# DATA SHEET

## PDTC143T series

NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = open

Product data sheet
Supersedes data of 2004 Apr 06

2004 Aug 06

# NPN resistor-equipped transistors; R1 = 4.7 kΩ, R2 = open

# PDTC143T 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 applications.

## 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 | 4.7 | – | 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 | | |
| PDTC143TE | SOT416 | SC-75 | 40 | PDTA143TE |
| PDTC143TEF | SOT490 | SC-89 | 11 | PDTA143TEF |
| PDTC143TK | SOT346 | SC-59 | 52 | PDTA143TK |
| PDTC143TM | SOT883 | SC-101 | DM | PDTA143TM |
| PDTC143TS | SOT54 (TO-92) | SC-43 | TC143T | PDTA143TS |
| PDTC143TT | SOT23 | – | *33[1] | PDTA143TT |
| PDTC143TU | SOT323 | SC-70 | *52[1] | PDTA143TU |

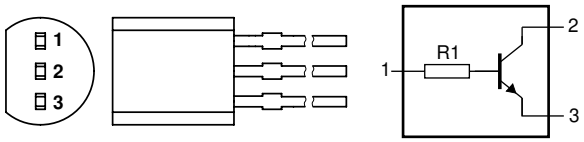
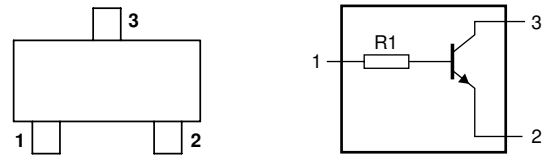
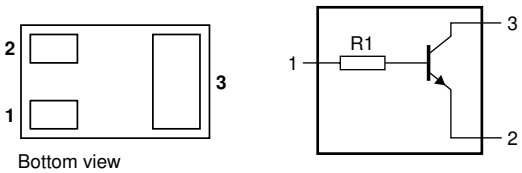
**Note**

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

# NPN resistor-equipped transistors; R1 = 4.7 kΩ, R2 = open

# PDTC143T series

**SIMPLIFIED OUTLINE, SYMBOL AND PINNING**

| TYPE NUMBER | SIMPLIFIED OUTLINE AND SYMBOL | PINNING | |
|---|---|---|---|
| | | PIN | DESCRIPTION |
| PDTC143TS |  MAM361 | 1<br>2<br>3 | base<br>collector<br>emitter |
| PDTC143TE<br>PDTC143TEF<br>PDTC143TK<br>PDTC143TT<br>PDTC143TU |  Top view MDB270 | 1<br>2<br>3 | base<br>emitter<br>collector |
| PDTC143TM |  Bottom view MHC507 | 1<br>2<br>3 | base<br>emitter<br>collector |

**ORDERING INFORMATION**

| TYPE NUMBER | PACKAGE | | |
|---|---|---|---|
| | NAME | DESCRIPTION | VERSION |
| PDTC143TE | – | plastic surface mounted package; 3 leads | SOT416 |
| PDTC143TEF | – | plastic surface mounted package; 3 leads | SOT490 |
| PDTC143TK | – | plastic surface mounted package; 3 leads | SOT346 |
| PDTC143TM | – | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTC143TS | – | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTC143TT | – | plastic surface mounted package; 3 leads | SOT23 |
| PDTC143TU | – | 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 |
| $I_{CM}$ | 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.

