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Introduction

Product Description

IB897 is a 3.5-inch single board computer based on the Intel® Atom™ E3800 series processors. It supports two DDR3L SODIMM sockets for a maximum memory capacity of 8GB.

IB897 features the Intel® Gen7 w/4EUs graphics engines and has both CRT and DisplayPort video display interface, and 24-bit LVDS dual channel interface with the use of the NXP PTN3460 device.

Onboard connections are available for two SATAII ports, two COM ports, one USB 3.0 ports, four USB2.0 ports, audio, two Mini PCI-e(x1) slots, and Micro SD. Power input is made with a +9~+30V DC in interface.

IB897 Features:

- Supports Atom™ E3800 series SoC processors
- Two DDR3L SO-DIMM, 1066/1333 MHz, Max. 8GB memory
- Integrated graphics for VGA, DP displays
- 2 x SATA II connectors
- 2x COM port connectors
- 2 x Mini-PCle(x1) slot (w/ USB/mSATA support)
- 2x GbE (RJ-45) connectors
- 24-bit dual channel LVDS
- Micro SD
- 1x 9V to 30V DC-in power connector
## Specifications

<table>
<thead>
<tr>
<th>Product Name</th>
<th>IB897 [default silk screen model # on PCB is IB897]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form Factor</td>
<td>3.5” disk size SBC</td>
</tr>
</tbody>
</table>
| SoC Type/Speed| Intel® Atom™ QC E3845 /2MB cache/1.91GHz [TDP=10W](IB897-I4)  
                Intel® Atom™ DC E3827 /1MB cache/1.75 GHz [TDP=8W] (IB897-I2)
| BIOS         | AMI BIOS                                         |
| Memory       | Intel® Atom™ SoC integrated memory controller    |
|              | 2x DDR3 SO-DIMM socket [Horizontal type]         |
|              | Max. Memory to DDR3L-1333@8GB [Non-ECC, Unbuffered, 1.35V] |
| VGA          | Intel® Gen7 w/4EUs graphics engines (@542MHz/792MHz [Turbo])  
              | Supports DX 11, OGL 3.0, OCL 1.1, OGLES 2.0,  
              | DP x 1; CRT x 1 via pin header                   |
| LVDS         | 24-bit dual channel via NXP PTN3460 thru eDP     |
| LAN          | Intel I210IT PCIe Gigabit LAN x 2                |
|              | [9mm x 9mm @ 64-QFN, -40°C to +85°C]             |
| USB          | Intel® Atom™ SoC built-in USB host controller    |
|              | Support USB 2.0 x 4 ports; USB 3.0 x 1 port,    |
|              | USB 2.0 x4 ports (Thru SMSC HUB USB2514)         |
| Serial ATA   | Intel® Atom™ SoC built-in SATA II controller, supports 2 ports |
| Audio        | Intel® Atom™ SoC built-in HD Audio controller + Realtek ALC269QHD  
              | Codec w/class-D speaker amplifier (2.3W per channel @ 5V power supply)  
              | [7mm x 7mm @ 48-QFN]; support 2-channel audio out + amp |
| LPC I/O      | Nuvoton NCT5523D [64-pin LOFP, 7x7/1.4mm]       |
|              | - COM #1 (RS322/422/485) [EXAR SP339EER1 x 1 for jumper-less]  
              | - COM #2 (RS-232 only)                               |
|              | [Hardware Monitor]; 2x Thermal inputs; 2x Voltage monitoring |
| Digital IO   | 4 in & 4 out                                     |
| Expansion Slots| **“Full-sized MiniPCIe (1x) support mSATA**** |
| Edge Connector| DB9 for COM1, DisplayPort, RJ45 x 2 for LAN 1 & 2  
                | USB 2.0 vertical connector x 1 (from SoC)         |
|              | USB 3.0 vertical connector x 1 (from SoC)       |
|              | LED indicators (red+green) x1 for power and HDD status  
              | Power button x 1                                  |
| Onboard Header/Connector | 2x8 pin header for CRT  
                | 2x4 pin header for 2x USB 2.0 (from SMSC HUB USB2514)  
                | DF20 socket connector x2 for 24-bit dual channel LVDS  
                | 4-pin box header for backlight/brightness control (PWM)  
                | 2x6 pin box header for Audio, 4-pin header for speaker  
                | 2x5 pin box header for COM2  
                | 2x5 pin headers for LPC (80-port card debugging purpose)  
                | Mini PCI-e(1x) connector x2, 5 pins box header for smart battery  
                | SATA connector x2 for SATA device  
                | 4-pins power connector (JST type, for SATA device)  
                | 2-pins connector for power input, Micro SD slot (type 3.3V) |
| Watchdog     | Yes (256 segments, 0, 1, 2...255 sec/min)       |
| Power Connector | 9V ~ 30V DC-in thru onboard 2-pin connector      |
| OS Support   | Windows 8 / Embedded; Windows 7 / Embedded, Linux |
| RoHS / REACH/CE /FCC | Yes / Yes / Yes / Class B                      |
| Operating Temperature | -40°C to +85°C  |
| Board Size   | 102mm x 147mm                                   |
Checklist

Your IB897 package should include the items listed below.

