

Silicon Pressure Sensor Signal Conditioned, Temperature Compensated and Calibrated

The MCPAZ6115A series piezoresistive transducers are designed for a wide range of applications, but particularly those employing a microcontroller or microprocessor with A/D inputs. This transducer uses advanced micromachining techniques to Provide an accurate, high level analog output signal that is Proportional to the applied pressure. The axial port can accommodate industrial grade tubing.

Features

- ◆ Resistant to high humidity and common automotive media
- ◆ Improved accuracy at high temperature
- ◆ 1.5% maximum error over 0 °C to 85 °C
- ◆ Ideally suited for microprocessor or microcontroller-based systems
- ◆ Durable Thermoplastic (PPS) Surface Mount Packag
- ◆ Temperature compensated from -40 °C to +125 °C

MCPAZ6115A Series

15 to 115 kPa (2.18 to 16.68 psi)
0.2 to 4.7 V Output

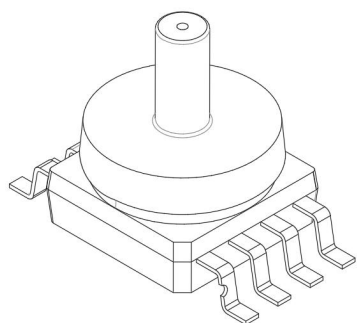
Application Examples

- ◆ Industrial controls
- ◆ Engine control/manifold absolute pressure (MAP)
- ◆ Weather station and weather reporting device barometers

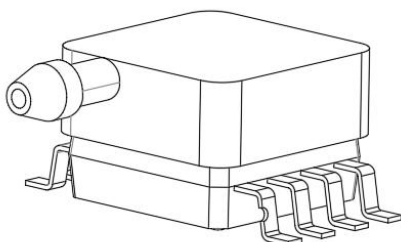
ORDERING INFORMATION

Device Name	# of Ports			Pressure Type			Device Marking
	None	Single	Dual	Gauge	Differential	Absolute	
Small Outline Package (MCPAZ6115A Series)							
MCPAZ6115AC6T1		●				●	MCPAZ6115A
MCPAZ6115AP		●				●	MCPAZ6115A
MCPAZ6115A6U	●					●	MCPAZ6115A

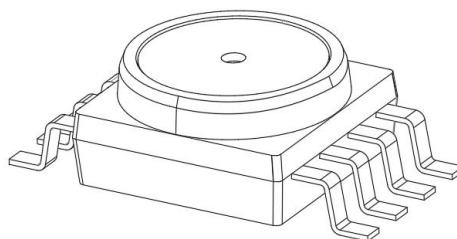
SMALL OUTLINE PACKAGES



MCPAZ6115AC6T1



MCPAZ6115AP



MCPAZ6115A6U

Operating Characteristics

Table 1. Operating Characteristics (VS = 5.0 Vdc, TA = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
Pressure Range	P _{OP}	15	—	115	kPa
Supply Voltage ⁽¹⁾	V _S	4.75	5.0	5.25	Vdc
Supply Current	I _o	—	2.5	10	mAdc
Minimum Pressure Offset ⁽²⁾ (0°C to 85°C) @ V _S = 5.0Volts	V _{off}	0.133	0.200	0.268	Vdc
Full Scale Output ⁽³⁾ (0°C to 85°C) @ V _S = 5.0Volts	V _{FSO}	4.633	4.700	4.768	Vdc
Full Scale Span ⁽⁴⁾ (0°C to 85°C) @ V _S = 5.0Volts	V _{FSS}	4.433	4.500	4.568	Vdc
Accuracy ⁽⁵⁾ (0°C to 85°C)	—	—	—	±1.5	%V _{FSS}
Sensitivity	V/P	—	45.0	—	mV/kPa
Response Time ⁽⁶⁾	t _R	—	2.0	—	ms

