



# KTY83 series

## Silicon temperature sensors

Rev. 06 — 4 April 2008

Product data sheet

## 1. Product profile

### 1.1 General description

The temperature sensors in the KTY83 series have a positive temperature coefficient of resistance and are suitable for use in measurement and control systems. The sensors are encapsulated in the SOD68 (DO-34) package.

Other special selections are available on request.

### 1.2 Features

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

### 1.3 Quick reference data

Table 1. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>25</sub>	sensor resistance	$I_{sen(cont)} = 1\text{ mA}$				
		KTY83/110	990	-	1010	$\Omega$
		KTY83/120	980	-	1020	$\Omega$
		KTY83/121	980	-	1000	$\Omega$
		KTY83/122	1000	-	1020	$\Omega$
		KTY83/150	950	-	1050	$\Omega$
		KTY83/151	950	-	1000	$\Omega$

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode (k)		 001aaa020
2	anode (a)		

### 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
KTY83/110	-	hermetically sealed glass package; axial leaded; 2 leads	SOD68
KTY83/120			
KTY83/121			
KTY83/122			
KTY83/150			
KTY83/151			

### 4. Marking

**Table 4. Marking codes**

Type number	Marking code
KTY83/110	KT83A
KTY83/120	KT83C
KTY83/121	KT83D
KTY83/122	KT83E
KTY83/150	KT83H
KTY83/151	KT83K

### 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; $T_{\text{amb}} = 175\text{ °C}$	-	2	mA
$T_{\text{amb}}$	ambient temperature		-55	+175	°C

## 6. Characteristics

**Table 6. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>25</sub>	sensor resistance	$I_{sen(cont)} = 1\text{ mA}$				
		KTY83/110	990	-	1010	Ω
		KTY83/120	980	-	1020	Ω
		KTY83/121	980	-	1000	Ω
		KTY83/122	1000	-	1020	Ω
		KTY83/150	950	-	1050	Ω
		KTY83/151	950	-	1000	Ω
TC	temperature coefficient		-	0.76	-	%/K
R <sub>100</sub> /R <sub>25</sub>	resistance ratio	$T_{amb} = 100\text{ °C}$ and $25\text{ °C}$	1.65	1.67	1.69	
R <sub>-55</sub> /R <sub>25</sub>	resistance ratio	$T_{amb} = -55\text{ °C}$ and $25\text{ °C}$	0.49	0.50	0.51	
ΔR <sub>25</sub>	drift of sensor resistance at 25 °C	10000 h continuous operation; $T_{amb} = 175\text{ °C}$	-	1	-	Ω
τ <sub>th</sub>	thermal time constant	in still air	[1] -	20	-	s
		in still liquid	[1] -	1	-	s
		in flowing liquid	[1] -	0.5	-	s

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

**Table 7. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/110 and KTY83/120** $I_{sen(cont)} = 1 \text{ mA}$ .

Ambient temperature		Temperature coefficient (%/K)	KTY83/110				KTY83/120			
(°C)	(°F)		Resistance (Ω)			Temperature error (K)	Resistance (Ω)			Temperature error (K)
			Min	Typ	Max		Min	Typ	Max	
-55	-67	0.97	485	500	515	±3.08	480	500	520	±4.11
-50	-58	0.96	510	525	540	±2.99	504	525	545	±4.04
-40	-40	0.93	562	577	592	±2.81	556	577	598	±3.88
-30	-22	0.91	617	632	647	±2.62	611	632	654	±3.72
-20	-4	0.88	677	691	706	±2.42	670	691	713	±3.56
-10	14	0.85	740	754	768	±2.2	732	754	776	±3.37
0	32	0.83	807	820	833	±1.97	798	820	841	±3.18
10	50	0.80	877	889	902	±1.72	868	889	910	±2.97
20	68	0.78	951	962	973	±1.45	942	962	983	±2.74
25	77	0.76	990	1000	1010	±1.31	980	1000	1020	±2.62
30	86	0.75	1027	1039	1050	±1.44	1017	1039	1060	±2.77
40	104	0.73	1105	1118	1132	±1.7	1093	1118	1143	±3.07
50	122	0.71	1185	1202	1219	±1.98	1173	1202	1231	±3.39
60	140	0.69	1268	1288	1309	±2.27	1255	1288	1321	±3.73
70	158	0.67	1355	1379	1402	±2.58	1341	1379	1416	±4.08
80	176	0.65	1445	1472	1500	±2.9	1430	1472	1515	±4.44
90	194	0.63	1537	1569	1601	±3.24	1522	1569	1617	±4.82
100	212	0.61	1633	1670	1707	±3.59	1617	1670	1723	±5.22
110	230	0.60	1732	1774	1816	±3.95	1714	1774	1834	±5.63
120	248	0.58	1834	1882	1929	±4.34	1815	1882	1948	±6.06
125	257	0.57	1886	1937	1987	±4.53	1867	1937	2006	±6.28
130	266	0.57	1939	1993	2046	±4.73	1919	1993	2066	±6.5
140	284	0.55	2047	2107	2167	±5.14	2026	2107	2188	±6.96
150	302	0.54	2158	2225	2292	±5.57	2136	2225	2314	±7.43
160	320	0.52	2272	2346	2420	±6.02	2249	2346	2444	±7.92
170	338	0.51	2389	2471	2553	±6.47	2364	2471	2578	±8.43
175	347	0.51	2449	2535	2621	±6.71	2423	2535	2646	±8.68

