IB909F

Intel® Broadwell-ULT

3.5” Disk Size SBC

USER’S MANUAL

Version 1.1

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Introduction

Product Description

The IB909F is a 3.5-inch single board computer based on the Intel® Broadwell-ULT MCP processors.

The IB909F platform is well suited for low-power and high-performance designs in a broad range of markets including Industrial Control & Automation, Digital Signage, Thin Client, Electronic Gaming Machines, and SMB storage appliances.

IB909F Features:

- Supports Intel® 5th generation mobile Core™ i MCP processors
- Two DDR3L SO-DIMM, 1333/1600 MHz, Max. 16GB memory
- Integrated graphics for DVI-I, LVDS displays
- 2 x SATA III connector
- 2x COM port connector
- 2 x Mini-PCIe(x1) slot *(w/ USB/MSATA support)*
- 2x GbE (RJ-45) connector
- 1x 9V to 24V DC-IN power connector

Checklist

Your IB909F package should include the items listed below.

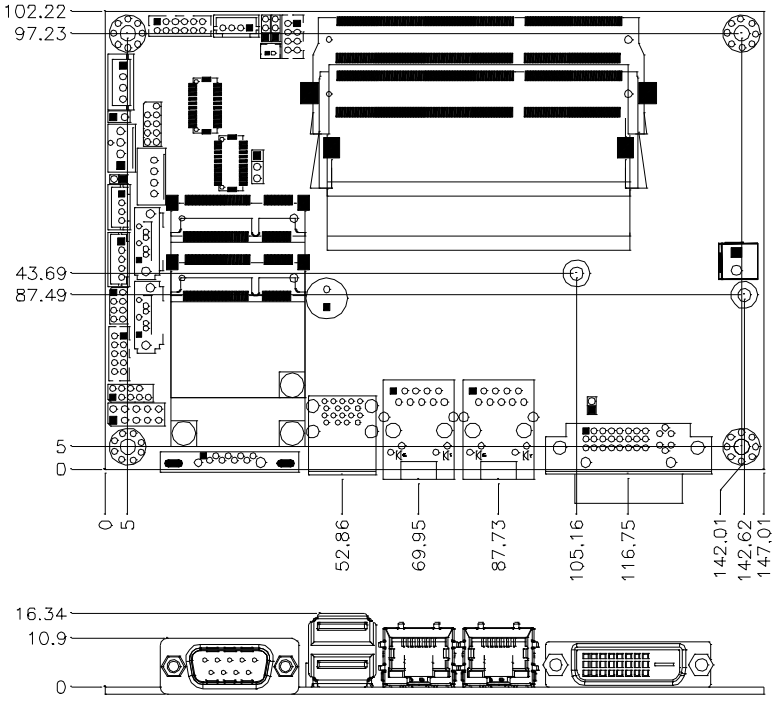
- The IB909F SBC
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Optional cable kit (containing DC in power cable/PW87, COM port cable / PK1H, SATA & HDD power cable/SATA-26 and USB 2.0 cable/USB-29)
- Other options: Audio-18 audio cable, HSIB908-BGA-1 heatsink

IB909F Specifications

Product Name	**IB909F**
Form Factor	3.5" SBC
CPU Type	- Intel® **5**th generation mobile Core™ i MCP processors (22nm monolithic) - TDP = 15W (DC) , FCBGA1168 @ solder side
CPU Speed	Intel® Core™ i7-5650U processor (2.2GHz) **[IB909AF-5650]** Intel® Core™ i5-5350U processor (1.8GHz) **[IB909AF-5350]** Intel® Core™ i3-5010U processor (2.1GHz) **[IB909F-5010]**
Cache	Up to 4MB
Chipset	Integrated in Intel® 5th Generation Core™ i U-series processor
BIOS	AMI BIOS
Memory	Intel® 5th Gen. Core™ i U-series processor integrated memory controller - DDR3L (1.35V) @1600 MHz, SO-DIMM [204-pin vertical] x **2** - Max. 16GB, Non-ECC
Display	Intel® 5th Gen. Core™ i U-series processor integrated Gfx, supports 3 independent displays, Direct X 11.1, OpenGL 4.2, Open CL 1.2 - DVI-I x 1 (Thru DDI#1 w/ Level shifter [ASM1442K] for DVI + DP to VGA [NXP PTN3392])
LVDS	- LVDS(Thru eDP, via NXP PTN3460 bridge IC) 24-bit dual channels LVDS interface w/DF20 socket x2
LAN	Intel® I218LM GbE PHY (IB909AF-5650& IB909AF-5350) or I218V GbE PHY (IB909F-5010 & IB909F-3765) Intel® I211AT as 2nd GbE
USB	- Intel® 5th Gen. Core™ i U-series processor integrated USB 2.0 host controller, supports **4** x USB 2.0: **2**-ports onboard pin header + 2 port thru MiniPCIe - Intel® 5th Gen. Core™ i U-series processor integrated USB 3.0 host controller, supports **2** x USB 3.0 in the rear panel

