



EMC TEST REPORT

For

Shenzhen Depowersupply Electrical Co., Ltd

MPPT Solar Charger&BOOST Constant Current Driver

Test Model: M2420

Serial models: (Refer to page 8)

Prepared for : Shenzhen Depowersupply Electrical Co., Ltd

Address : Floors 1-4, Unit 101, Building A4, Songbai (Gongming) Industrial Park, No. 2 Bieshu Road, Shangcun Community, Gongming Subdistrict, Guangming District, Shenzhen City, 518106 Guangdong, P.R. China

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Date of receipt of test sample : March 16, 2026

Date of Test : March 16, 2026 ~ April 09, 2026

Date of Report : April 09, 2026

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EMC TEST REPORT

EN IEC 61000-6-1: 2019

EN IEC 61000-6-3: 2021

EN IEC 61000-3-2: 2019+ A1: 2021+ A2: 2024

EN 61000-3-3: 2013+ A1: 2019+ A2: 2021

Report Reference No.: STE03182604E

Date of Issue.....: April 09, 2026

Testing Laboratory Name.....: Shenzhen STE Testing Laboratory Co., Ltd

Testing Location/ Address.....: 3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, NiuHu Community, Guanlan Street, Longhua District, Shenzhen, China, China

Applicant's Name.....: Shenzhen Depowersupply Electrical Co., Ltd

Address.....: Floors 1-4, Unit 101, Building A4, Songbai (Gongming) Industrial Park, No. 2 Bieshu Road, Shangcun Community, Gongming Subdistrict, Guangming District, Shenzhen City, 518106 Guangdong, P.R. China

Manufacturer's Name.....: Shenzhen Depowersupply Electrical Co., Ltd

Address.....: Floors 1-4, Unit 101, Building A4, Songbai (Gongming) Industrial Park, No. 2 Bieshu Road, Shangcun Community, Gongming Subdistrict, Guangming District, Shenzhen City, 518106 Guangdong, P.R. China

Test Specification:

Standard.....: EN IEC 61000-6-1: 2019;
EN IEC 61000-6-3: 2021;
EN IEC 61000-3-2: 2019+ A1: 2021+ A2: 2024;
EN 61000-3-3: 2013+ A1: 2019+ A2: 2021

Test Report Form No.....: IEC61000_6_1B

TRF Originator.....: STE

Master TRF.....: Dated 2024-08

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Test Item Description.....: MPPT Solar Charger&BOOST Constant Current Driver

Trade Mark.....: N/A

Test Model.....: M2420

Serial Models.....: (Refer to page 8)

Ratings.....: Input: DC12/24V, 20A
Output: DC16-80V, 50-5600mA

Result: Pass

Compiled by:

Hunter Liang

Hunter Liang/ File administrators

Supervised by:

Todd Qian

Todd Qian/ Technique principal

Approved by:



Fly Li/ Manager

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1. SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION TESTS (EN IEC 61000-6-3)			
Description of Test Item	Standard	Limits	Results
Conducted disturbance	EN IEC 61000-6-3: 2021	Class A	PASS
Radiated disturbance	EN IEC 61000-6-3: 2021	Class A	PASS
Harmonic current emissions	EN IEC 61000-3-2: 2019+ A1: 2021+ A2: 2024	Class A	PASS
Voltage fluctuations & flicker	EN 61000-3-3: 2013+ A1: 2019+ A2: 2021	--	PASS

IMMUNITY TESTS (EN IEC 61000-6-1)			
Description of Test Item	Basic Standard	Performance Criteria	Results
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Radio-Frequency Electromagnetic Fields	EN IEC 61000-4-3: 2020	A	PASS
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Injected Currents (Radio-frequency common mode)	EN IEC 61000-4-6: 2023	A	N/A
Voltage dips, 0% reduction	EN IEC 61000-4-11: 2020	B	PASS
Voltage dips, 40% / 70% reduction		C	PASS
Voltage interruptions		C	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+ A1: 2017	B	PASS
Surge (Telecommunication ports)		B	N/A
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS

Note:

N/A is an abbreviation for Not Applicable.

1.2 Description of Performance Criteria

General Performance Criteria

A functional description and a definition of specific performance criteria, during or as a consequence of immunity testing of equipment under test (EUT), shall be provided by the manufacturer and noted in the test report.

1.2.1 Performance criterion A

The EUT shall continue to operate as intended during and after the test.

No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended.

If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

1.2.2 Performance criterion B

The EUT shall continue to operate as intended after the test.

No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended.

The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but no change of actual operating state or stored data is allowed.

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

1.2.3 Performance criterion C

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

2. GENERAL INFORMATION

2.1 Description of Device (EUT)

EUT : MPPT Solar Charger&BOOST Constant Current Driver

Trade mark : N/A

Test Model : M2420

Serial Model No. : M1260, M1260-CV, M1280, M1280-CV, M2410, M2410-CV, M2415, M2415-CV, M2420-CV, M12100

Model Difference : All models are same except the appearance and rated power.

The laboratory tests and evaluates the main model. Adding models based on the guarantee letter provided by the Applicant. STE takes no responsibility for any mistakes and the problems of product consistency caused by inaccurate and/or invalid information submitted by the Applicant.

Power Supply : Input: DC12/24V, 20A
Output: DC16-80V, 50-5600mA

Highest internal frequency (Fx)	Highest measured frequency
☒ Fx ≤ 108 MHz ☐ 108 MHz < Fx ≤ 500 MHz ☐ 500 MHz < Fx ≤ 1 GHz ☐ Fx > 1 GHz	☒ 1 GHz ☐ 2 GHz ☐ 5 GHz ☐ 5 × Fx up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, Fx is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	

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

2.2 Description of Test Modes

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Working

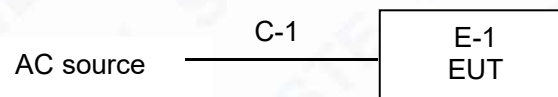
For Conducted Test	
Final Test Mode	Description
Mode 1	Normal Working

For Radiated Test	
Final Test Mode	Description
Mode 1	Normal Working

For EMS Test	
Final Test Mode	Description
Mode 1	Normal Working

2.3 Description of Test Setup

Mode 1:



2.4 Description Test Peripheral and EUT Peripheral

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.	Note
E-1	MPPT Solar Charger&BOOST Constant Current Driver	N/A	M2420	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	120cm	Supply cord

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.5 Statement of the 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 acc.

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 STE quality system according to 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.

2.6 Measurement Uncertainty

Test Item	Frequency Range	Expanded uncertainty (U _{lab})	Expanded uncertainty (U _{cispr})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Power disturbance	Level accuracy (30MHz to 300MHz)	± 2.90 dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 3.3 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB
Mains Harmonic	Voltage	$\pm 0.510\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 0.510\%$	N/A

- (1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.
- (2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

2.7 Environmental Conditions

The climatic conditions during the test are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. the climatic conditions during the test were in the following Limits:

Ambient temperature	10°C - 40°C
Relative Humidity air	10% - 90%

Climate values will be recorded and recorded separately if specifically required in the base standard or application product/product series standard.

2.8 Possible Test Case Verdicts

Test cases does not apply to test object	N or N/A (Not Applicable)
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1 Conducted Disturbance

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	2027-01-07
2	EMI Test Receiver	R&S	ESPI	101840	2027-01-07
3	Artificial Mains	R&S	ENV216	101288	2027-01-07
4	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	/
5	ISN	TESEQ	T800	45130	2027-01-07

3.2 Radiated Disturbance (Electric Field)

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	3m Semi Anechoic Chamber	Maorui	/	/	2027-01-07
2	EMI Test Receiver	ROHDE & SCHWARZ	ESR 3	102312	2027-01-07
3	Log per Antenna	ROHDE & SCHWARZ	VULP9118	873	2027-01-07
4	EMI Test Software	Farad	EMC	N/A	/
5	Positioning Controller	MF	MF-7082	/	2027-01-07

3.3 Harmonic Current, Voltage fluctuation and Flicker

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Power Analyzer Test System	Laplace	AC2000A	20000670053	2027-01-07

3.4 Power Frequency Magnetic Field Test

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Simulator	FRANKONIA	CIT-10	A126A1195	2027-01-07
2	CDN	FRANKONIA	CDN-M2	5100100100	2027-01-07
3	CDN	FRANKONIA	CDN-M3	0900-11	2027-01-07
4	Attenuator	FRANKONIA	ATT6	0010222A	2027-01-07
5	Infuse tongs	EMTEST	EM-Clamp	0513A031201	2027-01-07

3.5 Radio-Frequency Electromagnetic Fields

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	RS Test Software	Tonscend	/	/	2027-01-07
2	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2027-01-07
3	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2027-01-07

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	2027-01-07
5	RF POWER AMPLIFIER	OPHIR	5273F	1019	2027-01-07
6	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2027-01-07
7	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	2027-01-07
8	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2027-01-07

3.6 Electrostatic Discharge

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	ESD Simulator	TESEQ	NSG 437	1615	2027-01-07

3.7 Injected Currents (Radio-frequency common mode)

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Conducted Susceptibility Generator	HTEC	CDG6000	126A140012016	2027-01-07
2	CDN	HTEC	CDN-M2+M3	A22/0382/2016	2027-01-07
3	Attenuator	HTEC	ATT6	HA1601	2027-01-07
4	Electromagnetic Injection Clamp	LUTHI	EM101	35535	2027-01-07

3.8 Voltage Dips and Short Interruptions

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Voltage Dips and up Generator	HTEC	HPFS161P	162202	2027-01-07

3.9 Surges

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Surge test system	3CTEST	SG5006G	EC5581070	2027-01-07
2	Coupling/decoupling network	3CTEST	SGN-5010G	EC5591033	2027-01-07

