# DATA SHEET

# PDTC143Z series

NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = 47 kΩ

Product specification
Supersedes data of 2004 Apr 06

2004 Aug 16

Philips
Semiconductors

PHILIPS

# NPN resistor-equipped transistors; R1 = 4.7 kΩ, R2 = 47 kΩ

# PDTC143Z 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 | 4.7 | – | kΩ |
| R2 | bias resistor | 47 | – | kΩ |

## 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 | | |
| PDTC143ZE | SOT416 | SC-75 | 38 | PDTA143ZE |
| PDTC143ZEF | SOT490 | SC-89 | 53 | PDTA143ZEF |
| PDTC143ZK | SOT346 | SC-59 | 18 | PDTA143ZK |
| PDTC143ZM | SOT883 | SC-101 | E3 | PDTA143ZM |
| PDTC143ZS | SOT54 (TO-92) | SC-43 | TC143Z | PDTA143ZS |
| PDTC143ZT | SOT23 | – | *18[1] | PDTA143ZT |
| PDTC143ZU | SOT323 | SC-70 | *54[1] | PDTA143ZU |

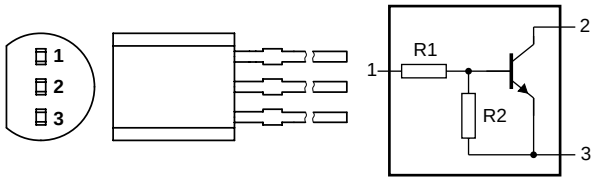
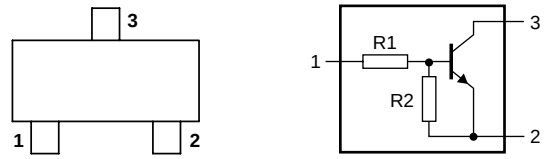
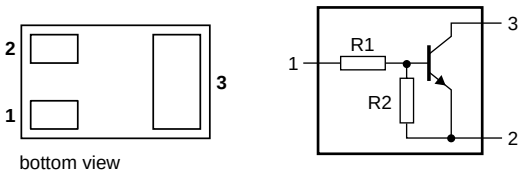
**Note**

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

# NPN resistor-equipped transistors; R1 = 4.7 kΩ, R2 = 47 kΩ

# PDTC143Z series

## SIMPLIFIED OUTLINE, SYMBOL AND PINNING

| TYPE NUMBER | SIMPLIFIED OUTLINE AND SYMBOL | PINNING | |
|---|---|---|---|
| | | PIN | DESCRIPTION |
| PDTC143ZS |  MAM364 | 1<br>2<br>3 | base<br>collector<br>emitter |
| PDTC143ZE<br>PDTC143ZEF<br>PDTC143ZK<br>PDTC143ZT<br>PDTC143ZU |  Top view MDB269 | 1<br>2<br>3 | base<br>emitter<br>collector |
| PDTC143ZM |  bottom view MHC506 | 1<br>2<br>3 | base<br>emitter<br>collector |

## ORDERING INFORMATION

| TYPE NUMBER | PACKAGE | | |
|---|---|---|---|
| | NAME | DESCRIPTION | VERSION |
| PDTC143ZE | – | plastic surface mounted package; 3 leads | SOT416 |
| PDTC143ZEF | – | plastic surface mounted package; 3 leads | SOT490 |
| PDTC143ZK | – | plastic surface mounted package; 3 leads | SOT346 |
| PDTC143ZM | – | leadless ultra small plastic package; 3 solder lands; body $1.0 \times 0.6 \times 0.5$ mm | SOT883 |
| PDTC143ZS | – | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTC143ZT | – | plastic surface mounted package; 3 leads | SOT23 |
| PDTC143ZU | – | 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 | – | 10 | V |
| $V_I$ | input voltage | | | | |
| | positive | | – | +30 | V |
| | negative | | – | –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 |
| | SOT883 | notes 2 and 3 | – | 250 | mW |
| | SOT416 | note 1 | – | 150 | mW |
| | SOT490 | notes 1 and 2 | – | 250 | 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 |
| | SOT883 | notes 2 and 3 | 500 | K/W |
| | SOT416 | note 1 | 833 | K/W |
| | SOT490 | notes 1 and 2 | 500 | 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.