Serial ATA Ports	Intel® 5th Gen. Core™ i U-series processor built-in SATA controller 2 x SATA 3.0 (6Gbps) and 2 x mSATA via MiniPCIe slots (w/NXP CBTL02043A switching IC)
Audio	Intel® 5th Gen. Core™ i U-series processor built-in High Definition Audio controller + Realtek ALC269Q-VC2-GR Codec [6mm **x** 6mm @ MQFN48] w/ class-D speaker amplifier(2W per channel @ 5V power supply)
LPC I/O	Nuvoton NCT6102D [128-pin LQFP, 14 mm x 14mm x 1.4mm) COM1 (RS232/422/485) [EXAR SP339EER1 232/422/485 transceiver for jumper-less]; COM2 (RS232 only) [SIPEX SP3243EBER, QFN32] [Hardware Monitor] 2 x Thermal inputs 2 x Voltage monitoring 1 x CPU Fan (PWM Fan type, 4-pin connector)
Digital IO	4 in & 4 out
iAMT(10.0)	For IB909AF-5650 / IB909AF-5350
Expansion Slots	1x mSATA/mPCIe(x1) w/ USB signal [Half-sized] 1x mSATA/mPCIe(x1) w/ USB signal [Full-sized]
Edge Connector	DVI-I x 1 RJ45 x2 for LAN#1 & #2 USB 3.0 stack connector x 1 for USB1 / 2 [Blue color] DB9 x 1 for COM #1
Onboard Header/Connector	DF20-20 socket connector x 2 for 24-bit dual channel LVDS 2 ports x SATA III [Blue color] 2x4 pins header x 1 for 2 USB 2.0 ports [DF11] 2x6 pins box header x1 for Audio [DF11] 1x4 pins box header x1 for Speaker out 2x5 pins box header x1 for COM2 2x5 pins headers x 1 for LPC (Debug purposes only) 5 pins box header x1 for smart battery 4 pins box header x1 for backlight/brightness control 4 pins power connector x1 for SATA HDD 2 pins power connector x1 for DC-in [180 degree vertical type]
Watchdog Timer	Yes (256 segments, 0, 1, 2…255 sec/min)
Power Input	+9V ~ +24V DC-in
RoHS	Yes
Board Size	102mm x 147mm
OS supported	Windows 8 / Embedded; Windows 7 / Embedded Linux
Others	Heatsink i-SMART (Auto-scheduler & Power fail resume function) EEPROM 24C02(Reserved for designing, M-SO8 package)

Board Dimensions



Installations

This section provides information on how to use the jumpers and connectors on the IB909F in order to set up a workable system. The topics covered are:

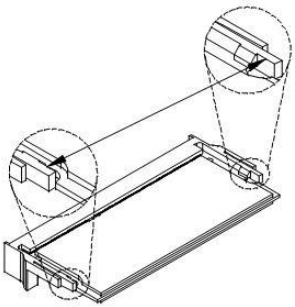
Installing the Memory

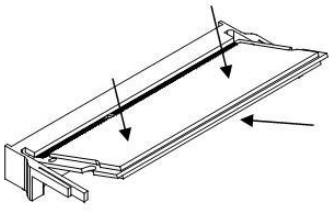
The IB909F board supports two DDR3L memory sockets for a maximum total memory of 16GB DDR3L memory type.

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.

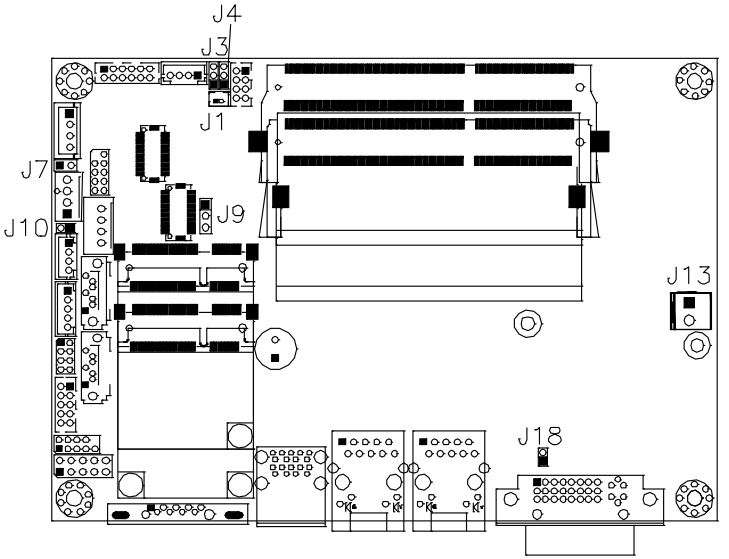




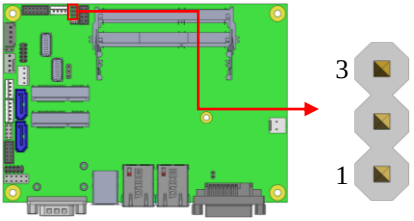
Setting the Jumpers

Jumpers are used on IB909F 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 IB909F and their respective functions.

