



NTE99 **Silicon NPN Transistor** **Darlington ^w/Base-Emitter Speed-up Diode**

Description:

The NTE99 is a silicon NPN Darlington transistor in a TO3 type package designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. This device is particularly suited for line-operated switchmode applications.

Applications:

- Switching Regulators
- Motor Controls
- Inverters
- Solenoid and Relay Drivers

Features:

- Fast Turn-Off Times:
 - 1.0μs (max) Inductive Crossover Time – 20 Amps
 - 2.5μs (max) Inductive Storage Time – 20 Amps
- Operating Temperature Range: –65° to +200°C

Absolute Maximum Ratings:

Collector-Emitter Voltage, V_{CEO}	400V
Collector-Emitter Voltage, V_{CEV}	600V
Emitter-Base Voltage, V_{EB}	8V
Collector Current, I_C	
Continuous	50A
Peak (Note 1)	75A
Base Current, I_B	
Continuous	10A
Peak (Note 1)	15A
Total Power Dissipation, P_D	
$T_C = +25^{\circ}\text{C}$	250W
Derate Above 25°C	1.43W/°C
$T_C = +100^{\circ}\text{C}$	143W
Operating Junction Temperature Range, T_J	–65° to +200°C
Storage Temperature Range, T_{stg}	–65° to +200°C
Thermal Resistance, Junction-to-Case, R_{thJC}	0.7°C/W
Maximum Lead Temperature (During Soldering, 1/8" from case for 5sec), T_L	+275°C

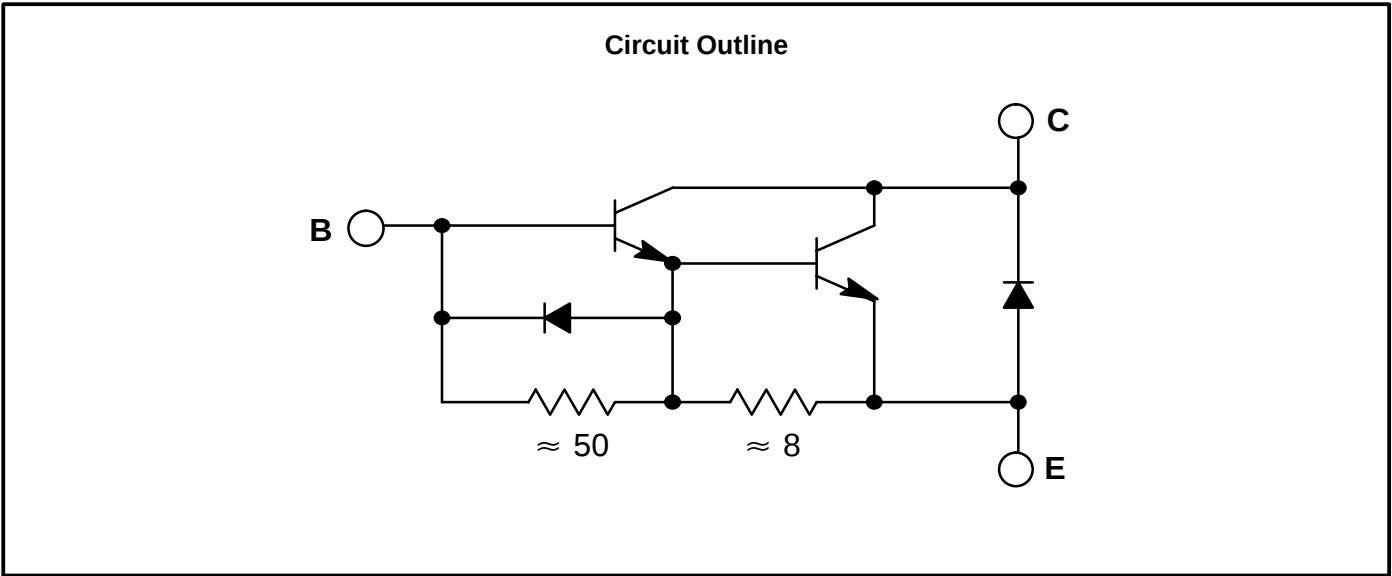
Note 1. Pulse Test: Pulse Width = 5ms, Duty Cycle ≤ 10%.

