

## Complementary power Darlington transistors

### Features

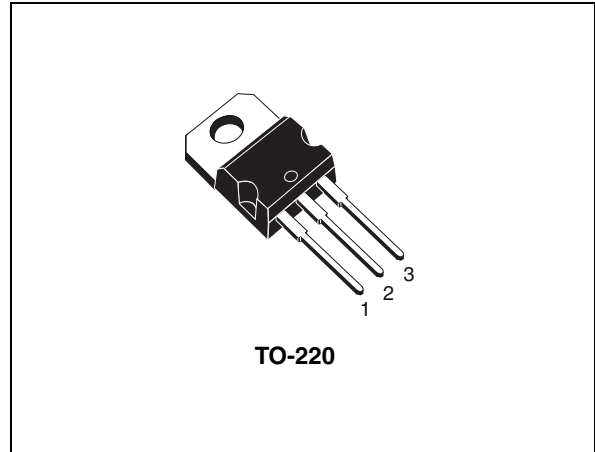
- Good  $h_{FE}$  linearity
- High  $f_T$  frequency
- Monolithic Darlington configuration with integrated antiparallel collector-emitter diode

### Application

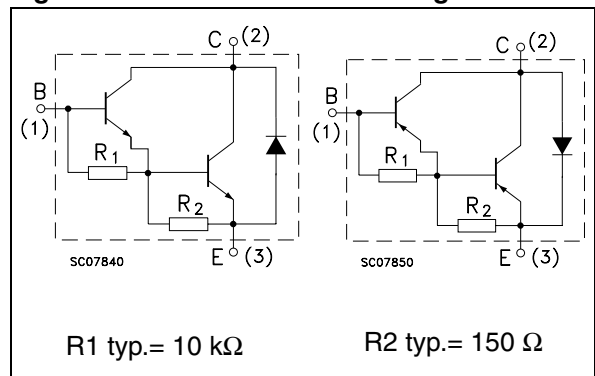
- Audio amplifiers
- Linear and switching industrial equipment

### Description

The devices are manufactured in planar base island technology with monolithic Darlington configuration.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|------------|---------|---------|-----------|
| BDX53B     | BDX53B  | TO-220  | Tube      |
| BDX53C     | BDX53C  |         |           |
| BDX54B     | BDX54B  |         |           |
| BDX54C     | BDX54C  |         |           |

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol    | Parameter                                     | Value |            |        | Unit             |
|-----------|-----------------------------------------------|-------|------------|--------|------------------|
|           |                                               | NPN   | BDX53B     | BDX53C |                  |
|           |                                               | PNP   | BDX54B     | BDX54C |                  |
| $V_{CBO}$ | Collector-base voltage ( $I_E = 0$ )          |       | 80         | 100    | V                |
| $V_{CEO}$ | Collector-emitter voltage ( $I_B = 0$ )       |       | 80         | 100    | V                |
| $V_{EBO}$ | Emitter-base voltage ( $I_C = 0$ )            |       | 5          |        | V                |
| $I_C$     | Collector current                             |       | 8          |        | A                |
| $I_{CM}$  | Collector peak current (repetitive)           |       | 12         |        | A                |
| $I_B$     | Base current                                  |       | 0.2        |        | mA               |
| $P_{TOT}$ | Total dissipation at $T_C = 25^\circ\text{C}$ |       | 60         |        | W                |
| $T_{stg}$ | Storage temperature                           |       | -65 to 150 |        | $^\circ\text{C}$ |
| $T_J$     | Max. operating junction temperature           |       | 150        |        | $^\circ\text{C}$ |

*Note:* For PNP types voltage and current values are negative.

## 2 Electrical characteristics

( $T_{CASE}=25^{\circ}\text{C}$  unless otherwise specified)

