



# NZX series

## Single Zener diodes

Rev. 02 — 3 June 2009

Product data sheet

## 1. Product profile

### 1.1 General description

General-purpose Zener diodes in a SOD27 (SC-40) small hermetically sealed glass package.

### 1.2 Features

- Total power dissipation:  $P_{\text{tot}} \leq 500 \text{ mW}$
- Low differential resistance
- Low leakage current
- AEC-Q101 qualified

### 1.3 Applications

- General regulation functions

### 1.4 Quick reference data

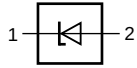
**Table 1. Quick reference data**  
 $T_j = 25^\circ\text{C}$  unless otherwise specified.

| Symbol | Parameter       | Conditions             | Min                   | Typ | Max | Unit |
|--------|-----------------|------------------------|-----------------------|-----|-----|------|
| $V_F$  | forward voltage | $I_F = 200 \text{ mA}$ | <a href="#">[1]</a> - | -   | 1.5 | V    |

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

## 2. Pinning information

**Table 2. Pinning**

| Pin | Description                 | Simplified outline                                                                   | Graphic symbol                                                                                     |
|-----|-----------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1   | cathode <a href="#">[1]</a> |  | <br>006aaa152 |
| 2   | anode                       |                                                                                      |                                                                                                    |

[1] The marking band indicates the cathode.

### 3. Ordering information

**Table 3. Ordering information**

| Type number                      | Package |                                                             |         |
|----------------------------------|---------|-------------------------------------------------------------|---------|
|                                  | Name    | Description                                                 | Version |
| NZX2V4A to NZX36X <sup>[1]</sup> | SC-40   | hermetically sealed glass package; axial leaded;<br>2 leads | SOD27   |

[1] The series consists of 111 types with nominal working voltages from 2.4 V to 36 V.

### 4. Marking

**Table 4. Marking codes**

| Type number       | Marking code                |
|-------------------|-----------------------------|
| NZX2V4A to NZX36X | the diodes are type branded |

### 5. Limiting values

**Table 5. Limiting values**

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

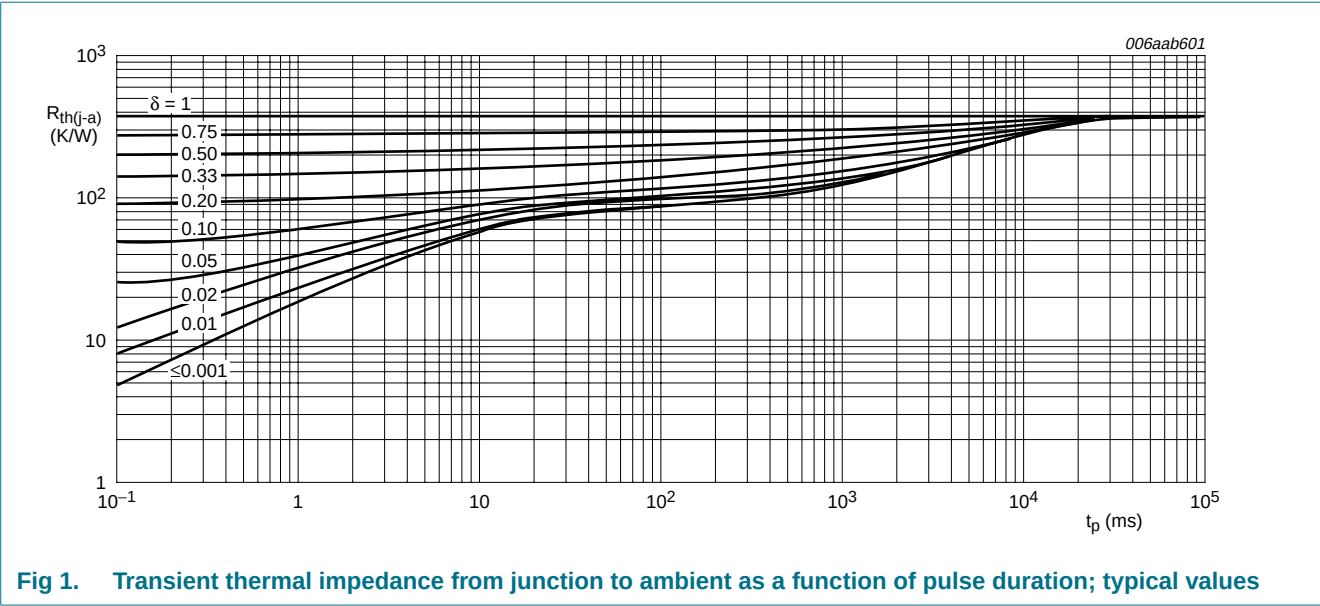
| Symbol    | Parameter               | Conditions                 | Min | Max  | Unit |
|-----------|-------------------------|----------------------------|-----|------|------|
| $I_F$     | forward current         |                            | -   | 250  | mA   |
| $P_{tot}$ | total power dissipation | $T_{tp} \leq 25\text{ °C}$ | -   | 500  | mW   |
| $T_j$     | junction temperature    |                            | -   | 175  | °C   |
| $T_{amb}$ | ambient temperature     |                            | -55 | +175 | °C   |
| $T_{stg}$ | storage temperature     |                            | -65 | +175 | °C   |

