

# PEMB24; PUMB24

PNP/PNP resistor-equipped transistors;  
R1 = 100 k $\Omega$ , R2 = 100 k $\Omega$

Rev. 01 — 18 February 2005

Product data sheet

## 1. Product profile

### 1.1 General description

PNP/PNP resistor-equipped transistors.

Table 1: Product overview

Type number	Package		NPN/PNP complement	NPN/PNP complement
	Philips	JEITA		
PEMB24	SOT666	-	PEMD24	PEMH24
PUMB24	SOT363	SC-88	PUMD24	PUMH24

### 1.2 Features

- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place cost

### 1.3 Applications

- Low current peripheral driver
- Control of IC inputs
- Replacement of general-purpose transistors in digital applications

### 1.4 Quick reference data

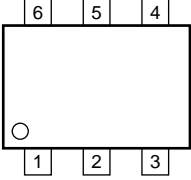
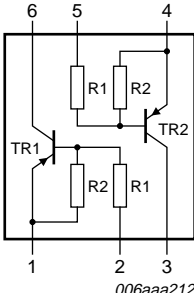
Table 2: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	-50	V
I <sub>O</sub>	output current (DC)		-	-	-20	mA
R1	bias resistor 1 (input)		70	100	130	k $\Omega$
R2/R1	bias resistor ratio		0.8	1	1.2	

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## 2. Pinning information

Table 3: Pinning

Pin	Description	Simplified outline	Symbol
1	GND (emitter) TR1	 <p>001aab555</p>	 <p>006aaa212</p>
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
PEMB24	-	plastic surface mounted package; 6 leads	SOT666
PUMB24	SC-88	plastic surface mounted package; 6 leads	SOT363

## 4. Marking

Table 5: Marking codes

Type number	Marking code <sup>[1]</sup>
PEMB24	6M
PUMB24	T7*

- [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</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	-	-10	V
V <sub>I</sub>	input voltage				
	positive		-	+10	V
	negative		-	-40	V
I <sub>O</sub>	output current (DC)		-	-20	mA
I <sub>CM</sub>	peak collector current		-	-100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C			
	SOT363		[1] -	200	mW
	SOT666		[1] [2] -	200	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
<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

[1] Device mounted on an FR4 printed-circuit board, single-sided copper, 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	T <sub>amb</sub> ≤ 25 °C				
	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	T <sub>amb</sub> ≤ 25 °C				
	SOT363		[1] -	-	416	K/W
	SOT666		[1] [2] -	-	416	K/W

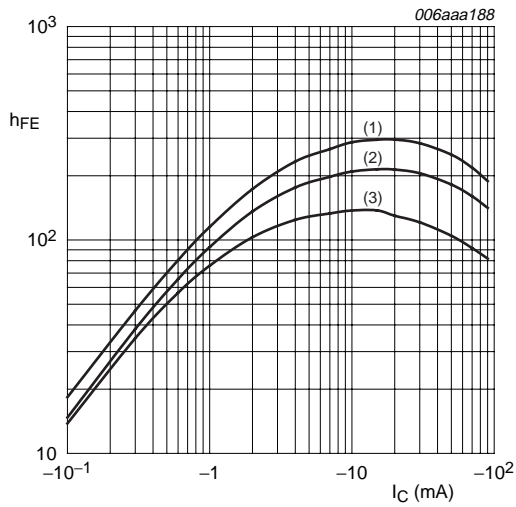
[1] Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.