- Device is ratiometric within this specified excitation range.
- Offset (V_{off}) is defined as the output voltage at the minimum rated pressure.
- Full Scale Output (V_{FSO}) is defined as the output voltage at the maximum or full rated pressure.
- Full Scale Span (V_{FSS}) is defined as the algebraic difference between the output voltage at full rated pressure and the output voltage at the minimum rated pressure.
- Accuracy (error budget) consists of the following:
 - Linearity: Output deviation from a straight line relationship with pressure over the specified pressure range.
 - Temperature Hysteresis: Output deviation at any temperature within the operating temperature range, after the temperature is cycled to and from the minimum or maximum operating temperature points, with zero differential pressure applied.
 - Pressure Hysteresis: Output deviation at any pressure within the specified range, when this pressure is cycled to and from the minimum or maximum rated pressure, at 25°C.
 - TcSpan: Output deviation over the temperature range of 0° to 85°C, relative to 25°C.
 - TcOffset: Output deviation with minimum rated pressure applied, over the temperature range of 0° to 85°C, relative to 25°C.
- Response Time is defined as the time for the incremental change in the output to go from 10% to 90% of its final value when subjected to a specified step change in pressure.

Note: Plugged or unplugged with power may cause permanent damage.

Maximum Ratings

Table 2. Maximum Ratings⁽¹⁾

Rating	Symbol	Value	Unit
Maximum Pressure (P1 > P2)	$P_{\max}$	400	kPa
Storage Temperature	T_{stg}	-40 to +125	°C
Operating Temperature	T_A	-40 to +125	°C

- Exposure beyond the specified limits may cause permanent damage or degradation to the device.

Figure 1 shows a block diagram of the internal circuitry.

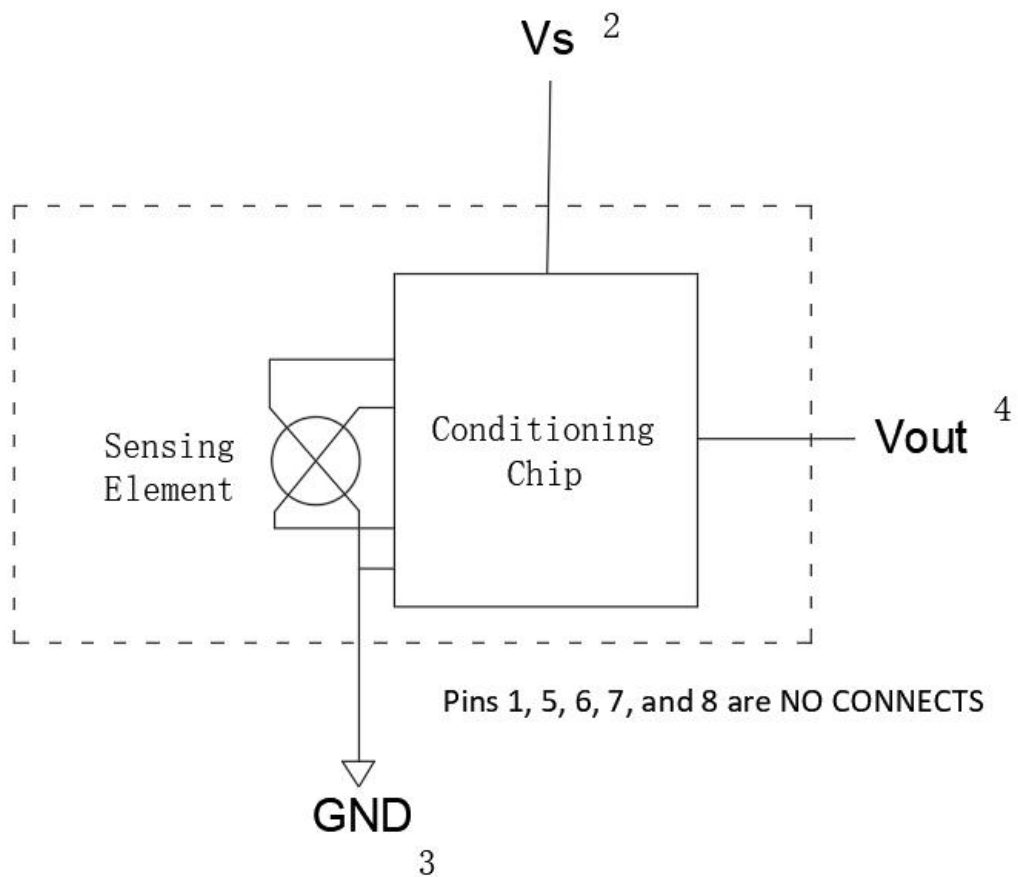


Figure 1. Pressure Sensor Schematic

TEMPERATURE COMPENSATION AND CALIBRATION

The performance over temperature is achieved by temperature compensation, calibration and signal conditioning circuitry.

