# Presentation Will Begin Shortly

**4:00**

## APRIL SESSIONS

| DATE | TIME | SESSION |
|---|---|---|
| THURS, APRIL 3RD | 10 AM CT | Beyond Metering: Silicon Labs and Digi - Unlocking New Potential with Wi-SUN |
| THURS, APRIL 15RD | 10 AM CT | Expand Wi-Fi Development Support with Ezurio's Veda SL917 Module |

## FUTURE DATES

| DATE | TIME |
|---|---|
| **MAY:** THURS, MAY 1ST & TUES, MAY 13TH | 10 AM CT |
| **JUNE:** THURS, JUNE 5TH & TUES, JUNE 17TH | 10 AM CT |

2025 techtalks WEBINAR SERIES

# Introducing the xG26 Platform

How MG26, PG26, and B26 fit in the IoT Landscape

**Moderator: Aashish Chaddha**

**Presenters: Chad Steider and Matt Maupin**

SILICON LABS

# Introducing MG26

## A Complete Matter Solution

# MG26 Key Features

- **Largest combination of Flash and RAM**
  - Future proofs deployed devices as specifications like Matter evolve over time
  - Eliminates the need for external flash for OTA updates
  - Enables Concurrent Multiprotocol for Zigbee and Thread end devices
- **Rich peripheral set with large number of GPIOs enables better system integration**
  - Up to 64 GPIOs and 4 dedicated analog pins expand the applications that can be supported with a single chip
  - LCD driver supporting up to 288 segments
- **High performance compute**
  - The tri-core device has a 78MHz M33 application core and dedicated cores for both the radio and security subsystems
  - AI/ML accelerator further offloads compute intensive tasks for machine learning – more RAM enables more complex ML applications
- **Robust RF performance provide long-range and reliable communication**
  - Best-in-class RF performance for reliable RF communication without the need for an external FEM (Front End Module)
- **Robust Security protects the data and the device**
  - Secure Vault High is designed for PSA Level 3 and protects against local and remote attacks
- **Low power enables smaller batteries and provides longer battery life**
  - Low active and sleep current enable ability to run on coin cell batteries and provide battery life measured in years
- **Pin compatible with MG24 SoCs and Modules**
  - Pin compatible options allow easy migration for devices that need more memory and ML capabilities

# MG26: Addressing High-end, Low power IoT Mesh Devices

matter
zigbee
THREAD
Bluetooth®
Proprietary

**6x6 QFN48 (32 GPIO)**
**6x6 QFN48 (28 GPIO + 4 AIN)**
**8x8 QFN68 (49 GPIO)**
**8x8 QFN68 (45 GPIO + 4 AIN)**
**7x7 BGA136 (64 GPIO + 4 AIN)**

## DIFFERENTIATED FEATURES

- **Large Flash and RAM**
  - Enables more features and applications
  - Future proofs product
- **High GPIO Count**
  - Allows for better system integration
  - Up 64 GPIO & 4 analog in
- **Concurrent Multiprotocol Support**
  - Zigbee & Thread CMP for end devices
- **Secure Vault™ High**
  - Designed for PSA Level 3
  - Protects the data and the device
- **Segment LCD Driver**
  - Simplified UI design and BOM consolidation
  - Up to 288 segments
- **AI/ML Accelerator**
  - 8x faster and 6x lower power
  - Large RAM improves audio inferencing
- **PLFRCO**
  - Eliminates need for 32 KHz crystal
- **Advanced Sensing**
  - 20-bit ADC with 16-bit ENOB
- **Package and Firmware Compatible with MG24**
  - Migration path to more Flash and RAM
  - 6x6 QFN48

## DEVICE SPECIFICATIONS

- **High Performance Radio**
  - Up to +19.5 dBm TX
  - -105.4 dBm sensitivity @ 250 kbps (802.15.4)
  - -97.6 dBm RX @ BLE 1 Mbps
  - -105.9 dBm RX @ 125 kbps GFSK
- **Efficient ARM® Cortex®-M33**
  - 78 MHz
  - Up to 3200 kB Flash
  - Up to 512 kB RAM
- **Low Power**
  - 5.9 mA TX @ 0 dBm
  - 6.2 mA RX (802.15.4)
  - 5.4 mA RX (BLE 1 Mbps)
  - 19.5 mA TX @ +10 dBm
  - 1.4 µA EM2 sleep
  - 53.9 µA/MHz (Coremark)
- **Wide Operating Range**
  - 1.71 to 3.8 volts
  - +125ºC operating temperature
- **Multiple Protocol Support**
  - Matter, Thread, Zigbee, Bluetooth (1M/2M/LR), Bluetooth mesh, Proprietary, DMP and CMP

