

DATA SHEET

PDTC124E series

NPN resistor-equipped transistors;

R1 = 22 k Ω , R2 = 22 k Ω

Product specification
Supersedes data of 2003 Apr 14

2004 Aug 17

NPN resistor-equipped transistors; R1 = 22 k Ω , R2 = 22 k Ω

PDTC124E 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 | 22 | – | 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 | | |
| PDTC124EE | SOT416 | SC-75 | 06 | PDTA124EE |
| PDTC124EEF | SOT490 | SC-89 | 36 | PDTA124EEF |
| PDTC124EK | SOT346 | SC-59 | 06 | PDTA124EK |
| PDTC124EM | SOT883 | SC-101 | DX | PDTA124EM |
| PDTC124ES | SOT54 (TO-92) | SC-43 | TC124E | PDTA124ES |
| PDTC124ET | SOT23 | – | *17 ⁽¹⁾ | PDTA124ET |
| PDTC124EU | SOT323 | SC-70 | *06 ⁽¹⁾ | PDTA124EU |

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 |
| PDTC124ES | <p style="text-align: center;"><i>MAM364</i></p> | 1 2 3 | base collector emitter |
| PDTC124EE PDTC124EEF PDTC124EK PDTC124ET PDTC124EU | <p style="text-align: center;">Top view <i>MDB269</i></p> | 1 2 3 | base emitter collector |
| PDTC124EM | <p style="text-align: center;">bottom view <i>MHC506</i></p> | 1 2 3 | base emitter collector |

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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 | – | +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 |
| | SOT416 | note 1 | – | 150 | mW |
| | SOT490 | notes 1 and 2 | – | 250 | mW |
| SOT883 | notes 2 and 3 | – | 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 μ m 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 |
| | SOT416 | note 1 | 833 | K/W |
| | SOT490 | notes 1 and 2 | 500 | K/W |
| SOT883 | notes 2 and 3 | 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.

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CHARACTERISTICS

$T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------------|--------------------------------------|---|------|------|------|------------------|
| I_{CBO} | collector-base cut-off current | $V_{\text{CB}} = 50 \text{ V}$; $I_{\text{E}} = 0$ | – | – | 100 | nA |
| I_{CEO} | collector-emitter cut-off current | $V_{\text{CE}} = 30 \text{ V}$; $I_{\text{B}} = 0$ | – | – | 1 | μA |
| | | $V_{\text{CE}} = 30 \text{ V}$; $I_{\text{B}} = 0$; $T_{\text{j}} = 150 \text{ }^\circ\text{C}$ | – | – | 50 | μA |
| I_{EBO} | emitter-base cut-off current | $V_{\text{EB}} = 5 \text{ V}$; $I_{\text{C}} = 0$ | – | – | 180 | μA |
| h_{FE} | DC current gain | $V_{\text{CE}} = 5 \text{ V}$; $I_{\text{C}} = 5 \text{ mA}$ | 60 | – | – | |
| V_{CEsat} | collector-emitter saturation voltage | $I_{\text{C}} = 10 \text{ mA}$; $I_{\text{B}} = 0.5 \text{ mA}$ | – | – | 150 | mV |
| $V_{\text{i(off)}}$ | input-off voltage | $I_{\text{C}} = 100 \text{ }\mu\text{A}$; $V_{\text{CE}} = 5 \text{ V}$ | – | 1.1 | 0.8 | V |
| $V_{\text{i(on)}}$ | input-on voltage | $I_{\text{C}} = 5 \text{ mA}$; $V_{\text{CE}} = 0.3 \text{ V}$ | 2.5 | 1.7 | – | V |
| R1 | input resistor | | 15.4 | 22 | 28.6 | $\text{k}\Omega$ |
| $\frac{R2}{R1}$ | resistor ratio | | 0.8 | 1 | 1.2 | |
| C_{c} | collector capacitance | $I_{\text{E}} = i_{\text{e}} = 0$; $V_{\text{CB}} = 10 \text{ V}$; $f = 1 \text{ MHz}$ | – | – | 2.5 | pF |

