# PDTA115T series

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

Rev. 05 — 2 September 2009 Product data sheet

## 1. Product profile

### 1.1 General description

PNP resistor-equipped transistors.

**Table 1. Product overview**

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

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

### 1.2 Features

- Built-in bias resistors
- 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

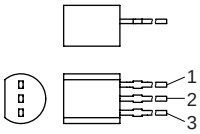
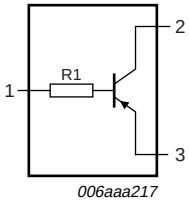
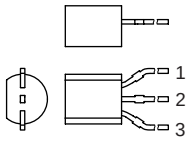
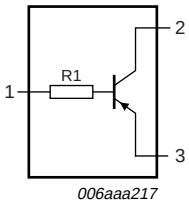
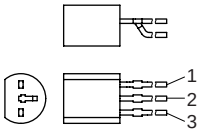
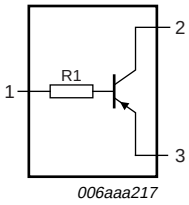
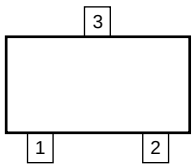
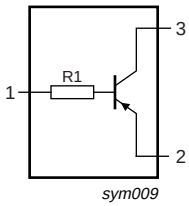
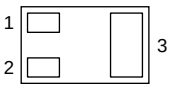
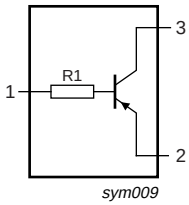
### 1.4 Quick reference data

**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 |

## 2. Pinning information

Table 3. Pinning

| Pin | Description | Simplified outline | Symbol |
|---|---|---|---|
| **SOT54** | | | |
| 1 | input (base) |  001aab347 |  006aaa217 |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| **SOT54A** | | | |
| 1 | input (base) |  001aab348 |  006aaa217 |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| **SOT54 variant** | | | |
| 1 | input (base) |  001aab447 |  006aaa217 |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| **SOT23, SOT323, SOT346, SOT416** | | | |
| 1 | input (base) |  006aaa144 |  sym009 |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |
| **SOT883** | | | |
| 1 | input (base) |  Transparent top view |  sym009 |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |

## 3. Ordering information

**Table 4. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PDTA115TE | SC-75 | plastic surface mounted package; 3 leads | SOT416 |
| PDTA115TK | SC-59 | plastic surface mounted package; 3 leads | SOT346 |
| PDTA115TM | SC-101 | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTA115TS[1] | SC-43A | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTA115TT | - | plastic surface mounted package; 3 leads | SOT23 |
| PDTA115TU | 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] |
|---|---|
| PDTA115TE | 12 |
| PDTA115TK | 11 |
| PDTA115TM | E8 |
| PDTA115TS | TA115T |
| PDTA115TT | *AC |
| PDTA115TU | *11 |

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

## 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 | $T_{amb} \leq 25$ °C | | | | |
| | SOT416 | | [1] | - | 150 | mW |
| | SOT346 | | [1] | - | 250 | mW |
| | SOT883 | | [2][3] | - | 250 | mW |
| | SOT54 | | [1] | - | 500 | mW |
| | SOT23 | | [1] | - | 250 | mW |
| | SOT323 | | [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.

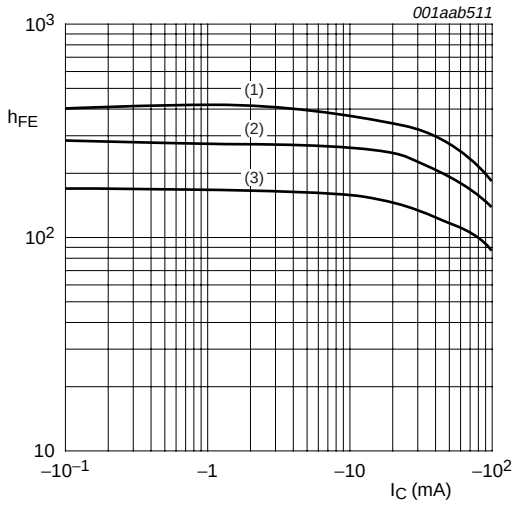
[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60 μm copper strip line.

