

# DATA SHEET

## **PDTA123E series**

**PNP resistor-equipped transistors;**

**R1 = 2.2 k $\Omega$ , R2 = 2.2 k $\Omega$**

Product specification  
Supersedes data of 2004 Apr 07

2004 Aug 02

## PNP resistor-equipped transistors; R1 = 2.2 k $\Omega$ , R2 = 2.2 k $\Omega$

## PDTA123E 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             | 2.2  | –    | k $\Omega$ |
| R2               | bias resistor             | 2.2  | –    | k $\Omega$ |

### DESCRIPTION

PNP resistor-equipped transistor (see “Simplified outline, symbol and pinning” for package details).

### PRODUCT OVERVIEW

| TYPE NUMBER | PACKAGE       |        | MARKING CODE       | NPN COMPLEMENT |
|-------------|---------------|--------|--------------------|----------------|
|             | PHILIPS       | EIAJ   |                    |                |
| PDTA123EE   | SOT416        | SC-75  | 5C                 | PDTC123EE      |
| PDTA123EEF  | SOT490        | SC-89  | 6C                 | PDTC123EEF     |
| PDTA123EK   | SOT346        | SC-59  | 42                 | PDTC123EK      |
| PDTA123EM   | SOT883        | SC-101 | F7                 | PDTC123EM      |
| PDTA123ES   | SOT54 (TO-92) | SC-43  | TA123E             | PDTC123ES      |
| PDTA123ET   | SOT23         | –      | *21 <sup>(1)</sup> | PDTC123ET      |
| PDTA123EU   | SOT323        | SC-70  | *42 <sup>(1)</sup> | PDTC123EU      |

### Note

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

PNP resistor-equipped transistors;  
 R1 = 2.2 kΩ, R2 = 2.2 kΩ

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SIMPLIFIED OUTLINE, SYMBOL AND PINNING

| TYPE NUMBER  | SIMPLIFIED OUTLINE AND SYMBOL | PINNING |             |
|--|-------------------------------|---------|-------------|
|  |                               | PIN     | DESCRIPTION |
| PDTA123ES  |                               | 1       | base        |
|  |                               | 2       | collector   |
|  |                               | 3       | emitter     |
| PDTA123EE<br>PDTA123EEF<br>PDTA123EK<br>PDTA123ET<br>PDTA123EU |                               | 1       | base        |
|  |                               | 2       | emitter     |
|  |                               | 3       | collector   |
| PDTA123EM  |                               | 1       | base        |
|  |                               | 2       | emitter     |
|  |                               | 3       | collector   |

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### ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION  | VERSION |
| PDTA123EE   | –       | plastic surface mounted package; 3 leads   | SOT416  |
| PDTA123EEF  | –       | plastic surface mounted package; 3 leads   | SOT490  |
| PDTA123EK   | –       | plastic surface mounted package; 3 leads   | SOT346  |
| PDTA123EM   | –       | leadless ultra small plastic package; 3 solder lands; body<br>1.0 x 0.6 x 0.5 mm | SOT883  |
| PDTA123ES   | –       | plastic single-ended leaded (through hole) package; 3 leads                      | SOT54   |
| PDTA123ET   | –       | plastic surface mounted package; 3 leads   | SOT23   |
| PDTA123EU   | –       | 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>CB0</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           | –    | –10  | V    |
| V <sub>I</sub>   | input voltage                 |                          |      |      |      |
|                  | positive                      |                          | –    | +10  | V    |
|                  | negative                      |                          | –    | –12  | 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   |
|                  | SOT416                        | note 1                   | –    | 150  | mW   |
|                  | SOT490                        | notes 1 and 2            | –    | 250  | mW   |
| SOT883           | notes 2 and 3                 | –                        | 250  | 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.

