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Kind regards,

Team Nexperia

PDTA113E series

PNP resistor-equipped transistors; R1 = 1 k Ω , R2 = 1 k Ω

Rev. 05 — 2 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 | |
| PDTA113EE | SOT416 | SC-75 | - | PDTC113EE |
| PDTA113EK | SOT346 | SC-59A | TO-236 | PDTC113EK |
| PDTA113EM | SOT883 | SC-101 | - | PDTC113EM |
| PDTA113ES ^[1] | SOT54 (TO-92) | SC-43A | TO-92 | PDTC113ES |
| PDTA113ET | SOT23 | - | TO-236AB | PDTC113ET |
| PDTA113EU | SOT323 | SC-70 | - | PDTC113EU |

[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

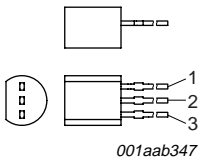
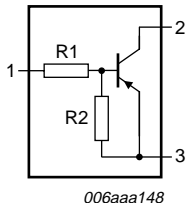
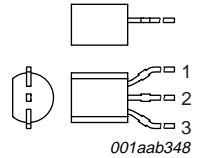
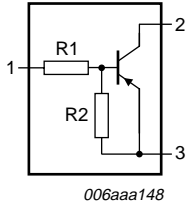
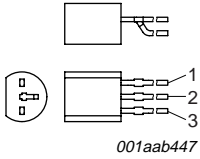
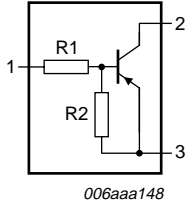
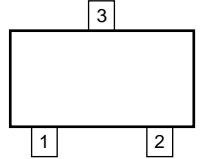
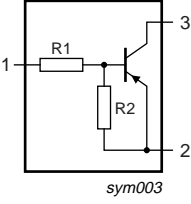
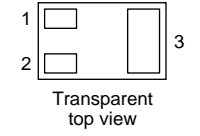
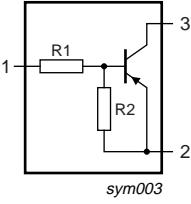
1.4 Quick reference data

Table 2. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|------------|-----|-----|------|------------|
| V _{CEO} | collector-emitter voltage | open base | - | - | -50 | V |
| I _O | output current (DC) | | - | - | -100 | mA |
| R1 | bias resistor 1 (input) | | 0.7 | 1 | 1.3 | k Ω |
| R2/R1 | bias resistor ratio | | 0.8 | 1 | 1.2 | |

2. Pinning information

Table 3. Pinning

| Pin | Description | Simplified outline | Symbol |
|--------------------------------------|--------------------|--|--|
| SOT54 | | | |
| 1 | input (base) |  <p>001aab347</p> |  <p>006aaa148</p> |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| SOT54A | | | |
| 1 | input (base) |  <p>001aab348</p> |  <p>006aaa148</p> |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| SOT54 variant | | | |
| 1 | input (base) |  <p>001aab447</p> |  <p>006aaa148</p> |
| 2 | output (collector) | | |
| 3 | GND (emitter) | | |
| SOT23, SOT323, SOT346, SOT416 | | | |
| 1 | input (base) |  <p>006aaa144</p> |  <p>sym003</p> |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |
| SOT883 | | | |
| 1 | input (base) |  <p>Transparent top view</p> |  <p>sym003</p> |
| 2 | GND (emitter) | | |
| 3 | output (collector) | | |

3. Ordering information

Table 4. Ordering information

| Type number | Package | | |
|--------------------------|---------|---|---------|
| | Name | Description | Version |
| PDTA113EE | SC-75 | plastic surface mounted package; 3 leads | SOT416 |
| PDTA113EK | SC-59A | plastic surface mounted package; 3 leads | SOT346 |
| PDTA113EM | SC-101 | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTA113ES ^[1] | SC-43A | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |
| PDTA113ET | - | plastic surface mounted package; 3 leads | SOT23 |
| PDTA113EU | 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 ^[1] |
|-------------|-----------------------------|
| PDTA113EE | 16 |
| PDTA113EK | 17 |
| PDTA113EM | G4 |
| PDTA113ES | TA113E |
| PDTA113ET | *15 |
| PDTA113EU | *14 |

[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 _{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 |
| V _I | input voltage | | | | |
| | positive | | - | +10 | V |
| | negative | | - | -10 | V |
| I _O | output current (DC) | | - | -100 | mA |
| I _{CM} | peak collector current | | - | -100 | mA |
| P _{tot} | total power dissipation | T _{amb} ≤ 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 _{stg} | storage temperature | | -65 | +150 |
| T _j | junction temperature | | - | 150 | °C |
| T _{amb} | 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 μ m copper strip line.

6. Thermal characteristics

Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|---|-------------|----------|-----|-----|------|
| R _{th(j-a)} | 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.

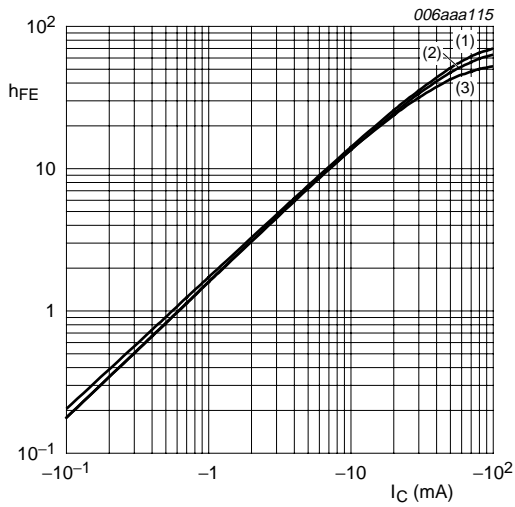
[2] Reflow soldering is the only recommended soldering method.

