Integrated Silicon Pressure Sensor for Manifold Absolute Pressure,Altimeter or Barometer Applications Signal Conditioned,Temperature and Calibrated

MCPAZ4115A Series

15 to 115 kPa (2.18 to 16.7 psi)
0.2 to 4.8 V Output

The MCPAZ4115A series piezoresistive transducers provide high output signal and temperature compensation. The small form factor and high reliability of integration make this pressure sensor a logical and economical choice for the system designer.This transducer uses advanced micromachining techniques to provide an accurate, high level analog output signal that is proportional to the applied pressure.

Features

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

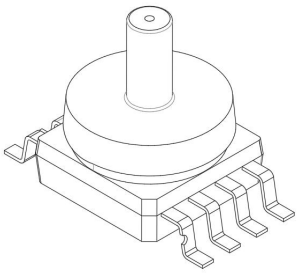
Application Examples

- Aviation Altimeters
- Industrial Controls
- Engine Control
- Weather Stations and Weather Reporting Devices

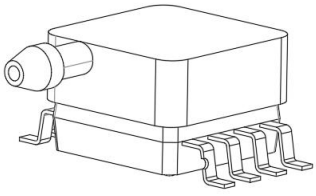
ORDERING INFORMATION

Device Name	# of Ports			Pressure Type			Device
	None	Single	Dual	Gauge	Differential	Absolute	
Small Outline Package (MCPAZ4115A Series)							
MCPAZ4115AC6U		•				•	MCPAZ4115A
MCPAZ4115A6U	•					•	MCPAZ4115A
MCPAZ4115AP		•				•	MCPAZ4115AP

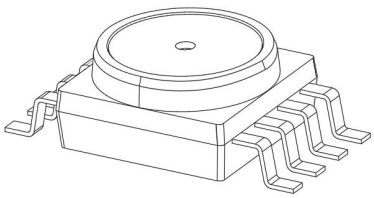
SMALL OUTLINE PACKAGES



MCPAZ4115AC6U



MXPAZ4115AP



MCPAZ4115A6U

Operating Characteristics

Table 1. Operating Characteristics (Vs = 5.1 Vdc, TA = 25°C unless otherwise noted, P1＞P2. Decoupling circuit shown in Figure 2 required to meet Electrical Specifications.)

Characteristics	Symbol	Min	Typ	Max	Unit
Pressure Range [1]	P_{OP}	15	—	115	kPa
Supply Voltage [2]	V_S	4.85	5.1	5.35	Vdc
Supply Current	I_o	—	2.5	10	mAdc
Minimum Pressure Offset [3] (0℃至85℃) @ V_S = 5.1Volts	V_{off}	0.135	0.204	0.273	Vdc
Full Scale Output[4] (0°C to 85°C) @ V_S = 5.1Volts	V_{FSO}	4.725	4.794	4.863	Vdc
Full Scale Span[5] (0°C to 85°C) @ V_S = 5.1Volts	V_{FSS}	4.521	4.590	4.659	Vdc
Accuracy[6] (0°C to 85°C)	—	—	—	±1.5	$\%V_{FSS}$
Sensitivity	V/P	—	45.9	—	mV/kPa
Response Time[7]	t_R	—	2.0	—	ms

1. 1.0kPa is equal to 0.145 psi.
2. Device is ratiometric within this specified excitation range.
3. Offset (Voff) is defined as the output voltage at the minimum rated pressure.
4. Full Scale Output (V_{FSO}) is defined as the output voltage at the maximum or full rated pressure.
5. 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.
6. 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.
7. 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(NOTE)

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

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

Figure 1 shows a block diagram of the internal circuitry.

