

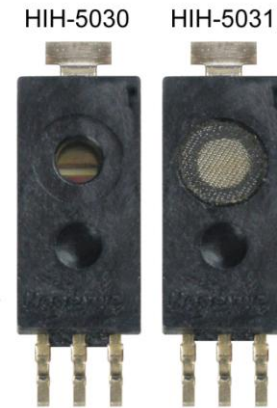


**THE DATASHEET OF  
HIH-5031-001**



## HIH-5030/5031 Series

### Low Voltage Humidity Sensors



#### DESCRIPTION

The HIH-5030/5031 Series Low Voltage Humidity Sensors operate down to 2.7 Vdc, often ideal in battery-powered systems where the supply is a nominal 3 Vdc.

The HIH 5030/5031 complements our existing line of 5 Vdc SMD (Surface Mount Device) humidity sensors. SMD packaging on tape and reel allows for use in high volume, automated pick and place manufacturing, eliminating lead misalignment to printed circuit board through-holes.

The HIH-5030/5031 Series Humidity Sensors are designed specifically for high volume OEM (Original Equipment Manufacturer) users.

Direct input to a controller or other device is made possible by this sensor's near linear voltage output. With a typical current draw of only 200  $\mu$ A, the HIH-5030/5031 Series is ideally suited for many low drain, battery operated systems.

Tight sensor interchangeability reduces or eliminates OEM production calibration costs.

#### FEATURES

- Operates down to 2.7 Vdc, often ideal in battery-powered systems where the supply is a nominal 3 Vdc.
- Tape and reel packaging allows for use in high volume pick and place manufacturing (1,000 units per tape and reel)
- Molded thermoset plastic housing
- Near linear voltage output vs %RH
- Laser trimmed interchangeability
- Low power design
- Enhanced accuracy
- Fast response time
- Stable, low drift performance
- Chemically resistant

The HIH-5030/5031 Series delivers instrumentation-quality RH (Relative Humidity) sensing performance in a competitively priced, solderable SMD.

The HIH-5030 is a covered integrated circuit humidity sensor. The HIH-5031 is a covered, condensation-resistant, integrated circuit humidity sensor that is factory-fitted with a hydrophobic filter allowing it to be used in many condensing environments including industrial, medical and commercial applications.

The RH sensor uses a laser trimmed, thermoset polymer capacitive sensing element with on-chip integrated signal conditioning.

The sensing element's multilayer construction provides excellent resistance to most application hazards such as condensation, dust, dirt, oils and common environmental chemicals.

Sample packs are available. See order guide.

#### POTENTIAL APPLICATIONS

##### Industrial

- Air compressors
- Battery-powered systems
- Drying equipment
- HVAC (includes air conditioning, air movement, thermostats, humidifiers, de-humidifiers, humidistats, enthalpy sensing)
- OEM assemblies
- Office automation equipment
- Process equipment
- Refrigeration (includes bulk and transport systems)
- Telecommunications cabinets
- Weather stations and meteorology equipment

##### Medical

- Hospital air compressors
- Infant incubators
- Microenvironments
- Sleep apnea equipment
- Treadmill stress monitoring equipment