# MGM260P – Our Highest performance 2.4 GHz Module for Fast Time to Market

matter zigbee Bluetooth® THREAD

**12.9 x 15.0 mm (29 GPIO)**

## DIFFERENTIATED FEATURES

- Large Memory
  - Up to 512kB RAM
  - Up to 3200kB Flash
- Concurrent Multiprotocol Support
  - Zigbee & Thread CMP for end devices
- **Faster Inferencing with AI/ML Accelerator**
  - 8x faster and 6x lower power
  - Large RAM improves audio inferencing
- **Secure Vault™ High**
  - Designed for PSA Level 3
  - Protects the data and the device
- **PLFRCO**
  - Eliminates need for 32 KHz crystal
- **Advanced Sensing**
  - 16-bit ADC
- **Easy migration path to xG26 SoCs**
  - Pin Compatible with xGM240P Module
- **Certifications**
  - Reduced development time and cost
  - Shielded, Fully Certified
  - FCC, IC, CE, MIC, KCC

## DEVICE SPECIFICATIONS

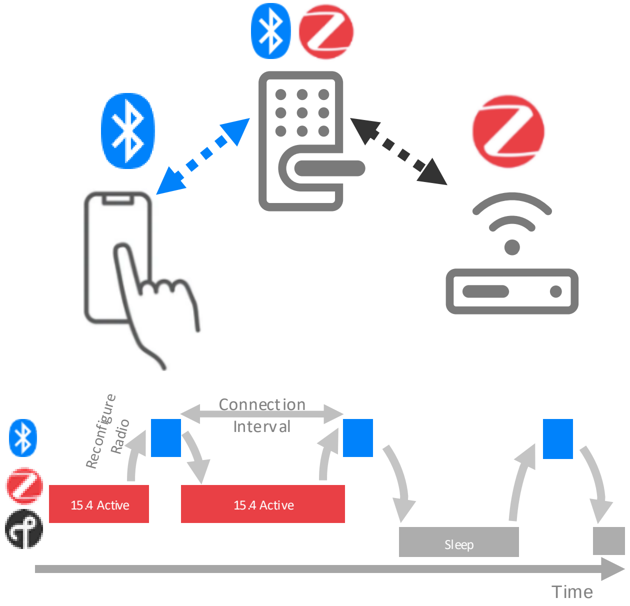
- **High Performance Radio**
  - -98.3 dBm RX @ BLE 1 Mbps
  - -106.1 dBm RX @ 802.15.4
  - Up to +20 dBm output power
- **Efficient ARM® Cortex®-M33**
  - Operating Frequency: Up to 78 MHz
- **Low Power**
  - 5.7 mA RX current @1 Mbps
  - 6.8 mA @ 0 dBm TX current
  - 19.4 mA @ +10 dBm TX current
  - 1.4 µA EM2 sleep current
  - 59.3 µA/MHz (EM0)
- **Wide Operating Range**
  - 1.8 to 3.8 volts
  - -40ºC to +125ºC operating temperature

