# THE DATASHEET OF

# PDTC115TM,315

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Kind regards,

Team Nexperia

# PDTC115T series

## NPN resistor-equipped transistors; R1 = 100 kΩ, R2 = open

Rev. 04 — 17 February 2005 Product data sheet

## 1. Product profile

### 1.1 General description

NPN resistor-equipped transistors.

**Table 1: Product overview**

| Type number | Package | | PNP complement |
|---|---|---|---|
| | Philips | JEITA | |
| PDTC115TE | SOT416 | SC-75 | PDTA115TE |
| PDTC115TK | SOT346 | SC-59A | PDTA115TK |
| PDTC115TM | SOT883 | SC-101 | PDTA115TM |
| PDTC115TS [1] | SOT54 (TO-92) | SC-43A | PDTA115TS |
| PDTC115TT | SOT23 | - | PDTA115TT |
| PDTC115TU | SOT323 | SC-70 | PDTA115TU |

[1] Also available in SOT54A and SOT54 variant packages (see Section 2).

### 1.2 Features

- Built-in bias resistor
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs

### 1.3 Applications

- General-purpose switching and amplification
- Inverter and interface circuits
- Circuit drivers

### 1.4 Quick reference data

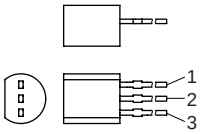
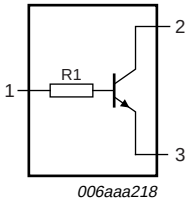
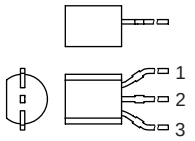
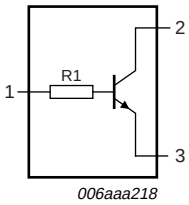
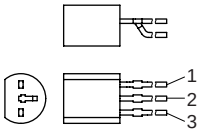
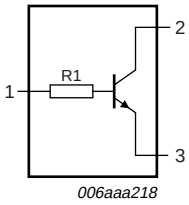
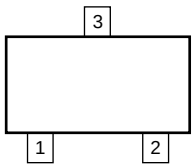
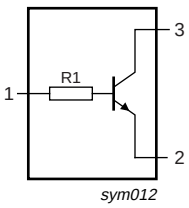
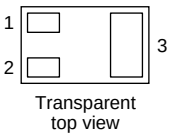
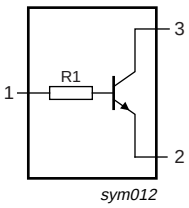
**Table 2: Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | - | - | 50 | V |
| $I_O$ | output current (DC) | | - | - | 100 | mA |
| R1 | bias resistor 1 (input) | | 70 | 100 | 130 | kΩ |

PHILIPS

## 2. Pinning information

Table 3: Pinning

| Pin | Description | Simplified outline | Symbol |
|---|---|---|---|
| **SOT54** | | | |
| 1 | input (base) |  001aab347 |  006aaa218 |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| **SOT54A** | | | |
| 1 | input (base) |  001aab348 |  006aaa218 |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| **SOT54 variant** | | | |
| 1 | input (base) |  001aab447 |  006aaa218 |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| **SOT23, SOT323, SOT346, SOT416** | | | |
| 1 | input (base) |  006aaa144 |  sym012 |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |
| **SOT883** | | | |
| 1 | input (base) |  Transparent top view |  sym012 |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |



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## 3. Ordering information

**Table 4: Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PDTC115TE | SC-75 | plastic surface mounted package; 3 leads | SOT416 |
| PDTC115TK | SC-59A | plastic surface mounted package; 3 leads | SOT346 |
| PDTC115TM | SC-101 | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTC115TS [1] | SC-43A | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTC115TT | - | plastic surface mounted package; 3 leads | SOT23 |
| PDTC115TU | SC-70 | plastic surface mounted package; 3 leads | SOT323 |

[1] Also available in SOT54A and SOT54 variant packages (see Section 2 and Section 9).

