

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

- SGS-THOMSON PREFERRED SALESTYPES
- COMPLEMENTARY PNP - NPN DEVICES
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

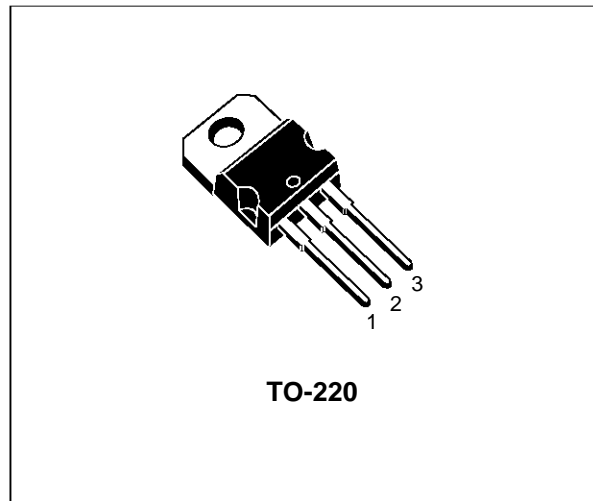
### APPLICATIONS

- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

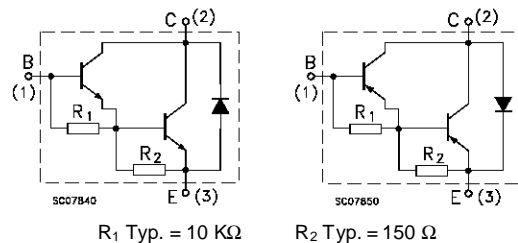
### DESCRIPTION

The BDW93B, and BDW93C are silicon epitaxial-base NPN power 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 BDW94B and BDW94C respectively.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		NPN	PNP	
$V_{CBO}$	Collector-Base Voltage ( $I_E = 0$ )	80	100	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	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 Dissipation at $T_c \leq 25^\circ\text{C}$	80		W
$T_{stg}$	Storage Temperature	-65 to 150		$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	150		$^\circ\text{C}$

For PNP types voltage and current values are negative.

## BDW93B/BDW93C/BDW94B/BDW94C

### THERMAL DATA

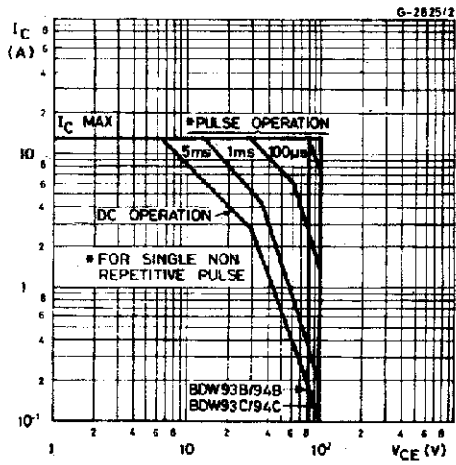
R <sub>thj-case</sub>	Thermal Resistance Junction-case	1.56	°C/W
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### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

