

EMC Test Report

Client Name : Shenzhen Zk electric technology co., limited

Address : Room 617, Guanlida Building, NO. 269 of Qianjin Road,
Wenhui community, Xin'an street, Bao'an District, Shenzhen
city.

Product Name : Inverter

Date : Jun. 21, 2021



Anbotek (Guangzhou) Compliance Laboratory Limited

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TEST REPORT

Applicant : Shenzhen Zk electric technology co., limited

Manufacturer : Shenzhen Zk electric technology co., limited

Product Name : Inverter

Model No. : See Chapter 1.9

Trade Mark : ZK

Rating(s) : See Chapter 1.9

Test Standard(s) : EN IEC 61800-3: 2018;
EN 61000-3-12: 2011;
EN 61000-3-11: 2000;
(IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5;
IEC 61000-4-6; IEC 61000-4-34)

The device described above is tested by Anbotek (Guangzhou) Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Anbotek (Guangzhou) Compliance Laboratory Limited is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the EN IEC 61800-3, EN 61000-3-12 and EN 61000-3-11 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Anbotek (Guangzhou) Compliance Laboratory Limited.

Date of Receipt: May 08, 2021

Date of Test: May 09 ~ May 14, 2021

Prepared By:


Jet Zhao

(Jet Zhao)

Approved & Authorized Signer:


Stephen Liu

(Stephen Liu)

1. General Information

1.1. Client Information

Applicant	:	Shenzhen Zk electric technology co., limited
Address	:	Room 617, Guanlida Building, NO. 269 of Qianjin Road, Wenhui community, Xin'an street, Bao'an District, Shenzhen city.
Manufacturer	:	Shenzhen Zk electric technology co., limited
Address	:	Room 617, Guanlida Building, NO. 269 of Qianjin Road, Wenhui community, Xin'an street, Bao'an District, Shenzhen city.
Factory	:	Shenzhen Zk electric technology co., limited
Address	:	Room 617, Guanlida Building, NO. 269 of Qianjin Road, Wenhui community, Xin'an street, Bao'an District, Shenzhen city.

1.2. Description of Device (EUT)

Product Name	:	Inverter
Model No.	:	See Chapter 1.9 (Note: All samples are the same except the model number & appearance, so we prepare "SU100-D3-004G-B" for test only.)
Trade Mark	:	ZK
Test Power Supply	:	AC 400V, 50Hz
Test Sample No.	:	1-1-1
Product Description	:	Adapter: N/A

Remark: (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

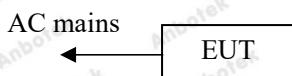
1.3. Auxiliary Equipment Used During Test

N/A	
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1.4. Description of Test Mode

Pretest Mode	Description
Mode 1	Working

For Mode 1 Block Diagram of Test Setup



1.5. Test Summary

Test Items	Test Mode	Status
Power Line Conducted Emission Test (150KHz To 30MHz)	Mode 1	P
Radiated Emission Test (30MHz To 1000MHz)	Mode 1	P
Harmonic Current Test	Mode 1	P
Voltage Fluctuations and Flicker Test	Mode 1	P
Electrostatic Discharge immunity Test	Mode 1	P
RF Field Strength susceptibility Test	Mode 1	P
Electrical Fast Transient/Burst Immunity Test	Mode 1	P
Surge Immunity Test	Mode 1	P
Injected Currents Susceptibility Test	Mode 1	P
Magnetic Field Susceptibility Test	/	N
Voltage Dips and Interruptions Test	Mode 1	P
Harmonics(THD and individual harmonic orders)	Mode 1	P
Harmonics short term (<15s)	Mode 1	P
Voltage deviations	Mode 1	P
Voltage dips and short interruptions	Mode 1	P
Voltage unbalance	Mode 1	P
Frequency variations	Mode 1	P
Frequency rate of change	Mode 1	P

P) Indicates "PASS".

N) Indicates "Not applicable".

1.6. Test Equipment List

Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Schwarzbeck	NSLK 8126	8126377	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
2.	Pre-amplifier	Schwarzbeck	BBV-9745	9745-075	Oct. 26, 2020	1 Year
3.	Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	01109	Nov. 02, 2020	2 Year
4.	Software Name EZ-EMC	Ferrari Technology	EMEC-3A1	N/A	N/A	N/A

Harmonic and Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Programmable AC Power source	IVYTECH	APS-5005A	632734	Oct. 26, 2020	1 Year
2.	Harmonic and Flicker Analyzer	EMC-PARTNER	HMONICS 1000-1P	164	Oct. 26, 2020	1 Year
3.	Harmonics-1000	N/A	Ed.3.0+4.0	N.A	N/A	N/A

Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	emtest	ESD NX30.1	11891	Mar. 25, 2021	1 Year

Electrical Fast Transient/Burst Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.1	EFT Burst Simulator	PRIMA	EFT61004B	PR10114282	Oct. 26, 2020	1 Year
1.2	EFT-Clamp	PRIMA	EFT-Clamp	/	Oct. 26, 2020	1 Year
2.1	EFT Burst Simulator	TESEQ	NSG 3060	1480	Oct. 26, 2020	1 Year
2.2	CDN	TESEQ	CDN 3061	1408	Oct. 26, 2020	1 Year

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R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
2.	Amplifier	Micotoop	MPA-80-100 0-250	MPA1903096	Oct. 26, 2020	1 Year
3.	Amplifier	Micotoop	MPA-1000-6 000-100	MPA1903122	Oct. 26, 2020	1 Year
4.	Log-Periodic Antenna	Schwarzbeck	VULP9118E	00992	Apr.17, 2021	1 Year
5.	Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
6.	Power Sensor	Agilent	E9301A	MY41498906	Oct. 26, 2020	1 Year
7.	Power Sensor	Agilent	E9301A	MY41498088	Oct. 26, 2020	1 Year
8.	Power Meter	Agilent	E4419B	GB40202909	Oct. 26, 2020	1 Year
9.	Field Probe	ETS-Lindgren	HI-6006	00212747	Apr.17, 2021	1 Year
10.	RS Test software	EMtrace	EM 3	V1.1.7	N/A	N/A

Surge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Generator	TESEQ	NSG 3060	1480	Oct. 26, 2020	1 Year
2.	CDN	TESEQ	CDN 3061	1408	Oct. 26, 2020	1 Year
3.	Telecom port surge generator	PMI	TW101	190411	May 13, 2021	1 Year

Injected Currents Susceptibility Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	C/S Conducted Immunity Test System	FRANKONIA	CIT-10	126A1196/20 12	Oct. 26, 2020	1 Year
2.	CDN	FRANKONIA	CDN - M2+ M3	A2210178/20 12	Oct. 26, 2020	1 Year
3.	6dB Attenuator	FRANKONIA	DAM 26W	1172202	Oct. 26, 2020	1 Year
4.	CIT-10	FRANKONIA	Version1.1.7	N/A	N.A	N/A
5.	EM-Clamp	FRANKONIA	EMCL-20	18101728-01 03	May 20, 2020	1 Year

Voltage Dips and Interruptions Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CYCLE SAG Simulator	PRIMA	DRP61011A G	PR12046234	Oct. 26, 2020	1 Year

1.7. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Test Location

Anbotek (Guangzhou) Compliance Laboratory Limited.
Room 508, Building 2, No.232, Kezhu Road, Science City, Guangzhou Economic & Technology Development Area, Guangzhou, Guangdong, China.510663

1.8. EMS Performance Criteria

- ✓ A: Normal performance within the specification limits
- ✓ B: Temporary degradation or loss of function or performance which is self-recoverable
- ✓ C: Temporary degradation or loss of function or performance which requires operator intervention or system reset
- ✓ D: Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data

Note: The manufacturer's specification may define effects on the EUT which may be considered insignificant, and therefore acceptable.

This classification may be used as a guide in formulating performance criteria, by committees responsible for generic, product and product-family standards, or as a framework for the agreement on performance criteria between the manufacturer and the purchaser, for example where no suitable generic, product or product-family standard exists.

1.9. Model List and Parameters

Model	Input voltage 1 (V.AC)	Input voltage 2 (V.DC)	Output current (A)	Output voltage (V.AC)	Output frequency (Hz)
SU10M-D1-R75G-B	110	90-400	7	0-110	0-600
SU10M-D1-1R5G-B	110	90-400	10	0-110	0-600
SU10M-D2-R75G-B	220	150-450	4	0-240	0-600
SU10M-D2-1R5G-B	220	150-450	7	0-240	0-600
SU10M-D2-2R2G-B	220	150-450	10	0-240	0-600
SU10M-D3-R75G-B	380	250-750	3	0-460	0-600
SU10M-D3-1R5G-B	380	250-750	4	0-460	0-600
SU10M-D3-2R2G-B	380	250-750	5	0-460	0-600
SU10M-D3-004G-B	380	250-750	9.5	0-460	0-600
SU10M-D3-5R5G-B	380	250-750	13	0-460	0-600
SU10M-D3-7R5G-B	380	250-750	17	0-460	0-600
SU100-D1-R75G-B	110	90-400	7	0-110	0-600
SU100-D1-1R5G-B	110	90-400	10	0-110	0-600
SU100-D2-R75G-B	220	150-450	4	0-240	0-600
SU100-D2-1R5G-B	220	150-450	7	0-240	0-600
SU100-D2-2R2G-B	220	150-450	10	0-240	0-600
SU100-D2-004G-B	220	150-450	16	0-240	0-600
SU100-D3-R75G-B	380	250-780	3	0-460	0-600
SU100-D3-1R5G-B	380	250-780	4	0-460	0-600
SU100-D3-2R2G-B	380	250-780	6	0-460	0-600
SU100-D3-004G-B	380	350-750	10	0-440	0-600
SU100-D3-5R5G-B	380	250-780	13	0-460	0-600
SU100-D3-7R5G-B	380	250-780	17	0-460	0-600
SU100-D3-011G-B	380	250-780	25	0-460	0-600
SU100-D3-015G-B	380	250-780	32	0-460	0-600
SU100-D3-018G-B	380	250-780	38	0-460	0-600
SU100-D3-022G-B	380	250-780	45	0-460	0-600
SU100-D3-030G	380	250-780	60	0-460	0-600
SU100-D3-037G	380	250-780	75	0-460	0-600
SU100-D3-045G	380	250-780	90	0-460	0-600
SU100-D3-055G	380	250-780	110	0-460	0-600
SU100-D3-075G	380	250-780	150	0-460	0-600
SU100-D3-093G	380	250-780	180	0-460	0-600
SU100-D3-110G	380	250-780	210	0-460	0-600
SU100-D3-132G	380	250-780	250	0-460	0-600
SU100-D3-160G	380	250-780	310	0-460	0-600
SU100-D3-185G	380	250-780	340	0-460	0-600

