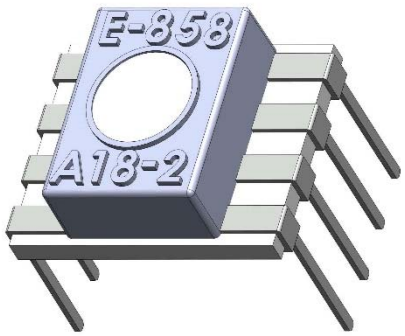
Altimeter/Barometric Pressure Sensor

APT45



- Absolute Pressure Sensor
- Temperature Measurement
- -25°C – 85°C Operating Temperature
- Compact Size – 8 Pin DIP
- ± 0.10% Linearity FS
- 14 Bit Digital Output – SPI
- Pressure Range: 525 – 825mm Hg
- Resolution: 0.018 mmHg
- Accuracy: ± 0.25mmHg
- Top Vent Hole with Moisture Barrier

DESCRIPTION

The APS45 is a barometric pressure sensor in a ceramic 8 pin package. This silicon pressure transducer was designed for barometric pressure applications.

The APT45 series utilizes MEMS piezo-resistive sensors pressurized on the passive backside of the absolute pressure die and is isolated from the substrate with an RTV for long term stability and accuracy.

Please contact the factory for Custom design availability.

APPLICATIONS

- Flow Meters
- Gas chromatography
- HVAC
- Pneumatic Controls
- Aviation
- Medical Equipment

Maximum Environmental Ratings

Operating Temperature ……..... -25°C to 85°C
Storage Temperature Range ……..-40°C to 100°C

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

Application Information

Package

The APT45 is housed in an 8 PIN ceramic package with DIP leads. The covers are ABS plastic.

Stability

The silicon MEMS absolute pressure sensor has a Pyrex base and is mounted to a ceramic base with RTV and is sealed with an ABS cover. The flexible die attach material helps reduce the mechanical stress which results in greater stability over time and temperature.

Additional stability is gained from factory stabilization of all sensors.

Pressure port

The APT45 has a top vent hole with a moisture barrier.

Media

Atmospheric air.

Wetted parts

The materials in contact with the air are RTV, epoxy, ceramic (Alumina) and Pyrex.

Mounting Recommendations

To reduce the mechanical hysteresis on the part, it is recommended to mount the part with an offset above the board. The recommended standoff id 0.100”.

Automated Oil/Gas Valves

Medical Equipment

APT45 Digital Output Operational Characteristics

V_+ = 5V, V_- = 0V, Temperature = 25°C

PARAMETER	SYMBOL	Min	Typ	Max	UNITS
Supply Voltage	V_{DD}	4.8	5	5.2	V
Operating Temperature	T_S	-25		85	ºC
Calibrated Temperature	Tc	-25		50	ºC
Supply Current (Note 1)	I_{DD}	70	120	2500	µA
Sleep Mode Supply Current	Istdby		0.5	32	µA
Accuracy					
Total Error Band		-0.17		0.17	%Full Scan
Non-Linearity (Note 2)		-0.1		0.1	%Full Scan
Temperature Error		-1		1	ºC
Response Time	t_R	1	2	20	ms
Analog-to-Digital					
Resolution			14 Bit		Full Scale
Temperature Resolution			0.1		ºC
I2C & 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	Csda @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

Electrical Pin Configuration (Digital [SPI])

Output	Pin1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
SPI	GND	V_{supply}	MISO	SCLK	SS	NC	NC	NC

Digital Interface – SPI

SPI is available only as half duplex (read-only from the APS72-4). The factory default is negative edge detect with a clock frequency of 4 MHz.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
SCLK clock frequency (4MHz clock)	f_{SCL}	50		800	kHz
SCLK clock frequency (1MHz clock)	f_{SCL}	50		200	kHz
SS drop to first clock edge	t_{HDSS}	2.5			µs
Minimum SCLK clock low width	t_{LOW}	0.6			µs[1]
Minimum SCLK clock high width	t_{HIGH}	0.6			µs[1]
Clock edge to data transition	t_{CLKD}	0		0.1	µs
Rise of SS relative to last clock edge	t_{SUSS}	0.1			µs
Bus free time between rise and fall of SS	t_{BUS}	2			µs

