

PDTA143X series

PNP resistor-equipped transistors;
R1 = 4.7 k Ω , R2 = 10 k Ω

Rev. 5 — 9 December 2011

Product data sheet

1. Product profile

1.1 General description

PNP Resistor-Equipped Transistor (RET) family in Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

| Type number | Package | | | NPN complement | Package configuration |
|-------------|---------|--------|----------|----------------|-----------------------|
| | NXP | JEITA | JEDEC | | |
| PDTA143XE | SOT416 | SC-75 | - | PDTC143XE | ultra small |
| PDTA143XM | SOT883 | SC-101 | - | PDTC143XM | leadless ultra small |
| PDTA143XT | SOT23 | - | TO-236AB | PDTC143XT | small |
| PDTA143XU | SOT323 | SC-70 | - | PDTC143XU | very small |

1.2 Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

1.3 Applications

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

1.4 Quick reference data

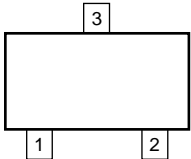
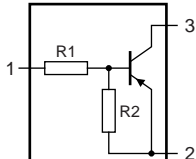

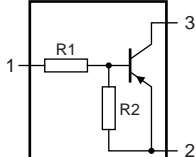
Table 2. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|------------|-----|-----|------|------------|
| V _{CEO} | collector-emitter voltage | open base | - | - | -50 | V |
| I _O | output current | | - | - | -100 | mA |
| R1 | bias resistor 1 (input) | | 3.3 | 4.7 | 6.1 | k Ω |
| R2/R1 | bias resistor ratio | | 1.7 | 2.1 | 2.6 | |



2. Pinning information

Table 3. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|------------------------------|--------------------|---|---|
| SOT23; SOT323; 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 |
| PDTA143XE | SC-75 | plastic surface-mounted package; 3 leads | SOT416 |
| PDTA143XM | SC-101 | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| PDTA143XT | - | plastic surface-mounted package; 3 leads | SOT23 |
| PDTA143XU | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |

4. Marking

Table 5. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PDTA143XE | 35 |
| PDTA143XM | DN |
| PDTA143XT | *31 |
| PDTA143XU | *46 |

[1] * = placeholder for manufacturing site code

5. Limiting values

Table 6. Limiting values

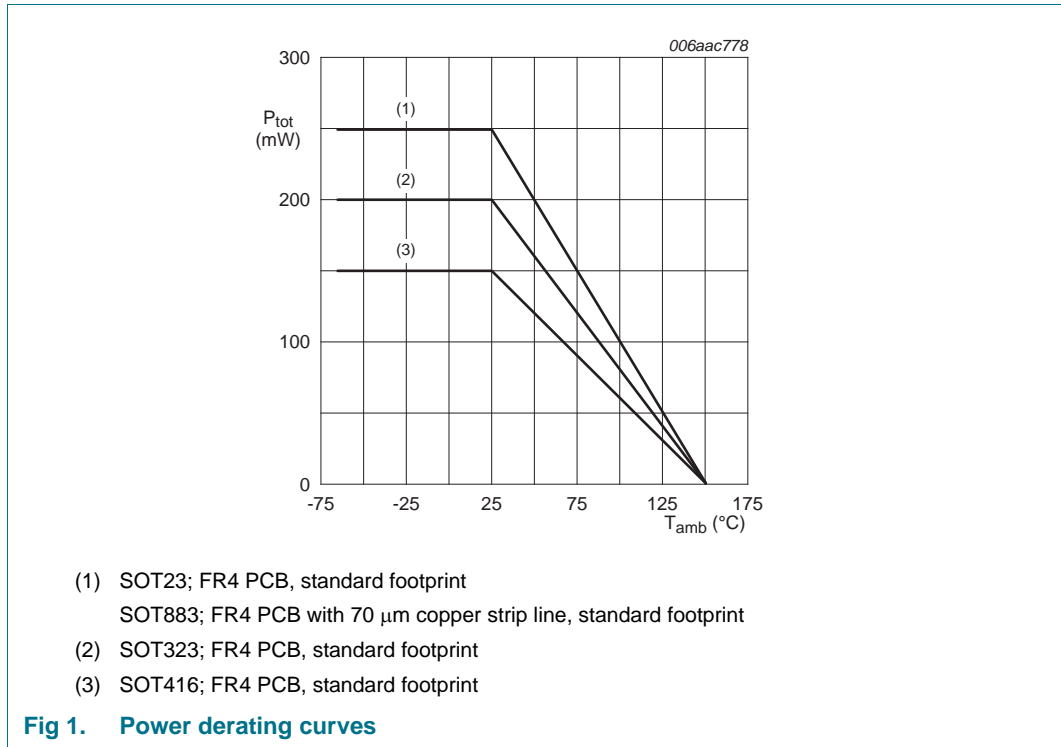
In accordance with the Absolute Maximum Rating System (IEC 60134).

| 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 | - | -7 | V | |
| V _I | input voltage | | | | | |
| | positive | | - | +7 | V | |
| | negative | | - | -20 | V | |
| I _O | output current | | - | -100 | mA | |
| I _{CM} | peak collector current | single pulse; t _p ≤ 1 ms | - | -100 | mA | |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | | | | |
| | PDTA143XE (SOT416) | | [1][2] | - | 150 | mW |
| | PDTA143XM (SOT883) | | [2][3] | - | 250 | mW |
| | PDTA143XT (SOT23) | | [1] | - | 250 | mW |
| | PDTA143XU (SOT323) | | [1] | - | 200 | mW |
| T _j | junction temperature | | - | 150 | °C | |
| T _{amb} | ambient temperature | | -65 | +150 | °C | |
| T _{stg} | storage temperature | | -65 | +150 | °C | |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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

[3] Device mounted on an FR4 PCB with 70 μ m copper strip line, standard footprint.