**Table 8. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/121 and KTY83/122** $I_{sen(cont)} = 1 \text{ mA}$ .

Ambient temperature		Temperature coefficient (%/K)	KTY83/121				KTY83/122			
(°C)	(°F)		Resistance (Ω)			Temperature error (K)	Resistance (Ω)			Temperature error (K)
			Min	Typ	Max		Min	Typ	Max	
-55	-67	0.97	480	495	510	±3.08	490	505	520	±3.08
-50	-58	0.96	505	519	534	±2.99	515	530	545	±2.99
-40	-40	0.93	556	571	586	±2.81	567	583	598	±2.81
-30	-22	0.91	611	626	641	±2.62	624	639	654	±2.62
-20	-4	0.88	670	685	699	±2.42	684	698	713	±2.42
-10	14	0.85	732	746	760	±2.2	747	762	776	±2.2
0	32	0.83	799	812	825	±1.97	815	828	842	±1.97
10	50	0.80	868	880	893	±1.72	886	898	911	±1.72
20	68	0.78	942	953	963	±1.45	961	972	983	±1.45
25	77	0.76	980	990	1000	±1.31	1000	1010	1020	±1.31
30	86	0.75	1017	1028	1039	±1.44	1038	1049	1060	±1.44
40	104	0.73	1094	1107	1121	±1.7	1116	1130	1144	±1.7
50	122	0.71	1173	1190	1206	±1.98	1197	1214	1231	±1.98
60	140	0.69	1256	1276	1295	±2.27	1281	1301	1322	±2.27
70	158	0.67	1341	1365	1388	±2.58	1368	1392	1416	±2.58
80	176	0.65	1430	1458	1485	±2.9	1459	1487	1515	±2.9
90	194	0.63	1522	1554	1585	±3.24	1553	1585	1617	±3.24
100	212	0.61	1617	1653	1690	±3.59	1650	1687	1724	±3.59
110	230	0.60	1715	1756	1798	±3.95	1750	1792	1834	±3.95
120	248	0.58	1816	1863	1910	±4.34	1853	1900	1948	±4.34
125	257	0.57	1867	1917	1967	±4.53	1905	1956	2007	±4.53
130	266	0.57	1920	1973	2025	±4.73	1959	2012	2066	±4.73
140	284	0.55	2027	2086	2145	±5.14	2068	2128	2188	±5.14
150	302	0.54	2137	2203	2269	±5.57	2180	2247	2314	±5.57
160	320	0.52	2249	2323	2396	±6.02	2295	2370	2444	±6.02
170	338	0.51	2365	2446	2527	±6.47	2413	2496	2578	±6.47
175	347	0.51	2424	2509	2595	±6.71	2473	2560	2647	±6.71