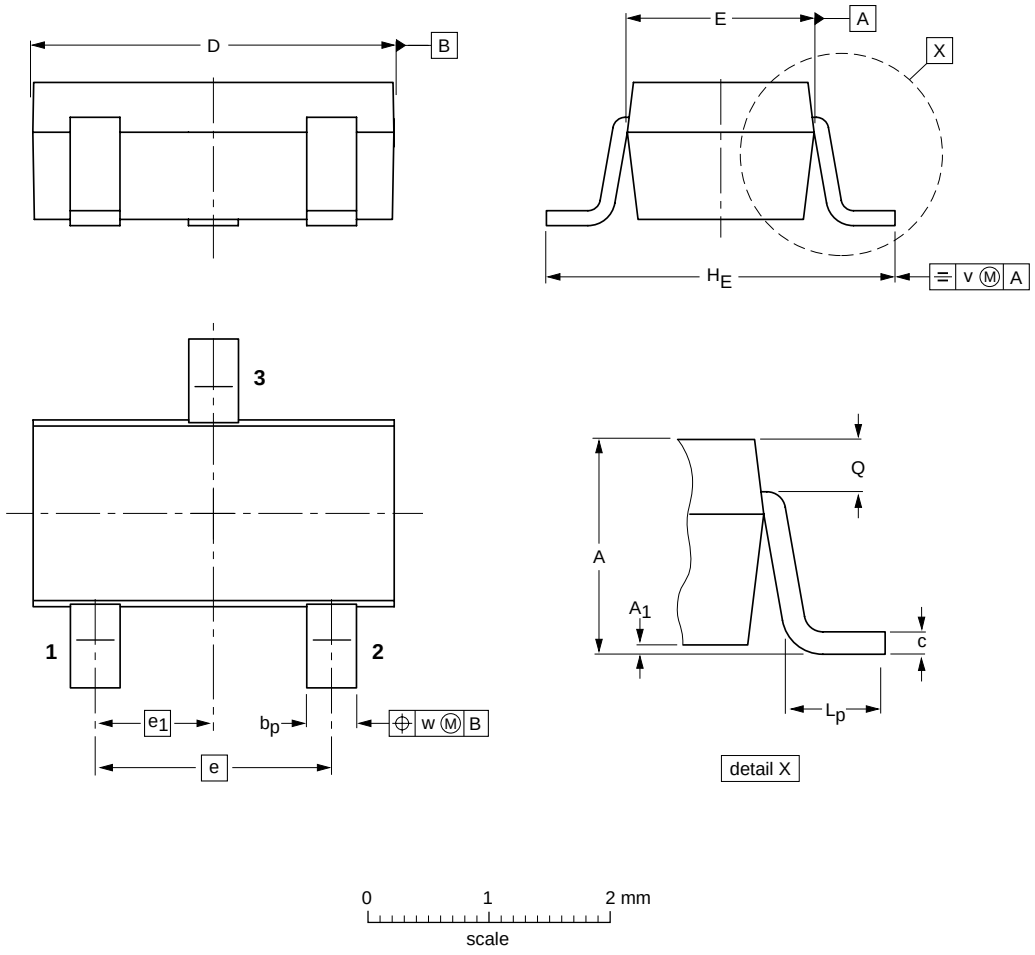
### CHARACTERISTICS

$T_{amb}$ = 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 | – | – | 170 | μA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 5 V; $I_C$ = 10 mA | 100 | – | – | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 5 mA; $I_B$ = 0.25 mA | – | – | 100 | mV |
| $V_{i(off)}$ | input-off voltage | $I_C$ = 100 μA; $V_{CE}$ = 5 V | – | 0.6 | 0.5 | V |
| $V_{i(on)}$ | input-on voltage | $I_C$ = 5 mA; $V_{CE}$ = 0.3 V | 1.3 | 0.9 | – | V |
| R1 | input resistor | | 3.3 | 4.7 | 6.1 | kΩ |
| $\frac{R2}{R1}$ | resistor ratio | | 8 | 10 | 12 | |
| $C_c$ | 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** **SOT346**