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SU100-D3-200G	380	250-780	380	0-460	0-600
SU100-D3-220G	380	250-780	415	0-460	0-600
SU100-D3-250G	380	250-780	470	0-460	0-600
SU100-D3-280G	380	250-780	510	0-460	0-600
SU100-D3-315G	380	250-780	600	0-460	0-600
SU100-D3-355G	380	250-780	670	0-460	0-600
SU100-D3-400G	380	250-780	750	0-460	0-600
SU100-D3-450G	380	250-780	810	0-460	0-600
SU100-D3-500G	380	250-780	860	0-460	0-600
SU100-D3-560G	380	250-780	990	0-460	0-600
SU100-D3-630G	380	250-780	1100	0-460	0-600
SU100-D3-720G	380	250-780	1260	0-460	0-600
SU100-D3-800G	380	250-780	1450	0-460	0-600

2. Power Line Conducted Emission Test

2.1. Test Standard and Limit

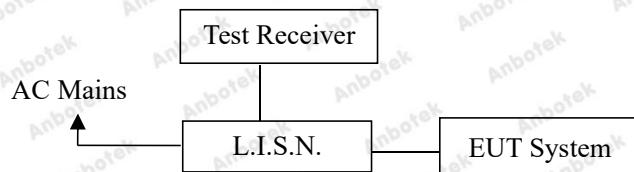
Test Standard	EN IEC 61800-3
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Limits for conducted emissions (Category C3)

Test Limit	Frequency (MHz)	At mains terminals (dB μ V)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	100	90
	0.50 ~ 5.00	86	76
	5.00~30.00	90~73	80~60

Remark: At the transition frequency the lower limit applies.

2.2. Test Setup



2.3. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN IEC 61800-3 Category C3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

2.4. Operating Condition of EUT

- 2.4.1. Setup the EUT as shown in Section 2.2.
- 2.4.2. Turn on the power of all equipments.
- 2.4.3. Let the EUT work in test mode and measure it.

2.5. Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground and connected to the AC mains through a Line Impedance Stabilization Network (L.I.S.N.). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission according to the EN IEC 61800-3 regulations during conducted emission measurement. And the voltage probe had been used for the load terminals measurement according to the EN IEC 61800-3 standard.

The bandwidth of the test receiver (ESCI) is set at 9KHz in 150KHz~30MHz.

The frequency range from 150KHz to 30MHz is investigated for AC mains.

All the test results are listed in Section 2.6.

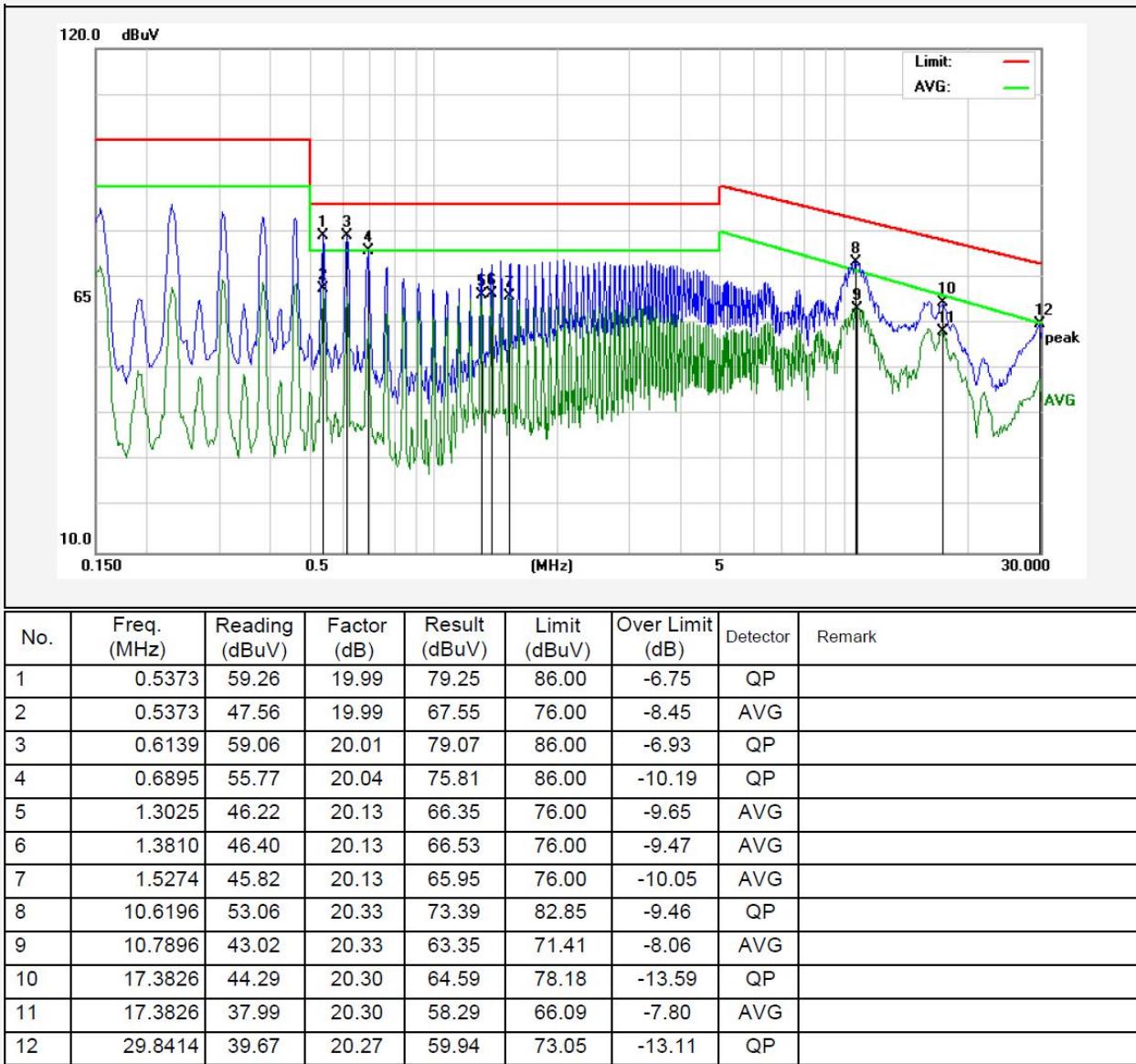
2.6. Test Results

PASS

The test curves are shown in the following pages.

Conducted Emission Test Data

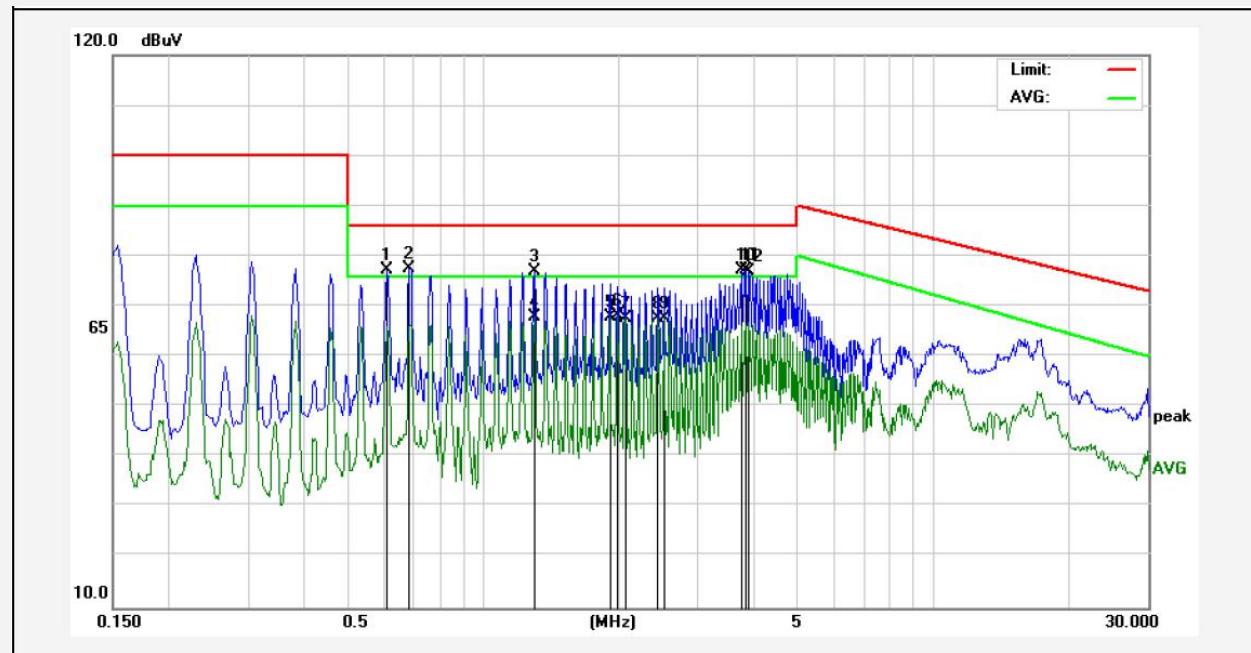
Test Site: 1# Shielded Room
 Test Specification: AC 400V, 50Hz
 Comment: Live Line 1
 Temp.: 23.5°C Hum.: 49%



Note: Result=Reading+Factor Over Limit=Result-Limit

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Test Specification: AC 400V, 50Hz
 Comment: Live Line 2
 Temp.: 23.5°C Hum.: 49%

