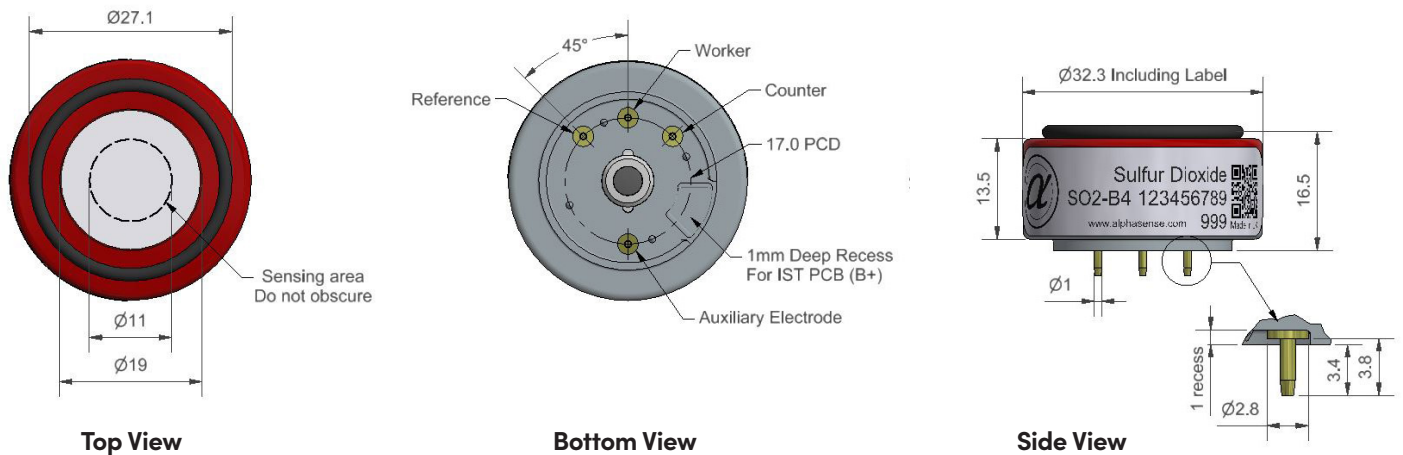


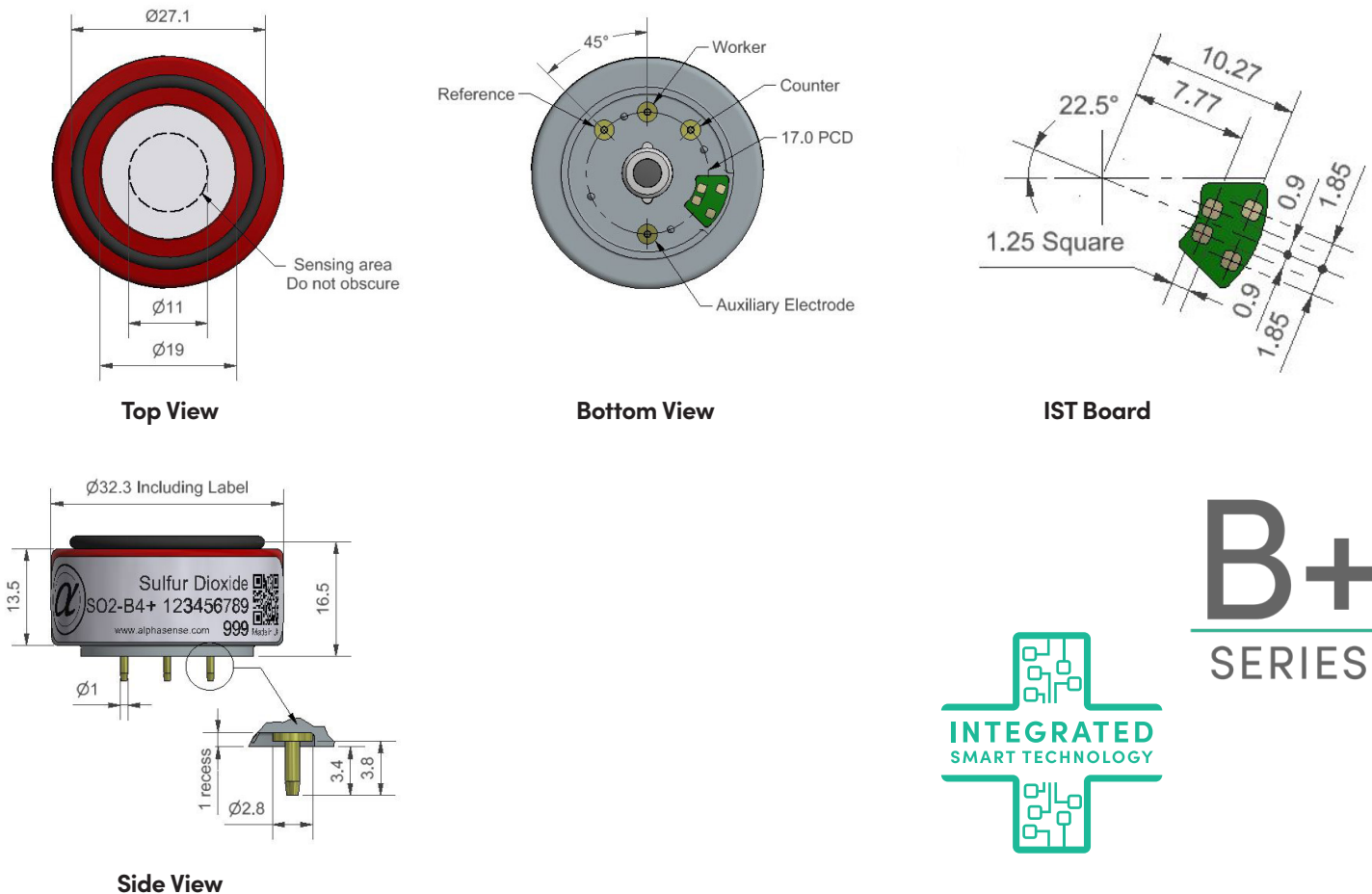
SO2-B4/SO2-B4+ Sulfur Dioxide Sensor

The SO2-B4 sensor is a PPB sensor that is designed for environmental air quality applications with best-in-class baseline stability. This product is available in our standard format (SO2-B4) and with our patented Integrated Smart Technology (SO2-B4+) that has an IST board with a memory chip and temperature sensor integrated in the sensor. The + sensors store specific calibration, specification, and identification data on every sensor allowing plug and play operation. The on-board temperature sensor improves the accuracy and simplicity of temperature compensation algorithms.

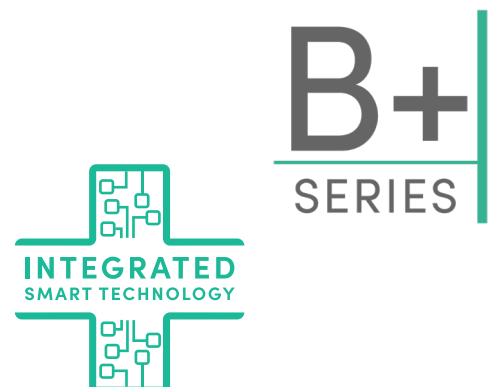
SO2-B4 Sulfur Dioxide Sensor – 4-Electrode



SO2-B4+ Sulfur Dioxide Sensor – 4-Electrode (with Integrated Smart Technology)



Dimensions are in millimetres (± 0.15 mm).



Sensor Data

Performance	Sensitivity	nA/ppm at 2ppm SO ₂	275 to 520
	Response time	t90 (s) from zero to 2ppm SO ₂	< 60
	Zero current	nA in zero air at 20°C	-100 to +100
	Noise*	±2 standard deviations (ppb equivalent)	5
	Range	ppm limit of performance warranty	100
	Linearity	ppb error at 100ppm SO ₂ , linear at zero and 10ppm SO ₂	0 to -2
	Overgas limit	maximum ppm for stable response to gas pulse	200
	*Tested with Alphasense ISB low noise circuit		

Lifetime	Zero drift	ppb equivalent change/year in lab air	< ± 20
	Sensitivity drift	% change/year in lab air, monthly test	< ± 15
	Operating life	months until 50% original signal (24-month warranted)	> 36

Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 2ppm SO ₂	70 to 90
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 2ppm SO ₂	90 to 110
	Zero @ -20°C	nA change from 20°C	0 to -10
	Zero @ 50°C	nA change from 20°C	10 to 30

Cross Sensitivity	Filter capacity	ppm hrs	450
	H ₂ S sensitivity	% measured gas @ 5ppm	H ₂ S < 2
	NO ₂ sensitivity	% measured gas @ 5ppm	NO ₂ < -120
	Cl ₂ sensitivity	% measured gas @ 5ppm	Cl ₂ < -80
	NO sensitivity	% measured gas @ 5ppm	NO < 4
	CO sensitivity	% measured gas @ 5ppm	CO < 3
	H ₂ sensitivity	% measured gas @ 100ppm	H ₂ < 0.5
	C ₂ H ₄ sensitivity	% measured gas @ 100ppm	C ₂ H ₄ < 1
	NH ₃ sensitivity	% measured gas @ 20ppm	NH ₃ < 0.1
	CO ₂ sensitivity	% measured gas @ 5%	CO ₂ < 0.1
	O ₃ sensitivity	% measured gas @ 0.5ppm	O ₃ < -120

Key Specifications	Temperature range	°C	-30 to 50
	Pressure range	kPa	80 to 120
	Humidity range	% rh continuous (see note below)	15 to 90
	Storage period	months @ 3 to 20°C (stored in sealed pot)	6
	Load resistor	Ω (ISB circuit is recommended)	33 to 100
	Weight	g	< 13

Figure 1 Sensitivity Temperature Dependence

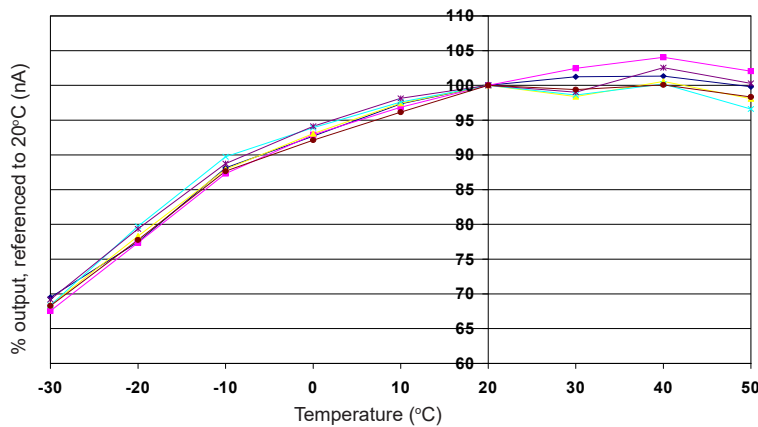


Figure 1 shows the temperature dependence of sensitivity at 2ppm SO₂.

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

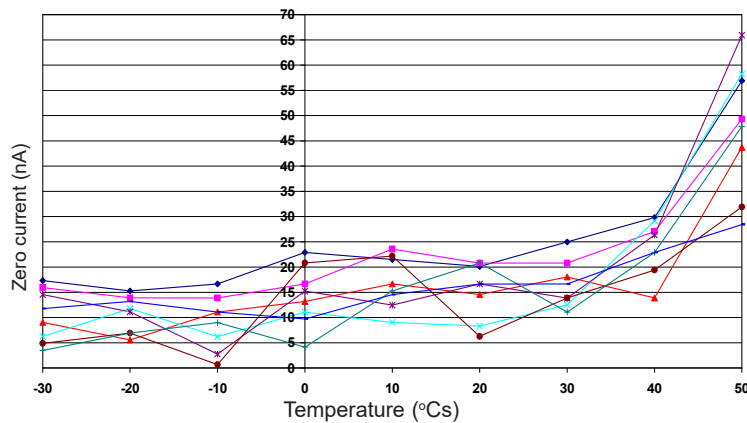


Figure 2 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for further information on zero current correction.

