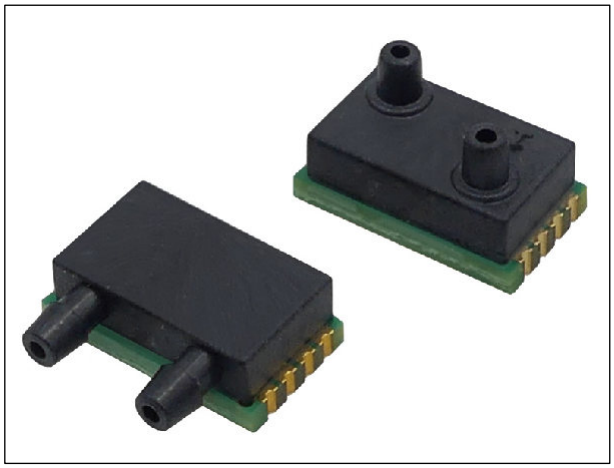
ASTE Series

Digital pressure sensors

PRELIMINARY

FEATURES

- Pressure ranges from 1 mbar to 10 bar
- Wide supply voltage range
- Ratiometric voltage output
- Digital I²C or SPI output
- 16 bit A/D resolution
- Outstanding offset stability
- Small footprint, low profile
- Pressure ports for direct manifold assemblies



SERVICE

Wetted materials:
Pressure port P1: silicon, RTV, ceramics Al_2O_3, Pyrex, LCP plastics
Pressure port P2: silicon, RTV, ceramics Al_2O_3, Pyrex, epoxy, FR4

SPECIFICATIONS

Maximum Ratings

Supply voltage	3.0...5.5 V_S

Lead Specifications

Average preheating temp. gradient	2.5 K/s
Soak time	approx. 3 min.
Time above 217 °C	50 s
Time above 230 °C	40 s
Time above 250 °C	15 s
Peak temperature	260 °C
Cooling temp. gradient	-3.5 K/s

Temperature ranges

Storage	-40...125 °C
Operating	-25...85 °C
Compensated	0...70 °C

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PRESSURE SENSOR CHARACTERISTICS

Part Number	Operating Pressure	Over Pressure[1]	Burst Pressure[2]
ASTE-M001	1 mbar	100 mbar	150 mbar
ASTE-MF02	2.5 mbar	100 mbar	150 mbar
ASTE-M005	5 mbar	150 mbar	200 mbar
ASTE-M010	10 mbar	150 mbar	200 mbar
ASTE-M020	20 mbar	200 mbar	300 mbar
ASTE-M050	50 mbar	500 mbar	750 mbar
ASTE-M100	100 mbar	1 bar	1.5 bar
ASTE-M350	350 mbar	1 bar	1.7 bar
ASTE-B001	1 bar	3 bar	5 bar
ASTE-B002	2 bar	6 bar	10 bar
ASTE-B005	5 bar	15 bar	25 bar
ASTE-B007	7 bar	21 bar	25 bar
ASTE-B010	10 bar	25 bar	25 bar

Specification notes:

1 Over pressure is the maximum pressure which may be applied without causing damage to the sensing element.
2 Burst pressure is the maximum pressure which may be applied without causing leakage damage to the sensing element.
3 Offset voltage is the voltage output at zero pressure.
4 Accuracy includes all effects (offset, span, non-linearity, pressure hysteresis and repeatability) at room temperature and represents maximum deviation of transducer signal from ideal characteristic.
5 Total accuracy includes all effects (offset, span, non-linearity, pressure hysteresis and repeatability) included with all temperature effects of offset and span. It describes overall error and represents maximum deviation of transducer signal from ideal characteristic in compensated temperature range from 0...70 °C.
6 Non-linearity is defined as the BFSL (best fit straight line) across entire pressure range.
7 Repeatability is defined as typical deviation of the output signal after 10 pressure cycles.
8 Analogue output signal is ratiometric to power supply V_S, digital signal is not ratiometric to the power supply. Temperature data are read directly on the sensing element
9 Full Scale Span (FSS) is the algebraic difference between the output signal for the highest and lowest specified pressure.

