



PESD36VS1UL

Unidirectional ESD protection diode

Rev. 1 — 5 March 2012

Product data sheet

1. Product profile

1.1 General description

Unidirectional ElectroStatic Discharge (ESD) protection diode in a leadless ultra small SOD882 Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients.

1.2 Features and benefits

- ESD protection of one line
- Ultra small SMD plastic package
- AEC-Q101 qualified
- ESD protection up to 30 kV
- IEC 61000-4-5; (surge); $I_{PPM} = 2.5$ A
- Rated peak pulse power: $P_{PPM} = 150$ W
- Ultra low leakage current: $I_{RM} < 1$ nA

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Portable electronics
- Communication systems

1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--------------------------|-----|-----|-----|------|
| V_{RWM} | reverse standoff voltage | | - | - | 36 | V |
| C_d | diode capacitance | $f = 1$ MHz; $V_R = 0$ V | - | - | 30 | pF |

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|-----------------------------|---------------------------|
| 1 | cathode | <p>Transparent top view</p> | <p>1 2</p> <p>sym035</p> |
| 2 | anode | | |

[1] The marking bar indicates the cathode.



3. Ordering information

Table 3. Ordering information

| Type number | Package | | Version |
|-------------|---------|--|---------|
| | Name | Description | |
| PESD36VS1UL | - | leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm | SOD882 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PESD36VS1UL | TC |

5. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|--------------------------|--------------------|----------|------|------|
| P_{PPM} | rated peak pulse power | $t_p = 8/20 \mu s$ | [1][2] - | 150 | W |
| I_{PPM} | rated peak pulse current | $t_p = 8/20 \mu s$ | [1][2] - | 2.5 | A |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] Device stressed with ten non-repetitive current pulses (8/20 μs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321).

[2] Measured from pin 1 to pin 2.

Table 6. ESD maximum ratings

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---------------------------------|--------------------------------------|----------|-----|------|
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [1][2] - | 30 | kV |
| | | machine model | [2] - | 400 | V |
| | | MIL-STD-883 (human body model) | - | 10 | kV |

[1] Device stressed with ten non-repetitive ESD pulses.

[2] Measured from pin 1 to pin 2.

Table 7. ESD standards compliance

| Standard | Conditions |
|--|---------------------------------|
| IEC 61000-4-2; level 4 (ESD) | > 15 kV (air); > 8 kV (contact) |
| MIL-STD-883; class 3B (human body model) | > 8 kV |

