亚辰电气

电 磁 脉 冲 防 护 装 置
Electromagnetic Pulse Protection Device (EPPD)

Smarter Monitoring.
Reliable Power.

四川亚辰电气有限公司
Sichuan Yachen Electric Co., Ltd.

Company Brief

四川亚辰电气有限公司
Sichuan Yachen Electric Co., Ltd.

EPPD Electromagnetic Pulse Protection Device

四川亚辰电气有限公司
Sichuan Yachen Electric Co., Ltd.

Sichuan Yachen Electric Co., Ltd. is a technology-driven manufacturing enterprise headquartered in Mianyang, Sichuan Province—known as China's "City of Science and Technology." Since its establishment in 2004, the company has specialized in the R&D and production of electromagnetic pulse (EMP) protection products, power transmission network monitoring equipment, lightning protection systems, instrumentation, high/low voltage electrical switches, and medical isolated power (IT) systems.

Our solutions are widely deployed across diverse sectors, including construction, electric power, telecommunications, railways, healthcare, and defense. Leveraging a robust R&D team, significant capital investment, and state-of-the-art infrastructure, Yachen Electric maintains long-term strategic partnerships with leading universities and research institutions. This commitment to collaboration ensures continuous technological optimization and innovation. To date, the company holds numerous invention and utility model patents, and all products have been rigorously tested and certified by authoritative Chinese industry bodies.

Our unwavering focus on advanced R&D, stringent quality control, and exceptional product reliability has earned Yachen Electric extensive recognition and acclaim from clients worldwide.

Mission: To enhance global power reliability through cutting-edge intelligent monitoring technology and innovative protection solutions. (使命：通过尖端的智能监测技术和创新的防护方案，提升全球电力的可靠性。)

Core Values:

Precision: In every sensor and every data point. （精准：对待每一个传感器和数据点。）

Integrity: Building trust through reliable infrastructure. （正直：通过可靠的基础设施建立信任。）

Innovation: Solving tomorrow's grid challenges today. （创新：今日即解决明天的电网挑战。）

四川亚辰电气有限公司
Sichuan Yachen Electric Co., Ltd.

Corporate Qualifications & Certifications: Yachen Electric is committed to operational excellence and holds several international management certifications, including:

- ISO 9001:2015 (Quality Management System)
- ISO 45001:2018 (Occupational Health and Safety Management System)
- ISO 14001:2015 (Environmental Management System)
- AAA-rated Credit Enterprise (since 2011) and AAA-rated Quality & Integrity Excellence Unit (since 2012)

Furthermore, the company serves as the Vice Chairman Unit of the Electromagnetic Pulse and Lightning Protection Technology Professional Committee of the Sichuan Institute of Electronics, and a Director Unit of the Southwest Construction Electrical Information Network. We are also a selected supplier for military-grade products.

To ensure superior customer experience, Yachen Electric maintains a strong presence across major regions in China, providing rapid and high-quality technical support and after-sales service. Our global reach is further extended through an extensive network of authorized distributors.

We sincerely welcome domestic and international partners to explore collaborative opportunities and achieve mutual growth.

Company Qualifications and Honors: Patent Certificate
公司资质及荣誉：专利证书

证书号第8069606号

专利公告信息

发明专利证书

发明名称：一种电磁脉冲防护方法及装置

专利权人：四川亚辰电气有限公司

地　　址：621000 四川省绵阳市经开区松垭镇波鸿二期4号厂房

发 明 人：许怀东

专　利　号：ZL 2025 1 0459810.1　　授权公告号：CN 119994825 B

专利申请日：2025年04月14日　　授权公告日：2025年07月15日

申请日时申请人：四川亚辰电气有限公司

申请日时发明人：许怀东

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第1页(共1页)

证书号第6424982号

发明专利证书

发明名称：一种UPS电源监测管理系统及方法

发　明　人：许怀东;石飞荣;唐伟

专　利　号：ZL 2023 1 0213639.7

专利申请日：2023年03月07日

专利权人：四川亚辰电气有限公司

地　　址：621000 四川省绵阳市经开区松垭镇波鸿二期4号厂房

授权公告日：2023年10月24日　　授权公告号：CN 116231861 B

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第1页(共2页)

其他事项参见续页

证书号第19983743号

实用新型专利证书

实用新型名称：一种便于布线的开关柜

发　明　人：许怀东;石飞荣

专　利　号：ZL 2023 2 1186638.X

专利申请日：2023年05月17日

专利权人：四川亚辰电气有限公司

地　　址：621000 四川省绵阳市经开区松垭镇波鸿二期4号厂房

授权公告日：2023年11月10日　　授权公告号：CN 219998723 U

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第1页(共2页)

其他事项参见续页

Company Qualifications and Honors: Patent Certificate
公司资质及荣誉：专利证书

证书号第16868048号

实用新型专利证书

实用新型名称：远程传输的高低压配电设备的消防检测报警系统

发　明　人：许怀东

专　利　号：ZL 2021 2 3215203.7

专利申请日：2021年12月20日

专利权人：四川亚辰电气有限公司

地　　址：621000 四川省绵阳市经开区板桥街68号

授权公告日：2022年07月05日　　授权公告号：CN 216901886 U

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2022年07月05日

第1页(共2页)

其他事项参见续页

证书号第19550341号

实用新型专利证书

实用新型名称：一种电气柜

发　明　人：许怀东;石飞荣

专　利　号：ZL 2023 2 0433183.0

专利申请日：2023年03月09日

专利权人：四川亚辰电气有限公司

地　　址：621000 四川省绵阳市经开区松垭镇波鸿二期4号厂房

授权公告日：2023年08月22日　　授权公告号：CN 219576313 U

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申长雨

国家知识产权局
2023年08月22日

第1页(共2页)

其他事项参见续页

证书号第19556591号

实用新型专利证书

实用新型名称：一种新型电气柜

发　明　人：许怀东;石飞荣

专　利　号：ZL 2023 2 0509919.8

专利申请日：2023年03月16日

专利权人：四川亚辰电气有限公司

地　　址：621000 四川省绵阳市经开区松垭镇波鸿二期4号厂房

授权公告日：2023年08月22日　　授权公告号：CN 219576297 U

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申长雨

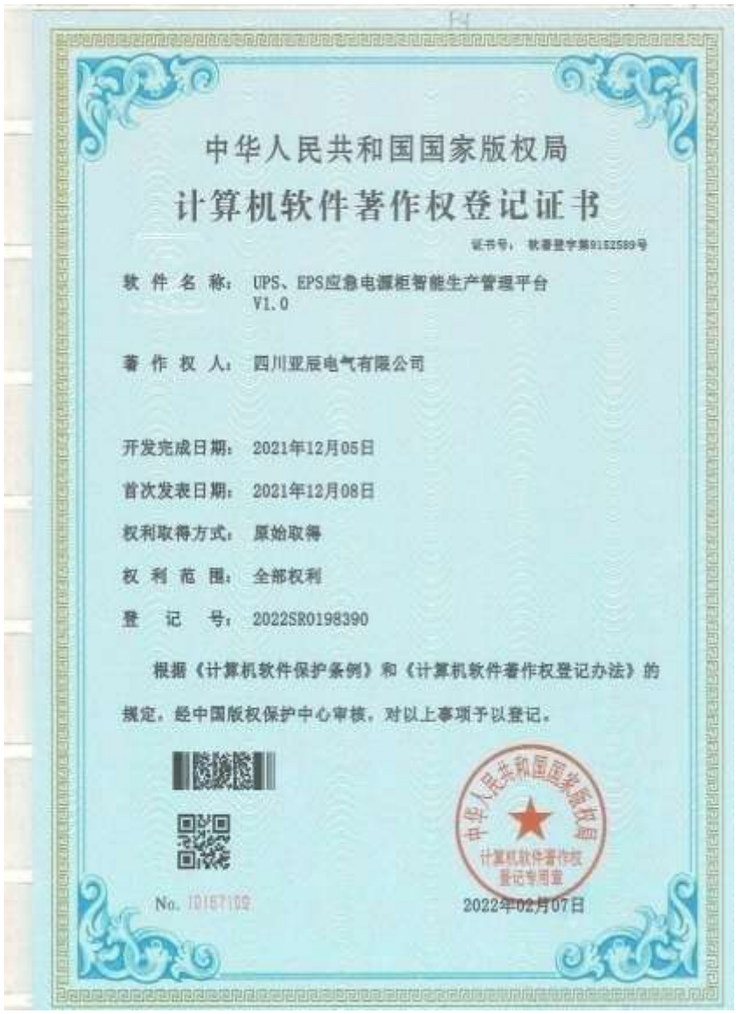
国家知识产权局
2023年08月22日

第1页(共2页)

其他事项参见续页

Company Qualifications and Honors: Software Copyright
公司资质及荣誉：软件著作权

UPS EPS应急电源柜智能生产管理平台V1.0



中华人民共和国国家版权局

计算机软件著作权登记证书

证书号：软著登字第9152589号

软件名称：UPS、EPS应急电源柜智能生产管理平台 V1.0

著作权人：四川亚辰电气有限公司

开发完成日期：2021年12月05日

首次发表日期：2021年12月08日

权利取得方式：原始取得

权利范围：全部权利

登记号：2022SR0198390

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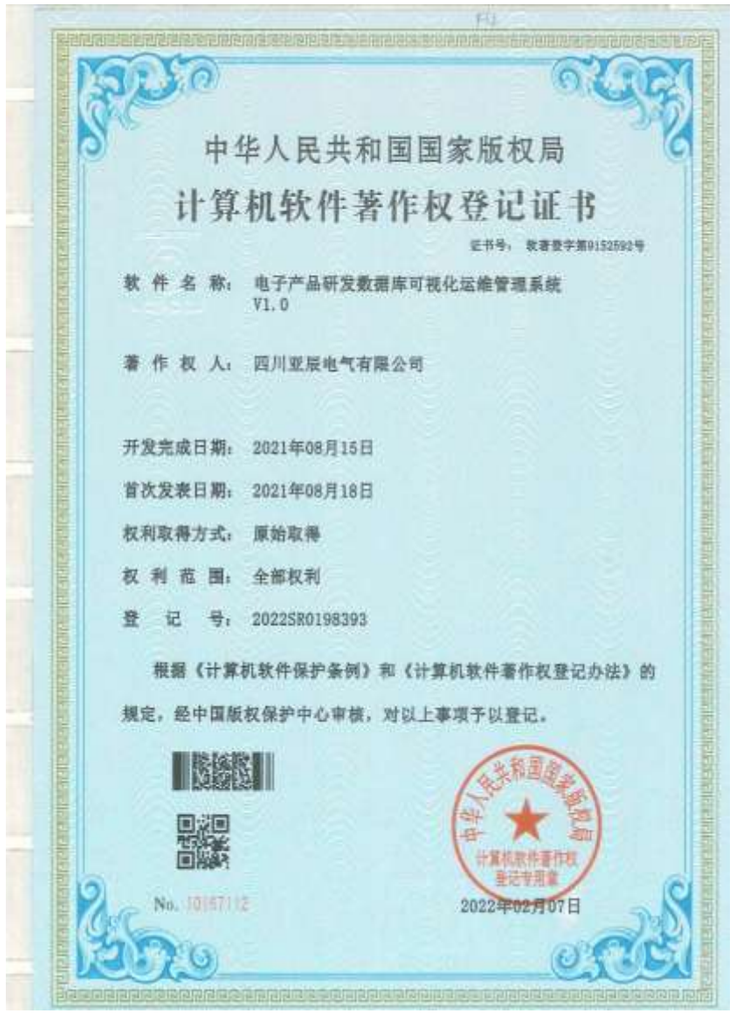
No. I0167109

