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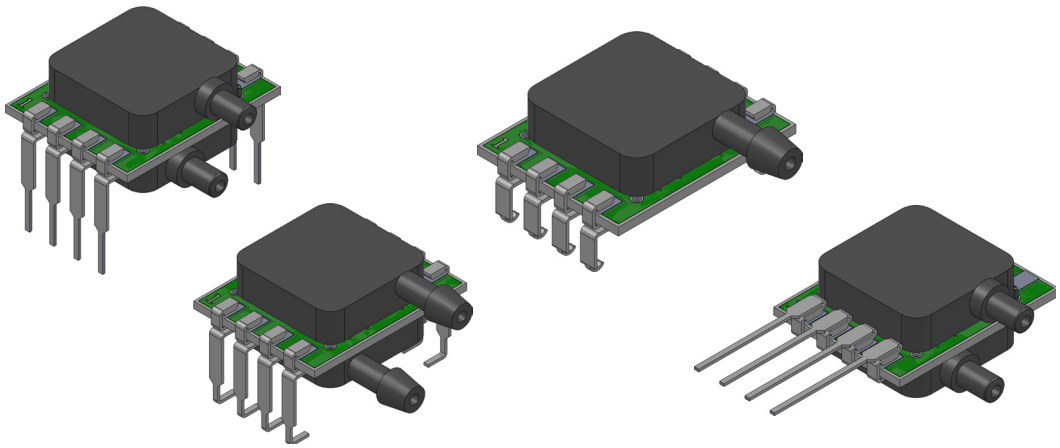
ELVR - Analog and Digital Low Pressure Sensors Series



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Introduction

The ELVR Series Mini Analog and Digital Output Sensor is based on All Sensors' CoBeam²™ Technology. This reduces package stress susceptibility, resulting in improved overall long term stability. The superior dual-die technology also vastly improves position sensitivity compared to single die devices. This technology breakthrough advances the state of the art for piezoresistive pressure sensors beyond what has been achieved for low pressure sensing using silicon based strain technology.

The ELVR sensors can communicate directly with microcontrollers, eliminating the need for additional A/D converters. ELVR series pressure sensors are available at 3V and 5V supply voltage. The ELVR series provides a rapid update rate at multiple resolutions. A wide range of miniature SIP and DIP package options allows for flexible and space-saving PCB-mounting. These calibrated and compensated sensors provide accurate, stable output over a wide temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air and dry gases. A protective parylene coating is optionally available for moisture/harsh media protection for pressure ranges 10 inH2O and above.

For All Sensors Corporation's most recent quality certification documents, please visit www.allsensors.com

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Features

- Special Pressure Ranges
- Precision ASIC Conditioning
- Analog Output with Digital I2C and SPI Interface
- 3V and 5V Supply Voltage

Applications

- Medical
- Industrial
- Medical Devices
- Medical Instrumentation
- Respiratory
- Portable / Hand-Held Equipment
- Environmental Controls
- Environmental Instrumentation
- Environmental Monitoring
- HVAC
- Industrial Controls
- Altimeters
- Chemical Analysis
- Meteorology

Wetted Media

- Silicon
- RTV
- Gold
- Ceramic
- Epoxy
- Nylon Plastic
- Aluminum

Pressure Sensor Maximum Ratings

Supply Voltage (Vs)	2.7 to 5.5 Vdc
Analog-Output Current	
Sink	1 mA
Source	1 mA
Maximum Device Temperature	245°C

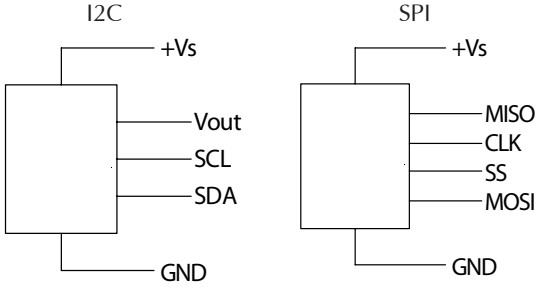
Environmental Specifications

Temperature Ranges		
Compensated:	Commercial	0°C to 70°C
	Industrial	-20°C to 85°C
Operating		-25°C to 85°C
Storage		-40°C to 125°C
Humidity Limits (non condensing)		0 to 95% RH

SMT Assembly Specifications

Average preheating temperature gradient	2.5 K/s
Soak Time	ca. 3 min
Time above 217°C	50 s
Time above 230°C	40 s
Time above 250°C	15 s
Peak Temperature	260°C
Cooling Temperature Gradient	-3.5 K/s

Equivalent Circuit



ELVR Special Millibar Calibrated Series Pressure Ranges

Pressure Range[1]					Proof Pressure[2]		Burst Pressure[3]		Common Mode Pressure[4]	
Pressure Range Code	Pmin mbar	Pmax mbar	Pressure Mode	kPa	mbar	kPa	mbar	kPa	mbar	kPa
M001D	-1.0	1.0	Differential	0.1	250	25	500	50	1035	104
MF25D	-2.5	2.5	Differential	0.25	250	25	500	50	1035	104
MF12D	-12.5	12.5	Differential	1.25	250	25	500	50	1035	104
M025D	-25	25	Differential	2.5	500	50	750	75	1035	104
M050D	-50	50	Differential	5	750	75	1,200	120	1035	104
M075D	-75	75	Differential	7.5	1,200	120	2,000	200	1035	104
M100D	-100	100	Differential	10	1,200	120	2,000	200	1035	104
M200D	-200	200	Differential	20	1,200	120	2,000	200	1035	104
MN17D	-10	70	Differential	-1 to 7	750	75	1,200	120	1035	104
MF25G	0	2.5	Gage	0.25	250	25	500	50	1035	104
MF12G	0	12.5	Gage	1.25	250	25	500	50	1035	104
M025G	0	25	Gage	2.5	500	50	750	75	1035	104
M050G	0	50	Gage	5	750	75	1,200	120	1035	104
M075G	0	75	Gage	7.5	1,200	120	2,000	200	1035	104
M100G	0	100	Gage	10	1,200	120	2,000	200	1035	104
M200G	0	200	Gage	20	1,200	120	2,000	200	1035	104

Note 1: Calibrated operating range

Note 2: Limit of differential pressure applied between any ports, beyond which performance may be permanently affected.

Note 3: Limit of mechanical integrity: Sensor element or package may rupture if differential pressure is applied beyond this limit.

Note 4: Maximum pressure that may be applied to both ports simultaneously while operating within specified differential limits.

