General Purpose NPN Epitaxial Planar Transistor

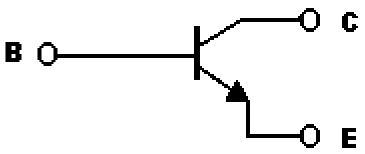
BTN3904N3

Description

- The BTN3904N3 is designed for general purpose switching amplifier applications.
- Complementary to BTP3906N3.
- ESD JEDEC rated HBM class 3B(>8KV).
- Pb-free lead plating and halogen-free package

Symbol

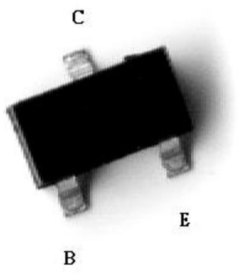
BTN3904N3



B：Base
C：Collector
E：Emitter

Outline

SOT-23



Absolute Maximum Ratings (Ta=25°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°C)	P_D	225 (Note)	mW
Power Dissipation (T_C=25°C)	P_D	560	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556 (Note)	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	223	°C/W
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	-55~+150	°C

Note : Free air condition

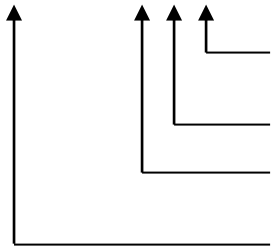
Characteristics (Ta=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	60	-	-	V	I_C=10μA
BV_{CEO}	40	-	-	V	I_C=1mA
BV_{EBO}	6	-	-	V	I_E=10μA
I_{CEX}	-	-	50	nA	V_{CE}=30V, V_{BE}=-3V
*$V_{CE(sat)}$1	-	0.1	0.2	V	I_C=10mA, I_B=1mA
*$V_{CE(sat)}$2	-	0.15	0.3	V	I_C=50mA, I_B=5mA
*$V_{BE(sat)}$1	0.65	0.75	0.85	V	I_C=10mA, I_B=1mA
*$V_{BE(sat)}$2	-	0.85	0.95	V	I_C=50mA, I_B=5mA
*h_{FE}1	40	-	-		V_{CE}=1V, I_C=100μA
*h_{FE}2	70	-	-		V_{CE}=1V, I_C=1mA
*h_{FE}3	100	-	300		V_{CE}=1V, I_C=10mA
*h_{FE}4	60	-	-		V_{CE}=1V, I_C=50mA
*h_{FE}5	30	-	-		V_{CE}=1V, I_C=100mA
f_T	300	-	-	MHz	V_{CE}=20V, I_C=10mA, f=100MHz
Cob	-	-	4	pF	V_{CB}=5V, I_E=0A,f=1MHz

*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

Ordering Information

Device	Package	Shipping
BTN3904N3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel



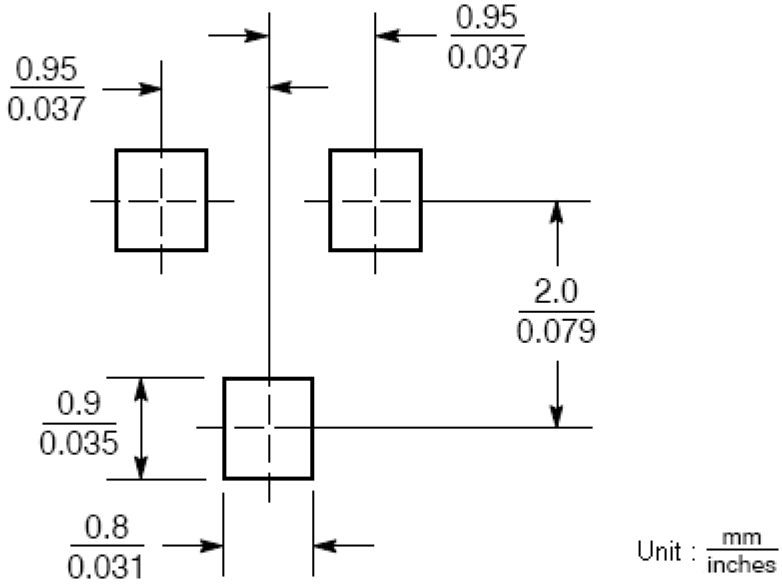
Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T1 : 3000 pcs / tape & reel, 7” reel

