

# 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

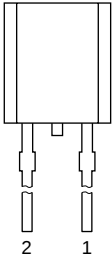
Table 1. Quick reference data

$T_{amb} = 25^{\circ}\text{C}$ ; 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<br>coefficient<br>(%/K) | KTY81/150      |      |      |                          |
|---------------------|------|-------------------------------------|----------------|------|------|--------------------------|
| (°C)                | (°F) |                                     | Resistance (Ω) |      |      | Temperature<br>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** $I_{sen(cont)} = 1\text{ mA}$ .

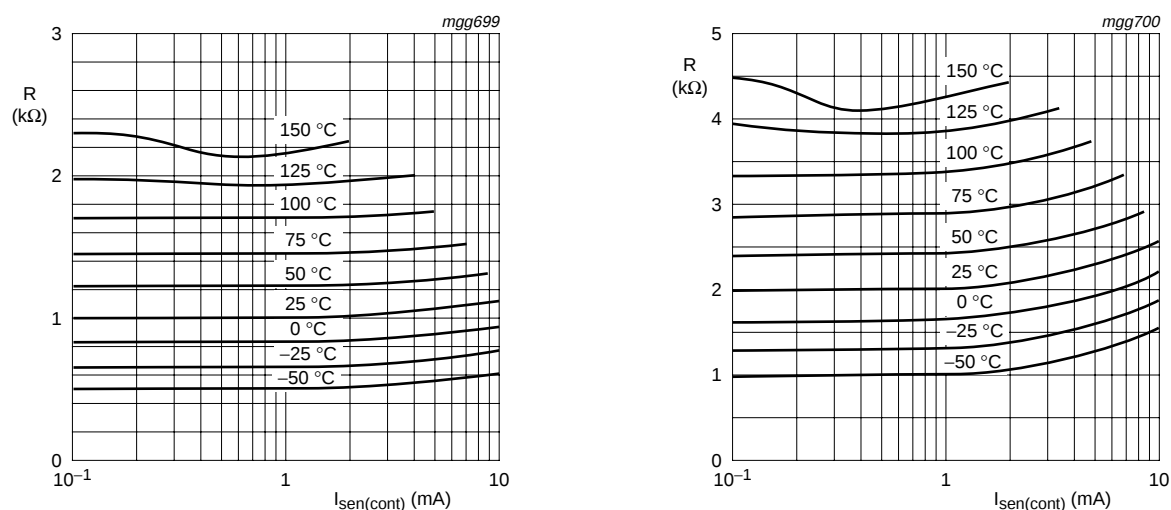
| Ambient temperature |      | Temperature coefficient<br>(%/K) | KTY81/210      |      |      |                       | KTY81/220      |      |      |                       |
|---------------------|------|----------------------------------|----------------|------|------|-----------------------|----------------|------|------|-----------------------|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

