



# PIMP32PA

50 V, 500 mA PNP/PNP Resistor-Equipped double Transistor;  
R1 = 2.2 k $\Omega$ , R2 = 10 k $\Omega$

31 August 2023

Product data sheet

## 1. General description

PNP/PNP Resistor-Equipped double Transistor (RET) in a medium power SOT1118 (DFN2020-6) leadless Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PIMN32PA

NPN/PNP complement: PIMC32PA

## 2. Features and benefits

- 500 mA output current capability
- Built-in resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs

## 3. Applications

- Digital applications
- Cost-saving alternative to BC807 series in digital applications
- Control of IC inputs
- Switching loads

## 4. Quick reference data

Table 1. Quick reference data

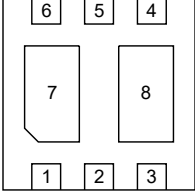
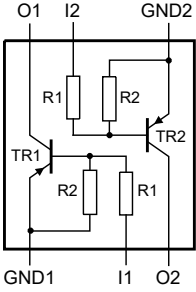
| Symbol                | Parameter                 | Conditions               |     | Min  | Typ  | Max  | Unit       |
|-----------------------|---------------------------|--------------------------|-----|------|------|------|------------|
| <b>Per transistor</b> |                           |                          |     |      |      |      |            |
| V <sub>CEO</sub>      | collector-emitter voltage | open base                |     | -    | -    | -50  | V          |
| I <sub>O</sub>        | output current            |                          |     | -    | -    | -500 | mA         |
| R1                    | bias resistor 1 (input)   | T <sub>amb</sub> = 25 °C | [1] | 1.54 | 2.2  | 2.86 | k $\Omega$ |
| R2/R1                 | bias resistor ratio       |                          | [1] | 4.1  | 4.55 | 5    |            |

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

50 V, 500 mA PNP/PNP Resistor-Equipped double Transistor; R1 = 2.2 kΩ, R2 = 10 kΩ

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description            | Simplified outline                                                                                                                           | Graphic symbol                                                                                        |
|-----|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1   | GND1   | GND (emitter) TR1      |  <p>Transparent top view<br/><b>DFN2020-6 (SOT1118)</b></p> |  <p>aaa-019790</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 |                                                                                                                                              |                                                                                                       |
| 7   | O1     | output (collector) TR1 |                                                                                                                                              |                                                                                                       |
| 8   | O2     | output (collector) TR2 |                                                                                                                                              |                                                                                                       |

6. Ordering information

Table 3. Ordering information

| Type number              | Package   |                                                                                                                                       |                         |
|--------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|                          | Name      | Description                                                                                                                           | Version                 |
| <a href="#">PIMP32PA</a> | DFN2020-6 | plastic, leadless thermal enhanced ultra thin small outline package; no leads; 6 terminals; 0.65 mm pitch; 2 mm x 2 mm x 0.65 mm body | <a href="#">SOT1118</a> |

