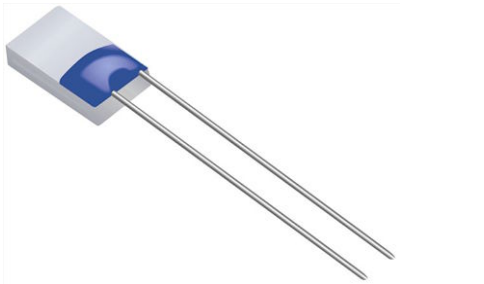
Leaded Platinum Temperature Sensor



PTL Temperature Sensors are the perfect choice for the most fields of modern electronics. The highly controlled platinum thin film manufacturing process guarantees an outstanding stability of temperature characteristics. Typical applications include temperature measurement in process controls in industrial electronics, and precise temperature measurement in medical equipment.

FEATURES

- Advanced platinum thin film technology
- Standardized according IEC 60751
- Outstanding stability of temperature characteristics
- Short reaction times down to $t_{0.9} \leq 8$ s
- 3 ceramic body sizes available
- Radial terminations

APPLICATIONS

Temperature measurement and control in

- Industrial electronics
- Medical electronics

TECHNICAL SPECIFICATIONS

DESCRIPTION		PTL 1112	PTL 1222	PTL 1252
Resistance values R_0 at 0 °C (1)		100 Ω, 500 Ω, 1000 Ω	100 Ω, 500 Ω, 1000 Ω	100 Ω, 500 Ω, 1000 Ω, 10 000 Ω
Temperature coefficient (0 °C to + 100 °C)		+ 3850 ppm/K		
Tolerance class		F0.15, F0.3 (1)		
Temperature range		- 50 °C up to + 550 °C (1)		
Long term stability $\Delta R_0/R_0$ (250 h at UCT)		< ± 0.1 %		
Insulation resistance		> 10 MΩ		
Measurement current $I_{mea.}$ (DC) (3)		Up to 1.0 mA for 100 Ω Up to 0.4 mA for 500 Ω Up to 0.3 mA for 1 kΩ Up to 0.1 mA for 10 kΩ		
Self-heating (2)	Flowing air (v = 3.0 m/s)	≤ 0.25 K/mW	≤ 0.2 K/mW	≤ 0.17 K/mW
	Still air (v = 1.0 m/s)	≈ 0.6 K/mW	≈ 0.4 K/mW	≈ 0.35 K/mW
Thermal response time (2)	Flowing air (v = 3.0 m/s)	$t_{0.5} \leq 2.5$ s	$t_{0.5} \leq 3$ s	$t_{0.5} \leq 5$ s
		$t_{0.9} \leq 8$ s	$t_{0.9} \leq 10$ s	$t_{0.9} \leq 15$ s
Material of leads		Platinum clad Ni (1)		
Length of leads		10 mm (1)		
Diameter of leads		0.2 mm (1)		

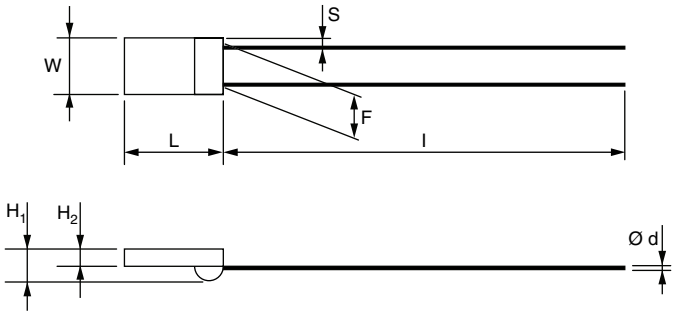
Notes

(1) Customized solutions on request, tolerance class F0.15 up to 300 °C, class F0.3 up to 500 °C

(2) Valid for sensor element only

(3) Indicated measurement currents can be applied continuously with self-heating effect of less than 0.1 °C at 0 °C in still air

