

3875081 G E SOLID STATE

01E 17273 D Y-33-29  
Darlington Power Transistors

File Number 1241

BD643, BD645, BD647, BD649

## 8-Ampere N-P-N Darlington Power Transistors

45-60-80 Volts, 70 Watts  
Gain of 750 at 3A

**Features:**

- Operates from IC without predriver
- Low leakage at high temperature

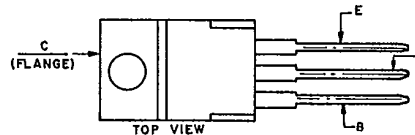
**Applications:**

- Power switching
- Hammer drivers
- Series and shunt regulators
- Audio amplifiers

The RCA-BD643, BD645, BD647, and BD649 are monolithic silicon n-p-n Darlington transistors designed for low- and medium-frequency power applications. The high gain of these devices makes it possible for them to be driven directly from integrated circuits.

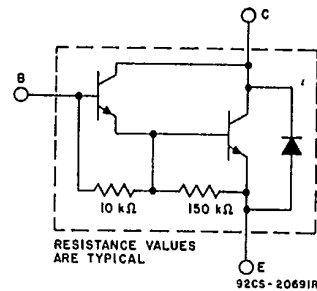
These devices are supplied in the JEDEC TO-220AB (VERSAWATT) plastic package.

**TERMINAL DESIGNATIONS**



92CS-39989

JEDEC TO-220AB



RESISTANCE VALUES ARE TYPICAL

92CS-20691R3

Fig. 1—Schematic diagram for all types.

**MAXIMUM RATINGS, Absolute-Maximum Values:**

	BD643	BD645	BD647	BD649	
V <sub>CB0</sub> .....	45	60	80	100	V
V <sub>CEO(sus)</sub> .....	45	60	80	100	V
V <sub>EBO</sub> .....	_____	5	_____	_____	V
I <sub>C</sub> .....	_____	8	_____	_____	A
I <sub>CM</sub> .....	_____	12	_____	_____	A
I <sub>B</sub> .....	_____	0.15	_____	_____	A
P <sub>T</sub> .....	_____	62.5	_____	_____	W
T <sub>C</sub> < 25°C .....	_____	Derate linearly 0.5	_____	_____	W/°C
T <sub>C</sub> > 25°C .....	_____	_____	_____	_____	°C
T <sub>stg</sub> , T <sub>J</sub> .....	_____	-55 to 150	_____	_____	°C
T <sub>L</sub> .....	_____	235	_____	_____	°C
At distances ≥ 1/8 in. (3.17 mm) from case for 10 s max.					

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D T-33-29

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**ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C$ ) = 25°C**  
Unless Otherwise Specified

CHARACTERISTIC	TEST CONDITIONS				LIMITS				UNITS
	VOLTAGE V dc			CUR- RENT A dc $I_C$	BD643		BD645		
	$V_{CB}$	$V_{CE}$	$V_{BE}$		Min.	Max.	Min.	Max.	
$I_{CEO}$		20 30			—	0.5	—	0.5	mA
$I_{CBO}$	45 60				—	0.2	—	0.2	
$T_C = 100^\circ\text{C}$	45 60				—	2	—	2	
$I_{EBO}$			-5	0	—	2	—	2	
$V_{(BR)CEO}$				0.1 <sup>a</sup>	45	—	60	—	V
$V_{(BR)CBO}$				0.005	45	—	60	—	
$V_{(BR)EBO}$ $I_E = 2 \text{ mA}$					5	—	5	—	
$h_{FE}$		3		0.5 <sup>a</sup>	1500 <sup>b</sup>	—	1500 <sup>b</sup>	—	
		3		3 <sup>a</sup>	750	—	750	—	
		3		6 <sup>a</sup>	750 <sup>b</sup>	—	750 <sup>b</sup>	—	
$V_{BE}$		3		3 <sup>a</sup>	—	2.5	—	2.5	V
$V_{CE(sat)}$ $I_B = 12 \text{ mA}$				3 <sup>a</sup>	—	2	—	2	
$f_T$ $f = 1 \text{ MHz}$		3 3		3 3	1 10 <sup>b</sup>	—	1 10 <sup>b</sup>	—	MHz
$R_{\theta JC}$					—	2	—	2	°C/W

<sup>a</sup> Pulsed; pulse duration = 200  $\mu\text{s}$ , duty factor = 1%.

