PEMH20; PUMH20

NPN/NPN resistor-equipped transistors; R1 = 2.2 kΩ, R2 = 2.2 kΩ

Rev. 03 — 14 February 2005 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
	Philips	JEITA		
PEMH20	SOT666	-	PEMD20	PEMB20
PUMH20	SOT363	SC-88	PUMD20	PUMB20

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

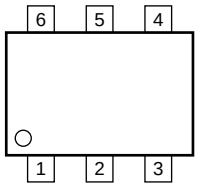
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	50	V
I_O	output current (DC)		-	-	100	mA
R1	bias resistor 1 (input)		1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio		0.8	1	1.2	

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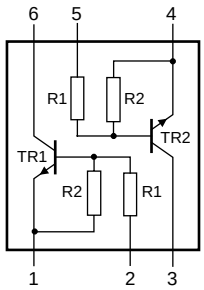
2. Pinning information

Table 3: Pinning

Pin	Description	Simplified outline	Symbol
1	GND (emitter) TR1		
2	input (base) TR1		
3	output (collector) TR2		
4	GND (emitter) TR2		
5	input (base) TR2		
6	output (collector) TR1		



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3. Ordering information

Table 4: Ordering information

Type number	Package		
	Name	Description	Version
PEMH20	-	plastic surface mounted package; 6 leads	SOT666
PUMH20	SC-88	plastic surface mounted package; 6 leads	SOT363

4. Marking

Table 5: Marking codes

Type number	Marking code [1]
PEMH20	6K
PUMH20	H7*

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

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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		-	+12	V
	negative		-	–10	V
I_O	output current (DC)		-	100	mA
I_{CM}	peak collector current		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °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	$T_{amb} \leq 25$ °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.

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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.

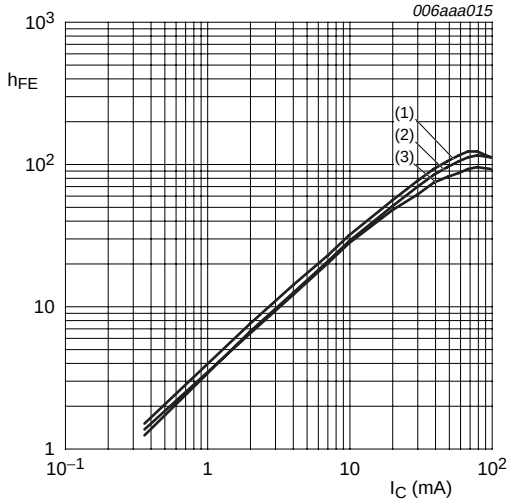
7. Characteristics

Table 8: Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	V_{CB} = 50 V; I_E = 0 A	-	-	100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 30 V; I_B = 0 A	-	-	1	µA
		V_{CE} = 30 V; I_B = 0 A; T_j = 150 °C	-	-	50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A	-	-	2	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 20 mA	30	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	-	-	150	mV
$V_{I(off)}$	off-state input voltage	V_{CE} = 5 V; I_C = 1 mA	-	1.2	0.5	V
$V_{I(on)}$	on-state input voltage	V_{CE} = 0.3 V; I_C = 20 mA	2	1.6	-	V
R1	bias resistor1 (input)		1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio		0.8	1	1.2	
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz	-	-	2.5	pF

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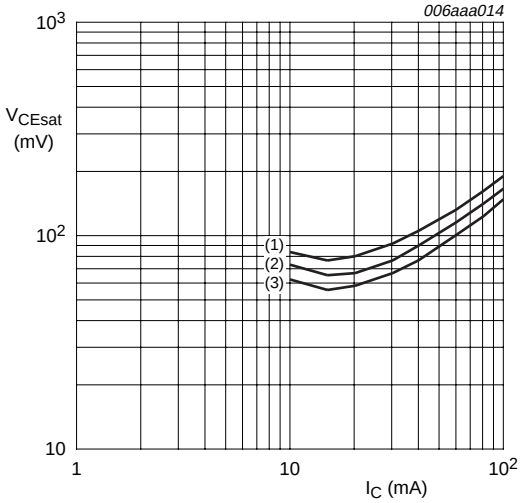
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –40 °C

