

## Low Capacitance Transient Voltage Suppressors / ESD Protectors

### Features

- Low I/O capacitance at 7pF typical
- Two, three, four or five channels of ESD protection
- In-system ESD protection to  $\pm 15\text{kV}$  contact discharge, per the IEC 61000-4-2 international standard
- 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 packaging

### 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

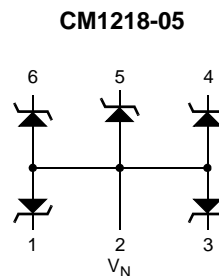
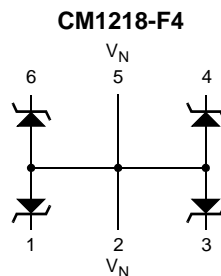
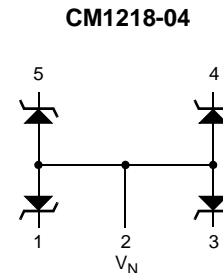
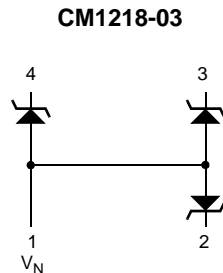
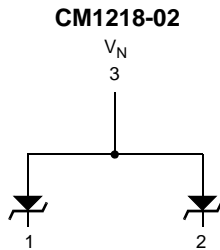
### Product Description

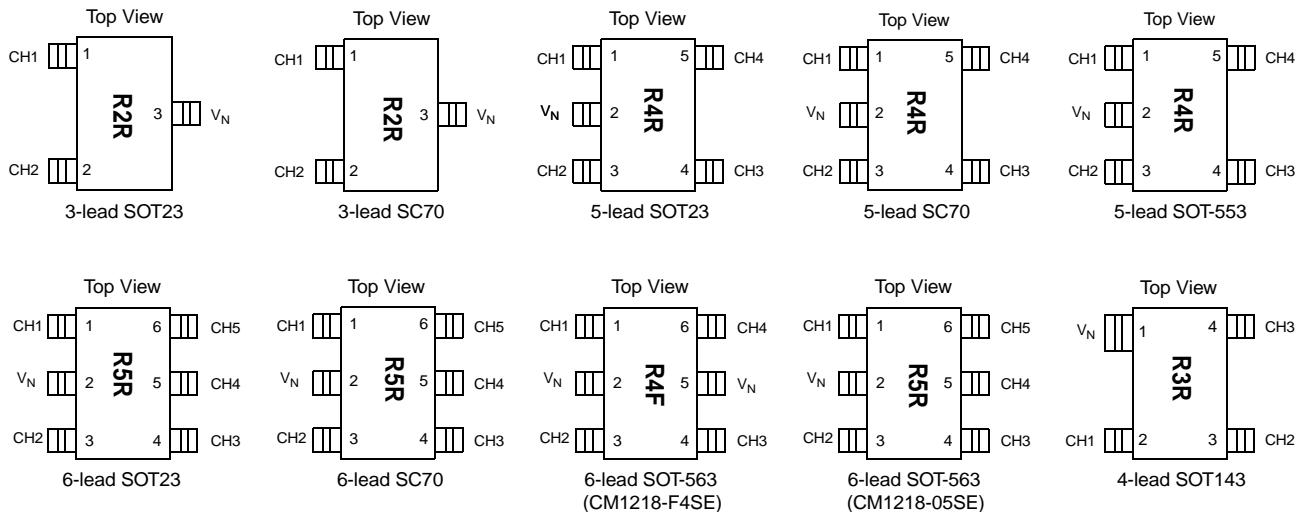
The CM1218 family of devices features transient voltage suppressor arrays that provide a very high level of protection for sensitive electronic components which may be subjected to electrostatic discharge (ESD).

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.