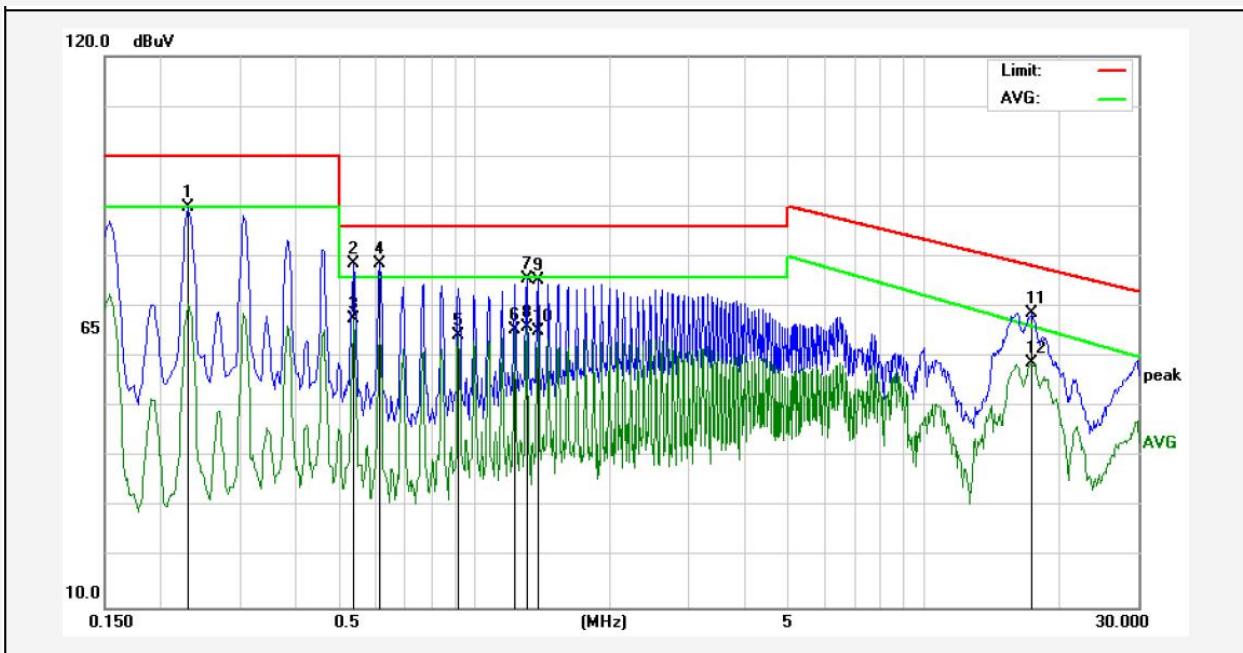


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.6075	57.23	20.01	77.24	86.00	-8.76	QP	
2	0.6824	57.41	20.03	77.44	86.00	-8.56	QP	
3	1.2960	56.96	20.13	77.09	86.00	-8.91	QP	
4	1.2960	47.75	20.13	67.88	76.00	-8.12	AVG	
5	1.9077	47.87	20.14	68.01	76.00	-7.99	AVG	
6	1.9798	47.90	20.14	68.04	76.00	-7.96	AVG	
7	2.0659	47.37	20.14	67.51	76.00	-8.49	AVG	
8	2.4346	47.47	20.15	67.62	76.00	-8.38	AVG	
9	2.5133	47.44	20.15	67.59	76.00	-8.41	AVG	
10	3.7395	57.10	20.17	77.27	86.00	-8.73	QP	
11	3.8195	57.12	20.18	77.30	86.00	-8.70	QP	
12	3.8807	56.84	20.18	77.02	86.00	-8.98	QP	

Note: Result=Reading+Factor Over Limit=Result-Limit

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Test Specification: AC 400V, 50Hz
 Comment: Live Line 3
 Temp.: 23.5°C Hum.: 49%

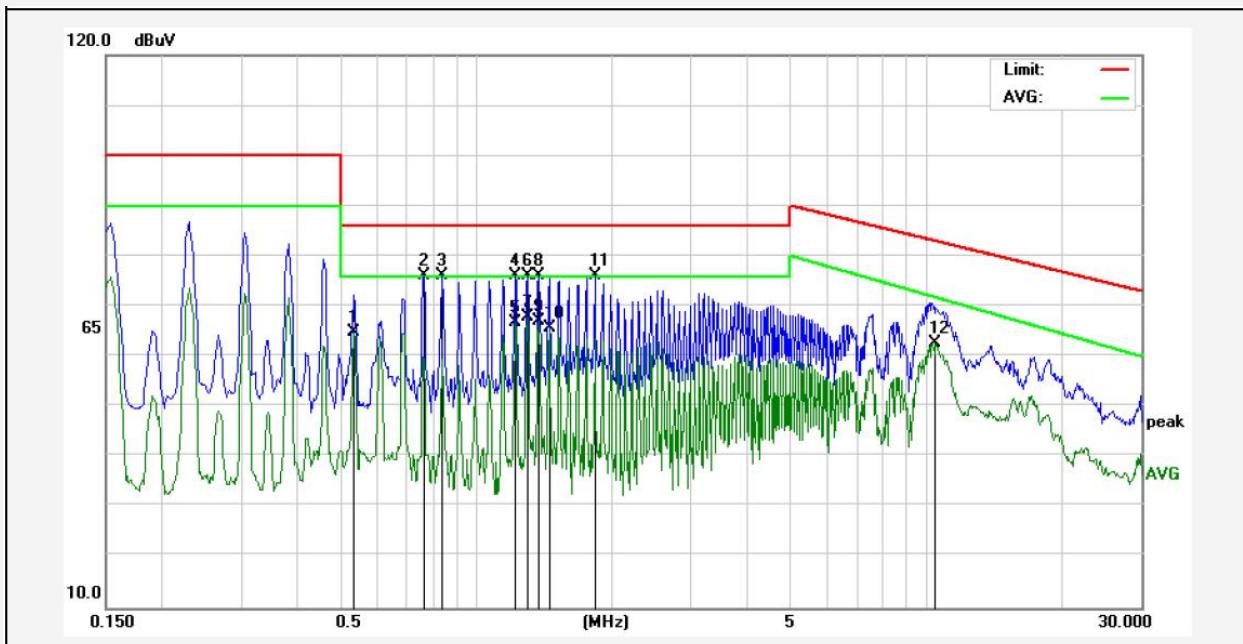


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.2291	70.11	19.89	90.00	100.00	-10.00	QP	
2	0.5377	58.76	19.99	78.75	86.00	-7.25	QP	
3	0.5377	47.56	19.99	67.55	76.00	-8.45	AVG	
4	0.6139	58.56	20.01	78.57	86.00	-7.43	QP	
5	0.9183	44.10	20.10	64.20	76.00	-11.80	AVG	
6	1.2291	45.23	20.12	65.35	76.00	-10.65	AVG	
7	1.3028	55.47	20.13	75.60	86.00	-10.40	QP	
8	1.3028	45.72	20.13	65.85	76.00	-10.15	AVG	
9	1.3810	55.29	20.13	75.42	86.00	-10.58	QP	
10	1.3810	44.90	20.13	65.03	76.00	-10.97	AVG	
11	17.3826	48.29	20.30	68.59	78.18	-9.59	QP	
12	17.3826	38.49	20.30	58.79	66.09	-7.30	AVG	

Note: Result=Reading+Factor Over Limit=Result-Limit

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Test Specification: AC 400V, 50Hz
 Comment: Neutral Line
 Temp.: 23.5°C Hum.: 49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.5322	44.94	19.99	64.93	76.00	-11.07	AVG	
2	0.7630	56.11	20.06	76.17	86.00	-9.83	QP	
3	0.8393	56.12	20.08	76.20	86.00	-9.80	QP	
4	1.2161	56.03	20.12	76.15	86.00	-9.85	QP	
5	1.2161	46.79	20.12	66.91	76.00	-9.09	AVG	
6	1.2960	55.96	20.13	76.09	86.00	-9.91	QP	
7	1.2960	47.75	20.13	67.88	76.00	-8.12	AVG	
8	1.3736	56.07	20.13	76.20	86.00	-9.80	QP	
9	1.3736	46.86	20.13	66.99	76.00	-9.01	AVG	
10	1.4484	45.65	20.13	65.78	76.00	-10.22	AVG	
11	1.8287	55.90	20.14	76.04	86.00	-9.96	QP	
12	10.4524	42.37	20.33	62.70	71.77	-9.07	AVG	

Note: Result=Reading+Factor Over Limit=Result-Limit

3. Radiated Emission Test

3.1. Test Standard and Limit

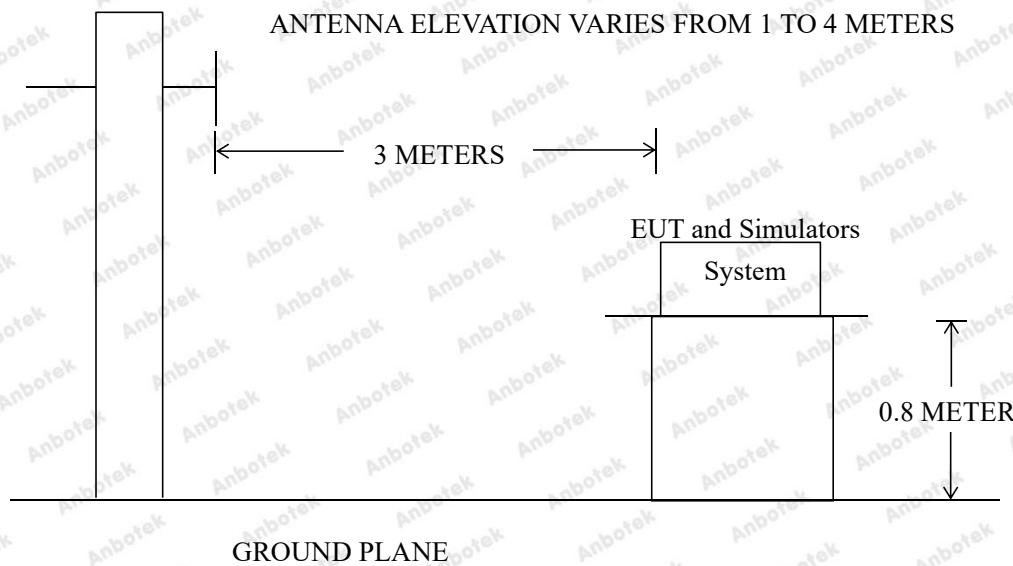
Test Standard	EN IEC 61800-3
---------------	----------------

Radiated Emission Test Limit (Category C3)

Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
	30 ~ 230	3	60
	230 ~ 1000	3	70

Remark: (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.

