

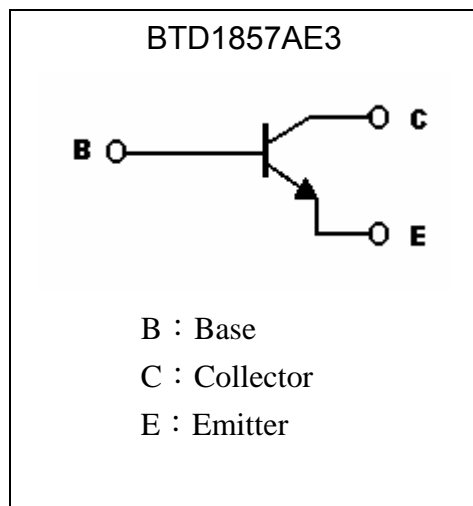
**Silicon NPN Epitaxial Planar Transistor**

# BTD1857AE3

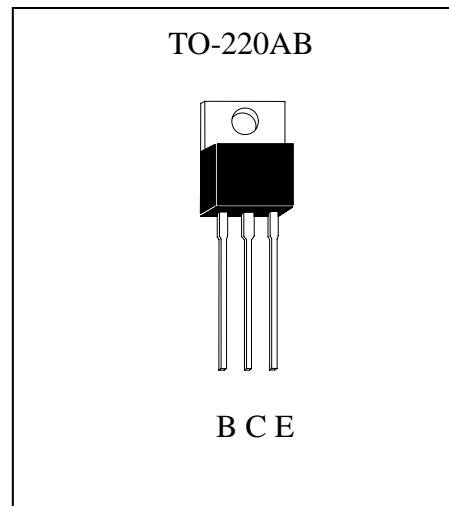
## Description

- High  $BV_{CEO}$
- High current capability
- Complementary to BTB1236AE3
- Pb-free lead plating package

## Symbol

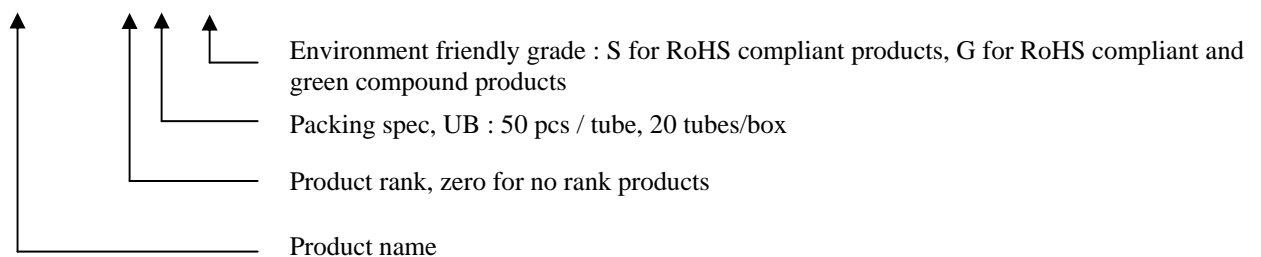


## Outline



## Ordering Information

Device	Package	Shipping
BTD1857AE3-0-UB-S	TO-220 (RoHS compliant package)	50 pcs/tube, 20 tubes/box, 4 boxes / carton



**Absolute Maximum Ratings** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V <sub>CBO</sub>	180	V
Collector-Emitter Voltage	V <sub>CEO</sub>	160	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Collector Current (DC)	I <sub>C</sub>	1.5	A
Collector Current (Pulse)	I <sub>CP</sub>	3	A
Power Dissipation @T <sub>A</sub> =25°C	P <sub>D</sub>	2	W
Power Dissipation @T <sub>C</sub> =25°C		20	W
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55~+150	°C

