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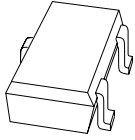
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Kind regards,

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# PMST3906

40 V, 200 mA PNP switching transistor

Rev. 05 — 29 April 2009

Product data sheet

## 1. Product profile

### 1.1 General description

PNP switching transistor in a SOT323 (SC-70) very small Surface-Mounted Device (SMD) plastic package.

NPN complement: PMST3904.

### 1.2 Features

- Collector current:  $I_C \leq -200$  mA
- Collector-emitter voltage:  $V_{CEO} \leq -40$  V
- Very small SMD plastic package

### 1.3 Applications

- General amplification and switching

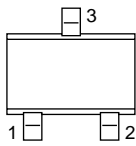
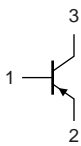
### 1.4 Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                 | Conditions | Min | Typ | Max  | Unit |
|-----------|---------------------------|------------|-----|-----|------|------|
| $V_{CEO}$ | collector-emitter voltage | open base  | -   | -   | -40  | V    |
| $I_C$     | collector current         |            | -   | -   | -200 | mA   |

## 2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline                                                                    | Graphic symbol                                                                        |
|-----|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1   | base        |  |  |
| 2   | emitter     |                                                                                       |                                                                                       |
| 3   | collector   |                                                                                       |                                                                                       |

*sym013*

### 3. Ordering information

Table 3. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| PMST3906    | SC-70   | plastic surface-mounted package; 3 leads | SOT323  |

### 4. Marking

Table 4. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| PMST3906    | *2A                         |

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

### 5. Limiting values

Table 5. 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                        | -   | -40  | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                           | -   | -40  | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                      | -   | -6   | V    |
| $I_C$     | collector current         |                                     | -   | -200 | mA   |
| $I_{CM}$  | peak collector current    | single pulse;<br>$t_p \leq 1$ ms    | -   | -200 | mA   |
| $I_{BM}$  | peak base current         | single pulse;<br>$t_p \leq 1$ ms    | -   | -100 | mA   |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25$ °C <sup>[1]</sup> | -   | 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.

### 6. 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 | <sup>[1]</sup> - | -   | 625 | K/W  |

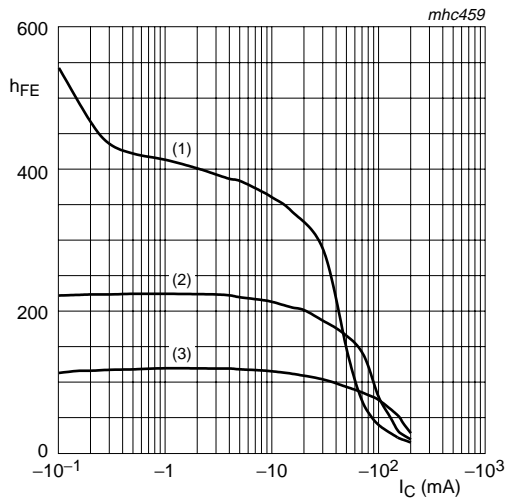
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

**Table 7. Characteristics**

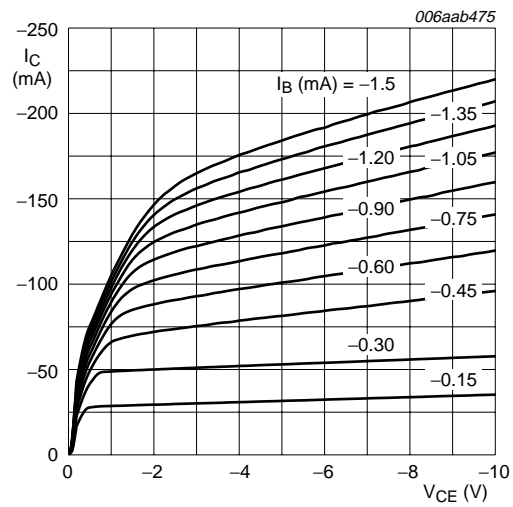
$T_{amb} = 25^\circ\text{C}$  unless otherwise specified.

