

Installation Instructions for the TruStability® Board Mount Pressure Sensors

HSC Series—High Accuracy, Compensated/Amplified

±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH₂O to ±150 psi

Digital or Analog Output

SSC Series—Standard Accuracy, Compensated/Amplified

±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH₂O to ±150 psi

Digital or Analog Output

GENERAL INFORMATION

Honeywell's TruStability® High Accuracy Silicon Ceramic (HSC) Series and Standard Accuracy Silicon Ceramic (SSC) Series are piezoresistive silicon pressure sensors offering a digital or analog output for reading pressure over the specified full scale pressure span and temperature range.

These sensors measure absolute, gage, or differential pressures. The absolute versions have an internal vacuum reference and an output value proportional to absolute pressure. Gage versions are referenced to atmospheric pressure and provide an output proportional to pressure variations from atmosphere. Differential versions allow measurement of pressure between the two pressure ports.

The HSC Series is calibrated over the temperature range of 0 °C to 50 °C [32 °F to 122 °F] while the SSC Series is calibrated over the temperature range of -20 °C to 85 °C [-4 °F to 185 °F].

The TruStability® pressure sensors are intended for use with non-corrosive, non-ionic gases, such as air and other dry gases. An available option extends the performance of these sensors to non-corrosive, non-ionic liquids for pressure ranges above 40 mbar | 4 kPa | 20 inH₂O.

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.**

CAUTION

PRODUCT DAMAGE FOR SENSORS WITH LIQUID MEDIA OPTION (ONLY AVAILABLE 60 MBAR | 6 KPA | 1 PSI AND ABOVE)

- Ensure liquid media is applied to Port 1 only; Port 2 is not compatible with liquids.
- Ensure liquid media contains no particulates. All TruStability® sensors are dead-ended devices. Particulates can accumulate inside the sensor, causing damage or affecting sensor output.
- Recommend that the sensor be positioned with Port 1 facing downwards; any particulates in the system are less likely to enter and settle within the pressure sensor if it is in this position.
- Ensure liquid media does not create a residue when dried; build-up inside the sensor may affect sensor output. Rinsing of a dead-ended sensor is difficult and has limited effectiveness for removing residue.
- Ensure liquid media are compatible with wetted materials. Noncompatible liquid media will degrade sensor performance and may lead to sensor failure.

Failure to comply with these instructions may result in product damage.

Table 1. Absolute Maximum Ratings¹

Characteristic	Min.	Max.	Unit
Supply voltage (V_{supply}) ² :	-3.0	6.0	Vdc
Storage temperature	-40 [-40]	85 [185]	°C [°F]
Soldering time and temperature:			
lead solder temperature (SIP, DIP)	4 s max. at 250 °C [482 °F]		
peak reflow temperature (SMT)	15 s max. at 250 °C [482 °F]		

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

² Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

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Table 2. Environmental Specifications

Characteristic	Parameter
Humidity: gases only (See “Options N and D” in Figures 5 and 6.) liquid media (See “Options T and V” in Figures 5 and 6.)	0% to 95% RH, non-condensing 100% condensing or direct liquid media on Port 1
Vibration	MIL-STD-202G Method 204D, Condition B (15 g, 10 Hz to 2 Hz)
Shock	MIL-STD-202G, Method 213B, Condition C (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)

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

Table 3. Wetted Materials¹

Component	Port 1 (Pressure Port)	Port 2 (Reference Port)
Ports and covers	high temperature polyamide	high temperature polyamide
Substrate	alumina ceramic	alumina ceramic
Adhesives	epoxy, silicone	epoxy, silicone
Electronic components	ceramic, silicon, glass, solder	silicon, glass, gold

¹Contact Honeywell Customer Service for detailed material information.

Table 4. HSC Series and SSC Series Analog Operating Specifications

Characteristic	Min.	Typ.	Max.	Unit
Supply voltage (V_{supply}) ^{1, 2, 3} : pressure ranges ≥60 mbar 6 kPa 1 psi: 3.3 Vdc 5.0 Vdc pressure ranges ≤40 mbar 4 kPa 20 inH ₂ O: 3.3 Vdc 5.0 Vdc	3.0 4.75 3.27 4.95	3.3 5.0 3.3 5.0	3.6 5.25 3.33 5.05	Vdc
Supply current: 3.3 Vdc 5.0 Vdc	— —	2.1 2.7	2.8 3.5	mA
Operating temperature range ⁴ : HSC SSC	-20 [-4] -40 [-40]	— —	85 [185] 85 [185]	°C [°F]
Compensated temperature range ⁵ : HSC SSC	0 [-32] -20 [-4]	— —	50 [122] 85 [185]	°C [°F]
Startup time (power up to data ready)	—	—	5	ms
Response time	—	1	—	ms
Clipping limit: upper lower	— 2.5	— —	97.5 —	%Vsupply
Accuracy ⁶	—	—	±0.25	%FSS BFSL ⁸
Output resolution	0.03	—	—	%FSS
Orientation sensitivity (± 1 g) ^{7, 9} : pressure ranges ≤40 mbar 4 kPa 20 inH ₂ O: pressure ranges ≤2.5 mbar 250 Pa 1 inH ₂ O:	— —	±0.1 ±0.2	— —	%FSS

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

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

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

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

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

⁶Accuracy: 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.

⁷Orientation sensitivity: The maximum change in offset of the sensor due to a change in position or orientation relative to Earth's gravitational field.

⁸Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range. (See Figures 5 and 6 for ranges.)

⁹Insignificant for pressure ranges above 40 mbar | 4 kPa | 20 inH₂O.

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Table 5. HSC Series and SSC Series Digital Operating Specifications

Characteristic	Min.	Typ.	Max.	Unit
Supply voltage (V_{supply}) ^{1, 2, 3:} pressure ranges ≥ 60 mbar 6 kPa 1 psi: 3.3 Vdc 5.0 Vdc pressure ranges ≤ 40 mbar 4 kPa 20 inH ₂ O: 3.3 Vdc 5.0 Vdc	3.0 4.75 3.27 4.95	3.3 5.0 3.3 5.0	3.6 5.25 3.33 5.05	Vdc
Supply current: 3.3 Vdc 5.0 Vdc	— —	3.1 3.7	3.9 4.6	mA
Operating temperature range ^{4:} HSC SSC	-20 [-4] -40 [-40]	— —	85 [185] 85 [185]	°C [°F]
Compensated temperature range ^{5:} HSC SSC	0 [-32] -20 [-4]	— —	50 [122] 85 [185]	°C [°F]
Startup time (power up to data ready)	—	—	3	ms
Response time	—	0.46	—	ms
SPI/I ² C voltage level: low high	— 80	— —	20 —	%Vsupply
Pull up on SDA/MISO, SCL/SCLK, SS	1	—	—	kOhm
Accuracy ⁶	—	—	± 0.25	%FSS BFSL ⁸
Output resolution	12	—	—	bits
Orientation sensitivity (± 1 g) ^{7, 9} pressure ranges ≤ 40 mbar 4 kPa 20 inH ₂ O: pressure ranges ≤ 2.5 mbar 250 Pa 1 inH ₂ O:	— —	± 0.1 ± 0.2	— —	%FSS

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

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

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

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

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

⁶Accuracy: 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.

⁷Orientation sensitivity: The maximum change in offset of the sensor due to a change in position or orientation relative to Earth's gravitational field.

⁸Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range. (See Figures 5 and 6 for ranges.)

