SENSYLINK Microelectronics

(CHT8575)

Digital Humidity &Temperature Sensor

CHT8575 is a Digital Humidity and Temperature Sensor with ±2.0%RH accuracy for humidity and ±0.1°C accuracy for temperature . It is compatible with SMBus, I2C Interface. It is ideally used in HVAC, Portable/Wearable weather monitor， environment monitor etc.

1 Description

CHT8575 is a digital humidity and temperature sensor with ±2.0%RH(Typ.) accuracy for humidity and ± 0.1℃(Typ.) accuracy for temperature. It provides high accuracy measurements over a wide supply range (1.8 V – 5.5 V), along with ultra-low power consumption. Humidity and Temperature data can be read out directly via digital interface by MCU, Bluetooth Chip or Soc chip.

The digital interface is compatible with SMBus and I2C protocol. Also, it supports communication with high speed (up to 1.0MHz) for I2C protocol.

Each chip is specially calibrated for temperature and humidity accuracy in factory before shipment to customers. There is no need for re-calibration anymore.

It includes a high precision band-gap circuit, an analog to digital converter, a calibration unit with non-volatile memory, and a digital interface block.

Available Package: CSP-4 package

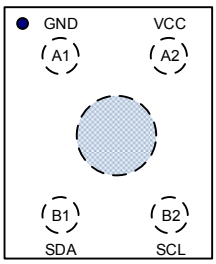
2 Features

- Operation Voltage: 1.8V to 5.5V
- Average Operating Current: 5.5uA (Typ.)@ 3.3V, 1Con/s for Both temperature and humidity Conversion
- Standby Current: 0.36uA(Typ.)
- Temperature Accuracy with calibration:
  ±0.1℃(Typ.), ±0.15℃(Max.)from 20℃ to 50℃
  ±0.2℃(Typ.), ±0.4℃(Max.)from 0℃ to 100℃
  ±0.3℃(Typ.), ±0.8℃(Max.) from -40℃ to 125℃
- Humidity Accuracy with calibration:
  ±2.0%RH(Typ.),±4.0%RH(Max.) from 20%RH to 80%RH
- Digital Interface compatible with SMBus and I2C, support:
  Packet Error Checking feature to improve communication reliability and robustness
  Speed up to 1.0MHz
  SMBus General Call
- Supports One shot or continuous measurement
- NIST traceability
- Temperature Range: -40℃ to 125 ℃
- Humidity Range: 0%RH to 100%RH

3 Applications

- Portable/Wearable Weather Monitor
- Smart HVAC System
- Cold Chain asset tracking & data logger
- Environment Monitor
- IP Camera

4 PIN Configurations (Top View)



CSP-4(Package Code J4)

5 Typical Application

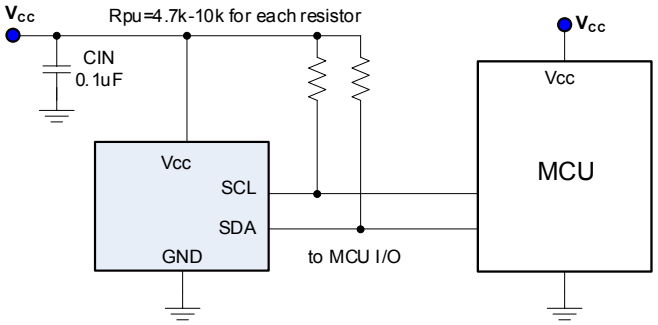


Figure 1 Typical Application of CHT8575

6 Pin Description

PIN No.	PIN Name	Description
A2	Vcc	Power supply input pin, using 0.1uF low ESR ceramic capacitor to ground
B2	SCL	Digital interface clock input pin, need a pull-up resistor to Vcc.
B1	SDA	Digital interface data input or output pin, need a pull-up resistor to Vcc.
A1	GND	Ground pin.

