

# ANTREX Electronics

Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** PHPT61006PYX  
**Manufacturer:** Nexperia USA Inc.  
**Package:** SC-100, SOT-669  
**Availability:** Please confirm with sales

### Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/phpt61006pyx.html>

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### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

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# PHPT61006PY

100 V, 6 A PNP high power bipolar transistor

12 August 2026

Product data sheet

## 1. General description

PNP high power bipolar transistor in a SOT669 (LFAK56) Surface-Mounted Device (SMD) power plastic package.

NPN complement: PHPT61006NY

## 2. Features and benefits

- High thermal power dissipation capability
- High temperature applications up to 175 °C
- Reduced Printed Circuit Board (PCB) requirements comparing to transistors in DPAK
- High energy efficiency due to less heat generation

## 3. Applications

- Power management
- Load switch
- Linear mode voltage regulator
- Backlighting applications
- Motor drive
- Relay replacement

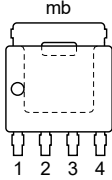
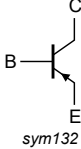
## 4. Quick reference data

Table 1. Quick reference data

| Symbol      | Parameter                               | Conditions                                                                                            | Min | Typ | Max  | Unit       |
|-------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------|-----|-----|------|------------|
| $V_{CEO}$   | collector-emitter voltage               | open base                                                                                             | -   | -   | -100 | V          |
| $I_C$       | collector current                       |                                                                                                       | -   | -   | -6   | A          |
| $I_{CM}$    | peak collector current                  | single pulse; $t_p \leq 1$ ms                                                                         | -   | -   | -12  | A          |
| $R_{CEsat}$ | collector-emitter saturation resistance | $I_C = -6$ A; $I_B = -600$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C | -   | 85  | 270  | m $\Omega$ |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                                                      | Graphic symbol                                                                      |
|-----|--------|-------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | E      | emitter     | <br><b>LFPAK56; Power-SO8 (SOT669)</b> |  |
| 2   | E      | emitter     |                                                                                                                         |                                                                                     |
| 3   | E      | emitter     |                                                                                                                         |                                                                                     |
| 4   | B      | base        |                                                                                                                         |                                                                                     |
| mb  | C      | collector   |                                                                                                                         |                                                                                     |

6. Ordering information

Table 3. Ordering information

| Type number                 | Package            |                                                            |                        |
|-----------------------------|--------------------|------------------------------------------------------------|------------------------|
|                             | Name               | Description                                                | Version                |
| <a href="#">PHPT61006PY</a> | LFPAK56; Power-SO8 | plastic, single-ended surface-mounted package; 4 terminals | <a href="#">SOT669</a> |

7. Marking

Table 4. Marking codes

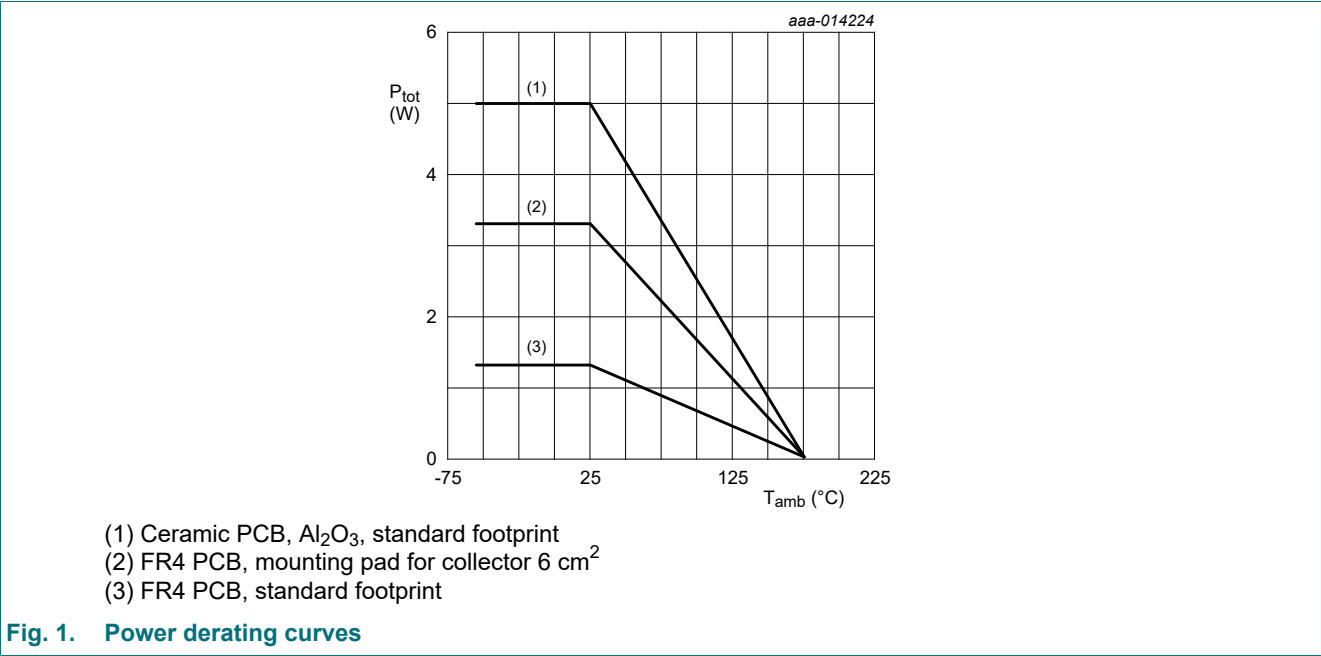
| Type number | Marking code |
|-------------|--------------|
| PHPT61006PY | 1006PAB      |