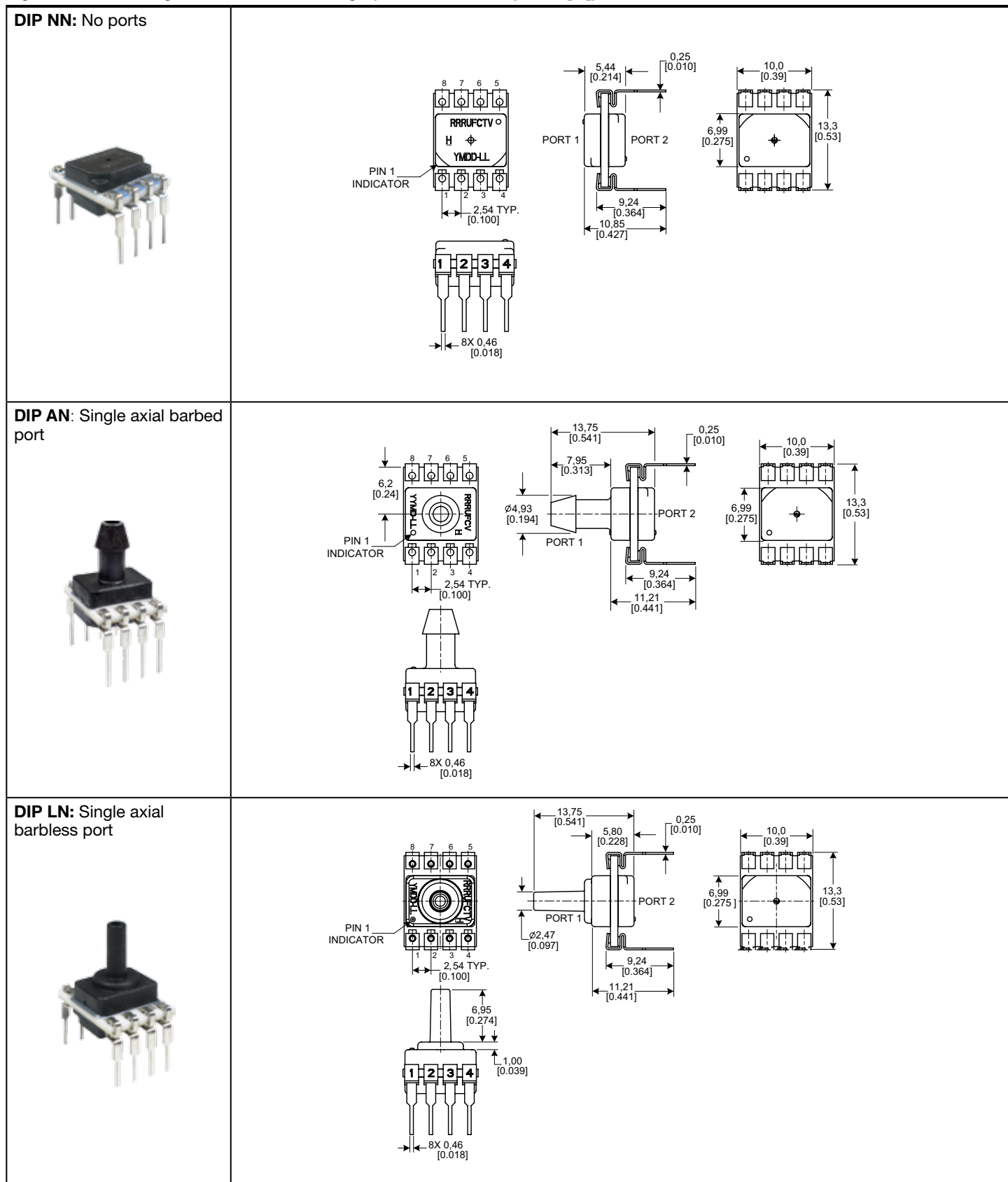
⁹Insignificant for pressure ranges above 40 mbar | 4 kPa | 20 inH₂O.

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Figure 1. DIP Package Dimensional Drawings (For reference only: mm [in])



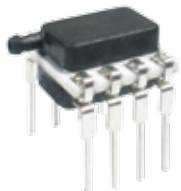
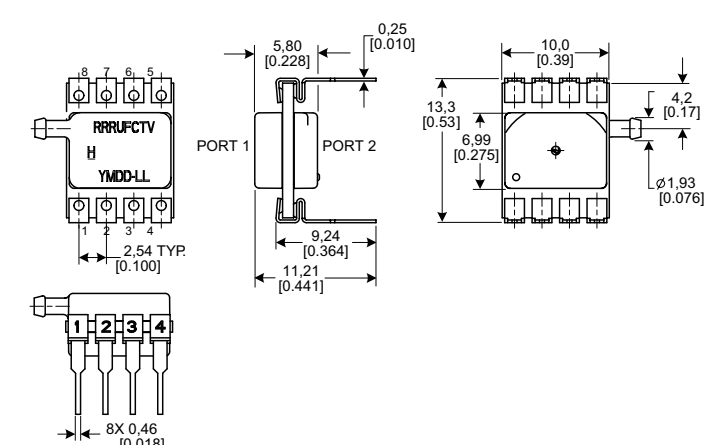
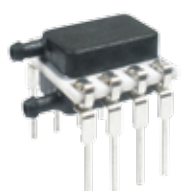
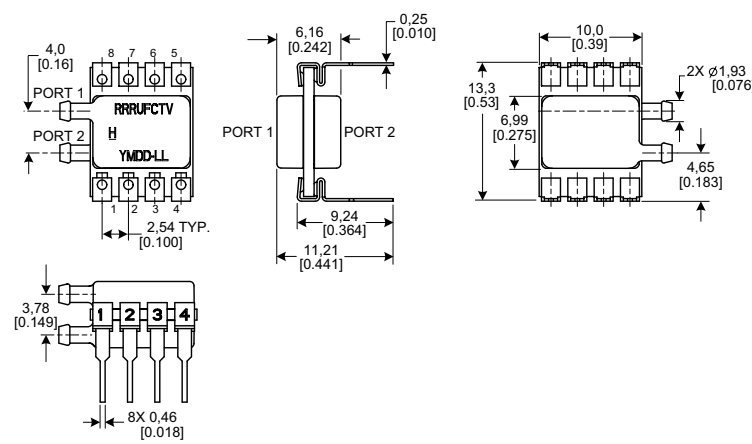
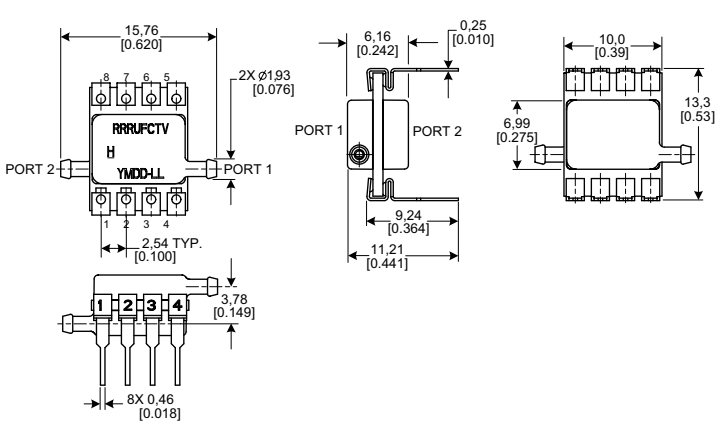
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Figure 1. DIP Package Dimensional Drawings (continued)

DIP RN: Single radial barbed port 	 Top view dimensions: 10.0 [0.39] (width), 13.3 [0.53] (height), 6.99 [0.275] (pin pitch), 4.2 [0.17] (port offset), $\phi 1.93$ [0.076] (port diameter). Side view dimensions: 5.80 [0.228] (port height), 0.25 [0.010] (port thickness), 9.24 [0.364] (pin length), 11.21 [0.441] (total length). Bottom view dimensions: 2.54 TYP. [0.100] (pin pitch), 8X 0.46 [0.018] (pin diameter).
DIP RR: Dual radial barbed ports, same side 	 Top view dimensions: 10.0 [0.39] (width), 13.3 [0.53] (height), 6.99 [0.275] (pin pitch), 4.65 [0.183] (port offset), 2X $\phi 1.93$ [0.076] (port diameter). Side view dimensions: 6.16 [0.242] (port height), 0.25 [0.010] (port thickness), 9.24 [0.364] (pin length), 11.21 [0.441] (total length). Bottom view dimensions: 2.54 TYP. [0.100] (pin pitch), 8X 0.46 [0.018] (pin diameter), 3.78 [0.149] (port offset).
DIP DR: Dual radial barbed ports, opposite sides 	 Top view dimensions: 15.76 [0.620] (width), 13.3 [0.53] (height), 6.99 [0.275] (pin pitch), 4.65 [0.183] (port offset), 2X $\phi 1.93$ [0.076] (port diameter). Side view dimensions: 6.16 [0.242] (port height), 0.25 [0.010] (port thickness), 9.24 [0.364] (pin length), 11.21 [0.441] (total length). Bottom view dimensions: 2.54 TYP. [0.100] (pin pitch), 8X 0.46 [0.018] (pin diameter), 3.78 [0.149] (port offset).

