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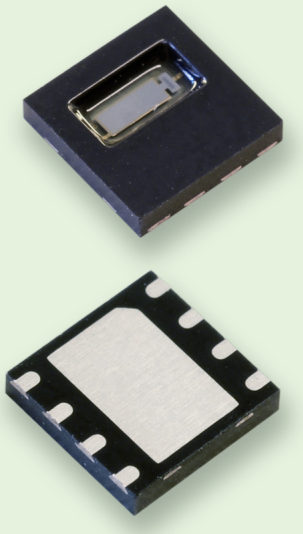
Datasheet HCT01

Humidity and Temperature Sensor



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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

Capacitive E+E Humidity Sensor

- With E+E proprietary sensor coating
  → protection against pollution

Temperature Sensor

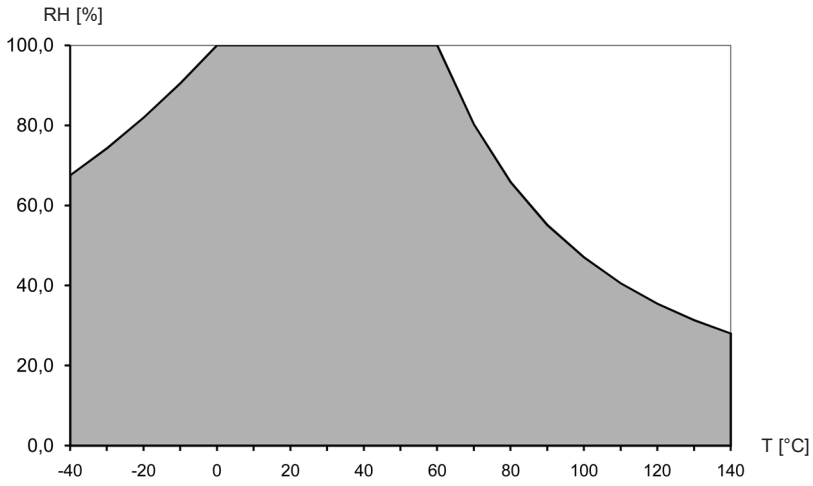
- Pt1000 DIN B or Mo 1 k

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.

