



EPITAXIAL-BASE NPN/PNP

POWER DARLINGTONS

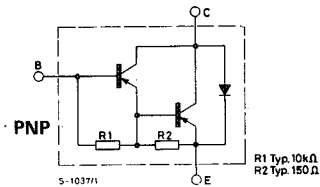
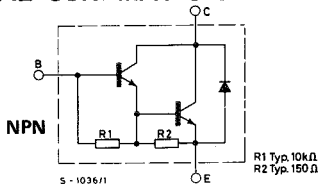
The BDX 53, BDX 53A, BDX 53B and BDX 53C are silicon epitaxial-base NPN transistors in monolithic Darlington configuration and are mounted in Jedec TO-220 plastic package, intended for use in hammer drivers, audio amplifiers and other medium power linear and switching applications.

The complementary PNP types are the BDX 54, BDX 54A, BDX 54B and BDX 54C respectively.

ABSOLUTE MAXIMUM RATINGS		NPN PNP*	BDX53 BDX54	BDX53A BDX54A	BDX53B BDX54B	BDX53C BDX54C
V_{CBO}	Collector-base voltage ($I_E = 0$)		45V	60V	80V	100V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)		45V	60V	80V	100V
V_{EBO}	Emitter-base voltage ($I_C = 0$)				5V	
I_C	Collector current				8A	
I_{CM}	Collector peak current (repetitive)				12A	
I_B	Base current				0.2A	
P_{tot}	Total power dissipation at $T_{case} \leq 25^\circ C$				60W	
T_{stg}	Storage temperature				-65 to 150°C	
T_J	Junction temperature				150°C	

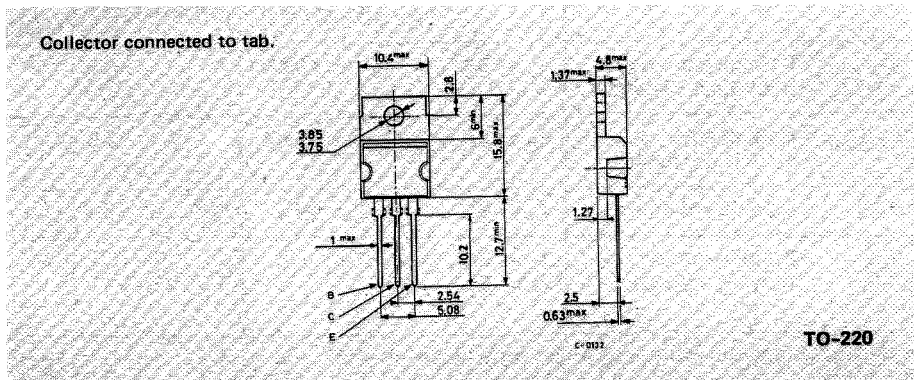
* For PNP types voltage and current values are negative

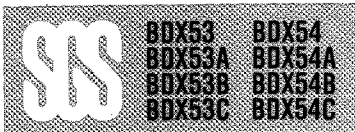
INTERNAL SCHEMATIC DIAGRAMS



MECHANICAL DATA

Dimensions in mm





THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	2.08 °C/W
$R_{th\ j-amb}$	Thermal resistance junction-ambient	max	70 °C/W