3.2. Test Setup



3.3. EUT Configuration on Measurement

The EN IEC 61800-3 Category C3 regulations test method must be used to find the maximum emission during radiated emission measurement.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT as shown in Section 3.2.
- 3.4.2. Turn on the power of all equipments.
- 3.4.3. Let the EUT work in test mode and measure it.

3.5. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table 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 an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the Receiver (ESCI) is set at 120kHz.

The EUT is tested in Chamber.

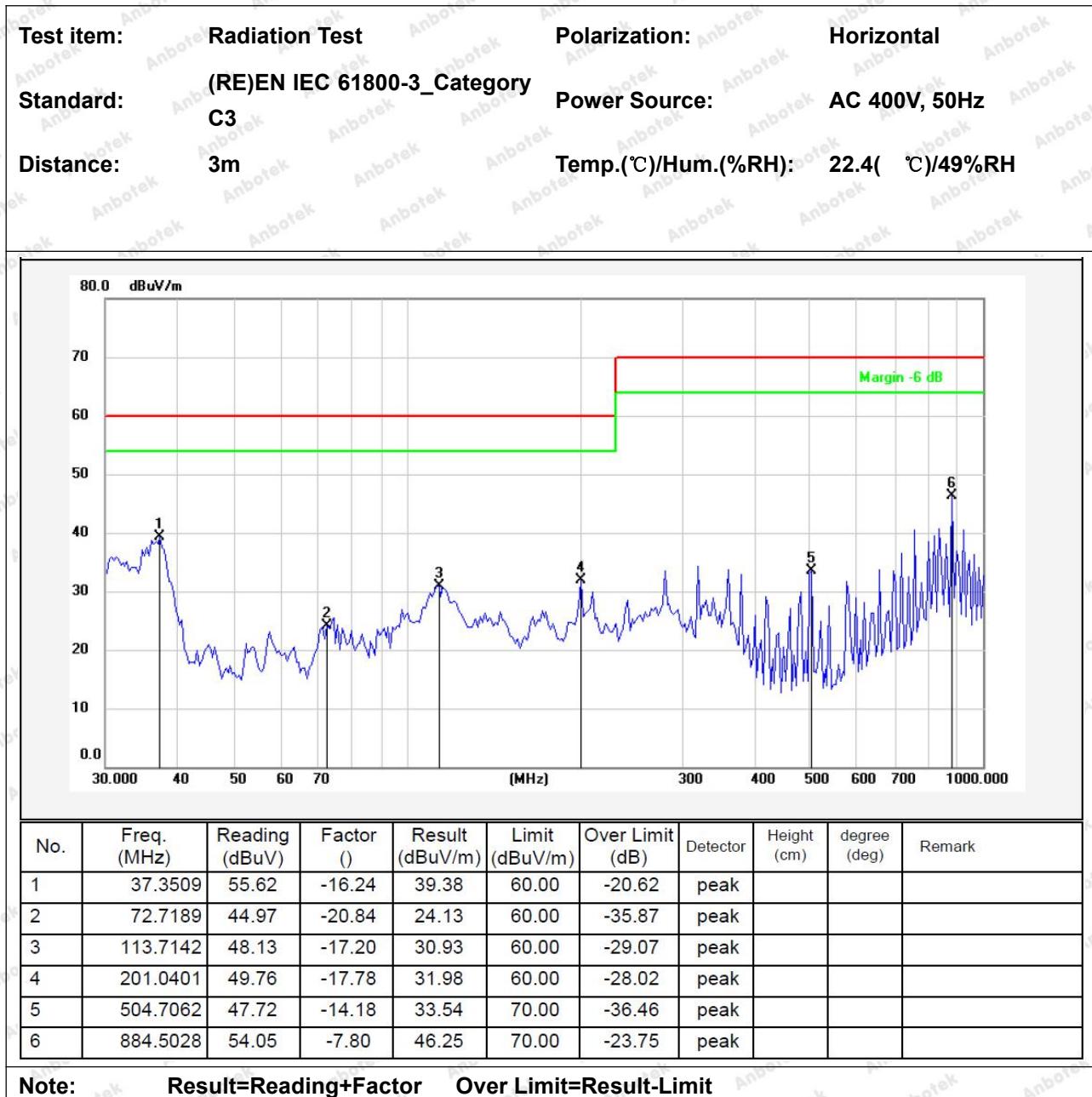
The test results are listed in Section 3.6.

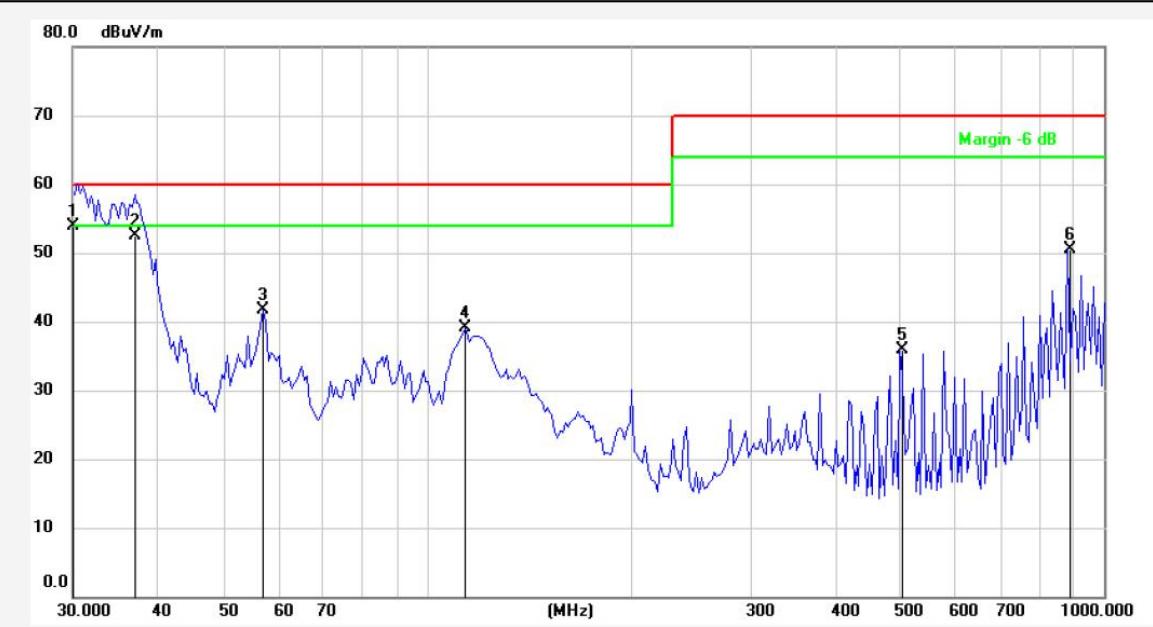
3.6. Test Results

PASS

The frequency range from 30MHz to 1000MHz is investigated.

The test curves are shown in the following pages.



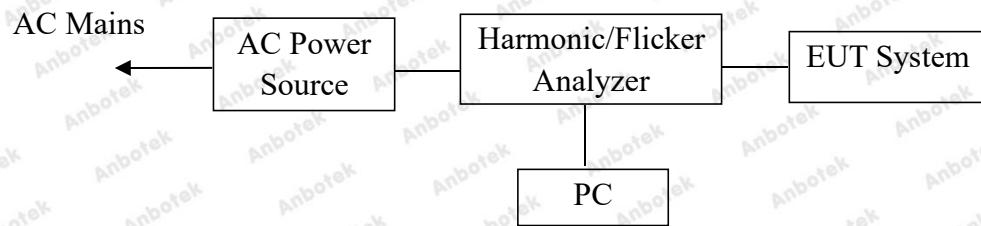
Test item:	Radiation Test		Polarization:	Vertical						
Standard:	(RE)EN IEC 61800-3_Category		Power Source:	AC 400V, 50Hz						
Distance:	C3		Temp.(°C)/Hum.(%RH):							
Distance:	3m		22.4(°C)/49%RH							
										
No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	30.1456	70.63	-16.81	53.82	60.00	-6.18	QP	100	360	
2	37.0248	68.84	-16.33	52.51	60.00	-7.49	QP	100	0	
3	57.3923	57.99	-16.26	41.73	60.00	-18.27	peak			
4	113.7143	56.36	-17.20	39.16	60.00	-20.84	peak			
5	500.3011	50.09	-14.27	35.82	70.00	-34.18	peak			
6	884.5029	58.24	-7.80	50.44	70.00	-19.56	peak			
Note: Result=Reading+Factor Over Limit=Result-Limit										

4. Harmonic Current Emission Test

4.1. Test Standard

Test Standard	EN 61000-3-12
---------------	---------------

4.2. Test Setup



4.3. Operating Condition of EUT

- 4.3.1. Setup the EUT as shown on Section 4.2.
- 4.3.2. Turn on the power of all equipments.
- 4.3.3. After that, let the EUT work in test mode measure it.

4.4. Test Results

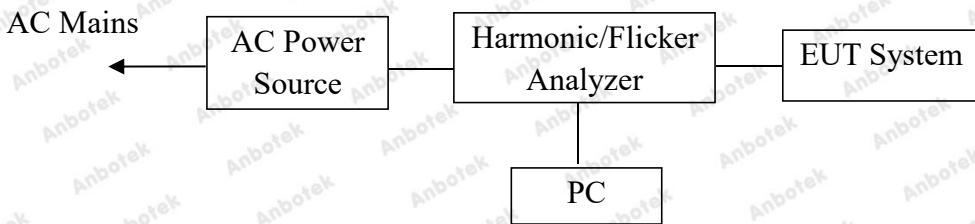
PASS

5. Voltage Fluctuations & Flicker Test

5.1. Test Standard

Test Standard	EN 61000-3-11
---------------	---------------

5.2. Test Setup



5.3. Operating Condition of EUT

- 5.3.1. Setup the EUT as shown on Section 5.2.
- 5.3.2. Turn on the power of all equipments.
- 5.3.3. After that, let the EUT work in test mode measure it.

