

PEMB24; PUMB24

PNP/PNP resistor-equipped transistors;
R1 = 100 k Ω , R2 = 100 k Ω

Rev. 02 — 2 September 2009

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/NPN complement
	NXP	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

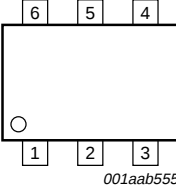
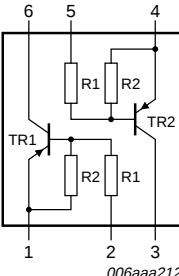
1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _O	output current (DC)		-	-	-20	mA
R1	bias resistor 1 (input)		70	100	130	k Ω
R2/R1	bias resistor ratio		0.8	1	1.2	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
1	GND (emitter) TR1	 001aab555	 006aaa212
2	input (base) TR1		
3	output (collector) TR1		
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 ^[1]
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	
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					
	positive		-	+10	V	
	negative		-	−40	V	
I _O	output current (DC)		-	−20	mA	
I _{CM}	peak collector current		-	−100	mA	
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C				
	SOT363		[1]	-	200	mW
	SOT666		[1] [2]	-	200	mW
T _{stg}	storage temperature		−65	+150	°C	
T _j	junction temperature		-	150	°C	
T _{amb}	ambient temperature		−65	+150	°C	
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 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
Per transistor						
R _{th(j-a)}	thermal resistance from junction to ambient	T _{amb} ≤ 25 °C				
	SOT363		[1]	-	-	625 K/W
	SOT666		[1] [2]	-	-	625 K/W
Per device						
R _{th(j-a)}	thermal resistance from junction to ambient	T _{amb} ≤ 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.

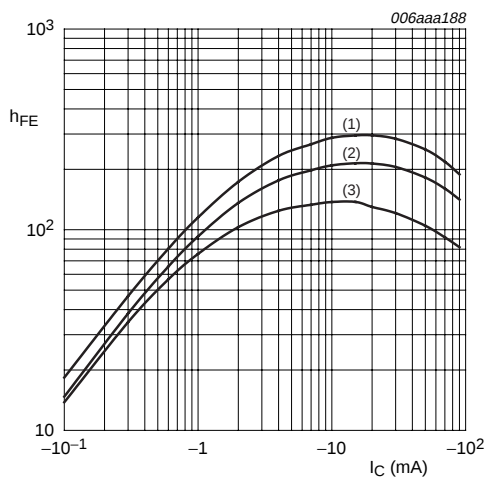
[2] Reflow soldering is the only recommended soldering method.

7. Characteristics

Table 8. Characteristics

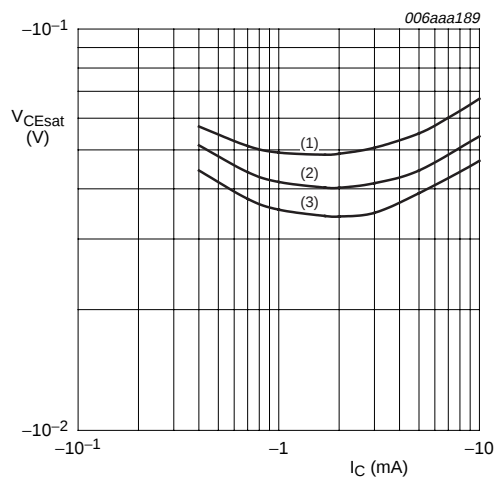
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
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	μA
		$V_{CE} = -30\text{ V}$; $I_B = 0\text{ A}$; $T_J = 150\text{ }^{\circ}\text{C}$	-	-	-50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}$; $I_C = 0\text{ A}$	-	-	-50	μA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}$; $I_C = -5\text{ mA}$	80	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -5\text{ mA}$; $I_B = -0.25\text{ mA}$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}$; $I_C = -100\text{ }\mu\text{A}$	-	-1.2	-0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}$; $I_C = -1\text{ mA}$	-3	-1.6	-	V
R1	bias resistor 1 (input)		70	100	130	k Ω
R2/R1	bias resistor ratio		0.8	1	1.2	
C_c	collector capacitance	$V_{CB} = -10\text{ V}$; $I_E = I_E = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	2.5	pF



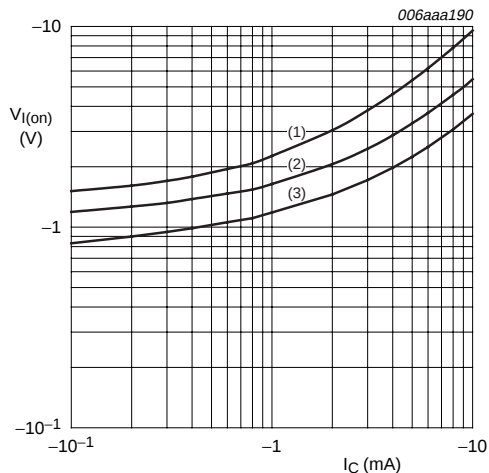
$V_{CE} = -5 \text{ V}$
 (1) $T_{amb} = 150 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40 \text{ }^{\circ}\text{C}$

