



# PEMH14

50 V, 100 mA NPN/NPN resistor-equipped transistor;  
R1 = 47 k $\Omega$ , R2 = open

29 December 2022

Product data sheet

## 1. General description

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

NPN/PNP complement: PEMD14

PNP/PNP complement: PEMB14

## 2. Features and benefits

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

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

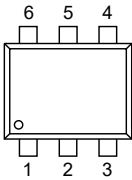
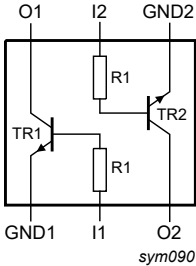
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	50	V
I <sub>O</sub>	output current		-	-	100	mA
R1	bias resistor 1 (input)	[1]	33	47	61	k $\Omega$

[1] See section "Test information" for resistor calculation and test conditions.

50 V, 100 mA NPN/NPN resistor-equipped transistor; R1 = 47 kΩ, R2 = open

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		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PEMH14</a>	SOT666	plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body	<a href="#">SOT666</a>

7. Marking

Table 4. Marking codes

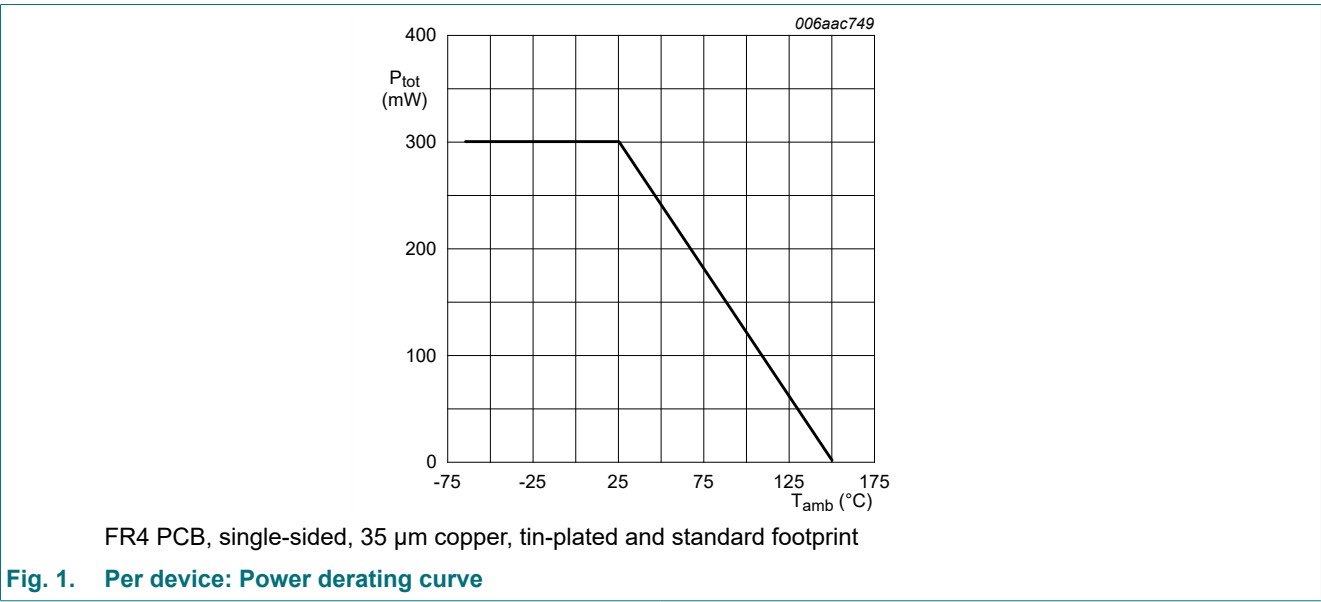
Type number	Marking code
PEMH14	5C

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						
V <sub>CBO</sub>	collector-base voltage	open emitter		-	50	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	50	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	5	V
I <sub>O</sub>	output current			-	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1] [2]	-	200	mW
Per device						
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1] [2]	-	300	mW
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C

- [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.



