

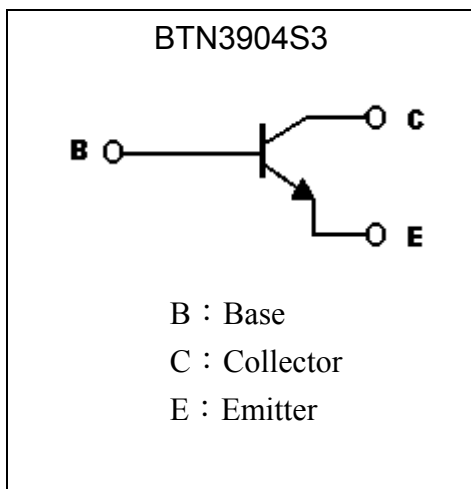
General Purpose NPN Epitaxial Planar Transistor

BTN3904S3

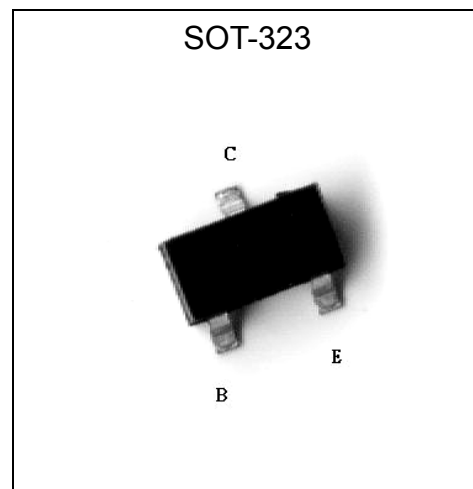
Description

- The BTN3904S3 is designed for general purpose switching amplifier applications.
- Complementary to BTP3906S3.
- Pb-free lead plating and halogen-free package

Symbol

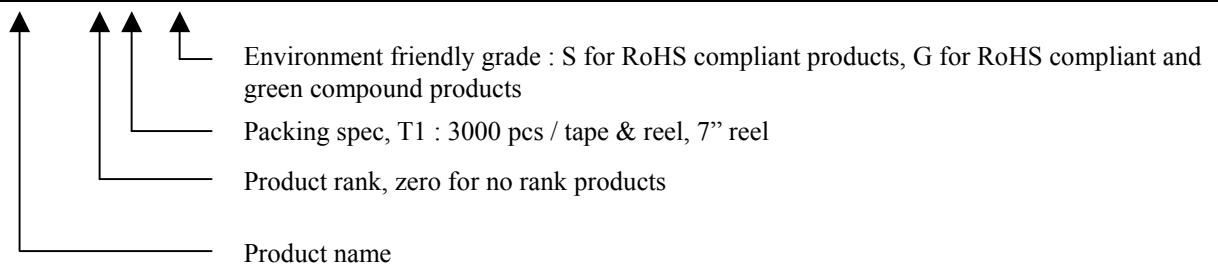


Outline



Ordering Information

Device	Package	Shipping
BTN3904S3-0-T1-G	SOT-323 (Pb-free and halogen-free package)	3000 pcs / Tape & Reel



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

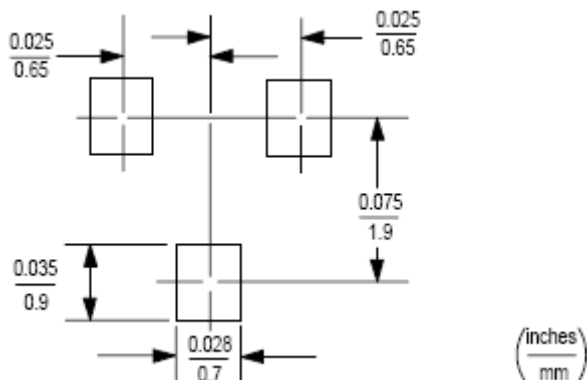
Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	200	mA
Power Dissipation ($T_A=25^{\circ}\text{C}$)	P_D	150 (Note)	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	833 (Note)	$^{\circ}\text{C/W}$
Operating Junction and Storage Temperature Range	$T_j ; T_{sig}$	-55~+150	$^{\circ}\text{C}$

Note : Device mounted on FR-4 glass epoxy printed circuit board using the minimum footprint.

