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Lanner Digital Input/Output and Management Utility Implementation Manual

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Revision History

| Rev | Date | Changes |
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About this document

Purpose

The purpose of this document is to provide implementation information for Lanner Digital input/output and other hardware management functionalities.

Intended audience

This document is for individuals who install and configure embedded and industrial platforms with the above mentioned functionality.

Conventions used

Following are all the special characters and typographical conventions used in this manual:

| Convention | Meaning |
|-------------|---|
| Press Enter | Means press the Enter or Return key or its equivalent on your computer. |
| Note | Introduces important additional information. |
| Caution | Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment. |

Chapter 1. Introduction

1.1 Features of Lanner DIO and other management utilities provided by GPIO

Lanner 's DIO (Digital Input/Output) is a general purpose input/output (GPIO). They are dedicated general-purpose pins that can be configured as either inputs or outputs. When configured as an output, you can write to an internal register to control the state driven on the output pin. When configured as an input, you can detect the state of the input by reading the state of an internal register. These pins are provided by Intel PCH chipset (like ICH7) or other Super I/O chips such as Fintek F81865 or Winbond 83627UHG. Depending on the chipsets used, commands and available functions vary. Here we list some common features:

- DIO (Digital Input/output): Lanner DIO utility (via both command line and GUI) is a simple program which is designed to test or alter the state of the input/output pins, i.e., switching between high and low.
- PIO: Programmable Input/Output pins. It can be utilized as a LED indicator for showing the operating state of the designated software or a specific function (such as the wireless LAN or GPS) of the device.
- Status LED/RunLED (for system operating status)
/AlarmLED/GPS_LED/WirelessLED: Those LED's behavior can be controlled by programming the GPIO pins. The availability of specific LED functions varies depending on the products.
- Hardware Monitor: The hardware monitor is a system health supervision tool. It monitors several critical parameters in PC hardware, including power supply voltages, fan speeds, temperatures, and CPU voltage, etc.
- CaseOpen: Caseopen detection detect whether the computer case has been opened and possibly tampered with. The sample code provided can be used to enable/disable/reset this function.

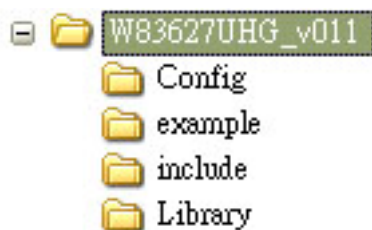
- **Software Reset Button:** On most of Lanner Network platforms, the reset button can be programmed to support either a hardware reset (i.e., shutdown and then start the device again) or a software reset (i.e., rest a software to its default setting). Note that a proper hardware jumper setting is required for this function to work (refer to the product's User Manual for more information).
- **Redundant Power Supply Function:** We provide a sample program which can be used to check the status (i.e., normal or failed) of the power supply.

The following shows the directory of the sample programs in the Driver and Manual CD:

On Linux (**HW** directory means Hardware monitor, sled directory means status LED, sw_btn means software Reset Button, sw_bp means watchdog/bypass utility, and rdd_pwr means redundant power supply)



On the Windows:



Chapter 2. Building and Installing the Program

2.1 DIO Installation on Linux

Note:

The OS supported by Lanner LCM function include platforms based on Linux Kernel series 2.4.x and Linux Kernel series 2.6.x, and DOS.

For installation on DOS, refer to the Readme file contained within the program.

Build

To build program source code on Linux platform, use the following steps as a guideline:

1. Copy the proper makefile from the Driver and Manual CD to your system:
#Makefile.linux
2. Set the access mode with these two parameters by editing the Makefile.linux directly:
DIRECT_IO_ACCESS= [0|1] (enter either 1 or 0) (enter either 1 or 0). Refer to the next section on Install for more details on access mode.
3. Type make to build source code:
#make Makefile (Note: omit the file extensions)
4. After the source code is compiled, the executable programs (DIO_TST) and the driver (dio_drv[k]o) will appear in the bin sub-directory.

