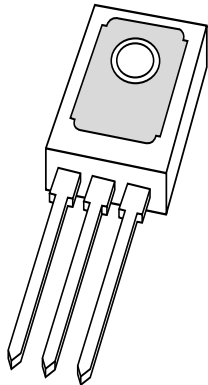


DATA SHEET



BDX45; BDX47 PNP Darlington transistors

Product specification
Supersedes data of September 1994
File under Discrete Semiconductors, SC04

1997 Jul 02

PNP Darlington transistors

BDX45; BDX47

FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V)
- Integrated diode and resistor.

APPLICATIONS

- Industrial switching applications such as:
 - print hammers
 - solenoids
 - relay and lamp drivers.

DESCRIPTION

PNP Darlington transistor in a TO-126; SOT32 plastic package. NPN complements: BDX42 and BDX44.

PINNING

| PIN | DESCRIPTION |
|-----|--|
| 1 | emitter |
| 2 | collector, connected to metal part of mounting surface |
| 3 | base |

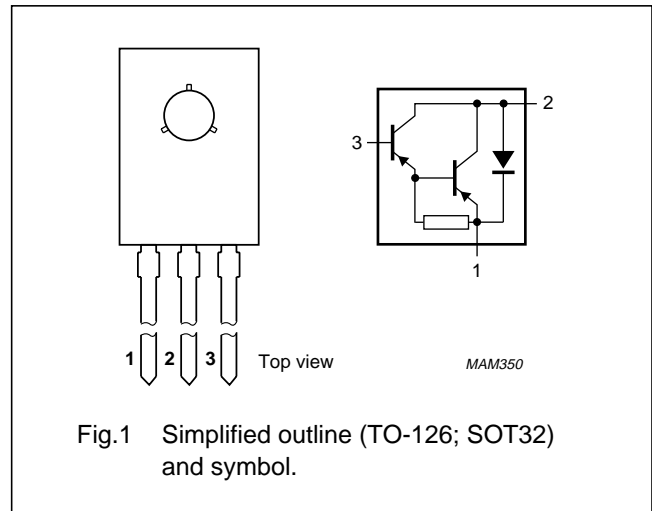


Fig.1 Simplified outline (TO-126; SOT32) and symbol.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------|---------------------------|--|------|------|------|------|
| V_{CBO} | collector-base voltage | open emitter | | | | |
| | BDX45 | | – | – | –60 | V |
| | BDX47 | | – | – | –90 | V |
| V_{CES} | collector-emitter voltage | $V_{BE} = 0$ | | | | |
| | BDX45 | | – | – | –45 | V |
| | BDX47 | | – | – | –80 | V |
| I_C | collector current (DC) | | – | – | –1 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ }^\circ\text{C}$ | – | – | 1.25 | W |
| | | $T_{mb} \leq 100\text{ }^\circ\text{C}$ | – | – | 5 | W |
| h_{FE} | DC current gain | $I_C = -150\text{ mA}; V_{CE} = -10\text{ V}$ | 1000 | – | – | |
| | | $I_C = -500\text{ mA}; V_{CE} = -10\text{ V}$ | 2000 | – | – | |
| f_T | transition frequency | $I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$ | – | 200 | – | MHz |

PNP Darlington transistors

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|------------------|-------------------------------|--------------------------|------|------|------|
| V _{CBO} | collector-base voltage | open emitter | | | |
| | BDX45 | | – | –60 | V |
| | BDX47 | | – | –90 | V |
| V _{CES} | collector-emitter voltage | V _{BE} = 0 | | | |
| | BDX45 | | – | –45 | V |
| | BDX47 | | – | –80 | V |
| V _{EBO} | emitter-base voltage | open collector | – | –5 | V |
| I _C | collector current (DC) | | – | –1 | A |
| I _{CM} | peak collector current | | – | –2 | A |
| I _B | base current (DC) | | – | –100 | mA |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | – | 1.25 | W |
| | | T _{mb} ≤ 100 °C | – | 5 | W |
| T _{stg} | storage temperature | | –65 | +150 | °C |
| T _j | junction temperature | | – | 150 | °C |
| T _{amb} | operating ambient temperature | | –65 | +150 | °C |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|----------------------|---|-------------|-------|------|
| R _{th j-a} | thermal resistance from junction to ambient | in free air | 100 | K/W |
| R _{th j-mb} | thermal resistance from junction to mounting base | | 10 | K/W |

