Humidity Sensors

Experts in Environmental Sensing

SENSIRION
THE SENSOR COMPANY

Sensirion – Market Leader Through Innovation

Sensirion's humidity and temperature sensors are established as the market standard due to their best-in-class performance, high reliability as well as technology and price leadership. The SHT1x was the first digital, calibrated, reflow-solderable humidity sensor (launched in 2001) and marked the beginning of a new category of humidity sensors. Sensirion's latest product innovations have set the market standard and opened up a wide range of new applications.

Sensirion's humidity and temperature as well as temperature-only products are based on Sensirion's CMOSens® Technology, which combines the strengths of standard CMOS production processes and advanced MEMS technology on a single silicon chip. The temperature sensors are based on a silicon bandgap temperature sensor principle. The humidity is sensed using a capacitor. Its dielectric is realized through a polymer, which absorbs or desorbs water depending on the ambient humidity. The capacitive element is designed as interdigitated electrodes.

Main Use Drivers for SHTxx

HEALTH & COMFORT

Humidity and temperature significantly affect personal health and comfort; thus, measurement of humidity and temperature in this context can improve personal well-being. Applications include humidifiers, baby monitors and home care respiratory equipment.

QUALITY & RELIABILITY

Quality and reliability of various processes are strongly determined by relative humidity and temperature. Measuring these parameters allows quality and reliability improvement of such processes. Applications include logistics of perishable goods, humidity sensing in printers and water intrusion detection in critical electronic devices.

ENERGY SAVING

Measurement of humidity and temperature can help optimize processes and thus save energy and costs. Applications include automotive engine control, smart condensation control for refrigerators and optimization of A/C cooling cycles.

SAFETY

Humidity and temperature may influence the safety of a system, a process or a person; thus, humidity and temperature measurement can help ensure their safety. Applications include automotive windshield anti-fogging, water intrusion detection in battery packs and building supervision for insurance purposes.

Tested and Proven Worldwide

Our in-house sensor calibration and testing infrastructure enables effective procedures that comply with established quality standards. Each sensor is individually calibrated and tested for quality and accuracy. The high reliability of our sensors has been proven by more than half a billion sensors in the field over more than ten years. Additionally, the reliability is demonstrated by qualification based on the AEC-Q100 automotive standard.

Facts About SHTxx

DIGITAL HUMIDITY SENSING

By pioneering the digital, calibrated, reflow solderable humidity sensor in 2001, Sensirion has marked the beginning of a new category of humidity sensors.

HUMIDITY SENSOR TECHNOLOGY

SHTxx sensors are polymer-based, capacitive humidity sensors. The capacitor is realized with an interdigitated structure.

TEMPERATURE SENSOR TECHNOLOGY

SHTxx sensors contain a bipolar junction transistorbased silicon bandgap temperature sensor.

DESIGNED FOR MASS PRODUCTION

SHTxx sensors are digital, calibrated, reflow solderable. Delivered in T&R for standard SMT assembly. High volumes available.

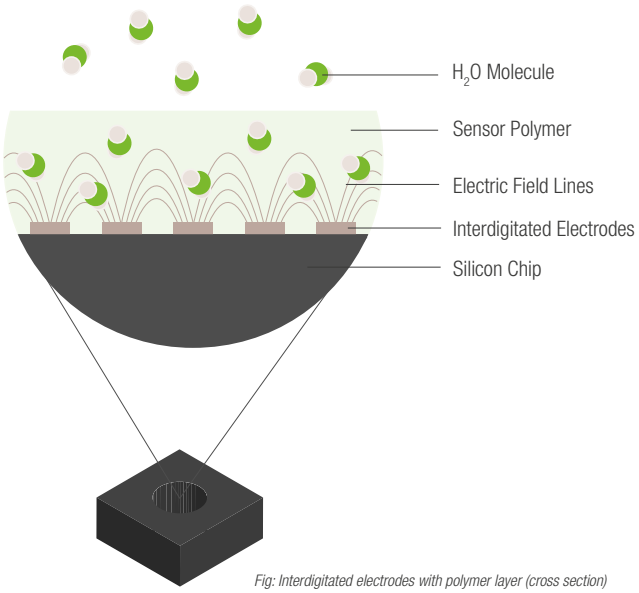


Fig: Interdigitated electrodes with polymer layer (cross section)