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Figure 1. DIP Package Dimensional Drawings (continued)

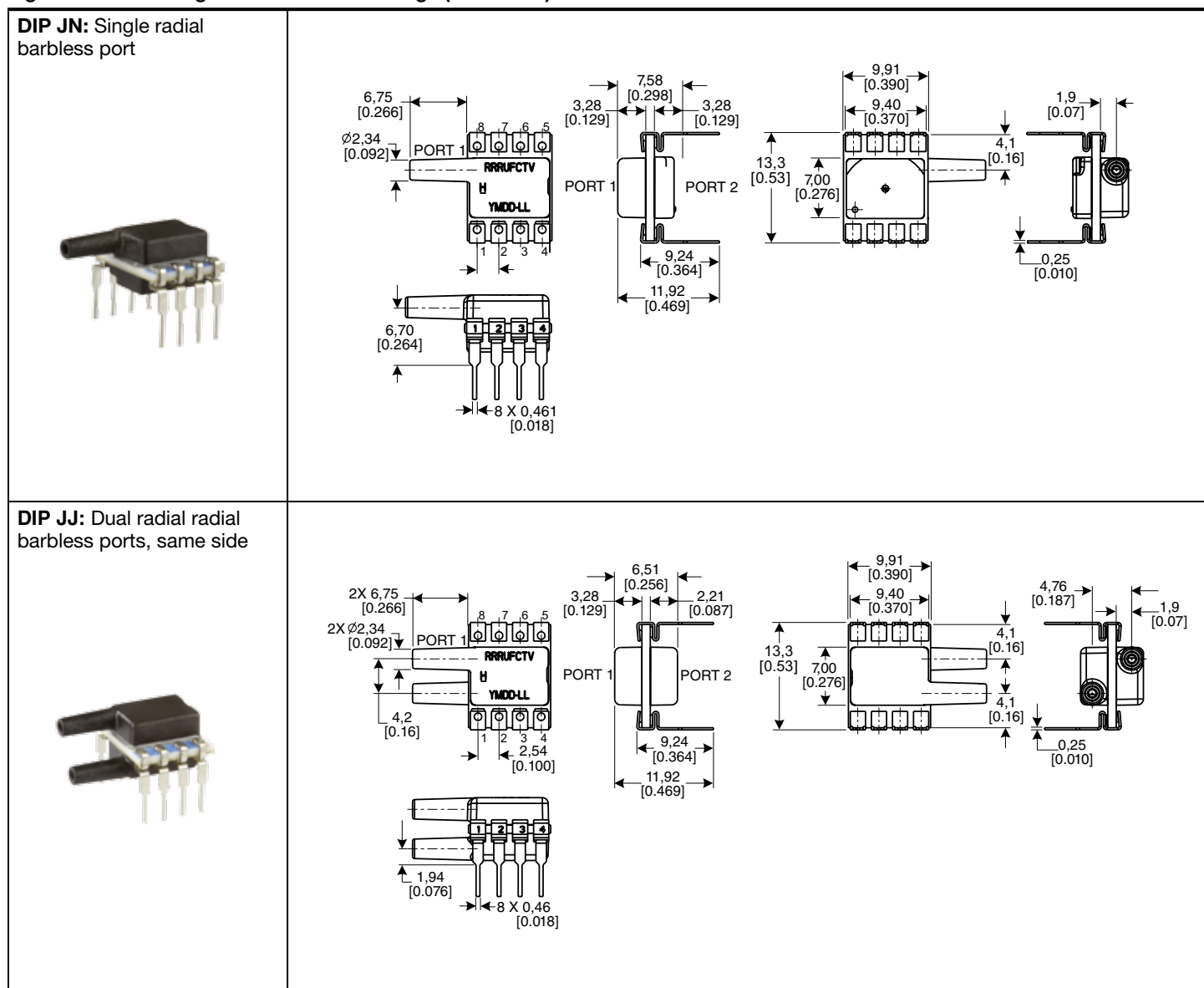
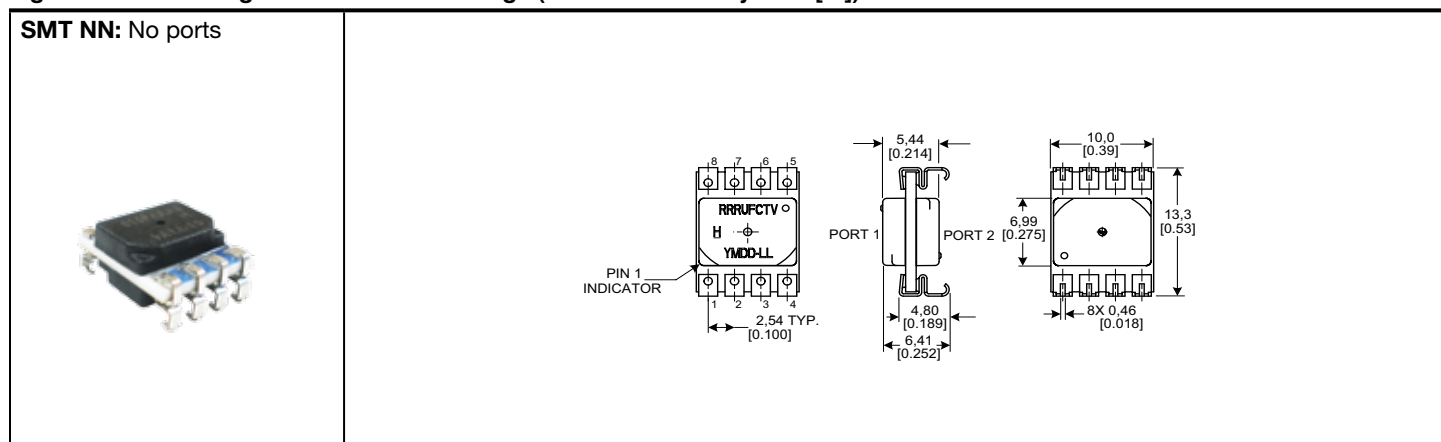


Figure 2. SMT Package Dimensional Drawings (For reference only: mm [in])

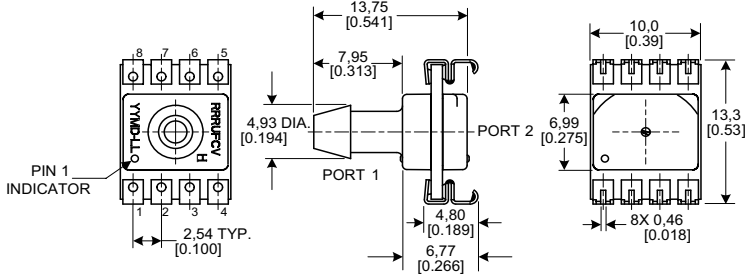
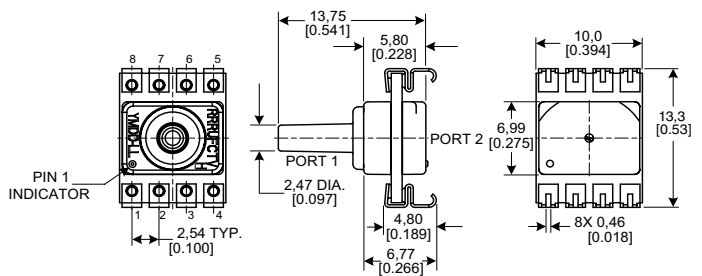
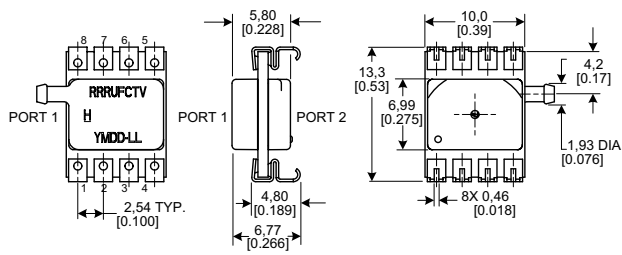


