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TIP121
Silicon NPN Transistor
Darlington Power Amp, Switch
TO–220 Type Package

Description:

The TIP121 is a silicon NPN Darlington transistor in a TO–220 type package designed for general purpose amplifier and low–speed switching applications.

Features:

- High DC Current Gain: h_{FE} = 2500 (Typ) at I_C = 4A
- Collector–Emitter Sustaining Voltage: $V_{CEO(sus)}$ = 80V (Min) at I_C = 100mA
- Low Collector–Emitter Saturation Voltage: $V_{CE(sat)}$ = 2.0V (Max) at I_C = 3A
  $V_{CE(sat)}$ = 4.0V (Max) at I_C = 5A

Absolute Maximum Ratings: (Note 1)

Collector–Emitter Voltage, V_{CEO} 80V
Collector–Base Voltage, V_{CB} 80V
Emitter–Base Voltage, V_{EB} 5V
Collector Current, I_C
  Continuous 5A
  Peak 8A
Base Current, I_B 120mA
Total Power Dissipation (T_C = +25°C), P_D 65W
  Derate Above +25°C . . . . . 0.52W/°C
Total Power Dissipation (T_A = +25°C), P_D 2.0W
  Derate Above +25°C . . . . . 0.016W/°C
Unclamped Inductive Load Energy (Note 2), E 50mJ
Operating Junction Temperature Range, T_J . . . . . –65° to +150°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C
Thermal Resistance, Junction–to–Case, R_{thJC} . . . . . 1.92°C/W
Thermal Resistance, Junction–to–Ambient, R_{thJA} . . . . . 62.5°C/W

Note 1. Stresses exceeding those listed in the Absolute Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damages may occur and reliability may be affected.

Note 2. I_C = 1A, L = 100mH, P.R.F. = 10Hz, V_{CC} = 20V, R_{BE} = 100Ω.

Electrical Characteristics: (T_C = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector−Emitter Sustaining Voltage	$V_{CEO(sus)}$	I_C = 100mA, I_B = 0, Note 3	80	–	–	V
Collector Cutoff Current	I_{CBO}	V_{CB} = 80V, I_E = 0	–	–	0.2	mA
	I_{CEO}	V_{CE} = 40V, I_B = 0	–	–	0.5	mA
Emitter Cutoff Current	I_{EBO}	V_{BE} = 5V, I_C = 0	–	–	2	mA
ON Characteristics (Note 3)						
DC Current Gain	h_{FE}	V_{CE} = 3V, I_C = 500mA	1000	–	–	
		V_{CE} = 3V, I_C = 3A	1000	–	–	
Collector−Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 3A, I_B = 12mA	–	–	2.0	V
		I_C = 5A, I_B = 20mA	–	–	4.0	V
Base−Emitter On Voltage	$V_{BE(on)}$	I_C = 3A, V_{CE} = 3V	–	–	2.5	V
Dynamic Characteristics						
Small−Signal Current Gain	h_{fe}	I_C = 3A, V_{CE} = 4V, f = 1MHz	4.0	–	–	
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 0.1MHz	–	–	200	pF

Note 3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.