# 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 | $V_{CB}$ = –10 V; $I_E$ = $i_e$ = 0 A; f = 1 MHz | - | - | 3 | pF |



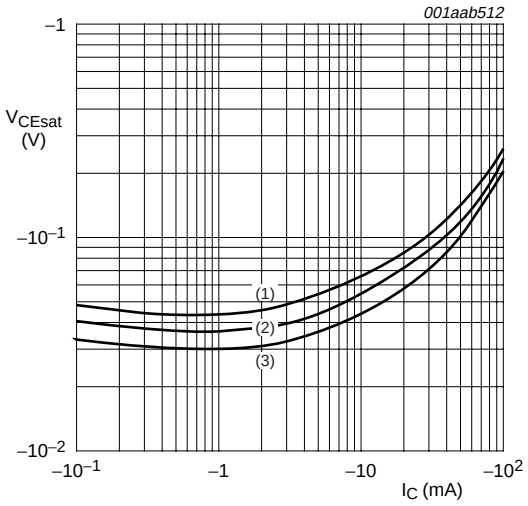

$V_{CE}$ = –5 V.

(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.

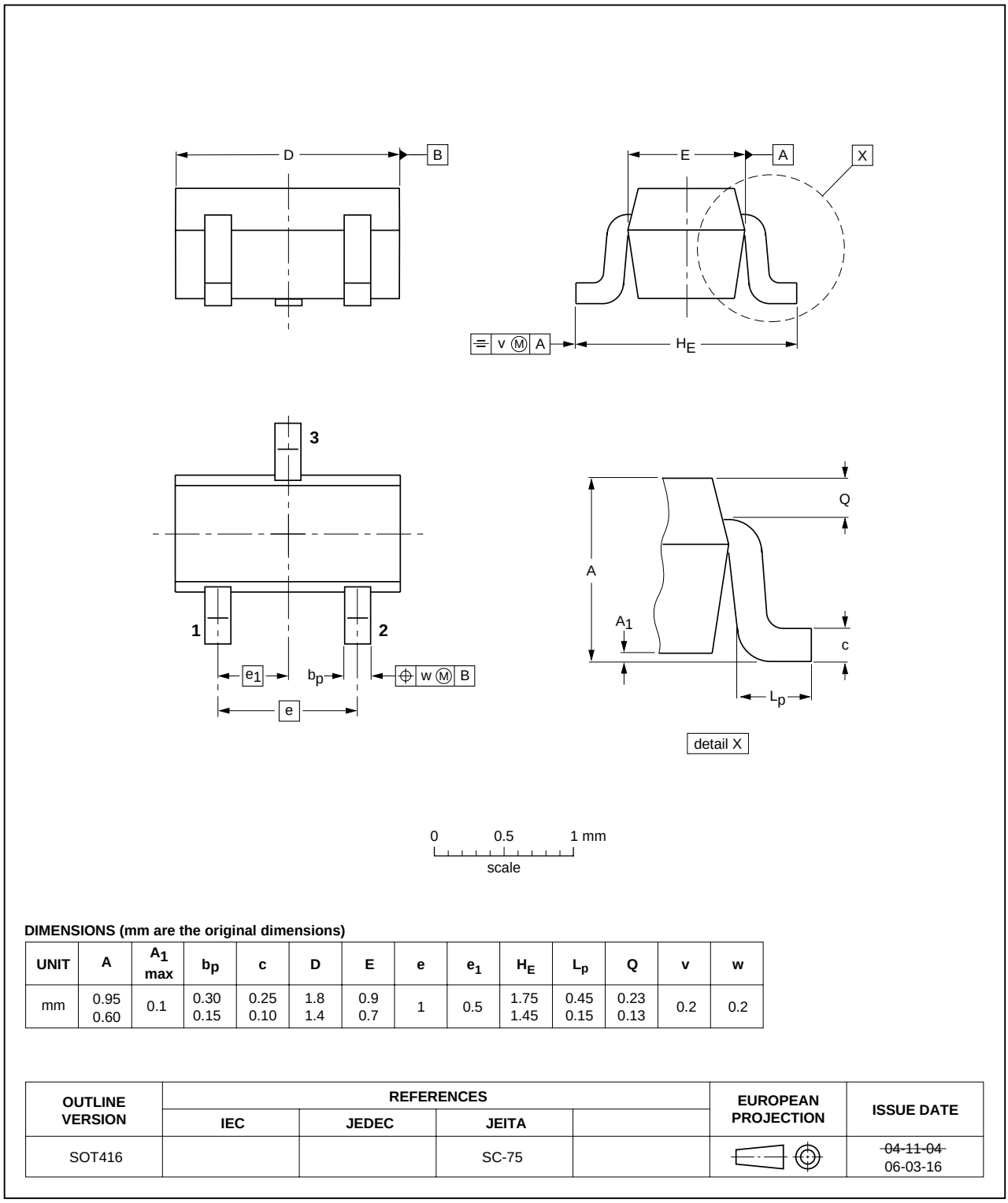
(2) $T_{amb}$ = 25 °C.

