Winbond
Electronics Corp.

Product Brief
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PC87391, PC87392, PC87393, PC87393F 100-Pin LPC SuperI/O Devices for Portable Applications

PC87391, PC87392, PC87393, PC87393F
100-Pin LPC SuperI/O Devices for Portable Applications

General Description

Winbond's PC8739x family of LPC SuperI/O devices is targeted for a wide range of portable applications. PC99 and ACPI compliant, the PC8739x family features an X-Bus Extension for read and write operations over the X-Bus, a full IEEE 1284 Parallel Port with a Parallel Port Multiplexer (PPM) for external Floppy Disk Drive (FDD) support, a Musical Instrument Digital Interface (MIDI) port, and a Game port. Like all Winbond LPC SuperI/O devices, the PC8739x offers a single-chip solution to the most commonly used PC I/O peripherals.

The PC8739x family also incorporates: a Floppy Disk Controller (FDC), two enhanced Serial Ports (UARTs), one with Fast Infrared (FIR, IrDA 1.1 compliant), General-Purpose Input/Output (GPIO) support for a total of 32 ports, Interrupt Serializer for Parallel IRQs and an enhanced watchdog timer.

The following features apply to the PC87393F. The feature lists for other PC8739x devices may differ. See the table on page 3 for a list of features for each device.

Outstanding Features

■ X-Bus Extension for read and write operations

■ LPC bus interface, based on Intel's *LPC Interface Specification* Rev. 1.1, August 2002 (supports $\overline{\text{CLK-RUN}}$ and $\overline{\text{LPCPD}}$ signals) and Intel FWH transactions

■ PC99 and ACPI 3.0 compliant

■ Serial IRQ support (15 options)

■ Interrupt Serializer (four Parallel IRQs to Serial IRQ)

■ PPM for external FDD signal support

■ MIDI interface compatible with MPU-401 UART mode

■ Game port inputs for up to two joysticks

■ Protection features, including GPIO lock and pin configuration lock

■ 32 GPIO ports (16 standard, 16 with Assert IRQ/$\overline{\text{SMI}}$)

■ 5V tolerant and back-drive protected pins (except LPC bus pins)