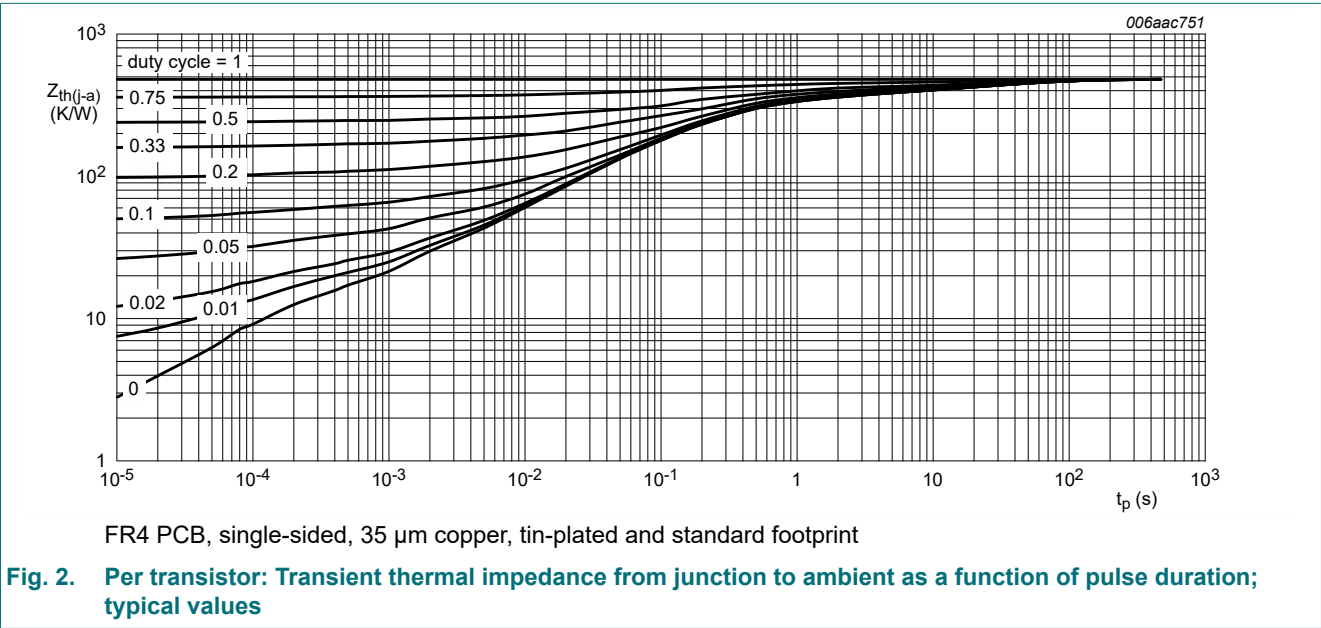
50 V, 100 mA NPN/NPN resistor-equipped transistor; R1 = 47 kΩ, R2 = open

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] [2]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[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.

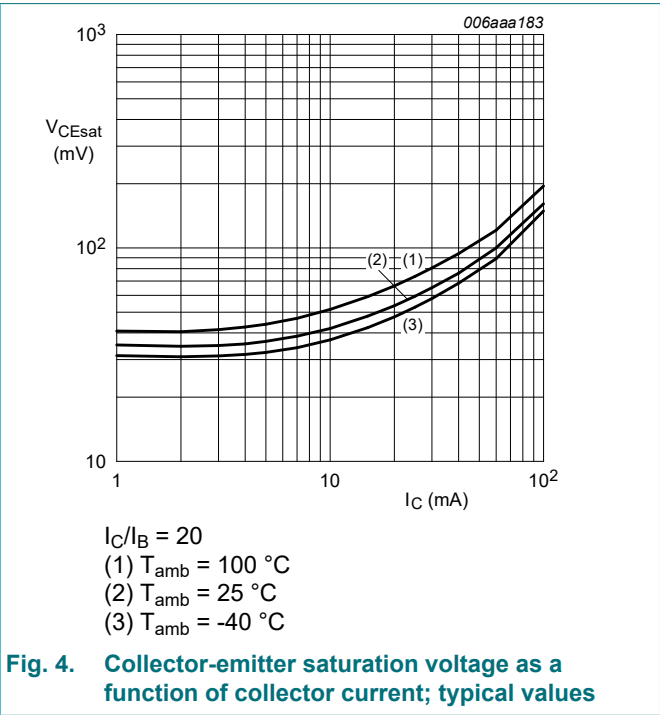
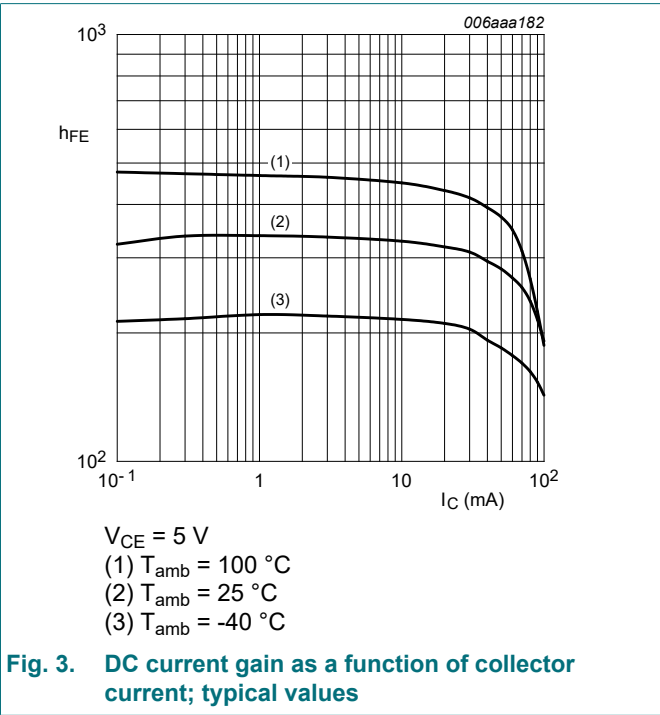


