

**SOD-323 Single Line TVS Diode for ESD Protection**

**Description**

TVS diodes are designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and PDA's. They offer superior electrical characteristics such as lower clamping voltage and no device degradation when compared to MLVs.

The UMD24L-323 is a Uni-Directional TVS that feature an ultra low capacitance, fast switching compensation diode in series with a standard TVS diode. This effectively reduces the overall capacitance of the device to less than 0.9pF making it an integrated, low capacitance solution for use on high-speed interface. The SOD-323 is a very small package which allows space saving on high density printed circuit board and also gives the designer the flexibility to protect one line in applications where arrays are not practical.

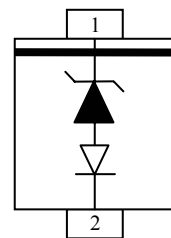
**Features**

- \* Solid-state silicon avalanche technology
- \* SOD-323 package
- \* Uni-Directional protection
- \* Protects one I/O or Power line
- \* 700 Watts peak pulse power (tp = 8/20µs)
- \* Working voltage: 24V
- \* Low input capacitance 0.85pF typical
- \* Low leakage current
- \* Full RoHS compliance
- \* Complies with the following standards:
  - IEC 61000-4-2 (ESD) Air-15kv, Contact-8kv
  - IEC 61000-4-4 (EFT) (5/50ns)
  - IEC 61000-4-5 (Surge) (8/20µs)

**Ultra Low Capacitance TVS**



**SOD-323 Pin Configuration**



<u>Pin</u>	<u>Description</u>
1	Cathode
2	Anode

**Mechanical Characteristics**

- \* Molded SOD-323 package
- \* Weight 5 milligrams (Approximate)
- \* Available in Lead-Free Pure-Tin Plating
- \* Solder Reflow Temp: Pure-Tin (Sn), 260-270°C
- \* Consult Factory for Leaded Device Availability
- \* Flammability Rating UL 94V-0
- \* 8mm Tape and Reel per EIA Standard 481
- \* Device Marking: Marking Code,  
Pin one defined by Polarity Band

**Applications**

- \* Cellular Handset Antenna
- \* PDA Antenna
- \* Power over Ethernet (PoE)
- \* Power Line Communication (PLC)
- \* Set Top Boxes and Digital TV



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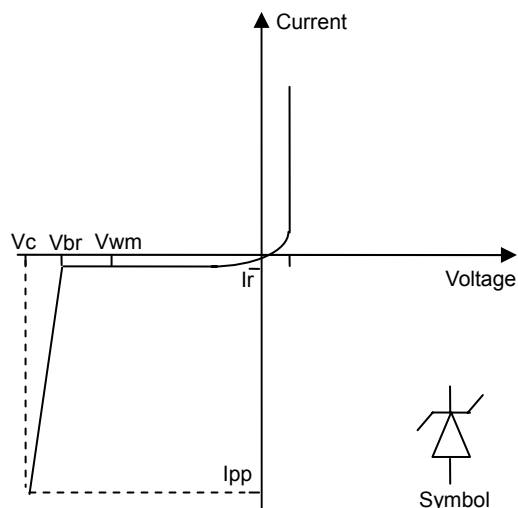
**Absolute Maximum Ratings @ 25°C unless otherwise specified**

Parameter	Symbol	Value	Units
Peak Pulse Power; pulse waveform = 8/20µs	P <sub>pp</sub>	700	W
Peak Pulse Current; pulse waveform = 8/20µs	I <sub>pp</sub>	15	A
ESD per IEC 61000-4-2 (Air)	V <sub>pp</sub>	±15	kV
ESD per IEC 61000-4-2 (Contact)		±8	
Operating Temperature	T <sub>j</sub>	-55 to 125	°C
Storage Temperature	T <sub>stg</sub>	-55 to 150	°C

