

SO-8 Four Lines TVS Array 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 SLVU2.8-4 is a TVS array designed to protect four Uni-Directional or two Bi-Directional lines in the common mode, or two line pairs in the differential mode from the damaging effects of ESD or EFT. SLVU2.8-4 is widely used in Ethernet 10/100/1000 Base T application.

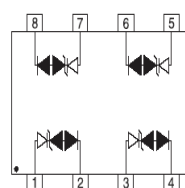
Features

- * Solid-state silicon-avalanche technology
- * SO-8 package
- * Uni-Directional or Bi-Directional protection
- * Protects up to four data lines
- * 600 Watts peak pulse power (tp = 8/20µs)
- * Working voltage: 2.8V
- * Low clamping factor Vcl/Vbr
- * 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) (8/20µs)

Multi Lines Protection TVS



SO-8 Pin Configuration



<u>Pin</u>	<u>Description</u>
1,3,5,7	Cathode
2,4,6,8	Anode

Mechanical Characteristics

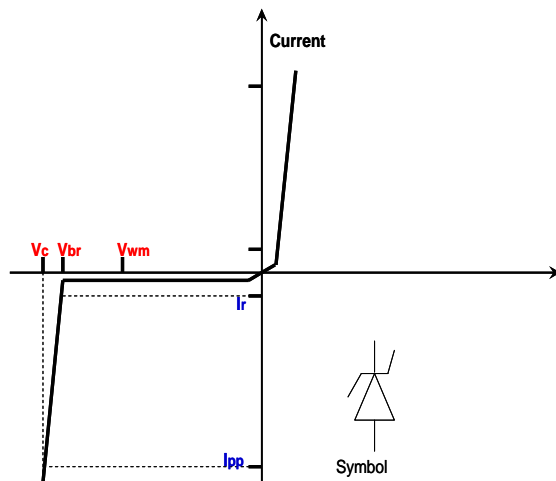
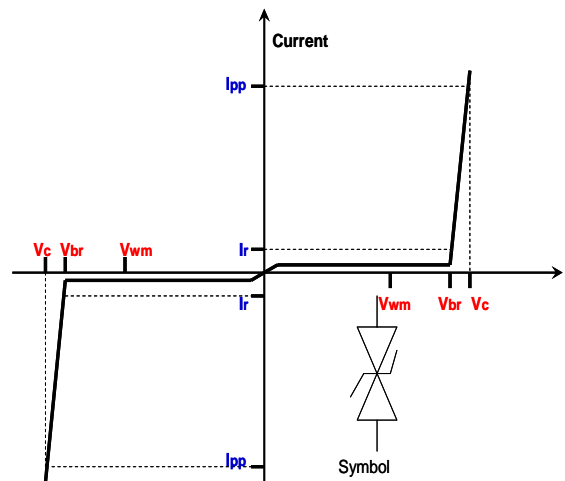
- * Molded JEDEC SO-8 package
- * Weight 70 milligrams (Approximate)
- * Available in Lead-Free Pure-Tin Plating
- * Solder Reflow Temp.: Pure-Tin (Sn), 260-270°C
- * Consult Factory for Leaded Device Availability
- * Flammability Rating UL 94V-0
- * Device Marking: Marking Code,
Pin one defined by DOT

Applications

- * 10/100 Base T Ethernet
- * WAN/LAN equipment
- * Notebook
- * Switching system
- * Gigabit Ethernet