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Figure 2. SMT Package Dimensional Drawings (continued)

SMT AN: Single axial barbed port 	 Top view dimensions: 8 pins (1-8), 2.54 TYP. [0.100], PIN 1 INDICATOR, 4.93 DIA. [0.194], 13.75 [0.541], 7.95 [0.313], 10.0 [0.39], 13.3 [0.53], 6.99 [0.275], 8X 0.46 [0.018]. Side view dimensions: 4.80 [0.189], 6.77 [0.266], PORT 1, PORT 2.
SMT LN: Single axial barbless port 	 Top view dimensions: 8 pins (1-8), 2.54 TYP. [0.100], PIN 1 INDICATOR, 2.47 DIA. [0.097], 13.75 [0.541], 5.80 [0.228], 10.0 [0.394], 13.3 [0.53], 6.99 [0.275], 8X 0.46 [0.018]. Side view dimensions: 4.80 [0.189], 6.77 [0.266], PORT 1, PORT 2.
SMT RN: Single radial barbed port 	 Top view dimensions: 8 pins (1-8), 2.54 TYP. [0.100], PORT 1, 5.80 [0.228], 10.0 [0.39], 13.3 [0.53], 6.99 [0.275], 8X 0.46 [0.018], 4.2 [0.17], 1.93 DIA. [0.076]. Side view dimensions: 4.80 [0.189], 6.77 [0.266], PORT 1, PORT 2.

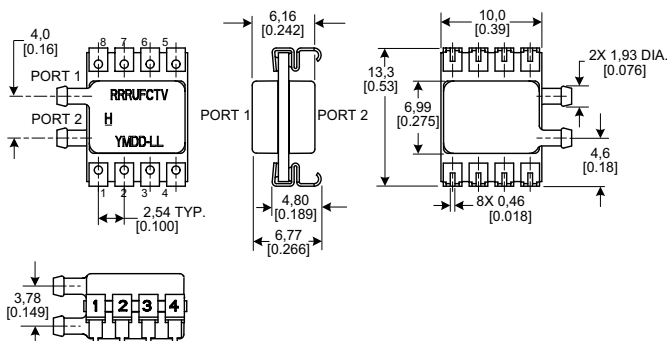
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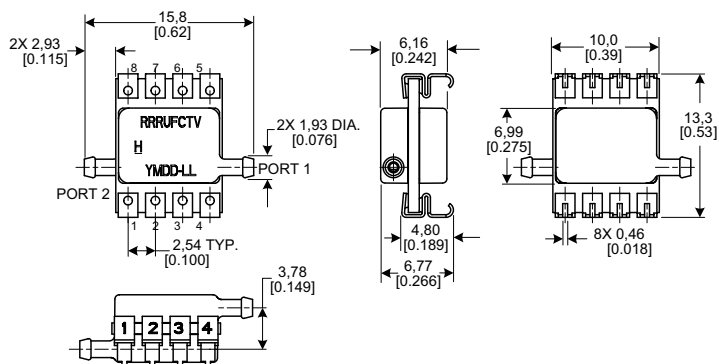
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Figure 2. SMT Package Dimensional Drawings (continued)

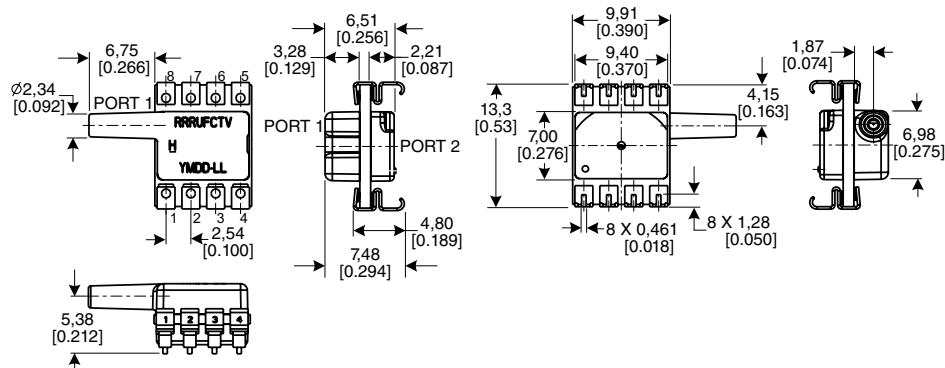
SMT RR: Dual radial barbed ports, same side



SMT DR: Dual radial barbed ports, opposite sides



SMT JN: Single radial barbless port



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Figure 2. SMT Package Dimensional Drawings (continued)