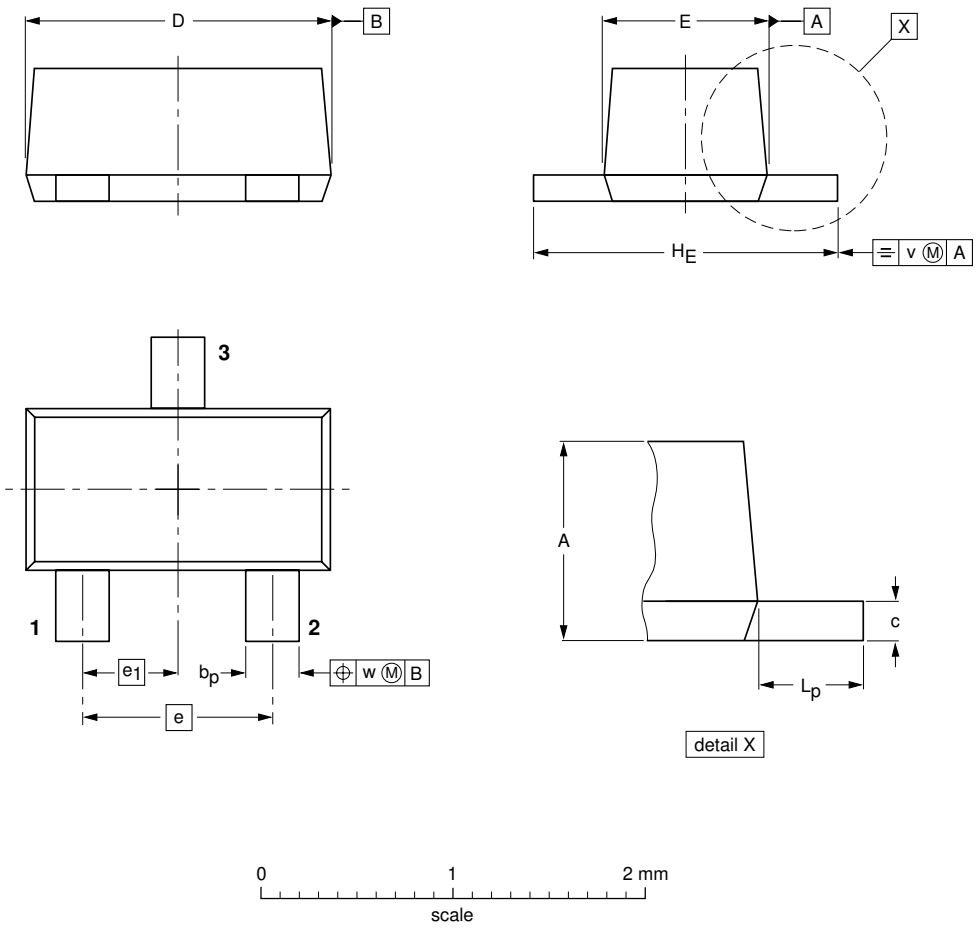
**CHARACTERISTICS**

$T_{amb}$ = 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 | 200 | – | – | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 5 mA; $I_B$ = 0.25 mA | – | – | 100 | mV |
| R1 | input resistor | | 3.3 | 4.7 | 6.1 | 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**

