

ANTREX Electronics

Electronic Components Sourcing Information

Product Reference Information

Part Number: PEMD20,115

Manufacturer: Nexperia USA Inc.

Package: SOT-563, SOT-666

Availability: Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/pemd20-115.html>

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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



PEMD20

50 V, 100 mA NPN/PNP resistor-equipped double transistor;
R1 = 2.2 k Ω , R2 = 2.2 k Ω

29 December 2022

Product data sheet

1. General description

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

NPN/NPN complement: PEMH20

PNP/PNP complement: PEMB20

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
- Control of IC inputs
- Replaces general-purpose transistors in digital applications

4. Quick reference data

Table 1. Quick reference data

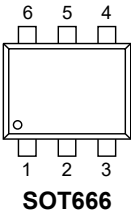
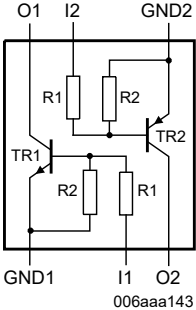
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity						
V _{CEO}	collector-emitter voltage	open base	-	-	50	V
I _O	output current		-	-	100	mA
R1	bias resistor 1 (input)		[1]	1.54	2.2	2.86 k Ω
R2/R1	bias resistor ratio	T _{amb} = 25 °C	[1]	0.8	1	1.2

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

50 V, 100 mA NPN/PNP resistor-equipped double transistor; R1 = 2.2 kΩ, R2 = 2.2 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		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PEMD20	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

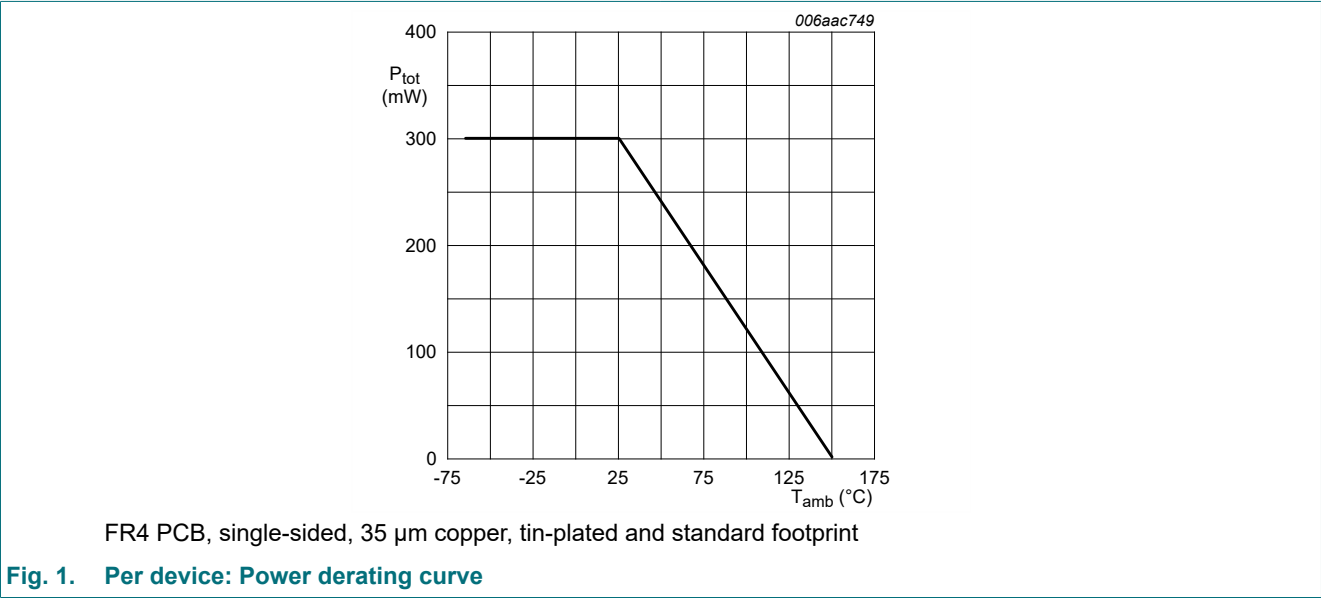
Type number	Marking code
PEMD20	6H

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		-	10	V
I _O	output current			-	100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	200	mW
TR1 (NPN)						
V _I	input voltage	positive		-	12	V
		negative		-	-10	V
TR2 (PNP)						
V _I	input voltage	positive		-	10	V
		negative		-	-12	V
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	300	mW
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-65	150	°C
T _{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

