



UNITED MICRO DEVICE INC.

UMD05-323

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 UMD05-323 is a Uni-Directional TVS that is designed to provide high overvoltage protection by clamping action and have instantaneous response to transient overvoltages. 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.

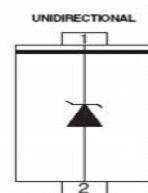
Features

- * Solid-state silicon-avalanche technology
- * SOD-323 package
- * Uni-Directional protection
- * Protects one I/O or Power line
- * 500 Watts peak pulse power ($t_p = 8/20\mu s$)
- * Working voltage: 5V
- * 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) 40A (5/50ns)
 - IEC 61000-4-5 (Surge) 24A (8/20 μs)

High-Power Surge 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

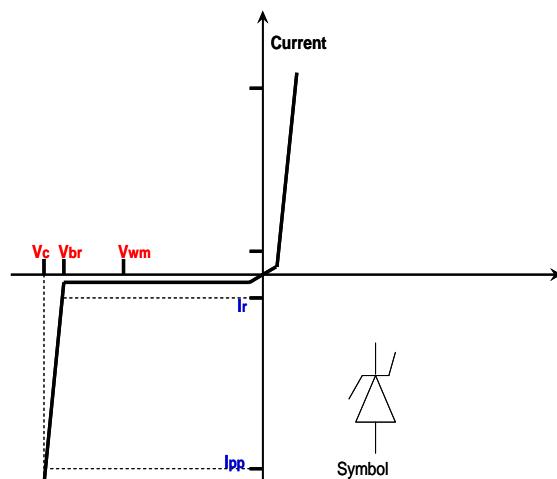
Applications

- * Cellular Handset
- * PDA
- * Notebook
- * Digital Camera
- * WiFi Phone

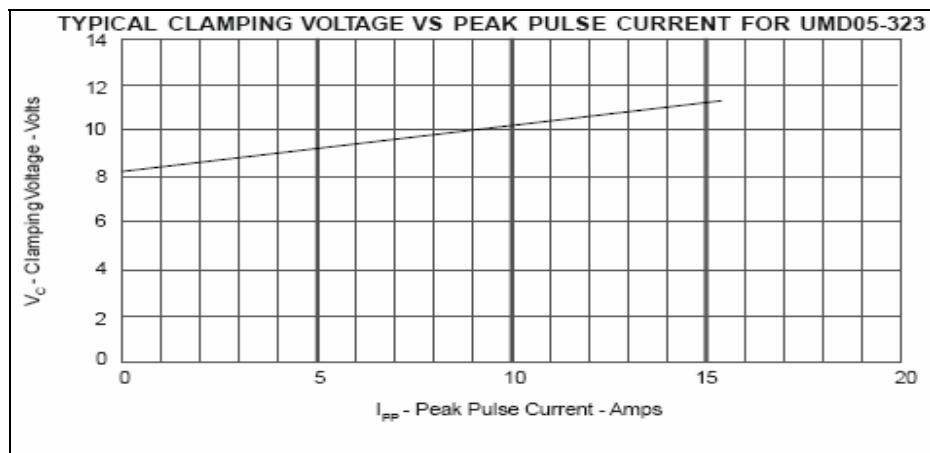
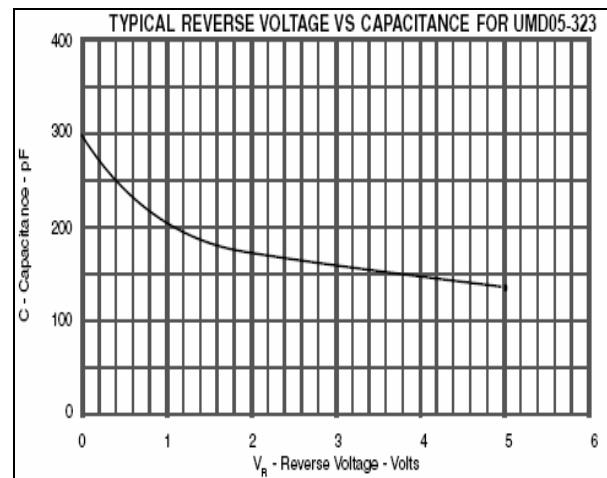
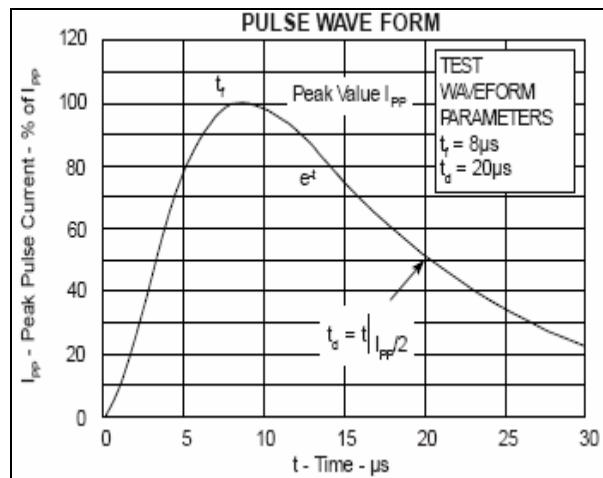
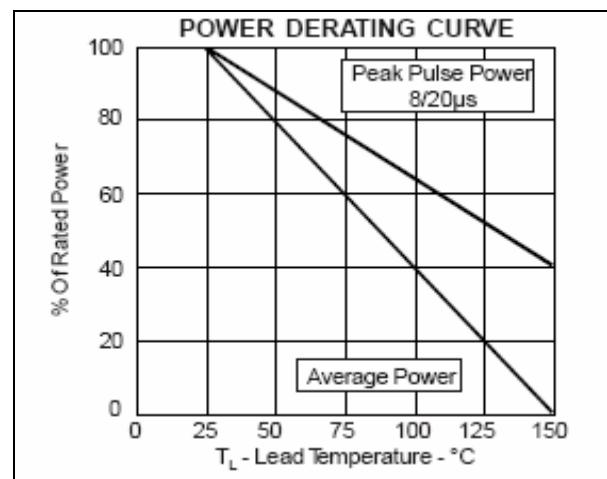
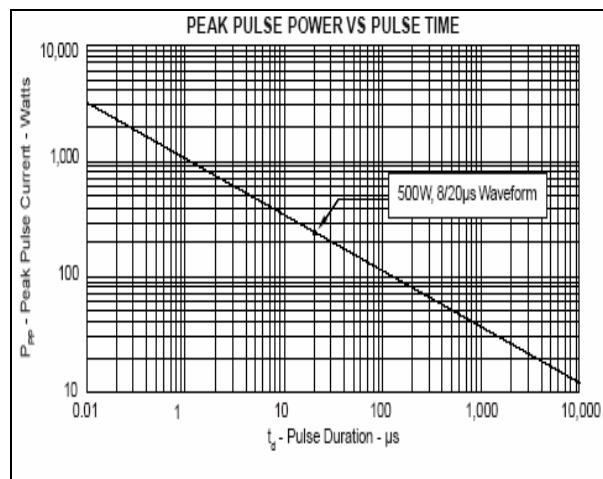
SOD-323 Single Line TVS Diode for ESD Protection
Absolute Maximum Ratings @ 25°C unless otherwise specified

Parameter	Symbol	Value	Units
Peak Pulse Power; pulse waveform = 8/20 μ s	P _{pp}	500	W
Peak Pulse Current; pulse waveform = 8/20 μ s	I _{pp}	42	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 150	°C
Storage Temperature	T _{stg}	-55 to 150	°C

Note: For a surge greater than maximum values, the diode will fail in short-circuit.

