

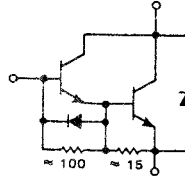
## SWITCHMODE SERIES

### NPN SILICON POWER DARLINGTON TRANSISTORS WITH BASE-EMITTER SPEEDUP DIODE

The MJ10022 and MJ10023 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 -  $I_C = 40$  A
- \*Switching Regulators
- \*Inverters
- \*Solenoid and Relay Drivers
- \*AC and DC Motor Controls

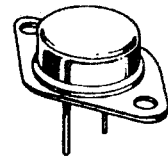


**NPN**  
**MJ10022**  
**MJ10023**

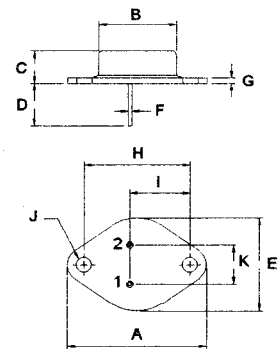
**40 AMPERE**  
**POWER DARLINGTON**  
**TRANSISTORS**  
**350-400 VOLTS**  
**250 WATTS**

#### MAXIMUM RATINGS

Characteristic	Symbol	MJ10022	MJ10023	Unit
Collector-Emitter Voltage	$V_{CEV}$	450	600	V
Collector-Emitter Voltage	$V_{CEO(SUS)}$	350	400	V
Emitter-Base Voltage	$V_{EBO}$	8.0	1.46	V
Collector Current-Continuous	$I_C$	40		A
-Peak	$I_{CM}$	80		A
Base current	$I_B$	20		A
Total Power Dissipation @ $T_C = 25^\circ C$	$P_D$	250		W
@ $T_C = 100^\circ C$		143		W
Derate above $25^\circ C$		1.43		W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	- 65 to +200		$^\circ C$



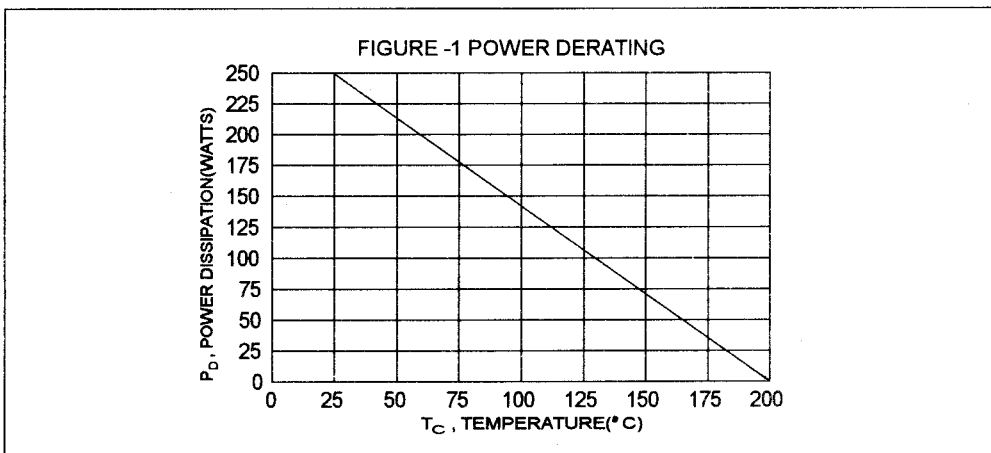
**TO-3**



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	1.46	1.55
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
----------------	--------	-----	-----	------

**OFF CHARACTERISTICS**

Collector - Emitter Sustaining Voltage ( $I_c = 100\text{ mA}, I_B = 0$ )	MJ10022 MJ10023	$V_{CE(SUS)}$	350 400	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 ( $V_{CEV} = \text{Rated Value}, R_{BE} = 50\ \Omega, T_c = 100^\circ\text{C}$ )		$I_{CER}$	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 ( $I_c = 10\text{ A}, V_{CE} = 5.0\text{ V}$ )		hFE	60 600	
Collector - Emitter Saturation Voltage ( $I_c = 20\text{ A}, I_B = 1.0\text{ A}$ ) ( $I_c = 40\text{ A}, I_B = 5.0\text{ A}$ ) ( $I_c = 20\text{ A}, I_B = 1.0\text{ A}, T_c = 100^\circ\text{C}$ )		$V_{CE(sat)}$	2.2 5.0 2.5	V
Base - Emitter Saturation Voltage ( $I_c = 20\text{ A}, I_B = 1.2\text{ A}$ ) ( $I_c = 20\text{ A}, I_B = 1.2\text{ A}, T_c = 100^\circ\text{C}$ )		$V_{BE(sat)}$	2.5 2.5	V
Diode Forward Voltage ( $I_F = 20\text{ A}$ )		$V_F$	5.0	V

