



PDTB123YT

PNP 500 mA, 50 V resistor-equipped transistor;
R1 = 2.2 k Ω , R2 = 10 k Ω

16 November 2020

Product data sheet

1. General description

500 mA PNP Resistor-Equipped Transistor (RET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.
NPN complement: PDTD123YT.

2. Features and benefits

- 500 mA output current capability
- Reduces pick and place costs
- Built-in bias resistors
- ± 10 % resistor ratio tolerance
- Simplifies circuit design
- Reduces component count
- AEC-Q101 qualified

3. Applications

- Digital application in automotive and industrial segments
- Cost-saving alternative for BC807 series in digital applications
- Control of IC inputs
- Switching loads

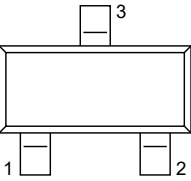
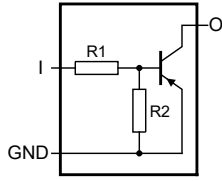
4. Quick reference data

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 | T _{amb} = 25 °C | 1.54 | 2.2 | 2.86 | k Ω |
| R2/R1 | bias resistor ratio | | 4.1 | 4.55 | 5 | |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------|--|---|
| 1 | I | input (base) |  <p style="text-align: center;">SOT23</p> |  <p style="text-align: center;">aaa-019606</p> |
| 2 | GND | ground (emitter) | | |
| 3 | O | output (collector) | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PDTB123YT | SOT23 | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PDTB123YT | %7Y |

[1] % = placeholder for manufacturing site code

8. 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 | - | 5 | V |
| | | negative | - | -20 | V |
| I_O | output current | | - | -500 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [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.

9. Thermal characteristics

Table 6. Thermal characteristics

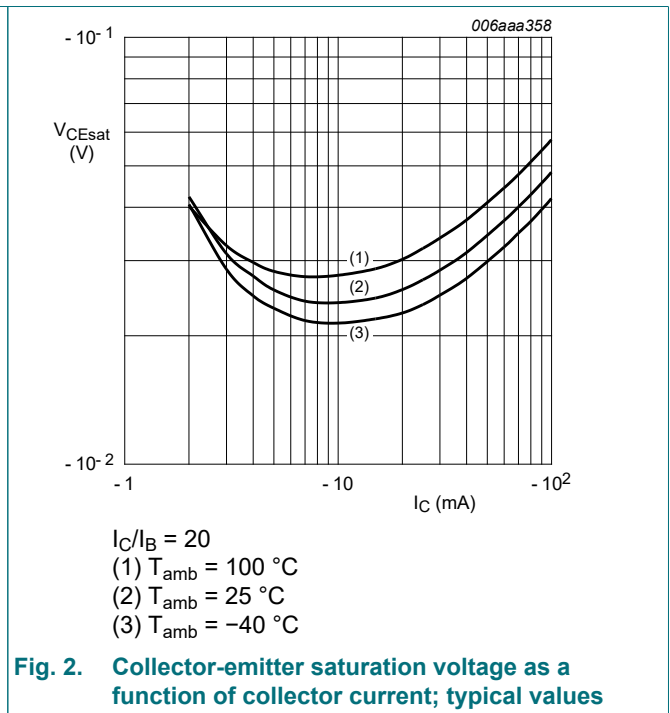
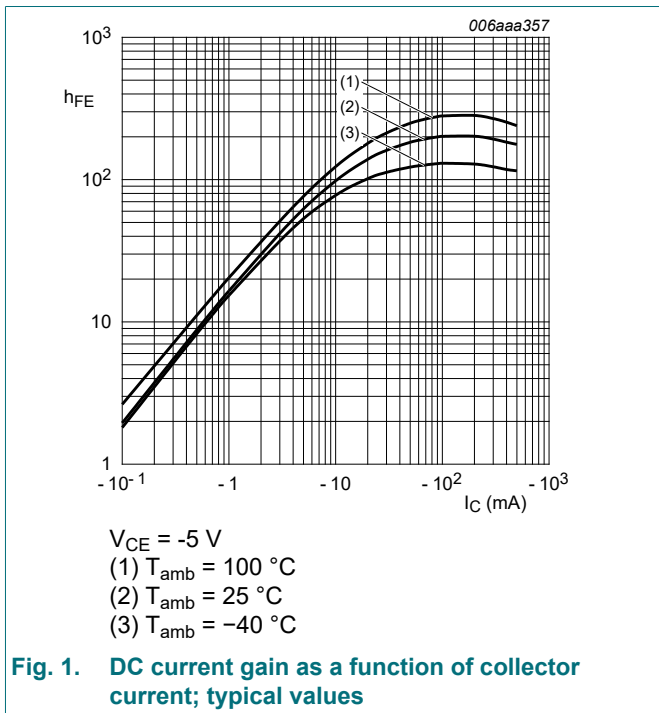
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|---|-------------|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | 500 | K/W |