# HIH-5030/5031 Series

**Table 1. Performance Specifications (At 3.3 Vdc supply and 25 °C [77 °F] unless otherwise noted.)**

| Parameter  | Minimum   | Typical       | Maximum  | Unit    | Specific Note |
|--|---|---------------|----------|---------|---------------|
| Interchangeability (first order curve)<br>0% RH to 10% RH, 90% RH to 100% RH | -7  | –             | 7        | % RH    | –             |
| 11% RH to 89% RH   | -3  | –             | 3        | % RH    | –             |
| Accuracy (best fit straight line) 11% RH to 89% RH                           | -3  | –             | +3       | % RH    | 4             |
| Hysteresis   | –   | 2             | –        | % RH    | –             |
| Repeatability  | –   | ±0.5          | –        | % RH    | –             |
| Settling time  | –   | –             | 70       | ms      | –             |
| Response time (1/e in slow moving air)                                       | –   | 5             | –        | s       | –             |
| Stability (at 50% RH in 5 years)   | –   | ±1.2          | –        | % RH    | 1             |
| Voltage supply   | 2.7   | –             | 5.5      | Vdc     | 2             |
| Current supply   | –   | 200           | 500      | µA      | –             |
| Voltage output (1st order curve fit)   | $V_{OUT}=(V_{SUPPLY})(0.00636(\text{sensor RH}) + 0.1515)$ , typical at 25 °C |               |          |         |               |
| Temperature compensation   | True RH = (Sensor RH)/(1.0546 – 0.00216T), T in °C                            |               |          |         |               |
| Output voltage temp. coefficient at 50% RH, 3.3 V                            | –   | -2            | –        | mV/°C   | –             |
| Operating temperature  | -40[-40]  | See Figure 2. | 85[185]  | °C[°F]  | –             |
| Operating humidity (HIH-5030)  | 0   | See Figure 2. | 100      | % RH    | 3             |
| Operating humidity (HIH-5031)  | 0   | See Figure 2. | 100      | % RH    | –             |
| Storage temperature  | -50[-58]  | –             | 125[257] | °C [°F] | –             |
| Storage humidity   | See Figure 3.   |               |          | % RH    | 3             |

**Specific Notes:**

1. Includes stress outside of recommended operating zone.
2. Device is tested at 3.3 Vdc and 25 °C.
3. Non-condensing environment. When liquid water falls on the humidity sensor die, output goes to a low rail condition indicating no humidity.
4. Total accuracy including interchangeability is ±3 %RH.

**General Notes:**

- Sensor is ratiometric to supply voltage.
- Extended exposure to ≥90 % RH causes a reversible shift of 3 % RH.
- Sensor is light sensitive. For best performance, shield sensor from bright light.



# Low Voltage Humidity Sensors

Figure 1. Operating Environment (Non-condensing environment for HIH-5030 catalog listings only.)