[1] *Combined low and high widths must equal or exceed minimum SCLK period.*

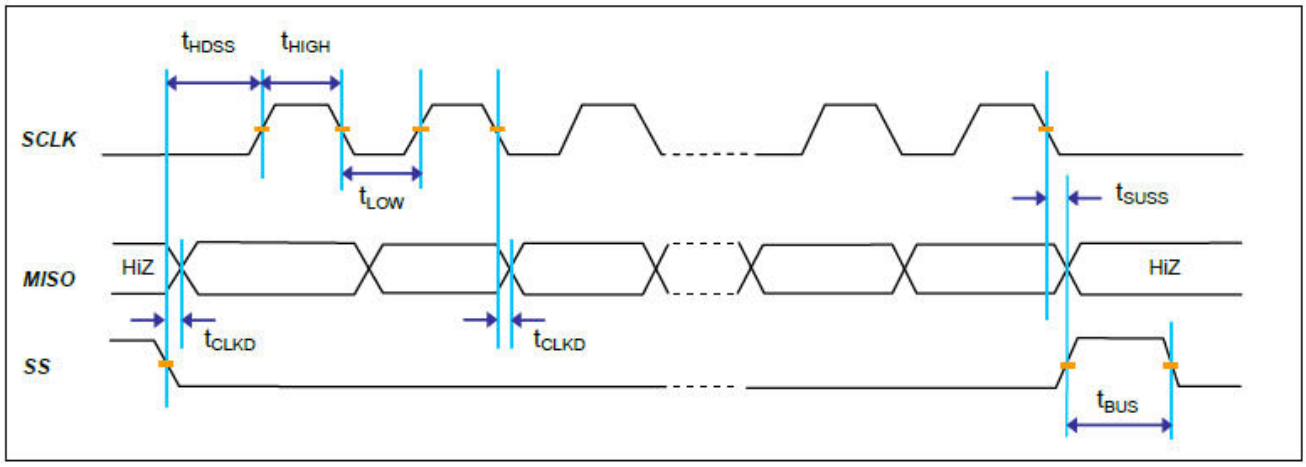


Figure 2

SPI Read

SPI Read Operations

For simplifying explanations and illustrations, only falling edge SPI polarity will be discussed in the following sections. The SPI interface will have data change after the falling edge of SCLK. The master should sample MISO on the rise of SCLK. The entire output packet is 4 bytes (32 bits). The high bridge data byte comes first, followed by the low bridge data byte. Then 11 bits of corrected temperature (T[10:0]) are sent: first the T[10:3] byte and then the {T[2:0],xxxxx} byte. The last 5 bits of the final byte are undetermined and should be masked off in the application. If the user only requires the corrected bridge value, the read can be terminated after the 2nd byte. If the corrected temperature is also required but only at an 8-bit resolution, the read can be terminated after the 3rd byte is read.

