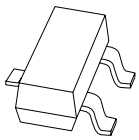


# PDTB123YT

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

Rev. 3 — 30 August 2010 Product data sheet

## 1. Product profile

### 1.1 General description

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

NPN complement: PDTD123YT.

### 1.2 Features and benefits

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

### 1.3 Applications

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

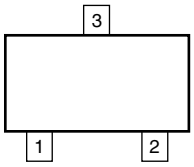
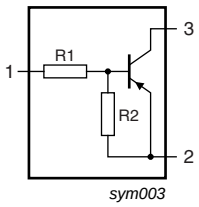
### 1.4 Quick reference data

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) | | 1.54 | 2.2 | 2.86 | kΩ |
| R2/R1 | bias resistor ratio | | 4.1 | 4.55 | 5 | |

## 2. Pinning information

**Table 2. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| 1 | input (base) |  |  |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |



006aaa144



sym003

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PDTB123YT | - | plastic surface-mounted package; 3 leads | SOT23 |

## 4. Marking

**Table 4. Marking codes**

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

[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 | | - | +5 | V |
| | negative | | - | –12 | 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 | $T_{amb} \leq 25$ °C | [1] | - | 250 | mW |
| $T_{stg}$ | storage temperature | | | −65 | +150 | °C |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient 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 |

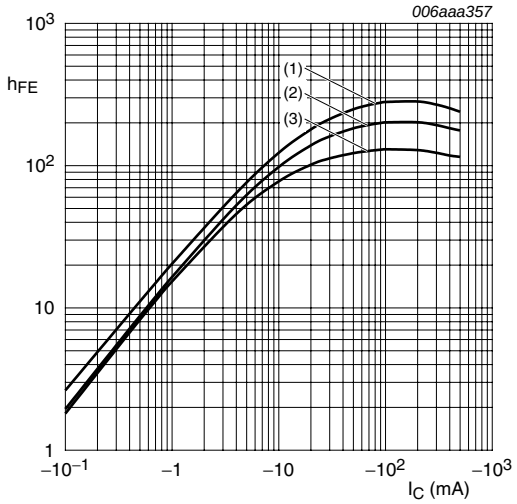
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 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 | μA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = −5 V; $I_C$ = 0 A | - | - | −0.65 | 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 μA | −0.4 | −0.6 | −1.0 | V |
| $V_{I(on)}$ | on-state input voltage | $V_{CE}$ = −0.3 V; $I_C$ = −20 mA | −0.5 | −1.0 | −1.4 | V |
| R1 | bias resistor 1 (input) | | 1.54 | 2.2 | 2.86 | kΩ |
| R2/R1 | bias resistor ratio | | 4.1 | 4.55 | 5 | |
| $C_c$ | collector capacitance | $V_{CB}$ = −10 V; $I_E = i_e$ = 0 A; f = 100 MHz | - | 11 | - | pF |



