

## 500mW Zener Diode Series

# ZD46XXSH

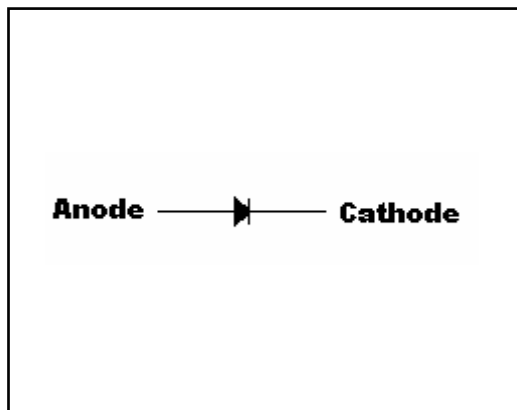
### Description

The ZD46XXSH series covers zener voltage range from 1.8V to 43V, and is encapsulated in SOD-123 package, very suitable for low cost, low power voltage regulation application.

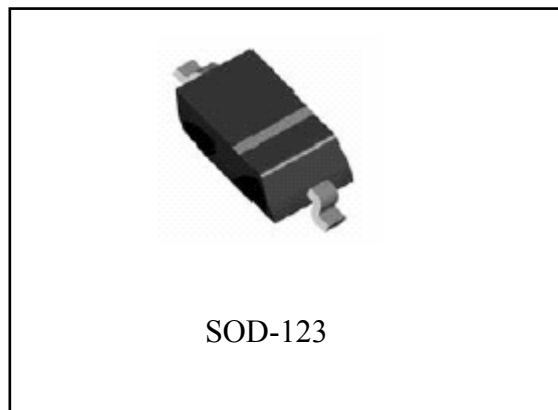
### Features

- Ultra small surface mount package
- General purpose, medium current
- Planar die construction
- Pb-free package

### Symbol



### Outline



### Ordering Information

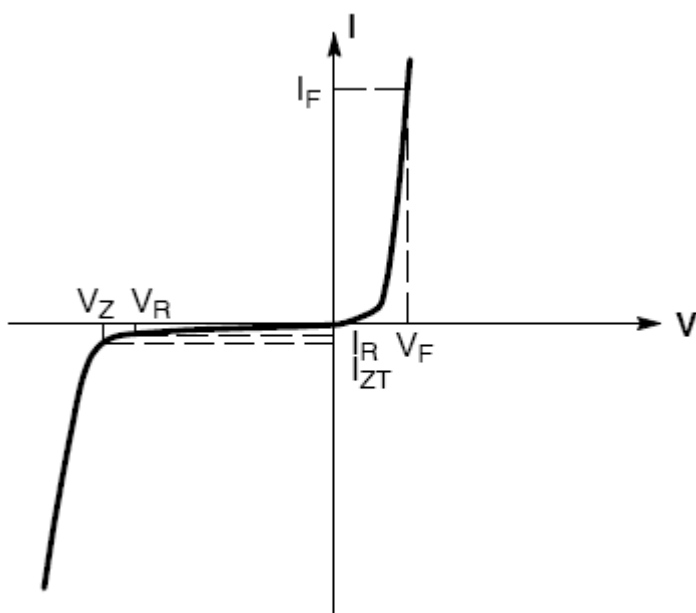
| Device          | Package                                                    | Shipping               |
|-----------------|------------------------------------------------------------|------------------------|
| ZD46XXSH-0-T1-G | SOD-123<br>(Pb-free lead plating and halogen-free package) | 3000 pcs / Tape & Reel |

## Absolute Maximum Ratings( $T_j=25^{\circ}\text{C}$ , unless otherwise specified)

- Maximum Temperatures  
Operating and Storage Temperature Range  $T_j, T_{stg}$  .....  $-65\sim+150^{\circ}\text{C}$
- Maximum Forward Voltage @  $I_F=10\text{mA}$  .....  $0.9\text{V}$
- Maximum Power Dissipation  
Total Power Dissipation @  $T_L=75^{\circ}\text{C}$   $P_{tot}$  (Note 1) .....  $500\text{ mW}$
- Thermal Resistance, Junction to Ambient Air  $R_{\theta JA}$  (Note 1) .....  $150^{\circ}\text{C/W}$
- Maximum Z-current .....  $P_{tot}/V_Z\text{ mA}$

Note : 1. Parts mounted on FR-5 board with area of  $3.5\text{inch} \times 1.5\text{inch}$ .

