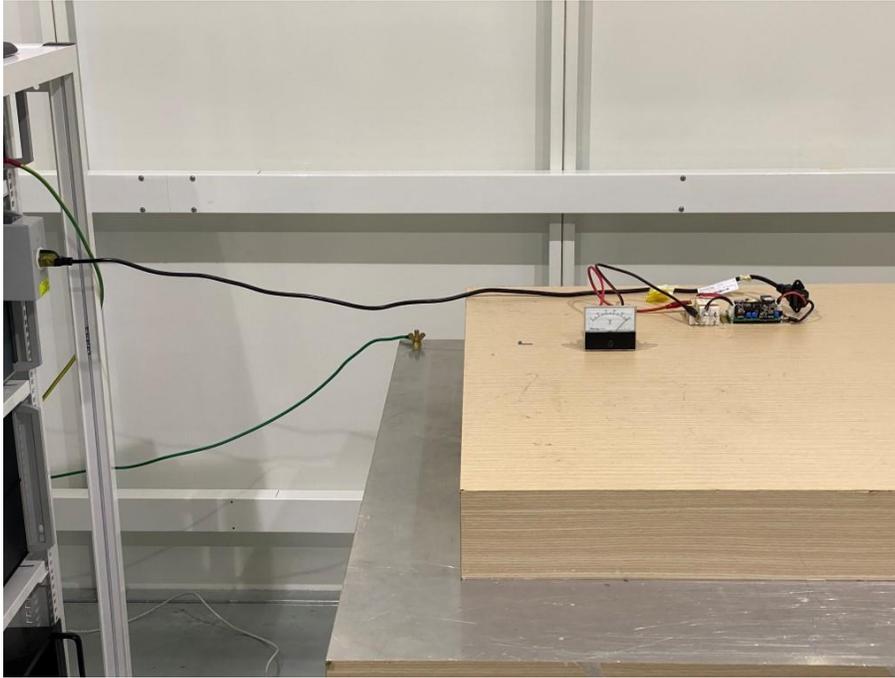


Electrical Fast Transient Immunity

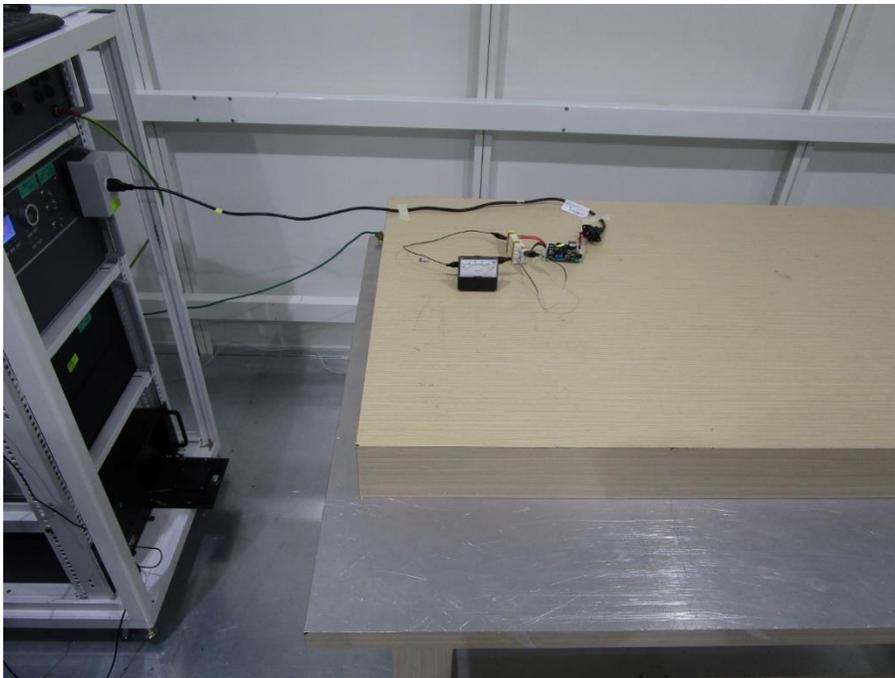


Surge Immunity

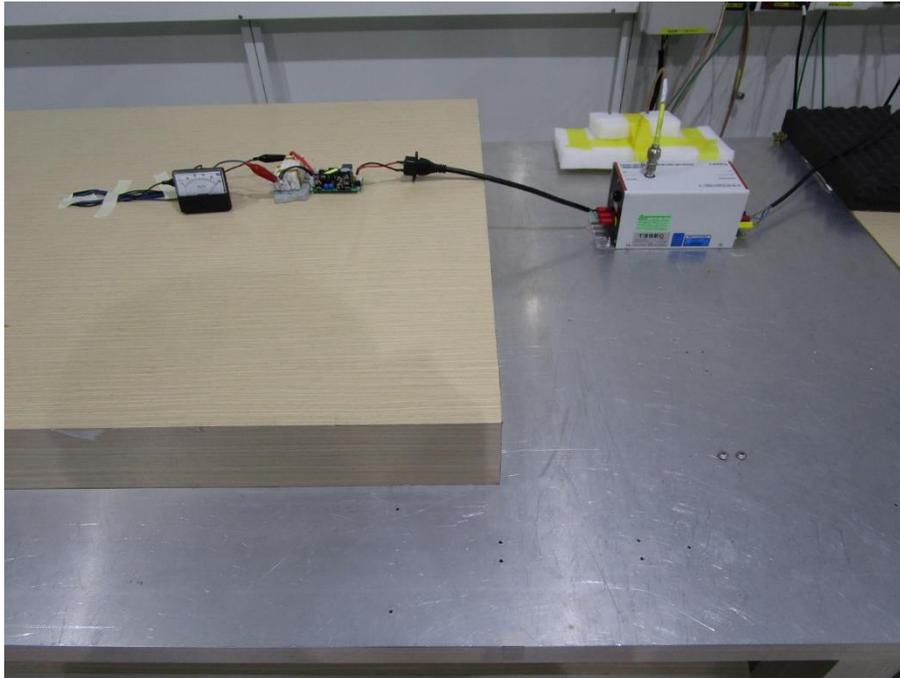
