



## Transient Voltage Suppressors / ESD Protectors

### Features

- Two, three, four, five, or six transient voltage suppressors
- Compact SMT package saves board space and facilitates layout in space-critical applications
- In-system ESD protection to 20kV contact discharge, per the IEC 61000-4-2 international standard

### Applications

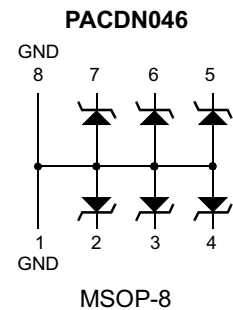
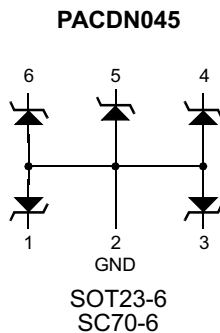
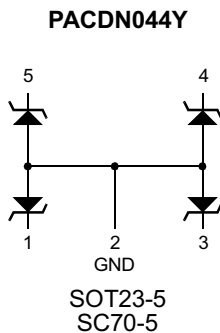
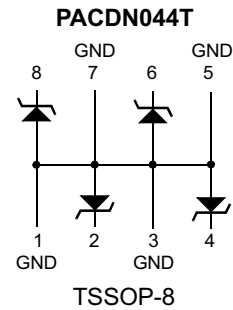
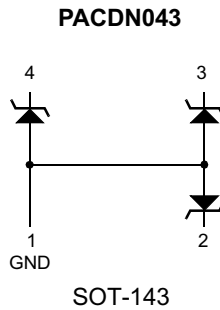
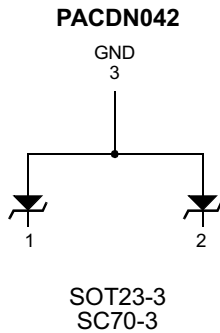
- ESD protection of PC ports, including USB ports, serial ports, parallel ports, IEEE1394 ports, docking ports, proprietary ports, etc.
- Protection of interface ports or IC pins which are exposed to high ESD levels

### Product Description

The family of devices consists of the PACDN042, PACDN043, PACDN044, PACDN045, and PACDN046. These devices are transient voltage suppressor arrays that provide a very high level of protection for sensitive electronic components which may be subjected to electrostatic discharge (ESD). The PACDN042/43/44/45/46 devices are designed and characterized to dissipate safely ESD strikes that exceed IEC 61000-4-2 International Standard Level 4 (8kV contact discharge).

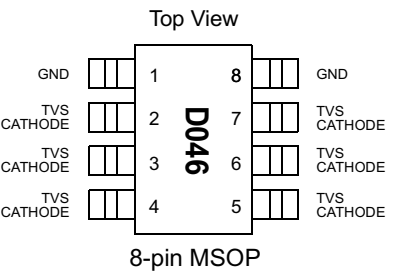
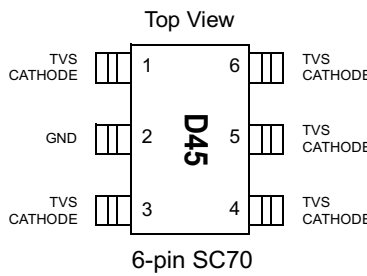
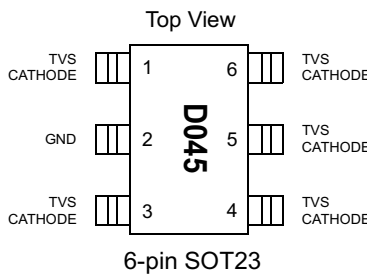
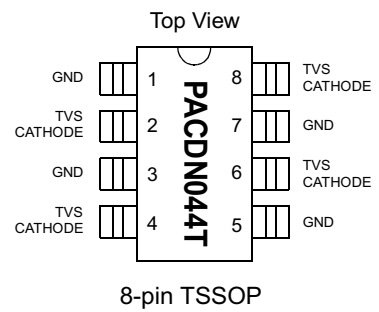
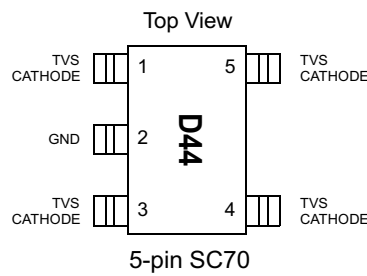
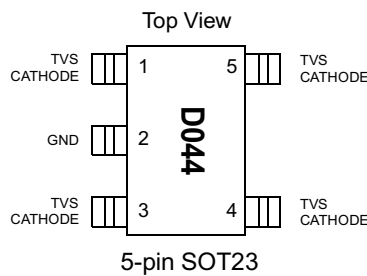
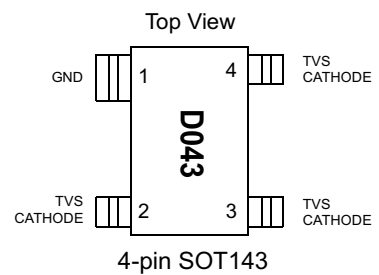
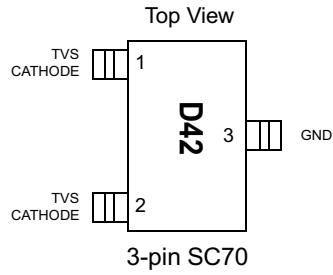
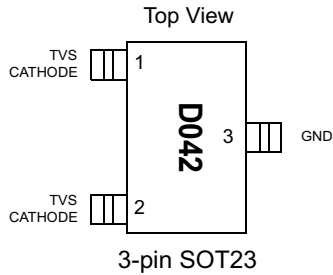
All pins are rated to withstand 20kV ESD pulses using the IEC 61000-4-2 contact discharge method. Using the MIL-STD-883D (Method 3015) specification for Human Body Model (HBM) ESD, all pins are protected from contact discharges of greater than 30kV.

