General Purpose NPN Epitaxial Planar Transistor

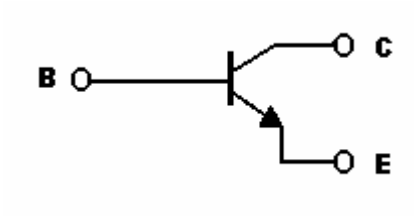
MMBT2222A

Description

- The MMBT2222A is designed for using in driver stage of AF amplifier and general purpose switching application.
- High $I_{C(Max)}$, $I_{C(Max)}$ = 0.6A.
- Low $V_{CE(sat)}$, Typ. $V_{CE(sat)}$ = 0.2V at I_C/I_B = 500mA/50mA.
  Optimal for low Voltage operation.
- Complementary to MMBT2907A.
- Pb-free package

Symbol

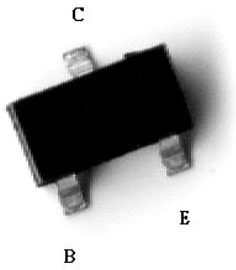
MMBT2222A



B：Base
C：Collector
E：Emitter

Outline

SOT-23



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V_{CBO}	75	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	0.6	A
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
Operating Junction Temperature Range	Tj	-55~+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}	75	-	-	V	I_C=10μA
BV_{CEO}	50	-	-	V	I_C=10mA
BV_{EBO}	6	-	-	V	I_E=10μA
I_{CBO}	-	-	10	nA	V_{CB}=60V
I_{CEX}	-	-	10	nA	V_{CE}=60V, V_{BE}=-3V
I_{EBO}	-	-	10	nA	V_{EB}=3V
*$V_{CE(sat)}$1	-	-	0.5	V	I_C=380mA, I_B=10mA
*$V_{CE(sat)}$ 2	-	-	0.25	V	I_C=150mA, I_B=15mA
*$V_{CE(sat)}$3	-	0.2	0.45	V	I_C=500mA, I_B=50mA
*$V_{BE(sat)}$1	0.7	-	1.0	V	I_C=150mA, I_B=15mA
*$V_{BE(sat)}$2	-	-	1.2	V	I_C=500mA, I_B=50mA
*h_{FE}1	85	-	-		V_{CE}=1V, I_C=0.1mA
*h_{FE}2	90	-	-		V_{CE}=1V, I_C=1mA
*h_{FE}3	95	-	-		V_{CE}=1V, I_C=10mA
*h_{FE}4	100	-	300		V_{CE}=1V, I_C=150mA
*h_{FE}5	40	-	-		V_{CE}=2V, I_C=500mA
f_T	-	230	-	MHz	V_{CE}=5V, I_C=20mA, f=100MHz
Cob	-	9.3	-	pF	V_{CB}=5V, f=1MHz

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

Ordering Information

Device	Package	Shipping	Marking
MMBT2222A	SOT-23 (Pb-free)	3000 pcs / Tape & Reel	2X

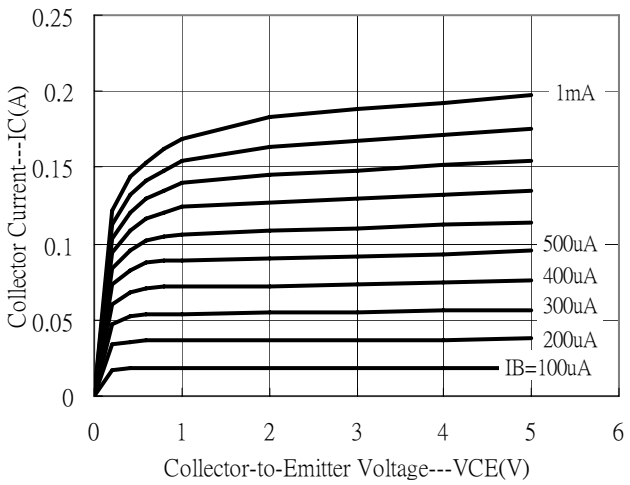
Recommended Storage Condition:

