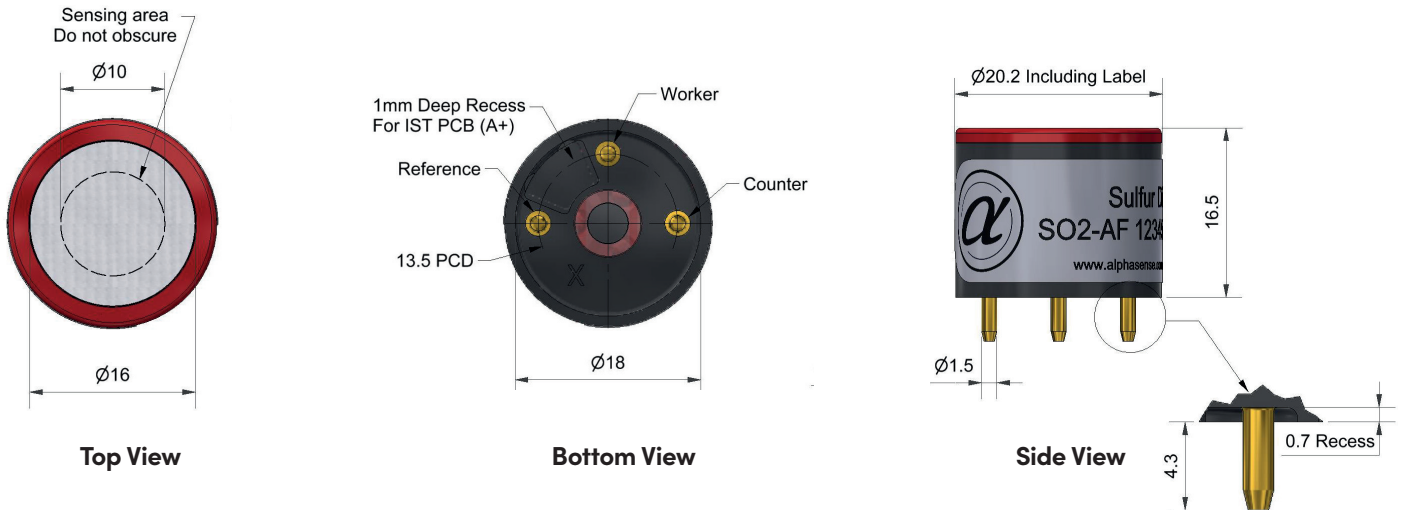


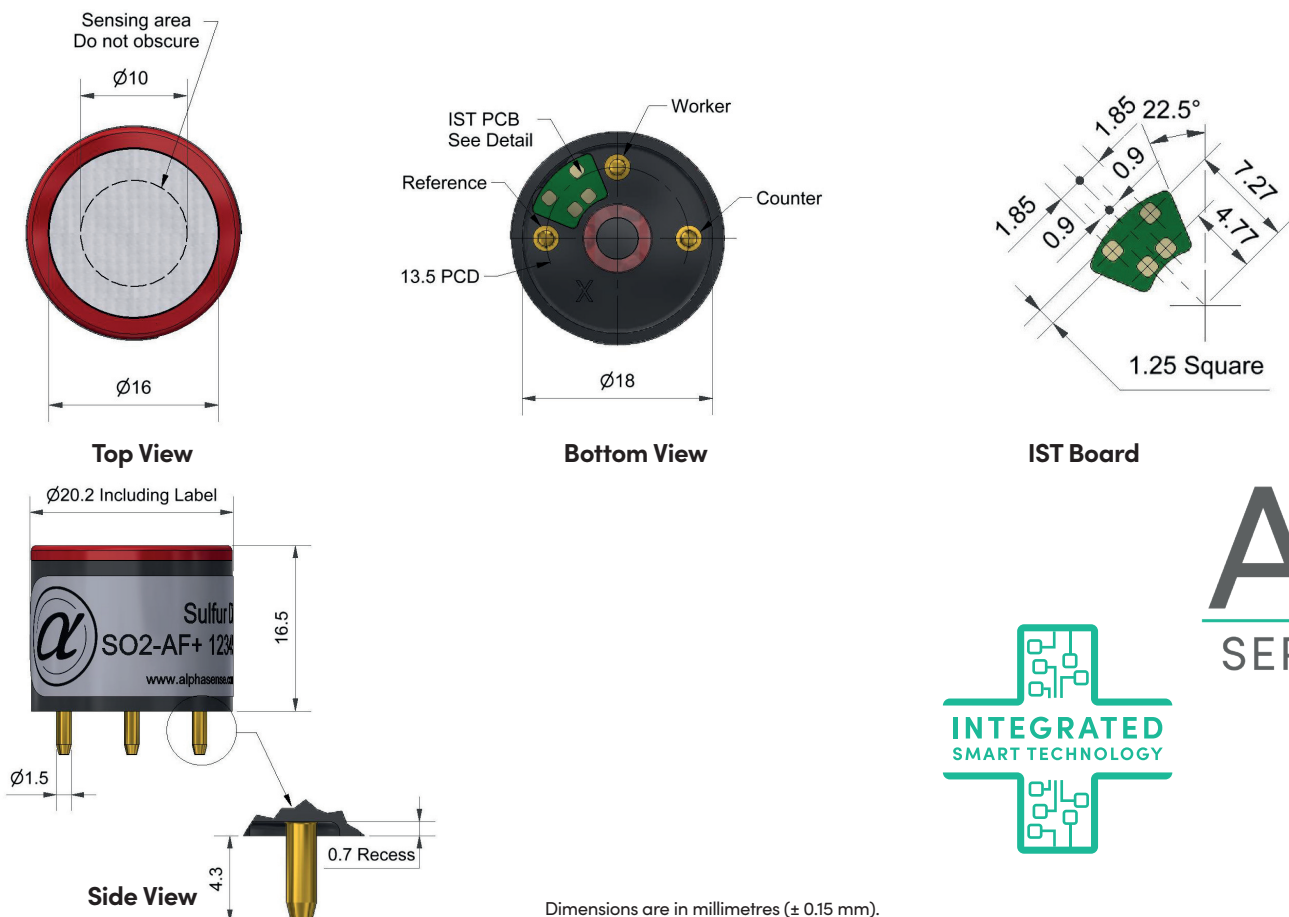
## SO2-AF/SO2-AF+ Sulfur Dioxide Sensor

The SO2-AF sensor is a PPM sensor that is designed for a broad variety of applications and instrumentation including portable gas detectors and fixed gas detection systems for industrial safety, environmental air quality analysis and process control. The A series is the most widely used sensor format for portable gas detection applications. It is available in our standard format (SO2-AF) and with our patented Integrated Smart Technology (SO2-AF+) 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-AF Sulfur Dioxide Sensor – 3-Electrode



### SO2-AF+ Sulfur Dioxide Sensor – 3-Electrode (with Integrated Smart Technology)



Dimensions are in millimetres ( $\pm 0.15$  mm).

## Sensor Data

|                           |                                           |                                                        |            |
|---------------------------|-------------------------------------------|--------------------------------------------------------|------------|
| <b>Performance</b>        | Sensitivity                               | nA/ppm in 10ppm SO <sub>2</sub>                        | 300 to 550 |
|                           | Response time                             | t <sub>90</sub> (s) from zero to 10ppm SO <sub>2</sub> | < 35       |
|                           | Zero current                              | ppm equivalent in zero air                             | < ± 0.6    |
|                           | Resolution                                | RMS noise (ppm equivalent)                             | < 0.1      |
|                           | Range                                     | ppm limit of performance warranty                      | 50         |
|                           | Linearity                                 | ppm error at full scale, linear at zero and 10ppm      | < ± 0.3    |
|                           | Overgas limit                             | maximum ppm for stable response to gas pulse           | 75         |
| <b>Lifetime</b>           | Zero drift                                | ppm equivalent change/year in lab air                  | <0.1       |
|                           | Sensitivity drift                         | % change/year in lab air, monthly test                 | < 4        |
|                           | Operating life                            | months until 80% original signal (24 month warranted)  | > 24       |
| <b>Environmental</b>      | Sensitivity @ -20°C                       | % (output @ -20°C/output @ 20°C) @ 10ppm               | 70 to 90   |
