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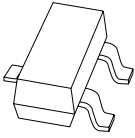
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Kind regards,

Team Nexperia



PDTD113ZT

NPN 500 mA, 50 V resistor-equipped transistor;
R1 = 1 k Ω , R2 = 10 k Ω

Rev. 02 — 23 March 2009

Product data sheet

1. Product profile

1.1 General description

NPN 500 mA Resistor-Equipped Transistor (RET) in a small Surface-Mounted Device (SMD) plastic package.

PNP complement: PDTB113ZT.

1.2 Features

- Built-in bias resistors
- Simplifies circuit design
- 500 mA output current capability
- Reduces component count
- Reduces pick and place costs
- $\pm 10\%$ resistor ratio tolerance

1.3 Applications

- Digital application in automotive and industrial segments
- Controlling IC inputs
- Cost-saving alternative for BC817 series in digital applications
- Switching loads

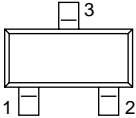
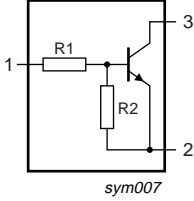
1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|------------|-----|-----|-----|------------|
| V _{CEO} | collector-emitter voltage | open base | - | - | 50 | V |
| I _O | output current | | - | - | 500 | mA |
| R1 | bias resistor 1 (input) | | 0.7 | 1 | 1.3 | k Ω |
| R2/R1 | bias resistor ratio | | 9 | 10 | 11 | |

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|--------------------|---|--|
| 1 | input (base) |  |  <p style="text-align: right; font-size: small;">sym007</p> |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PDTD113ZT | - | plastic surface-mounted package; 3 leads | SOT23 |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PDTD113ZT | *7V |

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---------------------------|----------------|-----|-----|------|
| V_{CBO} | collector-base voltage | open emitter | - | 50 | V |
| V_{CEO} | collector-emitter voltage | open base | - | 50 | V |
| V_{EBO} | emitter-base voltage | open collector | - | 5 | V |
| V_I | input voltage | | | | |
| | positive | | - | +10 | V |
| | negative | | - | -5 | V |
| I_O | output current | | - | 500 | mA |

Table 5. Limiting values ...continued*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|--------------------------|-------|------|------|
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | [1] - | 250 | mW |
| T _j | junction temperature | | - | 150 | °C |
| T _{amb} | ambient temperature | | -65 | +150 | °C |
| T _{stg} | storage temperature | | -65 | +150 | °C |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

6. Thermal characteristics

Table 6. Thermal characteristics

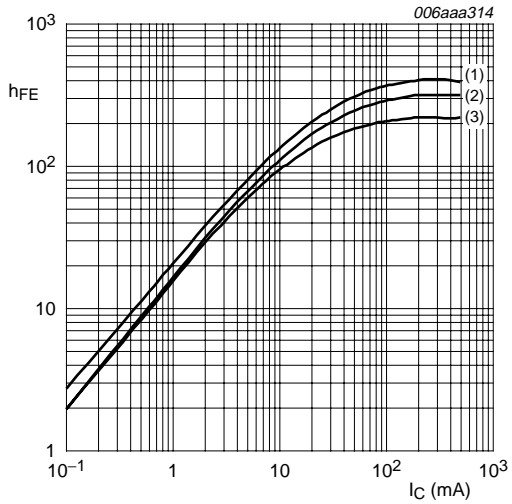
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|---|-------------|-------|-----|-----|------|
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] - | - | 500 | K/W |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

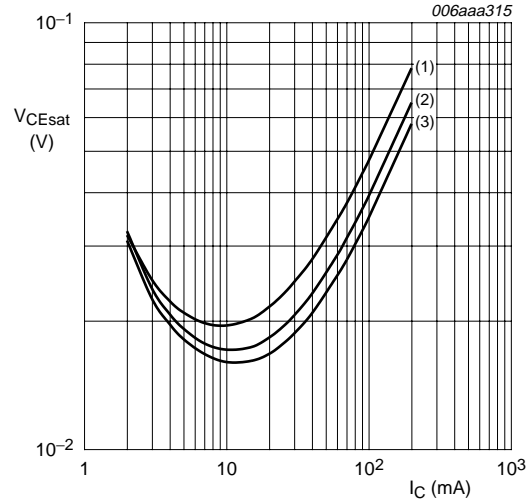
Table 7. Characteristics*T_{amb} = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|--------------------------------------|--|-----|-----|-----|------------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 40 V; I _E = 0 A | - | - | 100 | nA |
| | | V _{CB} = 50 V; I _E = 0 A | - | - | 100 | nA |
| I _{CEO} | collector-emitter cut-off current | V _{CE} = 50 V; I _B = 0 A | - | - | 0.5 | μ A |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 A | - | - | 0.8 | mA |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 50 mA | 70 | - | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 50 mA; I _B = 2.5 mA | - | - | 0.3 | V |
| V _{I(off)} | off-state input voltage | V _{CE} = 5 V; I _C = 100 μ A | 0.3 | 0.6 | 1 | V |
| V _{I(on)} | on-state input voltage | V _{CE} = 0.3 V; I _C = 20 mA | 0.4 | 0.8 | 1.4 | V |
| R1 | bias resistor 1 (input) | | 0.7 | 1 | 1.3 | k Ω |
| R2/R1 | bias resistor ratio | | 9 | 10 | 11 | |
| C _c | collector capacitance | V _{CB} = 10 V; I _E = i _e = 0 A; f = 100 MHz | - | 7 | - | pF |



