

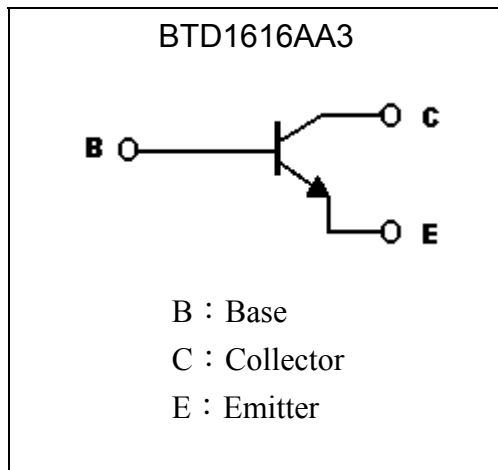
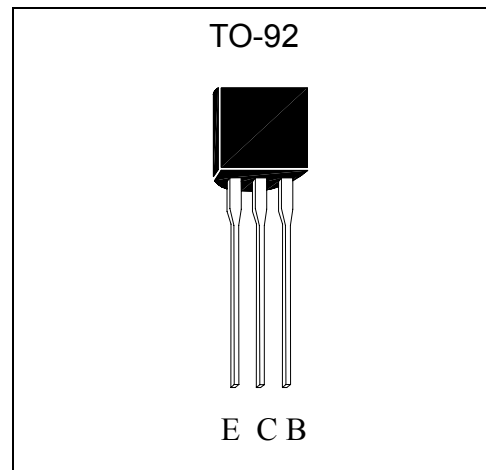
General Purpose NPN Epitaxial Planar Transistor

BTD1616AA3

BV_{CEO}	60V
I_C	1A
$R_{CESAT(max)}$	300m Ω

Features

- High breakdown voltage, $BV_{CEO} \geq 60V$
- Large continuous collector current capability
- Low collector saturation voltage
- Pb-free and Halogen-free package

Symbol

Outline

Absolute Maximum Ratings ($T_a=25^\circ C$)

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V_{CBO}	120	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	7	V
Collector Current (DC)	I_C	1	A
Collector Current (pulse)	I_{CP}	2 (Note)	A
Base Current	I_B	0.2	A
Power Dissipation	P_D	750	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	167	$^\circ C/W$
Operating Junction and Storage Temperature Range	$T_j ; T_{stg}$	-55~+150	$^\circ C$

 Note : Pulse test, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

**Characteristics (Ta=25°C)**

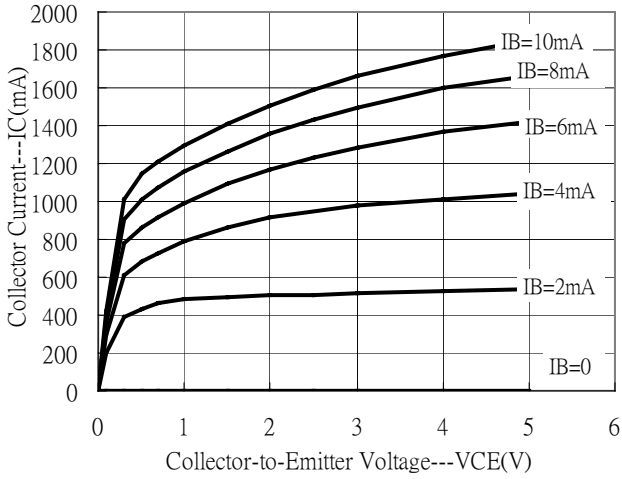
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	120	-	-	V	$I_C=50\mu A$
BV_{CEO}	60	-	-	V	$I_C=1mA$
BV_{EBO}	7	-	-	V	$I_E=50\mu A$
I_{CBO}	-	-	100	nA	$V_{CB}=120V$
I_{EBO}	-	-	100	nA	$V_{EB}=7V$
* $V_{CE(sat)}$	-	150	300	mV	$I_C=1A, I_B=50mA$
* $V_{CE(sat)}$	-	-	350	mV	$I_C=1A, I_B=20mA$
* $V_{BE(sat)}$	-	0.9	1.2	V	$I_C=1A, I_B=50mA$
* $V_{BE(on)}$	600	-	700	mV	$V_{CE}=2V, I_C=50mA$
* h_{FE1}	200	-	400	-	$V_{CE}=2V, I_C=100mA$
* h_{FE2}	120	-	-	-	$V_{CE}=2V, I_C=1A$
f_T	100	-	-	MHz	$V_{CE}=2V, I_C=100mA, f=100MHz$
Cob	-	13	18	pF	$V_{CB}=10V, I_E=0A, f=1MHz$
ton	-	40	-	ns	$V_{CC}=30V, I_C=1A, I_{B1}=-I_{B2}=33mA, R_L=30\Omega$
tstg	-	500	-		
tf	-	120	-		

