

BD643, BD645, BD647, BD649

8-Ampere N-P-N Darlington Power Transistors

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

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.

MAXIMUM RATINGS, Absolute-Maximum Values:

	BD643	BD645	BD647	BD649	
V_{CBO}	45	60	80	100	V
$V_{CEO(sus)}$	45	60	80	100	V
V_{EBO}		5			V
I_C		8			A
I_{CM}		12			A
I_B		0.15			A
P_T		62.5			W
$T_C < 25^\circ C$		Derate linearly 0.5			$W/^\circ C$
$T_C > 25^\circ C$		Derate linearly 0.5			$W/^\circ C$
T_{stg}, T_J		-55 to 150			$^\circ C$
T_1		235			$^\circ C$

At distances $> 1/8$ in. (3.17 mm) from case for 10's max.

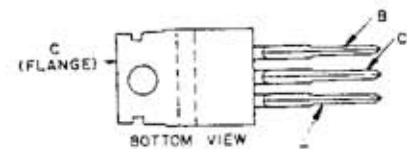
Features:

- Operates from IC without predriver
- Low leakage at high temperature
- High reverse second-breakdown capability

Applications:

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

TERMINAL DESIGNATIONS



JEDEC TO-220AB

(See dimensional outline 'S')

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

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

^a Pulsed; pulse duration = 200 μs , duty factor = 1%.

^b Typical value.

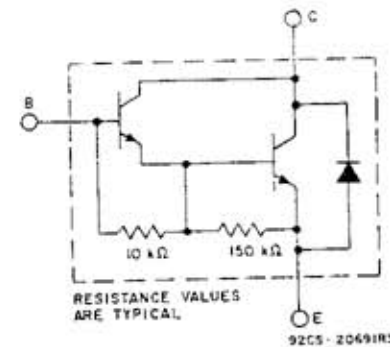


Fig. 1—Schematic diagram for all types.

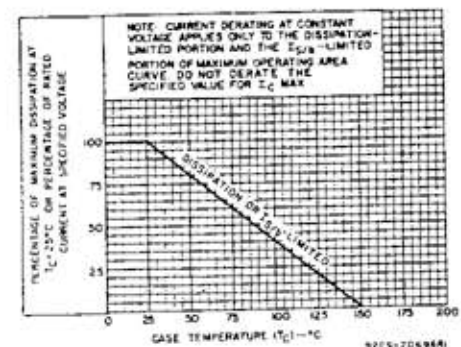


Fig. 2—Derating curve for all types.

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 _{CB}	V _{CE}	V _{BE}		Min.	Max.	Min.	Max.	
I _{CEO}		40 50			— —	0.5 —	— —	— 0.5	mA
I _{CBO}	80 100				— —	0.2 —	— —	— 0.2	
$T_C = 100^\circ\text{C}$	80 100				— —	2 —	— —	— 2	
I _{EBO}			-5	0	—	2	—	2	V
V _{(BR)CEO}				0.1 ^a	80	—	100	—	
V _{(BR)CBO}				0.005	80	—	100	—	
V _{(BR)EBO} I _E = 2 mA					5	—	5	—	
h _{FE}		3		0.5 ^a	1500 ^b	—	1500 ^b	—	
		3		3 ^a	750	—	750	—	
		3		6 ^a	750 ^b	—	750 ^b	—	
V _{BE}		3		3 ^a	—	2.5	—	2.5	V
V _{CE(sat)} I _B = 12 mA				3 ^a	—	2	—	2	
f _T f = 1 MHz		3 3		3 3	1 10 ^b	—	1 10 ^b	—	MHz
R _{θJC}					—	2	—	2	°C/W

^a Pulsed; pulse duration = 200 μs, duty factor = 1%.

^b Typical value.

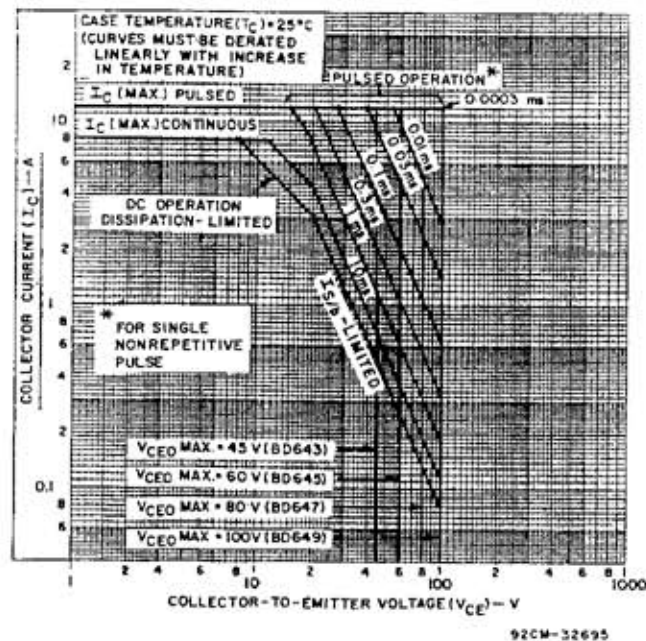


Fig. 3—Maximum operating area for all types.