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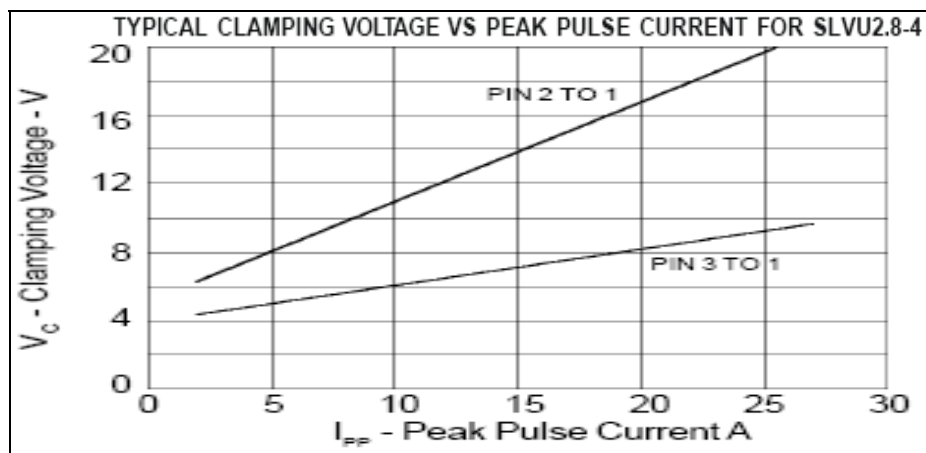
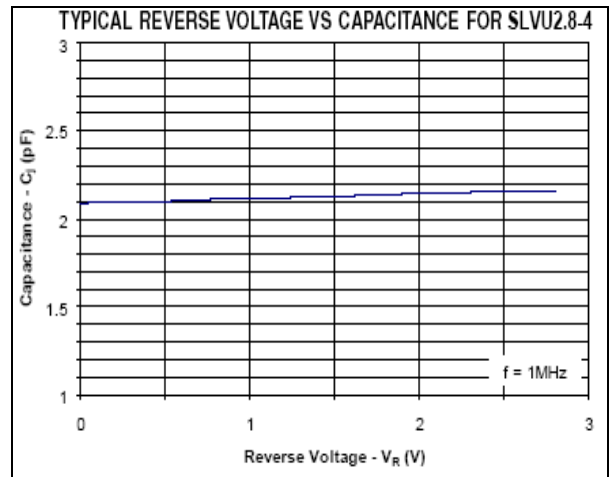
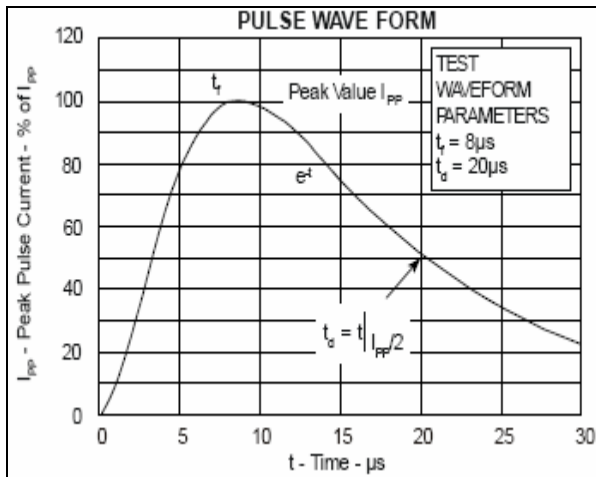
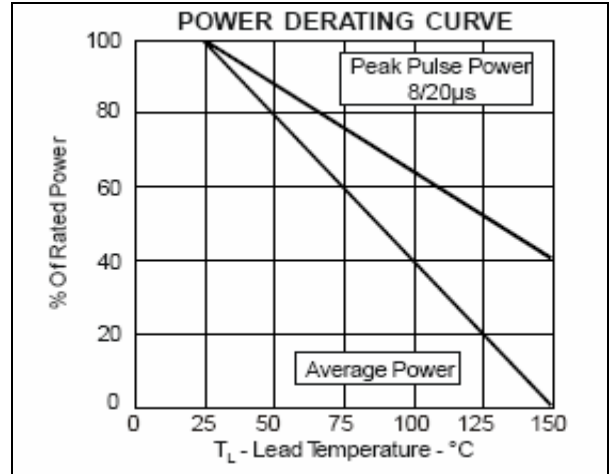
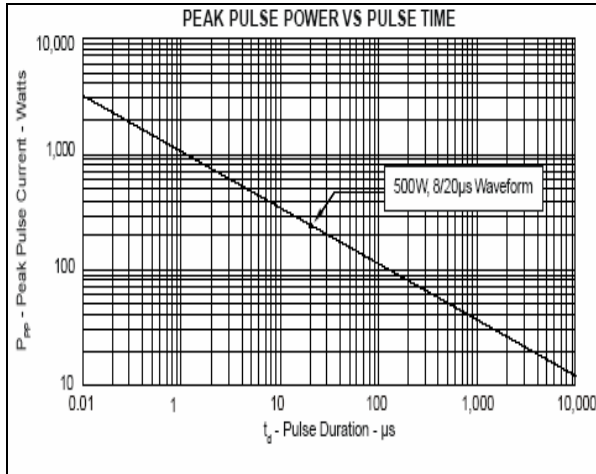
Absolute Maximum Ratings @ 25°C unless otherwise specified			
Parameter	Symbol	Value	Units
Peak Pulse Power; pulse waveform = 8/20µs	P _{pp}	600	W
Peak Pulse Current; pulse waveform = 8/20µs	I _{pp}	30	A
ESD per IEC 61000-4-2 (Air)	V _{pp}	±15	kV
ESD per IEC 61000-4-2 (Contact)		±8	
Operating Temperature	T _j	-55 to 150	°C
Storage Temperature	T _{stg}	-55 to 150	°C

