

Low Capacitance Transient Voltage Suppressors / ESD Protectors

Features

- Low I/O capacitance at 4pF typical
- In-system ESD protection to $\pm 8\text{kV}$ 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

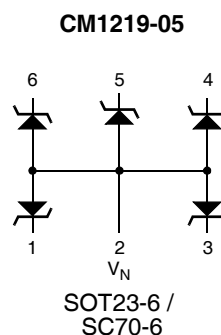
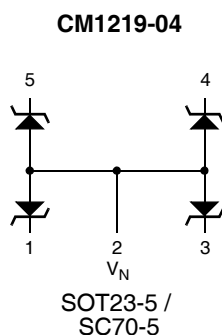
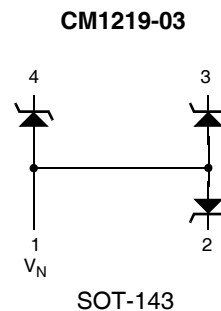
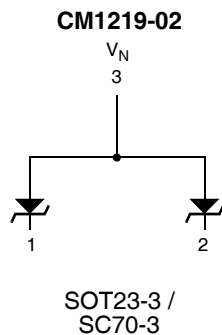
Product Description

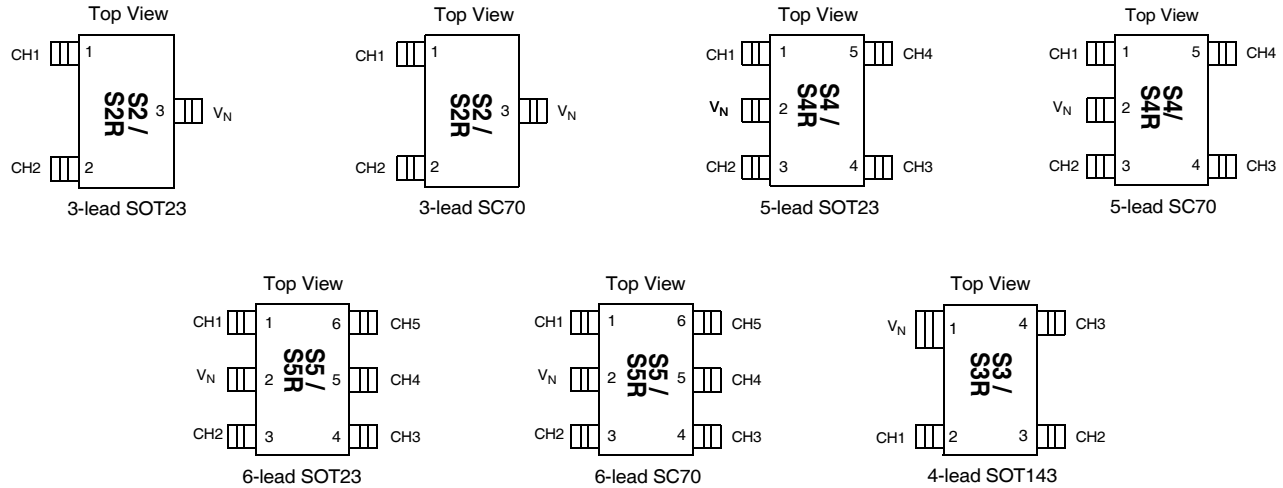
The CM1219 family of devices features transient voltage suppressor arrays that provide a very high level of protection for sensitive electronic components which may be subjected to electrostatic discharge (ESD).

All pins of the CM1219 are rated to withstand $\pm 8\text{kV}$ 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 $\pm 15\text{kV}$.

