



# THE DATASHEET OF PMBTA42





# PMBTA42DS

300 V, 100 mA NPN/NPN high-voltage double transistor

20 July 2023

Product data sheet

## 1. General description

NPN/NPN high-voltage double transistor in a small SOT457 (SC-74) Surface Mounted Device (SMD) plastic package.

## 2. Features and benefits

- High breakdown voltage
- Two electrically isolated transistor
- Small SMD plastic package
- AEC-Q101 qualified

## 3. Applications

- Automotive:
  - High- and low-side switches
  - Voltage regulators
- Communication: Telecom line interface
- Consumer: CRT TV
- Computing: Monitors

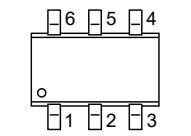
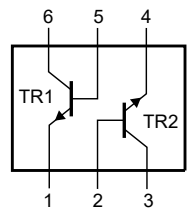
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                | Parameter                 | Conditions                    | Min | Typ | Max | Unit |
|-----------------------|---------------------------|-------------------------------|-----|-----|-----|------|
| <b>Per transistor</b> |                           |                               |     |     |     |      |
| $V_{CE0}$             | collector-emitter voltage | open base                     | -   | -   | 300 | V    |
| $I_C$                 | collector current         |                               | -   | -   | 100 | mA   |
| $I_{CM}$              | peak collector current    | single pulse; $t_p \leq 1$ ms | -   | -   | 200 | mA   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline                                                                                        | Graphic symbol                                                                                         |
|-----|--------|---------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 1   | E1     | emitter TR1   |  <p>TSOP6 (SOT457)</p> |  <p>006aaa677</p> |
| 2   | B2     | base TR2      |                                                                                                           |                                                                                                        |
| 3   | C2     | collector TR2 |                                                                                                           |                                                                                                        |
| 4   | E2     | emitter TR2   |                                                                                                           |                                                                                                        |
| 5   | B1     | base TR1      |                                                                                                           |                                                                                                        |
| 6   | C1     | collector TR1 |                                                                                                           |                                                                                                        |

## 6. Ordering information

Table 3. Ordering information

| Type number               | Package |                                                          |                        |
|---------------------------|---------|----------------------------------------------------------|------------------------|
|                           | Name    | Description                                              | Version                |
| <a href="#">PMBTA42DS</a> | TSOP6   | plastic, surface-mounted package (SC-74; TSOP6); 6 leads | <a href="#">SOT457</a> |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMBTA42DS   | P4           |

## 8. Limiting values

Table 5. Limiting values

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

| Symbol                | Parameter                 | Conditions                    |     | Min | Max | Unit |
|-----------------------|---------------------------|-------------------------------|-----|-----|-----|------|
| <b>Per transistor</b> |                           |                               |     |     |     |      |
| $V_{CBO}$             | collector-base voltage    | open emitter                  |     | -   | 300 | V    |
| $V_{CEO}$             | collector-emitter voltage | open base                     |     | -   | 300 | V    |
| $V_{EBO}$             | emitter-base voltage      | open collector                |     | -   | 6   | V    |
| $I_C$                 | collector current         |                               |     | -   | 100 | mA   |
| $I_{CM}$              | peak collector current    | single pulse; $t_p \leq 1$ ms |     | -   | 200 | mA   |
| $I_{BM}$              | peak base current         |                               |     | -   | 100 | mA   |
| $P_{tot}$             | total power dissipation   | $T_{amb} \leq 25$ °C          | [1] | -   | 290 | mW   |
|                       |                           |                               | [2] | -   | 370 | mW   |
|                       |                           |                               | [3] | -   | 450 | mW   |
| <b>Per device</b>     |                           |                               |     |     |     |      |
| $P_{tot}$             | total power dissipation   | $T_{amb} \leq 25$ °C          | [1] | -   | 420 | mW   |
|                       |                           |                               | [2] | -   | 560 | mW   |
|                       |                           |                               | [3] | -   | 700 | 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] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

[3] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

## 9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol                | Parameter                                        | Conditions  |     | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------------------|-------------|-----|-----|-----|-----|------|
| <b>Per transistor</b> |                                                  |             |     |     |     |     |      |
| $R_{th(j-a)}$         | thermal resistance from junction to ambient      | in free air | [1] | -   | -   | 431 | K/W  |
|                       |                                                  |             | [2] | -   | -   | 338 | K/W  |
|                       |                                                  |             | [3] | -   | -   | 278 | K/W  |
| $R_{th(j-sp)}$        | thermal resistance from junction to solder point |             |     | -   | -   | 105 | K/W  |
| <b>Per device</b>     |                                                  |             |     |     |     |     |      |
| $R_{th(j-a)}$         | thermal resistance from junction to ambient      | in free air | [1] | -   | -   | 298 | K/W  |
|                       |                                                  |             | [2] | -   | -   | 223 | K/W  |
|                       |                                                  |             | [3] | -   | -   | 179 | K/W  |

