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Team Nexperia

# DATA SHEET

## PDTC144T series

NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = open

Product data sheet
Supersedes data of 2004 Apr 06

2004 Aug 17

# NPN resistor-equipped transistors; R1 = 47 kΩ, R2 = open

# PDTC144T series

## FEATURES

- Built-in bias resistors
- Simplified circuit design
- Reduction of component count
- Reduced pick and place costs.

## APPLICATIONS

- General purpose switching and amplification
- Inverter and interface circuits
- Circuit driver.

## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | TYP. | MAX. | UNIT |
|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | – | 50 | V |
| $I_O$ | output current (DC) | – | 100 | mA |
| R1 | bias resistor | 47 | – | kΩ |
| R2 | open | – | – | – |

## DESCRIPTION

NPN resistor-equipped transistor (see “Simplified outline, symbol and pinning” for package details).

## PRODUCT OVERVIEW

| TYPE NUMBER | PACKAGE | | MARKING CODE | PNP COMPLEMENT |
|---|---|---|---|---|
| | PHILIPS | EIAJ | | |
| PDTC144TE | SOT416 | SC-75 | 43 | PDTA144TE |
| PDTC144TEF | SOT490 | SC-89 | 33 | PDTA144TEF |
| PDTC144TK | SOT346 | SC-59 | 53 | PDTA144TK |
| PDTC144TM | SOT883 | SC-101 | E4 | PDTA144TM |
| PDTC144TS | SOT54 (TO-92) | SC-43 | TC144T | PDTA144TS |
| PDTC144TT | SOT23 | – | *41[1] | PDTA144TT |
| PDTC144TU | SOT323 | SC-70 | *41[1] | PDTA144TU |

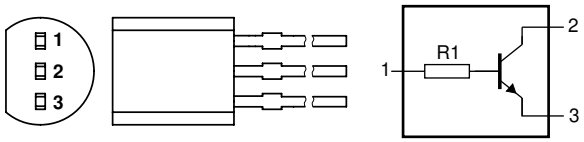
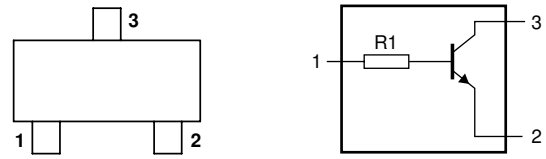
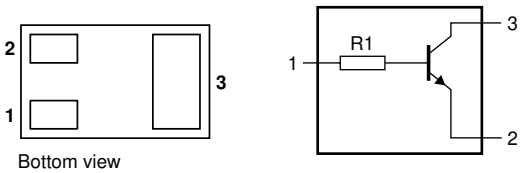
**Note**

1. * = p: Made in Hong Kong.
   * = t: Made in Malaysia.
   * = W: Made in China.

# NPN resistor-equipped transistors; R1 = 47 kΩ, R2 = open

# PDTC144T series

**SIMPLIFIED OUTLINE, SYMBOL AND PINNING**

| TYPE NUMBER | SIMPLIFIED OUTLINE AND SYMBOL | PINNING | |
|---|---|---|---|
| | | PIN | DESCRIPTION |
| PDTC144TS |  MAM361 | 1<br>2<br>3 | base<br>collector<br>emitter |
| PDTC144TE<br>PDTC144TEF<br>PDTC144TK<br>PDTC144TT<br>PDTC144TU |  Top view MDB270 | 1<br>2<br>3 | base<br>emitter<br>collector |
| PDTC144TM |  Bottom view MHC507 | 1<br>2<br>3 | base<br>emitter<br>collector |

**ORDERING INFORMATION**

| TYPE NUMBER | PACKAGE | | |
|---|---|---|---|
| | NAME | DESCRIPTION | VERSION |
| PDTC144TE | – | plastic surface mounted package; 3 leads | SOT416 |
| PDTC144TEF | – | plastic surface mounted package; 3 leads | SOT490 |
| PDTC144TK | – | plastic surface mounted package; 3 leads | SOT346 |
| PDTC144TM | – | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTC144TS | – | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTC144TT | – | plastic surface mounted package; 3 leads | SOT23 |
| PDTC144TU | – | plastic surface mounted package; 3 leads | SOT323 |

**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 | | | |
| | SOT54 | note 1 | – | 500 | mW |
| | SOT23 | note 1 | – | 250 | mW |
| | SOT346 | note 1 | – | 250 | mW |
| | SOT323 | note 1 | – | 200 | mW |
| | SOT490 | notes 1 and 2 | – | 250 | mW |
| | SOT883 | notes 2 and 3 | – | 250 | mW |
| | SOT416 | note 1 | – | 150 | mW |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $T_j$ | junction temperature | | – | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | −65 | +150 | °C |

**Notes**

1. Refer to standard mounting conditions.
2. Reflow soldering is the only recommended soldering method.
3. Refer to SOT883 standard mounting conditions; FR4 with 60 μm copper strip line.

