



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

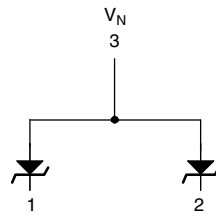
The CM1218 family of devices features transient voltage suppressor arrays that provide a very high level of protection for sensitive electronic components which may be subjected to electrostatic discharge (ESD).

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.

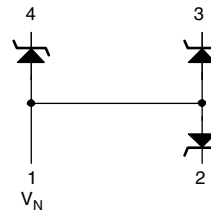
Electrical Schematics

CM1218-02



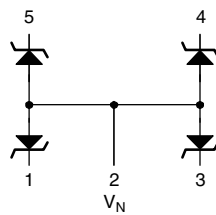
SOT23-3
SC70-3

CM1218-03



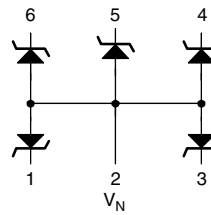
SOT-143

CM1218-04

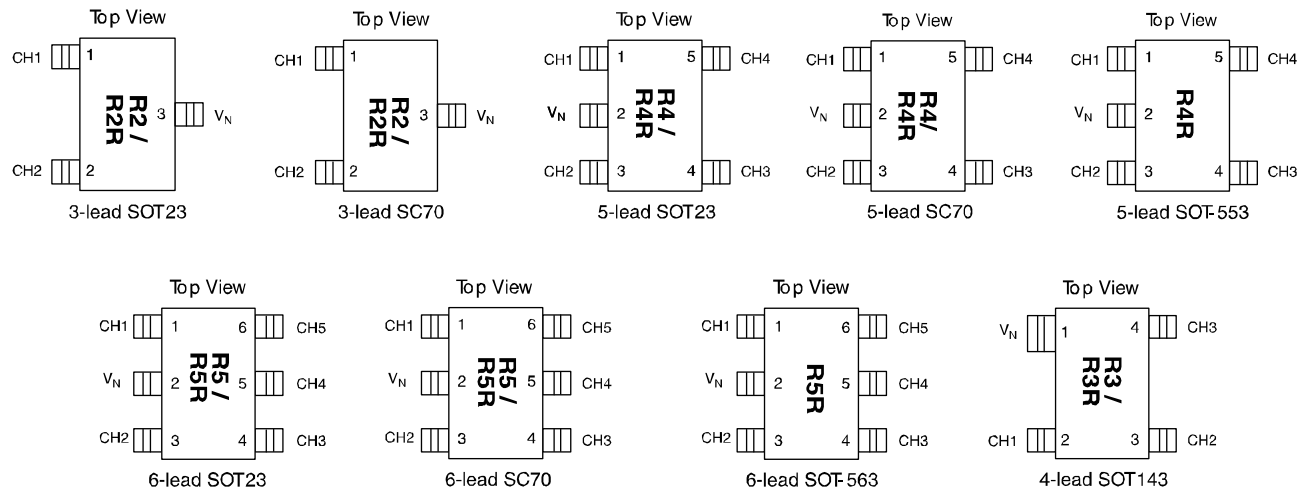


SOT23-5 / SOT-553
SC70-5

CM1218-05



SOT23-6 / SOT-563
SC70-6



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

CM1218

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 ²	Ordering Part Number ¹	Part Marking ²
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	SOT-553	CM1218-04SE	R4R	CM1218-04SE	R4R
5	SC70-5	CM1218-04SC	R4	CM1218-04S7	R4R
6	SOT23-6	CM1218-05ST	R5	CM1218-05SO	R5R
6	SOT-563	CM1218-05SE	R5R	CM1218-05SE	R5R
6	SC70-6	CM1218-05SC	R5	CM1218-05S7	R5R

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

Note 2: The SOT-553 and SOT-563 packages for leaded and lead-free finishing are the same. The maximum soldering reflow temperature for these packages is 240°C.

