

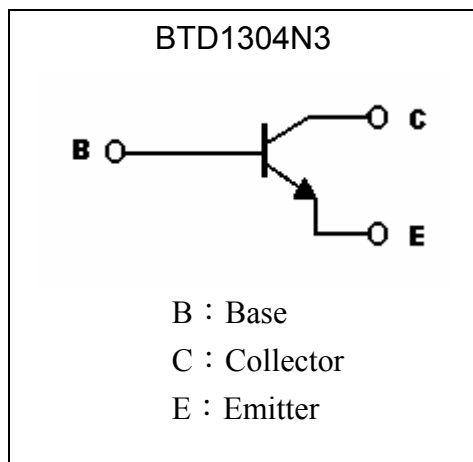
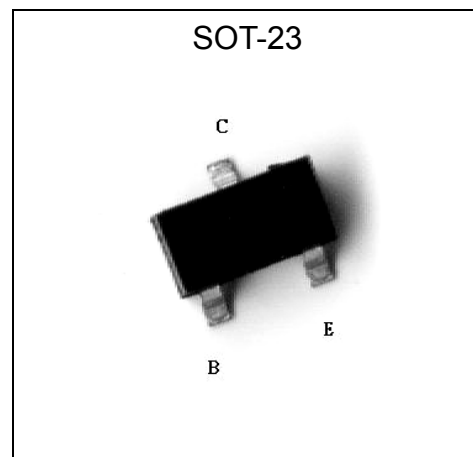
**NPN Epitaxial Planar Transistor
 AUDIO MUTING APPLICATION**

BTD1304N3

| | |
|---------------|--------------------|
| BV_{CEO} | 20V |
| I_C | 500mA |
| $R_{CE(SAT)}$ | 0.3 Ω (typ) |

Features

- High Emitter-Base voltage, $V_{EBO}=12V(\text{min})$.
- High reverse h_{FE} , reverse $h_{FE}=20(\text{min.}) @V_{CE}=2V, I_C=4mA$.
- Low On-resistance, $R_{on}=0.6 \Omega (\text{max}) @I_B=1mA$.
- Pb-free and halogen-free package.

Symbol

Outline

Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

| Parameter | Symbol | Limit | Unit |
|---|-----------------|----------|---------------------------|
| Collector-Base Voltage | V_{CB0} | 50 | V |
| Collector-Emitter Voltage | V_{CEO} | 20 | V |
| Emitter-Base Voltage | V_{EBO} | 12 | V |
| Collector Current | I_C | 500 | mA |
| Base Current | I_B | 50 | mA |
| Power Dissipation | P_D | 225 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55~+150 | $^\circ\text{C}$ |

**Characteristics (Ta=25°C)**

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|--------------------------|------|------|------|------|--|
| BV _{CB0} | 50 | - | - | V | I _C =100μA, I _E =0 |
| BV _{CE0} | 20 | - | - | V | I _C =1mA, I _B =0 |
| BV _{EB0} | 12 | - | - | V | I _E =10μA, I _C =0 |
| I _{CB0} | - | - | 100 | nA | V _{CB} =40V, I _E =0 |
| I _{EB0} | - | - | 100 | nA | V _{EB} =12V, I _C =0 |
| *V _{CE(sat)} | - | 34 | 100 | mV | I _C =100mA, I _B =10mA |
| *V _{CE(sat)} | - | 0.15 | 0.3 | V | I _C =500mA, I _B =20mA |
| *R _{CE(sat)} | - | 0.3 | 0.6 | Ω | I _C =500mA, I _B =20mA |
| *V _{BE(sat)} | - | 0.67 | 1 | V | I _C =100mA, I _B =10mA |
| *h _{FE1} (FOR) | 200 | - | 800 | - | V _{CE} =2V, I _C =4mA |
| *h _{FE2} (FOR) | 400 | - | - | - | V _{CE} =3V, I _C =100mA |
| *h _{FE 3} (REV) | 20 | - | - | - | V _{CE} =2V, I _C =4mA |
| f _T | - | 250 | - | MHz | V _{CE} =10V, I _C =50mA, f=100MHz |
| Cob | - | 10 | - | pF | V _{CB} =10V, f=1MHz |
| Ron | - | - | 0.6 | Ω | V _{in} =0.3V, I _B =1mA, f=1KHz |