### 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 <sub>N</sub>	The anode of the TVS diodes.

**Ordering Information**
**PART NUMBERING INFORMATION**

Leads	Channels	Package	Lead-free Finish	
			Ordering Part Number <sup>1</sup>	Part Marking
3	2	SOT23-3	CM1218-02SO	R2R
3	2	SC70-3	CM1218-02S7	R2R
4	3	SOT143	CM1218-03SR	R3R
5	4	SOT23-5	CM1218-04SO	R4R
5	4	SOT-553	CM1218-04SE	R4R
5	4	SC70-5	CM1218-04S7	R4R
6	4	SOT-563	CM1218-F4SE	R4F
6	5	SOT23-6	CM1218-05SO	R5R
6	5	SOT-563	CM1218-05SE	R5R
6	5	SC70-6	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	0.2	W
SOT23-3, SOT23-5, SOT23-6, SOT143	0.225	W
SOT-553, SOT-563	0.15	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
$\Delta C_{IN}$	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	$\mu\text{A}$
$V_{SIG}$	Small Signal Clamp Voltage	Positive Clamp		6.8		V
		Negative Clamp		-0.8		V
$V_{ESD}$	ESD Withstand Voltage	Contact Discharge per IEC 61000-4-2 standard	Notes 2, 4 & 5; $T_A = 25^\circ\text{C}$	$\pm 15$		kV
		Human Body Model, MIL-STD-883, Method 3015	Notes 2, 3 & 5; $T_A = 25^\circ\text{C}$	$\pm 30$		kV
$R_D$	Diode Dynamic Resistance	Forward Conduction	$T_A = 25^\circ\text{C}$ ; Notes 2 & 3	1.1		$\Omega$
				2.7		$\Omega$

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,  $C_{Discharge} = 100\text{pF}$ ,  $R_{Discharge} = 1.5\text{K}\Omega$ ,  $V_N$  grounded.

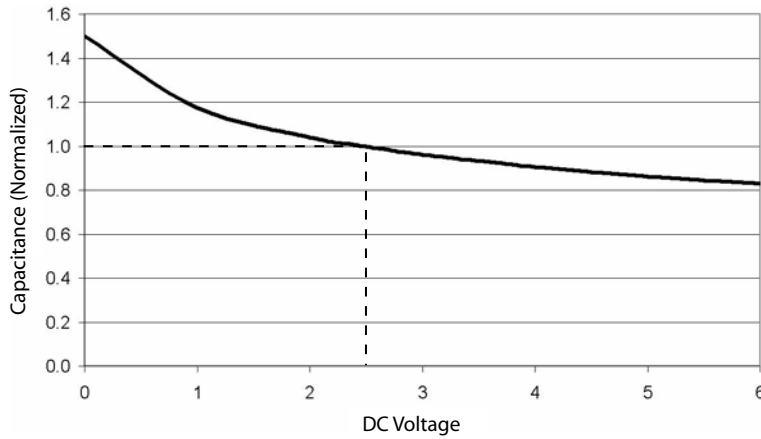
Note 4: Standard IEC 61000-4-2 with  $C_{Discharge} = 150\text{pF}$ ,  $R_{Discharge} = 330\Omega$ ,  $V_N$  grounded.

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.



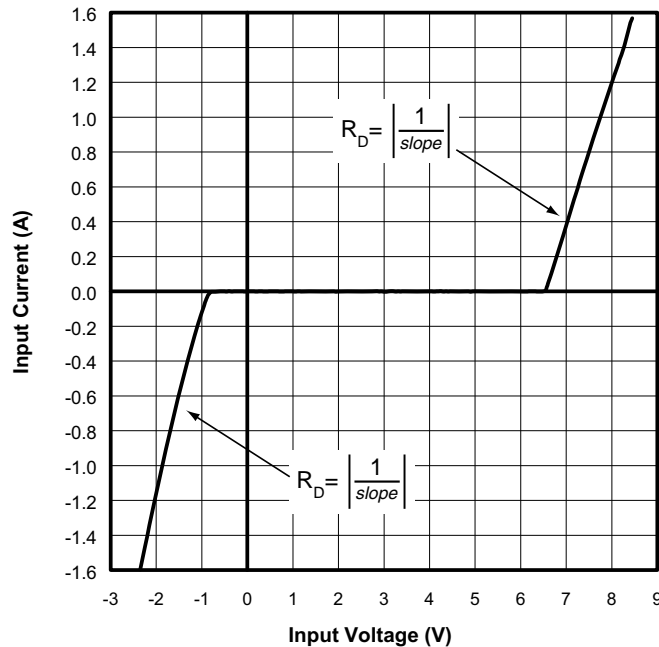
**Figure 1. Diode Capacitance vs. Reverse Voltage**

