

## Important notice

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Kind regards,

Team Nexperia

# PDTA123Y series

PNP resistor-equipped transistors; R1 = 2.2 k $\Omega$ , R2 = 10 k $\Omega$

Rev. 04 — 3 September 2009

Product data sheet

## 1. Product profile

### 1.1 General description

PNP Resistor-Equipped Transistors (RET).

Table 1. Product overview

| Type number              | Package |        |          | NPN complement |
|--------------------------|---------|--------|----------|----------------|
|                          | NXP     | JEITA  | JEDEC    |                |
| PDTA123YE                | SOT416  | SC-75  | -        | PDTC123YE      |
| PDTA123YK                | SOT346  | SC-59A | TO-236   | PDTC123YK      |
| PDTA123YM                | SOT883  | SC-101 | -        | PDTC123YM      |
| PDTA123YS <sup>[1]</sup> | SOT54   | SC-43A | TO-92    | PDTC123YS      |
| PDTA123YT                | SOT23   | -      | TO-236AB | PDTC123YT      |
| PDTA123YU                | SOT323  | SC-70  | -        | PDTC123YU      |

[1] Also available in SOT54A and SOT54 variant packages (see [Section 2](#))

### 1.2 Features

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

### 1.3 Applications

- General purpose switching and amplification
- Circuit drivers
- Inverter and interface circuits

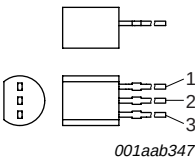
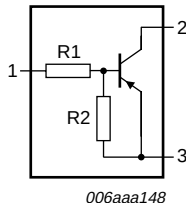
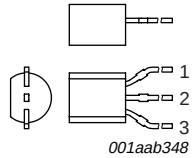
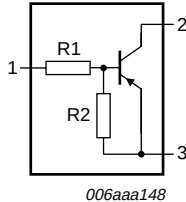
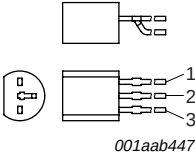
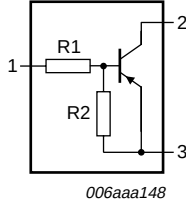
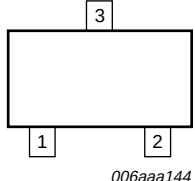
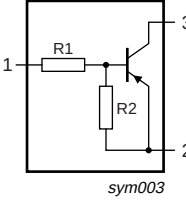
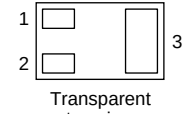
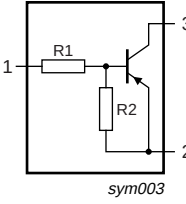
### 1.4 Quick reference data

Table 2. 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 (DC)       |            | -    | -   | -100 | mA         |
| R1               | bias resistor 1 (input)   |            | 1.54 | 2.2 | 2.86 | k $\Omega$ |
| R2/R1            | bias resistor ratio       |            | 3.6  | 4.5 | 5.5  |            |

2. Pinning information

Table 3. Pinning

| Pin                           | Description        | Simplified outline                                                                    | Symbol                                                                                |
|-------------------------------|--------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SOT54                         |                    |                                                                                       |                                                                                       |
| 1                             | input (base)       |    |    |
| 2                             | output (collector) |                                                                                       |                                                                                       |
| 3                             | GND (emitter)      |                                                                                       |                                                                                       |
| SOT54A                        |                    |                                                                                       |                                                                                       |
| 1                             | input (base)       |   |   |
| 2                             | output (collector) |                                                                                       |                                                                                       |
| 3                             | GND (emitter)      |                                                                                       |                                                                                       |
| SOT54 variant                 |                    |                                                                                       |                                                                                       |
| 1                             | input (base)       |  |  |
| 2                             | output (collector) |                                                                                       |                                                                                       |
| 3                             | GND (emitter)      |                                                                                       |                                                                                       |
| SOT23, SOT323, SOT346, SOT416 |                    |                                                                                       |                                                                                       |
| 1                             | input (base)       |  |  |
| 2                             | GND (emitter)      |                                                                                       |                                                                                       |
| 3                             | output (collector) |                                                                                       |                                                                                       |
| SOT883                        |                    |                                                                                       |                                                                                       |
| 1                             | input (base)       |  |  |
| 2                             | GND (emitter)      |                                                                                       |                                                                                       |
| 3                             | output (collector) |                                                                                       |                                                                                       |

### 3. Ordering information

Table 4. Ordering information

| Type number              | Package |                                                                               |         |
|--------------------------|---------|-------------------------------------------------------------------------------|---------|
|                          | Name    | Description                                                                   | Version |
| PDTA123YE                | SC-75   | plastic surface mounted package; 3 leads                                      | SOT416  |
| PDTA123YK                | SC-59A  | plastic surface mounted package; 3 leads                                      | SOT346  |
| PDTA123YM                | SC-101  | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883  |
| PDTA123YS <sup>[1]</sup> | SC-43A  | plastic single-ended leaded (through hole) package; 3 leads                   | SOT54   |
| PDTA123YT                | -       | plastic surface mounted package; 3 leads                                      | SOT23   |
| PDTA123YU                | SC-70   | plastic surface mounted package; 3 leads                                      | SOT323  |

[1] Also available in SOT54A and SOT54 variant packages (see [Section 2](#) and [Section 9](#))

### 4. Marking

Table 5. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| PDTA123YE   | 14                          |
| PDTA123YK   | 13                          |
| PDTA123YM   | G2                          |
| PDTA123YS   | TA123Y                      |
| PDTA123YT   | *AD                         |
| PDTA123YU   | *13                         |

[1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

## 5. Limiting values

**Table 6. 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           | -        | -5   | V    |
| V <sub>I</sub>   | input voltage             |                          |          |      |      |
|                  | positive                  |                          | -        | +5   | V    |
|                  | negative                  |                          | -        | -12  | V    |
| I <sub>O</sub>   | output current (DC)       |                          | -        | -100 | mA   |
| I <sub>CM</sub>  | peak collector current    |                          | -        | -100 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C |          |      |      |
|                  | SOT416                    |                          | [1] -    | 150  | mW   |
|                  | SOT346                    |                          | [1] -    | 250  | mW   |
|                  | SOT883                    |                          | [2][3] - | 250  | mW   |
|                  | SOT54                     |                          | [1] -    | 500  | mW   |
|                  | SOT23                     |                          | [1] -    | 250  | mW   |
|                  | SOT323                    |                          | [1] -    | 200  | mW   |
| T <sub>stg</sub> | storage temperature       |                          | -65      | +150 | °C   |
| T <sub>j</sub>   | junction temperature      |                          | -        | 150  | °C   |
| T <sub>amb</sub> | ambient temperature       |                          | -65      | +150 | °C   |

[1] Refer to standard mounting conditions.