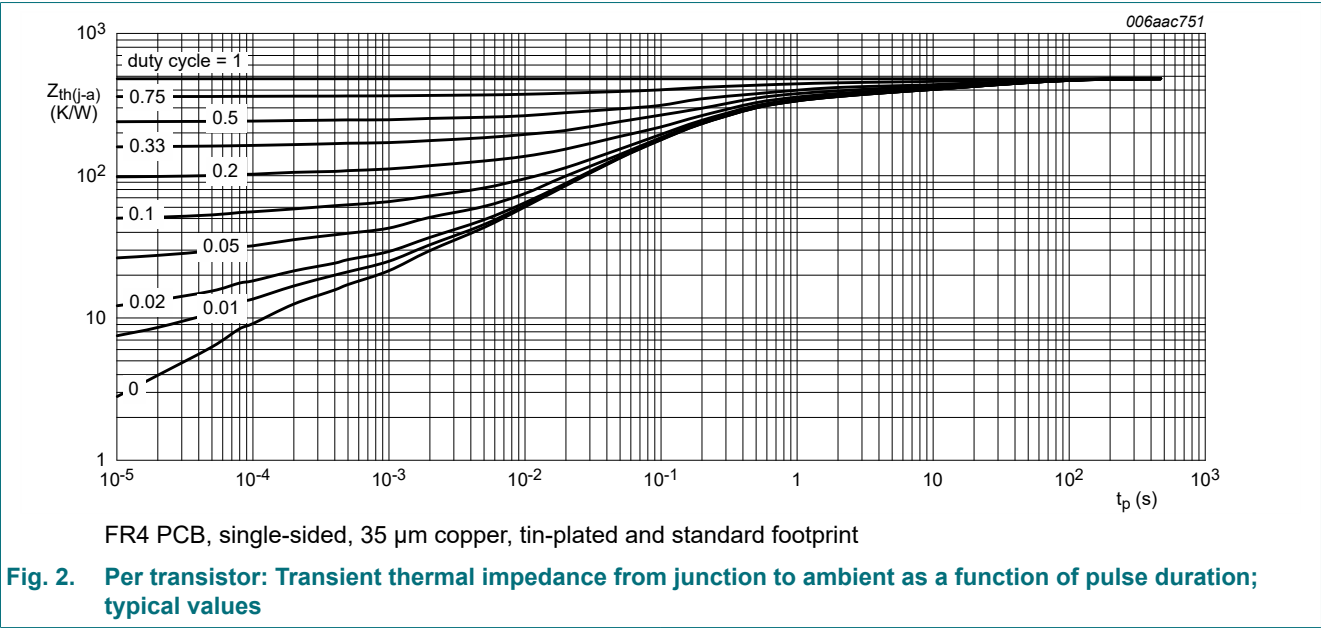


9. Thermal characteristics

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 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	$I_C = 100\ \mu\text{A}$; $I_E = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2\ \text{mA}$; $I_B = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		50	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 50\ \text{V}$; $I_E = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	-	100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30\ \text{V}$; $I_B = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	-	1	μA
		$V_{CE} = 30\ \text{V}$; $I_B = 0\ \text{A}$; $T_{\text{amb}} = 150\ ^\circ\text{C}$		-	-	50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\ \text{V}$; $I_C = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	-	2	mA
h_{FE}	DC current gain	$V_{CE} = 5\ \text{V}$; $I_C = 20\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		30	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\ \text{mA}$; $I_B = 0.5\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	-	150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = 5\ \text{V}$; $I_C = 1\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	1.2	0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = 0.3\ \text{V}$; $I_C = 20\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		2	1.6	-	V
R1	bias resistor 1 (input)		[1]	1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio	$T_{\text{amb}} = 25\ ^\circ\text{C}$	[1]	0.8	1	1.2	
TR1 (NPN)							
C_c	collector capacitance	$V_{CB} = 10\ \text{V}$; $I_E = 0\ \text{A}$; $f = 1\ \text{MHz}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	-	2.5	pF
TR2 (PNP)							
C_c	collector capacitance	$V_{CB} = -10\ \text{V}$; $I_E = 0\ \text{A}$; $i_e = 0\ \text{A}$; $f = 1\ \text{MHz}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$		-	-	3	pF

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

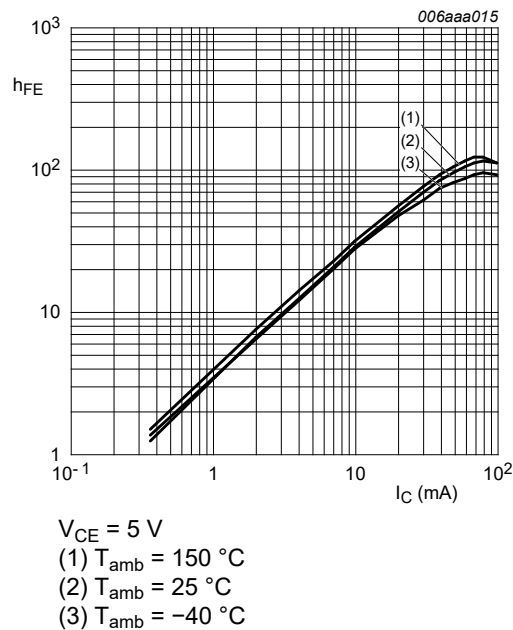


Fig. 3. TR1 (NPN): DC current gain as a function of collector current; typical values

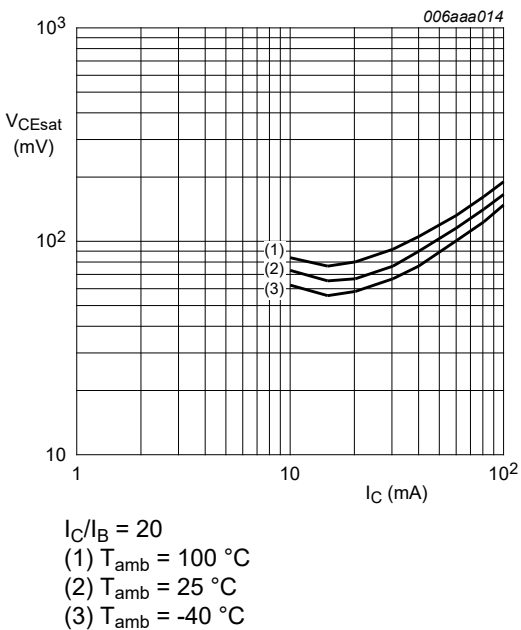


Fig. 4. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

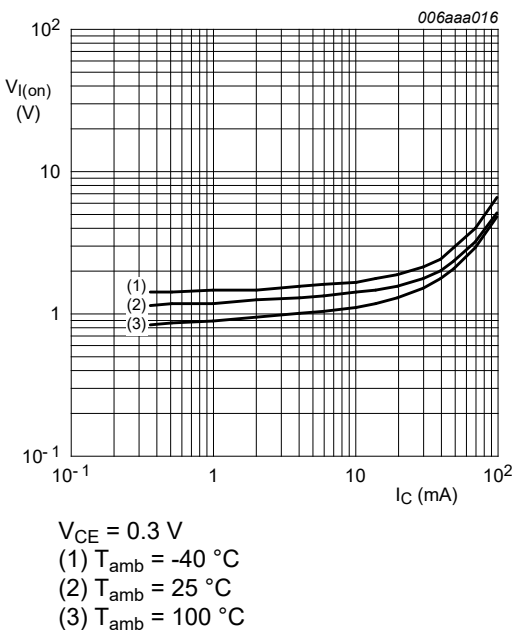


Fig. 5. TR1 (NPN): On-state input voltage as a function of collector current; typical values

