ISP1760, ISP1761, ISP1763 HI-SPEED USB HOST AND OTG CONTROLLERS

Extending USB beyond the PC—bringing its reliability, convenience, and interoperability to the digital home

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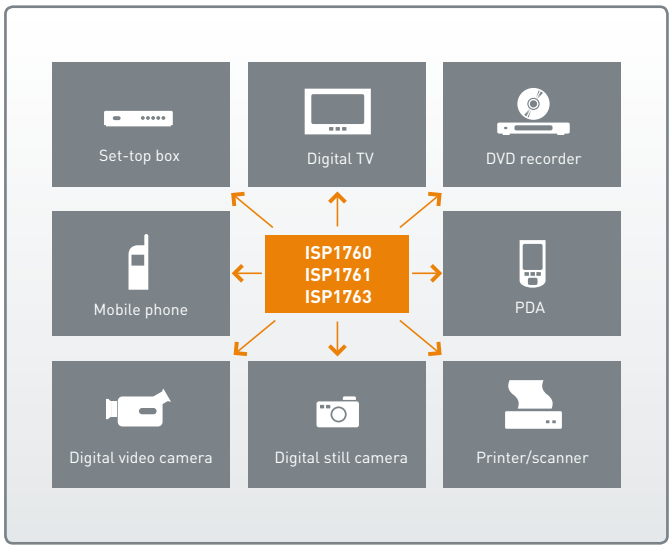
The ISP1760 is a Hi-Speed USB host controller optimized for use in embedded applications. The ISP1761 is a Hi-Speed USB OTG controller designed for point-to-point communication between mobile devices. The ISP1763 is like the ISP1761 but with a smaller footprint and offers many more CPU interface modes.

KEY FEATURES AND BENEFITS

- Hi-Speed USB controllers for consumer, communications, and PC-peripheral applications
  - ISP1760: three-port host controller for embedded applications
  - ISP1761: three-port dual-role (host/peripheral) controller with OTG
  - ISP1763: two-port dual-role (host/peripheral) controller with OTG
- Fully compliant with USB Specification Rev. 2.0, On-The-Go Supplement Rev. 1.3, and EHCI Specification Rev. 1.0
- High-speed (480 Mbit/s), full-speed (12 Mbit/s), and low-speed (1.5 Mbit/s) data transfer rates
- Integrated transaction translator supports single EHCI for all data transfer speeds
- Flexible options for host system CPU
  - Slave DMA support for reduced CPU load
  - ISP1760, ISP1761: 16- or 32-bit data bus with 64-Kbyte addressable space
  - ISP1763: 8- or 16-bit data bus with 24-Kbyte addressable space
  - Generic processor interface
  - ISP1763: also supports CPU interface modes of SRAM, NOR Flash, NAND Flash and general multiplex
- Built-in RAM for multi-function, multi-peripheral support
  - ISP1760: 64-Kbyte RAM for host controller
  - ISP1761: 8-Kbyte additional RAM for device controller
  - ISP1763: 24-Kbyte RAM for host, 4-Kbyte RAM for device
- Very low power consumption
  - Internal core operates at 1.8 V (1.2 V for ISP1763) from external 3.3 V supply
  - Tolerant I/O for low-voltage CPU interface (1.8 V to 3.3 V)
- Supported by FlexiUSB stack software
- Packaging
  - ISP1760, ISP1761: LQFP128; TFBGA128
  - ISP1763: HVQFN64; TFBGA64

TARGETED APPLICATIONS



ISP1760 FOR EMBEDDED APPLICATIONS

The ISP1760 is a Hi-Speed USB host controller intended for embedded applications. It brings the same reliable, easy-to-use USB host capabilities typically associated with a PC to the home entertainment environment. Used in a set-top box (STB), a digital TV (DTV), or a DVD recorder, for example, the ISP1760 provides reliable, high-speed connectivity to a variety of peripherals, including digital still cameras (DSCs), digital video cameras (DVCs), printers, hard disk drives, memory cards, and scanners. With the ISP1760 built into their home entertainment systems, consumers can easily use a Hi-Speed USB storage device for fast media file transfer or for video streaming playback and record. Or they can quickly transfer high-resolution pictures from their Hi-Speed USB-enabled digital camera, viewing files on a large-screen TV and printing color copies.