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			10	μA
Clamping Voltage	V _c	I _{pp} =1A, T _p =8/20 μ s			9.8	V
Clamping Voltage	V _c	I _{pp} =42A, T _p =8/20 μ s			13.5	V
Peak Pulse Current	I _{pp}	T _p =8/20 μ s			42	A
Junction Capacitance	C _j	V _r =0V, f=1MHz		350		pF

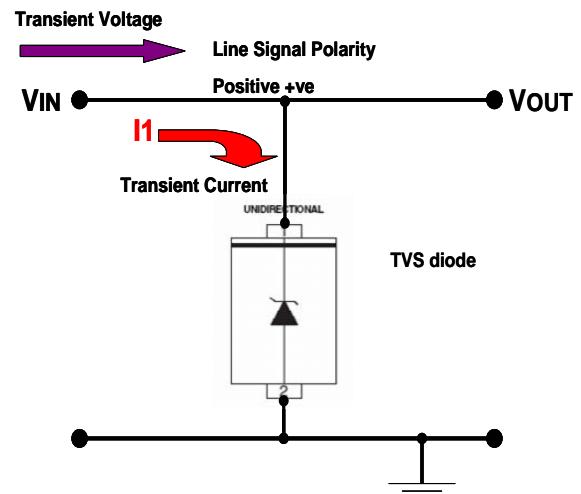
SOD-323 Single Line TVS Diode for ESD Protection
Electrical Characteristics Graphs


SOD-323 Single Line TVS Diode for ESD Protection

Applications Information

The UMD05-323 is designed to protect one data, I/O, or power supply 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.

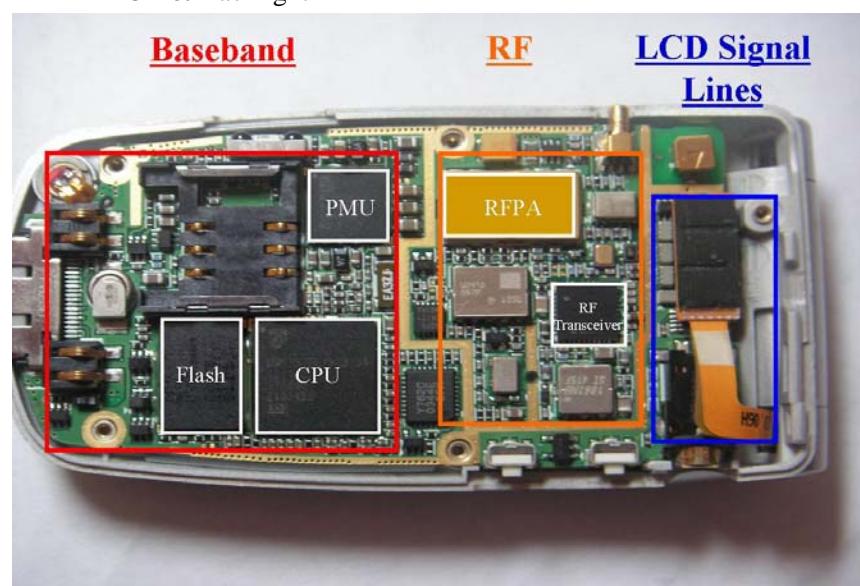
When a transient voltage appears, the UMD05-323 becomes active, clamping the voltage to a certain level and directing the transient current to ground.