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

7. Characteristics

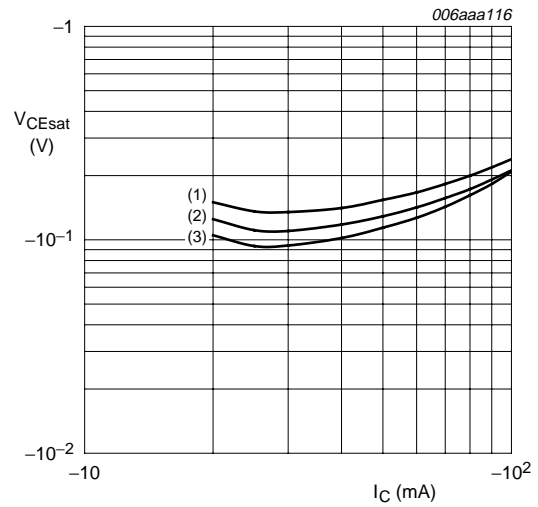
Table 8. Characteristics
T_{amb} = 25 °C unless otherwise specified

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|--------------------------------------|--|-----|------|------|------------|
| I _{CBO} | collector-base cut-off current | V _{CB} = -50 V; I _E = 0 A | - | - | -100 | nA |
| I _{CEO} | collector-emitter cut-off current | V _{CE} = -30 V; I _B = 0 A | - | - | -1 | μ A |
| | | V _{CE} = -30 V; I _B = 0 A; T _j = 150 °C | - | - | -50 | μ A |
| I _{EBO} | emitter-base cut-off current | V _{EB} = -5 V; I _C = 0 A | - | - | -4 | mA |
| h _{FE} | DC current gain | V _{CE} = -5 V; I _C = -40 mA | 30 | - | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = -30 mA; I _B = -1.5 mA | - | - | -150 | mV |
| V _{I(off)} | off-state input voltage | V _{CE} = -5 V; I _C = -100 μ A | - | -1.3 | -0.5 | V |
| V _{I(on)} | on-state input voltage | V _{CE} = -300 mV; I _C = -20 mA | -2 | -1.7 | - | V |
| R1 | bias resistor 1 (input) | | 0.7 | 1 | 1.3 | k Ω |
| R2/R1 | bias resistor ratio | | 0.8 | 1 | 1.2 | |
| C _c | collector capacitance | V _{CB} = -10 V; I _E = i _e = 0 A; f = 1 MHz | - | - | 2 | pF |



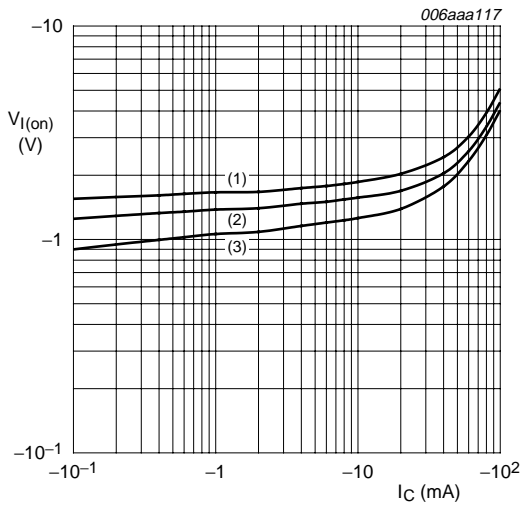
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



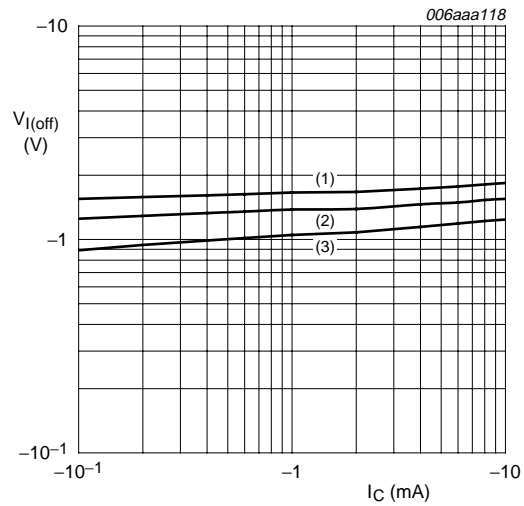
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