Temperature : ≤ 30 °C

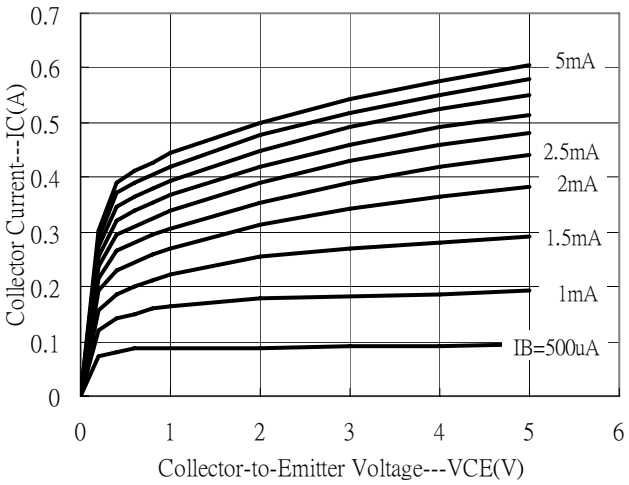
Humidity : ≤ 60% RH

Typical Characteristics

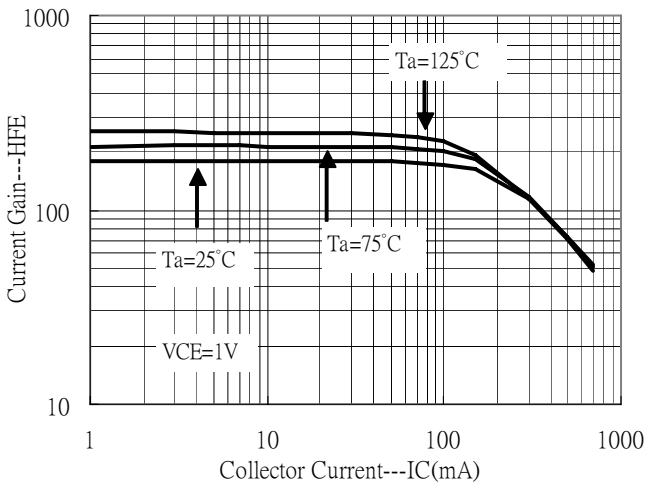
Emitter Grounded Output Characteristics



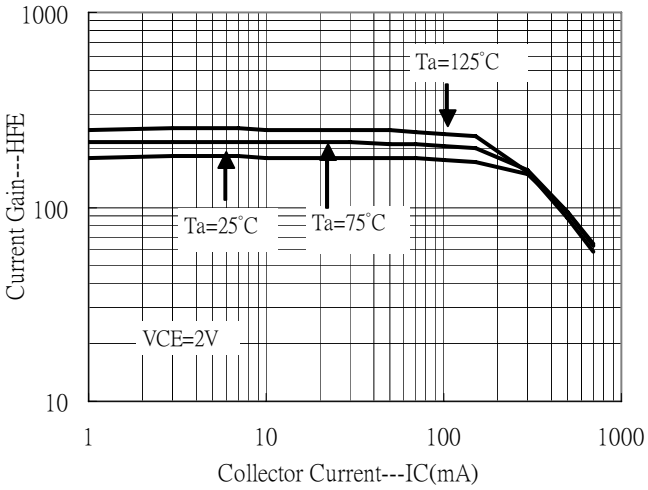
Emitter Grounded Output Characteristics



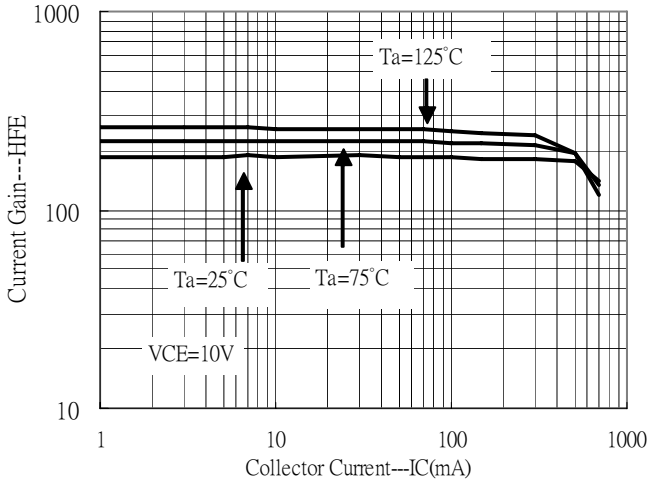