- The IB897 SBC
- This User’s Manual
- 1 CD containing chipset drivers and flash memory utility
Board Dimensions
Installations

This section provides information on how to use the jumpers and connectors on the IB897 in order to set up a workable system. The topics covered are:

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Installing the Memory

The IB897 board supports TWO DDR3L memory socket for a maximum total memory of 8GB DDR3L memory type.

Installing and Removing Memory Modules

To install the DDR3L modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR3L module so that the key of the DDR3L module aligned with that on the memory slot.
2. Gently push the DDR3L module in an upright position until the clips of the slot close to hold the DDR3L module in place when the DDR3L module touches the bottom of the slot.
3. To remove the DDR3L module, press the clips with both hands.

** Channel-A slot must be installed with memory module for booting up**
Setting the Jumpers

Jumpers are used on IB897 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on IB897 and their respective functions.

Jumper Locations on IB897

- JP2: LVDS Panel Brightness Control Selection
- J5: LVDS Panel Power Selection
- JP5: Clear ME Contents
- JP6: Clear CMOS Contents
Jumper Locations on IB897

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JP5: Clear ME Contents......................................................... 10
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JP2: LVDS Panel Brightness Control Selection

<table>
<thead>
<tr>
<th>JP2</th>
<th>Brightness Control (PWM mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>3.3V</td>
</tr>
<tr>
<td>Close</td>
<td>5V (Default)</td>
</tr>
</tbody>
</table>

J5: LVDS Panel Power Selection

<table>
<thead>
<tr>
<th>J5</th>
<th>Setting</th>
<th>Panel Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="J5 Setting" /></td>
<td>Pin 1-2 Short/Closed</td>
<td>3.3V (default)</td>
</tr>
<tr>
<td><img src="image" alt="J5 Setting" /></td>
<td>Pin 2-3 Short/Closed</td>
<td>5V</td>
</tr>
</tbody>
</table>
### JP5: Clear ME Contents

<table>
<thead>
<tr>
<th>JP5</th>
<th>Setting</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>![JP5 Diagram]</td>
<td>Pin 1-2 Short/Closed</td>
<td>Normal</td>
</tr>
<tr>
<td>![JP5 Diagram]</td>
<td>Pin 2-3 Short/Closed</td>
<td>Clear ME REGISTER</td>
</tr>
</tbody>
</table>

### JP6: Clear CMOS Contents

<table>
<thead>
<tr>
<th>JP6</th>
<th>Setting</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>![JP6 Diagram]</td>
<td>Pin 1-2 Short/Closed</td>
<td>Normal</td>
</tr>
<tr>
<td>![JP6 Diagram]</td>
<td>Pin 2-3 Short/Closed</td>
<td>Clear CMOS</td>
</tr>
</tbody>
</table>
Connectors on IB897

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Connector Locations on IB897
CN3: USB3.0 Connector

CN4, CN5: Gigabit LAN

CN4: Intel® I210IT

CN5: Intel® I210IT

CN6: USB2.0 Connector

CN7: DP Connector

CN8: DB9 Connector (COM1)

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCD, Data carrier detect</td>
<td>1</td>
<td>6</td>
<td>DSR, Data set ready</td>
</tr>
<tr>
<td>RXD, Receive data</td>
<td>2</td>
<td>7</td>
<td>RTS, Request to send</td>
</tr>
<tr>
<td>TXD, Transmit data</td>
<td>3</td>
<td>8</td>
<td>CTS, Clear to send</td>
</tr>
<tr>
<td>DTR, Data terminal ready</td>
<td>4</td>
<td>9</td>
<td>RI, Ring indicator</td>
</tr>
<tr>
<td>GND, ground</td>
<td>5</td>
<td>10</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

COM1 is jumper-less for RS-232, RS-422 and RS-485 and is to be configured with BIOS Selection.

<table>
<thead>
<tr>
<th>Pin #</th>
<th>RS-232</th>
<th>R2-422</th>
<th>RS-485</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>TX-</td>
<td>DATA-</td>
</tr>
<tr>
<td>2</td>
<td>RX</td>
<td>TX+</td>
<td>DATA+</td>
</tr>
<tr>
<td>3</td>
<td>TX</td>
<td>RX+</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>RX-</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>10</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
</tbody>
</table>

CN9: Micro SD (3.3V) Connector

SW1: Power Switch
LED1: Power LED and HDD LED
The green LED at the bottom is power LED. The red LED on top is the HDD LED.

CN1: SATAII /share mSATA/ Connectors

CN2: SATAII Connectors

SYS_FAN1: SYSTEM Fan Power Connector

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>+12V</td>
</tr>
<tr>
<td>3</td>
<td>Rotation detection</td>
</tr>
</tbody>
</table>
J1: Audio Connector (DF11-12DP-2DSA)

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINEOUT_R</td>
<td>2</td>
<td>1</td>
<td>LINEOUT_L</td>
</tr>
<tr>
<td>Ground</td>
<td>4</td>
<td>3</td>
<td>JD_FRONT</td>
</tr>
<tr>
<td>LINEIN_R</td>
<td>6</td>
<td>5</td>
<td>LINEIN_L</td>
</tr>
<tr>
<td>Ground</td>
<td>8</td>
<td>7</td>
<td>JD_LINEIN</td>
</tr>
<tr>
<td>MIC-R</td>
<td>10</td>
<td>9</td>
<td>MIC_L</td>
</tr>
<tr>
<td>Ground</td>
<td>12</td>
<td>11</td>
<td>JD_MIC1</td>
</tr>
</tbody>
</table>

