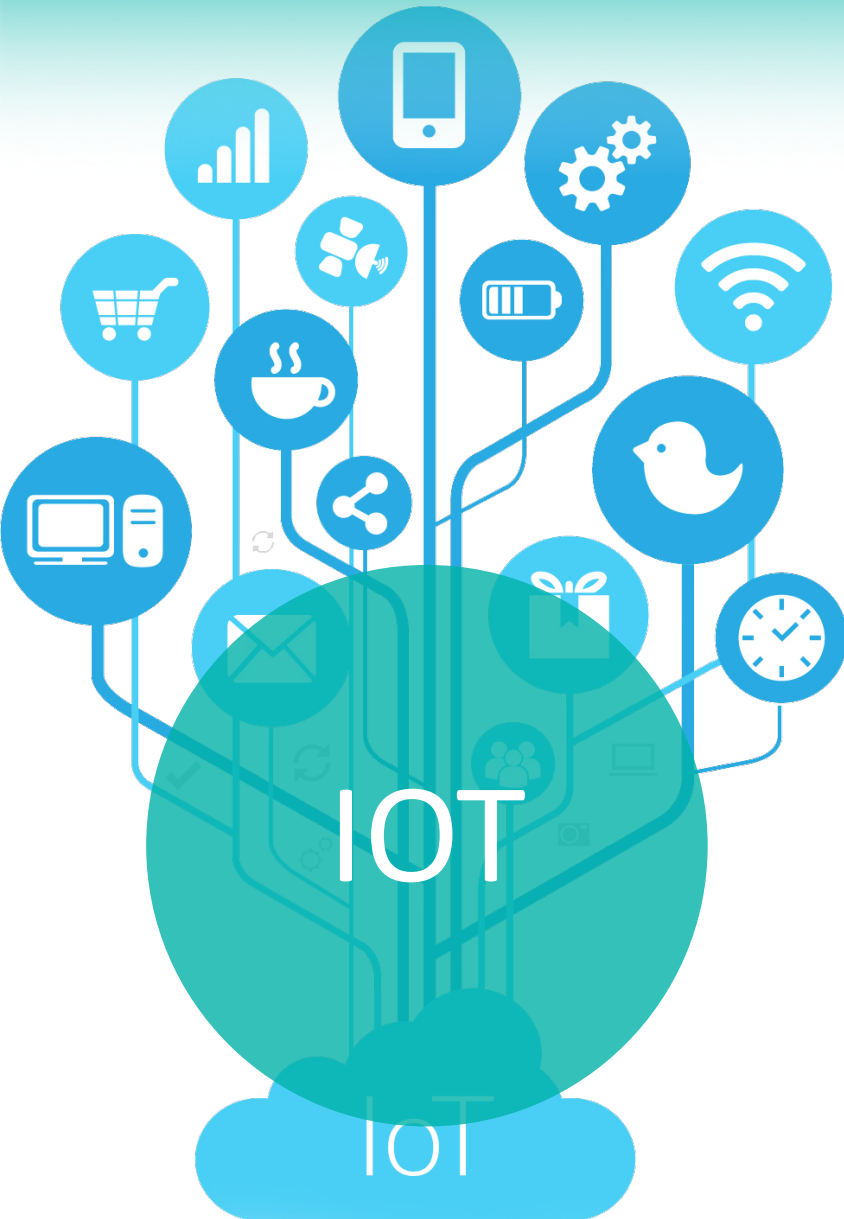


Maxim Low Power Microcontrollers

Focus Markets



Industrial



Consumer /Medical

Success Stories

- Heart rate monitor
- Blood oxygen monitor
- Blood Pressure



Smart Watches



Smart Mattresses



ECG Patches



Door Locks with Finger Print Reader



Thermal Camera Phone Modules

Longer Battery Life

More time between battery recharging or replacement

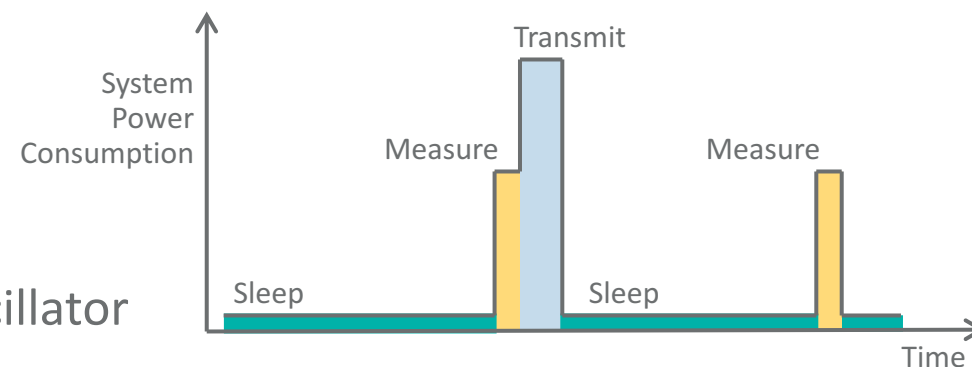
 Energy Efficiency

High Performance

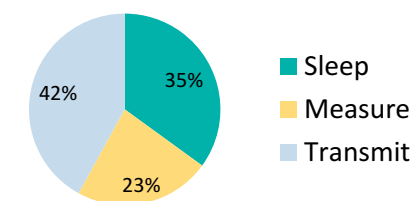
Strong Security

Smart Integration

- Low Active, Standby & Retention Power
- Fast wake up
- Advanced DMA Options
- Flexible Clock Options
 - High Speed Relaxation Oscillator
 - Low Power RC Oscillator
 - 32kHz Crystal Oscillator
- Dual Voltage I/O
- Large Memory for longer logging between wakeup