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

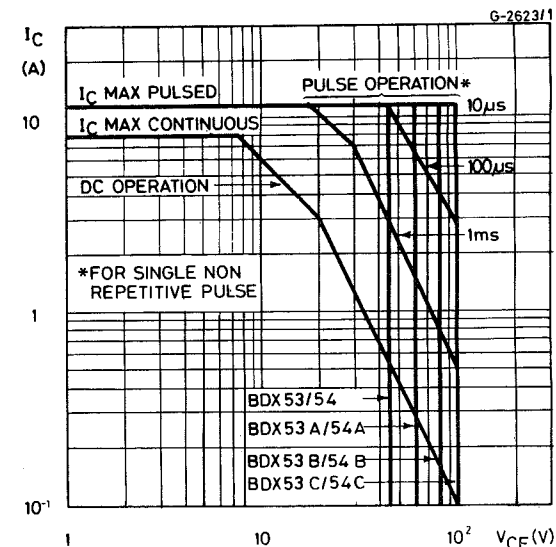
Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cutoff current ($I_E = 0$)	for BDX53/54 for BDX53A/54A for BDX53B/54B for BDX53C/54C	$V_{CB} = 45V$ $V_{CB} = 60V$ $V_{CB} = 80V$ $V_{CB} = 100V$	200 200 200 200	μA μA μA μA
I_{CEO}	Collector cutoff current ($I_B = 0$)	for BDX53/54 for BDX53A/54A for BDX53B/54B for BDX53C/54C	$V_{CE} = 22V$ $V_{CE} = 30V$ $V_{CE} = 40V$ $V_{CE} = 50V$	500 500 500 500	μA μA μA μA
I_{EBO}	Emitter cutoff current ($I_C = 0$)	$V_{EB} = 5V$		2	mA
$V_{CEO(sus)}$ *	Collector-emitter sustaining voltage ($I_B = 0$)	$I_C = 100mA$	for BDX53/54 for BDX53A/54A for BDX53B/54B for BDX53C/54C	45 60 80 100	V V V V
$V_{CE(sat)}$ *	Collector-emitter saturation voltage	$I_C = 3A$	$I_B = 12mA$	2	V
$V_{BE(sat)}$ *	Base-emitter saturation voltage	$I_C = 3A$	$I_B = 12mA$	2.5	V
h_{FE} *	DC current gain	$I_C = 3A$	$V_{CE} = 3V$	750	—
V_F	Parallel-diode forward voltage	$I_F = 3A$ $I_F = 8A$		1.8 2.5 2.5	V V

* Pulsed: pulse duration = 300 μs , duty cycle = 1.5%

For PNP types voltage and current values are negative



Safe operating area



For the other characteristics curves see TIP120/TIP125 series.



EPITAXIAL-BASE NPN/PNP

POWER DARLINGTONS

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.

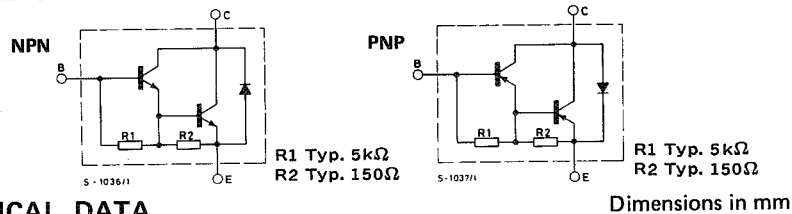
The complementary PNP types are the TIP125, TIP126 and TIP127 respectively.

ABSOLUTE MAXIMUM RATINGS

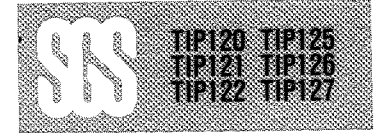
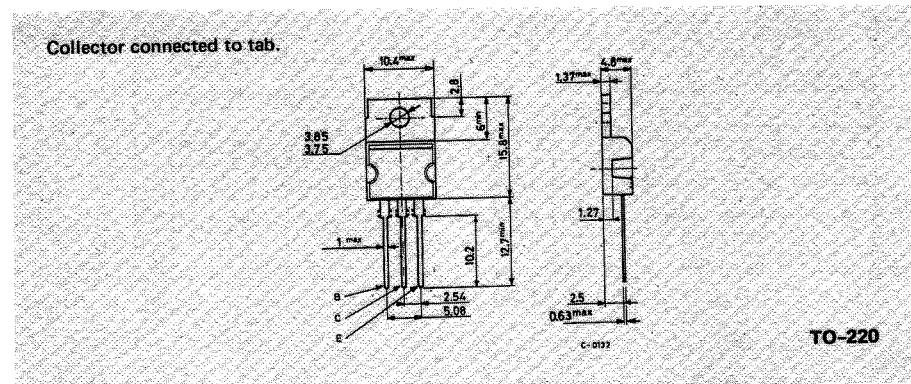
	NPN PNP*	TIP120 TIP125	TIP121 TIP126	TIP122 TIP127
V_{CBO}	Collector-base voltage ($I_E = 0$)	60V	80V	100V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	60V	80V	100V
V_{EBO}	Emitter-base voltage ($I_C = 0$)		5V	
I_C	Collector current		5A	
I_{CM}	Collector peak current		8A	
I_B	Base current		0.1A	
P_{tot}	Total power dissipation at $T_{case} \leq 25^\circ C$ $T_{amb} \leq 25^\circ C$		65W	2W
T_{stg}	Storage temperature		-65 to 150°C	
T_J	Junction temperature		150°C	

* For PNP types voltage and current values are negative.

