

# 1PS76SB21; BAT721 series

Schottky barrier diodes in small packages

Rev. 06 — 21 December 2006

Product data sheet

## 1. Product profile

### 1.1 General description

Planar Schottky barrier diodes with an integrated guard ring for stress protection. Encapsulated in small Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

| Type number | Package  |       | Configuration       |
|-------------|----------|-------|---------------------|
|             | Nexperia | JEITA |                     |
| 1PS76SB21   | SOD323   | SC-76 | single              |
| BAT721      | SOT23    | -     | single              |
| BAT721A     | SOT23    | -     | dual common anode   |
| BAT721C     | SOT23    | -     | dual common cathode |
| BAT721S     | SOT23    | -     | dual series         |

### 1.2 Features

- Low forward voltage
- Small SMD plastic packages
- Low capacitance

### 1.3 Applications

- Ultra high-speed switching
- Voltage clamping
- Line termination
- Reverse polarity protection

### 1.4 Quick reference data

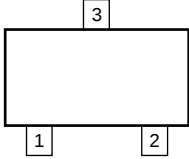
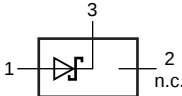
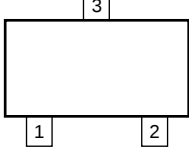
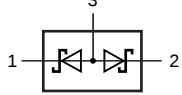
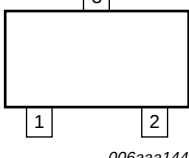
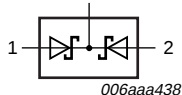
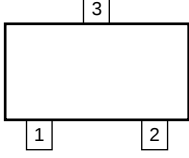
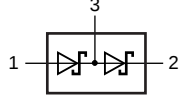
Table 2. Quick reference data

| Symbol    | Parameter       | Conditions             | Min                   | Typ | Max | Unit |
|-----------|-----------------|------------------------|-----------------------|-----|-----|------|
| Per diode |                 |                        |                       |     |     |      |
| $I_F$     | forward current |                        | -                     | -   | 200 | mA   |
| $V_R$     | reverse voltage |                        | -                     | -   | 40  | V    |
| $V_F$     | forward voltage | $I_F = 200 \text{ mA}$ | <a href="#">[1]</a> - | -   | 550 | mV   |

[1] Pulse test:  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$ .

2. Pinning information

Table 3. Pinning

| Pin       | Description                             | Simplified outline                                                                    | Symbol                                                                                                    |
|-----------|-----------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1PS76SB21 |                                         |                                                                                       |                                                                                                           |
| 1         | cathode                                 |    | <br><i>sym001</i>      |
| 2         | anode                                   |                                                                                       |                                                                                                           |
| BAT721    |                                         |                                                                                       |                                                                                                           |
| 1         | anode                                   |    | <br><i>006aaa436</i>   |
| 2         | not connected                           |                                                                                       |                                                                                                           |
| 3         | cathode                                 |                                                                                       |                                                                                                           |
| BAT721A   |                                         |                                                                                       |                                                                                                           |
| 1         | cathode (diode 1)                       |  | <br><i>006aaa439</i> |
| 2         | cathode (diode 2)                       |                                                                                       |                                                                                                           |
| 3         | anode (diode 1),<br>anode (diode 2)     |                                                                                       |                                                                                                           |
| BAT721C   |                                         |                                                                                       |                                                                                                           |
| 1         | anode (diode 1)                         |  | <br><i>006aaa438</i> |
| 2         | anode (diode 2)                         |                                                                                       |                                                                                                           |
| 3         | cathode (diode 1),<br>cathode (diode 2) |                                                                                       |                                                                                                           |
| BAT721S   |                                         |                                                                                       |                                                                                                           |
| 1         | anode (diode 1)                         |  | <br><i>006aaa437</i> |
| 2         | cathode (diode 2)                       |                                                                                       |                                                                                                           |
| 3         | cathode (diode 1),<br>anode (diode 2)   |                                                                                       |                                                                                                           |

[1] The marking bar indicates the cathode.

