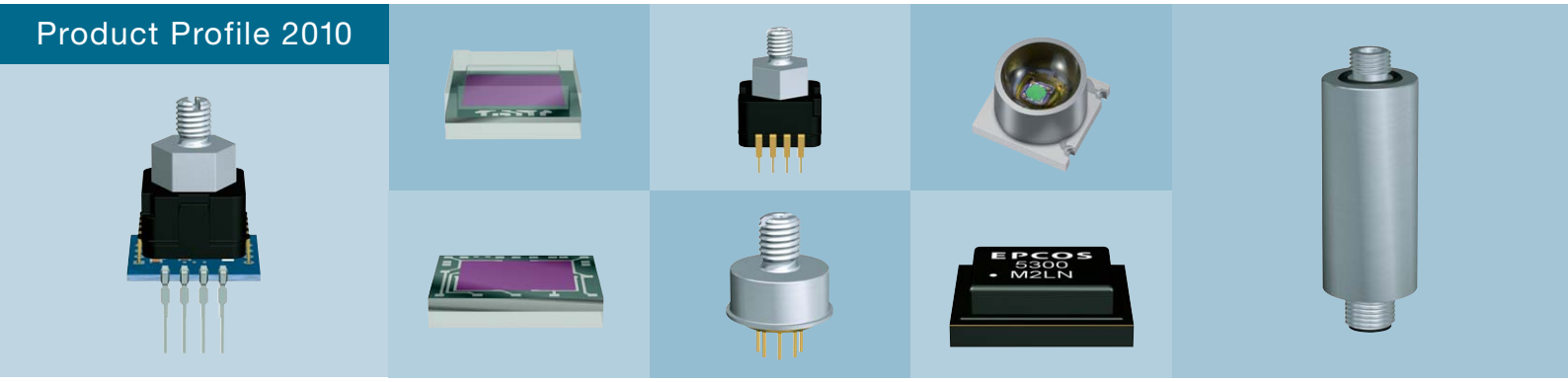
EPCOS

Product Profile 2010

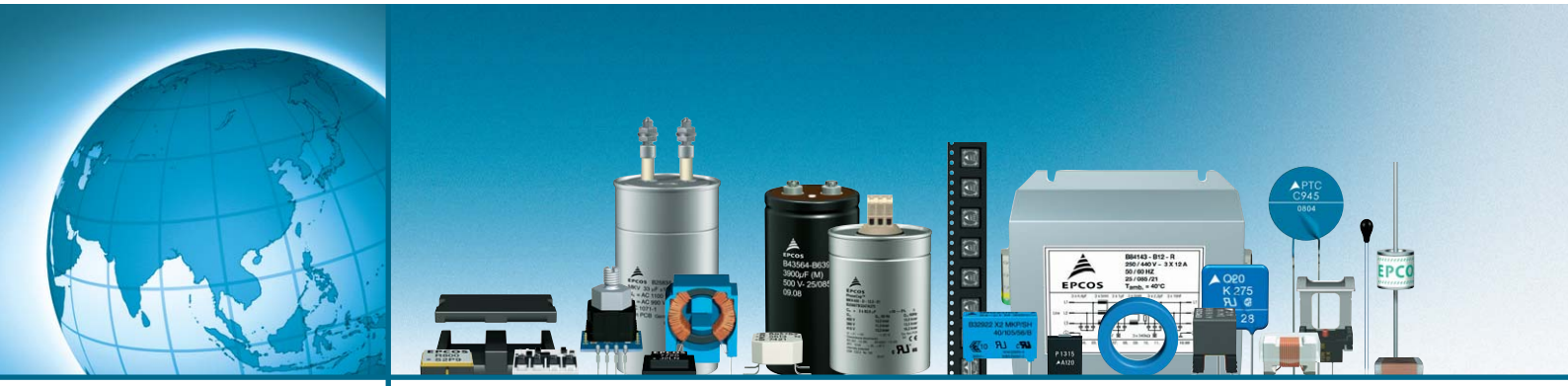


Pressure Sensors

for Industrial, Automotive, Medical
and Consumer Applications

www.epcos.com

Welcome to the World of Electronic Components and Modules



EPCOS is a leading manufacturer of electronic components, modules and systems. Our broad portfolio includes capacitors, inductors and ferrites, EMC filters, sensors and sensor systems, nonlinear resistors, and arresters, as well as SAW and BAW components and RF modules. As an innovative technology-driven company, EPCOS focuses technologically demanding growth markets in the areas of information and communications technology, automotive, industrial, and consumer electronics. We offer our customers both standard components as well as application-specific solutions.

EPCOS has design, manufacturing and marketing facilities in Europe, Asia and the Americas. We are continuously strengthening our global research and development network by expanding R&D activities at our production locations, primarily in Eastern Europe, China and India. With our global presence we are able to provide our customers with local development and manufacturing know-how and support in the early phases of their projects.

EPCOS is continually improving its processes and thus the quality of its products and services. The Group is ISO/TS 16949 certified and remains committed to constantly reviewing and systematically improving its quality management system.

Pressure Sensors for Industrial, Automotive, Medical and Consumer Applications

The high precision of piezoresistive sensor dies and the customization of the pressure sensors to specific requirements allow their versatile use in a wide range of applications.

Pressure sensors supply measured data for industrial equipment and systems in order to control and diagnose hydraulically or pneumatically operated machines. This makes them to key components in measurement and control technology.

Pressure sensors are also used in the automotive industry to minimize emissions of noxious exhaust gases and soot particles. Their high reliability is equally vital in air conditioning, engine management, powertrain electronics and brake systems in utility vehicles as well as for measuring pressure in respiratory, anesthesia equipment, blood pressure monitoring and cleaning technology in the medical sector.

EPCOS pressure sensors supply exact data within the scope of measuring liquid and gaseous media.

Equipped with miniaturized barometric pressure sensors, navigation devices can measure the altitude and – together with a GPS-provided location – very precisely determine the 3D position. Applications include navigation devices with 3D maps or position information accurate to within one story of a building for emergency calls from mobile phones.

Important Notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed**.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.

   The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, BAOKE, Alu-X, CeraDiode, CSMP, CSSP, CTVS, DSSP, MiniBlue, MiniCell, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.

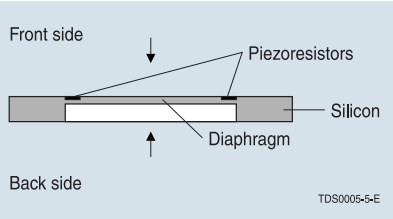
General Information

Piezoresistive pressure measurement

The pressure measurement in sensor dies operates on the basis of the piezoresistive effect, occurring in diaphragm, in which piezoresistors are implanted onto the surface.

The micromechanical etched diaphragm contains a wheatstone bridge. The silicon wafer is connected with a glass base by anodic bonding to ensure the restraint at the edges.

The mechanical bending stress by pressure application causes a change in the piezoresistors. The output of the powered bridge is a voltage signal (mV range) proportional to the pressure.

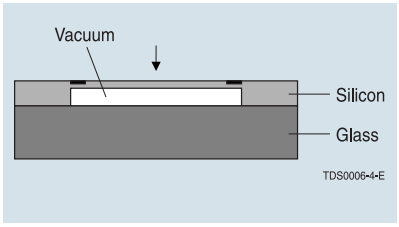


Absolute pressure sensor dies are bonded to a solid glass base under vacuum.

Gauge pressure sensor dies have a glass base with a hole, so that the reference pressure is applicable on the back side.

Absolute pressure – application on the front

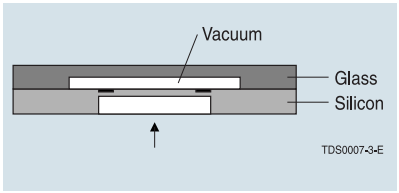
The glass base encloses the reference pressure for the absolute pressure measurements on the back. The measured medium comes into contact with the active electronic components. Only dry and non-aggressive media may be measured.



