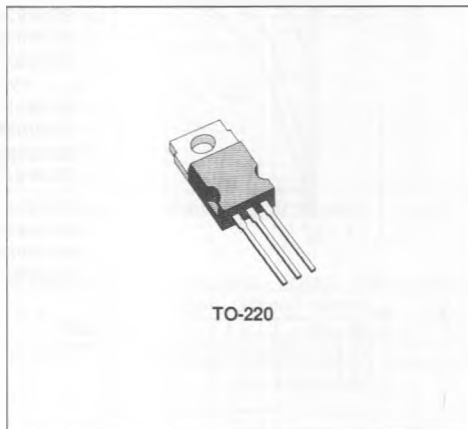


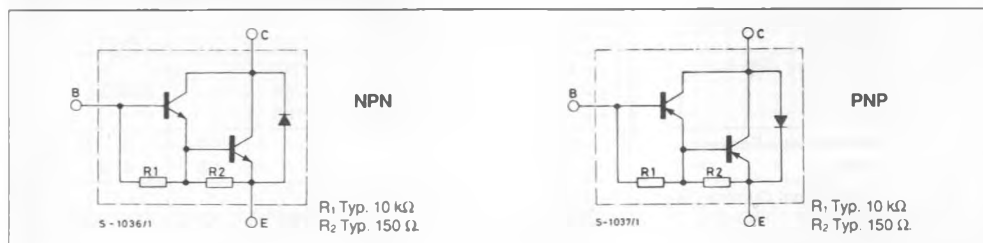
## NPN/PNP POWER DARLINGTONS

### 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	
$V_{CBO}$	Collector-base Voltage ( $I_E = 0$ )		45	60	80	100	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )		45	60	80	100	V
$I_C$	Collector Current		12				A
$I_{CM}$	Collector Peak Current		15				A
$I_B$	Base Current		0.2				A
$P_{tot}$	Total Power Dissipation at $T_{case} \leq 25^\circ\text{C}$		80				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	1.56	°C/W
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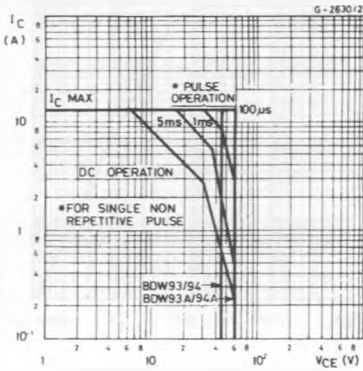
ELECTRICAL CHARACTERISTICS ( $T_{case} = 25\text{ °C}$  unless otherwise specified)

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

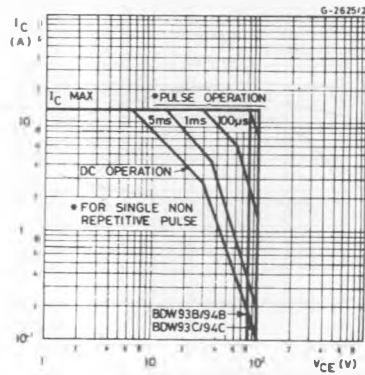
\* Pulsed pulse duration = 300  $\mu\text{s}$ , duty cycle = 1.5 %.

For PNP types voltage and current values are negative.

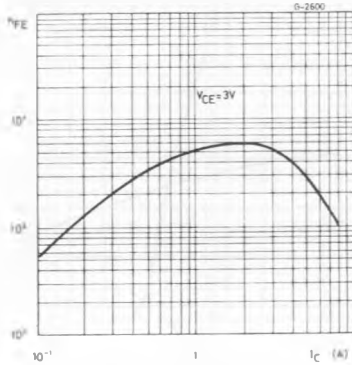
Safe Operating Areas (for **BDW93, BDW93A, BDW94, BDW94A**).



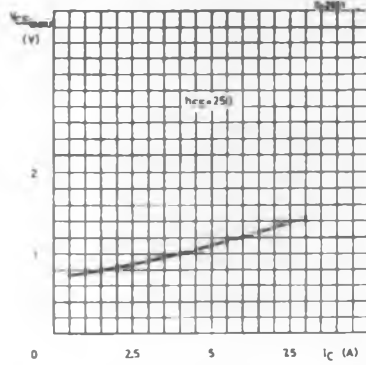
Safe Operating Areas (for **BDW93B, BDW93C, BDW94B, BDW94C**).



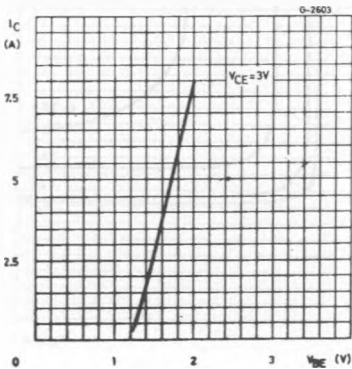
DC Current Gain (NPN types).



