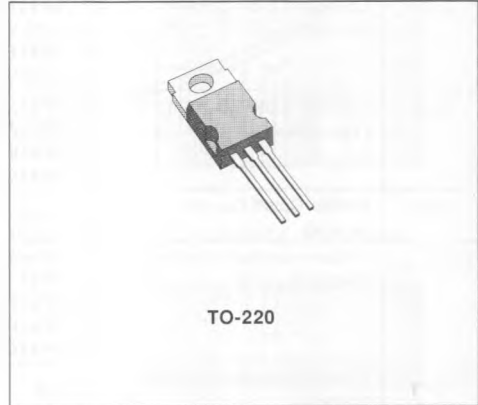


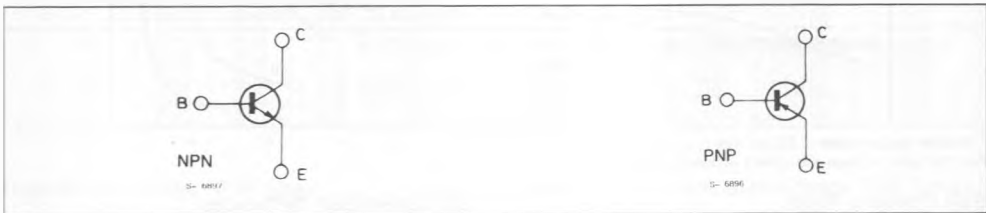
## MEDIUM POWER LINEAR AND SWITCHING APPLICATIONS

### 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	
$V_{CBO}$	Collector-base Voltage ( $I_E = 0$ )		40	60	80	100	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )		40	60	80	100	V
$V_{EBO}$	Emitter-base Voltage ( $I_C = 0$ )		5				V
$I_C$	Collector Current		3				A
$I_{CM}$	Collector Peak Current		5				A
$I_B$	Base Current		1				A
$P_{tot}$	Total Power Dissipation at $T_{case} \leq 25^\circ\text{C}$ $T_{amb} \leq 25^\circ\text{C}$		40 2				W W
$T_{stg}$	Storage Temperature		- 65 to 150				$^\circ\text{C}$
$T_j$	Junction Temperature		150				$^\circ\text{C}$

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

**THERMAL DATA**

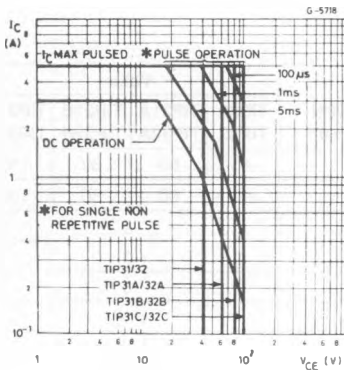
$R_{th(j-case)}$	Thermal Resistance Junction-case	Max	3.12	$^{\circ}C/W$
$R_{th(j-amb)}$	Thermal Resistance Junction-ambient	Max	62.5	$^{\circ}C/W$

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

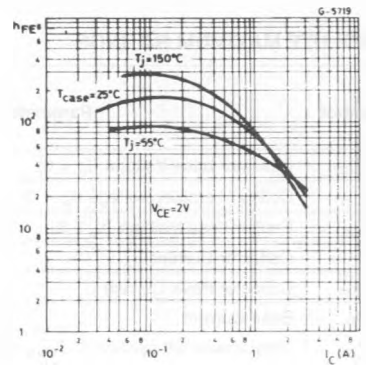
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEO}$	Collector Cutoff Current ( $I_B = 0$ )	for <b>TIP31/31A/32/32A</b> $V_{CE} = 30 V$ for <b>TIP31B/31C/32B/32C</b> $V_{CE} = 60 V$			0.3	mA
$I_{CES}$	Collector Cutoff Current ( $V_{BE} = 0$ )	for <b>TIP31/32</b> $V_{CE} = 40 V$ for <b>TIP31A/32A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

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

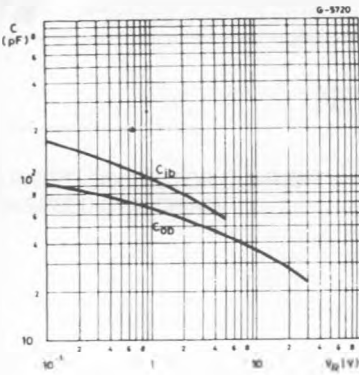
**Safe Operating Areas.**



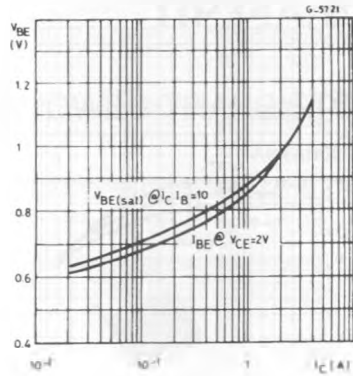
**DC Current Gain (NPN types).**



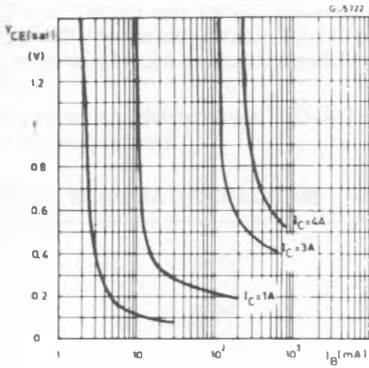
Input and Output Capacitance (NPN types).



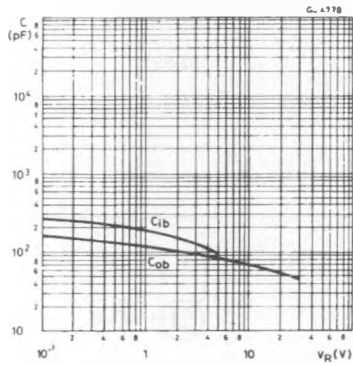
Base-emitter Voltage (NPN types).



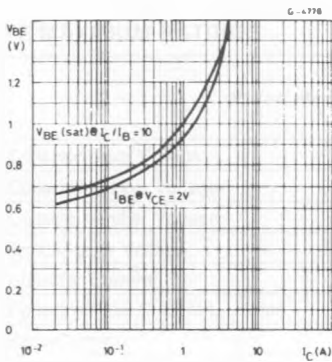
Collector-emitter Saturation Voltage (NPN types).



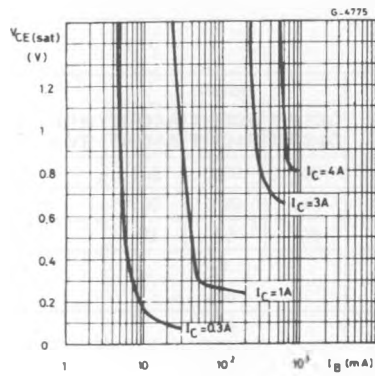
Input and Output Capacitance (PNP types).



Base-emitter Voltage (PNP types).



Collector-emitter Saturation Voltage (PNP types).



DC Current Gain (PNP types).