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 SOT-553, SOT-563	0.2 0.225 0.15	W W W

STANDARD OPERATING CONDITIONS

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

ELECTRICAL OPERATING CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
C_{IN}	Channel Input Capacitance	$T_A = 25^\circ\text{C}$, 2.5VDC, 1MHz		7		pF
ΔC_{IN}	Differential Channel I/O to GND Capacitance	$T_A = 25^\circ\text{C}$, 2.5VDC, 1MHz		0.19		pF
V_{RSO}	Reverse Stand-off Voltage	$I_R = 10\mu\text{A}$, $T_A = 25^\circ\text{C}$; Note 1	5.5	6.8	8.5	V
		$I_R = 1\text{mA}$, $T_A = 25^\circ\text{C}$; Note 1	6.1	6.8	8.8	V
I_{LEAK}	Leakage Current	$V_{IN} = 5.0\text{VDC}$, $T_A = 25^\circ\text{C}$; Note 1			1	μA
V_{SIG}	Small Signal Clamp Voltage Positive Clamp Negative Clamp	$I = 10\text{mA}$, $T_A = 25^\circ\text{C}$; Note 1	5.5	6.8	9.0	V
		$I = -10\text{mA}$, $T_A = 25^\circ\text{C}$	-0.4	-0.8	-1.20	V
V_{ESD}	ESD Withstand Voltage Contact Discharge per IEC 61000-4-2 standard Human Body Model, MIL-STD-883, Method 3015	Notes2 and 3; $T_A = 25^\circ\text{C}$	± 15			kV
		Notes1 and 3; $T_A = 25^\circ\text{C}$	± 30			kV
R_D	Diode Dynamic Resistance Forward Conduction Reverse Conduction	$T_A = 25^\circ\text{C}$; Note 1; Applied Pulse Width = 700 μs ; $I_{MAX} = 0.70\text{A}$. See Figure 2 to calculate R_D	0.8 2.2	1.1 2.7	1.4 3.2	Ω Ω

Note 1: 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 2: Standard IEC 61000-4-2 with $C_{Discharge} = 150\text{pF}$, $R_{Discharge} = 330\Omega$, V_N grounded.

Note 3: 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 Diode Capacitance vs. Reverse Voltage .

