Honeywell

Installation Instructions for the Basic Amplified Board Mount Pressure Sensors, ABP Series

32305127
Issue A

GENERAL SPECIFICATIONS

The Basic Amplified ABP Series is a piezoresistive silicon pressure sensor offering a ratiometric analog or digital output for reading pressure over the specified full scale pressure span and temperature range.

The ABP Series is fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects, and non-linearity using an on-board Application Specific Integrated Circuit (ASIC). Calibrated output values for pressure are updated at approximately 1 kHz for analog and 2 kHz for digital.

The ABP Series is calibrated over the temperature range of 0 °C to 50 °C [32 °F to 122 °F]. The sensor is characterized for operation from a single power supply of either 3.3 Vdc or 5.0 Vdc. These sensors measure gage or differential pressures.

The Basic Amplified pressure sensors are intended for use with non-corrosive, non-ionic gases, such as air and other dry gases. The following options extend the performance of these sensors to non-corrosive liquids.

- No silicone gel coating: The input port is limited to non-corrosive, non-ionic media such as dry air and gases and should not be exposed to condensation. The gases are limited to media that are compatible with high temperature polyamide, silicone, alumina ceramic, silicon, gold, and glass.
- Silicone gel coating: Uses the same materials in the wetted media path but is protected from condensation by a silicone-based gel coating; allows use in applications where condensation may occur.

CLEANING

CAUTION

IMPROPER CLEANING

Avoid cleaning the sensor; however, if it must be cleaned ensure cleaning fluids, such as appropriate alcohols or fluorinated solvents, are used based on the type of contaminants to be removed. Do not immerse the sensor. **Failure to comply with these instructions may result in product damage.**

Table 1. Absolute Maximum Ratings[1]

Characteristic	Min.	Max.	Unit
Supply voltage (V_{supply})	-0.3	6.0	Vdc
Voltage on any pin	-0.3	V_{supply} + 0.3	V
Digital interface clock frequency: I^2C SPI	 100 50	 400 800	kHz
ESD susceptibility (human body model)	2	—	kV
Storage temperature	-40 [-40]	85 [185]	°C [°F]
Soldering time and temperature: lead solder temperature (DIP) peak reflow temperature (Leadless SMT, SMT)	4 s max. at 250 °C [482 °F] 15 s max. at 250 °C [482 °F]		

[1]Absolute maximum ratings are the extreme limits the device will withstand without damage.

Table 2. Environmental Specifications

Characteristic	Parameter
Humidity (gases only)	0% to 95% RH, non-condensing
Vibration	15 g, 10 Hz to 2 Hz
Shock	100 g, 6 ms duration
Life[1]	1 million pressure cycles minimum
Solder reflow	J-STD-020-D.1 Moisture Sensitivity Level 1 (unlimited shelf life when stored at ≤30 °C/85 % RH)

[1]Life may vary depending on specific application in which the sensor is utilized.

Table 3. Wetted Materials[1]

Component	Pressure Port	
	No Silicone Gel Coating Option	Silicone Gel Coating Option
Ports and covers	high temperature polyamide	
Substrate	alumina ceramic	not exposed; protected by silicone gel
Adhesives	epoxy, silicone	epoxy
Electronic components	ceramic, silicon, glass, solder, gold	not exposed; protected by silicone gel

[1]Contact Honeywell Customer Service for detailed material information.

Table 4. Sensor Pressure Type

Pressure Type	Description
Gage	Output is proportional to the difference between applied pressure and atmospheric (ambient) pressure.
Differential	Output is proportional to the difference between the pressures applied to each port (Port 1 – Port 2).