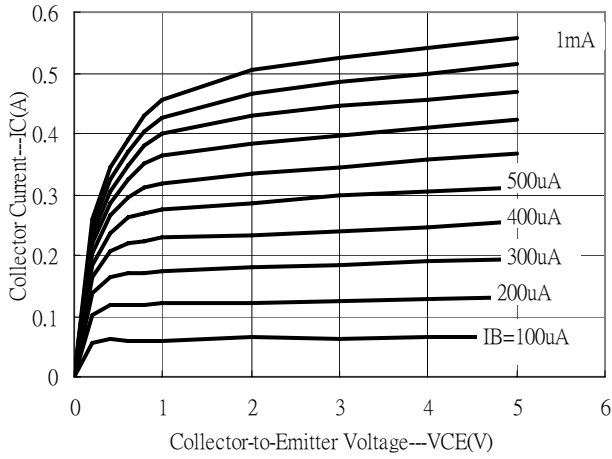
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

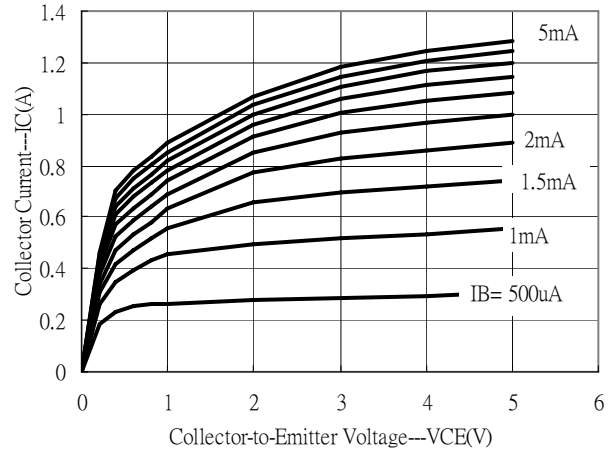
| Device | Package | Shipping | Marking |
|-----------|--|------------------------|---------|
| BTD1304N3 | SOT-23 (Pb-free and halogen-free package) | 3000 pcs / Tape & Reel | MAX |