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

[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60  $\mu$ m copper strip line.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

| Symbol               | Parameter                                   | Conditions  | Min      | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|----------|-----|-----|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air |          |     |     |      |
|                      | SOT416                                      |             | [1] -    | -   | 833 | K/W  |
|                      | SOT346                                      |             | [1] -    | -   | 500 | K/W  |
|                      | SOT883                                      |             | [2][3] - | -   | 500 | K/W  |
|                      | SOT54                                       |             | [1] -    | -   | 250 | K/W  |
|                      | SOT23                                       |             | [1] -    | -   | 500 | K/W  |
|                      | SOT323                                      |             | [1] -    | -   | 625 | K/W  |

[1] Refer to standard mounting conditions.

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

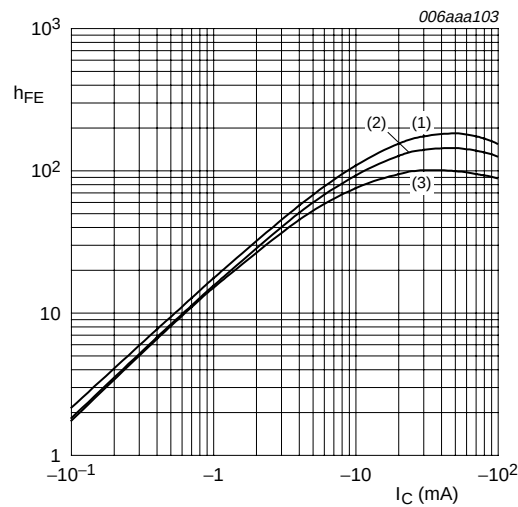
[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60  $\mu$ m copper strip line.

## 7. Characteristics

**Table 8. Characteristics**

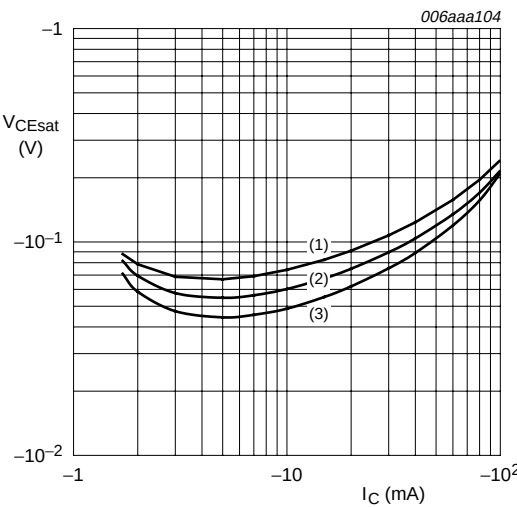
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified

| Symbol       | Parameter                            | Conditions                                                                            | Min  | Typ   | Max  | Unit          |
|--------------|--------------------------------------|---------------------------------------------------------------------------------------|------|-------|------|---------------|
| $I_{CBO}$    | collector-base cut-off current       | $V_{CB} = -50\text{ V}$ ; $I_E = 0\text{ A}$                                          | -    | -     | -100 | nA            |
| $I_{CEO}$    | collector-emitter cut-off current    | $V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$                                          | -    | -     | -1   | $\mu\text{A}$ |
|              |                                      | $V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$ ;<br>$T_J = 150\text{ }^{\circ}\text{C}$ | -    | -     | -50  | $\mu\text{A}$ |
| $I_{EBO}$    | emitter-base cut-off current         | $V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$                                           | -    | -     | -700 | $\mu\text{A}$ |
| $h_{FE}$     | DC current gain                      | $V_{CE} = -5\text{ V}$ ; $I_C = -5\text{ mA}$                                         | 35   | -     | -    |               |
| $V_{CEsat}$  | collector-emitter saturation voltage | $I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$                                        | -    | -     | -150 | mV            |
| $V_{I(off)}$ | off-state input voltage              | $V_{CE} = -5\text{ V}$ ; $I_C = -100\text{ }\mu\text{A}$                              | -    | -0.75 | -0.3 | V             |
| $V_{I(on)}$  | on-state input voltage               | $V_{CE} = -300\text{ mV}$ ; $I_C = -20\text{ mA}$                                     | -2.5 | -1.15 | -    | V             |
| R1           | bias resistor 1 (input)              |                                                                                       | 1.54 | 2.2   | 2.86 | k $\Omega$    |
| R2/R1        | bias resistor ratio                  |                                                                                       | 3.6  | 4.5   | 5.5  |               |
| $C_c$        | collector capacitance                | $V_{CB} = -10\text{ V}$ ; $I_E = i_e = 0\text{ A}$ ;<br>$f = 1\text{ MHz}$            | -    | -     | 2    | pF            |



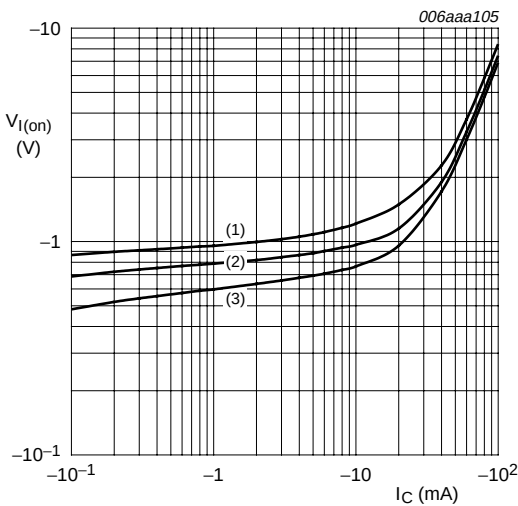
- $V_{CE} = -5\text{ V}$
- (1)  $T_{amb} = 100^\circ\text{C}$
  - (2)  $T_{amb} = 25^\circ\text{C}$
  - (3)  $T_{amb} = -40^\circ\text{C}$