*Pulse Test: Pulse Width $\leq 380\mu s$, Duty Cycle $\leq 2\%$ **Ordering Information**

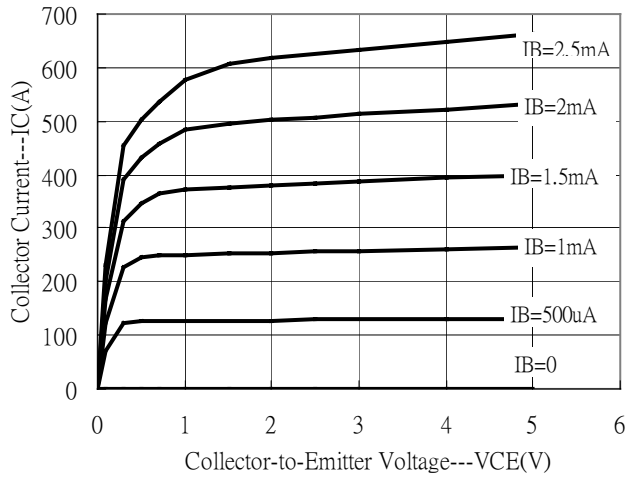
Device	Package	Shipping	Marking
BTD1616AA3	TO-92 (Pb-free and Halogen-free package)	2000 pcs / Tape & Box	D1616A
BTD1616AA3	TO-92 (Pb-free and Halogen-free package)	1000 pcs / Bag, 10 Bags/Box	D1616A