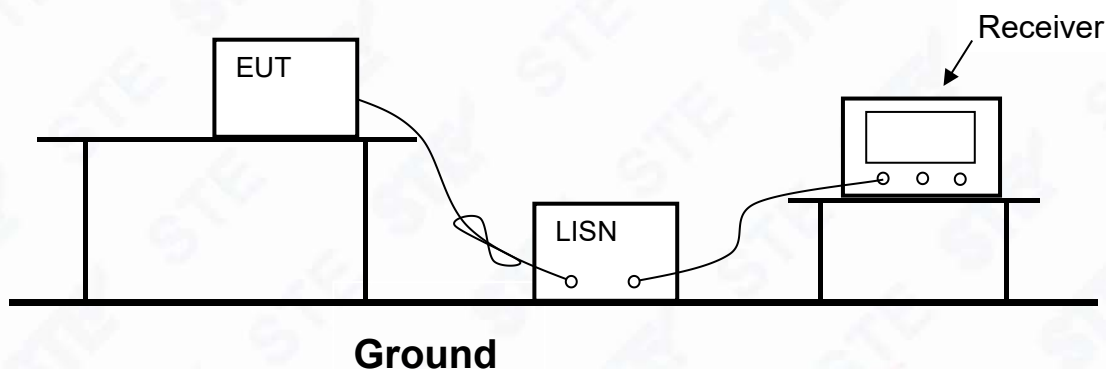
3.10 Electrical Fast Transient/ Burst

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Electrical fast transient (EFT) generator	HTEC	HEFT51	162201	2027-01-07
2	Coupling Clamp	HTEC	H3C	163701	2027-01-07

4. EMISSION TESTS

4.1 Conducted Emission Measurement

4.1.1 Block Diagram of Test Setup



4.1.2 Measuring Standard

EN IEC 61000-6-3: 2021

4.1.3 Conducted Emissions Limits

1, Power Line Conducted Emission (Frequency Range 150KHz - 30MHz)

FREQUENCY (MHz)	☐ Class A		☒ Class B	
	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.

2, Telecommunication Port Conducted Emission (Voltage Limits)
(Frequency Range 150KHz - 30MHz)

FREQUENCY (MHz)	☐ Class A (at 3m) dBuV/m		☐ Class B (at 3m) dBuV/m	
	Peak	Avg	Peak	Avg
0.15 -0.5	97 - 87 *	84 - 74 *	84 - 74 *	74 - 64 *
0.5 -30.0	87.00	74.00	74.00	64.00

4.1.4 EUT Configuration on Test

The following equipments are installed on Conducted Emission Measurement to see

EN 61000-6-3 requirements and operating in a manner which tends to maximize its emission characteristics in normal application.

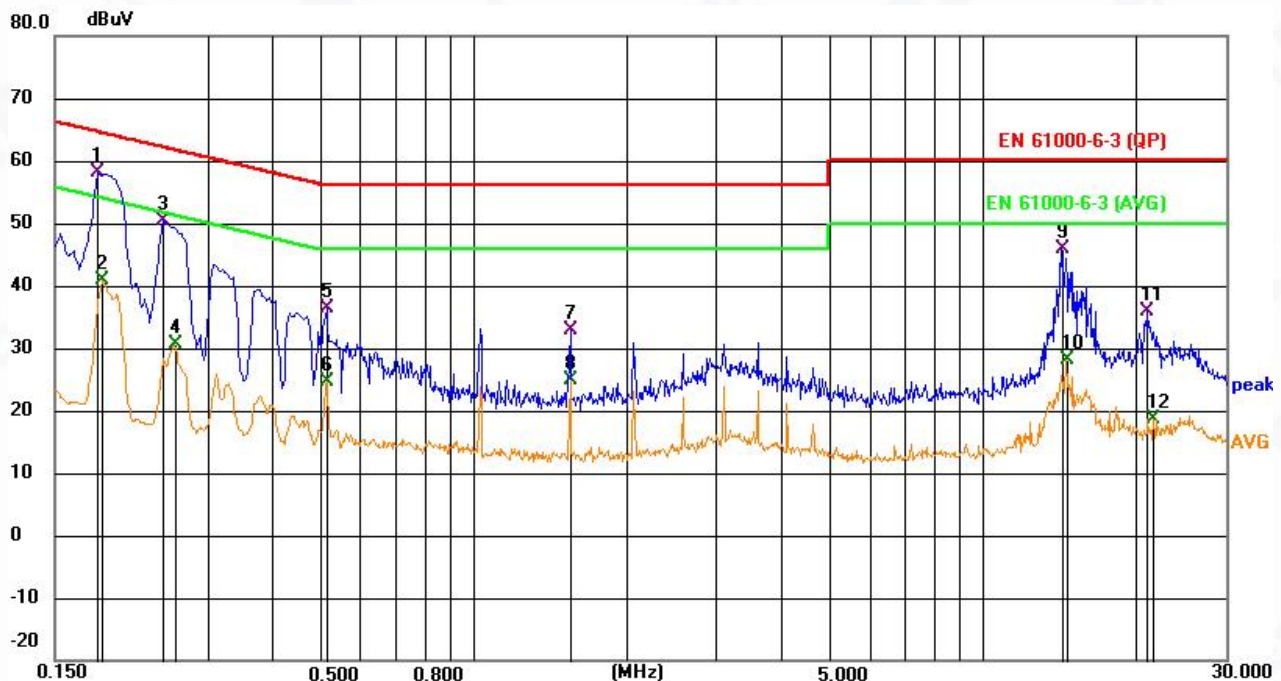
4.1.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 4.1.
2. Turn on the power of all equipments.
3. Let the EUT work in measuring mode (work) and measure it.



4.1.6 Test Result

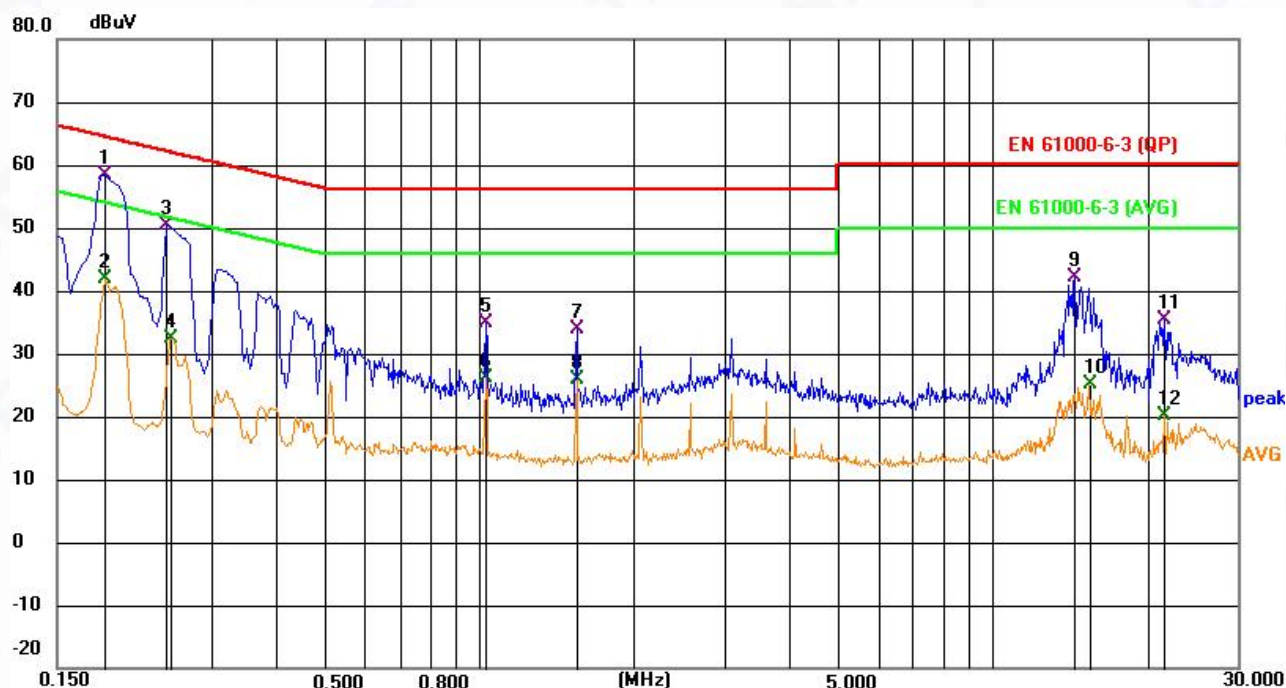
Model No.	M2420	Test Mode	Mode 1
Environmental Conditions	24.2°C, 56.1% RH	Test Engineer	Feng Zhang
Pol	Line	Test Voltage:	24V



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1816	38.39	19.63	58.02	64.41	-6.39	QP	
2		0.1861	21.30	19.63	40.93	54.21	-13.28	AVG	
3		0.2446	30.64	19.63	50.27	61.94	-11.67	QP	
4		0.2581	11.05	19.63	30.68	51.49	-20.81	AVG	
5		0.5146	16.62	19.65	36.27	56.00	-19.73	QP	
6		0.5146	4.94	19.65	24.59	46.00	-21.41	AVG	
7		1.5450	13.21	19.67	32.88	56.00	-23.12	QP	
8		1.5450	5.12	19.67	24.79	46.00	-21.21	AVG	
9		14.2801	26.14	19.86	46.00	60.00	-14.00	QP	
10		14.5231	8.17	19.86	28.03	50.00	-21.97	AVG	
11		21.0481	15.69	20.15	35.84	60.00	-24.16	QP	
12		21.6600	-1.47	20.12	18.65	50.00	-31.35	AVG	

* : Maximum data x : Over limit ! : over margin

Model No.	M2420	Test Mode	Mode 1
Environmental Conditions	24.2°C, 56.1% RH	Test Engineer	Feng Zhang
Pol	Neutral	Test Voltage:	24V