### Electrical Schematic





PACKAGE / PINOUT DIAGRAMS



Note: SOT23, SC70, SOT143, TSSOP, and MSOP packages may differ in size. These drawings are not to scale.

PIN DESCRIPTIONS

PINS	NAME	DESCRIPTION
(Refer to package outline drawings)	TVS Cathode	The cathode of the respective TVS diode, which should be connected to the node requiring transient voltage protection.
(Refer to package outline drawings)	GND	The anode of the TVS diodes.



## Ordering Information

<b>PART NUMBERING INFORMATION</b>			
<b>Pins</b>	<b>Package</b>	<b>Part Marking</b>	<b>Ordering Part Number<sup>1</sup></b>
3	SOT23-3	D042	PACDN042Y3
3	SC70-3	D42	PACDN042YB3
4	SOT143	D043	PACDN043Y4
5	SOT23-5	D044	PACDN044Y5
5	SC70-5	D44	PACDN044YB5
6	SOT23-6	D045	PACDN045Y6
6	SC70-6	D45	PACDN045YB6
8	TSSOP	PACDN044T	PACDN044T
8	MSOP	D046	PACDN046M

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

## Specifications

<b>ABSOLUTE MAXIMUM RATINGS</b>		
<b>PARAMETER</b>	<b>RATING</b>	<b>UNITS</b>
Storage Temperature Range	-65 to +150	°C
Package Power Dissipation		
SC70	0.2	W
SOT23-3, SOT23-5, SOT23-6, SOT143	0.225	W
TSSOP, MSOP	0.5	W

<b>STANDARD OPERATING CONDITIONS</b>		
<b>PARAMETER</b>	<b>RATING</b>	<b>UNITS</b>
Operating Temperature	-40 to +85	°C



**Specifications (cont'd)**

<b>ELECTRICAL OPERATING CHARACTERISTICS</b>						
<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNITS</b>
C	Capacitance	$T_A = 25^\circ\text{C}$ , 2.5VDC, 1MHz		30		pF
$V_{\text{RSO}}$	Reverse Stand-off Voltage	At $I = 10\mu\text{A}$ , $T_A = 25^\circ\text{C}$	5.5			V
$I_{\text{LEAK}}$	Leakage Current	$V_{\text{IN}} = 5.0\text{VDC}$ , $T_A = 25^\circ\text{C}$		1	100	nA
$V_{\text{SIG}}$	Small Signal Clamp Voltage				8	V
	Positive Clamp	$I = 10\text{mA}$ , $T_A = 25^\circ\text{C}$	5.6	6.8		V
	Negative Clamp	$I = -10\text{mA}$ , $T_A = 25^\circ\text{C}$	-0.4	-0.8	-1.2	V
$V_{\text{ESD}}$	ESD Withstand Voltage					
	Human Body Model, MIL-STD-883, Method 3015	Notes 1 & 2	$\pm 30$			kV
	Contact Discharge per IEC 61000-4-2 standard	Notes 1 & 2	$\pm 20$			kV
$V_{\text{CL}}$	Clamping Voltage during ESD Discharge	MIL-STD-883D, Method 3015				
	+8kV Discharge			12		V
	-8kV Discharge			-8		V
$R_{\text{D}}$	Diode Dynamic Resistance					
	Forward Conduction			1.0		$\Omega$
	Reverse Conduction			1.4		$\Omega$

Note 1: Guaranteed by design and characterization.

Note 2: ESD voltage applied between channel pins & ground, one pin at a time; all other channel pins open; all GND pins grounded.



## Performance Information

### Diode Capacitance

Typical diode capacitance with respect to positive TVS cathode voltage (reverse voltage across the diode) is given in [Figure 1](#).

