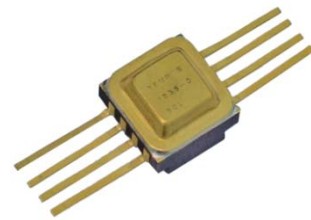


# **CMOS TEMPERATURE SENSOR**

**(SC1025-0)**



**DATA SHEET**  
**(Version 1.1, Dec 2021)**



**Semi-Conductor Laboratory**  
**Government of India**  
**S.A.S. Nagar, Punjab-160071**  
**[www.scl.gov.in](http://www.scl.gov.in)**



### PRODUCT DESCRIPTION:

The device is low voltage, precision centigrade temperature sensor which provides output voltage directly proportional to Celsius temperature. The core circuit comprises of traditional CTAT and PTAT block. Both CTAT and PTAT are BJT based blocks to improve performance. Cascode structures are used to improve mirroring and PSRR.

The CTAT is subtracted from PTAT to obtain desired output and sensitivity. The output of core block is:

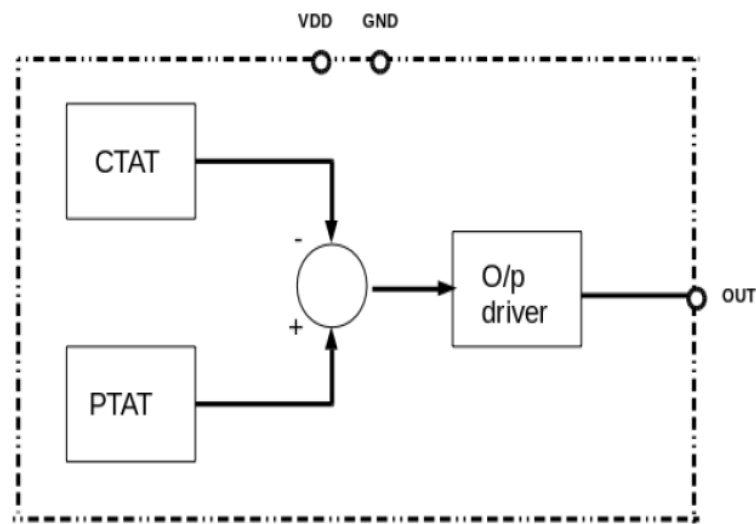
$$\text{Output} = \alpha \cdot \text{PTAT} - \beta \cdot \text{CTAT}$$

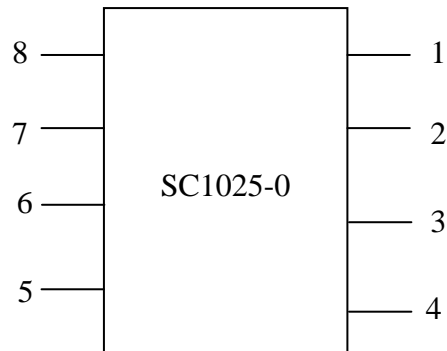
Where  $\alpha$  and  $\beta$  are scaling factor used to scale the output voltage and sensitivity.

### FEATURES:

- Power Supply Range:  $3\text{V} \pm 0.3\text{V}$
- Supply Current:  $300\ \mu\text{A}$
- Temperature range  $-20^\circ\text{C}$  to  $120^\circ\text{C}$
- Non-Linearity:  $0.25^\circ\text{C}$  (BFSL,  $25^\circ\text{C}$  to  $100^\circ\text{C}$ )
- Error:  $0.2^\circ\text{C}$  (2nd-Order,  $-20^\circ\text{C}$  to  $120^\circ\text{C}$ )
- Scale Factor (Typical):  $11.5\ \text{mV/deg. C}$
- PSRR:  $0.13\ ^\circ\text{C/V}$
- Typical Output Voltage (at  $25^\circ\text{C}$ ):  $675\ \text{mV}$
- Output Load Current:  $50\ \mu\text{A}$
- Capacitive Load Drive:  $100\ \text{pF}$
- 8 pin flat /SOP Package
- Die size:  $0.68\ \text{mm} \times 0.75\ \text{mm}$ , Thickness : $0.725\ \text{mm}$
- Standard  $180\ \text{nm}$  CMOS Technology

### BLOCK DIAGRAM:



**DEVICE PIN CONFIGURATION:****DEVICE PIN DESCRIPTION:**

PIN NUMBER	PIN NAME	DESCRIPTION
1	V <sub>SS</sub>	Ground
2	V <sub>DD</sub>	Positive Power Supply
3	V <sub>OUT</sub>	Output
4, 5, 6, 7, 8	NC	NC