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

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



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

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

8. Package outline

Plastic surface-mounted package; 3 leads

SOT416

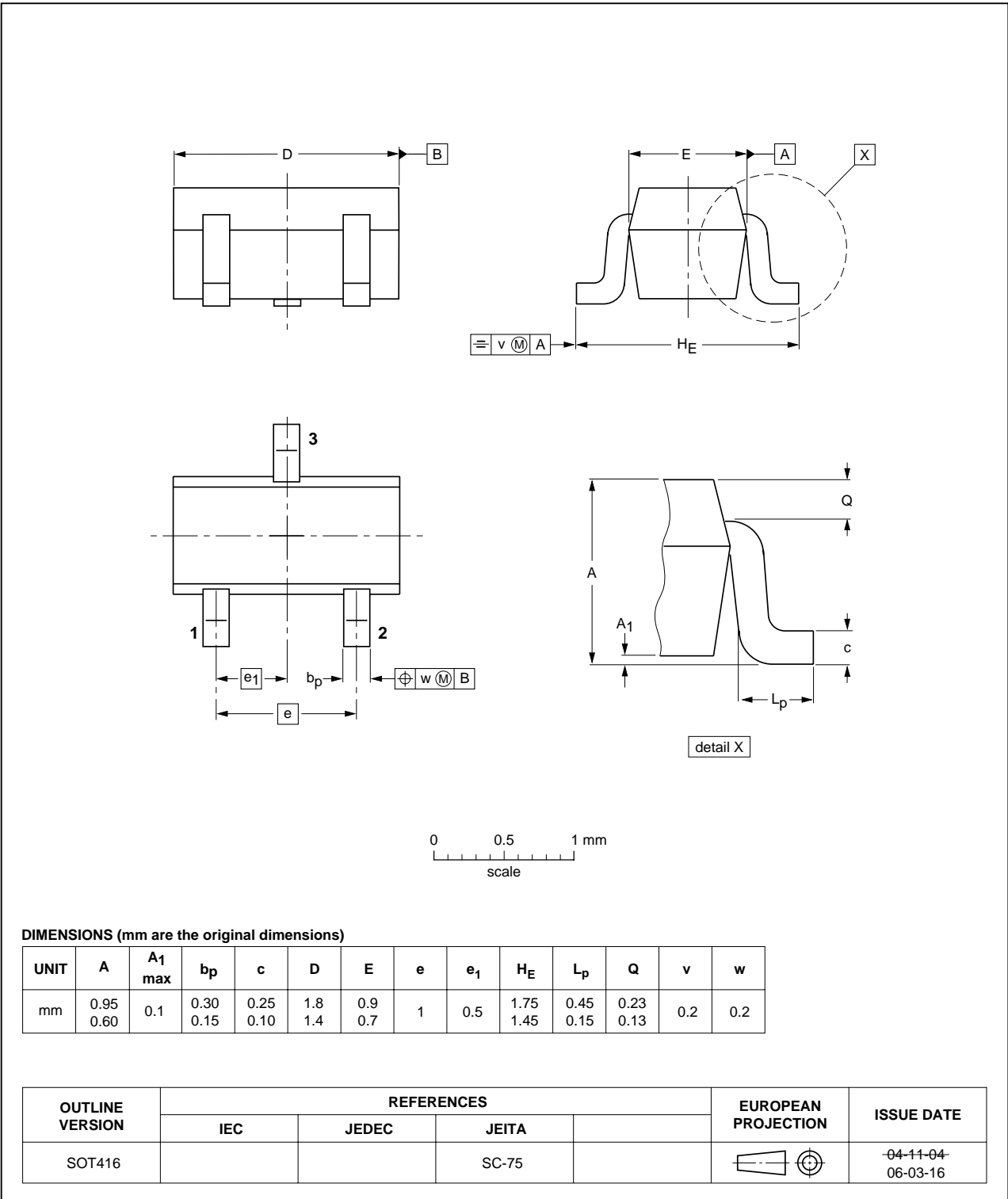


Fig 5. Package outline SOT416 (SC-75)