Mobile Handset

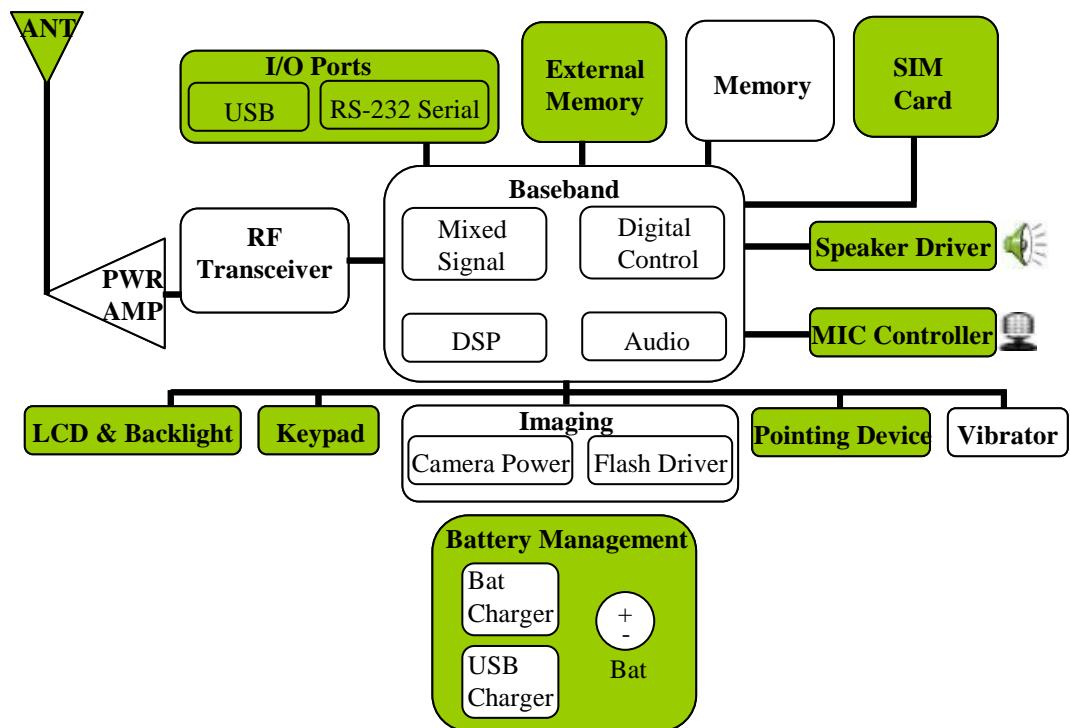
Main Parts in Mobile Phone

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

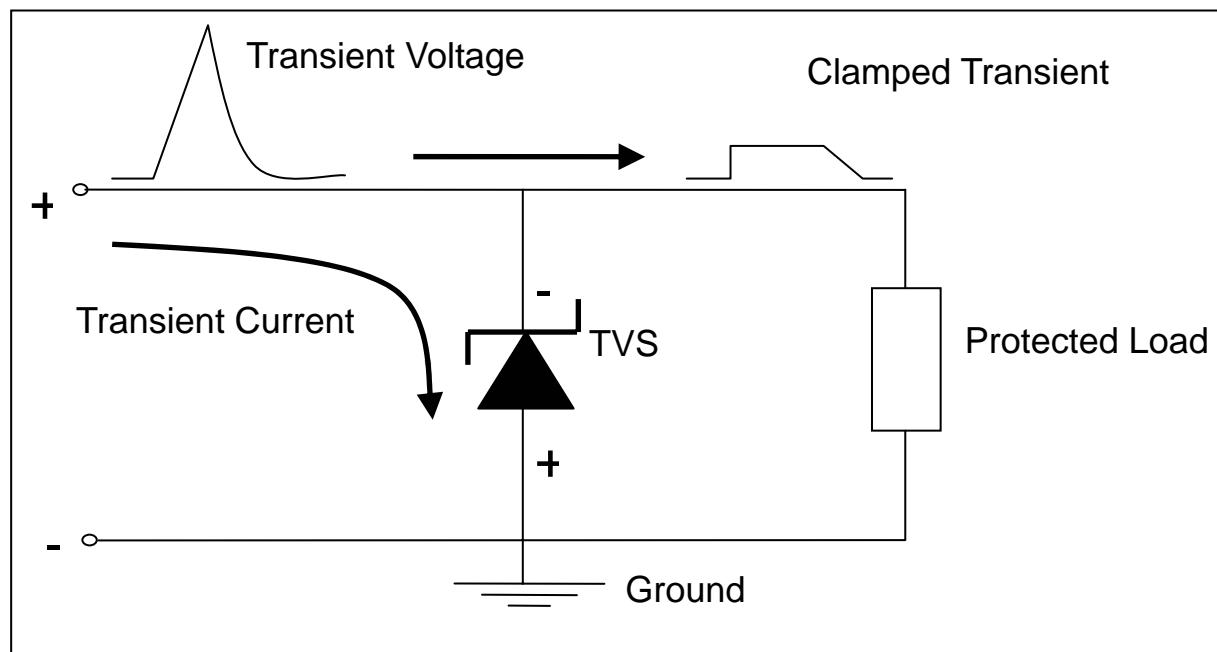


SOD-323 Single Line TVS Diode for ESD Protection

Areas That Require ESD Protection



UMD05-323 on Battery Management Application

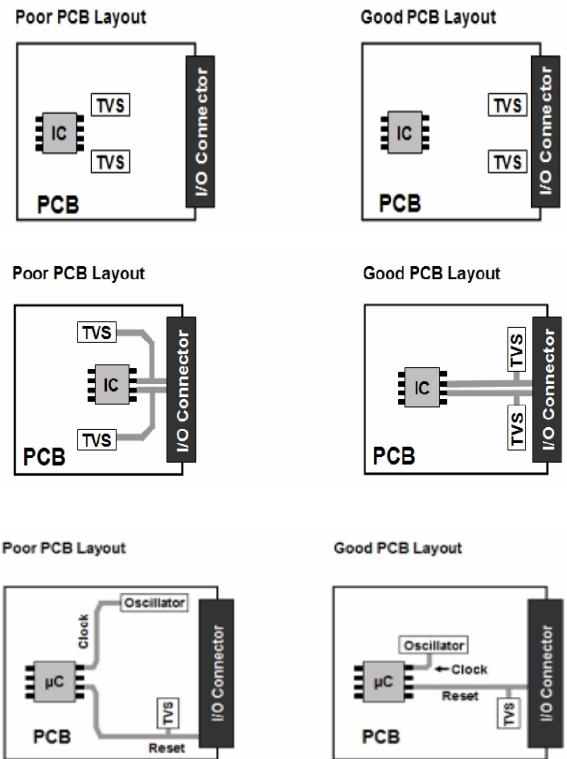


SOD-323 Single Line TVS Diode for ESD Protection

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:

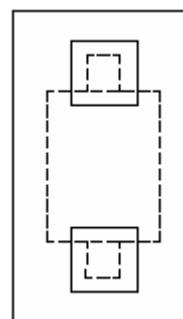
- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- The ESD transient return path to ground should be kept as short as possible.
- Place a TVS and decoupling capacitor between power and ground of components 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.



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.

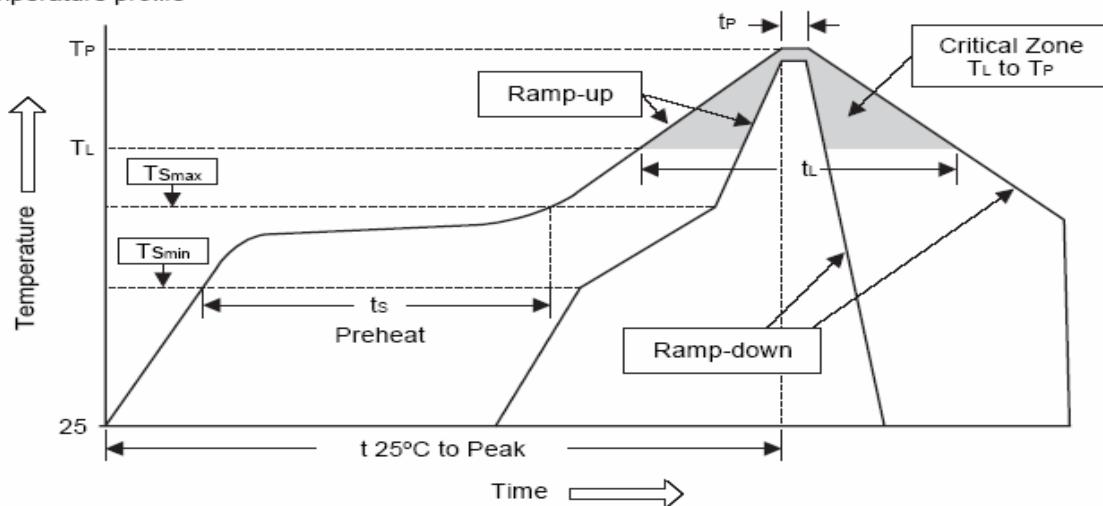
Component Placement



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

SOD-323 Single Line TVS Diode for ESD Protection
Soldering Method for UMD's Products