7. Marking

Table 4. Marking codes

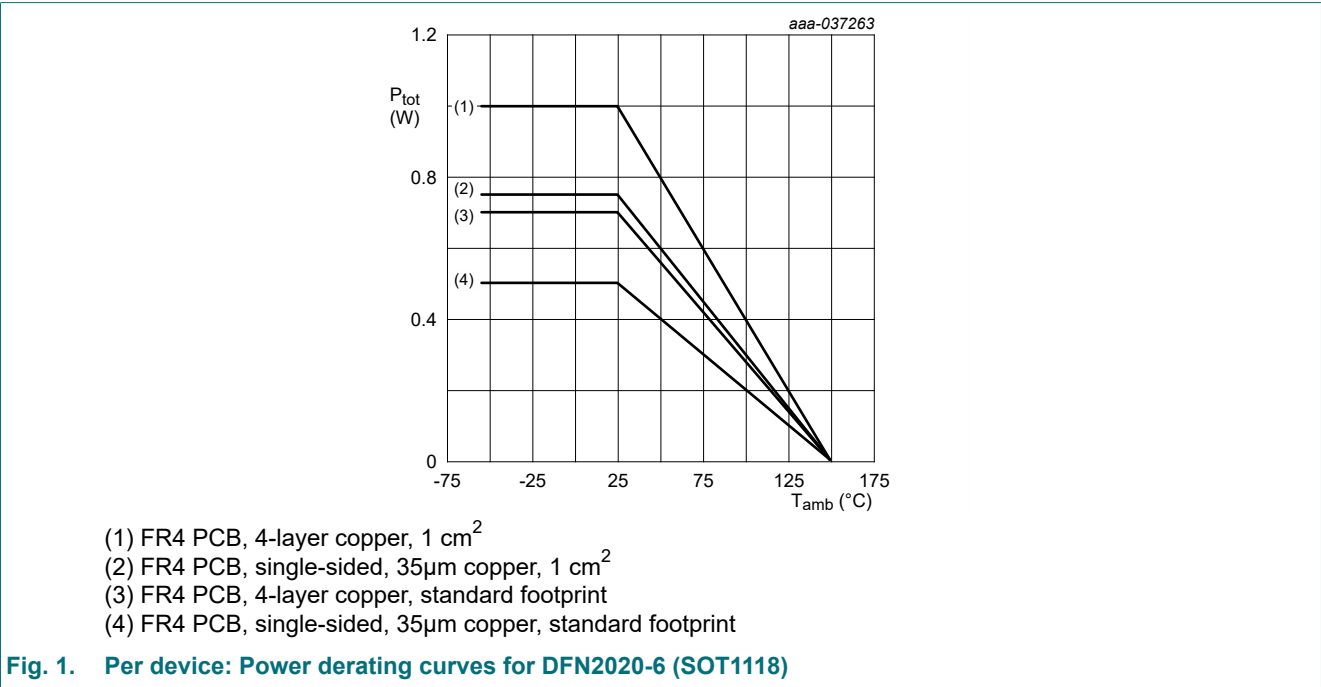
| Type number | Marking code |
|-------------|--------------|
| PIMP32PA    | 8H           |

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    |
| V <sub>I</sub>   | input voltage             |                          |     | -12 | 5    | V    |
| I <sub>O</sub>   | output current            |                          |     | -   | -500 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C | [1] | -   | 360  | mW   |
|                  |                           |                          | [2] | -   | 550  | mW   |
|                  |                           |                          | [3] | -   | 510  | mW   |
|                  |                           |                          | [4] | -   | 730  | mW   |
| Per device       |                           |                          |     |     |      |      |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C | [1] | -   | 500  | mW   |
|                  |                           |                          | [2] | -   | 750  | mW   |
|                  |                           |                          | [3] | -   | 700  | mW   |
|                  |                           |                          | [4] | -   | 1    | W    |
| T <sub>j</sub>   | junction temperature      |                          |     | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature       |                          |     | -55 | 150  | °C   |
| T <sub>stg</sub> | storage temperature       |                          |     | -65 | 150  | °C   |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 μm copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided, 35μm copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
- [3] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.



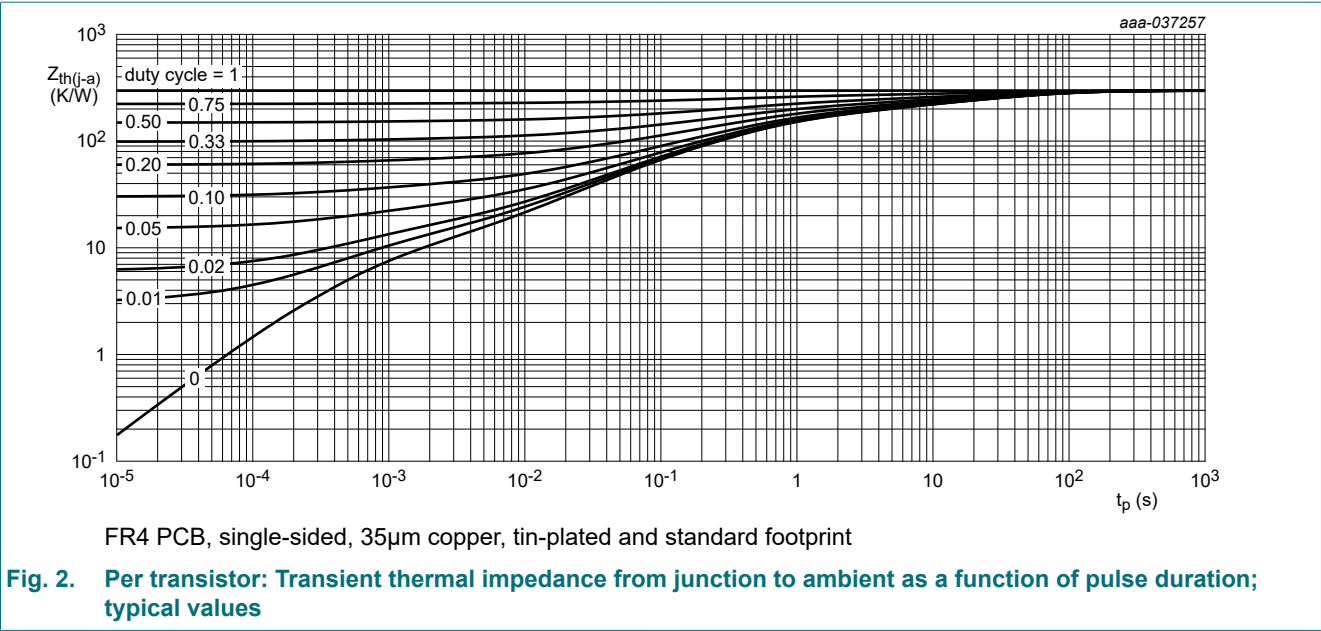
50 V, 500 mA PNP/PNP Resistor-Equipped double Transistor; R1 = 2.2 kΩ, R2 = 10 kΩ

