

# KTY81 series

## Silicon temperature sensors

Rev. 05 — 25 April 2008

Product data sheet

## 1. Product profile

### 1.1 General description

The temperature sensors in the KTY81 series have a positive temperature coefficient of resistance and are suitable for use in measurement and control systems. The sensors are encapsulated in the SOD70 2 in-line leads plastic package.

Other special selections are available on request.

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 1.2 Features

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

### 1.3 Quick reference data

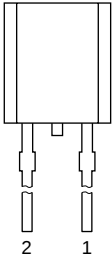
Table 1. Quick reference data

$T_{amb} = 25\text{ }^{\circ}\text{C}$ ; 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 |      |     |      |      |
|                 |                   | KTY81/110                     | 990  | -   | 1010 | Ω    |
|                 |                   | KTY81/120                     | 980  | -   | 1020 | Ω    |
|                 |                   | KTY81/121                     | 980  | -   | 1000 | Ω    |
|                 |                   | KTY81/122                     | 1000 | -   | 1020 | Ω    |
|                 |                   | KTY81/150                     | 950  | -   | 1050 | Ω    |
|                 |                   | KTY81/210                     | 1980 | -   | 2020 | Ω    |
|                 |                   | KTY81/220                     | 1960 | -   | 2040 | Ω    |
|                 |                   | KTY81/221                     | 1960 | -   | 2000 | Ω    |
|                 |                   | KTY81/222                     | 2000 | -   | 2040 | Ω    |
|                 |                   | KTY81/250                     | 1900 | -   | 2100 | Ω    |

## 2. Pinning information

Table 2. Pinning

| Pin | Description        | Simplified outline                                                                  |
|-----|--------------------|-------------------------------------------------------------------------------------|
| 1   | electrical contact |  |
| 2   | electrical contact |                                                                                     |

## 3. Ordering information

Table 3. Ordering information

| Type number | Package |                                                |         |
|-------------|---------|------------------------------------------------|---------|
|             | Name    | Description                                    | Version |
| KTY81/110   | -       | plastic near cylindrical single-ended package; | SOD70   |
| KTY81/120   |         | 2 in-line leads                                |         |
| KTY81/121   |         |                                                |         |
| KTY81/122   |         |                                                |         |
| KTY81/150   |         |                                                |         |
| KTY81/210   |         |                                                |         |
| KTY81/220   |         |                                                |         |
| KTY81/221   |         |                                                |         |
| KTY81/222   |         |                                                |         |
| KTY81/250   |         |                                                |         |

## 4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| KTY81/110   | 110          |
| KTY81/120   | 120          |
| KTY81/121   | 121          |
| KTY81/122   | 122          |
| KTY81/150   | 150          |
| KTY81/210   | 210          |
| KTY81/220   | 220          |
| KTY81/221   | 221          |
| KTY81/222   | 222          |
| KTY81/250   | 250          |