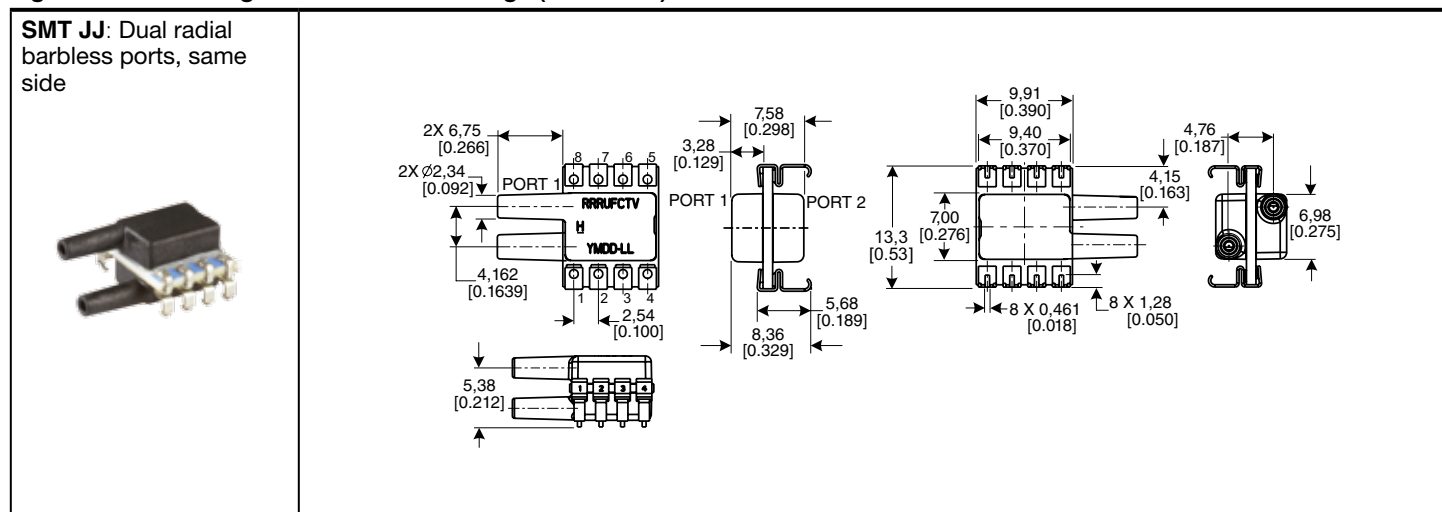
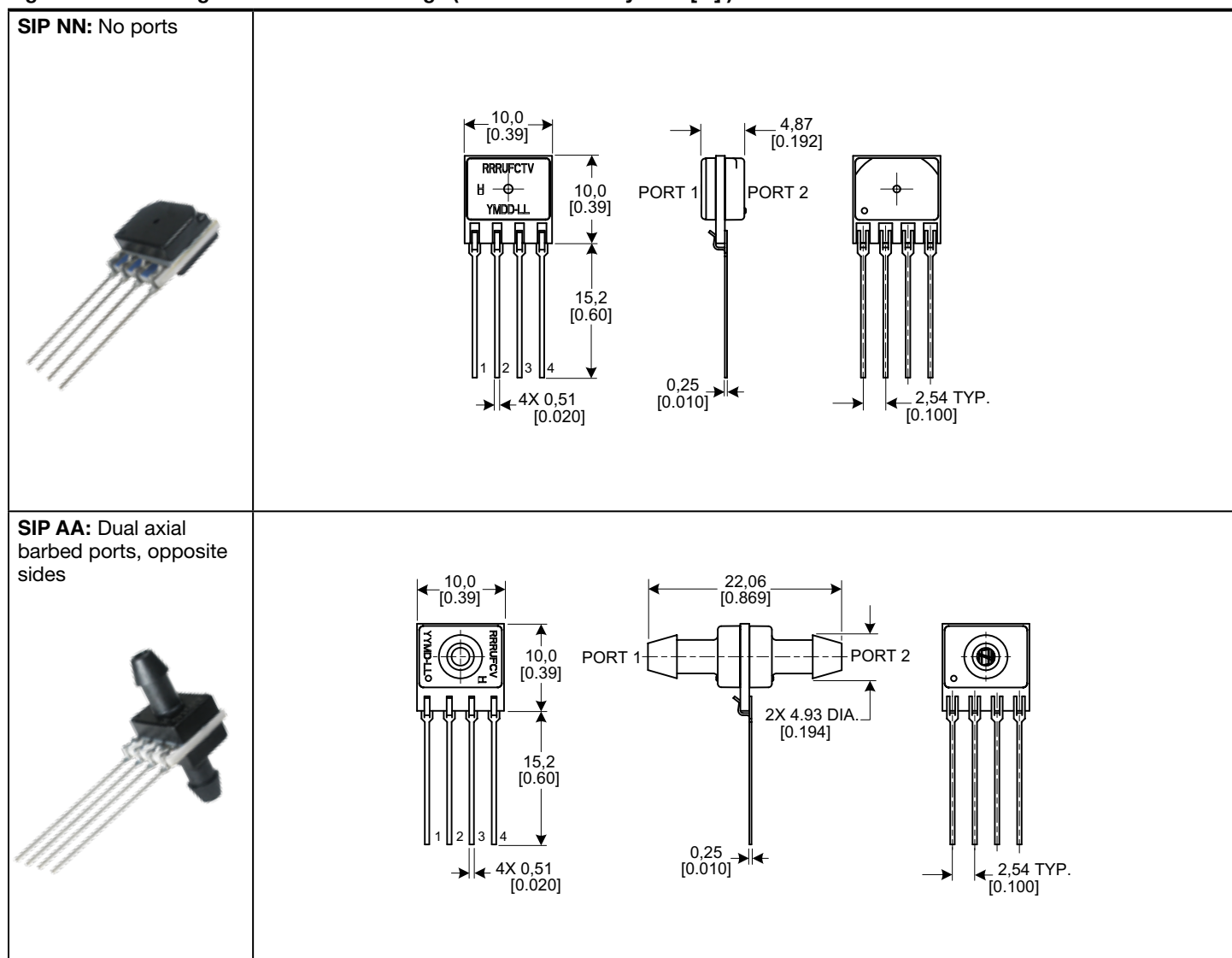


Figure 3. SIP Package Dimensional Drawings (For reference only: mm [in].)

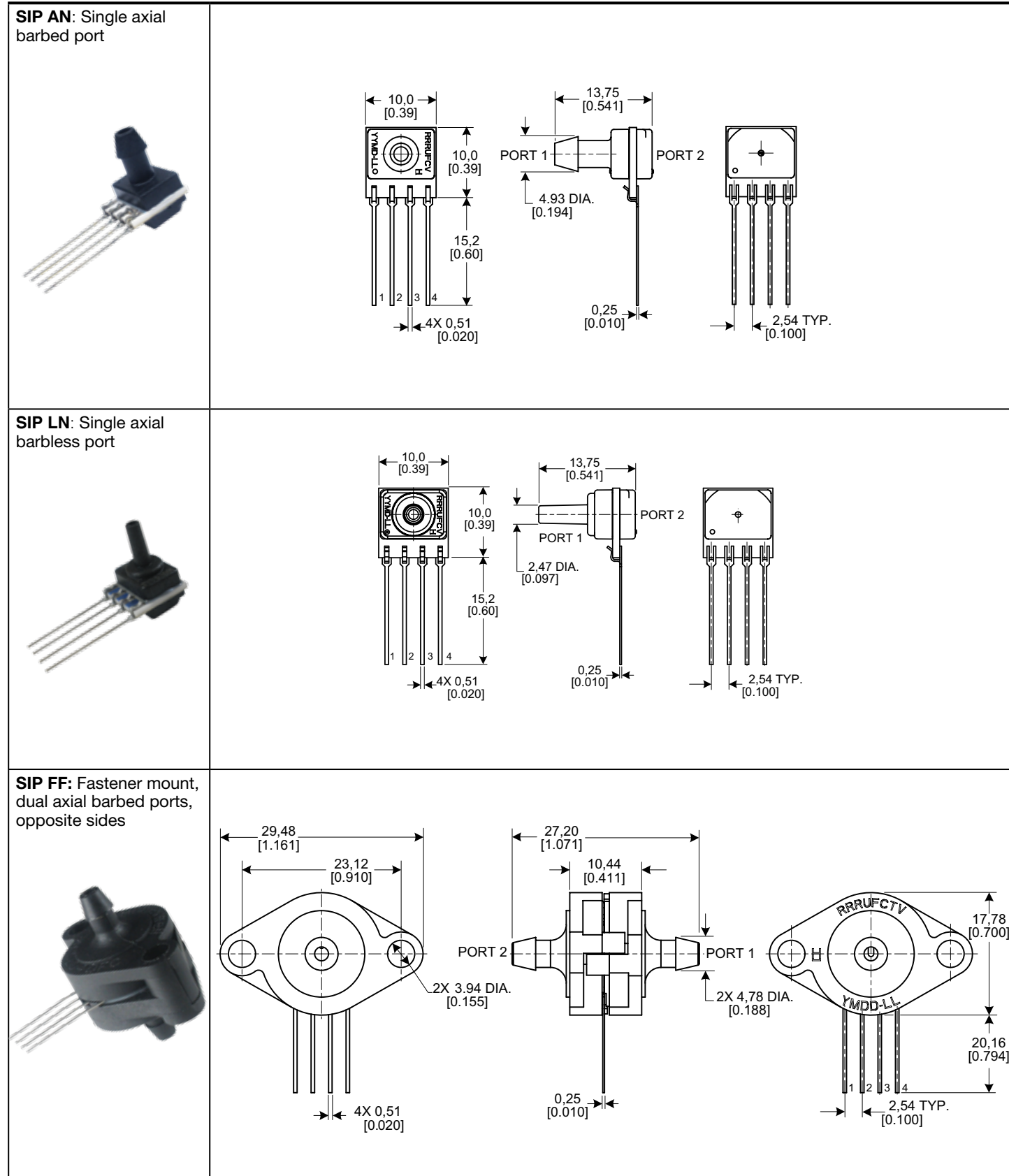


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Figure 3. SIP Package Dimensional Drawings (continued)