7 Function Block

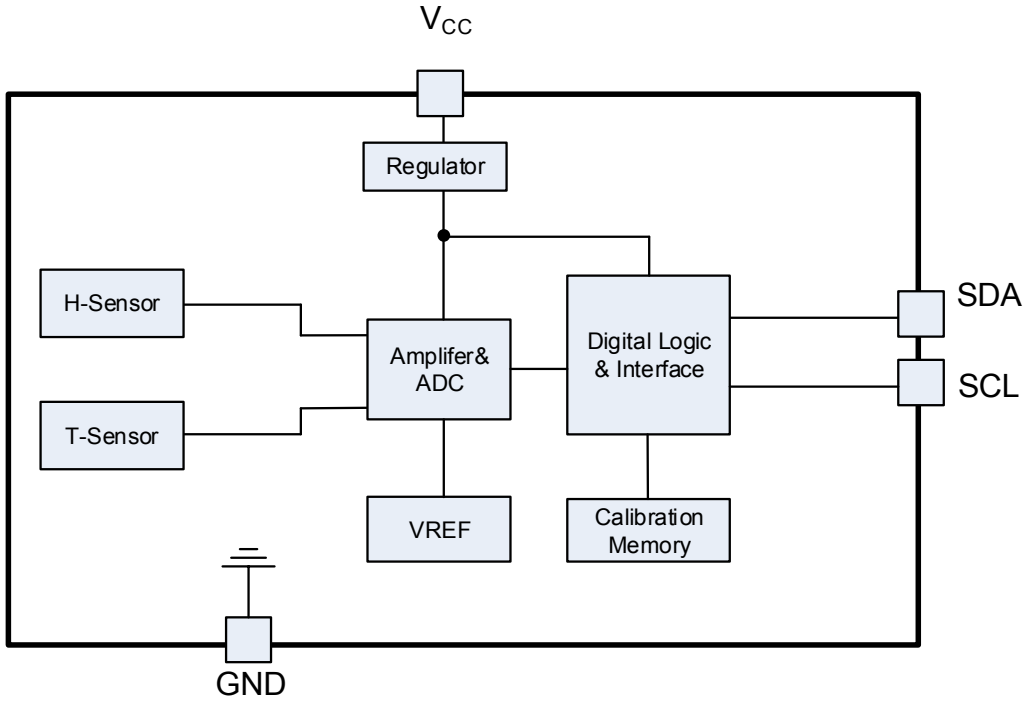


Figure 2 CHT8575 function block

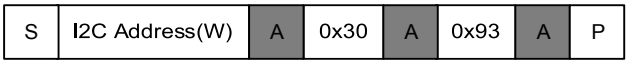


Figure 13 Break command

10.3. Conversion of Signal Output

Measurement data is always transferred as 16-bit values (unsigned integer). The relationship between humidity data in %RH unit and binary data is shown as below formula. Also humidity data can be considered as combination by each bit with 0.01%RH resolution.

Relative humidity conversion formula (result in %RH):

$$\text{Relative Humidity(\%RH)} = 100\% * \frac{\text{Humidity[bit15:0]}}{2^{16} - 1}$$

Temperature conversion formula (result in °C & °F):

$$\text{Temperature(°C)} = -45+175 * \frac{\text{Temperature[bit15:0]}}{2^{16} - 1}$$

$$\text{Temperature(°F)} = -49+315 * \frac{\text{Temperature[bit15:0]}}{2^{16} - 1}$$

10.4. Heater

10.4.1 Heater Enable and Disable

The CHT8575 includes an integrated heater with enough current draw to enable operation in condensing environments. The heater protects the humidity sensor area by preventing condensation as well as removing condensate. Enabling heater through command 0x306D and disable heater using command 0x3066.

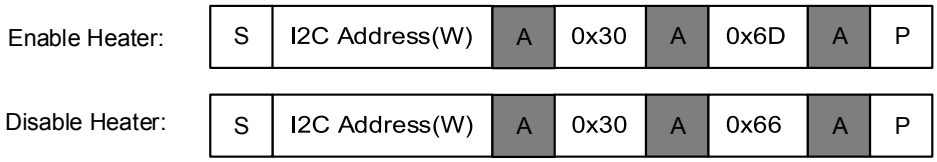


Figure 14 Enable Heater & Disable Heater Command

The heater is expected to impact the temperature measurement result and the relative humidity measurement result. An IC-based humidity sensor uses the die temperature as an estimate for the ambient temperature. Use of the heater will increase the die temperature up to 50°C above ambient temperature. Therefore, accurate measurement results of ambient temperature and relative humidity are not possible when the heater is in operation.

It is important to recognize that the integrated heater will evaporate condensate that forms on top of the humidity sensor, but does not remove any dissolved contaminants. This contaminant residue, if present, may impact the accuracy of the humidity sensor.

10.4.2 Configure Level of Heater Current

The CHT8575 heater architecture is comprised of 14 resistors in parallel, allowing support of several different power levels. The intent of this resistor array is to configure the appropriate heater current for offset error correction or condensation prevention/removal based on the ambient temperature and supply voltage. Table 2 below provides a partial list of heater configuration options. Figure 15 provides the sequence of setting the heating mode to full power.

Table 2 Configurations of HEATER_CONFIG

DESIRED HEATER CONFIGURATION	REQUIRED HEATER_CONFIG	CRC
ENABLE HEATER full power	3F FF	06
ENABLE HEATER half power	03 FF	00
ENABLE HEATER quarter power	00 9F	96

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