Table 5. Operating Specifications

Characteristic	Analog			Digital			Unit
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Supply voltage (V_{supply}):[1, 2, 3] 3.3 Vdc 5.0 Vdc	 3.0 4.75	 3.3 5.0	 3.6 5.25	 3.0 4.75	 3.3 5.0	 3.6 5.25	Vdc
Supply current: 3.3 Vdc 5.0 Vdc sleep mode option	 — — —	 2.1 2.7 —	 2.8 3.8 —	 — — —	 3.1 3.7 1	 3.9 4.6 10	 mA mA µA
Operating temperature range[4]	-40 [-40]	—	85 [185]	-40 [-40]	—	85 [185]	°C [°F]
Compensated temperature range[5]	0 [-32]	—	50 [122]	0 [-32]	—	50 [122]	°C [°F]
Temperature output option[6]	—	—	—	—	1.5	—	°C
Startup time (power up to data ready)	—	—	5	—	—	3	ms
Response time	—	1	—	—	0.46	—	ms
Clipping limit: upper lower	 — 2.5	 — —	 97.5 —	 — —	 — —	 — —	 %Vsupply
SPI/I²C voltage level: low high	 — —	 — —	 — —	 — 80	 — —	 20 —	 %Vsupply
Pull up on SDA/MISO, SCL/SCLK, SS	—	—	—	1	—	—	kOhm
Accuracy[7]	—	—	±0.25	—	—	±0.25	%FSS BFSL[8]
Output resolution	0.03 —	— —	— —	— 12	— —	— —	%FSS bits

[1]Sensors are either 3.3 Vdc or 5.0 Vdc based on the catalog listing selected.

[2]Ratiometricity of the sensor (the ability of the device output to scale to the supply voltage) is achieved within the specified operating voltage.

[3]The sensor is not reverse polarity protected. Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

[4]Operating temperature range: The temperature range over which the sensor will produce an output proportional to pressure.

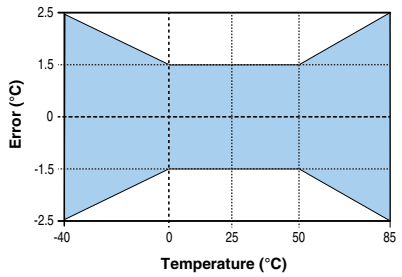
[5]Compensated temperature range: The temperature range over which the sensor will produce an output proportional to pressure within the specified performance limits.

[6]Temperature Output Option: Continuous operation in Sleep Mode only may provide different results.

[7]Accuracy: The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25 °C [77 °F]. Includes all errors due to pressure non-linearity, pressure hysteresis, and non-repeatability.

[8]Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range.

Figure 1. Temperature Output Option Temperature Error[1, 2]



[1]Operating temperature range: The temperature range over which the sensor will produce an output proportional to pressure.

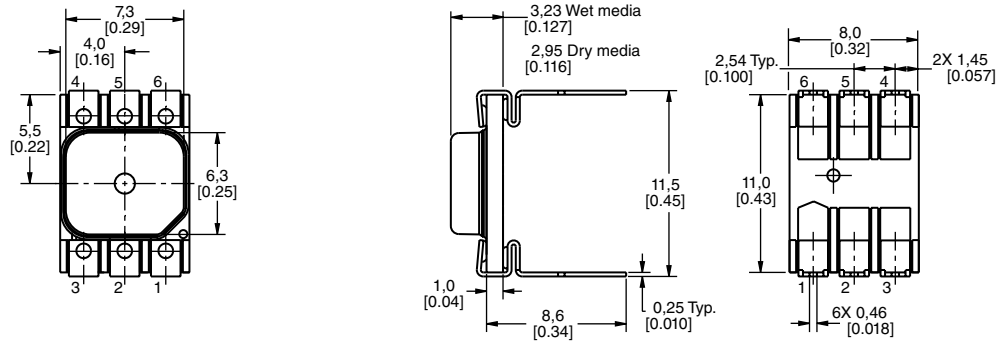
[2]Temperature Output Option: Continuous operation in Sleep Mode only may provide different results.

