

# DATA SHEET

## **PDTA144W series**

**PNP resistor-equipped transistors;**

**R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$**

Product specification  
Supersedes data of 2004 Mar 23

2004 Aug 05

## PNP resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

## PDTA144W 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             | 47   | –    | k $\Omega$ |
| R2               | bias resistor             | 22   | –    | 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   |                    |                |
| PDTA144WE   | SOT416        | SC-75  | 5D                 | PDTC144WE      |
| PDTA144WEF  | SOT490        | SC-89  | 2E                 | PDTC144WEF     |
| PDTA144WK   | SOT346        | SC-59  | 46                 | PDTC144WK      |
| PDTA144WM   | SOT883        | SC-101 | F8                 | PDTC144WM      |
| PDTA144WS   | SOT54 (TO-92) | SC-43  | TA144W             | PDTC144WS      |
| PDTA144WT   | SOT23         | –      | *43 <sup>(1)</sup> | PDTC144WT      |
| PDTA144WU   | SOT323        | SC-70  | *28 <sup>(1)</sup> | PDTC144WU      |

### 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                  |
| PDTA144WS  |                               | 1<br>2<br>3 | base<br>collector<br>emitter |
| PDTA144WE<br>PDTA144WEF<br>PDTA144WK<br>PDTA144WT<br>PDTA144WU |                               | 1<br>2<br>3 | base<br>emitter<br>collector |
| PDTA144WM  |                               | 1<br>2<br>3 | base<br>emitter<br>collector |

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#### ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION  | VERSION |
| PDTA144WE   | –       | plastic surface mounted package; 3 leads   | SOT416  |
| PDTA144WEF  | –       | plastic surface mounted package; 3 leads   | SOT490  |
| PDTA144WK   | –       | plastic surface mounted package; 3 leads   | SOT346  |
| PDTA144WM   | –       | leadless ultra small plastic package; 3 solder lands;<br>body 1.0 x 0.6 x 0.5 mm | SOT883  |
| PDTA144WS   | –       | plastic single-ended leaded (through hole) package; 3 leads                      | SOT54   |
| PDTA144WT   | –       | plastic surface mounted package; 3 leads   | SOT23   |
| PDTA144WU   | –       | 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>CE0</sub> | collector-emitter voltage     | open base                 | –    | –50  | V    |
| V <sub>EB0</sub> | emitter-base voltage          | open collector            | –    | –10  | V    |
| V <sub>I</sub>   | input voltage                 | positive                  | –    | +10  | V    |
|                  |                               | negative                  | –    | –40  | 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;  
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### 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   |      |

#### Note

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                                 | -    | -    | -110 | $\mu$ A    |
| h <sub>FE</sub>     | DC current gain                      | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -5 mA                               | 60   | -    | -    |            |
| 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> = -100 $\mu$ A; V <sub>CE</sub> = -5 V                        | -    | -1.7 | -1.2 | V          |
| V <sub>i(on)</sub>  | input-on voltage                     | I <sub>C</sub> = -2 mA; V <sub>CE</sub> = -0.3 V                             | -4   | -2.7 | -    | V          |
| R1                  | input resistor                       |  | 33   | 47   | 61   | k $\Omega$ |
| $\frac{R2}{R1}$     | resistor ratio                       |  | 0.37 | 0.47 | 0.57 |            |
| 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         |

