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NCT6776F / NCT6776D

Nuvoton LPC I/O

Date: July 12th, 2011 Revision 1.2

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1. GENERAL DESCRIPTION

The NCT6776F / NCT6776D is a member of Nuvoton's Super I/O product line. The NCT6776F / NCT6776D monitors several critical parameters in PC hardware, including power supply voltages, fan speeds, and temperatures. In terms of temperature monitoring, the NCT6776F / NCT6776D adopts the Current Mode (dual current source) and thermistor sensor approach. The NCT6776F / NCT6776D also supports the Smart Fan control system, including "SMART FAN™ I and SMART FAN™ IV, which makes the system more stable and user-friendly.

The NCT6776F / NCT6776D supports four – 360K, 720K, 1.2M, 1.44M, or 2.88M – disk drive types and data transfer rates of 250 Kb/s, 300 Kb/s, 500 Kb/s, 1 Mb/s, and 2 Mb/s. The disk drive adapter supports the functions of floppy disk drive controller (compatible with the industry standard 82077/ 765), data separator, write pre-compensation circuit, decode logic, data rate selection, clock generator, drive interface control logic, and interrupt and DMA logic. Such a wide range of functions integrated into one NCT6776F / NCT6776D greatly reduce the number of required components to interface with floppy disk drives.

The NCT6776F / NCT6776D provides two high-speed serial communication port (UART), which includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem-control capability, and a processor interrupt system. The UART supports legacy speeds up to 115.2K bps as well as even higher baud rates of 230K, 460K, or 921K bps to support higher speed modems.

The NCT6776F / NCT6776D supports the PC-compatible printer port (SPP), the bi-directional printer port (BPP), the enhanced parallel port (EPP) and the extended capabilities port (ECP). The NCT6776F / NCT6776D supports keyboard and mouse interface which is 8042-based keyboard controller.

The NCT6776F / NCT6776D provides flexible I/O control functions through a set of general purpose I/O (GPIO) ports. These GPIO ports may serve as simple I/O ports or may be individually configured to provide alternative functions.

The NCT6776F / NCT6776D supports the Intel® PECI (Platform Environment Control Interface) and AMD® SB-TSI interface. The NCT6776F / NCT6776D supports separated VID input and output pins for Vcore voltage adjustment. It also supports AMD® CPU power on sequence, and it also supports Intel® Deep Sleep Well glue logic to help customers to reduce the external circuits needed while using Deep Sleep Well function.

The NCT6776F / NCT6776D supports to decode port 80 diagnostic messages on the LPC bus. This could help on system power on debugging. It also supports two-color LED control to indicate system power states. The NCT6776F / NCT6776D supports Consumer IR function for remote control purpose. It also supports Advanced Power Saving function to further reduce the power consumption while the system is at S5 state.

The configuration registers inside the NCT6776F / NCT6776D support mode selection, function enable and disable, and power-down selection. Furthermore, the configurable PnP features are compatible with the plug-and-play feature in Windows, making the allocation of the system resources more efficient than ever.

2. FEATURES

General

Meet LPC Specification 1.1
Support AMD power on sequence
Support LDRQ# (LPC DMA), SERIRQ (Serialized IRQ)
Integrated hardware monitor functions
Support DPM (Device Power Management), ACPI (Advanced Configuration and Power Interface)
Programmable configuration settings
Single 24-MHz or 48-MHz clock input
Support selective pins of 5 V tolerance

FDC

Variable write pre-compensation with track-selection capability
Support vertical recording format
DMA-enable logic
16-byte data FIFO
Support floppy disk drives and tape drives
Detect all overrun and underrun conditions
Built-in address mark detection circuit to simplify the read electronics
FDD anti-virus functions with software write protect and FDD-write enable signal (write data signal forced to be inactive)
Support 3.5-inch or 5.25-inch floppy disk drives
Compatible with industry standard 82077
360K / 720K / 1.2M / 1.44M / 2.88M formats
250K, 300K, 500K, 1M, 2M bps data transfer rate
Support 3-mode FDD and its Windows driver

