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中国认可  
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检测  
TESTING  
CNAS L0841

# 江苏省计量科学研究所

JIANGSU INSTITUTE OF METROLOGY

## 检测报告

Test Report

报告编号: T2019-40656

Report No.

委托单位  
Customer

安科瑞电气股份有限公司  
Acrel Co., Ltd.

委托单位地址  
Customer Add.

上海市嘉定区育绿路 253 号  
No.253, Yulv Road, Jiading District, Shanghai, China

样品名称  
Name of Instrument

ADL

制造单位  
Manufacturer

江苏安科瑞电器制造有限公司  
Jiangsu Acrel Electric MFG. Co., Ltd.

地址: 南京市栖霞区文澜路 95 号 (总部)

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样品信息

Description of samples

名称 Name	ADL	型号/规格 Type/specification	ADL3000-E 3×220/380V 3×10(80)A
编号 Serial No.	SHZ19071680017	测量范围 Measuring Range	-
委托日期 Accepting date	2019-07-18	准确度等级/最大允许误差 Class of Accuracy/Maximum Permissible Errors	有功电能 0.5S 级 Active energy class 0.5S

备注 此类架装式仪表未进行防尘防水试验, 使用时应安装于不低于 IP51 或 IP54 防护等级的封闭外罩内。

This kind of rack mounted meters were not done the dustproof and waterproof test. The meters should be installed in a closed enclosure not less than IP51 or IP54 protection level when they used.

本次检测的依据:

Reference documents for the test

序号	文件代号及名称
1	IEC 62052-11:2003 <i>Electricity metering equipment (a.c.) – General requirements, tests and test conditions - Part 11: Metering equipment</i>
2	IEC 62053-22:2003 <i>Electricity metering equipment (a.c.) – Particular requirements – Part 22:Static meters for active energy(classes 0.2S and 0.5S)</i>

检测结论:

Results of test

依据用户委托, 对样品进行了检测, 所检项目符合 IEC 62052-11:2003 *Electricity metering equipment (a.c.) – General requirements, tests and test conditions - Part 11: Metering equipment* 和 IEC 62053-22:2003 *Electricity metering equipment (a.c.) – Particular requirements – Part 22:Static meters for active energy(classes 0.2S and 0.5S)* 的要求。

We tested the samples according to the items of test standard. The test results meet the requirements of the following documents: IEC 62052-11:2003 *Electricity metering equipment(a.c.) – General requirements, tests and test conditions - Part 11: Metering equipment* and IEC 62053-22:2003 *Electricity metering equipment(a.c.) – Particular requirements – Part 22:Static meters for active energy(classes 0.2S and 0.5S)*.

批准人/职务

Approved by/ Position

邓浩翔

审核人

Checked by

李博

主检人

Tested by

韩沁

签发日期

Date of Issue

2019 年

Year

11 月

Month

06 日

Day



检测用主要仪器设备一览表:

Main instruments used in this test:

仪器设备名称 Name	型号/规格 Type/specification	编号 Number	证书编号/有效期至 Certificate No./ Valid to
程控耐压测试仪 Program control high voltage testing equipment	YD9811	063	E2019-0056801 /2020-07-01
三相电能表检验装置 3-Phase Watt-hour Meter Calibration System	SJJ-1	1431003	E2018-0109257 /2019-11-29
冲击碰撞试验台 Striking and hitting test-bed	CP-100	920913	E2018-0105323 /2019-11-25
电磁干扰接收机 EMI receiver	ESCI7	100956	E2019-0090732 /2020-10-09
射频传导抗扰度测试系统 Immunity to conducted disturbances induced by radio frequency fields	CIT-10-75	126A1462/2017	E2019-0090701 /2020-10-09
射频电磁场辐射抗扰度测试系统 RF Immunity Test System	SML03	103221	E2018-0103206 /2019-11-18
静电放电发生器 ESD Simulator	ESD-30G	EC0281210	E2019-0004509 /2020-01-20
高温试验箱 High temperature test chamber	SEG-101H	1061111190	H2018-116887 /2019-12-24
灼热丝试验仪 Hot wire testing equipment	ZRS-2	127-12	H2018-0103174 /2019-11-10
电动振动试验系统 Electric vibration testing system	DC-3200-36	131244	E2018-0105326 /2019-11-13
组合式传导抗扰度模拟器 Combined conduction immunity simulator	NSG3060	1333	E2019-0014363 /2020-03-04

检测日期、检测地点、环境条件:

Location and environmental conditions for the test:

检测时间: 从 2019年08月12日 到 2019年11月01日

Date of testing from 2019.08.12 to 2019.11.01

地点: 南京市文澜路95号4412、3121、4105、4306、4302、4406室

Location: Room 4412,3121,4105,4306,4302,4406,No.95, WenLan Road,Nanjing

温度: (20.0~24.0)°C

Temperature:

相对湿度: (45~60)%

R. Humidity:



## 检测结果一览表

List of test items

序号 No.	检测项目 Test item	检测依据序号/条款号 Reference documents	结果 Results
1	外观、标志及结构 Appearance signs and structure	1/5	P
2	间隙和爬电距离 Clearance and Creepage distance	1/5.6	P
3	脉冲电压试验 Impulse voltage tests	1/7.3.2	P
4	交流电压试验 AC voltage tests	1/7.3.3	P
5	仪表的初始启动 Initial start-up of the meter	2/8.3	P
6	电流变化引起的误差极限 Limits of error due to variation of the current	2/8.1	P
7	仪表常数 Meter constant	2/8.4	P
8	起动试验 Starting	2/8.3	P
9	潜动试验 Test of no-load condition	2/8.3	P
10	环境温度改变 Ambient temperature variation	2/8.2	P
11	电压改变 Voltage variation	2/8.2	P
12	频率改变 Frequency variation	2/8.2	P
13	谐波改变 Influence of harmonics	2/8.2	P
14	外部恒定磁感应 Continuous magnetic induction of external origin	2/8.2	P
15	外磁感应强度 Magnetic induction of external origin 0.5mT	2/8.2	P
16	功率消耗 Power consumption	2/7.1	P
17	自热影响 Influence of self-heating	2/7.3	P
18	温升 Heating	1/7.2	P
19	短时过电流影响 Influence of short-time overcurrents	2/7.2	P
20	电压暂降和短时中断 Voltage dips and short interruptions	1/7.1.2	P
21	无线电干扰抑制 Radio interference suppression	1/7.5.8	P
22	快速瞬变脉冲群抗扰度 Fast transient burst test	1/7.5.4	P
23	射频电磁场抗扰度 Test of immunity to electromagnetic RF fields	1/7.5.3	P
24	射频场感应的传导骚扰抗扰度 Test of immunity to conducted disturbances, induced by radio-frequency fields	1/7.5.5	P
25	静电放电抗扰度 Test of immunity to electrostatic discharges	1/7.5.2	P





### 检测结果/说明

Results of test and additional explanation (continued page)

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
1	外观、标志及结构 Appearance signs and structure	<p>表壳、窗口、端子-端子座-保护接地端子、端子盖、间隙和爬电距离、绝缘防护等级、测量值的显示、输出装置等应符合规定的电能表机械要求;铭牌应具有相应可应用信息、接线图和端子标志应永久地标示接入的线路。</p> <p>Case ,window ,terminals-terminal block(s)-Protective earth terminal ,terminal covers, insulating encased meter of protective class II ,resistance to heat and fire ,protection against penetration of dust and water ,display of measured values ,output device, marking of meter shall meet item 5(mechanical requirements and tests) of IEC62052-11.</p>	符合要求 All requirements are met.	合格 pass	
2	间隙和爬电距离 Clearance and Creepage distance	最小间隙不小于 5.5mm Minimum clearance $\geq$ 5.5 mm	7.96mm	合格 pass	
		最小爬电距离不小于 6.3mm Minimum creepage distance $\geq$ 6.3mm	11.04mm	合格 pass	
3	脉冲电压试验 Impulse voltage tests	<p>脉冲电压峰值:6kV, 波形 1.2<math>\mu</math>s/50<math>\mu</math>s 脉冲, 脉冲之间最小间隔时间 3s, 正、负极性各 10 次, 应无电弧放电或击穿现象。</p> <p>Impulse waveform: 1.2/50 impulse specified in IEC60060-1; test voltage: 6kV.The EUT should be tested according to Item 7.3.2 of IEC62052-11.During this test no flashover, disruptive discharge or puncture shall occur.</p>	符合要求 All requirements are met.	合格 pass	
4	交流电压试验 AC voltage tests	<p>所有电路对地之间施加交流电压 4kV, 保持 1min, 应无击穿或飞弧。</p> <p>Between, on the one hand, all the current and voltage circuits as well as the auxiliary circuits whose reference voltage is over 40V, connected together, and, on the other hand, earth.</p> <p>Test voltage:4kV; test time:1min.</p> <p>During this test no flashover, disruptive discharge or puncture shall occur.</p>	符合要求 All requirements are met.	合格 pass	
5	仪表的初始启动 Initial start-up of the meter	<p>参比电压加到仪表接线端后, 5s 内仪表应达到全部工作状态。</p> <p>The meter shall be functional within 5s after the reference voltage is applied to the meter terminals.</p>	符合要求 All requirements are met.	合格 pass	