A silicone gel isolates the die surface and wire bonds from the environment, while allowing the pressure signal to be transmitted to the sensor diaphragm.

The MCPAZ6115A series pressure sensor operating characteristics, and internal reliability and qualification tests are based on use of dry air as the pressure media. Media, other than dry air, may have adverse effects on sensor performance and long-term reliability. Contact the factory for information regarding media compatibility in your application.

Figure 2 shows the recommended decoupling circuit for interfacing the integrated sensor to the A/D input of a microprocessor or microcontroller. Proper decoupling of the power supply is recommended.

Figure 3 shows the sensor output signal relative to pressure input. Typical, minimum, and maximum output curves are shown for operation over a temperature range of 0° to 85°C using the decoupling circuit shown in Figure 2.

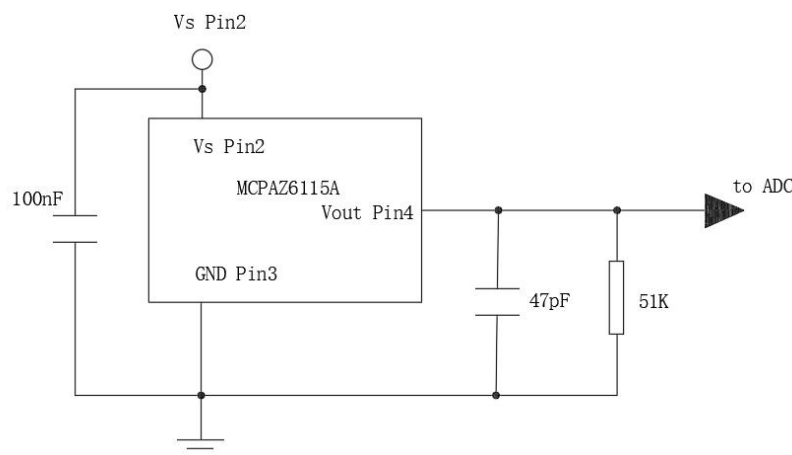


Figure 2. Recommended Power Supply Decoupling and Output Filtering

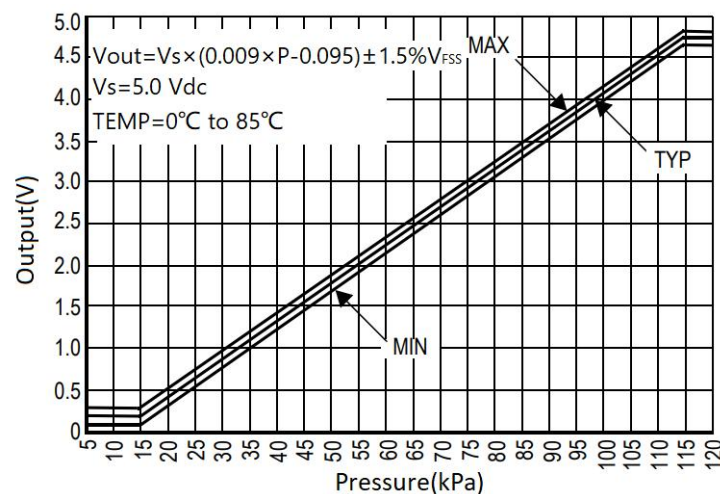


Figure 3. Output vs. Absolute Pressure

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the surface mount packages must be the correct size to ensure proper solder connection interface between the board and the package. With the correct footprint, the packages will self align when subjected to a solder reflow process. It is always recommended to design boards with a solder mask layer to avoid bridging and shorting between solder pads.

