

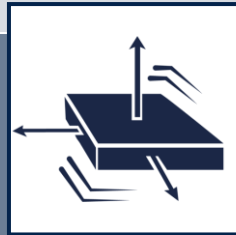


**Next-gen MEMS solutions
for vibration immunity,
shock resistance, and
material compliance**

New generation of MEMS solutions features

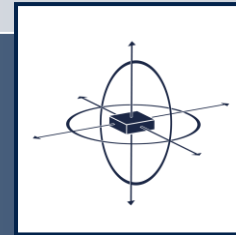
Vibration resilience

Innovative gyroscope, with symmetric design for vibration resilience to induced vibration in dynamic, mechanically noisy environments



Low & high dynamic motion

Accelerometer with dedicated mechanical structure for high and low acceleration



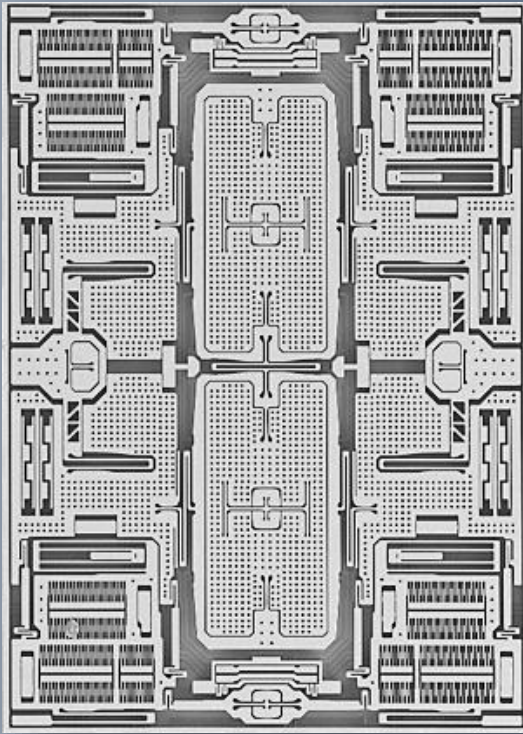
Sustainability

Synchronized sensors with edge AI and adaptive power efficiency. Compact footprint, sustainable design, and environmental compliance



A new supersymmetric gyroscope architecture

Combining robustness, compactness, and high vibration immunity



Simplify integration

Compact architecture for a cleaner PCB design and easy integration

Improve robustness

Fully differential architecture* designed to reject vibrations, shocks, oscillations, and process asymmetries

Enhance user experience

Supporting stable sensing for superior image stabilization and gaming performance

*Dual rotors per axis oscillate in counterphase, with coupled stators for a differential mechanical and electrical design

MEMS solutions for more sustainable applications

Supporting customers' transition to Pb and BPA requirements

The new generation of MEMS solutions is designed to meet the most stringent environmental regulations.

[Check ST sustainable technology label initiative](#)



LSM6DSK320X

Advanced IMU for robust sensing and sustainability

Precise, robust, compact, and smart IMU for accurate tracking



Key applications

- Drones
- Wearables
- Digital cameras
- Asset trackers & IoT
- Robotics

Dual accelerometer and new gyroscope architecture

- Dual accelerometer with low- high-g sensing up to ± 320 g
- Gyroscope with enhanced vibration immunity up to ± 4000 dps

Low noise, low power

- $60\mu\text{g}/\sqrt{\text{Hz}}$, $3.8\text{mdps}/\sqrt{\text{Hz}}$ @ $670\mu\text{A}$ in HP (Low-g)
- $1\text{mg}/\sqrt{\text{Hz}}$ @ $800\mu\text{A}$ in HP (High-g)

No increase in package size

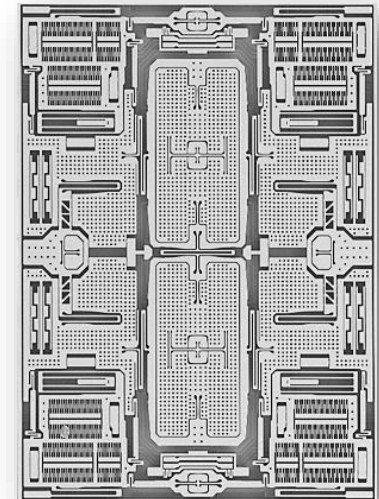
- Compact IMU footprint: $2.5 \times 3.0 \times 0.83$ mm

