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MJ10023 Silicon NPN Transistor Power Darlington ^w/Base-Emitter Speed-up Diode

Description:

The MJ10023 is a silicon NPN Darlington transistor in a TO3 type package designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. This device is particularly suited for line-operated switchmode applications.

Applications:

- Switching Regulators
- AC and DC Motor Controls
- Inverters
- Solenoid and Relay Drivers

Features:

- Continuous Collector Current: $I_C = 40A$

Absolute Maximum Ratings:

Collector-Emitter Voltage, V_{CEV}	600V
Collector-Emitter Voltage, $V_{CEO(sus)}$	400V
Emitter-Base Voltage, V_{EBO}	8V
Collector Current, I_C	
Continuous	40A
Peak	80A
Base Current, I_B	20A
Total Power Dissipation, P_D	
$T_C = +25^\circ C$	250W
Derate Above $25^\circ C$	1.43W/ $^\circ C$
$T_C = +100^\circ C$	143W
Operating Junction Temperature Range, T_J	-65° to $+200^\circ C$
Storage Temperature Range, T_{stg}	-65° to $+200^\circ C$
Thermal Resistance, Junction-to-Case, R_{thJC}	0.7 $^\circ C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 100\text{mA}, I_B = 0$	400	-	-	V
Collector Cutoff Current	I_{CEV}	$V_{CEV} = 600\text{V}, V_{BE(off)} = 1.5\text{V}$	-	-	0.25	mA
			$T_C = +150^\circ\text{C}$	-	-	5.0
Collector Cutoff Current	I_{CER}	$V_{CEV} = 600\text{V}, R_{BE} = 50\Omega, T_C = +100^\circ\text{C}$	-	-	5.0	mA
Emitter Cutoff Current	I_{EBO}	$V_{BE} = 2\text{V}, I_C = 0$	-	-	175	mA
ON Characteristics (Note 1)						
DC Current Gain	h_{FE}	$I_C = 10\text{A}, V_{CE} = 5\text{V}$	60	-	600	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 20\text{A}, I_B = 1\text{A}$	-	-	2.2	V
			$T_C = +100^\circ\text{C}$	-	-	2.5
		$I_C = 40\text{A}, I_B = 5\text{A}$	-	-	5.0	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 20\text{A}, I_B = 1.2\text{A}$	-	-	2.5	V
			$T_C = +100^\circ\text{C}$	-	-	2.5
Diode Forward Voltage	V_f	$I_F = 20\text{A}$	-	-	5.0	V
Dynamic Characteristic						
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}, I_E = 0, f_{test} = 1\text{kHz}$	150	-	600	pF
Switching Characteristics						
Delay Time	t_d	$V_{CC} = 250\text{V}, I_C = 20\text{A}, I_{B1} = 1\text{A}, V_{BE(off)} = 5\text{V}, t_p = 50\mu\text{s}, \text{Duty Cycle} \leq 2\%$	-	-	0.2	μs
Rise Time	t_r		-	-	1.5	μs
Storage Time	t_s		-	-	2.5	μs
Fall Time	t_f		-	-	1.1	μs

Note 1. Pulse Test: Pulse Width = $300\mu\text{s}$, Duty Cycle $\leq 2\%$.



