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Recommended practice on characteristic of surges in low-voltage (1000 V and Less) AC Power circuits

低压交流电源（不高于1000 V）中的浪涌特性

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Table of Contents

Foreword

The guidance of technical documents by the National Standardization Technical Committee lightning protection and focal point. The unit responsible for the drafting of this technical guidance document is. Department of Electrical Engineering and Applied Electronic Technology, Tsinghua University. The main drafters of this technical guidance document. Chen Shuiming, He Jinliang. This guidance document is the first to be released.

This Guidance Document consists of six parts. The first part sets out the scope of this Guidance Document and the second part lists the Guidance documents, the third part outlines the surge environment, and the fourth part describes how to derive from complex measurement data In the selection of some of the representative waveform as the recommended waveform, the fifth part introduces two standard waveforms that can include a variety of measurement data, the sixth A few additional test waveforms for special occasions are introduced, including direct lightning strikes that are rare. There are no specific waveforms that represent all surge environments and therefore require the complexity of the real world to be reduced to a few easy-to-handle standards Test the waveform. To this end, surge environments are categorized to provide wave and amplitude options for surge voltages and currents so that Suitable for evaluating different withstands of equipment connected to low-voltage AC power supplies, while equipment withstand and surge conditions need to be carried out Appropriate cooperation. The purpose of this guidance document is to provide equipment designers and users with standard and additional surge test waveforms and corresponding surge Environmental rating. The selection of standard waveforms and environmental ratings requires consideration of the freedom of choice for device designers and users. This guideline The recommended value for the piece is a simplified result from a large amount of measurement data analysis, which simplifies the connection to low voltage AC power supply equipment Survived performance

has a repeatable, valid specification. There is no specific requirement specified in this guidance document, and what it recommends is only a reasonable, well thought out method Recognize the diversity of needs. For a specific application, equipment designers need to consider not only what is described in this technical document Waveform and incidence, but also to examine the specific power supply environment and the need to be protected device characteristics. Therefore, different devices can not be special The required performance requirements are included in this guidance document, however, a practical surge resistance can be achieved by considering some of the factors below By ability. These factors include. Expected protection measures; worst or most typical case; hardware integrity (no damage); immunity to equipment operation (no Interference); device-specific sensitivities; power environment (surge characteristics, other power system parameters); interaction with a communication system or other system Impact; SPD performance (protection, durability and damage modes); test environment; total and relative costs. The answers to the above questions do not always exist. In particular, the sensitivity of the device may be difficult to obtain by the device designer. Below Information to guide the reader to determine the parameters, to further seek closer to the actual situation or quantify a test program. Expected protective measures. The expected precautions will vary depending on the application and the purpose of the application. For example, do not involve equipment in real time In the case of performance, the expected protection only requires reducing the risk of hardware damage to a certain level. In other cases, such as data Any important interruptions or interruptions in the course of a medical procedure or manufacturing process are unacceptable. Therefore, designers must distinguish between hardware Damage and process interference to consider the expected protection measures. Also need to consider in the case of direct lightning SPD can provide the corresponding And protect yourself against damage. Device sensitivity. The sensitivity of a particular device must match that goal. The sensitivity of the device to hardware damage and process disturbances is Not the same, these sensitivities include the maximum impact residual voltage amplitude, duration, waveform and energy sensitivity. Power environment

--- surge. The test waveforms recommended in this guidance document must be based on location category and exposure level, Ray's situation to choose. Power environment

--- electrical system. The rms amplitude of the supply voltage, as well as any expected fluctuations, need to be quantified. In a reasonable choice SPD need to consider the occasional power anomalies. According to these conditions to select a reasonable limit voltage, operating voltage and the maximum even Continued operating voltage and other parameters. SPD performance. The SPD must have long-term life under surges and normal operating voltages. At the same time, the residual voltage of the SPD is protected There must be a margin between prepared tolerance values. These parameters need to be considered at the same time, for example, a rated parameter is very close to the system rated voltage The low residual pressure of the SPD provides good protection but sacrifices the durability of the SPD due to low residual pressure in the presence of abnormal voltages

