

Low Capacitance Transient Voltage Suppressors / ESD Protectors

Features

- Low I/O capacitance at 7pF typical
- In-system ESD protection to $\pm 15\text{kV}$ contact discharge, per the IEC 61000-4-2 international standard
- Two, three, four or five channels of ESD protection
- Compact SMT package saves board space and facilitates layout in space-critical applications
- Each I/O pin can withstand over 1000 ESD strikes
- Lead-free versions available

Applications

- High-speed consumer electronic ports
- 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

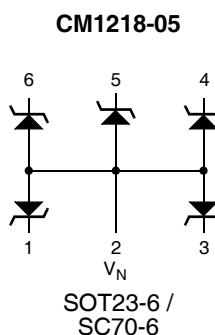
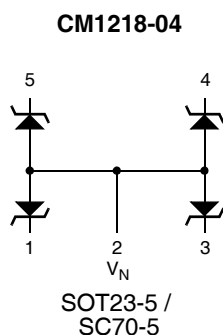
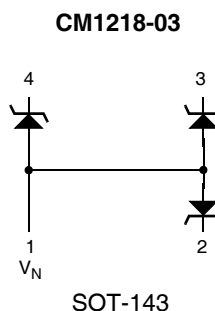
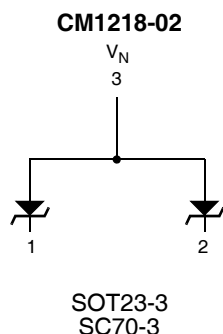
Product Description

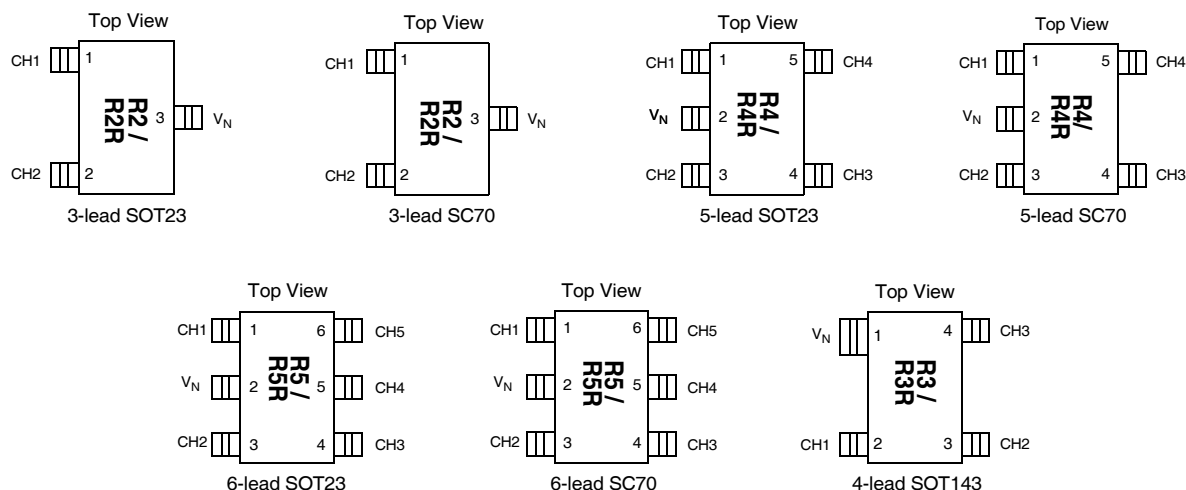
The CM1218 family of devices features transient voltage suppressor arrays that provide a very high level of protection for sensitive electronic components which may be subjected to electrostatic discharge (ESD).

All pins of the CM1218 are rated to withstand $\pm 15\text{kV}$ 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 $\pm 30\text{kV}$.

The CM1218 is supplied in a number of compact, surface mount packages depending on the channel configuration desired. All versions of this device are available with optional lead-free finishing.

Electrical Schematics



PACKAGE / PINOUT DIAGRAMS


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

PIN DESCRIPTIONS

LEADS	NAME	DESCRIPTION
(Refer to package / pinout diagrams)	CHx	The cathode of the respective TVS diode, which should be connected to the node requiring transient voltage protection.
(Refer to package / pinout diagrams)	V _N	The anode of the TVS diodes.