## 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**

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

| Symbol             | Parameter                                    | Conditions                                                     | Min   | Typ   | Max   | Unit     |
|--------------------|----------------------------------------------|----------------------------------------------------------------|-------|-------|-------|----------|
| $R_{25}$           | sensor resistance                            | $I_{\text{sen(cont)}} = 1\text{ mA}$                           |       |       |       |          |
|                    |                                              | KTY81/110                                                      | 990   | -     | 1010  | $\Omega$ |
|                    |                                              | KTY81/120                                                      | 980   | -     | 1020  | $\Omega$ |
|                    |                                              | KTY81/121                                                      | 980   | -     | 1000  | $\Omega$ |
|                    |                                              | KTY81/122                                                      | 1000  | -     | 1020  | $\Omega$ |
|                    |                                              | KTY81/150                                                      | 950   | -     | 1050  | $\Omega$ |
|                    |                                              | KTY81/210                                                      | 1980  | -     | 2020  | $\Omega$ |
|                    |                                              | KTY81/220                                                      | 1960  | -     | 2040  | $\Omega$ |
|                    |                                              | KTY81/221                                                      | 1960  | -     | 2000  | $\Omega$ |
|                    |                                              | KTY81/222                                                      | 2000  | -     | 2040  | $\Omega$ |
|                    |                                              | KTY81/250                                                      | 1900  | -     | 2100  | $\Omega$ |
| TC                 | temperature coefficient                      |                                                                | -     | 0.79  | -     | %/K      |
| $R_{100}/R_{25}$   | resistance ratio                             | $T_{\text{amb}} = 100\text{ °C}$ and $25\text{ °C}$            | 1.676 | 1.696 | 1.716 |          |
| $R_{-55}/R_{25}$   | resistance ratio                             | $T_{\text{amb}} = -55\text{ °C}$ and $25\text{ °C}$            | 0.480 | 0.490 | 0.500 |          |
| $\Delta R_{25}$    | drift of sensor resistance at $25\text{ °C}$ | 10000 h continuous operation; $T_{\text{amb}} = 150\text{ °C}$ |       |       |       |          |
|                    |                                              | KTY81/1 series                                                 | -     | 1.6   | -     | $\Omega$ |
|                    |                                              | KTY81/2 series                                                 | -     | 3.2   | -     | $\Omega$ |
| $\tau_{\text{th}}$ | thermal time constant                        | in still air                                                   | [1] - | 30    | -     | s        |
|                    |                                              | in still liquid                                                | [1] - | 5     | -     | s        |
|                    |                                              | in flowing liquid                                              | [1] - | 3     | -     | 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  $25\text{ °C}$  is moved to an environment with an ambient temperature of  $100\text{ °C}$ , the time for the sensor to reach a temperature of  $72.4\text{ °C}$  is the thermal time constant.

**Table 7. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY81/110 and KTY81/120** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY81/110      |      |      |                       | KTY81/120      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°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 KTY81/121 and KTY81/122** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY81/121      |      |      |                       | KTY81/122      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°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 KTY81/150** $I_{sen(cont)} = 1\text{ mA}$ .

| Ambient temperature |      | Temperature coefficient (%/K) | KTY81/150      |      |      |                       |
|---------------------|------|-------------------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                               | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                               | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                          | 456            | 490  | 524  | ±7.04                 |
| −50                 | −58  | 0.98                          | 479            | 515  | 550  | ±6.99                 |
| −40                 | −40  | 0.96                          | 530            | 567  | 605  | ±6.91                 |
| −30                 | −22  | 0.93                          | 584            | 624  | 663  | ±6.84                 |
| −20                 | −4   | 0.91                          | 642            | 684  | 725  | ±6.77                 |
| −10                 | 14   | 0.88                          | 703            | 747  | 791  | ±6.69                 |
| 0                   | 32   | 0.85                          | 769            | 815  | 861  | ±6.61                 |
| 10                  | 50   | 0.83                          | 838            | 886  | 934  | ±6.51                 |
| 20                  | 68   | 0.80                          | 912            | 961  | 1010 | ±6.41                 |
| 25                  | 77   | 0.79                          | 950            | 1000 | 1050 | ±6.35                 |
| 30                  | 86   | 0.78                          | 987            | 1040 | 1093 | ±6.55                 |
| 40                  | 104  | 0.75                          | 1064           | 1122 | 1181 | ±6.97                 |
| 50                  | 122  | 0.73                          | 1143           | 1209 | 1274 | ±7.4                  |
| 60                  | 140  | 0.71                          | 1226           | 1299 | 1371 | ±7.85                 |
| 70                  | 158  | 0.69                          | 1313           | 1392 | 1472 | ±8.31                 |
| 80                  | 176  | 0.67                          | 1402           | 1490 | 1577 | ±8.79                 |
| 90                  | 194  | 0.65                          | 1495           | 1591 | 1687 | ±9.29                 |
| 100                 | 212  | 0.63                          | 1591           | 1696 | 1801 | ±9.81                 |
| 110                 | 230  | 0.61                          | 1690           | 1805 | 1919 | ±10.4                 |
| 120                 | 248  | 0.58                          | 1791           | 1915 | 2039 | ±11.28                |
| 125                 | 257  | 0.55                          | 1840           | 1970 | 2099 | ±11.91                |
| 130                 | 266  | 0.52                          | 1889           | 2023 | 2158 | ±12.72                |
| 140                 | 284  | 0.45                          | 1980           | 2124 | 2269 | ±15.21                |
| 150                 | 302  | 0.35                          | 2057           | 2211 | 2365 | ±20.09                |

