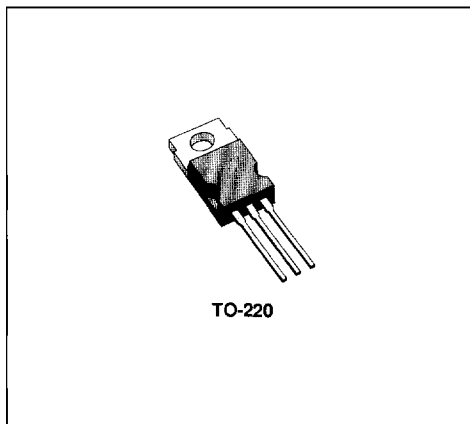


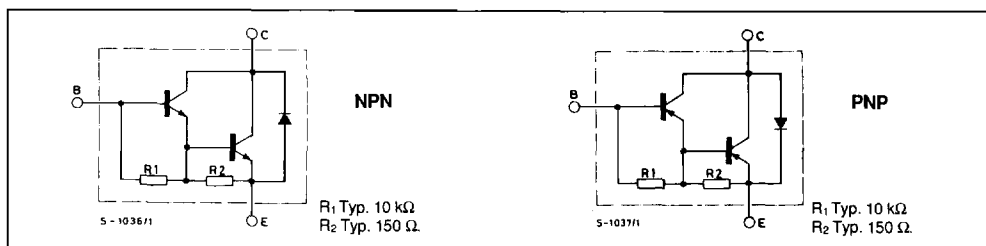
## NPN/PNP POWER DARLINGTONS

### DESCRIPTION

The BDW93, BDW93A, BDW93B and BDW93C are silicon epitaxial-base NPN transistors in monolithic Darlington configuration and are mounted in Jedec TO-220 plastic package. They are intended for use in power linear and switching applications. The complementary PNP types are the BDW94, BDW94A, BDW94B and BDW94C respectively.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	NPN PNP*	Value				Unit
			BDW93 BDW94	BDW93A BDW94A	BDW93B BDW94B	BDW93C BDW94C	
V <sub>CBO</sub>	Collector-base Voltage (I <sub>E</sub> = 0)		45	60	80	100	V
V <sub>CEO</sub>	Collector-emitter Voltage (I <sub>B</sub> = 0)		45	60	80	100	V
I <sub>C</sub>	Collector Current		12				A
I <sub>CM</sub>	Collector Peak Current		15				A
I <sub>B</sub>	Base Current		0.2				A
P <sub>tot</sub>	Total Power Dissipation at T <sub>case</sub> ≤ 25 °C		80				W
T <sub>stg</sub>	Storage Temperature		- 65 to 150				°C
T <sub>j</sub>	Junction Temperature		150				°C

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

## THERMAL DATA

$R_{th(j-case)}$	Thermal Resistance Junction-case	Max	1.56	$^{\circ}\text{C/W}$
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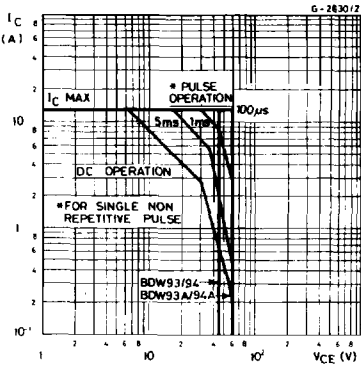
## ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cutoff Current ( $I_E = 0$ )	for <b>BDW93/94</b> $V_{CB} = 45\text{ V}$			100	$\mu\text{A}$
		for <b>BDW93A/94A</b> $V_{CB} = 60\text{ V}$			100	$\mu\text{A}$
		for <b>BDW93B/94B</b> $V_{CB} = 80\text{ V}$			100	$\mu\text{A}$
		for <b>BDW93C/94C</b> $V_{CB} = 100\text{ V}$			100	$\mu\text{A}$
		$T_{case} = 150^{\circ}\text{C}$				
$I_{CEO}$	Collector Cutoff Current ( $I_B = 0$ )	for <b>BDW93/94</b> $V_{CE} = 40\text{ V}$			1	$\text{mA}$
		for <b>BDW93A/94A</b> $V_{CE} = 60\text{ V}$			1	$\text{mA}$
		for <b>BDW93B/94B</b> $V_{CE} = 80\text{ V}$			1	$\text{mA}$
		for <b>BDW93C/94C</b> $V_{CE} = 80\text{ V}$			1	$\text{mA}$
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5\text{ V}$			2	$\text{mA}$
$V_{CEO(sus)}^*$	Collector-emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 100\text{ mA}$ for <b>BDW93/94</b> for <b>BDW93A/94A</b> for <b>BDW93B/94B</b> for <b>BDW93C/94C</b>	45 60 80 100			V V V V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 5\text{ A}$ $I_B = 20\text{ mA}$			2	V
		$I_C = 10\text{ A}$ $I_B = 100\text{ mA}$			3	V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 5\text{ A}$ $I_B = 20\text{ mA}$			2.5	V
		$I_C = 10\text{ A}$ $I_B = 100\text{ mA}$			4	V
$h_{FE}^*$	DC Current Gain	$I_C = 3\text{ A}$ $V_{CE} = 3\text{ V}$	1000		20000	
		$I_C = 5\text{ A}$ $V_{CE} = 3\text{ V}$	750			
		$I_C = 10\text{ A}$ $V_{CE} = 3\text{ V}$	100			
$V_F^*$	Parallel-diode Forward Voltage	$I_F = 5\text{ A}$		1.3	2	V
		$I_F = 10\text{ A}$		1.8	4	V
$h_{fe}$	Small Signal Current Gain	$I_C = 1\text{ A}$ $f = 1\text{ MHz}$	$V_{CE} = 10\text{ V}$	20		