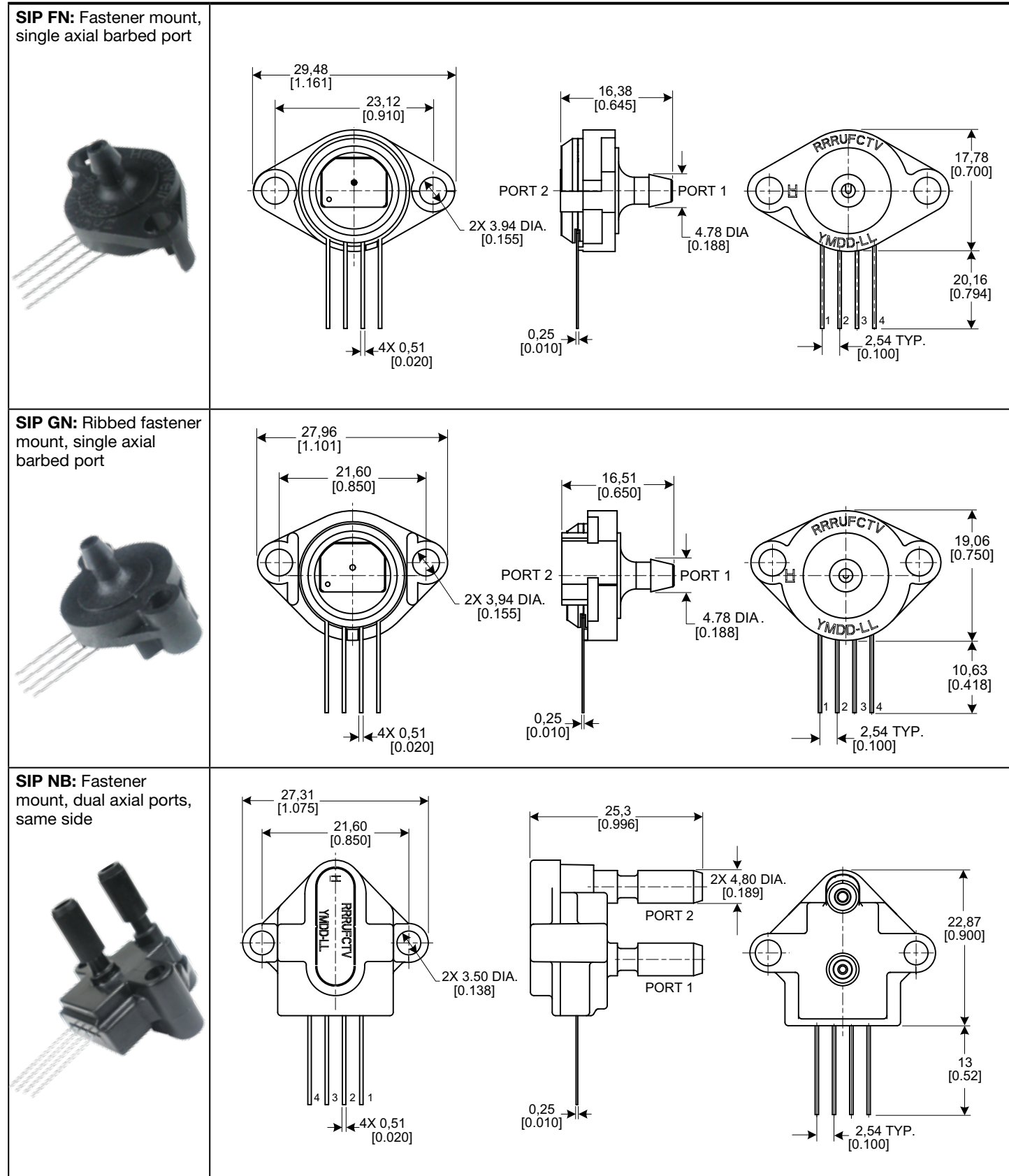


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Figure 3. SIP Package Dimensional Drawings (continued)

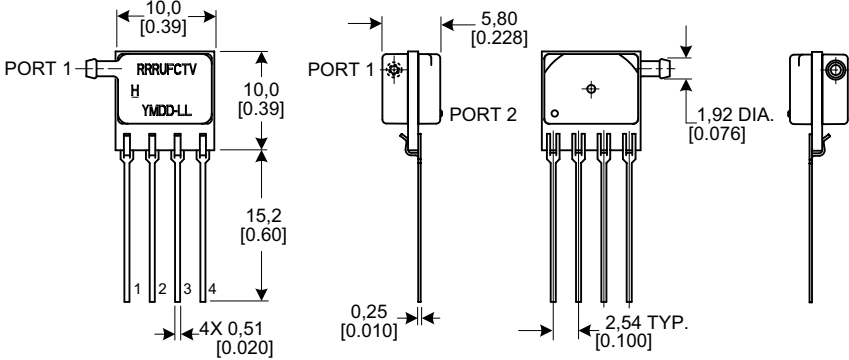
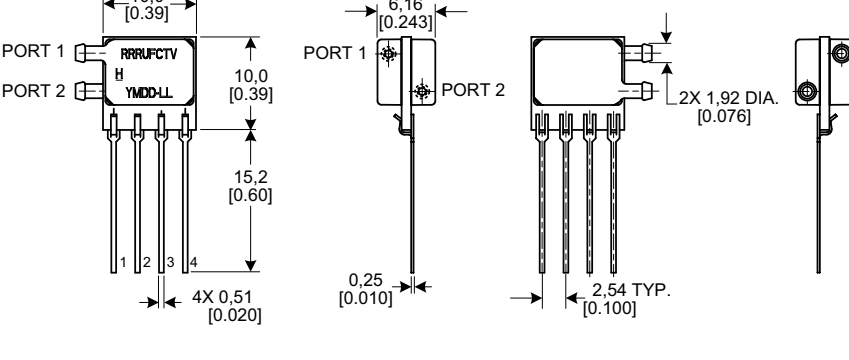
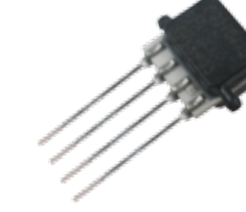
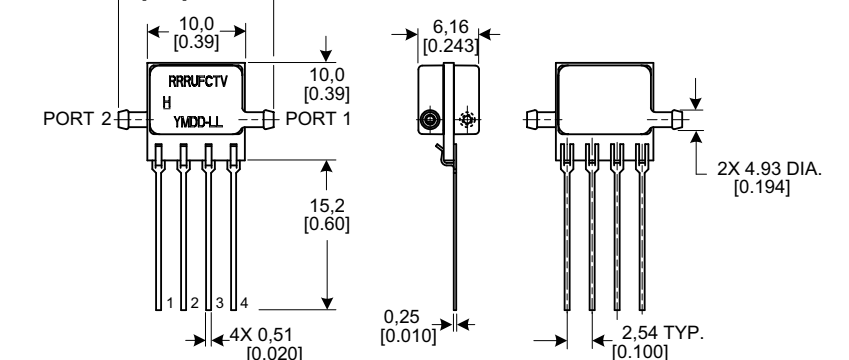


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Figure 3. SIP Package Dimensional Drawings (continued)

SIP RN: Single radial barbed port 	 Top view dimensions: 10,0 [0.39] (PORT 1 to center), 10,0 [0.39] (center to edge), 15,2 [0.60] (pin pitch), 4X 0,51 [0.020] (pin width). Side view dimensions: 5,80 [0.228] (PORT 1 to center), 0,25 [0.010] (pin diameter), 2,54 TYP. [0.100] (pin pitch). Front view dimensions: 1,92 DIA. [0.076] (port diameter), 2,54 TYP. [0.100] (pin pitch).
SIP RR: Dual radial barbed ports, same side 	 Top view dimensions: 10,0 [0.39] (PORT 1 to center), 10,0 [0.39] (center to edge), 15,2 [0.60] (pin pitch), 4X 0,51 [0.020] (pin width). Side view dimensions: 6,16 [0.243] (PORT 1 to center), 0,25 [0.010] (pin diameter), 2,54 TYP. [0.100] (pin pitch). Front view dimensions: 2X 1,92 DIA. [0.076] (port diameter), 2,54 TYP. [0.100] (pin pitch).
SIP DR: Dual radial barbed ports, opposite sides 	 Top view dimensions: 15,8 [0.62] (PORT 2 to center), 10,0 [0.39] (center to edge), 10,0 [0.39] (center to edge), 15,2 [0.60] (pin pitch), 4X 0,51 [0.020] (pin width). Side view dimensions: 6,16 [0.243] (PORT 1 to center), 0,25 [0.010] (pin diameter), 2,54 TYP. [0.100] (pin pitch). Front view dimensions: 2X 4,93 DIA. [0.194] (port diameter), 2,54 TYP. [0.100] (pin pitch).