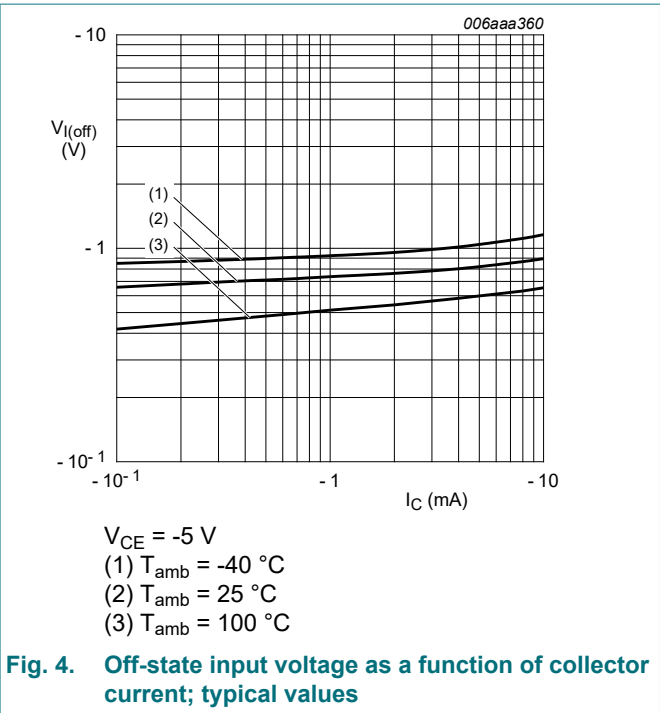
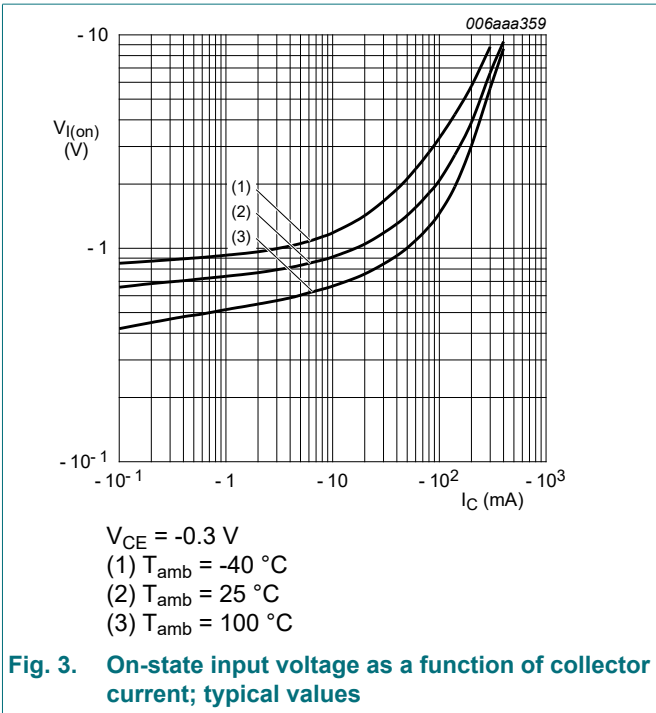
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------|--------------------------------------|---|------|------|-------|---------------|
| I_{CEO} | collector-emitter cut-off current | $V_{CE} = -50\text{ V}; I_B = 0\text{ A}; T_{amb} = 25\text{ °C}$ | - | - | -0.5 | μA |
| I_{CBO} | collector-base cut-off current | $V_{CB} = -40\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ °C}$ | - | - | -100 | nA |
| | | $V_{CB} = -50\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ °C}$ | - | - | -100 | nA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = -5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ °C}$ | - | - | -0.65 | mA |
| h_{FE} | DC current gain | $V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; T_{amb} = 25\text{ °C}$ | 70 | - | - | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -50\text{ mA}; I_B = -2.5\text{ mA}; T_{amb} = 25\text{ °C}$ | - | - | -300 | mV |
| $V_{I(off)}$ | off-state input voltage | $V_{CE} = -5\text{ V}; I_C = -100\text{ }\mu\text{A}; T_{amb} = 25\text{ °C}$ | -0.4 | -0.6 | -1 | V |
| $V_{I(on)}$ | on-state input voltage | $V_{CE} = -0.3\text{ V}; I_C = -20\text{ mA}; T_{amb} = 25\text{ °C}$ | -0.5 | -1 | -1.4 | V |
| R1 | bias resistor 1 | $T_{amb} = 25\text{ °C}$ | 1.54 | 2.2 | 2.86 | kΩ |
| R2/R1 | bias resistor ratio | | 4.1 | 4.55 | 5 | |
| C_C | collector capacitance | $V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 100\text{ MHz}; T_{amb} = 25\text{ °C}$ | - | 11 | - | pF |