### 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)



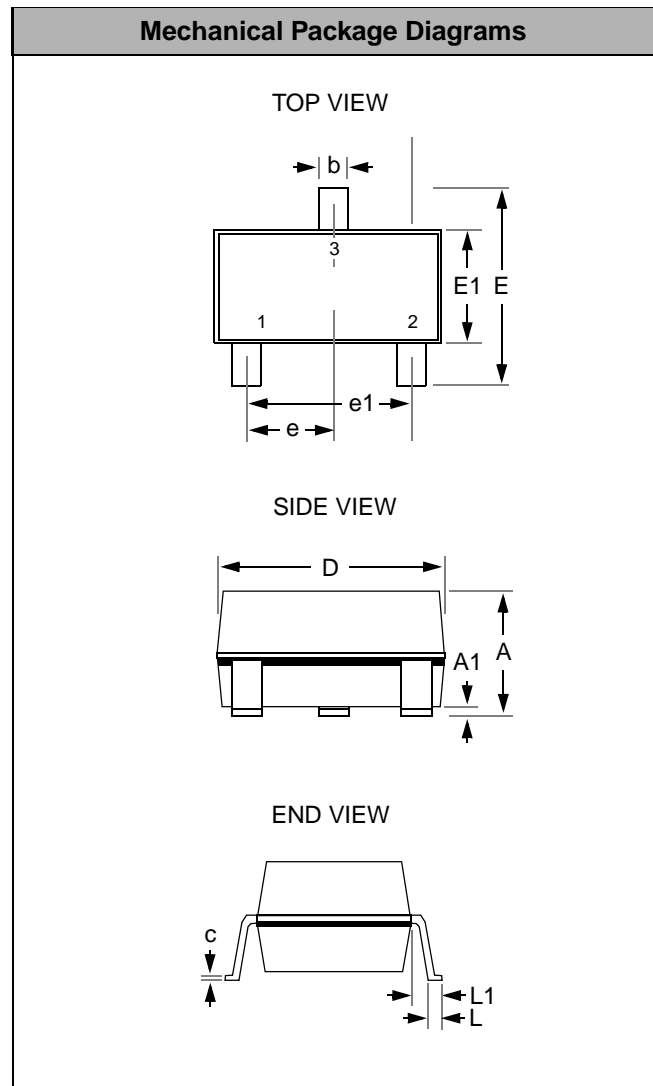
## Mechanical Details

CM1218 devices are supplied in the following packages: SOT23-3, SOT23-5, SOT23-6, SOT143, SOT553, SOT563, SC70-3, SC70-5, and SC70-6.

### SOT23-3 Mechanical Specifications

The CM1218-02SO is supplied in a 3-pin SOT23 package. Dimensions are presented below.

PACKAGE DIMENSIONS				
Package	SOT23-3 (JEDEC name is TO-236)			
JEDEC No.	TO-236 (Var. AB)			
Pins/Leads	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	0.60 REF		0.0236 REF	
# per tape and reel	3000 pieces			
Controlling dimension: millimeters				



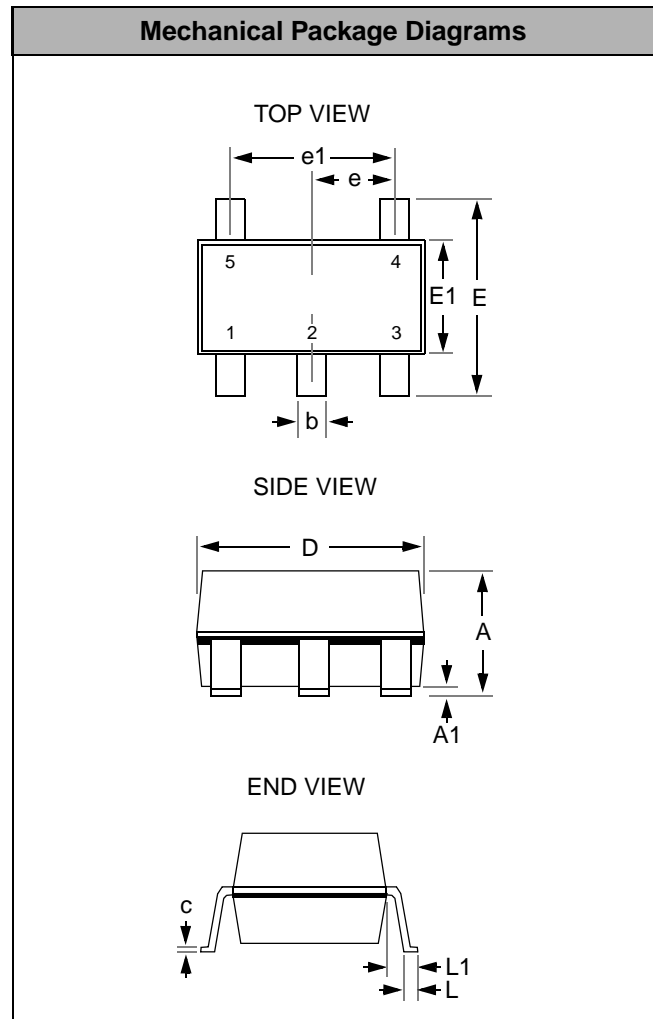
Package Dimensions for SOT23-3.