## Electrical Characteristic ( $T_a=25^{\circ}\text{C}$ , unless otherwise noted)



### Zener Voltage Regulator

| Symbol   | Parameter                        |
|----------|----------------------------------|
| $V_Z$    | Reverse zener voltage @ $I_{ZT}$ |
| $I_{ZT}$ | Reverse current                  |
| $I_R$    | Reverse leakage current @ $V_R$  |
| $V_R$    | Reverse voltage                  |
| $I_F$    | Forward current                  |
| $V_F$    | Forward voltage @ $I_F$          |

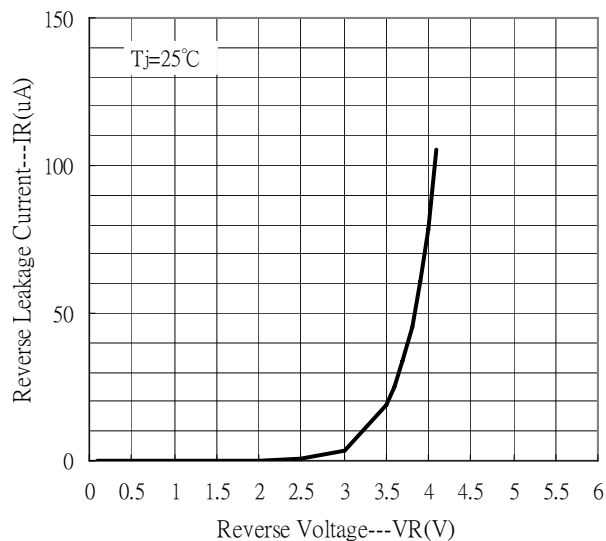


| Device | Type<br>Code | Nom. Zener Voltage              |      |       |                 | Max. Reverse Leakage Current |                |
|--------|--------------|---------------------------------|------|-------|-----------------|------------------------------|----------------|
|        |              | V <sub>Z</sub> @I <sub>ZT</sub> |      |       |                 |                              |                |
|        |              | Min.                            | Nom. | Max.  | I <sub>ZT</sub> | I <sub>R</sub>               | V <sub>R</sub> |
|        |              | (V)                             | (V)  | (V)   | (μA)            | (μA)                         | (V)            |
| ZD4678 | CC           | 1.71                            | 1.8  | 1.89  | 50              | 7.5                          | 1              |
| ZD4679 | CD           | 1.90                            | 2.0  | 2.10  | 50              | 5                            | 1              |
| ZD4680 | CE           | 2.09                            | 2.2  | 2.31  | 50              | 4                            | 1              |
| ZD4681 | CF           | 2.28                            | 2.4  | 2.52  | 50              | 2                            | 1              |
| ZD4682 | CH           | 2.565                           | 2.7  | 2.835 | 50              | 1                            | 1              |
| ZD4683 | CJ           | 2.85                            | 3.0  | 3.15  | 50              | 0.8                          | 1              |
| ZD4684 | CK           | 3.13                            | 3.3  | 3.47  | 50              | 7.5                          | 1.5            |
| ZD4685 | CM           | 3.42                            | 3.6  | 3.78  | 50              | 7.5                          | 2              |
| ZD4686 | CN           | 3.70                            | 3.9  | 4.10  | 50              | 5                            | 2              |
| ZD4687 | CP           | 4.09                            | 4.3  | 4.52  | 50              | 4                            | 2              |
| ZD4688 | CT           | 4.47                            | 4.7  | 4.94  | 50              | 10                           | 3              |
| ZD4689 | CU           | 4.85                            | 5.1  | 5.36  | 50              | 10                           | 3              |
| ZD4690 | CV           | 5.32                            | 5.6  | 5.88  | 50              | 10                           | 4              |
| ZD4691 | CA           | 5.89                            | 6.2  | 6.51  | 50              | 10                           | 5              |
| ZD4692 | CX           | 6.46                            | 6.8  | 7.14  | 50              | 10                           | 5.1            |
| ZD4693 | CY           | 7.13                            | 7.5  | 7.88  | 50              | 10                           | 5.7            |
