



# MEMS and Sensors Quick Reference Guide



## OUR MEMS SUSTAINABLE SOLUTIONS MATCH YOUR NEEDS



### MEMS sensors in your hands (AXL, PS, IMU)\*

- Smartphones, tablets, foldable phones
- Personal trackers
- Gaming devices
- Remote control
- Notebooks, laptops
- Cameras



### MEMS sensors in your training (AXL, PS, IMU)\*

- Watches, rings, smart band
- True wireless stereo (TWS)
- Pedometers
- Treadmills and barbells



### MEMS sensors in your home (AXL, PS, IMU, IR)\*

- Home alarm systems and car garages
- White goods
- Smart speakers
- Smart home automation control
- Electric, gas/water meters



### MEMS sensors in your car (AXL, IMU)\*

- Telematic boxes and security systems (car alarms)
- Body applications
- In-dash car navigation, precise positioning, ADAS
- Vehicle dynamics, stability and roll control systems and active suspensions
- Smart keys and road noise canceling systems



### MEMS sensors in smart manufacturing (AXL, PS, IMU, IR)\*

- Industrial IoT and connected devices
- Robotics, automation, and drones
- Precision inclinometers and leveling instruments
- Weather station equipment
- Smart filters, and gas and water meters
- Equipment condition monitoring
- Power tools
- Asset trackers



### MEMS sensors in healthcare (AXL, IMU, Biosensors)\*



- Helmets
- Earning aids
- Vital signs monitoring
- Rehabilitation devices
- Healthcare mobility
- Implantable medical devices
- Biopotential signals





























\*AXL: accelerometers, PS: pressure sensors, IMU: inertial measurement units, IR: infrared sensors


## A UNIQUE OFFERING BRINGING INTELLIGENCE TO THE EDGE





ST **smart sensors** allow developers to maximize the functionality of their application while improving overall system efficiency. By leveraging machine learning techniques, we enable true **edge processing** to improve accuracy and reduce power consumption.

 <b>MLC</b>	<b>Machine learning core</b> In-sensor classification engine based on decision tree logic	 <b>ISPU</b>	<b>Intelligent sensor processing unit</b> Highly specialized DSP for machine learning and processing
<ul style="list-style-type: none"> <li>• <b>Extremely low-power</b> sensors</li> <li>• <b>Increased accuracy</b> with better context detectability</li> <li>• <b>Offloading</b> the main processor and improving system efficiency</li> </ul>		<ul style="list-style-type: none"> <li>• <b>Ultralow power</b> consumption at <b>system level</b> thanks to <b>optimized data transfer</b></li> <li>• High processing capability with <b>AI-enabled programmable core</b></li> <li>• Comprehensive <b>ecosystem</b></li> </ul>	
<b>Sensor hub</b> feature, enabling connection of external standard sensors			

## MEET OUR FEATURED PRODUCTS









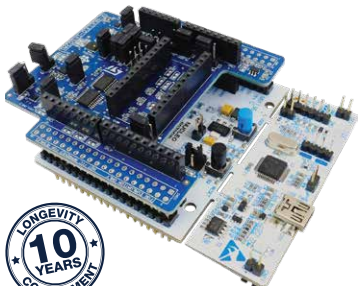



Motion sensors		Environmental sensors	Infrared sensors
<b>Accelerometers</b> 	<b>Inertial measurement units</b> 	<b>Pressure sensors</b> 	<b>Infrared sensors</b> 
LIS2DU12	 LSM6DSV16X	LPS22DF	STHS34PF80
 LIS2DUX12	 LSM6DSV16BX	LPS22HH	
 LIS2DUXS12	 LSM6DSV32X	 LPS27HHW	
LIS2DW12	LSM6DSV80X	 LPS28DFW	<b>Biosensors</b> 
LIS25BA	LSM6DSV320X	 ILPS22QS	 ST1VAFE3BX
H3LIS331DL	 LSM6DSO16IS	  ILPS28QSW	 ST1VAFE6AX
 IIS2ICLX	LSM6DSV		
 IIS2DULPX	LSM6DSR	<b>Temperature sensors</b> 	
IIS3DWB	 ISM330IS(N)	STTS22H	
IIS2DLPC	 ISM330DHCX		
IIS3DHHX	 ISM330BX	<b>MEMS microphones</b> 	
AIS2DW12	ASM330LHH	MP23DB01HP	
AIS2IH	 ASM330LHB	MP23ABS1	
AIS328DQ	 ASM330LHBG1	IMP23ABSU	
AIS25BA	 ASM330LHHX		
MIS2DH	 ASM330LHHXG1		