The ISP1760 is also well suited to printer applications, making it easy to print directly from a DSC with USB function— without connecting through a PC. Also, a multimemory card IC can be connected to the ISP1760 port in the printer, supporting multiple Flash-memory interfaces such as CompactFlash™ (CF), SmartMedia™ (SM), Memory Stick® (MS), xD-PictureCard™ MultiMediaCard™ (MMC), and Secure Digital™ (SD).

ISP1761 AND ISP1763 FOR PORTABLE APPLICATIONS

The ISP1761 (and the ISP1763), designed for portable applications, is a Hi-Speed USB dual-role (host/peripheral) controller with built-in support for USB OTG, the USB extension that enables point-to-point communications between mobile devices. Combining the standard host function with USB OTG capability makes for a very flexible solution, allowing a portable device such as a mobile phone, a DVC, a DSC, or a PDA to support any USB-enabled peripheral, including keychain storage devices.

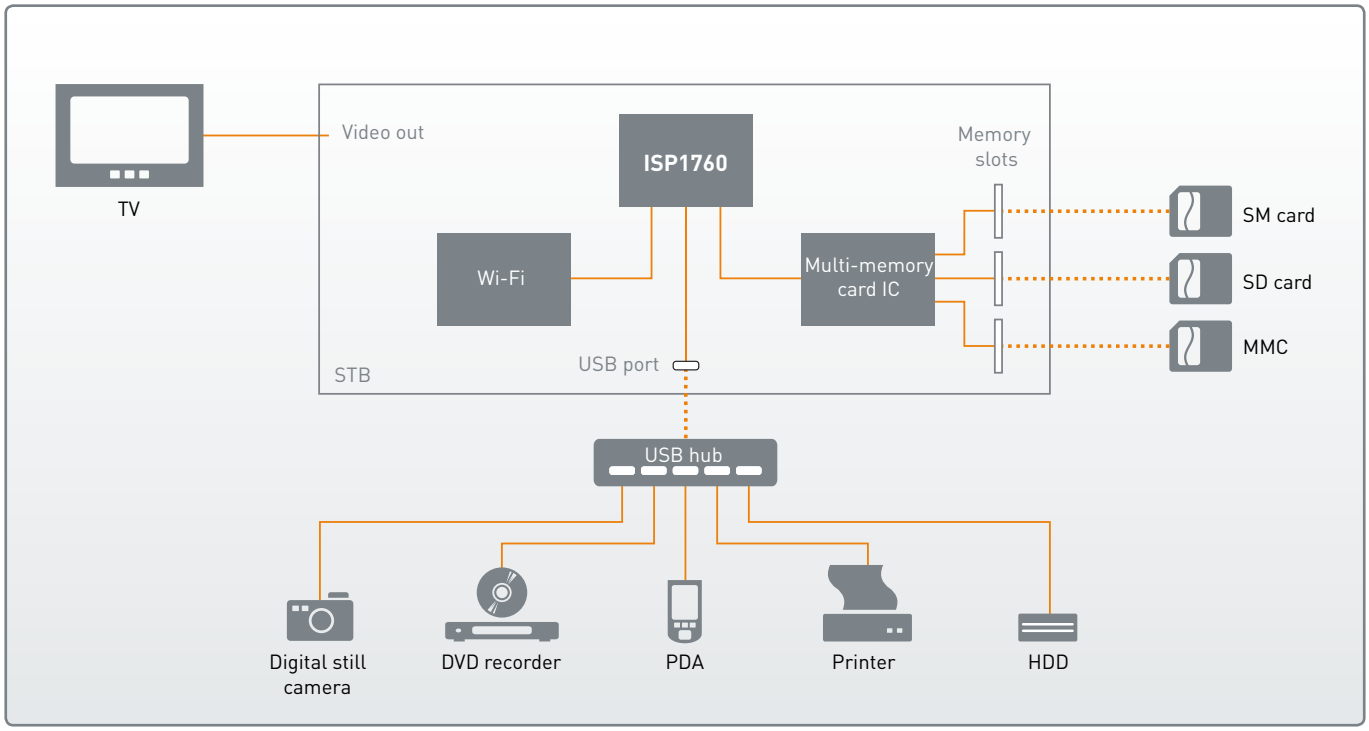
Using the ISP1761 or ISP1763, a mobile phone can be equipped with a high-resolution digital camera or an MPEG video camera. The phone can connect to a PC for quick upload and download of still images, for streaming, recording or editing video, or for data synchronization. A hard disk drive (HDD) can be attached to the OTG port to store still pictures and movie clips. The Hi-Speed USB host port can also serve as an expansion bus for attaching other modules such as Bluetooth® wireless connectivity, wireless LAN (WLAN) functions, a multimemory card, or a global positioning system (GPS). The portable device becomes the center of connectivity, providing fast, reliable data transfers without a PC.

