

# HC109

## SMD Humidity Sensors for Mass Applications

### Typical Applications

automotive - air conditioning  
 home appliances  
 photocopy machines

### Features

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

### Technical Data

| Sensor  | HC109                              |
|---|------------------------------------|
| Nominal capacitance $C_0$ (at 30°C / 86°F)          | 80 ± 12 pF                         |
| $C_{76}$ (at 30°C / 86°F)                           | 100.8 ± 15.1 pF                    |
| Response time $t_{90}$                              | < 6 sec.                           |
| Sensitivity   | 0.27 pF / % RH                     |
| Temperature dependence                              | dC = -0.00095 * RH * (T-30°C) [pF] |
| Working range humidity                              | 0...100% RH                        |
| temperature   | -40...120°C (-40...248°F)          |
| Linearity error (0...98% RH)                        | < ± 1.5% RH                        |
| Hysteresis  | 1.7 ± 0.15% RH                     |
| Long term stability at 20-30°C (68-86°F) / 20-80%RH | drift < 1.5 % / year               |
| Loss tangent  | < 0.05 typical                     |
| Maximum supply voltage (no DC voltage)              | 5V max (Upp)                       |
| Maximum DC voltage                                  | < 5mV                              |
| Operating frequency                                 | 10...100 kHz,<br>recommended 20kHz |
| Packaging tray 101.6x101.6 mm (4x4")                | not available                      |
| tape and reel                                       | refer to ordering guide            |

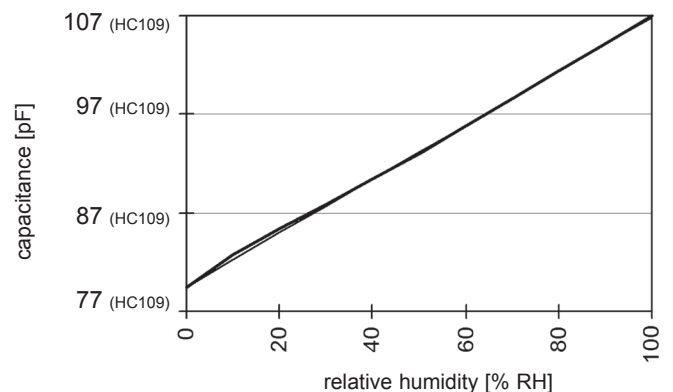
### Characteristics

The average increase of capacitance over the working range is 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:

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

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



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

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

whereby:

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

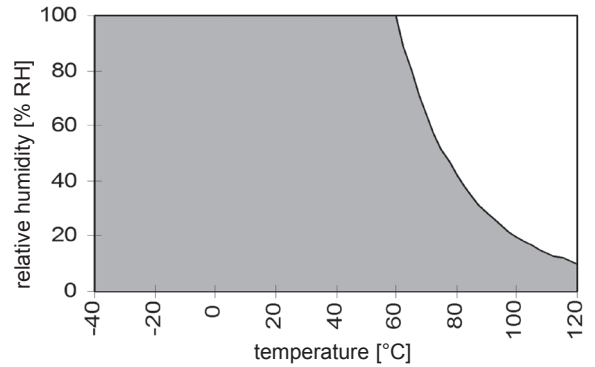
$A_1 = 2.6657E^{-3}$        $A_2 = -9.6134E^{-4}$   
 $A_3 = 1.1272E^{-4}$        $A_4 = -4.3E^{-6}$

## Working Range

The working range of the humidity sensors/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.

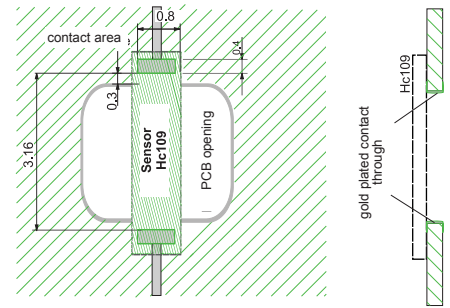
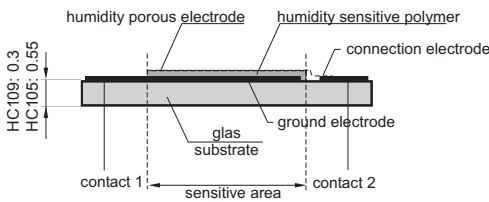
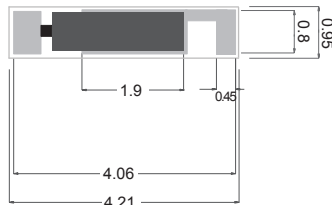


## Dimensions (mm)

1 mm = 0.03937" / 1" = 25.4 mm

## Mounting Instructions

### HC109



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

## Order Example

| TYPE                                   | PACKAGING   |
|--|---|
| capacitive humidity sensor 80 pF (109) | 500 sensors per reel (TR0,5)<br>1000 sensors per reel (TR1)<br>2500 sensors per reel (TR2,5)<br>10000 sensors per reel (TR10) |
| HC                                     |   |

### HC109TR1

SMD humidity sensor

Type: HC109

Packaging: 1000 sensors per reel