6. Thermal characteristics

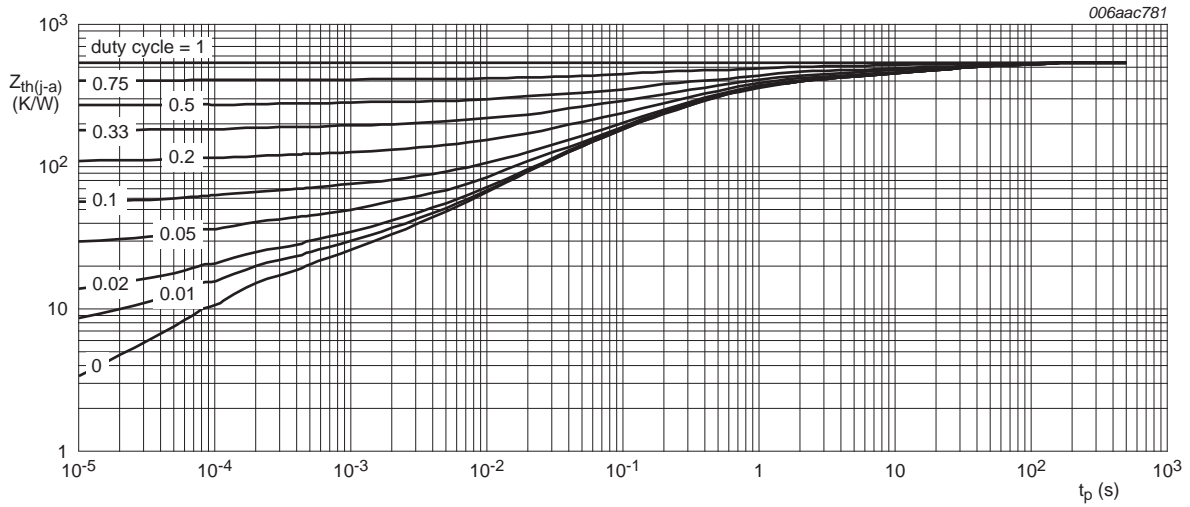
Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|---|-------------|-----|-----|-----|------|
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | | | | |
| | PDTA143XE (SOT416) | [1][2] | - | - | 830 | K/W |
| | PDTA143XM (SOT883) | [2][3] | - | - | 500 | K/W |
| | PDTA143XT (SOT23) | [1] | - | - | 500 | K/W |
| | PDTA143XU (SOT323) | [1] | - | - | 625 | K/W |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

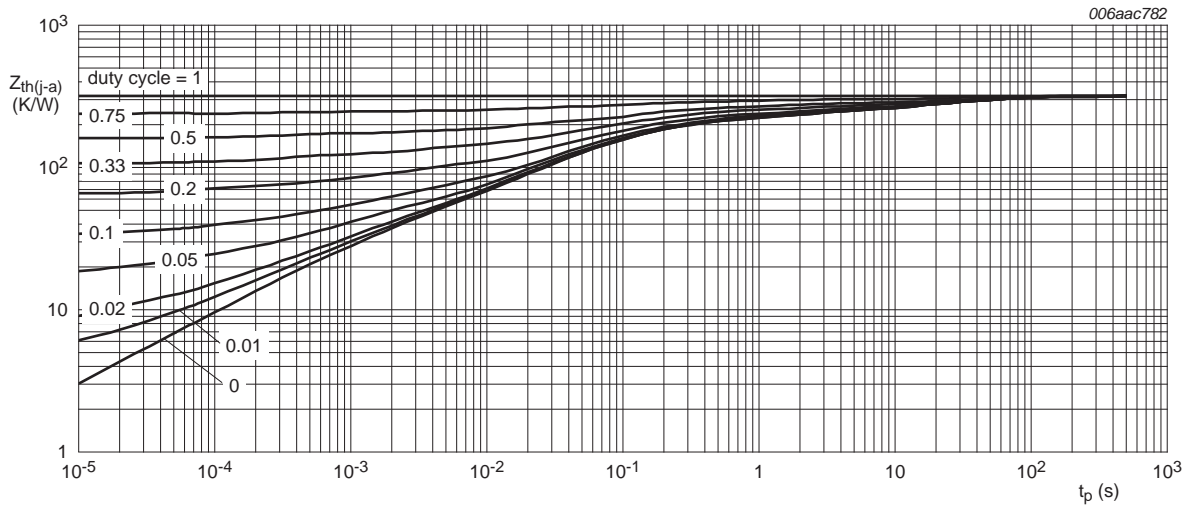
[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB with 70 μm copper strip line, standard footprint.



