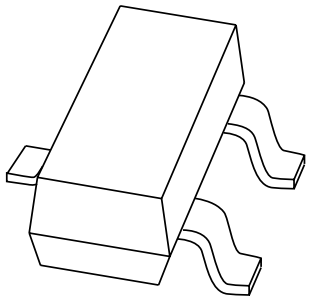
# DATA SHEET



# PLVA6xxA series
## Low-voltage avalanche regulator diodes

Product data sheet
Supersedes data of 1999 May 25

2004 Jan 14

NXP founded by Philips

# 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(1) |
|---|---|
| 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 |

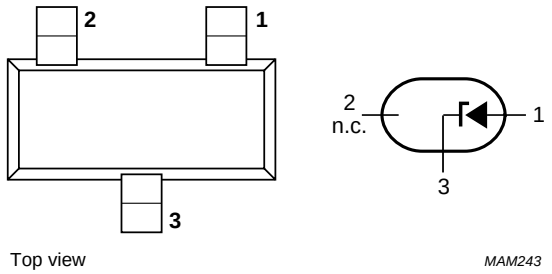



Fig.1 Simplified outline (SOT23) and symbol.

**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 μs; δ = 10% | – | 250 | mA |
| $P_{ZSM}$ | non-repetitive peak reverse power dissipation | $t_p$ = 100 μs; $T_j$ = 150 °C | – | 30 | W |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = 25 °C; note 1 | – | 250 | mW |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $T_j$ | junction temperature | | – | 150 | °C |

**Note**

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

**ELECTRICAL CHARACTERISTICS**

$T_j$ = 25 °C; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 10 mA | – | – | 0.9 | V |
| $V_Z$ | working voltage | $I_Z$ = 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 |
| $V_Z$ | working voltage | $I_Z$ = 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 |
| $R_Z$ | dynamic resistance | 1 kHz superimposed; | | | | |
| | PLVA650A | $I_{ZAC}$ is 10% of $I_{ZDC}$; $I_Z$ = 250 μA | – | – | 700 | Ω |
| | PLVA653A | | – | – | 250 | Ω |
| | PLVA656A to PLVA668A | | – | – | 100 | Ω |
| $S_Z$ | temperature coefficient | $I_Z$ = 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 |
| $I_R$ | 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 |

| 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 |
| | PLVA668A | | – | 0.8 | – | nA |
| $I_R$ | reverse current | $V_R$ = 90% $V_Z$ nominal | | | | |
| | PLVA650A | | – | 21 | – | μA |
| | PLVA653A | | – | 3.5 | – | μA |
| | PLVA656A | | – | 1.3 | – | μA |
| | PLVA659A | | – | 1.0 | – | μA |
| | PLVA662A | | – | 0.05 | – | μA |
| | PLVA665A | | – | 0.04 | – | μA |
| | PLVA668A | | – | 0.006 | – | μA |
| $\Delta V_Z$ | line regulation | | | | | |
| | PLVA659A to PLVA668A | $I_{LO}$ = 10 μA; $I_{HI}$ = 1 mA | – | – | 0.1 | V |
| | PLVA656A | $I_{LO}$ = 50 μA; $I_{HI}$ = 1 mA | – | – | 0.1 | V |
| | PLVA650A | $I_{LO}$ = 100 μA; $I_{HI}$ = 1 mA | – | – | 0.4 | V |
| | PLVA653A | $I_{LO}$ = 100 μA; $I_{HI}$ = 1 mA | – | – | 0.2 | V |
| $V_n$ | noise voltage density | f = 1 kHz; B = 1 kHz; $I_Z$ = 250 μA | – | – | 1.0 | $\frac{\mu V}{\sqrt{Hz}}$ |

**THERMAL CHARACTERISTICS**

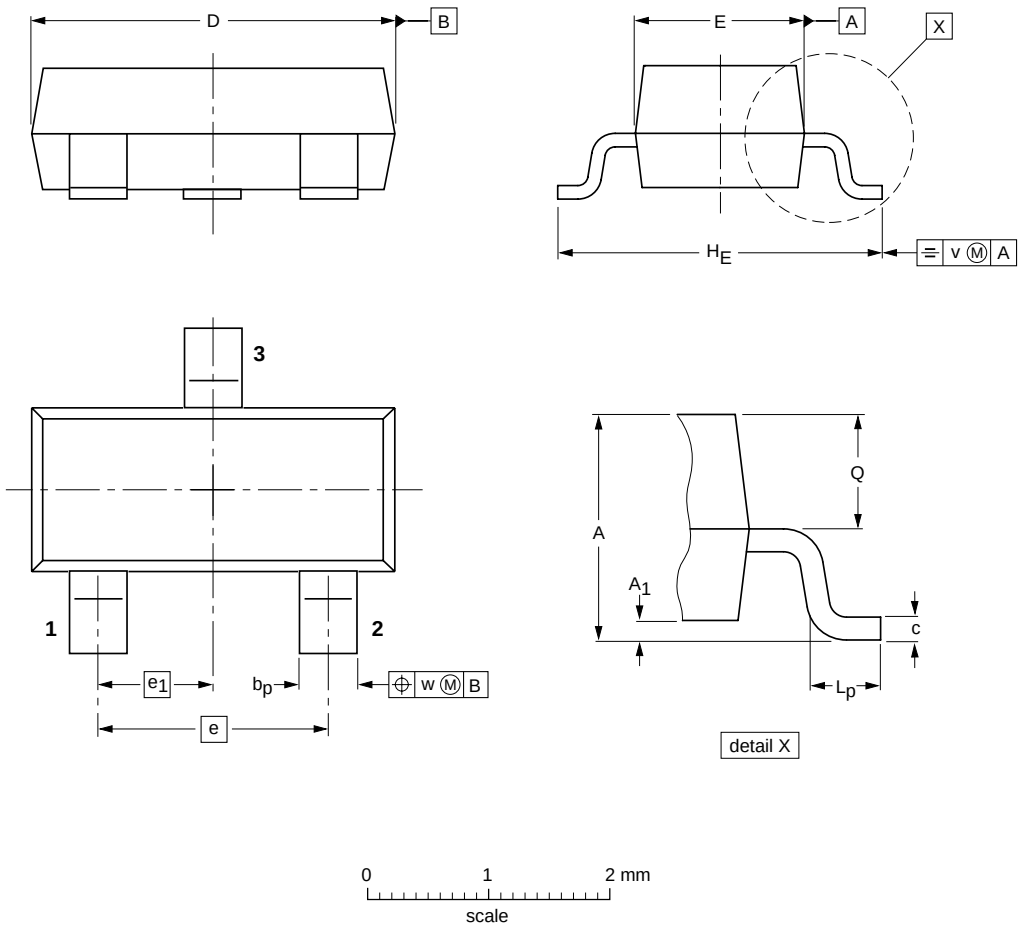
| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th(j\text{-}tp)}$ | thermal resistance from junction to tie-point | | 330 | K/W |
| $R_{th(j\text{-}a)}$ | thermal resistance from junction to ambient | note 1 | 500 | K/W |

**Note**

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

## PACKAGE OUTLINE

**Plastic surface-mounted package; 3 leads** **SOT23**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max. | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | 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 |

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| DOCUMENT STATUS[1] | PRODUCT STATUS[2] | 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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Printed in The Netherlands R76/03/pp8 Date of release: 2004 Jan 14 Document order number: 9397 750 12445

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