Jumper Locations on IB909F

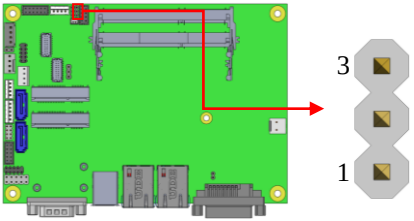


J3: Clear CMOS Contents



J3	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS

J4: Clear ME Contents

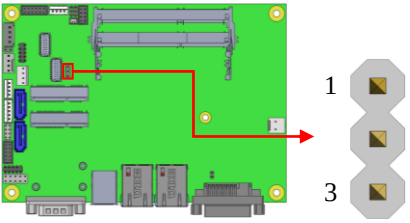


J4	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear ME RTC Register

J7: Flash Descriptor Security Override (Factory use only)

J7	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled

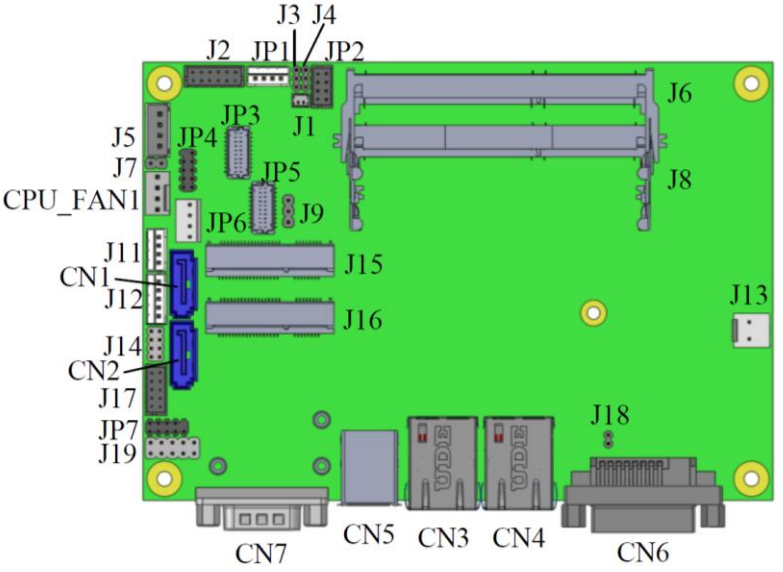
J9: LVDS Panel Power Selection

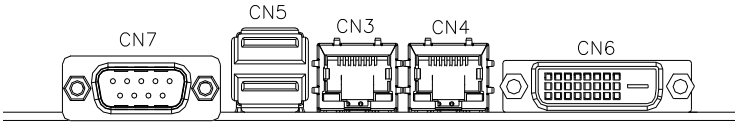


J9	Setting	Panel Voltage
	Pin 1-2 Short/Closed	3.3V (default)
	Pin 2-3 Short/Closed	5V

Connectors on IB909F

Connector Locations on IB909F





CN3, CN4: Gigabit LAN

CN3: Intel® Clarkville I218V/I218LM GbE PHY
CN4: Intel® Pearsonville I211AT as 2nd GbE

CN5: USB 1/2 Connector

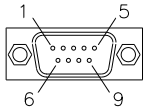
CN6: VGA DVI-I Connector

CN7: DB9 Connector

(COM1) is a DB-9 connector.

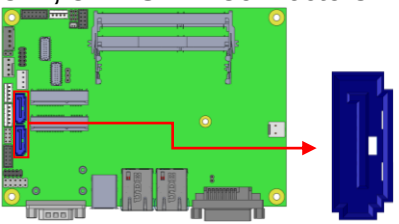
Signal Name	Pin #	Pin #	Signal Name
DCD, Data carrier detect	1	6	DSR, Data set ready
RXD, Receive data	2	7	RTS, Request to send
TXD, Transmit data	3	8	CTS, Clear to send
DTR, Data terminal ready	4	9	RI, Ring indicator
GND, ground	5	10	Not Used

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

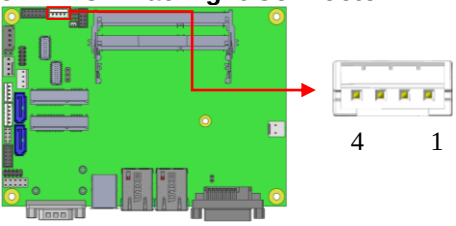


Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC

CN1, CN2: SATA Connectors

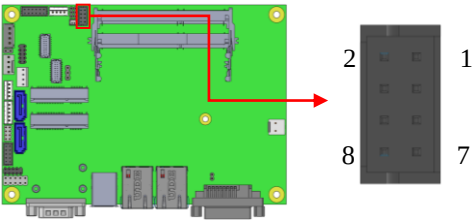


JP1: LCD Backlight Connector



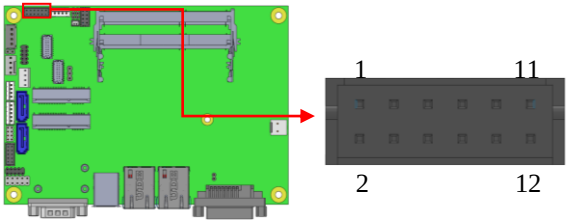
Pin #	Signal Name
1	+12V
2	Backlight Enable
3	Brightness Control
4	Ground

JP2: USB3/4 Connector



Signal Name	Pin #	Pin #	Signal Name
Vcc	1	2	Ground
D0-	3	4	D1+
D0+	5	6	D1-
Ground	7	8	Vcc