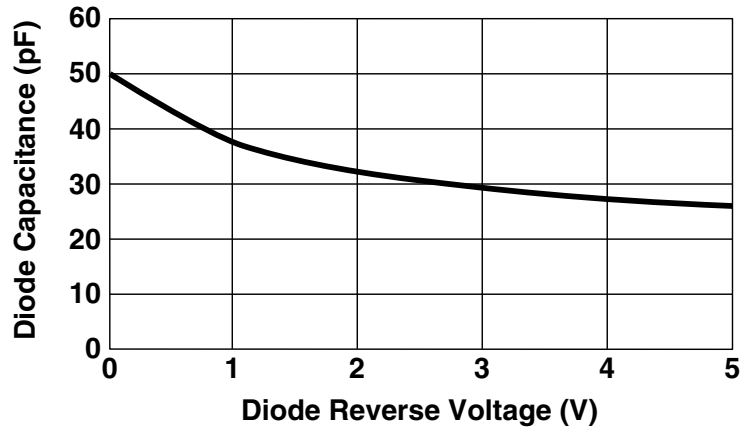


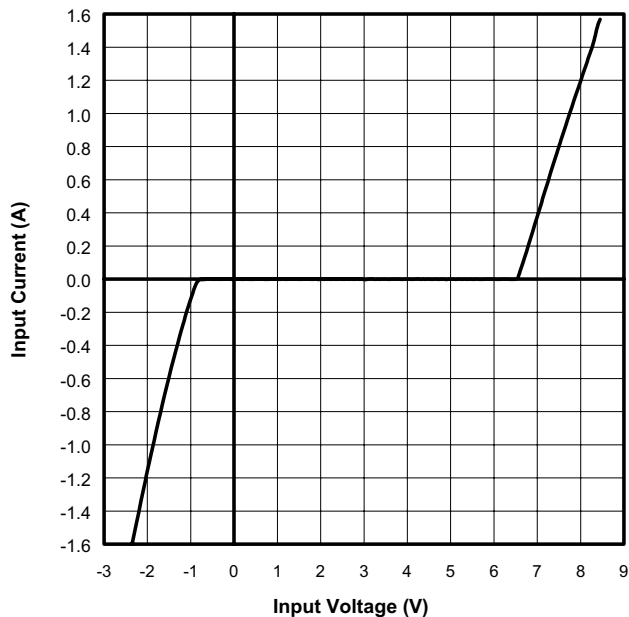
Figure 1. Diode Capacitance vs. Reverse Voltage

### Typical High Current Diode Characteristics

Measurements are made in pulse mode with a nominal pulse width of 0.7mS.

#### Typical Input VI Characteristics

(Pulse-mode measurements, pulse width = 0.7mS nominal)





### Mechanical Details

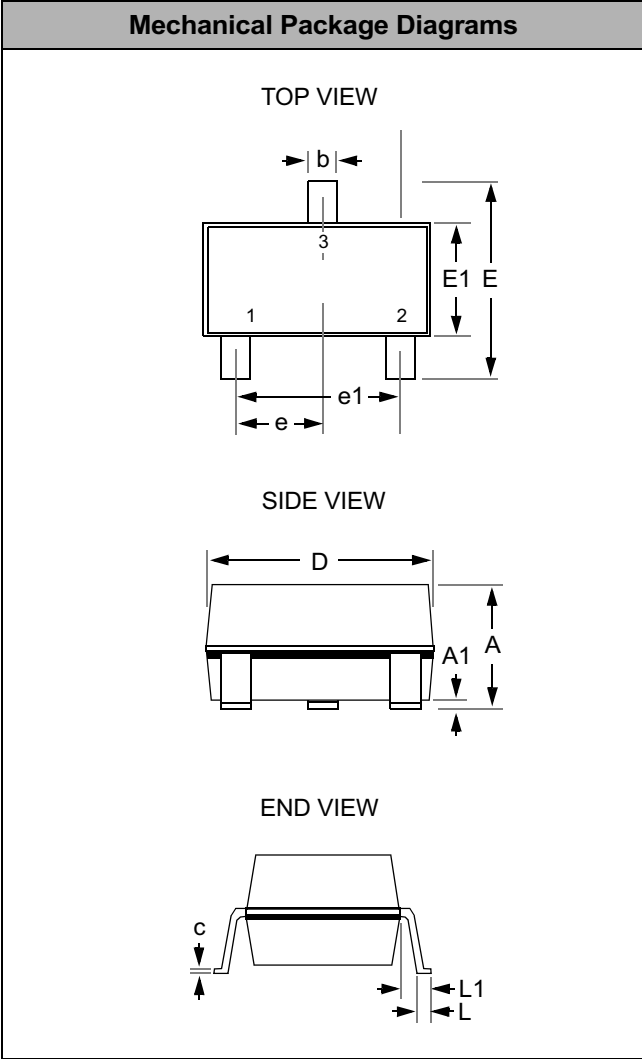
PACDN042/43/44/45/46 devices are packaged in the following packages: SOT23-3, SOT23-5, SOT23-6, SC70-3, SC70-5, SC70-6, SOT143, TSSOP-8, and MSOP-8.

#### SOT23-3 Mechanical Specifications

Dimensions for PACDN042/43/44/45/46 devices packaged in 3-pin SOT23 packages are presented below.

For complete information on the SOT23-3 package, see the California Micro Devices SOT23 Package Information document.

PACKAGE DIMENSIONS				
Package	SOT23-3 (JEDEC name is TO-236)			
Pins	3			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	0.89	1.12	0.0350	0.0441
A1	0.01	0.10	0.0004	0.0039
b	0.30	0.50	0.0118	0.0197
c	0.08	0.20	0.0031	0.0079
D	2.80	3.04	0.1102	0.1197
E	2.10	2.64	0.0827	0.1039
E1	1.20	1.40	0.0472	0.0551
e	0.95 BSC		0.0374 BSC	
e1	1.90 BSC		0.0748 BSC	
L	0.40	0.60	0.0157	0.0236
L1	0.54 REF		0.0213 REF	
# per tape and reel	3000 pieces			
Controlling dimension: millimeters				



Package Dimensions for SOT23-3.



