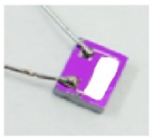
Thin-Film Platinum Resistance Temperature Sensor (PRT)



Product Description:

Temperature sensors are thin film platinum based PRTs. Nominal resistance at ambient is around 1 KΩ with sensitivity of 3Ω/°C.
Sensor variants with nominal resistance R_0 values of 100Ω, 500Ω & 1500Ω can also be customized as per application requirements.

Features:

- Operating Ranges : -20°C to 100°C
- Accuracy : 1°C
- Nominal Resistance (25°C) : 1KΩ ± 5%
- Sensitivity : 3Ω/°C
- Package : TO-46/52, Bare Dies, Custom
- Die Size : 2.0 mm x 2.5 mm x 0.675 mm

Product Specification		
S.No.	**Parameters**	**Specification**
1	Temperature Range[1]	-20°C to 100 °C
2	Calibration Accuracy[2]	0.1°C
3	Nominal Resistance (at 0°C), R_0	900 Ω
4	Nominal Temperature Coefficient, TCR	0.00315 Ω/Ω/°C
5	Package Style	TO-46/52, Dies, Custom Package
6	Lead Length	13.5 ± 0.5mm (TO-46/52)
7	Storage Temperature	-65°C to 135°C
8	Bare Die Size	2.0 mm x 2.5 mm x 0.675 mm
9	Response Time in still air using LCSR[3] method (τ63.2%)	40 sec (TO-46)
		3 sec (bare die, with lead wires)
10	Recommended values of excitation Current	0.1mA to 0.3mA

R-T Calibration Polynomial[4]

$R_T = R_0 (1+AT+BT2)$

R_T = Resistance at Temperature T°C
R_0 = Resistance at Temperature 0°C
A, B = Polynomial Coefficients

Note-1: Wider Temperature ranges are also available.
Note-2: Accuracy with calibration coefficients (R0, A & B) in the range -20°C to 100 °C.
Note-3: LCSR (Loop Current Step Response). This response time corresponds to the package TO-46/52.
Note-4: Each sensor is individually calibrated with 0.1 mA of excitation current. Sensor comes with values of calibration coefficients R_0, A & B.

Description

SCL's thin film temperature sensors are made of high purity platinum, which is deposited by E-beam evaporation system on silicon substrate. The sensing element was patterned using photolithographic process as per the design layout. The electrical connection between die pads to pin out through aluminum wire bonding using ultrasonic wire bonder.

PRT is a two terminal Pt- based resistance. Sensor resistance changes with temperature. Change in sensor resistance may be detected by known constant current excitation and reading back sensor voltage.