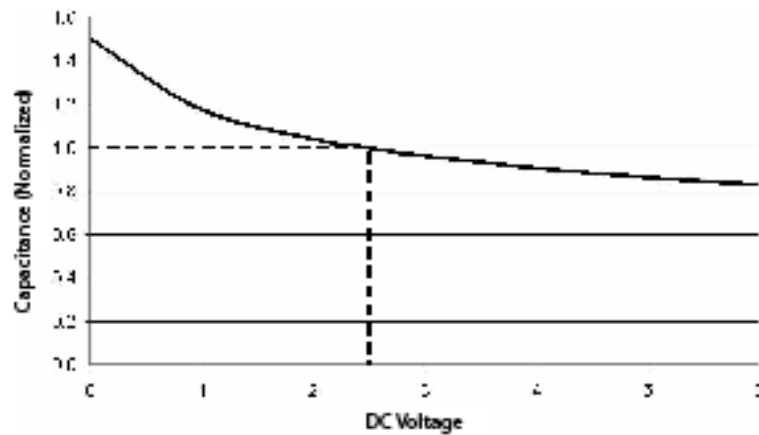


Figure 1. Diode Capacitance vs. Reverse Voltage

Typical High Current Diode Characteristics

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

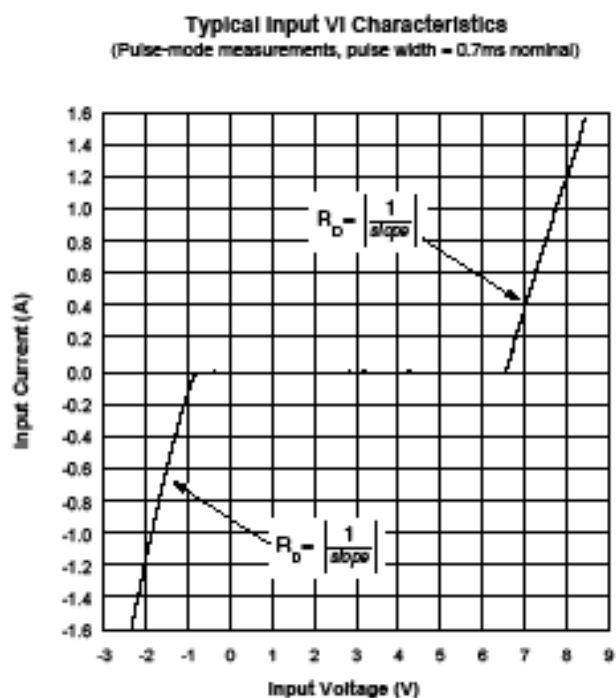


Figure 2. Input Voltage vs. Input Current Curve

Mechanical Details

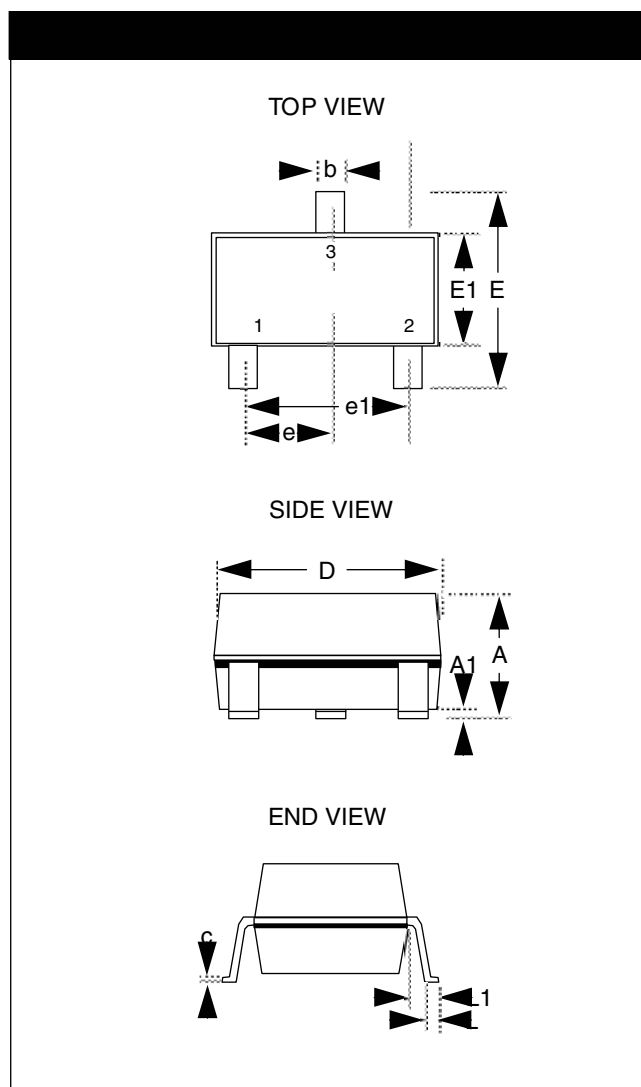
CM1218 devices are supplied in the following packages: SOT23-3, SOT23-5, SOT23-6, SOT143, SOT553, SOT563, SC70-3, SC70-5, and SC70-6.