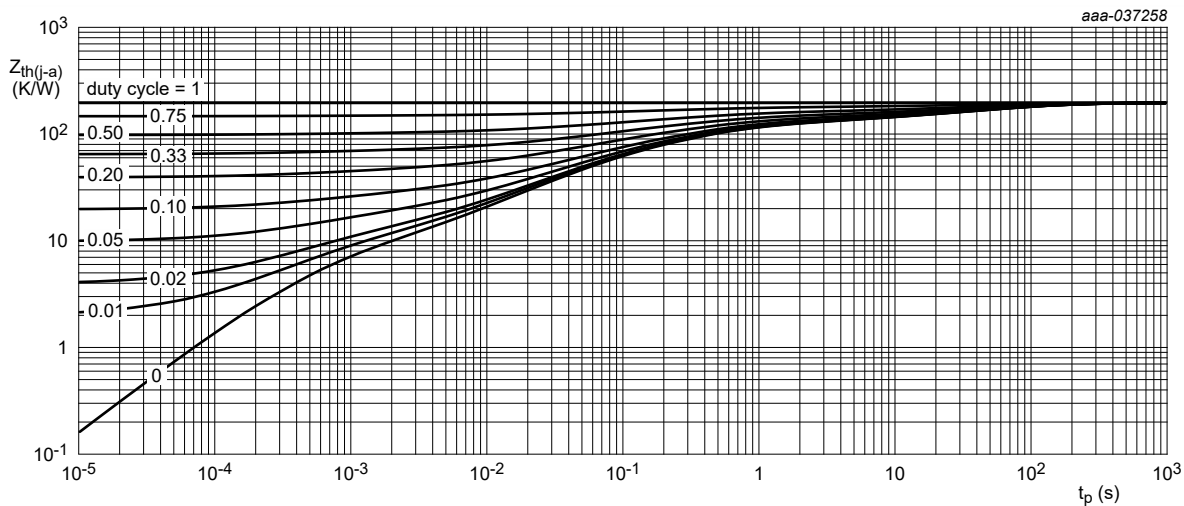
9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol               | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| Per transistor       |                                             |             |     |     |     |     |      |
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 348 | K/W  |
|                      |                                             |             | [2] | -   | -   | 228 | K/W  |
|                      |                                             |             | [3] | -   | -   | 246 | K/W  |
|                      |                                             |             | [4] | -   | -   | 172 | K/W  |
| Per device           |                                             |             |     |     |     |     |      |
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 250 | K/W  |
|                      |                                             |             | [2] | -   | -   | 167 | K/W  |
|                      |                                             |             | [3] | -   | -   | 179 | K/W  |
|                      |                                             |             | [4] | -   | -   | 125 | K/W  |

