

# Eaton TVSA and TVSL TVS diodes

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

**Product description**

Eaton's TVSA and TVSL TVS diodes are ESD suppressors with working voltage ratings from 3 to 12 Vdc. They are all bi-directional and come in a passive "chip" style package. Eaton TVSA and TVSL offer cost-effective electrostatic discharge suppression in various consumer, industrial, medical, and energy applications.

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. In addition, the TVSL family has a low-capacitance option suitable for use in high-speed data applications.

These devices offer very low clamping voltages and ultrafast response times (<1 ns), allowing them to efficiently address a wide range of ESD events. Applications for Eaton's TVSA and TVSL diodes include notebook and laptops, remote control and handheld devices, set-top boxes, IoT, HVAC, and climate control, wearable devices, LED/LCD screens, pushbuttons, gaming systems, and more.

Eaton TVSA/TVSL 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 electrons transfer from the positively-doped to the negatively-doped region of the P-N barrier when the reverse-bias supply voltage exceeds the breakdown voltage. 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
- Ultra-compact, cost-effective footprint
- High reliability with ease of AOI solder inspection
- A broad range of voltages in the same size, including a low capacitance option
- Higher solder connection reliability and inspection capability with passive-type package
- Higher ESD withstand ratings in 0201 EIA size package and reverse standoff ratings up to 12 Vdc or as low as 3 Vdc
- Pad layout compatibility with DFN0603 TVS products
- Minimal/incremental cost to improve field reliability for the end user
- Lead-free, halogen-free, and RoHS-compliant for global applications

## Packaging specifications and benefits

Eaton's TVSA and TVSL chip package ESD suppressors ship in 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 are preferable, using IR reflow or wave soldering techniques (see next section).

## Soldering and nspection

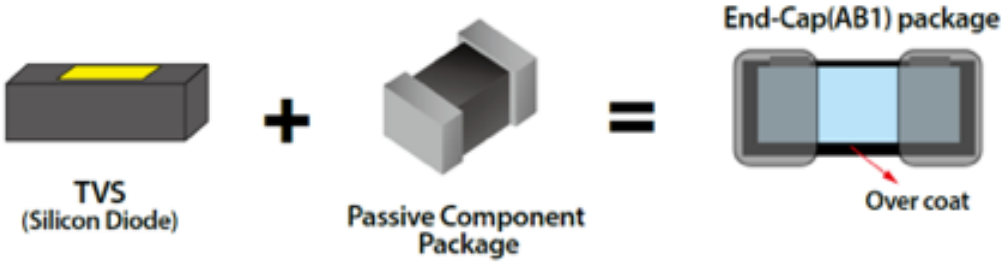
Eaton TVSA and TVSL ESD suppressors are compatible with both leaded and lead-free solder reflow processes, allowing for greater environmental regulatory compliance. Peak temperatures for reflow soldering are 260 °C max for 30 seconds max (IR soldering) and 260 °C max for 10 seconds max (wave soldering). 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

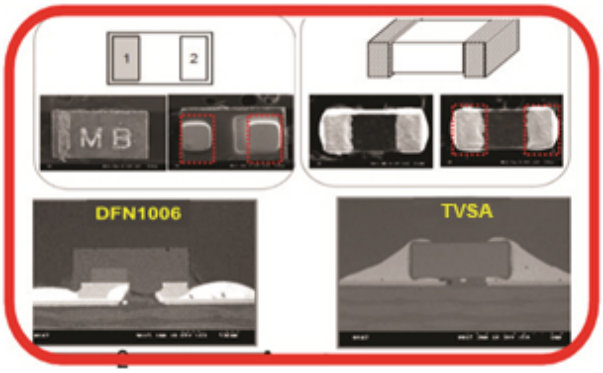
For optimal protection, Eaton TVSA and TVSL devices should be placed as close as possible to the signal input and ahead of any components. For more information on design considerations, please consult the technical whitepaper.

## TVSA/TVSL advantages

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









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