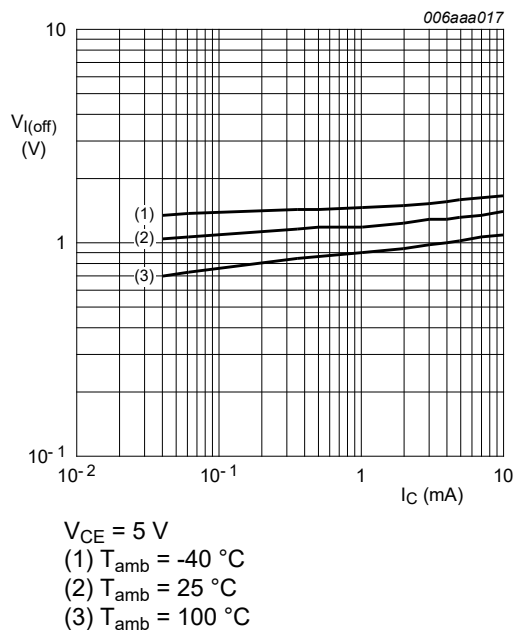


Fig. 6. TR1 (NPN): Off-state input voltage as a function of collector current; typical values

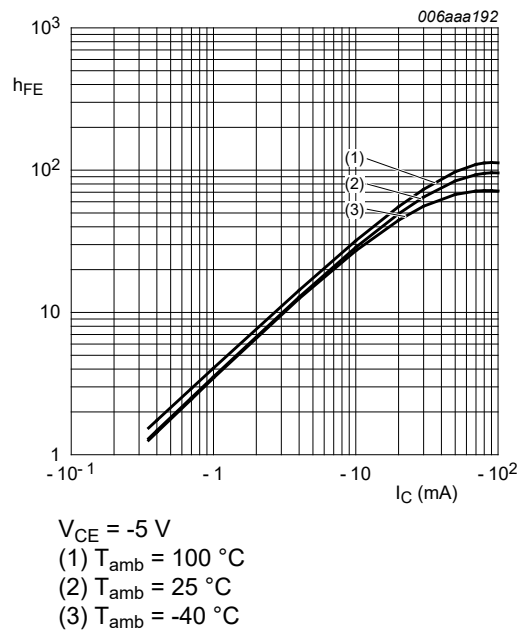


Fig. 7. TR2 (PNP): DC current gain as a function of collector current; typical values

