

# EPITAXIAL-BASE NPN/PNP

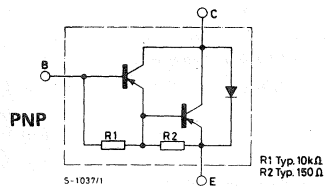
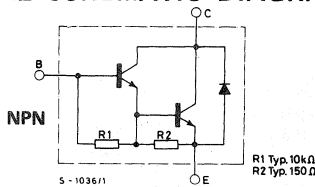
## POWER DARLINGTONS

The BDW 93, BDW 93A, BDW 93B and BDW 93C 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 BDW 94, BDW 94A, BDW 94B and BDW 94C respectively.

ABSOLUTE MAXIMUM RATINGS		NPN	BDW93	BDW93A	BDW93B	BDW93C
		PNP *	BDW94	BDW94A	BDW94B	BDW94C
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )		45V	60V	80V	100V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )		45V	60V	80V	100V
$I_C$	Collector current				12A	
$I_{CM}$	Collector peak current				15A	
$I_B$	Base current				0.2A	
$P_{tot}$	Total power dissipation at $T_{case} \leq 25^\circ C$				80W	
$T_{stg}$	Storage temperature				-65 to 150°C	
$T_j$	Junction temperature				150°C	

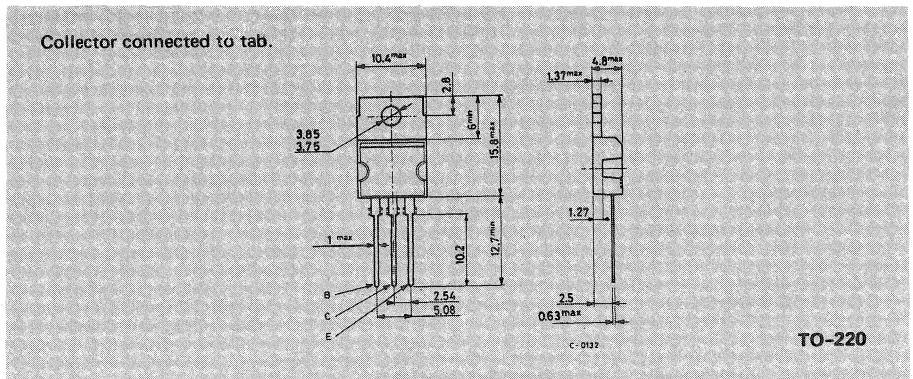
\* For PNP types voltage and current values are negative

## INTERNAL SCHEMATIC DIAGRAMS



## MECHANICAL DATA

Dimensions in mm





## THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	1.56	$^{\circ}C/W$
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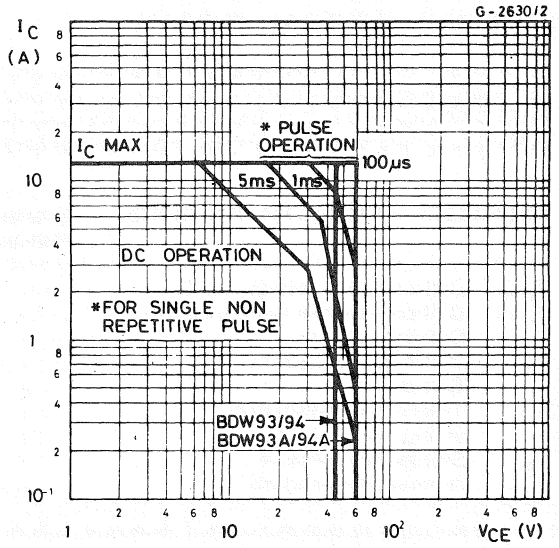
## ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$ unless otherwise specified)

Parameter	Test conditions	Min.	Typ.	Max.	Unit.
$I_{CBO}$ Collector cutoff current ( $I_E = 0$ )	for <b>BDW93/94</b> $V_{CB} = 45V$			100	$\mu A$
	for <b>BDW93A/94A</b> $V_{CB} = 60V$			100	$\mu A$
	for <b>BDW93B/94B</b> $V_{CB} = 80V$			100	$\mu A$
	for <b>BDW93C/94C</b> $V_{CB} = 100V$			100	$\mu A$
	$T_{case} = 150^{\circ}C$				
$I_{CEO}$ Collector cutoff current ( $I_B = 0$ )	for <b>BDW93/94</b> $V_{CE} = 40V$			1	mA
	for <b>BDW93A/94A</b> $V_{CE} = 60V$			1	mA
	for <b>BDW93B/94B</b> $V_{CE} = 80V$			1	mA
	for <b>BDW93C/94C</b> $V_{CE} = 80V$			1	mA
$I_{EBO}$ 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 <b>BDW93/94</b> for <b>BDW93A/94A</b> for <b>BDW93B/94B</b> for <b>BDW93C/94C</b>	45			V
$V_{CE(sat)}$ * Collector-emitter saturation voltage	$I_C = 5A$ $I_B = 20mA$			2	V
	$I_C = 10A$ $I_B = 100mA$			3	V
$V_{BE(sat)}$ * Base-emitter saturation voltage	$I_C = 5A$ $I_B = 20mA$			2.5	V
	$I_C = 10A$ $I_B = 100mA$			4	V
$h_{FE}$ * DC current gain	$I_C = 3A$ $V_{CE} = 3V$	1000			—
	$I_C = 5A$ $V_{CE} = 3V$	750	20000		—
	$I_C = 10A$ $V_{CE} = 3V$	100			—
$V_F$ * Parallel-diode forward voltage	$I_F = 5A$	1.3		2	V
	$I_F = 10A$	1.8		4	V
$h_{fe}$ Small signal current gain	$I_C = 1A$ $V_{CE} = 10V$ $f = 1\text{ MHz}$	20			—

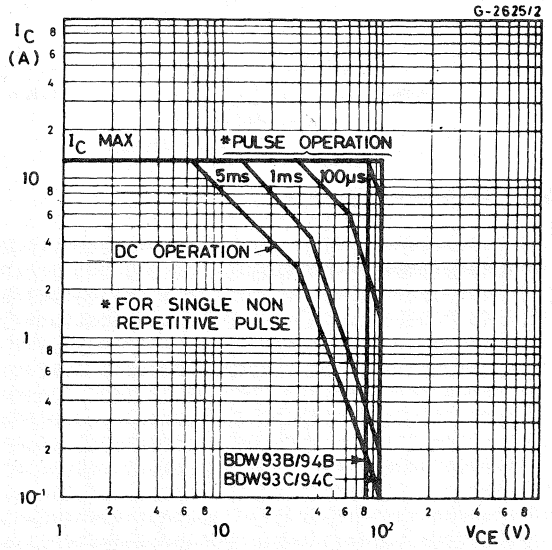
\* Pulsed: pulse duration = 300  $\mu s$ , duty cycle = 1.5%

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**)



For the others characteristics see **BDX33/BDX34** series