Uni-Directional Protection

Bi-Directional Protection


Electrical Characteristics @ 25°C unless otherwise specified						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Stand-off Voltage	V _{wm}				2.8	V
Breakdown Voltage	V _{br}	I _t =1mA	3.0			V
Leakage Current	I _r	V _{wm} =5V, T=25°C			1	µA
Clamping Voltage	V _c	I _{pp} =2A, T _p =8/20µs			5.5	V
Clamping Voltage	V _c	I _{pp} =30A, T _p =8/20µs			21.0	V
Peak Pulse Current	I _{pp}	T _p =8/20µs			30	A
Junction Capacitance	C _j	V _r =0V, f=1MHz		3		pF

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Electrical Characteristics Graphs



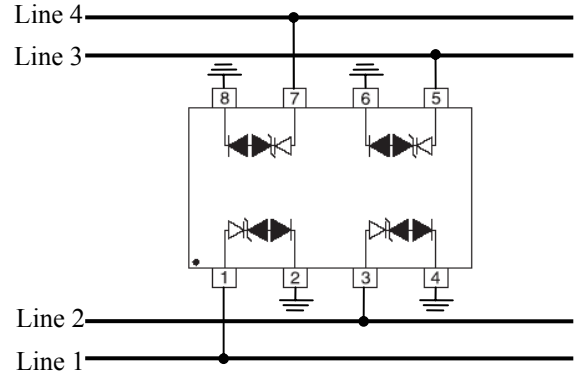
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Applications Information

The SLVU2.8-4 provides up to 4 lines of protection in a common-mode Uni-Directional configuration.

Circuit connectivity is as follows:

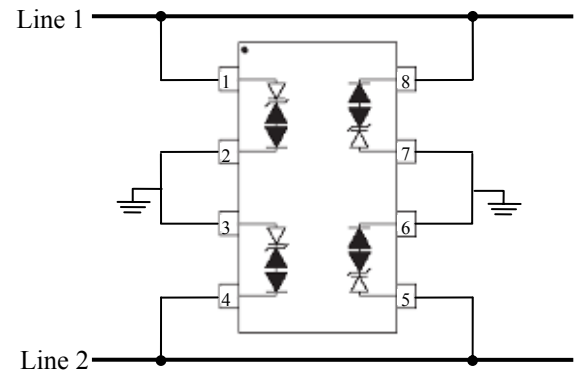
- Line 1 is connected to Pin 1
- Line 2 is connected to Pin 3
- Line 3 is connected to Pin 5
- Line 4 is connected to Pin 7
- Pin 2, 4, 6, 8 are connected to ground



The SLVU2.8-4 provides up to 2 lines of protection in a common-mode Bi-Directional configuration.

Circuit connectivity is as follows:

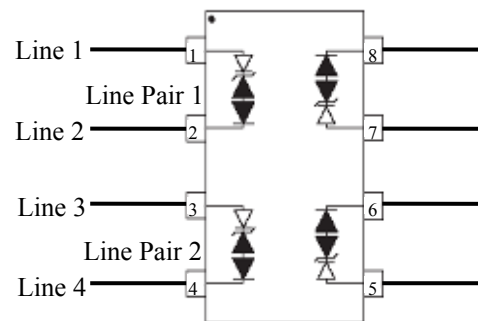
- Line 1 is connected to Pin 1 and Pin 8
- Line 2 is connected to Pin 4 and Pin 5
- Pin 2 and Pin 3 are connected to ground
- Pin 6 and Pin 7 are connected to ground



The SLVU2.8-4 provides up to 2 line pairs of protection in a differential-mode Bi-Directional configuration.

