



**THE DATASHEET OF  
PDTC124TU,115**



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Kind regards,

Team Nexperia

# DATA SHEET

## **PDTC124T series**

NPN resistor-equipped transistors;

R1 = 22 k $\Omega$ , R2 = open

Product data sheet  
Supersedes data of 2004 Apr 06

2004 Aug 13

## NPN resistor-equipped transistors; R1 = 22 k $\Omega$ , R2 = open

## PDTC124T 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 <sub>CEO</sub> | collector-emitter voltage | –    | 50   | V          |
| I <sub>O</sub>   | output current (DC)       | –    | 100  | mA         |
| R1               | bias resistor             | 22   | –    | k $\Omega$ |
| 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   |                    |                |
| PDTC124TE   | SOT416        | SC-75  | 41                 | PDTA124TE      |
| PDTC124TEF  | SOT490        | SC-89  | 35                 | PDTA124TEF     |
| PDTC124TK   | SOT346        | SC-59  | 50                 | PDTA124TK      |
| PDTC124TM   | SOT883        | SC-101 | DY                 | PDTA124TM      |
| PDTC124TS   | SOT54 (TO-92) | SC-43  | TC124T             | PDTA124TS      |
| PDTC124TT   | SOT23         | –      | *45 <sup>(1)</sup> | PDTA124TT      |
| PDTC124TU   | SOT323        | SC-70  | *50 <sup>(1)</sup> | PDTA124TU      |

### Note

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

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

PDTC124T series

**SIMPLIFIED OUTLINE, SYMBOL AND PINNING**

| TYPE NUMBER  | SIMPLIFIED OUTLINE AND SYMBOL   | PINNING     |                              |
|--|---|-------------|------------------------------|
|  |   | PIN         | DESCRIPTION                  |
| PDTC124TS  | <p style="text-align: center;"><i>MAM361</i></p>  | 1<br>2<br>3 | base<br>collector<br>emitter |
| PDTC124TE<br>PDTC124TEF<br>PDTC124TK<br>PDTC124TT<br>PDTC124TU | <p style="text-align: center;">Top view <span style="margin-left: 150px;"><i>MDB270</i></span></p>    | 1<br>2<br>3 | base<br>emitter<br>collector |
| PDTC124TM  | <p style="text-align: center;">Bottom view <span style="margin-left: 150px;"><i>MHC507</i></span></p> | 1<br>2<br>3 | base<br>emitter<br>collector |

NPN resistor-equipped transistors;  
R1 = 22 k $\Omega$ , R2 = open

PDTC124T series

### ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION  | VERSION |
| PDTC124TE   | –       | plastic surface mounted package; 3 leads   | SOT416  |
| PDTC124TEF  | –       | plastic surface mounted package; 3 leads   | SOT490  |
| PDTC124TK   | –       | plastic surface mounted package; 3 leads   | SOT346  |
| PDTC124TM   | –       | leadless ultra small plastic package; 3 solder lands; body<br>1.0 × 0.6 × 0.5 mm | SOT883  |
| PDTC124TS   | –       | plastic single-ended leaded (through hole) package; 3 leads                      | SOT54   |
| PDTC124TT   | –       | plastic surface mounted package; 3 leads   | SOT23   |
| PDTC124TU   | –       | 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 <sub>CBO</sub> | collector-base voltage        | open emitter             | –    | 50   | V    |
| V <sub>CEO</sub> | collector-emitter voltage     | open base                | –    | 50   | V    |
| V <sub>EBO</sub> | emitter-base voltage          | open collector           | –    | 5    | V    |
| I <sub>O</sub>   | output current (DC)           |                          | –    | 100  | mA   |
| I <sub>CM</sub>  | peak collector current        |                          | –    | 100  | mA   |
| P <sub>tot</sub> | total power dissipation       | T <sub>amb</sub> ≤ 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 <sub>stg</sub> | storage temperature           |                          | –65  | +150 | °C   |
| T <sub>j</sub>   | junction temperature          |                          | –    | 150  | °C   |
| T <sub>amb</sub> | 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  $\mu$ m copper strip line.

NPN resistor-equipped transistors;  
R1 = 22 k $\Omega$ , R2 = open

PDTC124T series

### THERMAL CHARACTERISTICS

| SYMBOL               | PARAMETER                                   | CONDITIONS    | VALUE | UNIT |
|----------------------|---|---------------|-------|------|
| R <sub>th(j-a)</sub> | 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  $\mu$ m copper strip line.

