Low Vcesat PNP Epitaxial Planar Transistor

BTB5140N3

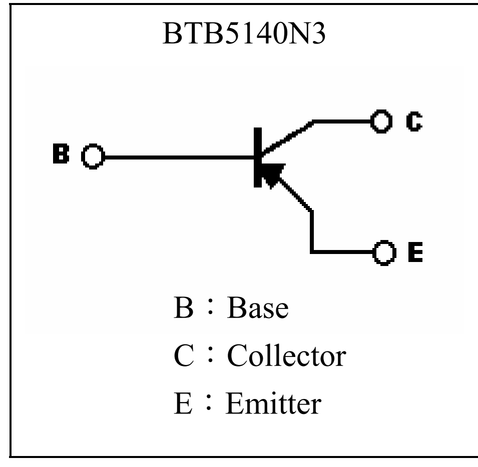
BV_{CEO}	-40V
I_C	-2A
$R_{CESAT(TYP)}$	0.22Ω

Features

- Low $V_{CE}(sat)$, $V_{CE}(sat)$=-0.25V (max), at I_C / I_B =- 500mA /- 50mA
- Pb-free package

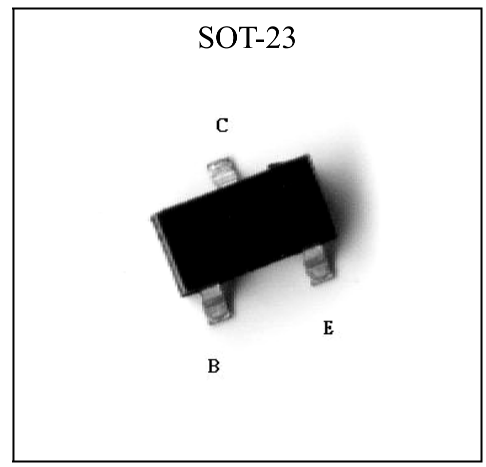
Symbol

BTB5140N3



Outline

SOT-23



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	
Emitter-Base Voltage	V_{EBO}	-5	
Collector Current(DC)	I_C	-2	A
Peak Collector Current	I_{CM}	-4 *1	
Peak Base Current	I_{BM}	-1	
Power Dissipation	P_D	300 *2	mW
		450 *3	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417 *2	°C/W
		278 *3	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	39	
Operating Junction and Storage Temperature Range	Tj;Tstg	-65~+150	°C

Note :1 Single pulse, Pw=10ms
2 When mounted on a FR-4 PCB, single-sided copper, tinplated and standard footprint.
3 When mounted on a FR-4 PCB, single-sided copper, tinplated and mounting pad for collector 1 cm^2.

Characteristics (Ta=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-40	-	-	V	I_C=-50μA, I_E=0
BV_{CEO}	-40	-	-	V	I_C=-1mA, I_B=0
BV_{EBO}	-5	-	-	V	I_E=-50μA, I_C=0
I_{CBO}	-	-	-100	nA	V_{CB}=-40V, I_E=0
I_{CEO}	-	-	-1	μA	V_{CE}=-30V, I_E=0
I_{EBO}	-	-	-100	nA	V_{EB}=-5V, I_C=0
*$V_{CE(sat)}$	-	-75	-200	mV	I_C=-100mA, I_B=-1mA
*$V_{CE(sat)}$	-	-110	-250	mV	I_C=-500mA, I_B=-50mA
*$V_{CE(sat)}$	-	-196	-400	mV	I_C=-1A, I_B=-100mA
*$R_{CE(sat)}$	-	220	500	mΩ	I_C=-500mA, I_B=-50mA
*$V_{BE(sat)}$	-	-860	-1	V	I_C=-1A, I_B=-50mA
*$V_{BE(on)}$	-	-762	-0.9	V	V_{CE}=-5V, I_C=-1A
*h_{FE} 1	300	464	-	-	V_{CE}=-5V, I_C=-1mA
*h_{FE} 2	300	427	600	-	V_{CE}=-5V, I_C=-100mA
*h_{FE} 3	250	360	-	-	V_{CE}=-5V, I_C=-500mA
*h_{FE} 4	160	300	-	-	V_{CE}=-5V, I_C=-1A
f_T	-	75	-	MHz	V_{CE}=-5V, I_C=-10mA, f=100MHz
Cob	-	20	-	pF	V_{CB}=-10V, f=1MHz