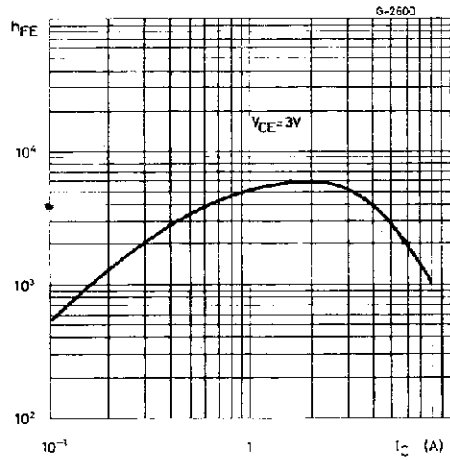
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CBO</sub>	Collector Cut-off Current (I <sub>E</sub> = 0)	for <b>BDW93B/94B</b> V <sub>CB</sub> = 80 V for <b>BDW93C/94C</b> V <sub>CB</sub> = 100 V T <sub>case</sub> = 150 °C for <b>BDW93B/94B</b> V <sub>CB</sub> = 80 V for <b>BDW93C/94C</b> V <sub>CB</sub> = 100 V			100 100 5 5	μA μA mA mA
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	for <b>BDW93B/94B</b> V <sub>CB</sub> = 80 V for <b>BDW93C/94C</b> V <sub>CB</sub> = 100 V			1 1	mA mA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 5 V			2	mA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 100 mA for <b>BDW93B/94B</b> for <b>BDW93C/94C</b>	80 100			V V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 5 A I <sub>B</sub> = 20 mA I <sub>C</sub> = 10 A I <sub>B</sub> = 100 mA			2 3	V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 5 A I <sub>B</sub> = 20 mA I <sub>C</sub> = 10 A I <sub>B</sub> = 100 mA			2.5 4	V V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 3 A V <sub>CE</sub> = 3 V I <sub>C</sub> = 5 A V <sub>CE</sub> = 3 V I <sub>C</sub> = 10 A V <sub>CE</sub> = 3 V	1000 750 100		20K	
V <sub>F*</sub>	Parallel-diode Forward Voltage	I <sub>F</sub> = 5 A I <sub>F</sub> = 10 A		1.3 1.8	2 4	V V
h <sub>fe</sub> :	Small Signal Current Gain	I <sub>C</sub> = 1 A V <sub>CE</sub> = 10 V f = 1 MHz	20			

\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %  
For PNP types voltage and current values are negative.

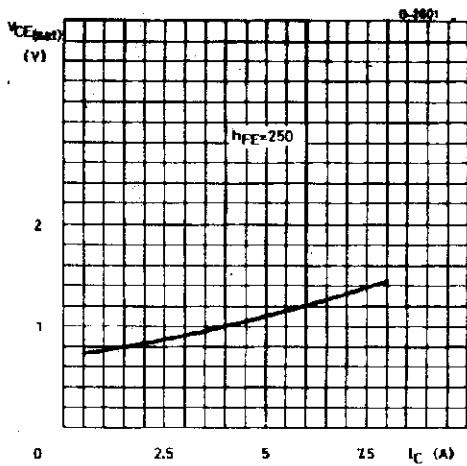
Safe Operating Area



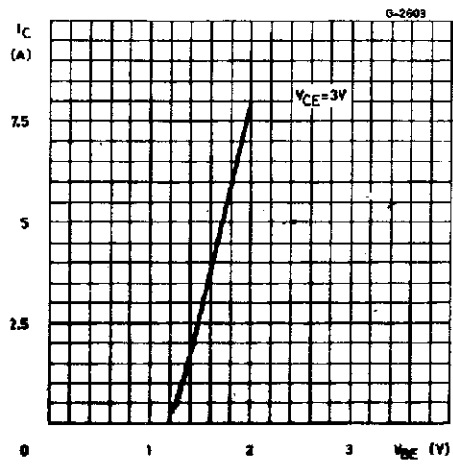
DC Current Gain (NPN types)



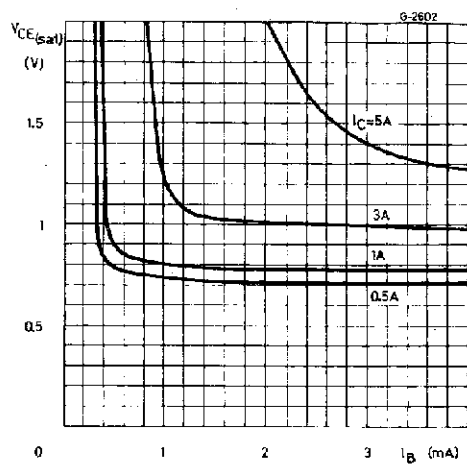
Collector Emitter Saturation Voltage (NPN types)



