How low should your TVS clamp in a 24V system?

Lower clamping voltage means less stress on the protected load.

Transient Threat

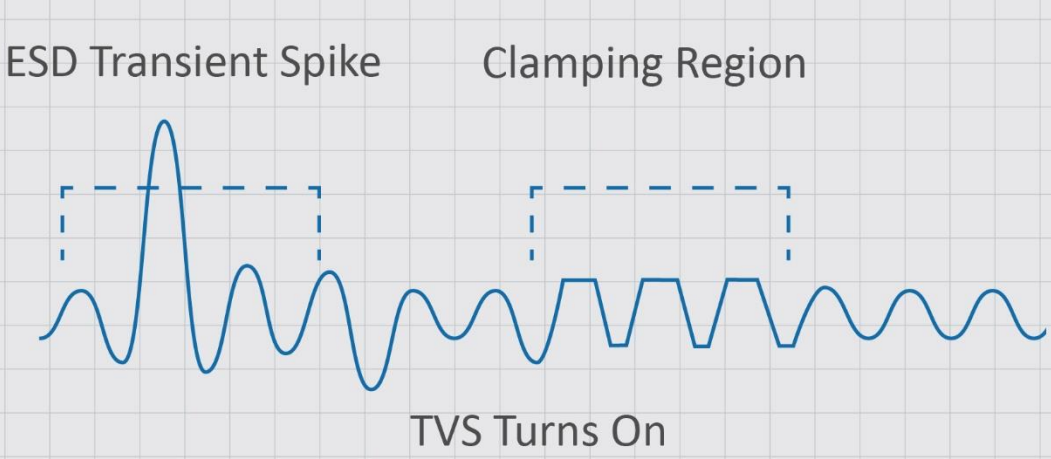
VOLTAGE TRANSIENTS

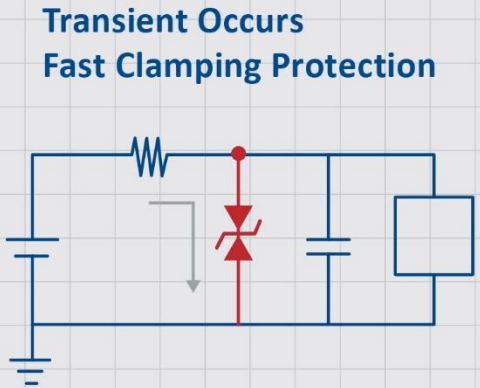
- **Load Switching**
- **ESD**
- **Lighting**



High-voltage transients can damage sensitive ICs, MCUs, driver ICs, and other electronic components.

Protection Mechanism

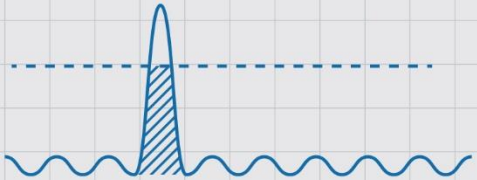




A TVS diode reacts rapidly during transient events, diverting excess surge energy to ground and protecting the circuit.

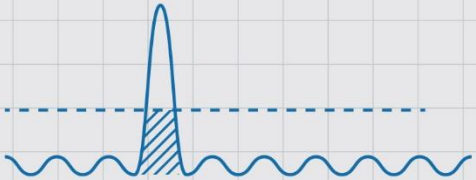
Clamp Performance

Conventional TVS



Higher voltage stress on the load

Super Clamp TVS

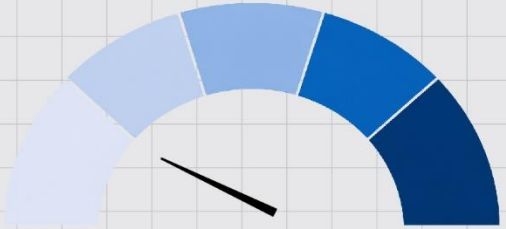


Lower voltage stress on the load

Super Clamp TVS keeps the clamping voltage closer to the breakdown voltage, reducing voltage stress on downstream components.

