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TIP150, TIP151, TIP152 Silicon NPN Power Darlington Transistor

Description:

The TIP150, TIP151, and TIP152 are silicon NPN power Darlington transistors in a TO220 type package designed for use in automotive ignition, switching, and motor control applications.

Features:

- Collector–Emitter Sustaining Voltage:
 $V_{CEO(sus)} = 300V$ min (TIP150)
 $V_{CEO(sus)} = 350V$ min (TIP151)
 $V_{CEO(sus)} = 400V$ min (TIP152)
- Collector–Emitter Saturation Voltage: $V_{CE(sat)} = 2V$ max at $I_C = 5A$
- Reverse–Base SOA: 300V to 400V at 7A

Absolute Maximum Ratings:

Collector–Emitter Voltage, V_{CEO}	
TIP150	300V
TIP151	350V
TIP152	400V
Collector–Base Voltage, V_{CBO}	
TIP150	300V
TIP151	350V
TIP152	400V
Emitter–Base Voltage, V_{EBO}	
8V	
Collector Current, I_C	
Continuous	7A
Peak	10A
Base Current, I_B	
1.5A	
Total Power Dissipation ($T_C = +25^\circ C$), P_D	
80W	
Derate above $25^\circ C$	
0.64W/ $^\circ C$	
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}	
1.56 $^\circ C/W$	

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector–Emitter Breakdown Voltage TIP150	$V_{(BR)CEO}$	$I_C = 10\text{mA}, I_B = 0, \text{Note 1}$	300	–	–	V
TIP151			350	–	–	V
TIP152			400	–	–	V
Collector–Base Breakdown Voltage TIP150	$V_{(BR)CBO}$	$I_C = 1\text{mA}, I_B = 0, \text{Note 1}$	300	–	–	V
TIP151			350	–	–	V
TIP152			400	–	–	V
Collector Cutoff Current TIP150	I_{CEO}	$V_{CE} = 300\text{V}, I_B = 0$	–	–	250	μA
TIP151		$V_{CE} = 350\text{V}, I_B = 0$	–	–	250	μA
TIP152		$V_{CE} = 400\text{V}, I_B = 0$	–	–	250	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 8\text{V}, I_C = 0$	–	–	15	mA
ON Characteristics (Note 1)						
DC Current Gain	h_{FE}	$V_{CE} = 5\text{V}, I_C = 2.5\text{A}$	150	–	–	
		$V_{CE} = 5\text{V}, I_C = 5.0\text{A}$	50	–	–	
		$V_{CE} = 5\text{V}, I_C = 7.0\text{A}$	15	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 1\text{A}, I_B = 10\text{mA}$	–	–	1.5	V
		$I_C = 2\text{A}, I_B = 100\text{mA}$	–	–	1.5	V
		$I_C = 5\text{A}, I_B = 250\text{mA}$	–	–	2.0	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 2\text{A}, I_B = 100\text{mA}$	–	–	2.2	V
		$I_C = 5\text{A}, I_B = 250\text{mA}$	–	–	2.3	V
Diode Forward Voltage	V_F	$I_F = 7\text{A}$	–	–	3.5	V
Dynamic Characteristics						
Small–Signal Current Gain	h_{fe}	$V_{CE} = 5\text{V}, I_C = 500\text{mA}, f = 1\text{kHz}$	200	–	–	
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$	–	–	150	pF
Switching Characteristics						
Delay Time	t_d	$V_{CC} = 250\text{V}, I_C = 5\text{A},$ $I_{B1} = -I_{B2} = 250\text{mA}, t_p = 20\mu\text{s},$ Duty Cycle $\leq 2\%$	–	30	–	ns
Rise Time	t_r		–	180	–	ns
Storage Time	t_s		–	3.5	–	ns
Fall Time	t_f		–	1.6	–	ns

Note 1. Pulse test: Pulse Width = $300\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

