

## Data Sheet



# SCA820-D04 1-AXIS HIGH PERFORMANCE ACCELEROMETER WITH DIGITAL SPI INTERFACE

### Features

- 3.3 V supply voltage
- $\pm 2$  g measurement range
- Single axis measurement in Z direction
- $\pm 30$  mg offset accuracy over temp range
- SPI digital interface
- Enhanced self diagnostics features
- Size 7.6 x 3.3 x 8.6 mm (w x h x l)
- Qualified according to AEC-Q100 standard
- Package, pin-out and SPI protocol compatible with Murata's digital accelerometer product family
- RoHS compliant Dual Flat Lead (DFL) plastic package suitable for lead free soldering process and SMD mounting
- Proven capacitive 3D-MEMS technology

### Applications

SCA820-D04 is targeted to automotive applications with high stability requirements.

Typical applications

- Hill Start Aid (HSA)
- Electronic Parking Brake (EPB)
- Roll Over detection
- Suspension control
- Motion and position measurements

### General description

SCA820-D04 is a single axis inclinometer component based on Murata's capacitive 3D-MEMS technology. The component integrates high accuracy micromechanical acceleration sensing together with a flexible SPI digital interface. Dual Flat Lead (DFL) housing guarantees reliable operation over product lifetime.

SCA820-D04 is designed, manufactured, and tested for high stability, reliability, and quality requirements of automotive applications. The inclinometer has an extremely stable output over wide ranges of temperature, humidity, and mechanical noise. The component is qualified to the AEC-Q100 standard and has several advanced self-diagnostics features. The DFL housing is suitable for SMD mounting and the component is compatible with the RoHS and ELV directives.

SCA820-D04 is a part of Murata digital accelerometer family and fully compatible with multi axis accelerometers (SCA2100 series and SCA3100 series) and other single axis accelerometers (SCA800 series).

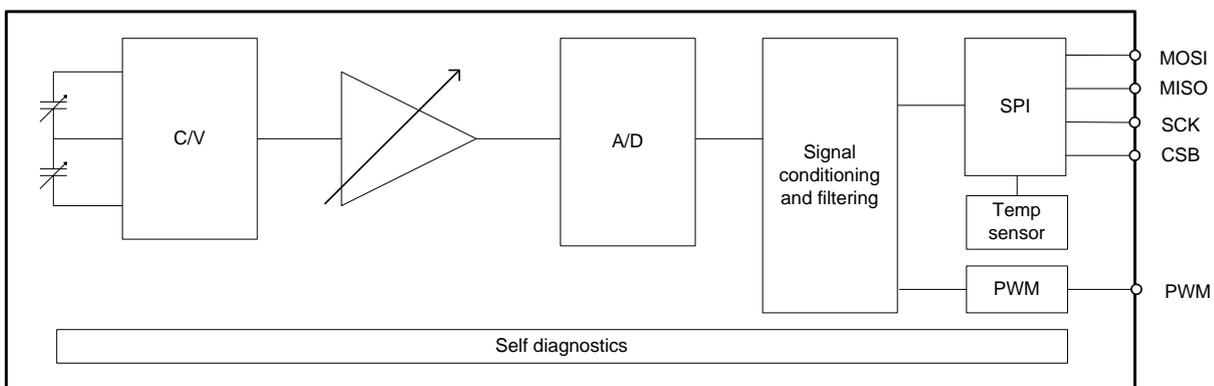
## Performance Characteristics

V<sub>dd</sub>=3.3 V and ambient temperature unless otherwise specified.

