

# DATA SHEET

**PEMB1; PUMB1**  
PNP/PNP resistor-equipped  
transistors; R1 = 22 k $\Omega$ , R2 = 22 k $\Omega$

Product specification  
Supersedes data of 2001 Sep 13

2003 Oct 15

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

**PEMB1; PUMB1**

**FEATURES**

- Built-in bias resistors
- Simplified circuit design
- Reduction of component count
- Reduced pick and place costs.

**APPLICATIONS**

- Low current peripheral drivers
- Replacement of general purpose transistors in digital applications.

**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   |
| TR1              | PNP                       | –    | –    | –    |
| TR2              | PNP                       | –    | –    | –    |
| R1               | bias resistor             | 22   | –    | kΩ   |
| R2               | bias resistor             | 22   | –    | kΩ   |

**DESCRIPTION**

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

**PRODUCT OVERVIEW**

| TYPE NUMBER | PACKAGE |       | MARKING CODE       | NPN/PNP COMPLEMENT | NPN/PNP COMPLEMENT |
|-------------|---------|-------|--------------------|--------------------|--------------------|
|             | PHILIPS | EIAJ  |                    |                    |                    |
| PEMB1       | SOT666  | –     | Z4                 | PEMD2              | PEMH1              |
| PUMB1       | SOT363  | SC-88 | B*3 <sup>(1)</sup> | PUMD2              | PUMH1              |

**Note**

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

**SIMPLIFIED OUTLINE, SYMBOL AND PINNING**

| TYPE NUMBER    | SIMPLIFIED OUTLINE AND SYMBOL                             | PINNING |               |
|----------------|---|---------|---------------|
|                |   | PIN     | DESCRIPTION   |
| PEMB1<br>PUMB1 | <p>Top view <span style="float: right;">MAM477</span></p> | 1       | emitter TR1   |
|                |   | 2       | base TR1      |
|                |   | 3       | collector TR2 |
|                |   | 4       | emitter TR2   |
|                |   | 5       | base TR2      |
|                |   | 6       | collector TR1 |

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#### ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION                              | VERSION |
| PEMB1       | –       | plastic surface mounted package; 6 leads | SOT666  |
| PUMB1       | –       | plastic surface mounted package; 6 leads | SOT363  |

#### LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL                | PARAMETER                     | CONDITIONS                              | MIN. | MAX. | UNIT             |
|-----------------------|-------------------------------|---|------|------|------------------|
| <b>Per transistor</b> |                               |   |      |      |                  |
| $V_{CBO}$             | 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                 |   | –    | +10  | V                |
|                       |                               |   | –    | –40  | V                |
| $I_o$                 | output current (DC)           |   | –    | –100 | mA               |
| $I_{CM}$              | peak collector current        |   | –    | –100 | mA               |
| $P_{tot}$             | total power dissipation       | $T_{amb} \leq 25\text{ }^\circ\text{C}$ |      |      |                  |
|                       |                               | note 1                                  | –    | 200  | mW               |
|                       | SOT363                        | note 1                                  | –    | 200  | mW               |
|                       | SOT666                        | notes 1 and 2                           | –    | 200  | mW               |
| $T_{stg}$             | storage temperature           |   | –65  | +150 | $^\circ\text{C}$ |
| $T_j$                 | junction temperature          |   | –    | 150  | $^\circ\text{C}$ |
| $T_{amb}$             | operating ambient temperature |   | –65  | +150 | $^\circ\text{C}$ |
| <b>Per device</b>     |                               |   |      |      |                  |
| $P_{tot}$             | total power dissipation       | $T_{amb} \leq 25\text{ }^\circ\text{C}$ |      |      |                  |
|                       |                               | note 1                                  | –    | 300  | mW               |
|                       |                               | notes 1 and 2                           | –    | 300  | mW               |
|                       | SOT363                        | note 1                                  | –    | 300  | mW               |
|                       | SOT666                        | notes 1 and 2                           | –    | 300  | mW               |

#### Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.
2. Reflow soldering is the only recommended soldering method.

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### THERMAL CHARACTERISTICS

| SYMBOL                | PARAMETER                                   | CONDITIONS               | VALUE | UNIT |
|-----------------------|---|--------------------------|-------|------|
| <b>Per transistor</b> |   |                          |       |      |
| R <sub>th j-a</sub>   | thermal resistance from junction to ambient | T <sub>amb</sub> ≤ 25 °C |       |      |
|                       | SOT363                                      | note 1                   | 625   | K/W  |
|                       | SOT666                                      | notes 1 and 2            | 625   | K/W  |
| <b>Per device</b>     |   |                          |       |      |
| R <sub>th j-a</sub>   | thermal resistance from junction to ambient | T <sub>amb</sub> ≤ 25 °C |       |      |
|                       | SOT363                                      | note 1                   | 416   | K/W  |
|                       | SOT666                                      | note 1                   | 416   | K/W  |

### Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.
2. Reflow soldering is the only recommended soldering method.

### 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                                | -    | -    | -100 | nA         |
| I <sub>CEO</sub>    | collector-emitter cut-off current | V <sub>CE</sub> = -30 V; I <sub>B</sub> = 0                                | -    | -    | -1   | $\mu$ A    |
|                     |                                   | V <sub>CE</sub> = -30 V; I <sub>B</sub> = 0; 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                                 | -    | -    | -180 | $\mu$ 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>  | 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                 | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 $\mu$ A                      | -    | -1.1 | -0.8 | V          |
| V <sub>i(on)</sub>  | input-on voltage                  | V <sub>CE</sub> = -0.3 V; I <sub>C</sub> = -5 mA                           | -2.5 | -1.7 | -    | V          |
| R1                  | input resistor                    |  | 15.4 | 22   | 28.6 | 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; V <sub>CB</sub> = -10 V;<br>f = 1 MHz | -    | -    | 3    | pF         |

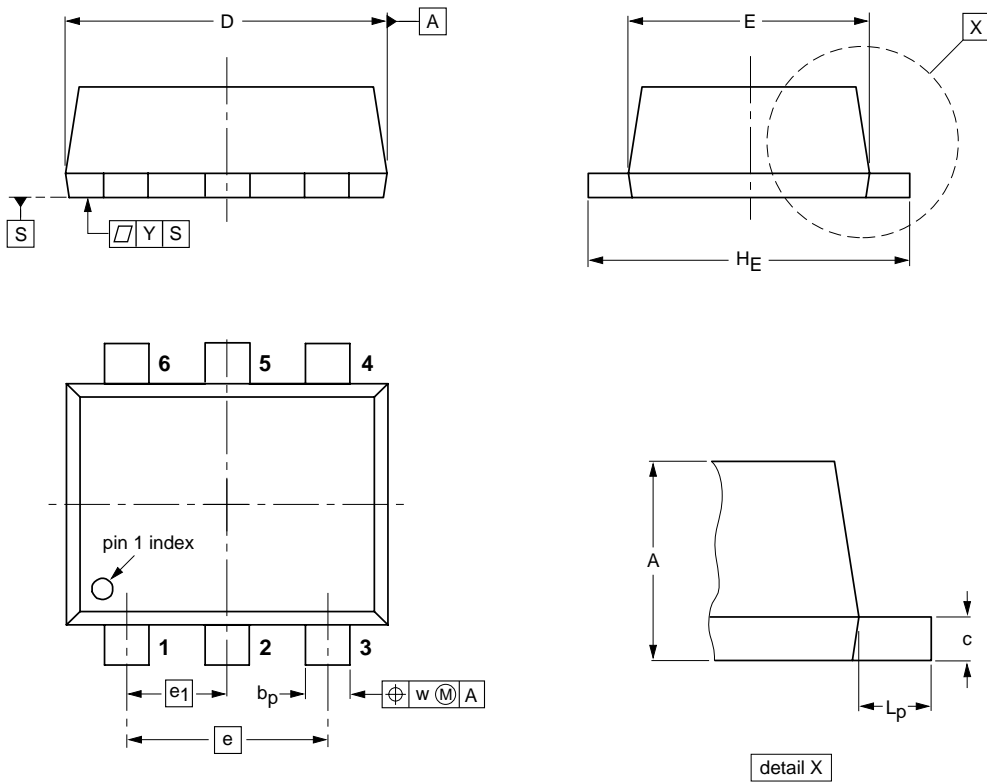
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PACKAGE OUTLINES

Plastic surface mounted package; 6 leads

SOT666



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> | w   | y   |
|------|------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|-----|-----|
| mm   | 0.6<br>0.5 | 0.27<br>0.17   | 0.18<br>0.08 | 1.7<br>1.5 | 1.3<br>1.1 | 1.0 | 0.5            | 1.7<br>1.5     | 0.3<br>0.1     | 0.1 | 0.1 |

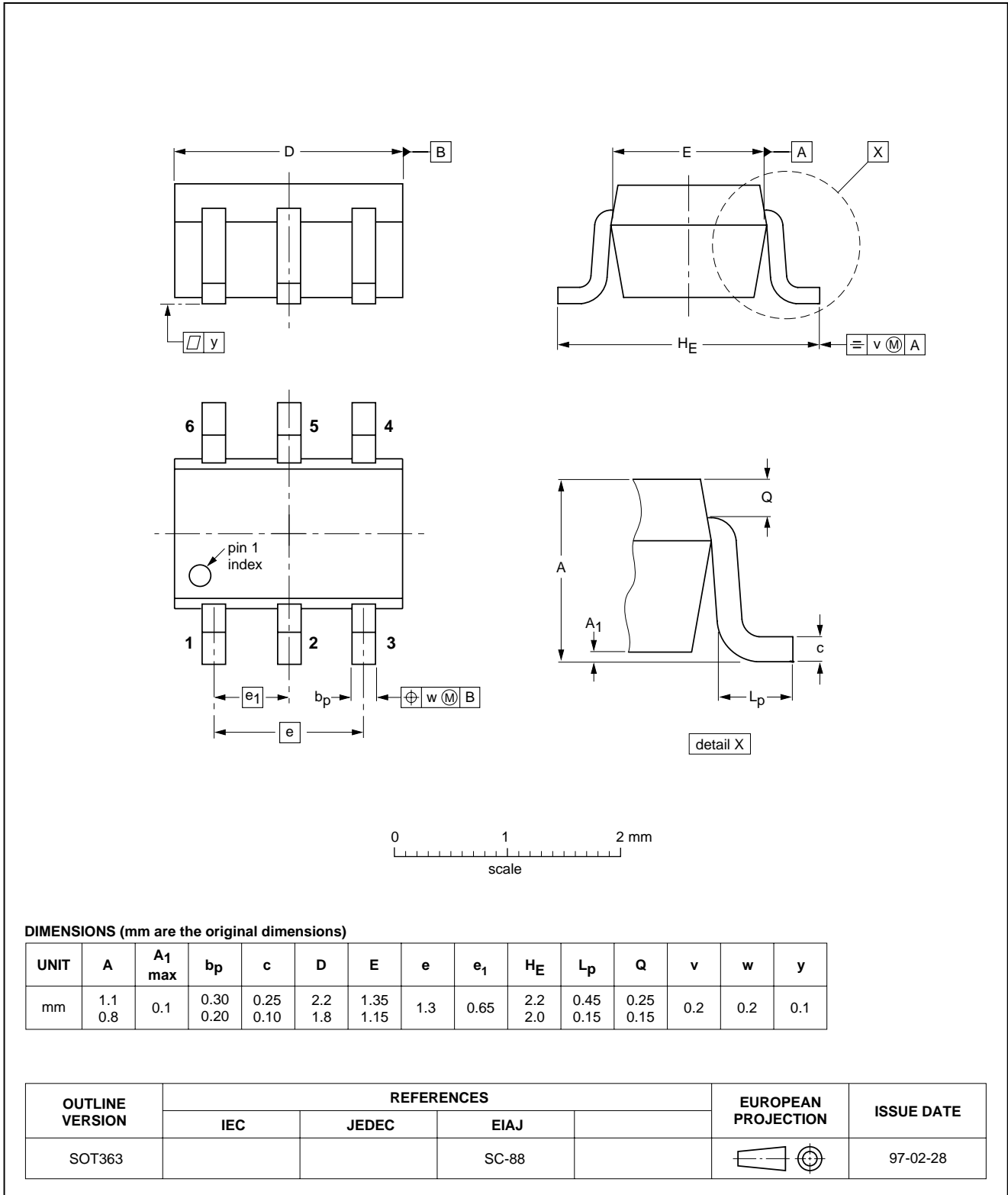
| OUTLINE VERSION | REFERENCES |       |      |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|-------|------|--|---------------------|----------------------|
|                 | IEC        | JEDEC | EIAJ |  |                     |                      |
| SOT666          |            |       |      |  |                     | 01-01-04<br>01-08-27 |

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R1 = 22 kΩ, R2 = 22 kΩ

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#### 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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**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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