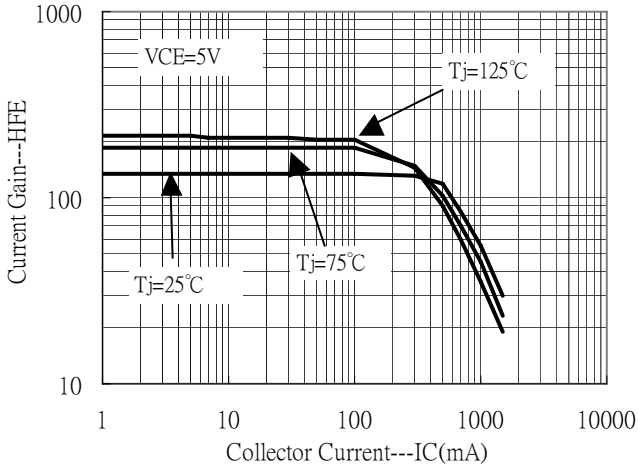
**Characteristics** (Ta=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CBO</sub>	180	-	-	V	I <sub>C</sub> =50μA, I <sub>E</sub> =0
BV <sub>CEO</sub>	160	-	-	V	I <sub>C</sub> =1mA, I <sub>B</sub> =0
BV <sub>EBO</sub>	6	-	-	V	I <sub>E</sub> =50μA, I <sub>C</sub> =0
I <sub>CBO</sub>	-	-	100	nA	V <sub>CB</sub> =160V, I <sub>E</sub> =0
I <sub>EBO</sub>	-	-	100	nA	V <sub>EB</sub> =6V, I <sub>C</sub> =0
*V <sub>CE(sat)</sub>	-	-	0.5	V	I <sub>C</sub> =1A, I <sub>B</sub> =100mA
*V <sub>BE(on)</sub>	-	-	1.2	V	V <sub>CE</sub> =5V, I <sub>C</sub> =150mA
h <sub>FE1</sub>	120	-	390	-	V <sub>CE</sub> =5V, I <sub>C</sub> =150mA
h <sub>FE2</sub>	60	-	-	-	V <sub>CE</sub> =5V, I <sub>C</sub> =500mA
f <sub>T</sub>	-	140	-	MHz	V <sub>CE</sub> =5V, I <sub>C</sub> =150mA
C <sub>ob</sub>	-	27	-	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0, f=1MHz

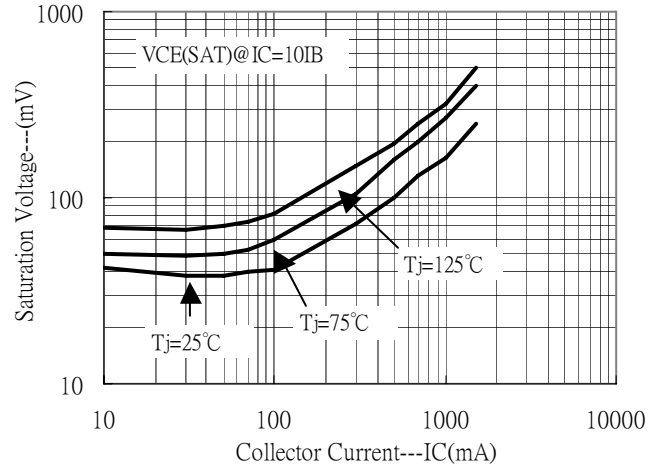
\*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

