

## Features

Wide Programmable Precise Output Voltage from 1.25V to 18V  
High Stability under Capacitive Load  
Low Temperature Deviation: 3mV Typical  
Low Equivalent Full-Range Temperature Coefficient: 20PPM/°C Typical  
Low Dynamic Output Resistance: 0.05Ω Typical  
High Sink Current Capacity from 0.1mA to 100mA  
Low Output Noise  
Wide Operating Range of 0 to +70 °C

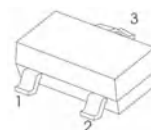
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## Applications

Graphic Card  
PC Motherboard  
Voltage Adapter  
Switching Power Supply  
Charger

### SOT-23

1.REFERENCE  
2.CATHODE  
3. ANODE



## Absolute Maximum Ratings (Note 2)

| Symbol    | Parameter                          | Rating       |     | Unit |
|-----------|------------------------------------|--------------|-----|------|
| $V_{KA}$  | Cathode Voltage                    | 20           |     | V    |
| $I_{KA}$  | Cathode Current Range (Continuous) | -100 to 100  |     | mA   |
| $I_{REF}$ | Reference Input Current Range      | 10           |     | mA   |
| $P_D$     | Power Dissipation                  | Z, R Package | 770 | mW   |
|           |                                    | N, K Package | 370 |      |
| $T_{STG}$ | Storage Temperature Range          | -65 to +150  |     | °C   |

Note 2: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

## Recommended Operating Conditions

| Symbol   | Parameter                           | Min       | Max | Unit |
|----------|-------------------------------------|-----------|-----|------|
| $V_{KA}$ | Cathode Voltage                     | $V_{REF}$ | 18  | V    |
| $I_{KA}$ | Cathode Current                     | 0.1       | 100 | mA   |
| —        | Operating Ambient Temperature Range | 0         | +70 | °C   |

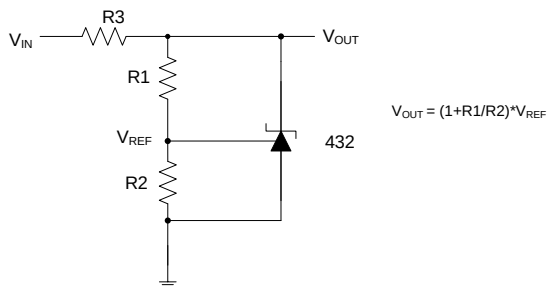
## CLASSIFICATION OF $V_{ref}$

| Rank  | 0.5%        | 1.0%        |
|-------|-------------|-------------|
| Range | 1.244~1.256 | 1.238~1.262 |