Current Gain vs Collector Current



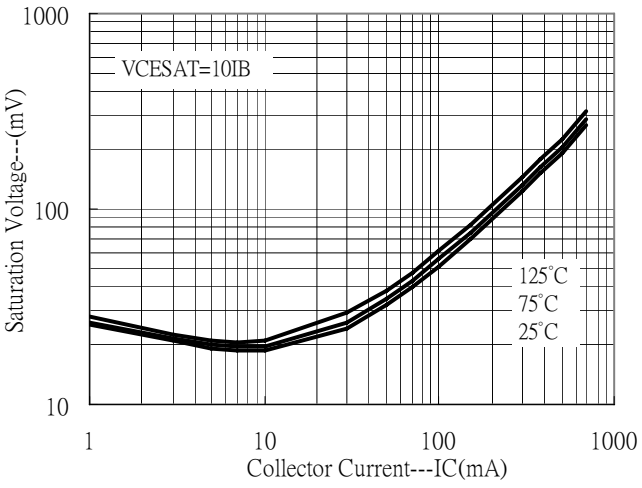
Current Gain vs Collector Current



Current Gain vs Collector Current

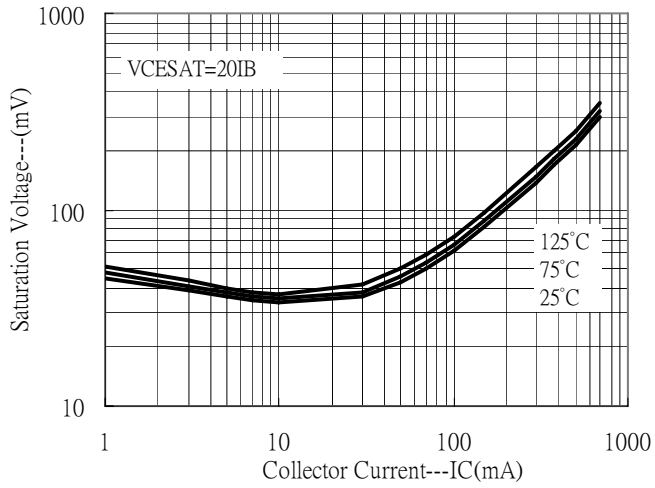


Saturation Voltage vs Collector Current

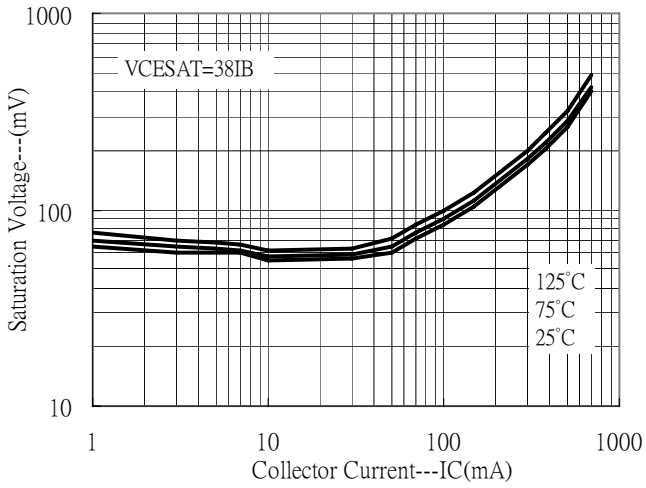


Typical Characteristics(Cont.)

