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

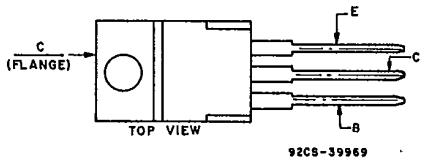
Features:

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

Applications:

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

TERMINAL DESIGNATIONS



JEDEC TO-220AB

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.

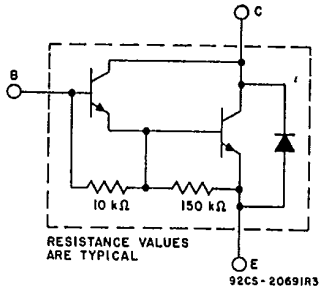


Fig. 1—Schematic diagram for all types.

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					
$T_C \leq 25°C$	62.5				W
$T_C > 25°C$	Derate linearly 0.5				W/°C
T_{stg}, T_J	−55 to 150				°C
T_L					
At distances ≥ 1/8 in. (3.17 mm) from case for 10 s max.	235				°C

BD643, BD645, BD647, BD649

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

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

[a] Pulsed; pulse duration = 200 μs, duty factor = 1%. [b] Typical value.

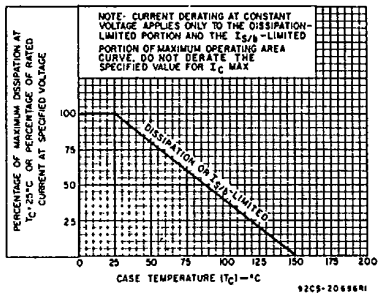


Fig. 2—Derating curve for all types.

BD643, BD645, BD647, BD649

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

CHARACTERISTIC	TEST CONDITIONS				LIMITS				UNITS
	VOLTAGE V dc			CURRENT A dc	BD647		BD649		
	V_{CB}	V_{CE}	V_{BE}	I_C	Min.	Max.	Min.	Max.	
I_{CEO}		40 50			— —	0.5 —	— —	— 0.5	mA
I_{CBO}	80 100				— —	0.2 —	— —	— 0.2	mA
T_C = 100°C	80 100				— —	2 —	— —	— 2	mA
I_{EBO}			−5	0	—	2	—	2	mA
$V_{(BR)CEO}$				0.1[a]	80	—	100	—	V
$V_{(BR)CBO}$				0.005	80	—	100	—	V
$V_{(BR)EBO}$ I_E = 2 mA					5	—	5	—	V
h_{FE}		3 3 3		0.5[a] 3[a] 6[a]	1500[b] 750 750[b]	— — —	1500[b] 750 750[b]	— — —	
V_{BE}		3		3[a]	—	2.5	—	2.5	V
$V_{CE(sat)}$ I_B = 12 mA				3[a]	—	2	—	2	V
f_T f = 1 MHz		3 3		3 3	1 10[b]	— —	1 10[b]	— —	MHz
$R_{\theta JC}$					—	2	—	2	°C/W

[a] Pulsed; pulse duration = 200 μs, duty factor = 1%. [b] Typical value.

BD643, BD645, BD647, BD649

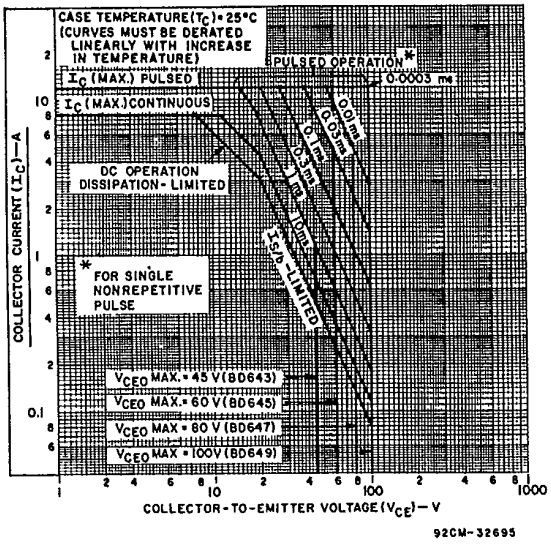


Fig. 3—Maximum operating area for all types.