

# KTY82 series

## Silicon temperature sensors

Rev. 04 — 14 January 2008

Product data sheet

## 1. Product profile

### 1.1 General description

The temperature sensors in the KTY82 series have a positive temperature coefficient of resistance and are suitable for use in measurement and control systems. The sensors are encapsulated in the small plastic Surface Mounted Device (SMD) SOT23 package.

Other special selections are available on request.

### 1.2 Features

- High accuracy and reliability
- Long-term stability
- Positive temperature coefficient; fail-safe behavior
- Virtually linear characteristics

### 1.3 Quick reference data

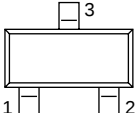
Table 1. Quick reference data

$T_{amb} = 25^{\circ}\text{C}$ ; in liquid; unless otherwise specified.

| Symbol          | Parameter         | Conditions                    | Min  | Typ | Max  | Unit |
|-----------------|-------------------|-------------------------------|------|-----|------|------|
| R <sub>25</sub> | sensor resistance | I <sub>sen(cont)</sub> = 1 mA |      |     |      |      |
|                 |                   | KTY82/110                     | 990  | -   | 1010 | Ω    |
|                 |                   | KTY82/120                     | 980  | -   | 1020 | Ω    |
|                 |                   | KTY82/121                     | 980  | -   | 1000 | Ω    |
|                 |                   | KTY82/122                     | 1000 | -   | 1020 | Ω    |
|                 |                   | KTY82/150                     | 950  | -   | 1050 | Ω    |
|                 |                   | KTY82/151                     | 950  | -   | 1000 | Ω    |
|                 |                   | KTY82/210                     | 1980 | -   | 2020 | Ω    |
|                 |                   | KTY82/220                     | 1960 | -   | 2040 | Ω    |
|                 |                   | KTY82/221                     | 1960 | -   | 2000 | Ω    |
|                 |                   | KTY82/222                     | 2000 | -   | 2040 | Ω    |
|                 |                   | KTY82/250                     | 1900 | -   | 2100 | Ω    |
|                 |                   | KTY82/251                     | 1900 | -   | 2000 | Ω    |
|                 |                   | KTY82/252                     | 2000 | -   | 2100 | Ω    |

## 2. Pinning information

Table 2. Pinning

| Pin | Description                            | Simplified outline                                                                  |
|-----|----------------------------------------|-------------------------------------------------------------------------------------|
| 1   | electrical contact                     |  |
| 2   | electrical contact                     |                                                                                     |
| 3   | substrate (must remain potential free) |                                                                                     |

## 3. Ordering information

Table 3. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| KTY82/110   | -       | plastic surface-mounted package; 3 leads | SOT23   |
| KTY82/120   |         |                                          |         |
| KTY82/121   |         |                                          |         |
| KTY82/122   |         |                                          |         |
| KTY82/150   |         |                                          |         |
| KTY82/151   |         |                                          |         |
| KTY82/210   |         |                                          |         |
| KTY82/220   |         |                                          |         |
| KTY82/221   |         |                                          |         |
| KTY82/222   |         |                                          |         |
| KTY82/250   |         |                                          |         |
| KTY82/251   |         |                                          |         |
| KTY82/252   |         |                                          |         |

## 4. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|-------------|--------------|
| KTY82/110   | 110          |
| KTY82/120   | 120          |
| KTY82/121   | 121          |
| KTY82/122   | 122          |
| KTY82/150   | 150          |
| KTY82/151   | 151          |
| KTY82/210   | 210          |
| KTY82/220   | 220          |
| KTY82/221   | 221          |
| KTY82/222   | 222          |
| KTY82/250   | 250          |
| KTY82/251   | 251          |
| KTY82/252   | 252          |

## 5. Limiting values

**Table 5. Limiting values**

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

| Symbol                 | Parameter                 | Conditions                                    | Min | Max  | Unit |
|------------------------|---------------------------|-----------------------------------------------|-----|------|------|
| $I_{\text{sen(cont)}}$ | continuous sensor current | in free air; $T_{\text{amb}} = 25\text{ °C}$  | -   | 10   | mA   |
|                        |                           | in free air; $T_{\text{amb}} = 150\text{ °C}$ | -   | 2    | mA   |
| $T_{\text{amb}}$       | ambient temperature       |                                               | -55 | +150 | °C   |

## 6. Characteristics

**Table 6. Characteristics**

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

| Symbol                            | Parameter                           | Conditions                                              | Min              | Typ   | Max   | Unit |
|-----------------------------------|-------------------------------------|---------------------------------------------------------|------------------|-------|-------|------|
| R <sub>25</sub>                   | sensor resistance                   | I <sub>sen(cont)</sub> = 1 mA                           |                  |       |       |      |
|                                   |                                     | KTY82/110                                               | 990              | -     | 1010  | Ω    |
|                                   |                                     | KTY82/120                                               | 980              | -     | 1020  | Ω    |
|                                   |                                     | KTY82/121                                               | 980              | -     | 1000  | Ω    |
|                                   |                                     | KTY82/122                                               | 1000             | -     | 1020  | Ω    |
|                                   |                                     | KTY82/150                                               | 950              | -     | 1050  | Ω    |
|                                   |                                     | KTY82/151                                               | 950              | -     | 1000  | Ω    |
|                                   |                                     | KTY82/210                                               | 1980             | -     | 2020  | Ω    |
|                                   |                                     | KTY82/220                                               | 1960             | -     | 2040  | Ω    |
|                                   |                                     | KTY82/221                                               | 1960             | -     | 2000  | Ω    |
|                                   |                                     | KTY82/222                                               | 2000             | -     | 2040  | Ω    |
|                                   |                                     | KTY82/250                                               | 1900             | -     | 2100  | Ω    |
|                                   |                                     | KTY82/251                                               | 1900             | -     | 2000  | Ω    |
|                                   |                                     | KTY82/252                                               | 2000             | -     | 2100  | Ω    |
| TC                                | temperature coefficient             |                                                         | -                | 0.79  | -     | %/K  |
| R <sub>100</sub> /R <sub>25</sub> | resistance ratio                    | T <sub>amb</sub> = 100 °C and 25 °C                     | 1.676            | 1.696 | 1.716 |      |
| R <sub>-55</sub> /R <sub>25</sub> | resistance ratio                    | T <sub>amb</sub> = -55 °C and 25 °C                     | 0.480            | 0.490 | 0.500 |      |
| ΔR <sub>25</sub>                  | drift of sensor resistance at 25 °C | 10000 h continuous operation; T <sub>amb</sub> = 150 °C |                  |       |       |      |
|                                   |                                     | KTY82/1 series                                          | -                | 1.6   | -     | Ω    |
|                                   |                                     | KTY82/2 series                                          | -                | 3.2   | -     | Ω    |
| τ <sub>th</sub>                   | thermal time constant               | in still air                                            | <sup>[1]</sup> - | 7     | -     | s    |
|                                   |                                     | in still liquid                                         | <sup>[1]</sup> - | 1     | -     | s    |
|                                   |                                     | in flowing liquid                                       | <sup>[1]</sup> - | 0.5   | -     | s    |