Battery Energy Usage



Richer User Experience

More time between battery recharging or replacement

Energy Efficiency



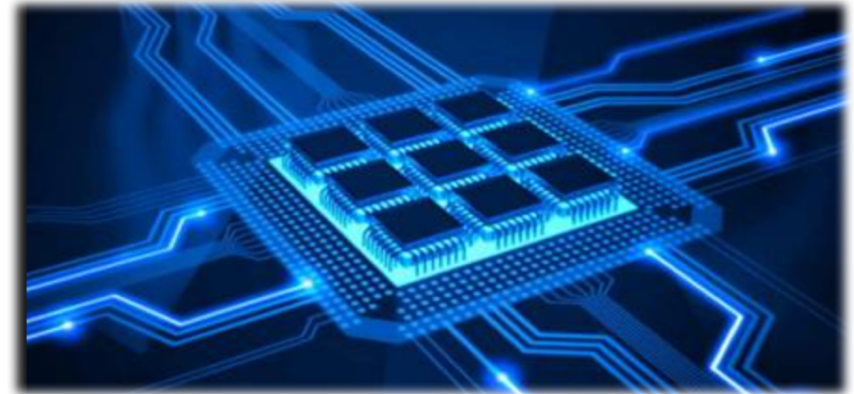
High Performance

Strong Security

Smart Integration

- High Speed Clocking
 - > Up to 120MHz
- Large memory
 - > Up to 1MB SRAM
 - > Up to 3MB Flash
 - > XIP for expansion of memory
- SIMD DSP Extensions
- Interfaces
 - > QSPI
 - > UART
 - > I2C
 - > USB
 - > 1-Wire

