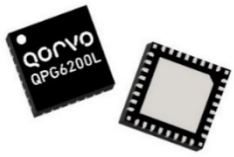
QPG6200L
Multi-Protocol SoC
Product Brief

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.

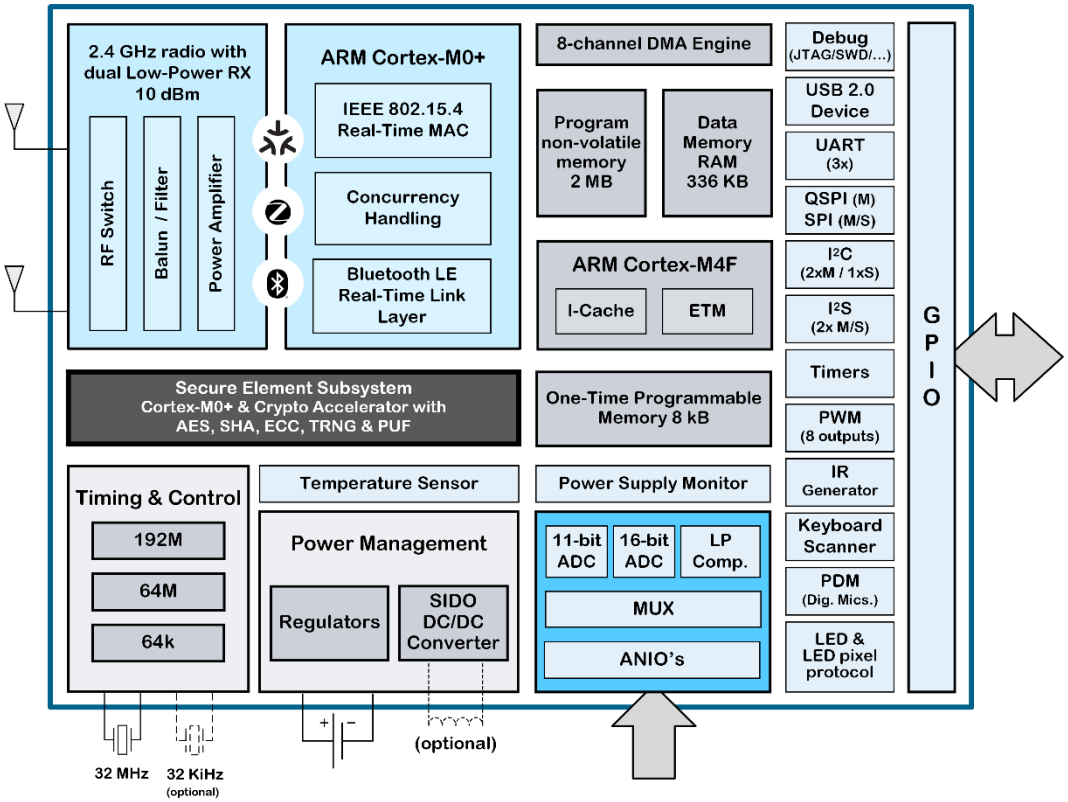


Featuring ConcurrentConnect™ Technologies:

- **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.

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 [1]	-102 dBm (High Sensitivity mode)
Antenna diversity gain [2]	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 [1]	(typical)
2 Mbit/s	-94.5 dBm
1 Mbit/s	-97.5 dBm
125 kbit/s	-105 dBm
Antenna diversity gain [2]	8 dB

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

2) 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 g1 = 2, g2 = 3.5.

Electrical Characteristics

Standby Mode Currents @32 kB RAM Retained [1]	
Using internal LjRC oscillator	0.9 µA
Operational Currents [1]	
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 (±40 ppm)
Optional	32.768 kHz

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^2C	2x Master, 1x Slave
I^2S	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 11-bit ADC via ANIO	1x 1x
Dedicated accurate power-supply monitor and a high-resolution temperature sensor (1/8th degree resolution)	

(*) up to 7 more when swapped with other pins

Package Information

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

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.

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Products: https://www.qorvo.com/products

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