- [1] The thermal time constant is the time taken for the sensor to reach 63.2 % of the total temperature difference. For example, if a sensor with a temperature of 25 °C is moved to an environment with an ambient temperature of 100 °C, the time for the sensor to reach a temperature of 72.4 °C is the thermal time constant.

**Table 7. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/110 and KTY82/120** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY82/110      |      |      |                       | KTY82/120      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                                  | Resistance (Ω) |      |      | Temperature error (K) | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                                  | Min            | Typ  | Max  |                       | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                             | 475            | 490  | 505  | ±3.02                 | 470            | 490  | 510  | ±4.02                 |
| −50                 | −58  | 0.98                             | 500            | 515  | 530  | ±2.92                 | 495            | 515  | 535  | ±3.94                 |
| −40                 | −40  | 0.96                             | 552            | 567  | 582  | ±2.74                 | 547            | 567  | 588  | ±3.78                 |
| −30                 | −22  | 0.93                             | 609            | 624  | 638  | ±2.55                 | 603            | 624  | 645  | ±3.62                 |
| −20                 | −4   | 0.91                             | 669            | 684  | 698  | ±2.35                 | 662            | 684  | 705  | ±3.45                 |
| −10                 | 14   | 0.88                             | 733            | 747  | 761  | ±2.14                 | 726            | 747  | 769  | ±3.27                 |
| 0                   | 32   | 0.85                             | 802            | 815  | 828  | ±1.91                 | 793            | 815  | 836  | ±3.08                 |
| 10                  | 50   | 0.83                             | 874            | 886  | 898  | ±1.67                 | 865            | 886  | 907  | ±2.88                 |
| 20                  | 68   | 0.80                             | 950            | 961  | 972  | ±1.41                 | 941            | 961  | 982  | ±2.66                 |
| 25                  | 77   | 0.79                             | 990            | 1000 | 1010 | ±1.27                 | 980            | 1000 | 1020 | ±2.54                 |
| 30                  | 86   | 0.78                             | 1029           | 1040 | 1051 | ±1.39                 | 1018           | 1040 | 1061 | ±2.68                 |
| 40                  | 104  | 0.75                             | 1108           | 1122 | 1136 | ±1.64                 | 1097           | 1122 | 1147 | ±2.97                 |
| 50                  | 122  | 0.73                             | 1192           | 1209 | 1225 | ±1.91                 | 1180           | 1209 | 1237 | ±3.28                 |
| 60                  | 140  | 0.71                             | 1278           | 1299 | 1319 | ±2.19                 | 1265           | 1299 | 1332 | ±3.61                 |
| 70                  | 158  | 0.69                             | 1369           | 1392 | 1416 | ±2.49                 | 1355           | 1392 | 1430 | ±3.94                 |
| 80                  | 176  | 0.67                             | 1462           | 1490 | 1518 | ±2.8                  | 1447           | 1490 | 1532 | ±4.3                  |
| 90                  | 194  | 0.65                             | 1559           | 1591 | 1623 | ±3.12                 | 1543           | 1591 | 1639 | ±4.66                 |
| 100                 | 212  | 0.63                             | 1659           | 1696 | 1733 | ±3.46                 | 1642           | 1696 | 1750 | ±5.05                 |
| 110                 | 230  | 0.61                             | 1762           | 1805 | 1847 | ±3.83                 | 1744           | 1805 | 1865 | ±5.48                 |
| 120                 | 248  | 0.58                             | 1867           | 1915 | 1963 | ±4.33                 | 1848           | 1915 | 1982 | ±6.07                 |
| 125                 | 257  | 0.55                             | 1919           | 1970 | 2020 | ±4.66                 | 1899           | 1970 | 2040 | ±6.47                 |
| 130                 | 266  | 0.52                             | 1970           | 2023 | 2077 | ±5.07                 | 1950           | 2023 | 2097 | ±6.98                 |
| 140                 | 284  | 0.45                             | 2065           | 2124 | 2184 | ±6.28                 | 2043           | 2124 | 2205 | ±8.51                 |
| 150                 | 302  | 0.35                             | 2145           | 2211 | 2277 | ±8.55                 | 2123           | 2211 | 2299 | ±11.43                |

