

Transient Suppression for MIL-STD-1275 Applications

Application Note



INTRODUCTION

Sensitron's SCP-5282 Series of devices are high pulse power Transorbs, the only COTS devices which meet and exceed the MIL-STD-1275 voltage surges and transients on the market today.

This application note covers transient voltage suppression and the capability of the SCP-5282 Series in meeting stringent MIL-STD-1275 requirements.

APPLICATIONS

The SCP-5282 is intended for use in all 28VDC applications that require MIL-STD-1275 transient voltage compliance and voltage dump functions such as:

- Main Power Distribution
- Electronic Generation & Conversion Systems
- Electrical Loads & Power Controllers
- Motors, Actuators & Associated Equipment
- Power Export/Import Ports
- C4ISR Equipment (Command, Control, Computers Communication, Intelligence, Surveillance & Reconnaissance)
- Any Other Vehicle Electronics

BENEFITS:

- System Reliability & Compliance
- Power Efficiency of Switching Devices

ABOUT MIL-STD-1275

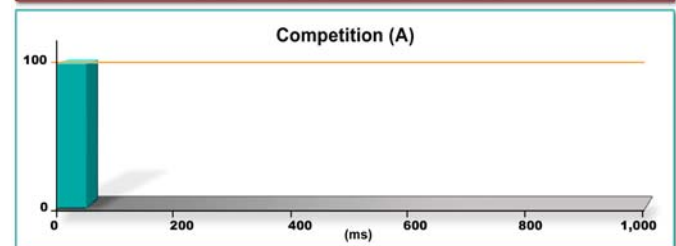
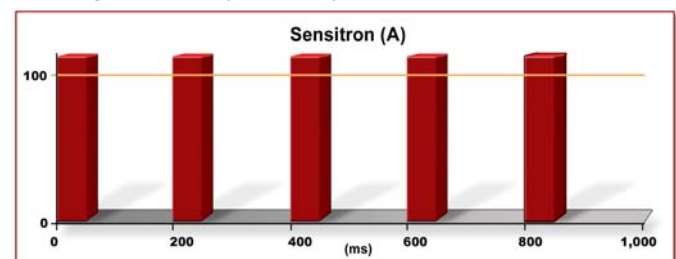
The MIL-STD-1275 specification, entitled "Characteristics of 28 Volt DC Electrical Systems

in Military Vehicles," is the most common power standard for all vehicle electronics (Vetronics) in the U.S. Armed Forces. This standard has also been adopted across non-military, high-reliability markets as well. At the time of this paper's publication, MIL-STD-1275D, issued on August 29th, 2006 was the latest and superseding version of this specification.

Though the MIL-STD-1275 standard covers various transient conditions (surges, spikes, ripples) in all modes of vehicle operations (starting, normal operation, generator-only), there are two requirements which stand out: $\pm 270\text{Vdc}$ spike in section 5.1.3.4, and 100Vdc surge in section 5.1.4.3. The $\pm 270\text{Vdc}$ spike is a short transient and limited in energy. The most stringent transient voltage requirement is the 100Vdc surge. As a result of the energy contained in its envelope, this surge is the most critical design requirement for every voltage transient suppression product that claims to meet the MIL-STD-1275 standard.

SYSTEM RELIABILITY

Sensitron's SCP-5282 device is designed and packaged to fully comply with MIL-STD-1275.



Sensitron offers 100% tested products subjected to five 50ms pulses of 110A within a period of one second as per the MIL-STD-1275 test method, "Voltage Spikes Imported into EDUT".

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POWER EFFICIENCY

Due to the MIL-STD-1275 voltage transient requirements, most vehicle power systems utilize MOSFET devices with V_{ds} ratings of 100Vdc or higher to switch electrical loads and provide power to various vehicle subsystems. For power applications utilizing Sensitron's SCP-5282 device, the V_{ds} rating can be selected at 55Vdc. Since the lower-rated MOSFET devices have lower $R_{ds(on)}$, the power savings on the switching MOSFET devices typically exceeds approximately 40%, therefore, justifies the use of SCP-5282 device.

PROTECTION LEVELS

In order to satisfy different systems' protection level requirements, Sensitron offers several product options. Regardless of the product selection, all Sensitron's SCP-5282 series devices set the industry's highest performance standards and are backed by Sensitron's design and manufacturing experience and quality control. The following table provides a quick summary of the key features:

	5282-3	5282-2	Competition
Peak Power (kW)	100	60	30
100% Testing	135A 130ms	100A 130ms	100A 50ms
Repetitive Pulses	110A 50ms 5x / sec	-	-
Polarity	Bi/Uni	Bi/Uni	Uni

Unlike active circuit TVS products, which consume power and degrade the system's efficiency by 10%, SCP-5282 devices consume virtually no power and pose no power degradation penalty.

INSTALLATION

Sensitron's SCP-5282 device has two threaded terminals for easy installation. For bidirectional configurations, the terminals are reversible and the polarity does not impact the device's performance. The SCP-5282 module should be mounted (bolted) on the heat sink, such as a metal plate or vehicle's chassis. For some designs, the stiff pad such as Bergquist's Sil-Pad K-10 or the Q-Pad 3 will be used in order to enhance the heat transfer.

The SCP-5282 device should be placed near the electrical system it protects and connected using at least a 10-gauge wire.

PACKAGING

The SCP-5282 is a potted, rugged design made with a metal plate and high-impact composite housing.

Assembly	Weight (oz)
SCP-5282-2	2.5
SCP-5282-3	4.3

These small, simple to use, and rugged devices are behind the success stories of many military and aerospace programs. As a natural extension of Sensitron's Power Management products, the SCP-5282 complements any one of the following Sensitron's product lines:

- Smart Solid State Power Controllers
- Integrated Motor Controllers & Power Stages
- DC to DC Converters & EMI Filters

ABOUT SENSITRON

Sensitron is a leading manufacturer of high reliability power electronic solutions including motor controllers, smart power management and conversion, diodes, voltage protection components and embedded boards. Sensitron has over 40 years of serving the complete spectrum of reliability markets including space, aerospace, and defense.

PRODUCT SUPPORT

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