

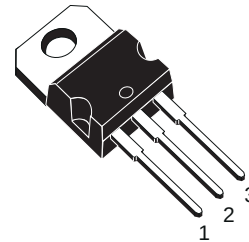


# BDX33B BDX33C BDX34B BDX34C

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

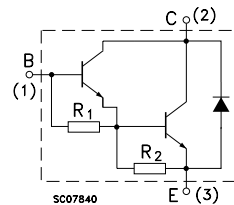
### DESCRIPTION

The BDX33B and BDX33C are silicon Epitaxial-Base NPN power transistors in monolithic Darlington configuration mounted in Jedec TO-220 plastic package. They are intended for use in power linear and switching applications. The complementary PNP types are BDX34B and BDX34C respectively.

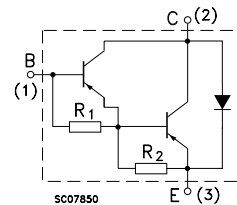


TO-220

### INTERNAL SCHEMATIC DIAGRAM



$R_1$  Typ. = 10 K $\Omega$



$R_2$  Typ. = 150  $\Omega$

### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                        | NPN | BDX33B     | BDX33C | Unit             |
|-----------|--------------------------------------------------|-----|------------|--------|------------------|
|           |                                                  | PNP | BDX34B     | BDX34C |                  |
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )             |     | 80         | 100    | V                |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )          |     | 80         | 100    | V                |
| $I_C$     | Collector Current                                |     | 10         |        | A                |
| $I_{CM}$  | Collector Peak Current                           |     | 15         |        | A                |
| $I_B$     | Base Current                                     |     | 0.25       |        | A                |
| $P_{tot}$ | Total Dissipation at $T_c \leq 25^\circ\text{C}$ |     | 70         |        | W                |
| $T_{stg}$ | Storage Temperature                              |     | -65 to 150 |        | $^\circ\text{C}$ |
| $T_j$     | Max. Operating Junction Temperature              |     | 150        |        | $^\circ\text{C}$ |

For PNP types voltage and current values are negative.

## BDX33B BDX33C BDX34B BDX34C

### THERMAL DATA

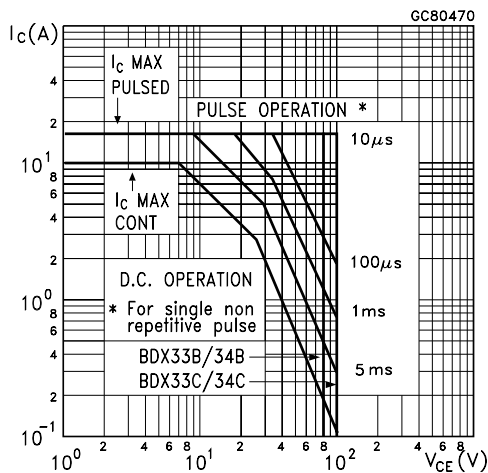
|                       |                                  |      |      |
|-----------------------|----------------------------------|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | 1.78 | °C/W |
|-----------------------|----------------------------------|------|------|

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| Symbol                 | Parameter                                                       | Test Conditions                                                                                                                                                                                                             | Min.      | Typ. | Max.                   | Unit                 |
|------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------------------|----------------------|
| I <sub>CBO</sub>       | Collector Cut-off Current (I <sub>E</sub> = 0)                  | for <b>BDX33B/34B</b> V <sub>CB</sub> = 80 V<br>for <b>BDX33C/34C</b> V <sub>CB</sub> = 100V<br>T <sub>case</sub> = 100 °C<br>for <b>BDX33B/34B</b> V <sub>CB</sub> = 80 V<br>for <b>BDX33C/34C</b> V <sub>CB</sub> = 100 V |           |      | 0.2<br>0.2<br>5<br>5   | mA<br>mA<br>mA<br>mA |
| I <sub>CEO</sub>       | Collector Cut-off Current (I <sub>B</sub> = 0)                  | for <b>BDX33B/34B</b> V <sub>CE</sub> = 40 V<br>for <b>BDX33C/34C</b> V <sub>CE</sub> = 50V<br>T <sub>case</sub> = 100 °C<br>for <b>BDX33B/34B</b> V <sub>CE</sub> = 40 V<br>for <b>BDX33C/34C</b> V <sub>CE</sub> = 50 V   |           |      | 0.5<br>0.5<br>10<br>10 | mA<br>mA<br>mA<br>mA |
| I <sub>EBO</sub>       | Emitter Cut-off Current (I <sub>C</sub> = 0)                    | V <sub>EB</sub> = 5 V                                                                                                                                                                                                       |           |      | 5                      | mA                   |
| V <sub>CEO(sus)*</sub> | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)       | I <sub>C</sub> = 100 mA for <b>BDX33B/34B</b><br>for <b>BDX33C/34C</b>                                                                                                                                                      | 80<br>100 |      |                        | V<br>V               |
| V <sub>CER(sus)*</sub> | Collector-emitter Sustaining Voltage (R <sub>BE</sub> = 100 Ω)  | I <sub>C</sub> = 100 mA for <b>BDX33B/34B</b><br>for <b>BDX33C/34C</b>                                                                                                                                                      | 80<br>100 |      |                        | V<br>V               |
| V <sub>CEV(sus)*</sub> | Collector-emitter Sustaining Voltage (V <sub>BE</sub> = -1.5 V) | I <sub>C</sub> = 100 mA for <b>BDX33B/34B</b><br>for <b>BDX33C/34C</b>                                                                                                                                                      | 80<br>100 |      |                        | V<br>V               |
| V <sub>CE(sat)*</sub>  | Collector-emitter Saturation Voltage                            | I <sub>C</sub> = 3 A I <sub>B</sub> = 6 mA                                                                                                                                                                                  |           |      | 2.5                    | V                    |
| V <sub>BE*</sub>       | Base-emitter Voltage                                            | I <sub>C</sub> = 3 A V <sub>CE</sub> = 3 V                                                                                                                                                                                  |           |      | 2.5                    | V                    |
| h <sub>FE*</sub>       | DC Current Gain                                                 | I <sub>C</sub> = 3 A V <sub>CE</sub> = 3 V                                                                                                                                                                                  | 750       |      |                        | V                    |
| V <sub>F*</sub>        | Parallel-Diode Forward Voltage                                  | I <sub>F</sub> = 8 A                                                                                                                                                                                                        |           |      | 4                      | V                    |
| h <sub>fe</sub>        | Small Signal Current Gain                                       | I <sub>C</sub> = 1 A V <sub>CE</sub> = 5 V f = 1MHz                                                                                                                                                                         | 100       |      |                        |                      |

