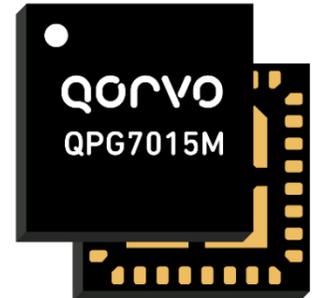
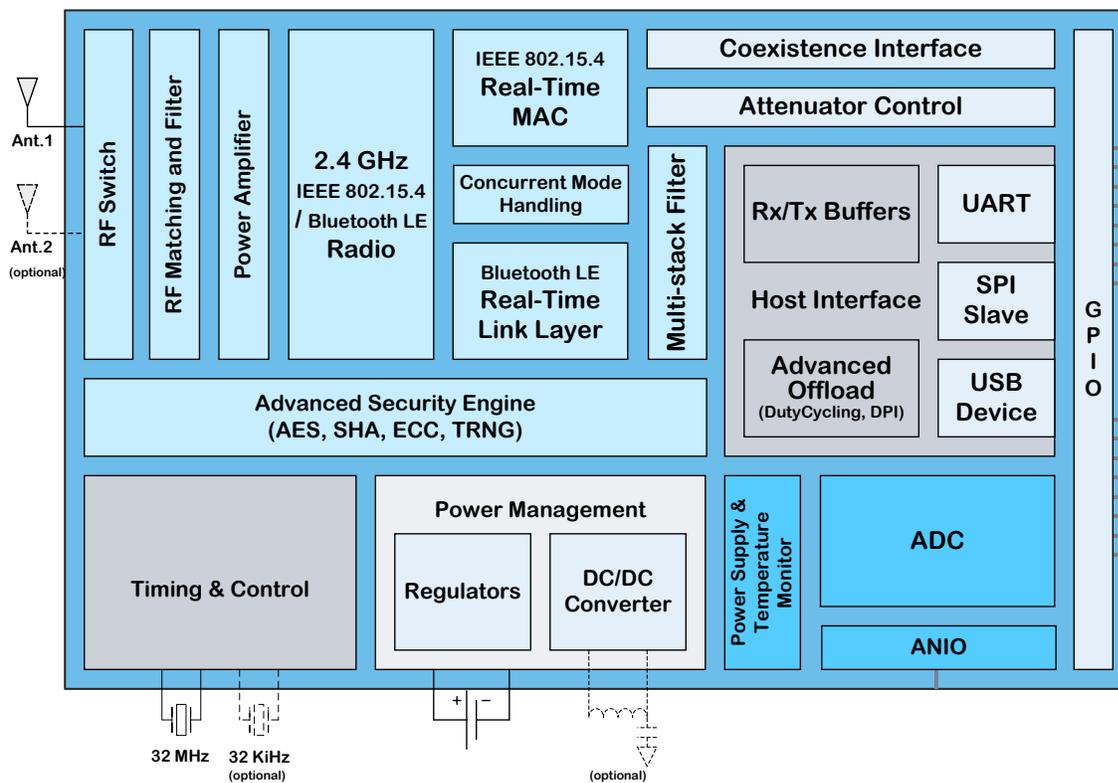


The QPG7015M transceiver features **Dynamic Multi-Protocol and ConcurrentConnect™**. This enables seamless **Bluetooth® Low Energy Mesh and Zigbee / Thread network management at the same time.**



- **ConcurrentConnect™**: allowing instantaneous switching between Bluetooth Low Energy and IEEE 802.15.4 protocols with no observable blind spots
- RF performance optimized for Central Hub use cases
 - Unique antenna diversity technology doubles the effective range
 - Inherently designed for interference robustness
 - Instant preamble detection allows swift medium arbitration
 - Maximized isolation by selecting lower noise antenna
- Boosted range to power consumption ratio
 - +20 dBm transmit power with 100 mA current (3 V)
- Small footprint (4x4 mm) to save real estate
- Integrated design for lowest external RBOM: requires up to 4x fewer components
- Designed for low power IoT applications such as:
 - Gateways
 - Set-top Boxes
 - Wi-Fi Routers
 - Voice Assistants