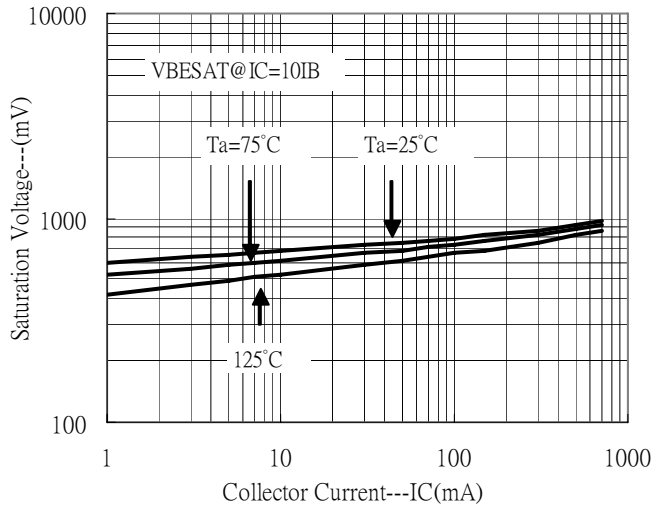
Saturation Voltage vs Collector Current



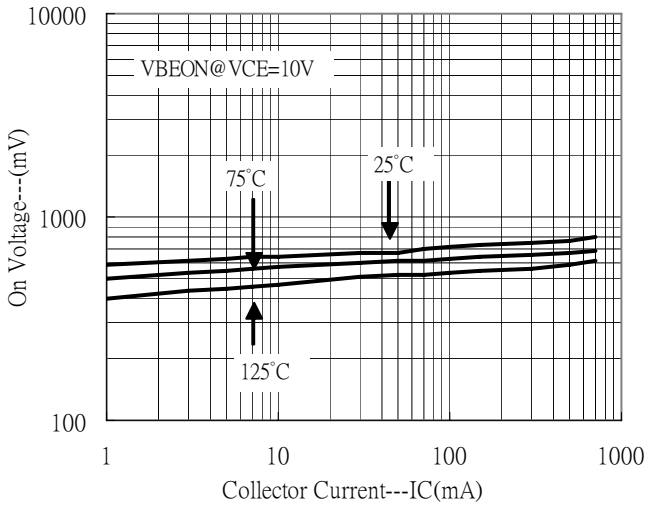
Saturation Voltage vs Collector Current



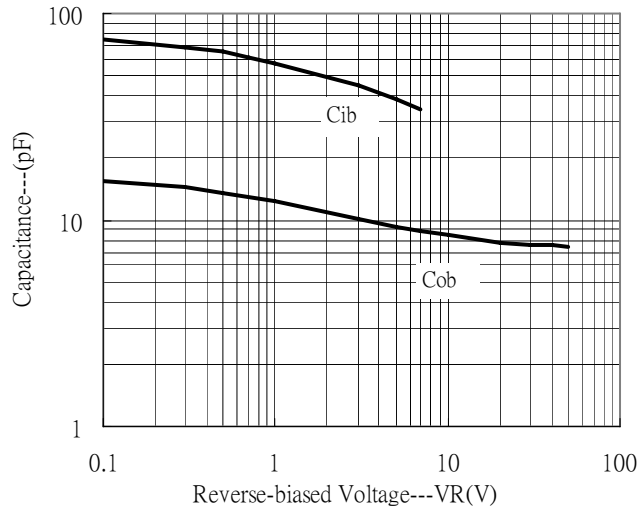
Saturation Voltage vs Collector Current



