Integrated silicon pressure sensor

Signal conditioning, temperature compensation, and

MCP 3V 5050 Series

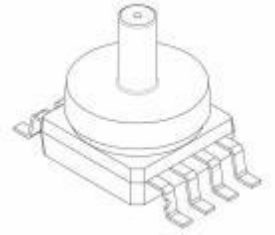
0 to 50 kPa (0 to 7.25 psi) 0.12 to 2.82 V output

characteristic

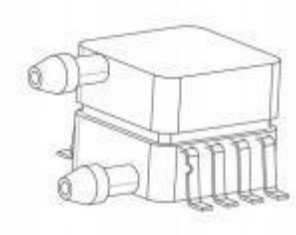
Order 0° C to 85° C with a maximum error of 2.5%
Make it very suitable for microprocessors or microcontroller-based systems
Enable durable epoxy integrated and thermoplastic (PPS) surface mount packaging
Order-40°C to + 125°C for temperature compensation

Order information							
Sensor model	Number of ports			Pressure type			Bidding content
	not have	one	two	gage pressure	differential pressure	Absolute pressure	
SOP Package (MCPV 5050 Series)							
MCP 3V 5050GC 6U		•		•			MCP 3V 5050G
MCP 3V 5050DP			•		•		MCP 3V 5050DP
MCP 3V 5050GP		•		•			MCP 3V 5050GP

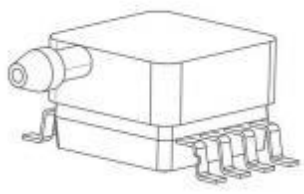
SOP package



MCP 3V 5050GC 6U



MCP 3V 5050DP



MCP 3V 5050GP

performance characteristics

Table 1. Operating characteristics (VS = 3.0 Vdc, TA = 25° C unless otherwise specified, P 1> P 2)

characteristic	sign	least value	representative value	crest value	unit
pressure limit	P_{OP}	0	—	50	kP a
service voltage(1)	Vs	2.7	3.0	3.3	V dc
supply current	I_o	—	—	10	m A dc
Minimum pressure output(2) (0℃ to 85℃) @ VS= 5.0V	V_{off}	0.053	0. 12	0. 188	V dc
Full range output(3) (0℃ to 85℃) @ VS= 5.0V	V_{FSO}	2.752	2.82	2.888	V dc
Full range(4) (0℃ to 85℃) @VS= 5.0V	V_{FSS}	—	2.7	—	V dc
accuracy(5) (0℃ to 85℃)	—	—	—	±2.5	% V FSS
sensitivity	V /P	—	54	—	mV /kPa
response time(6)	t_R	—	2.0	—	m s

1. The sensor is a proportional output in this supply voltage range.2. offset (Voff) Is defined as the output voltage at the minimum rated pressure.3. Full range output (VFSO) Is defined as the output voltage at the maximum or fully rated pressure.4. Full range span (VFSS) Is defined as the algebraic difference between the output voltage at the full rated pressure and the output voltage at the minimum rated pressure.5. Accuracy (error) includes the following contents:

Lineity: the deviation of the output from the pressure line within the specified pressure range.

Temperature hysteresis: output deviation at any temperature after applying zero pressure temperature difference in the operating temperature range. Pressure lag: Output deviation at any pressure within a specified range at 25° C after experiencing a pressure cycle from minimum to maximum rated pressure. TcSpan: Output deviation relative to the temperature range of 25° C, 0° C to 85° C.

TcOffset: Output deviation when applying minimum rated pressure from 25° C from 0° C to 85° C. Nominal deviation: at 25° C, the nominal deviation value of zero or full range accounts for VFSSPercentage of.

6. Response time is defined as the time when the output increases from 10% of its final value to 90% of the time when the pressure has a specified step change.

Note: The sensor cannot be hot and unplugged.

nominal parameter

Table 2. Rated[1] parameters

parameter	sign	price	unit
Maximum pressure (P 1> P 2)	Pma x	200	kP a
Storage temperature	Tstg	–40 to +125	°C
working temperature	TA	–40 to +125	°C

