EMC Test Report

Product： CARTRIDGE HEATERS

Trade Name： N/A

Model Number： 10*150

Issued for

Yancheng Huari Electric Heating Equipment Co.,Ltd

A12-2, Yandu East Road, Yancheng City

Prepared by

Shenzhen ATL Testing Technology Co., Ltd.

Floor.5, Genesis Zhongye Building, No.22, Puzai Road, Pingdi Street, Longgang District ,Shenzhen, Guangdong, China

Web:Http://www.atllab.org Mail:atl@atllab.org

TEST RESULT CERTIFICATION

Product:	CARTRIDGE HEATERS
Brand Mark:	N/A
Applicant:	Yancheng Huari Electric Heating Equipment Co.,Ltd
Address:	A12-2, Yandu East Road, Yancheng City
Manufacturer:	Yancheng Huari Electric Heating Equipment Co.,Ltd
Address:	A12-2, Yandu East Road, Yancheng City
Model No.:	10*150
Standards:	EN 55014-1:2017; EN 55014-2:2015; EN 61000-3-2:2014; EN 61000-3-3:2013.

The above equipment has been tested by Shenzhen ATL Testing Technology Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of Test .....:

Date (s) of performance of tests .....: 2020-08-24 to 2020-08-28

Date of Issue.....: 2020-08-28

Test Result.....: **Pass**

Testing by	:	Rose Fang	Date	:	2020-08-28
		(Rose Fang)			
Check by	:	Jane He	Date	:	2020-08-28
		(Jane He)			
Approved by	:	July Yan	Date	:	2020-08-28
		(July Yan)			

ATL Approved SHENZHEN ATL TESTING TECHNOLOGY CO.,LTD.

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1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55014-1:2017	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	
EN61000-3-2:2014	Harmonic Current Emission	Class A or D NOTE (2)	PASS	
EN 61000-3-3:2013	Voltage Fluctuations & Flicker	------	PASS	
EMC Immunity				
Section EN55014-2:2015	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN 61000-4-3:2006/A2:2010	RF electromagnetic field	A	PASS	
EN 61000-4-4:2012	Fast transients	B	PASS	
EN 61000-4-5:2014/A1:2017	Surges	B	PASS	
EN 61000-4-6:2014/AC:2015	Injected Current	A	PASS	
EN 61000-4-11:2004/A1:2017	Volt. Interruptions Volt. Dips	C / C / C **NOTE (3)**	PASS	

NOTE:

(1)' N/A' denotes test is not applicable in this Test Report

(2) No limits apply for equipment with an active input power up to and including 75W.

(3)Voltage dip: 0% reduction – Performance Criteria **C**

Voltage dip: 30% reduction – Performance Criteria **C**

Voltage dip: 60% reduction – Performance Criteria **C**

For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

Shenzhen ATL Testing Technology Co., Ltd.
Add. : Floor.5,Genesis Zhongye Building,No.22,Puzai Road,Pingdi Street,Longgang District, Shenzhen,Guangdong,China
Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
C	ANSI	150 KHz ~ 30MHz	3.2	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
A	ANSI	30MHz ~ 1000MHz	4.7	
		1GHz ~6GHz	5.0	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	CARTRIDGE HEATERS
Model Name	10*150
Serial No	N/A
Model Difference	N/A
Product Description	The EUT is an CARTRIDGE HEATERS Operating frequency: N/A Connecting I/O port: N/A Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an Household Device. More details of EUT technical specification, please refer to the User's Manual.
Power Source	AC Voltage
Power Rating	Input: AC 100-240V~, 300W

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible 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	Running

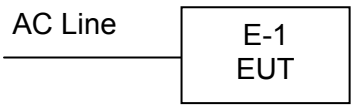
For Conducted Test	
Final Test Mode	Description
Mode 1	Running

For Radiated Test	
Final Test Mode	Description
Mode 1	Running

For EMS Test	
Final Test Mode	Description
Mode 1	Running

2.3 DESCRIPTION OF TEST SETUP

Mode :



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	CARTRIDGE HEATERS	N/A	10*150	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

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 MEASUREMENT INSTRUMENTS LIST

2.5.1 CONDUCTED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	LISN	R&S	ENV216	101313	Jul. 06, 2020	Jul. 05, 2021	1 year
2	LISN	SCHWARZBECK	NNLK 8129	8129245	Jul. 16, 2020	Jul. 15, 2021	1 year
3	Pulse Limiter	SCHWARZBECK	VTSD 9561F	9716	Jul. 16, 2020	Jul. 15, 2021	1 year
4	50Ω Switch	ANRITSU CORP	MP59B	6200983704	Jul. 06, 2020	Jul. 05, 2021	1 year
5	Test Cable	N/A	C01	N/A	Jul. 06, 2020	Jul. 05, 2021	1 year
6	Test Cable	N/A	C02	N/A	Jul. 06, 2020	Jul. 05, 2021	1 year
7	Test Cable	N/A	C03	N/A	Jul. 06, 2020	Jul. 05, 2021	1 year
8	EMI Test Receiver	R&S	ESCI	101160	Jul. 06, 2020	Jul. 05, 2021	1 year
9	Passive Voltage Probe	ESH2-Z3	R&S	100196	Jul. 06, 2020	Jul. 05, 2021	1 year
10	Triple-Loop Antenna	EVERFINE	LIA-2	11020003	Jul. 06, 2020	Jul. 05, 2021	1 year
11	Absorbing Clamp	R&S	MDS-21	100423	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.2 RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 06, 2020	Jul. 05, 2021	1 year
2	Test Cable	N/A	R-01	N/A	Jul. 16, 2020	Jul. 15, 2021	1 year
3	Test Cable	N/A	R-02	N/A	Jul. 16, 2020	Jul. 15, 2021	1 year
4	EMI Test Receiver	R&S	ESCI-7	101318	Jul. 06, 2020	Jul. 05, 2021	1 year
5	Antenna Mast	EM	SC100_1	N/A	N/A	N/A	N/A
6	Turn Table	EM	SC100	060531	N/A	N/A	N/A
7	50Ω Switch	Anritsu Corp	MP59B	6200983705	Jul. 06, 2020	Jul. 05, 2021	1 year
8	Spectrum Analyzer	Aglient	E4407B	MY45108040	Jul. 06, 2020	Jul. 05, 2021	1 year
9	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 06, 2020	Jul. 05, 2021	1 year
10	Amplifier	EM	EM-30180	060538	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.3 HARMONICS AND FILCK

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Harmonic & Flicker	EM TEST	DPA500	0303-04	Jul. 06, 2020	Jul. 05, 2021	1 year

2	AC Power Source	EM TEST	ACS500	0203-01	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.4 ESD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	ESD TEST GENERATOR	SCHAFFNER	NSG438	859	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.5 RS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Signal Generator	R&S	SMT 06	832080/007	Jul. 06, 2020	Jul. 05, 2021	1 year
2	Log-Bicon Antenna	Schwarzbeck	VULB9161	4022	Jul. 06, 2020	Jul. 05, 2021	1 year
3	Power Amplifier	AR	150W1000M1	320946	Jul. 06, 2020	Jul. 05, 2021	1 year
4	Microwave Horn Antenna	AR	AT4002A	321467	Jul. 06, 2020	Jul. 05, 2021	1 year
5	Power Amplifier	AR	25S1G4A	308598	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.6 SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Surge Generator	EVERFINE	EMS61000-5A	1101002	Jul. 06, 2020	Jul. 05, 2021	1 year
2	DIPS Generator	EVERFINE	EMS61000-11K	1011002	Jul. 06, 2020	Jul. 05, 2021	1 year
3	EFT/B Generator	EVERFINE	EMS61000-4A-V2	1012005	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.7 INJECTION CURRENT

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Signal Generator	IFR	2023A	202301/368	Jul. 06, 2020	Jul. 05, 2021	1 year
2	Power Amplifier	AR	75A250AM1	0320709	Jul. 06, 2020	Jul. 05, 2021	1 year
3	CDN	FCC	FCC-801-M2	06043	Jul. 06, 2020	Jul. 05, 2021	1 year
4	EM Clamp	FCC	F-203I-23MM	504	Jul. 06, 2020	Jul. 05, 2021	1 year

2.5.8 MF

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Generator	EVERFINE	EMS61000-8K	1007001	Jul. 06, 2020	Jul. 05, 2021	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

Frequency Range (MHz)	At mains terminals		At load terminals and additional terminals	
	Quasi-peak (dBuV)	Average (dBuV)	Quasi-peak (dBuV)	Average (dBuV)
0.15 -0.5	66 - 56 *	56 - 46 *	80.00	70.00
0.50 -5.0	56.00	46.00	74.00	64.00
5.0 -30.0	60.00	50.00	74.00	64.00

3.1.2 MAINS TERMINALS OF TOOLS

Frequency Range	Rated motor power not exceeding 700W		Rated motor power above 700W and not exceeding1 000 W		Rated motor power above 1 000 W	
(MHz)	dB (uV) Quasi-peak	dB (uV) Average**	dB (uV) Quasi-peak	dB (uV) Average**	dB (uV) Quasi-peak	dB (uV) Average**
0.15 -0.5	66.0 to 59.0*	59.0 to 49.0*	70.0 to 63.0*	63.0 to 53.0*	76.0 to 69.0*	69.0 to 59.0*
0.50 -5.0	59.0	49.0	63.0	53.0	69.0	59.0
5.0 -30.0	64.0	54.0	68.0	58.0	74.0	64.0