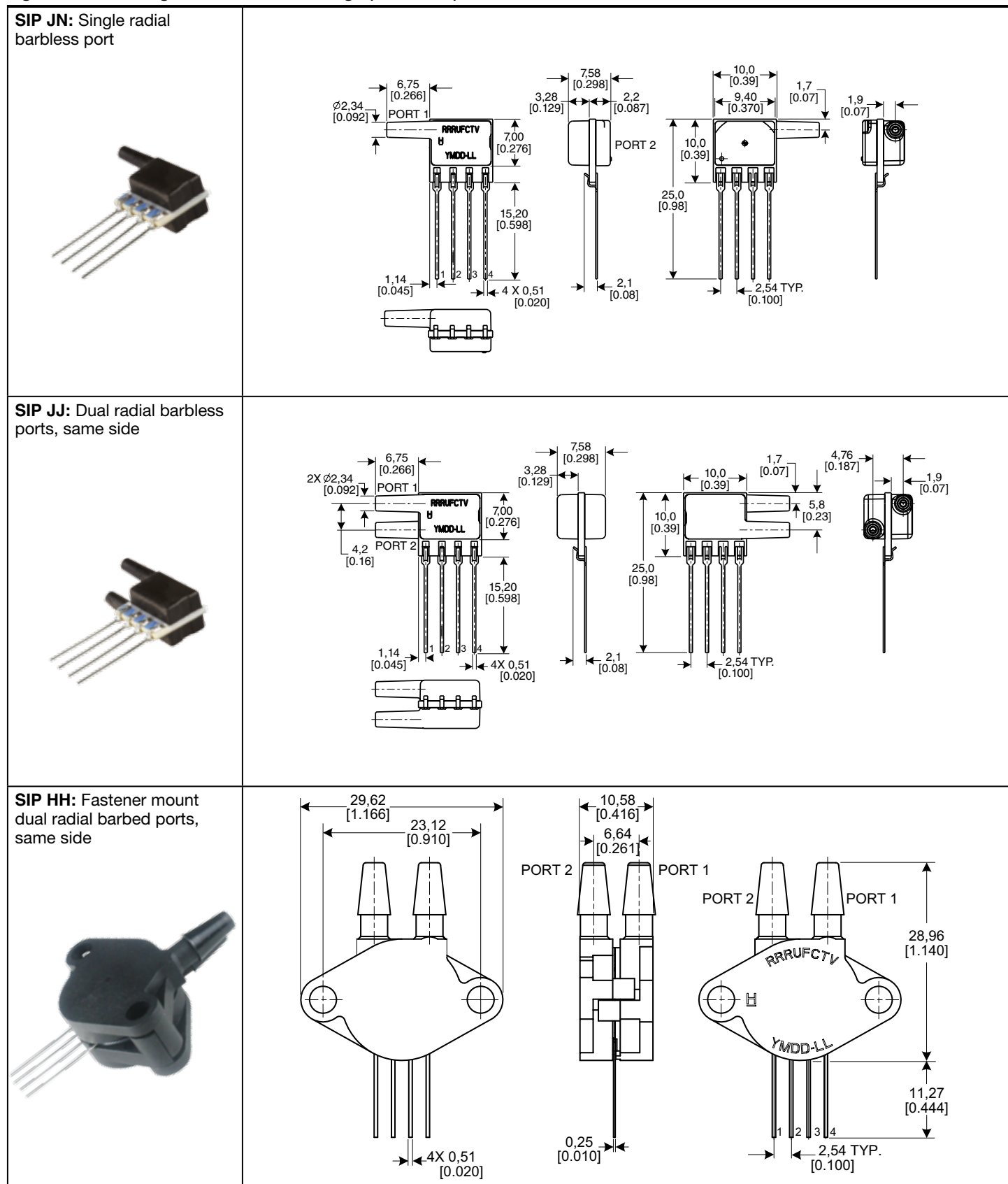
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Figure 3. SIP Package Dimensional Drawings (continued)



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Figure 3. SIP Package Dimensional Drawings (continued)

