

SOD-323 Single Line TVS Diode for ESD Protection
Description

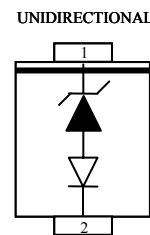
TVS diodes are designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and PDA's. They offer superior electrical characteristics such as lower clamping voltage and no device degradation when compared to MLVs.

The UMD05L-323 is a Uni-Directional TVS that feature a 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 3pF making it an integrated, low capacitance solution for use on high-speed interfaces. The SOD-323 is a very small package which allows 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 High Speed data line
- * 150 Watts peak pulse power ($t_p = 8/20\mu s$)
- * Working voltage: 5V
- * Low Capacitance: 3pF
- * Low clamping factor V_{cl}/V_{br}
- * Low leakage current
- * 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) (8/20 μs)

Low Capacitance TVS

SOD-323 Pin Configuration


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

Mechanical Characteristics

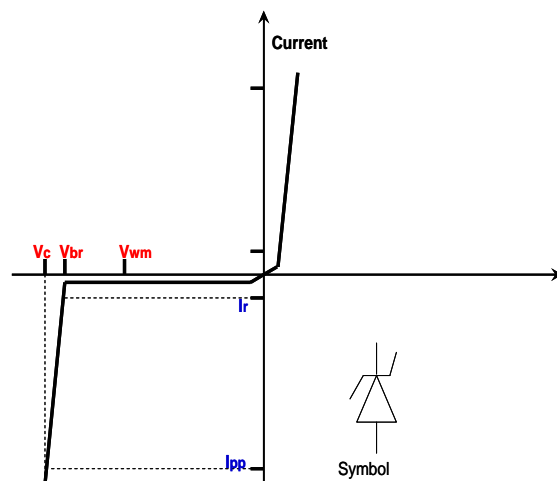
- * Molded JEDEC SOD-323 package
- * Weight 5 milligrams (Approximate)
- * Available in Lead-Free Pure-Tin Plating
- * Solder Reflow Temp.: Pure-Tin (Sn), 260-270°C
- * Consult Factory for Leaded Device Availability
- * Flammability Rating UL 94V-0
- * 8mm Tape and Reel per EIA Standard 481
- * Device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

Applications

- * Cellular Handset
- * PDA
- * High Speed Data Line
- * WAN/LAN Equipment
- * USB Port Protection

