

# General Purpose NPN Epitaxial Planar Transistor

# BTD1768S3

|                  |              |
|------------------|--------------|
| $BV_{CEO}$       | 80V          |
| $I_C$            | 1A           |
| $R_{CESAT(MAX)}$ | 0.5 $\Omega$ |

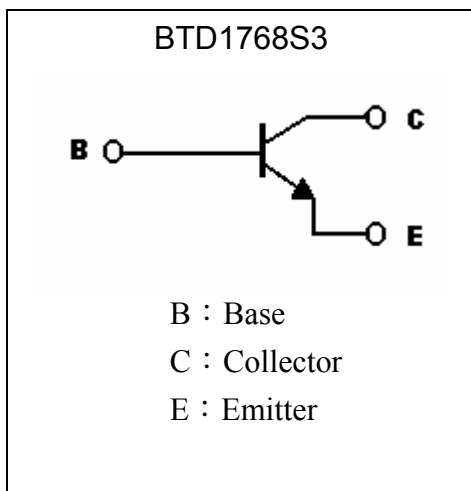
## Description

The BTD1768S3 is designed for use in driver and output stages of AF amplifier and general purpose application.

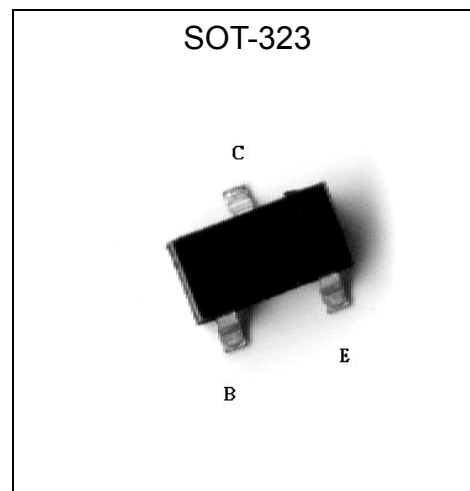
## Features

- Low collector saturation voltage
- High breakdown voltage,  $V_{CEO}=80V$  (min.)
- High collector current,  $I_{C(max)}=1A$  (DC)
- Pb-free package

## Symbol



## Outline



## Absolute Maximum Ratings (Ta=25°C)

| Parameter                               | Symbol          | Limits   | Unit          |
|---|-----------------|----------|---------------|
| Collector-Base Voltage                  | $V_{CB0}$       | 180      | V             |
| Collector-Emitter Voltage               | $V_{CEO}$       | 80       | V             |
| Emitter-Base Voltage                    | $V_{EB0}$       | 7        | V             |
| Collector Current (DC)                  | $I_C$           | 1        | A             |
| Collector Current (Pulse)               | $I_{CP}$        | 2 (Note) | A             |
| Power Dissipation                       | $P_D$           | 200      | mW            |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 625      | $^{\circ}C/W$ |
| Operating Junction Temperature Range    | $T_j$           | -55~+150 | $^{\circ}C$   |
| Storage Temperature                     | $T_{stg}$       | -55~+150 | $^{\circ}C$   |

Note : Pulse test,  $P_w \leq 10ms$ , Duty  $\leq 2\%$ .

