Atmodule AT2610-16A

16.0 PSIA Digital Output Pressure Sensor

GENERAL DESCRIPTION

The Atmodule AT2610-16A precision digital-output pressure sensor uses smart sensor techniques to correct pressure readings for temperature and linearity, achieving a total error band of under 0.1% FS (0.016 PSI) over the -58 F to +185 F temperature range. The typical error band is 0.05% FS (0.008 PSI) over the -58 F to +185 F temperature range. Static accuracy is better than 0.002 PSI. The module contains an aerospace-grade silicon pressure sensor, sensor interface electronics, a 21-bit A/D converter, EEPROM calibration memory, and a sensor signal processor. Operating from an unregulated power supply, the module is designed for board mounting with 10-pin header connection. The module is media isolated and compatible with air and oils. The wetted materials are stainless steel and silicon. A parylene conformal coating protects the electronic circuitry.

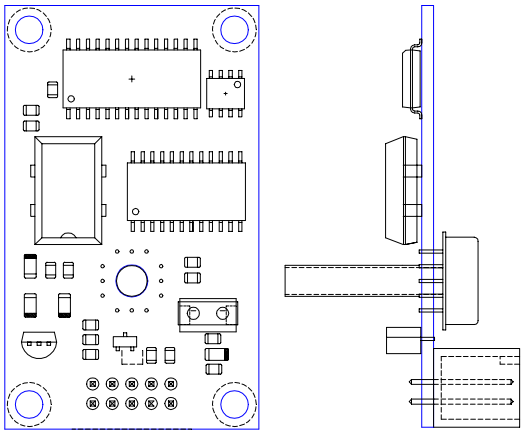
FEATURES

- Media isolation
- 0.10% FS total error over temperature all effects.
- Very low long term drift
- Four-wire serial interface bi-directional
- Three-wire user interface output only
- Pressure measurement range 0 to 16.6 PSIA
- Digital temperature compensation and calibration
- Parylene conformal coating protects circuitry
- 80 mS conversion time
- 1.0 mS data access time
- 0.013% (0.002 PSI) static accuracy

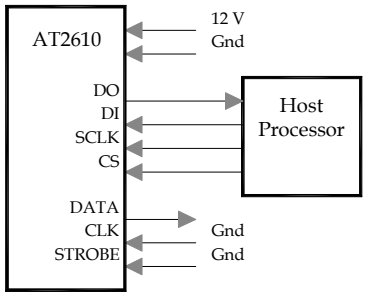
APPLICATIONS

- Barometers and altimeters
- Secondary air-data sensors
- Smart radios and GPS receivers

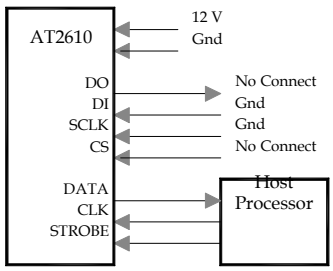
AT2610 Module Outline (Actual Size)



4-Wire Interface Connection



OEM User Interface Connection



The OEM user interface is a three-wire factory customizable interface with one bi-directional line and two input-only lines. This interface supports customer-specific communication protocols and triggering requirements.

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AT2610 - 16A

Performance

Parameter	Minimum	Typical	Maximum	Units
Pressure measurement range	0		16.3	PSIA
Over pressure			30	PSIA
Resolution		0.001		PSIA
Total accuracy (All effects over temperature)	-0.016	0.008	+0.016	PSIA
Static accuracy (Offset plus linearity error at 68 F)		0.002		PSIA
Stability		0.008	PSIA/Year	
Output noise pk-pk includes output resolution		0.002		PSIA
Output noise pk-pk (average pressure command)		0.001		PSIA
Time constant for the average pressure		8		Samples
Output scaling (Output Counts / PSIA)		1000		Counts
Digital-output word range	-32,767		32,767	Counts
Digital output value at zero input pressure		00000		Counts
Digital output value at full-scale pressure (16.000 Pisa)		16,000		Counts
Pressure measurement time (CS high to end of conversion)		80	110	mS

Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum
Vsupply	Supply voltage Operating	7.5	12.0	16.0
	Turn on rate	24 V/S		
Vdd	On board Vdd voltage regulator	4.75	5.0	5.25
Isupply	Supply current		8.0 mA	
Vih	Input high voltage CS , SCLK , DI	2.0		Vdd
Vil	Input low voltage CS , SCLK , DI	Vss		0.2 Vdd
Iil	Input leakage current CS , SCLK , DI	- 3 µA		+3 µA
Voh	Output low voltage DO (Iol = 10 mA)	0.5 Volts		
Voh	Output high voltage DO (Ioh = -4.0 mA)	Vdd - 0.5		
Rcspu	Chip select internal pull up resistance to Vdd		33 K Ohm	
Rsclkpd	SCLK internal pull down resistance to Vss		33 K Ohm	
Rdi	DI internal pull down resistance to Vss		33 K Ohm	

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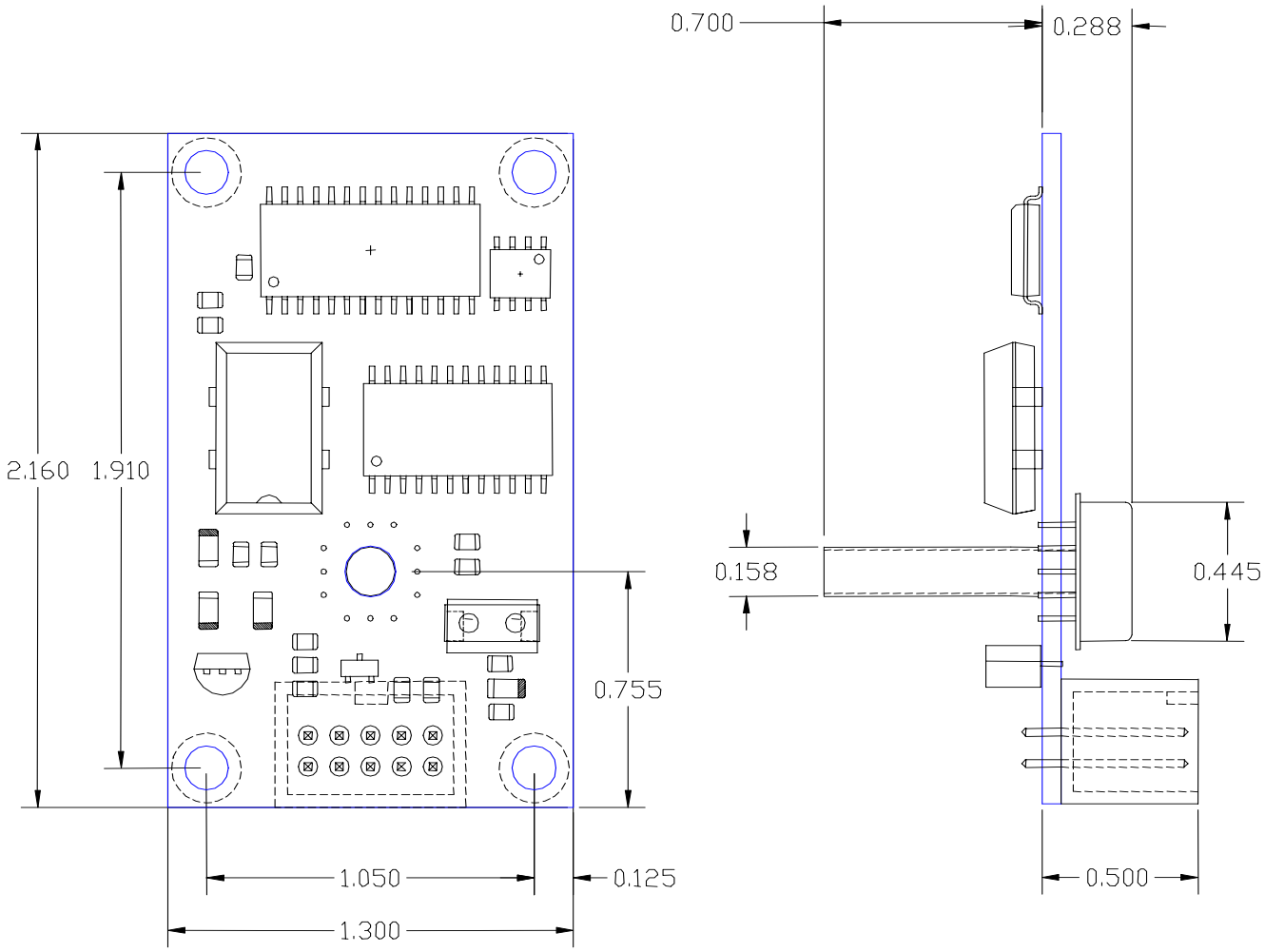
Atmodule AT2610 Series
Outline Drawing
http://www.atmos.com



