

CJ431/CD431 Adjustable Reference Source

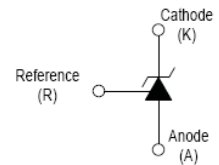
CJ431/CD431

Adjustable Accurate Reference Source

DEVICE DESCRIPTION

The CJ431/ CD431 is a three-terminal adjustable shunt regulator offering excellent temperature stability . This device has a typical dynamic output impedance of 0.2Ω. The device can be used as a replacement for zener diodes in many applications.

Equivalent Circuit



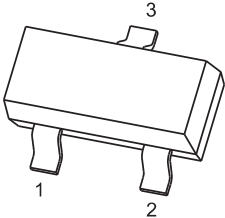
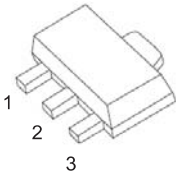
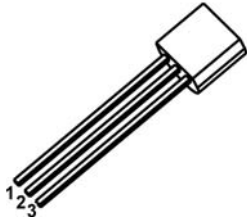
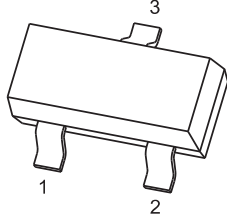
FEATURES

- The output voltage can be adjusted to 36V
- Low dynamic output impedance, its typical value is 0.2Ω
- Trapping current capability is 1 to 100mA
- Low output noise voltage
- Fast on -state response
- The effective temperature compensation in the working range of full temperature
- The typical value of the equivalent temperature factor in the whole temperature scope is 50 ppm/°C

APPLICATION

- Shunt Regulator
- High-Current Shunt Regulator
- Precision Current Limiter

PIN CONNENCTIONS and MARKING

| | | | |
|---|---|---|--|
| <p>CJ431</p>  | <p>SOT -23</p> <p>1.REFERENCE 2.CATHODE 3. ANODE</p> | <p>CJ431</p>  | <p>SOT-89</p> <p>1.REFERENCE 2.ANODE 3.CATHODE</p> |
| <p>CJ431</p>  | <p>TO-92</p> <p>1.REFERENCE 2.ANODE 3.CATHODE</p> | <p>CD431</p>  | <p>SOT-23</p> <p>1.CATHODE 2.REFERENCE 3. ANODE</p> |

ORDERING INFORMATION

| Part Number | MARKING ⁽¹⁾ | Package | Packing Method | Pack Quantity |
|-------------|-----------------------------------|---------|----------------|---------------|
| CJ431 | 431 | SOT-23 | Reel | 3000pcs/Reel |
| CD431 | CD431 | SOT-23 | Reel | 3000pcs/Reel |
| CJ431 | CJ431 | SOT-89 | Reel | 1000pcs/Reel |
| CJ431 | CJ TL431 XXX ⁽²⁾ | TO-92 | Bulk | 1000pcs/Bag |
| CJ431-TA | CJ TL431 XXX ⁽²⁾ | TO-92 | Tape | 2000pcs/Box |

Notes: (1). Solid dot = Green molding compound device, if none, the normal device.

(2). XXX=Code

ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified)

| Parameter | Symbol | Value | | | Unit |
|---|-----------------|-----------|--------|-------|------|
| | | SOT-23 | SOT-89 | TO-92 | |
| Cathode Voltage | V_{KA} | 36 | | | V |
| Cathode Current Range (Continuous) | I_{KA} | -100~+150 | | | mA |
| Reference Input Current Range | I_{ref} | 0.05~+10 | | | mA |
| Power Dissipation | P_D | 300 | 500 | 770 | mW |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 417 | 250 | 162 | °C/W |
| Operating Temperature | T_{opr} | -25~+85 | | | °C |
| Junction Temperature | T_J | 150 | | | °C |
| Storage Temperature Range | T_{STG} | -65~+150 | | | °C |

ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$ unless otherwise specified)