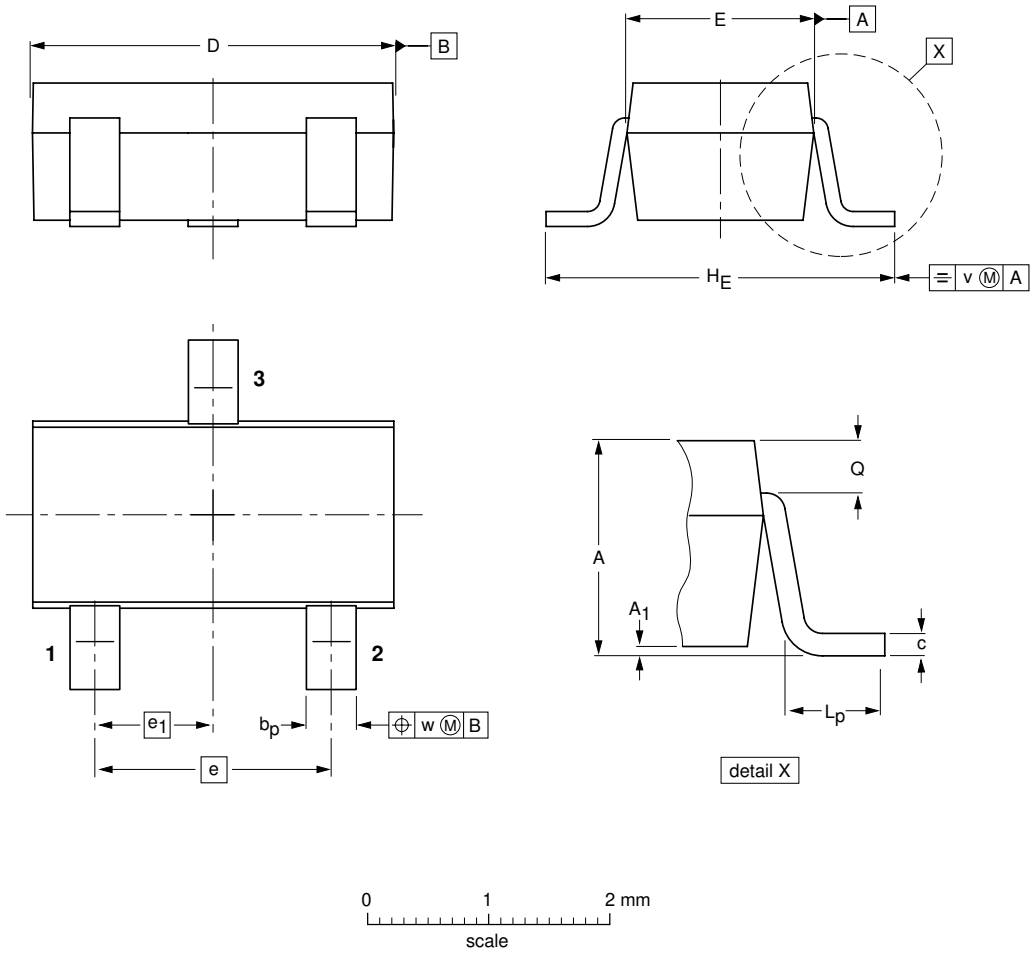



**DIMENSIONS (mm are the original dimensions)**

| 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**

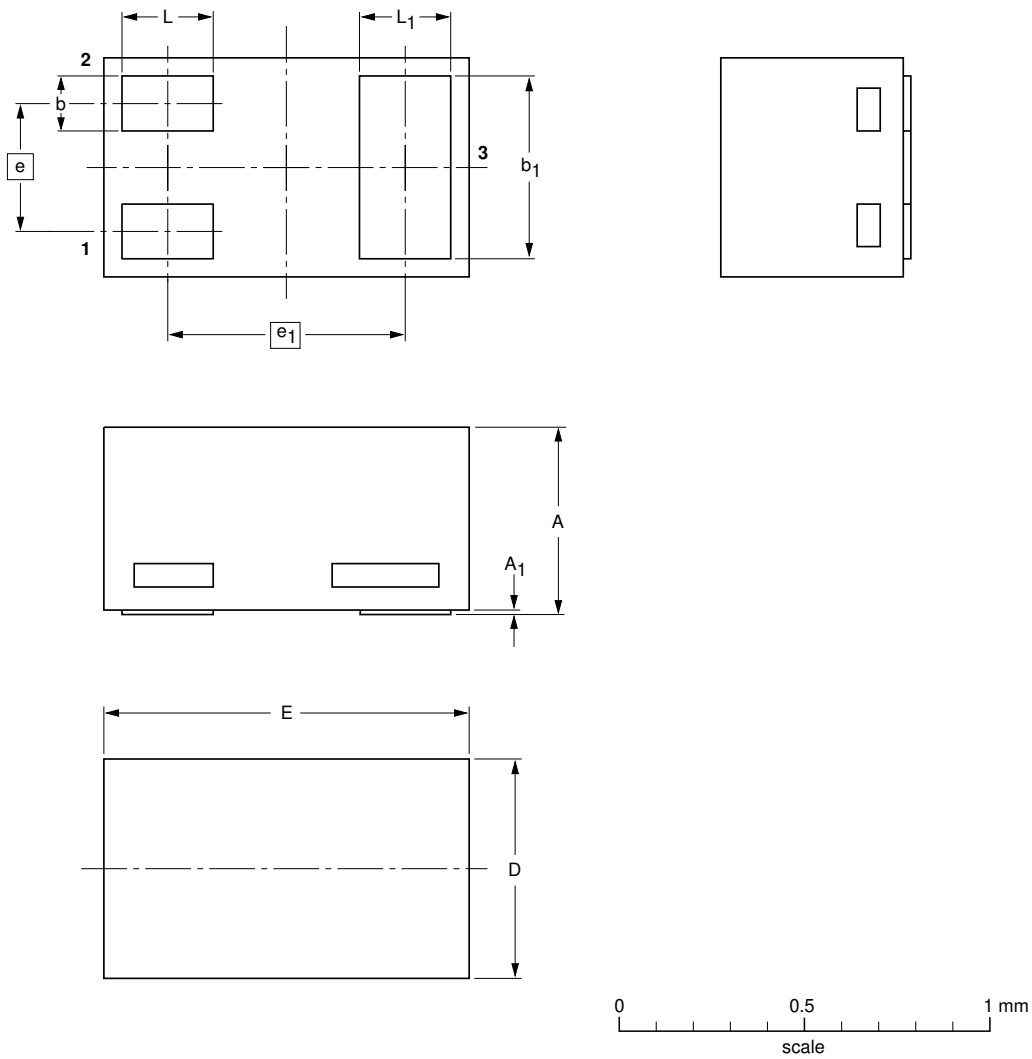