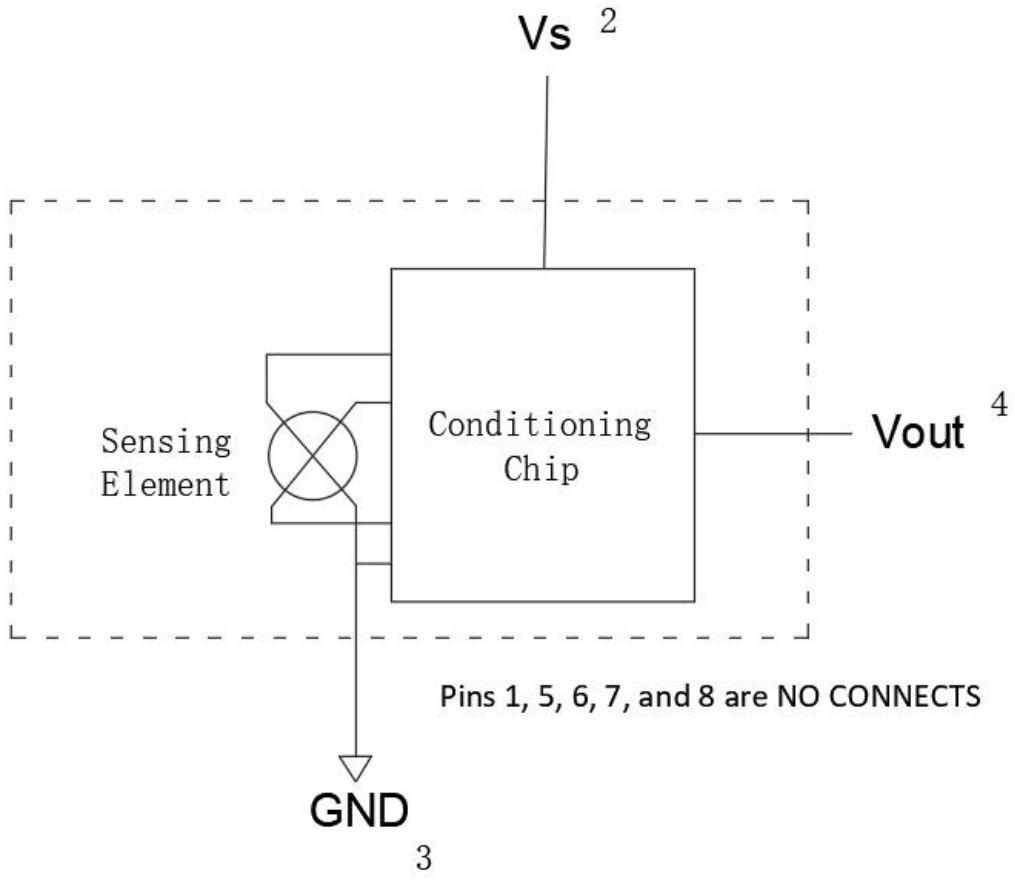


Figure 1. Pressure Sensor Schematic

TEMPERATURE COMPENSATION AND CALIBRATION

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

Figure 3 shows the sensor output signal relative to pres sure 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.

A gel die coat isolates the die surface and wire bonds from the environment, while allowing the pressure signal to be transmitted to the sensor diaphragm. The gel die coat and durable polymer package provide a media resis tant barrier that allows the sensor to operate reliably in high humidity conditions as well as environments contain ing common automotive media. Contact the factory for more information regarding media compatibility in your specific application.

