

# Humidity & Temperature Sensor

– for OEM Installations

Model BB-T9602-3-A-1-G2

# ADVANTECH

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## KEY FEATURES

- + Fully calibrated and temperature compensated
- + Water resistant (IP67 certified)
- + Pulse Density Modulated (PDM) convertible to analog
- + Precision & accuracy ( $\pm 2\%$  RH,  $\pm 0.5\text{ }^\circ\text{C}$ , 14-bit resolution)
- + Low current consumption
- + Designed for reliability in harsh environments
- + Flexible mounting options

## OVERVIEW

Model BB-T9602-3-A-1-G2 IP67, harsh environment humidity and temperature sensor, is a fully-calibrated and temperature-compensated combined humidity and temperature sensor supplied in a water-resistant IP67 package, making it the most advanced and cost-effective sensing solution for virtually any type of harsh environment application.

The sensor is designed with an exclusive capacitive polymer sensor chip and ASIC integrated into an easy mount OEM package. Individually factory calibrated and tested, the BB-T9602-3-A-1-G2 is simple and ready to use without further calibration or temperature compensation.

The BB-T9602-3-A-1-G2 provides linearized output signals as PDM (pulse density modulated) convertible to an analog signal to meet a wider range of application requirements.

## ORDERING INFORMATION

MODEL NO.	DESCRIPTION
BB-T9602-3-A-1-G2	<b>Humidity &amp; Temperature Sensor</b> - PMD analog output, 3.3V, OEM, 1m (3.28 ft)

## APPLICATIONS

### Energy Saving HVAC Control

- Air conditioning
- Refrigeration
- Indoor air quality
- Vent fans
- Home appliances
- Humidifiers / Dehumidifiers

### Process Control & Instrumentation

- Medical instruments
- Handheld devices
- Weather stations
- Food processing
- Printers
- RFIDs

## SPECIFICATIONS

HARDWARE	
Method	Capacitive polymer RH sensor, PTA (Proportional to Absolute) integrated temperature sensor
Operating Conditions	-20 to + 70 °C; 0 to 100% relative humidity (RH)
Storage Conditions	-40 to + 85 °C
Output Mode	PDM, convertible to analog
Power Requirement	3.3 or 5.0 VDC, $\pm 5.0\%$ (nominal)
Current Consumption	750 $\mu\text{A}$ (typical)
Cable	Outer diameter: 4.20, $\pm 0.20$ mm 4-core, shielded, double insulated and flexible.
Mounting Options	Grommet or cable P Clamp: P Clamp - 9.53 mm Hellermann Tyton (mpn# T3D03750M4) or equivalent Grommet - 11 mm, advanced antivibration components (mpn# V12R30M16004616) or equivalent
APPROVALS, CERTIFICATIONS	
Environmental	RoHS / REACH Compliant, IP67 Certified Halogen Free, Cable - UL VW-1 Certified

All product specifications are subject to change without notice.  
BB-T9602-3-A-1-G2\_4920ds

# ADVANTECH

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## RELATIVE HUMIDITY (RH%)

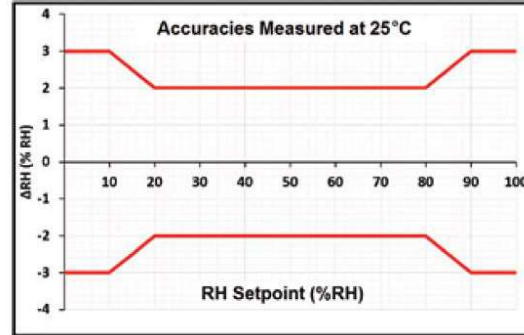
### ASSEMBLY ACCURACY SPECIFICATIONS

Resolution	14-bit, 0.01% relative humidity (RH)
Accuracy <sup>1</sup>	± 2.0% RH (20 ~ 80% RH) ± 3.5% RH (0 to 20% RH) and (80 to 100%) (see Typical %RH Accuracy graph)
Repeatability	± 0.2% RH
Hysteresis	± 2.0% RH
Linearity	< 0.2% RH
Response Time <sup>2</sup>	≤ 29 sec. (T 63%)
Temperature Coefficient	0.13% RH/°C (at 10 ~ 60 °C, 10 ~ 90% RH)
Operating Humidity	0 ~ 95% RH
Long Term Drift	<0.5% RH/year (normal conditions)

1. Accuracies measured in 25 °C, nominal voltage.

2. 30% RH step response, measured at 25 °C in a 1m/sec air flow.