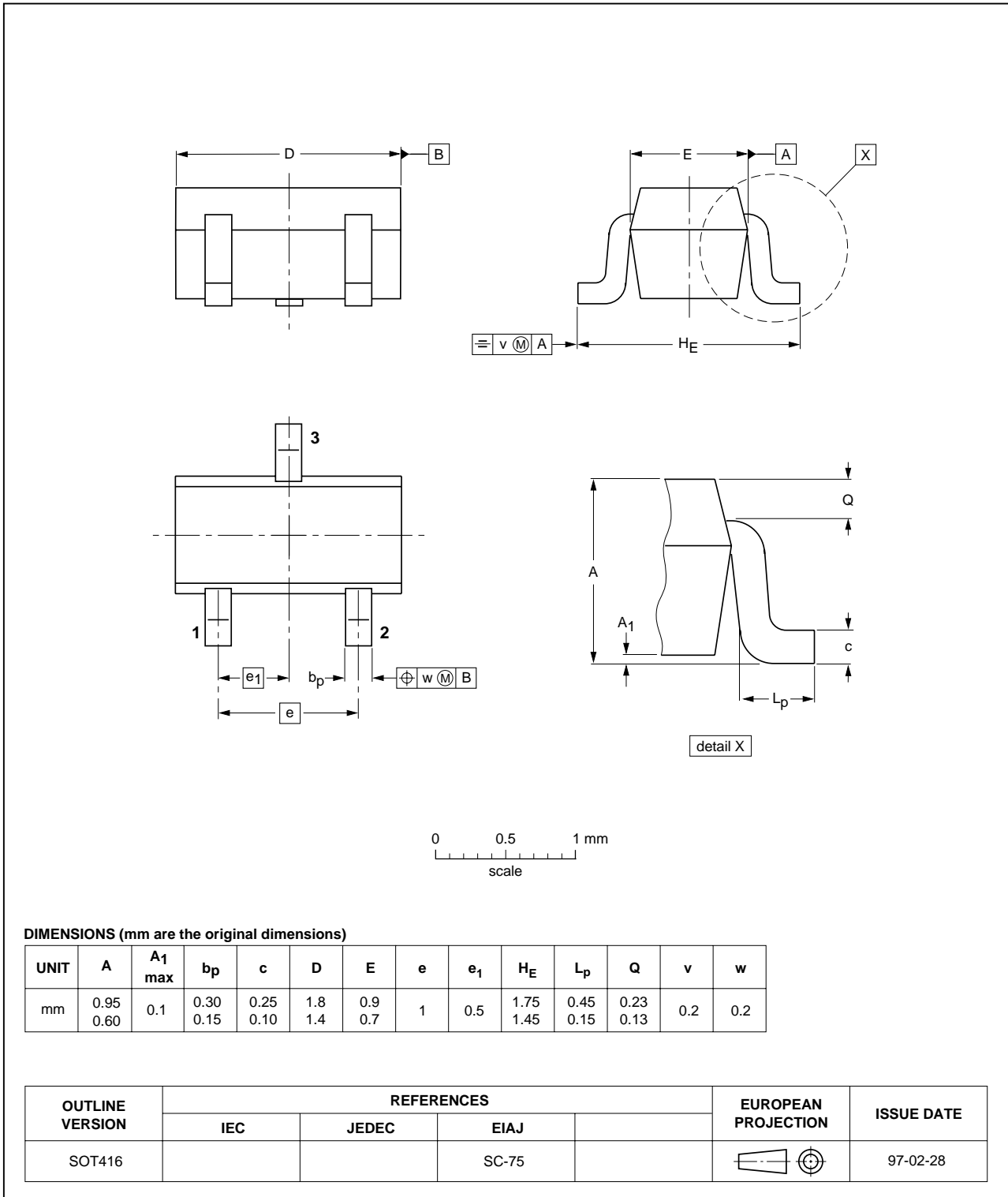
NPN resistor-equipped transistors;
R1 = 22 kΩ, R2 = 22 kΩ