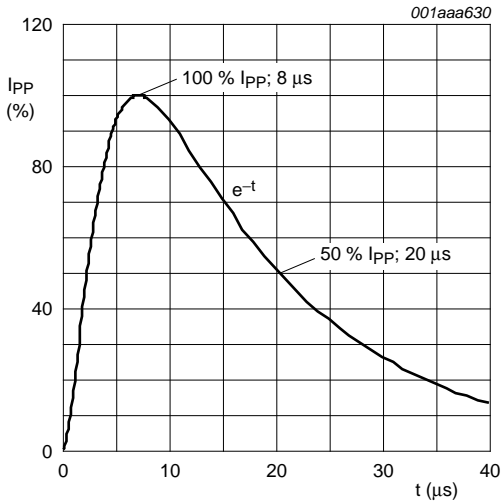


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5 and IEC 61643-321

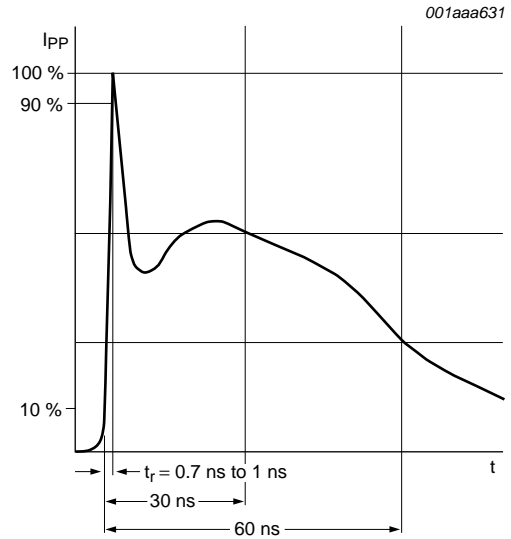


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

Table 8. Characteristics

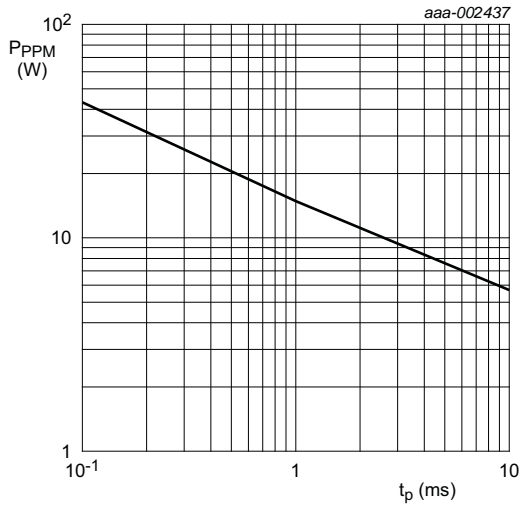
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--------------------------------------|--------|------|------|----------|
| V_{RWM} | reverse standoff voltage | | - | - | 36 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 36\text{ V}$ | - | <1 | 10 | nA |
| V_{BR} | breakdown voltage | $I_R = 2\text{ mA}$ | 38.2 | 39.0 | 39.8 | V |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}$ | - | 18 | 30 | pF |
| V_{CL} | clamping voltage | | [1][2] | | | |
| | | $I_{PP} = 1\text{ A}$ | - | - | 58 | V |
| | | $I_{PPM} = 2.5\text{ A}$ | - | - | 80 | V |
| r_{dyn} | dynamic resistance | $I_R = 10\text{ A}$ | [3] | | | |
| | | | - | 9.5 | - | Ω |

[1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321.

[2] Measured from pin 1 to pin 2.

[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) $t_p = 100\text{ ns}$; square pulse; ANS/IESD STM5-1-2008.



T_{amb} = 25 °C

Fig 3. Rated peak pulse power as a function of square pulse duration; maximum values

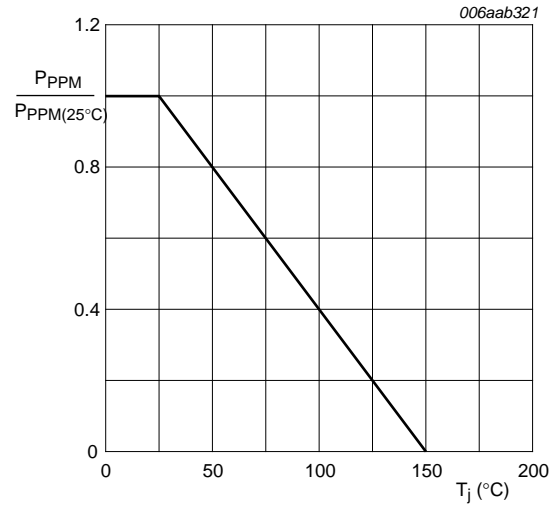
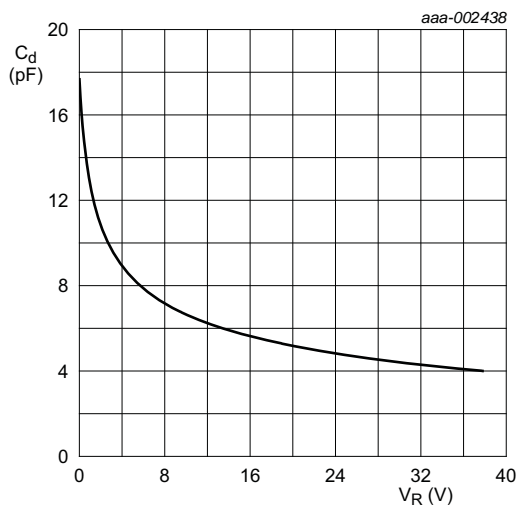


