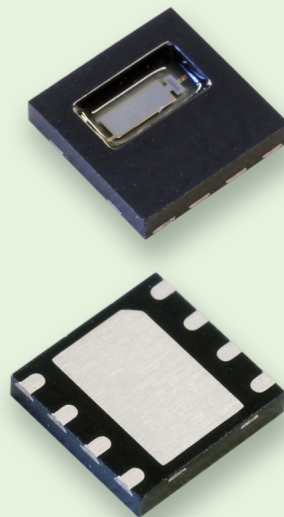




Datasheet HCT01

Humidity and Temperature Sensor



HCT01

Humidity and Temperature Sensor

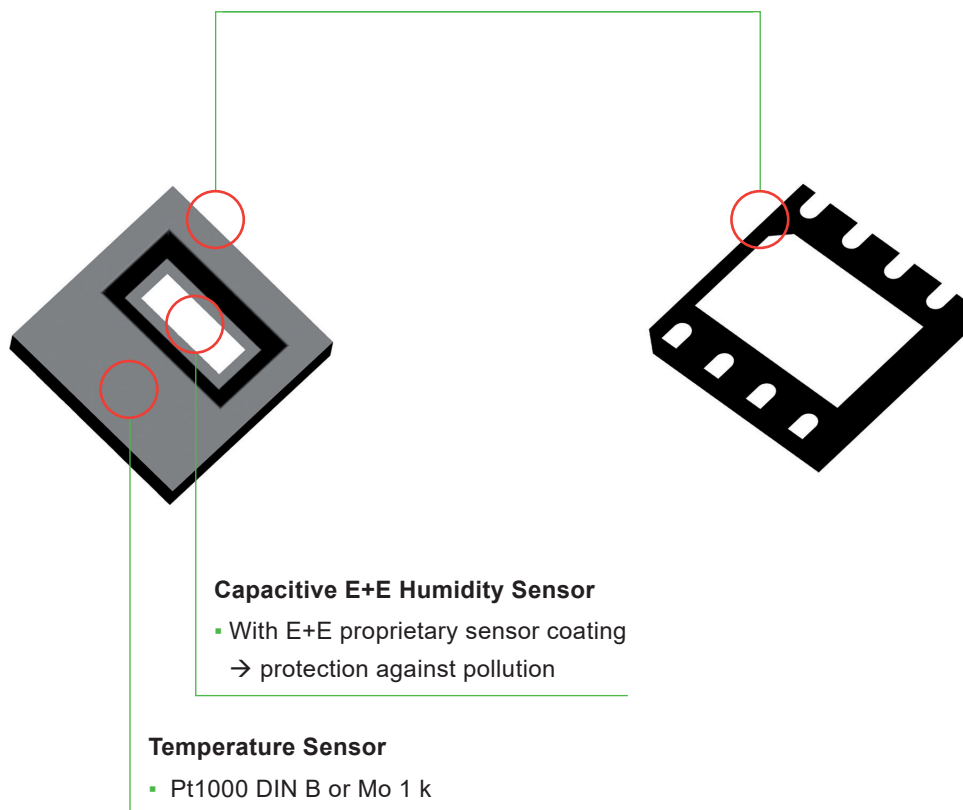
HCT01 humidity and temperature sensor combines high-quality, long-proven thin-film sensor technology, easy processability and cost-efficient integration into customer applications.

The DFN packaging guarantees maximum mechanical sensor protection and enables reflow soldering. The pre-adjusted capacitive E+E humidity sensing element eliminates complicated and time-consuming humidity adjustment. Depending on the individual application, accuracy requirements and existing interface electronics, different cost-saving evaluation circuitries are available.

The E+E proprietary coating, a protective layer applied to the active surface of the sensing element, ensures extensive protection against contamination like dust, salt or chemical deposit.

