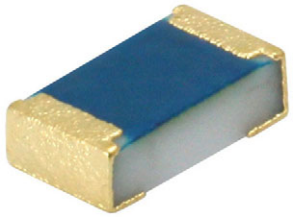
Gold Terminated Temperature Dependent Platinum Thin Film Chip Resistor (RTD)



FEATURES

- Gold terminations for conductive gluing
- Standardized curve according IEC 60751
- Short reaction times down to $t_{0.9} \leq 3$ s (in air)
- Outstanding stability of temperature characteristic
- Superior temperature cycling robustness
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e4

RoHS COMPLIANT

LINKS TO ADDITIONAL RESOURCES

3D Models Design Tools SPICE Models

PTS ATAU SMD flat chip temperature sensors are the perfect choice for temperature control of electronics operating under varying environmental conditions. The highly controlled platinum thin film manufacturing process guarantees an outstanding stability of temperature characteristics which ensures reliable operation even under harsh conditions. A final gold-plating on terminations enables the use for conductive adhesive gluing applications. Typical applications include automotive, aviation and industrial electronics.

APPLICATIONS

Temperature measurement and control in:

- Automotive electronics
- Aviation electronics
- Industrial electronics

TECHNICAL SPECIFICATIONS

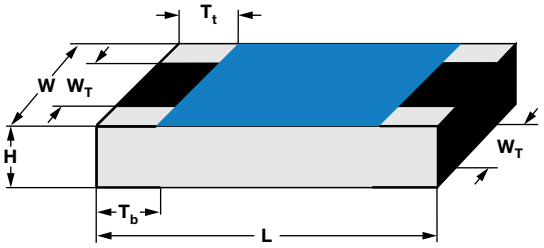
DESCRIPTION		PTS0603U	PTS0805U	PTS1206U
Resistance values R_0 at 0 °C		100 Ω	100 Ω, 500 Ω	100 Ω, 500 Ω, 1000 Ω
Temperature coefficient (0 °C to +100 °C)		+3850 ppm/K		
Tolerance classes		F0.3		
Temperature range		-55 °C to +175 °C		
Long term stability $\lvert\Delta R_0/R_0\rvert$; R_0 change after 1000 h at +155 °C		≤ 0.04 %		
Insulation resistance		> 10 MΩ		
Measurement current $I_{meas.}$ (DC) (1)	100 Ω	0.1 mA to 0.5 mA	0.1 mA to 1.0 mA	0.1 mA to 1.0 mA
	500 Ω	-	0.1 mA to 0.4 mA	0.1 mA to 0.4 mA
	1000 Ω	-	-	0.1 mA to 0.25 mA
Self-heating at 0 °C (2)	Calm air (v = 0.0 m/s)	≤ 0.9 K/mW	≤ 0.8 K/mW	≤ 0.7 K/mW
Thermal response time (2)	Flowing water (v = 0.4 m/s)	$t_{0.5} \leq 0.1$ s	$t_{0.5} \leq 0.2$ s	$t_{0.5} \leq 0.3$ s
		$t_{0.9} \leq 0.2$ s	$t_{0.9} \leq 0.3$ s	$t_{0.9} \leq 0.4$ s
	Flowing air (v = 3.0 m/s)	$t_{0.5} \leq 1.0$ s	$t_{0.5} \leq 1.5$ s	$t_{0.5} \leq 2.0$ s
		$t_{0.9} \leq 2.0$ s	$t_{0.9} \leq 3.0$ s	$t_{0.9} \leq 5.0$ s
Failure rate: $FIT_{observed}$		≤ 0.1 x 10^{-9}/h		

Notes

(1) Indicated measurement currents can be applied continuously with self-heating effect of less than 0.1 °C

(2) Valid for sensor element only

DIMENSIONS in millimeters



DIMENSIONS AND MASS							
TYPE	H	L	W	W_T	T_t	T_b	MASS (mg)
PTS0603 ATAU	0.43 + 0.1 / - 0.05	1.53 ± 0.05	0.85 ± 0.1	> 75 % of W	0.3 + 0.15 / - 0.2	0.3 + 0.15 / - 0.2	1.9
PTS0805 ATAU	0.45 + 0.1 / - 0.05	2.0 ± 0.1	1.25 ± 0.15	> 75 % of W	0.4 ± 0.2	0.4 ± 0.2	4.6
PTS1206 ATAU	0.55 ± 0.1	3.1 + 0.1 / - 0.2	1.6 ± 0.15	> 75 % of W	0.5 ± 0.25	0.5 ± 0.25	9.2

DESCRIPTION

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 (Al_2O_3) ceramic substrate and conditioned to achieve the correct temperature coefficient and stability. The sensor-elements are covered by a protective coating designed for electrical, mechanical, and climatic protection. The terminations receive a final gold over nickel plating.

