

# Industry's First Standard Product Peripherals I/O Chip



## OVERVIEW

The ComCentrix™ L1501 is a high-performance, highly integrated I/O solution designed for use by most peripherals, such as printers, digital copiers, and Multi Function Products (MFPs). The L1501 chip integrates several peripheral functions from the LSI Logic CoreWare® library including an Ethernet 10/100 MAC with DMA controller, a USB 2.0 device function, a USB 2.0 transceiver, an IEEE-1284 parallel port, two 16550-compatible UARTs, a fast Infrared port, two programmable timers, and 9 general-purpose I/Os, as well as a 32-bit, 33 MHz PCI bus compatible with most popular embedded processors. This device is manufactured using LSI Logic's G12™ 0.18  $\mu$  process with 3.3-volt I/Os and 1.8-volt core. The L1501 is packaged in a 208-pin plastic quad flat pack (PQFP).

## I/O BLOCKS BY FUNCTION

**Ethernet 10/100:** IEEE 802.3 compliant Media Access Controller (MAC) with integrated DMA buffer management unit, large independent (1k Bytes) receive and transmit FIFOs as well as MII physical media interface. Supports full duplex 10 and 100 Mbit/s receive and transmit, collision handling and retry algorithm.

**USB Device Function:** USB 2.0 (Universal Serial Bus) compliant interface, providing fast, bi-directional serial data transfer and control information for any peripheral device function for low speed (1.5 Mbit/s) and full speed (12 Mbit/s) and High speed (480 Mbits/s) modes. Supports control, isochronous, bulk and interrupt transfers between the peripheral device and the USB host. Handles USB bit level protocol (Serial Interface Engine), automatic retry of failed USB packets and disconnect signaling.

**USB 2.0 Transceiver:** The integrated USB Transceiver provides a USB 2.0 compliant physical interface and eliminates the need for any external transceiver components.

**IEEE-1284 Parallel Port:** IEEE 1284-1994 compliant bi-directional parallel peripheral interface with integrated DMA controller. Supports 1284-mode negotiations, device ID, compatibility (Centronics) mode, nibble mode, byte mode, EPP (enhanced parallel port) mode and ECP (extended capabilities port) mode.



*Standard product for peripheral  
I/O design*

## FEATURES

- Ethernet 10/100 MAC with DMA controller
- USB 2.0 device controller with integrated DMA Controller and FIFOs for 9 active USB endpoints
- USB 2.0 Transceiver
- IrDA port with DMA support
- IEEE-1284 ECP peripheral parallel port with integrated DMA controller
- PCI Interface, 2.2 compliant
- DUART, with external clocking capability
- Two independent Programmable Timers
- 9 programmable General-Purpose I/O s

## BENEFITS

- Lower development effort
- No need to redesign system ASIC to accommodate evolving I/Os
- Reduced component count
- Processor independent
- Reduced schedule risk
- Lowers system cost
- Accelerates time-to-market



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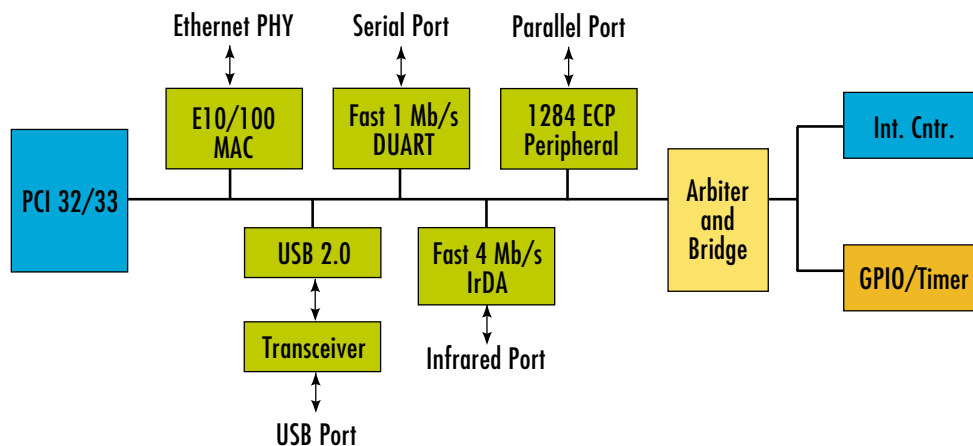


Figure 1. Functional Block Diagram

**Infrared Port:** IrDA (Infrared Data Association) specification 1.1 compliant serial interface. Supports asynchronous and synchronous (4 PPM or HDLC) framing modes. Transfer rates of 9600 bit/s - 115.2 kbits/s (asynchronous SIR mode), 576 kbit/s - 1.152 Mbit/s (HDLC synchronous MIR mode) and 4 Mbits (4PPM synchronous FIR mode).

**DUART:** Two (Universal Asynchronous Receiver/Transmitter)

**Programmable Timer:** Two independent programmable timers with periodic or interval modes usable for embedded system control and interrupt functions. Supports programmable freeze/run, up/down count and 6 trigger point registers.

**General Purpose I/O:** 9 independent channels/pins that can be configured as inputs or outputs for control and interfacing of external devices such as front panel LEDs, LCD displays, buttons and switches for external interrupt sources as well as for interfacing to serial ROMs or NVRAMs.

## DEVELOPMENT TOOLKIT

LSI Logic offers a comprehensive development system to accelerate integration of ComCentrix products into customer designs and to reduce overall design and product development cycles. The development system consists of a standard form factor ComCentrix PCI adapter card and LSI Logic's MiniRISC® BDMR4021 development board. The ComCentrix PCI adapter card connects to one of the BDMR4021's PCI slots, sample I/O drivers for ComCentrix running under VxWorks RTOS™ will be available to facilitate driver development and debug efforts. For more information contact: [printing-division@lsil.com](mailto:printing-division@lsil.com)

For more information please call:

### LSI Logic Corporation

North American Headquarters  
Milpitas, CA  
Tel: 800 574 4286

### LSI Logic Europe Ltd.

European Headquarters  
United Kingdom  
Tel: 44 1344 426544  
Fax: 44 1344 481039

### LSI Logic KK Headquarters

Tokyo, Japan  
Tel: 81 3 5463 7165  
Fax: 81 3 5463 7820

### LSI Logic web site

[www.lsilogic.com](http://www.lsilogic.com)

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