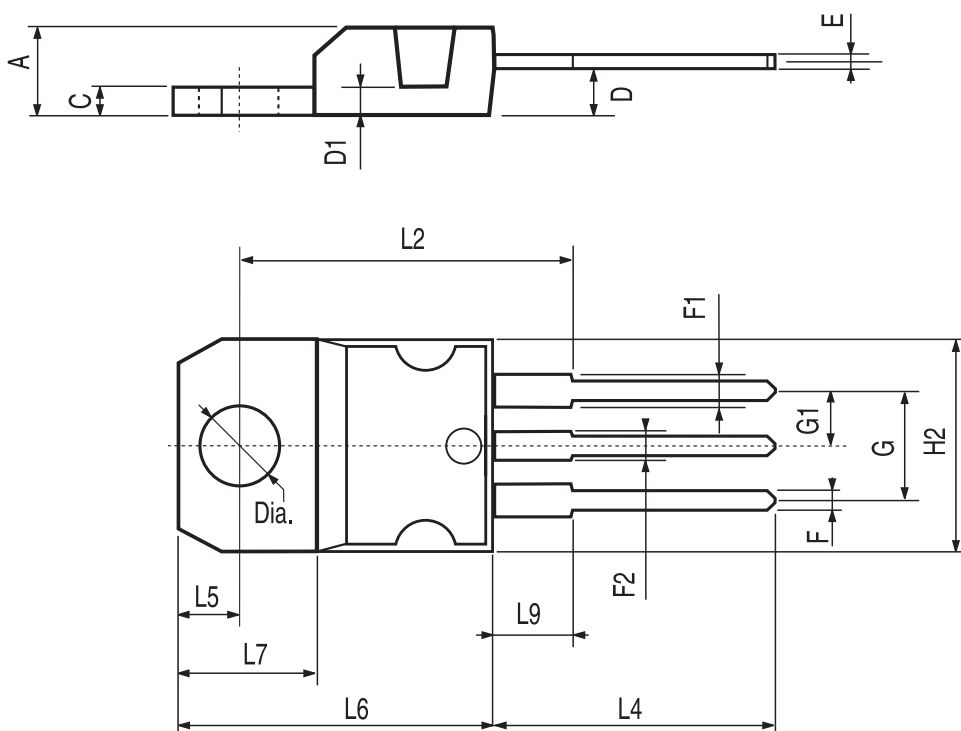
\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %  
For PNP types voltage and current values are negative.

### Safe Operating Area



## TO-220 MECHANICAL DATA

| DIM. | mm    |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |      | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23  |      | 1.32  | 0.048 |       | 0.051 |
| D    | 2.40  |      | 2.72  | 0.094 |       | 0.107 |
| D1   |       | 1.27 |       |       | 0.050 |       |
| E    | 0.49  |      | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61  |      | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95  |      | 5.15  | 0.194 |       | 0.203 |
| G1   | 2.4   |      | 2.7   | 0.094 |       | 0.106 |
| H2   | 10.0  |      | 10.40 | 0.393 |       | 0.409 |
| L2   |       | 16.4 |       |       | 0.645 |       |
| L4   | 13.0  |      | 14.0  | 0.511 |       | 0.551 |
| L5   | 2.65  |      | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.25 |      | 15.75 | 0.600 |       | 0.620 |
| L7   | 6.2   |      | 6.6   | 0.244 |       | 0.260 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151 |



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