

DATA SHEET

PIMH9; PUMH9; PEMH9
NPN/NPN resistor-equipped
transistors; $R1 = 10 \text{ k}\Omega$, $R2 = 47 \text{ k}\Omega$

Product specification
Supersedes data of 2003 Sep 15

2004 Apr 14

NPN/NPN resistor-equipped transistors;
R1 = 10 kΩ, R2 = 47 kΩ

PIMH9; PUMH9; PEMH9

FEATURES

- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces 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 |
| TR1 | NPN | – | – | – |
| TR2 | NPN | – | – | – |
| R1 | bias resistor | 10 | – | kΩ |
| R2 | bias resistor | 47 | – | kΩ |

DESCRIPTION

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

PRODUCT OVERVIEW

| TYPE NUMBER | PACKAGE | | MARKING CODE | PNP/PNP COMPLEMENT | NPN/PNP COMPLEMENT |
|-------------|---------|-------|--------------------|--------------------|--------------------|
| | PHILIPS | EIAJ | | | |
| PEMH9 | SOT666 | – | H9 | PEMB9 | PEMD9 |
| PIMH9 | SOT457 | SC-74 | H9 | – | – |
| PUMH9 | SOT363 | SC-88 | H*9 ⁽¹⁾ | PUMB9 | PUMD9 |

Note

- * = 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 |
| PEMH9 PIMH9 PUMH9 | <p>Top view MHC049</p> | 1 | emitter TR1 |
| | | 2 | base TR1 |
| | | 3 | collector TR2 |
| | | 4 | emitter TR2 |
| | | 5 | base TR2 |
| | | 6 | collectorTR1 |

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ORDERING INFORMATION

| TYPE NUMBER | PACKAGE | | |
|-------------|---------|--|---------|
| | NAME | DESCRIPTION | VERSION |
| PEMH9 | – | plastic surface mounted package; 6 leads | SOT666 |
| PIMH9 | – | plastic surface mounted package; 6 leads | SOT457 |
| PUMH9 | – | 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 | |
|-----------------------|-------------------------------|--------------------------|--------|------|------|----|
| Per transistor | | | | | | |
| 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 | | – | +40 | V | |
| | | | – | –10 | V | |
| I _o | output current | | – | 100 | mA | |
| I _{CM} | peak collector current | | – | 100 | mA | |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | | | | |
| | | SOT363 | note 1 | – | 200 | mW |
| | | SOT457 | note 1 | – | 300 | mW |
| | SOT666 | notes 1 and 2 | – | 200 | mW | |
| T _{stg} | storage temperature | | –65 | +150 | °C | |
| T _j | junction temperature | | – | 150 | °C | |
| T _{amb} | operating ambient temperature | | –65 | +150 | °C | |
| Per device | | | | | | |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | | | | |
| | | SOT363 | note 1 | – | 300 | mW |
| | | SOT457 | note 1 | – | 600 | 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 |
|-----------------------|---|--------------------------|-------|------|
| Per transistor | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | T _{amb} ≤ 25 °C | | |
| | SOT363 | note 1 | 625 | K/W |
| | SOT457 | note 1 | 417 | K/W |
| | SOT666 | notes 1 and 2 | 625 | K/W |
| Per device | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | T _{amb} ≤ 25 °C | | |
| | SOT363 | note 1 | 416 | K/W |
| | SOT457 | note 1 | 208 | K/W |
| | SOT666 | notes 1 and 2 | 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_{amb} = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------------|--------------------------------------|---|------|------|------|------------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 50 V; I _E = 0 A | – | – | 100 | nA |
| I _{CEO} | collector-emitter cut-off current | V _{CE} = 30 V; I _B = 0 A | – | – | 1 | μ A |
| | | V _{CE} = 30 V; I _B = 0 A; T _j = 150 °C | – | – | 50 | μ A |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 A | – | – | 150 | μ A |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 5 mA | 100 | – | – | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 5 mA; I _B = 0.25 mA | – | – | 100 | mV |
| V _{i(off)} | input-off voltage | V _{CE} = 5 V; I _C = 100 μ A | – | 0.7 | 0.5 | V |
| V _{i(on)} | input-on voltage | V _{CE} = 0.3 V; I _C = 1 mA | 1.4 | 0.8 | – | V |
| R1 | input resistor | | 7 | 10 | 13 | k Ω |
| $\frac{R2}{R1}$ | resistor ratio | | 3.7 | 4.7 | 5.7 | |
| C _c | collector capacitance | V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz | – | – | 2.5 | pF |