### CHARACTERISTICS

T<sub>amb</sub> = 25 °C unless otherwise specified.

| SYMBOL             | PARAMETER                            | CONDITIONS  | MIN. | TYP. | MAX. | UNIT       |
|--------------------|--------------------------------------|---|------|------|------|------------|
| I <sub>CBO</sub>   | collector-base cut-off current       | V <sub>CB</sub> = 50 V; I <sub>E</sub> = 0 A                                | –    | –    | 100  | nA         |
| I <sub>CEO</sub>   | collector-emitter cut-off current    | V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0 A                                | –    | –    | 1    | $\mu$ A    |
|                    |                                      | V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0 A; T <sub>j</sub> = 150 °C       | –    | –    | 50   | $\mu$ A    |
| I <sub>EBO</sub>   | emitter-base cut-off current         | V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A                                 | –    | –    | 100  | nA         |
| h <sub>FE</sub>    | DC current gain                      | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 mA                                | 100  | –    | –    |            |
| V <sub>CEsat</sub> | collector-emitter saturation voltage | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA                             | –    | –    | 150  | mV         |
| R1                 | input resistor                       |   | 15.4 | 22   | 28.6 | k $\Omega$ |
| C <sub>c</sub>     | collector capacitance                | I <sub>E</sub> = i <sub>e</sub> = 0 A; V <sub>CB</sub> = 10 V;<br>f = 1 MHz | –    | –    | 2.5  | pF         |

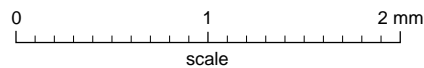
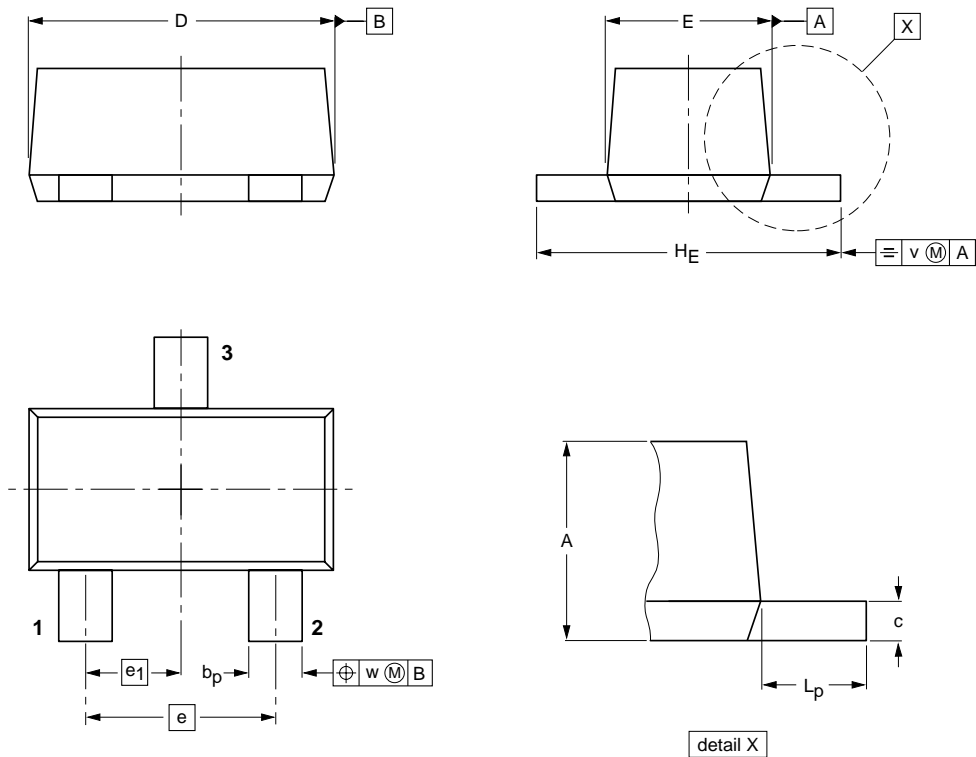
NPN resistor-equipped transistors;  
R1 = 22 kΩ, R2 = open

