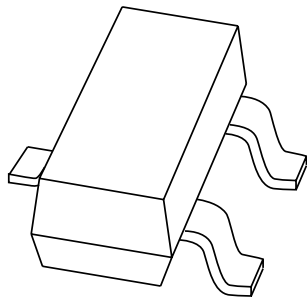


# DATA SHEET



## **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

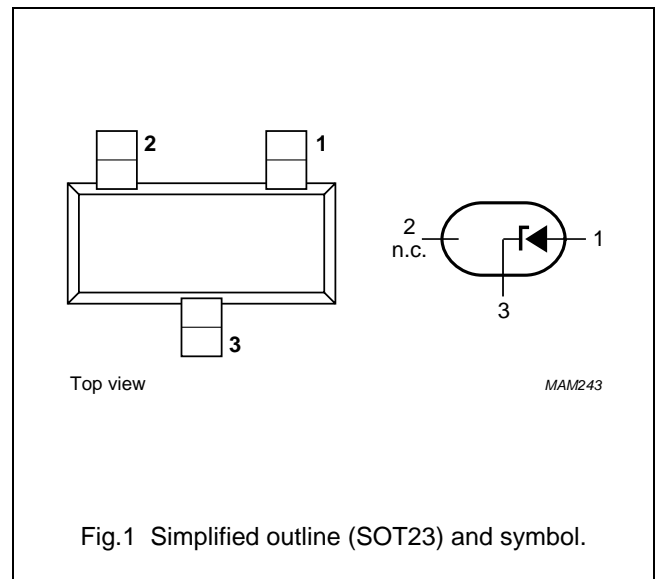
| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| PLVA650A    | *9A                         |
| PLVA653A    | *9B                         |
| PLVA656A    | *9C                         |
| PLVA659A    | *9D                         |
| PLVA662A    | *9E                         |
| 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** $T_j = 25\text{ }^\circ\text{C}$ ; unless otherwise specified.

| SYMBOL | PARAMETER               | CONDITIONS  | MIN. | TYP. | MAX.  | UNIT     |
|--------|-------------------------|---|------|------|-------|----------|
| $V_F$  | forward voltage         | $I_F = 10\text{ mA}$  | –    | –    | 0.9   | V        |
| $V_Z$  | working voltage         | $I_Z = 250\text{ }\mu\text{A}$  |      |      |       |          |
|        | 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        |
| $V_Z$  | working voltage         | $I_Z = 10\text{ }\mu\text{A}$   |      |      |       |          |
|        | 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        |
| $R_Z$  | dynamic resistance      | 1 kHz superimposed;<br>$I_{ZAC}$ is 10% of $I_{ZDC}$ ; $I_Z = 250\text{ }\mu\text{A}$ |      |      |       |          |
|        | PLVA650A                |   | –    | –    | 700   | $\Omega$ |
|        | PLVA653A                |   | –    | –    | 250   | $\Omega$ |
|        | PLVA656A to PLVA668A    |   | –    | –    | 100   | $\Omega$ |
| $S_Z$  | temperature coefficient | $I_Z = 250\text{ }\mu\text{A}$  |      |      |       |          |
|        | 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     |
| $I_R$  | reverse current         | $V_R = 80\% V_Z$ 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    | –    | $\mu$ A                                |
|              | PLVA653A              |   | –    | 3.5   | –    | $\mu$ A                                |
|              | PLVA656A              |   | –    | 1.3   | –    | $\mu$ A                                |
|              | PLVA659A              |   | –    | 1.0   | –    | $\mu$ A                                |
|              | PLVA662A              |   | –    | 0.05  | –    | $\mu$ A                                |
|              | PLVA665A              |   | –    | 0.04  | –    | $\mu$ A                                |
|              | PLVA668A              |   | –    | 0.006 | –    | $\mu$ 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.

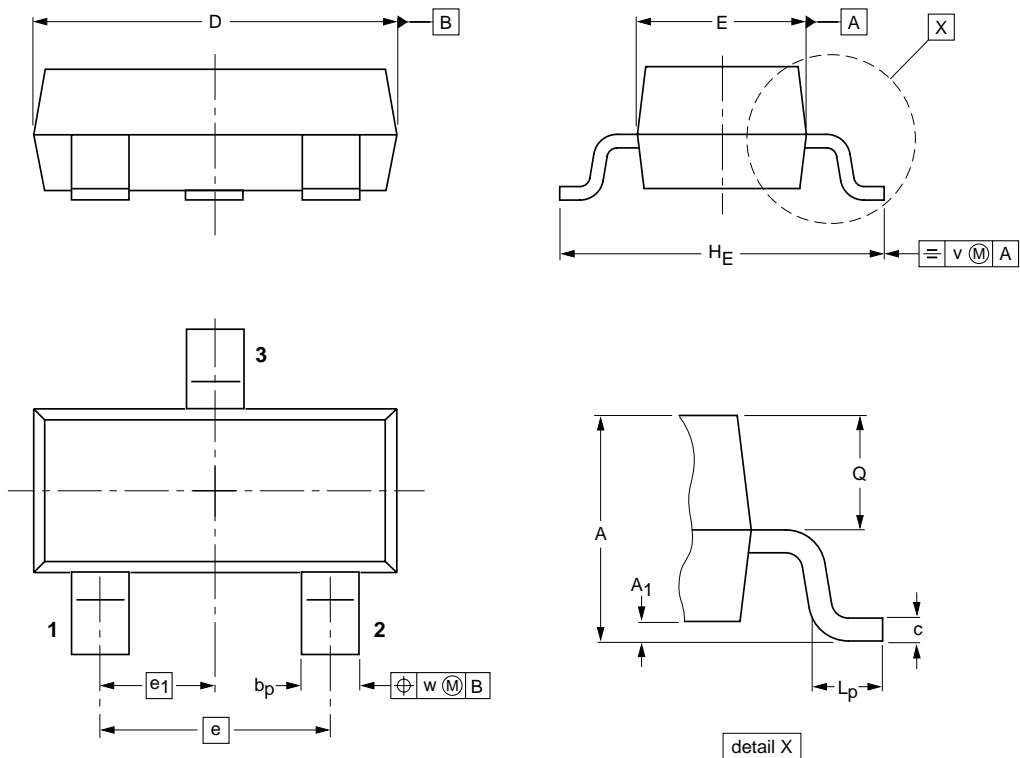
Low-voltage avalanche regulator diodes

PLVA6xxA series

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub> 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.                                     |

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