Mode 1



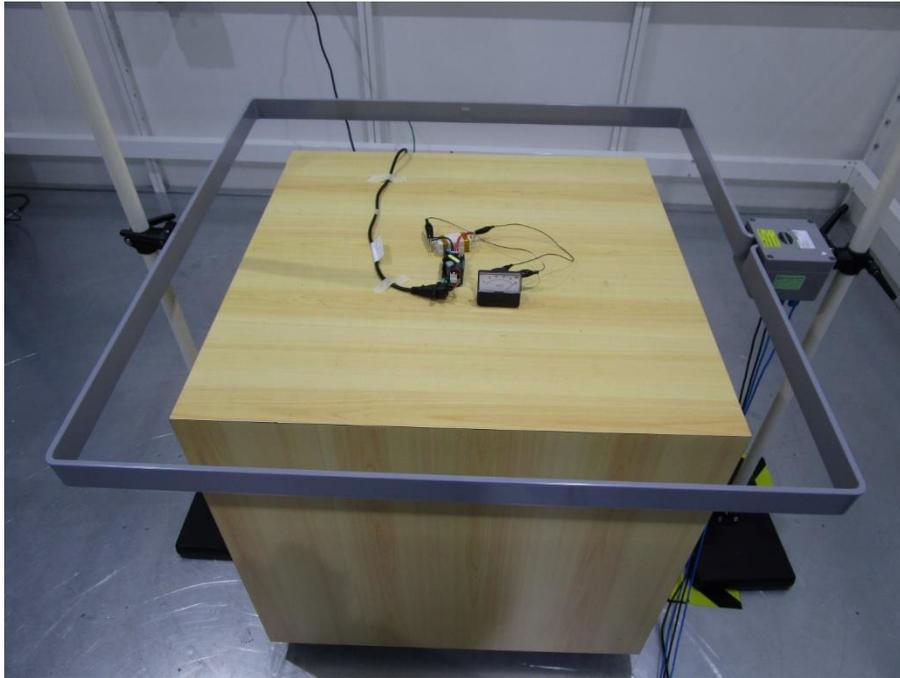
Mode 2



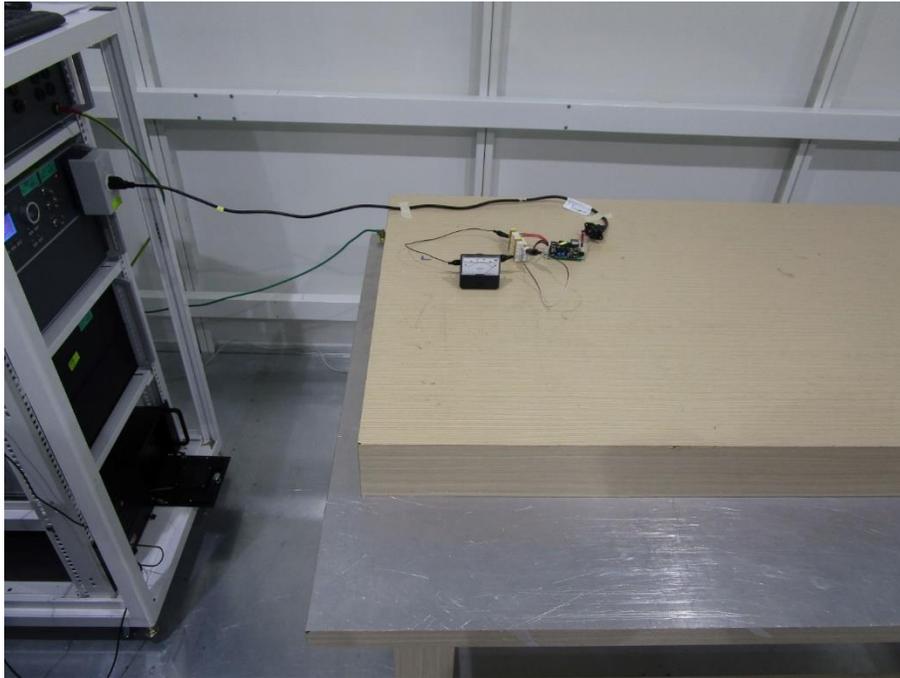
Immunity to conducted disturbances induced by RF fields



Power frequency magnetic field immunity



Voltage Dips and Short Interruptions Immunity



Appendix II: Photographs of the EUT

Please see the photographs of EUT in the test report no.: 4790076959-EP.