The CM1219 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 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 | CM1219-02ST | S2 | CM1219-02SO | S2R |
| 3 | SC70-3 | CM1219-02SC | S2 | CM1219-02S7 | S2R |
| 4 | SOT143 | CM1219-03SS | S3 | CM1219-03SR | S3R |
| 5 | SOT23-5 | CM1219-04ST | S4 | CM1219-04SO | S4R |
| 5 | SC70-5 | CM1219-04SC | S4 | CM1219-04S7 | S4R |
| 6 | SOT23-6 | CM1219-05ST | S5 | CM1219-05SO | S5R |
| 6 | SC70-6 | CM1219-05SC | S5 | CM1219-05S7 | S5R |

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 |

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 | | 4 | | pF |
| ΔC_{IN} | Differential Channel I/O to GND Capacitance | $T_A = 25^\circ\text{C}$, 2.5VDC, 1MHz; Note 2 | | 0.14 | | 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; $T_A = 25^\circ\text{C}$ | ± 8 | | | kV |
| | | Notes 2, 3 & 5; $T_A = 25^\circ\text{C}$ | ± 15 | | | kV |
| R_D | Diode Dynamic Resistance Forward Conduction Reverse Conduction | $T_A = 25^\circ\text{C}$; Notes 2 & 3 | | 1.3 | | Ω |
| | | | | 3.7 | | 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, $C_{Discharge} = 100\text{pF}$, $R_{Discharge} = 1.5\text{K}\Omega$, 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.

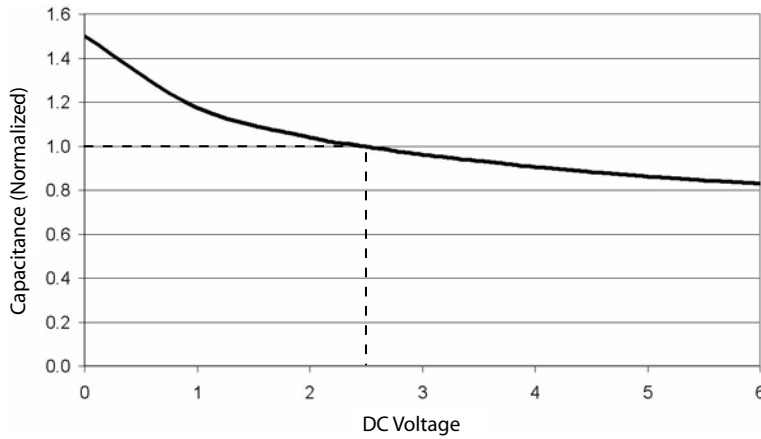


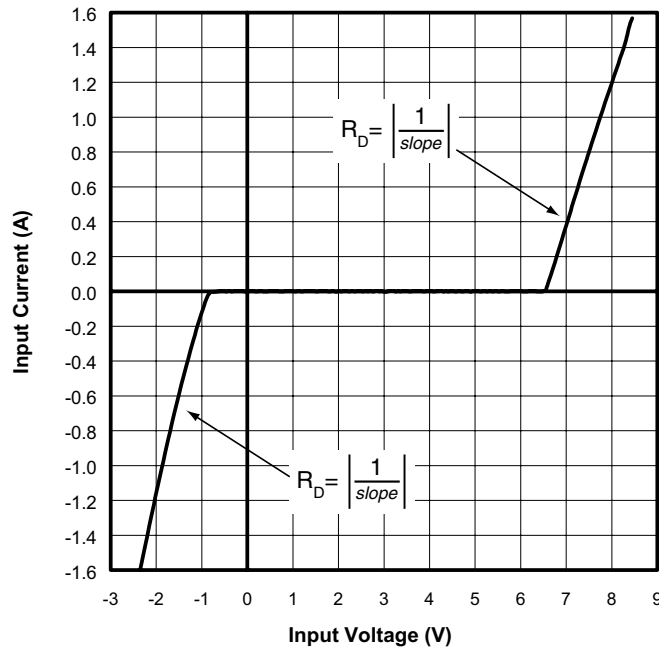
Figure 1. Diode Capacitance vs. Reverse Voltage

