# QOCVO

## QPG6105

**Multi-Standard Smart Home Communications Controller** 

**Product Brief** 

The QPG6105 is a multi-standard Smart Home communications controller supporting Zigbee, Thread, Matter, Bluetooth® Low Energy and Bluetooth® Mesh, enabling greater interoperability and scalability.

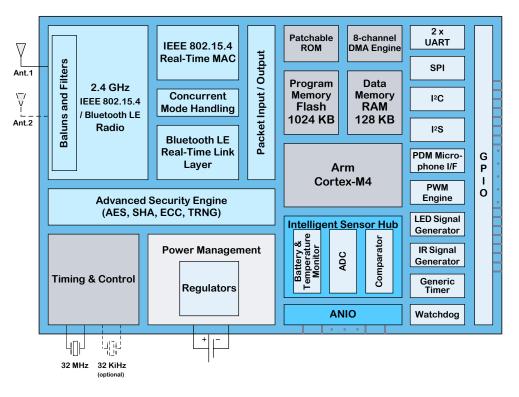
It features ConcurrentConnect<sup>™</sup> technology enabling multiple protocols to operate simultaneously, delivering improved capacity and enhanced interoperability with the leading low power standards.



Qorvo's turn-key development kits include complete software applications and hardware designs; enabling quick development of new Connected Lighting and Smart Home products.

- ConcurrentConnect<sup>™</sup> Multi-Radio capability allows concurrent listening by continuously scanning for incoming packets across Bluetooth Low Energy and IEEE 802.15.4 protocols with no observable blind spots
- Simplify Gateway dependencies by bridging Zigbee, Thread and/or Bluetooth Low Energy Mesh networks
- Enhanced security capabilities enable highly secure solution with built in support for secure boot, secure OTA software upgrade and secure identity
- Patented ConcurrentConnect<sup>™</sup> Antenna Diversity enables increased effective range
- ConcurrentConnect™ Multi-Channel capability allows operating in up to 3 PANs on different channels
- Optimized connected lighting design BOM, reducing the number of components and PCBs in the design
- Designed for low power IoT end node applications such as:

   Connected Lighting
   Sensors
   Smart Plugs
   Thermostats
   Wearables



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### Multi-Standard Smart Home Communications Controller

### **Key Features**

- Operates in the worldwide 2.4 GHz ISM-band
- Integrated baluns and RF filters
- IEEE 802.15.4 compliant PHY and Real-Time MAC
  - Preamble-based ConcurrentConnect Antenna Diversity
  - o Packet-in-Packet resynchronization
  - ConcurrentConnect Multi-Channel capability, operating in up to 3 PANs on different channels
- Bluetooth v 5.3 compliant Low Energy Controller
  - Enhanced Data Rate (2 Mbit/s)
  - o Link Layer Privacy
  - Advertising Extensions
  - Full connection utilization
- Multi-Stack Support
  - Multiple IEEE 802.15.4 based stacks MAC API
  - Bluetooth Low Energy HCI
- 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
- ConcurrentConnect Multi-Radio capability
  - Concurrent IEEE 802.15.4 and Bluetooth listening
  - ➔ Allows combining Bluetooth Low Energy Central/Observer or Mesh Node with Zigbee/Matter-over-Thread router
- Arm Cortex-M4 processor with DSP functionality, executing code from Flash or RAM at up to 64 MHz clock speed.
- 1 Mbyte Flash Program memory; patchable ROM containing Security Primitives, Bluetooth LE controller and 802.15.4 MAC software, significantly reducing the Flash memory footprint of a typical application
- 128 Kbyte Low Leakage Retention RAM
- 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.
  - o Cryptographic Random Number Generator
- Built in support for secure boot from ROM, secure OTA software upgrades and secure identity
- Fast and low-power analog measurements

### **Excellent Range and Reliability**

The QPG6105 has been optimized for reliable communication in harsh radio environments. 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.

### **Ultra-Low Power Consumption**

The QPG6105'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. The intelligent sensor hub allows for quick and low power measurements during standby.

QPG6105

### **Electrical Characteristics**

Standby Mode Currents <sup>1</sup>			
Using internal LjRC oscillator	0.9 µA		
Using 32 KiHz crystal oscillator (optional)	1.6 µA		
Using 32 MHz crystal oscillator	765 µA		
Operational Currents <sup>1</sup>			
Receive IEEE 802.15.4, single antenna	5.6 mA		
Receive IEEE 802.15.4, antenna diversity	7.4 mA		
Receive Bluetooth (1 Mbit/s)	10.4 mA		
Transmit (at 0 dBm)	16.7 mA		
Transmit (at 7 dBm, low power mode)	26.4 mA		
Transmit (at 10 dBm)	38.8 mA		
Supply Voltage	1.8 to 3.6 V		
Interfaces and Peripherals			
Programmable GPIO lines	up to 23		
Analog input lines	up to 4		
LED Signal Generator; 8-bit PWM with fading support	4 outputs		
16-bit PWM engine	8 outputs		
UART interfaces	2		
SPI and I <sup>2</sup> C Master and Slave p	eripheral interfaces		
I <sup>2</sup> S Master/Slave interface for digi	tal audio devices		
PDM Microphone interface	PDM Microphone interface		
IR Signal Generator			
10/12-bit ADC to monitor the analog input lines, the power supply level and the temperature			
Low power comparator	Low power comparator		
High speed programming interface			
Crystal Frequency	32.000 MHz (±40 ppm)		
Optional	32.768 kHz		

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### **Multi-Standard Smart Home Communications Controller**

### **General Characteristics**

Package	QFN32, 4x4 mm (0.4 mm pitch)
Operating Temperature	-40 to +125 °C
Storage Temperature	-50 to +150 °C
Soldering Temperature	260 °C (10 s max)
Compliance	RoHS

### **Radio Characteristics**

ETSI EN 300 328 FCC CFR-47 Part 15 ARIB STD-T66	
(adjustable down in 1 dB steps)	
Low power mode +7 dBm	
+10 dBm	

### 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 <sup>1</sup>	-101 dBm typical
Antenna diversity gain <sup>2</sup> 8 dB (increases the 'effective' receiver sensitivity to -109 dBm)	

### **Bluetooth Low Energy Radio Characteristics**

Standards compliant	Bluetooth Core Specification v 5.3, Low Energy
Frequency Band	2402 – 2480 MHz
Channels	40 (2 MHz step size)
Data Rate	1 Mbit/s, 2 Mbit/s
Receiver Sensitivity <sup>1</sup>	
2 Mbit/s	-94.5 dBm typical
1 Mbit/s	-97 dBm typical

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 g1 = 2, g2 = 3.5.

### **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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