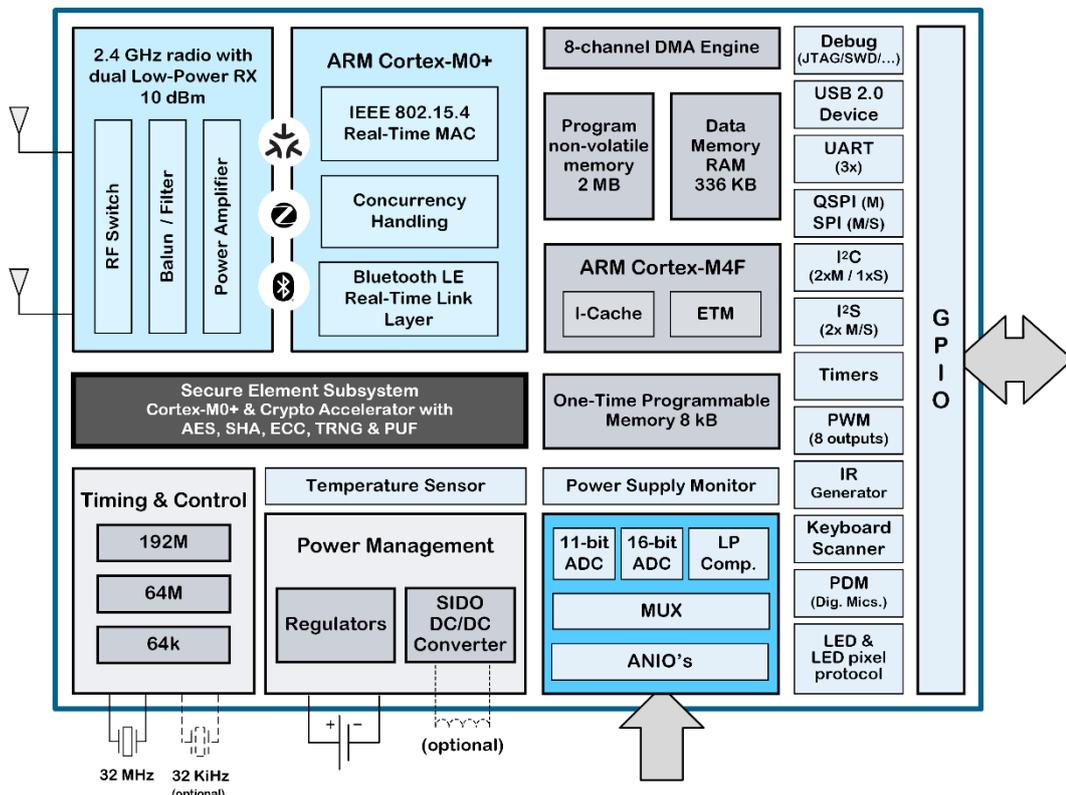


The QPG6200L is the industry's most reliable and robust wireless multi-standard System-on-Chip. Featuring Qorvo's ConcurrentConnect™ technology, the QPG6200L supports the latest standards for Matter (over Thread), Zigbee and Bluetooth® Low Energy in a truly concurrent way.



### Featuring ConcurrentConnect™ Technologies:

- **Antenna Diversity** for Bluetooth Low Energy and IEEE 802.15.4 enables increased effective range and interference robustness.
  - **Multi-Radio** capability allows continuously scanning for incoming packets across Bluetooth Low Energy and IEEE 802.15.4 protocols with no observable blind spots.
  - **Multi-Channel** capability allows operating in up to 3 IEEE 802.15.4 PAN's on different channels.
- **Integrated Secure Element featuring:**
    - Secure Boot (rooted in ROM with Boot Keys in OTP)
    - Secure Key Storage (PUF-based)
    - Secure Key Provisioning
    - Secure Debug
    - Secure Device Attestation
  - **Designed and optimized for low-power IoT end node applications such as:**
    - Connected Lighting
    - Smart Sensors
    - Wearables



