L3G462A

MEMS motion sensor:
± 625 dps full scale - 3-axis analog gyroscope

Preliminary data

Features

- ± 625 dps full scale
- Wide supply voltage range 2.4 V to 3.6 V
- Embedded power-down and sleep mode to save power consumption and shorten turn-on time
- Integrated temperature sensor
- Embedded low pass filter
- High shock survivability
- Extended operating temperature range (-40 °C to 85 °C)
- ECOPACK® RoHS and "Green" compliant

Applications

- Gaming and virtual reality input devices
- Motion control with MMI (man-machine interface)
- GPS navigation systems
- Appliances and robotics

Description

The L3G462A is a low-power 3-axis angular rate sensor.

It includes a sensing element and an IC interface able to provide the measured angular rate to the external world through three analog outputs.

The sensing element is manufactured using a dedicated micromachining process developed by ST to produce inertial sensors and actuators on silicon wafers.

LGA-16 (4x4x1.1 mm)
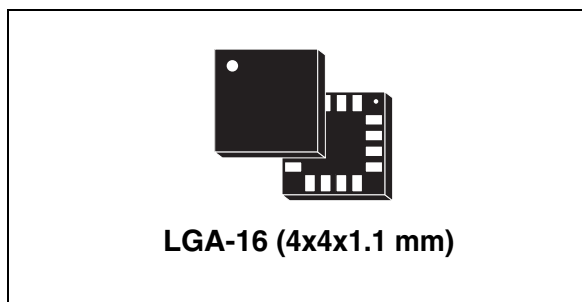
The IC interface is manufactured using a CMOS process that allows a high level of integration to design a dedicated circuit which is trimmed to better match the sensing element characteristics.

The L3G462A is available in a plastic land grid array (LGA) package and can operate within a temperature range from -40 °C to +85 °C.

Table 1. Device summary

Order code	Temperature range (°C)	Package	Packing
L3G462A	-40 to +85	LGA-16 (4x4x1.1)	Tray
L3G462ATR	-40 to +85	LGA-16 (4x4x1.1)	Tape and reel