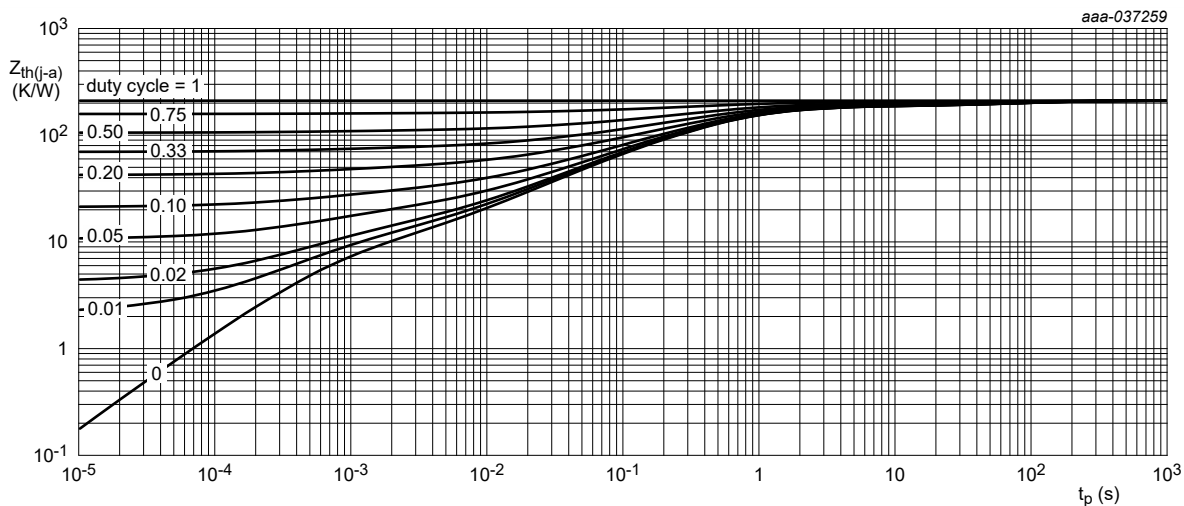
- [1] Device mounted on an FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided, 35μm copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
- [3] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.





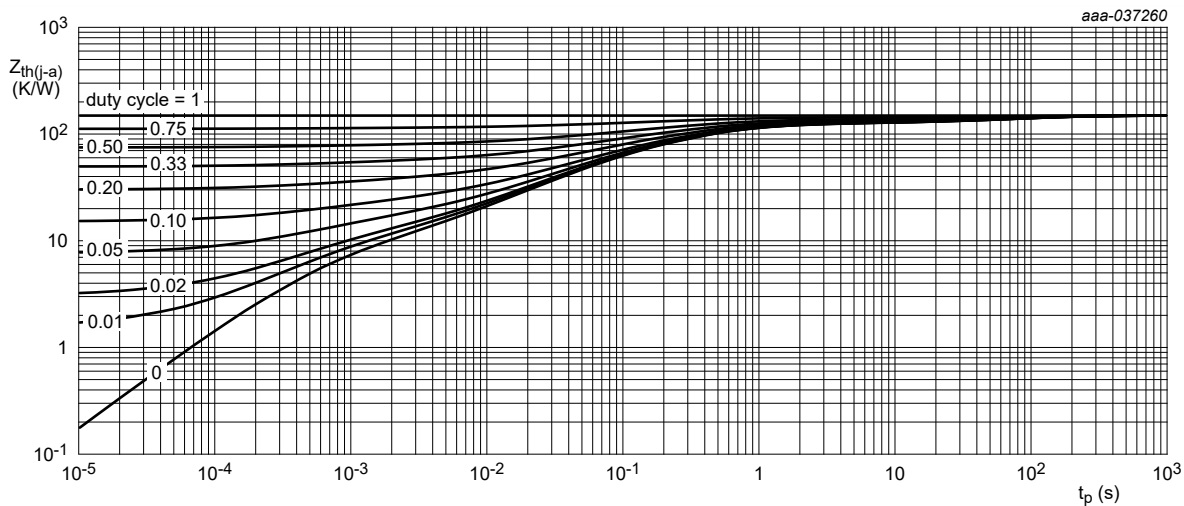
FR4 PCB, single-sided, 35µm copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

Fig. 3. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 4-layer copper, tin-plated and standard footprint.

