IEC 61009-1:2010+AMD1:2012+AMD2:2013/ EN 61009-1:2012+A12:2016, IEC 61543:1995+A2:2005/EN 61543:1995+A2:2006

EMC MEASUREMENT AND TEST REPORT

FOR

Changcheng Electrical Group Zhejiang Technology Co., Ltd.

(South Tower) No.2-1 Baixiang Avenue, North Baixiang Town, Yueqing, Zhejiang Province, P.R.China

Name Of Sample..	Residual current circuit breaker with over current protection
Model……..	YCB9LE-80M YCB9NL-40 YCB9LE-125
Ratings……	Ue=230V~(1P+N,2P),400V~(3P,3P+N,4P);In= 1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63, 80,100,125A; I△n=30-300mA
Date of Receipt…	2020/02/27
Date of Test……..	2020/02/27 to 2020/03/05
Test Engineer…...	Sophia Yu
Reviewed By……	Linda lin
Approved By……	Cristine Fang

* The above equipment was tested by **Shanghai Global Testing Services Co., Ltd**.for compliance with the requirements set forth in the EMC Directive 2014/30/EU and 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.

Test Result	**PASS**

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The product that is produced by **Changcheng Electrical Group Zhejiang Technology Co., Ltd.**
test model*:* **YCB9LE-80M YCB9NL-40 YCB9LE-125**
the "EUT" as referred to in this report is a **Residual current circuit breaker with over current protection,**
Complete test was conducted on **YCB9LE-80M** is one model **of YCB9LE-80M YCB9NL-40 YCB9LE-125, YCB9NL-40 YCB9LE-125** are the same serial products

A representative sample of the product covered by this report has been tested and complies with the applicable requirements of this standard.

Objective

In order to meet the EMC requirements approved by CENELEC, the following standards will be cited:

1. IEC 61543:1995+A2:2005/EN 61543:1995+A2:2006, Residual current circuit breaker with over current protection for household and similar use Electromagnetic compatibility.
2. IEC 61009-1:2010+AMD1:2012+AMD2:2013/EN 61009-1:2012+A12:2016, Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)-Part 1: General rules

Note: The test data is only valid for the test sample. There is possible deviation from the original test data for other products

Equipment Modifications

No modification to the EUT was made by **Shanghai Global Testing Services Co., Ltd** to make sure the EUT comply with applicable limits.

1 – EN 61543(CISPR 14)

1.1 Continuous Disturbance Voltage at Mains Terminal.

1.1.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESCS25	1005426	2019-12-19	2020-12-18
2	Line impedance stabilization network	SCHWARZBECK	NSLK838	8127-350	2019-12-19	2020-12-18

1.1.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

1.1.3 Limits of Continuous Disturbance Voltage at Mains Terminal.

Equipment type	Frequency range MHz	Limit values dBμV	
		Quasi-peak	Average
Household appliance	0.15 to 0.5	66-56 [a]	56- 46 [a]
	0.5 to 5	56	46
	5 to 30	60	50
[a] Decreasing linearly with logarithm of the frequency.			

Note: 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.

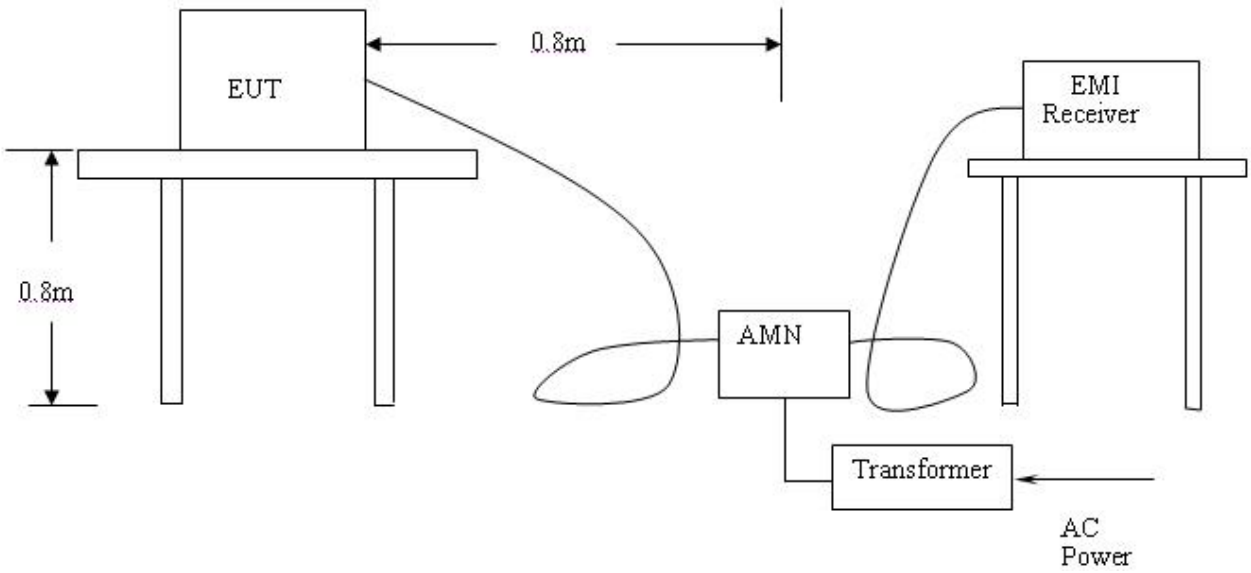
1.1.4 Test procedure and the test set-up