SOT23-3 Mechanical Specifications

The CM1218-02ST/SO is supplied in a 3-pin SOT23 package. Dimensions 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)			
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

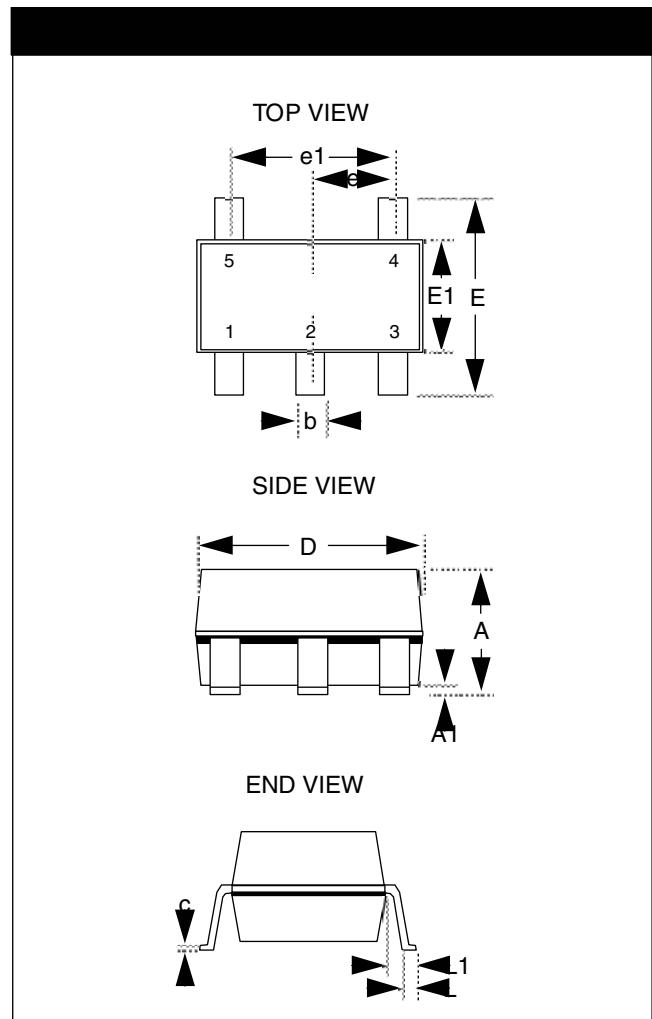
Mechanical Details (cont'd)

SOT23-5 Mechanical Specifications

The CM1218-04ST/SO is supplied in a 5-pin SOT23 package. Dimensions 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 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