## Mechanical Details (cont'd)

### SOT23-5 Mechanical Specifications

The CM1218-04SO is supplied in a 5-pin SOT23 package. Dimensions are presented below.

PACKAGE DIMENSIONS				
Package	SOT23-5			
JEDEC No.	MO-178 (Var. AA)			
Pins/Leads	5			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	--	1.45	--	0.0571
A1	0.00	0.15	0.0000	0.0059
b	0.30	0.50	0.0118	0.0197
c	0.08	0.22	0.0031	0.0087
D	2.75	3.05	0.1083	0.1201
E	2.60	3.00	0.1024	0.1181
E1	1.45	1.75	0.0571	0.0689
e	0.95 BSC		0.0374 BSC	
e1	1.90 BSC		0.0748 BSC	
L	0.30	0.60	0.0118	0.0236
L1	0.60 REF		0.0236 REF	
# per tape and reel	3000 pieces			
Controlling dimension: millimeters				



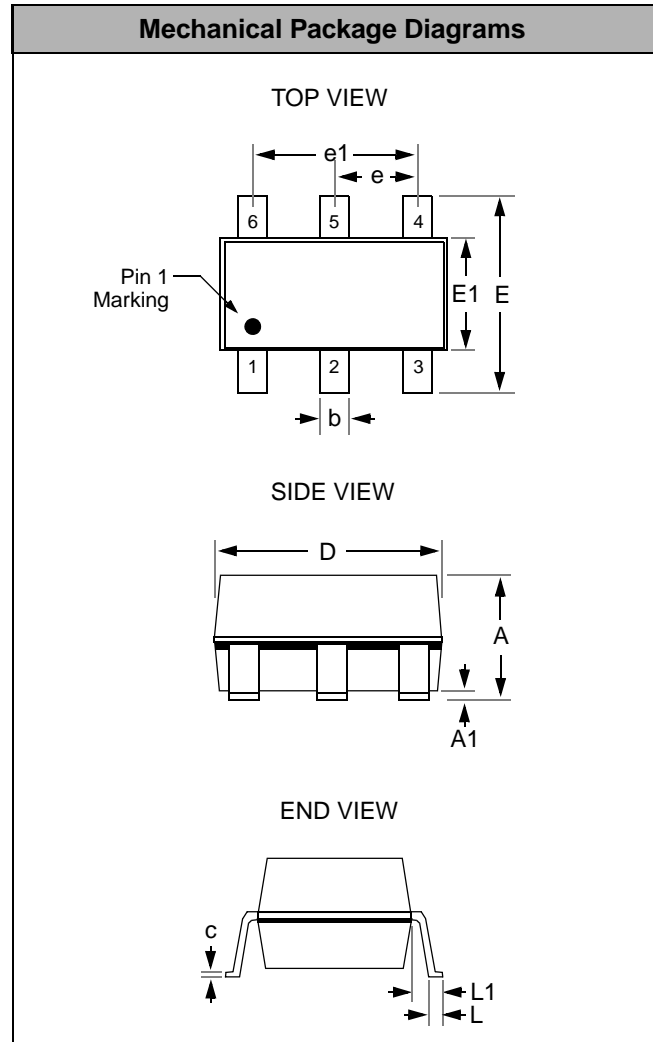
Package Dimensions for SOT23-5.

