ELECTRONICS, INC.
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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:

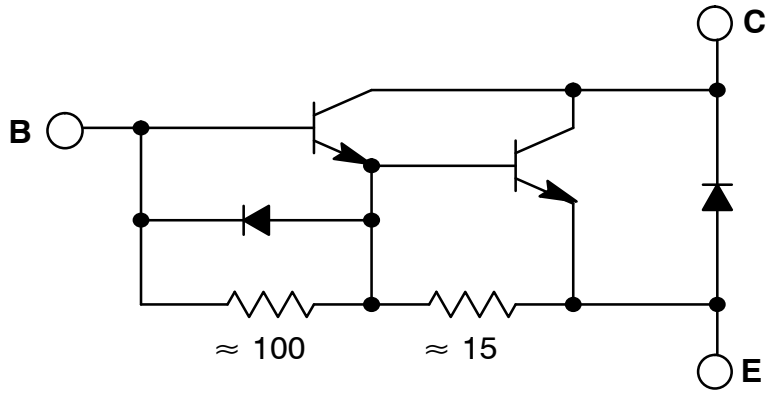
Collector–Emitter Voltage, V_{CEV} 600V
Collector–Emitter Voltage, $V_{CEO(sus)}$ 400V
Emitter–Base Voltage, V_{EBO} 8V
Collector Current, I_C
  Continuous 40A
  Peak 80A
Base Current, I_B 20A
Total Power Dissipation, P_D
  T_C = +25°C 250W
  Derate Above 25°C . . . . . 1.43W/°C
  T_C = +100°C 143W
Operating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

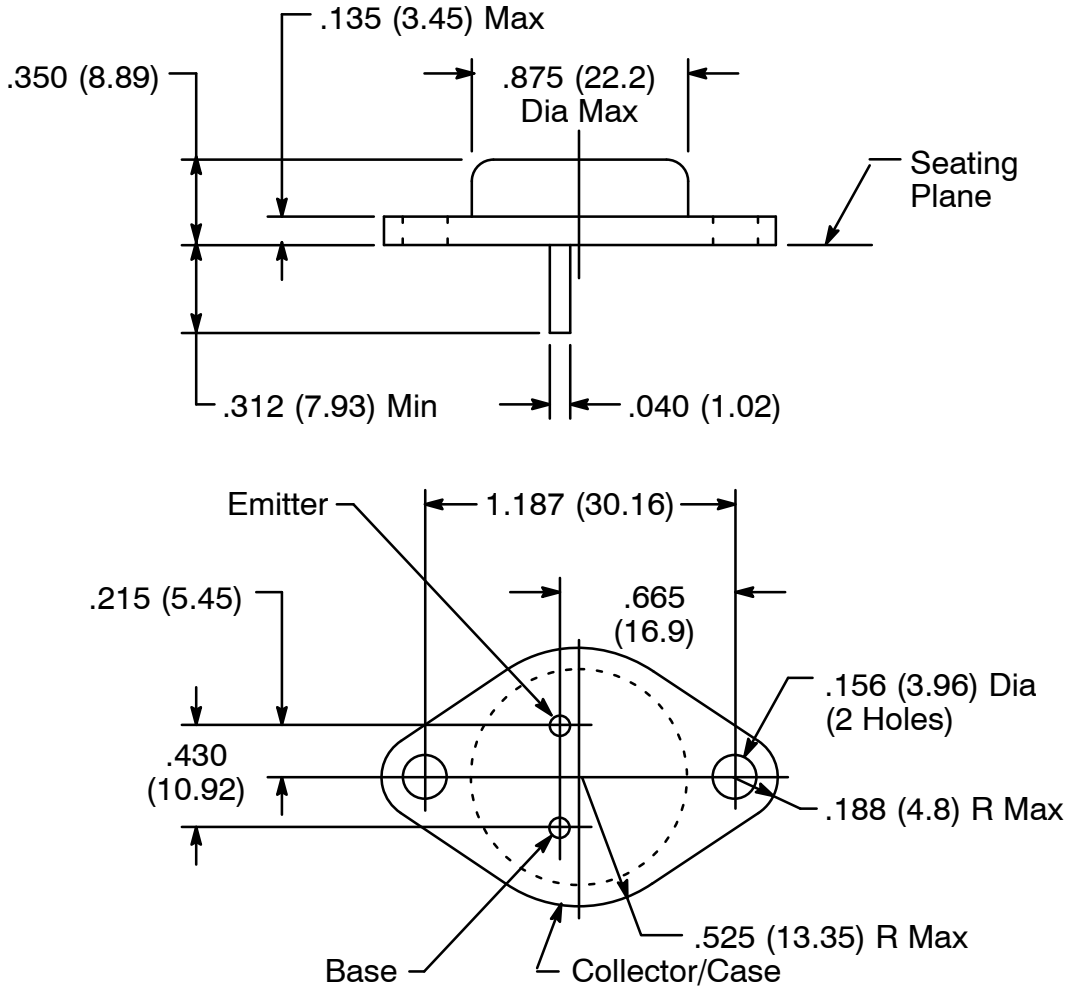
Electrical Characteristics: (T_C = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
OFF Characteristics							
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	I_C = 100mA, I_B = 0		400	–	–	V
Collector Cutoff Current	I_{CEV}	V_{CEV} = 600V, $V_{BE(off)}$ = 1.5V		–	–	0.25	mA
			T_C = +150°C	–	–	5.0	mA
Collector Cutoff Current	I_{CER}	V_{CEV} = 600V, R_{BE} = 50Ω, T_C = +100°C		–	–	5.0	mA
Emitter Cutoff Current	I_{EBO}	V_{BE} = 2V, I_C = 0		–	–	175	mA
ON Characteristics (Note 1)							
DC Current Gain	h_{FE}	I_C = 10A, V_{CE} = 5V		60	–	600	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 20A, I_B = 1A		–	–	2.2	V
			T_C = +100°C	–	–	2.5	V
		I_C = 40A, I_B = 5A		–	–	5.0	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 20A, I_B = 1.2A		–	–	2.5	V
			T_C = +100°C	–	–	2.5	V
Diode Forward Voltage	V_f	I_F = 20A		–	–	5.0	V
Dynamic Characteristic							
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f_{test} = 1kHz		150	–	600	pF
Switching Characteristics							
Delay Time	t_d	V_{CC} = 250V, I_C = 20A, I_{B1} = 1A, $V_{BE(off)}$ = 5V, t_p = 50μs, Duty Cycle ≤ 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 = 300μs, Duty Cycle ≤ 2%.

Circuit Outline




.135 (3.45) Max
.350 (8.89)
.875 (22.2)
Dia Max
Seating
Plane
.312 (7.93) Min
.040 (1.02)
Emitter
1.187 (30.16)
.215 (5.45)
.665
(16.9)
.156 (3.96) Dia
(2 Holes)
.430
(10.92)
.188 (4.8) R Max
.525 (13.35) R Max
Base
Collector/Case

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