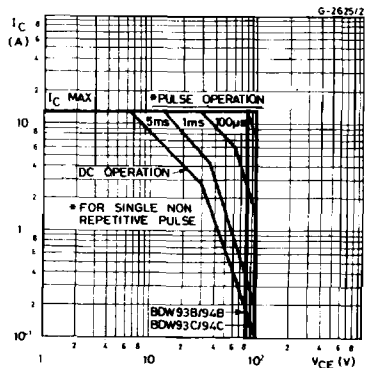
\* Pulsed : pulse duration = 300  $\mu\text{s}$ , duty cycle = 1.5 %.

For PNP types voltage and current values are negative.

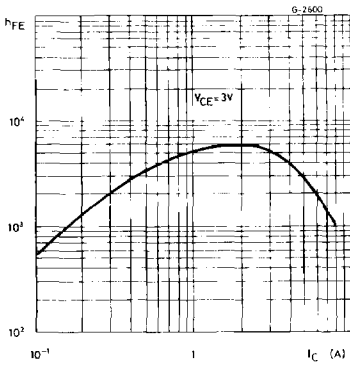
Safe Operating Areas (for **BDW93, BDW93A, BDW94, BDW94A**).



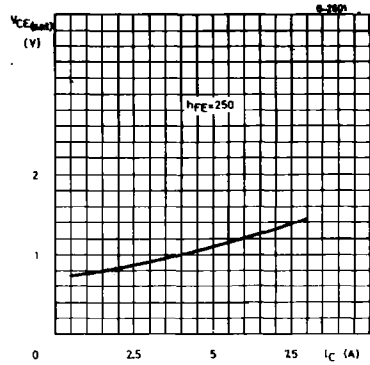
Safe Operating Areas (for **BDW93B, BDW93C, BDW94B, BDW94C**).



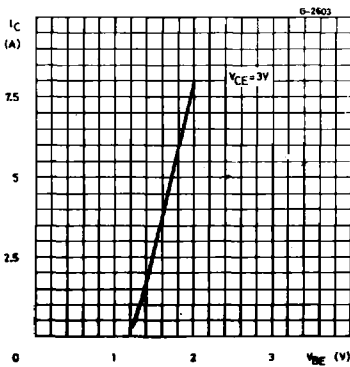
DC Current Gain (NPN types).



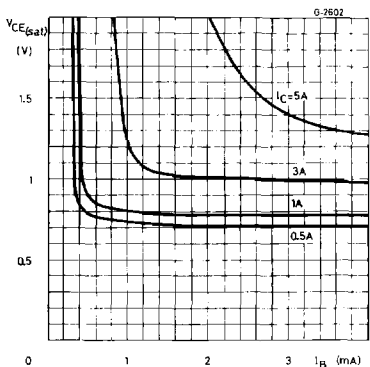
Collector-emitter Saturation Voltage (NPN types).



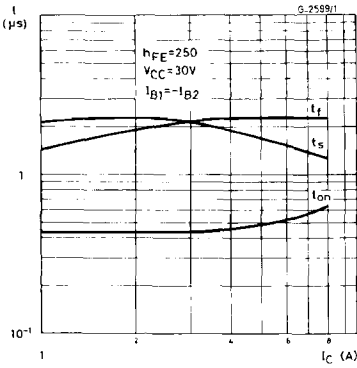
DC Transconductance (NPN types).



