

## CJ431/CD431 Adjustable Reference Source

### CJ431/CD431

Adjustable Accurate Reference Source

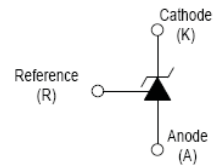
#### DEVICE DESCRIPTION

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

#### FEATURES

- The output voltage can be adjusted to 36V
- Low dynamic output impedance, its typical value is  $0.2\Omega$
- 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

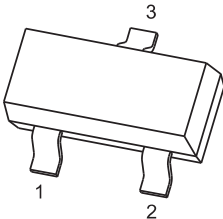
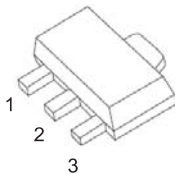
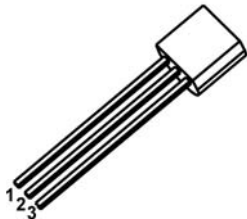
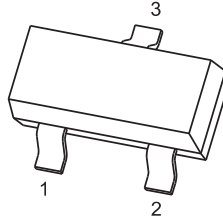
#### Equivalent Circuit



#### APPLICATION

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

#### PIN CONNENCTIONS and MARKING

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

## ORDERING INFORMATION

| Part Number | MARKING <sup>(1)</sup>                                 | Package | Packing Method | Pack Quantity |
|-------------|--------------------------------------------------------|---------|----------------|---------------|
| CJ431       | <b>431</b>                                             | SOT-23  | Reel           | 3000pcs/Reel  |
| CD431       | <b>CD431</b>                                           | SOT-23  | Reel           | 3000pcs/Reel  |
| CJ431       | <b>CJ431</b>                                           | SOT-89  | Reel           | 1000pcs/Reel  |
| CJ431       | <b>CJ</b><br><b>TL431</b> <sup>(2)</sup><br><b>XXX</b> | TO-92   | Bulk           | 1000pcs/Bag   |
| CJ431-TA    | <b>CJ</b><br><b>TL431</b> <sup>(2)</sup><br><b>XXX</b> | 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 Junction Temperature              | $T_J$           | -40~+125  |        |       | °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)                | $V_{ref(dev)}$                 | $V_{KA}=V_{REF}$ , $I_{KA}=10\text{mA}$<br>$T_{MIN}\leq T_a\leq T_{MAX}$                                |                                           | 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                                                     | $I_{ref}$                      | $I_{KA}=10\text{mA}$ , $R_1=10\text{k}\Omega$<br>$R_2=\infty$                                           |                                           | 1.5  | 4     | $\mu\text{A}$ |
| Deviation of reference input current over full temperature range            | $I_{ref(dev)}$                 | $I_{KA}=10\text{mA}$ , $R_1=10\text{k}\Omega$<br>$R_2=\infty$<br>$T_A=-25\text{ to }85^{\circ}\text{C}$ |                                           | 0.4  | 1.2   | $\mu\text{A}$ |
| 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   | $\mu\text{A}$ |
| Dynamic impedance                                                           | $Z_{KA}$                       | $V_{KA}=V_{REF}$ , $I_{KA}=1\text{ to }100\text{mA}$<br>$f\leq 1.0\text{kHz}$                           |                                           | 0.15 | 0.5   | $\Omega$      |