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) '**' If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

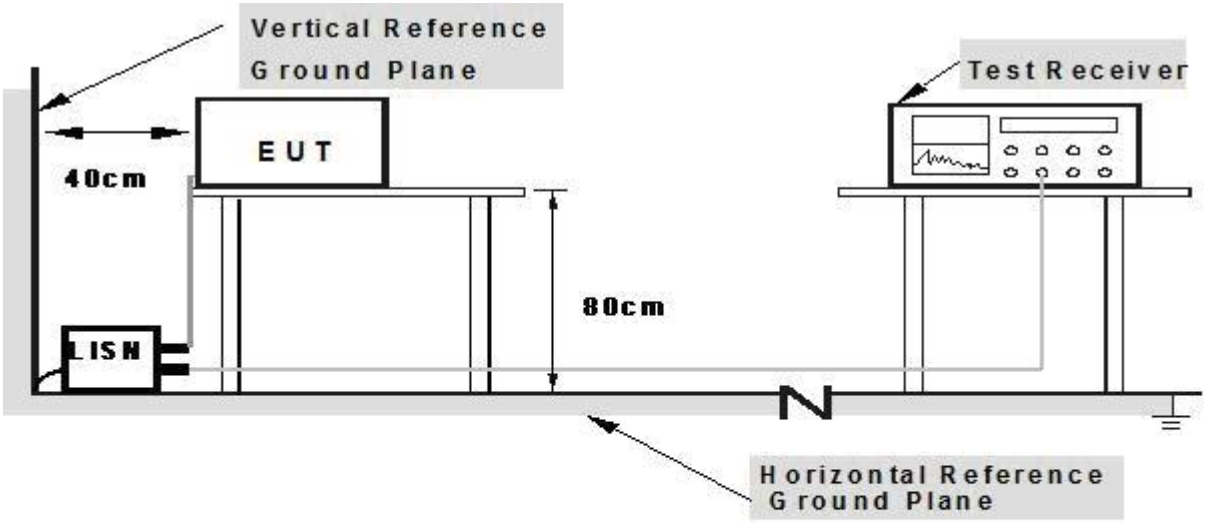
The following table is the setting of the receiver

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

3.1.3 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.4 TEST SETUP



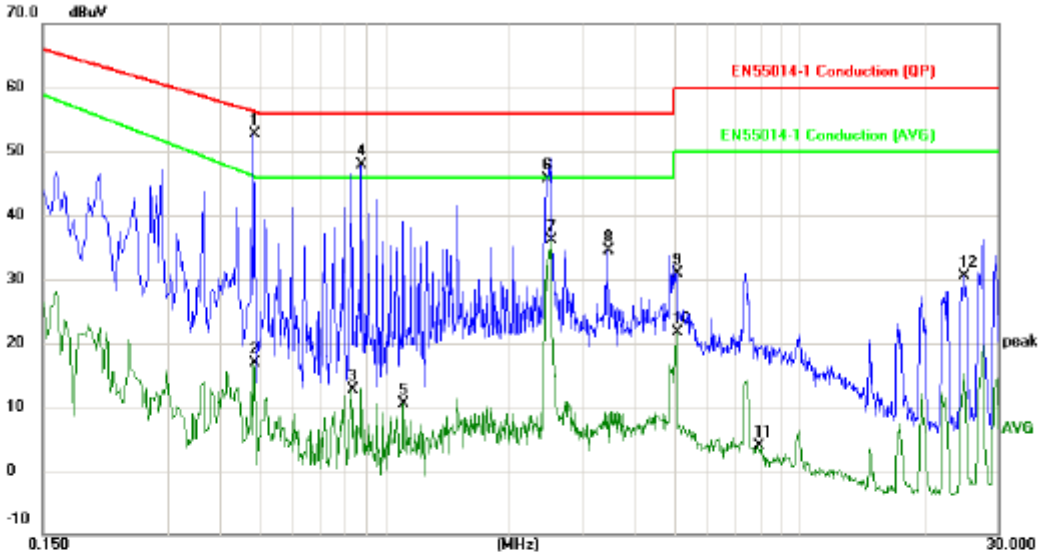
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.6 TEST RESULTS

EUT :	CARTRIDGE HEATERS	Model Name. :	10*150
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Test Date :	2020-08-26
Test Mode :	Running	Phase :	L
Test Voltage :	AC 230V/50Hz		



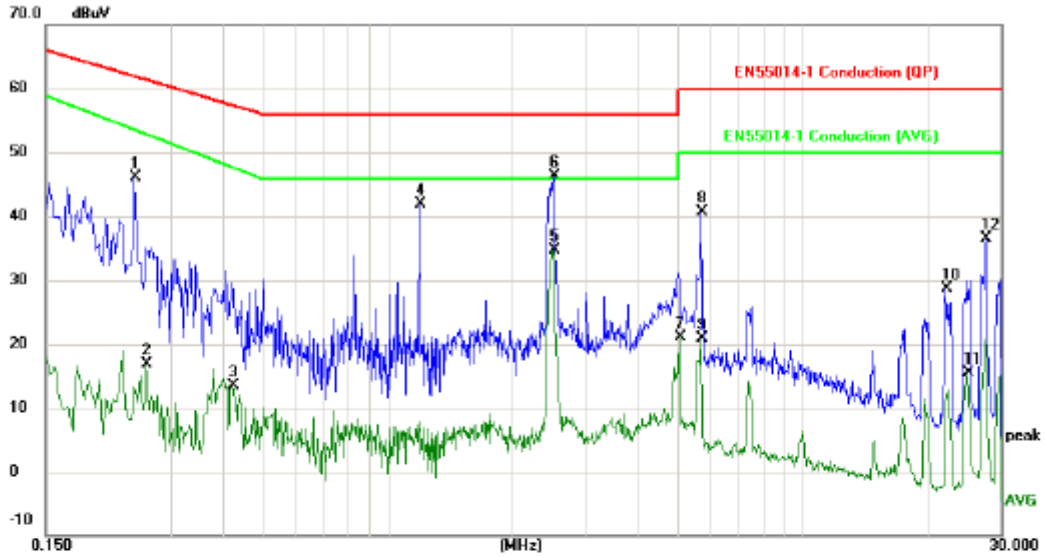
Site
Limit: EN55014-1 Conduction (QP)
EUT:
M/N:
Mode:
Note:

Phase: L1
Power:

Temperature: 24 □
Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.4860	52.22	0.42	52.64	56.24	-3.60	peak	
2		0.4860	16.58	0.42	17.00	46.31	-29.31	AVG	
3		0.8340	12.15	0.53	12.68	46.00	-33.32	AVG	
4		0.8780	47.39	0.54	47.93	56.00	-8.07	peak	
5		1.1060	9.99	0.57	10.56	46.00	-35.44	AVG	
6		2.4620	45.07	0.71	45.78	56.00	-10.22	peak	
7		2.5180	35.43	0.71	36.14	46.00	-9.86	AVG	
8		3.4420	33.74	0.76	34.50	56.00	-21.50	peak	
9		5.0340	30.01	0.81	30.82	60.00	-29.18	peak	
10		5.0340	20.81	0.81	21.62	50.00	-28.38	AVG	
11		7.9420	2.95	0.92	3.87	50.00	-46.13	AVG	
12		24.9020	29.20	1.25	30.45	60.00	-29.55	peak	

EUT :	CARTRIDGE HEATERS	Model Name. :	10*150
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Test Date :	2020-08-26
Test Mode :	Running	Phase :	N
Test Voltage :	AC 230V/50Hz		



Site
Limit: EN55014-1 Conduction (QP)
EUT:
M/N:
Mode:
Note:

Phase: N
Power:

Temperature: 24 □
Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2460	45.80	0.30	46.10	61.89	-15.79	peak	
2		0.2620	16.67	0.31	16.98	52.98	-36.00	AVG	
3		0.4220	13.06	0.40	13.46	47.83	-34.37	AVG	
4		1.1940	41.23	0.58	41.81	56.00	-14.19	peak	
5		2.5020	34.06	0.71	34.77	46.00	-11.23	AVG	
6	*	2.5220	45.56	0.71	46.27	56.00	-9.73	peak	
7		5.0420	20.21	0.81	21.02	50.00	-28.98	AVG	
8		5.7100	39.79	0.84	40.63	60.00	-19.37	peak	
9		5.7100	20.03	0.84	20.87	50.00	-29.13	AVG	
10		22.1540	27.50	1.24	28.74	60.00	-31.26	peak	
11		24.9660	14.26	1.25	15.51	50.00	-34.49	AVG	
12		27.6220	35.23	1.27	36.50	60.00	-23.50	peak	

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

FREQUENCY (MHz)	At 10m	At 3m
	dBuV/m	dBuV/m
30 – 230	30	40
230 – 1000	37	47

3.2.2 LIMITS OF DISTURBANCE POWER MEASUREMENT (Below 1000MHz)

	Household and similar appliances		Tools					
Frequency Range			Rated motor power not exceeding 700 W		Rated motor power above 700 W and not exceeding 1 000 W		Rated motor power above 1 000 W	
(MHz)	dB (pW) Quasi-peak	dB (pW) Averag*	dB (pW) Quasi-peak	dB (pW) Averag*	dB (pW) Quasi-peak	dB (pW) Averag*	dB (pW) Quasi-peak	dB (pW) Average*
30-300	44-55	35-45	44-55	35-45	49-59	39-49	55-65	45-55
* If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.								

