Presentation Will Begin Shortly

4:00

MATTER

FEB 15TH | The Final Step Matters: Scaling Secure Products into Volume Production

MAR 21ST | Matter Technology and Market Updates and Q&A with the Connectivity Standard Alliance

APR 25TH | Future Proofing your Matter Products

MAY 30TH | Matter Specification Updates and Enhanced Support for Low Power Sensor Devices

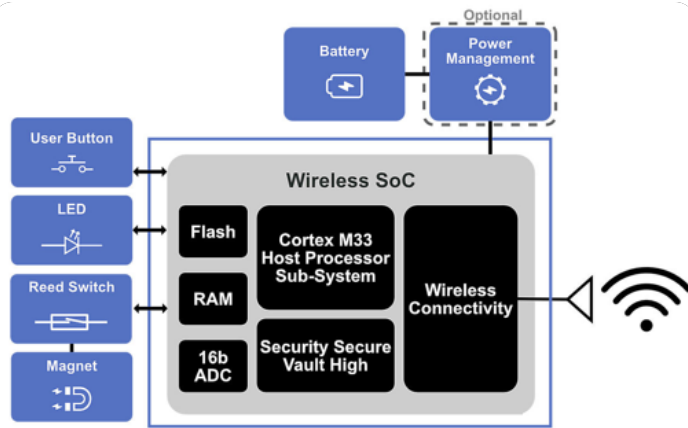SILICON LABS

Welcome

Future Proofing Your Matter Products

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Agenda

- **Why**

- **What**

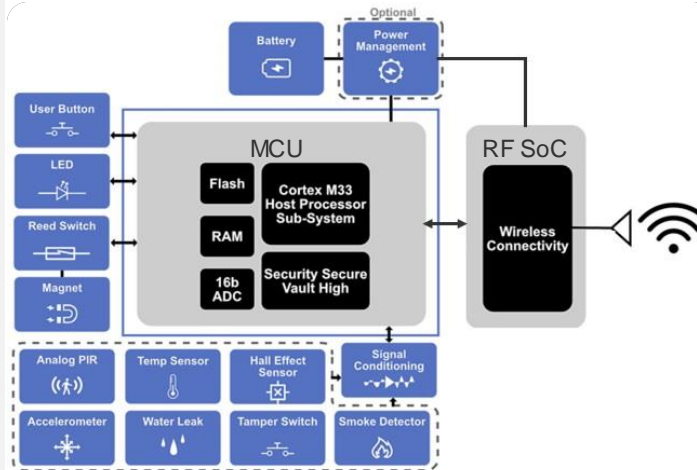- **How**

- **Q&A**

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Why

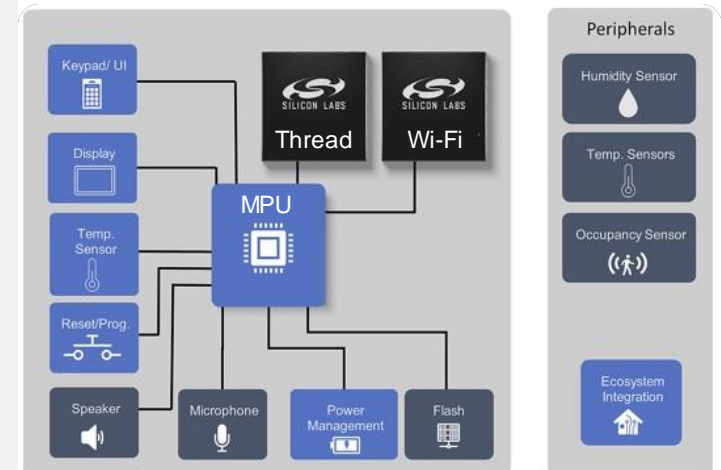# IoT Constrained Devices and Product Longevity

WIRELESS SOC

Wireless SoC runs everything

Needs large Flash/RAM

Security is on chip

Large number of GPIO/Peripherals

MCU + WIRELESS SOC

Main control is from Host (MCU)
Wireless runs stack and Matter
Less Flash and RAM
OTA may be off wireless SoC
Security may be off wireless SoC
Fewer resources like GPIO, etc.