## 4. Marking

**Table 5: Marking codes**

| Type number | Marking code [1] |
|---|---|
| PDTC115TE | 17 |
| PDTC115TK | 28 |
| PDTC115TM | G5 |
| PDTC115TS | TC115T |
| PDTC115TT | *AK |
| PDTC115TU | *17 |

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


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## 5. Limiting values

**Table 6: 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 |
| $I_O$ | output current (DC) | | | - | 100 | mA |
| $I_{CM}$ | peak collector current | | | - | 100 | mA |
| $P_{tot}$ | total power dissipation | | | | | |
| | SOT416 | $T_{amb} \leq 25$ °C | [1] | - | 150 | mW |
| | SOT346 | $T_{amb} \leq 25$ °C | [1] | - | 250 | mW |
| | SOT883 | $T_{amb} \leq 25$ °C | [2] [3] | - | 250 | mW |
| | SOT54 | $T_{amb} \leq 25$ °C | [1] | - | 500 | mW |
| | SOT23 | $T_{amb} \leq 25$ °C | [1] | - | 250 | mW |
| | SOT323 | $T_{amb} \leq 25$ °C | [1] | - | 200 | mW |
| $T_{stg}$ | storage temperature | | | –65 | +150 | °C |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | | –65 | +150 | °C |

[1] Refer to standard mounting conditions.

[2] Reflow soldering is the only recommended soldering method.

[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60 μm copper strip line.

## 6. Thermal characteristics

**Table 7: Thermal characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | | | | | |
| | SOT416 | | [1] | - | - | 833 | K/W |
| | SOT346 | | [1] | - | - | 500 | K/W |
| | SOT883 | | [2] [3] | - | - | 500 | K/W |
| | SOT54 | | [1] | - | - | 250 | K/W |
| | SOT23 | | [1] | - | - | 500 | K/W |
| | SOT323 | | [1] | - | - | 625 | K/W |

[1] Refer to standard mounting conditions.

[2] Reflow soldering is the only recommended soldering method.

[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60 μm copper strip line.



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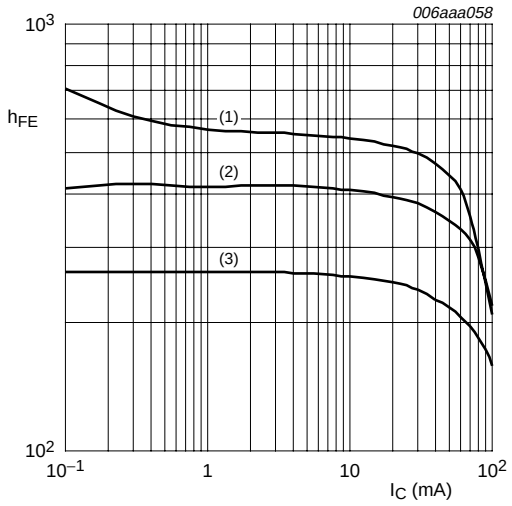
## 7. Characteristics

**Table 8: Characteristics**

*$T_{amb}$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 50 V; $I_E$ = 0 A | - | - | 100 | nA |
| $I_{CEO}$ | collector-emitter cut-off current | $V_{CE}$ = 30 V; $I_B$ = 0 A | - | - | 1 | µA |
| | | $V_{CE}$ = 30 V; $I_B$ = 0 A; $T_j$ = 150 °C | - | - | 50 | µA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 A | - | - | 100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 5 V; $I_C$ = 1 mA | 100 | - | - | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 5 mA; $I_B$ = 0.25 mA | - | - | 150 | mV |
| R1 | bias resistor 1 (input) | | 70 | 100 | 130 | kΩ |
| $C_c$ | collector capacitance | $I_E = i_e$ = 0 A; $V_{CB}$ = 10 V; f = 1 MHz | - | - | 2.5 | pF |