**THERMAL CHARACTERISTICS**

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | | |
| | SOT54 | note 1 | 250 | K/W |
| | SOT23 | note 1 | 500 | K/W |
| | SOT346 | note 1 | 500 | K/W |
| | SOT323 | note 1 | 625 | K/W |
| | SOT490 | notes 1 and 2 | 500 | K/W |
| | SOT883 | notes 2 and 3 | 500 | K/W |
| | SOT416 | note 1 | 833 | K/W |

**Notes**

1. Refer to standard mounting conditions.
2. Reflow soldering is the only recommended soldering method.
3. Refer to SOT883 standard mounting conditions; FR4 with 60 μm copper strip line.

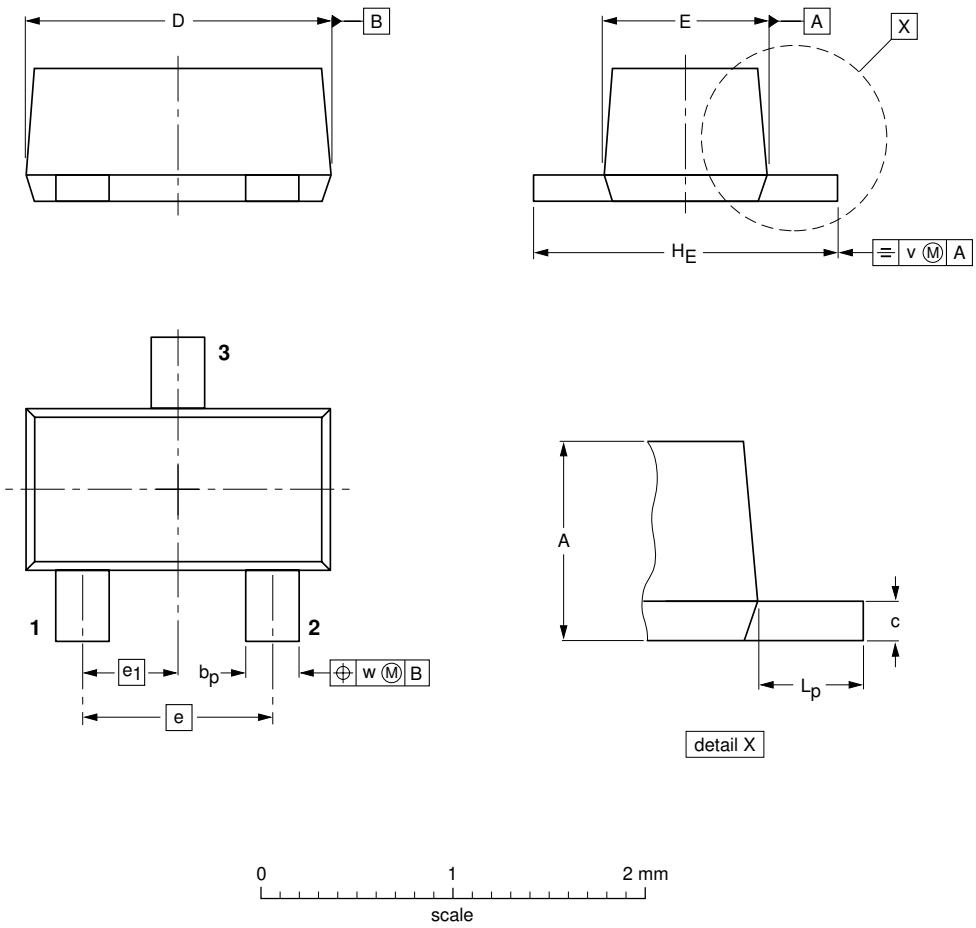
**CHARACTERISTICS**

$T_{amb}$ = 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 | $I_C$ = 10 mA; $I_B$ = 0.5 mA | – | – | 150 | mV |
| R1 | input resistor | | 33 | 47 | 61 | kΩ |
| $C_c$ | collector capacitance | $I_E = i_e$ = 0 A; $V_{CB}$ = 10 V; f = 1 MHz | – | – | 2.5 | pF |