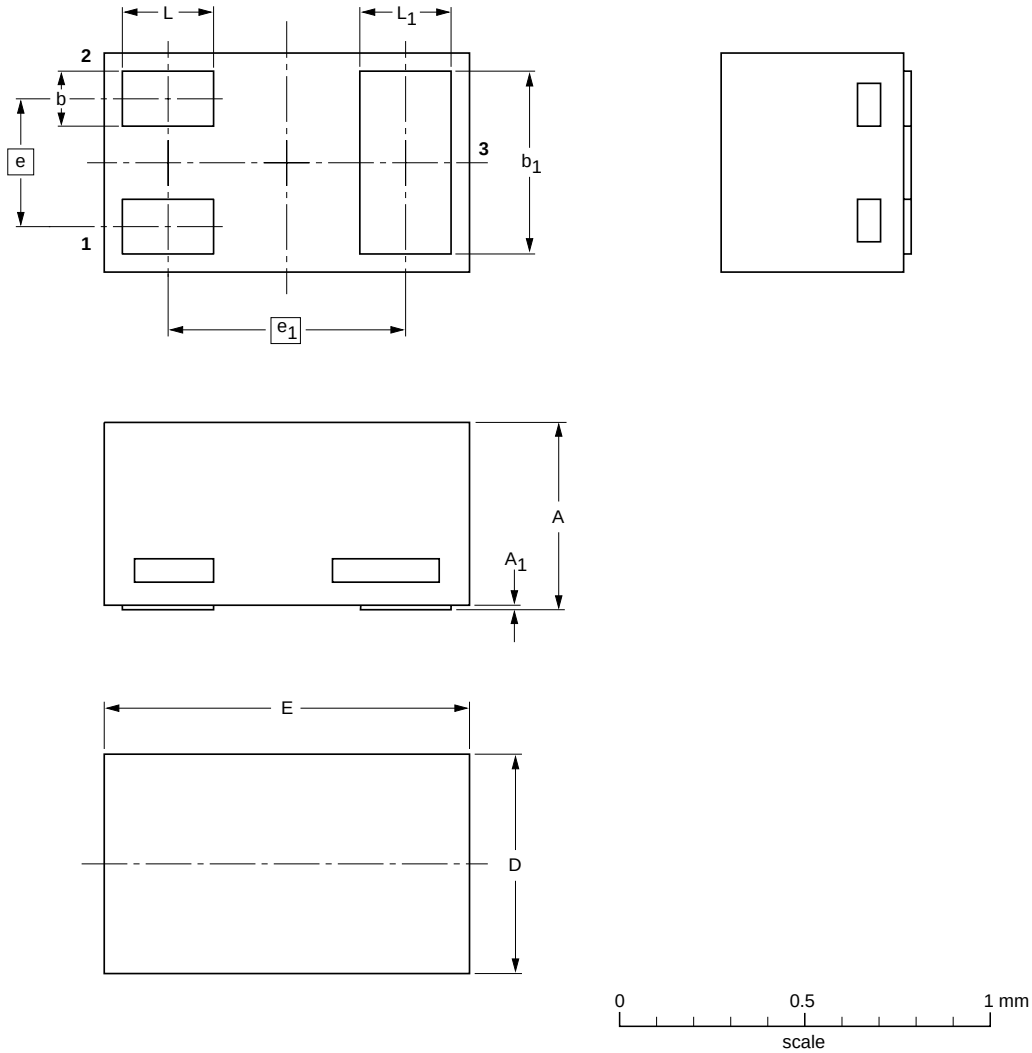



**DIMENSIONS (mm are the original dimensions)**

| 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 | EIAJ | | | |
| SOT346 | | TO-236 | SC-59 | | | 98-07-17 |