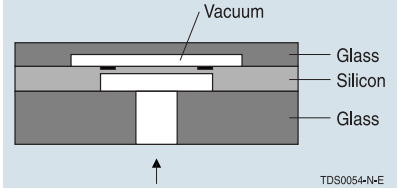
Absolute pressure – application on the back

To measure wet media, the reference pressure is enclosed on the front. The pressure is applied to the back where is no contact with active electronic components.

Typical applications are altitude measurements in ballons or barometric measurements for meteorological use.



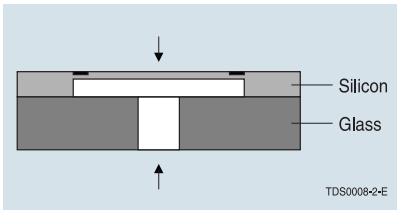
Alternative types for easy mounting with glass base on back side are also available.



Differential pressure

The pressure difference is measured with the help of making a hole in the glass base. The polarity of the bridge output signal changes depending on the side, where the pressure is higher.

A differential pressure sensor can be used for flow measurement by measuring the pressure drop along a gas stream.



Gauge pressure

Gauge pressure measurement is a case of differential pressure measurement, where the measurement is related to the actual air pressure. A typical application is the liquid level indication.

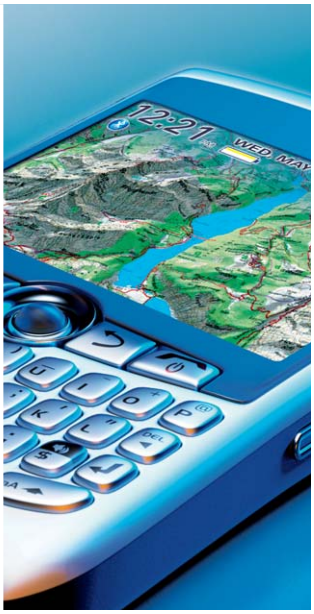
Gauge symmetrical pressure

In case of gauge symmetrical pressure, the measurement is related to equally over and under the actual air pressure.

The various arts of pressure measurement are due to the reference pressure related to measured pressure.

General Information



EPCOS offers various designs of piezoresistive pressure measurement devices – from simple pressure sensor dies via packaged pressure transducers and transmitters up to customer-specific pressure-sensor systems.

Every design is based on sensor dies developed and manufactured in our own cleanrooms.

Bonded and integrated into a standard package, the pressure transducer is processed directly on the circuit board.

The pressure transmitters are extended by a signal evaluation module and supplied with or without a stainless steel case in ready-to-mount form or for simple circuit board assembly.

Typical applications

Industry

- Hydraulic and pneumatic systems
- Measurement and control technology
- Environmental and climate protection
- Gas analyzers and meters
- Heating, ventilation and air conditioning systems in buildings

Automotive

- Exhaust recuperation
- Soot particle filters
- Air conditioning
- Engine management
- Powertrain electronics
- Utility vehicle brakes

Medicine

- Respiration technology
- Anesthesia equipment
- Blood pressure monitoring
- Cleaning equipment

Consumer

- Barometric measurements in portable electronics such as mobile phones, personal navigation devices and watches
- Hard disk drives (HDD)
- Cycling computers
- Cameras with altimeter function

Features

- Piezoresistive silicon technology
- Absolute, differential and gauge pressure measurement
- Extensive range of pressure measurements
- High measurement accuracy
- Various packaging forms
- Sensor elements for humid/wet operating environments
- RoHS-compatible

Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

Pressure Units

Conversion table for pressure units						
bar	**psi**	**kPa**	**cm H_2O**	**inch H_2O**	**mm Hg**	**lbf/ft²**
0.016	0.232	1.6	16.32	6.43	12.0	33.416
0.025	0.363	2.5	25.49	10.04	18.8	52.213
0.040	0.58	4.0	40.79	16.06	30.0	83.54
0.060	0.87	6.0	61.18	24.09	45.0	125.31
0.100	1.45	10.0	101.97	40.15	75.0	208.85
0.160	2.32	16.0	163.2	64.25	120.0	334.16
0.250	3.63	25.0	254.9	100.35	188.0	522.125
0.400	5.8	40.0	407.9	160.59	300.0	835.4
0.600	8.7	60.0	611.8	240.87	450.0	1253.1
1.000	14.5	100.0	1019.7	401.46	750.0	2088.5
1.600	23.2	160.0	1632.0	642.52	1200.0	3341.6
2.500	36.3	250.0	2549.0	1003.54	1875.0	5221.25
4.000	58.0	400.0	4079.0	1605.91	3000.0	8354.0
6.000	87.0	600.0	6118.0	2408.66	4500.0	12531.0
10.00	145.0	1000.0	10197.0	4014.57	7501.0	20885.0
16.00	232.0	1600.0	16316.0	6423.62	12001.0	33416.0
25.00	363.0	2500.0	25494.0	10037.01	18752.0	52212.5
40.00	580.0	4000.0	40790.0	16059.06	30002.0	83540.0
60.00	870.0	6000.0	61184.0	24088.19	45003.0	125310.0
100.0	1450.0	10000.0	101974.0	40147.24	75006.0	208850.0

Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

Overview

Pressure sensor dies, transducers and transmitters

Type	Description	Characteristics

Pressure sensor dies

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Selection of different die geometries.

Pressure sensor dies consist of a piezoresistive silicon element with an anodically bonded glass base.

Gauge pressure sensor dies with pressure to front and back side as well as absolute pressure sensor dies with pressure to front side are available.

The C29 and C32 pressure sensor dies were developed for absolute pressure measurements in wet media.

The difference to conventional absolute pressure sensor dies is the reference pressure chamber which is bonded to the front side and the pressure is applied to the back side.

Type	Rated pressure range	Pressure measurement
C41	0.025 … 0.060 bar	Gauge, back side
C27	0.250 … 1.000 bar 0.100 … 1.000 bar	Absolute, front side Gauge, back side
C28	2.500 … 25.00 bar	Absolute, front side Gauge, back side Gauge, front side
C29	1.000 … 10.00 bar	Absolute, back side
C32	1.600 … 25.00 bar	Absolute, back side Absolute, front side Gauge, back side
C33	1.200 bar	Absolute, front side

- Piezoresistive MEMS technology
- Square diaphragm
- Whetstone bridge with mV output ratiometric to supply voltage
- Anodically bonded glass base

Options

- Temperature sensing diode
- HPSP
  High-performance solder joint pressure die (back side solderable die) in development

Pressure sensor transducers

Page 14-15

AK2 gauge pressure transducers are based on piezoresistive silicon pressure sensor dies from our own cleanroom production facility.

The robust stainless steel/plastic casing features excellent mechanical decoupling.

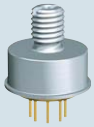
The output signal is neither calibrated nor temperature compensated.

Type	Rated pressure range	Pressure measurement
AK2	0.025 … 25.00 bar	Gauge

- Piezoresistive MEMS technology
- Whetstone bridge with mV output ratiometric to supply voltage
- RoHS-compatible, halogen-free
- Dual-in-line package for PCB mounting

Options

- Pressure port 4.8 mm tube fitting
- Pressure port M5 thread



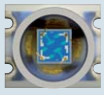
AT2 absolute pressure transducers are based on piezoresistive silicon pressure sensor dies from our own cleanroom production facility.

The robust stainless steel casing features excellent mechanical decoupling.

The output signal is not calibrated nor temperature compensated.

Type	Rated pressure range	Pressure measurement
AT2	1.600 … 25.00 bar	Absolute

- Piezoresistive MEMS technology
- Whetstone bridge with mV output ratiometric to supply voltage
- RoHS-compatible, halogen-free
- TO39 package for PCB mounting



The ASB 1200 E is an SMT-mountable gel-protected barometric pressure transducer with a stainless steel pressure port.

The output signal is neither calibrated nor temperature compensated.

