



## BD644/646/648/650/652

### SILICON DARLINGTON POWER TRANSISTORS

PNP epitaxial-base transistors in a monolithic Darlington circuit and housed in a TO-220 envelope. They are intended for output stages in audio equipment, general amplifiers, and analogue switching application.

NPN complements are BD643, BD645, BD647, BD649 and BD651

#### ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings	Value	Unit	
$-V_{CBO}$	Collector-Base Voltage	BD644	45	V
		BD646	60	
		BD648	80	
		BD650	100	
		BD652	120	
$-V_{CEO}$	Collector-Emitter Voltage	BD644	45	V
		BD646	60	
		BD648	80	
		BD650	100	
		BD652	120	
$-V_{EBO}$	Emitter-Base Voltage	BD644	5	V
		BD646		
		BD648		
		BD650		
		BD652		
$-I_C$	Collector Current	BD644	8	A
		BD646		
		BD648		
		BD650		
		BD652		
$-I_{CM}$	Collector Peak Current	BD644	12	A
		BD646		
		BD648		
		BD650		
		BD652		



## BD644/646/648/650/652

Symbol	Ratings		Value	Unit
$-I_B$	Base Current		150	mA
		BD644		
		BD646		
		BD648		
		BD650		
$P_T$	Power Dissipation	@ $T_{mb} < 25^\circ$	62.5	Watts
		BD644		
		BD646		
		BD648		
$T_J$	Junction <i>Temperature</i>		150	$^\circ\text{C}$
		BD644		
		BD646		
		BD648		
$T_s$	<i>Storage Temperature range</i>		-65 to +150	$^\circ\text{C}$
		BD644		
		BD646		
		BD648		

Limiting values in accordance with the Absolute Maximum System (IEC 134)

### THERMAL CHARACTERISTICS

Symbol	Ratings		Value	Unit
$R_{thJ-MB}$	From junction to mounting base		2	K/W
		BD644		
		BD646		
		BD648		
		BD650		
$R_{thJ-A}$	From junction to ambient in free air		70	K/W
		BD644		
		BD646		
		BD648		



**BD644/646/648/650/652**  
**ELECTRICAL CHARACTERISTICS**

TC=25°C unless otherwise noted

Symbol	Ratings	Test Condition(s)	Min	Typ	Mx	Unit	
<b>-I<sub>CBO</sub></b>	Collector Cutoff Current	$-I_E=0, -V_{CB} = -V_{CEO}MAX$	BD644	-	-	0.1	mA
			BD646				
			BD648				
			BD650				
			BD652				
		$-I_E=0, -V_{CB} = 1/2 -V_{CBO}MAX, T_J=150^\circ C$	BD644	-	-	1	mA
			BD646				
			BD648				
			BD650				
			BD652				
<b>-I<sub>CEO</sub></b>	Collector Cutoff Current	$-I_E=0, -V_{CE} = 1/2 -V_{CEO}MAX$	BD644	-	-	0.2	mA
			BD646				
			BD648				
			BD650				
			BD652				
<b>-I<sub>EBO</sub></b>	Emitter Cutoff Current	$-V_{EB}=5 V, -I_C=0$	BD644	-	-	5.0	mA
			BD646				
			BD648				
			BD650				
			BD652				
<b>-V<sub>CE(SAT)</sub></b>	Collector-Emitter saturation Voltage (*)	$-I_C=4 A, -I_B=16 mA$	BD644	-	-	2	V
			BD646				
			BD648				
			BD650				
			BD652				
		$-I_C=3 A, -I_B=12 mA$	BD644	-	-	2	
			BD646				
			BD648				
			BD650				
			BD652				
		$-I_C=5 A, -I_B=50 mA$	BD644	-	-	2.5	
			BD646				
			BD648				
			BD650				
			BD652				
<b>-V<sub>BE(SAT)</sub></b>	Base-Emitter Saturation Voltage (*)	$-I_C=12 A, -I_B=50 mA$	BD644	-	-	3	V
			BD646				
			BD648				
			BD650				
			BD652				