Characteristic Curves

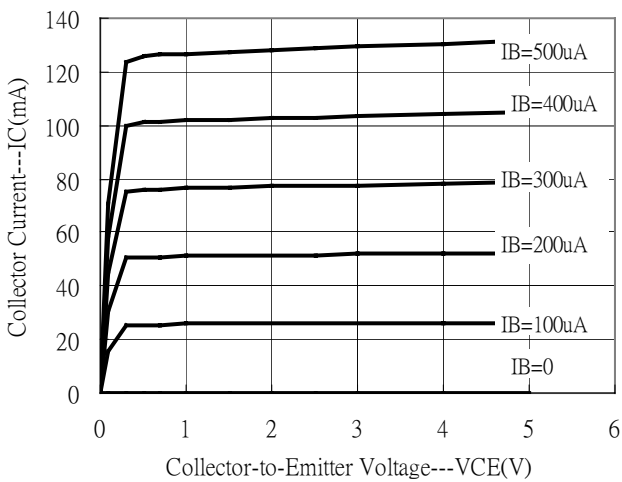
Emitter Grounded Output Characteristics



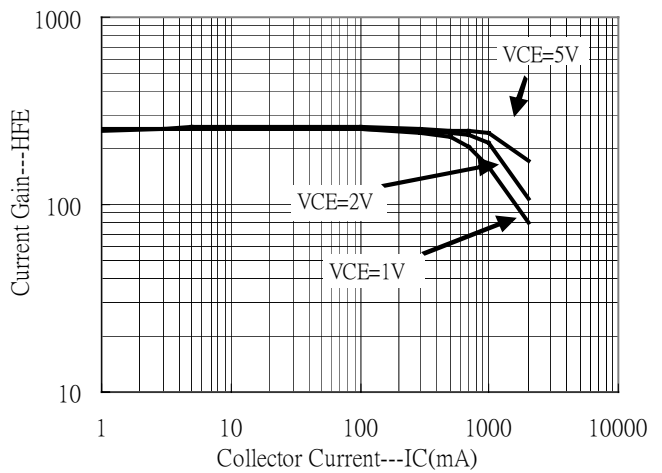
Emitter Grounded Output Characteristics



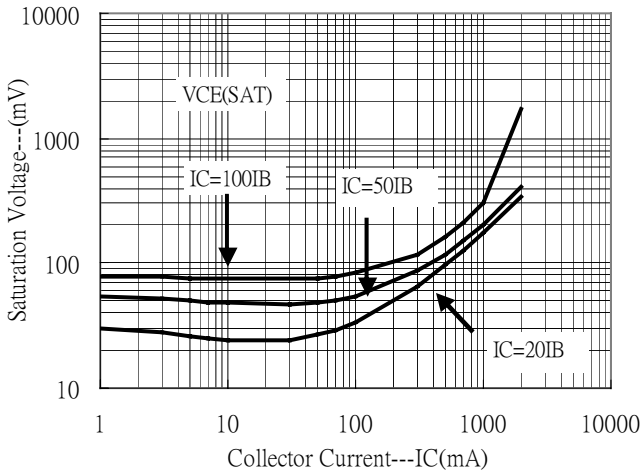
Emitter Grounded Output Characteristics



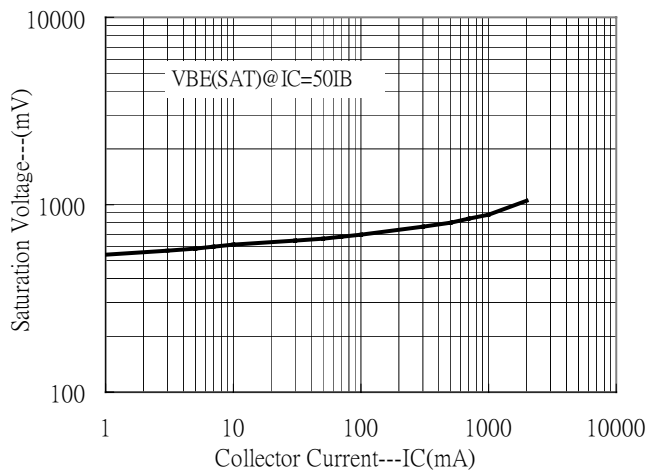
Current Gain vs Collector Current



Saturation Voltage vs Collector Current

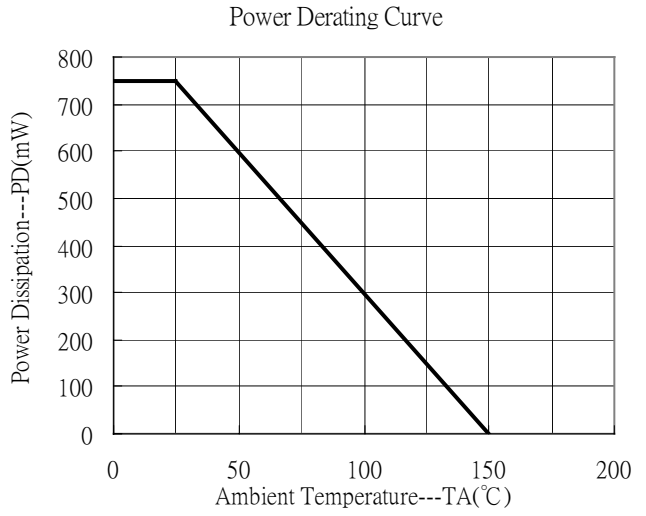
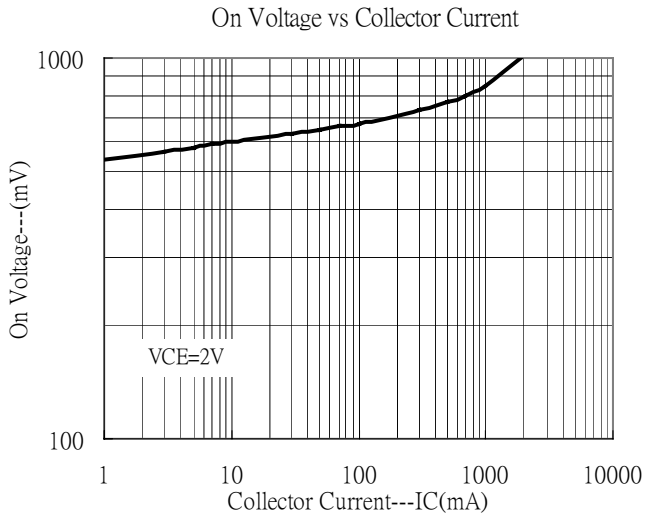