# Silicon Labs’ 2.4GHz SoC Portfolio

| | *x*G12 | *x*G21 | *x*G24 | *x*G26 |
|---|---|---|---|---|
| **Protocols** | | | | |
| **Frequency Bands** | 2.4 GHz, Sub-GHz | 2.4 GHz | 2.4 GHz | 2.4 GHz |
| **Core** | Cortex-M4 (40 MHz) | Cortex-M33 (80 MHz) | Cortex-M33 (78 MHz) | Cortex-M33 (78 MHz) |
| **Max Flash** | 1024 kB | 1024 kB | 1536 kB | 3200 kB |
| **Max RAM** | 256 kB | 96 kB | 256 kB | 512 kB |
| **Security** | Secure Vault - Base | Secure Vault - Mid<br>Secure Vault - High | Secure Vault - Mid<br>Secure Vault - High | Secure Vault - Mid<br>Secure Vault - High |
| **Rx Sensitivity (15.4)** | -102.7 dBm | -104.3 dBm | -105.4 dBm | -105.4 dBm |
| **Rx Sensitivity (BLE 1Mbps)** | -94.8 dBm | -97.1 dBm | -97.6 dBm | -97.6 dBm |
| **Active Current (CoreMark)** | 85 µA/MHz | 50,9 µA/MHz | 49.1 µA/MHz | 53.9 µA/MHz |
| **Sleep Current (EM2, 16 kB ret)** | 1.5 µA | 4.5 µA | 1.3 µA | 1.4 µA |
| **TX Current @ +0 dBm (2.4 GHz)** | 9.5 mA | 9.9 mA | 5.0 mA | 5.9 mA |
| **TX Current @ +10 dBm (2.4 GHz)** | 34 mA | 34.9 mA | 19.1 mA | 19.5 mA |
| **TX Current @ +20 dBm (2.4 GHz)** | 131 mA | 186.5 mA | 156.8 mA | 152.7 mA |
| **RX Current (802.15.4)** | 12.5 mA | 9.4 mA | 5.1 mA | 6.2 mA |
| **RX Current (BLE 1 Mbps)** | 10.9 mA | 8.8 mA | 4.4 mA | 5.4 mA |
| **Serial Peripherals** | USART, I2C | USART, I2C | USART, EUSART, I2C | USART, EUSART, I2C |
| **Analog Peripherals** | 12-bit ADC, ACMP, VDAC | 12-bit ADC, ACMP | 20-bit ADC, ACMP, VDAC | 20-bit ADC, ACMP, VDAC |
| **Other** | PCTN, LESENSE | Die Temp Sensor | Die Temp Sensor | Die Temp Sensor, Segment LCD |
| **Operating Voltage** | 1.8 V to 3.8 V | 1.71 V to 3.8 V | 1.71 V to 3.8 V | 1.71 V to 3.8 V |
| **Package** | 7x7 QFN48 (31 GPIO)<br>8x8 QFN68 (46 GPIO)<br>8x8 BGA125 (65 GPIO) | 4x4 QFN32 (20 GPIO) | 5x5 QFN40 (26 GPIO)<br>6x6 QFN48 (32 GPIO)<br>6x6 QFN48 (28 GPIO + 4 AIN) | 6x6 QFN48 (32 GPIO)<br>6x6 QFN48 (28 GPIO + 4 AIN)<br>8x8 QFN68 (49 GPIO)<br>8x8 QFN68 (45 GPIO + 4 AIN)<br>7x7 BGA136 (64 GPIO + 4 AIN) |

# xG26 DMP & CMP Support

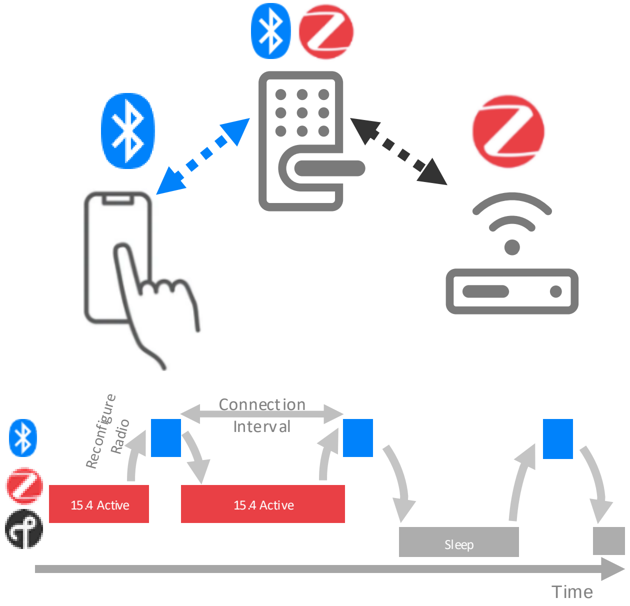
## DYNAMIC MULTIPROTOCOL (DMP)



- Time-sliced operation of two protocols (such as BLE and Zigbee)
- Enables direct phone connectivity
  - Enhanced UI for commissioning, etc.