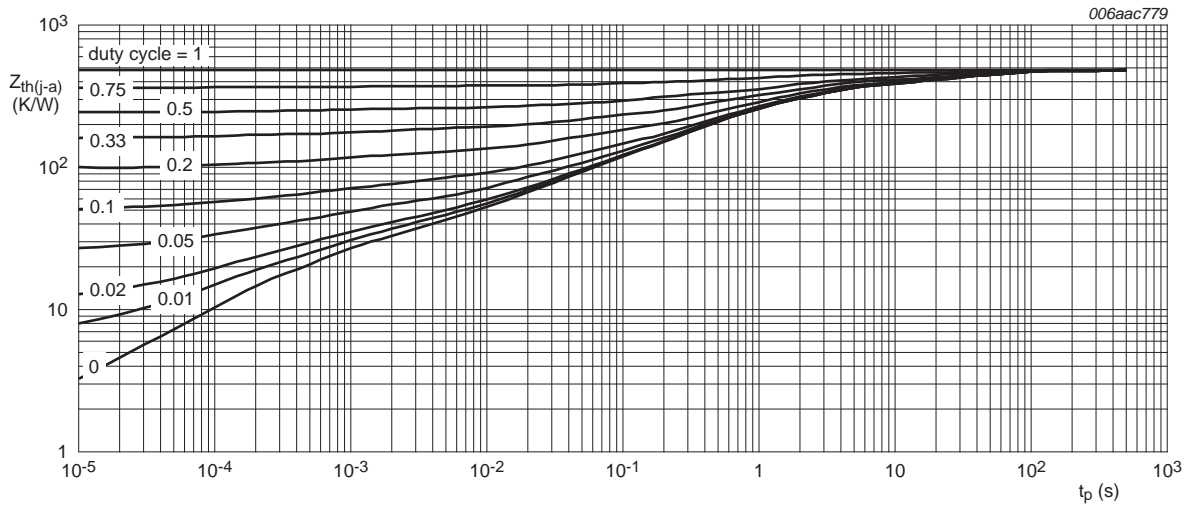
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XE (SOT416); typical values



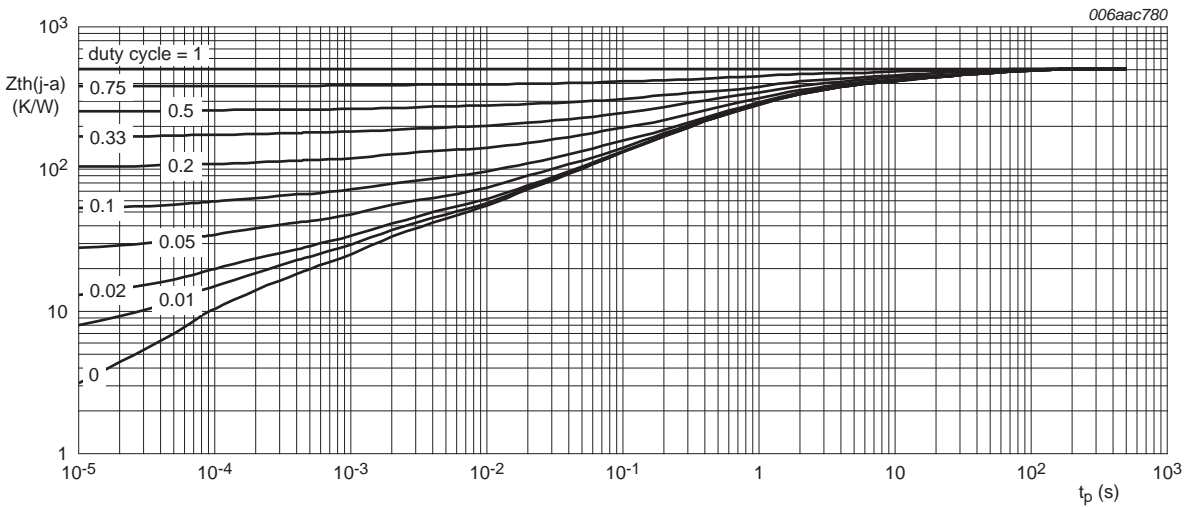
FR4 PCB, 70 μm copper strip line

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XM (SOT883); typical values



FR4 PCB, standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XT (SOT23); typical values