**Characteristics (Ta=25°C)**

| Symbol           | Min. | Typ. | Max. | Unit | Test Conditions                  |
|------------------|------|------|------|------|----------------------------------|
| $BV_{CBO}$       | 180  | -    | -    | V    | $I_C=50\mu A$                    |
| $BV_{CEO}$       | 80   | -    | -    | V    | $I_C=1mA$                        |
| $BV_{EBO}$       | 7    | -    | -    | V    | $I_E=50\mu A$                    |
| $I_{CBO}$        | -    | -    | 100  | nA   | $V_{CB}=180V, I_E=0$             |
| $I_{EBO}$        | -    | -    | 100  | nA   | $V_{EB}=7V, I_C=0$               |
| * $V_{CE(SAT)1}$ | -    | 0.15 | 0.3  | V    | $I_C=500mA, I_B=20mA$            |
| * $V_{CE(SAT)2}$ | -    | 0.3  | 0.5  | V    | $I_C=1A, I_B=50mA$               |
| * $V_{BE(SAT)}$  | -    | 0.96 | 1.2  | V    | $I_C=1A, I_B=50mA$               |
| * $V_{BE(ON)}$   | 0.6  | 0.66 | 0.7  | V    | $V_{CE}=2V, I_C=50mA$            |
| * $h_{FE1}$      | 180  | -    | 560  | -    | $V_{CE}=2V, I_C=100mA$           |
| * $h_{FE2}$      | 60   | -    | -    | -    | $V_{CE}=2V, I_C=500mA$           |
| * $h_{FE3}$      | 20   | -    | -    | -    | $V_{CE}=2V, I_C=1A$              |
| $f_T$            | -    | 250  | -    | MHz  | $V_{CE}=10V, I_C=50mA, f=100MHz$ |
| $C_{ob}$         | -    | 6    | 15   | pF   | $V_{CB}=10V, I_E=0A, f=1MHz$     |

\*Pulse Test: Pulse Width  $\leq 380\mu s$ , Duty Cycle  $\leq 2\%$ **Classification Of  $h_{FE1}$** 

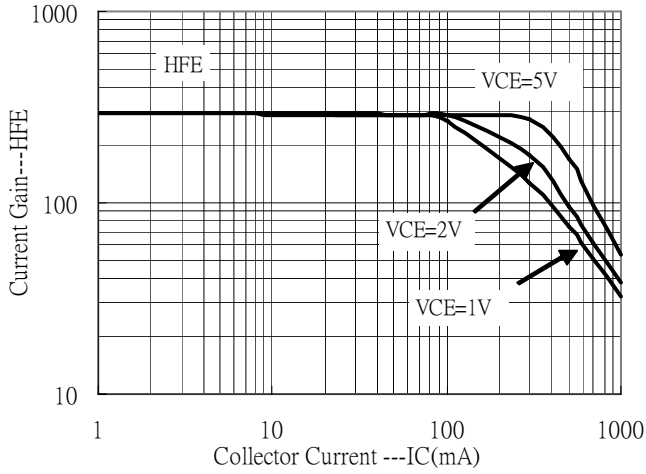
| Rank  | R       | S       |
|-------|---------|---------|
| Range | 180~390 | 270~560 |

**Ordering Information**

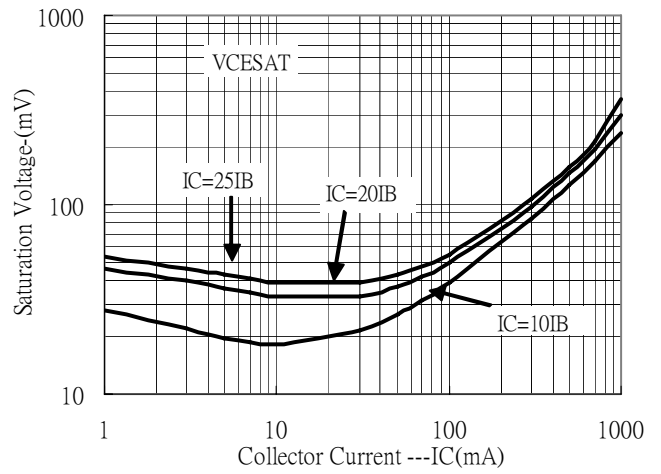
| Device    | Package  | Shipping               |
|-----------|--|------------------------|
| BTD1768S3 | SOT-323<br>(Pb-free lead plating and halogen-free package) | 3000 pcs / Tape & Reel |