Plastic surface-mounted package; 3 leads

SOT346

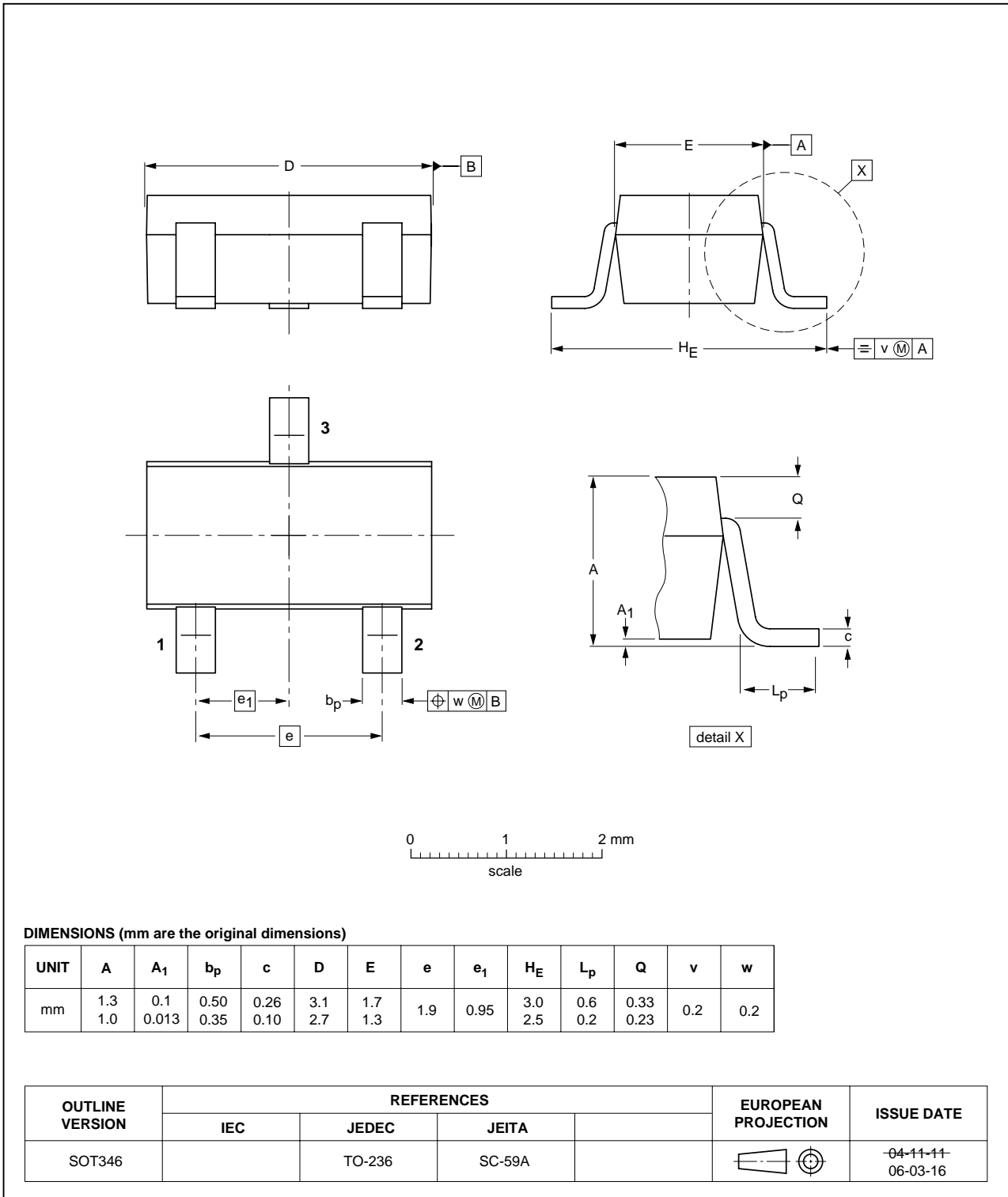


Fig 6. Package outline SOT346 (SC-59A/TO-236)

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

SOT883

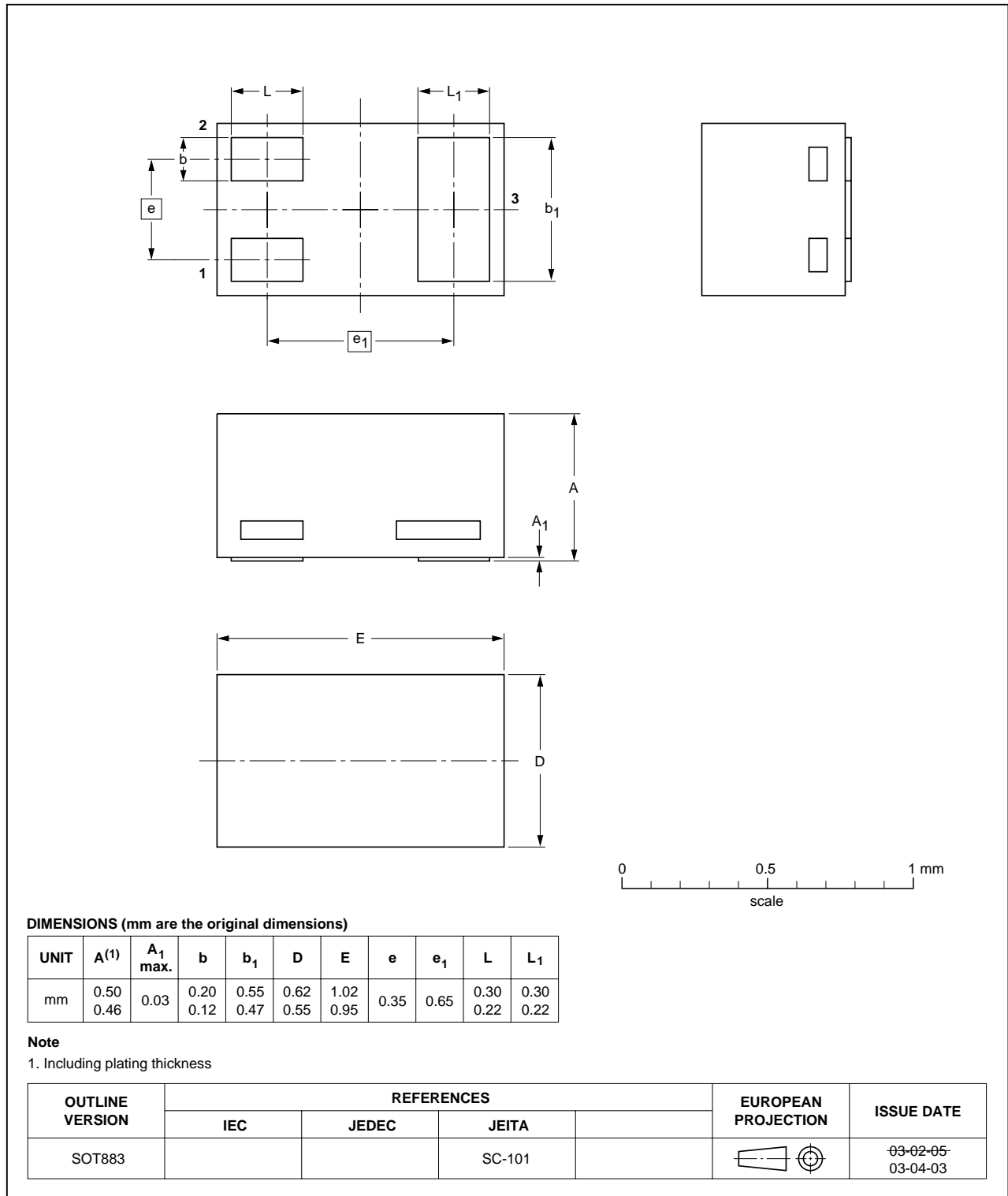


Fig 7. Package outline SOT883 (SC-101)