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

[3] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

## 10. Characteristics

Table 7. Characteristics

| Symbol                | Parameter                            | Conditions                                                                                                            |  | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| <b>Per transistor</b> |                                      |                                                                                                                       |  |     |     |     |      |
| $I_{CBO}$             | collector-base cut-off current       | $V_{CB} = 200 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$                                      |  | -   | -   | 100 | nA   |
| $I_{EBO}$             | emitter-base cut-off current         | $V_{EB} = 6 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$                                        |  | -   | -   | 100 | nA   |
| $h_{FE}$              | DC current gain                      | $V_{CE} = 10 \text{ V}; I_C = 1 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$                                      |  | 25  | -   | -   |      |
|                       |                                      | $V_{CE} = 10 \text{ V}; I_C = 10 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$                                     |  | 40  | -   | -   |      |
|                       |                                      | $V_{CE} = 10 \text{ V}; I_C = 30 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$                                     |  | 40  | -   | -   |      |
| $V_{CEsat}$           | collector-emitter saturation voltage | $I_C = 20 \text{ mA}; I_B = 2 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$                                        |  | -   | -   | 500 | mV   |
| $V_{BEsat}$           | base-emitter saturation voltage      |                                                                                                                       |  | -   | -   | 900 | mV   |
| $C_{re}$              | feedback capacitance                 | $V_{CB} = 20 \text{ V}; I_C = 0 \text{ A}; i_c = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$ |  | -   | -   | 3   | F    |
| $f_T$                 | transition frequency                 | $V_{CE} = 20 \text{ V}; I_C = 10 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$                |  | 50  | -   | -   | MHz  |

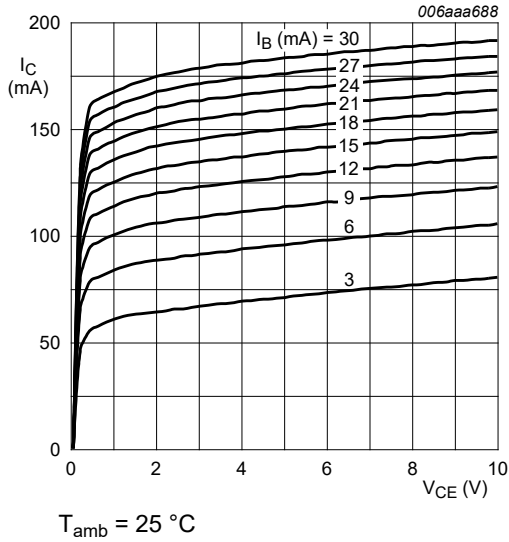


Fig. 1. Collector current as a function of collector-emitter voltage; typical values

