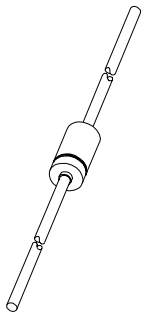


KTY83-1 series
Silicon temperature sensors

Product specification
Supersedes data of 1998 Apr 09

2000 Aug 25

Philips
Semiconductors

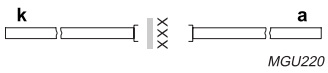
PHILIPS

Silicon temperature sensors KTY83-1 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.



The black band indicates the negative connection.
The marking provides type identity.
The sensor must be operated with the lower potential at the marked connection.

Fig.1 Simplified outline (SOD68; DO34).

MARKING

TYPE NUMBER	MARKING CODE
KTY83-110	KTY83A
KTY83-120	KTY83C
KTY83-121	KTY83D
KTY83-122	KTY83E
KTY83-150	KTY83H
KTY83-151	KTY83K
KTY83-152	KTY83N

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
R_{25}	sensor resistance	T_{amb} = 25 °C; I_{cont} = 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
	KTY83-152		1000	1050	Ω
T_{amb}	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_{cont}	continuous sensor current	in free air; T_{amb} = 25 °C	–	10	mA
		in free air; T_{amb} = 175 °C	–	2	mA
T_{amb}	ambient operating temperature		–55	+175	°C

CHARACTERISTICS

T_{amb} = 25 °C, in liquid, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R_{25}	sensor resistance	I_{cont} = 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
	KTY83-152		1000	–	1050	Ω
TC	temperature coefficient		–	0.76	–	%/K
R_{100}/R_{25}	resistance ratio	T_{amb} = 100 °C and 25 °C	1.65	1.67	1.69	
R_{-55}/R_{25}	resistance ratio	T_{amb} = –55 °C and 25 °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

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

Table 1 Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83-110 and KTY83-120

I_{cont} = 1 mA.

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

Table 2 Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83-121 and KTY83-122

I_{cont} = 1 mA.

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

Table 3 Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83-150 and KTY83-151

I_{cont} = 1 mA.

AMBIENT TEMPERATURE		TEMP. COEFF.	KTY83-150				KTY83-151			
(°C)	(°F)	(%/K)	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

Table 4 Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83-152

I_{cont} = 1 mA.

AMBIENT TEMPERATURE		TEMP. COEFF.	KTY83-152			
			RESISTANCE (Ω)			TEMP. ERROR (K)
(°C)	(°F)	(%/K)	MIN.	TYP.	MAX.	
–55	–67	0.97	489	512	536	±4.92
–50	–58	0.96	514	538	561	±4.56
–40	–40	0.93	567	591	616	±4.42
–30	–22	0.91	623	648	673	±4.28
–20	–4	0.88	683	709	734	±4.12
–10	14	0.85	747	773	799	±3.96
0	32	0.83	814	840	867	±3.79
10	50	0.80	885	912	938	±3.59
20	68	0.78	960	986	1012	±3.39
25	77	0.76	1000	1025	1050	±3.27
30	86	0.75	1037	1065	1092	±3.43
40	104	0.73	1115	1146	1178	±3.76
50	122	0.71	1196	1232	1267	±4.1
60	140	0.69	1280	1321	1361	±4.45
70	158	0.67	1368	1413	1459	±4.83
80	176	0.65	1458	1509	1560	±5.21
90	194	0.63	1552	1609	1666	±5.62
100	212	0.61	1648	1712	1775	±6.04
110	230	0.60	1748	1818	1889	±6.47
120	248	0.58	1851	1929	2006	±6.92
125	257	0.57	1904	1985	2066	±7.15
130	266	0.57	1957	2042	2128	±7.38
140	284	0.55	2066	2160	2253	±7.87
150	302	0.54	2178	2280	2383	±8.36
160	320	0.52	2293	2405	2517	±8.87
170	338	0.51	2411	2533	2655	±9.4
175	347	0.51	2471	2598	2725	±9.67