## Mechanical Details

### SOT23-6 Mechanical Specifications:

The CM1218-05SO is supplied in a 6-pin SOT23 package. Dimensions are presented below.

PACKAGE DIMENSIONS				
Package	SOT23-6			
JEDEC No.	MO-178 (Var. AB)			
Pins/Leads	6			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	--	1.45	--	0.0571
A1	0.00	0.15	0.0000	0.0059
b	0.30	0.50	0.0118	0.0197
c	0.08	0.22	0.0031	0.0087
D	2.75	3.05	0.1083	0.1201
E	2.60	3.00	0.1024	0.1181
E1	1.45	1.75	0.0571	0.0689
e	0.95 BSC		0.0374 BSC	
e1	1.90 BSC		0.0748 BSC	
L	0.30	0.60	0.0118	0.0236
L1	0.60 REF		0.0236REF	
# per tape and reel	3000 pieces			
Controlling dimension: millimeters				



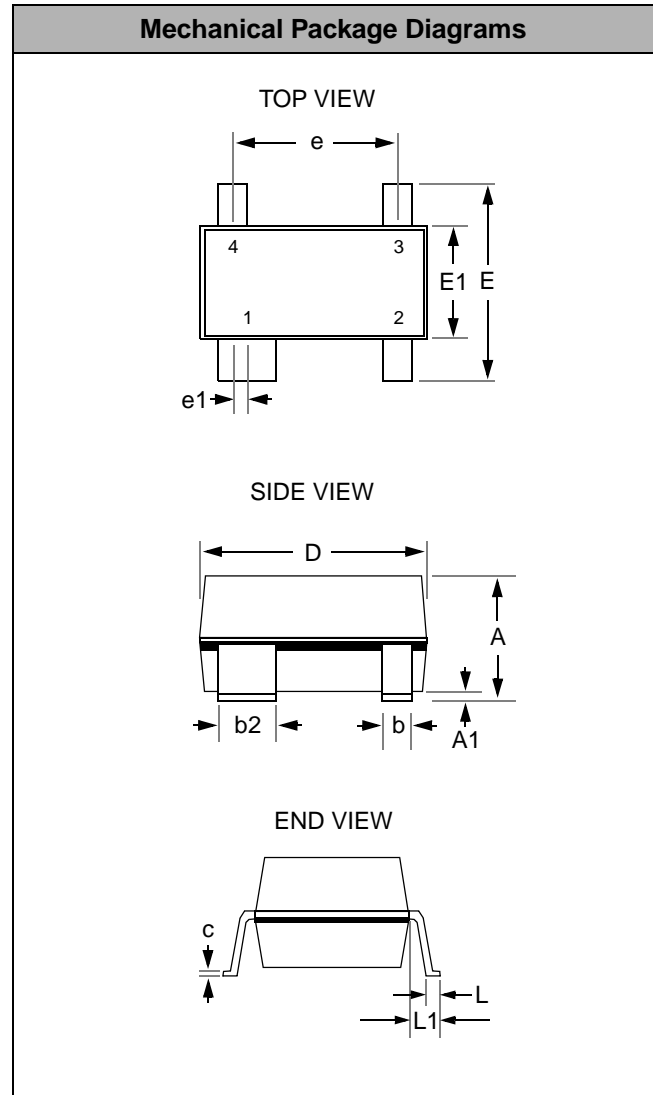
Package Dimensions for SOT23-6.

## Mechanical Details

### SOT143 Mechanical Specifications

The CM1218-03SR is supplied in a 4-pin SOT143 package. Dimensions are presented below.

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.