Product rank, zero for no rank products

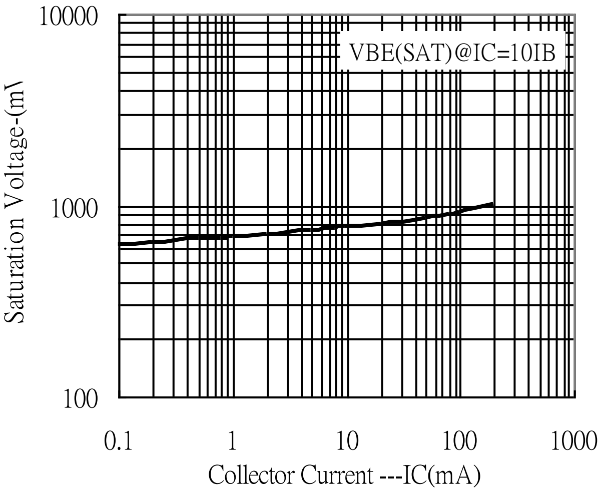
Product name

Recommended Soldering Footprint

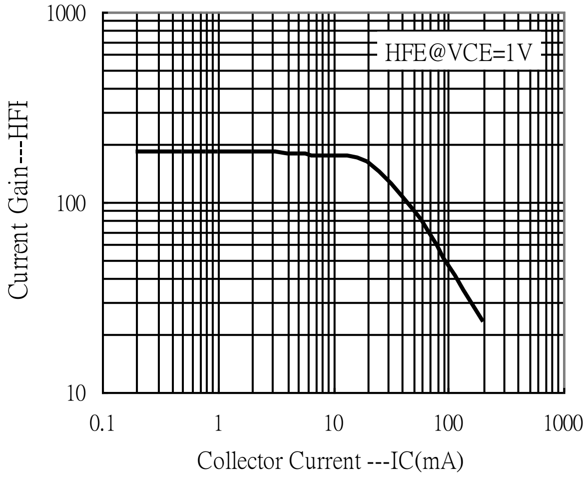


Characteristic Curves

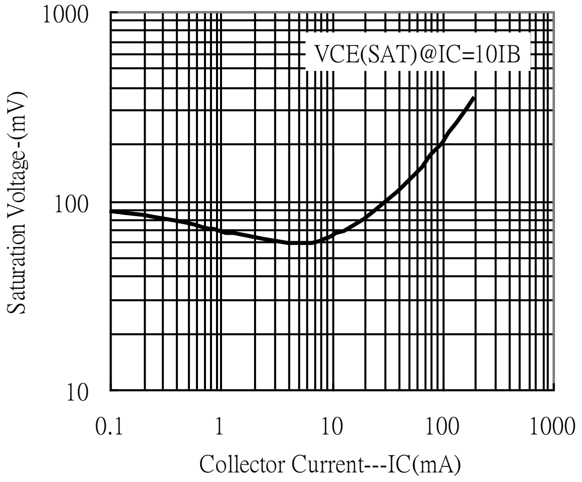
Saturation Voltage vs Collector Current