Typical Characteristics

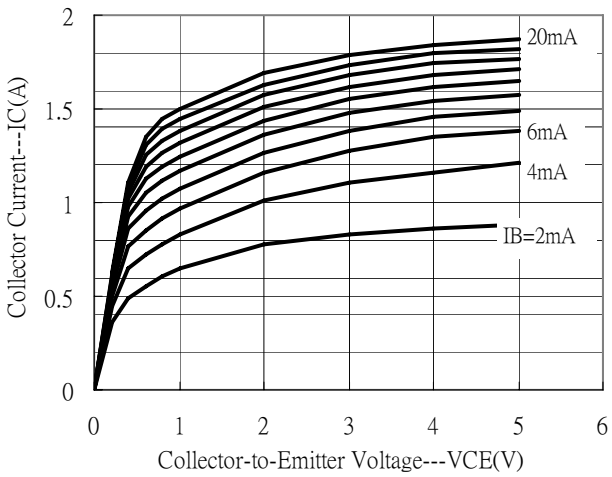
Emitter Grounded Output Characteristics



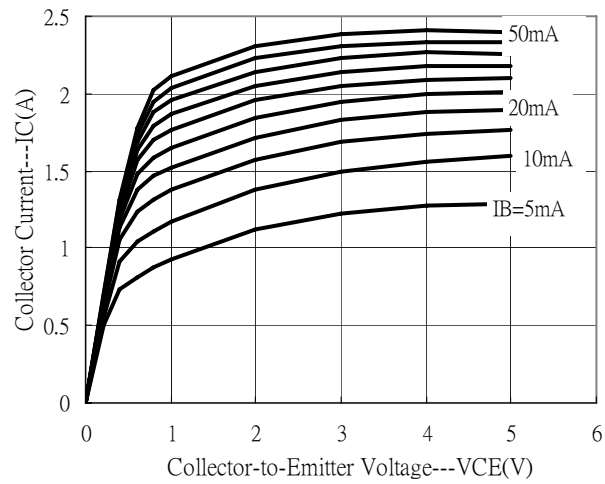
Emitter Grounded Output Characteristics



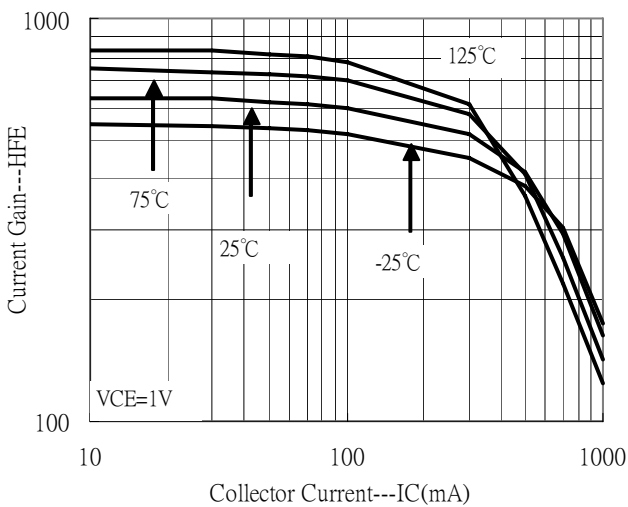
Emitter Grounded Output Characteristics



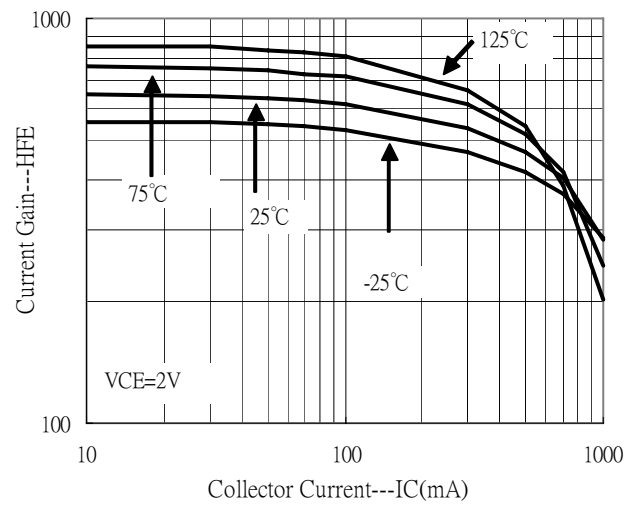