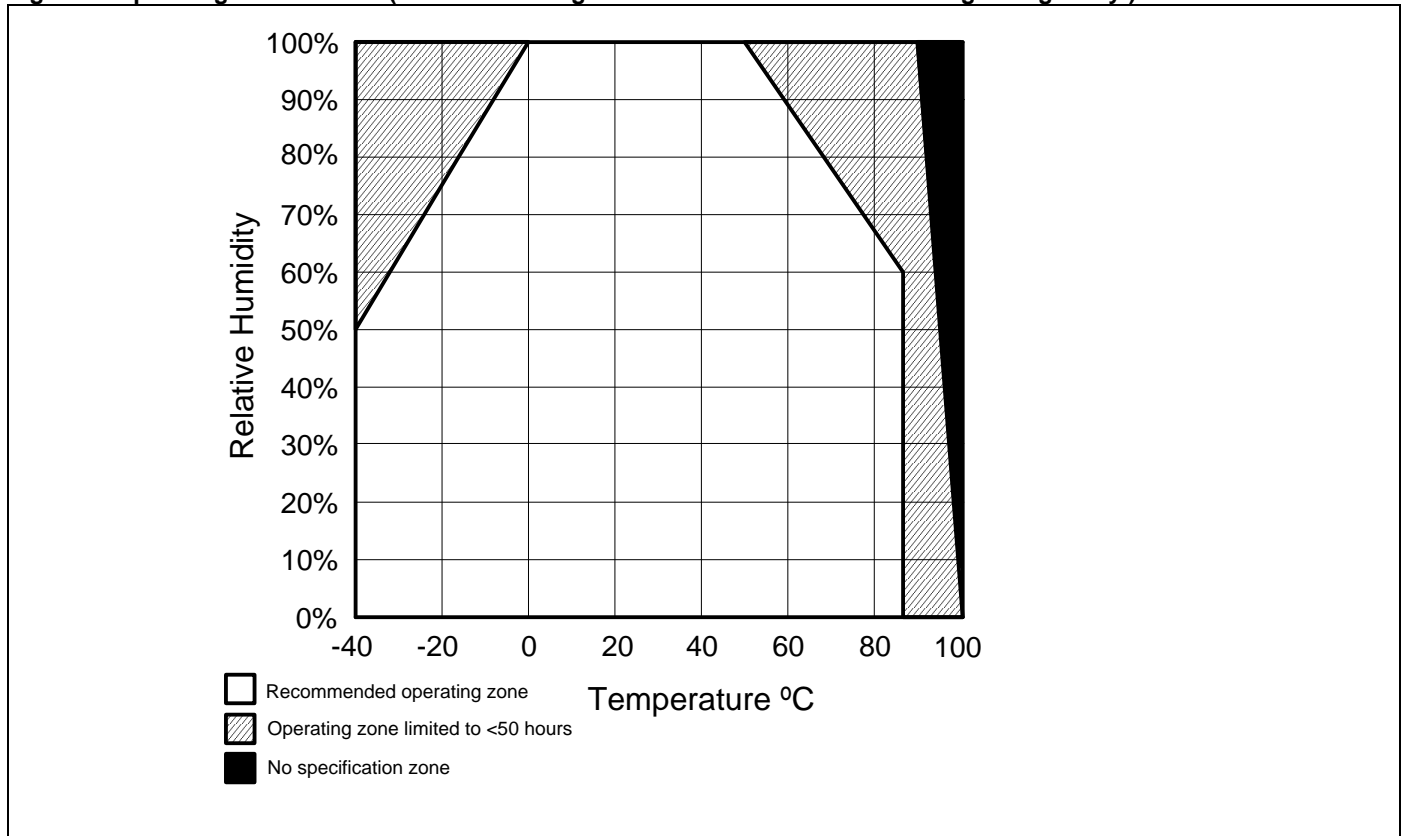
