



# EFR32FG22E Wireless Gecko SoC Family

## Data Short



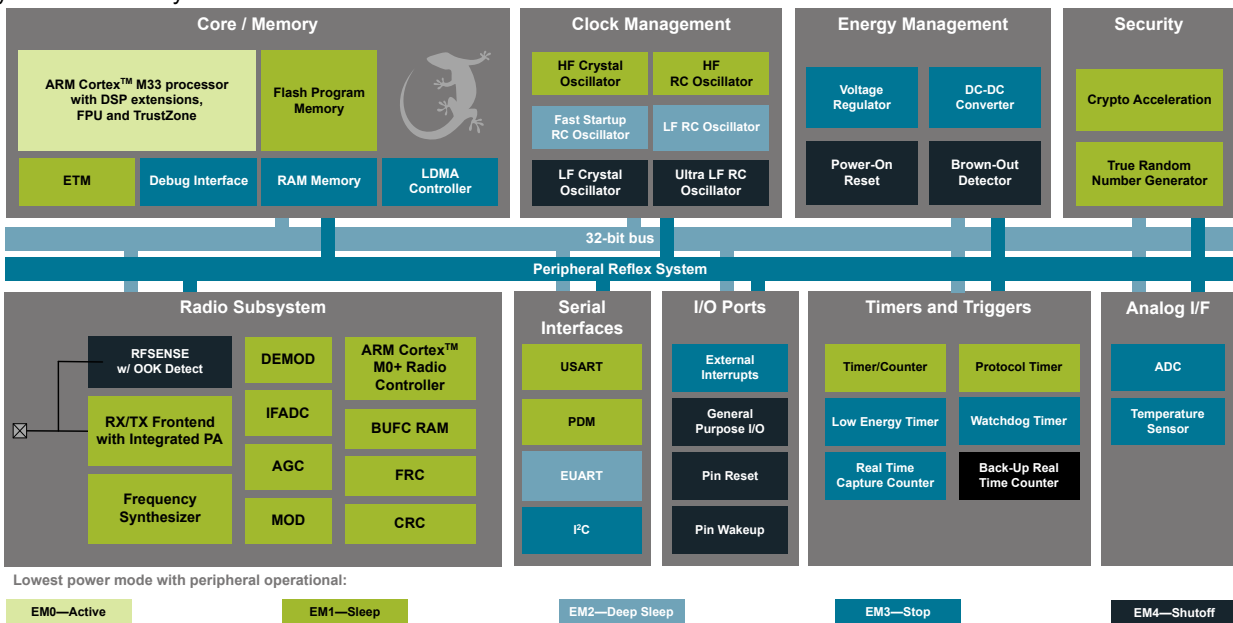
The EFR32FG22E Wireless Gecko proprietary protocol family of SoCs is part of the Wireless Gecko portfolio. EFR32FG22E Wireless Gecko SoCs are ideal for enabling energy-friendly proprietary protocol networking for IoT devices that require fast startup.

The single-die solution combines a 38.4 MHz Cortex-M33 with a high performance 2.4 GHz radio to provide an industry-leading, energy efficient, wireless SoC for IoT connected energy constrained applications.

Wireless Gecko applications include:

- Electronic Shelf Labels
- Home and Building Automation and Security
- Industrial Automation
- Commercial and Retail Lighting and Sensing
- Energy Harvest Kinetic Switches
- Energy Harvest Condition Monitoring
- Energy Harvest Factory Automation Sensors

KEY FEATURES
• 32-bit ARM® Cortex®-M33 core with 38.4 MHz maximum operating frequency
• Up to 512 kB of flash and 32 kB of RAM
• Energy-efficient radio core with low active and sleep currents
• Integrated PA with up to 6 dBm (2.4 GHz) TX power
• Fast cold start boot time and wake-up from EM4
• RFSense with selective OOK mode



Singel 3 | B-2550 Kontich | Belgium | Tel. +32 (0)3 458 30 33  
 info@alcom.be | www.alcom.be  
 Rivium 1e straat 52 | 2909 LE Capelle aan den IJssel | The Netherlands  
 Tel. +31 (0)10 288 25 00 | info@alcom.nl | www.alcom.nl

## 1. Feature List

The EFR32FG22E highlighted features are listed below.