Ordering Information
PART NUMBERING INFORMATION

Leads	Package	Standard Finish		Lead-free Finish	
		Ordering Part Number ¹	Part Marking	Ordering Part Number ¹	Part Marking
3	SOT23-3	CM1218-02ST	R2	CM1218-02SO	R2R
3	SC70-3	CM1218-02SC	R2	CM1218-02S7	R2R
4	SOT143	CM1218-03SS	R3	CM1218-03SR	R3R
5	SOT23-5	CM1218-04ST	R4	CM1218-04SO	R4R
5	SC70-5	CM1218-04SC	R4	CM1218-04S7	R4R
6	SOT23-6	CM1218-05ST	R5	CM1218-05SO	R5R
6	SC70-6	CM1218-05SC	R5	CM1218-05S7	R5R

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

Specifications

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNITS
Storage Temperature Range	-65 to +150	°C
Package Power Dissipation SC70 SOT23-3, SOT23-5, SOT23-6, SOT143	0.2 0.225	W W

STANDARD OPERATING CONDITIONS

PARAMETER	RATING	UNITS
Operating Temperature	-40 to +85	°C

ELECTRICAL OPERATING CHARACTERISTICS (NOTE 1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
C_{IN}	Channel Input Capacitance	$T_A = 25^{\circ}\text{C}$, 2.5VDC, 1MHz; Note 2		7		pF
ΔC_{IN}	Differential Channel I/O to GND Capacitance	$T_A = 25^{\circ}\text{C}$, 2.5VDC, 1MHz; Note 2		0.19		pF
V_{RSO}	Reverse Stand-off Voltage	$I_R = 10\mu\text{A}$, $T_A = 25^{\circ}\text{C}$	5.5			V
		$I_R = 1\text{mA}$, $T_A = 25^{\circ}\text{C}$	6.1			V
I_{LEAK}	Leakage Current	$V_{IN} = 5.0\text{VDC}$, $T_A = 25^{\circ}\text{C}$			1	μA
V_{SIG}	Small Signal Clamp Voltage Positive Clamp Negative Clamp	$I = 10\text{mA}$, $T_A = 25^{\circ}\text{C}$		6.8		V
		$I = -10\text{mA}$, $T_A = 25^{\circ}\text{C}$		-0.8		V
V_{ESD}	ESD Withstand Voltage Contact Discharge per IEC 61000-4-2 standard Human Body Model, MIL-STD-883, Method 3015	Notes 2, 4 & 5; $T_A = 25^{\circ}\text{C}$	± 15			kV
		Notes 2, 3 & 5; $T_A = 25^{\circ}\text{C}$	± 30			kV
R_D	Diode Dynamic Resistance Forward Conduction Reverse Conduction	$T_A = 25^{\circ}\text{C}$; Notes 2 & 3		1.1		Ω
				2.7		Ω

Note 1: All parameters specified at $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ unless otherwise noted.

Note 2: These parameters guaranteed by design and characterization.

Note 3: Human Body Model per MIL-STD-883, Method 3015, $C_{\text{Discharge}} = 100\text{pF}$, $R_{\text{Discharge}} = 1.5\text{K}\Omega$, V_N grounded.

Note 4: Standard IEC 61000-4-2 with $C_{\text{Discharge}} = 150\text{pF}$, $R_{\text{Discharge}} = 330\Omega$, V_N grounded.

Note 5: These measurements performed with no external capacitor on CH_X .

