

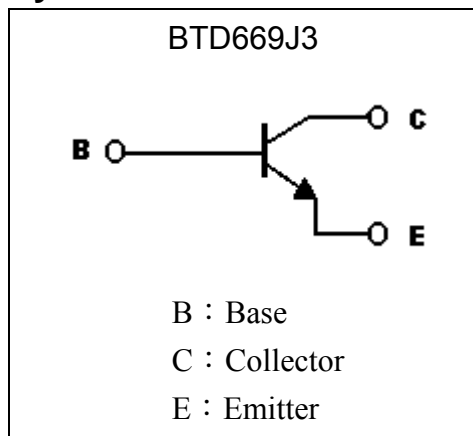
# General Purpose NPN Epitaxial Planar Transistor

## BTD669J3

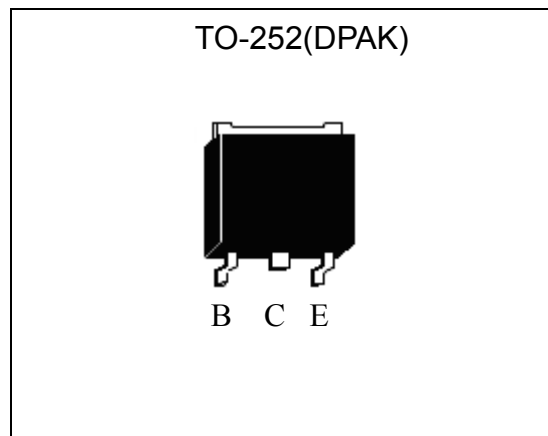
### Features

- High breakdown voltage,  $BV_{CEO} \geq 160V$
- Large continuous collector current capability
- Low collector saturation voltage
- Pb-free lead plating and halogen-free package

### Symbol

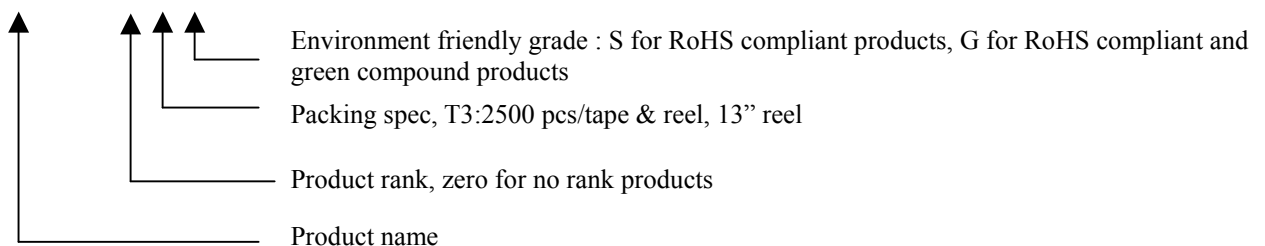


### Outline



### Ordering Information

Device	Package	Shipping
BTD669J3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / Tape & Reel





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

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V <sub>CB0</sub>	180	V
Collector-Emitter Voltage	V <sub>CEO</sub>	160	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Collector Current	I <sub>C</sub>	1	A
Collector Current (Pulse)	I <sub>CP</sub>	3	A
Base Current	I <sub>B</sub>	0.2	A
Power Dissipation @T <sub>A</sub> =25°C	P <sub>D</sub>	1	W
Power Dissipation @T <sub>C</sub> =25°C		10	W
Operating Junction Temperature Range	T <sub>j</sub>	-55~+150	°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150	°C

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>th,j-c</sub>	12.5	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>th,j-a</sub>	125	°C/W