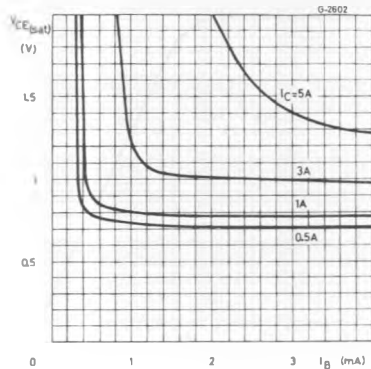
Collector-emitter Saturation Voltage (NPN types).



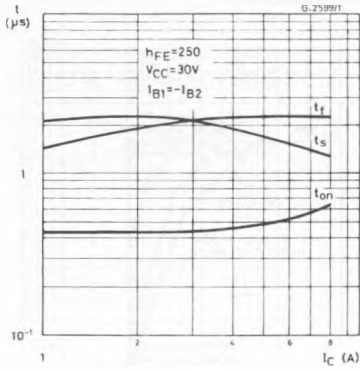
DC Transconductance (NPN types).



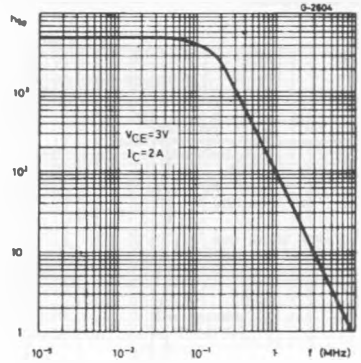
Collector-emitter Saturation Voltage (NPN types).



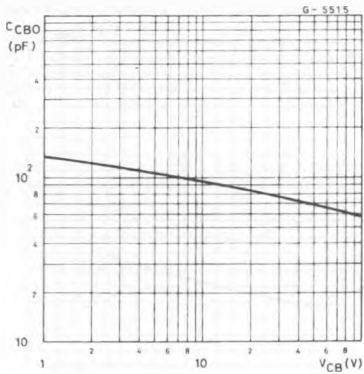
Saturated Switching Characteristics (NPN types).



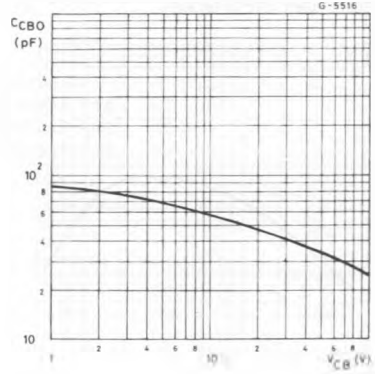
Small Signal Current Gain (NPN types).



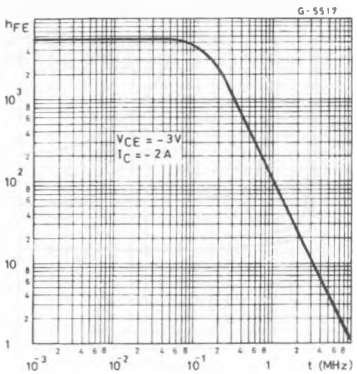
Collector-base Capacitance (PNP types).



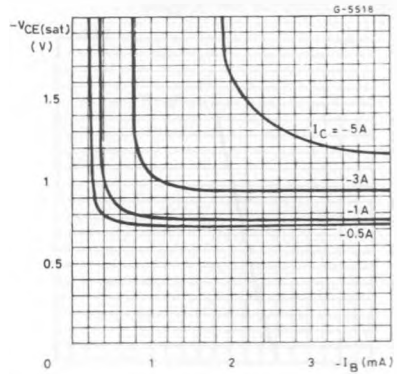
Collector-base Capacitance (NPN types).



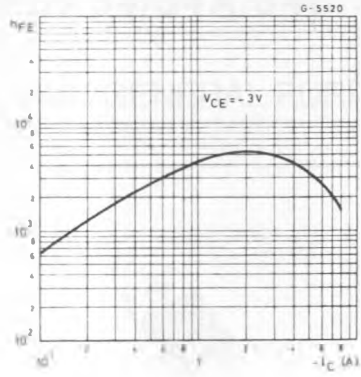
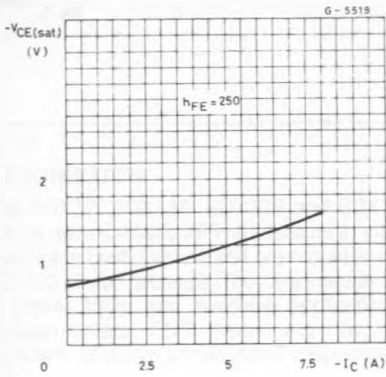
Small Signal Current Gain (PNP types).



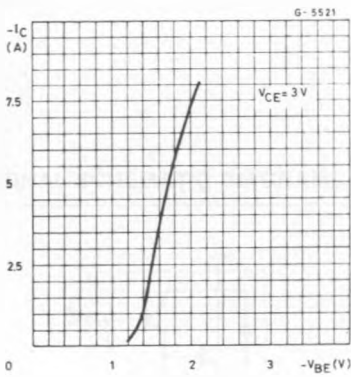
Collector-emitter Saturation Voltage (PNP types).



Collector-emitter Saturation Voltage (PNP types).



DC Transconductance (PNP types).



Saturated Switching Characteristics (PNP types).