Performance Information

Diode Capacitance

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

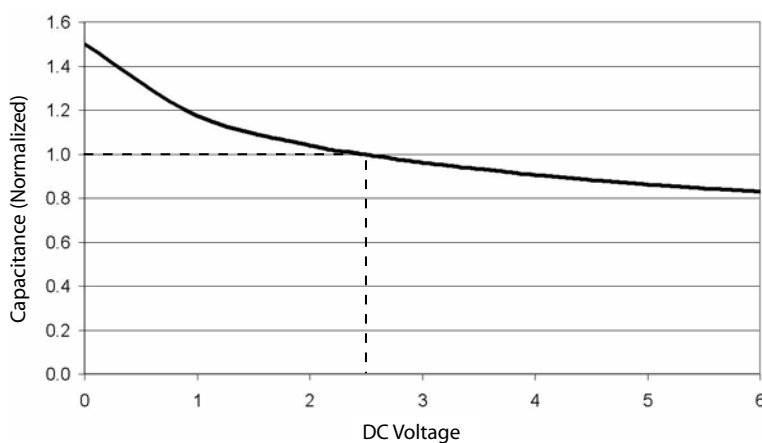


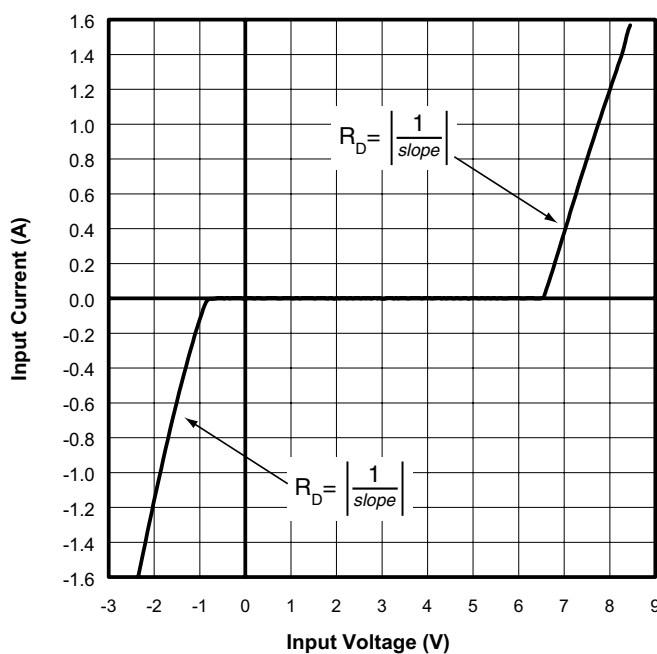
Figure 1. Diode Capacitance vs. Reverse Voltage

Typical High Current Diode Characteristics

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

Typical Input VI Characteristics

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



Mechanical Details

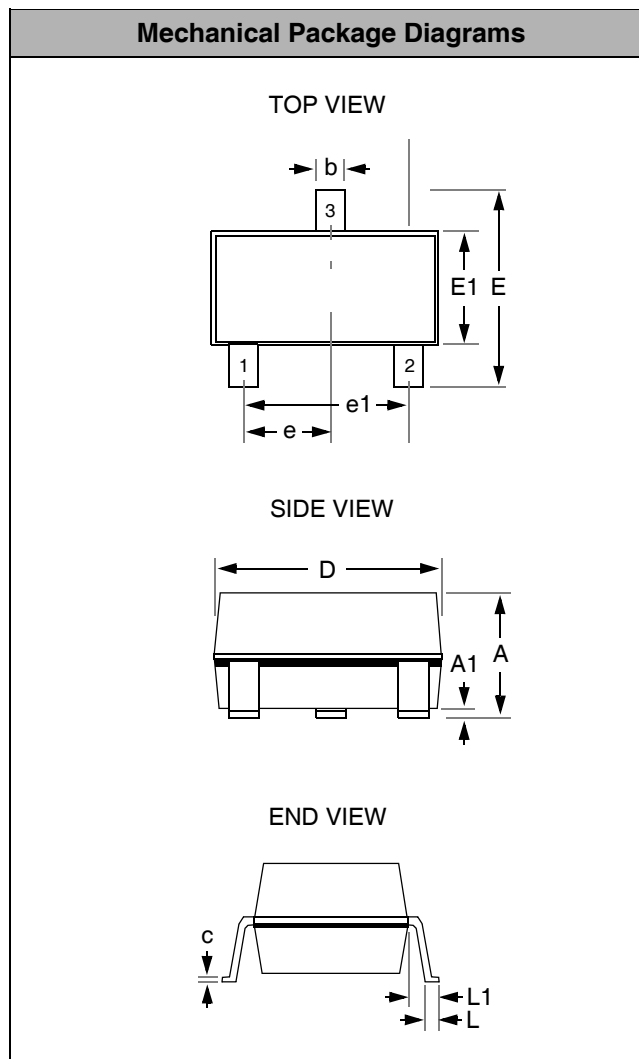
CM1218 devices are supplied in the following packages: SOT23-3, SOT143, SOT23-5, SOT23-6, SC70-3, SC70-5, and SC70-6.