## PACKAGE OUTLINES

**Plastic surface-mounted package; 3 leads** **SOT490**

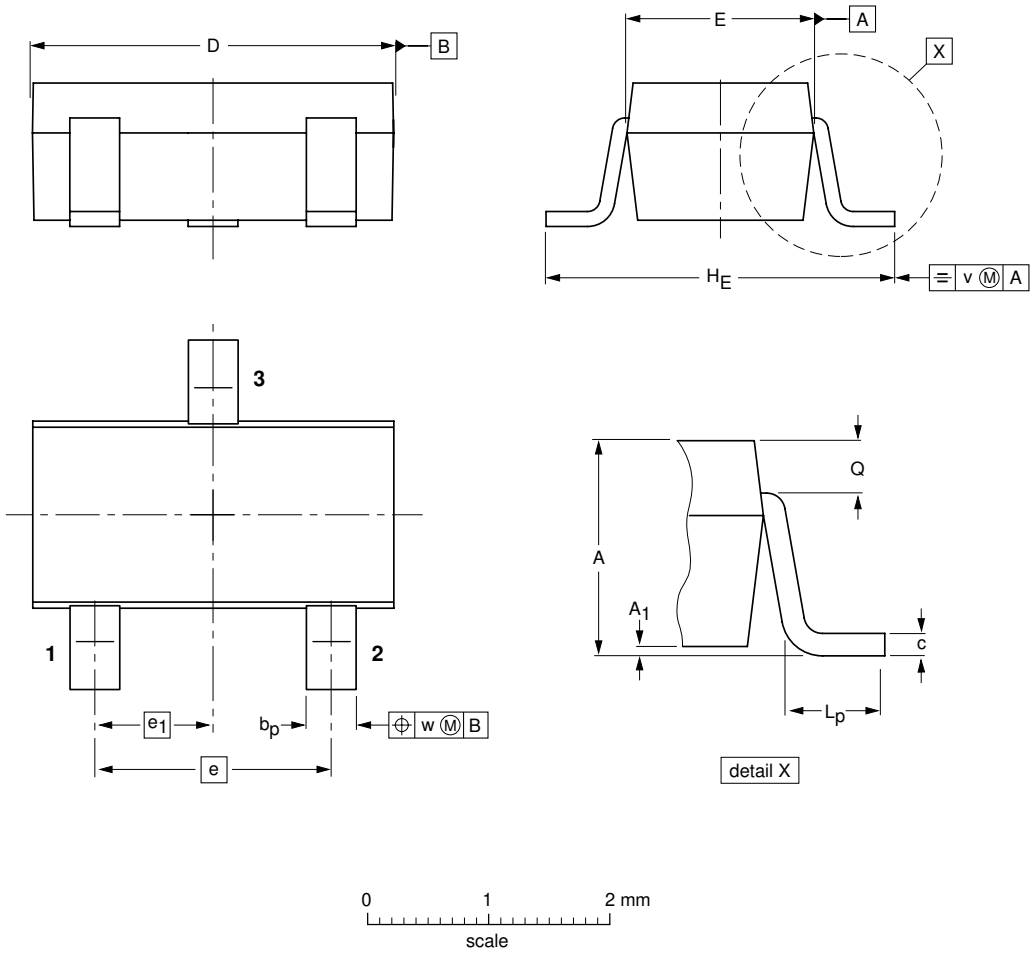



**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.8<br>0.6 | 0.33<br>0.23 | 0.2<br>0.1 | 1.7<br>1.5 | 0.95<br>0.75 | 1.0 | 0.5 | 1.7<br>1.5 | 0.5<br>0.3 | 0.1 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT490 | | | SC-89 | | | ~~05-07-28~~<br>06-03-16 |