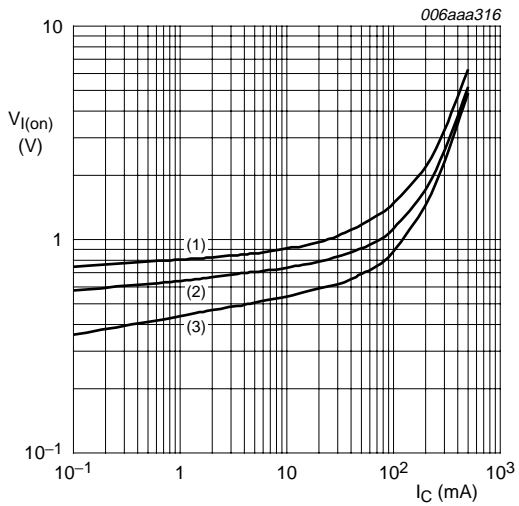
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 1. DC current gain as a function of collector current; typical values



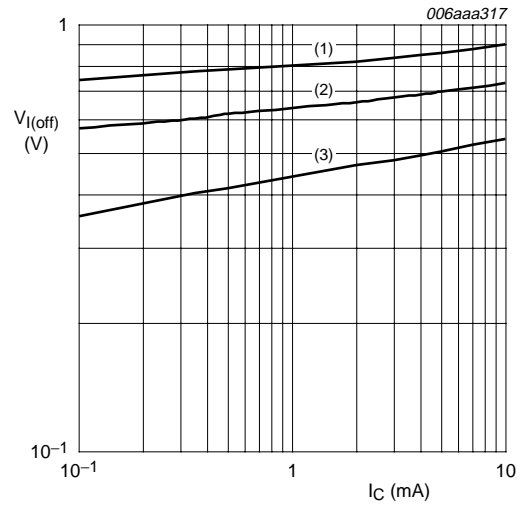
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 2. Collector-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = 0.3\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

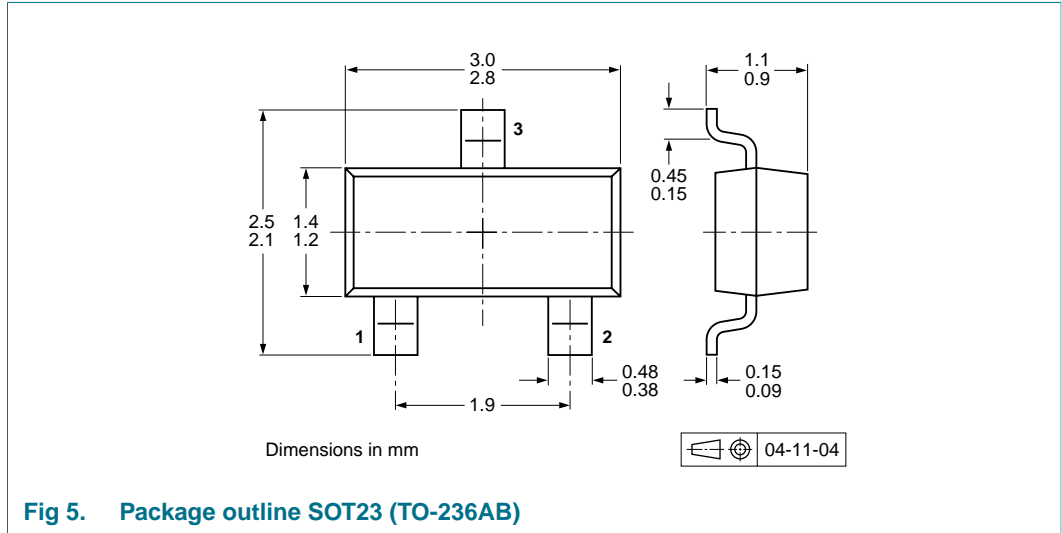
Fig 3. On-state input voltage as a function of collector current; typical values



$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 4. Off-state input voltage as a function of collector current; typical values

8. Package outline



9. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | |
|-------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| PDTD113ZT | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | -235 |

[1] For further information and the availability of packing methods, see [Section 13](#).