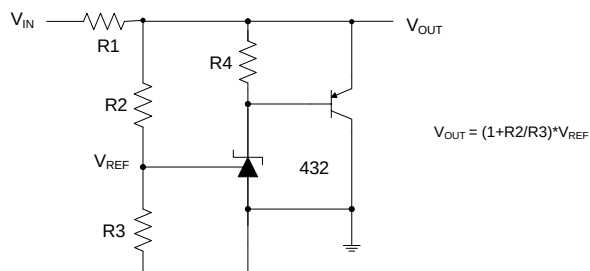
## ELECTRICAL CHARACTERISTICS ( $T_a=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol                                 | Parameter                                                     | Test Circuit | Conditions                                                                                                    | Min                             | Typ    | Max   | Unit                 |
|----------------------------------------|---------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------|---------------------------------|--------|-------|----------------------|
| $V_{REF}$                              | Reference Voltage                                             | 4            | $V_{KA} = V_{REF}$ , $I_{KA} = 10\text{mA}$                                                                   | 1.244                           | 1.250  | 1.256 | V                    |
|                                        |                                                               |              |                                                                                                               | 1.238                           | 1.250  | 1.262 |                      |
| $\Delta V_{REF}$                       | Deviation of Reference Voltage Over Full Temperature Range    | 4            | $V_{KA} = V_{REF}$ ,<br>$I_{KA} = 10\text{mA}$                                                                | 0 to $+70^{\circ}\text{C}$      | —      | 2     | mV                   |
|                                        |                                                               |              |                                                                                                               | $-40$ to $+85^{\circ}\text{C}$  | —      | 3     |                      |
|                                        |                                                               |              |                                                                                                               | $-40$ to $+125^{\circ}\text{C}$ | —      | 4     |                      |
| $\frac{\Delta V_{REF}}{\Delta V_{KA}}$ | Ratio of Change in $V_{REF}$ to the Change in Cathode Voltage | 5            | $I_{KA} = 10\text{mA}$ ,<br>$\Delta V_{KA}$ : $V_{REF}$ to 16V                                                | —                               | -0.5   | -1.5  | mV/V                 |
| $I_{REF}$                              | Reference Input Current                                       | 5            | $I_{KA} = 10\text{mA}$ , $R_1 = 10\text{K}\Omega$ , $R_2 = \infty$                                            | —                               | 0.15   | 0.4   | $\mu\text{A}$        |
| $\Delta I_{REF}$                       | Deviation of Reference Current Over Full Temperature Range    | 5            | $I_{KA} = 10\text{mA}$ , $R_1 = 10\text{K}\Omega$ , $R_2 = \infty$ ,<br>$T_A = -40$ to $+125^{\circ}\text{C}$ | —                               | 0.1    | 0.4   | $\mu\text{A}$        |
| $I_{KA}$<br>(Min)                      | Minimum Cathode Current for Regulation                        | 4            | $V_{KA} = V_{REF}$                                                                                            | —                               | 55     | 80    | $\mu\text{A}$        |
| $I_{KA}$<br>(Off)                      | Off-state Cathode Current                                     | 6            | $V_{REF} = 0$ , $V_{KA} = 18\text{V}$                                                                         | —                               | 0.04   | 0.10  | $\mu\text{A}$        |
|                                        |                                                               |              | $V_{KA} = 6\text{V}$ , $V_{REF} = 0$                                                                          | —                               | 0.01   | 0.05  |                      |
| $Z_{KA}$                               | Dynamic Impedance                                             | 4            | $V_{KA} = V_{REF}$ , $I_{KA} = 1$ to $100\text{mA}$ ,<br>$f \leq 1.0\text{KHz}$                               | —                               | 0.05   | 0.15  | $\Omega$             |
| $\theta_{JC}$                          | Thermal Resistance (Junction to Case)                         | —            | SOT-23                                                                                                        | —                               | 84.84  | —     | $^{\circ}\text{C/W}$ |
|                                        |                                                               |              | SOT-23-5                                                                                                      | —                               | 84.84  | —     |                      |
|                                        |                                                               |              | TO-92                                                                                                         | —                               | 140.80 | —     |                      |
|                                        |                                                               |              | SOT-89                                                                                                        | —                               | 29.80  | —     |                      |