- Floating Point Unit
- Multi-Core Architectures Options



Protect Sensitive Data and IP

Deter counterfeits and guard customer privacy

Energy Efficiency

High Performance

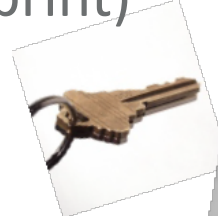


Strong Security

Smart Integration

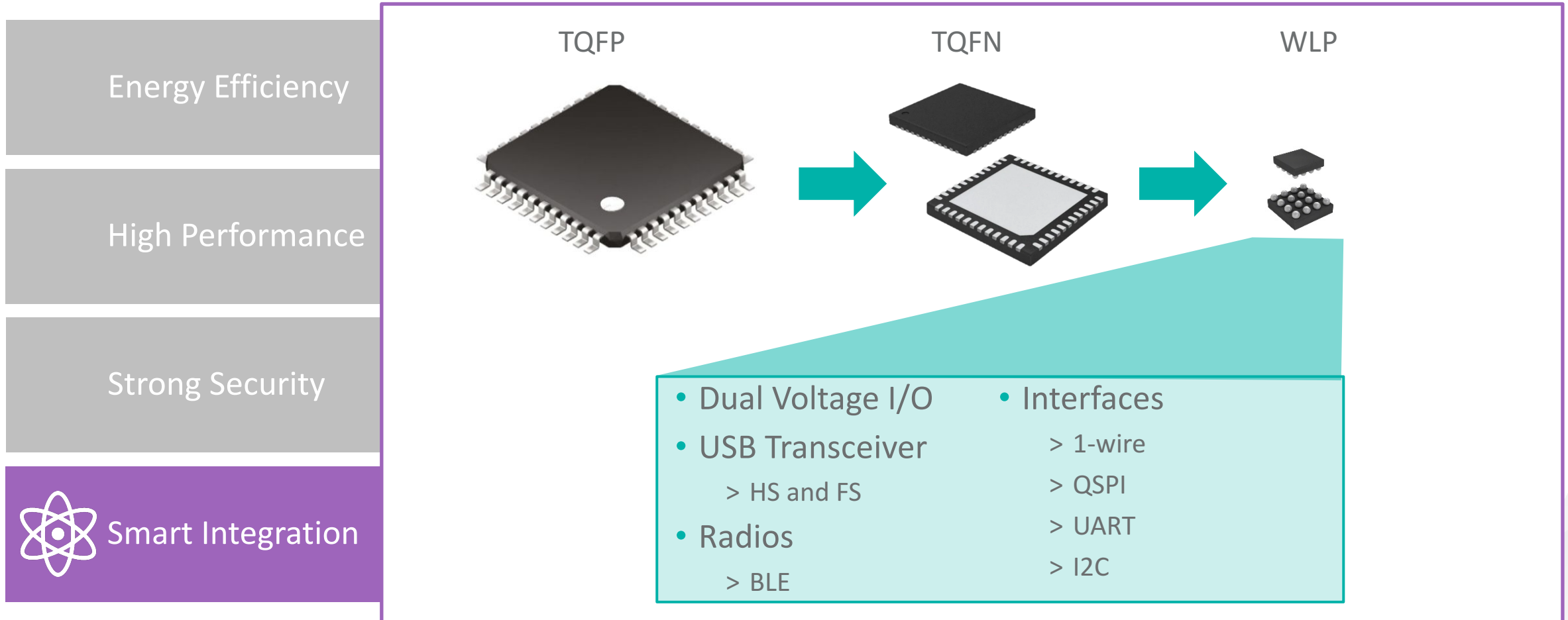
Trust Protection Unit

- > Unique ID
- > TRNG
- > Secure Hash (Electronic Fingerprint)
- > Strong Encryption
- > Digital Signatures
- > Lifecycle Management



Smaller, Lighter Products

Facilitates Smaller Form Factor or Increased Functionality on existing Form Factor



High Performance Ultra-Low Power ARM Cortex Selector Guide

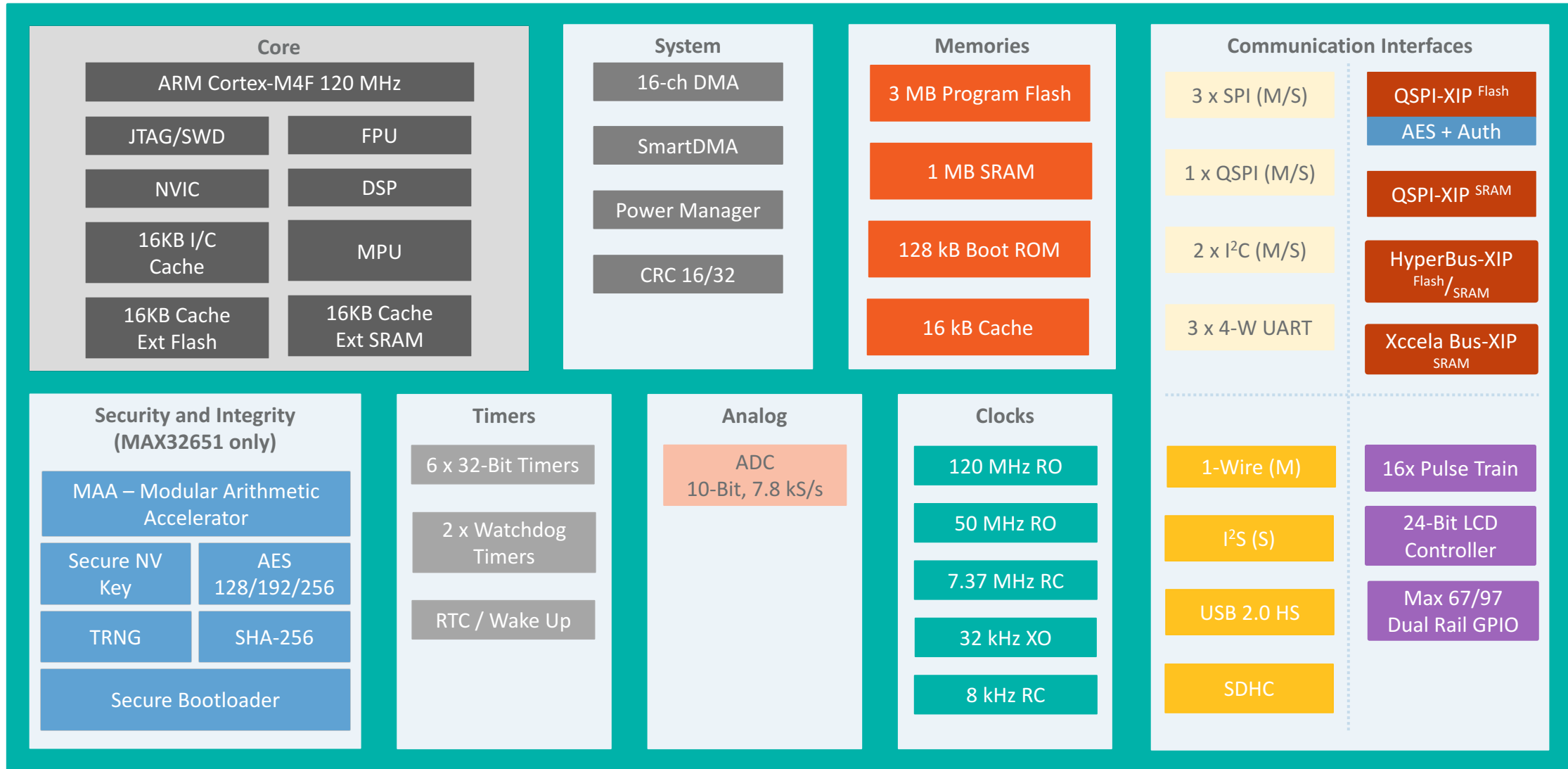
Device	MAX32620/21	MAX32625/26	MAX32630/31/32	MAX32650/51/52	MAX32660	MAX32665/66/67/68
Status	Production	Production	Production	Production	Production	Production ^[2]