## Mechanical Details (continued)

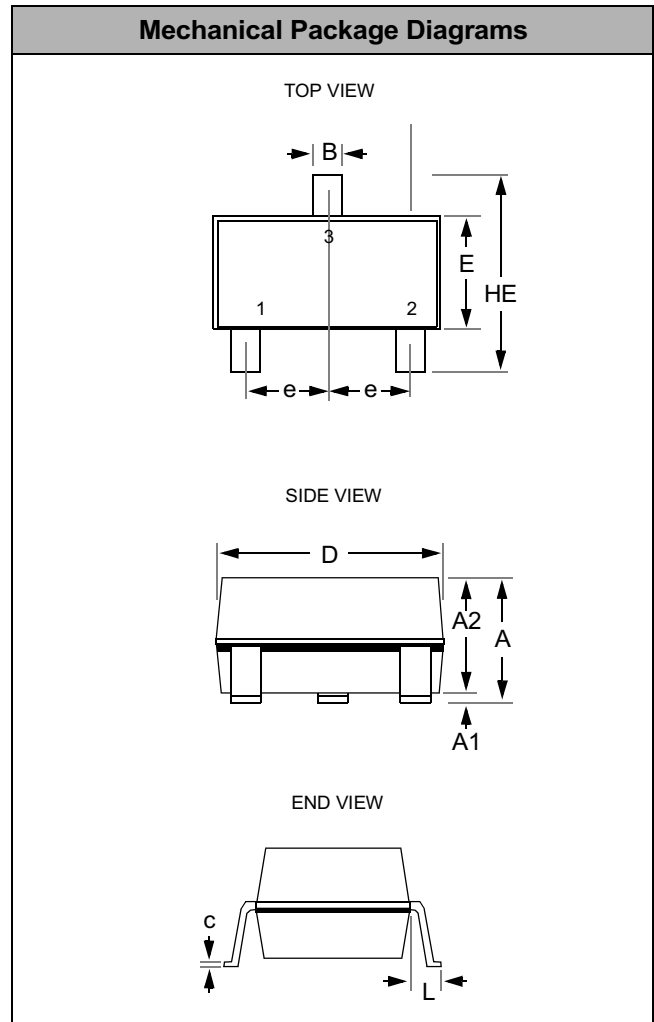
### SC70-3 Mechanical Specifications:

Dimensions for PACDN042YB3 devices packaged in 3-pin SC70 packages are presented below.

For complete information on the SC70-3 package, see the California Micro Devices SC70 Package Information document.

PACKAGE DIMENSIONS		
Package	SC70 (JEDEC name is MO-203 Issue A)	
Pins	3	
Dimensions	Millimeters	
	Min	Max
A	0.80	1.10
A1	0.00	0.10
A2	0.70	1.00
B	0.15	0.30
c	0.08	0.25
D	1.85	2.25
E	1.15	1.35
e	0.65 BSC	
HE	2.00	2.40
L	0.26	0.46
# per bag	1000 pieces*	
# per tape and reel	3000 pieces*	

\* This is an approximate amount which may vary.



Package Dimensions for SC70-3.



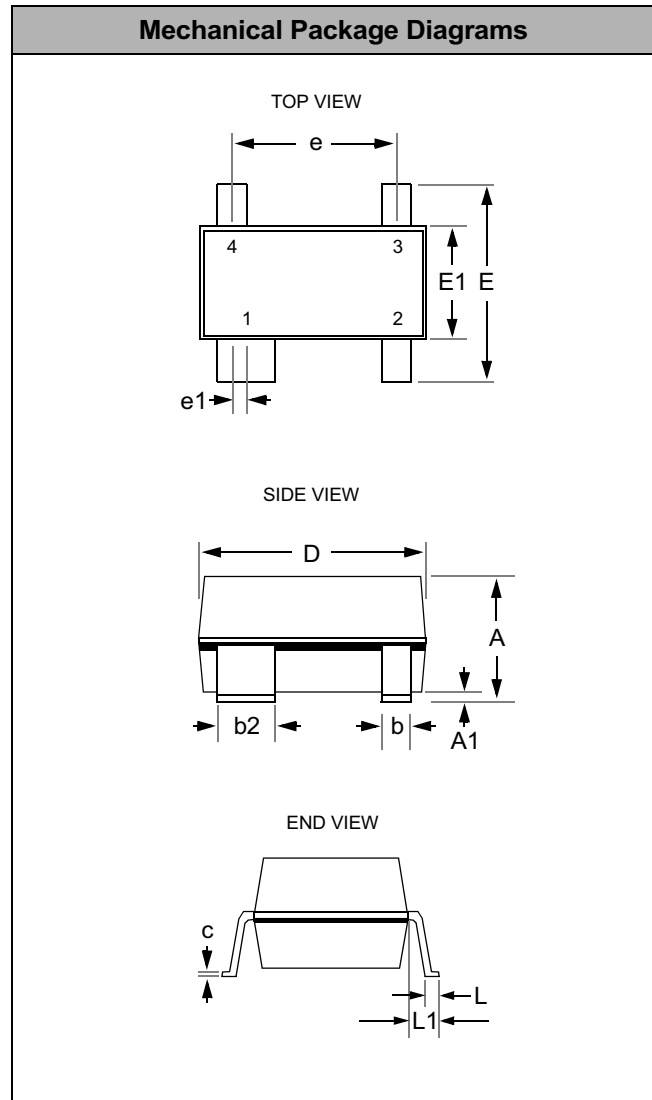
### Mechanical Details (continued)

