

# BAP51-06W

## General purpose PIN diode

Rev. 01 — 26 May 2008

Product data sheet

## 1. Product profile

### 1.1 General description

Two planar PIN diodes in common anode configuration in a SOT323 small SMD plastic package.

### 1.2 Features

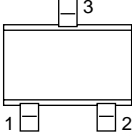
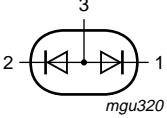
- Two elements in common anode configuration in a small SMD plastic package
- Low diode capacitance
- Low diode forward resistance

### 1.3 Applications

- general RF application

## 2. Pinning information

Table 1. Discrete pinning

| Pin | Description       | Simplified outline  | Graphic symbol  |
|-----|-------------------|---|---|
| 1   | cathode 1         |  |  |
| 2   | cathode 2         |   |   |
| 3   | common connection |   |   |

## 3. Ordering information

Table 2. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description                              | Version |
| BAP51-06W   | -       | plastic surface-mounted package; 3 leads | SOT323  |

## 4. Marking

**Table 3. Marking**

| Type number | Marking | Description              |
|-------------|---------|--------------------------|
| BAP51-06W   | W7*     | * = p: made in Hong Kong |
|             |         | * = t : made in Malaysia |

## 5. Limiting values

**Table 4. Limiting values**

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

| Symbol           | Parameter               | Conditions              | Min | Max  | Unit |
|------------------|-------------------------|-------------------------|-----|------|------|
| <b>Per diode</b> |                         |                         |     |      |      |
| $V_R$            | reverse voltage         |                         | -   | 50   | V    |
| $I_F$            | forward current         |                         | -   | 50   | mA   |
| $P_{tot}$        | total power dissipation | $T_{sp} = 90\text{ °C}$ | -   | 240  | mW   |
| $T_{stg}$        | storage temperature     |                         | -65 | +150 | °C   |
| $T_j$            | junction temperature    |                         | -65 | +150 | °C   |

## 6. Thermal characteristics

**Table 5. Thermal characteristics**

| Symbol         | Parameter  | Conditions | Typ | Unit |
|----------------|--|------------|-----|------|
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |            | 250 | K/W  |

## 7. Characteristics

**Table 6. Characteristics**

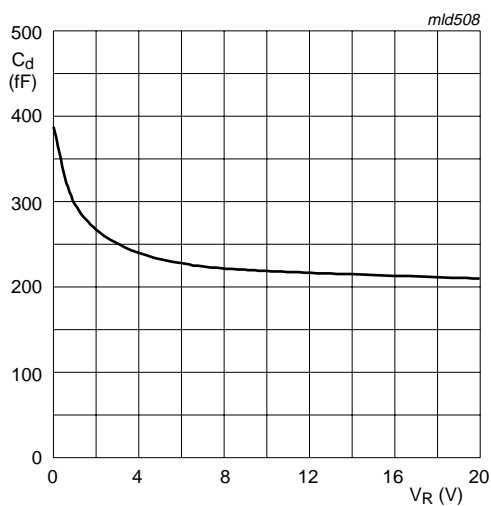
$T_j = 25\text{ °C}$  unless otherwise specified.

