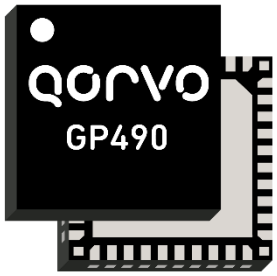
GP490

ZigBee Home Automation Communications Controller

Product Brief

Product Overview



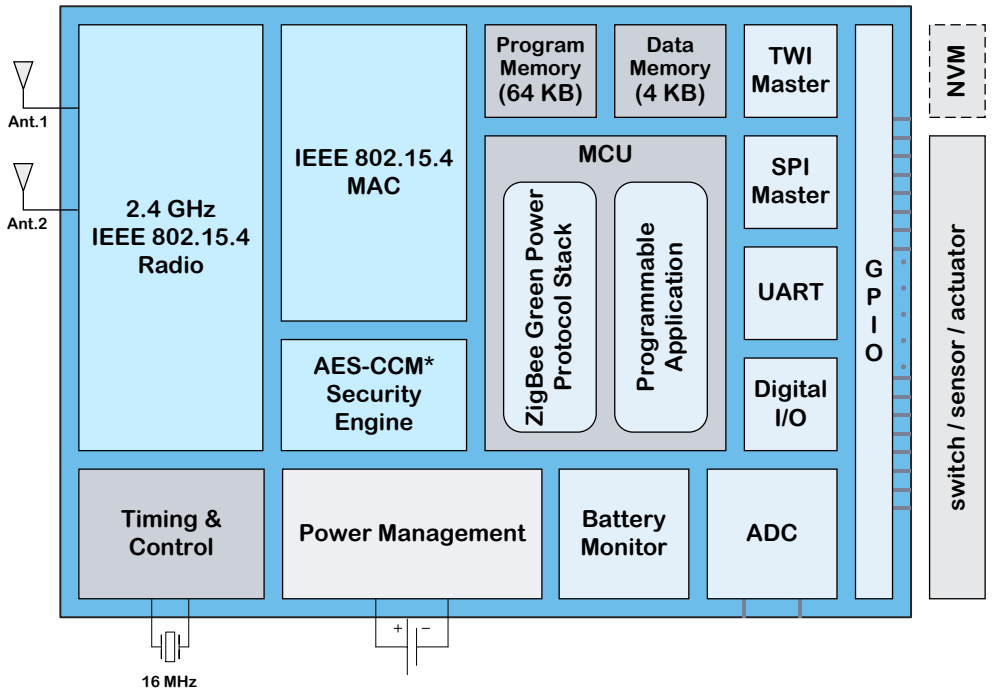
The GP490 ZigBee Home Automation Communications Controller is a System-on-Chip that provides a fully integrated solution for ultra-low power wireless communications for ZigBee Smart Home end node applications. It is compliant with the IEEE Standard 802.15.4, providing robust spread spectrum data communication with a secure encrypted data flow.

The GP490 features a radio transceiver, integrated real-time Medium Access Control processor, integrated microcontroller, security engine, event scheduler, advanced power management features, memory and an extensive set of peripherals. The integrated RF filtering simplifies the RF design complexity enabling very low cost single layer applications using simple PCB antennas requiring no shielding and a minimum number of external components.

Advanced power management features ensure that power consumption is minimized in both active and standby states.

The GP490 application layer is programmable. It can communicate with external peripherals via UART, SPI, TWI or direct signal interfaces.

Chip Overview



Key Features

- IEEE 802.15.4 compliant PHY and Real-Time MAC
- Operates in the worldwide 2.4 GHz ISM-band
- Excellent range by antenna diversity: 8 dB more reliable link budget compared to single antenna
- Additional robustness by packet-in-packet resynchronization
- Optional LNA and/or PA
- Hardware accelerated AES and CCM* encryption with
- 128-bit keys
- XAP5™ high performance 16/32-bit microcontroller
- 4 Kbyte RAM, 64 Kbyte Program Memory
- Advanced Energy Management, supporting Energy Harvester and battery operation
- UART, SPI or TWI serial interface
- ADC for two analog input channels and battery level

Low Cost

The GP490 is designed to operate on very low cost, single layer, paper phenol like PCB material using only low cost components and printed circuit antennas. No expensive shielding, chip antennas or voltage regulators are required to design a wireless harvesting control device. The integrated microcontroller, program memory, Real-Time MAC and harvesting power management allow for a fully integrated, single chip approach.