|                           | Sensitivity @ 50°C                        | % (output @ 50°C/output @ 20°C) @ 10ppm                | 90 to 102  |
|                           | Zero @ -20°C                              | ppm equivalent change from 20°C                        | < ± 0.8    |
|                           | Zero @ 50°C                               | ppm equivalent change from 20°C                        | < ± 3      |
| <b>Cross sensitivity</b>  | Filter capacity                           | ppm·hrs H <sub>2</sub> S                               | 1000       |
|                           | H <sub>2</sub> S sensitivity              | % measured gas @ 20ppm H <sub>2</sub> S                | < 3        |
|                           | NO <sub>2</sub> sensitivity               | % measured gas @ 10ppm NO <sub>2</sub>                 | < -130     |
|                           | Cl <sub>2</sub> sensitivity               | % measured gas @ 10ppm Cl <sub>2</sub>                 | < -60      |
|                           | NO sensitivity                            | % measured gas @ 50ppm NO                              | < ± 2      |
|                           | CO sensitivity                            | % measured gas @ 400ppm CO                             | < 1.6      |
|                           | H <sub>2</sub> sensitivity                | % measured gas @ 400ppm H <sub>2</sub>                 | < 0.3      |
|                           | C <sub>2</sub> H <sub>4</sub> sensitivity | % measured gas @ 400ppm C <sub>2</sub> H <sub>4</sub>  | < 40       |
| <b>Key specifications</b> | NH <sub>3</sub> sensitivity               | % measured gas @ 20ppm NH <sub>3</sub>                 | < 0.1      |
|                           | Temperature range                         | °C                                                     | -30 to 50  |
|                           | Pressure range                            | kPa                                                    | 80 to 120  |
|                           | Humidity range                            | % rh continuous                                        | 15 to 90   |
|                           | Storage period                            | months @ 3 to 20°C (stored in sealed pot)              | 6          |
|                           | Load resistor                             | Ω (recommended)                                        | 10 to 47   |
|                           | Weight                                    | g                                                      | < 6        |