Procedure

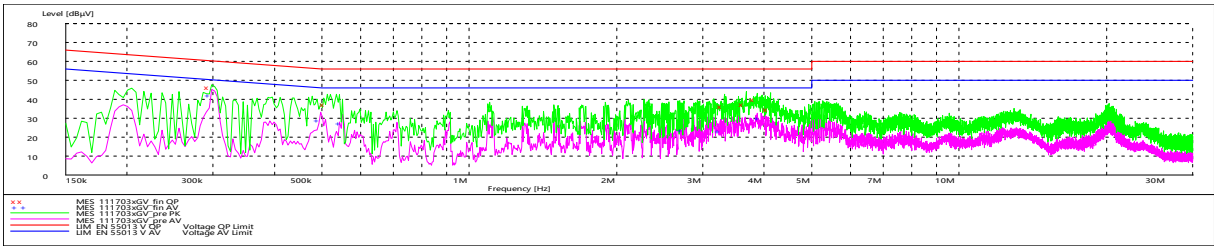
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under limit -20dB of the prescribed limits could not be reported.

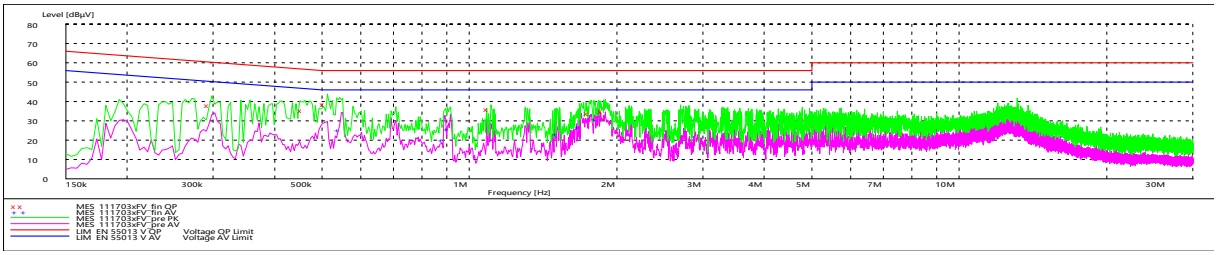
Set-up

The configuration is in accordance with the requirement in EN61000-6-3, the sketch map as follow:



1.1.5 Test Data and Records





1.1.6 Verdict

The EUT met the requirement.

1.2 Radiation Disturbances

1.2.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100987	2019-12-19	2020-12-18
2	Antenna	SCHWARZBECK	VULB9168	9168-493	2019-12-19	2020-12-18
3	CONTROLLER	INNCO	CO200	722	/	/

1.2.2 Description of Measurement Conditions

Temperature: 20℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

1.2.3 Limits of radiated disturbances of class B ITE at a measuring distance of 3m.

Frequency range MHz	Quasi-peak limits(3m) dB(μV/m)
30 to 230	40
230 to 1000	47
NOTE: The lower limit shall apply at the transition frequency. NOTE: Additional provisions may be required for cases where interference occurs.	

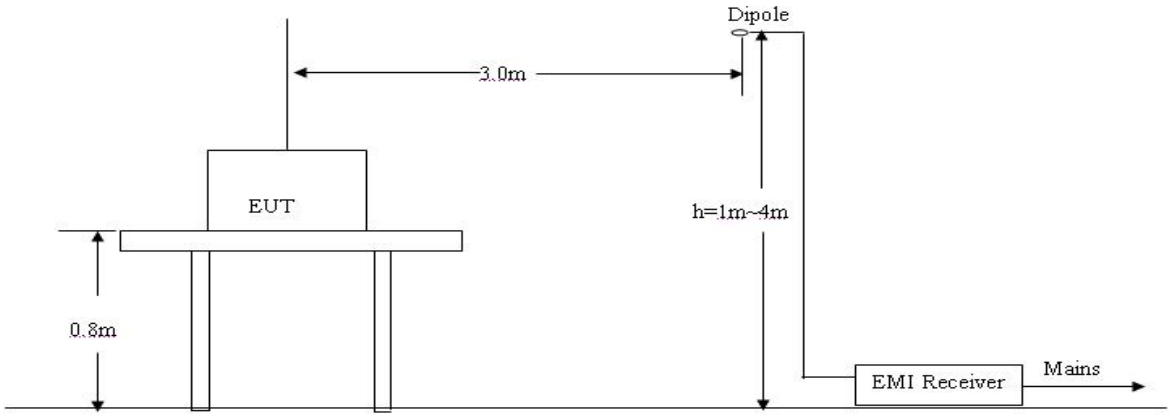
1.2.4 Test procedure and the test set-up