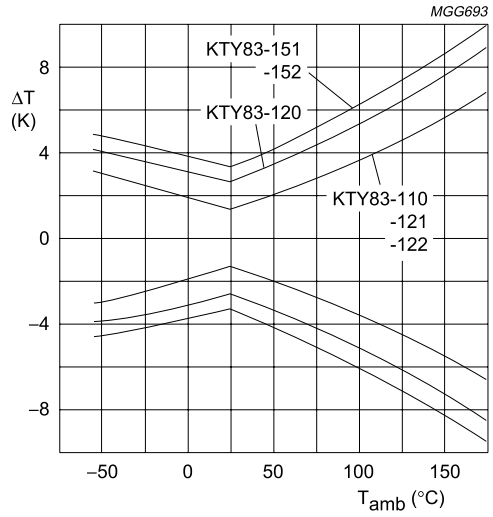
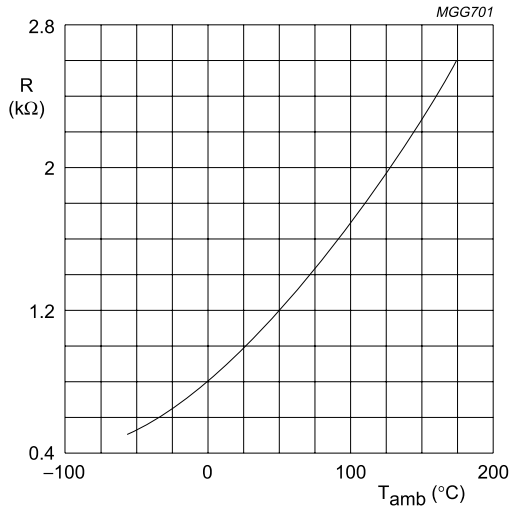
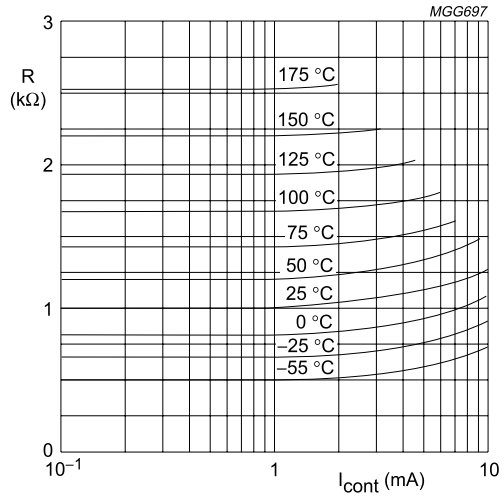


Fig.2 Maximum expected temperature error (ΔT).



I_{cont} = 1 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 mA is recommended for temperatures above 100 °C.

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

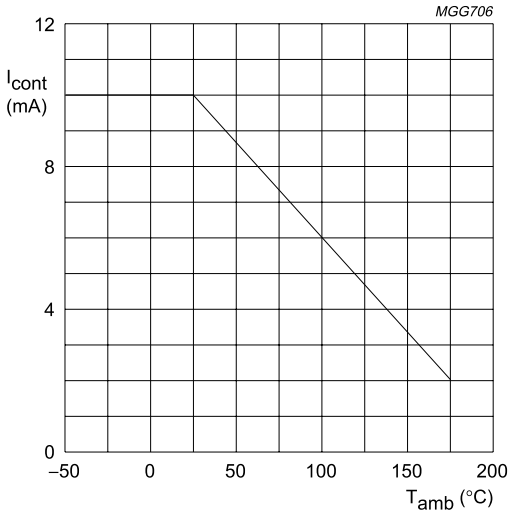
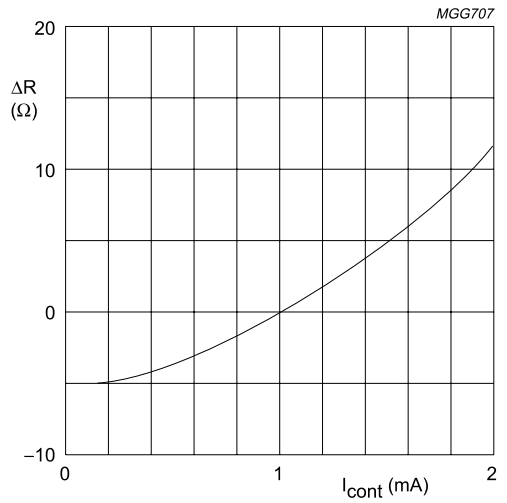


Fig.5 Maximum operating current for safe operation.



T_{amb} = 25 °C.

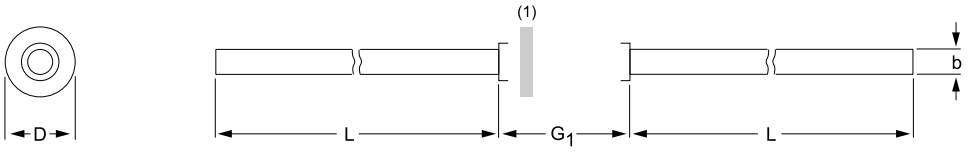
Fig.6 Deviation of sensor resistance as a function of operating current in still liquid.

APPLICATION INFORMATION

SYMBOL	PARAMETER	CONDITIONS	TYP.	UNIT
ΔR_{25}	drift of sensor resistance at 25 °C	10000 hours continuous operation; T_{amb} = 175 °C	1	Ω

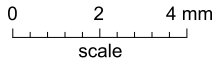
PACKAGE OUTLINE

Hermetically sealed glass package; axial leaded; 2 leads **SOD68**



DIMENSIONS (mm are the original dimensions)

UNIT	b max.	D max.	G_1 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

DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

DEFINITIONS

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

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

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