(3) $T_{amb}$ = –40 °C.

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

## 8. Package outline

**Plastic surface-mounted package; 3 leads** **SOT416**



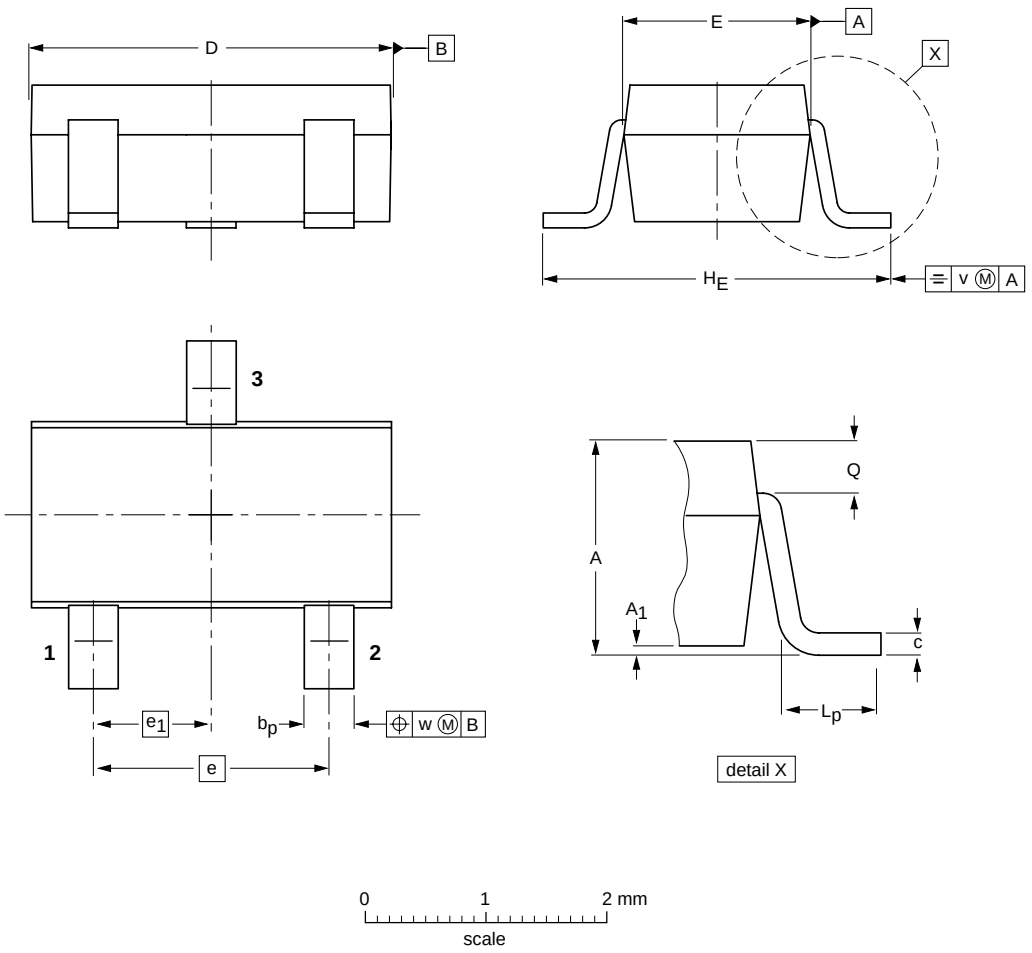

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.95<br>0.60 | 0.1 | 0.30<br>0.15 | 0.25<br>0.10 | 1.8<br>1.4 | 0.9<br>0.7 | 1 | 0.5 | 1.75<br>1.45 | 0.45<br>0.15 | 0.23<br>0.13 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT416 | | | SC-75 | | | ~~04-11-04~~<br>06-03-16 |