10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
$V_{(BR)CBO}$	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	$\mu\text{A}$
		$V_{CE} = 30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_j = 150\text{ }^\circ\text{C}$	-	-	50	$\mu\text{A}$
$I_{EBO}$	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	$V_{CE} = 5\text{ V}$ ; $I_C = 1\text{ mA}$ ; $T_{amb} = 25\text{ }^\circ\text{C}$	100	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA}$ ; $I_B = 0.5\text{ mA}$ ; $T_{amb} = 25\text{ }^\circ\text{C}$	-	-	150	mV
R1	bias resistor 1 (input)	[1]	33	47	61	kΩ
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}$ ; $I_E = 0\text{ A}$ ; $i_e = 0\text{ A}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ }^\circ\text{C}$	-	-	2.5	pF

[1] See section "Test information" for resistor calculation and test conditions.

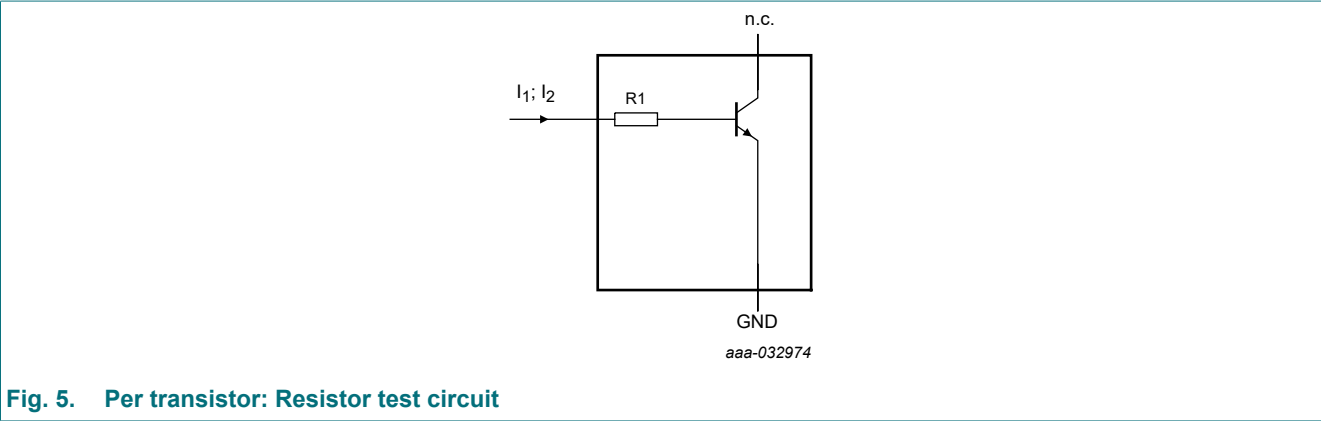


11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