Fig. 4. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

**Fig. 5. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

## 10. Characteristics

Table 7. Characteristics

| Symbol               | Parameter                            | Conditions                                                                                               |     | Min  | Typ   | Max   | Unit |
|----------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------|-----|------|-------|-------|------|
| Per transistor       |                                      |                                                                                                          |     |      |       |       |      |
| V <sub>(BR)CBO</sub> | collector-base breakdown voltage     | I <sub>C</sub> = -100 μA; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C                                 |     | -50  | -     | -     | V    |
| V <sub>(BR)CEO</sub> | collector-emitter breakdown voltage  | I <sub>C</sub> = -10 mA; I <sub>B</sub> = 0 A; T <sub>amb</sub> = 25 °C                                  |     | -50  | -     | -     | V    |
| I <sub>CBO</sub>     | collector-base cut-off current       | V <sub>CB</sub> = -50 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C                                  |     | -    | -     | -100  | nA   |
| I <sub>CEO</sub>     | collector-emitter cut-off current    | V <sub>CE</sub> = -50 V; I <sub>B</sub> = 0 A; T <sub>amb</sub> = 25 °C                                  |     | -    | -     | -0.5  | μA   |
| I <sub>EBO</sub>     | emitter-base cut-off current         | V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C                                   |     | -    | -     | -0.65 | mA   |
| h <sub>FE</sub>      | DC current gain                      | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -50 mA; T <sub>amb</sub> = 25 °C                                |     | 70   | -     | -     |      |
| V <sub>CEsat</sub>   | collector-emitter saturation voltage | I <sub>C</sub> = -50 mA; I <sub>B</sub> = -2.5 mA; T <sub>amb</sub> = 25 °C                              |     | -    | -     | -100  | mV   |
| V <sub>I(off)</sub>  | off-state input voltage              | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 μA; T <sub>amb</sub> = 25 °C                               |     | -0.4 | -0.65 | -1    | V    |
| V <sub>I(on)</sub>   | on-state input voltage               | V <sub>CE</sub> = -0.3 V; I <sub>C</sub> = -20 mA; T <sub>amb</sub> = 25 °C                              |     | -0.5 | -0.95 | -1.4  | V    |
| R1                   | bias resistor 1 (input)              | T <sub>amb</sub> = 25 °C                                                                                 | [1] | 1.54 | 2.2   | 2.86  | kΩ   |
| R2/R1                | bias resistor ratio                  |                                                                                                          | [1] | 4.1  | 4.55  | 5     |      |
| C <sub>c</sub>       | collector capacitance                | V <sub>CB</sub> = -10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C |     | -    | 7     | -     | pF   |
| f <sub>T</sub>       | transition frequency                 | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -50 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C                   | [2] | -    | 150   | -     | MHz  |

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

[2] Characteristics of built-in transistor.

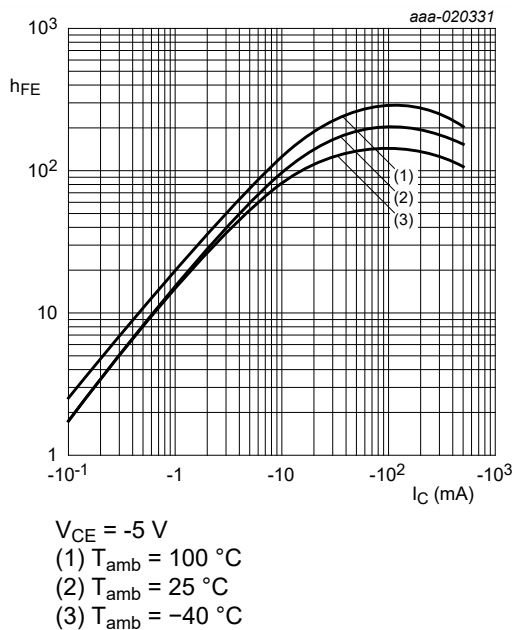


Fig. 6. DC current gain as a function of collector current; typical values

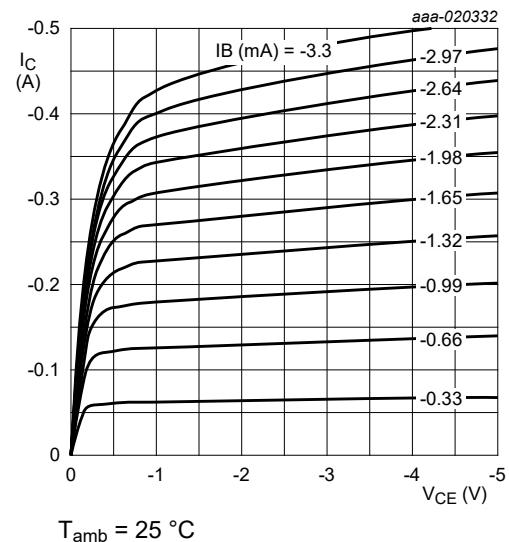


Fig. 7. Collector current as a function of collector-emitter voltage; typical values