Procedure

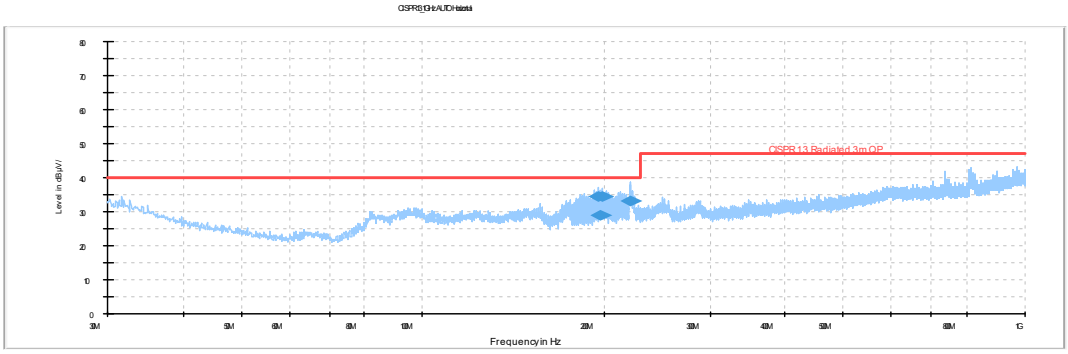
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m semi/full-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be retested one by one using the quasi- peak method or average method as specified and then reported In Data sheet peak mode and QP mode.

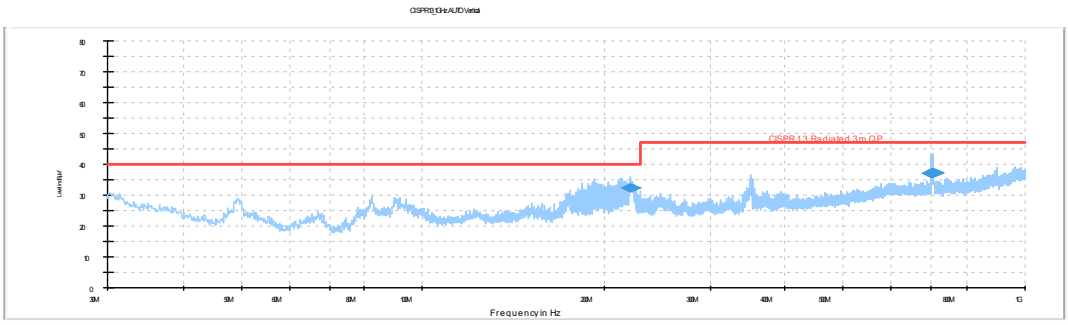
Set-up

The configuration is in accordance with the requirement in EN 55022, the sketch map as follow:



1.2.5 Test Data and Records





1.2.6 Verdict

The EUT met the requirement.

1.3 Disturbance Power

3.3.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100987	2019-12-19	2020-12-18

1.3.2 Description of Measurement Conditions

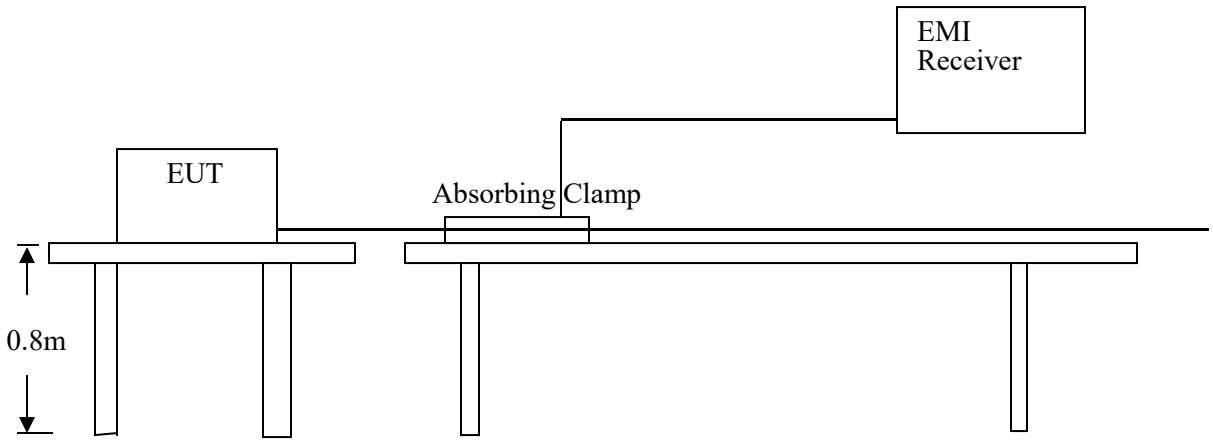
Temperature: 21℃
Humidity: 56%
Pressure: 1033mbar
Electromagnetic environment: normal

1.3.3 Limits of Disturbance Power

Equipment type	Frequency range MHz	Limit values (dBpW)	
		Quasi-peak	Average
Tools	30 to 300	55 to 65[a]	45 to 55[a]
[a] Increasing linearly with frequency.			