- **Low Power Wireless System-on-Chip**
  - High Performance 32-bit 38.4 MHz ARM Cortex<sup>®</sup>-M33 with DSP instruction and floating-point unit for efficient signal processing
  - Up to 512 kB flash program memory
  - Up to 32 kB RAM data memory
  - 2.4 GHz radio operation
- **Radio Performance**
  - -102.3 dBm sensitivity @ 250 kbps O-QPSK DSSS
  - -98.9 dBm sensitivity @ 1 Mbit/s GFSK
  - -96.2 dBm sensitivity @ 2 Mbit/s GFSK
  - TX power up to 6 dBm
  - 2.5 mA radio receive current
  - 3.4 mA radio transmit current @ 0 dBm output power
  - 7.5 mA radio transmit current @ 6 dBm output power
- **Low System Energy Consumption**
  - 3.6 mA RX current (1 Mbps GFSK)
  - 3.9 mA RX current (250 kbps O-QPSK DSSS)
  - 4.1 mA TX current @ 0 dBm output power
  - 8.2 mA TX current @ 6 dBm output power
  - 26  $\mu$ A/MHz in Active Mode (EM0) at 38.4 MHz
  - 1.20  $\mu$ A EM2 DeepSleep current (8 kB RAM retention and RTC running from LFRCO)
  - 0.17  $\mu$ A EM4 current
- **Supported Modulation Format**
  - 2 (G)FSK with fully configurable shaping
  - OQPSK DSSS
  - (G)MSK
- **Protocol Support**
  - Proprietary
- **Quality**
  - AEC-Q100 Qualification including AEC-Q006
- **Fast boot and wake-up**
  - Fast cold start boot time
  - Fast wake-up from EM4
- **Wide selection of MCU peripherals**
  - Analog to Digital Converter (ADC)
    - 12-bit @ 1 Msps
    - 16-bit @ 76.9 kbps
  - Up to 26 General Purpose I/O pins with output state retention and asynchronous interrupts
  - 8 Channel DMA Controller
  - 12 Channel Peripheral Reflex System (PRS)
  - 4  $\times$  16-bit Timer/Counter with 3 Compare/Capture/PWM channels
  - 1  $\times$  32-bit Timer/Counter with 3 Compare/Capture/PWM channels
  - 32-bit Real Time Counter
  - 24-bit Low Energy Timer for waveform generation
  - 1  $\times$  Watchdog Timer
  - 2  $\times$  Universal Synchronous/Asynchronous Receiver/Transmitter (UART/SPI/SmartCard (ISO 7816)/IrDA/I<sup>2</sup>S)
  - 1  $\times$  Enhanced Universal Asynchronous Receiver/Transmitter (EUSART)
  - 2  $\times$  I<sup>2</sup>C interface with SMBus support
  - Digital microphone interface (PDM)
  - RFSense with selective OOK mode
  - Die temperature sensor with +/-1.5 degree C accuracy after single-point calibration
- **Wide Operating Range**
  - 1.71 V to 3.8 V single power supply
  - -40  $^{\circ}$ C to 85  $^{\circ}$ C
- **Security Features**
  - Hardware Cryptographic Acceleration for AES128/256, SHA-1, SHA-2 (up to 256-bit), ECC (up to 256-bit), ECDSA, and ECDH
  - True Random Number Generator (TRNG) compliant with NIST SP800-90 and AIS-31
  - ARM<sup>®</sup> TrustZone<sup>®</sup>
- **Packages**
  - **QFN40** 5 mm  $\times$  5 mm  $\times$  0.85 mm
  - **QFN32** 4 mm  $\times$  4 mm  $\times$  0.85 mm

## 2. Ordering Information

**Table 2.1. Ordering Information**

Ordering Code	Protocol Stack	Max TX Power	Max CPU Speed	LFRCO	Flash (kB)	RAM (kB)	GPIO	Package	Temp Range
EFR32FG22E121F512IM40-C	Proprietary	6 dBm	38.4 MHz	Normal	512	32	26	QFN40	-40 to 125 °C
EFR32FG22E121F512IM32-C	Proprietary	6 dBm	38.4 MHz	Normal	512	32	18	QFN32	-40 to 125 °C

