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Kind regards,

Team Nexperia

# PDTA123T series

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

Rev. 02 — 3 September 2009

Product data sheet

## 1. Product profile

### 1.1 General description

PNP Resistor-Equipped Transistors (RET) family.

Table 1. Product overview

| Type number              | Package |        |          | NPN complement |
|--------------------------|---------|--------|----------|----------------|
|                          | NXP     | JEITA  | JEDEC    |                |
| PDTA123TE                | SOT416  | SC-75  | -        | PDTC123TE      |
| PDTA123TK                | SOT346  | SC-59A | TO-236   | PDTC123TK      |
| PDTA123TM                | SOT883  | SC-101 | -        | PDTC123TM      |
| PDTA123TS <sup>[1]</sup> | SOT54   | SC-43A | TO-92    | PDTC123TS      |
| PDTA123TT                | SOT23   | -      | TO-236AB | PDTC123TT      |
| PDTA123TU                | SOT323  | SC-70  | -        | PDTC123TU      |

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

### 1.2 Features

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

### 1.3 Applications

- Digital applications
- Controlling IC inputs
- Cost-saving alternative for BC857 series in digital applications
- Switching loads

### 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            |            | -    | -   | -100 | mA         |
| R1               | bias resistor 1 (input)   |            | 1.54 | 2.2 | 2.86 | k $\Omega$ |

## 2. Pinning information

**Table 3. Pinning**

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

### 3. Ordering information

Table 4. Ordering information

| Type number              | Package |   |         |
|--------------------------|---------|---|---------|
|                          | Name    | Description   | Version |
| PDTA123TE                | SC-75   | plastic surface mounted package; 3 leads                                      | SOT416  |
| PDTA123TK                | SC-59A  | plastic surface mounted package; 3 leads                                      | SOT346  |
| PDTA123TM                | SC-101  | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883  |
| PDTA123TS <sup>[1]</sup> | SC-43A  | plastic single-ended leaded (through hole) package; 3 leads                   | SOT54   |
| PDTA123TT                | -       | plastic surface mounted package; 3 leads                                      | SOT23   |
| PDTA123TU                | 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> |
|-------------|-----------------------------|
| PDTA123TE   | 2A                          |
| PDTA123TK   | GA                          |
| PDTA123TM   | FA                          |
| PDTA123TS   | TA123T                      |
| PDTA123TT   | ZL*                         |
| PDTA123TU   | *1S                         |

[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    |    |
| I <sub>O</sub>   | output current            |  | -      | -100 | mA   |    |
| I <sub>CM</sub>  | peak collector current    | single pulse;<br>t <sub>p</sub> ≤ 1 ms | -      | -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] 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 60 μm copper strip line, standard footprint.

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

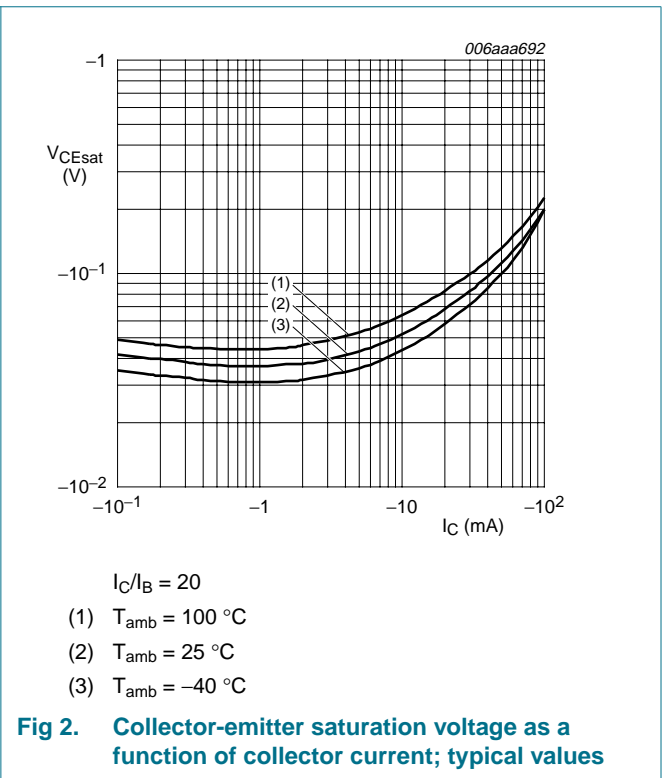
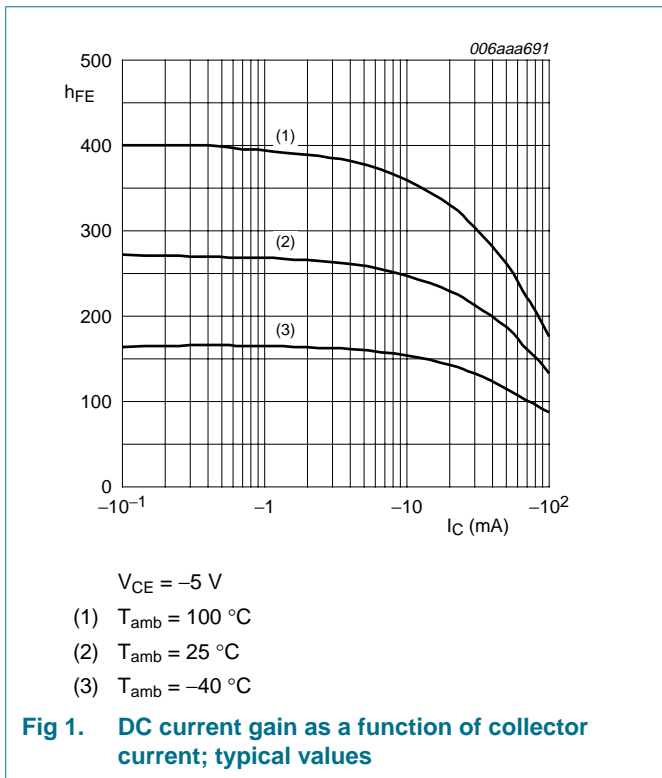
[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB with 60 μm copper strip line, standard footprint.