**DIMENSIONS (mm are the original dimensions)**

| 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)**

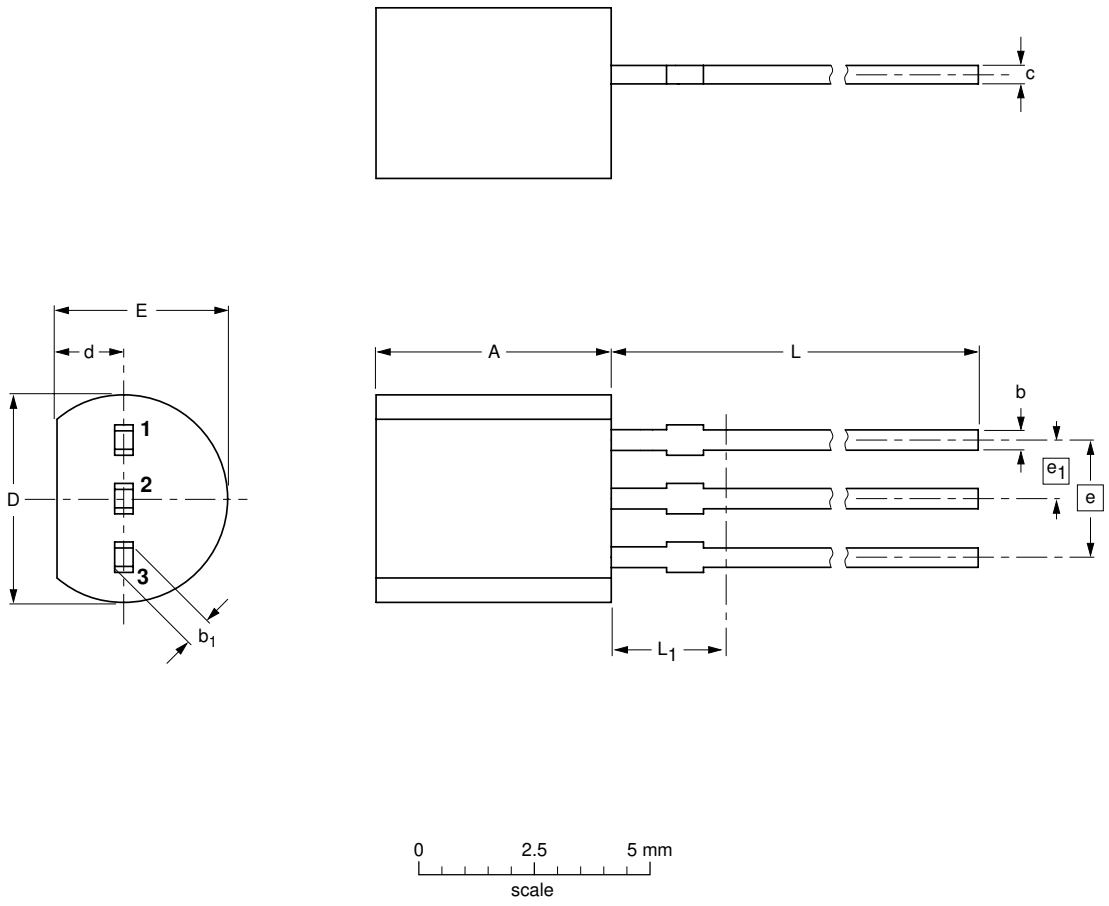
| UNIT | A(1) | $A_1$ max. | b | $b_1$ | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.50<br>0.46 | 0.03 | 0.20<br>0.12 | 0.55<br>0.47 | 0.62<br>0.55 | 1.02<br>0.95 | 0.35 | 0.65 | 0.30<br>0.22 | 0.30<br>0.22 |