Fig 1. DC current gain as a function of collector current; typical values



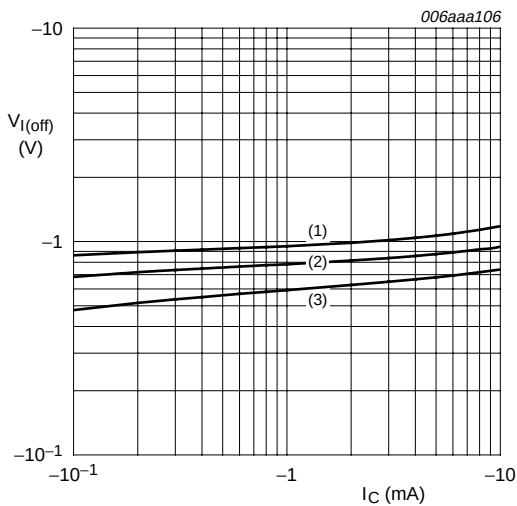
- $I_C/I_B = 20$
- (1)  $T_{amb} = 100^\circ\text{C}$
  - (2)  $T_{amb} = 25^\circ\text{C}$
  - (3)  $T_{amb} = -40^\circ\text{C}$

Fig 2. Collector-emitter saturation voltage as a function of collector current; typical values



- $V_{CE} = -0.3\text{ V}$
- (1)  $T_{amb} = -40^\circ\text{C}$
  - (2)  $T_{amb} = 25^\circ\text{C}$
  - (3)  $T_{amb} = 100^\circ\text{C}$

Fig 3. On-state input voltage as a function of collector current; typical values



- $V_{CE} = -5\text{ V}$
- (1)  $T_{amb} = -40^\circ\text{C}$
  - (2)  $T_{amb} = 25^\circ\text{C}$
  - (3)  $T_{amb} = 100^\circ\text{C}$

Fig 4. Off-state input voltage as a function of collector current; typical values

8. Package outline

Plastic surface-mounted package; 3 leads SOT416

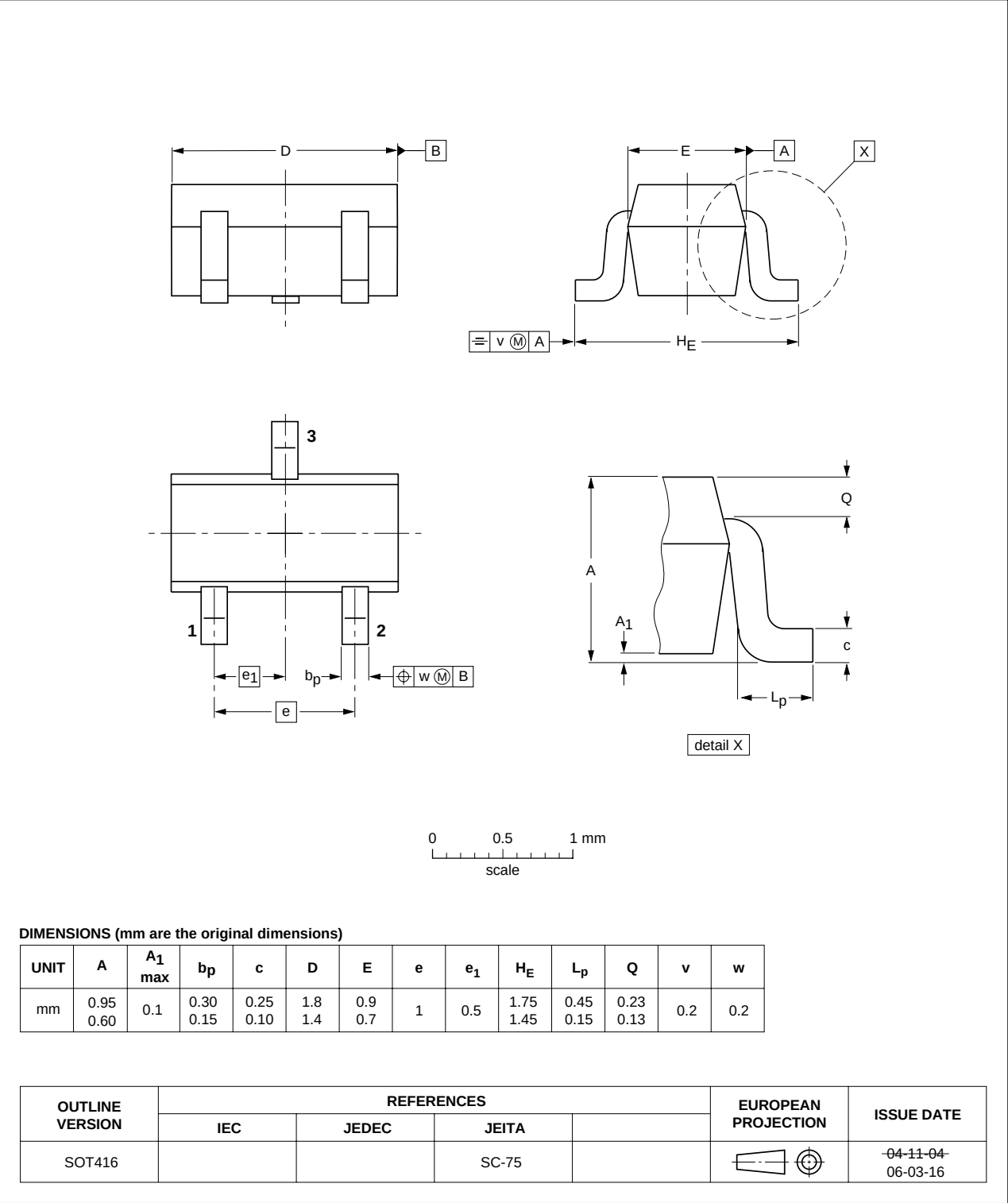


Fig 5. Package outline SOT416 (SC-75)