**ELECTRICAL SPECIFICATIONS:**

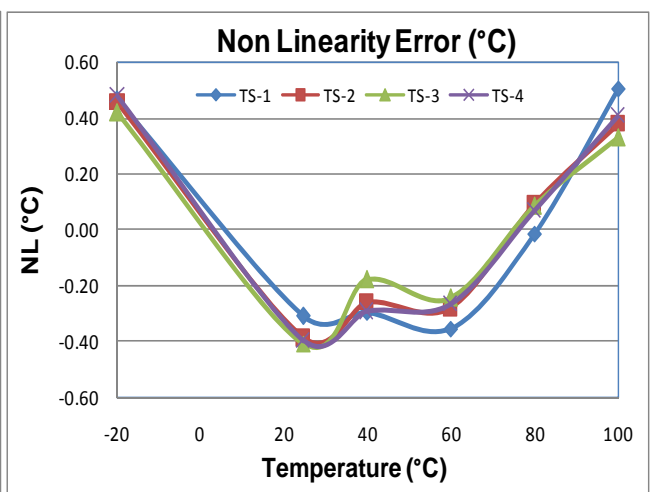
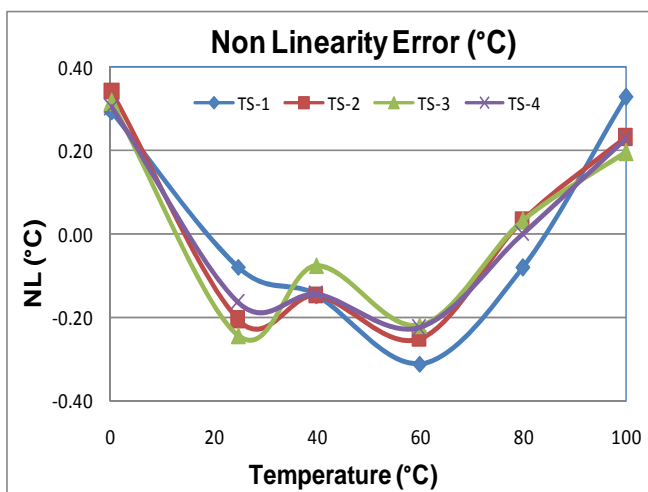
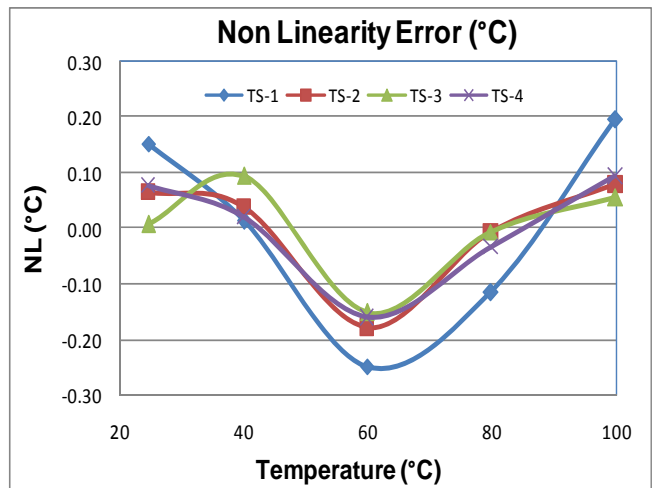
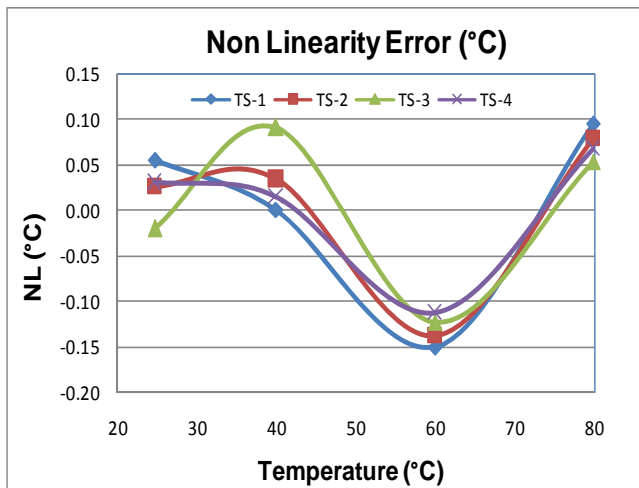
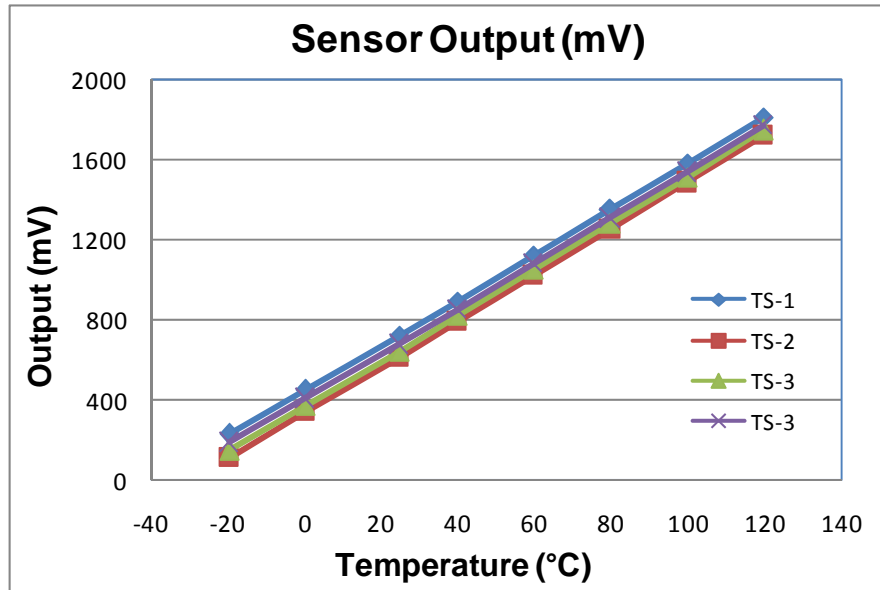
(V<sub>DD</sub> = 3.3V, -10°C < T<sub>AMB</sub> < 85°C), Otherwise Specified