1. Exposure to the environment exceeding the specified limit may cause permanent damage or degradation of the sensor.

Figure 1 shows a block diagram of the internal circuit of the pressure sensor

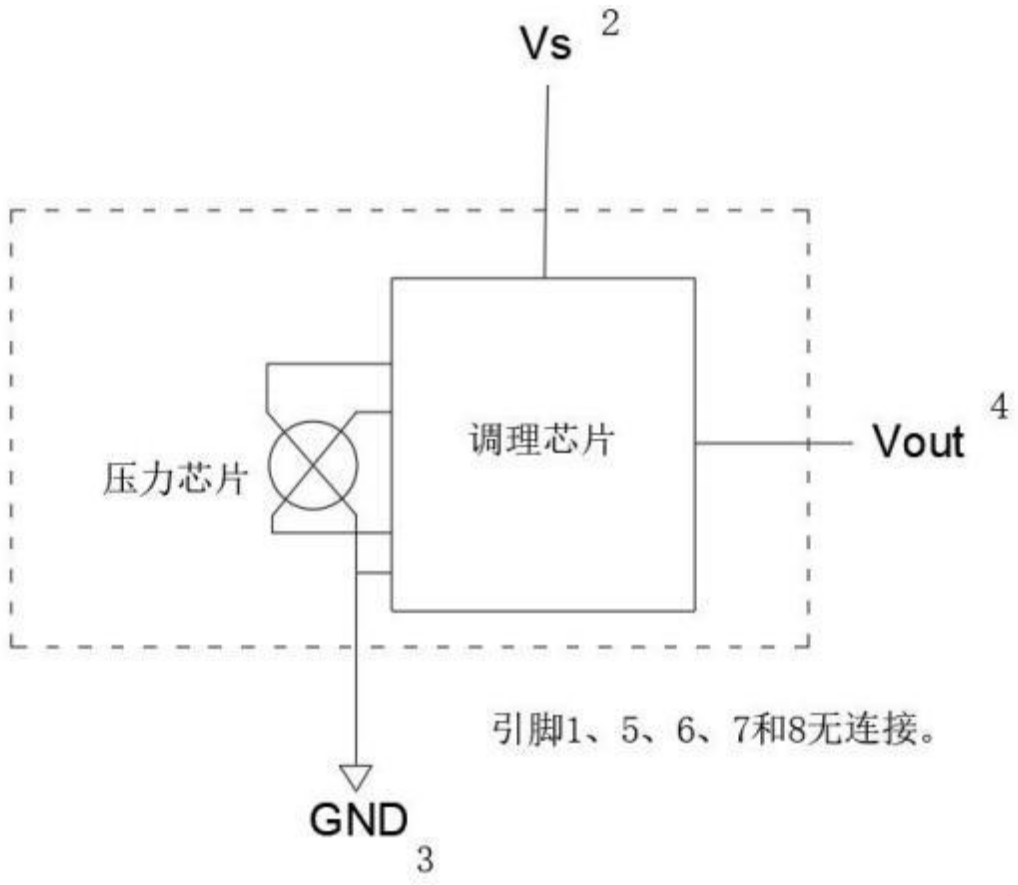


Figure 1. Block diagram of the pressure sensor

Temperature compensation and calibration

The temperature performance of the sensor is achieved through temperature compensation, calibration, and signal processing.

The silicon gel separates the chip surface and gold wire from the environment while allowing the pressure signal to the sensor diaphragm.

The operating characteristics, internal reliability and qualification testing of the MCP 3V 5050 series pressure sensors are based on the use of dry air as the pressure medium. Media other than dry air may adversely affect sensor performance and long-term reliability. Contact the factory for the medium compatibility in the application.

Figure 2 shows the recommended decoupling circuit connecting the sensor to the A / D input to the microprocessor or microcontroller.

Figure 3 shows the sensor output signal relative to the input pressure. Typical, minimum, and maximum output curves operating in the temperature range from 00 C to 850 C using the decoupling circuit shown in Figure 2.

