Esercitazione 2

AD592CN (sensore di temperatura integrato): Stima della temperatura quando l'uscita è pari a 310.2uA (file collegato esercitazione2.m)

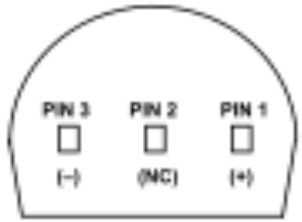
ANALOG DEVICES

Low Cost, Precision IC Temperature Transducer

AD592

FEATURES
High Precalibrated Accuracy: 0.5°C max @ +25°C
Excellent Linearity: 0.15°C max (0°C to +70°C)
Wide Operating Temperature Range: –25°C to +105°C
Single Supply Operation: +4 V to +30 V
Excellent Repeatability and Stability
High Level Output: 1 μA/K
Two Terminal Monolithic IC: Temperature In/ Current Out
Minimal Self-Heating Errors

CONNECTION DIAGRAM



★ PIN 2 CAN BE EITHER ATTACHED OR UNCONNECTED
BOTTOM VIEW

PRODUCT DESCRIPTION

The AD592 is a two terminal monolithic integrated circuit temperature transducer that provides an output current proportional to absolute temperature. For a wide range of supply voltages the transducer acts as a high impedance temperature dependent current source of 1 μA/K. Improved design and laser wafer trimming of the IC's thin film resistors allows the AD592 to achieve absolute accuracy levels and nonlinearity errors previously unattainable at a comparable price.

The AD592 can be employed in applications between –25°C and +105°C where conventional temperature sensors (i.e., thermistor, RTD, thermocouple, diode) are currently being used. The inherent low cost of a monolithic integrated circuit in a plastic package, combined with a low total parts count in any given application, make the AD592 the most cost effective temperature transducer currently available. Expensive linearization circuitry, precision voltage references, bridge components, resis-

PRODUCT HIGHLIGHTS

1. With a single supply (4 V to 30 V) the AD592 offers 0.5°C temperature measurement accuracy.
2. A wide operating temperature range (–25°C to +105°C) and highly linear output make the AD592 an ideal substitute for older, more limited sensor technologies (i.e., thermistors, RTDs, diodes, thermocouples).
3. The AD592 is electrically rugged; supply irregularities and variations or reverse voltages up to 20 V will not damage the device.
4. Because the AD592 is a temperature dependent current source, it is immune to voltage noise pickup and IR drops in the signal leads when used remotely.
5. The high output impedance of the AD592 provides greater than 0.5°C/V rejection of supply voltage drift and ripple.

Model	AD592AN Min	AD592AN Typ	AD592AN Max	AD592BN Min	AD592BN Typ	AD592BN Max	AD592CN Min	AD592CN Typ	AD592CN Max	Units
ACCURACY										
Calibration Error @ +25°C[1]		1.5	**2.5**		0.7	**1.0**		0.3	**0.5**	°C
T_A = 0°C to +70°C										
Error over Temperature		1.8	3.0		0.8	1.5		0.4	0.8	°C
Nonlinearity[2]		0.15	0.35		0.1	0.25		0.05	0.15	°C
T_A = –25°C to +105°C										
Error over Temperature[3]		2.0	**3.5**		0.9	**2.0**		0.5	**1.0**	°C
Nonlinearity[2]		0.25	0.5		0.2	0.4		0.1	0.35	°C
OUTPUT CHARACTERISTICS										
Nominal Current Output @ +25°C (298.2K)		298.2			298.2			298.2		µA
Temperature Coefficient		1			1			1		µA/°C
Repeatability[4]			0.1			0.1			0.1	°C
Long Term Stability[5]			0.1			0.1			0.1	°C/month
ABSOLUTE MAXIMUM RATINGS										
Operating Temperature	–25		+105	–25		+105	–25		+105	°C
Package Temperature[6]	–45		+125	–45		+125	–45		+125	°C
Forward Voltage (+ to –)			**44**			**44**			**44**	V
Reverse Voltage (– to +)			**20**			**20**			**20**	V
Lead Temperature (Soldering 10 sec)			300			300			300	°C
POWER SUPPLY										
Operating Voltage Range	4		30	4		30	4		30	V
Power Supply Rejection										
+4 V < V_S < +5 V			**0.5**			**0.5**			**0.5**	°C/V
+5 V < V_S < +15 V			**0.2**			**0.2**			**0.2**	°C/V
+15 V < V_S < +30 V			**0.1**			**0.1**			**0.1**	°C/V

AD592

- Dal datasheet
  - Sensibilità 1uA/C
  - Linearità 0.15 C
  - Errore di taratura (assoluto) 0.8 C
  - Nota: “calibration error 25 C” 0.5C
    - Andrebbe sommato per l’incertezza di taratura totale, ma può essere annulato circuitalmente.