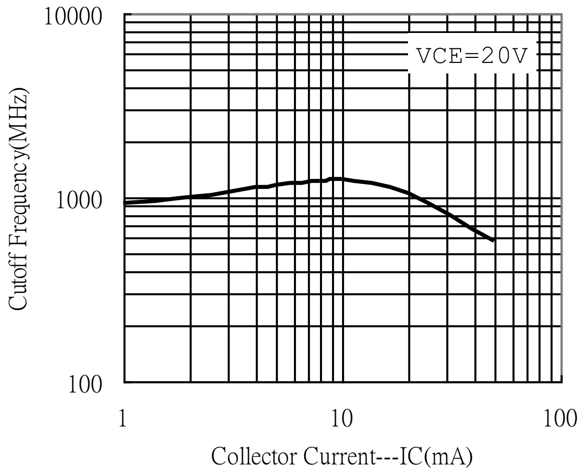
Current Gain vs Collector Current



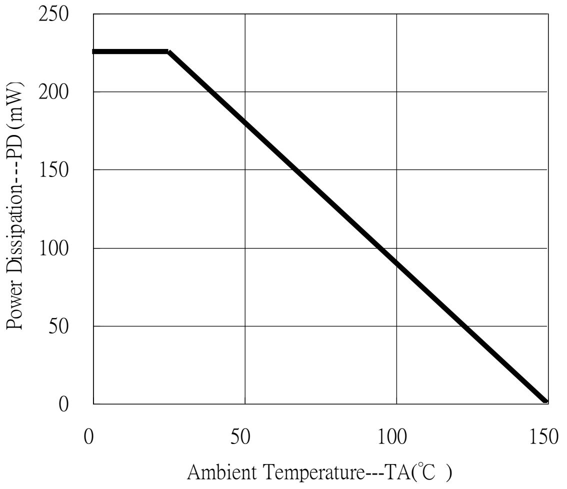
Saturation Voltage vs Collector Current



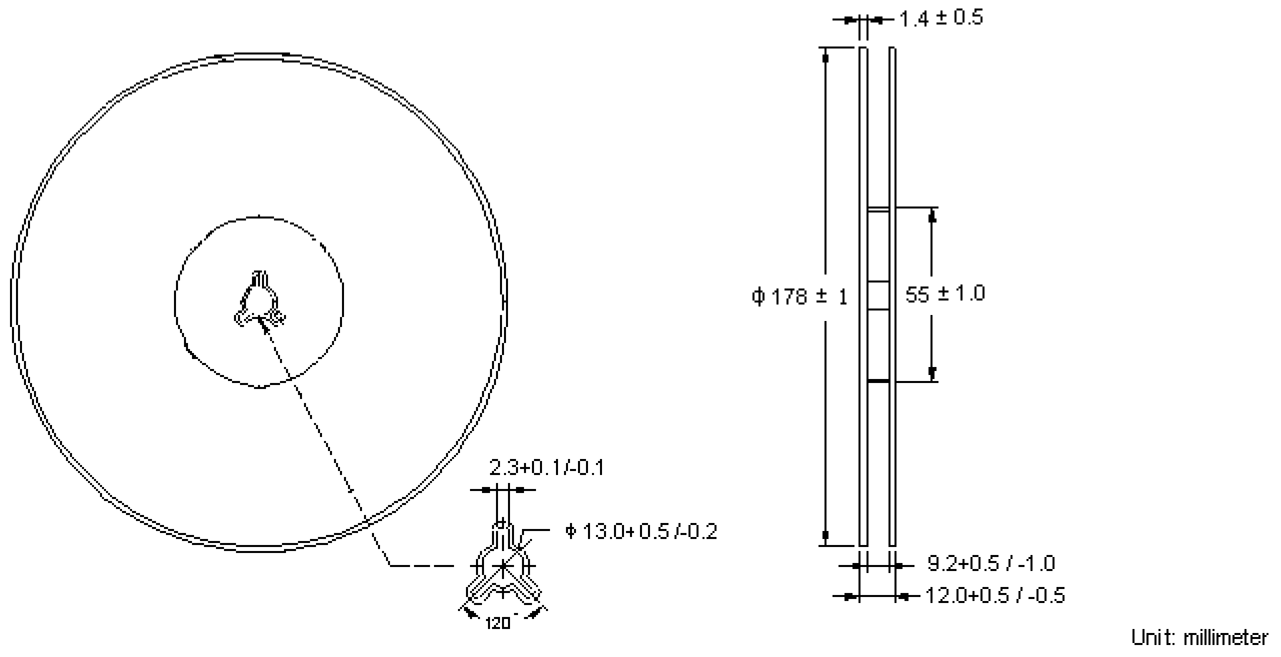
Cutoff Frequency vs Collector Current