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

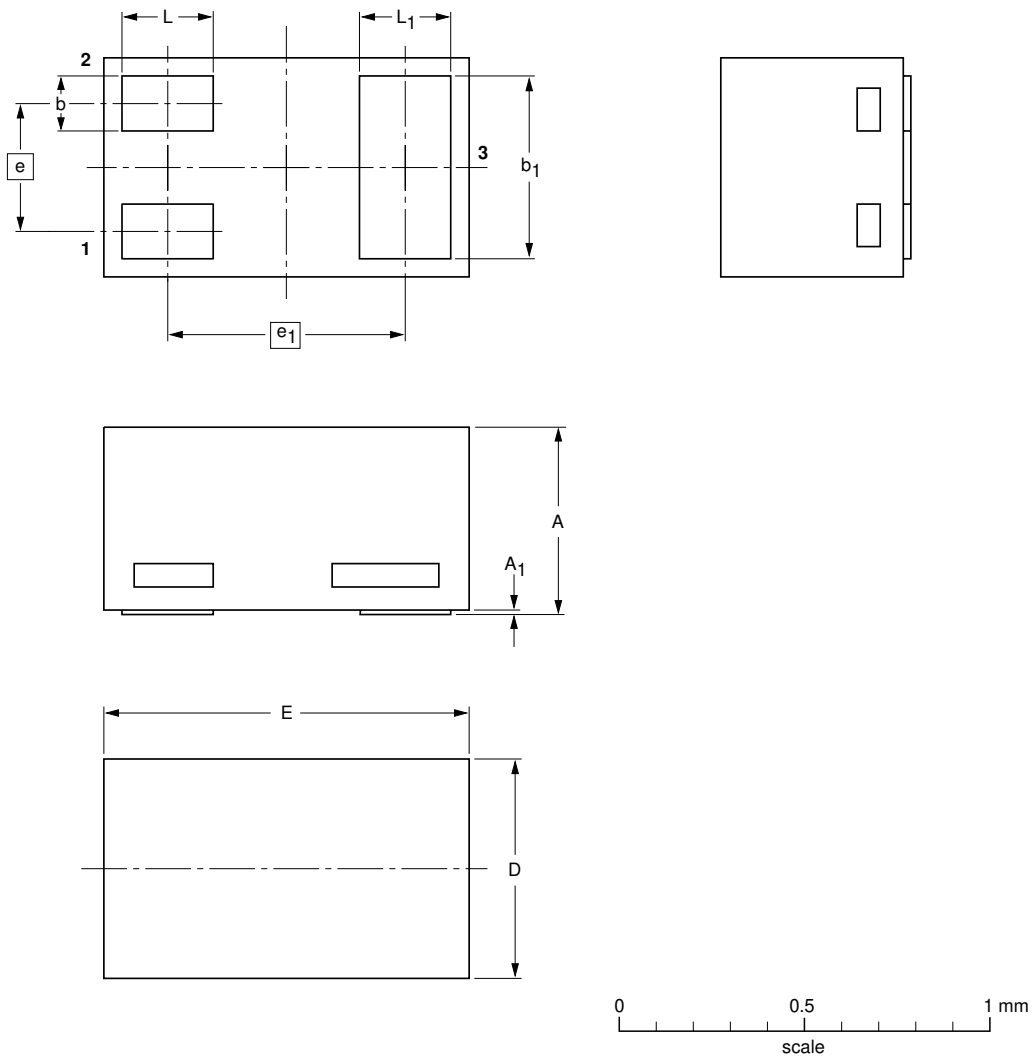



**DIMENSIONS (mm are the original dimensions)**

| 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 |

**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)**