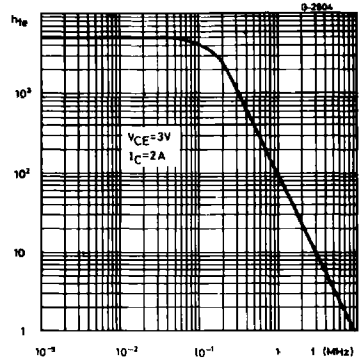
Collector-emitter Saturation Voltage (NPN types).



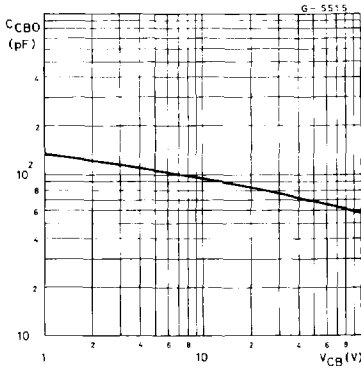
Saturated Switching Characteristics (NPN types).



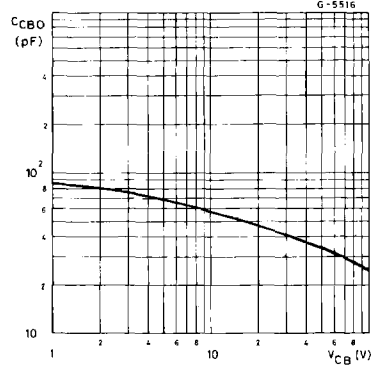
Small Signal Current Gain (NPN types).



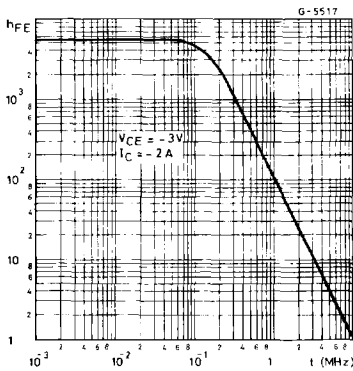
Collector-base Capacitance (PNP types).



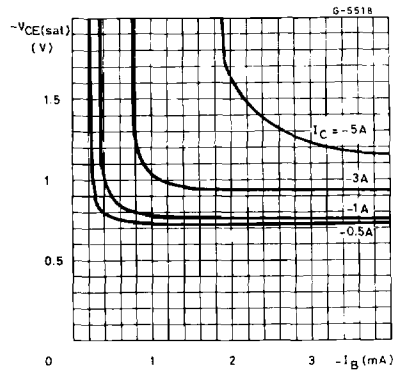
Collector-base Capacitance (NPN types).



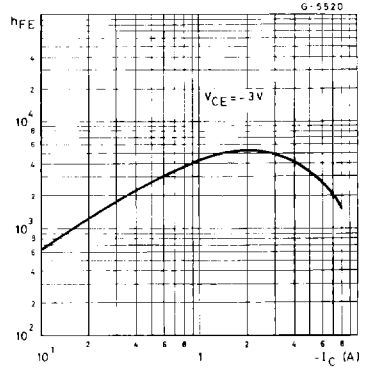
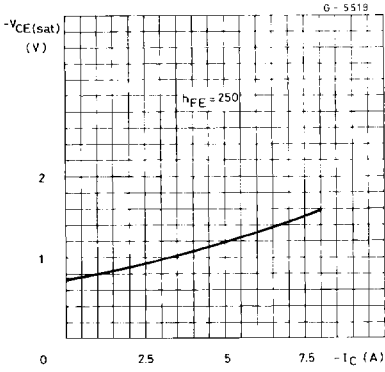
Small Signal Current Gain (PNP types).



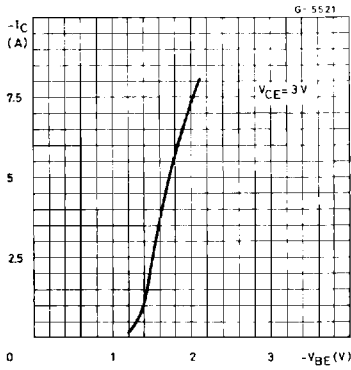
Collector-emitter Saturation Voltage (PNP types).



Collector-emitter Saturation Voltage (PNP types).



DC Transconductance (PNP types).



Saturated Switching Characteristics (PNP types).

