# BDX53B / BDX53C
# BDX54B / BDX54C

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

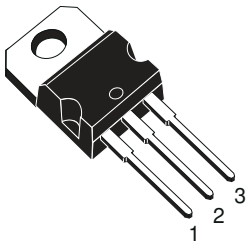
- STMicroelectronics PREFERRED SALESTYPES

**APPLICATIONS**
- AUDIO AMPLIFIERS
- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

**DESCRIPTION**

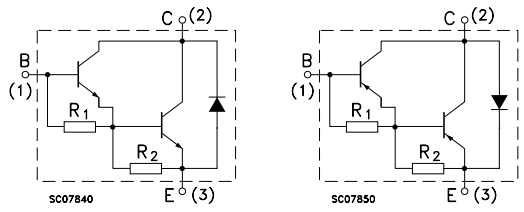
The BDX53B and BDX53C are silicon Epitaxial-Base NPN power transistors in monolithic Darlington configuration mounted in Jedec TO-220 plastic package. They are intented for use in hammer drivers, audio amplifiers and other medium power linear and switching applications.

The complementary PNP types are BDX54B and BDX54C respectively.




**TO-220**

**INTERNAL SCHEMATIC DIAGRAM**




$R_1$ Typ. = 10 KΩ  $R_2$ Typ. = 150 Ω

**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 | | A |
| $P_{tot}$ | Total Dissipation at $T_c \leq 25\ ^oC$ | | 60 | | W |
| $T_{stg}$ | Storage Temperature | | -65 to 150 | | $^oC$ |
| $T_j$ | Max. Operating Junction Temperature | | 150 | | $^oC$ |

For PNP types voltage and current values are negative.

## THERMAL DATA

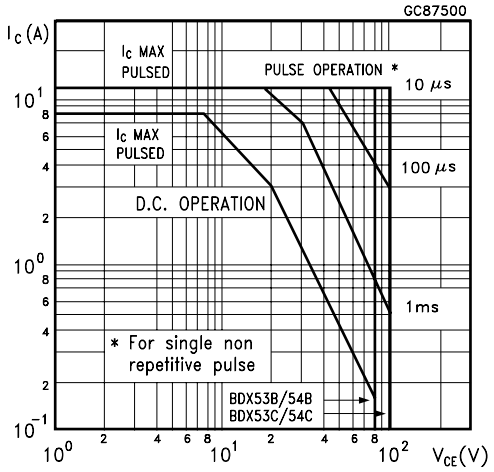
| | | | | |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case | Max | 2.08 | °C/W |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 70 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 °C unless otherwise specified)

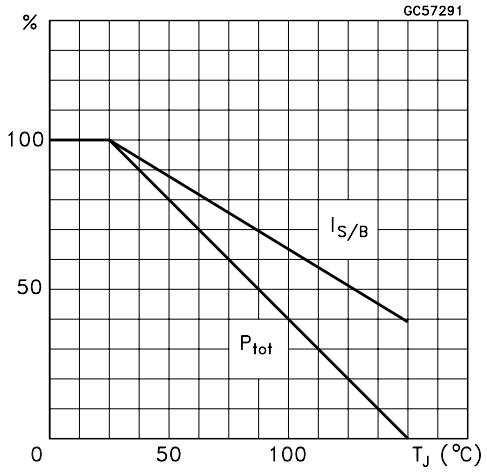
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector Cut-off Current ($I_E$ = 0) | for **BDX53B/54B** $V_{CB}$ = 80 V<br>for **BDX53C/54C** $V_{CB}$ = 100V | | | 0.2<br>0.2 | mA<br>mA |
| $I_{CEO}$ | Collector Cut-off Current ($I_B$ = 0) | for **BDX53B/54B** $V_{CE}$ = 40 V<br>for **BDX53C/54C** $V_{CE}$ = 50V | | | 0.5<br>0.5 | mA<br>mA |
| $I_{EBO}$ | Emitter Cut-off Current ($I_C$ = 0) | $V_{EB}$ = 5 V | | | 2 | mA |
| $V_{CEO(sus)}$* | Collector-Emitter Sustaining Voltage ($I_B$ = 0) | $I_C$ = 100 mA for **BDX53B/54B**<br>for **BDX53C/54C** | 80<br>100 | | | V<br>V |
| $V_{CE(sat)}$* | Collector-emitter Saturation Voltage | $I_C$ = 3 A $I_B$ =12 mA | | | 2 | V |
| $V_{BE(sat)}$* | Base-emitter Saturation Voltage | $I_C$ = 3 A $I_B$ =12 mA | | | 2.5 | V |
| $h_{FE}$* | DC Current Gain | $I_C$ = 3 A $V_{CE}$ = 3 V | 750 | | | |
| $V_F$* | Parallel-diode Forward Voltage | $I_F$ = 3 A<br>$I_F$ = 8 A | | 1.8<br>2.5 | 2.5 | V<br>V |