### 6. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol        | Parameter                                     | Conditions  | Min              | Typ | Max | Unit |
|---------------|-----------------------------------------------|-------------|------------------|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient   | in free air | <sup>[1]</sup> - | -   | 380 | K/W  |
| $R_{th(j-t)}$ | thermal resistance from junction to tie-point |             | <sup>[1]</sup> - | -   | 300 | K/W  |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB) without metallization pad; maximum lead length 8 mm.



7. Characteristics

Table 7. 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> = 200 mA | [1] - | -   | 1.5 | V    |

[1] Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.

Table 8. Characteristics per type; NZX2V4A to NZX18C  
*T<sub>j</sub> = 25 °C unless otherwise specified.*

| NZXxxx | Sel | Working voltage<br>V <sub>Z</sub> (V) |     | Differential<br>resistance<br>r <sub>dif</sub> (Ω) | Reverse current<br>I <sub>R</sub> (μA) |                    |
|--------|-----|---------------------------------------|-----|----------------------------------------------------|----------------------------------------|--------------------|
|        |     | I <sub>Z</sub> = 5 mA                 |     | I <sub>Z</sub> = 5 mA                              | Max                                    | V <sub>R</sub> (V) |
|        |     | Min                                   | Max | Max                                                |                                        |                    |
| 2V4    | A   | 2.3                                   | 2.5 | 100                                                | 50                                     | 1                  |
|        | B   | 2.4                                   | 2.6 |                                                    |                                        |                    |
| 2V7    | A   | 2.5                                   | 2.7 | 100                                                | 20                                     | 1                  |
|        | B   | 2.6                                   | 2.8 |                                                    |                                        |                    |
|        | C   | 2.7                                   | 2.9 |                                                    |                                        |                    |
| 3V0    | A   | 2.8                                   | 3.0 | 100                                                | 10                                     | 1                  |
|        | B   | 2.9                                   | 3.1 |                                                    |                                        |                    |
|        | C   | 3.0                                   | 3.2 |                                                    |                                        |                    |
| 3V3    | A   | 3.1                                   | 3.3 | 100                                                | 5                                      | 1                  |
|        | B   | 3.2                                   | 3.4 |                                                    |                                        |                    |
|        | C   | 3.3                                   | 3.5 |                                                    |                                        |                    |

**Table 8. Characteristics per type; NZX2V4A to NZX18C ...continued** $T_j = 25^\circ\text{C}$  unless otherwise specified.