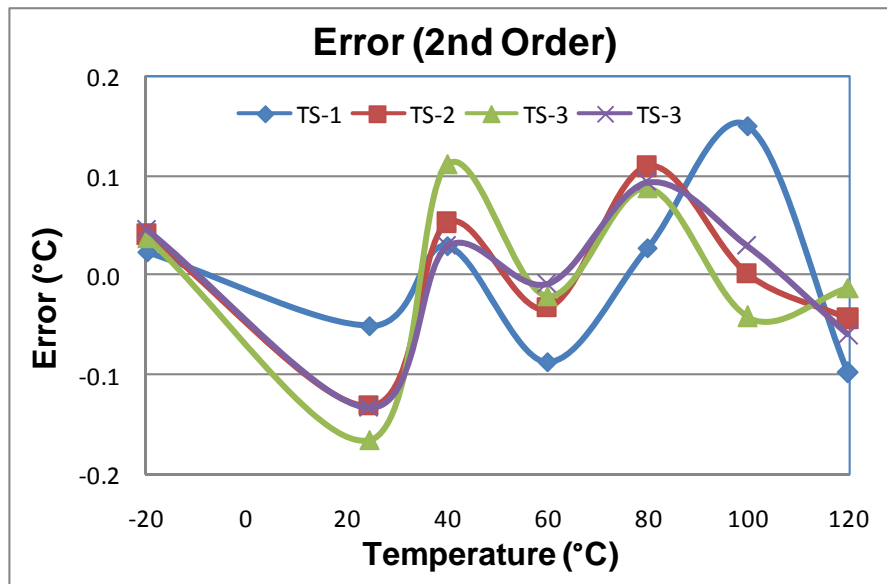
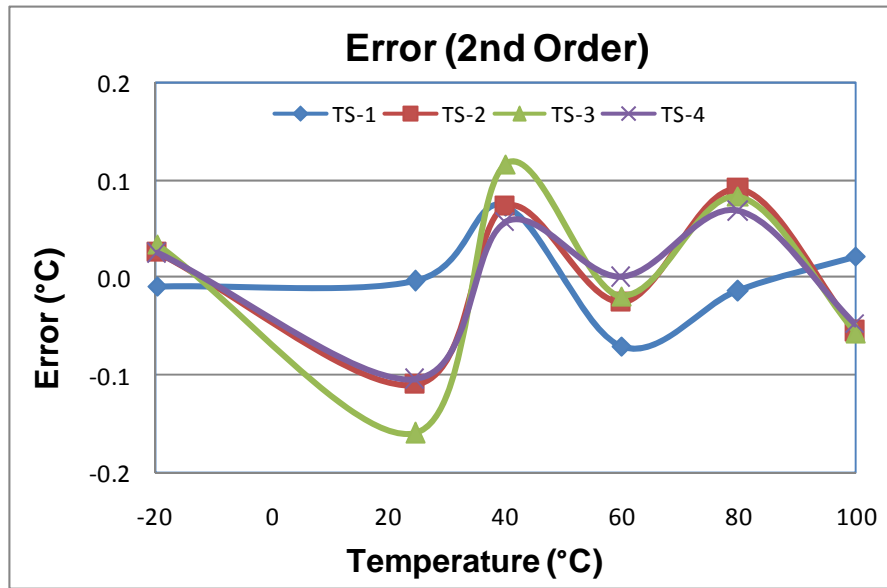
Specification	Symbol	Test Condition	Min	Typ	Max	Unit
Scale Factor		-20°C to 120°C	11.0	11.5	12.0	mV/°C
Non-Linearity		25°C to 85°C 25°C to 100°C 0°C to 100°C -20°C to 100°C	-	0.15 0.25 0.35 0.5	-	°C
Load Regulation		0 < I <sub>L</sub> < 50uA		0.004	0.0075	°C/μA
Power Supply Rejection Ratio	PSRR	T <sub>A</sub> = 25°C 3 < V <sub>DD</sub> < 3.6		0.062	0.130	°C/V
Typical Output Voltage	V <sub>OUT</sub>	T <sub>A</sub> = 25°C	600	675	750	mV
Output Load Current	I <sub>L</sub>				50	μA
Supply Current	I <sub>DD</sub>			300	400	μA
Capacitive Load Driving	C <sub>L</sub>	No Oscillations			100*	pF
Device Turn on time		Output with 1°C Load = 100Kohm    100pF		120	400*	us