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

SOT54

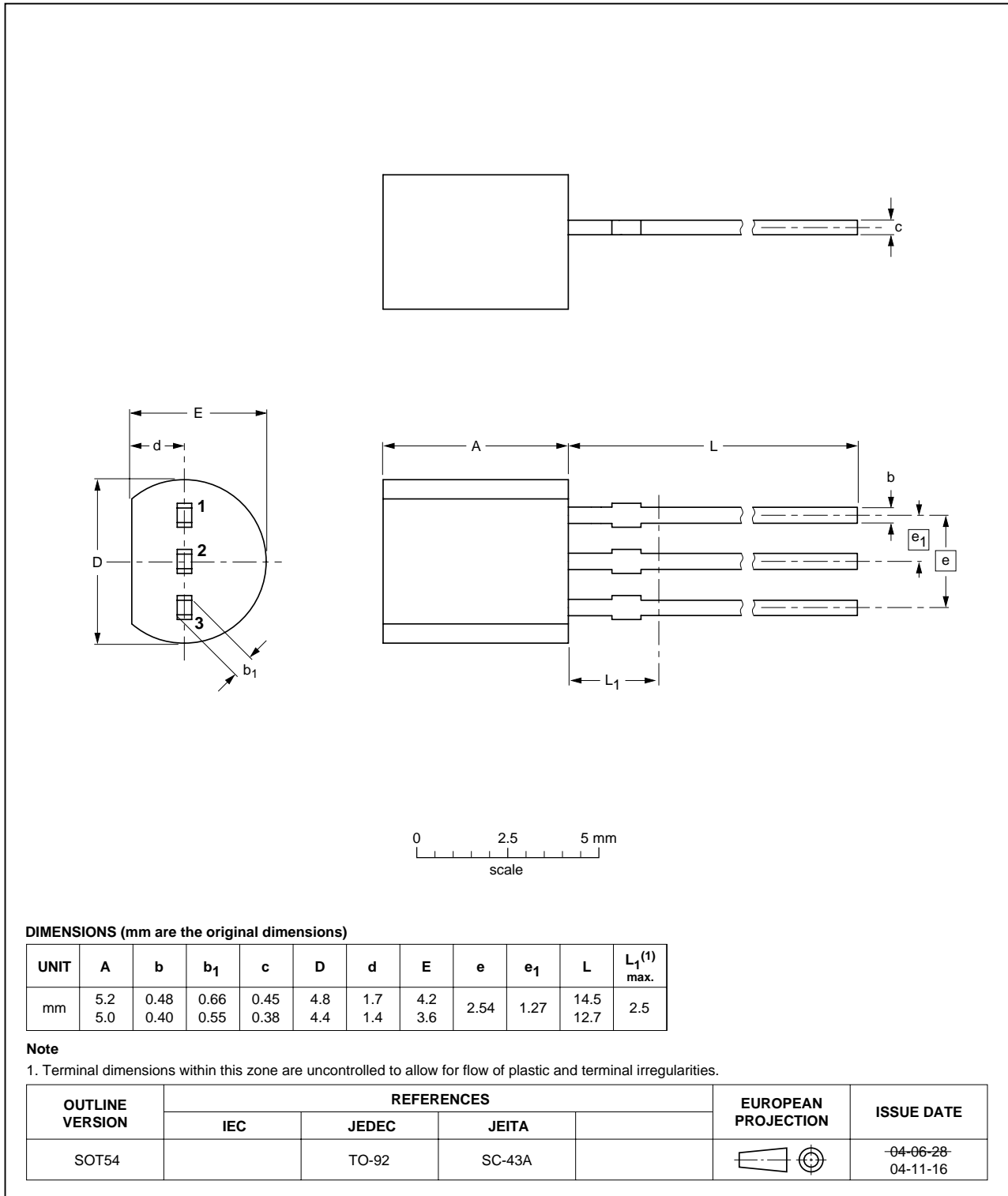


Fig 8. Package outline SOT54 (SC-43A/TO-92)