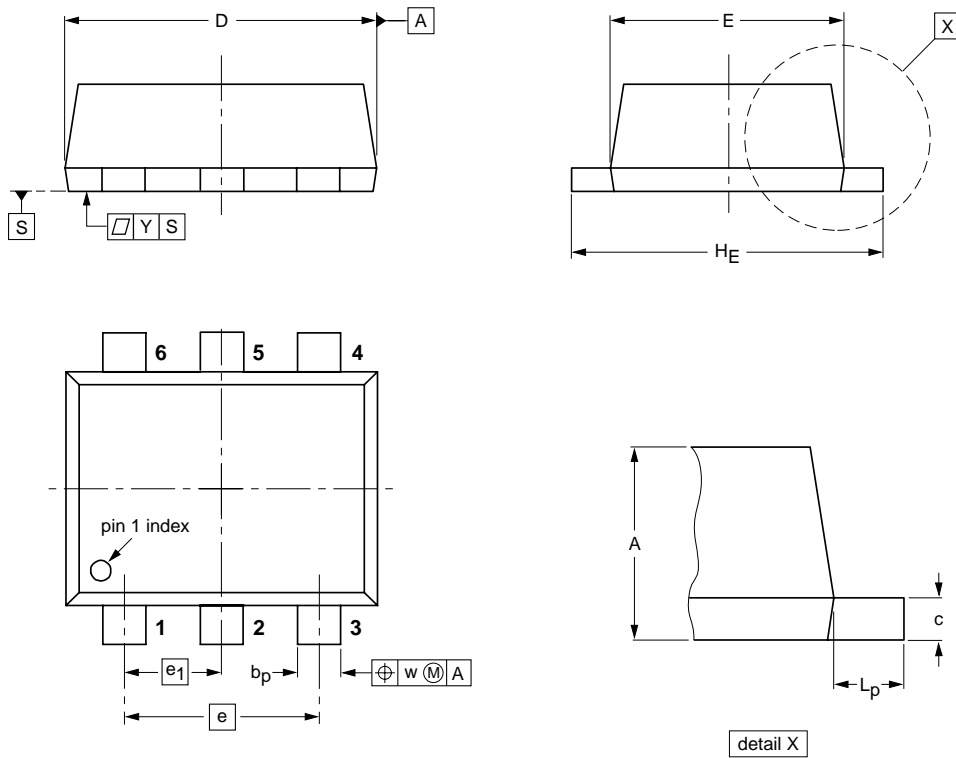
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PACKAGE OUTLINES

Plastic surface mounted package; 6 leads

SOT666



DIMENSIONS (mm are the original dimensions)

| UNIT | A | b_p | c | D | E | e | e_1 | H_E | L_p | w | y |
|------|------------|--------------|--------------|------------|------------|-----|-------|------------|------------|-----|-----|
| mm | 0.6 0.5 | 0.27 0.17 | 0.18 0.08 | 1.7 1.5 | 1.3 1.1 | 1.0 | 0.5 | 1.7 1.5 | 0.3 0.1 | 0.1 | 0.1 |