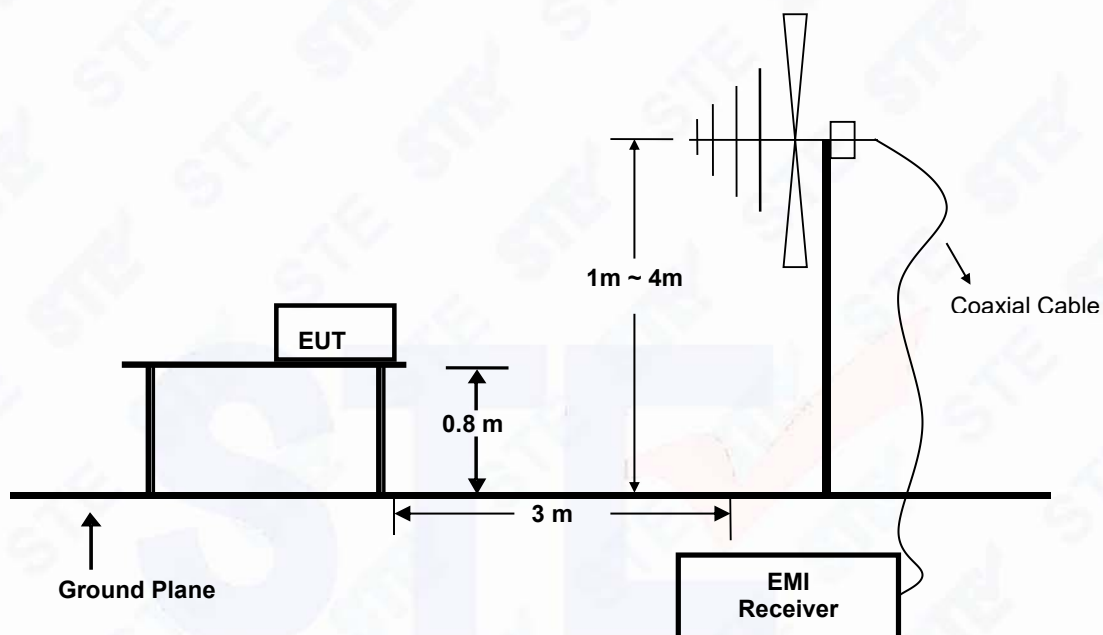
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1861	38.86	19.63	58.49	64.21	-5.72	QP	
2		0.1861	22.15	19.63	41.78	54.21	-12.43	AVG	
3		0.2446	30.86	19.63	50.49	61.94	-11.45	QP	
4		0.2491	12.82	19.63	32.45	51.79	-19.34	AVG	
5		1.0275	15.31	19.65	34.96	56.00	-21.04	QP	
6		1.0275	6.42	19.65	26.07	46.00	-19.93	AVG	
7		1.5450	14.21	19.67	33.88	56.00	-22.12	QP	
8		1.5450	6.21	19.67	25.88	46.00	-20.12	AVG	
9		14.5006	22.34	19.86	42.20	60.00	-17.80	QP	
10		15.4276	5.34	19.89	25.23	50.00	-24.77	AVG	
11		21.6600	15.21	20.12	35.33	60.00	-24.67	QP	
12		21.6600	0.09	20.12	20.21	50.00	-29.79	AVG	

* : Maximum data x : Over limit ! : over margin

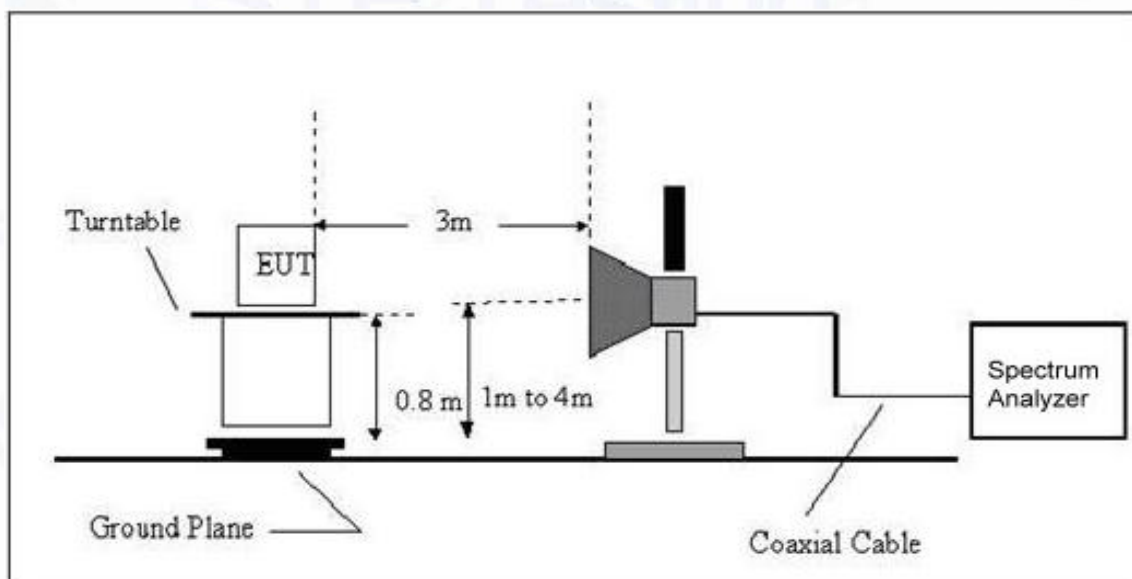
4.2 Radiated emission measurement

4.2.1 Block Diagram of Test Setup

1, Below 1 GHz



2, Above 1 GHz



4.2.2 Measuring Standard

EN IEC 61000-6-3: 2021

4.2.3 Radiated Emission Limits

All emanations from a class device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

1, Limits of Radiated Emission Measurement (Below 1000MHz)

FREQUENCY (MHz)	☐ Class A		☒ Class B	
	At 10m	At 3m	At 10m	At 3m
	dBuV/m	dBuV/m	dBuV/m	dBuV/m
30 – 230	40	50	30	40
230 – 1000	47	57	37	47

2, 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

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.2.4 EUT Configuration on Test

The EN IEC 61000-6-3 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.2.5 Operating Condition of EUT

1. Turn on the power.
2. Let the EUT work in test mode and measure it.

4.2.6 Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver is set at 120 kHz.

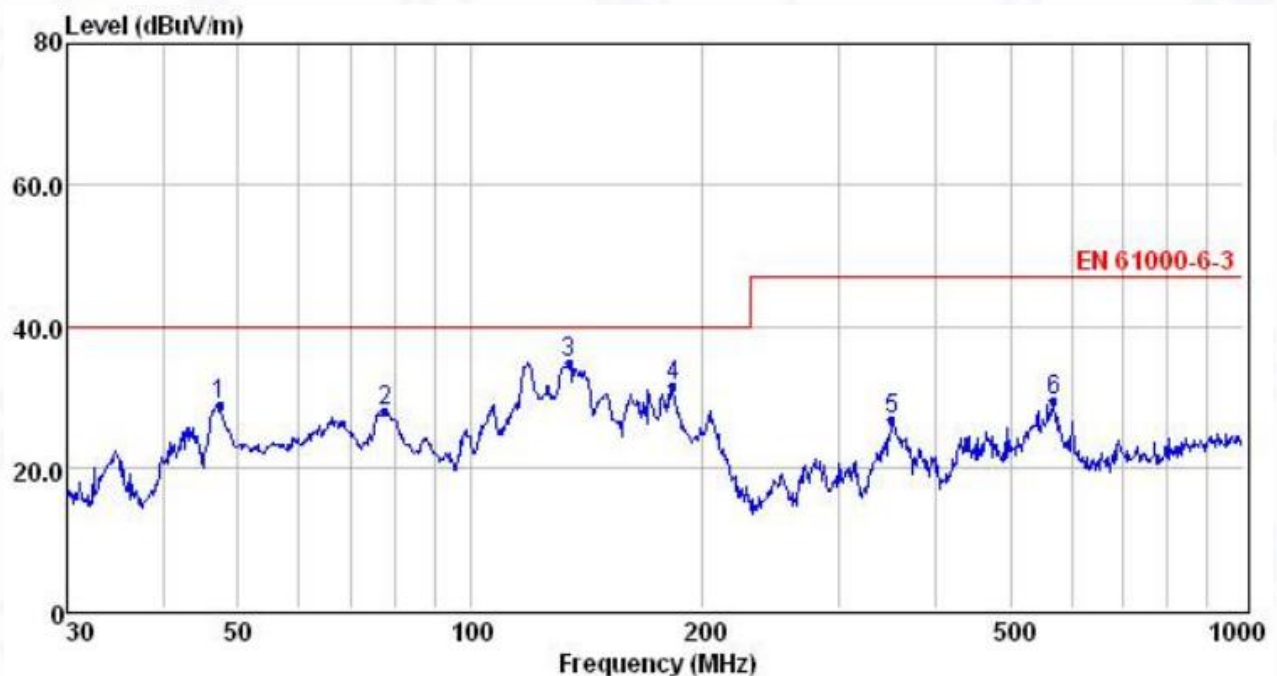
All the scanning waveform is in next page.

4.2.7 Test Results

PASS.

