

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

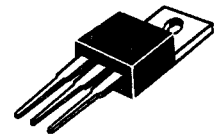
* Monolithic Construction with Built-in Base-Emitter Shunt Resistor

| NPN | PNP |
|--------|--------|
| BDX33 | BDX34 |
| BDX33A | BDX34A |
| BDX33B | BDX34B |
| BDX33C | BDX34C |

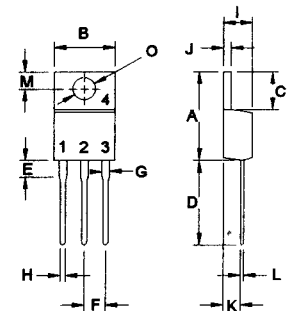
10 AMPERE
DARLINGTON
COMPLEMENTARY SILICON
POWER TRANSISTORS
45-100 VOLTS
70 WATTS

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



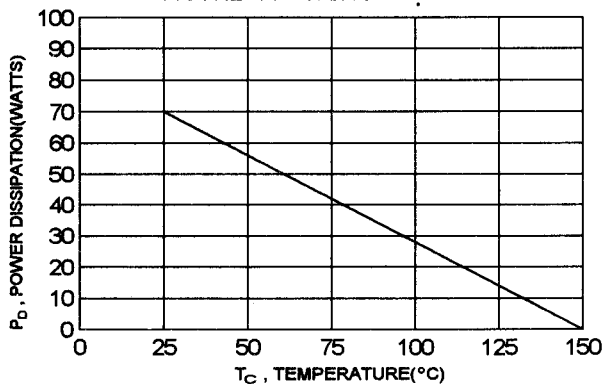
PIN 1.BASE
2.COLLECTOR
3.EMITTER
4.COLLECTOR(CASE)

THERMAL CHARACTERISTICS

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

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 14.68 | 15.31 |
| B | 9.78 | 10.42 |
| C | 5.01 | 6.52 |
| D | 13.06 | 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 |

FIGURE -1 POWER DERATING



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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

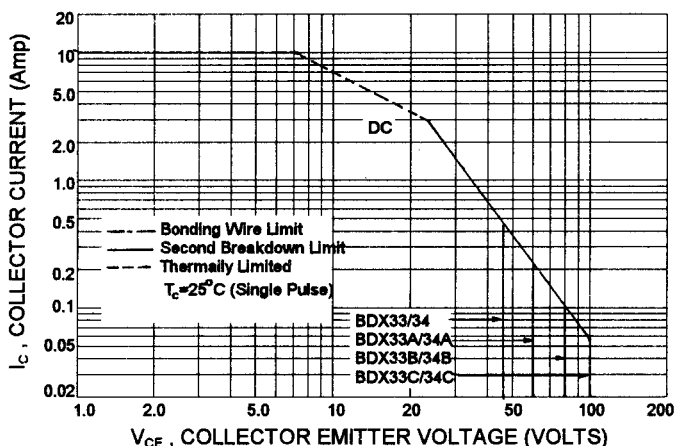
| | | | | |
|--|--|---------------|-----------------------|--------------------------------|
| Collector-Emitter Sustaining Voltage(1) ($I_C = 100\text{ mA}$, $I_B = 0$) | BDX33, BDX34 BDX33A, BDX34A BDX33B, BDX34B BDX33C, BDX34C | $V_{CE(sus)}$ | 45 60 80 100 | V |
| Collector Cutoff Current ($V_{CE} = 22\text{ V}$, $I_B = 0$) ($V_{CE} = 30\text{ V}$, $I_B = 0$) ($V_{CE} = 40\text{ V}$, $I_B = 0$) ($V_{CE} = 50\text{ V}$, $I_B = 0$) | 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 uA |
| 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 us, 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.



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