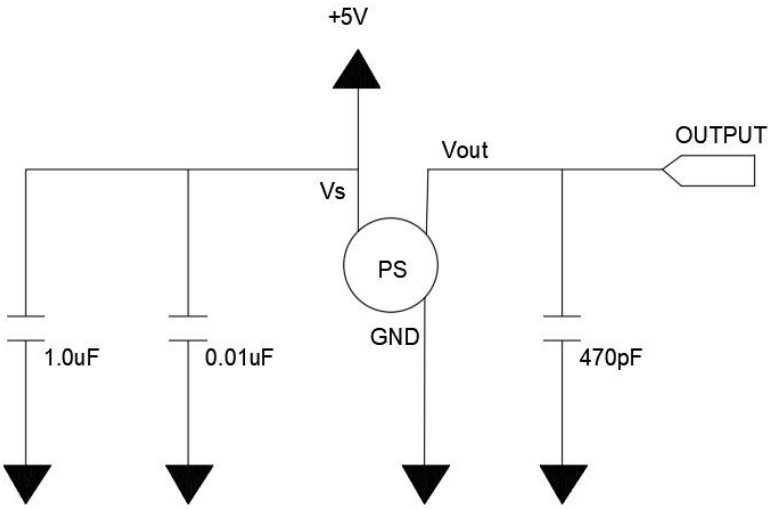


Figure 2. Recommended power supply decoupling and output filtering

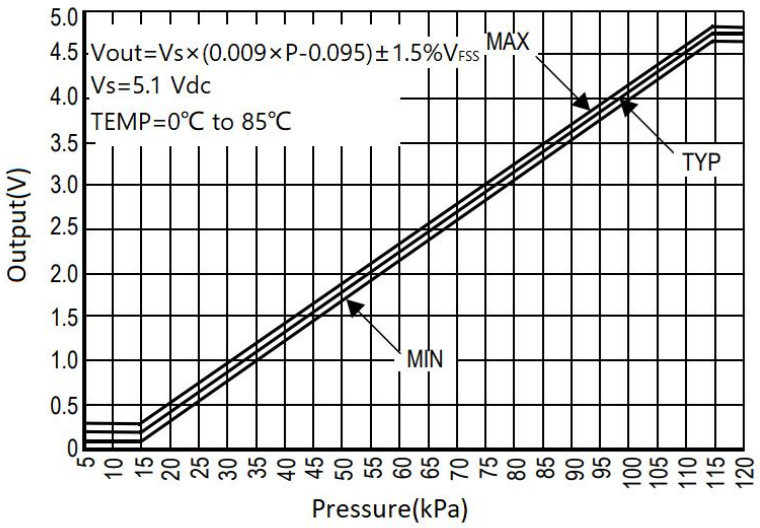


Figure 3. Output vs. Absolute Pressure

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.