Core	Cortex M4 w/ FPU	Cortex M4 w/ FPU	Cortex M4 w/ FPU	Cortex M4 w/ FPU	Cortex M4 w/ FPU	Dual Cortex M4 w/ FPU
Security	✓	✓	✓	✓	-	✓
Efficiency	127uW/Mhz	127uW/Mhz,	127uW/Mhz	104uW/MHz,	50uW/MHz ^[1]	90uW/MHz
Max Freq.	96MHz	96MHz	96MHz	120MHz	96MHz	96MHz
Flash	2MB	512kB	2MB	3MB	256kB	1MB
Static RAM	256kB	160kB	512kB	1MB	96kB	560kB
Cache	8kB	8kB	8kB	16kB	16kB	16kB on each core
SPI Master/Slave	3/1	3/1	3/1	3	2	3
UART	4	3	4	3	2	3
I2C Master/Slave	3/1	2/1	3/1	2	2	3
I2S Master/Slave	-	-	-	2	2	1
1-Wire Master	1	1	1	1	-	1
SPI XIP	1 (Flash)	1 (Flash)	1 (Flash)	2 (Flash/SRAM)	-	2 (Flash/SRAM)
SDHC	-	-	-	1	-	1
HyperBus	-	-	-	1	-	-
XccelaBus	-	-	-	1	-	-
SWD/JTAG	✓	✓	✓	✓	✓ (SWD Only)	✓
USB	Full Speed	Full Speed	Full Speed	High Speed	-	High Speed
GPIO	49	40	66	105	14	48
Package Options	WLP, TQFP	WLP, TQFN	WLP, TQFP	WLP, TQFP	WLP, TQFN	WLP, CTBGA