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                        |     | -   | -100 | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                           |     | -   | -100 | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                      |     | -   | -8   | V    |
| I <sub>C</sub>   | collector current         |                                     |     | -   | -6   | A    |
| I <sub>CM</sub>  | peak collector current    | single pulse; t <sub>p</sub> ≤ 1 ms |     | -   | -12  | A    |
| I <sub>B</sub>   | base current              |                                     |     | -   | -1   | A    |
| I <sub>BM</sub>  | peak base current         | pulsed; t <sub>p</sub> ≤ 1 ms       |     | -   | -2   | A    |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 1.3  | W    |
|                  |                           |                                     | [2] | -   | 3.3  | W    |
|                  |                           |                                     | [3] | -   | 5    | W    |
|                  |                           |                                     | [4] | -   | 25   | W    |
| T <sub>j</sub>   | junction temperature      |                                     |     | -   | 175  | °C   |
| T <sub>amb</sub> | ambient temperature       |                                     |     | -55 | 175  | °C   |
| T <sub>stg</sub> | storage temperature       |                                     |     | -65 | 175  | °C   |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 Printed-Circuit Board ( PCB), single-sided copper, tin-plated mounting pad for collector 6 cm<sup>2</sup>.
- [3] Device mounted on an ceramic Printed-Circuit Board (PCB), Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [4] Power dissipation from junction to mounting base.



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] | -   | -   | 115 | K/W  |
|                |                                                   |             | [2] | -   | -   | 45  | K/W  |
|                |                                                   |             | [3] | -   | -   | 30  | K/W  |
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base |             |     | -   | -   | 6   | K/W  |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.  
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.  
[3] Device mounted on a ceramic Printed-Circuit Board (PCB), Al<sub>2</sub>O<sub>3</sub>, standard footprint.