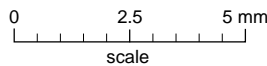
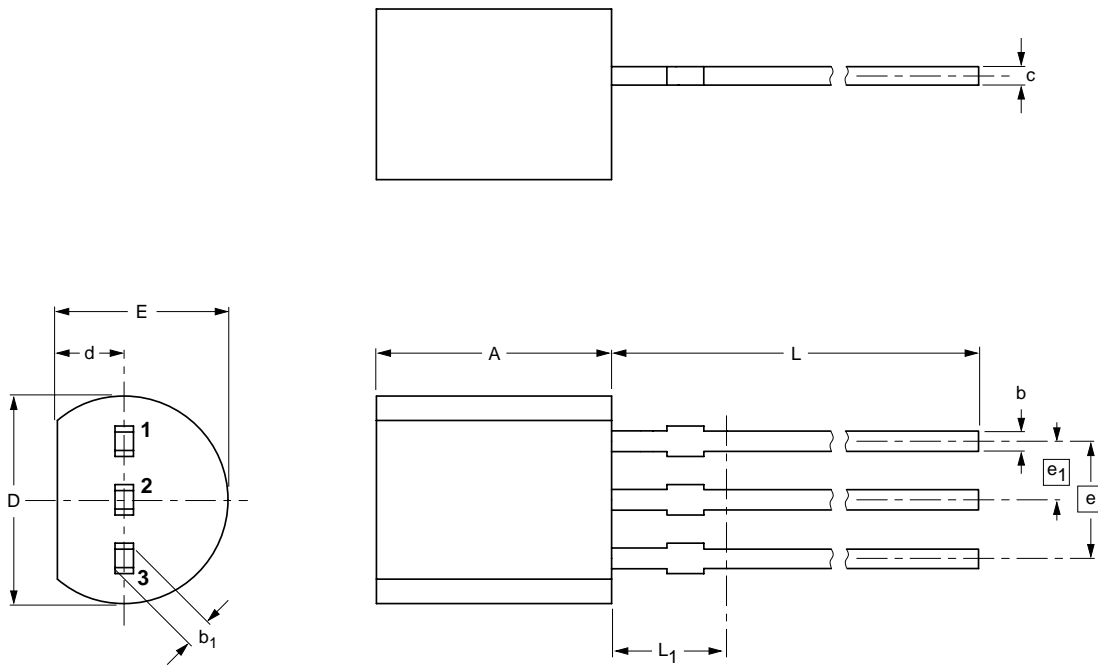
PNP resistor-equipped transistors;  
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PDTA144W series

PACKAGE OUTLINES

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.