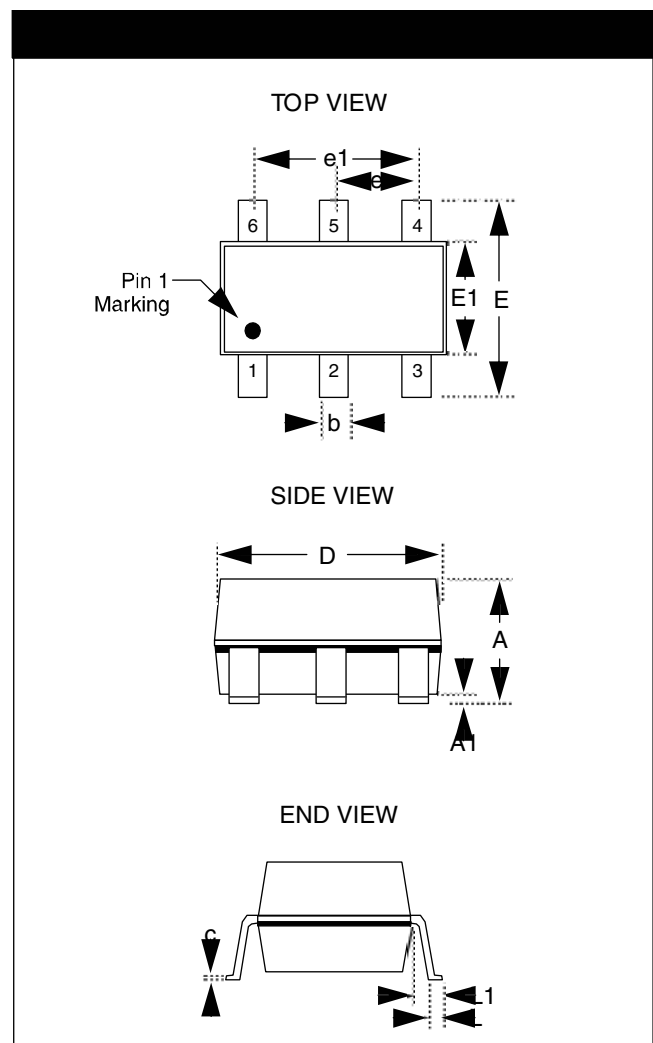
Mechanical Details

SOT23-6 Mechanical Specifications:

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

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

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

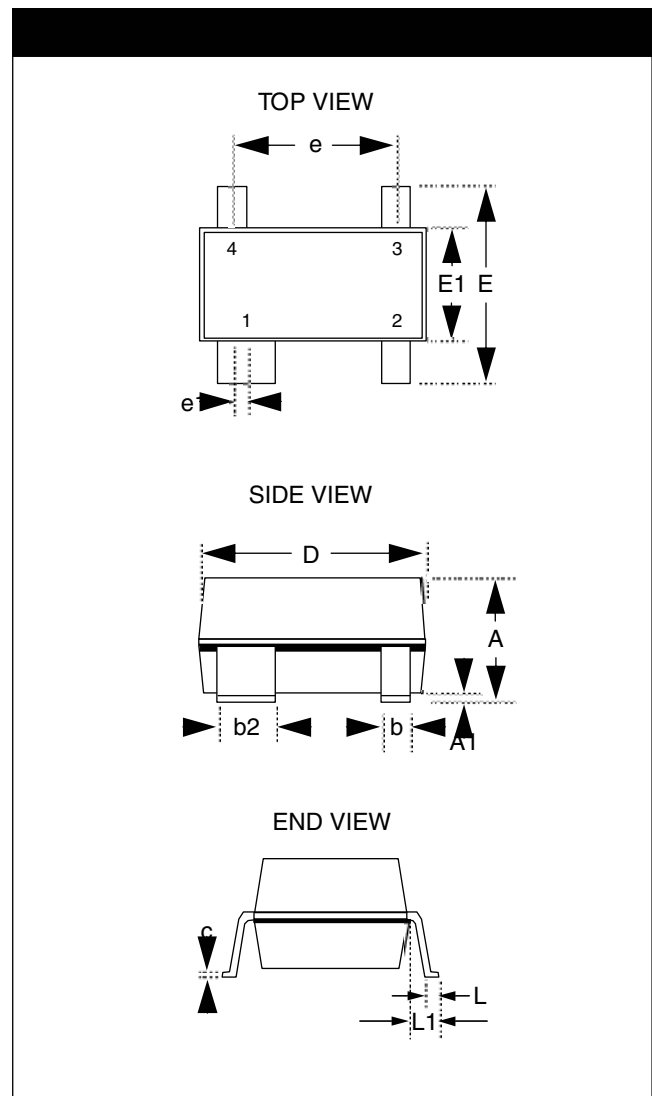
Mechanical Details

SOT143 Mechanical Specifications

The CM1218-03SS/SR is supplied in a 4-pin SOT143 package. Dimensions 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.