DIMENSIONS in millimeters



DIMENSIONS - PTL sensor type, relevant physical dimensions									
TYPE	H_1	H_2	L	W	Ø d	l	F	S	MASS (mg)
PTL 1112	1.0 ± 0.25	0.4 ± 0.05	1.6 ± 0.2	1.25 ± 0.2	0.2 ± 0.02	10.0 ± 1.0	0.55	0.35	16
PTL 1222	1.0 ± 0.25	0.4 ± 0.05	2.3 ± 0.2	2.0 ± 0.3	0.2 ± 0.02	10.0 ± 1.0	0.90	0.55	24
PTL 1252	1.0 ± 0.25	0.4 ± 0.05	5.0 ± 0.2	2.0 ± 0.3	0.2 ± 0.02	10.0 ± 1.0	0.90	0.55	36

PRODUCTION

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of platinum is deposited on a high grade ceramic body (96 % Al_2O_3). The sensor-elements are covered by a protective coating designed for electrical, mechanical and climatic protection.

QUALITY

The result of the determined production is verified by an extensive testing procedure performed on 100 % of the individual sensors. Only accepted products are laid directly into the waffle trays. The resistance values and tolerances according to DIN EN 60751 are given for the device including the standard leads. Any additional wiring will change resistance values for the total setup.

ASSEMBLY

The Pt-sensors are suitable for all standard assembly processes like crimping, soldering, brazing and welding (LASER- or resistive welding).
The parameters of the assembly process should be chosen in accordance with the used wire material. It is recommended to verify the parameters by pre-testing.

The assembly process of the sensor should be in compliance with the following guidelines and recommendations:

- Fixation of only one lead during assembly
- Tensile forces parallel to the leads < 5 N
- Avoiding of large temperature gradients between the welding region and the sensor during assembly, e.g. by using a cooled clamp with a good thermal conductivity
- Radius of curvature of the leads > 0.3 mm
- Curvature or torsion strain > 3 mm away form the sensor element
- After assembly we recommend to fix the leads in the welded region with a strain relief

ENVIRONMENTAL CONDITIONS

Unprotected sensor-elements are usable under dry environmental conditions only. Platinum-plated nickel leads enable the usage in applications with ambient temperatures up to 550 °C. The environment of the sensor application should be without any corrosive substances (e.g. potassium hydroxide or hydrogen fluoride) or other contaminants which could affect the sensor, especially shifting the temperature coefficient of the sensor. This has also to be considered during the assembly process.

DIRECTIVES

All products comply with the CEFIC-EECA-EICTA list of legal restrictions on hazardous substances.
This includes full compatibility with the following directives:

- 2000/53/EC End of Vehicle Life Directive (ELV)
- 2000/53/EC Annex II to End of Vehicle Life Directive (ELV II)
- 2002/95/EC Restriction of the use of Hazardous Substances Directive (RoHS)
- 2002/96/EC Waste Electrical and Electronic Equipment Directive (WEEE)

APPROVALS

The Pt-sensors are tested in accordance with **IEC 60751/ DIN EN 60751**.

PART NUMBER AND PRODUCT DESCRIPTION (1)

PART NUMBER (2): PTL122201B1K00KU00

P	T	L	1	2	2	2	0	1	B	1	K	0	0	K	U	0	0

TYPE	TYPE CODE	SPECIAL CHARACTER	TOLERANCE CLASS	RESISTANCE VALUE	PACKAGING (3)	SPECIAL
3 digits	4 digits	1 digit	2 digits	4 digits	2 digits	2 digits
PTL = Platinum Temperature Sensor Leaded	**1112** **1222** **1252**	**0** = Neutral	**1A** = Class F0.15 **1B** = Class F0.3	**100R** = 100 Ω **500R** = 500 Ω **1K00** = 1000 Ω **10K0** = 10 kΩ	Waffles in a box **KU** **K1**	**00** = Standard

PRODUCT DESCRIPTION (4): PTL 1222 -B KU 1K0

PTL	1222	-B	KU	1K0
TYPE	**TYPE CODE**	**TOLERANCE CLASS**	**PACKAGING (3)**	**RESISTANCE VALUE**
PTL = Platinum Temperature Sensor Leaded	**1112** **1222** **1252**	**A** = Class F0.15 **B** = Class F0.3	Waffles in a box **KU** **K1**	**100R** = 100 Ω **500R** = 500 Ω **1K0** = 1000 Ω **10K0** = 10 000 Ω

