BOSCH

BMA490L
High-performance longevity acceleration sensor

GENERAL DESCRIPTION

BMA490L is a high-performance longevity acceleration sensor with extended availability of up to ten years[1]. BMA490L is designed to cater the long life cycles of industrial applications such as industrial IoT (IIoT) and robots. The BMA490L is a triaxial, low-g acceleration sensor with digital interfaces, aiming for various stationary and mobile industrial applications.

BMA490L is part of Bosch Sensortec's longevity program

10 YEARS LONGEVITY

BMA490L TARGET APPLICATIONS

▶ Industrial IoT (IIoT), e.g. predictive maintenance, vibration monitoring

▶ Logistics, e.g. asset tracking

▶ Agricultural and industrial robots, e.g. orientation detection, tilt detection

▶ White goods and home appliances, e.g. vibration monitoring, power management

▶ Power tools, e.g. power management, device level detection

SENSOR FEATURES

With its embedded intelligence, BMA490L is unique among the accelerometers available in the market for home appliances, power tools and other industrial products where the long availability of the product is crucial. Intelligent signal processing and evaluation in the accelerometer ASIC enables advanced gesture recognition for diverse applications mentioned above.

Featuring a high-performance measurement mode with low pass filters and a current consumption of 150 µA in full operation mode, the BMA490L is robust to temperature fluctuations. In the low-power operation mode the current consumption is reduced by about a factor of ten, thereby fulfilling the current consumption requirements for always-on applications. On top, the BMA490L integrates other features such as any/no motion which facilitate its use in battery driven applications. Moreover the sensor is highly configurable in order to give the designer full flexibility when integrating the sensor into the system.

TECHNICAL SPECIFICATIONS

BMA490L technical data	
Digital resolution	16 bit
Resolution (in ±2g range)	0.06 mg
Measurement ranges (programmable)	±2 g; ±4 g; ±8 g; ±16 g
Sensitivity (calibrated)	±2 g: 16384 LSB/g ±4 g: 8192 LSB/g ±8 g: 4096 LSB/g ±16 g: 2048 LSB/g
Zero-g offset	±20 mg
Noise density (typ.)	120 µg/√Hz
Output data rate (programmable)	1600 Hz … 1.5 Hz
Digital inputs/outputs	SPI & I^2C, 2x digital interrupt pins
Supply voltage (V_{DD})	1.62 … 3.6 V
I/0 supply voltage (V_{DDIO})	1.2 … 3.6 V
Temperature range	-40 … +85 °C
Current consumption – full operation – low-power mode	 150 µA 14 µA (at 50 Hz data rate)
FIFO data buffer	1 kB
LGA package	2 x 2 x 0.95 mm³
Shock resistance	10,000 g x 200 µs

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[1] Starting from product introduction; see disclaimer in the datasheet

SENSOR OPERATION

The BMA490L supports two modes of operation:
1) Standard data polling mode: Acceleration data is directly read-out via the sensor's digital interface and computed by a system microcontroller, application processor or a baseband processor. An integrated FIFO with 1 kB size can be used optionally to reduce overall system current consumption.

Pin configuration (top view)

BMA490L

Top View
(Pads not visible!)

TECHNICAL SPECIFICATIONS

Pin		
Pin	Name	Description
1	SDO	SPI – Serial Data Out; I^2C - address select
2	SDx	Serial data I/O
3	V_{DDIO}	Power supply
4	ASDA	Serial data I/O – Secondary Interface
5	INT1	Interrupt pin
6	INT2	Interrupt pin
7	V_{DD}	Voltage supply
8	GND_{IO}	Ground
9	GND	Ground
10	CSB	SPI – Chip select
11	ASCL	Digital clock (in) – Secondary Interface
12	SCx	Digital clock (in)

2) Plug 'n' play intelligence operation: Acceleration data is computed already within the BMA490L.
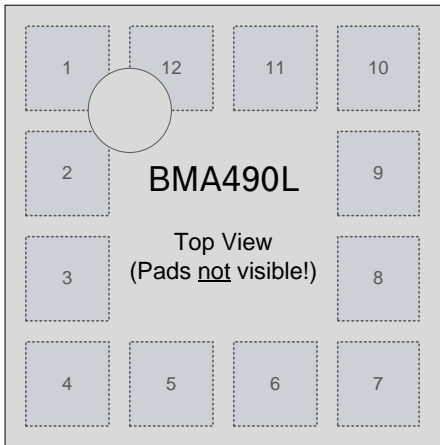
The embedded intelligence of the sensor can trigger an interrupt at certain selectable events which can be mapped to the selectable interrupt pins. In addition to the electrical interrupt, the status of the events are stored in the register map and can be read out easily.

Feature parameters can be configured by the designer and thus support the adoption to the required use case and system design.

SYSTEM COMPATIBILITY

The BMA490L has been designed for best possible fit into various industrial applications with extreme low power requirements. Beside the small footprint and low power consumption, the BMA490L offers wide ranges for VDD and VDDIO supply voltages. The BMA490L features I^2C and SPI (3-wire/4-wire) digital, serial interfaces. The availability of a separate I²C interface enables the connection of an external magnetometer (BMM150 recommended) and the synchronization of the acceleration and the magnetometer data in the FIFO of the BMA490L. This reduces the complexity of sensor data fusion and improves its precision. The BMA490L is designed for plug 'n' play functionality and ease-of-use in various system designs.