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Contents

1 Block diagram and pin description

1.1 Pin description

Figure 1. Pin connection

AM09244V1
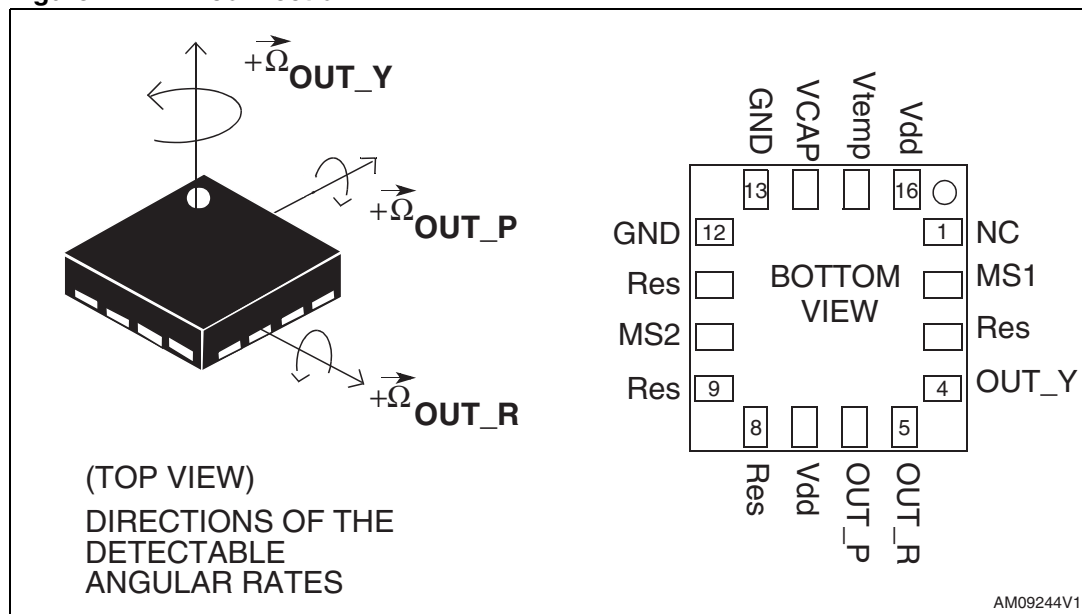
Table 2. Pin description

Pin#	Name	Function
1	NC	Internally not connected
2	MS1	Mode selection pin 1
3	Res	Reserved. Connect to GND
4	OUT_Y	Yaw axis angular rate output
5	OUT_R	Roll axis angular rate output
6	OUT_P	Pitch axis angular rate output
7	Vdd	Power supply
8	Res	Reserved. Leave unconnected
9	Res	Reserved. Leave unconnected
10	MS2	Mode selection pin 2
11	Res	Reserved. Leave unconnected
12	GND	0 V supply voltage
13	GND	0 V supply voltage
14	CAP	Charge pump capacitor connection pin
15	Vtemp	Temperature sensor output
16	Vdd	Power supply

2   Mechanical and electrical specifications

2.1   Mechanical characteristics

Vdd = 3.0 V, T = 25 °C unless otherwise noted [a]

Table 3.   Mechanical characteristics

Symbol	Parameter	Test condition	Min.	Typ.[1]	Max.	Unit
FS	Measurement range			±625		dps
So	Sensitivity			2		mV/dps
SoDr	Sensitivity change vs. temperature			±0.017		%/°C
Zrl	Zero-rate level			1.5		V
OffDr	Zero-rate level change vs. temperature[2]			±0.04		dps/°C
NL	Non linearity[3]	Best fit straight line		0.5		% FS
Rn	Rate noise density			0.017		dps/$\sqrt{Hz}$
BW	Bandwidth			140		Hz
TSo	Temperature sensor sensitivity			-2		mV/°C
TOff	Temperature sensor offset	27 °C		640		mV
TonPD	Turn-on time	From PD to normal mode		150		ms
TonSl	Turn-on time	From sleep to normal mode (no external filter applied)		10		ms
Top	Operating temperature range		-40		+85	°C

1. Typical specifications are not guaranteed.

2. Min. and max. values have been estimated based on the measurements of the current gyros in production.

3. Guaranteed by design.

a. The product is factory calibrated at 3.0 V. The operational power supply range is specified in *Table 4*.

2.2 Electrical characteristics

Vdd=3.0 V, T=25 °C unless otherwise noted [b]

Table 4.   **Electrical characteristics**

Symbol	Parameter	Test condition	Min.	Typ.[1]	Max.	Unit
Vdd	Supply voltage		2.4	3.0	3.6	V
Idd	Supply current			6.9		mA
IddSL	Supply current in sleep mode[2]	Selectable by digital interface		2		mA
IddPdn	Supply current in power-down mode	Selectable by digital interface		5		µA
Top	Operating temperature range		-40		+85	°C

1. Typical specifications are not guaranteed.

2. Sleep mode introduces a faster turn-on time related to power down mode.

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b. The product is factory calibrated at 3.0 V.

2.3 Absolute maximum ratings

Stresses above those listed as "absolute maximum ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Table 5.   Absolute maximum ratings

Symbol	Ratings	Maximum value	Unit
Vdd	Supply voltage	-0.3 to 4.8	V
T_{STG}	Storage temperature range	-40 to +125	°C
Sg	Acceleration g for 0.1 ms	10,000	g
ESD	Electrostatic discharge protection	2 (HBM)	kV

This is a mechanical shock sensitive device, improper handling can cause permanent damage to the part.

This is an ESD sensitive device, improper handling can cause permanent damage to the part.

2.4 Terminology

2.4.1 Sensitivity

An angular rate gyroscope is a device that produces a positive-going digital output for counterclockwise rotation around the sensible axis considered. Sensitivity describes the gain of the sensor and can be determined by applying a defined angular velocity to it. This value changes very little over temperature and time.

2.4.2 Zero-rate level

Zero-rate level describes the actual output signal if there is no angular rate present. The zero-rate level of precise MEMS sensors is, to some extent, a result of stress to the sensor and therefore zero-rate level can slightly change after mounting the sensor onto a printed circuit board or after exposing it to extensive mechanical stress.

2.5 Sleep mode and power-down mode

The L3G462A enables advanced power saving functionalities thanks to the different operating modes available. When the device is set in sleep mode configuration, the reading chain is completely turned off, allowing low power consumption. In this condition the device turn-on time is significantly reduced allowing simple external power cycling.