| Symbol      | Parameter                            | Conditions                                                                                                                   | Min | Typ | Max  | Unit |
|-------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|------|
| $I_{CBO}$   | collector-base cut-off current       | $I_E = 0\text{ A}; V_{CB} = -30\text{ V}$                                                                                    | -   | -   | -50  | nA   |
| $I_{EBO}$   | emitter-base cut-off current         | $I_C = 0\text{ A}; V_{EB} = -6\text{ V}$                                                                                     | -   | -   | -50  | nA   |
| $h_{FE}$    | DC current gain                      | $V_{CE} = -1\text{ V}$                                                                                                       |     |     |      |      |
|             |                                      | $I_C = -0.1\text{ mA}$                                                                                                       | 60  | -   | -    |      |
|             |                                      | $I_C = -1\text{ mA}$                                                                                                         | 80  | -   | -    |      |
|             |                                      | $I_C = -10\text{ mA}$                                                                                                        | 100 | -   | 300  |      |
|             |                                      | $I_C = -50\text{ mA}$                                                                                                        | 60  | -   | -    |      |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = -10\text{ mA}; I_B = -1\text{ mA}$                                                                                    | -   | -   | -250 | mV   |
|             |                                      | $I_C = -50\text{ mA}; I_B = -5\text{ mA}$                                                                                    | -   | -   | -400 | mV   |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = -10\text{ mA}; I_B = -1\text{ mA}$                                                                                    | -   | -   | -850 | mV   |
|             |                                      | $I_C = -50\text{ mA}; I_B = -5\text{ mA}$                                                                                    | -   | -   | -950 | mV   |
| $t_d$       | delay time                           | $I_C = -10\text{ mA};$<br>$I_{Bon} = -1\text{ mA};$<br>$I_{Boff} = 1\text{ mA}$                                              | -   | -   | 35   | ns   |
| $t_r$       | rise time                            |                                                                                                                              | -   | -   | 35   | ns   |
| $t_{on}$    | turn-on time                         |                                                                                                                              | -   | -   | 70   | ns   |
| $t_s$       | storage time                         |                                                                                                                              | -   | -   | 225  | ns   |
| $t_f$       | fall time                            |                                                                                                                              | -   | -   | 75   | ns   |
| $t_{off}$   | turn-off time                        |                                                                                                                              | -   | -   | 300  | ns   |
| $C_c$       | collector capacitance                | $I_E = i_e = 0\text{ A}; V_{CB} = -5\text{ V};$<br>$f = 1\text{ MHz}$                                                        | -   | -   | 4.5  | pF   |
| $C_e$       | emitter capacitance                  | $I_C = i_c = 0\text{ A};$<br>$V_{EB} = -500\text{ mV};$<br>$f = 1\text{ MHz}$                                                | -   | -   | 10   | pF   |
| $f_T$       | transition frequency                 | $I_C = -10\text{ mA};$<br>$V_{CE} = -20\text{ V};$<br>$f = 100\text{ MHz}$                                                   | 250 | -   | -    | MHz  |
| NF          | noise figure                         | $I_C = -100\text{ }\mu\text{A};$<br>$V_{CE} = -5\text{ V}; R_S = 1\text{ k}\Omega;$<br>$f = 10\text{ Hz to }15.7\text{ kHz}$ | -   | -   | 4    | dB   |



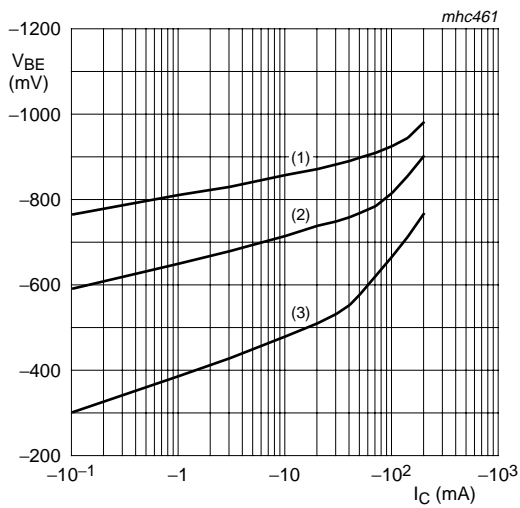
$V_{CE} = -1\text{ V}$   
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