[1] – At 24MHz

[2] - MAX32666 in production, MAX32665/67/68 sampling

MAX32650-52 Block Diagram

WLP-96, 4.4mm x 4.4mm, 0.4mm pitch
 WLP-140, 4.4mm x 4.4mm, 0.35mm pitch
 TQFP-144, 20mm x 20mm, .5mm pitch



MAX32650-52

Benefits & Features



Energy Efficiency

- 104 μ W/MHz active, executing from cache (Core @ 1.1V)
- 1.6 μ W backup mode w/ RTC enabled & 32kB of SRAM Retained (1.8V)



Smart Integration

- Large embedded memory – 3MB Flash & 1MB SRAM
- External Flash/RAM scalability with QSPI-XIP, HyperBus & Xccela Bus



High Performance

- ARM Cortex M4 with Floating Point Unit & DSP; up to 120MHz
- High speed serial peripherals - 1MHz I2C & 60Mbps QSPI



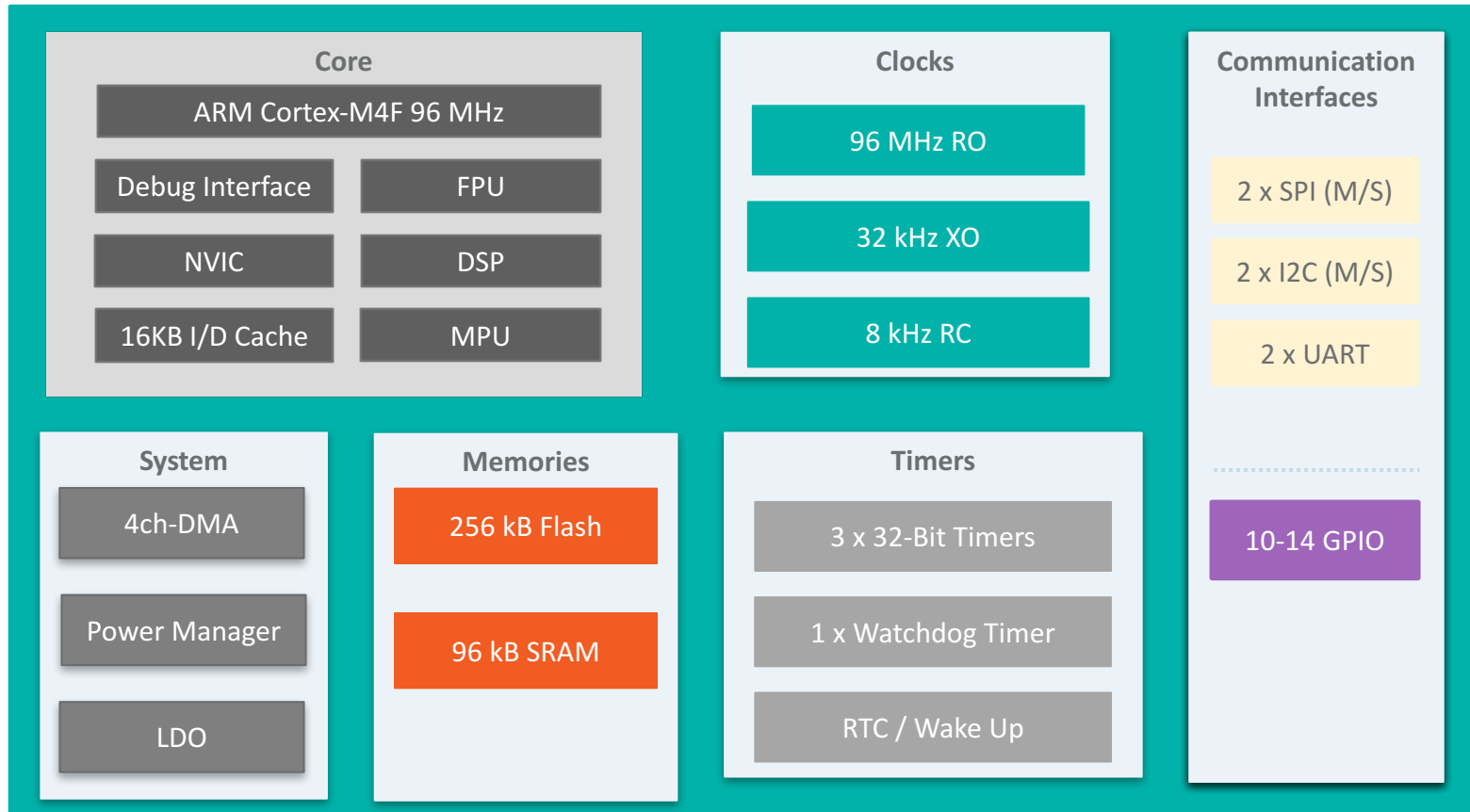
Strong Security

- Modular Arithmetic Accelerator for fast ECDSA, RSA
- AES 128-256 bit HW Accelerator & Secure Boot Loader

MAX32660

Block Diagram

WLP-16, 1.6mm x 1.6mm, 0.35mm pitch
TQFN-20, 4mm x 4mm, 0.5mm pitch
TQFN-24, 3mm x 3mm, 0.4mm pitch