2022年02月07日

电子产品研发数据库可视化运维管理系统V1.0



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计算机软件著作权登记证书

证书号：软著登字第9152592号

软件名称：电子产品研发数据库可视化运维管理系统 V1.0

著作权人：四川亚辰电气有限公司

开发完成日期：2021年08月15日

首次发表日期：2021年08月18日

权利取得方式：原始取得

权利范围：全部权利

登记号：2022SR0198393

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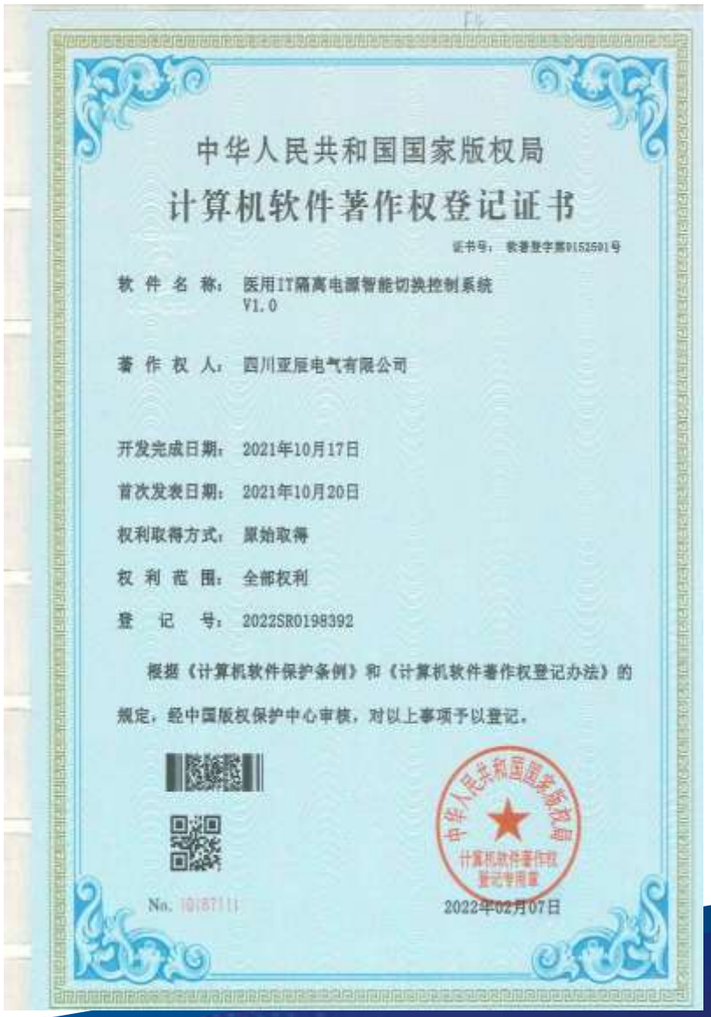
No. I0167112

2022年02月07日

医用IT隔离电源智能切换控制系统V1.0



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计算机软件著作权登记证书

证书号：软著登字第9152591号

软件名称：医用IT隔离电源智能切换控制系统 V1.0

著作权人：四川亚辰电气有限公司

开发完成日期：2021年10月17日

首次发表日期：2021年10月20日

权利取得方式：原始取得

权利范围：全部权利

登记号：2022SR0198392

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No. I0167111

2022年02月07日

Company Qualifications and Honors: Software Copyright
公司资质及荣誉：软件著作权

剩余电流式电气火灾监控探测性能测试分析系统V1.0

中华人民共和国国家版权局

计算机软件著作权登记证书

证书号：软著登字第9153586号

软件名称：剩余电流式电气火灾监控探测器性能测试分析系统V1.0

著作权人：四川亚辰电气有限公司

开发完成日期：2021年09月12日

首次发表日期：2021年09月15日

权利取得方式：原始取得

权利范围：全部权利

登记号：2022SR0198387

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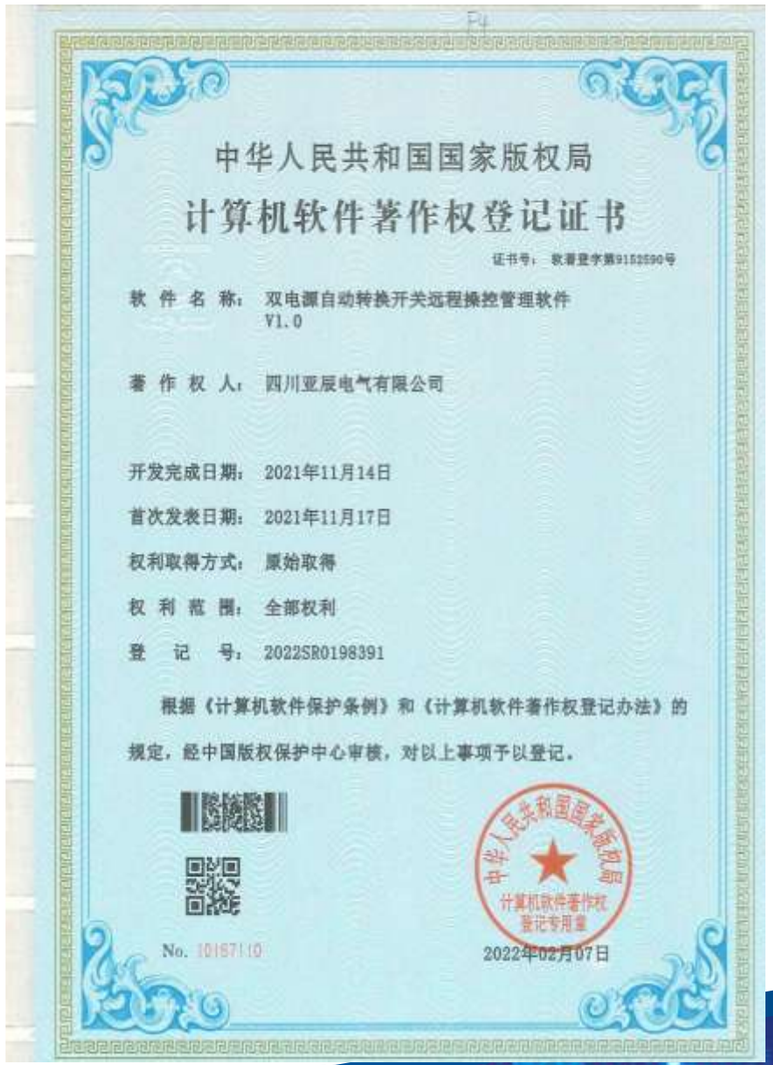
No. 10187108

2022年02月07日

双电源自动转换开关远程操控管理软件V1.0



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计算机软件著作权登记证书

证书号：软著登字第9153590号

软件名称：双电源自动转换开关远程操控管理软件V1.0

著作权人：四川亚辰电气有限公司

开发完成日期：2021年11月14日

首次发表日期：2021年11月17日

权利取得方式：原始取得

权利范围：全部权利

登记号：2022SR0198391

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No. 10187110

2022年02月07日

Company production/R&D workshop
公司生产研发实景

企业文化

Corporate culture

亚辰电气

电磁脉冲防护装置
Electromagnetic Pulse Protection Device (EPPD)

Electromagnetic pulse 电磁脉冲

Overview: An electromagnetic pulse (EMP) is a brief but intense electromagnetic radiation phenomenon that instantly generates a high-intensity electromagnetic field, covering a broad spectrum from radio waves to gamma rays. These pulses can be generated naturally or artificially.

Classification: Naturally generated (lightning, solar storms), Artificially generated (nuclear electromagnetic pulse, non-nuclear electromagnetic pulse)

Lightning: Lightning discharges are accompanied by strong electromagnetic pulses, which not only directly strike equipment causing damage, but the generated electromagnetic fields can also couple into electronic systems through power lines and signal lines, causing voltage surges and burning out circuit components.

Solar Storms: When solar activity is intense, it ejects large amounts of charged particles and plasma towards Earth, triggering geomagnetic storms. These storms induce huge currents in power grids and communication lines on the Earth's surface, which can lead to transformer burnout and power grid failure in severe cases. The 1989 Quebec blackout in Canada was caused by an electromagnetic pulse triggered by a solar storm.

Nuclear Electromagnetic Pulse (EMP): When a nuclear weapon explodes at high altitude, gamma rays interact with atmospheric molecules, generating a large number of high-speed electrons. These electrons, under the influence of the Earth's magnetic field, excite a powerful electromagnetic pulse (EMP). Nuclear EMPs have an extremely wide coverage area and extremely high intensity, capable of destroying electronic equipment over a large area, making them a highly deterrent strategic weapon.

Electromagnetic pulse 电磁脉冲

Non-nuclear EMP attack: High-intensity EMPs can also be generated using technologies such as explosive-compressed magnetic fields and high-power microwave generators. These attacks are small in size and flexible in use, and can be used for tactical intervention. They have already been used in modern local conflicts.

High-Power Switching Operations and Power Faults: Circuit breakers, thyristors, and motor commutators generate spike pulses (in μs) during the switching on and off of circuits; short circuits, lightning strikes, and sudden load changes trigger power grid surges that propagate along the lines, forming EMPs, which cause sudden changes in current in the circuit, generating transient electromagnetic pulses. Although these pulses are relatively low in intensity, they can be conducted through power lines, interfering with sensitive electronic equipment in the power grid (such as smart meters and relay protection devices), causing malfunctions or damage.

Other phenomena such as meteors and meteorites entering the atmosphere and electrostatic discharge, as well as some common specialized equipment (digital circuits, motor ignition systems, radar, frequency converters, etc.), can generate electromagnetic pulses when there are ultra-fast changes in charge/current, plasma generation, strong ionization, high-energy radiation interacting with matter, or violent disturbances in the magnetic field.

Electromagnetic pulse 电磁脉冲

Characteristics: Electromagnetic pulses (EMPs) release concentrated energy, significantly impacting electronic equipment and power systems. In the time domain, they exhibit a steep leading edge and narrow pulse width; in the frequency domain, they have a wide spectral range, generating strong interference and destructive effects. This effect allows EMPs to propagate powerful energy across space in the form of electromagnetic waves within an extremely short time, causing equipment failure or permanent damage to all military and civilian facilities and systems, including electronic devices, electrical equipment, and communication equipment, across a vast spatial area.

With the rapid development and widespread application of modern high technology, numerous advanced electronic technology systems have emerged and are widely used in various spaces and human activities on Earth, covering five dimensions: land, sea, air, space, and electromagnetic. The core of all modern high-tech systems is composed of sophisticated electronic computers, semiconductor integrated circuits, and low-current control software. Overall, the higher the degree of electronic integration of these facilities, the more vulnerable they become, increasingly sensitive to changes in the surrounding electromagnetic field, voltage, and current. Therefore, controlling the system's electromagnetic environment is crucial, and EMP protection is a key factor in this control.

Electromagnetic pulse Characteristics电磁脉冲-特点

I. Time Domain Characteristics (Time-wise)

* Extremely rapid rise: E1 nuclear EMP, electrostatic discharge, lightning strike spikes—sharp edges on the nanosecond to submicrosecond scale, instantly reaching the peak value.

* Extremely short duration: Main peaks are mostly on the μs/ns scale; only geomagnetic storm E3 is a slow pulse on the second to hour scale.

* Transient burst: Instantaneous concentrated release of energy, not continuous radio waves.