1.3.4 Configuration

The configuration in accordance with the requirement in EN55014-1, the sketch map as follow:



1.3.5 Test Data and Records

Test case does not apply to the test object

1.3.6 Verdict

The EUT met the requirement.

1.4 Discontinuous Disturbance Voltage at Mains Terminal (Click)

1.4.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	lick Meter	AFJ	CL55C	5040019044	2019-12-19	2020-12-18

1.4.2 Description of Measurement Conditions

Temperature: 22℃
Humidity: 56%
Pressure: 1033mbar
Electromagnetic environment: normal

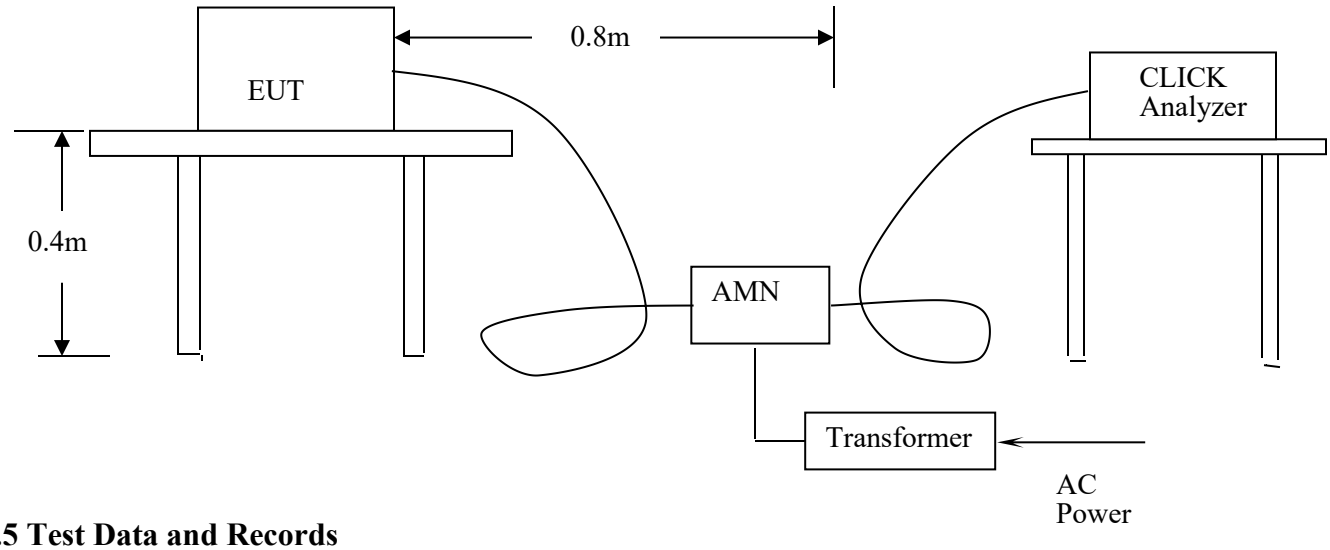
1.4.3 Limits of Click

For discontinuous disturbance, the click limit is attained by increasing the relevant limit of Continuous Disturbance Voltage with:

44dB for $N < 0.2$ or
20lg(30/N) dB for $0.2 \leq N < 30$

1.4.4 Configuration

The configuration in accordance with the requirement in EN55014-1, the sketch map as follow:



1.4.5 Test Data and Records

Test case does not apply to the test object

1.4.6 Verdict

The EUT met the requirement.

2 –IEC/EN 61543

Description of Performance Criterion

Performance Criterion A

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

2.1 SURGES

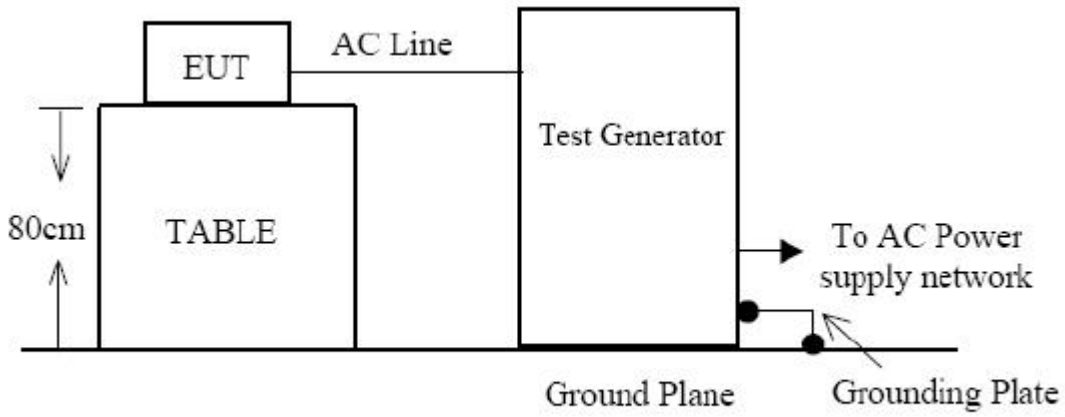
2.1.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Cal. Due date
1	Ultra-compact simulator	EM test	UCS500M4	V050710012 2	2019-12-19	2020-12-18

2.1.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

2.1.3 Configuration



Remark: Test generator includes control center、surge combination and coupler.