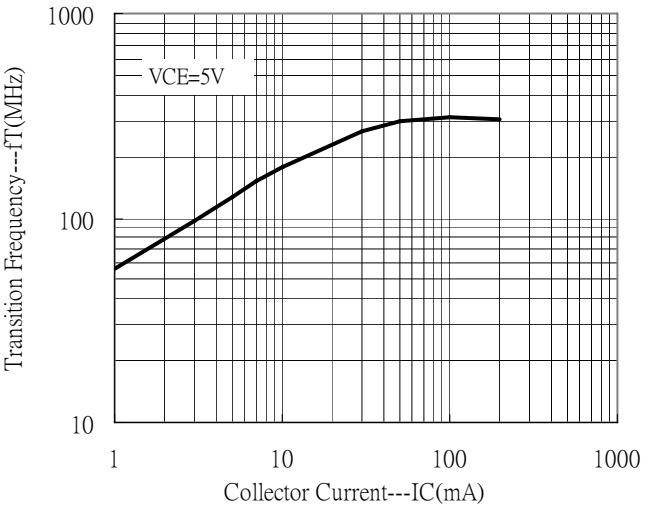
On Voltage vs Collector Current



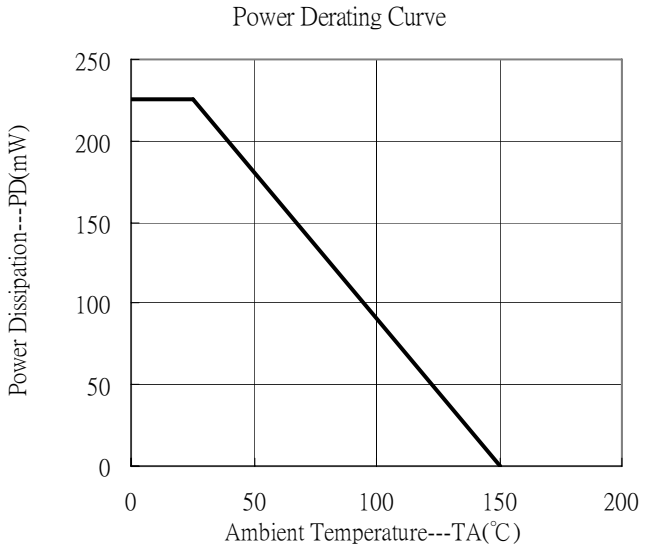
Capacitance vs Reverse-biased Voltage



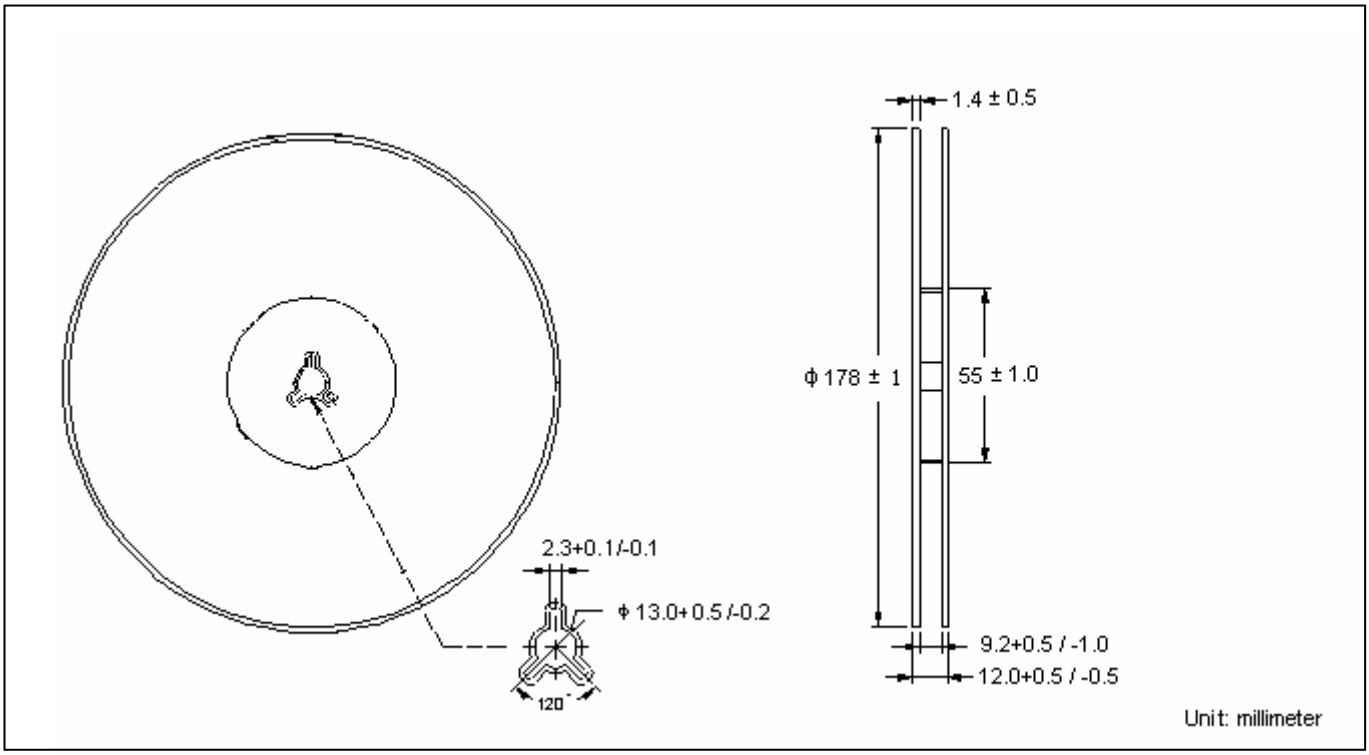
Transition Frequency vs Collector Current