What We Offer

Expert first contact → Fast and easy product evaluation → Design-in support → Lifetime support

1. EXPERT FIRST CONTACT
- Specialized and experienced sales force
- Worldwide presence with a global distribution network

2. FAST AND EASY PRODUCT EVALUATION
- Comprehensive product portfolio
- Easy-to-use evaluation kits for effortless humidity and temperature measurement during sensor evaluation
- Technical documents – data sheets, sample codes, application notes

3. DESIGN-IN SUPPORT
- Assistance in the integration of SHTxx sensors into your application
- Proven best practices to ensure that your production concept accommodates the requirements of SHTxx sensors

4. LIFETIME SUPPORT
- Reliable and flexible production
- Sustainable product innovation roadmap to meet your future needs

Sensirion Evaluation Kit for Environmental Sensors

FAST AND EASY EVALUATION FOR YOUR SENSOR APPLICATION

The evaluation kit SEK-Environmental Sensing is designed for an quick, easy and cost-efficient evaluation of Sensirion's environmental sensors. This faciliates to evaluate sensors and develop innovative sensor applications.

The kit combines plug-and-play hardware with an easy-to-use viewer software for in-depth evaluation, the ControlCenter. Each evaluation kit includes a Sensirion SensorBridge, all required connector cables, as well as various sensor samples. The SensorBridge features two independent I^2C channels that allow simultaneous evaluation of two environmental sensor samples. The ControlCenter viewer software makes it possible to display and log the sensor signals for multiple sensors connected to several SensorBridges on the same PC.

Humidity Sensors

SHTW2

- RH&T sensor in chip-scale package
- Ultra-small package size
- Size: 1.3 x 0.7 x 0.5 mm³

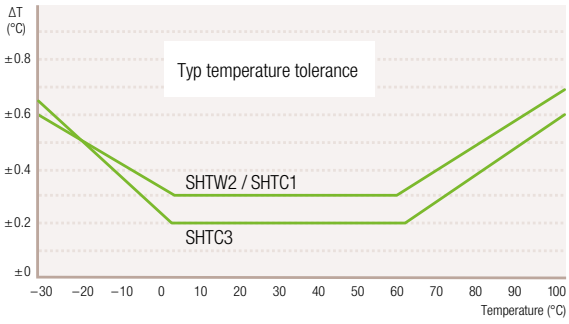
SHTC3

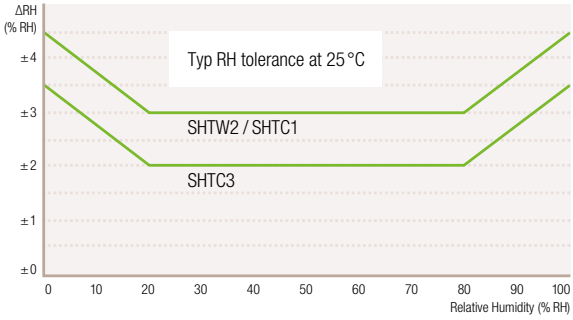
- Ultra-low power consumption
- Full battery supply voltage range (1.62 – 3.6V)
- Small DFN package: 2 x 2 x 0.75 mm³