| Symbol | Parameter                | Conditions  | Min                   | Typ  | Max  | Unit     |
|--------|--------------------------|---|-----------------------|------|------|----------|
| $V_F$  | forward voltage          | $I_F = 50\text{ mA}$                                | -                     | 0.95 | 1.1  | V        |
| $I_R$  | reverse current          | $V_R = 50\text{ V}$                                 | -                     | -    | 100  | nA       |
| $C_d$  | diode capacitance        | see <a href="#">Figure 1</a> ; $f = 1\text{ MHz}$   |                       |      |      |          |
|        |                          | $V_R = 0\text{ V}$                                  | -                     | 0.4  | -    | pF       |
|        |                          | $V_R = 1\text{ V}$                                  | -                     | 0.3  | 0.55 | pF       |
|        |                          | $V_R = 5\text{ V}$                                  | -                     | 0.2  | 0.35 | pF       |
| $r_D$  | diode forward resistance | see <a href="#">Figure 2</a> ; $f = 100\text{ MHz}$ |                       |      |      |          |
|        |                          | $I_F = 0.5\text{ mA}$                               | <a href="#">[1]</a> - | 5.3  | 9    | $\Omega$ |
|        |                          | $I_F = 1\text{ mA}$                                 | <a href="#">[1]</a> - | 3.5  | 6.5  | $\Omega$ |
|        |                          | $I_F = 10\text{ mA}$                                | <a href="#">[1]</a> - | 1.5  | 2.5  | $\Omega$ |

**Table 6. Characteristics ...continued**
 $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

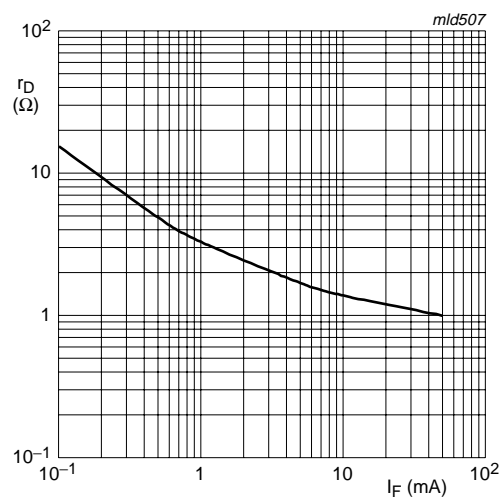
| Symbol    | Parameter                | Conditions  | Min | Typ  | Max | Unit          |
|-----------|--------------------------|---|-----|------|-----|---------------|
| ISL       | isolation                | $V_R = 0\text{ V}$  |     |      |     |               |
|           |                          | $f = 900\text{ MHz}$  | -   | 17   | -   | dB            |
|           |                          | $f = 1800\text{ MHz}$   | -   | 13   | -   | dB            |
|           |                          | $f = 2450\text{ MHz}$   | -   | 12   | -   | dB            |
| $L_{ins}$ | insertion loss           | $I_F = 0.5\text{ mA}$   |     |      |     |               |
|           |                          | $f = 900\text{ MHz}$  | -   | 0.44 | -   | dB            |
|           |                          | $f = 1800\text{ MHz}$   | -   | 0.50 | -   | dB            |
|           |                          | $f = 2450\text{ MHz}$   | -   | 0.54 | -   | dB            |
|           |                          | $I_F = 1\text{ mA}$   |     |      |     |               |
|           |                          | $f = 900\text{ MHz}$  | -   | 0.33 | -   | dB            |
|           |                          | $f = 1800\text{ MHz}$   | -   | 0.39 | -   | dB            |
|           |                          | $f = 2450\text{ MHz}$   | -   | 0.43 | -   | dB            |
|           |                          | $I_F = 10\text{ mA}$  |     |      |     |               |
|           |                          | $f = 900\text{ MHz}$  | -   | 0.19 | -   | dB            |
|           |                          | $f = 1800\text{ MHz}$   | -   | 0.24 | -   | dB            |
|           |                          | $f = 2450\text{ MHz}$   | -   | 0.28 | -   | dB            |
| $\tau_L$  | charge carrier life time | when switched from $I_F = 10\text{ mA}$ to $I_R = 6\text{ mA}$ ;<br>$R_L = 100\text{ }\Omega$ ; measured at $I_R = 3\text{ mA}$ | -   | 0.55 | -   | $\mu\text{s}$ |
| $L_S$     | series inductance        | $I_F = 100\text{ mA}$ ; $f = 100\text{ MHz}$  | -   | 1.6  | -   | nH            |

[1] Guaranteed on AQL basis: inspection level S4, AQL 1.0.



