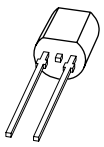


KTY81 series

Silicon temperature sensors

Rev. 05 — 25 April 2008 Product data sheet

https://www.nxp.com/docs/en/data-sheet/KTY81_SER.pdf

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

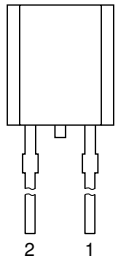
Table 1. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R_{25}	sensor resistance	$I_{sen(cont)}$ = 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; 2 in-line leads	SOD70
KTY81/120			
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
$I_{sen(cont)}$	continuous sensor current	in free air; T_{amb} = 25 °C	-	10	mA
		in free air; T_{amb} = 150 °C	-	2	mA
T_{amb}	ambient temperature		–55	+150	°C

6. Characteristics

Table 6. Characteristics

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

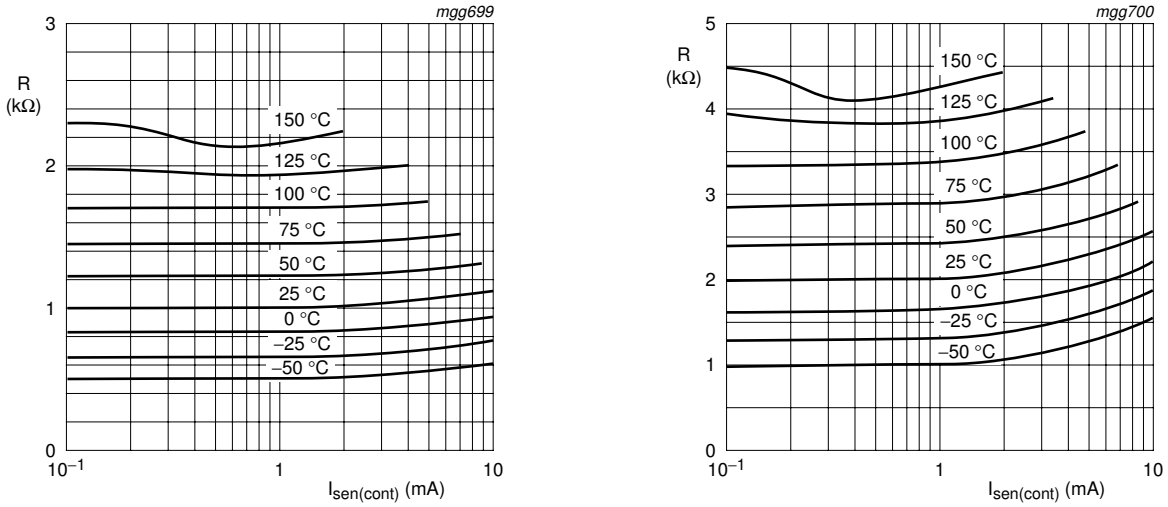
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R_{25}	sensor resistance	$I_{sen(cont)}$ = 1 mA					
		KTY81/110		990	-	1010	Ω
		KTY81/120		980	-	1020	Ω
		KTY81/121		980	-	1000	Ω
		KTY81/122		1000	-	1020	Ω
		KTY81/150		950	-	1050	Ω
		KTY81/210		1980	-	2020	Ω
		KTY81/220		1960	-	2040	Ω
		KTY81/221		1960	-	2000	Ω
		KTY81/222		2000	-	2040	Ω
		KTY81/250		1900	-	2100	Ω
TC	temperature coefficient			-	0.79	-	%/K
R_{100}/R_{25}	resistance ratio	T_{amb} = 100 °C and 25 °C		1.676	1.696	1.716	
R_{-55}/R_{25}	resistance ratio	T_{amb} = –55 °C and 25 °C		0.480	0.490	0.500	
ΔR_{25}	drift of sensor resistance at 25 °C	10000 h continuous operation; T_{amb} = 150 °C					
		KTY81/1 series		-	1.6	-	Ω
		KTY81/2 series		-	3.2	-	Ω
τ_{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 °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 10. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY81/210 and KTY81/220

$I_{sen(cont)}$ = 1 mA.