The user can select the desired operating mode through two dedicated pins (MS1 and MS2).

Table 6.   Sleep mode and power-down mode configuration

| Operating mode	MS1	MS2
Normal mode	0	0
Power-down	1	1
Sleep mode	0	1

2.6 Soldering information

The LGA package is compliant with the ECOPACK® RoHS and "Green" standards. It is qualified for soldering heat resistance according to JEDEC J-STD-020.

Leave "Pin 1 Indicator" unconnected during soldering.

Land pattern and soldering recommendations are available at www.st.com/mems.

3 Application hints

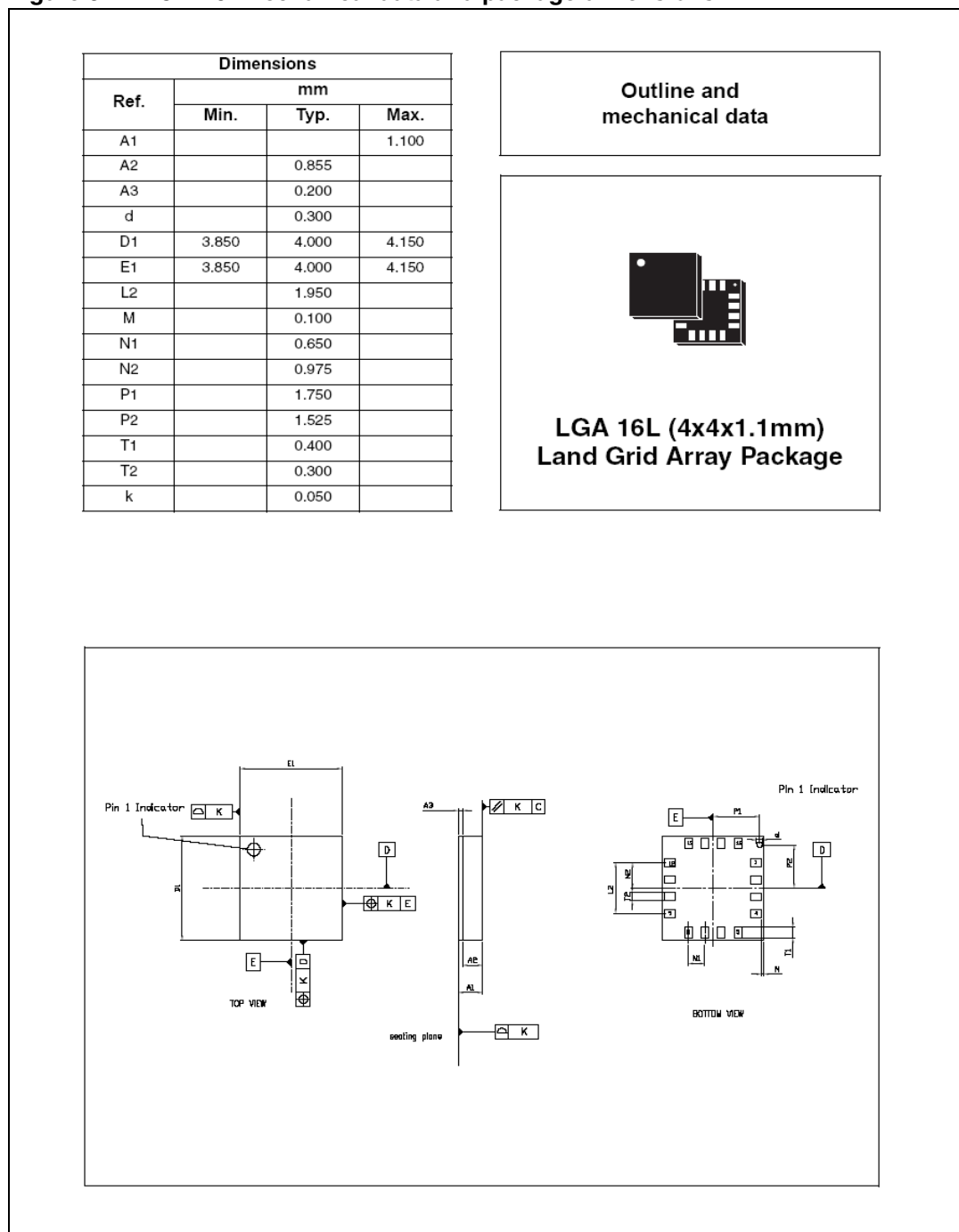**Figure 2. L3G462A electrical connections and external component values**
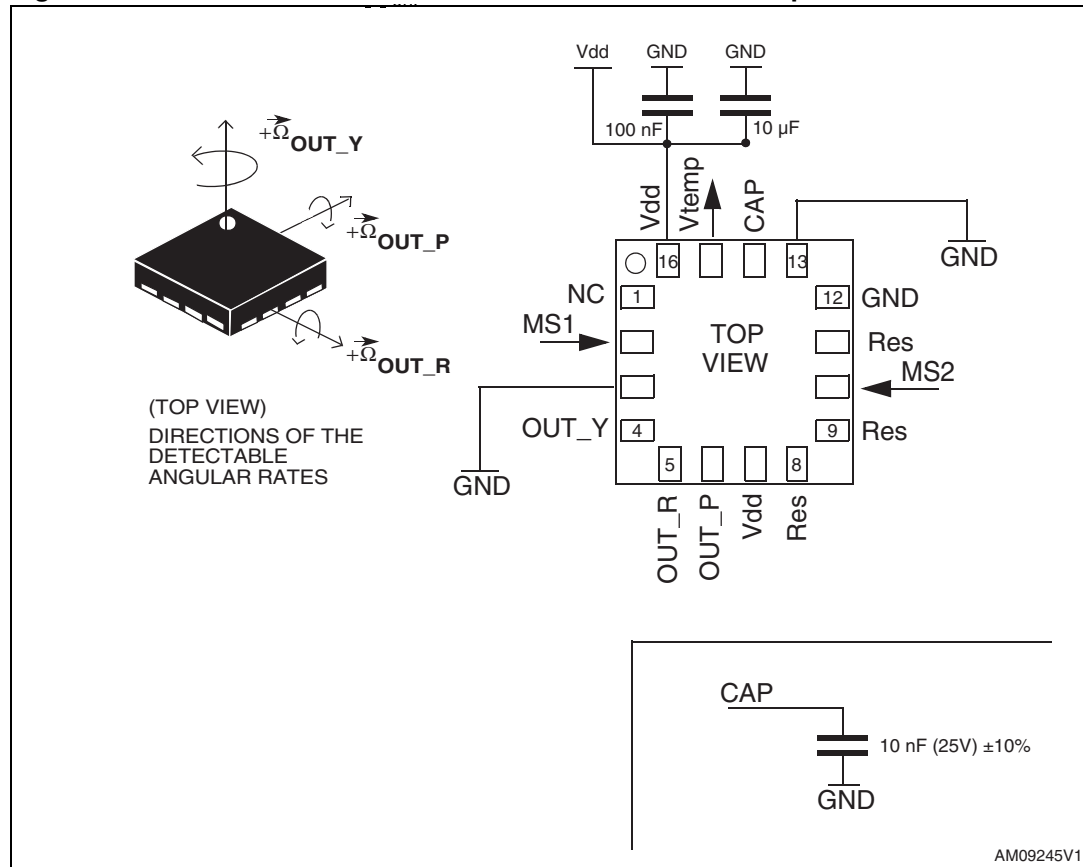
Power supply decoupling capacitors (100 nF ceramic or polyester + 10 µF aluminum) should be placed as near as possible to the device (common design practice). A 10 nF, 25 V class capacitor connected to pin 14 is required for proper working of the device.

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions, and product status are available at: www.st.com. ECOPACK is an ST trademark.

Figure 3.   LGA-16: mechanical data and package dimensions

Dimensions			
Ref.	mm		
	Min.	Typ.	Max.
A1			1.100
A2		0.855	
A3		0.200	
d		0.300	
D1	3.850	4.000	4.150
E1	3.850	4.000	4.150
L2		1.950	
M		0.100	
N1		0.650	
N2		0.975	
P1		1.750	
P2		1.525	
T1		0.400	
T2		0.300	
k		0.050	

Outline and mechanical data

LGA 16L (4x4x1.1mm) Land Grid Array Package

5 Revision history

Table 7. Document revision history

Date	Revision	Changes
15-Mar-2011	1	Initial release.

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