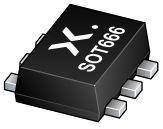
THE DATASHEET OF

PEMD6,115



PEMD6

50 V, 100 mA NPN/PNP Resistor-Equipped Transistor; R1 = 4.7 kΩ, R2 = open

5 January 2023 **Product data sheet**

1. General description

NPN/PNP Resistor-Equipped Transistor (RET) in a ultra small flat lead SOT666 Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PEMH7

PNP/PNP complement: PEMB3

2. Features and benefits

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

3. Applications

- Low current peripheral driver
- Controlling IC inputs
- Replaces general-purpose transistors in digital applications

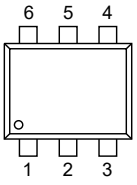
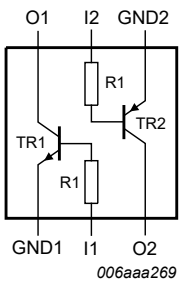
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity							
V_{CEO}	collector-emitter voltage	open base		-	-	50	V
I_O	output current			-	-	100	mA
R1	bias resistor 1 (input)			3.3	4.7	6.1	kΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1		
2	I1	input (base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	O1	output (collector) TR1		

SOT666

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PEMD6	SOT666	plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body	SOT666

7. Marking

Table 4. Marking codes

Type number	Marking code
PEMD6	D6

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor; for the PNP transistor with negative polarity						
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
I_O	output current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] [2]	-	200	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] [2]	-	300	mW

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.
[2] Reflow soldering is the only recommended soldering method.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	416	K/W

[1] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity							
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A; T_{amb} = 25 °C		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 2 mA; I_B = 0 A; T_{amb} = 25 °C		50	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = 50 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 30 V; I_B = 0 A; T_{amb} = 25 °C		-	-	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; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 1 mA; T_{amb} = 25 °C		200	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 5 mA; I_B = 0.25 mA; T_{amb} = 25 °C		-	-	100	mV
R1	bias resistor 1 (input)			3.3	4.7	6.1	kΩ
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C; TR1 (NPN)		-	-	2.5	pF
		V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C; TR2 (PNP)		-	-	3	pF

11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_1 = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

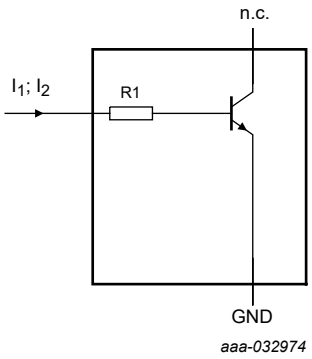


Fig. 1. TR1 (NPN): Resistor test circuit

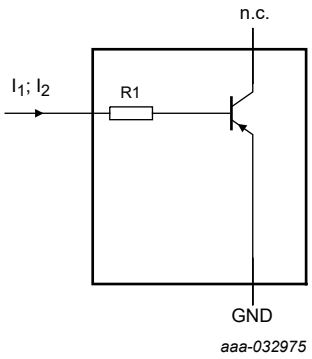


Fig. 2. TR2 (PNP): Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

PEMD6	R1 (kΩ)	R2 (kΩ)	Test conditions	
			I_1	I_2
TR1 (NPN)	4.7	open	750 µA	950 µA
TR2 (PNP)	4.7	open	-750 µA	-950 µA

12. Package outline

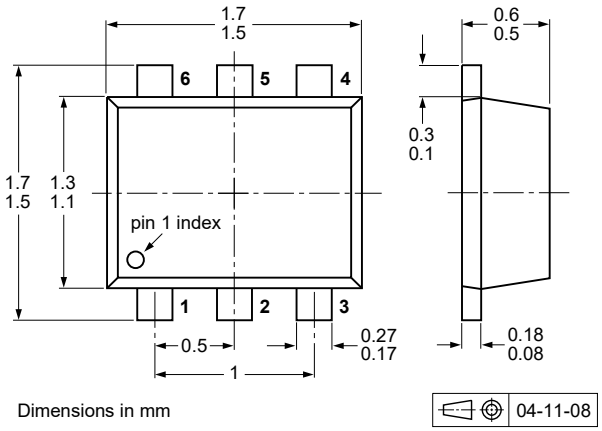


Fig. 3. Package outline SOT666

13. Soldering

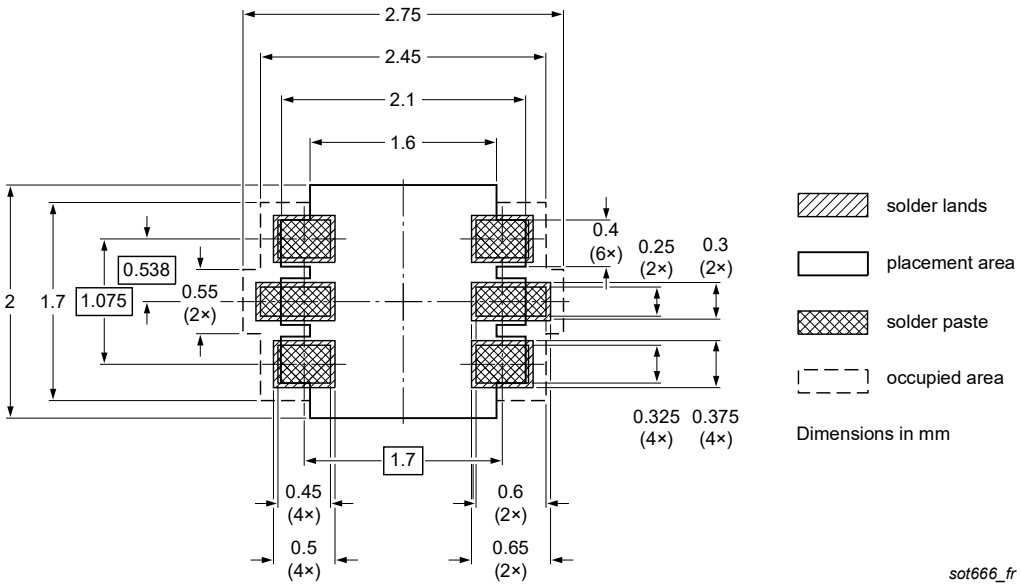


Fig. 4. Reflow soldering footprint for SOT666

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PEMD6 v.4	20230105	Product data sheet	-	PEMD6 v.3
Modifications:	• Section 5 "Pinning Information" table is corrected.			
PEMD6 v.3	20221229	Product data sheet	-	PUMD6_PEMD6 v.2
PUMD6_PEMD6 v.2	20040407	Product data sheet	-	PUMD6_PEMD6 v.1
PUMD6_PEMD6 v.1	20031104	Product specification	-	-

15. Legal information

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 https://www.nexperia.com.

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