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

**Plastic surface-mounted package; 3 leads** **SOT346**



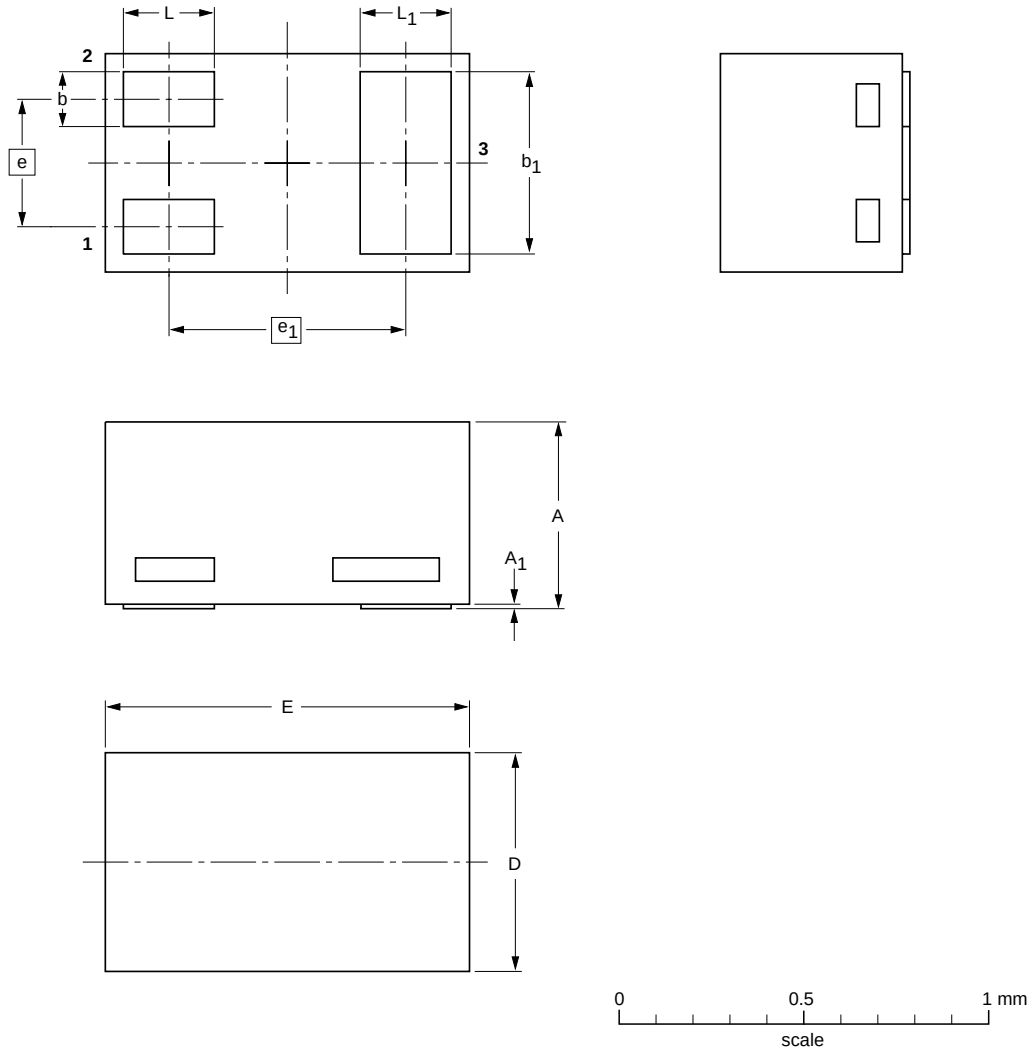

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.3<br>1.0 | 0.1<br>0.013 | 0.50<br>0.35 | 0.26<br>0.10 | 3.1<br>2.7 | 1.7<br>1.3 | 1.9 | 0.95 | 3.0<br>2.5 | 0.6<br>0.2 | 0.33<br>0.23 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT346 | | TO-236 | SC-59A | | | ~~04-11-11~~<br>06-03-16 |

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

**Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm** **SOT883**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A(1) | A1 max. | b | b1 | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.50<br>0.46 | 0.03 | 0.20<br>0.12 | 0.55<br>0.47 | 0.62<br>0.55 | 1.02<br>0.95 | 0.35 | 0.65 | 0.30<br>0.22 | 0.30<br>0.22 |