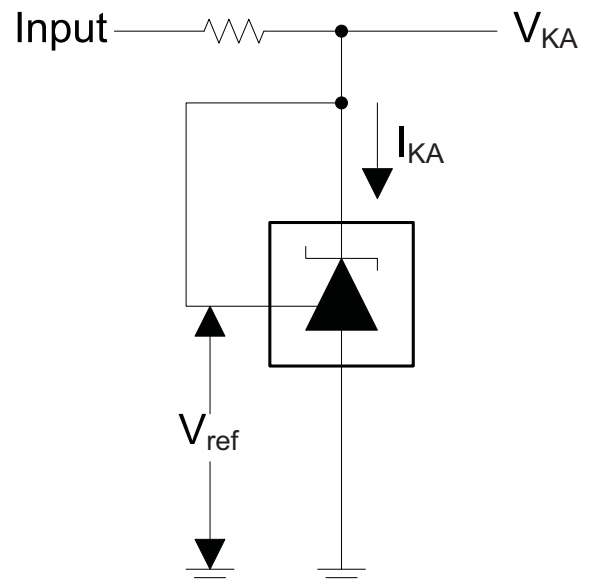
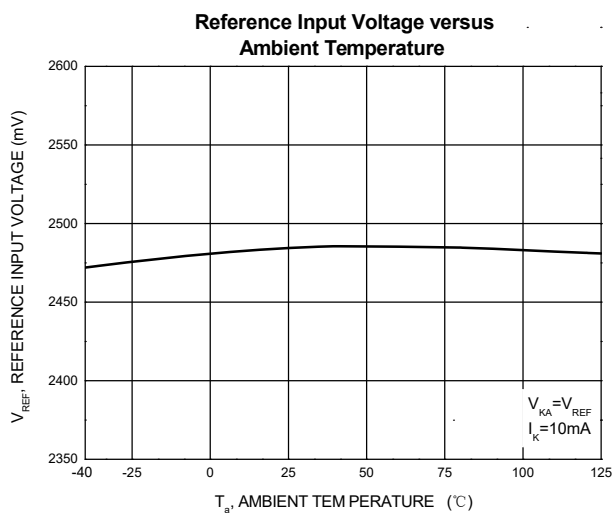
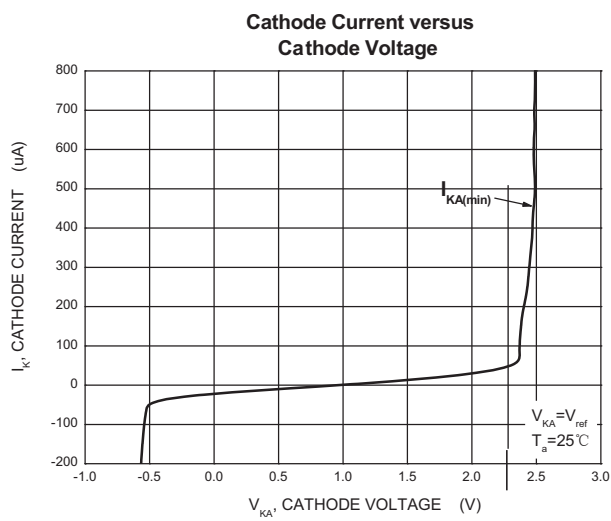
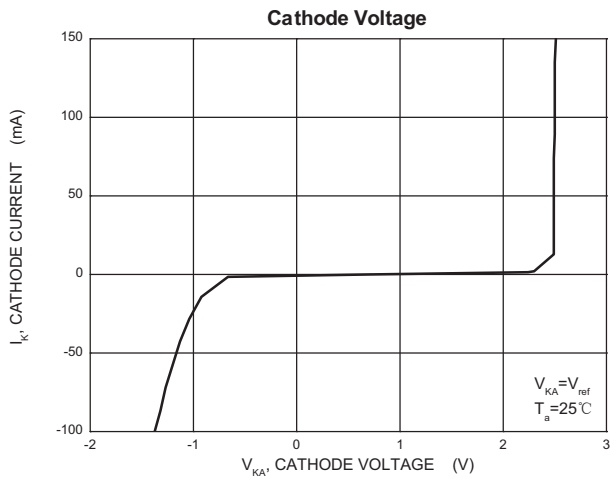
Note:  $T_{MIN}=-25^{\circ}\text{C}$ ,  $T_{MAX}=+85^{\circ}\text{C}$

### CLASSIFICATION of $V_{ref}$

| Rank  | 0.5%        | 1%          |
|-------|-------------|-------------|
| Range | 2.488-2.512 | 2.475-2.525 |