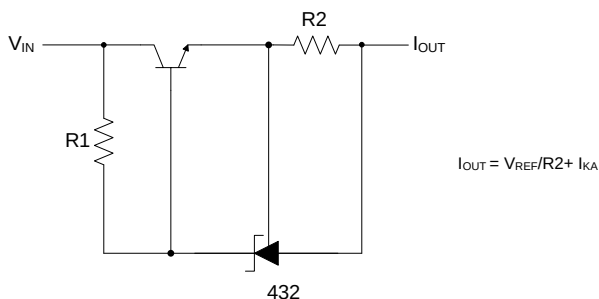
## Typical Application



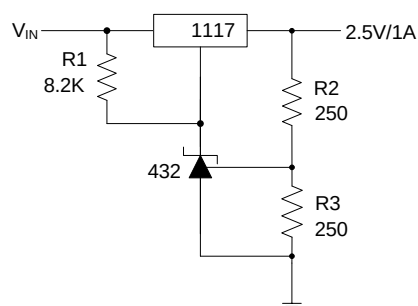
Shunt Regulator



High Current Shunt Regulator

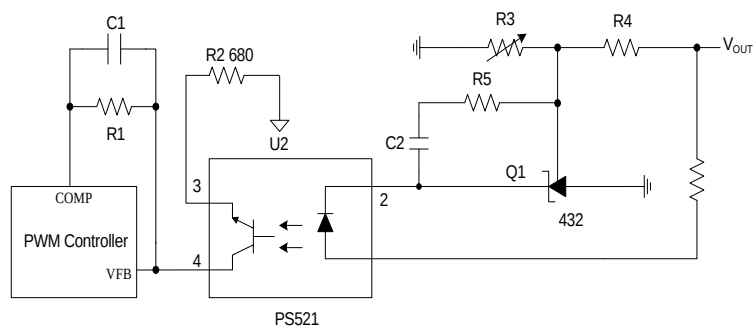


Current Source or Current Limit



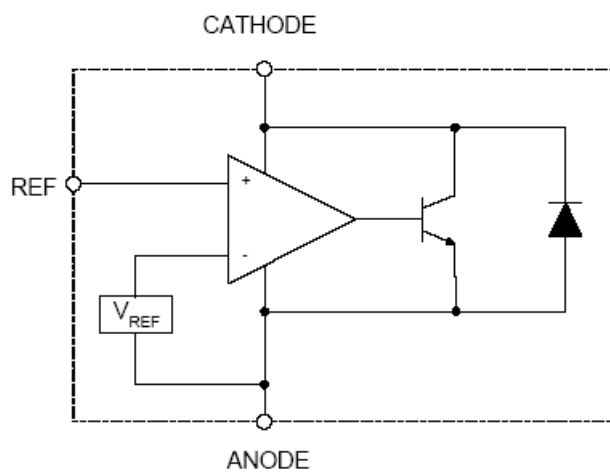
Precision 2.5V/1A Regulator

## Typical Application

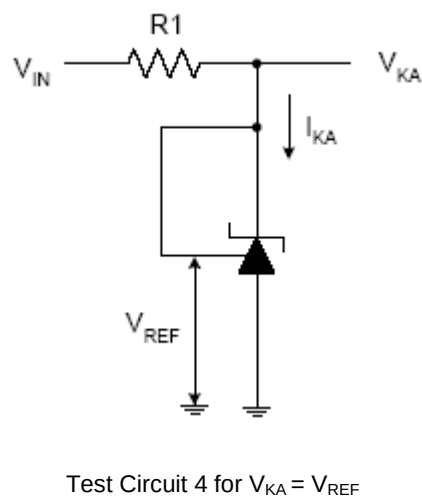
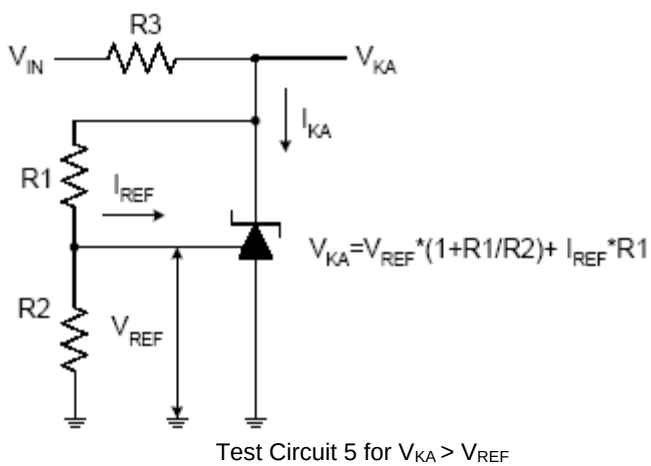