II. Frequency Domain Characteristics (Frequency-wise)

* Ultra-wide spectrum: Full coverage from extremely low frequencies (power frequency/geomagnetic) → radio frequency → microwave → GHz high frequencies.

* Strong high-frequency penetration: High-frequency components easily penetrate chassis, cables, and chips, interfering with digital circuits.

III. Field Strength and Energy Characteristics

* Extremely high field strength: The ground field strength of a nuclear airburst can reach several thousand to tens of thousands of V/m; the local field strength of electrostatic discharge is even higher.

* High energy and high density: Extremely high instantaneous power, capable of instantly breaking down semiconductors and melting circuits.

Non-directional/wide-area coverage: High-altitude nuclear explosions and geomagnetic storms can cover hundreds to thousands of kilometers; lightning strikes and ESD (Electromagnetic Discharge) are localized strong fields.

Electromagnetic pulse Characteristics电磁脉冲-特点

IV. Propagation and Coupling Characteristics

Ubiquitous: It can penetrate gaps and shells through spatial radiation, and can also conduct along power lines/network cables/metal pipes.

Easy to accumulate in metals: Cables, antennas, long railway tracks, and power transmission lines can induce high voltage and high current like "antennas."

Independent of visual distance: It can bypass obstructions and penetrate ordinary walls/non-metallic shells.

V. Characteristics of Destructive Effects

Targets Microelectronics: Instantly destroys chips, transistors, sensors, and low-voltage equipment; causes minimal damage to purely mechanical/old high-voltage (pure switches, motors) devices.

Three Levels of Destruction:

E1 (Fast Peak): Instantly breaks down chips and burns circuit boards.

E2 (Medium Speed): Sparks, arcs, and relay malfunctions.

E3 (Slow Geomagnetic): Induces large currents over long distances, burning transformers and paralyzing power grids.

Hidden and Irreversible: Mild effects include system crashes, garbled characters, and resets; severe effects include internal PN junction breakdown, leaving the exterior intact but completely unusable.

VI. Supplementary Differentiation

Ordinary Static Electricity, Electric Sparks, Switching Pulses: Weak field strength, small range, only affects nearby circuits.

Lightning EMP: Medium intensity, destroys electrical appliances and burns incoming wiring.

Nuclear EMP/Strong Geomagnetic Storm: Wide-area, strong field, destroys networks and electronic systems.

Electromagnetic Pulse – Hazards 电磁脉冲-危害

I. Damage to Electronic Chips and Low-Voltage Equipment (Most Critical):

- Damage to CPUs, memory modules, microcontrollers, sensors, cameras, and automotive electronics; the exterior may appear intact, but internal PN junctions burn out, rendering the device permanently unusable.
- Circuit board traces melt, capacitors explode, crystal oscillators are damaged, causing equipment crashes, garbled characters, repeated restarts, and complete data loss.
- Precision instruments and medical equipment (ventilators, monitors, MRI machines) malfunction, directly endangering lives.

II. Power Outage and Energy Network Collapse (Large-Scale Collapse):

- Long-distance high-voltage lines, substations, and transformers induce excessive current, causing winding burnout, explosions, and fires, resulting in widespread power outages.
- Oil and gas pipelines and water supply networks: Failure of low-voltage control valves, pressure gauges, and leak monitoring systems leads to leaks, explosions, and fires.
- Charging piles, photovoltaic power stations, and energy storage battery packs experience short circuits, inducing large-scale fires.

III. Interruption of Communication, Navigation, and Network (Complete Loss of Connection)

- Mobile phone base stations, fiber optic repeaters, satellite receivers, routers, and switches all fail: no signal, internet outage, and inability to make phone calls.
- GPS/BeiDou navigation malfunctions: aircraft, ships, and vehicles deviate from their positioning, become completely disconnected, and are highly susceptible to collisions, shipwrecks, and traffic accidents.
- Broadcasting, television, and emergency warning systems are paralyzed, making it impossible to issue alarms or transmit instructions during disasters.

Electromagnetic Pulse – Hazards 电磁脉冲-危害

IV. Transportation + Military + Industrial Uncontrolled Incidents (High-Risk Accidents)

- Automobiles/High-Speed Rail/Subways: Onboard electronic control, braking, and autopilot systems malfunction, resulting in sudden engine shutdown, brake failure, and derailment.
- Factory assembly lines, robots, and PLC industrial control systems malfunction: Punch presses and machine tools suddenly start, leading to explosions and injuries.
- Military radar, missile guidance, drones, and command and control systems are interfered with/malfunction, paralyzing defense and attack capabilities.

V. Differentiating the Harmful Effects of Different EMPs

- Static Electricity/Electric Spark EMP: Only burns small chips and circuit boards, damaging everyday electronic products.
- Lightning EMP: Burns household appliances, home wiring, damages base stations, causing localized power outages and fires.
- Nuclear EMP (High-Altitude Explosion): Causes widespread power outages and network disruptions across thousands of kilometers, destroying all modern electronic equipment.
- Solar Storm/Geomagnetic Storm EMP: Specifically targets long-distance power grids and transnational pipelines, causing nationwide blackouts.

Electromagnetic Pulse – Hazards 电磁脉冲-危害

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V. Differentiating the Harmful Effects of Different EMPs

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Electromagnetic Pulse Protection电磁脉冲-防护

Core Protection Principles: Shielding, Isolation and Discharge, Filtering and Grounding

- **Shielding:** All-metal casing for isolation
- **Isolation and Discharge:**
    - **Front-end:** High-power surge protector SPD (phase-to-ground high-voltage discharge)
    - **Middle section:** EMI filter, isolation transformer
    - **End:** Varistor before chip, TVS Zener diode, clamping spikes
- **Grounding and Equipotential Bonding**
    - To achieve "single-point grounding," avoid forming grounding loops and prevent electromagnetic pulse currents from interfering with equipment through the ground wire.

Difference between electromagnetic pulse and surge电磁脉冲与浪涌区别

1) **Surge Protection:** Primarily used to prevent damage caused by overvoltage. Overvoltage includes transient overvoltage surges caused by factors such as lightning strikes, electrostatic discharge, and metallic interruptions. (Surge voltage is mainly limited by surge current.) Surge protectors (SPDs) are mainly used to limit transient overvoltages caused by lightning strikes, i.e., lightning surges, and can also limit some operational overvoltages. Lightning surges may enter along power lines or signal lines, may originate from backflashovers caused by a rise in ground potential during a lightning strike, or may be generated in cables and circuits due to magnetic field induction in the building itself or the surrounding area. Therefore, even with good lightning rods, down conductors, and grounding systems, surge protectors (SPDs) are not indispensable, because lightning rods cannot prevent lightning induction and surges from entering along lines, and the actual grounding system is insufficient to prevent backflashovers. The use of surge protectors (SPDs) is particularly necessary when buildings house high-value, high-impact information and/or power electronic equipment, whose surge withstand capabilities are far lower than those of conventional electrical equipment.

2) Electromagnetic Pulse Protection Device: mainly used to solve the electromagnetic interference problem of military and key civilian facilities in complex electromagnetic environments, such as frequent tripping and power outages caused by electromagnetic pulse interference when operating and performing tasks in high-power, narrow-pulse electromagnetic shock environments; damage to precision equipment and instruments; and interference and errors to observation data.

Comparison Items:	EMP (Electromagnetic Pulse)	SPD
Ascent speed	Nanosecond to sub-nanosecond	Microsecond
Frequency domain	Full frequency domain	Eide pulse
Existence form	Spatial electromagnetic wave + line induction	Conducted only within the conductor
Affected range	Hundreds to thousands of kilometers; global range	Single point/single line
Can it damage equipment remotely?	Yes! Will it burn even if powered off but not disconnected?	No, it must be connected to the wires
Functions	Narrow pulse, oscillating pulse, spike pulse, anti-interference,	Primary leakage, secondary voltage limiting
Installation method	Front end of the equipment power supply	Step-by-step installation

The function of EPPD 电磁脉冲防护装置的作用

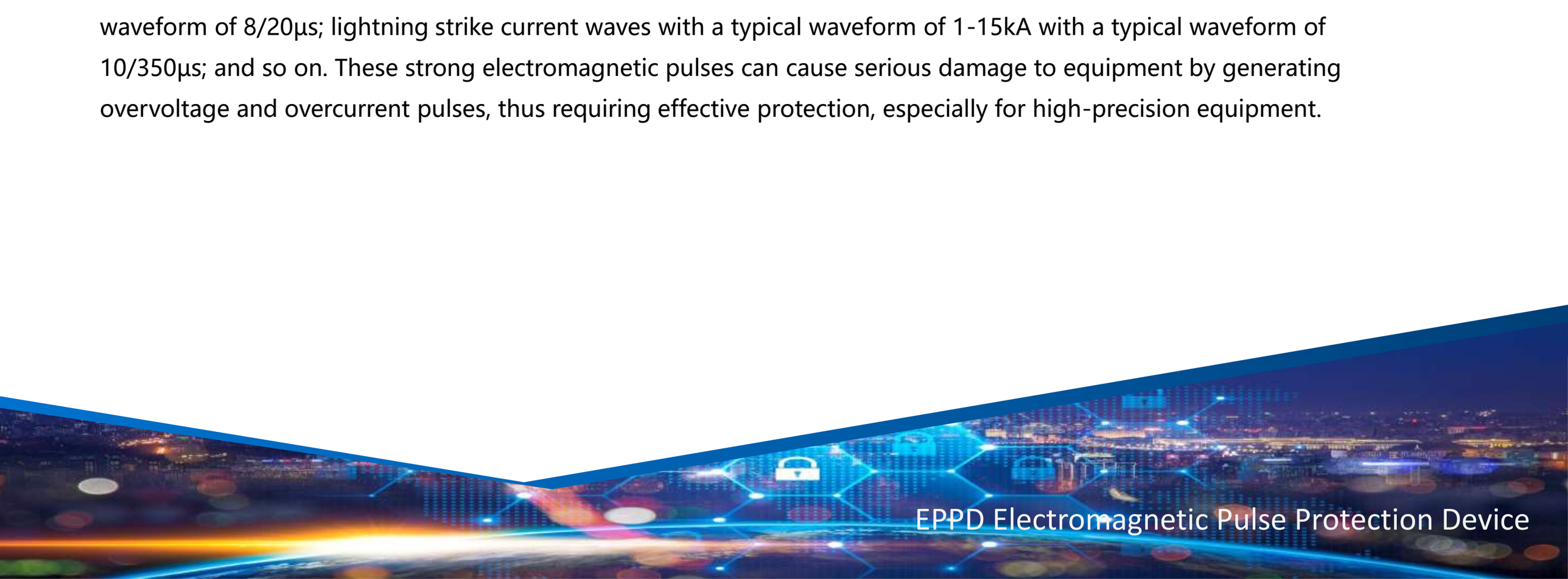
Electromagnetic pulse (EMP) protection devices are primarily used to address electromagnetic interference (EMI) problems in complex electromagnetic environments for various electrical equipment, instruments, communication devices, mobile applications, and infrastructure. These include issues such as frequent power outages and failures caused by EMP interference during operation and tasks under high-power, narrow-pulse electromagnetic shock environments; damage to precision equipment and instruments; and errors in observation data.

The core technologies include two main components: HEMP (High Electromagnetic Pulses) protection and hardening; and TEMPEST (Transient Electromagnetic Pulse Emanation Surveillance Technology) electromagnetic environment information security protection.