### 3. Ordering information

Table 4. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| 1PS76SB21   | SC-76   | plastic surface-mounted package; 2 leads | SOD323  |
| BAT721      | -       | plastic surface-mounted package; 3 leads | SOT23   |
| BAT721A     |         |                                          |         |
| BAT721C     |         |                                          |         |
| BAT721S     |         |                                          |         |

### 4. Marking

Table 5. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| 1PS76SB21   | S1                          |
| BAT721      | L7*                         |
| BAT721A     | L8*                         |
| BAT721C     | L9*                         |
| BAT721S     | L0*                         |

- [1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

### 5. Limiting values

Table 6. 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                     |                                                    | -   | 40   | V    |
| $I_F$            | forward current                     |                                                    | -   | 200  | mA   |
| $I_{FSM}$        | non-repetitive peak forward current | half sine wave;<br>JEDEC method;<br>$t_p = 8.3$ ms | -   | 1    | A    |
| $T_j$            | junction temperature                |                                                    | -   | 125  | °C   |
| $T_{amb}$        | ambient temperature                 |                                                    | -65 | +150 | °C   |
| $T_{stg}$        | storage temperature                 |                                                    | -65 | +150 | °C   |

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

| Symbol           | Parameter                                   | Conditions  | Min | Typ | Max | Unit |
|------------------|---------------------------------------------|-------------|-----|-----|-----|------|
| <b>Per diode</b> |                                             |             |     |     |     |      |
| $R_{th(j-a)}$    | thermal resistance from junction to ambient | in free air | [1] |     |     |      |
|                  | 1PS76SB21                                   |             | -   | -   | 450 | K/W  |
|                  | BAT721                                      |             | -   | -   | 500 | K/W  |
|                  | BAT721A                                     |             | -   | -   | 500 | K/W  |
|                  | BAT721C                                     |             | -   | -   | 500 | K/W  |
|                  | BAT721S                                     |             | -   | -   | 500 | K/W  |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