PWM Converter with Reference

## Function Block Diagram

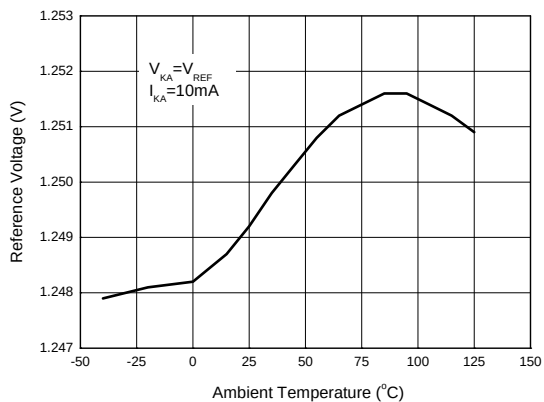


## Test Circuit

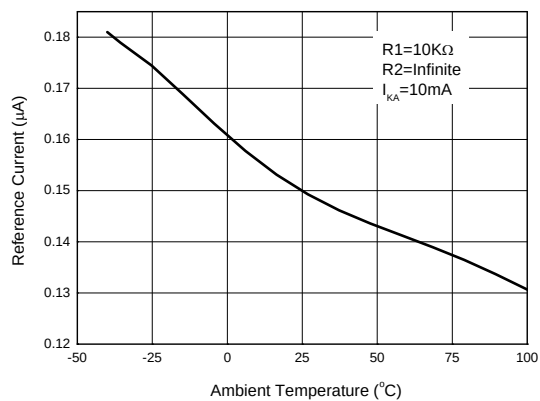


## RATING AND CHARACTERISTIC CURVES

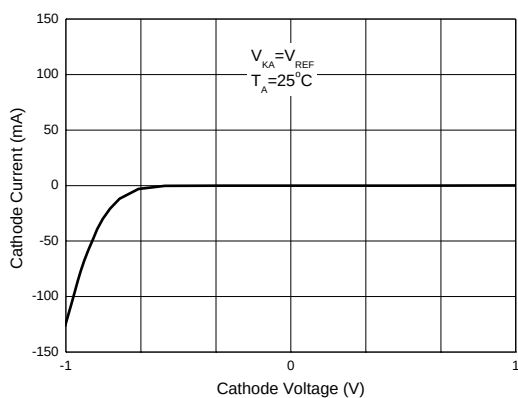
Reference Voltage vs. Ambient Temperature



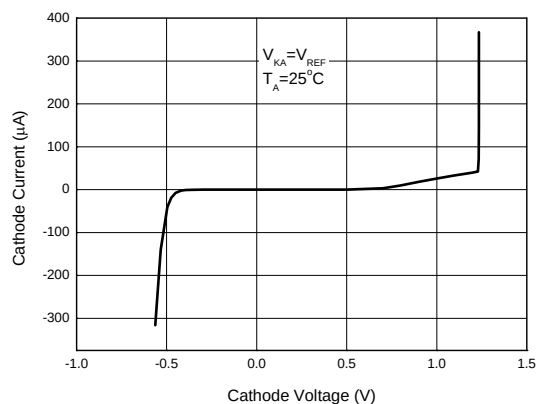
Reference Current vs. Ambient Temperature