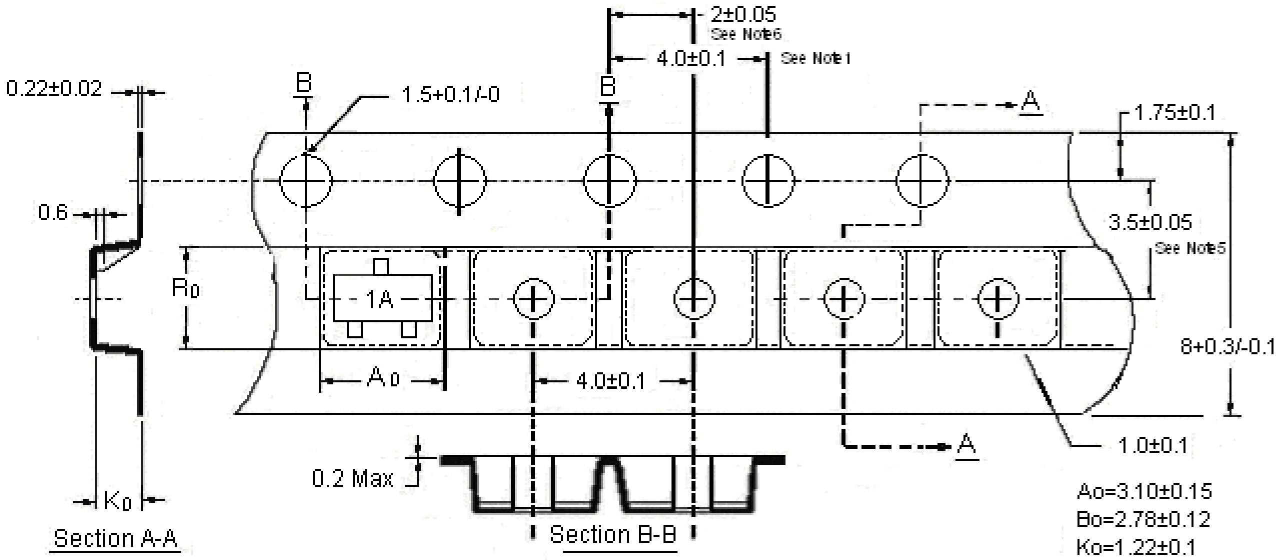
Power Derating Curve



Reel Dimension



Carrier Tape Dimension



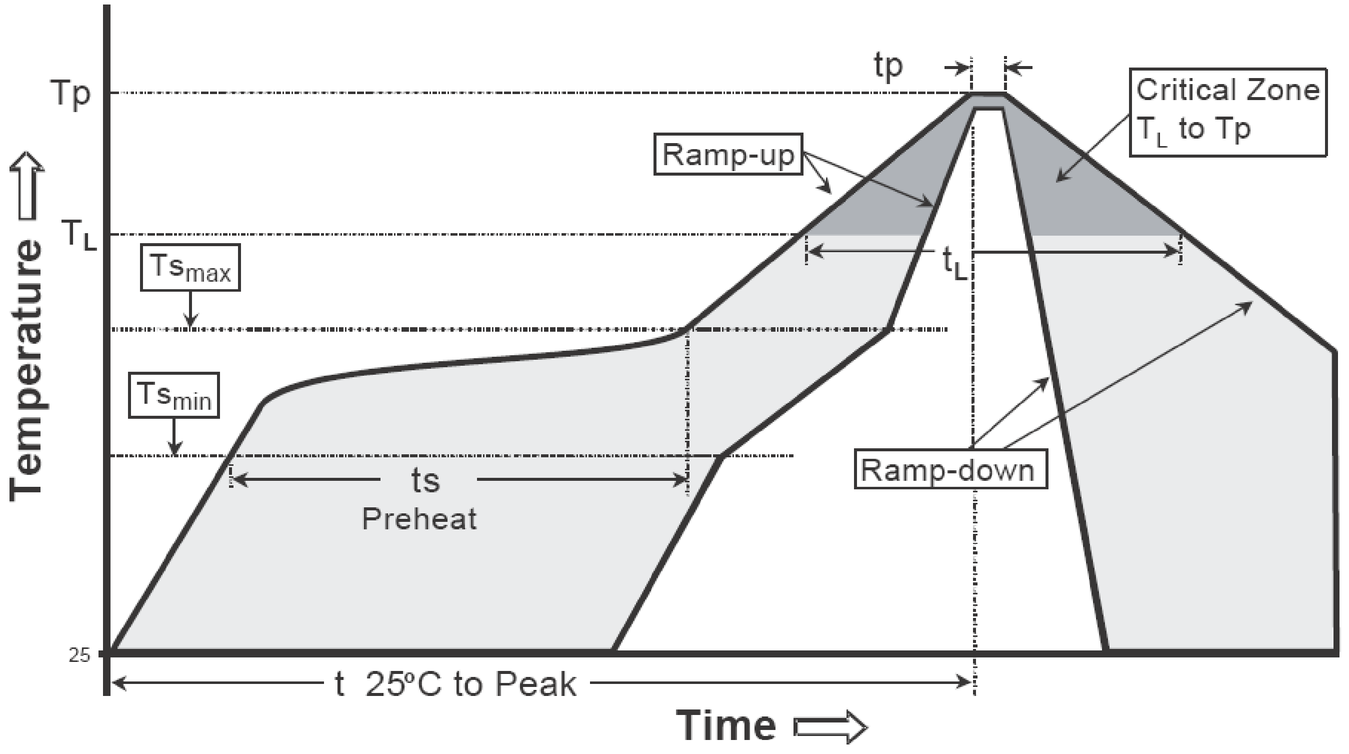
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.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