Table 6. Sensor Output at Significant Percentages (Digital Versions Only)

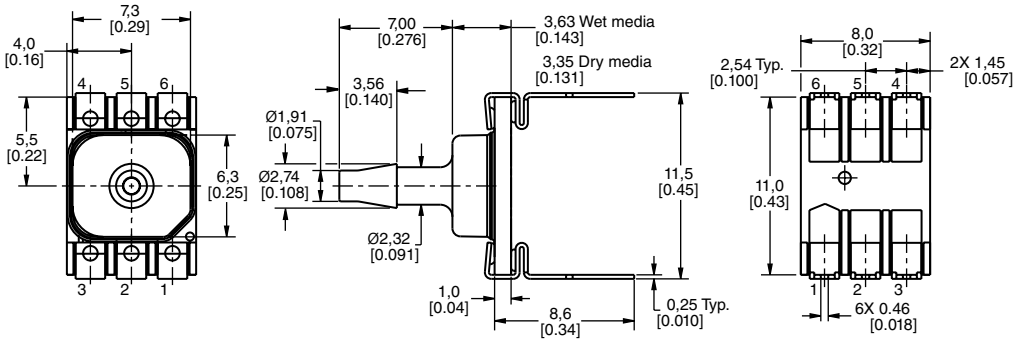
% Output	Digital Counts	
	decimal	hex
0	0	0x0000
10	1638	0x0666
50	8192	0x2000
90	14746	0x399A
100	16383	0x3FFF

Figure 2. DIP Package Dimensional Drawings (For reference only: mm [in].)