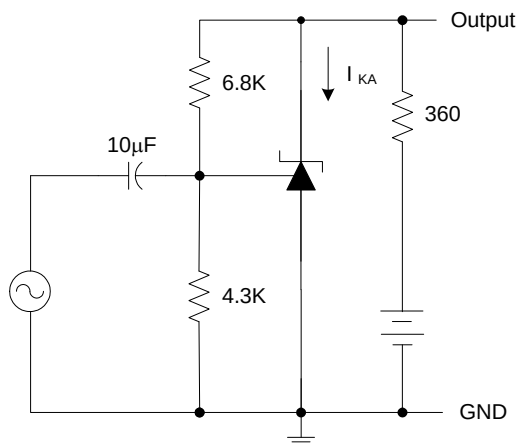
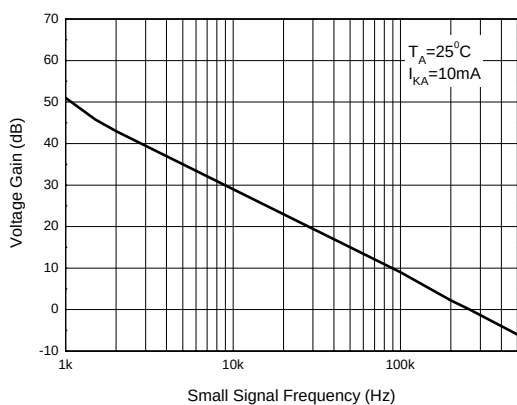
Cathode Current vs. Cathode Voltage



Cathode Current vs. Cathode Voltage

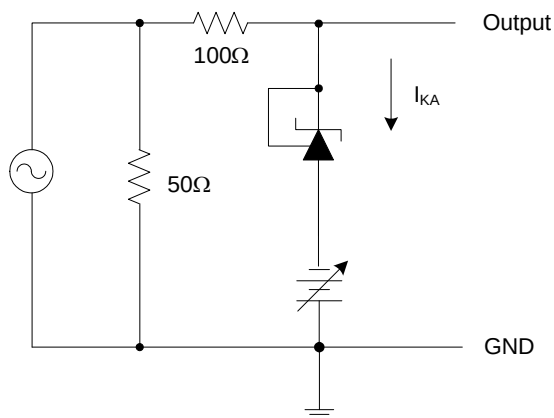
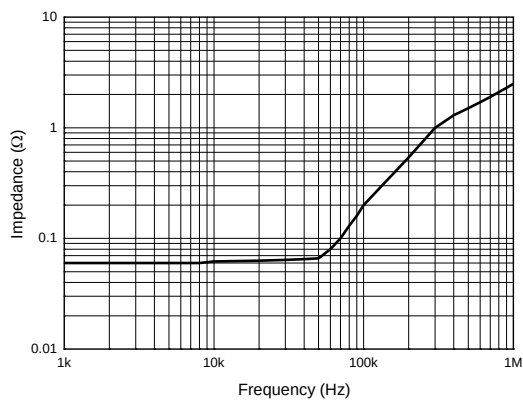


Small Signal Voltage Gain vs. Frequency

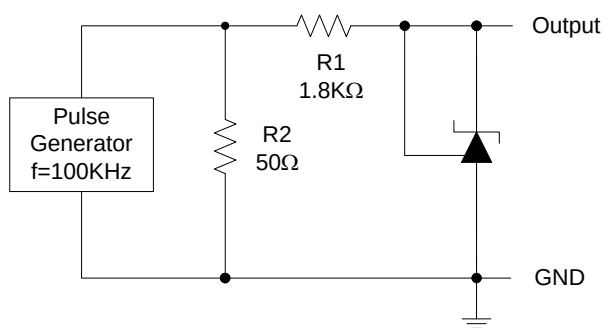
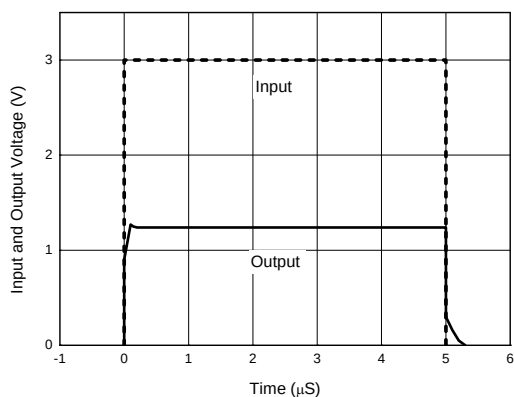


