



BD643/645/647/649/651

SILICON NPN DAELINGTON POWER TRANSISTORS

NPN 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.

PNP complements are BD644, BD646, BD648, BD650 and BD652

ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings	Value	Unit	
V_{CBO}	Collector-Base Voltage	BD644	60	V
		BD646	80	
		BD648	100	
		BD650	120	
		BD652	140	
V_{CEO}	Collector-Emitter Voltage	BD644	45	V
		BD646	60	
		BD648	80	
		BD650	100	
		BD652	120	
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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Symbol	Ratings		Value	Unit
I_B	Base Current	BD644 BD646 BD648 BD650 BD652	150	mA
P_T	Power Dissipation	@ $T_{mb} < 25^\circ$ BD644 BD646 BD648 BD650 BD652	62.5	Watts
$T_J T_s$	Junction Storage Temperature	BD644 BD646 BD648 BD650 BD652	150 -65 to +150	$^\circ C$

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	BD644 BD646 BD648 BD650 BD652	2	K/W
R_{thJ-A}	From junction to ambient in free air	BD644 BD646 BD648 BD650 BD652	70	K/W

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ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

Symbol	Ratings	Test Condition(s)	Min	Typ	Mx	Unit		
I_{CBO}	Collector Cutoff Current	$I_E=0, V_{CB} = V_{CEO}MAX$	-	-	0.1	mA		
		$I_E=0, V_{CB} = 1/2 V_{CBO}MAX,$ $T_J=150^\circ C$	-	-	1	mA		
I_{CEO}	Collector Cutoff Current	$I_E=0, V_{CE} = 1/2 V_{CEO}MAX$	-	-	0.2	mA		
I_{EBO}	Emitter Cutoff Current	$V_{EB}=5 V, I_C=0$	-	-	5.0	mA		
$V_{CE(SAT)}$	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	-	-	-		
			BD646	-	-	2		
			BD648	-	-	2		
			BD650	-	-	2		
		$I_C=5 A, I_B=50 mA$	BD652	-	-	2		
			BD644	-	-	2.5		
			BD646	-	-	2.5		
BD648	-		-	2.5				
BD650	-		-	2.5				
BD652	-	-	2.5					
	$V_{BE(SAT)}$	Base-Emitter Saturation Voltage (*)	$I_C=12 A, I_B=120 mA$	BD644	-	-	3	V
				BD646	-	-	-	
				BD648	-	-	-	
BD650				-	-	-		
BD652				-	-	-		

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Symbol	Ratings			Value			Unit
V_{BE}	Base-Emitter Voltage (*)	$I_C=4\text{ A}, V_{CE}=3\text{ V}$	BD644	-	-	2.5	V
			BD646	-	-	-	
			BD648	-	-	-	
			BD650	-	-	-	
			BD652	-	-	-	
		$I_C=3\text{ A}, V_{CE}=3\text{ V}$	BD644	-	-	-	
			BD646	-	-	2.5	
			BD648	-	-	2.5	
			BD650	-	-	2.5	
			BD652	-	-	2.5	
h_{FE}	DC Current Gain (*)	$V_{CE}=3.0\text{ V}, I_C=0.5\text{ A}$	BD644	-	-	-	-
			BD646	-	-	-	
			BD648	-	1900	-	
			BD650	-	-	-	
			BD652	-	-	-	
		$V_{CE}=3.0\text{ V}, I_C=4\text{ A}$	BD644	750	-	-	
			BD646	-	-	-	
			BD648	-	-	-	
			BD650	-	-	-	
			BD652	-	-	-	
		$V_{CE}=3.0\text{ V}, I_C=3\text{ A}$	BD644	-	-	-	
			BD646	-	-	-	
			BD648	750	-	-	
			BD650	-	-	-	
			BD652	-	-	-	
		$V_{CE}=3.0\text{ V}, I_C=8\text{ A}$	BD644	-	-	-	
			BD646	-	-	-	
			BD648	-	1800	-	
			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	-	-	-	
			BD648	-	-	-	
			BD650	-	-	-	
			BD652	-	-	-	
		$V_{CE}=3.0\text{ V}, I_C=3\text{ A}, f=1\text{MHz}$	BD644	-	-	-	
			BD646	10	-	-	
			BD648	10	-	-	
			BD650	10	-	-	
			BD652	10	-	-	

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

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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	2,52	0,098
U	0,79	0,03

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