Funzione di taratura

- Le funzione di taratura è compresa nella fascia a ridosso dell'approssimazione lineare della curva di taratura determinata dall'errore di non linearità e l'incertezza assoluta
- Approssimazione lineare curva di taratura

$$x = c(y - o)$$

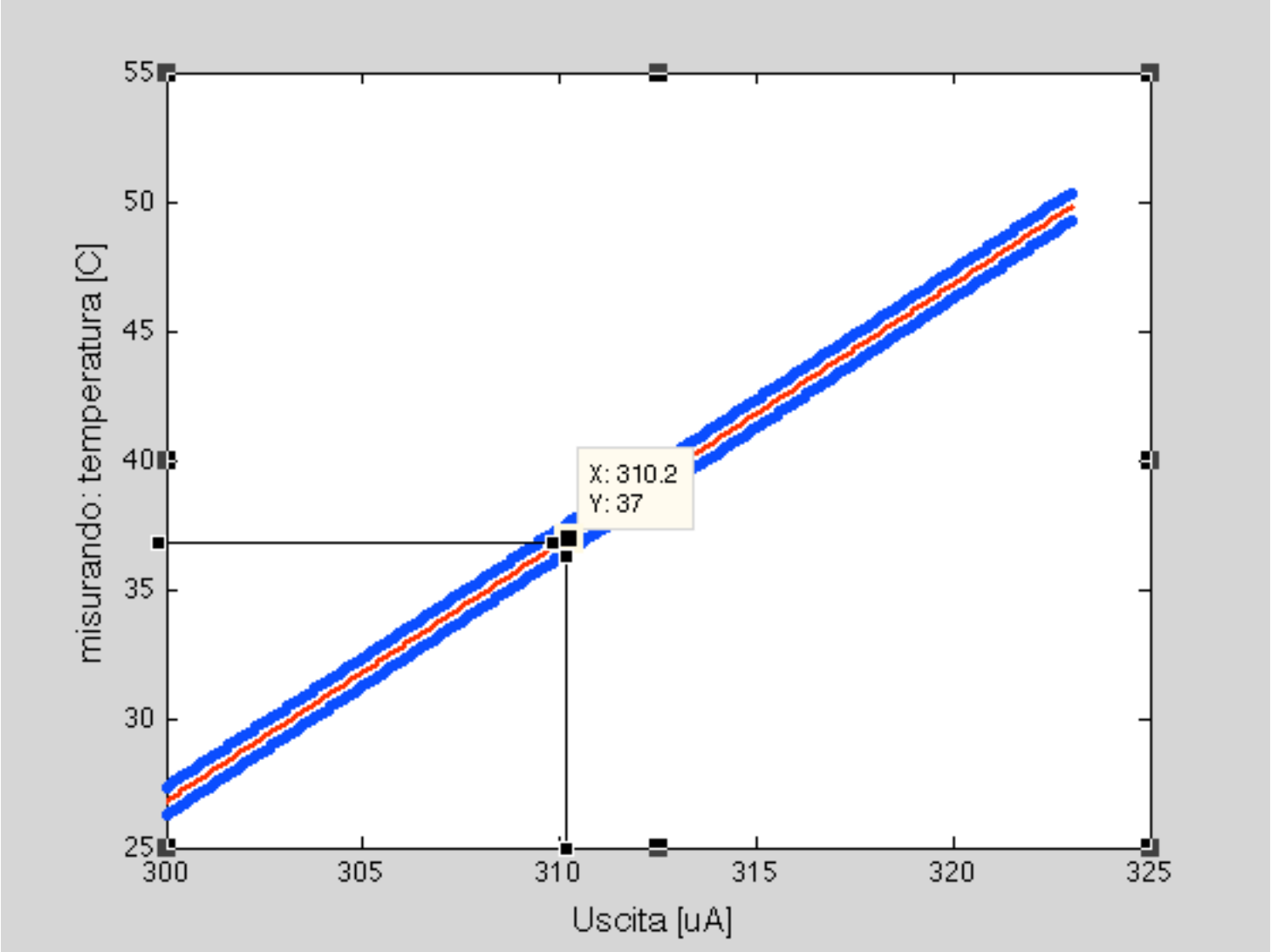
o = 273.2 uA (preso dalla tabella del data sheet)

$$c = 1\ C / \mu A$$

Inverso sensibilità

- Incertezza totale: 0.8+2*0.15=1.10 C

Approssimazione Funzione di taratura



Stima del misurando

- Ricavo x=(310.2 – 273.2) = 37 C
- Considerando l'incertezza totale di 1.10 C, la temperatura misurata sta nell'intervallo [36.45C, 37.55C]