4.2.8 TEST RESULTS (Below 1000MHz)

Model No. (M/N): M2420	Environmental Conditions: 23.6°C, 57.5% RH
Test Mode: Mode 1	Test Voltage: 24V
Polarization: Vertical	Test Engineer: Feng Liang



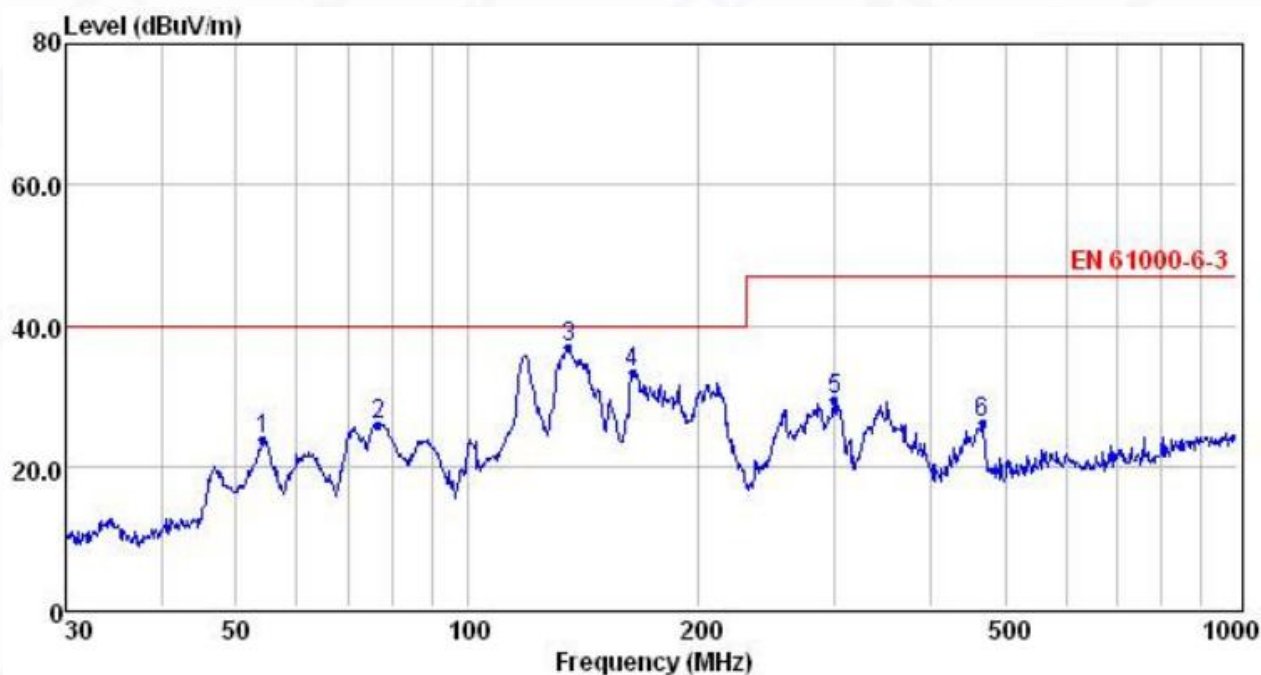
	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	47.33	16.39	0.58	11.97	28.94	40.00	-11.06	QP
2	77.59	17.40	0.73	9.89	28.02	40.00	-11.98	QP
3	134.09	24.90	0.97	9.02	34.89	40.00	-5.11	QP
4	183.20	20.43	1.15	9.96	31.54	40.00	-8.46	QP
5	351.71	10.49	1.36	14.87	26.72	47.00	-20.28	QP
6	568.61	9.76	1.50	18.31	29.57	47.00	-17.43	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

Model No. (M/N):	M2420	Environmental Conditions:	23.6°C, 57.5% RH
Test Mode:	Mode 1	Test Voltage:	24V
Polarization:	Horizontal	Test Engineer:	Feng Liang



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	54.26	10.74	0.62	12.56	23.92	40.00	-16.08	QP
2	76.51	15.35	0.72	9.93	26.00	40.00	-14.00	QP
3	135.51	26.86	0.98	8.90	36.74	40.00	-3.26	QP
4	163.76	22.70	1.08	9.39	33.17	40.00	-6.83	QP
5	300.37	14.30	1.32	13.70	29.32	47.00	-17.68	QP
6	467.24	8.49	1.47	16.09	26.05	47.00	-20.95	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

4.2.9 TEST RESULTS (1000~6000MHz)

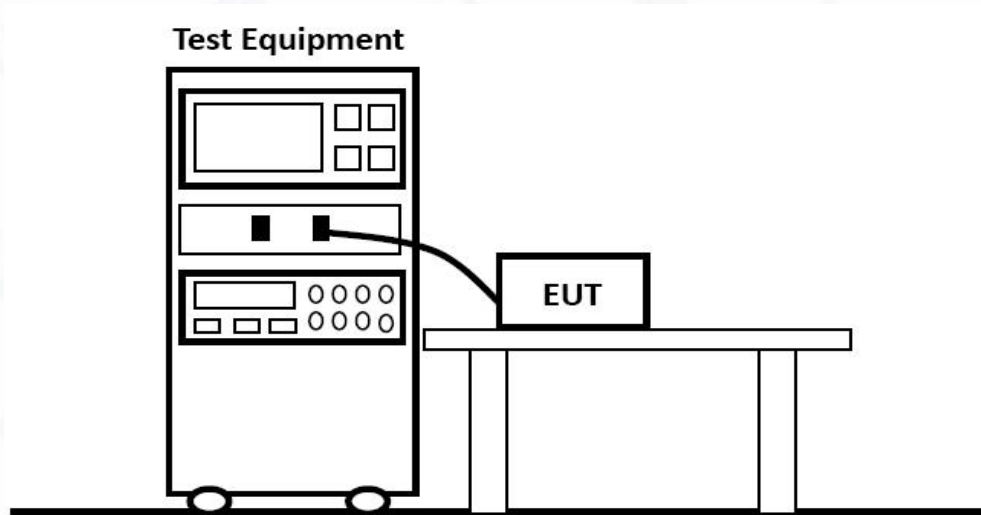
Model No. (M/N):	M2420	Environmental Conditions:	23.6℃, 57.5% RH
Test Mode:	/	Test Voltage:	/
Polarization:	/	Test Engineer:	/

Remark:

The frequency of the product is lower than 108MHz, it does not apply

4.3 Harmonic Current Emission Measurement

4.3.1 Block Diagram of Test Setup



4.3.2 Measuring Standard

EN IEC 61000-3-2: 2019+ A1: 2021+ A2: 2024 (Class A)

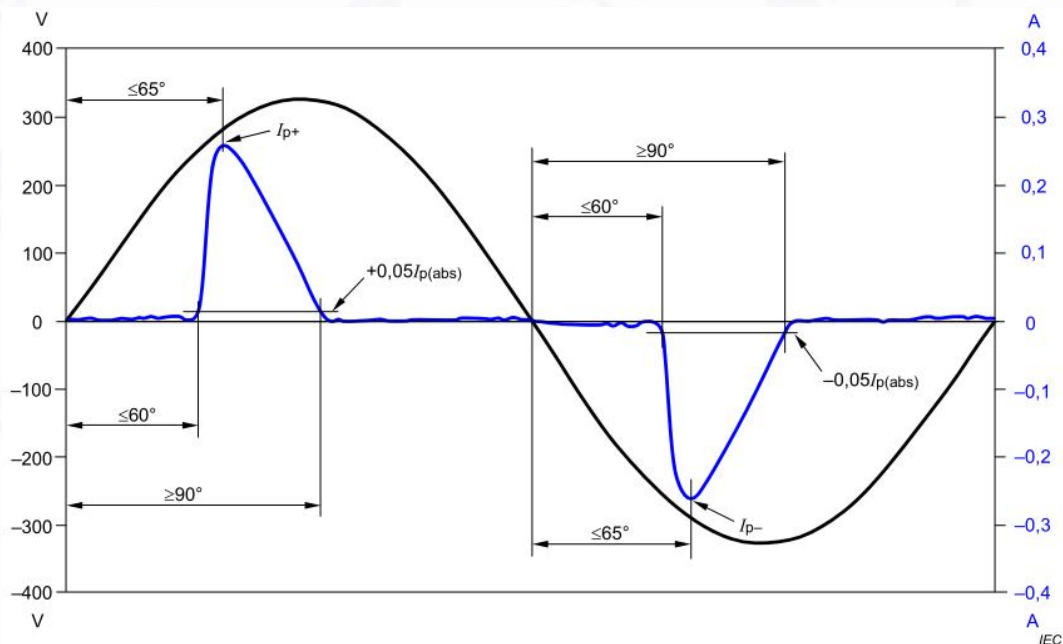
4.3.3 Limits

Harmonic order h	Maximum permissible harmonic current A
Odd harmonics	
3	2.3
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq h \leq 39$	$0.15 \frac{15}{h}$
Even harmonics	
2	1.08
4	0.43
5	0.30
$8 \leq h \leq 40$	$0.23 \frac{8}{h}$

– the third harmonic current, expressed as a percentage of the fundamental current, shall not exceed 86 % and the fifth harmonic current shall not exceed 61 %.

In addition, the waveform of the input current shall be such that it reaches the 5 % current threshold before or at 60°, has its peak value before or at 65° and does not fall below the 5 % current threshold before 90°, referenced to any zero crossing of the fundamental supply voltage.

The current threshold is 5 % of the highest absolute peak value that occurs in the measurement window, and the phase angle measurements are made on the cycle that includes this absolute peak value.



NOTE $I_{p(abs)}$ is the higher absolute value of I_{p+} and I_{p-} .

Figure 2 – Illustration of the relative phase angle and current parameters described in 7.4.3

– the THD shall not exceed 70 %.

The third order harmonic current, expressed as a percentage of the fundamental current, shall not exceed 35 %, the fifth order current shall not exceed 25 %, the seventh order current shall not exceed 30 %, the ninth and eleventh order currents shall not exceed 20 % and the second order current shall not exceed 5 %.