Characteristics ($T_a=25^{\circ}\text{C}$)

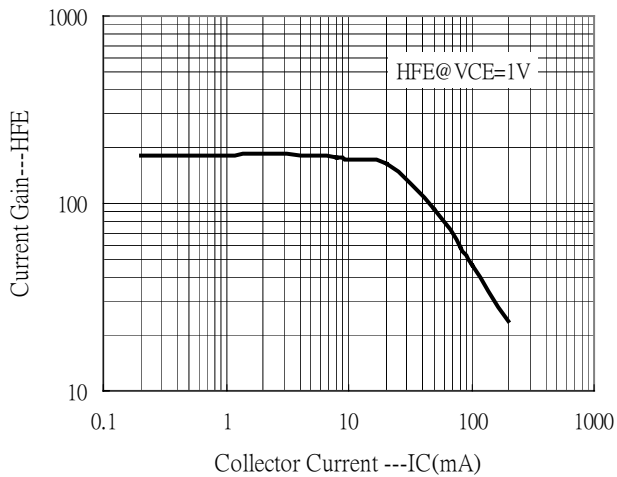
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	60	-	-	V	$I_C=10\mu\text{A}$
BV_{CEO}	40	-	-	V	$I_C=1\text{mA}$
BV_{EBO}	6	-	-	V	$I_E=10\mu\text{A}$
I_{CEX}	-	-	50	nA	$V_{CE}=30\text{V}, V_{EB}=3\text{V}$
$*V_{CE(sat)1}$	-	-	0.2	V	$I_C=10\text{mA}, I_B=1\text{mA}$
$*V_{CE(sat)2}$	-	-	0.3	V	$I_C=50\text{mA}, I_B=5\text{mA}$
$*V_{BE(sat)1}$	0.65	-	0.85	V	$I_C=10\text{mA}, I_B=1\text{mA}$
$*V_{BE(sat)2}$	-	-	0.95	V	$I_C=50\text{mA}, I_B=5\text{mA}$
$*h_{FE1}$	40	-	-		$V_{CE}=1\text{V}, I_C=100\mu\text{A}$
$*h_{FE2}$	70	-	-		$V_{CE}=1\text{V}, I_C=1\text{mA}$
$*h_{FE3}$	100	-	300		$V_{CE}=1\text{V}, I_C=10\text{mA}$
$*h_{FE4}$	60	-	-		$V_{CE}=1\text{V}, I_C=50\text{mA}$
$*h_{FE5}$	30	-	-		$V_{CE}=1\text{V}, I_C=100\text{mA}$
f_T	300	-	-	MHz	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$
Cob	-	-	4	pF	$V_{CB}=5\text{V}, I_E=0\text{A}, f=1\text{MHz}$

*Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

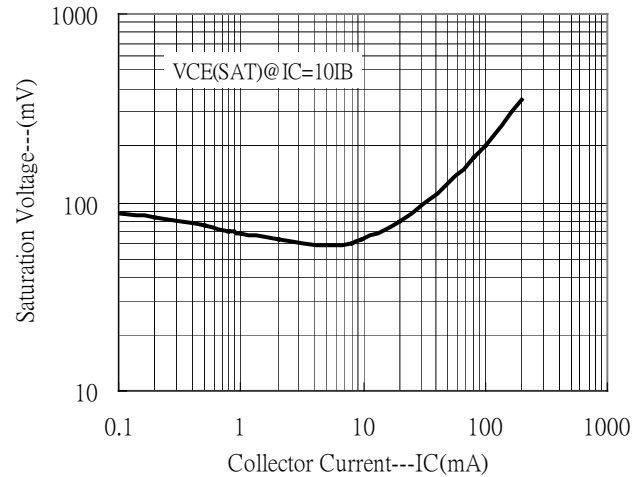
Recommended Footprint


Typical Characteristics

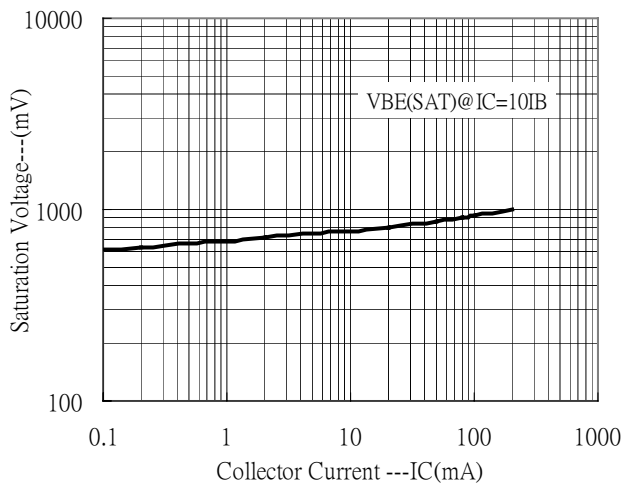
Current Gain vs Collector Current



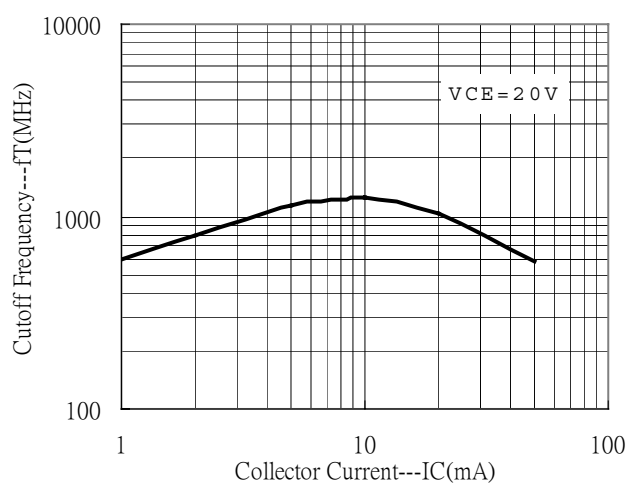
Saturation Voltage vs Collector Current



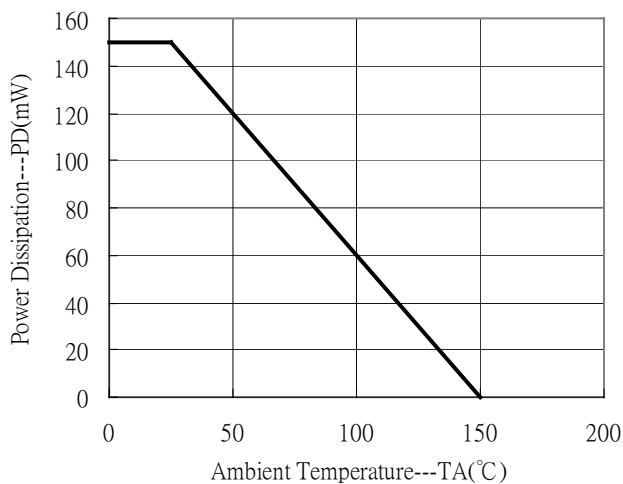