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

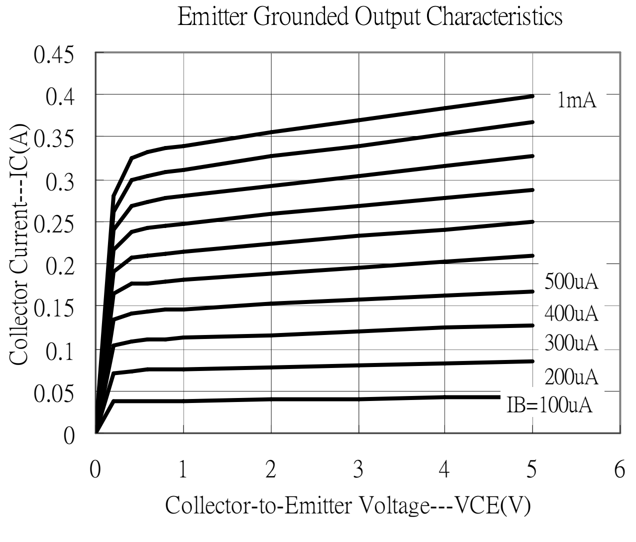
Ordering Information

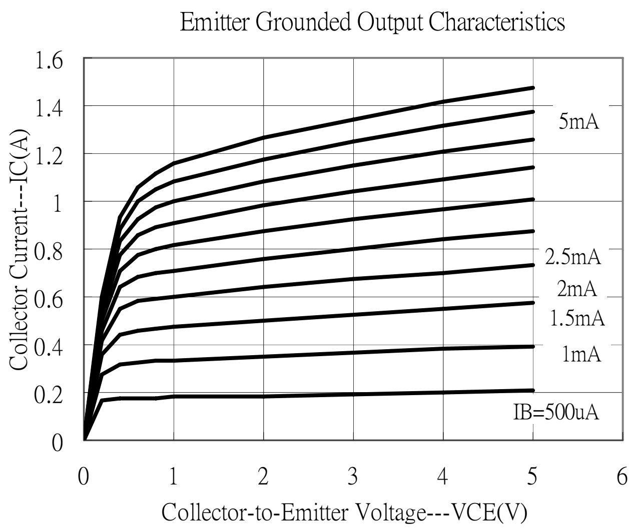
Device	Package	Shipping	Marking
BTB5140N3	SOT-23 (Pb-free)	3000 pcs / Tape & Reel	2H

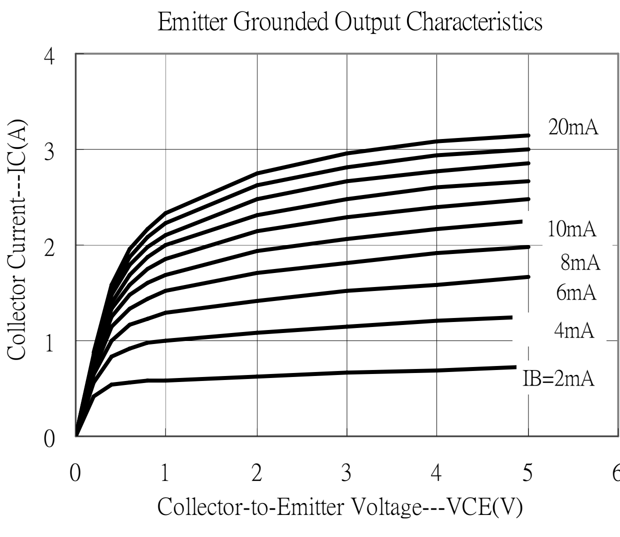
Moisture Sensitivity Level : Conform to JEDEC Level 1