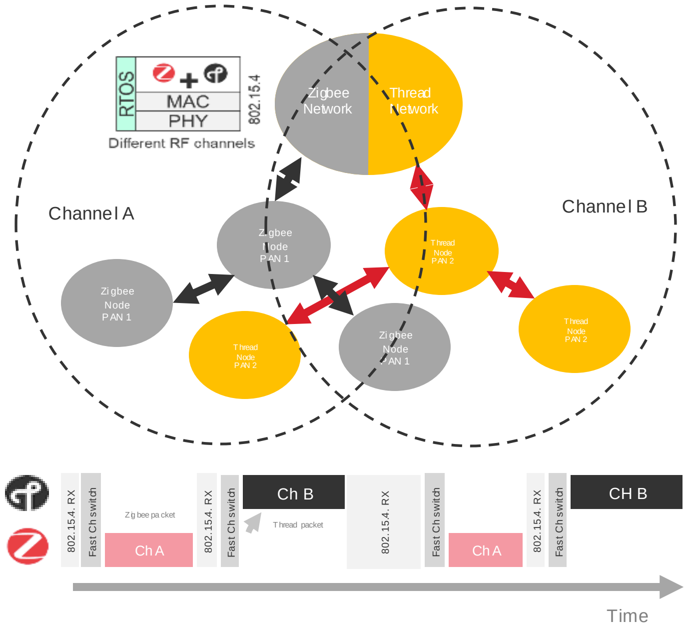
# xG26 DMP & CMP Support

## DYNAMIC MULTIPROTOCOL (DMP)



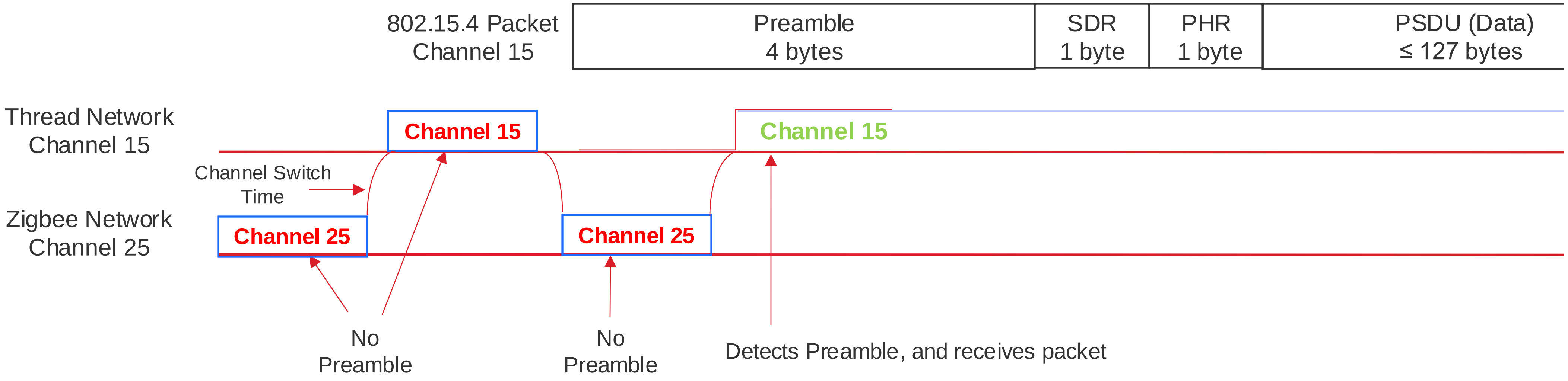
- Time-sliced operation of two protocols (such as BLE and Zigbee)
- Enables direct phone connectivity
  - Enhanced UI for commissioning, etc.

## CONCURRENT MULTIPROTOCOL (CMP)



- Concurrent operation of Zigbee and Thread
  - Operation is on the same or different (Fast Channel switching) channels
- HW based Fast Channel switching
  - CMP with Concurrent Listening
    - Zigbee and Thread are on different channels
    - Supported on MG21, MG24 for gateways and hubs (NCP/RCP)
    - Supported on MG26 gateways and hubs as well as end devices (SoC)

# Concurrent Multiprotocol Example



- **Device switches between channels**
- **When a valid 802.15.4 preamble is detected**
  - Stays on channel to receive the entire packet
  - Checks to see if it is a valid packet for the network and device
  - Transmits acknowledgement (if required)
- **Switches to the next channel and repeats the process**

CMP Blog for more information

# MG26 Summary

- **The MG26 family is Silicon Labs' highest performance wireless SOC for Series 2**
- **Leads the market with combination of best-in-class link budget, Flash, RAM, and GPIOs**
  - Removes the need of external Flash for Matter
  - Large number of GPIOs and rich peripherals enable better system integration
  - Enables more complex applications
  - Reduces BOM cost and PCB area
- **The tri-core device offloads security and radio critical tasks while freeing up the M33 for customer apps**
- **ML accelerator enables faster inferencing at lower power and large RAM enables more ML applications**
- **Secure Vault High provides support for industry-leading PSA Level 3 certification**
- **Best-in-class RF performance for reliable RF communication**
- **Low active and sleep current enable coin cell batteries and provide battery life measured in years**
- **Pin compatibility with MG24 and MGM240P enables migration to more memory and ML capabilities**
  - xG26 6x6 QFN48 is pin compatible with xG24 QFN48
  - xGM260P module is pin compatible with xGM240P module