PNP Darlington transistors

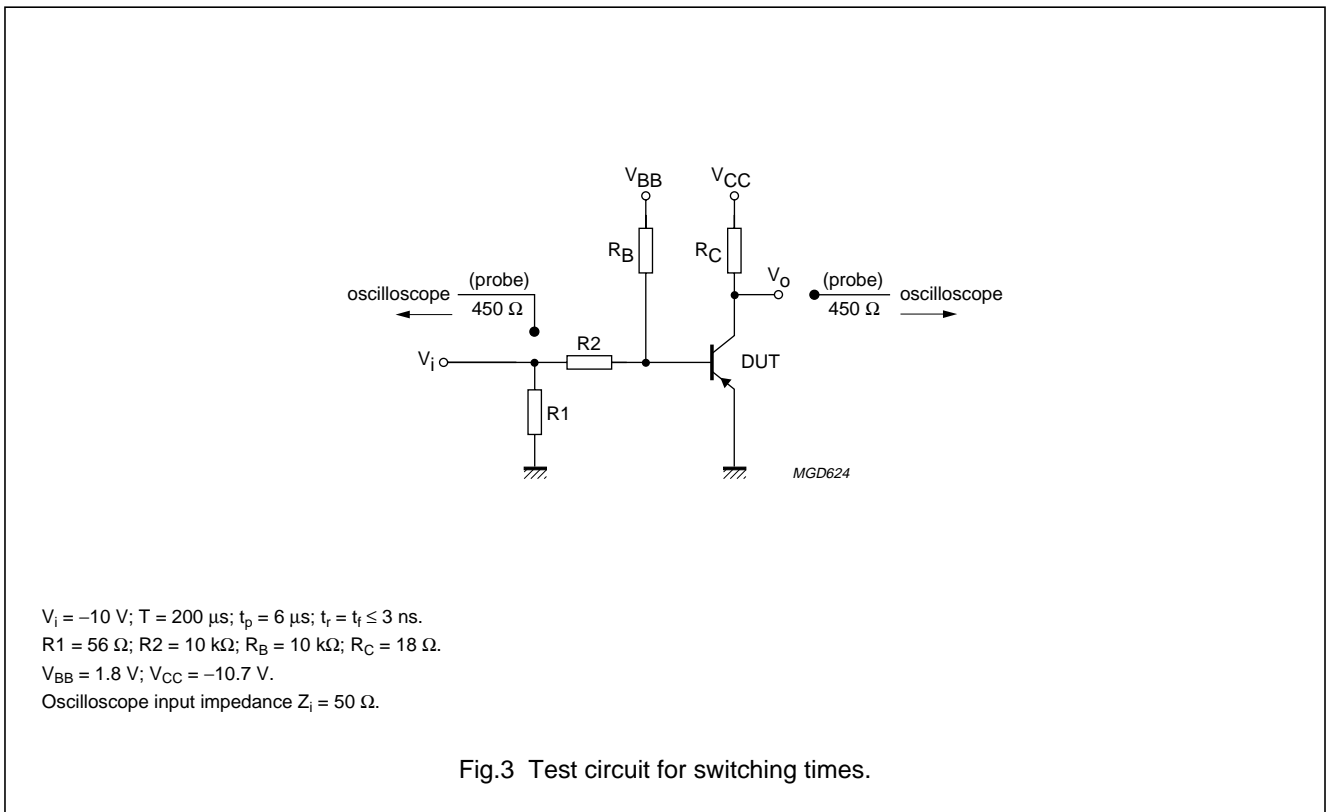
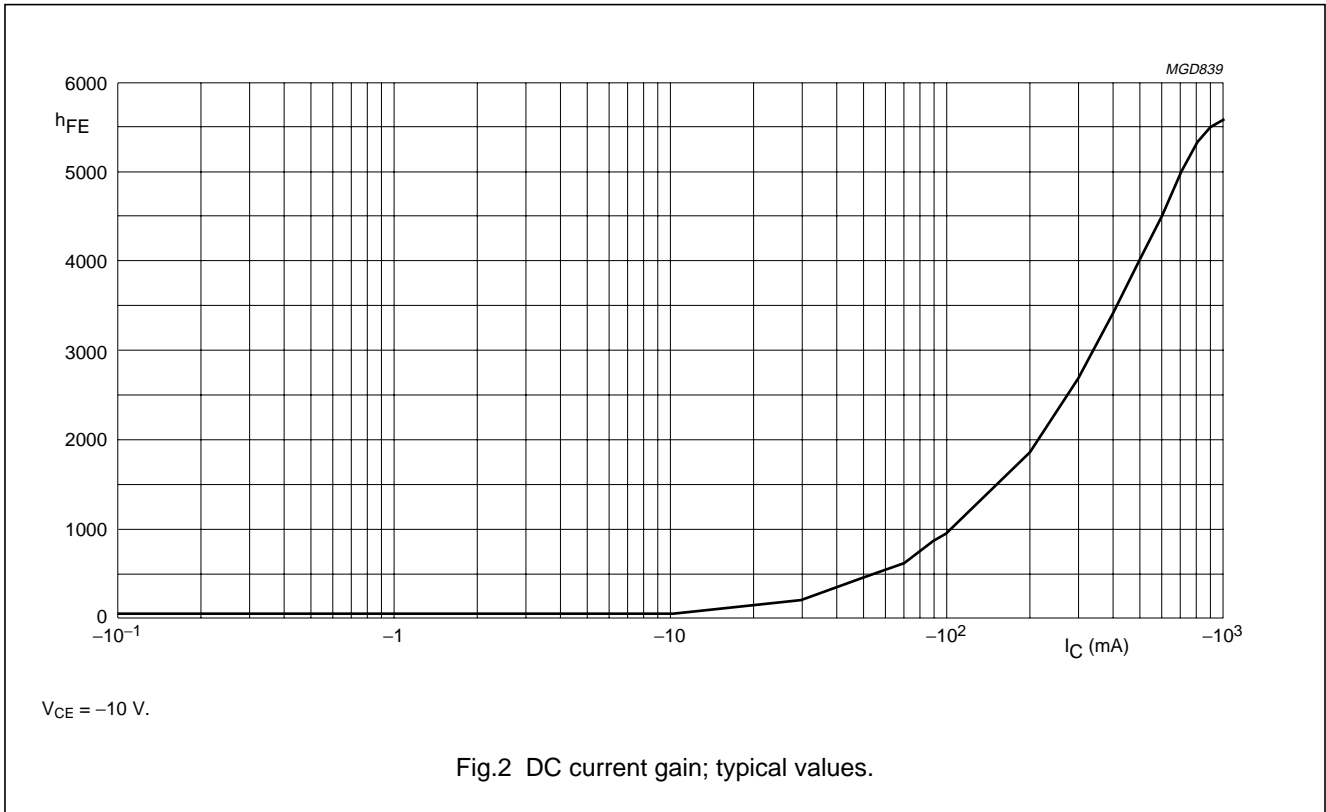
BDX45; BDX47

CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|--|--------------------------------------|--|-------------------------------------|--------|--------|------|
| I_{CBO} | collector cut-off current BDX45 | $I_E = 0; V_{CB} = -60\text{ V}$ | – | – | –100 | nA |
| | | BDX47 | $I_E = 0; V_{CB} = -90\text{ V}$ | – | – | –100 |
| I_{CES} | collector cut-off current BDX45 | $V_{BE} = 0; V_{CE} = -45\text{ V}$ | – | – | –50 | nA |
| | | BDX47 | $V_{BE} = 0; V_{CE} = -80\text{ V}$ | – | – | –50 |
| I_{EBO} | emitter cut-off current | $I_C = 0; V_{EB} = -4\text{ V}$ | – | – | –50 | nA |
| h_{FE} | DC current gain | $V_{CE} = -10\text{ V}$; see Fig. 2 $I_C = -150\text{ mA}$ $I_C = -500\text{ mA}$ | 1000 2000 | – – | – – | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -500\text{ mA}; I_B = -0.5\text{ mA}$ | – | – | –1.3 | V |
| | | $I_C = -500\text{ mA}; I_B = -0.5\text{ mA}; T_j = 150\text{ °C}$ | – | – | –1.3 | V |
| | | $I_C = -1\text{ A}; I_B = -4\text{ mA}$ | – | – | –1.6 | V |
| | | $I_C = -1\text{ A}; I_B = -4\text{ mA}; T_j = 150\text{ °C}$ | – | – | –1.6 | V |
| V_{BEsat} | base-emitter saturation voltage | $I_C = -500\text{ mA}; I_B = -0.5\text{ mA}$ | – | – | –1.9 | V |
| | | $I_C = -1\text{ A}; I_B = -4\text{ mA}$ | – | – | –2.2 | V |
| f_T | transition frequency | $I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$ | – | 200 | – | MHz |
| Switching times (between 10% and 90% levels); see Fig.3 | | | | | | |
| t_{on} | turn-on time | $I_{Con} = -500\text{ mA}; I_{Bon} = -0.5\text{ mA};$ $I_{Boff} = 0.5\text{ mA}$ | – | – | 500 | ns |
| t_d | delay time | | – | – | 200 | ns |
| t_r | rise time | | – | – | 300 | ns |
| t_{off} | turn-off time | | – | – | 700 | ns |
| t_s | storage time | | – | – | 550 | ns |
| t_f | fall time | | – | – | 150 | ns |