Type	Rated pressure range	Pressure measurement
ASB 1200 E	1.200 bar	Absolute

- Piezoresistive MEMS technology
- Whetstone bridge with mV output ratiometric to supply voltage
- RoHS-compatible, halogen-free
- SMT ceramic package for PCB mounting

T5100 pressure transducers are based on C33 pressure sensor dies. The bridge signal is available uncalibrated and without temperature compensation.

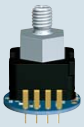
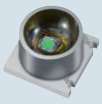
Type	Rated pressure range	Pressure measurement
T5100	1.200 bar	Absolute

- Piezoresistive full bridge
- Smallest CSMP™ package
- For high-volume consumer applications
- RoHS-compatible, halogen-free

Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

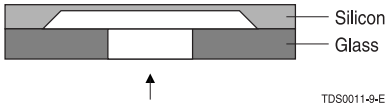
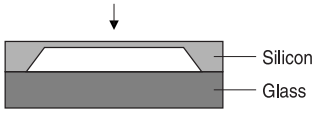
Overview

Pressure sensor dies, transducers and transmitters

Type	Description	Characteristics
Pressure sensor transmitters		**Page 16-23**
 	CAU-T pressure transmitters with and without stainless steel casing represent temperature compensated and calibrated precision pressure sensors. The electronics of the CAU-T series compensate linearity and temperature errors of the piezo-resistive measurement circuit. **Type** / **Rated pressure range** / **Pressure measurement** CAU-T / 1.000 … 25.00 bar / Absolute 0.100 … 25.00 bar / Gauge 0.100 … 1.000 bar / Gauge, symmetrical	• Piezoresistive MEMS technology • RoHS-compatible, halogen-free **Options** • Stainless steel casing (pressure port G1/8” thread) • Without casing (pressure port M5 thread) • Voltage output 0.5 ... 4.5 V • Current output 4 ... 20 mA
 	The AC-T pressure transmitters offer all advantages of the CAU-T series. They are completely calibrated and simply to replace, hence suitable for integration in control blocks and circuit boards. **Type** / **Rated pressure range** / **Pressure measurement** AC-T / 1.000 … 2.500 bar / Absolute 0.100 … 25.00 bar / Gauge 0.100 … 1.000 bar / Gauge, symmetrical	• Piezoresistive MEMS technology • Voltage output: 0.5 ... 4.5 V • RoHS-compatible, halogen-free • Dual-in-line package for PCB mounting **Options** • Pressure port 4.8 mm tube fitting • Pressure port M5 thread
	The ASB 1200 V1 and ASB 1200 VR are SMT-mountable gel-protected barometric pressure transmitters with a stainless steel pressure port. The heart of these new transmitters is a piezoresistive sensor die, which is mounted in hybrid technology together with a semiconductor ASIC. The voltage output is calibrated and temperature compensated. **Type** / **Rated pressure range** / **Pressure measurement** ASB 1200 V1 / 0.200 … 1.200 bar / Absolute ASB 1200 VR / 0.200 … 1.200 bar / Absolute	• Piezoresistive MEMS technology • Voltage output: 0 ... 1 V or ratiometric to V_{CC} • RoHS-compatible, halogen-free • SMT ceramic package for PCB mounting
 	T5300/T5400 pressure transmitters, temperature-compensated and calibrated with digital (I^2C and SPI) interface **Type** / **Rated pressure range** / **Pressure measurement** T5300 / 0.3 … 1.1 bar / Absolute T5400 / 0.3 … 1.1 bar / Absolute	• Digital output, serial interface • Smallest CSMP™ package • For high-volume consumer applications • RoHS-compatible, halogen-free **Options** • Customized calibrated pressure range • Customized accuracy

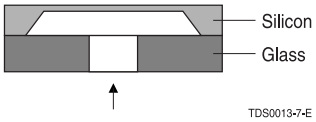
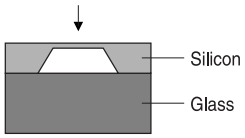
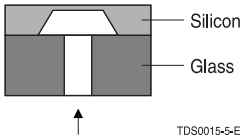
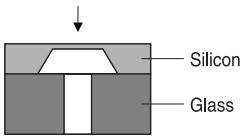
Pressure Sensor Dies

Technical data

Type		C41		C27		
Pressure measurement		**Gauge**		**Absolute**		
Measured media		Non-aggressive fluids and gases		Dry non-aggressive gases		
Output signal		mV, not calibrated, not temperature-compensated				
Pressure from		Back side		Front side		
Construction		 TDS0011-9-E		 TDS0012-8-E		
Dimensions						
Die size	mm	5.05 × 5.05		3.05 × 3.05		
Total height	mm	0.9		0.9		
Glass thickness	mm	0.5		0.5		
Hole diameter	mm	1.6		–		
Maximum ratings						
Storage temperature T_{st}	°C	–40 … +150		–40 … +150		
Operating temperature T_a	°C	–40 … +135		–40 … +135		
Supply voltage (max.) V_{DD}	V	10		10		
Temperature characteristics V_{DD} = 5 V						
Temperature coefficients α_{RS} of the bridge resistance (typ.) β_{RS}	10^{-3}/K $10^{-6}/K^2$	2.4 6		2.4 6		
Temperature coefficients α_S of the sensitivity (typ.) β_S	10^{-3}/K $10^{-6}/K^2$	–2.2 5		–2.2 5		
Temperature coefficient TCV_F of diode flow voltage (typ.)	mV/K	–2.2		–2.2		
Characteristics T_a = 25 °C, V_{DD} = 5 V						
Bridge resistance (min./max.) R_S	kΩ	4.0 … 6.0		2.6 … 4.0		
Offset voltage (min./max.) V_0	mV	–25 … +25		–30 … +30		
Diode flow voltage (typ.) V_F at I_F = 50 µA	mV	600		600		
Nonlinearity (typ.) L	%FS	±1	±0.75	±0.2		±0.3
Sensitivity (typ.) S	mV/bar	1000	700	400	300	120
Output span (typ.) V_{Sp}@p_r	mV	25	42	100	120	120
Rated pressure p_r	bar	0.025	0.060	0.250	0.400	1.000
Ordering code[1)]		B58601G5010A001	B58601G5010A002	B58600C5010A003	B58600C5010A004	B58600C5010A005

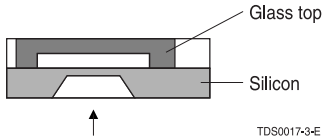
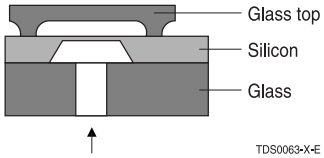
[1)] Rated pressure range 0.025 … 25.00 bar.
Other values on request.

Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

	C27	C28	C28	C28
	Gauge	**Absolute**	**Gauge**	**Gauge**
	Non-aggressive fluids and gases	Dry non-aggressive gases	Non-aggressive fluids and gases	Dry non-aggressive gases
	mV, not calibrated, not temperature-compensated			
	Back side	Front side	Back side	Front side
	 TDS0013-7-E	 TDS0014-6-E	 TDS0015-5-E	 TDS0016-4-E
	3.05 × 3.05	2.05 × 2.05	2.05 × 2.05	2.05 × 2.05
	0.9	1.2	1.2	1.2
	0.5	0.8	0.8	0.8
	0.7	–	0.4	0.4
	–40 … +150	–40 … +150	–40 … +150	–40 … +150
	–40 … +135	–40 … +135	–40 … +135	–40 … +135
	10	10	10	10
	2.4 6	2.4 6	2.4 6	2.4 6
	–2.2 5	–2.2 5	–2.2 5	–2.2 5
	–2.2	–2.2	–2.2	–2.2
	2.6 … 4.0	2.7 … 3.7	2.7 … 3.7	2.7 … 3.7
	–25 … +25	–30 … +30	–30 … +30	–30 … +30
	600	600	600	600
	±0.5	±0.2	±0.2	±0.2
	500	48	48	48
	50	120	120	120
	0.100	2.500	2.500	2.500
	B58601C5010A006	B58600D8010A011	B58601D8010A016	B58601D8010A024
	±0.35	±0.2	±0.2	±0.2
	400	20	20	20
	100	120	120	120
	0.250	6.000	6.000	6.000
	B58601C5010A007	B58600D8010A012	B58601D8010A017	B58601D8010A025
	±0.2	±0.2	±0.2	±0.2
	300	12	12	12
	120	120	120	120
	0.400	10.00	10.00	10.00
	B58601C5010A008	B58600D8010A013	B58601D8010A018	B58601D8010A026
	±0.2	±0.2	±0.2	±0.2
	120	4.8	4.8	4.8
	120	120	120	120
	1.000	25.00	25.00	25.00
	B58601C5010A009	B58600D8010A014	B58601D8010A019	B58601D8010A027