SOT23-3 Mechanical Specifications

Dimensions for CM1218-02ST/SO devices supplied in 3-pin SOT23 packages are presented below.

For complete information on the SOT23-3, 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)

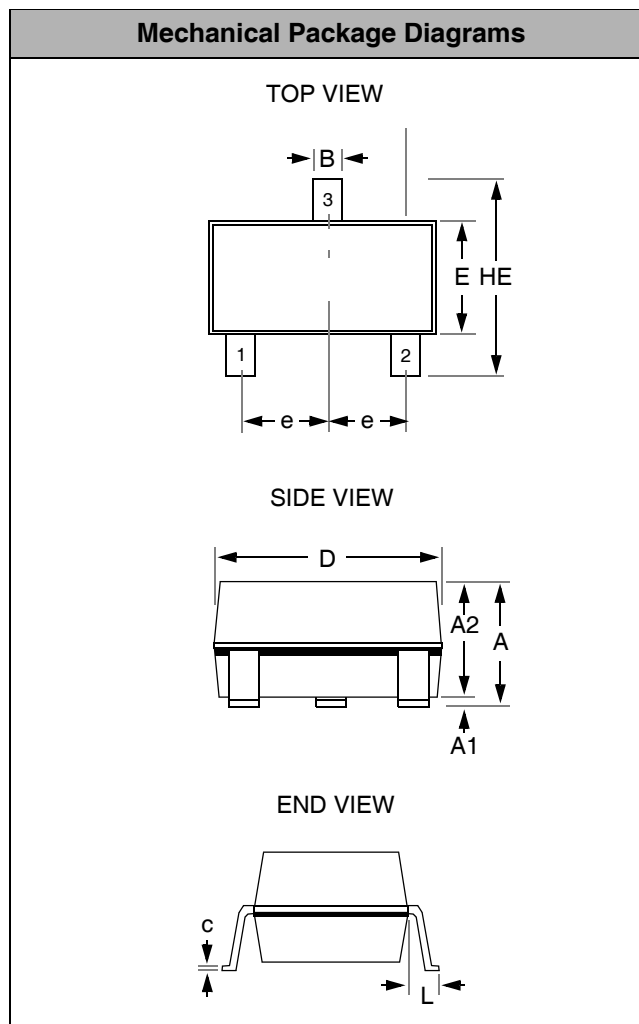
SC70-3 Mechanical Specifications:

Dimensions for CM1218-02SC/S7 device supplied in 3-pin SC70 packages are presented below.

For complete information on the SC70-3, 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
# / tube	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

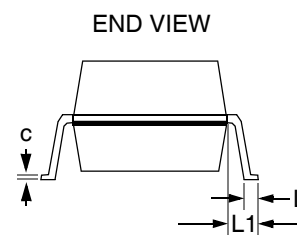
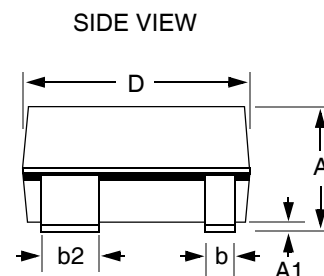
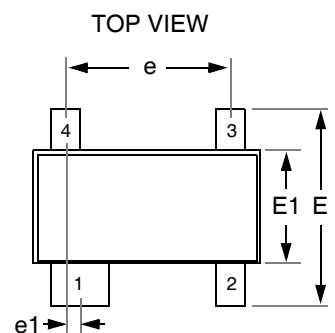
Dimensions for CM1218-03SS/SR devices supplied in 4-pin SOT143 packages are presented below.

For complete information on the SOT143, 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				

* This is an approximate amount which may vary.

Mechanical Package Diagrams



Package Dimensions for SOT143.