**Table 8. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/121 and KTY82/122** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY82/121      |      |      |                       | KTY82/122      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                                  | Resistance (Ω) |      |      | Temperature error (K) | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                                  | Min            | Typ  | Max  |                       | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                             | 471            | 485  | 500  | ±3.02                 | 480            | 495  | 510  | ±3.02                 |
| −50                 | −58  | 0.98                             | 495            | 510  | 524  | ±2.92                 | 505            | 520  | 535  | ±2.92                 |
| −40                 | −40  | 0.96                             | 547            | 562  | 576  | ±2.74                 | 558            | 573  | 588  | ±2.74                 |
| −30                 | −22  | 0.93                             | 603            | 617  | 632  | ±2.55                 | 615            | 630  | 645  | ±2.55                 |
| −20                 | −4   | 0.91                             | 662            | 677  | 691  | ±2.35                 | 676            | 690  | 705  | ±2.35                 |
| −10                 | 14   | 0.88                             | 726            | 740  | 754  | ±2.14                 | 741            | 755  | 769  | ±2.14                 |
| 0                   | 32   | 0.85                             | 794            | 807  | 820  | ±1.91                 | 810            | 823  | 836  | ±1.91                 |
| 10                  | 50   | 0.83                             | 865            | 877  | 889  | ±1.67                 | 883            | 895  | 907  | ±1.67                 |
| 20                  | 68   | 0.80                             | 941            | 951  | 962  | ±1.41                 | 960            | 971  | 982  | ±1.41                 |
| 25                  | 77   | 0.79                             | 980            | 990  | 1000 | ±1.27                 | 1000           | 1010 | 1020 | ±1.27                 |
| 30                  | 86   | 0.78                             | 1018           | 1029 | 1041 | ±1.39                 | 1039           | 1050 | 1062 | ±1.39                 |
| 40                  | 104  | 0.75                             | 1097           | 1111 | 1125 | ±1.64                 | 1120           | 1134 | 1148 | ±1.64                 |
| 50                  | 122  | 0.73                             | 1180           | 1196 | 1213 | ±1.91                 | 1204           | 1221 | 1238 | ±1.91                 |
| 60                  | 140  | 0.71                             | 1266           | 1286 | 1305 | ±2.19                 | 1291           | 1312 | 1332 | ±2.19                 |
| 70                  | 158  | 0.69                             | 1355           | 1378 | 1402 | ±2.49                 | 1382           | 1406 | 1430 | ±2.49                 |
| 80                  | 176  | 0.67                             | 1447           | 1475 | 1502 | ±2.8                  | 1477           | 1505 | 1533 | ±2.8                  |
| 90                  | 194  | 0.65                             | 1543           | 1575 | 1607 | ±3.12                 | 1574           | 1607 | 1639 | ±3.12                 |
| 100                 | 212  | 0.63                             | 1642           | 1679 | 1716 | ±3.46                 | 1676           | 1713 | 1750 | ±3.46                 |
| 110                 | 230  | 0.61                             | 1745           | 1786 | 1828 | ±3.83                 | 1780           | 1823 | 1865 | ±3.83                 |
| 120                 | 248  | 0.58                             | 1849           | 1896 | 1943 | ±4.33                 | 1886           | 1934 | 1982 | ±4.33                 |
| 125                 | 257  | 0.55                             | 1900           | 1950 | 2000 | ±4.66                 | 1938           | 1989 | 2041 | ±4.66                 |
| 130                 | 266  | 0.52                             | 1950           | 2003 | 2056 | ±5.07                 | 1989           | 2044 | 2098 | ±5.07                 |
| 140                 | 284  | 0.45                             | 2044           | 2103 | 2162 | ±6.28                 | 2085           | 2146 | 2206 | ±6.28                 |
| 150                 | 302  | 0.35                             | 2124           | 2189 | 2254 | ±8.55                 | 2167           | 2233 | 2299 | ±8.55                 |

**Table 9. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/150 and KTY82/151** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient (%/K) | KTY82/150      |      |      |                       | KTY82/151      |      |      |                       |
|---------------------|------|-------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                               | Resistance (Ω) |      |      | Temperature error (K) | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                               | Min            | Typ  | Max  |                       | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                          | 456            | 490  | 524  | ±7.04                 | 456            | 478  | 499  | ±4.52                 |
| −50                 | −58  | 0.98                          | 479            | 515  | 550  | ±6.99                 | 480            | 502  | 524  | ±4.45                 |
| −40                 | −40  | 0.96                          | 530            | 567  | 605  | ±6.91                 | 530            | 553  | 576  | ±4.3                  |
| −30                 | −22  | 0.93                          | 584            | 624  | 663  | ±6.84                 | 584            | 608  | 632  | ±4.16                 |
| −20                 | −4   | 0.91                          | 642            | 684  | 725  | ±6.77                 | 642            | 667  | 691  | ±4.01                 |
| −10                 | 14   | 0.88                          | 703            | 747  | 791  | ±6.69                 | 704            | 729  | 753  | ±3.84                 |
| 0                   | 32   | 0.85                          | 769            | 815  | 861  | ±6.61                 | 770            | 794  | 819  | ±3.67                 |
| 10                  | 50   | 0.83                          | 838            | 886  | 934  | ±6.51                 | 839            | 864  | 889  | ±3.48                 |
| 20                  | 68   | 0.80                          | 912            | 961  | 1010 | ±6.41                 | 912            | 937  | 962  | ±3.28                 |
| 25                  | 77   | 0.79                          | 950            | 1000 | 1050 | ±6.35                 | 950            | 975  | 1000 | ±3.18                 |
| 30                  | 86   | 0.78                          | 987            | 1040 | 1093 | ±6.55                 | 988            | 1014 | 1040 | ±3.33                 |
| 40                  | 104  | 0.75                          | 1064           | 1122 | 1181 | ±6.97                 | 1064           | 1094 | 1124 | ±3.64                 |
| 50                  | 122  | 0.73                          | 1143           | 1209 | 1274 | ±7.4                  | 1144           | 1178 | 1212 | ±3.97                 |
| 60                  | 140  | 0.71                          | 1226           | 1299 | 1371 | ±7.85                 | 1227           | 1266 | 1305 | ±4.31                 |
| 70                  | 158  | 0.69                          | 1313           | 1392 | 1472 | ±8.31                 | 1314           | 1357 | 1401 | ±4.67                 |
| 80                  | 176  | 0.67                          | 1402           | 1490 | 1577 | ±8.79                 | 1404           | 1453 | 1501 | ±5.05                 |
| 90                  | 194  | 0.65                          | 1495           | 1591 | 1687 | ±9.29                 | 1497           | 1551 | 1606 | ±5.43                 |
| 100                 | 212  | 0.63                          | 1591           | 1696 | 1801 | ±9.81                 | 1593           | 1654 | 1714 | ±5.84                 |
| 110                 | 230  | 0.61                          | 1690           | 1805 | 1919 | ±10.4                 | 1692           | 1759 | 1827 | ±6.3                  |
| 120                 | 248  | 0.58                          | 1791           | 1915 | 2039 | ±11.28                | 1792           | 1867 | 1942 | ±6.94                 |
| 125                 | 257  | 0.55                          | 1840           | 1970 | 2099 | ±11.91                | 1842           | 1920 | 1999 | ±7.38                 |
| 130                 | 266  | 0.52                          | 1889           | 2023 | 2158 | ±12.72                | 1891           | 1973 | 2055 | ±7.94                 |
| 140                 | 284  | 0.45                          | 1980           | 2124 | 2269 | ±15.21                | 1982           | 2071 | 2161 | ±9.63                 |
| 150                 | 302  | 0.35                          | 2057           | 2211 | 2365 | ±20.09                | 2059           | 2156 | 2252 | ±12.88                |