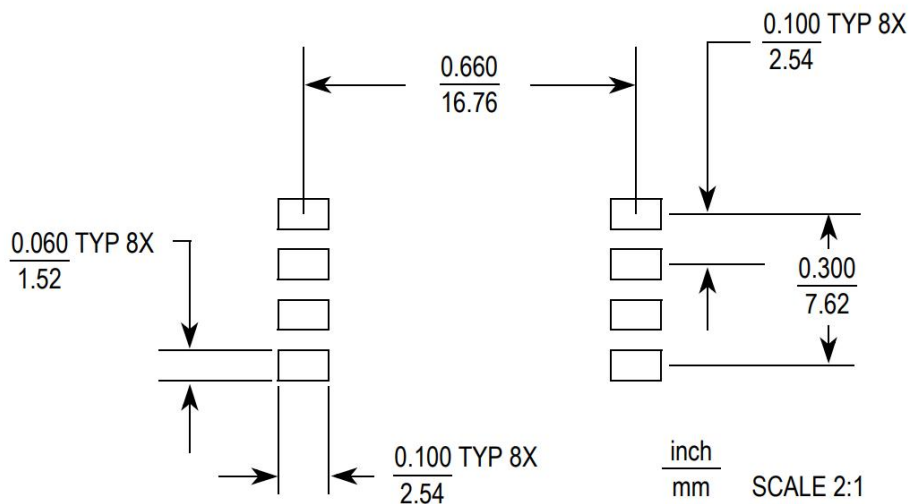
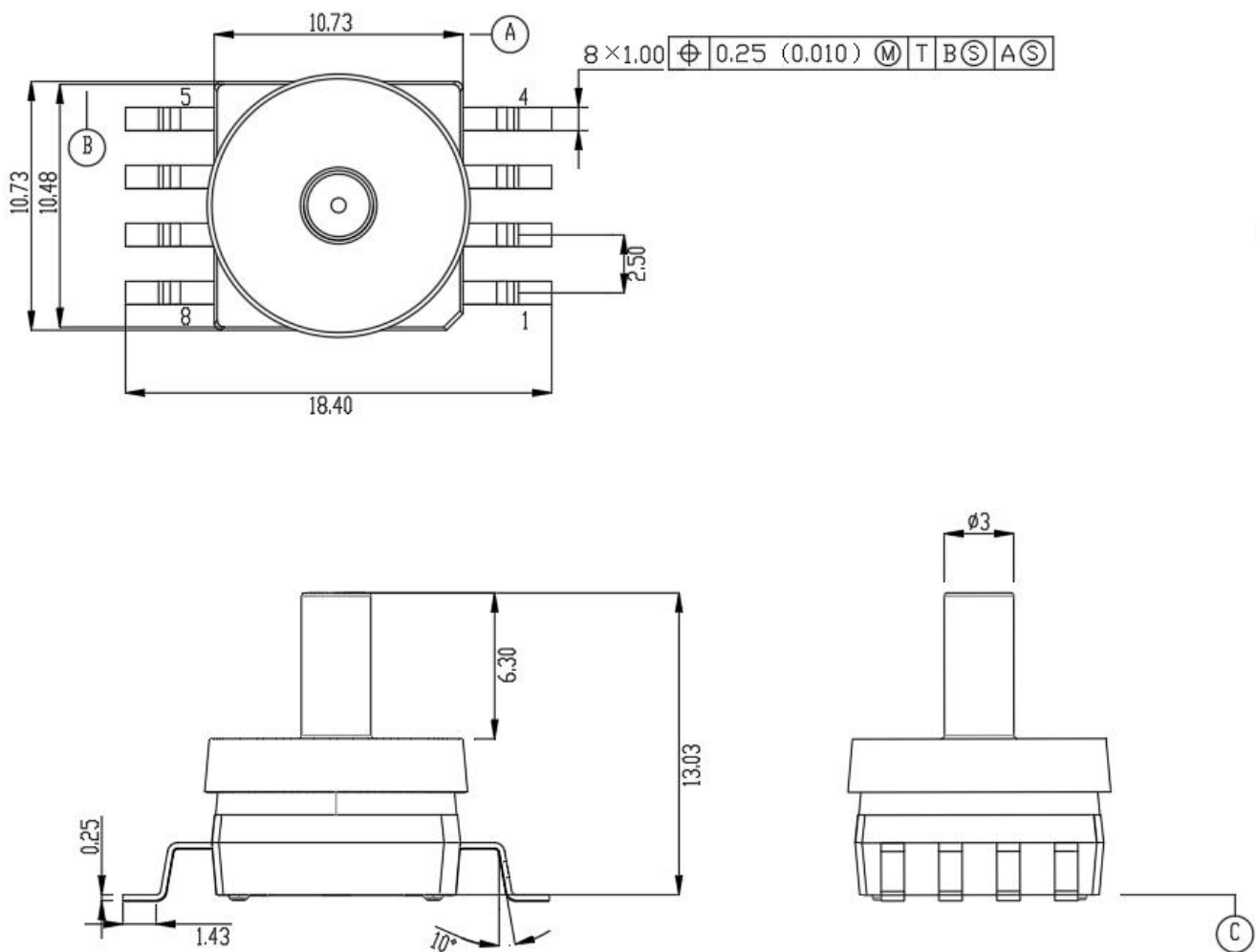
