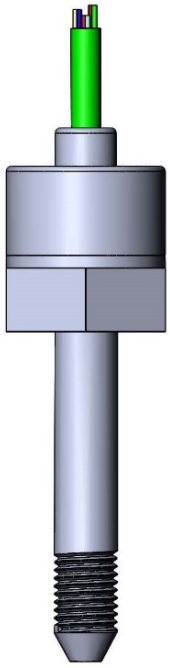
# Pressure Sensor
# High Pressure – 10,000 PSIA

## APS100



- 0-150°C Operating Temperature
- F375CX Autoclave Fitting
- Pressure/temperature read-out
- 15 Bit Digital Output – SPI
- 3.3V Operation
- ± 0.10% Linearity Error
- ± 0.2% Full Scale Error
- 6,000/10,000 PSIA Pressure Range
- Media – Harsh Liquid, Air, & Gas

## DESCRIPTION

The APS100 is a pressure transducer manufactured for a high operating temperature range for the most challenging of applications. This silicon pressure transducer was designed for demanding industrial and commercial applications. The stainless steel media isolated port design allows for pressure measurement of liquid or gas media.

The APS100 series utilizes MEMS piezo-resistive sensors pressurized on the passive backside of the SS diaphragm which has superior long term stability and accuracy (.10% Linearity).

The design is simple and proves value for OEM customers. Please contact the factory for custom design availability.

## APPLICATIONS

- Mil/Aero
- Industrial Automation
- HVAC
- Automotive Engine
- Compressor
- Pneumatic

## Maximum Environmental Ratings

Operating Temperature ……. 0°C to 150°C
Storage Temperature Range ……..-55°C to 175°C

Proof pressure ……..……... 3x full scale pressure
Burst pressure ……..……... 5x full scale pressure

## Package

The one piece body design is made of 316L stainless steel, which allows for easy manufacturability and long term stability.

## Stability

The silicon MEMS pressure sensor is welded into a 316L stainless media isolated housing. That in turn is mounted in the 316 stainless hex housing.

Additional stability is gained from a 2 week factory burn-in.

## Pressure port

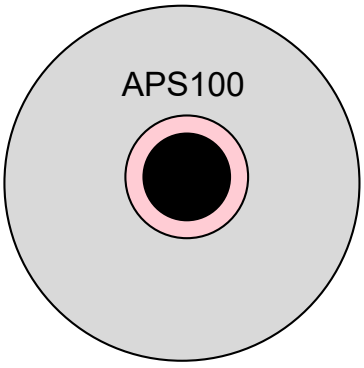
The pressure port is F375CX Autoclave.

**Ordering:** APS100-6K, APS100-10K

## Cover Marking

Part Number; Date Code

High temperature Kapton label with the serial number and date code is added to the side of the cap.




## Media

The 316L media isolated pressure port is tolerant to most media including oil, air, gas, some corrosive media, and salt water.

## Wetted parts

The wetted surfaces are composed of 316L stainless steel.

## Pressure Range

The standard pressure range is 6,000/10,000.

## Soldering

The electrical connection wires for the APS100 sensor can be easily attached to a connector or soldered directly to a board.

## EEPROM Serialization

The parts are serialized in the EEPROMS which ties back to the calibration/verification test data.

# APS100 Digital Output Operational Characteristics

$V_+$ = 3.3V, $V_-$ = 0V, Temperature = 25°C

| PARAMETER | SYMBOL | Min | Typ | Max | UNITS |
|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | 2.7 | 3.3 | 3.8 | VDC |
| Operating Temperature | $T_S$ | 0 | | 175 | ºC |
| Supply Current (Note 1) | $I_{DD}$ | 70 | 120 | 2500 | µA |
| Sleep Mode Supply Current | $I_{stdby}$ | | .5 | 32 | µA |
| **Accuracy** | | | | | |
| Pressure Error | | -0.2 | | 0.2 | %Full Scan |
| Non-Linearity (Note 2) | | -.1 | | .1 | %Full Scan |
| Temperature Error (Note 3) | | -2 | | 2 | ºC |
| Response Time | $t_R$ | 1 | 2 | 20 | ms |
| **Analog-to-Digital** | | | | | |
| Resolution | ADC | | 15 | | Bits |
| Temperature Resolution | | | 0.1 | | ºC |
| **SPI Interface** | | | | | |
| Input Low Level | $V_{in\_low}$ | 0 | | .2 | Vdd |
| Input High Level | $V_{in\_high}$ | .8 | | 1 | Vdd |
| Output Low Level | $V_{o\_low}$ | | | .1 | Vdd |
| Load Capacitance @SDA | $C_{sda}$ @400khz | | | 200 | pF |
| Pull-Up Resistor | $R_{I2C\_PU}$ | 500 | | | Ω |
| Input Capacitance (each pin) | $C_{I2C\_In}$ | | | 10 | pF |

Notes: 1) Measured at zero pressure. 2) Defined as best straight line 3) Measured from 0°C to 150°C.