## Characteristic Curves

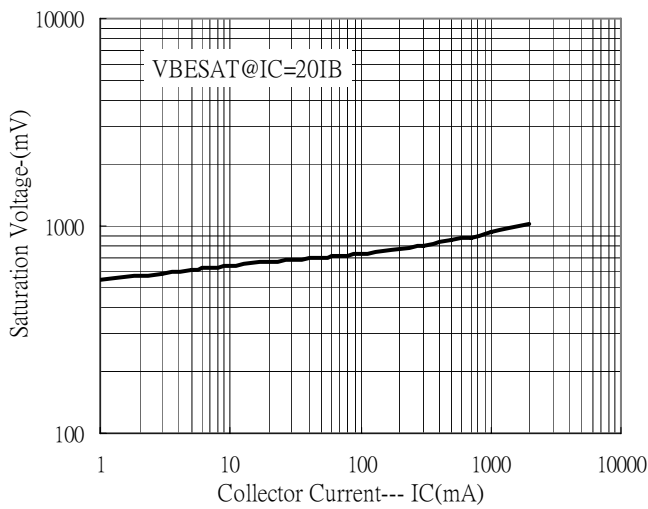
Current Gain vs Collector Current



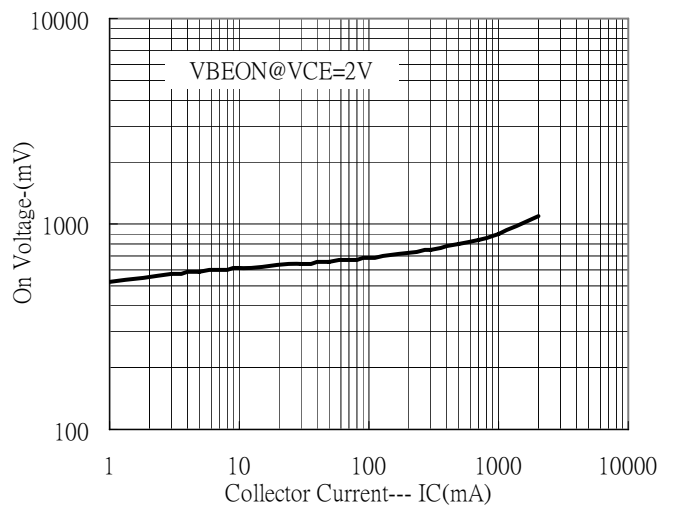
Saturation Voltage vs Collector Current



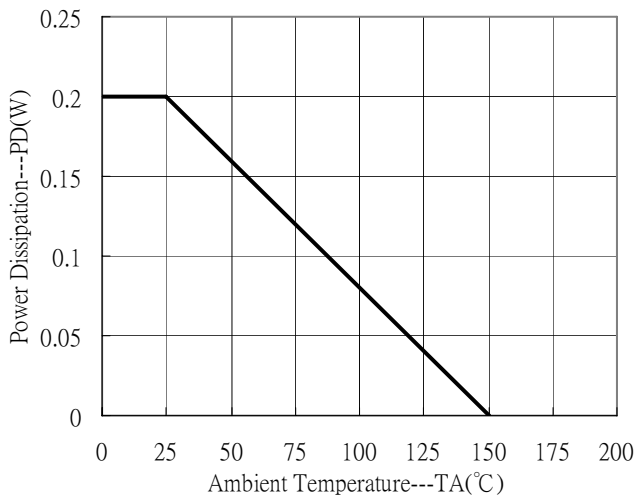
Saturation Voltage vs Collector Current



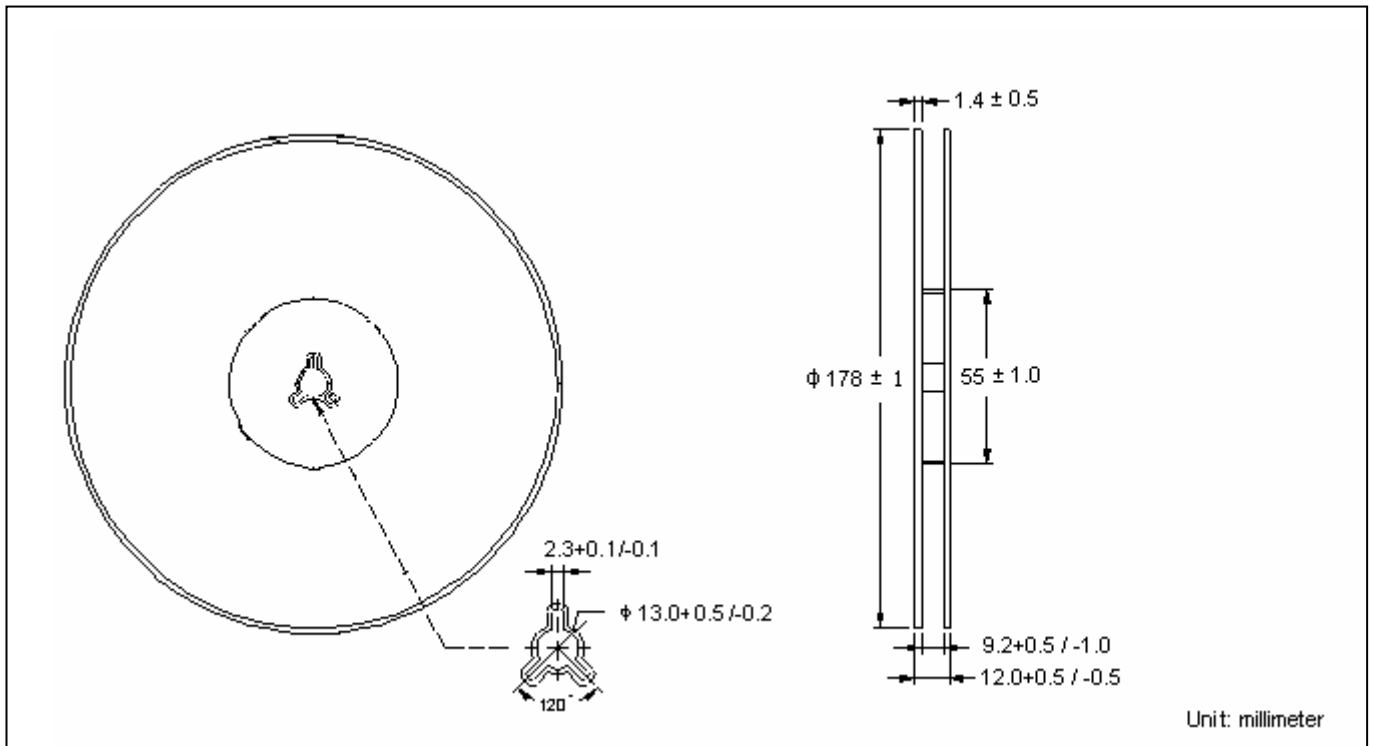
On Voltage vs Collector Current



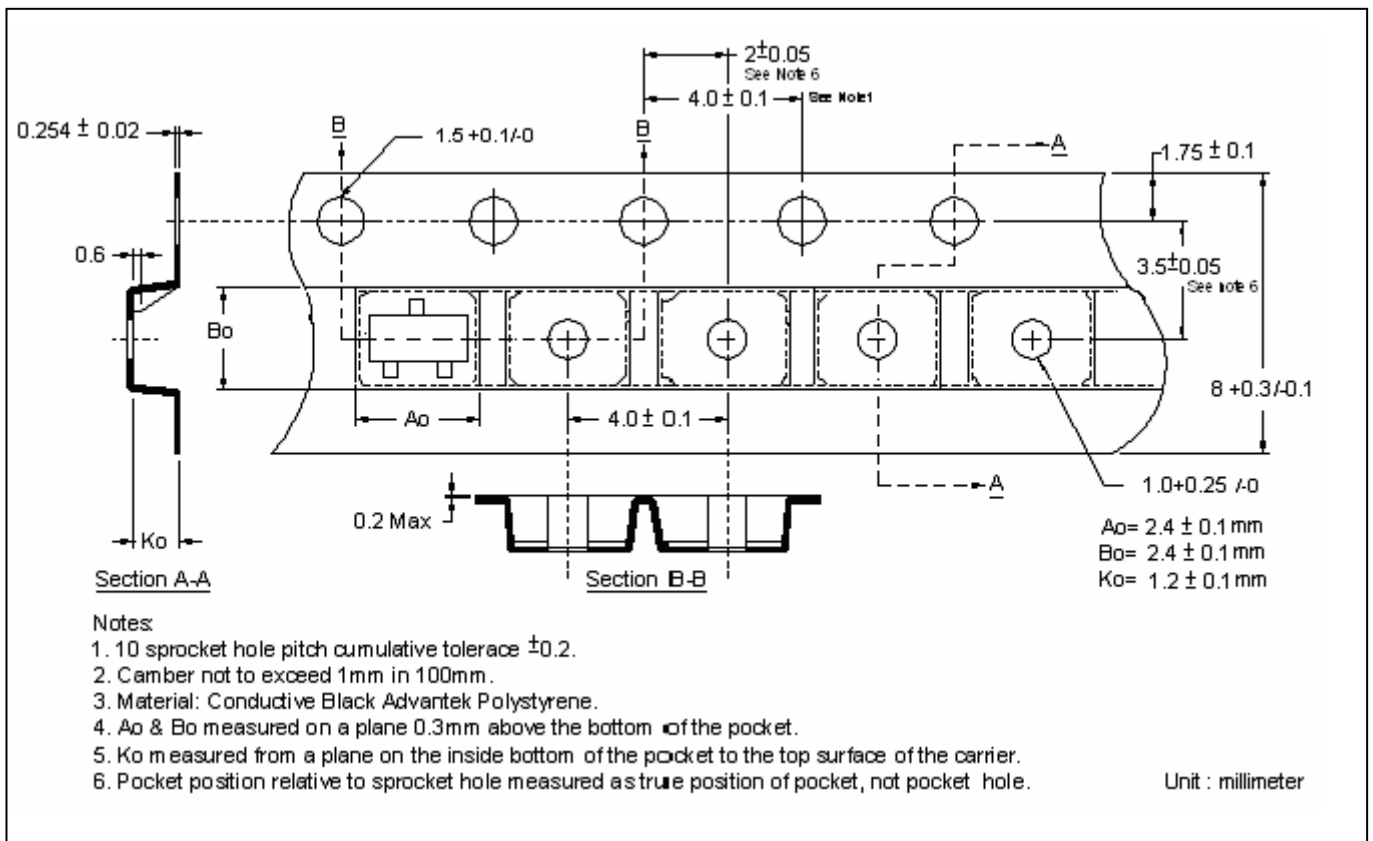
Power Derating Curve



**Reel Dimension**



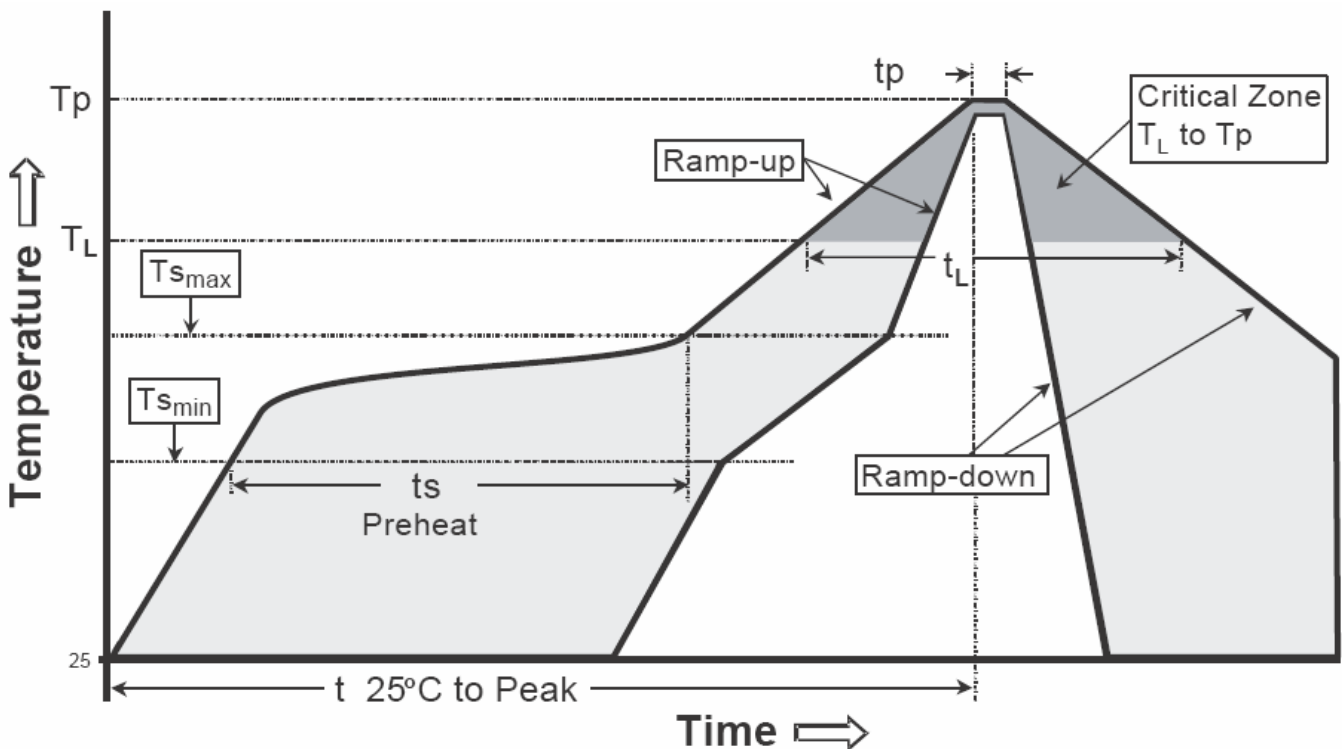
**Carrier Tape Dimension**



**Recommended wave soldering condition**

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