Emitter Grounded Output Characteristics



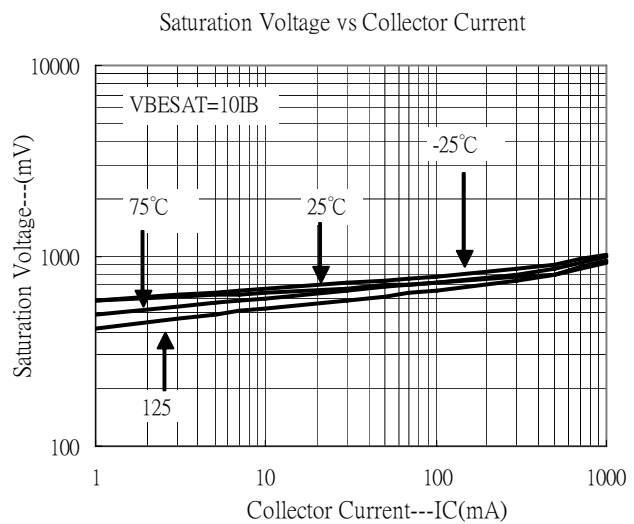
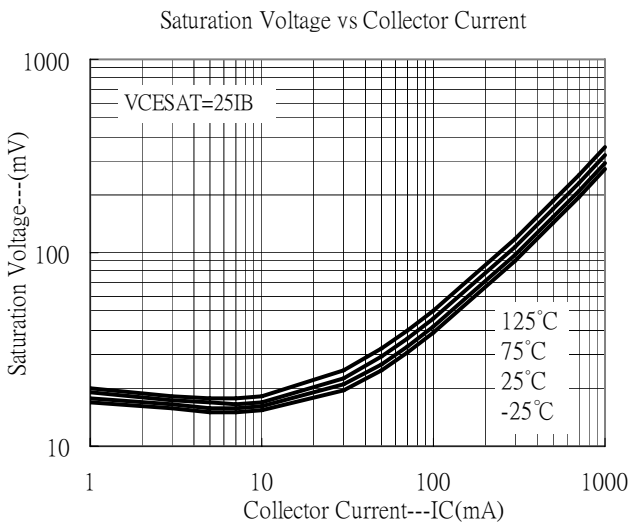
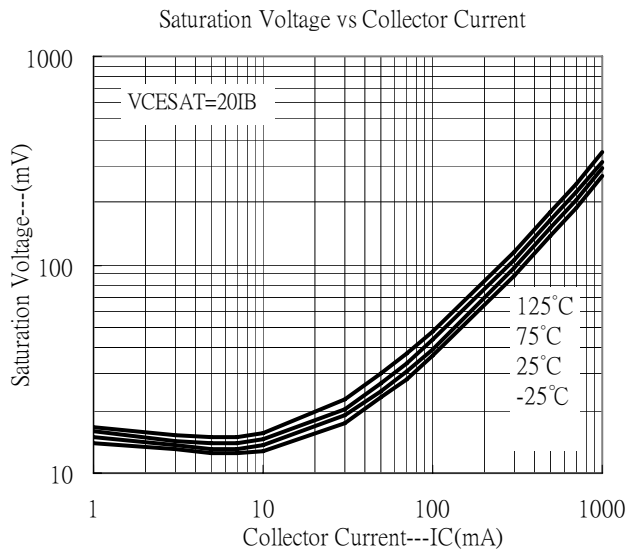
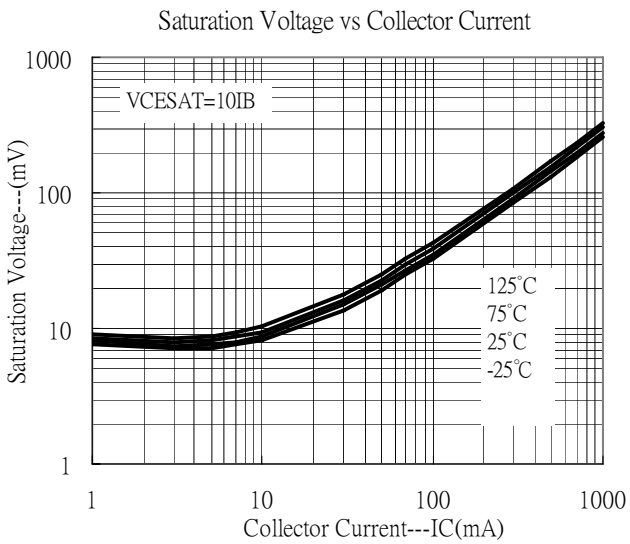
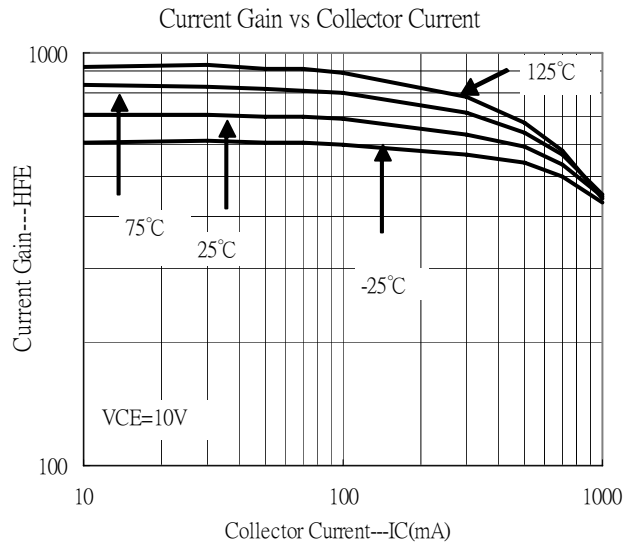
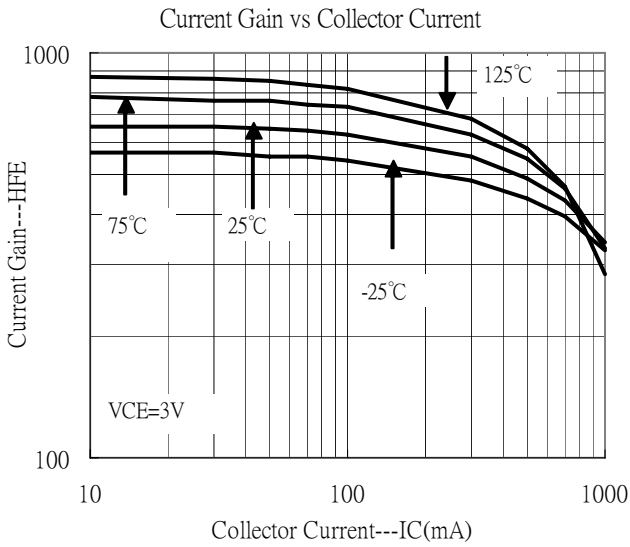
Current Gain vs Collector Current