Notes
(1) Products can be ordered using either the PART NUMBER or the PRODUCT DESCRIPTION
(2) The part number is shown to facilitate the introduction of unified part numbering system
(3) Please refer to table PACKAGING
(4) We recommend that the production description is used to minimize the possibility of errors in order handling

PACKAGING

MODEL	WAFFLE PACK	
	PIECES/WAFFLES IN A BOX	CODE
PTL	100	KU
	1000	K1

FUNCTIONAL PERFORMANCE

The temperature resistance relationships of the PTL series follow different equations:

for the temperature range from - 50 °C up to 0 °C:

$$R_T = R_0 \times (1 + A \times T + B \times T^2 + C \times (T - 100\ °C) \times T^3)$$

and for the temperature range from 0 °C up to + 550 °C:

$$R_T = R_0 \times (1 + A \times T + B \times T^2)$$

R_T: Resistance as a function of temperature
R_0: Nominal resistance value at 0 °C
T: Temperature in °C

According to IEC 60751/DIN EN 60751 the values of the coefficients are:

$$A = 3.9083 \times 10^{-3}\ °C^{-1}$$
$$B = -5.775 \times 10^{-7}\ °C^{-2}$$
$$C = -4.183 \times 10^{-12}\ °C^{-4}$$

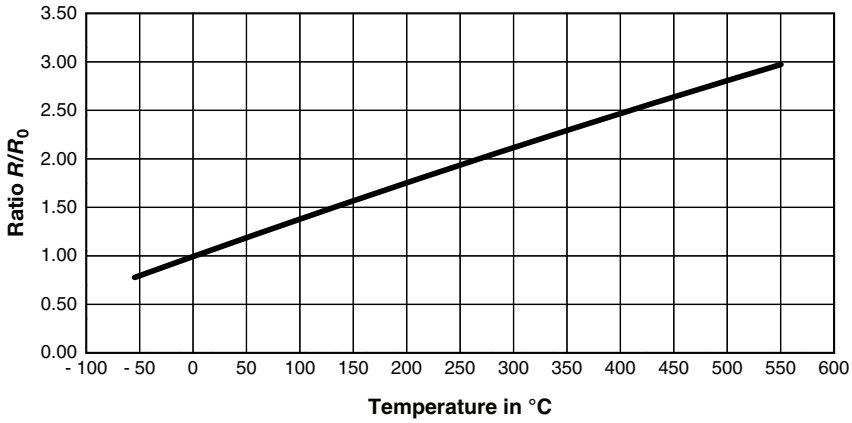
The temperature tolerances values of the PTL series are classified by the following equation:

Class F0.15: $\Delta T_{F0.15} = \pm (0.15 + 0.002 \times |T|)$
(valid from - 50 °C to 300 °C)

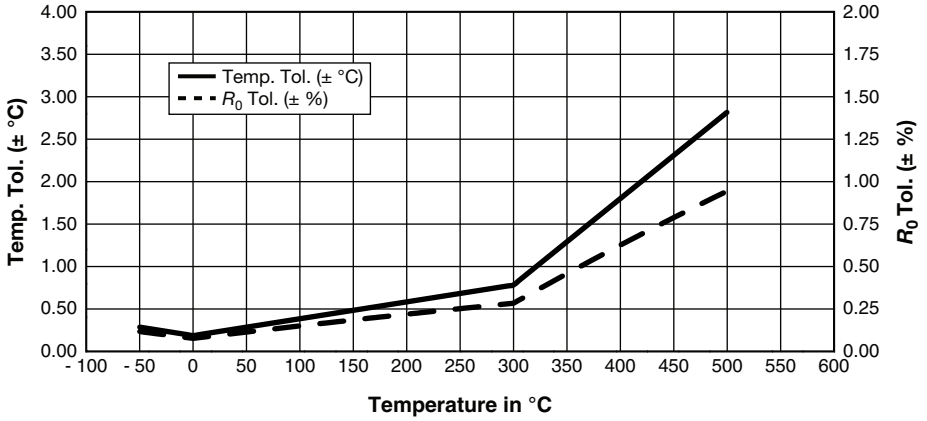
Class F0.3: $\Delta T_{F0.30} = \pm (0.30 + 0.005 \times |T|)$
(valid from - 50 °C to 500 °C)