| NZXxxx | Sel | Working voltage<br>$V_Z$ (V) |     | Differential<br>resistance<br>$r_{\text{dif}}$ ( $\Omega$ ) | Reverse current<br>$I_R$ ( $\mu\text{A}$ ) |           |
|--------|-----|------------------------------|-----|-------------------------------------------------------------|--------------------------------------------|-----------|
|        |     | $I_Z = 5\text{ mA}$          |     | $I_Z = 5\text{ mA}$                                         |                                            |           |
|        |     | Min                          | Max | Max                                                         | Max                                        | $V_R$ (V) |
| 3V6    | A   | 3.4                          | 3.6 | 100                                                         | 5                                          | 1         |
|        | B   | 3.5                          | 3.7 |                                                             |                                            |           |
|        | C   | 3.6                          | 3.8 |                                                             |                                            |           |
| 3V9    | A   | 3.7                          | 3.9 | 100                                                         | 3                                          | 1         |
|        | B   | 3.8                          | 4.0 |                                                             |                                            |           |
|        | C   | 3.9                          | 4.1 |                                                             |                                            |           |
| 4V3    | A   | 4.0                          | 4.2 | 100                                                         | 3                                          | 1         |
|        | B   | 4.1                          | 4.3 |                                                             |                                            |           |
|        | C   | 4.2                          | 4.4 |                                                             |                                            |           |
|        | D   | 4.3                          | 4.5 |                                                             |                                            |           |
| 4V7    | A   | 4.4                          | 4.6 | 100                                                         | 3                                          | 2         |
|        | B   | 4.5                          | 4.7 |                                                             |                                            |           |
|        | C   | 4.6                          | 4.8 |                                                             |                                            |           |
|        | D   | 4.7                          | 4.9 |                                                             |                                            |           |
| 5V1    | A   | 4.8                          | 5.0 | 100                                                         | 2                                          | 2         |
|        | B   | 4.9                          | 5.1 |                                                             |                                            |           |
|        | C   | 5.0                          | 5.2 |                                                             |                                            |           |
|        | D   | 5.1                          | 5.3 |                                                             |                                            |           |
| 5V6    | A   | 5.2                          | 5.5 | 40                                                          | 1                                          | 2         |
|        | B   | 5.3                          | 5.6 |                                                             |                                            |           |
|        | C   | 5.4                          | 5.7 |                                                             |                                            |           |
|        | D   | 5.5                          | 5.8 |                                                             |                                            |           |
|        | E   | 5.6                          | 5.9 |                                                             |                                            |           |
| 6V2    | A   | 5.7                          | 6.0 | 15                                                          | 3                                          | 4         |
|        | B   | 5.8                          | 6.1 |                                                             |                                            |           |
|        | C   | 6.0                          | 6.3 |                                                             |                                            |           |
|        | D   | 6.1                          | 6.4 |                                                             |                                            |           |
|        | E   | 6.3                          | 6.6 |                                                             |                                            |           |
| 6V8    | A   | 6.4                          | 6.7 | 15                                                          | 2                                          | 4         |
|        | B   | 6.6                          | 6.9 |                                                             |                                            |           |
|        | C   | 6.7                          | 7.0 |                                                             |                                            |           |
|        | D   | 6.9                          | 7.2 |                                                             |                                            |           |