Figure 3 Response to 200ppb SO₂

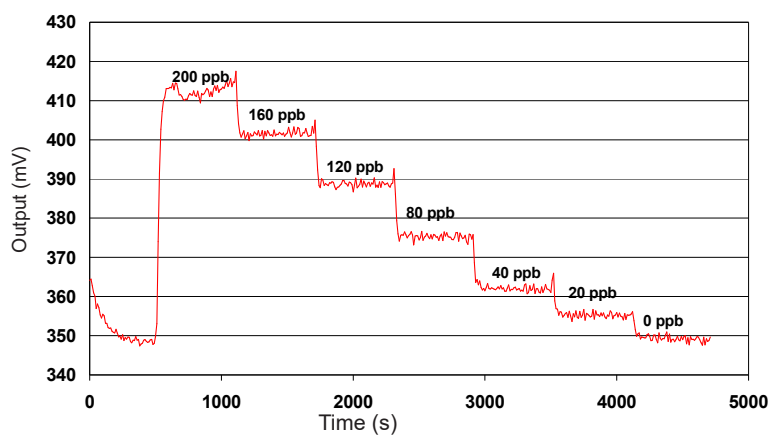


Figure 3 shows response from 20 to 200ppb SO₂.

Use of Alphasense ISB circuit reduces noise to 5ppb, with the opportunity of digital smoothing to reduce noise even further.

IST Board Data

Interface

Communication Bus	Compatible with the 400 kHz I ² C protocol
Max. Bus Speed	Up to 1 MHz
Input Logic Levels	High (Recessive) < 2.3 V Low (Dominant) < 0.2 V
Absolute Max. Input Signal	3.6 V

Electrical

Supply Voltage Range	1.7 V to 3.6 V
Supply current – Stand-By	< 5 µA
Supply current – Operating	< 0.15 mA (temperature reading only) < 2.15 mA (temperature reading + memory reading/writing)
Power Supply Conditioning	Built-In 100 nF decoupling capacitor
ESD Protection	4 kV (human body model) – Enhanced ESD / Latch-Up protection
Bus Pins Input Capacitance	15 pF max.

Performance

Operational Temperature	–40 °C to +85 °C
Temperature Sensor Accuracy	±1°C (–0°C to +70°C)
Memory Data Retention	> 200 years
Memory Write Cycles	> 4,000,000

Data & Communication

Memory IC & I2C Address	M24128X-FCU Device Address: R – 0xA0 / W – 0xA1
Temperature IC & I2C Address	MAX31875R0TZS+T Device Address: R – 0x90 / W – 0x91
Product Data Start Address	0x0900
Calibration Data Start Address	0x0B00
User Data Area	0x0D00 – 0x18FF (3,072 Bytes)
CRC Polynomial	0x 01 04C1 1DB7
Digital Signature Algorithm	SHA-256

Factory-populated data

Product Data

Data Format Version
Customer (OEM) ID
Product ID
Type of Sensor / Target Gas
Sensor Serial Number
End of Storage Period Date
Sensor Replacement Date
Product Data Checksum
Alphasense Digital Signature
Customer Digital Signature

Calibration

Calibration Data Units
Zero (clean dry air) Output
Calibration Span
Calibration Output
Sensitivity
Calibration Date
Calibration Data Checksum
Calibration Data Signature

Sensor Specification

Over-gas limit
Concentration Range
Temperature Range Low
Temperature Range High
Humidity Range Low
Humidity Range High
Pressure Range Low
Pressure Range High
Specification Checksum

15,000+ locations

Customer Specific

Custom Parameters
Re-Calibration Due Date
Operational Limits:
Low | High | STEL | TWA
Next Bump Test Due Date
User Data Area

Note: Above 85% rh and 40°C a maximum continuous exposure period of 10 days is warranted. Where such exposure occurs the sensor will recover normal electrolyte volumes when allowed to rest at lower % rh and temperature levels for several days.

At the end of the product's life, do not dispose of any electronic sensor, component or instrument in the domestic waste, but contact the instrument manufacturer, Alphasense or its distributor for disposal instructions. NOTE: all sensors are tested at ambient environmental conditions unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.

In the interest of continued product improvement, we reserve the right to change design features and specifications without prior notification. The data contained in this document is for guidance only. Alphasense Ltd accepts no liability for any consequential losses, injury or damage resulting from the use of this document or the information contained within.(©ALPHASENSE LTD) Doc. Ref. SO2-B4/FEB24