5.4. Test Results

PASS

6. Harmonics and Harmonics short term (<15s)

6.1. Test Standard and Limit

Test Standard:	IEC 61000-2-2				
Performance criterion:	(1) Harmonic: A (2) Harmonic short term (<15s): B				

Test Limit

Odd harmonics non-multiple of 3		Odd harmonics multiple of 3 a		Even harmonics	
Harmonic order (n)	Harmonic Voltage %	Harmonic order (n)	Harmonic Voltage %	Harmonic order (n)	Harmonic Voltage %
5	6	3	5	2	2
7	5	9	1.5	4	1
11	3.5	15	0.4	6	0.5
13	3	21	0.3	8	0.5
17 n 49	2.27 (17/n)-0.27	21 n 45	0.2	10 n 50	0.25 (10/n)+0.25

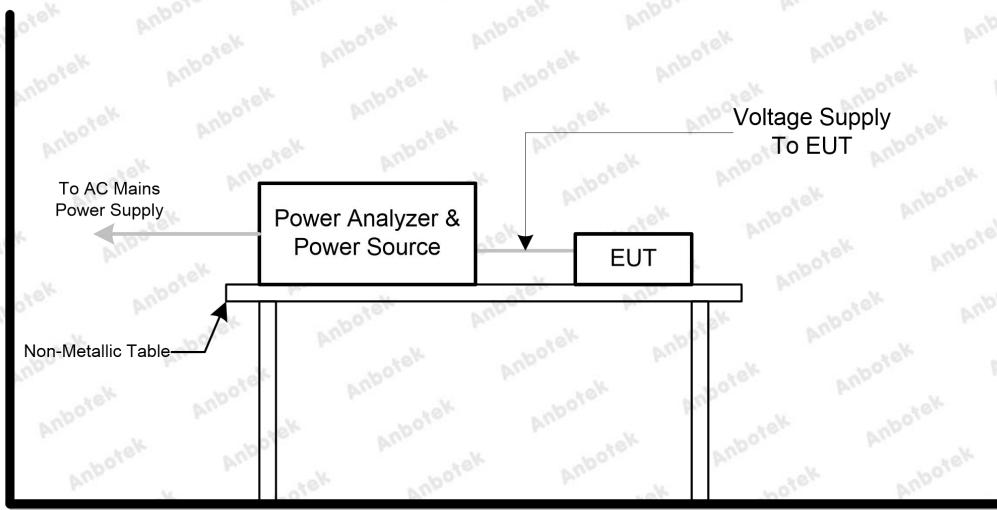
Remark: (1) a: the levels given for odd harmonics that are multiples of three apply to zero sequence harmonics. Also, on a three-phase network without a neutral conductor or without load connected between line and ground. The values of the 3rd and 9th harmonics may be much lower than the compatibility levels, depending on the unbalance of the system.

(2) The corresponding compatibility level for the total harmonic distortion is THD=8%

(3) The corresponding compatibility level is 1.5 times the value of the permanent compatibility levels

(4) The corresponding compatibility level for the total harmonic distortion is THD=11%

6.2. Test Setup



6.3. Operating Condition of EUT

Temperature:	23°C
Relative Humidity:	52%
Pressure:	1010 hPa
Test Power:	AC 400V, 50Hz

6.4. Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the 6.2 operating conditions.

6.5. Test Equipment

Test Equipment Used to Measure Harmonic, Harmonic short term, Voltage unbalance, Frequency variations and Frequency rate of change

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
TB-EMC00 7	Harmonic Flicker Test System	CI	001ix-CTS-400	Jan. 10, 2021	1 Year

6.6. Test Results

Harmonic:	PASS
Harmonic short term (<15s):	PASS

7. Voltage Deviations, Voltage Dips and Interruptions

7.1. Test Standard and Limit

Test Standard:	IEC 61000-2-2; IEC/TR 61000-2-1
Performance criterion:	Voltage deviations: A Test Level for Voltage Dips and Interruptions: C

Test Limit

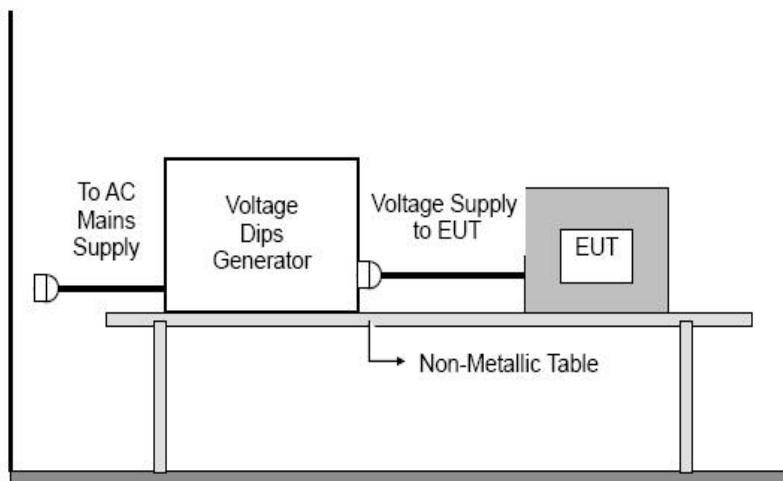
Voltage dip and short interruptions %UT	Duration (in period)
0	0.5
0	1
40	10
70	25
80	250
100	250

Remark: (1) UT is the nominal voltage for the equipment.

(2) Voltage deviations: the corresponding compatibility level for the nominal voltage $\pm 10\%$ of EUT

(3) Test Level for Voltage Dips and Interruptions: see the following table

7.2. Test Setup



7.3. Test Procedure

Set up the EUT and test generator as shown above, and operated to produce the 7.1 operating conditions.

7.4. Test Equipment

Test Equipment Used to Measure Harmonic, Harmonic short term, Voltage unbalance, Frequency variations and Frequency rate of change

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
TB-EMC007	Harmonic Flicker Test System	CI	001ix-CTS-400	Jan. 10, 2021	1 Year

7.5. Measuring Results

Voltage deviations:	PASS
Test Level for Voltage Dips and Interruptions:	PASS

8. Voltage unbalance, Frequency variations and Frequency rate of change

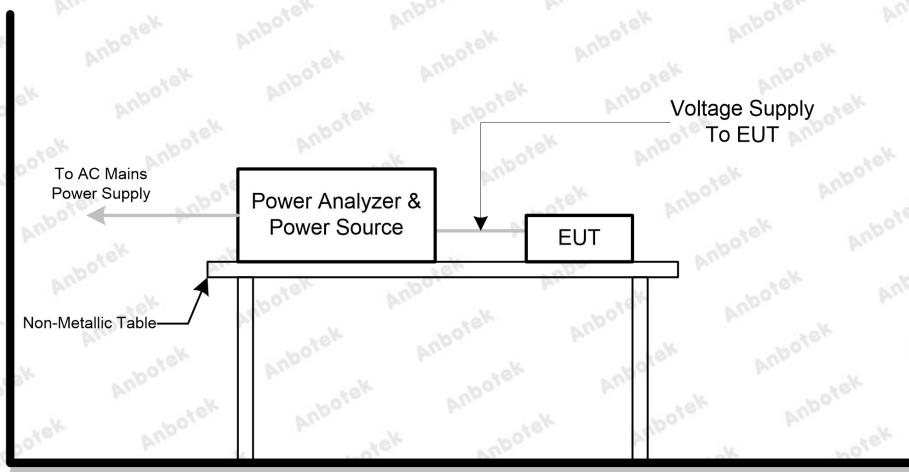
8.1. Test Standard and Limit

Test Standard:	IEC 61000-2-2
Performance criterion:	(1) Voltage unbalance: A (2) Frequency variations: A (3) Frequency rate of change: A

Test Limit

(1) Voltage unbalance: the corresponding compatibility level is 2% negative sequence component.(Not relevant for single phase PDSs)
(2) Frequency variations: the corresponding compatibility level is the nominal Frequency±2% of EUT.
(3) Frequency rate of change: the corresponding compatibility level is 1%/second.

8.2. Test Setup



8.3. Operating Condition of EUT

Temperature:	23°C
Relative Humidity:	52%
Pressure:	1010 hPa
Test Power:	AC 400V, 50Hz

8.4. Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the 8.1. operating conditions.

8.5. Test Equipment

Test Equipment Used to Measure Harmonic, Harmonic short term, Voltage unbalance, Frequency variations and Frequency rate of change

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
TB-EMC007	Harmonic Flicker Test System	CI	001ix-CTS-400	Jan. 10, 2021	1 Year

8.6. Test Results

Voltage unbalance:	PASS
Frequency variations:	PASS
Frequency rate of change:	PASS

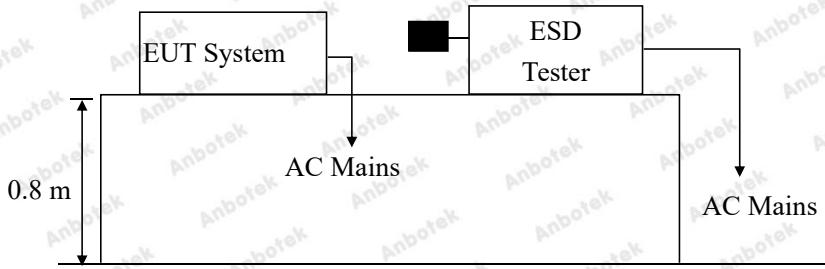
9. Electrostatic Discharge Immunity Test

9.1. Test Standard and Level

Test Standard:	EN IEC 61800-3 (IEC 61000-4-2)
Performance Criterion:	B
Severity Level: 3 / Air Discharge: $\pm 8\text{kV}$, Level: 2 / Contact Discharge: $\pm 4\text{kV}$	

Level	Test Level	
	Contact Discharge (kV)	Air Discharge (kV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X.	Special	Special

9.2. Test Setup



9.3. EUT Configuration on Measurement

The following equipments are installed on Electrostatic Discharge immunity Measurement to meet EN IEC 61800-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

9.4. Operating Condition of EUT

- 9.4.1. Setup the EUT as shown on Section 9.2.
- 9.4.2. Turn on the power of all equipments.
- 9.4.3. After that, let the EUT work in test mode measure it.

9.5. Test Procedure

9.5.1. 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.

9.5.2. Contact Discharge:

All the procedure shall be same as Section 9.5.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.5.3. Indirect discharge for horizontal coupling plane

At least 20 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

9.5.4. Indirect discharge for vertical coupling plane

At least 20 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m × 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.

9.6. Test Results

PASS

Please refer to the following page.

