



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/PNP 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	<p>SOT666</p>	<p>006aaa269</p>
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		

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} ≤ 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} ≤ 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	$I_C = 100\text{ }\mu\text{A}$; $I_E = 0\text{ A}$; $T_{amb} = 25\text{ }^\circ\text{C}$		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2\text{ mA}$; $I_B = 0\text{ A}$; $T_{amb} = 25\text{ }^\circ\text{C}$		50	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 50\text{ V}$; $I_E = 0\text{ A}$; $T_{amb} = 25\text{ }^\circ\text{C}$		-	-	100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30\text{ V}$; $I_B = 0\text{ A}$; $T_{amb} = 25\text{ }^\circ\text{C}$		-	-	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	$V_{EB} = 5\text{ V}$; $I_C = 0\text{ A}$; $T_{amb} = 25\text{ }^\circ\text{C}$		-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 1\text{ mA}$; $T_{amb} = 25\text{ }^\circ\text{C}$		200	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 5\text{ mA}$; $I_B = 0.25\text{ mA}$; $T_{amb} = 25\text{ }^\circ\text{C}$		-	-	100	mV
R1	bias resistor 1 (input)			3.3	4.7	6.1	kΩ
C_c	collector capacitance	$V_{CB} = 10\text{ V}$; $I_E = 0\text{ A}$; $i_e = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ }^\circ\text{C}$; TR1 (NPN)		-	-	2.5	pF
		$V_{CB} = 10\text{ V}$; $I_E = 0\text{ A}$; $i_e = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ }^\circ\text{C}$; TR2 (PNP)		-	-	3	pF