ROBUST AND HIGH-SPEED PERFORMANCE

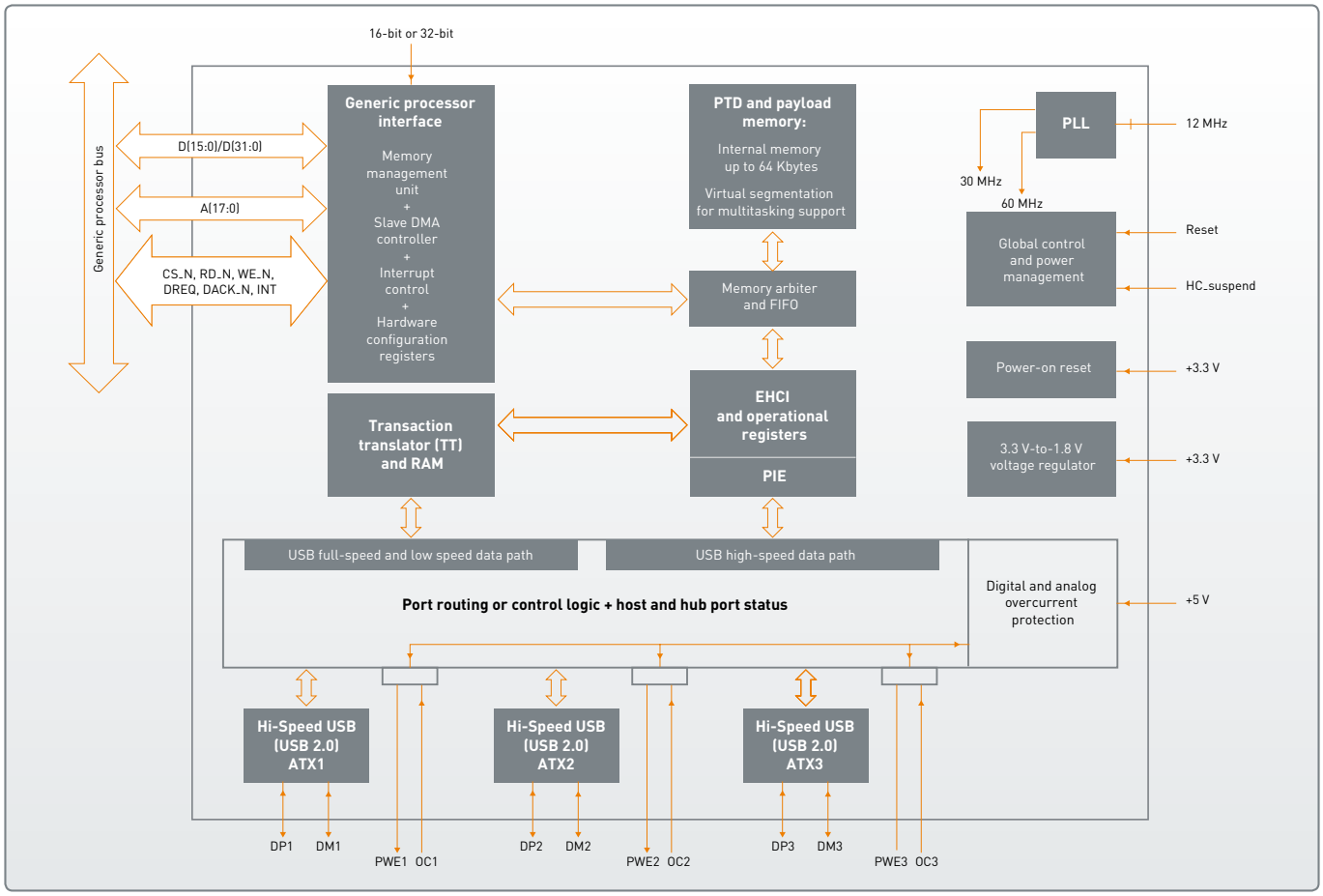
The ISP1760, ISP1761 and ISP1763 have overcome the constraints typically posed by the memory, bus speed, and operating system (OS) in consumer and communications applications. The performance of the Enhanced Host Controller Interface (EHCI), which is ordinarily run in a resource-rich PC environment, has been retained. The ICs fully utilize the 480 Mbit/s Hi-Speed USB bandwidth.