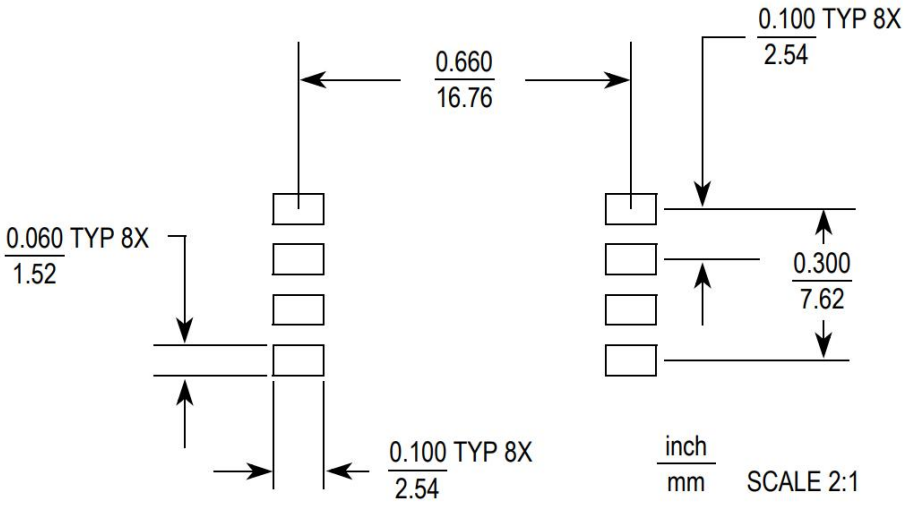
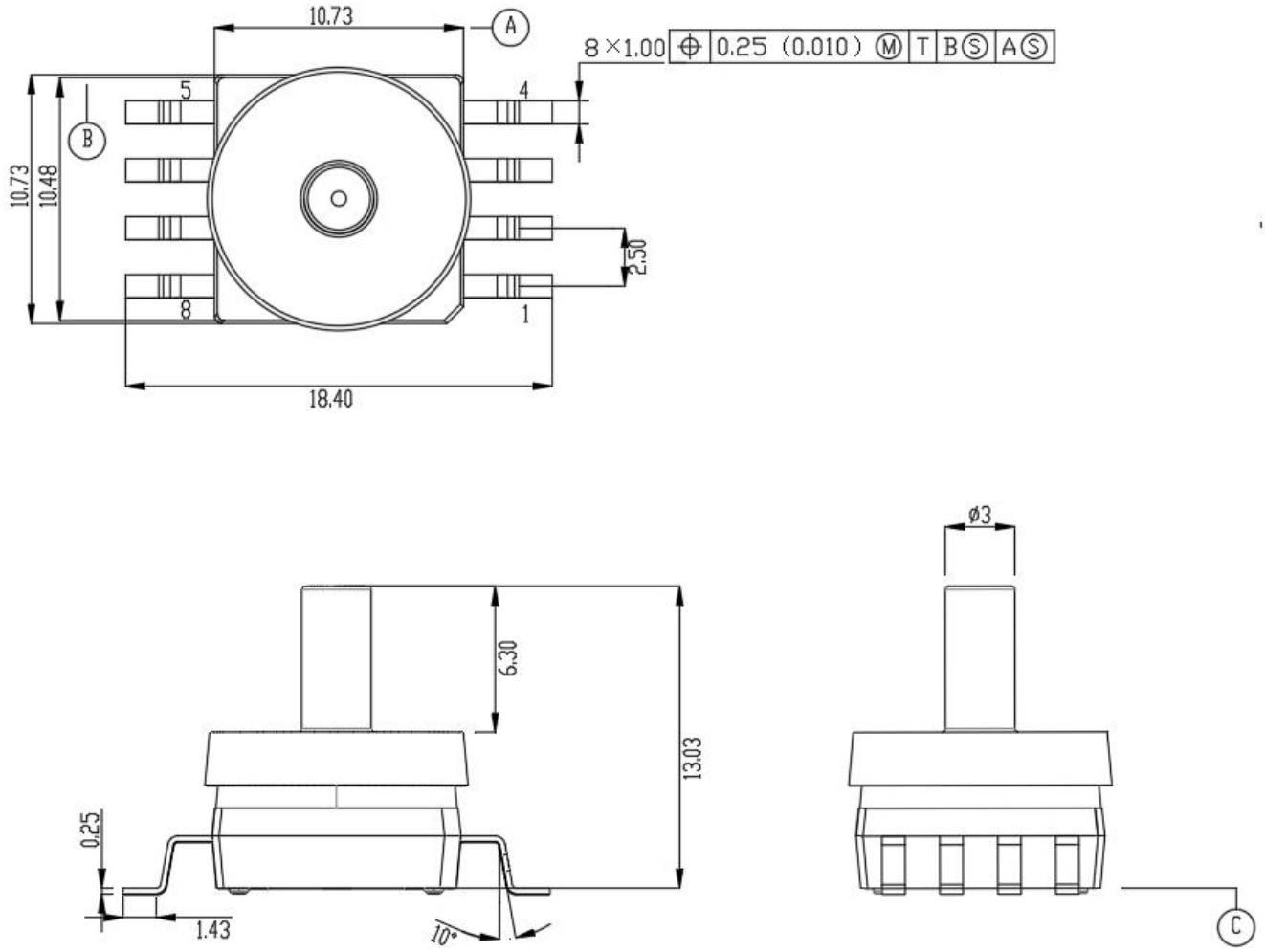