| ZD4694 | CZ           | 7.79                            | 8.2  | 8.61  | 50              | 1                            | 6.2            |
| ZD4695 | DC           | 8.27                            | 8.7  | 9.14  | 50              | 1                            | 6.6            |
| ZD4696 | DD           | 8.65                            | 9.1  | 9.56  | 50              | 1                            | 6.9            |
| ZD4697 | DE           | 9.50                            | 10   | 10.5  | 50              | 1                            | 7.6            |
| ZD4698 | DF           | 10.45                           | 11   | 11.55 | 50              | 0.05                         | 8.4            |
| ZD4699 | DH           | 11.40                           | 12   | 12.60 | 50              | 0.05                         | 9.1            |
| ZD4700 | DJ           | 12.35                           | 13   | 13.65 | 50              | 0.05                         | 9.8            |
| ZD4701 | DK           | 13.30                           | 14   | 14.70 | 50              | 0.05                         | 10.6           |
| ZD4702 | DM           | 14.25                           | 15   | 15.75 | 50              | 0.05                         | 11.4           |
| ZD4703 | DN           | 15.20                           | 16   | 16.80 | 50              | 0.05                         | 12.1           |
| ZD4704 | DP           | 16.15                           | 17   | 17.85 | 50              | 0.05                         | 12.9           |
| ZD4705 | DT           | 17.10                           | 18   | 18.90 | 50              | 0.05                         | 13.6           |
| ZD4706 | DU           | 18.05                           | 19   | 19.95 | 50              | 0.05                         | 14.4           |
| ZD4707 | DV           | 19.00                           | 20   | 21.00 | 50              | 0.01                         | 15.2           |
| ZD4708 | DA           | 20.90                           | 22   | 23.10 | 50              | 0.01                         | 16.7           |
| ZD4709 | DX           | 22.80                           | 24   | 25.20 | 50              | 0.01                         | 18.2           |
| ZD4710 | DY           | 23.75                           | 25   | 26.25 | 50              | 0.01                         | 19.0           |
| ZD4711 | EA           | 25.65                           | 27   | 28.35 | 50              | 0.01                         | 20.4           |
| ZD4712 | EC           | 26.60                           | 28   | 29.40 | 50              | 0.01                         | 21.2           |
| ZD4713 | ED           | 28.50                           | 30   | 31.50 | 50              | 0.01                         | 22.8           |
| ZD4714 | EE           | 31.35                           | 33   | 34.65 | 50              | 0.01                         | 25.0           |
| ZD4715 | EF           | 34.20                           | 36   | 37.80 | 50              | 0.01                         | 27.3           |
| ZD4716 | EH           | 37.05                           | 39   | 40.95 | 50              | 0.01                         | 29.6           |
| ZD4717 | EJ           | 40.85                           | 43   | 45.15 | 50              | 0.01                         | 32.6           |