PDTC124E series

PACKAGE OUTLINES

Plastic surface mounted package; 3 leads

SOT416

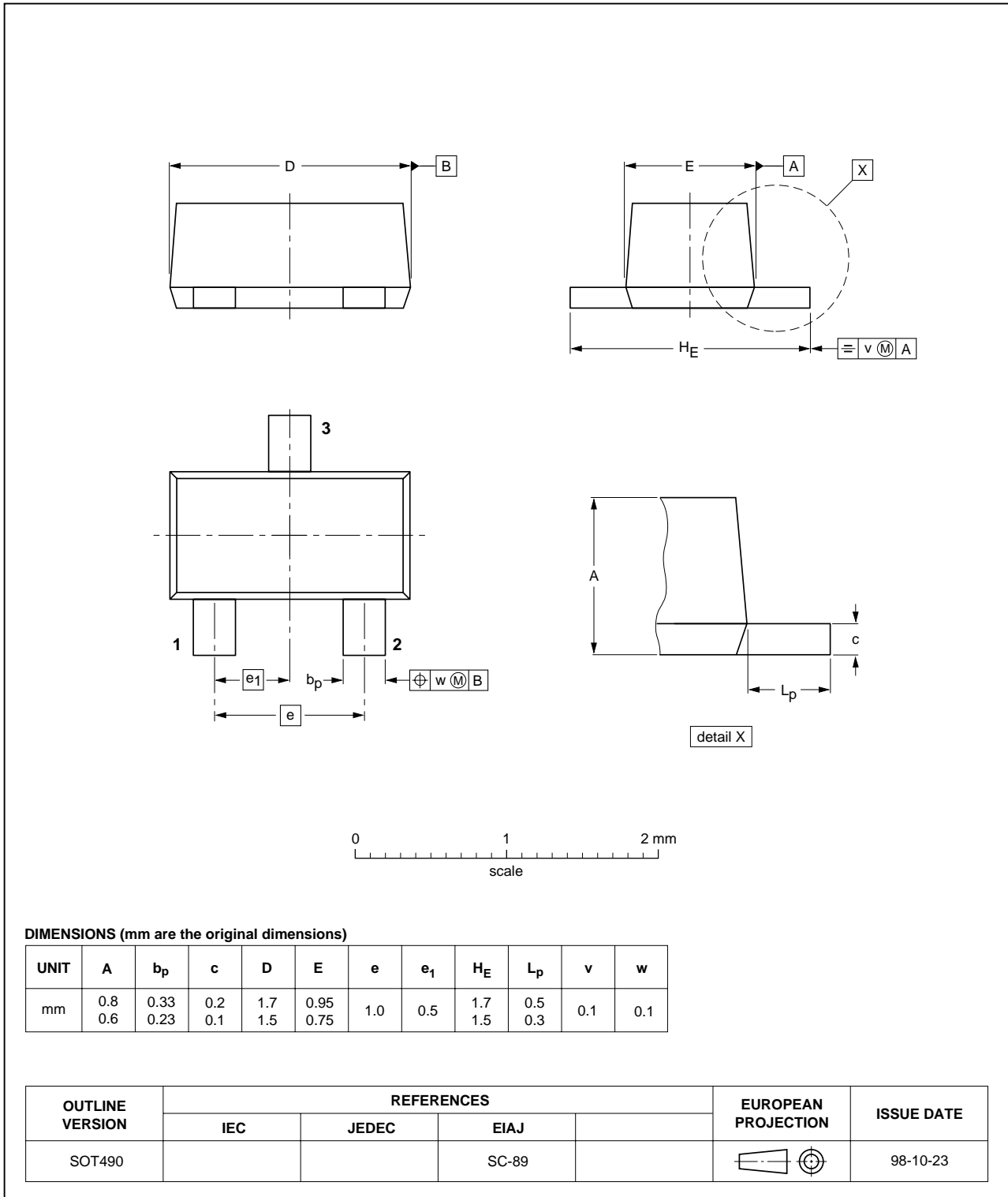


NPN resistor-equipped transistors;
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PDTC124E series