PNP Darlington transistors

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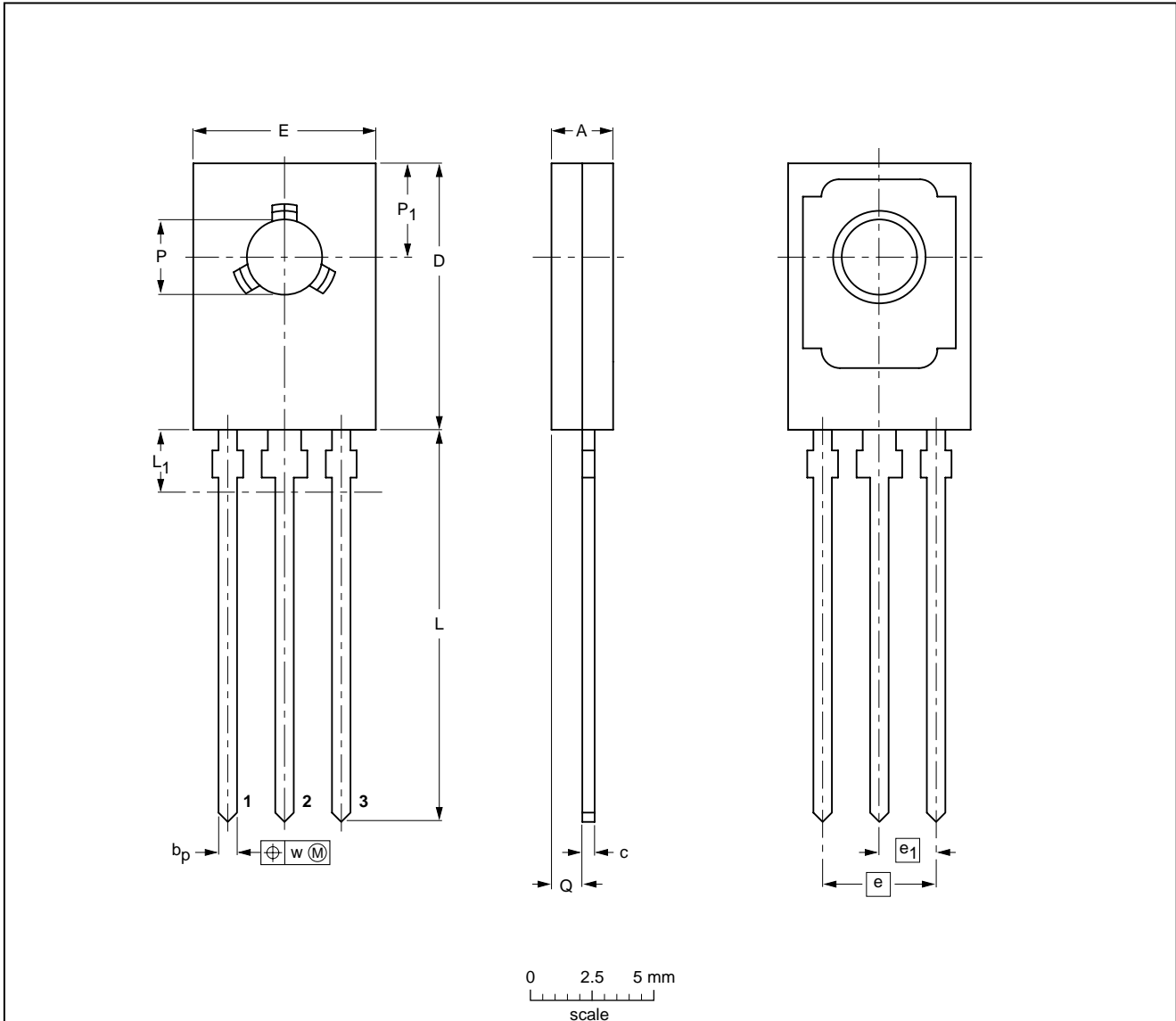


PNP Darlington transistors

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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; mountable to heatsink, 1 mounting hole; 3 leads SOT32



DIMENSIONS (mm are the original dimensions)

| UNIT | A | b _p | c | D | E | e | e ₁ | L | L ₁ ⁽¹⁾ max | Q | P | P ₁ | w |
|------|------------|----------------|--------------|--------------|------------|------|----------------|--------------|--------------------------------------|------------|------------|----------------|-------|
| mm | 2.7 2.3 | 0.88 0.65 | 0.60 0.45 | 11.1 10.5 | 7.8 7.2 | 4.58 | 2.29 | 16.5 15.3 | 2.54 | 1.5 0.9 | 3.2 3.0 | 3.9 3.6 | 0.254 |

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|--------|------|------------------------|------------|
| | IEC | JEDEC | EIAJ | | |
| SOT32 | | TO-126 | | | 97-03-04 |

PNP Darlington transistors

BDX45; BDX47

DEFINITIONS

| Data Sheet Status | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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