



## DUAL AXIS INCLINOMETER MODULE

### SAS221T-D09a PRODUCT SPECIFICATION



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## 1. General description

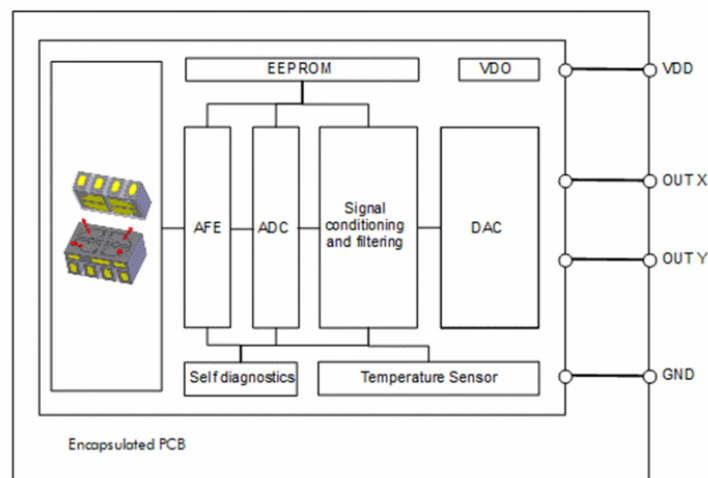
This document describes SAS221T inclination modules, suitable for various industrial applications. The sensor used inside is the muRata 3D-MEMS based accelerometer component with fully digital signal processing.

The output signal is proportional to the sine of the inclination angle.

The output data of the module is presented as analogue output voltage of 0.5 ... 4.5V.

## 2. Block diagram

Products are based on the newest 3D-MEMS components, mounted on PCB. Electronics is encapsulated in a robust metal housing, with pigtail. This new 3D-MEMS technology provides increased accuracy and improved out signal stability.



### 1.1. Inclinometer Features

- Accurate  $\pm 90^\circ$  measurement, single or dual axis
- DC response with low sensing element frequency response
- Easy to use and design in
- High resolution analog output
- Wide temperature range

#### Benefits

- Excellent long term stability
- Sensing element controlled frequency
- Outstanding shock durability
- Harsh environment robustness

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### 3. Electrical specifications

#### 3.1. Absolute maximum ratings

Parameter	Comment	Min.	Typ	Max.	Units
Supply voltage		4,75		5,5	V
Reverse polarity protection				0,3	V
Current consumption			10		mA
Output load	resistive	10			kΩ
	capacitive			10	nF
Storage temp		-40		90	°C
Operating temp		-25		85	°C

#### 3.2. Electrical Specifications

T / Q <sup>1)</sup>	Parameter	Condition	SAS221T-D09a	Units
T	Measurement range <sup>2)</sup>		± 90	°
T	Measurement axis	(see "Directions")	X-Y	
T	Offset <sup>5)</sup>	Output at 0°	2,5	V
T	Offset calibration error	Max. deviation	±1	°
Q	Offset temperature error	0...70°C (@0° pos.)	±0,3	°
		-25...85°C	±0,8	°
T	Sensitivity	@ 0° (offset position)	35 2	mV/° V/g
T	Sensitivity calibration accuracy		±1	%
Q	Sensitivity temperature error	0...70°C	-0,8...0,3	%
		-25...85°C	-1,5...0,5	%
Q	Angular nonlinearity	Arcsine function of acc.	N / A	°
	Acceleration nonlinearity	Best fit FS straight line	±10	mg
Q	Frequency response -3dB <sup>3)</sup>		85 ±10	Hz
T	Cross-axis sensitivity <sup>4)</sup>		4	%

Supply voltage +5V and room temperature, unless otherwise specified

- Note 1. T=Tested during production, Q = Parameter is qualified during product validation  
 Note 2. Measurement range is limited by sensitivity and offset  
 Note 3. Frequency response is determined by the sensing element's internal gas damping. Output has true DC response  
 Note 4. Cross-axis sensitivity determines how much inclination perpendicular to the measurement axis couples to the output  
 Note 5. Position should be calibrated during/after mounting. See "Measurement directions"

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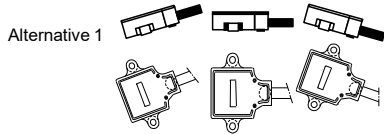
### 3.3. Electrical Connection

Highly flexible PUR cable, no connector

	Name	Function	Wire color
1	GND	Ground	white
2	VDD	Power supply +5VDC input	brown
3	Out X	Output SCA221T, X-direction	green
4	Out Y	Output SCA221T, Y-direction	yellow

### 3.4. Measuring Directions

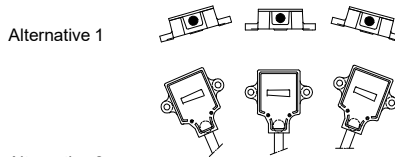
#### X-axis



Alternative 2

Negative incl., Zero position, Positive incl.

#### Y-axis



Alternative 2

Positive incl., Zero position, Negative incl.

Earth's gravity

Figure 1. Positions

## 4. Mechanical specification

- Cable length: 320 ± 20 mm
- Cable type: IGUS CHAINFLEX CF2.01.04, PUR grey
- Cable diam.: 6 ± 0,2mm
- Leads: 4 x 0,14mm<sup>2</sup>
- Total weight: approx. = 0,07 kg
- Protection class: IP66
- Metal part: Zinc casting, trivalent passivation (RoHS compliant)

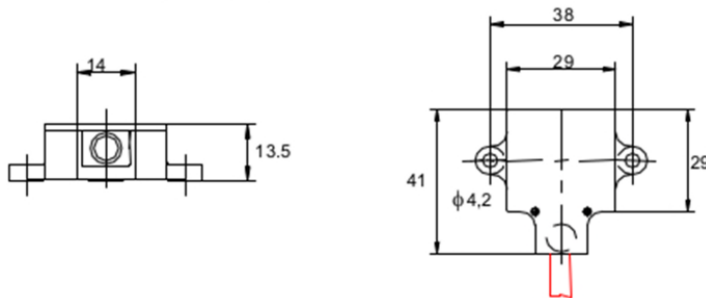


Figure 2

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## 5. Mounting

The sensor module is mounted with 2 screws, dimension M4. Mounting torque  $5 \pm 1$  Nm. Mounting alignment is critical as errors will decrease the sensor performance.

## 6. Ordering Information

Article	Description
SAS221T-D09a	Dual Axis Inclinometer Module ± 90°; Supply voltage 4,75Vdc to 5,5 Vdc Cable length 320 ± 20 mm Replacement of the SAS121T-D09

## 7. Document Change Control

Rev.	Date	Document	Description	Author
X1.0	27.05.2019	Initial version	Preliminary datasheet	KLCH
1.1	05.11.2019	Updated technical datas	Preliminary datasheet	KLCH
1.1	13.08.2020	No change, "preliminary" removed	Datasheet rev. 1.1	KLCH

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