序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
6	电流变化引起的误差极限 (有功电能) Limits of error due to variation of the current (active energy)	平衡负载 balanced loads $0.01I_n \leq I < 0.05I_n$ ( $\cos\varphi=1.0$ ) $0.02I_n \leq I < 0.1I_n$ ( $\cos\varphi=0.5L、0.8C$ ) $-1.0\% \leq \text{Percentage error(PE)} \leq +1.0\%$	-0.11%	合格 pass	
		平衡负载 balanced loads $0.05I_n \leq I \leq I_{max}$ ( $\cos\varphi=1.0$ ) $0.1I_n \leq I \leq I_{max}$ ( $\cos\varphi=0.5L、0.8C$ ) $-0.5\% \leq \text{Percentage error(PE)} \leq +0.5\%$	-0.20%	合格 pass	
		不平衡负载 unbalanced loads $0.05I_n \leq I \leq I_{max}$ ( $\cos\varphi=1.0$ ) $-1.0\% \leq \text{Percentage error(PE)} \leq +1.0\%$	+0.04%	合格 pass	
		不平衡负载 unbalanced loads $0.1I_n \leq I \leq I_{max}$ ( $\cos\varphi=0.5L$ ) $-0.6\% \leq \text{Percentage error(PE)} \leq +0.6\%$	-0.23%	合格 pass	
		单相负载与三相平衡负载误差之差 $\leq 1.0\%$ The difference between the percentage error when the meter is carrying a single-phase load and a balanced polyphase load shall not exceed 1.0%.	0.02%	合格 pass	
7	仪表常数 Meter constant	测试输出与显示器指示之间的关系应与铭牌标志一致。 The relation between the test output and the indication in the display shall comply with the marking on the name-plate.	符合要求 All requirements are met.	合格 pass	

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
8	起动试验 Starting	在规定电流条件下, 仪表应能起动并连续记录。 The meter shall start and continue to register.	符合要求 All requirements are met.	合格 pass	
9	潜动试验 Test of no-load condition	仪表加 115% $U_n$ 电流回路中没有电流, 其测试输出端不应产生多于一个的脉冲。 When the voltage is applied with no current flowing in the current circuit, the test output of the meter shall not produce more than one pulse. For this test the current circuit shall be open-circuit and a voltage of 115% of the reference voltage shall be applied to the voltage circuits.	符合要求 All requirements are met.	合格 pass	
10	环境温度改变 Ambient temperature variation	变差 $\leq 0.03\%/^{\circ}\text{C}$ ( $\cos\phi=1.0$ ) Variation in PE $\leq 0.03\%/^{\circ}\text{C}$ ( $\cos\phi=1.0$ )	0.019%/ $^{\circ}\text{C}$	合格 pass	
		变差 $\leq 0.05\%/^{\circ}\text{C}$ ( $\cos\phi=0.5L$ ) Variation in PE $\leq 0.05\%/^{\circ}\text{C}$ ( $\cos\phi=0.5L$ )	0.022%/ $^{\circ}\text{C}$	合格 pass	
11	电压改变 Voltage variation	1.1 $U_n$ 和 0.9 $U_n$ 时: 变差 $\leq 0.4\% \pm 10\%U_n$ ; Variation in PE $\leq 0.4\%$	0.03%	合格 pass	
		极限的工作范围为(0.0~1.15) $U_n$ , 试验后仪表应无损坏或信息改变。 Limit range of operation(0.0~1.15) $U_n$ . After test, the meter shall show no damage or change of the information.	符合要求 All requirements are met.	合格 pass	
		1.15 $U_n$ 和 0.8 $U_n$ 时: 变差 $\leq 1.2\%$ 1.15 $U_n$ and 0.8 $U_n$ ; Variation in PE $\leq 1.2\%$	0.05%	合格 pass	
12	频率改变 Frequency variation	变差 $\leq 0.2\%$ Variation in PE $\leq 0.2\%$	0.02%	合格 pass	



序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
13	谐波改变 Influence of harmonics				
(1)	电流和电压线路 谐波分量影响 Harmonic components in the current and Voltage circuits	变差 $\leq 0.5\%$ Variation in PE $\leq 0.5\%$	0.02%	合格 pass	
(2)	交流线路中 次谐波的影响 Sub-harmonics in the a.c. current circuit	变差 $\leq 1.5\%$ Variation in PE $\leq 1.5\%$	0.74%	合格 pass	
14	外部恒定磁感应 Continuous magnetic induction of external origin	变差 $\leq 2.0\%$ Variation in PE $\leq 2.0\%$	0.02%	合格 pass	
15	外磁感应强度 Magnetic induction of external origin 0.5mT	变差 $\leq 1.0\%$ Variation in PE $\leq 1.0\%$	0.28%	合格 pass	
16	功率消耗 Power consumption				
(1)	电压线路视在 功率消耗 Voltage circuit(VA)	$\leq 10VA$	3.6VA	合格 pass	
(2)	电压线路有功 功率消耗 Voltage circuit(W)	$\leq 2W$	1.7W	合格 pass	
(3)	电流线路视在 功率消耗 Current circuit(VA)	$\leq 1.0VA$	0.05VA	合格 pass	
17	自热影响 Influence of self-heating	变差 $\leq 0.2\%$ ( $\cos\phi=1.0$ ) Variation in PE $\leq 0.2\%$ ( $\cos\phi=1.0$ )	0.08%	合格 pass	
		变差 $\leq 0.2\%$ ( $\cos\phi=0.5L$ ) Variation in PE $\leq 0.2\%$ ( $\cos\phi=0.5L$ )	0.08%	合格 pass	
18	温升 Heating	电能表在 40℃ 条件下, 电流线路通以额定最大电流, 电压线路包括辅助电源线路加 115% 的参比电压, 2h 后立即测量仪表表面温度, 表壳的外表面温升不应超过 25K。 The temperature rise of the external surface shall not exceed 25K, with an ambient temperature of 40℃.	18.4K	合格 pass	
		试验后表壳不应损坏, 工作正常, 绝缘性能符合要求。 After the test, the meter shall show no damage and shall comply with the dielectric strength tests.	符合要求 All requirements are met.	合格 pass	

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
19	短时过电流影响 Influence of short-time overcurrents	短时过电流不应损坏仪表。当恢复至初始条件时, 仪表应能正常工作。 Short-time overcurrents shall not damage the meter. The meter shall perform correctly when back to its initial working condition.	符合要求 All requirements are met.	合格 pass	
		变差 $\leq 0.05\%$ Variation in PE $\leq 0.05\%$	0.01%	合格 pass	
20	电压暂降和短时中断 Voltage dips and short interruptions	<p>试验按下列条件进行:</p> <p>—电压线路和辅助线路通以参比电压;</p> <p>—电流线路无电流。</p> <p>a) 电压中断, <math>\Delta U=100\%</math></p> <p>—中断时间: 1s;</p> <p>—中断次数: 3次;</p> <p>—中断间隔时间: 50ms。</p> <p>b) 电压中断, <math>\Delta U=100\%</math></p> <p>—中断时间: 参比频率的一个周期;</p> <p>—中断次数: 1次。</p> <p>c) 电压暂降, <math>\Delta U=50\%</math></p> <p>—暂降时间: 1min;</p> <p>—暂降次数: 1次。</p> <p>电压暂降和短时中断应不使计度器产生大于 0.0528kWh 计量单位的改变以及测试输出不应产生大于等同 0.0528kWh 计量单位的信号量。</p> <p>The test shall be carried out under the following conditions:</p> <p>-voltage and auxiliary circuits energized with reference voltage;</p> <p>-without any current in the current circuits.</p> <p>a)voltage interruptions of <math>\Delta U=100\%</math></p> <p>-interruption time:1s;</p> <p>-number of interruptions:3;</p> <p>-restoring time between interruptions: 50ms.</p> <p>b)voltage interruptions of <math>\Delta U=100\%</math></p> <p>-interruption time: one cycle at rated frequency;</p> <p>-number of interruptions:1;</p> <p>c)voltage dips of <math>\Delta U=50\%</math></p> <p>-dip time:1min;</p> <p>-number of dips:1.</p> <p>Voltage dips and short interruptions shall not produce a change in the register of more than 0.0528kWh and the test output shall not produce a signal equivalent of more than 0.0528kWh.</p>	符合要求 All requirements are met.	合格 (详见附录 2) pass (refer to appendix 2)	
		电压恢复后仪表计量特性 When the voltage is restored, the meter shall not have suffered degradation of its metrological characteristics. -0.5% $\leq$ Percentage error(PE) $\leq$ +0.5%	+0.09%	合格 pass	