The ISP1760/1/3 is automatically equipped to work with full- and low-speed devices, thanks to an integrated transaction translator, which eliminates the need for additional software stacks and thus lowers overall cost.

The ISP1760 has three host ports for peripheral connectivity. The ISP1761 has two dedicated host ports and one port that can be a host, a device, or an OTG port. Each host port supports high-, full-, and low-speed peripherals, and supports the maximum five levels of USB 2.0 hubs as defined in the USB 2.0 specification. In the ISP1761, the internal charge pump drives a current of up to 50 mA to the OTG port, many times higher than the minimum value defined in the OTG specification.



Embedded in a set-top box, the ISP1760 creates a hub for conveniently viewing high-resolution pictures or video clips, and then saving and printing them.



ISP1760 block diagram

For faster performance at the CPU interface, the ISP1760/1 offers a data bus that can be configured for 32- or 16-bit operation. To reduce CPU overhead, a carefully designed 64-Kbyte internal buffer minimizes the impact of context switching in the OS. The buffer is designed to deliver more data with each transfer, thereby keeping CPU interrupts to a minimum.

To make selection of a system CPU easier and more cost-effective, the ISP1760/1/3 uses a configurable processor interface that is compatible with a variety of CPUs. As a slave host controller, the ISP1760/1/3 is independent of the PCI bus and does not require the bus-mastering capabilities of the host system. For use with a low-power CPU, the ISP1760/1/3 has a variable I/O interface that can run from 1.8 V to 3.3 V.

To extend battery life in portable applications, the ISP1760/1/3 offers very low power consumption in operating and suspend modes. The operating current consumption is less than half that of a typical PC host, and a hybrid power-down mode lets the USB cores and analog transceivers shut down when the USB function is idle. The power-down mode consumes less than 20 µA, significantly reducing the power requirements of a typical battery-powered device.

FlexiUSB™ STACK SOFTWARE

The ISP1760, ISP1761 and ISP1763 are supported by FlexiUSB stack, our USB software stack suite. FlexiUSB stack is a mature, operating-system independent USB stack that supports a multi-threading and multi-tasking software environment, enabling quick design-in on a proven, robust software platform. This is especially important in embedded applications, where the operating system may not provide native support for USB. The Hi-Speed USB version of FlexiUSB stack supports WinCE, Linux™, Symbian™, VxWorks™, µITRON™ and Nucleus™.

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