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

SOT54A

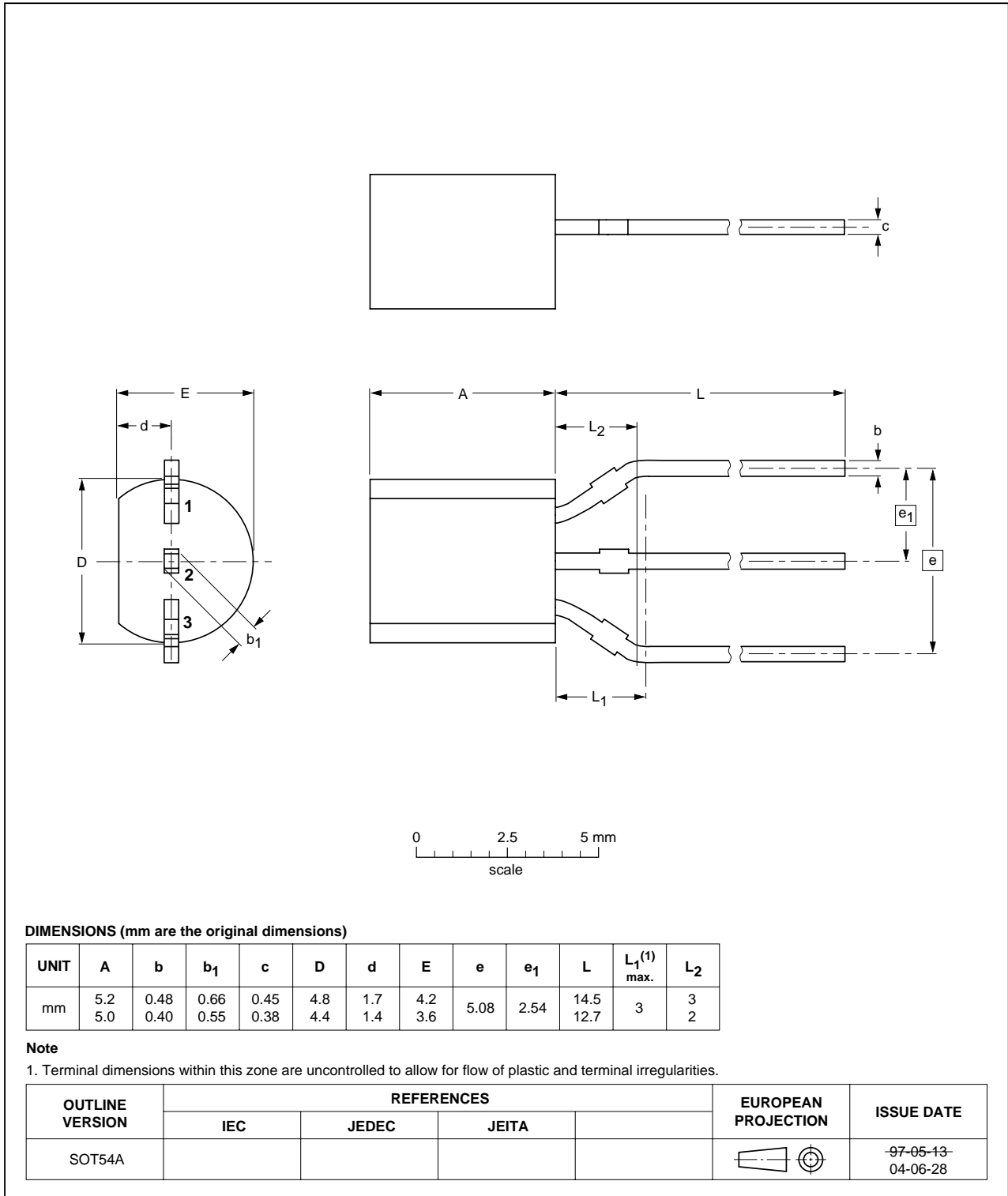


Fig 9. Package outline SOT54A

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

SOT54 variant