PNP resistor-equipped transistors;  
R1 = 2.2 k $\Omega$ , R2 = 2.2 k $\Omega$

PDTA123E series

### THERMAL CHARACTERISTICS

| SYMBOL               | PARAMETER                                   | CONDITIONS               | VALUE | UNIT |
|----------------------|---|--------------------------|-------|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | T <sub>amb</sub> ≤ 25 °C |       |      |
|                      | 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                   | 830   | 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  $\mu$ 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                                 | -    | -    | -2   | mA         |
| h <sub>FE</sub>     | DC current gain                      | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -20 mA                              | 30   | -    | -    |            |
| V <sub>CEsat</sub>  | collector-emitter saturation voltage | I <sub>C</sub> = -10 mA; I <sub>B</sub> = -0.5 mA                            | -    | -    | -150 | mV         |
| V <sub>i(off)</sub> | input-off voltage                    | I <sub>C</sub> = -1 mA; V <sub>CE</sub> = -5 V                               | -    | -1.2 | -0.5 | V          |
| V <sub>i(on)</sub>  | input-on voltage                     | I <sub>C</sub> = -20 mA; V <sub>CE</sub> = -0.3 V                            | -2   | -1.6 | -    | V          |
| R1                  | input resistor                       |  | 1.54 | 2.2  | 2.86 | k $\Omega$ |
| $\frac{R2}{R1}$     | resistor ratio                       |  | 0.8  | 1    | 1.2  |            |
| 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 | -    | -    | 3    | pF         |

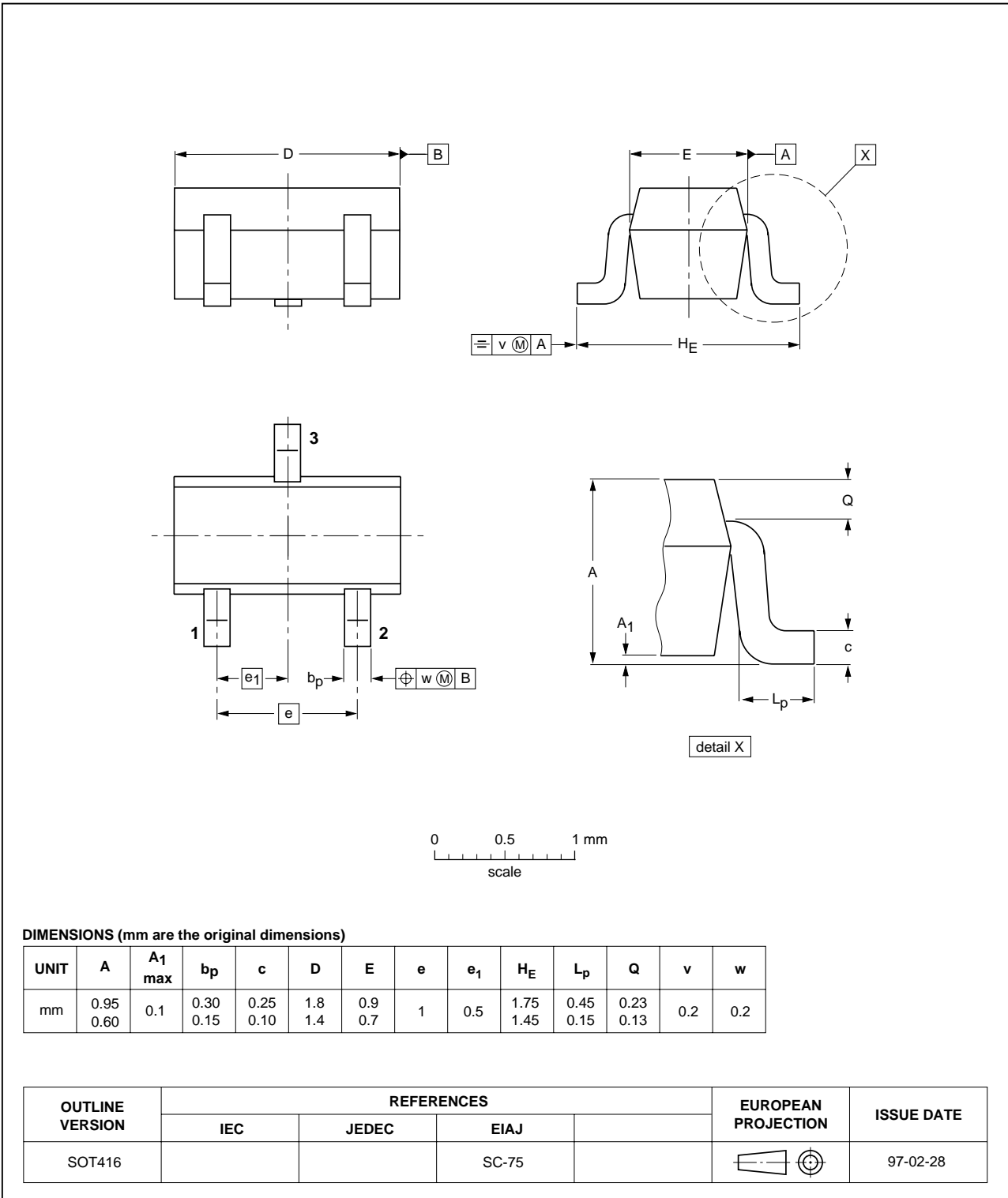
PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E series