Saturation Voltage vs Collector Current

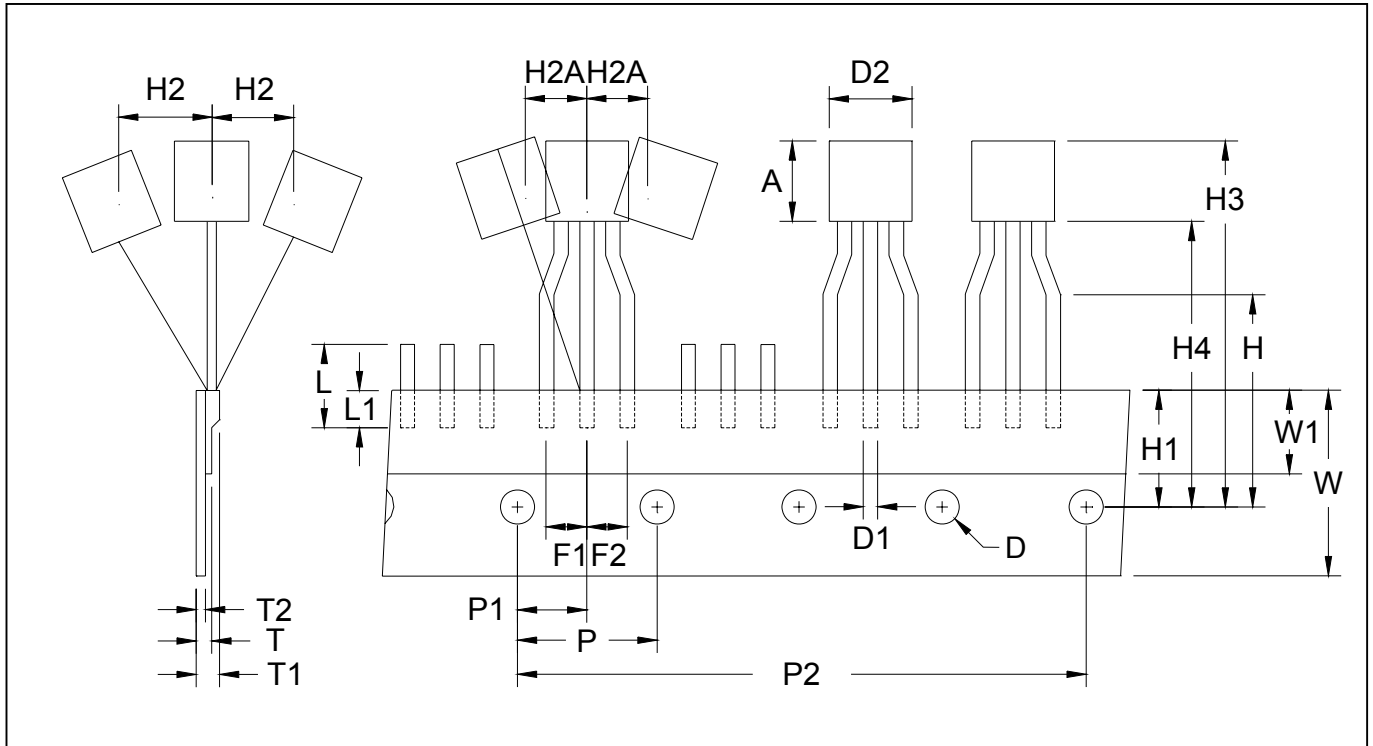




Characteristic Curves(Cont.)



