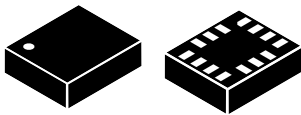


## Automotive 6-axis inertial module: 3D accelerometer and 3D gyroscope


**LGA-14L**

 Typ: (2.5 x 3.0 x 0.83 mm<sup>3</sup>)


### Features

- AEC-Q100 qualified
- Extended temperature range from -40 to +105 °C
- Embedded compensation for high stability over temperature
- Accelerometer user-selectable full scale up to ±16 g
- Extended gyroscope range from ±125 to ±4000 dps
- SPI & I<sup>2</sup>C host serial interface
- Six-channel synchronized output to enhance accuracy of dead-reckoning algorithms
- Smart programmable interrupts
- Embedded 3 kB FIFO available to underload host processor
- ECOPACK<sup>®</sup>, RoHS and “Green” compliant

### Applications

- Dead reckoning (DR)
- Vehicle-to-everything (V2X)
- Telematics, eTolling
- Anti-theft systems
- Impact detection and crash reconstruction
- Motion-activated functions
- Driving comfort
- Vibration monitoring and compensation

Product status link		
<a href="#">ASM330LHH</a>		
Product summary		
<b>Order code</b>	ASM330LHH	ASM330LHHTR
<b>Temp. range</b>	-40 °C to +105 °C	
<b>Package</b>	LGA-14L (2.5 x 3.0 x 0.83 mm <sup>3</sup> )	
<b>Packing</b>	Tray	Tape and reel

### Description

The **ASM330LHH** is a system-in-package featuring a 3D digital accelerometer and a 3D digital gyroscope with an extended temperature range up to +105 °C and designed to address automotive non-safety applications.

ST's family of MEMS sensor modules leverages the robust and mature manufacturing processes already used for the production of micromachined accelerometers and gyroscopes to serve both the automotive and consumer market. The ASM330LHH is AEC-Q100 compliant and industrialized through a dedicated MEMS production flow to meet automotive reliability standards. All the parts are fully tested with respect to temperature to ensure the highest quality level.

The sensing elements are manufactured using ST's proprietary micromachining processes, while the IC interfaces are developed using CMOS technology that allows the design of a dedicated circuit which is trimmed to better match the characteristics of the sensing element.

The ASM330LHH has a full-scale acceleration range of ±2/±4/±8/±16 g and a wide angular rate range of ±125/±250/±500/±1000/±2000/±4000 dps that enables its usage in a broad range of automotive applications.

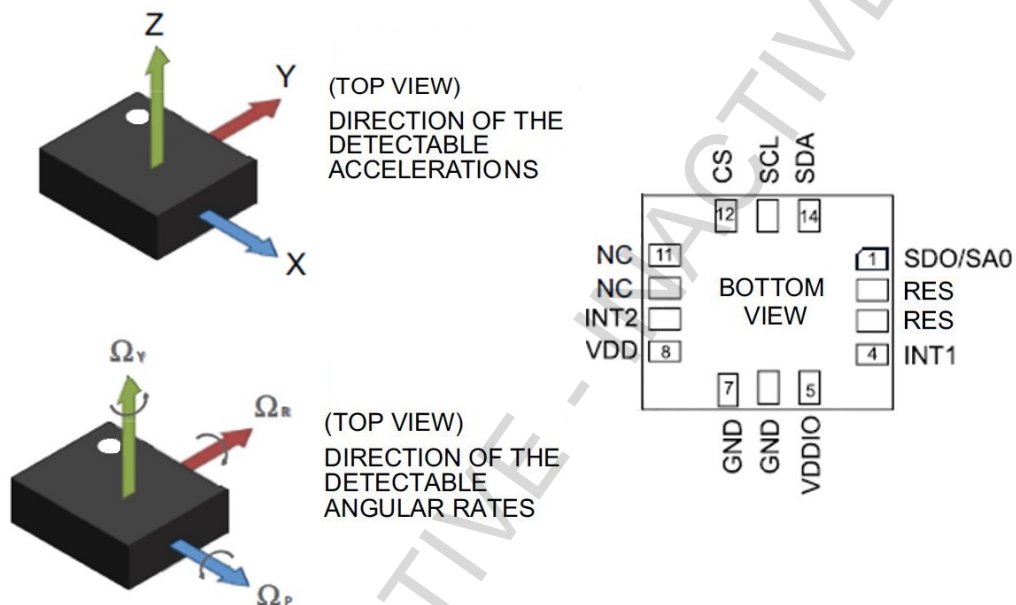
All the design aspects of the ASM330LHH have been optimized to reach superior output stability, extremely low noise and full data synchronization to the benefit of sensor-assisted applications like dead reckoning and sensor fusion.