**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)**

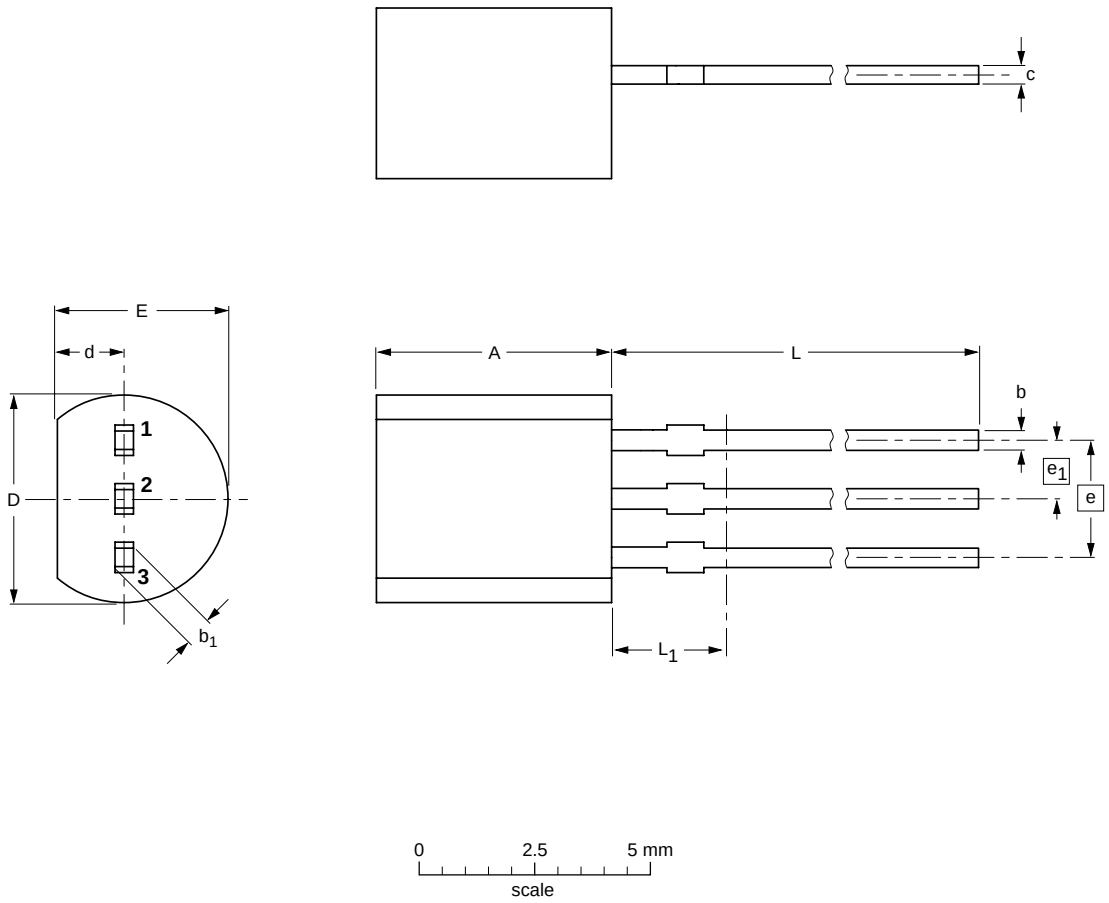
| UNIT | A(1) | A1 max. | b | b1 | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.50<br>0.46 | 0.03 | 0.20<br>0.12 | 0.55<br>0.47 | 0.62<br>0.55 | 1.02<br>0.95 | 0.35 | 0.65 | 0.30<br>0.22 | 0.30<br>0.22 |

