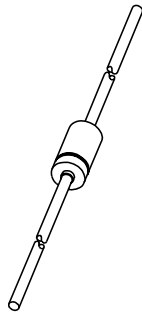


# DATA SHEET



## **KTY83 series** Silicon temperature sensors

Product specification  
Supersedes data of 2000 Aug 25

2003 Sep 15

# Silicon temperature sensors

# KTY83 series

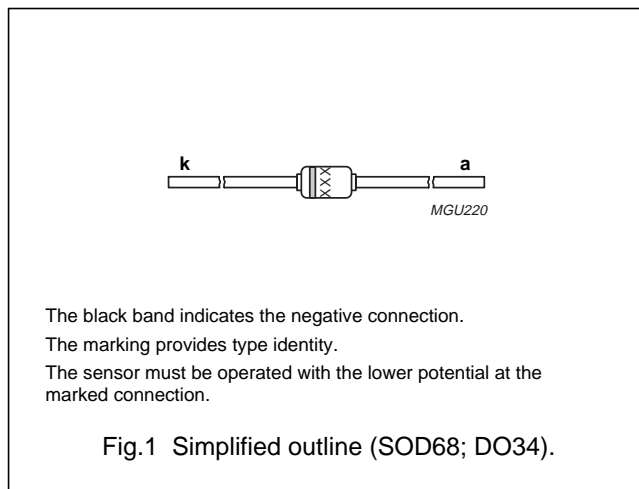
## DESCRIPTION

The temperature sensors in the KTY83-1 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.

Tolerances of 0.5% or other special selections are available on request.

## MARKING

TYPE NUMBER	MARKING CODE
KTY83/110	KT83A
KTY83/120	KT83C
KTY83/121	KT83D
KTY83/122	KT83E
KTY83/150	KT83H
KTY83/151	KT83K



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
R <sub>25</sub>	sensor resistance	T <sub>amb</sub> = 25 °C; I <sub>cont</sub> = 1 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	
T <sub>amb</sub>	ambient operating temperature		-55	+175	°C

## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I <sub>cont</sub>	continuous sensor current	in free air; T <sub>amb</sub> = 25 °C	-	10	mA
		in free air; T <sub>amb</sub> = 175 °C	-	2	mA
T <sub>amb</sub>	ambient operating temperature		-55	+175	°C

## Silicon temperature sensors

## KTY83 series

**CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R <sub>25</sub>	sensor resistance	$I_{cont} = 1\text{ mA}$				
	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	
τ	thermal time constant; note 1	in still air	–	20	–	s
		in still liquid; note 2	–	1	–	s
		in flowing liquid; note 2	–	0.5	–	s
	rated temperature range		–55	–	+175	°C

**Notes**

- 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.
- Inert liquid, e.g. FC43 manufactured by the 3M company.

## Silicon temperature sensors

## KTY83 series

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

AMBIENT TEMPERATURE		TEMP. COEFF. (%/K)	KTY83/110				KTY83/120			
(°C)	(°F)		RESISTANCE (Ω)			TEMP. ERROR (K)	RESISTANCE (Ω)			TEMP. 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

## Silicon temperature sensors

## KTY83 series

**Table 2** Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/121 and KTY83/122 $I_{\text{cont}} = 1 \text{ mA}$ .

AMBIENT TEMPERATURE		TEMP. COEFF. (%/K)	KTY83/121				KTY83/122			
(°C)	(°F)		RESISTANCE (Ω)			TEMP. ERROR (K)	RESISTANCE (Ω)			TEMP. 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

## Silicon temperature sensors

## KTY83 series

**Table 3** Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/150 and KTY83/151 $I_{\text{cont}} = 1 \text{ mA}$ .

AMBIENT TEMPERATURE		TEMP. COEFF. (%/K)	KTY83/150				KTY83/151			
(°C)	(°F)		RESISTANCE (Ω)			TEMP. ERROR (K)	RESISTANCE (Ω)			TEMP. 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	±5.62
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	±11.282	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	±9.67