## RATING AND CHARACTERISTIC CURVES

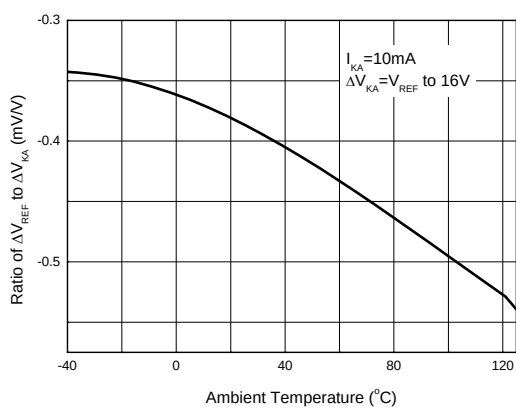
**Dynamic Impedance vs. Frequency**



**Pulse Response of Input and Output Voltage**

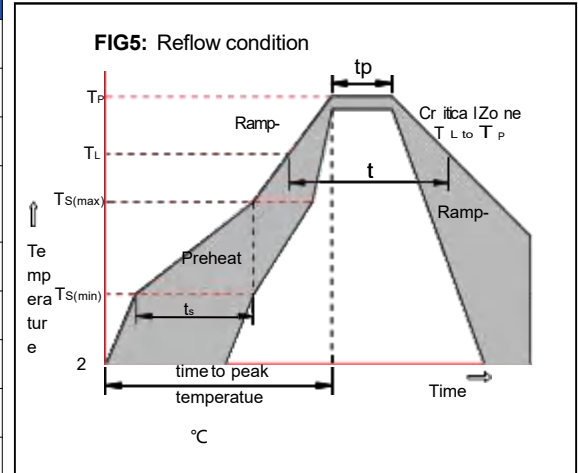


**Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage vs. Ambient Temperature**



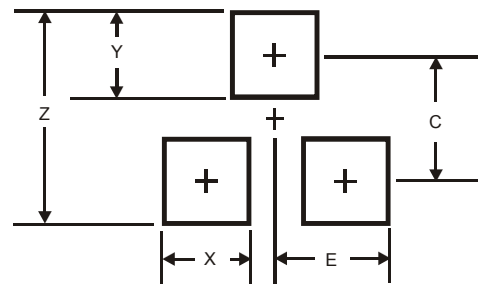
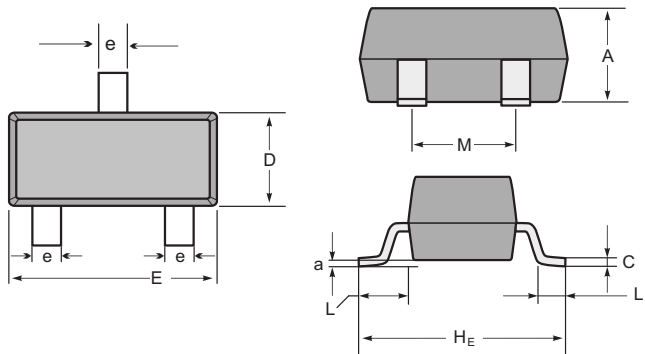
## Soldering parameters

| Reflow Condition                                        |                                   | Pb-Free assembly<br>(see as below) |
|---------------------------------------------------------|-----------------------------------|------------------------------------|
| Pre Heat                                                | -Temperature Min ( $T_{s(min)}$ ) | +150 °C                            |
|                                                         | -Temperature Max( $T_{s(max)}$ )  | +200 °C                            |
|                                                         | -Time (Min to Max) (ts)           | 60-180 secs.                       |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3 °C/sec. Max                      |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3 °C/sec. Max                      |
| Reflow                                                  | -Temperature( $T_L$ )(Liquid us)  | +217 °C                            |
|                                                         | -Temperature( $t_L$ )             | 60-150 secs.                       |
| Peak Temp ( $T_P$ )                                     |                                   | +260(+0/-5) °C                     |
| Time within 5 °C of actual Peak Temp ( $t_P$ )          |                                   | 30 secs. Max                       |
| Ramp-down Rate                                          |                                   | 6 °C/sec. Max                      |
| Time 25 °C to Peak Temp ( $T_P$ )                       |                                   | 8 min. Max                         |
| Do not exceed                                           |                                   | +260 °C                            |