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



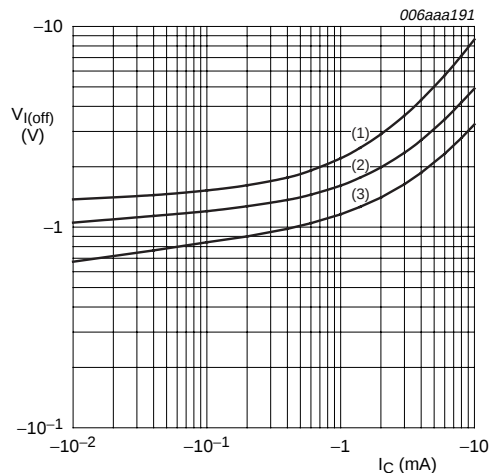
$I_C/I_B = 20$
 (1) $T_{amb} = 100 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40 \text{ }^{\circ}\text{C}$

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

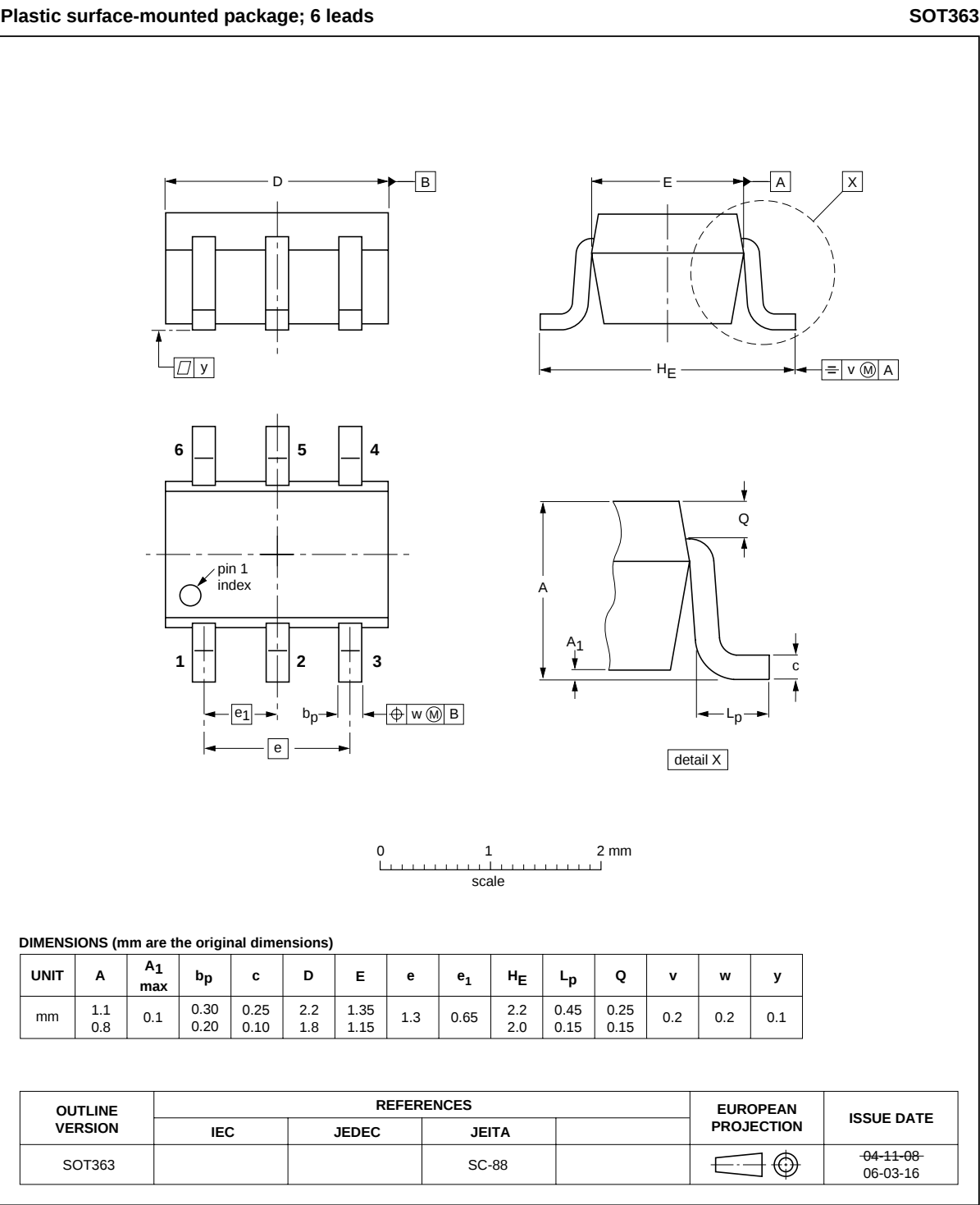


Fig 5. Package outline SOT363 (SC-88)