Notes:

(1) The limit for radiated test was performed according to as following: CISPR 14.

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

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

3.2.3 TEST PROCEDURE

a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

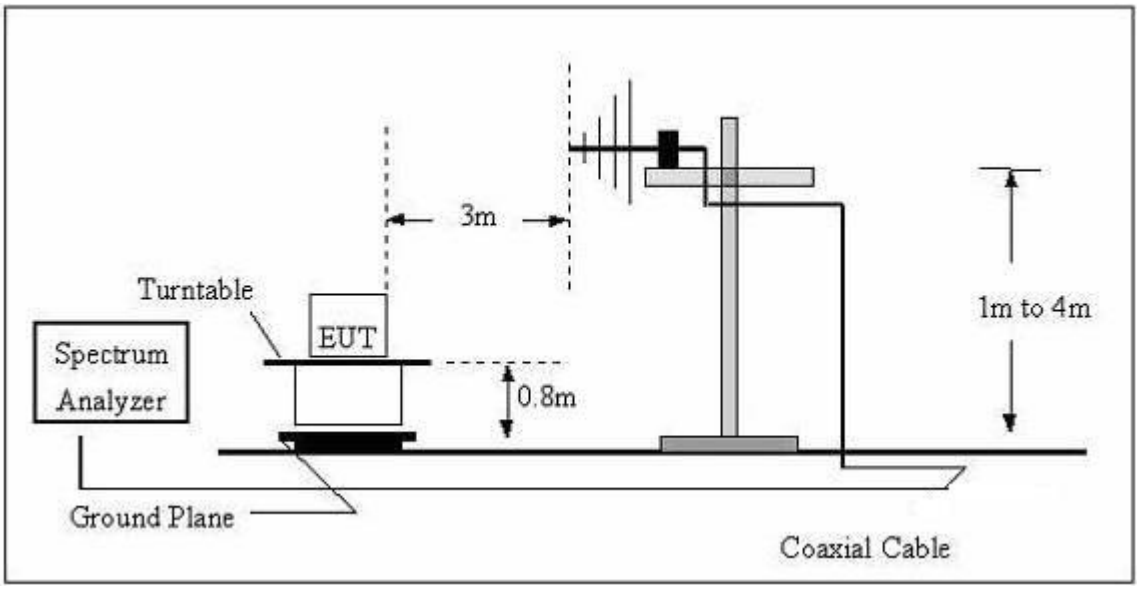
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.

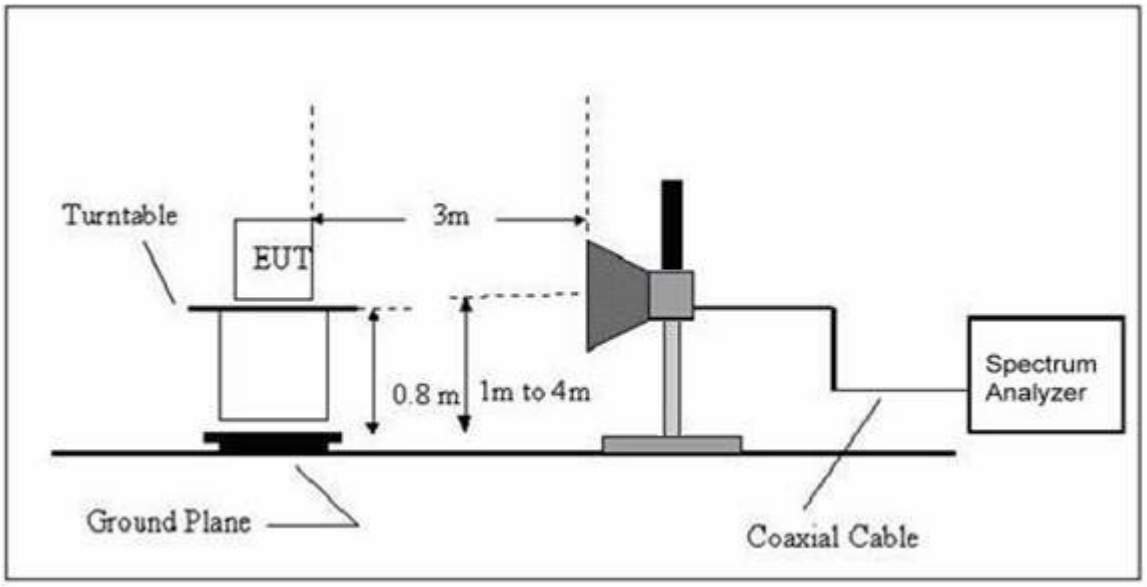
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz.



(B) Disturbance Power Test Set-UP Frequency Below 1GHz

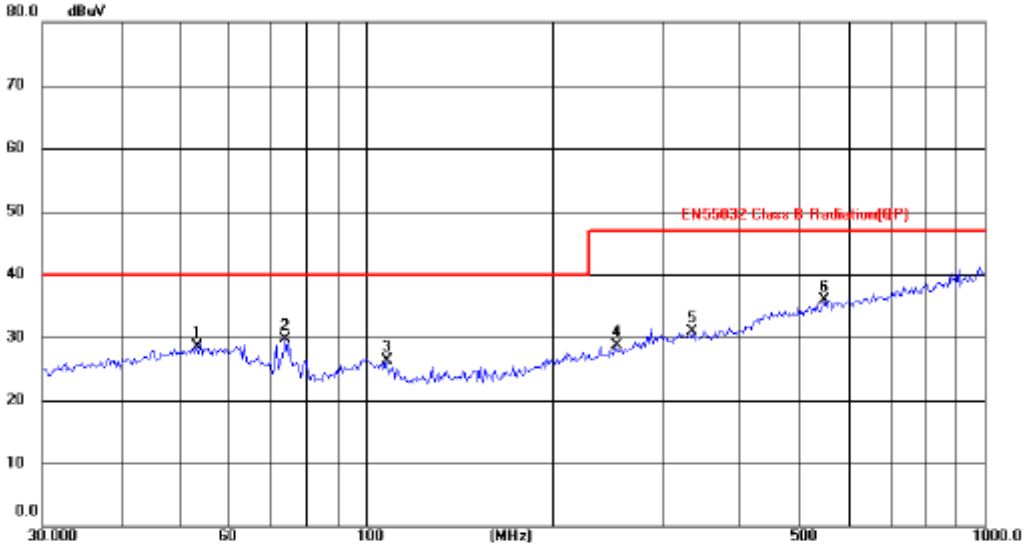


3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS(30MHz-1000MHz)

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running	Polarization：	Horizontal
Test Power：	AC 230V/50Hz		



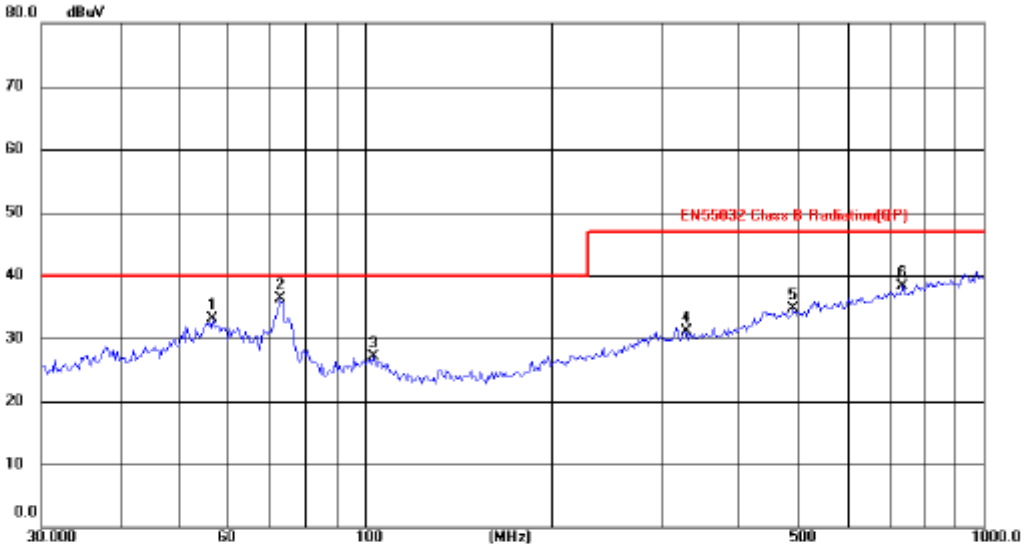
Site
Limit: EN55032 Class B Radiation(QP)
EUT:
M/N:
Mode:
Note:

Polarization: *Horizontal*
Power: AC230V/50Hz

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		53.3179	15.11	13.46	28.57	40.00	-11.43	peak	
2	*	74.1351	20.03	9.58	29.61	40.00	-10.39	peak	
3		107.5101	14.65	11.64	26.29	40.00	-13.71	peak	
4		252.9482	14.98	13.77	28.75	47.00	-18.25	peak	
5		337.2155	14.35	16.51	30.86	47.00	-16.14	peak	
6		550.9480	15.77	20.20	35.97	47.00	-11.03	peak	