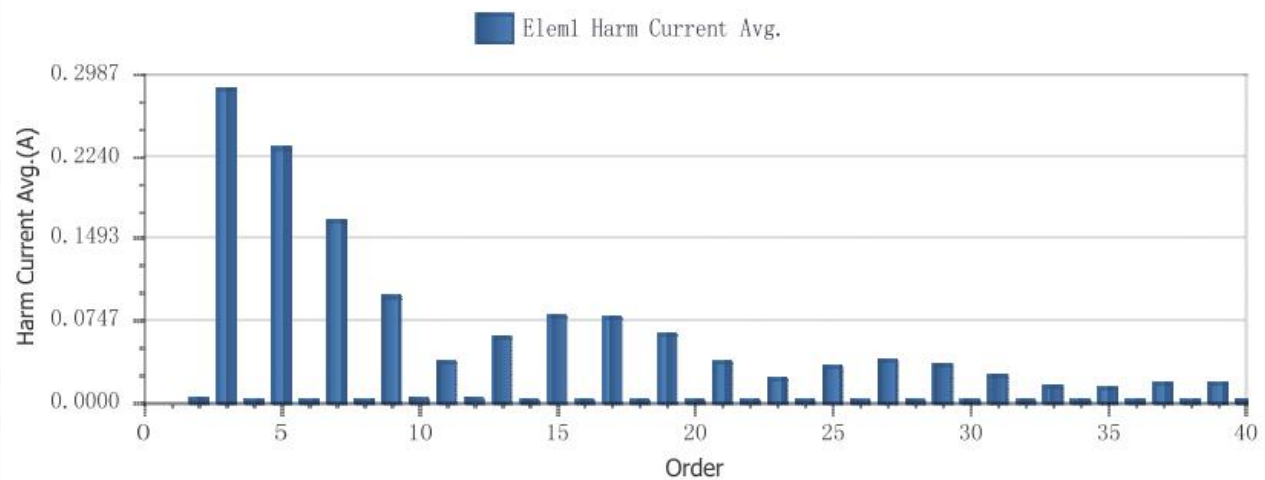
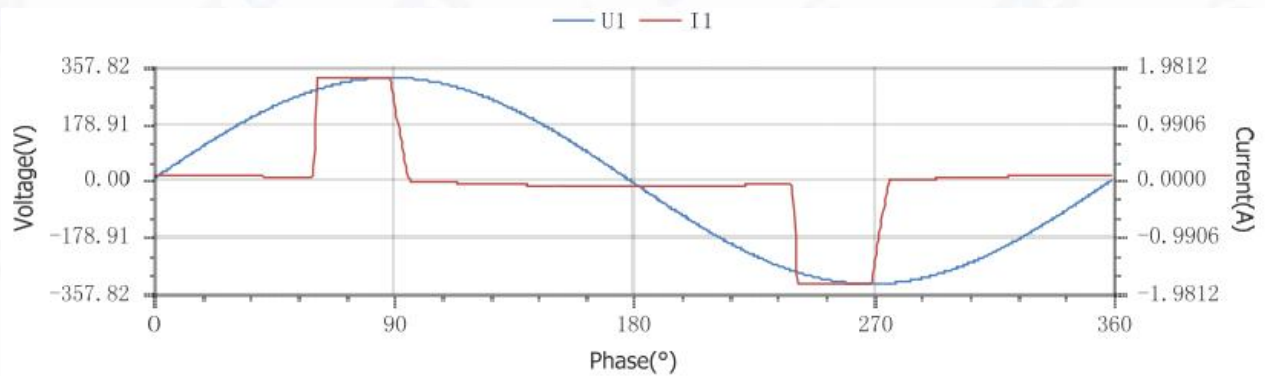
4.3.4 Operating Condition of EUT

1. Setup the EUT as shown on Section 4.4.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

4.3.5 Test Results

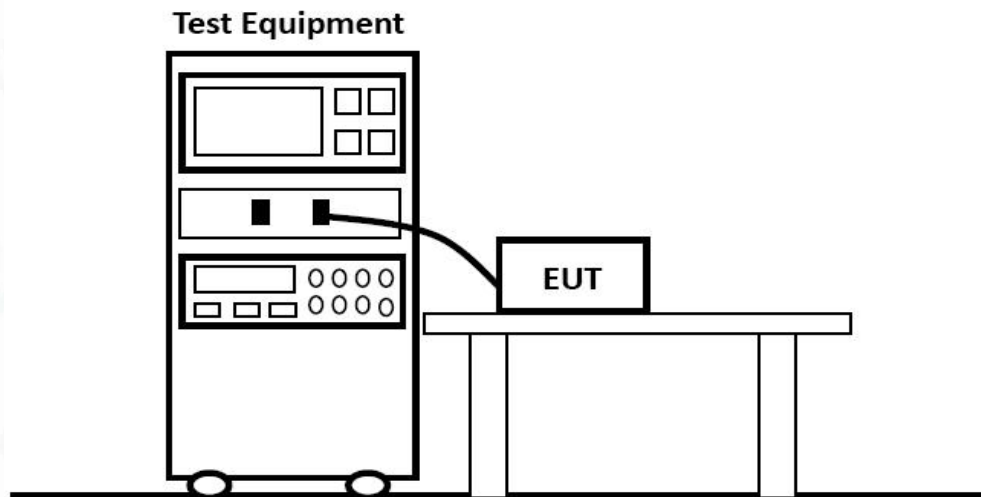
PASS.

Model No. (M/N): M2420	Environmental Conditions: 23.6℃, 57.5% RH
Test Mode: Mode 1	Test Voltage: 24V
	Test Engineer: Feng Liang



4.4 Voltage Fluctuation & Flicker Measurement

4.4.1 Block Diagram of Test Setup



4.4.2 Measuring Standard

EN 61000-3-3: 2013+ A1: 2019+ A2: 2021

4.4.3 Operating Condition of EUT

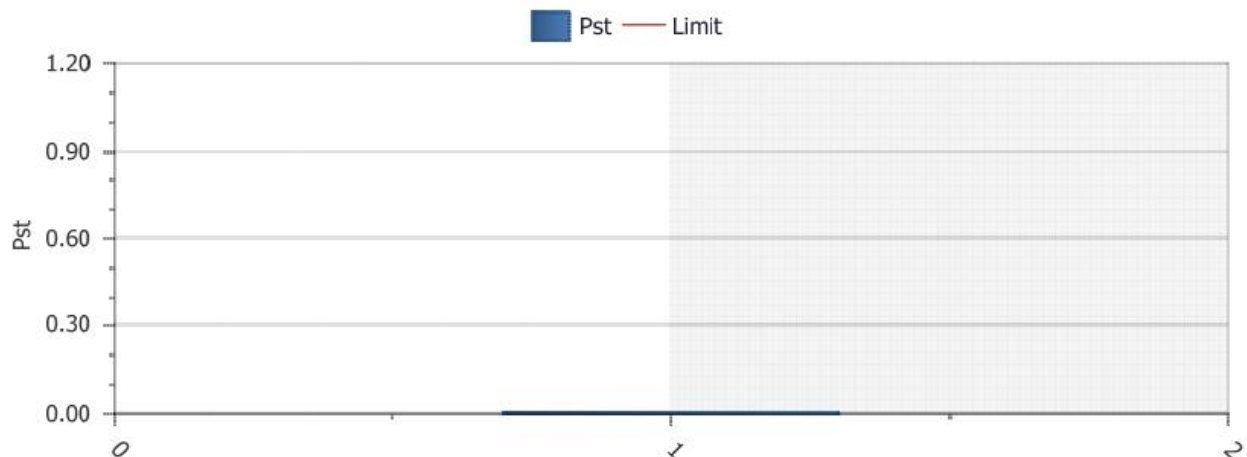
1. Setup the EUT as shown on Section 4.4.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

4.4.4 Test Results

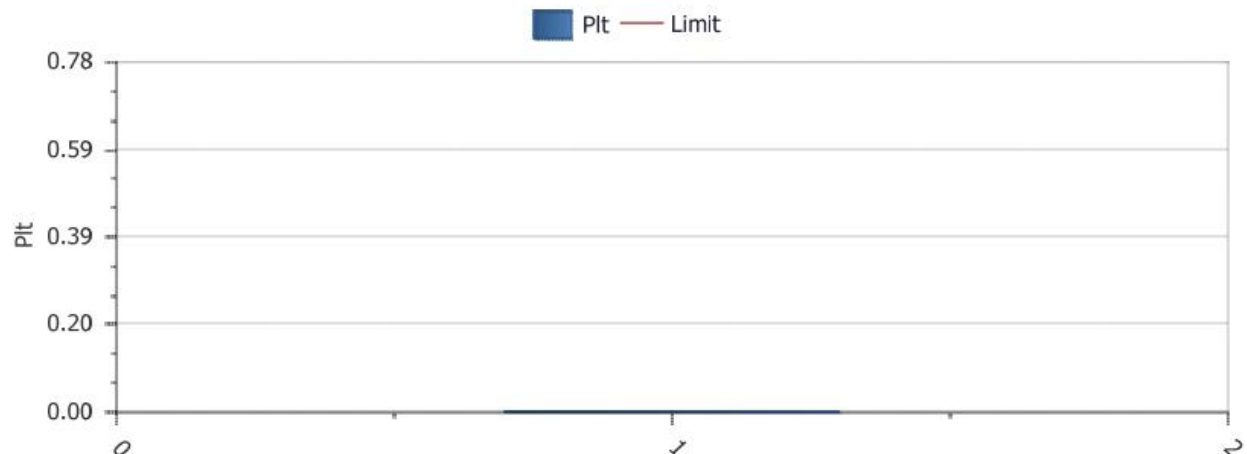
PASS.

