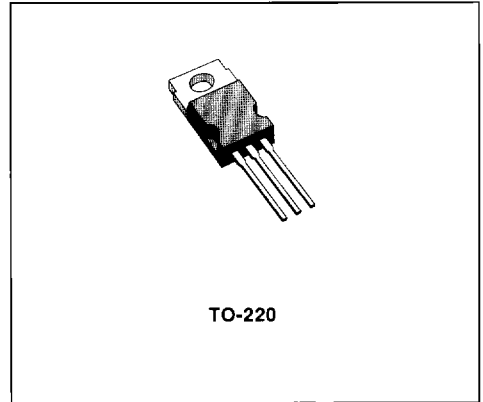


**MEDIUM POWER LINEAR AND SWITCHING APPLICATIONS**

**DESCRIPTION**

The TIP31, TIP31A, TIP31B and TIP31C are silicon epitaxial-base power NPN transistors in Jedec TO-220 plastic package, intended for use in medium power linear and switching applications. The complementary PNP types are the TIP32, TIP32A, TIP32B and TIP32C.



**INTERNAL SCHEMATIC DIAGRAMS**



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	NPN PNP*	Value				Unit
			TIP31 TIP32	TIP31A TIP32A	TIP31B TIP32B	TIP31C TIP32C	
V <sub>CB0</sub>	Collector-base Voltage (I <sub>E</sub> = 0)		40	60	80	100	V
V <sub>CE0</sub>	Collector-emitter Voltage (I <sub>B</sub> = 0)		40	60	80	100	V
V <sub>EB0</sub>	Emitter-base Voltage (I <sub>C</sub> = 0)		5				V
I <sub>C</sub>	Collector Current		3				A
I <sub>CM</sub>	Collector Peak Current		5				A
I <sub>B</sub>	Base Current		1				A
P <sub>tot</sub>	Total Power Dissipation at T <sub>case</sub> ≤ 25 °C T <sub>amb</sub> ≤ 25 °C		40 2				W W
T <sub>stg</sub>	Storage Temperature		- 65 to 150				°C
T <sub>j</sub>	Junction Temperature		150				°C

\* For PNP types voltage and current values are negative.

**THERMAL DATA**

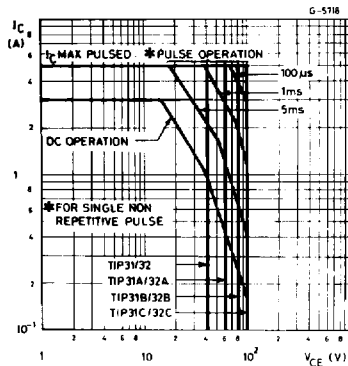
$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	3.12	°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W

**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25\text{ °C}$  unless otherwise specified)

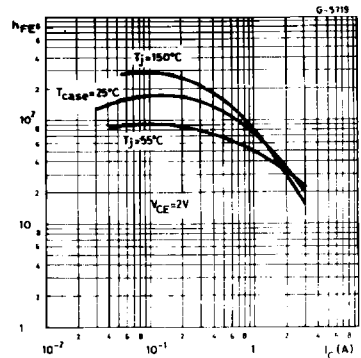
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEO}$	Collector Cutoff Current ( $I_B = 0$ )	for <b>TIP31/31A/32/32A</b> $V_{CE} = 30\text{ V}$ for <b>TIP31B/31C/32B/32C</b> $V_{CE} = 60\text{ V}$			0.3	mA
$I_{CES}$	Collector Cutoff Current ( $V_{BE} = 0$ )	for <b>TIP31/32</b> $V_{CE} = 40\text{ V}$ for <b>TIP31A/32A</b> $V_{CE} = 60\text{ V}$ for <b>TIP31B/32B</b> $V_{CE} = 80\text{ V}$ for <b>TIP31C/32C</b> $V_{CE} = 100\text{ V}$			0.2	mA
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5\text{ V}$			1	mA
$V_{CE0(sus)^+}$	Collector-emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 30\text{ mA}$ for <b>TIP31/32</b> for <b>TIP31A/32A</b> for <b>TIP31B/32B</b> for <b>TIP31C/32C</b>	40			V
$V_{CE(sat)^+}$	Collector-emitter Saturation Voltage	$I_C = 3\text{ A}$ $I_B = 375\text{ mA}$			1.2	V
$V_{BE(on)^+}$	Base-emitter Voltage	$I_C = 3\text{ A}$ $V_{CE} = 4\text{ A}$			1.8	V
$h_{FE}^*$	DC current Gain	$I_C = 1\text{ A}$ $V_{CE} = 4\text{ V}$ $I_C = 3\text{ A}$ $V_{CE} = 4\text{ V}$	25		50	
$h_{ie}$	Small Signal Current Gain	$I_C = 0.5\text{ A}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ KHz}$ $I_C = 0.5\text{ A}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ MHz}$	20		3	