Table 8. Characteristics per type; NZX2V4A to NZX18C ...continued

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

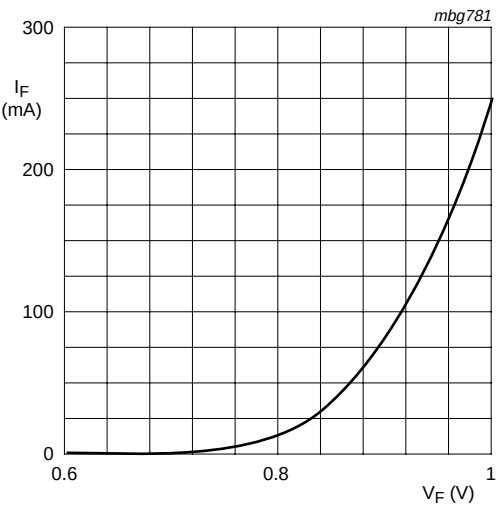
| NZXxxx | Sel | Working voltage<br>$V_Z$ (V) |       | Differential<br>resistance<br>$r_{\text{dif}}$ ( $\Omega$ ) | Reverse current<br>$I_R$ ( $\mu\text{A}$ ) |           |
|--------|-----|------------------------------|-------|-------------------------------------------------------------|--------------------------------------------|-----------|
|        |     | $I_Z = 5\text{ mA}$          |       | $I_Z = 5\text{ mA}$                                         |                                            |           |
|        |     | Min                          | Max   | Max                                                         | Max                                        | $V_R$ (V) |
| 7V5    | A   | 7.0                          | 7.3   | 15                                                          | 1                                          | 5         |
|        | B   | 7.2                          | 7.6   |                                                             |                                            |           |
|        | C   | 7.3                          | 7.7   |                                                             |                                            |           |
|        | D   | 7.5                          | 7.9   |                                                             |                                            |           |
|        | X   | 7.07                         | 7.45  |                                                             |                                            |           |
| 8V2    | A   | 7.7                          | 8.1   | 20                                                          | 0.7                                        | 5         |
|        | B   | 7.9                          | 8.3   |                                                             |                                            |           |
|        | C   | 8.1                          | 8.5   |                                                             |                                            |           |
|        | D   | 8.3                          | 8.7   |                                                             |                                            |           |
| 9V1    | A   | 8.5                          | 8.9   | 20                                                          | 0.5                                        | 6         |
|        | B   | 8.7                          | 9.1   |                                                             |                                            |           |
|        | C   | 8.9                          | 9.3   |                                                             |                                            |           |
|        | D   | 9.1                          | 9.5   |                                                             |                                            |           |
|        | E   | 9.3                          | 9.7   |                                                             |                                            |           |
| 10     | A   | 9.5                          | 9.9   | 25                                                          | 0.2                                        | 7         |
|        | B   | 9.7                          | 10.1  |                                                             |                                            |           |
|        | C   | 9.9                          | 10.3  |                                                             |                                            |           |
|        | D   | 10.2                         | 10.6  |                                                             |                                            |           |
| 11     | A   | 10.4                         | 10.8  | 25                                                          | 0.1                                        | 8         |
|        | B   | 10.7                         | 11.1  |                                                             |                                            |           |
|        | C   | 10.9                         | 11.3  |                                                             |                                            |           |
|        | D   | 11.1                         | 11.6  |                                                             |                                            |           |
| 12     | A   | 11.4                         | 11.9  | 35                                                          | 0.1                                        | 8         |
|        | B   | 11.6                         | 12.1  |                                                             |                                            |           |
|        | C   | 11.9                         | 12.4  |                                                             |                                            |           |
|        | D   | 12.2                         | 12.7  |                                                             |                                            |           |
|        | X   | 11.44                        | 12.03 |                                                             |                                            |           |
| 13     | A   | 12.4                         | 12.9  | 35                                                          | 0.1                                        | 8         |
|        | B   | 12.6                         | 13.1  |                                                             |                                            |           |
|        | C   | 12.9                         | 13.4  |                                                             |                                            |           |
| 14     | A   | 13.2                         | 13.7  | 35                                                          | 0.05                                       | 9.8       |
|        | B   | 13.5                         | 14.0  |                                                             |                                            |           |
|        | C   | 13.8                         | 14.3  |                                                             |                                            |           |

**Table 8. Characteristics per type; NZX2V4A to NZX18C ...continued**  
 $T_j = 25^\circ\text{C}$  unless otherwise specified.

| NZXxxx | Sel | Working voltage<br>$V_Z$ (V) |       | Differential<br>resistance<br>$r_{\text{dif}}$ ( $\Omega$ ) | Reverse current<br>$I_R$ ( $\mu\text{A}$ ) |           |
|--------|-----|------------------------------|-------|-------------------------------------------------------------|--------------------------------------------|-----------|
|        |     | $I_Z = 5\text{ mA}$          |       | $I_Z = 5\text{ mA}$                                         |                                            |           |
|        |     | Min                          | Max   | Max                                                         | Max                                        | $V_R$ (V) |
| 15     | A   | 14.1                         | 14.7  | 40                                                          | 0.05                                       | 10.5      |
|        | B   | 14.5                         | 15.1  |                                                             |                                            |           |
|        | C   | 14.9                         | 15.5  |                                                             |                                            |           |
|        | X   | 14.35                        | 15.09 |                                                             |                                            |           |
| 16     | A   | 15.3                         | 15.9  | 45                                                          | 0.05                                       | 11.2      |
|        | B   | 15.7                         | 16.5  |                                                             |                                            |           |
|        | C   | 16.3                         | 17.1  |                                                             |                                            |           |
| 18     | A   | 16.9                         | 17.7  | 55                                                          | 0.05                                       | 12.6      |
|        | B   | 17.5                         | 18.3  |                                                             |                                            |           |
|        | C   | 18.1                         | 19.0  |                                                             |                                            |           |