INTERNAL SCHEMATIC DIAGRAMS



MECHANICAL DATA



THERMAL DATA

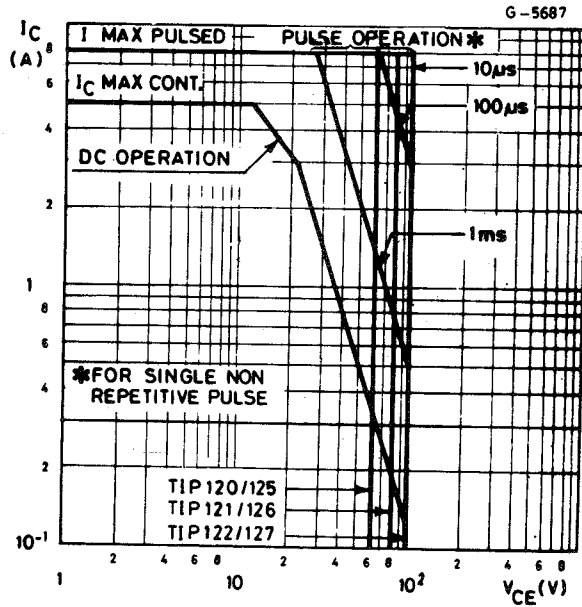
$R_{th\ j-case}$	Thermal resistance junction-case	max	1.92	°C/W
$R_{th\ j-amb}$	Thermal resistance junction-ambient	max	62.5	°C/W

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

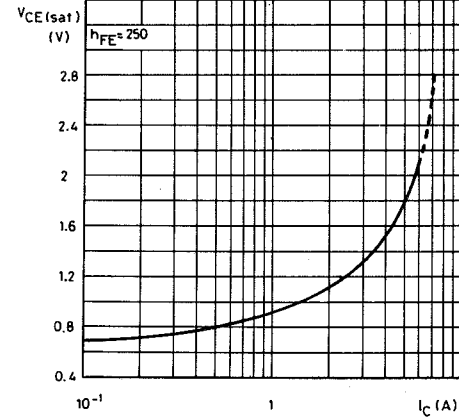
Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector cutoff current ($I_B = 0$)			0.5	mA
	for TIP120/5 $V_{CE} = 30V$ for TIP121/6 $V_{CE} = 40V$ for TIP122/7 $V_{CE} = 50V$			0.5	mA
I_{CBO}	Collector cutoff current ($I_E = 0$)			0.2	mA
	for TIP120/5 $V_{CB} = 60V$ for TIP121/6 $V_{CB} = 80V$ for TIP122/7 $V_{CB} = 100V$			0.2	mA
I_{EBO}	Emitter cutoff current ($I_C = 0$)			2	mA
$V_{CEO(sus)}$	Collector-emitter sustaining voltage ($I_B = 0$)	60	80	100	V
	$I_C = 30mA$ for TIP120/5 for TIP121/6 for TIP122/7				V
$V_{CE(sat)}$	Collector-emitter saturation voltage			2	V
	$I_C = 3A$ $I_B = 12mA$ $I_C = 5A$ $I_B = 20mA$			4	V
$V_{BE(on)}$	Base-emitter voltage			2.5	V
	$I_C = 3A$ $V_{CE} = 3V$				V
h_{FE}	DC current gain	1000			-
	$I_C = 0.5A$ $V_{CE} = 3V$ $I_C = 3A$ $V_{CE} = 3V$	1000			-