PDTC124T series

PACKAGE OUTLINES

Plastic surface-mounted package; 3 leads

SOT490



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | b <sub>p</sub> | c          | D          | E            | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | 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 |

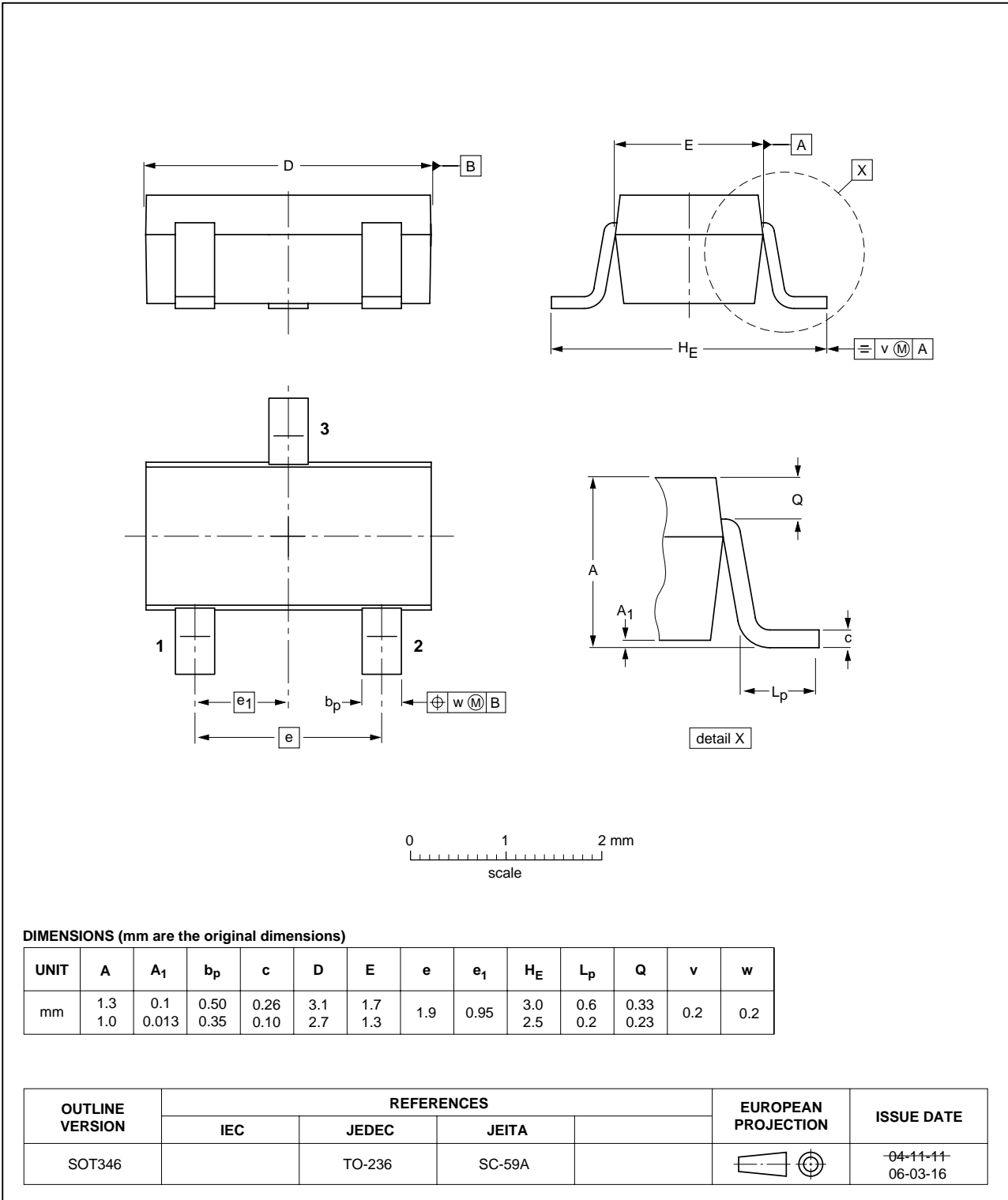
| OUTLINE VERSION | REFERENCES |       |       | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|-------|-------|---------------------|----------------------|
|                 | IEC        | JEDEC | JEITA |                     |                      |
| SOT490          |            |       | SC-89 |                     | 05-07-28<br>06-03-16 |