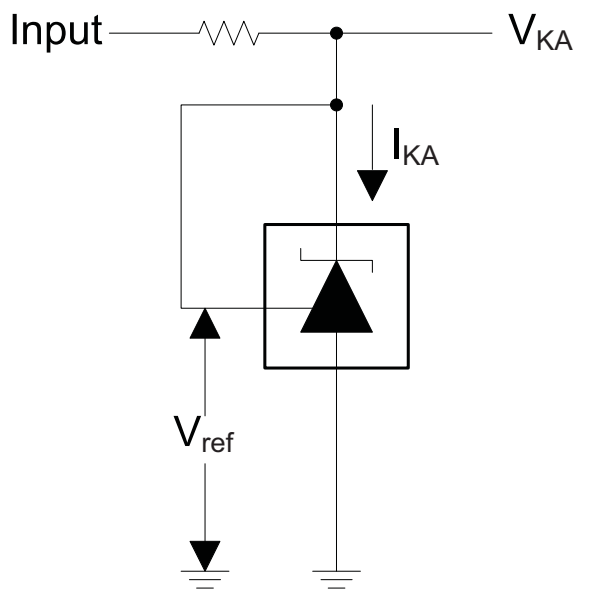
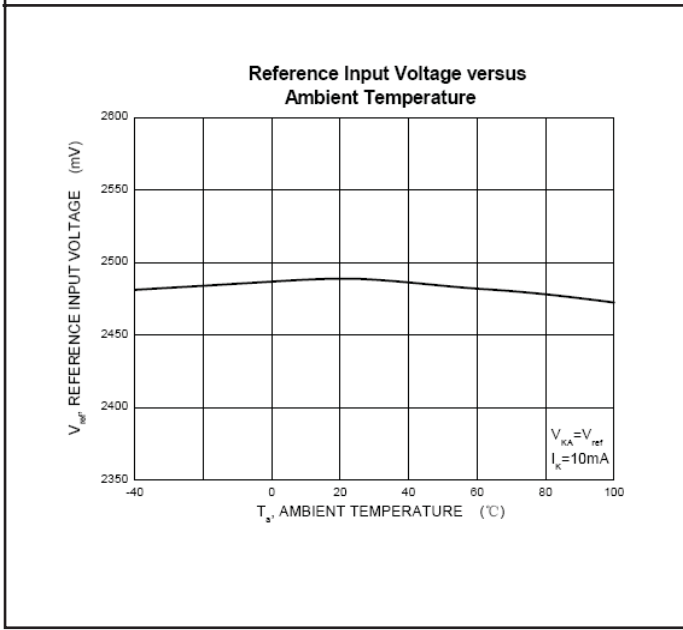
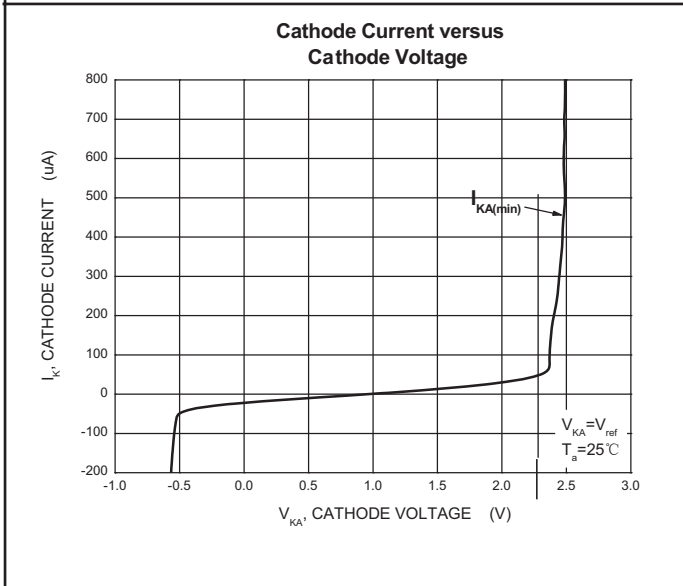
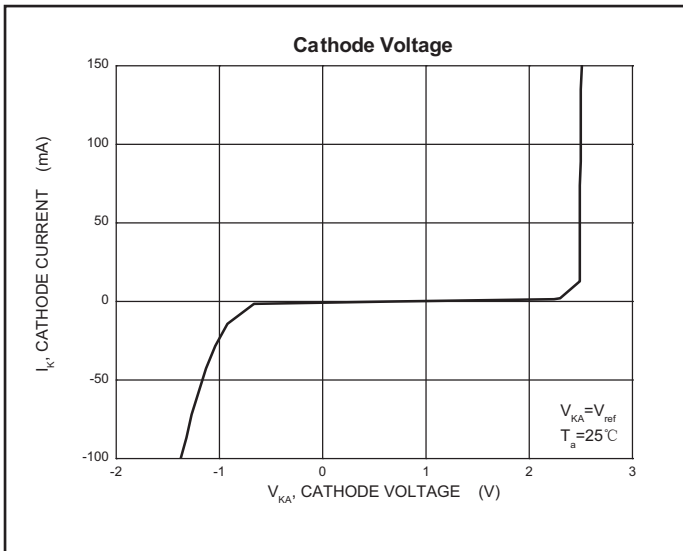
| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|--------------------------------|---|---|------|-------|---------------|
| Reference input voltage | V_{ref} | $V_{KA}=V_{REF}, I_{KA}=10\text{mA}$ | 2.475 | 2.5 | 2.525 | V |
| Deviation of reference Input voltage over temperature (note) | $\Delta V_{ref}/\Delta T$ | $V_{KA}=V_{REF}, I_{KA}=10\text{mA}$ $T_{MIN}\leq T_a\leq T_{MAX}$ | | 4.5 | 17 | mV |
| Ratio of change in reference Input voltage to the change in cathode voltage | $\Delta V_{ref}/\Delta V_{KA}$ | $I_{KA}=10\text{mA}$ | $\Delta V_{KA}=10\text{V}\sim V_{REF}$ | -1.0 | -2.7 | mV/V |
| | | | $\Delta V_{KA}=36\text{V}\sim 10\text{V}$ | -0.5 | -2.0 | mV/V |
| Reference input current | I_{ref} | $I_{KA}=10\text{mA}, R_1=10\text{k}\Omega$ $R_2=\infty$ | | 1.5 | 4 | μA |
| Deviation of reference input current over full temperature range | $\Delta I_{ref}/\Delta T$ | $I_{KA}=10\text{mA}, R_1=10\text{k}\Omega$ $R_2=\infty$ $T_A=-25$ to 85°C | | 0.4 | 1.2 | μA |
| Minimum cathode current for regulation | $I_{KA(min)}$ | $V_{KA}=V_{REF}$ | | 0.45 | 1.0 | mA |
| Off-state cathode current | $I_{KA(OFF)}$ | $V_{KA}=36\text{V}, V_{REF}=0$ | | 0.05 | 1.0 | μA |
| Dynamic impedance | Z_{KA} | $V_{KA}=V_{REF}, I_{KA}=1$ to 100mA $f\leq 1.0\text{kHz}$ | | 0.15 | 0.5 | Ω |