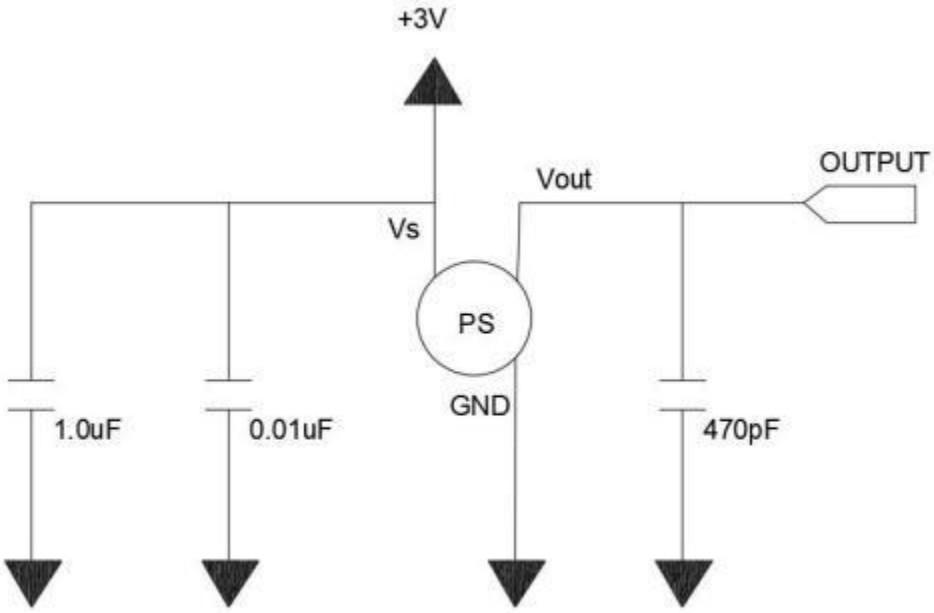
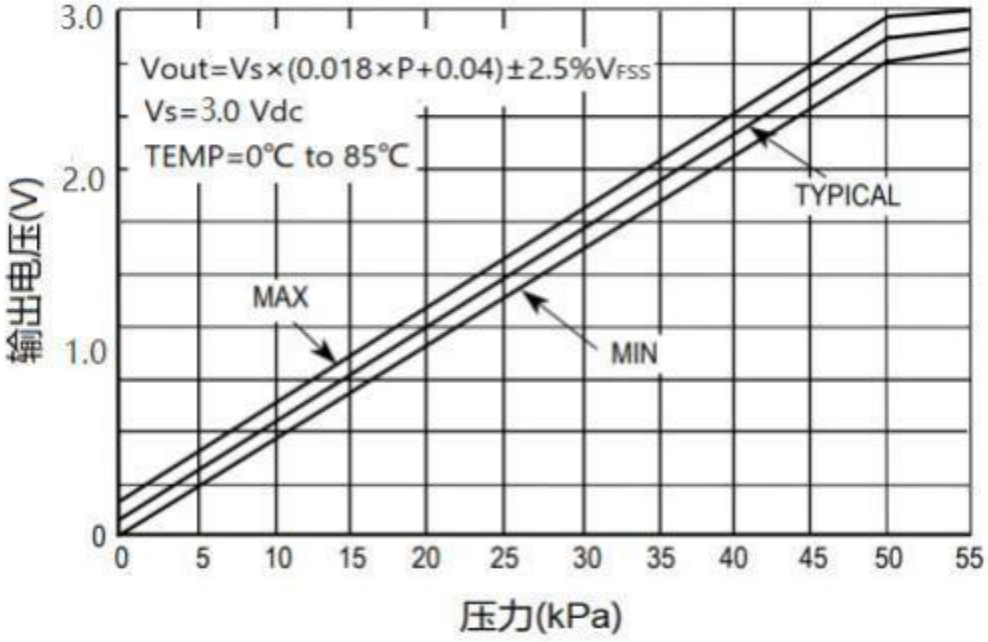


Figure Figure 22 shows the recommended decoupling and filtering circuit

Figure 3. Output voltage vs. input pressure


Vout=Vs×(0.018×P+0.04)±2.5%VFSS
Vs=3.0 Vdc
TEMP=0℃ to 85℃
TYPICAL
MAX
MIN
输出电压(V)
压力(kPa)
3.0
2.0
1.0
0
0
5
10
15
20
25
30
35
40
45
50
55

Pressure (P 1) side / vacuum (P 2) side identification table

The two sides of the pressure sensor are named as pressure (P 1) side and vacuum (P 2) side respectively. Pressure (P 1) has silicon gel on the side to protect the chip from harsh media. The pressure sensor is designed to work under a positive pressure difference, P 1> P 2.

The pressure (P 1) side can be identified by using the following table:

Sensor model	Pressure (P 1) side recognition
MCP 3V 5050GC 6U	Side with port
MCP 3V 5050DP	Tagged side
MCP 3V 5050GP	Side with port

Recommended minimum package size for the surface mount application

The surface mounting plate layout is a key part of the whole design. The surface mount pad must be of the correct dimensions to ensure the correct welding connection between the circuit board and the sensor. The correct pad size during reflow welding makes the sensor self-aligned. It is recommended to design circuit boards with weld resistance layers to avoid bridging and short circuits between pads.

