LBA Series
Low differential pressure sensors

FEATURES

- **Pressure ranges from 25 to 500 Pa (0.1 to 2 inH_2O)**
- **Pressure sensor based on thermal micro-flow measurement**
- **Calibrated and temperature compensated**
- **Linear 0.5...4.5 V output**
- **High flow impedance**
  → very low flow-through leakage
  → high immunity to dust and humidity
  → no loss in sensitivity using long tubing
- **RoHS and REACH compliant**
- **Quality Management System according to ISO 13485:2003 and ISO 9001:2008**

MEDIA COMPATIBILITY

Air and other non-corrosive gases

SPECIFICATIONS

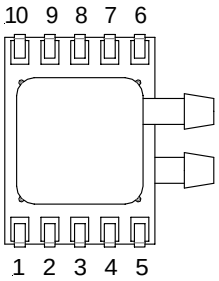
Maximum ratings

Supply voltage V_S	4.75 ... 5.25 V_{DC}
Output current	1 mA
Lead specifications	
Average preheating temperature gradient	2.5 K/s
Soak time	ca. 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 temperature gradient	-3.5 K/s
Temperature ranges	
Compensated	0 ... +70 °C
Operating	-20 ... +80 °C
Storage	-40 ... +80 °C
Humidity limits (non-condensing)	97 %RH
Vibration[1]	20 g
Mechanical shock[2]	500 g

Specification notes:

1. Sweep 20 to 2000 Hz, 8 min, 4 cycles per axis, MIL-STD-883, Method 2007.
2. 5 shocks, 3 axes, MIL-STD-883E, Method 2002.4.

ELECTRICAL CONNECTION



Pin	Connection
1	GND
2	+Vs
3	GND (Main)
4	Vout (bidirectional devices)
5	Vout (unidirectional devices)
6, 7, 8, 9, 10	GND

Note:
All GND pins 1, 3, 6, 7, 8, 9, 10 have to be connected.

At no time should any voltage be applied to pins 1, 6, 7, 8, 9, 10. In case of manual handling ensure that the socket is unpowered during insertion/removal of the LBA sensor.

PRESSURE SENSOR CHARACTERISTICS

Part no.	Operating pressure	Proof pressure[5]	Burst pressure[5]
LBAS025U...	0...25 Pa / 0...0.25 mbar (0.1 inH_2O)	2 bar (30 psi)	2 bar (30 psi)
LBAS050U...	0...50 Pa / 0...0.5 mbar (0.2 inH_2O)		
LBAS100U...	0...100 Pa / 0...1 mbar (0.4 inH_2O)		
LBAS250U...	0...250 Pa / 0...2.5 mbar (1 inH_2O)		
LBAS500U...	0...500 Pa / 0...5 mbar (2 inH_2O)		
LBAS025B...	0...±25 Pa / 0...±0.25 mbar (±0.1 inH_2O)		
LBAS050B...	0...±50 Pa / 0...±0.5 mbar (±0.2 inH_2O)		
LBAS100B...	0...±100 Pa / 0...±1 mbar (±0.4 inH_2O)		
LBAS250B...	0...±250 Pa / 0...±2.5 mbar (±1 inH_2O)		
LBAS500B...	0...±500 Pa / 0...±5 mbar (±2 inH_2O)		

GAS CORRECTION FACTORS[7]

Gas type	Correction factor
Dry air	1.0
Oxygen (O_2)	1.07
Nitrogen (N_2)	0.97
Argon (Ar)	0.98
Carbon dioxide (CO_2)	0.56

Specification notes (cont.):

3. Total accuracy is the combined error from offset and span calibration, linearity, pressure hysteresis and temperature effects.

4. The sensor is calibrated with a common mode pressure of 1 bar absolute. Due to the mass flow based measuring principle, variations in absolute common mode pressure need to be compensated according to the following formula:

$$\Delta P_{eff} = \Delta P_{sensor} \times \frac{1bara}{P_{abs}}$$

ΔP_{eff} = True differential pressure
ΔP_{sensor} = Differential pressure as indicated by output voltage
P_{abs} = Current absolute common mode pressure

5. The max. common mode pressure is 2 bar.

6. Figure based on accelerated lifetime test corresponding to 1 year of life.

7. For example with a LBAS500... sensor measuring CO_2 gas, at 4.5 V output the actual pressure will be 500 Pa x 0.56 = 280 Pa.

$$\Delta P_{eff} = \Delta P_{sensor} \times \text{gas correction factor}$$

ΔP_{eff} = True differential pressure
ΔP_{sensor} = Differential pressure as indicated by output voltage

PERFORMANCE CHARACTERISTICS[4]

all 25 Pa, 50 Pa and 100 Pa devices

(V_S=5.0 V_{DC}, T_A=20°C, P_{Abs}=1 bara, calibrated in air, output signal is **non ratiometric** to V_S)