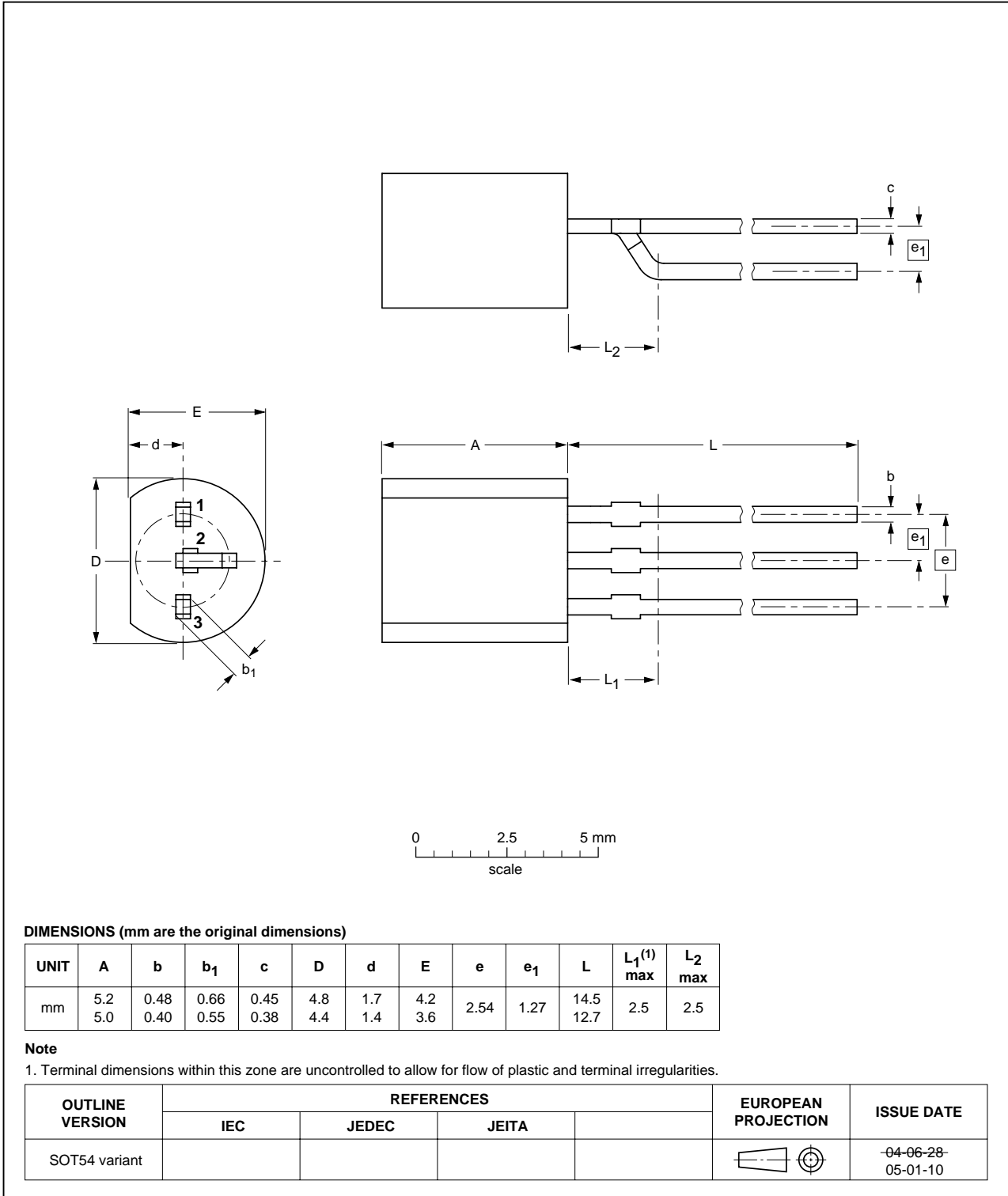


Fig 10. Package outline SOT54 variant

Plastic surface-mounted package; 3 leads

SOT23

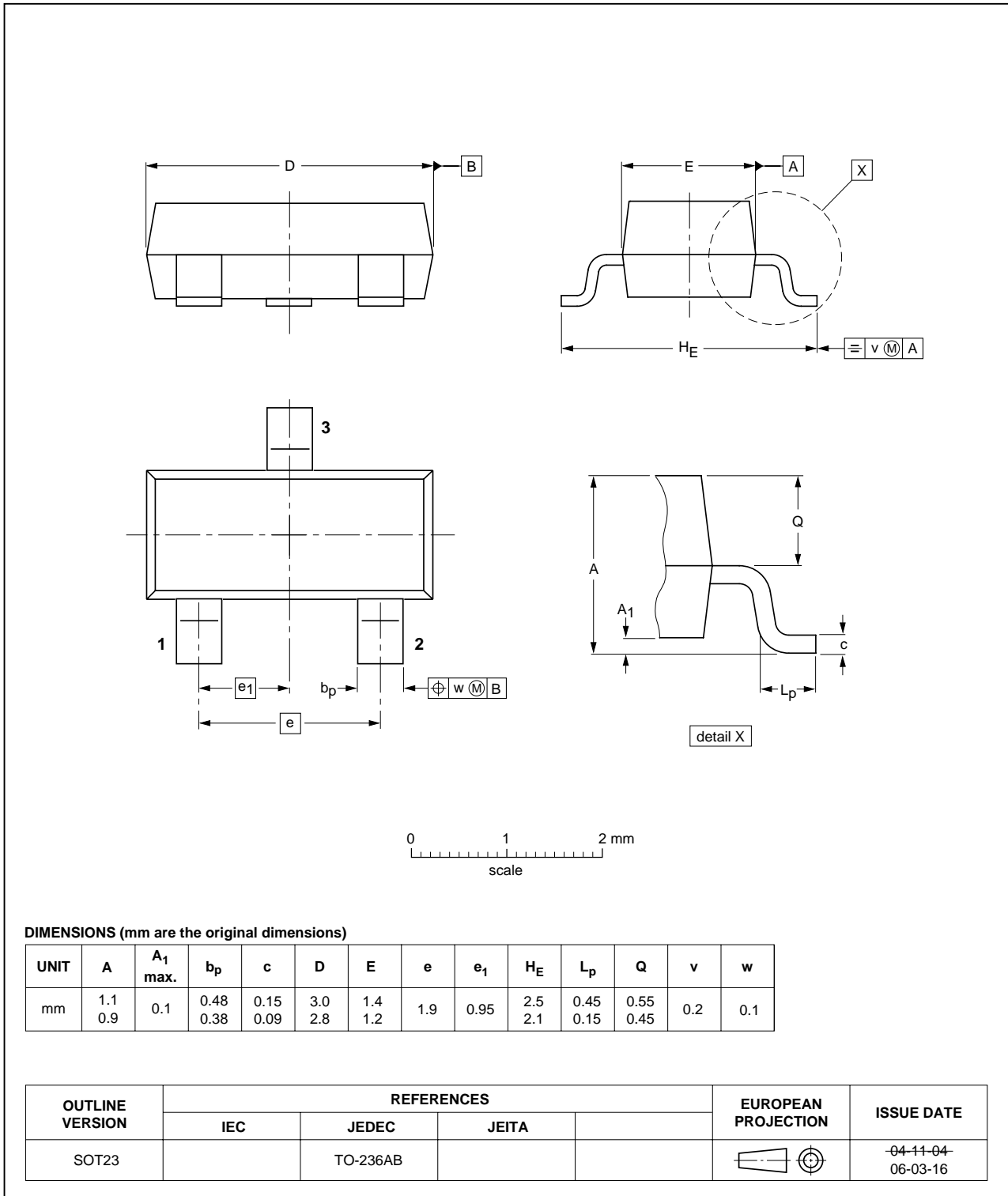


Fig 11. Package outline SOT23 (TO-236AB)

