Series PTC 7000, PTC 7001, PTC 7002, PTC 7003

Fast-Switching High Power Darlingtons

50 Amperes • 500 Volts

FEATURES

- High Voltage Rating – 500 Volts Sustaining
- Fast-Switching Capabilities/Fast Turn-Off Time
- Glass Passivated Die to Provide Excellent High Temperature Stability
- Thermally Stable Structure for Reliability in Power Cycling

APPLICATIONS

- High Voltage Switching Power Supplies
- Inverters/Regulators
- Deflection Circuits
- Pulse-Width-Modulated (PWM) System Control Circuitry

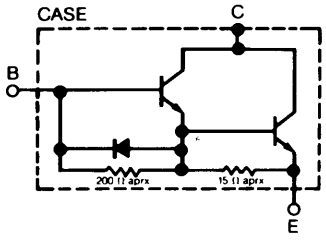
SPECIFICATIONS

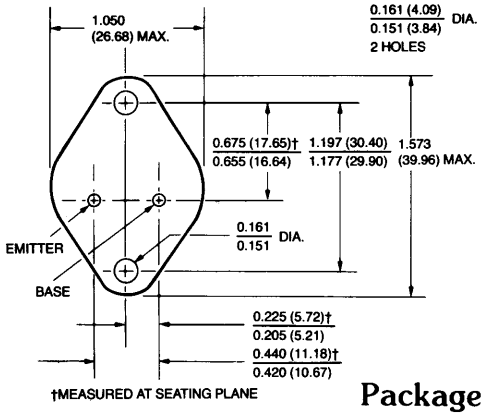
General

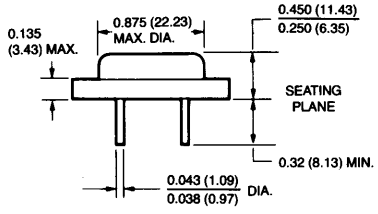
Featuring a unique process of manufacturing, Powermode series PTC 7000 Darlingtons provide a combination of fast-switching, high-power capabilities, including high safe operating areas (SOA) and are suited for application in switching power supplies, regulators, inverters and line operated systems.

The triple diffused, high temperature glass passivated mesa device exhibits improved secondary breakdown characteristics. An excellent voltage range enables the unit to meet unusually demanding requirements in fast-switching circuitry. An internal diode provides rapid device turn-off.

Electrical







Package outline JEDEC TO-3

Basic dimensions in inches.

Dimensions shown in PARENTHESES are in millimeters.

SERIES PTC 7000/7001/7002/7003

Fast-Switching, High Power Darlingtons

Absolute maximum ratings

	Description	PTC 7000	PTC 7001	PTC 7002	PTC 7003	Unit	Conditions
V_{CBO}	Collector-Base Voltage	350	400	450	550	V	
V_{CEO}	Collector-Emitter Voltage	350	400	450	550	V	
I_C	Collector Current – Continuous	50				A	
I_C	Colector Current – Peak	75				A	
I_B	Base Current – Continuous	8				A	
I_B	Base Current – Peak	12				A	
P_D	Maximum Power Dissipation	175				W	T_C = 25°C
T_j, T_{stg}	Junction Operating and Storage Temperature Range	−55 to +150				°C	
	Overload-Short Circuit	375	300	262	225	mJ	At rated sustaining voltage, I_B = 1A I_C = 75A min., Time = 10μS
	Lead Temperature	300				°C	Measured 0.0625 ±0.0312 in. (1.588 ±0.794 mm) from case for 10 sec.

Electrical characteristics at T_C = 25°C (unless otherwise specified)

	Description	Type	Min.	Typ.	Max.	Unit	Conditions
$V_{CEO(sus)}$	Collector Emitter Sustaining Voltage	PTC 7000	300			V	I_C = 2A, L = 2mH See Figure 2
		PTC 7001	350			V	
		PTC 7002	400			V	
		PTC 7003	500			V	
I_{CEO}	Collector Cutoff Current	All		0.1	1.0	mA	At rated collector voltage
I_{EBO}	Emitter Cutoff Current	All			300	mA	V_{EB} = 2V
FBSOA	Forward Bias Safe Operating Area	All					
h_{FE}	DC Current Gain [1]	All	80		240		I_C = 20A, V_{CE} = 5V
			40		120		I_C = 30A, V_{CE} = 5V
			15		60		I_C = 50A, V_{CE} = 5V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage [1]	All			2.0	V	I_C = 40A, I_B = 4A
					2.5	V	I_C = 50A, I_B = 5A
$V_{BE(sat)}$	Base-Emitter Saturation Voltage [1]	All			2.5	V	I_C = 40A, I_B = 4A

Switching characteristics resistive load

	Description	Type	Min.	Typ.	Max.	Unit	Conditions
t_d	Delay Time	All			0.04	μS	V_{CC} = 300V; I_C = 20A I_{B1} = 1.0A; I_{B2} = 3.0A V_{BE} = −6V P.W. = 25 μs See Figure 1
t_r	Rise Time	All			0.4	μS	
t_s	Storage Time	All			2.5	μS	
t_f	Fall Time	All			0.7	μS	