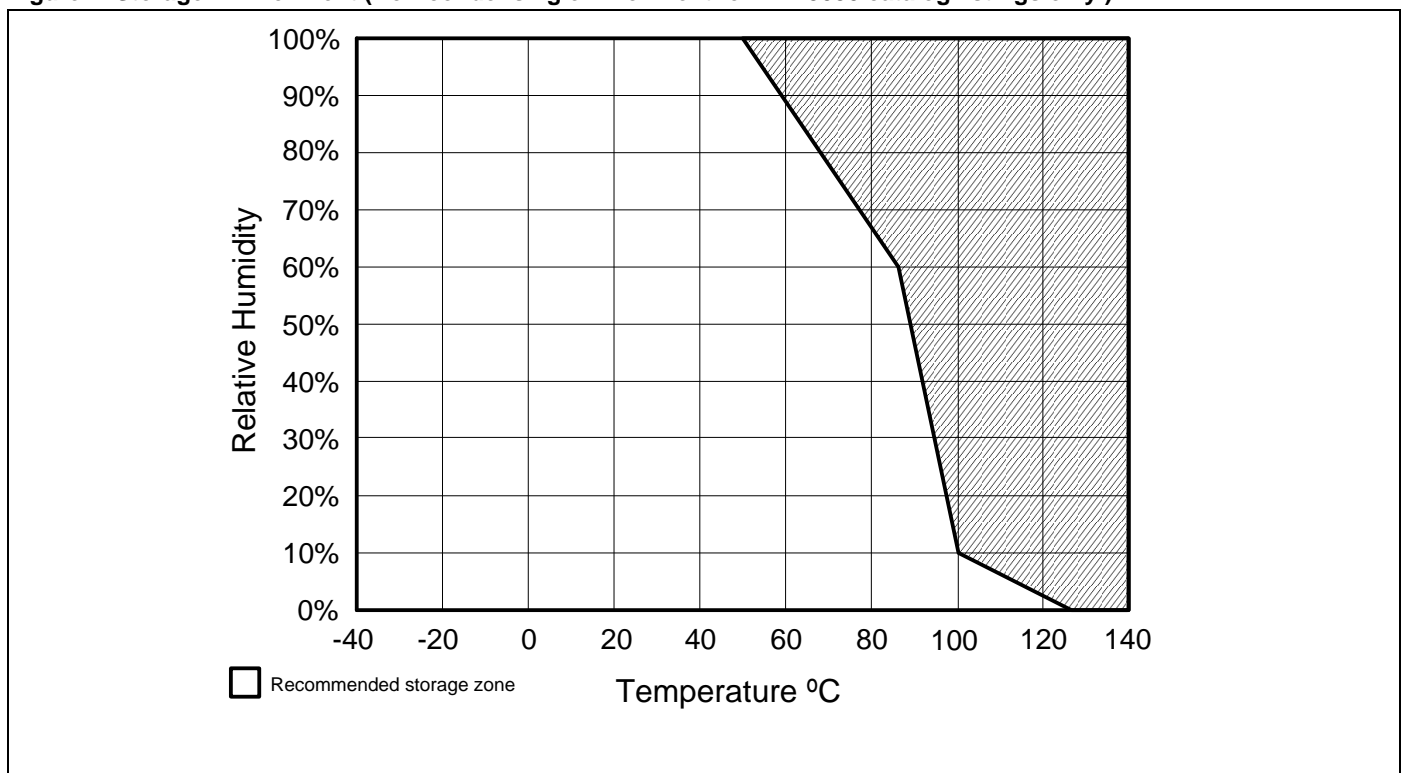