**Table 1.** Performance characteristics of SCA820-D04

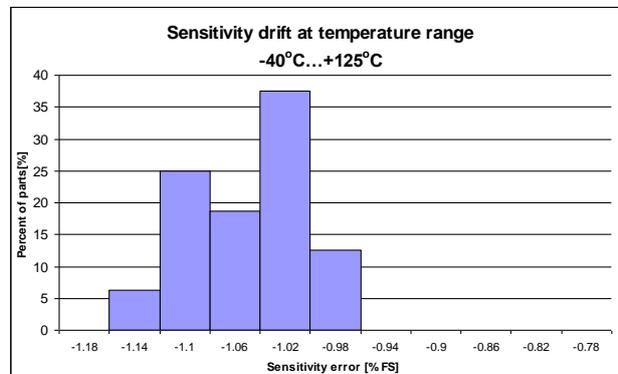
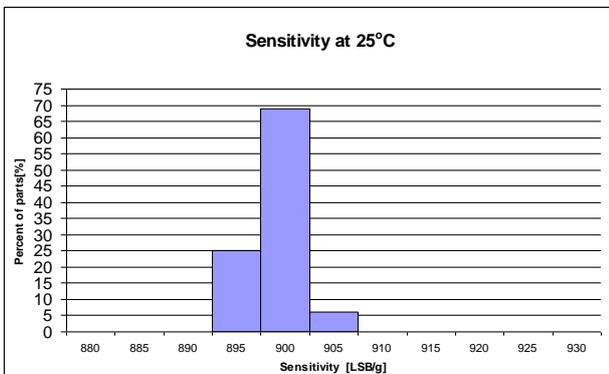
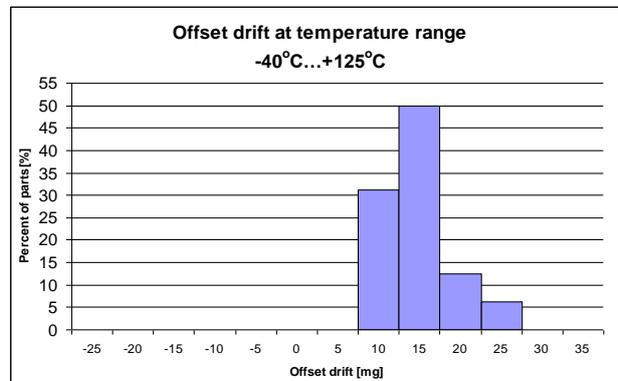
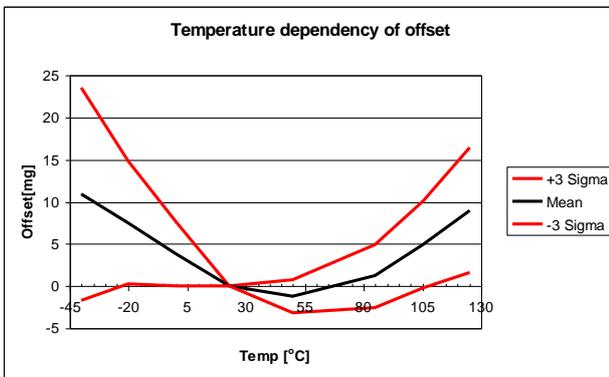
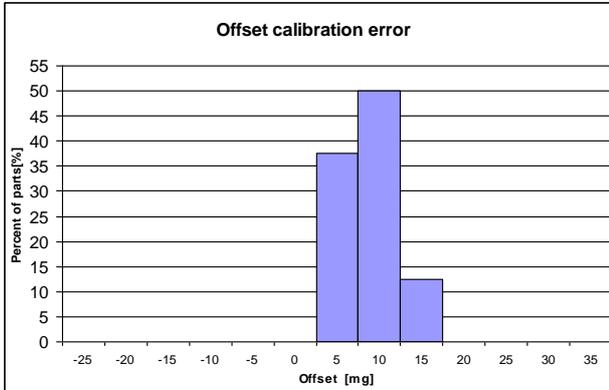
Parameter	Condition				Units
		Min	Typ <sup>1)</sup>	Max	
Analog and digital V <sub>dd</sub>		3.0		3.6	V
Current consumption	Active mode		5	6.3	mA
	Power down mode			0.1	mA
Measurement range	Measurement axes (Z)	-2		2	g
Operating temperature		-40		125	°C
Offset total error <sup>2)</sup>	Temperature range -40 ... +125 °C	-70		70	mg
Offset calibration error <sup>3)</sup>	@25 °C ±5°C	-40	±18	40	mg
Offset temperature drift	Temperature range -40 ... +125 °C	-30 <sup>4)</sup>	±25 <sup>5)</sup>	30 <sup>4)</sup>	mg
	Temperature range -20 ... +85 °C		±15		mg
Sensitivity	12 bit output		900		Count/g
	Between ±3°		0.0637		%/Count
Total sensitivity error	Temperature range -40 ... +125 °C	-4		4	% FS
Sensitivity calibration error	@25 °C ±5°C		±1.1		% FS
Sensitivity temperature drift	Temperature range -40 ... +125 °C		±1.3		% FS
Linearity error	+1g ... -1g range, end point fit	-20		20	mg
	+2g ... -2g range, end point fit	-40		40	mg
Cross-Axis sensitivity				±3.5	%
Zero acceleration output	2-complement		0		Counts
Amplitude response	-3dB frequency	30		80	Hz
Noise			2	5	mg RMS
Power on setup time				0.1	s
Output data rate			2000		Hz
Output load				50	pF
SPI clock rate				8	MHz
ESD	Human Body Model			2	kV
	Charge Device Model			1	kV
Moisture level	IPC/JEDEC J-STD-020C, Level 3				
Mechanical shock				20 000	g
ID register value	Customer readable ID register (27hex)		04		

- 1) Typical ± values are ±3 sigma variation limits from validation test population.
- 2) Includes offset deviation from 0 g value including calibration error and drift over lifetime, temperature, and supply voltage.
- 3) Includes offset deviation from 0 g value including calibration error and drift over lifetime.
- 4) Offset drift due to temperature. Value is a relative value and has been centred to zero. Error defined as maximum change of offset in temperature range. Offset (max) - Offset (min). 100% tested in production.
- 5) Biggest change of output from RT value due to temperature.

