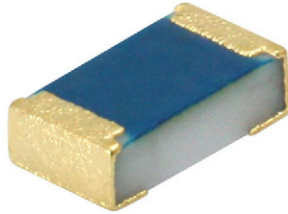


## Gold Terminated Platinum SMD Flat Chip Temperature Sensor



### LINKS TO ADDITIONAL RESOURCES



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.

### 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### APPLICATIONS

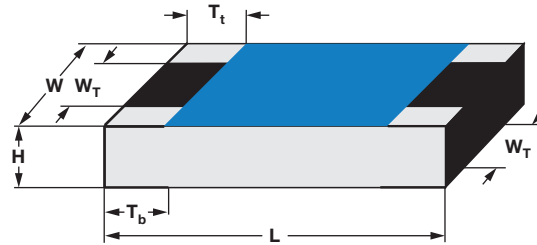
Temperature measurement and control in:

- Automotive electronics
- Aviation electronics
- Industrial electronics

TECHNICAL SPECIFICATIONS				
DESCRIPTION		PTS0603U	PTS0805U	PTS1206U
Resistance values $R_0$ at 0 °C		100 $\Omega$	100 $\Omega$ , 500 $\Omega$	100 $\Omega$ , 500 $\Omega$ , 1000 $\Omega$
Temperature coefficient (0 °C to +100 °C)		+3850 ppm/K		
Tolerance classes		F0.3		
Temperature range		-55 °C to +175 °C		
Long term stability $ \Delta R_0/R_0 $ ; $R_0$ change after 1000 h at +155 °C		$\leq 0.04$ %		
Insulation resistance		$> 10$ M $\Omega$		
Measurement current $I_{meas.}$ (DC) <sup>(1)</sup>	100 $\Omega$	0.1 mA to 0.5 mA	0.1 mA to 1.0 mA	0.1 mA to 1.0 mA
	500 $\Omega$	-	0.1 mA to 0.4 mA	0.1 mA to 0.4 mA
	1000 $\Omega$	-	-	0.1 mA to 0.25 mA
Self-heating at 0 °C <sup>(2)</sup>	Calm air ( $v = 0.0$ m/s)	$\leq 0.9$ K/mW	$\leq 0.8$ K/mW	$\leq 0.7$ K/mW
Thermal response time <sup>(2)</sup>	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 <sub>observed</sub>		$\leq 0.1 \times 10^{-9}$ /h		

### Notes

- <sup>(1)</sup> Indicated measurement currents can be applied continuously with self-heating effect of less than 0.1 °C  
<sup>(2)</sup> Valid for sensor element only

**DIMENSIONS** in millimeters


DIMENSIONS AND MASS							
TYPE	H	L	W	W <sub>T</sub>	T <sub>t</sub>	T <sub>b</sub>	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<sub>2</sub>O<sub>3</sub>) 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 <sup>(1)</sup>.

**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.

**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](http://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>

**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 <sup>(2)</sup>
- The Global Automotive Declarable Substance List (GADSL) <sup>(3)</sup>
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) <sup>(4)</sup> 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](http://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](http://www.vishay.com/doc?49037).

**APPROVALS**

The PTS ATAU sensors are tested in accordance with:

- IEC 60751 <sup>(1)</sup>
- IEC 60068 series
- AEC-Q200



PART NUMBER AND PRODUCT DESCRIPTION <sup>(1)</sup>																	
PART NUMBER: PTS0603U1B100RPU00																	
P	T	S	0	6	0	3	U	1	B	1	0	0	R	P	U	0	0
<b>TYPE</b>	<b>SIZE CODE</b>	<b>VERSION</b>	<b>TOLERANCE CLASS</b>	<b>RESISTANCE VALUE</b>	<b>PACKAGING</b>	<b>SPECIAL</b>											
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**

<sup>(1)</sup> 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:

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

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:

