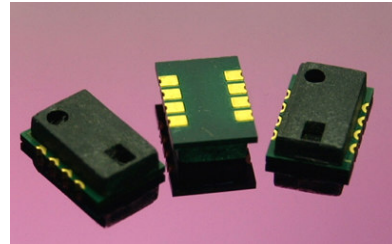


Features

- On-Chip humidity & temperature sensors
- Fully calibrated, 16 bit digital output
- Excellent long-term stability
- Low power consumption
- Serial interface control.
- Available in 8 SOP or Die



SMTHT08I Product Summary

The HT08I is a Read Out IC (ROIC) for Capacitive Sensor (ex. Humidity, Pressure etc) comprising a calibrated digital output. The device includes a capacitive to voltage converter (C-V Converter) for relative capacitive sensor elements and a band-gap temperature sensor. Both are seamlessly coupled to a 14bit analog to digital converter and a serial interface circuit on the same chip. This results in superior signal quality, a fast response time and insensitivity to external disturbances at a very competitive price.

Each HT08I is individually calibrated in a precision chamber. The calibration coefficients are programmed into the OTP memory. These coefficients are used internally during measurements to calibrate the signals from the sensors.

The 2-wire serial interface and internal voltage regulation allows easy and fast system integration. Its tiny size and low power consumption makes it the ultimate choice for even the most demanding applications.

Application

- HVAC -Test & Measurement
- Automotive -Data Logging
- Consumer Goods -Automation
- Weather Stations -White Goods
- Humidifiers -Medical
- Dehumidifiers

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Specifications

Working range

Humidity:	0-100	% RH
Temperature	-40 – 120	°C

Accuracy

Humidity	± 3	% RH
Temperature	± 3	°C (- 10 – 80 °C)

Response time	< 5	s
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Resolution

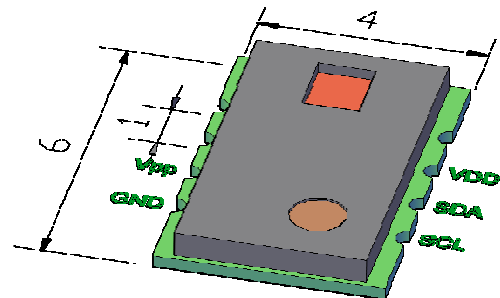
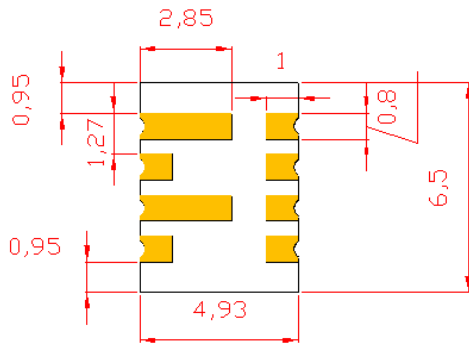
Humidity	0.03	% RH
Temperature	0.05	°C

Data out	16	Bits
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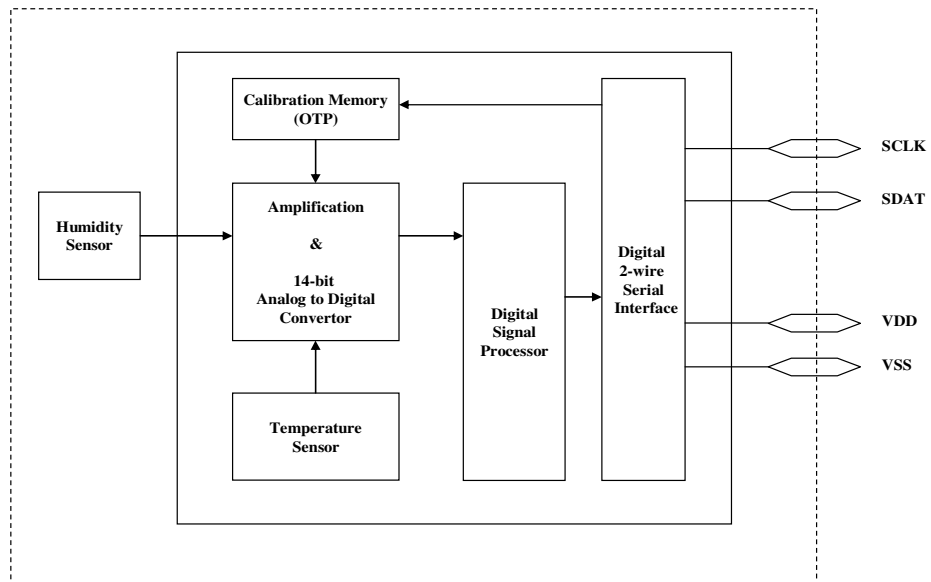


Dimension(all sizes in mm)

- W * L * T = 4.93 * 6.5 * 1.53
- PAD PITCH : 1.27mm3

Pin Descriptions

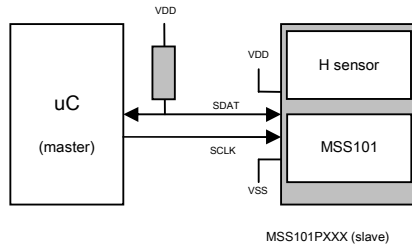
Name	Pin Function
NC	No Connection. Must be Open
HSEN	Sensor Terminal. Connect to GND
NC	No Connection. Must be Open
VPP	OTP Write Signal Pin
SCL	Serial clock Input Pin
SDA	Serial Data Pin
VDD	Power Pin
VSS	Ground Pin



Block Diagram HT08I

Interface Specifications

The HT08I chip is 2-wire serial interface.