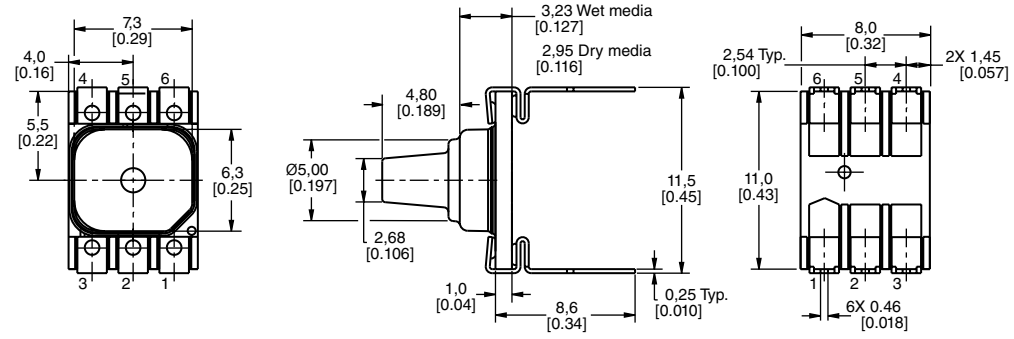
DIP NN: No port



DIP AN: Single axial barbed port



DIP LN: Single axial barbless port



DIP JN: Single radial barbless port

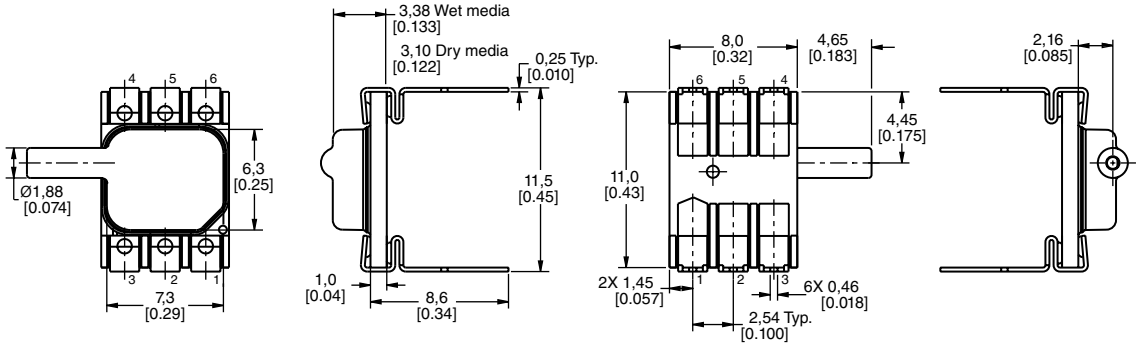
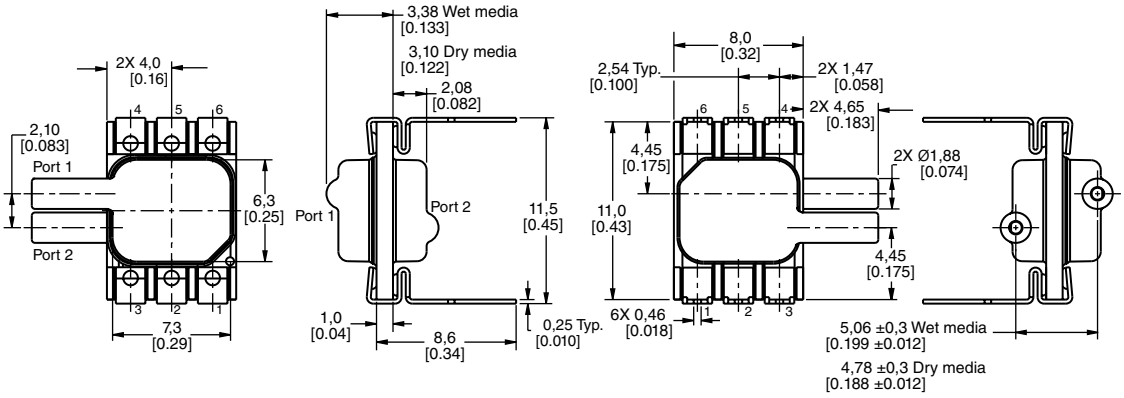
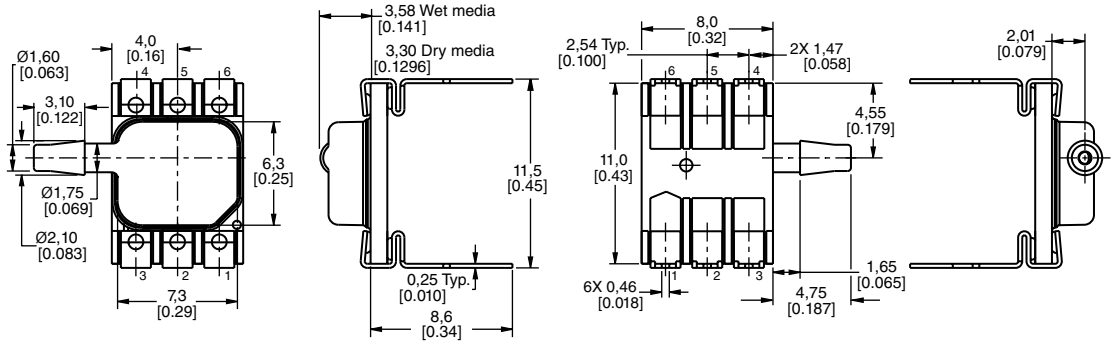


Figure 2. DIP Package Dimensional Drawings (continued)