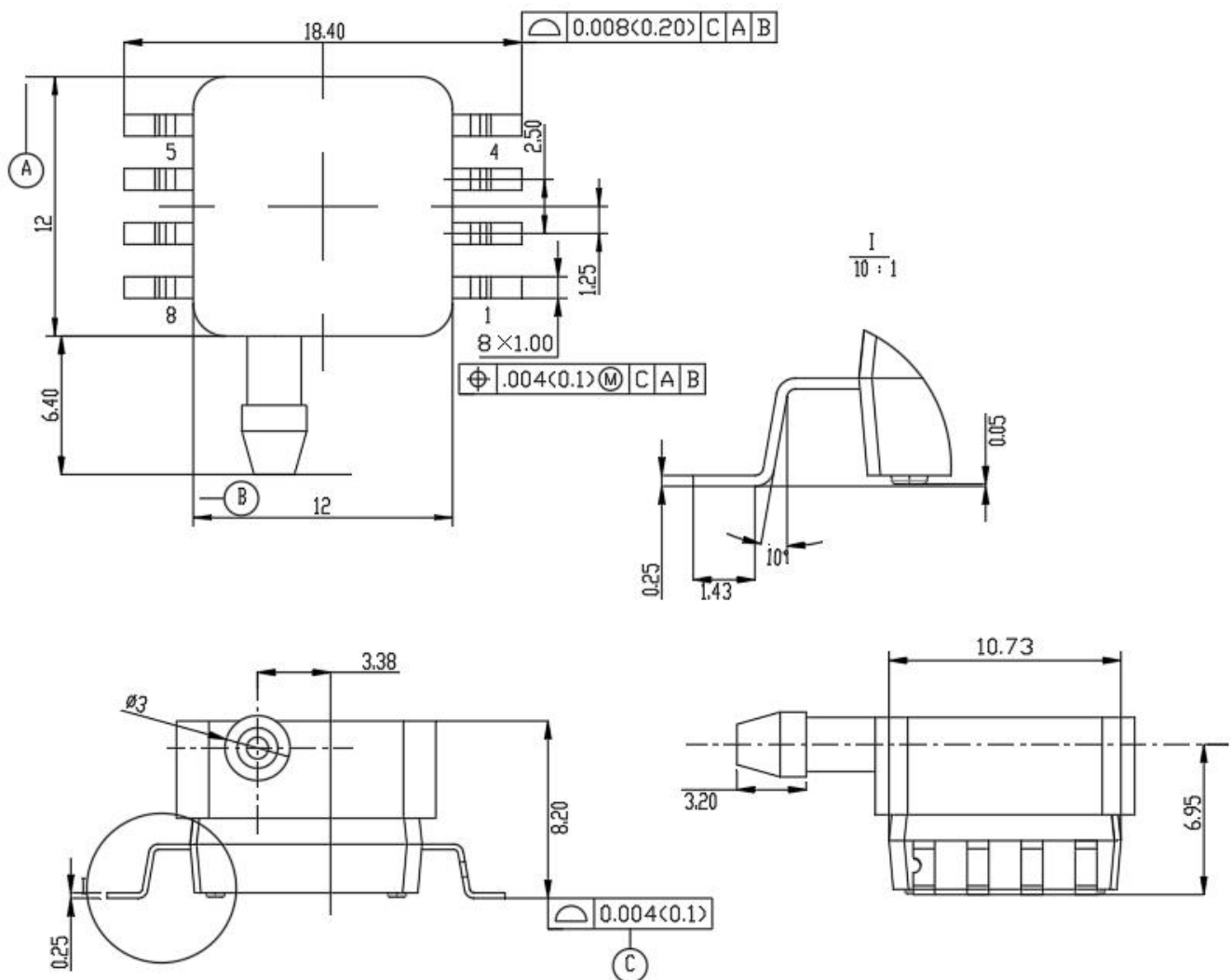