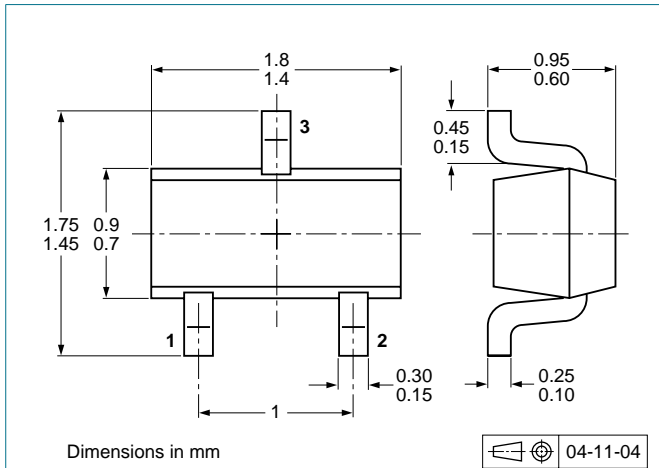
**7. Characteristics**

**Table 8. Characteristics**  
*T<sub>amb</sub> = 25 °C unless otherwise specified*

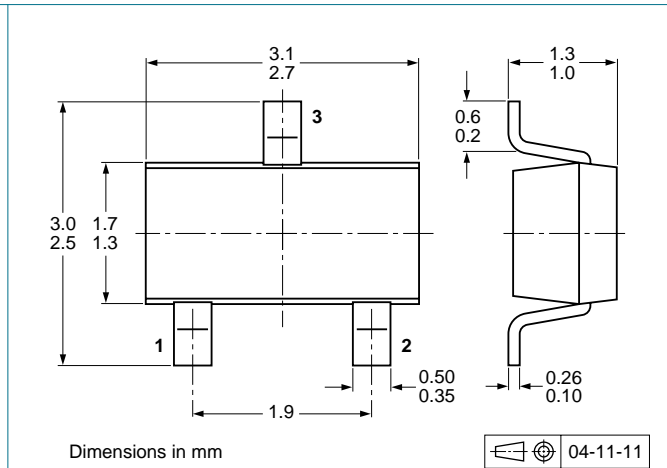
| Symbol             | Parameter                            | Conditions   | Min  | Typ | Max  | Unit |
|--------------------|--------------------------------------|--|------|-----|------|------|
| I <sub>CBO</sub>   | collector-base cut-off current       | V <sub>CB</sub> = -50 V; I <sub>E</sub> = 0 A                                | -    | -   | -100 | nA   |
| I <sub>CEO</sub>   | collector-emitter cut-off current    | V <sub>CE</sub> = -30 V; I <sub>B</sub> = 0 A                                | -    | -   | -1   | μA   |
|                    |                                      | V <sub>CE</sub> = -30 V; I <sub>B</sub> = 0 A;<br>T <sub>j</sub> = 150 °C    | -    | -   | -50  | μA   |
| I <sub>EBO</sub>   | emitter-base cut-off current         | V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A                                 | -    | -   | -100 | nA   |
| h <sub>FE</sub>    | DC current gain                      | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -20 mA                              | 30   | -   | -    |      |
| V <sub>CEsat</sub> | collector-emitter saturation voltage | I <sub>C</sub> = -10 mA; I <sub>B</sub> = -0.5 mA                            | -    | -   | -150 | mV   |
| R1                 | bias resistor 1 (input)              |  | 1.54 | 2.2 | 2.86 | kΩ   |
| C <sub>c</sub>     | collector capacitance                | V <sub>CB</sub> = -10 V; I <sub>E</sub> = i <sub>e</sub> = 0 A;<br>f = 1 MHz | -    | -   | 3    | pF   |



