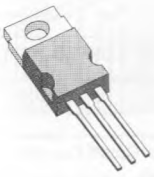
SGS-THOMSON MICROELECTRONICS

TIP31/31A/31B/31C
TIP32/32A/32B/32C

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.



TO-220

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 $T_{case} \leq 25$ °C $T_{amb} \leq 25$°C		40 2				W W
T_{stg}	Storage Temperature		– 65 to 150				°C
T_j	Junction Temperature		150				°C

* For PNP types voltage and current values are negative.

THERMAL DATA

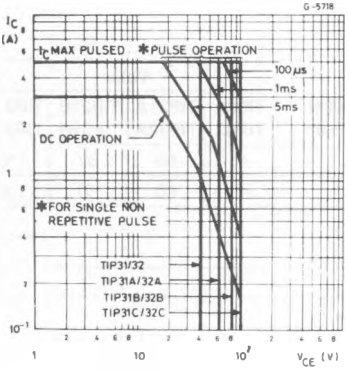
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	3.12	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

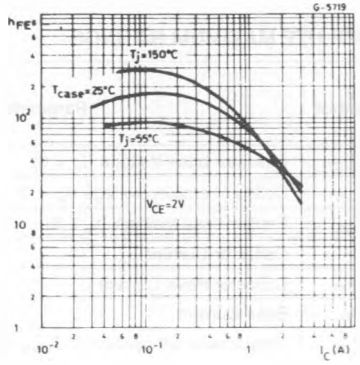
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector Cutoff Current (I_B = 0)	for **TIP31/31A/32/32A** V_{CE} = 30 V			0.3	mA
		for **TIP31B/31C/32B/32C** V_{CE} = 60 V			0.3	mA
I_{CES}	Collector Cutoff Current (V_{BE} = 0)	for **TIP31/32** V_{CE} = 40 V			0.2	mA
		for **TIP31A/32A** V_{CE} = 60 V			0.2	mA
		for **TIP31B/32B** V_{CE} = 80 V			0.2	mA
		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**	40			V
		for **TIP31A/32A**	60			V
		for **TIP31B/32B**	80			V
		for **TIP31C/32C**	100			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	25		50	
		I_C = 3 A V_{CE} = 4 V	10			
h_{fe}	Small Signal Current Gain	I_C = 0.5 A V_{CE} = 10 V f = 1 KHz	20			
		I_C = 0.5 A V_{CE} = 10 V f = 1 MHz	3			

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

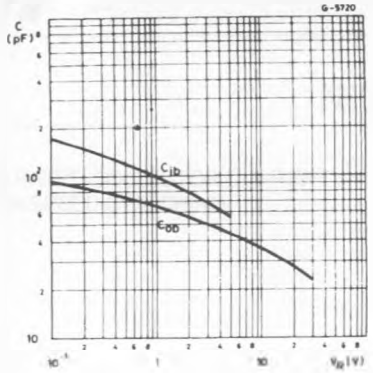
Safe Operating Areas.



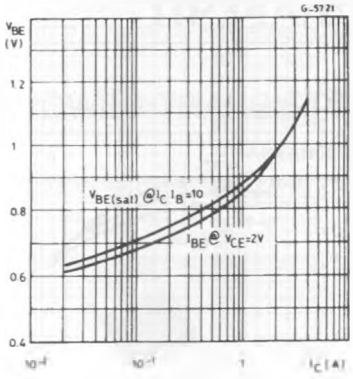
DC Current Gain (NPN types).



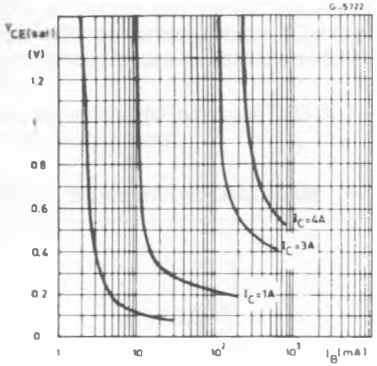
Input and Output Capacitance (NPN types).



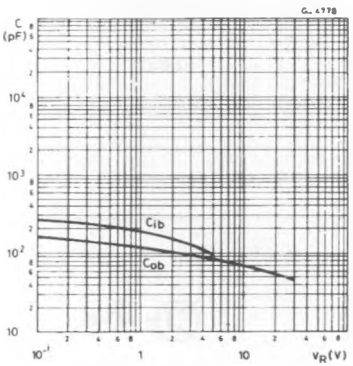
Base-emitter Voltage (NPN types).



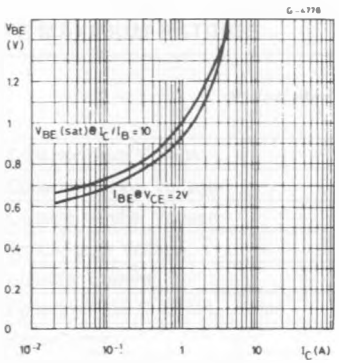
Collector-emitter Saturation Voltage (NPN types).



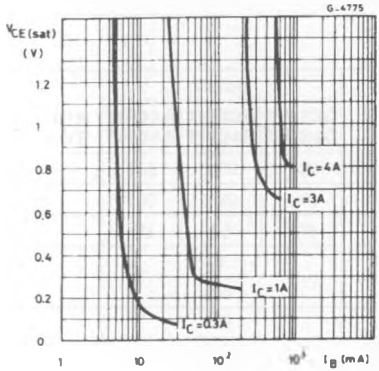
Input and Output Capacitance (PNP types).



Base-emitter Voltage (PNP types).



Collector-emitter Saturation Voltage (PNP types).



DC Current Gain (PNP types).