

DATA SHEET

PDTC144W series

NPN resistor-equipped transistors;

R1 = 47 k Ω , R2 = 22 k Ω

Product specification
Supersedes data of 2004 Mar 23

2004 Aug 17

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PDTC144W 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 | – | k Ω |
| R2 | bias resistor | 22 | – | 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 | | |
| PDTC144WE | SOT416 | SC-75 | 42 | PDTA144WE |
| PDTC144WEF | SOT490 | SC-89 | 34 | PDTA144WEF |
| PDTC144WK | SOT346 | SC-59 | 41 | PDTA144WK |
| PDTC144WM | SOT883 | SC-101 | DD | PDTA144WM |
| PDTC144WS | SOT54 (TO-92) | SC-43 | TC144W | PDTA144WS |
| PDTC144WT | SOT23 | – | *20 ⁽¹⁾ | PDTA144WT |
| PDTC144WU | SOT323 | SC-70 | *20 ⁽¹⁾ | PDTA144WU |

Note

1. * = 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 |
| PDTC144WS | | 1 2 3 | base collector emitter |
| PDTC144WE PDTC144WEF PDTC144WK PDTC144WT PDTC144WU | | 1 2 3 | base emitter collector |
| PDTC144WM | | 1 2 3 | base emitter collector |

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ORDERING INFORMATION

| TYPE NUMBER | PACKAGE | | |
|-------------|---------|--|---------|
| | NAME | DESCRIPTION | VERSION |
| PDTC144WE | – | plastic surface mounted package; 3 leads | SOT416 |
| PDTC144WEF | – | plastic surface mounted package; 3 leads | SOT490 |
| PDTC144WK | – | plastic surface mounted package; 3 leads | SOT346 |
| PDTC144WM | – | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTC144WS | – | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTC144WT | – | plastic surface mounted package; 3 leads | SOT23 |
| PDTC144WU | – | 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 _{CB0} | 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 | | – | +40 | V |
| | negative | | – | –10 | V |
| I _O | output current (DC) | | – | 100 | mA |
| I _{CM} | peak collector current | | – | 100 | mA |
| P _{tot} | total power dissipation | T _{amb} ≤ 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 μ m copper strip line.

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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 |
| | 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 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 | – | – | 110 | μ A |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 5 mA | 60 | – | – | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 10 mA; I _B = 0.5 mA | – | – | 150 | mV |
| V _{i(off)} | input-off voltage | I _C = 100 μ A; V _{CE} = 5 V | – | 1.7 | 1.2 | V |
| V _{i(on)} | input-on voltage | I _C = 2 mA; V _{CE} = 0.3 V | 4 | 2.7 | – | V |
| R1 | input resistor | | 33 | 47 | 61 | k Ω |
| $\frac{R2}{R1}$ | resistor ratio | | 0.37 | 0.47 | 0.57 | |
| C _c | collector capacitance | I _E = i _e = 0 A; V _{CB} = 10 V; f = 1 MHz | – | – | 2.5 | pF |