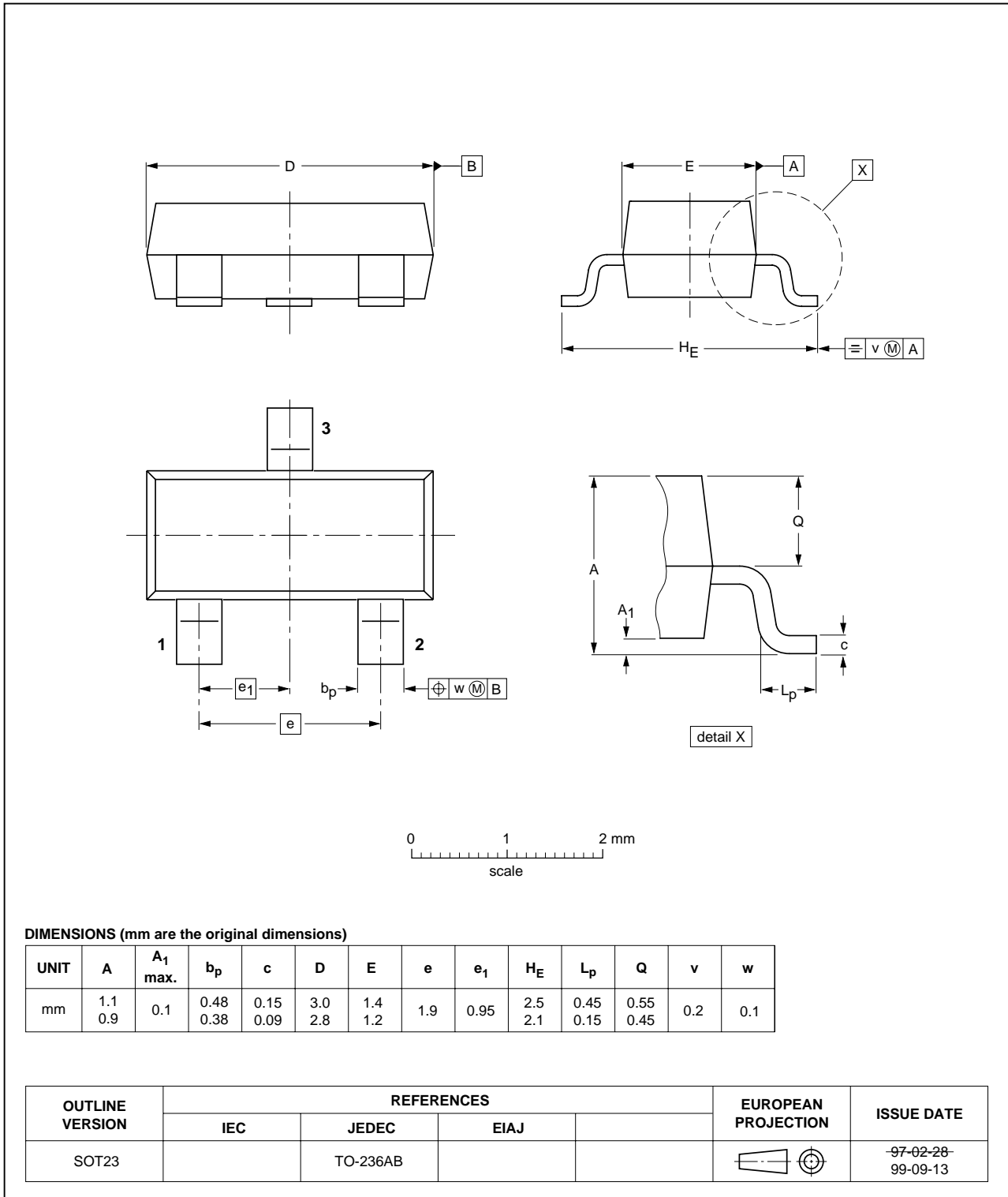
| OUTLINE<br>VERSION | REFERENCES |       |        | EUROPEAN<br>PROJECTION | ISSUE DATE                      |
|--------------------|------------|-------|--------|------------------------|---------------------------------|
|                    | IEC        | JEDEC | JEITA  |                        |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