SHTC1

- High production volume
- Low power consumption
- Size: 2 x 2 x 0.8 mm³

Humidity sensor	SHTW2	SHTC3	SHTC1
Typical accuracy (% RH)	± 3	± 2.0	± 3
Hysteresis (% RH)	± 1	± 1	± 1
Typ long-term drift (% RH / y)	< 0.25	< 0.25	< 0.25
Operating range (% RH)	0 to 100	0 to 100	0 to 100
Response time τ63% (s)	8	8	8
Temperature sensor			
Typical accuracy (°C)	± 0.3	± 0.2	± 0.3
Typ long-term drift (°C / y)	< 0.02	< 0.02	< 0.02
Operating range (°C)	– 30 to 100	– 40 to 125	– 30 to 100
Response time τ63% (s)[1]	> 2	< 5 to 30	> 2
Electrical			
Interface	I²C	I²C	I²C
Supply voltage range (V)	1.62 to 1.98	1.62 to 3.6	1.62 to 1.98
Measurement duration[2] (ms) (high / low)	10.8 (high) 0.7 (low)	10.8 (high) 0.7 (low)	10.8 (high) 0.7 (low)
Avg current consumption[3] (µA) (high / low)	4.8 (high) 0.9 (low)	1.6 (high) 0.5 (low)	4.8 (high) 0.9 (low)
Idle current (µA)	0.7	0.7	0.7
Other			
Protection option	–	–	–
Automotive version available	–	–	–





Please note that above values are of indicatory nature only. For detailed information please consult the respective datasheet.

[1] Temperature response times very much depend on thermal conductivity of substrate material of the sensor.

[2] Combined RH&T measurement. Different measurement modes possible (differing either in resolution or repeatability).
"High" indicates a measurement with the highest precision/power mode (highest resolution, best repeatability), "low" indicates a measurement with the lowest precision/power mode (lowest resolution, least repeatability).

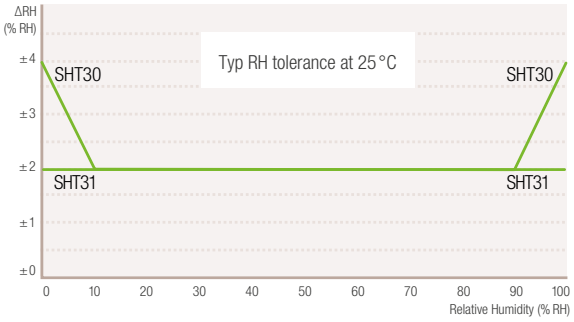
[3] Values for one RH&T measurement per second at VDD = 1.8 V (for SHTC1/SHTW2) or VDD = 3 V; different measurement modes possible (differing either in resolution or repeatability).

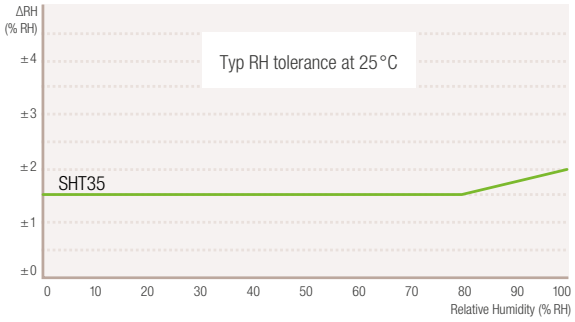
Humidity Sensors

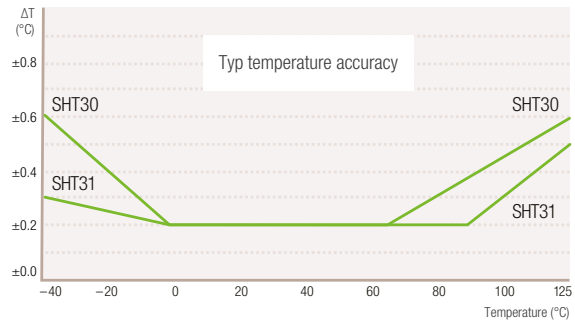
SHT3x SERIES

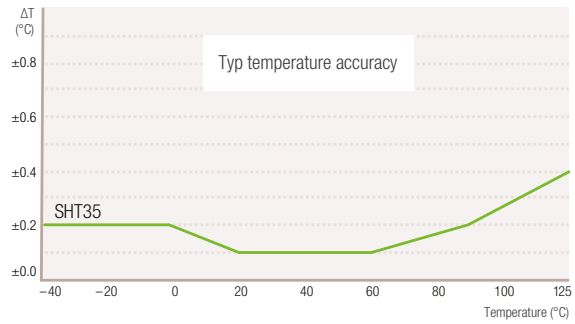
- Wide supply voltage range
- Superior functionality
- Size: 2.5 x 2.5 x 0.9 mm³