2.1.4 Test Data and Records

Level	Voltage	Poll	Phase angle	Path	Pass	Fail
1	**5.0kV**	±	0°, 90°, 180°, 270°,	L-N	**B**	
2	**4.0kV**	±	0°, 90°, 180°, 270°,	L-N	**B**	
3	**2.0kV**	±	0°, 90°, 180°, 270°,	L-N	**B**	

2.1.5 Verdict

The EUT was working as normal, the EUT met the requirement.

2.2 ESD

2.2.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Cal. Due date
1	Electrostatic Discharge Simulator	KIKUSUI	KES4021	LL004798	2019-12-19	2020-12-18

2.2.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

2.2.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-2, see the photo in appendix.

2.2.4 Test Data and Records

Air Discharge

Test Levels																
EN61000-4-2 Test Points	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-10 kV	+10 kV	-12.5 kV	+12.5 kV	-15 kV	+15 kV	-20 kV	+20 kV
EUT Front Side	B	B	B	B	B	B	B	B								
EUT Top Side	B	B	B	B	B	B	B	B								
EUT Back Side	B	B	B	B	B	B	B	B								
EUT Left Side	B	B	B	B	B	B	B	B								
EUT Right Side	B	B	B	B	B	B	B	B								

Direct Contact

Test Levels																
EN61000-4-2 Test Points	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-10 kV	+10 kV	-12.5 kV	+12.5 kV	-15 kV	+15 kV	-20 kV	+20 kV
EUT Front Side	B	B	B	B	B	B										
EUT Top Side	B	B	B	B	B	B										
EUT Back Side	B	B	B	B	B	B										
EUT Left Side	B	B	B	B	B	B										
EUT Right Side	B	B	B	B	B	B										

2.2.5 Verdict

The EUT was working as normal, the EUT met the requirement.

2.3 EFT/B

4.3.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Cal. Due date
1	Ultra-compact simulator	EM test	UCS500M4	V0507100122	2019-12-19	2020-12-18

2.3.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

2.3.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-4, see the photo in appendix.

2.3.4 Test Data and Records

Test Levels (kV)									
EN61000-4-4 Test Points		+1.0	-1.0	+2.0	-2.0	+3.0	-3.0	+4.0	-4.0
Power Port of EUT	L	B	B	B	B	B	B	B	B
	N	B	B	B	B	B	B	B	B
	L+N	B	B	B	B	B	B	B	B

2.3.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

2.4 INJECTED CURRENTS

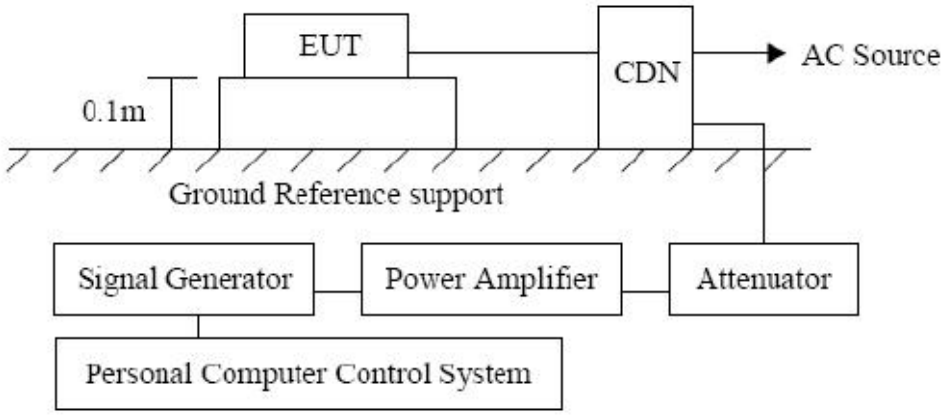
2.4.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Cal.Due date
1	AM/FM signal generator	AEROFLEX	2023A	202306/668	2019-12-19	2020-12-18
2	PAMP Conducted RF test system	HAEFFLY	PAMP250	151730	2019-12-19	2020-12-18
3	CDN impedance and K-factor	LUTHI	L-801 M2/M3	9931	/	/

2.4.2 Description of Measurement Conditions

Temperature: 22℃
Humidity: 59%
Pressure: 1033mbar
Electromagnetic environment: normal

2.4.3 Configuration



2.4.4 Test Data and Records

EN61000-4-6 Test Points	Frequency range MHz	Levels	Voltage Level (e.m.f.)V	Pass	Fail
Power Line	0.15-80MHz	1	1		
		2	3	A	
		3	10		
		X	Special		

2.4.5 Verdict

The EUT was working as normal, the EUT met the requirement.