Key Features

- Operates in the worldwide 2.4 GHz ISM-band
- Integrated PA, RF switch, matching and filters
- 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 5.0 compliant Low Energy Controller
 - High Data Rate (2 Mbits/s)
 - Long Range Coded PHY
 - Link Layer Privacy
 - Advertising extensions
 - Support for Angle of Arrival and Angle of Departure
 - Support for Bluetooth Direct Test Mode (DTM)
- HW-accelerated dynamic multi-protocol support
 - Allows combining Bluetooth Low Energy Peripheral/Advertiser with Zigbee/Thread router
- ConcurrentConnect: Concurrent IEEE 802.15.4 and Bluetooth listening
 - Allows combining Bluetooth Low Energy Central/Observer or Mesh Node with Zigbee/Thread router
- Stand-alone Zigbee rf4ce DutyCycling support and rf4ce packet filtering when the host is asleep
- Advanced Security Engine
 - Hardware accelerated AES and CCM* encryption with 128, 192 and 256-bit keys
 - Hashing engine: SHA-128, SHA-2 (SHA-256, SHA-512)
 - Public Key Crypto
 - Elliptic Curve; support for ECDSA, ECDH, P256, Curve25519, J-Pake, ECMQV, EdDSA, etc.
 - Cryptographic Random Number Generator
 - Support for Physical Unclonable Function (PUF)
- Flash Program and RAM memory for real-time firmware, filtering code and data buffering
- SPI Slave, UART or USB Device host interface
- Coexistence Interface with other radios in the device

Multi-Protocol Stack Support at Host Processor

The QPG7015M can support multiple protocol stacks in the host processor. Multiple IEEE 802.15.4 based stacks (Zigbee, Thread, proprietary) can interface simultaneously with the QPG7015M MAC API through a MAC Dispatcher, while the Bluetooth Low Energy Host Stack can interface with the QPG7015M at the HCI level at the same time.

Multi-Channel Support

For the IEEE 802.15.4 communications, the QPG7015M can simultaneously listen for packets on three different PANs (Personal Area Networks) that may be on the same or on different RF channels. In this way it can support the Zigbee coordinator role, concurrently with an rf4ce Target role and a Thread Border Router role, even if these networks run on different RF channels.

Or alternatively, it can be used to serve a Zigbee coordinator for up to 3 different Zigbee networks at the same time, each network running on a potentially different RF channel.

HW-Accelerated Dynamic Multi-Protocol Support

The QPG7015M has HW support to seamlessly interleave Bluetooth Low Energy communications (advertisements and Bluetooth connections) with IEEE 802.15.4 communications. This feature can be combined with Multi-Channel Support to support three IEEE 802.15.4 stacks (Zigbee, rf4ce, Thread), while simultaneously acting as a Bluetooth Low Energy peripheral and maintain a Bluetooth connection with a smartphone.

ConcurrentConnect™ Technology

The QPG7015M can concurrently listen to one IEEE 802.15.4 RF channel, and one Bluetooth advertisement channel. In this way it can combine a Zigbee Router role with Bluetooth Low Energy Central/Observer role. Another example would be the combination of a Thread Router role with a Bluetooth Low Energy Mesh Node.

Excellent Range and Reliability

The QPG7015M has been optimized for reliable communication in harsh radio environments. The excellent receiver sensitivity and integrated PA allow extended coverage. Built-in 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 packet-in-packet resynchronization further improves the communication reliability. The Coexistence Interface can be used to enable coexistence of the QPG7015M radio with other potentially interfering radios (Wi-Fi, Bluetooth) within the same device.