Characteristics		Min.	Typ.	Max.	Unit
Non-linearity			±(1.8 % of reading + 0.2 %FSS)	±(2.4 % of reading + 0.3 %FSS)	
Total accuracy[3]	5...55 °C			±(2.25 % of reading + 2.25 %FSS)	
	0...70 °C			±(4.25 % of reading + 2.25 %FSS)	
Offset warm-up shift			±2	±5	mV
Offset long term stability[6]			±0.3		%/year
Current consumption (no load)			4	5	mA
Response time (t_{63})			1-2		ms
Power-on time				10	

Unidirectional devices

Characteristics			Min.	Typ.	Max.	Unit
Zero pressure offset			0.46	0.50	0.54	V
Full scale span			3.92	4.00	4.08	
Full scale output				4.50		
Thermal effects	Offset	5...55 °C			±40	mV
		0...70 °C			±80	
	Span	5...55 °C		±1.25	±2	%FSS
		0...70 °C		±1.75	±2.75	

Bidirectional devices

Characteristics			Min.	Typ.	Max.	Unit
Zero pressure offset			2.47	2.50	2.53	V
Full scale span			3.92	4.00	4.08	
Output	at max. specified pressure			4.50		
	at min. specified pressure			0.50		
Thermal effects	Offset	5...55 °C			±25	mV
		0...70 °C			±50	
	Span	5...55 °C		±1.25	±2	%FSS
		0...70 °C		±1.75	±2.75	

PERFORMANCE CHARACTERISTICS[4]

all 250 Pa and 500 Pa devices

(V_S=5.0 V_{DC}, T_A=20°C, P_{Abs}=1 bara, calibrated in air, output signal is **non ratiometric** to V_S)

Characteristics			Min.	Typ.	Max.	Unit
Non-linearity				±(1.5 % of reading + 0.2 %FSS)	±(2 % of reading + 0.2 %FSS)	
Thermal effects	Offset	5...55 °C			±25	mV
		0...70 °C			±40	
	Span	5...55 °C		±1	±1.75	%FSS
		0...70 °C		±1.5	±2.5	
Total accuracy[3]		5...55 °C			±(1.5 % of reading + 1.5 %FSS)	
		0...70 °C			±(3.5 % of reading + 1.5 %FSS)	
Offset warm-up shift				±1	±5	mV
Offset long term stability[6]				±0.3		%/year
Current consumption (no load)				4	5	mA
Response time (t_{63})				1-2		ms
Power-on time					10	

Unidirectional devices

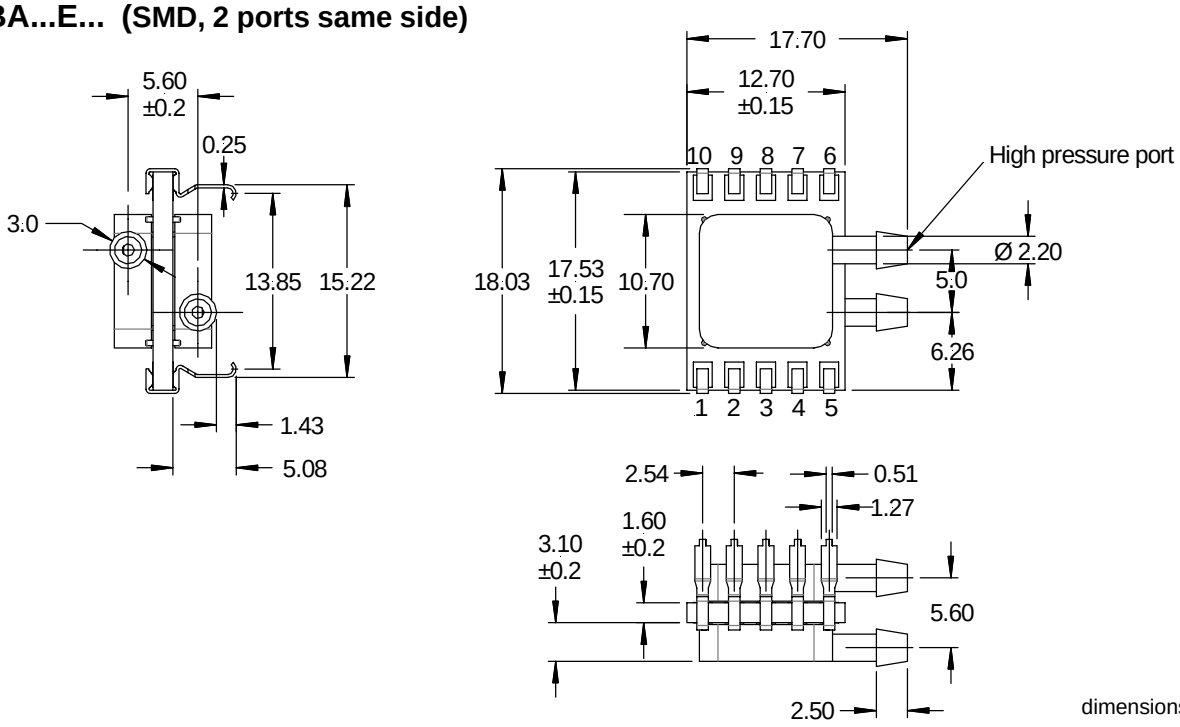
Characteristics	Min.	Typ.	Max.	Unit
Zero pressure offset	0.47	0.50	0.53	V
Full scale span	3.94	4.00	4.06	
Full scale output		4.50		