Thermal and mechanical characteristics

	Description	Type	Typ.	Unit	Conditions
$R_{\phi JC}$	Thermal Resistance Junction to Case	All	0.7	°C/W	
	Approximate Weight	All	0.5	oz	
			15	gm	
	Darlington Circuit	All	All		

[1] PULSE TEST: PW = 300 μs, DUTY CYCLE ≤ 2%

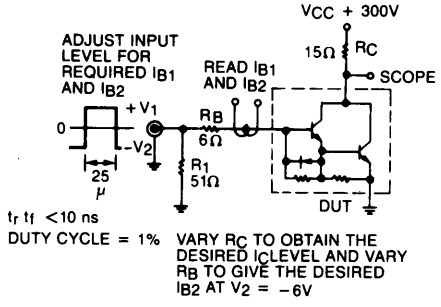


Figure 1— Switching Circuit

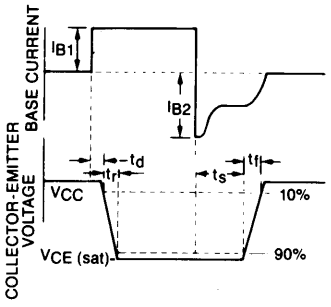


Figure 1a— Switching Waveform

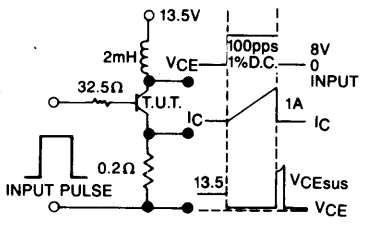
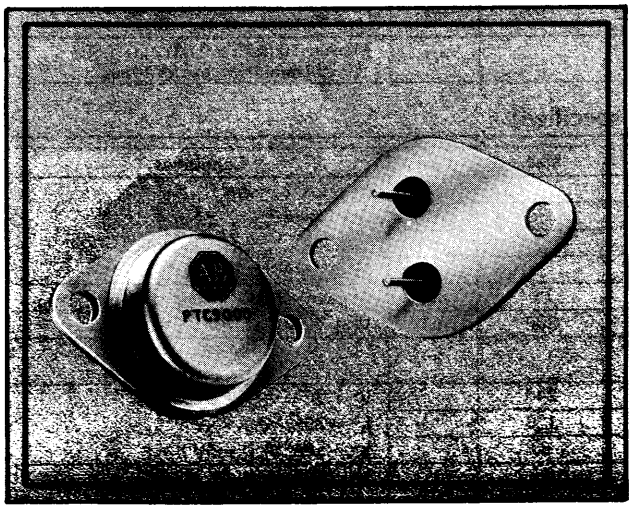


Figure 2 — Sustaining Voltage Test Circuit

Series PTC 9000, PTC 9001, PTC 9002 NPN Silicon Power Darlington Transistors

20 Amperes • 750, 850 and 900 Volts



FEATURES

- High Voltage Rating – 900 Volts Sustaining
- Fast-Switching Capabilities/Fast Turn-Off Time
- Glass Passivated Die to Provide Excellent High Temperature Stability
- Thermally Stable Structure for Reliability in Power Cycling
- No Parasitic Diode on Output Transistor

APPLICATIONS

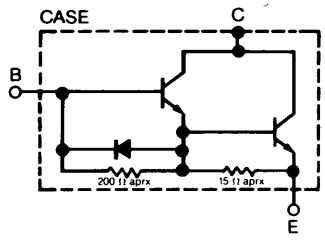
- High Voltage Switching Power Supplies
- Inverters/Regulators
- Deflection Circuits
- Pulse-Width-Modulated (PWM) System Control Circuitry