At-the-edge processing

- Adaptive self-configuration (ASC)
- Edge AI: MLC⁽¹⁾ FSM⁽²⁾, SFLP⁽³⁾
- High-g shocks and hard-coded wake-up
- HAODR, High accuracy ODR
- OIS with aux I³C interface
- Embedded FIFO
- And more



Gyroscope symmetric architecture



(1) MLC: Machine learning core

(2) FSM: Finite state machine

(3) SFLP: Sensor fusion low power



ISM6HGK256X

Advanced IMU for high-g industrial applications

Designed to deliver in demanding industrial environments



Dual accelerometer and new gyroscope architecture

- Dual accelerometer with low- and high-g sensing up to ± 256 g
- Gyroscope up to ± 4000 dps with enhanced vibration immunity

Low noise, low power

- $65\mu\text{g}/\sqrt{\text{Hz}}$, $4.5\text{mdps}/\sqrt{\text{Hz}}$ @ $670\mu\text{A}$ in HP (Low-g)
- $1\text{mg}/\sqrt{\text{Hz}}$ @ $800\mu\text{A}$ in HP (High-g)

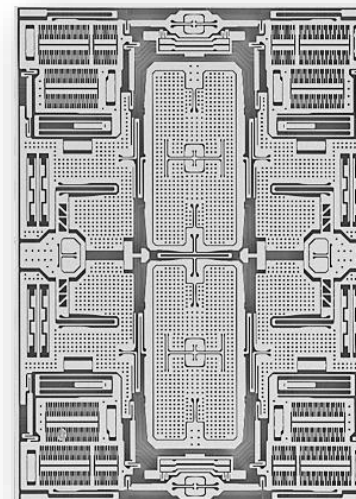
Extended temperature range

- Operating up to 105°C

Intelligent sensor

- Edge AI: MLC⁽¹⁾ FSM⁽²⁾, SFLP⁽³⁾
- Adaptive self-configuration (ASC)
- Smart FIFO up to 4.5 KB
- Event-detection interrupts
- Sensor hub
- Multiple interfaces: SPI, I2C, I3C
- And more

Gyroscope
symmetric architecture



Key applications

- Drones and UAVs
- Condition monitoring
- Asset tracking
- Factory automation
- Safety helmets
- Black boxes

(1) MLC: Machine learning core
(2) FSM: Finite state machine
(3) SFLP: Sensor fusion low power



LSM6DSK320X VS ISM6HGK256X



VS



	LSM6DSK320X	ISM6HGK256X	
Temperature range [°C]	-40 to +85 °C	-40 to +105 °C	Extended temperature range for the industrial version
Full scale	Low-g channel: up to ± 16 g High-g channel: up to ± 320 g	Low-g channel: up to ± 16 g High-g channel: up to ± 256 g	Different high-g channel full scale
Longevity commitment	n/a	10-year longevity From the product introduction date 	Industrial version supports long-term product value and future-ready design choices

Shared challenges, smarter sensing across every apps



Wearable applications



Health monitoring



Activity tracking



Energy efficiency



Data security & privacy

Cross-cutting challenges



Energy constraints
(Limited battery capacity)



Miniaturization &
size constraints



Thermal management
(Heat dissipation)



Reliability & robustness
(Variable operating conditions)



Security & data protection
(Sensitive data)



Drone and asset tracking applications



Navigation &
localization



Energy efficiency



Environmental resilience



Reliability &
security

LSM6DSK320X and ISM6H GK256X

Engineered for a broad spectrum of demanding applications

Drone



- **Vibration rejection** to maintain stable flight
- **Low-noise gyroscope** for camera stabilization and precise flight control
- **Temperature stability** for reliable performance

Wearable & IoT



- **Precise performance monitoring**
- **Extended sensing** across low- and high-dynamic ranges
- **Embedded processing** for context recognition

Asset tracking



- **Real-time location awareness** for inventory visibility
- **Low-power sensing** for long-lasting tracking
- Rugged performance in **demanding environments**

Robotics



- **Vibration resilience** in mechanically noisy environments
- **Low-noise IMU** for precise motion tracking
- **Performance** across operating conditions