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

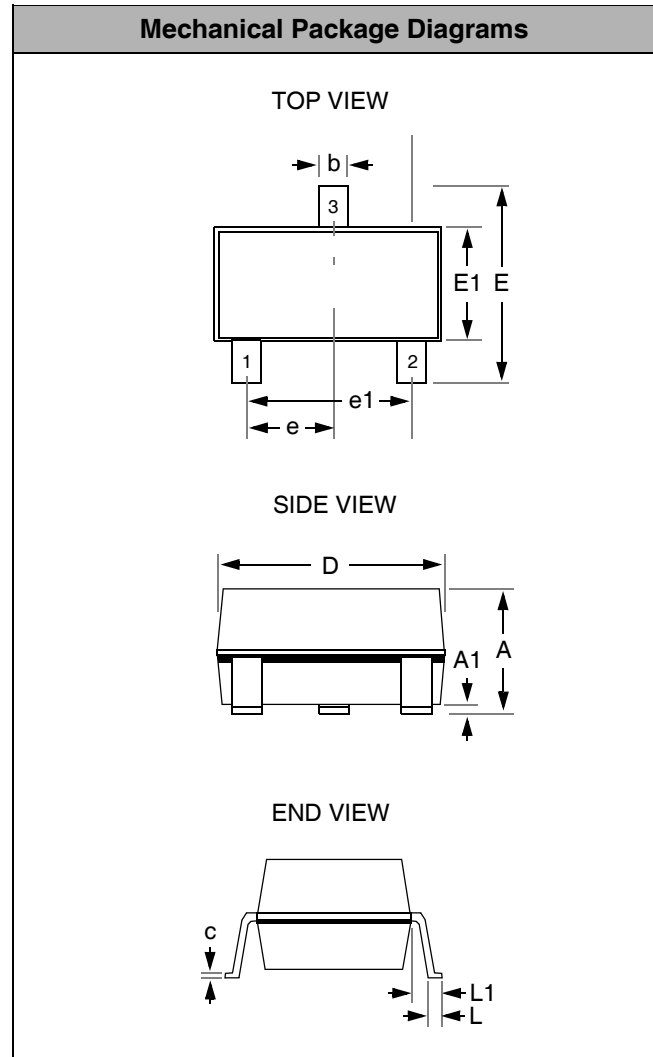
CM1219 devices are supplied in the following packages: SOT23-3, SOT143, SOT23-5, SOT23-6, SC70-3, SC70-5 and SC70-6.

SOT23-3 Mechanical Specifications

Dimensions for CM1219-02ST/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)

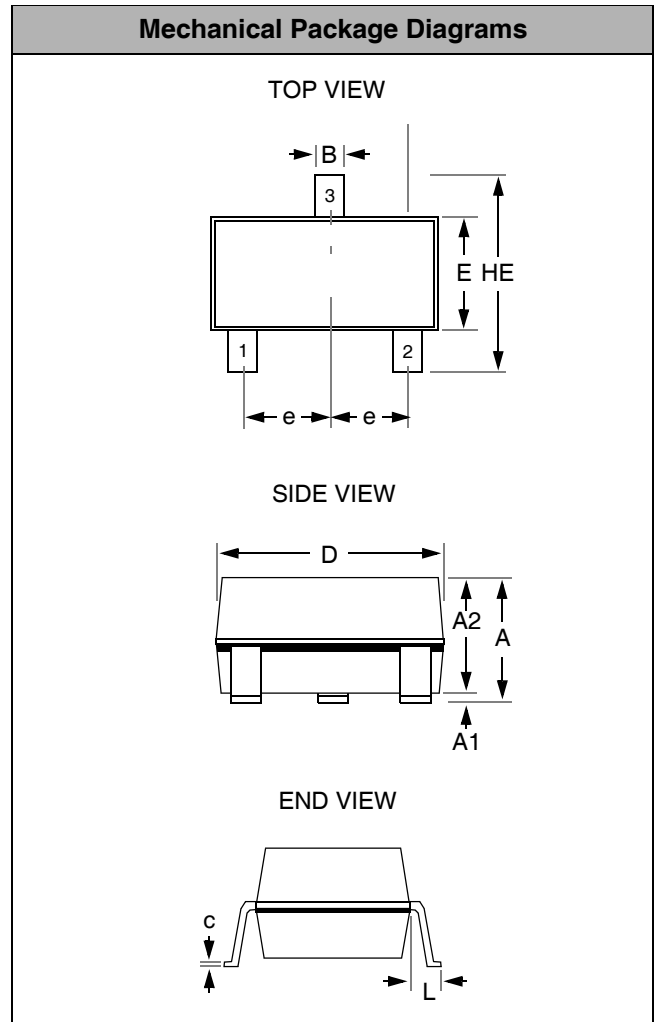
SC70-3 Mechanical Specifications:

Dimensions for CM1219-02SC/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)

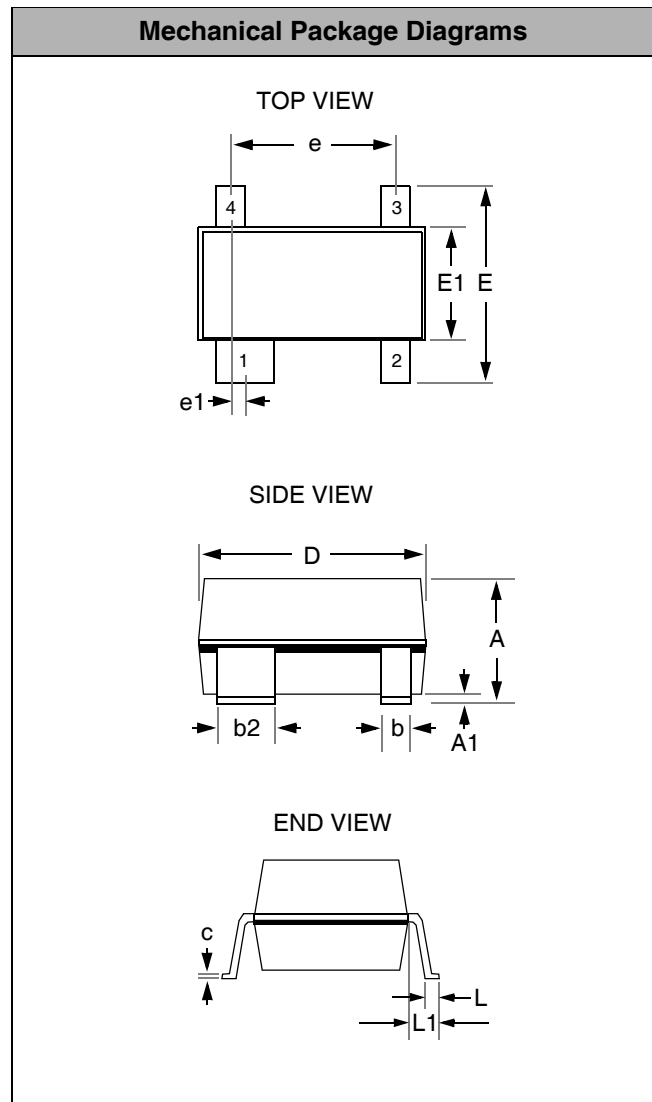
SOT143 Mechanical Specifications

Dimensions for CM1219-03SS/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.



Package Dimensions for SOT143.

Mechanical Details (continued)