Current Gain vs Collector Current

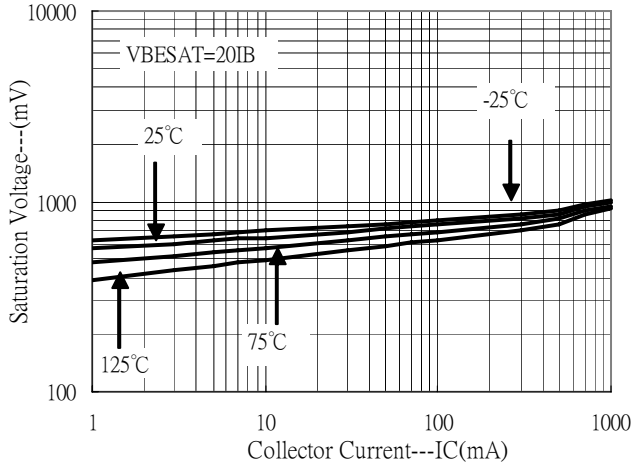


Typical Characteristics(Cont.)

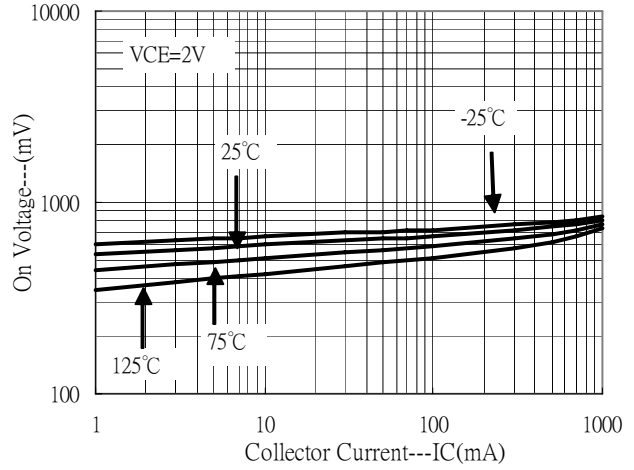


Typical Characteristics(Cont.)

