



# PDTA144EM-Q

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

10 April 2025

Product data sheet

## 1. General description

PNP Resistor-Equipped Transistor (RET) in an leadless ultra small SOT883 (SC-101) Surface-Mounted Device (SMD) plastic package.

NPN complement: PDTC144EM-Q

## 2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- Digital applications in automotive and industrial segments
- Cost-saving alternative for BC847/857 series in digital applications
- Control of IC inputs
- Switching loads

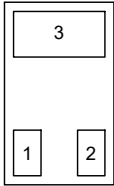
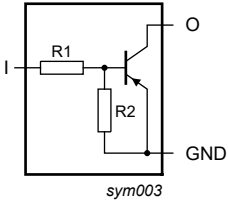
## 4. Quick reference data

Table 1. Quick reference data

| Symbol           | Parameter                 | Conditions               | Min | Typ | Max  | Unit       |
|------------------|---------------------------|--------------------------|-----|-----|------|------------|
| V <sub>CEO</sub> | collector-emitter voltage | open base                | -   | -   | -50  | V          |
| I <sub>O</sub>   | output current            |                          | -   | -   | -100 | mA         |
| R1               | bias resistor 1 (input)   | T <sub>amb</sub> = 25 °C | 33  | 47  | 61   | k $\Omega$ |
| R2/R1            | bias resistor ratio       |                          | 0.8 | 1   | 1.2  |            |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description        | Simplified outline                                                                                                                             | Graphic symbol                                                                                    |
|-----|--------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   | I      | input (base)       |  <p>Transparent top view</p> <p><b>DFN1006-3 (SOT883)</b></p> |  <p>sym003</p> |
| 2   | G      | GND (emitter)      |                                                                                                                                                |                                                                                                   |
| 3   | O      | output (collector) |                                                                                                                                                |                                                                                                   |

6. Ordering information

Table 3. Ordering information

| Type number                 | Package   |                                                                                                 |                        |
|-----------------------------|-----------|-------------------------------------------------------------------------------------------------|------------------------|
|                             | Name      | Description                                                                                     | Version                |
| <a href="#">PDTA144EM-Q</a> | DFN1006-3 | plastic, leadless ultra small package; 3 terminals; 0.35 mm pitch; 1 mm x 0.6 mm x 0.48 mm body | <a href="#">SOT883</a> |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PDTA144EM-Q | DR           |

8. Limiting values

Table 5. Limiting values

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

| Symbol           | Parameter                 | Conditions               |         | Min | Max  | Unit |
|------------------|---------------------------|--------------------------|---------|-----|------|------|
| 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           |         | -   | -10  | V    |
| V <sub>I</sub>   | input voltage             | positive                 |         | -40 | 10   | V    |
| I <sub>O</sub>   | output current            |                          |         | -   | -100 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C | [1] [2] | -   | 250  | 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), with 70 μm copper strip line, standard footprint.

[2] Reflow soldering is the only recommended soldering method.