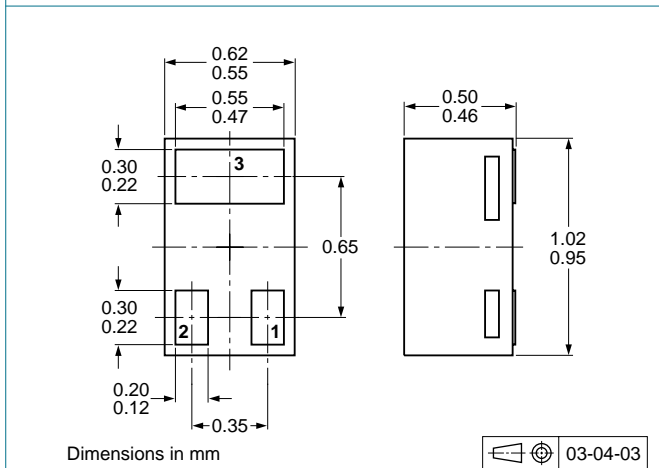
**8. Package outline**



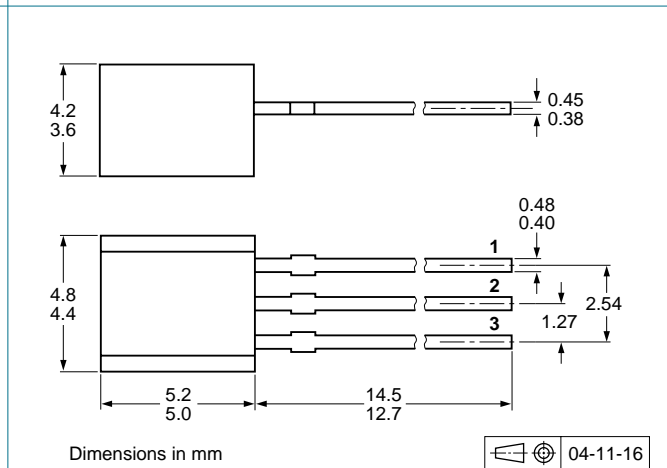
**Fig 3. Package outline SOT416 (SC-75)**



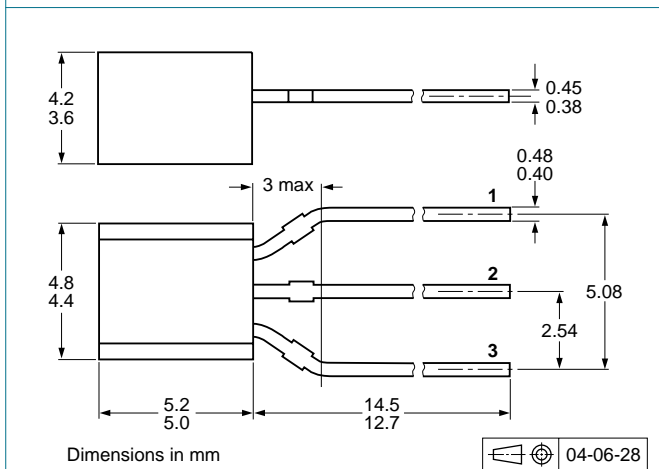
**Fig 4. Package outline SOT346 (SC-59A/TO-236)**



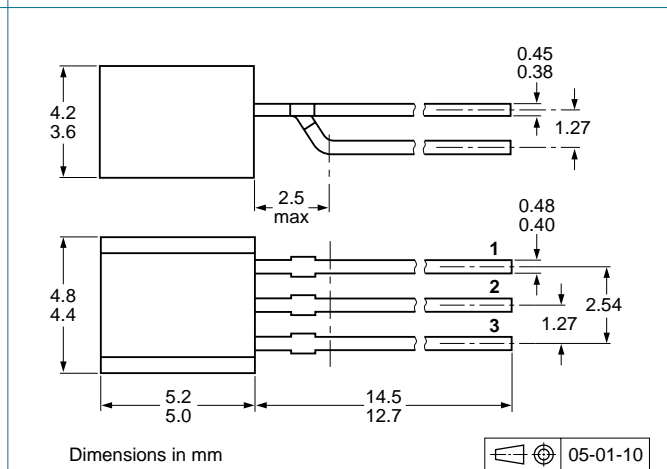
**Fig 5. Package outline SOT883 (SC-101)**