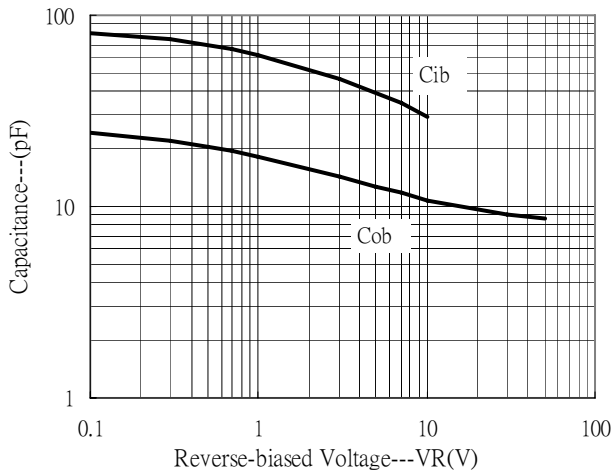
Saturation Voltage vs Collector Current



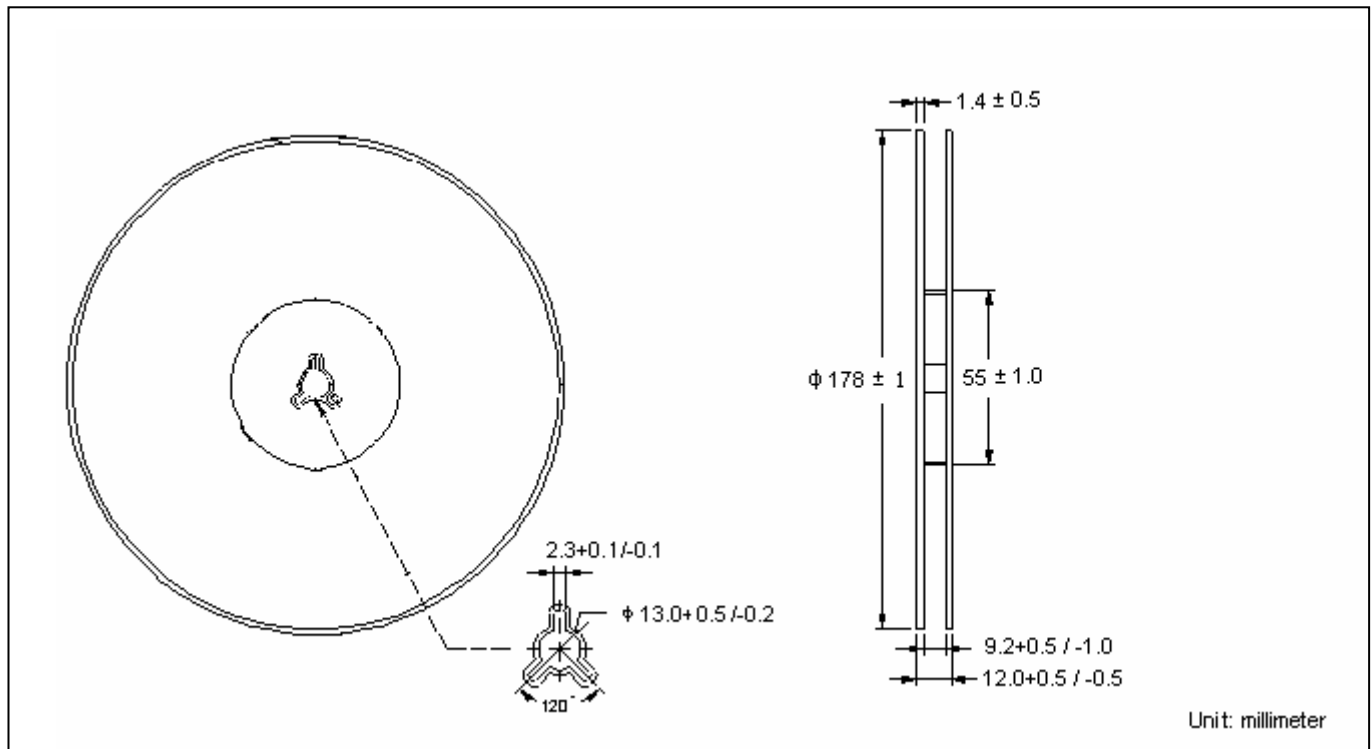
On Voltage vs Collector Current



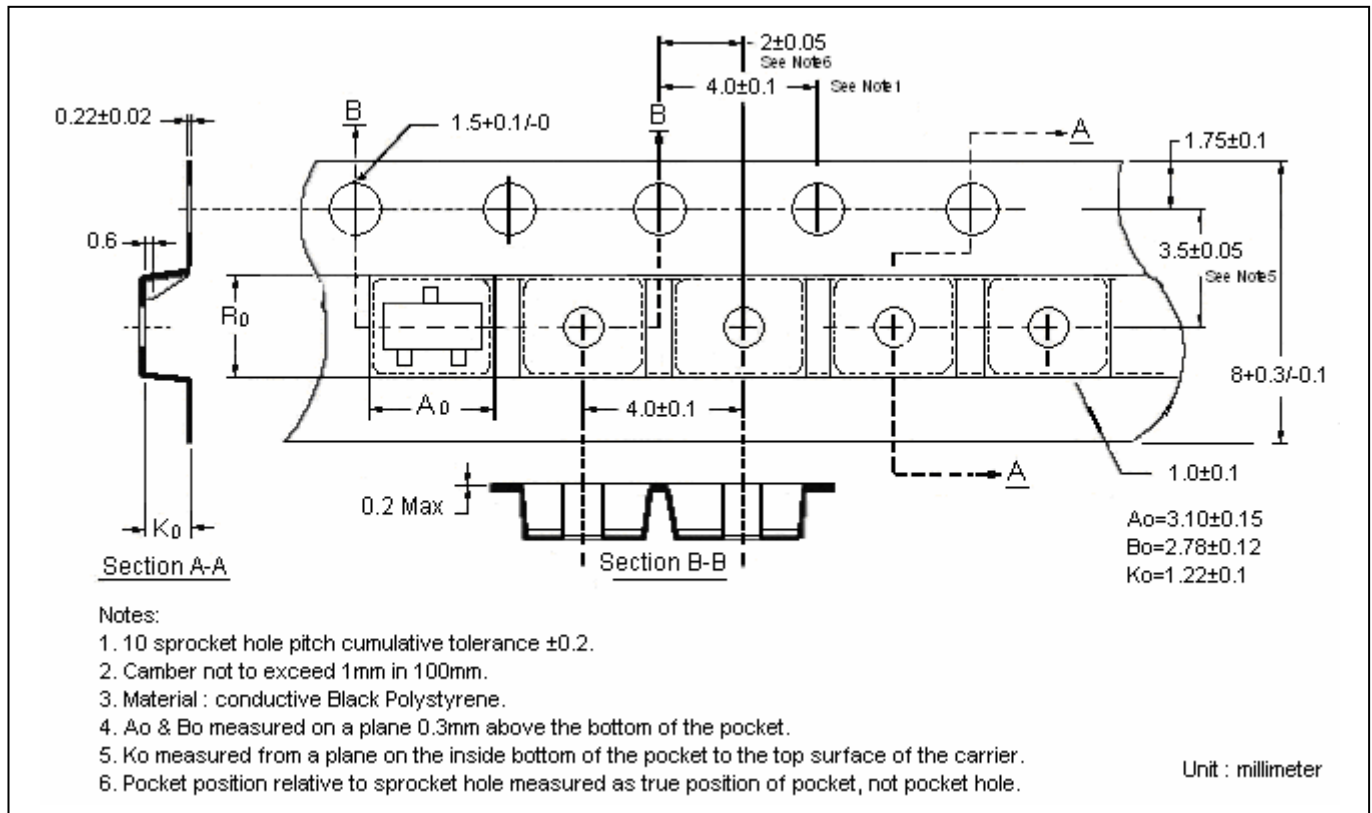
Capacitance vs Reverse-biased Voltage



Reel Dimension



Carrier Tape Dimension