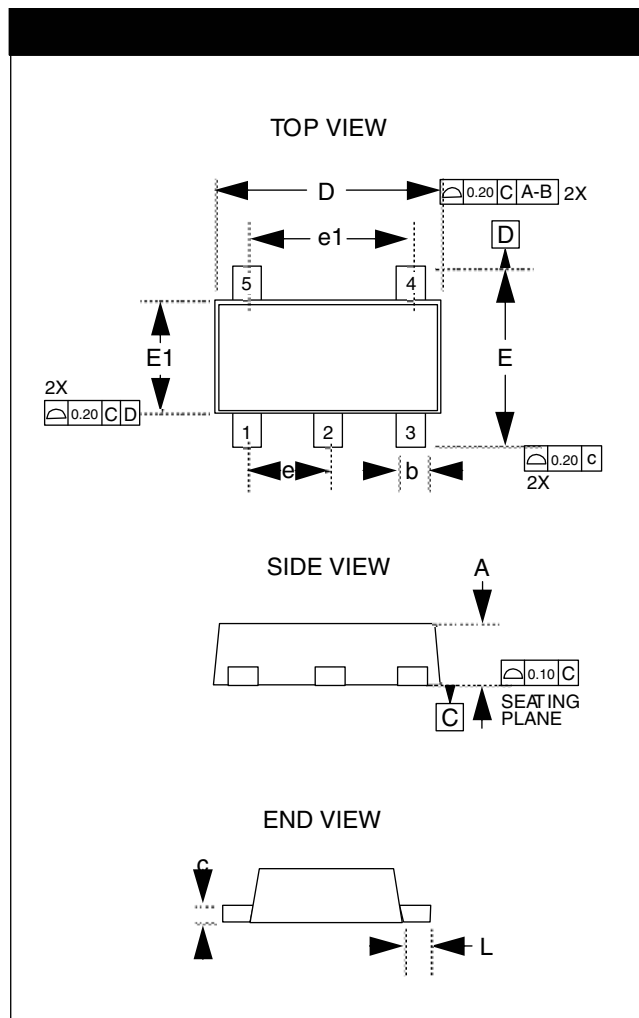
Mechanical Details (continued)

SOT-553 Mechanical Specifications

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

For complete information on the SOT-553, see the California Micro Devices SOT Package Information document.

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.

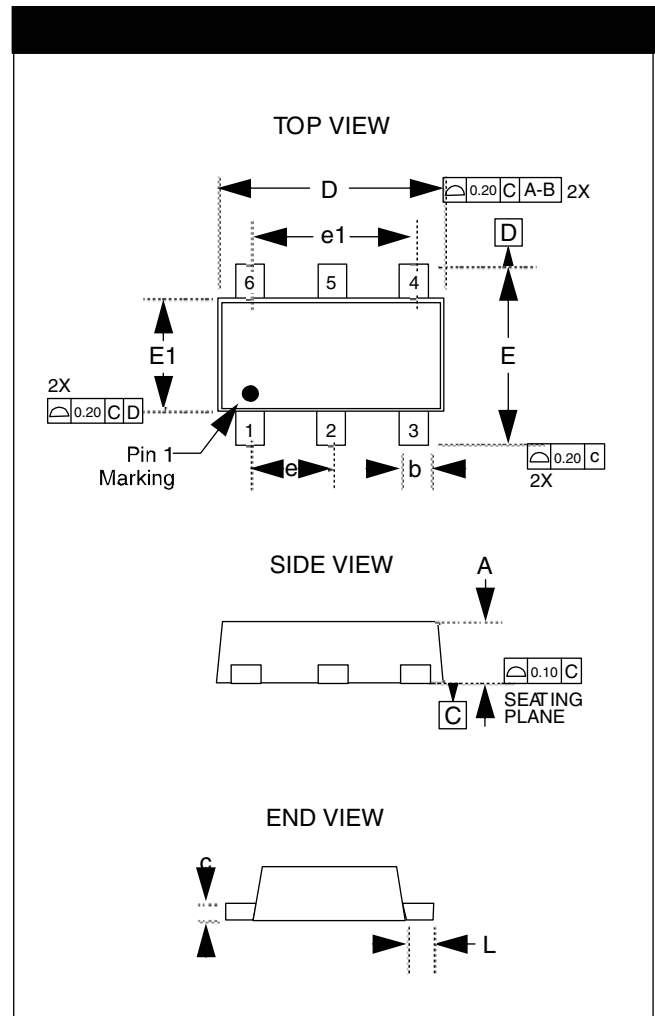
Mechanical Details (continued)

SOT-563 Mechanical Specifications

The CM1218-05SE is supplied in a 5-pin SOT-563 package. Dimensions are presented below.

