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Nuvoton LPC I/O

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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® PECC (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 I²C 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