Electrostatic Discharge Test Results

Air discharge :	$\pm 8.0\text{kV}$	Temperature :	24.7°C
Contact discharge :	$\pm 4.0\text{kV}$	Humidity :	52%
Power Supply :	AC 400V, 50Hz	Expert conclusion:	A
Test Result :	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

For each point positive 10 times and negative 10 times discharge

Location		Kind	Result
		A-Air Discharge C-Contact Discharge	
Knob	4 points	A	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Screen	4 points	A	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Slot	8 points	A	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Button	4 points	A	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
HCP	4 points	C	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
VCP of the front	4 points	C	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
VCP of the rear	4 points	C	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
VCP of the left	4 points	C	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
VCP of the right	4 points	C	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D

Remark: Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

10. RF Field Strength Susceptibility Test

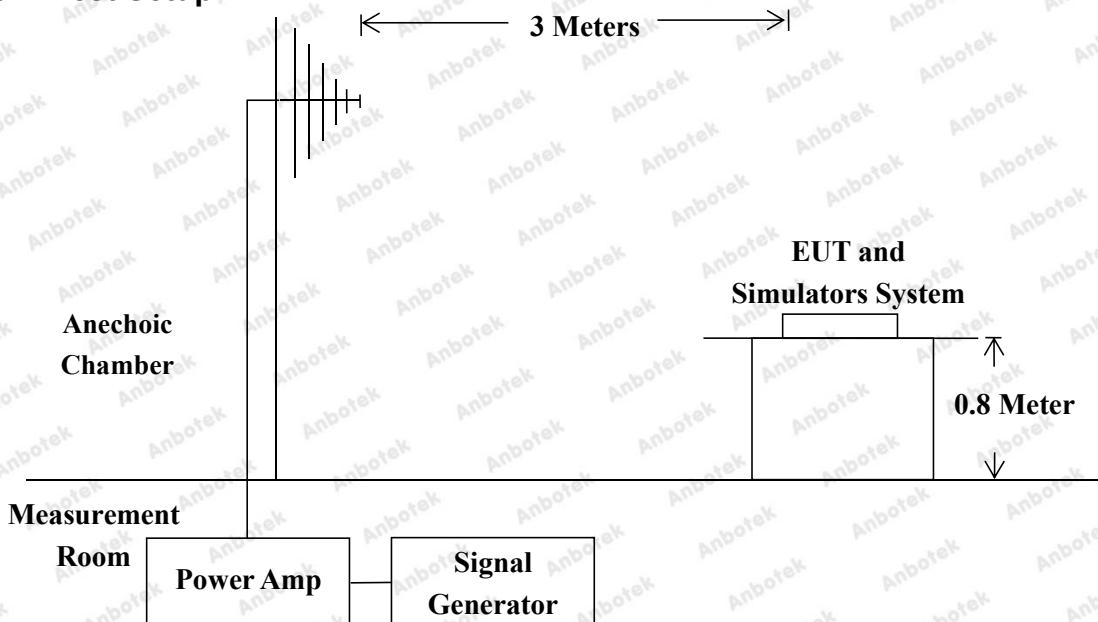
10.1. Test Standard and Level

Test Standard:	EN IEC 61800-3 (IEC 61000-4-3)
Required Performance:	A
Frequency Range:	80MHz to 1000MHz/ 1.4GHz to 2.0GHz/ 2.0GHz to 2.7GHz
Field Strength:	10 V/m, 3V/m, 1V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 0.5s

Test Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X.	1 Sec.

10.2. Test Setup



10.3. EUT Configuration on Measurement

The following equipments are installed on RF Field Strength susceptibility Measurement to meet EN IEC 61800-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

10.4. Operating Condition of EUT

10.4.1. Setup the EUT as shown on Section 10.2.

10.4.2. Turn on the power of all equipments.

10.4.3. After that, let the EUT work in test mode measure it.

10.5. 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.

- 1) 80 MHz to 1000 MHz the field strength level was 10V/m, 1.4 GHz to 2.0 GHz the field strength level was 3V/m, 2.0 GHz to 2.7 GHz the field strength level was 1V/m.
- 2) The frequency range is swept from 80 MHz to 1000 MHz, 1.4 GHz to 2.0 GHz, 2.0 GHz to 2.7 GHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- 3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.
- 4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

10.6. Measuring Results

PASS

Please refer to the following page.

RF Field Strength Susceptibility Test Results

Field Strength :	10V/m,3V/m,1V/m	Temperature :	24.5 °C
Expert conclusion:	A	Humidity :	51%
Power Supply :	AC 400V, 50Hz	Test Result :	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Dwell Time:	1s		

Frequency Range	Antenna Polarity	R.F. Field Strength	Azimuth	Result
80MHz~1000MHz	H / V	10 V/m (rms)	Front	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
			Rear	
			Left	
			Right	
1.4GHz~2.0GHz	H / V	3 V/m (rms)	Front	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
			Rear	
			Left	
			Right	
2.0GHz~2.7GHz	H / V	1 V/m (rms)	Front	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
			Rear	
			Left	
			Right	

11. Electrical Fast Transient/Burst Immunity Test

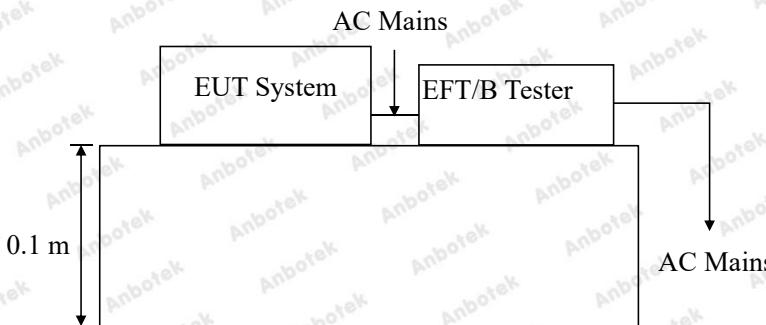
11.1. Test Standard and Level

Test Standard:	EN IEC 61800-3 (IEC 61000-4-4)	
Performance criterion:	B	
Severity Level 3: 2.00kV		

Test Level

Open Circuit Output Test Voltage ± 10%		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.50 kV	0.25 kV
2.	1.00 kV	0.50 kV
3.	2.00 kV	1.00 kV
4.	4.00 kV	2.00 kV
X.	Special	Special

11.2. Test Setup



11.3. EUT Configuration on Measurement

The following equipments are installed on Electrical Fast Transient/Burst Immunity Measurement to meet EN IEC 61800-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

11.4. Operating Condition of EUT

- 11.4.1. Setup the EUT as shown in Section 11.2.
- 11.4.2. Turn on the power of all equipments.
- 11.4.3. Let the EUT work in test mode and measure it.

11.5. Test Procedure

The EUT is put on the table which is 0.1 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.

11.5.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

11.5.2. For signal lines and control lines ports:

Select tests based on product characteristics.

11.5.3. For DC output line ports:

Select tests based on product characteristics.

11.6. Test Results

PASS

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Ambient Condition : 24.7°C / 52% RH	Expert conclusion: A		
Power Supply : AC 400V, 50Hz	Test Result : <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		
Inject Line : AC Mains	Inject Method: Direct		Inject Time(s): 120
Line	Polarity	Test Voltage (kV)	Result
AC Line	±	2.00kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
DC Line			
Signal Line			

12. Surge Immunity Test

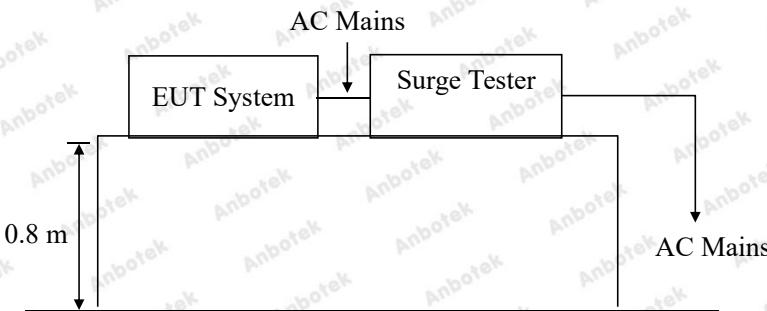
12.1. Test Standard and Level

Test Standard:	EN IEC 61800-3 (IEC 61000-4-5)
Performance criterion:	B
Severity Level 2, Line to Line: 1.0kV; Severity Level 3, Line to Earth: 2.0kV	

Test Level

Severity Level	Open-Circuit Test Voltage (kV)
1.	0.5
2.	1.0
3.	2.0
4.	4.0
X.	Special

12.2. Test Setup



12.3. EUT Configuration on Measurement

The following equipments are installed on Surge immunity Measurement to meet EN IEC 61800-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

12.4. Operating Condition of EUT

12.4.1. Setup the EUT as shown in Section 12.2.

12.4.2. Turn on the power of all equipments.

12.4.3. Let the EUT work in test mode and measure it.

12.5. Test Procedure

- 12.5.1. Set up the EUT and test generator as shown on Section 12.2.
- 12.5.2. For line to line coupling mode, provide a 1.0 kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 12.5.3. For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 12.5.4. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 12.5.5. Different phase angles are done individually.
- 12.5.6. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

9.6. Test Results

PASS

Please refer to the following page.