J2: Amplifier Connector

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OUTL+</td>
</tr>
<tr>
<td>2</td>
<td>OUTL-</td>
</tr>
<tr>
<td>3</td>
<td>OUTR-</td>
</tr>
<tr>
<td>4</td>
<td>OUTR+</td>
</tr>
</tbody>
</table>
J3: DDR3L SO-DIMM(CH-B) Sockets

J4, J6: LVDS Connectors, Hirose DF20G-20DP-1V
J4: First Channel LVDS

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX0N</td>
<td>2</td>
<td>1</td>
<td>TX0P</td>
</tr>
<tr>
<td>Ground</td>
<td>4</td>
<td>3</td>
<td>Ground</td>
</tr>
<tr>
<td>TX1N</td>
<td>6</td>
<td>5</td>
<td>TX1P</td>
</tr>
<tr>
<td>Ground</td>
<td>8</td>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>TX2N</td>
<td>10</td>
<td>9</td>
<td>TX2P</td>
</tr>
<tr>
<td>Ground</td>
<td>12</td>
<td>11</td>
<td>Ground</td>
</tr>
<tr>
<td>CLKN</td>
<td>14</td>
<td>13</td>
<td>CLKP</td>
</tr>
<tr>
<td>Ground</td>
<td>16</td>
<td>15</td>
<td>Ground</td>
</tr>
<tr>
<td>TX3N</td>
<td>18</td>
<td>17</td>
<td>TX3P</td>
</tr>
<tr>
<td>Power</td>
<td>20</td>
<td>19</td>
<td>Power</td>
</tr>
</tbody>
</table>

J6: Second Channel LVDS
### J7: DDR3L SO-DIMM(CH-A) Sockets

![J7 DDR3L SO-DIMM(CH-A) Sockets Diagram](image)

### J9: MCU Flash Connector (factory use only)

![J9 MCU Flash Connector Diagram](image)

### J10: SATA HDD Power Connectors

![J10 SATA HDD Power Connectors Diagram](image)

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+5V</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Ground</td>
</tr>
<tr>
<td>4</td>
<td>+12V</td>
</tr>
</tbody>
</table>
J11: Smart Battery

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RST#</td>
</tr>
<tr>
<td>2</td>
<td>ICHSWI#</td>
</tr>
<tr>
<td>3</td>
<td>Ground</td>
</tr>
<tr>
<td>4</td>
<td>SMB_DATA</td>
</tr>
<tr>
<td>5</td>
<td>SMB_CLK</td>
</tr>
</tbody>
</table>

J12: Mini PCIE Connector (share mSATA)

J13: Mini PCIE Connector (Half Size)
### J14: USB 2.0 Connector

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vcc</td>
<td>1</td>
<td>2</td>
<td>Ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D0-</td>
<td>3</td>
<td>4</td>
<td>D1+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D0+</td>
<td>5</td>
<td>6</td>
<td>D1-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>7</td>
<td>8</td>
<td>Vcc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### J15: COM2/RS232 Serial Port

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
<th>Signal Name</th>
<th>Pin #</th>
<th>Pin #</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCD, Data carrier detect</td>
<td>1</td>
<td>2</td>
<td>RXD, Receive data</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>TXD, Transmit data</td>
<td>5</td>
<td>6</td>
<td>DSR, Data set ready</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>GND, ground</td>
<td>9</td>
<td>10</td>
<td>CTS, Clear to send</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTS, Request to send</td>
<td></td>
<td></td>
<td>Not Used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RI, Ring indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### J16: VGA Connector (DF11-16DP-2DSA)

**Signal Name** | **Pin #** | **Pin #** | **Signal Name**
--- | --- | --- | ---
+5V | 2 | 1 | Red
Ground | 4 | 3 | Green
N.C | 6 | 5 | Blue
DDCDATA | 8 | 7 | N.C
H_SYNC | 10 | 9 | GND
V_SYNC | 12 | 11 | GND
DDCCLK | 14 | 13 | GND
N.C. | 16 | 15 | GND

### J17: Digital I/O Connector

**Signal Name** | **Pin #** | **Pin #** | **Signal Name**
--- | --- | --- | ---
GND | 1 | 2 | VCC
OUT3 | 3 | 4 | OUT1
OUT2 | 5 | 6 | OUT0
IN3 | 7 | 8 | IN1
IN2 | 9 | 10 | IN0
J18: Board Input Power Connector

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+9V to +30V</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
</tbody>
</table>

J19: Reset Switch

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reset Switch</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
</tr>
</tbody>
</table>

JP3: LCD Backlight Connector

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+12V</td>
</tr>
<tr>
<td>2</td>
<td>Backlight Enable</td>
</tr>
<tr>
<td>3</td>
<td>Brightness Control</td>
</tr>
<tr>
<td>4</td>
<td>Ground</td>
</tr>
</tbody>
</table>
JP4: SPI Flash Connector (factory use only)

JP7: Factory use only

JP8: Debug 80 Port Connector (factory use only)
BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

- BIOS Introduction .......................................................... 24
- BIOS Setup ........................................................................ 24
- Main Settings .................................................................... 26
- Advanced Settings ............................................................ 26
- Chipset Settings ............................................................... 34
- Security Settings ............................................................... 35
- Boot Settings .................................................................... 36
- Save & Exit Settings ........................................................ 38
BIOS Setup

The BIOS (Basic Input/Output System) installed in your computer system’s ROM supports Intel processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the “Reset” button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

Press <DEL> to Enter Setup

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Warning: It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.
Main Settings

System Language
Choose the system default language.