## Key Features

- Operates in the worldwide 2.4 GHz ISM-band
- Integrated Balun / Filter with minimal external components needed
- IEEE 802.15.4 compliant PHY and Real-Time MAC
  - Preamble-based antenna diversity
  - Packet-in-Packet resynchronization
  - Multi-Stack / Multi-Channel support, operating in up to 3 PANs on different channels
- Bluetooth v 5.4 compliant Low Energy Controller featuring
  - Preamble-based Antenna Diversity
  - Data Packet Length Extension
  - Link Layer Privacy
  - Advertising Extensions
  - Isochronous Channels & Bluetooth LE Audio
  - Angle of Arrival & Angle of Departure
- ConcurrentConnect™ technology
  - Concurrent IEEE 802.15.4 and Bluetooth listening
  - Allows combining Bluetooth Low Energy Central / Observer or Mesh Node with Matter (over Thread) router.
- Dynamic Multi-Protocol
  - Hardware accelerated Dynamic Multi-Protocol Bluetooth Low Energy and IEEE 802.15.4 communications
  - Allows combining Bluetooth Low Energy Peripheral with any type of Zigbee/Matter (over Thread) device.
- Arm Cortex-M4 processor with floating point support and DSP functionality, executing code from Flash or RAM at up to 192 MHz clock speed, with I-Cache and ETM.
- 2048 KB Non-Volatile Memory
- 336 KB Low Leakage Retention RAM
- Secure Element
  - Secure Boot (rooted in ROM with Boot Key in OTP), PUF-based Secure Key Storage, Secure Key Provisioning, Secure Debugging, Secure Device Attestation, Anti Tamper
  - Hardware accelerated AES and CTR/CCM\* encryption with 128, 192 and 256-bit keys
  - Hardware accelerated Hashing engine: SHA-128, SHA-2 (SHA-224, SHA-256, SHA-384, SHA-512)
  - Hardware accelerated Public Key Crypto engine
    - Elliptic Curve; support for P256, P521, Curve25519, ECDSA, ECDH, EdDSA, etc.
  - Cryptographic RNG with AIS31 support.

## Excellent Range and Communication Reliability

The QPG6200L is optimized for reliable communication in harsh radio environments. Built-in Bluetooth Low Energy and IEEE 802.15.4 antenna diversity with two antennas improves the reliable link budget by 8 dB resulting in approximately 70% more reliable range compared to similar systems with only one antenna. In high density networks the IEEE 802.15.4 packet-in-packet resynchronization further improves the communication reliability.

- For typical indoor usage in an environment with 50 ns delay spread and 2 MHz signal bandwidth using the Rayleigh fading model: antenna diversity with 2 antennas results in an 8 dB improved link budget at a 1% outage probability compared to no antenna diversity. 8 dB in link budget translates into 70% more range, if using a two-slope range model with the breakpoint at 10 m and  $g_1 = 2$ ,  $g_2 = 3.5$ .

## Ultra-Low Power Consumption

The QPG6200L's advanced integrated energy management system allows it to operate from a standard lithium coin cell battery, with a minimum of additional components. It includes ultra-low power voltage level detectors and overvoltage protection circuitry, allowing safe operation and graceful shutdown. The built-in battery monitor provides an easy-to-use interface to measure the power supply and remaining capacity of the battery.

## General Characteristics

Operating Temperature	-40 to +125 °C
Storage Temperature	-50 to +150 °C
Soldering Temperature	260 °C (10 s max)
Compliance	RoHS, SVHC

## Radio Characteristics

Radio Regulations compliance	ETSI EN 300 328 (EU/UK) FCC CFR-47 Part 15 (US)
Transmit Power	+10 dBm (adjustable down in 1 dB steps)

## IEEE 802.15.4 Radio Characteristic

Standards compliance	IEEE 802.15.4-2020, Matter, Thread, Zigbee
Frequency Band	2400 – 2483.5 MHz
Channels	16 (programmable, 5 MHz steps)
Data Rate	250 kbit/s
Receiver Sensitivity <sup>1</sup>	-102 dBm (High Sensitivity mode)
Antenna diversity gain <sup>2</sup>	8 dB