11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

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

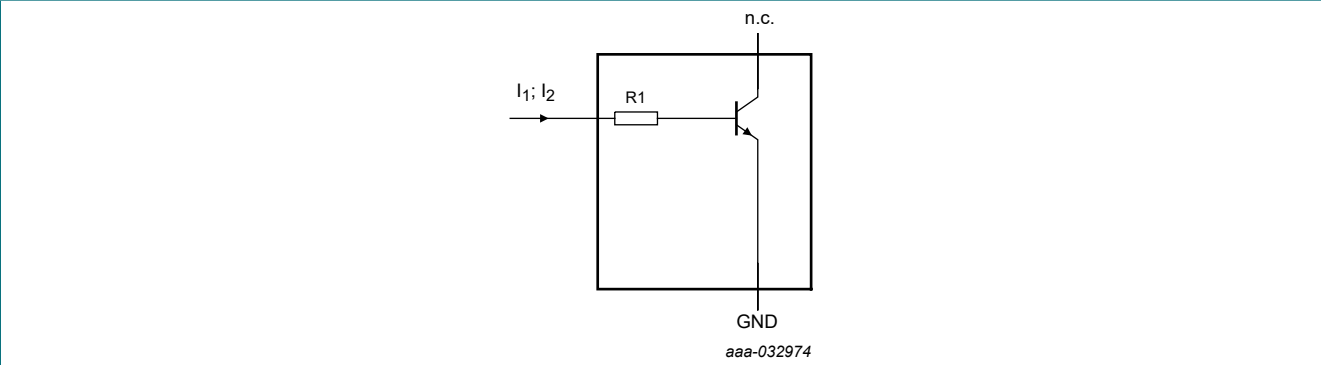


Fig. 1. TR1 (NPN): Resistor test circuit

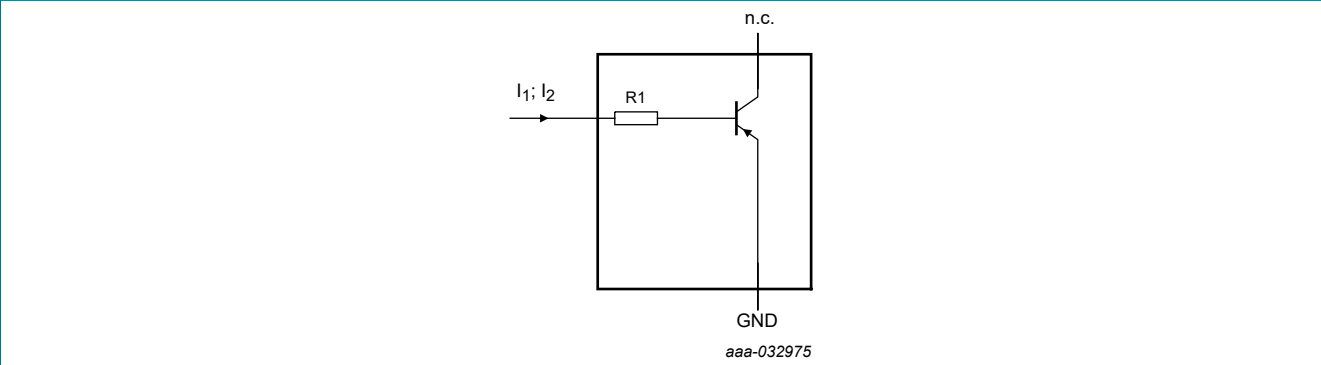


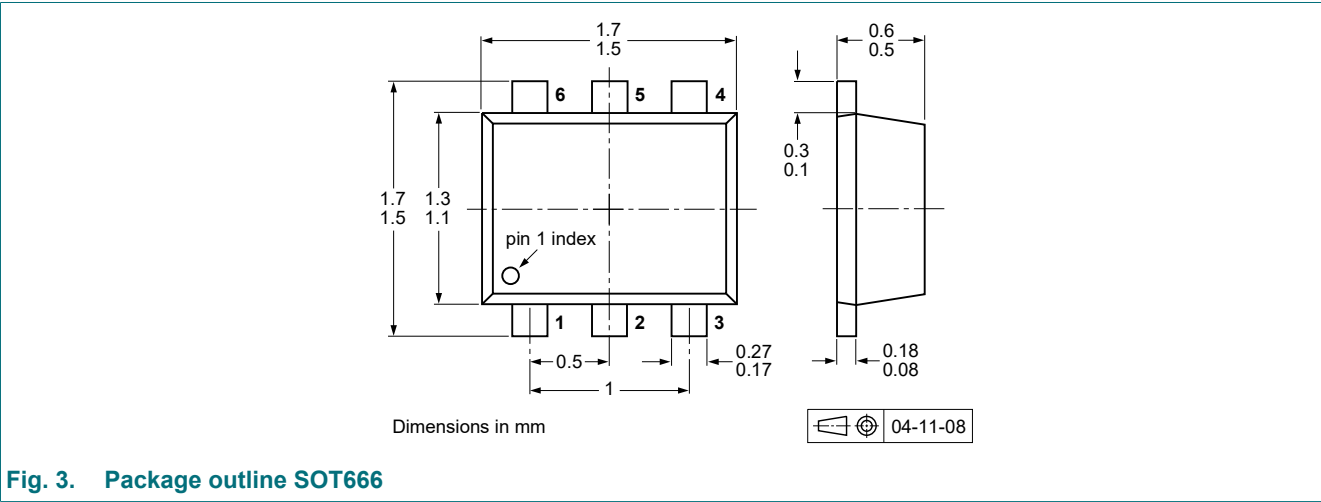
Fig. 2. TR2 (PNP): Resistor test circuit

Resistor test conditions

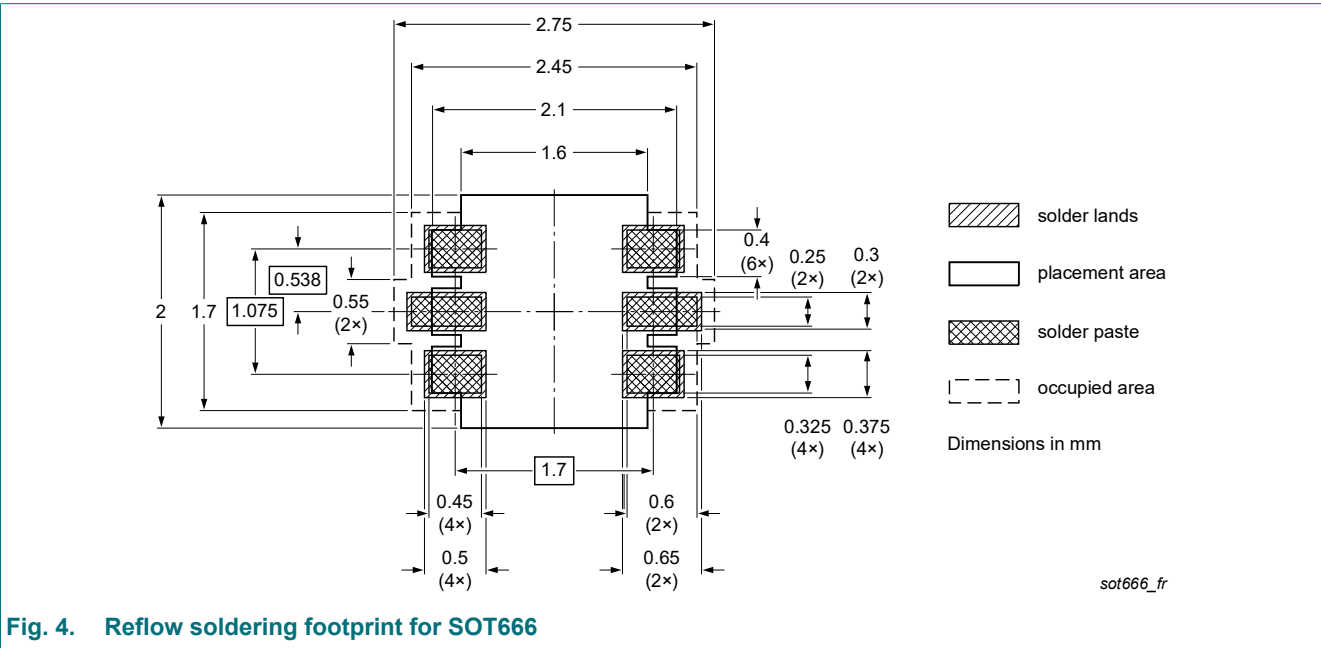
Table 8. Resistor test conditions

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



13. Soldering



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".
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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information..... 1

6. Ordering information..... 2

7. Marking..... 2

8. Limiting values..... 2

9. Thermal characteristics..... 2

10. Characteristics..... 3

11. Test information..... 4

12. Package outline..... 5

13. Soldering..... 5

14. Revision history..... 6

15. Legal information..... 7

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