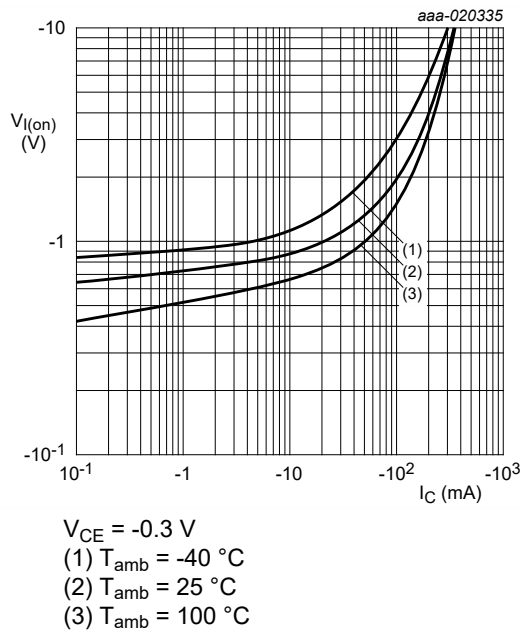


Fig. 8. On-state input voltage as a function of collector current; typical values

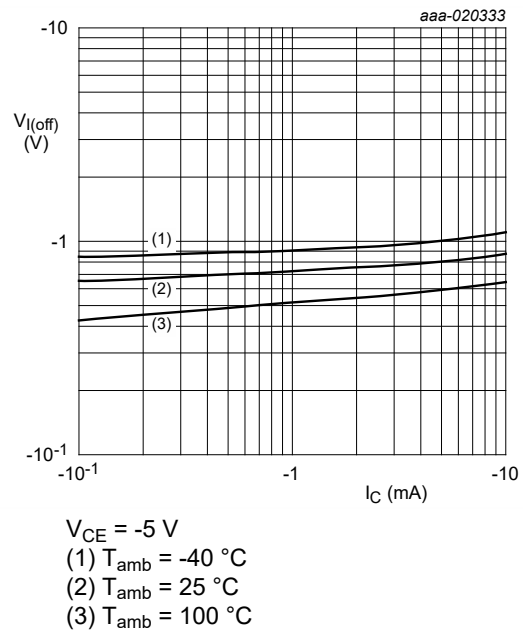


Fig. 9. Off-state input voltage as a function of collector current; typical values

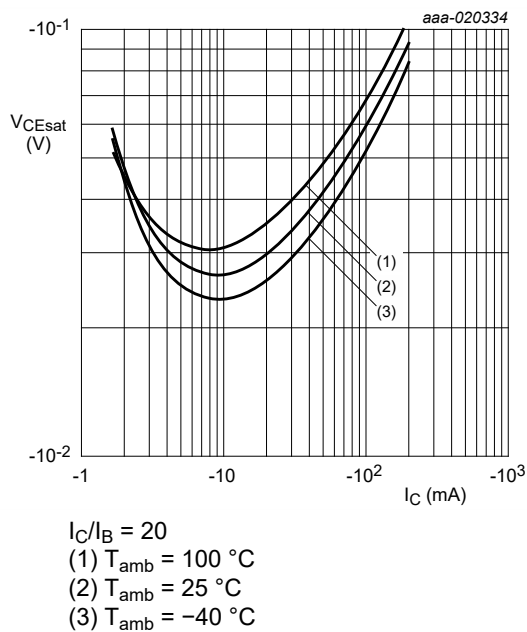


Fig. 10. Collector-emitter saturation voltage as a function of collector current; typical values

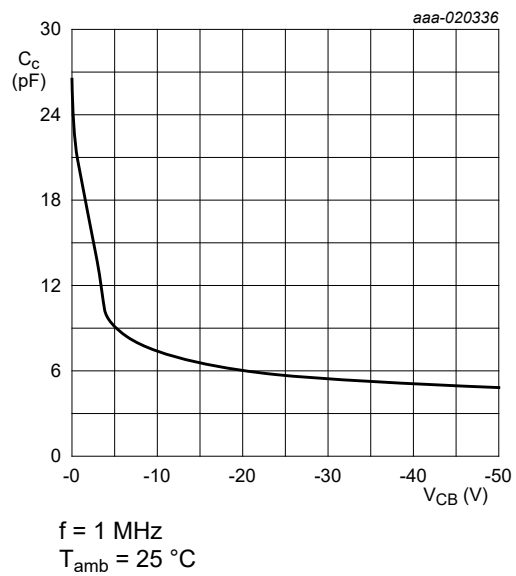
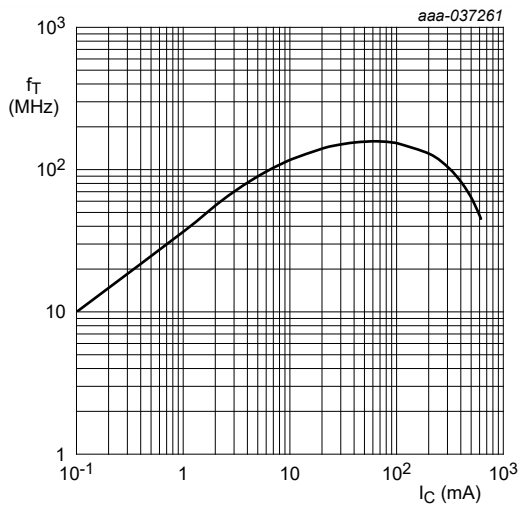