Fig 4. Relative variation of rated peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig 5. Diode capacitance as a function of reverse voltage; typical values

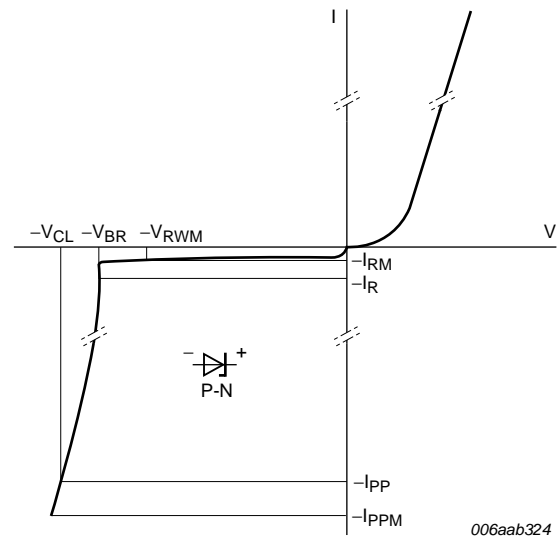


Fig 6. V-I characteristics for a unidirectional ESD protection diode

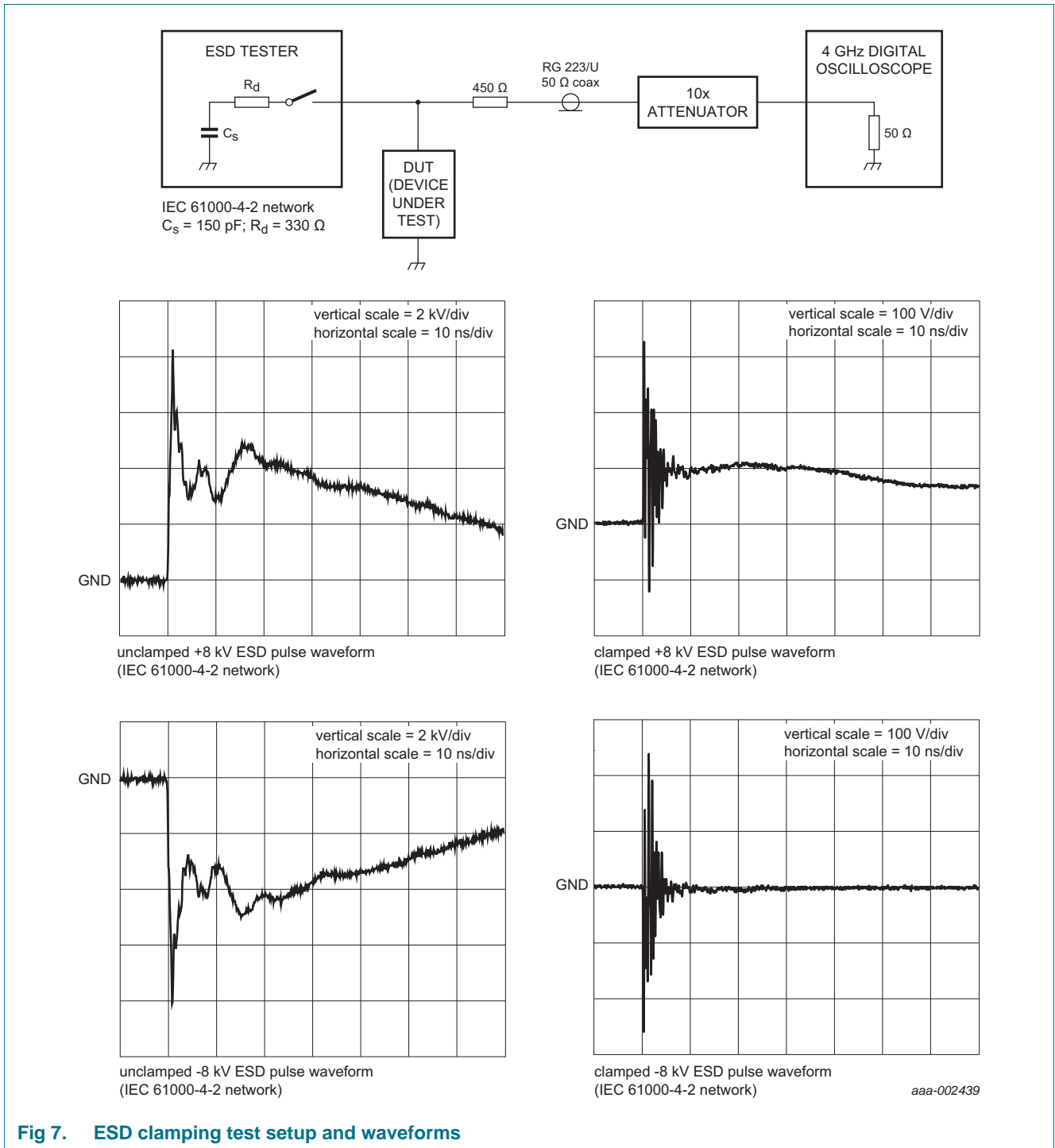
