

PEMH15; PUMH15

NPN/NPN resistor-equipped transistors;

R1 = 4.7 k Ω , R2 = 4.7 k Ω

Rev. 04 — 15 November 2009

Product data sheet

1. Product profile

1.1 General description

NPN/NPN resistor-equipped transistors.

Table 1. Product overview

Type number	Package		NPN/PNP complement	PNP/PNP complement
	NXP	JEITA		
PEMH15	SOT666	-	PEMD15	PEMB15
PUMH15	SOT363	SC-88	PUMD15	PUMB15

1.2 Features

- 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
- Replaces general-purpose transistors in digital applications

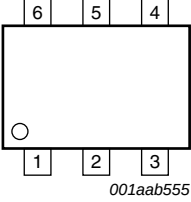
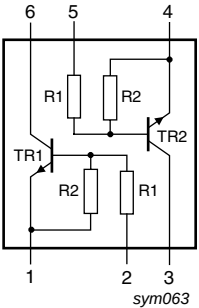
1.4 Quick reference data

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)		-	-	100	mA
R1	bias resistor 1 (input)		3.3	4.7	6.1	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		
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
PEMH15	-	plastic surface mounted package; 6 leads	SOT666
PUMH15	SC-88	plastic surface mounted package; 6 leads	SOT363

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PEMH15	5F
PUMH15	H2*

[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		-	+30	V
	negative		-	-10	V
I _O	output current (DC)		-	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 a FR4 printed-circuit board, 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	in free air				
	SOT363		[1]	-	625	K/W
	SOT666		[1][2]	-	625	K/W
Per device						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air				
	SOT363		[1]	-	416	K/W
	SOT666		[1][2]	-	416	K/W

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.

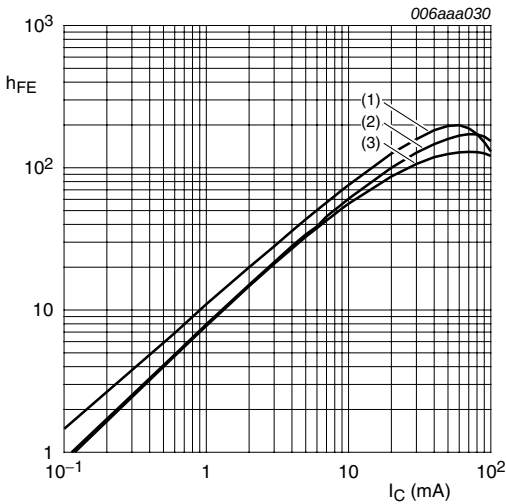
[2] Reflow soldering is the only recommended soldering method.

7. Characteristics

Table 8. Characteristics

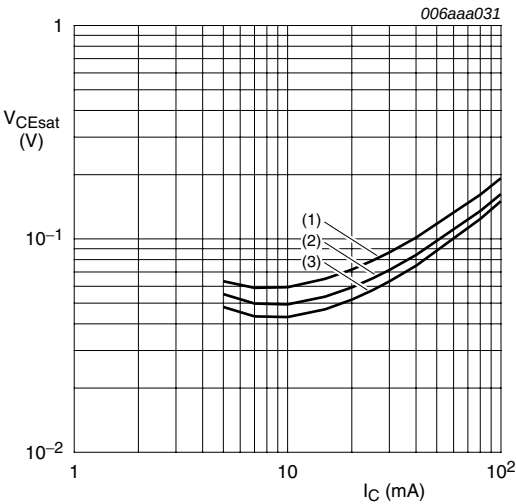
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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	$V_{EB} = 5\text{ V}$; $I_C = 0\text{ A}$	-	-	0.9	mA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$	30	-	-	
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	$V_{CE} = 5\text{ V}$; $I_C = 100\text{ }\mu\text{A}$	-	1.1	0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = 0.3\text{ V}$; $I_C = 20\text{ mA}$	2.5	1.9	-	V
R1	bias resistor1 (input)		3.3	4.7	6.1	kΩ
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