The ASM330LHH is available in a 14-lead plastic land grid array (LGA) package.

*Parts marked as "ES" are not yet qualified and therefore not yet ready to be used in production and any consequences deriving from such usage will not be under the responsibility of STMicroelectronics. Under no circumstances will STMicroelectronics be liable for any customer usage of these engineering samples in production. ST Quality has to be contacted prior to any decision to use these Engineering Samples to run any qualification activity.*

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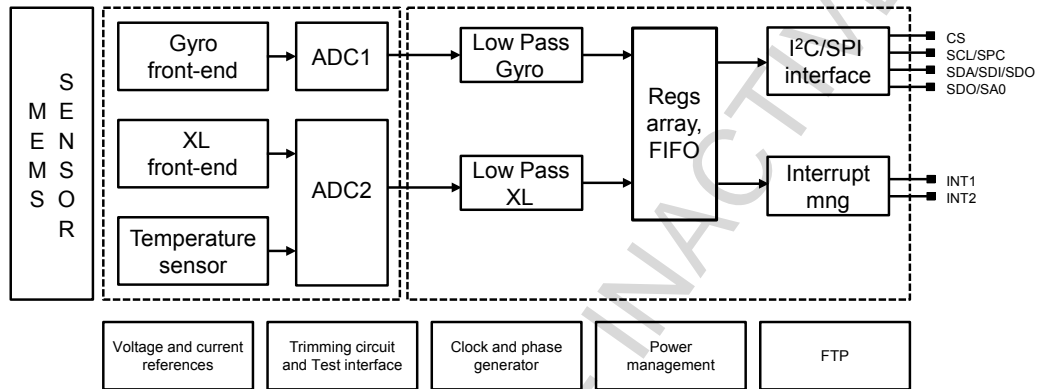
# 1 Pin description