Plastic surface-mounted package; 3 leads

SOT346

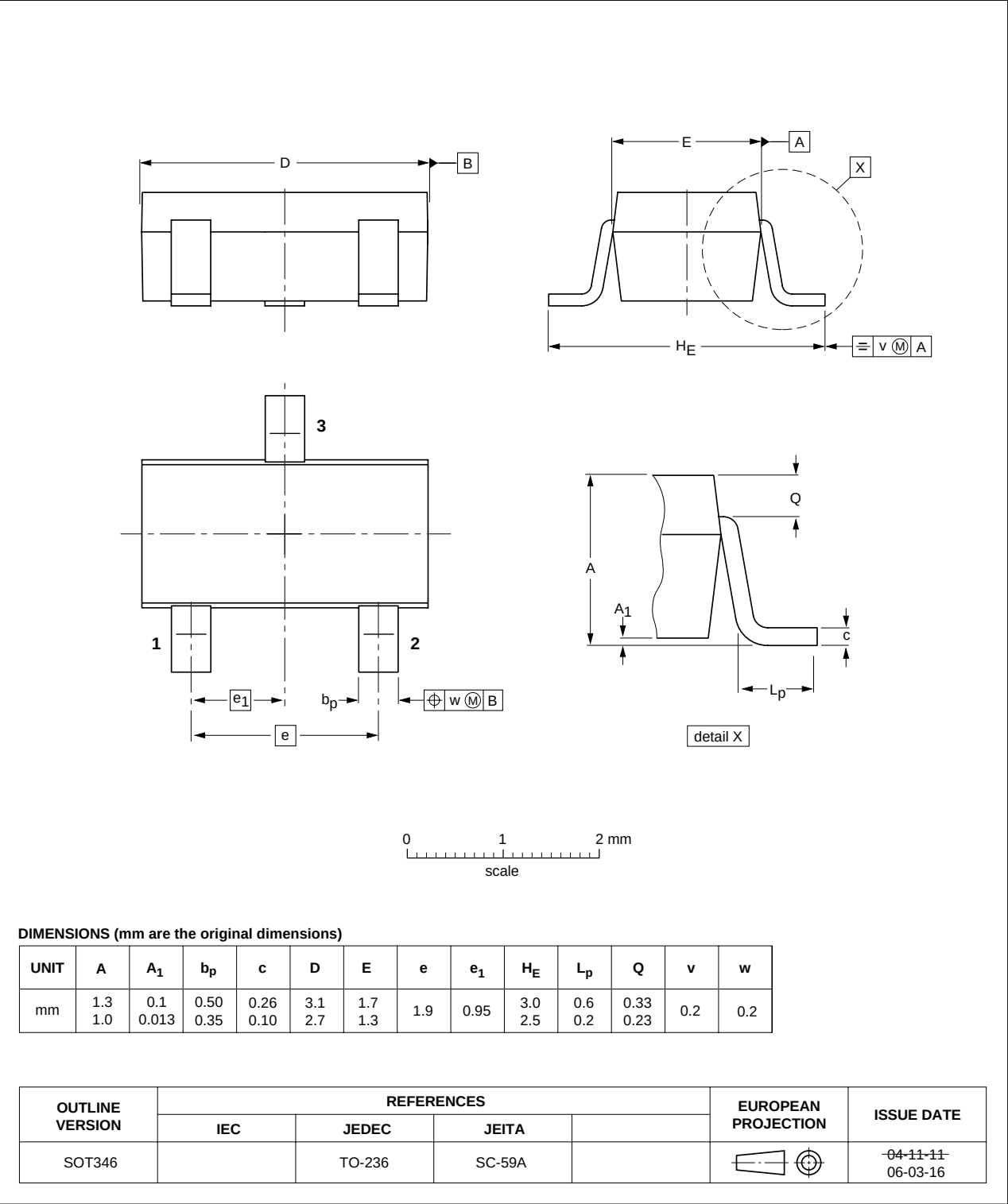


Fig 6. Package outline SOT346 (SC-59A/TO-236)