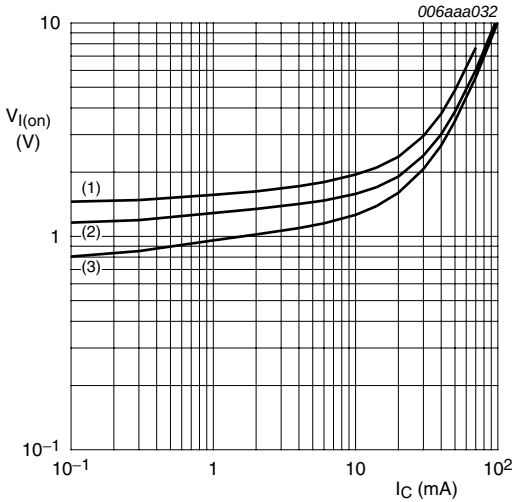
- $V_{CE} = 5\text{ V}$
- (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



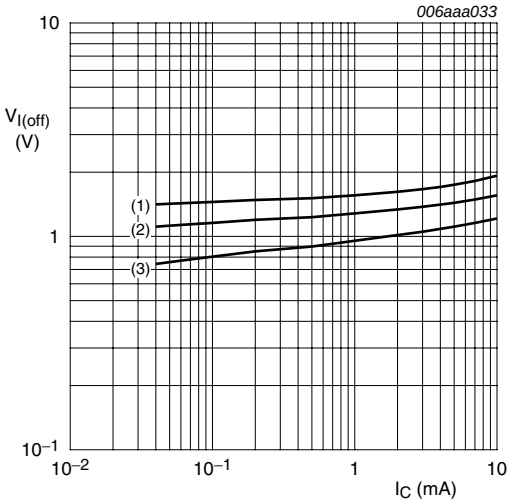
- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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

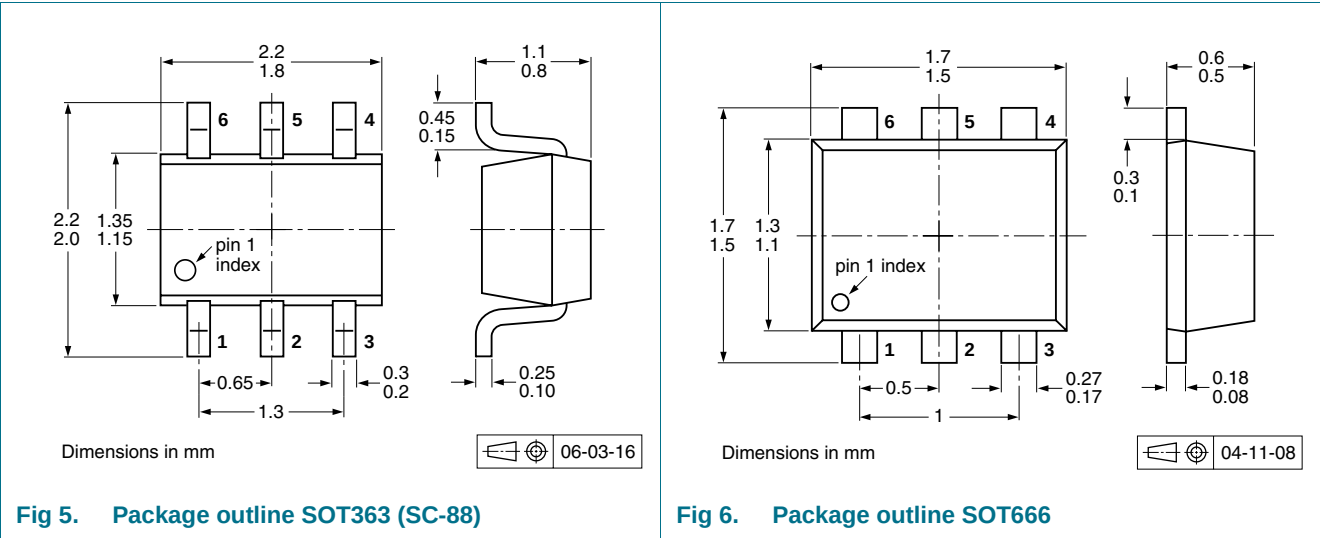
Fig 3. On-state input voltage as a function of collector current; typical values



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



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	8000	10000
PEMH15	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PUMH15	SOT363	4 mm pitch, 8 mm tape and reel; T1 [2]	-115	-	-	-135
		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
PEMH15_PUMH15_4	20091115	Product data sheet	-	PEMH15_PUMH15_3
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			
PEMH15_PUMH15_3	20050211	Product data sheet	-	PUMH15_2
PUMH15_2	20040414	Product specification	-	PUMH15_1
PUMH15_1	20031009	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".

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