IIS2ICLX

2-axis, high-accuracy inclinometer with embedded machine-learning core

The high-accuracy IIS2ICLX two-axis digital accelerometer is ideal for structural health monitoring and inclination measurements in Industry 4.0 applications, combining high stability and repeatability, low noise, and ultra-low-power with support for Artificial Intelligence at the Edge. It is included in ST’s 10-year longevity program.

The IIS2ICLX features:
• A 2-axis digital plug-and-play inclinometer
• Highest performance in terms of resolution, accuracy, stability, and power consumption
• Ultra-low noise (15 µg/√Hz)
• Programmable machine-learning core to integrate AI algorithms and reduce power consumption at system level.

KEY FEATURES & BENEFITS
• 2-axis, I²C/SPI digital output interface
• Selectable full scale: ±0.5/±1/±2/±3 g
• Ultra-low noise (15 µg/√Hz)
• Programmable bandwidth, up to 260 Hz
• Low power (0.4 mA)
• Programmable machine-learning core & finite state machines, sensor hub and FIFO
• Extended range: from -40 to +105 °C

KEY APPLICATIONS
• Structural health monitoring
• High accuracy inclinometers
• Antenna pointing and monitoring
• Platform leveling
• Installation and monitoring of equipment
• Robotics and industrial automation

High accuracy, high-resolution, low-power, 2-axis digital inclinometer with embedded machine-learning core

www.st.com/mems
Advanced features

The IIS2ICLX inclinometer is tailored for monitoring structural health and Industry 4.0 applications. Its design and calibration processes are optimized for a superior accuracy, stability, repeatability and extremely low noise, and it embeds temperature compensation for out of the box stability in temperature (from -40°C up to 105 °C).

The unparalleled set of features, such as machine learning core (MLC), programmable Finite State Machines (FSM), FIFO, sensor hub capabilities, event decoding and interrupts, provide fundamental support for low power intelligent sensor nodes able to reduce data transfer rates and volumes to the cloud.

Thanks to its decision-tree classifiers algorithms, the IIS2ICLX significantly increase the autonomy of battery-operated applications by allowing nodes to remain in very low power standby until the sensor autonomously detects and classifies movement or vibration events.

Sensor with Machine Learning Core

Applications Examples

Antenna pointing, platform leveling and stabilization
Building and infrastructure condition monitoring
Inclinometers for industrial vehicles

Ordering information

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<tr>
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<th>Package</th>
<th>Packing</th>
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<td>IIS2ICLXTR</td>
<td>2-axis digital inclinometer with embedded machine-learning core</td>
<td>-40 to +105</td>
<td>CLGA-16</td>
<td>Tape and reel</td>
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Evaluation Tools

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<td>STEVAL-MK1109V3, Professional MEMS motherboard</td>
<td>STEVAL-MK209V1K, MEMS inclinometer kit based on IIS2ICLX</td>
<td>Unico-GUI</td>
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<td>Prototype</td>
<td>STM32 Nucleo development board (like NUCLEO-F401RE or NUCLEO-L152RE or NUCLEO-L476RG or NUCLEO-L073RZ)</td>
<td>X-NUCLEO-ICS02A1, X-NUCLEO industrial motion MEMS sensor expansion board for STM32 Nucleo board + STEVAL-MK209V1K, MEMS inclinometer kit based on IIS2ICLX</td>
<td>Unico-GUI, Algobuilder</td>
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Software Tools

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<tr>
<th>Order code</th>
<th>Description</th>
<th>Usage</th>
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<tr>
<td>Unico-GUI</td>
<td>Cross-platform graphical user interface for MEMS sensors</td>
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<tr>
<td>Unico-GUI</td>
<td>GUI for X-CUBE-MEMS1, motion MEMS and environmental sensor software expansion for STM32Cube</td>
<td>Prototype</td>
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<td>Algobuilder</td>
<td>Graphical design application to build and use algorithms</td>
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<tr>
<td>X-CUBE-MEMS1</td>
<td>Sensor and motion algorithm software expansion for STM32Cube</td>
<td>Evaluation / Prototype / Production</td>
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<tr>
<td>MotionAC2, MotionTL2</td>
<td>Software libraries, included into X-CUBE-MEMS1 software expansion for STM32Cube, for inclinometer calibration and real-time tilt computation</td>
<td>Evaluation / Prototype / Production</td>
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