#### SOT143 Mechanical Specifications

Dimensions for PACDN043Y4 devices packaged in 4-pin SOT143 packages are presented below.

For complete information on the SOT143 package, see the California Micro Devices SOT143 Package Information document.

PACKAGE DIMENSIONS				
Package	SOT143			
Pins	4			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	0.80	1.22	0.031	0.048
A1	0.05	0.15	0.002	0.006
b	0.30	0.50	0.012	0.019
b2	0.76	0.89	0.030	0.035
c	0.08	0.20	0.003	0.008
D	2.80	3.04	0.110	0.119
E	2.10	2.64	0.082	0.103
E1	1.20	1.40	0.047	0.055
e	1.92 BSC		0.075 BSC	
e1	0.20 BSC		0.008 BSC	
L	0.4	0.6	0.016	0.024
L1	0.54 REF		0.021 REF	
# per tape and reel	3000 pieces*			
Controlling dimension: millimeters				



Package Dimensions for SOT143.

\* This is an approximate amount which may vary.





### Mechanical Details (continued)

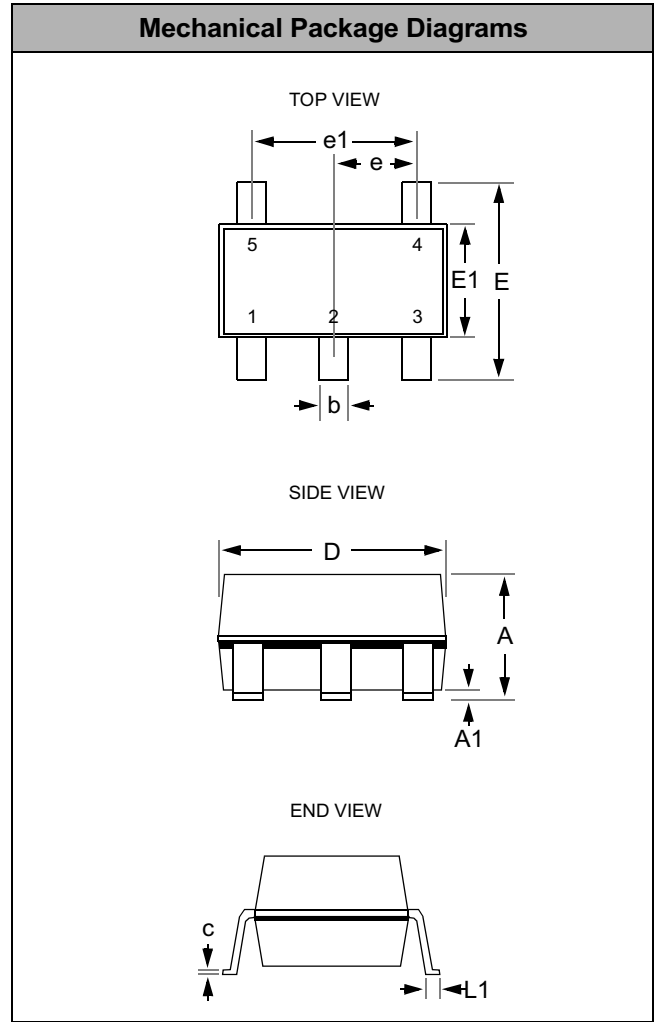
#### SOT23-5 Mechanical Specifications

Dimensions for PACDN044Y5 devices packaged in 5-pin SOT23 packages are presented below.

For complete information on the SOT23-5 package, see the California Micro Devices SOT23 Package Information document.

PACKAGE DIMENSIONS				
Package	SOT23-5 (JEDEC name is MO-178)			
Pins	5			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	--	1.45	--	0.057
A1	0.00	0.15	0.000	0.006
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.75	3.05	0.108	0.120
E	2.60	3.00	0.102	0.118
E1	1.45	1.75	0.057	0.069
e	0.95 BSC		0.0374 BSC	
e1	1.90 BSC		0.0748 BSC	
L	0.60 REF		0.0236 REF	
# per tape and reel	3000 pieces*			
Controlling dimension: inches				

\* This is an approximate amount which may vary.



Package Dimensions for SOT23-5.