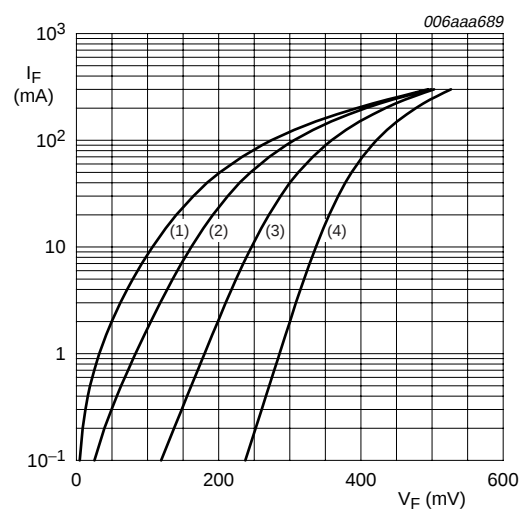
## 7. Characteristics

**Table 8. Characteristics**

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

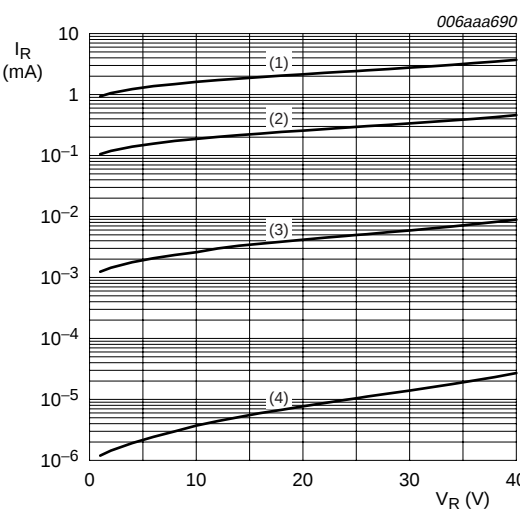
| Symbol           | Parameter         | Conditions                               | Min | Typ | Max | Unit          |
|------------------|-------------------|------------------------------------------|-----|-----|-----|---------------|
| <b>Per diode</b> |                   |                                          |     |     |     |               |
| $V_F$            | forward voltage   | $I_F = 10\text{ mA}$                     | [1] | -   | 300 | mV            |
|                  |                   | $I_F = 100\text{ mA}$                    | [1] | -   | 420 | mV            |
|                  |                   | $I_F = 200\text{ mA}$                    | [1] | -   | 550 | mV            |
| $I_R$            | reverse current   | $V_R = 30\text{ V}$                      | -   | -   | 15  | $\mu\text{A}$ |
|                  |                   | $V_R = 30\text{ V}; T_J = 100\text{ °C}$ | -   | -   | 3   | mA            |
| $C_d$            | diode capacitance | $V_R = 0\text{ V}; f = 1\text{ MHz}$     | -   | 40  | 50  | pF            |

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .



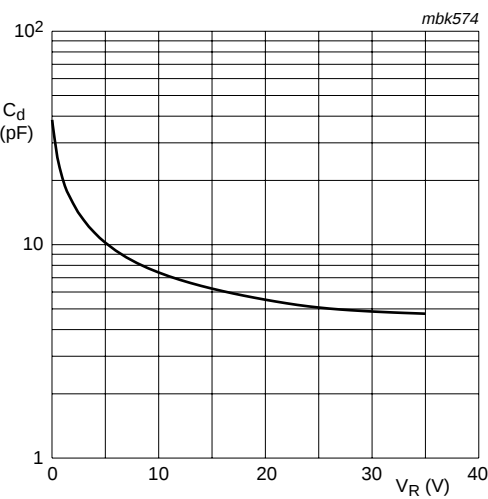
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 1. Forward current as a function of forward voltage; typical values



- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

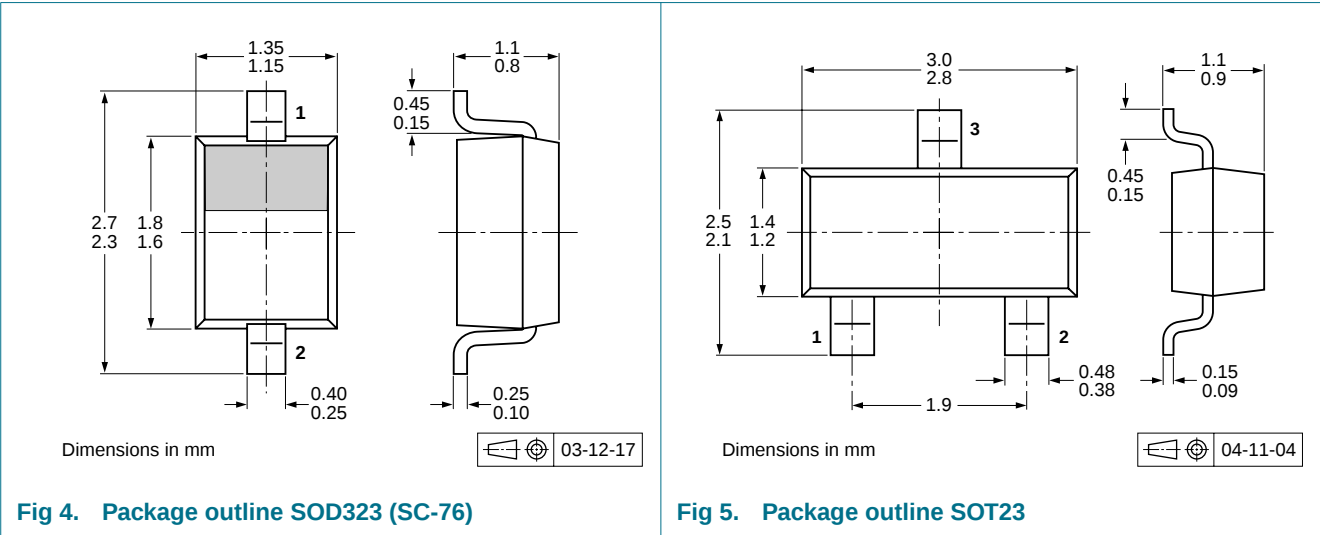
Fig 2. Reverse current as a function of reverse voltage; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$

