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NTE53
Silicon NPN Transistor
High Voltage, High Speed Switch
TO−3 Type Package

Description:

The NTE53 is a silicon NPN transistor in a TO−3 type package designed for high voltage, high−speed power switching in inductive circuits where fall time is critical. This device is particularly suited for 115V and 220V line−operated switch−mode applications.

Applications:

- Switching Regulators
- PWM Inverters and Motor Controls
- Deflection Circuits
- Solenoid and Relay Drivers

Absolute Maximum Ratings:

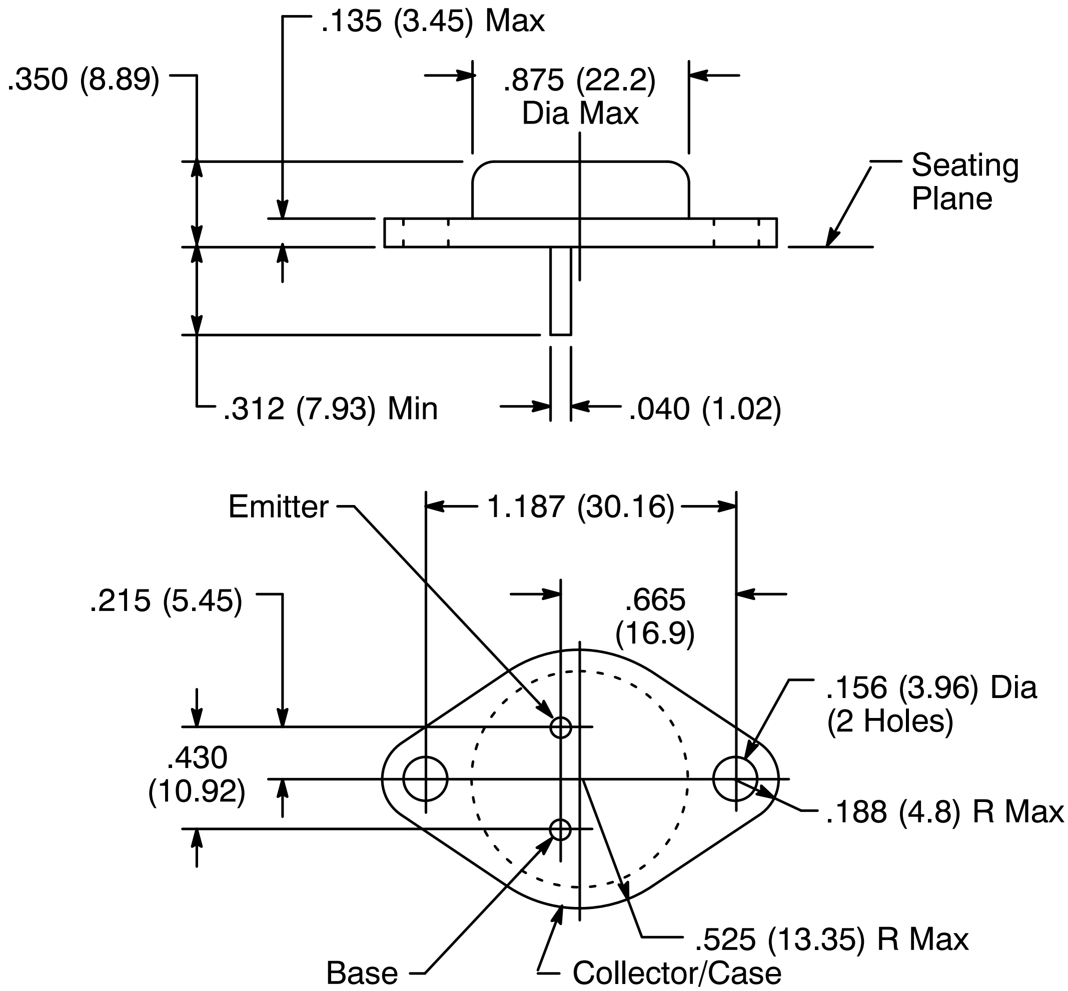
Collector−Emitter Voltage, $V_{CEO(sus)}$ 400V
Collector−Emitter Voltage, $V_{CEX(sus)}$ 450V
Collector−Emitter Voltage, V_{CEV} 850V
Emitter−Base Voltage, V_{EB} 9V
Collector Current, I_C
  Continuous 15A
  Peak (Note 1) 30A
Base Current, I_B
  Continuous 10A
  Peak (Note 1) 20A
Total Device Dissipation (T_C = +25°C), P_D 175W
  Derate Above 25°C . . . . 1.0W/°C
Total Device Dissipation (T_C = +100°C), P_D 100W
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} . . . . 1.0°C/W
Maximum Lead Temperature (During Soldering, 1/8” from case, 5sec), T_L . . . . +275°C