Ambient temperature		Temperature coefficient (%/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

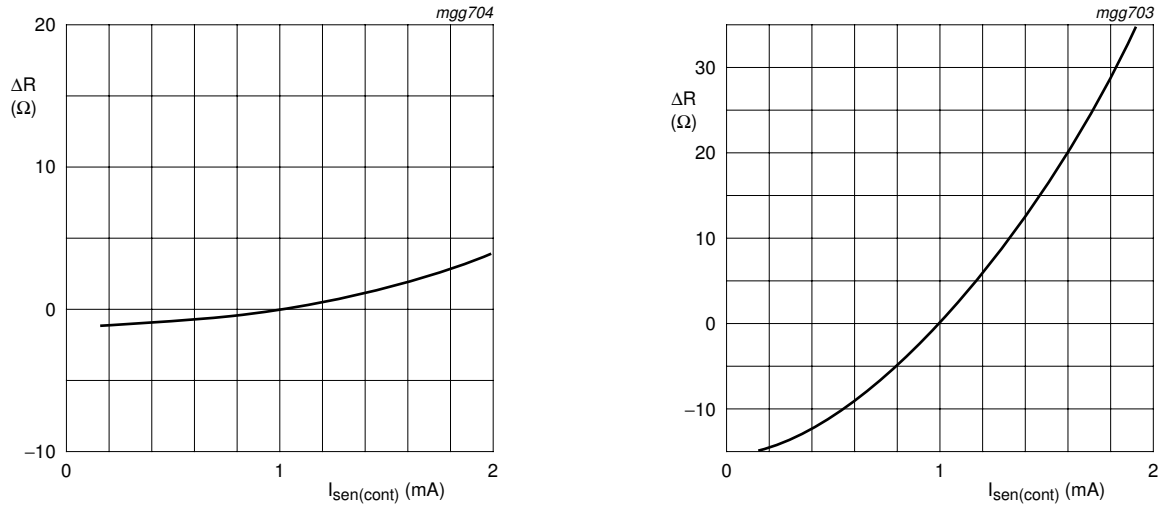


To keep the temperature error low, an operating current of $I_{sen(cont)}$ = 1 mA is recommended for temperatures above 100 °C

