

**2N3868**

**Silicon PNP Power Transistors**

**APPLICATIONS:**

- High-Speed Switching
- Medium-Current Switching
- High-Frequency Amplifiers

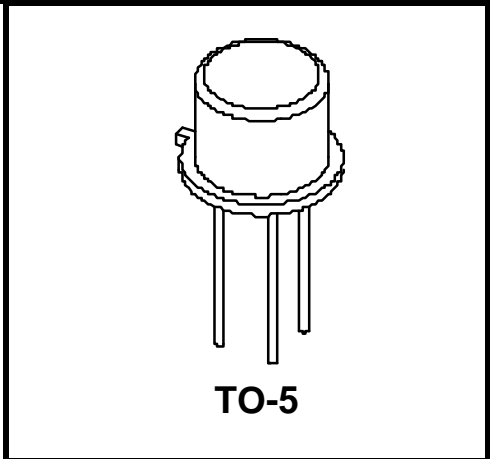
**FEATURES:**

- Collector-Emitter Sustaining Voltage:  $V_{CEO(sus)} = - 60 \text{ Vdc (Min)}$
- DC Current Gain:  $h_{FE} = 30-150 @ I_C = 1.5 \text{ Adc}$
- Low Collector-Emitter Saturation Voltage:  
 $V_{CE(sat)} = - 0.75 \text{ Vdc @ } I_C = 1.5 \text{ Adc}$
- High Current-Gain - Bandwidth Product:  $f_T = 90 \text{ MHz (Typ)}$

**DESCRIPTION:**

These power transistors are produced by PPC's DOUBLE DIFFUSED PLANAR process. This technology produces high voltage devices with excellent switching speeds, frequency response, gain linearity, saturation voltages, high current gain, and safe operating areas. They are intended for use in Commercial, Industrial, and Military power switching, amplifier, and regulator applications.

Ultrasonically bonded leads and controlled die mount techniques are utilized to further increase the SOA capability and inherent reliability of these devices. The temperature range to 200°C permits reliable operation in high ambients, and the hermetically sealed package insures maximum reliability and long life.



**ABSOLUTE MAXIMUM RATINGS:**

SYMBOL	CHARACTERISTIC	VALUE	UNITS
$V_{CEO}^*$	Collector-Emitter Voltage	- 60	Vdc
$V_{CB}^*$	Collector-Base Voltage	- 60	Vdc
$V_{EB}^*$	Emitter-Base Voltage	- 4.0	Vdc
$I_C^*$	Peak Collector Current	10	Adc
$I_C^*$	Continuous Collector Current	3.0	Adc
$I_B^*$	Base Current	0.5	Adc
$T_{STG}^*$	Storage Temperature	-65 to 200	°C
$T_J^*$	Operating Junction Temperature	-65 to 200	°C
$P_D^*$	Total Device Dissipation $T_C = 25^\circ\text{C}$ Derate above 25°C	6.0 34.3	Watts mW/°C
$P_D^*$	Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C	1.0 5.71	Watts mW/°C
$\theta_{JC}$	Thermal Resistance Junction to Case	29	°C/W
	Junction to Ambient	175	°C/W

\* Indicates JEDEC registered data.

**ELECTRICAL CHARACTERISTICS:  
 (25° Case Temperature Unless Otherwise Noted)**

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	VALUE		Units
			Min.	Max.	
V <sub>CEO(sus)</sub> *	Collector-Emitter Sustaining Voltage	I <sub>C</sub> = 20 mAdc, I <sub>B</sub> = 0 (Note 1)	- 60	----	Vdc
BV <sub>CBO</sub> *	Collector-Base Breakdown Voltage	I <sub>C</sub> = 100 μAdc, I <sub>E</sub> = 0	- 60	----	Vdc
BV <sub>EBO</sub> *	Emitter-Base Breakdown Voltage	I <sub>E</sub> = 100 μAdc, I <sub>C</sub> = 0	- 4.0	----	Vdc
I <sub>CEX</sub> *	Collector Cutoff Current	V <sub>CE</sub> = - 60V, V <sub>BE(off)</sub> = 2.0 Vdc	----	1.0	μAdc
I <sub>CBO</sub> *	Collector Cutoff Current	V <sub>CB</sub> = - 60V, I <sub>E</sub> = 0, T <sub>C</sub> = 150°C	----	150	μAdc
h <sub>FE</sub> *	DC Current Gain (Note 1)	I <sub>C</sub> = 500 mAdc, V <sub>CE</sub> = - 1.0 Vdc I <sub>C</sub> = 1.5 Adc, V <sub>CE</sub> = - 2.0 Vdc I <sub>C</sub> = 2.5 Adc, V <sub>CE</sub> = - 3.0 Vdc I <sub>C</sub> = 3.0 Adc, V <sub>CE</sub> = - 5.0 Vdc	35 30 20 20	---- 150 ---- ----	---- ---- ---- ----
V <sub>CE(sat)</sub> *	Collector-Emitter Saturation Voltage (Note 1)	I <sub>C</sub> = 500 mAdc, I <sub>B</sub> = 50 mAdc I <sub>C</sub> = 1.5 Adc, I <sub>B</sub> = 150 mAdc I <sub>C</sub> = 2.5 Adc, I <sub>B</sub> = 250 mAdc	---- ---- ----	- 0.5 - 0.75 - 1.3	Vdc Vdc Vdc
V <sub>BE(sat)</sub> *	Base-Emitter Saturation Voltage (Note 1)	I <sub>C</sub> = 500 mAdc, I <sub>B</sub> = 50 mAdc I <sub>C</sub> = 1.5 Adc, I <sub>B</sub> = 150 mAdc I <sub>C</sub> = 2.5 Adc, I <sub>B</sub> = 250 mAdc	---- - 0.9 ----	- 1.0 - 1.4 - 2.0	Vdc Vdc Vdc
f <sub>T</sub> *	Current Gain Bandwidth Product (Note 2)	I <sub>C</sub> = 100 mAdc, V <sub>CE</sub> = - 5.0 Vdc, f <sub>test</sub> = 20 MHz	60	----	MHz
C <sub>ob</sub> *	Output Capacitance	V <sub>CB</sub> = - 10 Vdc, I <sub>E</sub> = 0, f = 0.1 MHz	----	120	pF
C <sub>ib</sub> *	Input Capacitance	V <sub>EB</sub> = - 3.0 Vdc, I <sub>C</sub> = 0, f = 0.1 MHz	----	1000	pF
t <sub>d</sub> *	Delay Time	V <sub>CC</sub> = - 30 Vdc, V <sub>BE(off)</sub> = 0, I <sub>C</sub> = 1.5 Adc, I <sub>B1</sub> = 150 mAdc	----	35	ns
t <sub>r</sub> *	Rise Time	V <sub>CC</sub> = - 30 Vdc, V <sub>BE(off)</sub> = 0, I <sub>C</sub> = 1.5 Adc, I <sub>B1</sub> = 150 mAdc	----	65	ns
t <sub>s</sub> *	Storage Time	V <sub>CC</sub> = - 30 Vdc, I <sub>C</sub> = 1.5 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 150 mAdc	----	325	ns
t <sub>f</sub> *	Fall Time	V <sub>CC</sub> = - 30 Vdc, I <sub>C</sub> = 1.5 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 150 mAdc	----	75	ns

Note 1: Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.

Note 2: f<sub>T</sub> = |h<sub>fe</sub>| \* f<sub>test</sub>

\* Indicates JEDEC registered data.

**PACKAGE MECHANICAL DATA:**

