

PEMB16; PUMB16

PNP/PNP resistor-equipped transistors;
R1 = 22 k Ω , R2 = 47 k Ω

Rev. 03 — 31 August 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/PNP complement
	NXP	JEITA		
PEMB16	SOT666	-	PEMD16	PEMH16
PUMB16	SOT363	SC-88	PUMD16	PUMH16

1.2 Features

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

1.3 Applications

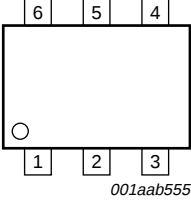
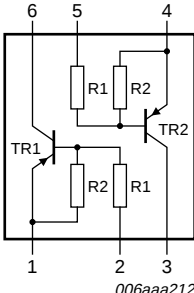
- Low current peripheral driver
- Control of IC inputs
- Replacement of general-purpose transistors in digital applications

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		-	-	-100	mA
R1	bias resistor 1 (input)		15.4	22	28.6	k Ω
R2/R1	bias resistor ratio		1.7	2.1	2.6	

2. Pinning information

Table 3. Pinning			
Pin	Description	Simplified outline	Symbol
1	GND (emitter) TR1	 001aab555	 006aaa212
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
PEMB16	-	plastic surface mounted package; 6 leads	SOT666
PUMB16	SC-88	plastic surface mounted package; 6 leads	SOT363

4. Marking

Table 5. Marking codes	
Type number	Marking code ^[1]
PEMB16	5G
PUMB16	B*7

[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	-	-5	V
V _I	input voltage				
	positive		-	+7	V
	negative		-	-40	V
I _O	output current		-	-100	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 (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
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 PCB, single-sided copper, tin-plated and standard footprint.

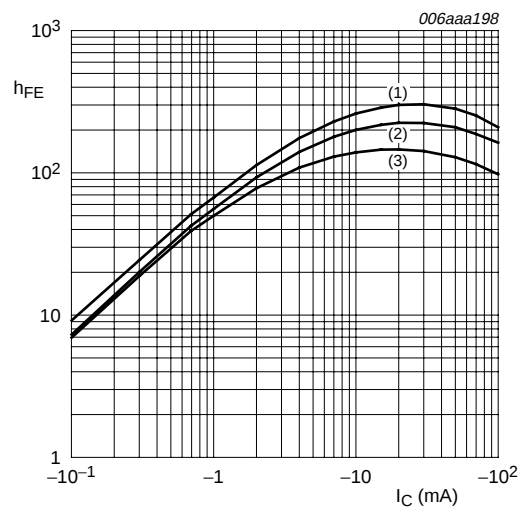
[2] Reflow soldering is the only recommended soldering method.

7. Characteristics

Table 8. Characteristics

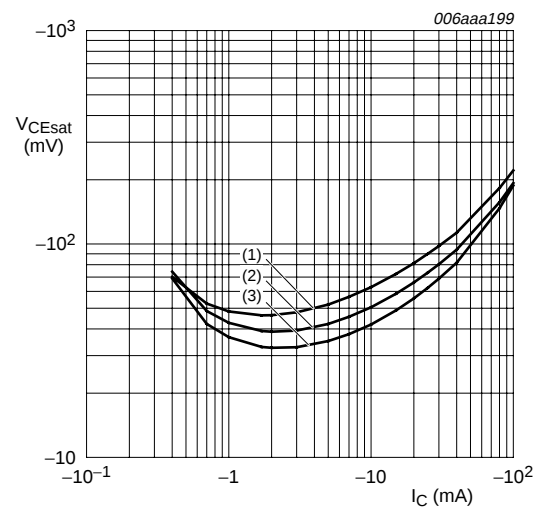
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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	$V_{EB} = -5\text{ V}$; $I_C = 0\text{ A}$	-	-	-120	μA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}$; $I_C = -5\text{ mA}$	80	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10\text{ mA}$; $I_B = -0.5\text{ mA}$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}$; $I_C = -100\text{ }\mu\text{A}$	-	-0.8	-0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}$; $I_C = -2\text{ mA}$	-2	-1.1	-	V
R1	bias resistor 1 (input)		15.4	22	28.6	k Ω
R2/R1	bias resistor ratio		1.7	2.1	2.6	
C_c	collector capacitance	$V_{CB} = -10\text{ V}$; $I_E = i_e = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	3	pF



