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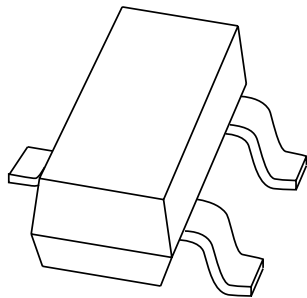
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Kind regards,

Team Nexperia

# DATA SHEET



## **PLVA6xxA series** Low-voltage avalanche regulator diodes

Product data sheet  
Supersedes data of 1999 May 25

2004 Jan 14

# Low-voltage avalanche regulator diodes

# PLVA6xxA series

## FEATURES

- Very low dynamic impedance at low currents: approximately  $\frac{1}{20}$  of conventional series
- Hard breakdown knee
- Low noise: approximately  $\frac{1}{10}$  of conventional series
- Total power dissipation: max. 250 mW
- Small tolerances of  $V_Z$
- Working voltage range: nominal 5.00 to 6.80 V
- Non-repetitive peak reverse power dissipation: maximal 30 W.

## APPLICATIONS

- Low current, low power, low noise applications
- CMOS RAM back-up circuits
- Voltage stabilizers
- Voltage limiters
- Smoke detector relays.

## DESCRIPTION

High performance voltage regulator diodes in small SOT23 plastic SMD packages.

The series consists of PLVA650A to PLVA668A.

## MARKING

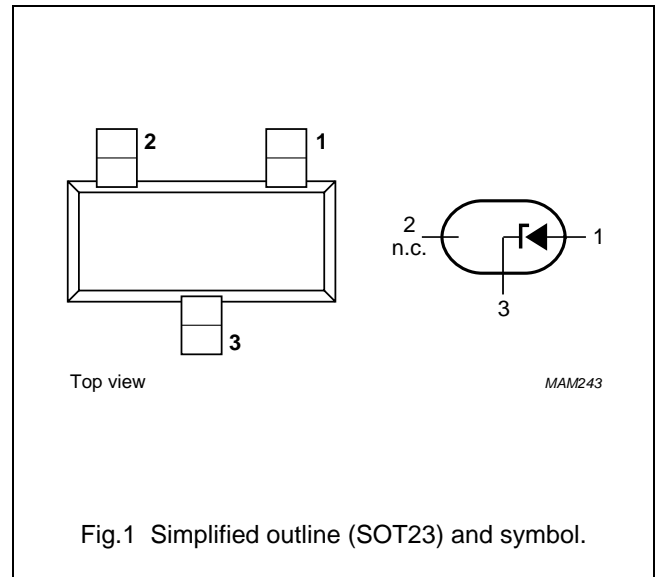
| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| PLVA650A    | *9A                         |
| PLVA653A    | *9B                         |
| PLVA656A    | *9C                         |
| PLVA659A    | *9D                         |
| PLVA662A    | *9E                         |
| PLVA665A    | *9F                         |
| PLVA668A    | *9G                         |

## Note

1. \* = p: Made in Hong Kong.  
 \* = t: Made in Malaysia.  
 \* = W: Made in China.

## PINNING

| PIN | DESCRIPTION   |
|-----|---------------|
| 1   | anode         |
| 2   | not connected |
| 3   | cathode       |



## Low-voltage avalanche regulator diodes

## PLVA6xxA series

## ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION                              | VERSION |
| PLVA6xxA    | –       | plastic surface mounted package; 3 leads | SOT23   |

## LIMITING VALUES

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

| SYMBOL    | PARAMETER                                     | CONDITIONS   | MIN. | MAX. | UNIT             |
|-----------|---|--|------|------|------------------|
| $I_F$     | continuous forward current                    |  | –    | 250  | mA               |
| $I_{ZRM}$ | repetitive peak working current               | $t_p = 100 \mu\text{s}$ ; $\delta = 10\%$                    | –    | 250  | mA               |
| $P_{ZSM}$ | non-repetitive peak reverse power dissipation | $t_p = 100 \mu\text{s}$ ; $T_j = 150 \text{ }^\circ\text{C}$ | –    | 30   | W                |
| $P_{tot}$ | total power dissipation                       | $T_{amb} = 25 \text{ }^\circ\text{C}$ ; note 1               | –    | 250  | mW               |
| $T_{stg}$ | storage temperature                           |  | –65  | +150 | $^\circ\text{C}$ |
| $T_j$     | junction temperature                          |  | –    | 150  | $^\circ\text{C}$ |