Fig 3. Diode capacitance as a function of reverse voltage; typical values

8. Package outline



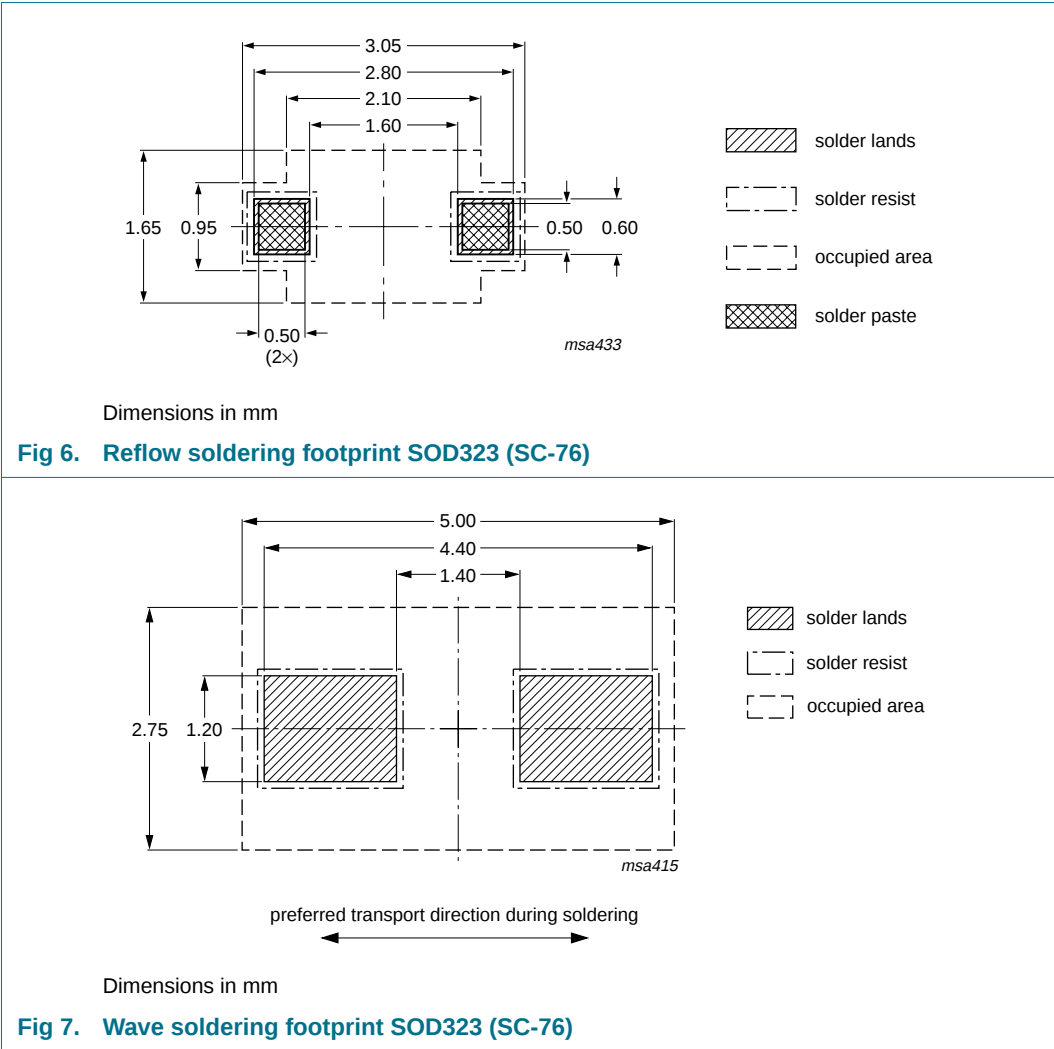
9. Packing information