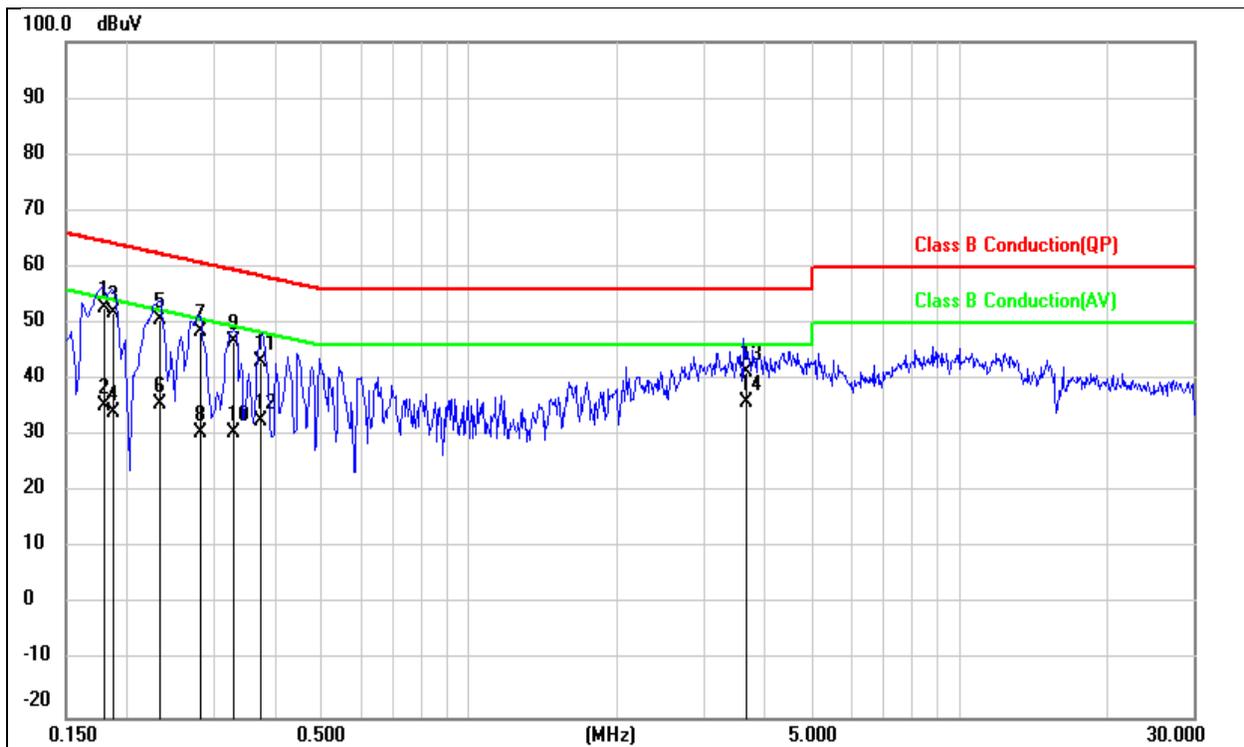
END OF REPORT

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Appendix III: Preliminary Test Raw Data