Ultra-Low Power, Maintenance Free

The GP490 is designed for ultra-low power consumption and can run on a coin-cell battery for up to 10 years, essentially removing the need for battery replacement. The energy generated by a harvester is enough to send multiple packages on the generated energy, allowing for a battery free solution.

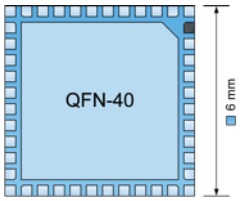
Advanced Integrated Energy Management

The GP490 has an advanced integrated energy management system, which allows it to operate from a standard lithium coin-cell battery as well as from intermittent power supplies like photovoltaic (solar), electro-mechanical and piezoelectric, with a minimum of additional components. The energy management system includes ultra-low power voltage level detectors and overvoltage protection circuitry, allowing safe operation and graceful shutdown. The battery lifetime monitor tracks the usage of the battery and provides an early exhaustion warning.

Excellent Range and Reliability

The Qorvo radios have been optimized for reliable communication in harsh radio environments. The GP490, in combination with other Qorvo products, provides robust and reliable link quality. The high receiver sensitivity on Qorvo products in combination with the built-in antenna diversity and Qorvo's unique receiver technology provides excellent range and reliability. In high density networks the packet-in-packet resynchronization further improves the communication reliability. The potential risks of interference by Wi-Fi and/or Bluetooth devices have been reduced by the combination of excellent receiver dynamic range and an auto tuned band-pass filter.

General Characteristics

Package	QFN40, 6x6 mm 
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]	
Untimed, Event Driven	250 nA
Timed, using 16 MHz crystal	600 µA
Timed, using 32 KiHz crystal	750 nA
Operational Currents [1]	
Receive	21 mA
Transmit (at 0 dBm)	20 mA
Supply Voltage	2.1 to 3.6 V
Interfaces and Peripherals	
Programmable GPIO lines	17
Analog input lines	2
Keyboard (HW assisted)	max 8 x 8
SPI Master peripheral interface	
TWI Master peripheral interface	
UART interface	
Control for external LNA and/or PA	
ADC to monitor the analog input lines and the power supply level	
High speed programming interface	
Crystal Frequencies	
Operational	16.000 MHz (±40 ppm)
Standby (optional)	32.768 kHz (±40 ppm)

Radio Characteristics

Standards compliant	IEEE 802.15.4-2003 IEEE 802.15.4-2006
Radio Regulations compliant	ETSI EN 300 328 FCC CFR-47 Part 15 ARIB STD-T66
Frequency Band	2400 – 2483.5 MHz
Channels	16 (programmable, 5 MHz steps)
Modulation	IEEE 802.15.4
Chip rate	2 Mchip/s
Data Rate	250 kbit/s
Receiver Sensitivity [1]	-93 dBm typical
Antenna diversity gain [2]	9 dB (increases the 'effective' receiver sensitivity to -102 dBm)
Co-channel Rejection	> -2.5 dB
Adjacent Channel Rejection	> 30 dB
Alt. Adjacent Channel Rejection	> 45 dB
Wi-Fi IEEE 802.11g Rejection[3]	> 30 dB
Bluetooth Rejection[4]	> 25 dB
Transmit Power	+7 dBm (adjustable down in 1 dB steps)
Radio Management	Antenna Diversity Digital RSSI Link Quality Indication

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 9 dB improved link budget at a 1% outage probability compared to no antenna diversity. The 9 dB in link budget translates into 80% more range, if using a two slope range model with the breakpoint at 10 m and g1 = 2, g2 = 3.5.

3) At +12 MHz and -13 MHz.

4) At +4 MHz and -4 MHz.

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 RF4CE/BLE Remote Control products.

Contact Information

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

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Important Notice