**E+E** *YOUR PARTNER IN SENSOR TECHNOLOGY*

**ELEKTRONIK** ®
*Ges.m.b.H.*

# HC105/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 | | 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 | | $dC = -0.0019*RH*(T-30°C)$ [pF] | $dC = -0.00095*RH*(T-30°C)$ [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, recommended 20kHz | 10...100 kHz, 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:

$$C(RH) = C_0 * [1 + HC_0 * RH]$$
with $HC_0 = 3420 ± 191$ ppm /% RH
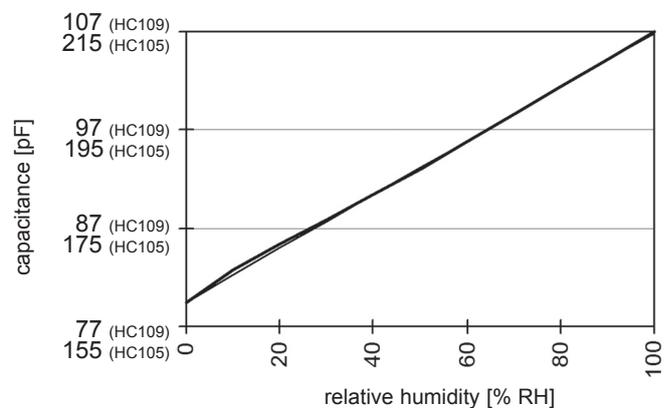


For high accuracy requirements, the sensitivity is determined by the following polynomial:

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

whereby:
$$K(RH) = A_1*RH + A_2*RH^{1.5} + A_3*RH^2 + A_4*RH^{2.5}$$
$A_1 = 2.6657E^{-3}$      $A_2 = -9.6134E^{-4}$
$A_3 = 1.1272E^{-4}$      $A_4 = -4.3E^{-6}$

**HC105/HC109**

三協インタナショナル株式会社 東京:Tel:03-3662-8100 大阪:Tel:06-6372-5843 名古屋:Tel:052-709-1781

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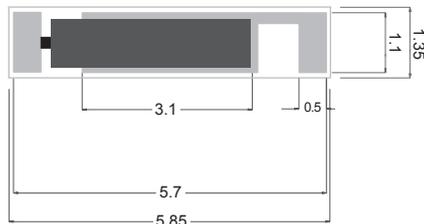
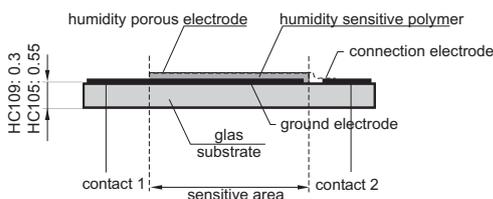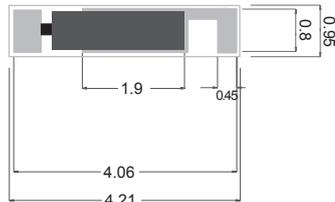In applications with high humidity at high temperatures the time factor shall be considered.
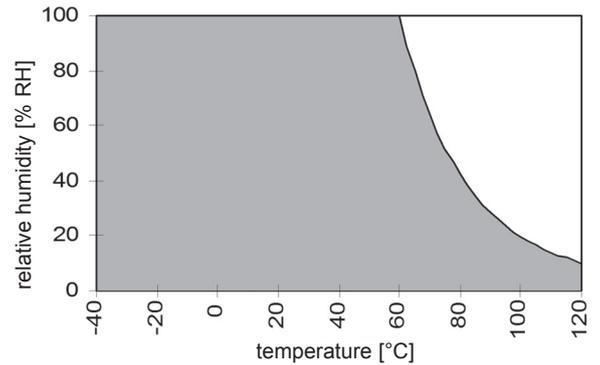


## Dimensions (mm)
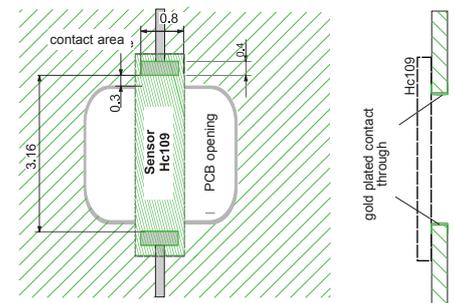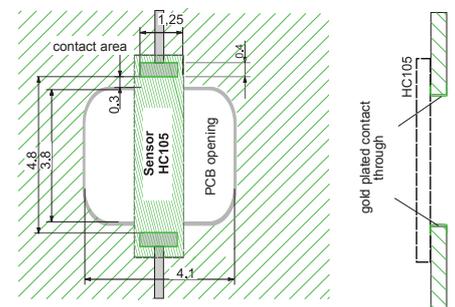
1 mm = 0.03937" / 1" = 25.4 mm

### 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) |
| **HC** | | | |

## Order Example

**HC105TR1**
SMD humidity sensor

Type:        HC105
Packaging: 1000 sensors per reel

**HC105/HC109**

三協インタナショナル株式会社 東京:Tel:03-3662-8100 大阪:Tel:06-6372-5843 名古屋:Tel:052-709-1781