**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 |

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




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

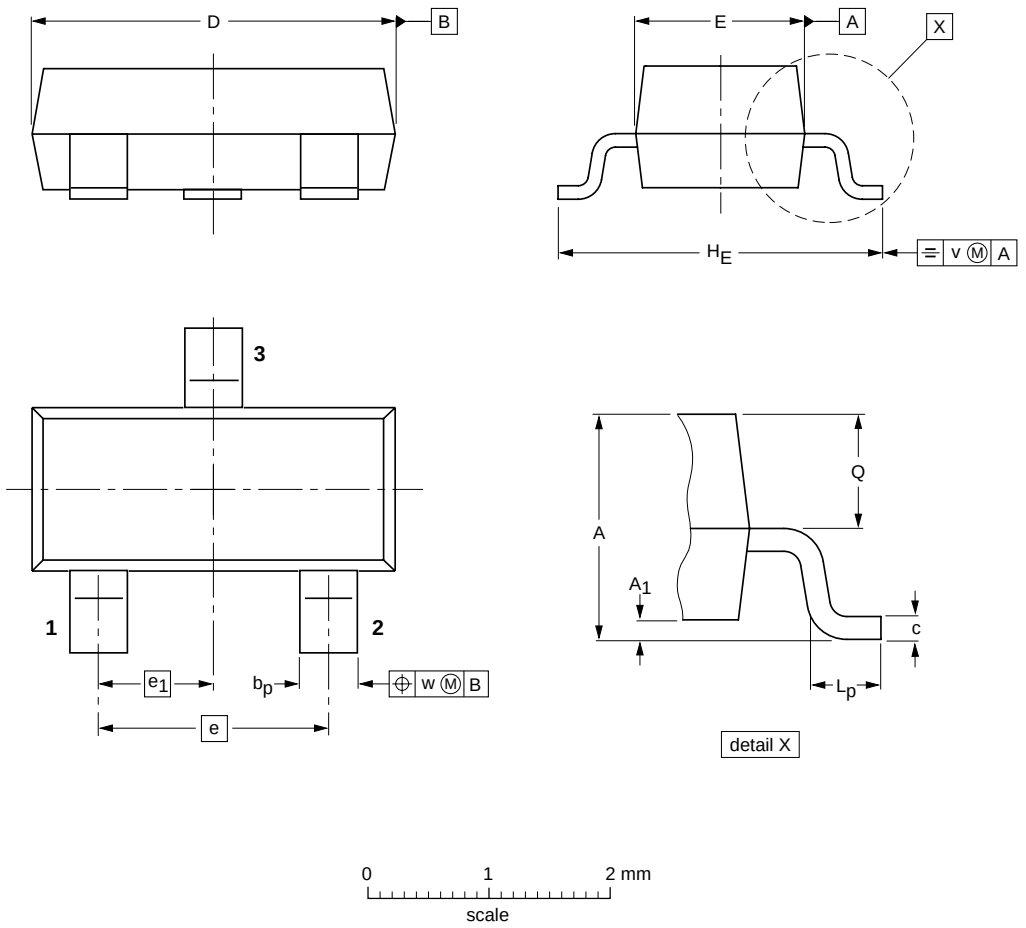
| UNIT | A | b | $b_1$ | c | D | d | E | e | $e_1$ | L | $L_1$ (1) max. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.55 | 0.45<br>0.38 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 2.54 | 1.27 | 14.5<br>12.7 | 2.5 |

