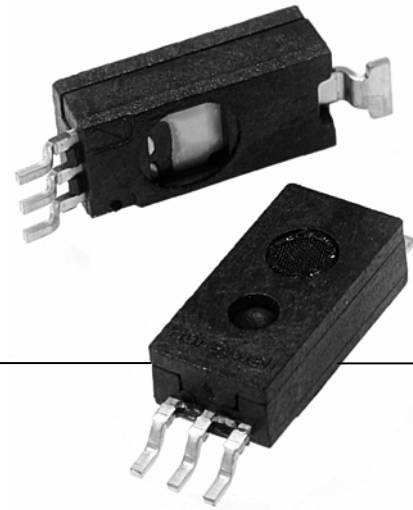


HIH-4030/31 Series

Humidity Sensors



DESCRIPTION

Honeywell has expanded our HIH Series to include an SMD (Surface Mount Device) product line: the new HIH 4030/4031. The HIH 4030/4031 complements our existing line of non-SMD 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-hole.

The HIH-4030/4031 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 μ A, the HIH-4030/4031 Series is often ideally suited for low drain, battery operated systems.

Tight sensor interchangeability reduces or eliminates OEM production calibration costs. Individual sensor calibration data is available.

FEATURES

- 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-4030/4031 Series delivers instrumentation-quality RH (Relative Humidity) sensing performance in a competitively priced, solderable SMD.

The HIH-4030 is a covered integrated circuit humidity sensor. The HIH-4031 is a covered, condensation-resistant, integrated circuit humidity sensor that is factory-fitted with a hydrophobic filter allowing it to be used in 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

- Refrigeration equipment
- HVAC (Heating, Ventilation and Air Conditioning) equipment
- Medical equipment
- Drying
- Metrology
- Battery-powered systems
- OEM assemblies

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TABLE 1. PERFORMANCE SPECIFICATIONS (At 5 Vdc supply and 25 °C [77 °F] unless otherwise noted.)

| Parameter | Minimum | Typical | Maximum | Unit | Specific Note |
|--|--|---------------|----------|--------|---------------|
| Interchangeability (first order curve) | – | – | – | – | – |
| 0% RH to 59% RH | -5 | – | 5 | % RH | – |
| 60% RH to 100% RH | -8 | – | 8 | % RH | – |
| Accuracy (best fit straight line) | -3.5 | – | +3.5 | % RH | 1 |
| Hysteresis | – | 3 | – | % RH | – |
| Repeatability | – | ±0.5 | – | % RH | – |
| Settling time | – | – | 70 | ms | – |
| Response time (1/e in slow moving air) | – | 5 | – | s | – |
| Stability (at 50% RH in a year) | – | ±1.2 | – | % RH | 2 |
| Stability (at 50% RH in a year) | – | ±0.5 | – | % RH | 3 |
| Voltage supply | 4 | – | 5.8 | Vdc | 4 |
| Current supply | – | 200 | 500 | µA | – |
| Voltage output (1 st order curve fit) | $V_{OUT} = (V_{SUPPLY})(0.0062(\text{sensor RH}) + 0.16)$, typical at 25 °C | | | | |
| Temperature compensation | True RH = (Sensor RH)/(1.0546 – 0.00216T), T in °C | | | | |
| Output voltage temp. coefficient at 50% RH, 5 V | – | -4 | – | mV/°C | – |
| Operating temperature | -40[-40] | See Figure 1. | 85[185] | °C[°F] | – |
| Operating humidity (HIH-4030) | 0 | See Figure 1. | 100 | % RH | 5 |
| Operating humidity (HIH-4031) | 0 | See Figure 1. | 100 | % RH | – |
| Storage temperature | -50[-58] | – | 125[257] | °C[°F] | – |
| Storage humidity | See Figure 2. | | | % RH | 5 |

Specific Notes:

1. Can only be achieved with the supplied slope and offset. For HIH-4030/31-003 catalog listings only.
2. Includes testing outside of recommended operating zone.
3. Includes testing for recommended operating zone only.
4. Device is calibrated at 5 Vdc and 25 °C.
5. Non-condensing environment. When liquid water falls on the humidity sensor die, output goes to a low rail condition indicating no humidity.

