

**BD643 – 645 – 647 – 649 – 651**

## SILICON DARLINGTON 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

Compliance to RoHS.

### ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings	Value	Unit	
$V_{CBO}$	Collector-Base Voltage	BD643	60	V
		BD645	80	
		BD647	100	
		BD649	120	
		BD651	140	
$V_{CEO}$	Collector-Emitter Voltage	BD643	45	V
		BD645	60	
		BD647	80	
		BD649	100	
		BD651	120	
$V_{EBO}$	Emitter-Base Voltage	BD643	5	V
		BD645		
		BD647		
		BD649		
		BD651		
$I_C$	Collector Current	BD643	8	A
		BD645		
		BD647		
		BD649		
		BD651		
$I_{CM}$	Collector Peak Current	BD643	12	A
		BD645		
		BD647		
		BD649		
		BD651		

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### ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings		Value	Unit
$I_B$	Base Current	BD643	300	mA
		BD645		
		BD647		
		BD649		
		BD651		
$P_T$	Power Dissipation	@ $T_{mb} < 25^\circ$	62.5	Watts
		BD643		
		BD645		
		BD647		
		BD649		
$T_J$	Junction Temperature	BD643	150	$^\circ\text{C}$
		BD645		
		BD647		
		BD649		
		BD651		
$T_s$	Storage Temperature range	BD643	-65 to +150	$^\circ\text{C}$
		BD645		
		BD647		
		BD649		
		BD651		

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	62.5	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	$I_E=0, V_{CB}=V_{CE0Max}$	BD643	-	-	0.2	mA
			BD645				
			BD647				
			BD649				
			BD651				
		$I_E=0, V_{CB}=1/2 V_{CBOMax}$ $T_J=150^\circ C$	BD643	-	-	2	mA
			BD645				
			BD647				
BD649							
$I_{CEO}$	Collector Cutoff Current	$I_E=0, V_{CE}=1/2 V_{CE0Max}$	BD643	-	-	0.5	mA
			BD645				
			BD647				
			BD649				
			BD651				
$I_{EBO}$	Emitter Cutoff Current	$V_{EB}=5 V, I_C=0$	BD643	-	-	5.0	mA
			BD645				
			BD647				
			BD649				
			BD651				
$V_{CE0}$	Collector-Emitter Breakdown Voltage	$I_C=30 mA, I_B=0$	BD643	45	-	-	V
			BD645	60	-	-	
			BD647	80	-	-	
			BD649	100	-	-	
			BD651	120	-	-	
$V_{CE(SAT)}$	Collector-Emitter saturation Voltage (*)	$I_C=4 A, I_B=16 mA$	BD643	-	-	2	V
			BD645				
			BD647				
			BD649				
		$I_C=3 A, I_B=12 mA$	BD643	-	-	2	
			BD645				
			BD647				
			BD649				
		$I_C=5 A, I_B=50 mA$	BD643	-	-	2.5	
			BD645				
			BD647				
			BD649				
$V_{BE(SAT)}$	Base-Emitter Saturation Voltage (*)	$I_C=12 A, I_B=50 mA$	BD643	-	-	3	V
			BD645				
			BD647				
			BD649				
			BD651				

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### ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

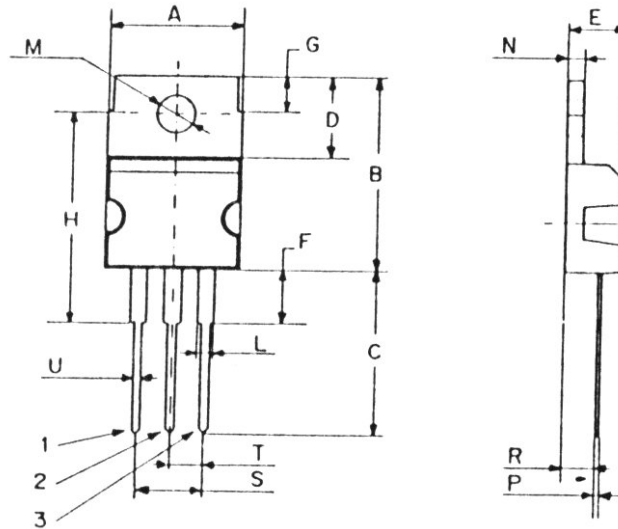
Symbol	Ratings	Test Condition(s)	Min	Typ	Max	Unit	
$V_{BE}$	Base-Emitter Voltage (*)	$I_C=4\text{ A}, V_{CE}=3\text{ V}$	BD643	-	-	2.5	V
		$I_C=3\text{ A}, V_{CE}=3\text{ V}$	BD645	-	-	2.5	
			BD647				
			BD649				
			BD651				
$h_{FE}$	DC Current Gain (*)	$V_{CE}=3.0\text{ V}, I_C=0.5\text{ A}$	BD643	-	1900	-	
			BD645				
			BD647				
			BD649				
			BD651				
		$V_{CE}=3.0\text{ V}, I_C=4\text{ A}$	BD643	750	-	-	
			$V_{CE}=3.0\text{ V}, I_C=3\text{ A}$	BD645	750	-	-
				BD647			
		BD649					
		$V_{CE}=3.0\text{ V}, I_C=8\text{ A}$	BD643	-	1800	-	
			BD645				
			BD647				
BD649							
$h_{fe}$	Small Signal Current Gain	$V_{CE}=3.0\text{ V}, I_C=4\text{ A}$ $f=1\text{ MHz}$	BD643	10	-	-	-
			BD645	10	-	-	
		$V_{CE}=3.0\text{ V}, I_C=3\text{ A}$ $f=1\text{ MHz}$	BD647	10	-	-	
			BD649	10	-	-	
			BD651	10	-	-	

(\*) 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
Case :	Collector

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