**Table 10. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/210 and KTY82/220** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient (%/K) | KTY82/210      |      |      |                       | KTY82/220      |      |      |                       |
|---------------------|------|-------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                               | Resistance (Ω) |      |      | Temperature error (K) | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                               | Min            | Typ  | Max  |                       | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                          | 951            | 980  | 1009 | ±3.02                 | 941            | 980  | 1019 | ±4.02                 |
| −50                 | −58  | 0.98                          | 1000           | 1030 | 1059 | ±2.92                 | 990            | 1030 | 1070 | ±3.94                 |
| −40                 | −40  | 0.96                          | 1105           | 1135 | 1165 | ±2.74                 | 1094           | 1135 | 1176 | ±3.78                 |
| −30                 | −22  | 0.93                          | 1218           | 1247 | 1277 | ±2.55                 | 1205           | 1247 | 1289 | ±3.62                 |
| −20                 | −4   | 0.91                          | 1338           | 1367 | 1396 | ±2.35                 | 1325           | 1367 | 1410 | ±3.45                 |
| −10                 | 14   | 0.88                          | 1467           | 1495 | 1523 | ±2.14                 | 1452           | 1495 | 1538 | ±3.27                 |
| 0                   | 32   | 0.85                          | 1603           | 1630 | 1656 | ±1.91                 | 1587           | 1630 | 1673 | ±3.08                 |
| 10                  | 50   | 0.83                          | 1748           | 1772 | 1797 | ±1.67                 | 1730           | 1772 | 1814 | ±2.88                 |
| 20                  | 68   | 0.80                          | 1901           | 1922 | 1944 | ±1.41                 | 1881           | 1922 | 1963 | ±2.66                 |
| 25                  | 77   | 0.79                          | 1980           | 2000 | 2020 | ±1.27                 | 1960           | 2000 | 2040 | ±2.54                 |
| 30                  | 86   | 0.78                          | 2057           | 2080 | 2102 | ±1.39                 | 2036           | 2080 | 2123 | ±2.68                 |
| 40                  | 104  | 0.75                          | 2217           | 2245 | 2272 | ±1.64                 | 2194           | 2245 | 2295 | ±2.97                 |
| 50                  | 122  | 0.73                          | 2383           | 2417 | 2451 | ±1.91                 | 2359           | 2417 | 2475 | ±3.28                 |
| 60                  | 140  | 0.71                          | 2557           | 2597 | 2637 | ±2.19                 | 2531           | 2597 | 2663 | ±3.61                 |
| 70                  | 158  | 0.69                          | 2737           | 2785 | 2832 | ±2.49                 | 2709           | 2785 | 2860 | ±3.94                 |
| 80                  | 176  | 0.67                          | 2924           | 2980 | 3035 | ±2.8                  | 2894           | 2980 | 3065 | ±4.3                  |
| 90                  | 194  | 0.65                          | 3118           | 3182 | 3246 | ±3.12                 | 3086           | 3182 | 3278 | ±4.66                 |
| 100                 | 212  | 0.63                          | 3318           | 3392 | 3466 | ±3.46                 | 3284           | 3392 | 3500 | ±5.05                 |
| 110                 | 230  | 0.59                          | 3523           | 3607 | 3691 | ±3.93                 | 3487           | 3607 | 3728 | ±5.61                 |
| 120                 | 248  | 0.53                          | 3722           | 3817 | 3912 | ±4.7                  | 3683           | 3817 | 3950 | ±6.59                 |
| 125                 | 257  | 0.49                          | 3815           | 3915 | 4016 | ±5.26                 | 3775           | 3915 | 4055 | ±7.31                 |
| 130                 | 266  | 0.44                          | 3901           | 4008 | 4114 | ±6                    | 3861           | 4008 | 4154 | ±8.27                 |
| 140                 | 284  | 0.33                          | 4049           | 4166 | 4283 | ±8.45                 | 4008           | 4166 | 4325 | ±11.46                |
| 150                 | 302  | 0.20                          | 4153           | 4280 | 4407 | ±14.63                | 4110           | 4280 | 4450 | ±19.56                |