MPU + TRANSCEIVER

High end host MPU

Wireless is Transceiver only

Limited resources needed

OTA off chip

Security off chip

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Wireless Specification Evolution

Wi-Fi - 1997 1 Mbps
- Wi-Fi 1 1999
- Wi-Fi 2 1999
- Wi-Fi 3 2003
- Wi-Fi 4 2008
- Wi-Fi 5 2014
- Wi-Fi 6 2019
- Wi-Fi 6E 2020
- Wi-Fi 7 2024

Bluetooth – 1999
- Bluetooth 1.1 2001, Bluetooth 1.2 2003
- Bluetooth 2.0 2004, Bluetooth 2.1 2007
- Bluetooth 3 2009
- Bluetooth 4 2010, Bluetooth 4.1 2013, Bluetooth 4.2 2014
- Bluetooth 5 2016, Bluetooth 5.1 2019, Bluetooth 5.2 2020, Bluetooth 5.3 2021, Bluetooth 5.4 2023

Zigbee – 2004
- Zigbee 2006 (r06) 2006
  - r07, r13, r14, r15
- Zigbee 2007 (Zigbee Pro - r16) 2007
  - r17, r18, r19, r20, r21
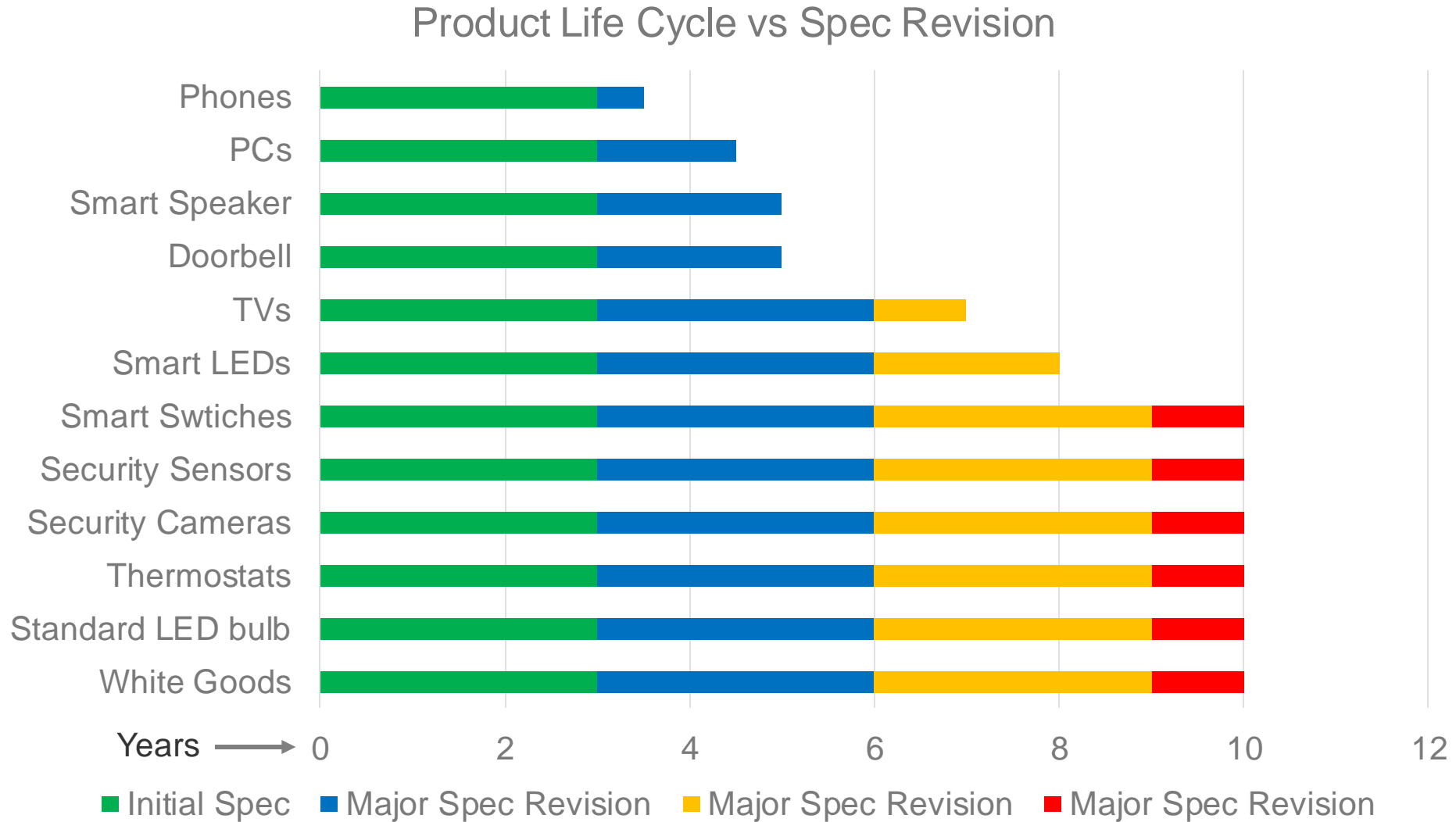- Zigbee 3.0 (r21) 2015
  - r22, r23

