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PROFUSE

PLATINUM TEMPERATURE SENSOR PT1000-550

Application

Platinum temperature sensors due to their good linearity, long-term stability and endurance are destined for the accurate measurement of temperatures from -70 to +550 °C.

Description

The thin film sensors are made of high purity platinum, which is deposited by vapour plating on the ceramic substrate. Photolithographic structured active area is after the setting of the nominal value of the sensor covered with a passivation layer. The wire outlets are spot-welded to the contacts and protected by a drop of material based on ceramic.

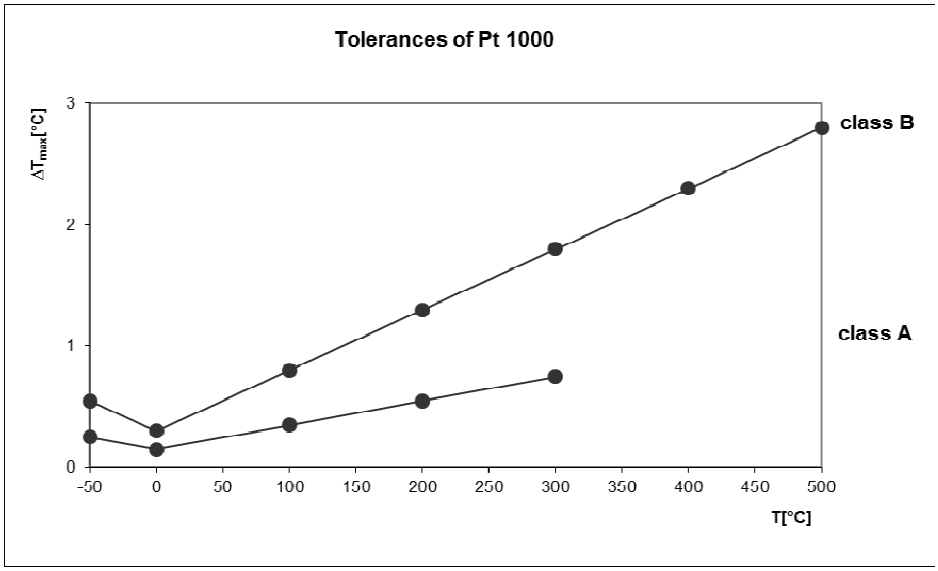
Nominal Values

Nominal value of resistance R_0 at the temperature 0 °C: 1000 Ω

Tolerance

The Accuracy classes comply with EN 60 751, which is norm for Pt resistance temperature sensors.
For the tolerance is valid:
Class B: $_{\Delta}T[°C] = \pm (0{,}30 + 0{,}005\ |t|)$

Where |t| is the absolute temperature in °C.



Tolerance table

Temperature	class A		class B	
[°C]	ΔR[Ω]	ΔT[°C]	ΔR[Ω]	ΔT[°C]
-50	± 1	± 0,25	± 2,2	± 0,55
0	± 0,6	± 0,15	± 1,2	± 0,3
100	± 1,3	± 0,35	± 3	± 0,8
200	± 2	± 0,55	± 4,8	± 1,3
300	± 2,7	± 0,75	± 6,4	± 1,8
400			± 7,3	± 2,3
500			± 9,3	± 2,8

Temperature coefficient

Temperature coefficient TKR is defined as a resistance mean relative variation per a degree of Celsius between the temperatures of 0 and 100 °C

$$\mathrm{TKR} = \frac{\mathrm{R}_{100} - R_0}{100 * R_0} * 10^6 \qquad \left[\frac{\mathrm{ppm}}{^\circ\mathrm{C}}\right]$$

TKR = 3850 ppm/°C

Long-term stability

The change of the value of sensor resistance R_0 is 0,04% after 1000 operation hours at 500 °C.