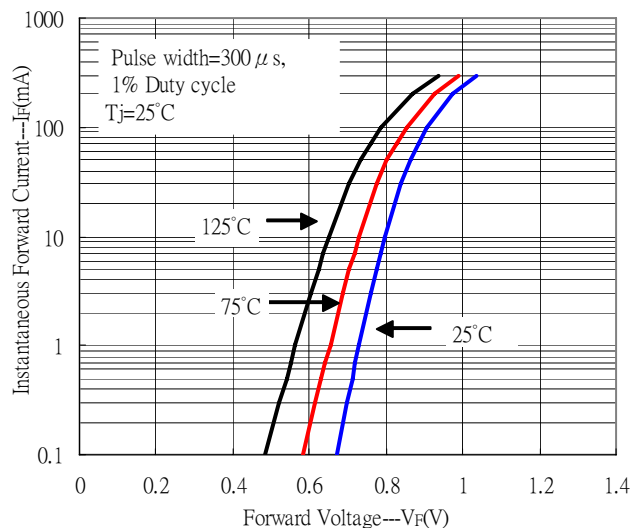
## Characteristic Curves

### ZD4686

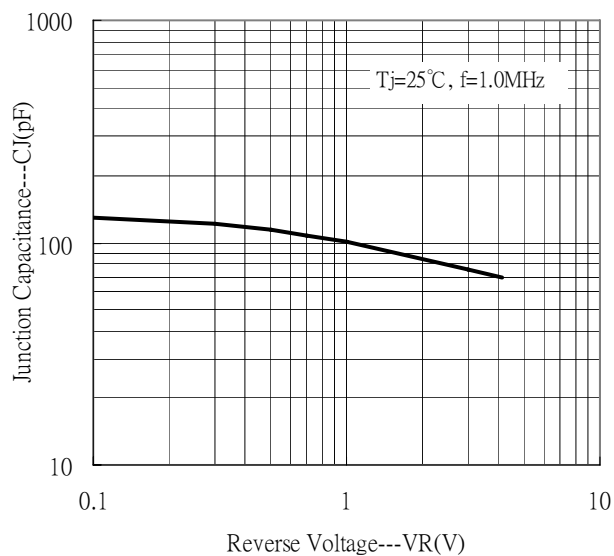
Reverse Leakage Current vs Reverse Voltage



Forward Current vs Forward Voltage

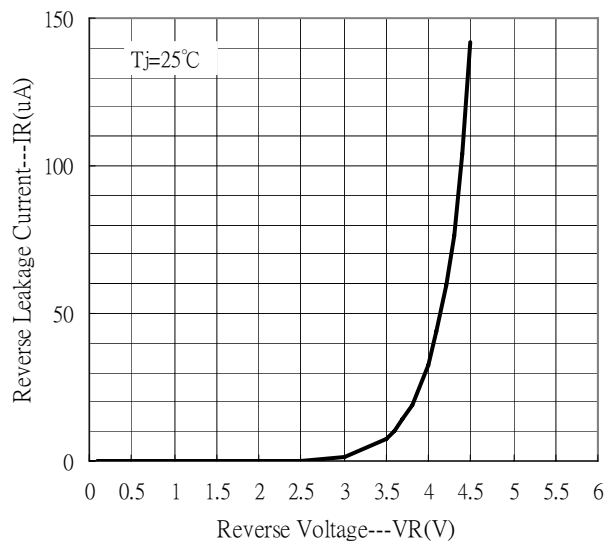


Junction Capacitance vs Reverse Voltage

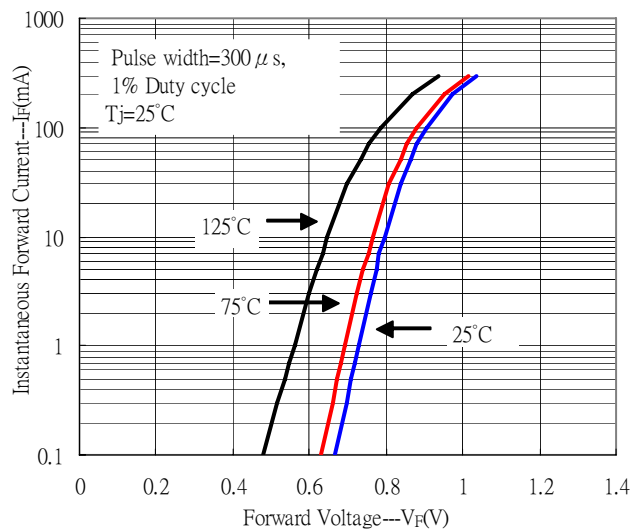


**ZD4687**

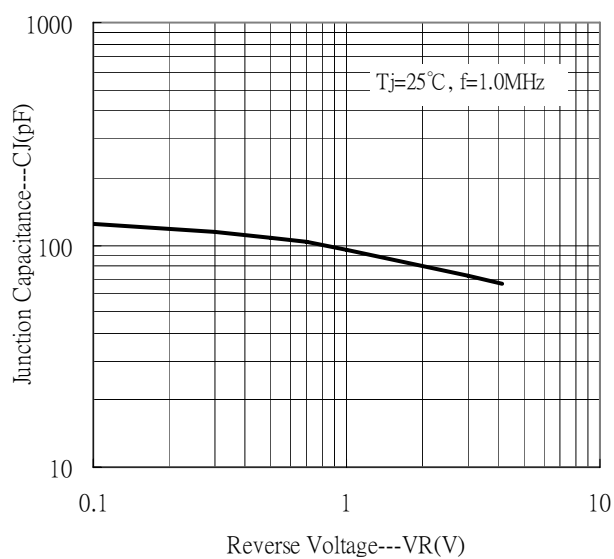
Reverse Leakage Current vs Reverse Voltage