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running	Polarization：	Vertical
Test Power：	AC 230V/50Hz		



Site
Limit: EN55032 Class B Radiation(QP)
EUT:
M/N:
Mode:
Note:

Polarization: *Vertical*
Power: AC230V/50Hz

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		56.7917	19.32	13.69	33.01	40.00	-6.99	peak	
2	*	73.1025	26.01	10.27	36.28	40.00	-3.72	peak	
3		103.0800	15.32	11.70	27.02	40.00	-12.98	peak	
4		327.8873	15.09	16.11	31.20	47.00	-15.80	peak	
5		492.4685	15.35	19.31	34.66	47.00	-12.34	peak	
6		739.6605	16.33	21.90	38.23	47.00	-8.77	peak	

3.3 HARMONICS CURRENT

3.3.1 LIMITS OF HARMONICS CURRENT

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

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

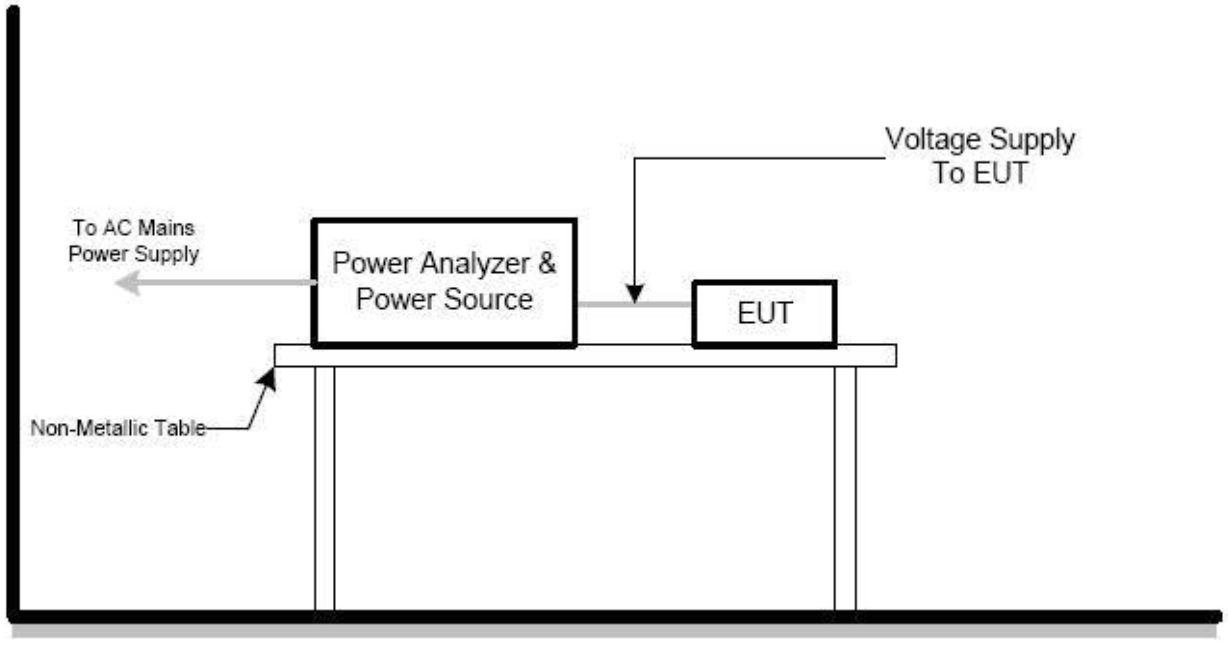
3.3.1.1TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.
b. The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
Class B: Portable tools. Portable tools.; Arc welding equipment which is not professional equipment.
Class C: Lighting equipment.
Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.
c. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

3.3.1.2 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.1.3 TEST SETUP



3.3.2 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

E. U. T. Result

Harmonic(s) > 200 ： Order (n): None
Harmonic(s with aver ge > 90%: Order (n): None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min: Order (n): None

Power Source Result

First dataset out of limit: DS (time): None
Harmonic(s) out of limit: Order (n): None

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	103.384E-3	100.000		
2	956.891E-6	0.926	972.00E-3	PASS
3	83.690E-3	80.951	2.07	PASS
4	1.808E-3	1.749	387.00E-3	PASS
5	77.497E-3	74.960	1.03	PASS
6	705.481E-6	0.682	270.00E-3	PASS
7	60.989E-3	58.993	693.00E-3	PASS
8	703.456E-6	0.680	207.00E-3	PASS
9	43.751E-3	42.319	360.00E-3	PASS
10	898.653E-6	0.869	165.60E-3	PASS
11	28.954E-3	28.006	297.00E-3	PASS
12	841.106E-6	0.814	138.00E-3	PASS
13	14.128E-3	13.666	189.00E-3	PASS
14	826.600E-6	0.800	118.29E-3	PASS
15	3.875E-3	3.748	135.00E-3	PASS
16	634.699E-6	0.614	103.50E-3	PASS
17	3.128E-3	3.026	119.11E-3	PASS
18	1.014E-3	0.980	92.00E-3	PASS
19	6.080E-3	5.881	106.58E-3	PASS
20	575.798E-6	0.557	82.80E-3	PASS
21	6.606E-3	6.390	96.43E-3	PASS
22	1.049E-3	1.015	75.28E-3	PASS
23	4.577E-3	4.427	88.05E-3	PASS
24	633.660E-6	0.613	68.99E-3	PASS
25	2.693E-3	2.605	81.00E-3	PASS
26	954.876E-6	0.924	63.69E-3	PASS
27	603.163E-6	0.583	75.00E-3	PASS
28	563.846E-6	0.545	59.14E-3	PASS
29	1.683E-3	1.628	69.83E-3	PASS
30	651.872E-6	0.631	55.20E-3	PASS
31	2.371E-3	2.293	65.32E-3	PASS
32	617.490E-6	0.597	51.75E-3	PASS
33	2.313E-3	2.238	61.36E-3	PASS
34	619.118E-6	0.599	48.71E-3	PASS
35	1.537E-3	1.487	57.86E-3	PASS
36	609.259E-6	0.589	46.00E-3	PASS
37	858.899E-6	0.831	54.73E-3	PASS
38	552.790E-6	0.535	43.58E-3	PASS
39	935.659E-6	0.905	51.92E-3	PASS
40	646.854E-6	0.626	41.40E-3	PASS

Maximum harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	103.606E-3	100.000		
2	1.170E-3	1.129	2.16	PASS
3	83.874E-3	80.955	4.60	PASS
4	1.931E-3	1.864	860.00E-3	PASS
5	77.628E-3	74.927	2.28	PASS
6	812.338E-6	0.784	600.00E-3	PASS
7	61.093E-3	58.967	1.54	PASS
8	764.689E-6	0.738	460.00E-3	PASS
9	43.928E-3	42.399	800.00E-3	PASS
10	1.012E-3	0.977	368.00E-3	PASS
11	29.067E-3	28.055	660.00E-3	PASS
12	908.323E-6	0.877	306.66E-3	PASS
13	14.290E-3	13.793	420.00E-3	PASS
14	891.760E-6	0.861	262.86E-3	PASS
15	4.058E-3	3.916	300.00E-3	PASS
16	722.895E-6	0.698	230.00E-3	PASS
17	3.322E-3	3.207	264.70E-3	PASS
18	1.139E-3	1.099	204.44E-3	PASS
19	6.237E-3	6.020	236.84E-3	PASS
20	650.921E-6	0.628	184.00E-3	PASS
21	6.722E-3	6.488	214.28E-3	PASS
22	1.139E-3	1.100	167.28E-3	PASS
23	4.697E-3	4.534	195.66E-3	PASS
24	717.536E-6	0.693	153.32E-3	PASS
25	2.792E-3	2.695	180.00E-3	PASS
26	1.041E-3	1.005	141.54E-3	PASS
27	677.390E-6	0.654	166.66E-3	PASS
28	614.130E-6	0.593	131.42E-3	PASS
29	1.759E-3	1.698	155.18E-3	PASS
30	713.875E-6	0.689	122.66E-3	PASS
31	2.462E-3	2.376	145.16E-3	PASS
32	703.805E-6	0.679	115.00E-3	PASS
33	2.428E-3	2.343	136.36E-3	PASS
34	676.075E-6	0.653	108.24E-3	PASS
35	1.771E-3	1.710	128.58E-3	PASS
36	671.761E-6	0.648	102.22E-3	PASS
37	911.717E-6	0.880	121.62E-3	PASS
38	622.430E-6	0.601	96.84E-3	PASS
39	1.018E-3	0.982	115.38E-3	PASS
40	752.266E-6	0.726	92.00E-3	PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.45	100.632		
2	67.57E-3	0.029	0.2	PASS
3	158.12E-3	0.069	0.9	PASS
4	15.94E-3	0.007	0.2	PASS
5	44.69E-3	0.019	0.4	PASS
6	12.02E-3	0.005	0.2	PASS
7	95.62E-3	0.042	0.3	PASS
8	15.97E-3	0.007	0.2	PASS
9	72.36E-3	0.031	0.2	PASS
10	9.02E-3	0.004	0.2	PASS
11	23.33E-3	0.010	0.1	PASS
12	13.23E-3	0.006	0.1	PASS
13	63.13E-3	0.027	0.1	PASS
14	11.19E-3	0.005	0.1	PASS
15	22.11E-3	0.010	0.1	PASS
16	9.83E-3	0.004	0.1	PASS
17	13.44E-3	0.006	0.1	PASS
18	10.45E-3	0.005	0.1	PASS
19	29.57E-3	0.013	0.1	PASS
20	10.70E-3	0.005	0.1	PASS
21	39.51E-3	0.017	0.1	PASS
22	11.87E-3	0.005	0.1	PASS
23	26.81E-3	0.012	0.1	PASS
24	12.91E-3	0.006	0.1	PASS
25	15.26E-3	0.007	0.1	PASS
26	10.97E-3	0.005	0.1	PASS
27	23.50E-3	0.010	0.1	PASS
28	15.68E-3	0.007	0.1	PASS
29	32.63E-3	0.014	0.1	PASS
30	10.31E-3	0.004	0.1	PASS
31	28.90E-3	0.013	0.1	PASS
32	11.03E-3	0.005	0.1	PASS
33	19.73E-3	0.009	0.1	PASS
34	11.35E-3	0.005	0.1	PASS
35	18.05E-3	0.008	0.1	PASS
36	10.56E-3	0.005	0.1	PASS
37	25.55E-3	0.011	0.1	PASS
38	11.48E-3	0.005	0.1	PASS
39	27.56E-3	0.012	0.1	PASS
40	10.72E-3	0.005	0.1	PASS