Thread – 2014
- 1.1 2015
- 1.2 2019
- 1.3 2022

Matter 2022
- Matter 1.1 Released May 2023
- Matter 1.2 Released October 2023
- Matter 2024 Spring Update
- Matter 2024 Fall Update

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Product Life Cycles

Product Life Cycle vs Spec Revision

What

Device Types

Devices Categories and Device Types Supported by Matter (1.2)

HVAC CONTROLS

SAFETY & SECURITY

DOOR LOCKS

LIGHTING & ELECTRICAL

MEDIA DEVICES

WINDOW COVERINGS & SHADES

AIR QUALITY CONTROL

WHITE GOOD (APPLIANCES)

CONTROLLERS & BRIDGES

ROBOT VACUUMS

Device Categories and Device Types in Development

CAMERAS

WHITE GOODS (APPLIANCES)

AIR QUALITY CONTROL

ENERGY MANAGEMENT

AMBIENT PRESENCE SENSING

SMOKE & CO DETECTION

ACCESS POINTS

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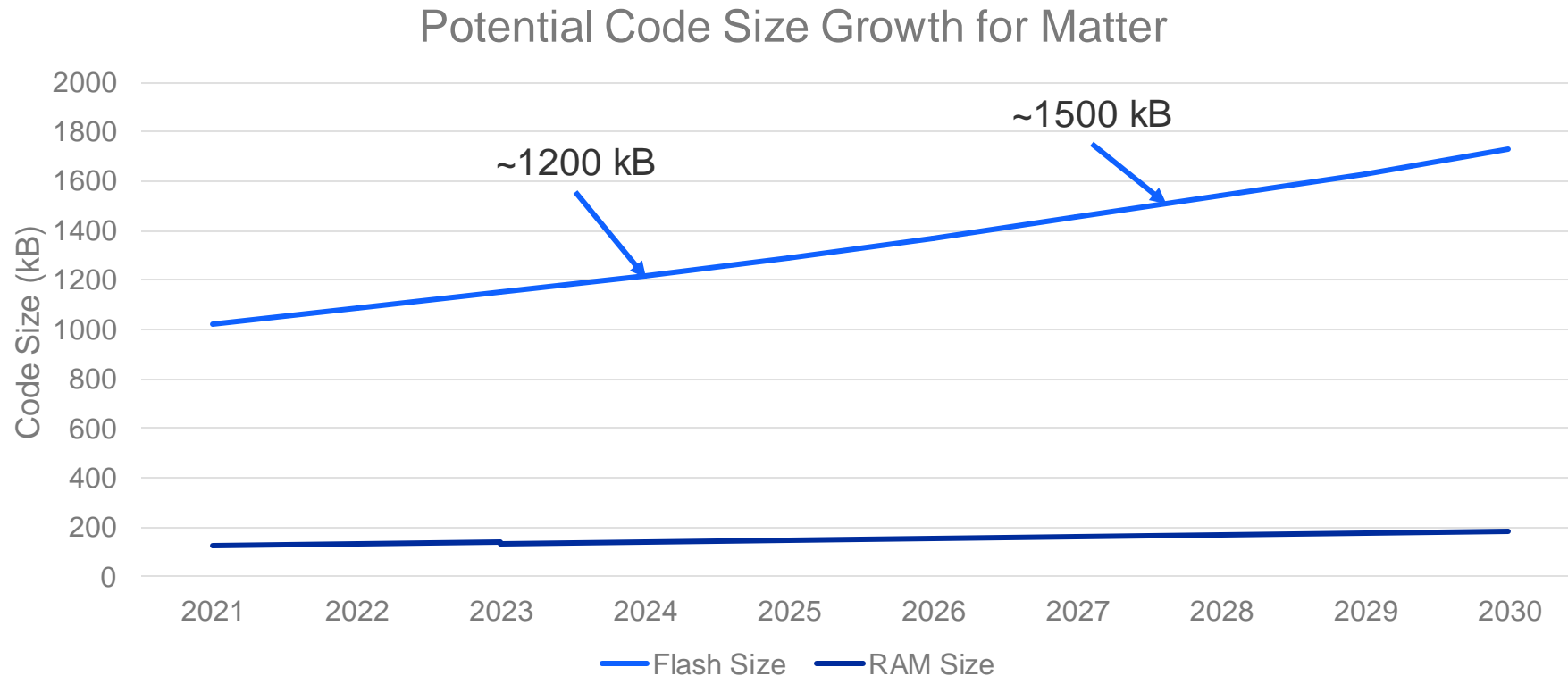
Code Size Growth

- **Matter code size continues to grow**
  - Zigbee growth has averaged 5-7% now that spec has stabilized
  - Spikes occur during new revisions, feature additions, etc.
  - Includes Firmware OTA in main Flash

Potential Code Size Growth for Matter

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# Matter Security – Will Recommended Become Mandatory?

MANUFACTURING

Matter devices must be injected with a unique DAC certificate/ private key, Onboarding Payload (QR code delivered), Certification Declaration (CD), and other static/ dynamic data during manufacturing. **(Mandatory)**

COMMISSIONING

DAC with VID/PID must be checked against the DCL and CD verified to ensure only authentic and certified Matter devices are commissioned. **(Mandatory)**

DEVICE COMMUNICATION
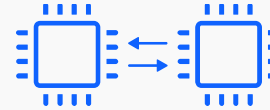
Communication between Matter devices must be secured and encrypted using cryptographic keys and PBKDF. **(Mandatory)**

SOFTWARE UPDATES

Devices must support OTA firmware updates to allow vulnerabilities to be patched **(Mandatory)**

OTHER SECURITY SPECIFICATIONS

- Authentication and encryption keys must be generated by a "Deterministic Random Bit Generator" Seeded by NIST 800-90B TRNG **(Mandatory)**
- Debug interfaces and access to secure boot trust anchors should be disabled to only allow authorized access (fusing) **(Recommended)**
- DACs and operational private key confidentiality should be protected from *remote* attacks **(Recommended)**
- Vendors should have a public policy & mechanism to identify and rectify security vulnerabilities in a timely manner **(Recommended)**
- The software should be encrypted *at rest* to prevent unauthorized access to core IP **(Optional)**
- Some devices should be protected against *physical* attacks to prevent tampering, side-channel, or debug glitching attacks. **(Optional)**