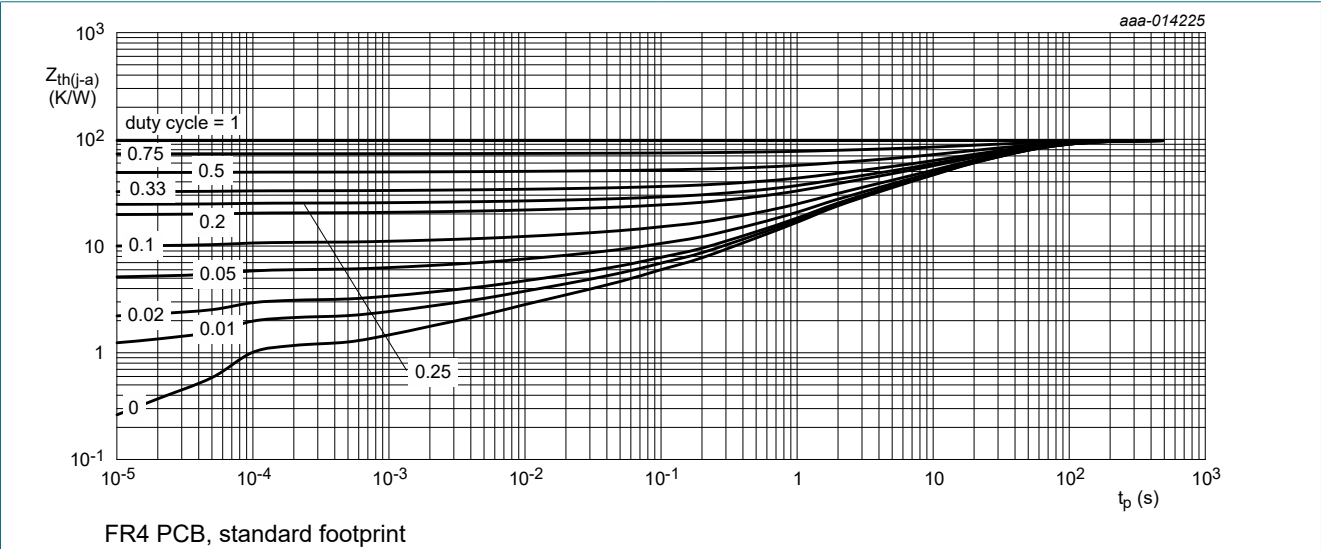


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

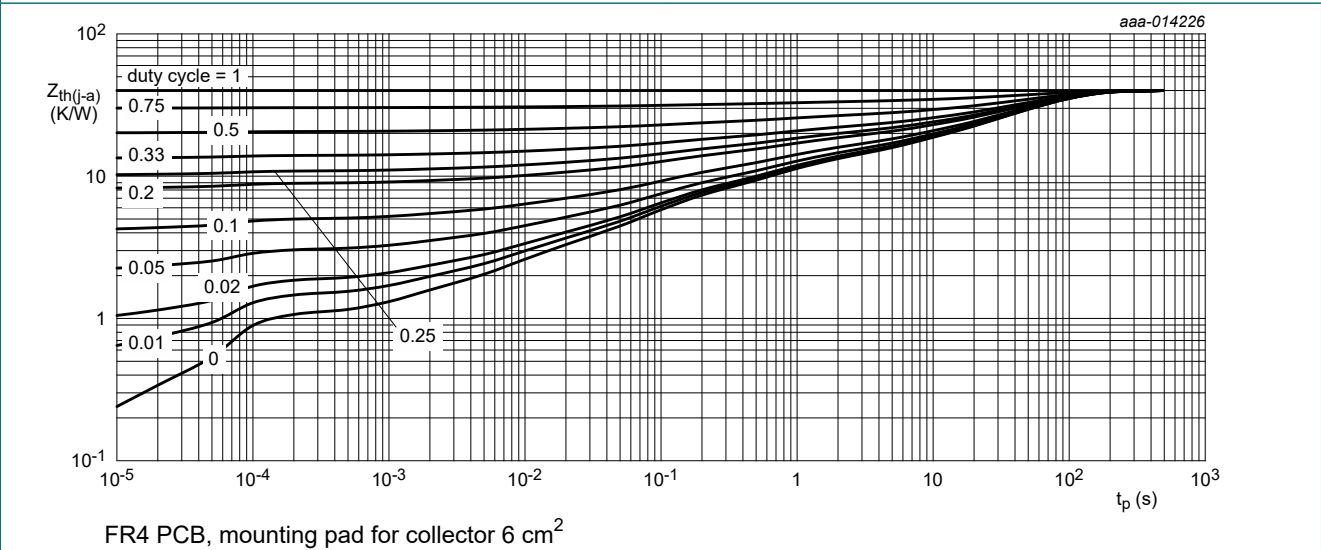


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                               | Conditions                                                                                                                                             | Min | Typ   | Max   | Unit          |
|-------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|-------|---------------|
| $I_{CBO}$   | collector-base cut-off current          | $V_{CB} = -80 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                     | -   | -     | -100  | nA            |
|             |                                         | $V_{CB} = -80 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^{\circ}\text{C}$                                                                        | -   | -     | -50   | $\mu\text{A}$ |
| $I_{CES}$   | collector-emitter cut-off current       | $V_{CE} = -80 \text{ V}; V_{BE} = 0 \text{ V}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                  | -   | -     | -100  | nA            |
| $I_{EBO}$   | emitter-base cut-off current            | $V_{EB} = -8 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                      | -   | -     | -100  | nA            |
| $h_{FE}$    | DC current gain                         | $V_{CE} = -2 \text{ V}; I_C = -500 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                  | 170 | 305   | -     |               |
|             |                                         | $V_{CE} = -2 \text{ V}; I_C = -1 \text{ A}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}; \text{pulsed}$ | 160 | 275   | -     |               |
|             |                                         | $V_{CE} = -2 \text{ V}; I_C = -3 \text{ A}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}; \text{pulsed}$ | 45  | 90    | -     |               |
|             |                                         | $V_{CE} = -2 \text{ V}; I_C = -6 \text{ A}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$ | 10  | 20    | -     |               |
| $V_{CEsat}$ | collector-emitter saturation voltage    | $I_C = -1 \text{ A}; I_B = -50 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$                 | -   | -75   | -130  | mV            |
|             |                                         | $I_C = -3 \text{ A}; I_B = -300 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$ | -   | -150  | -240  | mV            |
|             |                                         | $I_C = -6 \text{ A}; I_B = -600 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$ | -   | -900  | -1600 | mV            |
| $R_{CEsat}$ | collector-emitter saturation resistance |                                                                                                                                                        | -   | 85    | 270   | m $\Omega$    |
| $V_{BEsat}$ | base-emitter saturation voltage         | $I_C = -1 \text{ A}; I_B = -50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$  | -   | -0.8  | -0.95 | V             |
|             |                                         | $I_C = -3 \text{ A}; I_B = -300 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$ | -   | -0.95 | -1.1  | V             |
|             |                                         | $I_C = -6 \text{ A}; I_B = -600 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$ | -   | -1.1  | -1.25 | V             |
| $V_{BEon}$  | base-emitter turn-on voltage            | $V_{CE} = -2 \text{ V}; I_C = -500 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                  | -   | -0.7  | -0.8  | V             |
| $t_d$       | delay time                              | $V_{CC} = -12.5 \text{ V}; I_C = -3 \text{ A}; I_{B(on)} = -150 \text{ mA}; I_{B(off)} = 150 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$        | -   | 15    | -     | ns            |
| $t_r$       | rise time                               |                                                                                                                                                        | -   | 220   | -     | ns            |
| $t_{on}$    | turn-on time                            |                                                                                                                                                        | -   | 235   | -     | ns            |
| $t_s$       | storage time                            |                                                                                                                                                        | -   | 160   | -     | ns            |
| $t_f$       | fall time                               |                                                                                                                                                        | -   | 185   | -     | ns            |
| $t_{off}$   | turn-off time                           |                                                                                                                                                        | -   | 345   | -     | ns            |
| $f_T$       | transition frequency                    | $V_{CE} = -10 \text{ V}; I_C = -500 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                            | -   | 116   | -     | MHz           |
| $C_c$       | collector capacitance                   | $V_{CB} = -10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                               | -   | 52    | -     | pF            |