* Pulsed: pulse duration = 300 μs , duty cycle $\leq 2\%$

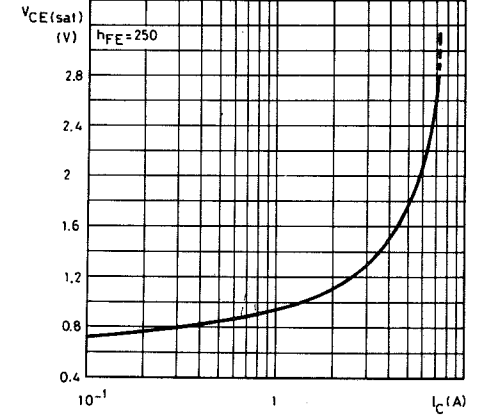
Safe operating areas



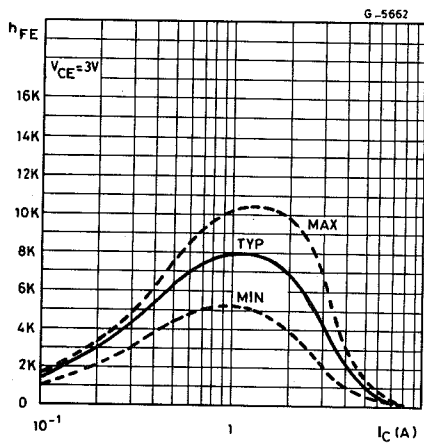
Collector-emitter saturation voltage (NPN types)



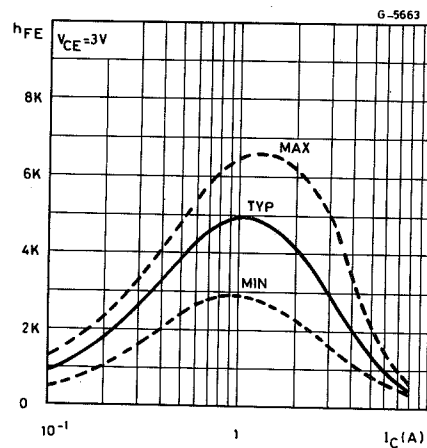
Collector-emitter saturation voltage (PNP types)



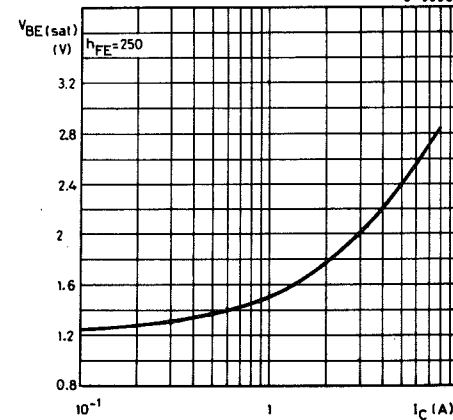
DC current gain (NPN types)



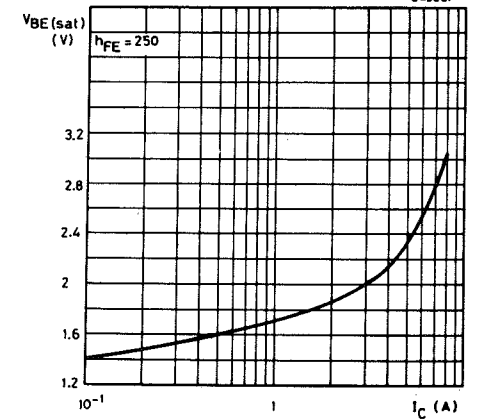
DC current gain (PNP types)



Base-emitter saturation voltage (NPN types)



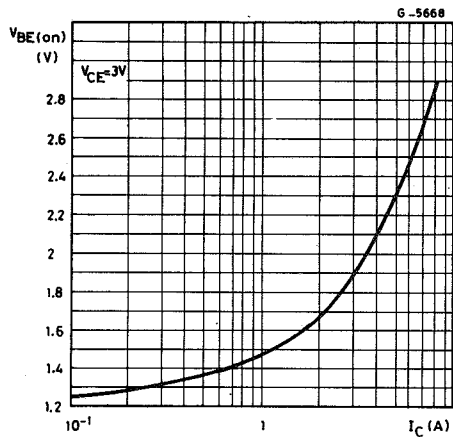
Base-emitter saturation voltage (PNP types)