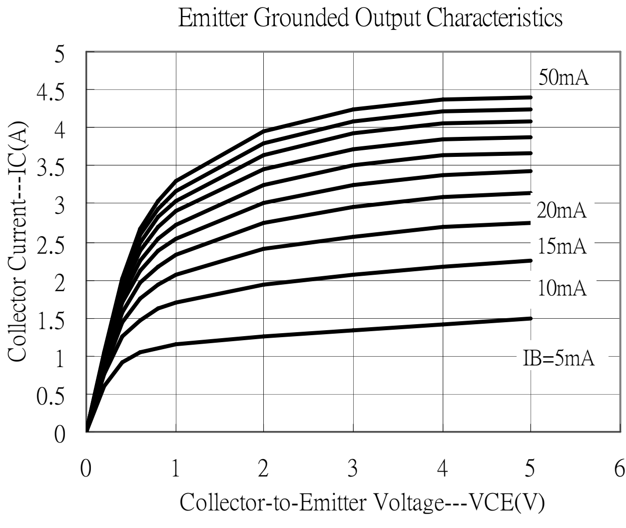
Recommended Storage Condition:
Temperature : ≤ 30 °C
Humidity : ≤ 60% RH

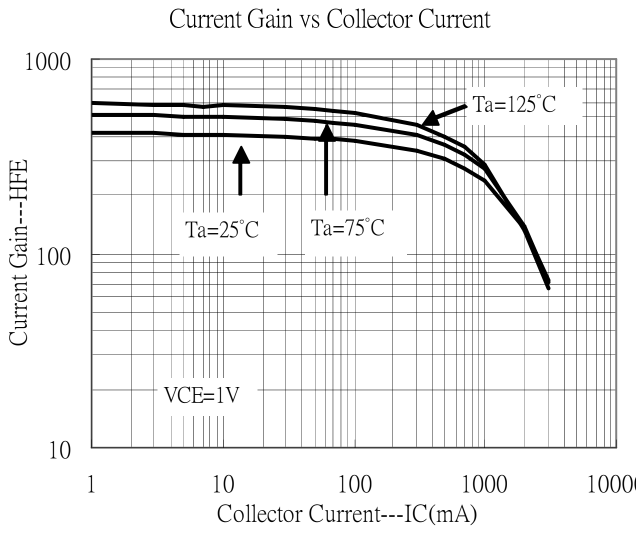
Typical Characteristics

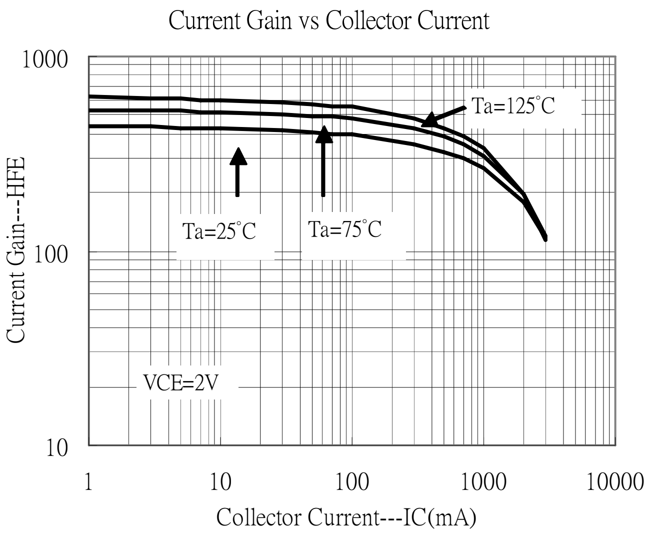












Typical Characteristics(Cont.)

Current Gain vs Collector Current

Current Gain---HFE (1000, 100, 10) vs Collector Current---IC(mA) (1, 10, 100, 1000, 10000)

Ta=125°C
Ta=25°C
Ta=75°C
VCE=5V

Saturation Voltage vs Collector Current

Saturation Voltage---(mV) (1000, 100, 10) vs Collector Current---IC(mA) (1, 10, 100, 1000, 10000)

VCESAT=10IB
125°C
75°C
25°C

Saturation Voltage vs Collector Current

Saturation Voltage---(mV) (1000, 100, 10) vs Collector Current---IC(mA) (1, 10, 100, 1000, 10000)

VCESAT=50IB
125°C
75°C
25°C

Saturation Voltage vs Collector Current

Saturation Voltage---(mV) (10000, 1000, 100, 10) vs Collector Current---IC(mA) (1, 10, 100, 1000, 10000)