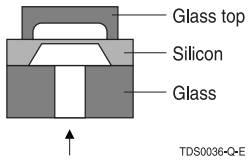
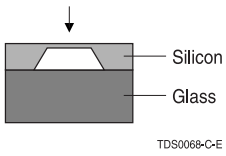
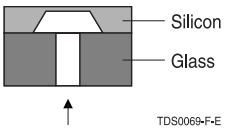
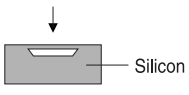
Pressure Sensor Dies

Technical data

Type		C29				C29			
Pressure measurement		**Absolute**				**Absolute**			
Measured media		Non-aggressive fluids and gases							
Output signal		mV, not calibrated, not temperature-compensated							
Pressure from		Back side				Back side			
Construction									
Dimensions									
Die size	mm	2.2 × 2.7				2.2 × 2.7			
Total height	mm	0.8				1.6			
Glass thickness	mm	0.4				0.4 front, 0.8 back			
Hole diameter	mm	–				0.4			
Maximum ratings									
Storage temperature T_{st}	°C	–40 … +150				–40 … +150			
Operating temperature T_a	°C	–40 … +135				–40 … +135			
Supply voltage (max.) V_{DD}	V	10				10			
Temperature characteristics V_{DD} = 5 V									
Temperature coefficients α_{RS} of the bridge resistance (typ.) β_{RS}	10^{-3}/K 10^{-6}/K²	2.2 6				2.2 6			
Temperature coefficients α_S of the sensitivity (typ.) β_S	10^{-3}/K 10^{-6}/K²	–2.2 5				–2.2 5			
Temperature coefficient TCV_F of diode flow voltage (typ.)	mV/K	–2.2				–2.2			
Characteristics T_a = 25 °C, V_{DD} = 5 V									
Bridge resistance (min./max.) R_S	kΩ	2.1 … 3.3				2.1 … 3.3			
Offset voltage (min.) V_0	mV	–65	–55	–45	–35	–65	–55	–45	–35
Offset voltage (max.) V_0	mV	+30	+30	+30	+30	+30	+30	+30	+30
Diode flow voltage (typ.) V_F at I_F = 50 µA	mV	600				600			
Nonlinearity (typ.) L	%FS	±0.2				±0.2			
Sensitivity (typ.) S	mV/bar	85	50	30	13	85	50	30	13
Output span (typ.) V_{Sp}@p_r	mV	85	125	120	130	85	125	120	130
Rated pressure p_r	bar	1.000	2.500	4.000	10.00	1.000	2.500	4.000	10.00
Ordering code[1]		B58600E0410A020	B58600E0410A021	B58600E0410A022	B58600E0410A023	B58600E0410A002	B58600E0410A003	B58600E0410A004	B58600E0410A005

[1] Rated pressure range 1.000 … 25.00 bar. Other values on request.

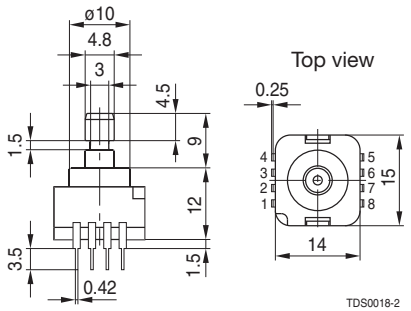
Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

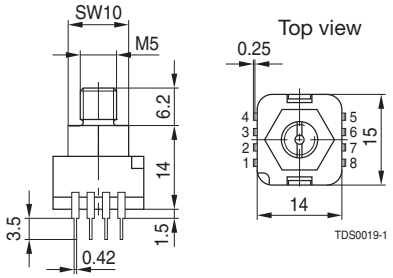
	C32	C32	C32	C33
	Absolute	**Absolute**	**Gauge**	**Absolute**
	Non-aggressive fluids and gases			
	mV, not calibrated, not temperature-compensated			
	Back side	Front side	Back side	Front side
				
	1.65 × 1.65	1.65 × 1.65	1.65 × 1.65	1.00 × 1.00
	1.5	1.1	1.1	0.4
	0.4 front, 0.8 back	0.8	0.8	–
	0.4	–	0.4	–
	–40 … +150	–40 … +150	–40 … +150	–40 … +150
	–40 … +135	–40 … +135	–40 … +135	–40 … +135
	10	10	10	10
	2.3 5	2.3 5	2.3 5	2.4 6
	–2.2 5	–2.2 5	–2.2 5	–2.2 5
	–	–	–	–
	2.6 … 4.0	2.6 … 4.0	2.6 … 4.0	2.6 … 4.0
	–50 | –40 | –35 | –30	–30	–25	–30
	+25 | +25 | +25 | +25	+30	+25	+30
	–	–	–	–
	±0.2	±0.2	±0.2	±0.3
	70 | 30 | 12 | 4.8	70 | 30 | 12 | 4.8	70 | 30 | 12 | 4.8	100
	112 | 120 | 120 | 120	112 | 120 | 120 | 120	112 | 120 | 120 | 120	120
	1.600 | 4.000 | 10.00 | 25.00	1.600 | 4.000 | 10.00 | 25.00	1.600 | 4.000 | 10.00 | 25.00	1.200
	B58600H8400A037 | B58600H8400A039 | B58600H8400A038 | B58600H8400A040	B58600H8000A001 | B58600H8000A002 | B58600H8000A003 | B58600H8000A004	B58601H8000A035 | B58601H8000A033 | B58601H8000A036 | B58601H8000A034	B58600I0000A001

Pressure Transducers

Technical data

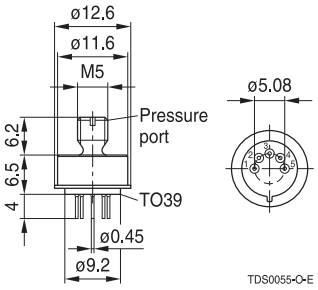
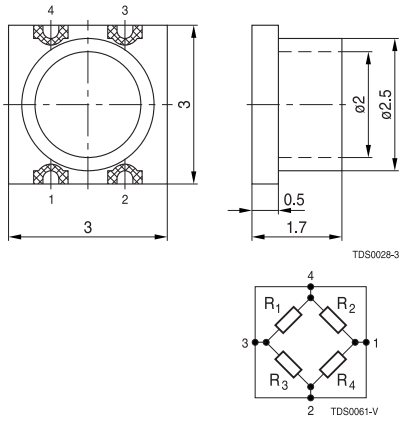
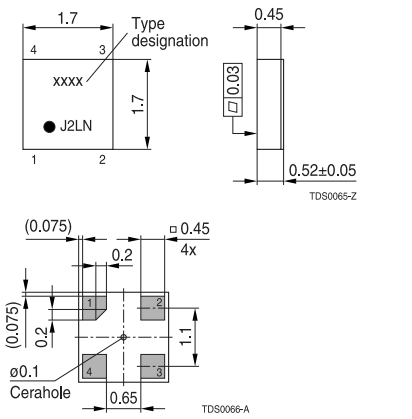
Type	AK2, KD types	AK2, KC types
Pressure measurement	**Gauge**	
Measured media	Non-aggressive fluids and gases	
Output signal	mV, not calibrated, not temperature-compensated	
Terminal assignment	Supply voltage V_{DD+}: Pin 1, Output voltage V_{out+}: Pin 2, Supply voltage V_{DD-}: Pin 3, Output voltage V_{out-}: Pin 4	
Dimensional drawings in mm	KD type, tube fitting	KC type, thread connection