## Note

1. Device mounted on an FR4 printed circuit-board.

## Low-voltage avalanche regulator diodes

## PLVA6xxA series

**ELECTRICAL CHARACTERISTICS**T<sub>j</sub> = 25 °C; unless otherwise specified.

| SYMBOL         | PARAMETER               | CONDITIONS   | MIN. | TYP. | MAX.  | UNIT |
|----------------|-------------------------|--|------|------|-------|------|
| V <sub>F</sub> | forward voltage         | I <sub>F</sub> = 10 mA   | –    | –    | 0.9   | V    |
| V <sub>Z</sub> | working voltage         | I <sub>Z</sub> = 250 μA  |      |      |       |      |
|                | PLVA650A                |  | 4.80 | 5.00 | 5.20  | V    |
|                | PLVA653A                |  | 5.10 | 5.30 | 5.50  | V    |
|                | PLVA656A                |  | 5.40 | 5.60 | 5.80  | V    |
|                | PLVA659A                |  | 5.70 | 5.90 | 6.10  | V    |
|                | PLVA662A                |  | 6.00 | 6.20 | 6.40  | V    |
|                | PLVA665A                |  | 6.30 | 6.50 | 6.70  | V    |
|                | PLVA668A                |  | 6.60 | 6.80 | 7.00  | V    |
| V <sub>Z</sub> | working voltage         | I <sub>Z</sub> = 10 μA   |      |      |       |      |
|                | PLVA650A                |  | –    | 4.30 | –     | V    |
|                | PLVA653A                |  | –    | 5.20 | –     | V    |
|                | PLVA656A                |  | –    | 5.51 | –     | V    |
|                | PLVA659A                |  | –    | 5.85 | –     | V    |
|                | PLVA662A                |  | –    | 6.19 | –     | V    |
|                | PLVA665A                |  | –    | 6.49 | –     | V    |
|                | PLVA668A                |  | –    | 6.80 | –     | V    |
| R <sub>Z</sub> | dynamic resistance      | 1 kHz superimposed;<br>I <sub>ZAC</sub> is 10% of I <sub>ZDC</sub> ; I <sub>Z</sub> = 250 μA |      |      |       |      |
|                | PLVA650A                |  | –    | –    | 700   | Ω    |
|                | PLVA653A                |  | –    | –    | 250   | Ω    |
|                | PLVA656A to PLVA668A    |  | –    | –    | 100   | Ω    |
| S <sub>Z</sub> | temperature coefficient | I <sub>Z</sub> = 250 μA  |      |      |       |      |
|                | PLVA650A                |  | –    | 0.20 | –     | mV/K |
|                | PLVA653A                |  | –    | 1.60 | –     | mV/K |
|                | PLVA656A                |  | –    | 1.90 | –     | mV/K |
|                | PLVA659A                |  | –    | 2.40 | –     | mV/K |
|                | PLVA662A                |  | –    | 2.65 | –     | mV/K |
|                | PLVA665A                |  | –    | 2.90 | –     | mV/K |
|                | PLVA668A                |  | –    | 3.40 | –     | mV/K |
| I <sub>R</sub> | reverse current         | V <sub>R</sub> = 80% V <sub>Z</sub> nominal  |      |      |       |      |
|                | PLVA650A                |  | –    | –    | 20000 | nA   |
|                | PLVA653A                |  | –    | –    | 5000  | nA   |
|                | PLVA656A                |  | –    | –    | 1000  | nA   |
|                | PLVA659A                |  | –    | –    | 500   | nA   |
|                | PLVA662A                |  | –    | –    | 100   | nA   |
|                | PLVA665A                |  | –    | –    | 50    | nA   |
|                | PLVA668A                |  | –    | –    | 10    | nA   |

## Low-voltage avalanche regulator diodes

## PLVA6xxA series

| SYMBOL       | PARAMETER             | CONDITIONS  | MIN. | TYP.  | MAX. | UNIT                                   |
|--------------|-----------------------|---|------|-------|------|--|
| $I_R$        | reverse current       | $V_R = 50\% V_Z$ nominal                                      |      |       |      |  |
|              | PLVA650A              |   | –    | 34    | –    | nA                                     |
|              | PLVA653A              |   | –    | 22    | –    | nA                                     |
|              | PLVA656A              |   | –    | 1.1   | –    | nA                                     |
|              | PLVA659A              |   | –    | 0.9   | –    | nA                                     |
|              | PLVA662A              |   | –    | 0.9   | –    | nA                                     |
|              | PLVA665A              |   | –    | 0.9   | –    | nA                                     |
| $I_R$        | reverse current       | $V_R = 90\% V_Z$ nominal                                      |      |       |      |  |
|              | PLVA650A              |   | –    | 21    | –    | $\mu\text{A}$                          |
|              | PLVA653A              |   | –    | 3.5   | –    | $\mu\text{A}$                          |
|              | PLVA656A              |   | –    | 1.3   | –    | $\mu\text{A}$                          |
|              | PLVA659A              |   | –    | 1.0   | –    | $\mu\text{A}$                          |
|              | PLVA662A              |   | –    | 0.05  | –    | $\mu\text{A}$                          |
|              | PLVA665A              |   | –    | 0.04  | –    | $\mu\text{A}$                          |
|              | PLVA668A              |   | –    | 0.006 | –    | $\mu\text{A}$                          |
| $\Delta V_Z$ | line regulation       |   |      |       |      |  |
|              | PLVA659A to PLVA668A  | $I_{LO} = 10 \mu\text{A}; I_{HI} = 1 \text{ mA}$              | –    | –     | 0.1  | V                                      |
|              | PLVA656A              | $I_{LO} = 50 \mu\text{A}; I_{HI} = 1 \text{ mA}$              | –    | –     | 0.1  | V                                      |
|              | PLVA650A              | $I_{LO} = 100 \mu\text{A}; I_{HI} = 1 \text{ mA}$             | –    | –     | 0.4  | V                                      |
|              | PLVA653A              | $I_{LO} = 100 \mu\text{A}; I_{HI} = 1 \text{ mA}$             | –    | –     | 0.2  | V                                      |
| $V_n$        | noise voltage density | $f = 1 \text{ kHz}; B = 1 \text{ kHz}; I_Z = 250 \mu\text{A}$ | –    | –     | 1.0  | $\frac{\mu\text{V}}{\sqrt{\text{Hz}}}$ |