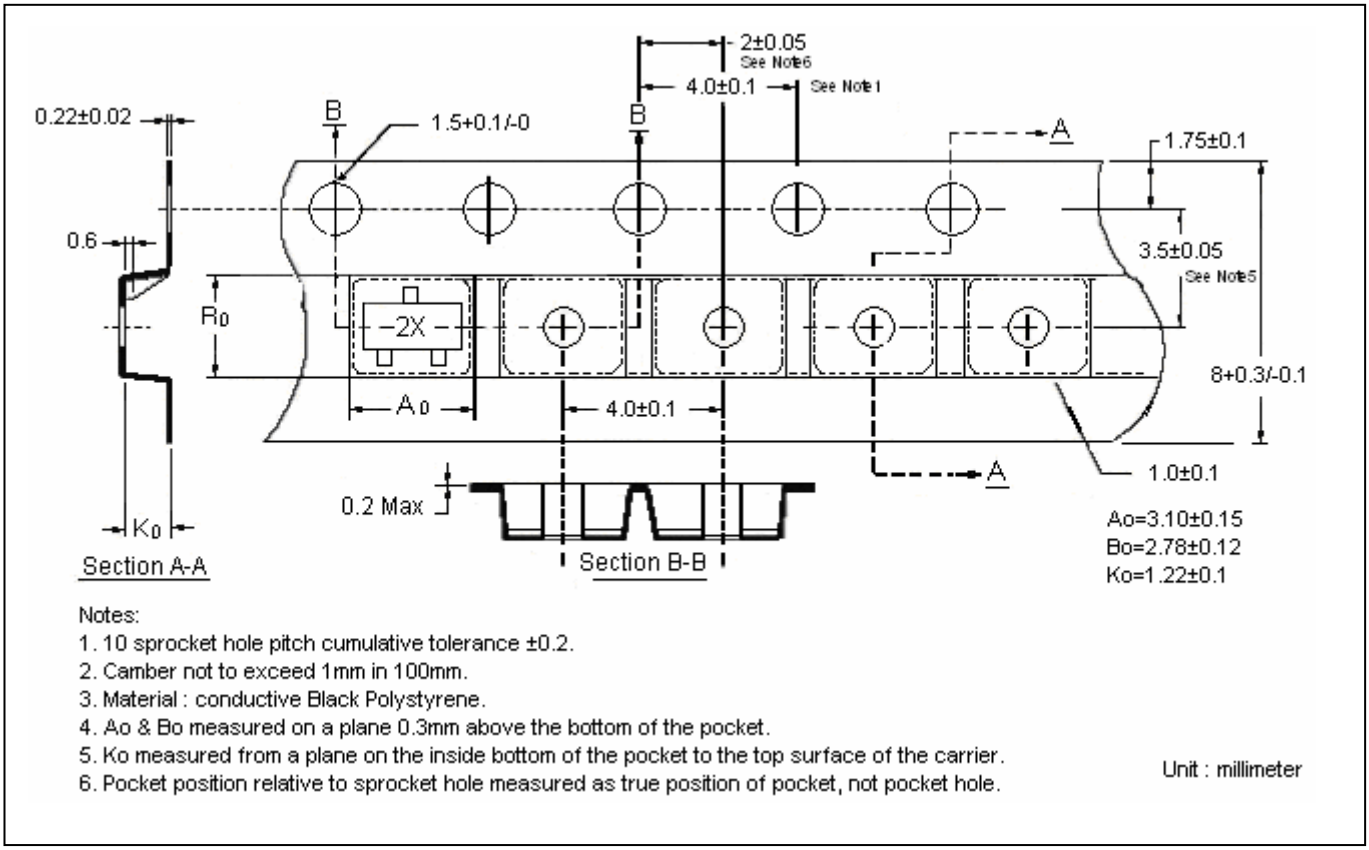
Typical Characteristics(Cont.)



