

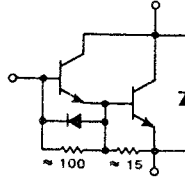
SWITCHMODE SERIES

NPN SILICON POWER DARLINGTON TRANSISTORS WITH BASE-EMITTER SPEEDUP DIODE

The MJ10020 and MJ10021 darlington transistors are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line operated switchmode applications such as:

FEATURES:

- *Continuous Collector Current - $I_C = 60$ A
- *Switching Regulators
- *Inverters
- *Solenoid and Relay Drivers
- *AC and DC Motor Controls

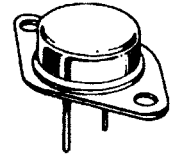


NPN
MJ10020
MJ10021

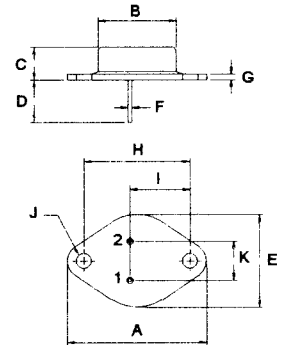
60 AMPERE
POWER DARLINGTON
TRANSISTORS
200-250 VOLTS
250 WATTS

MAXIMUM RATINGS

Characteristic	Symbol	MJ10020	MJ10021	Unit
Collector-Emitter Voltage	V_{CEV}	200	250	V
Collector-Emitter Voltage	$V_{CEO(SUS)}$	300	350	V
Emitter-Base Voltage	V_{EBO}	8.0		V
Collector Current-Continuous	I_C	60		A
-Peak	I_{CM}	100		A
Base current	I_B	20		A
Total Power Dissipation @ $T_C=25^\circ C$	P_D	250		W
Derate above $25^\circ C$		1.43		W/ $^\circ C$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	- 65 to +200		$^\circ C$



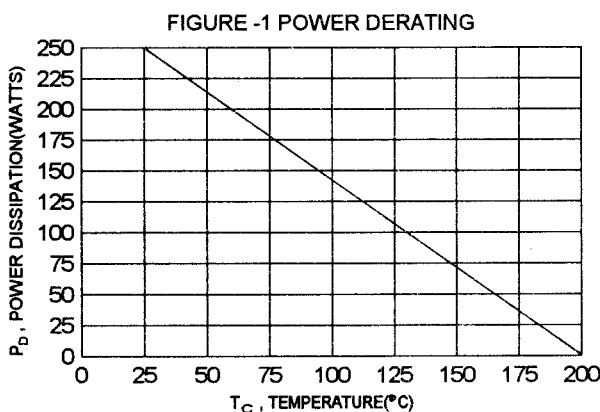
TO-3



PIN 1. BASE
2. EMITTER
COLLECTOR(CASE)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	0.7	$^\circ C/W$



DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

ELECTRICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector - Emitter Sustaining Voltage ($I_C = 100\text{ mA}, I_B = 0$)	MJ10020 MJ10021	$V_{CEO(sus)}$	200 250	V
Collector Cutoff Current ($V_{CEV} = \text{Rated Value}, V_{BE(OFF)} = 1.5\text{ V}$) ($V_{CEV} = \text{Rated Value}, V_{BE(OFF)} = 1.5\text{ V}, T_C = 150^\circ\text{C}$)		I_{CEV}	0.25 5.0	mA
Collector Cutoff Current ($V_{CEV} = \text{Rated Value}, V_{CEV}, R_{BE} = 50\ \Omega, T_C = 100^\circ\text{C}$)		I_{CER}	5.0	mA
Emitter Cutoff Current ($V_{EB} = 2.0\text{ V}, I_C = 0$)		I_{EBO}	175	mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 15\text{ A}, V_{CE} = 5.0\text{ V}$)		hFE	75 1000	
Collector - Emitter Saturation Voltage ($I_C = 30\text{ A}, I_B = 1.2\text{ A}$) ($I_C = 60\text{ A}, I_B = 4.0\text{ A}$) ($I_C = 30\text{ A}, I_B = 1.2\text{ A}, T_C = 100^\circ\text{C}$)		$V_{CE(sat)}$	2.2 4.0 2.4	V
Base - Emitter Saturation Voltage ($I_C = 30\text{ A}, I_B = 1.2\text{ A}$) ($I_C = 30\text{ A}, I_B = 1.2\text{ A}, T_C = 100^\circ\text{C}$)		$V_{BE(sat)}$	3.0 3.5	V
Diode Forward Voltage ($I_F = 30\text{ A}$)		V_F	5.0	V