Fig. 11. Collector capacitance as a function of collector-base voltage; typical values

50 V, 500 mA PNP/PNP Resistor-Equipped double Transistor; R1 = 2.2 kΩ, R2 = 10 kΩ



$f = 100 \text{ MHz}$ ;  $V_{CE} = 5 \text{ V}$   $T_{amb} = 25 \text{ }^\circ\text{C}$

Fig. 12. Transition frequency as a function of collector current; typical values of built-in transistor

11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1):

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

- Calculation of bias resistor ratio (R2/R1):

$$\frac{R_2}{R_1} = \frac{V(I_4) - V(I_3)}{R_1 \cdot (I_4 - I_3)} - 1$$

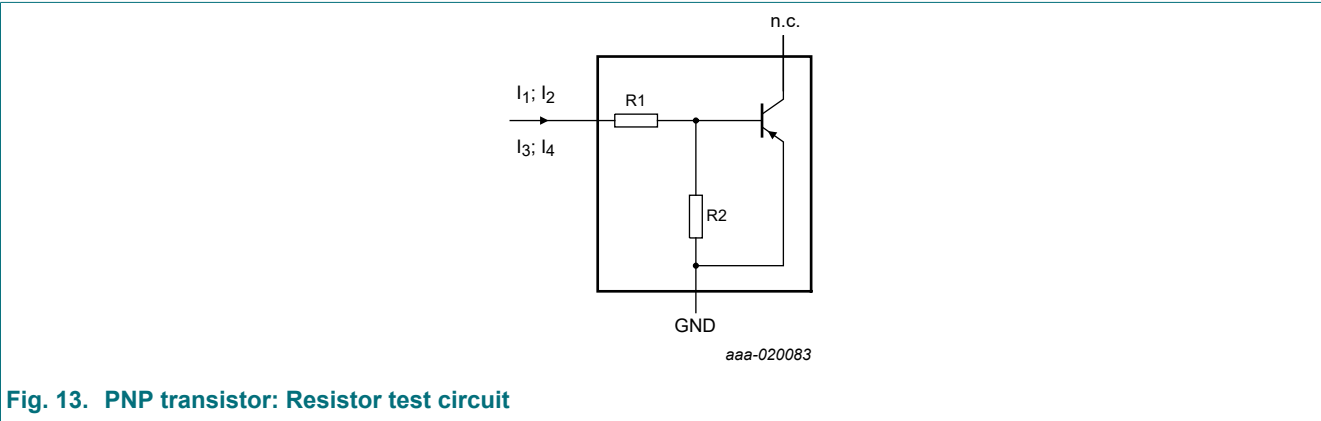


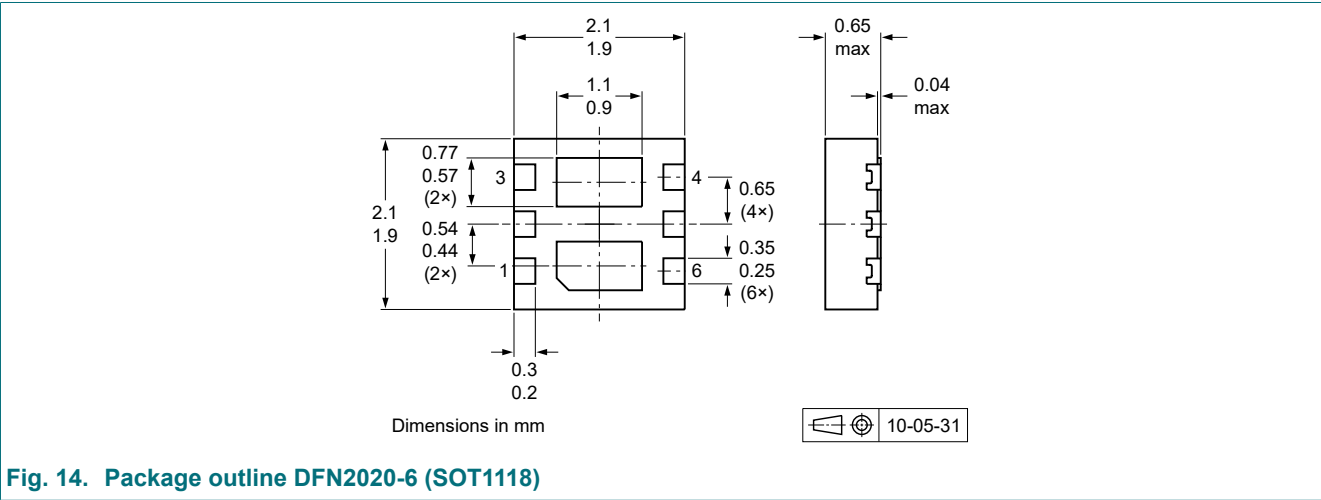
Fig. 13. PNP transistor: Resistor test circuit