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



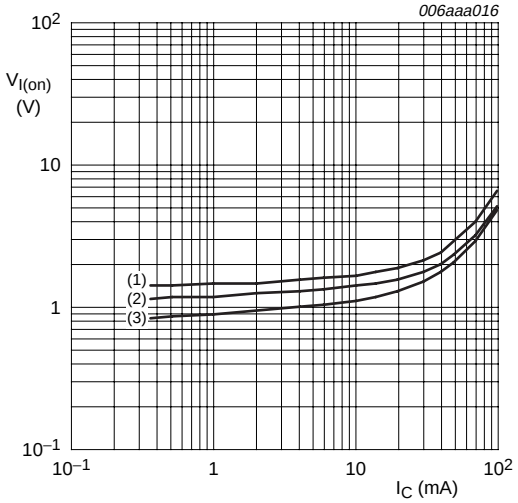
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –40 °C

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



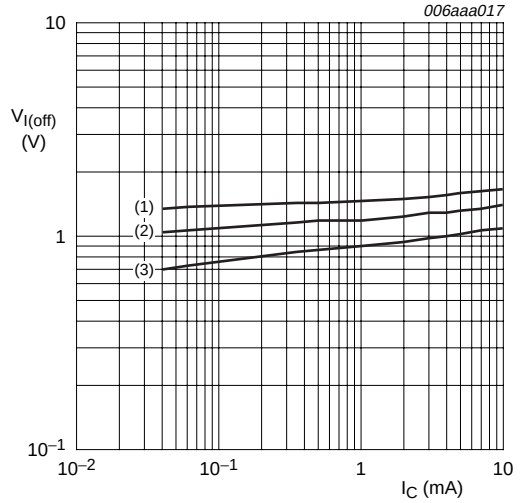
V_{CE} = 0.3 V

(1) T_{amb} = –40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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



V_{CE} = 5 V

(1) T_{amb} = –40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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

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8. Package outline

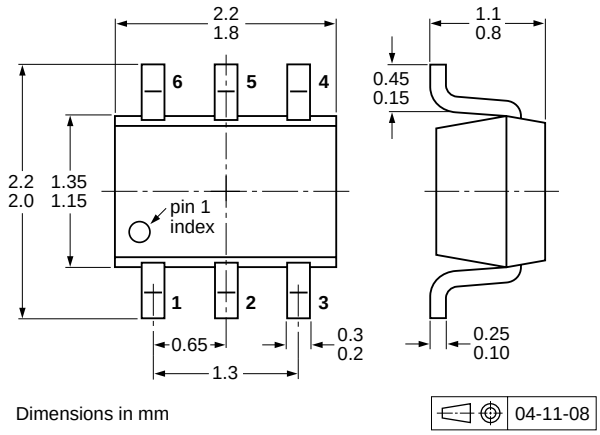


Fig 5. Package outline SOT363 (SC-88)

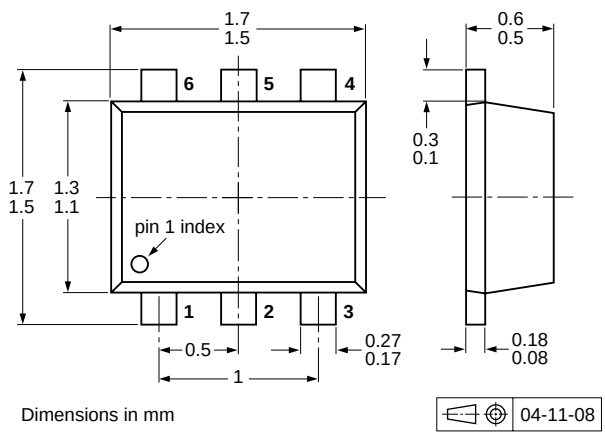


Fig 6. Package outline SOT666

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	8000	10000
PEMH20	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PUMH20	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 14.

[2] T1: normal taping

[3] T2: reverse taping

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10. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PEMH20_PUMH20_3	20050214	Product data sheet	-	9397 750 14425	PUMH20_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • Type PEMH20 added • Table 8 “Characteristics” $V_{i(on)}$ and $V_{i(off)}$ redefined to $V_{I(on)}$ and $V_{I(off)}$ • Figure 1, 2, 3 and 4 added • Section 9 “Packing information” added				
PUMH20_2	20040414	Product specification	-	9397 750 13089	PUMH20_1
PUMH20_1	20031016	Product specification	-	9397 750 11894	-

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11. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	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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III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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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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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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15. 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**	**4**
7	**Characteristics**	**4**
8	**Package outline**	**6**
9	**Packing information**	**6**
10	**Revision history**	**7**
11	**Data sheet status**	**8**
12	**Definitions**	**8**
13	**Disclaimers**	**8**
14	**Contact information**	**8**

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