

0402ESDA-AEC

Automotive grade ESD suppressor



Product features

- AEC-Q200 qualified
- Ultra-low capacitance (0.05 pF) ideal for high speed data applications
- Provides Electro static discharge (ESD) protection with fast response time (<1 ns) allowing equipment to pass IEC 61000-4-2 Level 4 test and ISO10605.
- Single-line, bi-directional device
- Low leakage current (<0.1 nA typ.) reduces power consumption
- 0402 (1005 metric) compact design utilizes less board space

Applications

- Infotainment and telematics
 - In-vehicle infotainment (IVI) and navigation
 - Audio subsystems
 - USB and Ethernet hubs
 - Active noise cancellation (ANC)
- High speed data ports and interface
 - RF Antenna
 - Ethernet
 - USB
 - HDMI
- Automotive body electronics
 - Central body control unit
 - Vehicle access control system
- Advanced driver assistance systems
 - Rear and front view cameras
 - Automatic parking control
 - Adaptive cruise control (ACC)
- Satellite navigation systems

Ordering

- Specify part number and termination suffix (e.g. 0402ESDA-AEC1)
0402ESDA-AEC=part number,
1=Termination suffix

Termination suffixes

- 1 (Dip termination, Packaged: Tape and reel, 10 000 parts per 7" diameter reel)

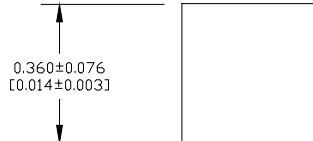
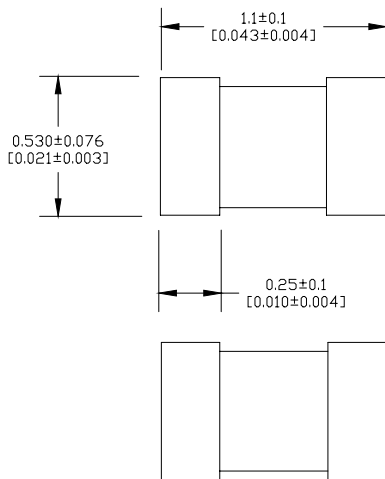
Product specifications

Part number ⁴	Rated voltage (V _{dc}) maximum	Clamping voltage ¹ (V) typical	Trigger voltage ² (V) typical	Capacitance @ 1 MHz (pF) typical	Capacitance @ 1 MHz (pF) maximum	Attenuation change (0-6 GHz) (dB) typical	Leakage current @ 12 V _{dc} (nA) typical	ESD capability IEC61000-4-2 Direct discharge (kV) typical	ESD capability IEC61000-4-2 Air discharge (kV) typical	ESD capability ISO10605 Direct discharge (kV) typical	ESD pulse withstand ³ typical
0402ESDA-AEC	30	35	300	0.05	0.15	-0.2	<0.1	12	25	8	>1000

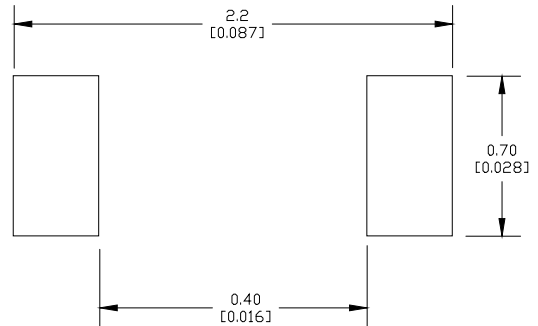
1. Clamping voltage: Per IEC61000-4-2, Level 4 waveform (8 kV direct 30 A) measured 30 ns after initial pulse.
2. Trigger voltage: Trigger measurement made using Transmission Line Pulse (TLP) method.

3. Minor shifting in characteristics may be observed over multiple ESD pulses at very rapid rate.
4. Part Number Definition: 0402ESDA-AEC
0402ESDA= Product code and size
-AEC= Form designation

Dimensions—mm [in]



Recommended Pad Layout



Design considerations

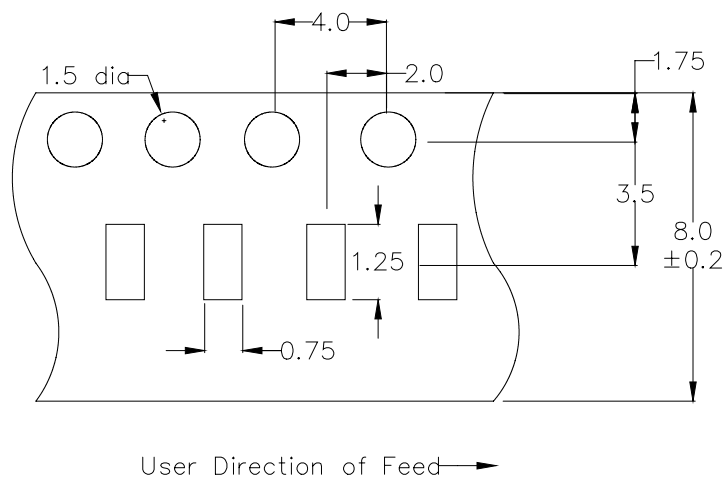
The location in the circuit for the 0402ESDA-AEC has to be carefully determined. For better performance, the device should be placed as close to the signal input as possible and ahead of any other component. Due to the high current associated with an ESD event, it is recommended to use a “0-stub” pad design (pad directly on the signal/data line and second pad directly on common ground).