**Table 10. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY81/210 and KTY81/220** $I_{sen(cont)} = 1\text{ mA}$ .

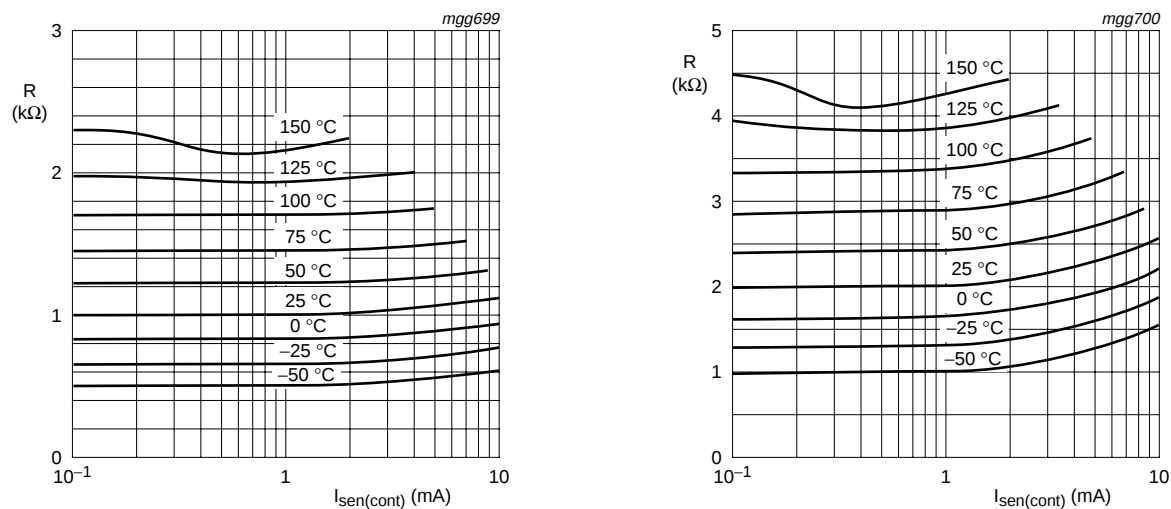
| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY81/210      |      |      |                       | KTY81/220      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°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 KTY81/221 and KTY81/222** $I_{sen(cont)} = 1 \text{ mA}$ .

| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY81/221      |      |      |                       | KTY81/222      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|
| (°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 KTY81/250** $I_{sen(cont)} = 1\text{ mA}$ .

