

# 0603ESDA-AEC1

## 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
- 0603 (1608 metric) compact design utilizes less board space
- Single-line, bi-directional device
- Moisture sensitivity level (MSL): 1

### 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

### Environmental compliance



## Product specifications

Part number <sup>4</sup>	Rated voltage (V <sub>dc</sub> ) maximum	Clamping voltage <sup>1</sup> (V) typical	Trigger voltage <sup>2</sup> (V) typical	Capacitance @ 1 MHz (pF) typical	Capacitance @ 1 MHz (pF) maximum	Attenuation change (0–6 GHz) (dB) typical	Leakage current @ 12 V <sub>dc</sub> (nA) typical	ESD capability IEC61000-4-2 Direct discharge (kV) typical	ESD capability IEC61000-4-2 Air discharge (kV) typical	ESD pulse withstand <sup>3</sup> typical
0603ESDA-AEC1	30	35	300	0.05	0.15	-0.2	<1.0	8	15	>1000

1. Clamping voltage: Per IEC61000-4-2, Level 4 waveform (8 kV direct 30 A) measured 30 ns after initial pulse.

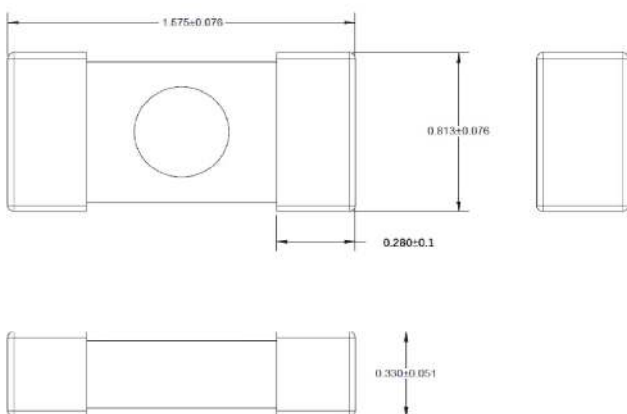
2. Trigger voltage: Trigger measurement made using transmission line pulse (TLP) method.

3. Minor shifting in characteristics may be observed over multiple ESD pulses at very rapid rate.

4. Part number definition: 0603ESDA-AEC1

0603ESDA-AEC1 Product code and size

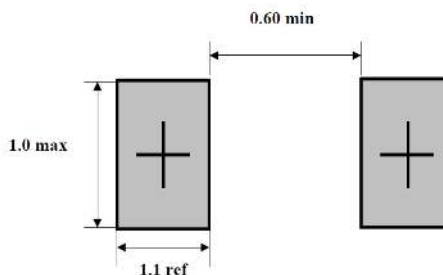
## Dimensions—mm



Part marking : No marking

Termination finish: Tin over nickel

## Recommended pad layout



## Design considerations

The location in the circuit for the 0603ESDA-AEC1 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).

## Packaging information

5,000 parts on a 7 inch tape and reel (EIA Standard 481 compliant)