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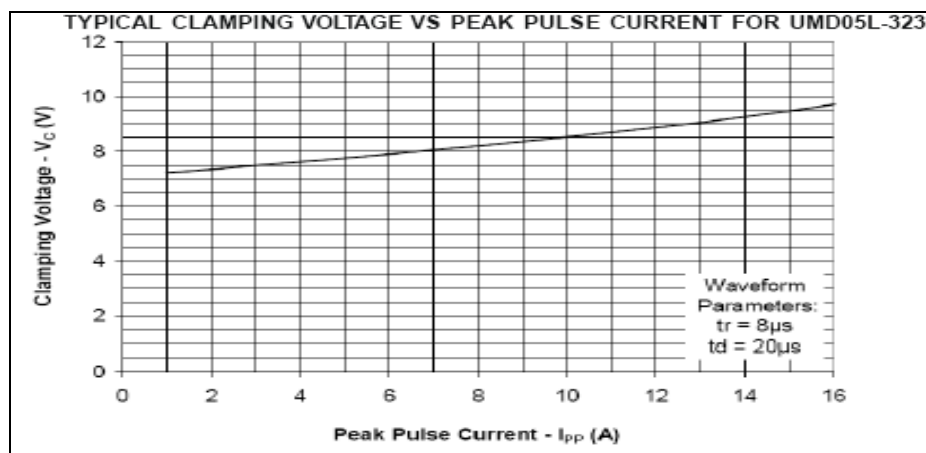
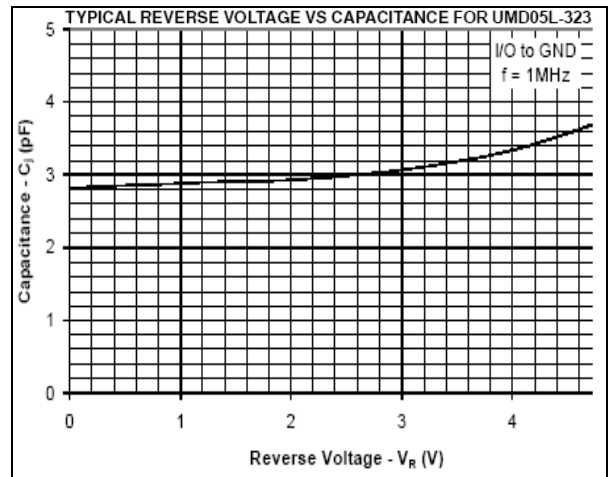
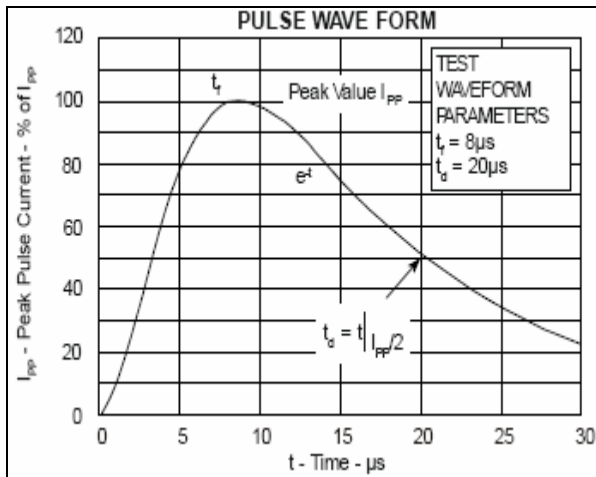
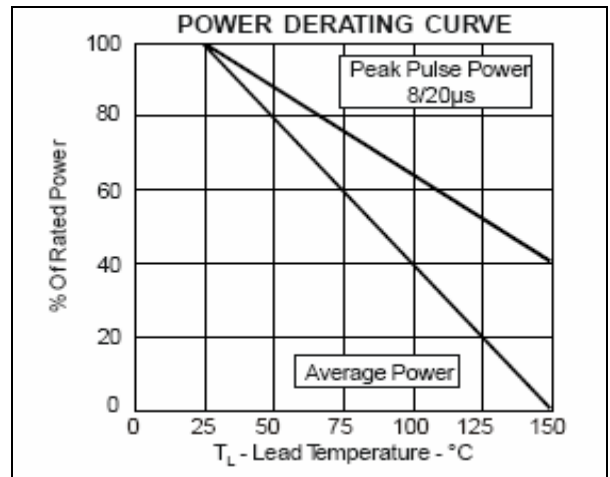
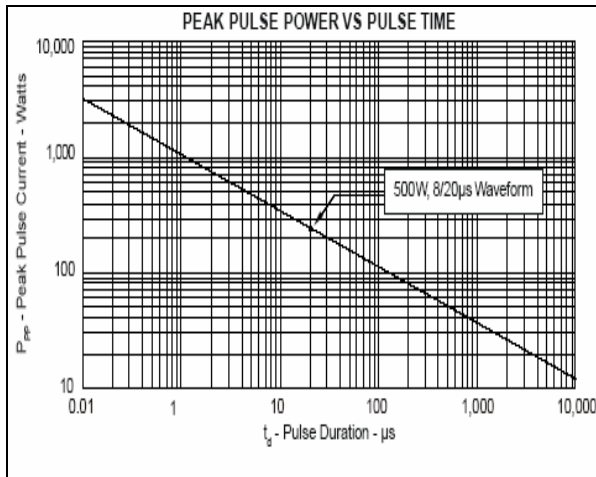
Absolute Maximum Ratings @ 25°C unless otherwise specified			
Parameter	Symbol	Value	Units
Peak Pulse Power; pulse waveform = 8/20μs	P _{pp}	150	W
Peak Pulse Current; pulse waveform = 8/20μs	I _{pp}	12	A
ESD per IEC 61000-4-2 (Air)	V _{pp}	±20	kV
ESD per IEC 61000-4-2 (Contact)		±15	
Operating Temperature	T _j	-55 to 125	°C
Storage Temperature	T _{stg}	-55 to 150	°C

Uni-Directional Protection


Electrical Characteristics @ 25°C unless otherwise specified						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Stand-off Voltage	V _{wm}				5.0	V
Breakdown Voltage	V _{br}	I _t =1mA	6.0			V
Leakage Current	I _r	V _{wm} =5V, T=25°C			1	μA
Clamping Voltage	V _c	I _{pp} =1A, T _p =8/20μs			8.2	V
Clamping Voltage	V _c	I _{pp} =12A, T _p =8/20μs			14	V
Peak Pulse Current	I _{pp}	T _p =8/20μs			12	A
Junction Capacitance	C _j	V _r =0V, f=1MHz		3		pF