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Performance Characteristics for ELVR Series Amplified Low Pressure Sensors

All parameters are measured at **5.0 volt** excitation and 25°C unless otherwise specified. Pressure measurements are with positive pressure applied to PORT B

Analog Performance Characteristics

Parameter		Minimum	Nominal	Maximum	Units	Specification Notes
Full Scale Span (FSS)		3.9	4.0	4.1	V	5
Full Scale Output (FSO)						
	Min Pressure	-	0.25	-	V	-
	Max Pressure	-	4.25	-	V	-
Span Temperature Shift						
	M001x	-	-	±2.5	%FSS	2
	MF25x	-	-	±2	%FSS	2
	MF12x and above	-	-	±1	%FSS	2
Offset Voltage @ zero differential pressure						
	MxxxG	0.15	0.25	0.35	V	-
	MxxxD	2.15	2.25	2.35	V	-
Offset Temperature Shift						
	M001x	-	-	±2.0	%FSS	-
	MF25x	-	-	±1.5	%FSS	-
	MF12x and above	-	-	±0.5	%FSS	-
Offset Warm-up Shift		-				
	M001x, MF25x	-	±15	-	mV	-
	MF12x and above	-	±5	-	mV	-
Offset Position Sensitivity (±1 g)						
	M001x, MF25x	-	±15	-	mV	-
	MF12x and above	-	±5	-	mV	-
Offset Long Term Drift (one year)						
	M001x, MF25x	-	±15	-	mV	-
	MF12x and above	-	±5	-	mV	-
Linearity, Hysteresis error (all products)		-	±0.05	±0.25	%FSS	4
Response Delay						
	12-bit resolution	-	0.5	-	ms	1
	14-bit resolution	-	1.0	-	ms	1
Current Consumption (no load)		-	5.0	-	mA	6

Performance Characteristics for ELVR Series Amplified Low Pressure Sensors

All parameters are measured at **3.0 volt** excitation and 25°C unless otherwise specified. Pressure measurements are with positive pressure applied to PORT B

Analog Performance Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Specification Notes
Full Scale Span (FSS)	1.9	2.0	2.1	V	5
Full Scale Output (FSO)					
Min Pressure	-	0.25	-	V	-
Max Pressure	-	2.25	-	V	-
Span Temperature Shift					
M001x	-	-	±2.5	%FSS	2
MF25x	-	-	±2	%FSS	2
MF12x and above	-	-	±1	%FSS	2
Offset Voltage @ zero differential pressure					
MxxxG	0.15	0.25	0.35	V	-
MxxxD	1.15	1.25	1.35	V	-
Offset Temperature Shift					
M001x	-	-	±2.0	%FSS	-
MF25x	-	-	±1.5	%FSS	-
MF12x and above	-	-	±0.5	%FSS	-
Offset Warm-up Shift	-				
M001x, MF25x	-	±15	-	mV	-
MF12x and above	-	±5	-	mV	-
Offset Position Sensitivity (±1 g)					
M001x, MF25x	-	±15	-	mV	-
MF12x and above	-	±5	-	mV	-
Offset Long Term Drift (one year)					
M001x, MF25x	-	±15	-	mV	-
MF12x and above	-	±5	-	mV	-
Linearity, Hysteresis error (all products)	-	±0.05	±0.25	%FSS	4
Response Delay					
12-bit resolution	-	0.5	-	ms	1
14-bit resolution	-	1.0	-	ms	1
Current Consumption (no load)	-	5.0	-	mA	6

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Performance Characteristics for ELVR Series Amplified Low Pressure Sensors

All parameters are measured at **5.0 volt** excitation and 25°C unless otherwise specified. Pressure measurements are with positive pressure applied to PORT B

Digital Performance Characteristics in Decimal

Parameter		Minimum	Nominal	Maximum	Units	Specification Notes
Full Scale Span (FSS)		-	26214	-	Decimal	2
Full Scale Output (FSO)						
	Min Pressure	-	1638	-	Decimal	5
	Max Pressure	-	27852	-	Decimal	5
Span Temperature Shift						
	M001x	-	-	±2.5	%FSS	2
	MF25x	-	-	±2	%FSS	2
	MF12x and above	-	-	±1	%FSS	2
Offset Output @ zero differential pressure						
	MxxD	14090	14745	15400	Decimal	-
	MxxG	983	1638	2294	Decimal	-
Offset Temperature Shift						
	M001x	-	-	±2.0	%FSS	-
	MF25x	-	-	±1.5	%FSS	-
	MF12x and above	-	-	±0.5	%FSS	2
Offset Warm-up Shift						
	M001x, MF25x	-	66	-	Decimal	3
	MF12x and above	-	33	-	Decimal	3
Offset Position Sensitivity (±1 g)						
	M001x, MF25x	-	99	-	Decimal	-
	MF12x and above	-	33	-	Decimal	-
Offset Long Term Drift (one year)						
	M001x, MF25x	-	66	-	Decimal	-
	MF12x and above	-	33	-	Decimal	-
Linearity, Hysteresis error (all products)		-	±0.05	±0.25	%FSS	4
Response Delay						
	12-bit resolution	-	0.5	-	ms	1
	14-bit resolution	-	1.0	-	ms	1
Current Consumption		-	5	-	mA	6

Performance Characteristics for ELVR Series Amplified Low Pressure Sensors

All parameters are measured at **3.0 volt** excitation and 25°C unless otherwise specified. Pressure measurements are with positive pressure applied to PORT B

Digital Performance Characteristics in Decimal

Parameter		Minimum	Nominal	Maximum	Units	Specification Notes
Full Scale Span (FSS)		21299	21845	22391	Decimal	2
Full Scale Output (FSO)						
	Min Pressure	-	2731	-	Decimal	5
	Max Pressure	-	24576	-	Decimal	5
Span Temperature Shift						
	M001x	-	-	±2.5	%FSS	2
	MF25x	-	-	±2	%FSS	2
	MF12x and above	-	-	±1	%FSS	2
Offset Output @ zero differential pressure						
	MxxD	12561	13653	14745	Decimal	-
	MxxG	1638	2731	3823	Decimal	-
Offset Temperature Shift						
	M001x	-	-	±2.0	%FSS	-
	MF25x	-	-	±1.5	%FSS	-
	MF12x and above	-	-	±0.5	%FSS	2
Offset Warm-up Shift						
	M001x, MF25x	-	66	-	Decimal	3
	MF12x and above	-	33	-	Decimal	3
Offset Position Sensitivity (±1 g)						
	M001x, MF25x	-	99	-	Decimal	-
	MF12x and above	-	33	-	Decimal	-
Offset Long Term Drift (one year)						
	M001x, MF25x	-	66	-	Decimal	-
	MF12x and above	-	33	-	Decimal	-
Linearity, Hysteresis error (all products)		-	±0.05	±0.25	%FSS	4
Response Delay						
	12-bit resolution	-	0.5	-	ms	1
	14-bit resolution	-	1.0	-	ms	1
Current Consumption		-	5	-	mA	6

Specification Notes

Note 1: For any pressure applied the output response time to reach 90% of pressure applied.
Note 2: Shift is relative to 25°C between standard or industrial compensated temperature range endpoints.
Note 3: Shift is within the first hour of excitation applied to the device.
Note 4: Measured at one-half full scale rated pressure using best straight line curve fit.
Note 5: The span is the algebraic difference between full scale output voltage and the offset voltage.
Note 6: Parameter is characterized and not 100% tested.

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Device Options

The following is a list of factory programmable options. Consult the factory to learn more about the options.

Interface

I2C and SPI interfaces are available with eight (8) lead packages only.

Supply Voltage

Devices are characterized at either 3.0V or 5.0V depending on the options selected. It is suggested to select the option that most closely matches the application supply voltage for best possible performance.

Speed/Power

There are two options of Speed/Power. These are Fast(F) and High Resolution(H).