Resistor test conditions

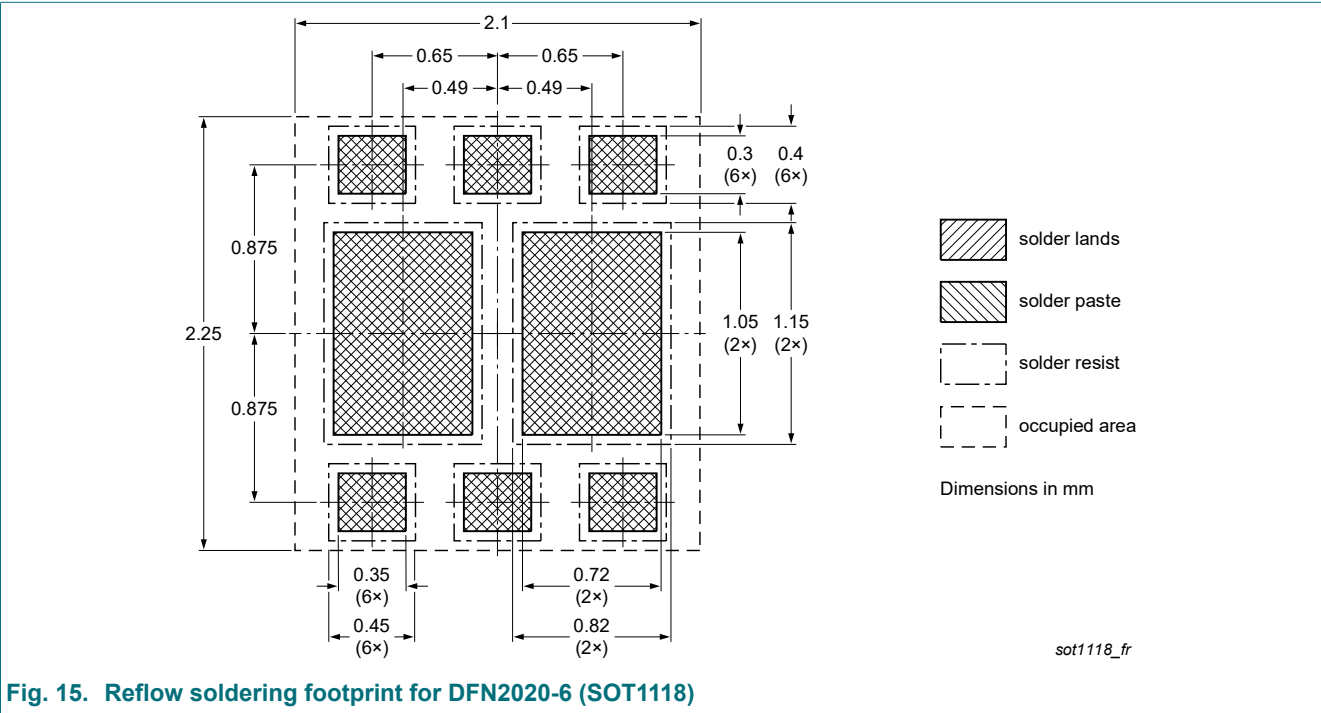
Table 8. Resistor test conditions

| PIMP32PA      | R1 (kΩ) | R2 (kΩ) | Test conditions |         |         |         |
|---------------|---------|---------|-----------------|---------|---------|---------|
|               |         |         | I1              | I2      | I3      | I4      |
| TR1/TR2 (PNP) | 2.2     | 10      | -0.7 mA         | -0.8 mA | 0.45 mA | 0.55 mA |

12. Package outline



13. Soldering



14. Revision history

Table 9. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PIMP32PA v.1  | 20230831     | 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.                                     |

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