Embedded AI development made easy

A comprehensive ecosystem for developers

Software libraries



Motion XLF

Accuracy data (fusion of high-g and low-g)



Sensor fusion

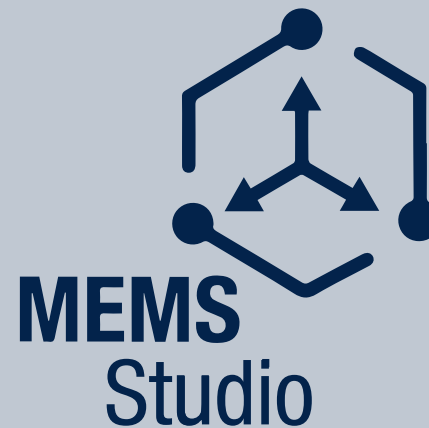
Heterogenous data (different sensors' fusion)



Context awareness (MLC)

Human activity recognition, gesture from wrist

Software tool

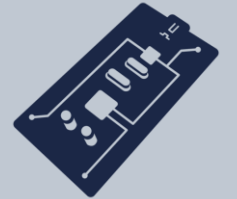


Development kits

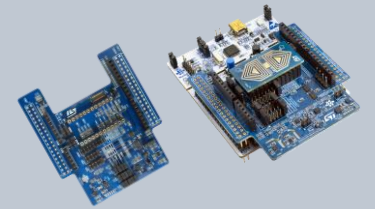
STEVAL-MKI109D



STEVAL-MKI257A
STEVAL-MKI258KA



SensorTile.Box PRO



X-NUCLEO-IKS4A1
X-NUCLEO-IKS5A1

Evaluate and program next-gen IMUs. Develop embedded AI features and design no-code algorithms.



LSM6DSK320X

Superior motion tracking vs. competitors

Features	LSM6DSK320X	Competitor IMUs
Mechanical structure	Three sensing elements in a single package: • Gyroscope • Low-g accelerometer (± 16 g) • High-g accelerometer (± 320 g)	Two sensing elements in a single package: • Gyroscope • Low-g accelerometer (± 32 g)
Signal dynamics	High-fidelity motion tracking Adaptive reconstruction and auto-configuration	Limited dynamic reconstruction
False-positive robustness	Advanced filtering for strong noise immunity	Basic filtering capabilities
Edge AI	Machine learning core and adaptive self-configuration	--
Software libraries	Motion XLF, sensor fusion, context awareness, basic libraries	Basic libraries for standard operations
Vibration immunity	Enhanced robustness against external vibration	Basic immunity against external vibration
Target applications	Superior motion tracking for drones, wearables and IoT, robotics	Limited functionality to specific applications