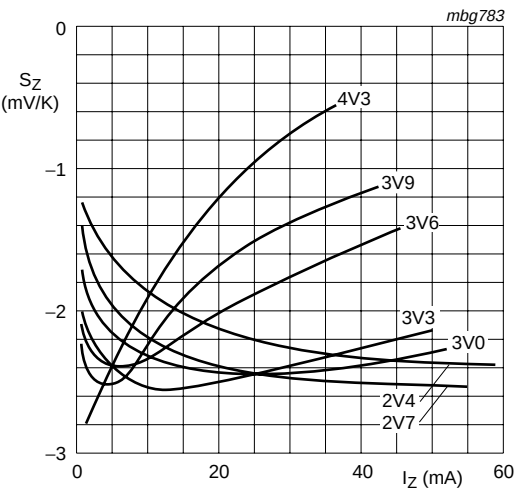
**Table 9. Characteristics per type; NZX20A to NZX36X***T<sub>j</sub> = 25 °C unless otherwise specified.*

| NZXxxx | Sel | Working voltage<br>V <sub>Z</sub> (V) |       | Differential<br>resistance<br>r <sub>dif</sub> (Ω) | Reverse current<br>I <sub>R</sub> (μA) |                    |
|--------|-----|---------------------------------------|-------|----------------------------------------------------|----------------------------------------|--------------------|
|        |     | I <sub>Z</sub> = 2 mA                 |       | I <sub>Z</sub> = 2 mA                              |                                        |                    |
|        |     | Min                                   | Max   | Max                                                | Max                                    | V <sub>R</sub> (V) |
| 20     | A   | 18.8                                  | 19.7  | 60                                                 | 0.05                                   | 14                 |
|        | B   | 19.5                                  | 20.4  |                                                    |                                        |                    |
|        | C   | 20.2                                  | 21.2  |                                                    |                                        |                    |
| 22     | A   | 20.9                                  | 21.9  | 65                                                 | 0.05                                   | 15.4               |
|        | B   | 21.6                                  | 22.6  |                                                    |                                        |                    |
|        | C   | 22.3                                  | 23.3  |                                                    |                                        |                    |
| 24     | A   | 22.9                                  | 24.0  | 70                                                 | 0.05                                   | 16.8               |
|        | B   | 23.6                                  | 24.7  |                                                    |                                        |                    |
|        | C   | 24.3                                  | 25.5  |                                                    |                                        |                    |
|        | X   | 22.61                                 | 23.77 |                                                    |                                        |                    |
| 27     | A   | 25.2                                  | 26.6  | 80                                                 | 0.05                                   | 18.9               |
|        | B   | 26.2                                  | 27.6  |                                                    |                                        |                    |
|        | C   | 27.2                                  | 28.6  |                                                    |                                        |                    |
|        | X   | 26.99                                 | 28.39 |                                                    |                                        |                    |
| 30     | A   | 28.2                                  | 29.6  | 100                                                | 0.05                                   | 21                 |
|        | B   | 29.2                                  | 30.6  |                                                    |                                        |                    |
|        | C   | 30.2                                  | 31.6  |                                                    |                                        |                    |
|        | X   | 29.02                                 | 30.51 |                                                    |                                        |                    |
| 33     | A   | 31.2                                  | 32.6  | 120                                                | 0.05                                   | 23.1               |
|        | B   | 32.2                                  | 33.6  |                                                    |                                        |                    |
|        | C   | 33.2                                  | 34.5  |                                                    |                                        |                    |
| 36     | A   | 34.2                                  | 35.7  | 140                                                | 0.05                                   | 25.2               |
|        | B   | 35.3                                  | 36.8  |                                                    |                                        |                    |
|        | C   | 36.4                                  | 38.0  |                                                    |                                        |                    |
|        | X   | 35.36                                 | 37.19 |                                                    |                                        |                    |