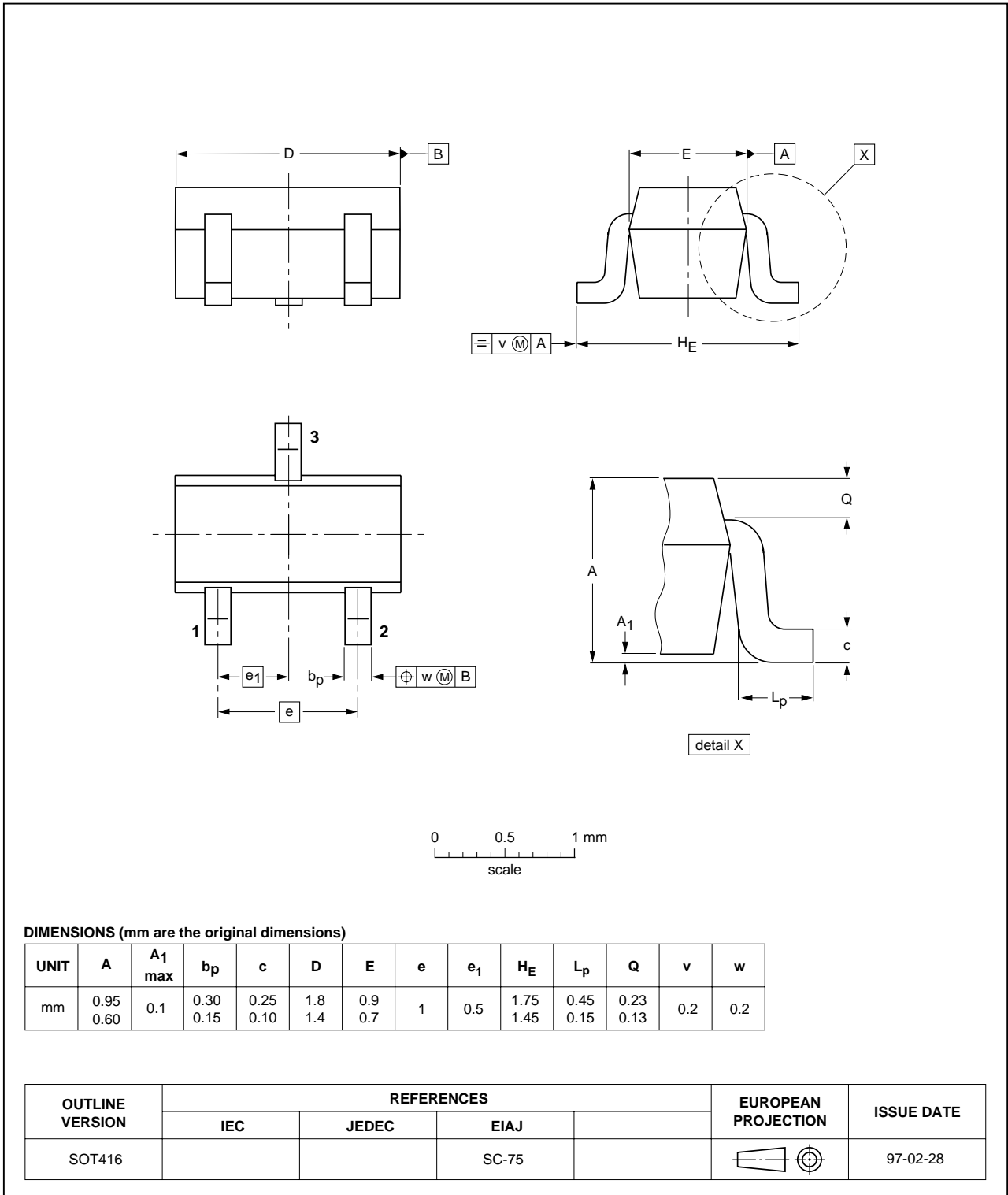
NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W series

PACKAGE OUTLINES

Plastic surface mounted package; 3 leads

SOT416

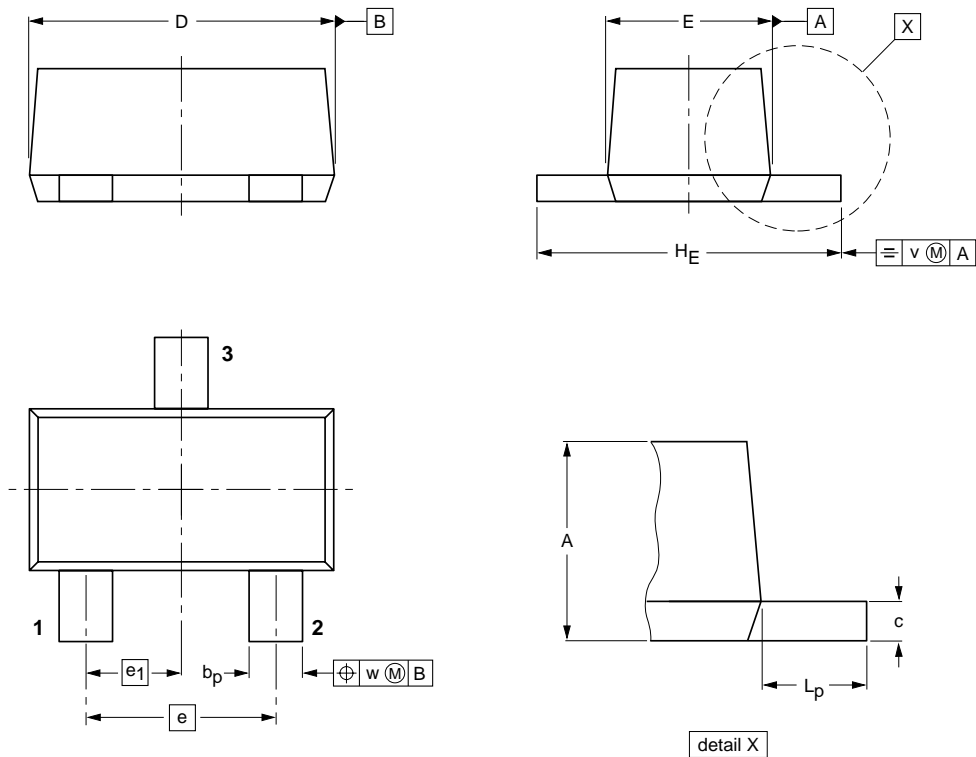


NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W 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 |