EMP protection devices are mainly used to reduce or eliminate the impact of large-scale man-made electromagnetic pulses on systems within their effective area, improving the electromagnetic survivability of electronic equipment. They meet the requirements for EMP protection and hardening devices for PCUI double exponential wave injection waves. They can also be used to suppress interference harmonics generated in loop systems (loops formed by power lines or signal lines) when spatial electromagnetic interference waves generated by strong electromagnetic interference sources act on them. This device meets the electromagnetic protection and hardening requirements for 35MHz damped oscillating antenna oscillation waves. It also meets the protection requirements for lightning electromagnetic pulses. It effectively protects against damage to equipment caused by transient electromagnetic fields and high-order harmonics in AC power supply systems and equipment power systems.

The function of EPPD 电磁脉冲防护装置的作用

This Electromagnetic Pulse Protection Device is mainly used to protect against strong electromagnetic pulses in power line systems. It includes two specifications: EMP-45 for single-phase power systems and EMP-85 for three-phase power systems. Because the power lines in equipment systems are the longest and, unlike information transmission systems that can use optical fibers, must use metal cables for power transmission, the probability and energy of receiving and coupling to strong electromagnetic pulses are enormous (common frequency 1kHz-30GHz, impulse voltage 10-20kV, impulse energy 1-20kA). It is a major source of intrusion for system damage from strong electromagnetic attacks and a primary cause of equipment damage under strong electromagnetic pulses. Strong electromagnetic pulses typically generated in power lines include: electromagnetic weapon attack pulses with a typical waveform of 20/500ns; damped oscillations with a typical waveform of 100-500A at 35MHz under line inductance; coupled overvoltage waves with a typical waveform of 10-20kV with a typical waveform of 1.2/50μs; coupled current waves with a typical waveform of 5-50kA with a typical waveform of 8/20μs; lightning strike current waves with a typical waveform of 1-15kA with a typical waveform of 10/350μs; and so on. These strong electromagnetic pulses can cause serious damage to equipment by generating overvoltage and overcurrent pulses, thus requiring effective protection, especially for high-precision equipment.



EMP-45 EPPD

检验检测机构

资质认定证书

证书编号：190121340902

名称：北京军盾恒胜防雷检测技术有限公司

地址：北京市通州区景盛南四街13号8幢102一层

经审查，你机构已具备国家有关法律、行政法规规定的基本条件和能力，现予批准，可以向社会出具具有证明作用的数据和结果，特发此证。资质认定包括检验检测机构计量认证。

检验检测能力及授权签字人见证书附表

许可使用标志

CMA

190121340902

发证日期：2019年03月26日

有效期至：2025年03月25日

发证机关：北京市市场监督管理局

本证书由国家认证认可监督管理委员会监制，在中华人民共和国境内有效。

扫描二维码或登录发证机关政府网站验证

Product and Inspection Report

EPPD Electromagnetic Pulse Protection Device

Test reports for EMP-45 1P EPPD

电磁脉冲防护装置

检 测 报 告

LPS Test Report

报告编号：JDJC-DQBG20240528-0002

受控编号：JDJC/BG-01-0

受检单位：四川亚辰电气有限公司

项目名称：EMP-45电磁防护装置

检测类别：委托参数测试

检测日期：2024 年 5 月 28 日

北京军盾恒胜防雷检测技术有限公司

2024 年 5 月 28 日

电磁防护装置测试报告

委托单位	四川亚辰电气有限公司	联系人	许怀东
		联系电话	13088269292
联系地址	四川绵阳市经开区松垭镇波鸿好圣二期工业园区4号厂房	邮编	101300
项目名称	EMP-45电磁防护装置	检测地点	北京
检测时间	2024年5月 28 日-2024 年 5 月 31 日	天气	晴
温度	/	湿度	/
检测依据	1. GJB 8848-2016 系统电磁环境效应试验方法 2. GB/T 18802.11-2020 低压电涌保护器(SPD) 第 11 部分：低压电源系统的电涌保护器 性能要求和试验： 3. 产品技术规格书		
检测设备	□高频电桥 □直流电桥 □PCUI双指数波冲击试验台 □35MHz阻尼振荡天线震荡波发生器 □模拟雷击冲击试验台		
检测内容	1. PCUI双指数波注入波冲击 2. 35MHz阻尼振荡天线震荡波冲击 3. 10/350μs雷电波冲击 4. 8/20μs雷电波冲击 5. 8/20μs+1.2/50μs组合波限制电压测试		
综合评定	1. 试品具备耐受20/500nsPCUI双指数波500A冲击能力。 2. 试品具备耐受35MHz阻尼振荡天线震荡波300A冲击能力。 3. 试品具备耐受10/350μs雷电波15kA冲击能力。 4. 试品具备耐受8/20μs雷电波45kA冲击能力。 5. 试品8/20μs+1.2/50μs组合波限制电压小于700V。		
检测人			
审核人			
批准人		北京军盾恒胜防雷检测技术有限公司（检测专用章） 2024 年 5 月 28 日	

1. 20/500nsPCUI双指数波脉冲冲击参数：

序号	PCUI冲击电流(20/500nS)	负载实际流过电流值	冲击次数	合格判定
1	100A	101A	3次	合格
2	300A	309A	3次	合格
3	500A	513A	3次	合格

2. 35MHz阻尼振荡天线震荡波脉冲冲击参数：

序号	冲击短路电流	负载实际流过电流值	冲击次数	合格判定
1	100A	103A	3次	合格
2	200A	202A	3次	合格
3	300A	301A	3次	合格

3. 10/350μs脉冲冲击参数：

序号	冲击短路电流(10/350μS)	负载实际流过电流值	冲击次数	合格判定
1	12.5kA	12.47kA	3次	合格
2	15.0kA	15.25kA	3次	合格

4. 8/20μs脉冲冲击参数：

序号	冲击短路电流(8/20μS)	负载实际流过电流值	冲击次数	合格判定
1	10kA	10.06kA	正反两次	合格
2	20kA	20.11kA	正反两次	合格
3	30kA	30.09kA	正反两次	合格
4	45kA	46.35kA	正反两次	合格
5	60kA	62.97kA	正反两次	合格

5. 8/20μs+1.2/50μs组合波限制电压参数：

序号	8/20μS+1.2/50μs组合波	负载实际流过电流值	负载两端限制电压值	合格判定
1	5kA+10kV	5.03kA	<650V	合格
2	10kA+10kV	10.04kA	<650V	合格
3	15kA+15KV	15.09kA	<700V	合格
4	20kA+15kV	20.07kA	<700V	合格

电磁防护装置测试报告

委托单位	四川亚辰电气有限公司	联系人	许怀东
		联系电话	13088269292
联系地址	四川绵阳市经开区松垭镇波鸿好圣二期工业园区4号厂房	邮编	101300
项目名称	EMP-45电磁防护装置	检测地点	北京
检测时间	2025年10月 9 日-2025 年 10 月 10日	天气	晴
温度	/	湿度	/
检测依据	1. IEC 62615:2010 静电放电敏感性测试 传输线脉冲(TLP)：元件级别：Electrostatic discharge sensitivity testing - Transmission line pulse (TLP)-Component level 2. BS IEC 62615:2011 静电放电敏感性试验 传输线脉冲(TLP)，部件等级：Electrostatic discharge sensitivity testing Transmission line pulse (TLP)，Component level 3. ANSI/ESD STM5.5.1-2022 ESD 协会静电放电 (ESD) 灵敏度测试标准测试方法 传输线脉冲 (TLP) 组件级：ESD Association Standard Test Method for Electrostatic Discharge (ESD) Sensitivity Testing -Transmission Line Pulse (TLP) - Component Level		
检测设备	□TLP脉冲发生器 □测试探针 □测试线 □示波器		
检测内容	注入上升沿1ns持续时间100nsTLP (Transmission line pulse) 脉冲，测试EMP-45电磁防护装置响应时间。		
综合评定	1.试品防护元件响应时间<5ns；合格。 2.试品防护装置整体响应时间<15ns；合格。		
检测人			
审核人		北京军盾恒胜防雷检测技术有限公司（检测专用章） 2025 年 10 月 10 日	
批准人			

1. TLP脉冲防护元件响应时间：

序号	TLP脉冲上升陡度 1nS	TLP脉冲持续时间 100nS	响应时间	合格判定
1	1nS	102nS	2nS	合格
2	1nS	100nS	2nS	合格
3	1nS	102nS	2nS	合格

2. TLP脉冲防护装置整体响应时间：

序号	TLP脉冲上升陡度 1nS	TLP脉冲持续时间 100nS	响应时间	合格判定
L-N	1nS	104nS	8nS	合格
L-PE	1nS	102nS	10nS	合格

EMP-85 EPPD

检验检测机构

资质认定证书

证书编号：190121340902

名称：北京军盾恒胜防雷检测技术有限公司

地址：北京市通州区景盛南四街13号8幢102一层

经审查，你机构已具备国家有关法律、行政法规规定的基本条件和能力，现予批准，可以向社会出具具有证明作用的数据和结果，特发此证。资质认定包括检验检测机构计量认证。

检验检测能力及授权签字人见证书附表

许可使用标志

CMA

190121340902

发证日期：2019年03月26日

有效期至：2025年03月25日

发证机关：北京市市场监督管理局

本证书由国家认证认可监督管理委员会监制，在中华人民共和国境内有效。

扫描二维码或登录发证机关政府网站验证

Product and Inspection Report

EPPD Electromagnetic Pulse Protection Device

Test reports for EMP-85 3P EPPD

受控编号：JDJC/BG-01-01 A/1

电磁脉冲防护装置
检 测 报 告
LPS Test Report

报告编号：JDJC-DQBG20240528-0001

受检单位：四川亚辰电气有限公司

项目名称：EMP-85电磁防护装置

检测类别：委托参数测试

检测日期：2024 年 5 月 28 日

北京军盾恒胜防雷检测技术有限公司

2024 年 5 月 28 日

电磁防护装置测试报告

委托单位	四川亚辰电气有限公司	联系人	许怀东
		联系电话	13088269292
联系地址	四川绵阳市经开区松垭镇波鸿好圣二期工业园区4号厂房	邮编	101300
项目名称	EMP-85电磁防护装置	检测地点	北京
检测时间	2024年5月28 日-2024 年 5 月 31 日	天气	晴
温度	/	湿度	/
检测依据	1. GJB 8848-2016 系统电磁环境效应试验方法 2. GB/T 18802.11-2020 低压电涌保护器(SPD) 第 11 部分：低压电源系统的电涌保护器 性能要求和试验； 3. 产品技术规格书		
检测设备	□高频电桥 □直流电桥 □PCUI双指数波冲击试验台 □35MHz阻尼振荡天线震荡波发生器 □模拟雷击冲击试验台		
检测内容	1. PCUI双指数波注入波冲击 2. 35MHz阻尼振荡天线震荡波冲击 3. 10/350 μ s雷电波冲击 4. 8/20 μ s雷电波冲击 5. 8/20 μ s+1. 2/50 μ s组合波限制电压测试		
综合评定	1. 试品具备耐受20/500nsPCUI双指数波500A冲击能力。 2. 试品具备耐受35MHz阻尼振荡天线震荡波300A冲击能力。 3. 试品具备耐受10/350 μ s雷电波15kA冲击能力。 4. 试品具备耐受8/20 μ s雷电波85kA冲击能力。 5. 试品8/20 μ s+1. 2/50 μ s组合波限制电压小于700V。		
检测人			
审核人			
批准人		北京军盾恒胜防雷检测技术有限公司（检测专用章） 2024 年 5 月 28 日	

1. 20/500nsPCUI双指数波脉冲冲击参数：

序号	PCUI冲击电流(20/500nS)	负载实际流过电流值	冲击次数	合格判定
1	100A	103A	3次	合格
2	300A	317A	3次	合格
3	500A	520A	3次	合格