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How

Secure Vault™ Protecting the IoT Device

Base	Mid	High	Feature	
✓	✓	✓	**True Random Number Generator**	
✓	✓	✓	**Crypto Engine**	
✓	✓	✓	**Secure Application Boot**	
—	VSE / HSE	HSE	**Secure Engine**	
—	✓	✓	**Secure Boot with RTSL**	
—	✓	✓	**Secure Debug with Lock/Unlock**	
—	✓ (HSE) Optional (VSE)	✓	**DPA Countermeasures**	
—	—	✓	**Anti-Tamper**	
—	—	✓	**Secure Attestation**	
—	—	✓	**Secure Key Management**	
—	—	✓	**Advanced Crypto**	

Designing Secure IoT Devices

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Silicon Labs' Product Portfolio Designed for Matter

matter

High Performance, Low-power SoC
MG24

- SoCs and Modules
- Thread + BLE
- Lowest Power
- Robust peripheral set
- AI/ML accelerator
- Secure Vault High

Best combination of Flash, RAM and GPIO
MG26

- SoCs and Modules (2025)
- Largest Flash/RAM
- Highest Integration
- Thread + BLE
- Low Power
- Robust peripheral set
- AI/ML accelerator
- Secure Vault High

Lowest Power Best Security Wi-Fi 6 SoC
SiW917

- Wi-Fi 6 End Devices
- SoCs and Modules
- Large Flash/RAM
- Wi-Fi 6 + BLE
- Low power

Lowest Power Wi-Fi 4 NCP Solution
RS9116

- Wi-Fi 4 End Devices
- ICs and Modules
- Wi-Fi 4 + BT/BLE
- Low Power
- Requires external Host

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Matter over Wi-Fi

SiWx917 Wi-Fi 6 SoC for Matter over Wi-Fi

- **Single-Chip Matter over Wi-Fi Solution**
  - Wi-Fi, Bluetooth LE, and Matter single chip solution
  - Certified Solution
- **Ultra-Low Power**
  - Increases Battery life and Recharging Interval
- **IoT-Optimized Wireless Performance**
  - 2.4GHz: long-range, low-power, effective wall penetration, high-throughput
- **Large Memory**
  - Up to 672kB RAM, 8MB Flash/PSRAM, External Flash/PSRAM
- **Edge Computing + System Integration**
  - Separate Application MCU and Wireless Processor
  - Rich Peripherals, Sensor Hub, High GPIO
- **Robust Security**
  - A High Level of Security for the Device, Wi-Fi Protocol, and Networking

The most IoT optimized Wi-Fi SoC for Matter over Thread end devices

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SiWx917: Ultra-Low-Power, High-Performance Wi-Fi 6 SoC

Wi-Fi 6

Bluetooth®   matter

SiWx917

7 x7 QFN 84 (45 GPIO)

DIFFERENTIATED FEATURES

Lowest Power Wi-Fi 6 SoC
- Wi-Fi Standby Assoc mode current: 55 µA @ 1-second
- Deep sleep current ~2.5 µA
- Sleep/Standby current (352kB RAM retention) ~10 µA
- Low MCU active current: 32uA/MHz at 20MHz LP mode

Large Memory
- SRAM 672kB
- Embedded Flash 0/4/8MB
- Embedded PSRAM up to 8 MB
- External Flash and PSRAM up to 16MB