**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)**

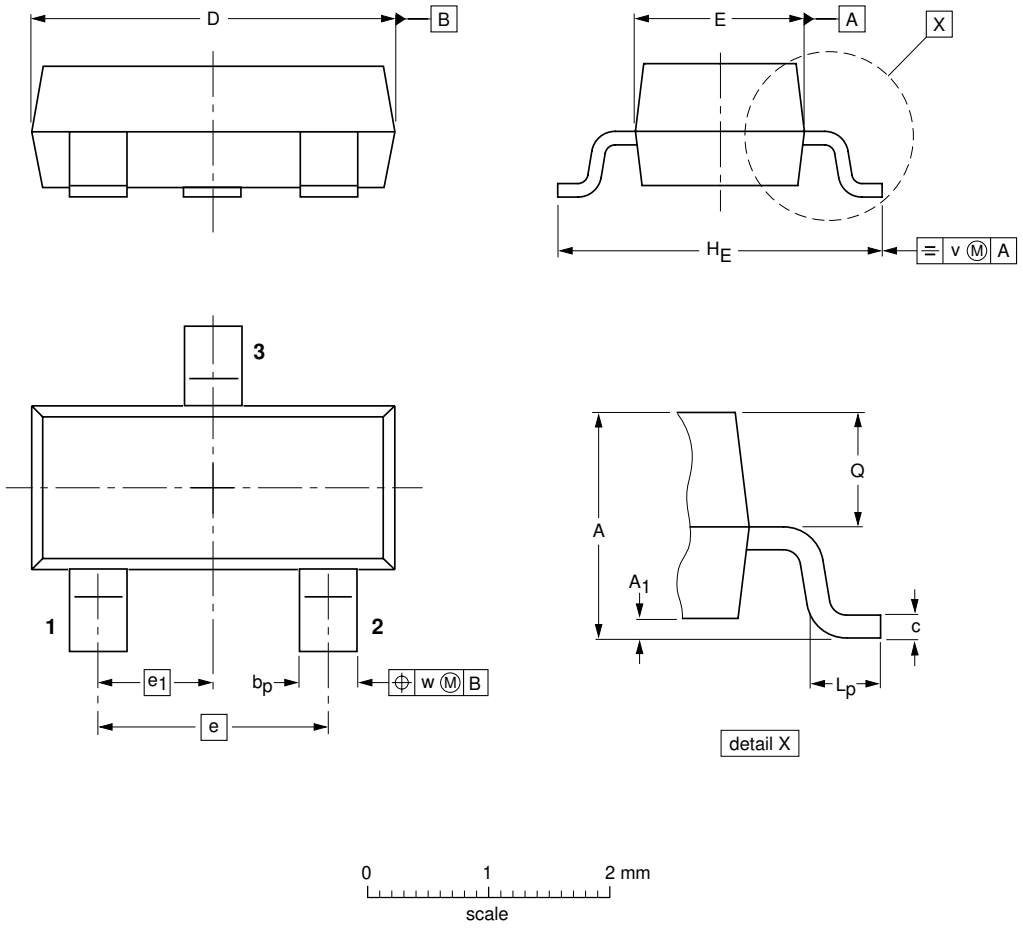
| UNIT | A | b | $b_1$ | c | D | d | E | e | $e_1$ | L | $L_1$ (1) max. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.55 | 0.45<br>0.38 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 2.54 | 1.27 | 14.5<br>12.7 | 2.5 |