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

PDTC124T series

Plastic surface-mounted package; 3 leads

SOT346

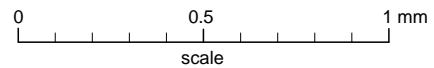
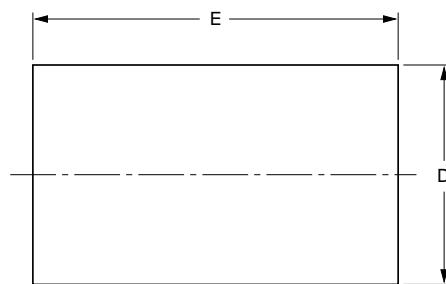
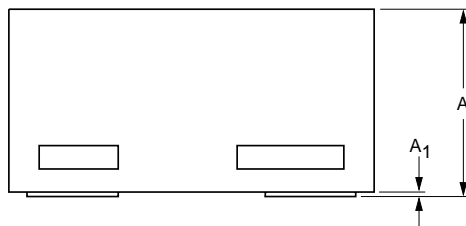
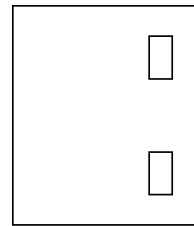
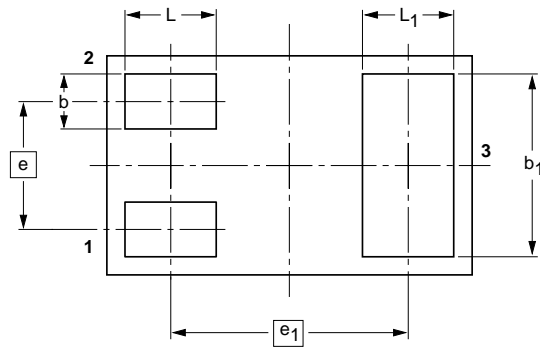


NPN resistor-equipped transistors;  
R1 = 22 kΩ, R2 = open

PDTC124T 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 <sup>(1)</sup> | A <sub>1</sub><br>max. | b            | b <sub>1</sub> | D            | E            | e    | e <sub>1</sub> | L            | L <sub>1</sub> |
|------|------------------|------------------------|--------------|----------------|--------------|--------------|------|----------------|--------------|----------------|
| 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

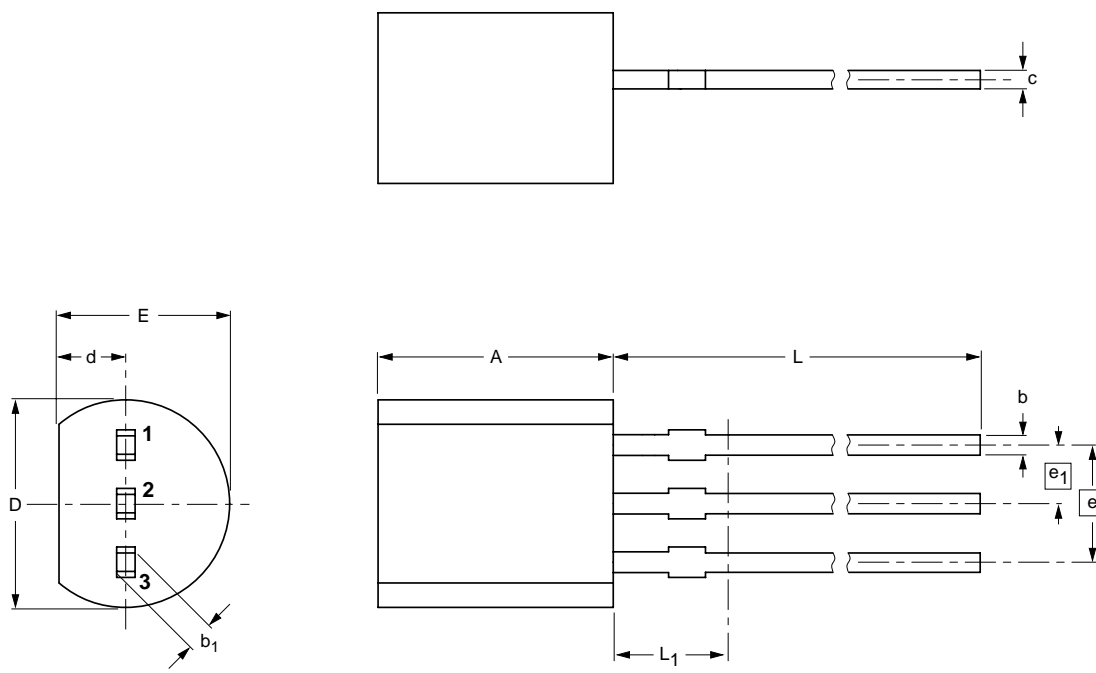
| OUTLINE<br>VERSION | REFERENCES |       |        | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|-------|--------|------------------------|----------------------|
|                    | IEC        | JEDEC | JEITA  |                        |                     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

