

# Eaton TVSA Transient voltage ESD suppressors

Eaton TVSA ESD suppressors protect against transient voltages or ESD in a host of consumer and computing applications

**Product description**

Eaton TVSA chip package ESD suppressors protect against voltage transients or ESD events in a host of consumer and computing applications such as computers, mobile phones, game controllers, cameras, power ports, and more. These devices feature low clamping voltages and ultrafast response times (<1 ns), allowing them to efficiently address a wide range of ESD events.

Eaton TVSA chip package ESD suppressors use silicon avalanche technology with two diodes in series. Silicon avalanche diodes (SADs) experience diodic avalanche breakdown at specific reverse-bias voltages. They are similar to Zener diodes as there is a transfer of electrons from the positively-doped to the negatively-doped region of the P-N barrier when the reverse-bias supply voltage exceeds the breakdown voltage.

However, unlike Zener diodes, SADs have a positive temperature coefficient (internal resistance increases as the operating temperature increases). Moreover, SADs can respond to overvoltage events without significant degradation.

Eaton's TVSA ESD suppressors are bi-directional devices; they can clamp both positive and negative voltage spikes. They come in low-profile chip packages (0201 and 0402 industry sizes), providing board savings in space-constrained applications. ESD protection ratings for both footprints are 15 kV and 8 kV for air and contact discharge respectively. Eaton's TVSA chip package ESD suppressors offer low leakage current to minimize power consumption and ultra-low capacitance (4 - 6 pF) to ensure transient voltage protection in high-speed circuits. Each product is lead-free, halogen-free, and RoHS compliant.

**Features and benefits:**

- Fast response times and low clamping voltage
- Low capacitance for protecting high-speed circuits
- Low leakage current for minimizing power consumption
- Small footprints in EIA packaging for board space savings
- Lead-free, halogen-free, and RoHS compliant for global applications

## Packaging Specifications and Benefits

Eaton TVSA chip package ESD suppressors ship in a standard tape and reel packaging with 15,000 units per reel for the 0201 footprint and 10,000 units per reel for the 0402 footprints. This packaging method allows for easy soldering and inspection.

The small footprints of the 0201 and 0402 ESD suppressors afford designers greater flexibility in component-dense or space-constrained applications. Each SMD component can be soldered directly onto a PCB via metal contacts at the bottom. Due to the small size of the solderable contacts, type 4 solder paste having smaller particle sizes is preferable, using IR reflow or wave soldering techniques (see next section).

## Soldering and Inspection

Eaton's TVSA ESD suppressors are compatible with both leaded and lead-free solder reflow processes, allowing for greater environmental regulatory compliance. Peak temperatures for reflow soldering are 260 °C max for 30 seconds max (IR soldering) and 260 °C max for 10 seconds max (wave soldering). Water-soluble flux is ideal for cleaning stray solder during component mounting, but depending on the type, can leave corrosive residue behind, so proper cleaning is required.

To test solder joint integrity after mounting, an X-ray system can be used to identify issues such as voids, open contacts, and stray solder that can cause short circuits. Additional checks should be done to ascertain adequate solder joint volume, shape, and stand-off height.

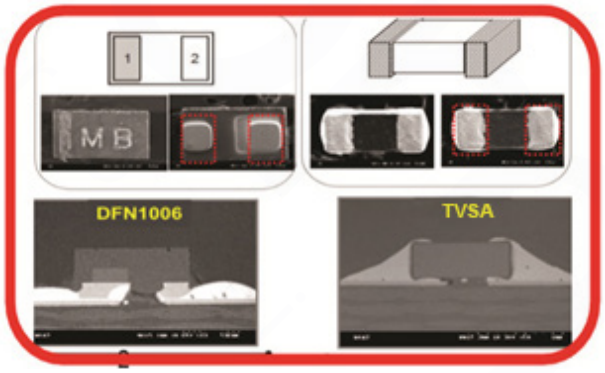
## Design considerations

For optimal protection, Eaton TVSA devices should be placed as close as possible to the signal input and ahead of any components. For more information on design considerations, please consult the technical whitepaper.

## TVSA Advantages

- Reduce solder joint inspection time and cost
- Excellent solderability
- Bi-directional protection



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