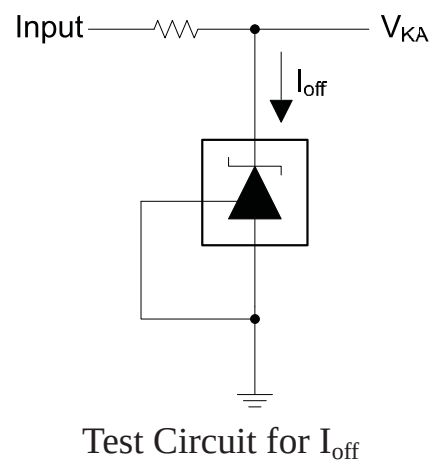
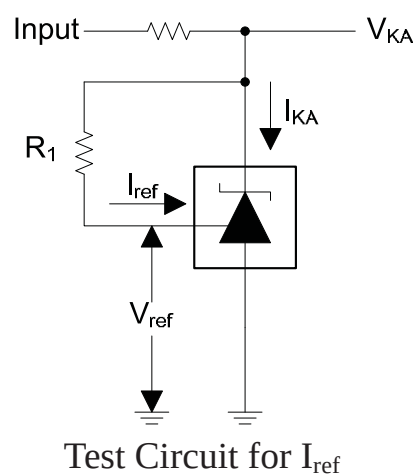
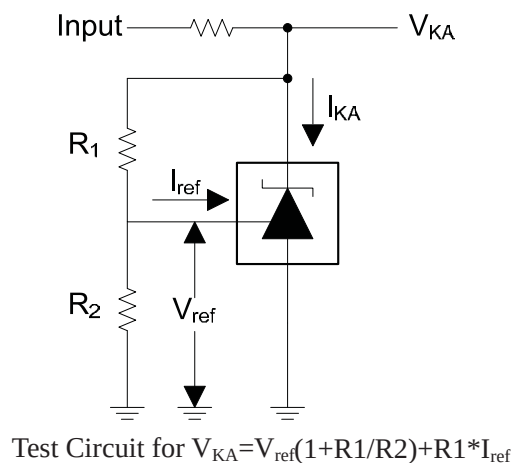
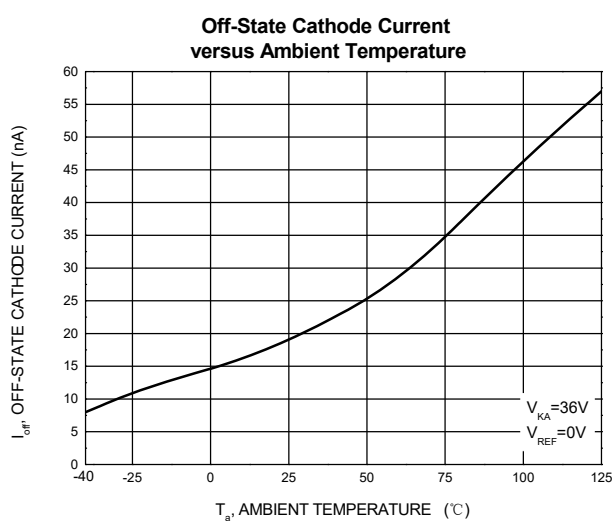
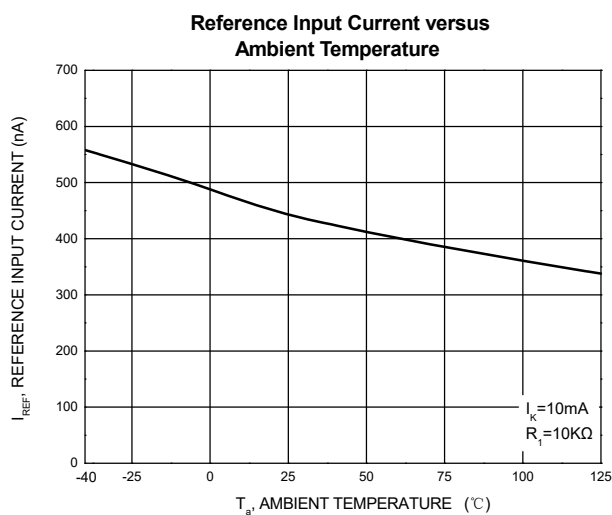
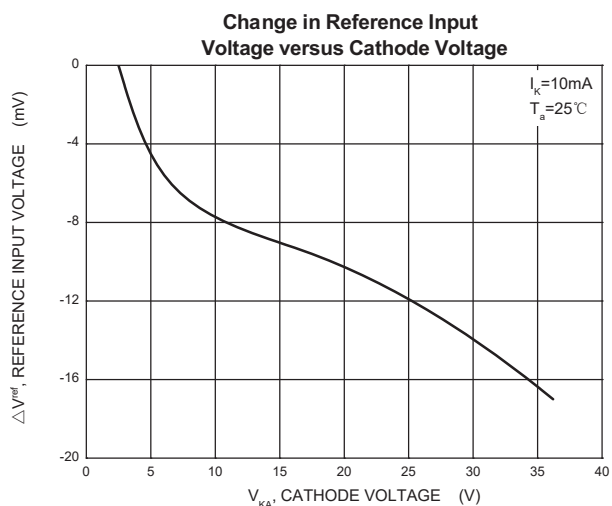
**NOTE:** It is strongly recommended to connect a capacitor(value more than 0.1 $\mu\text{F}$ ) at the output pin to smooth the output. The capacitor should be placed as close as possible to the output pin, with the shortest path to GND.