VCESAT=100IB
125°C
75°C
25°C

Saturation Voltage vs Collector Current

Saturation Voltage---(mV) (10000, 1000, 100) vs Collector Current---IC(mA) (1, 10, 100, 1000, 10000)

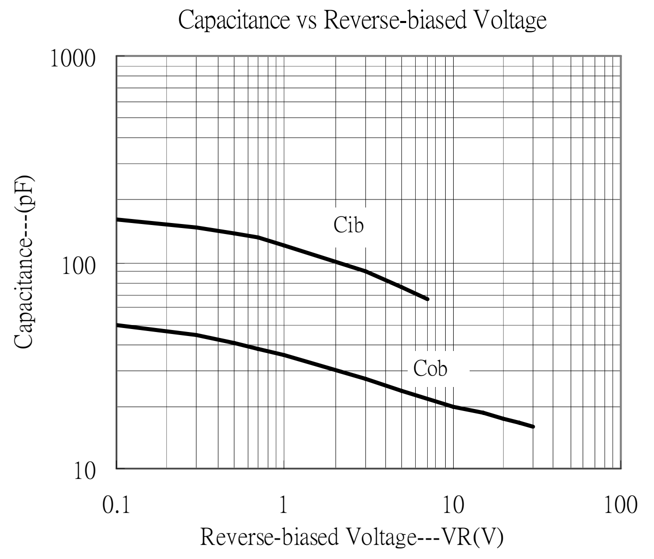
VBESAT@IC=10IB
Ta=75°C
Ta=25°C
125°C

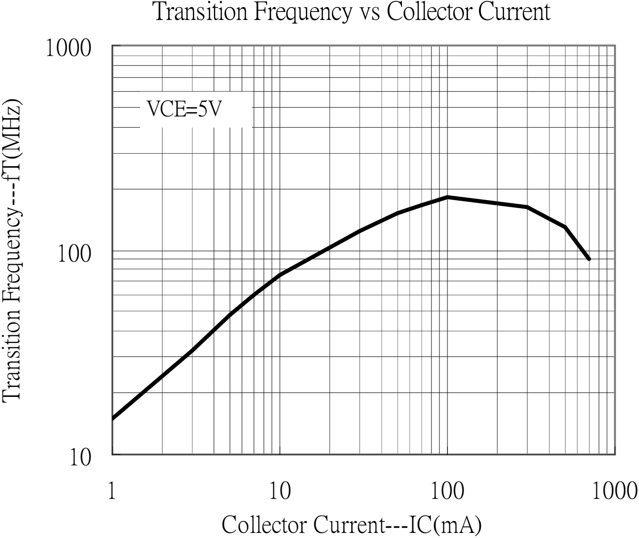
On Voltage vs Collector Current

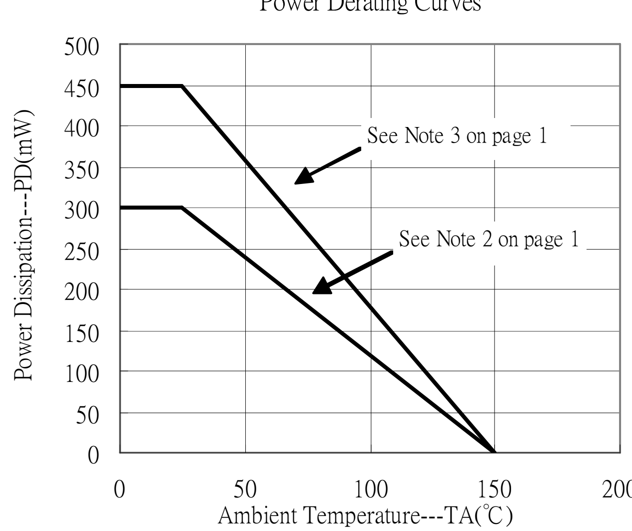
On Voltage---(mV) (10000, 1000, 100) vs Collector Current---IC(mA) (1, 10, 100, 1000, 10000)