■ 100-pin TQFP Package

Block Diagram

PC87393 / PC87393F
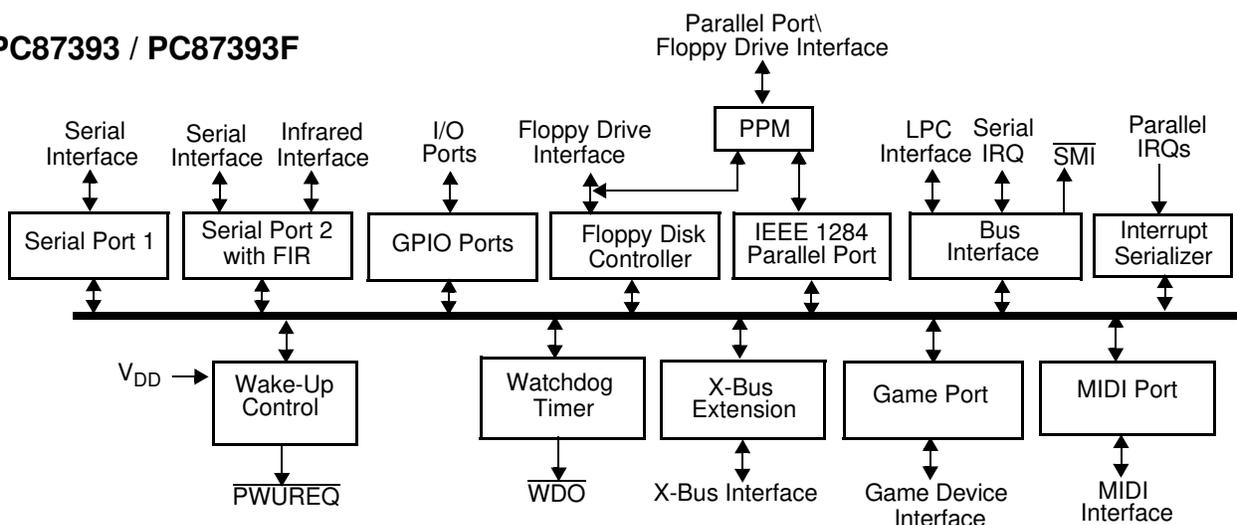
Features

- **LPC System Interface**
  — Synchronous cycles, up to 33 MHz bus clock
  — 8-bit I/O cycles
  — Up to four 8-bit DMA channels
  — $\overline{\text{LPCPD}}$ and $\overline{\text{CLKRUN}}$ support
  — Implements PCI mobile design guide recommendation (*PCI Mobile Design Guide 1.1, Dec. 18, 1998)*
  — Memory and FWH transaction support

- **Interrupt Serializer**
  — Four Parallel IRQs to Serial IRQ

- **Musical Instrument Digital Interface (MIDI) Port**
  — Compatible with MPU-401 UART mode
  — 16-byte Receive and Transmit FIFOs
  — Loopback mode support

- **Game Port**
  — Compatible with the Legacy Game Port definition
  — Full digital implementation
  — Supports up to two analog joysticks

- **X-Bus Extension**
  — Supports read and write operations
  — 8-bit data bus
  — Up to 28-bit address bus supports up to 256MB data
  — Two chip select pins
  — Interrupt routing via PIRQ pins
  — Supports BIOS flash devices

- **PC1999 and ACPI Compliant**
  — PnP Configuration Register structure
  — Flexible resource allocation for all logical devices
    - ❑ Relocatable base address
    - ❑ Fifteen IRQ routing options
    - ❑ Four optional 8-bit DMA channels (where applicable)
  — Supports ACPI Specification Revision 3.0 September 2, 2004

- **Clock Sources**
  — 32.768 KHz, 14.318 MHz or 48 MHz clock input
  — LPC clock, up to 33 MHz

- **Power Supply**
  — 3.3V supply operation
  — All pins are 5V tolerant
  — All pins are back-drive protected, except LPC bus pins

- **Wake-Up Control**
  — Optional routing of IRQ to power-up event

- **32 General-Purpose I/O (GPIO) Ports**
  — Sixteen standard, with Assert IRQ/$\overline{\text{SMI}}$ for 16 ports
  — Programmable drive type for each output pin (open-drain, push-pull or output disable)
  — Programmable option for internal pull-up resistor on each input pin
  — Output lock option
  — Input debounce mechanism

- **Floppy Disk Controller (FDC)**
  — Programmable write protect
  — FM and MFM mode support
  — Enhanced mode command for three-mode Floppy Disk Drive (FDD) support
  — Perpendicular recording drive support for 2.88 MB
  — Burst and non-burst modes
  — Full support for IBM Tape Drive register (TDR) implementation of AT and PS/2 drive types
  — 16-byte data FIFO
  — Error-free handling of data overrun and underrun
  — Software compatible with the PC8477, which contains a superset of the FDC functions in the μDP8473, the NEC μPD765A and the N82077
  — High-performance, digital separator
  — Standard 5.25" and 3.5" FDD support
  — Supports up to four floppy disk drives
  — Supports fast tape drives (2 Mbps) and standard tape drives (1 Mbps, 500 Kbps and 250 Kbps)
  — Supports external drive via parallel port pins

- **IEEE 1284 compliant Parallel Port**
  — ECP, including Level 2 (14 mA sink and source output buffers)
  — Software or hardware control
  — Enhanced Parallel Port (EPP) compatible with EPP 1.7 and EPP 1.9
  — EPP support as mode 4 of the Extended Control Register (ECR)
  — Selection of internal pull-up or pull-down resistor for Paper End (PE) pin
  — Supports a demand DMA mode mechanism and a DMA fairness mechanism for improved bus utilization
  — Protection circuit that prevents damage to the parallel port when a printer connected to it powers up or is operated at high voltages, even if the device is in power-down
  — Parallel Port Multiplexer (PPM) to support additional external FDC signals on parallel port pins for FDD use