For complete information on the SOT-563, see the California Micro Devices SOT Package Information document.

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.

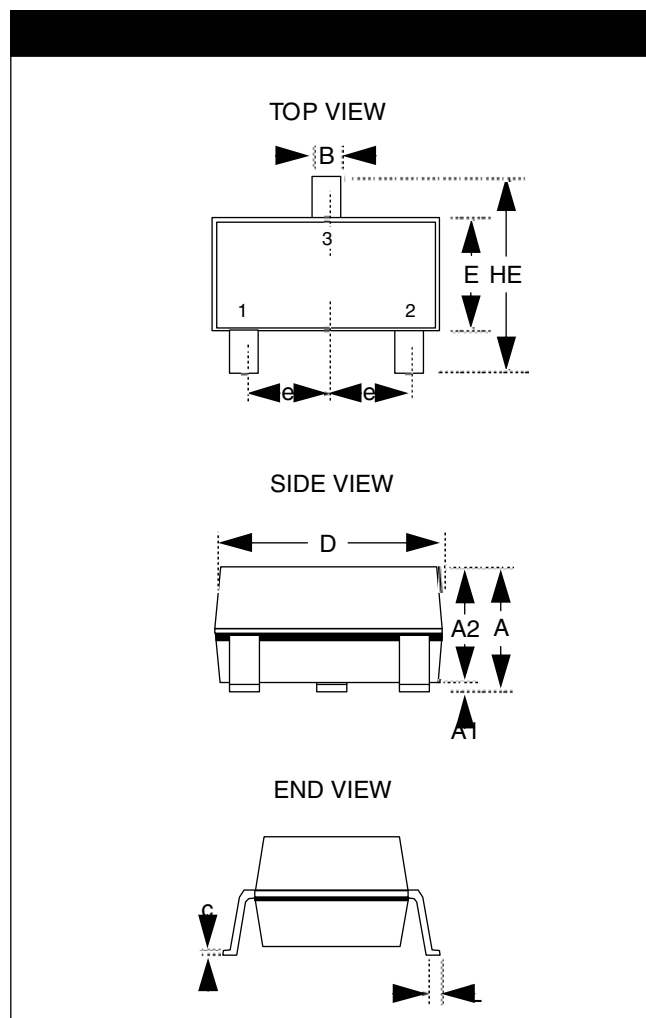
Mechanical Details (continued)

SC70-3 Mechanical Specifications

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

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

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	0.30
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 SC70-3.