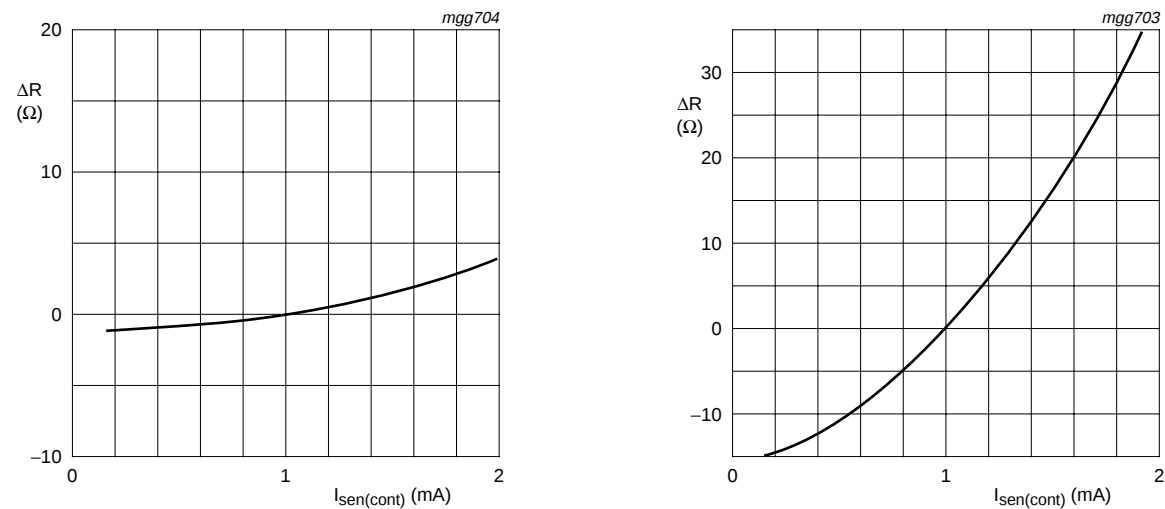
| Ambient temperature |      | Temperature coefficient (%/K) | KTY81/250      |      |      |                       |
|---------------------|------|-------------------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                               | Resistance (Ω) |      |      | Temperature error (K) |
|                     |      |                               | Min            | Typ  | Max  |                       |
| −55                 | −67  | 0.99                          | 911            | 980  | 1049 | ±7.04                 |
| −50                 | −58  | 0.98                          | 959            | 1030 | 1101 | ±6.99                 |
| −40                 | −40  | 0.96                          | 1060           | 1135 | 1210 | ±6.91                 |
| −30                 | −22  | 0.93                          | 1168           | 1247 | 1327 | ±6.84                 |
| −20                 | −4   | 0.91                          | 1283           | 1367 | 1451 | ±6.77                 |
| −10                 | 14   | 0.88                          | 1407           | 1495 | 1583 | ±6.69                 |
| 0                   | 32   | 0.85                          | 1538           | 1630 | 1721 | ±6.61                 |
| 10                  | 50   | 0.83                          | 1677           | 1772 | 1867 | ±6.51                 |
| 20                  | 68   | 0.80                          | 1824           | 1922 | 2021 | ±6.41                 |
| 25                  | 77   | 0.79                          | 1900           | 2000 | 2100 | ±6.35                 |
| 30                  | 86   | 0.78                          | 1974           | 2080 | 2185 | ±6.55                 |
| 40                  | 104  | 0.75                          | 2127           | 2245 | 2362 | ±6.97                 |
| 50                  | 122  | 0.73                          | 2287           | 2417 | 2547 | ±7.4                  |
| 60                  | 140  | 0.71                          | 2453           | 2597 | 2741 | ±7.85                 |
| 70                  | 158  | 0.69                          | 2626           | 2785 | 2943 | ±8.31                 |
| 80                  | 176  | 0.67                          | 2805           | 2980 | 3154 | ±8.79                 |
| 90                  | 194  | 0.65                          | 2990           | 3182 | 3374 | ±9.29                 |
| 100                 | 212  | 0.63                          | 3182           | 3392 | 3602 | ±9.81                 |
| 110                 | 230  | 0.59                          | 3379           | 3607 | 3836 | ±10.65                |
| 120                 | 248  | 0.53                          | 3569           | 3817 | 4065 | ±12.25                |
| 125                 | 257  | 0.49                          | 3658           | 3915 | 4173 | ±13.45                |
| 130                 | 266  | 0.44                          | 3741           | 4008 | 4274 | ±15.06                |
| 140                 | 284  | 0.33                          | 3883           | 4166 | 4450 | ±20.49                |
| 150                 | 302  | 0.20                          | 3982           | 4280 | 4578 | ±34.35                |