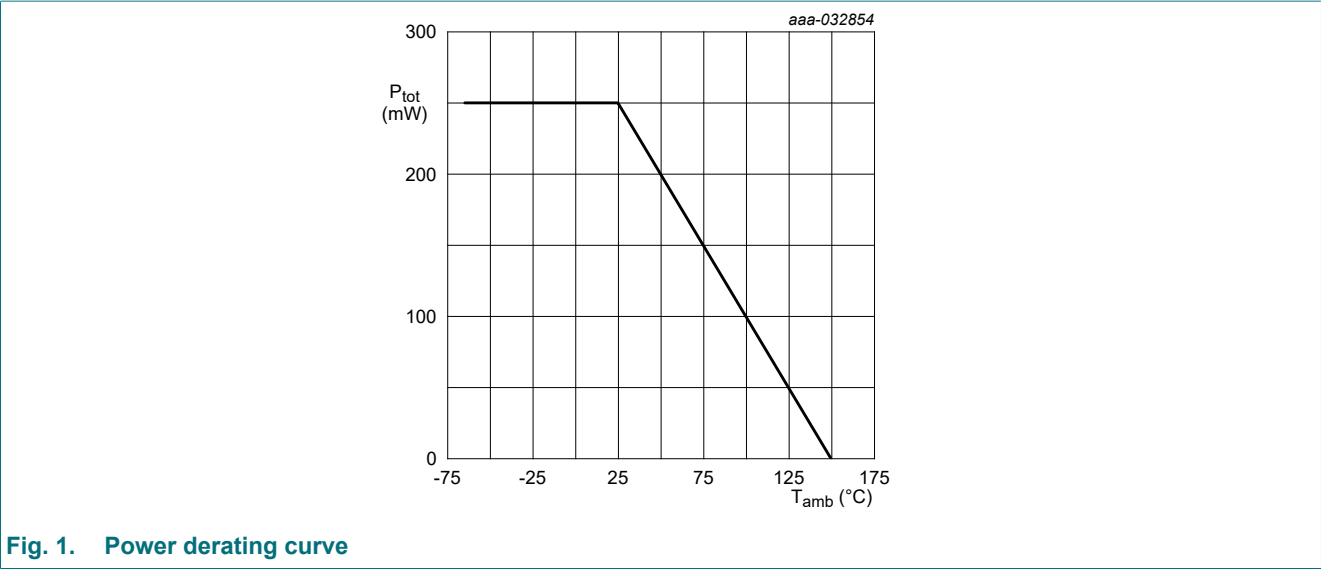


Fig. 1. Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol        | Parameter                                   | Conditions  |         | Min | Typ | Max | Unit |
|---------------|---------------------------------------------|-------------|---------|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] [2] | -   | -   | 500 | K/W  |

- [1] Device mounted on an FR4 PCB, with 70 μm copper strip line, standard footprint.  
[2] Reflow soldering is the only recommended soldering method.