Fast Mode(F) Is the fastest operating mode where the device operates with continuous sampling at the fastest internal speed 12 bit resolution, 0.5ms update rate.

High Resolution(H): Also operates with continuous samples however the ADC is set for longer duration for higher resolution. The conversion times are resultantly longer than the Fast(F) mode with 1 ms update rate.

Coating

Parylene Coating: Parylene coating provides a moisture barrier and protection from some harsh media. Consult factory for applicability of Parylene for the target application and sensor type. This option is not available for pressure ranges below 25 mbar or for J-LEAD or L-LEAD SMT configurations.

Soldering Recommendations

Vapor phase reflow processes are not compatible with this product.

If these devices are to be subjected to solder reflow assembly or other high temperature processing, they must be baked for 1 hour at 125°C within 24 hours prior to exposure. Failure to comply may result in cracking and/or delamination of critcal interfaces within the package, and is not covered by warranty.

I2C Interface

Introduction

The ELVR is capable of producing a digital output signal. The device runs a cyclic program, which will store a corrected pressure value about every 0.5 ms (F option) or 1 ms (H option) within the output registers of the internal ASIC. In order to use the sensor for digital signal readout, it should be connected to a bidirectional I2C-bus.

According to the I2C-bus specification, the bus is controlled by a master device, which generates the clock signal, controls the bus access and generates START and STOP conditions. The ELVR is designed to work as a slave, hence it will only respond to requests from a master device.

Digital I2C interface

The ELVR complies with the following protocol in Figure 1.

Bus not busy : During idle periods both data line (SDA) and clock line (SCL) remain HIGH.

START condition (S) : HIGH to LOW transition of SDA line while clock (SCL) is HIGH is interpreted as START condition. START conditions are always generated by the master. Each initial request for a pressure value has to begin with a START condition.

STOP condition (P) : LOW to HIGH transition of SDA line while clock (SCL) is HIGH determines STOP condition. STOP conditions are always generated by the master. More than one request for the current pressure value can be transmitted without generation of intermediate STOP condition.

DATA valid (D): State of data line represents valid data when, after START condition, data line is stable for duration of HIGH period of clock signal. Data on line must be changed during LOW period of clock signal. There is one clock pulse per bit of data.

Acknowledge (A): Data is transferred in pieces of 8 bits (1 byte) on serial bus, MSB first. After each byte the receiving device – whether master or slave – is obliged to pull data line LOW as acknowledge for reception of data. Master must generate an extra clock pulse for this purpose. When acknowledge is missed, slave transmitter becomes inactive. Master must then either send last command again or generate STOP condition in that case.

Slave address: The I2C-bus master-slave concept requires a unique address for each device. The ELVR has a preconfigured slave address, see table 2. The sensor will then listen to both slave addresses. After generating a START condition the master sends the address byte containing a 7 bit address followed by a data direction bit (R/W). A "0" indicates a transmission from master to slave (WRITE), a "1" indicates a data request (READ).

DATA operation : The sensor starts to send 2 data bytes containing the current pressure value as a 15 bit value placed in the output registers.

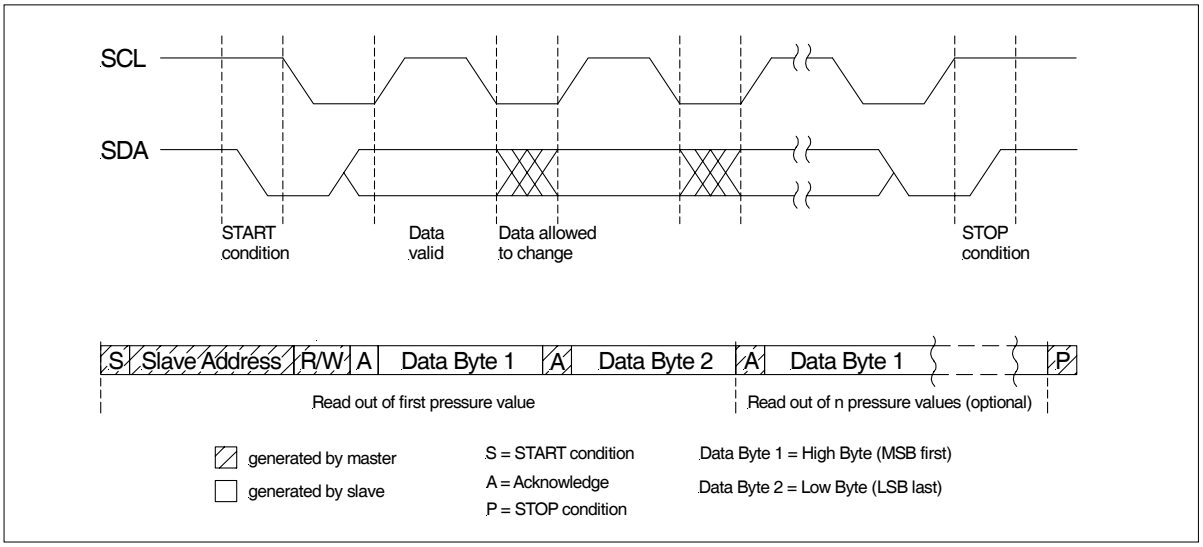

Figure 1: I²C bus protocol

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I²C BUS INTERFACE (Cont'd)

I²C Interface Parameters

Parameter	Symbol	Minimum	Nominal	Maximum	Unit	Specification Notes
Input High Level	-	90	-	100	% of Vs	6
Input Low Level	-	0	-	10	% of Vs	6
Output Low Level	-	-	-	10	% of Vs	6
Pull-Up Resistor	-	500	-	-	Ω	6
Load Capacitance @ SDA	C_{SDA}	-	-	400	pF	6
Input Capacitance @ SDA/SCL	C_{I2C_IN}	-	-	10	pF	6
Signal Clock Frequency	F_{SCL}	100*	-	400	kHZ	6
Bus Free Time Between STOP and START Condition	t_{BUF}	1.3	-	-	µs	6
Hold Time (Repeated) START Condition, to First Clock Pulse	$t_{HD.STA}$	0.8	-	-	µs	6
Low Period of SCL	t_{Low}	1.3	-	-	µs	6
High Period of SCL	t_{High}	0.6	-	-	µs	6
Setup Time Repeated START Condition	$t_{SU.STA}$	1	-	-	µs	6
Data Hold Time	$t_{HD.DAT}$	0	-	-	µs	6