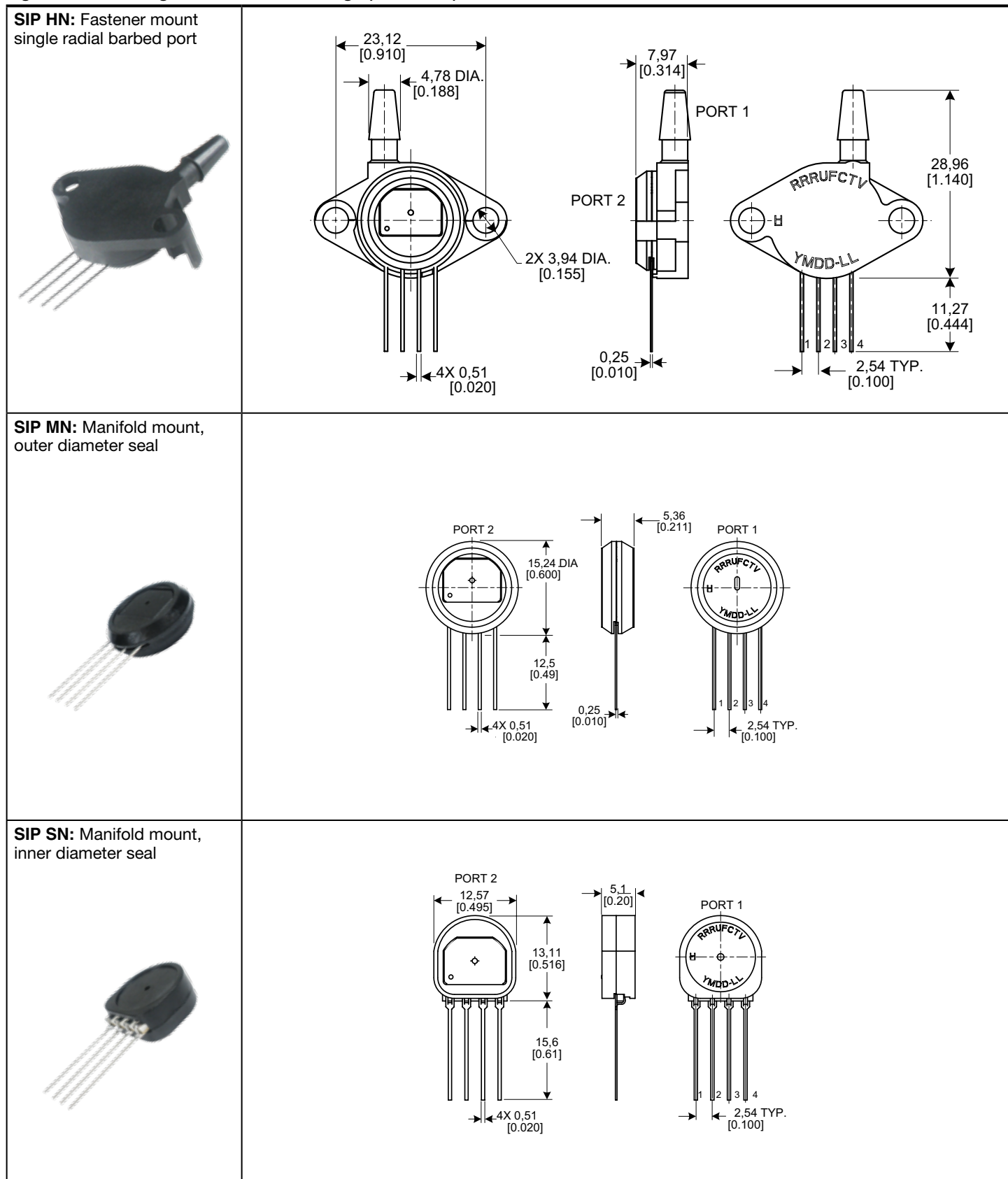


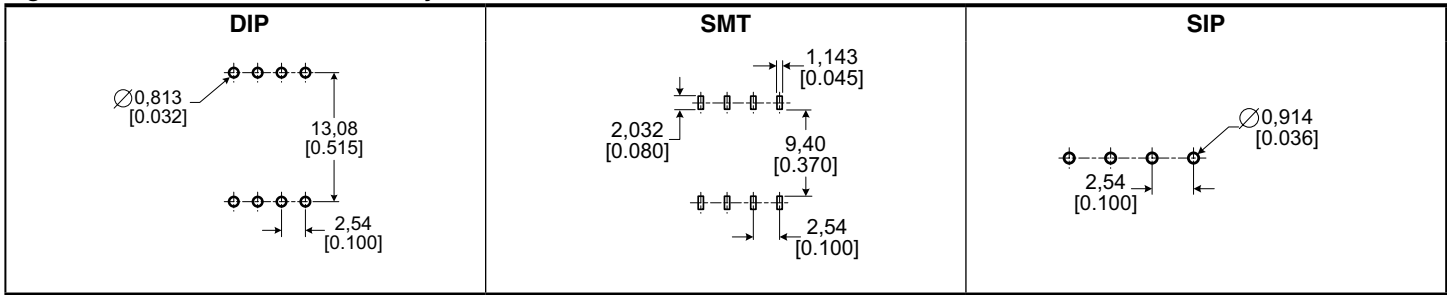
Table 6. Pinouts for DIP and SMT Packages

Output Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
I ² C	GND	Vsupply	SDA	SCL	NC	NC	NC	NC
SPI	GND	Vsupply	MISO	SCLK	SS	NC	NC	NC
Analog	NC	Vsupply	Vout	GND	NC	NC	NC	NC

Table 7. Pinouts for SIP Packages

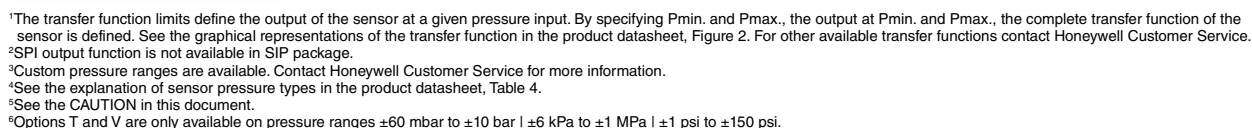
Output Type	Pin 1	Pin 2	Pin 3	Pin 4
I ² C	GND	Vsupply	SDA	SCL
Analog	NC	Vsupply	Vout	GND

Figure 4. Recommended PCB Pad Layouts



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For example, **HSCDNNN150PGAA3** defines an HSC Series TruStability® Pressure Sensor, DIP package, NN pressure port, no special options, 150 psi gage pressure range, analog output type, 10% to 90% of Vsupply transfer function, 3.3 Vdc supply voltage.



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Figure 6. SSC Series Nomenclature and Order Guide

For example, **SSCDNNN150PGAA3** defines an SSC Series TruStability® Pressure Sensor, DIP package, NN pressure port, no special options, 150 psi gage pressure range, analog output type, 10% to 90% of Vsupply transfer function, 3.3 Vdc supply voltage.

SSC D N N N 150 P G A A 3			Supply Voltage	
Product Series			3	3.3 Vdc
SSC Standard Accuracy, Compensated/Amplified			5	5.0 Vdc
Package			Transfer Function¹	
D DIP (Dual Inline Pin)			A	10% to 90% of Vsupply (analog), 2 ¹⁴ counts (digital)
M SMT (Surface Mount Technology)			B	5% to 95% of Vsupply (analog), 2 ¹⁴ counts (digital)
S SIP (Single Inline Pin)			C	5% to 85% of Vsupply (analog), 2 ¹⁴ counts (digital)
Pressure Port			F	4% to 94% of Vsupply (analog), 2 ¹⁴ counts (digital)
DIP			Output Type²	
NN No ports			A	Analog
AN Single axial barbed port			S	SPI
LN Single axial barless port			2	I ² C, Address 0x28
—			3	I ² C, Address 0x38
—			4	I ² C, Address 0x48
—			5	I ² C, Address 0x58
—			6	I ² C, Address 0x68
—			7	I ² C, Address 0x78
—			Pressure Range^{3, 4}	
—			±1.6 mbar to ±10 bar	
—			±160 Pa to ±1 MPa	
—			±0.5 inH₂O to ±150 psi	
—			Absolute	
—			001BA	0 bar to 1 bar
—			1.6BA	0 bar to 1.6 bar
—			2.5BA	0 bar to 2.5 bar
—			004BA	0 bar to 4 bar
—			006BA	0 bar to 6 bar
—			010BA	0 bar to 10 bar
—			100KA	0 kPa to 100 kPa
—			160KA	0 kPa to 160 kPa
—			250KA	0 kPa to 250 kPa
—			400KA	0 kPa to 400 kPa
—			600KA	0 kPa to 600 kPa
—			001GA	0 kPa to 1 MPa
—			Differential	
—			1.6MD	±1.6 mbar
—			2.5MD	±2.5 mbar
—			004MD	±4 mbar
—			006MD	±6 mbar
—			010MD	±10 mbar
—			016MD	±16 mbar
—			025MD	±25 mbar
—			040MD	±40 mbar
—			060MD	±60 mbar
—			100MD	±100 mbar
—			160MD	±160 mbar
—			250MD	±250 mbar
—			400MD	±400 mbar
—			600MD	±600 mbar
—			001BD	±1 bar
—			100KD	±100 kPa
—			1.6BD	±1.6 bar
—			160KD	±160 kPa
—			2.5BD	±2.5 bar
—			250KD	±250 kPa
—			004BD	±4 bar
—			400KD	±400 kPa
—			Gage	
—			2.5MG	0 mbar to 2.5 mbar
—			004MG	0 mbar to 4 mbar
—			006MG	0 mbar to 6 mbar
—			010MG	0 mbar to 10 mbar
—			016MG	0 mbar to 16 mbar
—			025MG	0 mbar to 25 mbar
—			040MG	0 mbar to 40 mbar
—			060MG	0 mbar to 60 mbar
—			100MG	0 mbar to 100 mbar
—			160MG	0 mbar to 160 mbar
—			250MG	0 mbar to 250 mbar
—			400MG	0 bar to 400 mbar
—			600MG	0 bar to 600 mbar
—			001BG	0 bar to 1 bar
—			1.6BG	0 bar to 1.6 bar
—			2.5BG	0 bar to 2.5 bar
—			004BG	0 bar to 4 bar
—			006BG	0 bar to 6 bar
—			010BG	0 bar to 10 bar
—			001GG	0 kPa to 1 MPa
Options^{5, 6}				
N Dry gases only, no diagnostics				
D Dry gases only, diagnostics on				
T Liquid media on Port 1, no diagnostics				
V Liquid media on Port 1, diagnostics on				

¹The transfer function limits define the output of the sensor at a given pressure input. By specifying Pmin. and Pmax., the output at Pmin. and Pmax., the complete transfer function of the sensor is defined. See the graphical representations of the transfer function in the product datasheet, Figure 2. For other available transfer functions contact Honeywell Customer Service.

²SPI output function is not available in SIP package.

³Custom pressure ranges are available. Contact Honeywell Customer Service for more information.

⁴See the explanation of sensor pressure types in the product datasheet, Table 4.

⁵See the CAUTION in this document.

⁶Options T and V are only available on pressure ranges ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi.

HSC Series—High Accuracy, Compensated/Amplified

SSC Series—Standard Accuracy, Compensated/Amplified

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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.

WARRANTY

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 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.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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