

DATA SHEET

PDTC143X series

NPN resistor-equipped transistors;

R1 = 4.7 k Ω , R2 = 10 k Ω

Product specification
Supersedes data of 2004 Mar 23

2004 Aug 06

NPN resistor-equipped transistors; R1 = 4.7 k Ω , R2 = 10 k Ω

PDTC143X 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 | – | k Ω |
| R2 | bias resistor | 10 | – | k Ω |

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 | | |
| PDTC143XE | SOT416 | SC-75 | 34 | PDTA143XE |
| PDTC143XEF | SOT490 | SC-89 | 54 | PDTA143XEF |
| PDTC143XK | SOT346 | SC-59 | 26 | PDTA143XK |
| PDTC143XM | SOT883 | SC-101 | E2 | PDTA143XM |
| PDTC143XS | SOT54 (TO-92) | SC-43 | TC143X | PDTA143XS |
| PDTC143XT | SOT23 | – | *32 ⁽¹⁾ | PDTA143XT |
| PDTC143XU | SOT323 | SC-70 | *53 ⁽¹⁾ | PDTA143XU |

Note

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

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SIMPLIFIED OUTLINE, SYMBOL AND PINNING

| TYPE NUMBER | SIMPLIFIED OUTLINE AND SYMBOL | PINNING | |
|--|-------------------------------|---------|-------------|
| | | PIN | DESCRIPTION |
| PDTC143XS | | 1 | base |
| | | 2 | collector |
| | | 3 | emitter |
| PDTC143XE PDTC143XEF PDTC143XK PDTC143XT PDTC143XU | | 1 | base |
| | | 2 | emitter |
| | | 3 | collector |
| PDTC143XM | | 1 | base |
| | | 2 | emitter |
| | | 3 | collector |

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ORDERING INFORMATION

| TYPE NUMBER | PACKAGE | | |
|-------------|---------|--|---------|
| | NAME | DESCRIPTION | VERSION |
| PDTC143XE | – | plastic surface mounted package; 3 leads | SOT416 |
| PDTC143XEF | – | plastic surface mounted package; 3 leads | SOT490 |
| PDTC143XK | – | plastic surface mounted package; 3 leads | SOT346 |
| PDTC143XM | – | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTC143XS | – | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTC143XT | – | plastic surface mounted package; 3 leads | SOT23 |
| PDTC143XU | – | 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 | – | +20 | V | |
| | | negative | – | –7 | V | |
| I_O | output current (DC) | | – | 100 | mA | |
| I_{CM} | peak collector current | | – | 100 | mA | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25 \text{ }^\circ\text{C}$ | | | | |
| | | SOT54 | note 1 | – | 500 | mW |
| | | SOT23 | note 1 | – | 250 | mW |
| | | SOT346 | note 1 | – | 250 | mW |
| | | SOT323 | note 1 | – | 200 | mW |
| | | SOT416 | note 1 | – | 150 | mW |
| | | SOT883 | notes 2 and 3 | – | 250 | mW |
| SOT490 | notes 1 and 2 | – | 250 | mW | | |
| T_{stg} | storage temperature | | –65 | +150 | $^\circ\text{C}$ | |
| T_j | junction temperature | | – | 150 | $^\circ\text{C}$ | |
| T_{amb} | operating ambient temperature | | –65 | +150 | $^\circ\text{C}$ | |

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.

NPN resistor-equipped transistors;
R1 = 4.7 k Ω , R2 = 10 k Ω

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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 |
| | SOT416 | note 1 | 833 | K/W |
| | SOT883 | notes 2 and 3 | 500 | 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 μ m 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 | μ A |
| | | V _{CE} = 30 V; I _B = 0 A; T _j = 150 °C | – | – | 50 | μ A |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 A | – | – | 600 | μ A |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 10 mA | 50 | – | – | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 10 mA; I _B = 0.5 mA | – | – | 100 | mV |
| V _{i(off)} | input-off voltage | I _C = 100 μ A; V _{CE} = 5 V | – | – | 0.3 | V |
| V _{i(on)} | input-on voltage | I _C = 20 mA; V _{CE} = 0.3 V | 2.5 | – | – | V |
| R1 | input resistor | | 3.3 | 4.7 | 6.1 | k Ω |
| $\frac{R2}{R1}$ | resistor ratio | | 1.7 | 2.1 | 2.6 | |
| C _c | collector capacitance | I _E = i _e = 0 A; V _{CB} = 10 V; f = 1 MHz | – | – | 2.5 | pF |