SOD-323 Single Line TVS Diode for ESD Protection

Electrical Characteristics Graphs

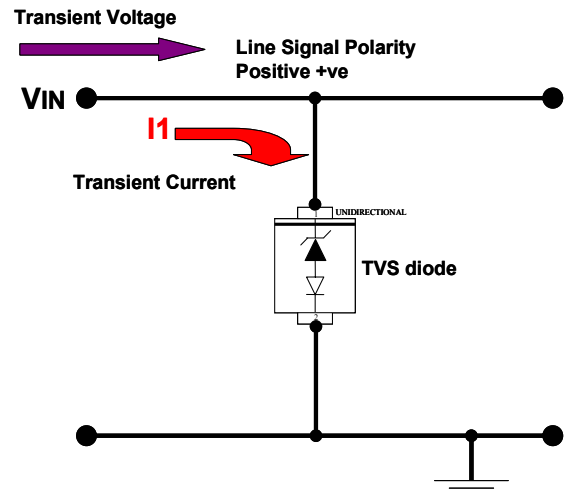


SOD-323 Single Line TVS Diode for ESD Protection

Applications Information

The UMD05L-323 is designed to protect high speed data line. The Device is Uni-Directional and may be used on lines where the signal polarity is above ground. The cathode band should be placed towards the line that is to be protected.

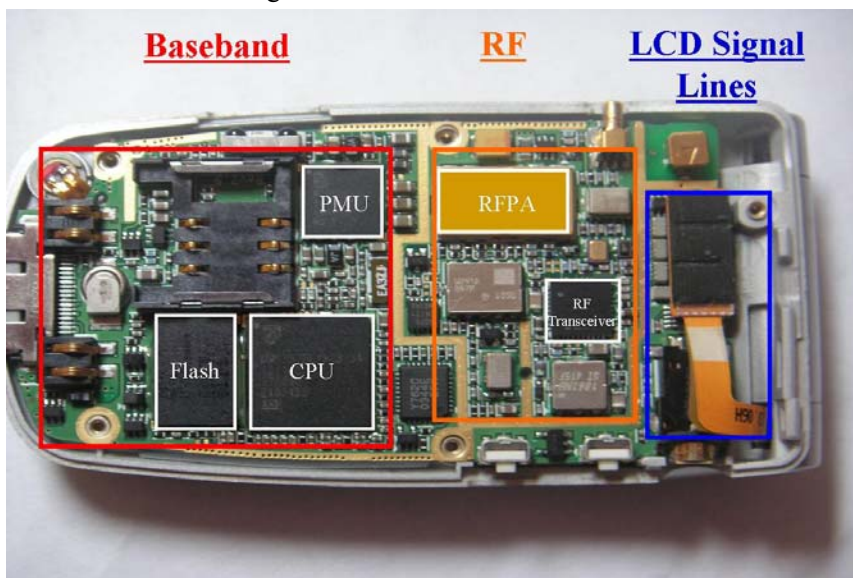
UMD05L-323 utilizes a low capacitance compensation diode in series with, but in opposite polarity to a TVS diode to achieve an effective capacitance of less than 3pF.