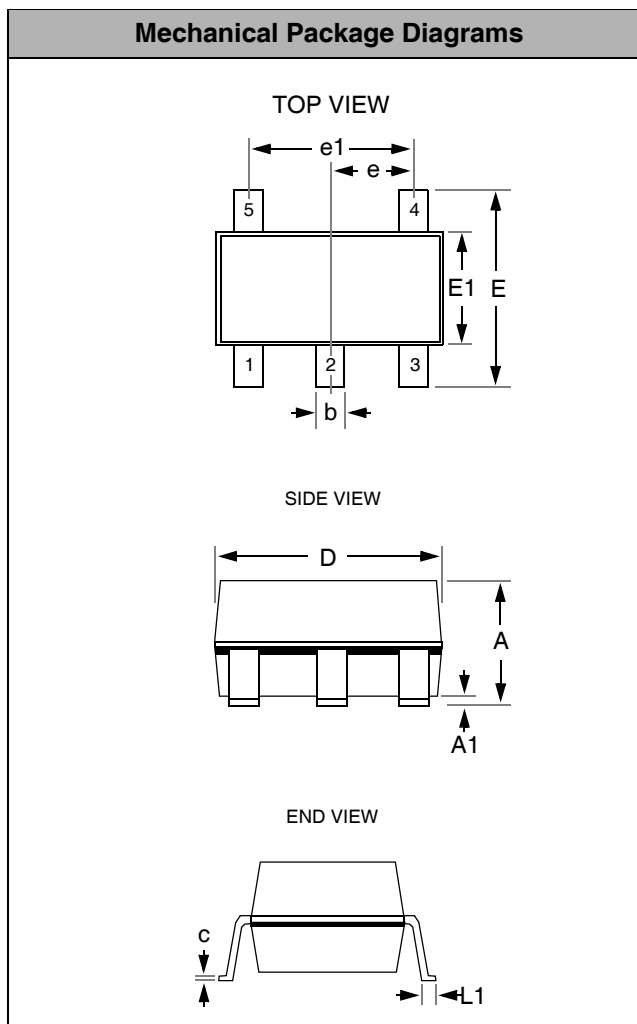
SOT23-5 Mechanical Specifications

Dimensions for CM1219-04ST/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.



Package Dimensions for SOT23-5.

Mechanical Details (continued)

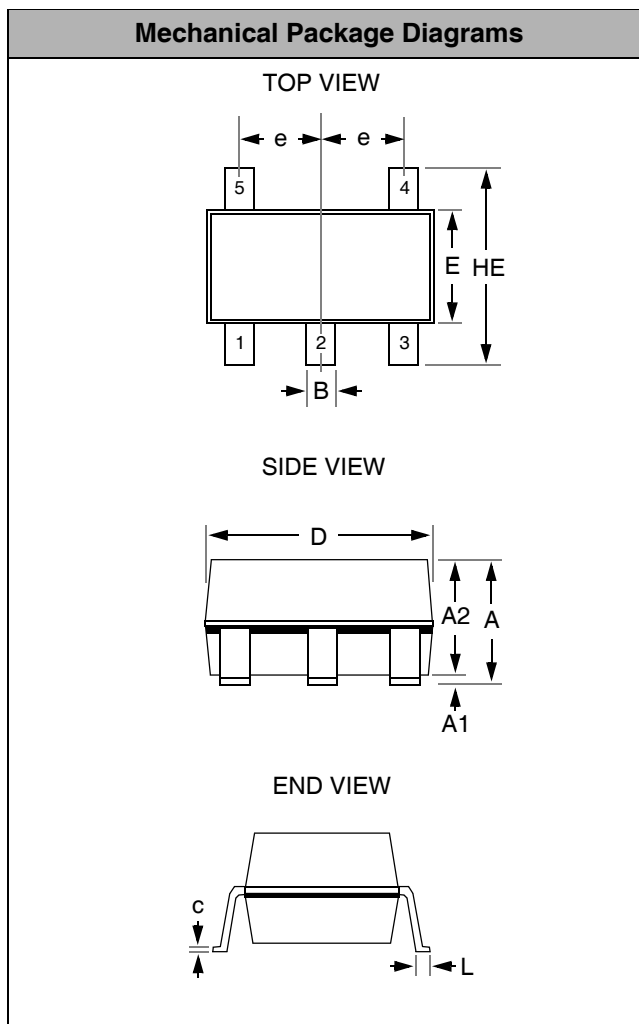
SC70-5 Mechanical Specifications:

Dimensions for CM1219-04SC/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)