**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 | | | ~~97-02-28~~<br>04-06-28 |

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

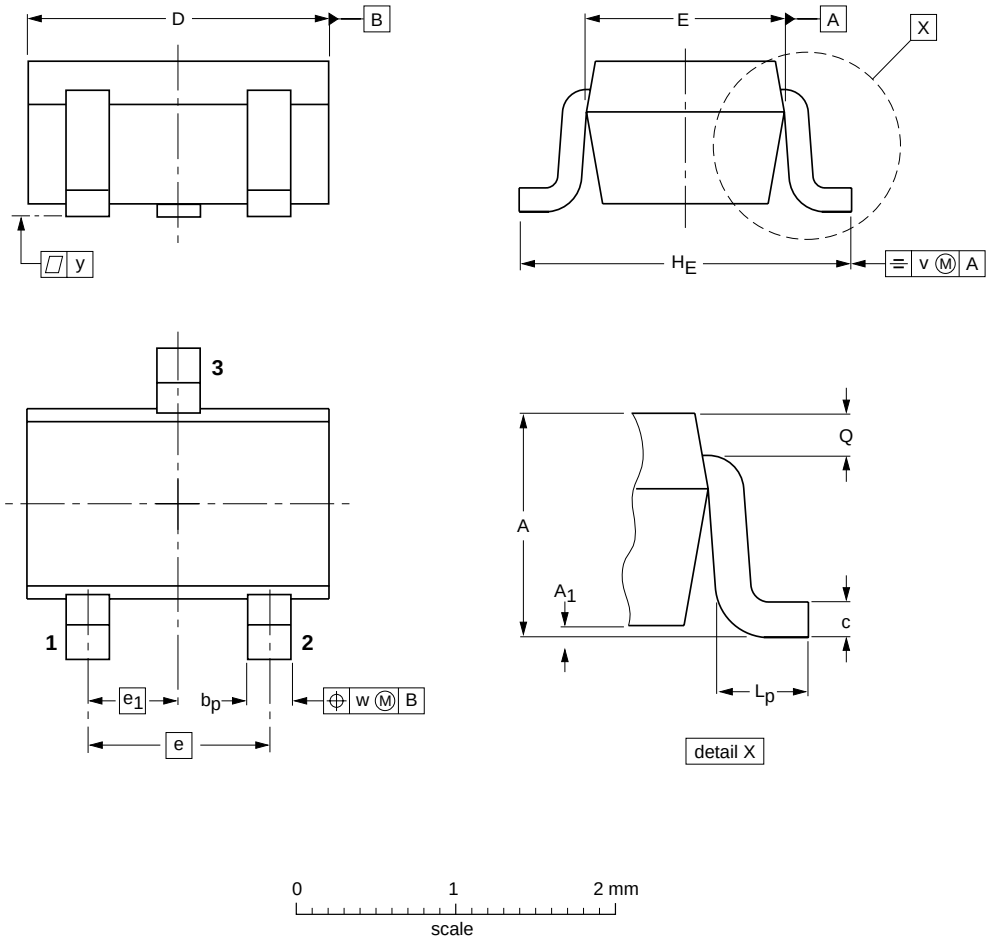



**DIMENSIONS (mm are the original dimensions)**

| 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 | EIAJ | | | |
| SOT23 | | TO-236AB | | | | ~~97-02-28~~<br>99-09-13 |