FR4 PCB, standard footprint

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XU (SOT323); typical values

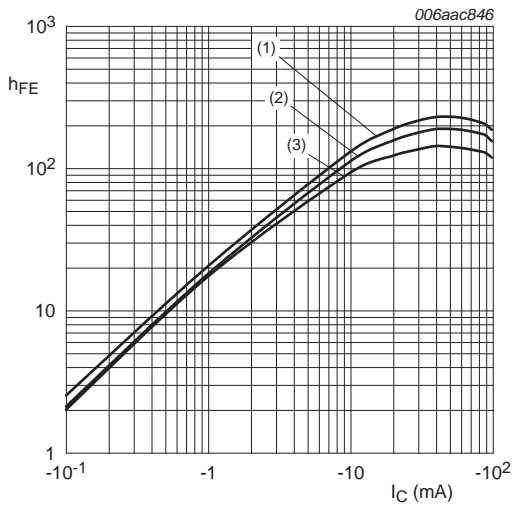
7. Characteristics

Table 8. Characteristics

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

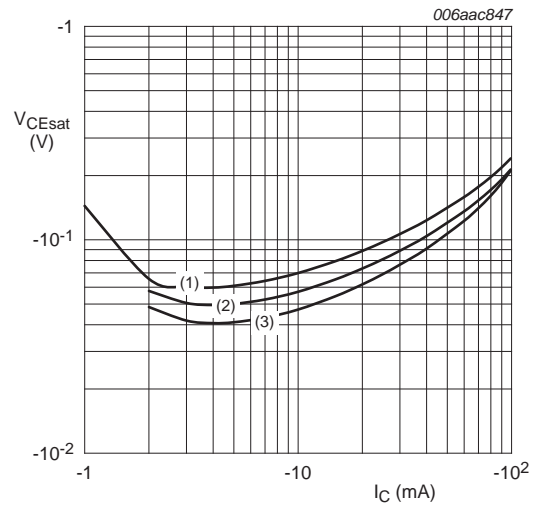
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------|--------------------------------------|--|------|------|------|---------------|
| I_{CBO} | collector-base cut-off current | $V_{CB} = -50\text{ V}; I_E = 0\text{ A}$ | - | - | -100 | nA |
| I_{CEO} | collector-emitter cut-off current | $V_{CE} = -30\text{ V}; I_B = 0\text{ A}$ | - | - | -1 | μA |
| | | $V_{CE} = -30\text{ V}; I_B = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$ | - | - | -5 | μA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = -5\text{ V}; I_C = 0\text{ A}$ | - | - | -600 | μA |
| h_{FE} | DC current gain | $V_{CE} = -5\text{ V}; I_C = -10\text{ mA}$ | 50 | - | - | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$ | - | - | -100 | mV |
| $V_{I(off)}$ | off-state input voltage | $V_{CE} = -5\text{ V}; I_C = -100\text{ }\mu\text{A}$ | - | -0.9 | -0.3 | V |
| $V_{I(on)}$ | on-state input voltage | $V_{CE} = -0.3\text{ V}; I_C = -20\text{ mA}$ | -2.5 | -1.5 | - | V |
| R1 | bias resistor 1 (input) | | 3.3 | 4.7 | 6.1 | k Ω |
| R2/R1 | bias resistor ratio | | 1.7 | 2.1 | 2.6 | |
| C_c | collector capacitance | $V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$ | - | - | 3 | pF |
| f_T | transition frequency | $V_{CE} = -5\text{ V}; I_C = -10\text{ mA};$ [1] $f = 100\text{ MHz}$ | - | 180 | - | MHz |

[1] Characteristics of built-in transistor



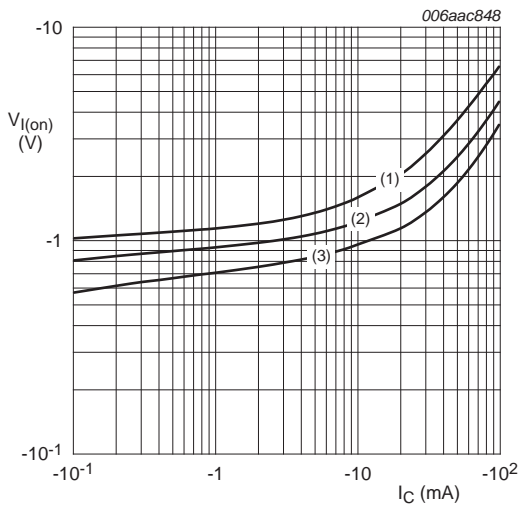
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



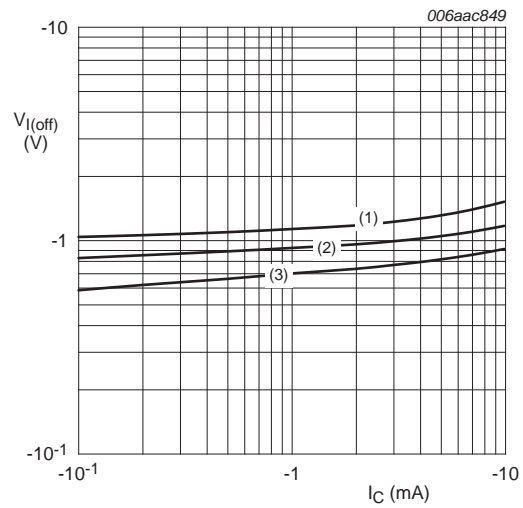
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