2.5 VOLTAGE DIPS AND INTERRUPTIONS

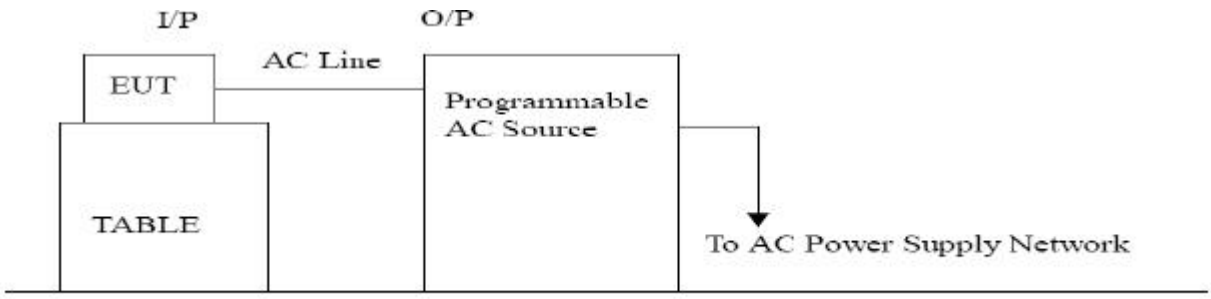
2.5.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Cal. Due date
1	Ultra-compact simulator	EM test	UCS500M4	V0507100789	2019-12-19	2020-12-18
2	Motorised Variac	EM test	MV2616	V0507100459	2019-12-19	2020-12-18

2.5.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

2.5.3 Configuration



2.5.4 Test Data and Records

Environmental phenomena		Test level in % U_T	Duration (in periods of the rated frequency)	Phase Angle	Pass	Fail
Interruptions		0	0.5T	0/180	C	
Voltage dips in % U_T	60	40	10T	0/180	C	
	30	70	50T	0/180	C	
	0.85	1.1	50T	0/180	C	

.

2.5.5 Verdict

The EUT was working as normal, the EUT met the requirement.

2.6 Radio-frequency electromagnetic field

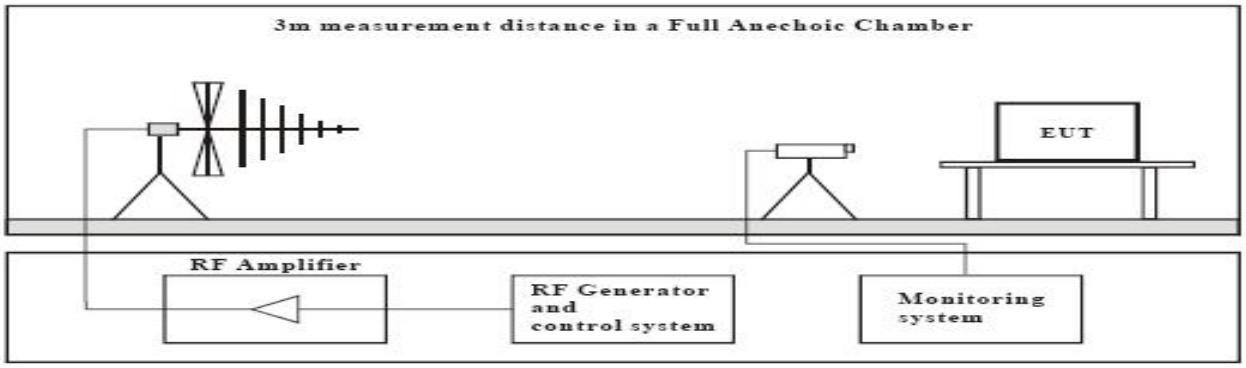
2.6.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Ultra broadband antenna	Rohde & Schwarz	HL562	100944	2019-12-19	2020-12-18
2	amplifier	AR	30W1000B	0327284	--	--
3	amplifier	AR	30S1G3	0324978	--	--
4	power meter	Rohde & Schwarz	NRP	101641	2019-12-19	2020-12-18
5	Signal generator	Rohde & Schwarz	SMR40	100657	2019-12-19	2020-12-18

2.6.2 Description of Measurement Conditions

Temperature: 20℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

2.6.3 Configuration



2.6.4 Test Data and Records

Frequency Range (MHz)	Front Side (10 V/m)		Rear Side (10V/m)		Left Side (10V/m)		Right Side (10V/m)	
80-1000	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
	A	A	A	A	A	A	A	A

2.6.5 Verdict

The EUT was working as normal, the EUT met the requirement.