**Table 11. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/221 and KTY82/222** $I_{sen(cont)} = 1\text{ mA}$ .

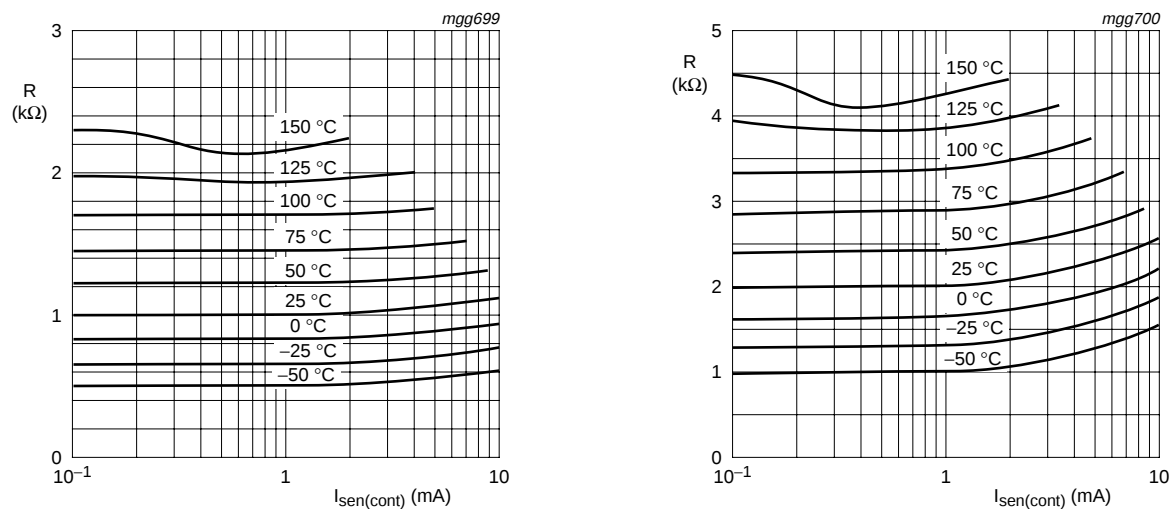
| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY82/221      |      |      |                       | KTY82/222      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                                  | Resistance (Ω) |      |      | Temperature error (K) | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                                  | Min            | Typ  | Max  |                       | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                             | 941            | 970  | 999  | ±3.02                 | 960            | 990  | 1020 | ±3.02                 |
| −50                 | −58  | 0.98                             | 990            | 1019 | 1049 | ±2.92                 | 1010           | 1040 | 1070 | ±2.92                 |
| −40                 | −40  | 0.96                             | 1094           | 1123 | 1153 | ±2.74                 | 1116           | 1146 | 1176 | ±2.74                 |
| −30                 | −22  | 0.93                             | 1205           | 1235 | 1264 | ±2.55                 | 1230           | 1260 | 1290 | ±2.55                 |
| −20                 | −4   | 0.91                             | 1325           | 1354 | 1382 | ±2.35                 | 1352           | 1381 | 1410 | ±2.35                 |
| −10                 | 14   | 0.88                             | 1452           | 1480 | 1508 | ±2.14                 | 1481           | 1510 | 1538 | ±2.14                 |
| 0                   | 32   | 0.85                             | 1587           | 1613 | 1640 | ±1.91                 | 1619           | 1646 | 1673 | ±1.91                 |
| 10                  | 50   | 0.83                             | 1730           | 1754 | 1779 | ±1.67                 | 1765           | 1790 | 1815 | ±1.67                 |
| 20                  | 68   | 0.80                             | 1882           | 1903 | 1924 | ±1.41                 | 1920           | 1941 | 1963 | ±1.41                 |
| 25                  | 77   | 0.79                             | 1960           | 1980 | 2000 | ±1.27                 | 2000           | 2020 | 2040 | ±1.27                 |
| 30                  | 86   | 0.78                             | 2037           | 2059 | 2081 | ±1.39                 | 2078           | 2100 | 2123 | ±1.39                 |
| 40                  | 104  | 0.75                             | 2195           | 2222 | 2250 | ±1.64                 | 2239           | 2267 | 2295 | ±1.64                 |
| 50                  | 122  | 0.73                             | 2360           | 2393 | 2426 | ±1.91                 | 2407           | 2441 | 2475 | ±1.91                 |
| 60                  | 140  | 0.71                             | 2531           | 2571 | 2611 | ±2.19                 | 2582           | 2623 | 2664 | ±2.19                 |
| 70                  | 158  | 0.69                             | 2710           | 2757 | 2804 | ±2.49                 | 2764           | 2812 | 2860 | ±2.49                 |
| 80                  | 176  | 0.67                             | 2895           | 2950 | 3005 | ±2.8                  | 2953           | 3009 | 3065 | ±2.8                  |
| 90                  | 194  | 0.65                             | 3086           | 3150 | 3214 | ±3.12                 | 3149           | 3214 | 3279 | ±3.12                 |
| 100                 | 212  | 0.63                             | 3285           | 3358 | 3431 | ±3.46                 | 3351           | 3426 | 3501 | ±3.46                 |
| 110                 | 230  | 0.59                             | 3488           | 3571 | 3655 | ±3.93                 | 3558           | 3643 | 3728 | ±3.93                 |
| 120                 | 248  | 0.53                             | 3684           | 3779 | 3873 | ±4.7                  | 3759           | 3855 | 3951 | ±4.7                  |
| 125                 | 257  | 0.49                             | 3776           | 3876 | 3976 | ±5.26                 | 3853           | 3955 | 4056 | ±5.26                 |
| 130                 | 266  | 0.44                             | 3862           | 3967 | 4073 | ±6                    | 3940           | 4048 | 4155 | ±6                    |
| 140                 | 284  | 0.33                             | 4009           | 4125 | 4241 | ±8.45                 | 4090           | 4208 | 4326 | ±8.45                 |
| 150                 | 302  | 0.20                             | 4112           | 4237 | 4363 | ±14.63                | 4195           | 4323 | 4451 | ±14.63                |