Figure 2. Storage Environment (Non-condensing environment for HIH-5030 catalog listings only.)



# HIH-5030/5031 Series

Figure 3. Typical Output Voltage vs Relative Humidity (At 25 °C and 3.3 Vdc.)

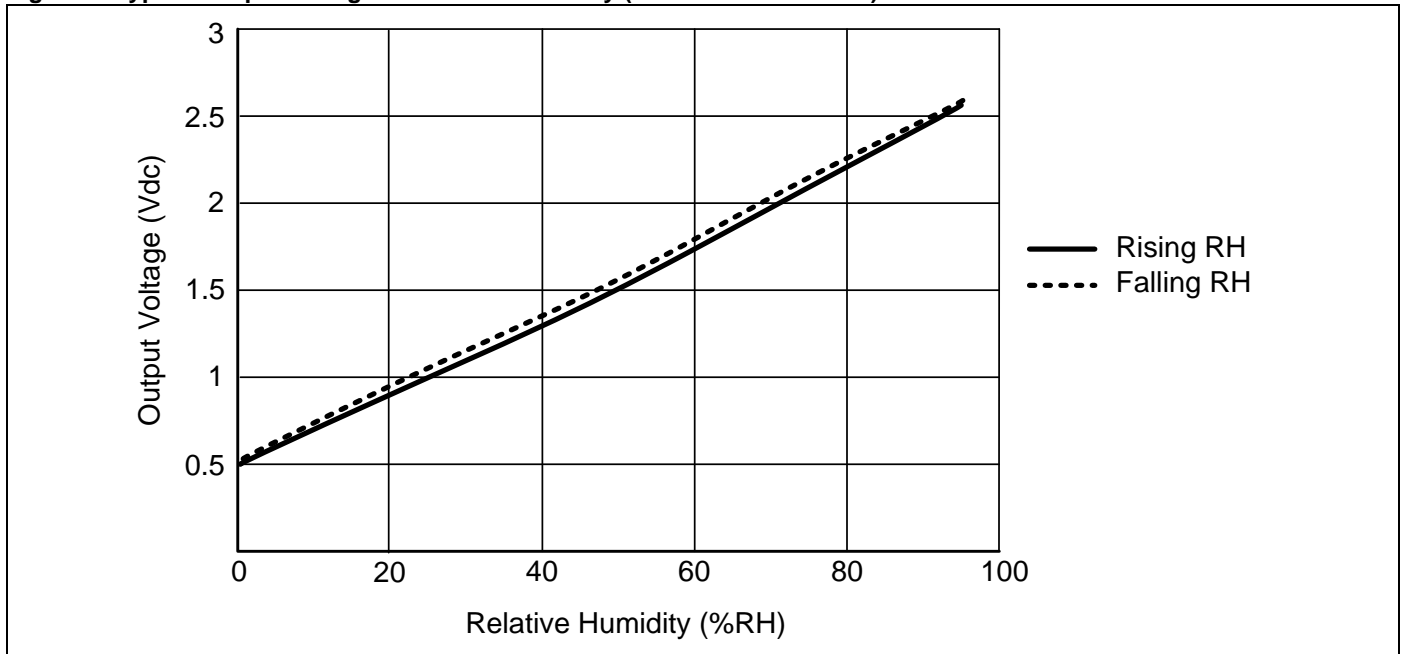
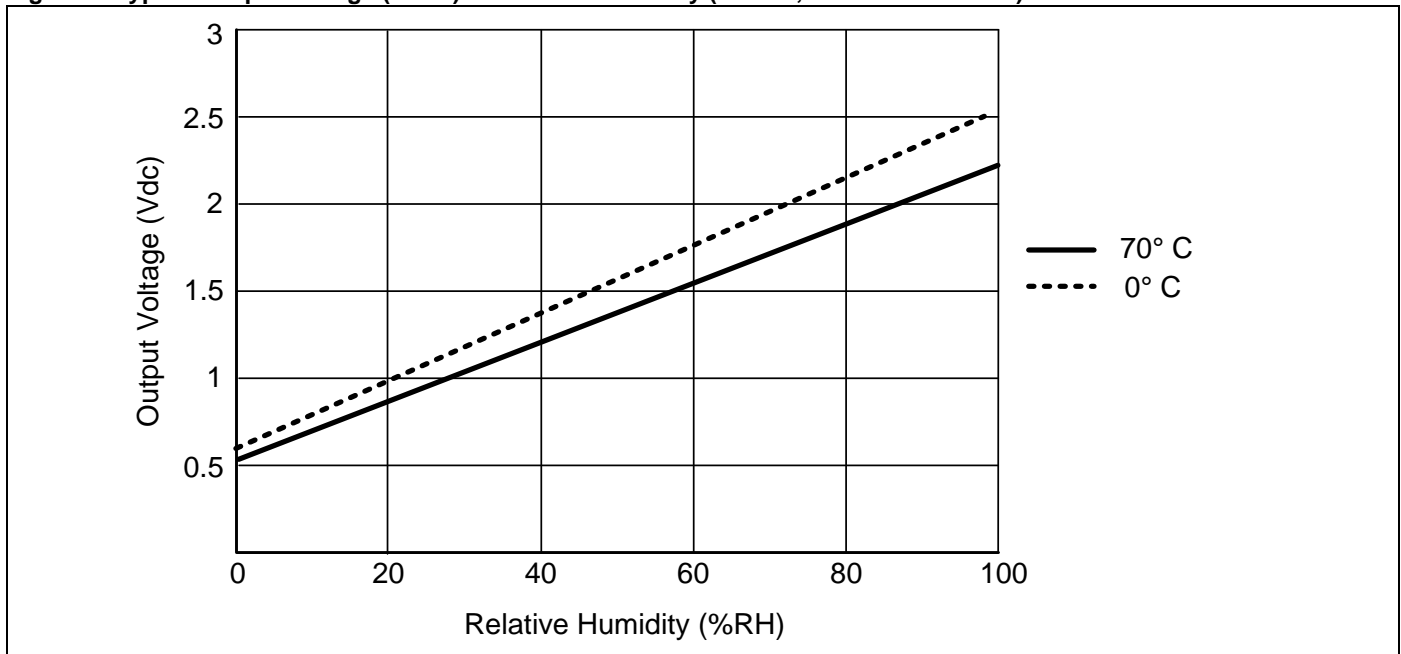


Figure 4. Typical Output Voltage (BFSL) vs Relative Humidity (At 0 °C, 70 °C and 3.3 Vdc.)