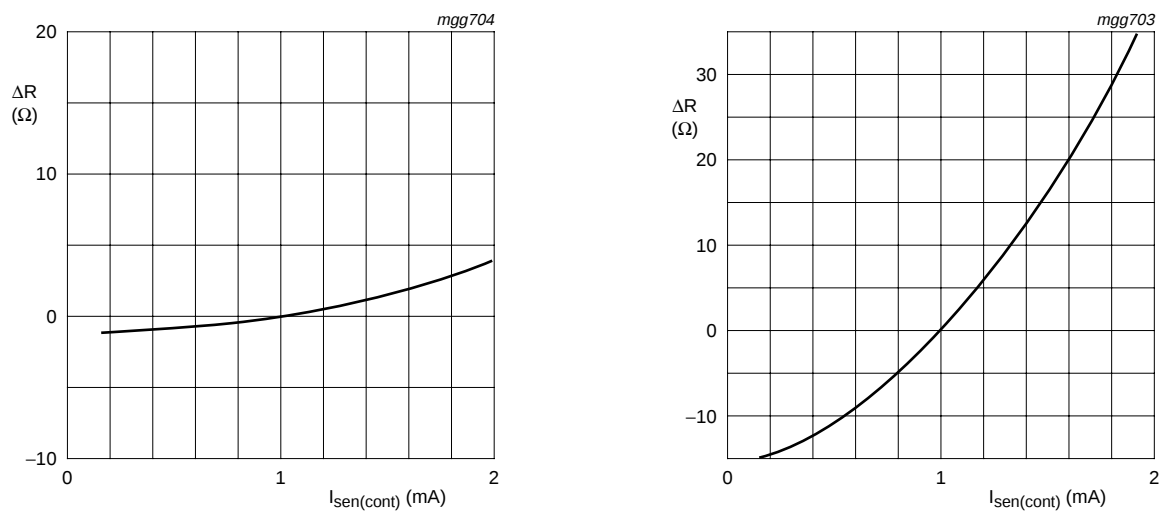
| Ambient temperature |      | Temperature coefficient (%/K) | KTY81/250      |      |      |                       |
|---------------------|------|-------------------------------|----------------|------|------|-----------------------|
| (°C)                | (°F) |                               | Resistance (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  $I_{\text{sen(cont)}} = 1 \text{ mA}$  is recommended for temperatures above  $100 \text{ }^{\circ}\text{C}$