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			SHZ19071680017		
21	无线电干扰抑制 Radio interference suppression	<p>试验应按 CISPR 22, 在下列条件下进行:</p> <ul style="list-style-type: none"> <li>—作为 B 级设备;</li> <li>—作为台式设备试验;</li> <li>—对电压线路与每个连接器的连接, 应使用长度为 1m 的无屏蔽电缆;</li> <li>—仪表在工作状态;</li> <li>—电压线路和辅助线路通以参比电压;</li> <li>—电流在 <math>0.1I_b(I_n)</math> 与 <math>0.2I_b(I_n)</math> 之间。(用 1m 长的无屏蔽电缆和线性负荷连接)。</li> </ul> <p>The test shall be carried out according to CISPR 22, under the following conditions:</p> <ul style="list-style-type: none"> <li>• for class B equipment;</li> <li>• tested as table-top equipment;</li> <li>• for connection to the voltage circuits, an unshielded cable length of 1 m to each connector shall be used;</li> <li>• meter in operating condition: <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- with a current between <math>0,1 I_b</math> and <math>0,2 I_b</math> resp. <math>0,1 I_n</math> and <math>0,2 I_n</math> (drawn by linear load and connected by unshielded cable length of 1 m)</li> </ul> </li> </ul> <p>(0.15~≤0.50)MHz QP≤ (66~56)dBμV  (0.50~≤5.0)MHz QP≤ 56dBμV  (5.0~≤30)MHz QP≤ 60dBμV  (0.15~≤0.50)MHz AV≤ (56~46)dBμV  (0.50~≤5.0)MHz AV≤ 46dBμV  (5.0~≤30)MHz AV≤ 50dBμV</p>	符合要求 All requirements are met.	合格 (详见附录 3) pass (refer to appendix 3)	
(1)	电源端子传导骚扰 Conducted emission test				

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
(2)	辐射骚扰 Radiated emission test	<p>试验应按 CISPR 22, 在下列条件下进行:</p> <ul style="list-style-type: none"> <li>—作为 B 级设备;</li> <li>—作为台式设备试验;</li> <li>—电压线路与每个连接器的连接, 应使用长度为 1m 的无屏蔽电缆;</li> </ul> <p>仪表在工作状态:</p> <ul style="list-style-type: none"> <li>—电压线路和辅助线路通以参比电压;</li> <li>—电流在 <math>0.1I_b(I_n)</math> 与 <math>0.2I_b(I_n)</math> 之间。(用 1m 长的无屏蔽电缆和线性负荷连接)。 <p>测试距离: 10m 天线升降范围: (1~4)m 天线极化方向: 垂直、水平 转台角度范围: 0~360°</p> <p>The test shall be carried out according to CISPR 22, under the following conditions:</p> <ul style="list-style-type: none"> <li>• for class B equipment;</li> <li>• tested as table-top equipment;</li> <li>• for connection to the voltage circuits, an unshielded cable length of 1 m to each connector shall be used;</li> <li>• meter in operating condition: <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- with a current between <math>0,1 I_b</math> and <math>0,2 I_b</math> resp. <math>0,1 I_n</math> and <math>0,2 I_n</math> (drawn by linear load and connected by unshielded cable length of 1 m).</li> </ul> </li> </ul> <p>measuring distance: 10 m; antenna elevation range (1~4)m; antenna polarization direction: vertical, horizontal; turntable angle range: 0~360° .</p> <p>(30~≤230)MHz QP≤30dBμV/m (230~1000)MHz QP≤37dBμV/m</p> </li></ul>	符合要求 All requirements are met.	合格 (详见附录 4) pass (refer to appendix 4)	



序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
22	快速瞬变脉冲群 抗扰度 Fast transient burst test	<p>试验在下列条件下进行:</p> <ul style="list-style-type: none"> <li>— 作为台式设备试验;</li> <li>— 仪表在工作状态: <ul style="list-style-type: none"> <li>• 电压线路和辅助线路通以参比电压;</li> <li>• 基本电流 <math>I_b(I_n)</math> 和 <math>\cos\phi=1</math> (相应的 <math>\sin\phi=1</math>);</li> </ul> </li> <li>— 在耦合设备与仪表之间的电缆长度: 1m;</li> <li>— 试验电压以共模方式 (线对地) 作用于: <ul style="list-style-type: none"> <li>• 电压线路;</li> <li>• 电流线路, 如果在正常使用时与电压线路是隔离的;</li> <li>• 辅助线路, 如果在正常使用时与电压线路是隔离的;</li> </ul> </li> <li>— 在电流线路和电压线路上的试验电压: 4kV;</li> <li>— 在参比电压超过 40V 的辅助线路上的试验电压: 2kV;</li> <li>— 试验时间: 每一极性 60s。</li> </ul> <p>在试验时仪表的工作状况不受干扰且误差的改变应小于 4.0%。</p> <p>The test shall be carried out according to IEC 61000-4-4, under the following conditions:</p> <ul style="list-style-type: none"> <li>• tested as table-top equipment;</li> <li>• meter in operating condition: <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- with basic current <math>I_b</math> resp. rated current <math>I_n</math>, and <math>\cos\phi</math> resp. <math>\sin\phi</math> according to the value given in the relevant standard.</li> </ul> </li> <li>• cable length between coupling device and EUT: 1m;</li> <li>• the test voltage shall be applied in common mode (line to earth) to: <ul style="list-style-type: none"> <li>- the voltage circuits;</li> <li>- the current circuits, if separated from the voltage circuits in normal operation;</li> <li>- the auxiliary circuits, if separated from the voltage circuits in normal operation;</li> </ul> </li> <li>• test voltage on the current and voltage circuit: 4kV;</li> <li>• test voltage on the auxiliary circuits with a reference voltage over 40V: 2kV;</li> <li>• duration of the test: 60s at each polarity.</li> </ul> <p>During the test, a temporary degradation or loss of function or performance is acceptable, nevertheless the variation of the error shall be less than 4.0%.</p>	0.05%	合格 (详见附录 5) pass (refer to appendix 5)	

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
23	射频电磁场 抗扰度 Test of immunity to electromagnetic RF fields	<p>试验按下列条件下进行:</p> <ul style="list-style-type: none"> <li>—作为台式设备试验;</li> <li>—暴露于电磁场中的电缆长度: 1m;</li> <li>—频率范围: 80MHz~2000MHz;</li> <li>—在 1kHz 正弦波上以 80%调幅载波调制;</li> <li>—仪表在工作状态:                             <ul style="list-style-type: none"> <li>• 电压线路和辅助线路通以参比电压;</li> <li>• 基本电流 <math>I_b(I_n)</math>和 <math>\cos\phi=1</math>(相应的 <math>\sin\phi=1</math>);</li> </ul> </li> <li>—未调制的试验场强: 10V/m。</li> </ul> <p>在试验时仪表的工作状况不受干扰且误差的改变应小于 2.0%。</p> <p>The test shall be carried out according to IEC 61000-4-3, under the following conditions:</p> <ul style="list-style-type: none"> <li>• tested as table-top equipment;</li> <li>• cable length, exposed to the field: 1m;</li> <li>• frequency band: 80MHz~2000MHz;</li> <li>• carrier modulated with 80% AM at 1kHz sine wave;</li> </ul> <p>Test with current</p> <ul style="list-style-type: none"> <li>• meter in operating condition:                             <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- basic current <math>I_b</math> resp. rated current <math>I_n</math>, and <math>\cos\phi</math> resp. <math>\sin\phi</math> according to the value given in the relevant standard.</li> </ul> </li> <li>• unmodulated test field strength: 10V/m.</li> </ul> <p>During the test, the behaviour of the equipment shall not be perturbed and the variation of error shall be less than 2.0%.</p>	0.03%	合格 (详见附录 6) pass (refer to appendix 6)	



序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
	射频电磁场 抗扰度 Test of immunity to electromagnetic RF fields	试验按下列条件下进行: 一作为台式设备试验; 一暴露于电磁场中的电缆长度: 1m; 一频率范围: 80MHz~2000MHz; 一在 1kHz 正弦波上以 80%调幅载波调制; 一仪表在工作状态: ● 电压线路和辅助线路通以参比电压; ● 电流线路无电流(开路); 一未调制的试验场强: 30V/m。 射频电磁场的作用不应使计度器产生大于 0.0528kWh 计量单位的改变以及测试输出不应产生 大于等同 0.0528kWh 计量单位的信号量。 在试验中, 允许功能暂时丧失或性能降低, 但 在骚扰停止后仪表能自行恢复, 无需操作者干预。 The test shall be carried out according to IEC 61000-4-3, under the following conditions: • tested as table-top equipment; • cable length, exposed to the field: 1m; • frequency band: 80MHz~2000MHz; • carrier modulated with 80% AM at 1kHz sine wave; Test without any current • meter in operating condition: - voltage and auxiliary circuits energized with reference voltage; - without any current in the current circuits and the current terminals shall be open circuit. • unmodulated test field strength: 30V/m. The application of the RF field shall not produce a change in the register of more than 0.0528kWh and the test output shall not produce a signal equivalent to more than 0.0528kWh. During the test, a temporary degradation or loss of function or performance is acceptable.	符合要求 All requirements are met.	合格 (详见附录 6) pass (refer to appendix 6)	