Features

- RH and T sensor in one package
- RH adjusted
- Mature humidity sensor technology
- High temperature accuracy
- Reflow-solderable SMD component
- E+E proprietary coating
- Standardized DFN package



Typical Applications

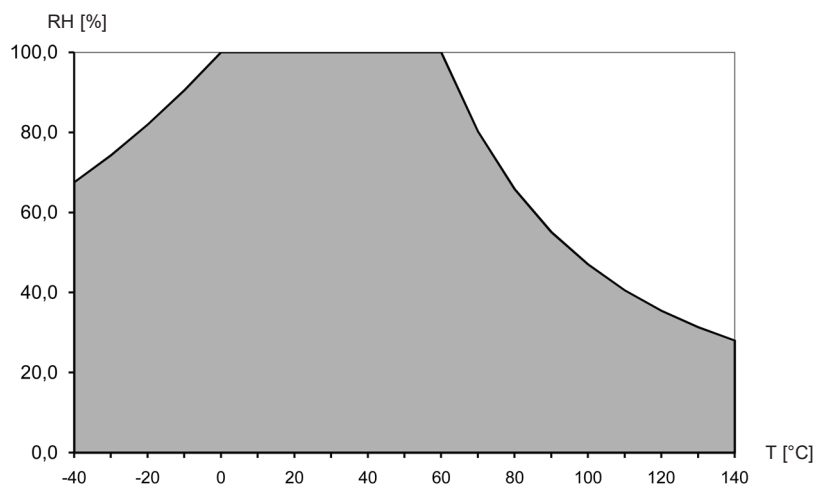
- Automotive industry
- Climate control
- Data loggers
- Humidity monitoring

Working Range

The working range is shown with regard to the humidity / temperature limits.

Although the sensors would not fail beyond the limits, the specification is guaranteed only within the working range.

In applications with high humidity at high temperatures the time factor shall be considered.

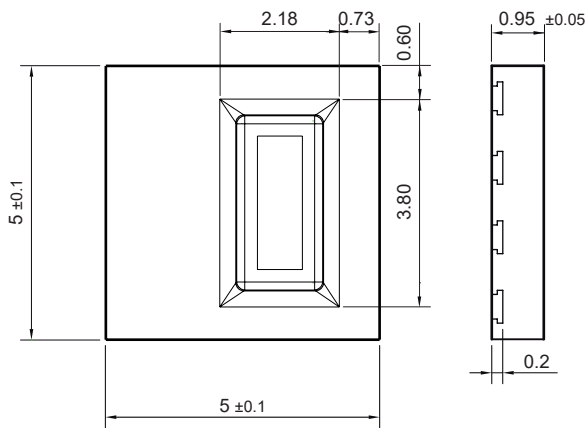


Dimensions

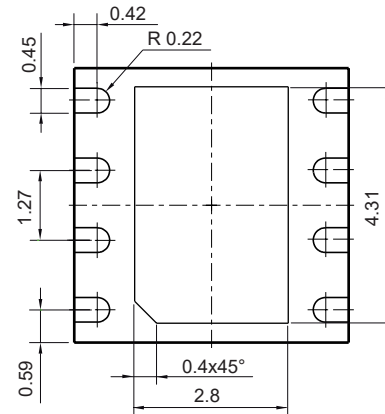
Values in mm

DFN-8 package

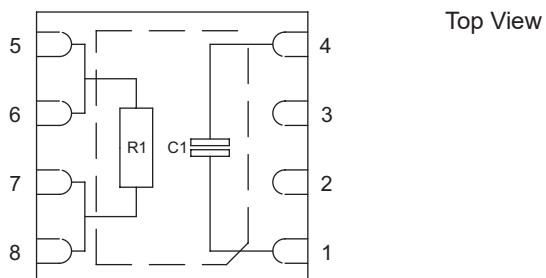
Top View



Bottom View



Pin Configuration



Pin #	Name	Description
1	H1	Humidity +
2	NC	Not connected
3	NC	Not connected
4	H2	Humidity -
5	T1	Temperature
6	T1	Temperature
7	T2	Temperature
8	T2	Temperature

Technical Data

Humidity Element

Measuring range	0...100 %RH
Nominal capacitance C_0	70 pF
Accuracy ¹⁾ @ 30 °C	HCT01-00 HCT01-02 20...80 %RH 0...90 %RH HCT01-03 20...80 %RH 0...90 %RH Non-adjusted (C_0: 70±7 pF) ±2% RH ±3% RH ±3% RH ±4.5% RH
Temperature dependency of electronics, typ.	±0.03 %RH/°C
Response time t_{63}	≤ 6 s
Sensitivity	0.25 pF / %RH
Temperature dependency ¹⁾	dC = -0.00083*RH*(T-30°C) pF
Hysteresis	< 1.85 %
Long term stability	Drift < 0.5% / year ²⁾
Maximum supply voltage	5 V (V_{PP})
Maximum DC voltage	< 0.3 V
Parallel Resistance	$R_P \geq 100 \text{ M}\Omega$
Serial Resistance	$R_S \leq 1200 \text{ }\Omega$
Enclosure material	Plated Cu lead frame and green epoxy-based compound fully RoHS and WEEE compliant
Lead finish	NiPdAu
Sensor protection	E+E proprietary coating
Storage temperature	-40...+55 °C
Dimensions	5 x 5 x 0.95 mm