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

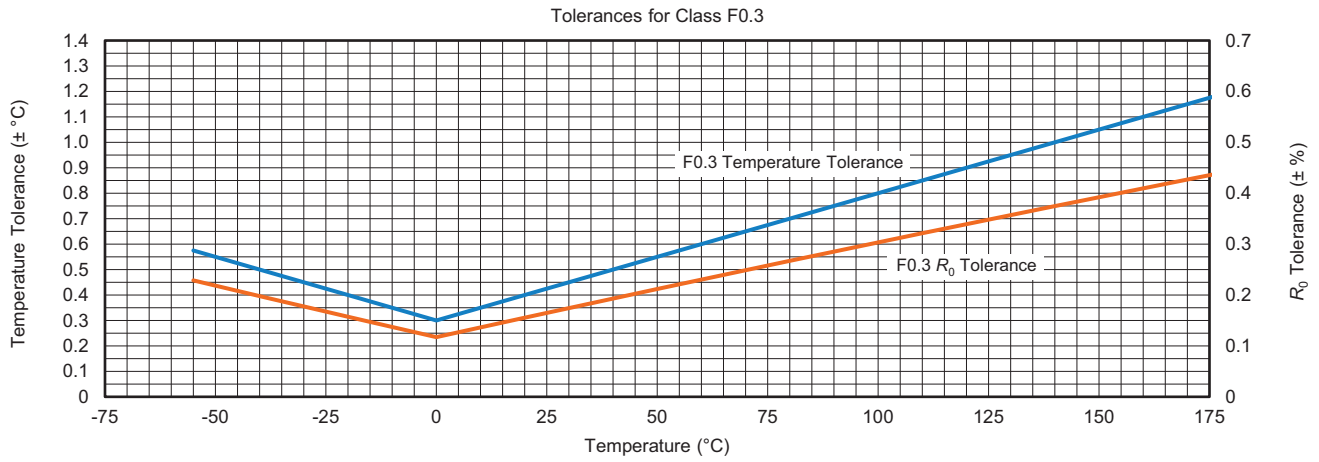
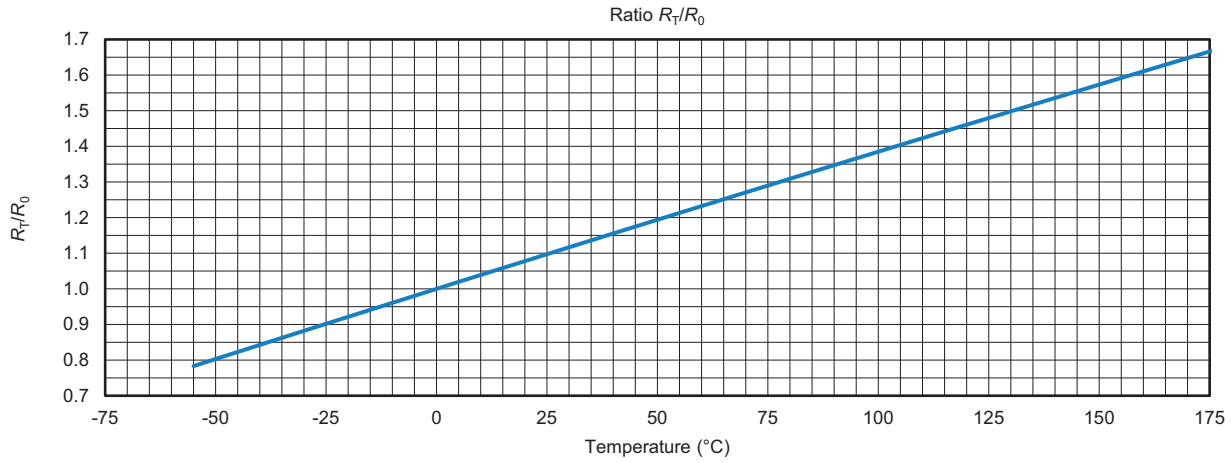
$$B = -5.7750 \times 10^{-7} \text{ °C}^{-2}$$

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

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

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

NOMINAL RESISTANCE VALUES AND TEMPERATURE TOLERANCE				
TEMPERATURE (°C)	NOMINAL RESISTANCE (Ω)			TOLERANCE (K)
	$R_0 = 100 \text{ Ω}$	$R_0 = 500 \text{ Ω}$	$R_0 = 1000 \text{ Ω}$	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





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