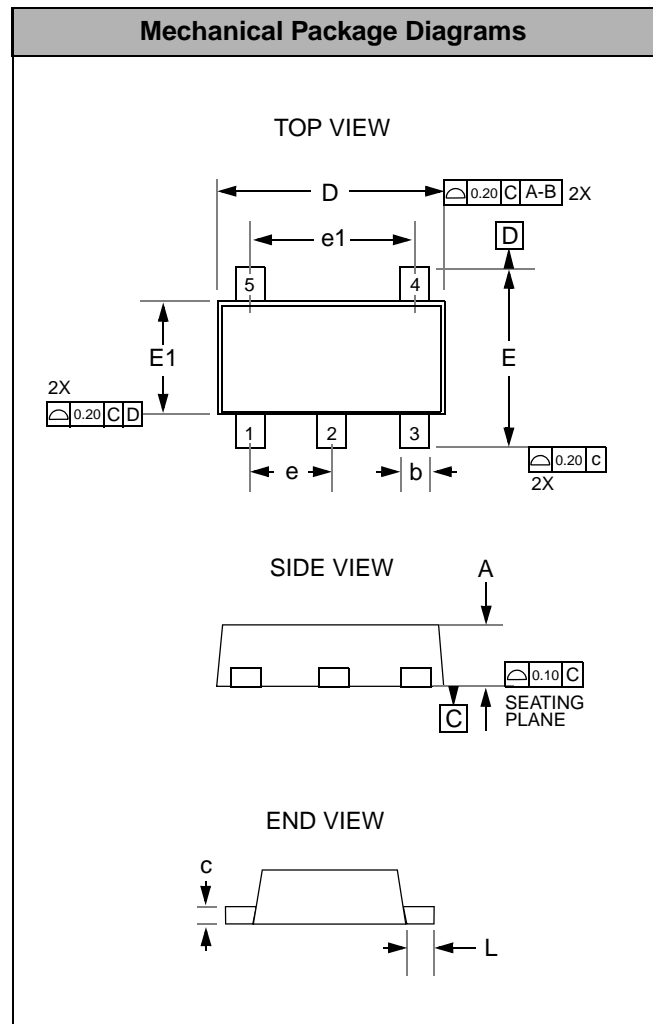


## Mechanical Details (continued)

### SOT-553 Mechanical Specifications

The CM1218-04SE is supplied in a 5-pin SOT-553 package. Dimensions are presented below.

PACKAGE DIMENSIONS						
Package	SOT-553					
Leads	5					
Dim.	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08	0.13	0.18	0.003	0.005	0.007
D	1.60 BSC			0.063 BSC		
E	1.60 BSC			0.063 BSC		
E1	1.20 BSC			0.047 BSC		
e	0.50 BSC			0.020 BSC		
e1	1.00 BSC			0.040 BSC		
L	0.20 BSC			0.008 BSC		
# per tape and reel	5000 pieces					
Controlling dimension: millimeters						



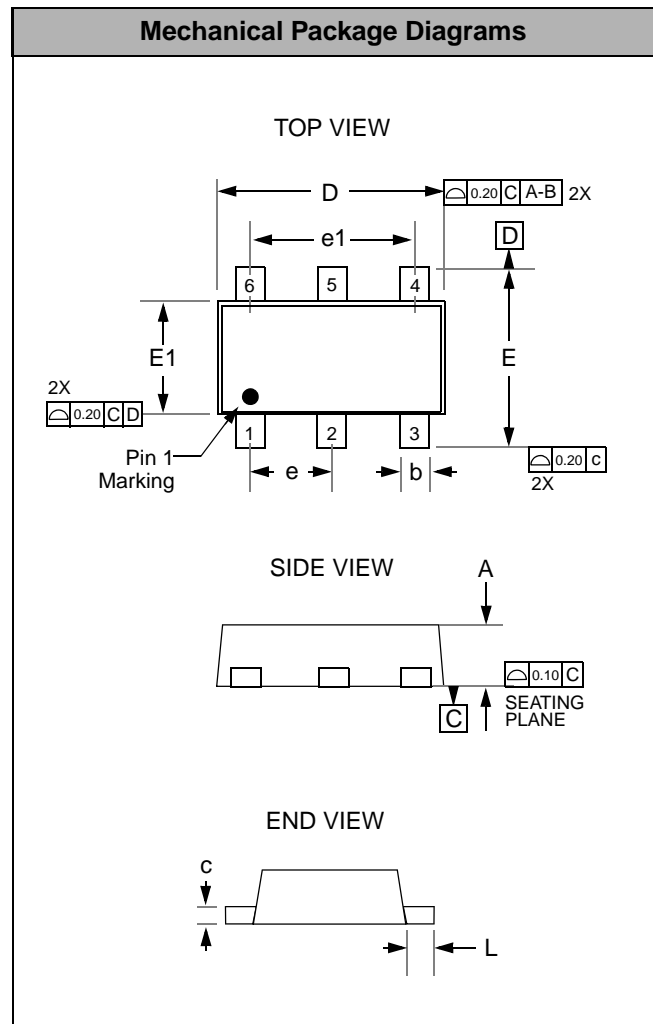
Package Dimensions for SOT-553.