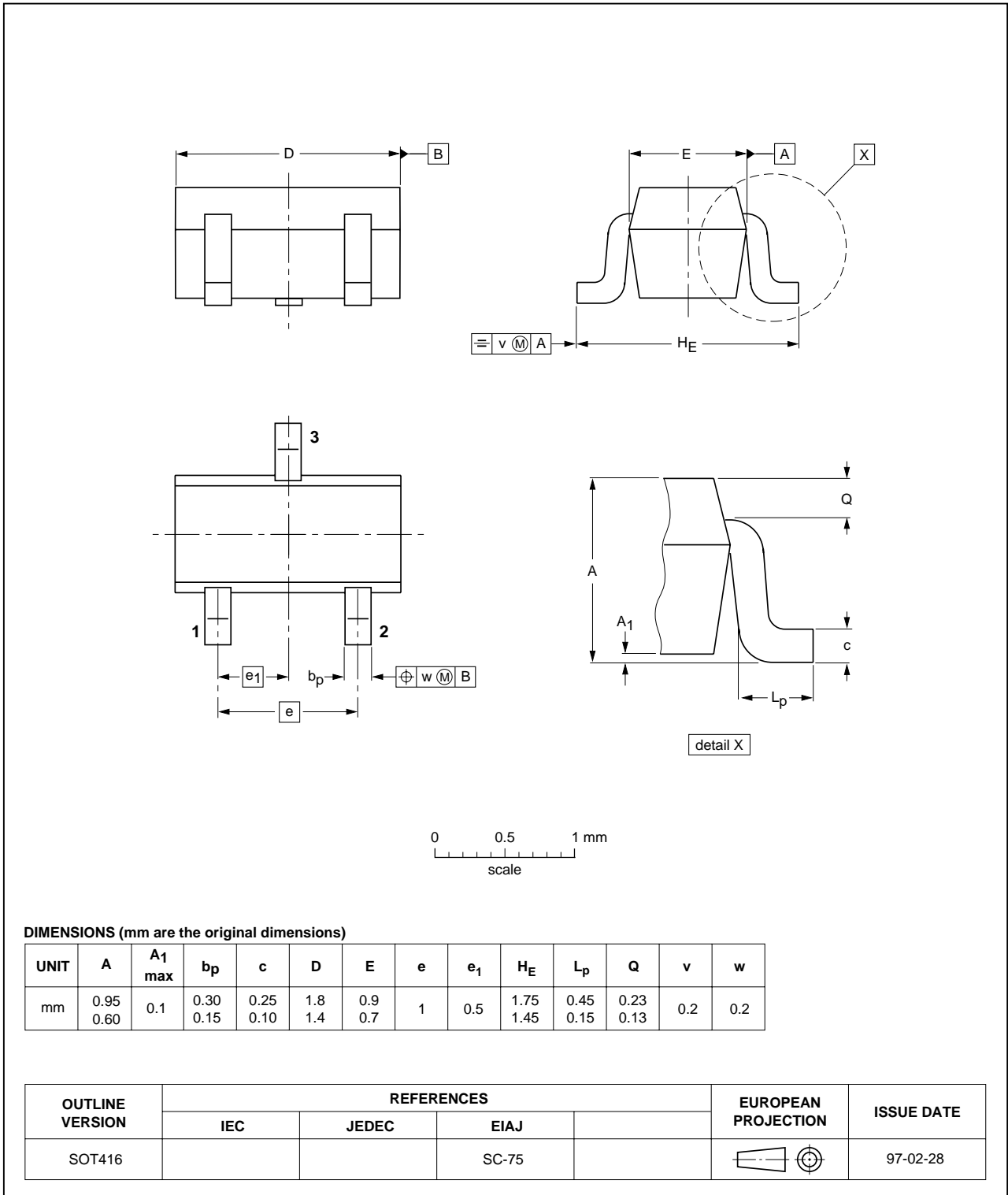
NPN resistor-equipped transistors;
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PDTC143X series