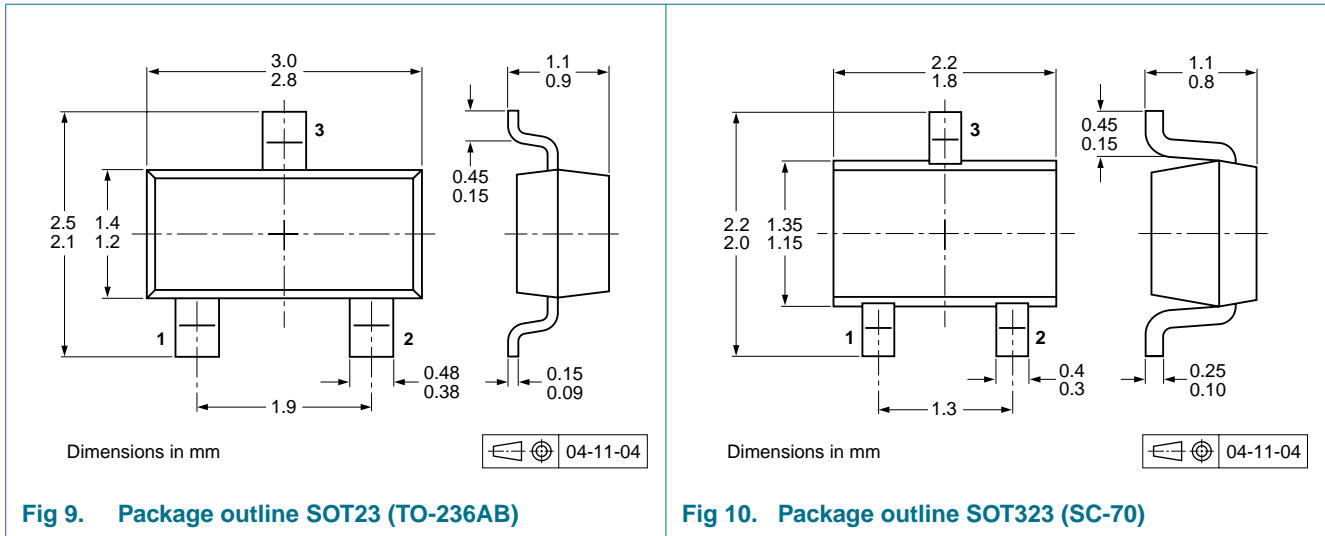
**Fig 6. Package outline SOT54 (SC-43A/TO-92)**



**Fig 7. Package outline SOT54A**



**Fig 8. Package outline SOT54 variant**



**Fig 9. Package outline SOT23 (TO-236AB)**

**Fig 10. 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.<sup>[1]</sup>

| Type number | Package       | Description                    | Packing quantity |      |       |
|-------------|---------------|--------------------------------|------------------|------|-------|
|             |               |                                | 3000             | 5000 | 10000 |
| PDTA123TE   | SOT416        | 4 mm pitch, 8 mm tape and reel | -115             | -    | -135  |
| PDTA123TK   | SOT346        | 4 mm pitch, 8 mm tape and reel | -115             | -    | -135  |
| PDTA123TM   | SOT883        | 2 mm pitch, 8 mm tape and reel | -                | -    | -315  |
| PDTA123TS   | SOT54         | bulk, straight leads           | -                | -412 | -     |
|             | SOT54A        | tape and reel, wide pitch      | -                | -    | -116  |
|             |               | tape ammpack, wide pitch       | -                | -    | -126  |
|             | SOT54 variant | bulk, delta pinning            | -                | -112 | -     |
| PDTA123TT   | SOT23         | 4 mm pitch, 8 mm tape and reel | -215             | -    | -235  |
| PDTA123TU   | 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     |
|----------------|---|--------------------|---------------|----------------|
| PDTA123T_SER_2 | 20090903  | Product data sheet | -             | PDTA123T_SER_1 |
| 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></ul> |                    |               |                |
| PDTA123T_SER_1 | 20060307  | Product 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.                                     |

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[2] The term 'short data sheet' is explained in section "Definitions".

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