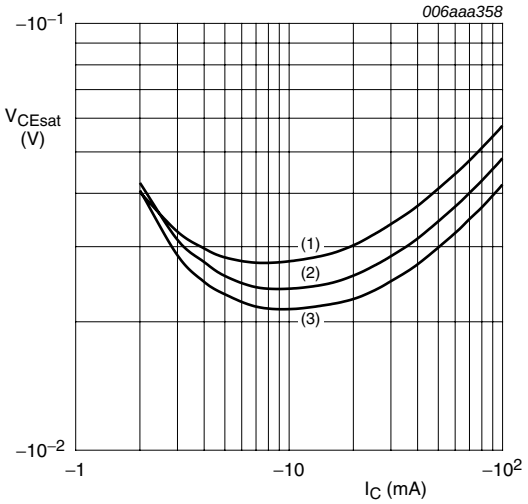

$V_{CE}$ = −5 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −40 °C

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



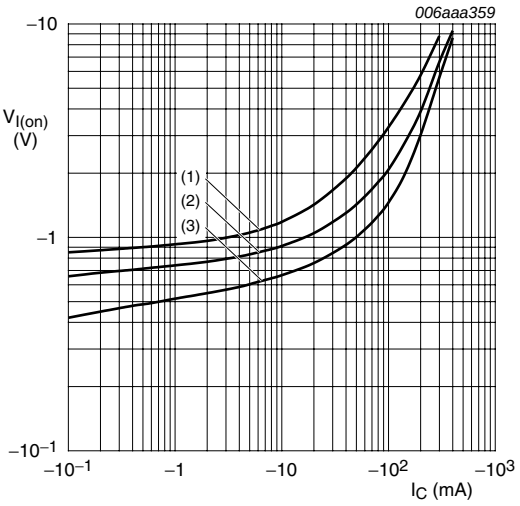

$I_C/I_B$ = 20

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −40 °C

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



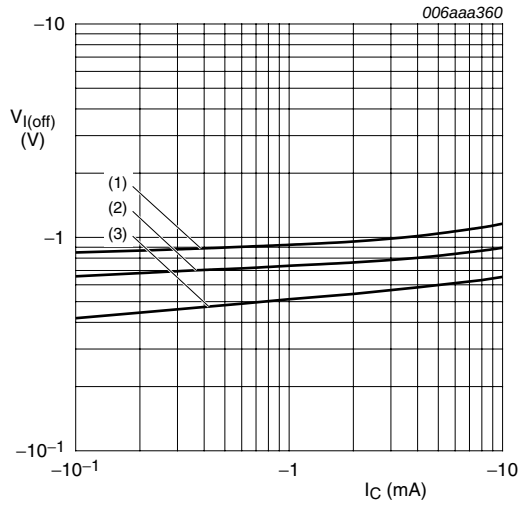

$V_{CE}$ = −0.3 V

(1) $T_{amb}$ = −40 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

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




$V_{CE}$ = −5 V

(1) $T_{amb}$ = −40 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

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

# 8. Test information

## 8.1 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.

# 9. Package outline

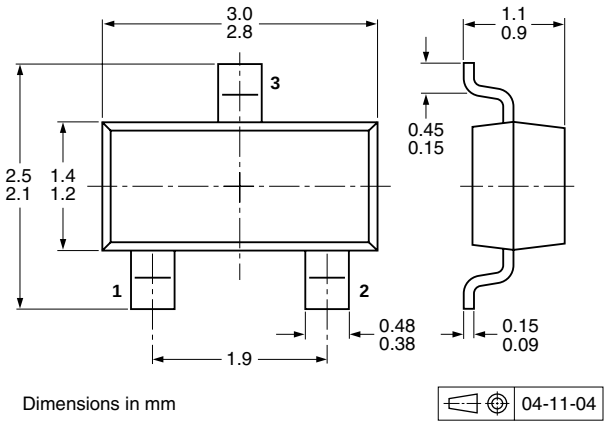



**Fig 5. Package outline SOT23 (TO-236AB)**

# 10. 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 |
| PDTB123YT | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | -235 |

[1] For further information and the availability of packing methods, see Section 14.