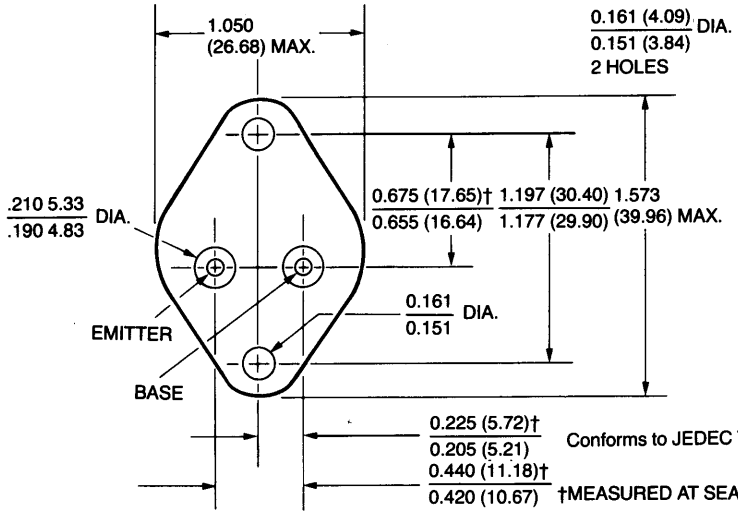
SPECIFICATIONS

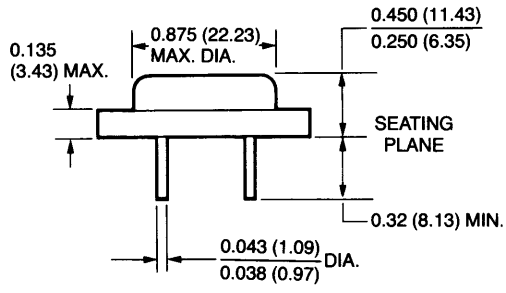
General

The PTC 9000, PTC 9001 and PTC 9002, Powerlithic series of silicon NPN darlington transistors are designed for high voltage, high speed, high power switching applications. These high voltage darlington transistors are ideally suited for applications in switching power supplies, pulse-width-modulated regulators and inverter or converter circuits operating off 480 volt lines.

Electrical







Basic dimensions in inches.

Dimensions shown in PARENTHESES are in millimeters.

Package outline JEDEC TO-3

SERIES PTC 9000/9001/9002

Fast-Switching, High Voltage Darlingtons

Absolute maximum ratings

	Description	PTC 9000	PTC 9001	PTC 9002	Unit	Conditions
V_{CBO}	Collector-Base Voltage	800	900	950	V	
V_{CEO}	Collector-Emitter Voltage	800	900	950	V	
I_C	Collector Current – Continuous		20		A	
I_C	Collector Current – Peak		40		A	
I_B	Base Current – Continuous		10		A	
I_B	Base Current – Peak		15		A	
P_D	Maximum Power Dissipation		125		W	T_C = 25°C
T_j, T_{stg}	Junction Operating and Storage Temperature Range		−65 to +150		°C	
	Lead Temperature		300		°C	Measured 0.0625 ± 0.0312 in. (1.588 ± 0.794 mm) from case for 10 sec.

Electrical characteristics at T_C = 25°C (unless otherwise specified)

	Description	Type	Min.	Max.	Unit	Conditions
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage	PTC 9000	750		V	I_C = 1.0A
		PTC 9001	850		V	L = 2mH,
		PTC 9002	900		V	See Figure 2
I_{CEO}		All		0.25	mA	At rated Collector Voltage
I_{EBO}		All		375	mA	V_{EBO} = 5.0V
F_{BSOA}	Forward Bias Safe Operating Area	All				
h_{FE}	DC Current Gain ■	All	20			I_C = 10A; V_{CE} = 5V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ■	All		2.0	V	I_C = 10A; I_B = 1.0A
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ■	All		2.5	V	I_C = 10A; I_B = 1.0A

Switching characteristics resistive load

	Description	Type	Min.	Max.	Unit	Conditions
t_d	Delay Time	All		0.5	μS	V_{CC} = 250V; I_C = 10A — See
t_r	Rise Time	All		3.0	μS	I_{B1} = 1.0A I_{B2} = 2.0A — Figure 1
t_s	Storage Time	All		6.0	μS	$V_{BE(off)}$ = −6V; PW ≥ 25μS
t_f	Fall Time	All		3.0	μS	DUTY CYCLE ≤ 2%

Thermal and mechanical characteristics

	Description	Type	Typ.	Unit	Conditions
$R_{\theta JC}$	Thermal Resistance Junction-to-Case	All	1.0	°C/W	
	Approximate Weight	All	0.5 14	oz gm	
	Darlington Circuit	All			

■ PULSE TEST: PW = 300 μs, DUTY CYCLE ≤ 2%

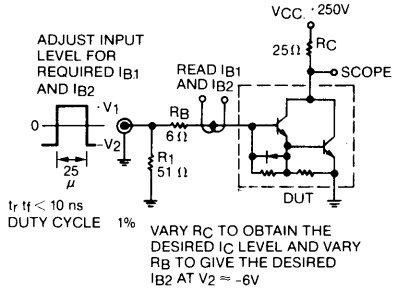


Figure 1 – Switching Circuit

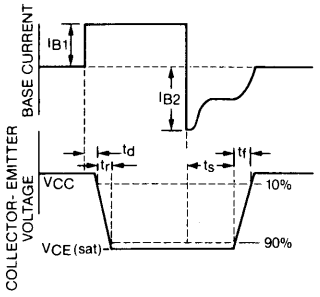


Figure 1a – Switching Waveform

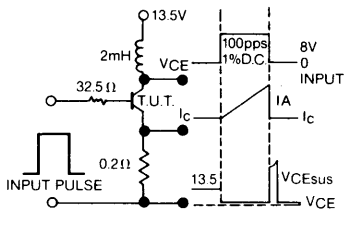


Figure 2 – Sustaining Voltage Test Circuit