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TIP122 (NPN) Silicon Complementary Transistor Darlington Power Amplifier

Description:

The TIP122 (NPN) is a complementary silicon Darlington power transistor in a TO220 type package designed for general purpose amplifier and low-speed switching applications.

Features:

- High DC Current Gain: $h_{FE} = 2500$ Typ @ $I_C = 4A$
- Collector-Emitter Sustaining Voltage: $V_{CEO(sus)} = 100V$ Min @ 100mA
- Low Collector-Emitter Saturation Voltage:
 - $V_{CE(sat)} = 2V$ Max @ $I_C = 3A$
 - $= 4V$ Max @ $I_C = 5A$
- Monolithic Construction with Built-In Base-Emitter Shunt Resistor

Absolute Maximum Ratings:

Collector-Emitter Voltage, V_{CEO}	100V
Collector-Base Voltage, V_{CB}	100V
Emitter-Base Voltage, V_{EB}	5V
Collector Current, I_C	
Continuous	5A
Peak	8A
Base Current, I_B	120mA
Total Power Dissipation ($T_C = +25^\circ C$), P_D	65W
Derate Above $25^\circ C$	0.52W/ $^\circ C$
Total Power Dissipation ($T_A = +25^\circ C$), P_D	2W
Derate Above $25^\circ C$	0.016W/ $^\circ C$
Unclamped Inductive Load Energy (Note 1), E	50mJ
Operating Junction Temperature range, T_J	-65° to $+150^\circ C$
Storage Temperature Range, T_{stg}	-65° to $+150^\circ C$
Thermal Resistance, Junction-to-Case, R_{thJC}	1.92 $^\circ C/W$
Thermal Resistance, Junction-to-Ambient, R_{thJA}	62.5 $^\circ C/W$

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

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 100\text{mA}$, $I_B = 0$, Note 2	100	-	-	V
Collector Cutoff Current	I_{CEO}	$V_{CE} = 50\text{V}$, $I_B = 0$	-	-	0.5	mA
	I_{CBO}	$V_{CB} = 100\text{V}$, $I_E = 0$	-	-	0.2	mA
Emitter Cutoff Current	I_{EBO}	$V_{BE} = 5\text{V}$, $I_C = 0$	-	-	2.0	mA
ON Characteristics (Note 2)						
DC Current Gain	h_{FE}	$I_C = 0.5\text{A}$, $V_{CE} = 3\text{V}$	1000	-	-	
		$I_C = 3\text{A}$, $V_{CE} = 3\text{V}$	1000	-	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 3\text{A}$, $I_B = 12\text{mA}$	-	-	2.0	V
		$I_C = 5\text{A}$, $I_B = 20\text{mA}$	-	-	4.0	V
Base-Emitter ON Voltage	$V_{BE(on)}$	$I_C = 3\text{A}$, $V_{CE} = 3\text{V}$	-	-	2.5	V
Dynamic Characteristics						
Small-Signal Current Gain	$ h_{fe} $	$I_C = 3\text{A}$, $V_{CE} = 4\text{V}$, $f = 1\text{MHz}$	4.0	-	-	
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}$, $I_E = 0$, $f = 0.1\text{MHz}$	-	-	300	pF

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