10. Soldering

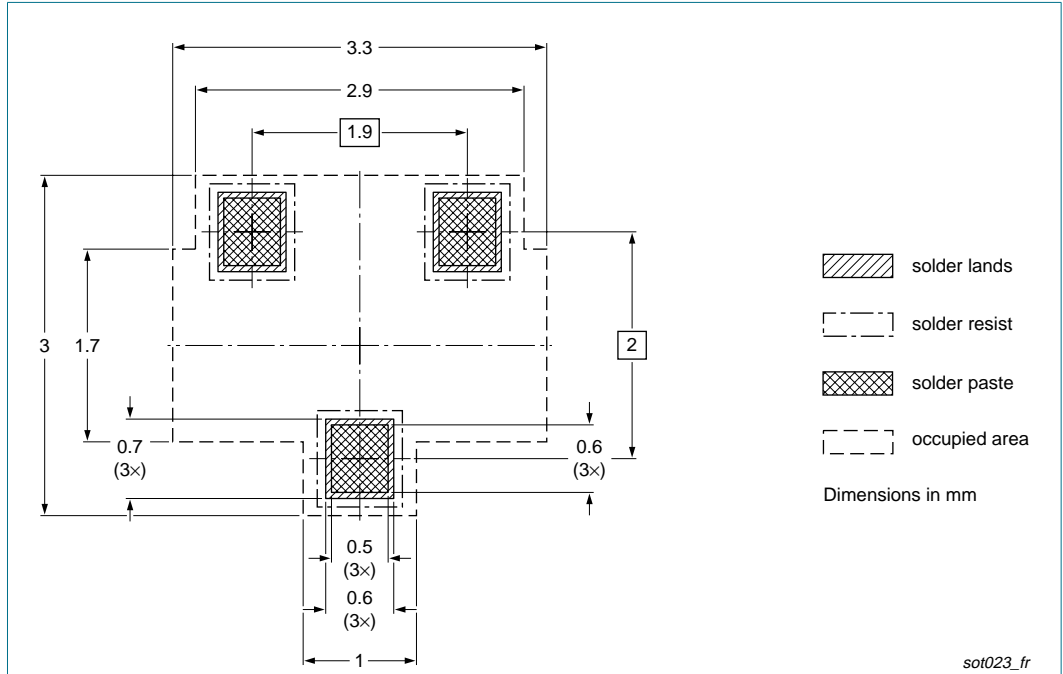


Fig 6. Reflow soldering footprint SOT23 (TO-236AB)

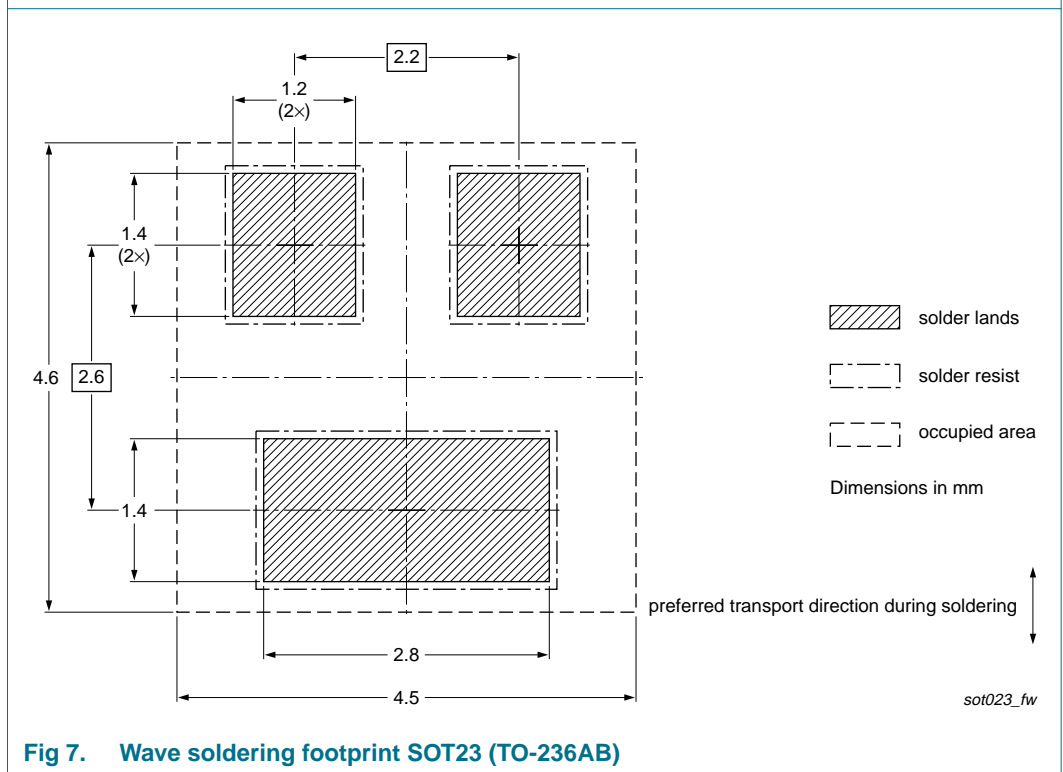


Fig 7. Wave soldering footprint SOT23 (TO-236AB)

11. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|---|
| PDTD113ZT_2 | 20090323 | Product data sheet | - | PDTD113Z_SER_1 |
| Modifications: | | | | |
| | | | | <ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.• Type numbers PDTD113ZK and PDTD113ZS removed• Table 5 "Limiting values": typo for maximum value of V_I positive corrected• Section 10 "Soldering": added• Section 12 "Legal information": updated |
| PDTD113Z_SER_1 | 20050405 | Product data sheet | - | - |

12. Legal information

12.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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