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
24	射频场感应的传导骚扰抗扰度 Test of immunity to conducted disturbances, induced by radio-frequency fields	<p>试验在下列条件下进行:</p> <ul style="list-style-type: none"> <li>—作为台式设备试验;</li> <li>—仪表在工作状态:                             <ul style="list-style-type: none"> <li>• 电压线路和辅助线路通以参比电压;</li> <li>• 基本电流 <math>I_b(I_n)</math>和 <math>\cos \phi = 1</math>(相应的 <math>\sin \phi = 1</math>);</li> </ul> </li> <li>—频率范围: 150kHz~80MHz;</li> <li>—电压水平: 10V。</li> </ul> <p>在试验时仪表的工作状况不受干扰且误差的改变应小于 2.0%。</p> <p>The test shall be carried out according to IEC 61000-4-6, under the following conditions:</p> <ul style="list-style-type: none"> <li>• tested as table-top equipment;</li> <li>• meter in operating condition;                             <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- with basic current <math>I_b</math> resp. rated current <math>I_n</math>, and <math>\cos \phi</math> resp. <math>\sin \phi</math> according to the value given in the relevant standard;</li> </ul> </li> <li>• frequency range: 150kHz to 80MHz;</li> <li>• voltage level: 10V.</li> </ul> <p>During the test, the behaviour of the equipment shall not be perturbed and variation of the error shall be less than 2.0%.</p>	0.02%	合格 (详见附录 7) pass (refer to appendix 7)	



序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
25	静电放电 抗扰度 Test of immunity to electrostatic discharges	<p>试验在下列条件下进行:</p> <ul style="list-style-type: none"> <li>—作为台式设备试验;</li> <li>—仪表在工作状态: <ul style="list-style-type: none"> <li>• 电压线路和辅助线路通以参比电压;</li> <li>• 电流线路无电流(开路);</li> </ul> </li> <li>—直接放电和间接放电;</li> <li>—试验电压: 8kV;</li> <li>—放电次数: 每一极性 10 次;</li> <li>—直接放电时如因无外露金属部件而不能接触放电, 则以 15kV 试验电压作空气放电(相对湿度范围为 30%~60%)。</li> </ul> <p>静电放电作用应不使计度器产生大于 0.0528kWh 计量单位的改变以及测试输出不应产生大于等同 0.0528kWh 计量单位的信号量。</p> <p>在试验中, 允许功能暂时丧失或性能暂时降低, 但在骚扰停止后仪表能自行恢复, 无需操作者干预。</p> <p>The test shall be carried out according to IEC61000-4-2, under the following conditions:</p> <ul style="list-style-type: none"> <li>• tested as table-top equipment;</li> <li>• meter in operating condition; <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- without any current in the current circuits(open circuit);</li> </ul> </li> <li>• contact discharge;</li> <li>• test voltage: 8kV;</li> <li>• number of discharges: 10(in the most sensitive polarity).</li> </ul> <p>If contact discharge is not applicable because no metallic parts are outside, then apply air discharge with a 15 kV test voltage.</p> <p>The application of the electrostatic discharge shall not produce a change in the register of more than 0.0528kWh and the test output shall not produce a signal equivalent to more than 0.0528kWh.</p> <p>During the test, a temporary degradation or loss of function or performance is acceptable.</p>	符合要求 All requirements are met.	合格 (详见附录 8) pass (refer to appendix 8)	

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
26	浪涌抗扰度 Surge immunity test	<p>试验在下列条件下进行:</p> <ul style="list-style-type: none"> <li>—仪表在工作状态;</li> <li>● 电压线路和辅助线路通以参比电压;</li> <li>● 电流线路无电流(开路);</li> </ul> <p>—浪涌发生器与仪表之间的电缆长度: 1m;</p> <p>—以差模方式(线对线)试验;</p> <p>—相位角: 在相对于交流电源零位的 60°和 240°施加脉冲;</p> <p>—在电流线路和电压线路(干线)上的试验电压: 4kV, 发生器电源阻抗: 2Ω;</p> <p>—在参比电压超过 40V 的辅助线路上的试验电压: 1kV; 发生器电源阻抗: 42Ω;</p> <p>—试验次数: 每一极性 5 次;</p> <p>—重复率: 每分钟 1 次。</p> <p>浪涌抗扰度试验电压的作用应不使计度器产生大于 0.0528kWh 计量单位的改变以及测试输出不应产生大于等同 0.0528kWh 计量单位的信号量。</p> <p>在试验中, 允许功能暂时丧失或性能暂时降低, 但在骚扰停止后仪表能自行恢复, 无需操作者干预。</p> <p>The test shall be carried out according to IEC61000-4-5, under the following conditions:</p> <ul style="list-style-type: none"> <li>• meter in operating condition: <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- without any current in the current circuits and the current terminals shall be open circuit;</li> </ul> </li> <li>• cable length between surge generator and meter: 1m;</li> <li>• tested in differential mode(line to line);</li> <li>• Phase angle: pulses to be applied at 60° and 240° relative to zero crossing of AC supply;</li> <li>• test voltage on the current and voltage circuit(mains lines): 4kV.</li> <li>• number of tests: 5 positive and 5 negative;</li> <li>• repetition rate: 1/min.</li> </ul> <p>The application of the surge immunity test voltage shall not produce a change in the register of more than 0.0528kWh and the test output shall not produce a signal equivalent to more than 0.0528kWh.</p> <p>During the test, a temporary degradation or loss of function or performance is acceptable.</p>	符合要求 All requirements are met.	合格 (详见附录 9) pass (refer to appendix 9)	
27	高温试验 Dry heat test	<p>高温贮存: +70°C ± 2°C, 72h; 仪表为非工作状态。</p> <p>-meter in non-operating condition;</p> <p>-temperature: +70°C ± 2°C;</p> <p>-duration of the test: 72h.</p>	符合要求 All requirements are met.	合格 pass	
		<p>试验后仪表应无损坏或信息改变。</p> <p>After the test, the meter shall show no damage or change of information and shall operate correctly.</p>			
		-0.5% ≤ Percentage error(PE) ≤ +0.5%	+0.17%	合格 pass	

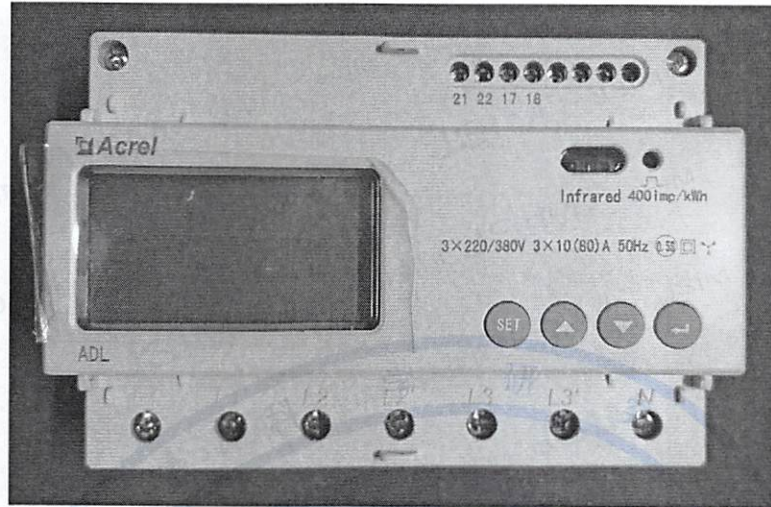


序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
28	低温试验 Cold test	低温贮存: $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ , 72h; 仪表为非工作状态。 -meter in non-operating condition; -temperature: $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ; -duration of the test: 72h.			
		试验后仪表应无损坏或信息改变。 After the test, the meter shall show no damage or change of information and shall operate correctly.	符合要求 All requirements are met.	合格 pass	
		$-0.5\% \leq \text{Percentage error(PE)} \leq +0.5\%$	-0.05%	合格 pass	
29	交变湿热试验 Damp heat cyclic test	交变湿热: 电能表所有电压线路加参比电压, 电流线路无电流; 试验温度 (25~40) °C, 相对湿度为: 93% ± 3%。试验 6 个周期, 每个周期 24h。 -voltage and auxiliary circuits energized with reference voltage; -without any current in the current circuits; -temperature: (25~40)°C; -humidity: 93%±3%RH; -duration of the test: 6 cycles, 24 hours each cycle;			
		试验后仪表应无损坏或信息改变, 试验后, 仪表应无损坏或信息改变并能正确地工作, 不应出现可能影响仪表功能特性的腐蚀痕迹。并满足规定的脉冲电压试验和交流电压试验要求。 After the test, the meter shall show no damage or change of information and shall operate correctly. 24h after the end of this test, the meter shall comply with the dielectric strength tests. No trace of corrosion likely to affect the functional properties of the meter shall be apparent.	符合要求 All requirements are met.	合格 pass	
		$-0.5\% \leq \text{Percentage error(PE)} \leq +0.5\%$	+0.10%	合格 pass	
30	振动试验 Vibration test	频率 $f=(10\sim 60)\text{Hz}$ , 振幅 $A_m=0.075\text{mm}$ ; 频率 $f=(60\sim 150)\text{Hz}$ , 加速度 $a=9.8\text{m/s}^2$ , 每一轴向扫频 10 次。 -meter in non-operation condition, without the packing; -Frequency range: 10Hz to 150Hz; -Transition frequency: 60Hz; - $f < 60\text{Hz}$ , constant amplitude of movement 0.075mm; - $f > 60\text{Hz}$ , constant acceleration $9.8\text{m/s}^2$ ; -Single point control; -Number of sweep cycles per axis: 10.			
		试验后仪表应无损坏或信息改变。 After the test, the meter shall show no damage or change of information and shall operate correctly.	符合要求 All requirements are met.	合格 pass	
		$-0.5\% \leq \text{Percentage error(PE)} \leq +0.5\%$	+0.06%	合格 pass	
31	冲击试验 Shock test	峰值加速度: $a=300\text{m/s}^2$ ; 冲击时间: $T=18\text{ms}$ ; 每个面 3 次, 6 个面共 18 次。 -meter in non-operation condition, without the packing; -half-sine pulse; -peak acceleration: $a=300\text{m/s}^2$ ; -duration of the pulse: 18ms.			
		试验后仪表应无损坏或信息改变。 After the test, the meter shall show no damage or change of information and shall operate correctly.	符合要求 All requirements are met.	合格 pass	
		$-0.5\% \leq \text{Percentage error(PE)} \leq +0.5\%$	+0.04%	合格 pass	