Note: $T_{MIN}=-25^\circ\text{C}$, $T_{MAX}=+85^\circ\text{C}$

CLASSIFICATION cZV_{ref}

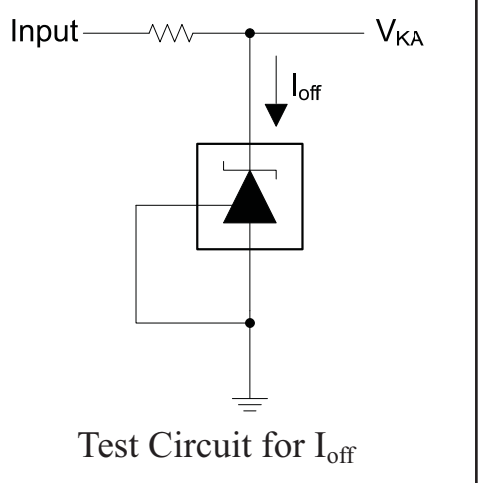
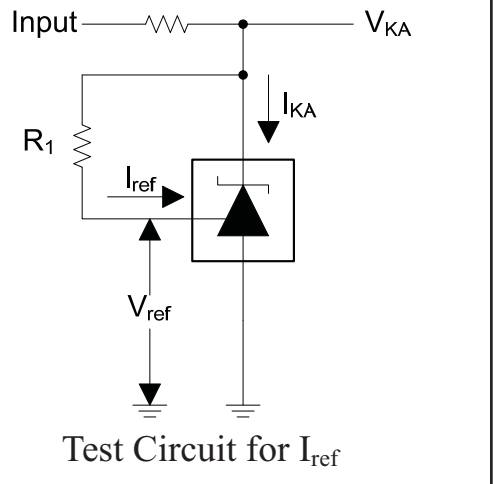
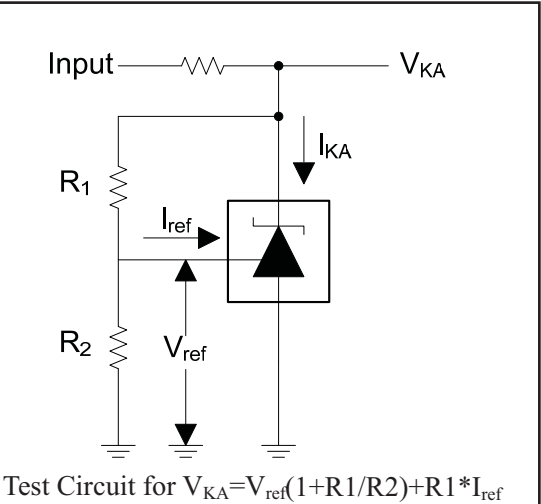
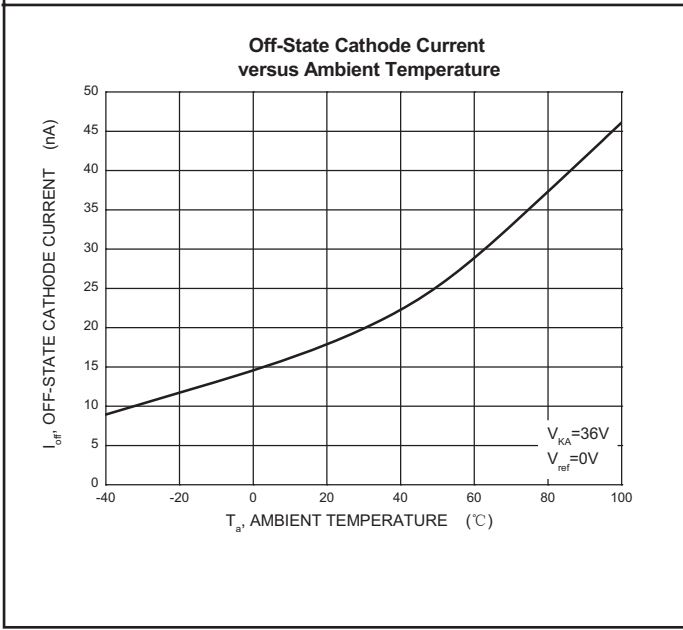
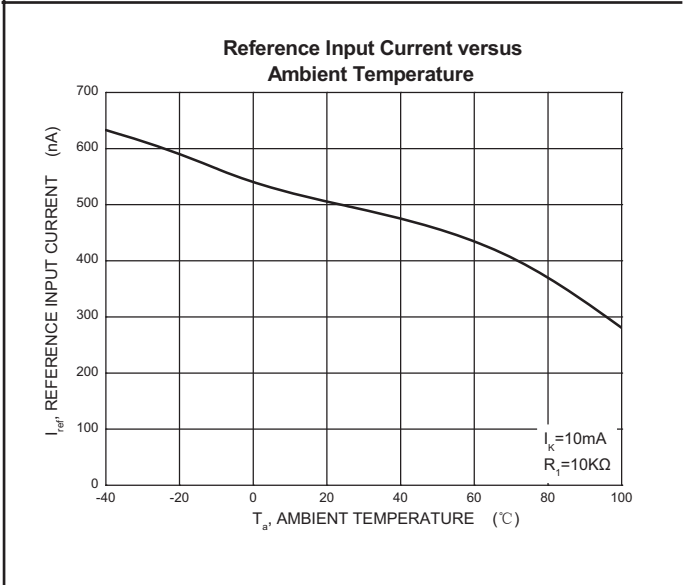
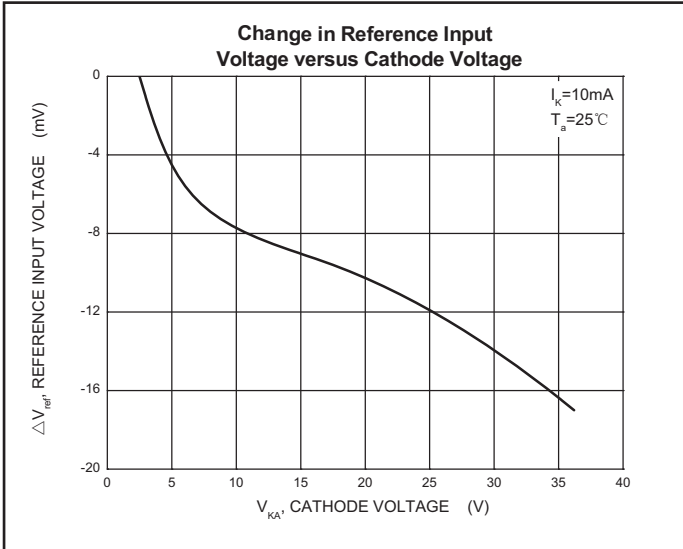
| Rank | 0.5% | 1% |
|-------|-------------|-------------|
| Range | 2.487-2.513 | 2.475-2.525 |