## Typical Characteristics

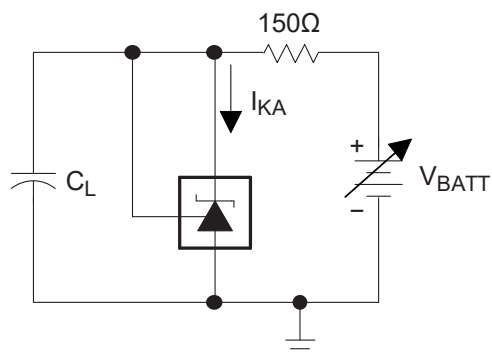
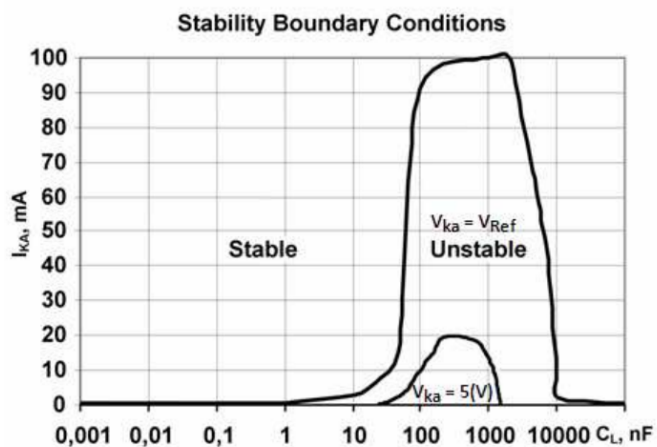