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

## 7. Characteristics

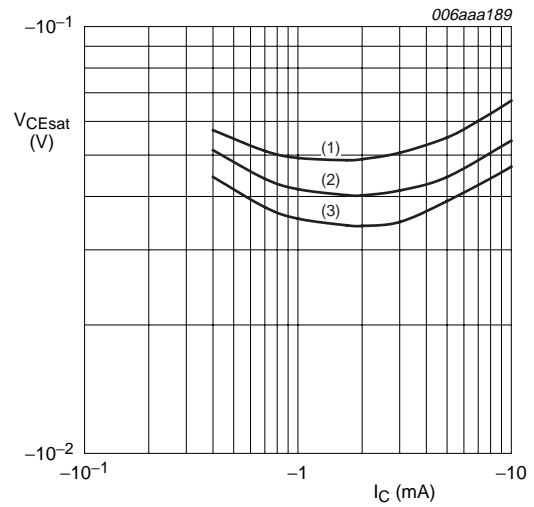
**Table 8: Characteristics**
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
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	-	-	-50	$\mu$ A
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -5 mA	80	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -5 mA; I <sub>B</sub> = -0.25 mA	-	-	-150	mV
V <sub>I(off)</sub>	off-state input voltage	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 $\mu$ A	-	-1.2	-0.5	V
V <sub>I(on)</sub>	on-state input voltage	V <sub>CE</sub> = -0.3 V; I <sub>C</sub> = -1 mA	-3	-1.6	-	V
R1	bias resistor 1 (input)		70	100	130	k $\Omega$
R2/R1	bias resistor ratio		0.8	1	1.2	
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -10 V; I <sub>E</sub> = i <sub>e</sub> = 0 A; f = 1 MHz	-	-	2.5	pF



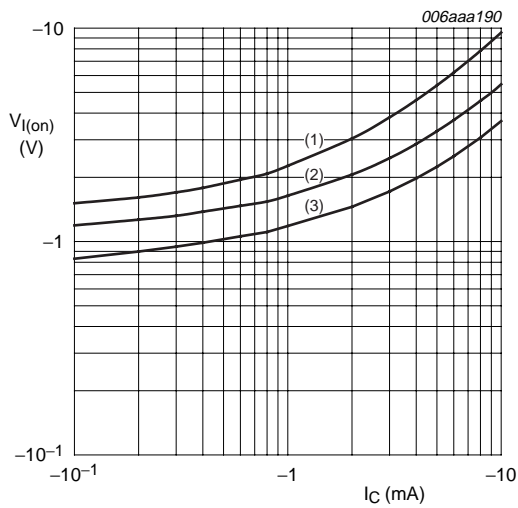
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = 150 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^\circ\text{C}$

**Fig 1. DC current gain as a function of collector current; typical values**



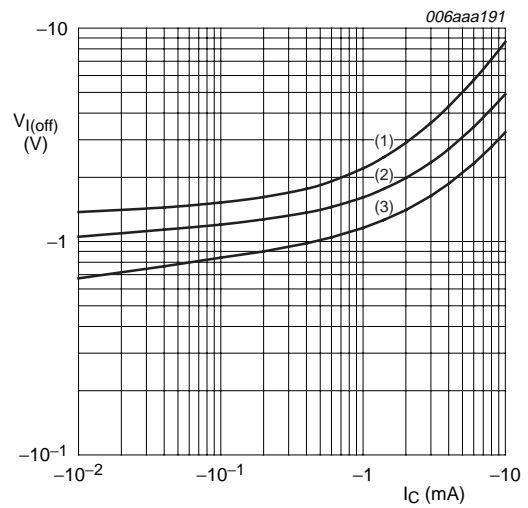
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^\circ\text{C}$