Mobile Handset

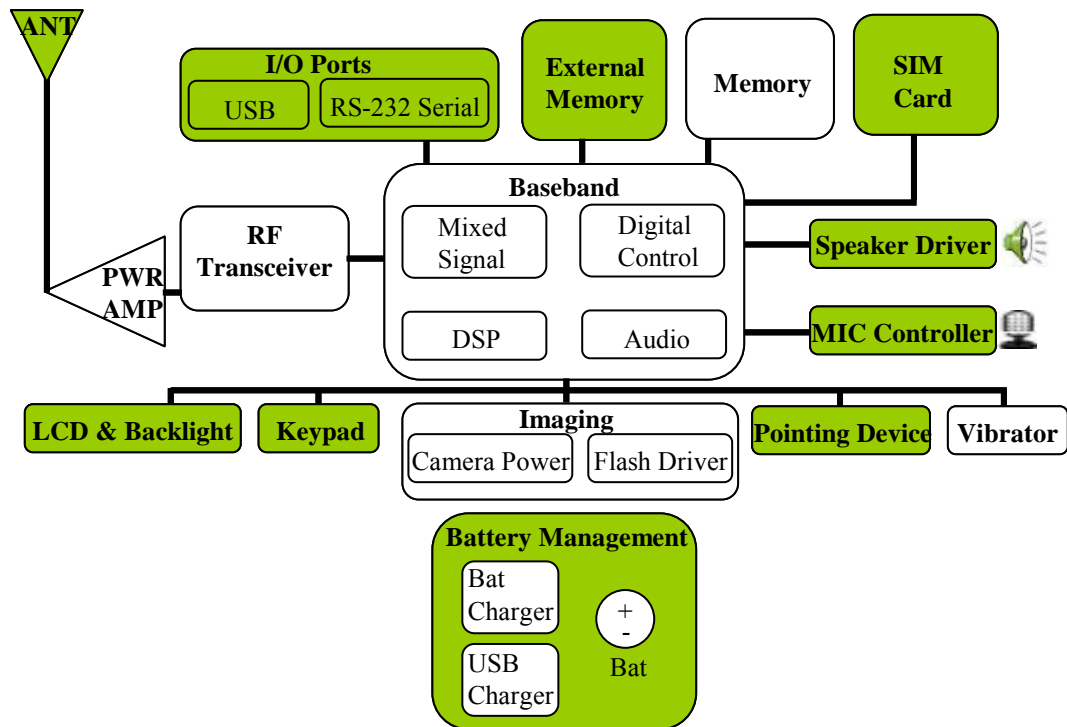
Main Parts in Mobile Phone

- Baseband
 - ❖ Central Processing Unit (CPU)
 - ❖ Power Management Unit (PMU)
 - ❖ Flash IC
- RF Module
 - ❖ RF Transceiver
 - ❖ RF Power Amplifier
- LCD & Backlight

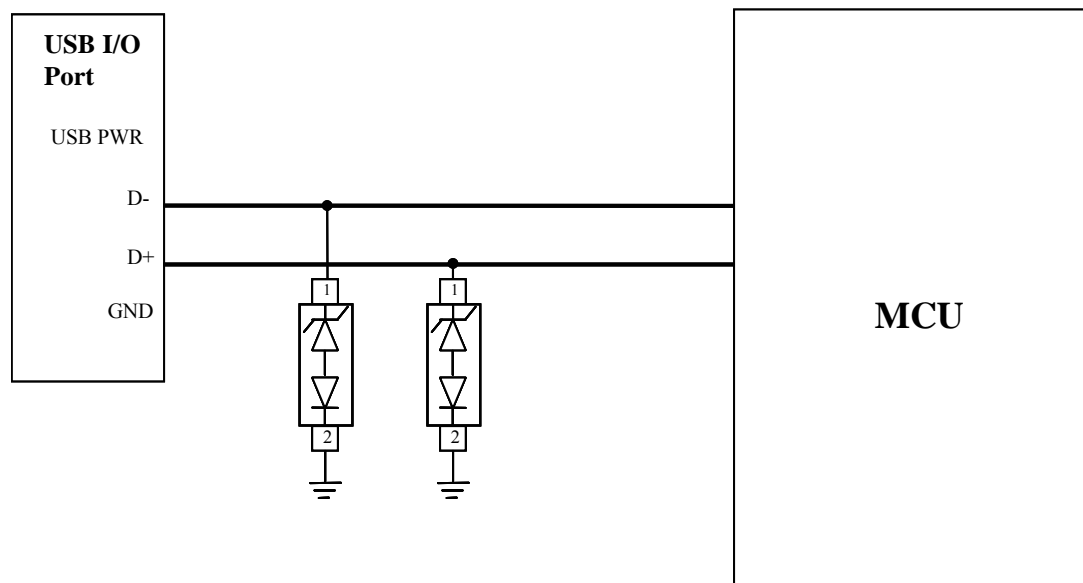


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Areas That Require ESD Protection



UMD05L-323 on USB Port Protection Application



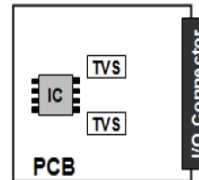
SOD-323 Single Line TVS Diode for ESD Protection

Circuit Board Layout Recommendations

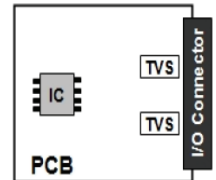
Good circuit board layout is critical for the suppression of fast rise-time transients such as ESD. The following guidelines are recommended:

- 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.