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm

SOT883

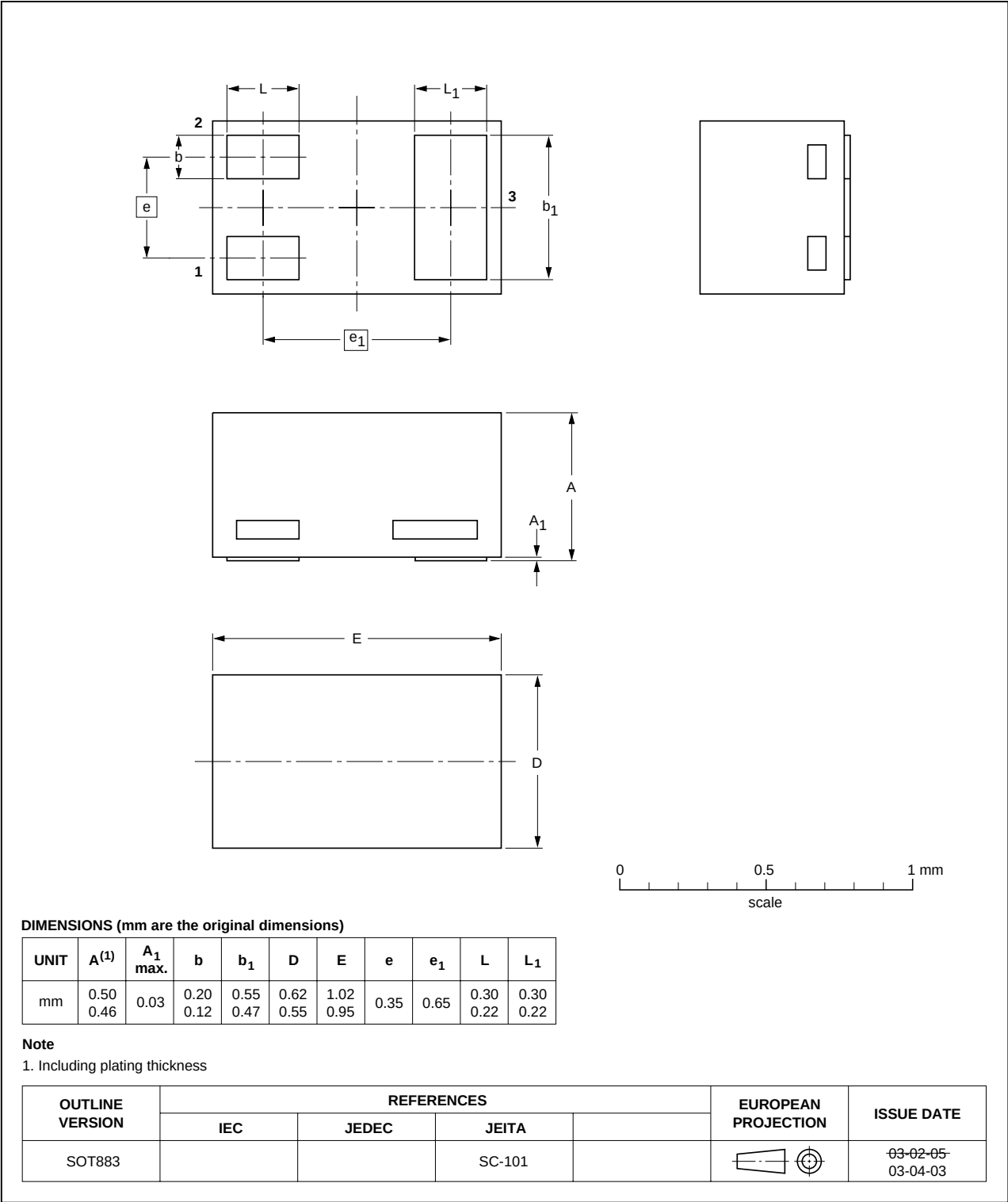


Fig 7. Package outline SOT883 (SC-101)

Plastic single-ended leaded (through hole) package; 3 leads

SOT54

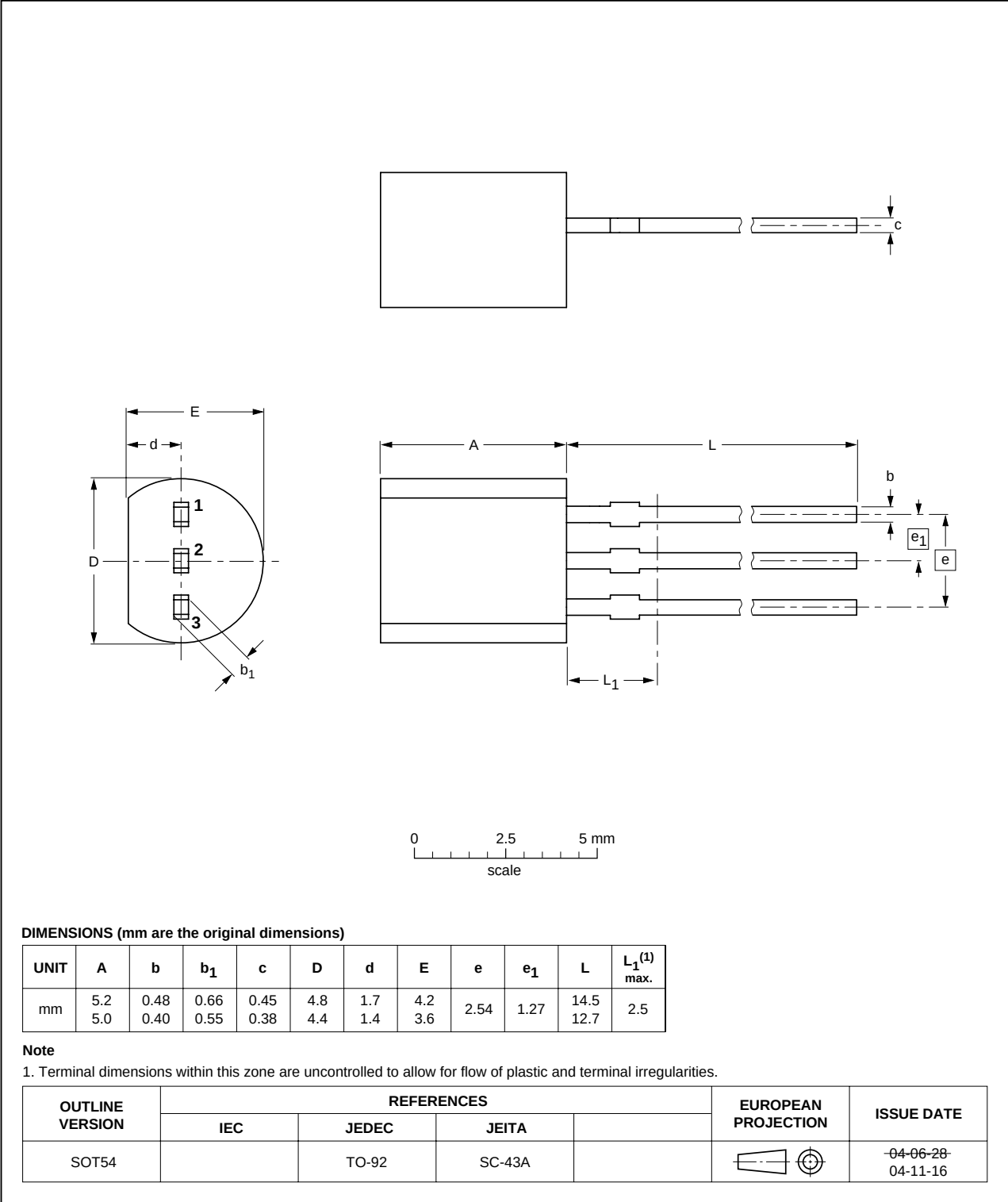


Fig 8. Package outline SOT54 (SC-43A/TO-92)

Plastic single-ended leaded (through hole) package; 3 leads (wide pitch)