## THERMAL CHARACTERISTICS

| SYMBOL         | PARAMETER                                     | CONDITIONS | VALUE | UNIT |
|----------------|---|------------|-------|------|
| $R_{th(j-tp)}$ | thermal resistance from junction to tie-point |            | 330   | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient   | note 1     | 500   | K/W  |

## Note

1. Device mounted on an FR4 printed circuit-board.

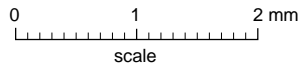
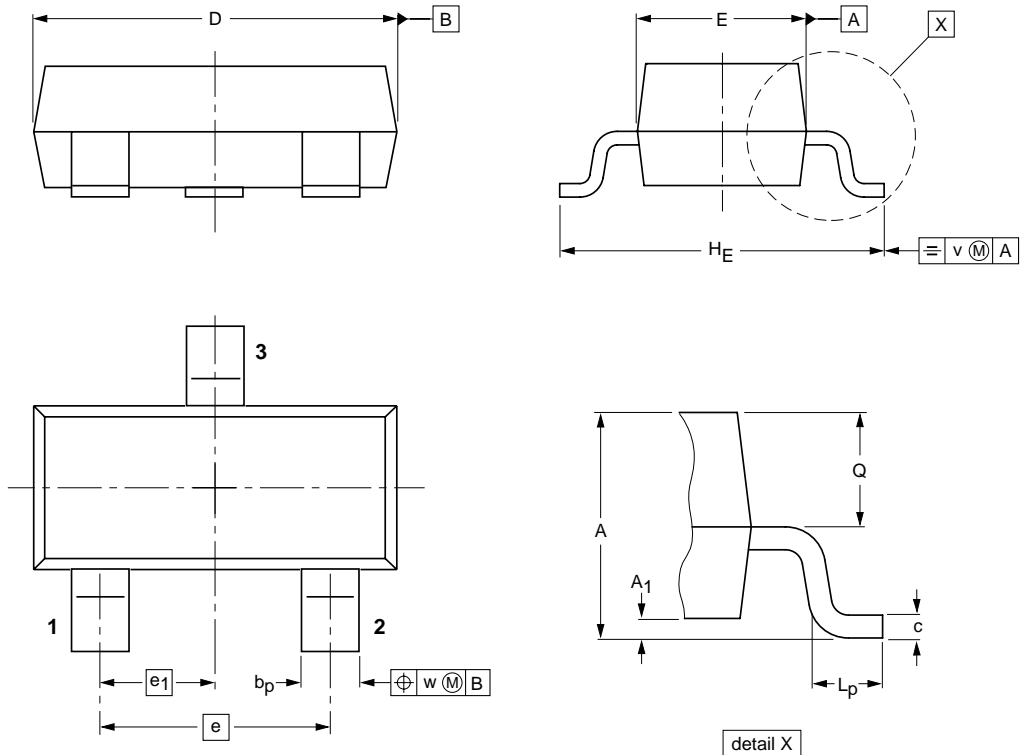
Low-voltage avalanche regulator diodes

PLVA6xxA series

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max. | b <sub>p</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   |
|------|------------|------------------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm   | 1.1<br>0.9 | 0.1                    | 0.48<br>0.38   | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 0.95           | 2.5<br>2.1     | 0.45<br>0.15   | 0.55<br>0.45 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES |          |       |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|----------|-------|--|---------------------|----------------------|
|                 | IEC        | JEDEC    | JEITA |  |                     |                      |
| SOT23           |            | TO-236AB |       |  |                     | 04-11-04<br>06-03-16 |

## Low-voltage avalanche regulator diodes

## PLVA6xxA series

## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION  |
|--------------------------------|-------------------------------|---|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

## Notes

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# ***NXP Semiconductors***

## **Customer notification**

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, except for package outline drawings which were updated to the latest version.

## **Contact information**

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