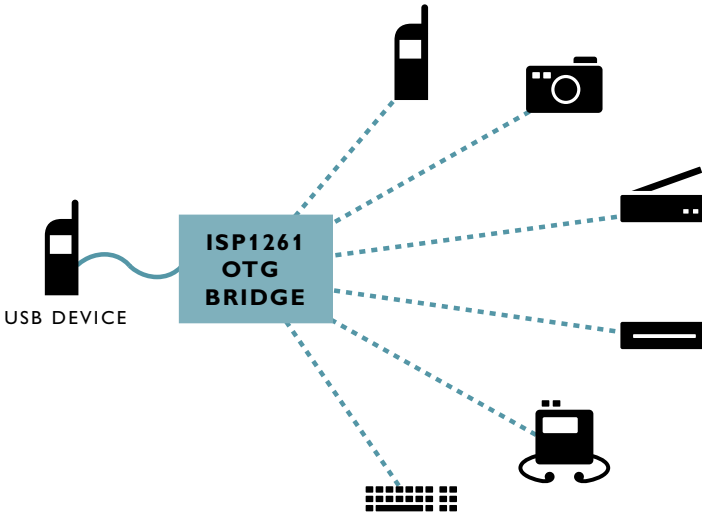
ISP1261

USB OTG bridge controller

The ISP1261 USB OTG bridge controller converts a USB peripheral function to a USB OTG function. Designed directly onto the circuit board or used in a dongle, the ISP1261 is the fastest, most cost-effective way to add OTG to an existing design.



Key features

> Quickest way to add USB OTG to an existing USB design
  – Add directly to PCB, or use in a dongle
> Two types of interface to USB client of SoC: two types
  – Analog USB connection D+/D-
  – Digital USB transceiver connection device SIE
> Full-speed (12 Mbps) and low-speed (1.5 Mbps) operation
> 3200-byte on-chip buffer
> 14 programmable device endpoints
> Dual power supplies
> Low power consumption
> 13 or 26 MHz direct clock and crystal
> Space-saving HVQFN32 package (5 mm x 5 mm)
> Works with protocol layer
  – pseudo host for USB host stack
  – pseudo peripheral for USB peripheral stack

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The ISP1261 is a USB OTG bridge controller, optimized for use in mobile phones, personal digital assistants (PDAs), digital still cameras (DSCs), digital video cameras (DVCs) and MP3 players, that provides the simplest, most cost-effective way to add OTG functionality to an existing USB system. Designers can add the ISP1261 directly to the original hardware or can use the ISP1261 to create a dongle that works with USB systems already in the field.

Two interface versions are supported. A USB D+/D- interface allows use with basebands and system-on-a-chip (SoC) ICs that have an integrated USB transceiver. A USB device Serial Interface Engine (SIE) interface allows use with basebands and SoCs that do not have an integrated USB transceiver.

The ISP1261 is particularly useful in mobile phones, where the baseband may not be able to connect directly to a USB OTG dual-role controller because it lacks a parallel data bus. The ISP1261 connects directly to the baseband's USB circuitry, eliminating the need for a parallel data bus.

To work with the ISP1261, the system baseband or SoC must have built-in Control-In and Control-Out endpoints as well as 64-byte Bulk-In and Bulk-Out endpoints. An additional Bulk-Out for IRQ control is optional because the ISP1261 can also use a polling method.

USB D+/D- interface

The ISP1261 interfaces with the baseband or SoC using the USB D+/D- analog signaling. The interface conforms to the full-speed section of the USB 2.0 specification.

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USB device SIE interface

The ISP1261 interfaces with the baseband or SoC using programmable transceiver interface signals. It can directly connect to industry-leading basebands that integrate the USB Serial Interface Engine (SIE).

ISP1261 supports full-speed (12 Mbps) and low-speed (1.5 Mbps) data transfer rates, as well as the full USB OTG protocol and multi-tier hub environments. (Final application performance will depend on the system's existing USB functionality).