- **Serial Port 1 (SP1)**
  — Software compatible with the 16550A and the 16450
  — Shadow register support for write-only bit monitoring
  — UART data rates up to 1.5 Mbaud

- **Serial Port 2 with Fast Infrared (SP2 with FIR)**
  — Software compatible with the 16550A and the 16450
  — Shadow register support for write-only bit monitoring
  — UART data rates up to 1.5 Mbaud
  — FIR IrDA 1.1 compliant
  — HP-SIR
  — ASK-IR option of SHARP-IR
  — DASK-IR option of SHARP-IR
  — Consumer Remote Control supports RC-5, RC-6, NEC, RCA and RECS 80
  — DMA support – one or two channels
  — PnP dongle support

Features (Continued)

■ Watchdog Timer
— Times out the system based on user-programmable time-out period
— System power-down capability for power saving
— User-defined trigger events to restart watchdog
— Optional routing of watchdog output on IRQ and/or SMI lines

■ Strap Configuration
— Base Address (BADDR) strap to determine the base address of the Index-Data register pair
— Test strap to force the device into test mode (reserved for Winbond use)
— X-Bus straps (XCNF2-0) define the functionality of the X-Bus at reset

Device-specific Information

The following table shows the main features for each device in the PC8739x family.

Function	PC87391	PC87392	PC87393	PC87393F
LPC System Interface	✔	✔	✔	✔
Interrupt Serializer	✔	✔	✔	✔
Musical Instrument Digital Interface (MIDI) Port	✗	✗	✔	✔
Game Port	✗	✗	✔	✔
X-Bus Extension	✗	✗	✔	✔
FWH Emulation	✗	✗	✗	✔
PC99 and ACPI Compliant	✔	✔	✔	✔
Wake-Up Control	✔	✔	✔	✔
General-Purpose I/O (GPIO) Ports	✗	✔	✔	✔
Floppy Disk Controller (FDC)	✔	✔	✔	✔
IEEE 1284 compliant Parallel Port	✔	✔	✔	✔
Serial Port 1 (SP1)	✔	✔	✔	✔
Serial Port 2 with Fast Infrared (SP2 with FIR)	✔	✔	✔	✔
Watchdog Timer	✔	✔	✔	✔

Features (Continued)

The following set of device-specific Block Diagrams show the modules for each device in the PC87393 family.