## Package Dimensions & Suggested Pad Layout

### SOT23



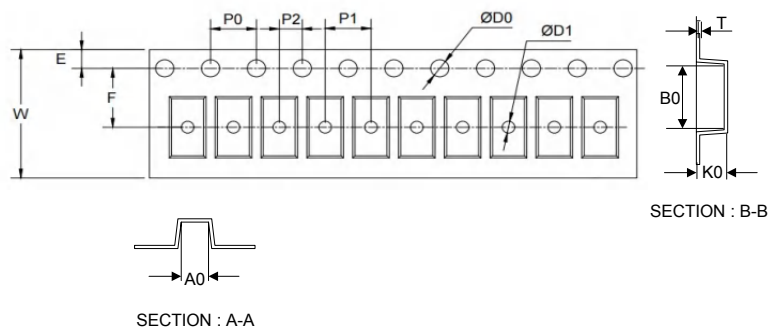
### SOT-23 mechanical data

| UNIT |     | A   | C    | D   | E   | H <sub>E</sub> | e   | M    | L          | L <sub>1</sub> | a    |
|------|-----|-----|------|-----|-----|----------------|-----|------|------------|----------------|------|
| mm   | max | 1.1 | 0.15 | 1.4 | 3.0 | 2.6            | 0.5 | 1.95 | 0.55 (ref) | 0.36 (ref)     | 0.0  |
|      | min | 0.9 | 0.08 | 1.2 | 2.8 | 2.2            | 0.3 | 1.7  |            |                | 0.15 |
| mil  | max | 43  | 6    | 55  | 118 | 102            | 20  | 77   | 22 (ref)   | 14 (ref)       | 0.0  |
|      | min | 35  | 3    | 47  | 110 | 87             | 12  | 67   |            |                | 6    |

| Dimensions | SOT23 |
|------------|-------|
| Z          | 2.9   |
| X          | 0.8   |
| Y          | 0.9   |
| C          | 2.0   |
| E          | 1.35  |

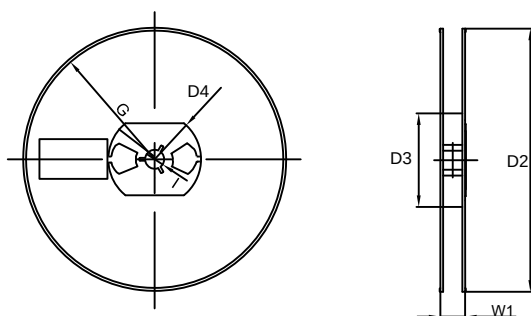
## Tape & reel specification

### Tape



| Symbol | Dimension (mm) |
|--------|----------------|
| P0     | 4.00±0.10      |
| P1     | 4.00±0.10      |
| P2     | 2.00±0.10      |
| D0     | 1.55±0.10      |
| D1     | 1.05±0.10      |
| E      | 1.55±0.10      |
| F      | 3.60±0.10      |
| W      | 8.00±0.10      |
| A0     | 3.80±0.20      |
| B0     | 3.25±0.20      |
| K0     | 1.45±0.10      |
| T      | 0.25±0.05      |

### 7" Reel



|    |           |
|----|-----------|
| D2 | 178.0±3.0 |
| D3 | 55Min.    |
| D4 | R24.0±3.0 |
| G  | R82.0±3.0 |
| I  | 13.0±2.0  |
| W1 | 11.0±3.0  |

Quantity: 3000PCS