**Table 9. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/150 and KTY83/151** $I_{sen(cont)} = 1 \text{ mA}$ .

Ambient temperature		Temperature coefficient (%/K)	KTY83/150				KTY83/151			
(°C)	(°F)		Resistance (Ω)			Temperature error (K)	Resistance (Ω)			Temperature error (K)
			Min	Typ	Max		Min	Typ	Max	
-55	-67	0.97	465	500	535	±7.19	466	487	509	±4.92
-50	-58	0.96	489	525	561	±7.16	489	512	534	±4.56
-40	-40	0.93	539	577	615	±7.1	539	562	586	±4.42
-30	-22	0.91	592	632	673	±7.04	593	617	641	±4.28
-20	-4	0.88	649	691	734	±6.97	650	674	699	±4.12
-10	14	0.85	710	754	798	±6.9	710	735	760	±3.96
0	32	0.83	774	820	866	±6.81	774	799	824	±3.79
10	50	0.80	842	889	937	±6.72	842	867	892	±3.59
20	68	0.78	913	962	1012	±6.61	914	938	963	±3.39
25	77	0.76	950	1000	1050	±6.55	950	975	1000	±3.27
30	86	0.75	986	1039	1091	±6.76	987	1013	1039	±3.43
40	104	0.73	1060	1118	1177	±7.19	1061	1090	1120	±3.76
50	122	0.71	1137	1202	1267	±7.63	1138	1172	1206	±4.1
60	140	0.69	1217	1288	1360	±8.1	1218	1256	1295	±4.45
70	158	0.67	1300	1379	1457	±8.58	1301	1344	1387	±4.83
80	176	0.65	1386	1472	1559	±9.07	1387	1435	1484	±5.21
90	194	0.63	1475	1569	1664	±9.59	1476	1530	1584	±5.623
100	212	0.61	1566	1670	1773	±10.12	1568	1628	1688	±6.04
110	230	0.60	1661	1774	1887	±10.66	1663	1730	1796	±6.47
120	248	0.58	1759	1882	2004	±11.28	1761	1835	1908	±6.92
125	257	0.57	1809	1937	2064	±11.51	1811	1888	1966	±7.15
130	266	0.57	1859	1993	2126	±11.8	1862	1943	2024	±7.38
140	284	0.55	1963	2107	2251	±12.4	1965	2054	2143	±7.87
150	302	0.54	2069	2225	2380	±13.01	2072	2169	2267	±8.36
160	320	0.52	2178	2346	2514	±13.64	2181	2288	2394	±8.87
170	338	0.51	2290	2471	2652	±14.28	2293	2409	2525	±9.4
175	347	0.51	2347	2535	2722	±14.61	2350	2471	2592	±6.67

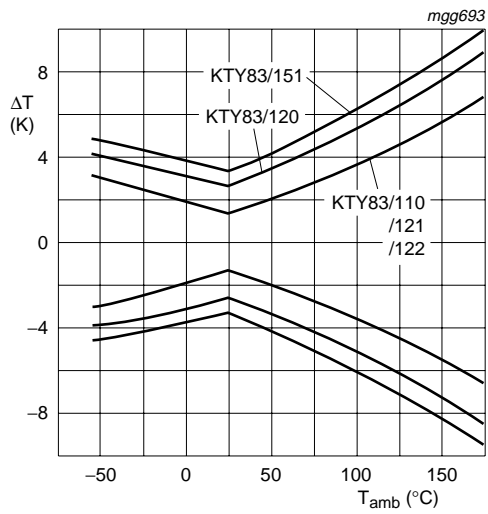


Fig 1. Maximum expected temperature error ( $\Delta T$ )

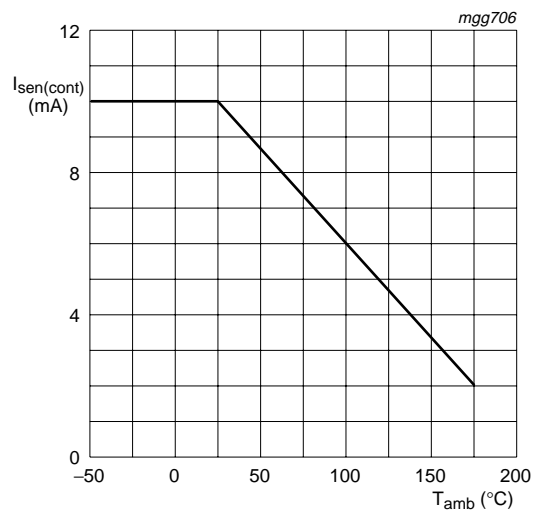
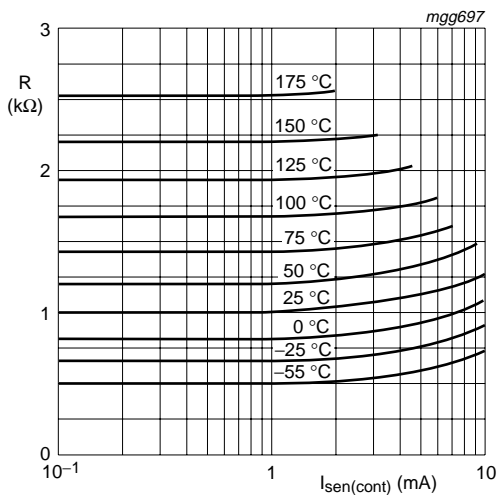
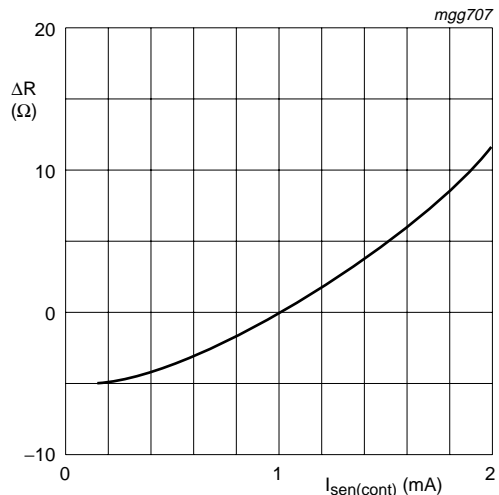


