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Team Nexperia

PEMH24; PUMH24

NPN/NPN resistor-equipped transistors; R1 = 100 kΩ, R2 = 100 kΩ

Rev. 04 — 18 May 2005 Product data sheet

1. Product profile

1.1 General description

NPN/NPN Resistor-Equipped Transistors (RET).

Table 1: Product overview

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

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)		-	-	20	mA
R1	bias resistor 1 (input)		70	100	130	kΩ
R2/R1	bias resistor ratio		0.8	1	1.2	

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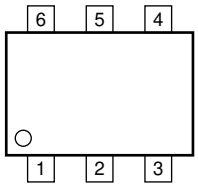
2. Pinning information

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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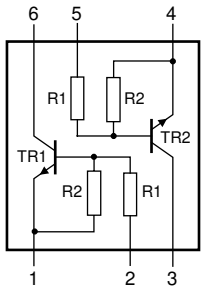

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3. Ordering information

Table 4: Ordering information

Type number	Package		
	Name	Description	Version
PEMH24	-	plastic surface mounted package; 6 leads	SOT666
PUMH24	SC-88	plastic surface mounted package; 6 leads	SOT363

4. Marking

Table 5: Marking codes

Type number	Marking code [1]
PEMH24	6T
PUMH24	H8*

[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			-	+40	V
	negative			-	−10	V
I_O	output current (DC)			-	20	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 an FR4 Printed-Circuit Board (PCB), 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 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 °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	-	-	50	µA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 5 mA	80	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 5 mA; I_B = 0.25 mA	-	-	150	mV
$V_{I(off)}$	off-state input voltage	V_{CE} = 5 V; I_C = 100 µA	-	1.1	0.5	V
$V_{I(on)}$	on-state input voltage	V_{CE} = 0.3 V; I_C = 1 mA	3	1.5	-	V
R1	bias resistor 1 (input)		70	100	130	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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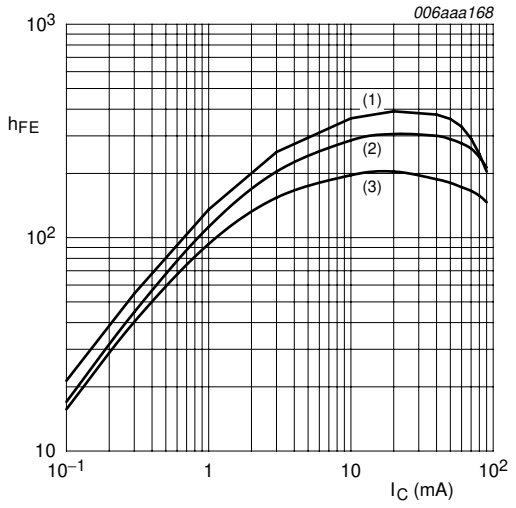


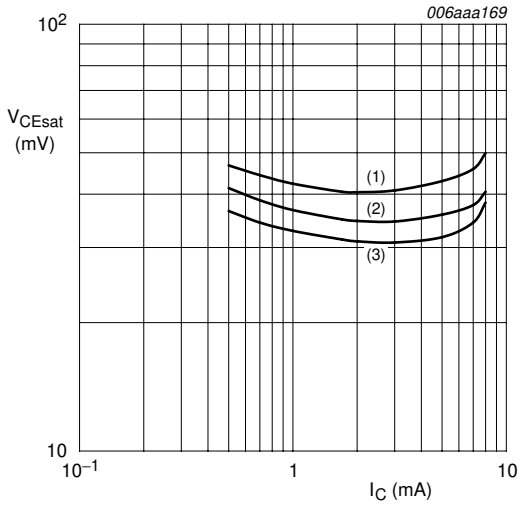
V_{CE} = 5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