## General specifications

Operating temperature: - 55 °C to +125 °C

Storage temperature (component): - 55 °C to +125 °C

Mechanical shock: MIL-STD-202 Method 213 condition F

Vibration: MIL-STD-202 Method 204 condition D

Resistance to soldering heat: MIL-STD-202 Method 210 condition B

High temperature exposure: MIL-STD-202 Method 108

Temperature cycling: JESD22 Method JA-104

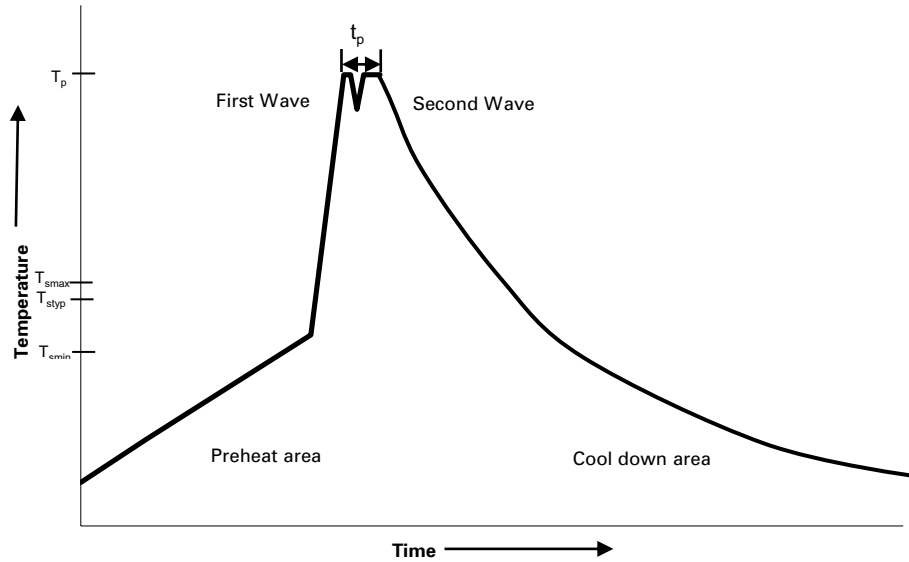
Moisture resistance: MIL-STD-202 Method 106

Biased Humidity: MIL-STD-202 Method 103

Operational Life: MIL-STD-202 Method 108

Solderability: J-STD-002

**Wave solder profile**



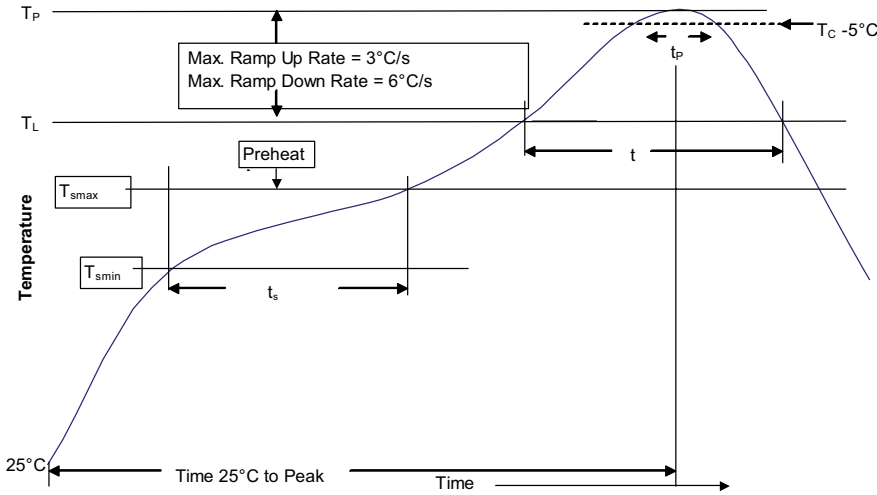
**Reference EN 61760-1:2006**

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
$\Delta$ 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 <sup>3</sup> <350	Volume mm <sup>3</sup> ≥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 <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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	<ul style="list-style-type: none"> <li>Temperature min. (<math>T_{smin}</math>)</li> <li>Temperature max. (<math>T_{smax}</math>)</li> <li>Time (<math>T_{smin}</math> to <math>T_{smax}</math>) (<math>t_s</math>)</li> </ul>	<ul style="list-style-type: none"> <li>100 °C</li> <li>150 °C</li> <li>60-120 seconds</li> </ul>
Ramp up rate $T_L$ to $T_p$	3 °C/ second max.	3 °C/ second max.
Liquidous temperature ( $T_L$ ) Time ( $t_L$ ) maintained above $T_L$	<ul style="list-style-type: none"> <li>183 °C</li> <li>60-150 seconds</li> </ul>	<ul style="list-style-type: none"> <li>217 °C</li> <li>60-150 seconds</li> </ul>
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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