Environmental data

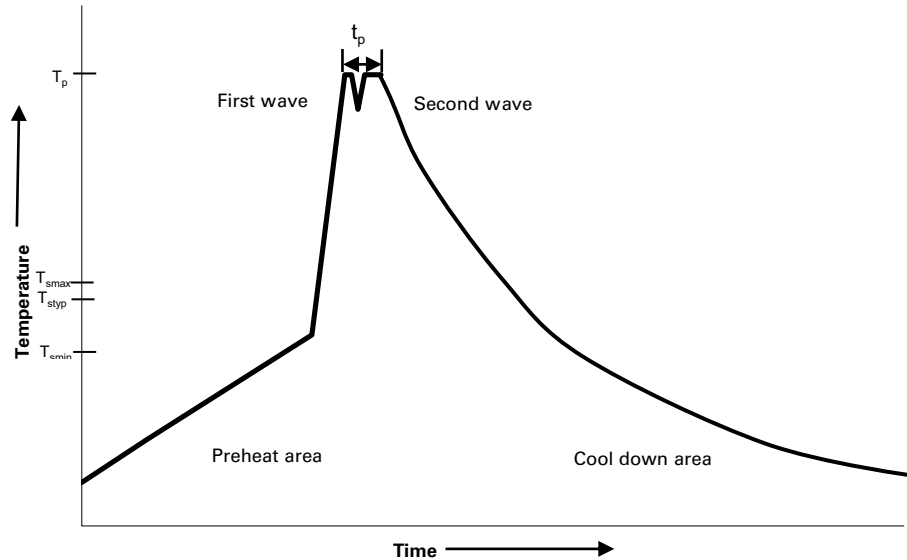
Operating temperature: - 55 °C to +125 °C	Mechanical shock: MIL-STD-202, method 213
Storage temperature (component): - 55 °C to +125 °C	Mechanical vibration: MIL-STD-202, method 204
Operational life: MIL-STD-202, method 108 (1000 hours at +125 °C, bias 85% of rated voltage)	Biased humidity: MIL-STD-202, method 103 (1000 hours at 85% RH/85 °C, 85% of rated voltage)
Temperature cycling: JESD-22, method JA-104 (-55 °C to +125 °C, 1000 cycles)	Endurance test: IEC6100-4-2 standrd ESD pulse: 8 kV contact, 1000 pulses, 1 second interval
High temperature exposure: MIL-STD-202, method 108 (1000 hours at +150 °C unpowered)	Solderability: J-STD-002, method B1

Packaging information—mm

Supplied in tape-and-reel packaging, 10,000 parts per reel, 7" diameter reel.



Wave solder profile



Reference EN 61760-1:2006

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat		
• Temperature min. (T_{smin})	100 °C	100 °C
• Temperature typ. (T_{styp})	120 °C	120 °C
• Temperature max. (T_{smax})	130 °C	130 °C
• Time (T_{smin} to T_{smax}) (t_s)	70 seconds	70 seconds
Δ preheat to max Temperature	150 °C max.	150 °C max.
Peak temperature (T_p)*	235 °C – 260 °C	250 °C – 260 °C
Time at peak temperature (t_p)	10 seconds max 5 seconds max each wave	10 seconds max 5 seconds max each wave
Ramp-down rate	~ 2 K/s min ~3.5 K/s typ ~5 K/s max	~ 2 K/s min ~3.5 K/s typ ~5 K/s max
Time 25 °C to 25 °C	4 minutes	4 minutes

Manual solder

+350 °C (4-5 seconds by soldering iron), generally manual/hand soldering is not recommended.

Solder reflow profile

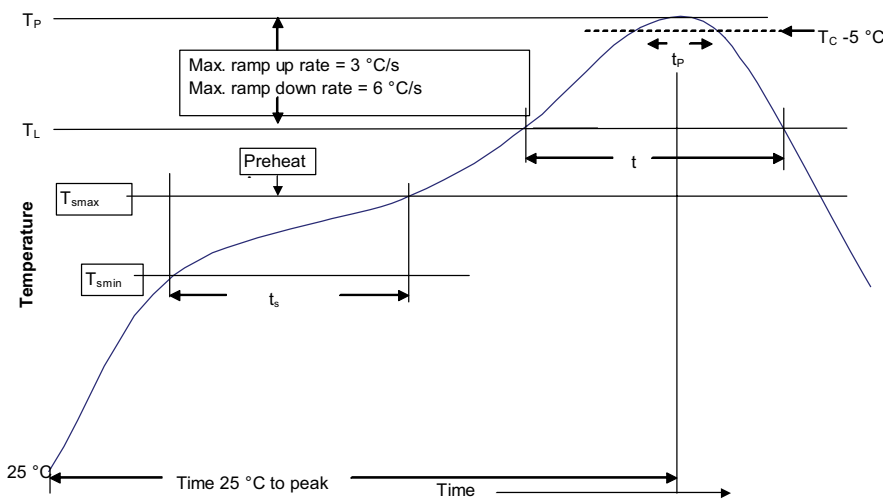


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2 - Lead (Pb) free solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ 350 - 2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Reference J-STD-020

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. (T_{smin})	100 °C	150 °C
• Temperature max. (T_{smax})	150 °C	200 °C
• Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Ramp up rate T_L to T_p	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above T_L	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)*	Table 1	Table 2
Time (t_p)* within 5 °C of the specified classification temperature (T_C)	20 seconds*	30 seconds*
Ramp-down rate (T_p to T_L)	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

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