PACKAGE OUTLINES

Plastic surface mounted package; 3 leads

SOT416

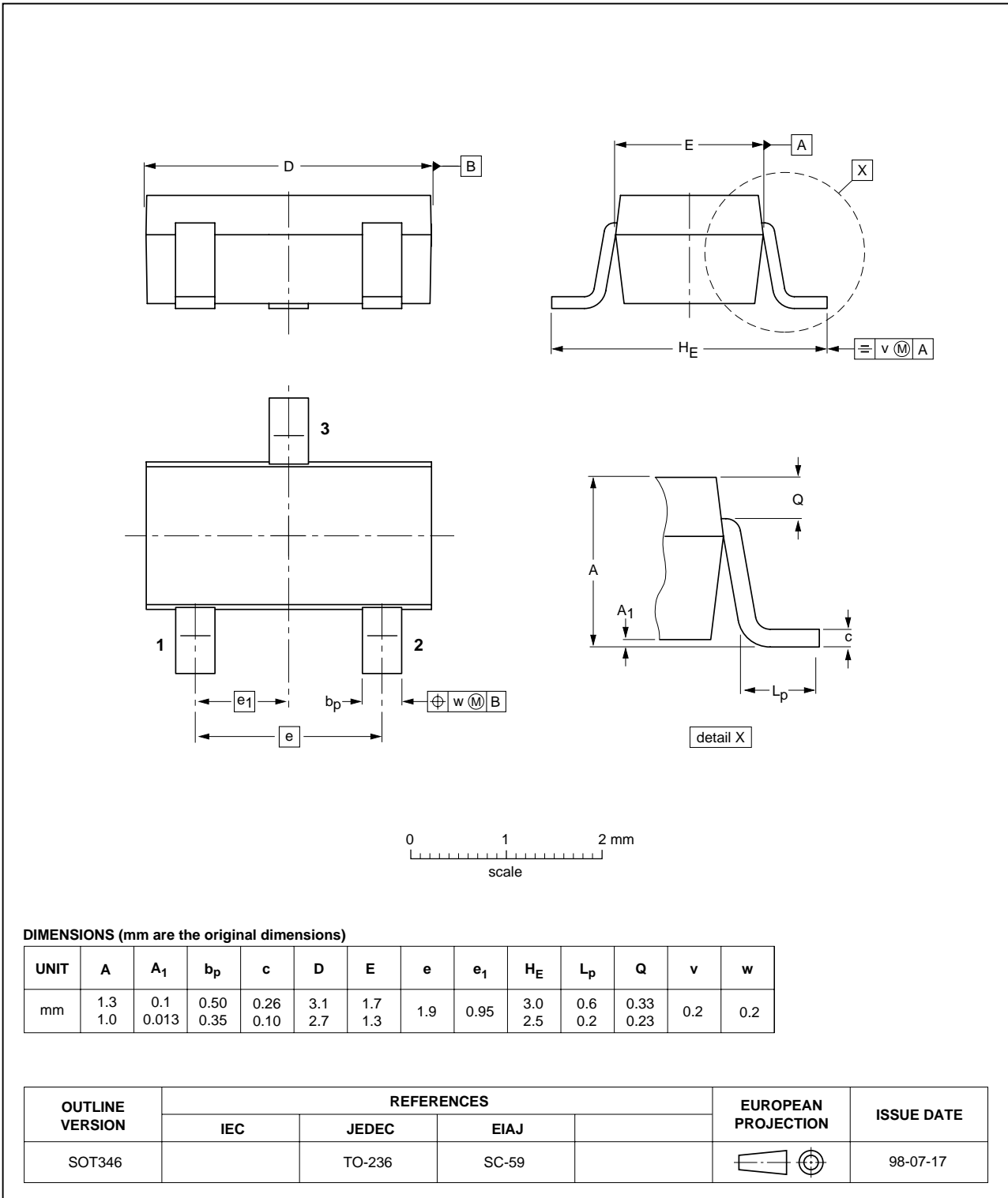


NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = 10 kΩ

PDTC143X series

Plastic surface mounted package; 3 leads

SOT346