Install

The installation procedures depend on the access mode that you have set by using the above mentioned method.

If you have set `DIRECT_IO_ACCESS=1`, driver installation is not necessary. Proceed to the next section on executing the Lanner DIO program.

If you have set `DIRECT_IO_ACCESS=0`, Lanner DIO driver needs to be installed. Install the driver and create a node in the `/dev` directory as shown in the following example:

```
#insmod dio_drv.[k]o
#mknod /dev/dio_drv c 244 0
```

Note: For descriptions of the command, refer to the Readme file contained within the program.

2.2 DIO Installation on FreeBSD

Build

Use the script file `Makefile.bsd` to build the source code. After compiling, you will get driver file `dio_drv.[k]o` and test file `DIO_TST` in the same folder.

1. Copy the proper makefile from the Driver and Manual CD to your system
2. Set the access mode with these two parameters by editing the `Makefile.bsd` directly: `DIRECT_IO_ACCESS= [0|1]` (enter either 1 or 0) Refer to the next section on Install for more details on access mode.
3. Type `make` to build source code:
`#make Makefile` (Note: omit the file extensions)
4. After the source code is compiled, the executable program `s` (`DIO_TST`) and the driver (`dio_drv[k]o`) will appear in the `bin` sub-directory.

Note: The OS supported by Lanner DIO function includes platforms based on FreeBSD 8.0

Install

The installation procedures depend on the access mode that you have set in the Makefile.bsd.

If you have set `DIRECT_IO_ACCESS=1`, driver installation is not necessary. Proceed to the next section on executing the Lanner DIO program.

If you have set `DIRECT_IO_ACCESS=0`, Lanner DIO driver needs to be installed. Install the driver and create a node in the `/dev` directory as shown in the following example:

Insert the module by:

```
#kldload -v ./dio_drv.ko
```

2.3 Other Management utilities Installation

Follow the same procedures as mentioned above but use the appropriate driver name and major number instead, for instance, use driver `sled_drv.[k]o` and major number 240 for Status LED function. Use driver `wd_drv.[k]o` and major number 241 for watchdog timer. Refer to the Readme file contained within the program for more information.

Hardware Monitor with Linux Im-sensors:

The Im-sensor is an essential tool for monitoring the hardware health of Linux systems. It supports a wide range of monitoring devices including I2C/SMBus hardware monitoring chips, features integrated in Super I/O chips or south bridges, thermal sensors integrated in CPU, and so on. Lanner has tested and verified the use of Im-sensors (version 3.3.0) on our products. For more information and downloading the Im sensors program, visit: <http://www.lm-sensors.org>.

Use the following steps as a guideline to run the sample program (you will need to have the root privilege to run this program :

1. Make the program (refer to the website's manual installation guide).
2. Run `sensors -detect` to let the system detect the hardware monitor chips automatically and install the module.
3. Copy the modified configuration file for better or more readable output: `sensors3.conf` (provided by Lanner in the HW folder on the Driver and Manual CD) under the `/etc/sensors.d/`
4. Run `sensors -s` (The `-s` option evaluate all ``set'` statements in the `sensors3.conf` configuration file and exit)
5. Run `sensors` to output the hardware monitor information