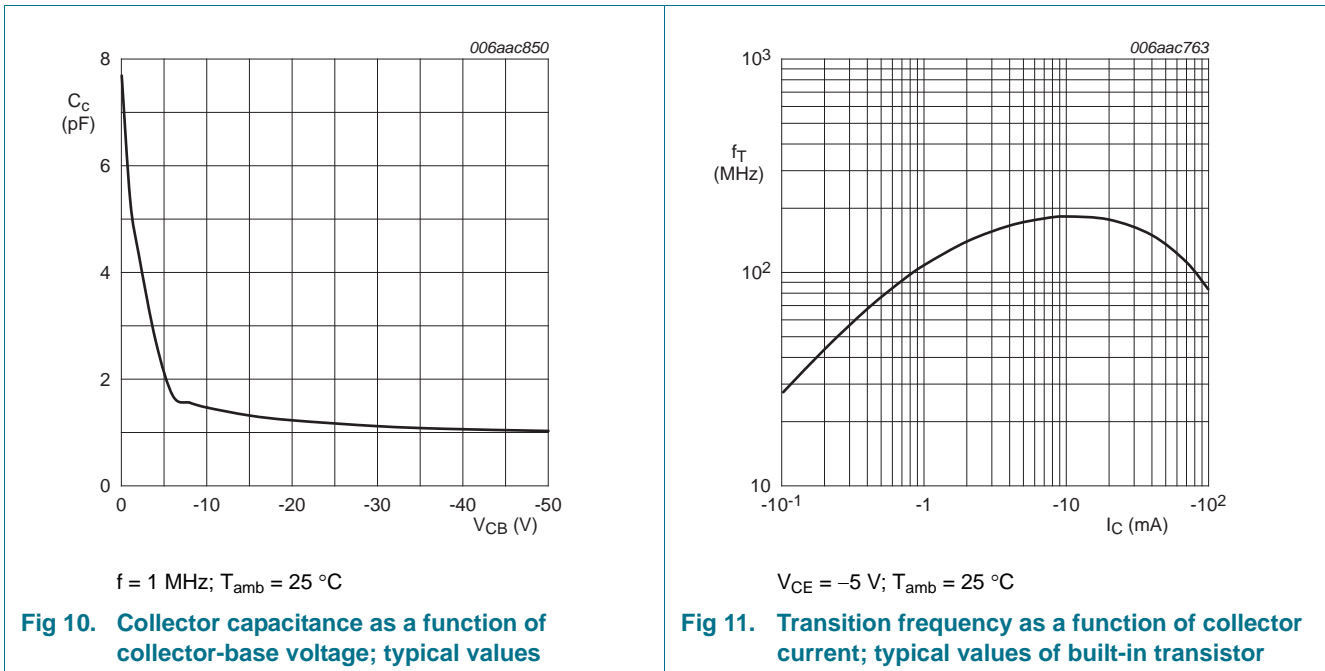
$V_{CE} = -0.3\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 8. 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 9. Off-state input voltage as a function of collector current; typical values

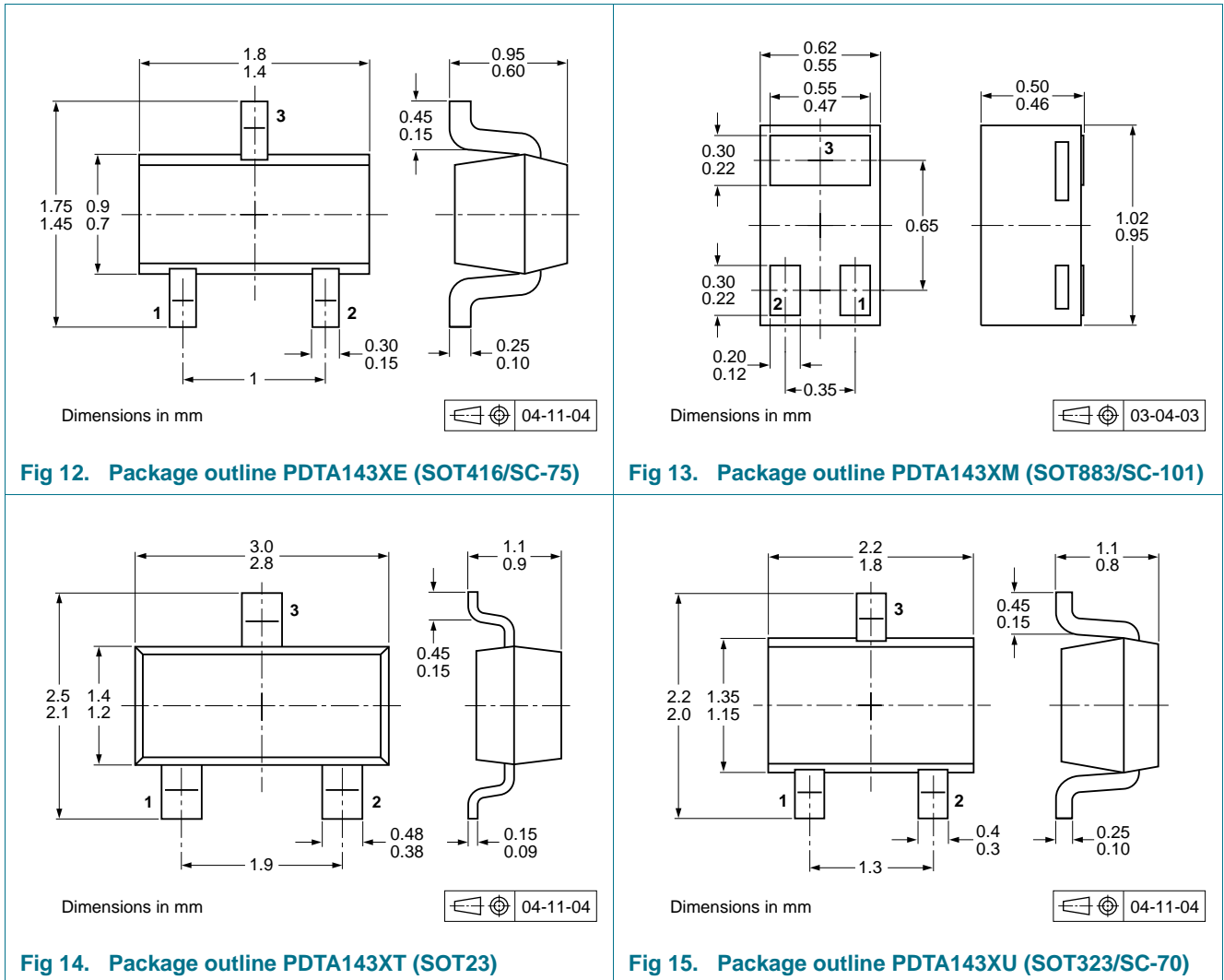


8. Test information

8.1 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.