Test Circuit for  $V_{KA} = V_{ref}$

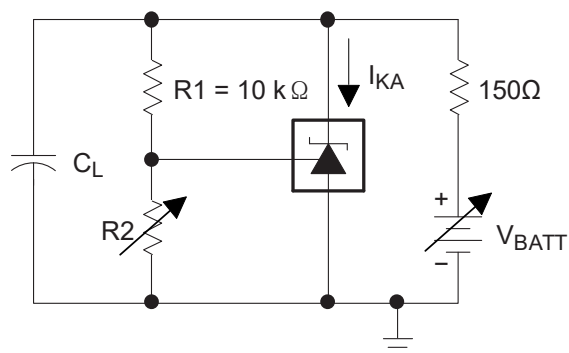
## Typical Characteristics



## Typical Characteristics

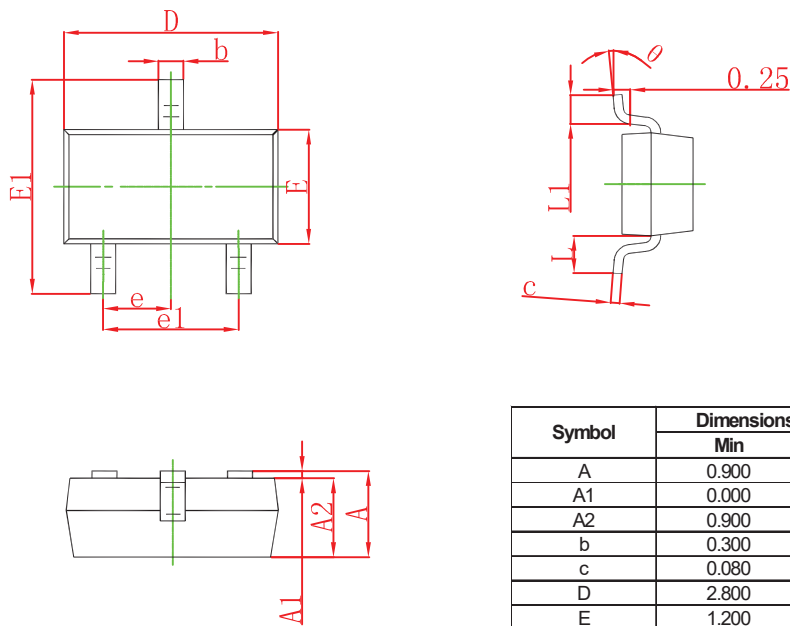


Test Circuit for  $V_{KA} = V_{ref}$



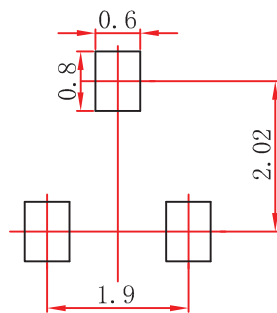
Test Circuit for  $V_{KA} = V_{ref}(1 + R1/R2) + R1 * I_{ref}$

## SOT-23 Package Outline Dimensions



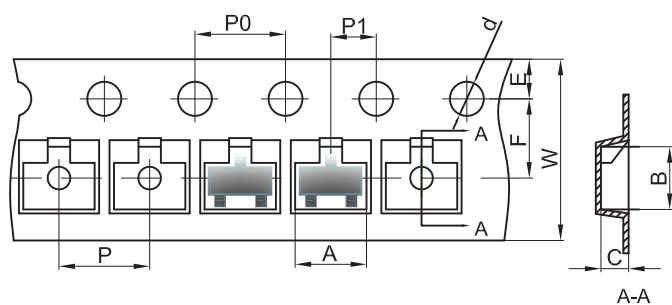
| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 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 |
| v      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



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

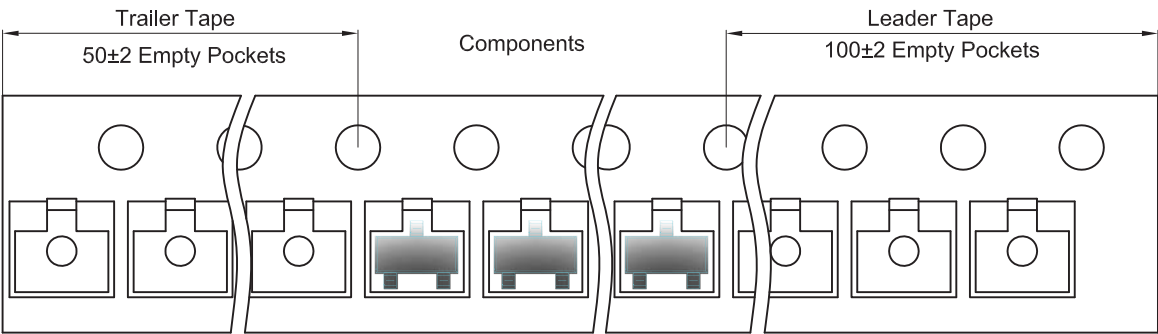
SOT-23 Embossed Carrier Tape



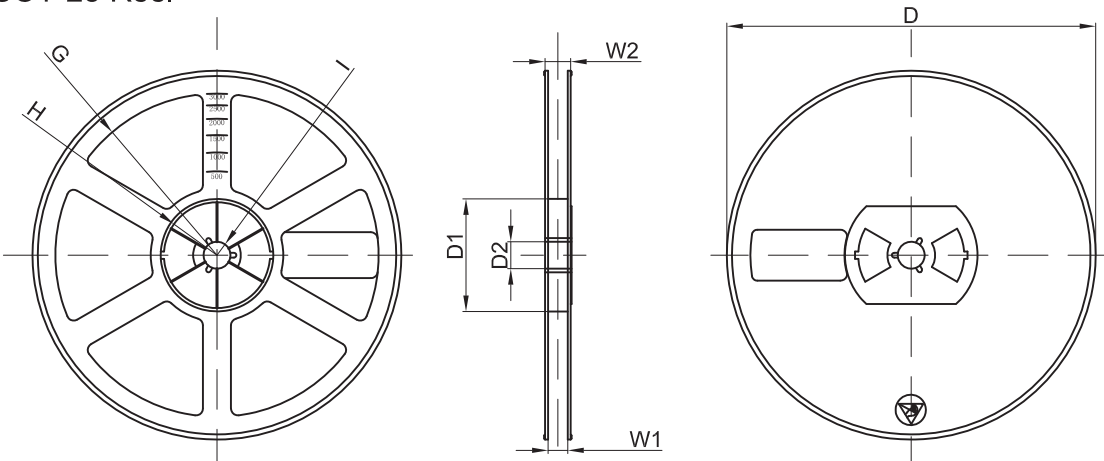
Packaging Description:  
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. 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