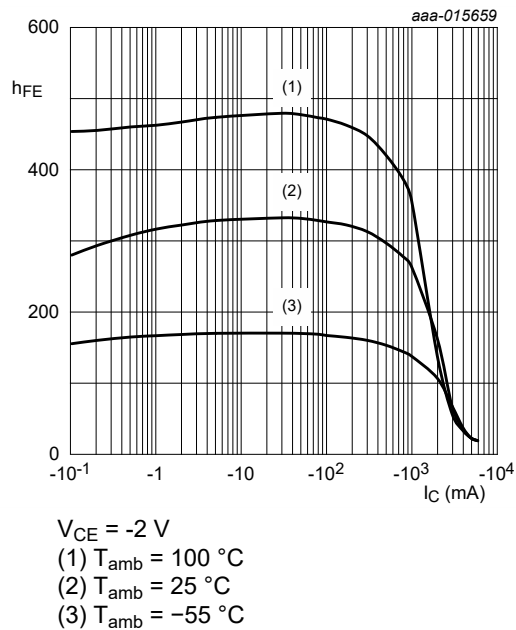


Fig. 4. DC current gain as a function of collector current; typical values

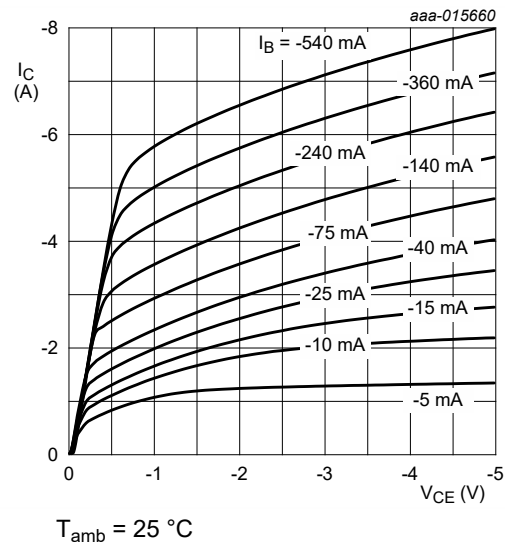


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

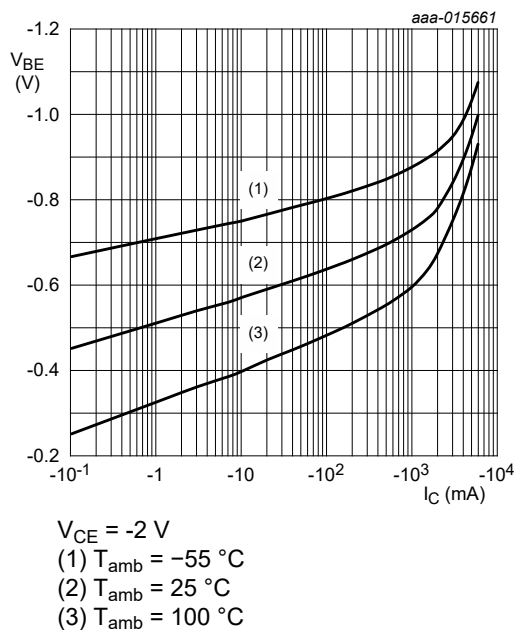


Fig. 6. Base-emitter voltage as a function of collector current; typical values

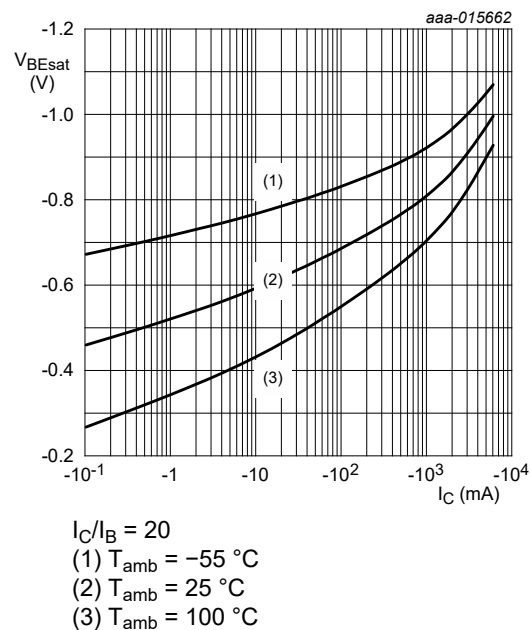
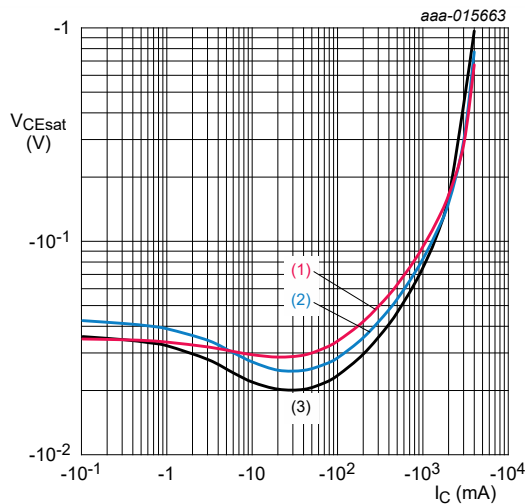
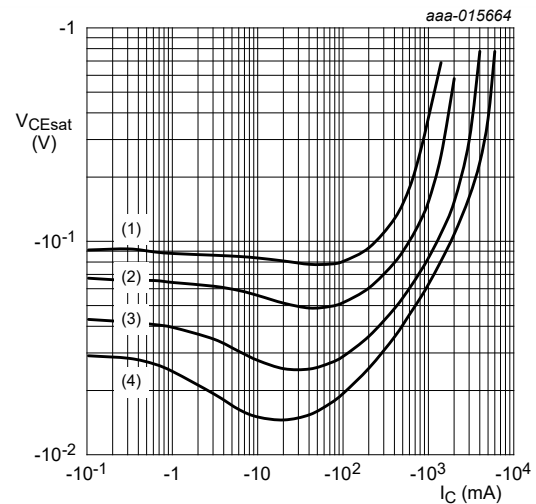