9. Package outline



10. Packing information

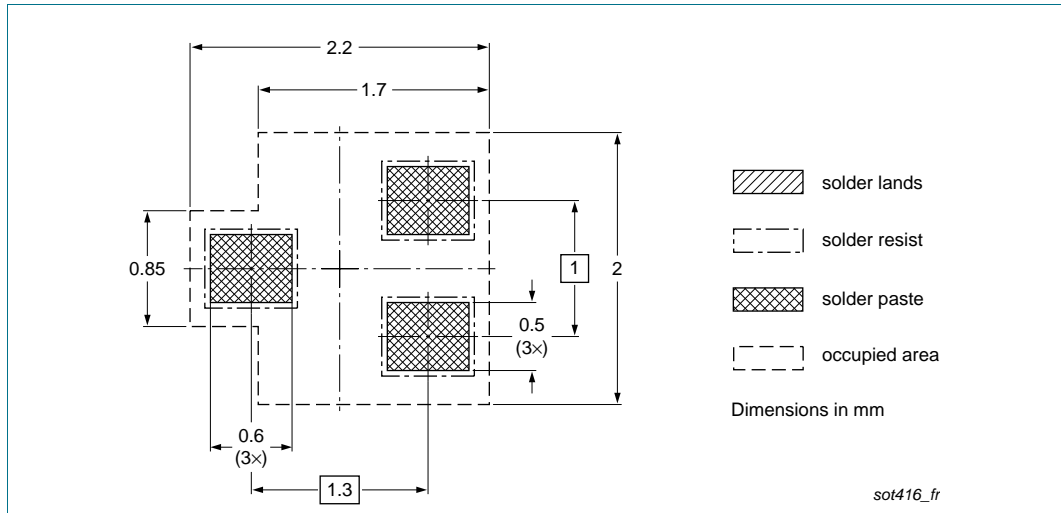
Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | | |
|-------------|---------|--------------------------------|------------------|------|-------|
| | | | 3000 | 5000 | 10000 |
| PDTA143XE | SOT416 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |
| PDTA143XM | SOT883 | 2 mm pitch, 8 mm tape and reel | - | - | -315 |
| PDTA143XT | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | -235 |
| PDTA143XU | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | -135 |

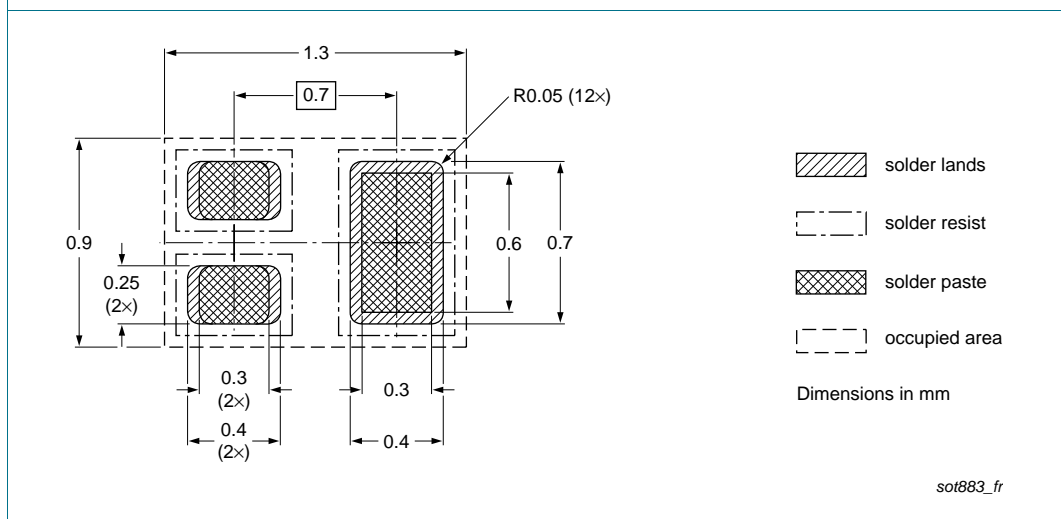
[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering



Reflow soldering is the only recommended soldering method.

Fig 16. Reflow soldering footprint PDTA143XE (SOT416/SC-75)



Reflow soldering is the only recommended soldering method.