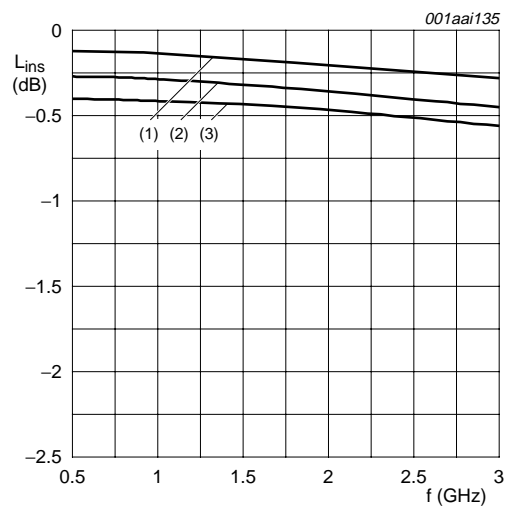
$f = 100\text{ MHz}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .

**Fig 1. Diode capacitance as a function of reverse voltage; typical values**



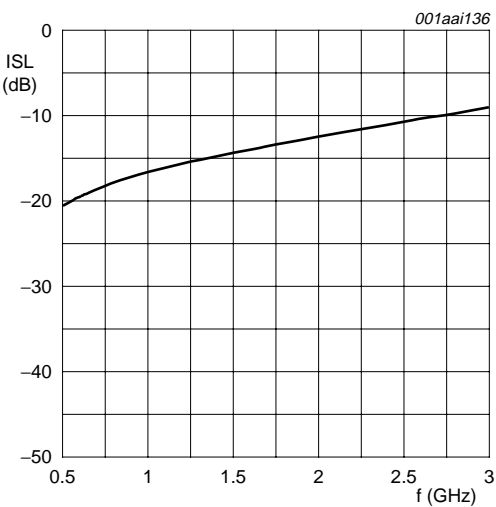
$f = 100\text{ MHz}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .

**Fig 2. Diode forward resistance as a function of forward current; typical values**



(1)  $I_F = 10$  mA  
(2)  $I_F = 1$  mA  
(3)  $I_F = 0.5$  mA  
Diode inserted in series with a 50  $\Omega$  stripline circuit and biased via the analyzer Tee network.

Fig 3. Insertion loss of the diode as a function of frequency; typical values



Diode zero biased and inserted in series with a 50  $\Omega$  stripline circuit;  $T_{amb} = 25$   $^{\circ}$ C.