Harmonic current results - DS: 12

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	103.352E-3	100.000		
2	926.032E-6	0.896	1.08	PASS
3	83.757E-3	81.041	2.30	PASS
4	1.823E-3	1.763	430.00E-3	PASS
5	77.452E-3	74.940	1.14	PASS
6	649.967E-6	0.629	300.00E-3	PASS
7	60.866E-3	58.892	770.00E-3	PASS
8	732.364E-6	0.709	230.00E-3	PASS
9	43.599E-3	42.185	400.00E-3	PASS
10	891.259E-6	0.862	184.00E-3	PASS
11	28.800E-3	27.866	330.00E-3	PASS
12	884.144E-6	0.855	153.33E-3	PASS
13	13.926E-3	13.475	210.00E-3	PASS
14	777.239E-6	0.752	131.43E-3	PASS
15	3.683E-3	3.564	150.00E-3	PASS
16	629.864E-6	0.609	115.00E-3	PASS
17	3.266E-3	3.160	132.35E-3	PASS
18	1.024E-3	0.990	102.22E-3	PASS
19	6.221E-3	6.019	118.42E-3	PASS
20	561.889E-6	0.544	92.00E-3	PASS
21	6.684E-3	6.467	107.14E-3	PASS
22	1.064E-3	1.029	83.64E-3	PASS
23	4.568E-3	4.420	97.83E-3	PASS
24	651.190E-6	0.630	76.66E-3	PASS
25	2.683E-3	2.596	90.00E-3	PASS
26	933.890E-6	0.904	70.77E-3	PASS
27	580.964E-6	0.562	83.33E-3	PASS
28	537.537E-6	0.520	65.71E-3	PASS
29	1.740E-3	1.683	77.59E-3	PASS
30	613.010E-6	0.593	61.33E-3	PASS
31	2.426E-3	2.347	72.58E-3	PASS
32	621.079E-6	0.601	57.50E-3	PASS
33	2.365E-3	2.288	68.18E-3	PASS
34	631.753E-6	0.611	54.12E-3	PASS
35	1.490E-3	1.441	64.29E-3	PASS
36	631.514E-6	0.611	51.11E-3	PASS
37	881.833E-6	0.853	60.81E-3	PASS
38	532.572E-6	0.515	48.42E-3	PASS
39	860.089E-6	0.832	57.69E-3	PASS
40	675.645E-6	0.654	46.00E-3	PASS

Caution: Results related to the 100% limit values

Harmonic voltage results - DS: 12

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.44	100.625		
2	55.73E-3	0.024	0.2	PASS
3	134.73E-3	0.059	0.9	PASS
4	10.64E-3	0.005	0.2	PASS
5	32.44E-3	0.014	0.4	PASS
6	8.87E-3	0.004	0.2	PASS
7	77.44E-3	0.034	0.3	PASS
8	5.72E-3	0.002	0.2	PASS
9	58.06E-3	0.025	0.2	PASS
10	1.60E-3	0.001	0.2	PASS
11	12.39E-3	0.005	0.1	PASS
12	2.98E-3	0.001	0.1	PASS
13	60.94E-3	0.026	0.1	PASS
14	11.19E-3	0.005	0.1	PASS
15	13.76E-3	0.006	0.1	PASS
16	6.48E-3	0.003	0.1	PASS
17	8.90E-3	0.004	0.1	PASS
18	2.83E-3	0.001	0.1	PASS
19	19.06E-3	0.008	0.1	PASS
20	6.34E-3	0.003	0.1	PASS
21	31.93E-3	0.014	0.1	PASS
22	4.97E-3	0.002	0.1	PASS
23	21.17E-3	0.009	0.1	PASS
24	9.28E-3	0.004	0.1	PASS
25	8.85E-3	0.004	0.1	PASS
26	4.92E-3	0.002	0.1	PASS
27	20.09E-3	0.009	0.1	PASS
28	1.25E-3	0.001	0.1	PASS
29	25.30E-3	0.011	0.1	PASS
30	7.98E-3	0.003	0.1	PASS
31	24.55E-3	0.011	0.1	PASS
32	4.66E-3	0.002	0.1	PASS
33	15.51E-3	0.007	0.1	PASS
34	6.21E-3	0.003	0.1	PASS
35	15.04E-3	0.007	0.1	PASS
36	3.45E-3	0.002	0.1	PASS
37	17.82E-3	0.008	0.1	PASS
38	8.04E-3	0.003	0.1	PASS
39	25.61E-3	0.011	0.1	PASS
40	1.09E-3	0.000	0.1	PASS

Power and THD results - DS: 12

True power P:	130.0W	Apparent power S:	134.4VA
Reactiv power Q:	34.10var	Power factor:	0.432
THD (U):	0.001	THD (I):	1.362
Crest Factor (U):	1.412	Crest Factor (I):	3.204

3.4 VOLTAGE FLUCTUATION AND FLICKERS

3.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKERS

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

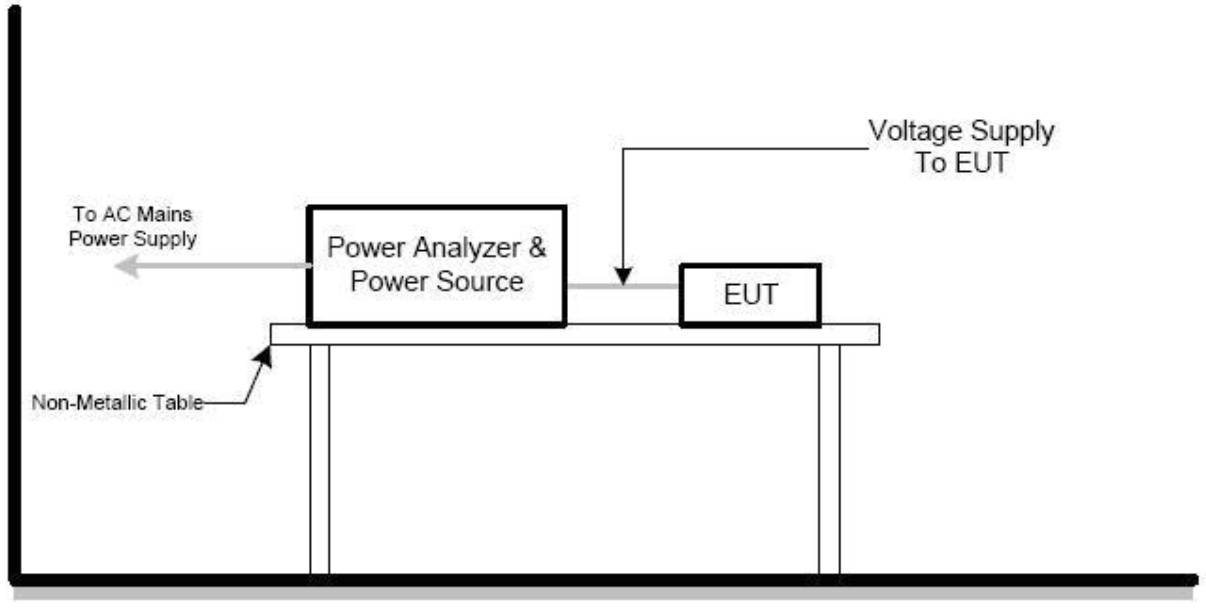
3.4.1.1TEST PROCEDURE

a. Harmonic Current Test:
Test was performed according to the procedures specified in Clause 5.0 of IEC555-2 and/or Sub-clause 6.2 of IEC/EN 61000-3-2 depend on which standard adopted for compliance measurement.
b. Fluctuation and Flickers Test:
Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.
c. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

3.4.1.2 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.4.1.3 TEST SETUP



3.4.2 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.005	3.30	PASS
dmax [%]	0.224	7.00	PASS
dt [s]	0.000	0.50	PASS