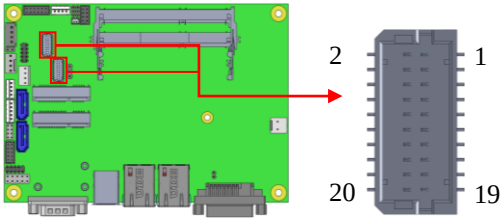
J2: Audio Connector (DF11 Connector)



Signal Name	Pin #	Pin #	Signal Name
LINEOUT_R	2	1	LINEOUT_L
Ground	4	3	JD_FRONT
LINEIN_R	6	5	LINEIN_L
Ground	8	7	JD_LINEIN
MIC-R	10	9	MIC_L
Ground	12	11	JD_MIC1

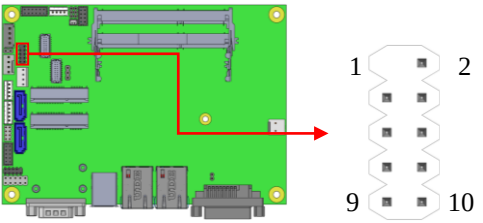
JP3, JP5: LVDS Connectors (LVDS1, LVDS2)

The LVDS connectors (Hirose DF20G-20DP-1V) on board consist of the first channel (LVDS1) and second channel (LVDS2).

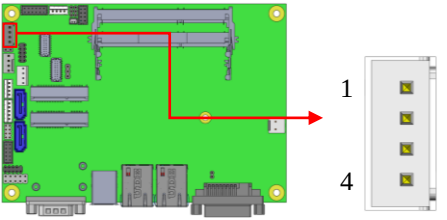


Signal Name	Pin #	Pin #	Signal Name
TX0N	2	1	TX0P
Ground	4	3	Ground
TX1N	6	5	TX1P
Ground	8	7	Ground
TX2N	10	9	TX2P
Ground	12	11	Ground
CLKN	14	13	CLKP
Ground	16	15	Ground
TX3N	18	17	TX3P
Power	20	19	Power

JP4: SPI Flash Connector (factory use only)

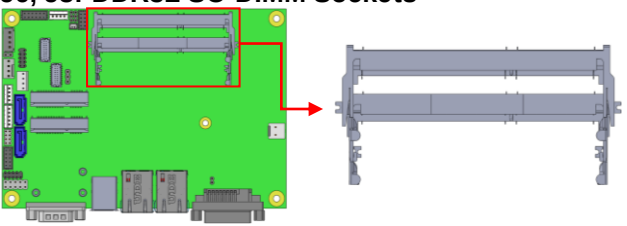


J5: Amplifier Connector

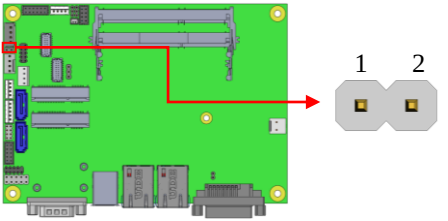


Pin #	Signal Name
1	OUTL+
2	OUTL-
3	OUTR-
4	OUTR+

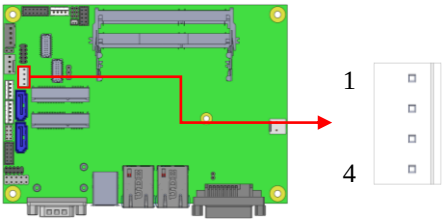
J6, J8: DDR3L SO-DIMM Sockets



J7: Factory use only

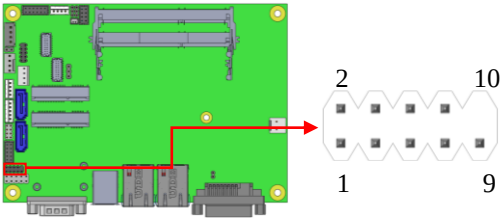


JP6: SATA HDD Power Connectors

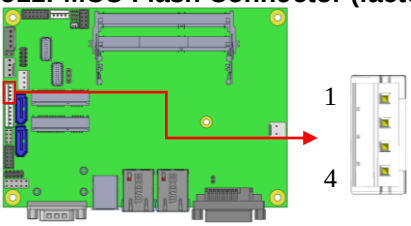


Pin #	Signal Name
1	+5V
2	Ground
3	Ground
4	+12V

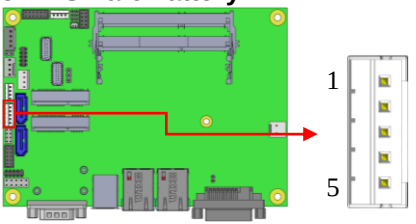
JP7: Debug 80 Port Connector (factory use only)



J11: MCU Flash Connector (factory use only)