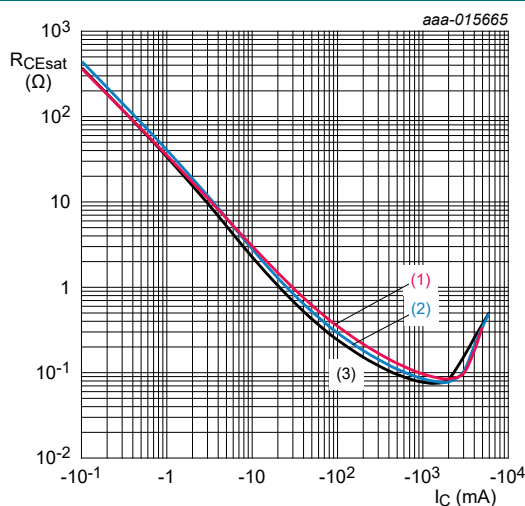
Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values



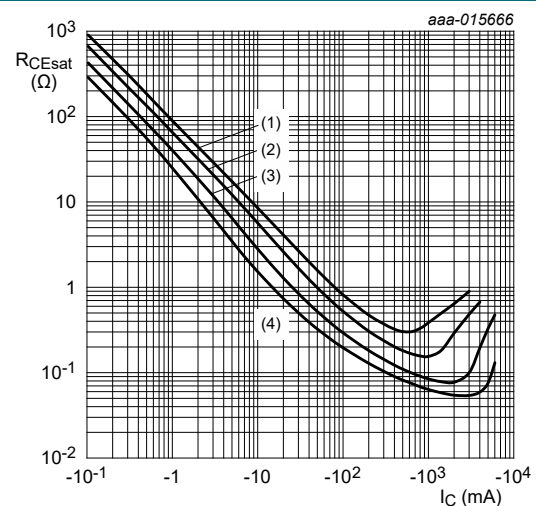
**Fig. 8.** Collector-emitter saturation voltage as a function of collector current; typical values