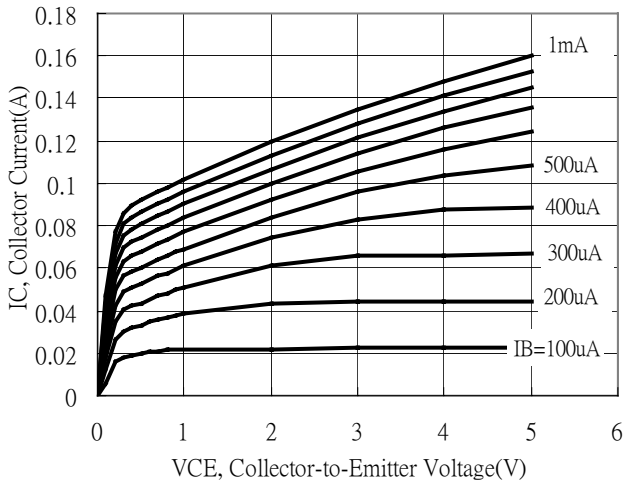
**Characteristics** (Ta=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CB0</sub>	180	-	-	V	I <sub>C</sub> =1mA
BV <sub>CEO</sub>	160	-	-	V	I <sub>C</sub> =10mA
BV <sub>EBO</sub>	6	-	-	V	I <sub>E</sub> =1mA
I <sub>CB0</sub>	-	-	100	nA	V <sub>CB</sub> =180V
I <sub>EBO</sub>	-	-	100	nA	V <sub>EB</sub> =6V
*V <sub>CE(sat)</sub>	-	0.25	0.5	V	I <sub>C</sub> =500mA, I <sub>B</sub> =50mA
*V <sub>BE(sat)</sub>	-	0.87	1.2	V	I <sub>C</sub> =500mA, I <sub>B</sub> =50mA
*V <sub>BE(on)</sub>	-	0.73	1.5	V	V <sub>CE</sub> =5V, I <sub>C</sub> =150mA
*h <sub>FE 1</sub>	160	-	320	-	V <sub>CE</sub> =10V, I <sub>C</sub> =150mA
*h <sub>FE 2</sub>	30	-	-	-	V <sub>CE</sub> =10V, I <sub>C</sub> =500mA
f <sub>T</sub>	100	-	-	MHz	V <sub>CE</sub> =10V, I <sub>C</sub> =50mA, f=100MHz
Cob	-	6.3	15	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz

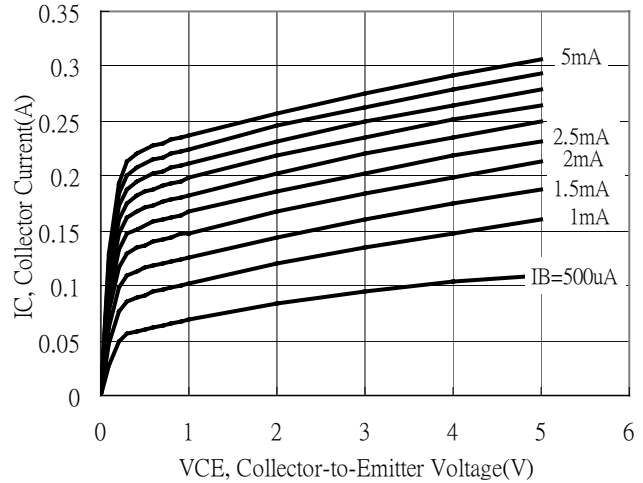
\*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