Fig 4. Isolation of the diode as a function of frequency; typical values

8. Package outline

Plastic surface-mounted package; 3 leadsSOT323

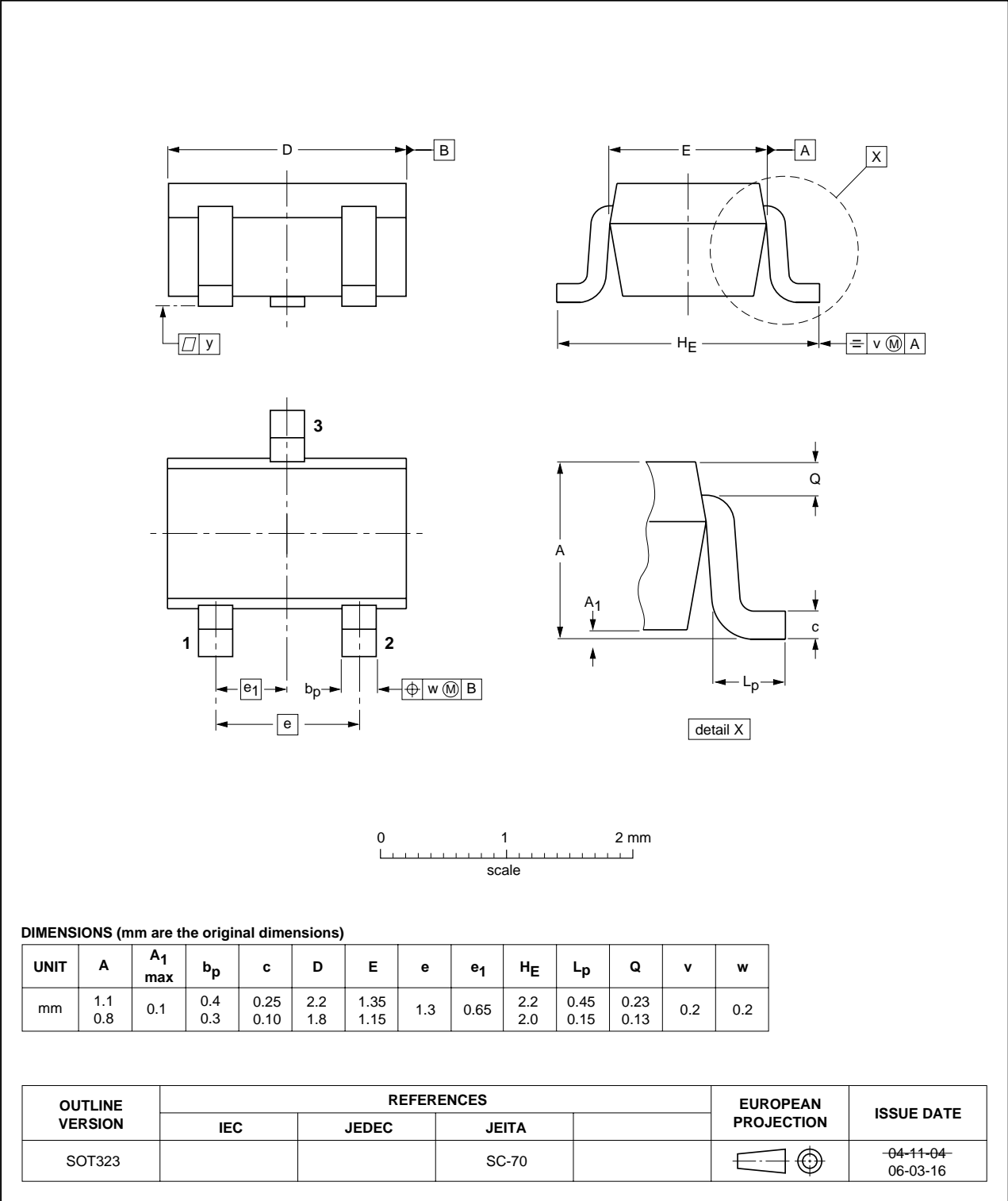


Fig 5. Package outline SOT323

## 9. Abbreviations

Table 7. Abbreviations

| Acronym | Description                |
|---------|----------------------------|
| AQL     | Acceptable Quality Level   |
| PIN     | P-type, Intrinsic, N-type  |
| SMD     | Surface Mounted Device     |
| RF      | Radio Frequency            |
| S4      | Special inspection level 4 |

## 10. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status  | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| BAP51-06W_1 | 20080526     | Product data sheet | -             | -          |

## 11. Legal information

### 11.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

### 11.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

### 11.3 Disclaimers

**General** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or

malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

### 11.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 12. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

13. Contents

1 Product profile ..... 1

1.1 General description..... 1

1.2 Features ..... 1

1.3 Applications ..... 1

2 Pinning information..... 1

3 Ordering information..... 1

4 Marking..... 2

5 Limiting values..... 2

6 Thermal characteristics..... 2

7 Characteristics..... 2

8 Package outline ..... 5

9 Abbreviations..... 6

10 Revision history..... 6

11 Legal information..... 7

11.1 Data sheet status ..... 7

11.2 Definitions..... 7

11.3 Disclaimers..... 7

11.4 Trademarks..... 7

12 Contact information..... 7

13 Contents ..... 8



Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.