

# HC105/HC109

## SMD Humidity Sensors for Mass Applications

### Typical Applications

automotive - air conditioning  
home appliances  
photocopy machines

### Features

SMD mounting  
high reproducibility  
wetable  
very good long term stability  
small size construction

### Technical Data

Sensor		HC105	HC109
Nominal capacitance $C_0$ (at 30°C / 86°F)		160 ± 16 pF	80 ± 12 pF
	$C_{76}$ (at 30°C / 86°F)	201.6 ± 20.3 pF	100.8 ± 15.1 pF
Response time $t_{90}$		< 6 sec.	< 6 sec.
Sensitivity		0.55 pF /% RH	0.27 pF /% RH
Temperature dependence		$dC = -0.0019 \cdot RH \cdot (T-30^\circ C)$ [pF]	$dC = -0.0019 \cdot RH \cdot (T-30^\circ C)$ [pF]
Working range	humidity	0...100% RH	0...100% RH
	temperature	-40...120°C (-40...248°F)	-40...120°C (-40...248°F)
Linearity error	(0...98% RH)	< ± 1.5% RH	< ± 1.5% RH
Hysteresis		1.7 ± 0.15% RH	1.7 ± 0.15% RH
Long term stability at 20-30°C (68-86°F) / 20-80%RH		drift < 1.5 % / year	drift < 1.5 % / year
Loss tangent		< 0.05 typical	< 0.05 typical
Maximum supply voltage (no DC voltage)		5V max (Upp)	5V max (Upp)
Maximum DC voltage		< 5mV	< 5mV
Operating frequency		10...100 kHz,	10...100 kHz,
		recommended 20kHz	recommended 20kHz
Packaging	tray 101.6x101.6 mm (4x4")	420 sensors	not available
	tape and reel	refer to ordering guide	refer to ordering guide

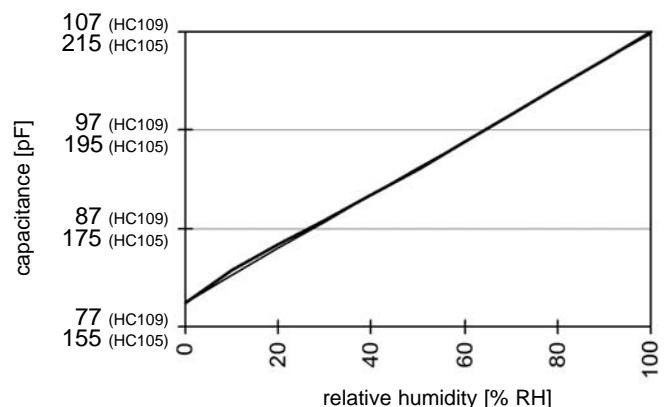
### Characteristics

The average increase of capacitance over the working range is 55pF (HC105) resp. 27.5pF (HC109). 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:

$$C(RH) = C_0 \cdot [1 + HC_0 \cdot RH]$$

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



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

$$C(RH) = C_0 \cdot [1 + HC_0 \cdot RH + K(RH)]$$

whereby:

$$K(RH) = A_1 \cdot RH + A_2 \cdot RH^{1.5} + A_3 \cdot RH^2 + A_4 \cdot RH^{2.5}$$

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

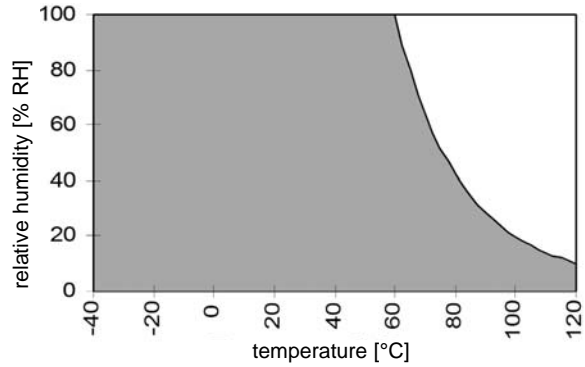
$$A_3 = 1.1272E^{-4} \quad A_4 = -4.3E^{-6}$$

## Working Range

The working range of the humidity sensors HC105/HC109 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.

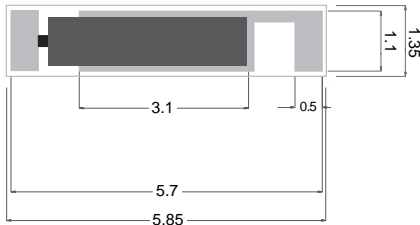
In applications with high humidity at high temperatures the time factor shall be considered.



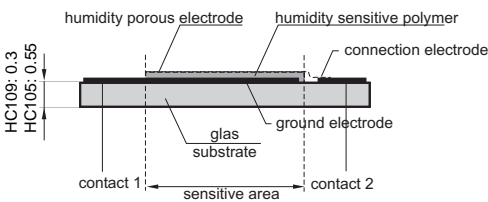
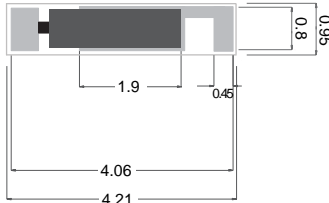
## Dimensions (mm)

1 mm = 0.03937" / 1" = 25.4 mm

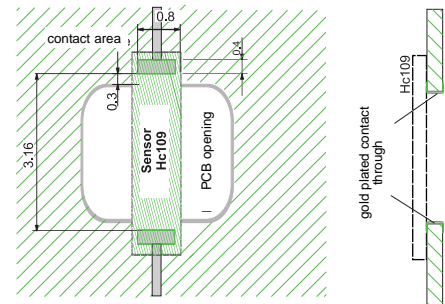
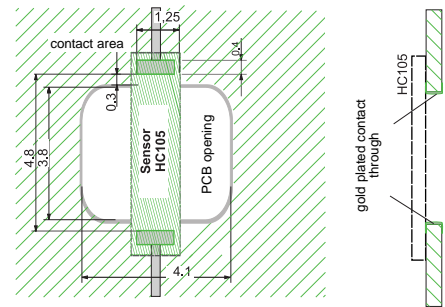
### HC105



### HC109



## Mounting Instructions



To allow full access of the air, the humidity sensor should be positioned over an opening in the printed circuit board (PCB).

False readings because of humidity assimilation at the front side of the PCB should be avoided as much as possible by using gold-plated-through holes.

## Assembling and Soldering

HC105/HC109 sensor series are designed for SMD automatic assembling with subsequent reflow-soldering.

### Recommended SMD equipment:

- Automatic tooling machine with suction pipette
- Optical control for sensor identification

## Ordering Guide

TYPE	PACKAGING
capacitive humidity sensor 160 pF (105)	tray (for HC105 only) (no code)
capacitive humidity sensor 80 pF (109)	500 sensors per reel (TR0,5)
	1000 sensors per reel (TR1)
	2500 sensors per reel (TR2,5)
	10000 sensors per reel (TR10)
<b>HC</b>	

## Order Example

### HC105TR1

SMD humidity sensor

Type: HC105

Packaging: 1000 sensors per reel