**Table 12.** Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/250 and KTY82/251 $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY82/250      |      |      |                       | KTY82/251      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                                  | Resistance (Ω) |      |      | Temperature error (K) | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                                  | Min            | Typ  | Max  |                       | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                             | 911            | 980  | 1049 | ±7.04                 | 913            | 956  | 999  | ±4.52                 |
| −50                 | −58  | 0.98                             | 959            | 1030 | 1101 | ±6.99                 | 960            | 1004 | 1048 | ±4.45                 |
| −40                 | −40  | 0.96                             | 1060           | 1135 | 1210 | ±6.91                 | 1061           | 1106 | 1152 | ±4.3                  |
| −30                 | −22  | 0.93                             | 1168           | 1247 | 1327 | ±6.84                 | 1169           | 1216 | 1263 | ±4.16                 |
| −20                 | −4   | 0.91                             | 1283           | 1367 | 1451 | ±6.77                 | 1285           | 1333 | 1381 | ±4.01                 |
| −10                 | 14   | 0.88                             | 1407           | 1495 | 1583 | ±6.69                 | 1408           | 1457 | 1507 | ±3.84                 |
| 0                   | 32   | 0.85                             | 1538           | 1630 | 1721 | ±6.61                 | 1539           | 1589 | 1639 | ±3.67                 |
| 10                  | 50   | 0.83                             | 1677           | 1772 | 1867 | ±6.51                 | 1678           | 1728 | 1778 | ±3.48                 |
| 20                  | 68   | 0.80                             | 1824           | 1922 | 2021 | ±6.41                 | 1825           | 1874 | 1923 | ±3.28                 |
| 25                  | 77   | 0.79                             | 1900           | 2000 | 2100 | ±6.35                 | 1900           | 1950 | 2000 | ±3.18                 |
| 30                  | 86   | 0.78                             | 1974           | 2080 | 2185 | ±6.55                 | 1975           | 2028 | 2080 | ±3.33                 |
| 40                  | 104  | 0.75                             | 2127           | 2245 | 2362 | ±6.97                 | 2129           | 2189 | 2248 | ±3.64                 |
| 50                  | 122  | 0.73                             | 2287           | 2417 | 2547 | ±7.4                  | 2289           | 2357 | 2425 | ±3.97                 |
| 60                  | 140  | 0.71                             | 2453           | 2597 | 2741 | ±7.85                 | 2455           | 2532 | 2609 | ±4.31                 |
| 70                  | 158  | 0.69                             | 2626           | 2785 | 2943 | ±8.31                 | 2628           | 2715 | 2802 | ±4.67                 |
| 80                  | 176  | 0.67                             | 2805           | 2980 | 3154 | ±8.79                 | 2807           | 2905 | 3003 | ±5.05                 |
| 90                  | 194  | 0.65                             | 2990           | 3182 | 3374 | ±9.29                 | 2993           | 3102 | 3212 | ±5.43                 |
| 100                 | 212  | 0.63                             | 3182           | 3392 | 3602 | ±9.81                 | 3185           | 3307 | 3429 | ±5.84                 |
| 110                 | 230  | 0.59                             | 3379           | 3607 | 3836 | ±10.65                | 3382           | 3517 | 3652 | ±6.45                 |
| 120                 | 248  | 0.53                             | 3569           | 3817 | 4065 | ±12.25                | 3573           | 3721 | 3870 | ±7.53                 |
| 125                 | 257  | 0.49                             | 3658           | 3915 | 4173 | ±13.45                | 3662           | 3817 | 3973 | ±8.33                 |
| 130                 | 266  | 0.44                             | 3741           | 4008 | 4274 | ±15.06                | 3745           | 3907 | 4070 | ±9.4                  |
| 140                 | 284  | 0.33                             | 3883           | 4166 | 4450 | ±20.49                | 3887           | 4062 | 4237 | ±12.96                |
| 150                 | 302  | 0.20                             | 3982           | 4280 | 4578 | ±34.35                | 3987           | 4173 | 4359 | ±22.02                |