Fig 17. Reflow soldering footprint PDTA143XM (SOT883/SC-101)

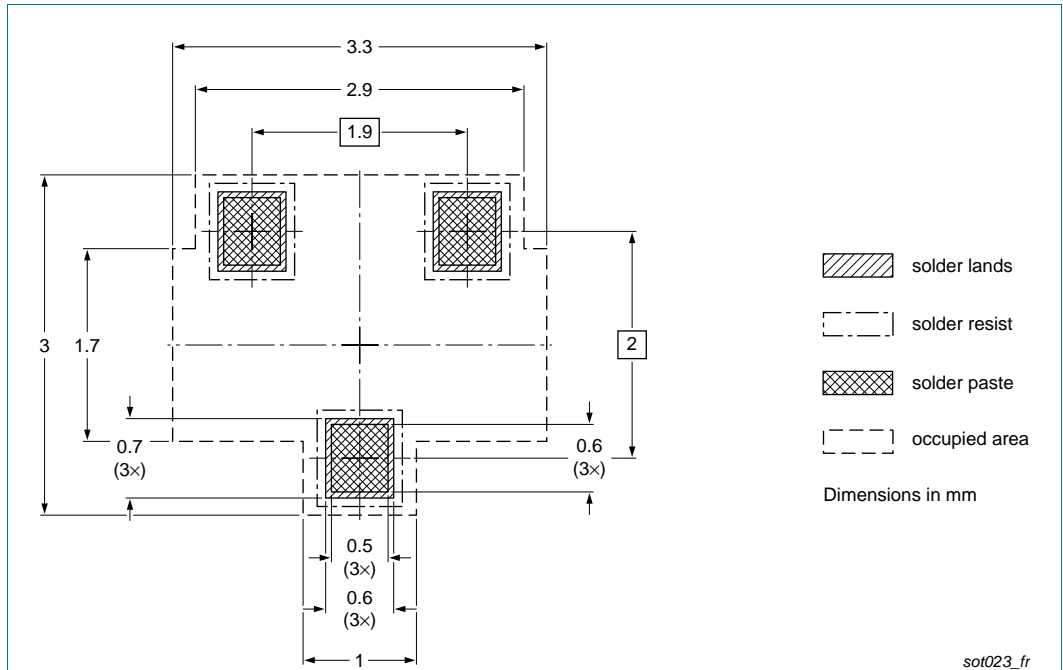


Fig 18. Reflow soldering footprint PDTA143XT (SOT23)

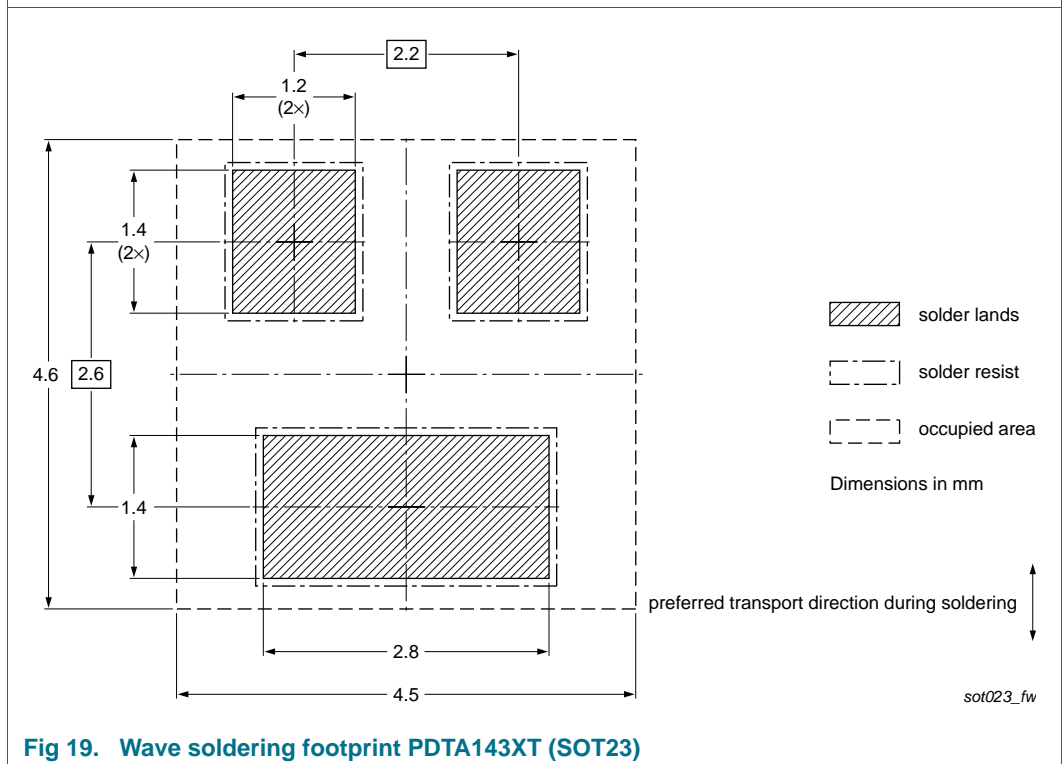


Fig 19. Wave soldering footprint PDTA143XT (SOT23)