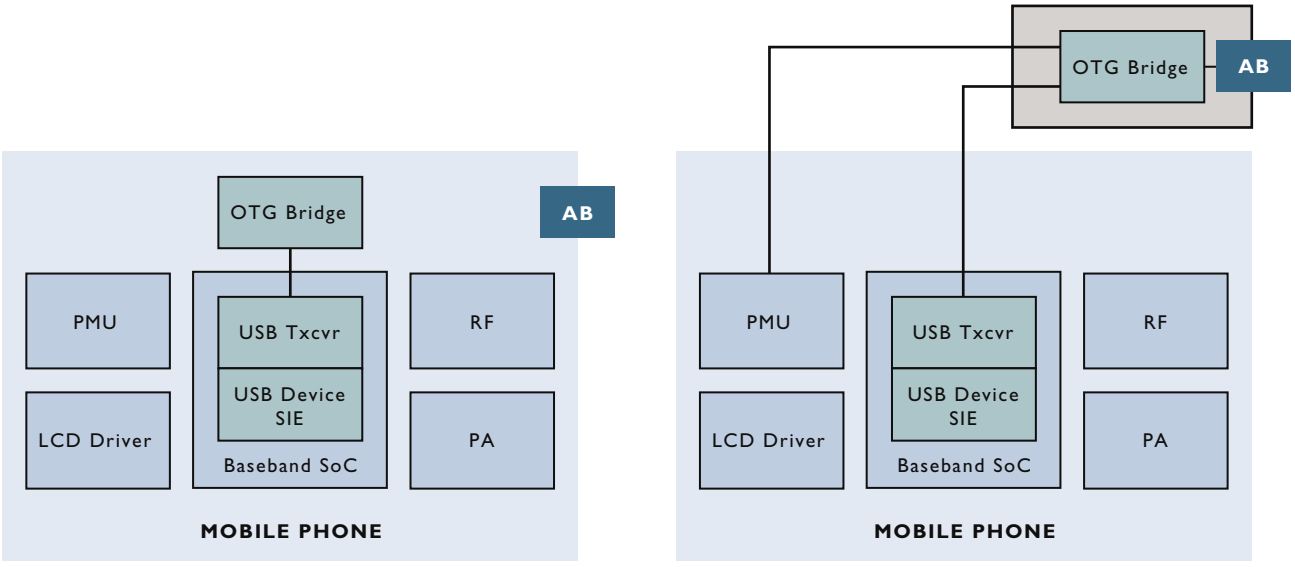
Derived from the Philips ISP1362, the industry's first single-chip USB OTG dual-role controller, the ISP1261 is designed for high performance. It integrates a 3200-byte buffer for host transaction data and offers 14 endpoints for complex implementations with composite peripheral functions. It has a multi-second buffering mechanism for ISO traffic and an auto-polling mechanism for interrupt traffic.

For flexible design configuration, the ISP1261 offers two power supplies. There is a 1.65 V-to-3.6 V voltage I/O interface for use with the baseband/SoC and a 2.7 V-to-4.5 V main power supply for use with the system battery. The digital core of the ISP1261 operates at 1.8 V for very low power consumption.