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

PDTC124T series

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

SOT54



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

| UNIT | A          | b            | b <sub>1</sub> | c            | D          | d          | E          | e    | e <sub>1</sub> | L            | L <sub>1</sub> <sup>(1)</sup><br>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.

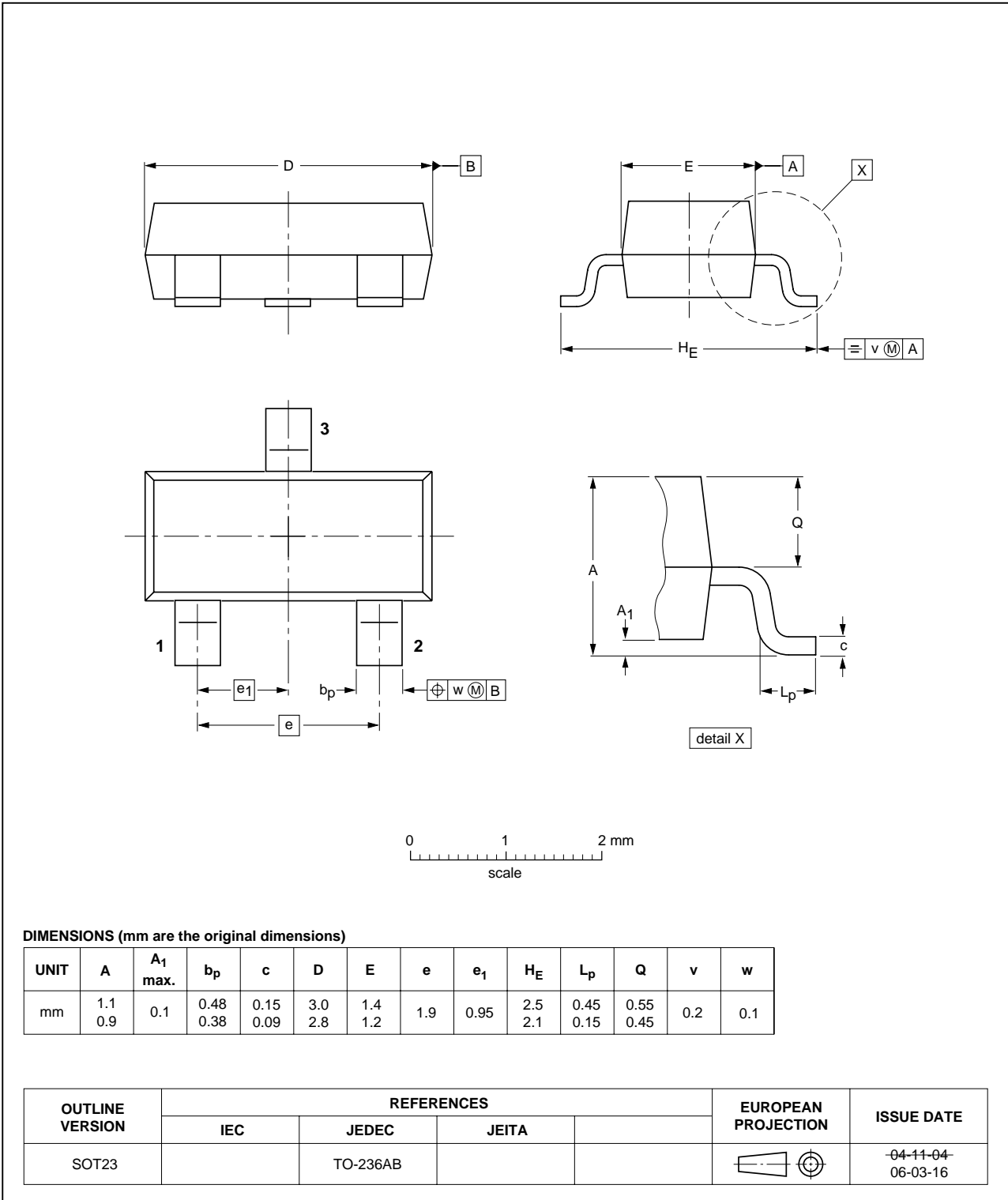
| OUTLINE<br>VERSION | REFERENCES |       |        | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|-------|--------|------------------------|----------------------|
|                    | IEC        | JEDEC | JEITA  |                        |                      |
| SOT54              |            | TO-92 | SC-43A |                        | 04-06-28<br>04-11-16 |