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PERFORMANCE CHARACTERISTICS
T_A=25 °C

Parameter		Min.	Typ.	Max.	Unit
Accuracy (@ 25 °C)[4]	1 to 5 mbar		±1.0	±2.5	
	10 to 100 mbar		±0.5	±1.0	
	All other		±0.1	±0.5	
Total accuracy (0...70 °C)[5]	1 to 5 mbar		±1.5	±4.0	%FSO
	10 to 100 mbar		±0.75	±1.5	
	All other		±0.25	±0.75	
Non-linearity (BFSL)[6]			±0.1	±0.3	
Repeatability[7]			±0.05		
Response time			1.3		ms
Position sensitivity	1 mbar		±0.25		%FSS
	All other		±0.05		
A/D resolution				16	bit
D/A resolution			16		bit
Load resistance		2		∞	kΩ
Current consumption			4.6	5.5	mA
Weight			0.6		g

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Digital pressure sensors

PERFORMANCE CHARACTERISTICS
(V_S = 3 to 5.5 V, T_A=25 °C)

Analogue output[8]

Unidirectional pressure devices

Parameter		Min.	Typ.	Max.	Unit
Zero pressure offset[3]			10		
Full scale span (FSS)[9]			80		%V_S
Full scale output (FSO)			90		

Bidirectional pressure devices

Parameter		Min.	Typ.	Max.	Unit
Zero pressure offset[3]			50		
Full scale span (FSS)[9]			80		%V_S
Output	At min. specified pressure		10		
	At max. specified pressure		90		

Digital output (15 bit)[8]

Unidirectional pressure devices

Parameter		Min.	Typ.	Max.	Unit
Zero pressure offset[3]			3277		
Full scale span (FSS)[9]			26214		counts
Full scale output (FSO)			29491		

Bidirectional pressure devices

Parameter		Min.	Typ.	Max.	Unit
Zero pressure offset[3]			16384		
Full scale span (FSS)[9]			26214		counts
Output	At min. specified pressure		3277		
	At max. specified pressure		29491		

Temperature output

Parameter		Min.	Typ.	Max.	Unit
Temperature output @ 0 °C			8192		counts
Temperature output @ 70 °C			24576		

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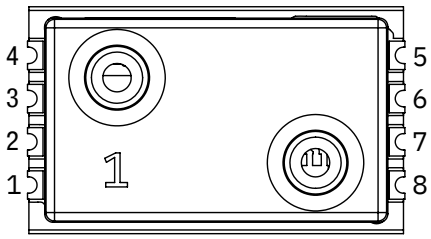
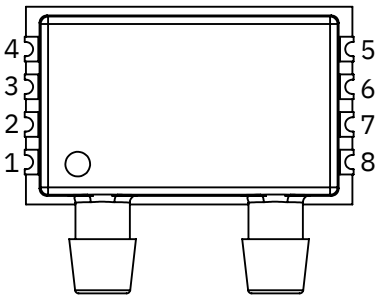
ELECTRICAL CONNECTION

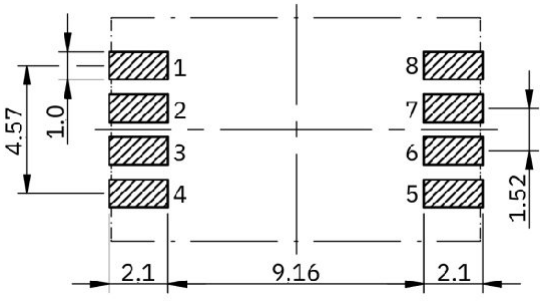




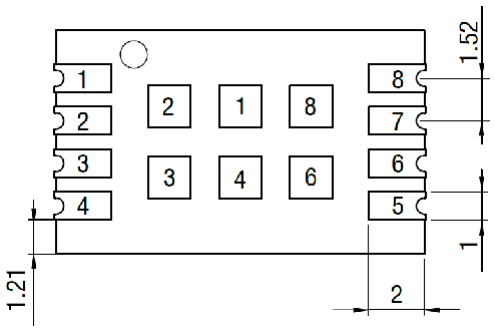
Pin	Name	Function	Alternative name and function	
1	V_{OUT}	Analogue output	1-wire interface I/O, PWM output, FM output, Digital alarm output	
2	GND	Ground		
3	SDA	Data I/O	MOSI	SPI data in
4	SLK	I²C clock	SCK	SPI Clock
5	I/C	Internal connection	NCS	SPI Chip select
6	I/C	Internal connection	MISO	SPI data out
7	EOC	End of conversation or status output		
8	$+V_S$	Positive power supply		