**Typical Characteristics**

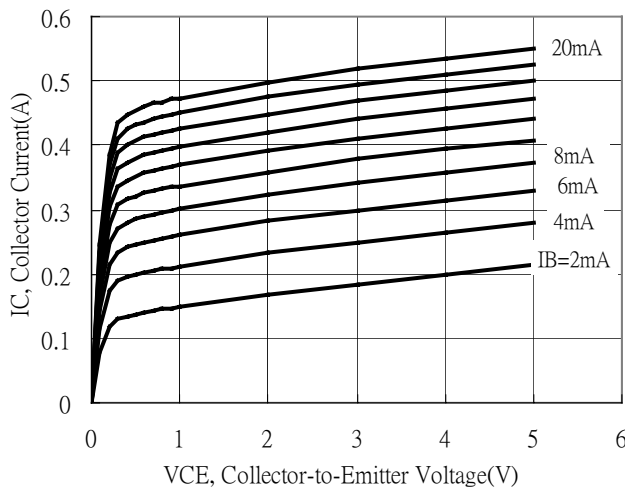
Emitter Grounded Output Characteristics



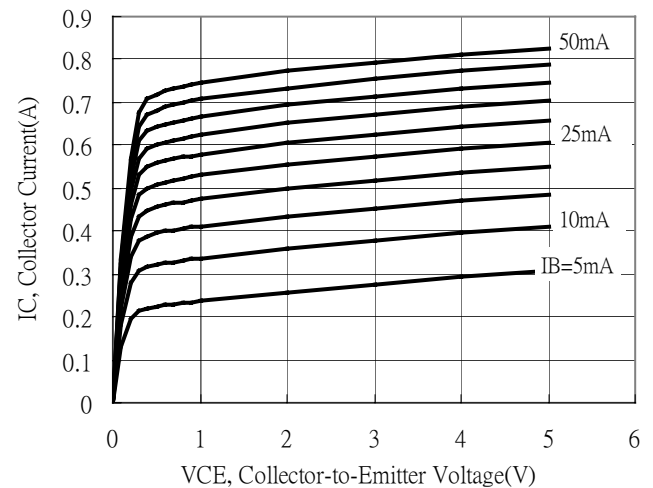
Emitter Grounded Output Characteristics



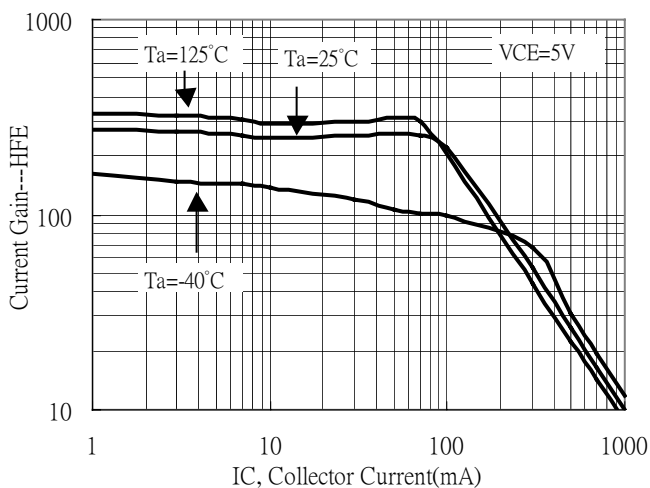
Emitter Grounded Output Characteristics



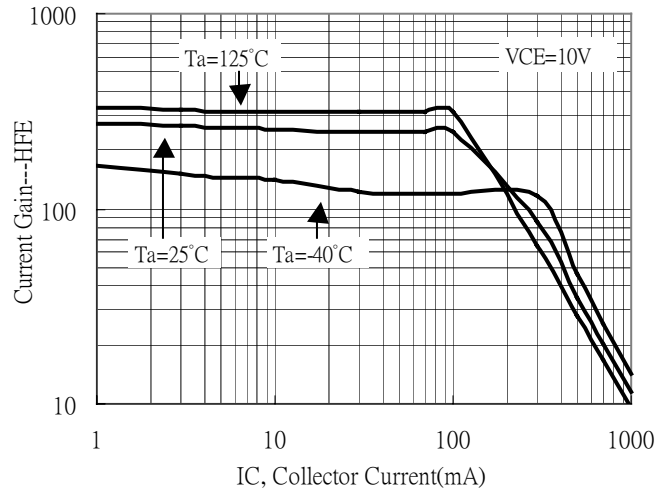
Emitter Grounded Output Characteristics



Current Gain vs Collector Current