Ratio Comparison

Conventional TVS



Clamping Ratio: ~1.65 - ~1.7

Super Clamp TVS



Clamping Ratio: ~1 - ~1.05

A lower clamping ratio means the system experiences less overvoltage during transient events.

SUPER CLAMP Low Clamp 24V Surface Mount TVS

Higher Peak Pulse Current vs. Conventional TVS



DO-218AB	SMC	SMB
+223%	+142%	+75%

Compare with conventional TVS,
higher IPP Capability for stronger surge protection

Low Clamping Voltage

VC is closer to VBR, reducing voltage stress on downstream components.

High IPPM Capability

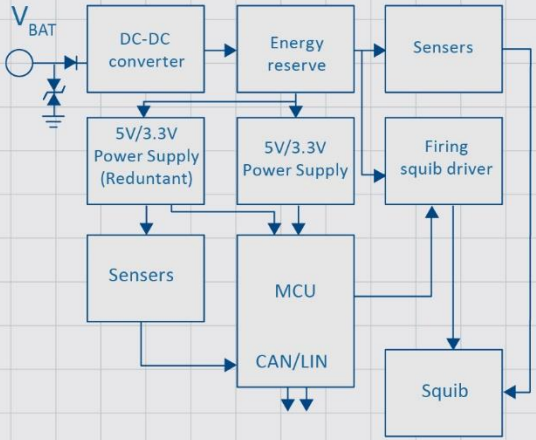
Higher surge-handling capability, suitable for high-reliability protection requirements.

BOM & PCB Space Optimization

Reduced component count and layout complexity, improving design flexibility.

Application Example

12V ECU transient protection for Airbag





DC-DC converter - Boost to 23V, 33V for backup power supply.
Squib IC - Buck to 3.3V, 5V for driver IC, MCU

Even if the battery connection is interrupted, the backup power supply can ensure the deployment operates normally.

Sensors, Local, Rollover, Satellite

MCU, CAN, LIN, Squib Driver IC

Application Example

Industrial Power System Protection

In industrial and automotive systems such as motor drives and power modules, compliance with IEC 61000-4-5 surge immunity is critical. 48V architectures, long cable harnesses, and harsh environments require TVS diodes with high IPP, strong avalanche capability, and proven long-term reliability.

Figure 1 shows a 48V system in which MOSFETs must withstand high transient voltages. The avalanche capability of the MOSFET body diode alone is often insufficient; an external TVS is required for reliable protection.

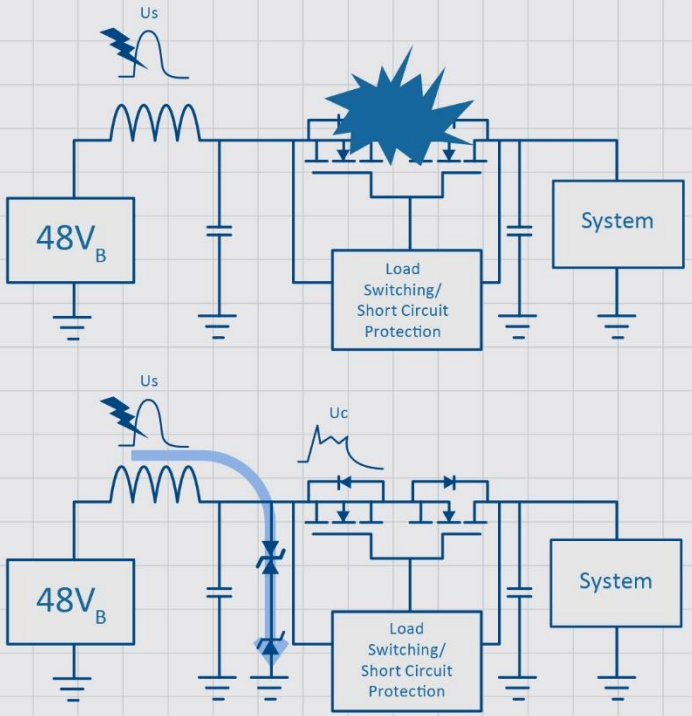


Figure 1: Super Clamp combination conventional TVS solution for 48V system

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