Unit : millimeter

Recommended wave soldering condition

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

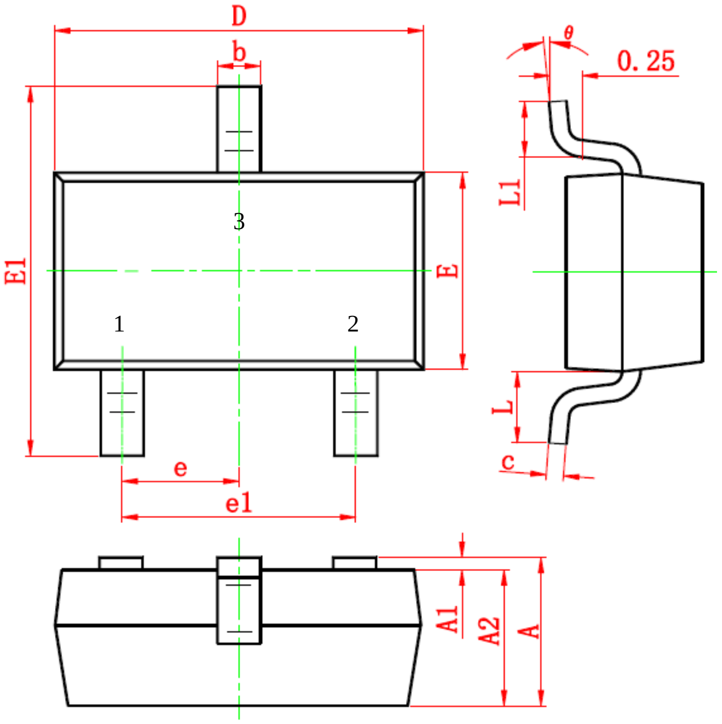
Recommended temperature profile for IR reflow

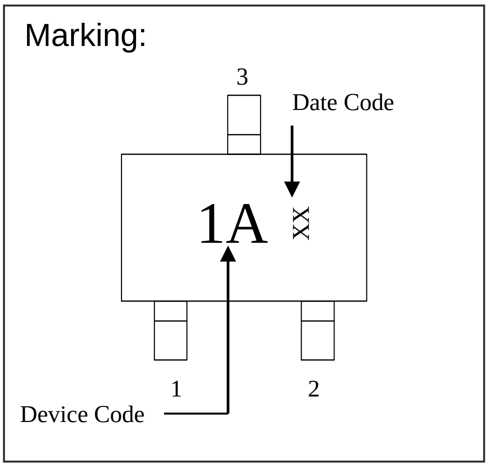


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 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.

SOT-23 Dimension





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

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

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045	E1	2.250	2.550	0.089	0.100
A1	0.000	0.100	0.000	0.004	e	0.950	TYP	0.037	TYP
A2	0.900	1.050	0.035	0.041	e1	1.800	2.000	0.071	0.079
b	0.300	0.500	0.012	0.020	L	0.550	REF	0.022	REF
c	0.080	0.150	0.003	0.006	L1	0.300	0.500	0.012	0.020
D	2.800	3.000	0.110	0.118	θ	0°	8°	0°	8°
E	1.200	1.400	0.047	0.055					

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.