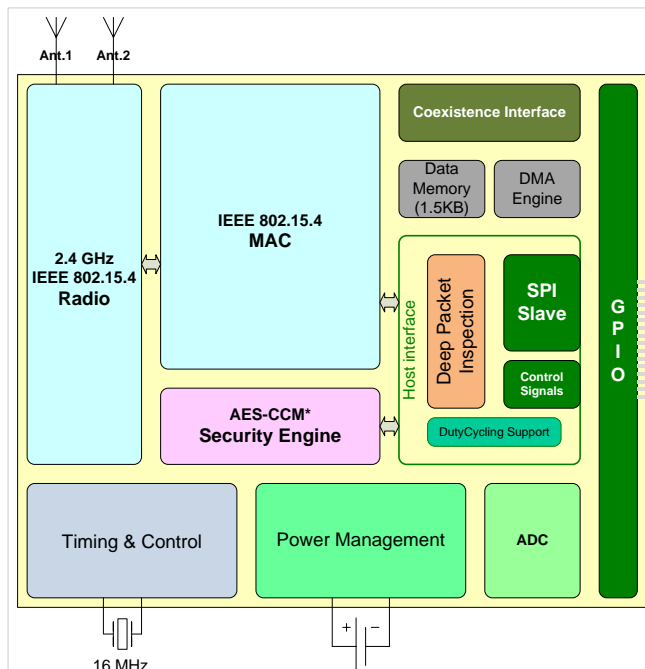


The GreenPeak Technologies GP501 ZigBee-ready IEEE 802.15.4 Communications Controller is a fully integrated transceiver solution for ultra low power wireless communications. It is compliant with the IEEE Standard 802.15.4, providing robust spread spectrum data communication with a secure encrypted data flow. Its Wi-Fi interference rejection capability and antenna diversity offer superior performance in a crowded wireless 2.4 GHz environment. In addition, the GP501 supports a Coexistence Interface to enable coexistence with other potentially interfering radios (Bluetooth, Wi-Fi) within the same device.

The GP501 features a radio transceiver, integrated real-time Medium Access Control processor, security engine, event scheduler and advanced power management features. A high-speed SPI interface is provided for communication with the external controller. 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. The embedded security engine automatically encrypts, decrypts and authenticates messages with locally stored keys, so minimizing the overhead for the controller. Advanced power management features ensure that power consumption is minimized in both active and standby states.

The combination of a GP501 with a microcontroller forms an IEEE 802.15.4 node, examples of which include a ZigBee coordinator, router or end device, or an RF4CE Target or Controller device.

Chip Overview



Low Cost

The GP501 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 high performance ZigBee application. The integrated Real-Time MAC greatly reduces software complexity and improves stability.

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: 9 dB more reliable link budget compared to single antenna
- Additional robustness by packet-in-packet resynchronization
- 30 dB better robustness to Wi-Fi Interference
- External PA signals for extended range
- Hardware accelerated AES and CCM* encryption with 128, 192 and 256-bit keys
- 1.5 Kbyte RAM for data buffering
- Advanced Energy Management, supporting intermitted energy sources and coin cell battery operation
- External Controller SPI Slave interface
- Stand-alone RF4CE DutyCycling support and RF4CE packet filtering when the host is asleep
- Coexistence Interface with other radios in the device

GreenPeak Technologies is a fabless semiconductor company offering innovative ultra low power wireless and battery-free data communication technologies for consumer electronics and sense and control applications.

GP501 IEEE 802.15.4 Communications Controller

Excellent Range and Reliability

The GP501 has been optimized for reliable communication in harsh radio environments. The -93 dBm receiver sensitivity allows extended coverage. Built-in antenna diversity with two antennas improves the reliable link budget by 9 dB resulting in approximately twice the 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 potential risks of interference by Wi-Fi and/or Bluetooth devices have been reduced by the combination of excellent receiver interference rejection capability and dynamic adaption of the frequency channel. The Coexistence Interface can be used to enable coexistence of the IEEE 802.15.4 radio of the GP501 with other potentially interfering radios (Wi-Fi, Bluetooth) within the same device.

Ultra Low Power

The GP501 is designed for ultra low power network applications. It supports RF4CE duty cycling and can wake up the host when a specified message has been received, with RF4CE Network layer and Profile layer Deep Packet Inspection.

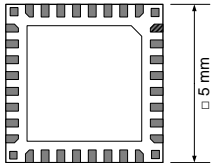
Reference Designs, Tools and SW

GreenPeak Technologies' reference designs, development kits, software libraries and production platforms provide a quick time-to-market solution for STB's, Gateways, RF4CE Remote Control, Sensor and other Home Automation Network products.

Electrical Characteristics

Standby Mode Currents ¹	
Reset mode	10 nA
Timed, using 16 MHz crystal	800 µA
Operational Currents ¹	
Receive	20 mA
Transmit	21 mA (at 0 dBm)
Supply Voltage	
	2.1 to 3.6 V
Interfaces	
Programmable GPIO lines	8
SPI Slave	
Control for external PA	
Coexistence Interface	
Crystal Frequencies	
Operational	16.000 MHz (±40 ppm)

General Characteristics

Package	
QFN32, 5x5 mm	
Operating Temperature	-40 to +85°C (industrial)
Storage Temperature	-50 to +150°C
Soldering Temperature	260°C (10 s max)
Compliance	RoHS

Radio Characteristics

Standards compliant	IEEE802.15.4-2003 IEEE802.15.4-2006
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 step size)
Modulation	IEEE802.15.4
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	> 27 dB
Bluetooth Rejection ⁴	> 27 dB
Transmit Power (adjustable down in 1 dB steps)	+3 dBm
Radio Management	Antenna Diversity Digital RSSI Link Quality Indication

1) At 3.0V 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 log-distance breakpoint model with path loss coefficients $g_1=2$ (free space propagation) and $g_2=3.5$ above the breakpoint at 10 m.

3) At +12 MHz and -13 MHz.

4) At +4 MHz and -4 MHz.