2.4 Windows Installation

Driver Installation

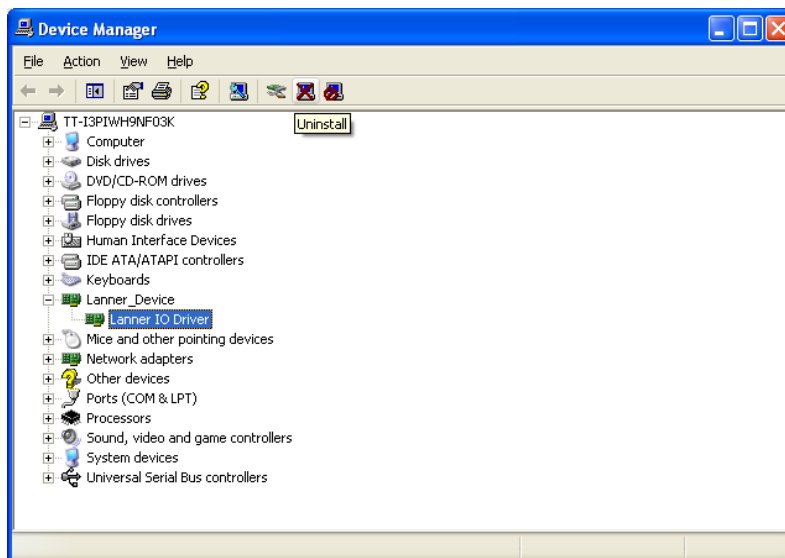
Note: The driver installation is needed only on the Windows platform. And it supports Windows XP and Windows 7.

The current version of Lanner DIO driver is V101. The older version needs to be uninstalled before the current one can be installed.

To install the Lanner GPIO driver, follow these steps:

Removing the Old Driver

1. Open the device manager on the computer:



2. Select the Lanner IO Driver and click uninstall.
3. Confirm the deletion.



Installing the demo program

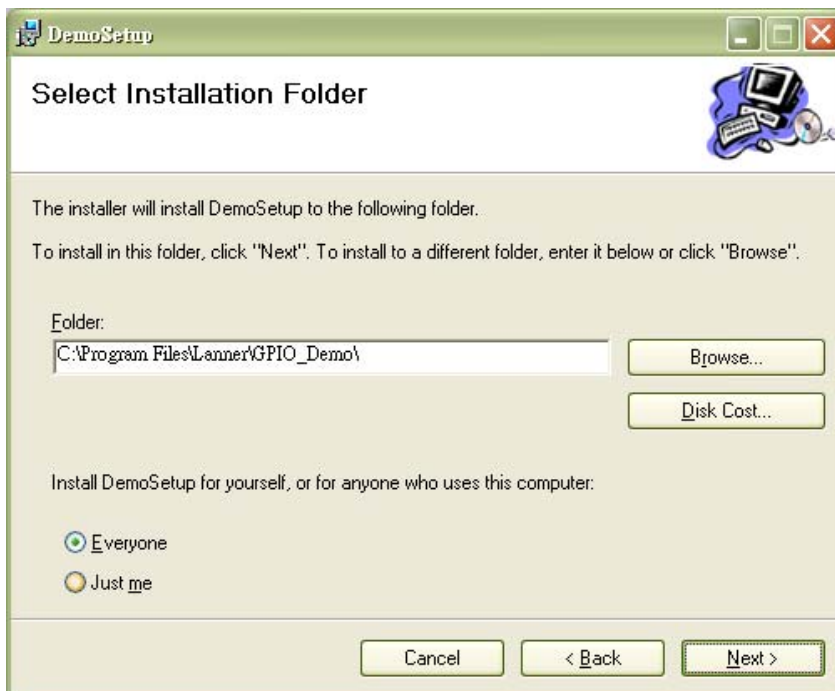
1. Double click the GPIO_Demo.msi file



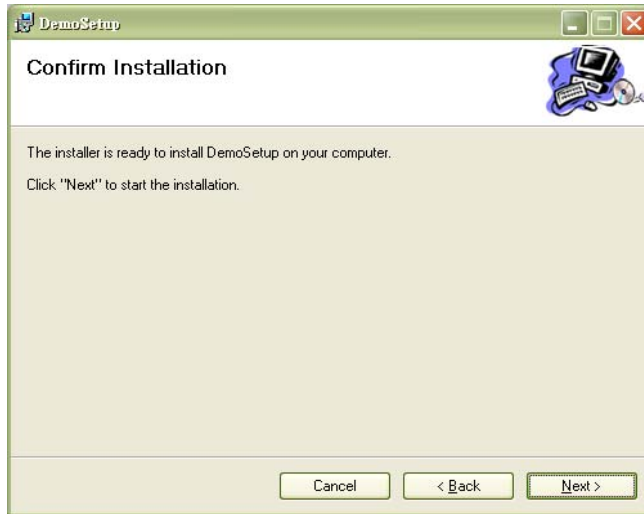
2. The welcome screen appears.



