

Suppression Products



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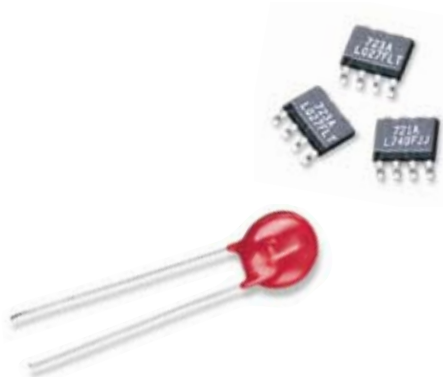
Overvoltage Suppression Products

Introduction

Overvoltage conditions are rapidly becoming an increasing concern in the electrical industry. Component miniaturization has resulted in increased sensitivity to many devices as the trend towards downsizing equipment and components continues. The majority of these devices are unable to handle high currents that result from Electrostatic Discharge (ESD) and other voltage transients.

Did you know?

- 75% of field equipment failure is caused by Electrical Over-Stress (EOS)
- Semiconductor devices are becoming increasingly intolerant to voltage transients
- A lightning strike several miles away can induce transients in your equipment
- Power distribution transformers susceptibility impacts clean power condition



What Are Transients?

Voltage Transients are defined as short duration surges of electrical energy. Transients result from the sudden release of previously stored energy. In terms of electrical and electronic circuits, this energy can be released through intentional, controlled switching action, or induced into a circuit from external sources. If the voltage magnitude of the transient is large enough, circuit component damage or malfunction of the circuit may result.

Transients occur in either repeatable fashion or as random impulses. Repeatable transients are frequently caused by the operation of motors, generators, or the switching of reactive circuit components. Random transients, on the other hand, are often caused by lightning and ESD. Lightning and ESD generally occur unpredictably, and may require elaborate monitoring to be accurately measured.

Typical Overvoltage Applications

- Industrial, High Energy AC Products
(Solenoids, Motor Drives, Robotics, etc.)
- Telecommunications Products
- TVSS Products (UPS, AC Panels, Power Supplies,
Circuit Breakers, etc.)
- Portable Electronic Equipment
- Automotive Electronics

Transient Sources and Magnitude

	Voltage	Current	Rise-Time	Duration
Lighting	25kV	20kA	10 μ s	1ms
Switching	600V	500A	50 μ s	500ms
EMP	1kV	10A	20ns	1ms
SSD	15kV	30A	1-5ns	100ns

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Transient Voltage Scenarios

The switching of inductive loads generates high energy transients which increase in magnitude with increasingly heavy loads. When the inductive load is switched off, the collapsing magnetic field is converted into electrical energy which takes the form of a double exponential transient. Depending on the source, these transients can be as large as hundreds of volts and hundreds of amps with duration times of 400 milliseconds.

Typical sources of inductive transients are:

- Generator
- Motor
- Relay
- Transformer

These examples are extremely common in electrical and electronic systems. Because the sizes of the loads vary according to the application, the wave shape, duration, peak current, and peak voltage are all variables which exist in real world transients. Once these variables can be approximated, a suitable suppressor technology can be selected.

ESD (Electrostatic Discharge)

Electrostatic discharge is characterized by very fast rise times and very high peak voltages and currents. This energy is the result of an imbalance of positive and negative charges between objects.

Lightning Induced Transients

Even though a direct strike is clearly destructive, transients induced by lightning are not the result of a direct strike. When a lightning strike occurs, the event creates a magnetic field which can induce transients of large magnitude in nearby electrical cables.

Technological Solutions for Transient Threats

Because of the various types of transients and applications, it is necessary to employ protection devices with different characteristics in different applications. Littelfuse offers the broadest range of circuit protection technologies. Our overvoltage protection portfolio includes:

MOVs

Metal Oxide Varistors (MOV)

Ceramic Technology

Available in screw terminal, radial, square and axial leaded connections. Offers medium to very high energy ratings for a wide range of applications.

Surface Mount MOV

Metal Oxide Varistor (MOV)

Ceramic Technology

Available in a wide range of voltage ratings. Offers low to medium energy ratings for a variety of applications and is available with screw terminal, radial, square and axial leaded connections.

MLV

Multilayer Metal Oxide Varistor

Ceramic Technology

Available in a wide range of surface mount packages. Offers a lower voltage range and enhanced performance and filtering characteristics for applications requiring protection from low to medium energy transients.

PulseGuard® Suppressor

Voltage Variable Polymer Technology

Available in surface mount and 'D-Sub connector' format packages.

Specifically designed for high data-rate applications requiring ESD protection and the lowest possible capacitance.

TVS Diode Arrays

Silicon Avalanche Diode Technology

Available in surface mount multi-pin packages or CSP (chip scale package) arrays. Designed for applications requiring multiline ESD protection and the lowest possible clamp voltage.

Discrete TVS Diode

Silicon Avalanche Diode Technology

Available in surface mount and axial leaded packages. Offers protection from medium to very high energy transients and can be used in wide range of applications.

SIDACTOR® Thyristor

Thyristor Breakover Technology

Available in surface mount, axial leaded and TO-220 through hole package options. Offers protection from medium to high energy transients, SIDACTOR thyristors are specifically designed for transient suppression in telecom and data transmission systems.