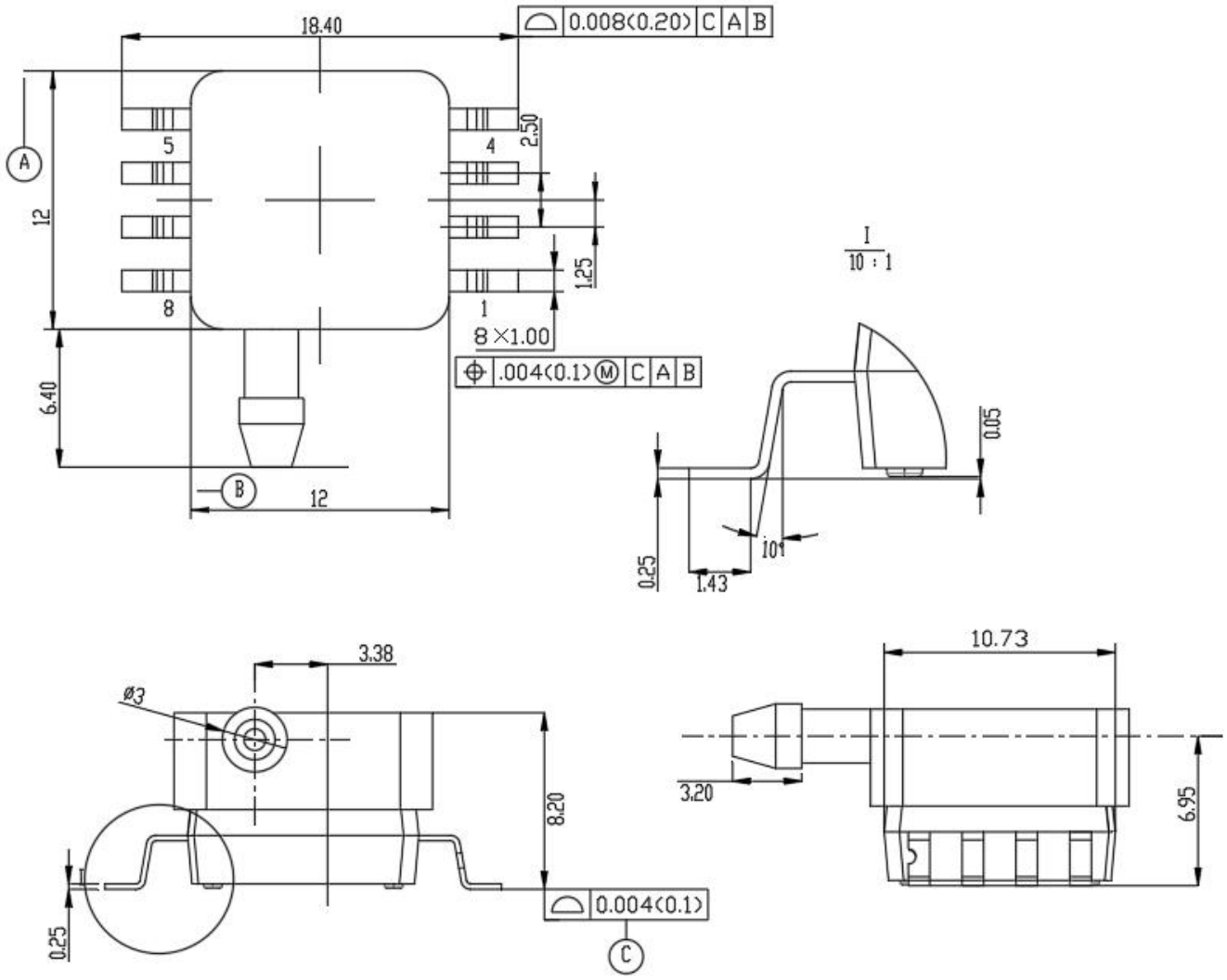