High Output Power
- Wi-Fi TX PA up to +20dBm;
- Bluetooth PA up to +19.5 dBm

DEVICE SPECIFICATIONS

2.4 GHz Wi-Fi 6 Radio
- Single Stream Wi-Fi 6
- IEEE 802.11 b/g/n/ax
- Rx Sensitivity -97.5 dBm

Format Bluetooth Low Energy 5.4
- -95 dBm sensitivity

ARM® Cortex®-M4 with FPU
- Application Core up to 180 MHz

Secure
- WPA2 (Personal/Enterprise), WPA3 (Personal), TLS1.3
- Secure Boot/OTA, PUF, TRNG, Secure Zone, Secure Key Storage, Secure Debug, Anti Rollback, Encrypted XiP, Secure Attestation

Feature Rich peripherals
- SDIO, UART, (Q)SPI, I2C, I2S, SIO, PWM, RTC, Timers, 12-bit ADC/DAC, Op-Amp, Comparator, Temp Sensor, Cap Touch
- Sensor Hub

Wide Operating Range
- 1.75 V to 3.63 V
- -40 to +85 °C
- -40 to +105 °C for limited duty cycle use cases

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SiWx917 - Large Memory

672kB RAM

- **A large internal RAM allowing more space to run application and stacks**
- **Three software-configurable MCU application memory options for sharing the RAM between the wireless, system, and application:**
  - For application: 192 / 256 / 320 kB

8MB
Embedded Flash or PSRAM

- **A large Embedded Flash or PSRAM to accommodate application, OTA, Matter, and code growth**
- **Embedded Flash: 0, 4, or 8 MB**
- **Embedded PSRAM: 0, 2, or 8 MB**
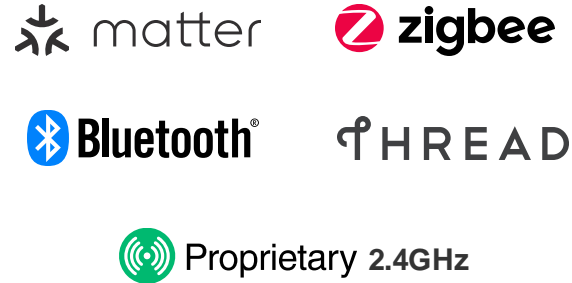- **Encrypted XiP**

16MB
External Flash or PSRAM

- **Supports a Large External Flash or PSRAM for ultimate design flexibitility, space, and growth**
- **External Flash or PSRAM up to 16MB**
- **Encrypted XiP**

Get More Space for Your Application, OTA, Matter, and Future Growth!

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Matter over Thread

MG24: Optimized for Battery Powered IoT Mesh Devices

matter   zigbee

Bluetooth®   ꟼHREAD

Proprietary 2.4GHz

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MG24

5x5 QFN40 (26 GPIO)
6x6 QFN48 (32 GPIO)

DIFFERENTIATED FEATURES

Optimized Large Flash and RAM
- Provides optimal Flash and RAM for low power end devices

High Output Power
- Internal PA capable of up to +19.5 dBm

AI/ML Hardware Accelerator
- Enables inferencing 8x faster and 6x lower power than in Software

Advanced Sensing
- 20-bit ADC with 16-bit ENOB

PLFRCO with 500 PPM accuracy
- Eliminates need for 32 KHz crystal

DEVICE SPECIFICATIONS

High Performance Radio
- -97.6 dBm RX Sensitivity @ BLE 1 Mbps
- -105.4 dBm RX Sensitivity @ 802.15.4

Efficient ARM® Cortex®-M33
- Operating Frequency: Up to 78 MHz
- Up to 1526 kB Flash and 256 kB RAM

Low Power
- 5.0 mA TX @ 0 dBm
- 19.1 mA TX @ +10 dBm
- 4.4 mA RX (BLE 1 Mbps)
- 5.1 mA RX (802.15.4)
- 33.4 µA/MHz (Coremark)
- 1.3 µA EM2 with 16 kB RAM