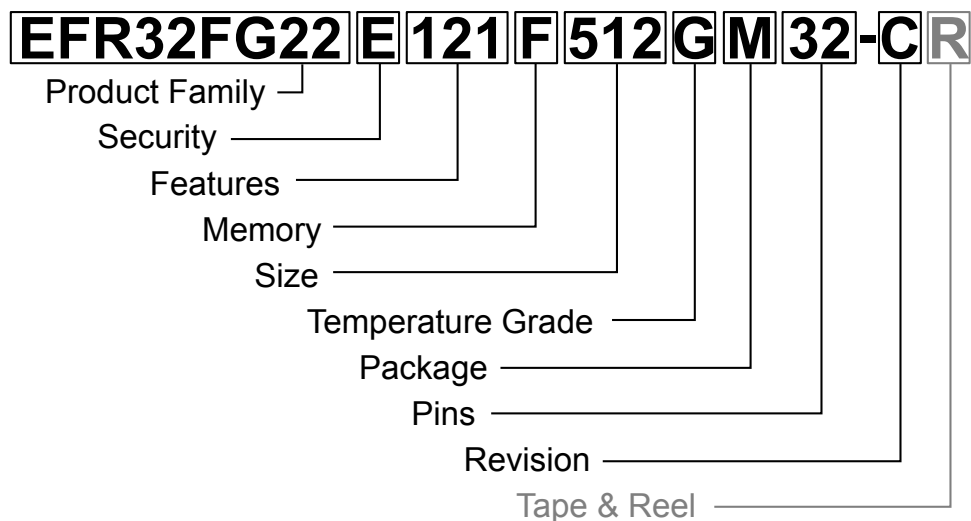


Figure 2.1. Ordering Code Key

Field	Options
Product Family	<ul style="list-style-type: none"> <li>• <b>EFR32FG22</b>: Gecko 22 Family</li> </ul>
Security	<ul style="list-style-type: none"> <li>• <b>E</b>: Base Security</li> </ul>
Features [f1][f2][f3]	<ul style="list-style-type: none"> <li>• f1                             <ul style="list-style-type: none"> <li>• <b>1</b>: MCU Frequency of 38.4 MHz</li> <li>• <b>2</b>: MCU Frequency of 76.8 MHz</li> </ul> </li> <li>• f2                             <ul style="list-style-type: none"> <li>• <b>1</b>: 0 dBm output power</li> <li>• <b>2</b>: 6 dBm output power</li> </ul> </li> <li>• f3                             <ul style="list-style-type: none"> <li>• <b>1</b>: No Direction finding, without Precision LFRCO</li> <li>• <b>2</b>: No Direction finding, with Precision LFRCO</li> <li>• <b>3</b>: Direction finding, without Precision LFRCO</li> <li>• <b>4</b>: Direction finding, with Precision LFRCO</li> </ul> </li> </ul>
Memory	<ul style="list-style-type: none"> <li>• <b>F</b>: Flash</li> </ul>
Size	<ul style="list-style-type: none"> <li>• <b>Memory Size</b> in kBytes</li> </ul>
Temperature Grade	<ul style="list-style-type: none"> <li>• <b>G</b>: -40 to +85 °C</li> <li>• <b>I</b>: -40 to +125 °C</li> </ul>
Package	<ul style="list-style-type: none"> <li>• <b>M</b>: QFN</li> </ul>
Pins	<ul style="list-style-type: none"> <li>• <b>Number of Package Pins</b></li> </ul>
Revision	<ul style="list-style-type: none"> <li>• <b>C</b>: Revision C</li> </ul>
Tape & Reel	<ul style="list-style-type: none"> <li>• <b>R</b>: Tape &amp; Reel (optional)</li> </ul>

# Simplicity Studio

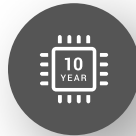
One-click access to MCU and wireless tools, documentation, software, source code libraries & more. Available for Windows, Mac and Linux!