# Low Voltage Humidity Sensors

Figure 5. HIH-5030 Mounting Dimensions (For reference only. mm/[in])

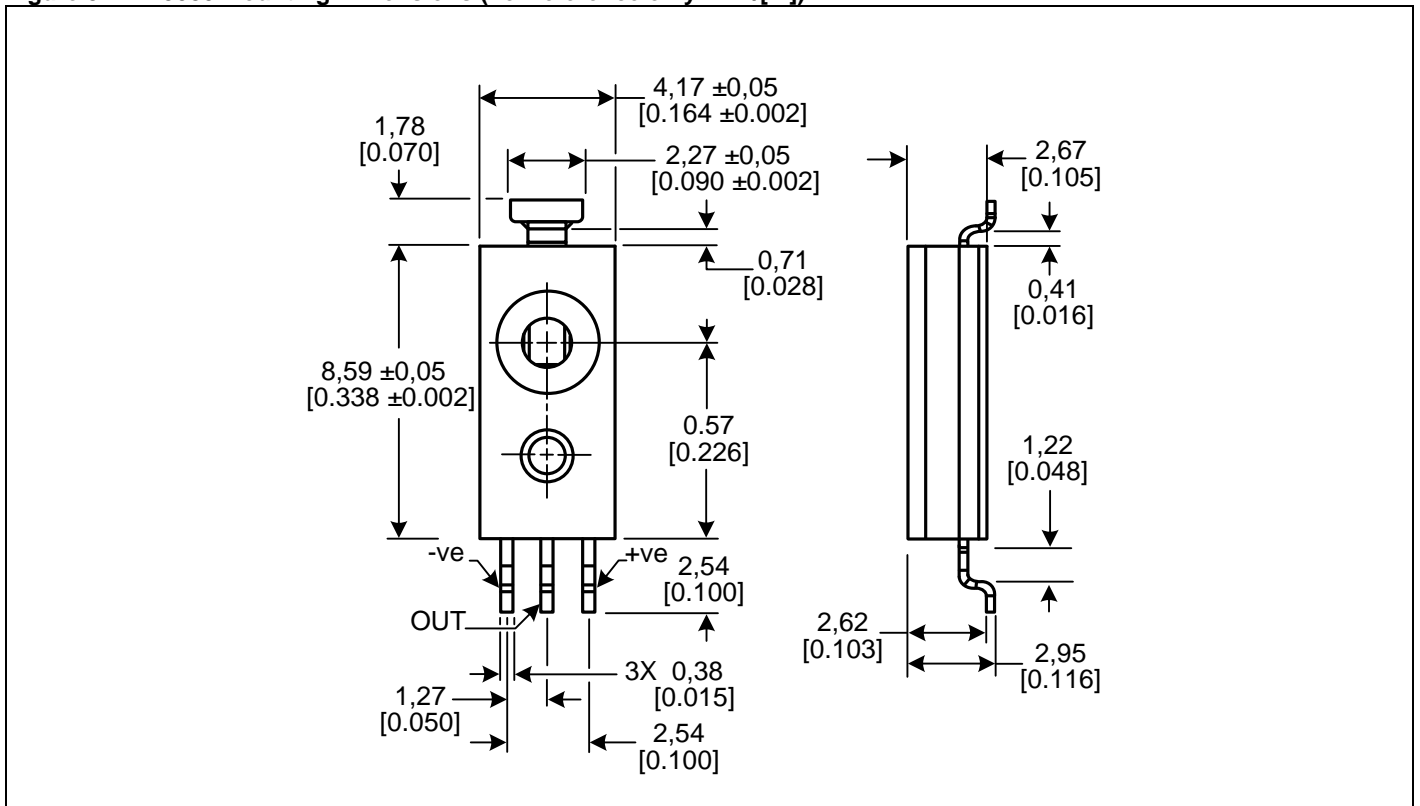
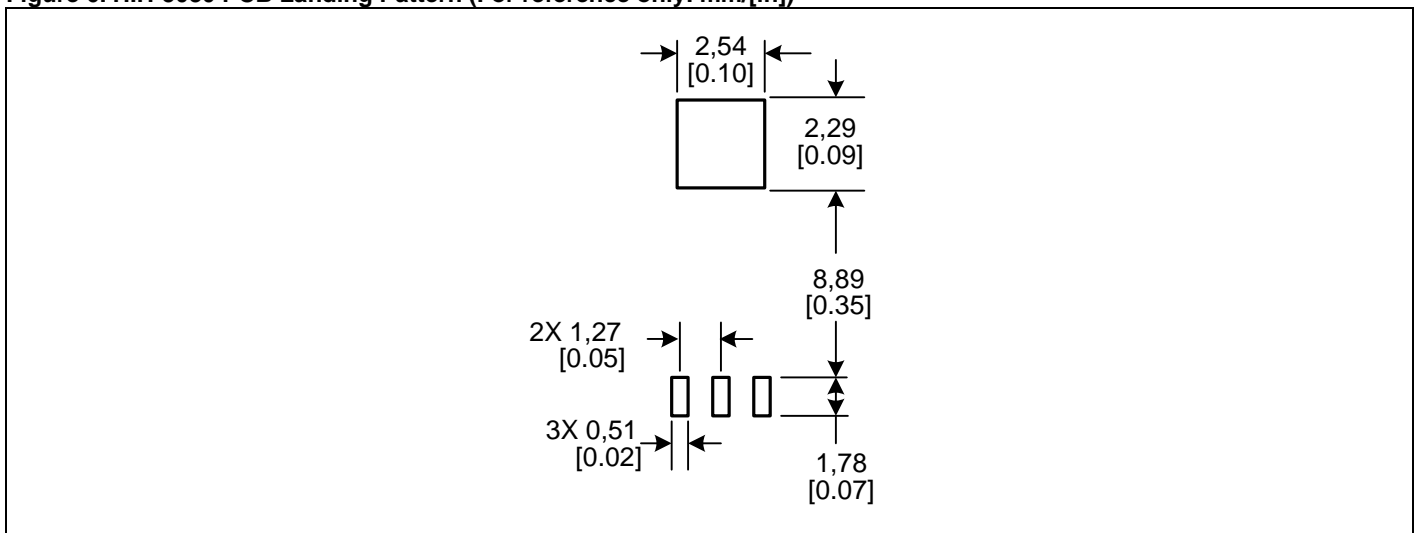