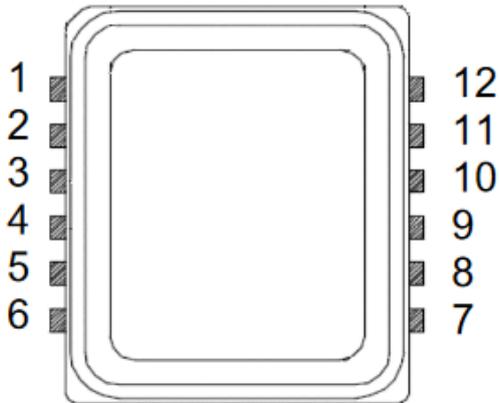


**Figure 1.** SCA820-D04 Block Diagram

## Typical Performance characteristics



## Pin Description



**Figure 1.** Component pinout

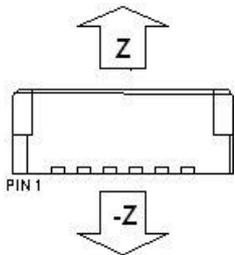
**Table 2.** Component pinout

No.	Name	Type <sup>1)</sup>	PD/PU <sup>2)</sup>	Function	Connect
1	Reserved			Not used	Gnd
2	Reserved		PD	Factory use	Gnd
3	AVSS	AI		Negative power supply (analog)	Gnd
4	AVDD	AI		Positive power supply (analog)	Vdd
5	CSB	DI	PU	Chip select	CSB
6	MISO	ZO		Data output	MISO
7	SCK	DI	PD	Serial clock	SCK
8	MOSI	DI	PD	Data input	MOSI
9	Reserved	ADO		Pulse width modulation output	PWM
10	DVDD	AI		Positive power supply (digital)	Vdd
11	DVSS	AI		Negative power supply (digital)	Gnd
12	EGnd	AI		EMC ground	Gnd

- 1) A = Analog, D = Digital, I = Input, O = Output, Z = Tristate Output
- 2) PU = internal pullup, PD = internal pulldown
- 3) PWM pin is driven to '0' after start-up when PWM is disabled. During the mass deflection self-test (STE) PWM pin goes to '1' and returns to '0' when STE is completed. In case of STE failure PWM output will stay at '1'

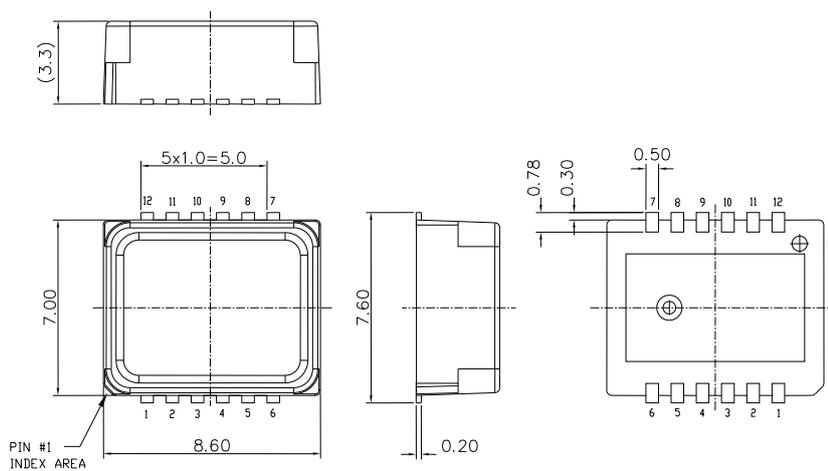
Further description of recommended circuit diagram and PWB layout can be found from company website.  
Documentation: **SCA8X0 21X0 3100 Product Family Specification**

### Measurement directions



**Figure 3.** Accelerometer measuring directions.

### Housing dimensions



**Figure 4.** Housing dimensions

## Order information

**Table 3.** Order codes for SCA820-D04

Order code	Description	Measurement Range (g)	Packing	Qty
SCA820-D04-004	1-axis high performance accelerometer with digital SPI interface	±2 g	Bulk	4 pcs
SCA820-D04-1	1-axis high performance accelerometer with digital SPI interface	±2 g	T&R	100 pcs
SCA820-D04-10	1-axis high performance accelerometer with digital SPI interface <i>This order code is used for automotive customers after customer has approved the product for production</i>	±2 g	T&R	1000 pcs

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