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/ SERVRITY LEVEL/ CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform. Criteria
1. ESD IEC/EN 61000-4-2	8KV air discharge 4KV contact discharge	Direct Mode	B
	4KV HCP discharge 4KV VCP discharge	Indirect Mode	B
2. RS IEC/EN 61000-4-3	80 MHz to 1000 MHz, 1000Hz, 80%, AM modulated	Enclosure	A
3. EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5KHz Repetition Freq.	Power Supply Port	B
	5/50ns Tr/Th 5KHz Repetition Freq.	CTL/Signal Data Line Port	B
4. Surges IEC/EN 61000-4-5	1.2/50(8/20) Tr/Th us	L-N	B
	1.2/50(8/20) Tr/Th us	L-PE N-PE	B
5 Injected Current IEC/EN 61000-4-6	0.15 MHz to 80 MHz, 1000Hz 80 % , AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz, 1000Hz 80 % , AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz, 1000Hz 80 % , AM Modulated 150Ω source impedance	DC Power Port	A
6. Power Frequency Magnetic Field IEC/EN 61000-4-8	50 Hz,	Enclosure	A
7. Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 0% Voltage dip 30% Voltage dip 60%	AC Power Port	C C C

4.2 GENERAL PERFORMANCE CRITERIA

According to **EN 55014-2** standard, the general performance criteria as following:

Criterion A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss 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.
Criterion B	After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena 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. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
Criterion C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

4.3 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

4.4 ESD TESTING

4.4.1 TEST SPECIFICATION

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

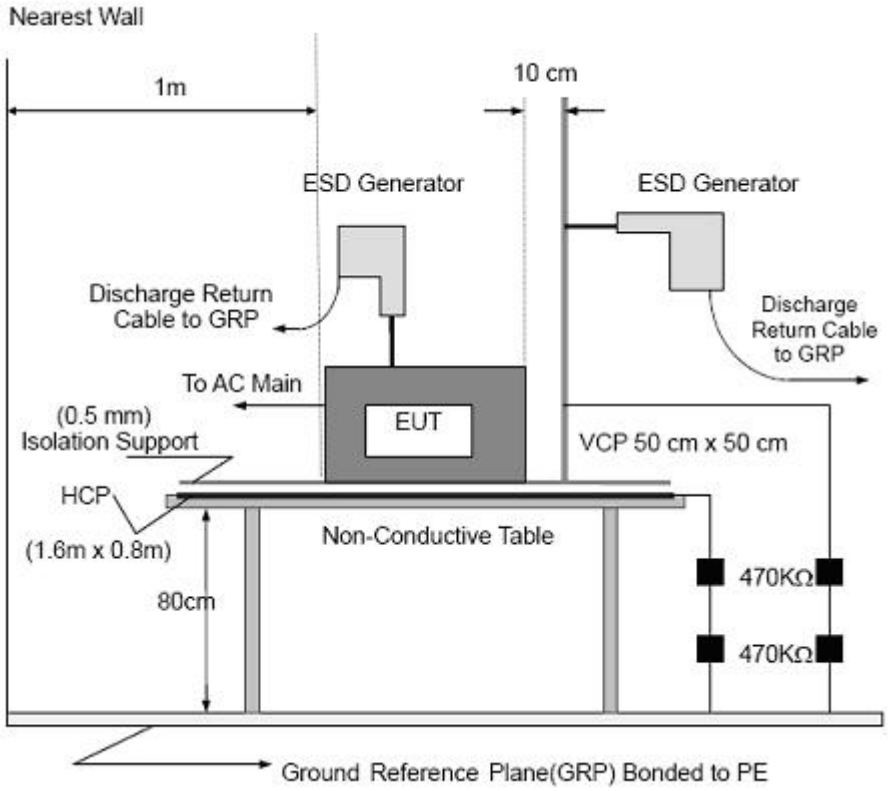
4.4.2 TEST PROCEDURE

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

a. Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

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

4.4.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.4.4 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

Mode	Air Discharge								Contact Discharge								Criterion	Result
Test level (kV)	2		4		8		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
HCP									A	A	A	A						**PASS**
VCP									A	A	A	A						**PASS**
Slit	A	A	A	A	A	A												**PASS**
Surface											A	A						**PASS**
Screw											A	A					**B**	**PASS**

Note:

1) +/- denotes the Positive/Negative polarity of the output voltage.
2) Test condition:
   Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point. Air discharges: Minimum 10 times (Positive/Negative) at each point.
3) Test location(s) in which discharge (Air and contact discharge) to be applied illustrated by photos shown in next page(s)
4) The Indirect (HCP/VCP) discharges description of test point as following:
   1. left side 2.right side 3.front side 4.rear side.
5) N/A - denotes test is not applicable in this test report.

4.4.5 PHOTO(S) SHOWN THE LOCATION(S) OF ESD EVALUATED

4.5 RS TESTING

4.5.1 TEST SPECIFICATION

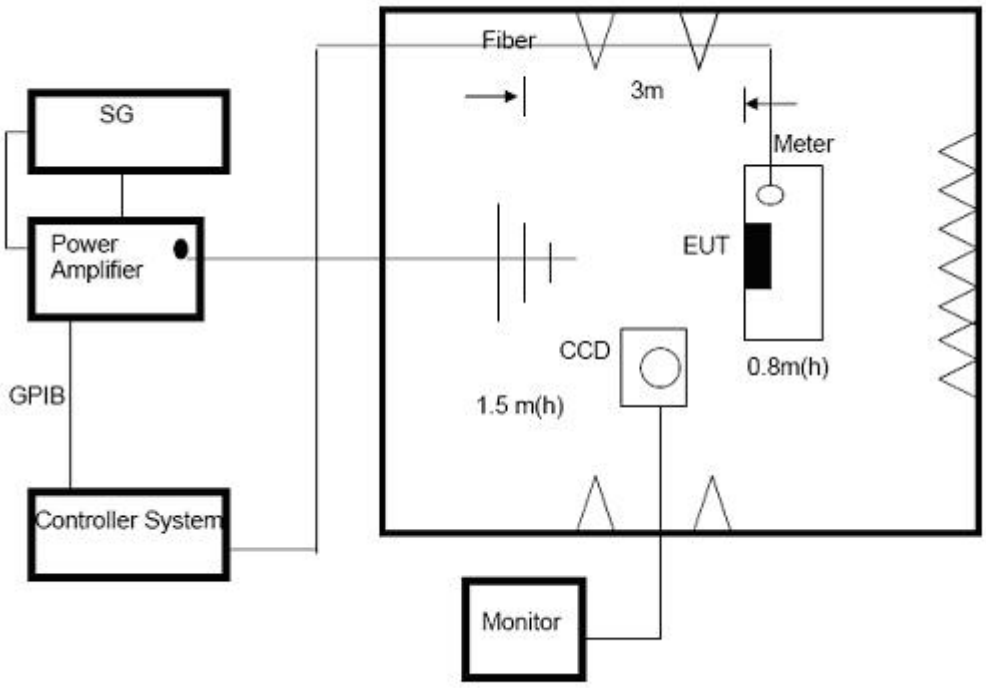
Basic Standard:	IEC/EN 61000-4-3
Required Performance	A
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least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

4.5.2 TEST PROCEDURE

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

a. The frequency range is swept from 80 MHz to 1000 MHz, & 1400MHz - 2700MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
b. Sweep Frequency 900 MHz, with the Duty Cycle: 1/8 and Modulation: Pulse 217 Hz(if applicable)
c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.5.3 TEST SETU



Note:

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

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

4.5.4 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results	Judgment
80MHz - 1000MHz	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	**A**	**A**	**PASS**
			Rear			
			Left			
			Right			

Note:

1) N/A - denotes test is not applicable in this test report.
2) Criteria A: There was no change operated with initial operating during the test.
3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
4) Criteria C: The system shut down during the test.

4.6 EFT/BURST TESTING

4.6.1 TEST SPECIFICATION

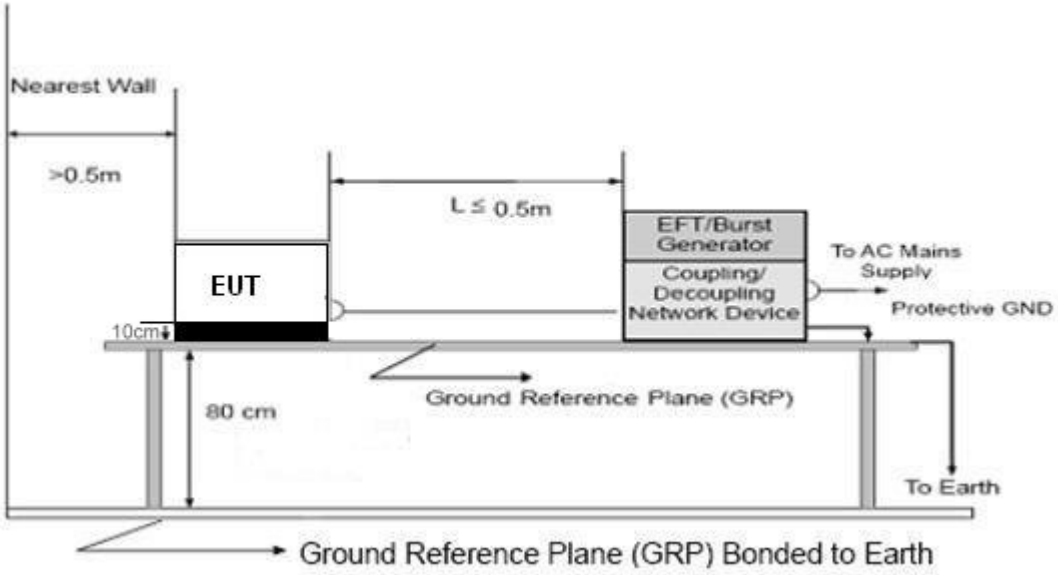
Basic Standard:	IEC/EN 61000-4-4
Required Performance	B
Test Voltage:	Power Line：1 kV Signal/Control Line：0.5 KV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