Mechanical Details (continued)

SOT23-5 Mechanical Specifications

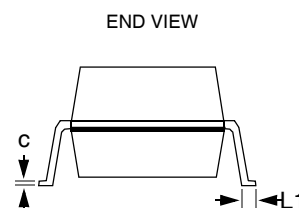
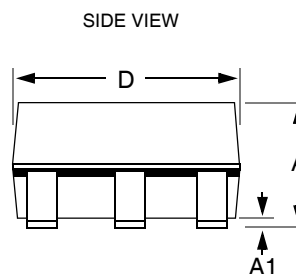
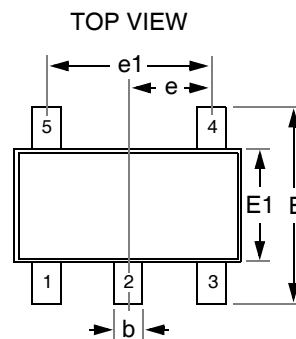
Dimensions for CM1218-04ST/SO devices supplied in 5-pin SOT23 packages are presented below.

For complete information on the SOT23-5, 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.

Mechanical Package Diagrams



Package Dimensions for SOT23-5.

Mechanical Details (continued)

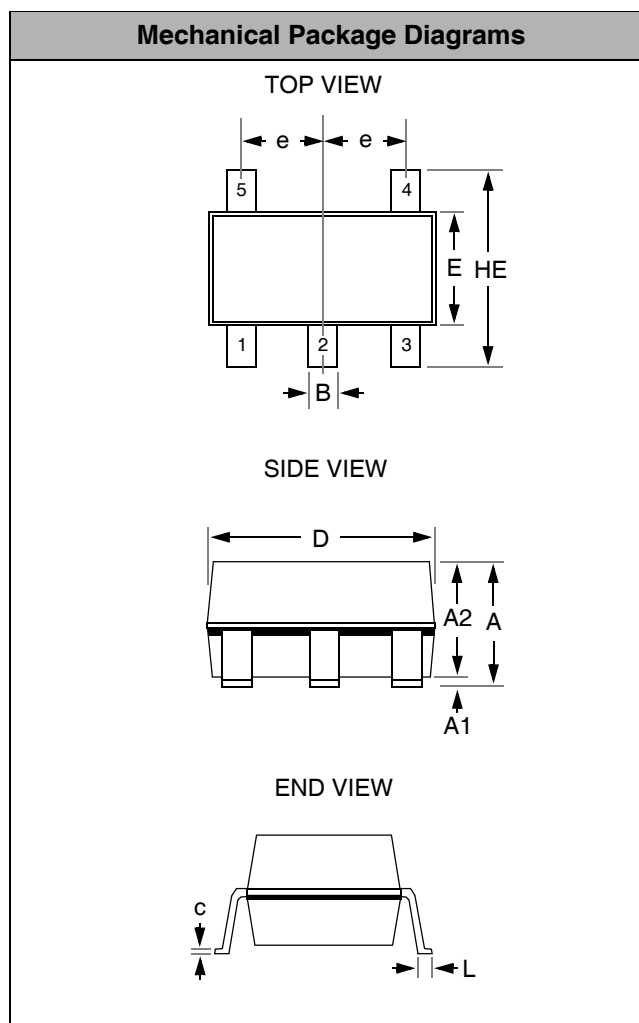
SC70-5 Mechanical Specifications:

Dimensions for CM1218-04SC/S7 devices supplied in 5-pin SC70 packages are presented below.

For complete information on the SC70-5, 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
# / tube	1000 pieces*	
# / tape and reel	3000 pieces*	

* This is an approximate amount which may vary.



Package Dimensions for SC70-5

Mechanical Details (continued)