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# Introducing PG26

## More peripherals with the same low power performance

# Introducing PG26

- **Large combination of Flash and RAM to meet the needs of more challenging applications**
  - Allows for more complex AI/ML algorithms and larger customer applications
- **Rich peripheral set with large number of GPIOs enables better system integration**
  - Up to 64 GPIOs + 4 additional analog only pins reduces the need for external components
  - Integrated LCD driver to support up to 288 segments
- **High performance, multi-core compute platform improved efficiency**
  - 80MHz Cortex-M33 core to meet demanding real time processing needs
  - Additional security core for isolation and to ensure more cycles remain for customer application
- **Firmware compatible with other Series 2 MCUs**
  - Simplifies designs for connected and non-connected products
  - Package compatibility for 2.4GHz and Sub-GHz wireless SoC options

# PG26 – High Performance and More GPIOs for More Complex Applications

32 32-Bit MCU

**6x6 QFN48 (28 GPIO + 4 AIN)**
**8x8 QFN68 (48 GPIO + 4 AIN)**
**7x7 BGA136 (64 GPIO + 4 AIN)**

## DIFFERENTIATED FEATURES

- **Large Flash and RAM**
  - Enables more features and applications
- **High GPIO Count**
  - Allows for better system integration
  - Up 64 GPIO & 4 analog in
- **Faster Inferencing with AI/ML Accelerator**
  - 8x faster and 6x lower power
  - Large RAM improves audio inferencing
- **Segment LCD Driver**
  - Simplified UI design and BOM consolidation
  - Up to 288 segments
- **Secure Vault™ High**
  - Upgraded security over Series 0 and Series 1
  - Consistent across wired and wireless platforms
- **Package and Firmware Compatible with PG28**
  - Migration path to more Flash and RAM
- **Software Compatible with xG2x Wireless SoCs**
  - Easy migration to wireless support

## DEVICE SPECIFICATIONS

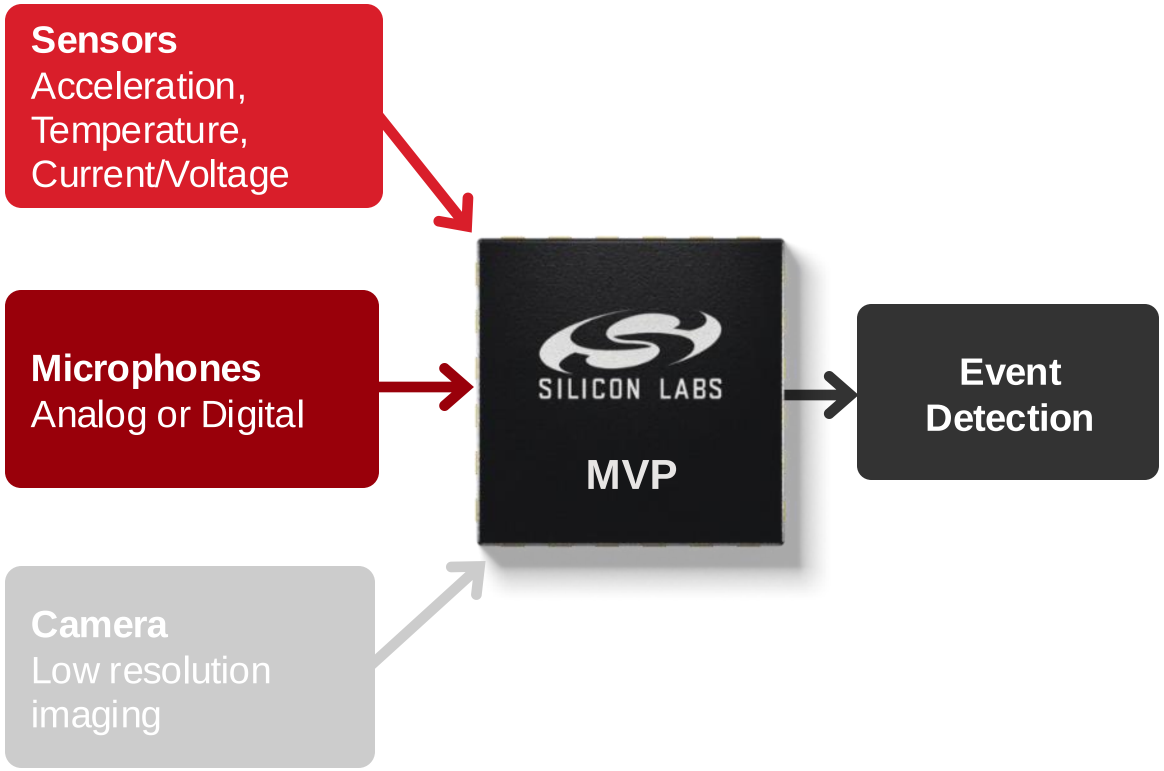
- **Ultra Low Power**
  - 42.8 µA/MHz EM0 @ 80 Mhz[1]
  - 1.4 µA EM2 with 16 kB RAM
- **Efficient ARM® Cortex®-M33**
  - Operating Frequency: Up to 80 MHz
  - Up to 512 kB RAM and 3200 kB Flash
- **Low Power Peripherals**
  - 4 x EUSART, 3 x USART (7 x UART), 4 x I2C
  - 16-bit ADC
  - 2x 12-bit VDAC, 2x ACMP
  - Temperature sensor +/- 1.5°C
- **Wide Operating Range**
  - 1.71 to 3.8 volts
  - +125ºC operating temperature