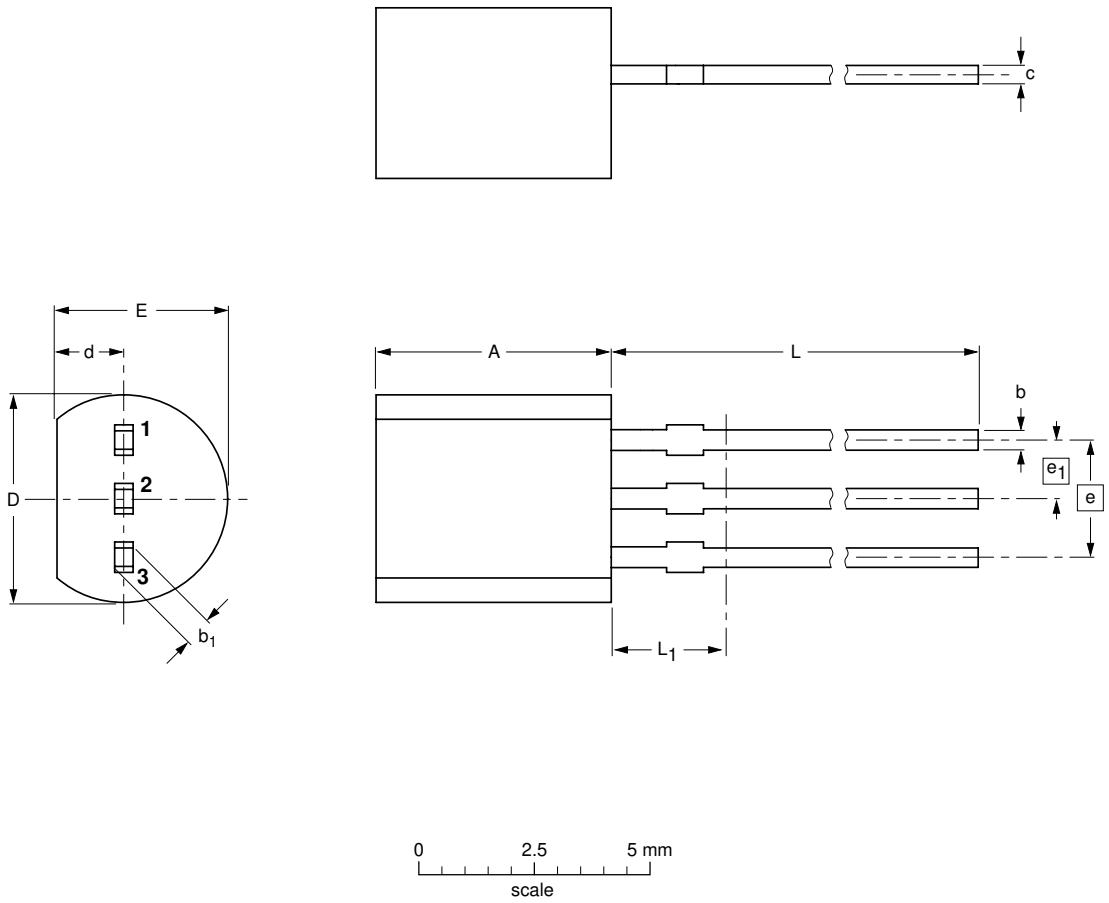
| UNIT | A(1) | $A_1$ max. | b | $b_1$ | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.50<br>0.46 | 0.03 | 0.20<br>0.12 | 0.55<br>0.47 | 0.62<br>0.55 | 1.02<br>0.95 | 0.35 | 0.65 | 0.30<br>0.22 | 0.30<br>0.22 |