**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**

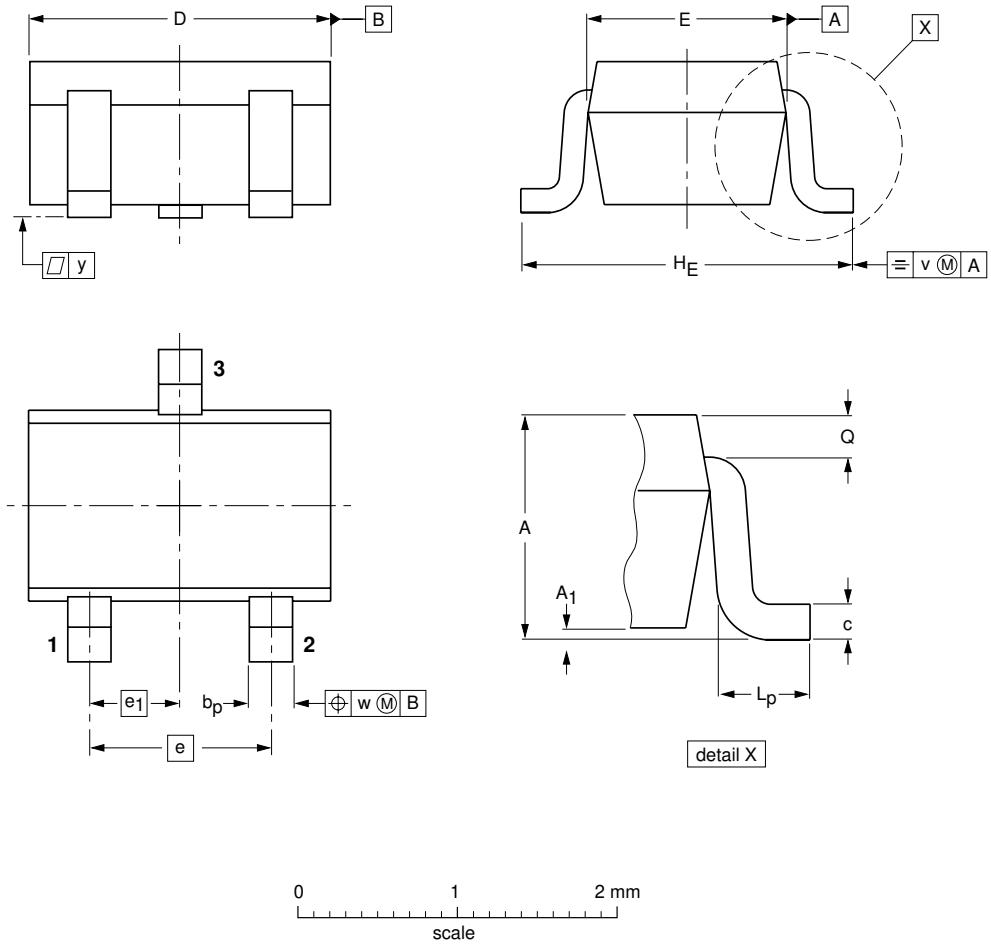



**DIMENSIONS (mm are the original dimensions)**

| 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**

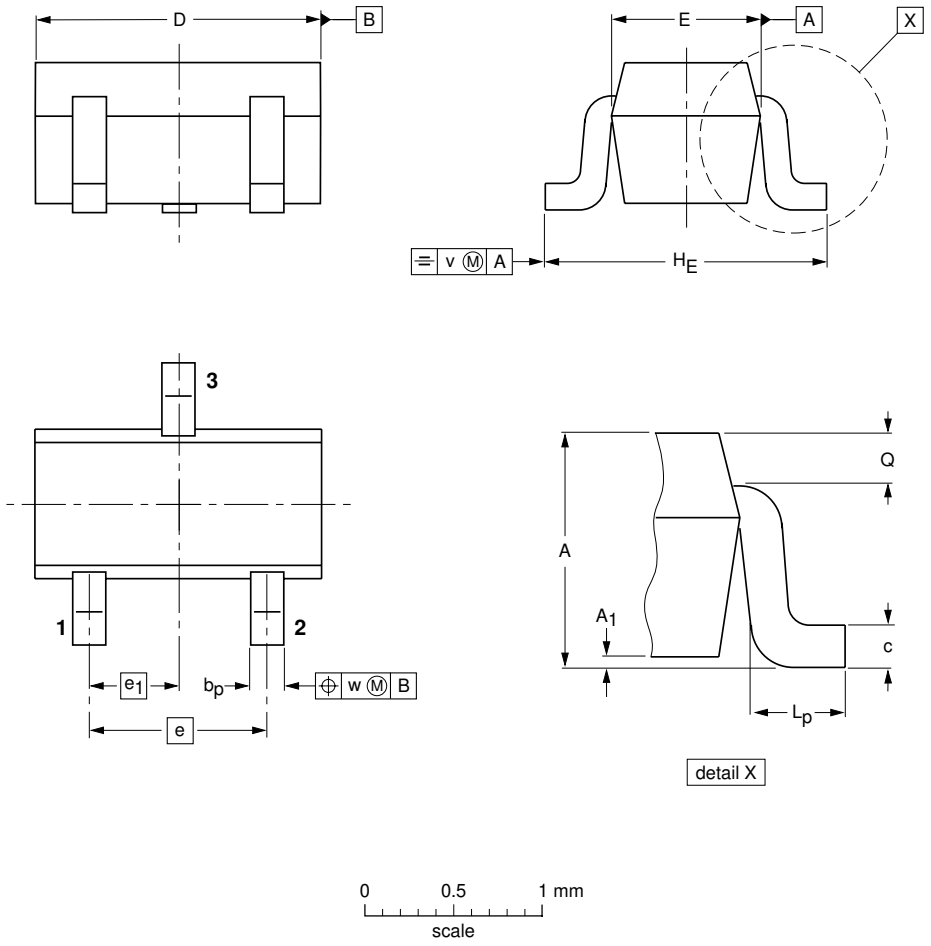



**DIMENSIONS (mm are the original dimensions)**

| 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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2. 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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# *NXP Semiconductors*

**Customer notification**

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, except for package outline drawings which were updated to the latest version.

**Contact information**

For additional information please visit: **http://www.nxp.com**
For sales offices addresses send e-mail to: **salesaddresses@nxp.com**



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