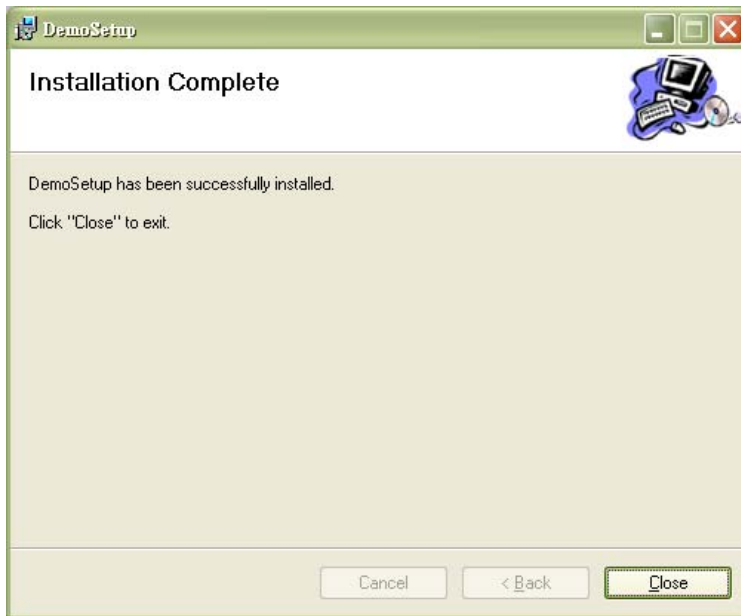
3. Select the installation folder.



4. Confirm the installation.



5. Installation completed.



6. To access the program, click start->programs->Lanner GPIO Demo->Demo and it will automatically install the new driver for you.

Installing the driver separately

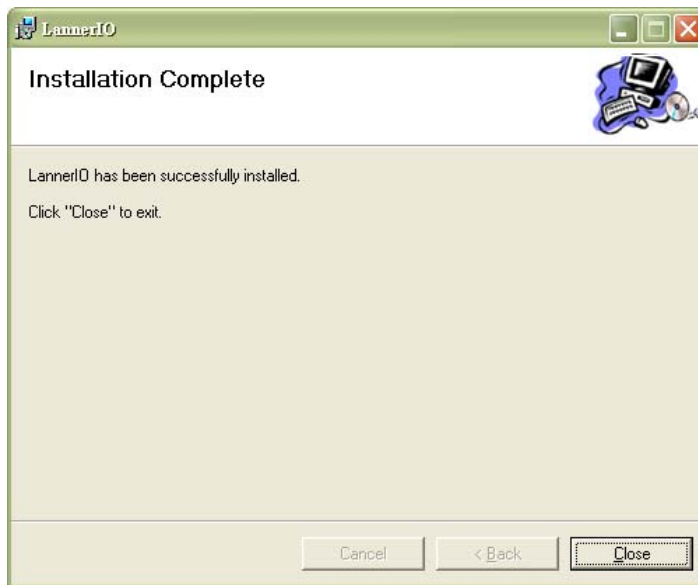
1. Unzip the LannerIO v101.rar file
2. Double click the Setup program



3. The welcome screen appears. Click Next to proceed.



4. The installation process continues. Click Close when the process completes.



Chapter 3. Executing the Sample Program

3.1 Via the Command Line

Note:

The OS supported by Lanner DIO function include platforms based on Linux Kernel series 2.4.x and Linux Kernel series 2.6.x, FreeBSD 8.0, and DOS.

This section contains sample executable programs that you could test on your platform. It demonstrates some useful functionality that the DIO provides. Note that the installation needs to be completed before proceeding with the execution.

On Linux

The executable program will be in the bin directory after compilation.