System Date
Set the Date. Use Tab to switch between Data elements.

System Time
Set the Time. Use Tab to switch between Data elements.
Advanced Settings
This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACPI Settings</td>
<td>LVDS Configuration</td>
<td>iSmart Controller</td>
<td>Super IO Configuration</td>
<td>H/W Monitor</td>
<td>CPU Configuration</td>
</tr>
</tbody>
</table>

ACPI Settings

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACPI Settings</td>
<td>Enable ACPI Auto Configuration</td>
<td>Disabled</td>
<td>Enable Hibernation</td>
<td>Enabled</td>
<td>ACPI Sleep State</td>
</tr>
</tbody>
</table>

Enabled ACPI Auto Configuration
Enables or Disables BIOS ACPI Auto Configuration.

Enable Hibernation
Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

ACPI Sleep State
Select ACPI sleep state the system will enter when the SUSPEND button is pressed.
LVDS Configuration

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Color Depth</td>
<td>24 BIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVDS Channel Type</td>
<td>Single</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel Type</td>
<td>1024 x 768</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVDS Backlight Control</td>
<td>0(Min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ ←Select Screen
↑↓ Select Item
Enter: Select
+- Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

iSmart Controller

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>iSmart Controller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power-On after Power failure</td>
<td>Disable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule Slot 1</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule Slot 2</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ ←Select Screen
↑↓ Select Item
Enter: Select
+- Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

Power-On after Power failure
This field sets the system power status whether Disable or Enable when power returns to the system from a power failure situation.

Schedule Slot 1 / 2
Setup the hour/minute for system power on.
Super IO Configuration

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super IO Configuration</td>
<td>→← Select Screen</td>
<td>↑↓ Select Item</td>
<td>Enter: Select</td>
<td>+− Change Opt.</td>
<td>F1: General Help</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F2: Previous Values</td>
</tr>
</tbody>
</table>

Serial Port 1 Configuration
Set parameters of serial port 1(COMA)

Serial Port 2 Configuration
Set parameters of serial port 2(COMA)
H/W Monitor

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<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Health Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smart Fan Function</td>
<td>Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYS temp</td>
<td>+33.0 C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU temp</td>
<td>+34.5 C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN1 Speed</td>
<td>4066 RPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vcore</td>
<td>+1.704 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+1.35V</td>
<td>+1.544 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVCC</td>
<td>+3.360 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VSB3</td>
<td>+3.344 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCC3V</td>
<td>+3.328 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU Shutdown Temperature</td>
<td>Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Smart Fan Function
This field enables or disables the smart fan feature.
Disabled (default)
50 °C
60 °C
70 °C
80 °C
90 °C

Shutdown Temperature
This field enables or disables the Shutdown Temperature
Disabled (default)
70 °C/158 F
75 °C/167 F
80 °C/176 F
85 °C/185 F
90 °C/194 F
90 °C/203 F

Temperatures/Voltages
These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status
### BIOS SETUP

**CPU Configuration**

This section shows the CPU configuration parameters.

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Configuration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>►Socket 0 CPU Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU Speed</td>
<td>1751 Mhz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64-bit</td>
<td>Supported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ ←Select Screen
↑ ↓ Select Item
Enter: Select
+- Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

**Socket 0 CPU Information**

Socket specific CPU Information.
CPU PPM Configuration

Enable/Disable Intel SpeedStep.
## IDE Configuration

SATA Devices Configuration.

### Serial-ATA(SATA)

Enabled / Disabled Serial ATA

### SATA Mode

Select IDE / AHCI Mode

### Serial –ATA Port 0

Enabled / Disabled Serial Port 0

### SATA Port0 HotPlug

Enabled / Disabled SATA Port 0 HotPlug

### Serial –ATA Port 1

Enabled / Disabled Serial Port 1

### SATA Port1 HotPlug

Enabled / Disabled SATA Port 1 HotPlug

---

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDE Configuration</td>
<td>Serial-ATA (SATA)</td>
<td>Enabled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SATA Mode</td>
<td>SATA Port0</td>
<td>AHCI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial-ATA Port 0</td>
<td>Serial-ATA Port1</td>
<td>Enabled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SATA Port0 HotPlug</td>
<td>SATA Port1 HotPlug</td>
<td>Disabled</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

← → Select Screen

↑ ↓ Select Item

Enter: Select

+- Change Field

F1: General Help

F2: Previous Values

F3: Optimized Default

F4: Save ESC: Exit
SDIO Configuration

SDIO Access Mode
Auto Option: Access SD device in DMA mode if controller supports it. Otherwise, use PIO mode.
DMA options: Access SD device in DMA mode.
PIO Option: Access PIO device in DMA
## Chipset Settings