SOLDERING FOOTPRINT AND BOTTOM VIEW

Recommended soldering footprint



Bottom View



Dimension in mm

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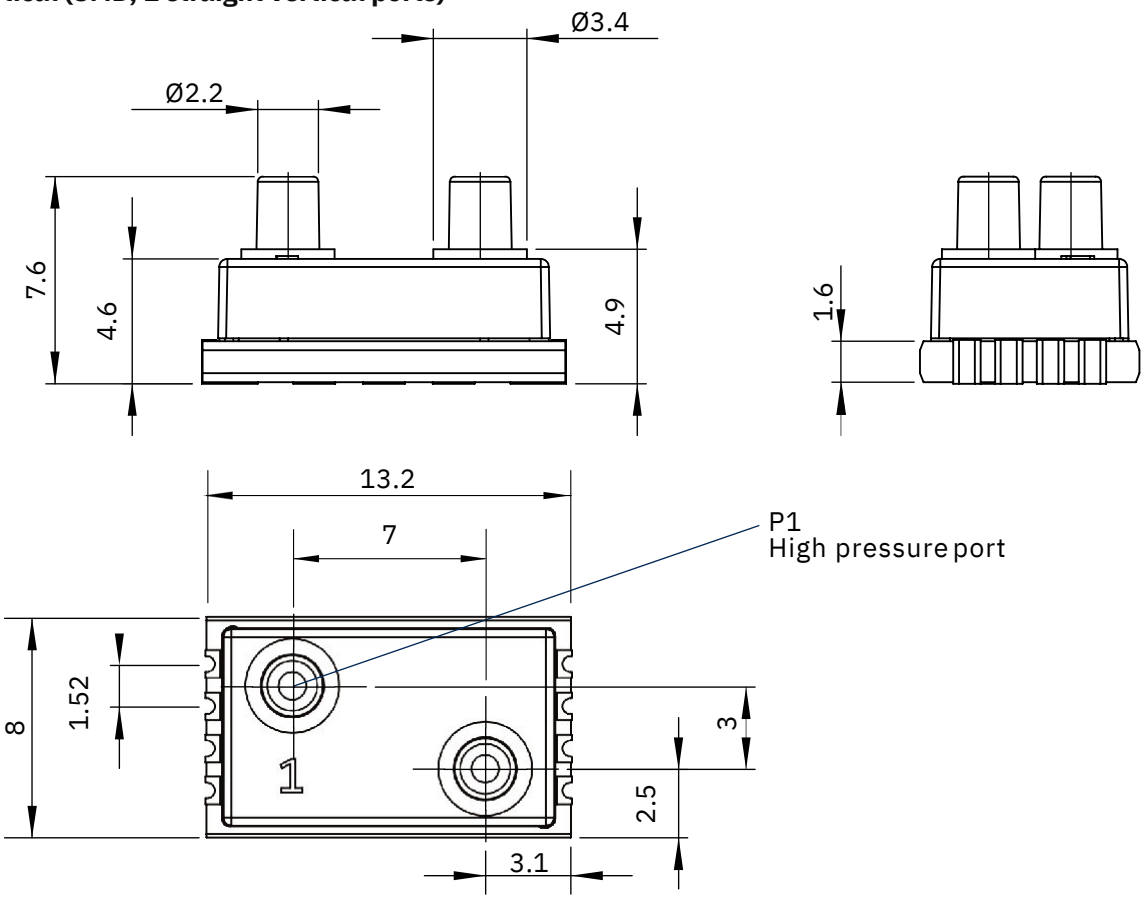
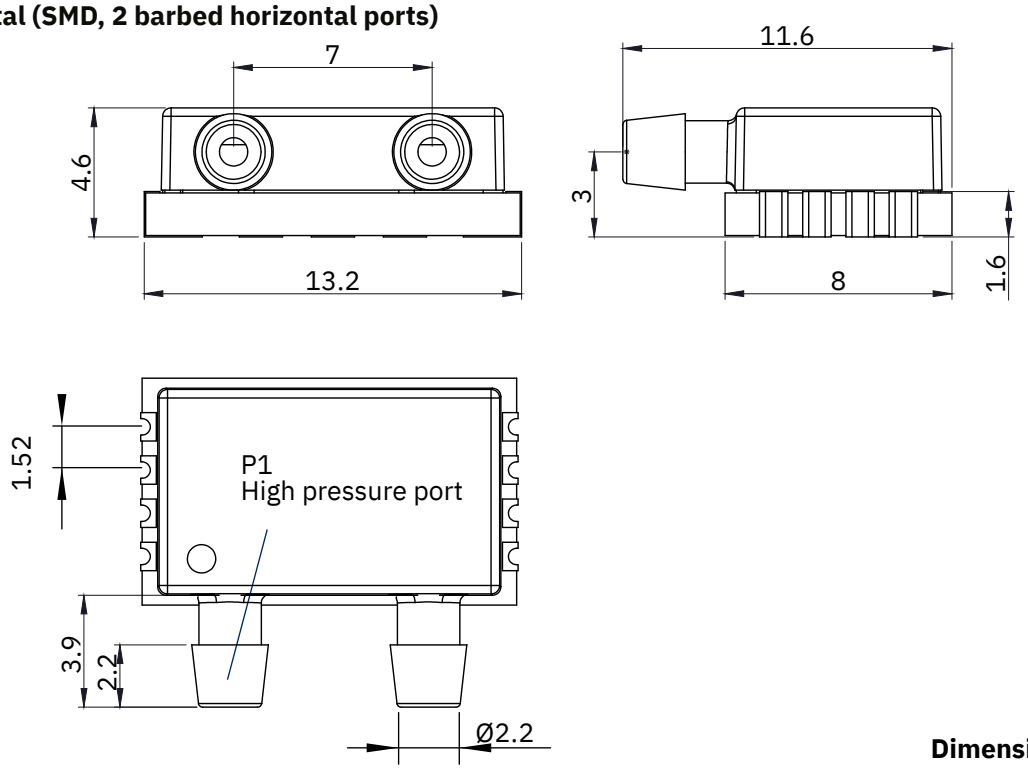
DIMENSIONAL DRAWINGS