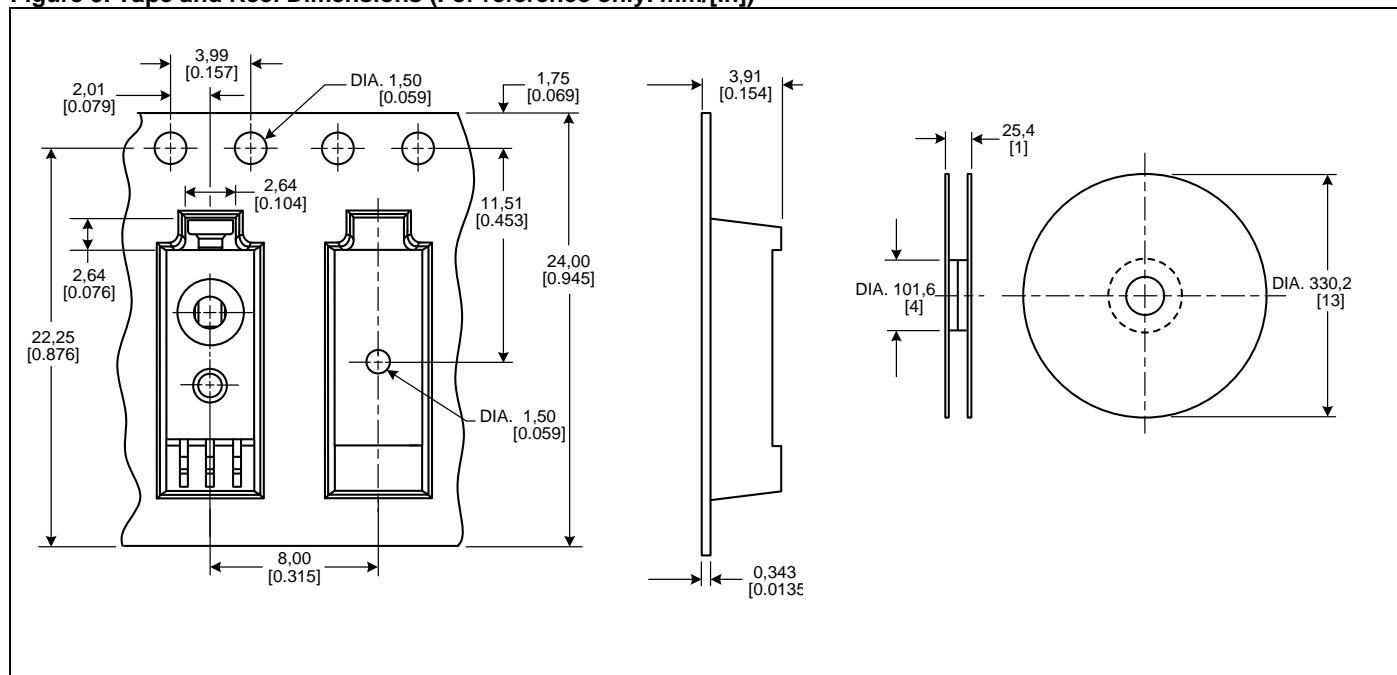
Figure 6. HIH-5030 PCB Landing Pattern (For reference only. mm/[in])