**Fig. 9.** Collector-emitter saturation voltage as a function of collector current; typical values



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



**Fig. 11.** Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

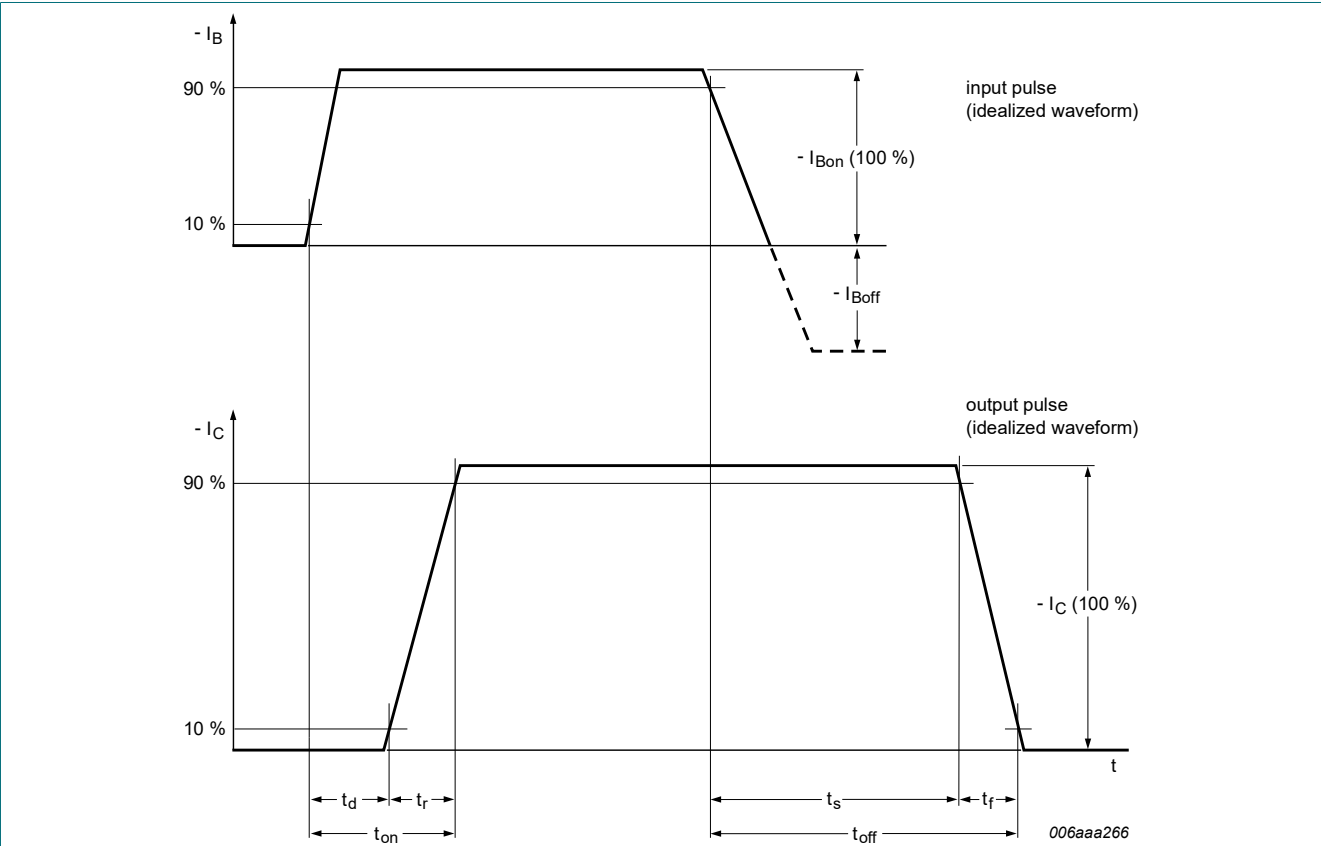


Fig. 12. Transistor switching time definition