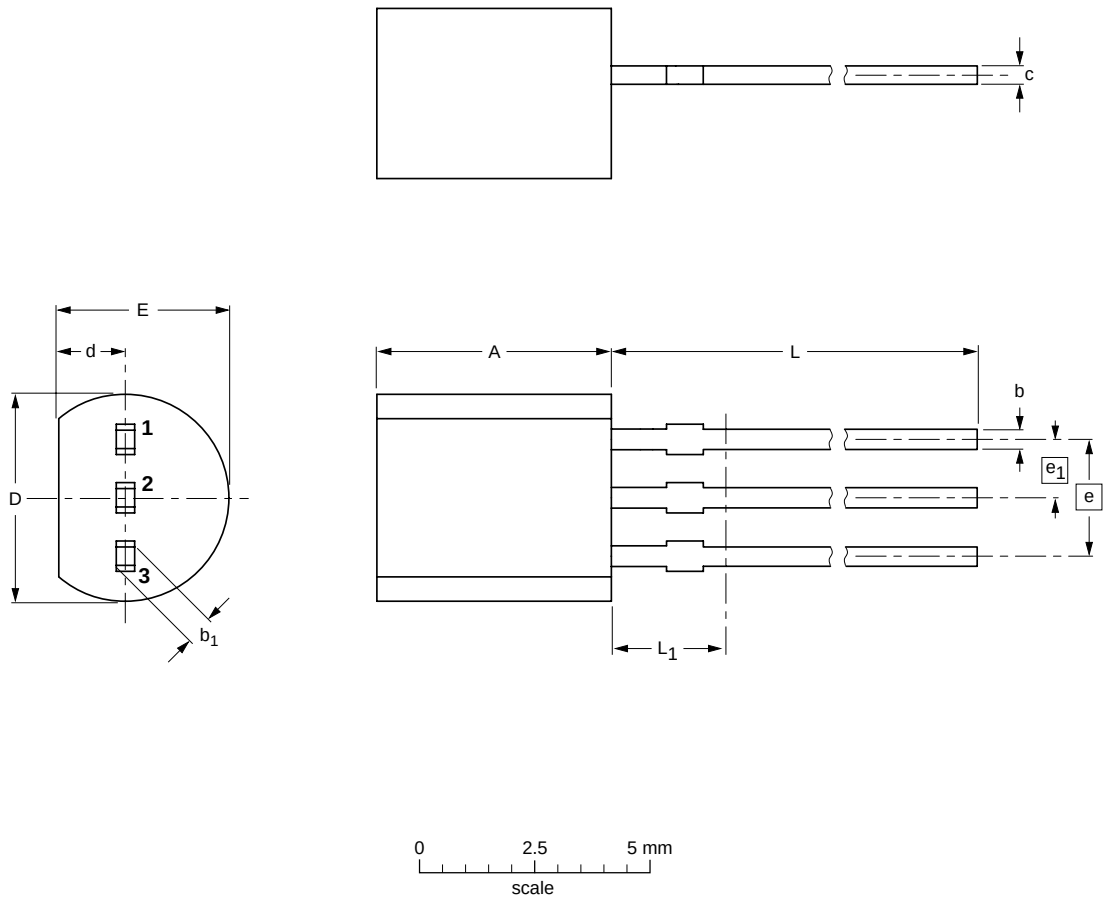
**Note**

1. Including plating thickness

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT883 | | | SC-101 | | | ~~03-02-05~~<br>03-04-03 |

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

**Plastic single-ended leaded (through hole) package; 3 leads** **SOT54**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | b | $b_1$ | c | D | d | E | e | $e_1$ | L | $L_1$ (1) max. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.55 | 0.45<br>0.38 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 2.54 | 1.27 | 14.5<br>12.7 | 2.5 |