2.7 Power-frequency magnetic field

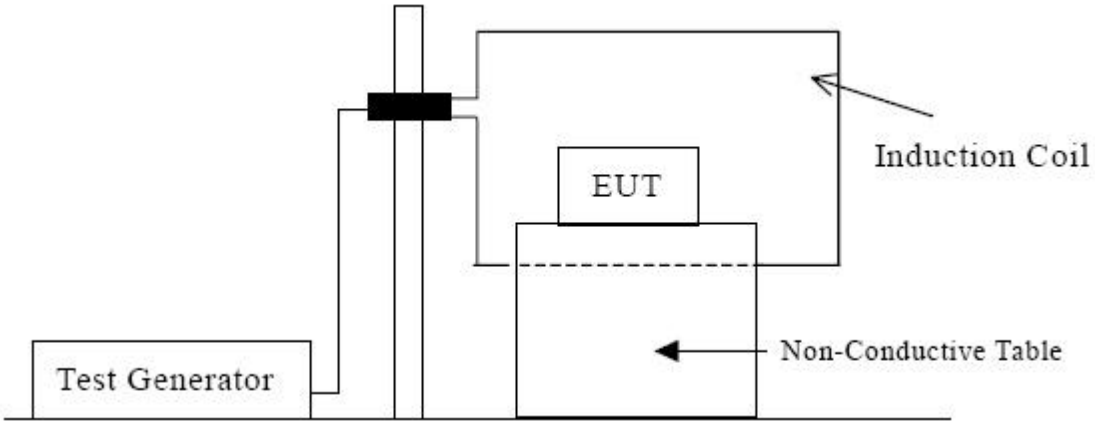
2.7.1 Test Equipment List and Details

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Magnetic field tester	HAEFELY TEST AG	MGA 100	152676	2019-12-19	2020-12-18
2	Active loop	EMCO	6502	9003-2484	2019-12-19	2020-12-18

2.7.2 Description of Measurement Conditions

Temperature: 22℃
Humidity: 59%
Pressure: 1033mbar
Electromagnetic environment: normal

2.7.3 Configuration



2.7.3 Test Data and Records

Power Frequency Magnetic Field	Testing Duration	Coil Oritentation	Pass
50Hz/60 Hz 10A/m	1 Min	X-axis	**A**
50Hz/60 Hz 10A/m	1 Min	Y-axis	**A**
50Hz/ 60 Hz 10A/m	1 Min	Z-axis	**A**

2.7.4 Verdict

The EUT was working as normal, so it met the requirement of performance criteria A.

2.8 Current oscillatory transients(ring wave)

2.8.1 Test Data and Records

/

2.8.2 Verdict

The EUT was working as normal, the EUT met the requirement.

2.9 Conducted common mode disturbances in the frequency range lower than 150 kHz

2.9.1 Test Data and Records

/

2.9.2 Verdict

The EUT was working as normal, the EUT met the requirement.

--- End of Test Report ---

Type of equipment, model: Residual current circuit breaker with over current protection, YCB9LE-80M YCB9NL-40 YCB9LE-125

Details of:

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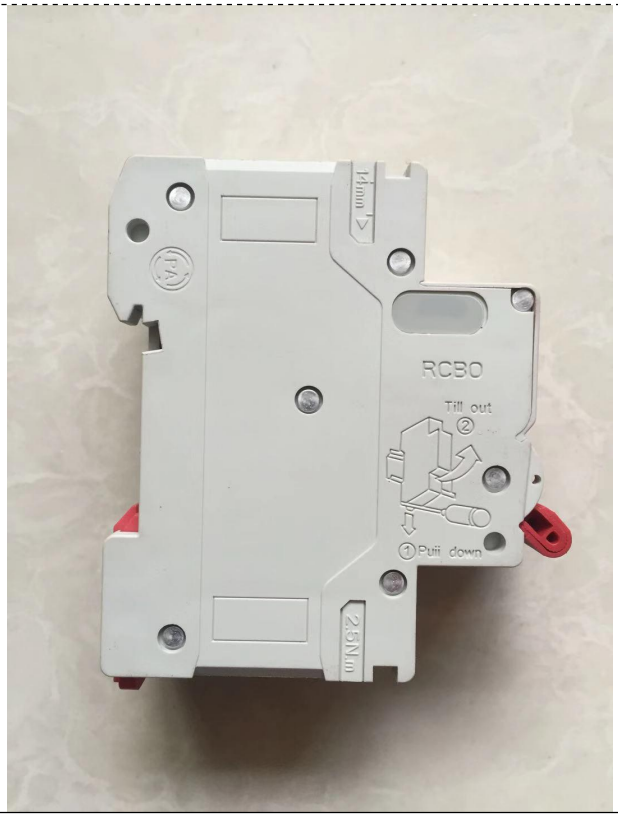