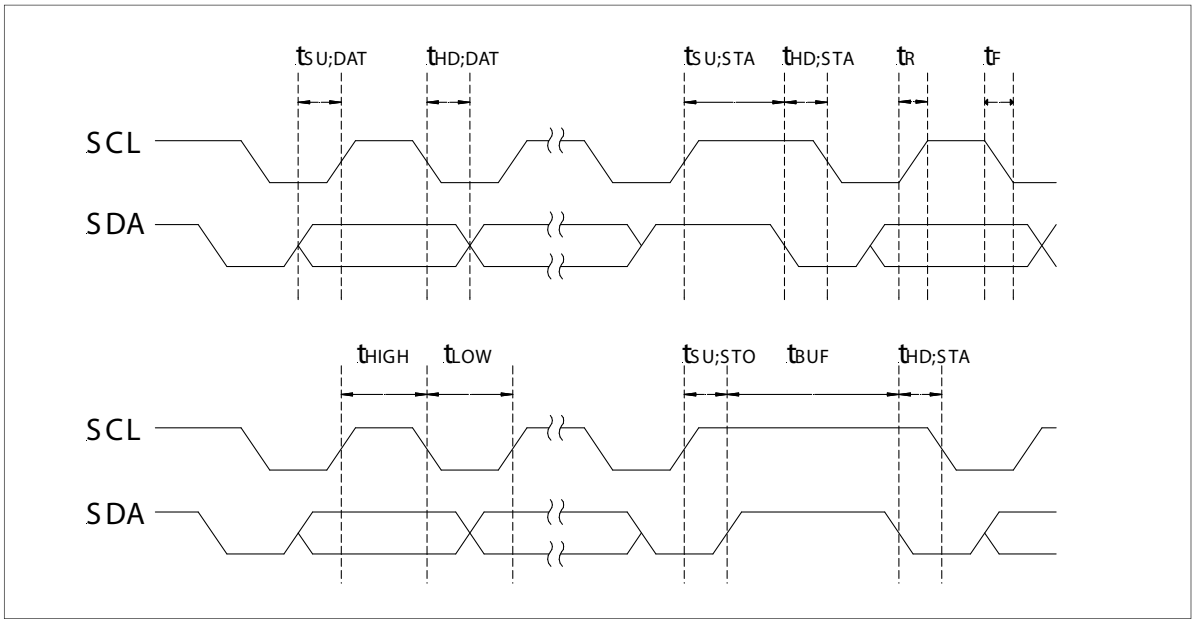

Figure 2. Timing Characteristics

SPI - SERIAL PERIPHERAL INTERFACE

Introduction

The ELVR series is capable of producing a digital output signal. The device runs a cyclic program, which will store a corrected sensor value about every 0.5 ms (F option) or 1 ms (H option) within the output registers of the internal ASIC. This cyclic program runs independent from the bus communication. In order to use the pressure sensor for digital signal readout, it should be connected to a SPI Master device.

SPI specifies four signals: The clock (CLK) is generated by the master and input to all slaves. MOSI carries data from master to slave. MISO carries data from slave back to master. A slave select line (SS) allows individual selection of a slave device.

SPI Modes

A pair of parameters called clock polarity (CPOL) and clock phase (CPHA) determine the edges of the clock signal on which the data are driven and sampled. Each of the two parameters has two possible states, which allows for four possible combinations, all of which are incompatible with one another.

The ELVR series supports all clock phase (CPHA)=0 and polarity (CPOL)=0. CPOL which means that data transmission starts with the rising first clock edge (see Figure 3).

Slave select

The falling edge of the SS line indicates the beginning of the transfer. Additionally the SS line must not be negated and reasserted between the three bytes to be transmitted.

Data operation

The MOSI line should always be set to high level. So there is no data transmission from master to slave. Because of internal configuration the slave will answer the first byte with an FFxh. The second and third byte contain the 15 bit pressure information (see Figure 4).

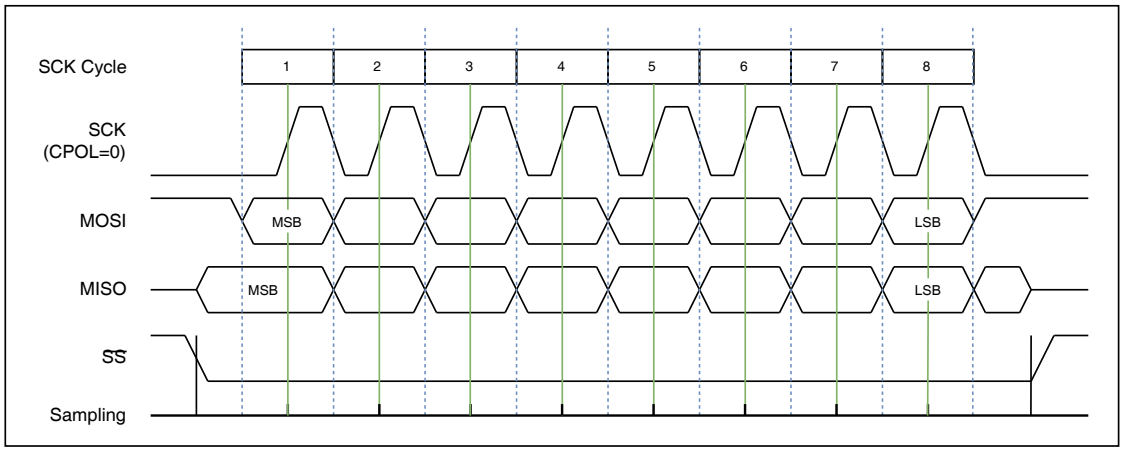

Figure 3: Example of a standard 1 byte SPI data transfer for CPHA=0 and CPOL=0

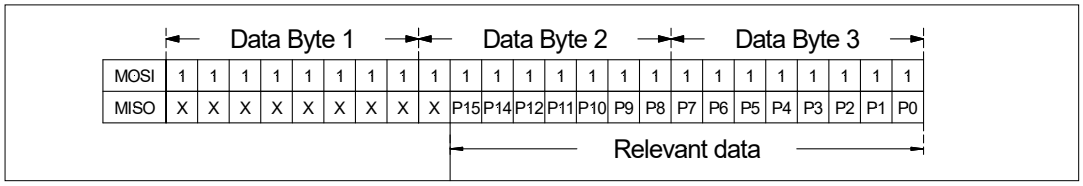

Figure 4: 3 byte data stream between ELVR sensor and master containing the pressure value as a 15 bit value.

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SPI - SERIAL PERIPHERAL INTERFACE (Cont'd)

Interface Parameters

Parameter	Symbol	Minimum	Nominal	Maximum	Unit	Specification Notes
Input High Level	-	90	-	100	% of Vs	6
Input Low Level	-	0	-	10	% of Vs	6
Output Low Level	-	-	-	10	% of Vs	6
Pull-Up Resistor	-	500	-	-	Ω	6
Load Capacitance @ MISO	C_{MISO}	-	-	400	pF	6
Input Capacitance @ Each Pin	C_{SPI_IN}	-	-	10	pF	6
Signal Clock Frequency	f_{SCK}	100*	-	640	kHZ	6
MISO Hold Time after SCK Sample Slope	$t_{SPI_HD_MISO}$	200	-	-	ns	6
MOSI Setup Time Before SCK Sample Slope	$t_{SPI_SU_MOSI}$	$2/f_{CLK}$	-	-	-	6
/SS Setup Time Before SCK Sample Slope	$t_{SPI_SU_SS}$	10	-	-	ns	6
/SS Hold Time After SCK Sample Slope	$t_{SPI_HD_SS}$	$1/f_{CLK}$	-	-	-	6

Note: **All Sensors recommends communication speeds of at least 100 kHz (max. 640 kHz). Please contact your All Sensors sales manager for further information.**