2. 35MHz阻尼振荡天线震荡波脉冲冲击参数：

序号	冲击短路电流	负载实际流过电流值	冲击次数	合格判定
1	100A	102A	3次	合格
2	200A	201A	3次	合格
3	300A	302A	3次	合格

3. 10/350 μ s脉冲冲击参数：

序号	冲击短路电流(10/350 μ S)	负载实际流过电流值	冲击次数	合格判定
1	12.5kA	12.53kA	3次	合格
2	15.0kA	15.10kA	3次	合格

4. 8/20 μ s脉冲冲击参数：

序号	冲击短路电流(8/20 μ S)	负载实际流过电流值	冲击次数	合格判定
1	10kA	10.12kA	正反两次	合格
2	20kA	20.08kA	正反两次	合格
3	40kA	40.21kA	正反两次	合格
4	80kA	80.65kA	正反两次	合格
5	100kA	101.11kA	正反两次	合格

5. 8/20 μ s+1. 2/50 μ s组合波限制电压参数：

序号	8/20 μ S+1. 2/50 μ s组合波	负载实际流过电流值	负载两端限制电压值	合格判定
1	5kA+10kV	5.02kA	<650V	合格
2	10kA+10kV	10.07kA	<650V	合格
3	15kA+15KV	15.05kA	<700V	合格
4	20kA+15kV	20.11kA	<700V	合格

电磁防护装置测试报告

委托单位	四川亚辰电气有限公司	联系人	许怀东
		联系电话	13088269292
联系地址	四川绵阳市经开区松垭镇波鸿好圣二期工业园区4号厂房	邮编	101300
项目名称	EMP-85电磁防护装置	检测地点	北京
检测时间	2025年10月 9 日-2025 年 10 月 10日	天气	晴
温度	/	湿度	/
检测依据	1. IEC 62615:2010 静电放电敏感性测试 传输线脉冲(TLP)：元件级别：Electrostatic discharge sensitivity testing - Transmission line pulse (TLP)-Component level 2. BS IEC 62615:2011 静电放电敏感性试验 传输线脉冲(TLP)，部件等级：Electrostatic discharge sensitivity testing, Transmission line pulse (TLP), Component level 3. ANSI/ESD STM5.5.1-2022 ESD 协会静电放电 (ESD) 灵敏度测试标准测试方法 传输线脉冲 (TLP) 组件级：ESD Association Standard Test Method for Electrostatic Discharge (ESD) Sensitivity Testing -Transmission Line Pulse (TLP) - Component Level		
检测设备	☑TLP脉冲发生器 ☑测试探针 ☑测试线 ☑示波器		
检测内容	注入上升沿1ns持续时间100nsTLP (Transmission line pulse) 脉冲，测试EMP-45电磁防护装置响应时间。		
综合评定	1. 试品防护元件响应时间<5ns；合格。 2. 试品防护装置整体响应时间<15ns；合格。		
检测人			
审核人		北京军盾恒胜防雷检测技术有限公司（检测专用章） 2025 年 10 月 10 日	
批准人			

1. TLP脉冲防护元件响应时间：

序号	TLP脉冲上升陡度 1nS	TLP脉冲持续时间 100nS	响应时间	合格判定
1	1nS	105nS	2nS	合格
2	1nS	102nS	2nS	合格
3	1nS	105nS	2nS	合格

2. TLP脉冲防护装置整体响应时间：

序号	TLP脉冲上升陡度 1nS	TLP脉冲持续时间 100nS	响应时间	合格判定
L1-N	1nS	102nS	8nS	合格
L2-N	1nS	102nS	8nS	合格
L3-N	1nS	105nS	9nS	合格
L1-PE	1nS	102nS	12nS	合格
L2-PE	1nS	102nS	10nS	合格
L3-PE	1nS	102nS	10nS	合格

Test reports for EMP-85 3P EPPD

- The main protective components utilize dual-energy wave sensitive ceramic elements and a controllable discharge gap with arc-extinguishing circuitry;
- the mainboard is manufactured using ultra-high-reliability PCB board and PCBA/SMT processes, exhibiting excellent electrical insulation and temperature resistance;
- it employs full-mode protection modes including L1, L2, L3-N; L1, L2, L3-PE; and N-PE;
- it features recording capabilities for 0-999 impact cycles and impact time (optional);
- it includes optional monitoring functions for electromagnetic pulse parameters such as peak value, energy, waveform steepness, and charge.
- optional protective status monitoring;
- optional online grounding status monitoring;
- monitoring information can be accessed via wired or wireless communication through an app, WeChat mini-program, or B/S architecture backend software;
- high-quality flame-retardant terminals for protection against electric shock and misconnection, with a maximum wire diameter of 35mm²; 10~16mm² installation cables;
- a high-quality cold-rolled steel chassis with excellent fire resistance, explosion-proof, corrosion resistance, and salt spray resistance;
- various installation options, supporting wall mounting and 35mm DIN rail mounting to meet complex installation requirements.

Parameters of EPPD

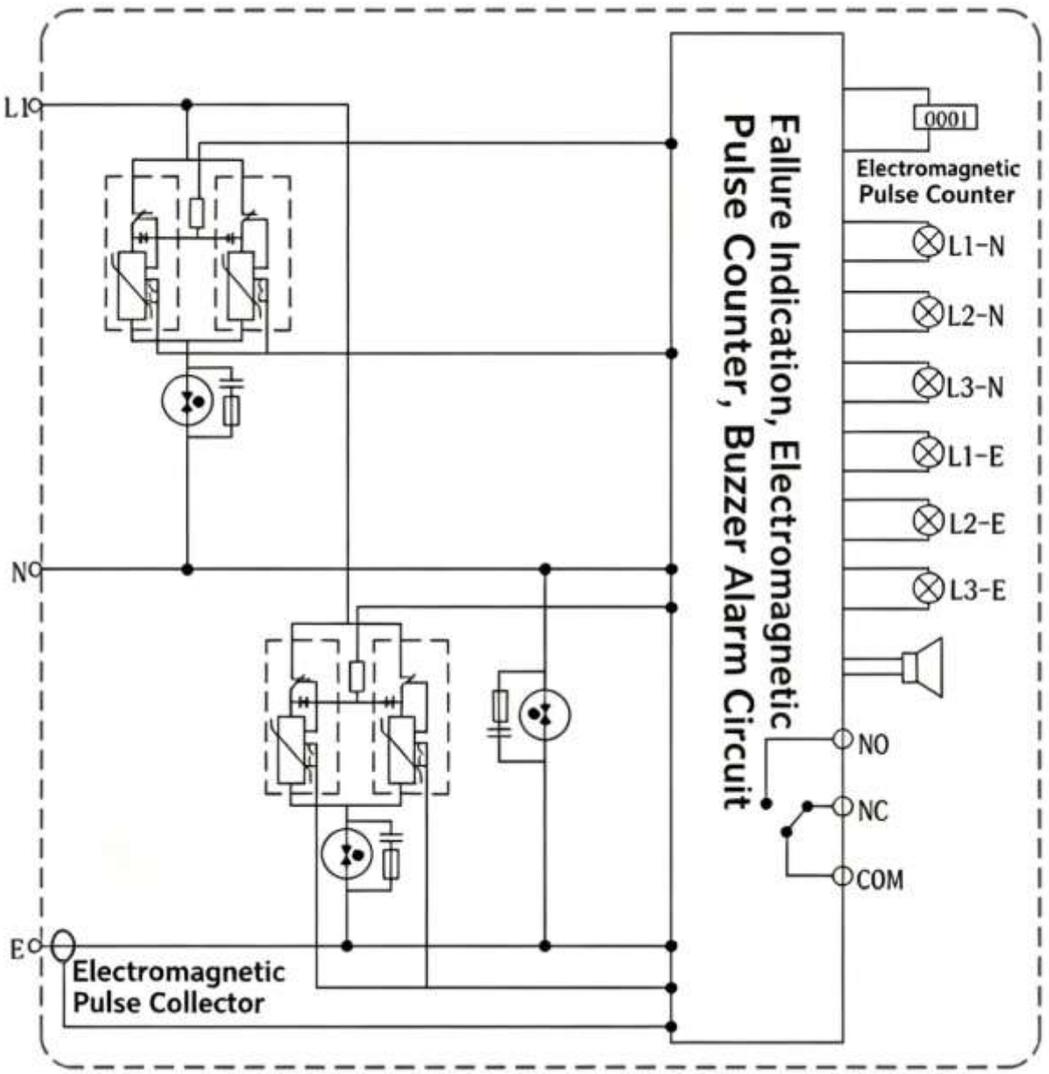
Technical Standards	GJB 8848-2016 Test Methods for Electromagnetic Environment Effects of Systems	
	GB/T 18802.11-2020 Low-voltage surge protectors (SPDs) Part 11: Performance requirements and tests for surge protectors in low-voltage power supply systems; (equivalent to IEC61643-11)	
Protection level	T1, T2	
Protection type	L1, L2, L3-N; L1, L2, L3-PE; N-PE full mold protection	
Enclosure protection level	IP20	
Applicable temperature	-40℃ to +85℃	
Applicable humidity	Relative humidity <95%RH	
model	EMP-45KA	EMP-85KA
Nominal operating voltage Un	220V (AC, 50Hz)	
Maximum continuous operating voltage Uc	380V (AC, 50Hz)	
impulse discharge voltage	1.2/50μs, 15kV	
Impact discharge current Iimp	10/350μs, >12.5kA	10/350μs, >15kA
Nominal discharge current In	8/20μs, 45kA	8/20μs, 85kA
Maximum discharge current Imax	8/20μs, 60kA	8/20μs, 100kA