Just run “dio_tst” for Digital IO test. This program will drive output pin with specific value (high or low) and then read status of input pin. If you have external loopback which connects input to output pins directly, the input value should be identical with output value.

To execute the *DIO* sample code, type:

```
# ./dio_tst
```

```
=== Lanner platform miscellaneous utility ===
LEB-7105 Digital IO V1.0 2011-05-19

Set All Ouput pin to High ...
==>Readback All Input pin, value =
Set All Ouput pin to Low ...
==>Readback All Input pin, value =
Set Ouput pin to 1010 ...
==>Readback All Input pin, value =
Set Ouput pin to 0101 ...
==>Readback All Input pin, value =
Test completed
```

To execute the *watchdog* sample code, type:

The watchdog can serve two purposes: *bypass* and *watchdog*. Switch between them with the following command first.

```
# ./wd_tst --swtsb (Set Watchdog Timeout State to Bypass function)
```

```
# ./wd_tst --swtsr (Set Watchdog Timeout State to Reset function)
```

Set watchdog timeout value and start/stop the watchdog with the following commands.

```
# ./wd_tst --swt xxx (Set Watchdog Timer 1-255 seconds)
```

```
# ./wd_tst[*] --start (Start Watchdog Timer)
```

```
# ./wd_tst --stop (Stop Watchdog Timer)
```

To execute the *Status LED* sample code, type:

```
#!/sled_tst
```

```
=== Lanner platform miscellaneous utility ===  
MB-8770 Status LED V1.0 2011-1-05
```

```
Set LED AMBER/GREEN for 4 seconds...  
Set LED GREEN/AMBER for 4 seconds...  
Set LED DARK  
Test Finished
```

As mentioned above, the status LED can be programmed to show the status of the user-defined program. This sample program demonstrates lighting the LED for 4 seconds.

To execute the *Software Reset Button* test function, type:

```
# ./btn_tst
```

```
=== Lanner platform miscellaneous utility ===
MB-8770 SW button V1.0 2011-03-03
```

```
Please touch the software reset button.....
The software reset button was pressed.
```

The sample program will recognize that the software reset button was pressed.

To execute the *Redundant Power Supply* test function, type:

```
# ./pwr_tst
```

```
=== Lanner platform miscellaneous utility ===
MB-8865 Redundant Power Supply V2.0 2011-04-21
```

```
Power supply 1/2 ...Normal state
```

The sample program will check whether the redundant power is failed or normal.

On Windows

Specific to the PCH chipset used or Super IO chipset, the commands and functionality vary by product models. For more information, refer to the README or User Guide contained within the utility folder.

For example: Here we have Fintek F81865 GPIO utility, to execute, follow the command description below:

The Lanner F81865 GPIO utility

Usage:

```
F81865 DIO_In  port_number
      F81865 DIO_Out  port_number value
      F81865 PIO   port_number value
F81865 RunLED  port_number value
      F81865 AlarmLED port_number value
      F81865 GPS_LED port_number value
```

F81865 WirelessLED port_number value

Argument:

| | |
|-------------|-------------------------|
| DIO_IN | Read state from DIO In. |
| DIO_OUT | Set DIO Out state. |
| PIO | Set PIO LED state. |
| RunLED | Set RUN LED state. |
| AlarmLED | Set Alarm LED state. |
| GPS_LED | Set GPS LED state. |
| WirelessLED | Set Wireless LED state. |

Where

| | |
|-------------|-------------------------|
| port_number | The port number. |
| value | 1 for on and 0 for off. |
| command | The command number |

For instance:

DIO:

To run the test program, type:

F81865 DIO_In port_number

F81865 DIO_Out port_number value

Example:

F81865 DIO_In 2

F81865 DIO_Out 3 1

PIO:

To run the test program, type:

F81865 PIO port_number value

Example:

F81865 PIO 4 0

RunLED:

To run the test program, type:

F81865 RunLED port_number value

Example:

F81865 RunLED 1 1

Alarm Enable/Disable LED:

To run the test program, type:

F81865 AlarmLED port_number value

Example:

F81865 AlarmLED 4 0

GPS Enable/Disable LED:

To run the test program, type:

F81865 GPS_LED port_number value

Example:

F81865 GPS_LED 4 0

Wireless Enable/Disable LED:

To run the test program, type:

F81865 WirelessLED port_number value

Example:

F81865 WirelessLED 4 0

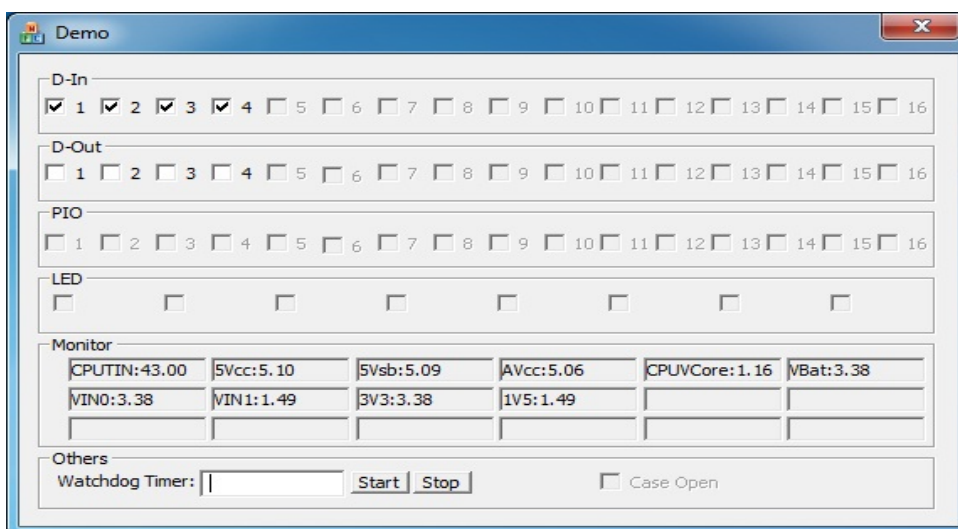
System Health Monitor Function:

| | |
|---------------------------------|----------------------------------|
| W83627UHG_test Monitor CPUVIN | //Get CPU temperature |
| W83627UHG_test Monitor 5Vcc | //Get SuperIO's 5V voltage |
| W83627UHG_test Monitor 5Vsb | //Get Super IO's standby voltage |
| W83627UHG_test Monitor AVcc | //Get Super IO's IO voltage |
| W83627UHG_test Monitor CPUVCore | //Get CPU voltage |
| W83627UHG_test Monitor VBat | //Get battery voltage |
| W83627UHG_test Monitor 3V3 | //Get other voltage |
| W83627UHG_test Monitor 1V5 | //Get other voltage |

3.2 Via the Demo Program on Windows

This Demo program provides graphic interface for you to assign/read value on the specific GPIO pins.

To access the program, click start->programs->Lanner GPIO Demo->Demo



D-IN: Check the box to alter the voltage level of the digital input pins as to enable or disable the input pins. The default value for D-in is 1 which indicates the high voltage (5V).

The corresponding commands:

| | |
|---|--|
| Winbond W83627UHG SuperI/O: The index address is 2EH. | Fintek F81865 SuperI/O Chip: The index address is 2EH. |
| Note: Refer to Appendix A for more information on the Register (page 150 of W83627 datasheet) | Note: Refer to Appendix B for more information on the Register (page 87-101 of F81865 datasheet) |

D-Out: Check the box to alter the voltage level of the digital output pins as to write the output pins to “1”. The default value for D-Out is 0 which indicates the low voltage (0V).

| | |
|---|--|
| Winbond W83627UHG SuperI/O: The index address is 2EH. | Fintek F81865 SuperI/O Chip: The index address is 2EH. |
| Note: Refer to Appendix A for more information on the Register (page 150 of W83627 datasheet) | Note: Refer to Appendix B for more information on the Register (page 87-101 of F81865 datasheet) |