# Electrical Pin Configuration (Digital [SPI])

Yellow - SCLK

Green - MISO

White- INT/SS

Red - V+

Black - GND

Orange – MOSI

**Fig. 1**

**Digital Interface – SPI**

SPI Clock Speed: 125KHz

Data Order: MSB First

Clock Polarity: SCK low, idle

Clock Phase: Sample Trailing Edge

Chip Select: CS on, idle high

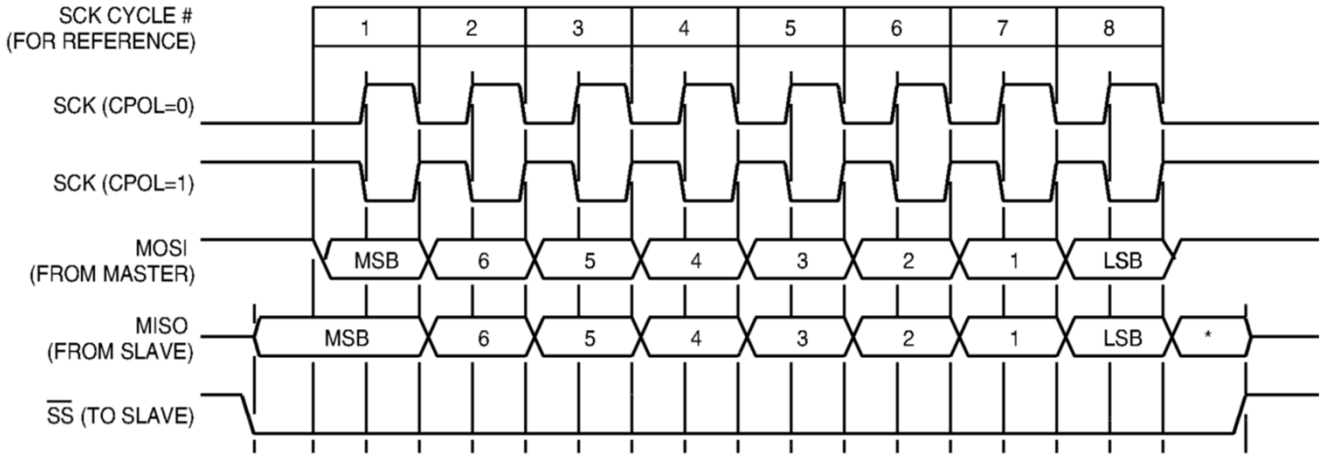


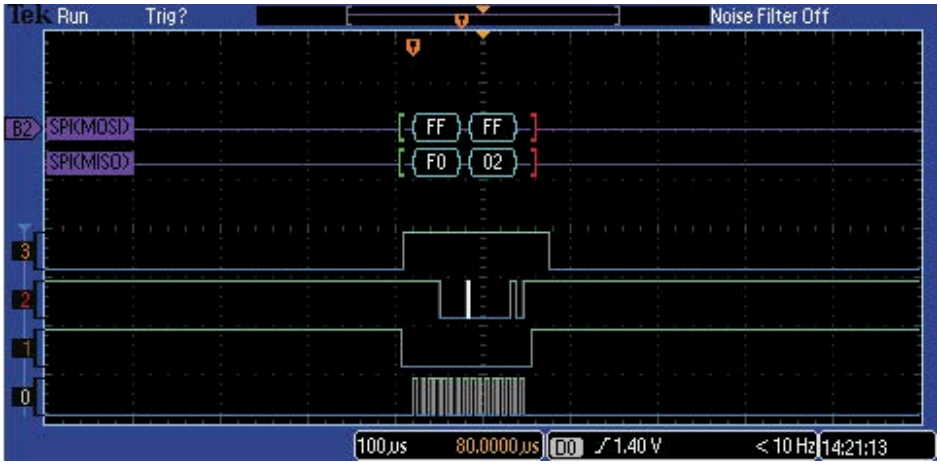

Figure 2

| Nr. | Parameter | Symbol | min | typ | max | Unit | Conditions |
|---|---|---|---|---|---|---|---|
| 1 | SCK to internal clock frequency ratio | $f_{SCK\_CLK}$ | | | $f_{CLK}/5$ | | $f_{SCK}$ must be 5 times smaller than $f_{CLK}$ |
| 2 | MISO hold time after SCK sample slope | $t_{SPI\_HD\_MISO}$ | 200 | | | ns | |
| 3 | MOSI setup time before SCK sample slope | $t_{SPI\_SU\_MISO}$ | $2/f_{CLK}$ | | | | |
| 4 | /SS setup time before SCK sample slope | $t_{SPI\_SU\_SS}$ | 10 | | | ns | |
| 5 | /SS hold time after SCK sample clk | $t_{SPI\_HD\_SS}$ | $1/ f_{SCK\_CLK}$ * | | | | |