<sup>b</sup> Typical value.

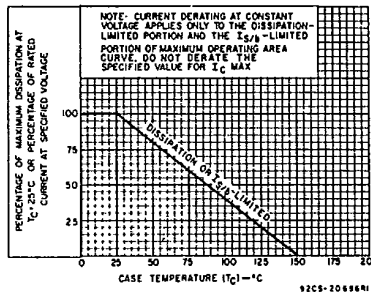


Fig. 2—Derating curve for all types.

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01E 17275 D T-33-29  
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BD643, BD645, BD647, BD649

ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C$ ) = 25°C  
Unless Otherwise Specified

CHARACTERISTIC	TEST CONDITIONS				LIMITS				UNITS
	VOLTAGE V dc			CUR- RENT A dc	BD647		BD649		
	V <sub>CB</sub>	V <sub>CE</sub>	V <sub>BE</sub>		I <sub>C</sub>	Min.	Max.	Min.	
I <sub>CEO</sub>		40 50			—	0.5	—	—	mA
I <sub>CBO</sub>	80 100				—	0.2	—	—	
$T_C = 100^\circ\text{C}$	80 100				—	2	—	—	
I <sub>EBO</sub>			—5	0	—	2	—	2	
V <sub>(BR)CEO</sub>				0.1 <sup>a</sup>	80	—	100	—	V
V <sub>(BR)CBO</sub>				0.005	80	—	100	—	
V <sub>(BR)EBO</sub> I <sub>E</sub> = 2 mA					5	—	5	—	
h <sub>FE</sub>		3 3 3		0.5 <sup>a</sup> 3 <sup>a</sup> 6 <sup>a</sup>	1500 <sup>b</sup> 750 750 <sup>b</sup>	— — —	1500 <sup>b</sup> 750 750 <sup>b</sup>	— — —	V
V <sub>BE</sub>		3		3 <sup>a</sup>	—	2.5	—	2.5	
V <sub>CE(sat)</sub> I <sub>B</sub> = 12 mA				3 <sup>a</sup>	—	2	—	2	
f <sub>T</sub> f = 1 MHz		3 3		3 3	1 10 <sup>b</sup>	— —	1 10 <sup>b</sup>	— —	MHz
R <sub>θJC</sub>					—	2	—	2	°C/W

<sup>a</sup> Pulsed; pulse duration = 200 μs, duty factor = 1%.

<sup>b</sup> Typical value.

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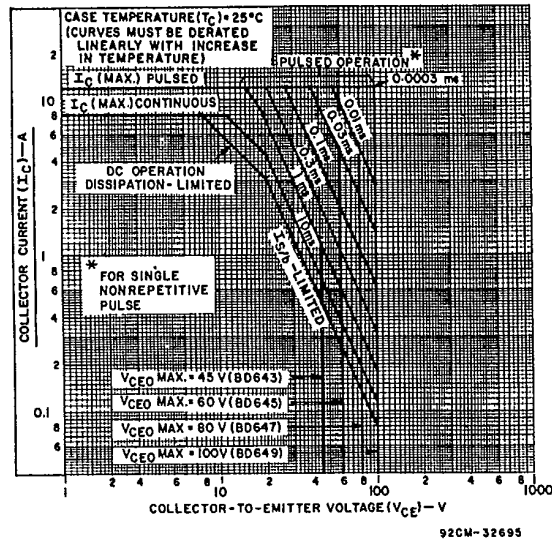


Fig. 3—Maximum operating area for all types.