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>North Bridge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- → ← Select Screen
- ↑ ↓ Select Item
- Enter: Select
- ← Change Opt.
- F1: General Help
- F2: Previous Values
- F3: Optimized Defaults
- F4: Save & Exit
- ESC: Exit

### North Bridge

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Memory Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Memory</td>
<td>4096 MB (LPDDR3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Memory Slot0</td>
<td>4096 MB (LPDDR3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Memory Slot2</td>
<td>Not Present</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- → ← Select Screen
- ↑ ↓ Select Item
- Enter: Select
- ← Change Opt.
- F1: General Help
- F2: Previous Values
- F3: Optimized Defaults
- F4: Save & Exit
- ESC: Exit
Security Settings
This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ONLY the Administrator’s password is set, then this only limit access to Setup and is only asked for when entering Setup.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ONLY the User’s password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The password length must be in the following range:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum length 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum length 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrator Password</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Password</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Administrator Password
Set Administrator Password.

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Boot Settings
This section allows you to configure the boot settings.

<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup Prompt Timeout</td>
<td>1</td>
<td></td>
<td>On</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bootup NumLock State</td>
<td></td>
<td></td>
<td>Disabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiet Boot</td>
<td>Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast Boot</td>
<td>Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boot Option Priorities</td>
<td></td>
<td></td>
<td>UEFI:Built-in EFI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boot Option #1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Setup Prompt Timeout
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State
Select the keyboard NumLock state.

Quiet Boot
Enables or disables Quiet Boot option.

Fast Boot
Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

Boot Option Priorities
Sets the system boot order.
REMARKS:
Before the installation of Windows 8, go to the BIOS Setup to check that the Boot Option #1 of the Boot Option Priorities field is set as UEFI MODE (DVD drive).
Save & Exit Settings

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<table>
<thead>
<tr>
<th>Main</th>
<th>Advanced</th>
<th>Chipset</th>
<th>Boot</th>
<th>Security</th>
<th>Save &amp; Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save Changes and Exit</td>
<td>Discard Changes and Exit</td>
<td>Save Changes and Reset</td>
<td>Discard Changes and Reset</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Save Options</td>
<td>Save Changes</td>
<td>Discard Changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restore Defaults</td>
<td>Save as User Defaults</td>
<td>Restore User Defaults</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boot Override</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ ← Select Screen
↑ ↓ Select Item
Enter: Select
+- Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

Save Changes and Exit
Exit system setup after saving the changes.

Discard Changes and Exit
Exit system setup without saving any changes.

Save Changes and Reset
Reset the system after saving the changes.

Discard Changes and Reset
Reset system setup without saving any changes.

Save Changes
Save Changes done so far to any of the setup options.

Discard Changes
Discard Changes done so far to any of the setup options.

Restore Defaults
Restore/Load Defaults values for all the setup options.

Save as User Defaults
Save the changes done so far as User Defaults.

Restore User Defaults
Restore the User Defaults to all the setup options.
Drivers Installation

This section describes the installation procedures for software and drivers. The software and drivers are included with the motherboard. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

- Intel Chipset Software Installation Utility ........................................... 40
- VGA Drivers Installation ..................................................................... 41
- Realtek High Definition Audio Driver Installation .............................. 42
- Intel Trusted Execution Engine Installation ......................................... 43
- Intel Sideband Fabric Device Driver Installation ............................... 44
- GPIO Controller Driver Installation .................................................... 45
- Notes on Boot Option and Windows 8 Setup ...................................... 47

IMPORTANT NOTE:
After installing your Windows operating system, you must install first the Intel Chipset Software Installation Utility before proceeding with the drivers installation.
Intel Chipset Software Installation Utility

The Intel Chipset Drivers should be installed first before the software drivers to enable Plug & Play INF support for Intel chipset components. Follow the instructions below to complete the installation.

1. Insert the DVD that comes with the board. Click Intel and then Intel(R) Baytrail Chipset. Click Intel(R) Chipset Software Installation Utility.

2. Inside This CD...

3. When the Welcome screen to the Intel® Chipset Device Software appears, click Next to continue.

4. Click Yes to accept the software license agreement and proceed with the installation process.

5. The Setup process is now complete. Click Finish to restart the computer and for changes to take effect.
VGA Drivers Installation

1. Insert the DVD that comes with the board. Click Intel and then Intel(R) Baytrail Chipset. Click Intel(R) Baytrail Graphics Driver.

2. When the Welcome screen appears, click Next to continue.

3. Click Yes to accept the license agreement and continue the installation.

4. Setup complete. Click Finish to restart the computer and for changes to take effect.
Realtek High Definition Audio Driver Installation

1. Insert the DVD that comes with the board. Click Intel and then Intel(R) Baytrail Chipset. Click Realtek High Definition Audio Driver.

2. On the Welcome screen, click Next to proceed with the installation.

4. InstallShield Wizard is complete. Click Finish to restart the computer and for changes to take effect.
Intel Trusted Execution Engine Installation

1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) Baytrail Chipset**. Click **Intel(R) Baytrail Graphics Driver**.