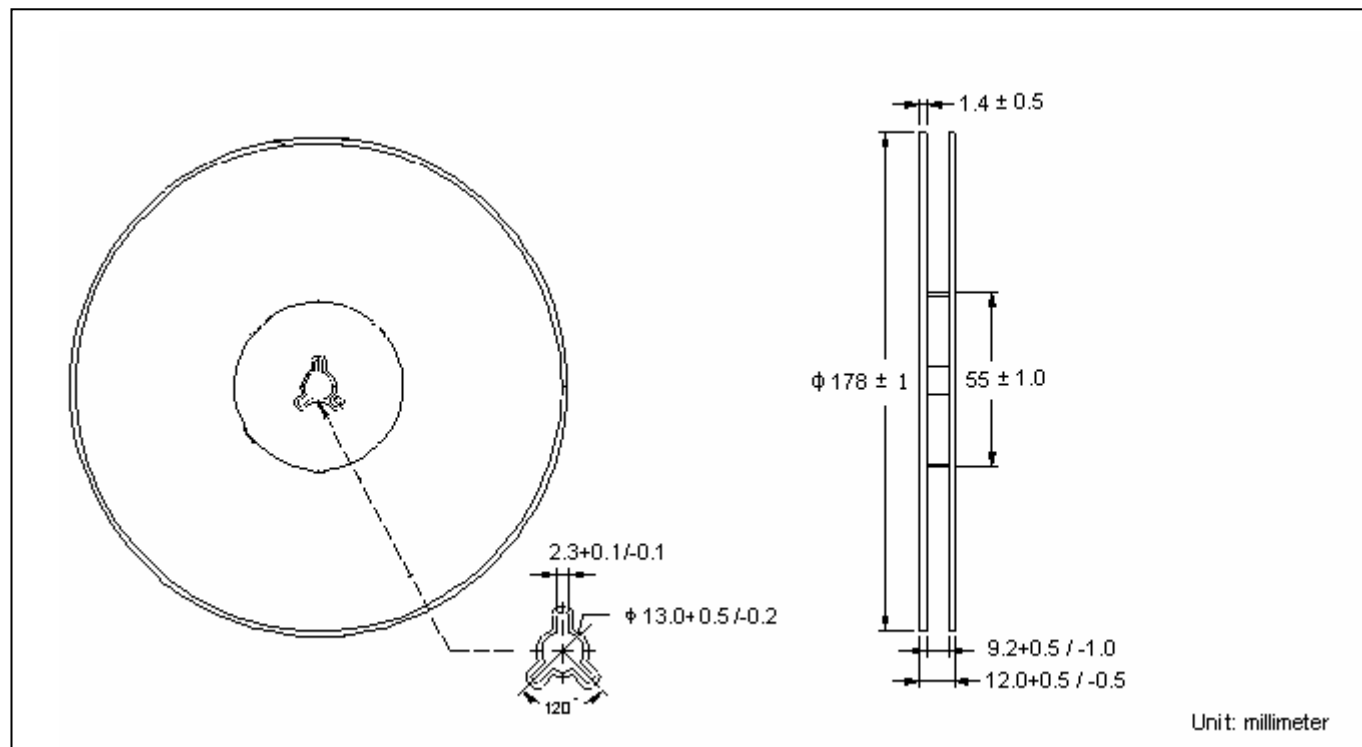
Forward Current vs Forward Voltage



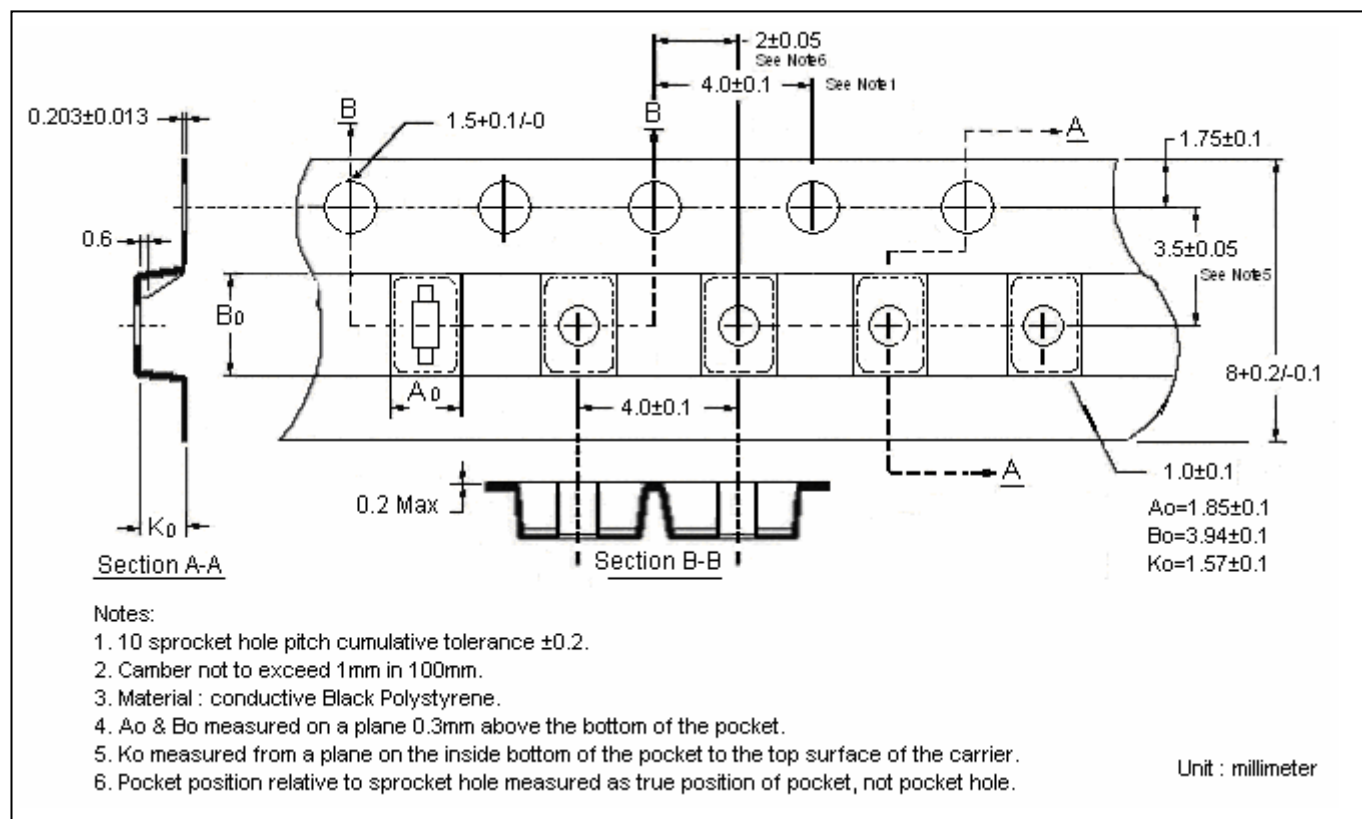
Junction Capacitance vs Reverse Voltage