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

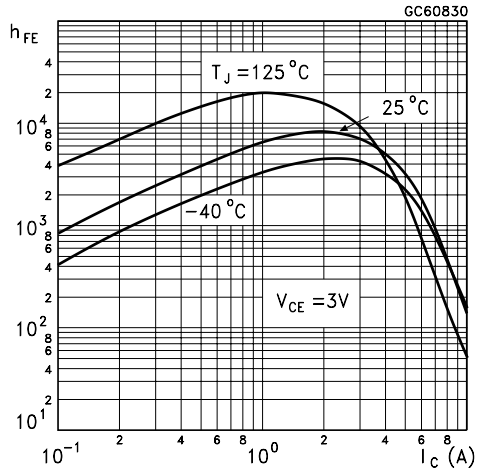
Safe Operating Area




Derating Curve



DC Current Gain (NPN type)

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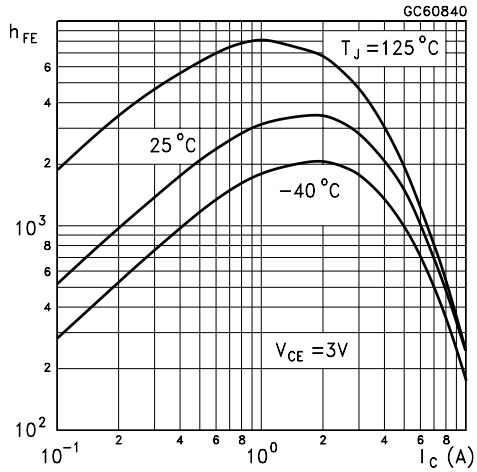
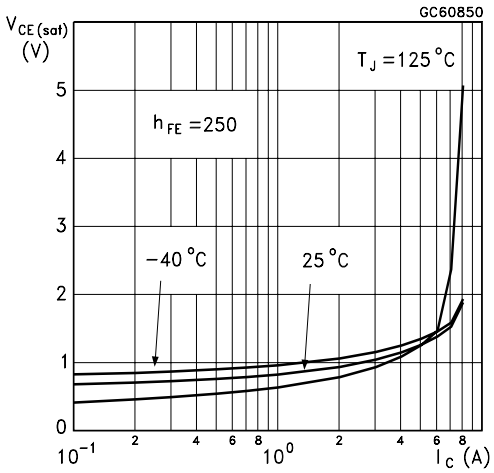
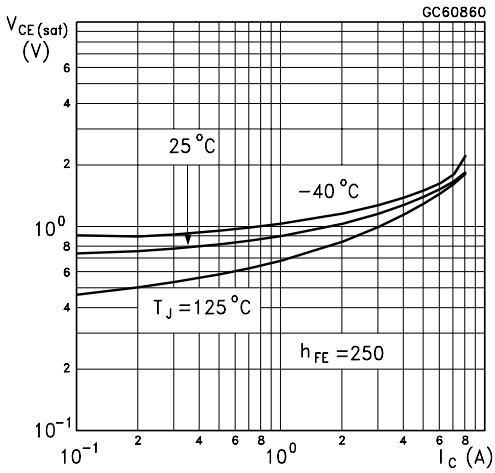


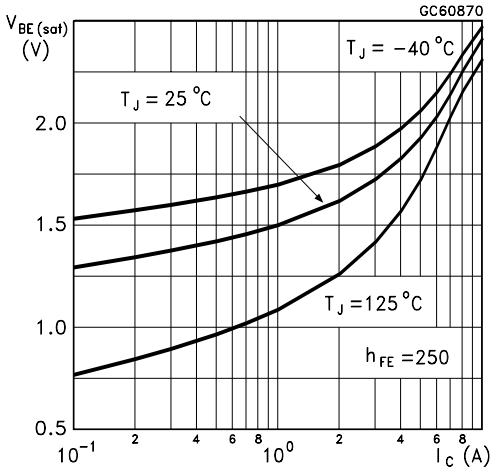

Collector Emitter Saturation Voltage (NPN type)