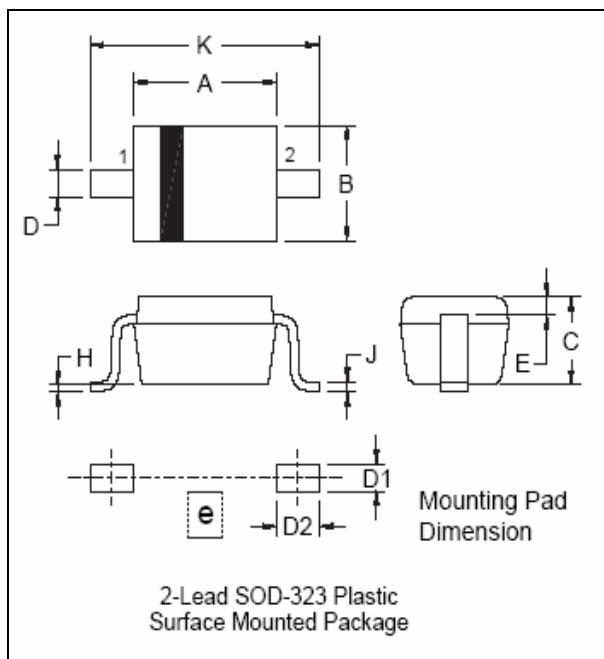
1. Storage environment: Temperature = 10°C~35°C Humidity = 65%±15%
2. Reflow soldering of surface-mount devices

Temperature profile


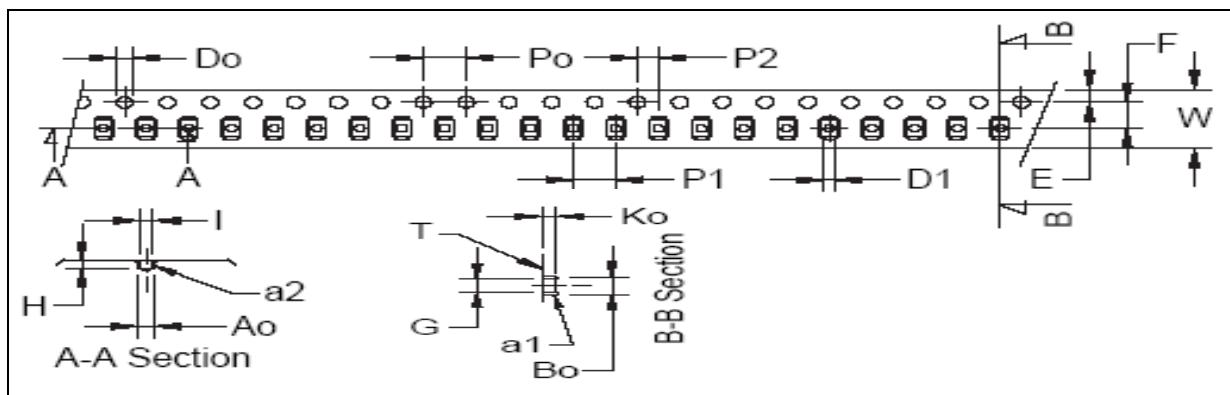
Profile Feature	Pb-Free Assembly
Average ramp-up rate (TL to TP)	<3°C/sec
Preheat	<ul style="list-style-type: none"> - Temperature Min (Tsmin) 150°C - Temperature Max (Tsmax) 200°C - Time (min to max) (ts) 60~180sec
Tsmax to TL	<ul style="list-style-type: none"> - Ramp-up Rate <3°C/sec
Time maintained above:	<ul style="list-style-type: none"> - 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

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

^{*: Typical}

Dim	Dimensions		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	-	*0.020	-	*0.5
E	0.006	-	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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SOD-323 Single Line TVS Diode for ESD Protection

Marking Code

Part Number	Device Marking
UMD05-323	05

Ordering Information

Part Number	Lead Finish	Qty Per Reel	Reel Size
UMD05-323	Pb-Free	3,000	7 inch

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