Plastic surface mounted package; 3 leads

SOT490



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

PDTC124E series

Plastic surface mounted package; 3 leads

SOT346

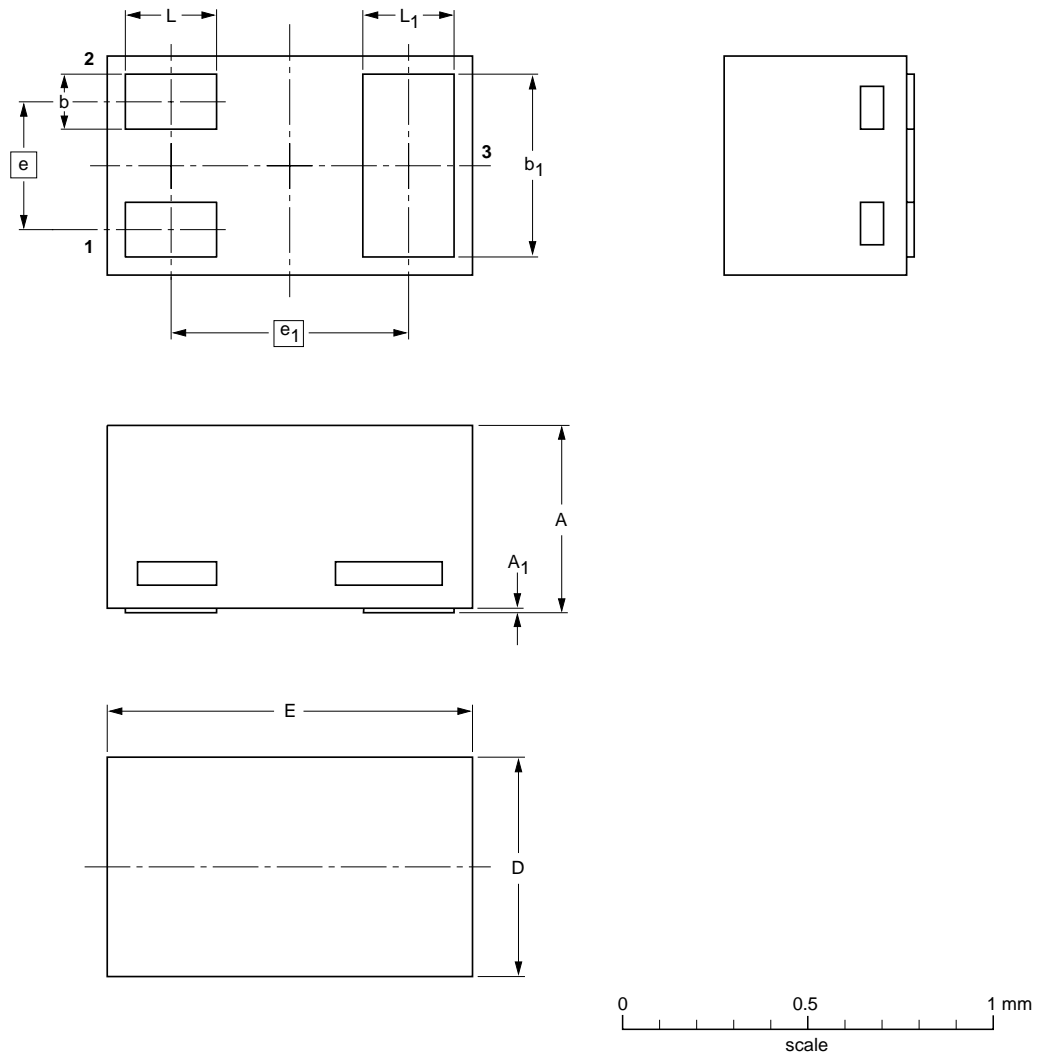


NPN resistor-equipped transistors;
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Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm

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

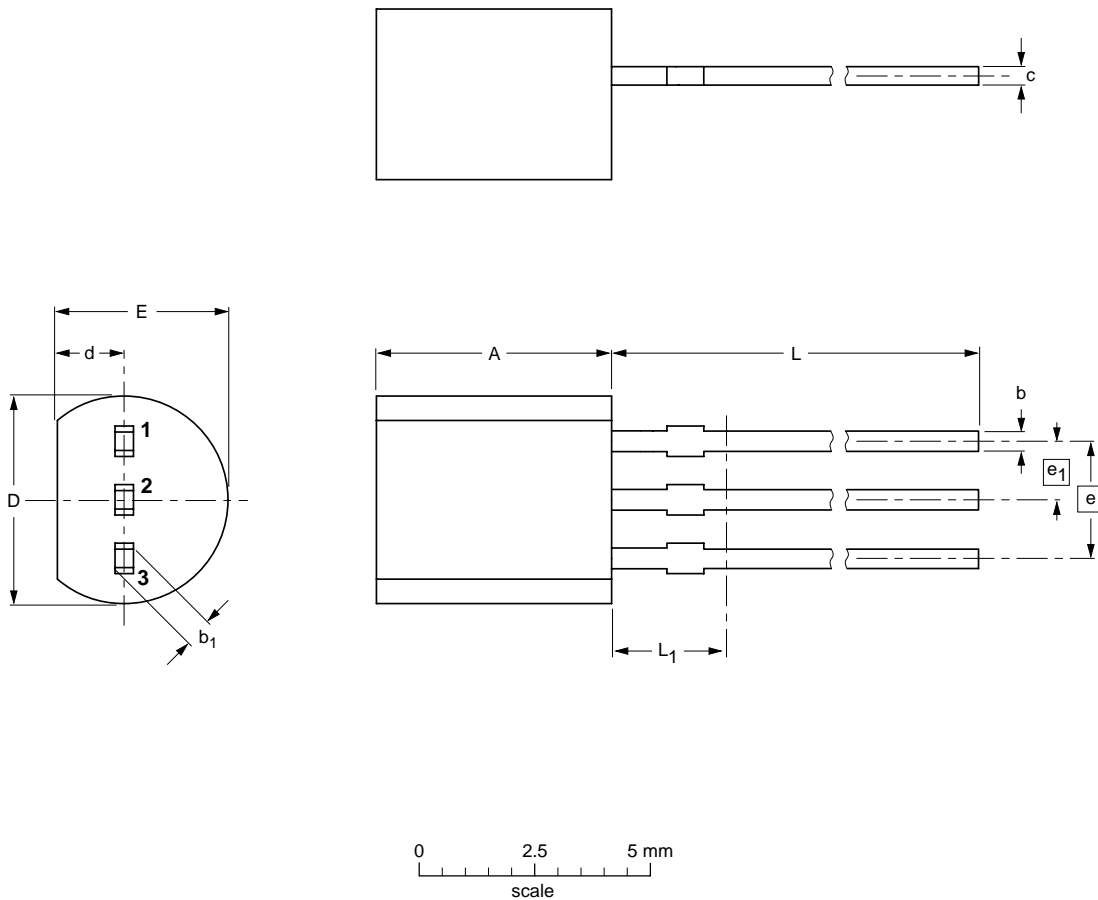
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|--------|------------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT883 | | | SC-101 | | 03-02-05 03-04-03 |

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

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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 = 22 kΩ, R2 = 22 kΩ

PDTC124E 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;
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DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾⁽³⁾ | DEFINITION |
|-------|----------------------------------|----------------------------------|--|
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Printed in The Netherlands

R75/07/pp14

Date of release: 2004 Aug 17

Document order number: 9397 750 13669

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