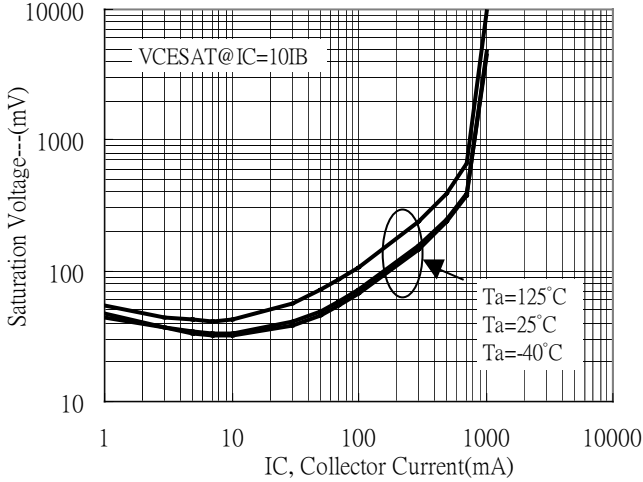


Current Gain vs Collector Current

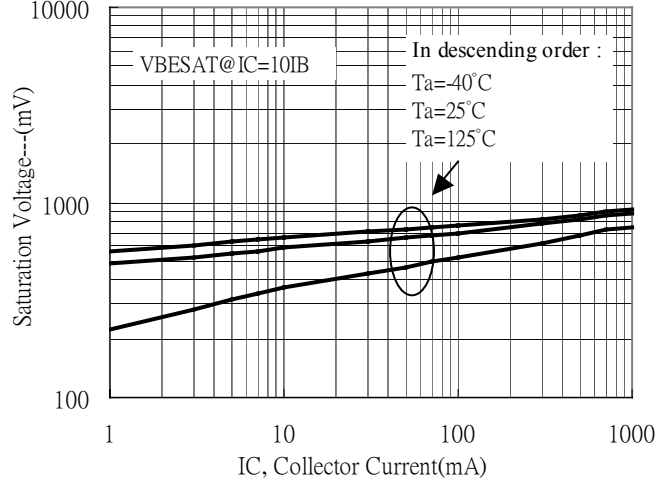


**Typical Characteristics(Cont.)**

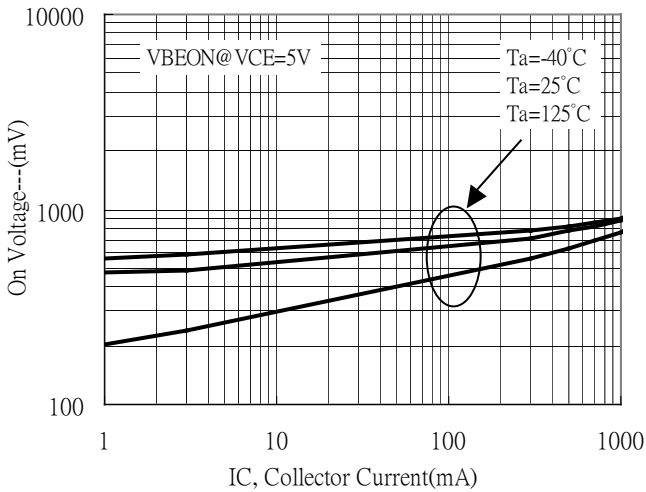
Saturation Voltage vs Collector Current



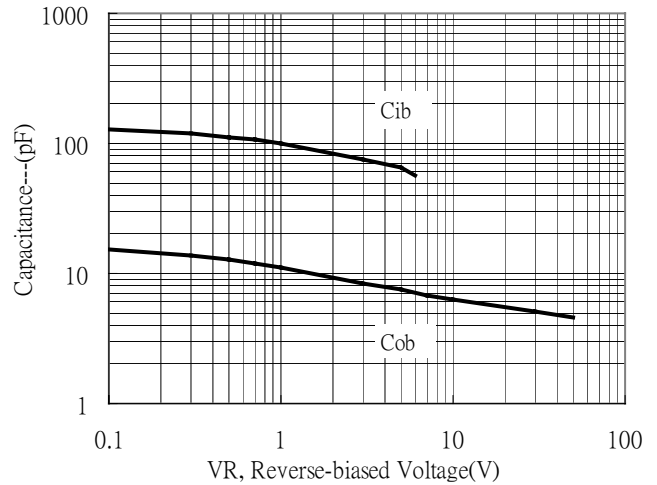
Saturation Voltage vs Collector Current



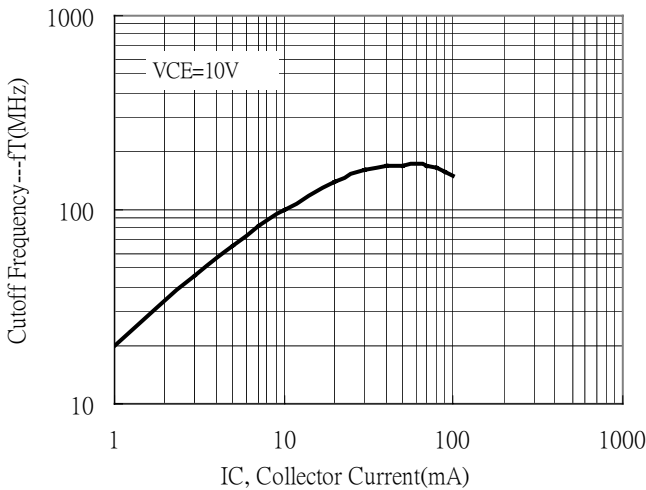
On Voltage vs Collector Current



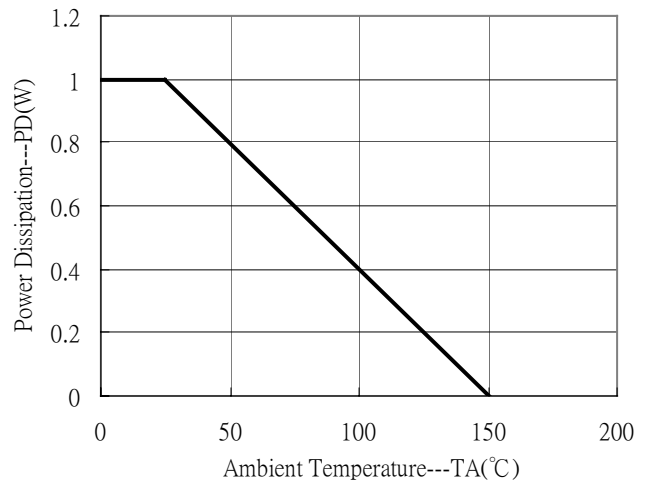