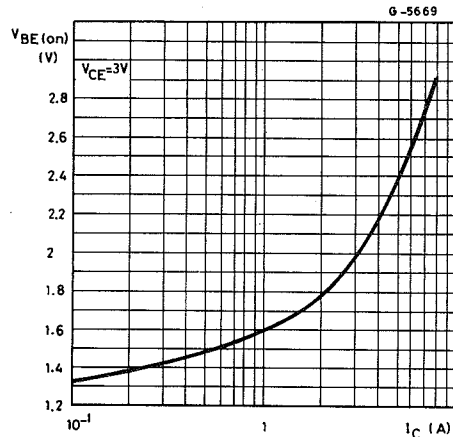


TIP120 TIP125
TIP121 TIP126
TIP122 TIP127

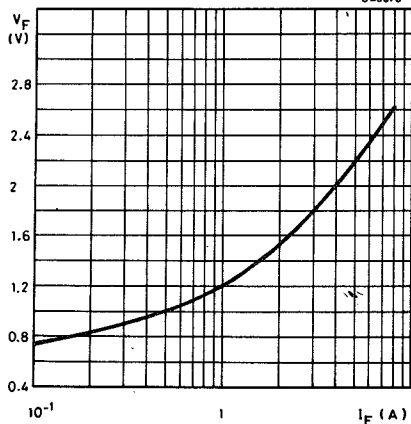
Base-emitter voltage (NPN types)



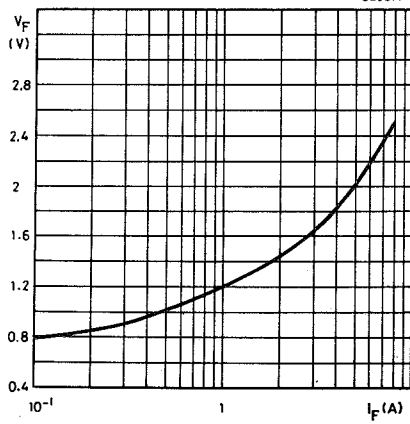
Base-emitter voltage (PNP types)



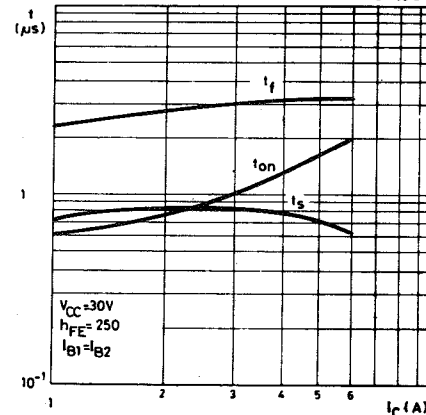
Freewheel diode forward voltage (NPN types)



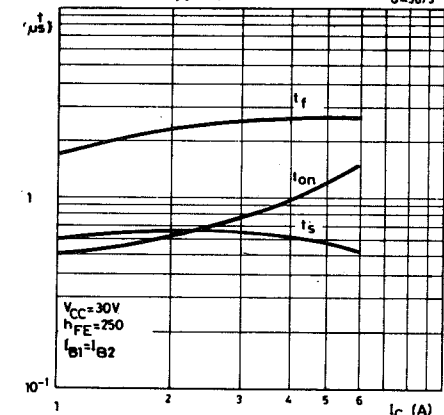
Freewheel diode forward voltage (PNP types)



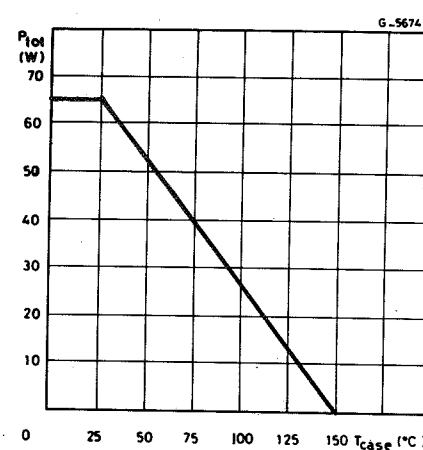
Switching times vs. T_{case} resistive load (NPN types)



Switching times vs. T_{case} resistive load (PNP types)



Derating curve



Free-air temperature derating curve