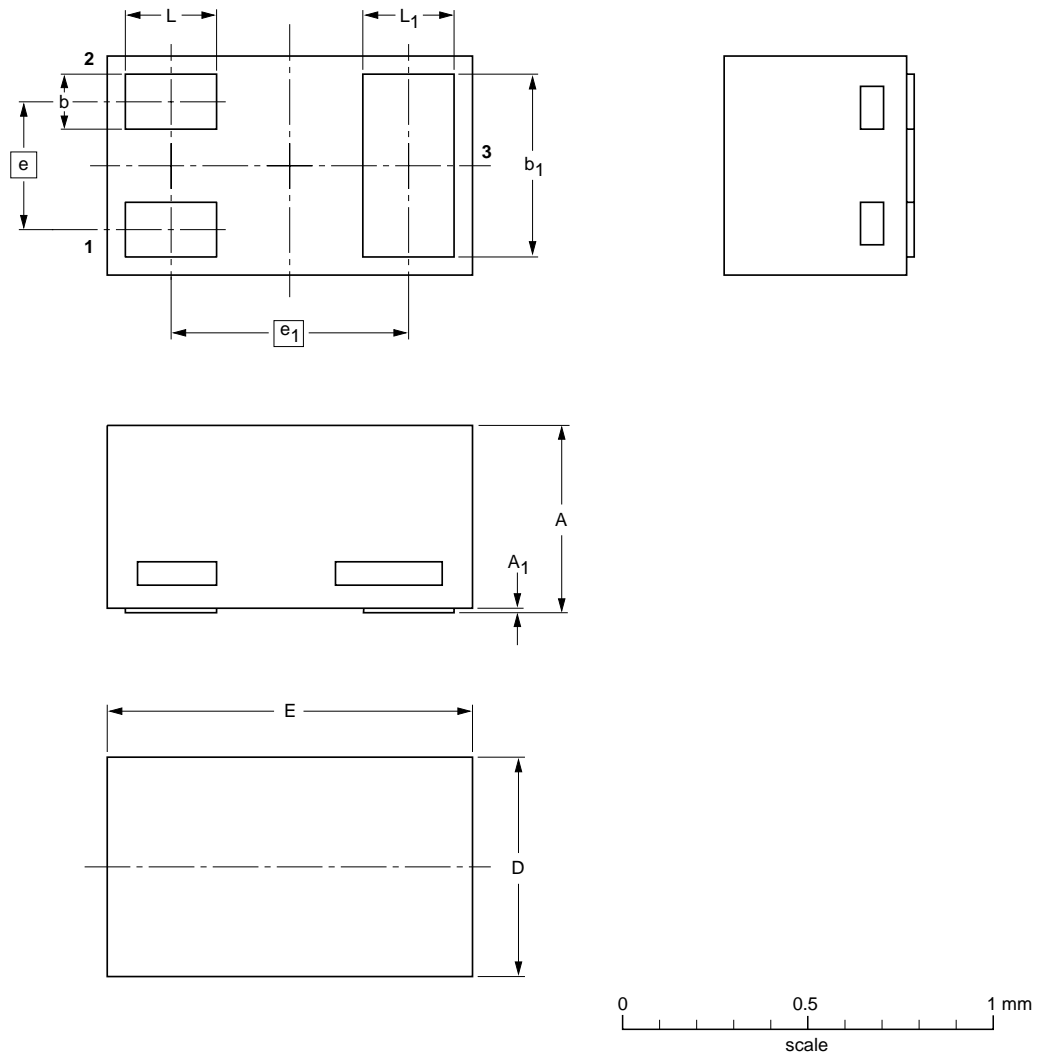


NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = 10 kΩ

PDTC143X series

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 0.46 | 0.03 | 0.20 0.12 | 0.55 0.47 | 0.62 0.55 | 1.02 0.95 | 0.35 | 0.65 | 0.30 0.22 | 0.30 0.22 |