**Table 3. Electrical characteristics**

| Symbol              | Parameter                                          | Test conditions                                                     | Min.      | Typ. | Max. | Unit   |
|---------------------|----------------------------------------------------|---------------------------------------------------------------------|-----------|------|------|--------|
| $V_{CE(sus)}^{(1)}$ | Collector-emitter sustaining voltage ( $I_B = 0$ ) | $I_C = 100\text{ mA}$<br>for BDX53B - BDX54B<br>for BDX53C - BDX54C | 80<br>100 |      |      | V<br>V |
| $I_{CBO}$           | Collector cut-off current ( $I_E = 0$ )            | $V_{CB} = 80\text{ V}$<br>for BDX53B - BDX54B                       |           |      | 0.2  | mA     |
|                     |                                                    | $V_{CB} = 100\text{ V}$<br>for BDX53C - BDX54C                      |           |      | 0.2  | mA     |
| $I_{CEO}$           | Collector cut-off current ( $I_B = 0$ )            | $V_{CE} = 40\text{ V}$<br>for BDX53B - BDX54B                       |           |      | 0.5  | mA     |
|                     |                                                    | $V_{CE} = 50\text{ V}$<br>for BDX53C - BDX54C                       |           |      | 0.5  | mA     |
| $I_{EBO}$           | Emitter cut-off current ( $I_C = 0$ )              | $V_{EB} = 5\text{ V}$                                               |           |      | 2    | mA     |
| $V_{CE(sat)}^{(1)}$ | Collector-emitter saturation voltage               | $I_C = 3\text{ A}; I_B = 12\text{ mA}$                              |           |      | 2    | V      |
| $V_{BE(sat)}^{(1)}$ | Base-emitter saturation voltage                    | $I_C = 3\text{ A}; I_B = 12\text{ mA}$                              |           |      | 2.5  | V      |
| $h_{FE}^{(1)}$      | DC current gain                                    | $I_C = 3\text{ A}; V_{CE} = 3\text{ V}$                             | 750       |      |      |        |
| $V_F^{(1)}$         | Diode forward voltage                              | $I_F = 3\text{ A};$                                                 |           | 1.8  | 2.5  | V      |
|                     |                                                    | $I_F = 8\text{ A};$                                                 |           | 2.5  |      | V      |

1. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

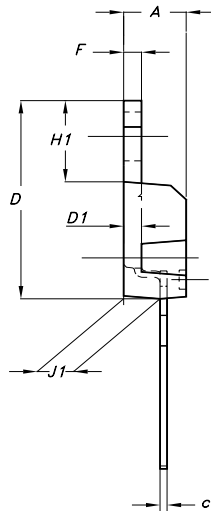
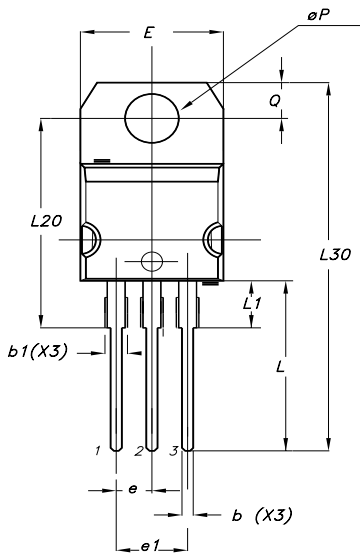
**Note:** For PNP types voltage and current values are negative.

### 3      **Package mechanical data**

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

TO-220 mechanical data

| Dim | mm    |       |       | inch  |       |       |
|-----|-------|-------|-------|-------|-------|-------|
|     | Min   | Typ   | Max   | Min   | Typ   | Max   |
| A   | 4.40  |       | 4.60  | 0.173 |       | 0.181 |
| b   | 0.61  |       | 0.88  | 0.024 |       | 0.034 |
| b1  | 1.14  |       | 1.70  | 0.044 |       | 0.066 |
| c   | 0.49  |       | 0.70  | 0.019 |       | 0.027 |
| D   | 15.25 |       | 15.75 | 0.6   |       | 0.62  |
| D1  |       | 1.27  |       |       | 0.050 |       |
| E   | 10    |       | 10.40 | 0.393 |       | 0.409 |
| e   | 2.40  |       | 2.70  | 0.094 |       | 0.106 |
| e1  | 4.95  |       | 5.15  | 0.194 |       | 0.202 |
| F   | 1.23  |       | 1.32  | 0.048 |       | 0.051 |
| H1  | 6.20  |       | 6.60  | 0.244 |       | 0.256 |
| J1  | 2.40  |       | 2.72  | 0.094 |       | 0.107 |
| L   | 13    |       | 14    | 0.511 |       | 0.551 |
| L1  | 3.50  |       | 3.93  | 0.137 |       | 0.154 |
| L20 |       | 16.40 |       |       | 0.645 |       |
| L30 |       | 28.90 |       |       | 1.137 |       |
| ØP  | 3.75  |       | 3.85  | 0.147 |       | 0.151 |
| Q   | 2.65  |       | 2.95  | 0.104 |       | 0.116 |



POA 0015988\_P

## 4 Revision history

**Table 4. Document revision history**

| Date        | Revision | Changes                                                                            |
|-------------|----------|------------------------------------------------------------------------------------|
| 09-Sep-2004 | 3        |                                                                                    |
| 23-Oct-2007 | 4        | Technology change from epibase to planar (PCN APM-PWR/07/2417 and APM-PWR/07/2615) |

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