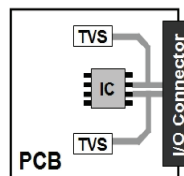
Poor PCB Layout



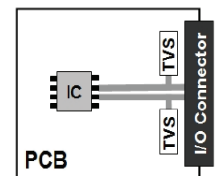
Good PCB Layout



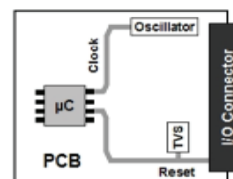
Poor PCB Layout



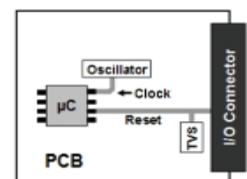
Good PCB Layout



Poor PCB Layout



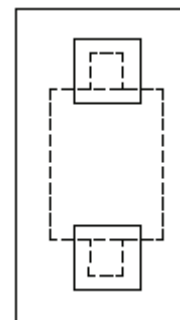
Good PCB Layout



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 lead 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 fluxes that can cause degradation to solder joint.

Component Placement

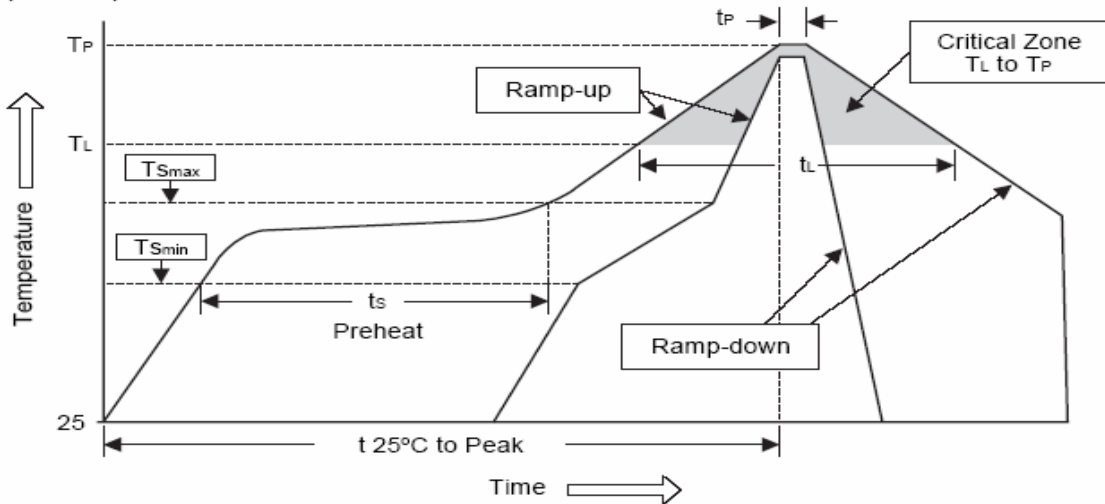


SOD-323 on recommended (SOD-323) Solder Pad.

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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