Note

1. Including plating thickness

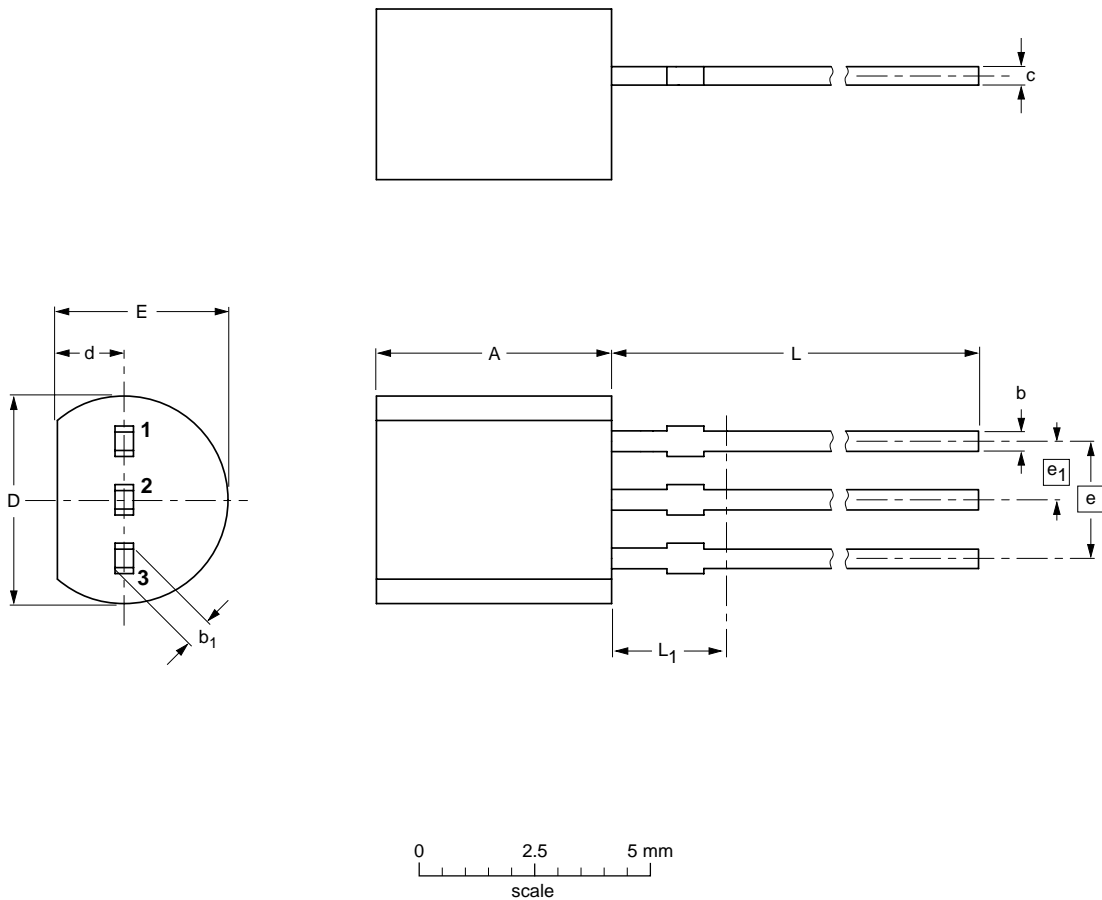
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|--------|------------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT883 | | | SC-101 | | 03-02-05 03-04-03 |

NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = 10 kΩ

PDTC143X series

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 5.0 | 0.48 0.40 | 0.66 0.55 | 0.45 0.38 | 4.8 4.4 | 1.7 1.4 | 4.2 3.6 | 2.54 | 1.27 | 14.5 12.7 | 2.5 |