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.

FACTORY CALIBRATION DATA

HIH-4030/31 Sensors may be ordered with a calibration and data printout. See Table 2 and the order guide on the back page.

TABLE 2. EXAMPLE DATA PRINTOUT

| | |
|---|---|
| Model | HIH-4030-003 |
| Channel | 92 |
| Wafer | 030996M |
| MRP | 337313 |
| Calculated values at 5 V | |
| V _{OUT} at 0% RH | 0.958 V |
| V _{OUT} at 75.3% RH | 3.268 V |
| Linear output for 3.5% RH accuracy at 25 °C | |
| Zero offset | 0.958 V |
| Slope | 30.680 mV/%RH |
| Sensor RH | (V _{OUT} - zero offset)/slope (V _{OUT} - 0.958)/0.0307 |
| Ratiometric response for 0% RH to 100% RH | |
| V _{OUT} | V _{SUPPLY} (0.1915 to 0.8130) |



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FIGURE 1. OPERATING ENVIRONMENT (Non-condensing environment for HIH-4030 catalog listings only.)

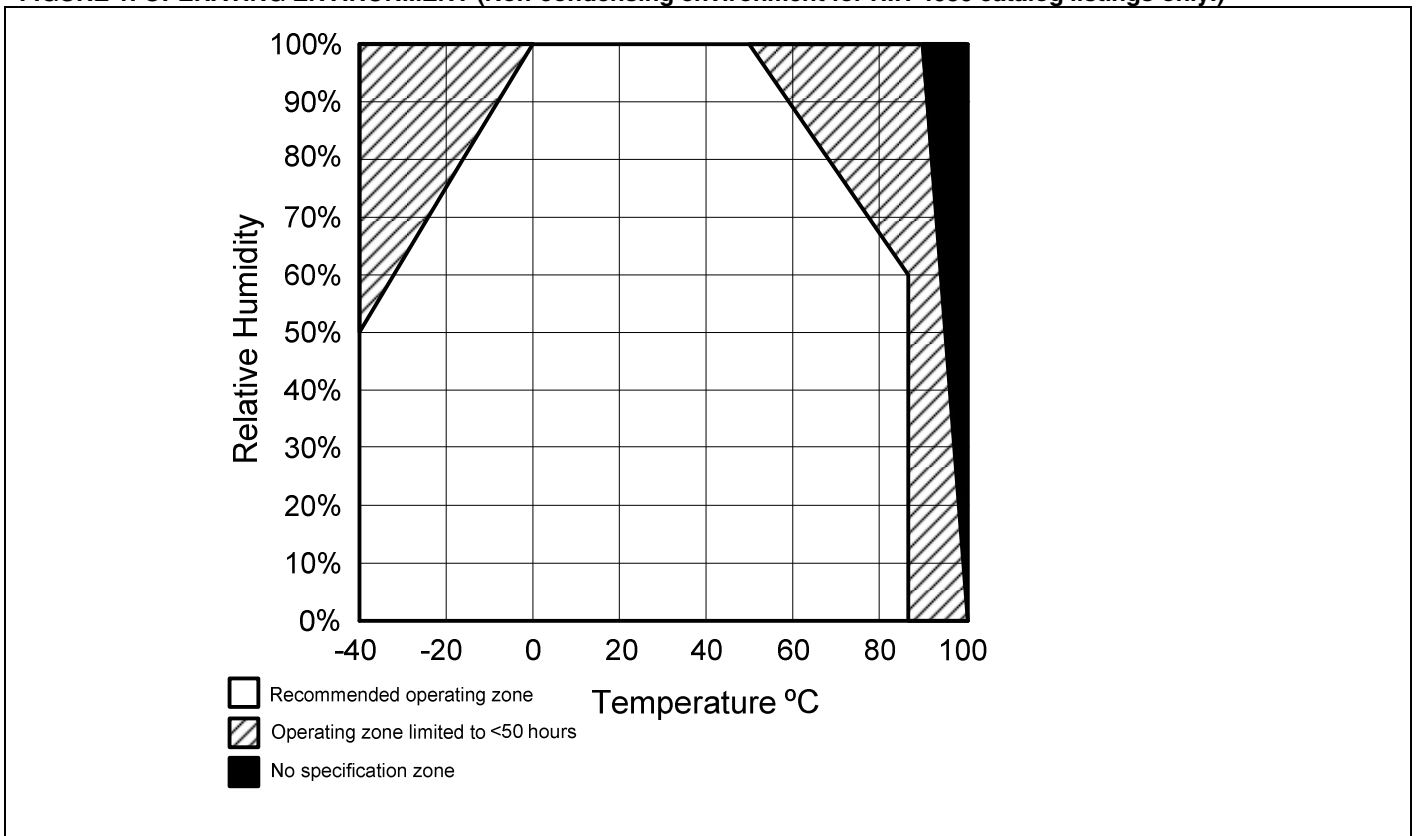
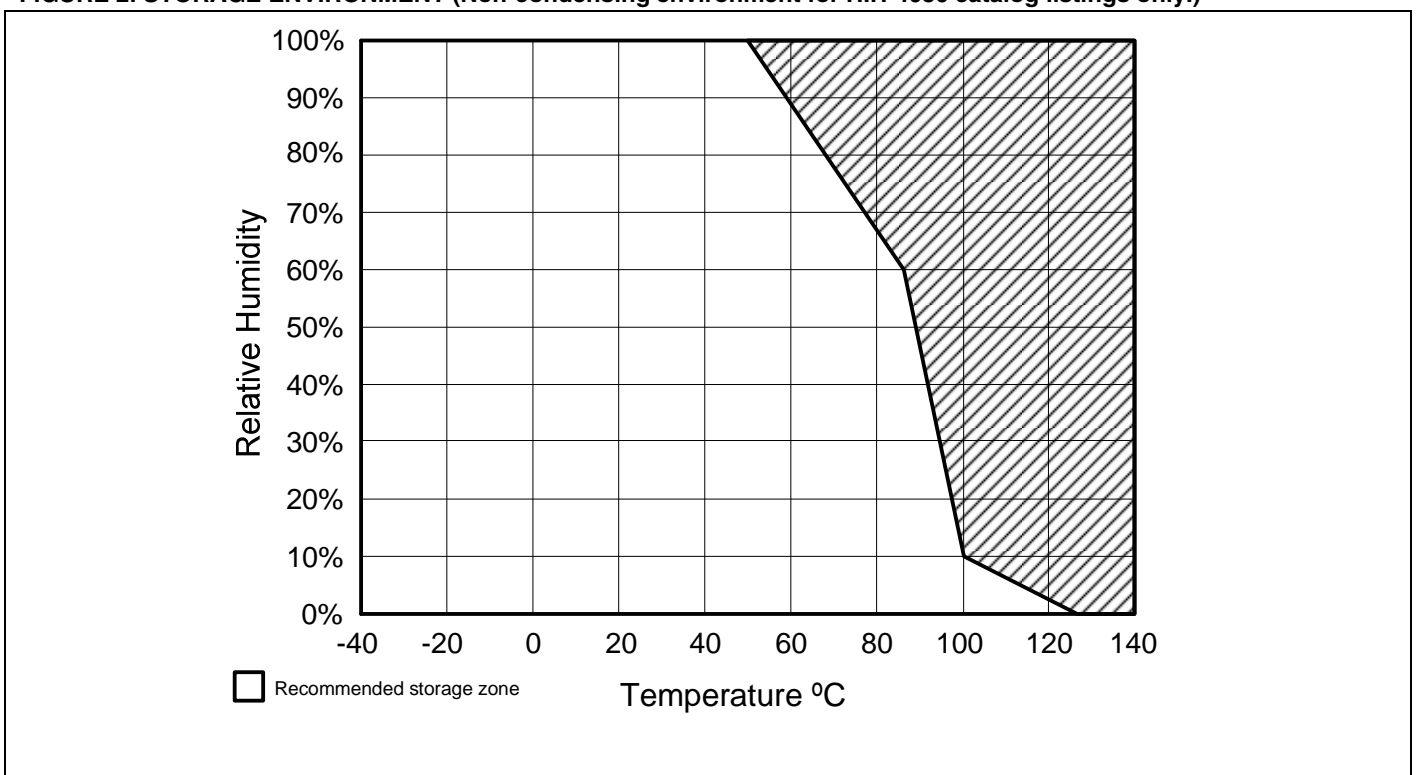