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

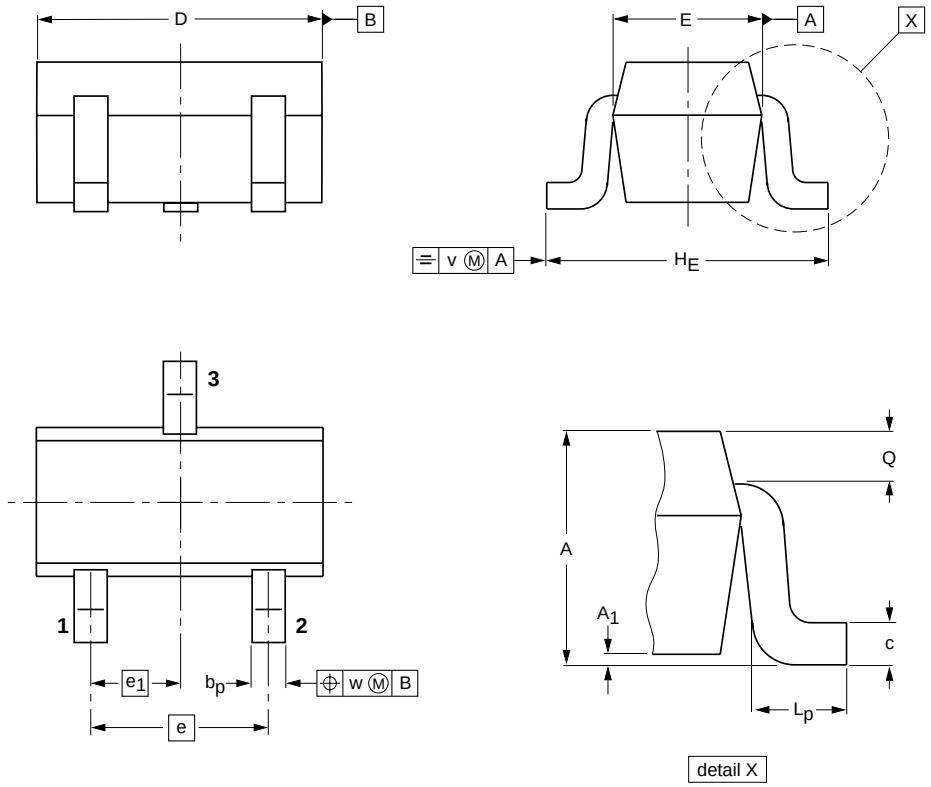



**DIMENSIONS (mm are the original dimensions)**

| 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 | EIAJ | | | |
| SOT323 | | | SC-70 | | | 97-02-28 |

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

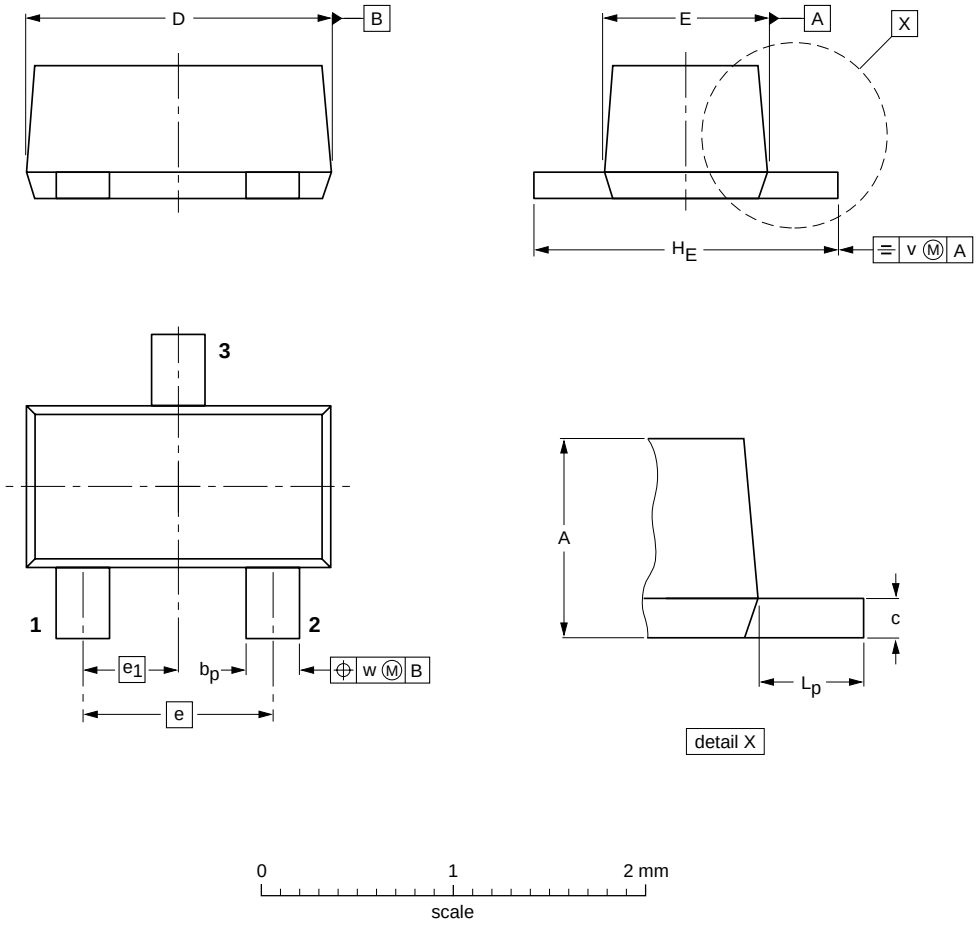



**DIMENSIONS (mm are the original dimensions)**

| 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 | EIAJ | | | |
| SOT416 | | | SC-75 | | | 97-02-28 |

**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 | EIAJ | | | |
| SOT490 | | | SC-89 | | | 98-10-23 |

**DATA SHEET STATUS**

| LEVEL | DATA SHEET STATUS[1] | PRODUCT STATUS[2][3] | DEFINITION |
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