PIO:

The PIO is the programmable input/output. In Lanner products, they are provided as additional LED indicators for certain events which can be defined in your software.

| | |
|---|--|
| Winbond W83627UHG superI/O: The index address is 2EH. | Fintek F81865 SuperI/O Chip: The index address is 2EH. |
| Note: Refer to Appendix A for more information on Register (page 150 of W83627 datasheet) | Note: Refer to Appendix B for more information on Register (page 87-101 of F81865 datasheet) |

LED:

Specific to Lanner products, there are several front panel LEDs which can be programmed to signal certain functions in the system such as the RUN (for system operating status), Alarm, GPS, Wireless etc.

| | |
|---|--|
| Winbond W83627UHG superI/O: The index address is 2EH. | Fintek F81865 SuperI/O Chip: The index address is 2EH. |
| Ex: Winbond W83627UHG SuperI/O Chip W83627UHG_test RunLED port_number value (value: 0,1,2,3.....) | Ex: Fintek F81865 SuperI/O Chip F81865 RunLED port_number value (value: 0,1,2,3.....) |
| Note: Refer to Appendix A for more information on Register (page 150 of W83627 datasheet) | Note: Refer to Appendix B for more information on Register (page 87-101 of F81865 datasheet) |

Monitor:

The Monitor field shows the following information (from left to right):

CPUTIN: shows the CPU temperature
 5Vcc: shows SuperIO's 5V voltage
 5Vsb: shows SuperIO's standby voltage
 AVcc: shows SuperIO's IO voltage
 CPUVCore: shows CPU voltage
 VBat: shows battery volrage
 VIN0~VIN2: shows other voltages

The corresponding commands:

| |
|--|
| Winbond W83627UHG superI/O: The index address is 2EH. |
| W83627UHG_test Monitor CPUTIN //Get CPU temperature |
| W83627UHG_test Monitor 5Vcc //Get superior's 5V voltage |
| W83627UHG_test Monitor 5Vsb //Get Super IO's standby voltage |
| W83627UHG_test Monitor Avcc //Get Super IO's IO voltage |
| W83627UHG_test Monitor CPUVCore //Get CPU voltage |
| W83627UHG_test Monitor Vbat //Get battery voltage |
| W83627UHG_test Monitor 3V3 //Get other voltage |
| W83627UHG_test Monitor 1V5 //Get other voltage |
| Note: Refer to Appendix A for more information on Register (page 55 of W83627 datasheet) |

Note:

Specific to the PCH chipset used or Super IO chipset, the commands and functionality vary depending on product models. For more information, refer to the README or User Guide contained within the utility folder.

Watchdog Timer:

Enter the number of seconds to start count down before the system can be reset. Press start to start the counter and stop to stop the counter.

The corresponding commands:

| |
|--|
| Winbond W83627UHG superI/O: The index address is 2EH. |
| W83627UHG_test Watchdog //Show the timer remained |
| W83627UHG_test Watchdog timeout_value //Set the watchdog timer timeout value |
| Note: Refer to Appendix B for more information on Register (page 172, 173of W83627UHG datasheet) |

CaseOpen:

The purpose of Caseopen function is to detect whether the computer case has been opened and possibly tampered with. You will need to enable this function first through jumper selection (refer to the product's user manual for detailed information). Select to enable this function.

The corresponding commands:

| |
|---|
| EX: Fintek 81865 super I/O |
| F81865 CaseOpen //start caseopen detection CaseOpen_Clear //reset the case open status to undetected |
| Note: Refer to Appendix A for more information on Register (page 52 of F81865 datasheet) |

Appendix A. Register Addresses

Winbond W83627UHG



**W83627UHG
WINBOND LPC I/O**

Date: May/25/2007 Revision: 1.0

Fintek F81865



Feature Integration Technology Inc.

F81865

F81865

Super IO with 6 UARTs

Release Date: May, 2010
Version: V0.28P

May, 2010
V0.28P