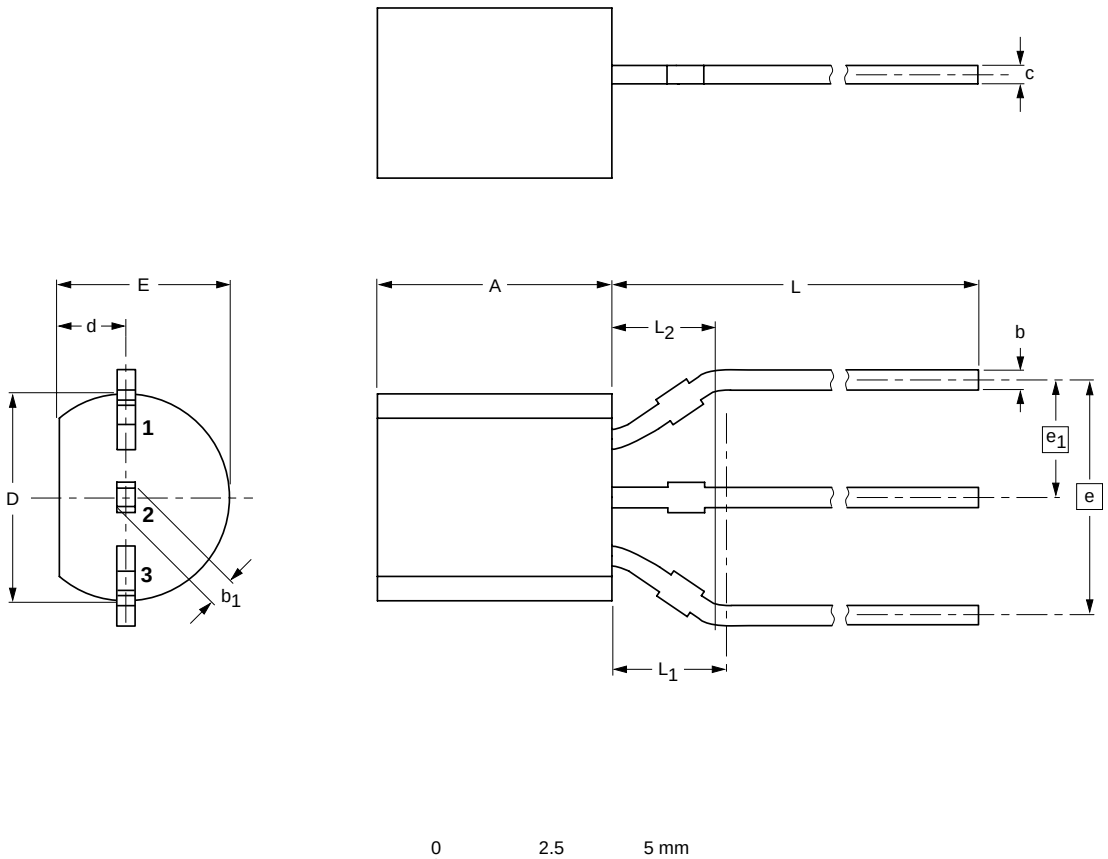
**Note**

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 | JEITA | | | |
| SOT54 | | TO-92 | SC-43A | | | ~~04-06-28~~<br>04-11-16 |

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

**Plastic single-ended leaded (through hole) package; 3 leads (wide pitch)** **SOT54A**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | b | $b_1$ | c | D | d | E | e | $e_1$ | L | $L_1$ (1) max. | $L_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.55 | 0.45<br>0.38 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 5.08 | 2.54 | 14.5<br>12.7 | 3 | 3<br>2 |

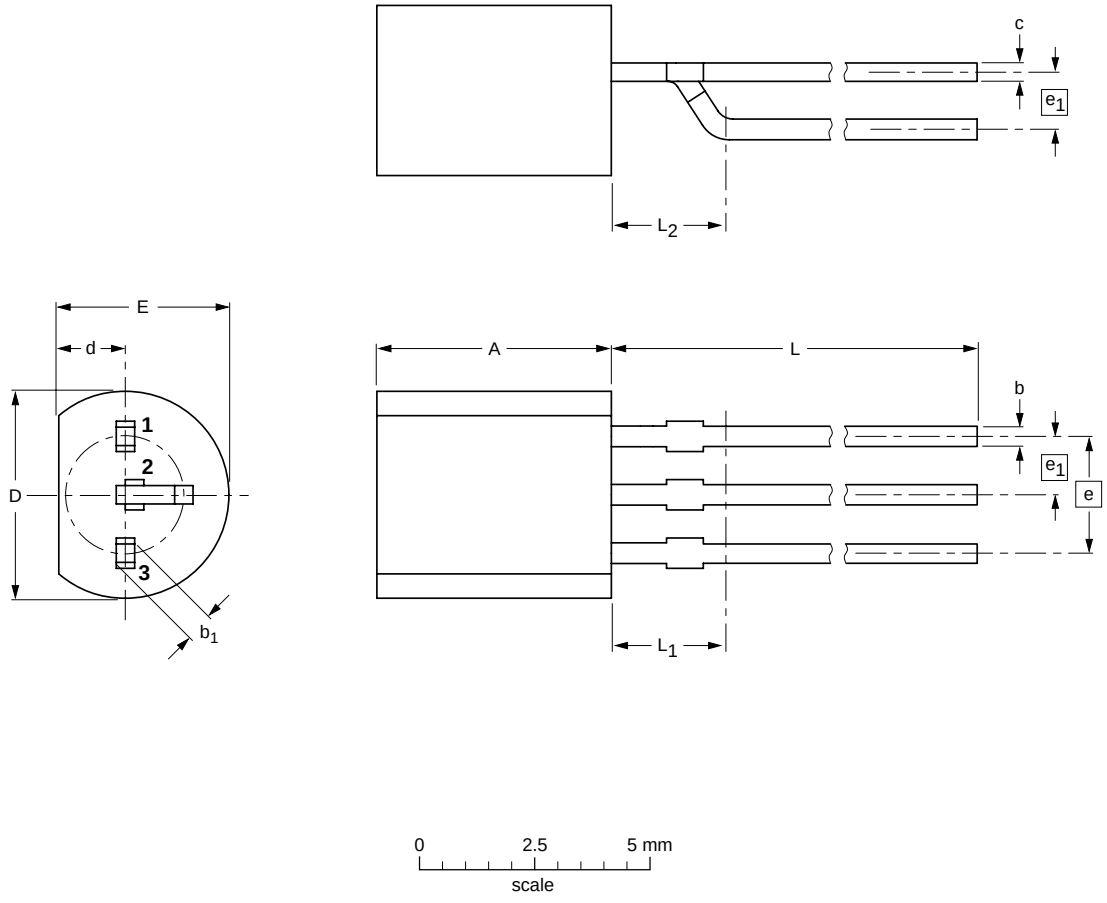
**Note**

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 | JEITA | | | |
| SOT54A | | | | | | ~~97-05-13~~<br>04-06-28 |