V- vertical (SMD, 2 straight vertical ports)



H- horizontal (SMD, 2 barbed horizontal ports)



Dimension in mm

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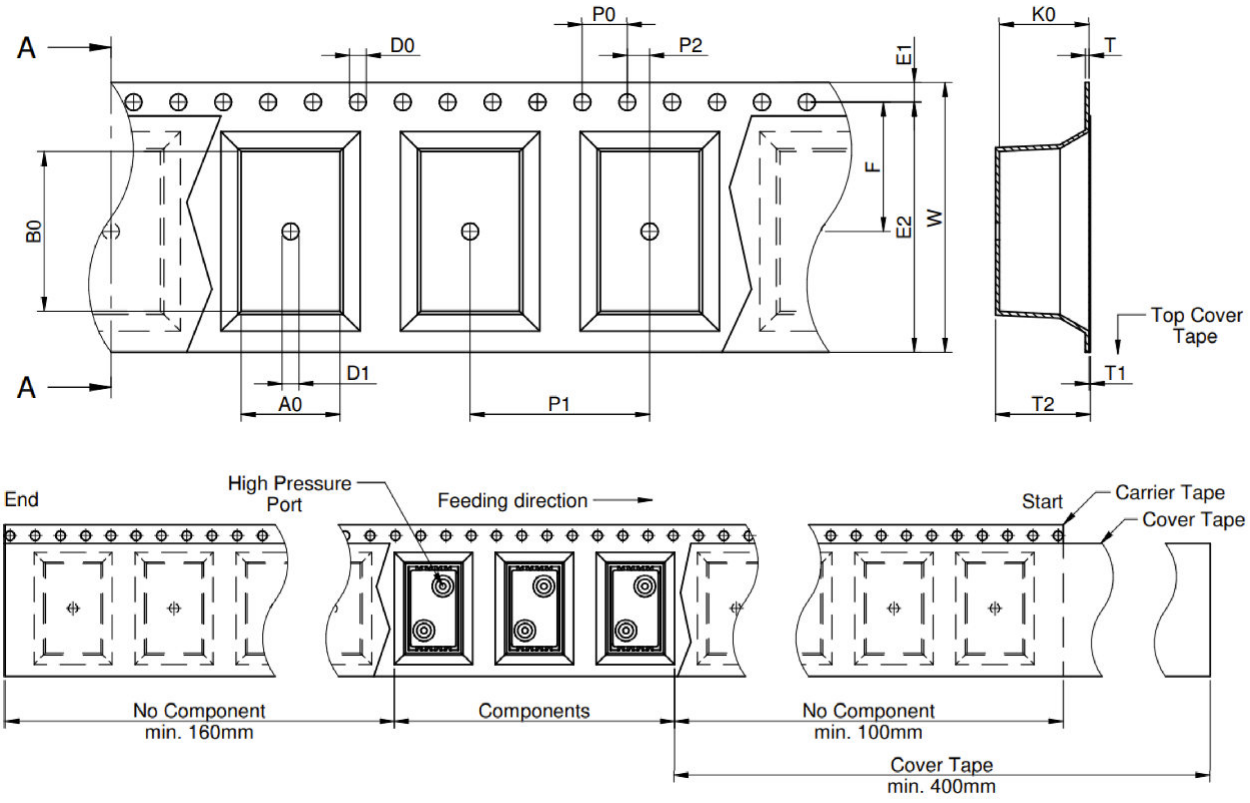
PACKING SPECIFICATION - VERTICAL PRESSURE PORT



[mm]	A0	B0	W	T	T1	K0	P0
Value	8,8	14,2	24,0	0,35	0,10	8,22	8,0
Tolerance	typ.	typ.	+0,3/-0,1	ref.	ref.	typ.	±0,1

[mm]	P1	P2	D0	D1	E1	E2	F
Value	16,0	2,0	1,5	1,5	1,75	22,25	11,5
Tolerance	±0,1	±0,1	+0,1/-0,0	min.	±0,1	min.	±0,1