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



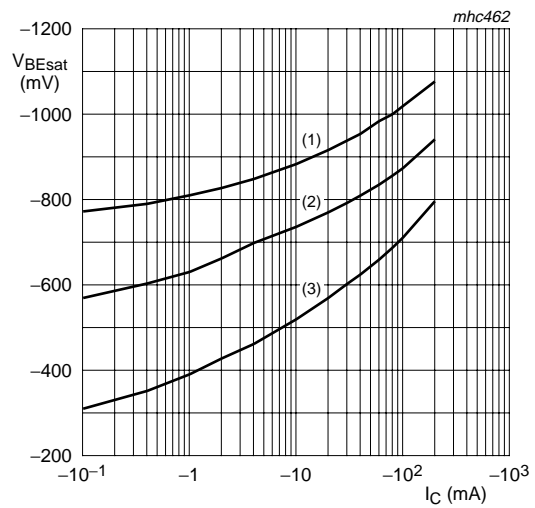
$T_{amb} = 25^\circ\text{C}$

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



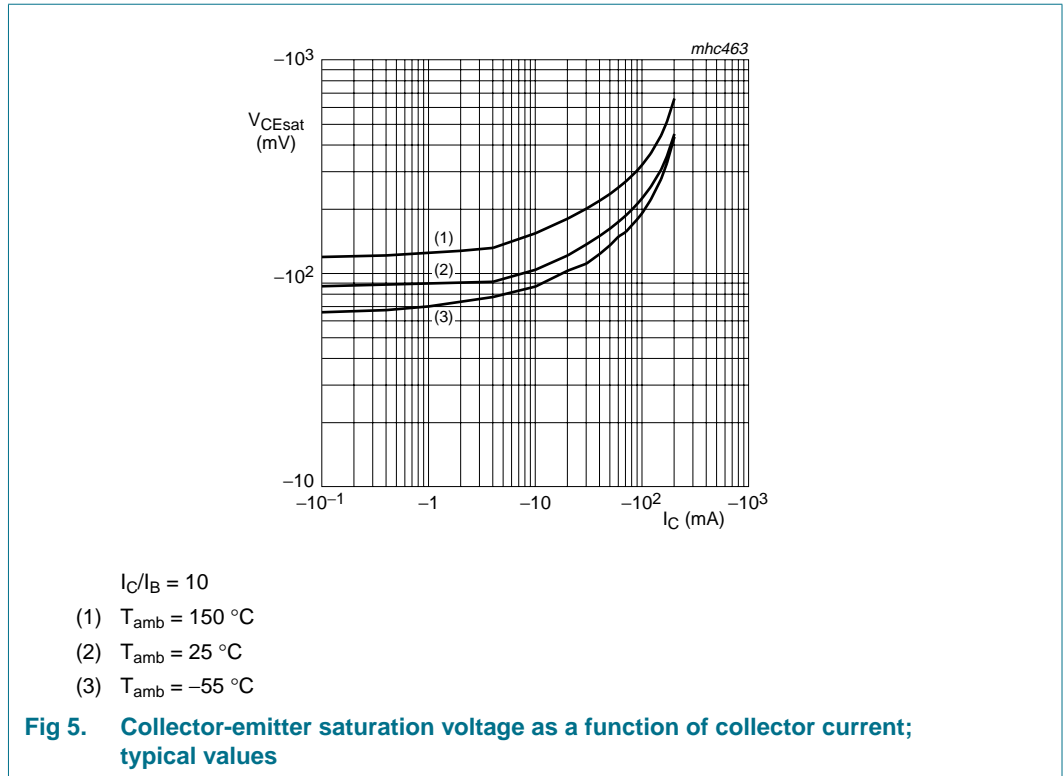
$V_{CE} = -1\text{ V}$   
 (1)  $T_{amb} = -55^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = 150^\circ\text{C}$