Reel Dimension



Carrier Tape Dimension



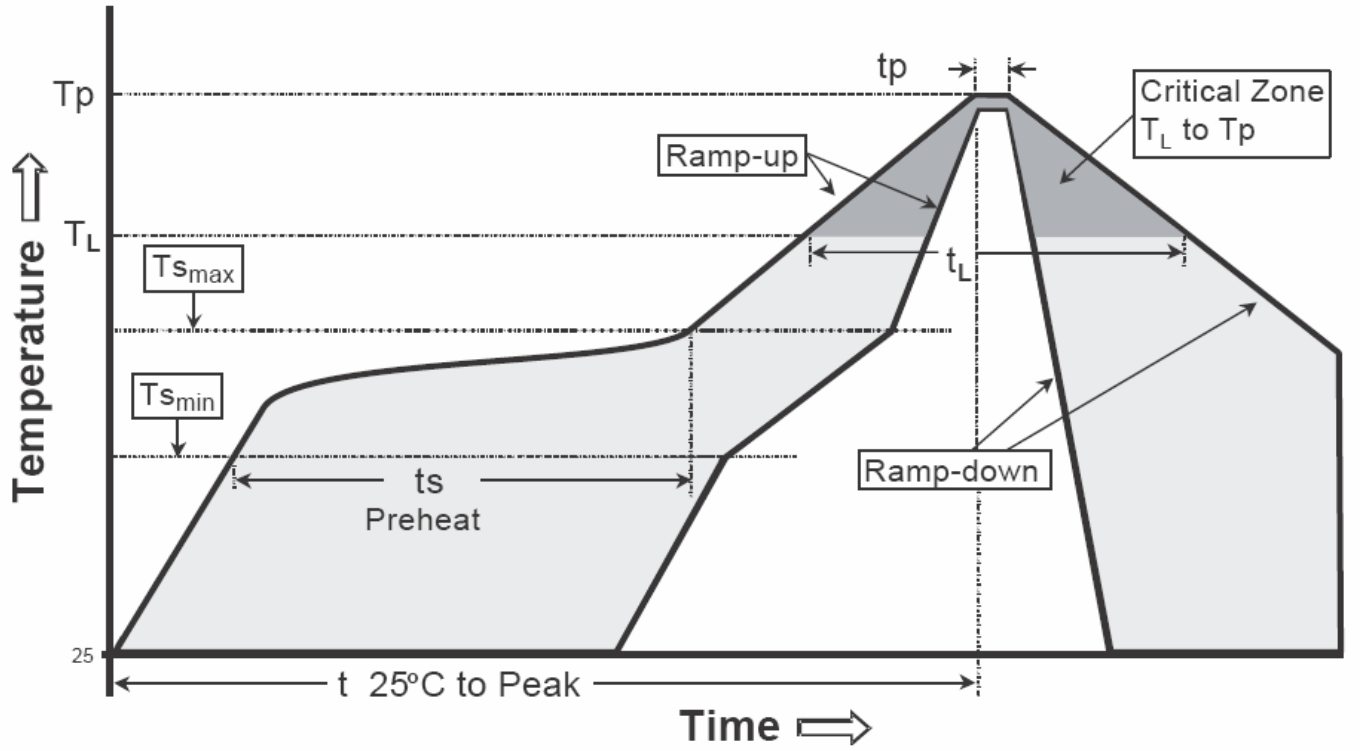
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.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

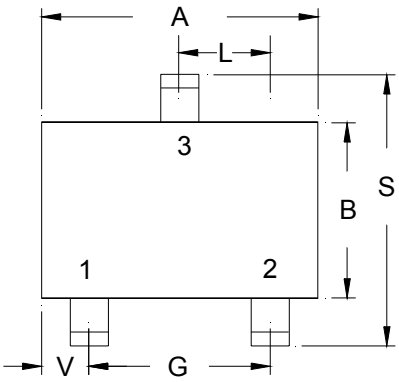
Recommended temperature profile for IR reflow



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.

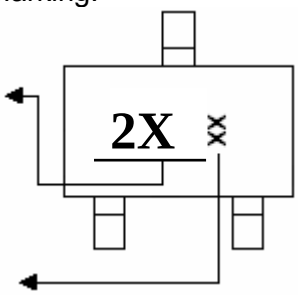
SOT-23 Dimension

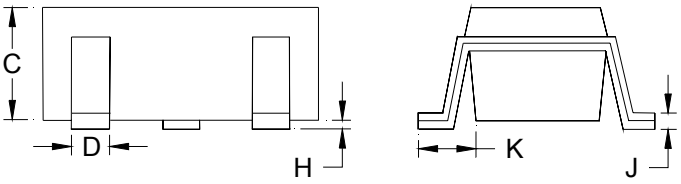


Product Code

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

Marking:





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.