Plastic surface-mounted package; 6 leads

SOT666

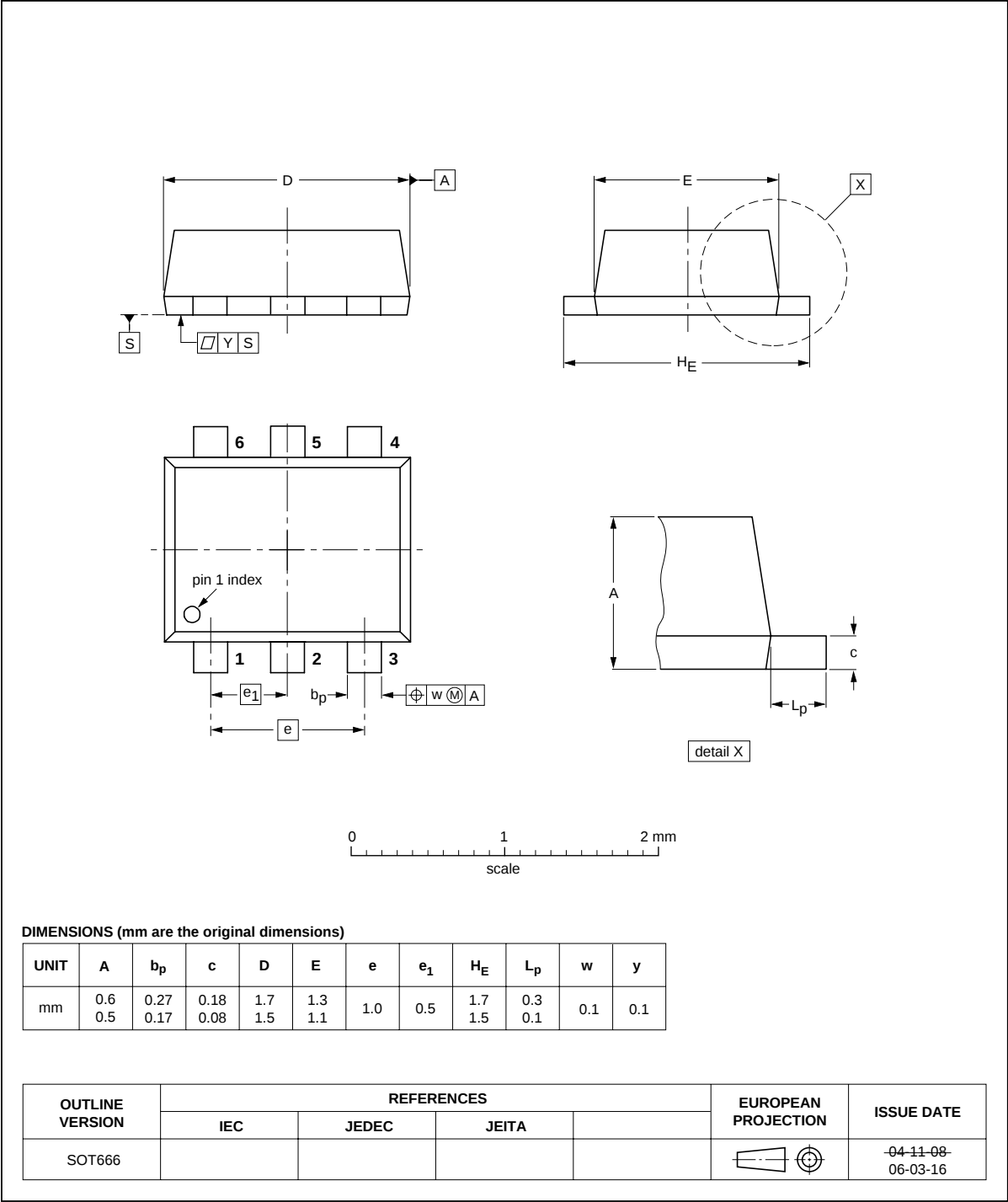


Fig 6. Package outline SOT666

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 [2]	-115	-	-135
PUMB24	SOT363	4 mm pitch, 8 mm tape and reel; T2 [3]	-125	-	-165

[1] For further information and the availability of packing methods, see [Section 12](#).

[2] T1: normal taping

[3] T2: reverse taping

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PEMB24_PUMB24_2	20090902	Product data sheet	-	PEMB24_PUMB24_1
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Figure 5 "Package outline SOT363 (SC-88)": updated • Figure 6 "Package outline SOT666": updated			
PEMB24_PUMB24_1	20050218	Product data sheet	-	-

11. Legal information

11.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	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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13. Contents

1	Product profile	1
1.1	General description.	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data.	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	3
6	Thermal characteristics	3
7	Characteristics	4
8	Package outline	6
9	Packing information	8
10	Revision history	9
11	Legal information	10
11.1	Data sheet status	10
11.2	Definitions	10
11.3	Disclaimers	10
11.4	Trademarks	10
12	Contact information	10
13	Contents	11

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