Surge Immunity Test Results

Humidity :	52%		Temperature :	24.7°C	
Power Supply :	AC 400V, 50Hz		Criterion required:	A	
Test Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail				
Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (kV)	Performance Criterion
L1-L2	±	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°	5	1.0kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
L1-L3	±	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°	5	1.0kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
L2-L3	±	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°	5	1.0kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
L1-PE	±	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°	5	2.0kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
L2-PE	±	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°	5	2.0kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
L3-PE	±	<input checked="" type="checkbox"/> 0° <input checked="" type="checkbox"/> 90° <input checked="" type="checkbox"/> 180° <input checked="" type="checkbox"/> 270°	5	2.0kV	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D

13. Injected Currents Susceptibility Test

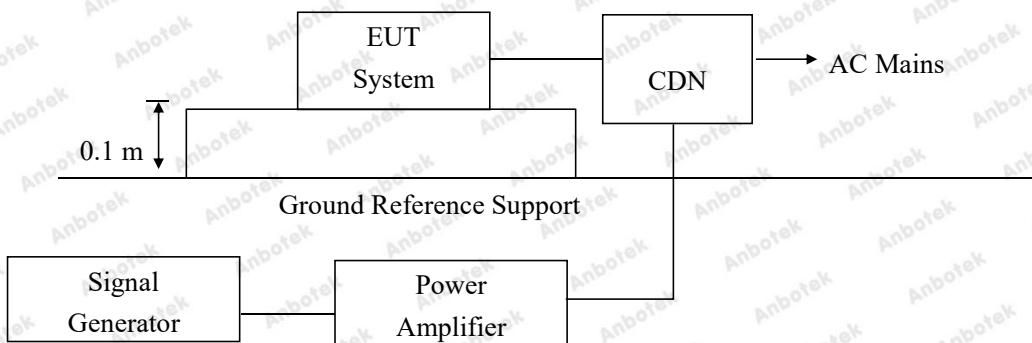
13.1. Test Standard and Level

Test Standard	EN IEC 61800-3 (IEC 61000-4-6)
Performance criterion	A
Severity Level 3: 10V (rms), (0.15MHz ~80MHz)	

Test Level

Level	Field Strength V
1.	1
2.	3
3.	10
X.	Special

13.2. Test Setup



13.3. EUT Configuration

The following equipments are installed on currents susceptibility Measurement to meet EN IEC 61800-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

13.4. Operating Condition of EUT

13.4.1. Setup the EUT as shown in Section 13.2.

13.4.2. Turn on the power of all equipments.

13.4.3. Let the EUT work in test mode and measure it.

13.5. Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 13.2.
- 2) Let the EUT work in test mode and measure it.
- 3) 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 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) 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.
- 7) 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.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

13.6. Test Results

PASS

Please refer to the following page.

Injected Currents Susceptibility Test Results

Humidity : 52%	Temperature : 24.7°C		
Power Supply : AC 400V, 50Hz	Criterion required: A		
Test Result : <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result
0.15 ~ 80	AC Mains	10 V	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Remark : 1. Modulation Signal:1KHz 80% AM			

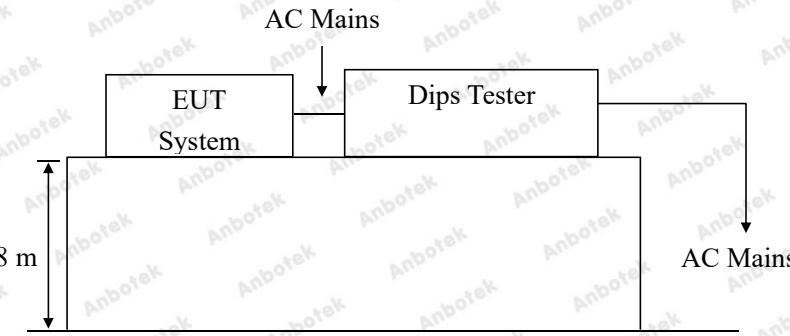
14. Voltage Dips And Interruptions Test

14.1. Test Standard and Level

Test Standard:	EN IEC 61800-3 (IEC 61000-4-34)
Performance Criterion:	C

Test Level			
Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)	
0	100	0.5 1 5 10 25 50 *	
40	60		
70	30		
0	100		

14.2. Test Setup



14.3. EUT Configuration on Measurement

The following equipments are installed on Voltage dips and interruptions Measurement to meet EN IEC 61800-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

14.4. Operating Condition of EUT

- 14.4.1. Setup the EUT as shown in Section 14.2.
- 14.4.2. Turn on the power of all equipments.
- 14.4.3. Let the EUT work in test mode and measure it.

14.5. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 14.2.
- 2) The interruptions is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

14.6. Test Results

PASS

Please refer to the following page.

Voltage Dips and Interruptions Test Results

Temperature : 24.7°C		Humidity : 52%	
Power Supply : AC 400V, 50Hz		Expert conclusion: C	
Test Result : <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			
Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Result
0	100	1P	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
40	60	10P	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
70	30	25P	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D
80	20	250P	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D
Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Result
0	100	250P	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Power Line Conducted Emission Test