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

Electrical Characteristics: (T_C = +25°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	400	–	–	V
	$V_{CEX(sus)}$	I_C = 8A, V_{clamp} = 450V, T_C = +100°C	450	–	–	V
		I_C = 15A, V_{clamp} = 300V, T_C = +100°C	300	–	–	V
Collector Cutoff Current	I_{CEV}	V_{CEV} = 850V, $V_{BE(off)}$ = 1.5V	–	–	1.0	mA
		V_{CEV} = 850V, $V_{BE(off)}$ = 1.5V, T_C = +100°C	–	–	4.0	mA
	I_{CER}	V_{CE} = 850V, R_{BE} = 50Ω, T_C = +100°C	–	–	5.0	mA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 9V, I_C = 0	–	–	1.0	mA
Second Breakdown						
Second Breakdown Collector Current with Base Forward Bias	$I_{S/b}$	V_{CE} = 100V, t = 1.0s (non−repetitive)	0.2	–	–	A
ON Characteristics (Note 2)						
DC Current Gain	h_{FE}	V_{CE} = 2V, I_C = 5A	12	–	60	
		V_{CE} = 2V, I_C = 10A	6	–	30	
Collector−Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10A, I_B = 2A	–	–	1.5	V
		I_C = 10A, I_B = 2A, T_C = +100°C	–	–	2.5	V
		I_C = 15A, I_B = 3A	–	–	5.0	V
Base−Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 10A, I_B = 2A	–	–	1.6	V
		I_C = 10A, I_B = 2A, T_C = +100°C	–	–	1.6	V
Dynamic Characteristics						
Current Gain−Bandwidth Product	f_T	V_{CE} = 10V, I_C = 500mA, f = 1MHz	6	–	28	MHz
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 1MHz	125	–	500	pF
Switching Characteristics (Resistive Load)						
Delay Time	t_d	V_{CC} = 250V, I_C = 10A, I_{B1} = I_{B2} =2A, t_p = 300μs, Duty Cycle ≤ 2%	–	–	0.05	μs
Rise Time	t_r		–	–	1.0	μs
Storage Time	t_s		–	–	4.0	μs
Fall Time	t_f		–	–	0.7	μs
Switching Characteristics (Inductive Load, Clamped)						
Storage Time	t_{sv}	I_C = 10A peak, V_{clamp} = 450V, I_{B1} = 2A, $V_{BE(off)}$ = 5V	–	2.0	–	μs
Fall Time	t_{fi}		0.09	–	–	μs
Storage Time	t_{sv}	I_C = 10A peak, V_{clamp} = 450V, I_{B1} = 2A, $V_{BE(off)}$ = 5V, T_J = +100°C	–	–	5.0	μs
Fall Time	t_{fi}		–	–	1.5	μs

Note 2. Pulse test: Pulse Width = 300μs, Duty Cycle ≤ 2%.


.135 (3.45) Max
.350 (8.89)
.875 (22.2)
Dia Max
Seating
Plane
.312 (7.93) Min
.040 (1.02)
Emitter
1.187 (30.16)
.215 (5.45)
.665
(16.9)
.156 (3.96) Dia
(2 Holes)
.430
(10.92)
.188 (4.8) R Max
.525 (13.35) R Max
Base
Collector/Case