HC104-Kxx

Interchangeable SMD Humidity Sensors
for Mass Applications

Typical Applications

mass appliances
photocopy machines
automotive - air conditioning

Features

interchangeable
inexpensive, easy humidity calibration
best accuracy without calibration
SMD compatible
outstanding long term stability
wettable

Technical Data

<table>
<thead>
<tr>
<th>Sensor</th>
<th>HC104-K00</th>
<th>HC104-K25</th>
<th>HC104-K50</th>
<th>HC104-K75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration point</td>
<td>0% RH</td>
<td>25% RH</td>
<td>50% RH</td>
<td>75% RH</td>
</tr>
<tr>
<td>Nominal capacity at calibration point [pF]</td>
<td>140</td>
<td>152.5</td>
<td>163.8</td>
<td>175.9</td>
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Interchangeability

Sensitivity        0.48 pF / % RH
Temperature dependence  \( dC = -0.00166 \times RH \times (T-30 \text{ degC}) \) [pF]
Working range   humidity  0...100% RH
                     temperature  -40...120 degC (-40...248°F)
Linearity error (0 ... 98% RH)  < ± 1.5% RH
Hysteresis           1.7 ± 0.15% RH
Response time \( t_{90} \)  < 6 s
Long term stability at 20-30 degC (68-86°F) / 20-80% RH  drift < 1.5 % / year
Loss tangent        < 0.05 typical
Maximum supply voltage (no DC voltage)  5 V max (Upp)
Maximum DC voltage   < 5 mV
Operating frequency  10...100 kHz, recommended 20kHz
Packaging          tray 101.6 x 101.6mm (4 x 4 inch) with 240 sensors

Working Range

The working range of the humidity sensors HC104-Kxx 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.
Characteristics

The average increase of capacitance over the working range is 55pF. 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:

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

with \( HC_0 = 3420 \pm 191 \) ppm /% RH

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

\[ C(RH) = C_0 \times [1 + FK_0 \times r.F. + K(RH)] \]

whereby:

\[ K(RH) = A_1 \times RH + A_2 \times RH^{1.5} + A_3 \times RH^2 + A_4 \times RH^{2.5} \]

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

Dimensions (mm)

1 mm = 0.03937 inch / 1 inch = 25.4 mm

Mounting Instructions

To allow full access of the air, the humidity sensor should be positioned over an opening in the printed circuit board (PCB). - Fig.1

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.

Ordering Guide

<table>
<thead>
<tr>
<th>MODEL</th>
<th>TYPE</th>
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<tbody>
<tr>
<td>HC</td>
<td>Interchangeable capacitive humidity sensor 140 pF, calibration point 0% RH</td>
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<tr>
<td></td>
<td>Interchangeable capacitive humidity sensor 152.5 pF, calibration point 25% RH</td>
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<tr>
<td></td>
<td>Interchangeable capacitive humidity sensor 163.8 pF, calibration point 50% RH</td>
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<tr>
<td></td>
<td>Interchangeable capacitive humidity sensor 175.9 pF, calibration point 75% RH</td>
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HC