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Atmodule AT2610-16A

Four-Wire Serial Interface Specification

GENERAL DESCRIPTION

The AT2610-16A four-wire serial interface is a microwire type synchronous serial interface. Multiple modules can be placed on the same bus with an individual chip-select (CS) line and data out (DO) line per module. The input data word is 16 bits long. The output data word is 17 bits long including the end-of-conversion bit that is always a one. To select the module the chip-select line is set low. The pressure measurement in progress is finished and the end of conversion bit (D16) is output. The module is now ready to receive and transmit data. The 16-bit input word is clocked in while the output words remaining 16 bits are read out. The output data word is the result of the **previous** command. **The data-in line is read on the rising edge of the serial clock (SCLK) line. The data out line changes state just after the rising edge of the serial clock line**. The input command is executed when the chip-select line is brought high after all 16 bits have been clocked in. Clocks beyond the 16th are ignored. If the CS line is brought high (deselected) before all 16 bits have been transferred then the data I/O is aborted and a pressure conversion cycle started.

OUTPUT DATA FORMAT

The output data word is 17 bits long. The data is clocked out of the module from most significant to least significant bit. Data bit D16, the most significant bit, is the end-of-conversion bit and is always a one.

Data bit D15 is the sign bit for the output magnitude.

0 = positive 1 = negative

Data bits D14 through D0 contain the magnitude.

Magnitude = 0 to 32,767

```
(D16                              D0)
(1 x x x x x x x x x x x x x x x x)
(E S |------ Magnitude ----------|)
```

E = End of conversion bit = 1

S = Sign bit

INPUT DATA FORMAT

The input data word is 16 bits long.

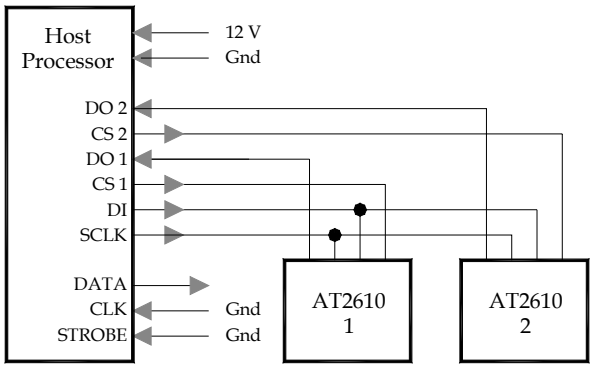
The data is clocked into the module most significant to least significant bit.

Data bits D15 through D8 contain the command.

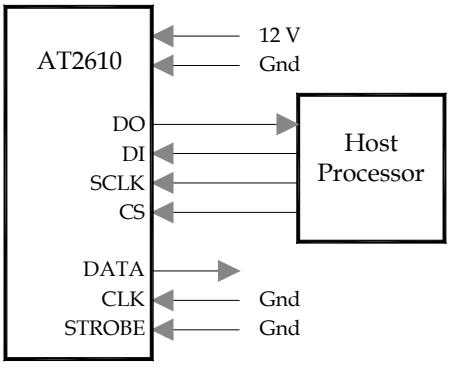
Data bits D7 through D0 contain the command option.

```
(D15          D8)(D7             D0)
(x x x x x x x x)(x x x x x x x x)
 |---Command---|  |----Option-----|
```