## Mechanical Details (continued)

### SOT-563 Mechanical Specifications

The CM1218-F4SE is supplied in a 6-pin SOT-563 package. Dimensions are presented below.

PACKAGE DIMENSIONS						
Package	SOT-563					
Leads	6					
Dim.	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08	0.13	0.18	0.003	0.005	0.007
D	1.60 BSC			0.063 BSC		
E	1.60 BSC			0.063 BSC		
E1	1.20 BSC			0.047 BSC		
e	0.50 BSC			0.020 BSC		
e1	1.00 BSC			0.040 BSC		
L	0.20 BSC			0.008 BSC		
# per tape and reel	5000 pieces					
Controlling dimension: millimeters						



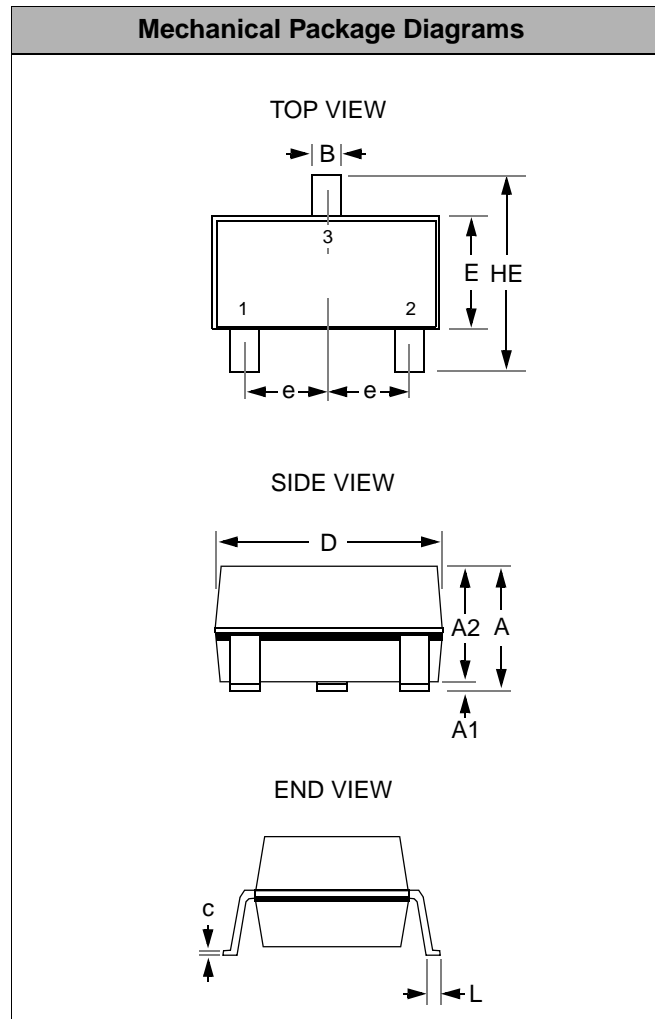
Package Dimensions for SOT-563.

## Mechanical Details (continued)

### SC70-3 Mechanical Specifications

The CM1218-02S7 is supplied in a 3-pin SC70 package. Dimensions are presented below.

PACKAGE DIMENSIONS		
Package	SC70-3 (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	0.40
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
# / tape and reel	3000 pieces	
Controlling dimension: millimeters		