序号 No.	检测项目 Test Item	技术要求 Technical Standard Requirement	检测结果 Test Result	结论 Conclusion	备注 Remark
			SHZ19071680017		
32	弹簧锤试验 Spring hammer test	(0.2±0.02)J 的动能作用于表壳(包括窗口) 和端盖的外表面上, 不应出现影响仪表功能及可触及带电部件的损伤。 The spring hammer shall act on the outer surfaces of the meter cover(including windows) and on the terminal cover with a kinetic energy of 0.2J±0.02J. The meter case and terminal cover do not sustain damage which could affect the function of the meter and it is not possible to touch live parts.	符合要求 All requirements are met.	合格 pass	
33	耐热和阻燃 Resistance to heat and fire	接线端座: (960±10)°C 接线端盖和表壳: (650±10)°C; 作用时间: (30±1)s; 仪表不应燃烧。 如发生燃烧, 则应在移开灼热丝之后的 30s 内熄灭, 且铺底层的绢纸不应起燃。 -terminal block: (960±10)°C -terminal cover and meter case: (650±10)°C; -duration of application: (30±1)s. The terminal block ,the terminal cover and the meter case shall ensure reasonable safety against spread of fire .They should not be ignited by thermal overload of live parts in contact with them.	符合要求 All requirements are met.	合格 pass	
34	逆相序 Reversed phase sequence	变差≤0.1% Variation in PE≤0.1%	0.01%	合格 pass	
35	电压不平衡 Voltage unbalance	变差≤1.0% Variation in PE≤1.0%	0.04%	合格 pass	

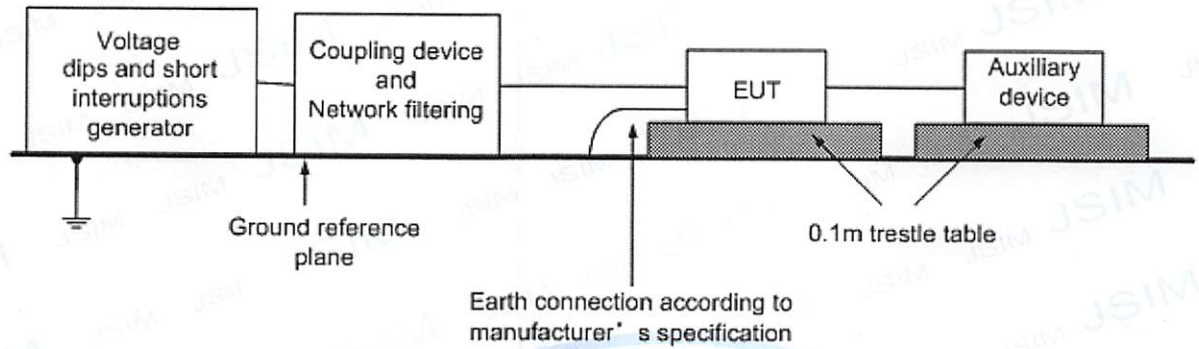


附录 1  
Appendix 1  
样品照片 Sample picture

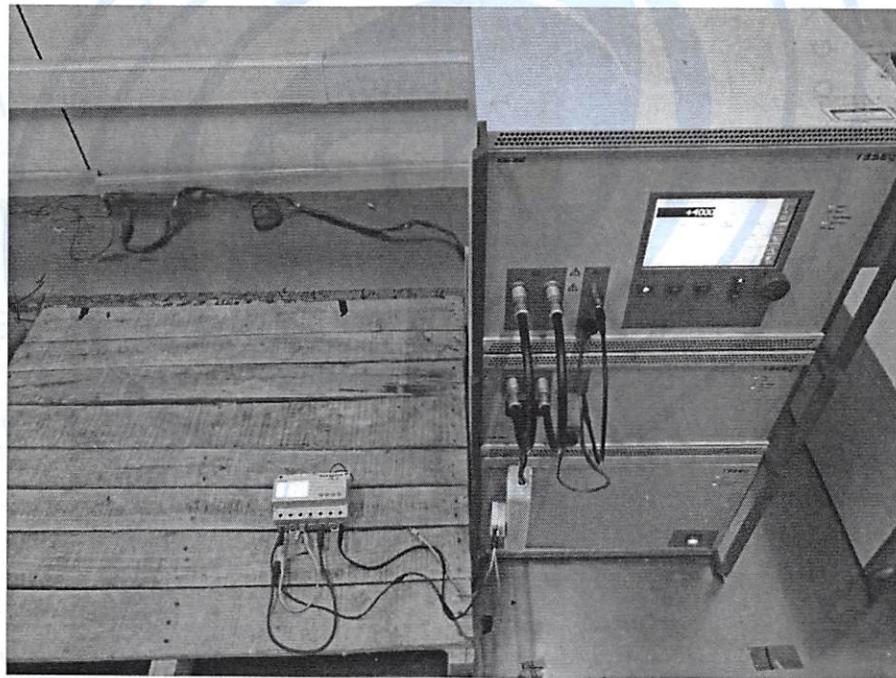


附录 2  
Appendix 2

1. 电压暂降和短时中断试验布置图  
Setup pic of voltage dips and short interruptions test



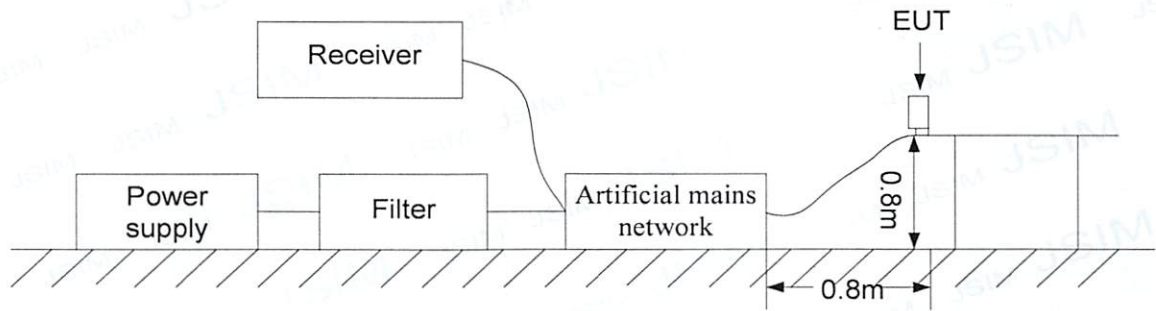
2. 电压暂降和短时中断试验布置照片  
Test pic of voltage dips and short interruptions test