Gas Plasma Protector/Gas Discharge Tube

Gas Plasma Technology

Available in surface mount, axial leaded, radial leaded and special packages. The Littelfuse Gas Plasma technology offers high surge ratings and very low capacitance for use in telecommunication and broadband systems.

Overvoltage Suppression Products

Industrial Varistor Products

	TMOV™/iTMOV™ Varistor Series	UltraMov™ Varistor Series	C-III Series	LA Series	ZA Series
Operating Voltage:	115-420 VAC 170-420 VDC	130-625 VAC 170-825 VDC	130-320 VAC	130-1000 VAC 175-1200 VDC	4-460 VAC 5.5-615 VDC
Peak Current:	6,000-10,000A	1,750-10,000A	6,000-9,000A	1,200-6,500A	50-6,500A
Peak Energy:	50-320	50-273J	45-220J	11-360J	0.1-52J
Mount/Form Factor:	Radial Leaded	Radial Leaded	Radial Leaded	Radial Leaded	Radial Leaded
Disc Size:	14, 20mm	7, 10, 14, 20mm	14, 20mm	7, 10, 14, 20mm	5, 7, 10, 14, 20mm
Indicating:	iTMOV Varistor Only	N/A	N/A	N/A	N/A

	MA Series	RA Series	CH Series	CA Series	NA Series
Operating Voltage:	9-264 VAC 13-365 VDC	4-275 VAC 5.5-369 VDC	14-275 VAC 18-369 VDC	250-2800 VAC 330-3500 VDC	250-750 VAC 330-970 VDC
Peak Current:	40-100A	150-6,500A	250-500A	20,000-70,000A	40,000A
Peak Energy:	0.06-1.7J	0.4-140J	1-23J	200-10,000J	370-1,050J
Mount/Form Factor:	Axial Leaded	Packaged	Surface Mount	Bare Disc	Bare Disc
Disc Size:	3mm	8, 6, 22mm	N/A	32, 40, 60mm	34mm

	PA Series	HB34 Series	HA Series	DA/DB Series	BB/BA Series
Operating Voltage:	130-660 VAC 175-850 VDC	130-750 VAC 175-970 VDC	130-750 VAC 175-970 VDC	130-970 VAC 175-970 VDC	130-2800 VAC 175-3500 VDC
Peak Current:	6,500A	40,000A	25,000-40,000A	40,000A	50,000-70,000A
Peak Energy:	70-250J	270-1,050J	200-1,050J	270-1,050J	450-10,000J
Mount/Form Factor:	Packaged	Industrial Packaged	Packaged	Industrial Packaged	Packaged
Disc Size:	20mm	34mm	32, 40mm	40mm	60mm

Contact factory for additional information.

Overvoltage Suppression Products

Surge Suppression Fuses



The Littelfuse Varistor Protection (LVSP) Fuses are intended for the protection of TVSS products. The LVSP series has been designed to survive the 8x20μs lightning surges described in various standards (UL1449, IEC61000-4-5 & IEEE C62.41) without opening. This allows the TVSS to perform the necessary suppression. The LVSP is not rated for continuous current and the ratings are specific 8x20μs surge capability. The LVSP series can be used to facilitate TVSS module compliance to UL 1449 in permanently connected applications (abnormal overvoltage, unlimited current conditions).

Features

- Very current-limiting under AC short-circuit conditions.
- Available in multiple mounting configurations (cartridge, bolt-in, PC board mount).
- Provides short-circuit protection in TVSS systems and complements the Littelfuse line of overvoltage products (HA, HB34, TMOV™ and iTMOV™ varistors as well as the AK-10 series TVS diodes).

Applications

- TVSS products
- Surge arrestors

Catalog No.	8x20μs Surge Rating	Nominal Melting I ² t (A ² s)	Nominal Clearing I ² t (A ² s)	I _{peak@100kA 60Hz} (A)
LVSP 5	5,000	359	981	3,700
LVSP 10	10,000	1,300	3,210	5,823
LVSP 15	15,000	3,267	6,235	7,765
LVSP 20	20,000	4,940	11,710	8,135
LVSP 30	30,000	11,950	35,325	12,478
LVSP 40	40,000	20,550	61,700	15,250
LVSP 60	60,000	39,240	145,555	19,604
LVSP 80	80,000	75,000	254,000	24,600
LVSP 100	100,000	Contact Factory		

Specifications

Voltage Rating: 600 VAC
Interrupting Rating: 200,000 amps
Ratings: 5 – 100kA 8x20μs surge withstand
Approvals: UL Recognized under the components program. (File No. E71611)

Recommended Fuse Blocks

L60030M and LPSM series – LVSP (5-20)-2
 LJ60030 and LPSJ30 series – LVSP (30-80)-2

Mounting Options

Surge Rating	Catalog Number		
	Cartridge	Leaded	Bolt-In
5	LVSP 5-2	LVSP 5-R	–
10	LVSP 10-2	LVSP 10-R	–
15	LVSP 15-2	LVSP 15-R	–
20	LVSP 20-2	LVSP 20-R	–
30	LVSP 30-2	–	LVSP 30
40	LVSP 40-2	–	LVSP 40
60	LVSP 60-2	–	LVSP 60
80	LVSP 80-2	–	LVSP 80
100	–	–	LVSP 100-L

Note: Contact factory for dimensions and availability of specific mounting configurations. For availability of RoHS compliant product, call 1-800-TEC-FUSE.