Typical Characteristics

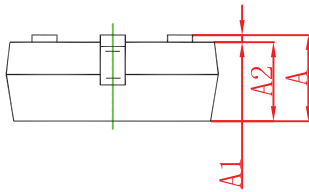
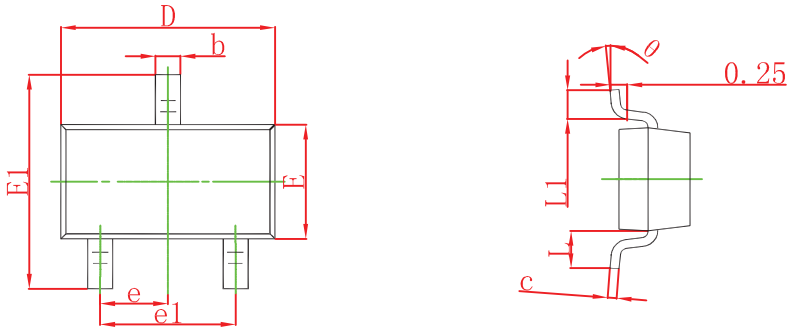


Test Circuit for $V_{KA} = V_{ref}$

Typical Characteristics

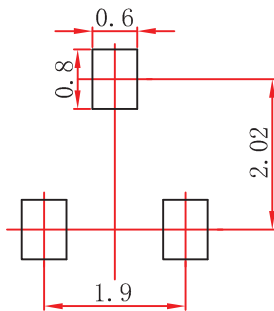


SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF | | 0.022 REF | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

SOT-23 Suggested Pad Layout



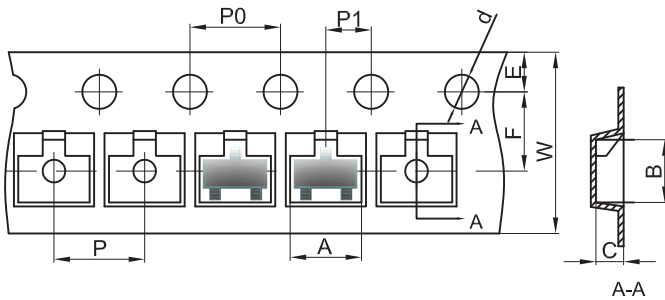
- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.

NOTICE

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SOT-23 Tape and Reel

SOT-23 Embossed Carrier Tape



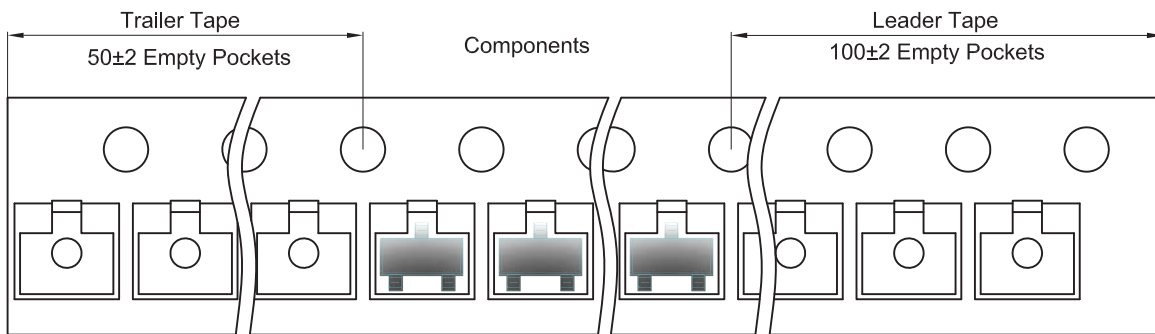
Packaging Description:

SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

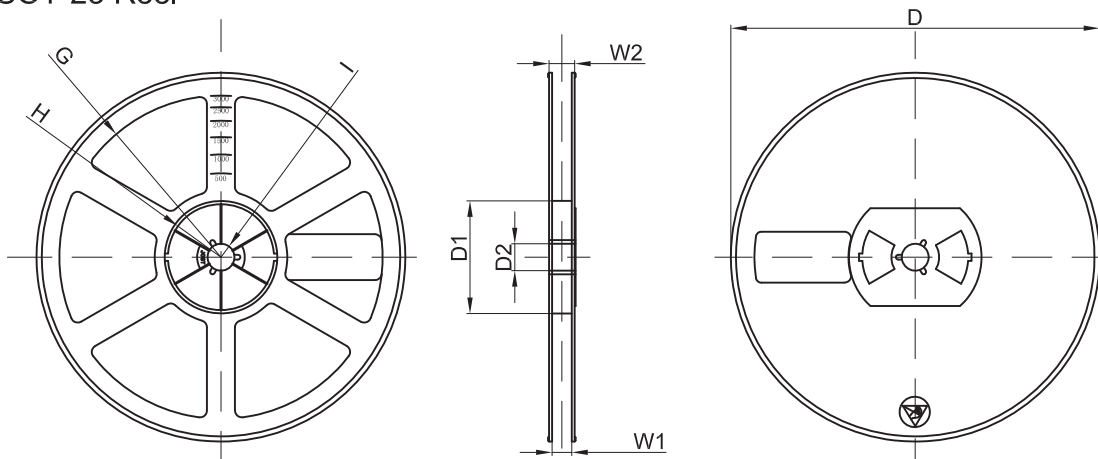
Dimensions are in millimeter

| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
|----------|------|------|------|-------|------|------|------|------|------|------|
| SOT-23 | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23 Tape Leader and Trailer



SOT-23 Reel



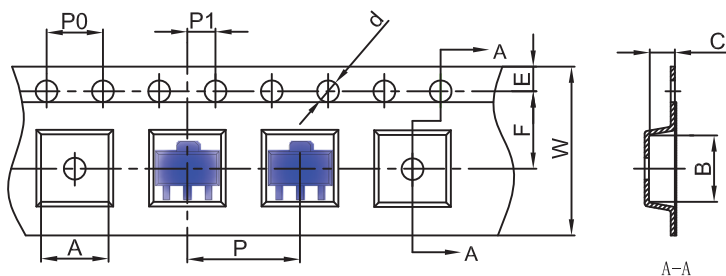
Dimensions are in millimeter

| Reel Option | D | D1 | D2 | G | H | I | W1 | W2 |
|-------------|---------|-------|-------|--------|--------|-------|------|-------|
| 7" Dia | Ø178.00 | 54.40 | 13.00 | R78.00 | R25.60 | R6.50 | 9.50 | 12.30 |

| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch | 45,000 pcs | 203×203×195 | 180,000 pcs | 438×438×220 | |

SOT-89-3L Tape and reel

SOT-89-3L Embossed Carrier Tape



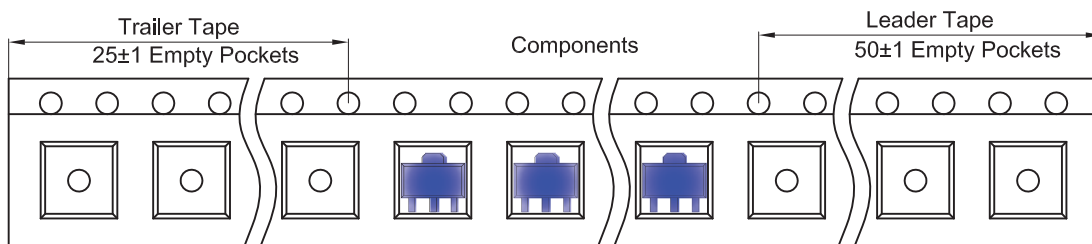
Packaging Description:

SOT-89-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 1,000 units per 7" or 18.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

