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TIP31E

Silicon NPN Transistor

General Purpose Amp, Switch

TO-220 Type Package

Features:

- Collector–Emitter Sustaining Voltage: $V_{CE(sus)} = 140V$ Min
- Current Gain Bandwidth Product: $f_T = 3MHz$ Min @ $I_C = 1A$

Absolute Maximum Ratings:

Collector–Emitter Voltage, V_{CEO}	140V
Collector–Base Voltage, V_{CBO}	180V
Emitter–Base Voltage, V_{EBO}	5V
Continuous Current, I_C	
Continuous	3A
Pulse	5A
Base Current, I_B	1A
Power Dissipation ($T_C = +25^\circ C$), P_D	40W
Derate Above $+25^\circ C$	$0.32W/^\circ C$
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}	$3.125^\circ C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 30mA, I_B = 0$, Note 1	140	–	–	V
Collector Cutoff Current	I_{CEO}	$V_{CE} = 90V, I_B = 0$	–	–	0.3	mA
	I_{CES}	$V_{CE} = 180V, V_{BE} = 0$	–	–	0.2	mA
Emitter–Base Cutoff Current	I_{EBO}	$V_{EB} = 5V, I_C = 0$	–	–	1.0	mA
ON Characteristics (Note 1)						
DC Current Gain	h_{FE}	$V_{CE} = 4V, I_C = 1A$	25	–	–	
		$V_{CE} = 4V, I_C = 3A$	5	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 3A, I_B = 750mA$	–	–	2.5	V
Base–Emitter ON Voltage	$V_{BE(on)}$	$V_{CE} = 4V, I_C = 3A$	–	–	1.8	V

Note 1. Pulsed: Pulse Duration $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Dynamic Characteristics						
Current Gain Bandwidth Product	f_T	$V_{CE} = 10\text{V}, I_C = 500\text{mA}, f = 1\text{MHz}$	3	-	-	MHz
Small Signal Current Gain	h_{fe}	$V_{CE} = 10\text{V}, I_C = 500\text{mA}, f = 1\text{kHz}$	20	-	-	
Switching Characteristics						
Turn On Time	t_{on}	$I_C = 1\text{A}, I_{B1} = -I_{B2} = 0.1\text{A},$ $V_{BE(off)} = -4.3\text{V}, R_L = 30\Omega$	-	-	0.6	μs
Turn Off Time	t_{off}		-	-	2.8	μs

Note 1. Pulsed: Pulse Duration $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

Note 2. $f_T = |h_{fe}| \cdot f_{TEST}$