**Table 13. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY82/252** $I_{sen(cont)} = 1\text{ mA}$ .

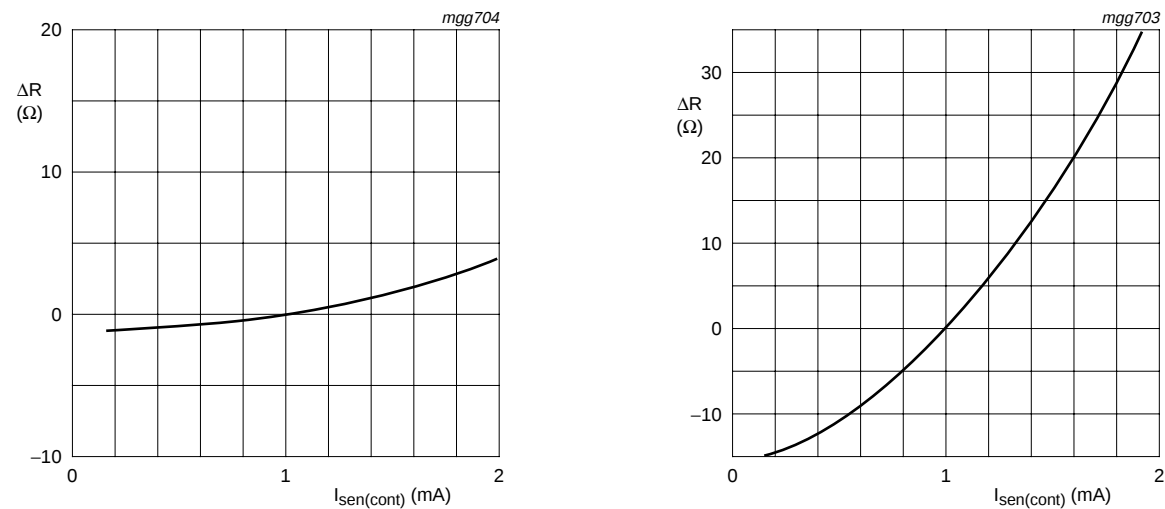
| Ambient temperature |      | Temperature coefficient (%/K) | KTY82/252      |      |      |                       |
|---------------------|------|-------------------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                               | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                               | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                          | 959            | 1005 | 1050 | ±4.52                 |
| −50                 | −58  | 0.98                          | 1009           | 1055 | 1102 | ±4.45                 |
| −40                 | −40  | 0.96                          | 1115           | 1163 | 1211 | ±4.3                  |
| −30                 | −22  | 0.93                          | 1229           | 1278 | 1328 | ±4.16                 |
| −20                 | −4   | 0.91                          | 1351           | 1401 | 1452 | ±4.01                 |
| −10                 | 14   | 0.88                          | 1480           | 1532 | 1584 | ±3.84                 |
| 0                   | 32   | 0.85                          | 1618           | 1670 | 1723 | ±3.67                 |
| 10                  | 50   | 0.83                          | 1764           | 1817 | 1869 | ±3.48                 |
| 20                  | 68   | 0.80                          | 1919           | 1970 | 2022 | ±3.28                 |
| 25                  | 77   | 0.79                          | 2000           | 2050 | 2100 | ±3.18                 |
| 30                  | 86   | 0.78                          | 2077           | 2132 | 2187 | ±3.33                 |
| 40                  | 104  | 0.75                          | 2238           | 2301 | 2364 | ±3.64                 |
| 50                  | 122  | 0.73                          | 2406           | 2478 | 2549 | ±3.97                 |
| 60                  | 140  | 0.71                          | 2581           | 2662 | 2743 | ±4.31                 |
| 70                  | 158  | 0.69                          | 2763           | 2854 | 2946 | ±4.67                 |
| 80                  | 176  | 0.67                          | 2951           | 3054 | 3157 | ±5.05                 |
| 90                  | 194  | 0.65                          | 3147           | 3262 | 3376 | ±5.43                 |
| 100                 | 212  | 0.63                          | 3349           | 3477 | 3605 | ±5.84                 |
| 110                 | 230  | 0.59                          | 3556           | 3697 | 3839 | ±6.45                 |
| 120                 | 248  | 0.53                          | 3756           | 3912 | 4068 | ±7.53                 |
| 125                 | 257  | 0.49                          | 3850           | 4013 | 4177 | ±8.33                 |
| 130                 | 266  | 0.44                          | 3937           | 4108 | 4278 | ±9.4                  |
| 140                 | 284  | 0.33                          | 4087           | 4271 | 4455 | ±12.96                |
| 150                 | 302  | 0.20                          | 4191           | 4387 | 4583 | ±22.02                |



To keep the temperature error low, an operating current of  $I_{sen(cont)} = 1$  mA is recommended for temperatures above 100 °C

- a. KTY82/1 series
- b. KTY82/2 series

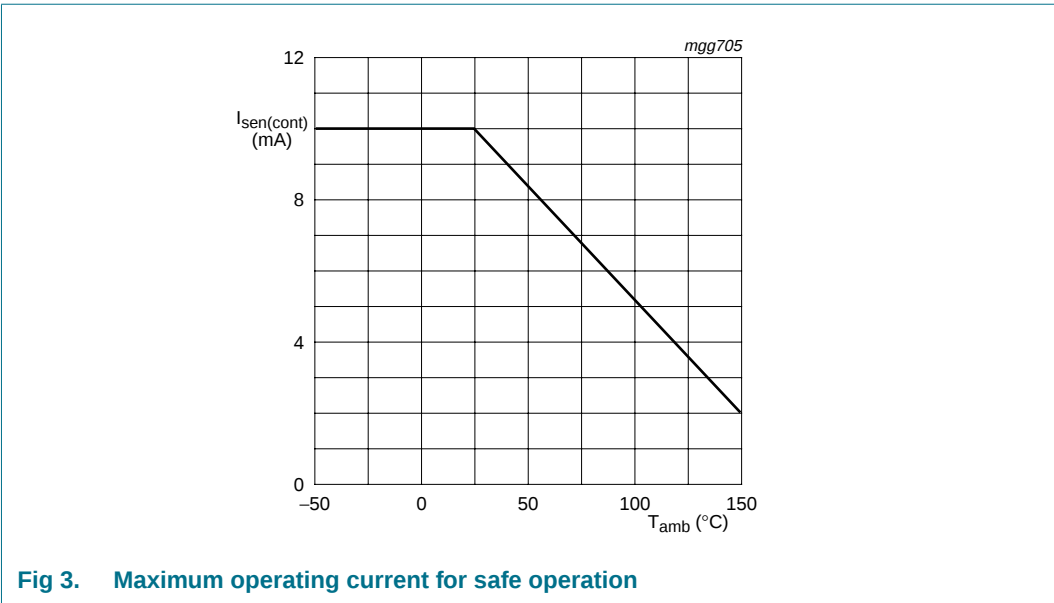
Fig 1. Sensor resistance as a function of operating current