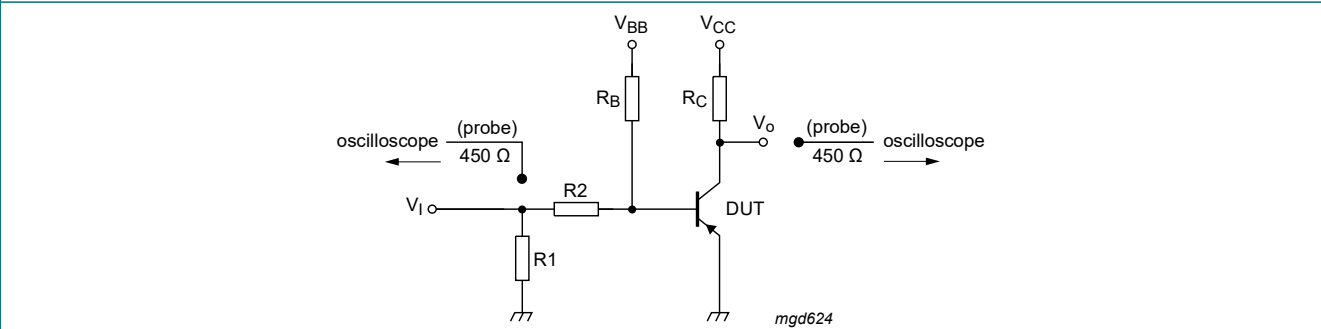


Fig. 13. Test circuit for switching times

12. Package outline

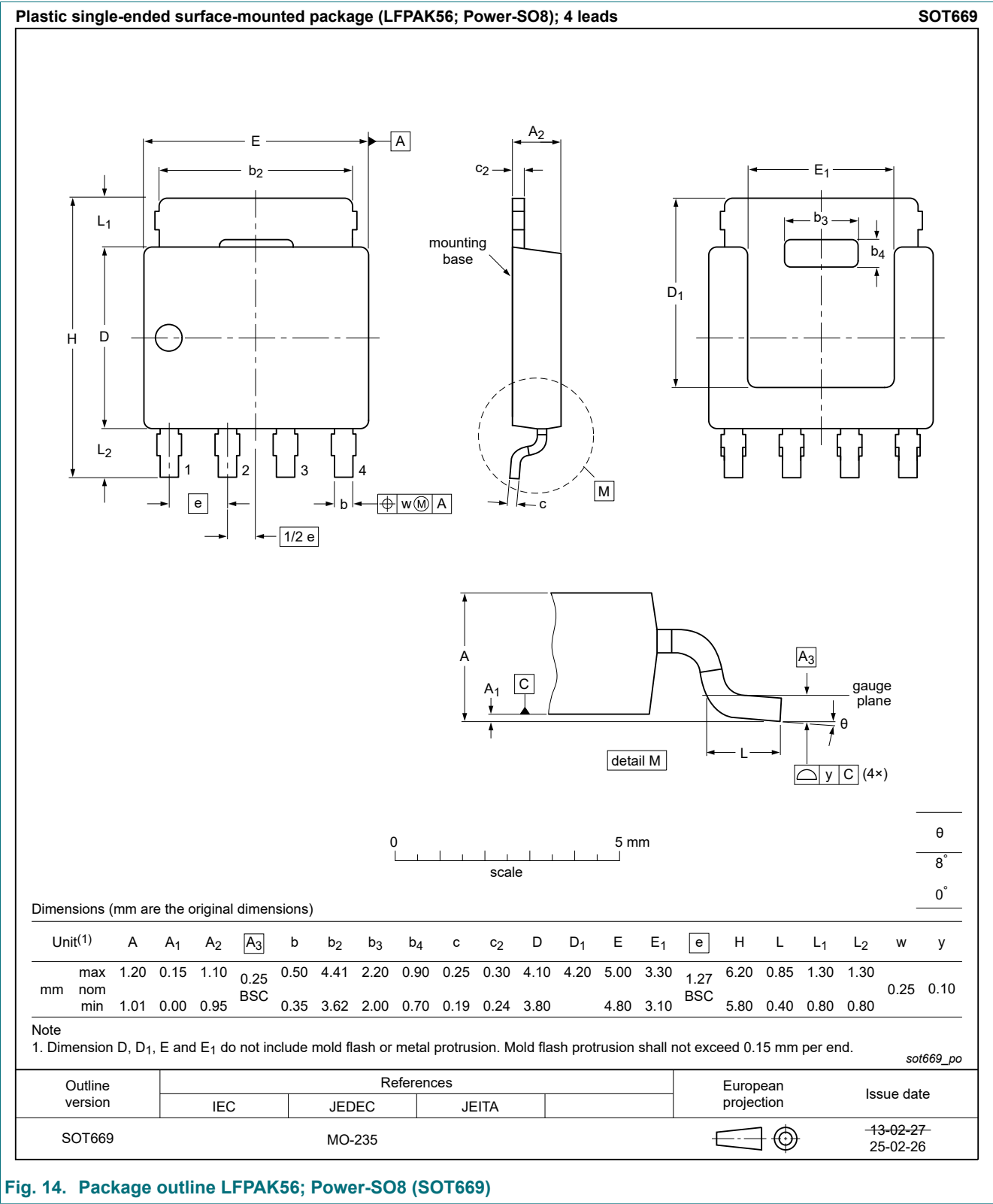


Fig. 14. Package outline LFAK56; Power-SO8 (SOT669)

13. Soldering

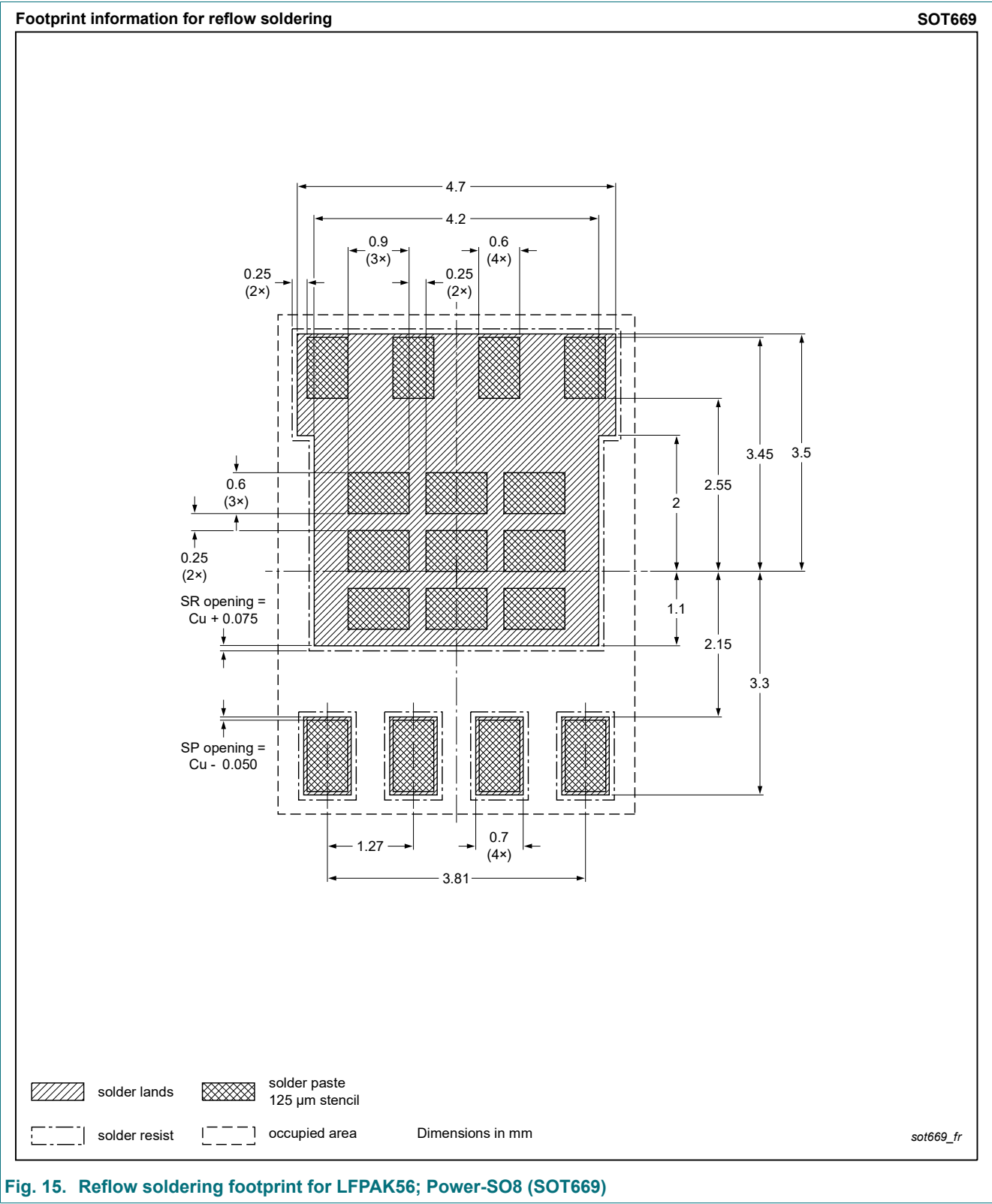


Fig. 15. Reflow soldering footprint for LFP56; Power-SO8 (SOT669)