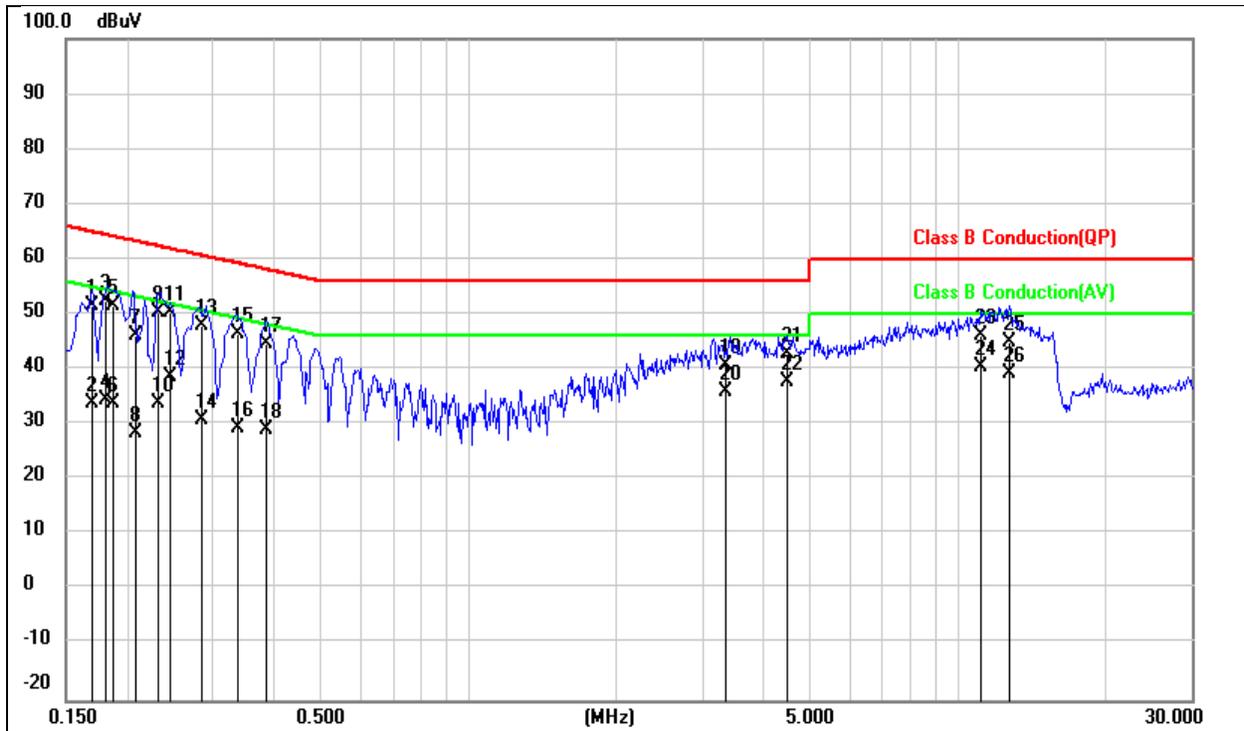
Conducted Emission

Project No.:	4790076959	Probe:	L1
Standard:	Class B Conduction(QP)	Power Source:	AC230V_50Hz
Test item:	Conduction Test	Date:	3/15/2021
Temp./Hum.(%RH):	23(C)/53%RH	Time:	7:38:21 PM
EUT:	AC to DC Power Supply	Test By:	Eric T Fan
Model:	TPI 50-148AB-J		
Mode:	mode 1		
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1796	33.22	19.53	52.75	64.50	-11.75	QP
2	0.1796	15.71	19.53	35.24	54.50	-19.26	AVG
3	0.1874	32.44	19.53	51.97	64.15	-12.18	QP
4	0.1874	14.56	19.53	34.09	54.15	-20.06	AVG
5	0.2329	31.22	19.53	50.75	62.35	-11.60	QP
6	0.2329	16.26	19.53	35.79	52.35	-16.56	AVG
7	0.2822	28.89	19.53	48.42	60.75	-12.33	QP
8	0.2822	10.93	19.53	30.46	50.75	-20.29	AVG
9	0.3318	27.10	19.51	46.61	59.41	-12.80	QP
10	0.3318	11.03	19.51	30.54	49.41	-18.87	AVG
11	0.3746	23.75	19.51	43.26	58.40	-15.14	QP
12	0.3746	13.25	19.51	32.76	48.40	-15.64	AVG
13	3.6606	21.66	19.58	41.24	56.00	-14.76	QP
14	3.6606	16.41	19.58	35.99	46.00	-10.01	AVG

Project No.:	4790076959	Probe:	N
Standard:	Class B Conduction(QP)	Power Source:	AC230V_50Hz
Test item:	Conduction Test	Date:	3/15/2021
Temp./Hum.(%RH):	23(C)/53%RH	Time:	7:42:49 PM
EUT:	AC to DC Power Supply	Test By:	Eric T Fan
Model:	TPI 50-148AB-J		
Mode:	mode 1		
Note:			