Dimensions

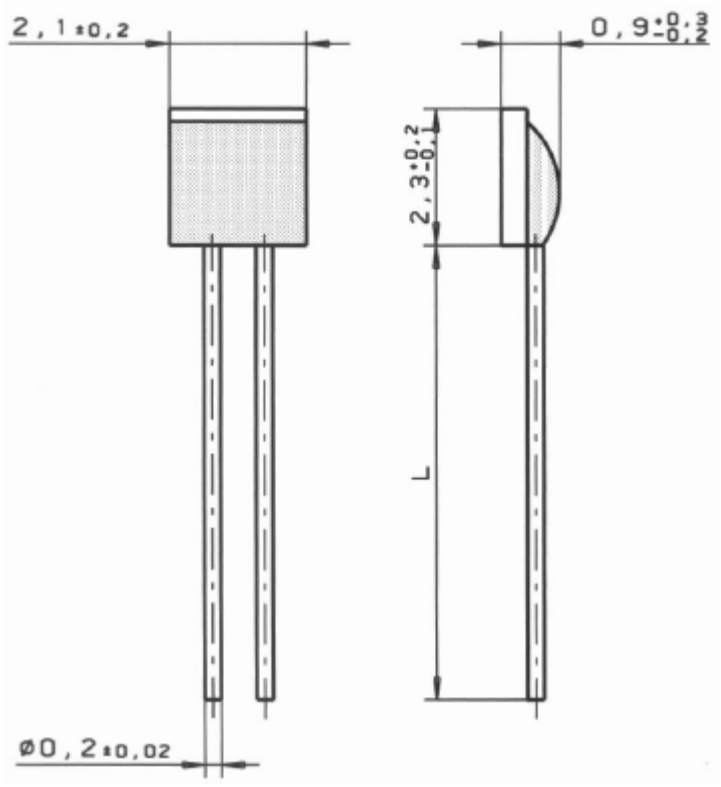
The basic dimensions of Pt sensors are 2,3 x 2,1 x 0,9 mm, wire outlets have a diameter 0,2 mm and the length 10 mm ± 1 mm.

Self – heating

Self – heating of sensor caused by passing current is 0,4 K / mW. Recommended values of measuring current are: 0,3 to 1,0 mA for 100 Ω, 0,1 to 0,7 mA for 500 Ω, 0,1 to 0,3 mA for 1000 Ω.

Response time

Air (v = 2 m/s)	$t_{0,5}$ = 3,0 s	$t_{0,9}$ = 10 s
Water (v = 0,4 m/s)	$t_{0,5}$ = 0,05 s	$t_{0,9}$ = 0,15 s



L = 10 mm ± 1 mm

Table of values

The R-T dependency is given by polynomial: $R_T = R_0 (1 + 3{,}90802.10^{-3}.T + 5{,}802.10^{-7}.T^2)$ [Ω]

°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-50	80.31									
-40	84.27	83.88	83.48	83.08	82.69	82.29	81.89	81.50	81.10	80.70
-30	88.22	87.83	87.43	87.04	86.64	86.25	85.85	85.46	85.06	84.67
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.40	89.01	88.62
-10	96.09	95.69	95.30	94.91	94.52	94.12	93.73	93.34	92.95	92.55
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48