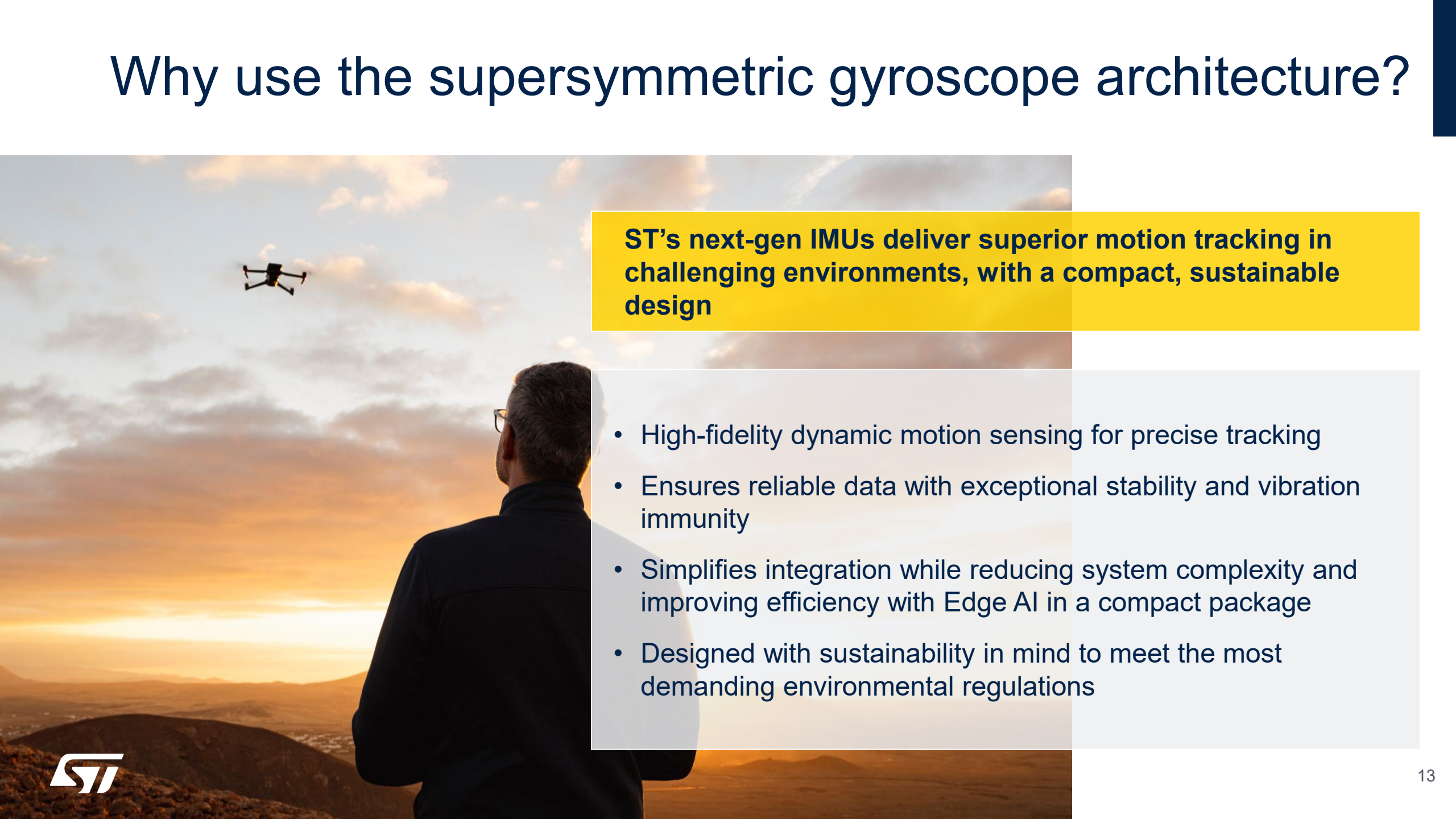


ISM6HGK256X

Superior motion tracking vs. competitors

Features	ISM6HGK256X	Competitor IMUs
Mechanical structure	Three sensing elements in a single package: • Gyroscope • Low-g accelerometer (± 16 g) • High-g accelerometer (± 256 g)	Two sensing elements in a single package: • Gyroscope • Low-g accelerometer (± 32 g)
10-year longevity	Manufacturing continuity for at least 10 years from the start of mass production	In general not available
Signal dynamics reconstruction	Capable of high-fidelity motion tracking and reconstruction	Limited dynamic reconstruction
False-positive robustness	High robustness with advanced filtering and signal processing	Basic filtering capabilities
Edge AI	Machine learning core and adaptive self-configuration	--
Software libraries	Motion XLF, sensor fusion, context awareness, basic libraries	Basic libraries for standard operations
Stability vs external aggressor	Enhanced vibration immunity thanks to new gyroscope architecture	Basic immunity against external vibration
Target applications	Superior functionality for drones, robotics and asset tracking	Limited functionality to specific applications

Why use the supersymmetric gyroscope architecture?



ST's next-gen IMUs deliver superior motion tracking in challenging environments, with a compact, sustainable design

- High-fidelity dynamic motion sensing for precise tracking
- Ensures reliable data with exceptional stability and vibration immunity
- Simplifies integration while reducing system complexity and improving efficiency with Edge AI in a compact package
- Designed with sustainability in mind to meet the most demanding environmental regulations

Our technology starts with You



Find out more at www.st.com

© STMicroelectronics - All rights reserved.

ST logo is a trademark or a registered trademark of STMicroelectronics International NV or its affiliates in the EU and/or other countries.

For additional information about ST trademarks, please refer to www.st.com/trademarks.

All other product or service names are the property of their respective owners.