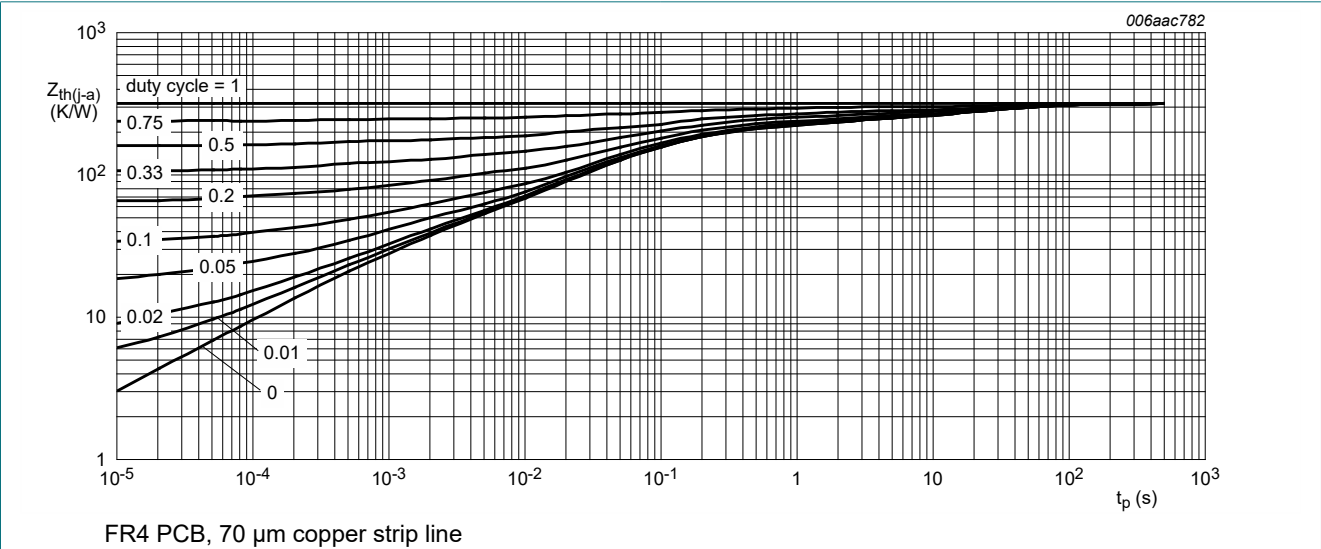


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

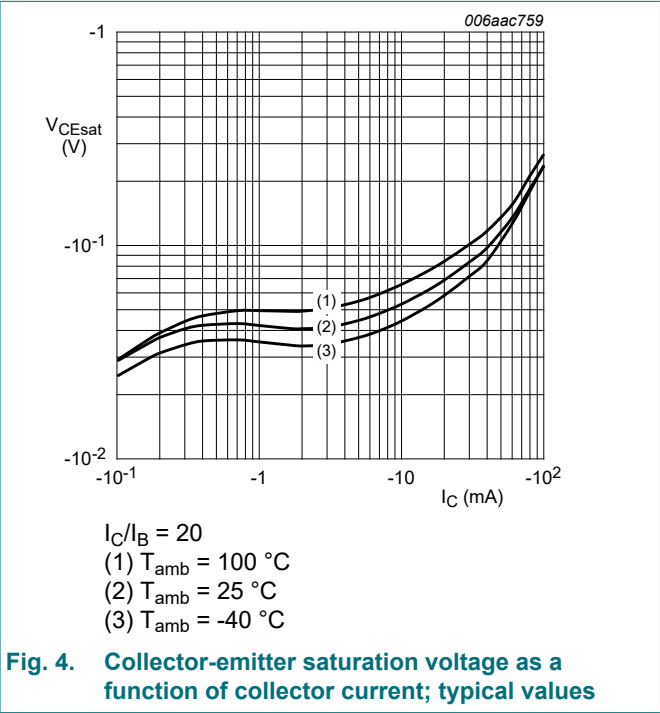
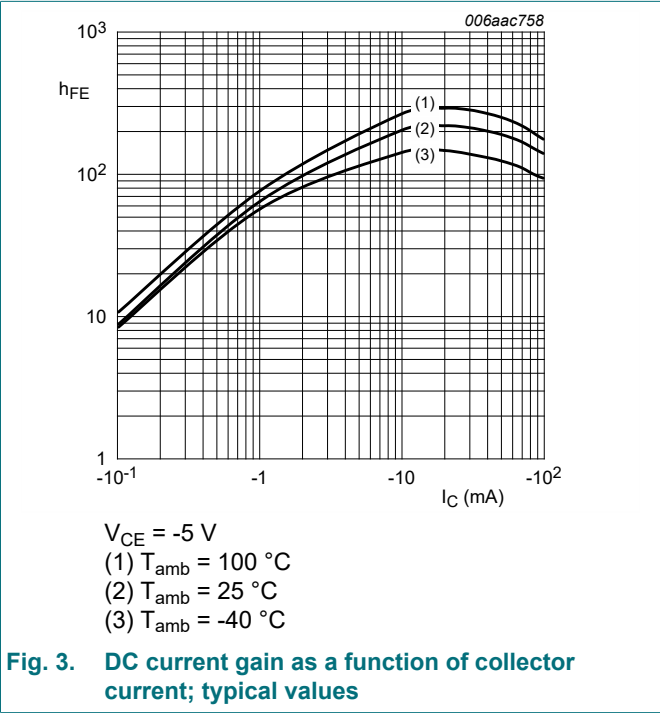
Table 7. Characteristics

| Symbol    | Parameter                      | Conditions                                       |  | Min | Typ | Max  | Unit |
|-----------|--------------------------------|--------------------------------------------------|--|-----|-----|------|------|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB} = -50$ V; $I_E = 0$ A; $T_{amb} = 25$ °C |  | -   | -   | -100 | nA   |

50 V, 100 mA PNP resistor-equipped transistor; R1 = 47 kΩ, R2 = 47 kΩ

| Symbol       | Parameter                            | Conditions                                                                                                          | Min | Typ  | Max  | Unit          |
|--------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----|------|------|---------------|
| $I_{CEO}$    | collector-emitter cut-off current    | $V_{CE} = -30\text{ V}; I_B = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                     | -   | -    | -100 | nA            |
|              |                                      | $V_{CE} = -30\text{ V}; I_B = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$                                        | -   | -    | -5   | $\mu\text{A}$ |
| $I_{EBO}$    | emitter-base cut-off current         | $V_{EB} = -5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                      | -   | -    | -90  | $\mu\text{A}$ |
| $h_{FE}$     | DC current gain                      | $V_{CE} = -5\text{ V}; I_C = -5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                    | 80  | -    | -    |               |
| $V_{CEsat}$  | collector-emitter saturation voltage | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                   | -   | -    | -150 | mV            |
| $V_{I(off)}$ | off-state input voltage              | $V_{CE} = -5\text{ V}; I_C = -100\text{ }\mu\text{A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                         | -   | -1.2 | -0.8 | V             |
| $V_{I(on)}$  | on-state input voltage               | $V_{CE} = -0.3\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                  | -3  | -1.6 | -    | V             |
| R1           | bias resistor 1 (input)              | $T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                              | 33  | 47   | 61   | kΩ            |
| R2/R1        | bias resistor ratio                  |                                                                                                                     | 0.8 | 1    | 1.2  |               |
| $C_c$        | collector capacitance                | $V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | -   | -    | 3    | pF            |
| $f_T$        | transition frequency                 | $V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$               | [1] | 180  | -    | MHz           |

[1] Characteristics of built-in transistor.