**Electrical Characteristics @ 25°C unless otherwise specified**

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Stand-off Voltage	V <sub>wm</sub>				24.0	V
Breakdown Voltage	V <sub>br</sub>	I <sub>t</sub> =1mA	26.7	30.9		V
Leakage Current	I <sub>r</sub>	V <sub>wm</sub> =24V, T=25°C		0.1	1	µA
Clamping Voltage	V <sub>c</sub>	I <sub>pp</sub> =1A T <sub>p</sub> =8/20µs		32.2		V
Clamping Voltage	V <sub>c</sub>	I <sub>pp</sub> =15A T <sub>p</sub> =8/20µs		47.6		V
Peak Pulse Current	I <sub>pp</sub>	T <sub>p</sub> =8/20µs			15	A
Junction Capacitance	C <sub>j</sub>	V <sub>r</sub> =0V, f=1MHz		0.85	0.90	pF

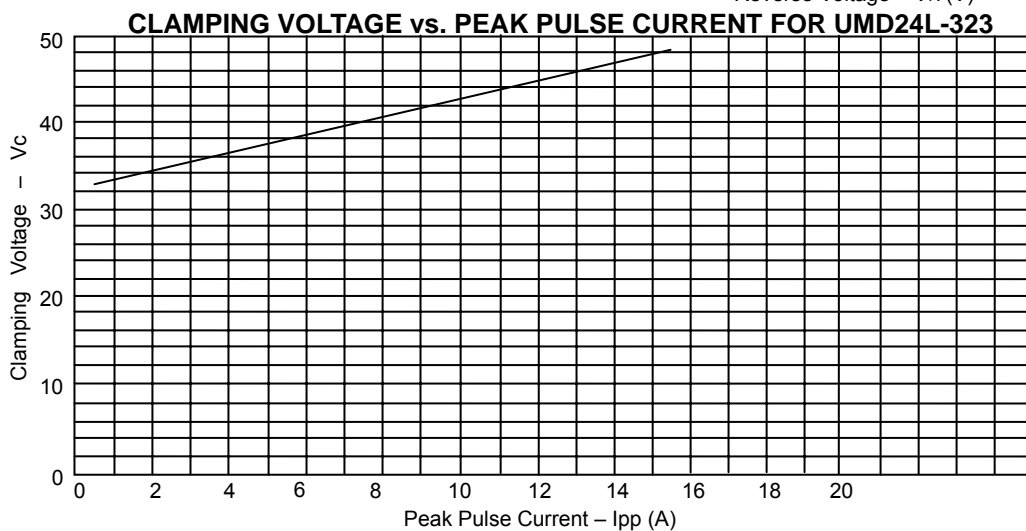
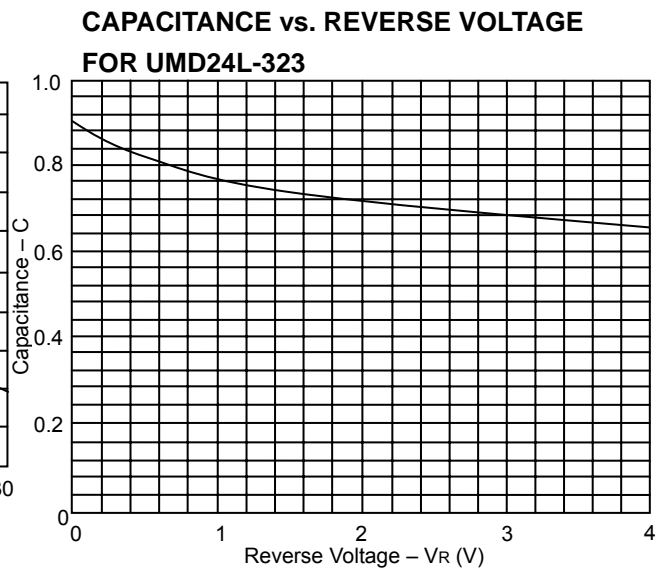
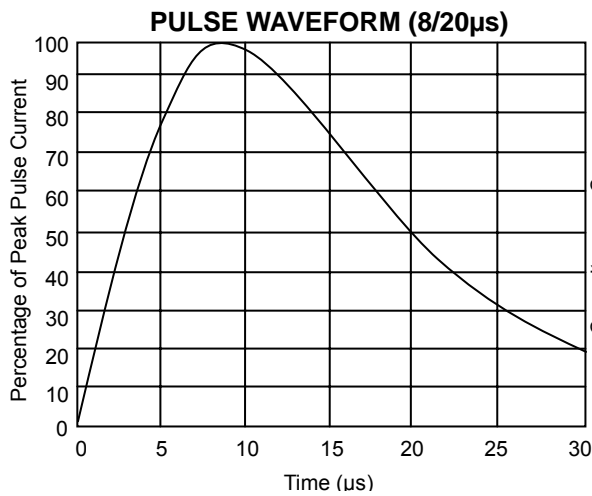
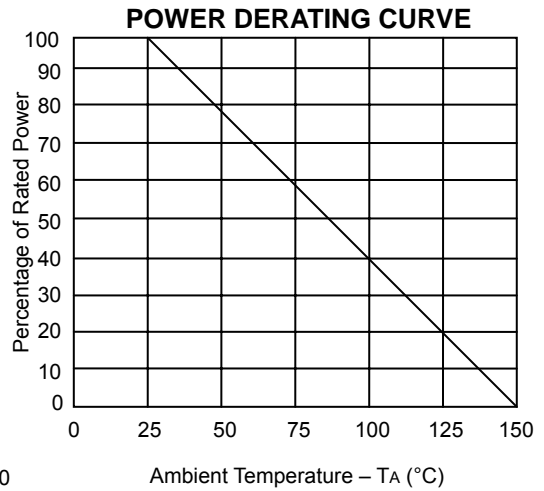
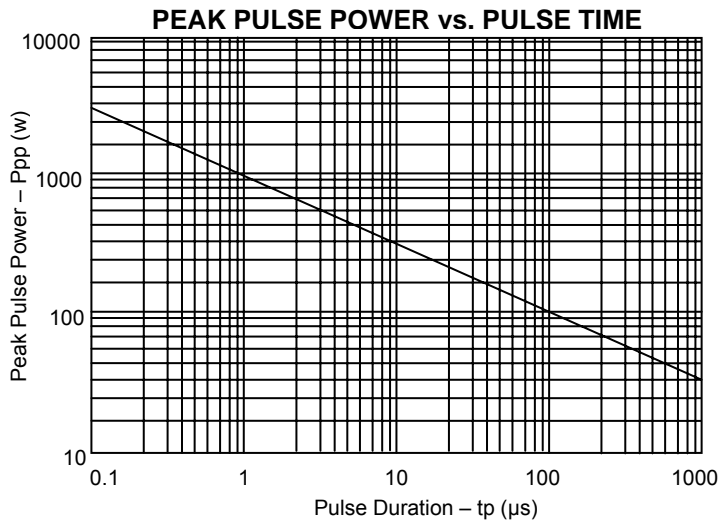
**Uni-Directional Protection**