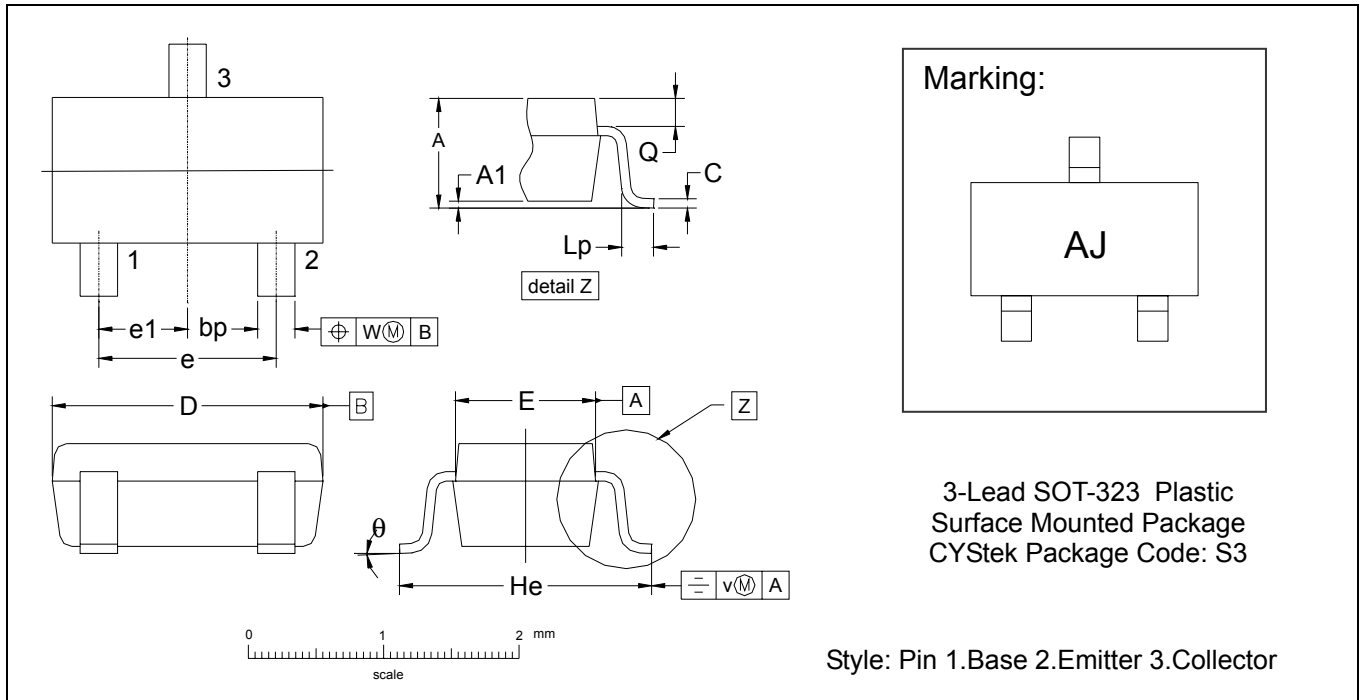
**Recommended temperature profile for IR reflow**



| Profile feature   | Sn-Pb eutectic Assembly | Pb-free Assembly |
|---|-------------------------|------------------|
| Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> ) | 3°C/second max.         | 3°C/second max.  |
| Preheat   |                         |                  |
| -Temperature Min(T <sub>s min</sub> )                       | 100°C                   | 150°C            |
| -Temperature Max(T <sub>s max</sub> )                       | 150°C                   | 200°C            |