Plastic surface-mounted package; 3 leads

SOT323

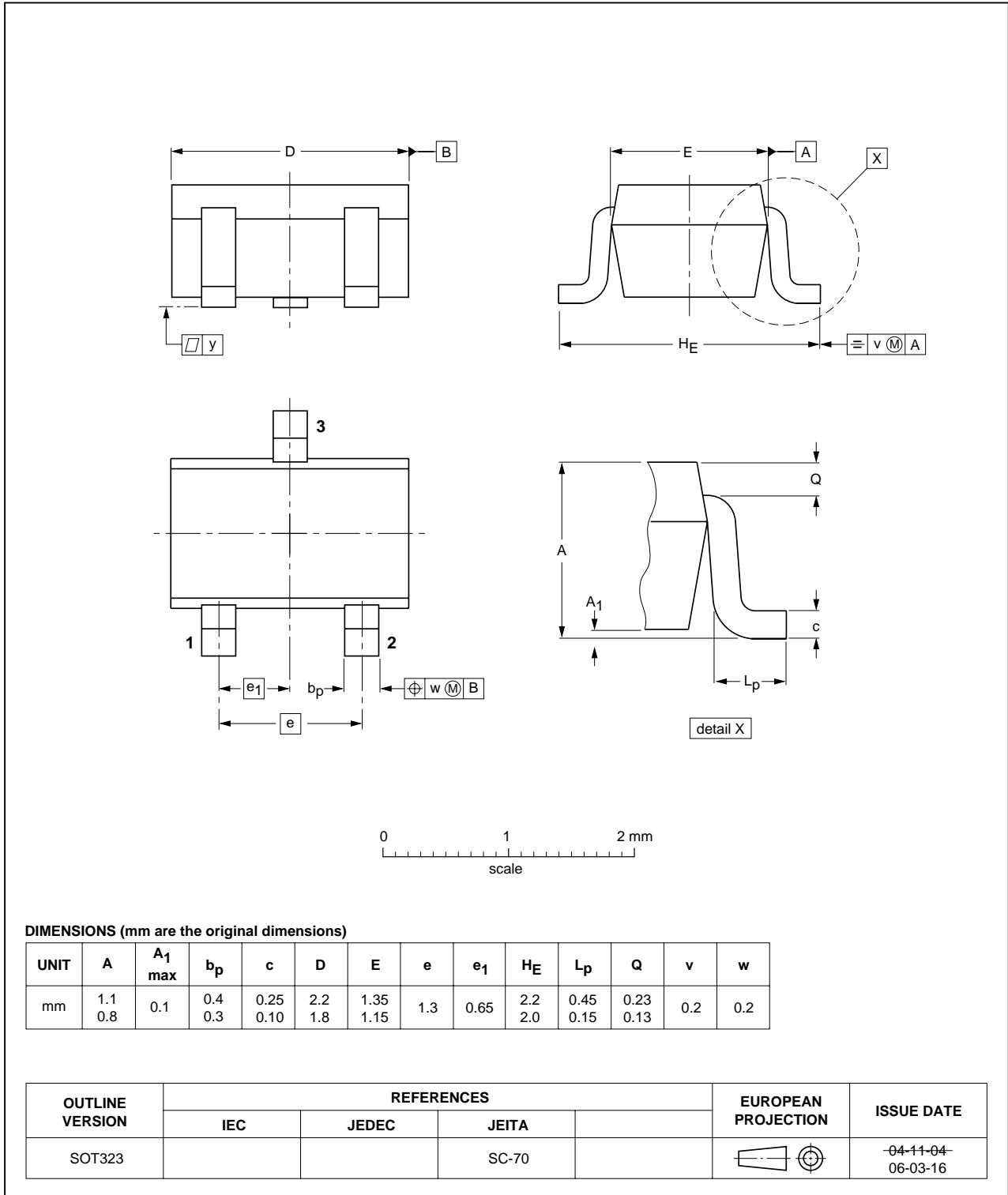


Fig 12. Package outline SOT323 (SC-70)

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 |
| PDTA113EE | SOT416 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTA113EK | SOT346 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTA113EM | SOT883 | 2 mm pitch, 8 mm tape and reel | - | - | -315 |
| PDTA113ES | SOT54 | bulk, straight leads | - | -412 | - |
| | SOT54A | tape and reel, wide pitch | - | - | -116 |
| | SOT54A | tape ammopack, wide patch | - | - | -126 |
| | SOT54 variant | bulk, delta pinning | - | -112 | - |
| PDTA113ET | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | -235 |
| PDTA113EU | 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 |
|----------------|--------------|---|---------------|----------------|
| PDTA113E_SER_5 | 20090902 | Product data sheet | - | PDTA113E_SER_4 |
| Modifications: | | <ul style="list-style-type: none"> 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. Figure 5 "Package outline SOT416 (SC-75)" updated Figure 6 "Package outline SOT346 (SC-59A/TO-236)" updated Figure 11 "Package outline SOT23 (TO-236AB)" updated Figure 12 "Package outline SOT323 (SC-70)" updated | | |
| PDTA113E_SER_4 | 20050405 | Product data sheet | - | PDTA113ET_3 |
| PDTA113ET_3 | 20040720 | Objective data sheet | - | PDTA113ET_2 |
| PDTA113ET_2 | 20040415 | Objective data sheet | - | PDTA113ET_1 |
| PDTA113ET_1 | 20040316 | Objective data sheet | - | - |

11. Legal information

11.1 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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