NOMINAL RESISTANCE VALUE

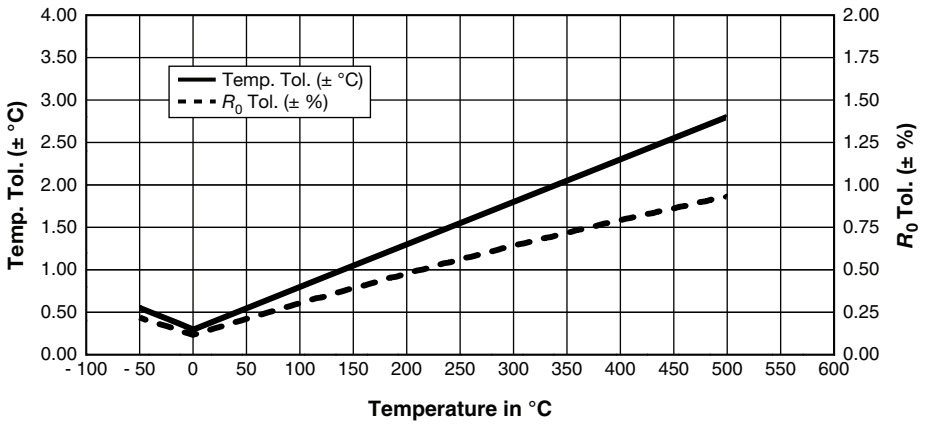
TEMPERATURE (°C)	R_0 = 100 Ω	R_0 = 500 Ω	R_0 = 1000 Ω	R_0 = 10 000 Ω	CLASS F0.15	CLASS F0.30
	NOMINAL RESISTANCE (Ω)	NOMINAL RESISTANCE (Ω)	NOMINAL RESISTANCE (Ω)	NOMINAL RESISTANCE (Ω)	TOLERANCE (K)	TOLERANCE (K)
- 50	80.306	401.53	803.06	8030.6	± 0.25	± 0.55
- 25	90.192	450.96	901.92	9019.2	± 0.20	± 0.43
0	**100**	**500**	**1000**	**10 000**	**± 0.15**	**± 0.30**
25	109.73	548.67	1097.3	10 973	± 0.20	± 0.43
50	119.40	596.99	1194.0	11 940	± 0.25	± 0.55
75	128.99	644.94	1289.9	12 899	± 0.30	± 0.68
100	138.51	692.53	1385.1	13 851	± 0.35	± 0.80
125	147.95	739.76	1479.5	14 795	± 0.40	± 0.93
150	157.33	786.63	1573.3	15 733	± 0.45	± 1.05
175	166.63	833.13	1666.3	16 663	± 0.50	± 1.18
200	175.86	879.28	1758.6	17 586	± 0.55	± 1.30
225	185.01	925.07	1850.1	18 501	± 0.60	± 1.43
250	194.10	970.49	1941.0	19 410	± 0.65	± 1.55
275	203.11	1015.6	2031.1	20 311	± 0.70	± 1.68
300	212.05	1060.3	2120.5	21 205	± 0.75	± 1.80
325	220.92	1104.6	2209.2	22 092		± 1.93
350	229.72	1148.6	2297.2	22 972		± 2.05
375	238.44	1192.2	2384.4	23 844		± 2.18
400	247.09	1235.5	2470.9	24 709		± 2.30
425	255.67	1278.4	2556.7	25 567		± 2.43
450	264.18	1320.9	2641.8	26 418		± 2.55
475	272.61	1363.1	2726.1	27 261		± 2.68
500	280.98	1404.9	2809.8	28 098		± 2.80
525	289.27	1446.3	2892.7	28 927		± 2.93
550	297.49	1487.4	2974.9	29 749		



Tolerance for Class F0.15



Tolerance for Class F0.3



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