## Reel Dimension



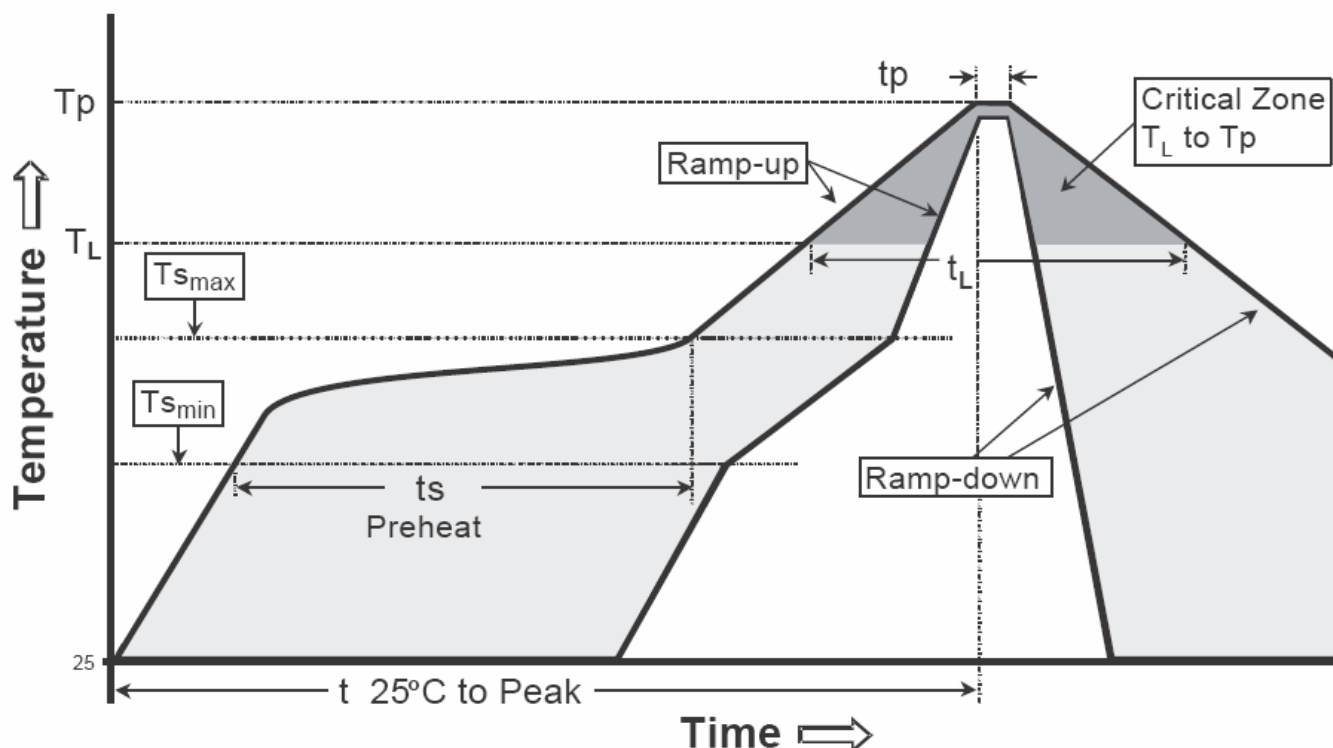
## Carrier Tape Dimension



## Recommended wave soldering condition

| Product         | Peak Temperature | Soldering Time  |
|-----------------|------------------|-----------------|
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