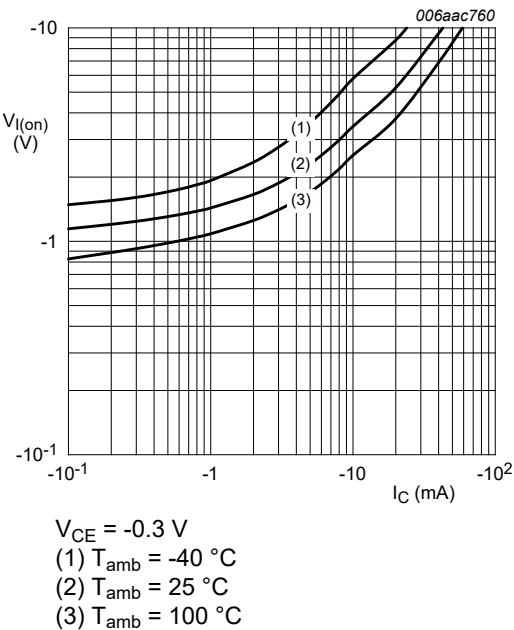


Fig. 5. On-state input voltage as a function of collector current; typical values

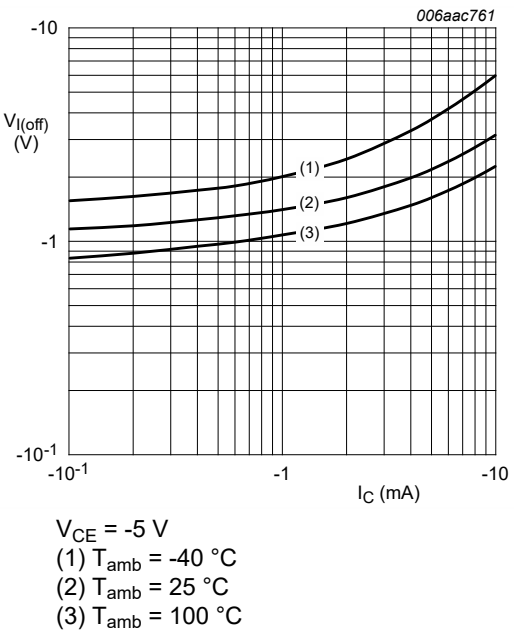


Fig. 6. Off-state input voltage as a function of collector current; typical values

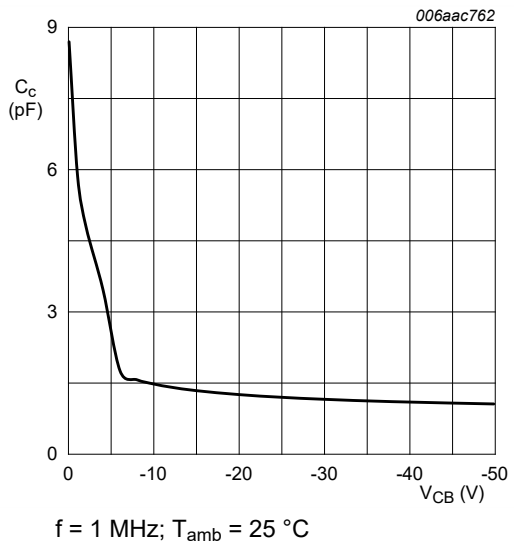


Fig. 7. Collector capacitance as a function of collector-base voltage; typical values of built-in transistor

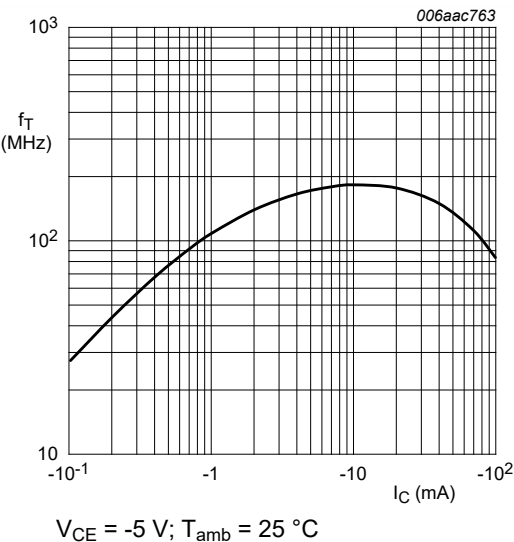


Fig. 8. Transition frequency as a function of collector current; typical values of built-in transistor