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

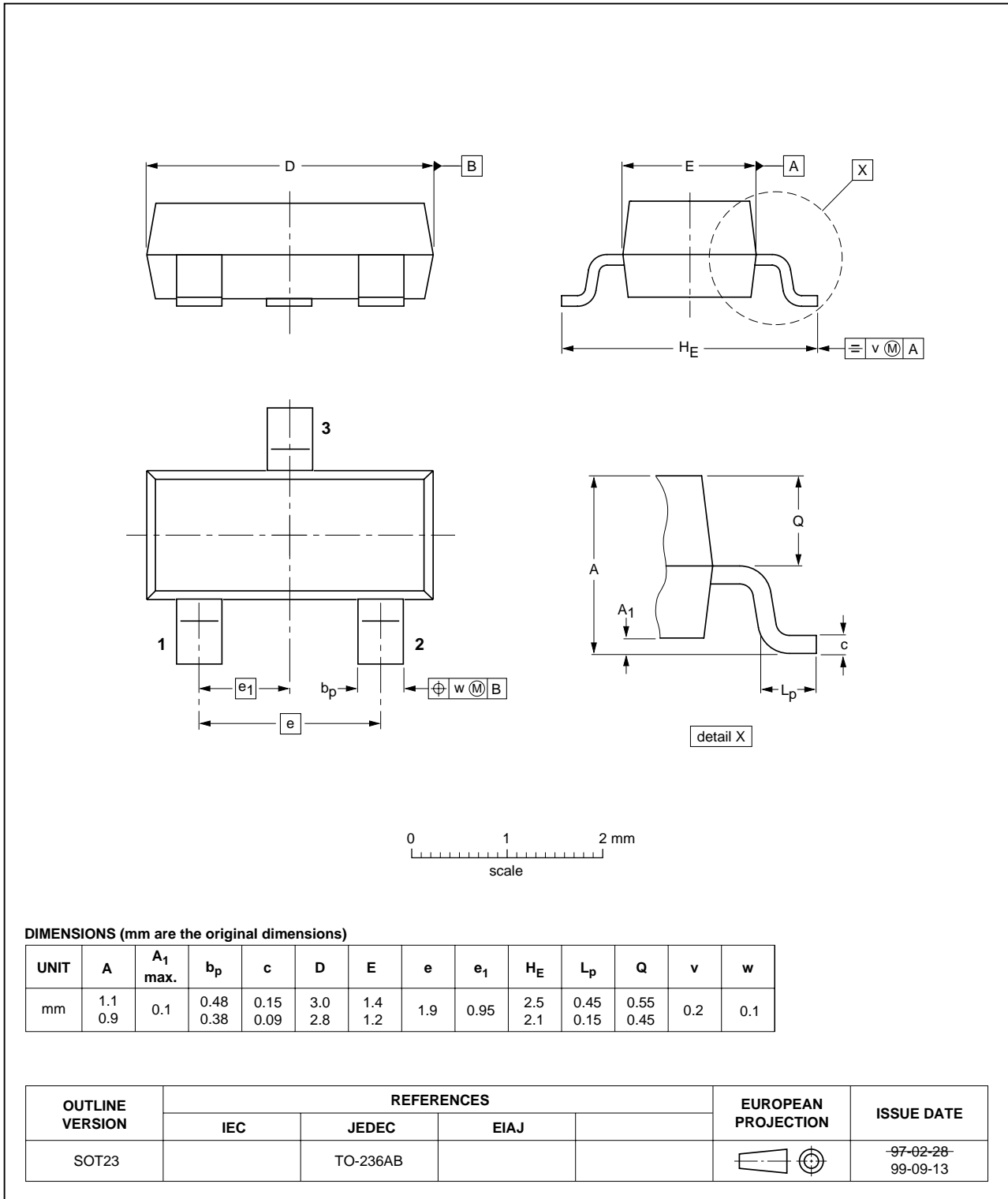
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|--------|------------------------|-----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT54 | | TO-92 | SC-43A | | -97-02-28 04-06-28 |

NPN resistor-equipped transistors;
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Plastic surface mounted package; 3 leads