DYNAMIC CHARACTERISTICS

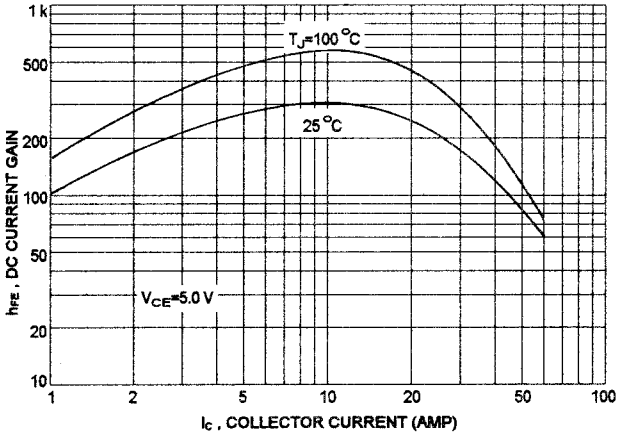
Output Capacitance ($V_{CB} = 10\text{ V}, I_E = 0, f = 1.0\text{ kHz}$)		C_{ob}	160 750	pF
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SWITCHING CHARACTERISTICS

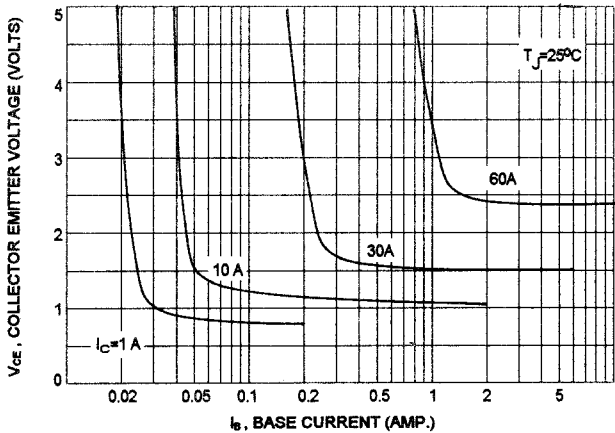
Delay Time	$V_{CC} = 175\text{ V}, I_C = 30\text{ A}$ $I_{B1} = 1.2\text{ A}, V_{BE(off)} = 5.0\text{ V}$ $t_p = 25\text{ us}, \text{Duty Cycle} \leq 2\%$	t_d	0.2	us
Rise Time		t_r	1.0	us
Storage Time		t_s	3.5	us
Fall Time		t_f	0.8	us

(1) Pulse Test: Pulse width = $300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$