QUALITY

The result of the determined production is verified by an extensive testing procedure and optical inspection performed on 100 % of the individual sensors. Only accepted products are laid directly into the paper tape in accordance with IEC 60286-3 (1).

STORAGE

Solderability is specified for 2 years after production or re-qualification. The permitted storage time is 20 years.

ASSEMBLY

The Pt-sensors are suitable for processing on automatic SMD assembly systems only. They are suitable for conductive adhesive gluing technology and automatic soldering using reflow technology as shown in IEC 61760-1. The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters and aqueous solutions. The suitability of conformal coatings, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system. The use of potting resins in close contact with the protective coating or terminations is not recommended. For frequent high temperature usage, thermal compatible substrates and high temperature solder alloys or conductive adhesives should be selected to minimize any thermal mismatch or degradation of the junctions.

MATERIALS

Vishay acknowledges the following systems for the regulation of hazardous substances:

- IEC 62474, Material Declaration for Products of and for the Electrotechnical Industry, with the list of declarable substances given therein (2)
- The Global Automotive Declarable Substance List (GADSL) (3)
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) (4) for its supply chain

The products do not contain any of the banned substances as per IEC 62474, GADSL, or the SVHC list, see www.vishay.com/how/leadfree.

Hence the products fully comply with the following directives:

- 2000/53/EC End-of-Life Vehicle Directive (ELV) and Annex II (ELV II)
- 2011/65/EU Restriction of the Use of Hazardous Substances Directive (RoHS) with amendment 2015/863/EU
- 2012/19/EU Waste Electrical and Electronic Equipment Directive (WEEE)

Vishay pursues the elimination of conflict minerals from its supply chain, see the Conflict Minerals Policy at www.vishay.com/doc?49037.

APPROVALS

The PTS ATAU sensors are tested in accordance with:

- IEC 60751 (1)
- IEC 60068 series
- AEC-Q200

Notes

(1) The quoted IEC standards are also released as EN standards with the same number and identical contents
(2) The IEC 62474 list of declarable substances is maintained in a dedicated database, which is available at http://std.iec.ch/iec62474
(3) The Global Automotive Declarable Substance List (GADSL) is maintained by the American Chemistry Council and available at www.gadsl.org
(4) The SVHC list is maintained by the European Chemical Agency (ECHA) and available at http://echa.europa.eu/candidate-list-table

PART NUMBER AND PRODUCT DESCRIPTION (1)

PART NUMBER: PTS0603U1B100RPU00

P	T	S	0	6	0	3	U	1	B	1	0	0	R	P	U	0	0

TYPE	SIZE CODE	VERSION	TOLERANCE CLASS	RESISTANCE VALUE	PACKAGING	SPECIAL
3 digits	4 digits	1 digit	2 digits	4 digits	2 digits	2 digits
PTS = platinum temperature sensor SMD	**0603** **0805** **1206**	**U** = AT AU (gold termination)	**1B** = class F0.3	**100R** = 100 Ω **500R** = 500 Ω **1K00** = 1000 Ω	**PU** **P1**	**00** = standard

PRODUCT DESCRIPTION: PTS 0603-B ATAU PU 100R

PTS	0603	-B	ATAU	P1	500R
TYPE	SIZE CODE	TOLERANCE CLASS	VERSION	PACKAGING (see Packaging table)	RESISTANCE VALUE
PTS = platinum temperature sensor SMD	**0603** **0805** **1206**	**B** = class F0.3	**ATAU** = automotive / gold termination	**PU** **P1**	**100R** = 100 Ω **500R** = 500 Ω **1K** = 1000 Ω

Note

(1) Products can be ordered using either the PART NUMBER or the PRODUCT DESCRIPTION

PACKAGING

TYPE	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	BOX/REEL	BOX / REEL DIAMETER
PTS 0603 PTS 0805 PTS 1206	PU	100	Paper tape acc. IEC 60286-3	8 mm	4 mm	Box	114 mm
	P1	1000				Reel	180 mm / 7"