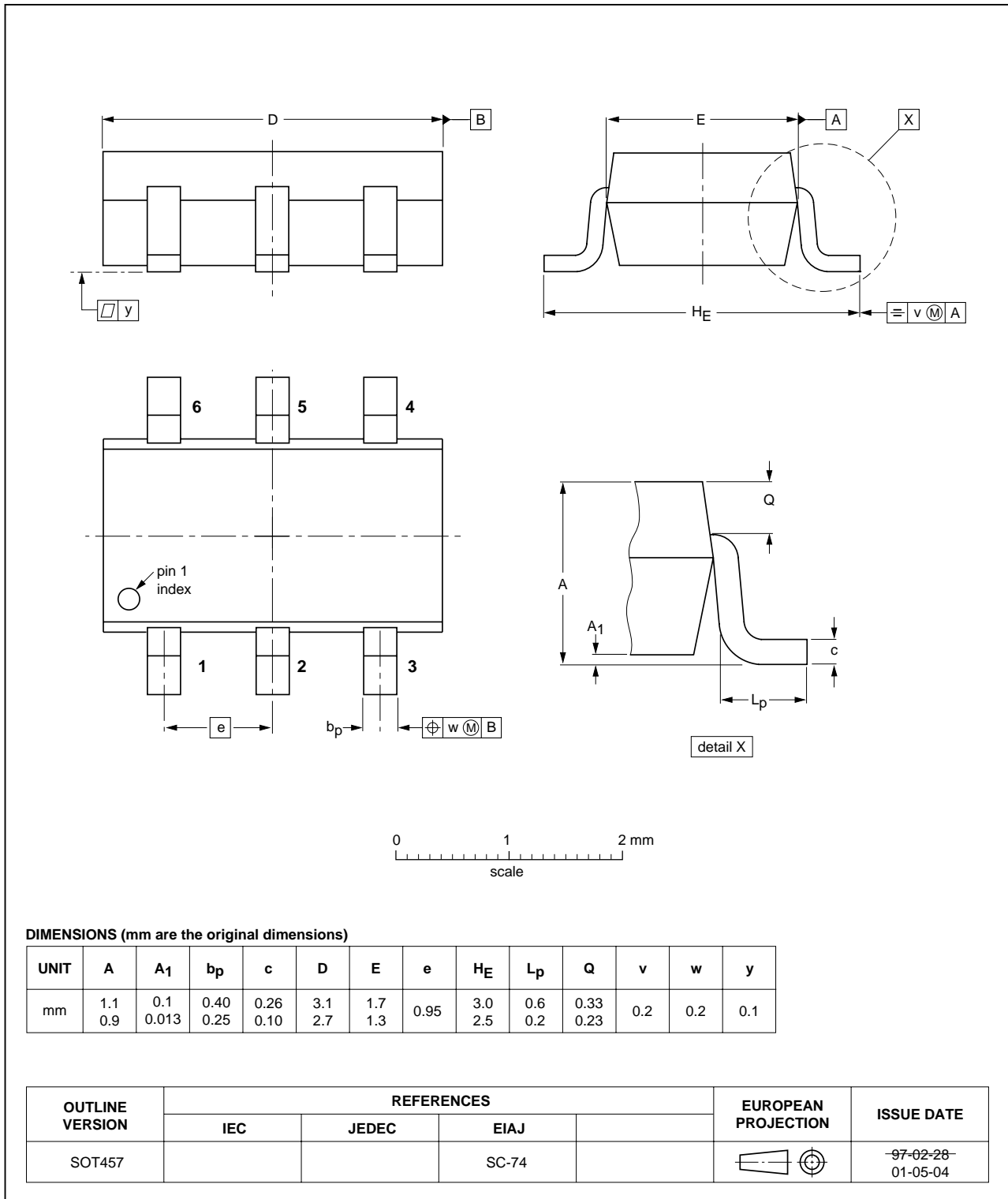
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | |
| SOT666 | | | | | 01-01-04 01-08-27 |

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SOT457

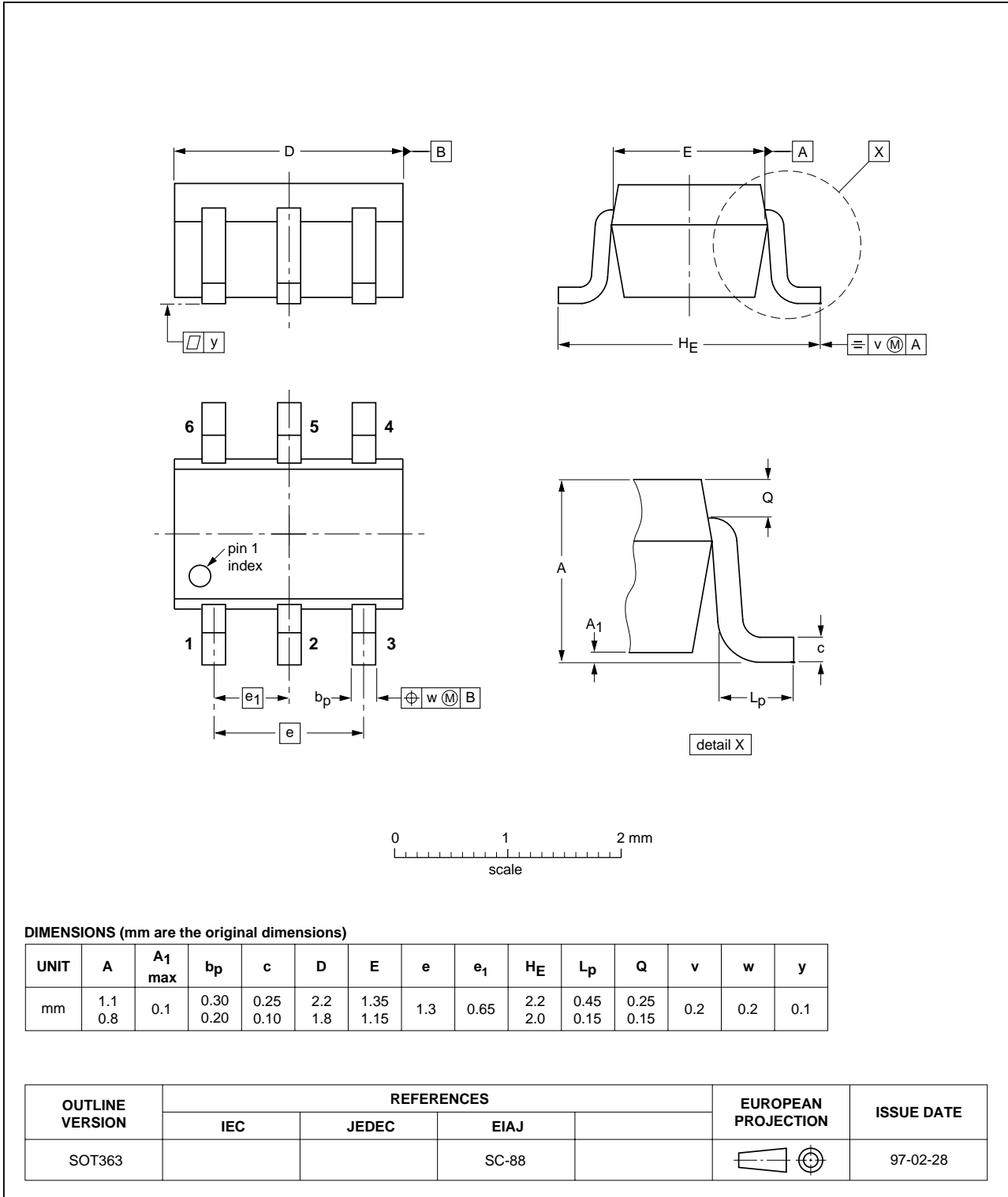


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DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾⁽³⁾ | 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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Notes

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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

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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