**Fig 2. Collector-emitter saturation voltage as a function of collector current; typical values**



$V_{CE} = -0.3 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

**Fig 3. On-state input voltage as a function of collector current; typical values**



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

**Fig 4. Off-state input voltage as a function of collector current; typical values**

**8. Package outline**

Plastic surface mounted package; 6 leads

SOT363

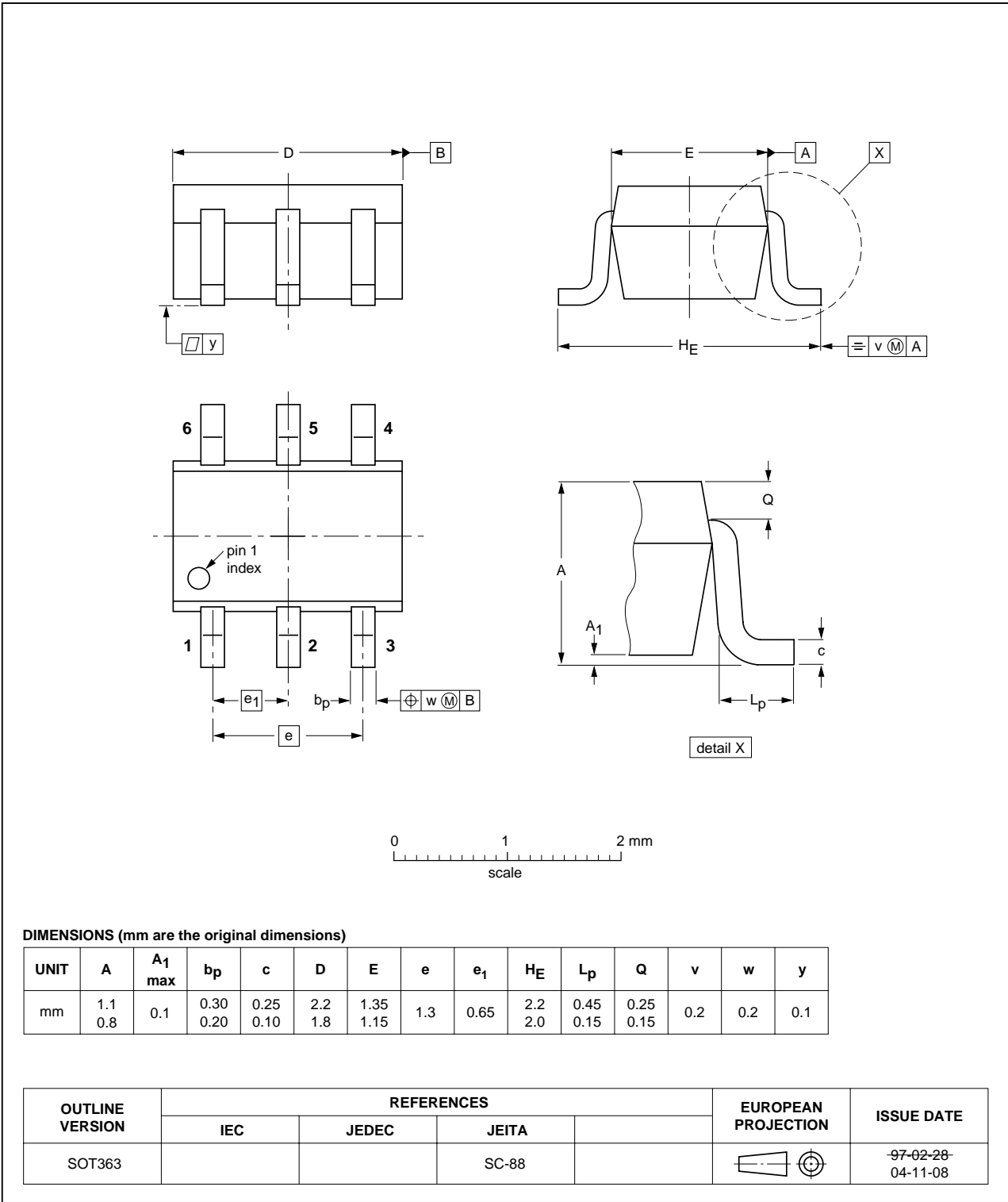


Fig 5. Package outline SOT363 (SC-88)