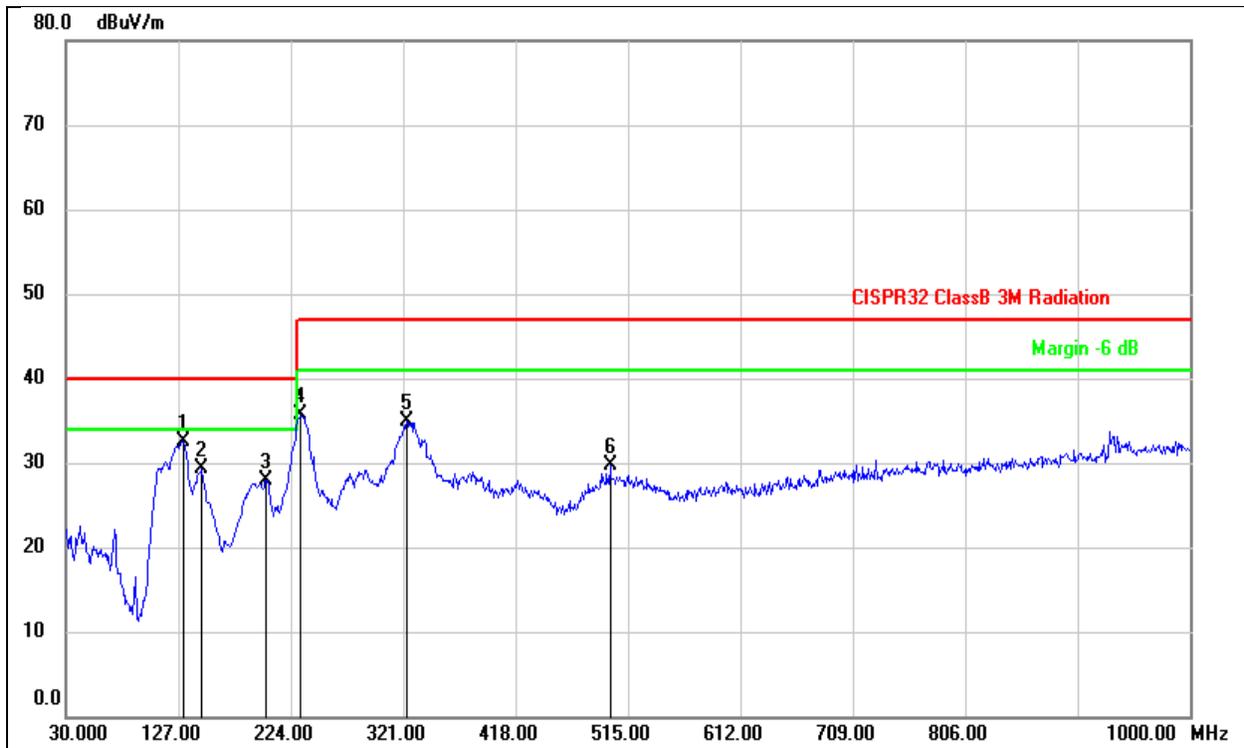


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1702	32.09	19.54	51.63	64.95	-13.32	QP
2	0.1702	14.28	19.54	33.82	54.95	-21.13	AVG
3	0.1805	32.96	19.53	52.49	64.46	-11.97	QP
4	0.1805	14.86	19.53	34.39	54.46	-20.07	AVG
5	0.1877	32.06	19.53	51.59	64.14	-12.55	QP
6	0.1877	14.42	19.53	33.95	54.14	-20.19	AVG
7	0.2096	26.58	19.53	46.11	63.22	-17.11	QP
8	0.2096	9.01	19.53	28.54	53.22	-24.68	AVG
9	0.2304	30.95	19.53	50.48	62.44	-11.96	QP
10	0.2304	14.31	19.53	33.84	52.44	-18.60	AVG
11	0.2450	30.84	19.53	50.37	61.92	-11.55	QP
12	0.2450	19.27	19.53	38.80	51.92	-13.12	AVG
13	0.2850	28.51	19.53	48.04	60.67	-12.63	QP
14	0.2850	11.26	19.53	30.79	50.67	-19.88	AVG
15	0.3373	26.89	19.51	46.40	59.27	-12.87	QP
16	0.3373	9.90	19.51	29.41	49.27	-19.86	AVG
17	0.3863	25.28	19.51	44.79	58.14	-13.35	QP
18	0.3863	9.59	19.51	29.10	48.14	-19.04	AVG
19	3.3618	21.19	19.56	40.75	56.00	-15.25	QP

20	3.3618	16.31	19.56	35.87	46.00	-10.13	AVG
21	4.5091	23.38	19.58	42.96	56.00	-13.04	QP
22	4.5091	18.07	19.58	37.65	46.00	-8.35	AVG
23	11.0753	26.40	19.70	46.10	60.00	-13.90	QP
24	11.0753	20.63	19.70	40.33	50.00	-9.67	AVG
25	12.7577	25.35	19.73	45.08	60.00	-14.92	QP
26	12.7577	19.55	19.73	39.28	50.00	-10.72	AVG