Parameters of EPPD

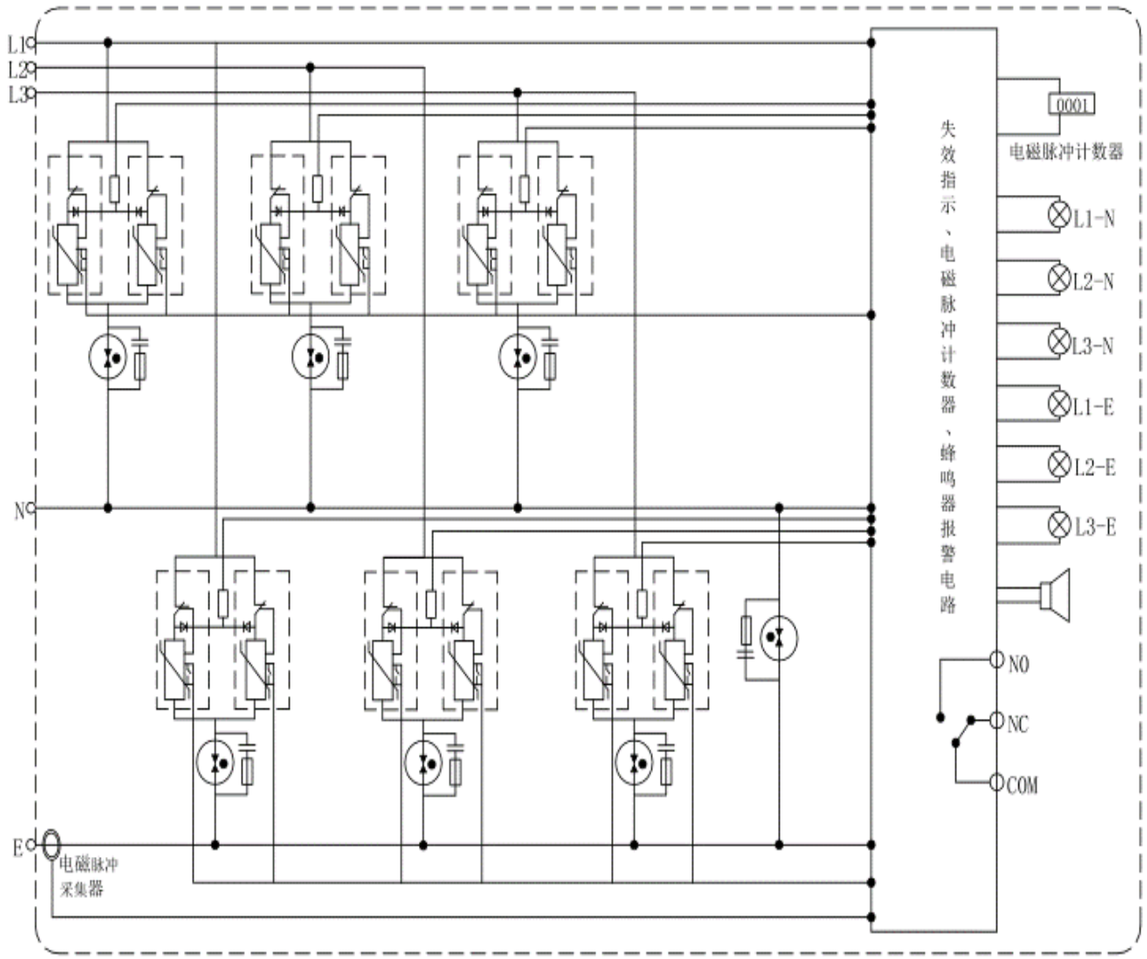
Electromagnetic pulse current	20/500ns, >500A
Electromagnetic interference current	35MHz damped oscillation antenna oscillation wave, >300A
Limiting voltage Uoc	<700V (8/20μs, 5kA+1.2/50μs, 10kV)
Voltage protection level Up	L1, L2, L3-N; L1, L2, L3-PE, <1.2 kV; N-PE, <700V
Response time T_A	<15ns
Impact counting	Number of impacts (0-999), impact time
Waveform monitoring (optional)	It can record electromagnetic pulse peak value, energy, waveform steepness, charge, etc.
Protection status monitoring (optional)	L1, L2, L3, and N lines: Normal (green light), Degraded (yellow light), Failed (red light)
Grounding status monitoring (optional)	PE circuit, good or bad
Communication port	1 normally closed and normally open contact, 2 spares
Communication methods	Wired or wireless communication (communication mode can be specified)
Background monitoring mode (can be added)	APP, WeChat mini-program, or B/S architecture backend software
External dimensions	EMP- 85 207 *152*85mm/ EMP-45 207*114*85mm