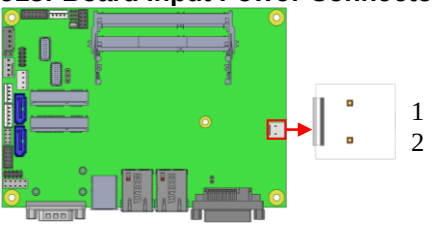


J12: Smart Battery



Pin #	Signal Name
1	RST#
2	ICHSWI#
3	Ground
4	SMB_DATA
5	SMB_CLK

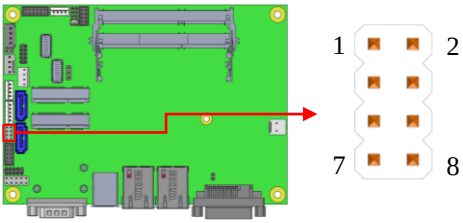
J13: Board Input Power Connector



Pin #	Signal Name
1	+9V to +24V
2	Ground

J14: Front Panel Connector

The following table shows the pin outs of the 2x4 pin header



Signal Name	Pin #	Pin #	Signal Name
Ground	1	2	PWR_SW
PWR_LED+	3	4	PWR_LED-
HDD_LED+	5	6	HDD_LED-
Ground	7	8	Reset

J14 provides connectors for system indicators that provide light indication of the computer activities and switches to change the computer status. J14 is an 8-pin header that provides interfaces for the following functions.

ATX Power ON Switch: Pins 1 and 2

This 2-pin connector is an "ATX Power Supply On/Off Switch" on the system that connects to the power switch on the case. When pressed, the power switch will force the system to power on. When pressed again, it will force the system to power off.

Power LED: Pins 3 and 4

Pin #	Signal Name
3	LED(+)
4	LED(-)

Hard Disk Drive LED Connector: Pins 5 and 6

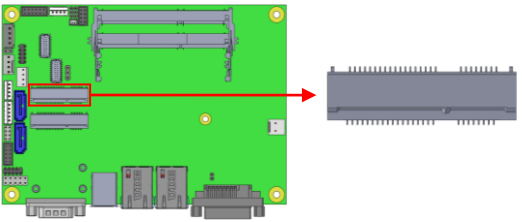
This connector connects to the hard drive activity LED on control panel. This LED will flash when the HDD is being accessed.

Pin #	Signal Name
5	LED(+)
6	LED(-)

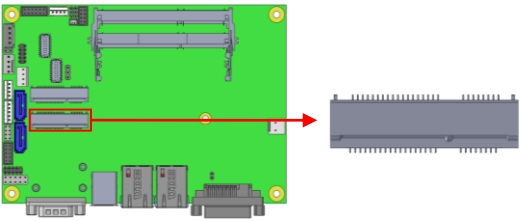
Reset Switch: Pins 7 and 8

The reset switch allows the user to reset the system without turning the main power switch off and then on again. Orientation is not required when making a connection to this header.

J15: Mini PCIE Connector (Supports mSATA)

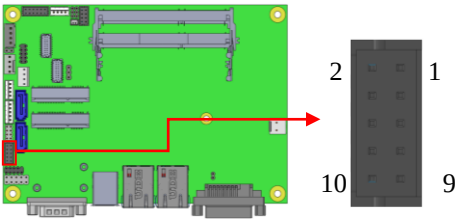


J16: Mini PCIE Connector (Half Size/ Supports mSATA)



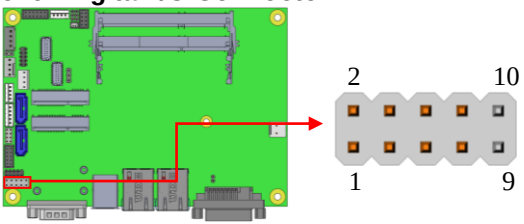
*** The gap of height between J15 & J16 is following PCI Express Mini Card electromechanical spec. ***

J17: COM2/RS232 Serial Port



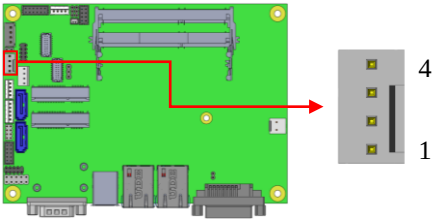
Signal Name	Pin #	Pin #	Signal Name
DCD, Data carrier detect	1	2	RXD, Receive data
TXD, Transmit data	3	4	Data terminal ready
GND, ground	5	6	DSR, Data set ready
RTS, Request to send	7	8	CTS, Clear to send
RI, Ring indicator	9	10	Not Used

J19: Digital I/O Connector



Signal Name	Pin #	Pin #	Signal Name
Ground	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

CPU_FAN1: CPU Fan Power Connector



Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection
4	Control

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BIOS Setup

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

BIOS Introduction

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

BIOS Setup

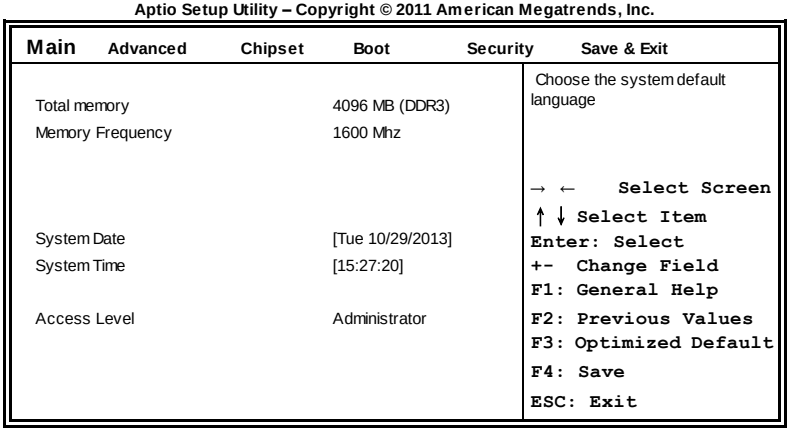
The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the <Del> key immediately allows you to enter the Setup utility. If you are 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> or <ESC>  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.