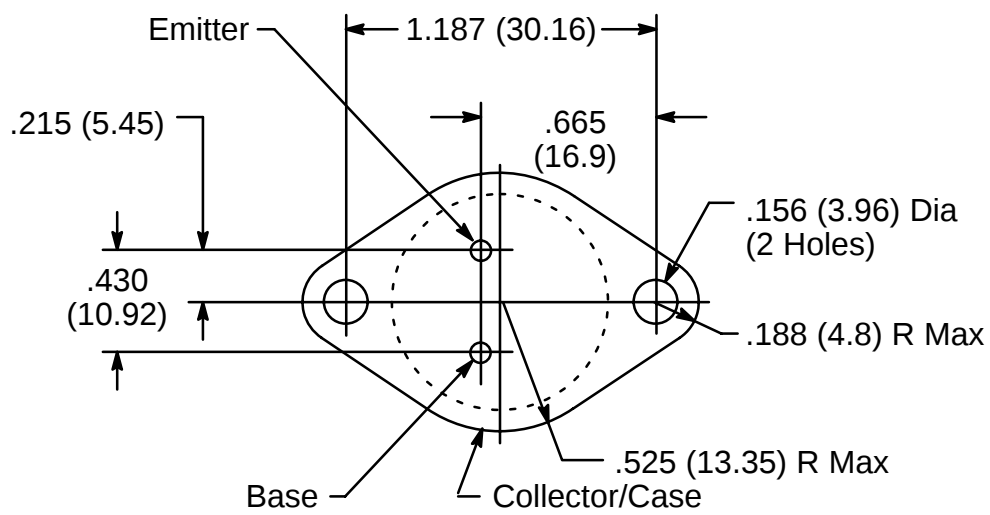
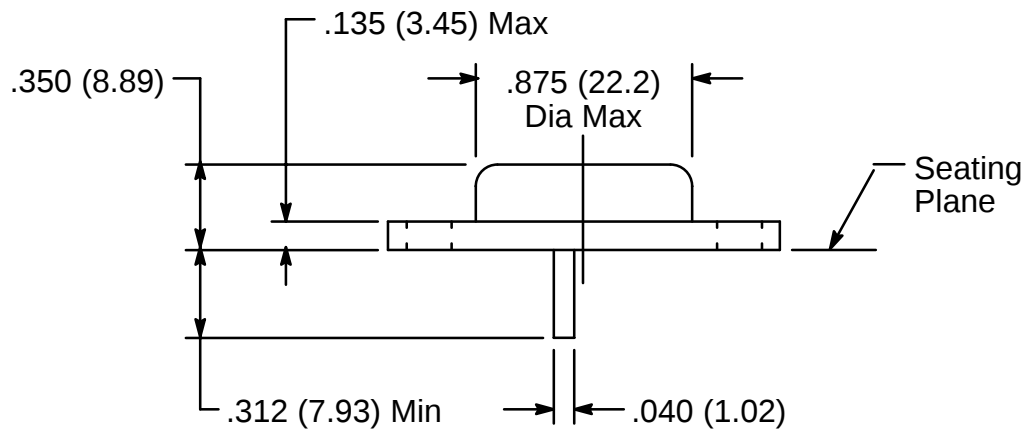
Electrical Characteristics: ($T_C = +25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics (Note 2)						
Collector–Emitter Sustaining Voltage	V _{CEO(sus)}	I _C = 100mA, I _B = 0, V _{clamp} = 400V	400	–	–	V
Collector Cutoff Current	I _{CEV}	V _{CEV} = 600V, V _{BE(off)} = 1.5V	–	–	0.25	mA
Emitter Cutoff Current	I _{EBO}	V _{BE} = 2V, I _C = 0	–	–	350	mA
ON Characteristics (Note 2)						
DC Current Gain	h _{FE}	I _C = 20A, V _{CE} = 5V	25	–	–	
		I _C = 40A, V _{CE} = 5V	10	–	–	
Collector–Emitter Saturation Voltage	V _{CE(sat)}	I _C = 20A, I _B = 1A	–	–	2.2	V
		I _C = 50A, I _B = 10A	–	–	5.0	V
Base–Emitter Saturation Voltage	V _{BE(sat)}	I _C = 20A, I _B = 1A	–	–	2.75	V
Diode Forward Voltage	V _f	I _F = 20A, Note 3	–	2.5	5.0	V
Dynamic Characteristic						
Output Capacitance	C _{ob}	V _{CB} = 10V, I _E = 0, f _{test} = 100kHz	–	–	750	pF
Switching Characteristics						
Resistive Load						
Delay Time	t _d	V _{CC} = 250V, I _C = 20A, I _{B1} = 1A, V _{BE(off)} = 5V, t _p = 25μs, Duty Cycle ≤ 2%	–	0.14	0.3	μs
Rise Time	t _r		–	0.3	1.0	μs
Storage Time	t _s		–	0.8	2.5	μs
Fall Time	t _f		–	0.3	1.0	μs
Inductive Load, Clamped						
Storage Time	t _{sv}	I _C = 20A(pk), V _{clamp} = 250V, I _{B1} = 1A, V _{BE(off)} = 5V	–	1.0	2.5	μs
Crossover Time	t _c		–	0.36	1.0	μs

Note 2. Pulse Test: Pulse Widthg = $300\mu\text{s}$, Duty Cycle $\leq 2\%$.

Note 3. The internal Collector–to–Emitter diode can eliminate the need for an external diode to clamp inductive loads. Tests have shown that the Forward Recovery Voltage (V_f) of this diode is comparable to that of typical fast recovery rectifiers.





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