DIP JJ: Dual radial barbless ports, same side



DIP RN: Single radial barbed port



DIP RR: Dual radial barbed ports, same side

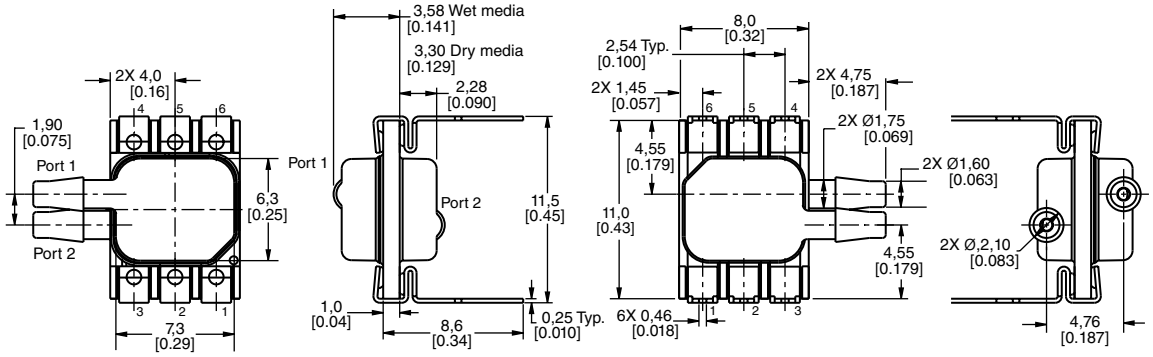
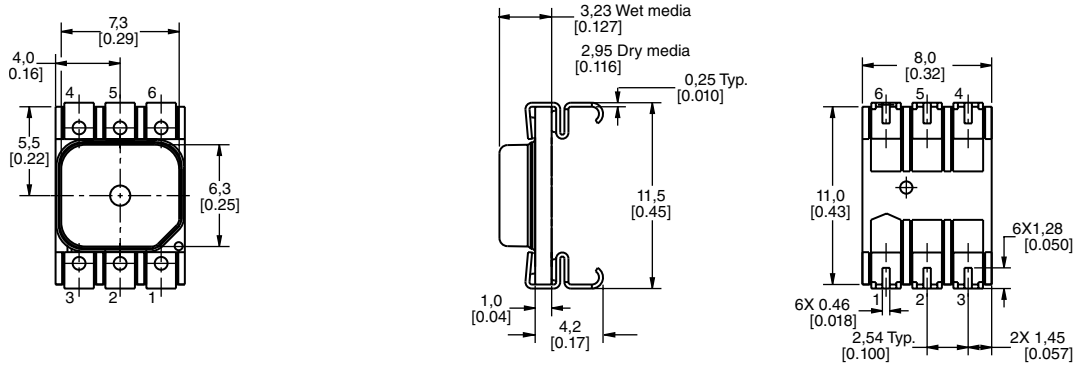
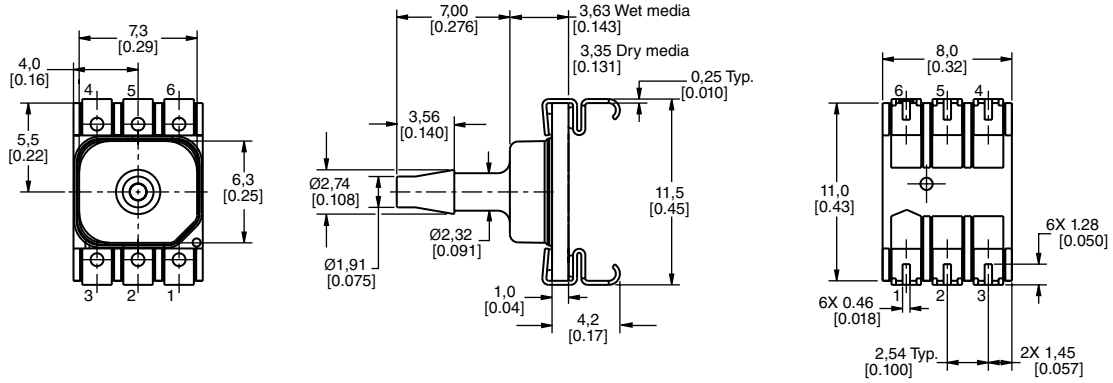


Figure 3. SMT Package Dimensional Drawings (For reference only: mm [in].)