**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 |

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




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

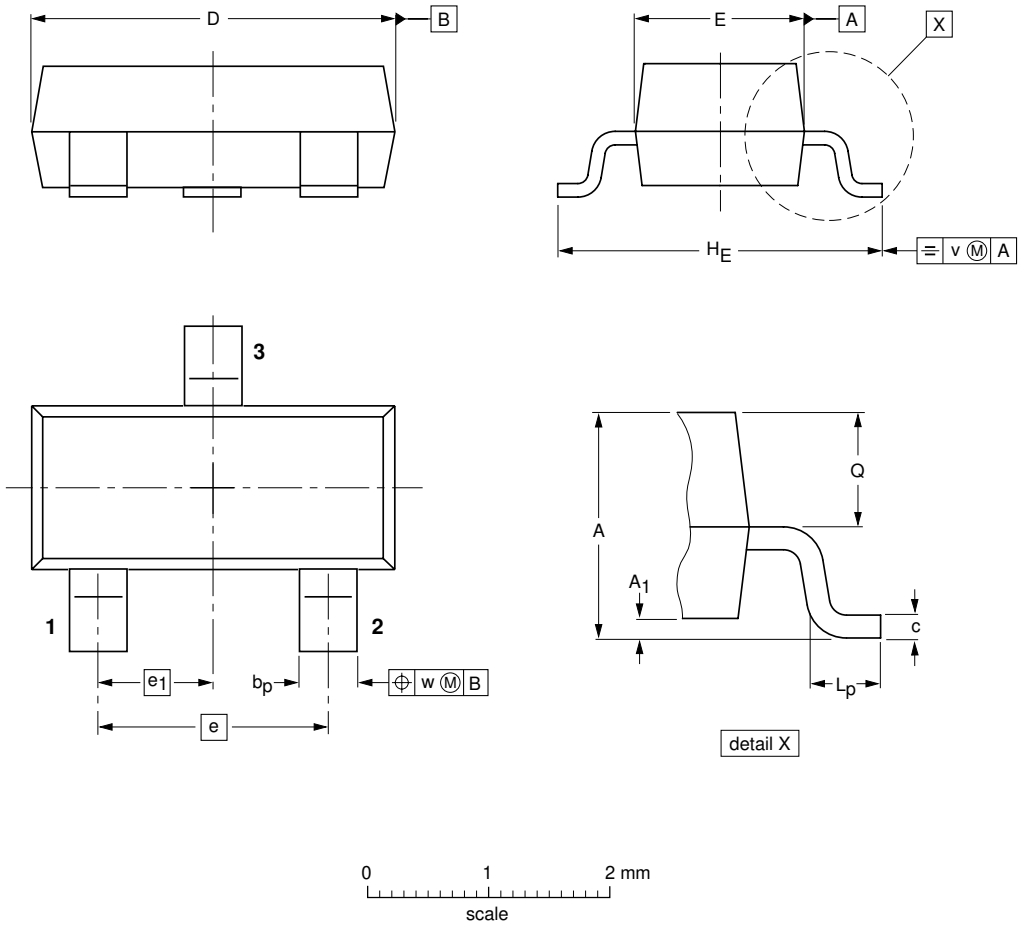
| UNIT | A | b | $b_1$ | c | D | d | E | e | $e_1$ | L | $L_1$ (1) max. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.55 | 0.45<br>0.38 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 2.54 | 1.27 | 14.5<br>12.7 | 2.5 |