This is unacceptable for sexual or overall performance. test environment. Surging test environment must be based on the above factors and the parameters that users think are important. Typical test environment package Including voltage and current as well as the definition of short circuit current. It is meaningless to specify only the open circuit voltage without specifying the short circuit current. To avoid this Defects, this guideline documents both voltage and current. cost. The cost of surge protection is less than the cost of the system as a whole, and the benefits of protection. Therefore, recoverable Use better performance surge protectors as a conservative way to compensate for some unknown parameter changes. This approach can be spent on the increase Not many cases for the user to obtain better benefits. The test waveforms listed in this Guidance Document help designers and manufacturers to define devices that use low-voltage AC power to encounter in the future Surge environment. It is emphasized again that the description of these environments and the recommendations of the waveforms should form the basis for the actual successful application, including appropriate Risk analysis should not be blindly used as a specification. As defined in this technical document, 1 the surge in indoor and indoor incursions along the line. Since the.1991 IEEE Std587-1980 was released as a recommended operating guide and more than 20 years of successful experience have confirmed its reliability. This situation should include Two standard waves (100 kHz ring and combined) for the three position categories, as well as two additional waves (EFT burst and 10/1000μs long wave). Case 2 takes into account the rare occurrence of thunder-hit buildings. If this building has a proper lightning protection design, or lightning current pass Road into the grounding system, lightning will affect the form of lightning current into the line side of the SPD. Lightning current in the system will also be induced in the indoor transient voltage transients. For a building without lightning protection system, or one A lightning strike is not intended to be a de facto lightning receptor for a building, which is hard to estimate. But they can be considered along uncontrolled thunder The current path causes insulation breakdown and may also cause transient voltages in the indoor wiring. Lightning the earth next to the building can also lead to one Sub-lightning current into the grounding system, lightning current dispersion similar to all the current injected directly into the lightning protection system (Case 2 peculiar). But its amplitude with The distance between the lightning strike point and the grounding system increases. Because this amplitude reduction effect stems from the extension of the propagation path, with the local earth Conductivity and the status of the earth electrode, it is difficult to accurately determine its value. The relevant energy of Case 2 and the mechanical stress of the SPD outlet are significantly increased compared to Case 1. However, the successful scene has been verified The definition of a standard wave in Case 1 is valid. When using some conversion factors, you can use standard 8/20μs or 4/10μs power Flow test. Taking into account what is likely to happen in Case 2, an appropriate risk analysis must be conducted prior to SPD design for this situation. should Consider (but are not limited to) the following factors. local lightning density, building characteristics and location, lightning current magnitude statistics, current rate of change, facilities Use, the consequences of power failure after SPD failure,

damage to other instruments, etc. Indoors due to long-range, near or direct lightning induced transient voltage induced phenomenon is inevitable. No matter for energy Consider or introduce the choice of line SPD must be processed. For practical purposes, the 100kHz ringing wave shows this effect Used to characterize this phenomenon. This Guidance Document is for reference only. The suggestions and opinions on this Guidance Document shall be submitted to the competent department of standardization administration under the State Council Door reflection. Surge characteristics in low voltage AC power (up to 1000)

1 Scope

GB/Z 21713-2008 is the Chinese national standard on recommended practice on characteristic of surges in low-voltage (1000 v and less) ac power circuits, in the field of electrical engineering. The /Z suffix marks it as a guiding technical document: it does not prescribe requirements that can be certified against, but sets out the technique, the method or the state of the art that the standards bodies recommend following. It was issued on 24 April 2008 by the State Administration for Market Regulation; Standardization Administration of China. As a guiding technical document it carries no separate date of entry into force: it applies from publication. Classification: ICS 29.120.01, CCS K30. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This instructive document describes surge voltage and surge current conditions in low voltage AC power sources (<=1000V), excluding other electrical energy The amount of problems, such as voltage drops, electrical noise and so on. Surge considered in the standard duration does not exceed half a frequency cycle, these surges can be weeks Periodic, but also can be a random event, can appear in the FireWire, zero line and ground between. The voltage and voltage are usually limited by a surge protector (SPD) The magnitude of the current shunts dangerous surge energy and is generally eliminated by other means for surges that only interfere with the equipment.

2 Normative references

The following documents contain provisions which, through reference in this Guidance Document, become the provisions of this Guidance Note document. All dated Reference documents, all subsequent amendments (not including errata content), or revisions do not apply to this guidance document, however, drums Recipients of the agreement based on this guidance document are encouraged to study whether the latest versions of these documents are applicable. All undated references The latest version of this document applies to this guidance document. IEEEC62.41.1. Guidelines for Surging Surges in Low Voltage AC Power Sources (Up to 1000V).2002 IEEEC62.41.2. Recommended Practice for