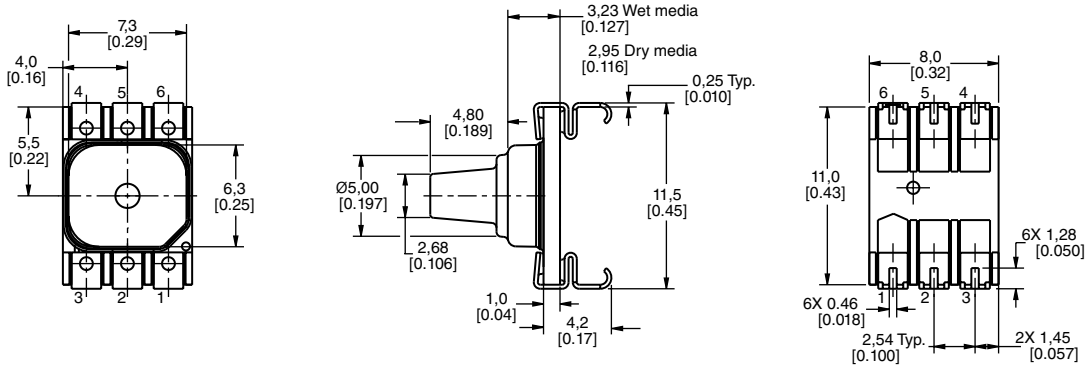
SMT NN: No port



SMT AN: Single axial barbed port



SMT LN: Single axial barbless port



SMT JN: Single radial barbless port

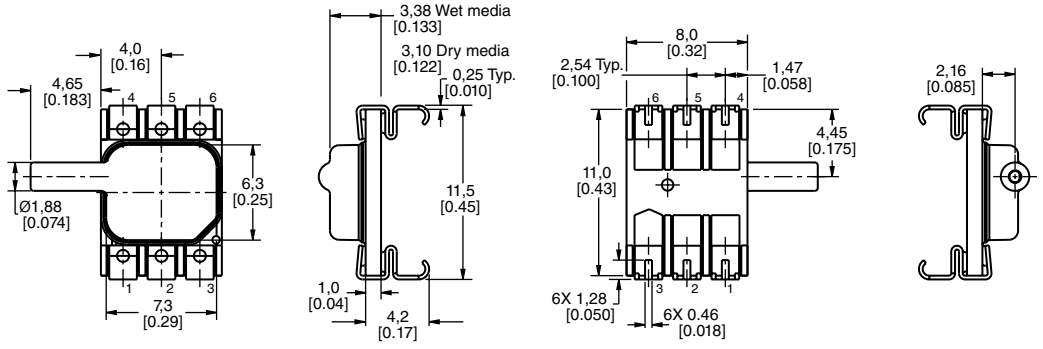
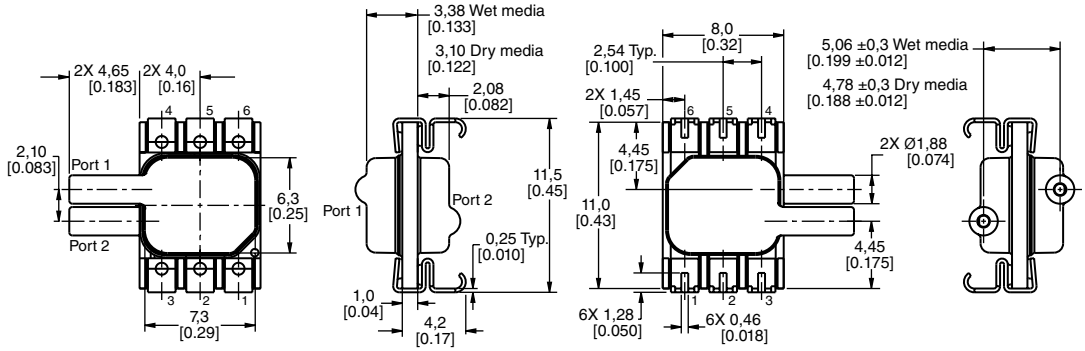
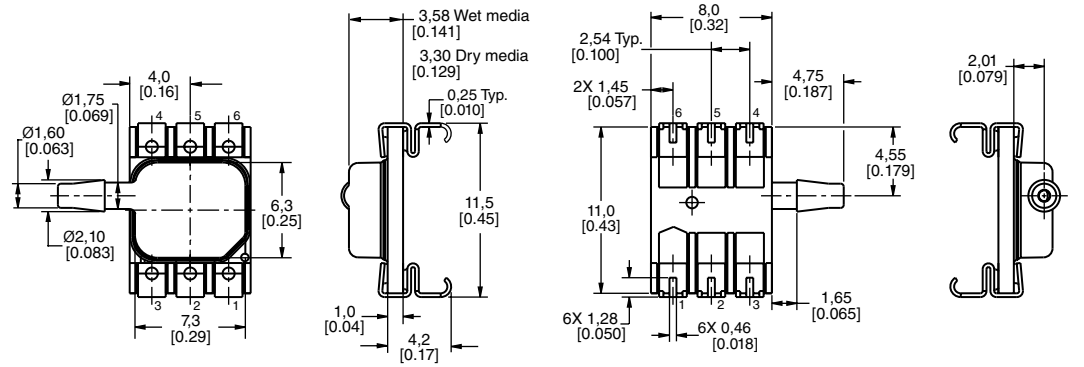