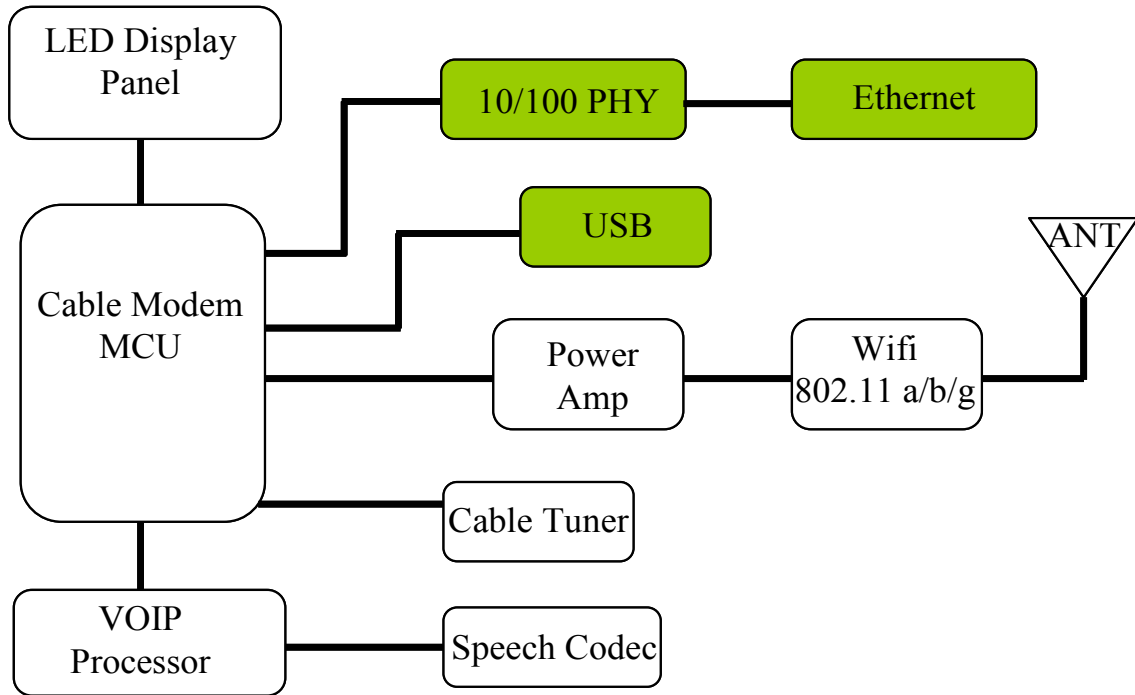
Circuit connectivity is as follows:

- Line 1 is connected to Pin 1 and Pin 8
- Line 2 is connected to Pin 2 and Pin 7
- Line 3 is connected to Pin 3 and Pin 6
- Line 4 is connected to Pin 4 and Pin 5