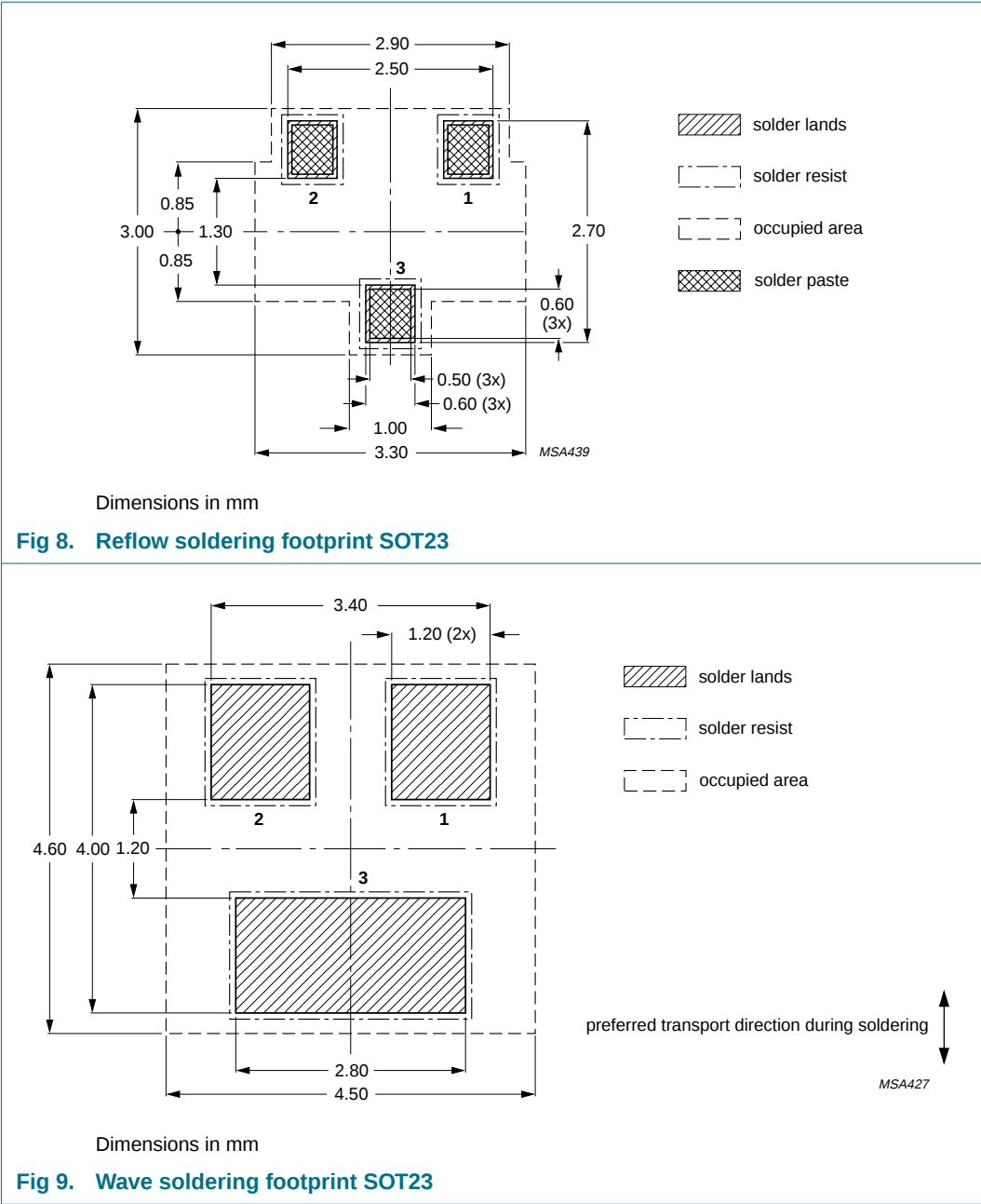
Table 9. Packing methods  
The indicated -xxx are the last three digits of the 12NC ordering code.[\[1\]](#)