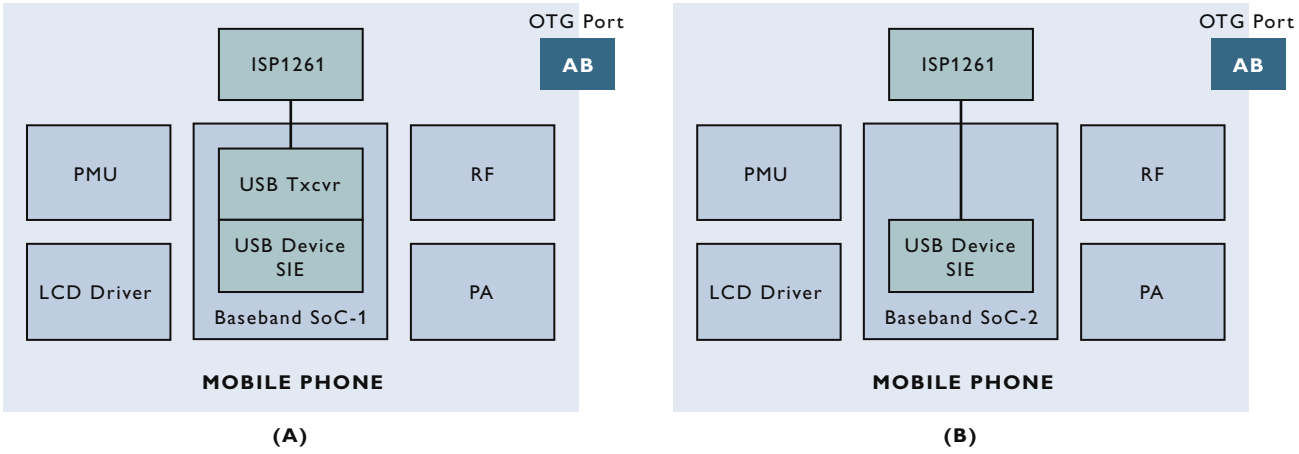
To configure the ISP1261 in a dongle that attaches to a mobile phone, the phone's native connector can be used to bring out the D+, D-, and digital Vcc signals to deliver the required 3.3V power supply.

The clocking function has been designed to reduce chip-count and save board space. The ISP1261 supports use of a 13-MHz crystal — the type most commonly used with baseband chipsets — and can also accept a clock input directly from the system. The ISP1261 also supports a 26-MHz crystal.

The ISP1261 is available in an HVQFN32 package that measures only 5 mm x 5 mm.



The ISP1261 USB OTG bridge function can reside on the phone PCB (A) or in an external dongle (B).



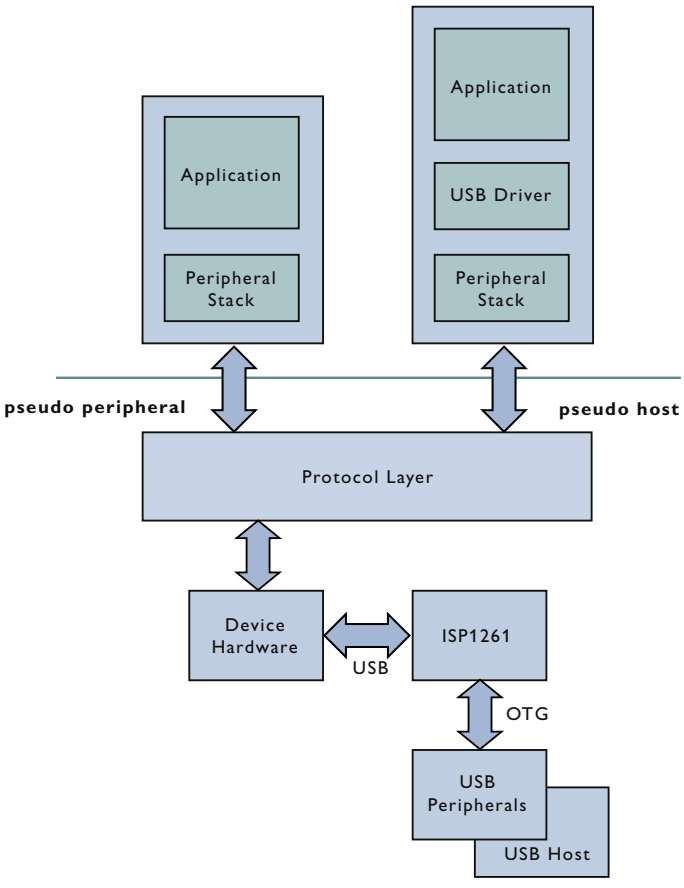
Connecting using a USB D+/D- interface (A); connecting using a USB device SIE interface (B).