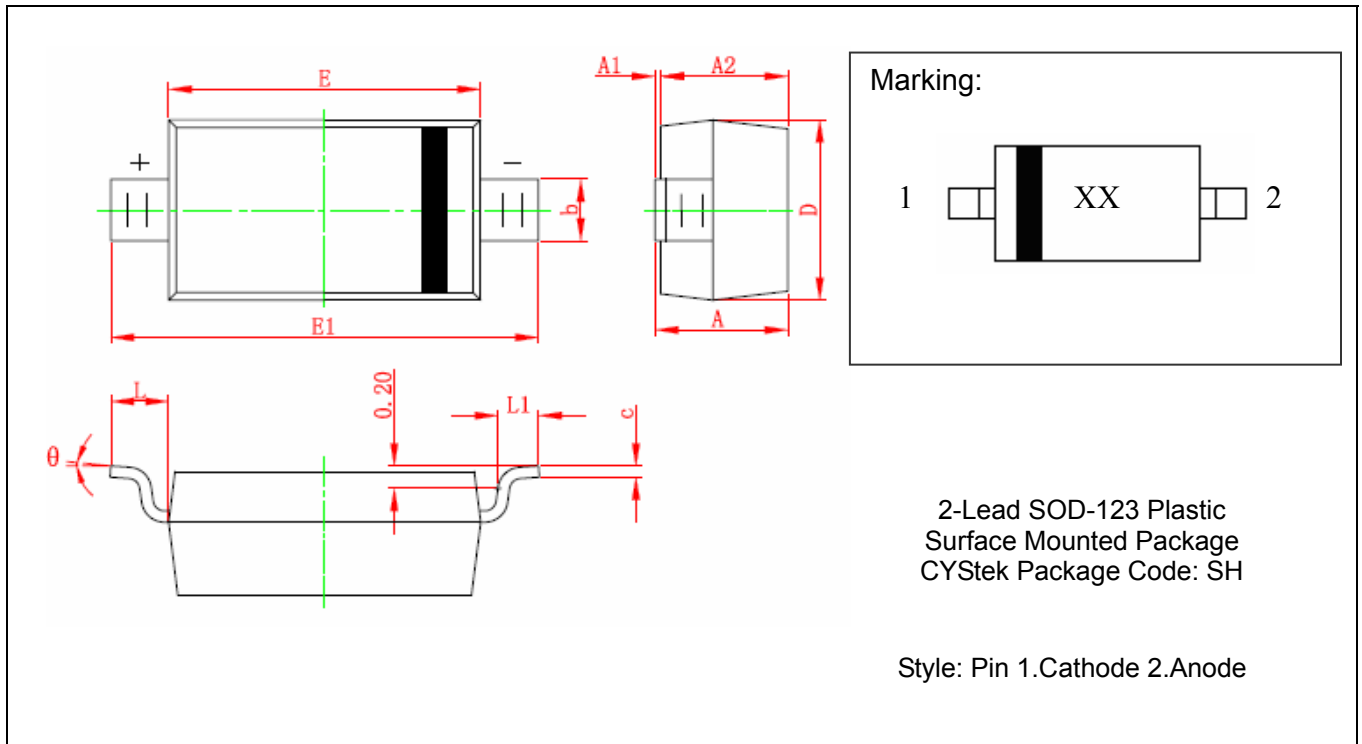
## Recommended temperature profile for IR reflow



| Profile feature                                | Sn-Pb eutectic Assembly | Pb-free Assembly |
|------------------------------------------------|-------------------------|------------------|
| Average ramp-up rate (Tsmax to Tp)             | 3°C/second max.         | 3°C/second max.  |
| Preheat                                        |                         |                  |
| -Temperature Min(Ts min)                       | 100°C                   | 150°C            |
| -Temperature Max(Ts max)                       | 150°C                   | 200°C            |
| -Time(ts min to ts max)                        | 60-120 seconds          | 60-180 seconds   |
| Time maintained above:                         |                         |                  |
| -Temperature (Tl)                              | 183°C                   | 217°C            |
| - Time (tL)                                    | 60-150 seconds          | 60-150 seconds   |
| Peak Temperature(Tp)                           | 240 +0/-5 °C            | 260 +0/-5 °C     |
| Time within 5°C of actual peak temperature(tp) | 10-30 seconds           | 20-40 seconds    |
| Ramp down rate                                 | 6°C/second max.         | 6°C/second max.  |
| Time 25 °C to peak temperature                 | 6 minutes max.          | 8 minutes max.   |

Note : All temperatures refer to topside of the package, measured on the package body surface.

## SOD-123 Dimension



| DIM | Millimeters |       | Inches |       | DIM | Millimeters |       | Inches    |       |
|-----|-------------|-------|--------|-------|-----|-------------|-------|-----------|-------|
|     | Min.        | Max.  | Min.   | Max.  |     | Min.        | Max.  | Min.      | Max.  |
| A   | 1.050       | 1.250 | 0.041  | 0.049 | E   | 2.600       | 2.800 | 0.102     | 0.110 |
| A1  | 0.000       | 0.100 | 0.000  | 0.004 | E1  | 3.550       | 3.850 | 0.140     | 0.152 |
| A2  | 1.050       | 1.115 | 0.041  | 0.045 | L   | 0.500 REF   |       | 0.020 REF |       |
| b   | 0.450       | 0.650 | 0.018  | 0.026 | L1  | 0.250       | 0.450 | 0.010     | 0.018 |
| c   | 0.080       | 0.150 | 0.003  | 0.006 | θ   | 0°          | 8°    | 0°        | 8°    |
| D   | 1.500       | 1.700 | 0.059  | 0.067 |     |             |       |           |       |

Notes: 1.Controlling dimension : millimeters.  
 2.Lead thickness specified per L/F drawing with solder plating.  
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

### Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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