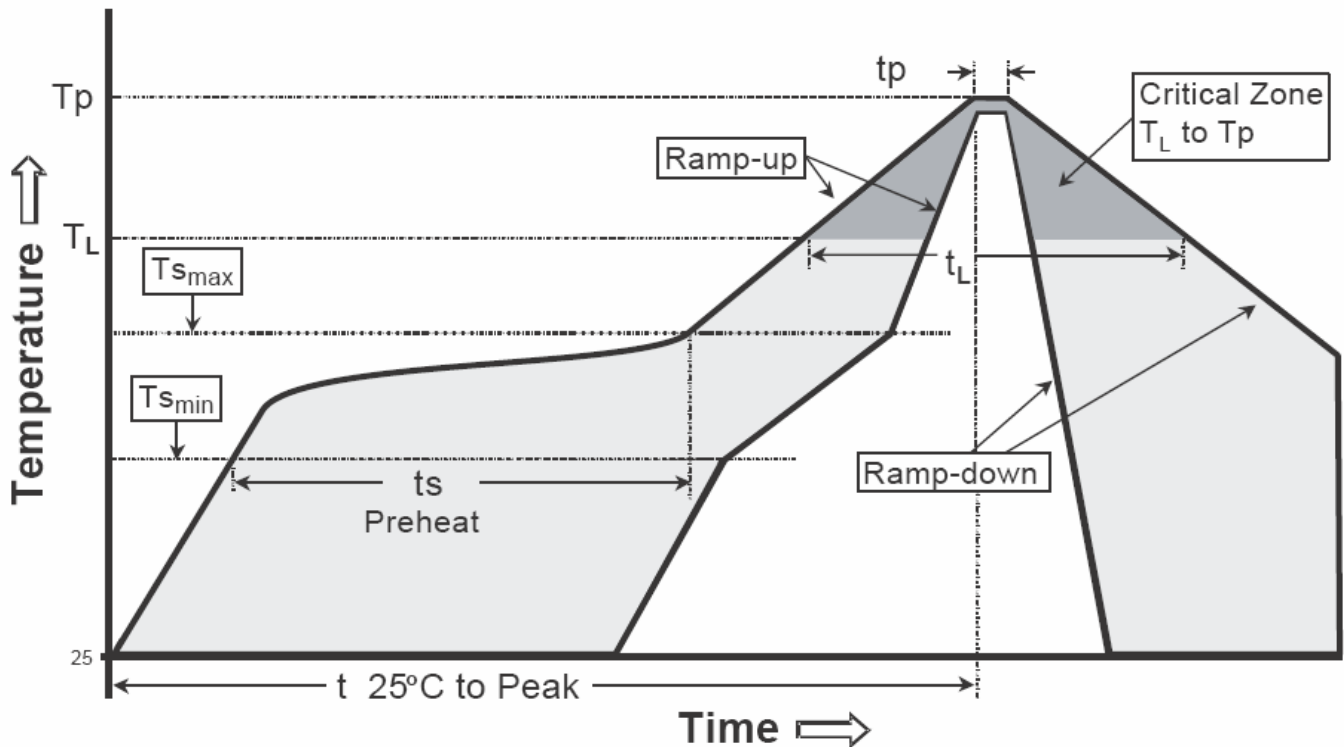


Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2 .
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. A_0 & B_0 measured on a plane 0.3mm above the bottom of the pocket.
5. K_0 measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Recommended wave soldering condition