SOT23

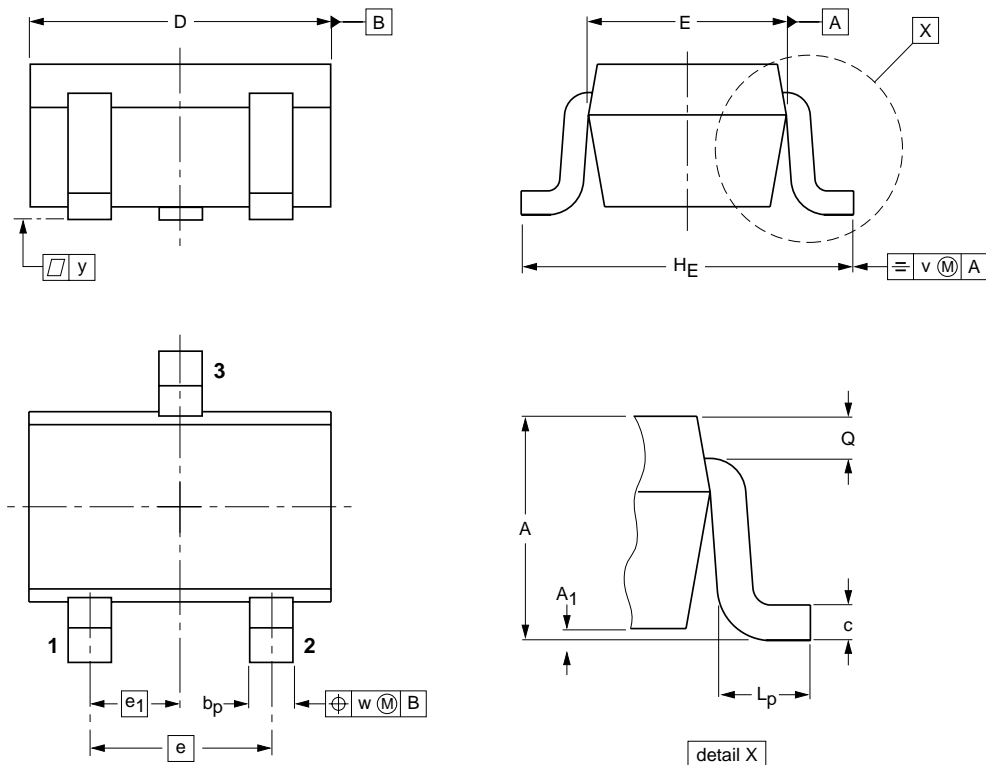


NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = 10 kΩ

PDTC143X series

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 0.8 | 0.1 | 0.4 0.3 | 0.25 0.10 | 2.2 1.8 | 1.35 1.15 | 1.3 | 0.65 | 2.2 2.0 | 0.45 0.15 | 0.23 0.13 | 0.2 | 0.2 |

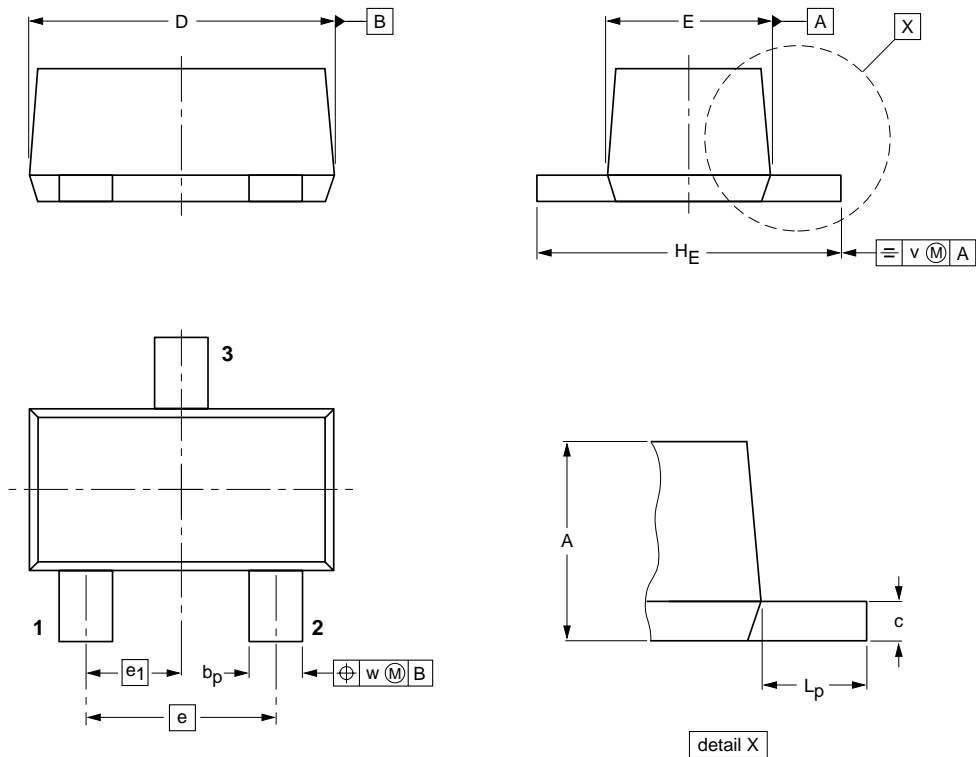
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT323 | | | SC-70 | | | 97-02-28 |

NPN resistor-equipped transistors;
R1 = 4.7 kΩ, R2 = 10 kΩ

PDTC143X series

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 0.6 | 0.33 0.23 | 0.2 0.1 | 1.7 1.5 | 0.95 0.75 | 1.0 | 0.5 | 1.7 1.5 | 0.5 0.3 | 0.1 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|---------------------|------------|
| | IEC | JEDEC | EIAJ | | |
| SOT490 | | | SC-89 | | 98-10-23 |

NPN resistor-equipped transistors;
R1 = 4.7 k Ω , R2 = 10 k Ω

PDTC143X series

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. |
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