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

- a. KTY81/1 series
- b. KTY81/2 series

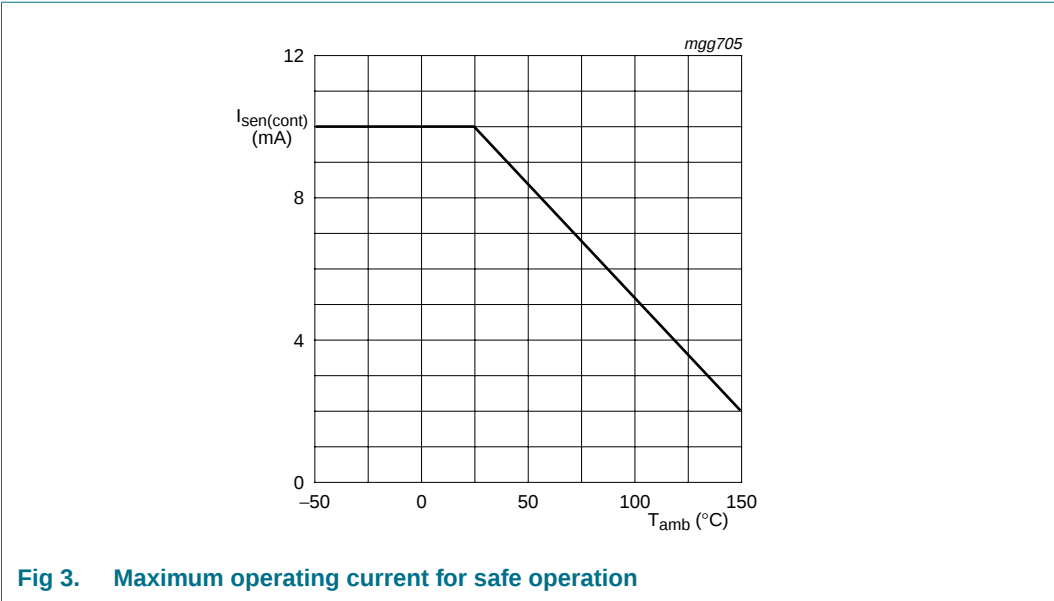
Fig 1. Sensor resistance as a function of operating current