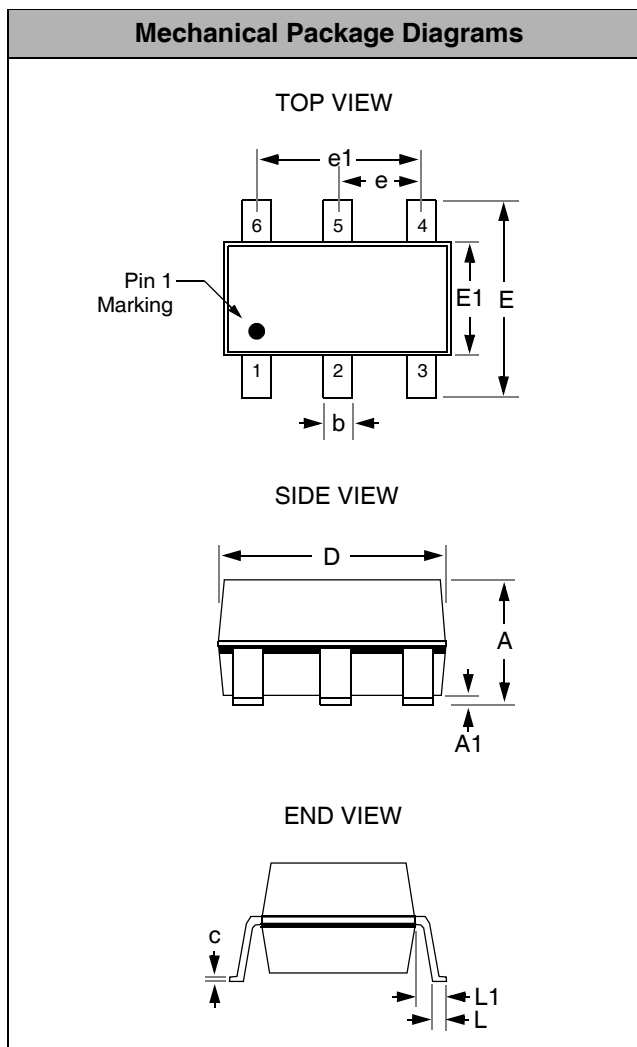
SOT23-6 Mechanical Specifications:

Dimensions for CM1219-05ST/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)

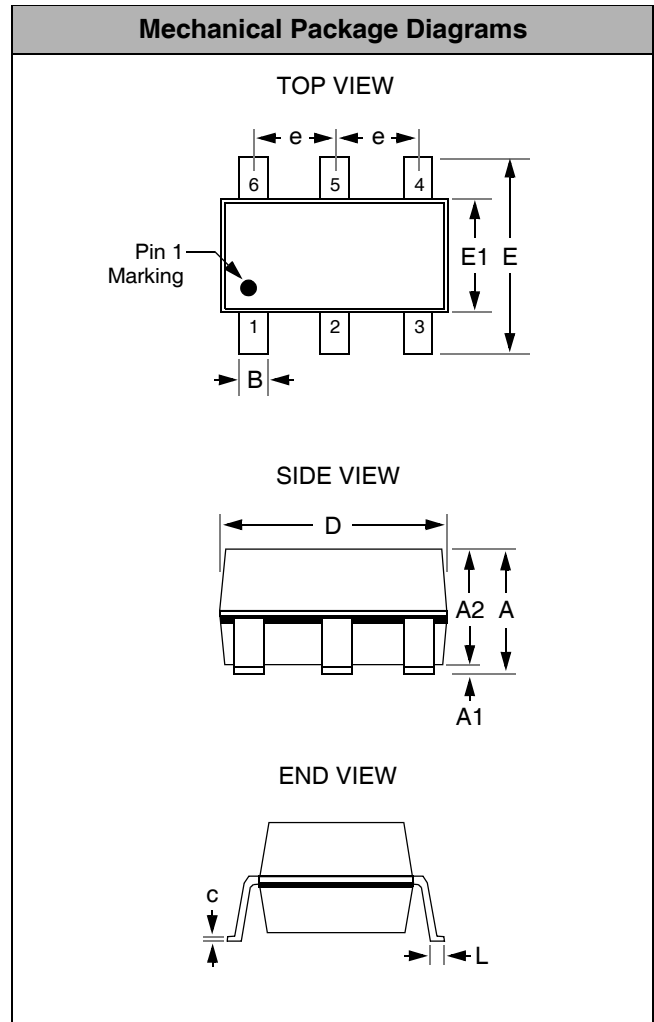
SC70-6 Mechanical Specifications:

Dimensions for CM1219-05SC/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.