GreenPeak GP712

Version 1.01

IEEE 802.15.4 Multi Stack Communications Controller

The GreenPeak Technologies GP712 System-on-Chip is an IEEE 802.15.4 communications controller for integration into a ZigBee node. It is compliant with the IEEE Standard 802.15.4, providing robust spread spectrum data communication with a secure encrypted data flow, and supports multiple ZigBee (RF4CE, ZigBee PRO, ZigBee IP) and other low power wireless (6LowPAN, Thread) protocol stacks in the host processor. The GP712 is able to listen simultaneously on three different channels with antenna diversity.

The GP712's interference robustness and antenna diversity offer superior performance in a crowded wireless 2.4 GHz environment. In addition, the GP712 presents a Coexistence Interface to enable coexistence with other potentially interfering radios (Bluetooth, Wi-Fi) within the same host device.

The GP712 provides a high-speed serial interface (SPI or UART) to the host processor.

It supports stand-alone RF4CE DutyCycling and packet filtering through Deep Packet Inspection when the host is asleep and has an extremely low standby power consumption enabling total system power consumption of less than 1 mW while allowing reception of remote control commands.

The GP712 is optimized for low cost while providing superior performance. Its radio characteristics reduce the product's RF design complexity enabling low cost single layer applications using simple PCB antennas requiring no shielding and a minimum number of external components.

Chip Overview and Key Features
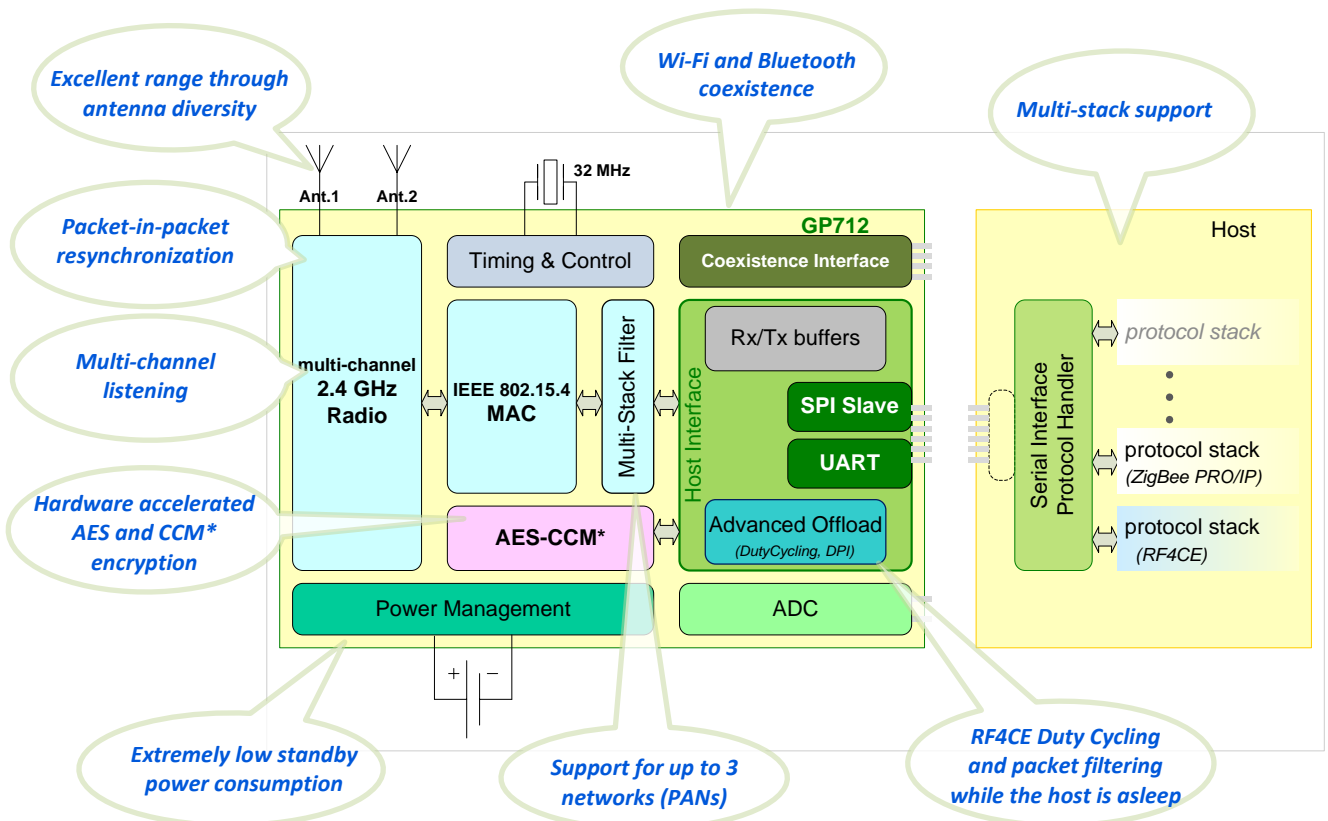
Multi Stack Support

The GP712 can support multiple protocol stacks in the host processor, operating in up to 3 Personal Area Networks. These PANs may be on the same or on different RF channels.

Excellent Range and Reliability

The GP712 has been optimized for reliable communication in harsh radio environments. The excellent receiver sensitivity and high transmit power allow 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 an 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 GP712 with other potentially interfering radios (Wi-Fi, Bluetooth) within the same device.

Ultra Low Power Consumption

The GP712 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, to allow the host to stay asleep as much as possible.

Low Cost

The GP712 is designed to operate on PCB designs using only low cost components and printed circuit antennas. No expensive shielding, chip antennas or voltage regulators are required.

Reference Designs, Tools and SW

GreenPeak Technologies' reference designs, development kits, software libraries and production platforms provide a quick time-to-market solution for RF4CE Remote Control products and sensor and control devices for Home Automation networks.

Electrical Characteristics

Standby Mode Currents [1]		
Using internal RC oscillator	1 µA	
Using crystal oscillator	760 µA	
Operational Currents [1]		
Receive	7 mA	
Transmit (at 0 dBm)	18 mA	
Transmit (at 7 dBm)	30 mA	
Supply Voltage	2.1 to 3.6 V	
Interfaces		
SPI Slave serial host interface		
UART-based serial host interface		
Coexistence Interface with other radios		
External LNA/PA signals		
2 Analog input lines		
ADC to monitor the ANIO pins and the power supply level		
Crystal Frequency	32.000 MHz (±40 ppm)	

General Characteristics

Package	QFN-24, 4x4 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]	-96 dBm typical
Antenna diversity gain [2]	9 dB (increases the 'effective' receiver sensitivity to -105 dBm)
Transmit Power	+7 dBm (adjustable down in 1 dB steps)
Radio Management	Antenna Diversity Digital RSSI Link Quality Indication

1) At 3.0V and 25°C.
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 10m and g1 = 2, g2 = 3.5.
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