**DYNAMIC CHARACTERISTICS**

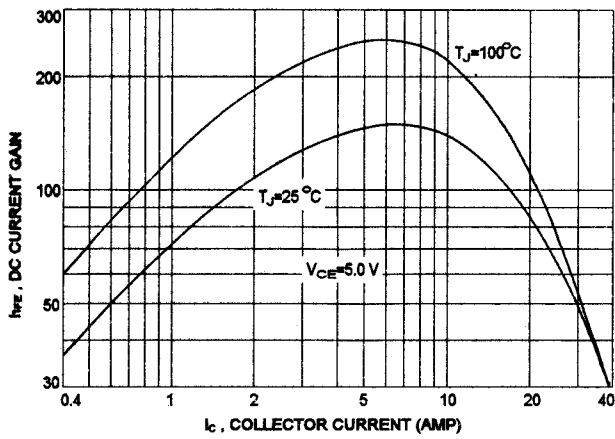
Output Capacitance ( $V_{CB} = 10\text{ V}, I_E = 0, f = 1.0\text{ kHz}$ )		$C_{ob}$	150 600	pF
---	--	----------	------------	----

**SWITCHING CHARACTERISTICS**

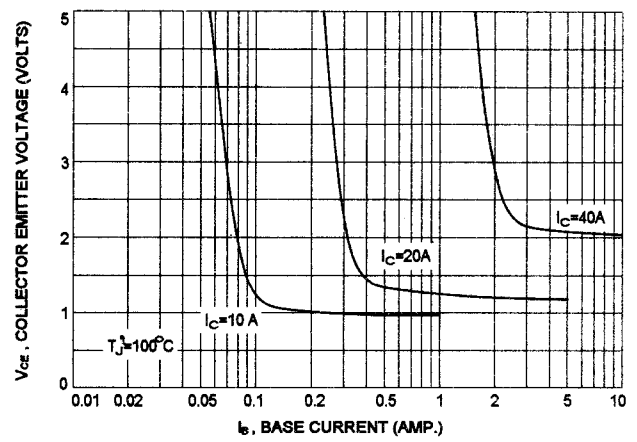
Delay Time	$V_{CC} = 250\text{ V}, I_c = 20\text{ A}$ $I_{B1} = 1.0\text{ A}, V_{BE(off)} = 5.0\text{ V}$ $t_p = 50\mu\text{s}, \text{Duty Cycle} \leq 2\%$	$t_d$	0.2	us
Rise Time		$t_r$	1.5	us
Storage Time		$t_s$	2.5	us
Fall Time		$t_f$	1.1	us