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

PDTC124T series

Plastic surface-mounted package; 3 leads

SOT23



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

PDTC124T series

Plastic surface-mounted package; 3 leads

SOT323



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max | b <sub>p</sub> | c            | D          | E            | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | 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 |

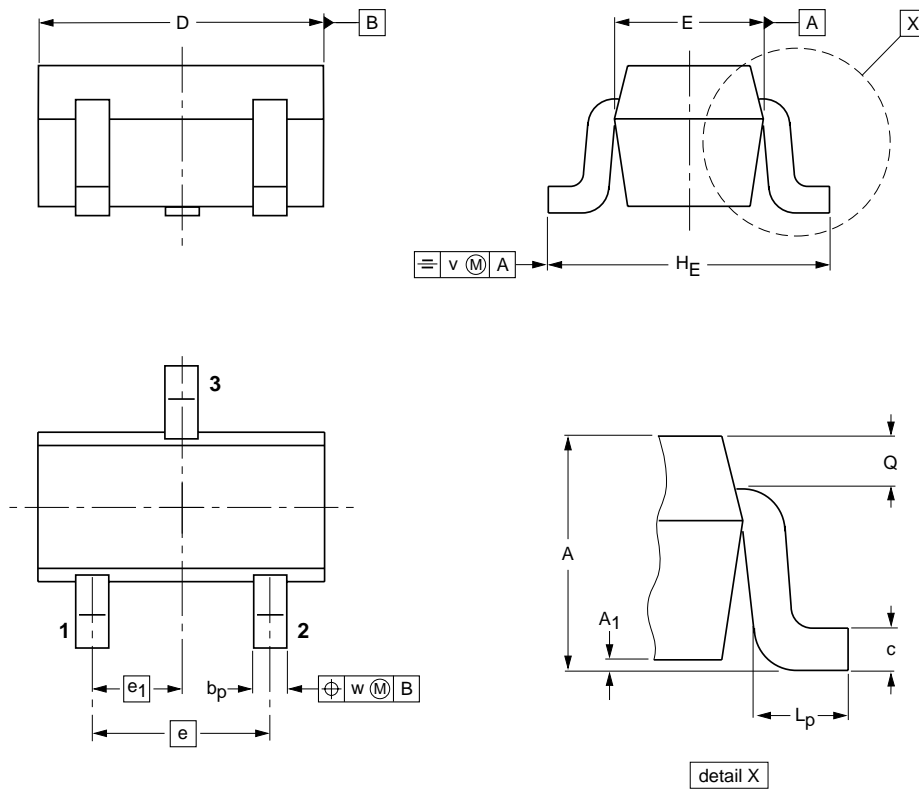
| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE                      |
|--------------------|------------|-------|-------|--|------------------------|---------------------------------|
|                    | IEC        | JEDEC | JEITA |  |                        |                                 |
| SOT323             |            |       | SC-70 |  |                        | <del>04-11-04</del><br>06-03-16 |

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

PDTC124T series

Plastic surface-mounted package; 3 leads

SOT416



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

| UNIT | A            | A1<br>max | bp           | c            | D          | E          | e | e1  | HE           | Lp           | 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<br>VERSION | REFERENCES |       |       | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|-------|-------|------------------------|----------------------|
|                    | IEC        | JEDEC | JEITA |                        |                      |
| SOT416             |            |       | SC-75 |                        | 04-11-04<br>06-03-16 |

NPN resistor-equipped transistors;  
R1 = 22 k $\Omega$ , R2 = open

PDTC124T series

#### DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | 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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## **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>

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