**Figure 1. Pin connections**

**Table 1. Pin description**

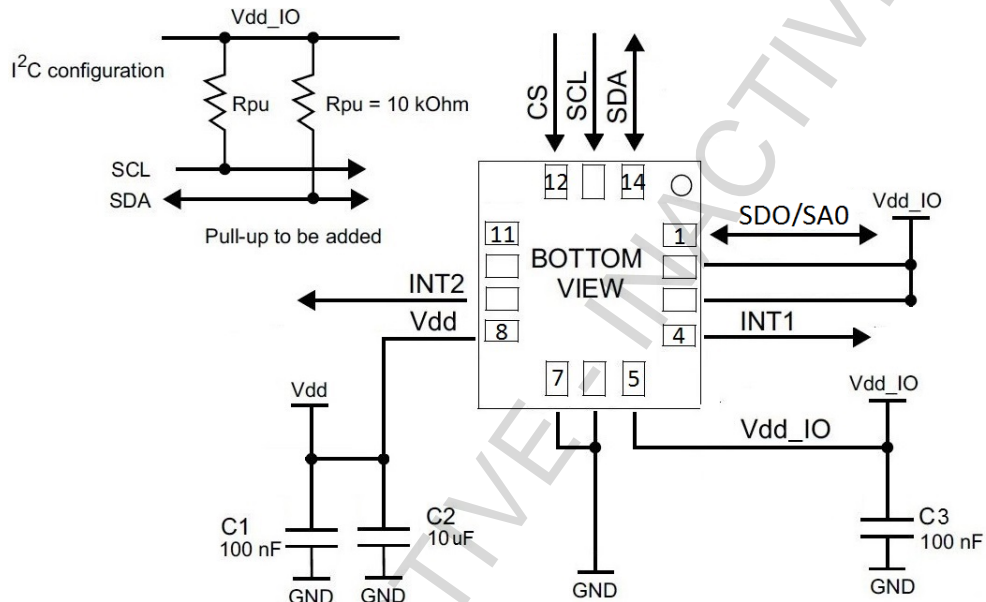
Pin #	Name	Function
1	SDA	SPI 4-wire serial data output (SDO)
	SDO	I <sup>2</sup> C least significant bit of the device address (SA0)
2	RES	Connect to VDDIO or GND
3	RES	Connect to VDDIO or GND
4	INT1	Programmable interrupt #1
5	Vdd_IO <sup>(1)</sup>	Power supply for I/O pin
6	GND	Connect to GND
7	GND	Connect to GND
8	Vdd <sup>(2)</sup>	Power supply
9	INT2	Programmable interrupt #2 (INT2) / Data enabled (DEN)
10	NC	Leave unconnected
11	NC	Leave unconnected
12	CS	I <sup>2</sup> C/SPI mode selection (1: SPI idle mode / I <sup>2</sup> C communication enabled; 0: SPI communication mode / I <sup>2</sup> C disabled and reset)
13	SCL	I <sup>2</sup> C serial clock (SCL) SPI serial port clock (SPC)
14	SDA	I <sup>2</sup> C serial data (SDA) SPI serial data input (SDI) 3-wire interface serial data output (SDO)

1. Recommended 100 nF filter capacitor.
2. Recommended 100 nF plus 10 μF capacitors.

## 2 Block diagram

**Figure 2. Block diagram**


### 3 Application hints

**Figure 3. ASM330LHH electrical connections**


The device core is supplied through the Vdd line while the I/O pads are supplied through the Vdd\_IO line. As a common design practice, the power supply decoupling capacitors C1 = 100 nF ceramic and C2 = 10  $\mu$ F aluminum should be placed as near as possible to pin 8, while C3 = 100 nF ceramic should be positioned as close as possible to pin 5.

All the voltage and ground supplies must be present at the same time to have proper IC behavior.

The functionality of the device and the measured acceleration/angular rate data are selectable and accessible through the I<sup>2</sup>C or SPI interfaces. When using the I<sup>2</sup>C protocol, CS must be tied high. Every time the CS line is set to low level, the I<sup>2</sup>C bus is internally reset.

All the functions, the threshold and the timing of the two interrupt pins can be completely programmed by the user through the I<sup>2</sup>C/SPI interface.