**Fig 3. Base-emitter voltage as a function of collector current; typical values**

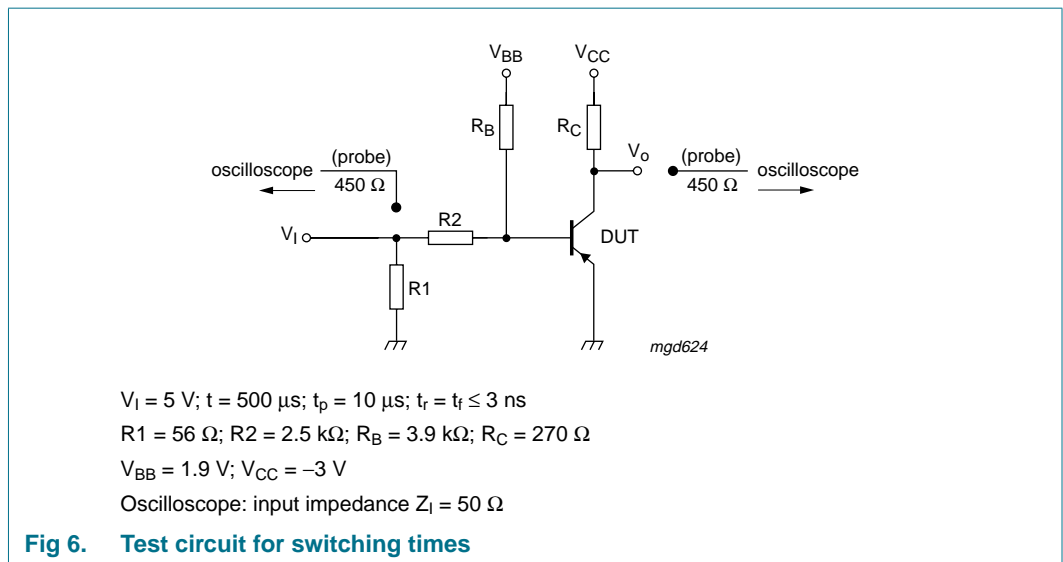


$I_C/I_B = 10$   
 (1)  $T_{amb} = -55^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = 150^\circ\text{C}$

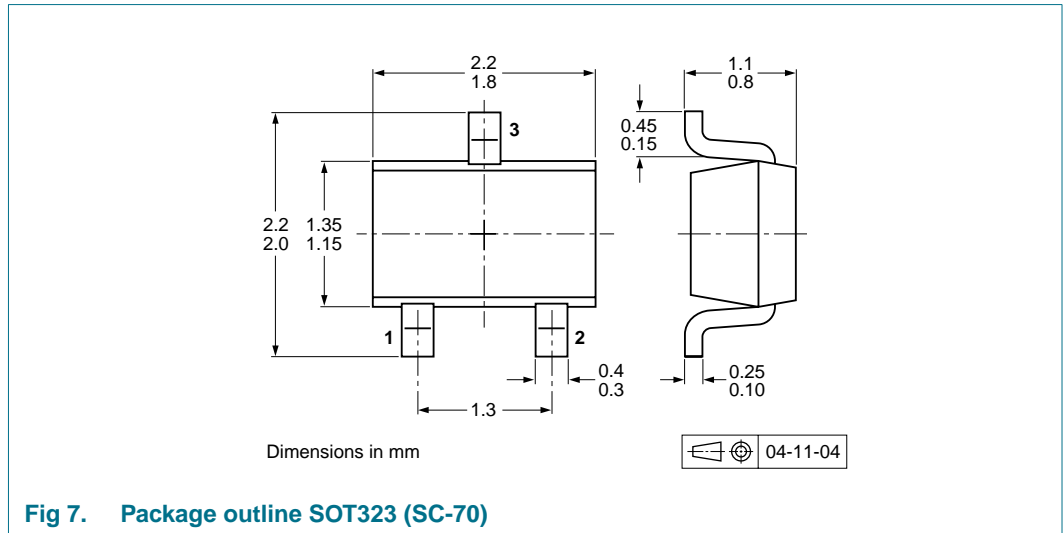
**Fig 4. Base-emitter saturation voltage as a function of collector current; typical values**



## 8. Test information



## 9. Package outline



## 10. Packing information

**Table 8. 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             | 10000 |
| PMST3906    | 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

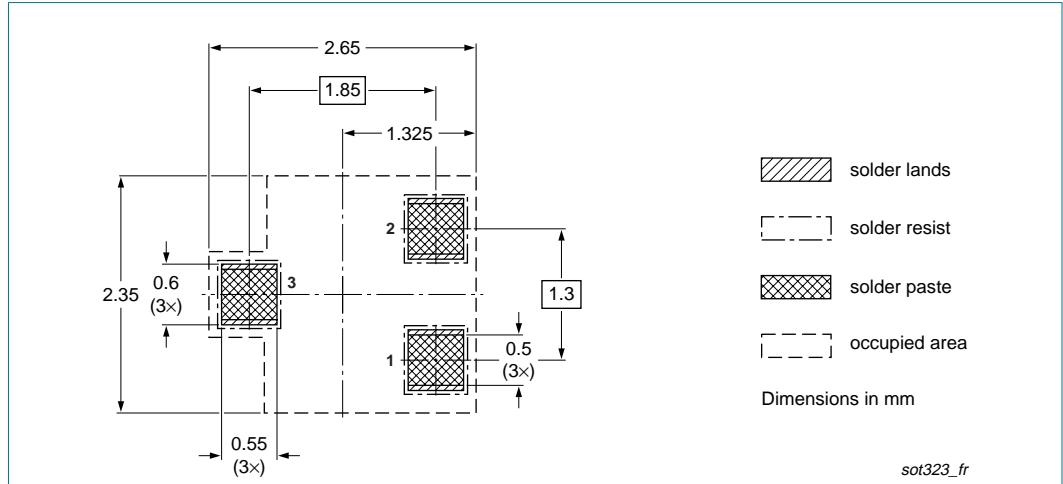


Fig 8. Reflow soldering footprint SOT323 (SC-70)