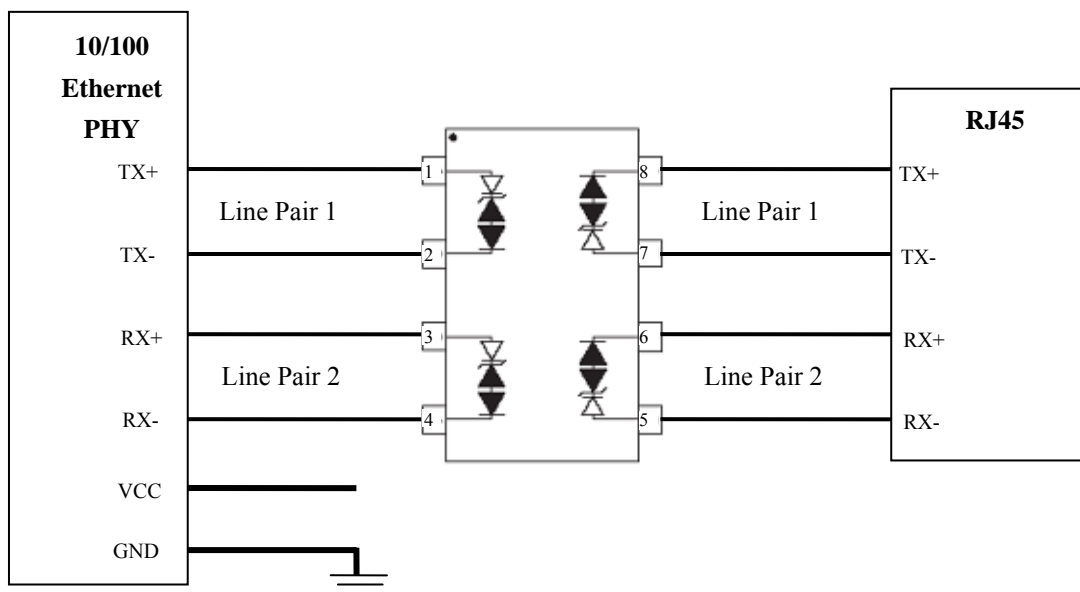


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Areas That Require Overvoltage Protection



SLVU2.8-4 on 10/100 Ethernet Application



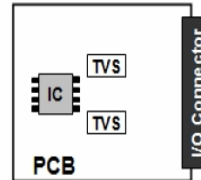
SO-8 Four Lines TVS Array for ESD Protection

Circuit Board Layout Recommendations

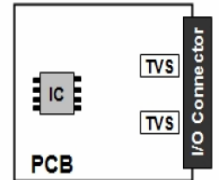
Good circuit board layout is critical for the suppression of fast rise-time transients such as ESD. The following guidelines are recommended:

- 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.

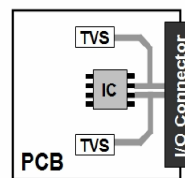
Poor PCB Layout



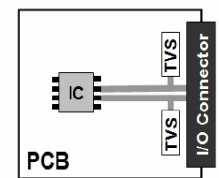
Good PCB Layout



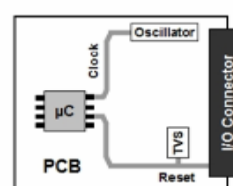
Poor PCB Layout



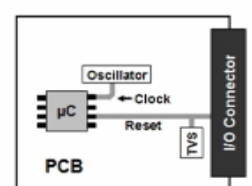
Good PCB Layout



Poor PCB Layout



Good PCB Layout



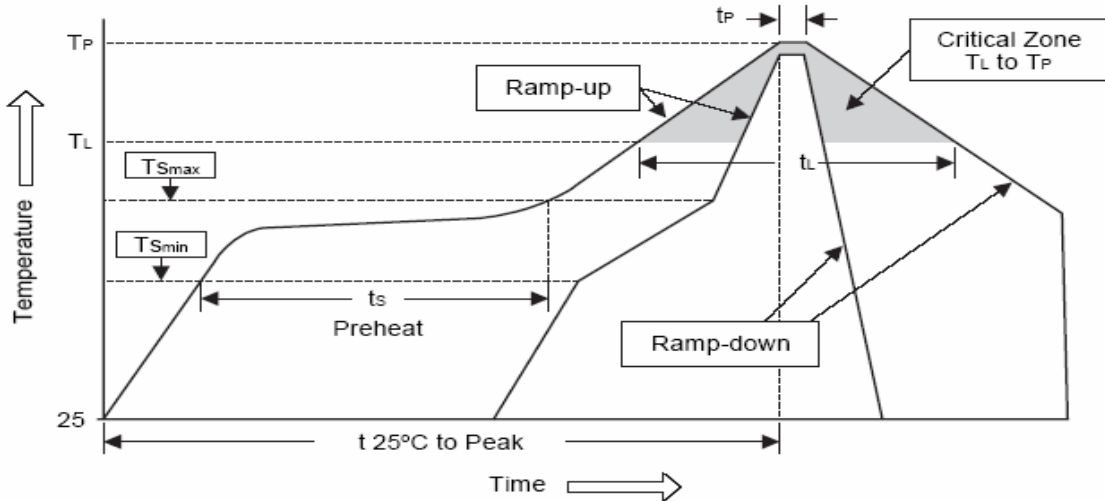
Matte Tin Lead Finish

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 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

