

ISM330DHCX

iNEMO[®] 6-axis inertial module with Machine Learning Core for IIoT



Best-in-class accuracy 6-axis IMU with Machine Learning Core for industrial IoT applications

The ISM330DHCX is a system-in-package featuring a high-performance 3D digital accelerometer and 3D digital gyroscope tailored for Industry 4.0 applications. ISM330DHCX offers superior accuracy and flexibility with low power consumption, enabling demanding applications, even battery-operated ones. The ISM330DHCX contains a Machine Learning Core (MLC), based on decision-tree classifier, able to classify motion data on known patterns. MLC can interact with integrated Finite-State-Machine (FSM) which can run simple algorithms.

KEY FEATURES

- Acceleration range : $\pm 2/\pm 4/\pm 8/\pm 16$ g
- Angular rate range: $\pm 125/\pm 245/\pm 500/\pm 1000/\pm 2000/\pm 4000$ dps
- Temperature range: -40 to + 105 °C
- Noise density (accel.): 60 $\mu\text{g}/\sqrt{\text{Hz}}$
- Rate noise (gyro): 5 mdps/ $\sqrt{\text{Hz}}$
- Machine Learning Core
- Programmable Finite State Machine
- Embedded 9 Kbyte FIFO
- Embedded sensor hub
- I²C/SPI digital interfaces
- LGA-14 package (2.5 x 3 x 0.83 mm)

TARGET APPLICATIONS

- 5G smart antenna condition monitoring
- Industrial IoT and connected devices
- Dynamic inclinometers for industrial vehicles
- Robotics and industrial automation
- Navigation systems and telematics
- Optical image and lens stabilization
- Container tracking devices
- Vibration monitoring and compensation

Advanced features

A high-accuracy, high performance, 6-axis IMU, the ISM330DHCX is tailored for Industry 4.0 applications with embedded real edge computing (Machine Learning Core). The ISM330DHCX's design, test and calibration processes are optimized to reach superior accuracy, stability, extremely low noise and full data synchronization.

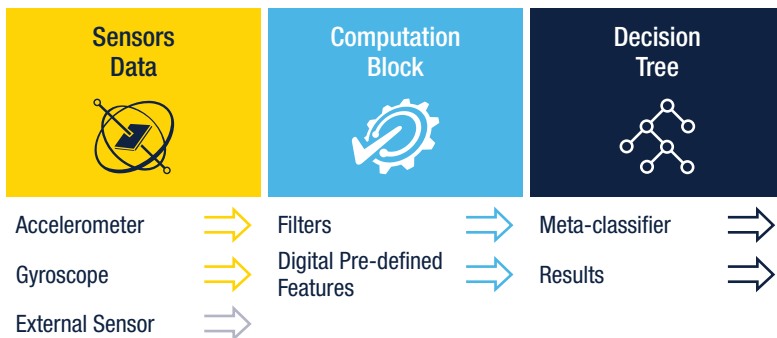
A unique motion sensor equipped with compensation for high stability over a wide temperature range (up to 105 °C) and with high shock survivability, the

sensing elements of its accelerometer and gyroscope are implemented on the same silicon die, thus guaranteeing superior stability and robustness. An unmatched set of embedded features such as Machine Learning Core (MLC), programmable FSM, FIFO, sensor hub, event decoding and interrupts are enablers for implementing smart and complex sensor nodes which deliver high performance at very low power. Thanks to its embedded MLC logic based on decision-tree learning techniques, the ISM330DHCX is able

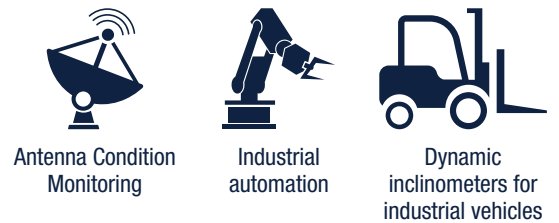
to process algorithms for movement recognition in IIoT applications enabling longer battery runtime and lower maintenance. The machine learning process consists of three simple steps for ease of use.

In addition to a complete documentation package, MLC examples and software GUI (Graphical User Interface), ST offers a complete development ecosystem for evaluating the implementation of MLC algorithms.

Machine Learning Core



Application Examples



Ordering code

Part Number	Packing
ISM330DHCX	Tape & Reel



Evaluation tools

Usage	Part Number	Description
Prototype	NUCLEO-F401 or NUCLEO-L152RE or NUCLEO-L476RG or NUCLEO-L073RZ	STM32 Nucleo board
	X-NUCLEO-IKS02A1	Nucleo Expansion Boards (X-Nucleos)
	X-CUBE-MEMS1	Expansion Software package
Prototype	UNICLEO-GUI UNICO-GUI	Graphical user interface (GUI) for the X-CUBE-MEMS1 Graphical user interface (GUI) for MLC development
	STEWAL-STWINKT1	STWIN SensorTile Wireless Industrial Node development kit and reference design
Performance evaluation	STEWAL-MKI109V3	Professional MEMS tool motherboard
	STEWAL-MKI207V1 or STEVAL-MKI210V1K	Adapter board (socket DIL24) Adapter board (socket DIL24)
	UNICO-GUI	Software package for the Professional MEMS tool motherboard