## 11. Soldering

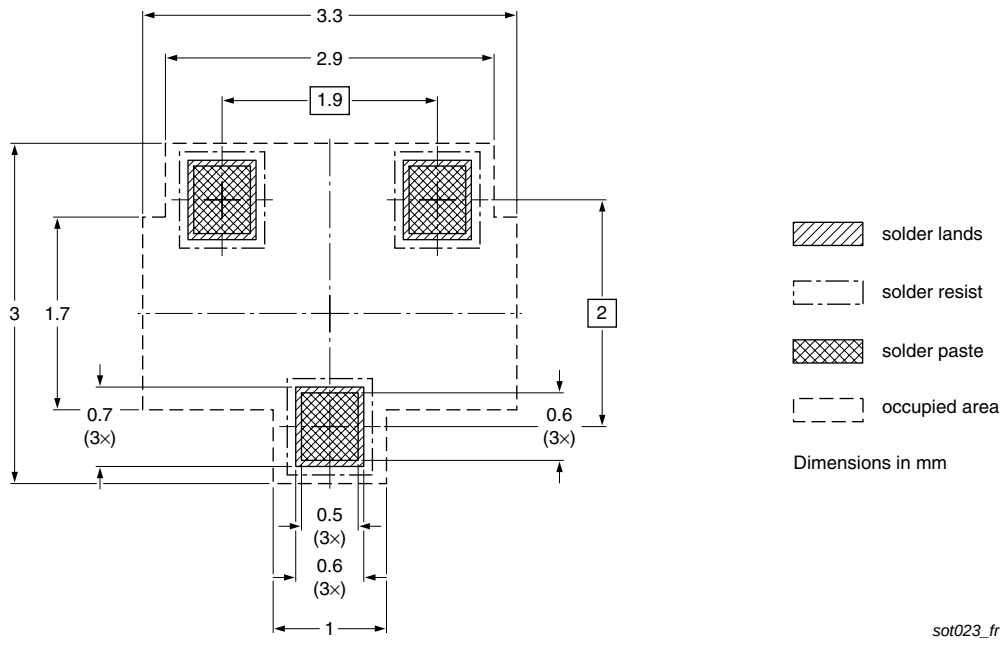



**Fig 6. Reflow soldering footprint SOT23 (TO-236AB)**

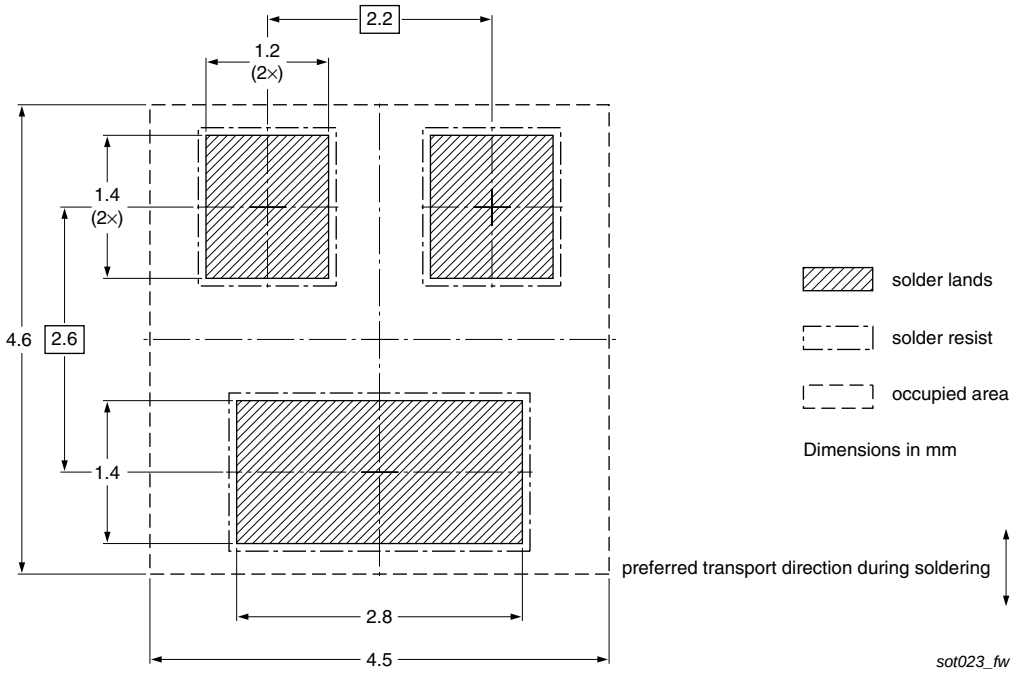



**Fig 7. Wave soldering footprint SOT23 (TO-236AB)**

## 12. Revision history

**Table 9. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PDTB123YT v.3 | 20100830 | Product data sheet | - | PDTB123Y_SER_2 |
| Modifications: | • Type numbers PDTB123YK and PDTB123YS deleted.<br>• Table 7 “Characteristics”: unit for $V_{CEsat}$ changed from mV to V.<br>• Section 8 “Test information”: added.<br>• Section 11 “Soldering”: added.<br>• Section 13 “Legal information”: updated. | | | |
| PDTB123Y_SER_2 | 20091116 | Product data sheet | - | PDTB123Y_SER_1 |
| PDTB123Y_SER_1 | 20050427 | Product data sheet | - | - |

# 13. Legal information

## 13.1 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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## 15. Contents





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