Model No. (M/N):	M2420	Environmental Conditions: 23.6°C, 57.5% RH
Test Mode:	Mode 1	Test Voltage: 24V
		Test Engineer: Feng Liang

Pst and Limit



Plt and Limit



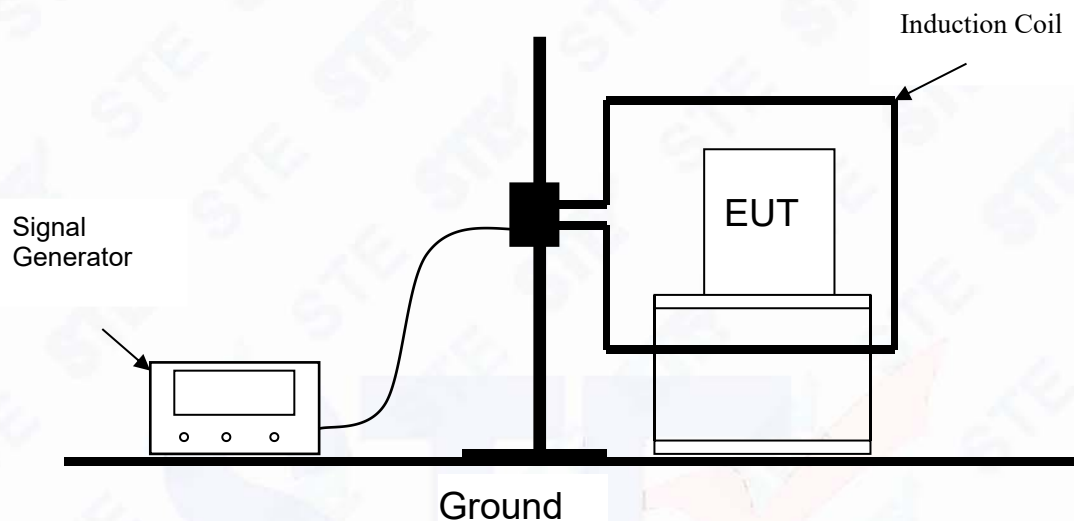
Relevant Parameter and Judgement During Test Period

Vrms at the end of test(V)		229.76		
Error Max(%)		Test Limit(%)		
T-max(ms)	0.00	Test Limit(ms)	500	Pass
dc(%)	0.00	Test Limit(%)	3.30	Pass
dmax(%)	0.00	Test Limit(%)	4.00	Pass
Pst	0.00	Test Limit	1.00	Pass
Plt	0.00	Test Limit	0.65	Pass

5. IMMUNITY TESTS

5.1 Power Frequency Magnetic Field Test

5.1.1 Block Diagram of Test Setup



5.1.2 Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-8: 2010)

5.1.3 Severity Levels and Performance Criterion

Characteristic	Test levels
Test frequency	50, 60Hz
Magnetic field strength	3 A/m

5.1.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.1.5 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field.

Also can reach the same aim by change the position of the EUT.

5.1.6 Test Results

PASS.

Please refer to the following page.

Power Frequency Magnetic Field Test Result

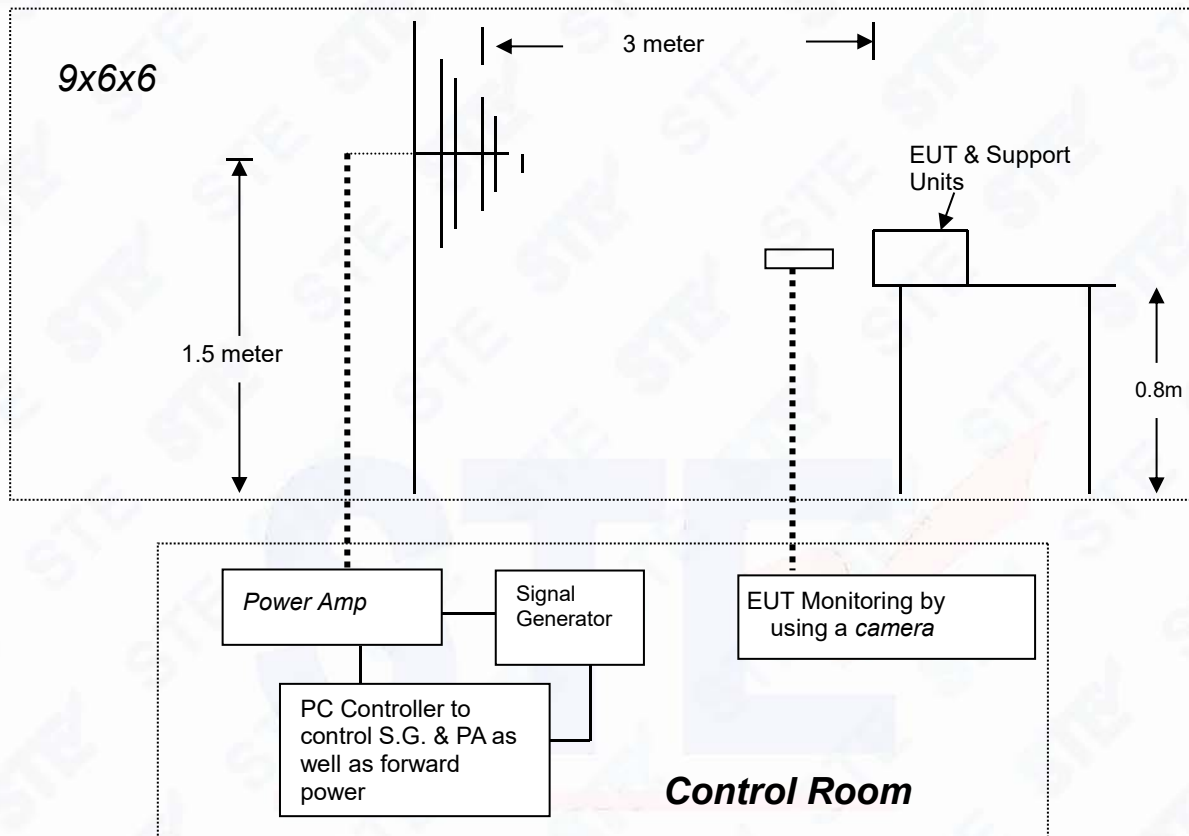
Standard	☐ IEC 61000-4-8 ☒ EN 61000-4-8		
Applicant	Shenzhen Depowersupply Electrical Co., Ltd		
EUT	MPPT Solar Charger&BOOST Constant Current Driver	Temperature	24.2℃
M/N	M2420	Humidity	52.1%
Test Mode	Mode 1	Criterion	A
Test Engineer	Xp Rao	Test Voltage	24V

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
3	5 mins	X	A	PASS
3	5 mins	Y	A	PASS
3	5 mins	Z	A	PASS

Note:

5.2 Radio-Frequency Electromagnetic Test

5.2.1 Block Diagram of Test Setup



5.2.2 Test Standard

EN IEC 61000-6-1: 2019

(EN IEC 61000-4-3, Severity Level: 2, 3V/ m)

5.2.3 Severity Levels and Performance Criterion

Radio-frequency electromagnetic fields – Test levels			
Frequency range	Test levels	Amplitude modulated	Performance Criteria
80 MHz to 1 000 MHz	3 V/m	1 kHz, 80 % AM, sine wave	A
1400 MHz to 6000 MHz	3 V/m		A

Note: The test level specified is the r.m.s. value of the unmodulated carrier.

5.2.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.2.5 Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.1.5, except the test setup replaced as Section 5.2.1.

5.2.6 Test Procedure

The test was carried out in a half-wave anechoic chamber with absorbent material attached to a reflective ground plate.

Before the test, the test field strength needs to be calibrated. During the calibration, the corresponding relationship between the target field strength and the forward power applied to the transmitting antenna is established. During the test, except for EUT, the indoor layout is consistent with the calibration.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.

EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test.

Each of the four sides of EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

5.2.7 Test Results

PASS.

Please refer to the following page.

Radio-Frequency Electromagnetic Test Results

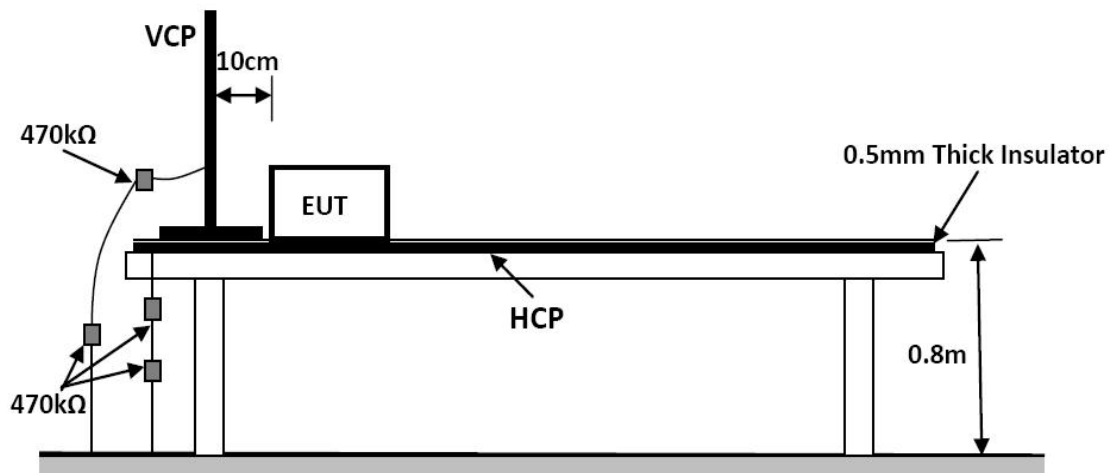
Standard	☐ IEC 61000-4-3 ☒ EN IEC 61000-4-3		
Applicant	Shenzhen Depowersupply Electrical Co., Ltd		
EUT	MPPT Solar Charger&BOOST Constant Current Driver	Temperature	23.7℃
M/N	M2420	Humidity	59.8%
Field Strength	3 V/m	Criterion	A
Test Mode	Mode 1	Test Engineer	Feng Liang
Modulation	80% AM 1KHz	Steps	1%

Angle of EUT	Antenna polarization	Frequency Range	Test Level (V/m)	Performance Criteria
0°	Vertical, Horizontal	80 MHz to 1000 MHz	3	A
90°	Vertical, Horizontal	80 MHz to 1000 MHz	3	A
180°	Vertical, Horizontal	80 MHz to 1000 MHz	3	A
270°	Vertical, Horizontal	80 MHz to 1000 MHz	3	A
0°	Vertical, Horizontal	1400 MHz to 6000 MHz	3	A
90°	Vertical, Horizontal	1400 MHz to 6000 MHz	3	A
180°	Vertical, Horizontal	1400 MHz to 6000 MHz	3	A
270°	Vertical, Horizontal	1400 MHz to 6000 MHz	3	A

Note:

5.3 Electrostatic Discharge Immunity Test

5.3.1 Block Diagram of Test Setup



5.3.2 Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-2: 2009)

5.3.3 Severity Levels and Performance Criterion

Electrostatic discharges — Test levels				
Discharge Type	Discharge Level (kV)		Number of discharges (Each point)	Performance Criteria
	+	-		
Air Discharge-Direct	8	8	20	B
Contact Discharge-Direct	4	4	20	
Contact Discharge- Indirect	4	4	20	

5.3.4 EUT Configuration on Test

The configuration of EUT is listed in Section 3.2.