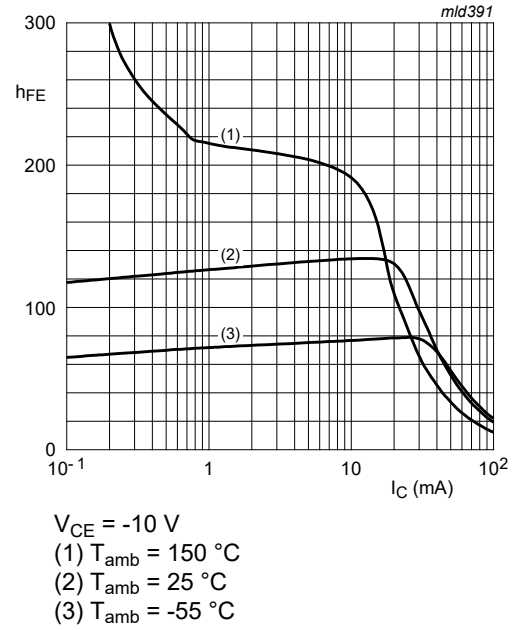


Fig. 2. DC current gain as a function of collector current; typical values

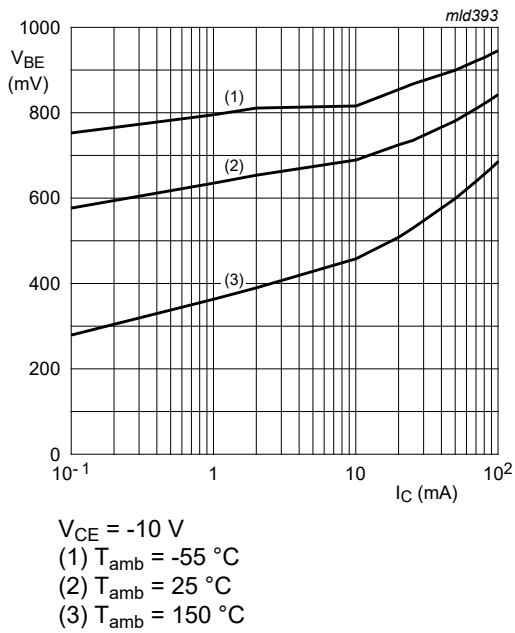


Fig. 3. Base-emitter voltage as a function of collector current; typical values

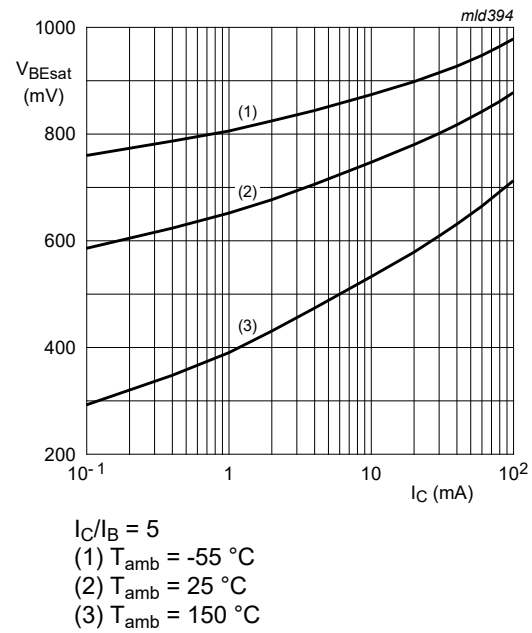
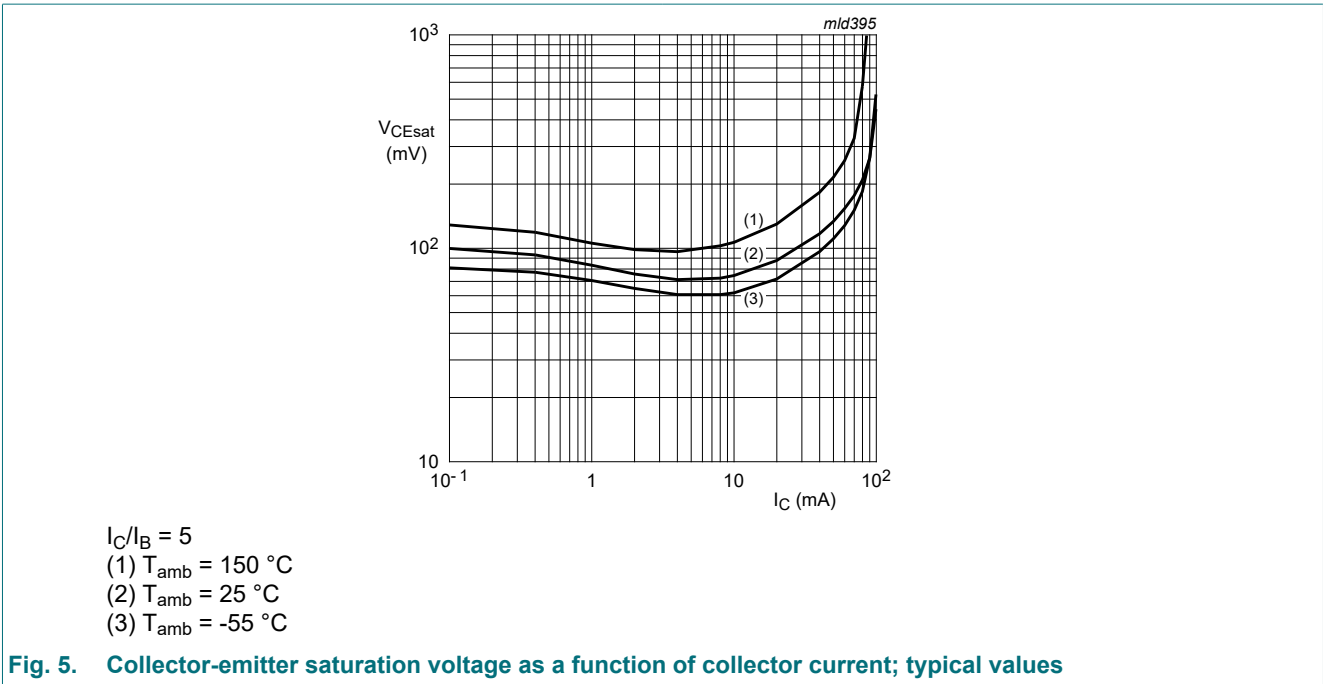


Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values

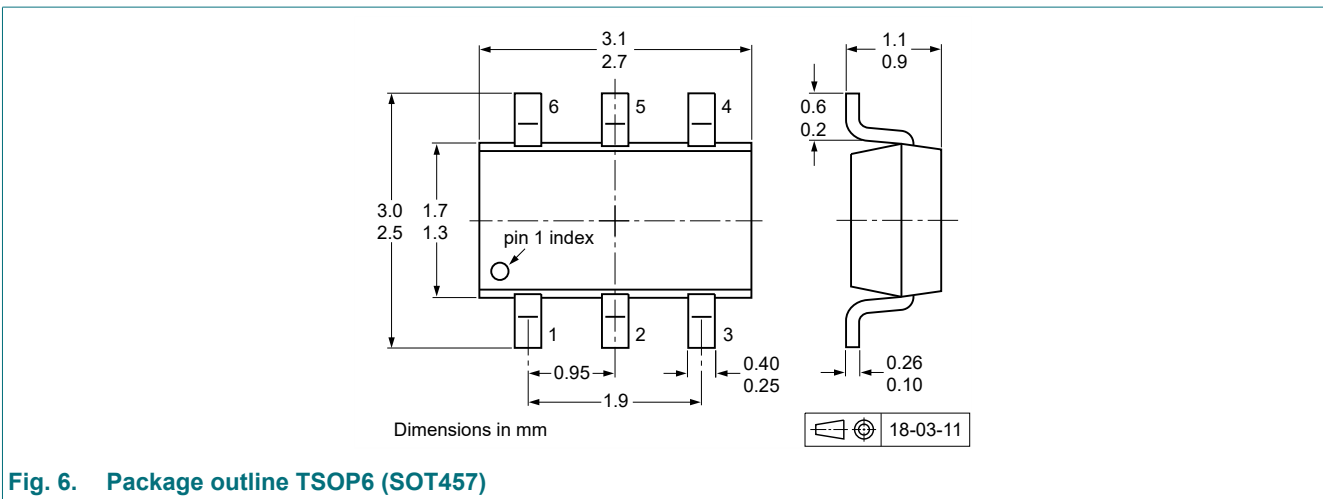


## 11. Test information

### 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.

## 12. Package outline



### 13. Soldering

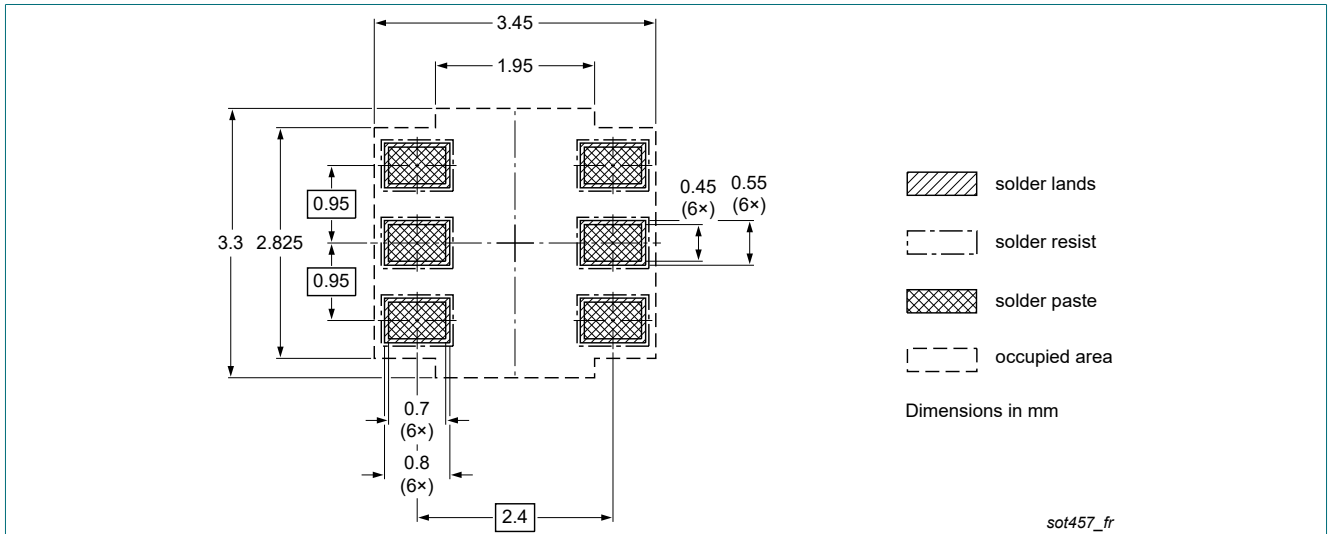


Fig. 7. Reflow soldering footprint for TSOP6 (SOT457)