**Fig 7. Package outline SOT54A**

**Plastic single-ended leaded (through hole) package; 3 leads (on-circle)** **SOT54 variant**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | b | $b_1$ | c | D | d | E | e | $e_1$ | L | $L_1$ (1) max | $L_2$ max |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.55 | 0.45<br>0.38 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 2.54 | 1.27 | 14.5<br>12.7 | 2.5 | 2.5 |

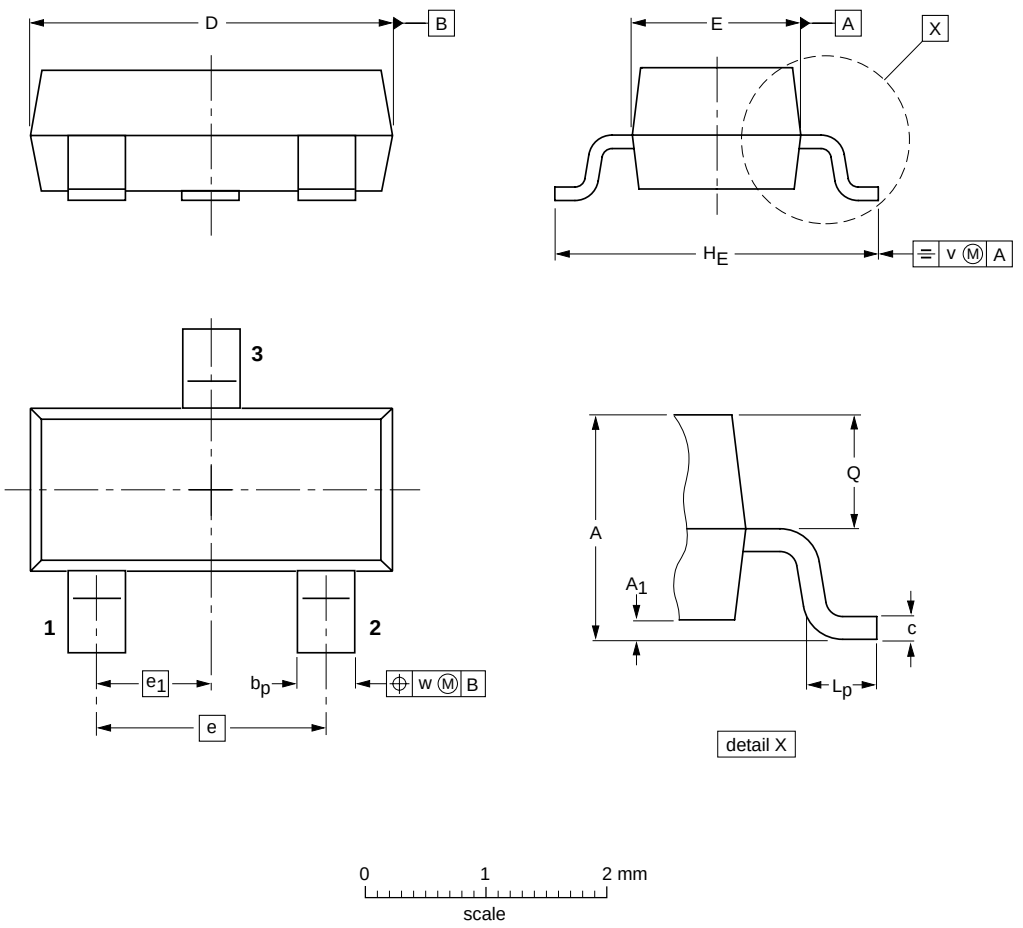
**Note**

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 | JEITA | | | |
| SOT54 variant | | | | | | ~~04-06-28~~<br>05-01-10 |