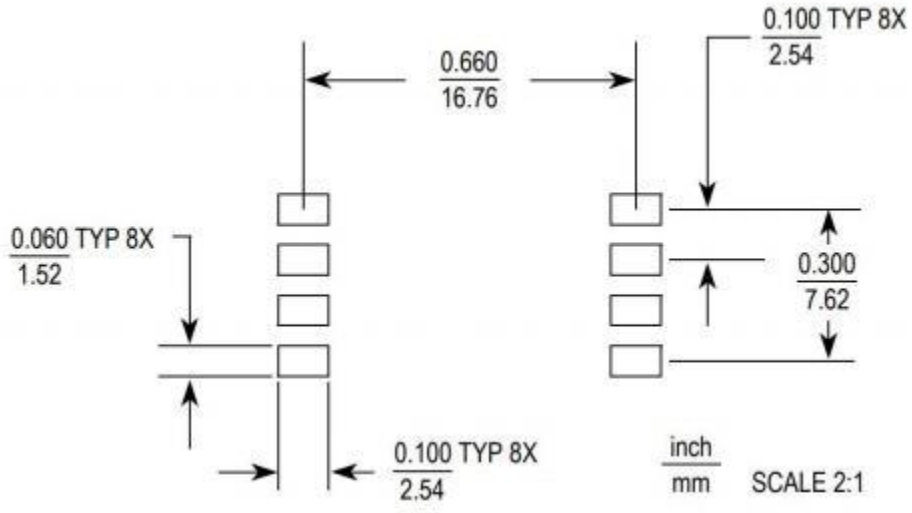
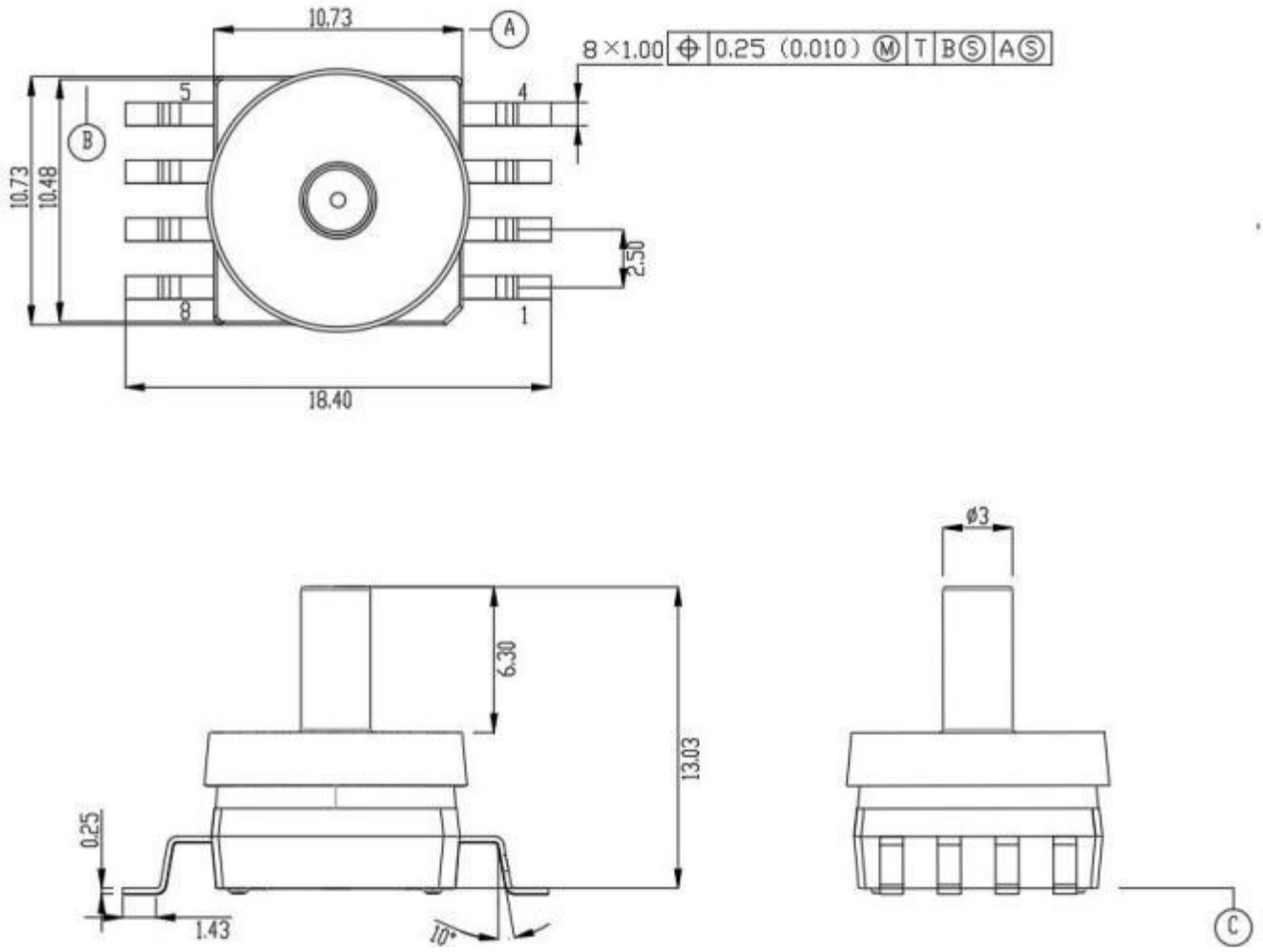