Software Emulated OTG Controller (SEOC) protocol layer (pseudo host and pseudo peripheral stacks)

The ISP1261 works with a software emulated OTG controller (SEOC) protocol layer that includes two stacks: pseudo host and the pseudo peripheral.

This protocol layer maps the host or peripheral function of the ISP1261 bridge controller onto the original peripheral function of the baseband or SoC. With it, the host and peripheral stacks operate as though they were physical implementations on the baseband or SoC.

Both pseudo host and pseudo peripheral have full access to all registers and buffers of the OTG, host, and peripheral controllers.



The ISP1261 works with the protocol stack.

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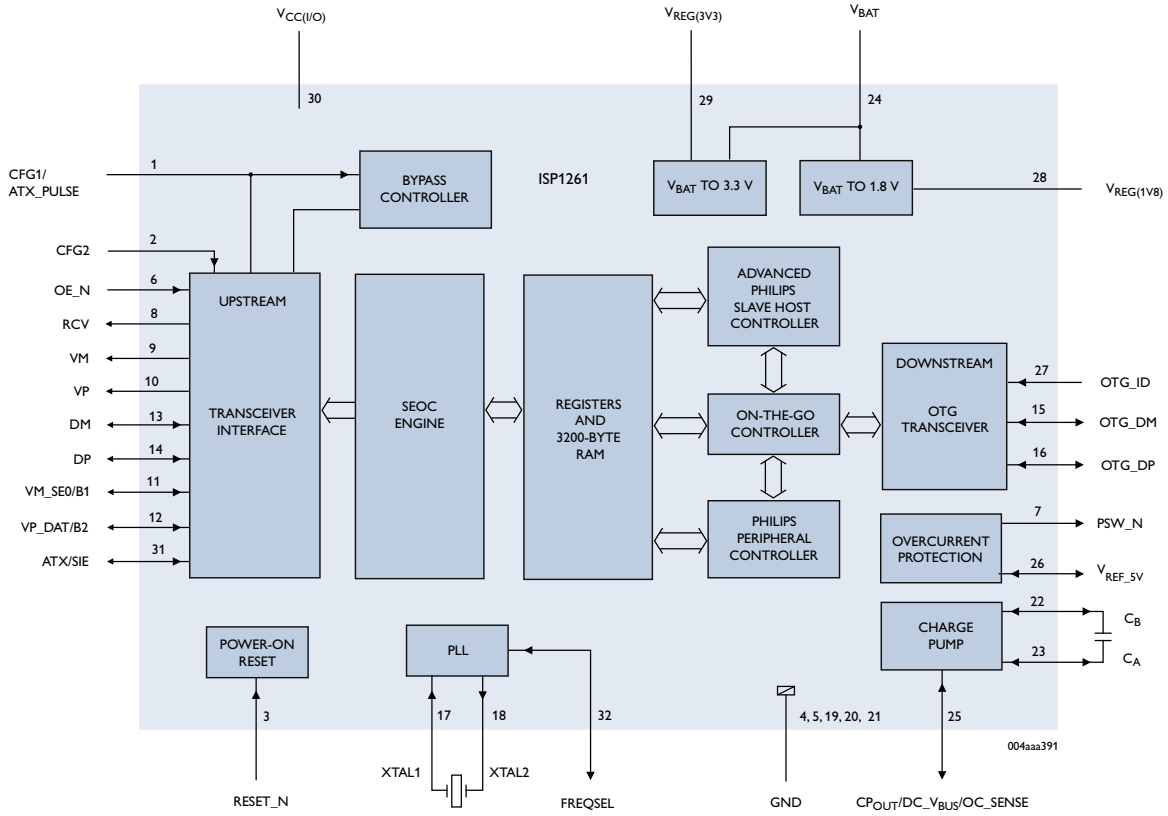

ISP1261 block diagram

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