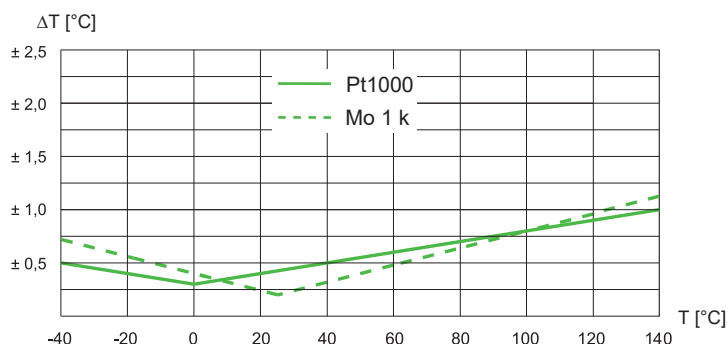
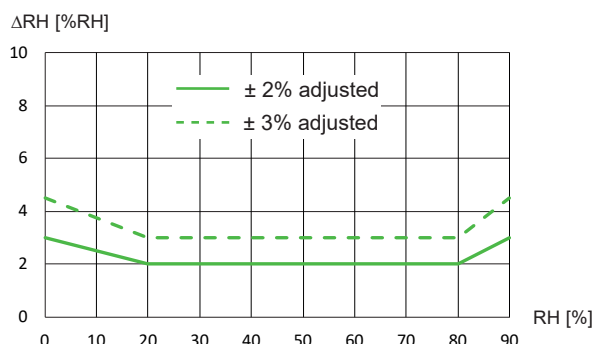
1) Detailed calculation on request.

2) In environments with high concentrations of volatile organic compounds, the value may be higher.

Temperature Element

Measuring range	-40...+140 °C	
	Mo 1 k	Pt1000
Nominal resistance @ 25 °C	R ₂₅ = 1000 Ω	R ₀ = 1000 Ω
Accuracy	dt = ±[0.2+0.008 * (t-25)] K	DIN B
Response time t ₆₃	≤ 6 s	According to EN 60751
Characteristics	R = R ₀ * (1+A*t+B*t²) R ₀ = 928.73 Ω A = 0.0030659 B = 3.41*10 ⁻⁷	
Maximum continuous current I _{cont} (t _{LL} <t _A <t _{UL})	0.1 mA	
Maximum current I _{max}	1 mA	
Self heating	0.35 K/mW	

Accuracy for RH and T



Humidity Element Characteristic

The average increase of capacitance over the working range is approx. 25 pF. For the range of 0...98 %RH, linear approximation is possible, errors will be lower than $< \pm 1.5$ %RH.

The sensor characteristic is determined by the following linear formula:

$$C(U_w) = C_0 * [1 + HC_0 * U_w] \quad C_0 = 70 \text{ pF}$$

with $HC_0 = 3420 \pm 191 \text{ ppm} / \%RH$

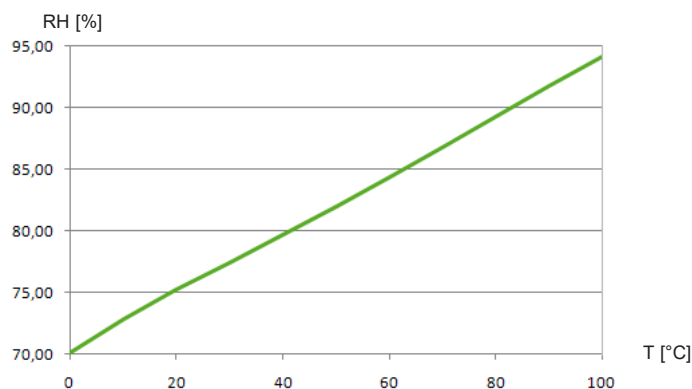
For high accuracy requirements, the sensitivity is determined by the following polynomial:

$$C(U_w) = C_0 * [1 + HC_0 * U_w + k(U_w)]$$

whereby: $k(U_w) = A_1 * U_w + A_2 * U_w^{1.5} + A_3 * U_w^2 + A_4 * U_w^{2.5}$

$$A_1 = 2.6657E^{-3} \quad A_2 = -9.6134E^{-4}$$

$$A_3 = 1.1272E^{-4} \quad A_4 = -4.3E^{-6}$$



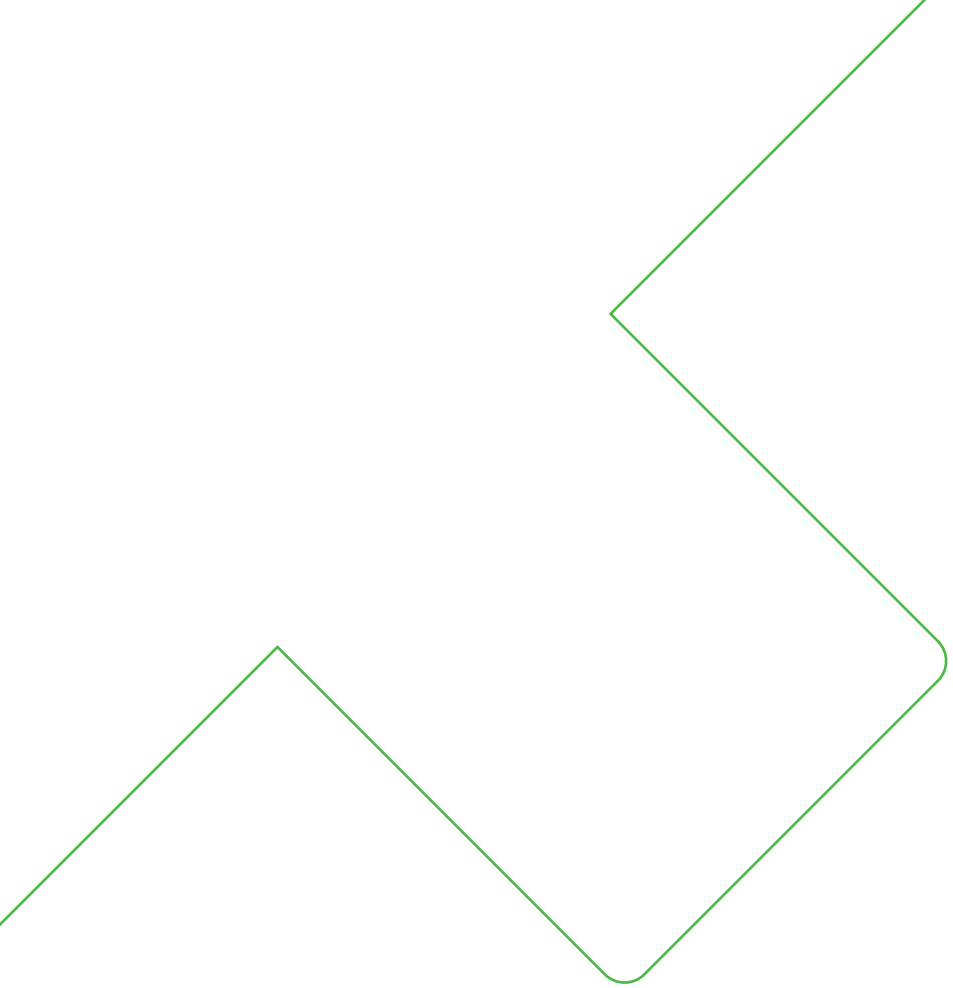
Ordering Guide

Feature	Description	Code
		HCT01-
RH accuracy	Non-adjusted	00
	±2 %	02
	±3 %	03
Temperature element	No T element	No code
	Pt1000 DIN B	D
	Mo 1 k	S
Tape and reel packaging	1 000 sensors per reel	TR1
	2 500 sensors per reel	TR2,5

Order Example

HCT01-02STR1

Feature	Code	Description
RH accuracy	02	±2 %
Temperature element	S	Mo 1 k
Tape and reel packaging	TR1	1 000 sensors per reel



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