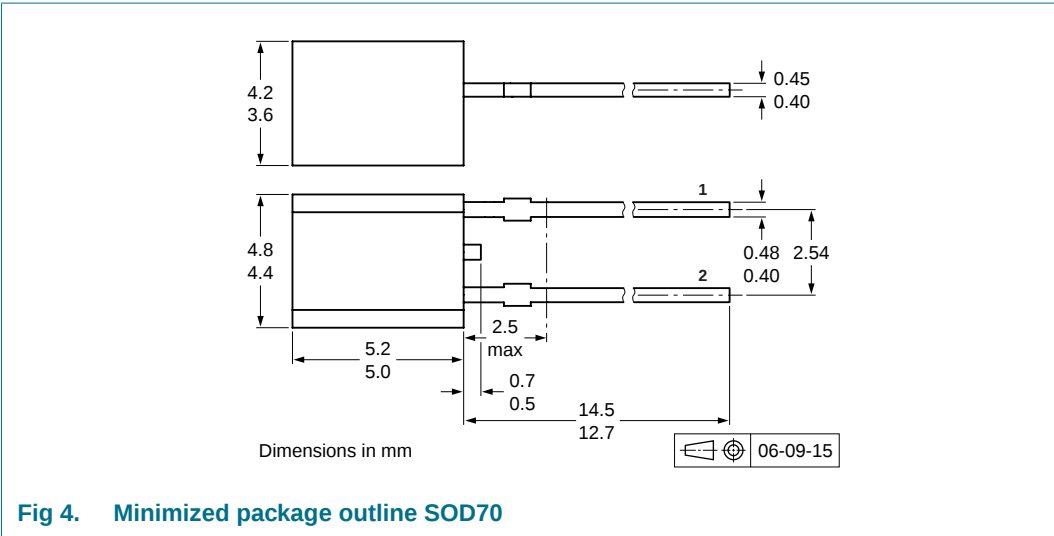
$T_{amb} = 25$  °C

- a. KTY81/1 series
- b. KTY81/2 series

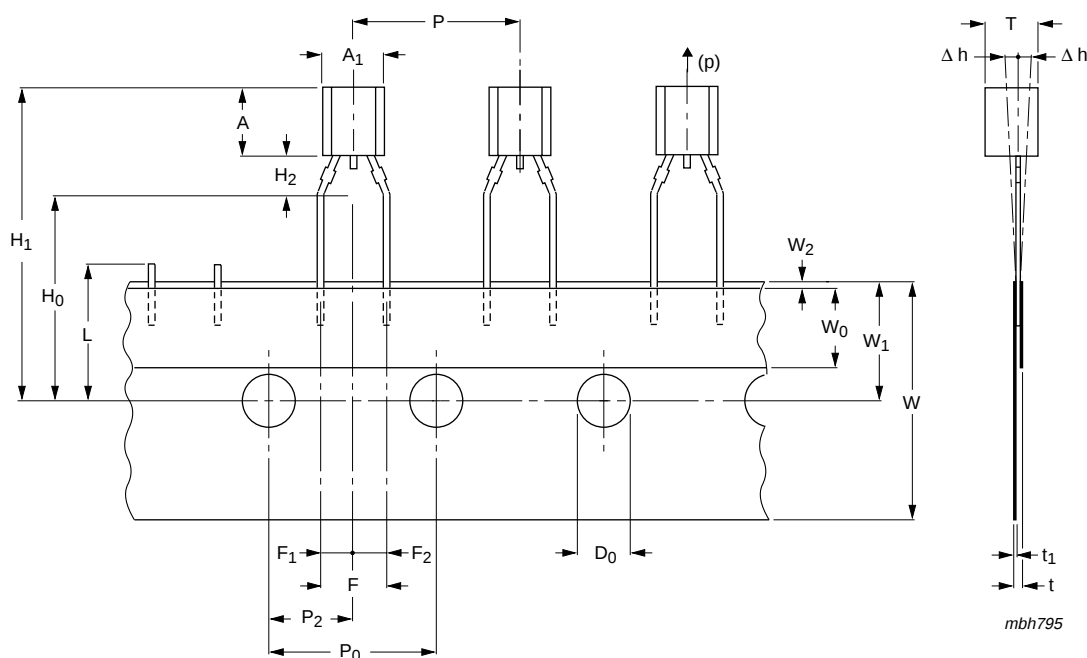
Fig 2. Deviation of sensor resistance as a function of operating current



7. Package outline



## 8. Packing information



**Fig 5. Configuration of bandolier: spread leads**

**Note:** Types in bulk packaging have a lead-to-lead distance of 2.54 mm (see [Figure 4](#)). The lead-to-lead distance of types packaged on reel have a lead-to-lead distance of 5.08 mm, spread leads (see [Figure 5](#)).

Table 13. Tape specification

| Symbol                          | Dimension                            | Specifications |      |       |           |      | Remarks                            |
|---------------------------------|--------------------------------------|----------------|------|-------|-----------|------|------------------------------------|
|                                 |                                      | Min            | Typ  | Max   | Tolerance | Unit |                                    |
| A <sub>1</sub>                  | body width                           | 4.4            | -    | 4.8   | -         | mm   |                                    |
| A                               | body height                          | 5              | -    | 5.2   | -         | mm   |                                    |
| T                               | body thickness                       | 3.6            | -    | 4.2   | -         | mm   |                                    |
| P                               | pitch of component                   | -              | 12.7 | -     | ±1        | mm   |                                    |
| P <sub>0</sub>                  | feed hole pitch                      | -              | 12.7 | -     | ±0.3      | mm   |                                    |
|                                 | cumulative pitch error               | -1             | -    | +1    | -         | mm   | measured over 20 devices           |
| P <sub>2</sub>                  | feed hole center to component center | -              | 6.35 | -     | ±0.4      | mm   | to be measured at bottom of clinch |
| F                               | lead-to-lead distance                | -              | 5.08 | -     | +0.6/-0.2 | mm   | spread leads                       |
| Δh                              | component alignment                  | -              | 0    | 1     | -         | mm   | at top of body                     |
| W                               | tape width                           | -              | 18   | -     | ±0.5      | mm   |                                    |
| W <sub>0</sub>                  | hold-down tape width                 | -              | 6    | -     | ±0.2      | mm   |                                    |
| W <sub>1</sub>                  | hole position                        | -              | 9    | -     | +0.7/-0.5 | mm   |                                    |
| W <sub>2</sub>                  | hold-down tape position              | -              | 0.5  | -     | ±0.2      | mm   |                                    |
| H <sub>0</sub>                  | lead wire clinch height              | -              | 16.5 | -     | ±0.5      | mm   |                                    |
| H <sub>1</sub>                  | component height                     | -              | -    | 23.25 | -         | mm   |                                    |
| L                               | length of snapped leads              | -              | -    | 11    | -         | mm   |                                    |
| D <sub>0</sub>                  | feed hole diameter                   | -              | 4    | -     | ±0.2      | mm   |                                    |
| t                               | total tape thickness                 | -              | -    | 1.2   | -         | mm   | t <sub>1</sub> = 0.3 mm to 0.6 mm  |
| F <sub>1</sub> , F <sub>2</sub> | lead to snapped lead distance        | -              | 2.54 | -     | +0.4/-0.2 | mm   | spread leads                       |
| H <sub>2</sub>                  | clinch height                        | -              | 2.5  | -     | +0.5/0    | mm   |                                    |
| (p)                             | pull-out force                       | 6              | -    | -     | -         | N    |                                    |