Collector Emitter Saturation Voltage (PNP type)




Base Emitter Saturation Voltage (NPN type)

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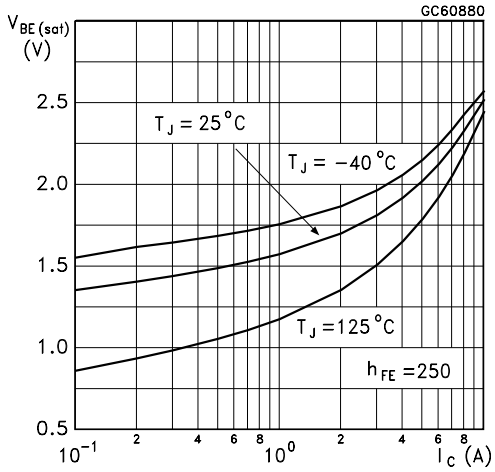
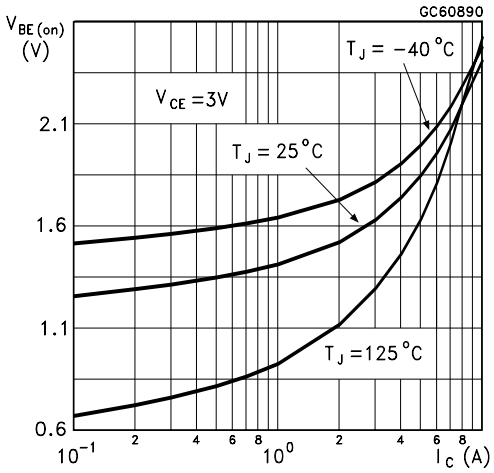
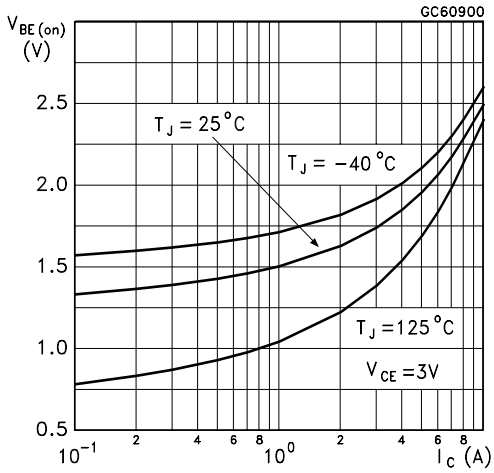


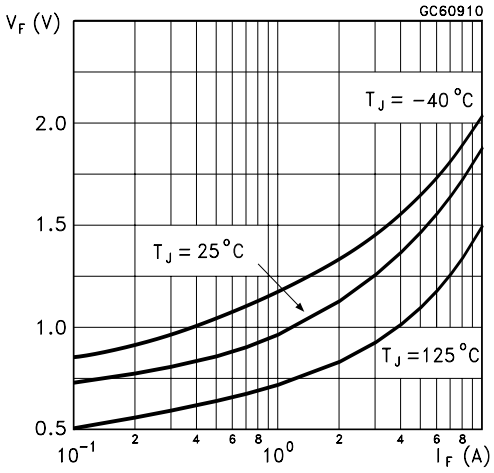
Base Emitter On Voltage (NPN type)




Base Emitter On Voltage (PNP type)




Freewheel Diode Forward Voltage (NPN type)