-  Sensors embedding Qvar technology
-  Waterproof pressure sensor
-  ISPU: intelligent sensor processing unit
-  MLC: machine learning core


# A COMPLETE AND USER-FRIENDLY ECOSYSTEM TO SUPPORT YOUR DESIGN:

## Boards

 <b>Evaluate</b>	 <b>Develop</b>	 <b>Prototype</b>
<p>ProfiMEMS <b>STEVAL-MKI109D</b></p>  <p><b>+</b></p> <p>MEMS sensor adapter</p> 	<p>STM32Nucleo expansion <b>X-NUCLEO-IKS41</b></p> 	<p>SensorTile.box PRO + adapter <b>STEVAL-MKBOXPRO</b></p> 
<p>MEMS sensor adapter</p> 	<p>STM32Nucleo expansion <b>X-NUCLEO-IKS02A1</b></p>  	<p>STWIN.box + adapter <b>STEVAL-STWINBX1</b></p>  
<p> <span style="color: blue;">■</span> Consumer                <span style="color: darkblue;">■</span> Industrial                <span style="color: yellow;">■</span> Automotive         </p>		

## Software solutions

For sensors and MLC:

MEMS Studio	
	<p>Software tool for MEMS sensors with graphical no-code design of algorithms and embedded AI features development</p>

Additional tool for ISPU:

ISPU Toolchain


NanoEdge AI Studio
 <p><b>NANOEDGE AI STUDIO</b></p>

## FIND THE SENSOR YOU NEED IN ST.COM



Whether you're looking for motion sensors, environmental sensors, or any other MEMS & Sensors products, our portfolio offers a wide range of products that are designed to meet the highest standards of quality and reliability.

Visit our website to find the perfect sustainable solution for your needs.

[st.com/mems](https://st.com/mems)

# Ensuring sustainability & intelligence

An overview of ST MEMS & Sensors products to help you understand the use cases and the benefits they bring to people's lives.



## FOLLOW OUR JOURNEY TO A SUSTAINABLE ONLIFE ERA

With the increasing fusion of technology in our daily lives, sensors are essential for improving our interactions with the world around us. Now, in a world facing new environmental challenges, people have even greater expectations. More than just making our lives better, these devices must be efficient and help protect the planet, while remaining centered on humans.

ST is enabling the transition to a **sustainable Onlife era** with an extensive MEMS sensor portfolio based on more than 25 years of experience and innovation. Our MEMS sensors are smart, open, accurate, and designed to help you build human-centric solutions that boost user creativity and interaction with the world, while optimizing energy efficiency in embedded systems.



### SMART

Sensors are capable of directly processing the data they capture and delivering meaningful insights to the host device. By processing data locally, smart sensors reduce transmitted data and cloud processing requirements, thus lowering power consumption at the system level.

Our unique offers: **machine learning core (MLC)** and **intelligent sensor processing unit (ISPU)**.



### OPEN

Sensors that can interface with other sensors. This allows third parties to benefit from ST on-sensor processing innovations, while contributing to an ecosystem that creates value for customers.

Our unique offers: **ST MEMS sensor hub** and **ST MEMS sensor ecosystem**.



### ACCURATE

Sensors can provide high-precision data that allows better quality decisions and smoother and more natural user interactions. These sensors also reduce factory calibration time and resources to reduce energy requirements even further.

Our unique offers: **sensor fusion low power (SFLP)**, **adaptive self-configuration (ASC)**.

# At STMicroelectronics we create technology that starts with You



Order code: **BR2503MEMSENSQR**

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