FIGURE 2. STORAGE ENVIRONMENT (Non-condensing environment for HIH-4030 catalog listings only.)



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FIGURE 3. TYPICAL OUTPUT VOLTAGE VS RELATIVE HUMIDITY (At 25 °C and 5 V.)

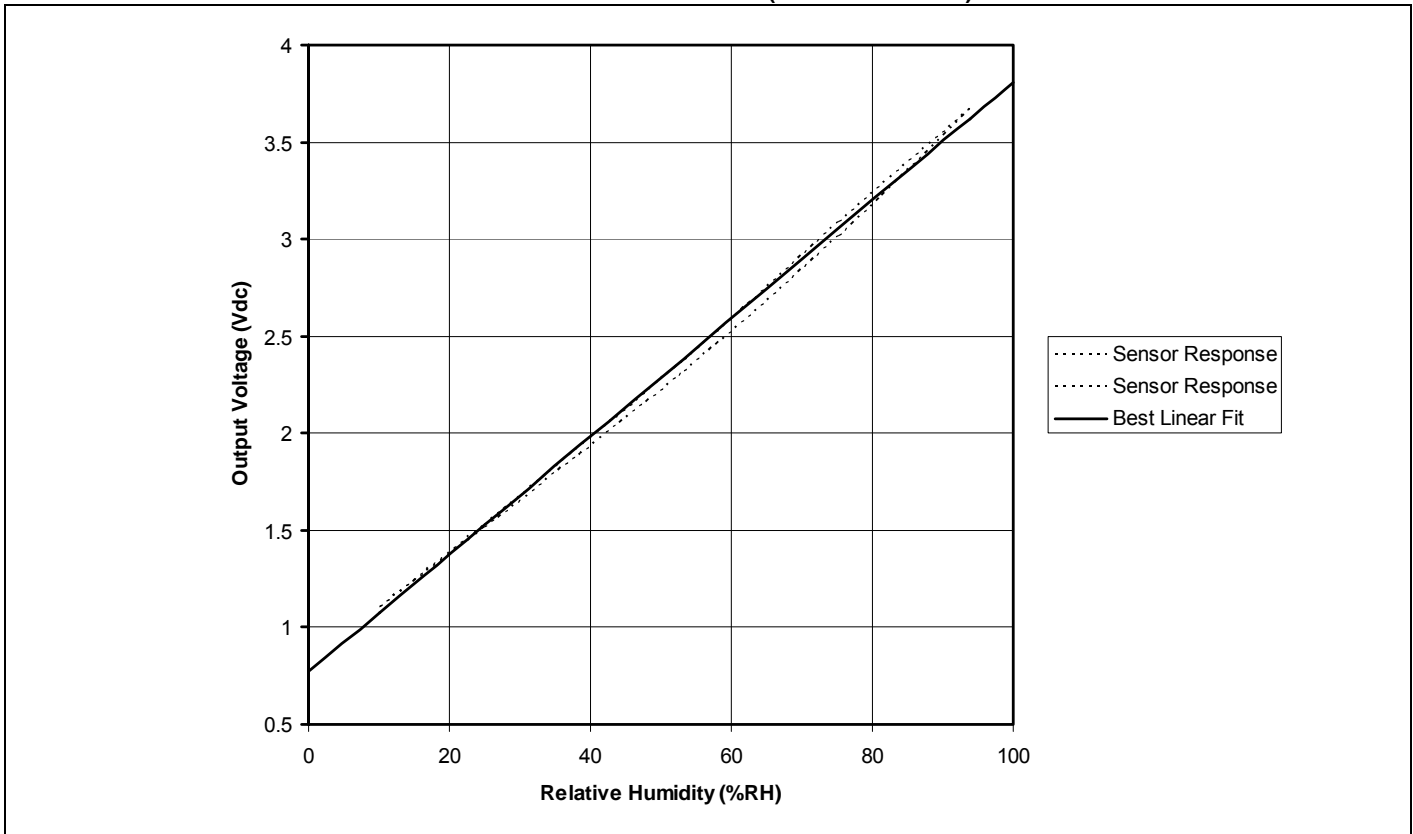
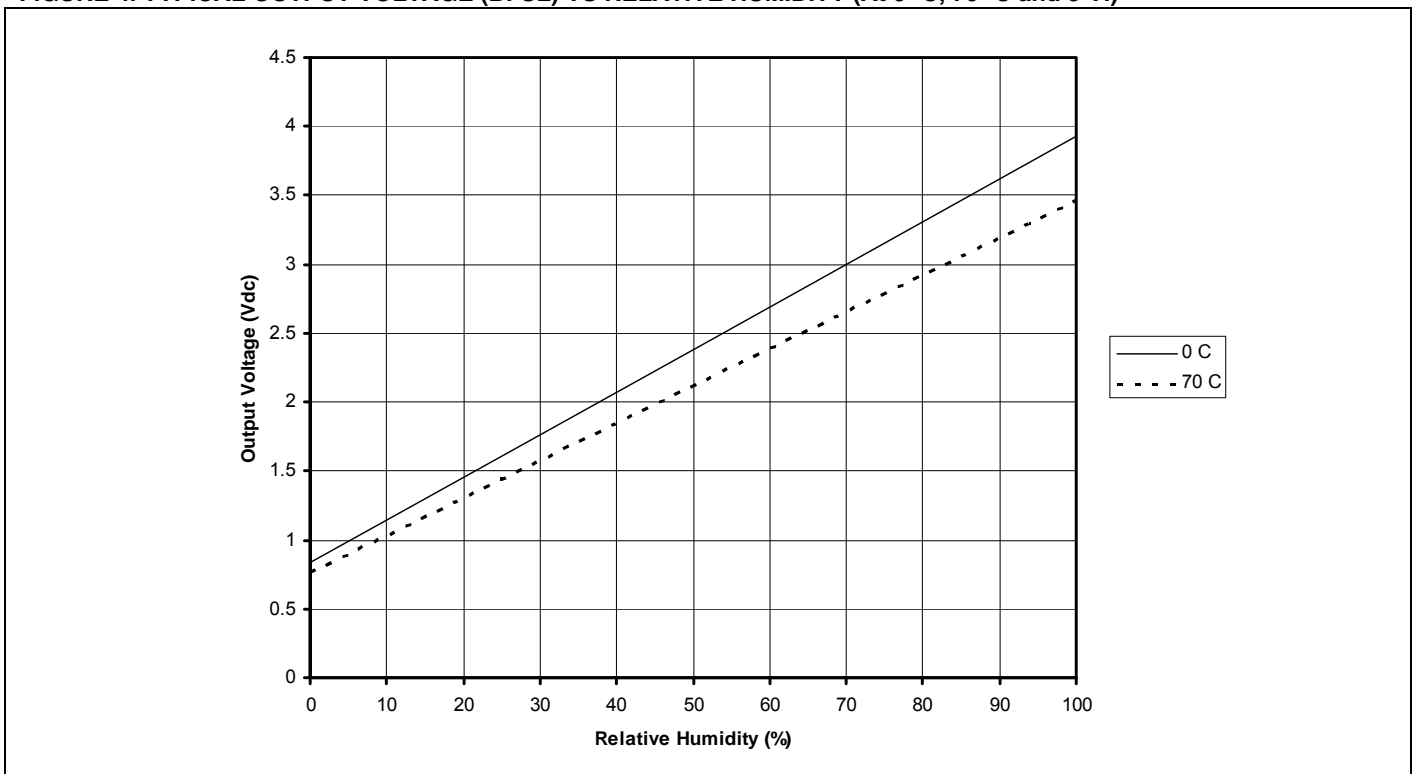


FIGURE 4. TYPICAL OUTPUT VOLTAGE (BFSL) VS RELATIVE HUMIDITY (At 0 °C, 70 °C and 5 V.)