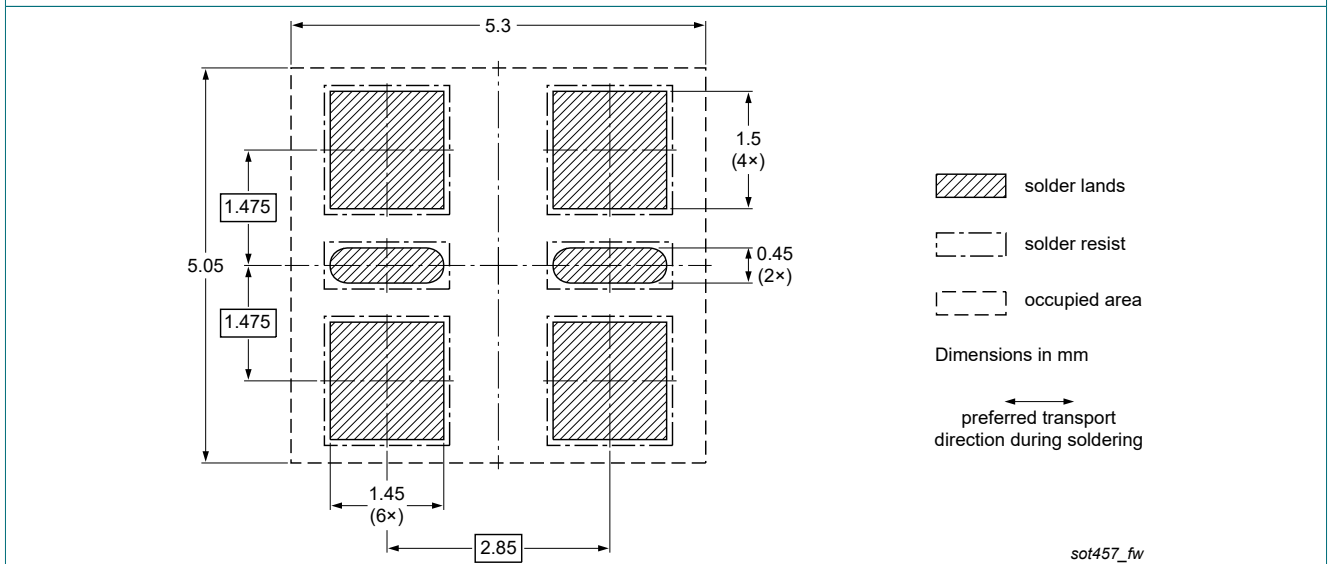


Fig. 8. Wave soldering footprint for TSOP6 (SOT457)

## 14. Revision history

**Table 8. Revision history**

| Data sheet ID  | Release date                                                                                                                                                                                                                                                                                | Data sheet status  | Change notice | Supersedes  |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-------------|
| PMBTA42DS v.3  | 20230720                                                                                                                                                                                                                                                                                    | Product data sheet | -             | PMBTA42DS_2 |
| Modifications: | <ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Section "Packing information" removed.</li></ul> |                    |               |             |
| PMBTA42DS_2    | 20090827                                                                                                                                                                                                                                                                                    | Product data sheet | -             | PMBTA42DS_1 |
| PMBTA42DS_1    | 20060106                                                                                                                                                                                                                                                                                    | Product data sheet | -             | -           |

## 15. Legal information

### 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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## Contents



|                                 |   |
|---------------------------------|---|
| 1. General description.....     | 1 |
| 2. Features and benefits.....   | 1 |
| 3. Applications.....            | 1 |
| 4. Quick reference data.....    | 1 |
| 5. Pinning information.....     | 1 |
| 6. Ordering information.....    | 2 |
| 7. Marking.....                 | 2 |
| 8. Limiting values.....         | 2 |
| 9. Thermal characteristics..... | 3 |
| 10. Characteristics.....        | 3 |
| 11. Test information.....       | 5 |
| 12. Package outline.....        | 5 |
| 13. Soldering.....              | 6 |
| 14. Revision history.....       | 7 |
| 15. Legal information.....      | 8 |

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