| -Time(t <sub>s min</sub> to t <sub>s max</sub> )            | 60-120 seconds          | 60-180 seconds   |
| Time maintained above:                                      |                         |                  |
| -Temperature (T <sub>L</sub> )                              | 183°C                   | 217°C            |
| - Time (t <sub>L</sub> )                                    | 60-150 seconds          | 60-150 seconds   |
| Peak Temperature(T <sub>p</sub> )                           | 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.

**SOT-323 Dimension**



| DIM | Inches |        | Millimeters |      | DIM | Inches |        | Millimeters |      |
|-----|--------|--------|-------------|------|-----|--------|--------|-------------|------|
|     | Min.   | Max.   | Min.        | Max. |     | Min.   | Max.   | Min.        | Max. |
| A   | 0.0315 | 0.0433 | 0.80        | 1.10 | e1  | 0.0256 | -      | 0.65        | -    |
| A1  | 0.0000 | 0.0039 | 0.00        | 0.10 | He  | 0.0787 | 0.0886 | 2.00        | 2.25 |
| bp  | 0.0118 | 0.0157 | 0.30        | 0.40 | Lp  | 0.0059 | 0.0177 | 0.15        | 0.45 |
| C   | 0.0039 | 0.0098 | 0.10        | 0.25 | Q   | 0.0051 | 0.0091 | 0.13        | 0.23 |
| D   | 0.0709 | 0.0866 | 1.80        | 2.20 | v   | 0.0079 | -      | 0.2         | -    |
| E   | 0.0453 | 0.0531 | 1.15        | 1.35 | w   | 0.0079 | -      | 0.2         | -    |
| e   | 0.0512 | -      | 1.3         | -    | θ   | -      | -      | 10°         | 0°   |

Notes: 1.Controlling dimension: millimeters.  
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.  
 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

**Important Notice:**

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.