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

PDTA144W series

Plastic surface mounted package; 3 leads

SOT23

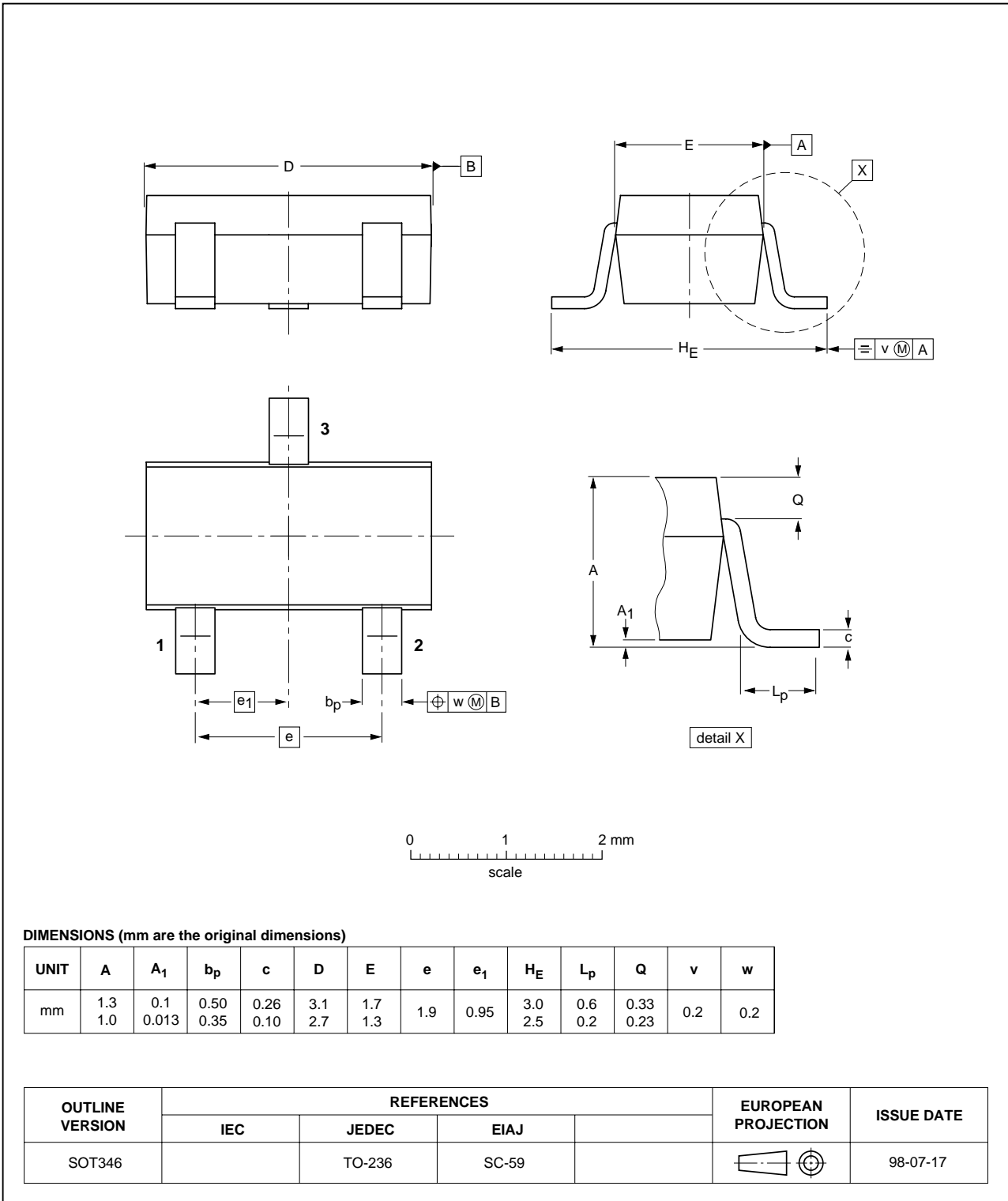


PNP resistor-equipped transistors;  
R1 = 47 kΩ, R2 = 22 kΩ

PDTA144W series

Plastic surface mounted package; 3 leads

SOT346



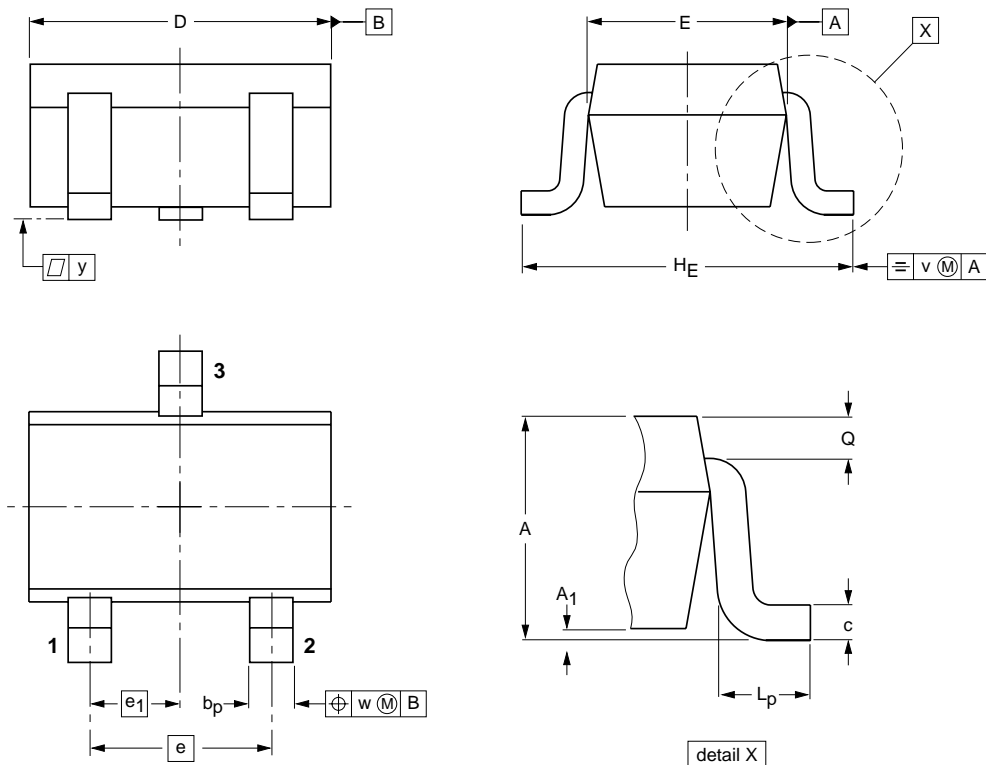


PNP resistor-equipped transistors;  