SOT54A

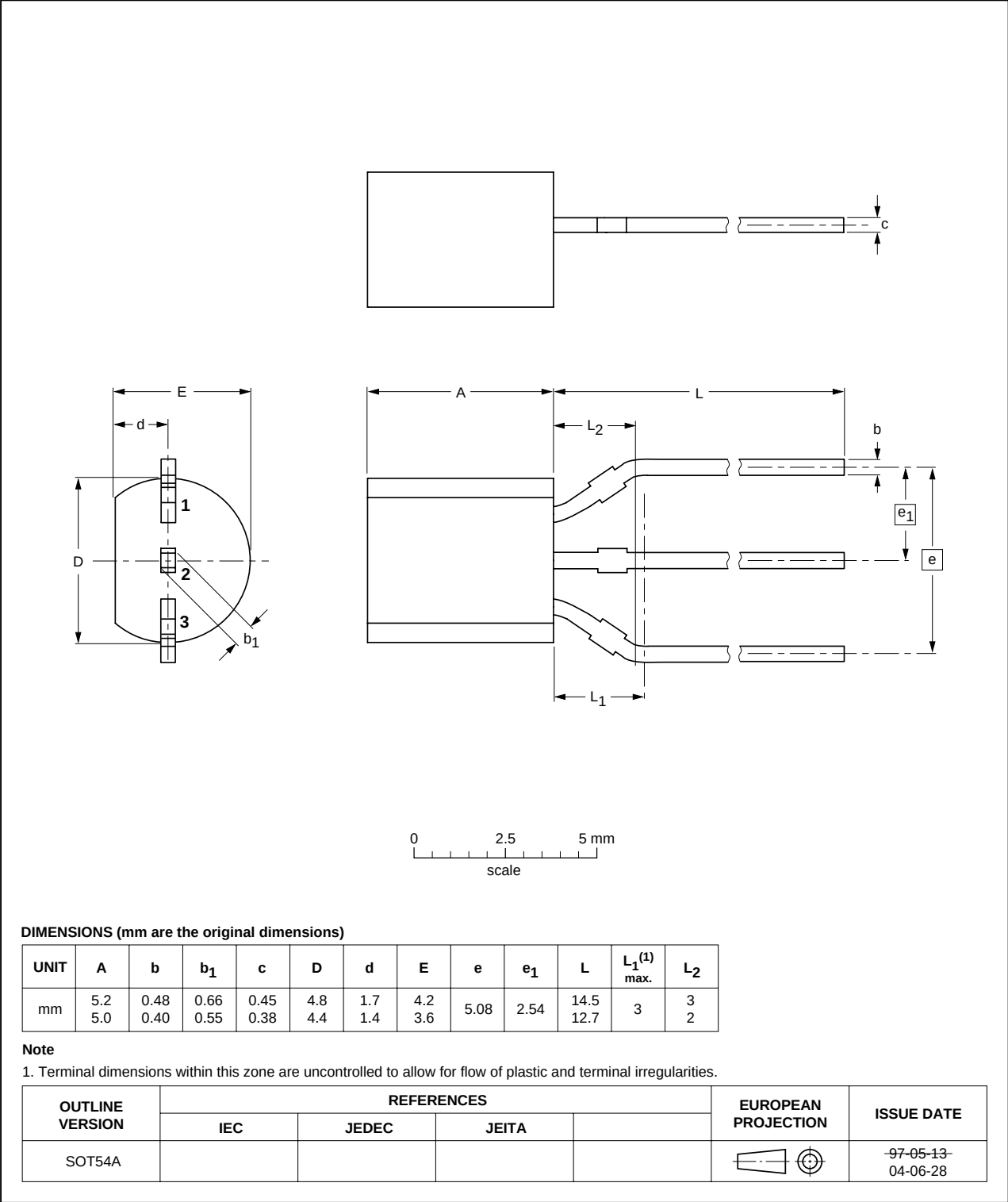


Fig 9. Package outline SOT54A

Plastic single-ended leaded (through hole) package; 3 leads (on-circle)