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

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)

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

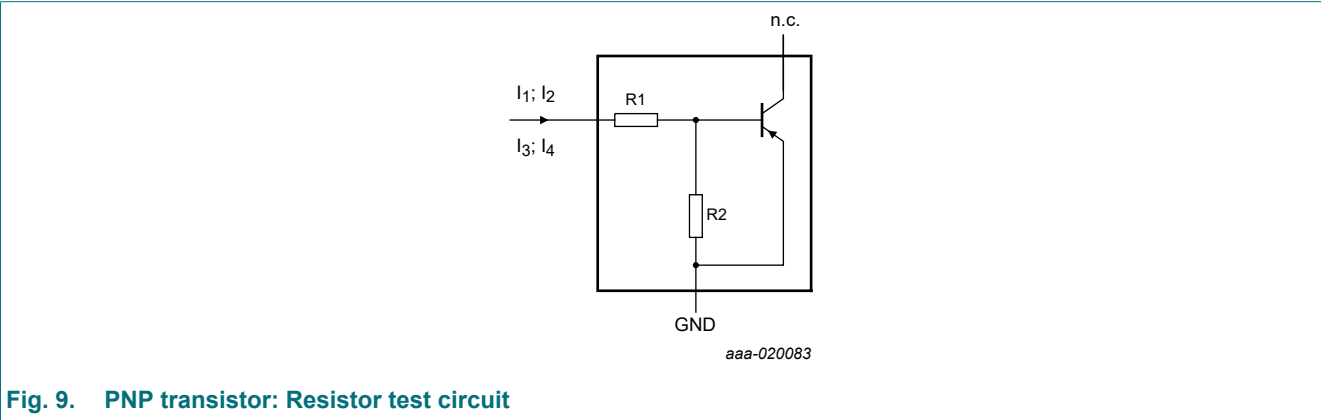


Fig. 9. PNP transistor: Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

| Type number | R1 (kΩ) | R2 (kΩ) | Test conditions |         |       |        |
|-------------|---------|---------|-----------------|---------|-------|--------|
|             |         |         | I1              | I2      | I3    | I4     |
| PDTA144EM-Q | 47      | 47      | -55 μA          | -105 μA | 55 μA | 105 μA |