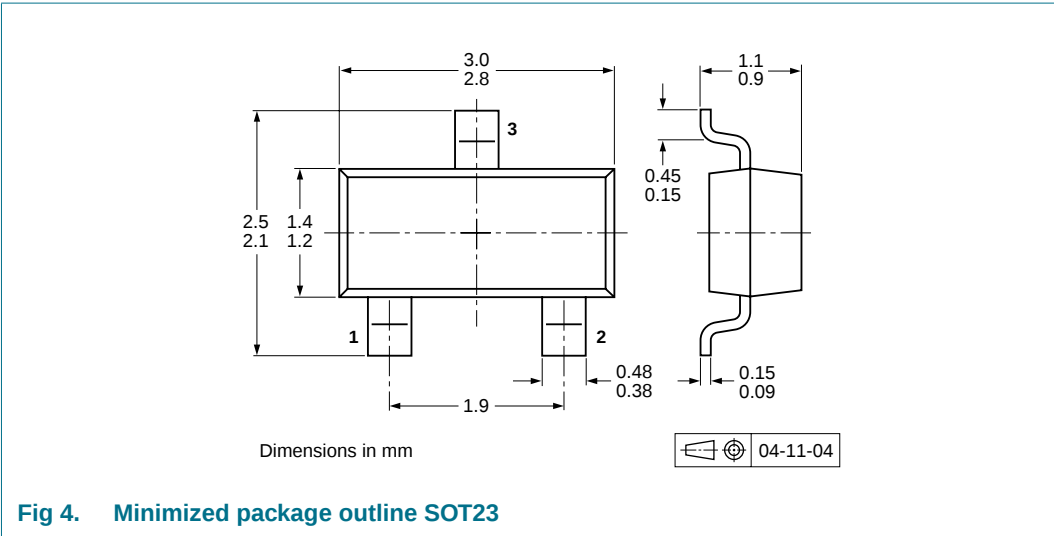
$T_{amb} = 25$  °C

- a. KTY82/1 series
- b. KTY82/2 series

Fig 2. Deviation of sensor resistance as a function of operating current



7. Package outline



8. Handling information

KTY82 series temperature sensors are sensitive to ElectroStatic Discharge (ESD). ESD can lead to irreversible changes of the characteristic.

9. Soldering

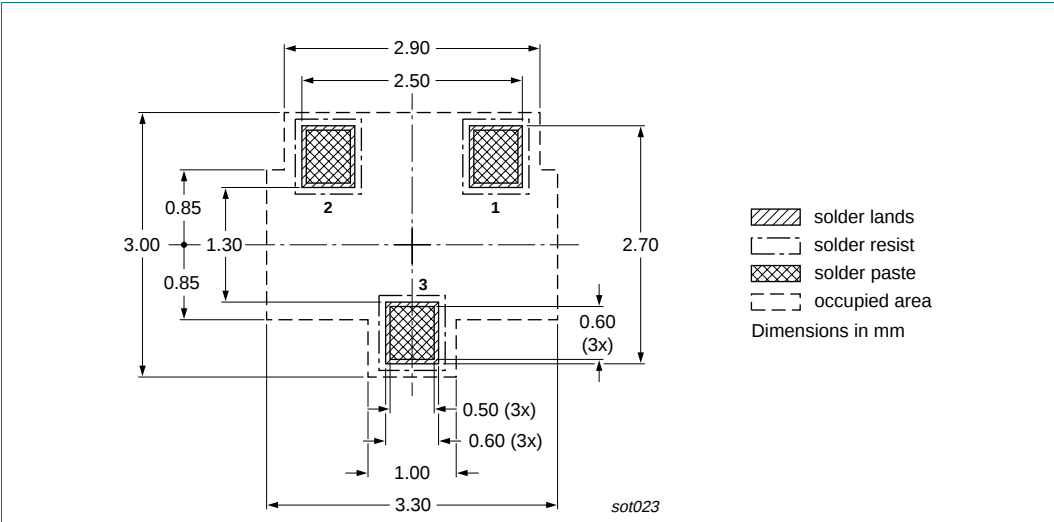


Fig 5. Reflow soldering footprint SOT23

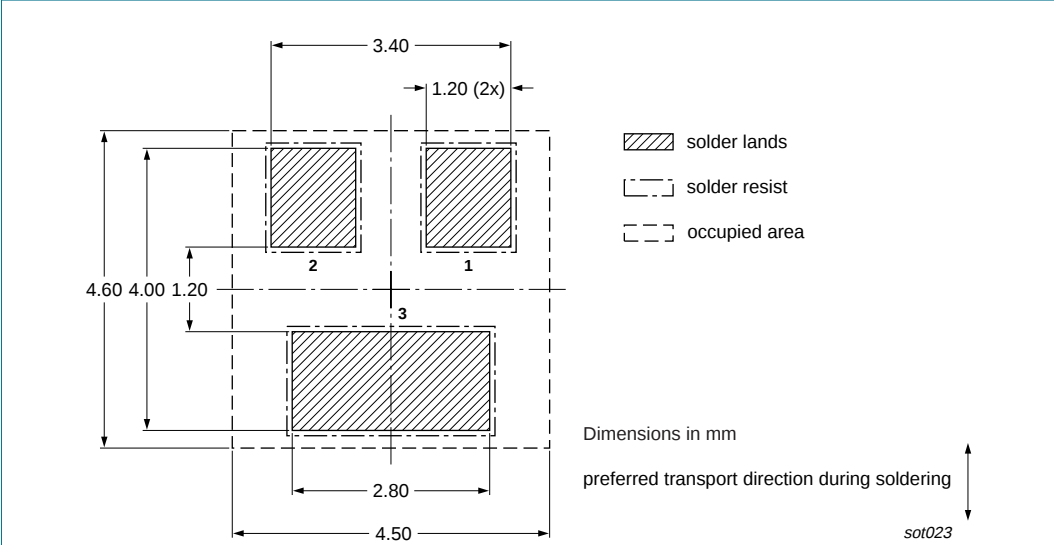


Fig 6. Wave soldering footprint SOT23

## 10. Revision history

**Table 14. Revision history**

| Document ID     | Release date                                                                                                                                                                                                                                             | Data sheet status     | Change notice | Supersedes                         |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|------------------------------------|
| KTY82_SER_4     | 20080114                                                                                                                                                                                                                                                 | Product data sheet    | -             | KTY82-2SERIES_3<br>KTY82-1SERIES_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></ul> |                       |               |                                    |
| KTY82-2SERIES_3 | 19980326                                                                                                                                                                                                                                                 | Product specification | -             | -                                  |
| KTY82-1SERIES_3 | 19980326                                                                                                                                                                                                                                                 | Product specification | -             | -                                  |

## 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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