SOD-323 Single Line TVS Diode for ESD Protection

Electrical Characteristics Graphs



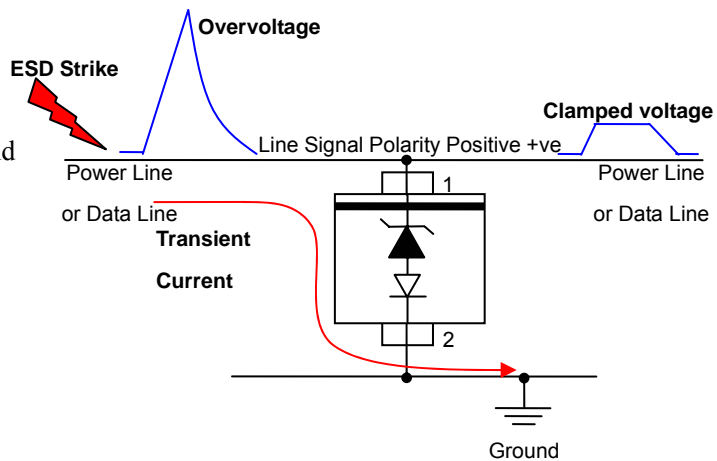
**SOD-323 Single Line TVS Diode for ESD Protection**

**Applications Information**

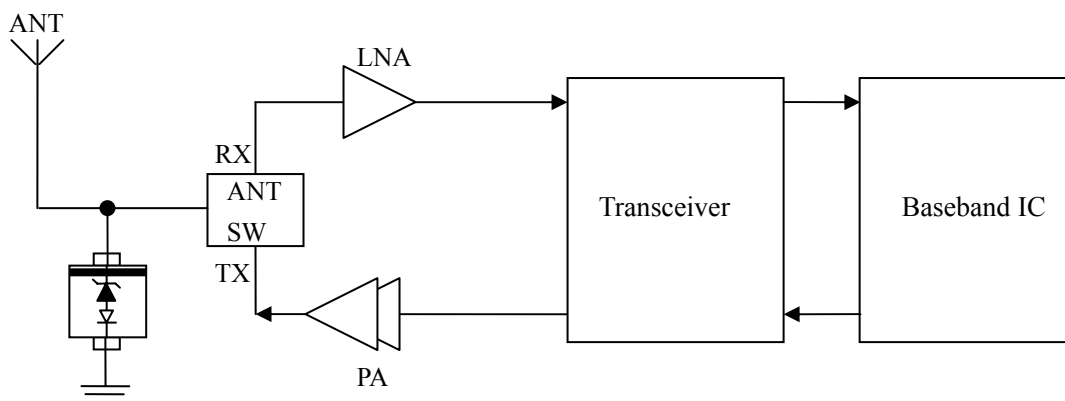
The UMD24L-323 is designed to protect one data or power supply line. The device is Uni-directional and may be used on lines where the signal polarity is above ground. The cathode pin should be placed towards the line that is to be protected.

Circuit connectivity is as follows:

- Line 1 is connected to Pin 1
- Pin 2 is connected to Ground

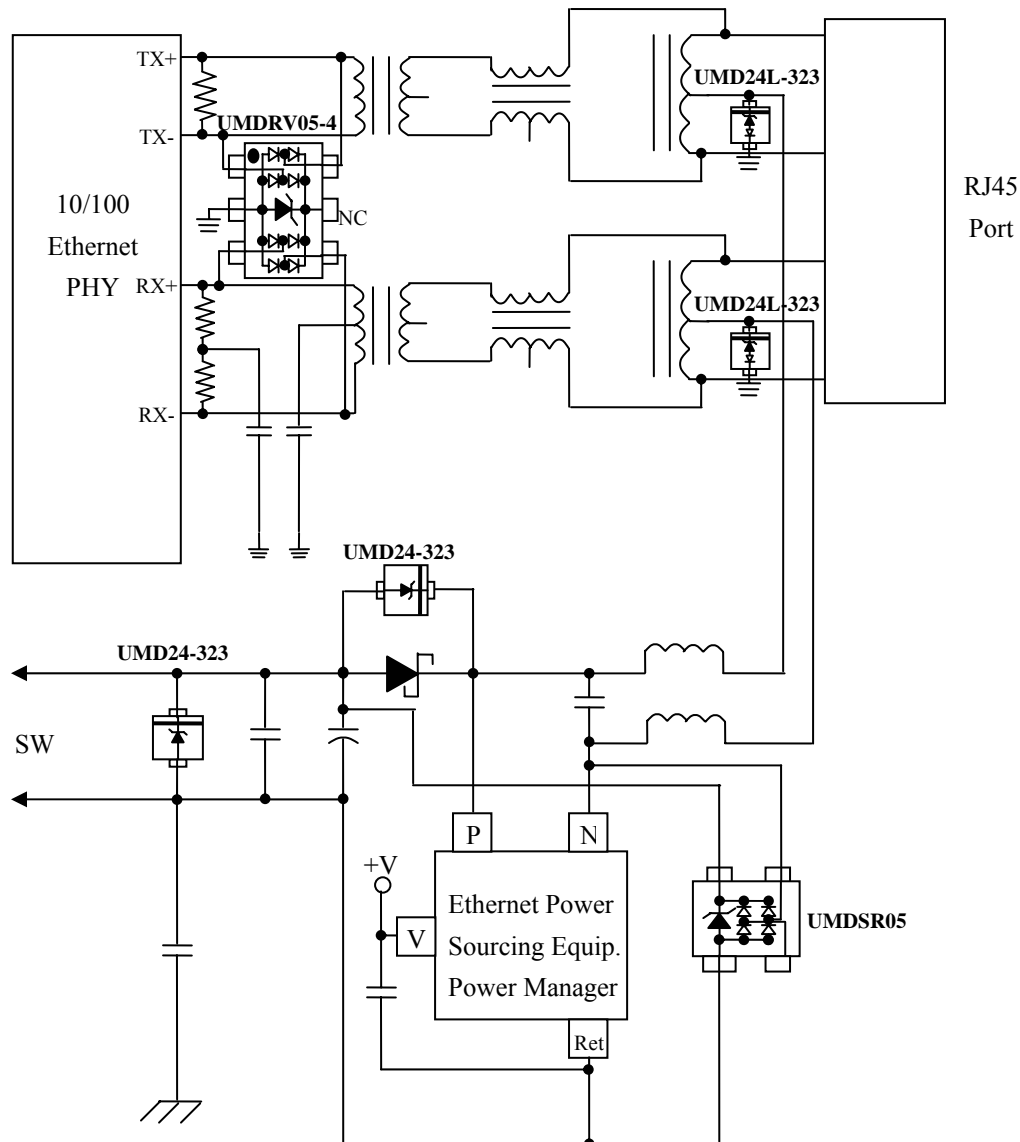


**UMD24L-323 on Antenna Application**



**SOD-323 Single Line TVS Diode for ESD Protection**

**UMD24L-323 on PoE Application**



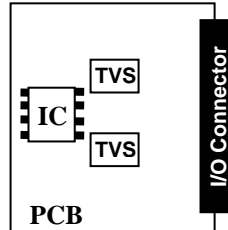
**SOD-323 Single Line TVS Diode for ESD Protection**

**Circuit Board Layout Recommendations**

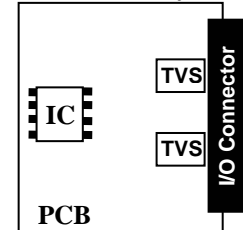
Good circuit board layout is critical for creating an effective surge suppression circuit. The following PCB guidelines are recommended to enhance the performance of a TVS device:

- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- The ESD transient return path to ground should be kept as short as possible.
- Place a TVS and decoupling capacitor between power and ground of components that may be vulnerable to electrostatic discharges to the ground plane.
- Minimize all conductive loops including power and ground loops.
- Use multilayer boards when possible.
- Minimize interconnecting line lengths.
- Never run critical signals near board edges.
- Fill unused portions of the PCB with ground plane.