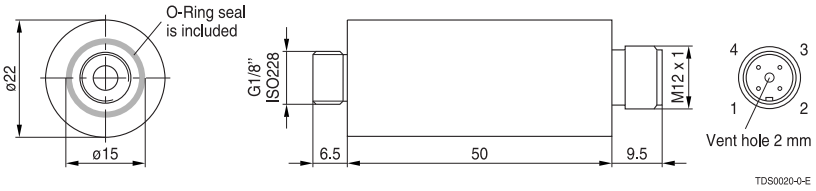


Maximum ratings											
Storage temperature T_{st}	°C	–40 … +125					–40 … +125				
Operating temperature T_a	°C	–30 … +85					–30 … +85				
Supply voltage (max.) V_{DD}	V	10					10				
Temperature characteristics V_{DD} = 5 V											
Temperature coefficients α_{RS} of the bridge resistance (typ.) β_{RS}	10^{-3}/K 10^{-6}/K²	2.4 6					2.4 6				
Temperature coefficients α_S of the sensitivity (typ.) β_S	10^{-3}/K 10^{-6}/K²	–2.2 5					–2.2 5				
Characteristics T_a = 25 °C, V_{DD} = 5 V											
Bridge resistance (typ.) R_S	kΩ	5.0	5.0	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.2
Offset voltage (min./max.) V_0	mV	–25 … +25									
Nonlinearity (typ.) L	%FS	±1	±0.75	±0.5			±0.25				
Output span (typ.) V_{Sp}@p_r	mV	25	42	50	100	120	120				
Rated pressure p_r	bar	0.025	0.060	0.100	0.250	0.400	1.000	2.500	6.000	10.00	25.00
Ordering code for KD types[1]		B58611K1100A001	B58611K1100A002	B58611K1100A003	B58611K1100A004	B58611K1100A005	B58611K1100A006	B58611K1100A007	B58611K1100A008	B58611K1100A009	B58611K1100A010
Ordering code for KC types[1]		B58611K1500A007	B58611K1500A008	B58611K1500A009	B58611K1500A010	B58611K1500A011	B58611K1500A012	B58611K1500A013	B58611K1500A014	B58611K1500A015	B58611K1500A016

[1] Rated pressure range 0.025 … 25.00 bar. Other values on request.

	AT2	ASB 1200 E SMD	T5100 SMD
	Absolute		
	Non-aggressive gases	Non-aggressive gases	Non-aggressive gases
	mV, not calibrated, not temperature-compensated		
	Supply voltage V_{DD+}: Pin 2, Output voltage V_{out+}: Pin 5, Supply voltage V_{DD-}: Pin 4, Output voltage V_{out-}: Pin 3	Supply voltage V_{DD+}: Pad 4, Output voltage V_{out+}: Pad 1, Supply voltage V_{DD-}: Pad 2, Output voltage V_{out-}: Pad 3	Output voltage V_{out+}: Pin 1, Ground GND: Pin 2, Output voltage V_{out-}: Pin 3, Supply voltage V_{DD}: Pin 4
			
	–40 … +125	–40 … +125	–40 … +125
	–30 … +85	–40 … +85	–40 … +85
	10	10	10
	2.3 5	2.4 6	2.4 6
	–2.2 5	–2.2 5	–2.2 5
	2.6 … 4.0	2.6 … 4.0	2.6 … 4.0
	–30 … +30	–30 … +30	0 … +30
	±0.2	±0.3	±0.3
	120	120	120
	1.600	1.200	1.200
	B58610T4600A001	B58610A0000A001	Upon request
	2.500		
	B58610T4600A002		
	4.000		
	B58610T4600A003		
	6.000		
	B58610T4600A004		
	10.00		
	B58610T4600A005		
	16.00		
	B58610T4600A006		
	25.00		
	B58610T4600A007		

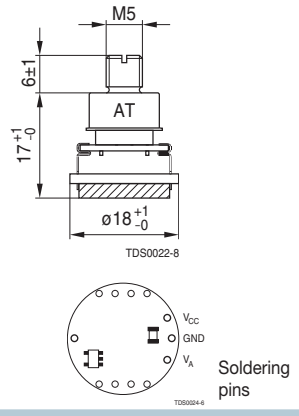
Technical data

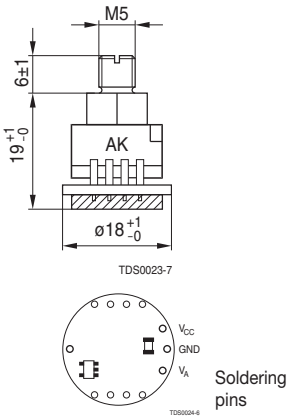
Type		CAU-T with stainless steel casing, **voltage** output		
Pressure measurement		**Absolute**	**Gauge**	**Gauge, symmetr.**
Measured media		Non-aggressive gases	Non-aggressive fluids and gases	
Output signal		0.5 V … 4.5 V, calibrated and temperature-compensated		
Terminal assignment		Supply voltage V_{CC}: Pin 1 (brown), Output voltage V_A: Pin 2 (white) Ground GND: Pin 3 (blue), Ground (Kelvin guidance) GND: Pin 4 (black)		
Dimensional drawings in mm		 A shielded 4-pole cable (2 m) with a modified (pressure equalisation) female M12 locking plug is included in delivery		
Maximum ratings				
Storage temperature T_{st}	°C	–30 … +85	–30 … +85	–30 … +85
Operating temperature T_a	°C	–25 … +85	–25 … +85	–25 … +85
Compensated range T_C	°C	0 … +70	0 … +70	0 … +70
DC breakdown voltage (min.) V_{is}	V	500	500	500
Supply voltage (min./max.) V_{CC}	V	7.5 … 30	7.5 … 30	7.5 … 30
Supply current (max.) I_{CC} (I_A=0)	mA	7	7	7
Signal output current (max.) I_A	mA	2	2	2
Max. output signal V_{ERR} at sensor failure	V	0.01	0.01	0.01
Temperature characteristics V_{CC} = 15 V within T_C				
Temperature coefficient of offset (typ.) TCV_{A0}	%FS/K	±0.015	±0.015	±0.015
Temperature coefficient of span (typ.) TCV_{FS}	%FS/K	±0.015	±0.015	±0.015
Characteristics T_a = 25 °C, V_{CC} = 15 V, I_A < 0.1 mA				
Response time (typ.) t_{10-90}	ms	1	1	1
Offset V_{A0}	V	0.5 ±0.015	0.5 ±0.015	2.5 ±0.015
Nonlinearity (typ.) L	%FS	±0.1	±0.1	±0.25
Output span V_{FS}	V	4.0 ±0.015	4.0 ±0.015	4.0 ±0.015
Rated pressure p_r	bar	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000
Ordering code[1)]		B58620H5810A018	B58620H5810A019	B58620H5810A020	B58620H5810A021	B58620H5810A022	B58621H5810A023	B58621H5810A024	B58621H5810A025	B58621H5810A026	B58621H5810A027	B58621H5810A028	B58621H5810A029	B58621H5810A030	B58623H5810A031	B58623H5810A032	B58623H5810A033	B58623H5810A034

[1)] Rated pressure range 0.100 … 25.00 bar. Other values on request.

Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

CAU-T without casing, **voltage** output		
Absolute	**Gauge**	**Gauge, symmetr.**
Non-aggressive gases	Non-aggressive fluids and gases	
0.5 V … 4.5 V, calibrated and temperature-compensated		
Supply voltage: V_{CC}, Ground: GND, Output signal (reference to GND): V_A		

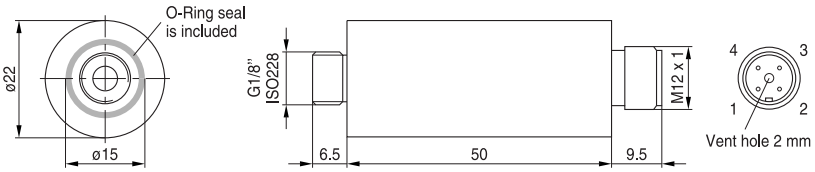
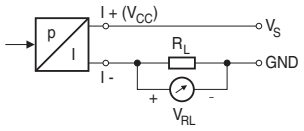




–40 … +105	–40 … +105	–40 … +105
–25 … +85	–25 … +85	–25 … +85
0 … +70	0 … +70	0 … +70
500	500	500
4.75 … 5.5	4.75 … 5.5	4.75 … 5.5
7	7	7
2	2	2
0.01	0.01	0.01
Temperature characteristics V_{CC} = 5 V within T_C		
±0.015	±0.015	±0.015
±0.015	±0.015	±0.015
Characteristics T_a = 25 °C, V_{CC} = 5 V, I_A < 0.1 mA		
1	1	1
0.5 ±0.015	0.5 ±0.015	2.5 ±0.015
±0.1	±0.1	±0.25
4.0 ±0.015	4.0 ±0.015	4.0 ±0.015

1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000
B58620T0510A001	B58620T0510A002	B58620T0510A003	B58620T0510A004	B58620T0510A005	B58621K0510A006	B58621K0510A007	B58621K0510A008	B58621K0510A009	B58621K0510A010	B58621K0510A011	B58621K0510A012	B58621K0510A013	B58623K0510A014	B58623K0510A015	B58623K0510A016	B58623K0510A017

Technical data

Type	CAU-T with stainless steel casing, **current** output			
Pressure measurement	**Absolute**	**Gauge**	**Gauge, symmetr.**	
Measured media	Non-aggressive gases	Non-aggressive fluids and gases		
Output signal	4 mA … 20 mA, calibrated and temperature-compensated			
Terminal assignment	Positive supply voltage I+ (V_{CC}): Pin 1 (brown), Negative supply voltage I–: Pin 3 (blue)			
Dimensional drawings in mm	 A shielded 4-pole cable (2 m) with a modified (pressure equalisation) female M12 locking plug is included in delivery 			

Maximum ratings				
Storage temperature T_{st}	°C	–30 … +85	–30 … +85	–30 … +85
Operating temperature T_a	°C	–25 … +85	–25 … +85	–25 … +85
Compensated range T_C	°C	0 … +70	0 … +70	0 … +70
DC breakdown voltage (min.) V_{is}	V	500	500	500
Supply voltage (min./max.) V_{CC}	V	10 … 30	10 … 30	10 … 30
Current limit I_{CCmax}	mA	23	23	23
Max. working resistance R_L $R_L = (V_S – 10\ V) / 0.02\ A$	Ω	1000	1000	1000
Max. output signal I_{ERR} at sensor failure	mA	3	3	3
Temperature characteristics V_{CC} = 15 V within T_C				
Temperature coefficient of offset (typ.) TCI_{CC0}	%FS/K	±0.015	±0.015	±0.015
Temperature coefficient of span (typ.) TCI_{FS}	%FS/K	±0.015	±0.015	±0.015
Characteristics T_a = 25 °C, V_{CC} = 15 V, R_L = 100 Ω				
Response time (typ.) $t_{10–90}$	ms	1	1	1
Offset I_{CC0}	mA	4 ±0.08	4 ±0.08	12 ±0.08
Nonlinearity (typ.) L	%FS	±0.1	±0.1	±0.25
Output span I_{FS}	mA	16 ±0.08	16 ±0.08	16 ±0.08

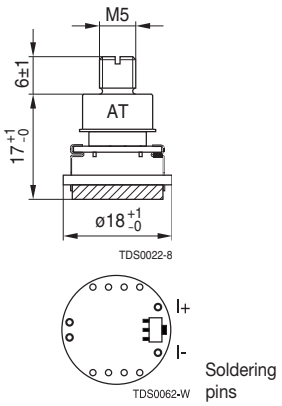
Rated pressure p_r	bar	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000
Ordering code[1]		B58620H5820A035	B58620H5820A036	B58620H5820A037	B58620H5820A038	B58620H5820A039	B58621H5820A040	B58621H5820A041	B58621H5820A042	B58621H5820A043	B58621H5820A044	B58621H5820A045	B58621H5820A046	B58621H5820A047	B58623H5820A048	B58623H5820A049	B58623H5820A050	B58623H5820A051

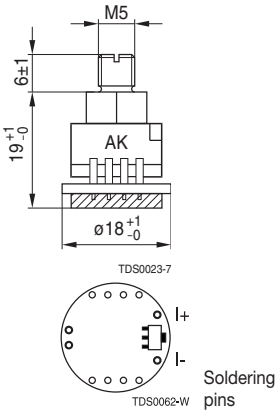
[1] Rated pressure range 0.100 … 25.00 bar. Other values on request.

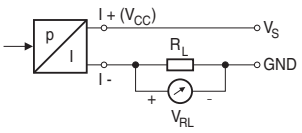
Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

CAU-T without casing, **current** output

Absolute	**Gauge**	**Gauge, symmetr.**
Non-aggressive gases	Non-aggressive fluids and gases	
4 mA … 20 mA, calibrated and temperature-compensated		
Positive supply voltage: I+ Negative supply voltage: I–		







–40 … +105	–40 … +105	–40 … +105
–25 … +85	–25 … +85	–25 … +85
0 … +70	0 … +70	0 … +70
500	500	500
10 … 30	10 … 30	10 … 30
23	23	23
1000	1000	1000
3	3	3
±0.015	±0.015	±0.015
±0.015	±0.015	±0.015
1	1	1
4 ±0.08	4 ±0.08	12 ±0.08
±0.1	±0.1	±0.25
16 ±0.08	16 ±0.08	16 ±0.08

1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000
B58620T0520A001	B58620T0520A002	B58620T0520A003	B58620T0520A004	B58620T0520A005	B58621K0520A001	B58621K0520A002	B58621K0520A003	B58621K0520A004	B58621K0520A005	B58621K0520A006	B58621K0520A007	B58621K0520A008	B58623K0520A001	B58623K0520A002	B58623K0520A003	B58623K0520A004

