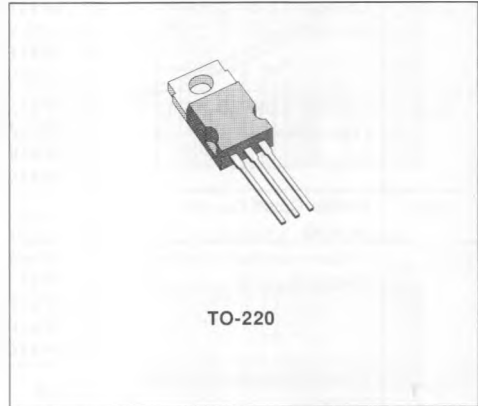


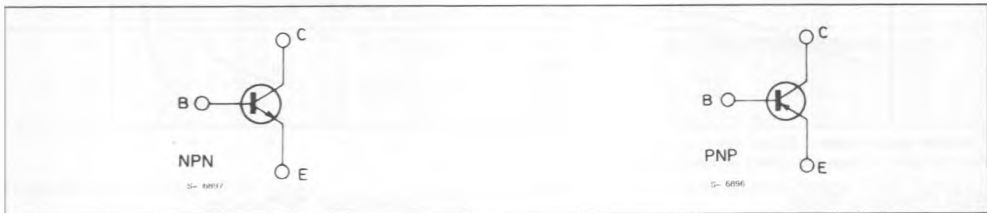
MEDIUM POWER LINEAR AND SWITCHING APPLICATIONS

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			W	
			2			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

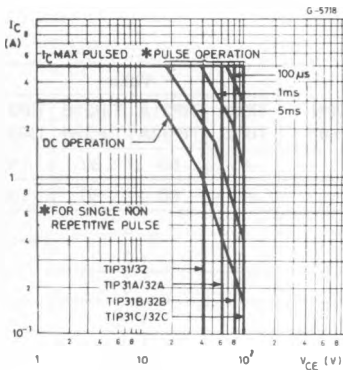
$R_{th(j-case)}$	Thermal Resistance Junction-case	Max	3.12	$^{\circ}C/W$
$R_{th(j-amb)}$	Thermal Resistance Junction-ambient	Max	62.5	$^{\circ}C/W$

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

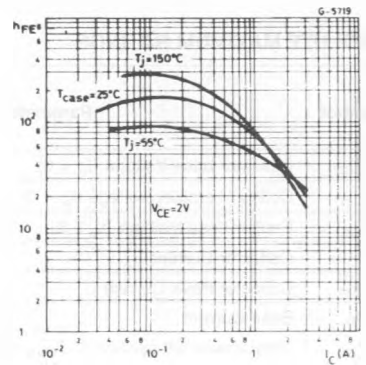
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector Cutoff Current ($I_B = 0$)	for TIP31/31A/32/32A $V_{CE} = 30 V$ for TIP31B/31C/32B/32C $V_{CE} = 60 V$			0.3	mA
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	for TIP31/32 $V_{CE} = 40 V$ for TIP31A/32A $V_{CE} = 60 V$ for TIP31B/32B $V_{CE} = 80 V$ for TIP31C/32C $V_{CE} = 100 V$			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 TIP31/32 for TIP31A/32A for TIP31B/32B for TIP31C/32C	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	$I_C = 0.5 A$ $f = 1 KHz$ $I_C = 0.5 A$ $f = 1 MHz$	20			
			3			

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

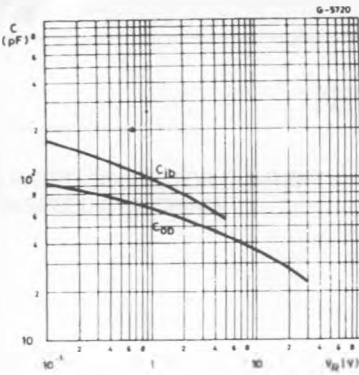
Safe Operating Areas.



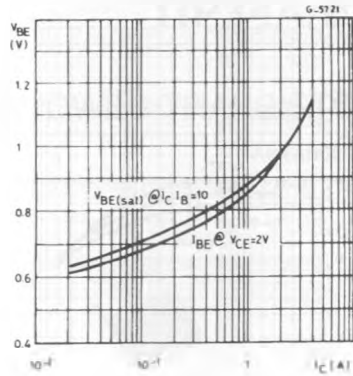
DC Current Gain (NPN types).



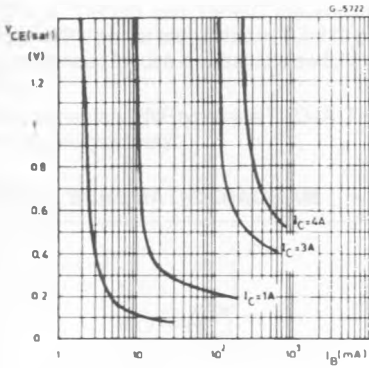
Input and Output Capacitance (NPN types).



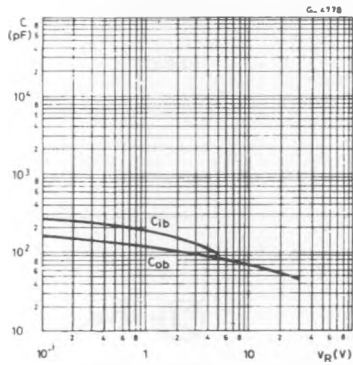
Base-emitter Voltage (NPN types).



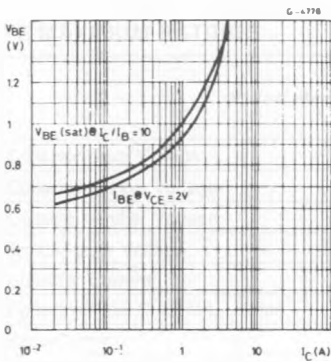
Collector-emitter Saturation Voltage (NPN types).



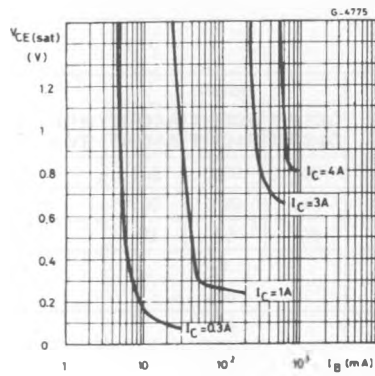
Input and Output Capacitance (PNP types).



Base-emitter Voltage (PNP types).



Collector-emitter Saturation Voltage (PNP types).



DC Current Gain (PNP types).