Figure 3. SMT Package Dimensional Drawings (continued)

SMT JJ: Dual radial barbless ports, same side



SMT RN: Single radial barbed port



SMT RR: Dual radial barbed ports, both sides

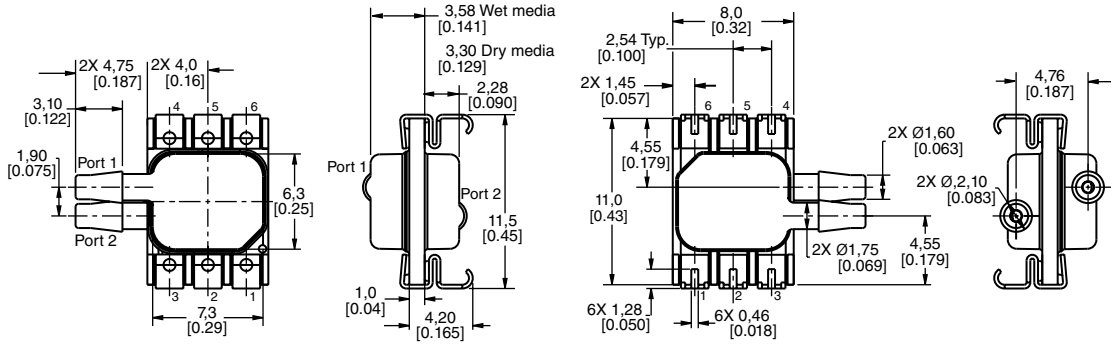
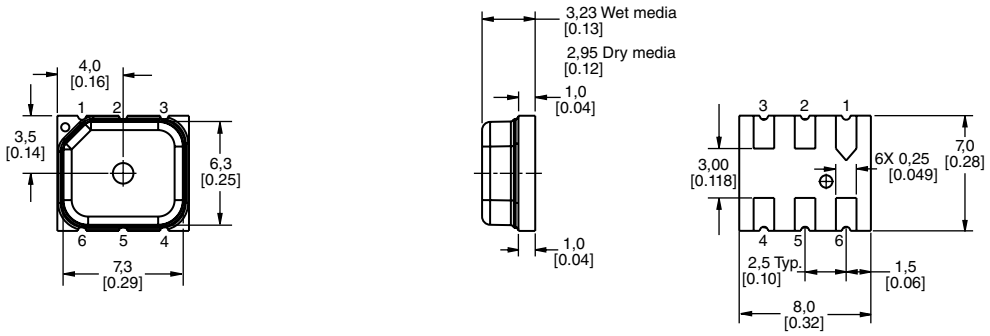
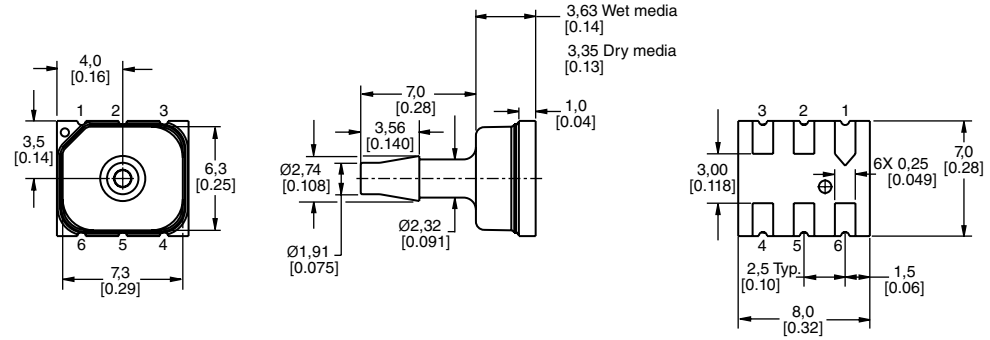