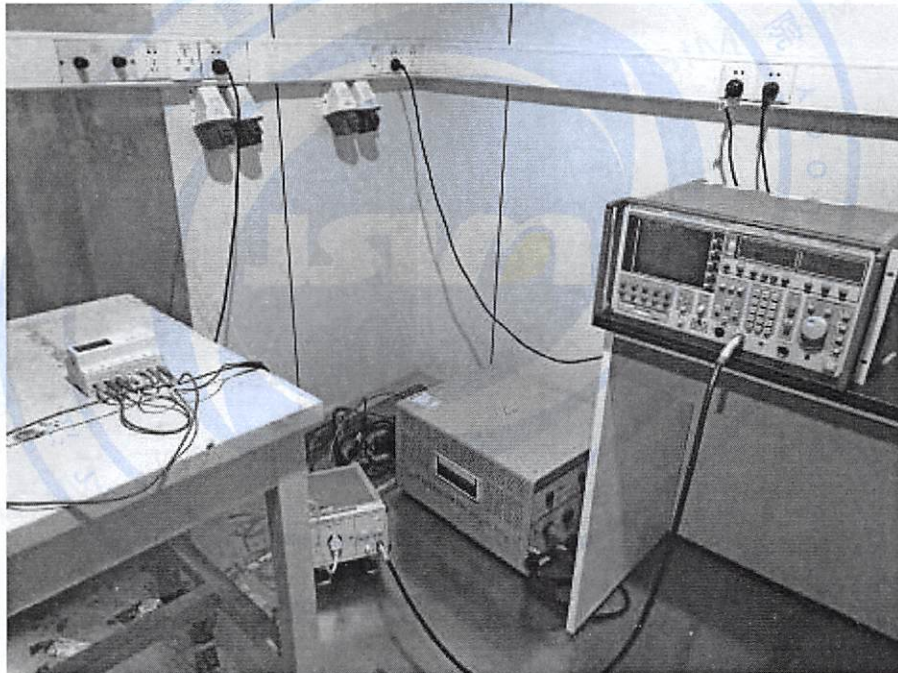


附录 3  
Appendix 3

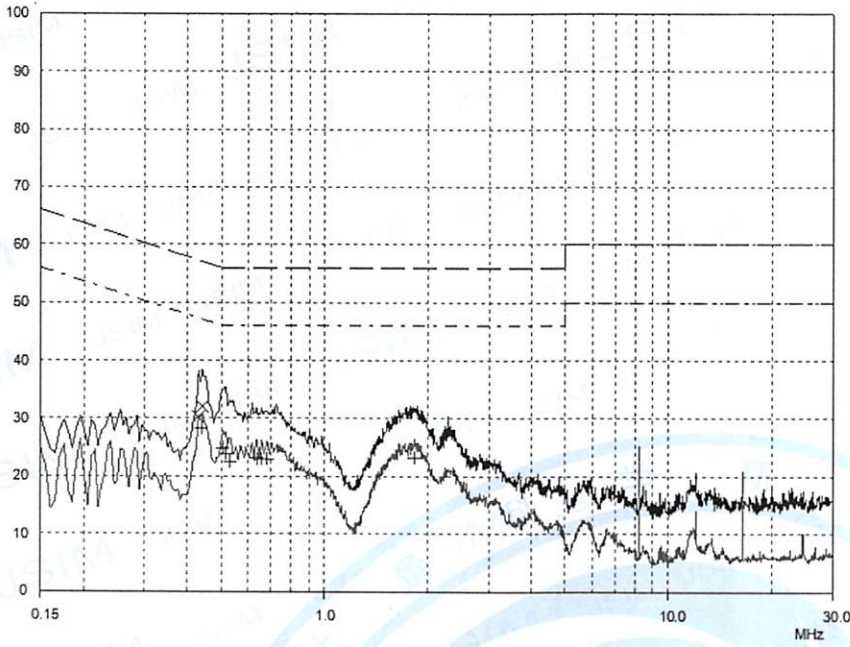
1. 电源端子传导骚扰试验布置图  
Setup pic of conducted emission test



2. 电源端子传导骚扰试验布置照片  
Test pic of conducted emission test



### 3. 电源端子传导骚扰试验测试曲线及结果 Curve and Results of Conducted Emission Test



#### Final Measurement Results

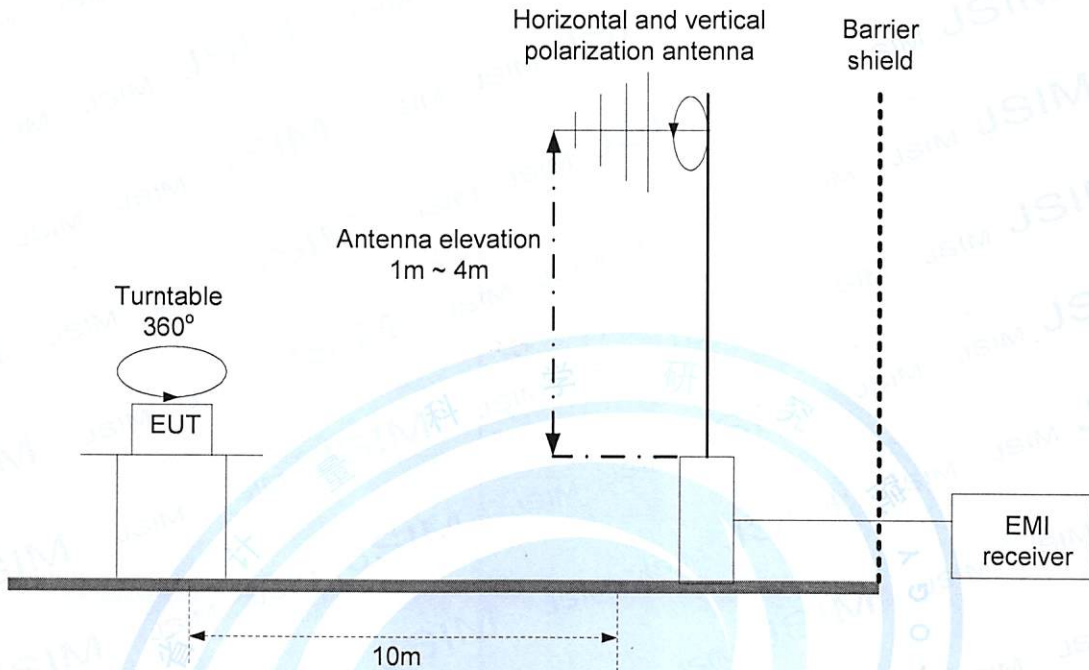
Frequency MHz	QP Level dBμV	QP Limit dBμV	QP Delta dB	Phase	PE
0.43	30.25	57.25	27.00	N	gnd
0.44	32.04	57.06	25.02	N	gnd

Frequency MHz	AV Level dBμV	AV Limit dBμV	AV Delta dB	Phase	PE
0.44	28.26	47.06	18.80	N	gnd
0.505	24.85	46.00	21.15	N	gnd
0.515	23.87	46.00	22.13	N	gnd
0.53	22.61	46.00	23.39	N	gnd
0.635	23.13	46.00	22.87	N	gnd
0.655	22.93	46.00	23.07	N	gnd
0.68	23.01	46.00	22.99	N	gnd
1.825	23.18	46.00	22.82	N	gnd

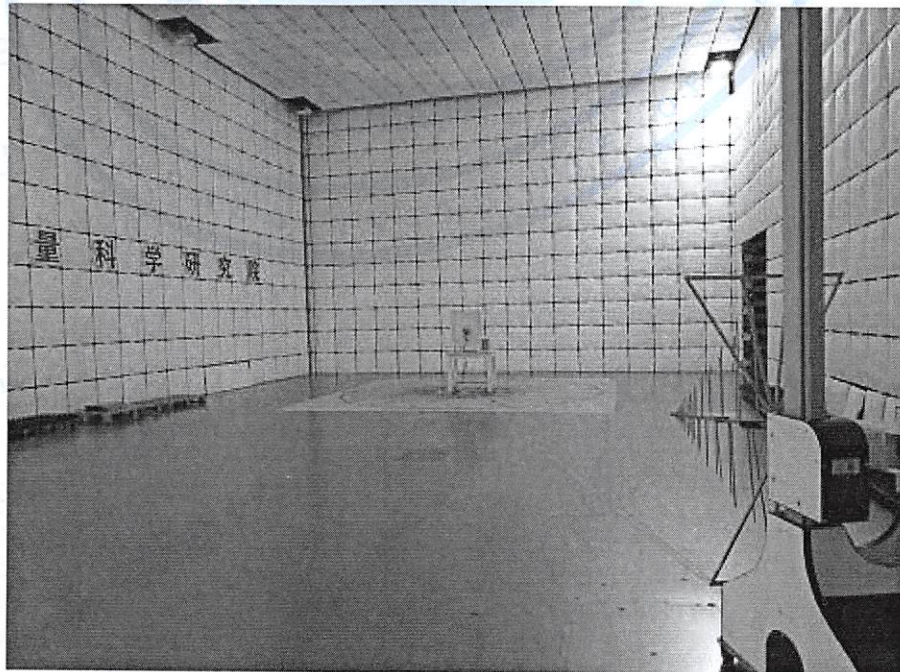


附录 4  
Appendix 4

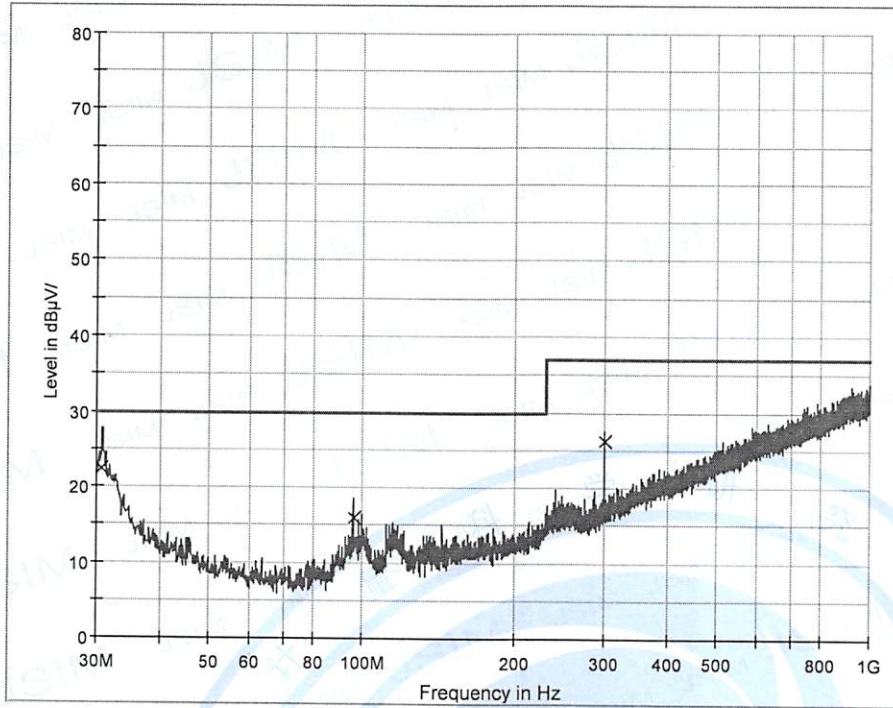
1. 辐射骚扰试验布置图  
Setup pic of radiated emission test