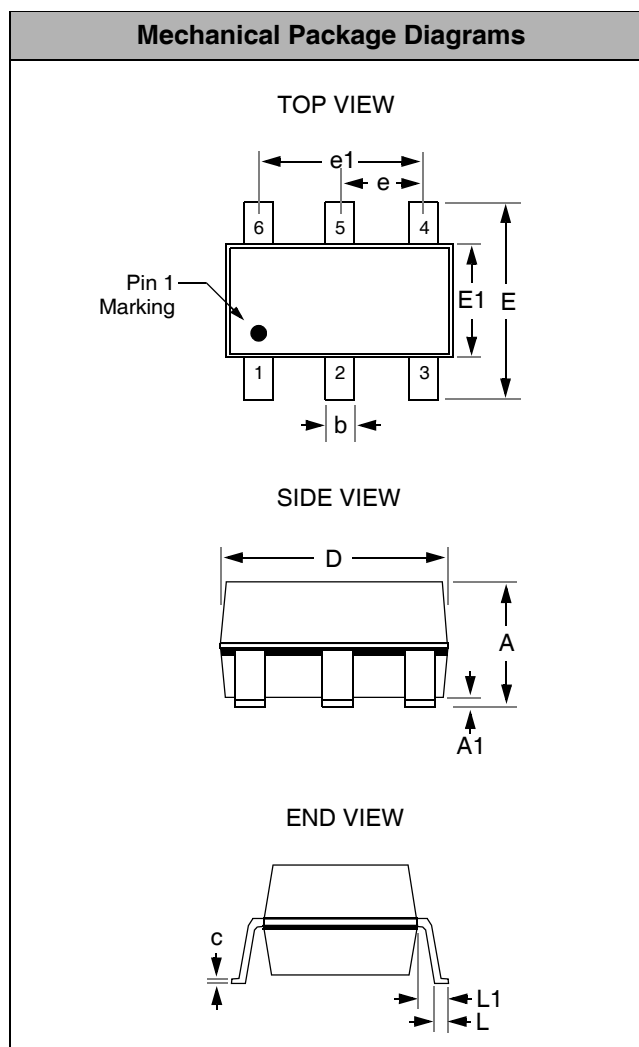
SOT23-6 Mechanical Specifications:

Dimensions for CM1218-05ST/SO devices supplied in 6-pin SOT23 packages are presented below.

For complete information on the SOT23-6, 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)

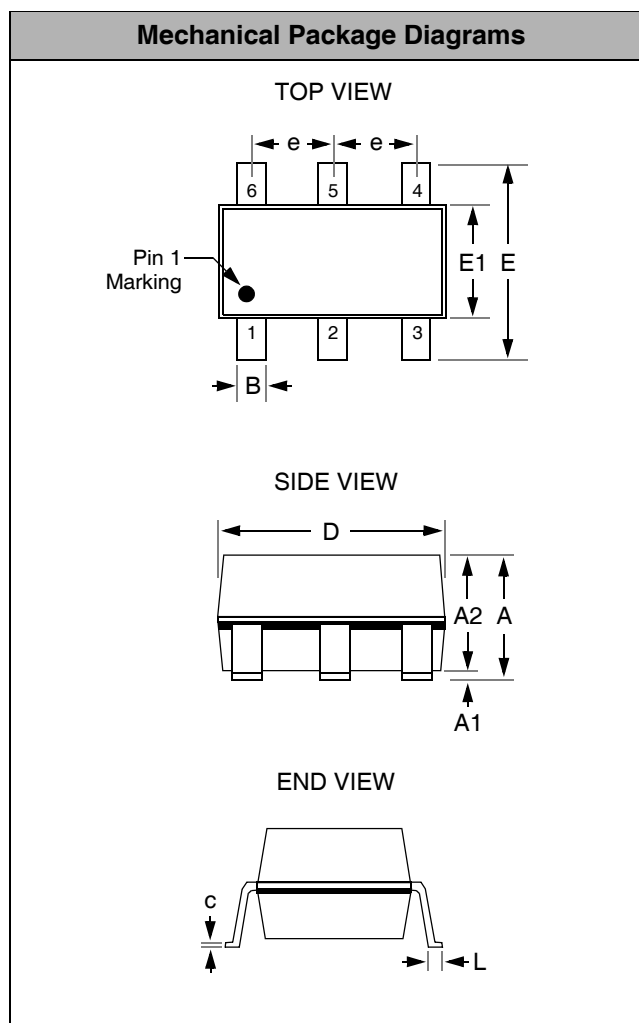
SC70-6 Mechanical Specifications:

Dimensions for CM1218-05SC/S7 devices supplied in 6-pin SC70 packages are presented below.

For complete information on the SC70-6, 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
# / tube	1000 pieces*	
# / tape and reel	3000 pieces*	

* This is an approximate amount which may vary.



Package Dimensions for SC70-6.