### Typical %RH Accuracy



## TEMPERATURE (°C)

### ASSEMBLY ACCURACY SPECIFICATIONS

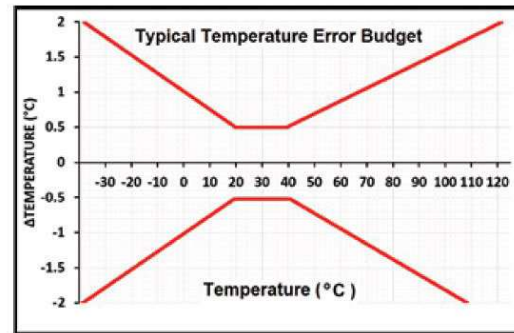
Resolution	14-bit (0.01 °C)
Accuracy <sup>1</sup>	± 0.5 °C (see Typical Temperature Accuracy graph)
Repeatability	± 0.1 °C
Response Time <sup>2</sup>	≤ 116 sec. (T 63)
Operating Range <sup>3</sup>	-20 ~ +70 °C
Long Term Drift	<0.05% °C/year (normal conditions)

1. Accuracies measured in 25 °C, nominal voltage.

2. 25 °C step response in a 1m/sec air flow.

3. Minimum design range, documented testing 0 to +50 °C

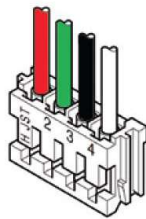
### Typical Temperature Accuracy



## SENSOR PIN DESIGN & SCHEMATIC

### Analog

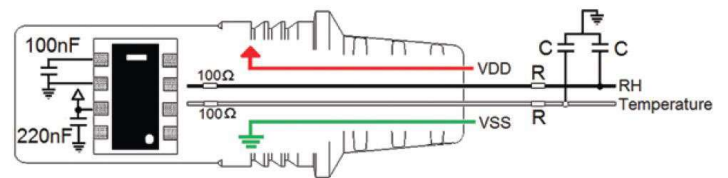
1. V+
2. Ground
3. PDM RH
4. PDM Temp



### SCHEMATIC:

CONN	PIN	PIN	CONN
J1	Red	2	J2
J1	Green	8	J2
J1	Capacitors		
J1	Black	3	J2
J1	White	4	J2

## INTERNAL WIRING DIAGRAMS



T9602 Analog Wiring Diagram

## CONVERSION EQUATIONS & SMARTSWARM™ GATEWAY SETTINGS

DRAIN VOLTAGE	
VDD	3300 mV
TEMPERATURE	
Equation	$T [^{\circ}\text{C}] = (\text{PDM\_T} [\text{mV}] / \text{VDD} [\text{mV}] - 0.2424) * 165$
SmartSwarm 342 Setting - AI 2	0V = -40 °C, 3.3V = 125 °C
HUMIDITY	
Equation	$\%RH = \text{PDM\_H} [\text{mV}] / \text{VDD} [\text{mV}] * 100$
SmartSwarm 342 Setting - AI 3	0V = 0%RH, 3.3V = 100%RH

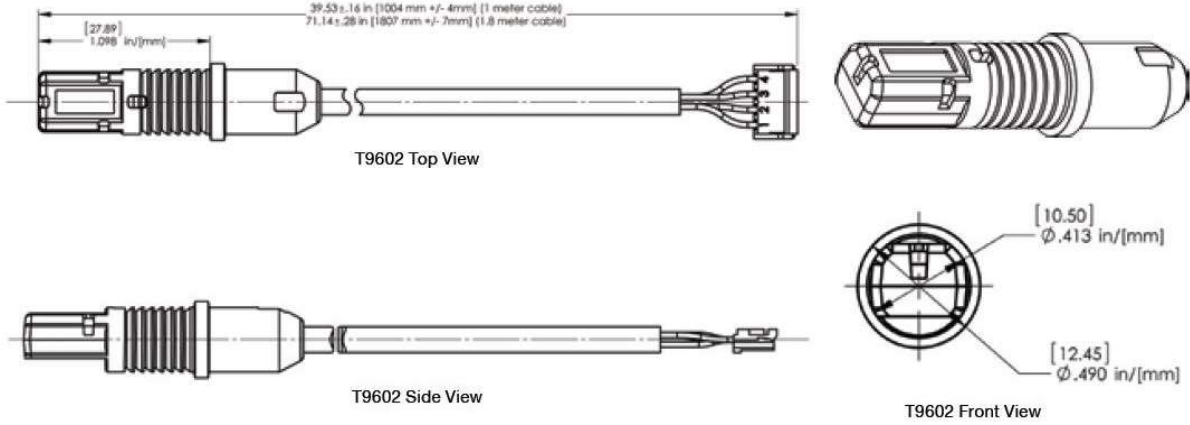
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## INTERFACE DRAWING



## MECHANICAL DRAWING

Dimensions = mm