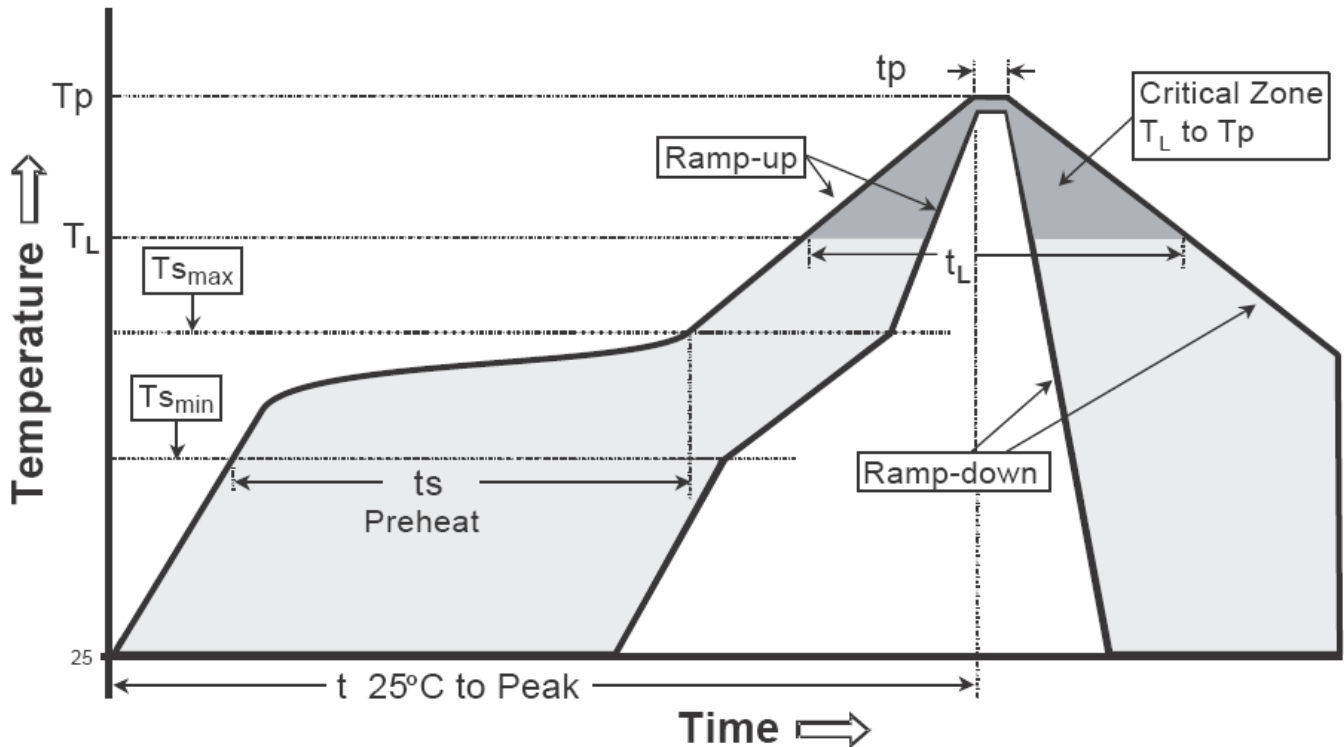
TO-92 Taping Outline



DIM	Item	Millimeters	
		Min.	Max.
A	Component body height	4.33	4.83
D	Tape Feed Diameter	3.80	4.20
D1	Lead Diameter	0.36	0.53
D2	Component Body Diameter	4.33	4.83
F1,F2	Component Lead Pitch	2.40	2.90
F1,F2	F1-F2	-	±0.3
H	Height Of Seating Plane	15.50	16.50
H1	Feed Hole Location	8.50	9.50
H2	Front To Rear Deflection	-	1
H2A	Deflection Left Or Right	-	1
H3	Component Height	-	27
H4	Feed Hole To Bottom Of Component	-	21
L	Lead Length After Component Removal	-	11
L1	Lead Wire Enclosure	2.50	-
P	Feed Hole Pitch	12.50	12.90
P1	Center Of Seating Plane Location	5.95	6.75
P2	4 Feed Hole Pitch	50.30	51.30
T	Over All Tape Thickness	-	0.55
T1	Total Taped Package Thickness	-	1.42
T2	Carrier Tape Thickness	0.36	0.68
W	Tape Width	17.50	19.00
W1	Adhesive Tape Width	5.00	7.00
-	20 pcs Pitch	253	255