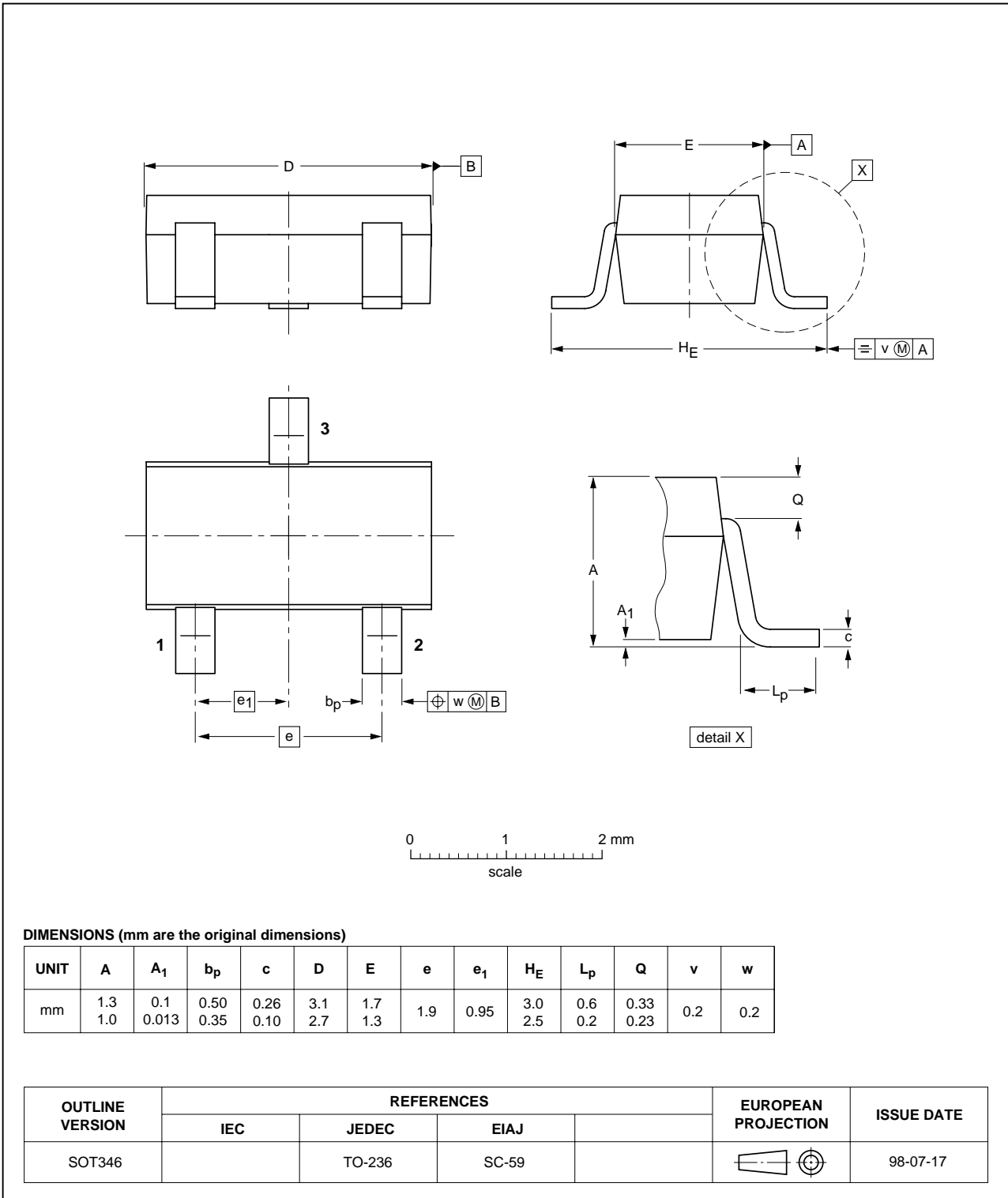
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|---------------------|------------|
| | IEC | JEDEC | EIAJ | | |
| SOT490 | | | SC-89 | | 98-10-23 |

NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W series

Plastic surface mounted package; 3 leads

SOT346

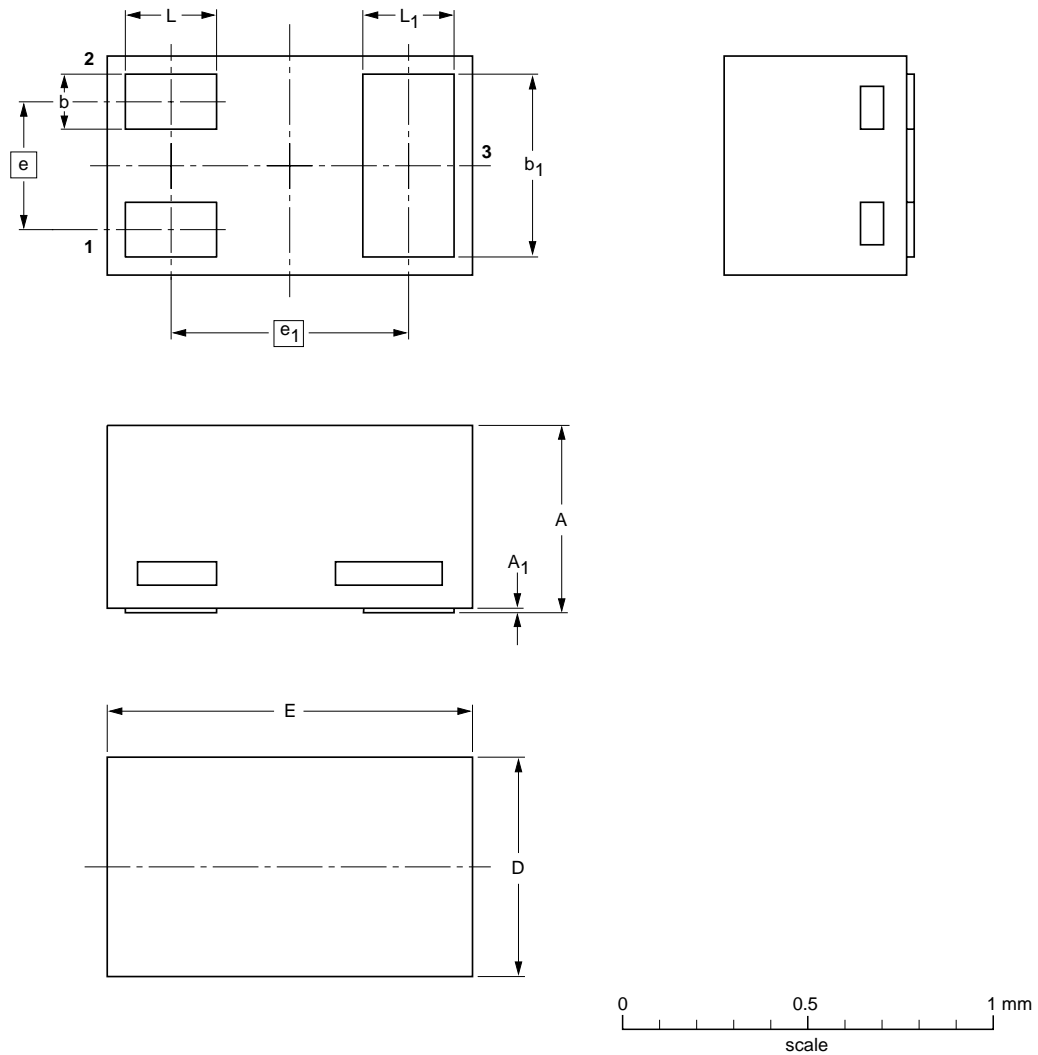


NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W 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