Figure 4. Leadless SMT Package Dimensional Drawings (For reference only: mm [in].)

Leadless SMT AN: No port



Leadless SMT AN: Single axial barbed port



Leadless SMT LN: Single axial barbless port

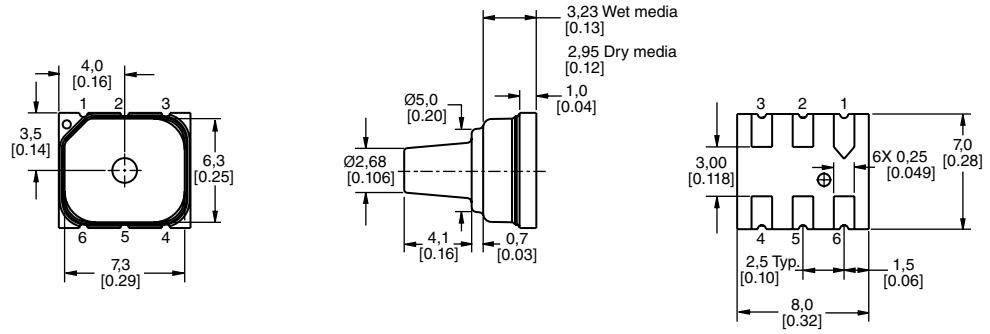


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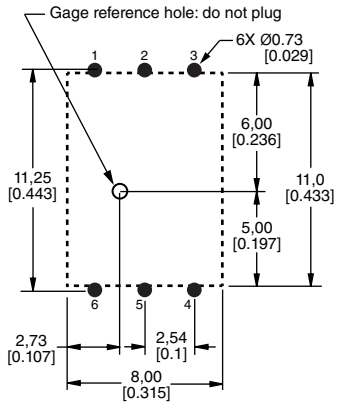
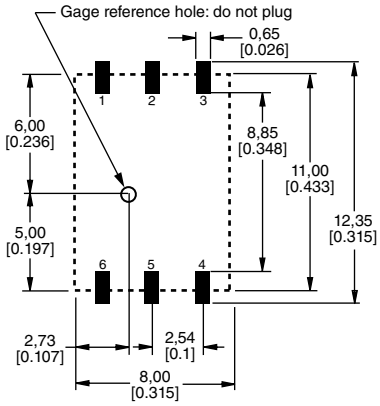
Figure 5. Recommended PCB Layouts

DIP



SMT



Leadless SMT

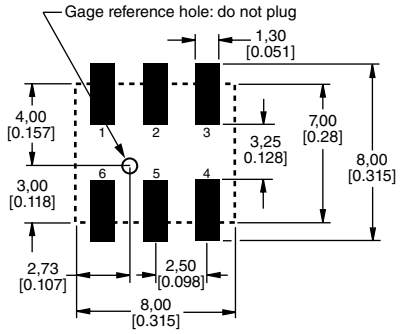


Table 7. Pinouts

Output Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Digital (I^2C, SPI)	GND	V_{DD}	SS/INT	NC	SDA	SCL
Analog	GND	NC	V_{out}	NC	NC	V_{DD}

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

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

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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