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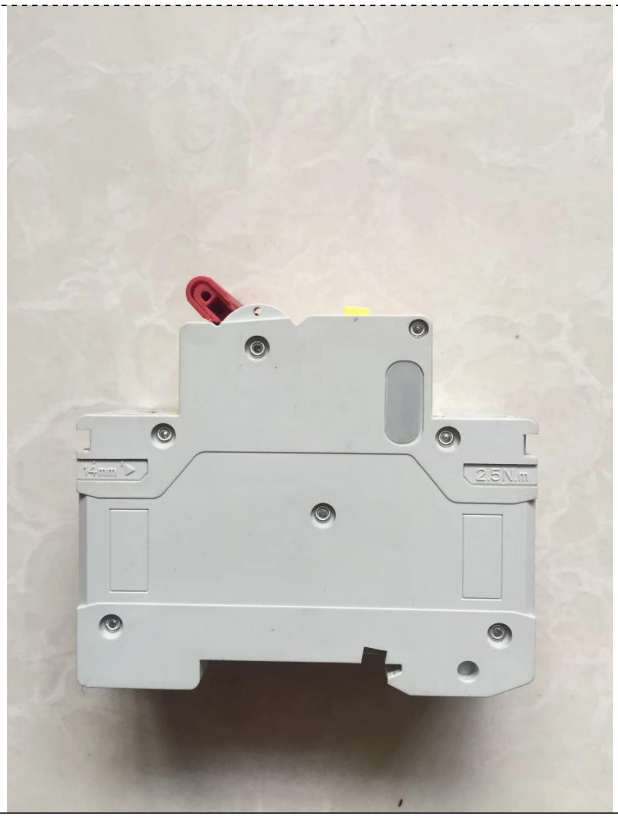

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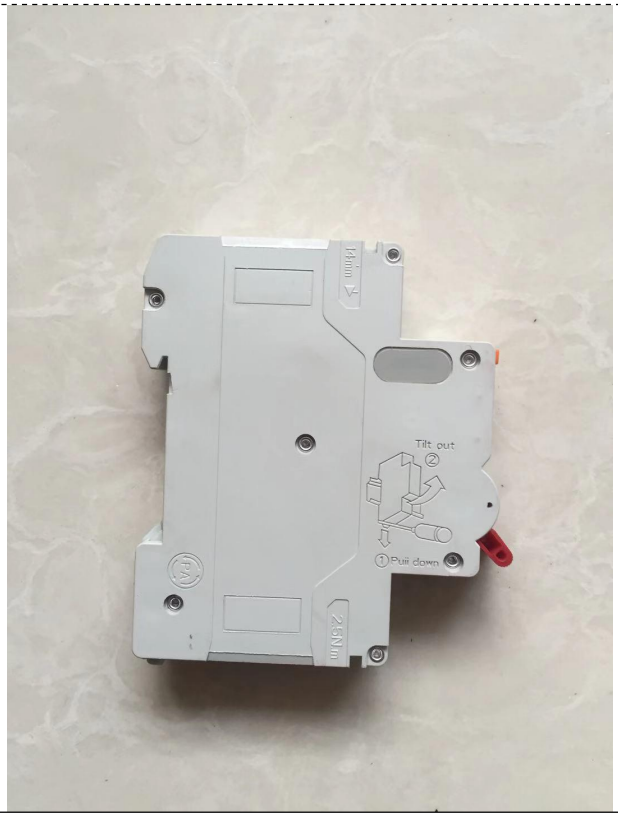

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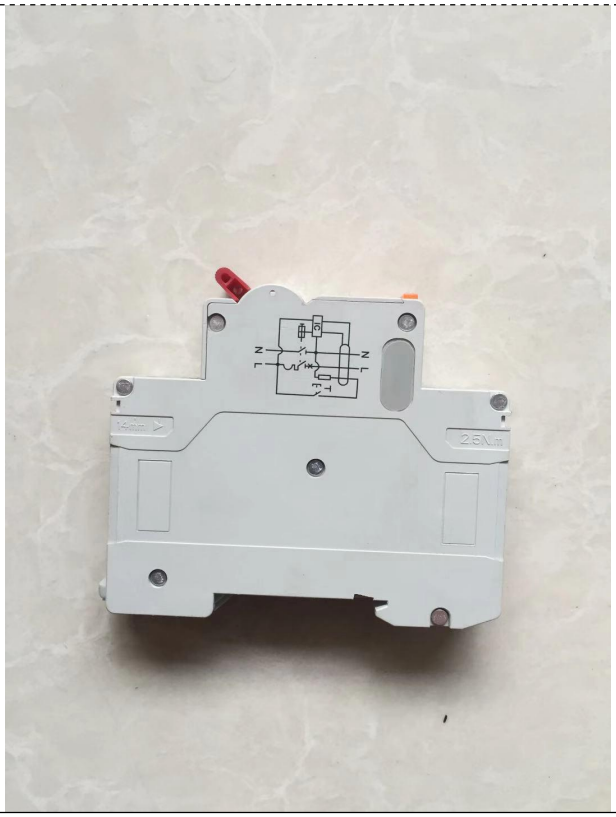

Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom