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Kind regards,

Team Nexperia

# PEMD30; PUMD30

NPN/PNP double resistor-equipped transistors;  
R1 = 2.2 k $\Omega$ , R2 = open

Rev. 01 — 31 March 2006

Product data sheet

## 1. Product profile

### 1.1 General description

NPN/PNP double Resistor-Equipped Transistors (RET) in Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

| Type number | Package |       | PNP/PNP complement | NPN/PNP complement |
|-------------|---------|-------|--------------------|--------------------|
|             | Philips | JEITA |                    |                    |
| PEMD30      | SOT666  | -     | PEMB30             | PEMH30             |
| PUMD30      | SOT363  | SC-88 | PUMB30             | PUMH30             |

### 1.2 Features

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs

### 1.3 Applications

- Low current peripheral driver
- Control of IC inputs
- Cost-saving alternative for BC847BPN and BC847BVN
- Switching loads

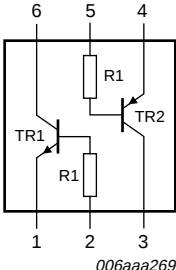
### 1.4 Quick reference data

Table 2. Quick reference data

| Symbol                                                        | Parameter                 | Conditions | Min  | Typ | Max  | Unit       |
|---------------------------------------------------------------|---------------------------|------------|------|-----|------|------------|
| Per transistor; for the PNP transistor with negative polarity |                           |            |      |     |      |            |
| V <sub>CEO</sub>                                              | collector-emitter voltage | open base  | -    | -   | 50   | V          |
| I <sub>O</sub>                                                | output current            |            | -    | -   | 100  | mA         |
| R1                                                            | bias resistor 1 (input)   |            | 1.54 | 2.2 | 2.86 | k $\Omega$ |

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2. Pinning information

| Table 3. Pinning |                        |                                                                                                  |                                                                                                  |
|------------------|------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Pin              | Description            | Simplified outline                                                                               | Symbol                                                                                           |
| 1                | GND (emitter) TR1      | <br>001aab555 | <br>006aaa269 |
| 2                | input (base) TR1       |                                                                                                  |                                                                                                  |
| 3                | output (collector) TR2 |                                                                                                  |                                                                                                  |
| 4                | GND (emitter) TR2      |                                                                                                  |                                                                                                  |
| 5                | input (base) TR2       |                                                                                                  |                                                                                                  |
| 6                | output (collector) TR1 |                                                                                                  |                                                                                                  |

3. Ordering information

| Table 4. Ordering information |         |                                          |         |
|-------------------------------|---------|------------------------------------------|---------|
| Type number                   | Package |                                          |         |
|                               | Name    | Description                              | Version |
| PEMD30                        | -       | plastic surface-mounted package; 6 leads | SOT666  |
| PUMD30                        | SC-88   | plastic surface-mounted package; 6 leads | SOT363  |

4. Marking

| Table 5. Marking codes |                             |
|------------------------|-----------------------------|
| Type number            | Marking code <sup>[1]</sup> |
| PEMD30                 | 2U                          |
| PUMD30                 | *B3                         |

[1] \* = -: made in Hong Kong  
\* = p: made in Hong Kong  
\* = t: made in Malaysia  
\* = W: made in China

## 5. Limiting values

**Table 6. Limiting values**

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

| Symbol                                                               | Parameter                 | Conditions                             | Min    | Max  | Unit |
|----------------------------------------------------------------------|---------------------------|----------------------------------------|--------|------|------|
| <b>Per transistor; for the PNP transistor with negative polarity</b> |                           |                                        |        |      |      |
| 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            |                                        | -      | 100  | mA   |
| I <sub>CM</sub>                                                      | peak collector current    | single pulse;<br>t <sub>p</sub> ≤ 1 ms | -      | 100  | mA   |
| P <sub>tot</sub>                                                     | total power dissipation   | T <sub>amb</sub> ≤ 25 °C               |        |      |      |
|                                                                      | SOT363                    |                                        | [1]    | 200  | mW   |
|                                                                      | SOT666                    |                                        | [1][2] | 200  | mW   |
| <b>Per device</b>                                                    |                           |                                        |        |      |      |
| P <sub>tot</sub>                                                     | total power dissipation   | T <sub>amb</sub> ≤ 25 °C               |        |      |      |
|                                                                      | SOT363                    |                                        | [1]    | 300  | mW   |
|                                                                      | SOT666                    |                                        | [1][2] | 300  | mW   |
| T <sub>stg</sub>                                                     | storage temperature       |                                        | -65    | +150 | °C   |
| T <sub>j</sub>                                                       | junction temperature      |                                        | -      | 150  | °C   |
| T <sub>amb</sub>                                                     | ambient temperature       |                                        | -65    | +150 | °C   |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

| Symbol                | Parameter                                   | Conditions  | Min    | Typ | Max | Unit |
|-----------------------|---------------------------------------------|-------------|--------|-----|-----|------|
| <b>Per transistor</b> |                                             |             |        |     |     |      |
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient | in free air |        |     |     |      |
|                       | SOT363                                      |             | [1]    | -   | 625 | K/W  |
|                       | SOT666                                      |             | [1][2] | -   | 625 | K/W  |
| <b>Per device</b>     |                                             |             |        |     |     |      |
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient | in free air |        |     |     |      |
|                       | SOT363                                      |             | [1]    | -   | 416 | K/W  |
|                       | SOT666                                      |             | [1][2] | -   | 416 | K/W  |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

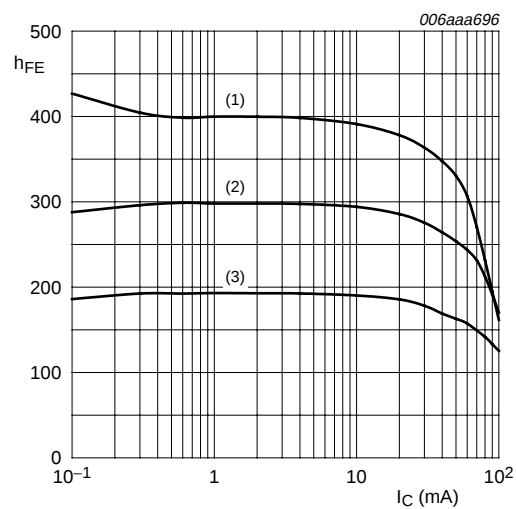
[2] Reflow soldering is the only recommended soldering method.

## 7. Characteristics

**Table 8. Characteristics**

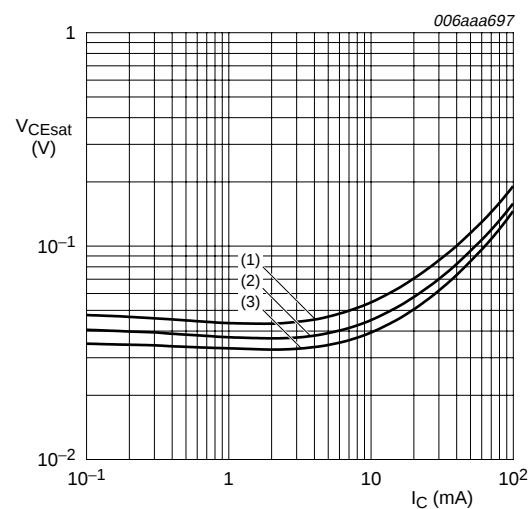
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| Symbol                                                               | Parameter                            | Conditions                                                                  | Min  | Typ | Max  | Unit          |
|----------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------|------|-----|------|---------------|
| <b>Per transistor; for the PNP transistor with negative polarity</b> |                                      |                                                                             |      |     |      |               |
| $I_{CBO}$                                                            | collector-base cut-off current       | $V_{CB} = 50\text{ V}; I_E = 0\text{ A}$                                    | -    | -   | 100  | nA            |
| $I_{CEO}$                                                            | collector-emitter cut-off current    | $V_{CE} = 30\text{ V}; I_B = 0\text{ A}$                                    | -    | -   | 1    | $\mu\text{A}$ |
|                                                                      |                                      | $V_{CE} = 30\text{ V}; I_B = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$ | -    | -   | 50   | $\mu\text{A}$ |
| $I_{EBO}$                                                            | emitter-base cut-off current         | $V_{EB} = 5\text{ V}; I_C = 0\text{ A}$                                     | -    | -   | 100  | nA            |
| $h_{FE}$                                                             | DC current gain                      | $V_{CE} = 5\text{ V}; I_C = 20\text{ mA}$                                   | 30   | -   | -    |               |
| $V_{CEsat}$                                                          | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$                                   | -    | -   | 150  | mV            |
| R1                                                                   | bias resistor 1 (input)              |                                                                             | 1.54 | 2.2 | 2.86 | k $\Omega$    |
| $C_c$                                                                | collector capacitance                | $V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$            |      |     |      |               |
|                                                                      | TR1 (NPN)                            |                                                                             | -    | -   | 2.5  | pF            |
|                                                                      | TR2 (PNP)                            |                                                                             | -    | -   | 3    | pF            |



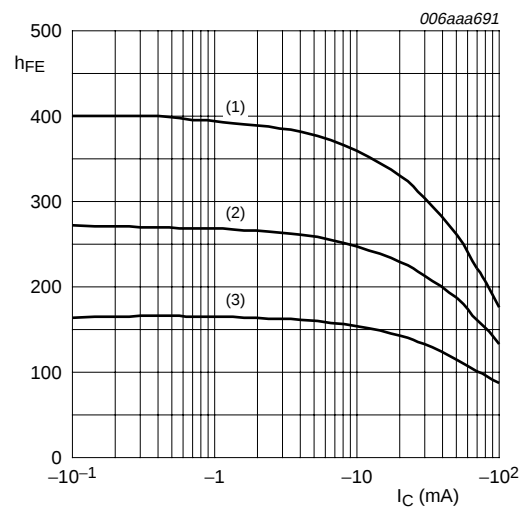
$V_{CE} = 5\text{ V}$   
(1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 1. TR1 (NPN): DC current gain as a function of collector current; typical values



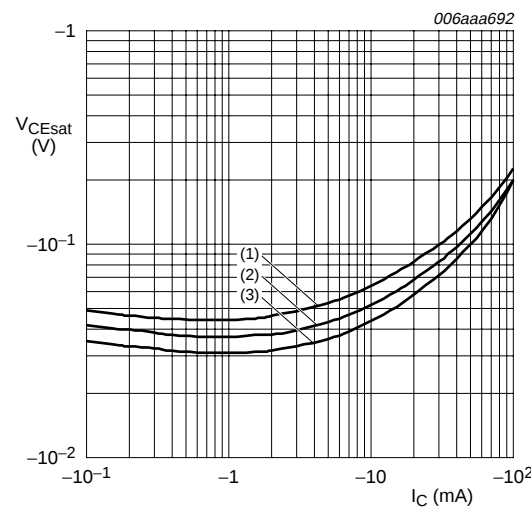
$I_C/I_B = 20$   
(1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 2. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = -5\text{ V}$   
(1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

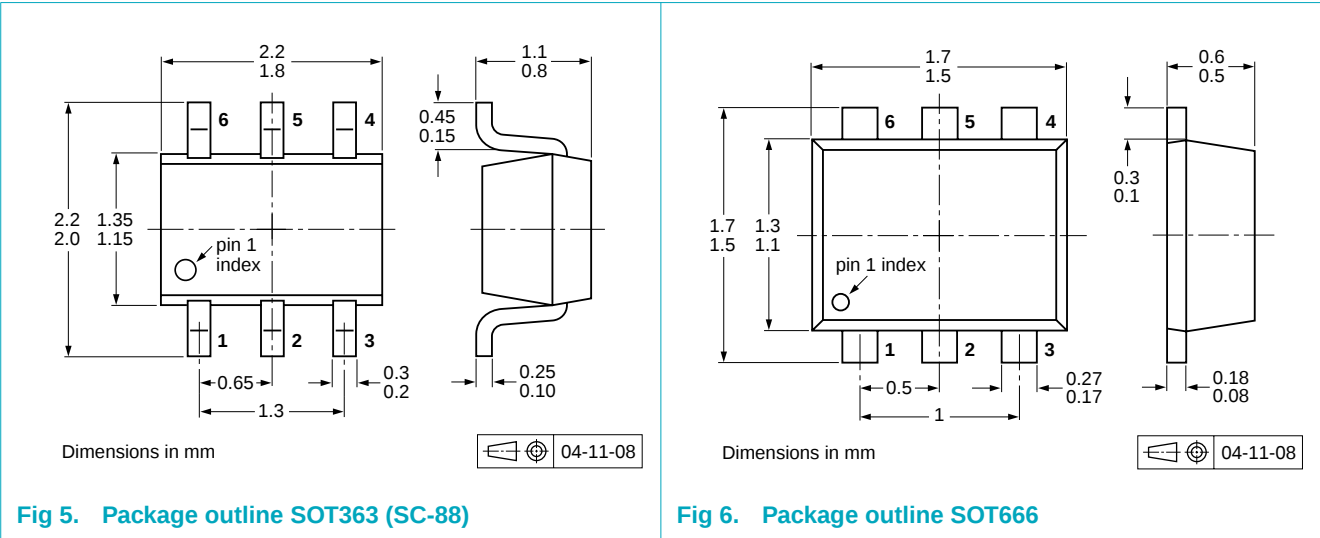
Fig 3. TR2 (PNP): DC current gain as a function of collector current; typical values



$I_C/I_B = 20$   
(1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 4. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

8. Package outline



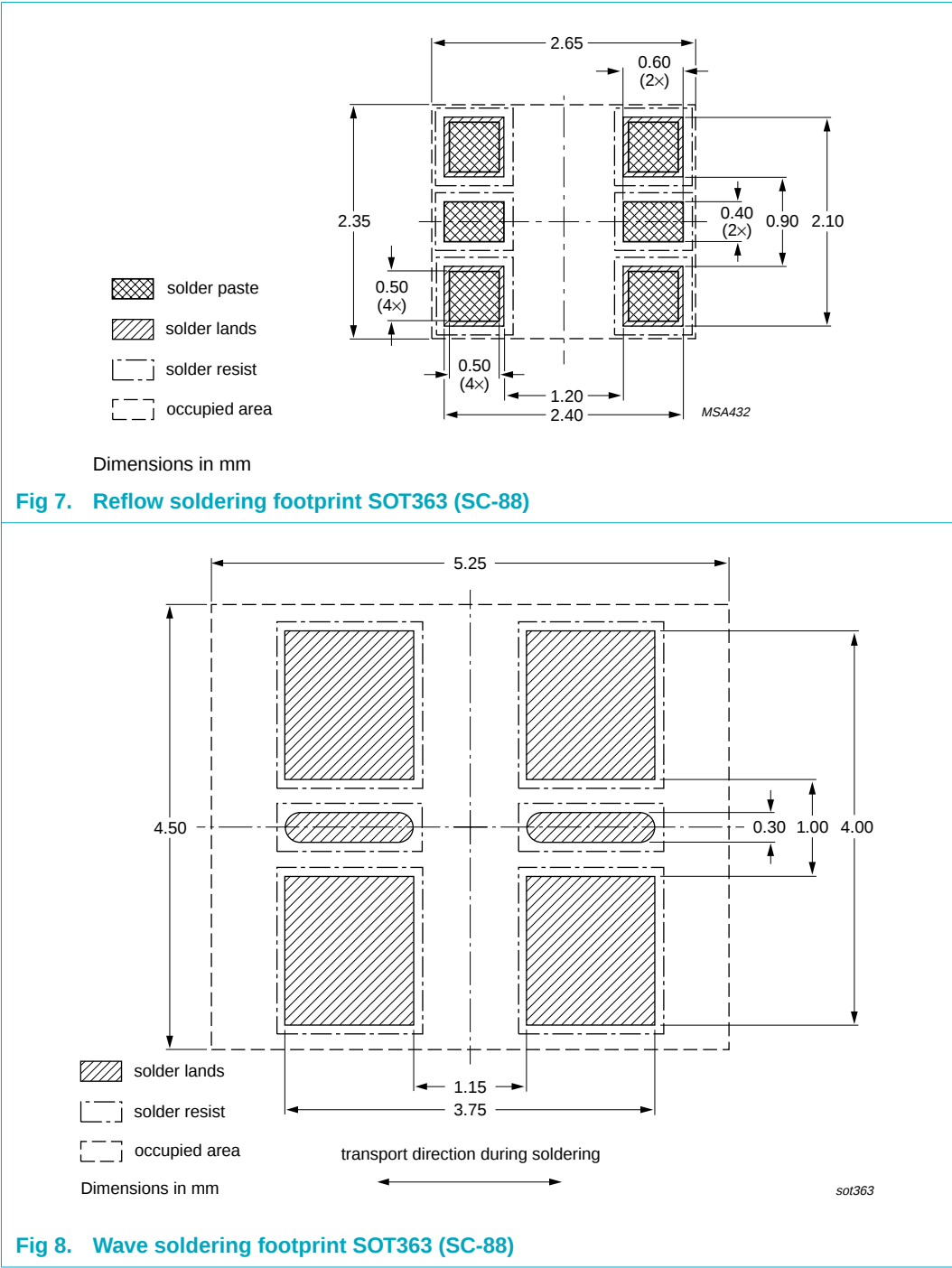
9. Packing information

Table 9. Packing methods  
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

| Type number | Package | Description                                       | Packing quantity |      |      |       |
|-------------|---------|---------------------------------------------------|------------------|------|------|-------|
|             |         |                                                   | 3000             | 4000 | 8000 | 10000 |
| PEMD30      | SOT666  | 2 mm pitch, 8 mm tape and reel                    | -                | -    | -315 | -     |
|             |         | 4 mm pitch, 8 mm tape and reel                    | -                | -115 | -    | -     |
| PUMD30      | SOT363  | 4 mm pitch, 8 mm tape and reel; T1 <sup>[2]</sup> | -115             | -    | -    | -135  |
|             |         | 4 mm pitch, 8 mm tape and reel; T2 <sup>[3]</sup> | -125             | -    | -    | -165  |

[1] For further information and the availability of packing methods, see [Section 13](#).  
[2] T1: normal taping  
[3] T2: reverse taping

10. Soldering





11. Revision history

Table 10. Revision history

| Document ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PEMD30_PUMD30_1 | 20060331     | Product data sheet | -             | -          |

## 12. Legal information

### 12.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition                                                                            |
|-----------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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