

**DARLINGTON COMPLEMENTARY  
SILICON POWER TRANSISTORS**

..designed for general-purpose amplifier and low speed switching applications

**FEATURES:**

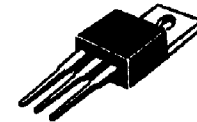
- \* Collector-Emitter Sustaining Voltage-  
 $V_{CE(SUS)}$  = 45 V (Min) - BDX33, BDX34  
           = 60 V (Min) - BDX33A, BDX34A  
           = 80 V (Min) - BDX33B, BDX34B  
           = 100 V (Min) - BDX33C, BDX34C
- \* Monolithic Construction with Built-in Base-Emitter Shunt Resistor

NPN	PNP
BDX33	BDX34
BDX33A	BDX34A
BDX33B	BDX34B
BDX33C	BDX34C

**10 AMPERE  
DARLINGTON  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
45-100 VOLTS  
70 WATTS**

**MAXIMUM RATINGS**

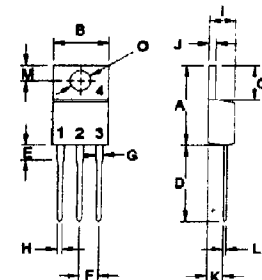
Characteristic	Symbol	BDX33 BDX34	BDX33A BDX34A	BDX33B BDX34B	BDX33C BDX34C	Unit
Collector-Emitter Voltage	$V_{CEO}$	45	60	80	100	V
Collector-Base Voltage	$V_{CBO}$	45	60	80	100	V
Emitter-Base Voltage	$V_{EBO}$	5.0				V
Collector Current - Continuous	$I_C$	10				A
Peak	$I_{CM}$	15				
Base Current	$I_B$	0.25				A
Total Power Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	$P_D$	70 0.56				W W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150				$^\circ C$



**TO-220**

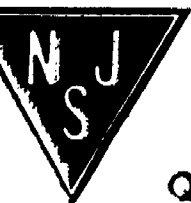
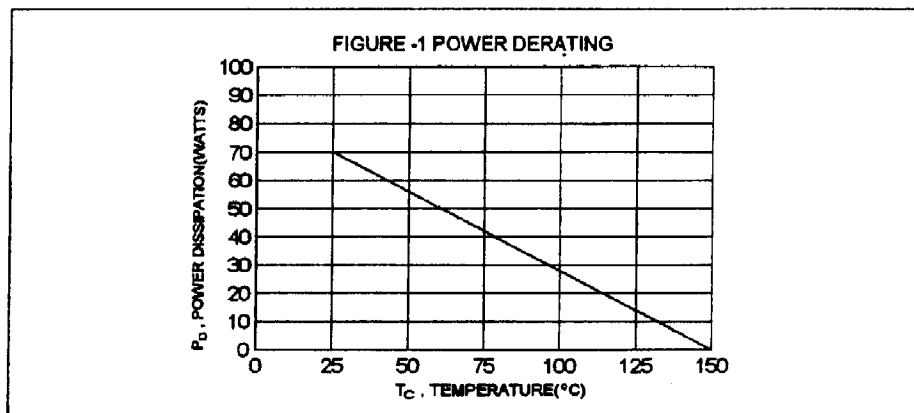
**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.78	$^\circ C/W$



PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.08	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90



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**Quality Semi-Conductors**

BDX33,A,B,C NPN / BDX34,A,B,C PNP

ELECTRICAL CHARACTERISTICS (  $T_c = 25^\circ\text{C}$  unless otherwise noted )

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

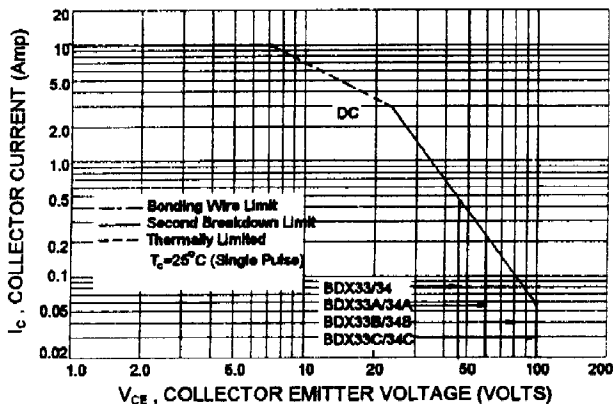
Collector-Emitter Sustaining Voltage(1) ( $I_c = 100\text{ mA}$ , $I_B = 0$ )	BDX33, BDX34 BDX33A, BDX34A BDX33B, BDX34B BDX33C, BDX34C	$V_{CE(sus)}$	45 60 80 100	V
Collector Cutoff Current ( $V_{CE} = 22\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 30\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 40\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 50\text{ V}$ , $I_B = 0$ )	BDX33, BDX34 BDX33A, BDX34A BDX33B, BDX34B BDX33C, BDX34C	$I_{CEO}$	0.5 0.5 0.5 0.5	mA
Collector-Base Cutoff Current ( $V_{CB} = \text{Rated } V_{CB}$ , $I_E = 0$ )		$I_{CBO}$	200	$\mu\text{A}$
Emitter-Base Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )		$I_{EBO}$	10	mA

ON CHARACTERISTICS (1)

DC Current Gain ( $I_c = 4.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) ( $I_c = 3.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ )	BDX33/33A/34/34A BDX33B/33C/34B/34C	hFE	750 750	
Collector-Emitter Saturation Voltage ( $I_c = 4.0\text{ A}$ , $I_B = 8.0\text{ mA}$ ) ( $I_c = 3.0\text{ A}$ , $I_B = 6.0\text{ mA}$ )	BDX33/33A/34/34A BDX33B/33C/34B/34C	$V_{CE(sat)}$	2.5 2.5	V
Base-Emitter On Voltage ( $I_c = 4.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) ( $I_c = 3.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ )	BDX33/33A/34/34A BDX33B/33C/34B/34C	$V_{BE(on)}$	2.5 2.5	V

(1) Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

FIG-2 SAFE OPERATING AREA



There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_c$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data of FIG-2 is base on  $T_{j(PK)} = 150^\circ\text{C}$ ;  $T_c$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{j(PK)} < 150^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.