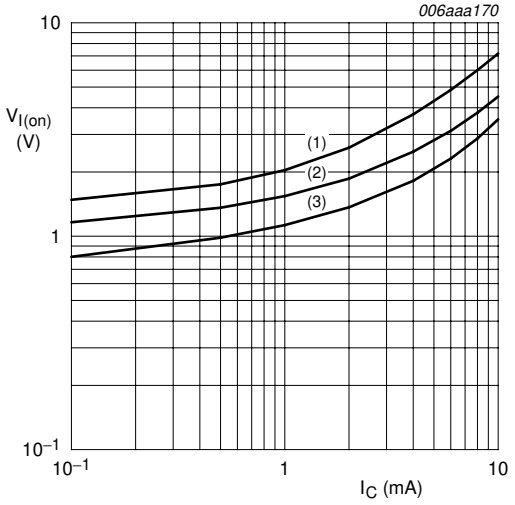
I_C/I_B = 20

(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



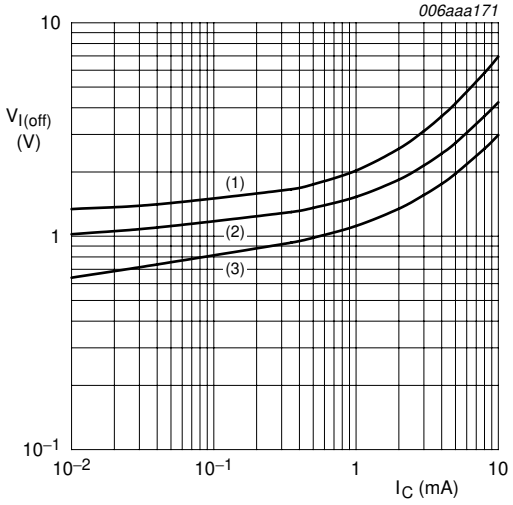
V_{CE} = 0.3 V

(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

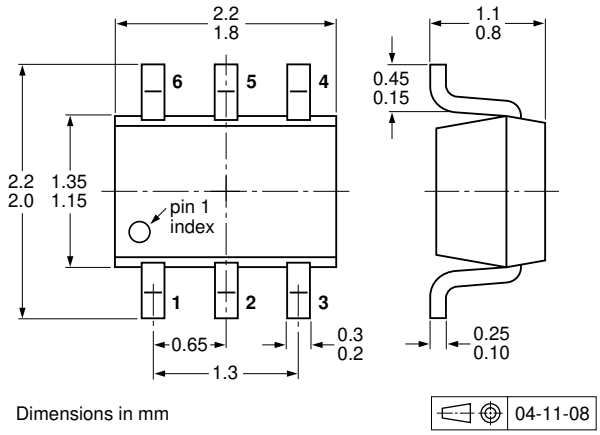

Fig 5. Package outline SOT363 (SC-88)

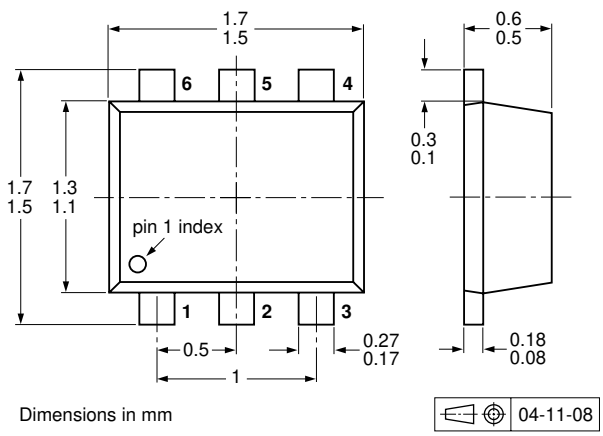

Fig 6. Package outline SOT666

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
PEMH24	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PUMH24	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 15.

[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
PEMH24_PUMH24_4	20050518	Product data sheet	-	9397 750 14456	PUMH24_3
Modifications:	• Type PEMH24 added • Table 1 “Product overview”: added • Figure 1, 2, 3 and 4: electrical graphs added • Table 9 “Packing methods”: added • Section 14 “Trademarks”: added				
PUMH24_3	20041015	Product data sheet	-	9397 750 13628	PUMH24_2
PUMH24_2	20040414	Product specification	-	9397 750 13087	PUMH24_1
PUMH24_1	20031016	Product specification	-	9397 750 11895	-

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11. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[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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16. Contents

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