---

1 - 80 MHz HFRCO, CPU running CoreMark loop from Flash

# MVP – Matrix Vector Processor (AI/ML Hardware Accelerator)

- **Matrix processor accelerates ML inferencing**
  - Multi-dimensional array operations
  - Handles real and complex data
  - Offloads MCU
- **Up to 8x faster inferencing over Cortex-M**
  - Lower latency
- **Up to 6x lower power for inferencing**
  - Longer battery life
- **MVP Math Library**
  - Can be used for non-ML applications



**Sensors**
Acceleration,
Temperature,
Current/Voltage

**Microphones**
Analog or Digital

**Camera**
Low resolution
imaging

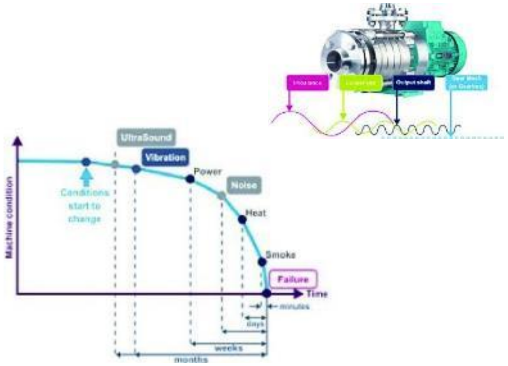
**Event Detection**

**AI/ML Hardware Accelerator enables efficient Edge ML inferencing**

# Machine Learning Application Examples xG26

## Typical/recommended Resource needs with ML applications in Order of Magnitudes

RAM: 64kB
Ops/s: 5M-40M



**SENSOR**

**Signal Processing**
**(time series, low-rate data)**

- Predictive/Preventative Maintenance
- Anomaly detection (e.g. air quality, abnormal usage, leak detection)
- Condition based monitoring – machine health, Cold chain monitoring, Battery monitoring
- Bio-signal analysis -healthcare and medical (e.g., pulse detection, EKG)
- Accelerometer use-cases e.g., fall detection, pedometer, step counting
- Agricultural use-cases (e.g. cow health)

RAM: 128kB
Ops/s: 40M-100M

**AUDIO**

**Audio Pattern Matching**

- Security applications e.g., Glass break, scream, shot detection
- Cough detection
- Machine malfunction detection
- Breath monitoring

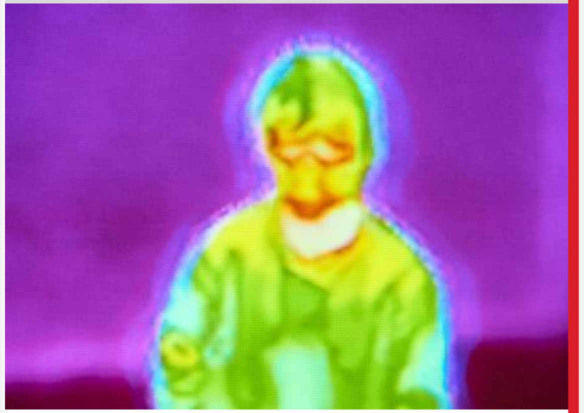
RAM: 256kB
Ops/s: 50M-500M

**VOICE**

**Voice Commands**

- 10 words command set for smart appliance
- Wake-word detection (Always-On voice)
- Smart device voice control
- Voice assistant