2. On the Setup Welcome screen, click **Next** to proceed with the installation process.

3. Click **Next** accept the license agreement and continue the installation.

4. Installation of the Intel Trusted Execution Engine is now complete. Click **Finish**.
Intel Sideband Fabric Device Driver Installation

1. Insert the DVD that comes with the board. Click Intel and then Intel(R) Baytrail Chipset. Click Intel(R) MBI Drivers.

2. On the Welcome to the Setup screen, click Next to proceed.

3. Click Next to accept the license agreement and to proceed.

4. Setup is complete. Click Finish to restart the computer and for changes to take effect.
GPIO Controller Driver Installation

1. The driver for the GPIO controllers has to be manually installed. Go to the Device Manager. There will be an item for Other devices showing several Unknown device.

![Device Manager with Unknown devices](image)

2. With the mouse, right click on the first Unknown device and select Update Driver Software.

![Update Driver Software](image)

3. Click Browse and select the folder that contains the drivers, which is the drive for the drivers DVD. As shown below, click on GPIO, then click OK.

![Browse for driver software on your computer](image)
4. When the driver software in the location has been found, click Next to proceed with the installation.

3. Windows has successfully updated the driver software for the GPIO controller. Click Close. Repeat the same steps for the remaining two GPIO controllers.
Notes on Boot Option and Windows 8 Setup

1. Before installing Windows 8, check the BIOS Setup’s **Boot Option Priorities** if **Boot Option #1** is set to UEFI mode (which would be the DVD drive where to boot the Windows 8 OS from). UEFI stands for Unified Extensible Firmware Interface, an interface between the operating systems and platform firmware during the start-up process.

2. When Boot Option #1 is set to UEFI, there will be 4 partitions in the HDD shown in the Windows Setup screen as can be seen in the picture below.
Appendix

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

<table>
<thead>
<tr>
<th>Address</th>
<th>Device Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000h-001Fh</td>
<td>Direct memory access controller</td>
</tr>
<tr>
<td>0000h-001Fh</td>
<td>PCI bus</td>
</tr>
<tr>
<td>0040h-0043h</td>
<td>System timer</td>
</tr>
<tr>
<td>0050h-0053h</td>
<td>System timer</td>
</tr>
<tr>
<td>0070h-0077h</td>
<td>System CMOS/real time clock</td>
</tr>
<tr>
<td>0081h-0091h</td>
<td>Direct memory access controller</td>
</tr>
<tr>
<td>0093h-009Fh</td>
<td>Direct memory access controller</td>
</tr>
<tr>
<td>00C0h-00DFh</td>
<td>Direct memory access controller</td>
</tr>
<tr>
<td>00F0h-00F0h</td>
<td>Numeric data processor</td>
</tr>
<tr>
<td>02F8h-02FFh</td>
<td>Communications Port (COM2)</td>
</tr>
<tr>
<td>03B0h-03BBh</td>
<td>Intel(R) HD Graphics 4600</td>
</tr>
<tr>
<td>03C0h-03DFh</td>
<td>Intel(R) HD Graphics 4600</td>
</tr>
<tr>
<td>03F8h-03FFh</td>
<td>Communications Port (COM1)</td>
</tr>
<tr>
<td>0D00h-FFFFh</td>
<td>PCI bus</td>
</tr>
<tr>
<td>E000h-EFFFh</td>
<td>Intel(R) 8 Series/C220 Series PCI Express Root Port #7 - 8C1C</td>
</tr>
<tr>
<td>F000h-F03Fh</td>
<td>Intel(R) HD Graphics 4600</td>
</tr>
<tr>
<td>F040h-F05Fh</td>
<td>Intel(R) 8 Series/C220 Series SMBus Controller - 8C22</td>
</tr>
<tr>
<td>F060h-F07Fh</td>
<td>Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02</td>
</tr>
<tr>
<td>F0A0h-F0A3h</td>
<td>Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02</td>
</tr>
<tr>
<td>F0B0h-F0B7h</td>
<td>Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02</td>
</tr>
<tr>
<td>F0C0h-F0C3h</td>
<td>Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02</td>
</tr>
<tr>
<td>F0D0h-F0D7h</td>
<td>Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02</td>
</tr>
<tr>
<td>F0E0h-F0E7h</td>
<td>Intel(R) Active Management Technology - SOL (COM3)</td>
</tr>
</tbody>
</table>
B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

<table>
<thead>
<tr>
<th>Level</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRQ0</td>
<td>System Timer</td>
</tr>
<tr>
<td>IRQ3</td>
<td>Serial Port #2</td>
</tr>
<tr>
<td>IRQ4</td>
<td>Serial Port #1</td>
</tr>
<tr>
<td>IRQ 10</td>
<td>Intel(R) 8 Series/C220 Series SMBus Controller - 8C22</td>
</tr>
<tr>
<td>IRQ 13</td>
<td>Numeric data processor</td>
</tr>
<tr>
<td>IRQ 16</td>
<td>High Definition Audio Controller</td>
</tr>
<tr>
<td>IRQ 16</td>
<td>Intel(R) 8 Series/C220 Series USB EHCI #2 - 8C2D</td>
</tr>
<tr>
<td>IRQ 16</td>
<td>Intel(R) Management Engine Interface</td>
</tr>
<tr>
<td>IRQ 19</td>
<td>Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02</td>
</tr>
<tr>
<td>IRQ 19</td>
<td>Intel(R) Active Management Technology - SOL (COM3)</td>
</tr>
<tr>
<td>IRQ 22</td>
<td>High Definition Audio Controller</td>
</tr>
<tr>
<td>IRQ 23</td>
<td>Intel(R) 8 Series/C220 Series USB EHCI #1 - 8C26</td>
</tr>
</tbody>
</table>
C. Digital I/O Sample Code