**Figure 1 Sensitivity Temperature Dependence**

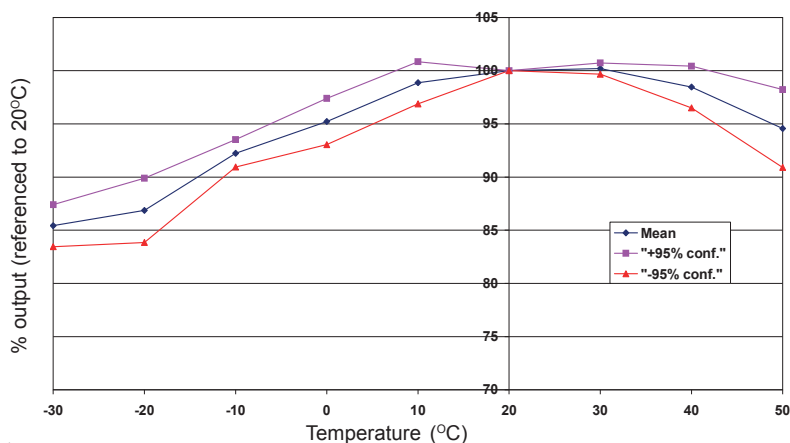


Figure 1 shows the variation in sensitivity caused by changes in temperature.

This data is taken from a typical batch of sensors. The mean and 95% confidence intervals are shown.

**Figure 2 Zero Temperature Dependence**

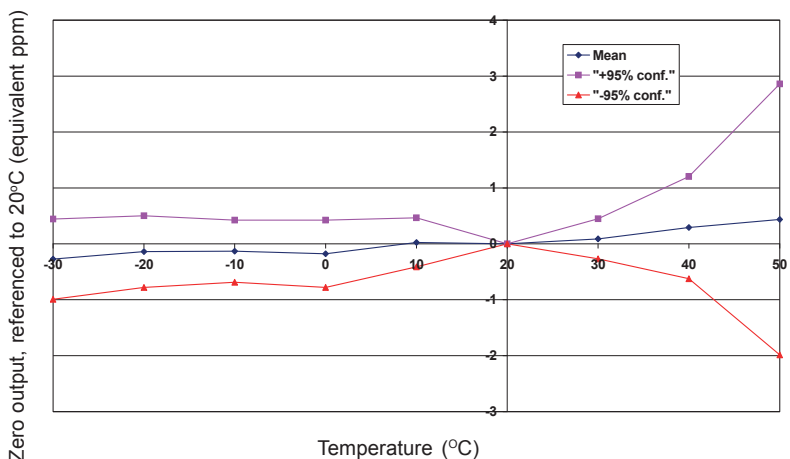
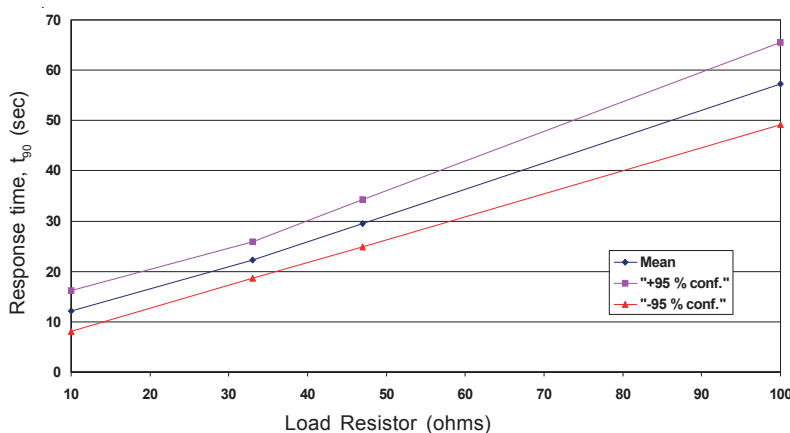


Figure 2 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent, referenced to zero at 20°C.

This data is taken from a typical batch of sensors.

**Figure 3 Response Time vs. Load Resistor**



As with all Alphasense toxic gas sensors, increasing the load resistor slows the response time, but also reduces noise for better resolution.

IST Board Data

Interface

|                            |                                                       |
|----------------------------|-------------------------------------------------------|
| Communication Bus          | Compatible with the 400 kHz I <sup>2</sup> 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)<br>< 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

15,000+ locations

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

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 40oC 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, with 10 ohm load resistor, 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-AF/SEPT24

T: +44 (0)1376 556700

E: [sensors.alphasense@ametek.com](mailto:sensors.alphasense@ametek.com)

W: [www.alphasense.com](http://www.alphasense.com)

For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. or visit our website at "www.alphasense.com".