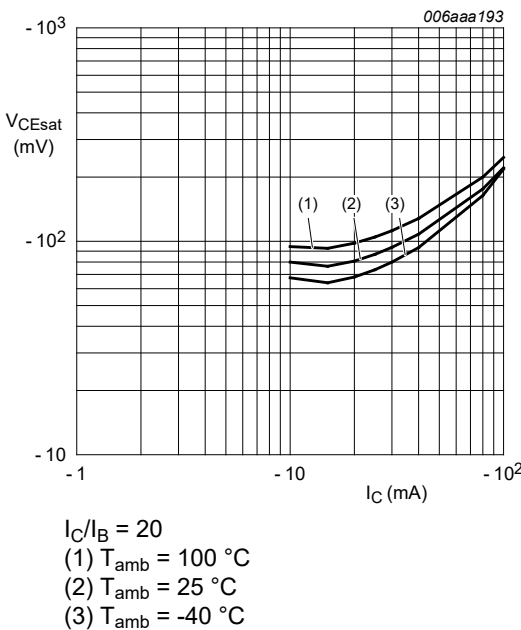


Fig. 8. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

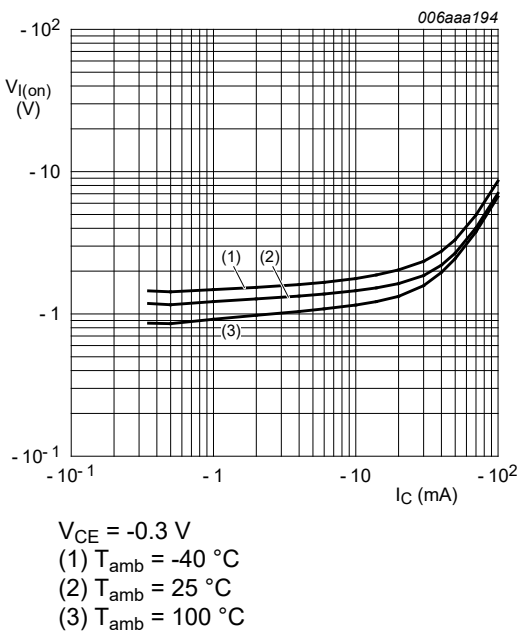


Fig. 9. TR2 (PNP): On-state input voltage as a function of collector current; typical values

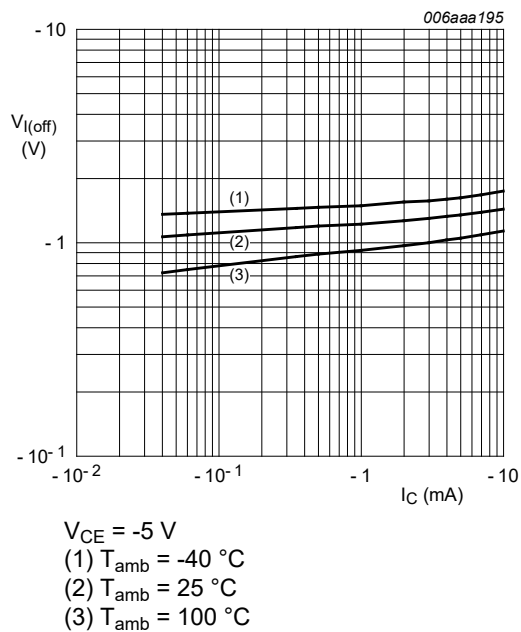


Fig. 10. TR2 (PNP): Off-state input voltage as a function of collector current; typical values

11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R1 = \frac{V(I12) - V(I11)}{I12 - I11}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I3)}{R1 \cdot I3} - 1$$