## 4.2 LGA-14L packing information

Figure 5. Carrier tape information for LGA-14L package

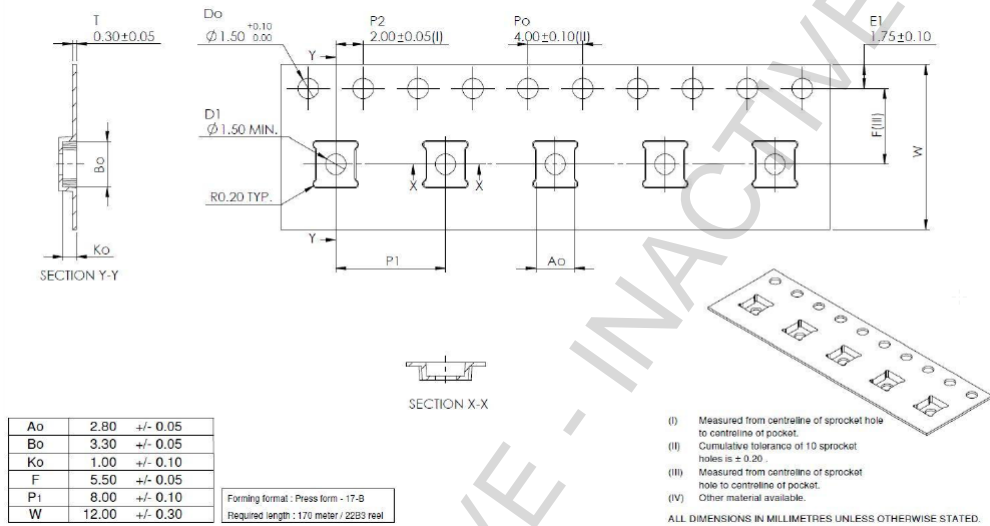


Figure 6. LGA-14L package orientation in carrier tape

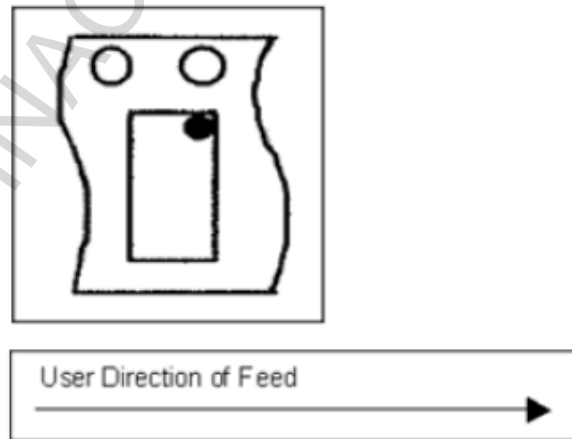


Figure 7. Reel information for carrier tape of LGA-14L package

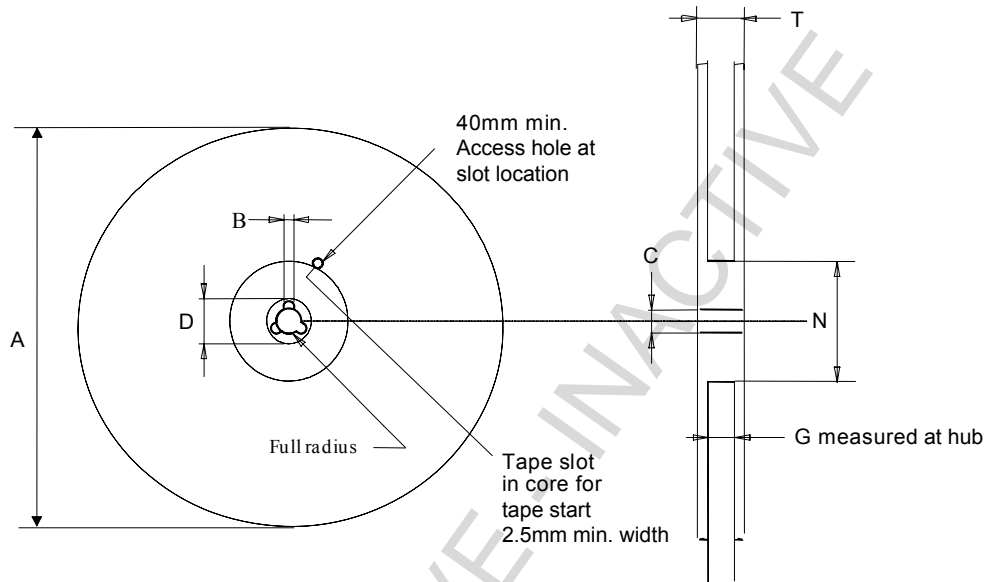


Table 2. Reel dimensions for carrier tape of LGA-14L package

Reel dimensions (mm)	
A (max)	330
B (min)	1.5
C	13 ±0.25
D (min)	20.2
N (min)	60
G	12.4 +2/-0
T (max)	18.4





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