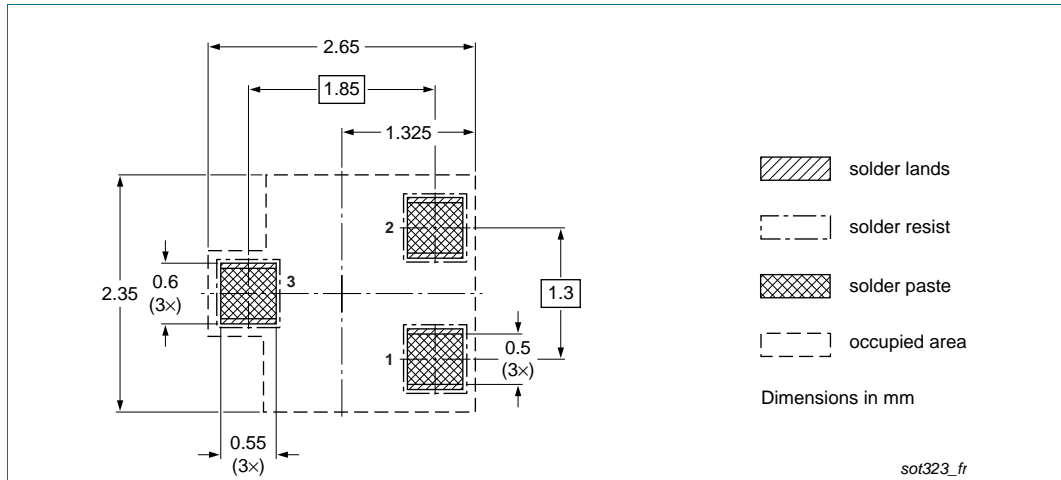


Fig 20. Reflow soldering footprint PDTA143XU (SOT323/SC-70)

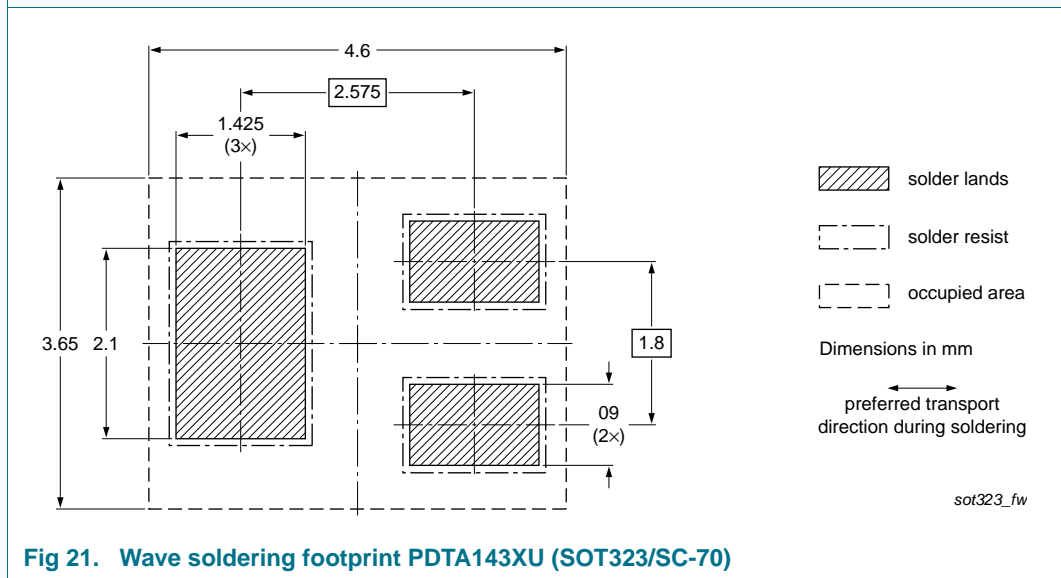


Fig 21. Wave soldering footprint PDTA143XU (SOT323/SC-70)

12. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------------|--|-----------------------|---------------|---------------------|
| PDTA143X_SER v.5 | 20111209 | Product data sheet | - | PDTA143X_SERIES v.4 |
| Modifications: | <ul style="list-style-type: none"> • Type numbers PDTA143XK and PDTA143XS removed. • Section 1 "Product profile": updated • Section 4 "Marking": updated • Figure 1 to 5, 10 and 11: added • Section 6 "Thermal characteristics": updated • Figure 6 to 9: updated • Table 8 "Characteristics": I_{CEO} updated, f_T added • Section 8 "Test information": added • Section 11 "Soldering": added • Section 13 "Legal information": updated | | | |
| PDTA143X_SERIES v.4 | 20070416 | Product data sheet | - | PDTA143X_SERIES v.3 |
| PDTA143X_SERIES v.3 | 20040804 | Product specification | - | PDTA143X_SERIES v.2 |
| PDTA143X_SERIES v.2 | 20030410 | Product specification | - | - |

13. Legal information

13.1 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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15. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features and benefits | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| 2 | Pinning information | 2 |
| 3 | Ordering information | 2 |
| 4 | Marking | 2 |
| 5 | Limiting values | 3 |
| 6 | Thermal characteristics | 4 |
| 7 | Characteristics | 7 |
| 8 | Test information | 9 |
| 8.1 | Quality information | 9 |
| 9 | Package outline | 10 |
| 10 | Packing information | 10 |
| 11 | Soldering | 11 |
| 12 | Revision history | 14 |
| 13 | Legal information | 15 |
| 13.1 | Data sheet status | 15 |
| 13.2 | Definitions | 15 |
| 13.3 | Disclaimers | 15 |
| 13.4 | Trademarks | 16 |
| 14 | Contact information | 16 |
| 15 | Contents | 17 |

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