

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		

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ABSOLUTE MAXIMUM RATINGS

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

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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 (*)	$-I_C=5 A, -I_B=50 mA$	BD644	-	-	3	V
			BD646				
			BD648				
			BD650				
			BD652				

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ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

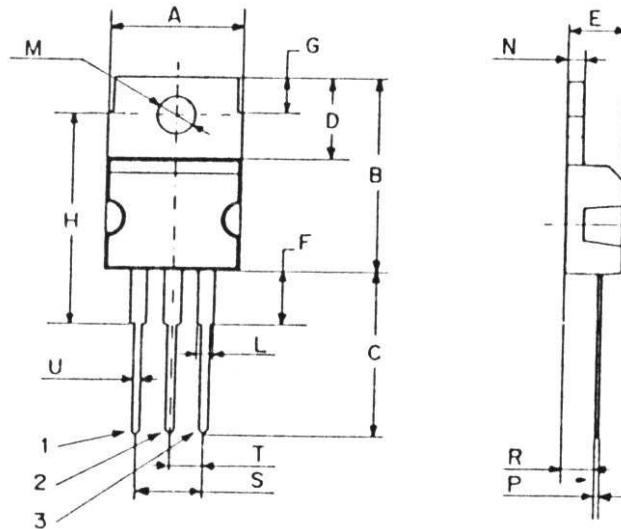
Symbol	Ratings		Min	Typ	Max	Unit	
$-V_{BE}$	Base-Emitter Voltage (*)	$-I_C=4\text{ A}, -V_{CE}=3\text{ V}$	BD644	-	-	2.5	V
		$-I_C=3\text{ A}, -V_{CE}=3\text{ V}$	BD646	-	-	2.5	
			BD648				
			BD650				
			BD652				
h_{FE}	DC Current Gain (*)	$-V_{CE}=3.0\text{ V}$ $-I_C=0.5\text{ A}$	BD644	-	2700	-	
			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							
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	-	μs
				t_{off}	turn-off time	$-I_{Bon}=I_{Boff}=12\text{ mA}$	

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

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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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