

## NPN SILICON POWER DARLINGTON TRANSISTORS

...designed for use in automotive ignition, switching and motor control applications.

### FEATURES:

\* Collector-Emitter Sustaining Voltage-

$$V_{CE(sus)} = 320 \text{ V (Min) - TIP160}$$

$$= 350 \text{ V (Min) - TIP161}$$

$$= 380 \text{ V (Min) - TIP162}$$

\* Collector-Emitter Saturation Voltage

$$V_{CE(sat)} = 2.9 \text{ V (Max.) @ } I_C = 10 \text{ A}$$

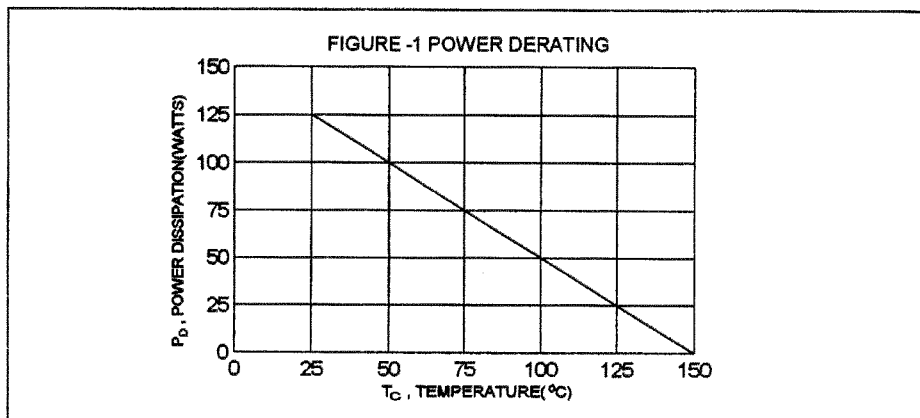
\* 10 A Rated Continuous Collector Current

### MAXIMUM RATINGS

Characteristic	Symbol	TIP160	TIP161	TIP162	Unit
Collector-Emitter Voltage	$V_{CEO}$	320	350	380	V
Collector-Base Voltage	$V_{CBO}$	320	350	380	V
Emitter-Base Voltage	$V_{EBO}$	5.0			V
Collector Current-Continuous -Peak	$I_C$ $I_{CM}$	10 15			A
Base Current	$I_B$	1.0			A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	125 1.0			W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	- 65 to +150			$^\circ\text{C}$

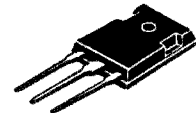
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.0	$^\circ\text{C/W}$

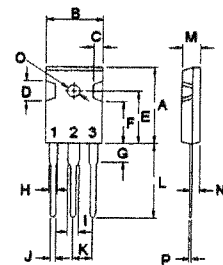


**NPN**  
**TIP160**  
**TIP161**  
**TIP162**

**10 AMPERE**  
**DARLINGTON**  
**POWER TRANSISTORS**  
**320-380 VOLTS**  
**125 WATTS**



**TO-247 (3P)**



PIN 1.BASE  
2.COLLECTOR  
3.EMITTER

DIM	MILLIMETERS	
	MIN	MAX
A	20.63	22.38
B	15.38	16.20
C	1.90	2.70
D	5.10	6.10
E	14.81	15.22
F	11.72	12.84
G	4.20	4.50
H	1.82	2.46
I	2.92	3.23
J	0.89	1.53
K	5.28	5.66
L	18.50	21.50
M	4.68	5.36
N	2.40	2.80
O	3.25	3.65
P	0.55	0.70

TIP160, TIP161, TIP162 NPN

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector Cutoff Current ( $V_{CE} = 320\text{ V}, I_B = 0$ ) ( $V_{CE} = 350\text{ V}, I_B = 0$ ) ( $V_{CE} = 380\text{ V}, I_B = 0$ )	TIP160 TIP161 TIP162	$I_{CEO}$	1.0 1.0 1.0	mA
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}, I_C = 0$ )		$I_{EBO}$	100	mA

ON CHARACTERISTICS (1)

DC Current Gain ( $I_C = 4.0\text{ A}, V_{CE} = 2.2\text{ V}$ )	$h_{FE}$	200		
Collector-Emitter Saturation Voltage ( $I_C = 6.5\text{ A}, I_B = 0.1\text{ A}$ ) ( $I_C = 10\text{ A}, I_B = 1.0\text{ A}$ )	$V_{CE(sat)}$		2.8 2.9	V
Base-Emitter Saturation Voltage ( $I_C = 6.5\text{ A}, I_B = 0.1\text{ A}$ )	$V_{BE(sat)}$		2.2	V
Diode Forward Voltage ( $I_F = 10\text{ A}$ )	$V_F$		3.5	V

SWITCHING CHARACTERISTICS

Delay Time	$V_{CC} = 33\text{ V}, I_C = 6.5\text{ A}$ $I_{B1} = -I_{B2} = 100\text{ mA}$ $t_p = 20\mu\text{s}, \text{Duty Cycle} \leq 2.0\%$	$t_d$	0.3(Typ)		us
Rise Time		$t_r$	1.5(Typ)		us
Storage Time		$t_s$	2.3(Typ)		us
Fall Time		$t_f$	2.8(Typ)		us

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

