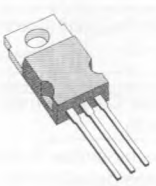
SGS-THOMSON MICROELECTRONICS

TIP120-121-122
TIP125-126-127

POWER DARLINGTONS

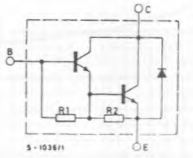
DESCRIPTION

The TIP120, TIP121 and TIP122 are silicon epitaxial-base NPN transistors in monolithic Darlington configuration in Jedec TO-220 plastic package, intended for use in power linear and switching applications. The complementary PNP types are the TIP125, TIP126 and TIP127 respectively.

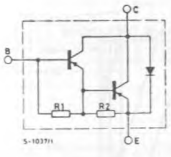


TO-220

INTERNAL SCHEMATIC DIAGRAMS



R1 Typ. 5 KΩ
R2 Typ. 150 KΩ



R1 Typ. 5 KΩ
R2 Typ. 150 KΩ

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	NPN PNP*	Value			Unit
			TIP120 TIP125	TIP121 TIP126	TIP122 TIP127	
V_{CBO}	Collector-base Voltage (I_E = 0)		60	80	100	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)		60	80	100	V
V_{EBO}	Emitter-base Voltage (I_C = 0)		5			V
I_C	Collector Current		5			A
I_{CM}	Collector Peak Current		8			A
I_B	Base Current		0.1			A
P_{tot}	Total Power Dissipation at $T_{case} \leq 25$ °C $T_{amb} \leq 25$°C		65 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

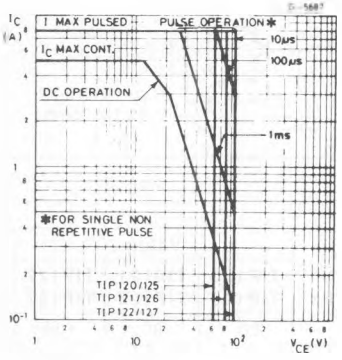
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	1.92	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W

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

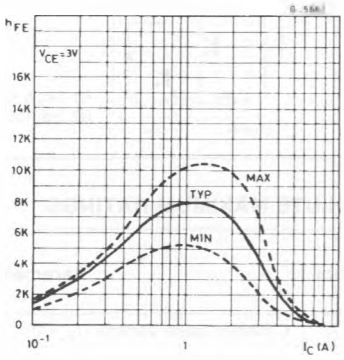
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_{CEO}	Collector Cutoff Current (I_B = 0)	for **TIP120/5**	V_{CE} = 30 V			0.5	mA
		for **TIP121/6**	V_{CE} = 40 V			0.5	mA
		for **TIP122/7**	V_{CE} = 50 V			0.5	mA
I_{CBO}	Collector Cutoff Current (I_E = 0)	for **TIP120/5**	V_{CB} = 60 V			0.2	mA
		for **TIP121/6**	V_{CB} = 80 V			0.2	mA
		for **TIP122/7**	V_{CB} = 100 V			0.2	mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 5 V				2	mA
$V_{CEO(sus)}$*	Collector-emitter Sustaining Voltage (I_B = 0)	I_C = 30 mA					
		for **TIP120/5**		60			V
		for **TIP121/6**		80			V
		for **TIP122/7**		100			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = 3 A	I_B = 12 mA			2	V
		I_C = 5 A	I_B = 20 mA			4	V
$V_{BE(on)}$*	Base-emitter Voltage	I_C = 3 A	V_{CE} = 3 V			2.5	V
h_{FE}*	DC current Gain	I_C = 0.5 A	V_{CE} = 3 V	1000			
		I_C = 3 A	V_{CE} = 3 V	1000			

* Pulsed : pulse duration = 300 µs, duty cycle ≤ 2 %.

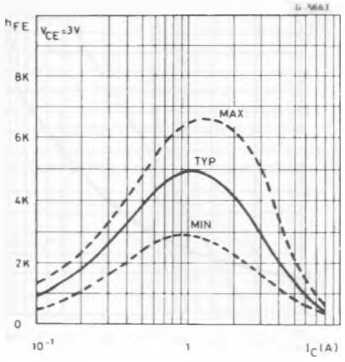
Safe Operating Areas.



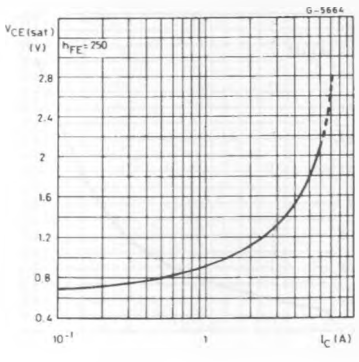
DC Current Gain (NPN types).