R1 = 47 kΩ, R2 = 22 kΩ

PDTA144W 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 |

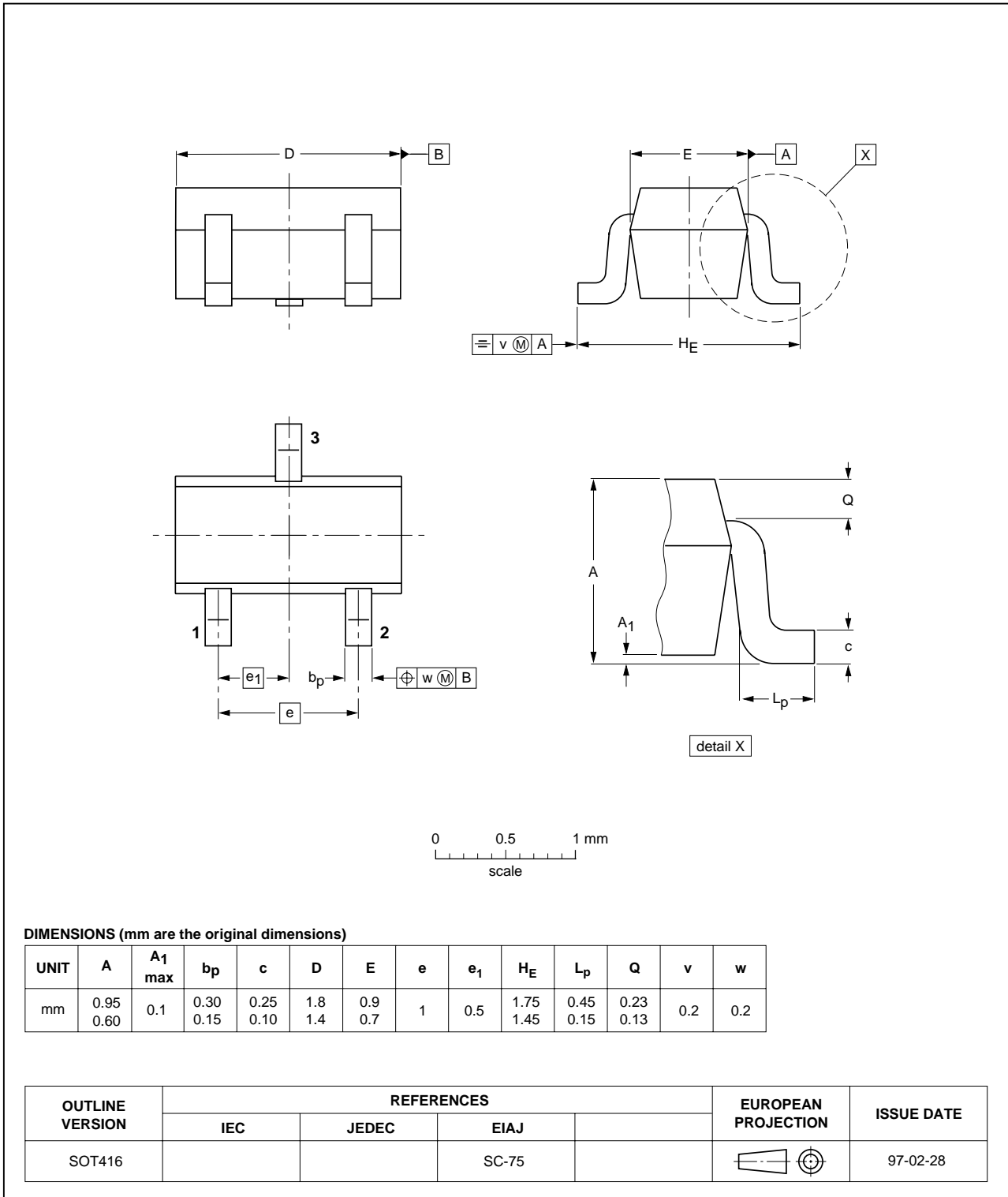
| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|------------|
|                    | IEC        | JEDEC | EIAJ  |  |                        |            |
| SOT323             |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