Plastic surface mounted package; 6 leads

SOT666

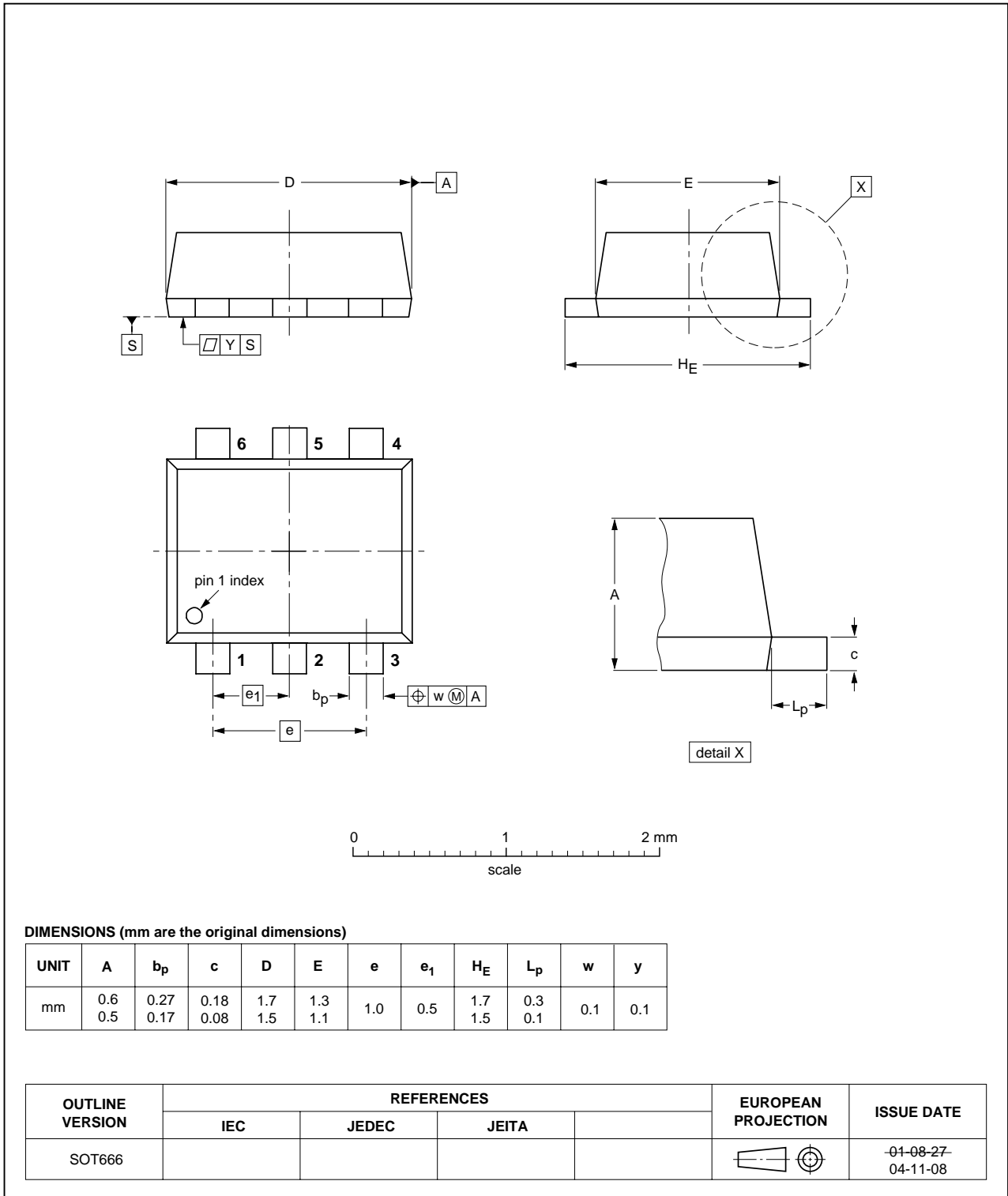


Fig 6. Package outline SOT666

## 9. Packing information

**Table 9: Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code. [\[1\]](#)

Type number	Package	Description	Packing quantity		
			3000	4000	10000
PEMB24	SOT666	4 mm pitch, 8 mm tape and reel	-	-115	-
PUMB24	SOT363	4 mm pitch, 8 mm tape and reel; T1 <a href="#">[2]</a>	-115	-	-135
PUMB24	SOT363	4 mm pitch, 8 mm tape and reel; T2 <a href="#">[3]</a>	-125	-	-165

[1] For further information and the availability of packing methods, see [Section 14](#).

[2] T1: normal taping

[3] T2: reverse taping



## 10. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PEMB24_PUMB24_1	20050218	Product data sheet	-	9397 750 14368	-

## 11. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[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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[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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