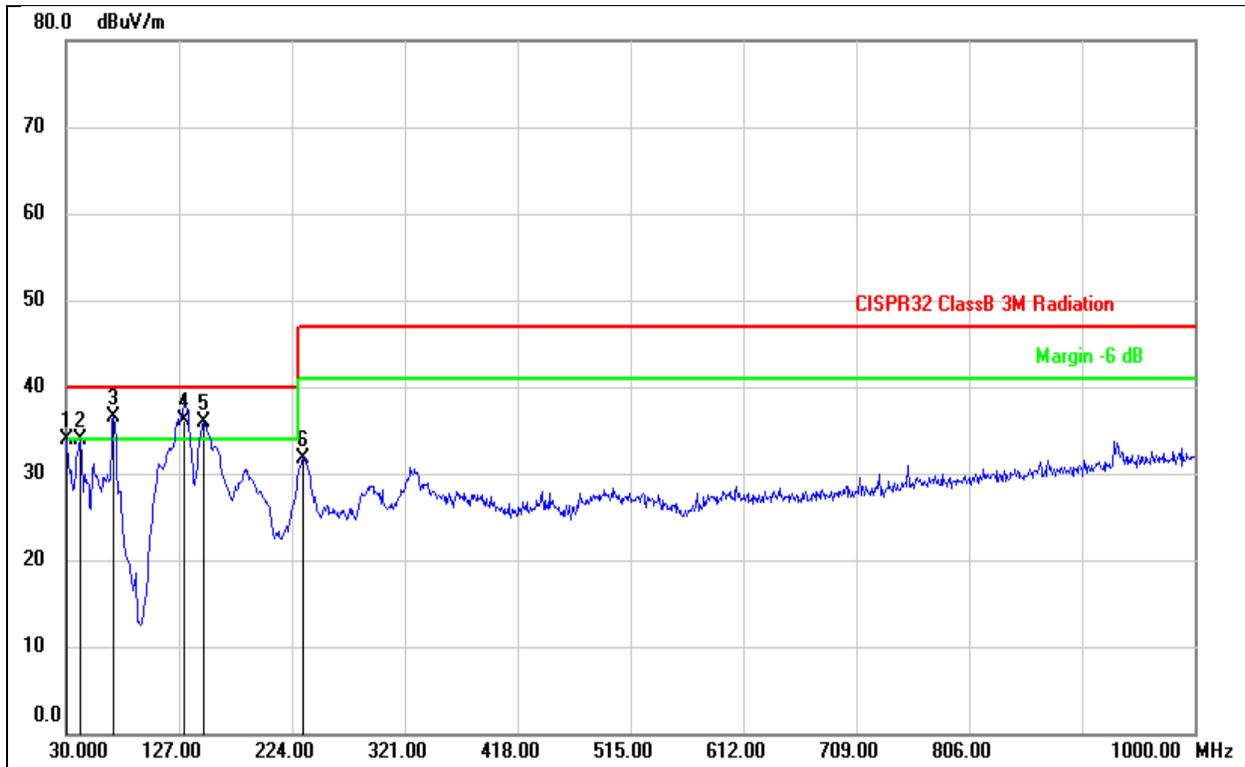
Radiated Emission

Project No.:	4790076959	Polarization:	Horizontal
Standard:	CISPR32 ClassB 3M Radiation	Power Source:	AC 230V_50Hz
Test item:	Radiation Test	Date:	3/19/2021
Temp./Hum.(%RH):	25(C)/59%RH	Time:	9:16:56 PM
EUT:	AC to DC Power Supply	Test By:	Rupert Huang
Model:	TPI 50-148AB-J	Distance:	3m
Mode:	mode 1		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	132.1410	45.66	-13.14	32.52	40.00	-7.48	peak
2	147.4347	41.38	-12.04	29.34	40.00	-10.66	peak
3	203.3390	43.06	-15.06	28.00	40.00	-12.00	peak
4	232.9240	49.93	-14.20	35.73	47.00	-11.27	peak
5	324.4273	45.08	-10.21	34.87	47.00	-12.13	peak
6	499.9973	35.08	-5.38	29.70	47.00	-17.30	peak