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

PDTA144W series

Plastic surface mounted package; 3 leads

SOT416

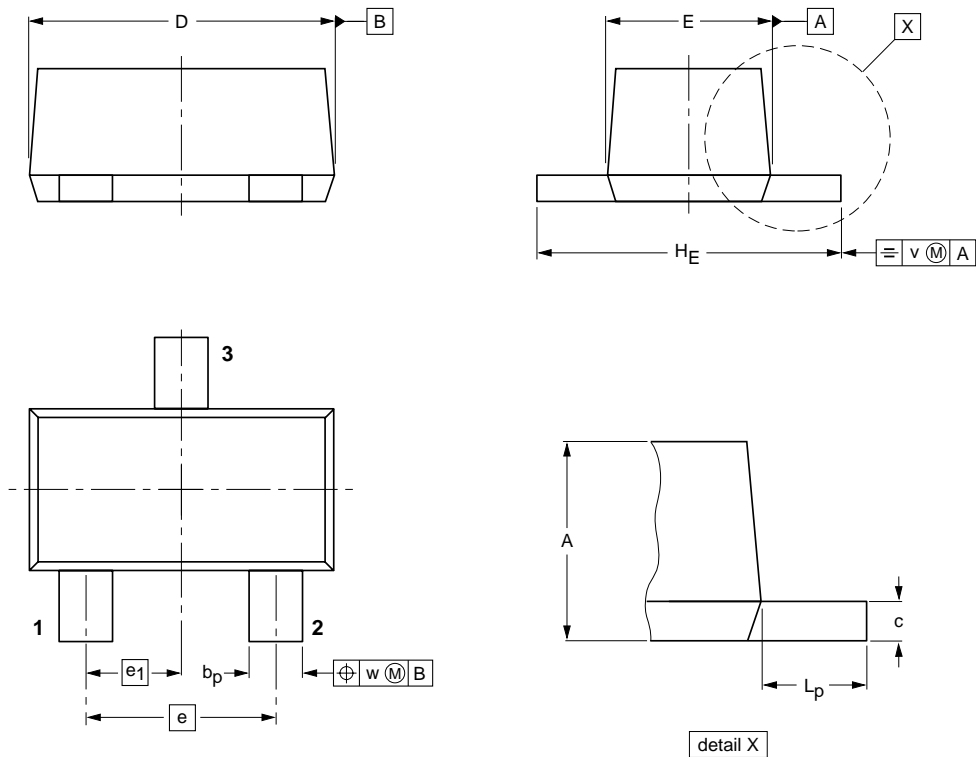


PNP resistor-equipped transistors;  
R1 = 47 kΩ, R2 = 22 kΩ

PDTA144W 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<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 |