Saturation Voltage vs Collector Current



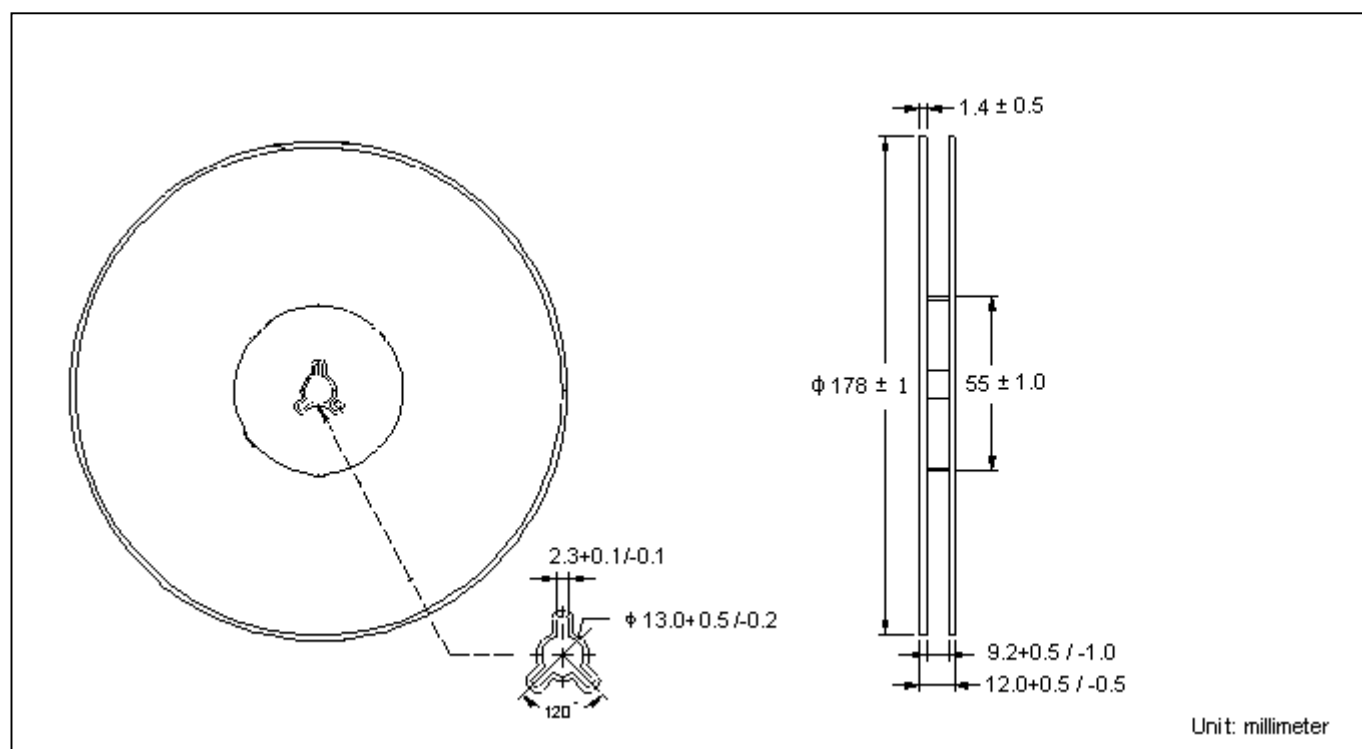
Cutoff Frequency vs Collector Current



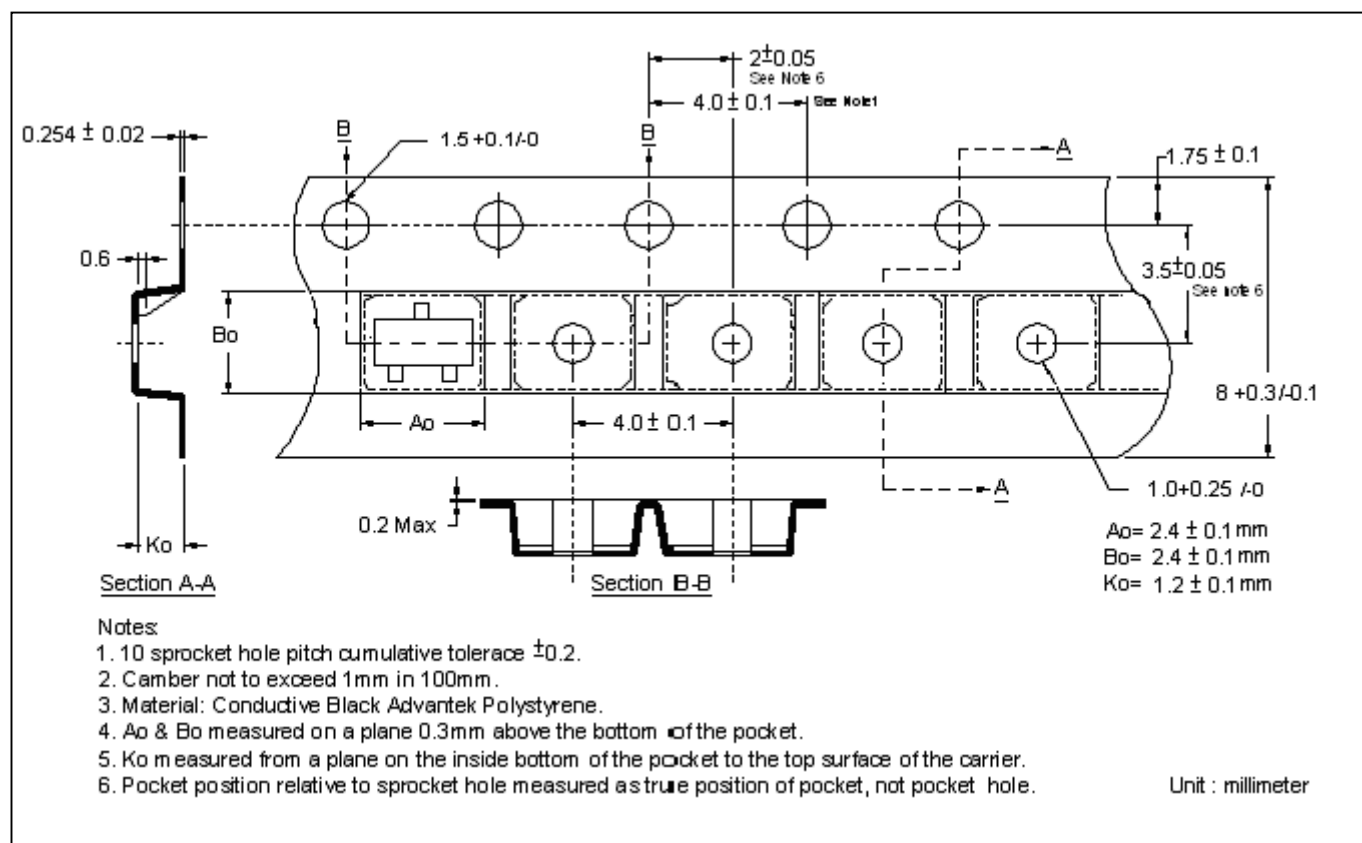
Power Derating Curve



Reel Dimension



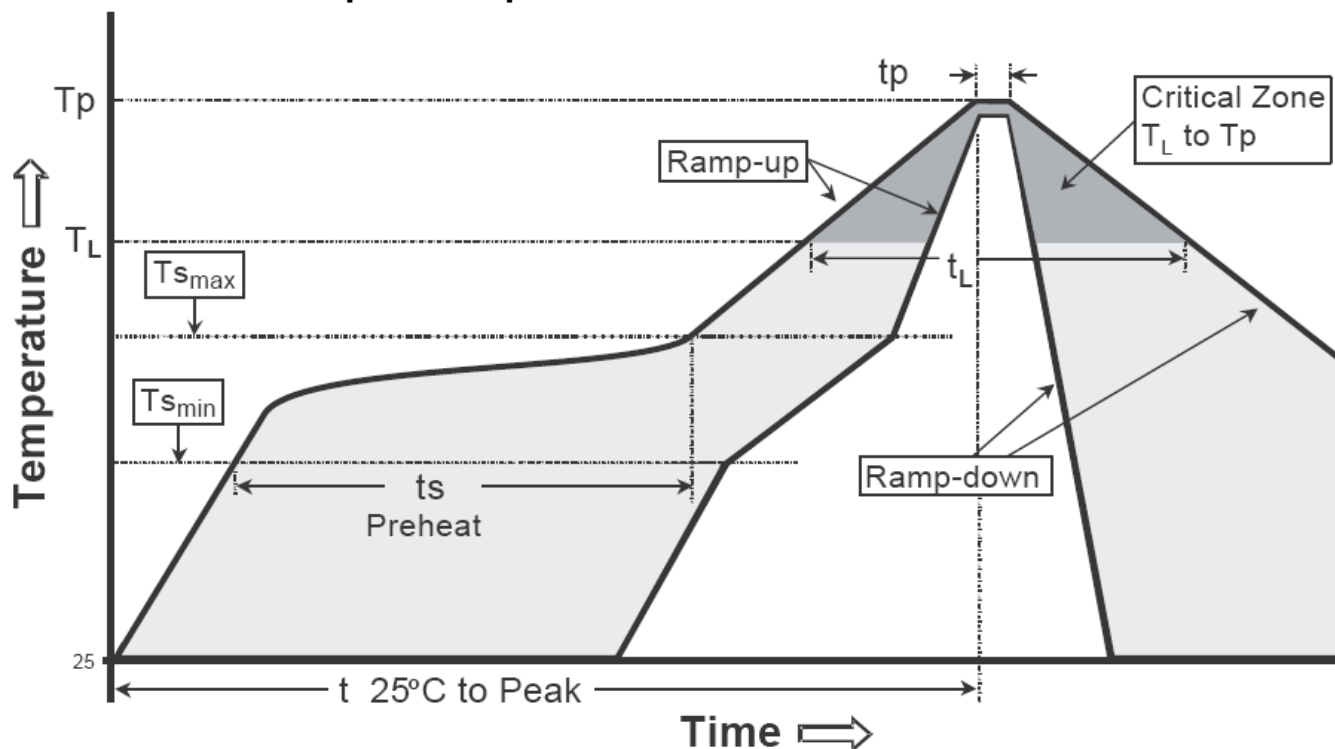
Carrier Tape Dimension



Recommended wave soldering condition

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