**IoT Portfolio**  
[www.silabs.com/IoT](http://www.silabs.com/IoT)



**SW/HW**  
[www.silabs.com/simplicity](http://www.silabs.com/simplicity)



**Quality**  
[www.silabs.com/quality](http://www.silabs.com/quality)



**Support & Community**  
[www.silabs.com/community](http://www.silabs.com/community)

## Disclaimer

Silicon Labs intends to provide customers with the latest, accurate, and in-depth documentation of all peripherals and modules available for system and software implementers using or intending to use the Silicon Labs products. Characterization data, available modules and peripherals, memory sizes and memory addresses refer to each specific device, and "Typical" parameters provided can and do vary in different applications. Application examples described herein are for illustrative purposes only. Silicon Labs reserves the right to make changes without further notice to the product information, specifications, and descriptions herein, and does not give warranties as to the accuracy or completeness of the included information. Without prior notification, Silicon Labs may update product firmware during the manufacturing process for security or reliability reasons. Such changes will not alter the specifications or the performance of the product. Silicon Labs shall have no liability for the consequences of use of the information supplied in this document. This document does not imply or expressly grant any license to design or fabricate any integrated circuits. The products are not designed or authorized to be used within any FDA Class III devices, applications for which FDA premarket approval is required or Life Support Systems without the specific written consent of Silicon Labs. A "Life Support System" is any product or system intended to support or sustain life and/or health, which, if it fails, can be reasonably expected to result in significant personal injury or death. Silicon Labs products are not designed or authorized for military applications. Silicon Labs products shall under no circumstances be used in weapons of mass destruction including (but not limited to) nuclear, biological or chemical weapons, or missiles capable of delivering such weapons. Silicon Labs disclaims all express and implied warranties and shall not be responsible or liable for any injuries or damages related to use of a Silicon Labs product in such unauthorized applications.

**Note: This content may contain offensive terminology that is now obsolete. Silicon Labs is replacing these terms with inclusive language wherever possible. For more information, visit [www.silabs.com/about-us/inclusive-lexicon-project](http://www.silabs.com/about-us/inclusive-lexicon-project)**

## Trademark Information

Silicon Laboratories Inc.<sup>®</sup>, Silicon Laboratories<sup>®</sup>, Silicon Labs<sup>®</sup>, SiLabs<sup>®</sup> and the Silicon Labs logo<sup>®</sup>, Bluegiga<sup>®</sup>, Bluegiga Logo<sup>®</sup>, EFM<sup>®</sup>, EFM32<sup>®</sup>, EFR, Ember<sup>®</sup>, Energy Micro, Energy Micro logo and combinations thereof, "the world's most energy friendly microcontrollers", Redpine Signals<sup>®</sup>, WiSeConnect, n-Link, ThreadArch<sup>®</sup>, EZLink<sup>®</sup>, EZRadio<sup>®</sup>, EZRadioPRO<sup>®</sup>, Gecko<sup>®</sup>, Gecko OS, Gecko OS Studio, Precision32<sup>®</sup>, Simplicity Studio<sup>®</sup>, Telegesis, the Telegesis Logo<sup>®</sup>, USBXpress<sup>®</sup>, Zentri, the Zentri logo and Zentri DMS, Z-Wave<sup>®</sup>, and others are trademarks or registered trademarks of Silicon Labs. ARM, CORTEX, Cortex-M3 and THUMB are trademarks or registered trademarks of ARM Holdings. Keil is a registered trademark of ARM Limited. Wi-Fi is a registered trademark of the Wi-Fi Alliance. All other products or brand names mentioned herein are trademarks of their respective holders.



Singel 3 | B-2550 Kontich | Belgium | Tel. +32 (0)3 458 30 33  
[info@alcom.be](mailto:info@alcom.be) | [www.alcom.be](http://www.alcom.be)  
Rivium 1e straat 52 | 2909 LE Capelle aan den IJssel | The Netherlands  
Tel. +31 (0)10 288 25 00 | [info@alcom.nl](mailto:info@alcom.nl) | [www.alcom.nl](http://www.alcom.nl)