Main Settings



System Date

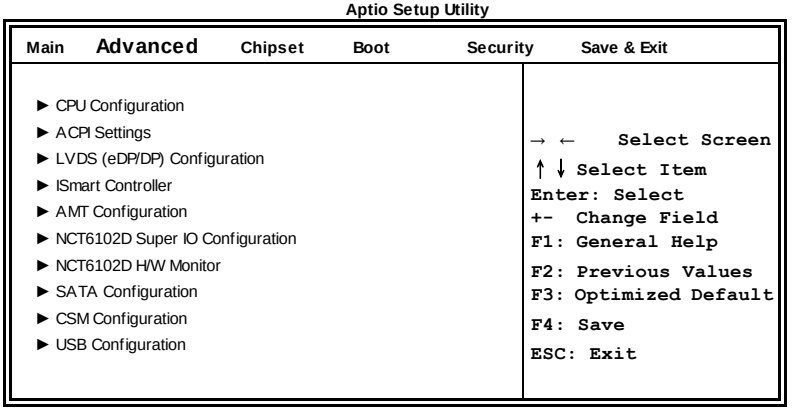
Set the Date. Use Tab to switch between Data elements.

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.



CPU Configuration

This section shows the CPU configuration parameters.

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
CPU Configuration					
Intel(R) CPU Core(TM)i7-5650U @ 2.20GHz					
CPU Signature		306d4			
Microcode Patch		e			
Max CPU Speed		2200 MHz			
Min CPU Speed		500 MHz			
CPU Speed		3100 MHz			
Processor Cores		2			
Intel HT Technology		Supported			
Intel VT-x Technology		Supported			
Intel SMX Technology		Supported			
64-bit		Supported			
EIST Technology		Supported			
L1 Data Cache		32 kB x 2			
L1 Code Cache		32 kB x 2			
L2 Cache		256 kB x 2			
L3Cache		4 MB			
L4Cache		Not Present			
Hyper-threading		Enabled			
Active Processor Cores		All			
Overclocking lock		Disabled			
Execute Disable Bit		Enabled			
Intel Virtualization Technology		Enabled			
EIST		Enabled			
Turbo Mode		Enabled			

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

Hyper-threading

Select the performance state that the BIOS will set before OS handoff.

Active Processor Cores

Number of cores to enable in each processor package.

Overclocking lock

Flex_RATIO(194)MSR

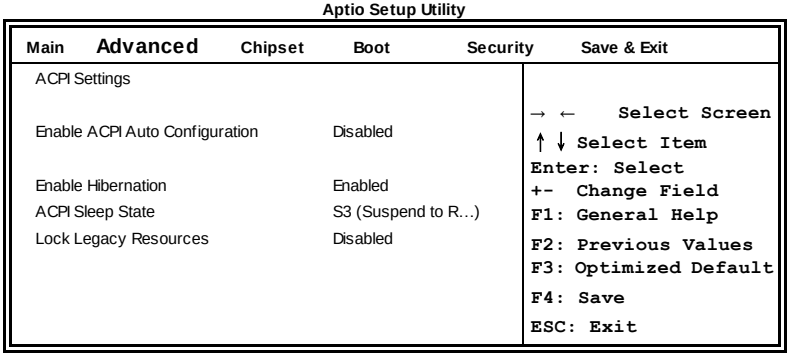
Execute Disable Bit

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.)

Intel Virtualization Technology
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

EIST
Enabled/Disabled Intel Speedstep.

ACPI Settings



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.

Lock Legacy Resources
Enabled or Disabled Lock of Legacy Resources.

LVDS (eDP/DP) Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit

LVDS (eDP/DP) Configuration

LVDS (eDP/DP) Support	Enabled
Panel Color Depth	24 BIT
LVDS Chanel Type	Single
Panel Type	800 x 600
LVDS Backlight Control (3.3V / 5V)	3.3V
LVDS Backlight Level Control	Level-5

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

Panel Color Depth
Select the LFP Panel Color Depth: 18 Bit, 24 Bit.

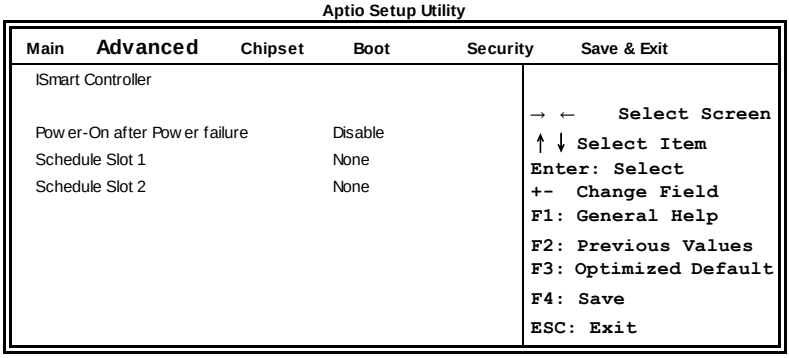
LVDS Chanel Type
Select LVDS Chanel Type

Panel Type
Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item: 800x600 LVDS ~ 1920x1080 LVDS.