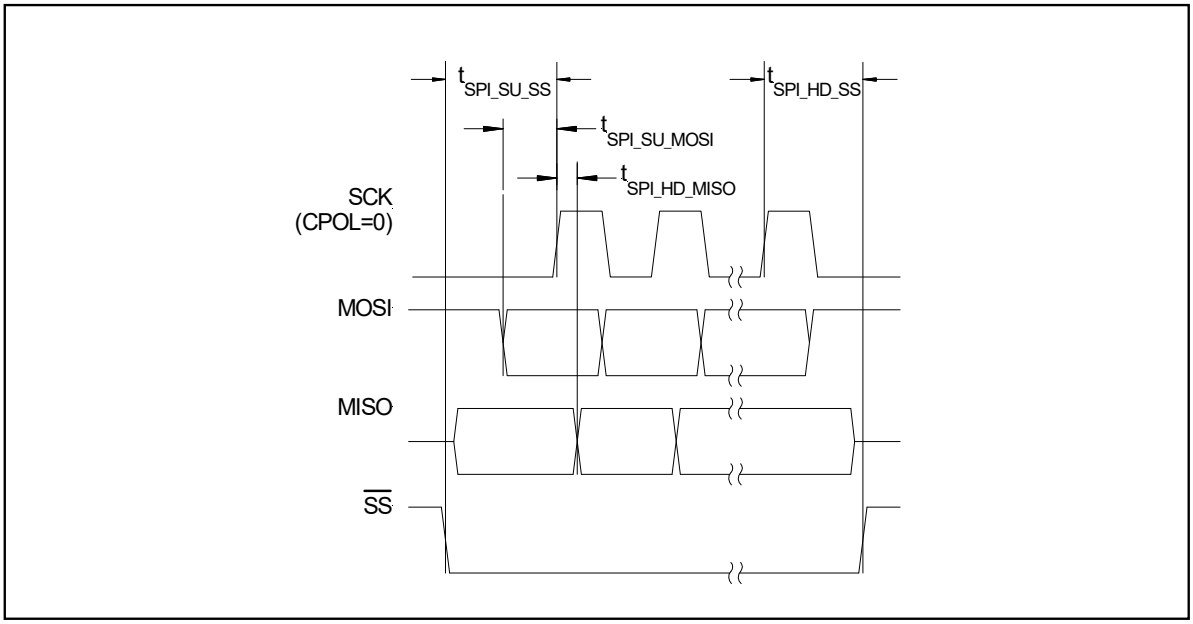


Figure 5: Timing characteristics

How to Order

Refer to Table 1 for configuring a standard base part number which includes the pressure range, package and temperature range. Table 2 shows the available configuring options. The option identifier is required to complete the device part number. Refer to Table 3 for the available device package options.

Example P/N with options: ELVR-M001D-F1RJ-C-NI3F

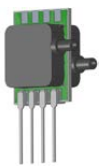
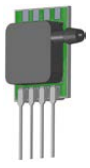
Table 1 - How to configure a base part number

ORDERING INFORMATION	SERIES		PRESSURE RANGE			PACKAGE									TEMPERATURE RANGE	
						Base	Port Orientation		Lid Style		Lead Type					
	ID		ID	Description		ID	ID	Description	ID	Description	ID	Description			ID	Description
	ELVR		M001D	±1 mbar		F	1	Dual Port Same Side	R	Long Non-Barbed	T	SIL (see note 7)			C	Commercial
			MF25D	±2.5 mbar			N	Single Port	S	Long Barbed	D	DIP			I	Industrial
			MF12D	±12.5 mbar							J	J-Lead SMT				
			M025D	±25 mbar							L	L-Lead SMT				
			M050D	±50 mbar												
			M075D	±75 mbar												
			M100D	±100 mbar												
			M200D	±200 mbar												
			MN17D	-10 to 70 mbar												
			MF25G	2.5 mbar												
			MF12G	12.5 mbar												
			M025G	25 mbar												
			M050G	50 mbar												
			M075G	75 mbar												
			M100G	100 mbar												
			M200G	200 mbar												
Example	ELVR	-	M001D		-	F	1		R		J		-		C	

Table 2 - How to configure an option identifier

ORDERING INFORMATION	COATING		INTERFACE			SUPPLY VOLTAGE		DIGITAL RESOLUTION, UPDATE RATE	
	ID	Description	ID	Description	Address	ID	Description	ID	Description
	N	No Coating	A	Analog Only (see note 7)	N/A	3	3.0V	F	Fast Mode
	P	Parylene Coating (see note 8)	I	I2C & Analog	0x78	5	5.0V		(12bit, 0.5ms)
			T	**Option**- SPI & Analog	N/A				
			2	**Option**- I2C & Analog	0x28			H	High Resolution
			3	**Option**- I2C & Analog	0x38				(14bit, 1ms)
			4	**Option**- I2C & Analog	0x48				
			5	**Option**- I2C & Analog	0x58				
			6	**Option**- I2C & Analog	0x68				
Example	N		I			3		F	

TABLE 3: Available F-Series Package Configurations

Port Orientation	Non-Barbed Lid				Barbed Lid			
	Lead Style				Lead Style			
	SIL	DIP	SMT-J	SMT-L	SIL	DIP	SMT-J	SMT-L
Dual Port Same Side	 F1RT	F1RD	F1RJ	F1RL	F1ST	F1SD	NOT OFFERED	F1SL
Single Port	FNRT	FNRD	FNRJ	FNRL	 FNST	FNSD	FNSJ	FNSL

Specification Notes (Cont.)

NOTE 7: LEADFRAME "T" HAS ONLY ANALOG OUTPUT CAPABILITY. ALL LEAD TYPES EXCEPT FOR "T" HAVE SIMULTANEOUS DIGITAL AND ANALOG OUTPUT CAPABILITY.

NOTE 8: PARYLENE COATING NOT OFFERED IN J-LEAD OR L-LEAD SMT CONFIGURATION. PARYLENE COATING IS NOT OFFERED FOR PRESSURE RANGES BELOW 10 INH2O.

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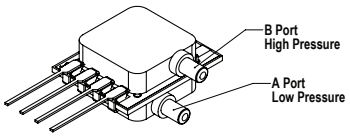
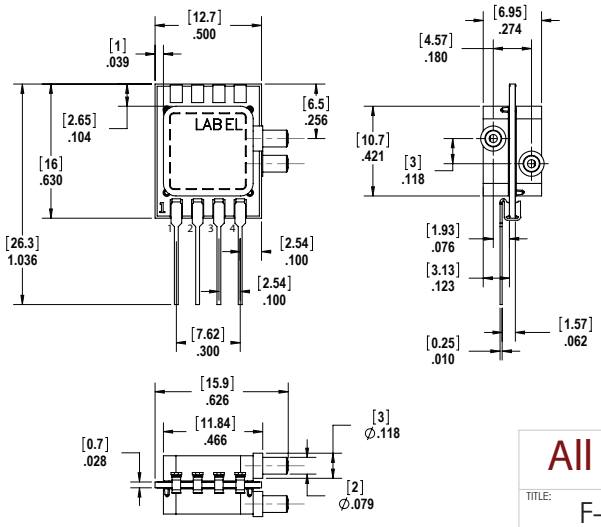
Package Drawings



Pin	Definition
1	Vs
2	Gnd
3	Vout
4	Do not connect

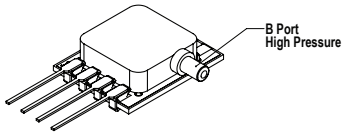


NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-01.