**BD644/646/648/650/652**

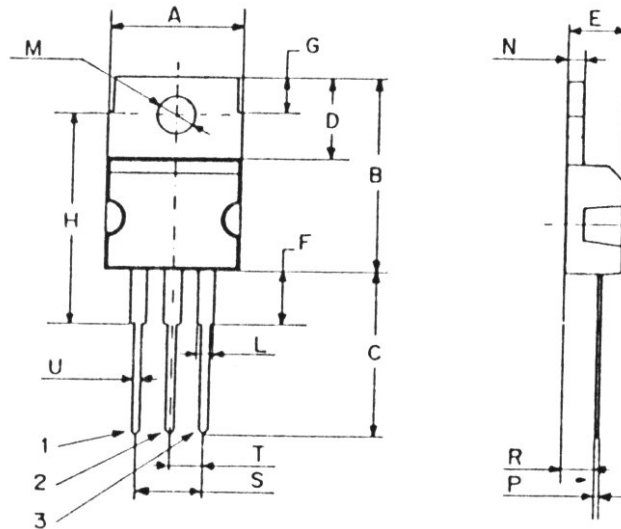
Symbol	Ratings			Value			Unit
<b>-V<sub>BE</sub></b>	Base-Emitter Voltage (*)	-I <sub>C</sub> =4 A, -V <sub>CE</sub> =3 V	<b>BD644</b>	-	-	2.5	V
			<b>BD646</b>	-	-	-	
			<b>BD648</b>	-	-	-	
			<b>BD650</b>	-	-	-	
			<b>BD652</b>	-	-	-	
		-I <sub>C</sub> =3 A, -V <sub>CE</sub> =3 V	<b>BD644</b>	-	-	-	
			<b>BD646</b>	-	-	2.5	
			<b>BD648</b>	-	-	2.5	
			<b>BD650</b>	-	-	2.5	
			<b>BD652</b>	-	-	2.5	
<b>h<sub>FE</sub></b>	DC Current Gain (*)	-V <sub>CE</sub> =3.0 V, -I <sub>C</sub> =0.5 A	<b>BD644</b>	-	2700	-	-
			<b>BD646</b>	-		-	
			<b>BD648</b>	-		-	
			<b>BD650</b>	-		-	
			<b>BD652</b>	-		-	
		-V <sub>CE</sub> =3.0 V, -I <sub>C</sub> =4 A	<b>BD644</b>	750	-	-	
			<b>BD646</b>	-	-	-	
			<b>BD648</b>	-	-	-	
			<b>BD650</b>	-	-	-	
			<b>BD652</b>	-	-	-	
		-V <sub>CE</sub> =3.0 V, -I <sub>C</sub> =3 A	<b>BD644</b>	-	750	-	
			<b>BD646</b>	-		-	
			<b>BD648</b>	-		-	
			<b>BD650</b>	-		-	
			<b>BD652</b>	-		-	
		-V <sub>CE</sub> =3.0 V, -I <sub>C</sub> =8 A	<b>BD644</b>	-	200	-	
			<b>BD646</b>	-		-	
			<b>BD648</b>	-		-	
			<b>BD650</b>	-		-	
			<b>BD652</b>	-		-	
<b>h<sub>fe</sub></b>	Small Signal Current Gain	-V <sub>CE</sub> =3.0 V, -I <sub>C</sub> =4 A, f=1MHz	<b>BD644</b>	10	-	-	
			<b>BD646</b>	-	-	-	
			<b>BD648</b>	-	-	-	
			<b>BD650</b>	-	-	-	
			<b>BD652</b>	-	-	-	
		-V <sub>CE</sub> =3.0 V, -I <sub>C</sub> =3 A, f=1MHz	<b>BD644</b>	-	-	-	
			<b>BD646</b>	10	-	-	
			<b>BD648</b>	10	-	-	
			<b>BD650</b>	10	-	-	
			<b>BD652</b>	10	-	-	

(\*) Pulse Width ≈ 300 μs, Duty Cycle &lt; 2.0%

## BD644/646/648/650/652

### MECHANICAL DATA CASE TO-220

DIMENSIONS		
	mm	inches
A	9,86	0,39
B	15,73	0,62
C	13,37	0,52
D	6,67	0,26
E	4,44	0,17
F	4,21	0,16
G	2,99	0,11
H	17,21	0,68
L	1,29	0,05
M	3,6	0,14
N	1,36	0,05
P	0,46	0,02
R	2,1	0,08
S	5	0,19
T	2,51	0,098
U	0,79	0,03



Pin 1 :	Anode 1
Pin 2 :	Anode 2
Pin 3 :	Gate