Multi-Module Connection



4-Wire Connection



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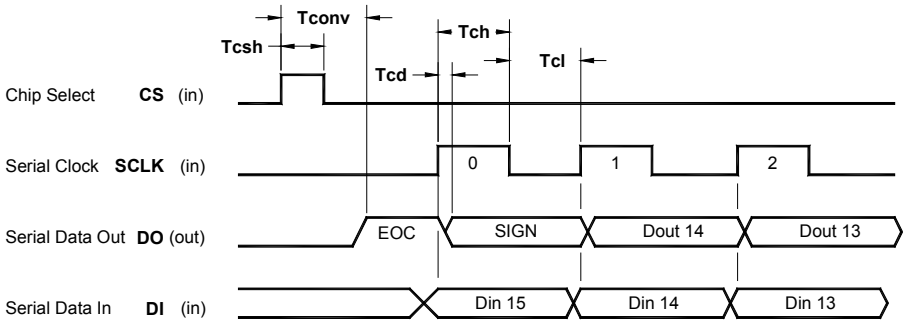
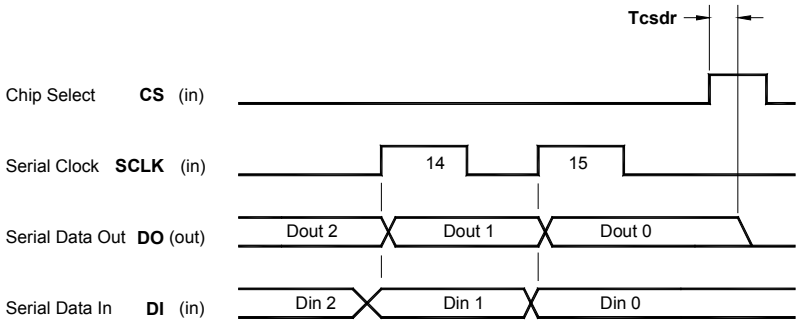
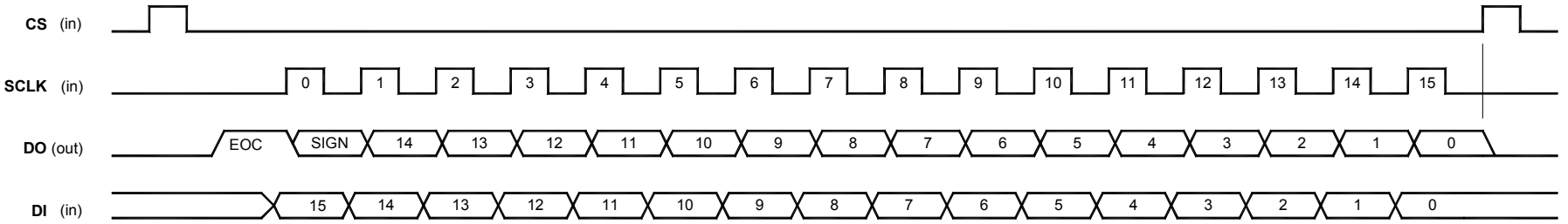
AT2610 4-Wire Serial Interface Timing Diagram







I/O Timing

Parameter	Description	Minimum	Typical	Maximum
Tpon	Power on time to module ready		20 mS	30 mS
Tconv	Pressure conversion time		90 mS	110 mS
Tconv	Read module serial number or average value	1.0 mS	2.0 mS	3.0 mS
Tcsh	Chip select high time	50 µS		Tconv
Tch	Serial data clock high time	28 µS		
Tcl	Serial data clock low time	28 µS		
Tcsdr	Chip select high(deselected) to date line set low		22 µS	
Tcd	Serial data clock high to data valid time	6.5 µS	15 µS	28 µS

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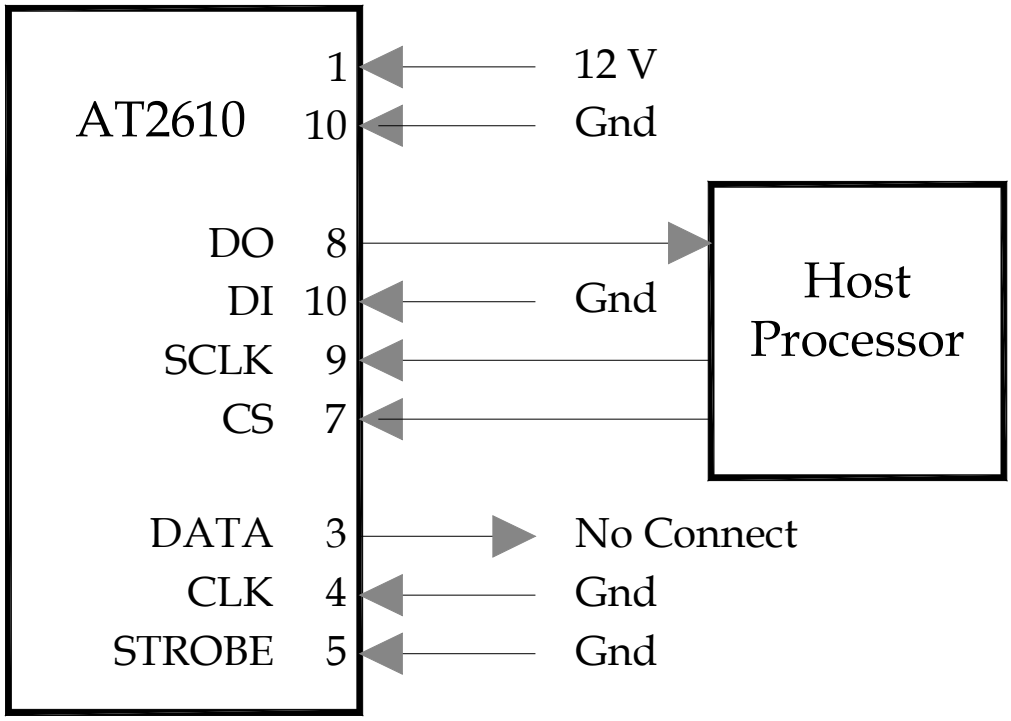
AT2610 Pressure Module Commands

