

**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

Compliance to RoHS.

**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

### ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings		Value	Unit	
$-I_B$	Base Current	BD644	150	mA	
		BD646			
		BD648			
		BD650			
		BD652			
$P_T$	Power Dissipation	@ $T_{mb} < 25^\circ$	BD644	62.5	Watts
			BD646		
			BD648		
			BD650		
			BD652		
$T_J$	Junction <i>Temperature</i>	BD644	150	°C	
		BD646			
		BD648			
		BD650			
		BD652			
$T_s$	Storage <i>Temperature range</i>	BD644	-65 to +150		
		BD646			
		BD648			
		BD650			
		BD652			

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
$R_{thJ-A}$	From junction to ambient in free air	70	K/W

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

TC=25°C unless otherwise noted

Symbol	Ratings	Test Condition(s)	Min	Typ	Max	Unit	
$-I_{CBO}$	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				
$-I_{CEO}$	Collector Cutoff Current	$-I_E=0, -V_{CE} = 1/2 - V_{CEO}MAX$	BD644	-	-	0.2	mA
			BD646				
			BD648				
			BD650				
			BD652				
$-I_{EBO}$	Emitter Cutoff Current	$-V_{EB}=5 V, -I_C=0$	BD644	-	-	5.0	mA
			BD646				
			BD648				
			BD650				
			BD652				
$-V_{CE(SAT)}$	Collector-Emitter saturation Voltage (*)	$-I_C=4 A, -I_B=16 mA$	BD644	-	-	2	V
			BD646				
		$-I_C=3 A, -I_B=12 mA$	BD648	-	-	2	
			BD650				
			BD652				
		$-I_C=5 A, -I_B=50 mA$	BD644	-	-	2.5	
			BD646				
			BD648				
			BD650				
		BD652					
$-V_{BE(SAT)}$	Base-Emitter Saturation Voltage (*)	$-I_C=12 A, -I_B=50 mA$	BD644	-	-	3	V
			BD646				
			BD648				
			BD650				
			BD652				

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### ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

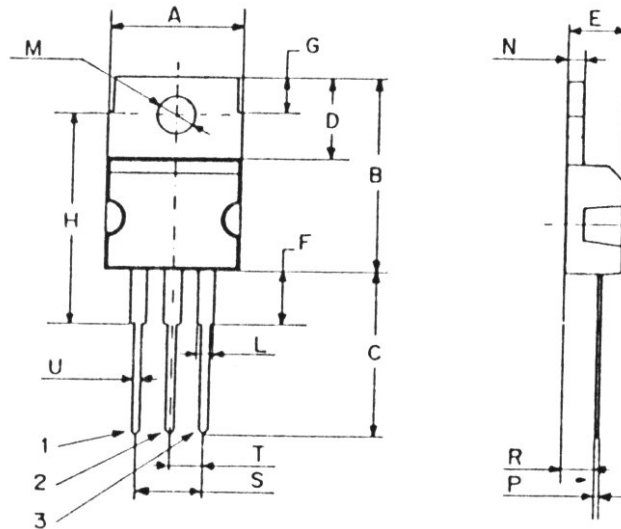
Symbol	Ratings		Min	Typ	Max	Unit	
$-V_{BE}$	Base-Emitter Voltage (*)	$-I_C=4\text{ A}, -V_{CE}=3\text{ V}$	BD644	-	-	2.5	V
		$-I_C=3\text{ A}, -V_{CE}=3\text{ V}$	BD646	-	-	2.5	
			BD648				
			BD650				
			BD652				
$h_{FE}$	DC Current Gain (*)	$-V_{CE}=3.0\text{ V}$ $-I_C=0.5\text{ A}$	BD644	-	2700	-	
			BD646				
			BD648				
			BD650				
			BD652				
		$-V_{CE}=3.0\text{ V}, -I_C=4\text{ A}$	BD644	750	-	-	
			BD646	750	-	-	
			BD648				
			BD650				
		BD652					
		$-V_{CE}=3.0\text{ V}, -I_C=8\text{ A}$	BD644	-	200	-	
			BD646				
BD648							
BD650							
BD652							
$h_{fe}$	Small Signal Current Gain	$-V_{CE}=3.0\text{ V}, -I_C=4\text{ A}$ $f=1\text{ MHz}$	BD644	10	-	-	
			BD646	10	-	-	
		BD648					
		BD650					
		BD652					
$t_{on}$	turn-on time	$-I_C=3\text{ A}$	All types	-	1	-	$\mu\text{s}$
$t_{off}$	turn-off time	$-I_{Bon}=I_{Boff}=12\text{ mA}$		-	5	-	

(\*) Pulse Width  $\approx 300\ \mu\text{s}$ , Duty Cycle  $\angle 2.0\%$

## BD644 – 646 – 648 – 650 – 652

### MECHANICAL DATA CASE TO-220

DIMENSIONS (mm)		
	Min.	Max.
A	9,90	10,30
B	15,65	15,90
C	13,20	13,40
D	6,45	6,65
E	4,30	4,50
F	2,70	3,15
G	2,60	3,00
H	15,75	17,15
L	1,15	1,40
M	3,50	3,70
N	-	1,37
P	0,46	0,55
R	2,50	2,70
S	4,98	5,08
T	2,49	2,54
U	0,70	0,90



Pin 1 :	Base
Pin 2 :	Collector
Pin 3 :	Emitter
Package	Collector

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