Bidirectional devices

Characteristics		Min.	Typ.	Max.	Unit
Zero pressure offset		2.47	2.50	2.53	V
Full scale span		3.94	4.00	4.06	
Output	at max. specified pressure		4.50		
	at min. specified pressure		0.50		

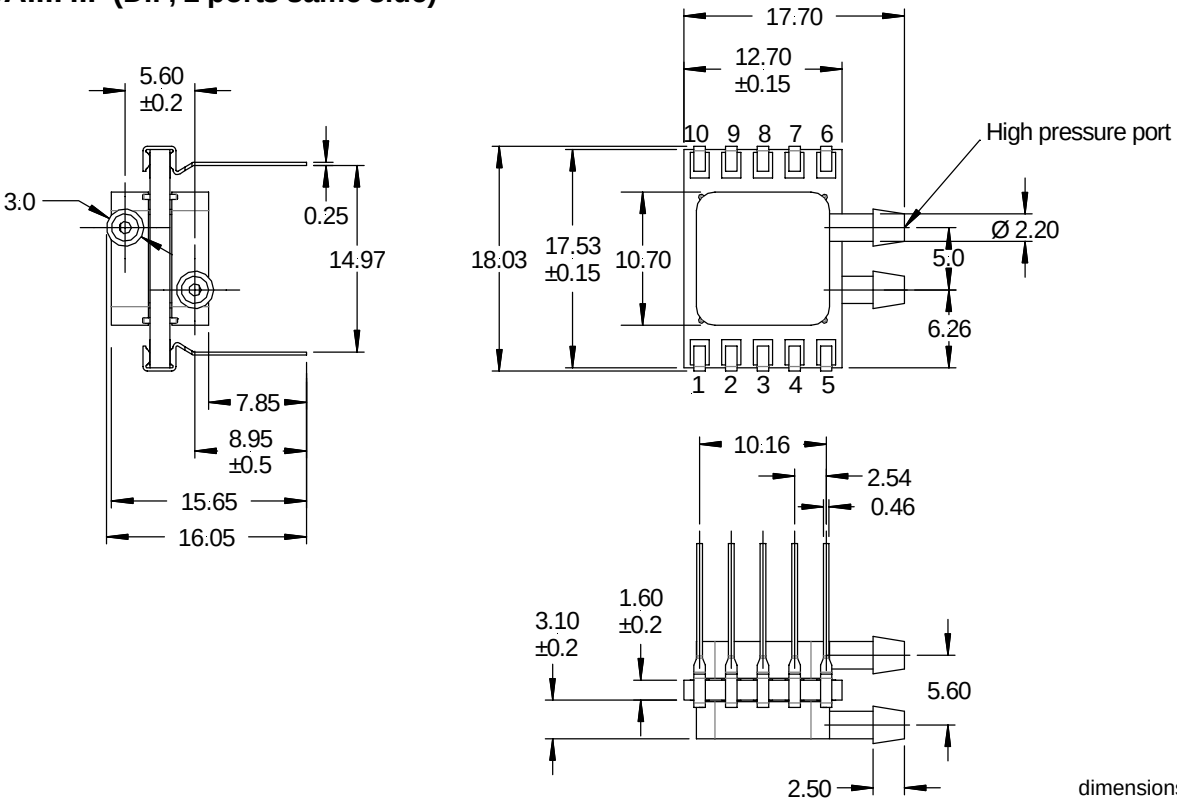
OUTLINE DRAWING

LBA...E... (SMD, 2 ports same side)



dimensions in mm

LBA...F... (DIP, 2 ports same side)



dimensions in mm

ORDERING INFORMATION

	Series	Pressure range		Calibration		Housing		Output		Grade	
Options	**LBA**	**S025**	25 Pa ($0.1\ inH_2O$)	**B**	Bidirectional	**E**	SMT, 2 ports same side	**6***	0.5...4.5 non-ratiometric	**S**	High
		S050	50 Pa ($0.2\ inH_2O$)	**U**	Unidirectional	**F**	DIP, 2 ports same side				
		S100	100 Pa ($0.4\ inH_2O$)								
		S250	250 Pa ($1\ inH_2O$)								
		S500	500 Pa ($2\ inH_2O$)								
								* Ratiometric output versions on request			
Example:	**LBA**	**S250**		**B**		**F**		**6**		**S**	

LGA InterCert
Certified Quality System
EN ISO 13485:2003+AC:2009
DIN EN ISO 9001:2008