Secure
- Secure Vault Mid and High Options
- ARM ® TrustZone ®

Feature Rich peripherals
- 20-bit ADC, ACMP, VDAC, USARTs, I2C, I2S, Timers, LCD

Wide Operating Range
- 1.71 to 3.8 volts
- +125ºC operating temperature

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Introducing the MG26

- **Largest combination of Flash and RAM enables more complex applications and ML capabilities**
  - Future proofs deployed devices as specification like Matter evolve over time
  - Eliminates the need for external flash for OTA updates
- **Rich Peripheral set with large number of GPIO enables better system integration**
  - Up to 64 GPIO and 4 dedicated analog pins expands the applications that can be supported with a single chip
- **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
- **Robust RF Performance provide long range and reliable communication**
  - Best-in-class RF performance for reliable RF communication with the need for an external FEM (Front End Module)
- **Robust Security protects the data and the device**
  - Secure Vault Mid/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 provides battery life measured in years
- **Pin compatible with xG24 devices**
  - Pin compatible 6x6 QFN48 for xG24 allows easy migration for devices that need more memory and ML capabilities

The best combination of Flash, RAM and GPIO for Matter over Thread devices

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

matter   zigbee

Bluetooth®   THREAD

Proprietary 2.4GHz

MG26
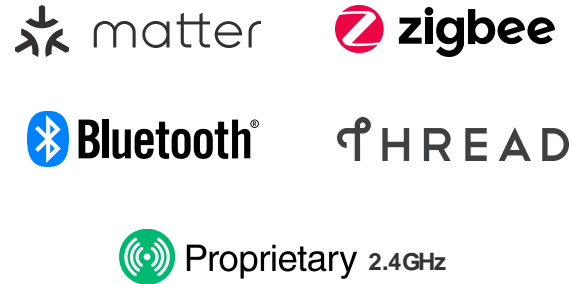
6x6 QFN48 (32 GPIO)

8x8 QFN68 (49 GPIO)

7x7 BGA136 (64 GPIO + 4 AIN)

DIFFERENTIATED FEATURES

Large Flash and RAM
- Up to 3200kB Flash and 512kB RAM
- Provides more application space for future proofing and eliminates external Flash

High GPIO Count
- Up 64 GPIO & 4 analog inputs for more complex applications

High Output Power
- Internal PA capable of up to +19.5 dBm

Integrated segment LCD Controller
- Up to 288 segments (4x40 or 8x36) for better system integration

AI/ML Hardware Accelerator
- Enables inferencing 8x faster and 6x lower power than in Software

Drop-In Compatible xG24
- Easy migration from MG24 6x6 QFN48

Advanced Sensing
- 20-bit ADC with 16-bit ENOB

PLFRCO with 500 PPM accuracy
- Eliminates need for 32 KHz crystal

DEVICE SPECIFICATIONS

High Performance Radio
- -97.6 dBm RX Sensitivity @ BLE 1 Mbps
- -105.4 dBm RX Sensitivity @ 802.15.4

Efficient ARM® Cortex®-M33
- Operating Frequency: Up to 78 MHz

Low Power
- 6.0 mA TX @ 0 dBm
- 6.2 mA RX (802.15.4)
- 5.4 mA RX (BLE 1 Mbps)
- 19.0 mA TX @ +10 dBm
- 1.4 µA EM2 sleep
- 66.9 µA/MHz (Coremark)

Secure
- Secure Vault Mid and High Options
- ARM ® TrustZone ®

Feature Rich peripherals
- 20-bit ADC, ACMP, VDAC, USARTs, I2C, I2S, Timers, LCD

Wide Operating Range
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Summary

- **IoT Wireless Standard are evolving**

- **Feature enhancements, bug fixes and security updates are inevitible**

- **Deployed IoT products at the edge have long product life cycles and limited resources**

- **Designers need to plan for updating firmware and features in the field**

- **Consideration should be made in the design to ensure products do not become obsolete**

- **Silicon Labs Matter offerings are designed to help future proof your products**

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Q&A

MATTER

Thank You

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