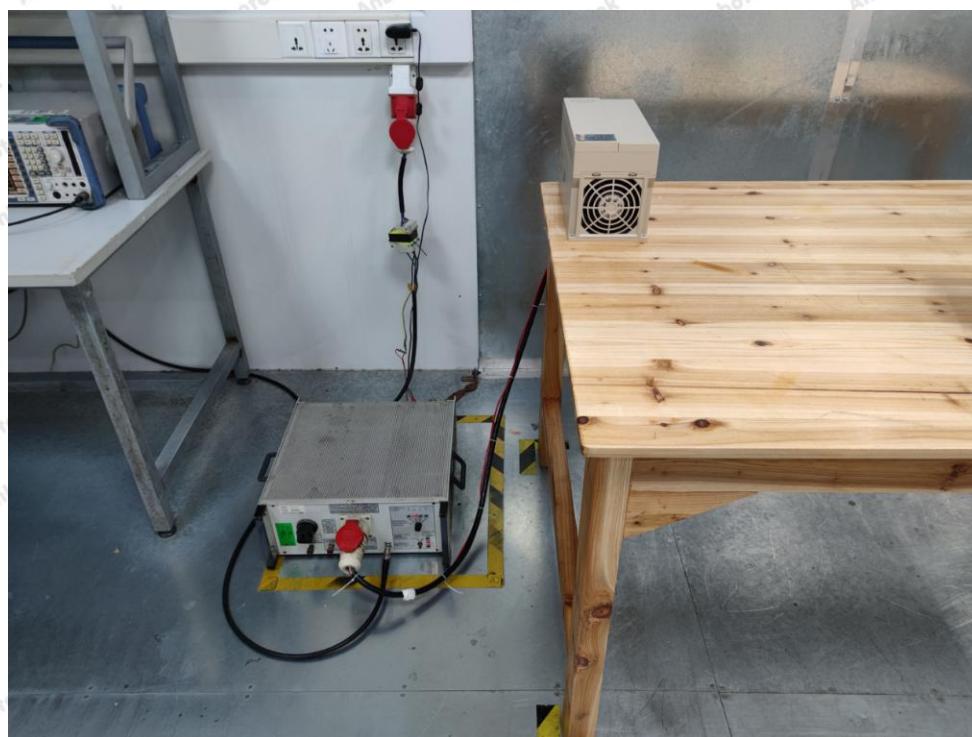


Photo of Radiated Emission Test

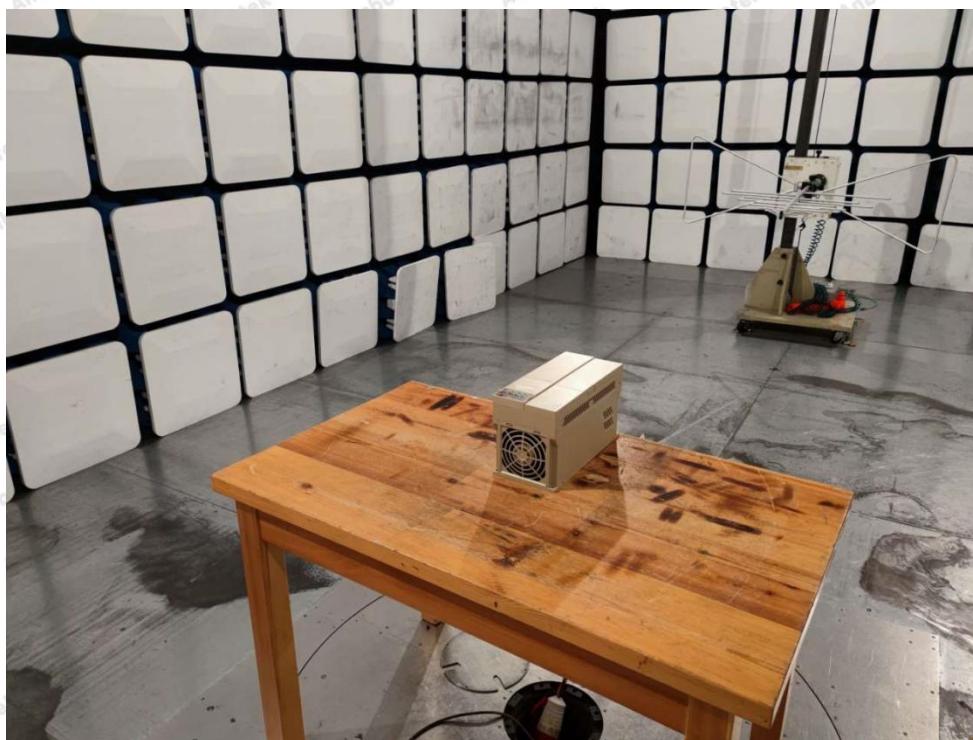


Photo of Electrostatic Discharge Immunity Test

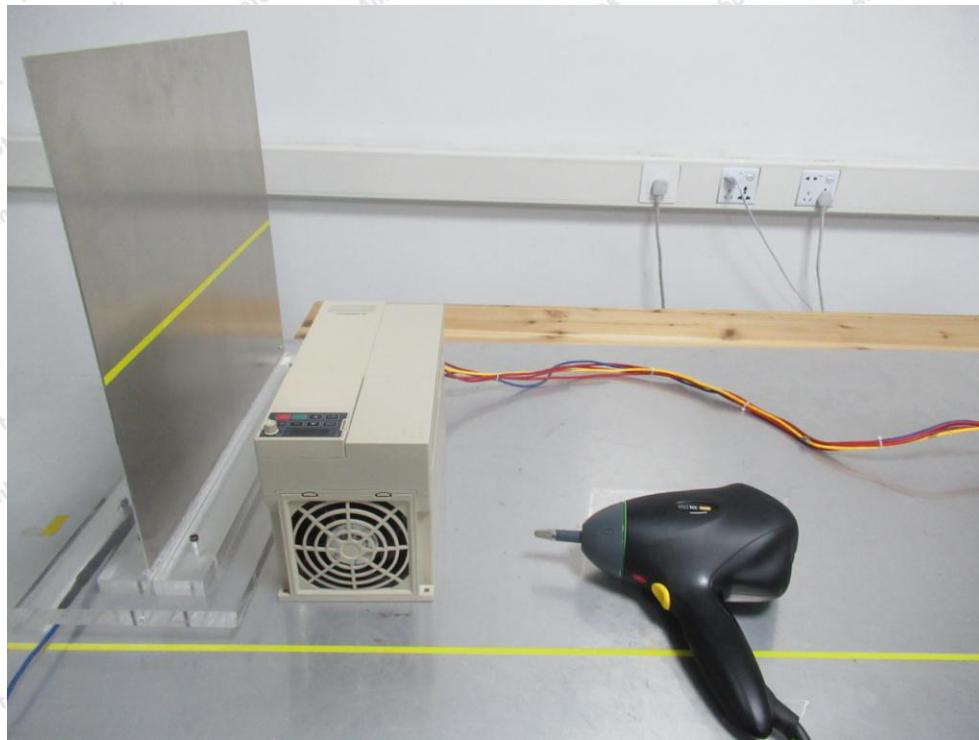


Photo of RF Field Strength susceptibility Test

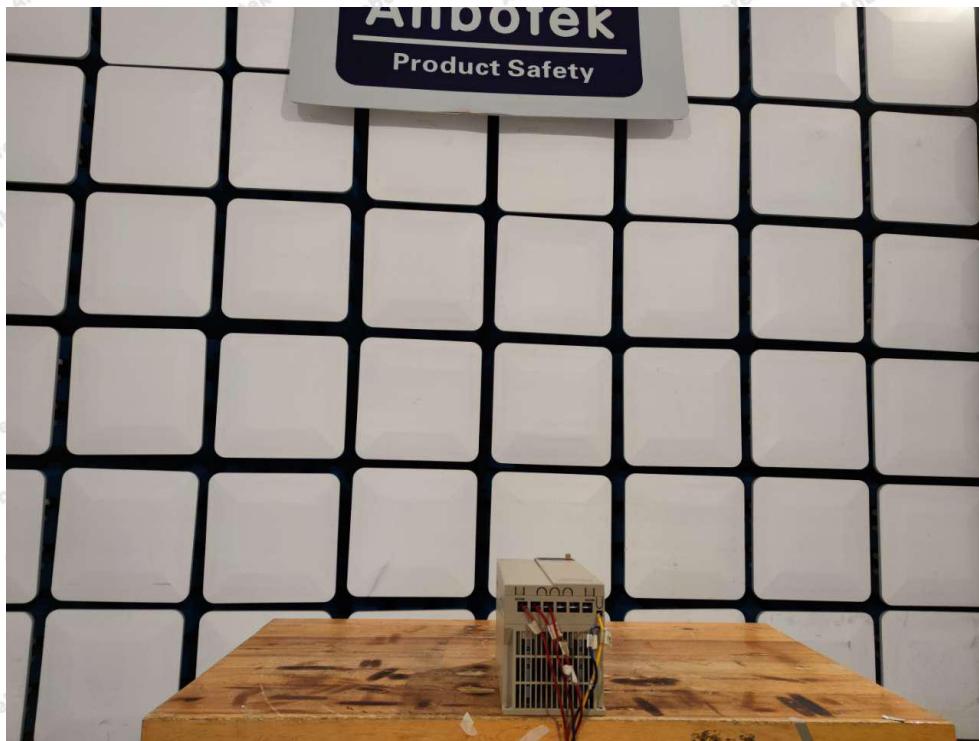


Photo of Electrical Fast Transient/Burst Immunity Test

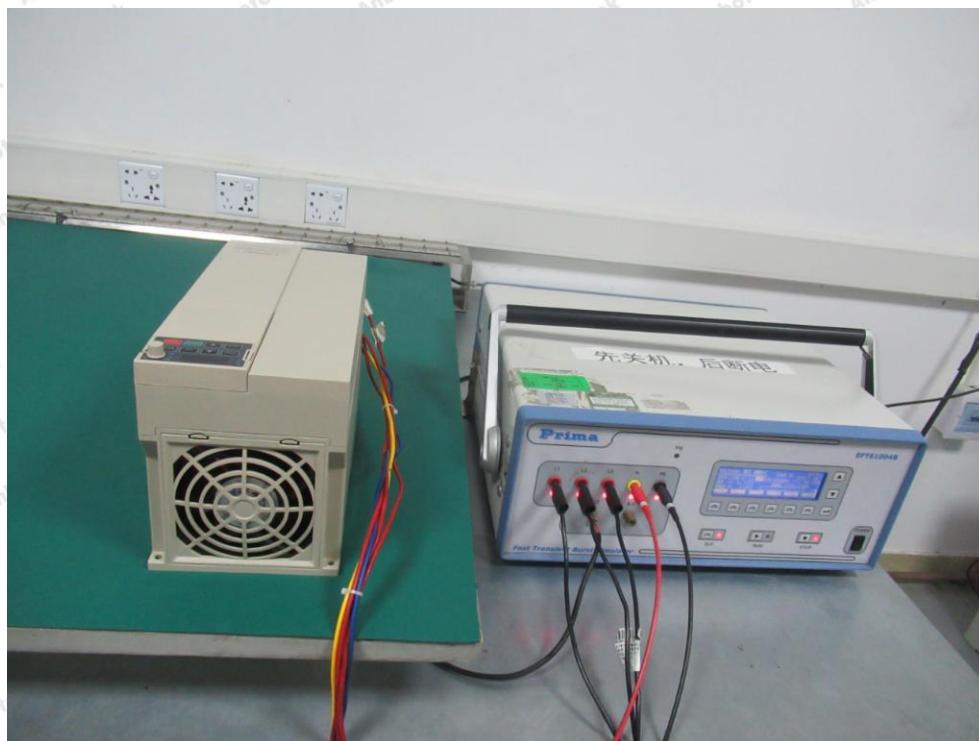
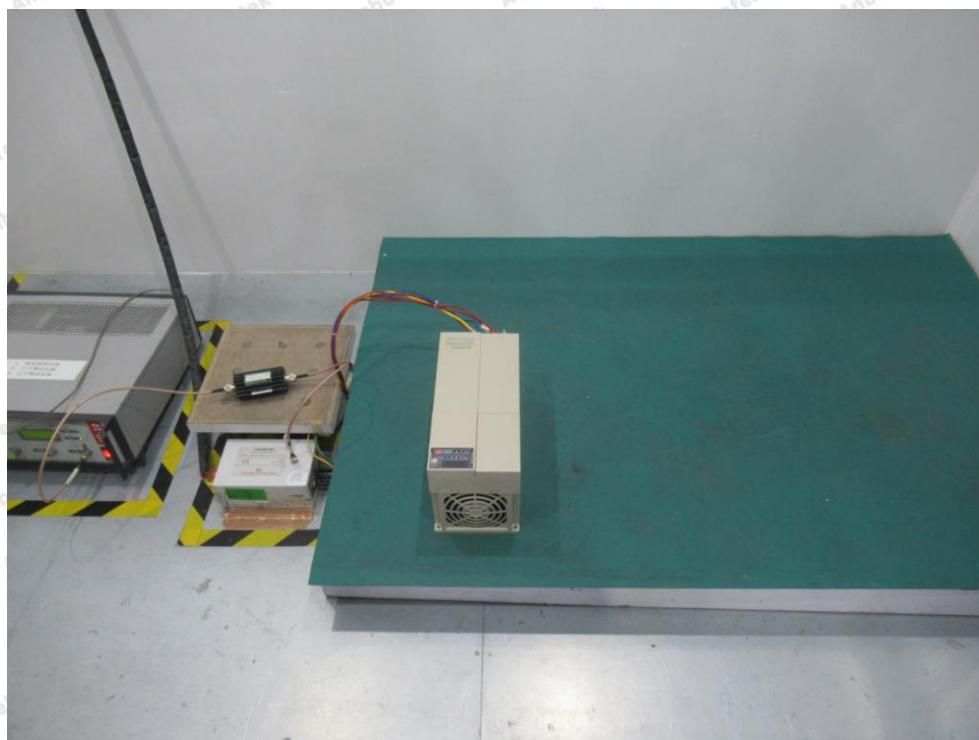
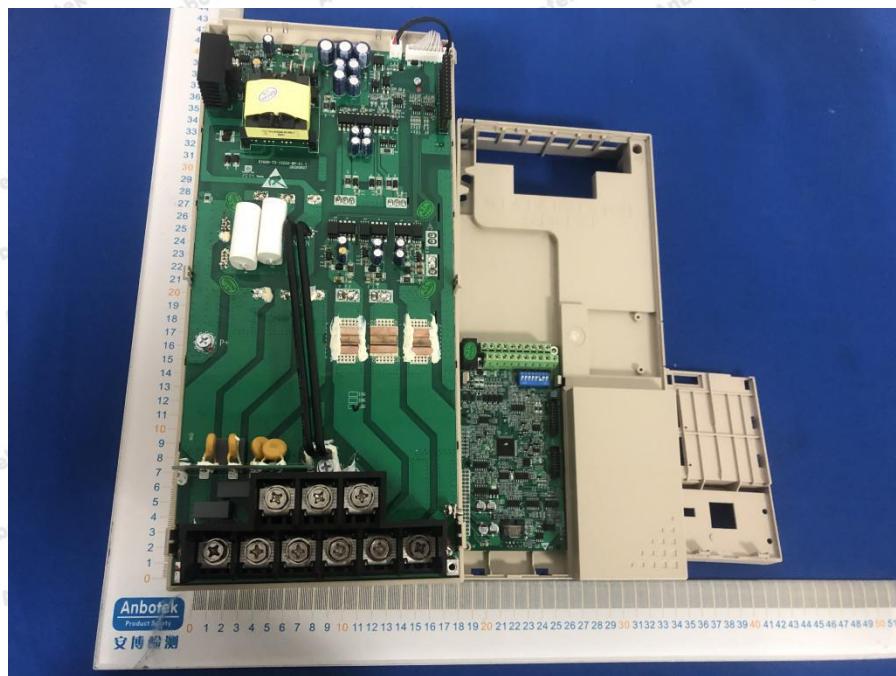


Photo of Injected currents susceptibility Test



APPENDIX II -- EXTERNAL PHOTOGRAPH



APPENDIX III -- INTERNAL PHOTOGRAPH



CE Label

1. The CE conformity marking must consist of the initials 'CE' taking the following form:
If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.
4. The CE marking must be affixed visibly, legibly and indelibly.
It must have the same height as the initials 'CE'.

----- End of Report -----