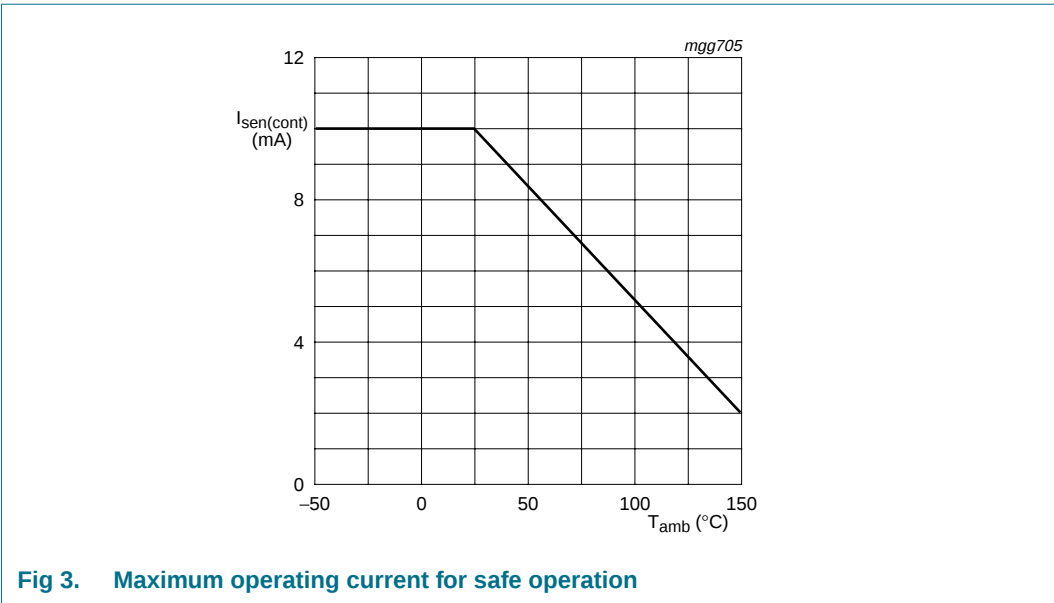
- a. KTY81/1 series

**Fig 1. Sensor resistance as a function of operating current**

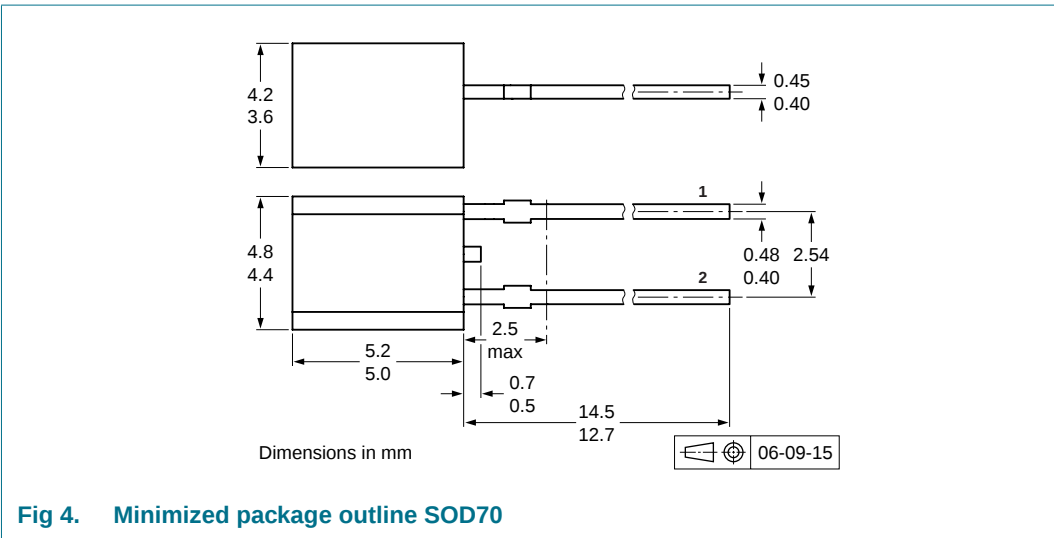

$$T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$$
$$T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$$

- a. KTY81/1 series

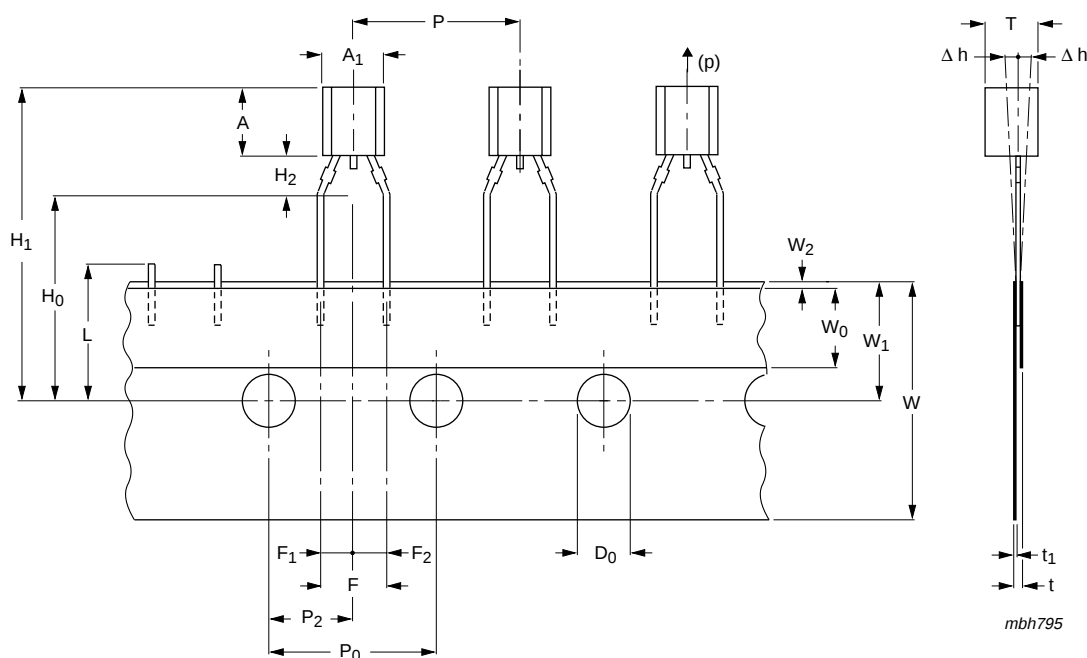
**Fig 2. Deviation of sensor resistance as a function of operating current**



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".

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