Humidity sensor	SHT30	SHT31	SHT35
Typical accuracy (% RH)	± 2 (10 to 90 % RH)	± 2 (0 to 100 % RH)	± 1.5 (0 to 80 % RH)
Hysteresis (% RH)	± 0.8	± 0.8	± 0.8
Typ long-term drift (% RH / y)	< 0.25	< 0.25	< 0.25
Operating range (% RH)	0 to 100	0 to 100	0 to 100
Response time τ63% (s)	8	8	8
Temperature sensor			
Typical accuracy (°C)	± 0.2 (0 to 65°C)	± 0.2 (0 to 90°C)	± 0.1 (20 to 60°C)
Typ long-term drift (°C / y)	< 0.02	< 0.02	< 0.02
Operating range (°C)	– 40 to 125	– 40 to 125	– 40 to 125
Response time τ63% (s)[1]	> 2	> 2	> 2
Electrical			
Interface	I²C, analog voltage	I²C, analog voltage	I²C
Supply voltage range (V)	2.15 to 5.5	2.15 to 5.5	2.15 to 5.5
Measurement duration[2] (ms) (high / low)	13 (high) 3 (low)	13 (high) 3 (low)	13 (high) 3 (low)
Avg current consumption[3] (µA) (high / low)	10 (high) 2 (low)	10 (high) 2 (low)	10 (high) 2 (low)
Idle current (µA)	0.2	0.2	0.2
Other			
Protection option	–	Filter membrane, protective cover	Filter membrane
Automotive version available	yes	yes	yes





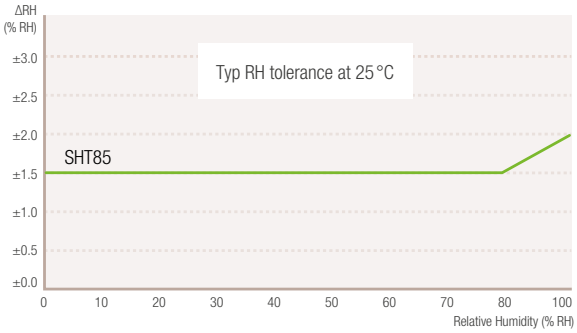


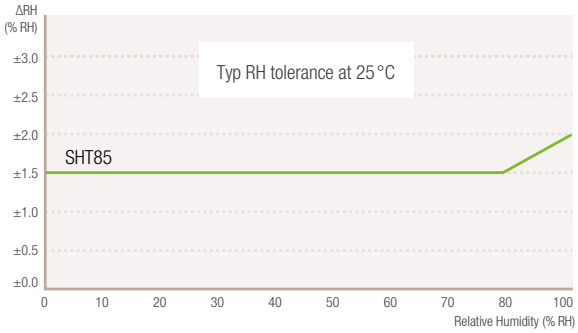


SHT85

- Suitable for manual assembly
- Wide supply voltage range
- Size: 17.8 x 4.9 x 2.1 mm³

Humidity sensor	SHT85
Typical accuracy (% RH)	± 1.5
Hystereis (% RH)	± 0.8
Typ long-term drift (% RH / y)	< 0.25
Operating range (% RH)	0 to 100
Response time 63%(s)	8
Temperature sensor	
Typical accuracy (°C)	± 0.1
Typ long-term drift (°C / y)	< 0.03
Operating range (°C)	– 40 to 105
Response time 63%(s1)	> 2
Electrical	
Interface	I²C
Supply voltage range (V)	2.15 to 5.5
Measurement duration[2] (ms) (high / low)	13 (high) 3 (low)
Avg current consumption[3] (µA) (high / low)	10 (high) 2 (low)
Idle current (µA)	0.2
Other	
Protection option	Filter membrane standard included
Automotive version available	–





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[3] Values for one RH&T measurement per second at VDD = 1.8 V (for SHTC1/SHTW2) or VDD = 3 V; different measurement modes possible (differing either in resolution or repeatability).

Sensing. Anytime. Anywhere.

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