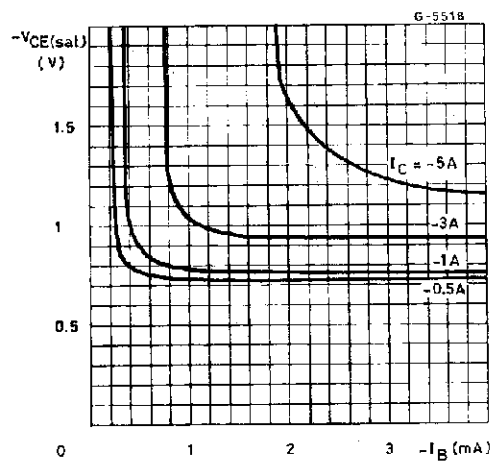
DC Transconductance (NPN types)



Collector Emitter Saturation Voltage (NPN types)

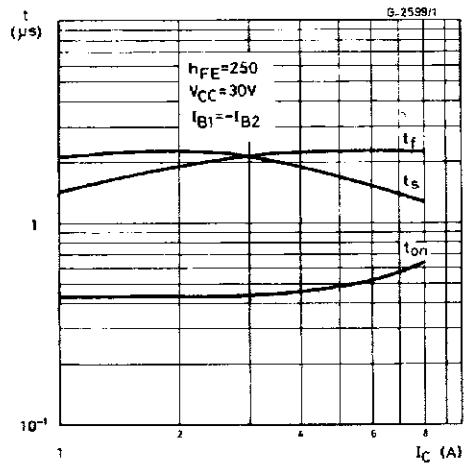


Collector Emitter Saturation Voltage (PNP types)

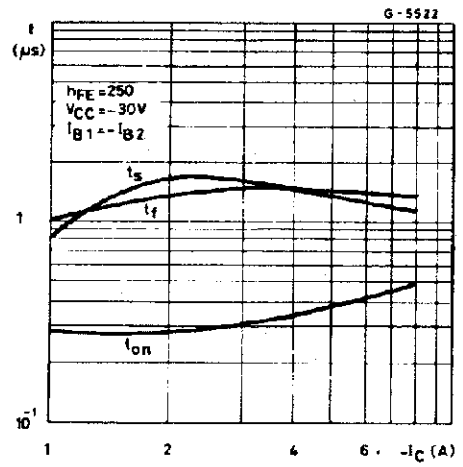


# BDW93B/BDW93C/BDW94B/BDW94C

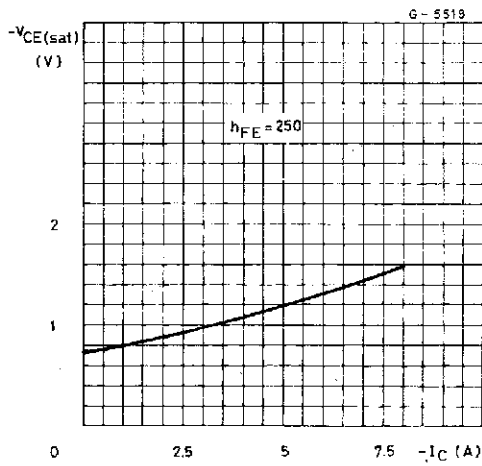
Saturated Switching Characteristics (NPN types)



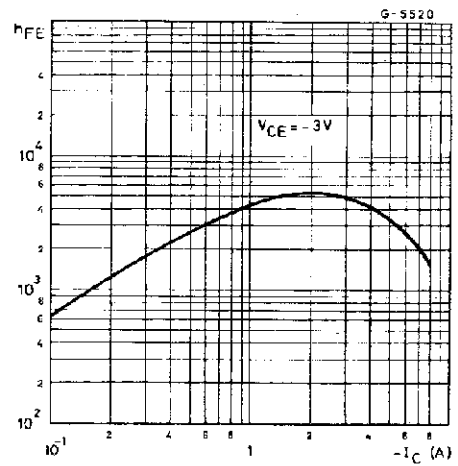
Saturated Switching Characteristics (PNP types)