SOT54 variant

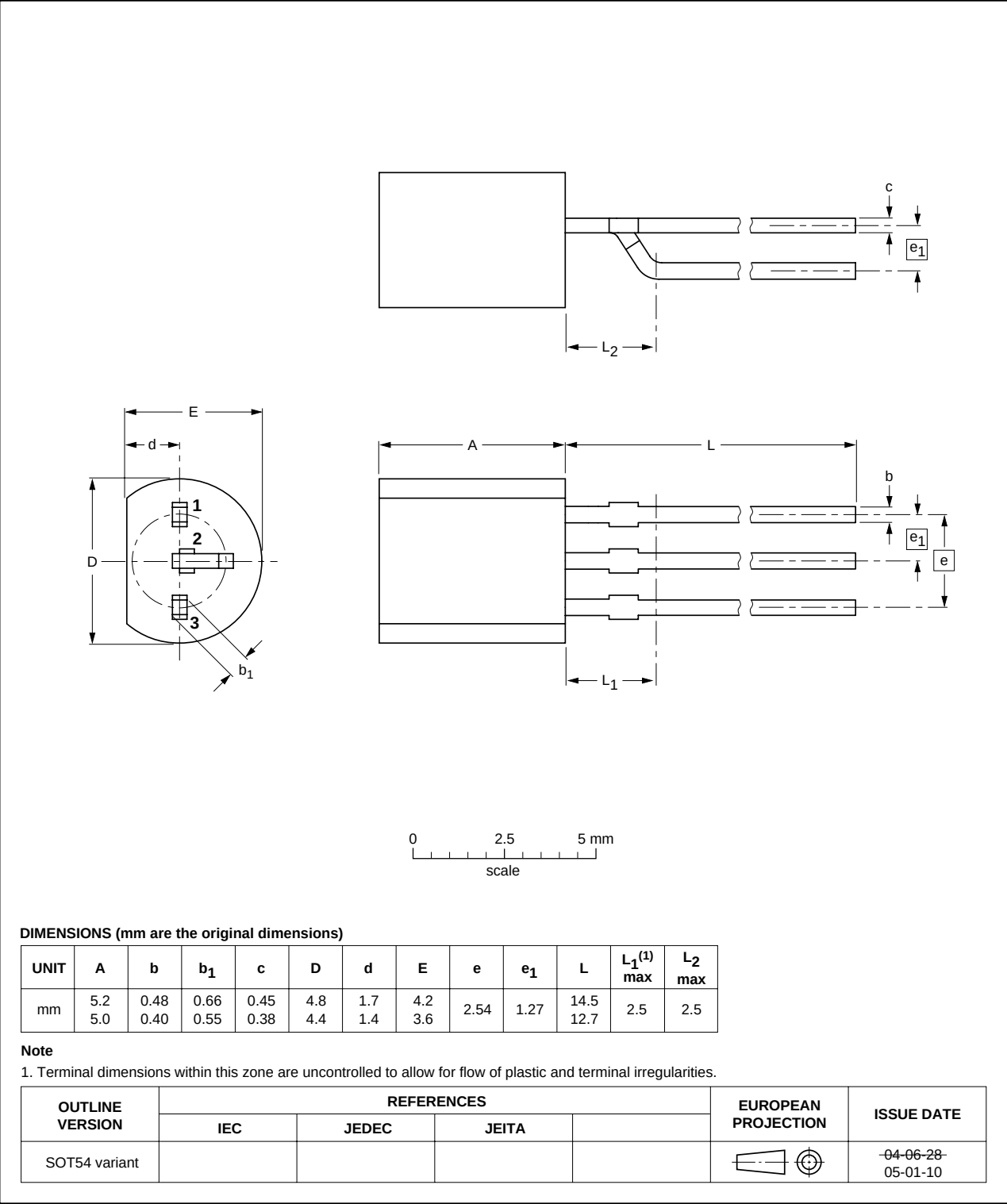


Fig 10. Package outline SOT54 variant

Plastic surface-mounted package; 3 leads

SOT23

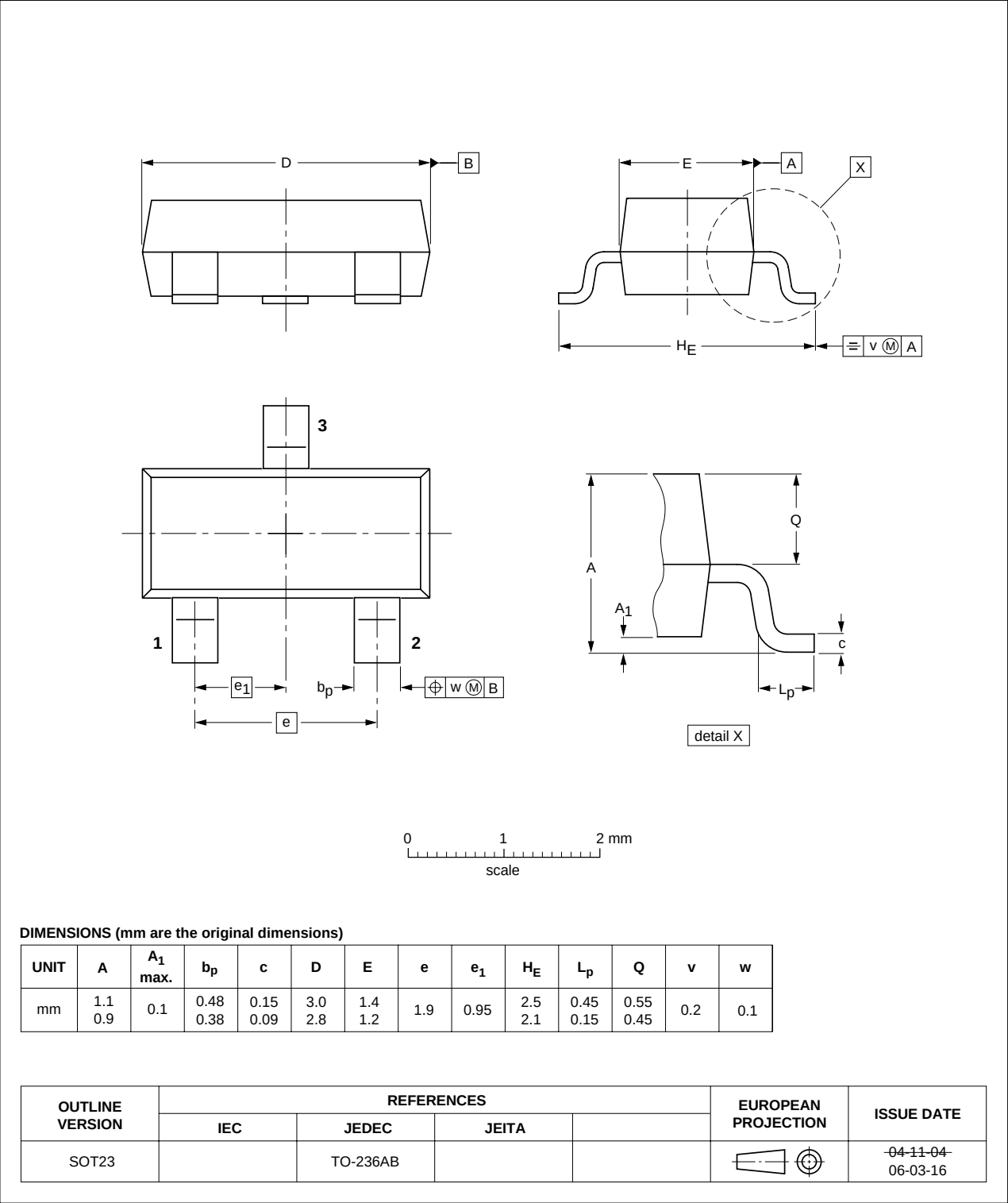


Fig 11. Package outline SOT23 (TO-236AB)