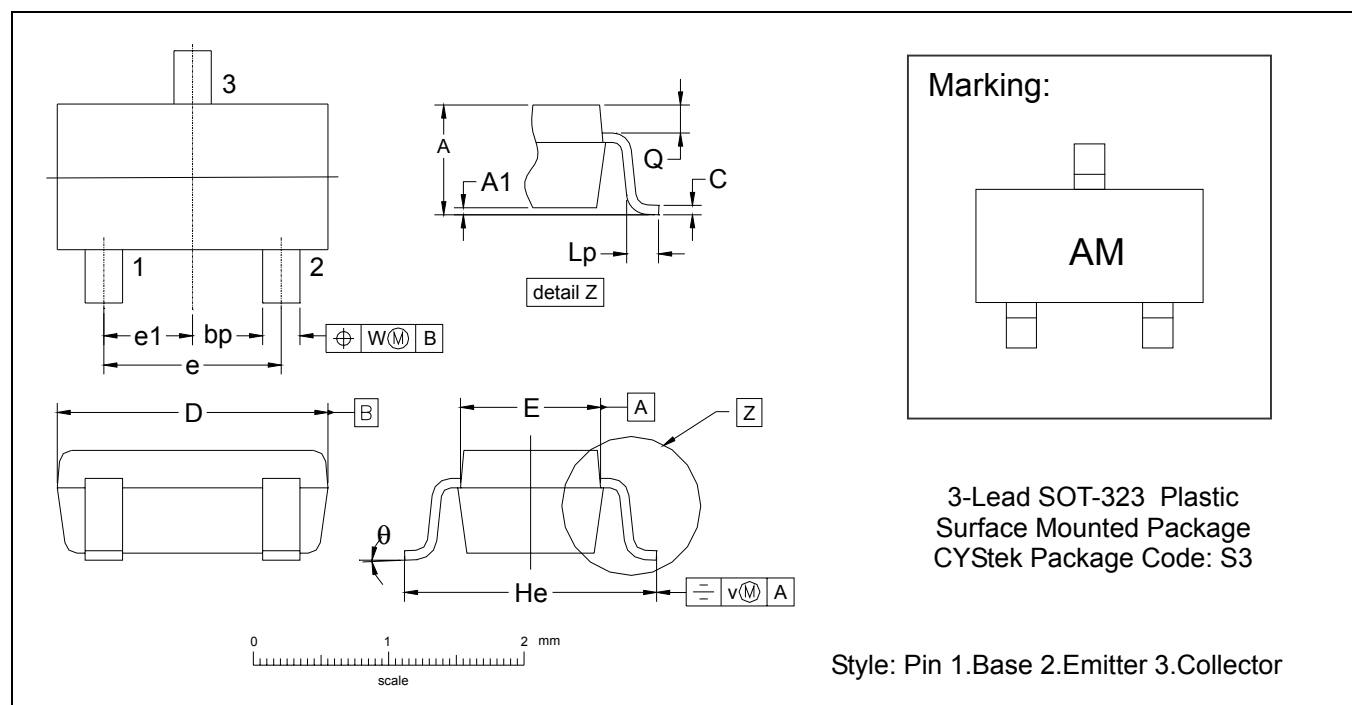
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T_{smax} to T_p)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(t_{smin} to t_{smax})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T_L) - Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_p)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t_p)	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	0.0846	0.0965	2.15	2.45
bp	0.0078	0.0157	0.20	0.40	Lp	0.0105	0.0181	0.26	0.46
C	0.0031	0.0059	0.08	0.15	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	0.0472	0.0551	1.20	1.40	θ	0°	8°	0°	8°

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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