Silicon temperature sensors

KTY83 series

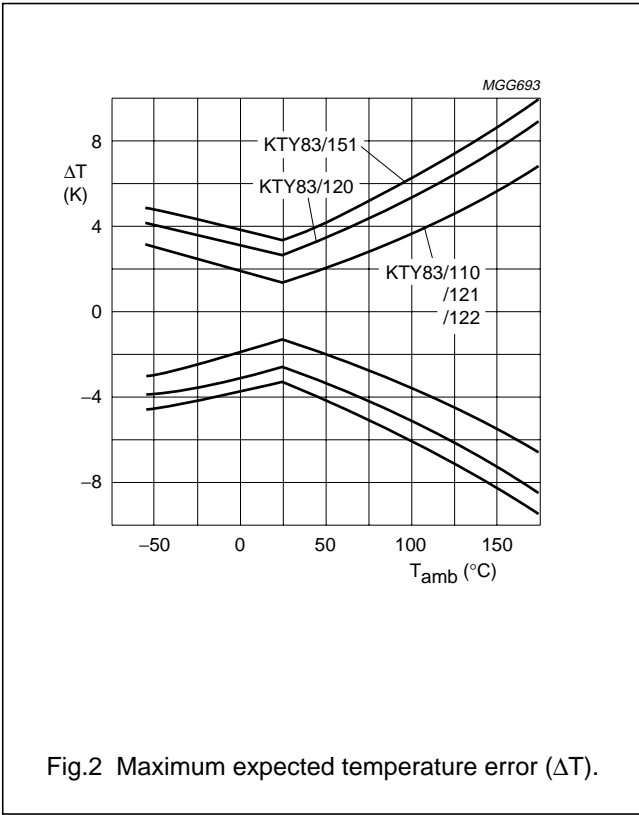
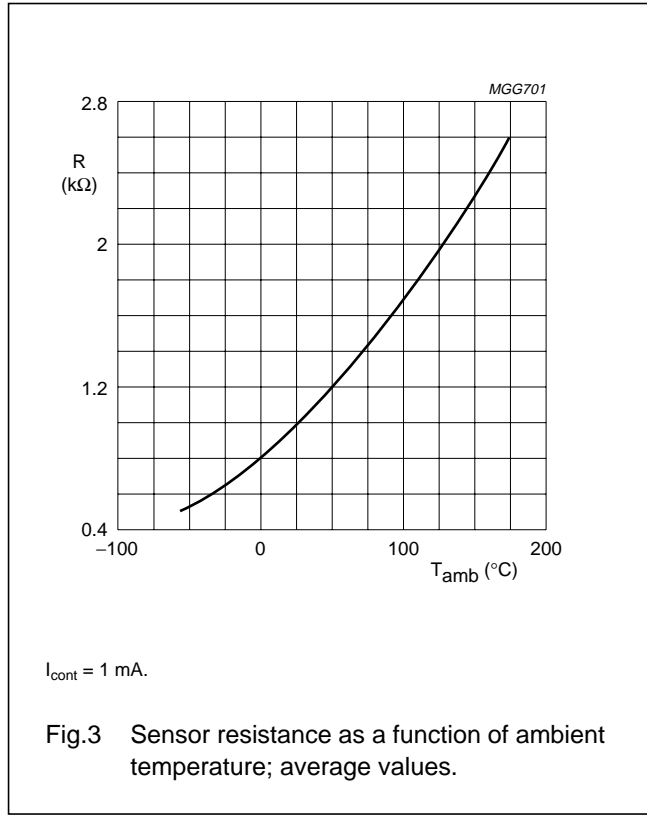
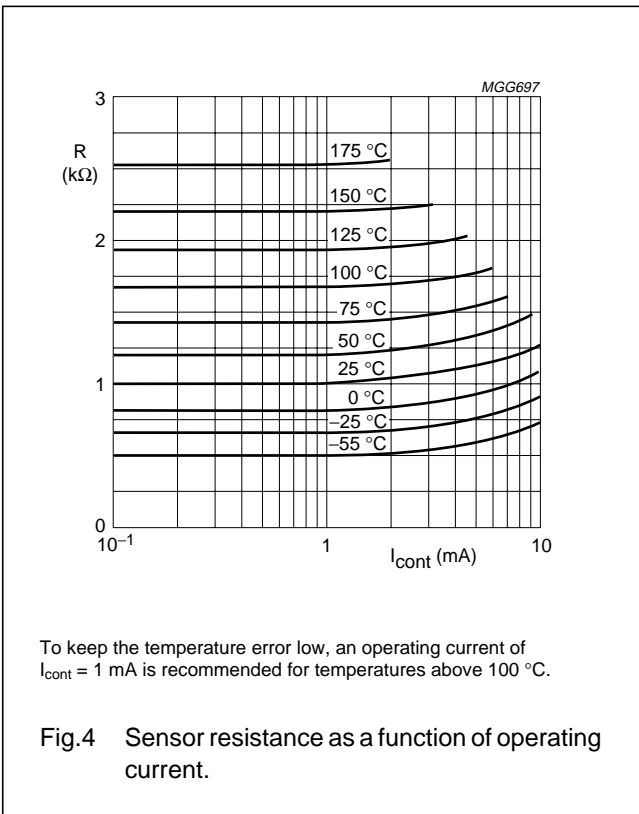


Fig.2 Maximum expected temperature error ( $\Delta T$ ).



$I_{cont} = 1 \text{ mA}$ .

Fig.3 Sensor resistance as a function of ambient temperature; average values.



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

Fig.4 Sensor resistance as a function of operating current.