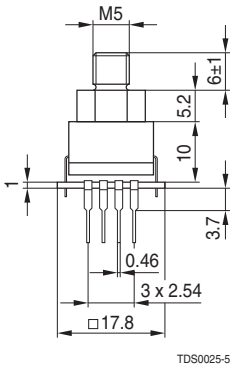
Technical data

Type	AC-T series, LN types, **voltage** output		AC-T series, KD types, **voltage** output							
Pressure measurement	**Absolute**		**Gauge**				**Gauge, symmetr.**			
Measured media	Non-aggressive gases		Non-aggressive fluids and gases							
Output signal	0.5 V … 4.5 V, calibrated and temperature-compensated									
Terminal assignment	Supply voltage V_{CC}: Pin 1, Ground GND: Pin 2, Output signal (reference to GND) V_A: Pin 3									
Dimensional drawings in mm	For PCB mounting. Terminal assignment		For PCB mounting. Terminal assignment							
Maximum ratings										
Storage temperature T_{st} °C	–40 … +105		–40 … +105				–40 … +105			
Operating temperature T_a °C	–25 … +85		–25 … +85				–25 … +85			
Compensated range T_C °C	0 … +70		0 … +70				0 … +70			
DC breakdown voltage (min.) V_{is} V	500		500				500			
Supply voltage (min./max.) V_{CC} V	4.75 … 5.5		4.75 … 5.5				4.75 … 5.5			
Supply current (max.) I_{CC} (I_A=0) mA	7		7				7			
Signal output current (max.) I_A mA	2		2				2			
Max. output signal V_{ERR} at sensor failure V	0.01		0.01				0.01			
Temperature characteristics V_{CC} = 5 V within T_C										
Temperature coefficient of offset (typ.) TCV_{A0} %FS/K	±0.015		±0.015				±0.015			
Temperature coefficient of span (typ.) TCV_{FS} %FS/K	±0.015		±0.015				±0.015			
Characteristics T_a = 25 °C, V_{CC} = 5 V, I_A < 0.1 mA										
Response time (typ.) t_{10-90} ms	1		1				1			
Offset V_{A0} V	0.5 ±0.015		0.5 ±0.015				2.5 ±0.015			
Nonlinearity (typ.) L %FS	±0.1		±0.1				±0.25			
Output span V_{FS} V	4.0 ±0.015		4.0 ±0.015				4.0 ±0.015			
Rated pressure p_r bar	1.000	2.500	0.100	0.250	0.400	1.000	0.100	0.250	0.400	1.000
Ordering code[1]	B58620L1110A052	B58620L1110A053	B58621K1110A054	B58621K1110A055	B58621K1110A056	B58621K1110A057	B58623K1110A058	B58623K1110A059	B58623K1110A060	B58623K1110A061

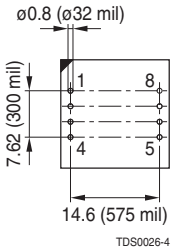
[1] Rated pressure range 0.100 … 25.00 bar. Other values on request.

	AC-T series, KC types, **voltage** output	
	Gauge	**Gauge, symmetr.**
	Non-aggressive fluids and gases	
	0.5 V … 4.5 V, calibrated and temperature-compensated	
	Supply voltage V_{CC}: Pin 1, Ground GND: Pin 2, Output signal (reference to GND) V_A: Pin 3	

For PCB mounting.



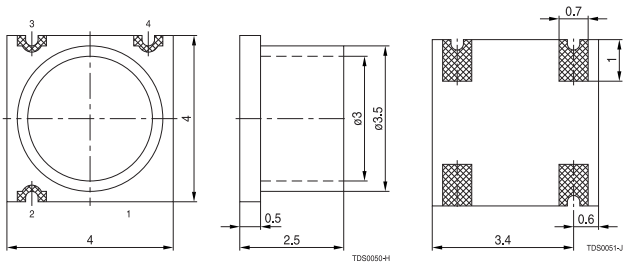
Terminal assignment



	–40 … +105	–40 … +105
	–25 … +85	–25 … +85
	0 … +70	0 … +70
	500	500
	4.75 … 5.5	4.75 … 5.5
	7	7
	2	2
	0.01	0.01
	±0.015	±0.015
	±0.015	±0.015
	1	1
	0.5 ±0.015	2.5 ±0.015
	±0.1	±0.25
	4.0 ±0.015	4.0 ±0.015

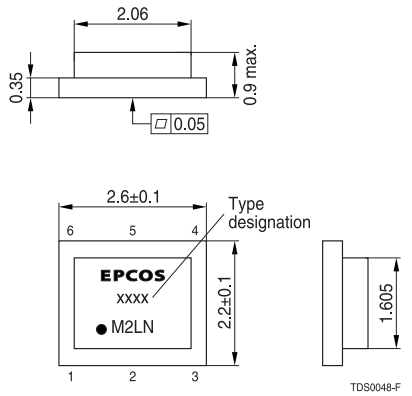
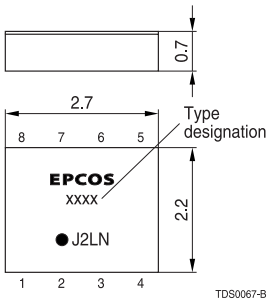
0.100	0.250	0.400	1.000	2.500	6.000	10.00	25.00	0.100	0.250	0.400	1.000
B58621K1510A062	B58621K1510A063	B58621K1510A064	B58621K1510A065	B58621K1510A066	B58621K1510A067	B58621K1510A068	B58621K1510A069	B58623K1510A070	B58623K1510A071	B58623K1510A072	B58623K1510A073

Technical data

Type		ASB 1200 V1 SMD	ASB 1200 VR SMD
Pressure measurement		**Absolute**	**Absolute**
Measured media		Non-aggressive gases	Non-aggressive gases
Output signal		0…1 V, calibrated and temperature-compensated	10 … 90% V_{CC}, calibrated and temp.-compensat.
Terminal assignment		Supply voltage V_{CC}: Pad 4, Output voltage V_A: Pad 3, Ground GND: Pad 2	
Dimensional drawings in mm			
Maximum ratings			
Storage temperature T_{st}	°C	–40 … +125	–40 … +125
Operating temperature T_a	°C	–40 … +85	–40 … +85
Compensated range T_C	°C	0 … +70	0 … +70
DC breakdown voltage (min.) V_{is}	V	500	500
Supply voltage (min./max.) V_{CC}	V	2.7 … 5.5	2.7 … 5.5
Supply current (max.) I_{CC} (I_A=0)	mA	5	5
Signal output current (max.) I_A	mA	2	2
Resolution	bit	11	11
Temperature characteristics V_{CC} = 5 V within T_C			
Temperature coefficient of offset (typ.) TCV_{A0}	%FS/K	±0.015	±0.015
Temperature coefficient of span (typ.) TCV_{FS}	%FS/K	±0.015	±0.015
Characteristics T_a = 25 °C, V_{CC} = 5 V, I_A < 0.1 mA			
Response time (typ.) t_{10-90}	ms	2	2
Offset V_{A0}	V	0 @ 200 mbar	10% V_{CC} @ 200 mbar
Nonlinearity (typ.) L	%FS	±0.1	±0.1
Output span V_{FS}	V	1	80% V_{CC}
Rated pressure range	bar	0.2 … 1.2	0.2 … 1.2
Ordering code[1)]		B58620A0010A001	B58620A0010A002

[1)] Rated pressure range 1.200 bar. Other values on request.

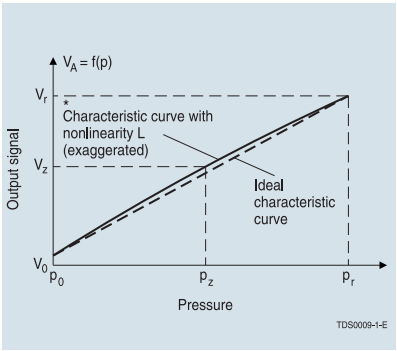
Please read *Important notes* on page 4 and *Cautions and warnings* on page 25.

	T5300 SMD	T5400 SMD
	Absolute	**Absolute**
	Non-aggressive gases	Non-aggressive gases
	Serial bus, I²C, SPI	Serial bus, I²C, SPI
	Ground GND: Pad 1 and 4, INT/SS: Pad 2, V_{DD}: Pad 3, SCL/SCLK: Pad 5, SDA/MISO: Pad 6	V_{DD}: Pad 1, CAP: Pad 2, Ground GND: Pad 3, PROG: Pad 4, RST/SS: Pad 5, MOSI: Pad 6, SDA/MISO: Pad 7, SCL/SCLK: Pad 8
		
	–40 … +125	–40 … +125
	–40 … +85	–40 … +85
	customer-specific	customer-specific
	–	–
	2.7 … 5.5	1.8 … 3.6
	3	2
	–	–
	14	16
	–	–
	–	–
	–	–
	–	–
	–	–
	–	–
	0.3 … 1.1	0.3 … 1.1
	Upon request	Upon request

Description of Terms

Characteristic curve

The key parameters of the characteristic curve are described below:



Offset voltage $V_0 = V_A(p_0)$

The output voltage V_A at zero pressure, known as the offset voltage, typically varies between ±25 mV[1] due to the spread of the technological parameters.