Capacitance vs Reverse-biased Voltage



Cutoff Frequency vs Collector Current

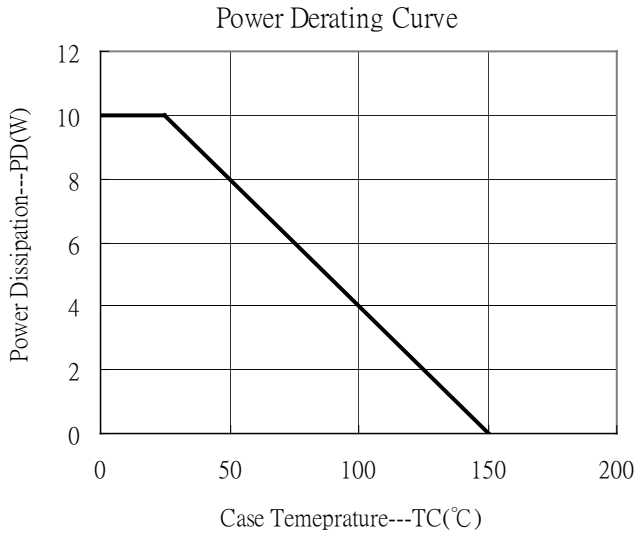


Power Derating Curve





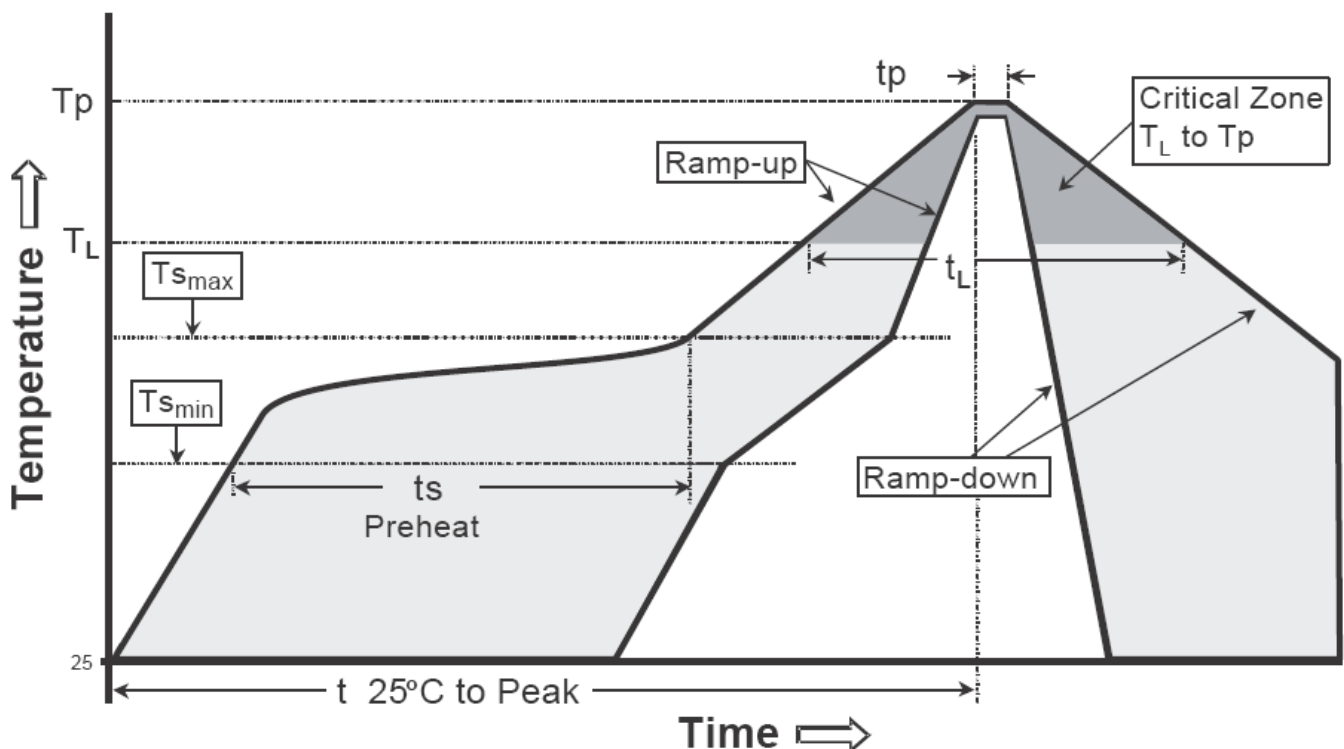
**Typical Characteristics(Cont.)**





**Recommended wave soldering condition**

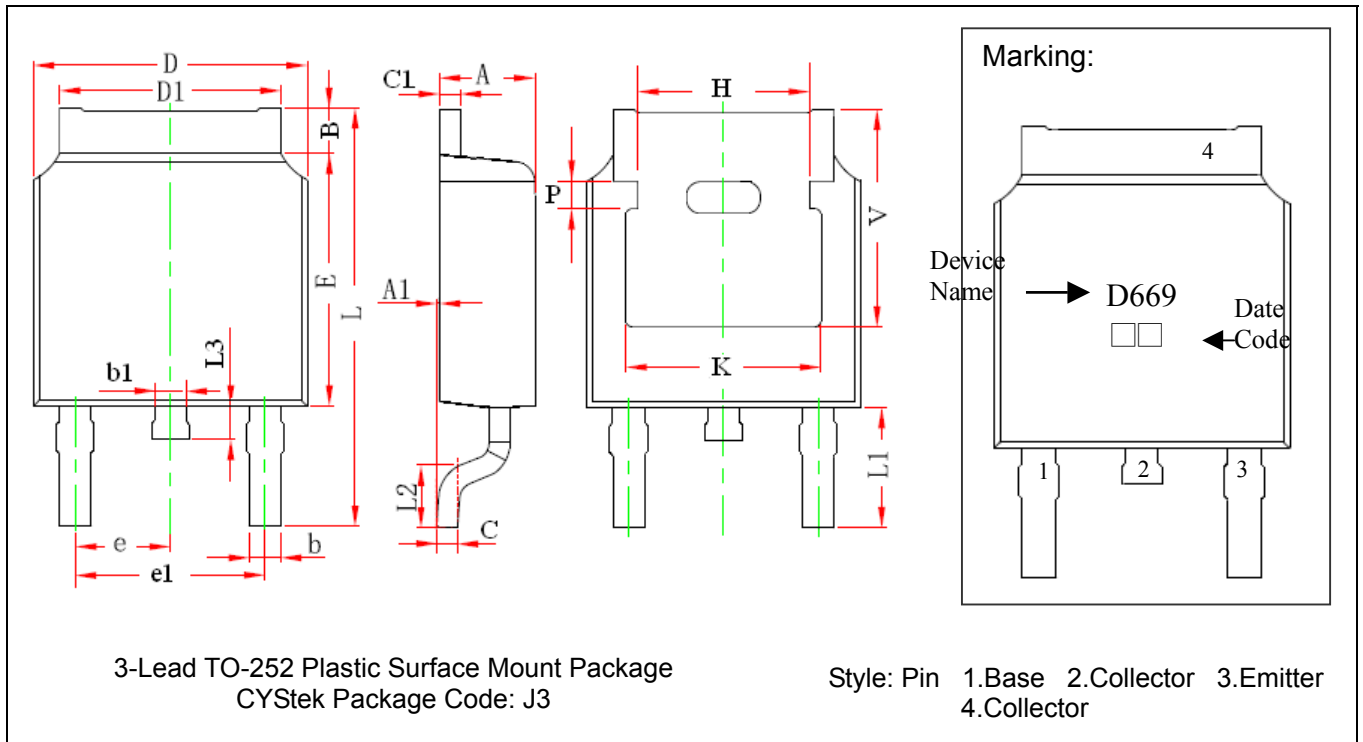
Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

**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)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)	183°C	217°C
- Time (tL)	60-150 seconds	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.

## TO-252 Dimension



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	e	0.086	0.094	2.186	2.386
A1	0.000	0.005	0.000	0.127	e1	0.172	0.188	4.372	4.772
B	0.039	0.048	0.990	1.210	H	0.163	REF	4.140	REF
b	0.026	0.034	0.660	0.860	K	0.190	REF	4.830	REF
b1	0.026	0.034	0.660	0.860	L	0.386	0.409	9.800	10.400
C	0.018	0.023	0.460	0.580	L1	0.114	REF	2.900	REF
C1	0.018	0.023	0.460	0.580	L2	0.055	0.067	1.400	1.700
D	0.256	0.264	6.500	6.700	L3	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	P	0.026	REF	0.650	REF
E	0.236	0.244	6.000	6.200	V	0.211	REF	5.350	REF

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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