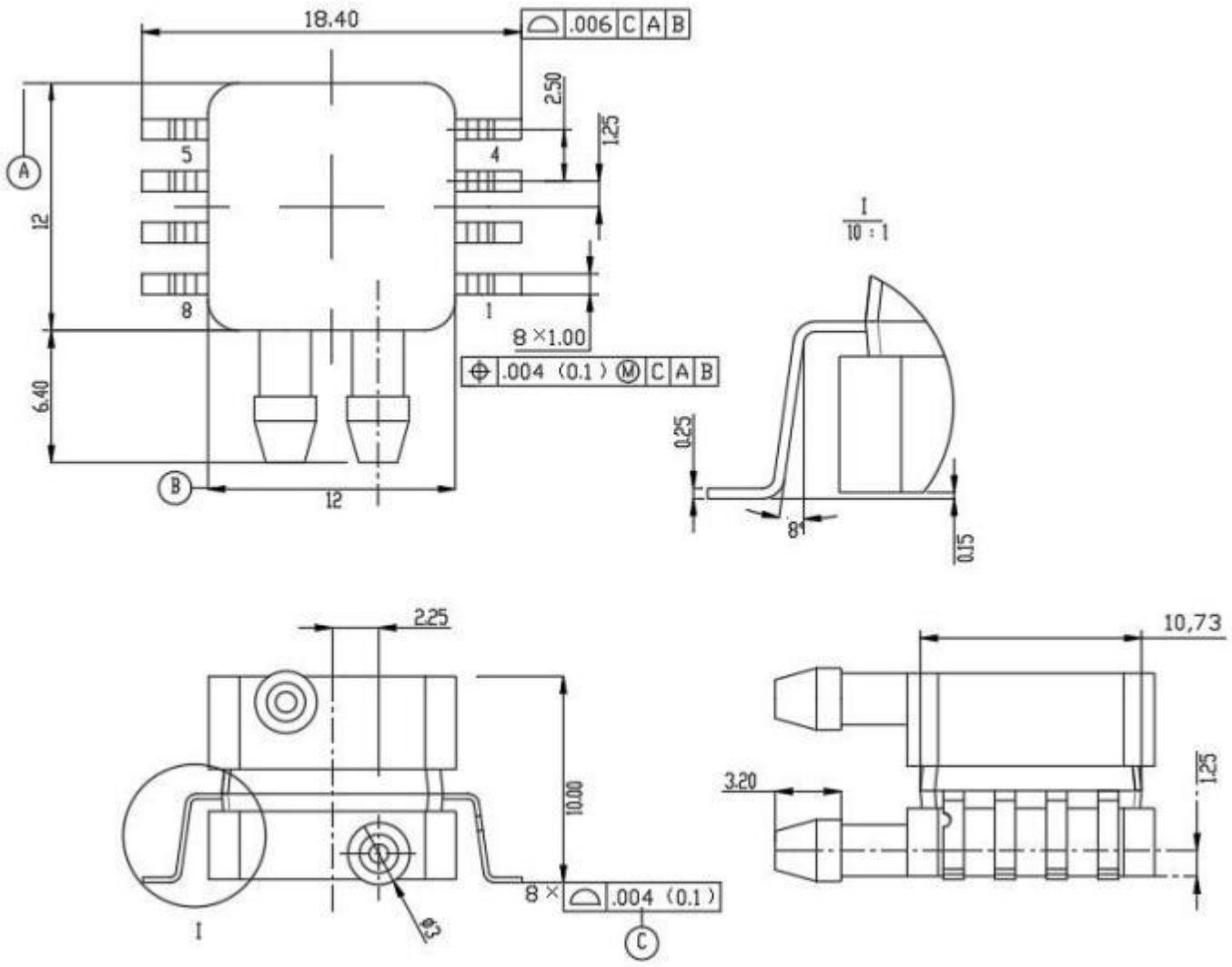