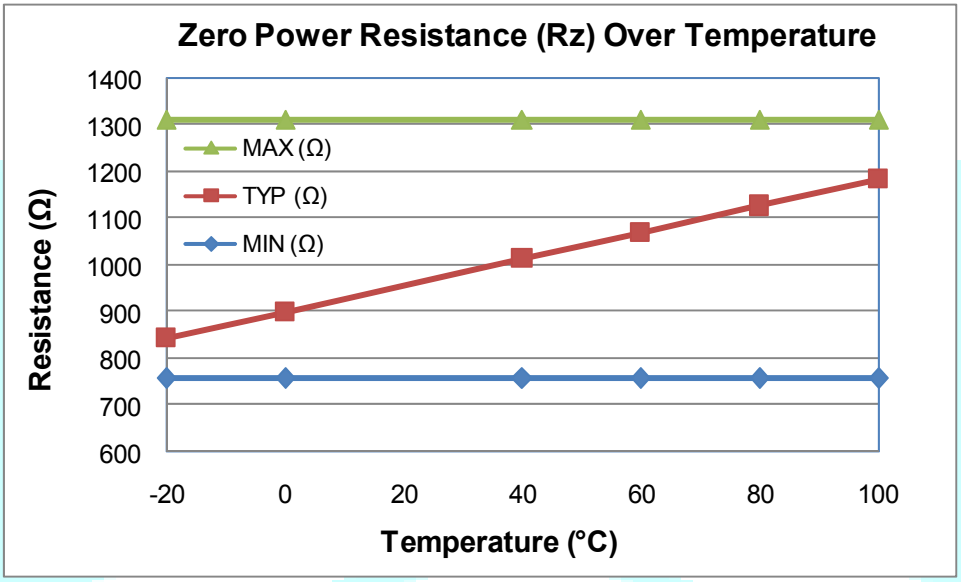
Specifications

Platinum Resistance Temperature Sensor (PRT)	
Part No.	PRT-0900
Temperature Range	-20°C to 100 °C
Accuracy[1]	< 0.5°C
Nominal Resistance (at 0°C), R_0	900 Ω
Nominal Temperature Coefficient, TCR	0.00315 Ω/Ω/°C
Package Style	TO-46/52 with Cap
Body Base Material	KOVAR Header with Nickel Cap
Lead Base Material	KOVAR
Weight (Maximum)	350 mg
Lead Length	13.5 ± 0.5mm
Storage Temperature	-65°C to 135°C
Response Time in still air using LCSR2 method (τ63.2%)	< 40 sec

Note-1: Worst case accuracy with calibration coefficients (R0, A & B) in the range -20°C to 100 °C.

Note-2: LCSR (Loop Current Step Response). This response time corresponds to the chosen package TO46.

Zero Power Resistance & Temperature Characteristics



Resistance vs. Temperature Calibration Polynomial

$$R_T = R_0 (1+AT+BT^2)$$

R_T= Resistance at Temperature T°C

R_0= Resistance at Temperature 0°C

A, B = Polynomial Coefficients

Each sensor is individually calibrated with 0.1 mA of measurement dc current.

Absolute Maximum Ratings

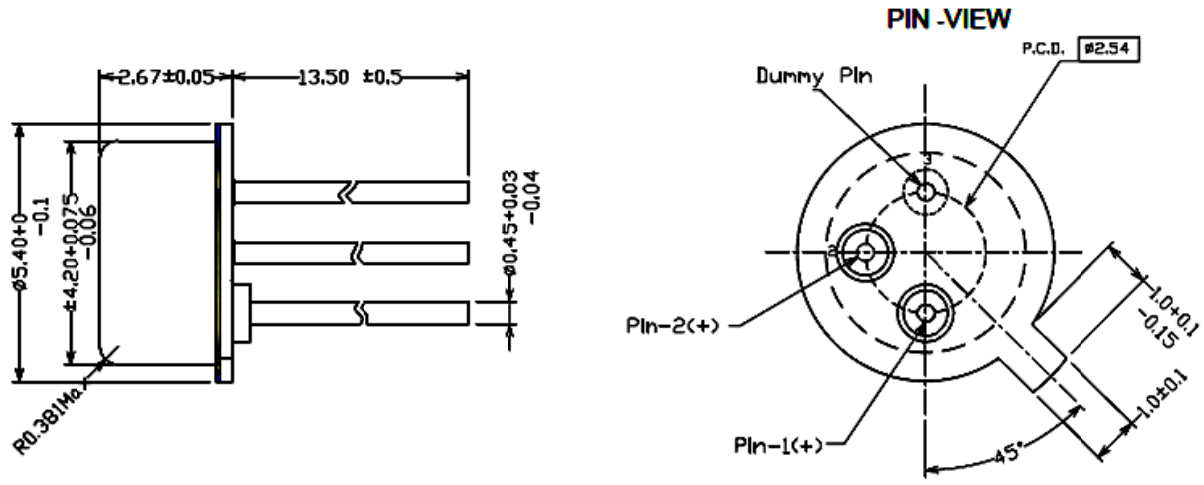
The maximum ratings shall not be exceeded at any time during use or storage

Parameter	Min.	Max.	Units
DC Measurement Voltage	-	0.76	Volts
DC Measurement Current	-	1.0	mA
Power dissipation (PD)		1.5	mW
Storage Temperature (T_{STG})	-65	135	°C

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating DC Current	-	0.1	0.3	mA
Zero Power Resistance (R_Z) at 0°C	810	900	990	Ω
TC of Resistance (TCR)	0.00306	0.00315	0.00324	(Ω/Ω/°C)
Insulation Resistance	100	-	-	MΩ
Operating Temperature (T_{AMB})	-20	-	100	°C

Mechanical Drawing



All dimensions are in mm

Important Notice

Semi Conductor Laboratory (SCL) reserves the right to make corrections, enhancements, improvements and other changes to its sensor products and specifications, and to discontinue any product. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

Reproduction of significant portions of SCL information in SCL data sheets is permissible only if reproduction is without alteration and is accompanied by all associated conditions, limitations, and notices. SCL is not responsible or liable for such altered documentation.