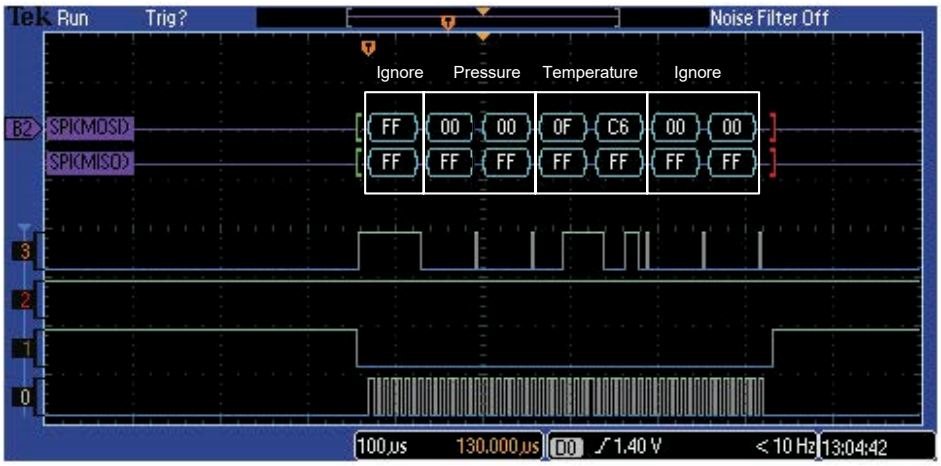
Figure 3

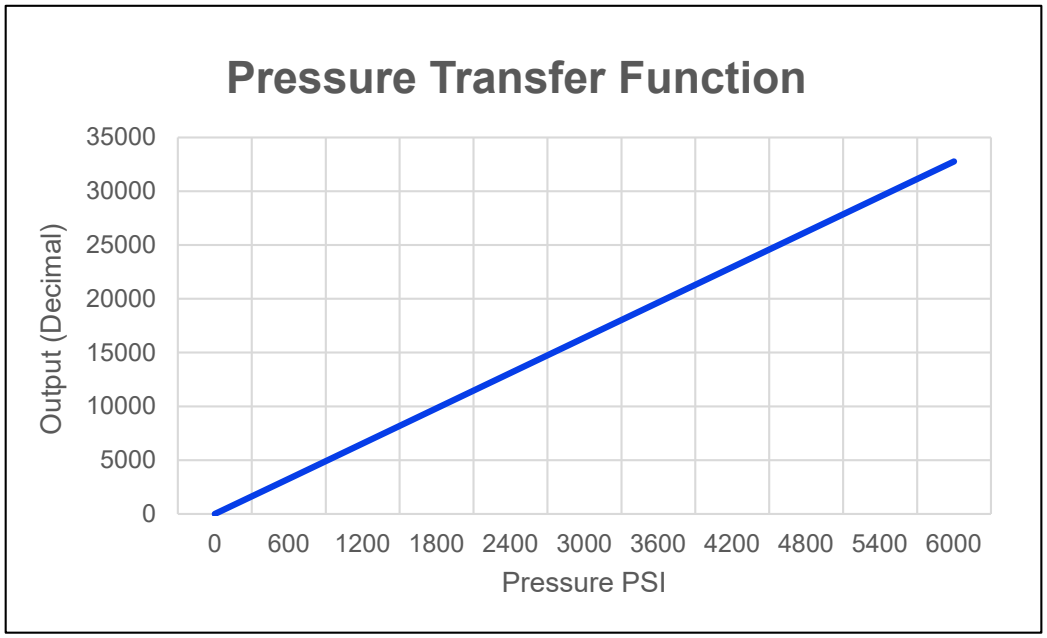
# Digital Interface - SPI

**Read Command**
F002 (address and read command) Sent from Master to Slave



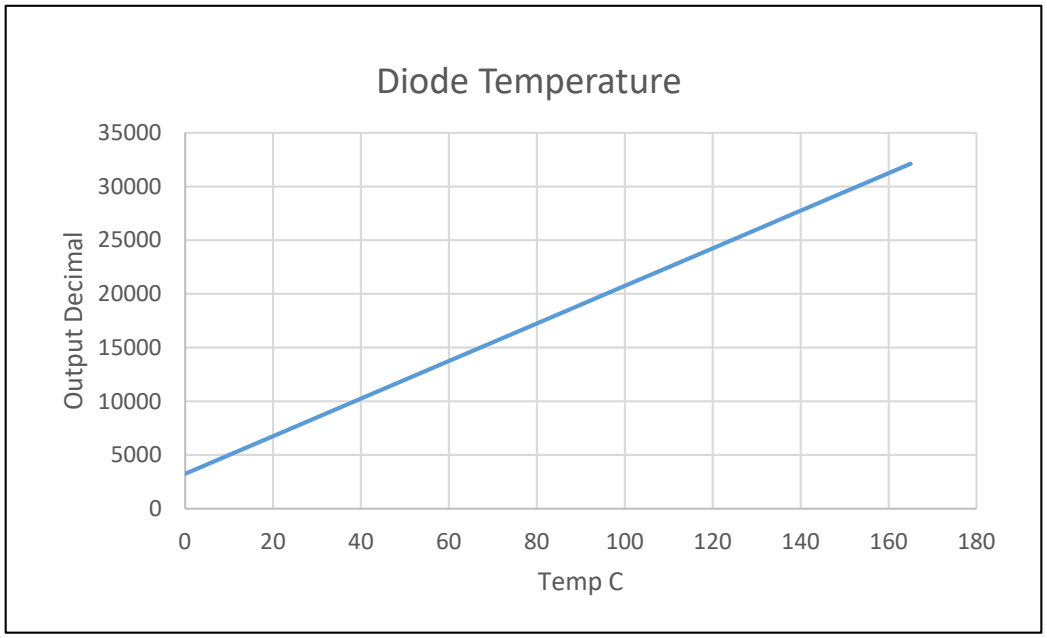

**Data Output**
CS/ (1) Pulled Low Starts Data Output





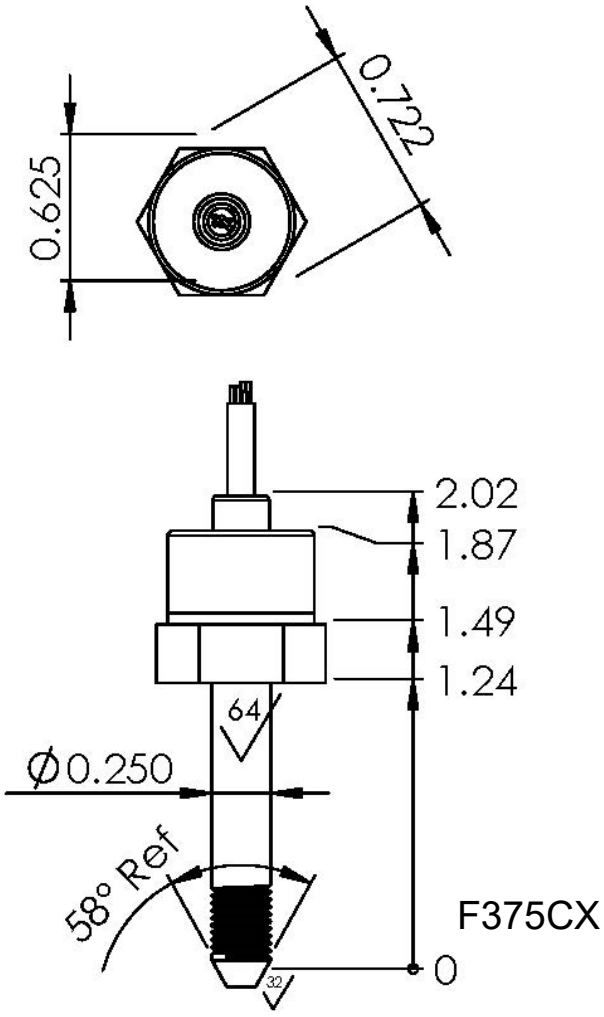

| PSI | | % Output | Decimal | Hex |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 x0000 |
| 600 | 1000 | 10 | 3277 | CCC |
| 1200 | 2000 | 20 | 6554 | 1999 |
| 1800 | 3000 | 30 | 9830 | 2666 |
| 2400 | 4000 | 40 | 13107 | 3333 |
| 3000 | 5000 | 50 | 16384 | 4000 |
| 3600 | 6000 | 60 | 19661 | 4CCC |
| 4200 | 7000 | 70 | 22938 | 5999 |
| 4800 | 8000 | 80 | 26214 | 6666 |
| 5400 | 9000 | 90 | 29491 | 7333 |
| 6000 | 10000 | 100 | 32768 | 8000 |

# Sensor Outputs




| Temp C | Decimal | Hex |
|---|---|---|
| 0 | 3250 | CB2 |
| 25 | 7625 | 1DC9 |
| 50 | 12000 | 2EE0 |
| 75 | 16375 | 3FF7 |
| 90 | 19000 | 4A38 |
| 100 | 20750 | 510E |
| 125 | 25125 | 6225 |
| 150 | 29500 | 733C |
| 165 | 32125 | 7D7D |

# Mechanical Dimensions (inches)

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