12. Package outline

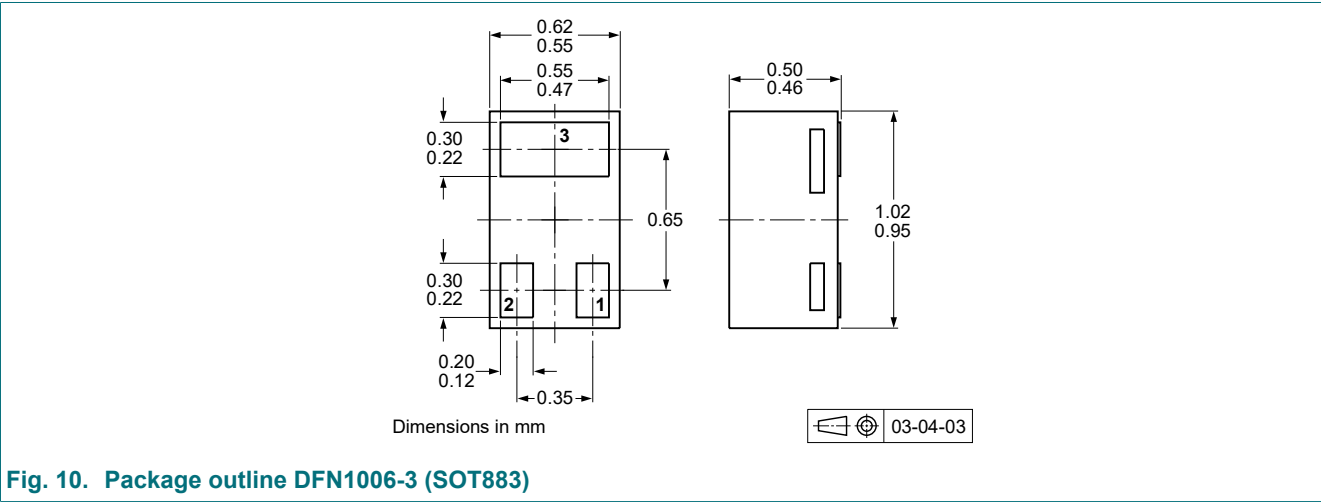
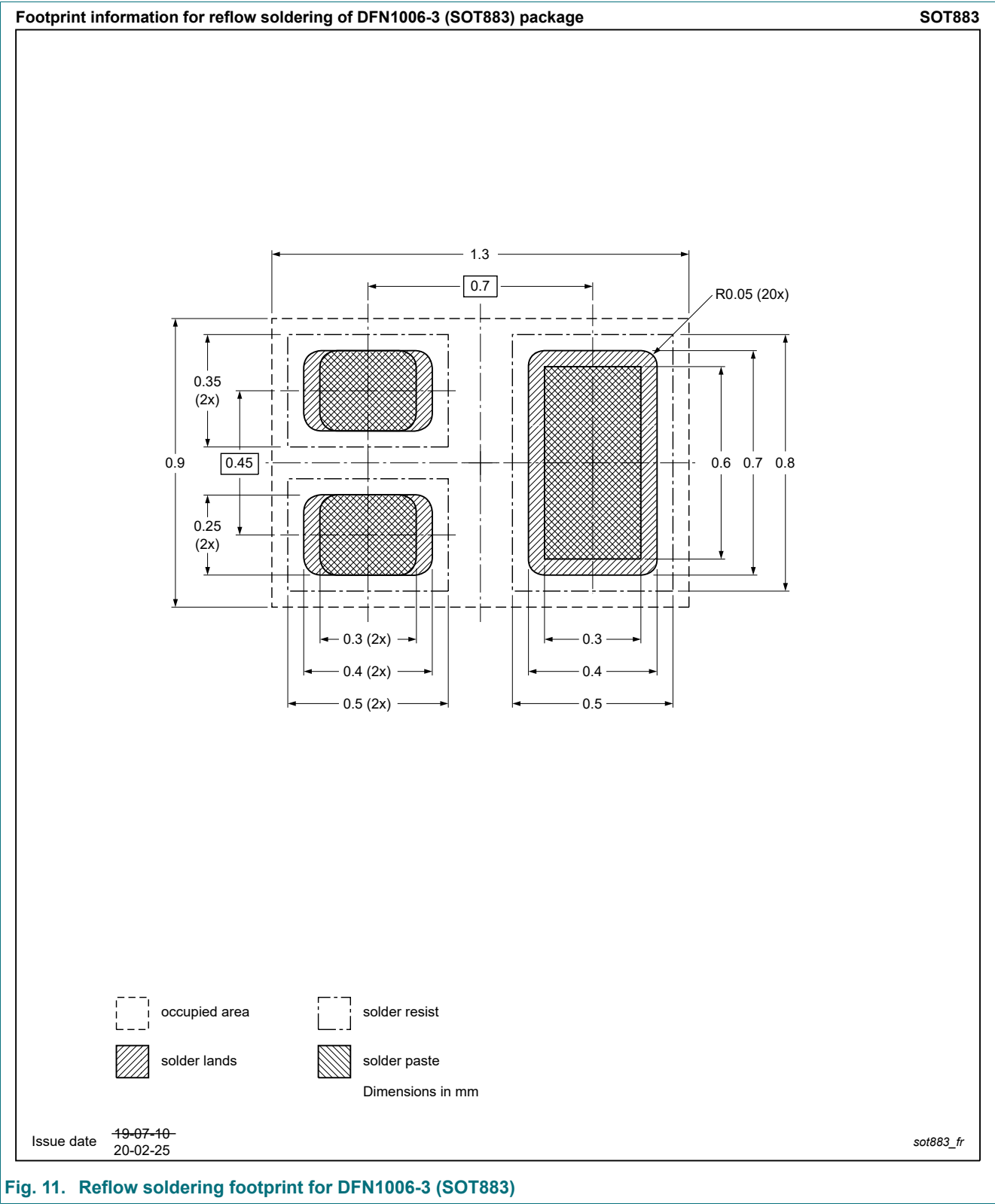


Fig. 10. Package outline DFN1006-3 (SOT883)

13. Soldering



50 V, 100 mA PNP resistor-equipped transistor; R1 = 47 kΩ, R2 = 47 kΩ

14. Revision history

Table 9. Revision history

| Data sheet ID   | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PDTA144EM-Q v.1 | 20250410     | 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".
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Date of release: 10 April 2025