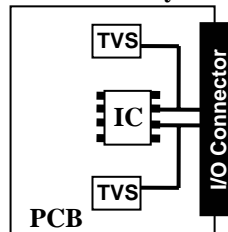
**Poor PCB Layout**



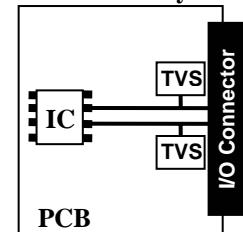
**Good PCB Layout**



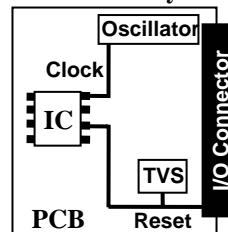
**Poor PCB Layout**



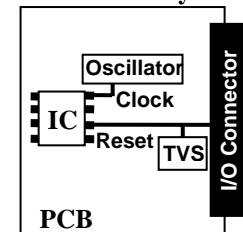
**Good PCB Layout**



**Poor PCB Layout**



**Good PCB Layout**



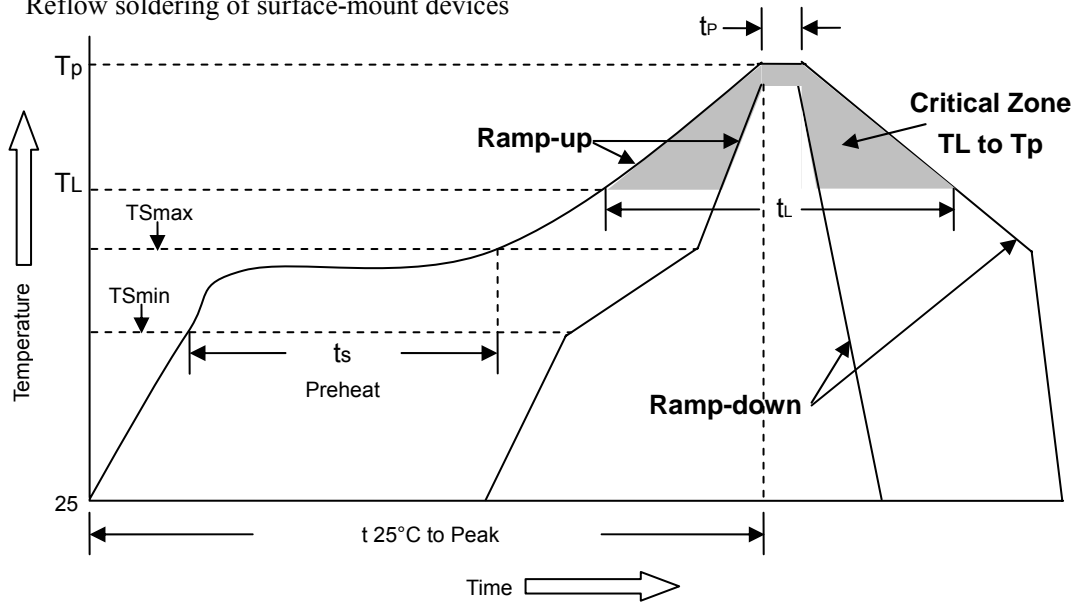
**Matte Tin Lead Finish**

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. Unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation to solder joint.

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**Soldering Method for UMD's Products**

1. Storage environment: Temperature = 10°C~35°C Humidity = 65%±15%
2. Reflow soldering of surface-mount devices



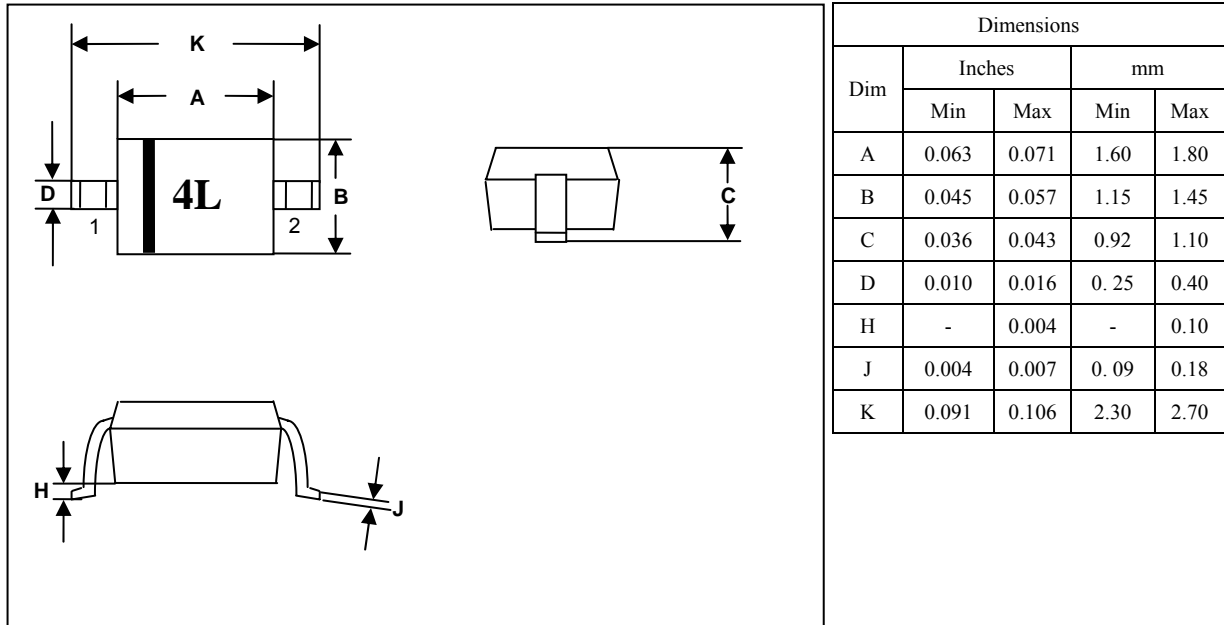
Profile Feature	Pb-Free Assembly
Average ramp-up rate (TL to TP)	<3°C/sec
Preheat	
- Temperature Min (TSmin)	150°C
- Temperature Max (TSmax)	200°C
- Time (min to max) (ts)	60~180sec
TSmax to TL	
- Ramp-up Rate	<3°C/sec
Time maintained above:	
- Temperature (TL)	220°C
- Time (tL)	50~145sec
Peak Temperature (Tp)	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (tp)	20~40sec
Ramp-down Rate	<6°C/sec
Time 25°C to peak Temperature	<8 minutes