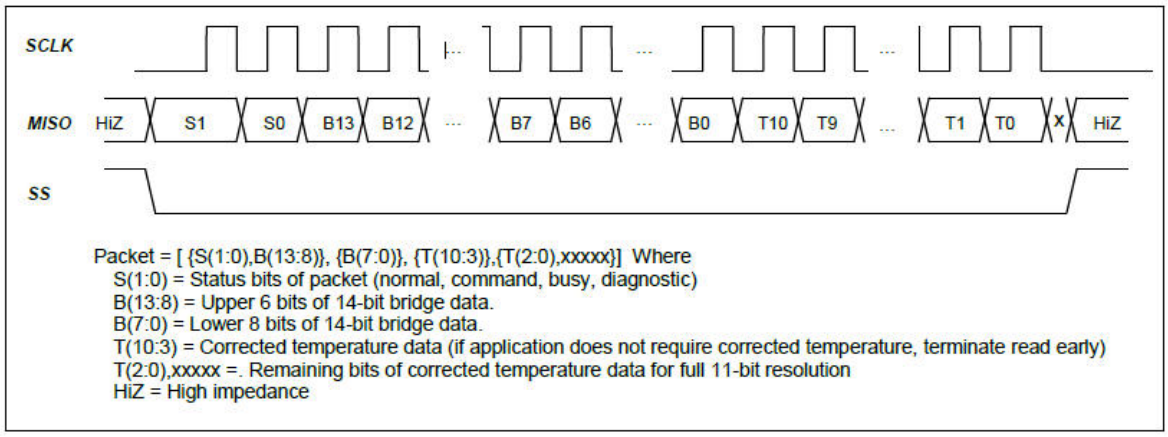


Figure 3

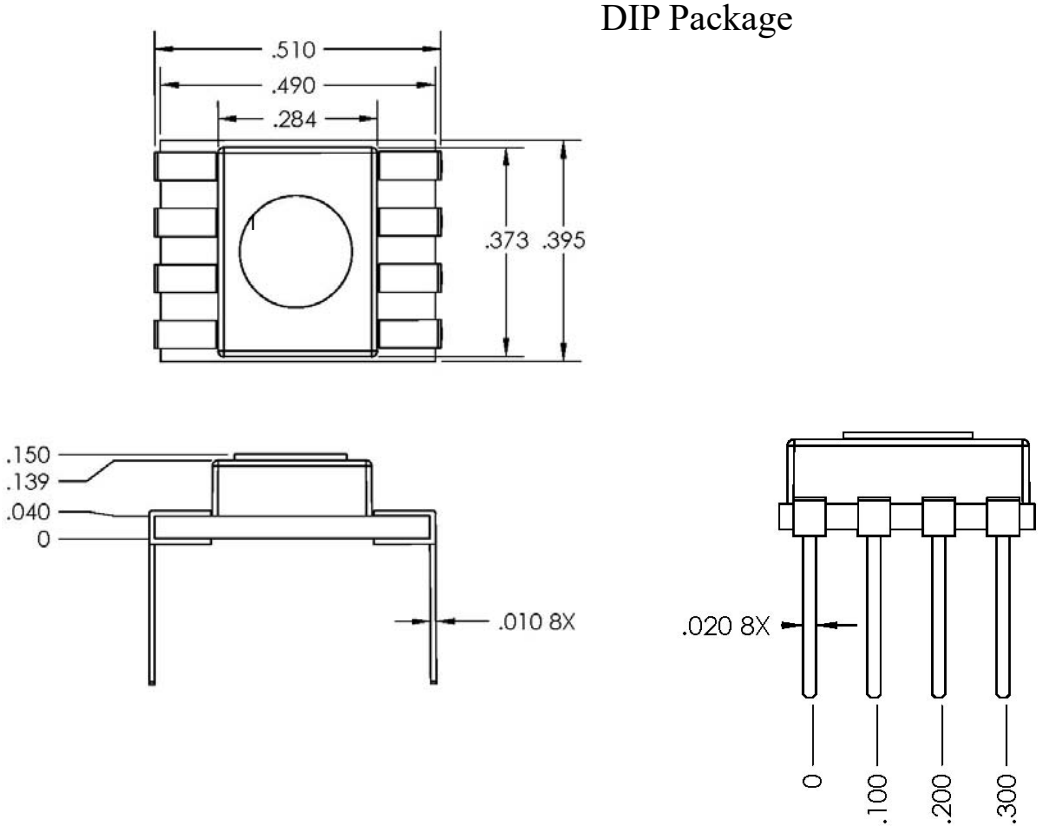
Digital Output - Transfer Function

Pressure Output			
% Output	mmHg	Decimal	Hex
0	525	0	0X0000
25	555	4095	0X0FFF
50	675	8191	0X1FFF
75	795	12287	0X2FFF
100	825	16383	0X3FFF

Temperature Output			
% Output	ºC	Decimal	Hex
0	-50	0	0X0000
25	0	512	0X0200
50	50	1024	0X0400
75	100	1536	0X0600
100	150	2048	0X0800

Mechanical Dimensions (inches)

DIP Package



Part Number Configuration

APT45