| Type number | Package | Description                    | Packing quantity |       |
|-------------|---------|--------------------------------|------------------|-------|
|             |         |                                | 3000             | 10000 |
| 1PS76SB21   | SOD323  | 4 mm pitch, 8 mm tape and reel | -115             | -135  |
| BAT721      | SOT23   | 4 mm pitch, 8 mm tape and reel | -215             | -235  |
| BAT721A     |         |                                |                  |       |
| BAT721C     |         |                                |                  |       |
| BAT721S     |         |                                |                  |       |

[1] For further information and the availability of packing methods, see [Section 13](#).

10. Soldering





## 11. Revision history

Table 10. Revision history

| Document ID            | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Data sheet status     | Change notice | Supersedes                     |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|--------------------------------|
| 1PS76SB21_BAT721_SER_6 | 20061221                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 1PS76SB21_BAT721_SER_5         |
| Modifications:         | <ul style="list-style-type: none"> <li>Amended <a href="#">Table 10 "Revision history"</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |               |                                |
| 1PS76SB21_BAT721_SER_5 | 20061205                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | BAT721_SERIES_4<br>1PS76SB21_3 |
| Modifications:         | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>This data sheet is a combination of data sheets BAT721_SERIES_4 and 1PS76SB21_3.</li> <li><a href="#">Table 1 "Product overview"</a>: added</li> <li><a href="#">Section 1.2 "Features"</a>: amended</li> <li><a href="#">Section 1.3 "Applications"</a>: amended</li> <li><a href="#">Table 2 "Quick reference data"</a>: added</li> <li><a href="#">Table 5 "Marking codes"</a>: for 1PS76SB21 amended</li> <li><a href="#">Table 5 "Marking codes"</a>: enhanced table note section</li> <li><a href="#">Table 6 "Limiting values"</a>: indication per diode added</li> <li><a href="#">Table 6 "Limiting values"</a>: for 1PS76SB21 <math>I_{FSM}</math> condition amended</li> <li><a href="#">Table 6 "Limiting values"</a>: <math>T_{amb}</math> ambient temperature added</li> <li><a href="#">Table 7 "Thermal characteristics"</a>: indication per diode added</li> <li><a href="#">Table 7</a>: <math>R_{th(j-a)}</math> thermal resistance from junction to ambient condition amended</li> <li><a href="#">Table 8 "Characteristics"</a>: indication per diode added</li> <li><a href="#">Table 8 "Characteristics"</a>: reference to <a href="#">Table note 1</a> amended</li> <li><a href="#">Table 8</a>: for 1PS76SB21 <math>C_d</math> minimum value changed to typical value</li> <li><a href="#">Figure 1</a> and <a href="#">2</a>: amended</li> <li><a href="#">Figure 4</a> and <a href="#">5</a>: superseded by minimized package outlines</li> <li><a href="#">Section 9 "Packing information"</a>: added</li> <li><a href="#">Section 10 "Soldering"</a>: added</li> <li><a href="#">Section 12 "Legal information"</a>: updated</li> </ul> |                       |               |                                |
| BAT721_SERIES_4        | 20040315                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | BAT721_SERIES_3                |
| 1PS76SB21_3            | 20040126                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | 1PS76SB21_2                    |

## 12. Legal information

### 12.1 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.nexperia.com>.

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