°C	0	1	2	3	4	5	6	7	8	9
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.28
30	111.67	112.06	112.45	112.83	113.22	113.61	113.99	114.38	114.77	115.15
40	115.54	115.93	116.31	116.70	117.08	117.47	117.85	118.24	118.62	119.01
50	119.40	119.78	120.16	120.55	120.93	121.32	121.70	122.09	122.47	122.86
60	123.24	123.62	124.01	124.39	124.77	125.16	125.54	125.92	126.31	126.69
70	127.07	127.45	127.84	128.22	128.60	128.98	129.37	129.75	130.13	130.51
80	130.89	131.27	131.66	132.04	132.42	132.80	133.18	133.56	133.94	134.32
90	134.70	135.08	135.46	135.84	136.22	136.60	136.98	137.36	137.74	138.12
100	138.50	138.88	139.26	139.64	140.02	140.39	140.77	141.15	141.53	141.91
110	142.29	142.66	143.04	143.42	143.80	144.17	144.55	144.93	145.31	145.68
120	146.06	146.44	146.81	147.19	147.57	147.94	148.32	148.70	149.07	149.45
130	149.82	150.20	150.57	150.95	151.33	151.70	152.08	152.45	152.83	153.20
140	153.58	153.95	154.32	154.70	155.07	155.45	155.82	156.19	156.57	156.94
150	157.31	157.69	158.06	158.43	158.81	159.18	159.55	159.93	160.30	160.67
160	161.04	161.42	161.79	162.16	162.53	162.90	163.27	163.65	164.02	164.39
170	164.76	165.13	165.50	165.87	166.24	166.61	166.98	167.35	167.72	168.09
180	168.46	168.83	169.20	169.57	169.94	170.31	170.68	171.05	171.42	171.79
190	172.16	172.53	172.90	173.26	173.63	174.00	174.37	174.74	175.10	175.47
200	175.84	176.21	176.57	176.94	177.31	177.68	178.04	178.41	178.78	179.14
210	179.51	179.88	180.24	180.61	180.97	181.34	181.71	182.07	182.44	182.80
220	183.17	183.53	183.90	184.26	184.63	184.99	185.36	185.72	186.09	186.45
230	186.82	187.18	187.54	187.91	188.27	188.63	189.00	189.36	189.72	190.09
240	190.45	190.81	191.18	191.54	191.90	192.26	192.63	192.99	193.35	193.71
250	194.07	194.44	194.80	195.16	195.52	195.88	196.24	196.60	196.96	197.33
260	197.69	198.05	198.41	198.77	199.13	199.49	199.85	200.21	200.57	200.93
270	201.29	201.65	202.01	202.36	202.72	203.08	203.44	203.80	204.16	204.52
280	204.88	205.23	205.59	205.95	206.31	206.67	207.02	207.38	207.74	208.10
290	208.45	208.81	209.17	209.52	209.88	210.24	210.59	210.95	211.31	211.66
300	212.02	212.37	212.73	213.09	213.44	213.80	214.15	214.51	214.86	215.22
310	215.57	215.93	216.28	216.64	216.99	217.35	217.70	218.05	218.41	218.76
320	219.12	219.47	219.82	220.18	220.53	220.88	221.24	221.59	221.94	222.29
330	222.65	223.00	223.35	223.70	224.06	224.41	224.76	225.11	225.46	225.81
340	226.17	226.52	226.87	227.22	227.57	227.92	228.27	228.62	228.97	229.32
350	229.67	230.02	230.37	230.72	231.07	231.42	231.77	232.12	232.47	232.82
360	233.17	233.52	233.87	234.22	234.56	234.91	235.26	235.61	235.96	236.31
370	236.65	237.00	237.35	237.70	238.04	238.39	238.74	239.09	239.43	239.78
380	240.13	240.47	240.82	241.17	241.51	241.86	242.20	242.55	242.90	243.24
390	243.59	243.93	244.28	244.62	244.97	245.31	245.66	246.00	246.35	246.69
400	247.04	247.38	247.73	248.07	248.41	248.76	249.10	249.45	249.79	250.13
410	250.48	250.82	251.16	251.50	251.85	252.19	252.53	252.88	253.22	253.56
420	253.90	254.24	254.59	254.93	255.27	255.61	255.95	256.29	256.64	256.98
430	257.32	257.66	258.00	258.34	258.68	259.02	259.36	259.70	260.04	260.38
440	260.72	261.06	261.40	261.74	262.08	262.42	262.76	263.10	263.43	263.77
450	264.11	264.45	264.79	265.13	265.47	265.80	266.14	266.48	266.82	267.15
460	267.49	267.83	268.17	268.50	268.84	269.18	269.51	269.85	270.19	270.52
470	270.86	271.20	271.53	271.87	272.20	272.54	272.88	273.21	273.55	273.88
480	274.22	274.55	274.89	275.22	275.56	275.89	276.23	276.56	276.89	277.23
490	277.56	277.90	278.23	278.56	278.90	279.23	279.56	279.90	280.23	280.56
500	280.90									

For other values R_0 is needed to multiply the values from the table by relevant coefficient K = $\frac{R_0\,(x)}{R_0\,(1000)}$

Notice: another values and designs are on request available.