PC87391
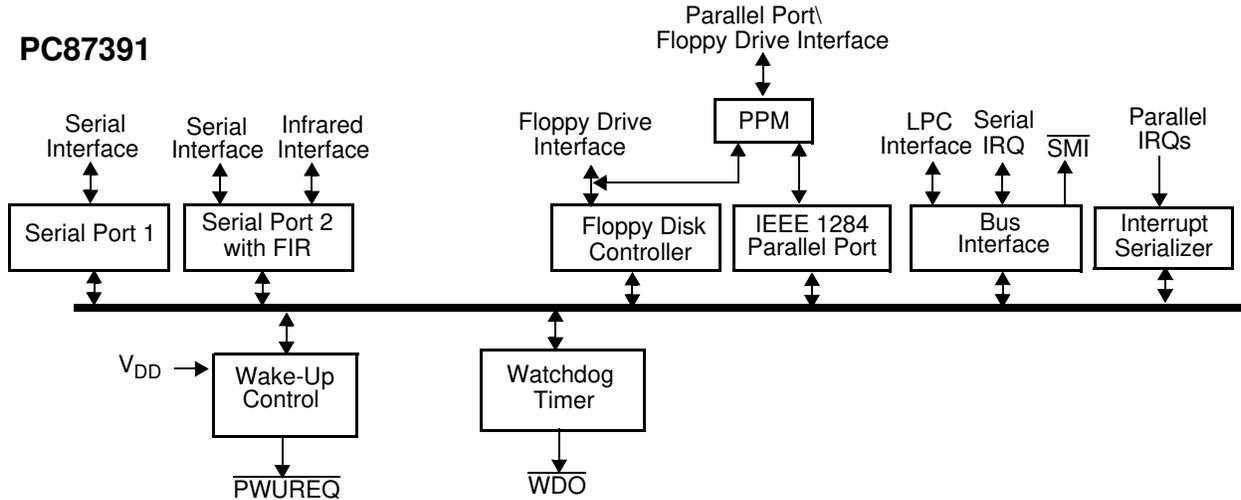

PC87392
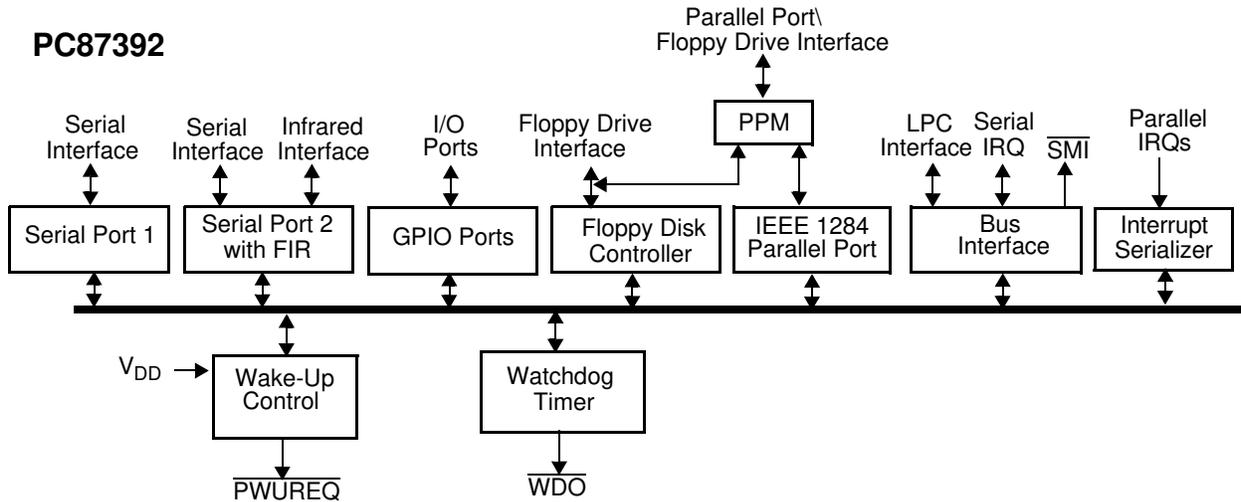
PC87393 / PC87393F
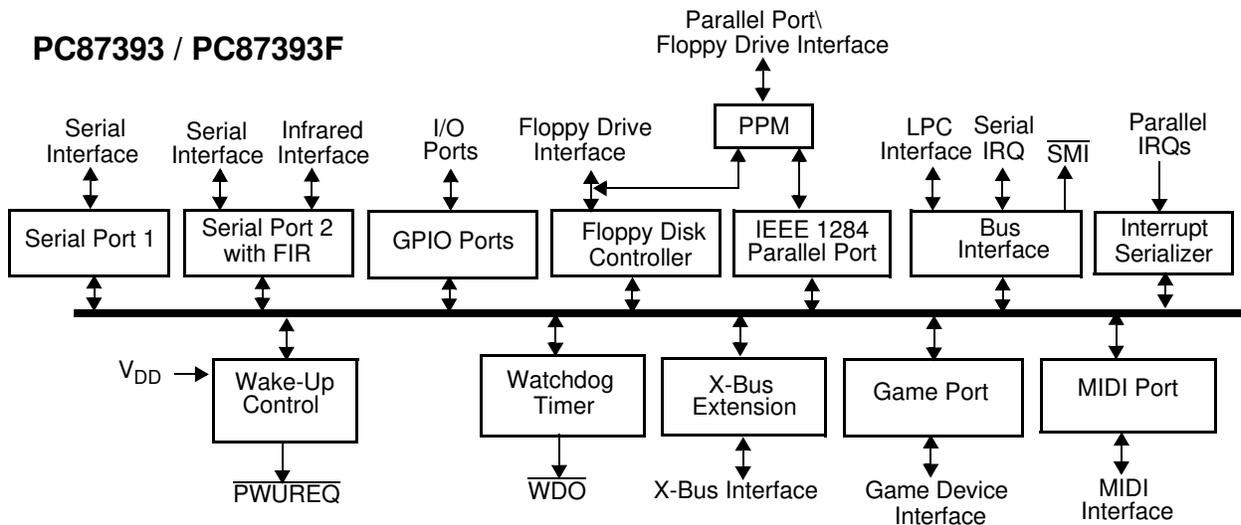
Physical Dimensions