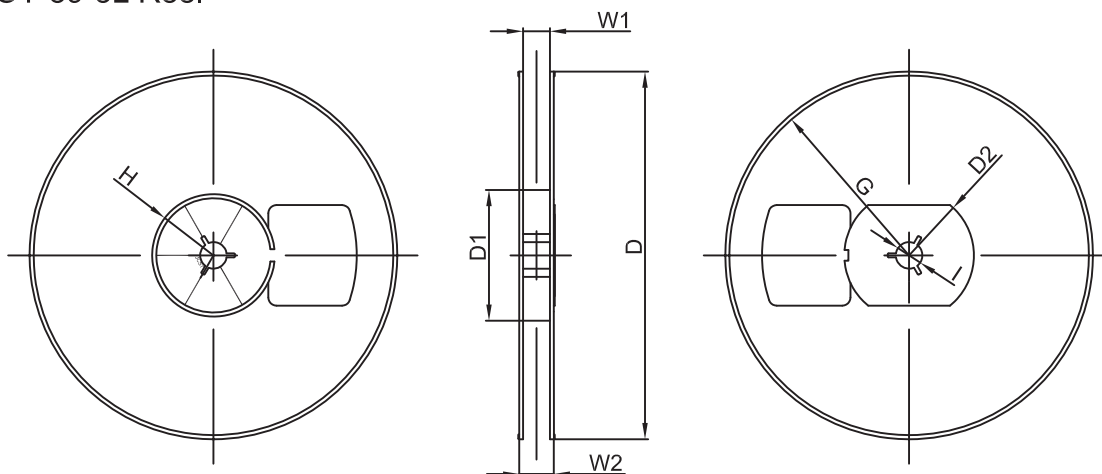
Dimensions are in millimeter

| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
|-----------|------|------|------|-------|------|------|------|------|------|-------|
| SOT-89-3L | 4.85 | 4.45 | 1.85 | Ø1.50 | 1.75 | 5.50 | 4.00 | 8.00 | 2.00 | 12.00 |

SOT-89-3L Tape Leader and Trailer



SOT-89-3L Reel

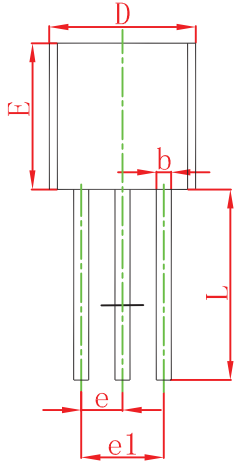
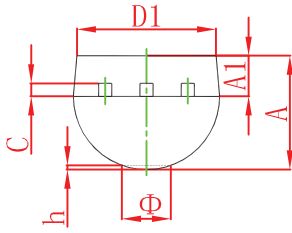


Dimensions are in millimeter

| Reel Option | D | D1 | D2 | G | H | I | W1 | W2 |
|-------------|---------|-------|--------|--------|--------|--------|-------|-------|
| 7" Dia | Ø180.00 | 60.00 | R32.00 | R86.50 | R30.00 | Ø13.00 | 13.20 | 16.50 |

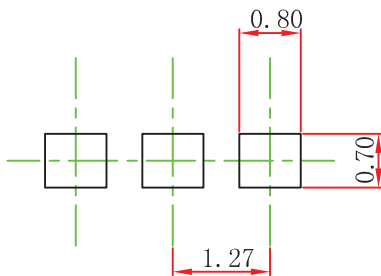
| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|------------|-----------------|----------|
| 1000 pcs | 7 inch | 10,000 pcs | 203×203×195 | 40,000 pcs | 438×438×220 | |

TO-92 Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 3.300 | 3.700 | 0.130 | 0.146 |
| A1 | 1.100 | 1.400 | 0.043 | 0.055 |
| b | 0.380 | 0.550 | 0.015 | 0.022 |
| c | 0.360 | 0.510 | 0.014 | 0.020 |
| D | 4.300 | 4.700 | 0.169 | 0.185 |
| D1 | 3.430 | | 0.135 | |
| E | 4.300 | 4.700 | 0.169 | 0.185 |
| e | 1.270 TYP | | 0.050 TYP | |
| e1 | 2.440 | 2.640 | 0.096 | 0.104 |
| L | 14.100 | 14.500 | 0.555 | 0.571 |
| Φ | | 1.600 | | 0.063 |
| h | 0.000 | 0.380 | 0.000 | 0.015 |