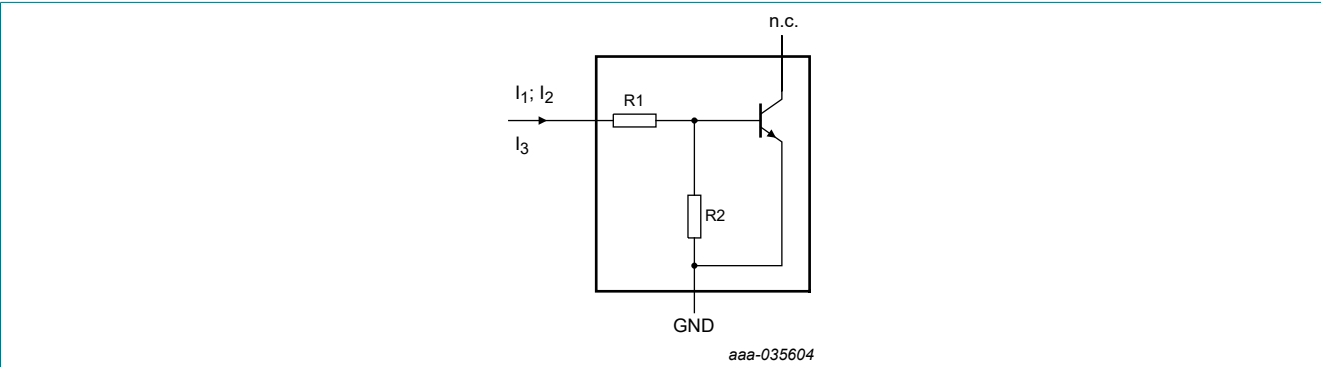


Fig. 11. TR1 (NPN): Resistor test circuit

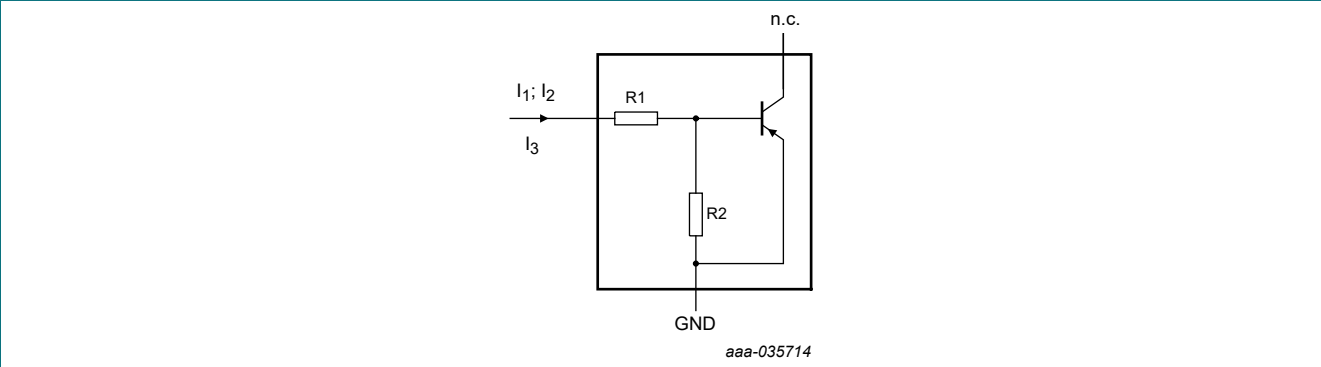


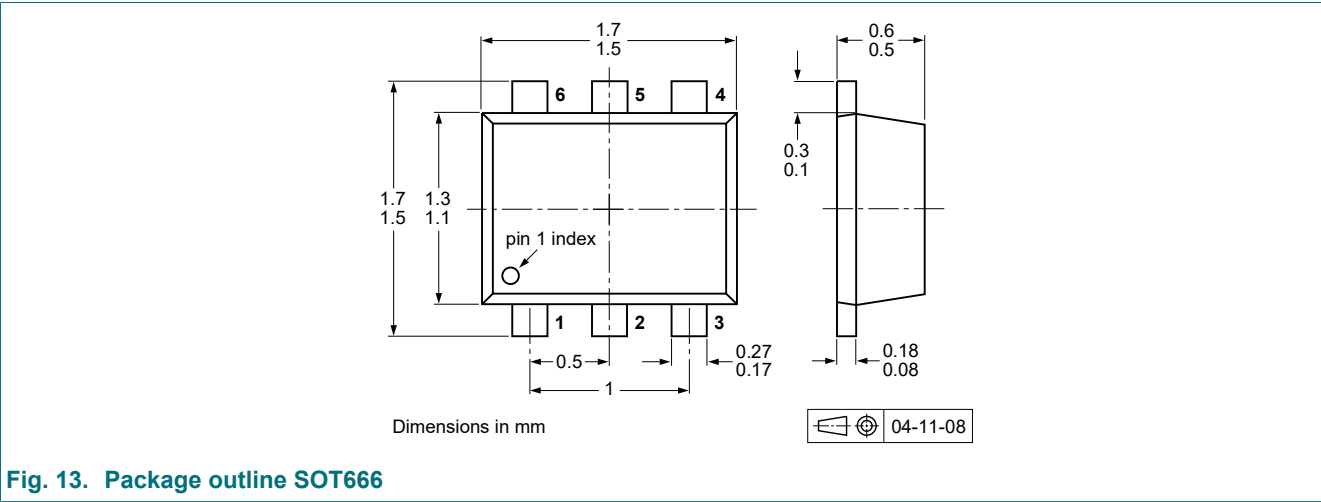
Fig. 12. TR2 (PNP): Resistor test circuit