FUNCTIONAL PERFORMANCE

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

For the temperature range of -55 °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 of 0 °C up to +175 °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 the values of the coefficients are:

$$A = +3.9083 \times 10^{-3}\ °C^{-1}$$

$$B = -5.7750 \times 10^{-7}\ °C^{-2}$$

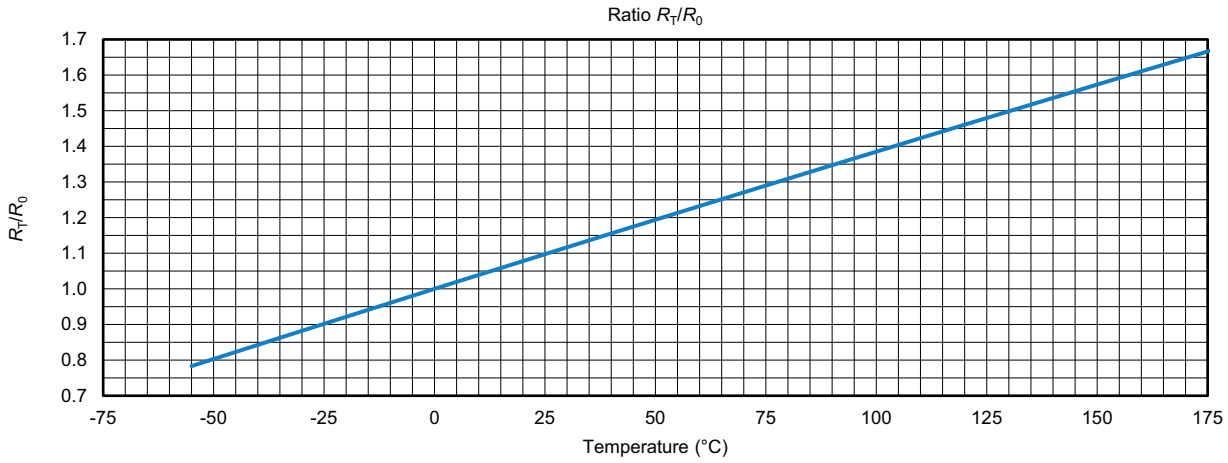
$$C = -4.1830 \times 10^{-12}\ °C^{-4}$$

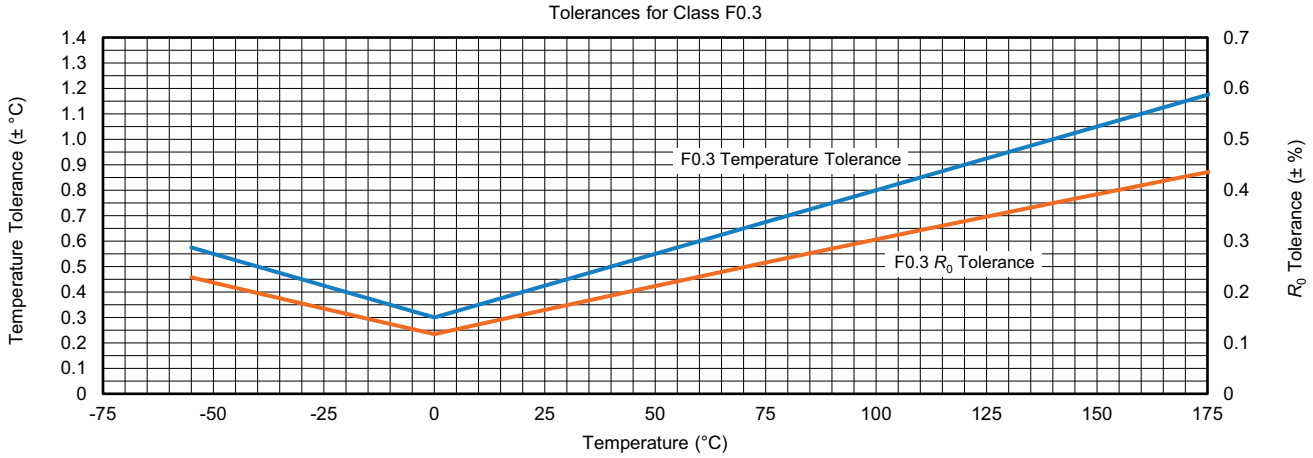
The tolerances values of the PTS AT series are classified by the following equations as specified by IEC 60751:

Class F0.3: $\Delta T_{F0.3} = \pm (0.3 + 0.005 \times |T|)$

NOMINAL RESISTANCE VALUES AND TEMPERATURE TOLERANCE

TEMPERATURE (°C)	NOMINAL RESISTANCE (Ω)			TOLERANCE (K)
	R_0 = 100 Ω	R_0 = 500 Ω	R_0 = 1000 Ω	CLASS F0.3
-55	78.32	391.59	783.19	± 0.58
-50	80.31	401.53	803.06	± 0.55
-25	90.19	450.96	901.92	± 0.43
0	**100.00**	**500.00**	**1000.00**	**± 0.30**
25	109.73	548.67	1097.35	± 0.43
50	119.40	596.99	1193.97	± 0.55
75	128.99	644.94	1289.87	± 0.68
100	138.51	692.53	1385.06	± 0.80
125	147.95	739.76	1479.51	± 0.93
150	157.33	786.63	1573.25	± 1.05
175	166.63	833.13	1666.27	± 1.18





Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.