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

T_{amb} = 25 °C

b. KTY81/2 series

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

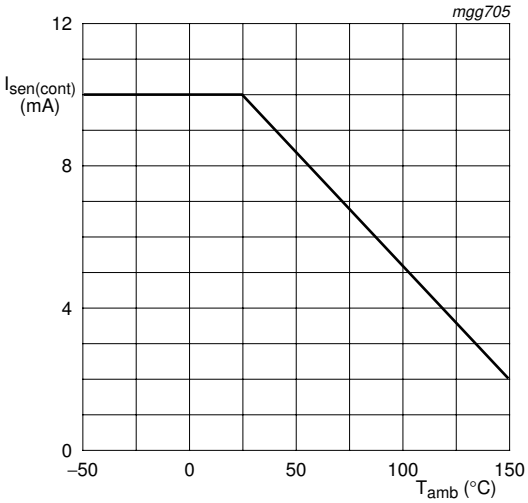


Fig 3. Maximum operating current for safe operation

7. Package outline

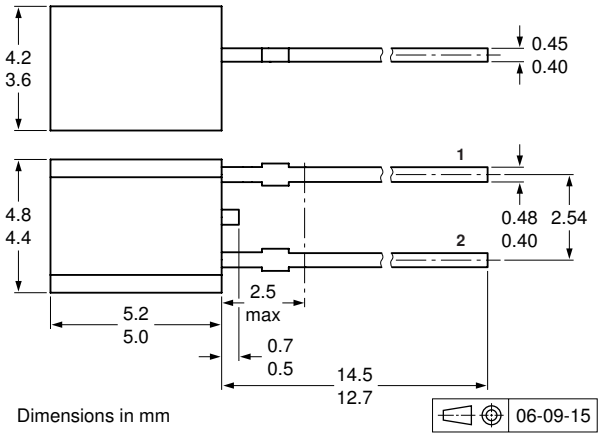


Fig 4. Minimized package outline SOD70

8. Packing information

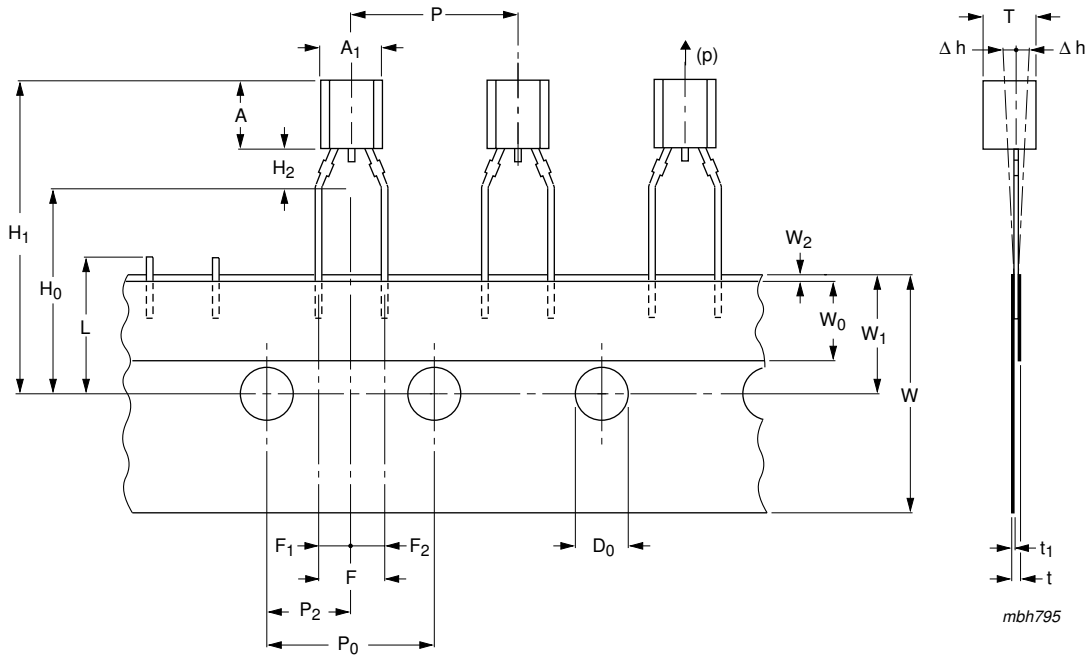


Fig 5. Configuration of bandolier: spread leads

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_1	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_0	feed hole pitch	-	12.7	-	±0.3	mm	
	cumulative pitch error	–1	-	+1	-	mm	measured over 20 devices
P_2	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_0	hold-down tape width	-	6	-	±0.2	mm	
W_1	hole position	-	9	-	+0.7/–0.5	mm	
W_2	hold-down tape position	-	0.5	-	±0.2	mm	
H_0	lead wire clinch height	-	16.5	-	±0.5	mm	
H_1	component height	-	-	23.25	-	mm	
L	length of snipped leads	-	-	11	-	mm	
D_0	feed hole diameter	-	4	-	±0.2	mm	
t	total tape thickness	-	-	1.2	-	mm	t_1 = 0.3 mm to 0.6 mm
F_1, F_2	lead to snipped lead distance	-	2.54	-	+0.4/–0.2	mm	spread leads
H_2	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 KTY81-1SERIES_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
KTY81-2SERIES_4	20000825	Product specification	-	-
KTY81-1SERIES_3	20000825	Product specification	-	-

10. Legal information

10.1 Data sheet status

Document status[1][2]	Product status[3]	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.

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11. Contact information

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12. Contents

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