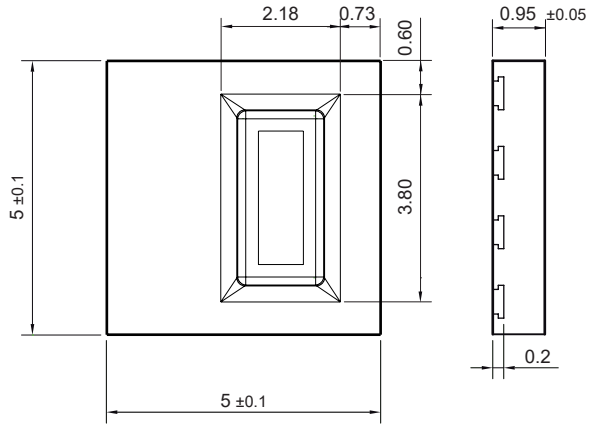


Dimensions

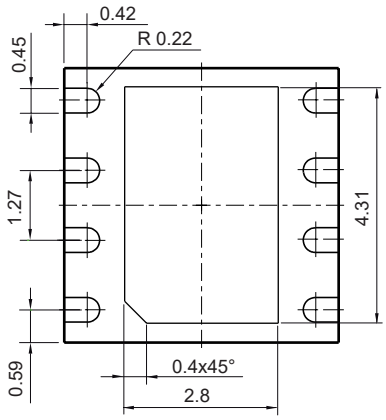
Values in mm

DFN-8 package

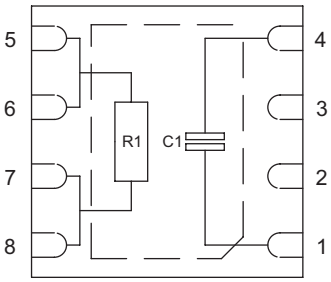
Top View



Bottom View



Pin Configuration



Top View

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

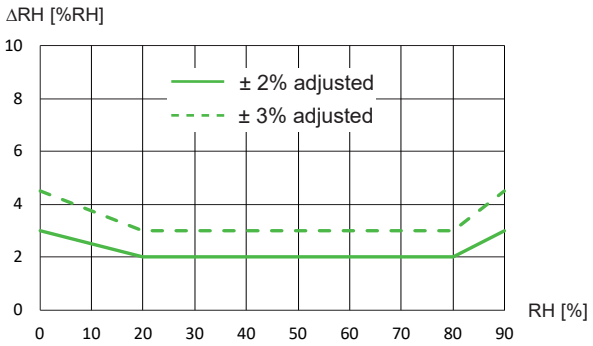
Measuring range		0...100 %RH
Nominal capacitance C_0		70 pF
Accuracy[1] @ 30 °C		
HCT01-TF0x		Non-adjusted (C_0: 70±7 pF)
HCT01-TF20x	20...80 %RH	±2% RH
	0...90 %RH	±3% RH
HCT01-TF30x	20...80 %RH	±3% RH
	0...90 %RH	±4.5% RH
Temperature dependency of electronics, typ.		±0.03 %RH / °C
Response time t_{63}		≤ 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 ≥ 100 MΩ
Serial Resistance		R_S ≤ 1200 Ω
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

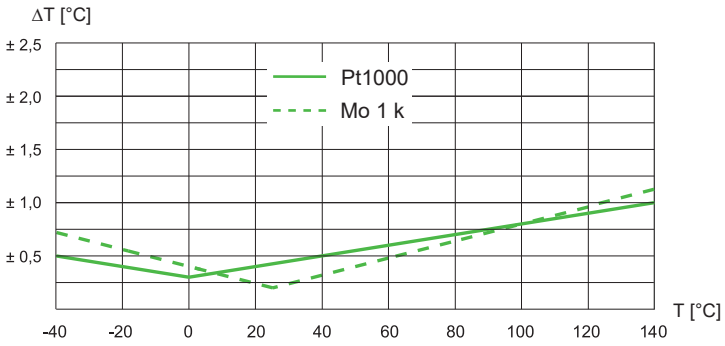
1) Detailed calculation on request.
2) In environments with high concentrations of volatile organic compounds, the value may be higher.

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	
Characteristics	$R = R_0 * (1+A*t+B*t^2)$ R_0 = 928.73 Ω A = 0.0030659 $B = 3.41*10^{-7}$	According to EN 60751
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 < ±1.5% RH.

The sensor characteristic is determined by the following linear formula:

$C(U_w) = C_0 * [1 + HC_0 * U_w]$ $C_0 = 70$ pF

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

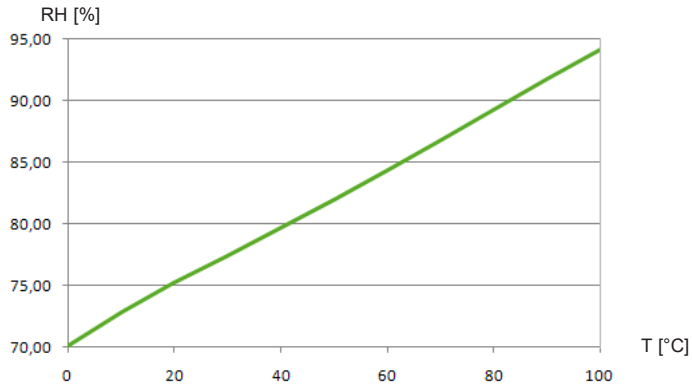
For high accuracy requirements, the sensitivity is determined by the following polynomial:

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

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

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

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



Ordering Guide

Feature	Description	Code
		HCT01-
RH accuracy	Non-adjusted	TF0
	±2 %	TF20
	±3 %	TF30
Temperature element	No T element	TP0
	Pt1000 DIN B	TP4
	Mo 1 k	TP18
Tape and reel packaging	1 000 sensors per reel	TR1
	2 500 sensors per reel	TR2,5

Order Example

HCT01-TF20TP18TR1

Feature	Code	Description
RH accuracy	TF20	±2 %
Temperature element	TP18	Mo 1 k
Packaging	TR1	1 000 sensors per reel

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