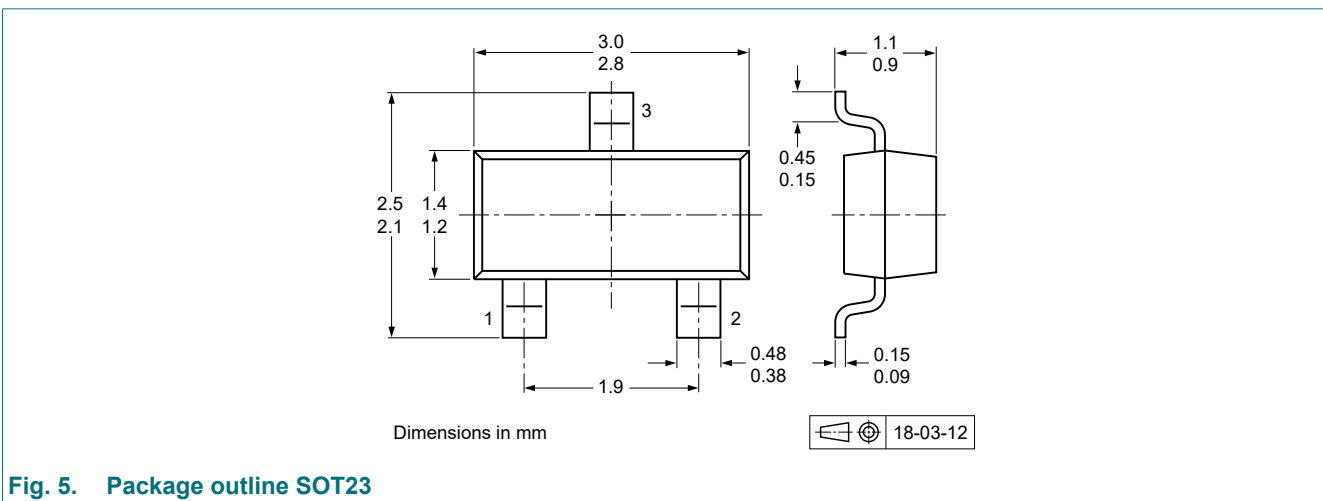


11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline



13. Soldering

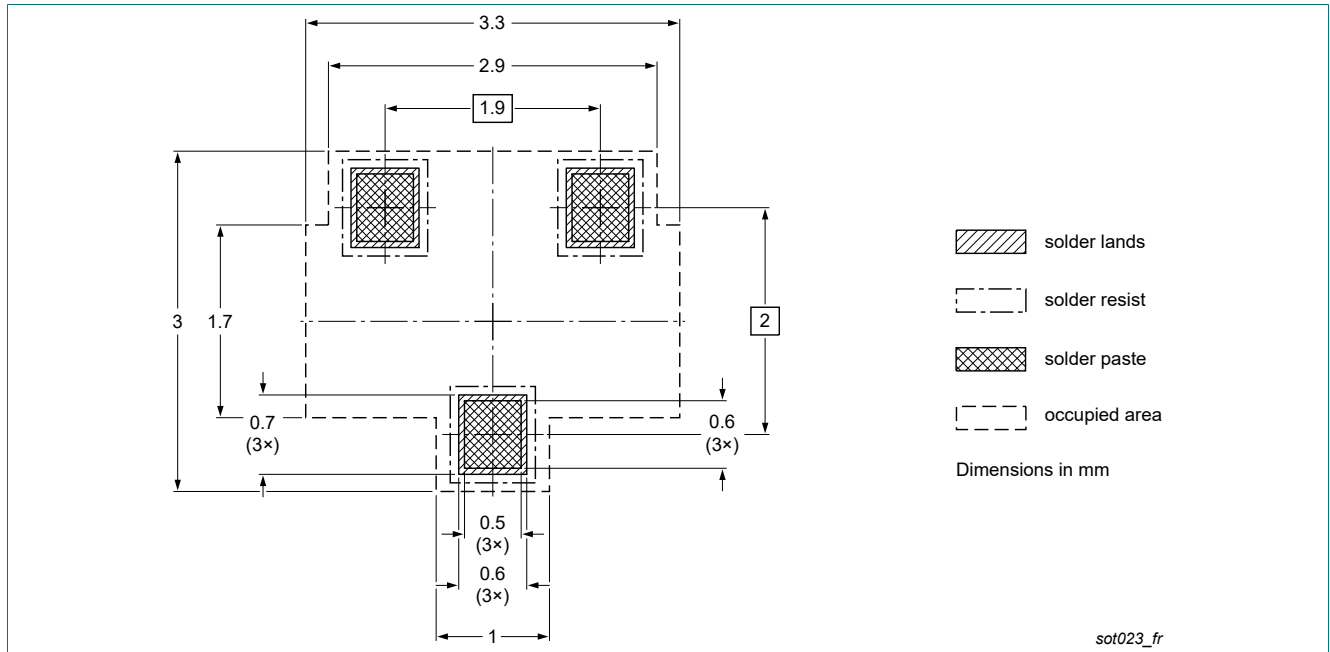


Fig. 6. Reflow soldering footprint for SOT23

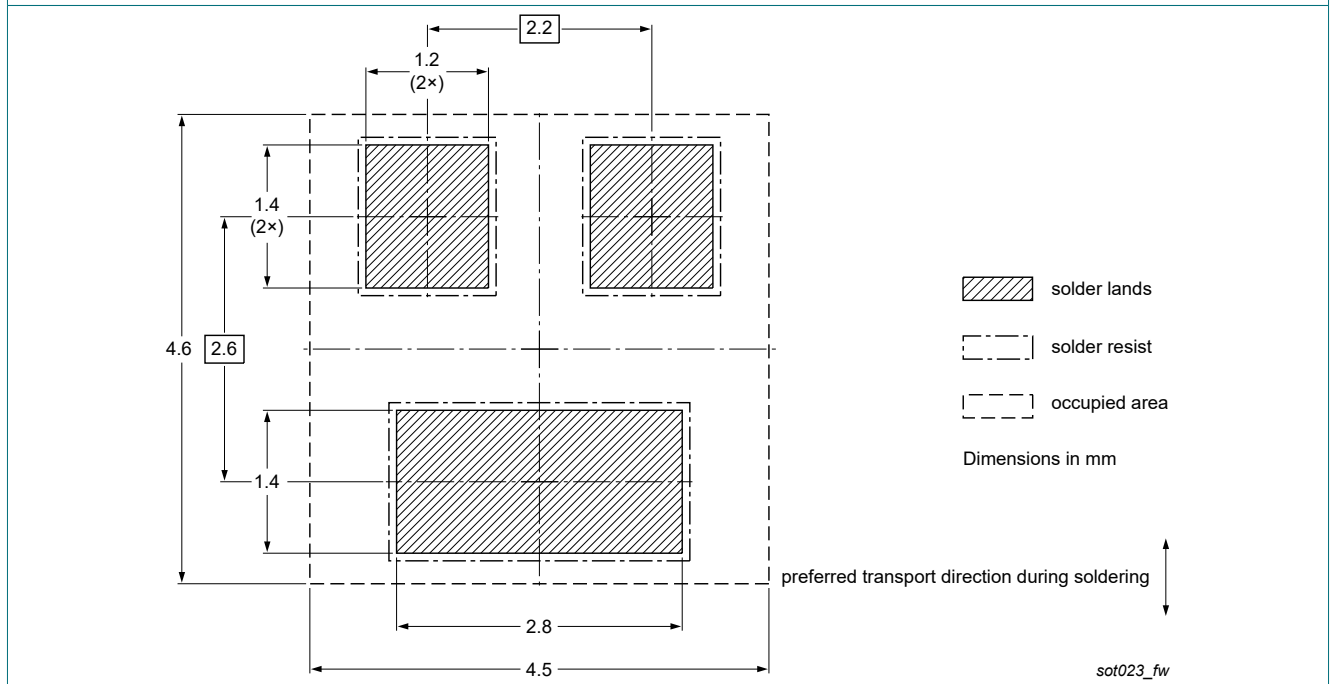


Fig. 7. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--|--------------------|---------------|-------------------|
| PDTB123YT v.4 | 20201116 | Product data sheet | - | PDTB123YT v.3 |
| Modifications: | <ul style="list-style-type: none"> Limiting values: Negative input voltage changed The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. | | | |
| PDTB123YT v.3 | 20100923 | Product data sheet | - | PDTB123YT_SER v.2 |
| PDTB123YT_SER v.2 | 20091116 | Product data sheet | - | PDTB123YT_SER v.1 |
| PDTB123YT_SER v.1 | 20050427 | Product data sheet | - | - |

15. Legal information

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 <https://www.nexperia.com>.

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