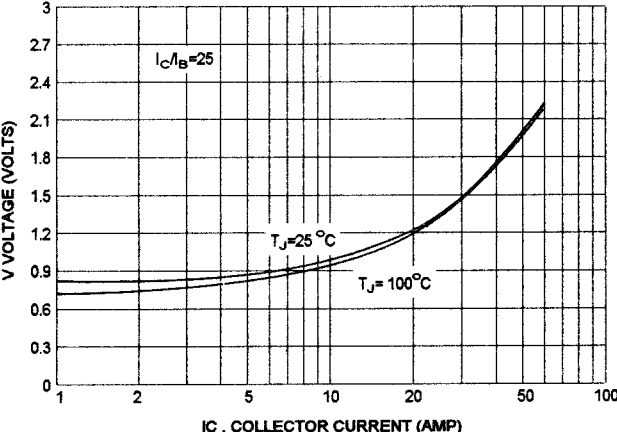
DC CURRENT GAIN



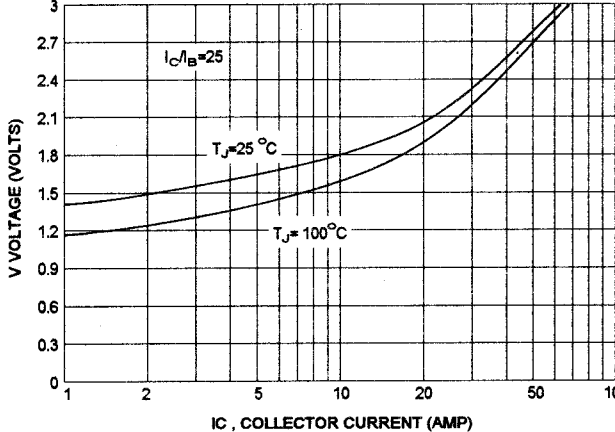
COLLECTOR SATURATION REGION



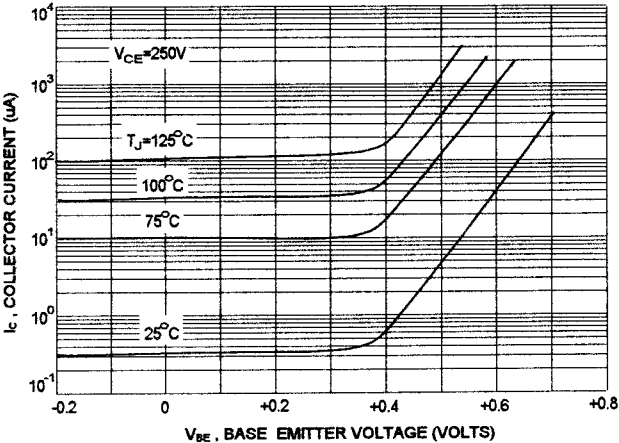
COLLECTOR-EMITTER SATURATION VOLTAGE



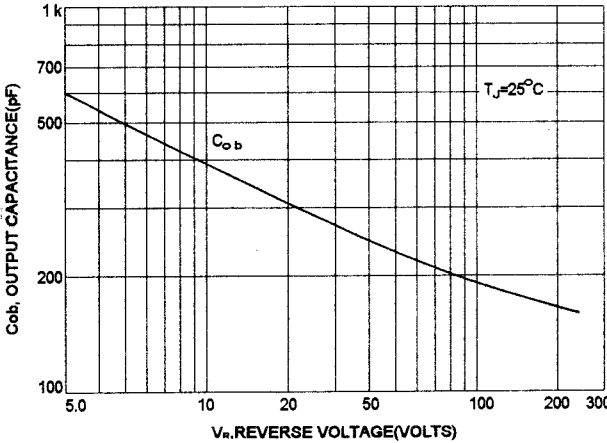
BASE-EMITTER VOLTAGE



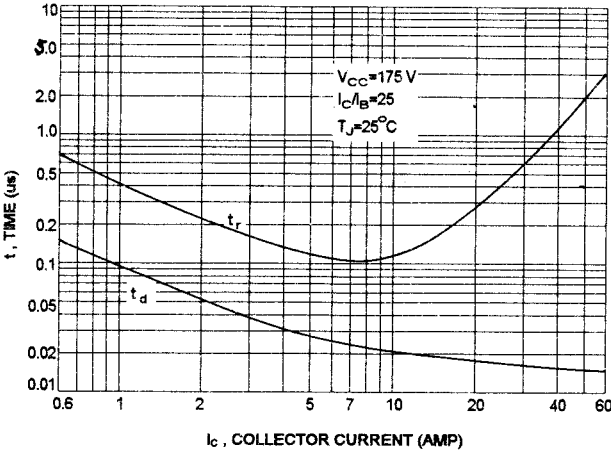
COLLECTOR CUT-OFF REGION



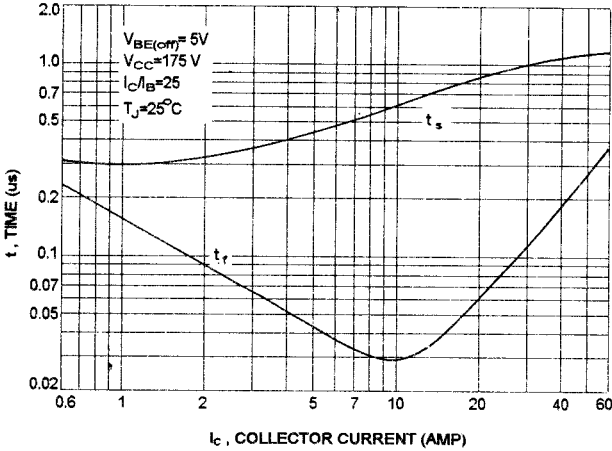
OUTPUT CAPACITANCES



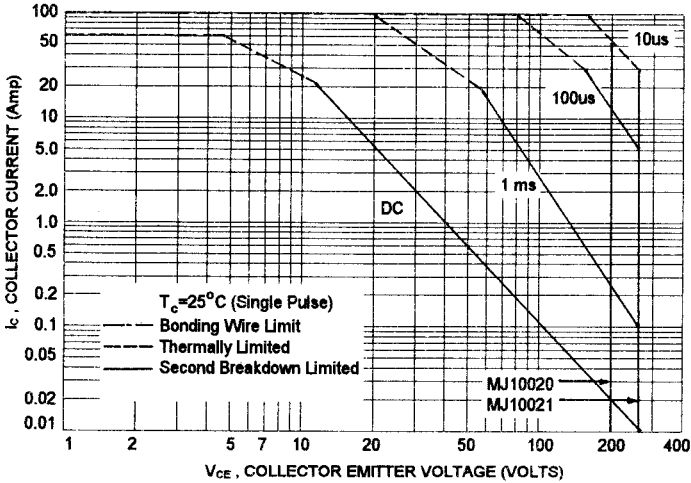
TURN-ON TIME



TURN-OFF TIME



ACTIVE REGION SAFE OPERATING AREA



REVERSE BIAS SWITCHING SAFE OPERATING AREA