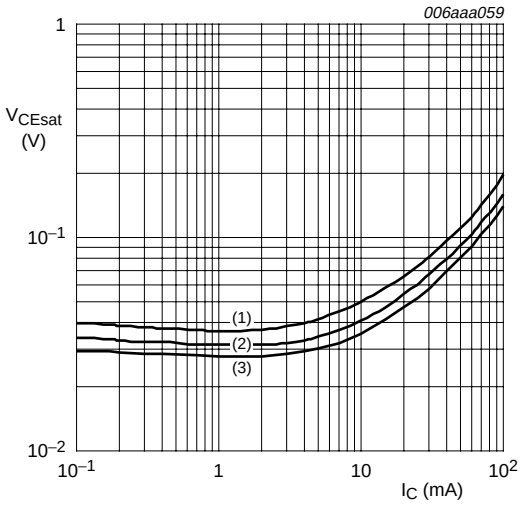

$V_{CE}$ = 5 V

(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**



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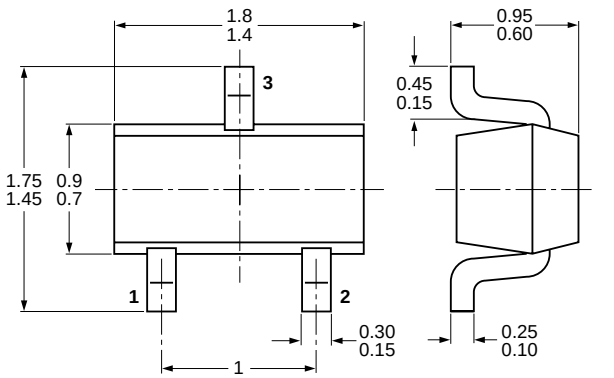
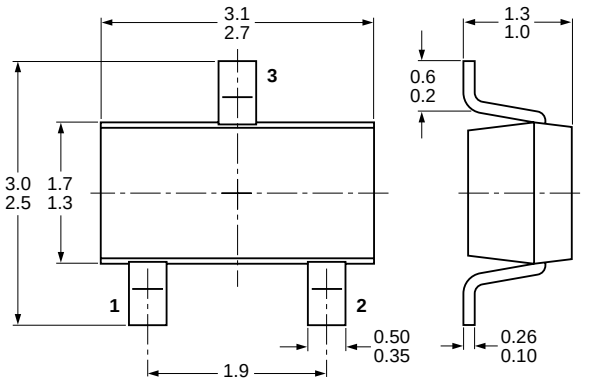
## 8. Package outline




Dimensions in mm

04-11-04

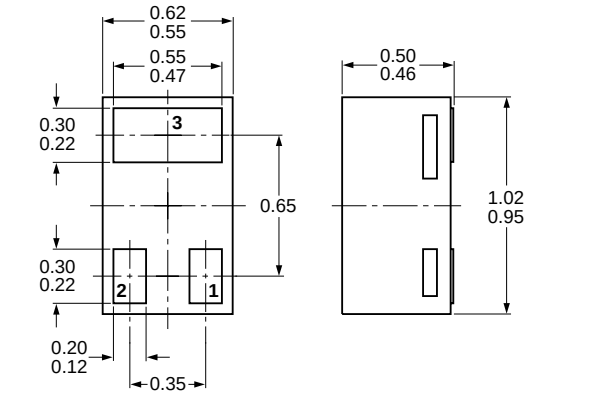
**Fig 3. Package outline SOT416 (SC-75)**




Dimensions in mm

04-11-11

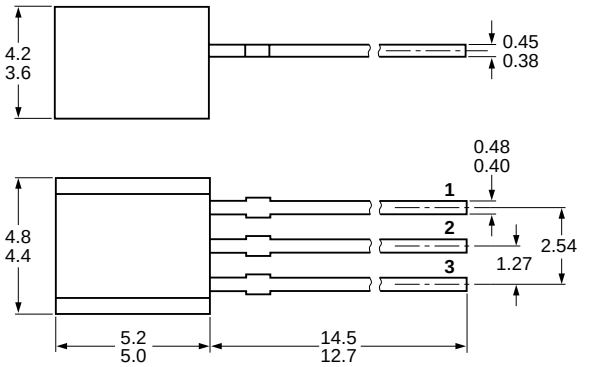
**Fig 4. Package outline SOT346 (SC-59A/TO-236)**




Dimensions in mm

03-04-03

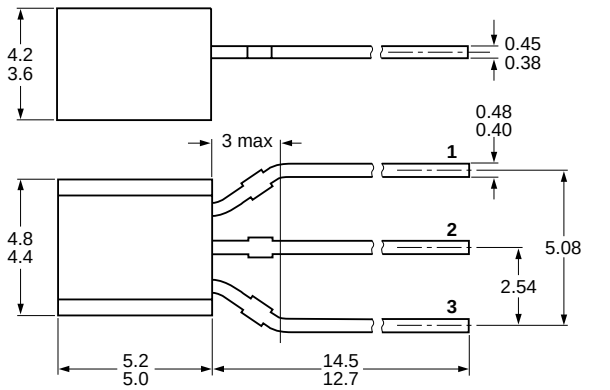
**Fig 5. Package outline SOT883 (SC-101)**