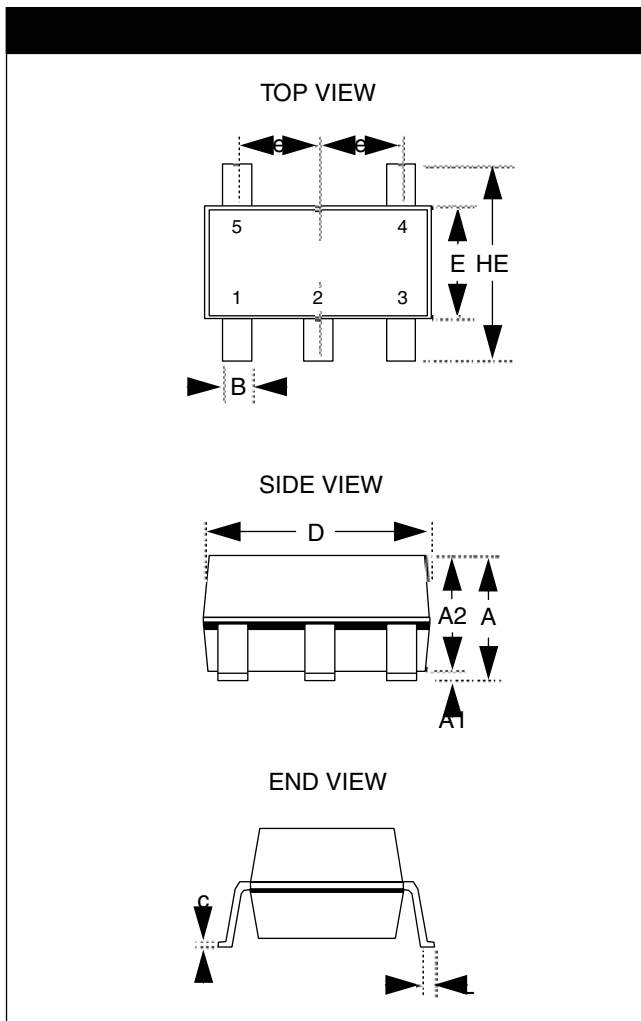
Mechanical Details (continued)

SC70-5 Mechanical Specifications:

The CM1218-04SC/S7 is supplied in a 5-pin SC70 package. Dimensions 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
# / tape and reel	3000 pieces	
Controlling dimension: millimeters		



Package Dimensions for SC70-5.

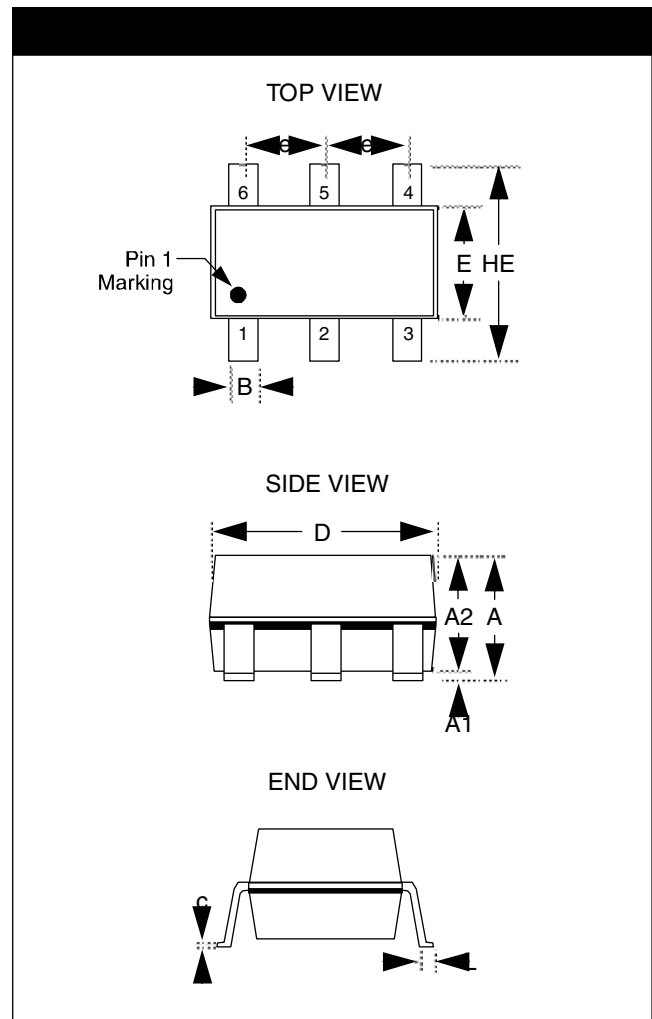
Mechanical Details (continued)

SC70-6 Mechanical Specifications:

The CM1218-05SC/S7 is supplied in a 6-pin SC70 package. Dimensions 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
# / tape and reel	3000 pieces	
Controlling dimension: millimeters		



Package Dimensions for SC70-6.

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