MAX32660

Benefits & Features



Energy Efficiency

- As low as 50uA/MHz executing from Flash
- 0.2uA in lowest power mode
- Flexible power manager with 4 power modes & 3 clock sources



Smart Integration

- Integrated LDO for operation from a single battery or supply 1.8-3.3V
- Embedded memory: 256KB flash and 96KB SRAM
- Ultra tiny footprint – 1.6m x 1.6m WLP



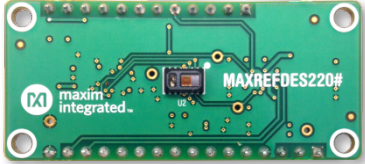
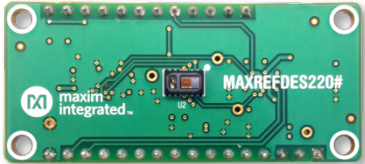


High Performance

- ARM Cortex M4 with Floating Point Unit & DSP; up to 96MHz @ 1.1V
- High speed serial peripherals: 3.2Mbps I2C & 48Mbps SPI
- 32-bit performance at 16-bit price

Introduction of MAX32664

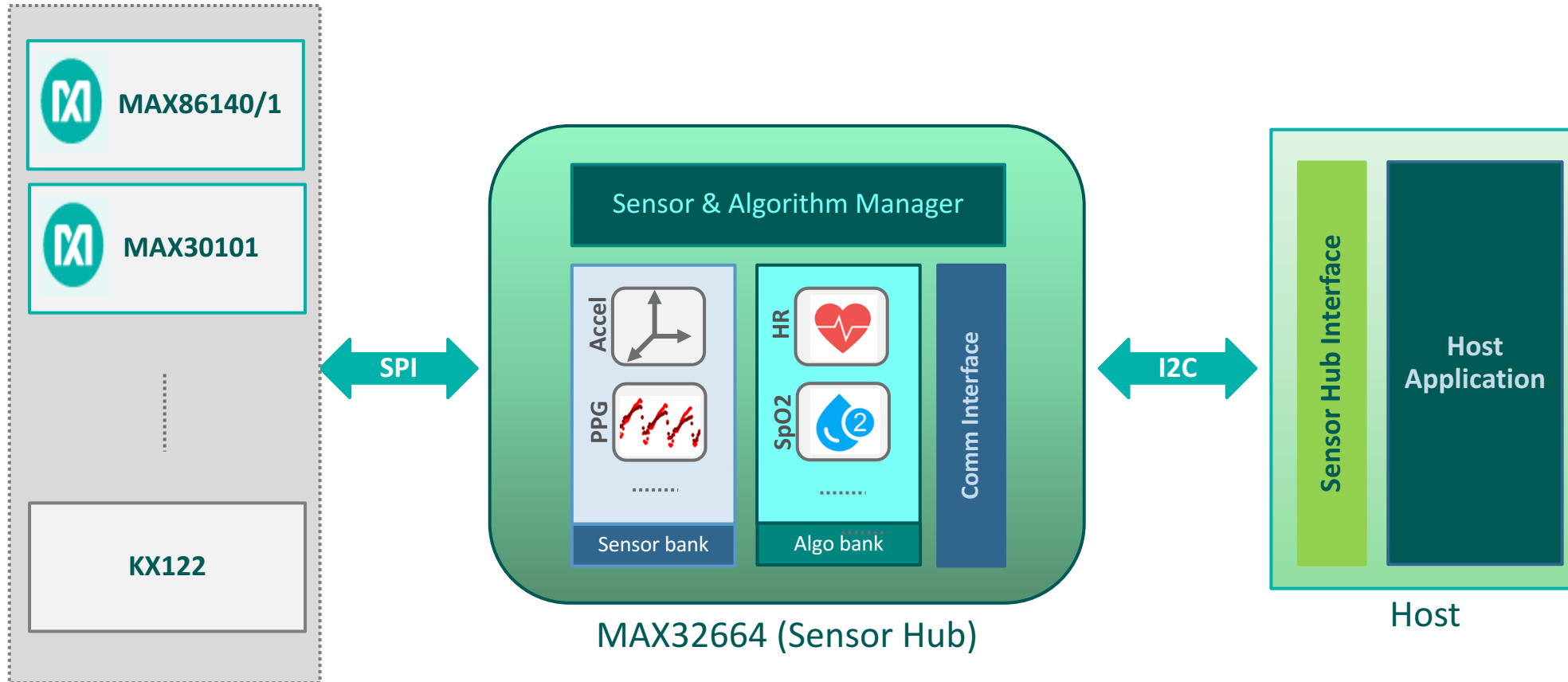
- MAX32664 is a sensor hub family with embedded firmware and algorithms for wearables. It enables customer desired sensor functionality, including communication with Maxim's optical sensor solutions and delivering raw or calculated data to the outside world.