RAM: 256kB
Ops/s: 200M-1.5G w /hardware accelerator



**VISION**

**Low-resolution vision**

- Wake-up on object detection (always-on)
- Presence detection
- People counting, people-flow counting
- Movement detection
- Smart city monitoring (e.g. Parking spot)
- Fingerprint matching

**MG26 increased RAM means higher resolution, bigger ML models and more accuracy**

# Secure Vault™ - Protecting the IoT Device

| Base | Mid | High | Feature |
|---|---|---|---|
| ✓ | ✓ | ✓ | True Random Number Generator |
| ✓ | ✓ | ✓ | Crypto Engine |
| ✓ | ✓ | ✓ | Secure Application Boot |
| — | VSE / HSE | HSE | Secure Engine |
| — | ✓ | ✓ | TrustZone |
| — | ✓ | ✓ | Secure Boot with RTSL |
| — | ✓ | ✓ | Secure Debug with Lock/Unlock |
| — | Optional | ✓ | DPA Countermeasures |
| — | — | ✓ | Anti-Tamper |
| — | — | ✓ | Secure Attestation |
| — | — | ✓ | Secure Key Management |
| — | — | ✓ | Advanced Crypto |
|  |  | BG26<br>MG26<br>PG26<br>xGM260P |  |

SESIP™2
psacertified™ level two

SESIP™3
psacertified™ level three

# PG26 Summary

A more general-purpose Series 2 MCU

- Larger memory options and more GPIOs to address a broader number of possible applications

AI/ML Hardware Accelerator to improve latency and efficiency

- 8x faster inferencing at 6x lower power while maintaining compatibility with other MVP enabled families

Firmware and package compatibility with other Series 2 Wireless SoCs and MCUs

- Directly compatible with MG26 and BG26 wireless SoCs while maintaining firmware compatibility to all Series 2 EFR Products

Multi-Core architecture allows for optimized applications and security without compromise

- Isolated security sub-system and core provides best in class security and ensures more MCU cycles are available for customer applications

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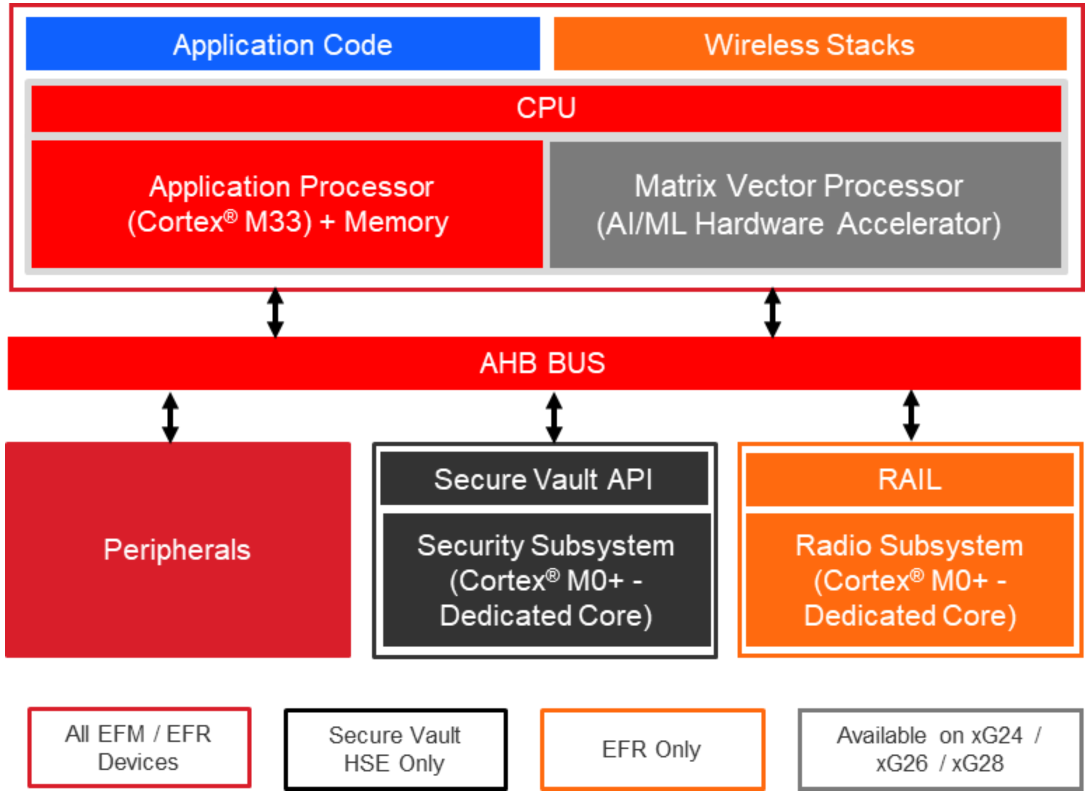
# xG26