Figure 4. SOP Footprint

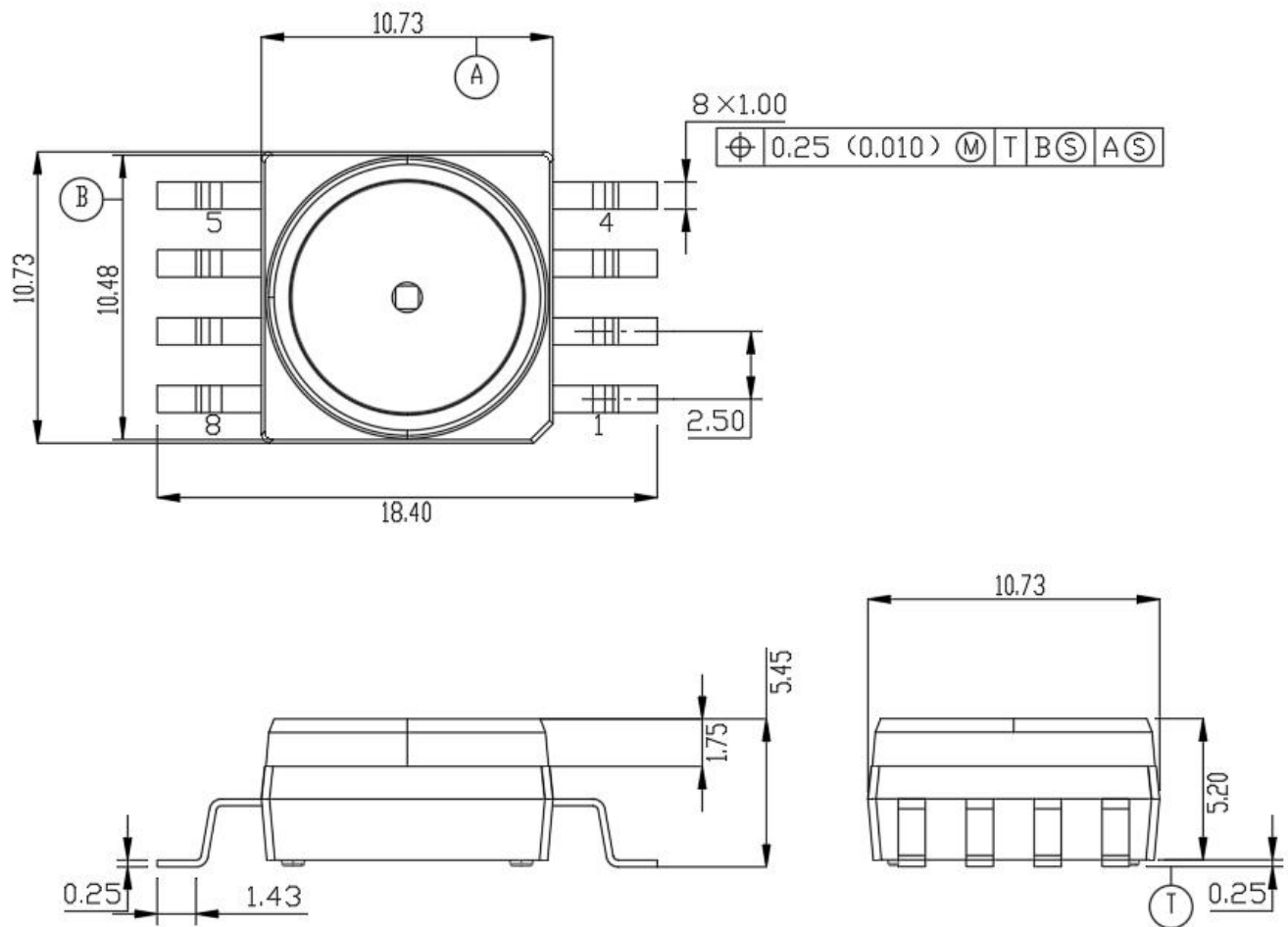
PACKAGE DIMENSIONS



MCPAZ6115AC6T1



MCPAZ6115AP



MCPAZ6115A6U