5.3.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.1.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.3.6 Test Procedure

(1) Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

(2) Contact Discharge

All the procedure shall be same as Section 5.1.6(1). Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

(3) Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

(4) Indirect Discharge For Vertical Coupling Plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.3.7 Test Results

PASS.

Please refer to the following pages

ESD Test Results

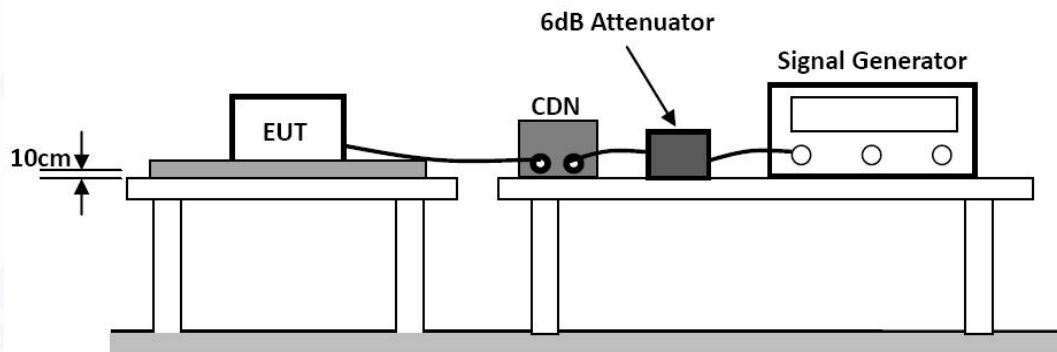
Standard	☐ IEC 61000-4-2 ☒ EN 61000-4-2		
Applicant	Shenzhen Depowersupply Electrical Co., Ltd		
EUT	MPPT Solar Charger&BOOST Constant Current Driver	Temperature	23.6℃
M/N	M2420	Humidity	55.9%
Criterion	B	Pressure	1021 mbar
Test Mode	Mode 1	Test Engineer	Feng Liang

Discharge mode	Test points	Results						Performance Criteria
		2kv		4kv		8kv		
		+	-	+	-	+	-	
Direct-Contact Discharge	Front	/	/	P	P	/	/	B
	Back	/	/	P	P	/	/	B
	Left	/	/	P	P	/	/	B
	Right	/	/	P	P	/	/	B
	Top	/	/	P	P	/	/	B
	Bottom	/	/	P	P	/	/	B
Direct-Air Discharge	Front	/	/	/	/	P	P	B
	Back	/	/	/	/	P	P	B
	Left	/	/	/	/	P	P	B
	Right	/	/	/	/	P	P	B
	Top	/	/	/	/	P	P	B
	Bottom	/	/	/	/	P	P	B
Indirect-Contact Discharge(VCP)	/	/	/	P	P	/	/	B
Indirect-Contact Discharge(HCP)	/	/	/	P	P	/	/	B

Note: "P" = Pass.

5.4 Injected Currents Test (Radio-frequency common mode)

5.4.1 Block Diagram of Test Setup



5.4.2 Test Standard

EN IEC 61000-6-1: 2019 (EN IEC 61000-4-6: 2023)

5.4.3 Limits

Frequency range	Test levels	Modulation	Source impedance
0.15 MHz to 80 MHz	3V	1 kHz, 80 % AM, sine wave	150 Ω

5.4.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.4.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.5.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.4.6 Test Procedure

a) The EUT are placed on an insulated wooden table 0.8m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT.

Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

b) The test signal is sent to the coupling device through the 6dB attenuator, and then injected into the EUT test port by the common mode of the coupling device.

The power port is injected use CDN.

The signal line and control line are injected use Electromagnetic Injection Clamp

c) The frequency range is swept from 150kHz to 80MHz using 3V signal level, and with the

disturbance signal 80% amplitude modulated with a 1kHz sine wave.

The rate of sweep shall not exceed 1.5×10^{-3} decades/s.

Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

5.4.7 Test Results

PASS.

Please refer to the following page.



Injected Currents Test Results

Standard	☐ IEC 61000-4-6 ☒ EN IEC 61000-4-6		
Applicant	Shenzhen Depowersupply Electrical Co., Ltd		
EUT	MPPT Solar Charger&BOOST Constant Current Driver	Temperature	24.2℃
M/N	M2420	Humidity	52.1%
Test Mode	Mode 1	Criterion	A
Test Engineer	Xp Rao	Test Voltage	24V

Test Port Type	Frequency range (MHz)	Test Level (V/m)	Coupling method	Performance Criteria
AC Power ports	0.15 to 80	3	CDN	A
DC Input / Output Power ports				

Remark:

1. Modulation Signal: 1kHz, 80%, AM, Sine wave.

2. Measurement Equipment:

Simulator : CIT-10 (FRANKONIA)

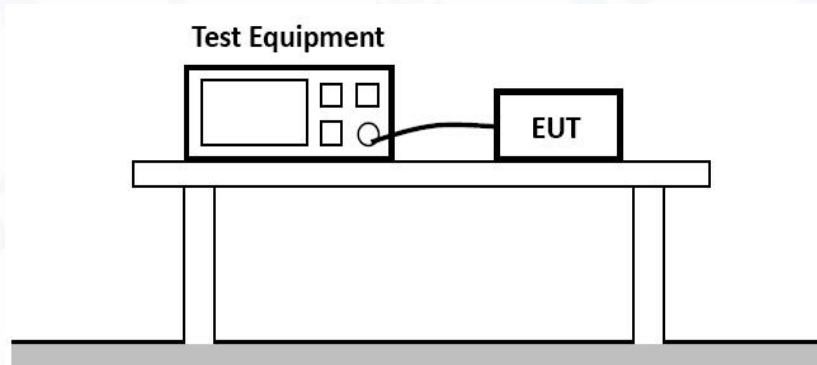
CDN : ☒ CDN-M2 (FRANKONIA)

☐ CDN-M3 (FRANKONIA)

Note:

5.5 Voltage Dips and Interruptions Test

5.5.1 Block Diagram of Test Setup



5.5.2 Test Standard

EN IEC 61000-6-1: 2019 (EN IEC 61000-4-11: 2020)

5.5.3 Limits

Voltage dips and short interruptions-Test levels for AC mains power ports			
Test item	Test Level	Duration	Performance criterion
Voltage dips	0% Residual voltage	0.5 cycle	B
	0% Residual voltage	1 cycle	C
	70% Residual voltage	25 cycles (50Hz) 30 cycles (60Hz)	C
Voltage interruptions	0% Residual voltage	250 cycles (50Hz) 300 cycles (60Hz)	C

5.5.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.5.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.7.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.5.6 Test Procedure

- a) The EUT shall be connected to the test generator for testing using the shortest power cable specified by the EUT manufacturer and, if no cable length is specified, the shortest cable suitable for the EUT.
- b) The interruptions is introduced at selected phase angles with specified duration.
- c) EUT shall carry out tests in accordance with the prescribed test grade and duration, and the

test interval is 10s

5.5.7 Test Results

PASS.

Voltage Dips & Interruptions Test Results

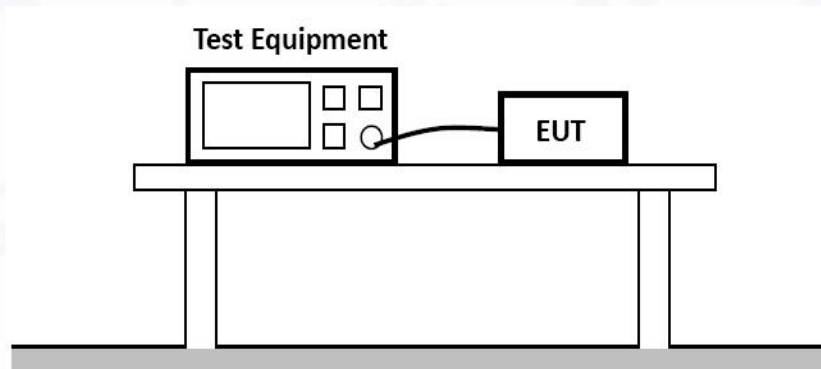
Standard	☐ IEC 61000-4-11 ☒ EN IEC 61000-4-11		
Applicant	Shenzhen Depowersupply Electrical Co., Ltd		
EUT	MPPT Solar Charger&BOOST Constant Current Driver	Temperature	24.2℃
M/N	M2420	Humidity	52.1%
Test Mode	Mode 1	Criterion	B & C
Test Engineer	Xp Rao	Test Voltage	24V

Test item	Frequency	Test Level	Duration	Performance criteria
Voltage dips	50Hz	0% Residual voltage	0.5 cycle	B
Voltage dips	50Hz	0% Residual voltage	1 cycles	C
Voltage dips	50Hz	70% Residual voltage	25 cycles	C
Voltage interruptions	50Hz	0% Residual voltage	250 cycles	C

Note:

5.6 Surge Immunity Test

5.6.1 Block Diagram of Test Setup



5.6.2 Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-5: 2014+A1: 2017)

5.6.3 Limits

Table 10) Surges – Test levels at input AC power ports

Characteristics	Test levels
Wave-shape data (T_r/T_h)	1.2/50 (8/20) μ s
line to line	$\boxtimes \pm 1.0$ kV
line to earth	$\boxtimes \pm 2.0$ kV

5.6.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.6.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.6.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.6.6 Test Procedure

- a) The surge is applied to the EUT power supply terminal via the capacitive coupling network, to the EUT power supply provide a 1.0kV 1.2/50us voltage surge (at open-circuit condition).
- d) At least 5 positive and 5 negative (polarity) tests with 1/min repetition rate are conducted during test. and phase angles is 90°and 270°.
- c) Different phase angles and line-to-line, line-to-ground coupling mode measurements
- d) line-to-line coupling mode, the Generator impedance is 2 Ω , line-to-ground coupling mode, the Generator impedance is 12 Ω .

5.6.7 Test Results

PASS.