UART

Two high-speed, 16550-compatible UART with 16-byte send / receive FIFO
Support RS485
--- Supports auto flow control
Fully programmable serial-interface characteristics:
--- 5, 6, 7 or 8-bit characters
--- Even, odd or no parity bit generation / detection
--- 1, 1.5 or 2 stop-bit generation
Internal diagnostic capabilities:
--- Loop-back controls for communications link fault isolation
--- Break, parity, overrun, framing error simulation
Programmable baud rate generator allows division of clock source by any value from 1 to (2^{16}-1)
Maximum baud rate for clock source 14.769 MHz is up to 921K bps. The baud rate at 24 MHz is 1.5 M bps.

Parallel Port

Compatible with IBM® parallel port
Support PS/2-compatible bi-directional parallel port
Support Enhanced Parallel Port (EPP) – Compatible with IEEE 1284 specification
Support Extended Capabilities Port (ECP) – Compatible with IEEE 1284 specification
Enhanced printer port back-drive current protection

Keyboard Controller

8042-based keyboard controller
Asynchronous access to two data registers and one status register
Software-compatible with 8042
Support PS/2 mouse
Support Port 92
Support both interrupt and polling modes
Fast Gate A20 and Hardware Keyboard Reset
12MHz operating frequency

Hardware Monitor Functions

Smart Fan control system
Programmable threshold temperature to speed fan fully while current temperature exceeds this threshold in the Thermal Cruise™ mode
Support Current Mode (dual current source) temperature sensing method
Nine voltage inputs (CPUVCORE, VIN[0..3], 3VCC, AVCC, 3VSB and VBAT)
Five fan-speed monitoring inputs
Three fan-speed controls
Dual mode for fan control (PWM and DC) for SYSFANOUT
Built-in case-open and CPU socket occupied detection circuit
Programmable hysteresis and setting points for all monitored items
Issue SMI#, OVT# (Over-temperature) to activate system protection
Nuvoton Health Manager support
Provide I^2C master / slave interface to read / write registers

CIR and IR (Infrared)

- Support IrDA version 1.0 SIR protocol with maximum baud rate up to 115.2K bps
- Support SHARP ASK-IR protocol with maximum baud rate up to 57,600 bps
- Support Consumer IR, including CIRTX, CIRRX, CIRRXWB, CIR LED, CIR SENSE

VCORE Voltage Adjustment

Support INTEL® VRM11.1 VID input to VID output
Watch Dog Timer for VID over-voltage failure recovery
Support AMD® Parallel VID input to VID output
Support Intel® VR12 SVID
Support AMD® Serial VID input to Serial VID output

General Purpose I/O Ports

GPIO0 ~ GPIOA programmable general purpose I/O ports
Two access channels, indirect (via 2E/2F or 4E/4F) and direct (Base Address) access.

ACPI Configuration

Support Glue Logic functions
Support general purpose Watch Dog Timer functions

OnNow Functions

Keyboard Wake-Up by programmable keys
Mouse Wake-Up by programmable buttons
OnNow Wake-Up from all of the ACPI sleeping states (S1-S5)

PECI Interface

Support PECI 1.1, 2.0 and 3.0 specification
Support 2 CPU addresses and 2 domains per CPU address

AMD SB-TSI Interface

Support AMD® SB-TSI specification

SMBus Interface

Support SMBus Slave interface to report Hardware Monitor device data
Support SMBus Master interface to get thermal data from PCH
Support SMBus Master interface to get thermal data from MXM module

Power Measurement

Support Power Consumption measurement
Fading LED driver control for power status and diagnostic indications

Intel Deep Sleep Well (DSW) Glue Logic

Support Deep Sleep Well (DSW) Glue Logic

AMD® CPU Power on Sequence

Support AMD® CPU power on sequence

Advanced Power Saving

Advanced Sleep State Control to save motherboard Stand-by power consumption

Operation voltage

- 3.3 voltage

Package

NCT6776F 128-pin QFP
NCT6776D 128-pin LQFP
Green