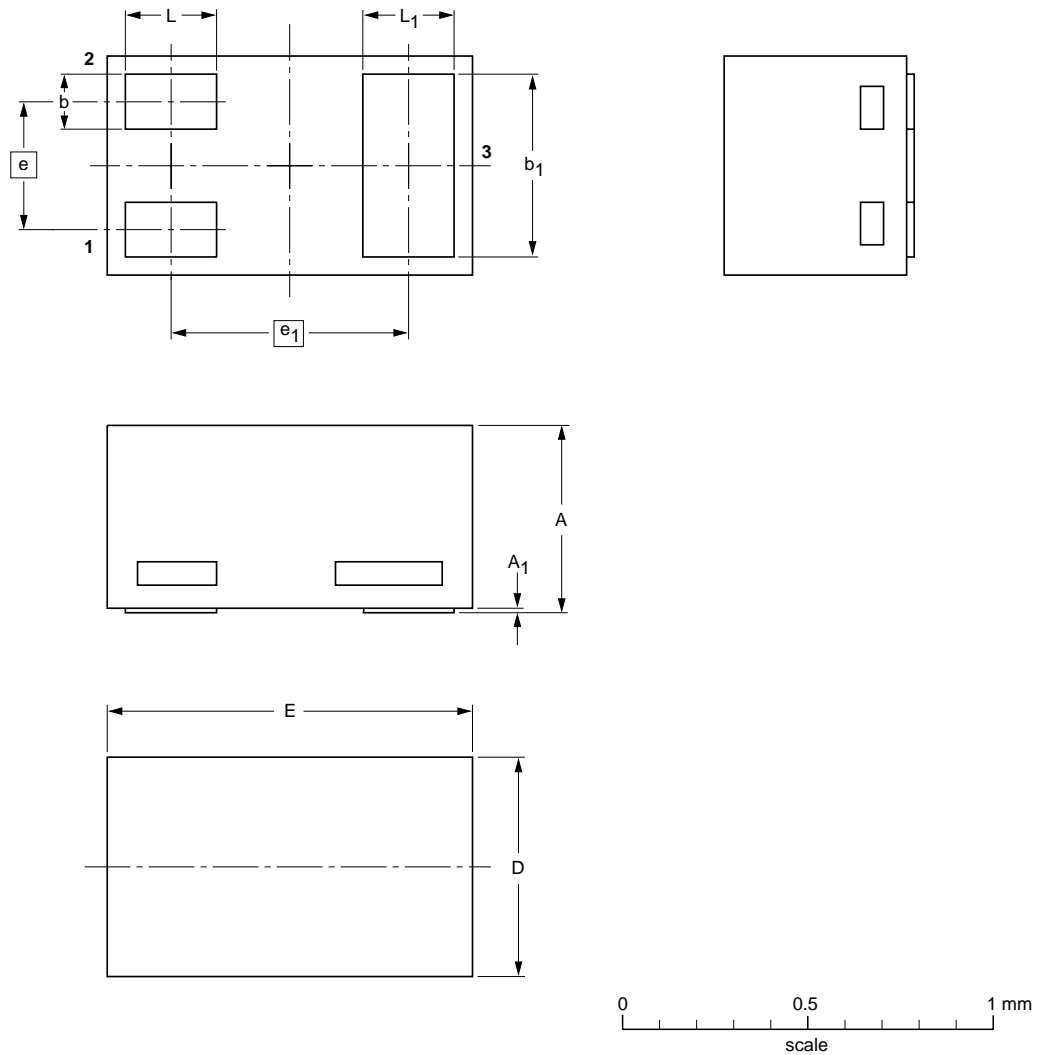
| OUTLINE VERSION | REFERENCES |       |       |  | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|--|---------------------|------------|
|                 | IEC        | JEDEC | EIAJ  |  |                     |            |
| SOT490          |            |       |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

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

PDTA144W 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 = 47 kΩ, R2 = 22 kΩ

PDTA144W 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.  |
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## **Contact information**

For additional information please visit <http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

For sales offices addresses send e-mail to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com).

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