Power pins

The HT08I requires a voltage supply between 2.4 and 3.6v. After power up, the device needs 10ms to reach its “stand-by” state. No commands should be sent before that time. Power supply pins (Vcc, Gnd) may be decoupled with a 0.1uF capacitor.

Serial Interface (Bidirectional 2-wire)

The serial interface of the HT08I is optimized for sensor readout and power consumption and is not compatible with I²C interface. ????

Serial clock input (SCLK)

The SCLK is used to synchronize the communication between a microcontroller and the HT08I. Since the interface consists of fully static logic there is no minimum SCK frequency.

Serial data (SDAT)

The SDAT tri-state pin is used to transfer data in and out of the device. Data changes after the falling edge and is valid on the rising edge of the serial clock SCLK. During transmission the SDAT line must remain stable while SCLK is high. An external pull-up

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resistor (e.g. 10k Ω) is required to pull the signal high. Pull-up resistors are often included in I/O circuits of microcontrollers

HT08I command & Resister

HTD700S Command	Code
Write Command	1000 0000
Read Command	1000 0001
Measure Temperature	1000 0010
Measure Humidity	1000 0011

HTD08I Command table

HT08I Register Map

Addresses	Register command	default
R0 ~ R15	Reserved User must not use R0 ~ R15.	
R16	Read Humidity	xxxb bbbb
R17	Read Humidity	bbbb bbbb
R18	Read Temperature	xxbb bbbb
R19	Read Temperature	bbbb bbbb

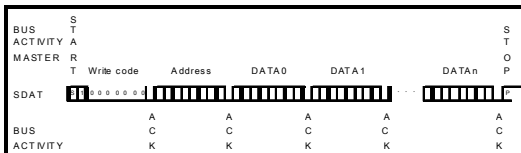
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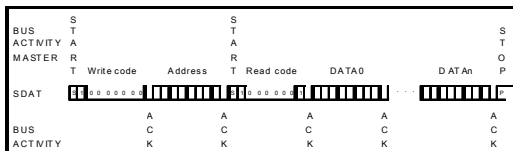
Write operation

Following the start signal from the master like as I²C protocol, the device command code (8 bits) is placed onto the bus by the master transmitter. See HT08I command table for device code (8 bits).



Read operation

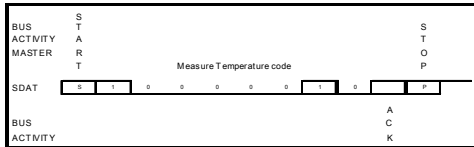
Read operations are initiated in the same way as write operations with the exception that the R/W bit of the slave address is set to one. There are three basic types of read operations as typical I²C protocols : current address read, random read, and sequential read.



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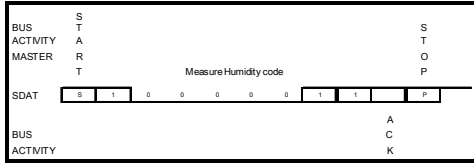
Measure Temperature operation

Measure Temperature operation is in the same way as write operations. After Measure Temperature command code, the uC has to wait for the measurement to complete approximately 110 ms. And then uC readout from HT08I internal register R18, R19 for Temperature data.



Measure Humidity operation

Measure Humidity operation is in the same way as write operations. After Measure Humidity command code, the uC has to wait for the measurement to complete approximately 220 ms. And then uC readout from HT08I internal register R16, R17 for Humidity data.



Measurement sequence (Humidity & Temperature)

After issuing a measurement command ('1000 0011' for Humidity, '1000 0010' for Temperature) the controller has to wait for the measurement to complete. This takes approximately 11/55/210 ms for a 8/12/14bit measurement. The exact time varies by up to $\pm 15\%$ with the speed of the internal oscillator.

To signal the completion of a measurement, the HT08I pulls up the data line and enters idle mode. The controller must wait for this "data ready" signal before restarting SCK to readout the data. Measurement data is stored HT08I Internal register (R16, R17 for Humidity, R18, R19 for Temperature) until readout, therefore the controller can continue with other tasks and readout as convenient.

After issuing a measurement command ('1000 0011' for Humidity, '1000 0010' for Temperature)

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the controller has to wait for the measurement to complete approximately 11/55/210 ms. And then uC readout from HT08I internal register.(R16, R17 for Humidity, R18, R19 for Temperature).

Two bytes register value of measurement data will then be readout. The uC must acknowledge each byte by pulling the DATA line low for measurement data readout.

Measurement resolution (Humidity & Temperature)

The default measurement resolution of 14bit (temperature) and 12bit (humidity) can be reduced to 12 and 8bit. This is especially useful in high speed or extreme low power applications.

Electrical characteristics.

VDD=3.3V, Temperature=25°C unless otherwise noted

Parameter	Symb ol	Min	Ty p	Max	Un it	Condition
Power supply DC	VCC	2.4	3. 3	3.6	V	
High level input voltage	VIH	0.7V			V	
Low level input voltage	VIL	CC		0.3V CC	V	
High level output voltage	VOH	0.8V			V	
Low level output voltage	VOL	CC		0.2V CC	V	
Leakage current	IL			1	uA	
Operation current	IDD		50 0	600	uA	VCC=3.3v, SCLK=1MHz

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DC Characteristics

	Sym bol	Min	Ty p	Max	Un it	Condition
SCLK Frequency	FSC K			1	M Hz	VCC > 3.0v
SDAT Fall time	TRF O	3	10	20	ns	Output Load 5pF
SCLK Hi/Low time	TCL X	200			ns	
SDAT valid time	TV		25 0		ns	
SDAT setup time	TS	100			ns	
SDAT hold time	TH	0	10		ns	
SCLK rise/fall time	TR/T F		10		ns	