Dimensions in mm

04-11-16

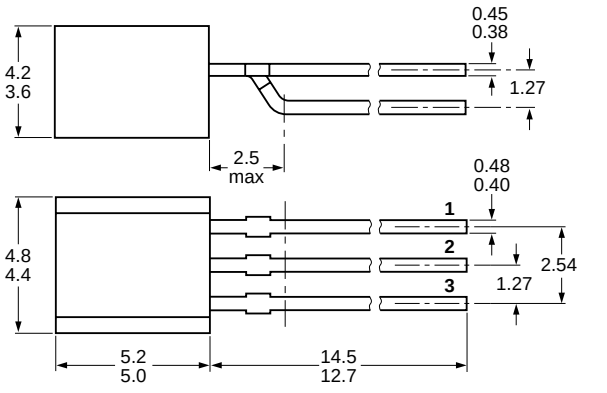
**Fig 6. Package outline SOT54 (SC-43A/TO-92)**




Dimensions in mm

04-06-28

**Fig 7. Package outline SOT54A**




Dimensions in mm

05-01-10

**Fig 8. Package outline SOT54 variant**



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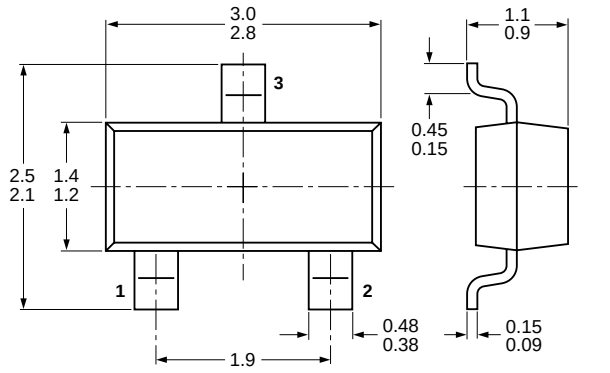


Fig 9. Package outline SOT23 (TO-236AB)

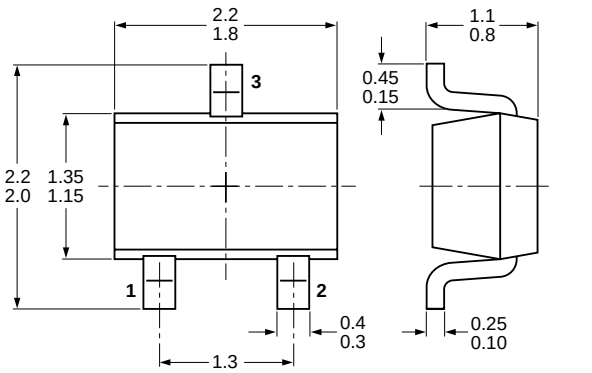


Fig 10. Package outline SOT323 (SC-70)

## 9. Packing information

**Table 9: Packing methods**

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

| Type number | Package | Description | Packing quantity | | |
|---|---|---|---|---|---|
| | | | 3000 | 5000 | 10000 |
| PDTC115TE | SOT416 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTC115TK | SOT346 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTC115TM | SOT883 | 2 mm pitch, 8 mm tape and reel | - | - | -315 |
| PDTC115TS | SOT54 | bulk, straight leads | - | -412 | - |
| PDTC115TS | SOT54A | tape and reel, wide pitch | - | - | -116 |
| PDTC115TS | SOT54A | tape ammopack, wide pitch | - | - | -126 |
| PDTC115TS | SOT54 variant | bulk, delta pinning | - | -112 | - |
| PDTC115TT | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | -235 |
| PDTC115TU | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |

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


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## 10. Revision history

**Table 10: Revision history**

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|---|---|---|---|---|---|
| PDTC115T_SER_4 | 20050217 | Product data sheet | - | 9397 750 14021 | PDTC115TT_3 |
| Modifications | • The types PDTC115TE, PDTC115TK, PDTC115TM, PDTC115TS and PDTC115TU were added.<br>• Table 1 “Product overview” added<br>• Figure 1 and 2 added<br>• Section 9 “Packing information” added | | | | |
| PDTC115TT_3 | 20040727 | Product data sheet | - | 9397 750 13505 | PDTC115TT_2 |
| PDTC115TT_2 | 20040510 | Objective data sheet | - | 9397 750 13206 | PDTC115TT_1 |
| PDTC115TT_1 | 20040305 | Objective data sheet | - | 9397 750 12554 | - |


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## 11. Data sheet status

| Level | Data sheet status [1] | Product status [2] [3] | Definition |
|---|---|---|---|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
| III | Product data | Production | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

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

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## 12. Definitions

**Short-form specification —** The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition —** Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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