Recommended wave soldering condition

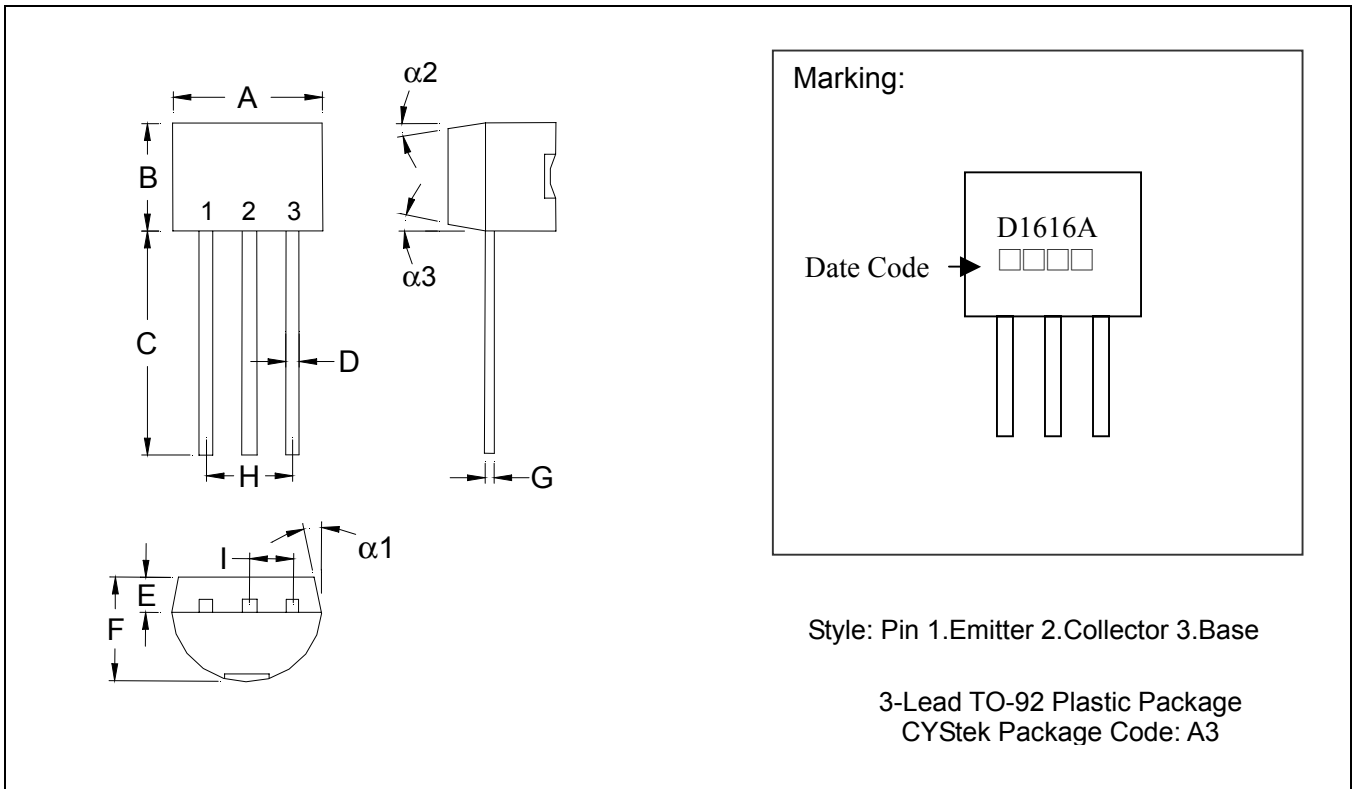
Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	60-150 seconds
Peak Temperature(T _p)	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-92 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1704	0.1902	4.33	4.83	G	0.0142	0.0220	0.36	0.56
B	0.1704	0.1902	4.33	4.83	H	-	*0.1000	-	*2.54
C	0.5000	-	12.70	-	I	-	*0.0500	-	*1.27
D	0.0142	0.0220	0.36	0.56	$\alpha 1$	-	*5°	-	*5°
E	-	*0.0500	-	*1.27	$\alpha 2$	-	*2°	-	*2°
F	0.1323	0.1480	3.36	3.76	$\alpha 3$	-	*2°	-	*2°

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: KFC ; pure tin plated
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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