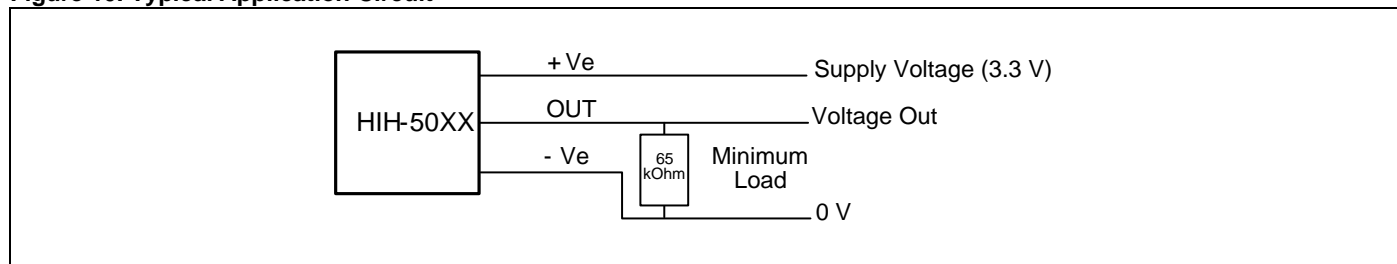


# Low Voltage Humidity Sensors

**Figure 9. Tape and Reel Dimensions (For reference only. mm/[in])**



**Figure 10. Typical Application Circuit**



**ORDER GUIDE**

| Catalog Listing | Description   |
|-----------------|---|
| HIH-5030-001    | Covered integrated circuit humidity sensor, SMD, 1000 units on tape and reel                            |
| HIH-5031-001    | Covered, filtered integrated circuit humidity sensor, SMD, 1000 units on tape and reel                  |
| HIH-5030-001S   | Sample pack: covered integrated circuit humidity sensor, SMD, five units on tape                        |
| HIH-5031-001S   | Sample pack: covered, filtered integrated circuit humidity sensor, SMD, sample pack, five units on tape |

**ADDITIONAL HUMIDITY SENSOR INFORMATION**

See the following associated literature is available on the [Web](#):

- Product installation instructions
- Application sheets:
  - Humidity Sensor Performance Characteristics
  - Humidity Sensor Theory and Behavior
  - Humidity Sensor Moisture and Psychrometrics
  - Thermoset Polymer-based Capacitive Sensors

# HIH-5030/5031 Series

# Low Voltage Humidity Sensors

## WARNING

### MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

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## WARNING

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**Failure to comply with these instructions could result in death or serious injury.**

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