File of the NCT5523D.H

//----------------------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//----------------------------------------------------------------------

#ifndef __NCT5523D_H
#define __NCT5523D_H 1

#define NCT5523D_INDEX_PORT (NCT5523D_BASE)
#define NCT5523D_DATA_PORT (NCT5523D_BASE+1)

#define NCT5523D_REG_LD   0x07

#define NCT5523D_UNLOCK   0x87
#define NCT5523D_LOCK     0xAA

unsigned int Init_NCT5523D(void);
void Set_NCT5523D_LD( unsigned char);
void Set_NCT5523D_Reg( unsigned char, unsigned char);
unsigned char Get_NCT5523D_Reg( unsigned char);

#endif //__NCT5523D_H
File of the MAIN.CPP

#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "NCT5523D.H"

int main (void)
{
    char SIO;
    SIO = Init_NCT5523D();
    if (SIO == 0)
    {
        printf("Can not detect Nuvoton NCT5523D, program abort.
    return(1);
    }

    Dio5Initial();

    Dio5SetDirection(0x0F); //GP20..23 = input, GP24..27=output
    printf("Current DIO direction = 0x%X", Dio5GetDirection());
    printf("Current DIO status = 0x%X", Dio5GetInput());
    printf("Set DIO output to high
    Dio5SetOutput(0x0F);
    printf("Set DIO output to low
    Dio5SetOutput(0x00);

    return 0;
}
void Dio5Initial(void)
{
    unsigned char ucBuf;

    ucBuf = Get_NCT5523D_Reg(0x1C);
    ucBuf &= ~0x02;
    Set_NCT5523D_Reg(0x1C, ucBuf);

    Set_NCT5523D_LD(0x07);  //switch to logic device 7
    ucBuf = Get_NCT5523D_Reg(0x30);
    ucBuf |= 0x04;
    Set_NCT5523D_Reg(0x30, ucBuf);
}

void Dio5SetOutput(unsigned char NewData)
{
    Set_NCT5523D_LD(0x07);  //switch to logic device 7
    Set_NCT5523D_Reg(0xE1, NewData);
}

unsigned char Dio5GetInput(void)
{
    unsigned char result;

    Set_NCT5523D_LD(0x07);  //switch to logic device 7
    result = Get_NCT5523D_Reg(0xE1);
    return (result);
}

void Dio5SetDirection(unsigned char NewData)
{
    //NewData : 1 for input, 0 for output
    Set_NCT5523D_LD(0x07);  //switch to logic device 7
    Set_NCT5523D_Reg(0xE8, NewData);
}

unsigned char Dio5GetDirection(void)
{
    unsigned char result;

    Set_NCT5523D_LD(0x07);  //switch to logic device 7
    result = Get_NCT5523D_Reg(0xE8);
    return (result);
}
File of the NCT5523D.CPP
//........................................................................
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//........................................................................
#include "NCT5523D.H"
#include <dos.h>
//........................................................................
unsigned int NCT5523D_BASE;
void Unlock_NCT5523D (void);
void Lock_NCT5523D (void);
//........................................................................
unsigned int Init_NCT5523D(void)
{
    unsigned int result;
    unsigned char ucDid;

    NCT5523D_BASE = 0x4E;
    result = NCT5523D_BASE;

    ucDid = Get_NCT5523D_Reg(0x20);
    if (ucDid == 0xC4)  //NCT5523D??
    {
        goto Init_Finish;
    }

    NCT5523D_BASE = 0x2E;
    result = NCT5523D_BASE;

    ucDid = Get_NCT5523D_Reg(0x20);
    if (ucDid == 0xC4)  //NCT5523D??
    {
        goto Init_Finish;
    }

    NCT5523D_BASE = 0x00;
    result = NCT5523D_BASE;

    Init_Finish:
    return (result);
}
//........................................................................
void Unlock_NCT5523D (void)
{
    outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
    outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
}
//........................................................................
void Lock_NCT5523D (void)
{
    outportb(NCT5523D_INDEX_PORT, NCT5523D_LOCK);
}
void Set_NCT5523D_LD(unsigned char LD) {
    Unlock_NCT5523D();
    outportb(NCT5523D_INDEX_PORT, NCT5523D_REG_LD);
    outportb(NCT5523D_DATA_PORT, LD);
    Lock_NCT5523D();
}
//-----------------------------------------------------------------------------
void Set_NCT5523D_Reg(unsigned char REG, unsigned char DATA) {
    Unlock_NCT5523D();
    outportb(NCT5523D_INDEX_PORT, REG);
    outportb(NCT5523D_DATA_PORT, DATA);
    Lock_NCT5523D();
}
//-----------------------------------------------------------------------------
unsigned char Get_NCT5523D_Reg(unsigned char REG) {
    unsigned char Result;
    Unlock_NCT5523D();
    outportb(NCT5523D_INDEX_PORT, REG);
    Result = inportb(NCT5523D_DATA_PORT);
    Lock_NCT5523D();
    return Result;
}
//-------------------------------------------------------------------------------
D. Watchdog Timer Configuration