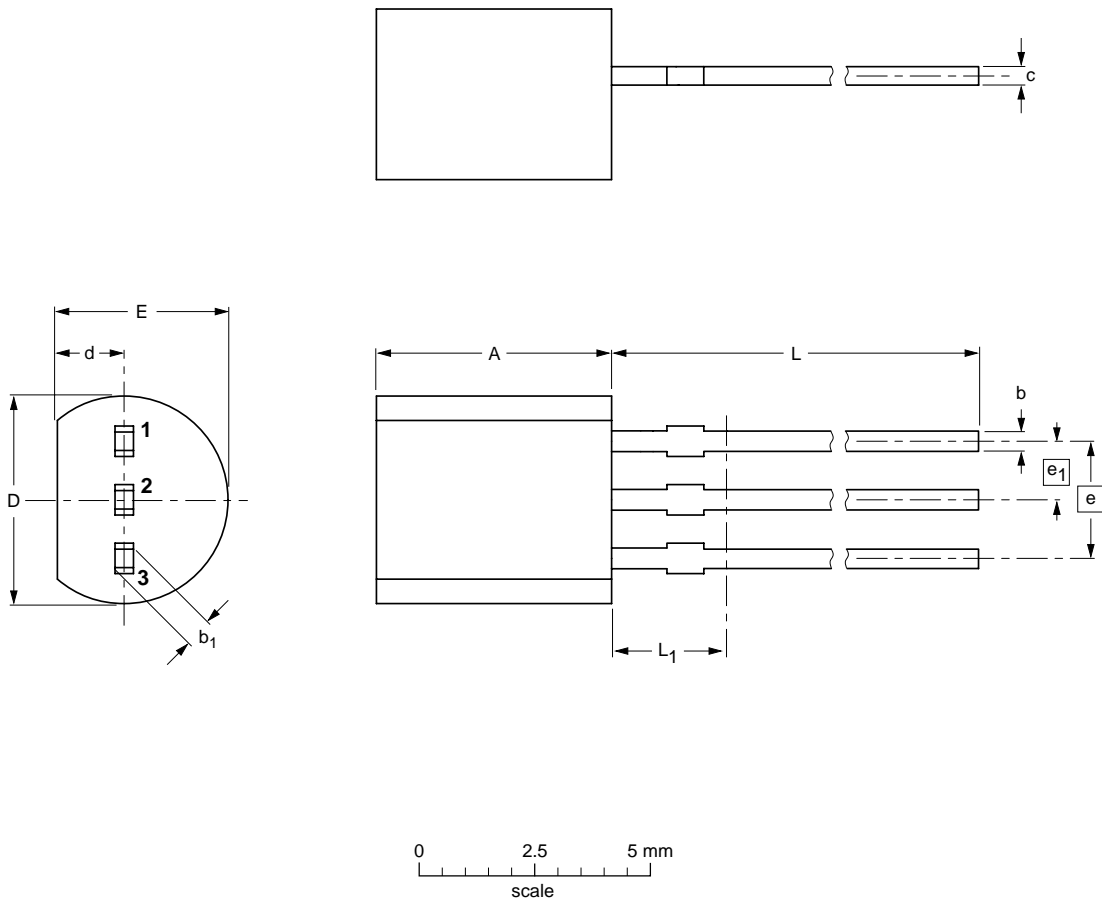
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|--------|------------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT883 | | | SC-101 | | 03-02-05 03-04-03 |

NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W 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.

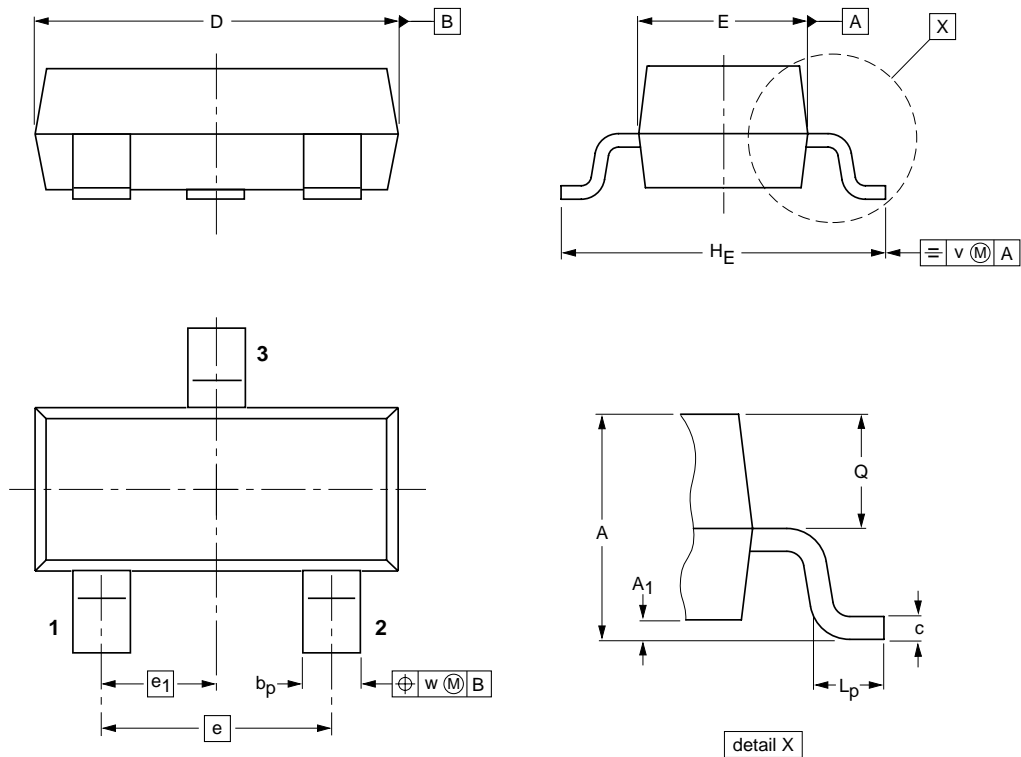
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|--------|---------------------|-----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT54 | | TO-92 | SC-43A | | -97-02-28 04-06-28 |

NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W series

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 0.9 | 0.1 | 0.48 0.38 | 0.15 0.09 | 3.0 2.8 | 1.4 1.2 | 1.9 | 0.95 | 2.5 2.1 | 0.45 0.15 | 0.55 0.45 | 0.2 | 0.1 |

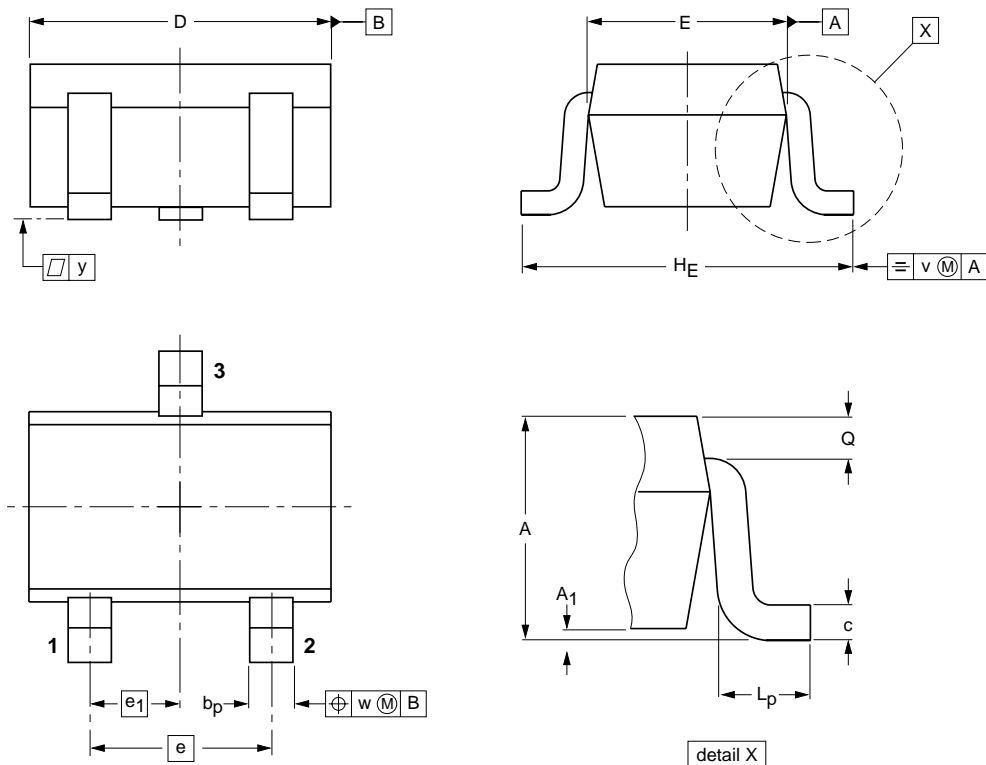
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|----------|------|--|------------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT23 | | TO-236AB | | | | 97-02-28 99-09-13 |

NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 22 kΩ

PDTC144W 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 = 47 kΩ, R2 = 22 kΩ

PDTC144W 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. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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