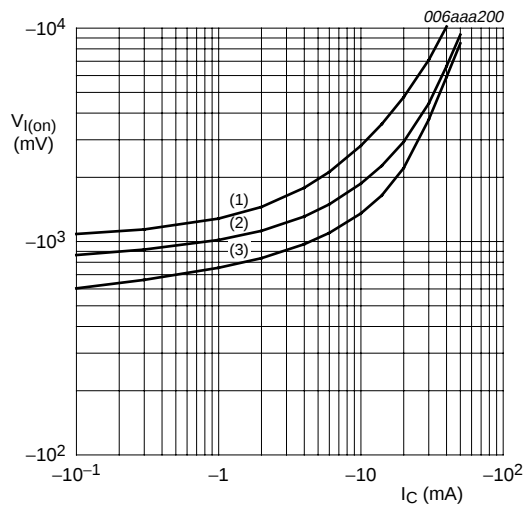
- $V_{CE} = -5\text{ V}$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



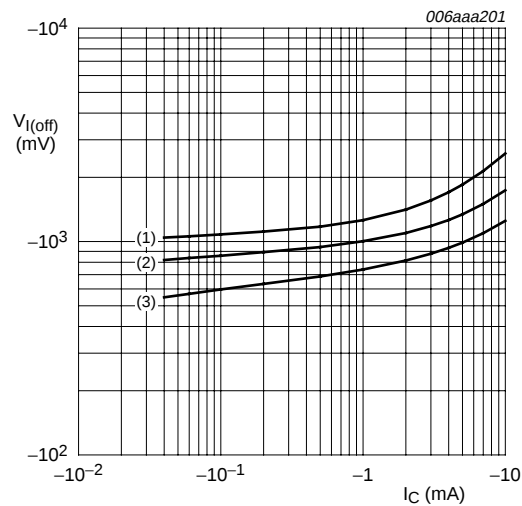
- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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) $T_{amb} = 100\text{ }^{\circ}\text{C}$

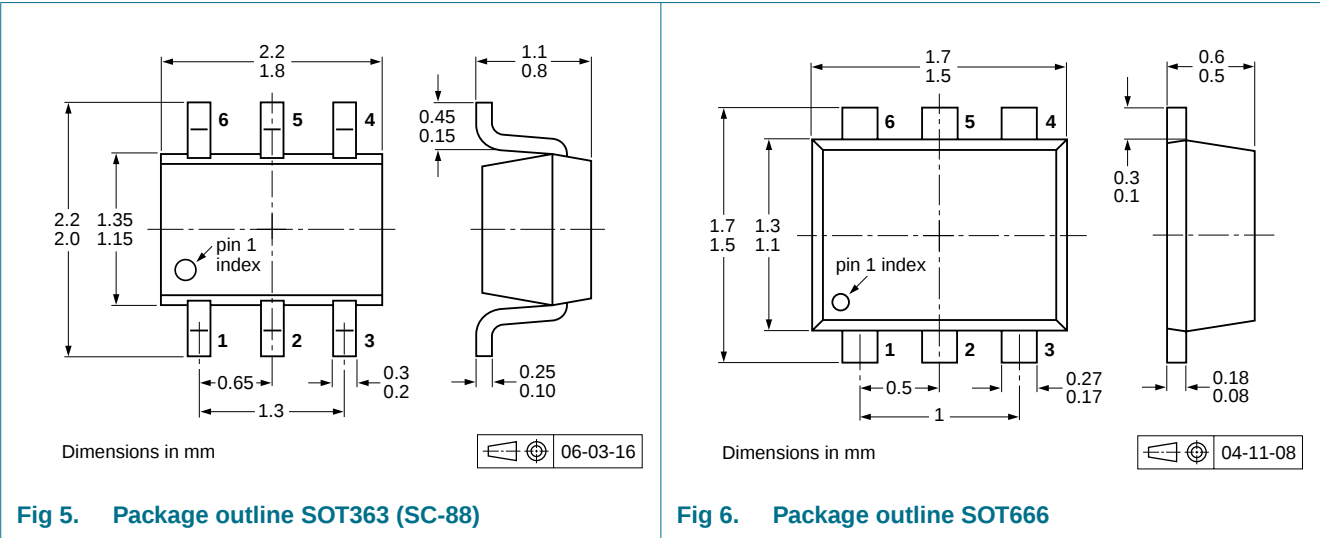
Fig 3. On-state input voltage as a function of collector current; typical values



- $V_{CE} = -5\text{ V}$
- (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



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
PEMB16	SOT666	4 mm pitch, 8 mm tape and reel;	-	-115	-
PUMB16	SOT363	4 mm pitch, 8 mm tape and reel; T1 [2]	-115	-	-135
PUMB16	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
PEMB16_PUMB16_3	20090831	Product data sheet	-	PEMB16_PUMB16_2
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			
PEMB16_PUMB16_2	20050610	Product data sheet	-	PUMB16_1
PUMB16_1	20031103	Product specification	-	-

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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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