Wave soldering footprint information for LFPAK56 package

SOT669

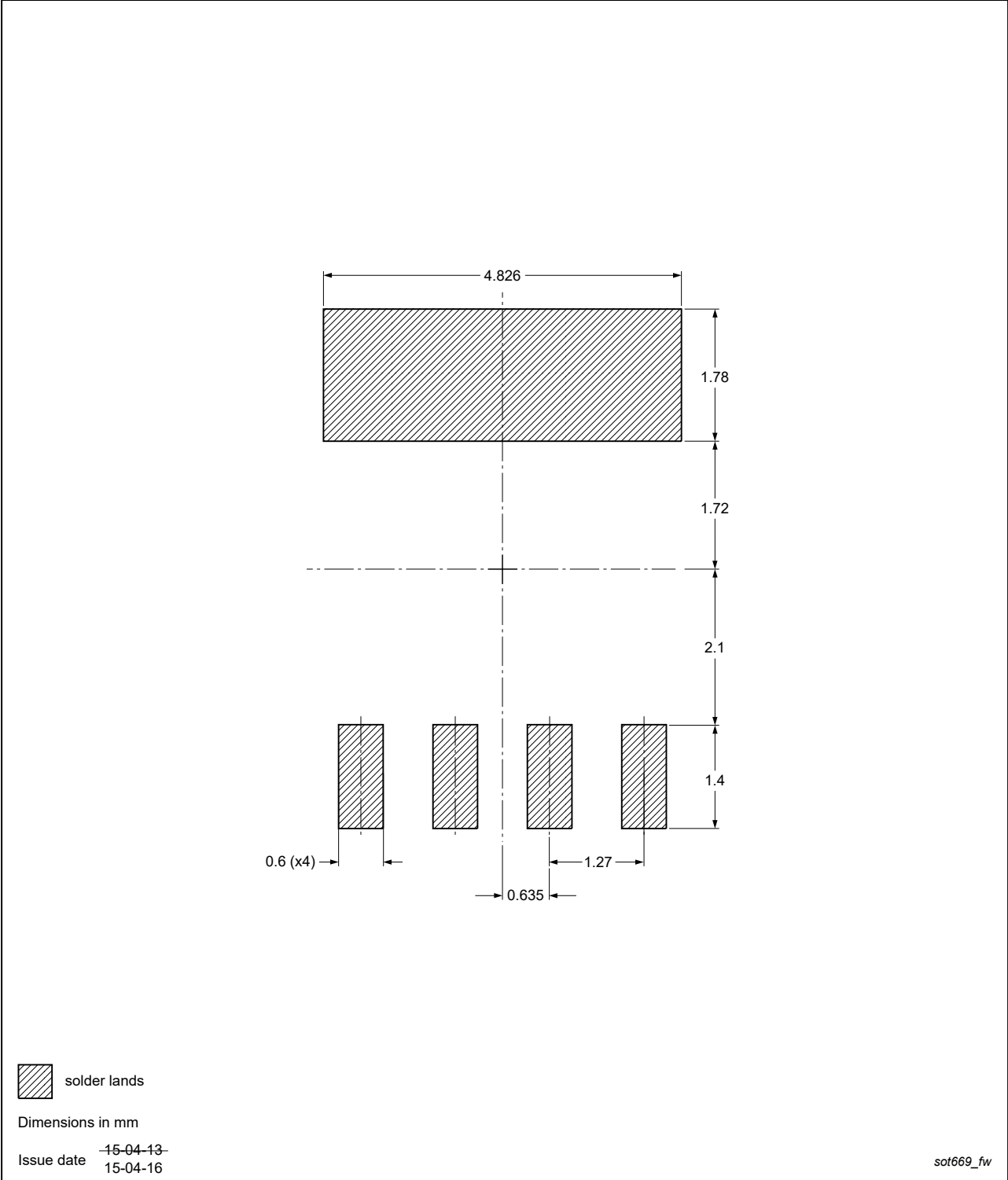


Fig. 16. Wave soldering footprint for LFPAK56; Power-SO8 (SOT669)

14. Revision history

Table 8. Revision history

| Data sheet ID   | Release date                                                                                                                                                                 | Data sheet status  | Change notice | Supersedes      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-----------------|
| PHPT61006PY v.2 | 20260812                                                                                                                                                                     | Product data sheet | -             | PHPT61006PY v.1 |
| Modifications:  | <ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li></ul> |                    |               |                 |
| PHPT61006PY v.1 | 20150121                                                                                                                                                                     | 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.                       |
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- [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: 12 August 2026