EPPD protection function schematic diagram

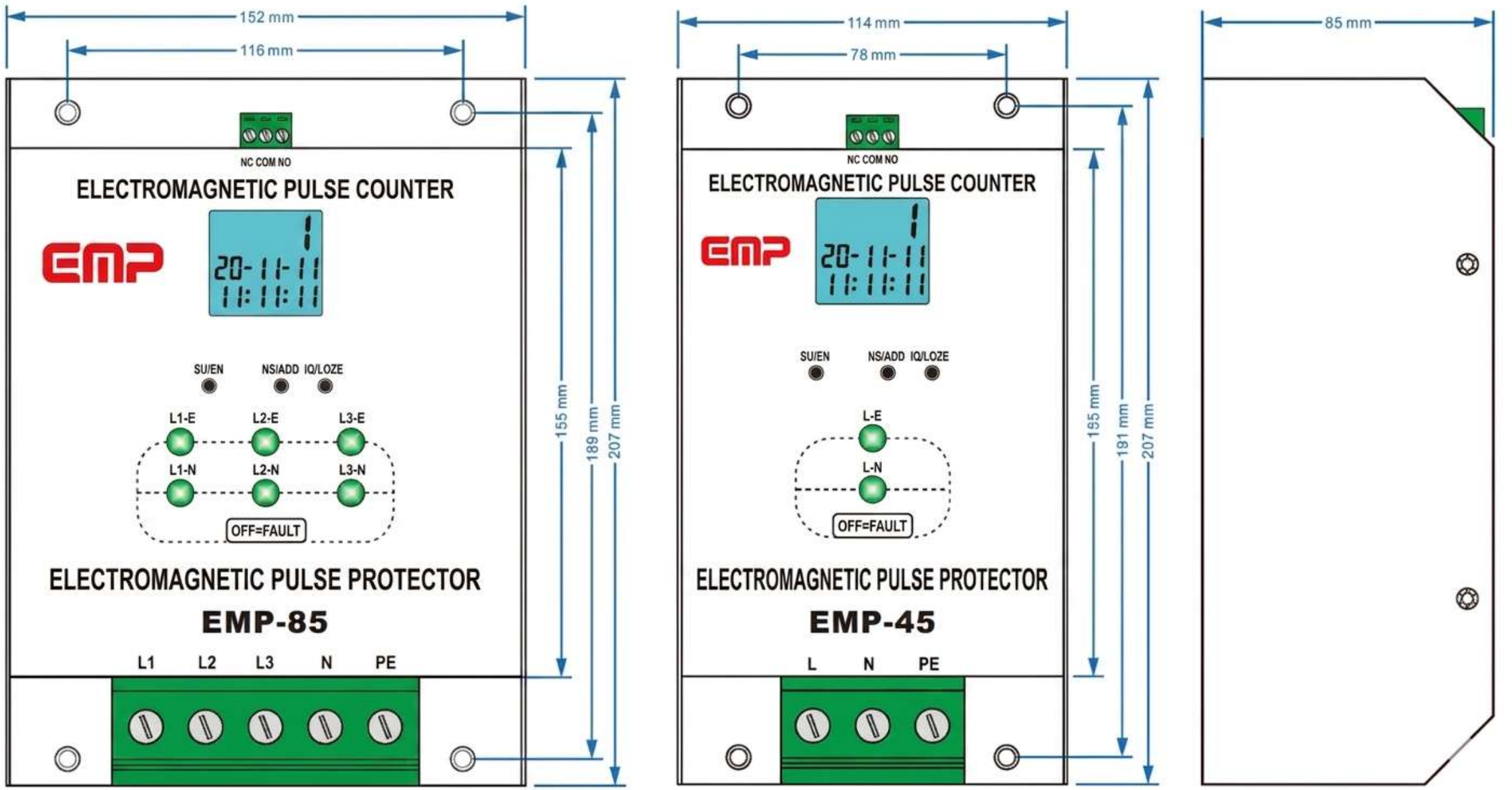
EMP-45KA



EMP-85KA

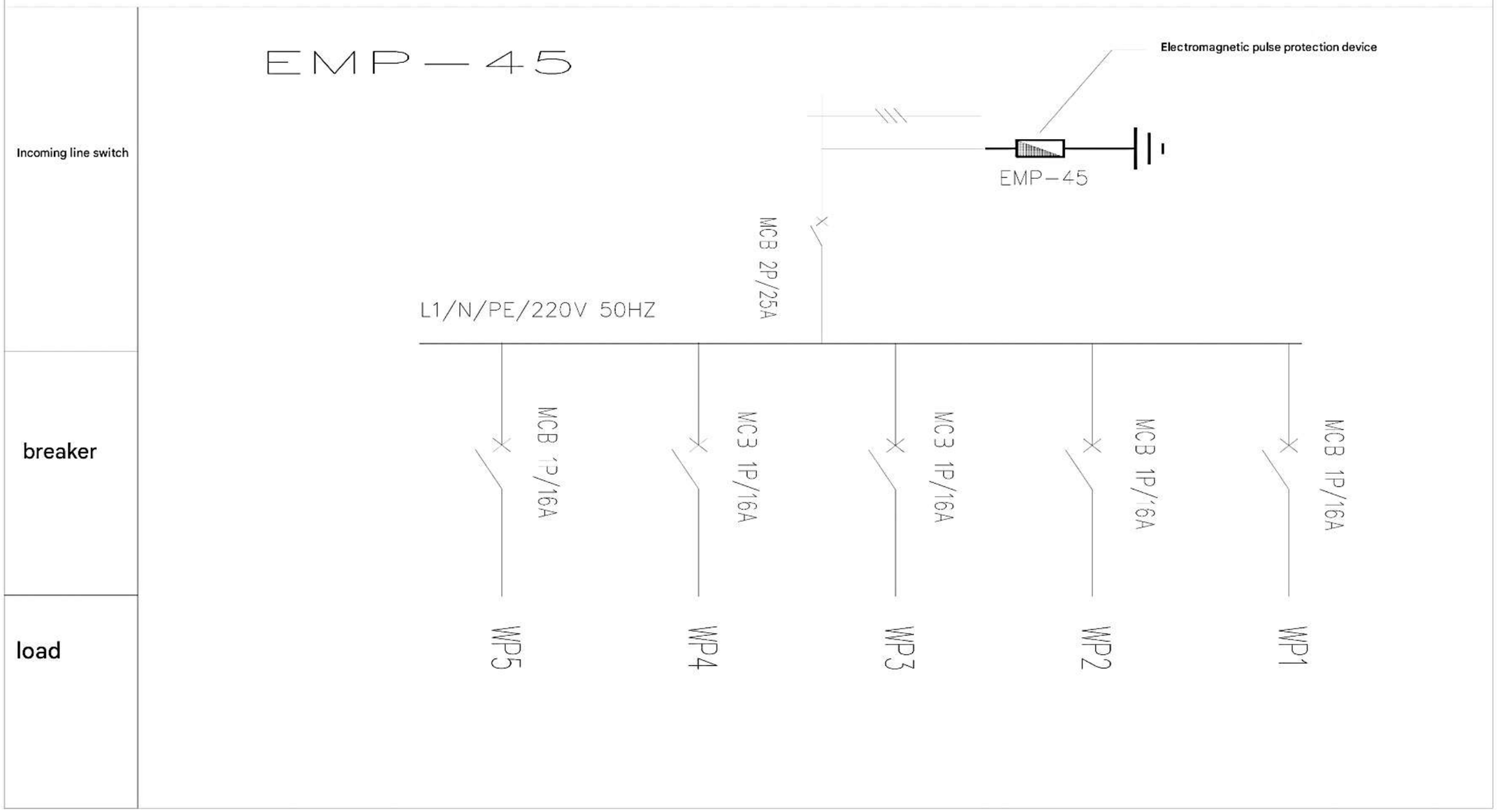


EPPD product dimensions



EMP-45 EPPD Applications

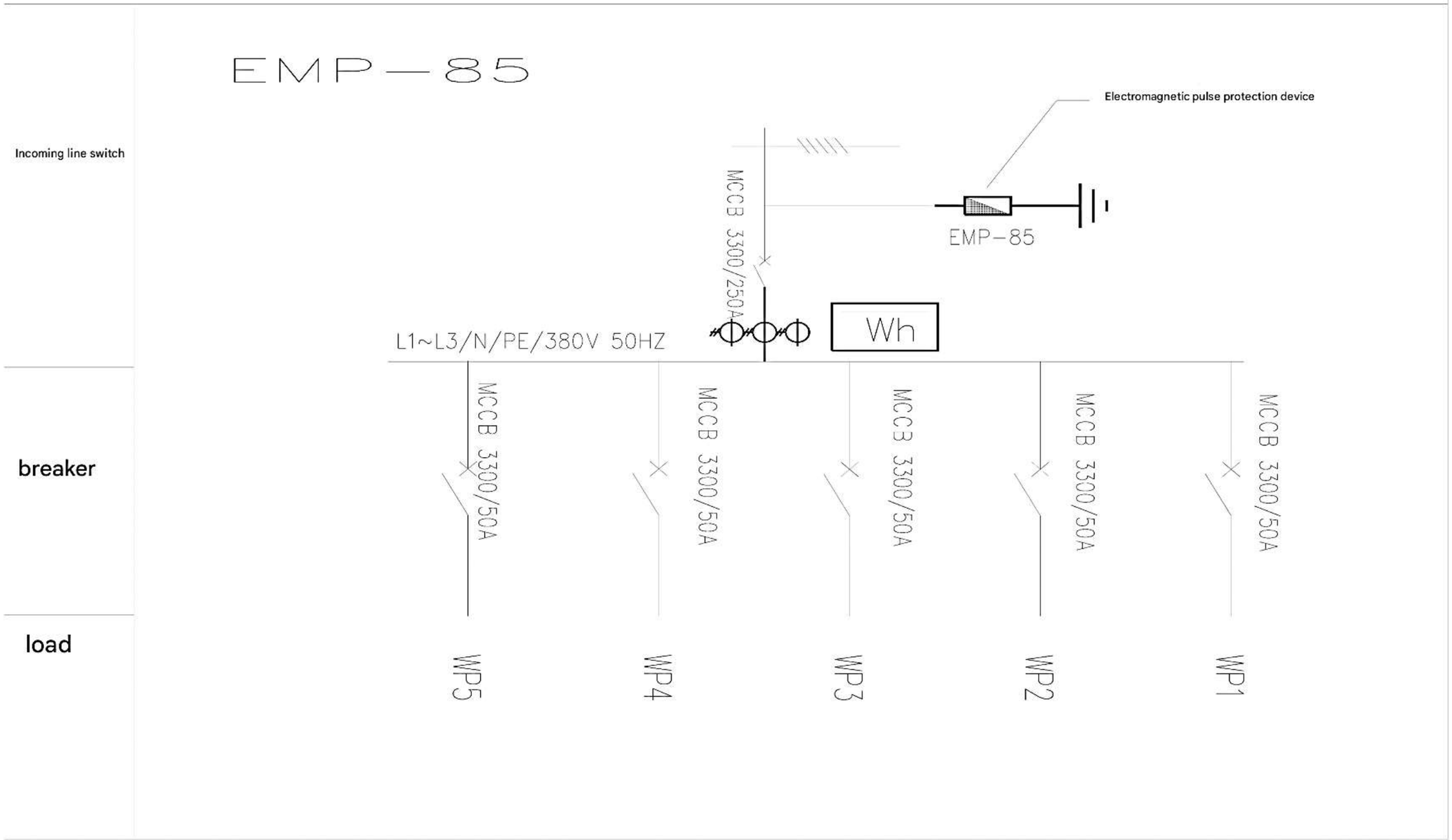
Applications include: research institutes; urban emergency command centers; laser halls, energy depots, test ranges, and other locations with strong electromagnetic pulses; and the front end of control power switches for critical equipment in data centers, airports, railways, and other key and civilian facilities (installed in parallel with the switch).



EMP-85EPPD Applications

Applications include: esearch institutes; urban emergency command centers; laser halls, energy depots, test ranges, and other locations with strong electromagnetic pulses;

and the front end of control power switches for critical equipment in data centers, airports, railways, and other key and civilian facilities (installed in parallel with the switch).



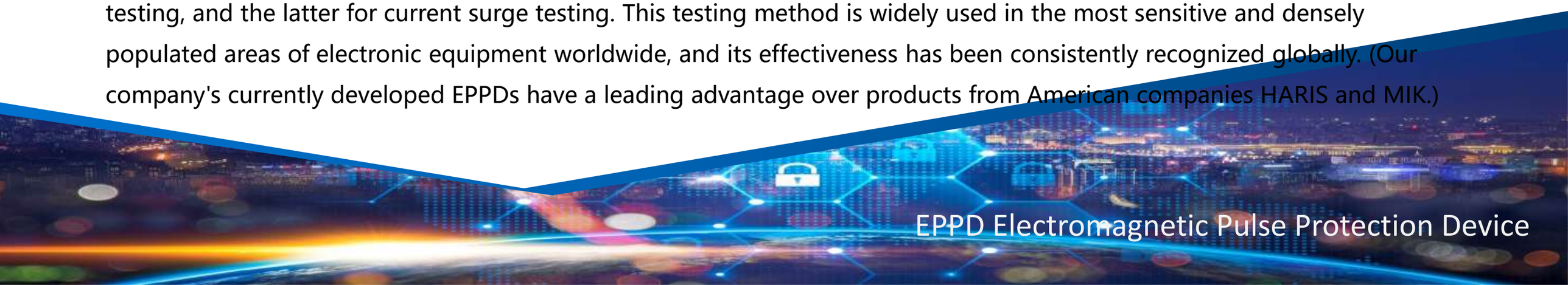
EPPD Electromagnetic Pulse Protection Device

EPPD design basis

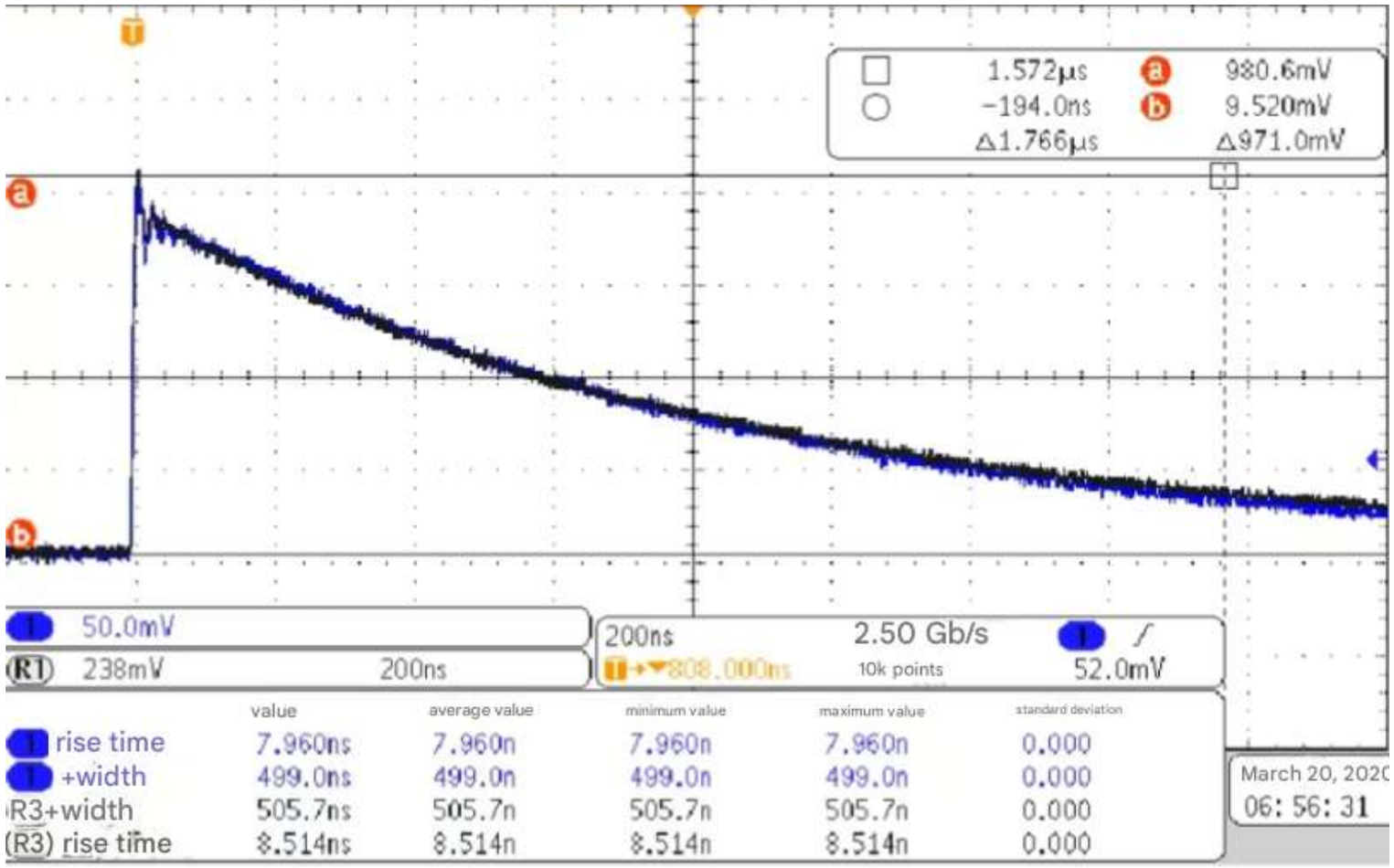
For nuclear and non-nuclear electromagnetic pulses (EMIPs) generated by electromagnetic pulse weapons or large-scale nuclear test devices that can reach destructive levels, the test waveforms for the protection and hardening units (devices) are typically tested using a **10/500ns single pulse, 100-500A, PCUI double exponential wave injection waveform**. This test can be conducted according to the GJB8848-2016 standard.

Space electromagnetic interference waves generated by strong electromagnetic interference sources are typically tested using **a 100-500A 35MHz damped oscillating antenna oscillation wave**. This is mainly used to verify the suppression capability of shielding devices in unshielded systems against space electromagnetic fields. It can also be used to verify the suppression capability of filters or electromagnetic protection units against interference harmonics generated in a loop system (a loop formed by power lines or signal lines) when a strong electromagnetic interference source acts on it.

For precision power supplies used in laboratory systems, the protection capability of their EPPDs can be tested according to the IEEE C62.41.2-2002 standard, using a **10-20kV/10-20kA, 1.2/50μs + 8/20μs combined waveform**. IEEE C62.45-2002, C62.41.1-2002, and C62.41.2-2002 technical documents recommend testing sensitive, precision power supply systems using a 100kHz ring waveform (simulating low-amplitude transient voltage and electromagnetic interference) for electromagnetic protection devices installed in Class A power distribution systems. For Class C and B power distribution systems, a 1.2/50μs + 8/20μs mixed waveform is used for testing; the former is used for voltage testing, and the latter for current surge testing. This testing method is widely used in the most sensitive and densely populated areas of electronic equipment worldwide, and its effectiveness has been consistently recognized globally. (Our company's currently developed EPPDs have a leading advantage over products from American companies HARIS and MIK.)