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FIGURE 6. HIH-4031 MOUNTING DIMENSIONS (For reference only. mm/[in])

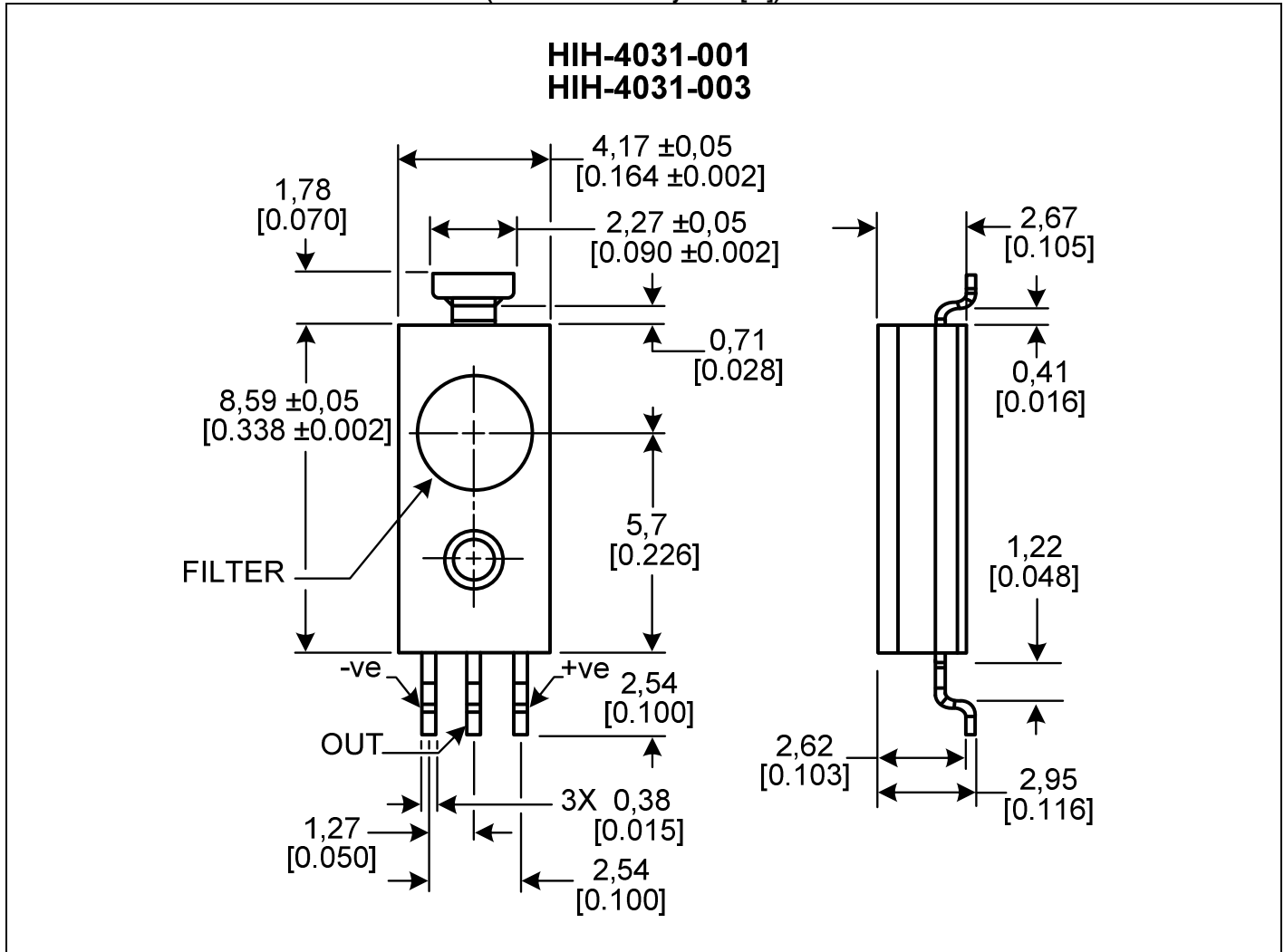
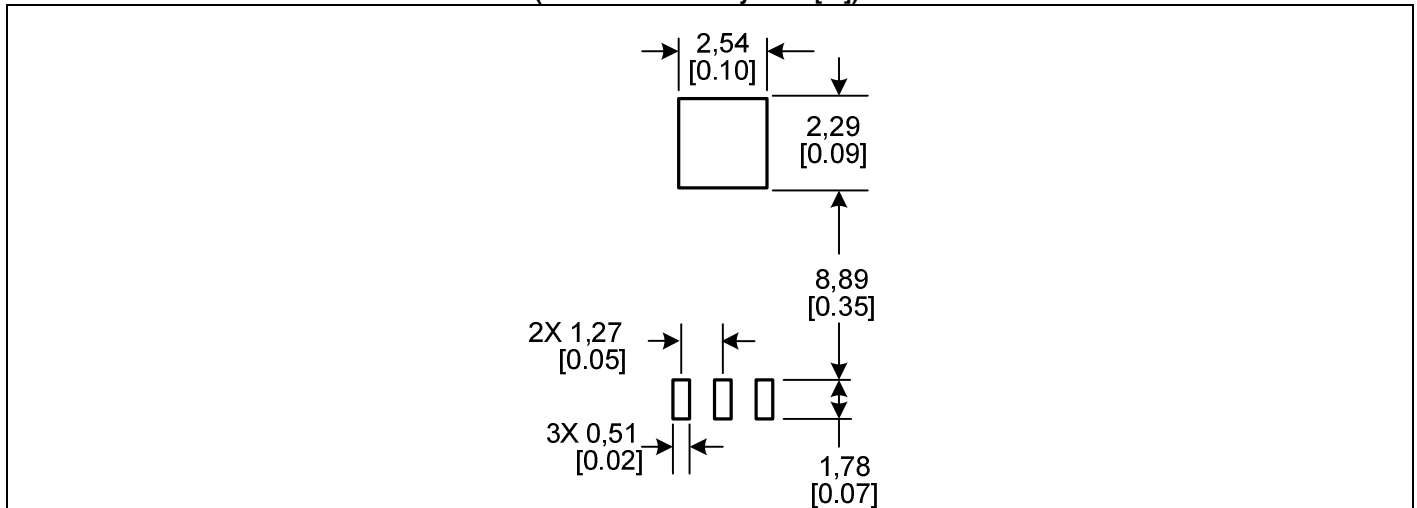