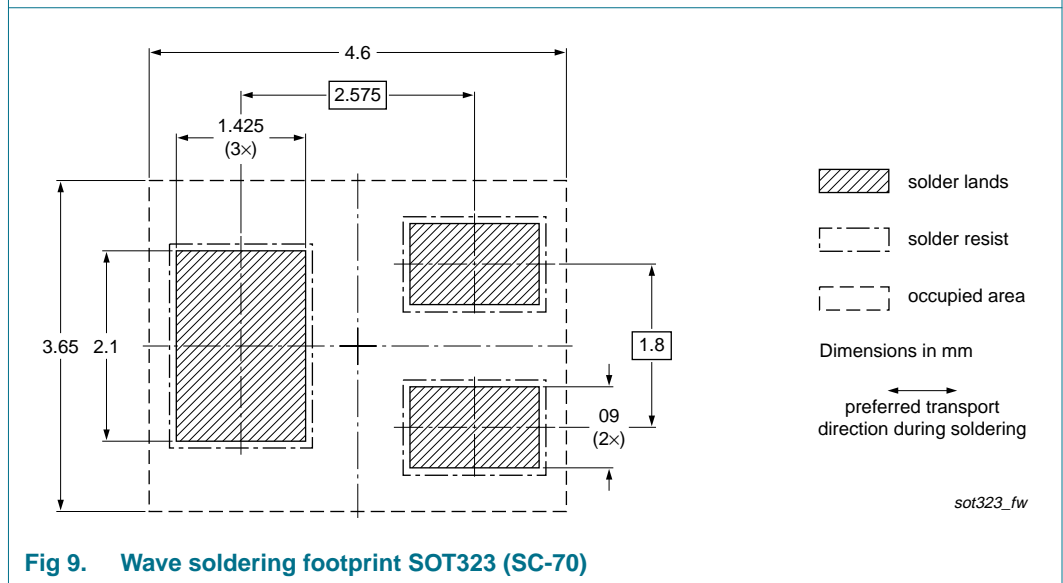


Fig 9. Wave soldering footprint SOT323 (SC-70)



## 12. Revision history

**Table 9.** Revision history

| Document ID    | Release date | Data sheet status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Change notice | Supersedes     |
|----------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|
| PMST3906_5     | 20090429     | Product data sheet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | -             | PMST3906_4     |
| Modifications: |              | <ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• <a href="#">Figure 2</a>: updated</li><li>• <a href="#">Figure 5</a>: figure notes order amended</li><li>• <a href="#">Section 10 "Packing information"</a> added</li><li>• <a href="#">Section 11 "Soldering"</a>: added</li><li>• <a href="#">Section 13 "Legal information"</a>: updated</li></ul> |               |                |
| PMST3906_4     | 20040121     | Product specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -             | PMST3906_3     |
| PMST3906_3     | 19990422     | Product specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -             | PMST3906_CNV_2 |
| PMST3906_CNV_2 | 19970527     | Product specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -             | -              |

## 13. Legal information

### 13.1 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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**15. Contents**

**1 Product profile . . . . . 1**

1.1 General description . . . . . 1

1.2 Features . . . . . 1

1.3 Applications . . . . . 1

1.4 Quick reference data . . . . . 1

**2 Pinning information . . . . . 1**

**3 Ordering information . . . . . 2**

**4 Marking . . . . . 2**

**5 Limiting values . . . . . 2**

**6 Thermal characteristics . . . . . 2**

**7 Characteristics . . . . . 3**

**8 Test information . . . . . 5**

**9 Package outline . . . . . 6**

**10 Packing information . . . . . 6**

**11 Soldering . . . . . 7**

**12 Revision history . . . . . 8**

**13 Legal information . . . . . 9**

13.1 Data sheet status . . . . . 9

13.2 Definitions . . . . . 9

13.3 Disclaimers . . . . . 9

13.4 Trademarks . . . . . 9

**14 Contact information . . . . . 9**

**15 Contents . . . . . 10**

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Date of release: 29 April 2009

Document identifier: PMST3906\_5