### Mechanical Details (continued)

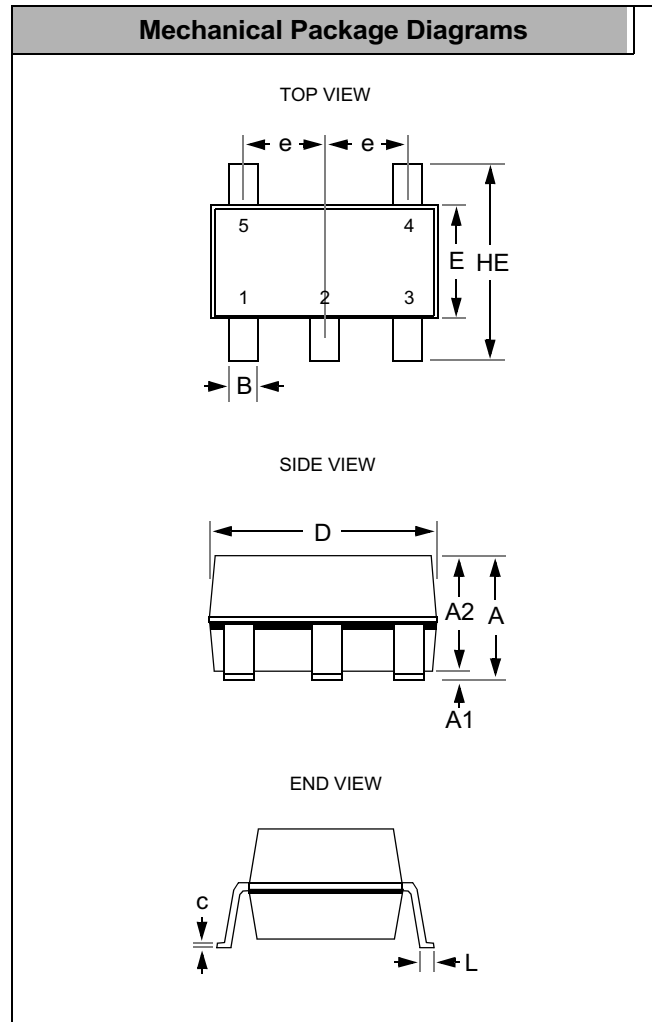
#### SC70-5 Mechanical Specifications:

Dimensions for PACDN044YB5 devices packaged in 5-pin SC70 packages are presented below.

For complete information on the SC70-5 package, see the California Micro Devices SC70 Package Information document.

PACKAGE DIMENSIONS		
Package	SC70-5 (JEDEC name is MO-203 Issue A)	
Pins	5	
Dimensions	Millimeters	
	Min	Max
A	0.80	1.10
A1	0.00	0.10
A2	0.70	1.00
B	0.15	0.30
c	0.08	0.25
D	1.85	2.25
E	1.15	1.35
e	0.65 BSC	
HE	2.00	2.40
L	0.26	0.46
# / bag	1000 pieces*	
# / tape and reel	3000 pieces*	

\* This is an approximate amount which may vary.



Package Dimensions for SC70-5



### Mechanical Details (continued)

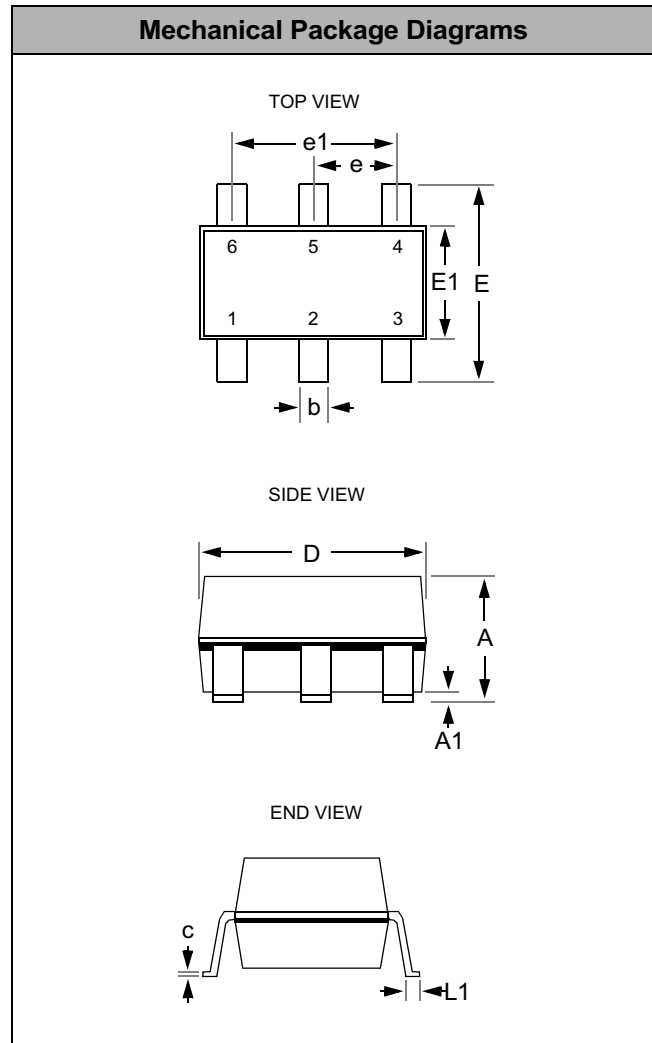
#### SOT23-6 Mechanical Specifications:

Dimensions for PACDN045Y6 devices packaged in 6-pin SOT23 packages are presented below.