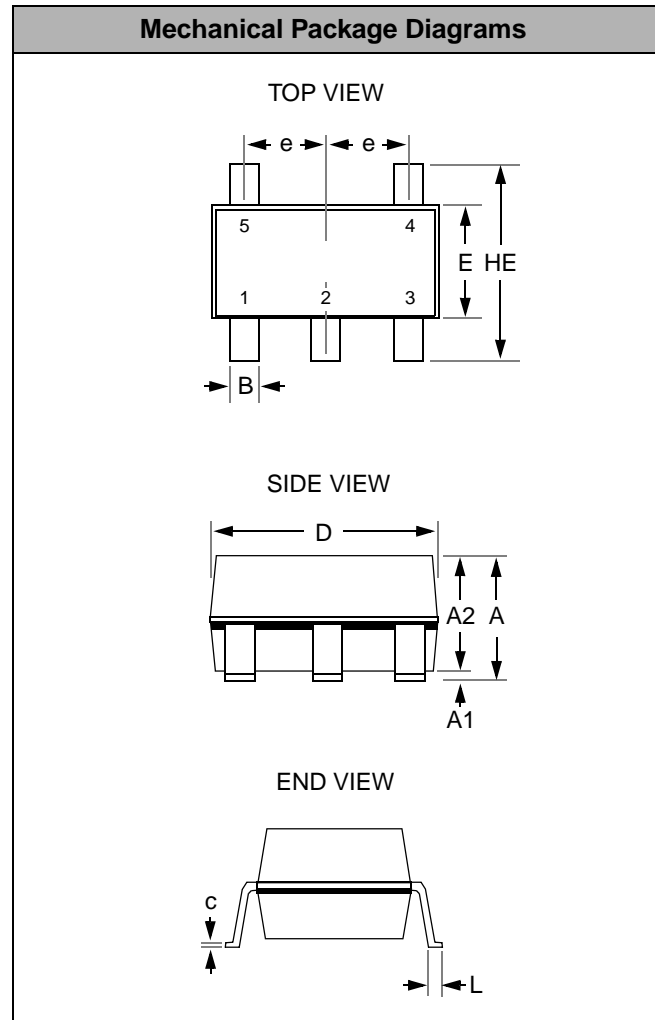
Package Dimensions for SC70-3.

## Mechanical Details (continued)

### SC70-5 Mechanical Specifications:

The CM1218-04S7 is supplied in a 5-pin SC70 package. Dimensions are presented below.

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
# / tape and reel	3000 pieces	
Controlling dimension: millimeters		



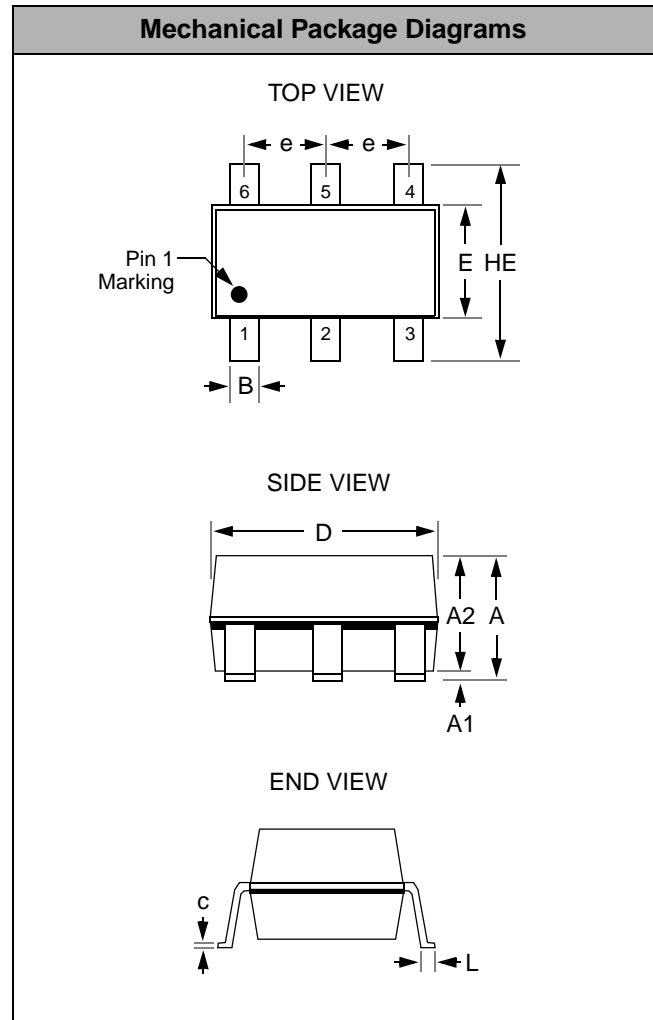
Package Dimensions for SC70-5.

## Mechanical Details (continued)

### SC70-6 Mechanical Specifications:

The CM1218-05S7 is supplied in a 6-pin SC70 package. Dimensions are presented below.

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



Package Dimensions for SC70-6.