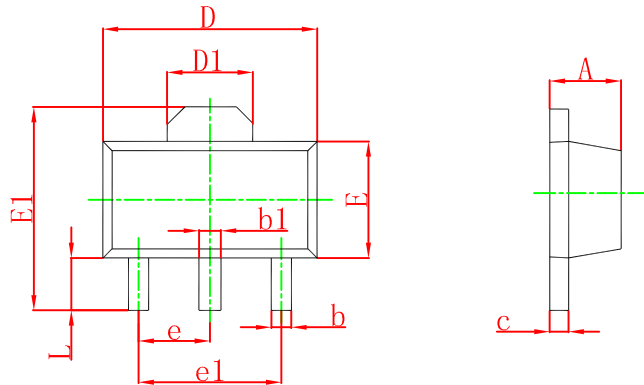
SOT-23 Reel



| 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 |

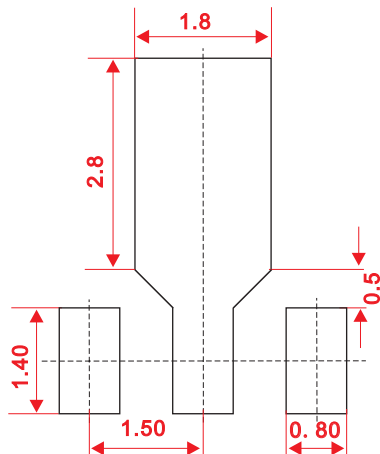
| REEL     | Reel Size | Box        | Box Size(mm) | Carton      | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch    | 45,000 pcs | 203×203×195  | 180,000 pcs | 438×438×220     |          |

## SOT-89-3L Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.400                     | 1.600 | 0.055                | 0.063 |
| b      | 0.320                     | 0.520 | 0.013                | 0.020 |
| b1     | 0.400                     | 0.580 | 0.016                | 0.023 |
| c      | 0.350                     | 0.440 | 0.014                | 0.017 |
| D      | 4.400                     | 4.600 | 0.173                | 0.181 |
| D1     | 1.550 REF.                |       | 0.061 REF.           |       |
| E      | 2.300                     | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                     | 4.250 | 0.155                | 0.167 |
| e      | 1.500 TYP.                |       | 0.060 TYP.           |       |
| e1     | 3.000 TYP.                |       | 0.118 TYP.           |       |
| L      | 0.900                     | 1.200 | 0.035                | 0.047 |

## SOT-89-3L 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.

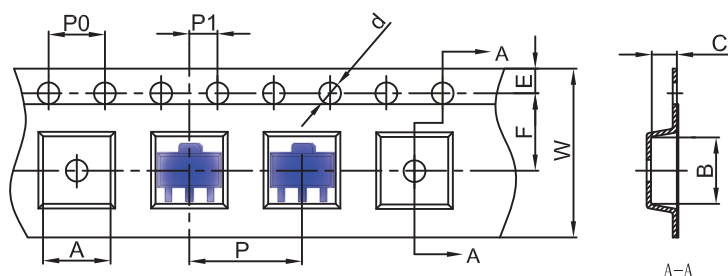
### NOTICE

JSCJ reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. JSCJ does not assume any liability arising out of the application or use of any product described herein.