## 9. Revision history

Table 14. Revision history

| Document ID     | Release date | Data sheet status                                                                                                                                                                                                                                       | Change notice | Supersedes                         |
|-----------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------|
| KTY81_SER_5     | 20080425     | Product data sheet                                                                                                                                                                                                                                      | -             | KTY81-2SERIES_4<br>KTY81-1SERIES_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> |               |                                    |
| KTY81-2SERIES_4 | 20000825     | Product specification                                                                                                                                                                                                                                   | -             | -                                  |
| KTY81-1SERIES_3 | 20000825     | Product specification                                                                                                                                                                                                                                   | -             | -                                  |

## 10. Legal information

### 10.1 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>.

### 10.2 Definitions

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

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

### 10.3 Disclaimers

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

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

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental

damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

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

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

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

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

**Quick reference data** — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

### 10.4 Trademarks

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

## 11. Contact information

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

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

## 12. Contents

|           |                                       |           |
|-----------|---------------------------------------|-----------|
| <b>1</b>  | <b>Product profile</b> . . . . .      | <b>1</b>  |
| 1.1       | General description. . . . .          | 1         |
| 1.2       | Features . . . . .                    | 1         |
| 1.3       | Quick reference data. . . . .         | 1         |
| <b>2</b>  | <b>Pinning information</b> . . . . .  | <b>2</b>  |
| <b>3</b>  | <b>Ordering information</b> . . . . . | <b>2</b>  |
| <b>4</b>  | <b>Marking</b> . . . . .              | <b>2</b>  |
| <b>5</b>  | <b>Limiting values</b> . . . . .      | <b>3</b>  |
| <b>6</b>  | <b>Characteristics</b> . . . . .      | <b>3</b>  |
| <b>7</b>  | <b>Package outline</b> . . . . .      | <b>11</b> |
| <b>8</b>  | <b>Packing information</b> . . . . .  | <b>12</b> |
| <b>9</b>  | <b>Revision history</b> . . . . .     | <b>13</b> |
| <b>10</b> | <b>Legal information</b> . . . . .    | <b>14</b> |
| 10.1      | Data sheet status . . . . .           | 14        |
| 10.2      | Definitions . . . . .                 | 14        |
| 10.3      | Disclaimers . . . . .                 | 14        |
| 10.4      | Trademarks . . . . .                  | 14        |
| <b>11</b> | <b>Contact information</b> . . . . .  | <b>14</b> |
| <b>12</b> | <b>Contents</b> . . . . .             | <b>15</b> |

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

© NXP B.V. 2008.

All rights reserved.

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

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

Date of release: 25 April 2008

Document identifier: KTY81\_SER\_5

founded by

**PHILIPS**