\* Note: Simulation Results



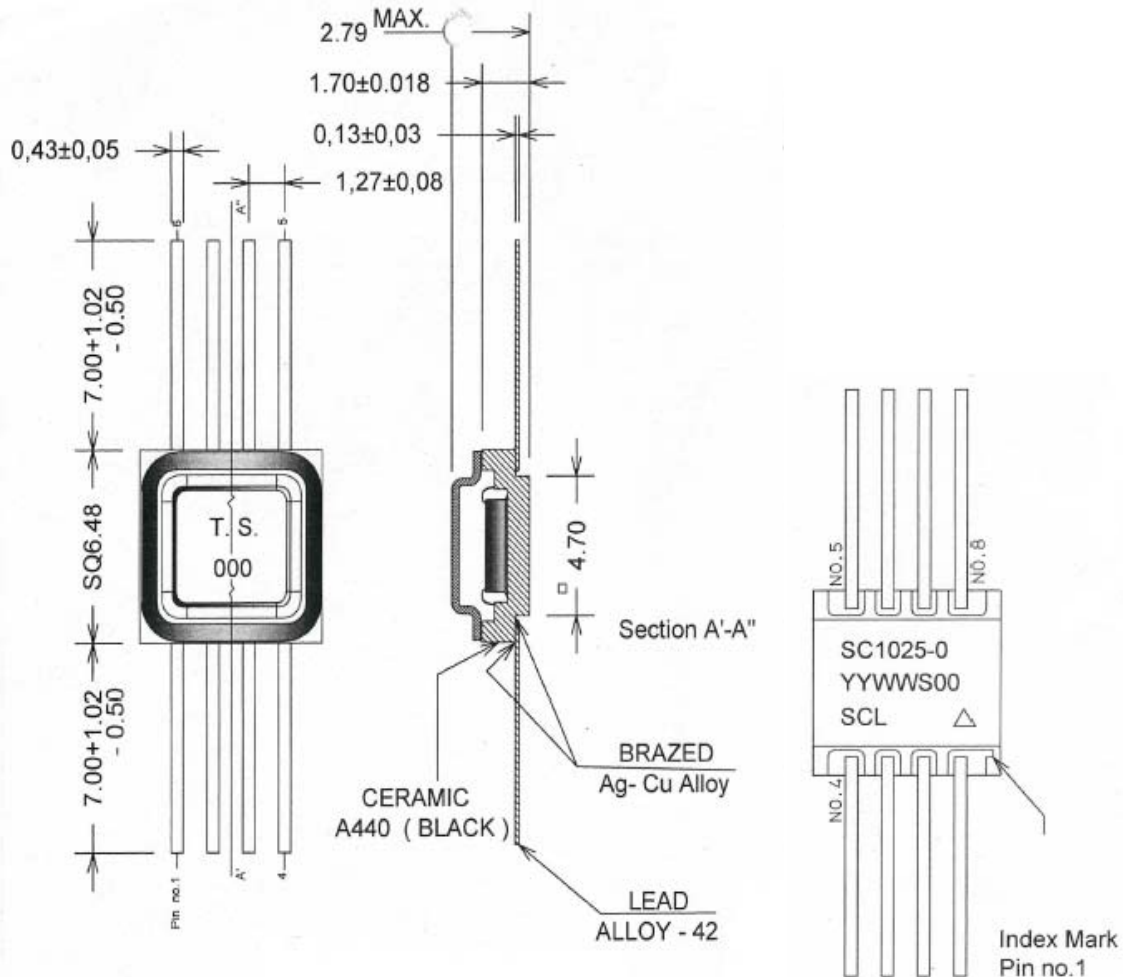
TEMPERATURE CHARACTERISTICS (SC1025-0):







**MECHANICAL DRAWING OF PACKAGE:**



**Bottom View**

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