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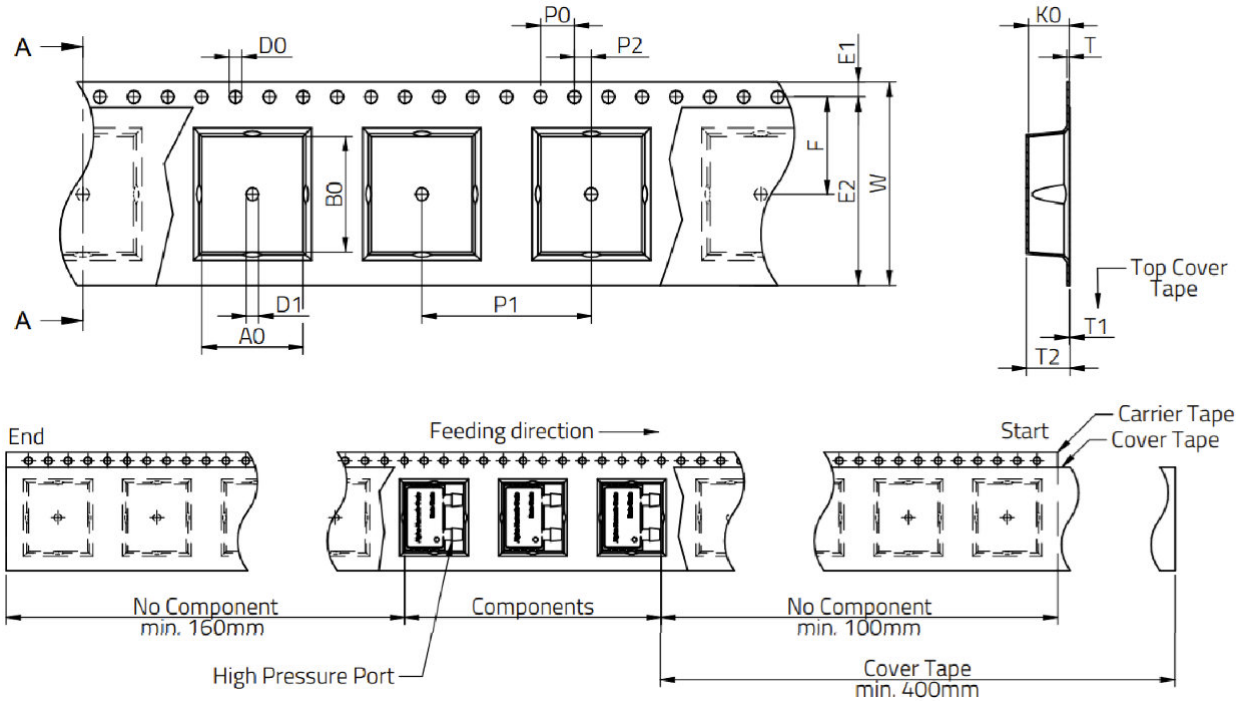
PACKING SPECIFICATION - HORIZONTAL PRESSURE PORT



[mm]	A0	B0	W	T	T1	T2	K0	P0
Value	11,9	13,6	24,0	0,4	0,1	5,2	4,8	4,0
Tolerance	typ.	typ.	+0,3/-0,1	ref.	ref.	typ.	typ.	±0,1

[mm]	P1	P2	D0	D1	E1	E2	F
Value	20,0	2,0	1,5	1,5	1,75	22,25	11,5
Tolerance	±0,1	±0,1	+0,1/-0,0	min.	±0,1	min.	±0,1

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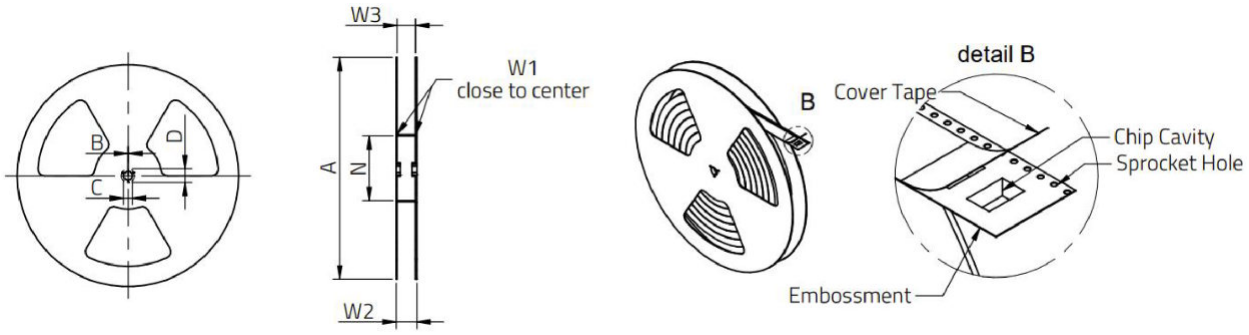
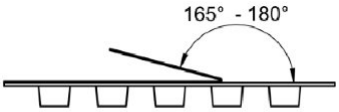
PACKING SPECIFICATION - TAPE AND REEL PACKAGING