**Fig 8. Package outline SOT54 variant**

**Plastic surface-mounted package; 3 leads** **SOT23**



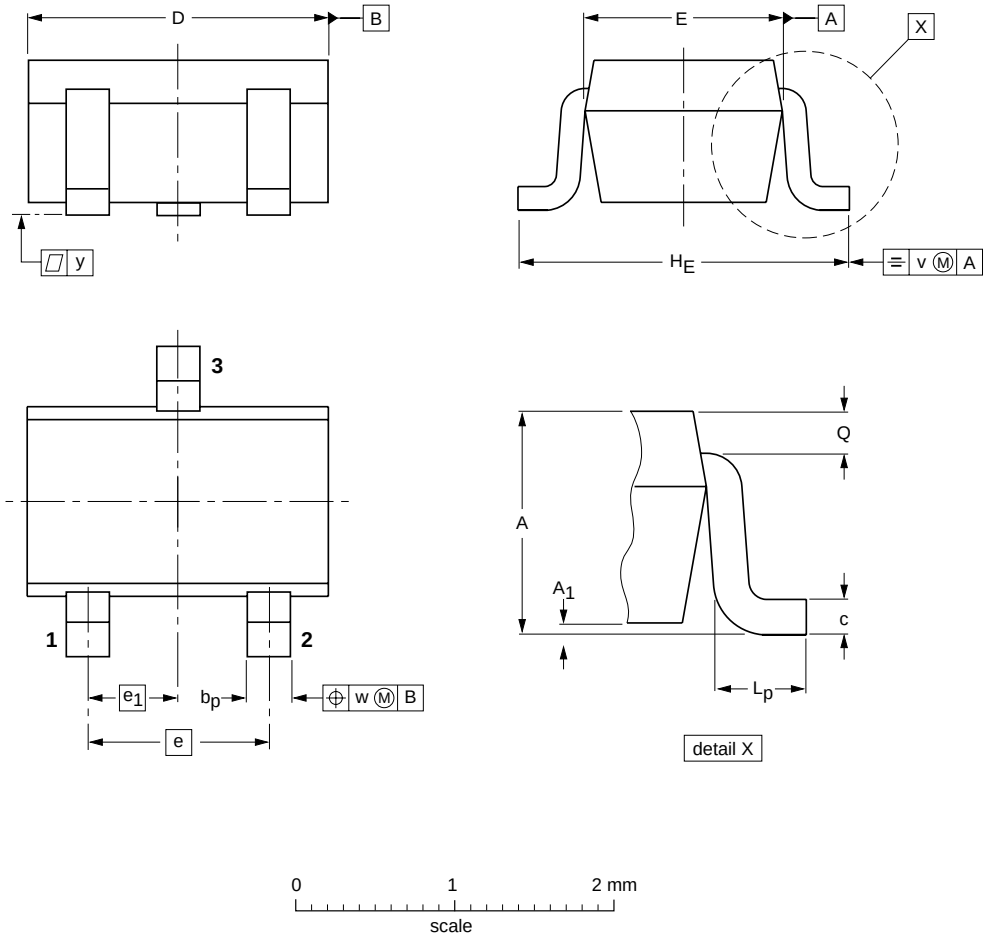

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max. | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.9 | 0.1 | 0.48<br>0.38 | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 0.95 | 2.5<br>2.1 | 0.45<br>0.15 | 0.55<br>0.45 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT23 | | TO-236AB | | | | ~~04-11-04~~<br>06-03-16 |

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

**Plastic surface-mounted package; 3 leads** **SOT323**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.4<br>0.3 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.23<br>0.13 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT323 | | | SC-70 | | | ~~04-11-04~~<br>06-03-16 |

**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 |
| PDTA115TE | SOT416 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTA115TK | SOT346 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTA115TM | SOT883 | 2 mm pitch, 8 mm tape and reel | - | - | -315 |
| PDTA115TS | SOT54 | bulk, straight leads | - | -412 | - |
| | SOT54A | tape and reel, wide pitch | - | - | -116 |
| | SOT54A | tape ammopack, wide patch | - | - | -126 |
| | SOT54 variant | bulk, delta pinning | - | -112 | - |
| PDTA115TT | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | -235 |
| PDTA115TU | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |

[1] For further information and the availability of packing methods, see Section 12.

## 10. Revision history

**Table 10. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PDTA115T_SER_5 | 20090902 | Product data sheet | - | PDTA115T_SER_4 |
| Modifications: | • This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.<br>• Figure 3 “Package outline SOT416 (SC-75)”: updated<br>• Figure 4 “Package outline SOT346 (SC-59/TO-236)”: updated<br>• Figure 9 “Package outline SOT23 (TO-236AB)”: updated<br>• Figure 10 “Package outline SOT323 (SC-70)”: updated | | | |
| PDTA115T_SER_4 | 20050405 | Product data sheet | - | PDTA115TT_3 |
| PDTA115TT_3 | 20040907 | Objective data sheet | - | PDTA115TT_2 |
| PDTA115TT_2 | 20040518 | Objective data sheet | - | PDTA115TT_1 |
| PDTA115TT_1 | 20040323 | Objective data sheet | - | - |

# 11. Legal information

## 11.1 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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# 12. Contact information

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