	Command	Command Data	Binary Command Word
Measure the applied pressure and return the pressure value	0	0	(00000000)(00000000)
Return average pressure value	1	0	(00000001)(00000000)
Return the serial number	6	0	(00000110)(00000000)
Reserved commands	2 , 3 , 4 , 5 7 to 15	0 to 255	(0000xxxx)(xxxxxxxx)

The module accepts commands 0 through 15. The reserved commands are used for factory access to internal diagnostic and calibration registers. Issuing a reserved command may affect the calibration of the unit. Atmos recommends that the customer use the zero command to access the module pressure. In applications that only require the measured pressure the data in line can be tied low.

Recommended 4-wire connections



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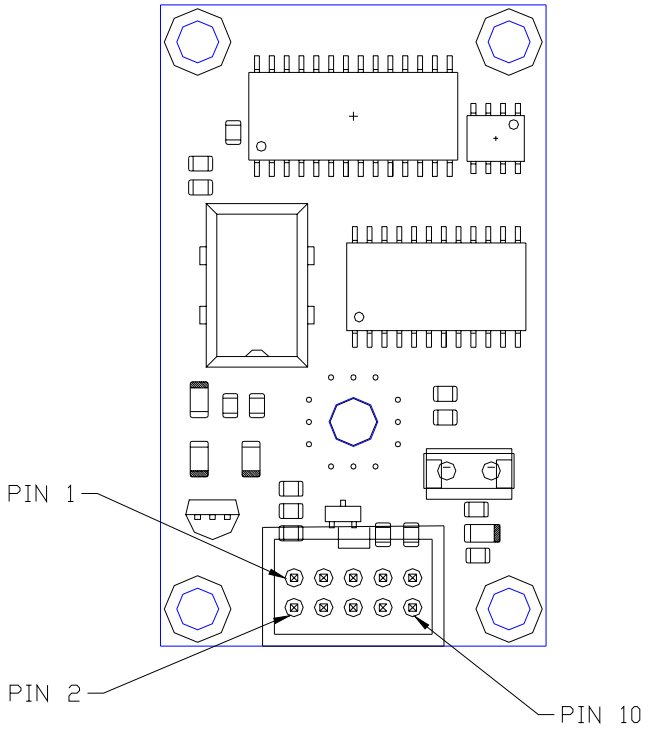
AT2610-16A Pin Assignment

Pin Number	Signal Name	Type	Description
1	GND	Power pin	Ground
2	12 V DC	Power pin	12 supply
3	OEM DATA	Output	OEM interface data out
4	OEM CLK	Input	OEM interface clock
5	OEM STROBE	Input	OEM interface strobe Active high
6	Not Connected	Not Connected	
7	CS (Active Low)	Input with internal 33 K ohm pull-up	Chip Select Active low
8	DO	Output	Data Out
9	SCLK	Input with internal 33 K ohm pull down	Serial Clock
10	DI	Input with internal 33 K ohm pull-down	Data Input

When using the 4-wire serial interface pin 3 should be left unconnected, pin 4 should be tied to ground and pin 5 should be tied to ground to prevent the OEM interface from becoming active.

Top View Of AT2610



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