$T_j = 25\text{ }^{\circ}\text{C}$

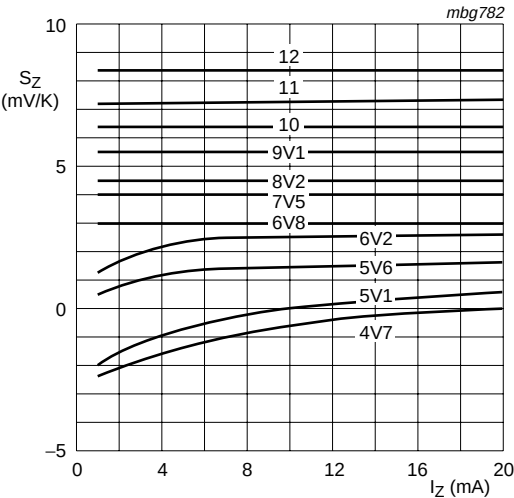
Fig 2. Forward current as a function of forward voltage; typical values



NZX2V4 to NZX4V3

$T_j = 25\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$

Fig 3. Temperature coefficient as a function of working current; typical values



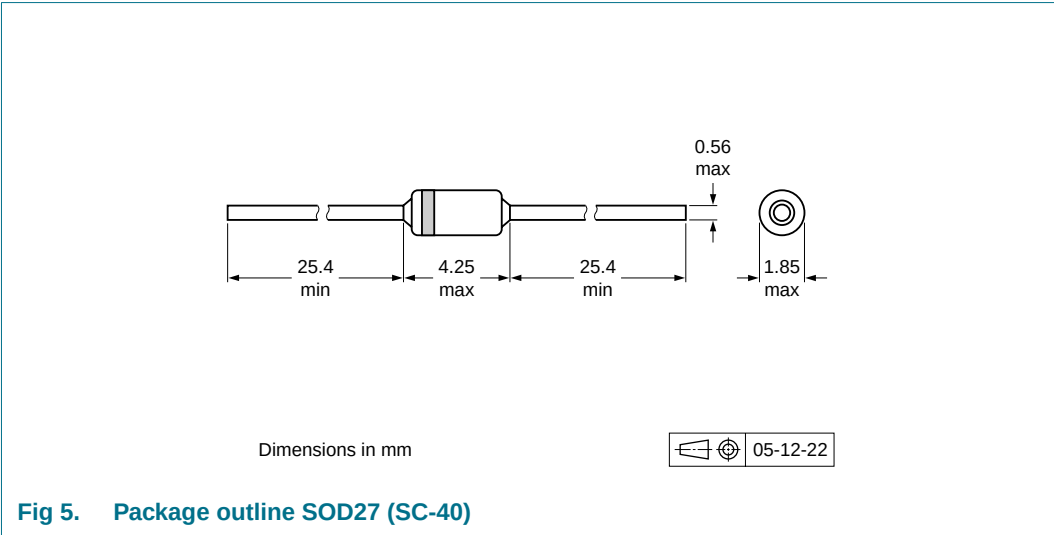
NZX4V7 to NZX12

$T_j = 25\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$

Fig 4. Temperature coefficient as a function of working current; typical values



8. Package outline



9. Packing information

**Table 10. Packing methods**  
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

| Type number <sup>[2]</sup> | Package | Description                | Packing quantity |       |
|----------------------------|---------|----------------------------|------------------|-------|
|                            |         |                            | 5000             | 10000 |
| NZX2V4A to NZX36X          | SOD27   | 26 mm tape ammopack, axial | -143             | -     |
|                            |         | 52 mm tape ammopack, axial | -                | -133  |
|                            |         | 52 mm reel pack, axial     | -                | -113  |

[1] For further information and the availability of packing methods, see [Section 12](#).  
[2] The series consists of 111 types with nominal working voltages from 2.4 V to 36 V.

## 10. Revision history

**Table 11.** Revision history

| Document ID    | Release date                                                                                                                                                                                                                                                       | Data sheet status  | Change notice | Supersedes |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|------------|
| NZX_SER_2      | 20090603                                                                                                                                                                                                                                                           | Product data sheet | -             | NZX_SER_1  |
| Modifications: | <ul style="list-style-type: none"><li>• 42 type numbers added</li><li>• <a href="#">Section 1.1 "General description"</a>: amended</li><li>• <a href="#">Figure 1</a>: updated</li><li>• <a href="#">Table 5</a>: <math>P_{tot}</math> condition amended</li></ul> |                    |               |            |
| NZX_SER_1      | 20080724                                                                                                                                                                                                                                                           | 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>.

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