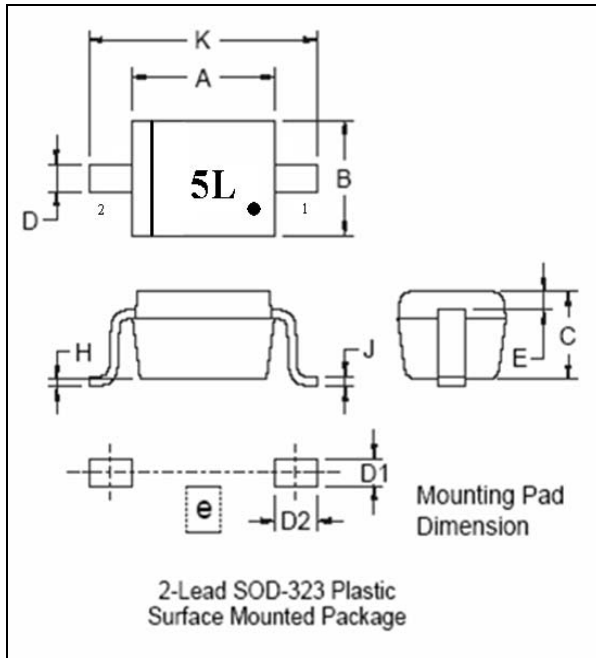
Temperature profile



Profile Feature	Pb-Free Assembly
Average ramp-up rate (T _L to T _P)	<3°C/sec
Preheat <ul style="list-style-type: none"> - Temperature Min (T_{Smin}) - Temperature Max (T_{Smax}) - Time (min to max) (t_s) 	150°C 200°C 60~180sec
T _{Smax} to T _L <ul style="list-style-type: none"> - Ramp-up Rate 	<3°C/sec
Time maintained above: <ul style="list-style-type: none"> - Temperature (T_L) - Time (t_L) 	220°C 50~145sec
Peak Temperature (T _P)	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t _P)	20~40sec
Ramp-down Rate	<6°C/sec
Time 25°C to peak Temperature	<8 minutes

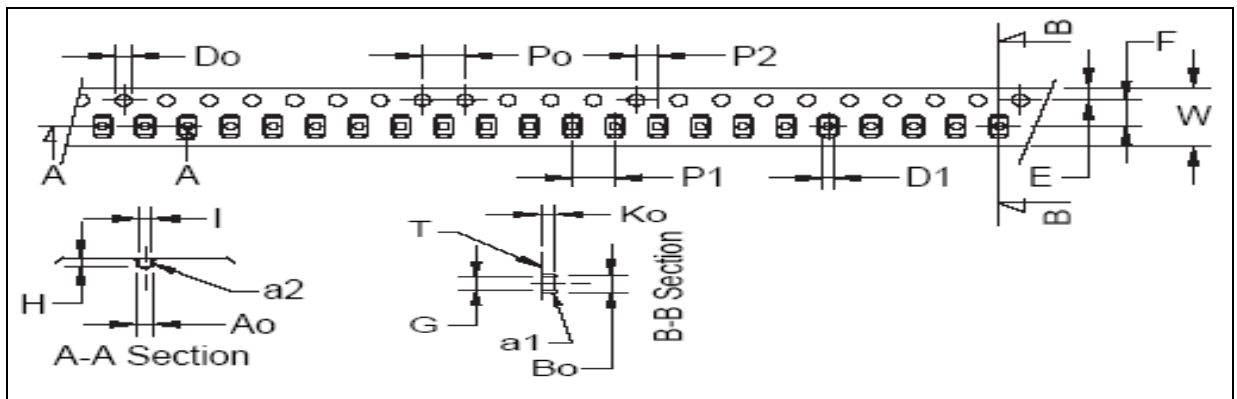
Flow (wave) soldering (solder dipping)

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

SOD-323 Single Line TVS Diode for ESD Protection
SOD-323 Dimension Drawing


*: Typical

Dim	Dimensions			
	Inches		mm	
	Min	Max	Min	Max
A	0.063	0.071	1.60	1.80
B	0.045	0.057	1.15	1.45
C	0.031	0.039	0.80	1.00
D	0.010	0.016	0.25	0.40
D1	-	*0.016	-	*0.4
D2	- *	0.02	-	*0.5
E	0.06	-	0.15	-
e	-	*0.087	-	*2.20
H	-	0.004	-	0.10
J	0.004	0.007	0.089	0.18
K	0.091	0.106	2.30	2.70

SOD-323 Carrier Dimension


Dim	Min Inch	Max Inch	Min mm	Max mm	Dim	Min Inch	Max Inch	Min mm	Max mm
A0	0.056	0.064	1.42	1.62	D0	0.055	0.063	1.40	1.60
B0	0.110	0.118	2.80	3.00	D1	0.030	0.049	0.75	1.25
K0	0.049	0.057	1.25	1.45	W	0.311	0.327	7.90	8.30
P0	0.154	0.161	3.90	4.10	G	-	*0.082	-	*2.08
P1	0.154	0.161	3.90	4.10	H	-	*0.042	-	*1.07
P2	0.077	0.081	1.95	2.05	I	-	*0.033	-	*0.84
T	0.009	0.011	0.24	0.27	a1	-	5°	-	5°
E	0.065	0.073	1.65	1.85	a2	-	8°	-	8°
F	0.136	0.140	3.45	3.55	*: Typical				



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Marking Code

Part Number	Device Marking
UMD05L-323	5L

Ordering Information

Part Number	Lead Finish	Qty Per Reel	Reel Size
UMD05L-323	Pb-Free	3,000	7 inch

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