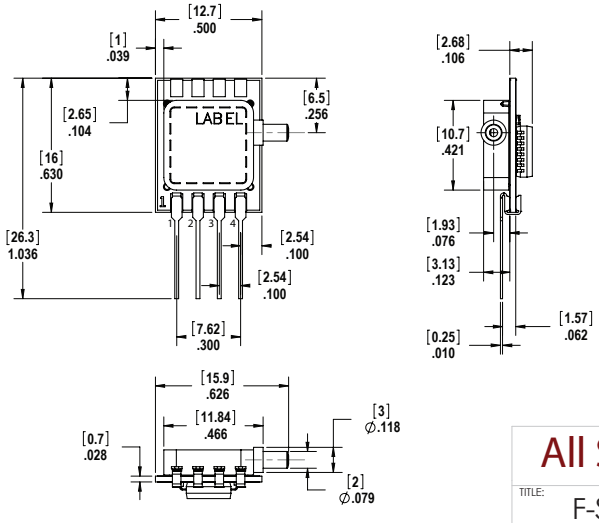
All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1RT Package



Pin	Definition
1	Vs
2	Gnd
3	Vout
4	Do not connect

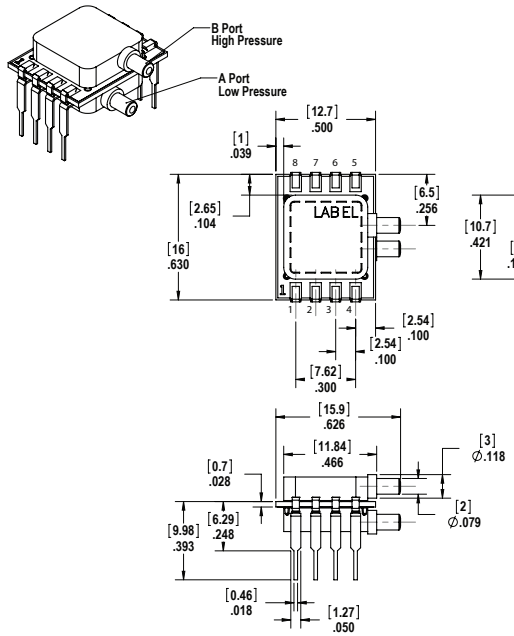


NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-01.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNRT Package



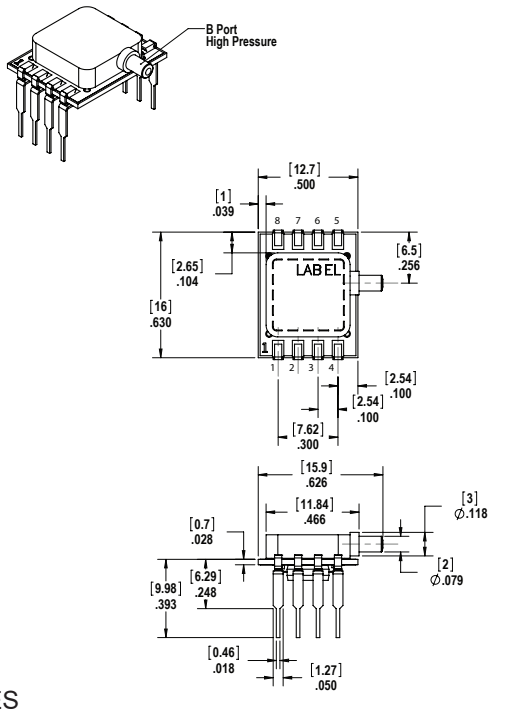
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-27.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1RD Package



	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-27.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNRD Package

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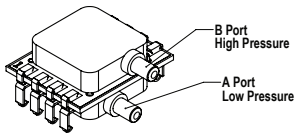
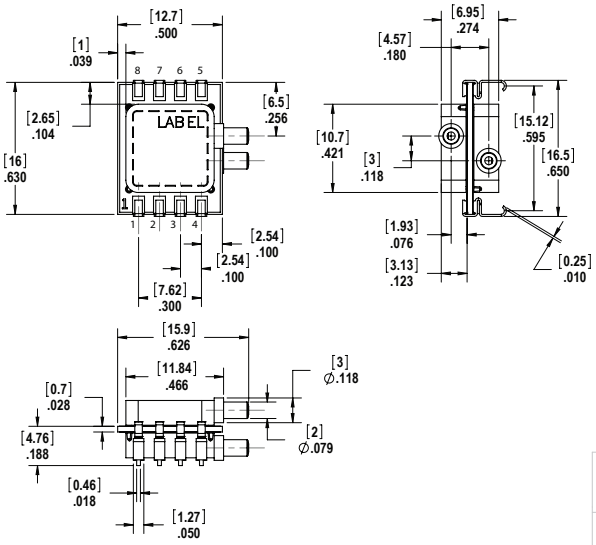
Package Drawings (Cont'd)





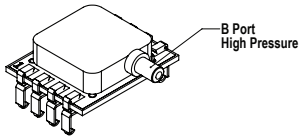
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

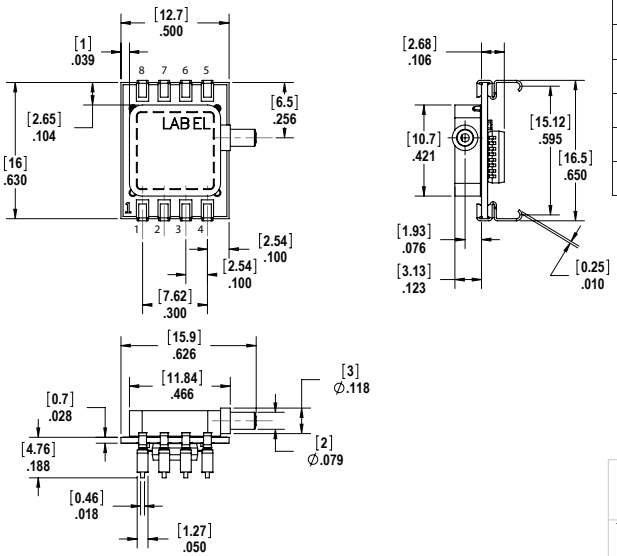
NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-28.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1RJ Package