DC Current Gain (PNP types).



Collector-emitter Saturation Voltage (NPN types).



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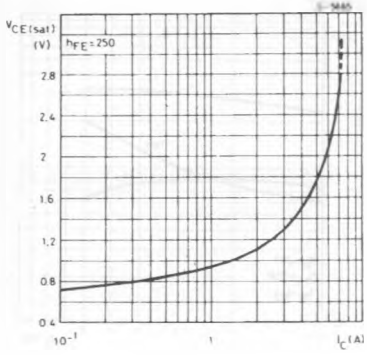
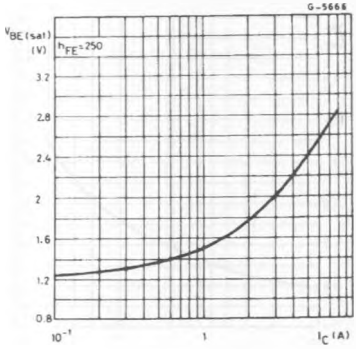


Base-emitter Saturation Voltage (NPN types).



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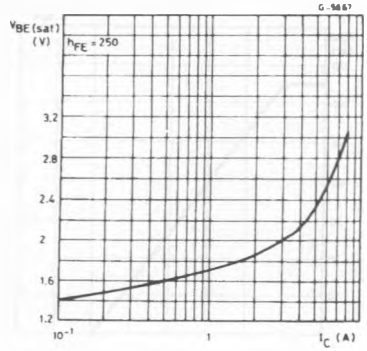

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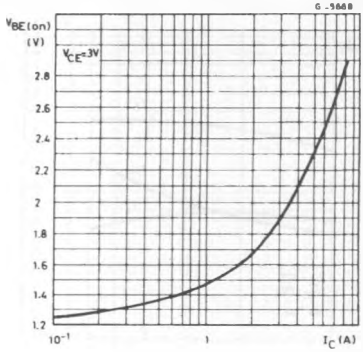

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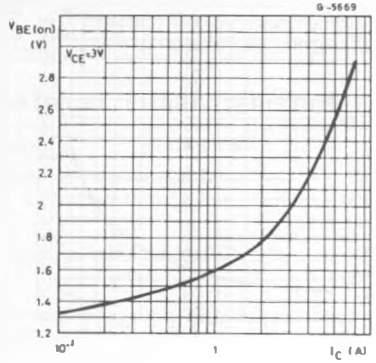
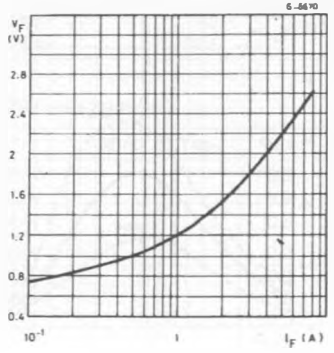


Freewheel Diode Forward Voltage (NPN types).



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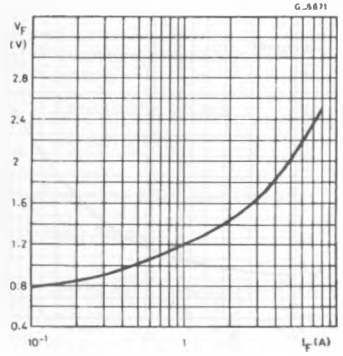
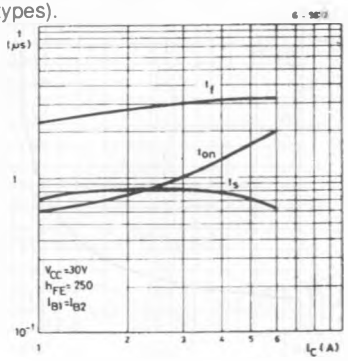


Switching Times vs. T_{case} Resistive Load (NPN types).



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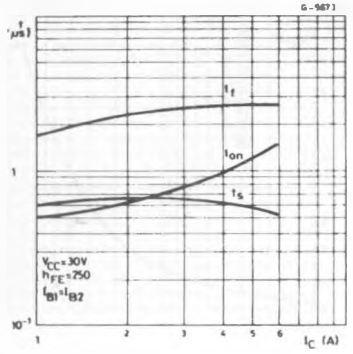
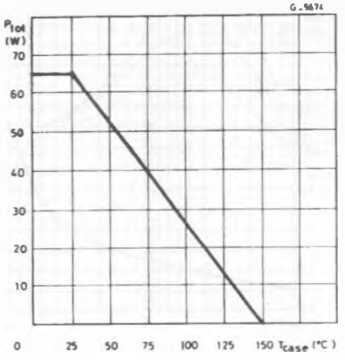


Derating Curve.



Free-air Temperature Derating Curve.