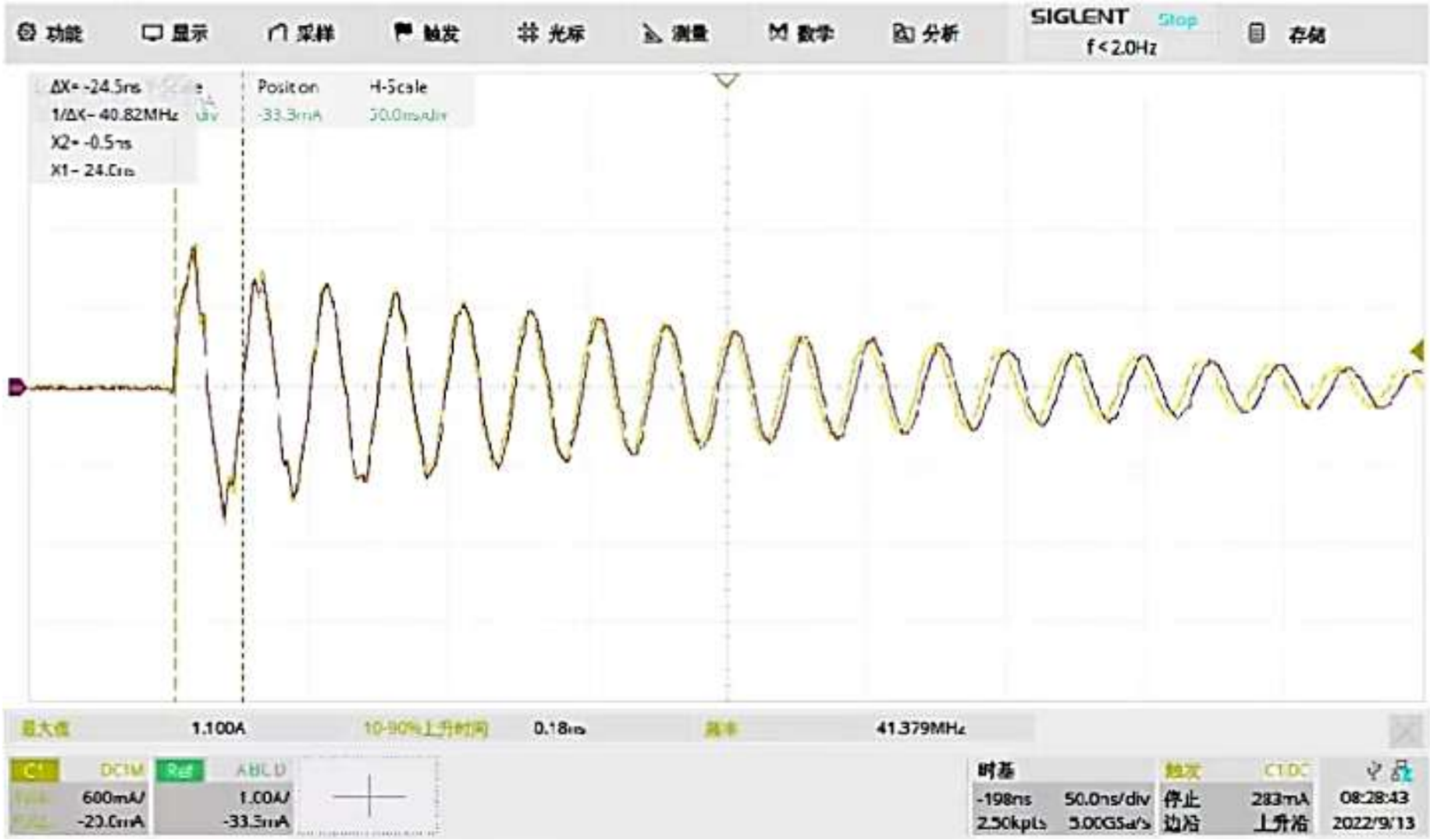


Nuclear electromagnetic pulse: PCUI double exponential injection wave



The PCUI double exponential wave injection wave, based on the GJB8848-2016 standard, has a rise time of 8-10 ns and a fall time of 500 ns. A 10/500 ns single pulse is typically used, with an impact energy of 100-500 A. It is primarily used to verify the protection and hardening capabilities against nuclear and non-nuclear electromagnetic pulses generated by electromagnetic pulse weapons or large nuclear test devices that can cause equipment damage. This device is designed to provide protection against 500 A and has passed testing.

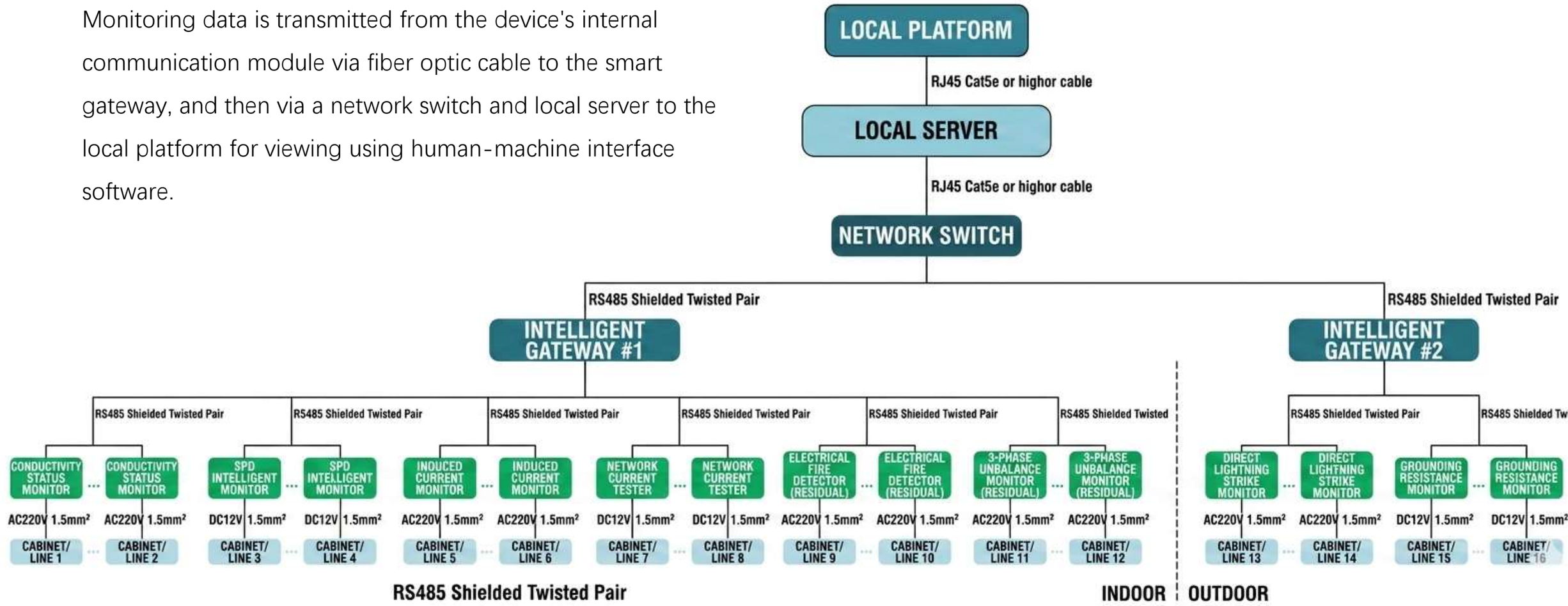
Strong electromagnetic pulse interference: PCI damped oscillation wave



Based on the GJB8848-2016 standard, a 35MHz PCI antenna damped oscillation wave was generated using a 35MHz charging line pulse source, producing 20 consecutive pulses with an impulse energy of 100-300A. This was primarily used to verify the suppression capability of spatial electromagnetic interference generated by strong electromagnetic interference sources and the interference harmonics when these sources act on a loop system. The device is designed with a protection capability of 300A and has passed testing.

EPPD system network topology diagram

Monitoring data is transmitted from the device's internal communication module via fiber optic cable to the smart gateway, and then via a network switch and local server to the local platform for viewing using human-machine interface software.



EPPD Software interface diagram

The homepage directly displays alarm indicators, alarm analysis, alarm processing progress, etc., allowing users to quickly focus on key information and carry out targeted actions; it also provides statistics on the frequency and causes of faults within a given period.

FAQ on EPPD design and application

1. Question: Should a backup protector be installed at the front end of the product? (Can the product withstand the instantaneous short-circuit current and be damaged in the event of a short circuit?)

No backup protector is needed. 1. The product itself has a reliable thermal trip device, and because it uses a varistor-gap series structure, there is no leakage current during operation, so thermal collapse will not occur. There is no short-circuit fault during operation; the only failure is an open circuit. 2. SSDs themselves have low energy tolerance to narrow pulses and are easily damaged by high-energy narrow pulses. Therefore, it is not recommended to install any backup protection device at the front end.

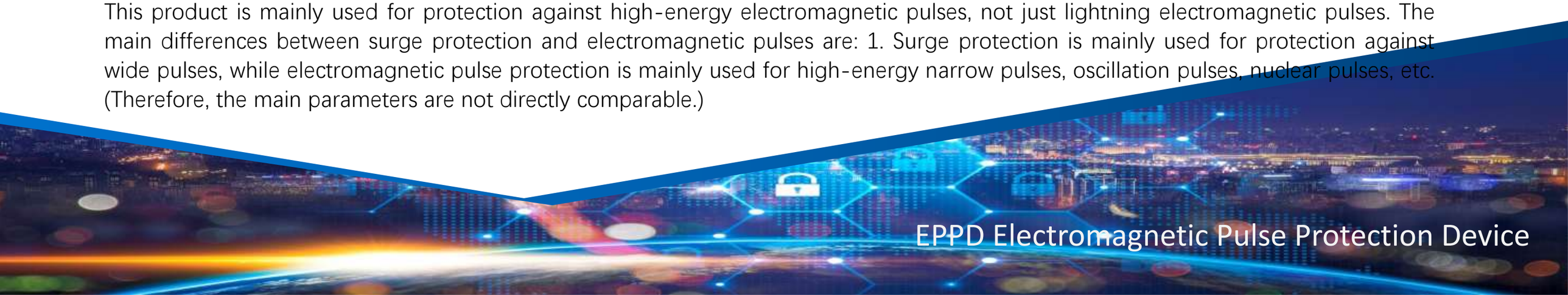
2. Question: Does the product function include all surge protection features? Is it unnecessary to install surge protectors and filters after installing the product?

The product itself has both 8/20us and 10/350us surge protection capabilities, therefore, there is no need to install an additional surge protector (SPD) in the same circuit.

(If this product is installed in a single distribution cabinet, surge protection is not required. Surge protection is required for circuits outside the protection circuits of this product throughout the entire circuit system.)

3. Question: It is suggested to add a parameter and function comparison table for the product and surge protection.

This product is mainly used for protection against high-energy electromagnetic pulses, not just lightning electromagnetic pulses. The main differences between surge protection and electromagnetic pulses are: 1. Surge protection is mainly used for protection against wide pulses, while electromagnetic pulse protection is mainly used for high-energy narrow pulses, oscillation pulses, nuclear pulses, etc. (Therefore, the main parameters are not directly comparable.)



FAQ on EPPD design and application

4. Question: Should the number of installations and the installation location be graded? (The product is connected in parallel with the power switch at the front end of the equipment.)

This product is mainly used for protection against high-energy electromagnetic pulses and is not applicable to SPD standards and lightning protection standards. Therefore, there are no "grading" requirements. It only needs to be installed near the power supply side of the equipment to be protected.

5. Question: For radiated coupling current and voltage, if it is coupled in from the cable interface of the equipment, can our product protect against it?

This product is mainly used for protection against conducted voltage and current waves of high-energy electromagnetic pulses in power lines. If the device itself is a source of interference, it can be installed at the device's power output. (The coupled induced pulse can only be generated in a closed loop; the induced current and voltage differ from the coil size formed by the closed loop.)

6. Question: Does the protection device only function when the energy reaches a certain threshold? (For example, if the energy of lightning, weapon tests, or external interference pulses is not high, will the protection device work?) (That is, it only functions when the voltage level exceeds the residual voltage level by at least 700V.)

The product starts working when the induced pulse energy (voltage ⩾ 1000V, current ⩾ 100A) is reached. If it is less than these parameters, the line and equipment are considered to be withstandable. Residual voltage is irrelevant.

7. Question: Do EPPDs all achieve protection through grounding discharge?

The protection method is called grounding equalization (to reduce the impulse potential at the protected port, it is recommended to install a compensating grounding electrode if conditions permit. If this is not possible, it is not necessary.)

More to come

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