# SOT-89-3L Tape and reel

## SOT-89-3L Embossed Carrier Tape

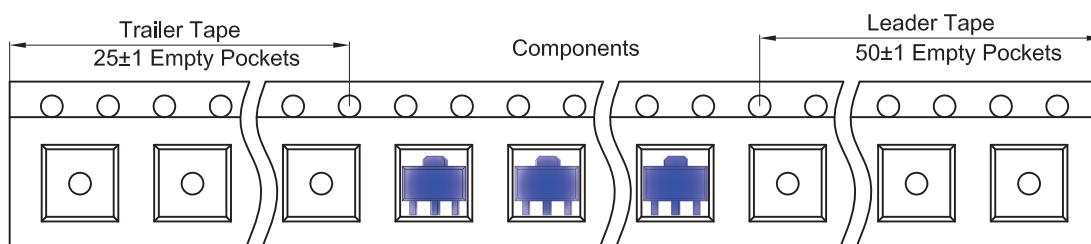


### Packaging Description:

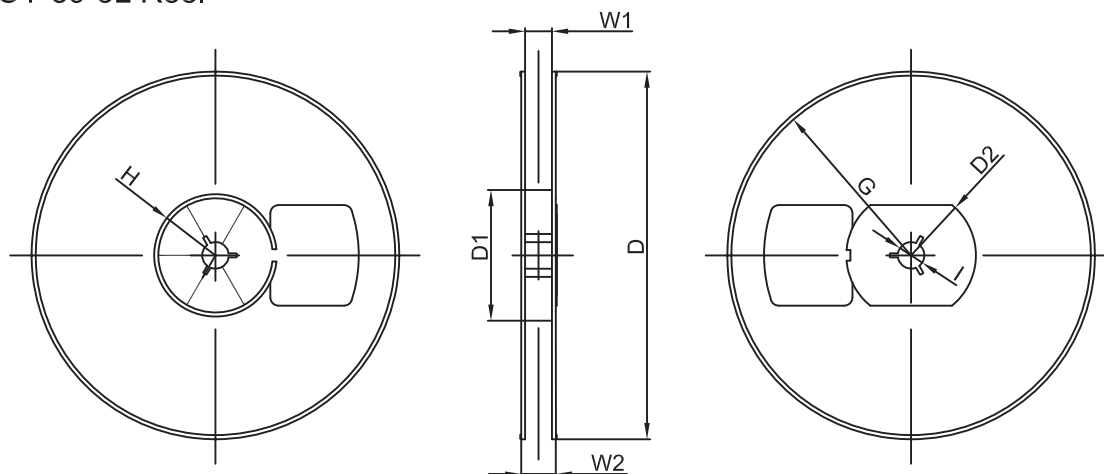
SOT-89-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts 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



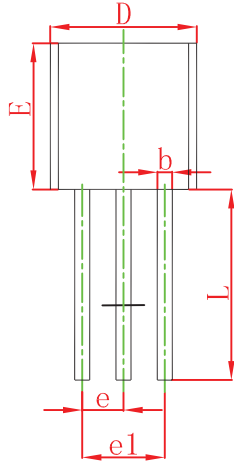
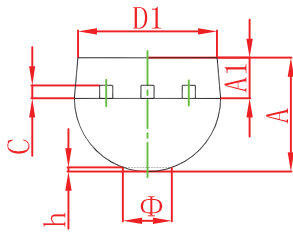
## SOT-89-3L Reel



| 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 |

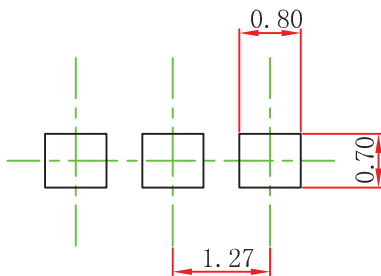
| REEL     | Reel Size | Box        | Box Size(mm) | Carton     | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|------------|-----------------|----------|
| 1000 pcs | 7 inch    | 10,000 pcs | 203×203×195  | 40,000 pcs | 438×438×220     |          |

## 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 |
| h      |                           | 1.600  |                      | 0.063 |
| h      | 0.000                     | 0.380  | 0.000                | 0.015 |