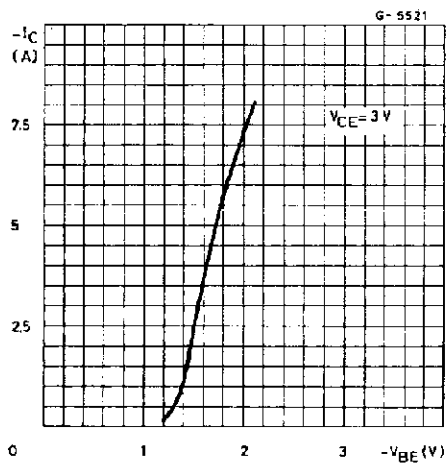
Collector Emitter Saturation Voltage (PNP types)



DC Current Gain (PNP types)

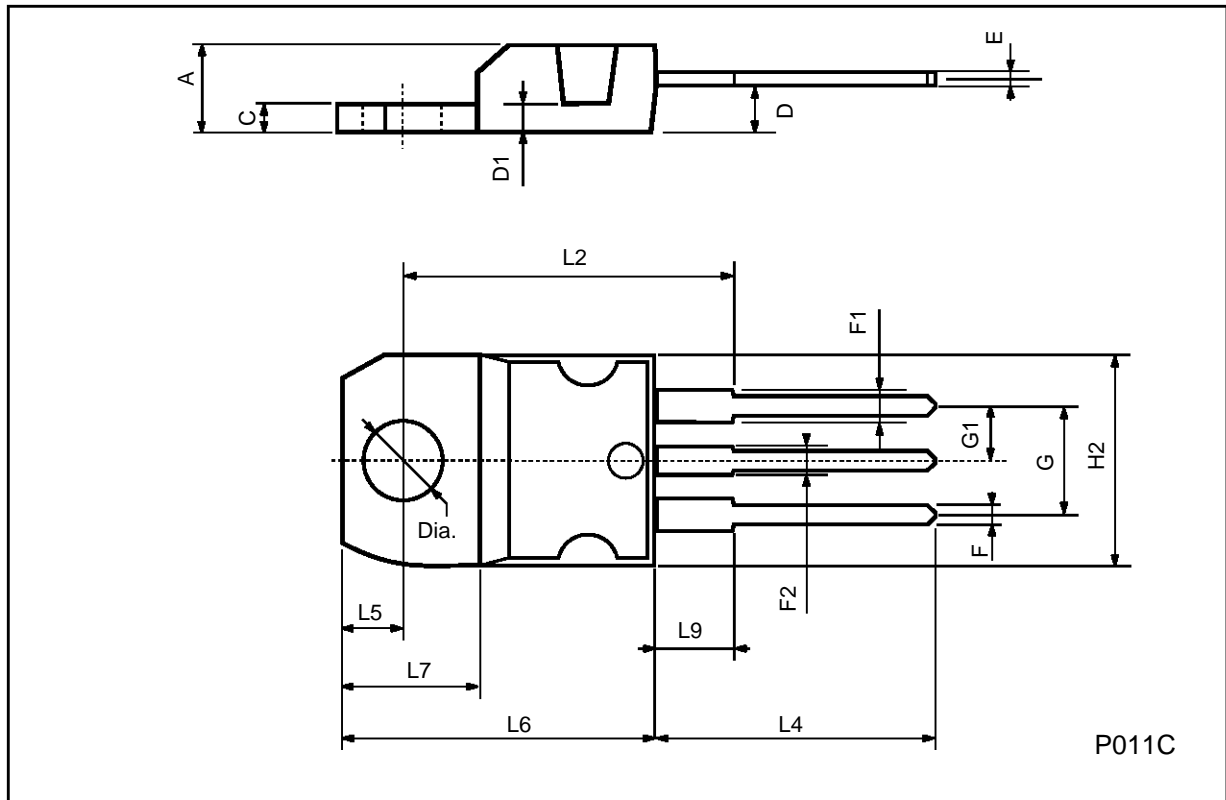


DC Transconductance (PNP types)



**TO-220 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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