FIGURE 7. HIH-4031 PCB LANDING PATTERN (For reference only. mm/[in])



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FIGURE 8. TAPE AND REEL DIMENSIONS (For reference only. mm/[in])

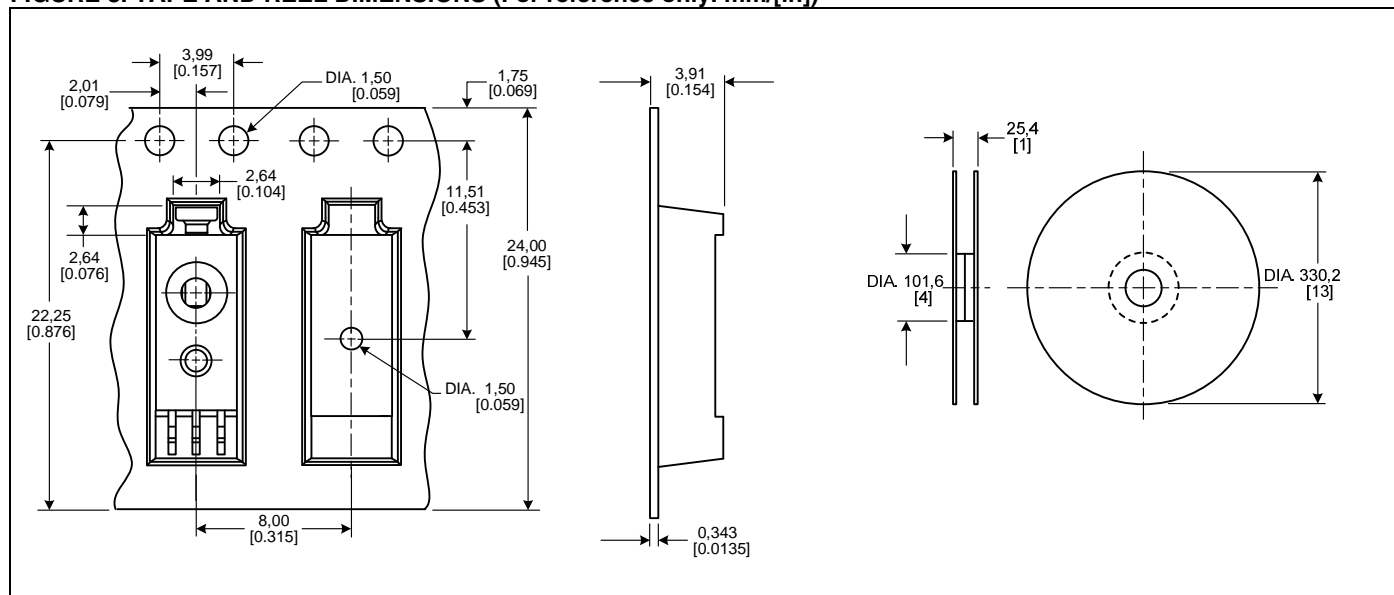
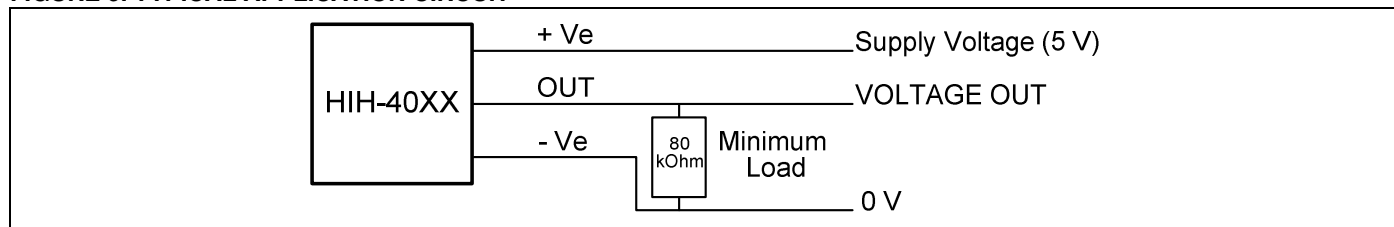


FIGURE 9. TYPICAL APPLICATION CIRCUIT



ORDER GUIDE

| Catalog Listing | Description |
|-----------------|---|
| HIH-4030-001 | Covered integrated circuit humidity sensor, SMD, 1000 units on tape and reel |
| HIH-4030-003 | Covered integrated circuit humidity sensor, SMD, calibration and data printout, 1000 units on tape and reel |
| HIH-4031-001 | Covered, filtered integrated circuit humidity sensor, SMD, 1000 units on tape and reel |
| HIH-4031-003 | Covered, filtered integrated circuit humidity sensor, SMD, calibration and data printout, 1000 units on tape and reel |
| HIH-4030-001S | Sample pack: covered integrated circuit humidity sensor, SMD, five units on tape |
| HIH-4030-003S | Sample pack: covered integrated circuit humidity sensor, SMD, calibration and data printout, five units on tape |
| HIH-4031-001S | Sample pack: covered, filtered integrated circuit humidity sensor, SMD, sample pack, five units on tape |
| HIH-4031-003S | Sample pack: covered, filtered integrated circuit humidity sensor, SMD, calibration and data printout, five units on tape |

FURTHER 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