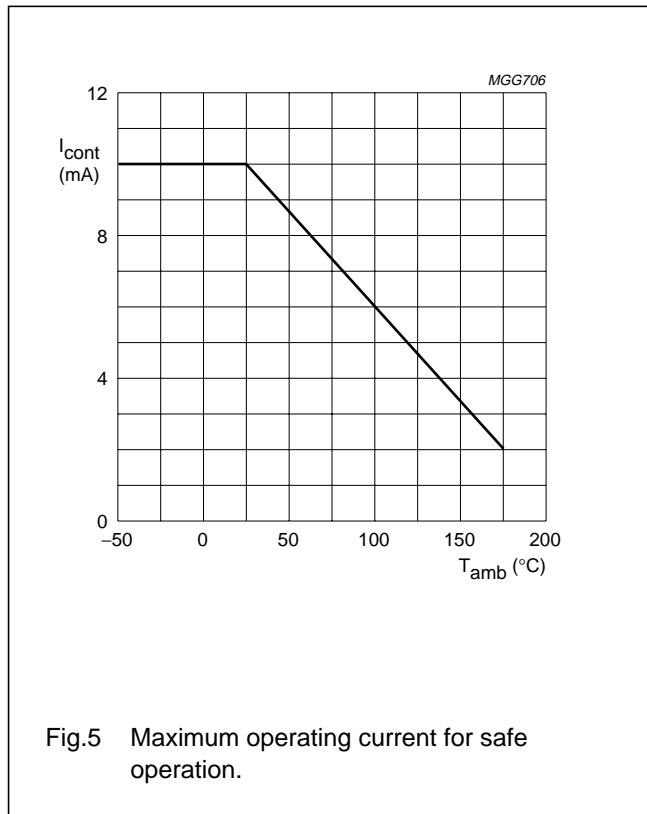
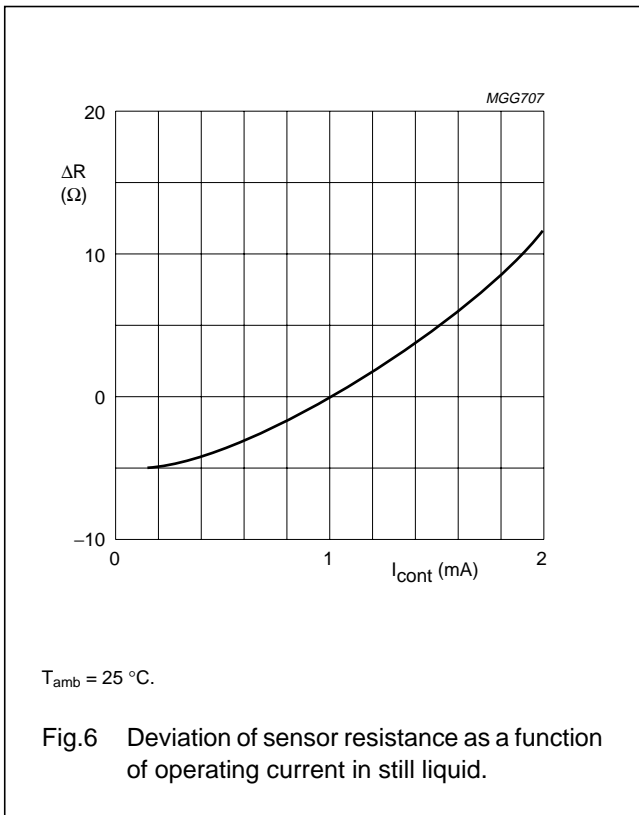


Fig.5 Maximum operating current for safe operation.

Silicon temperature sensors

KTY83 series



**APPLICATION INFORMATION**

SYMBOL	PARAMETER	CONDITIONS	TYP.	UNIT
$\Delta R_{25}$	drift of sensor resistance at 25 °C	10000 hours continuous operation; $T_{amb} = 175\text{ }^{\circ}\text{C}$	1	$\Omega$



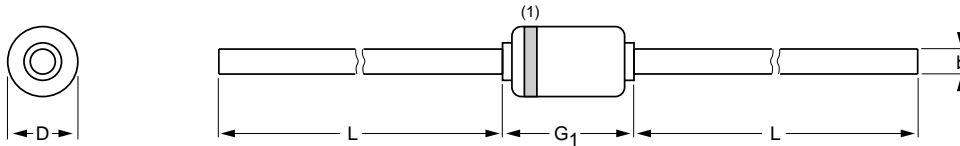
Silicon temperature sensors

KTY83 series

PACKAGE OUTLINE

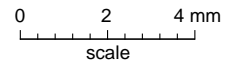
Hermetically sealed glass package; axial leaded; 2 leads

SOD68



DIMENSIONS (mm are the original dimensions)

UNIT	b max.	D max.	G <sub>1</sub> max.	L min.
mm	0.55	1.6	3.04	25.4



Note

1. The marking band indicates the cathode.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOD68		DO-34				97-06-09

## Silicon temperature sensors

## KTY83 series

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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