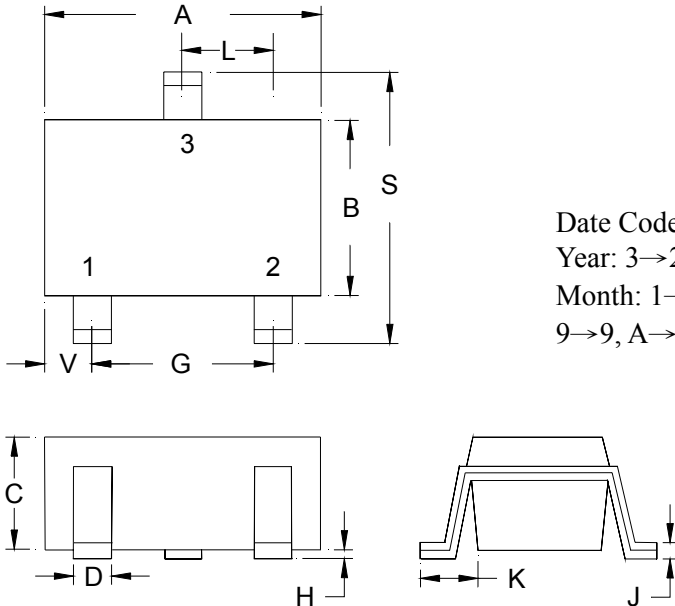
| | | |
|-----------------|------------------|-----------------|
| Product | Peak Temperature | Soldering Time |
| Pb-free devices | 260 +0/-5 °C | 5 +1/-1 seconds |

Recommended temperature profile for IR reflow


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

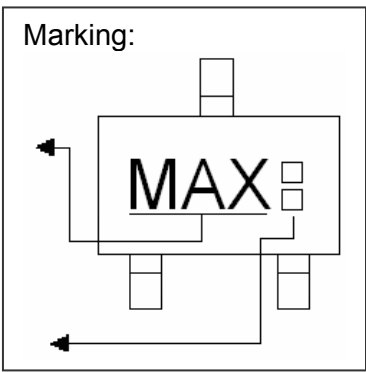
Note : All temperatures refer to topside of the package, measured on the package body surface.

SOT-23 Dimension



The diagram shows three views of the SOT-23 package: a top view with dimensions A, L, B, S, 1, 2, 3, V, and G; a side view with dimensions C, D, and H; and a perspective view with dimensions K and J. Lead 1 is the base, lead 2 is the emitter, and lead 3 is the collector.

Marking:



The marking diagram shows a rectangular package with three leads. The top lead is labeled 'MAX'. Arrows point to the leads from the left and right sides.

Product Code

Date Code: Year+Month
 Year: 3→2003, 4→2004
 Month: 1→1, 2→2, . . .
 9→9, A→10, B→11, C→12

3-Lead SOT-23 Plastic Surface Mounted Package
 CYStek Package Code: N3

Style : Pin 1.Base 2.Emitter 3.Collector

*:Typical

| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|--------|-------------|------|-----|--------|--------|-------------|-------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.1102 | 0.1204 | 2.80 | 3.04 | J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| B | 0.0472 | 0.0630 | 1.20 | 1.60 | K | 0.0128 | 0.0266 | 0.32 | 0.67 |
| C | 0.0335 | 0.0512 | 0.89 | 1.30 | L | 0.0335 | 0.0453 | 0.85 | 1.15 |
| D | 0.0118 | 0.0197 | 0.30 | 0.50 | S | 0.0830 | 0.1083 | 2.10 | 2.75 |
| G | 0.0669 | 0.0910 | 1.70 | 2.30 | V | 0.0098 | 0.0256 | 0.25 | 0.65 |
| H | 0.0005 | 0.0040 | 0.013 | 0.10 | | | | | |

- 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.

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