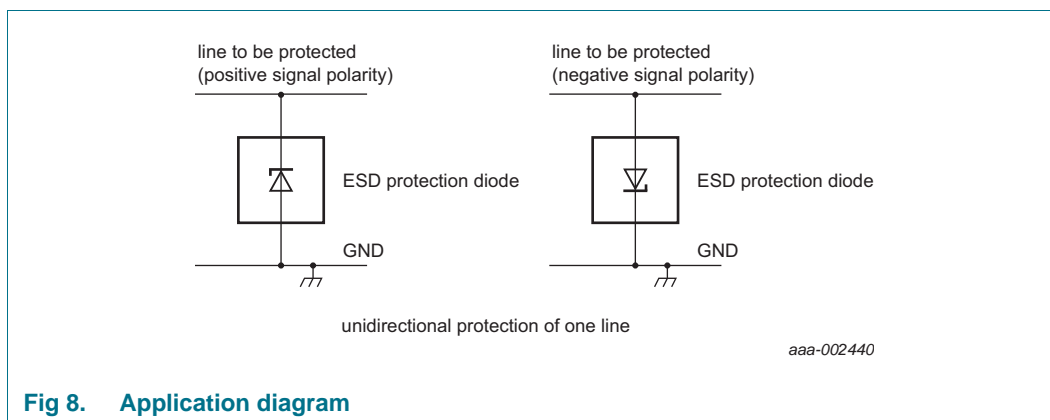


Fig 7. ESD clamping test setup and waveforms

7. Application information

The device is designed for the protection of one unidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are either positive or negative with respect to ground. The device provides a surge capability of 150 W for an 8/20 μ s waveform.



Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

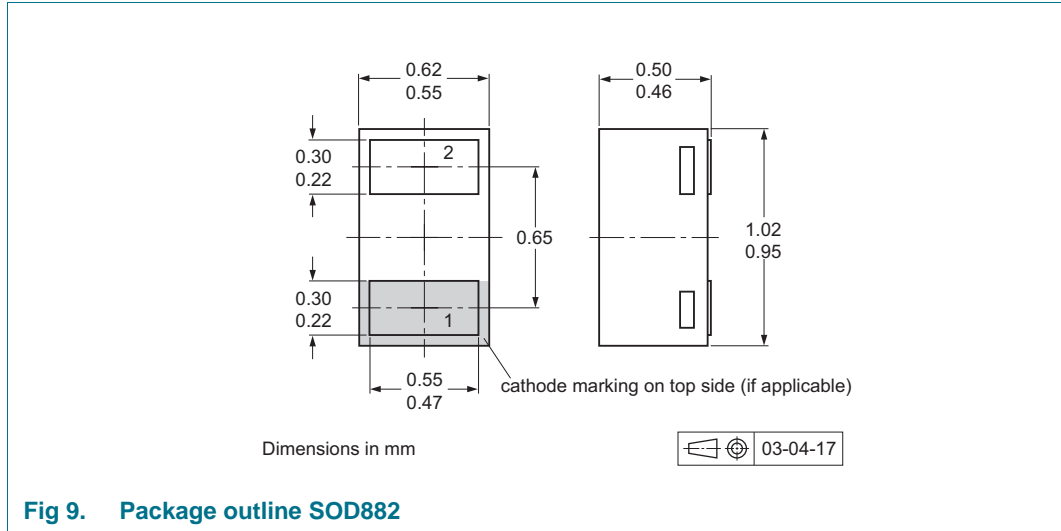
1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

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

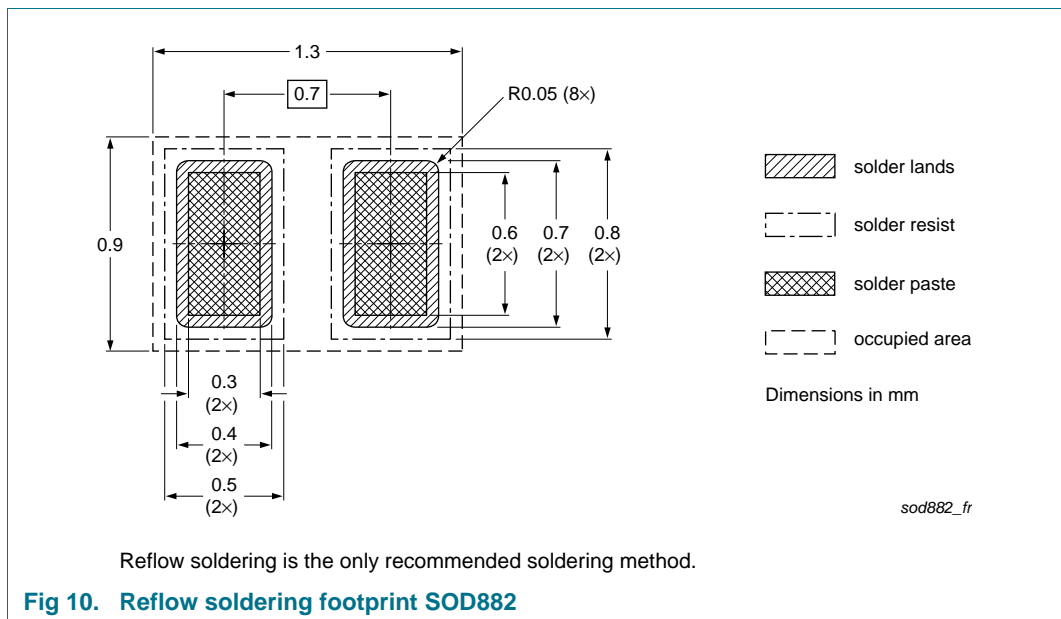
Table 9. Packing methods

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

| Type number | Package | Description | Packing quantity |
|-------------|---------|--------------------------------|------------------|
| | | | 10000 |
| PESD36VS1UL | SOD882 | 4 mm pitch, 8 mm tape and reel | -315 |

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

11. Soldering



12. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PESD36VS1UL v.1 | 20120305 | Product data sheet | - | - |

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 1

3 Ordering information 2

4 Marking 2

5 Limiting values 2

6 Characteristics 3

7 Application information 6

8 Test information 6

8.1 Quality information 6

9 Package outline 7

10 Packing information 7

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 10

14 Contact information 10

15 Contents 11

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