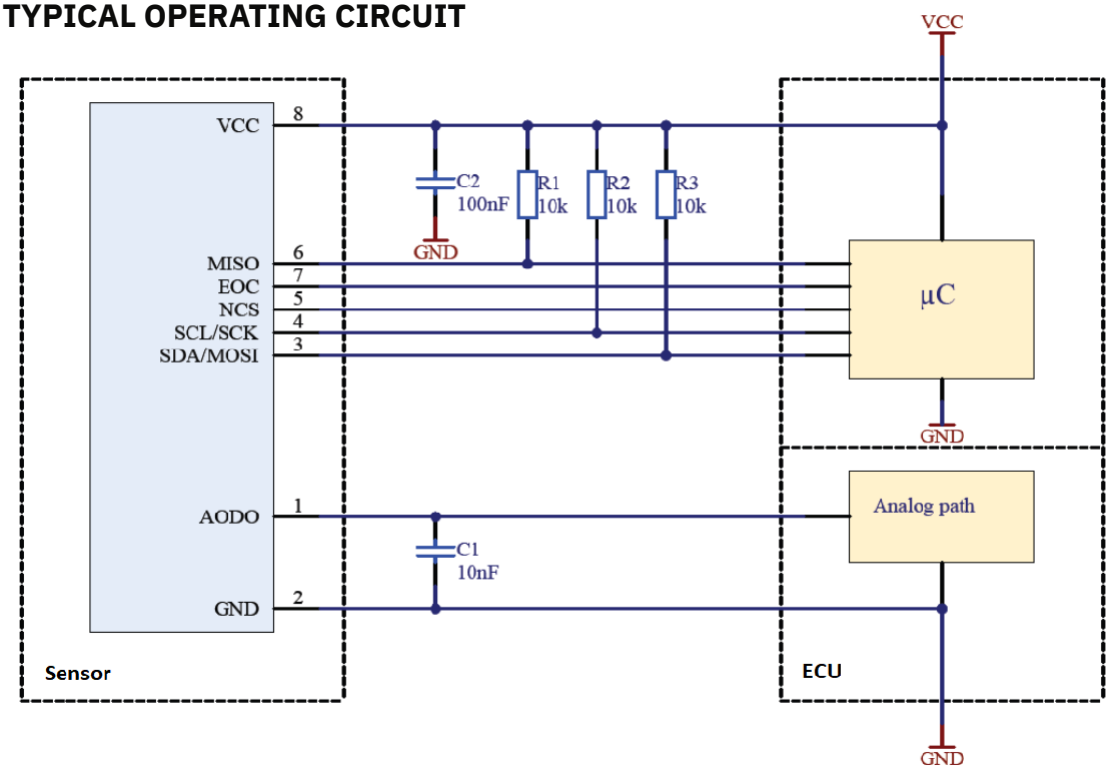


[mm]	A	B	C	D	N	W1	W2	W3	Quantity
Value	330,0	1,5	12,8	20,2	60,0	24,4	30,4	25,65	500
Tolerance	±2,0	min.	min.	min.	min.	+2,0	max.	±1,75	pcs/reel



Pull-off force: 0.1 - 1.3

TYPICAL OPERATING CIRCUIT



Notes:

1 The external decoupling capacitor 100 nF must be connected between pins V_{CC} and GND.
2 The load capacitance at pin AODO is 22 nF max.
3 Signal lines of I²C and SPI must be connected to the external pull-up resistors (≥2 kΩ)
4 The communication protocols I²C and SPI are explained in the corresponding application note

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ORDERING INFORMATION

Series	Pressure Range	Calibration	Housing	Parylene	Communication	Voltage
ASTE-	**M001** 1 mbar	**D-** Bidirectional *	**V-** vertical	**N** No	**I** I2C	**1** 3...5V
	MF02 2.5 mbar	**G-** Unidirectional	**H-** horizontal		**S** SPI	
	M005 5 mbar	**A-** Absolute **				
	M010 10 mbar					
	M020 20 mbar					
	M050 50 mbar					
	M100 100 mbar					
	M350 350 mbar					
	B001 1 bar					
	B002 2 bar					
	B005 5 bar					
	B007 7 bar	* Only up to 1bar				
	B010 10 bar	** Only from 1 bar				

Please note:
Products are laser-marked with a shortened version of the order code. For example, ASTE-M010D-V-NI1 will appear as E-M010D-V-NI1.