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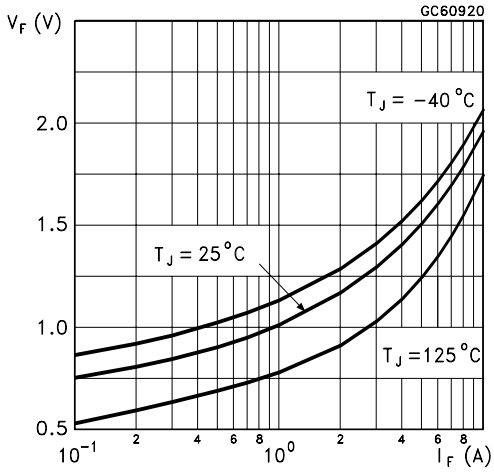
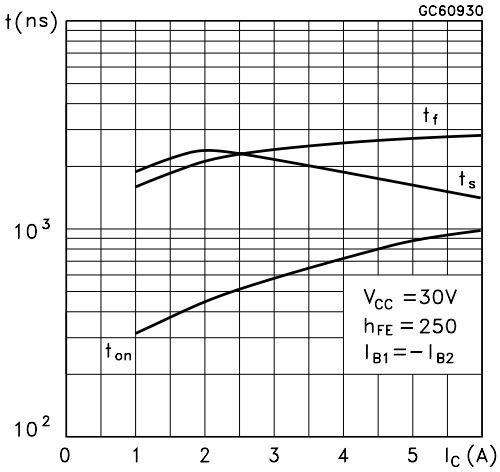
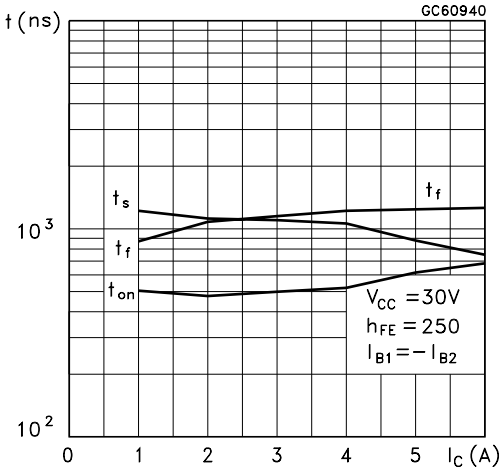



Switching Time Resistive Load (NPN type)

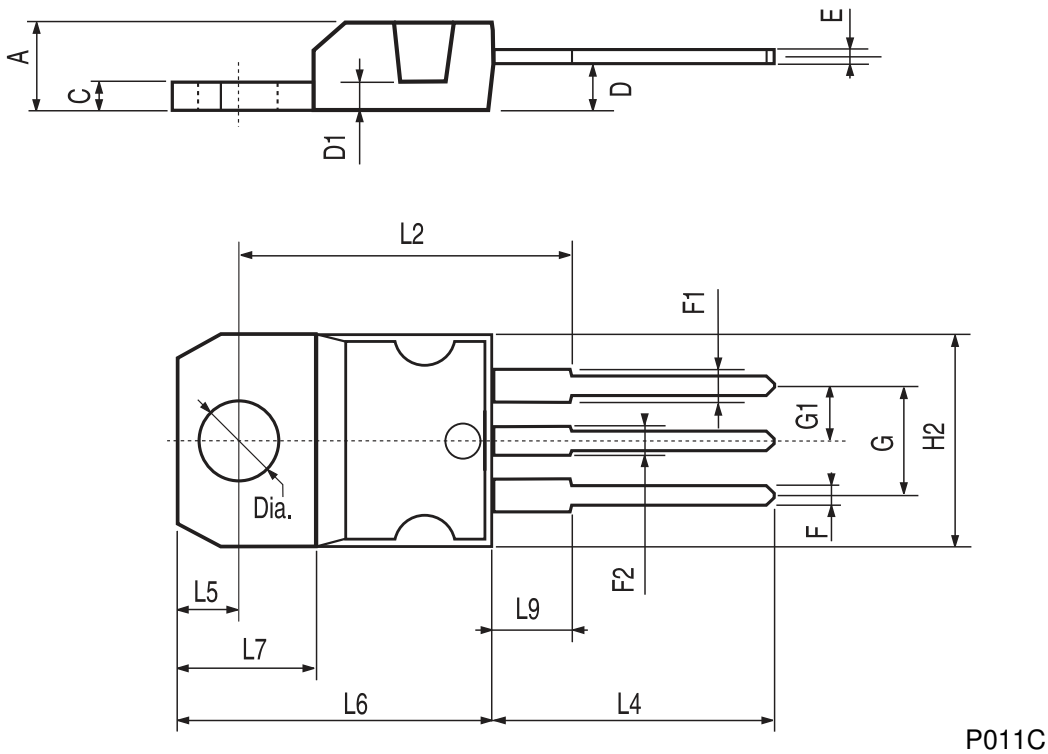



Switching Time resistive Load (PNP type)



## 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 |




P011C