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

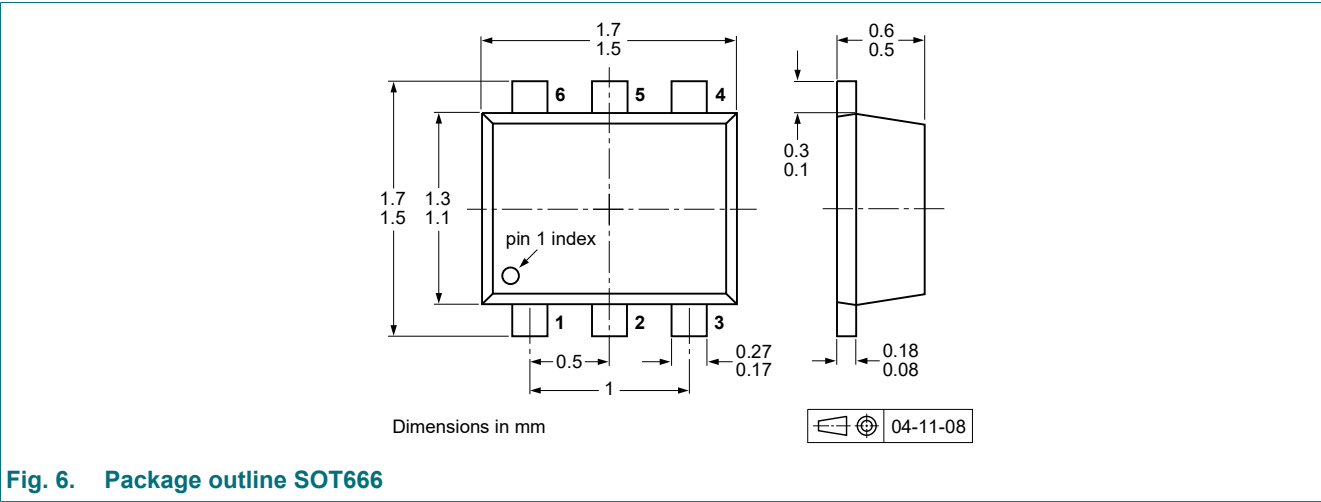


Resistor test conditions

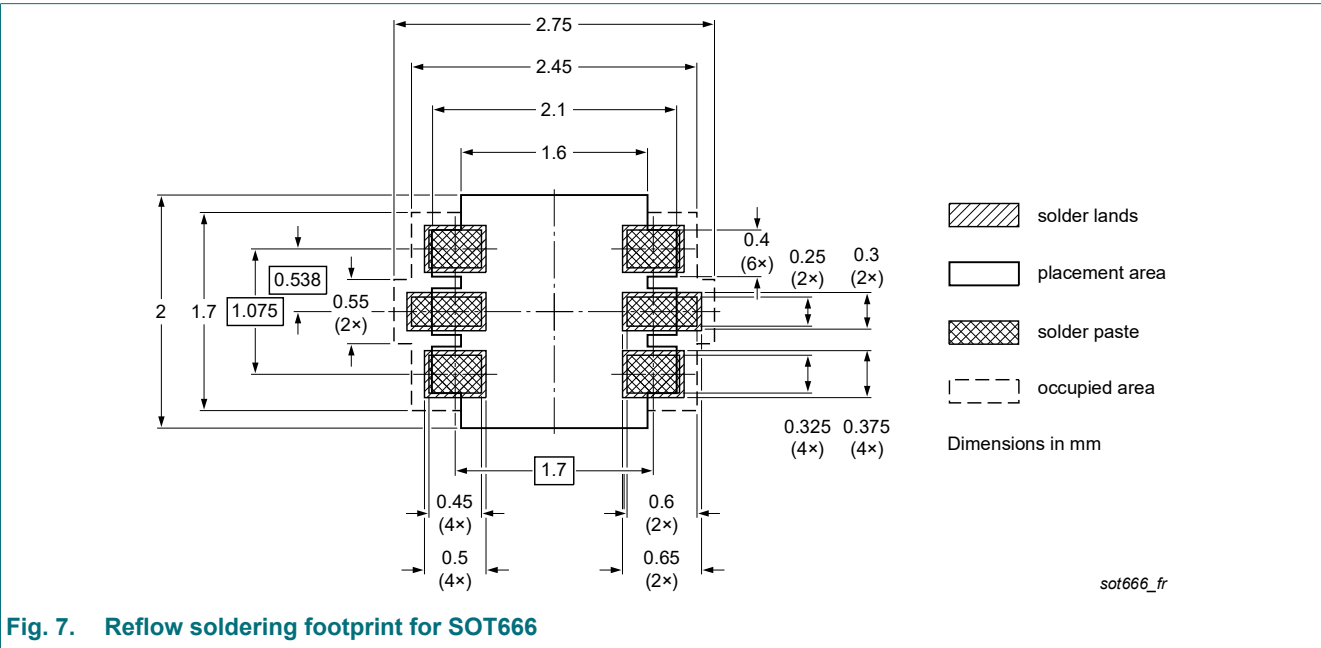
Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions	
			I <sub>1</sub>	I <sub>2</sub>
PEMH14	47	open	60 μA	110 μA

12. Package outline



13. Soldering



## 14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PEMH14 v.4	20221229	Product data sheet	-	PEMH14_PUMH14_3
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Family data sheet reduced to single type data sheet.</li> <li>Packing information removed.</li> <li>Product(s) changed to non-automotive qualification.</li> </ul>			
PEMH14_PUMH14_3	20091115	Product data sheet	-	PEMH14_PUMH14_2
PEMH14_PUMH14_2	20050429	Product data sheet	-	PUMH14_1
PUMH14_1	20031016	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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