VBEON@VCE=2V
75°C
25°C
125°C

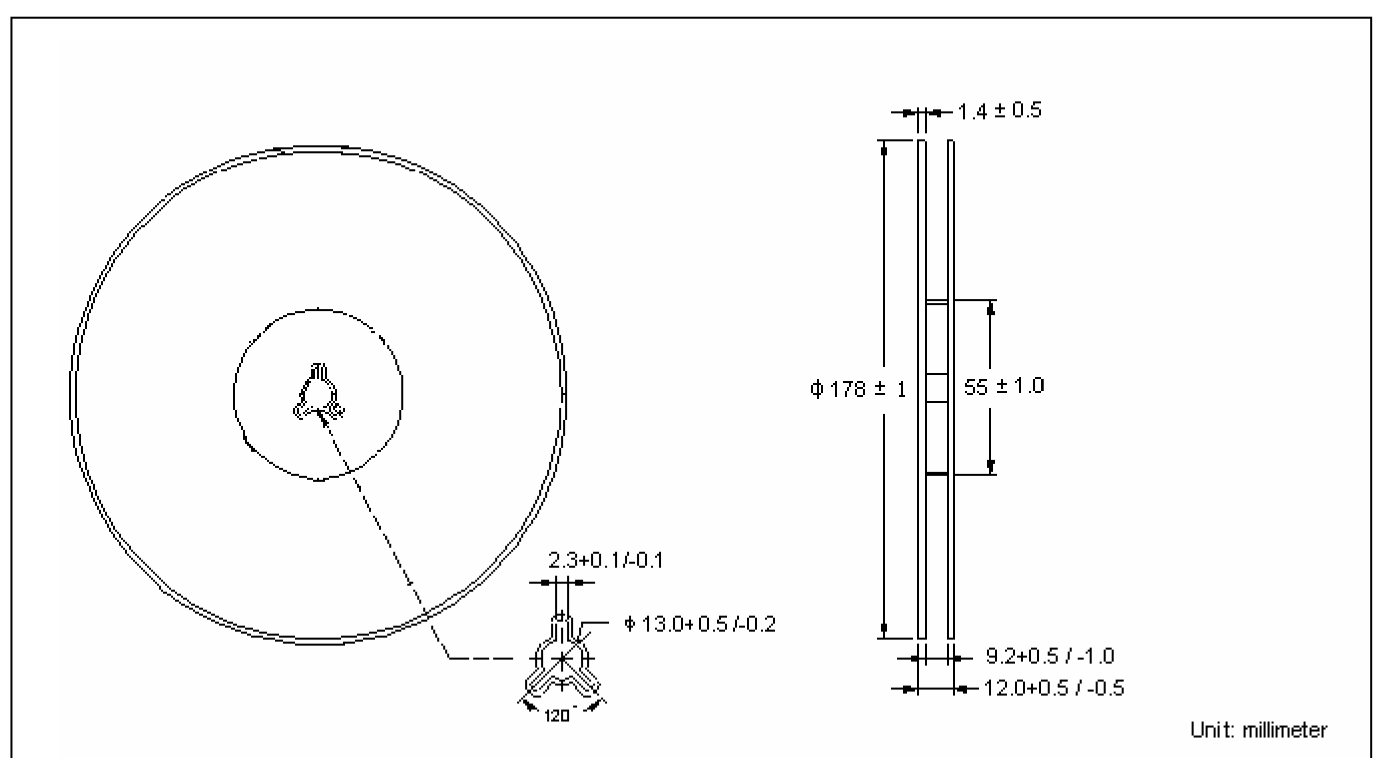
Typical Characteristics(Cont.)