Surge Immunity Test Result

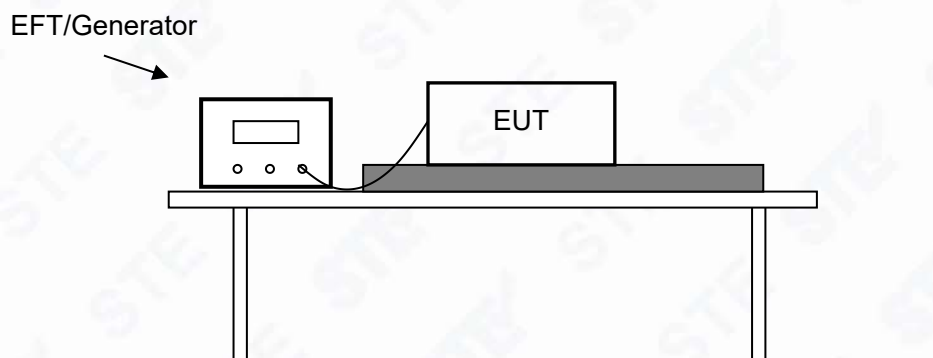
Standard	☐ IEC 61000-4-5 ☒ EN 61000-4-5		
Applicant	Shenzhen Depowersupply Electrical Co., Ltd		
EUT	MPPT Solar Charger&BOOST Constant Current Driver	Temperature	24.2℃
M/N	M2420	Humidity	52.1%
Test Mode	Mode 1	Criterion	B
Test Engineer	Xp Rao	Test Voltage	24V

Test Port Type	Inject Line	Tset Level (kV)	Phase Angle	Number of surges	Repetition rate	Performance criteria
AC Input	L-N	+ 1.0	90°	5	60s	B
		- 1.0	270°	5	60s	B
AC Input	L-PE	+ 2.0	90°	5	60s	B
		- 2.0	270°	5	60s	B
AC Input	N-PE	+ 2.0	90°	5	60s	B
		- 2.0	270°	5	60s	B

Note:

5.7 Electrical Fast Transient / Burst Immunity Test

5.7.1 Block Diagram of Test Setup



5.7.2 Test Standard

EN IEC 61000-6-1 (EN 61000-4-4: 2012)

5.7.3 Limits

1) Fast transients – Test levels at ☒ input and output AC power ports

Characteristics	Test levels
Voltage peak	± 1 kV (peak)
Rise time/hold time	5/50 ns
Repetition frequency	5 kHz or 100 kHz

2) Fast transients – Test levels at ☐ input and output DC power ports

Characteristics	Test levels
Voltage peak	± 0.5 kV (peak)
Rise time/hold time	5/50 ns
Repetition frequency	5 kHz

3) Fast transients –Test levels at ☐ ports for signal/control lines ports

Characteristics	Test levels
Voltage peak	± 0.5 kV (peak)
Rise time/hold time	5/50 ns
Repetition frequency	5 kHz

5.7.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.7.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.4.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.7.6 Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

1. The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC or DC power lines. Both polarities of the test voltage should be applied during compliance test, Fast transients are carried out with a minimum duration of 2 min with a positive polarity and a minimum of 2 min with a negative polarity

2. For signal lines and control lines ports: No I/O ports. It's unnecessary to test.

5.7.7 Test Results

PASS.

Electrical Fast Transient/ Burst Test Results

Standard	☐ IEC 61000-4-8 ☒ EN 61000-4-8		
Applicant	Ningbo NewHope Lighting Co., Ltd.		
EUT	LED Work Light	Temperature	24.2℃
M/N	WL04-50W	Humidity	52.1%
Test Mode	Mode 1	Criterion	A
Test Engineer	Xp Rao	Test Voltage	24V

Test Port Type	Test Level	Repetition Frequency	Test Duration		Performance Criteria
			+	-	
AC Power ports	±1.0kV	5kHz	2min	2min	B
DC Input /Output Power ports					

Note:

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

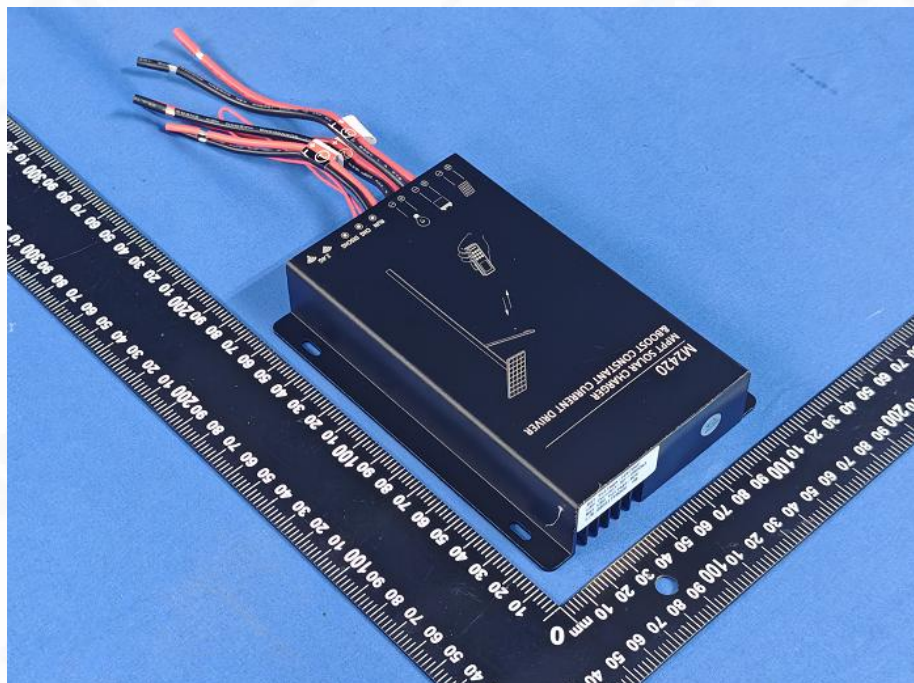


Fig. 1

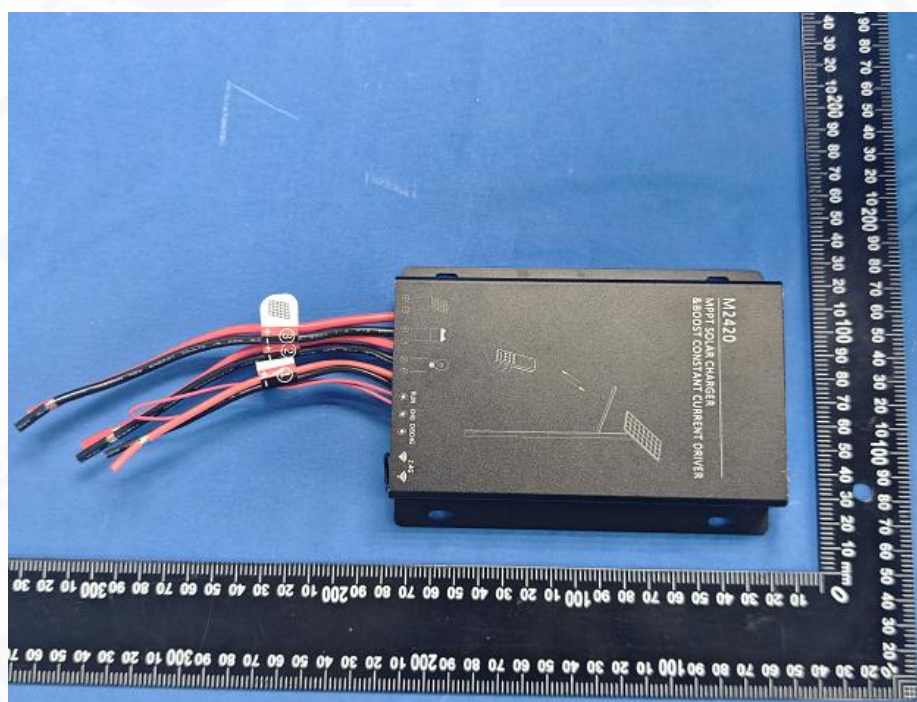


Fig. 2

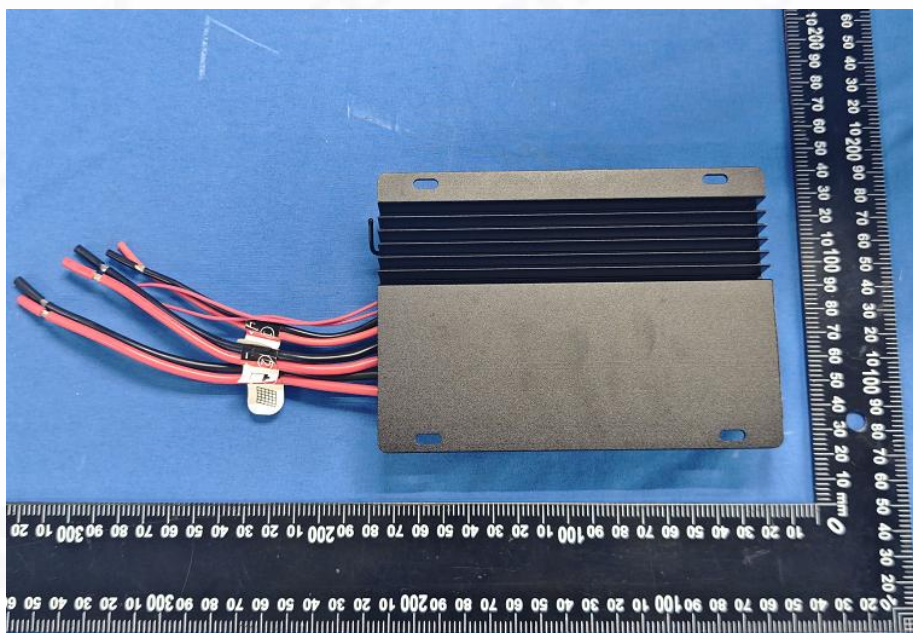


Fig. 3

----- THE END OF TEST REPORT -----