Sensitivity $S = (V_r - V_0) / (p_r - p_0)$

The sensitivity is the quotient of the changes of the output voltage and the applied pressure. Thinner diaphragms and larger surfaces increase the sensitivity and decrease the loadbearing capacity of the diaphragm. Every design is therefore a compromise between high sensitivity and a sufficient pressure overload factor.
Depending on the pressure range, the sensitivity extends between 0.5 and 1800 mV/bar[1]. The spread of the technological parameters means that the sensitivity varies within a single pressure range.

[1] At V_{DD} = 5 V voltage source
[2] FS = $V_r - V_0$ (full scale)

Nonlinearity

$L = (V_z - V_0) / (V_r - V_0) - (p_z - p_0) / (p_r - p_0)$

The nonlinearity describes the deflection of the characteristic curve or the deviation from an ideal straight line. The above formula calculates the nonlinearity by the end-point method. Depending on the pressure range, the nonlinearity typically varies from ±0.1 to ±1.0% FS[2]. In many cases, the nonlinearity is preserved despite the hysteresis error, as this is very small in comparative terms.

Hysteresis

For an output signal indicating the same pressure, this represents the greatest difference between measurements made in the direction of increasing and (subsequently) decreasing pressure. This error cannot be determined or compensated. However, the effect is very small and can be neglected in most applications.

Temperature effects

The offset, sensitivity and bridge resistance are functions of the temperature:

Offset V_0

$V_0 = V_0(25\ °C) + TCV_0 \cdot (\vartheta - 25\ °C) \cdot V_{DD}$

The temperature coefficient of the offset voltage typically varies between ±4 µV/VK depending on the technological parameters. This effect can be neglected in most applications.

Sensitivity S

$S(\vartheta) = S(25\ °C) \cdot [1 + \alpha_S \cdot (\vartheta - 25\ °C) + \beta_S \cdot (\vartheta - 25\ °C)^2]$

The temperature coefficient of the sensitivity is much more significant. Depending on the technological parameters, a typical value of α_S ranges between –3.1 and $-1.8 \cdot 10^{-3}$/K. The sensitivity thus decreases with temperature rise. A typical value of β_S is $6 \cdot 10^{-6}/K^2$.

Bridge resistance R_S

$R_S(\vartheta) = R_S(25\ °C) \cdot [1 + \alpha_{RS} \cdot (\vartheta - 25\ °C) + \beta_{RS} \cdot (\vartheta - 25\ °C)^2]$

The bridge resistance is directly proportional to the temperature (at 25 °C, 3 kΩ and 5 kΩ). Depending on the technological parameters, a typical value of α_{RS} ranges between 2.0 and $2.5 \cdot 10^{-3}$/K. A typical value of β_{RS} is $6 \cdot 10^{-6}/K^2$.

Cautions and Warnings

Storage (general)

All pressure sensors should be stored in their original packaging. They should not be placed in harmful environments such as corrosive gases nor exposed to heat or direct sunlight, which may cause deformations. Similar effects may result from extreme storage temperatures and climatic conditions. Avoid storing the sensor dies in an environment where condensation may form or in a location exposed to corrosive gases, which will adversely affect their performance. Plastic materials should not be used for wrapping/packing when storing or transporting these dies, as they may become charged. Pressure sensor dies should be used soon after opening their seal and packaging.

Operation (general)

Media compatibility with the pressure sensors must be ensured to prevent their failure. The use of other media can cause damage and malfunction. Never use pressure sensors in atmospheres containing explosive liquids or gases.

Ensure pressure equalization to the environment, if gauge pressure sensors are used. Avoid operating the pressure sensors in an environment where condensation may form or in a location exposed to corrosive gases. These environments adversely affect their performance.

If the operating pressure is not within the rated pressure range, it may change the output characteristics. This may also happen with pressure sensor dies if an incorrect mounting method is used. Be sure that the applicable pressure does not exceed the overpressure, as it may damage the pressure sensor.

Do not exceed the maximum rated supply voltage nor the rated storage temperature range, as it may damage the pressure sensor.

Temperature variations in both the ambient conditions and the media (liquid or gas) can affect the accuracy of the output signal from the pressure sensors. Be sure to check the operating temperature range and thermal error specification of the pressure sensors to determine their suitability for the application.

Connections must be wired in accordance with the terminal assignment specified in the data sheets. Care should be taken as reversed pin connections can damage the pressure transmitters or degrade their performance. Contact between the pressure sensor terminals and metals or other materials may cause errors in the output characteristics.

Design notes (dies)

This specification describes the mechanical, electrical and physical requirements of a piezoresistive sensor die for measuring pressure. The specified parameters are valid for the pressure sensor die with pressure application either to the front or back side of the diaphragm as described in the data sheet. Pressure application to the other side may result in differing data. Most of the parameters are influenced by assembly conditions. Hence these parameters and the reliability have to be specified for each specific application and tested over its temperature range by the customer.

Handling/Mounting (dies)

Pressure sensor dies should be handled appropriately and not be touched with bare hands. They should only be picked up manually by the sides using tweezers. Their top surface should never be touched with tweezers. Latex gloves should not be used for handling them, as this will inhibit the curing of the adhesive used to bond the die to the carrier. When handling, be careful to avoid cuts caused by the sharp-edged terminals. The sensor die must not be contaminated during manufacturing processes (gluing, soldering, silk-screen process).

The package of pressure sensor dies should not to be opened until the die is mounted and should be closed after use. The sensor die must not be cleaned. The sensor die must not be damaged during the assembly process (especially scratches on the diaphragm).

Soldering (transducers, transmitters)

The thermal capacity of pressure sensors is normally low, so steps should be taken to minimize the effects of external heat. High temperatures may lead to damage or changes in characteristics.

A non-corrosive type of flux resin should normally be used and complete removal of the flux is recommended.

Avoid rapid cooling due to dipping in solvent. Note that the output signal may change if pressure is applied to the terminals during soldering.

This listing does not claim to be complete, but merely reflects the experience of EPCOS AG.

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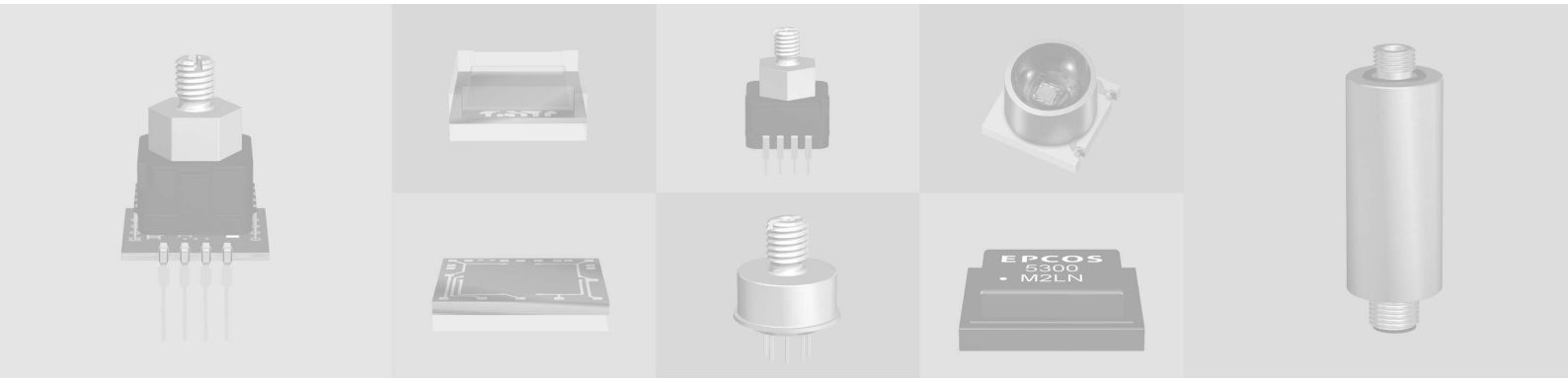

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