## Bluetooth Low Energy Radio Characteristics

Standards compliance	Bluetooth Core Specification v 5.4, Low Energy, including Bluetooth Mesh v1.0
Frequency Band	2402 – 2480 MHz
Channels	40 (2 MHz step size)
Data Rate	2 Mbit/s, 1 Mbit/s, 500 kbit/s, 125 kbit/s
Receiver Sensitivity <sup>1</sup>	(typical)
2 Mbit/s	-94.5 dBm
1 Mbit/s	-97.5 dBm
125 kbit/s	-105 dBm
Antenna diversity gain <sup>2</sup>	8 dB

1) Typical, at 3.0 V and 25 °C, DCDC converter enabled, unless specified otherwise.

## Electrical Characteristics

Standby Mode Currents @32 kB RAM Retained <sup>1</sup>	
Using internal LjRC oscillator	0.9 $\mu$ A
Operational Currents <sup>1</sup>	
Receive IEEE 802.15.4, single antenna	1.25 mA
Receive IEEE 802.15.4, antenna diversity	2.2 mA
Receive Bluetooth (1 Mbit/s), single antenna	2.2 mA
Receive Bluetooth (1 Mbit/s), antenna diversity	3.1 mA
Transmit (at 0 dBm) (*)	6 mA
Transmit (at 4 dBm) (*)	7.5 mA
Transmit (at 10 dBm) (*)	19 mA
MCU Idle Current (*)	0.6 mA
MCU Active Current running @ 64 MHz, execution from RAM (*)	1.2 mA
Supply Voltage	1.7 to 3.6 V

(\*) with DC/DC Converter

## Crystal Options

Crystal Frequency	32.000 MHz ( $\pm$ 40 ppm)
Optional	32.768 kHz

## Reference Designs, Tools and SW

Qorvo's turn-key development kits include complete SW applications and HW designs; enabling quick development of new Connected Lighting and Smart Home products with reduced BOM.

## Important Notice

The information contained herein is believed to be reliable; however, Qorvo makes no warranties regarding the information contained herein and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for Qorvo products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information. **THIS INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Without limiting the generality of the foregoing, Qorvo products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

Copyright 2022-2024 © Qorvo, Inc. | Qorvo is a registered trademark of Qorvo, Inc. | ConcurrentConnect™ is a trademark of Qorvo, Inc.

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Qorvo is under license. Matter is developed by the Connectivity Standards Alliance™. This brand, related logos, and marks are trademarks of the Alliance, all rights reserved. Arm and Cortex are registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere. All other trademarks and trade names are those of their respective owners.

## Interfaces and Peripherals

GPIOs	14x (*)
USB 2.0	Full Speed (12 Mbit/s) data rate
UART	3x
Quad SPI	1x Master
SPI	1x Master, 1x Slave
I <sup>2</sup> C	2x Master, 1x Slave
I <sup>2</sup> S	2x Master/Slave
LED Signal Generator; 8-bit PWM with fading support	4 outputs
LED Pixel Protocol Master (RTZ) for dyn. control of LED light strips	2x
16-bit PWM engine	8 outputs
Timers	6x 32-bit or 12x 16-bit
PDM Microphone interfaces	2x
IR Generator	1x
Keyboard Scanner	1x
Low power comparator	2x 8-bit
16-bit ADC via ANIO	1x
11-bit ADC via ANIO	1x
Dedicated accurate power-supply monitor and a high-resolution temperature sensor (1/8 <sup>th</sup> degree resolution)	
(*) up to 7 more when swapped with other pins	

## Package Information

QFN32: Quad Flat No-lead package, 32 pins, 4x4 mm.

## Web Contact Information

**Products:** <https://www.qorvo.com/products>

**Support:** <https://www.qorvo.com/support>