TO-92 Suggested Pad Layout



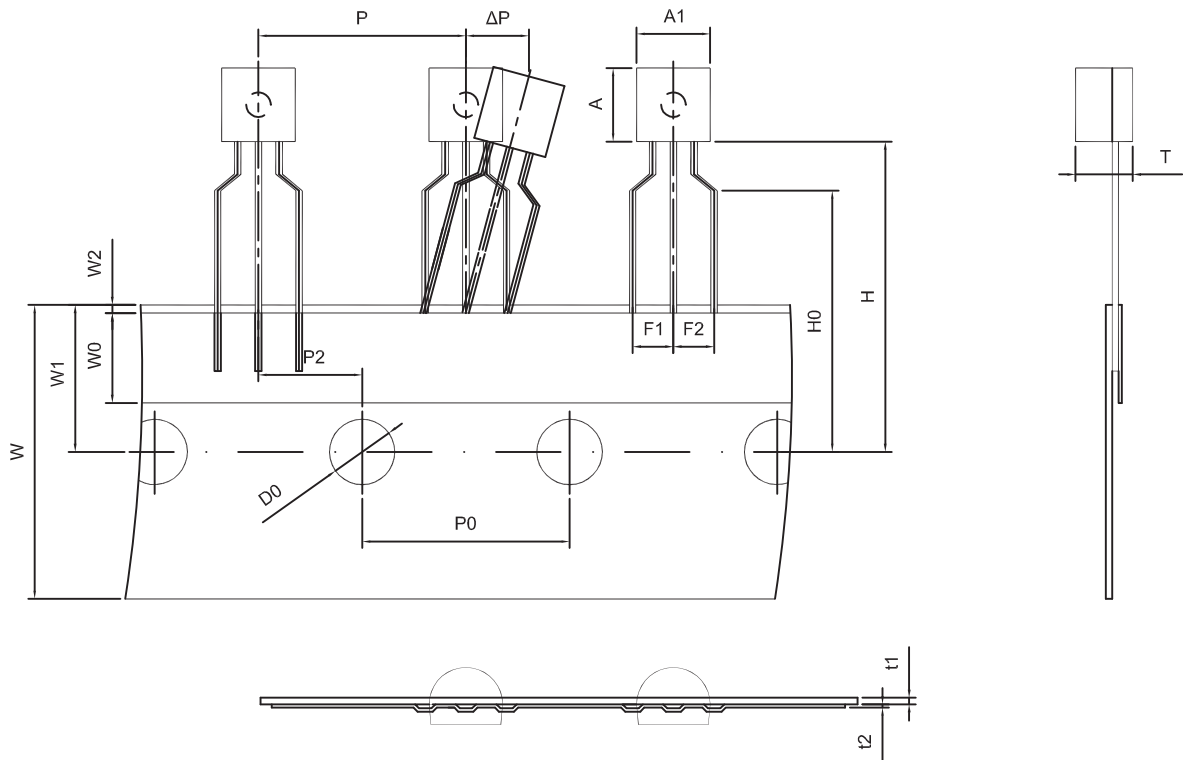
Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

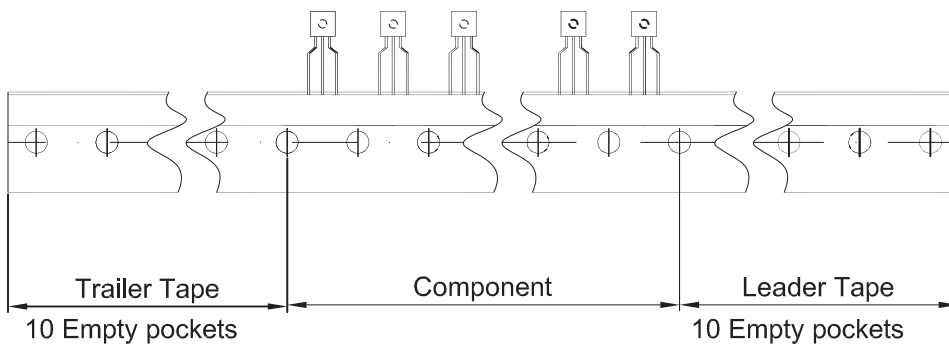
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TO-92 PACKAGE TAPEING DIMENSION



| Dimiensions are in millimeter | | | | | | | | |
|-------------------------------|-----|----------|------|------|------|-----|-----|------|
| A1 | A | T | P | P0 | P2 | F1 | F2 | W |
| 4.5 | 4.5 | 3.5 | 12.7 | 12.7 | 6.35 | 2.5 | 2.5 | 18.0 |
| W0 | W1 | W2 | H | H0 | D0 | t1 | t2 | ΔP |
| 6.0 | 9.0 | 1.0 MAX. | 19.0 | 16.0 | 4.0 | 0.4 | 0.2 | 0 |



| Package | Box | Box Size(mm) | Carton | Carton Size(mm) |
|---------|----------|--------------|------------|-----------------|
| TO-92 | 2000 pcs | 333×162×43 | 20,000 pcs | 350×340×250 |