For complete information on the SOT23-6 package, see the California Micro Devices SOT23 Package Information document.

PACKAGE DIMENSIONS				
Package	SOT23 (JEDEC name is MO-178)			
Pins	6			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	--	1.45	--	0.057
A1	0.00	0.15	0.000	0.006
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.75	3.05	0.108	0.120
E	2.60	3.00	0.102	0.118
E1	1.45	1.75	0.057	0.069
e	0.95 BSC		0.0374 BSC	
e1	1.90 BSC		0.0748 BSC	
L	0.60 REF		0.0236 REF	
# per tape and reel	3000 pieces*			
Controlling dimension: inches				

\* This is an approximate amount which may vary.



Package Dimensions for SOT23-6.



### Mechanical Details (continued)

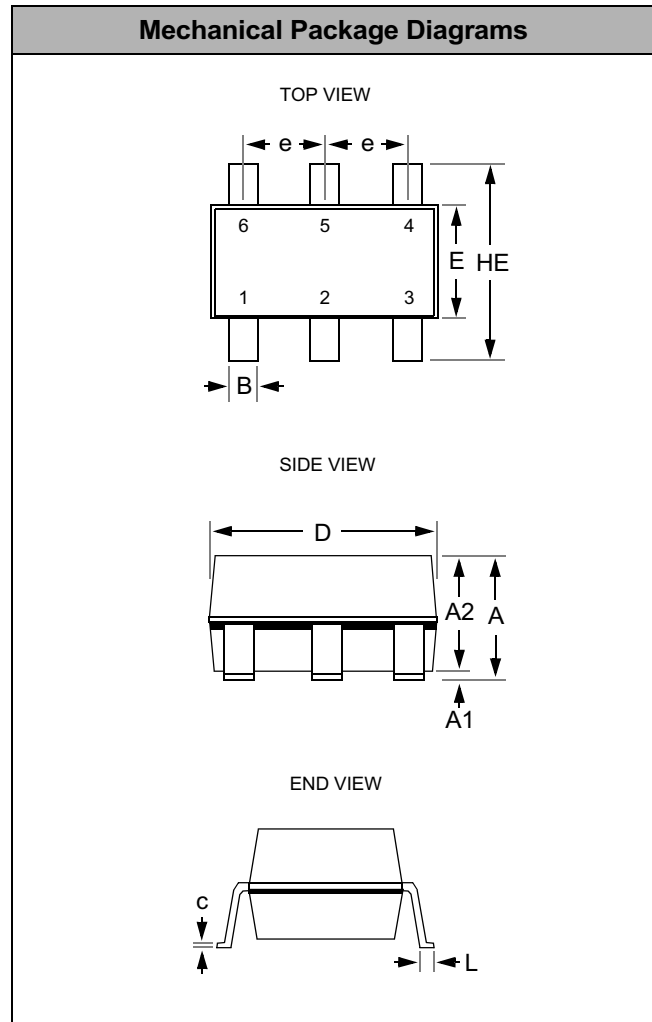
#### SC70-6 Mechanical Specifications:

Dimensions for PACDN045YB6 devices packaged in 6-pin SC70 packages are presented below.

For complete information on the SC70-6 package, see the California Micro Devices SC70 Package Information document.

PACKAGE DIMENSIONS		
Package	SC70-6 (JEDEC name is MO-203 Issue A)	
Pins	6	
Dimensions	Millimeters	
	Min	Max
A	0.80	1.10
A1	0.00	0.10
A2	0.70	1.00
B	0.15	0.30
c	0.08	0.25
D	1.85	2.25
E	1.15	1.35
e	0.65 BSC	
HE	2.00	2.40
L	0.26	0.46
# / bag	1000 pieces*	
# / tape and reel	3000 pieces*	

\* This is an approximate amount which may vary.



Package Dimensions for SC70-6.



## Mechanical Details (continued)

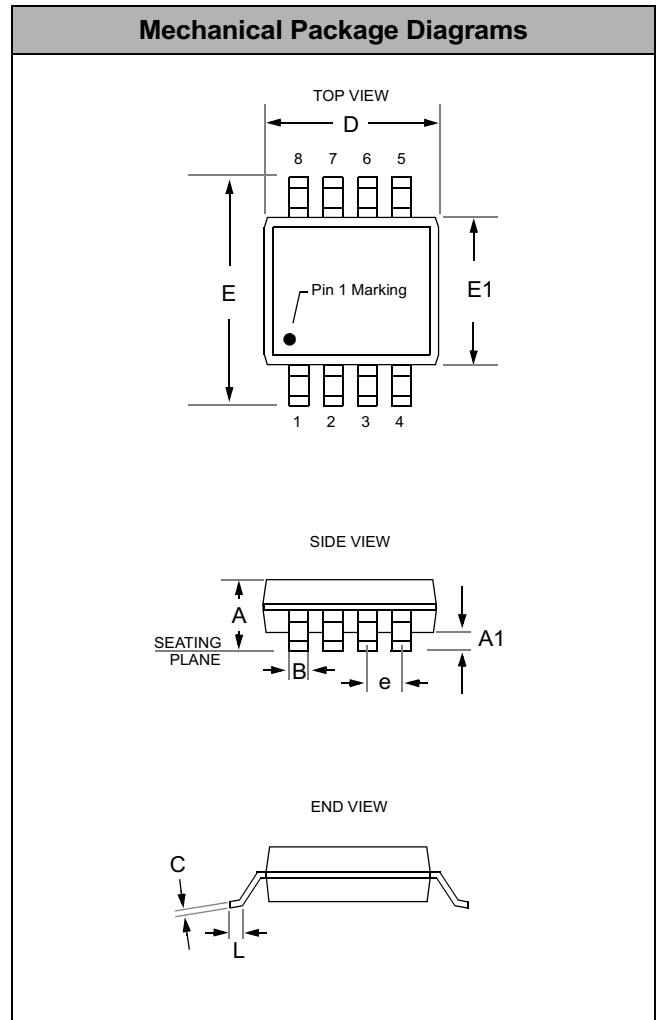
### TSSOP-8 Mechanical Specifications:

Dimensions for PACDN044T devices packaged in 8-pin TSSOP packages are presented below.

For complete information on the TSSOP-8 package, see the California Micro Devices TSSOP Package Information document.

PACKAGE DIMENSIONS				
Package	TSSOP			
Pins	8			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	—	1.10	—	0.0433
A1	0.05	0.15	0.002	0.006
B	0.19	0.30	0.0075	0.0118
C	0.09	0.20	0.0035	0.0079
D	2.90	3.10	0.114	0.122
E	6.25	6.50	0.246	0.256
E1	4.30	4.50	0.169	0.177
e	0.65 BSC		0.0256 BSC	
L	0.50	0.70	0.020	0.028
# per tube	74 pcs*			
# per tape and reel	2500 pcs			
Controlling dimension: millimeters				

\* This is an approximate amount which may vary.



Package Dimensions for TSSOP-8



## Mechanical Details (continued)

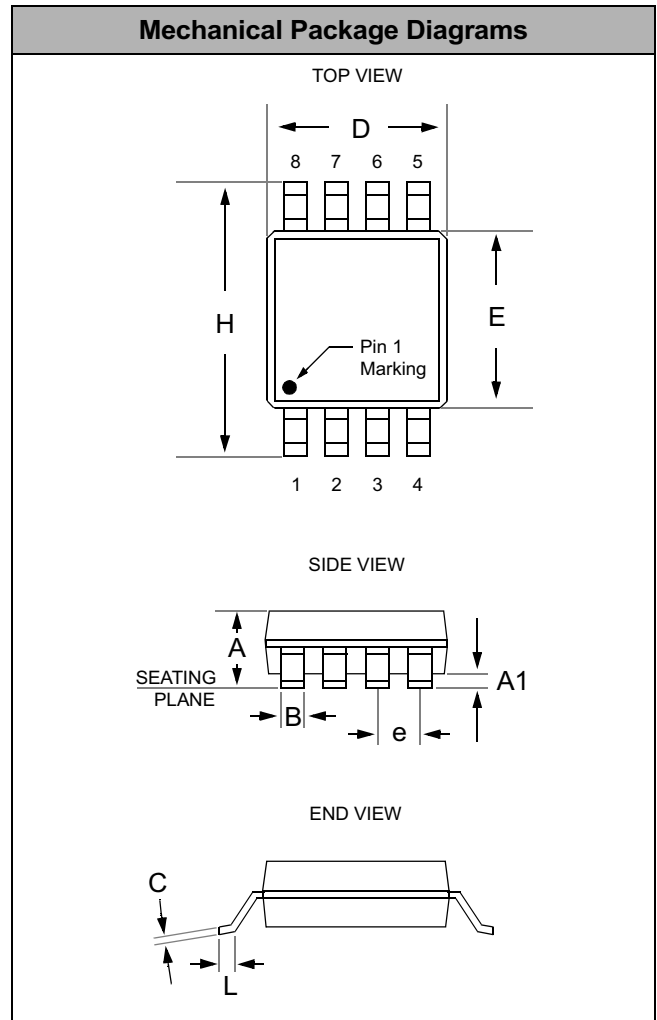
### MSOP-8 Mechanical Specifications:

Dimensions for PACDN046M devices packaged in 8-pin MSOP packages are presented below.

For complete information on the MSOP-8 package, see the California Micro Devices MSOP Package Information document.

PACKAGE DIMENSIONS				
Package	MSOP			
Pins	8			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	0.87	1.17	0.034	0.046
A1	0.05	0.25	0.002	0.010
B	0.30 (typ)		0.012 (typ)	
C	0.18		0.007	
D	2.90	3.10	0.114	0.122
E	2.90	3.10	0.114	0.122
e	0.65 BSC		0.025 BSC	
H	4.78	4.98	0.188	0.196
L	0.52	0.54	0.017	0.025
# per tube	80 pieces*			
# per tape and reel	4000 pieces			
Controlling dimension: inches				

\* This is an approximate amount which may vary.



Package Dimensions for MSOP-8