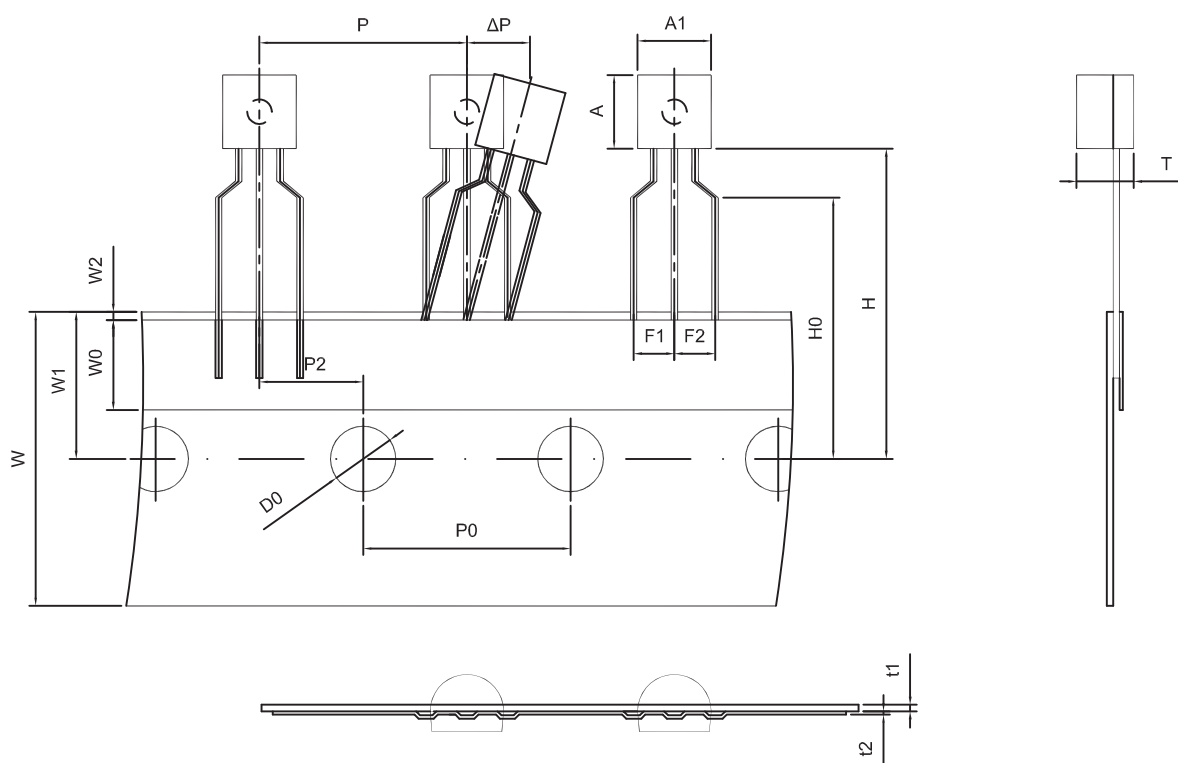
## TO-92 Suggested Pad Layout



Note:

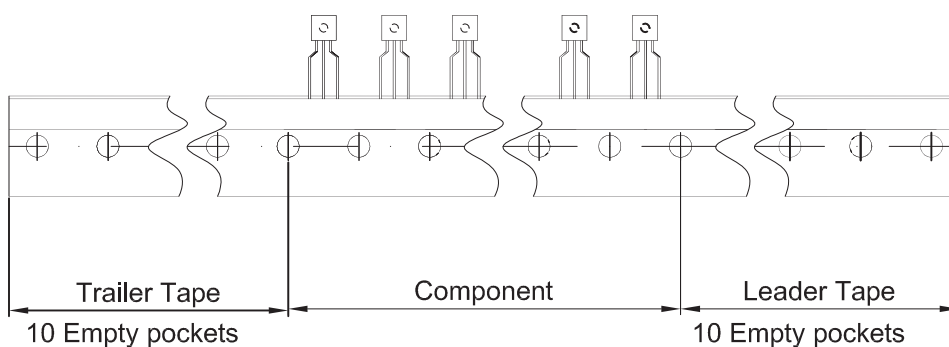
1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

# 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     |

# DISCLAIMER

## IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

Any person who purchases or uses JSCJ products for design shall: 1. Select products suitable for circuit application and design; 2. Design, verify and test the rationality of circuit design; 3. Procedures to ensure that the design complies with relevant laws and regulations and the requirements of such laws and regulations. JSCJ makes no warranty or representation as to the accuracy or completeness of the information contained in this data sheet and assumes no responsibility for the application or use of any of the products described in this data sheet.

Without the written consent of JSCJ, this product shall not be used in occasions requiring high quality or high reliability, including but not limited to the following occasions: medical equipment, automotive electronics, military facilities and aerospace. JSCJ shall not be responsible for casualties or property losses caused by abnormal use or application of this product.

Official Website: [www.jscj-elec.com](http://www.jscj-elec.com)

Copyright © JIANGSU CHANGJING ELECTRONICS TECHNOLOGY CO., LTD.