Flow (wave) soldering (solder dipping)

Products	Dipping time
Pb devices	5sec±1sec
Pb-Free devices	5sec±1sec

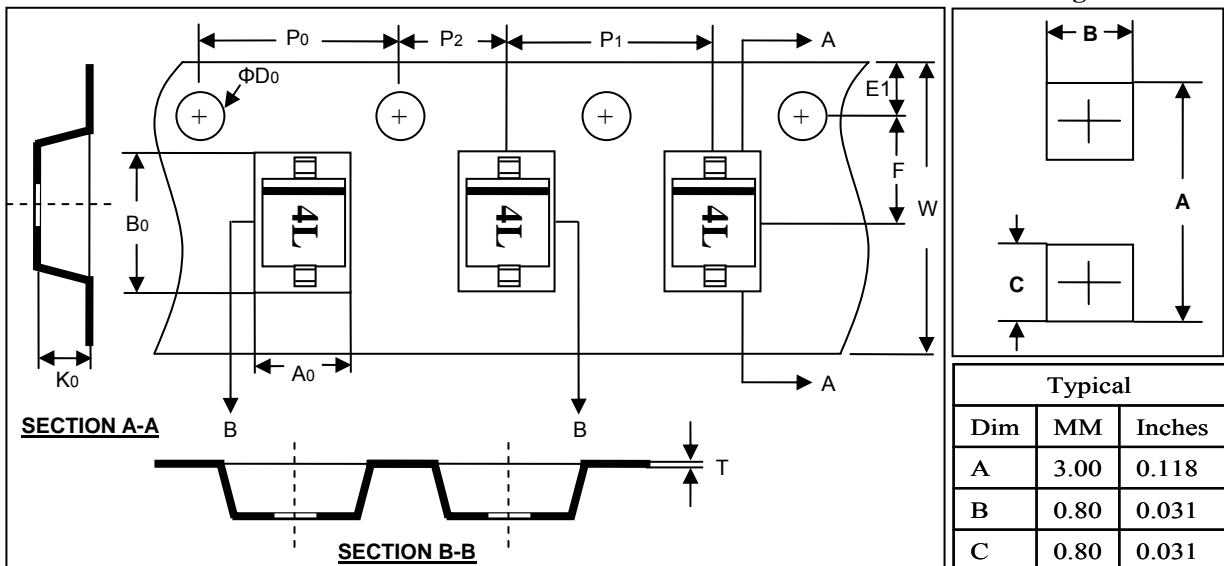
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**SOD-323 Dimension Drawing**



**SOD-323 Carrier Dimension**

**Mounting Pattern**



Dimensions in mm.

Reel Dia.	Tape Width	A0	B0	K0	ΦD0	E1
178mm (7")	8mm	1.55±0.10	2.90±0.10	1.35±0.10	1.50±0.10	1.75±0.10
F	W	P0	P2	P1	T	
3.50±0.05	8.00±0.30	4.00±0.10	2.00±0.05	4.00±0.10	0.25	



**SOD-323 Single Line TVS Diode for ESD Protection**

**Marking Code**

Part Number	Device Marking
UMD24L-323	4L

**Ordering Information**

Part Number	Lead Finish	Qty Per Reel	Reel Size
UMD24L-323	Pb-Free	3,000	7 inch

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