Ultra-Low Power Consumption

The QPG7015M is designed for ultra-low power network applications. It supports Zigbee rf4ce duty cycling and can wake up the host when a specified message has been received, with Zigbee rf4ce Network layer and Profile layer Deep Packet Inspection, to allow the host to stay asleep as much as possible.

Low Cost

The QPG7015M is designed to operate on PCB designs using only low-cost components and printed circuit antennas. It has two single-ended RF ports with integrated matching and filtering. No expensive shielding, chip antennas or voltage regulators are required.

General Characteristics

Package	LGA32, 4x4 mm (0.4 mm pitch)
Operating Temperature	-40 to +85 °C (industrial)
Storage Temperature	-50 to +150 °C
Soldering Temperature	260 °C (10 s max)
Compliance	RoHS

Electrical Characteristics

Standby Mode Currents ^{1, 3}	
Using internal LjRC oscillator	4.0 µA
Using 32 KiHz crystal oscillator	4.7 µA
Using 32MHz crystal oscillator	850 µA
Operational Currents ¹ (with / without DC/DC Converter)	
Receive IEEE (single antenna)	4.4 / 6.0 mA
Receive IEEE (antenna diversity)	5.6 / 7.7 mA
Receive IEEE (multi-channel)	8.2 / 11.6 mA
Receive Bluetooth	7.6 / 10.6 mA
Transmit (at 0 dBm)	15.3 / 22.4 mA
Transmit (at 20 dBm)	100 / 110 mA
Supply Voltage	2.1 to 3.6 V
Interfaces and Peripherals	
SPI Slave host interface	up to 16 MHz
UART host interface	2 MBd
USB Device host interface	USB 2.0, up to 12 Mbit/s
Programmable GPIO lines	15
Analog input lines	1
10/12-bit ADC to monitor the analog input line, the power supply level and the temperature	
Crystal Frequency	32.000 MHz (±40 ppm)
Optional	32.768 kHz

Radio Characteristics

Radio Regulations compliant	ETSI EN 300 328 FCC CFR-47 Part 15 ARIB STD-T66
Transmit Power	+20 dBm (adjustable down in 1 dB steps)

IEEE 802.15.4 Radio Characteristics

Standards compliant	IEEE 802.15.4-2015
Frequency Band	2400 – 2483.5 MHz
Channels	16 (programmable, 5 MHz steps)
Data Rate	250 kbit/s
Receiver Sensitivity ¹	
Single channel	-98 dBm
Multi-channel	-96 dBm
IEEE/Bluetooth concurrent mode	-95 dBm
Antenna diversity gain ²	8 dB (increases the 'effective' receiver sensitivity to -106 dBm)

Bluetooth Low Energy Radio Characteristics

Standards compliant	Bluetooth Core Specification v5.0, Low Energy
Frequency Band	2402 – 2480 MHz
Channels	40 (2 MHz step size)
Data Rates	125 kbit/s, 500 kbit/s, 1 Mbit/s, 2 Mbit/s
Receiver Sensitivity ¹ (channel 0)	
2 Mbit/s	-92 dBm
1 Mbit/s, Bluetooth only	-95.5 dBm
500 kbit/s, Bluetooth only	-98 dBm
125 kbit/s, Bluetooth only	-103.5 dBm
Concurrent IEEE 802.15.4 and Bluetooth LE mode	-95 dBm

1) Typical, at 3.0 V and 25 °C, 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 a 8 dB improved link budget at a 1% outage probability compared to no antenna diversity. The 8 dB in link budget translates into 70% more range, if using a two-slope range model with the breakpoint at 10 m and $g_1 = 2$, $g_2 = 3.5$.

3) Standby Mode is not supported with USB host interface.



Reference Designs, Tools and SW

Qorvo reference designs, development kits, software libraries and production platforms provide a quick time-to-market solution for sensor and control devices for Smart Home networks and for other IEEE 802.15.4 / Bluetooth Low Energy communication products.

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

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Email: lpw.support@qorvo.com

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