Figure 4 SOP Del Size

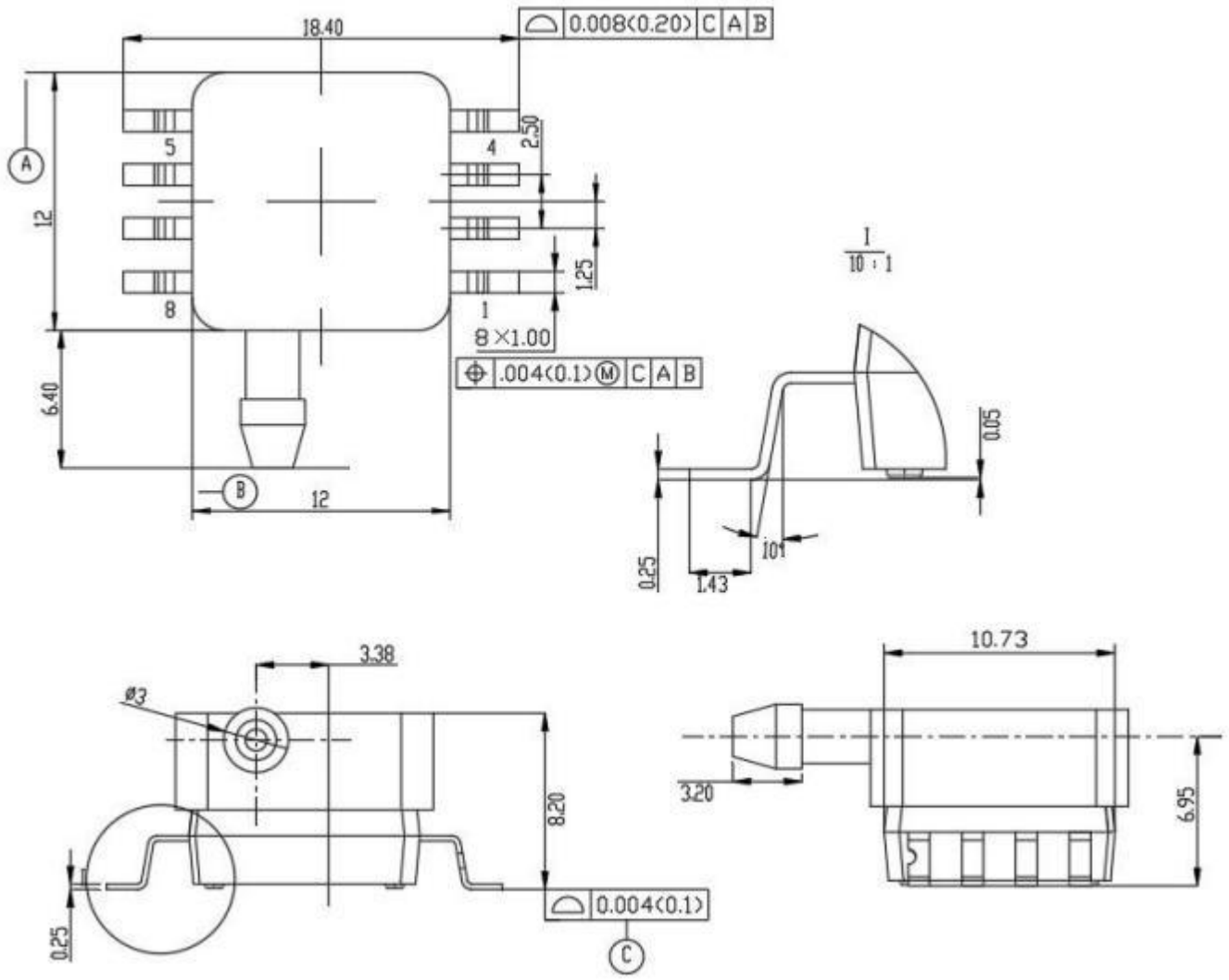
Package size



MCP 3V 5050GC 6U



MCP 3V 5050DP



MCP 3V 5050GP