2. 辐射骚扰试验布置照片  
Test pic of radiated emission test



### 3. 辐射骚扰试验测试曲线及结果 Curve and Results of Radiation Emission Test



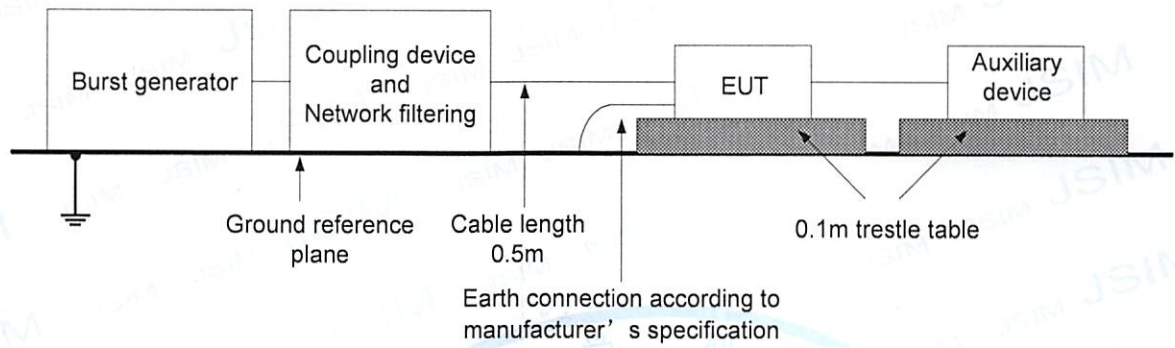
Result Table\_Single

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
30.730000	22.4	1000.0	120.000	100.0	V	0.0	18.2	
95.960000	15.9	1000.0	120.000	100.0	V	0.0	9.5	
300.020000	26.2	1000.0	120.000	100.0	V	0.0	16.6	

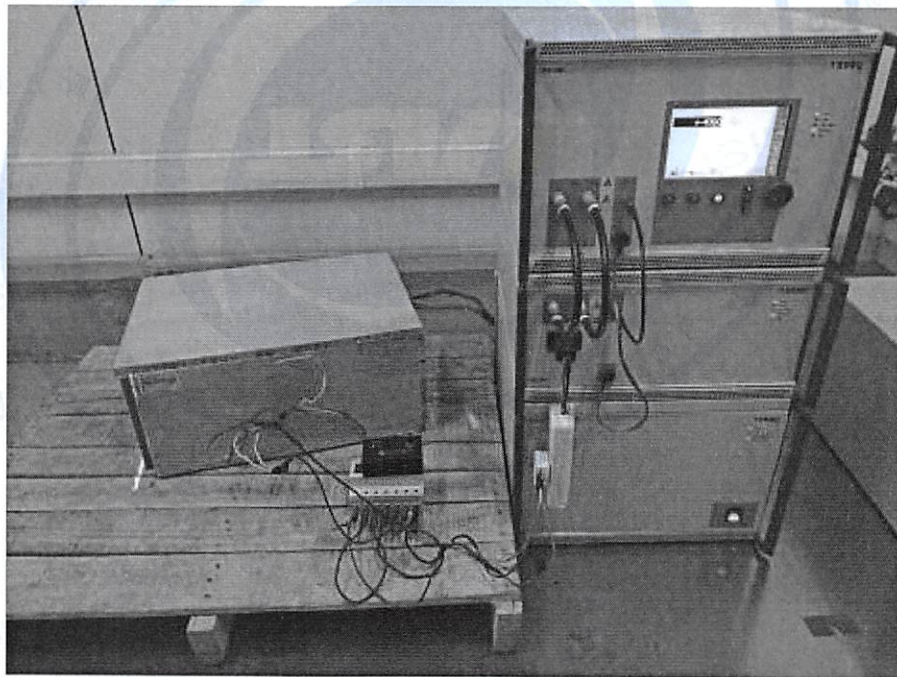


附录 5  
Appendix 5

1. 快速瞬变脉冲群抗扰度试验布置图  
Setup pic of fast transient burst test



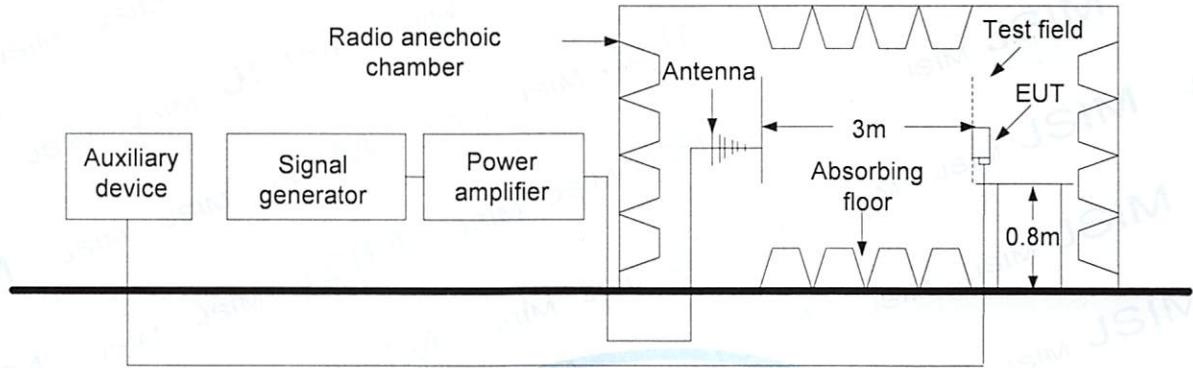
2. 快速瞬变脉冲群抗扰度试验布置照片  
Test pic of fast transient burst test