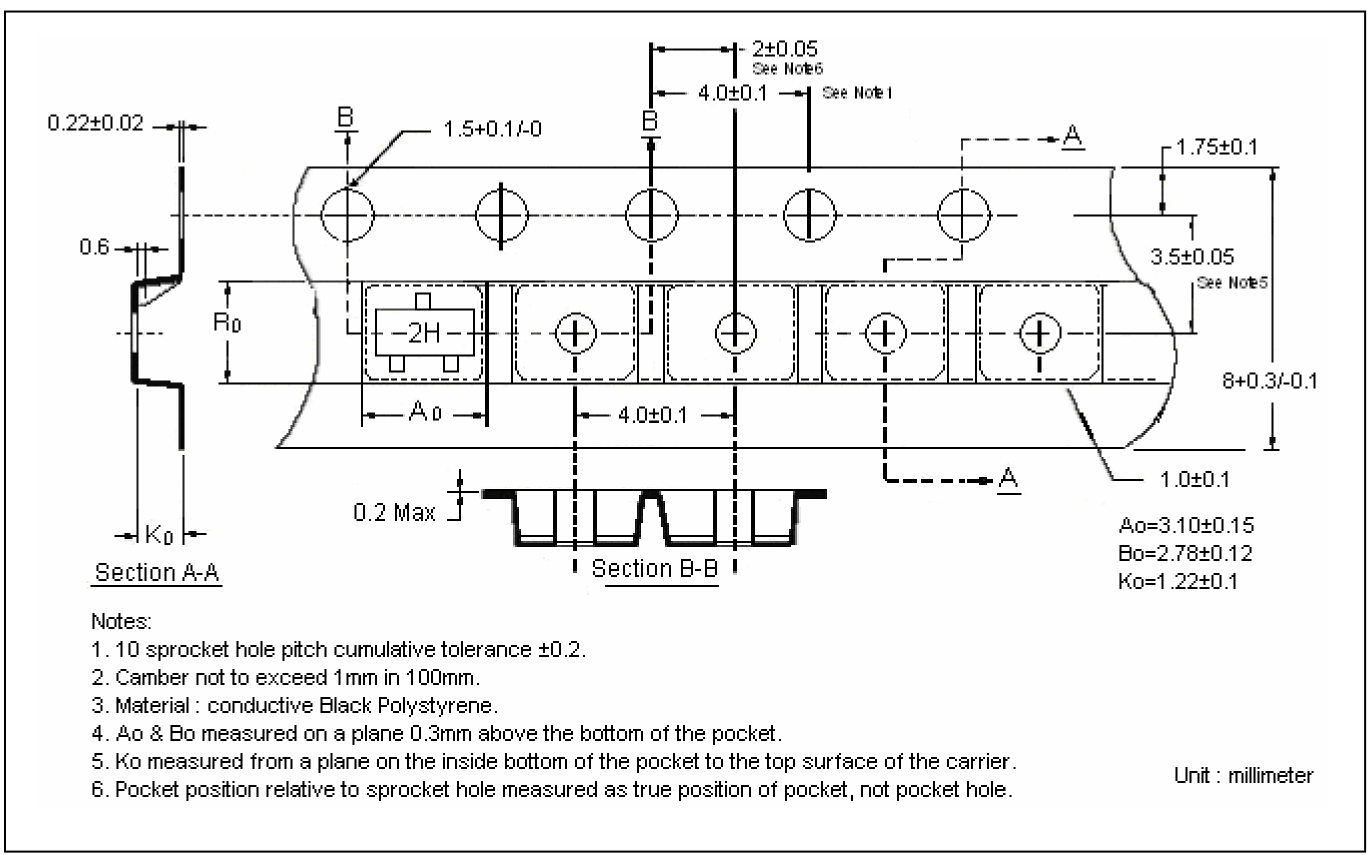




Reel Dimension



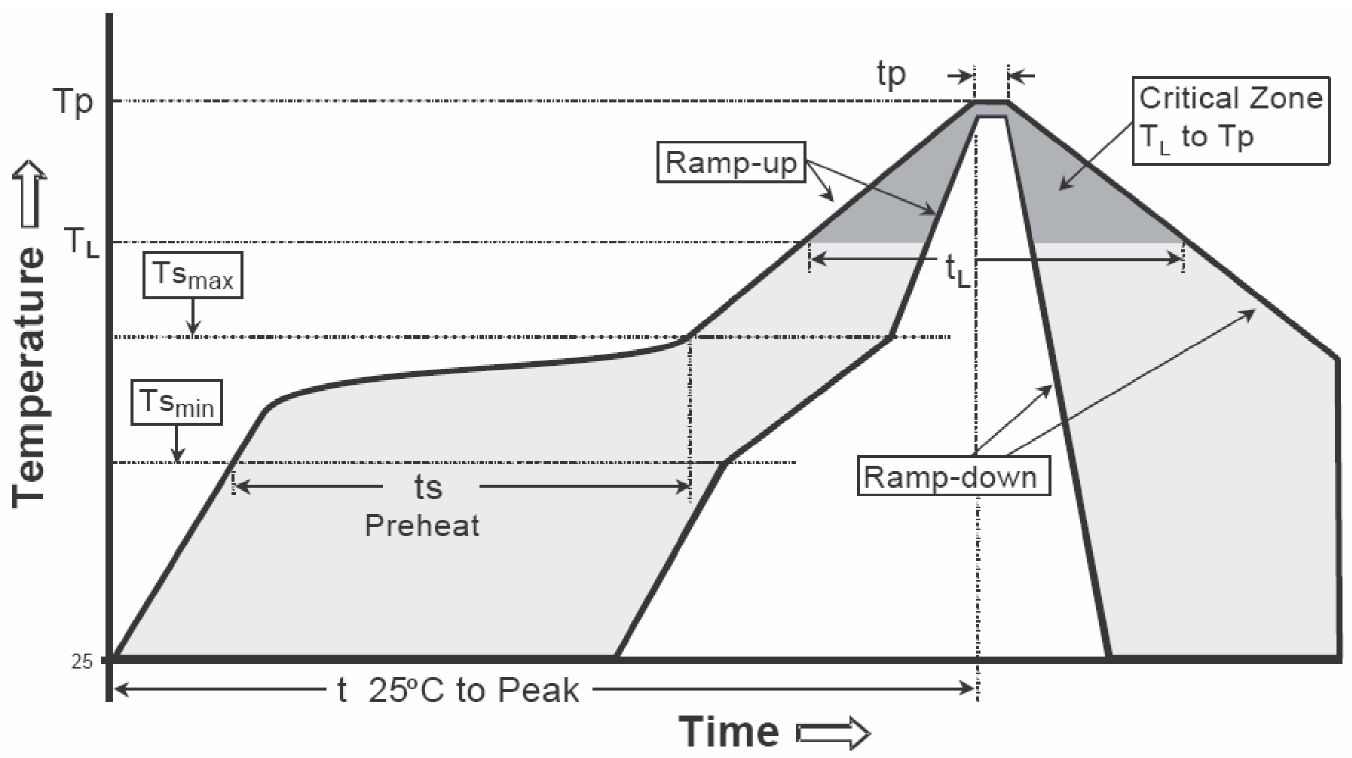
Carrier Tape Dimension



Recommended wave soldering condition

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

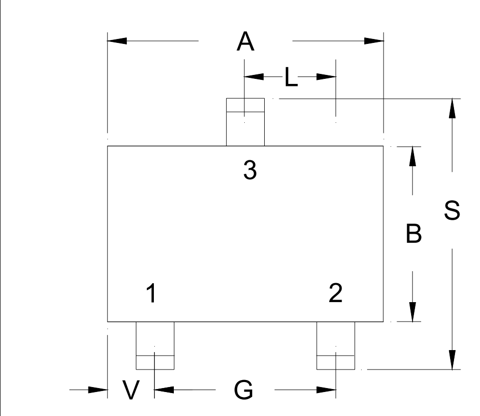
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (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.

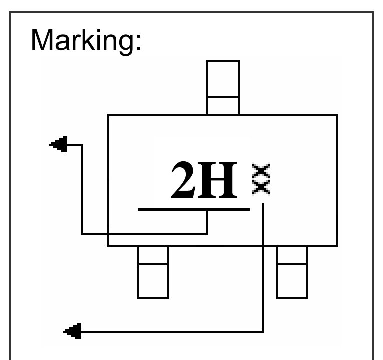
Note : All temperatures refer to topside of the package, measured on the package body surface.

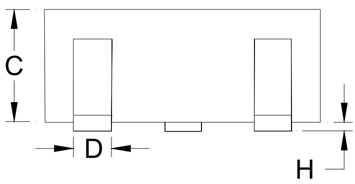
SOT-23 Dimension

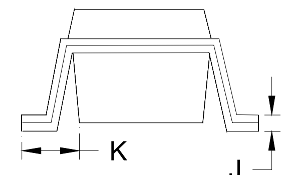


Product Code

Date Code: Year+Month
Year: 7→2007, 8→2008
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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