A Platform for advanced IoT

# EFM and EFR: Multi-Core Solutions for IoT Development



Application Code

Wireless Stacks

CPU

Application Processor (Cortex® M33) + Memory

Matrix Vector Processor (AI/ML Hardware Accelerator)

AHB BUS

Peripherals

Secure Vault API

Security Subsystem (Cortex® M0+ - Dedicated Core)

RAIL

Radio Subsystem (Cortex® M0+ - Dedicated Core)

All EFM / EFR Devices

Secure Vault HSE Only

EFR Only

Available on xG24 / xG26 / xG28

**1- EFR32 devices only 2- Secure Vault Hardware Secure Element (HSE) Only**

- **Multi-core architecture gives design flexibility and optimization across EFM and EFR platforms**
  - Dedicated application, radio[1], and security[2] cores share system burden for better resource utilization
- **Common development platform for connected and non-connected products**
  - Simplicity Studio gives developers a common development platform for entire product portfolio
- **Common Security and AI/ML subsystems**
  - Allows for design consistency independent of connectivity needs
- **Footprint and firmware compatibility between EFM and EFR families**
  - Simplified SKU management and code base development lowers development cost and complexity

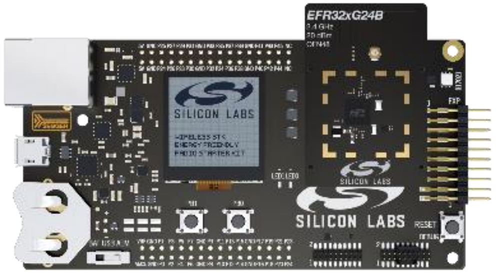
| | BG | MG | FG<br>Wi SUN | ZG | SG<br>amazon sidewalk | PG |
|---|---|---|---|---|---|---|
| xG21 | ✓ | ✓ | | | | |
| xG22 | ✓ | ✓ | | | | ✓ |
| xG23 | | | ✓ | ✓ | ✓ | ✓ |
| xG24 | ✓ | ✓ | | | | |
| xG25 | | | ✓ | | | |
| xG26 | ✓ | ✓ | | | | ✓ |
| xG27 | ✓ | ✓ | | | | |
| xG28 | | | ✓ | ✓ | ✓ | ✓ |
| | EFR Device Families | | | | | EFM |

# Getting Started with xG26

- **Dev Board**
  - 1x Development board
    - On-board debugger
    - Signal breakouts
    - On-board sensors
    - 20-bit ADC
    - AI/ML hardware accelerator
- **Explorer kit**
  - 1x Explorer board
    - mikroBUS socket
    - Qwiic connector

| Part Number | Description |
|---|---|
| xG26-DK2608A | xG26 +10 dBm Dev Kit |
| xG26-EK2709A | xG26 +10 dBm Explorer Kit |
| PG26-EK2711A | MCU, QFN68 Explorer Kit |
| MGM260P-EK2713A | xGM260 +20 dBm Explorer Kit |

- **Pro kits**
  - 1x radio board
  - 1 x WSTK main board
    - Modular development platform
    - Advanced development
    - RF measurements
    - Energy profiling
    - External device debug
    - Ethernet for large network test*
    - Segment LCD*



| Part Number | Description |
|---|---|
| xG26-PK6028A | xG26 +10 dBm Pro Kit |
| PG26-PK2505A | MCU, BGA136 Pro Kit |

- **Radio Board kits**
  - 1x radio board
    - Uses existing WSTK boards
    - Uses existing software tools

| Part Number | Description |
|---|---|
| xG26-RB4120A | 8x8 QFN68, +10 dBm Radio Board |
| xG26-RB4121A | 8x8 QFN68, +20 dBm Radio Board |
| XG26-RB4118A | 7x7 BGA136, +10 dBm Radio Board |
| MGM260P-RB4350A | xGM260P +10 dBm Radio Board |
| MGM260P-RB4351A | xGM260P +20 dBm Radio Board |

# Q&A

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# Thank you

## APRIL SESSIONS

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| THURS, APRIL 15RD | 10 AM CT | Expand Wi-Fi Development Support with Ezurio's Veda SL917 Module |

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