PACKAGE OUTLINES

Plastic surface mounted package; 3 leads

SOT416

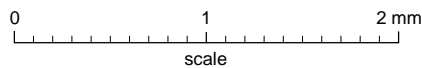
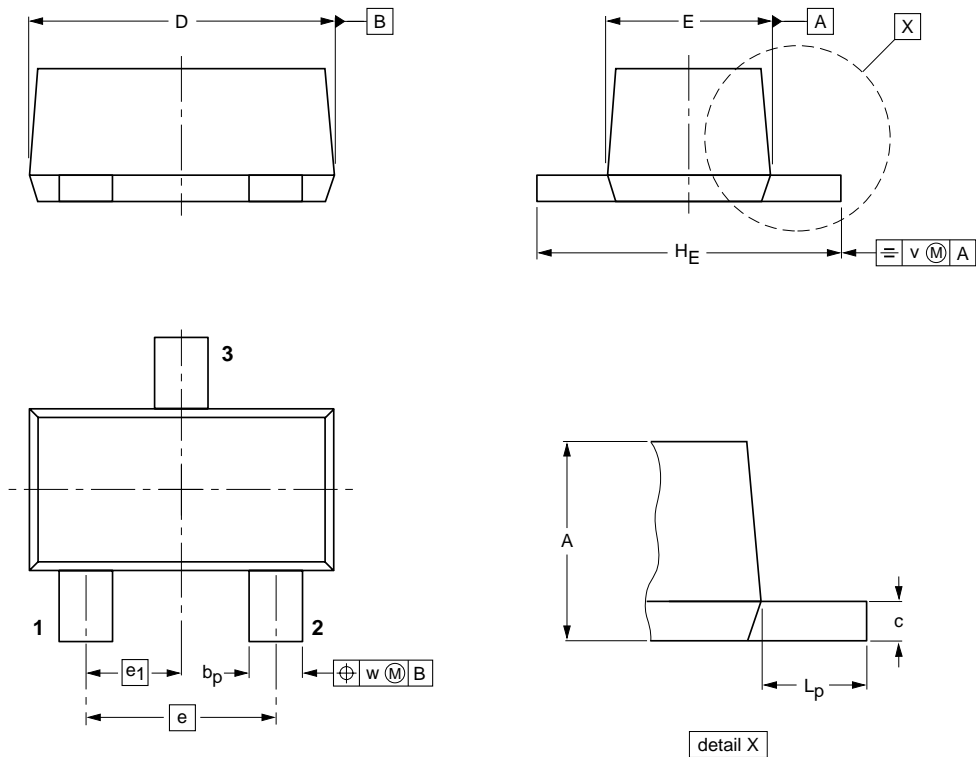


PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E series

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 |

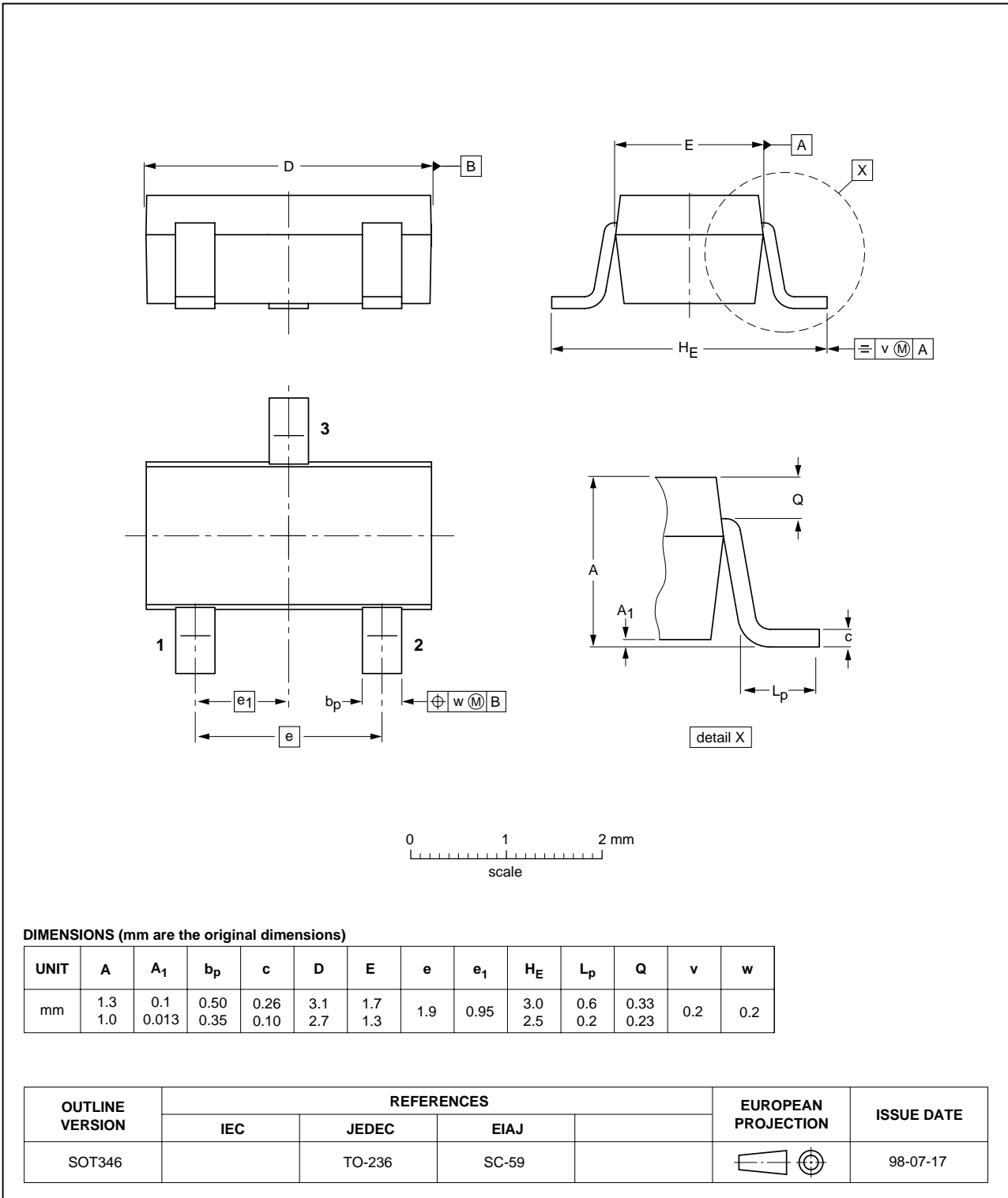
| OUTLINE VERSION | REFERENCES |       |       | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|---------------------|------------|
|                 | IEC        | JEDEC | EIAJ  |                     |            |
| SOT490          |            |       | SC-89 |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

PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E series

Plastic surface mounted package; 3 leads

SOT346

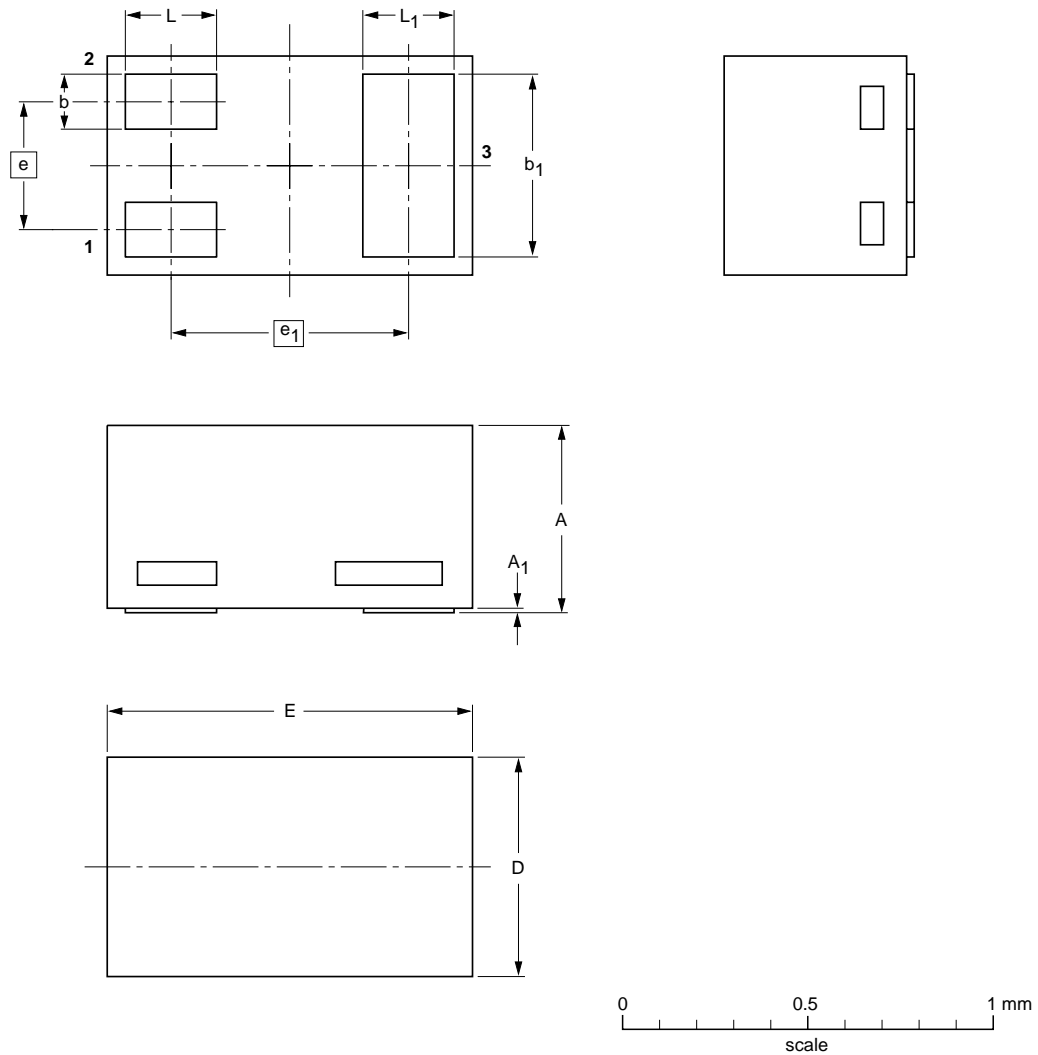


PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E 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> 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

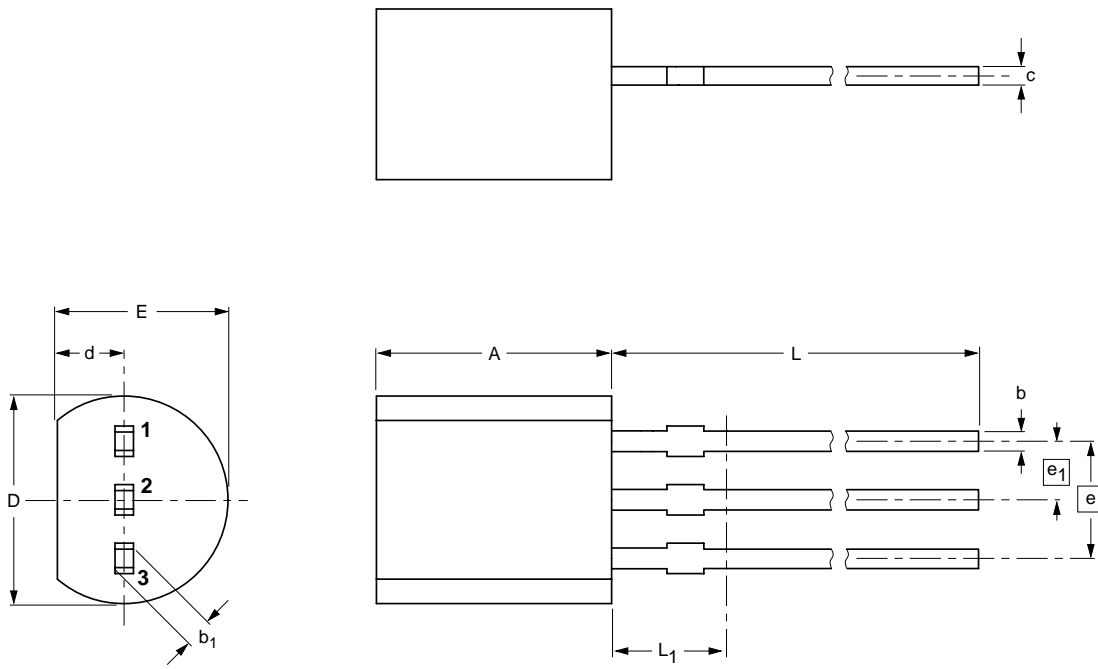
| OUTLINE VERSION | REFERENCES |       |        | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|-------|--------|---------------------|----------------------|
|                 | IEC        | JEDEC | JEITA  |                     |                      |
| SOT883       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

PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E 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.

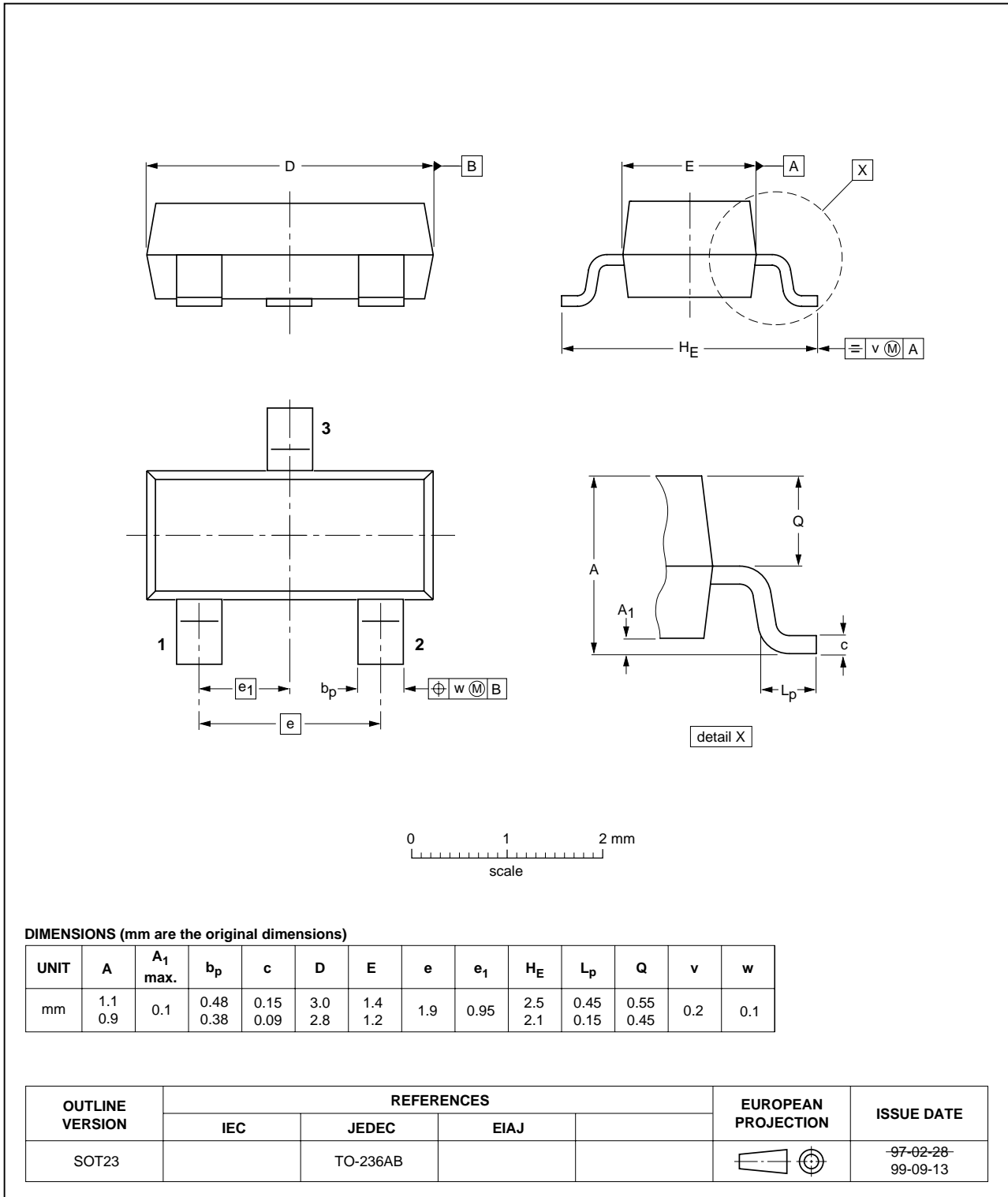
| OUTLINE<br>VERSION | REFERENCES |       |        | EUROPEAN<br>PROJECTION | ISSUE DATE            |
|--------------------|------------|-------|--------|------------------------|-----------------------|
|                    | IEC        | JEDEC | JEITA  |                        |                   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

PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E series

Plastic surface mounted package; 3 leads

SOT23

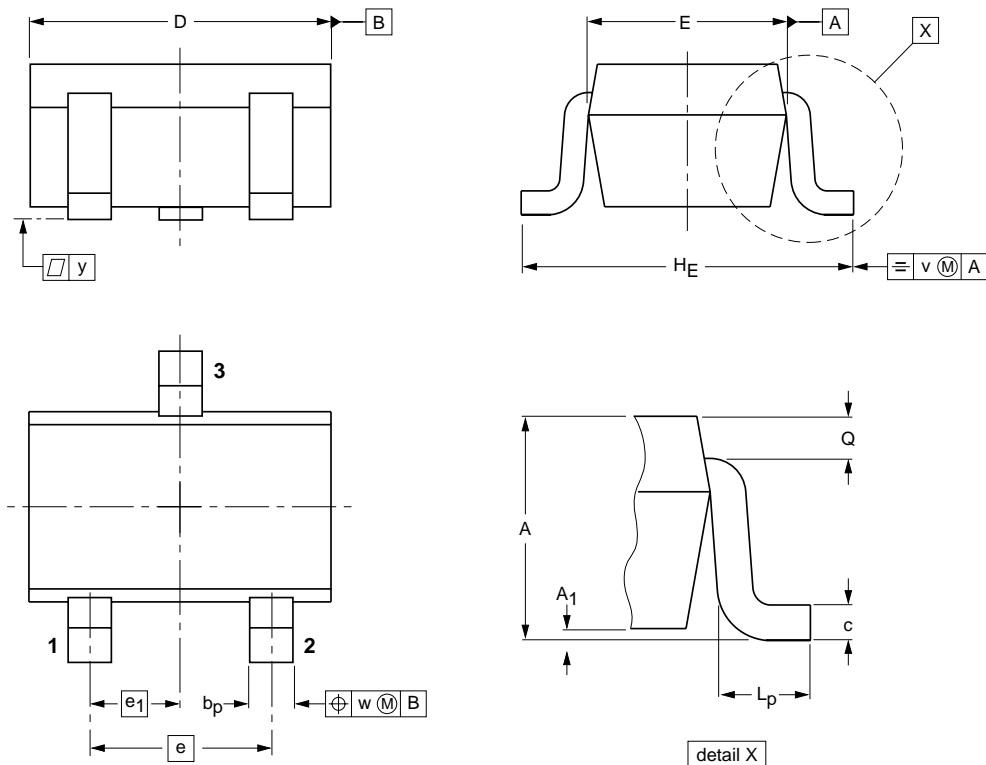


PNP resistor-equipped transistors;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

PDTA123E 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 | EIAJ  |  |                        |            |
| SOT323             |            |       | SC-70 |  |                        | 97-02-28   |

PNP resistor-equipped transistors;  
R1 = 2.2 k $\Omega$ , R2 = 2.2 k $\Omega$

PDTA123E series

#### DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)(3)</sup> | 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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