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NTE99 Silicon NPN Transistor Darlington ^w/Base-Emitter Speed-up Diode TO-3 Type Package

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	
$T_C = +25^\circ C$	250W
Derate Above 25°C	1.43W/°C
$T_C = +100^\circ C$	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	$V_{CEO(sus)}$	$I_C = 100\text{mA}, I_B = 0, V_{clamp} = 400\text{V}$	400	–	–	V
Collector Cutoff Current	I_{CEV}	$V_{CEV} = 600\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	0.25	mA
Emitter Cutoff Current	I_{EBO}	$V_{BE} = 2\text{V}, I_C = 0$	–	–	350	mA
ON Characteristics (Note 2)						
DC Current Gain	h_{FE}	$I_C = 20\text{A}, V_{CE} = 5\text{V}$	25	–	–	
		$I_C = 40\text{A}, V_{CE} = 5\text{V}$	10	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 20\text{A}, I_B = 1\text{A}$	–	–	2.2	V
		$I_C = 50\text{A}, I_B = 10\text{A}$	–	–	5.0	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 20\text{A}, I_B = 1\text{A}$	–	–	2.75	V
Diode Forward Voltage	V_f	$I_F = 20\text{A}, \text{Note 3}$	–	2.5	5.0	V
Dynamic Characteristic						
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}, I_E = 0, f_{test} = 100\text{kHz}$	–	–	750	pF
Switching Characteristics						
Resistive Load						
Delay Time	t_d	$V_{CC} = 250\text{V}, I_C = 20\text{A}, I_{B1} = 1\text{A}, V_{BE(off)} = 5\text{V}, t_p = 25\mu\text{s}, \text{Duty Cycle} \leq 2\%$	–	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}	$I_C = 20\text{A(pk)}, V_{clamp} = 250\text{V}, I_{B1} = 1\text{A}, V_{BE(off)} = 5\text{V}$	–	1.0	2.5	μs
Crossover Time	t_c		–	0.36	1.0	μs

Note 2. Pulse Test: Pulse Widtg = $300\mu\text{s}$, 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.



