iCOMOX: Condition Based Monitoring Reference Design

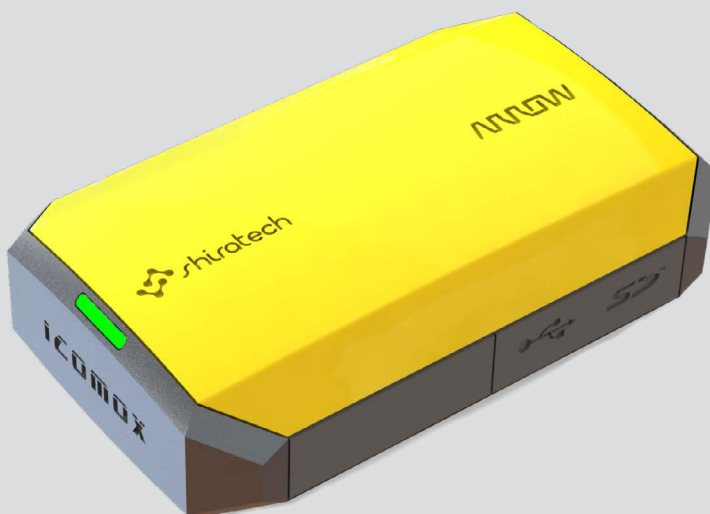## Open Embedded Sensor-to-Cloud Platform for Prototyping and Quick Deployment

Unplanned equipment downtime causes significant disruption to operations and productivity which directly impacts a company's bottom line. This problem is further compounded with legacy equipment that is prone to frequent failures. Current inspection methods mainly involve maintenance personnel physically checking equipment on a periodic basis. This approach is resource intensive and cannot be scaled easily. Further, complexity and cost of repairs increase after equipment failures occur, compared to preventive measures.

iCOMOX (Intelligent Condition Monitoring Box) – is an open development platform for Condition Based Monitoring (CBM) of industrial equipment, assets, and structures. iCOMOX monitors operating conditions from the surface of the equipment to identify potential faults and reduce risks associated with equipment operation and maintenance. This extends the lifetime of the equipment, reduces unplanned downtime, cuts maintenance costs and unlocks potential for energy savings.
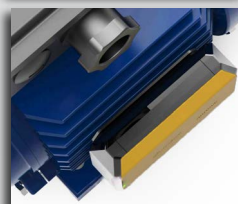
Benefits of the iCOMOX Platform

> **Rapid prototyping and product development –** Quick prototyping, rapid development and testing for condition-based monitoring designs
> **Fast time to market for customer products –** Out-of-the-box use case with software and application support for quick deployment with minimal changes. CE and FCC certified
> **Reliable and accommodates a wide range of monitored equipment -** Small form-factor and options for mounting adapters
> **Quick customization services –** Add new functionality, lower BOM cost, or have the complete product designed

Multi-sensing condition monitoring solution:
Vibration, magnetic field, temperature and sound sensors
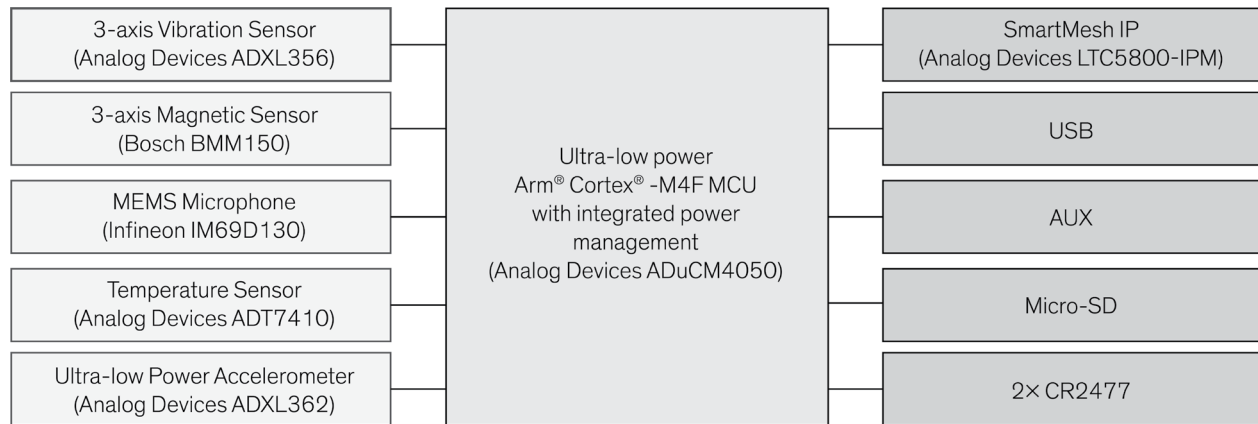
Part #: SRT-COMOX-SM

iCOMOX Use Cases:

> Manufacturing facilities: Motors, pumps, gearboxes, etc.
> Construction facilities: Drills, motors, heavy equipment
> Buildings: Elevators, moving walkways, escalators, refrigeration, HVAC systems
> Healthcare: Large medical equipment with motors
> Oil & gas: Pumps, drills
> Transportation: Fleet management
> Structures: Bridges, towers, pipelines

iCOMOX Block Diagram

3-axis Vibration Sensor (Analog Devices ADXL356)		SmartMesh IP (Analog Devices LTC5800-IPM)
3-axis Magnetic Sensor (Bosch BMM150)	Ultra-low power Arm® Cortex® -M4F MCU with integrated power management (Analog Devices ADuCM4050)	USB
MEMS Microphone (Infineon IM69D130)		AUX
Temperature Sensor (Analog Devices ADT7410)		Micro-SD
Ultra-low Power Accelerometer (Analog Devices ADXL362)		2× CR2477

Hardware Features

> Multi-sensing: Vibration, magnetic field, temperature and sound sensors
> Highly reliable wireless SmartMesh™ IP 2.4 GHz 802.15.4e communication even in tough industrial environments
> Compact form factor and various mounting adapters to accommodate a wide range of monitored equipment
> CE and FCC certified with an IP66 enclosure

Software Features

> Embedded intelligence for early detection of machine failures
> Ability to configure warning and alarm levels and timestamp events for each sensor
> Seamless integration into existing systems and to the maintenance portal
> AI enables predictive and smart preventive maintenance

Portal Features

> Centralized management of all assets and related maintenance processes
> Real-time reporting and dashboards for visualization
> User-friendly interface that can be accessed from anywhere, via a computer or a mobile device

iCOMOX Wiki for documentation and code

Key Components

> **Analog Devices ADuCM4050**: Ultra-low power Arm® Cortex®- M4F MCU with integrated power management
> **Analog Devices ADXL356**: 3-axis accelerometer serves as a vibration sensor
> **Analog Devices LTC5800-IPM**: SmartMesh IP 2.4 GHz, 802.15.4e SoC as either a wireless mote, e-manager, or access point mote in a SmartMesh IP network
> **Analog Devices ADXL362**: Ultra-low power, low-g accelerometer
> **Analog Devices ADT7410**: Temperature sensor with ±0.5 °C accurate with 16-bit resolution
> **Bosch BMM150**: 3-axis magnetic field sensor
> **Infineon IM69D130**: High-performance MEMS microphone

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Online
iCOMOX Wiki for documentation and code

Ordering Information

iCOMOX Part #:
SRT-COMOX-SM

iCOMOX Evaluation Kit:
SRT-ICOMOX-KIT

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