LVDS Backlight Control (3.3V / 5V)
LVDS Back Light Volt Control: 3.3V, 5V

LVDS Backlight Level Control
Backlight Brightness Control

ISmart Controller



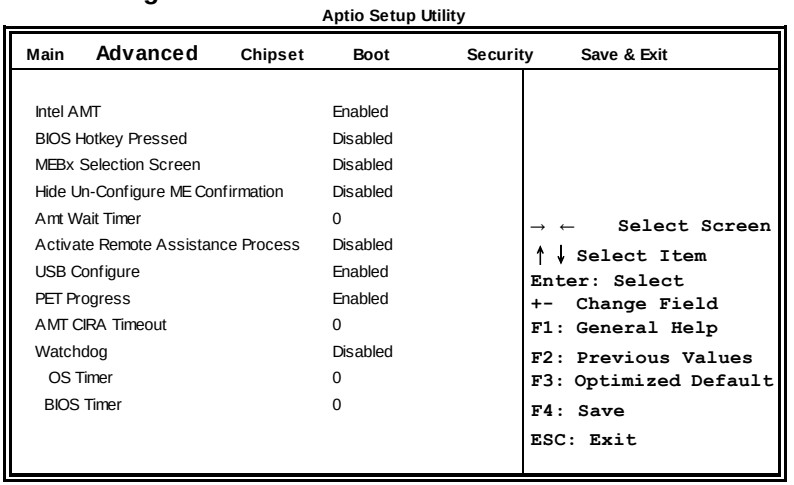
Power-On after Power failure

Enable or Disable.

Schedule Slot 1 / 2

Setup the hour/minute for system power on.

AMT Configuration



AMT Configuration

This configuration is supported iAMT function. Options are Enabled and Disabled.

Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

Amt Wait Timer

Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

Activate Remote Assistance Process

Trigger CIRA boot.

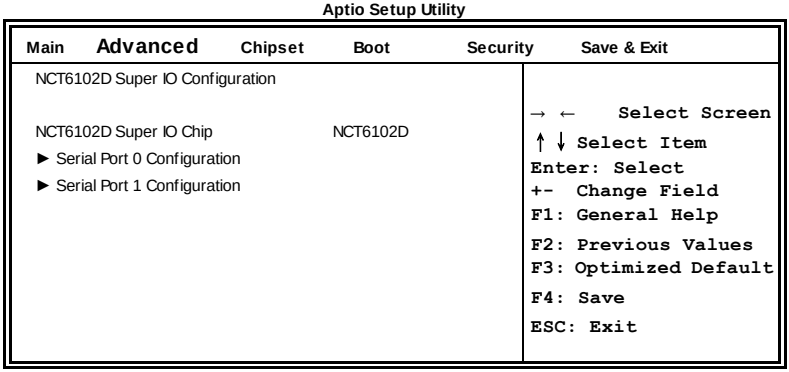
PET Progress

User can Enable/Disable PET Events progress to receive PET events or not.

Watchdog Timer

Enable/Disable Watchdog Timer.

NCT6102D Super IO Configuration



Serial Port Configuration

Set parameters of serial ports. User can Enable/Disable the serial port and Select an optimal settings for the Super IO Device.

NCT6102D H/W Monitor

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
PC Health Status					
ACPI Shutdown Temperature		Disable			
#####Smart Fan Function#####					
CPU Smart Fan Control		Disabled			
SYS Temp		+32.5 C			
CPU Temp		+35.5 C			
Fan Speed		2673			
Vcore		+1.792 V			
+5V		+5.255 V			
+12V		+12.096 V			
Memory Voltage		+1.360 V			

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

ACPI Shutdown Temperature

The default setting is Disabled.

Smart Fan Function

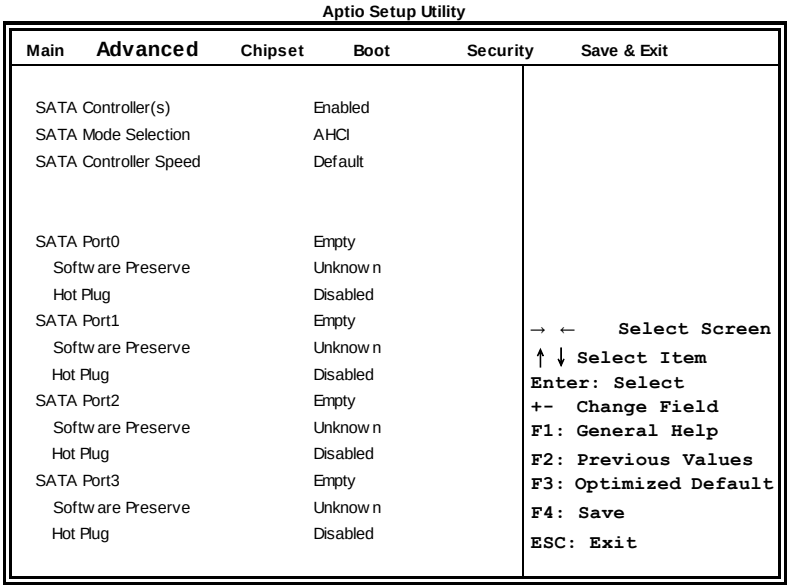
This field enables or disables the smart fan feature. At a certain temperature, the fan starts turning. Once the temperature drops to a certain level, it stops turning again.