**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 |

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

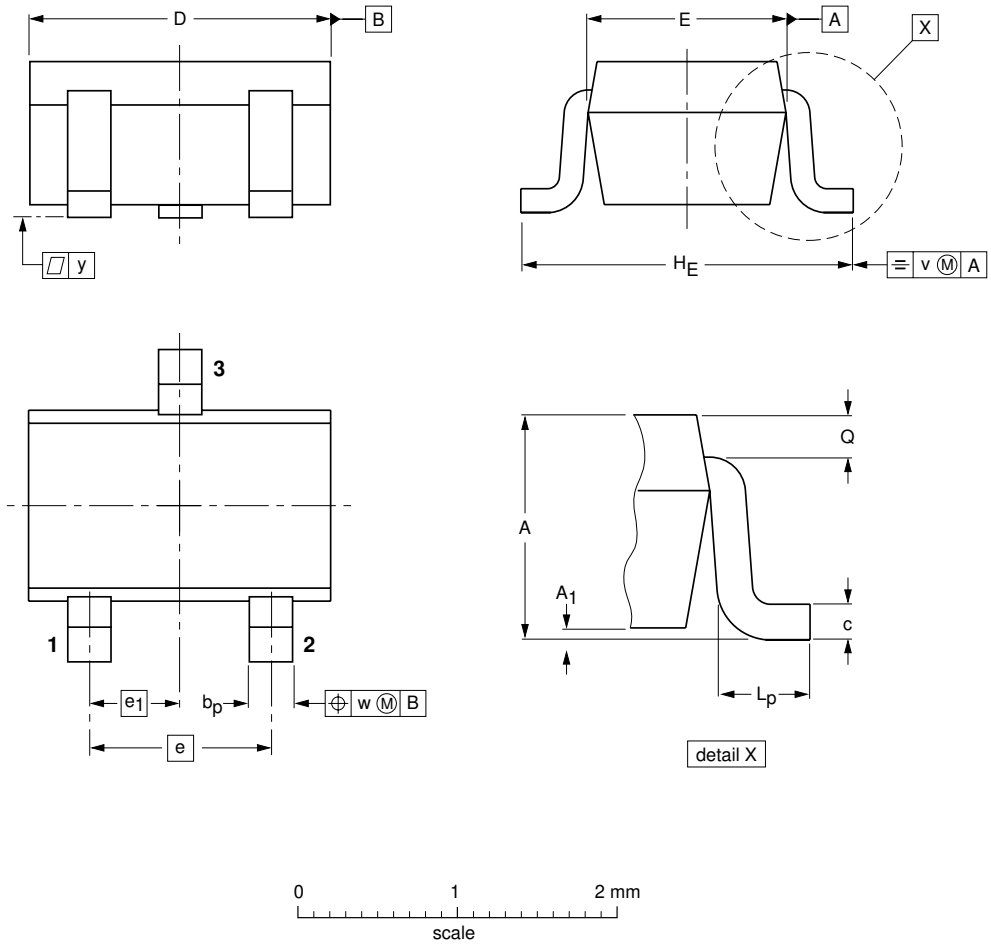



**DIMENSIONS (mm are the original dimensions)**

| 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 |

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

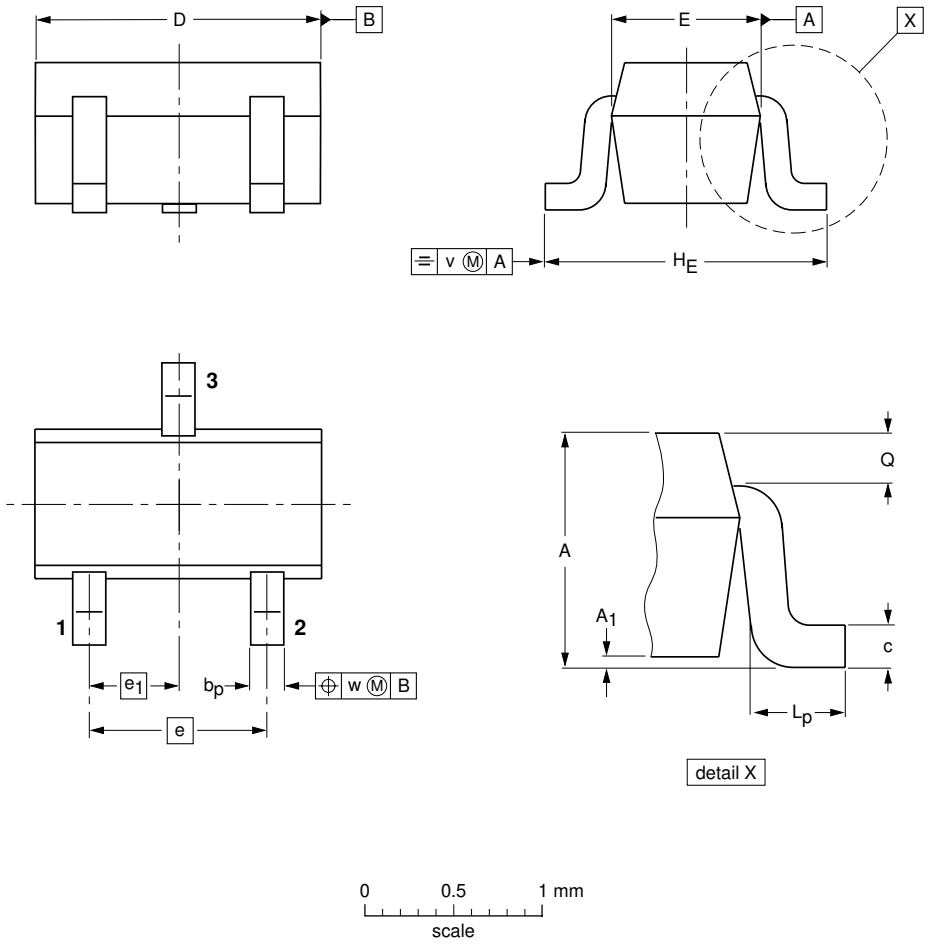



**DIMENSIONS (mm are the original dimensions)**

| 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 |

**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 |

**DATA SHEET STATUS**

| DOCUMENT STATUS[1] | PRODUCT STATUS[2] | DEFINITION |
|---|---|---|
| Objective data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary data sheet | Qualification | This document contains data from the preliminary specification. |
| Product data sheet | Production | This document contains the product specification. |

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# *NXP Semiconductors*

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**Contact information**

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Printed in The Netherlands R75/05/pp14 Date of release: 2004 Aug 17 Document order number: 9397 750 13679