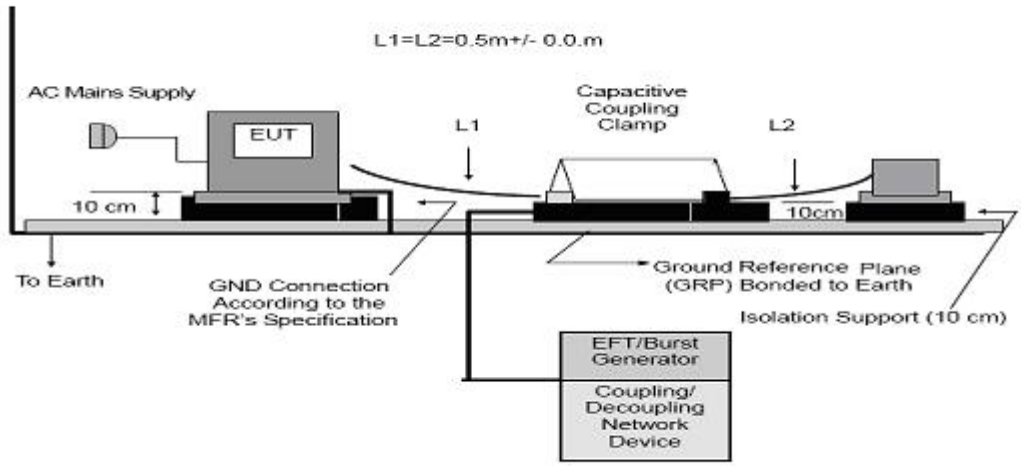
4.6.2 TEST PROCEDURE

The EUT and its simulators were placed on a ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. The other condition as following manner:

a. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
b. Both positive and negative polarity discharges were applied.
c. The duration time of each test sequential was 1 minute.

4.6.3 TEST SETUP





Note:

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

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

4.6.4 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

Coupling Line		Test level (kV)								Criterion	Result
		0.5		1		2		4			
		+	-	+	-	+	-	+	-		
AC line	L	A	A	A	A					B	**PASS**
	N	A	A	A	A						**PASS**
	PE										
	L+N	A	A	A	A						**PASS**
	L+PE										
	N+PE										
	L+N+PE										
DC Line											
Signal Line											

Note:

1) +/- denotes the Positive/Negative polarity of the output voltage.

2) N/A - denotes test is not applicable in this test report.

3) Criteria A: There was no change operated with initial operating during the test.

4) Criteria B: The EUT function loss during the test, but self-recoverable after the test.

5) Criteria C: The system shut down during the test.

4.7 SURGE TESTING

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Line：0.5 kV, 1 kV, 2 kV
Surge Input/Output:	L-N, L-PE, N-PE
Generator Source:	2 ohm between networks
Impedance:	12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

4.7.2 TEST PROCEDURE

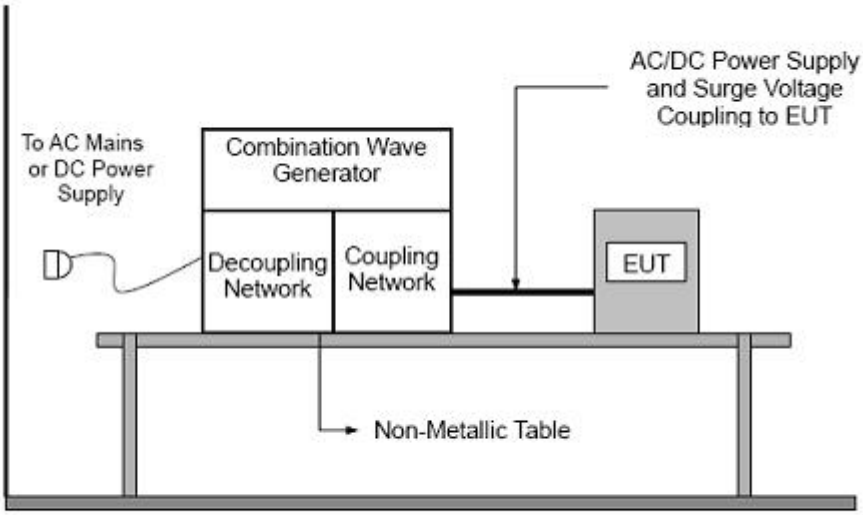
a. For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling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

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

c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

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

4.7.3 TEST SETUP



4.7.4 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

Coupling Line			Test level								Criterion	Result
			0.5 kV		1 kV		2 kV		4 kV			
			+	-	+	-	+	-	+	-		
AC line	L-N	0°	A	A	A	A					B	PASS
		90°	A	A	A	A						
		180°	A	A	A	A						
		270°	A	A	A	A						
	L-PE											
	N-PE											
DC Line												
Signal Line												

Note:

1) Polarity and Numbers of Impulses：5 Pst / Ngt at each tested mode.
2) N/A - denotes test is not applicable in this Test Report.
3) Criteria A: There was no change operated with initial operating during the test.
4) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
5) Criteria C: The system shut down during the test.

4.8 INJECTION CURRENT TESTING

4.8.1 TEST SPECIFICATION

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

4.8.2 TEST PROCEDURE

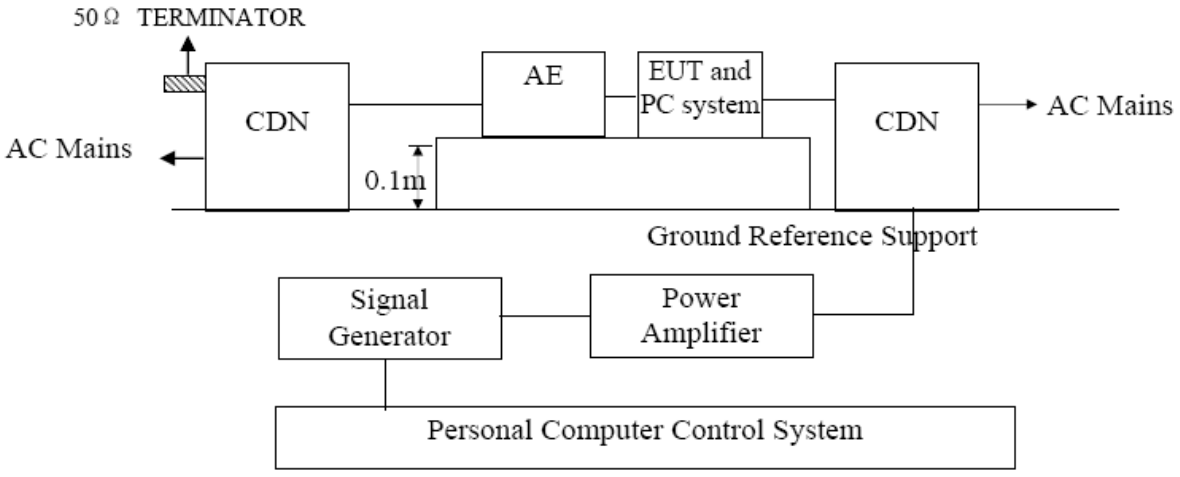
The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50mm (where possible). The disturbance signal described below is injected to EUT through CDN.

The other condition as following manner:

a. The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

b. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

4.8.3 TEST SETUP



NOTE:

FLOOR-STANDING EQUIPMENT

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

4.8.4 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

Test Ports (Mode)	Freq. Range MHz)	Field Strength	Perform. Criteria	Results	Judgment
Input/ Output AC. Power Port	0.15 ---80	3V(rms) AM Modulated 1000Hz, 80%	**A**	**A**	**PASS**
Input/ Output DC. Power Port	0.15 --- 80		**A**	**N/A**	**N/A**
Signal Line	0.15 --- 80		**A**	**N/A**	**N/A**

Note:

1) N/A - denotes test is not applicable in this Test Report.
2) Criteria A: There was no change operated with initial operating during the test.
3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
4) Criteria C: The system shut down during the test.