Plastic surface-mounted package; 3 leads

SOT323

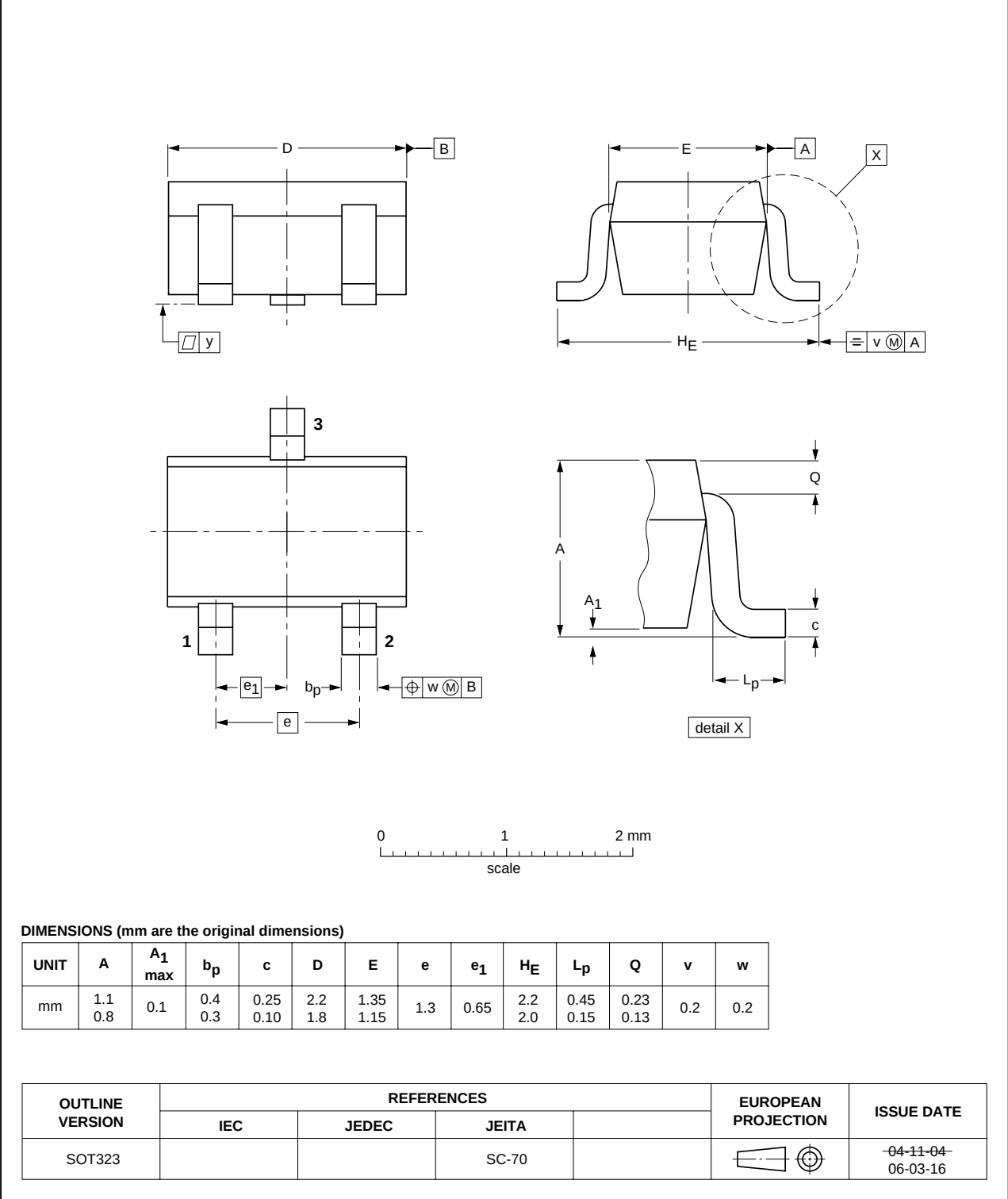


Fig 12. Package outline SOT323 (SC-70)

## 9. Packing information

**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code. [\[1\]](#)

| Type number | Package       | Description                    | Packing quantity |      |       |
|-------------|---------------|--------------------------------|------------------|------|-------|
|             |               |                                | 3000             | 5000 | 10000 |
| PDTA123YE   | SOT416        | 4 mm pitch, 8 mm tape and reel | -115             | -    | -135  |
| PDTA123YK   | SOT346        | 4 mm pitch, 8 mm tape and reel | -115             | -    | -135  |
| PDTA123YM   | SOT883        | 2 mm pitch, 8 mm tape and reel | -                | -    | -315  |
| PDTA123YS   | SOT54         | bulk, straight leads           | -                | -412 | -     |
|             | SOT54A        | tape and reel, wide pitch      | -                | -    | -116  |
|             |               | tape ammopack, wide patch      | -                | -    | -126  |
|             | SOT54 variant | bulk, delta pinning            | -                | -112 | -     |
| PDTA123YT   | SOT23         | 4 mm pitch, 8 mm tape and reel | -215             | -    | -235  |
| PDTA123YU   | SOT323        | 4 mm pitch, 8 mm tape and reel | -115             | -    | -135  |

[1] For further information and the availability of packing methods, see [Section 12](#).

## 10. Revision history

**Table 10. Revision history**

| Document ID    | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Data sheet status    | Change notice | Supersedes     |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------|----------------|
| PDTA123Y_SER_4 | 20090903                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Product data sheet   | -             | PDTA123Y_SER_3 |
| Modifications: | <ul style="list-style-type: none"><li>• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content</li><li>• <a href="#">Figure 5 "Package outline SOT416 (SC-75)"</a>: updated</li><li>• <a href="#">Figure 6 "Package outline SOT346 (SC-59A/TO-236)"</a>: updated</li><li>• <a href="#">Figure 11 "Package outline SOT23 (TO-236AB)"</a>: updated</li><li>• <a href="#">Figure 12 "Package outline SOT323 (SC-70)"</a>: updated</li></ul> |                      |               |                |
| PDTA123Y_SER_3 | 20050405                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Product data sheet   | -             | PDTA123YT_2    |
| PDTA123YT_2    | 20040611                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Objective data sheet | -             | PDTA123YT_1    |
| PDTA123YT_1    | 20040325                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Objective data sheet | -             | -              |

## 11. Legal information

### 11.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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 URL <http://www.nxp.com>.

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## 12. Contact information

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For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

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