\* Pulsed : pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
For PNP types voltage and current values are negative.

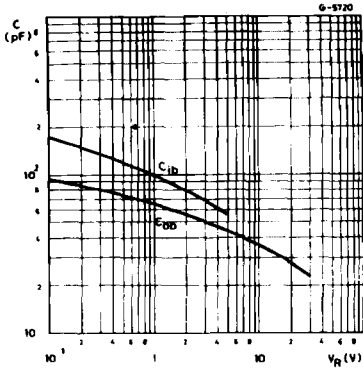
**Safe Operating Areas.**



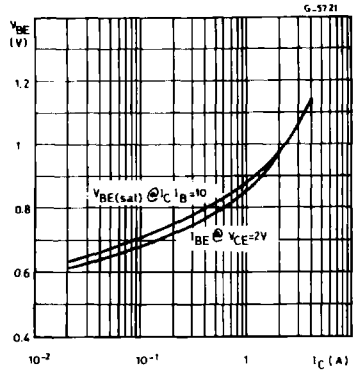
**DC Current Gain (NPN types).**



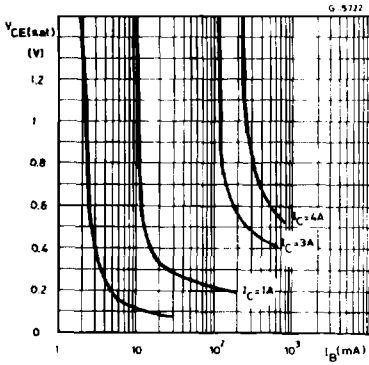
Input and Output Capacitance (NPN types).



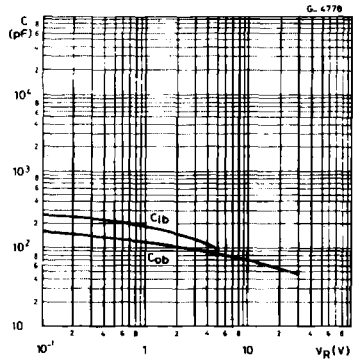
Base-emitter Voltage (NPN types).



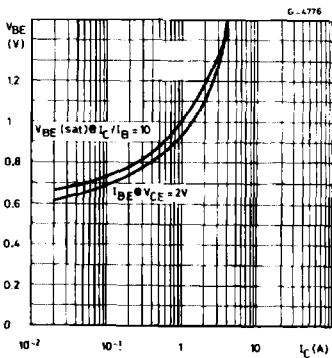
Collector-emitter Saturation Voltage (NPN types).



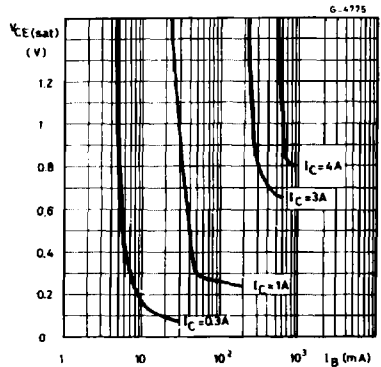
Input and Output Capacitance (PNP types).



Base-emitter Voltage (PNP types).



Collector-emitter Saturation Voltage (PNP types).



DC Current Gain (PNP types).