Project No.:	4790076959	Polarization:	Vertical
Standard:	CISPR32 ClassB 3M Radiation	Power Source:	AC 230V_50Hz
Test item:	Radiation Test	Date:	3/19/2021
Temp./Hum.(%RH):	25(C)/59%RH	Time:	9:18:47 PM
EUT:	AC to DC Power Supply	Test By:	Rupert Huang
Model:	TPI 50-148AB-J	Distance:	3m
Mode:	mode 1		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.2933	47.67	-13.67	34.00	40.00	-6.00	peak
2	42.3190	46.12	-12.19	33.93	40.00	-6.07	peak
3	71.0633	51.00	-14.51	36.49	40.00	-3.51	peak
4	132.6260	49.24	-13.14	36.10	40.00	-3.90	QP
5	148.3723	47.96	-12.10	35.86	40.00	-4.14	peak

Annex : Additional test request by client.

In this appendix test item and level, lab has not accredited by TAF, the test data just for client reference.

RS TEST RESULT FORM

Project No.: 4790076959

Applicant	TRACO ELECTRONIC AG	Product Name	AC to DC Power Supply
Model Name	TPI 50-148A-J	Standard	EN 55024

Test Mode:	Mode 2	Temperature:	21°C
Test Voltage:	AC 230V/ 50Hz	Humidity:	54%RH
Tested By:	Rupert Huang	Test Date:	Apr. 7, 2021

Customer request: H: Horizontal V: Vertical

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criterion	Results	Judgment
80-1000	Front	H / V	20	A	A	Pass
	Left	H / V	20	A	A	
	Right	H / V	20	A	A	
	Rear	H / V	20	A	A	
Note	There was no abnormal situation during the test compared with initial operation.					

RS TEST RESULT FORM

Project No.: 4790076959

Applicant	TRACO ELECTRONIC AG	Product Name	AC to DC Power Supply
Model Name	TPI 50-148A-J	Standard	EN 55035

Test Mode:	Mode 2	Temperature:	21°C
Test Voltage:	AC 230V/ 50Hz	Humidity:	54%RH
Tested By:	Rupert Huang	Test Date:	Apr. 7, 2021

Customer request: H: Horizontal V: Vertical

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criterion	Results	Judgment
80-1000	Front	H / V	20	A	A	Pass
	Left	H / V	20	A	A	
	Right	H / V	20	A	A	
	Rear	H / V	20	A	A	
1800(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
2600(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
3500(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
5000(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
Note	There was no abnormal situation during the test compared with initial operation.					

Immunity Level to common wireless communication

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m)	Criterion	Results	Judgment
800	Front / Left / Right / Rear	H / V	20	A	A	Pass
900	Front / Left / Right / Rear	H / V	20	A	A	Pass
1800(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
2600(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
3500(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
5000(±1%)	Front / Left / Right / Rear	H / V	20	A	A	Pass
Note	There was no abnormal situation during the test compared with initial operation.					

CS TEST RESULT FORM

Project No.: 4790076959

Applicant	TRACO ELECTRONIC AG	Product Name	AC to DC Power Supply
Model Name	TPI 50-148A-J	Standard	EN 55024

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V / 50Hz	Humidity:	65%RH
Tested By:	Eric T Fan	Test Date:	Apr. 9, 2021

Customer Request:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	CDN	Criteria	Results	Judgment
AC Power	0.15 --- 80	20V	M016(M2)	A	A	Pass
Note	There was no abnormal situation during the test compared with initial operation.					

CS TEST RESULT FORM

Project No.: 4790076959

Applicant	TRACO	Product Name	AC to DC Power Supply
Model Name	TPI 50-148A-J	Standard	EN 55035

Test Mode:	Mode 2	Temperature:	22°C
Test Voltage:	AC 230V / 50Hz	Humidity:	65%RH
Tested By:	Eric T Fan	Test Date:	Apr. 9, 2021

Customer Request:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	CDN	Criteria	Results	Judgment
AC Power	0.15 --- 80	20V	M016(M2)	A	A	Pass
Note	There was no abnormal situation during the test compared with initial operation.					