MAX32664 and Algorithm Variations

Body Location	Feature	Sensor Hub	Sensor IC	Demo
Finger Tip	HR, HRV, SpO2	MAX32664A	MAX30101/2	MAXREFDES220 
Finger Tip	HR, HRV, SpO2, BPT ¹	MAX32664D	MAX30101/2	MAXREFDES220-BPT ² 
Wrist, Chest, Forehead	HR, HRV	MAX32664B	MAX86140/1	MAXREFDES101 
Wrist, Chest, Forehead	HR, HRV, SpO2	MAX32664C	MAX86140/1	MAXREFDES102 ³ 

¹Blood Pressure Trending / ²Not public, ask your Maxim representative / ³Design files are ready to be distributed

Typical Application

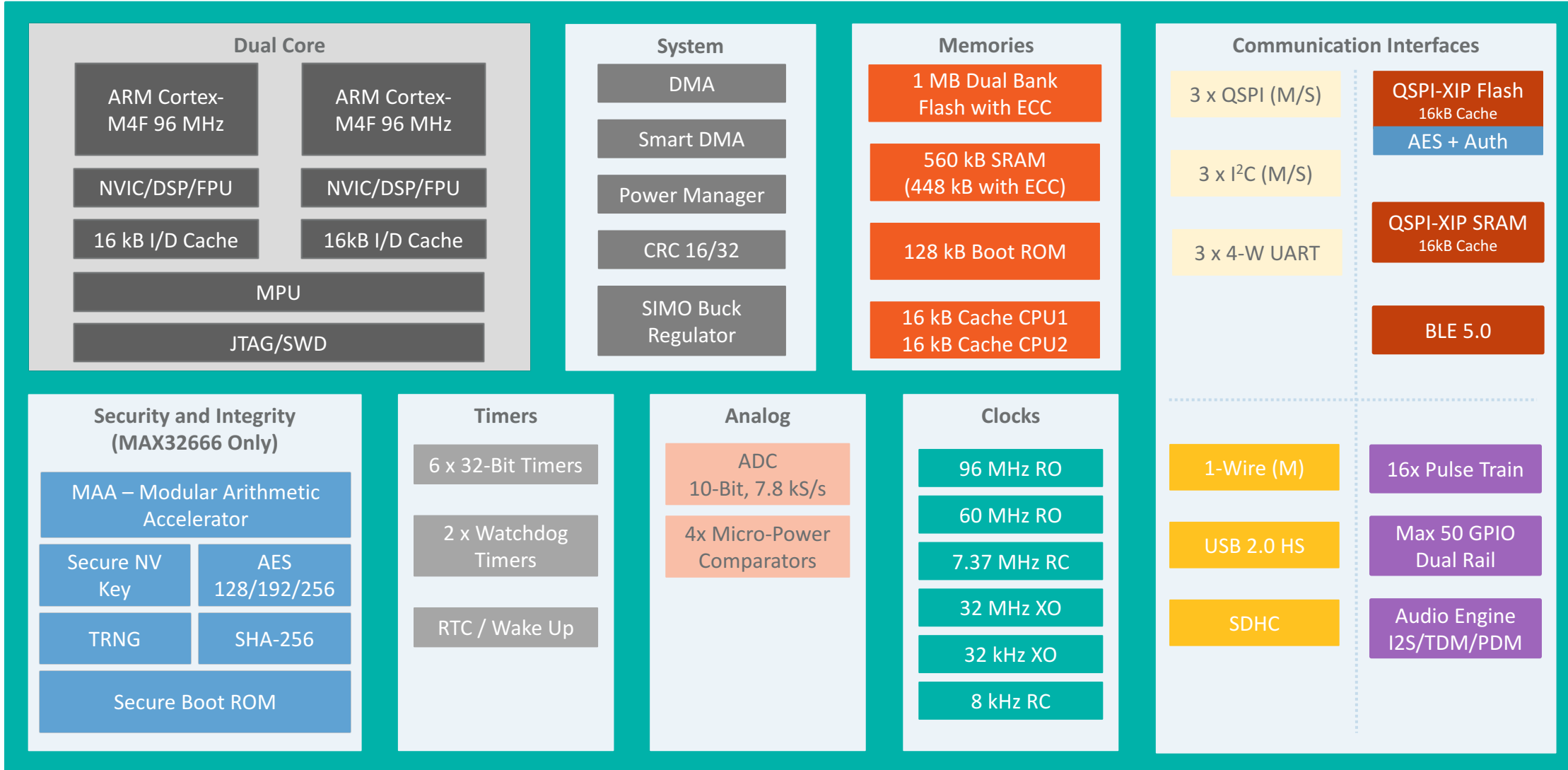


Accelerometer may be connected to MAX32664 or Host MCU

MAX32665/66

Block Diagram

WLP-109, 3.8mm x 4.2mm, 0.35mm pitch
CTBGA-121, 8mm x 8mm, 0.65mm pitch



MAX32665-68

Benefits & Features



Energy Efficiency

- Rx Power: 5.0mW; Tx Power: 5.85mW @0dbm
- 28uA/MHz @3.3 V - While (1), Sub 1uA lowest power mode



Smart Integration

- 2.4GHz RF Transceiver supporting Bluetooth 5, Bluetooth 4.2
- SIMO DC-DC Power Conversion
- 6 Clock Sources, Dual Voltage I/O



High Performance

- Dual ARM Cortex M4 with Floating Point Unit & DSP; up to 96MHz
- High reliability memory -Single Error Correct/Double Error Detect
- Dual Bank Flash – Execute from one , Write to the other



Strong Security

- Modular Arithmetic Accelerator for fast ECDSA, RSA
- AES 128-256 bit HW Accelerator & Secure Boot Loader

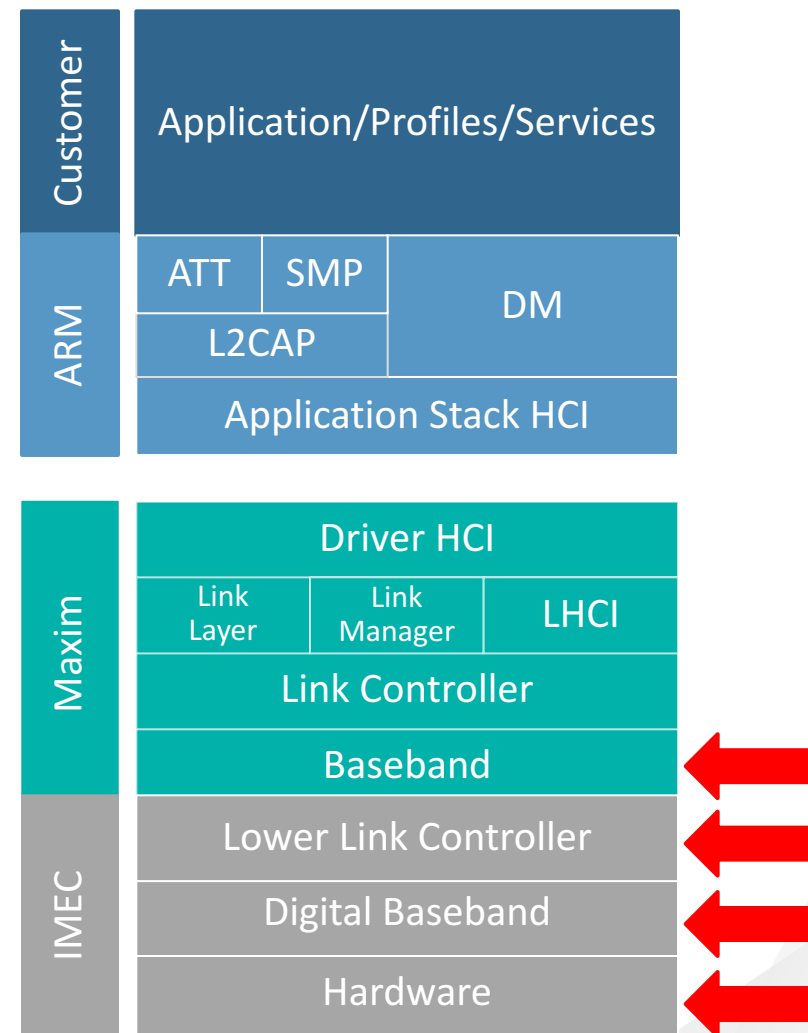
MAX32665-68

Radio Specifications

Bluetooth 5	Up To 2 Mbps data throughput, long range (125 kbps and 500 kbps)
RX Sensitivity	-95 dBm, 1Mbps mode, 37 Byte payload
Tx Output Power	+9.5 dBm, programmable down to -20 dBm in 4dB steps
Active mode RX	5mA @ 0.9V, 1Mbps mode, 37 Byte payload
Active mode TX at 0 dBm	6.5 mA @ 0.9V, 0dBm