Temperature profile



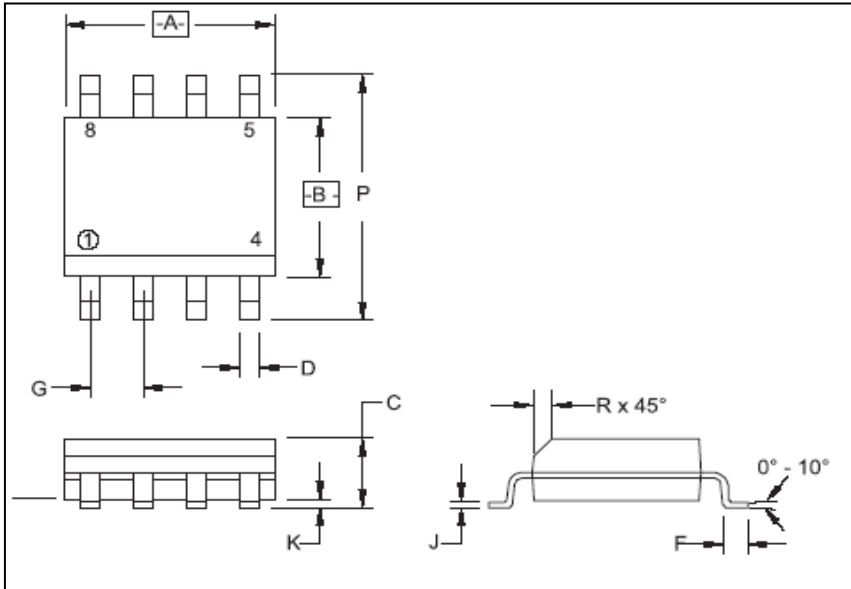
Profile Feature	Pb-Free Assembly
Average ramp-up rate (T _L to T _P)	<3°C/sec
Preheat	
- Temperature Min (T _{Smin})	150°C
- Temperature Max (T _{Smax})	200°C
- Time (min to max) (t _s)	60~180sec
T _{Smax} to T _L	
- Ramp-up Rate	<3°C/sec
Time maintained above:	
- Temperature (T _L)	220°C
- Time (t _L)	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

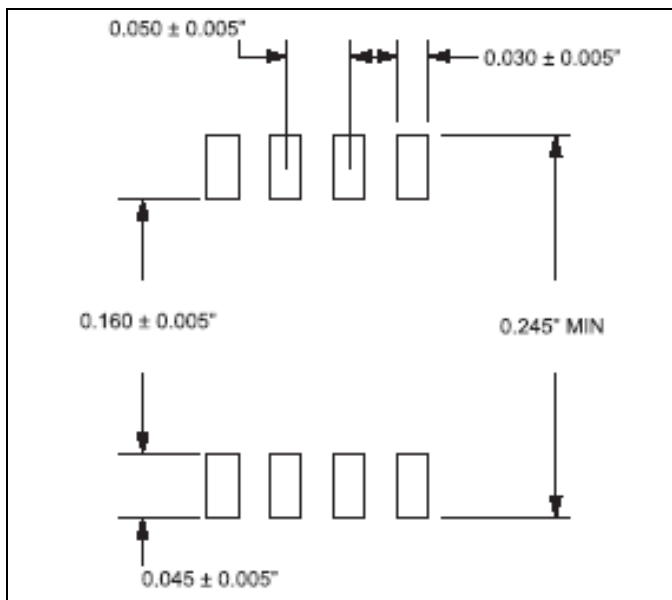
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SO-8 Dimension Drawing



Dim	Dimensions			
	Inches		mm	
	Min	Max	Min	Max
A	0.189	0.196	4.80	5.00
B	0.150	0.157	3.80	4.00
C	0.054	0.068	1.35	1.75
D	0.014	0.019	0.35	0.49
F	0.016	0.049	0.40	1.25
G	0.05BSC		1.27 BSC	
J	0.007	0.009	0.18	0.25
K	0.004	0.008	0.10	0.25
P	0.229	0.244	5.80	6.20
R	0.010	0.019	0.25	0.50

SO-8 Mounting Pad





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Marking Code

Part Number	Device Marking
SLVU2.8-4	SLVU2.8-4

Ordering Information

Part Number	Lead Finish	Qty Per Tube	Reel Size
SLVU2.8-4	Pb-Free	98	N/A

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