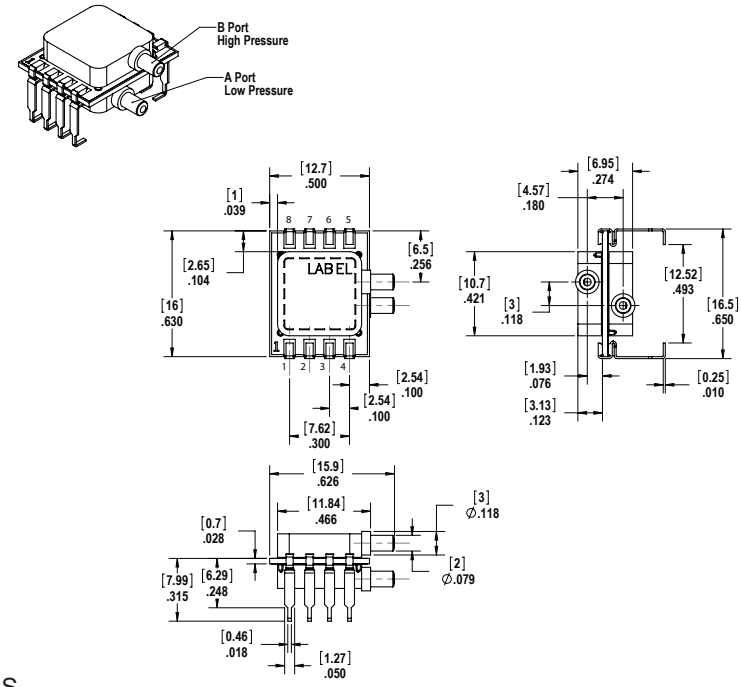
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-28.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNRJ Package



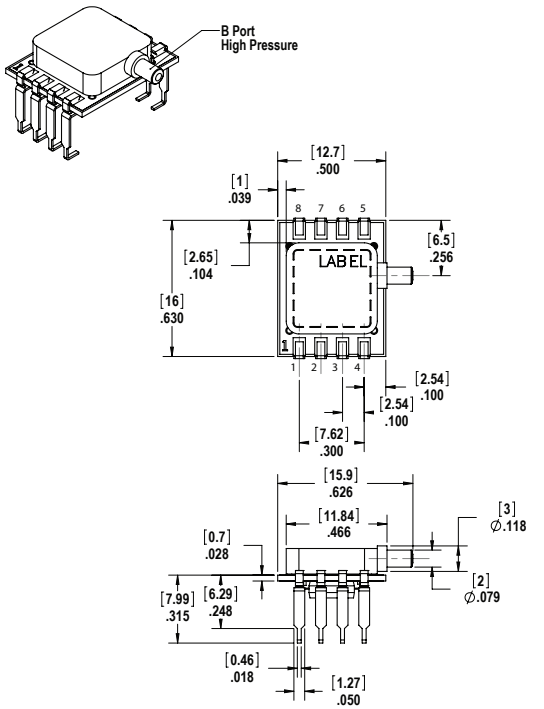
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-29.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1RL Package



	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-29.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNRL Package

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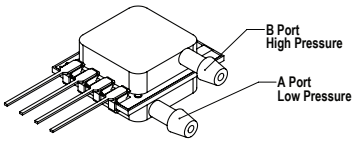
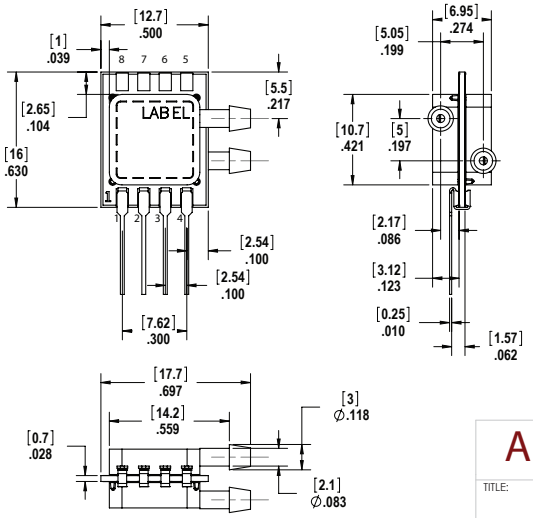
Package Drawings (Cont'd)



Pin	Definition
1	Vs
2	Gnd
3	Vout
4	Do not connect

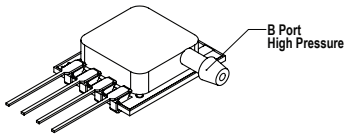


NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-01.

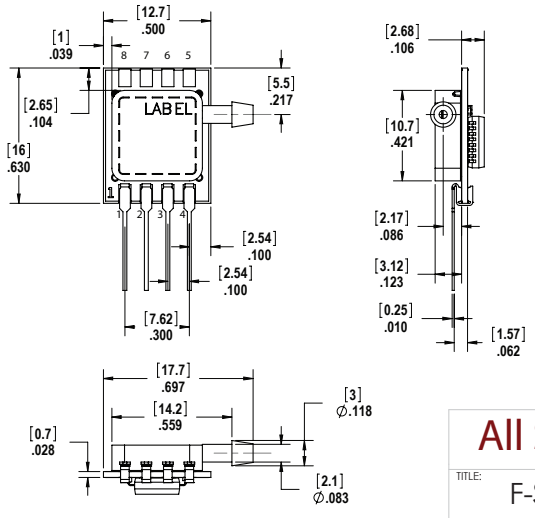
All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1ST Package



Pin	Definition
1	Vs
2	Gnd
3	Vout
4	Do not connect

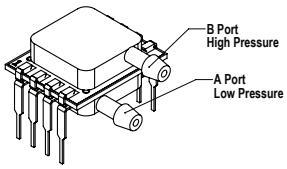


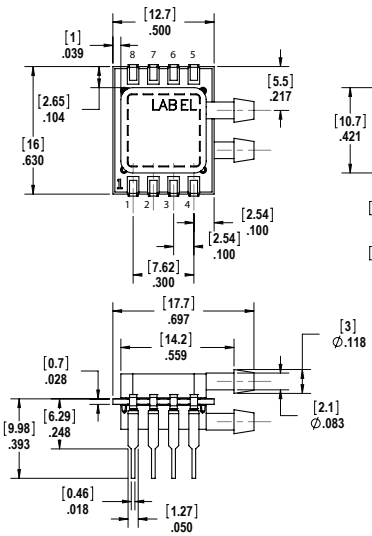
NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-01.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNST Package





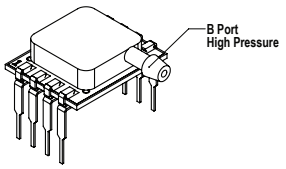
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

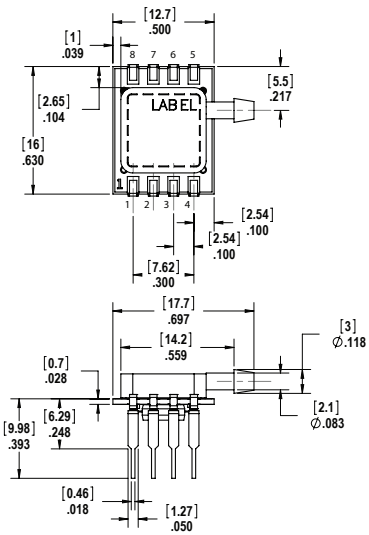
NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-27.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1SD Package





	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-27.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNSD Package