**Characteristic Curves**

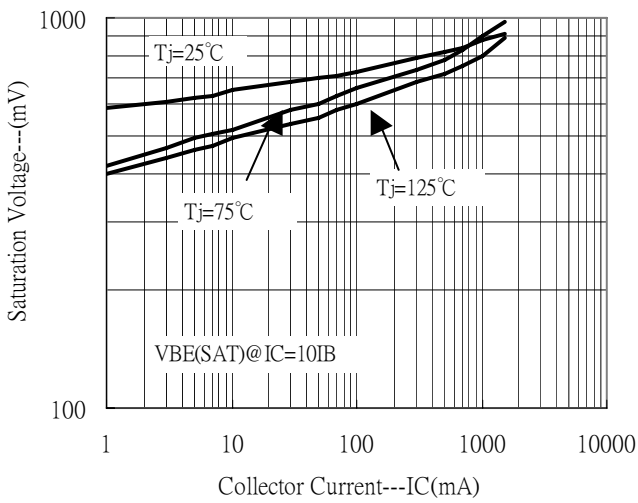
Current Gain vs Collector Current



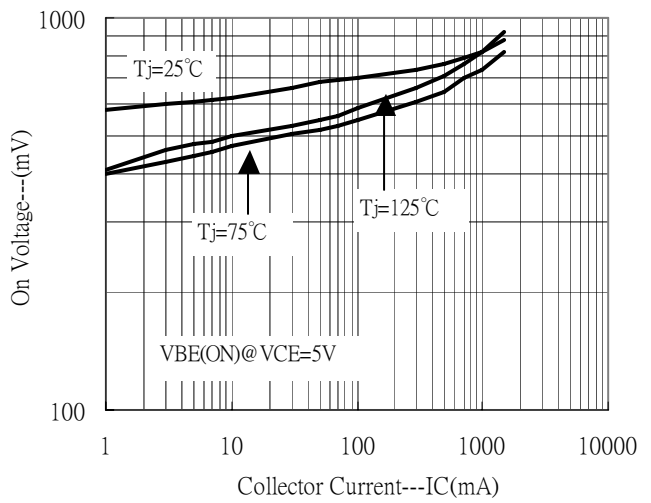
Saturation Voltage vs Collector Current



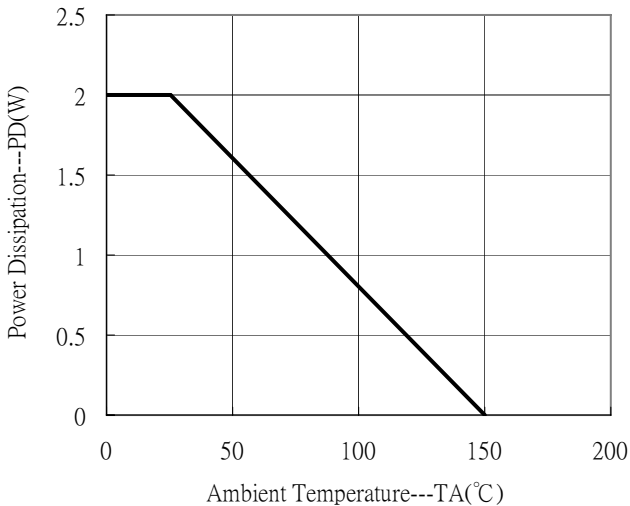
Saturation Voltage vs Collector Current



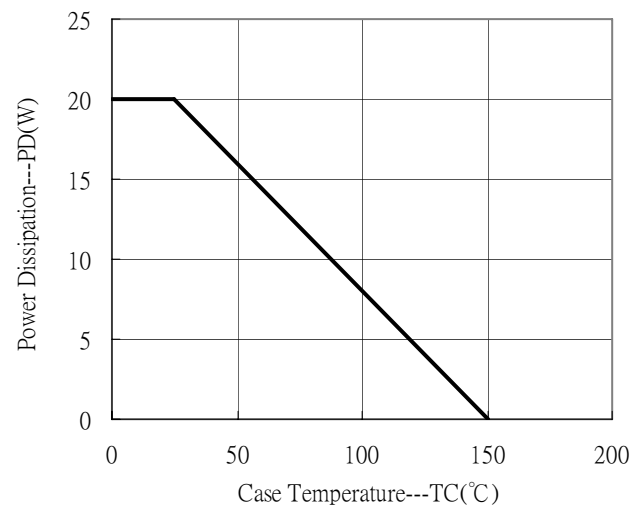
On Voltage vs Collector Current



Power Derating Curve



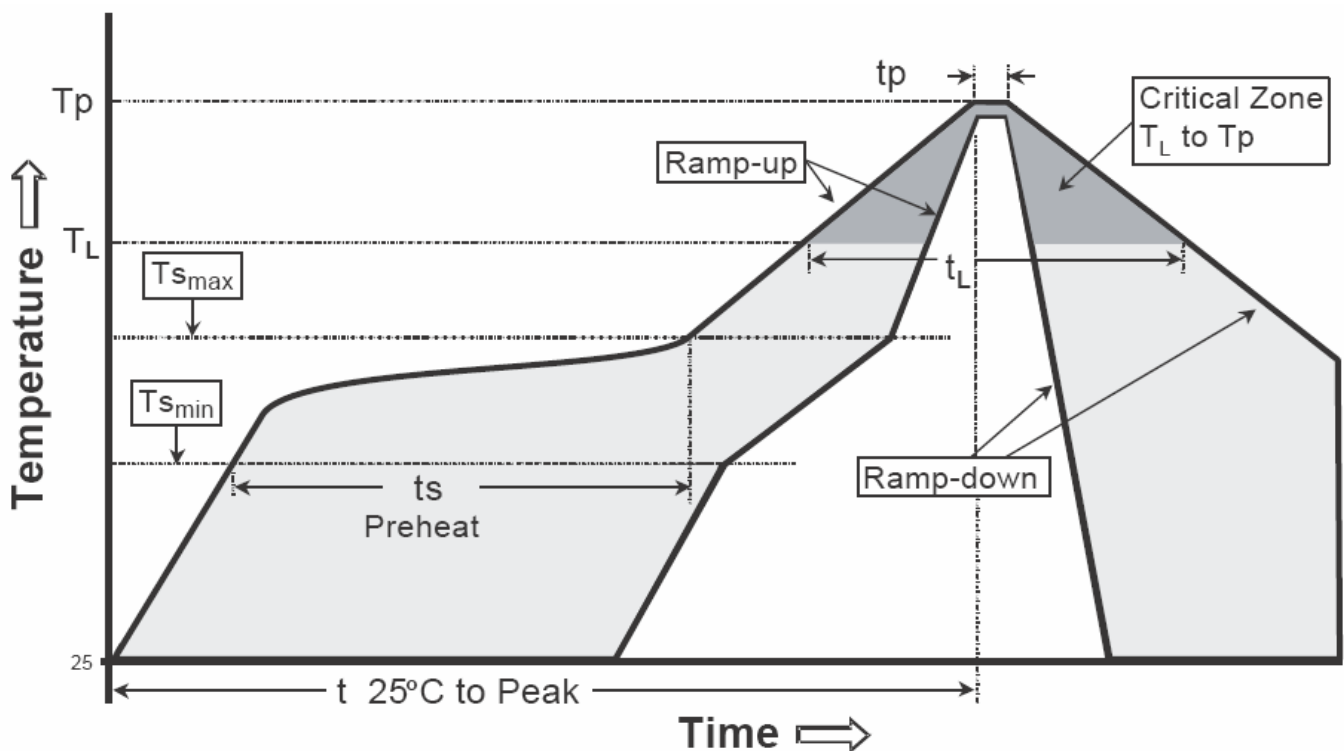