Resistor test conditions

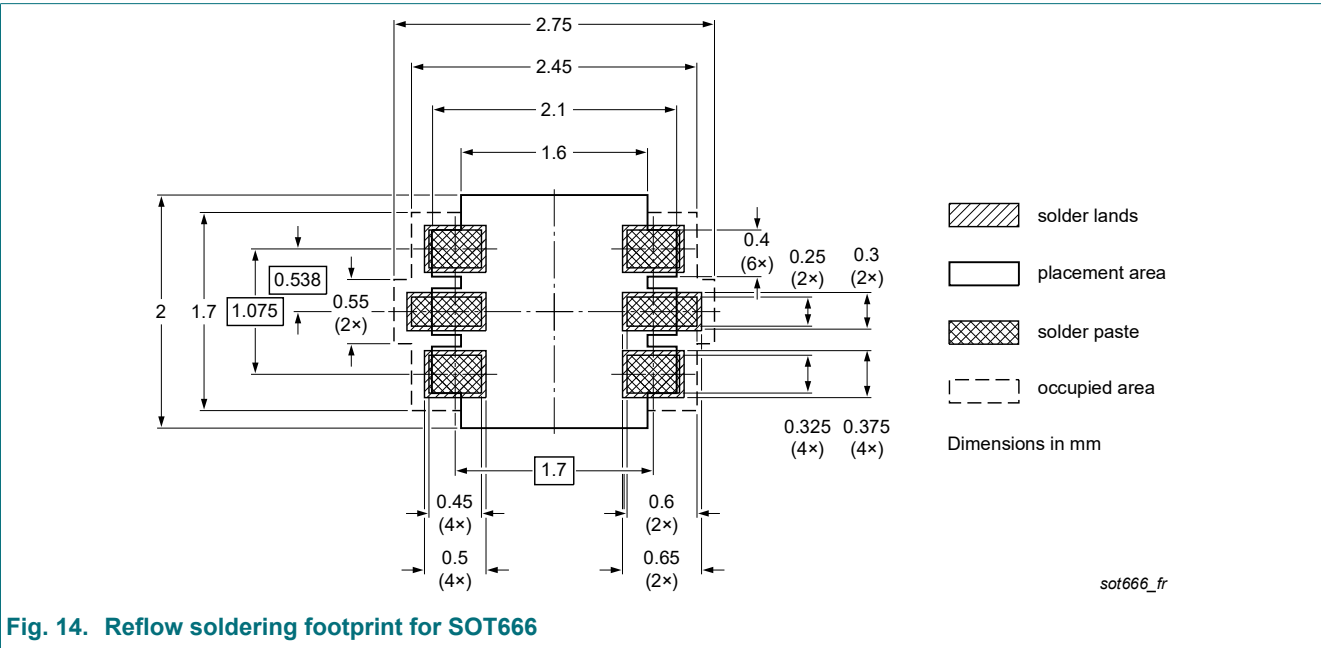
Table 8. Resistor test conditions

PEMD20	R1 (kΩ)	R2 (kΩ)	Test conditions		
			I1	I2	I3
TR1 (NPN)	2.2	2.2	750 μA	950 μA	-850 μA
TR2 (PNP)	2.2	2.2	-750 μA	-950 μA	850 μA

12. Package outline



13. Soldering



14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PEMD20 v.2	20221229	Product data sheet	-	PEMD20_PUMD20_1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Family data sheet splitted to single type data sheets. • Section "Packing information" removed. • Product changed to non-automotive qualification.			
PEMD20_PUMD20_1	20050502	Product data sheet	-	-

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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