

# Qualcomm® Bluetooth Low Energy 101x Product Family

Single-mode Bluetooth low energy radio with integrated microprocessor and enhanced memory for IoT applications.

The CSR101x product family consists of five product variants designed to develop devices that use Bluetooth low energy. The CSR101x series provides a built-in processor to run the customer application as well as the qualified Bluetooth single mode stack and radio. CSR101x chips can run directly from a 3V coin cell, and connect directly to a PCB antenna.

The CSR101x System-on-Chips (SoCs) are optimized for easy development and low cost designs with minimal external components and provide a complete Bluetooth low energy qualified solution that takes less time to make a connection and consumes approximately 20 times less power than Bluetooth basic rate. Bluetooth low energy devices based on CSR101x are able to transfer simple data sets between compact devices thereby opening up a whole new class of Bluetooth applications for the Internet of Things (IoT). Consumers expect their wireless devices to quickly and seamlessly 'connect' and to perform just like wired ones do – at home, in the car and on the move. And along with that universal connectivity they want minimal or no setup and full interoperability with whatever device they choose—smartphone or tablet.

Qualcomm Technologies International, Ltd. (QTI) is an industry leader in delivering high quality connectivity experiences that help differentiate devices in the Internet of Things. More than singular solutions, we develop flexible, robust product platforms combining silicon, software, and services to provide customers a complete connectivity platform for success.

## Solution Highlights

### Optimized for low power consumption and low cost IoT solutions

Ultra-low power connectivity and basic data transfer for applications previously limited by the power consumption, size constraints and complexity of other wireless standards.



### Faster connections for more responsive, engaging devices

Make connection, send data, and receive acknowledgement in 3 milliseconds.



### Full software support for easy application development

The Bluetooth low energy SDK includes example applications that are qualified and designed to significantly reduce product development time.



### One-chip solution for whole new class of Bluetooth applications

Controller, host and application are integrated on one chip, perfect for transfer of simple data sets between compact devices in the IoT.



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CSR101x

## Bluetooth Low Energy Applications

- Input Accessories
- Fitness Devices
- Heart Rate Monitor
- TV Remotes
- Auto Keyless Entry
- Smart Lighting



## Features

- Bluetooth 4.1 low energy radio with direct single-ended 50Ω antenna connection
- 50kB of user app space
- Switch-mode power supply and linear regulators
- Up to 4.4V direct supply connection for Li-poly batteries
- Wake-up interrupt and watchdog timer
- Time-stamping hardware
- 1 μA integrated key scanning hardware
- Peripheral (I<sup>2</sup>C) and debug interfaces (SPI)
- Integrated Bluetooth 4.1 qualified stack
- On-chip temperature and battery monitoring
- PWM hardware blocks for LED patterns and motor control
- Master and slave operation, including encryption
- Software development kit with C compiler and debug tools

Product	Part Number
CSR1010D QFN	CSR1010A05-DQQM-R
CSR1010 QFN	CSR1010A05-IQQM-R
CSR1011 QFN	CSR1011A05-IQQA-R
CSR1012 QFN	CSR1012A05-IQQP-R
CSR1013 UT-WLCSP	CSR1013A05-IUUM-R

## Related Products

CSR101x Starter Development Kit

CSR1010/1011 Development Kits

CSRmesh™ Development Kit

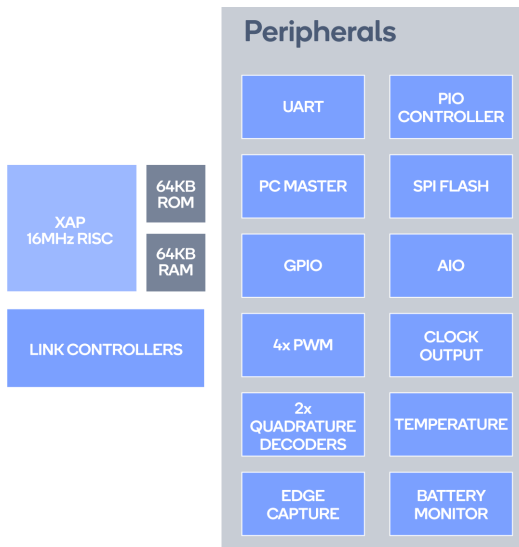
Proximity Beacon Development Kit

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## CSR101x Block Diagram



## Chip Variants

<b>CSR1010</b> All-purpose general platform	12x GPIO 3x AIO QFN 32 lead 5 x 5 x 0.6mm 0.5mm pitch
<b>CSR1011</b> High I/O count variant	32x GPIO 3x AIO QFN 56 lead 8 x 8 x 0.9mm 0.5mm pitch
<b>CSR1012</b> Small package for wearables	12x GPIO 3x AIO QFN 32 lead 4 x 4 x 0.65mm 0.4mm pitch
<b>CSR1013</b> Smallest and thinnest chip	12x GPIO 1x AIO UT-WLCSP 34 bump 2.4 x 2.6 x 0.35mm 0.4mm pitch

## CSR101x Specifications

<b>MCU</b>	16MHz 16MIPS XAP application processor (RISC) with hardware link controller
<b>Bluetooth Version</b>	Bluetooth v4.1 specification compliant
<b>Memory</b>	128KB Memory: 64KB RAM & 64KB ROM
<b>Bluetooth TX/RX</b>	up to +9dBm max RF transmit power -93dBm receiver sensitivity No external power amplifier or TX/RX switch required
<b>Interfaces</b>	UART, I <sup>2</sup> C, PIO controller 4x PWM modules 2x hardware quadrature decoders 12x or 32x re-assignable GPIOs plus dedicated WAKE pin 10-bit SAR ADC/DAC with 1x or 3x AIO 32kHz or 16MHz clock output
<b>Current Consumption</b>	<20mA peak current 5μA in deep sleep 900nA in dormant mode
<b>Operating Voltage</b>	1.8 to 4.3V
<b>Operating Temperature</b>	-40°C to +85°C -30°C to +105°C (CSR1010D)

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