Power Derating Curve



**Recommended wave soldering condition**

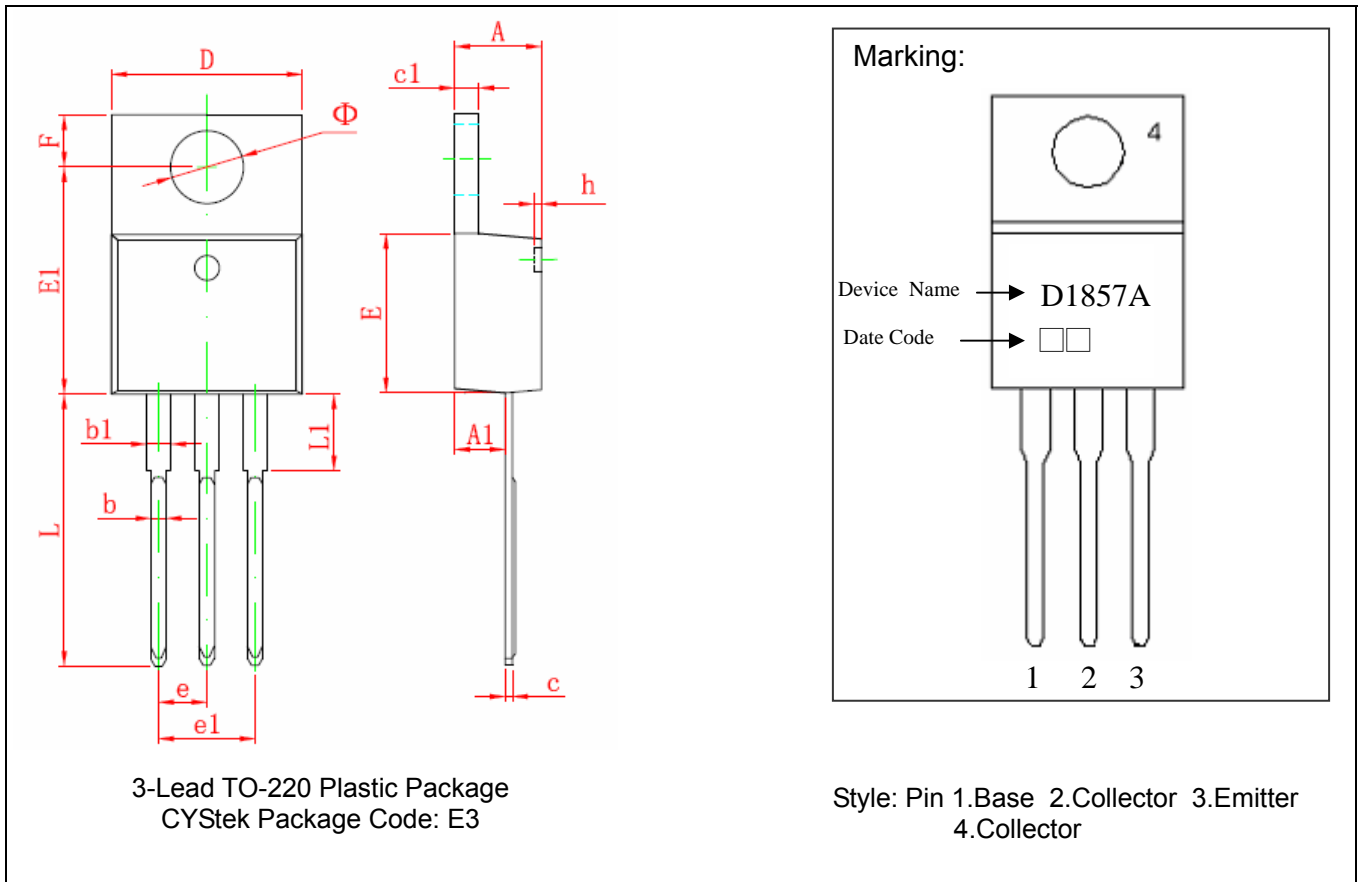
Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	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.

**TO-220 Dimension**



\*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184	E1	12.060	12.460	0.475	0.491
A1	2.520	2.820	0.099	0.111	e	2.540*		0.100*	
b	0.710	0.910	0.028	0.036	e1	4.980	5.180	0.196	0.204
b1	1.170	1.370	0.046	0.054	F	2.590	2.890	0.102	0.114
c	0.310	0.530	0.012	0.021	h	0.000	0.300	0.000	0.012
c1	1.170	1.370	0.046	0.054	L	13.400	13.800	0.528	0.543
D	10.010	10.310	0.394	0.406	L1	3.560	3.960	0.140	0.156
E	8.500	8.900	0.335	0.350	Φ	3.735	3.935	0.147	0.155

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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