附录 6  
Appendix 6

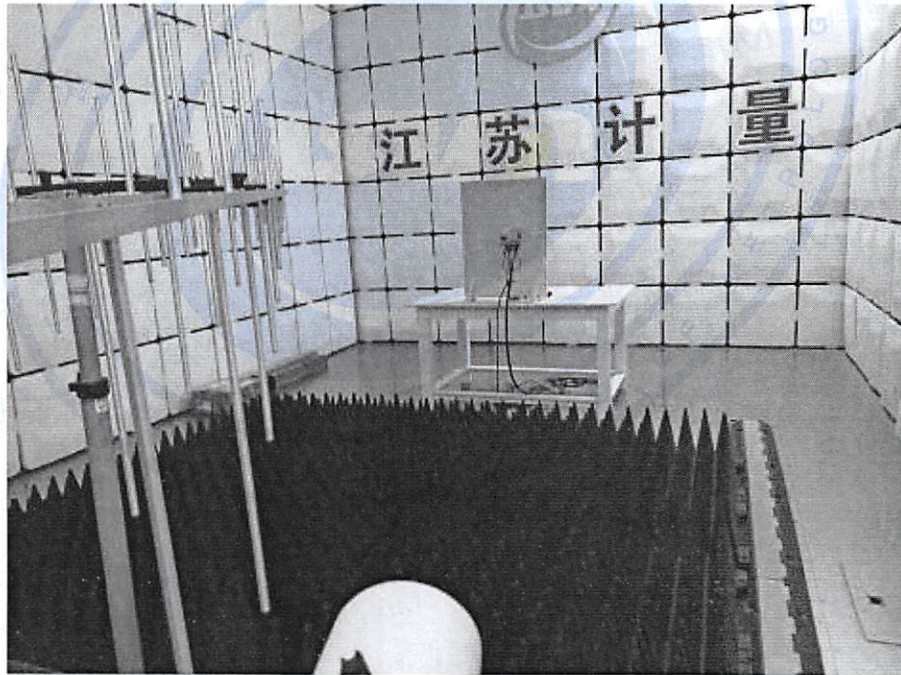
1. 射频电磁场抗扰度试验布置图

Setup pic of Test of immunity to electromagnetic RF fields



2. 射频电磁场抗扰度试验布置照片

Test pic of Test of immunity to electromagnetic RF fields

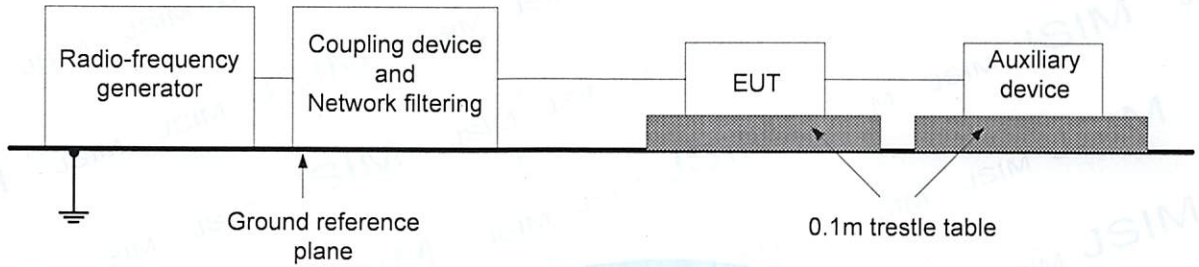




附录 7  
Appendix 7

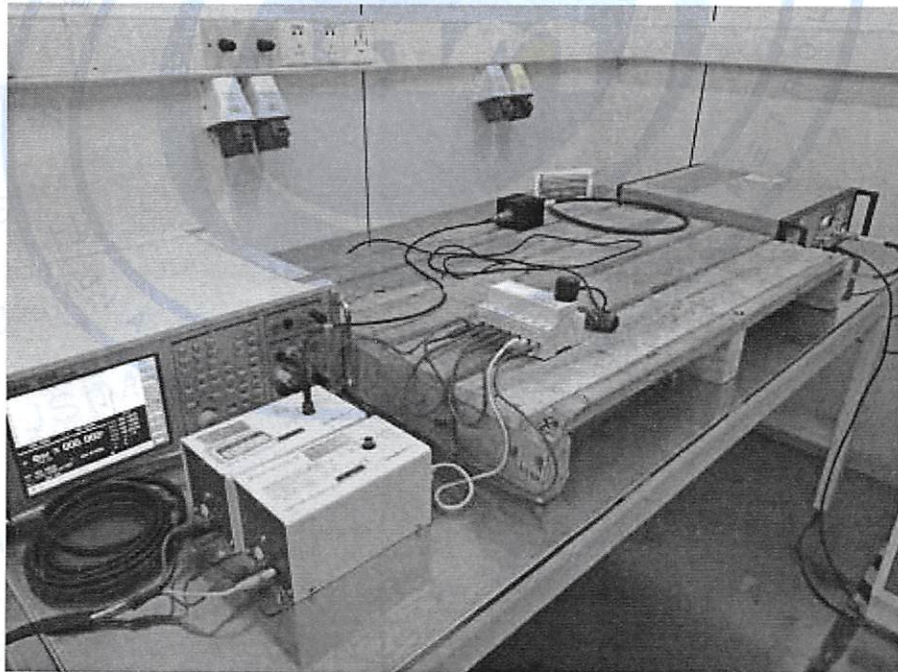
1. 射频场感应的传导骚扰抗扰度试验布置图

Setup pic of Test of immunity to conducted disturbances, induced by radio-frequency fields



2. 射频场感应的传导骚扰抗扰度试验布置照片

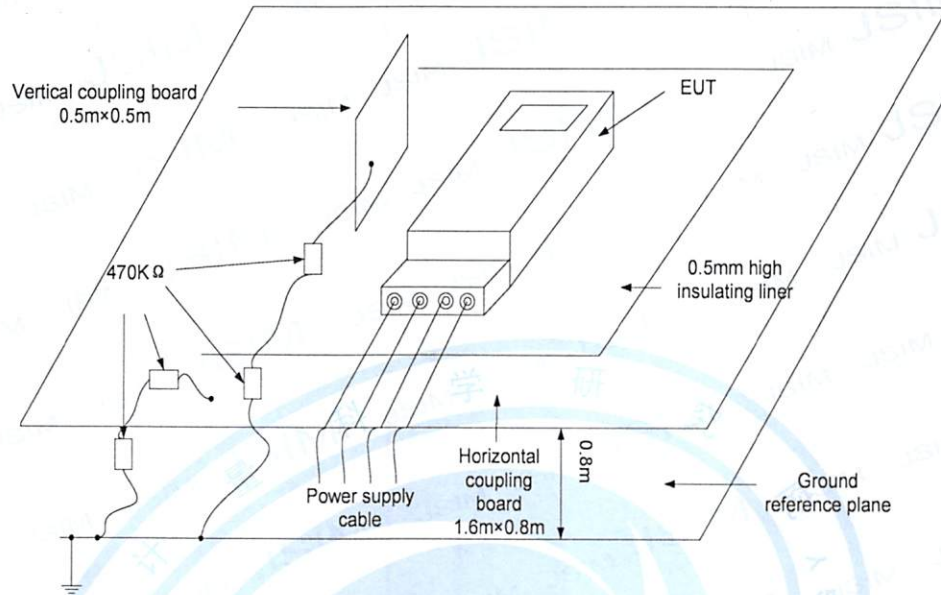
Test pic of Test of immunity to conducted disturbances, induced by radio-frequency fields



附录 8  
Appendix 8

1. 静电放电抗扰度试验布置图

Setup pic of test of immunity to electrostatic discharges



2. 静电放电抗扰度试验布置照片

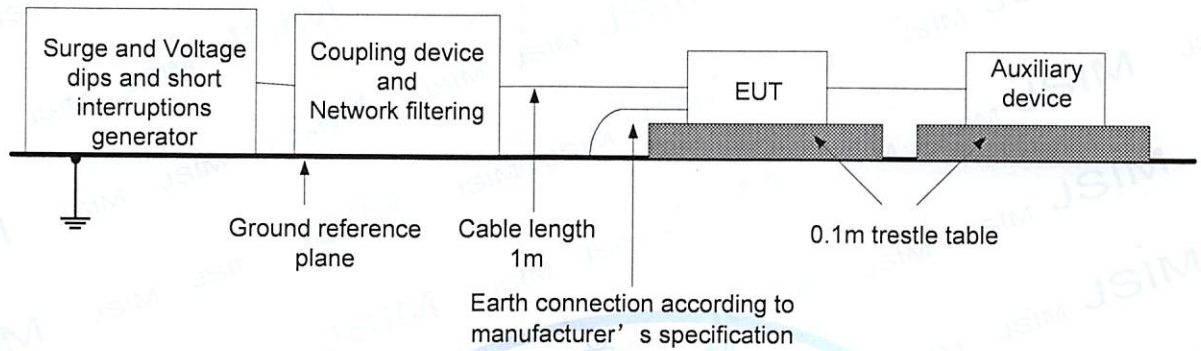
Test pic of test of immunity to electrostatic discharges



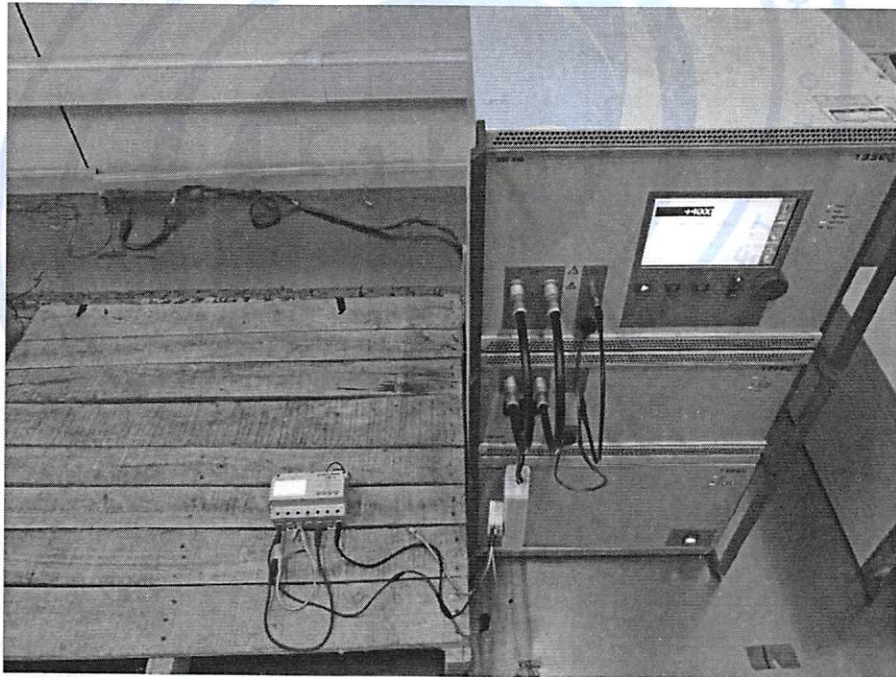


附录 9  
Appendix 9

1. 浪涌抗扰度试验布置图  
Setup pic of surge immunity test



2. 浪涌抗扰度试验布置照片  
Test pic of surge immunity test



以下空白

End of Report

# 注 意 事 项

## Attention

一、本检测报告未加盖本机构“检测专用章”或有数据涂改的均无效。

The report is invalid without an official stamp of Jiangsu Institute of Metrology (JSIM) or if tampered.

二、复制检测报告未重新加盖“检测专用章”的均为无效。

The report can not be copied in any form without JSIM's authorization.

三、对检测结果有异议者，请在收到本检测报告之日起十五日内向本机构提出。

Please make an objection to the test result within 15 days from you receipt the report.

四、委托检测，按照《检测业务委托合同》执行，其检测结果仅对检测样品负责。

This test is in accordance with the contract. The test result is valid only for the samples.

五、请在收到本报告时取回送样样品，逾期三个月不领且未提出处理意见的，将按本机构有关规定处理。

The samples will be returned at the same time you receipt the report. If the sample not be taken back more than three months without any handling opinions, JSIM will deal with the sample according to related regulations.

六、本检测报告无主检、审核、批准人签字无效。

The report is invalid without signatures of the tester, checker and approver.