The WDT is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

SAMPLE CODE:

File of the NCT5523D.H
polator------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//------------------------------
#ifndef __NCT5523D_H
#define __NCT5523D_H   1
//------------------------------
#define NCT5523D_INDEX_PORT  (NCT5523D_BASE)
#define NCT5523D_DATA_PORT  (NCT5523D_BASE+1)
//------------------------------
#define NCT5523D_REG_LD   0x07
//------------------------------
#define NCT5523D_UNLOCK   0x87
#define NCT5523D_LOCK   0xAA
//------------------------------
unsigned int Init_NCT5523D(void);
void Set_NCT5523D_LD( unsigned char);
void Set_NCT5523D_Reg( unsigned char, unsigned char);
unsigned char Get_NCT5523D_Reg( unsigned char);
//------------------------------
#endif //__NCT5523D_H

File of the MAIN.CPP.
//----------------------------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//----------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "NCT5523D.H"
//----------------------------------------------------------------------------
int main (void);

void WDTInitial(void);
void WDTEnable(unsigned char);
void WDTDisable(void);

//----------------------------------------------------------------------------
int main (void)
{
    char SIO;

    SIO = Init_NCT5523D();
    if (SIO == 0)
    {
        printf("Can not detect Nuvoton NCT5523D, program abort.\n");
        return(1);
    }

    WDTInitial();
    WDTEnable(10);
    WDTDisable();

    return 0;
}
//----------------------------------------------------------------------------
void WDTInitial(void)
{
    unsigned char bBuf;
    Set_NCT5523D_LD(0x08);      //switch to logic device 8
    bBuf = Get_NCT5523D_Reg(0x30);
    bBuf &= (~0x01);
    Set_NCT5523D_Reg(0x30, bBuf);    //Enable WDTS
}
//----------------------------------------------------------------------------
void WDTEnable(unsigned char NewInterval)
{
    unsigned char bBuf;

    Set_NCT5523D_LD(0x08);        //switch to logic device 8
    Set_NCT5523D_Reg(0x30, 0x01);  //enable timer

    bBuf = Get_NCT5523D_Reg(0xF0);
    bBuf &= (~0x08);
    Set_NCT5523D_Reg(0xF0, bBuf);  //count mode is second

    Set_NCT5523D_Reg(0xF1, NewInterval);  //set timer
}

//--------------------------------------------------------------------------------
void WDTDisable(void)
{
    Set_NCT5523D_LD(0x08);        //switch to logic device 8
    Set_NCT5523D_Reg(0xF1, 0x00);  //clear watchdog timer
    Set_NCT5523D_Reg(0x30, 0x00);  //watchdog disabled
}

//-------------------------------------------------------------------------------
File of the NCT5523D.CPP
//-----------------------------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#include "NCT5523D.H"
#include <dos.h>
//-----------------------------------------------------------------------------
unsigned int NCT5523D_BASE;
void Unlock_NCT5523D (void);
void Lock_NCT5523D (void);
//-----------------------------------------------------------------------------
unsigned int Init_NCT5523D(void)
{
    unsigned int result;
    unsigned char ucDid;

    NCT5523D_BASE = 0x4E;
    result = NCT5523D_BASE;

    ucDid = Get_NCT5523D_Reg(0x20);
    if (ucDid == 0xC4) //NCT5523D??
    {
        goto Init_Finish;
    }

    NCT5523D_BASE = 0x2E;
    result = NCT5523D_BASE;

    ucDid = Get_NCT5523D_Reg(0x20);
    if (ucDid == 0xC4) //NCT5523D??
    {
        goto Init_Finish;
    }

    NCT5523D_BASE = 0x00;
    result = NCT5523D_BASE;

    Init_Finish:
    return (result);
}
//-----------------------------------------------------------------------------
void Unlock_NCT5523D (void)
{
    outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
    outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
}
//-----------------------------------------------------------------------------
void Lock_NCT5523D (void)
{
    outportb(NCT5523D_INDEX_PORT, NCT5523D_LOCK);
}
void Set_NCT5523D_LD(unsigned char LD) 
{
    Unlock_NCT5523D();
    outportb(NCT5523D_INDEX_PORT, NCT5523D_REG_LD);
    outportb(NCT5523D_DATA_PORT, LD);
    Lock_NCT5523D();
}

//------------------------------------------------------------------
void Set_NCT5523D_Reg(unsigned char REG, unsigned char DATA) 
{
    Unlock_NCT5523D();
    outportb(NCT5523D_INDEX_PORT, REG);
    outportb(NCT5523D_DATA_PORT, DATA);
    Lock_NCT5523D();
}

//------------------------------------------------------------------
unsigned char Get_NCT5523D_Reg(unsigned char REG) 
{
    unsigned char Result;
    Unlock_NCT5523D();
    outportb(NCT5523D_INDEX_PORT, REG);
    Result = inportb(NCT5523D_DATA_PORT);
    Lock_NCT5523D();
    return Result;
}

//----------------------------------------------------------------------------