Fig 2. Maximum operating current for safe operation



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

Fig 3. Sensor resistance as a function of operating current



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

Fig 4. Deviation of sensor resistance as a function of operating current in still liquid

## 7. Package outline

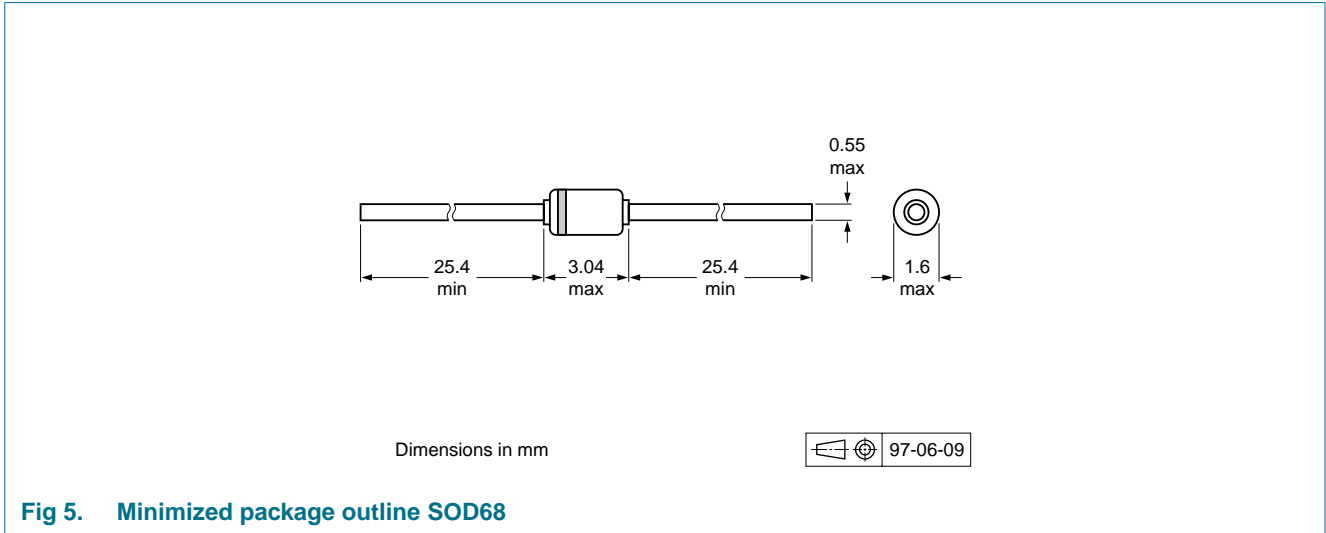


Fig 5. Minimized package outline SOD68

## 8. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
KTY83_SER_6	20080404	Product data sheet	-	KTY83_SERIES_5
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>		
KTY83_SERIES_5	20030915	Product specification	-	KTY83-1SERIES_4
KTY83-1SERIES_4	20000825	Product specification	-	KTY83-1SERIES_3
KTY83-1SERIES_3	19980409	Product specification	-	KTY83-1SERIES_2
KTY83-1SERIES_2	19961206	Product specification	-	KTY83-1 series
KTY83-1 series	October 1988	-	-	-



## 9. Legal information

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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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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