

DUAL AXIS INCLINOMETER MODULE

SAS221T-D09

PRODUCT SPECIFICATION



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1. General description

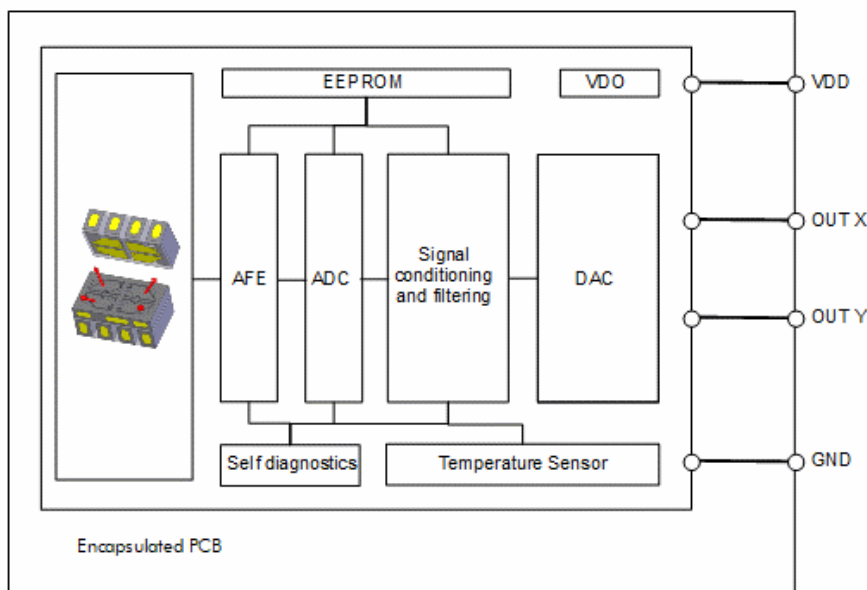
This document describes SAS221T inclination modules, suitable for various industrial applications. The sensor used inside is the muRata 3D-MEMS based accelerometer component with fully digital signal processing.

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. Inclinomater 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

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 ¹⁾	Parameter	Condition	SAS221T-D09a	Units
T	Measurement range ²⁾		± 90	°
T	Measurement axis	(see "Directions")	X-Y	
T	Offset ⁵⁾	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 ³⁾		85 ±10	Hz
T	Cross-axis sensitivity ⁴⁾		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"

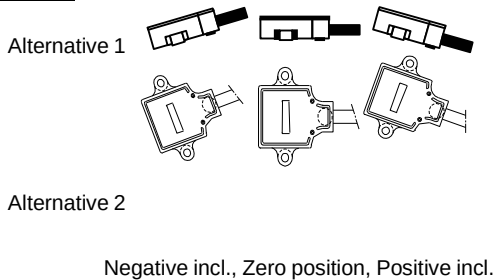
3.3. Electrical Connection

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



Y-axis

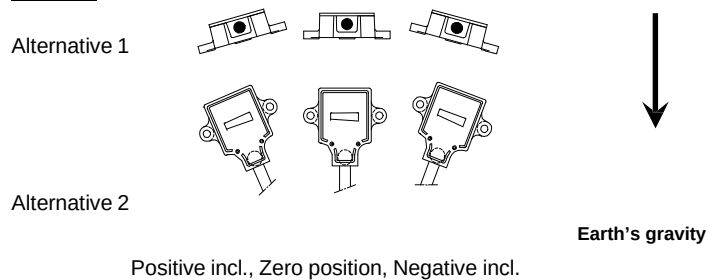


Figure 1. Positions

4. Mechanical specification

Cable length:	D09a:	320 ± 20 mm
	D09a-EL	1500 ± 20 mm
Cable type:	IGUS CHAINFLEX CF2.01.04, PUR grey	
Cable diam.:	6 ± 0,2mm	
Leads:	4 x 0,14mm ²	
Total weight:	approx. = 0,07 kg	
Protection class:	IP66	
Metal part:	Zinc casting, trivalent passivation (RoHS compliant)	

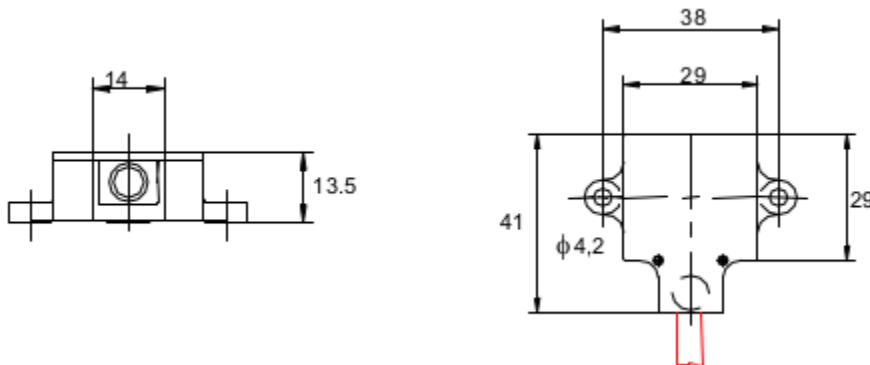


Figure 2

5. Mounting

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

6. Ordering Information

Article	Description
SAS221T-D09a	Dual Axis Inclinator Module $\pm 90^\circ$; Supply voltage 4,75Vdc to 5,5 Vdc Cable length $320 \pm 20\text{ mm}$
SAS221T-D09a-EL	Dual Axis Inclinator Module $\pm 90^\circ$; Supply voltage 4,75Vdc to 5,5 Vdc Cable length $1500 \pm 20\text{ mm}$

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 data	Preliminary datasheet	KLCH
1.1	13.08.2020	No change, "preliminary" removed	Datasheet rev. 1.1	LE
1.2	25.11.2021	Cable length	4. Mechanical specification & 6. Ordering Information changed	THOHAR
2.1	01.08.2022	New Design internal PCB	Preliminary datasheet Different Microcontroller can be used on different PCBs SiliconLabs EFM32TG110F32 Microchip PIC32CM6408MC00032 PIC32CM1216MC00032	KLCH
2.2	30.11.2022	Updated revision	Removed "preliminary" Status	THOHAR
2.3	19.12.2024	Updated revision	Add extra long cable option	THOHAR

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