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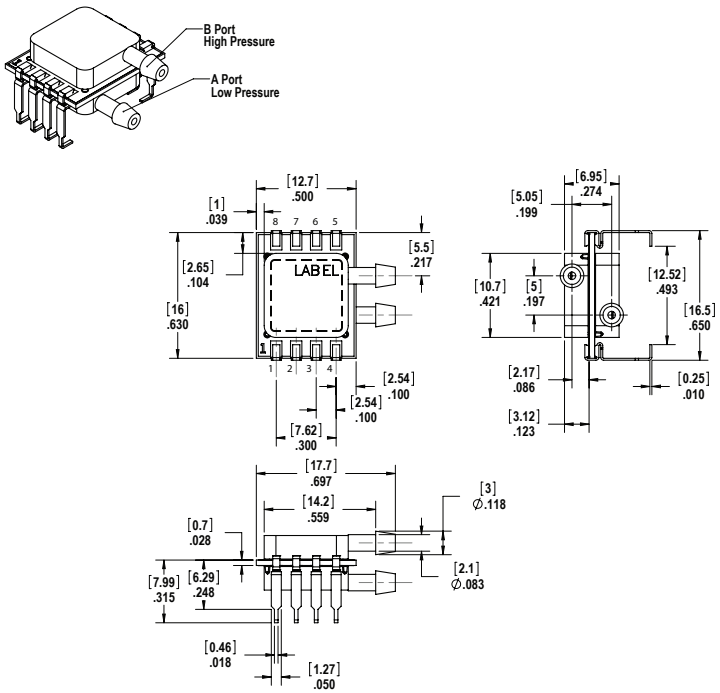
Package Drawings (Cont'd)



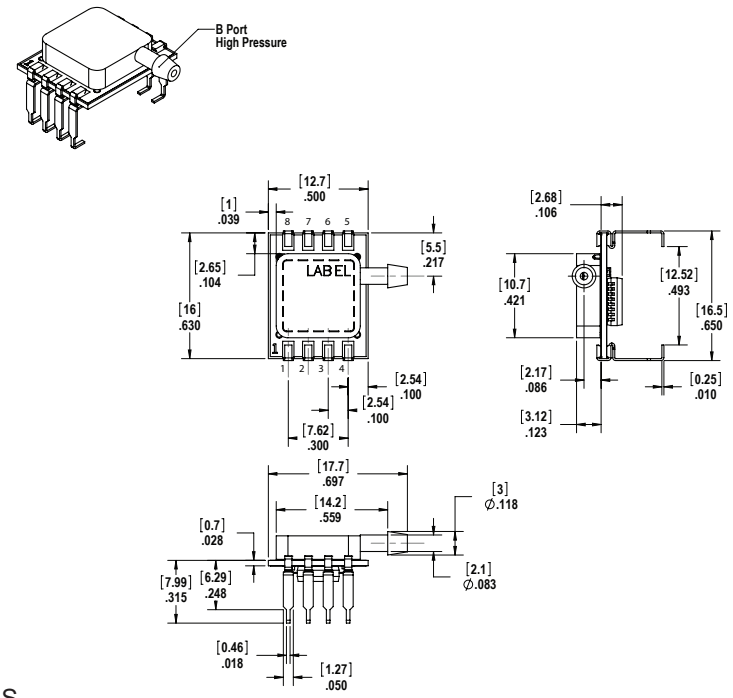
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-29.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME F1SL Package



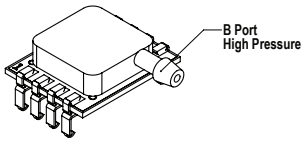
	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

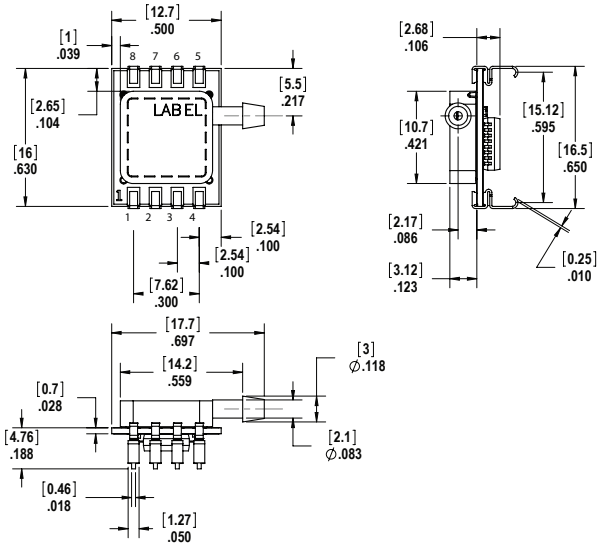
NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-29.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNSL Package





	I2C	SPI
Pin	Definition	Definition
1	Vs	Vs
2	Gnd	Gnd
3	Vout	Vout
4	Do not Connect	MISO
5	SCL	CLK
6	Do not Connect	SS
7	Do not Connect	Do not Connect
8	SDA	MOSI

NOTES
1) Dimensions are in inches [mm].
2) For suggested pad layout, see drawing: PAD-28.

All Sensors

TITLE: F-Series Package

SIZE A | FILE NAME FNSJ Package

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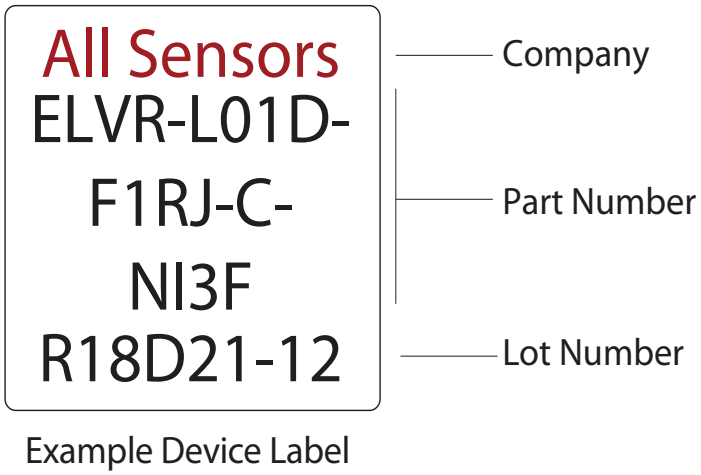
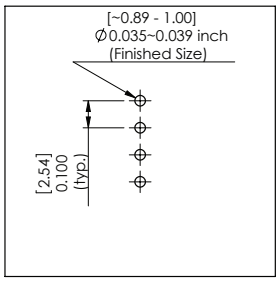
Product Labeling

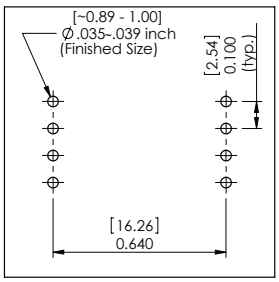


Example Device Label

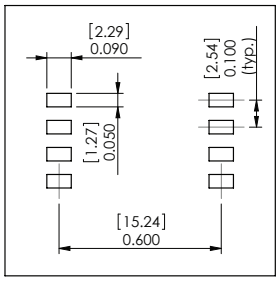
Suggested Pad Layouts



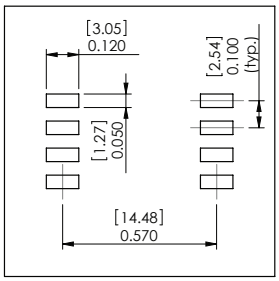
PAD-01



PAD-27



PAD-28



PAD-29

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