4.9 VOLTAGE INTERRUPTION/DIPS TESTING

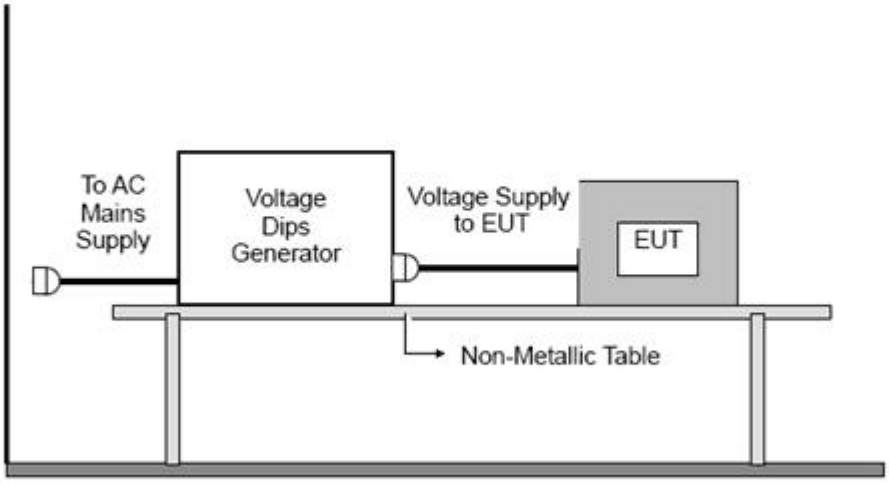
4.9.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance:	C (For 0% Voltage Dips) C (For 30% Voltage Dips) C (For 60% Voltage Dips)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

4.9.2 TEST PROCEDURE

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

4.9.3 TEST SETUP



4.9.4 TEST RESULTS

EUT：	CARTRIDGE HEATERS	Model Name. ：	10*150
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Date：	2020-08-26
Test Mode：	Running		
Test Power：	AC 230V/50Hz		

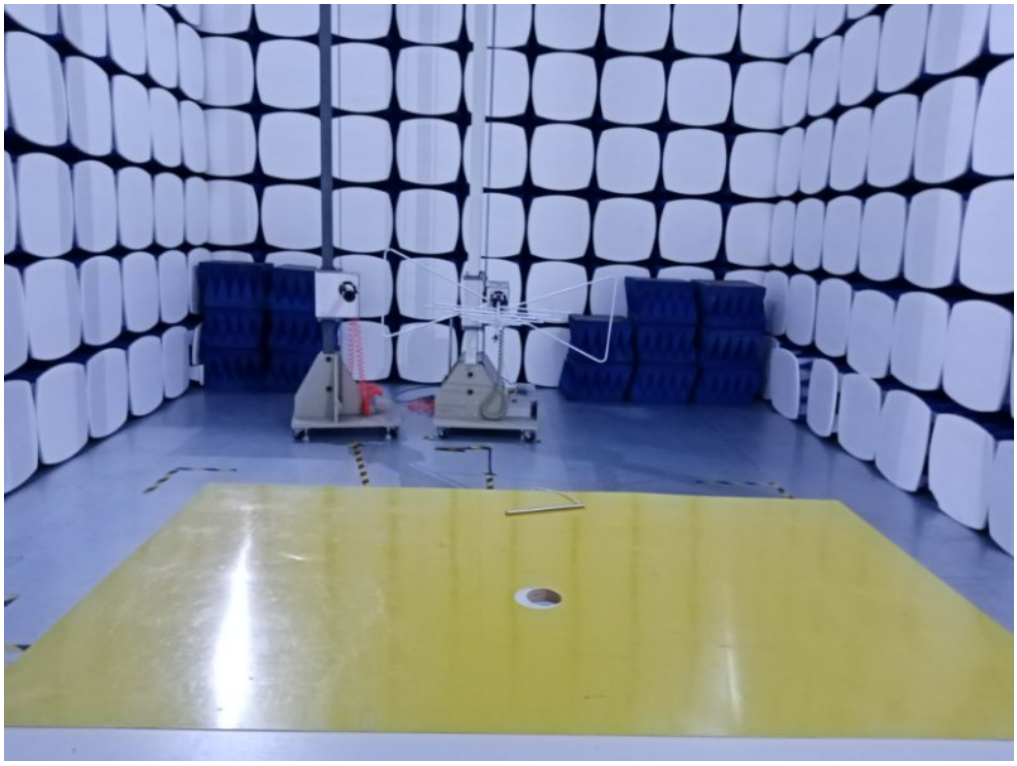
Interruption & Dips	Duration (T)	Perform Criteria	Results	Judgment
Voltage dip 0%	0.5	C	B	PASS
Voltage dip 60%	10	C	B	PASS
Voltage dip 30%	50	C	B	PASS

Note:

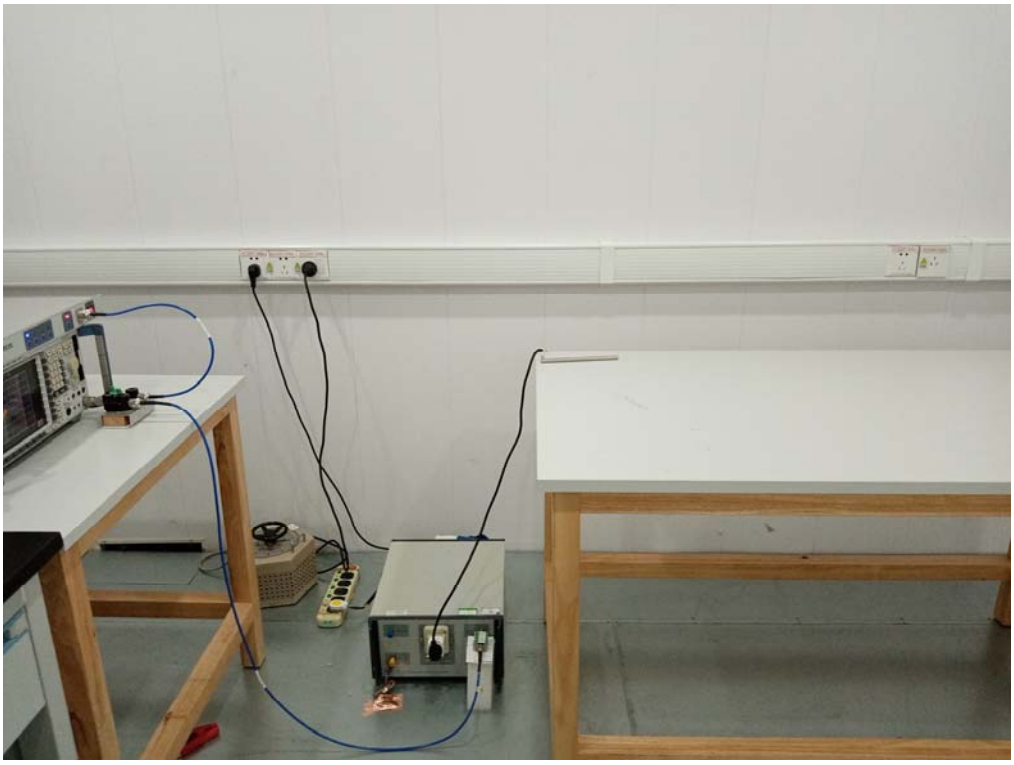
1). N/A - denotes test is not applicable in this test report.
2) Criteria A: There was no change operated with initial operating during the test.
3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
4) Criteria C: The system shut down during the test.

5. EUT TEST PHOTO

Radiated Emission



Conducted Emission



ATTACHMENT PHOTOGRAPHS OF EUT

Photo 1

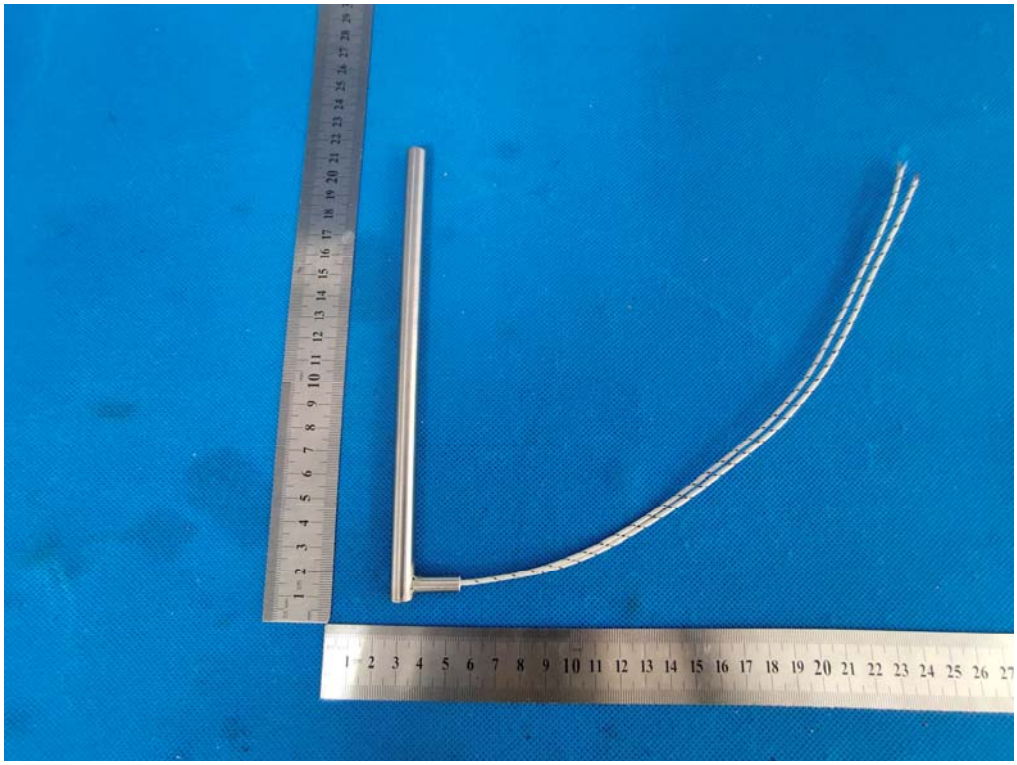


Photo 2