BLE 5 Stack

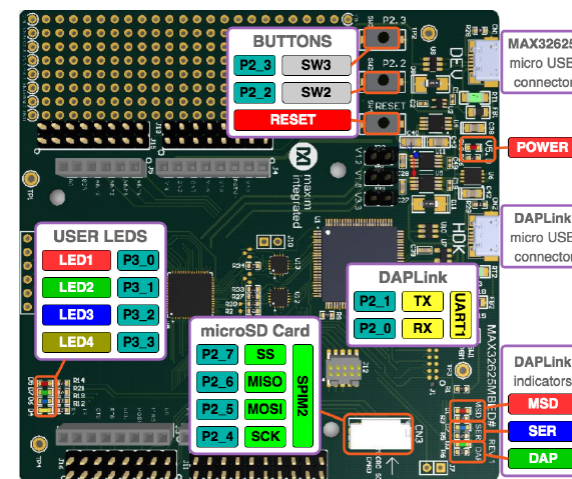
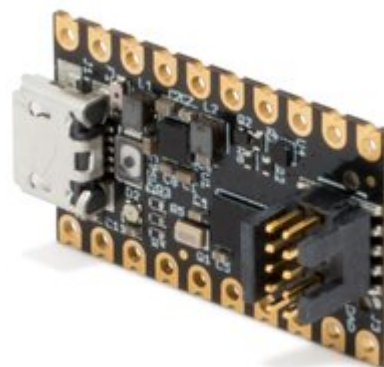
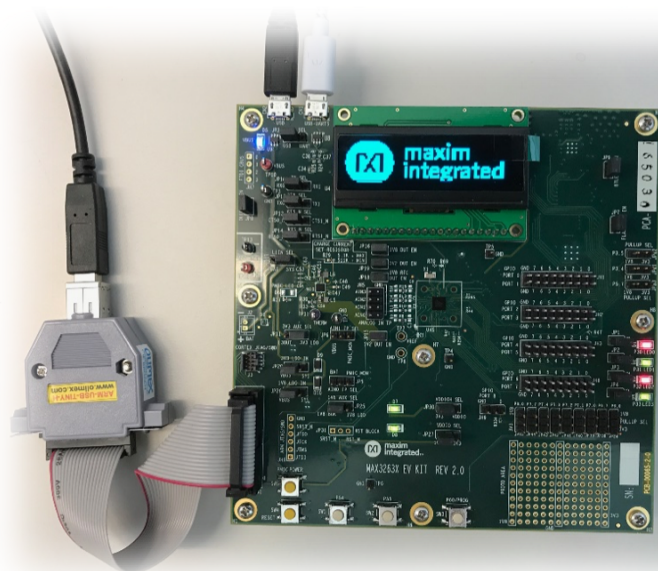
- IMEC IP provides HW design and low-level, protocol-agnostic control SW
- Maxim provides BLE link-layer SW
- ARM provides BLE upper layers and application examples
- IMEC and Maxim SW , along with part of ARM stack, provided in binary form
- Bluetooth 5.0 upgrade will involve IMEC hardware/software changes and Maxim baseband code changes
- 24KB SRAM, 100KB FLASH



Related Documents

You can find the related documents and resource in the website, show as next page. Include:

- Datasheet
- User's guider
- EV-Kits
- Reference design
- Development environment
- Application notes
- Other....



What Development Environments Does Maxim Support?



- Free
- Zero install
- Broad support
- Limited debug
- Significant object overhead
- Heavy ARM oversight



- Professional IDE
- Excellent debug
- Great support
- Expensive
- Barriers to entry



- Professional IDE
- Excellent debug
- Great support
- Expensive
- Barriers to entry



- Free
- Excellent IDE
- Good debug
- Challenging setup
- Non-intuitive interface

What Development Environments Does Maxim Support?



mbed

- Register on the website: <https://os.mbed.com/>
- Enter the compiler
- Set up your board and project



ARMKEIL
Microcontroller Tools

- Download the MDK from <http://www.keil.com/>
- Install the MDK and Maxim low-power MCU package



IAR
SYSTEMS

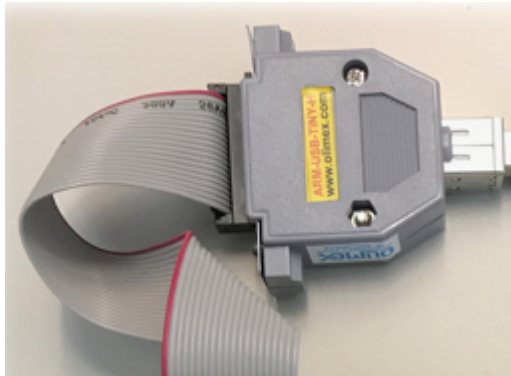
- Download from <https://www.iar.com/>
- Install the IAR



eclipse

- Download from [Low Power ARM Micro Toolchain \(Windows\)](#)
- This tool integrate IDE and examples

Hardware Emulator



Olimex-arm-usb-tiny
Only for JTAG

Easy support in Eclipse



CMSIS-DAP
Only for SWD

Supported by KEIL,
IAR, Eclipse



Jlink
JTAG & SWD

Supported by KEIL,
IAR, Eclipse



Thank you