Figure 4. SOP Footprint

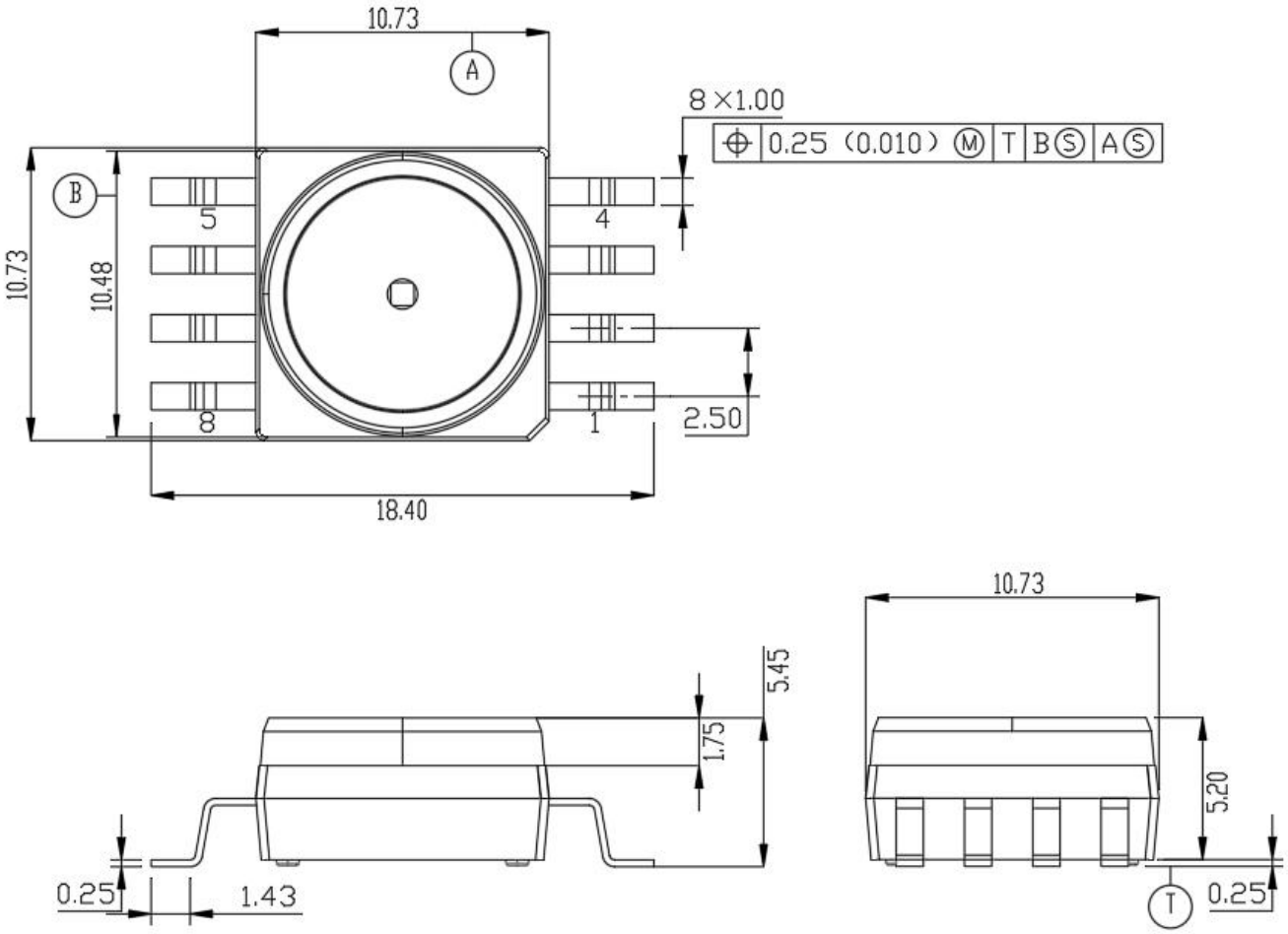
PACKAGE DIMENSIONS



MCPAZ4115AC6U



MCPAZ4115AP



MCPAZ4115A6U