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

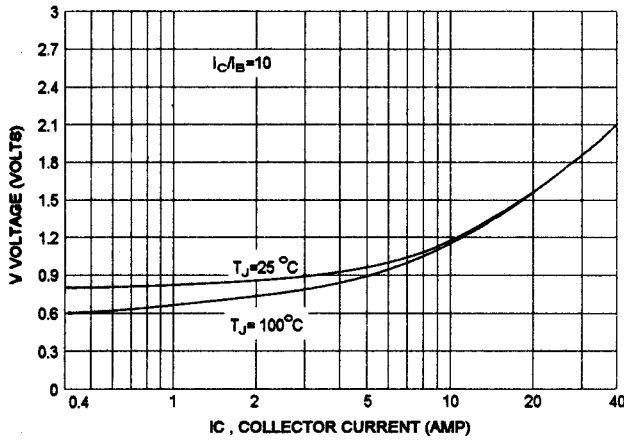
DC CURRENT GAIN



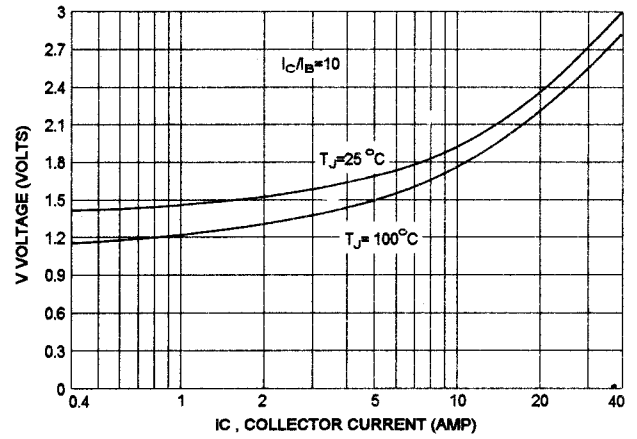
COLLECTOR SATURATION REGION



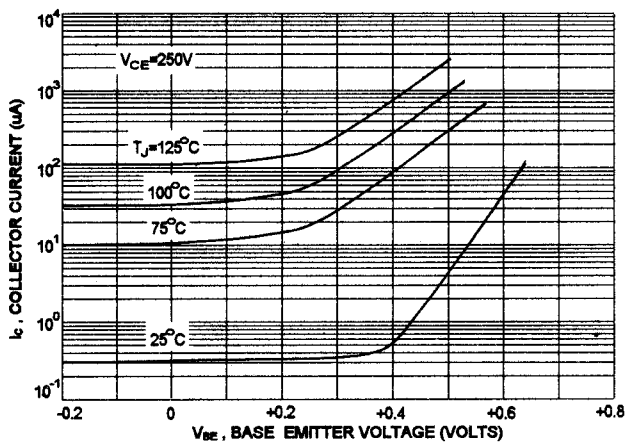
COLLECTOR-EMITTER SATURATION VOLTAGE



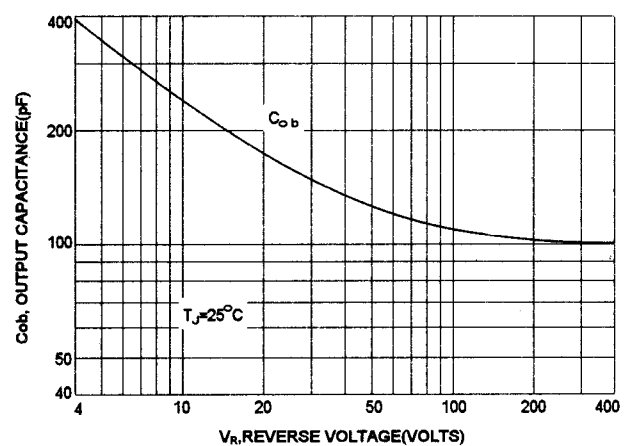
BASE-EMITTER SATURATION VOLTAGE



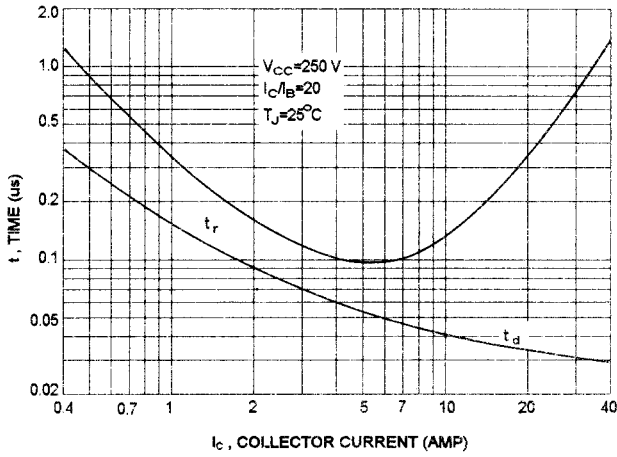
COLLECTOR CUT-OFF REGION



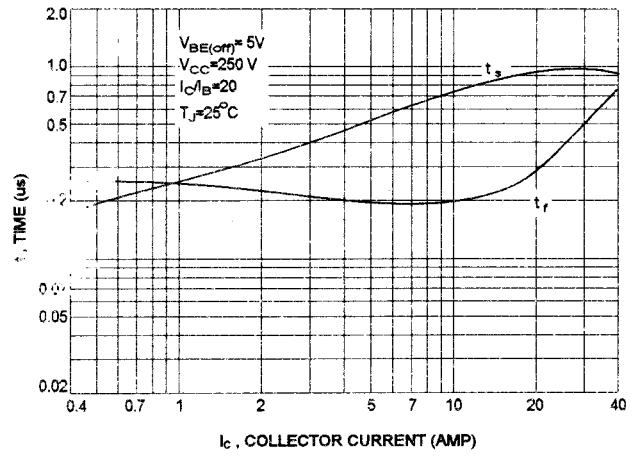
OUTPUT CAPACITANCES



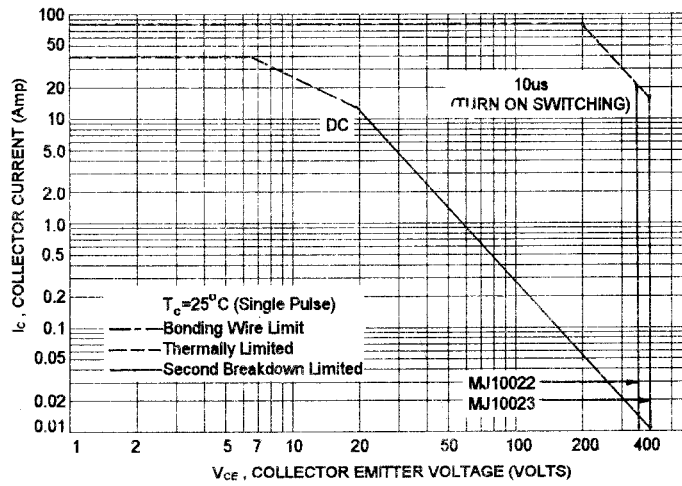
TURN-ON TIME



TURN-OFF TIME



ACTIVE REGION SAFE OPERATING AREA



REVERSE BIAS SWITCHING SAFE OPERATING AREA