All dimensions are in millimeters
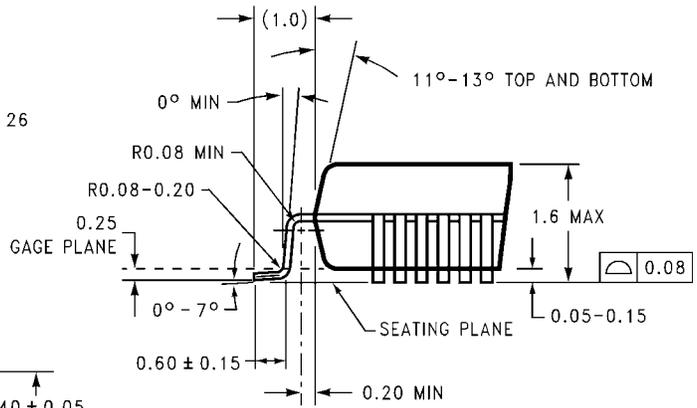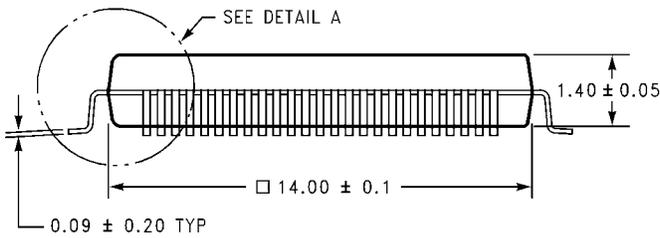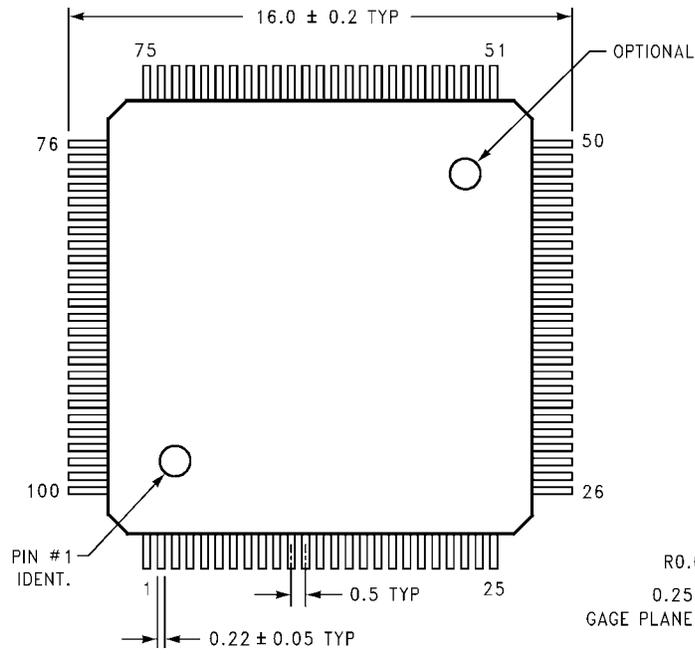
Thin Quad Flatpack (TQFP), JEDEC
Order Numbers 87391D2, 87392D2, 87393FD2

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