Temperatures/Voltages

These fields are the parameters of the hardware monitoring function feature of the board. The values are read-only values as monitored by the system and show the PC health status.

SATA Configuration

SATA Devices Configuration.



SATA Controller(s)

Enable / Disable Serial ATA Controller.

SATA Mode Selection

(1) AHCI Mode.
(2) RAID Mode.

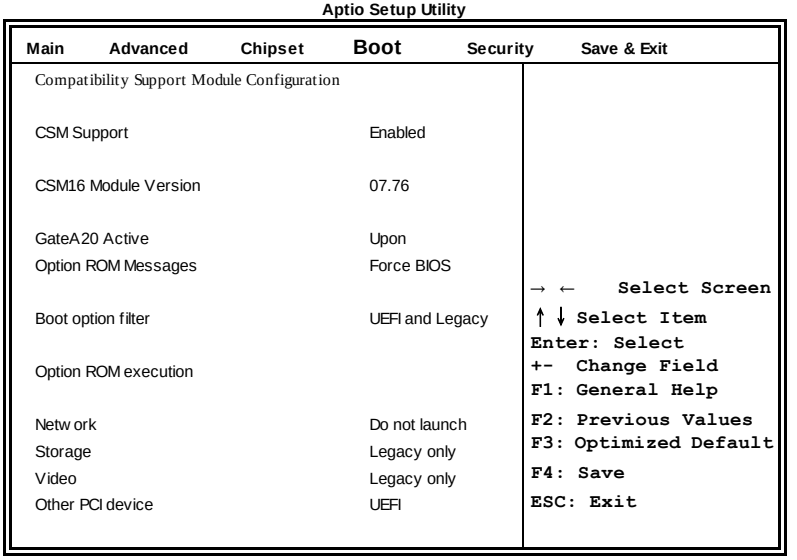
SATA Controller Speed

Indicates the maximum speed the SATA controller can support

Hot Plug

Designates this port as Hot Pluggable.

CSM Configuration



CSM Support
Enable/Disable CSM Support.

Boot option filter
This option controls what devices system can boot to.

Network
Controls the execution of UEFI and Legacy PXE OpROM.

Storage
Controls the execution of UEFI and Legacy Storage OpROM.

Video
Controls the execution of UEFI and Legacy Video OpROM.

Other PCI device
Determines OpROM execution policy for devices other than Network, Storage, or Video.

USB Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Module Version			8.11.02		
USB Devices:					
1 Keyboard, 1 Mouse					
Legacy USB Support			Enabled		
USB3.0 Support			Enabled		
XHCI Hand-off			Enabled		
EHCI Hand-off			Enabled		
USB hardware delays and time-outs:					
USB Transfer time-out			20 sec		
Device reset tine-out			20 sec		
Device power-up delay			Auto		

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

Legacy USB Support

Enables Legacy USB support.
AUTO option disables legacy support if no USB devices are connected.
DISABLE option keeps USB devices available only for EFI applications.

USB3.0 Support

Enable/Disable USB3.0 (XHCI) Controller support.

XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

EHCI Hand-off

Enabled/Disabled. This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

USB Transfer time-out

The time-out value for Control, Bulk, and Interrupt transfers.

Device reset time-out

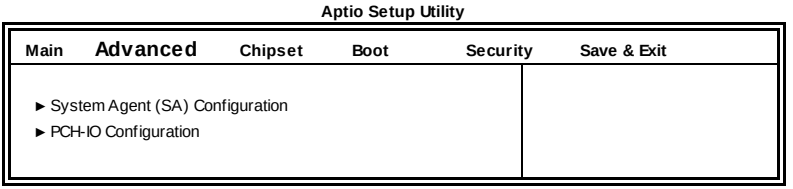
USB mass Storage device start Unit command time-out.

Device power-up delay

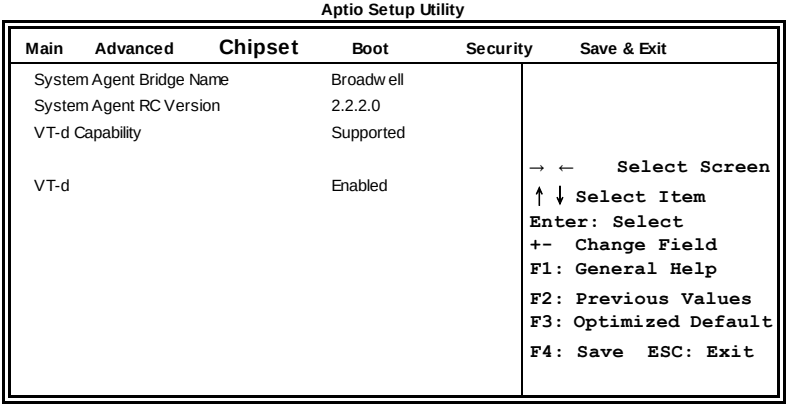
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

Chipset Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



System Agent (SA) Configuration

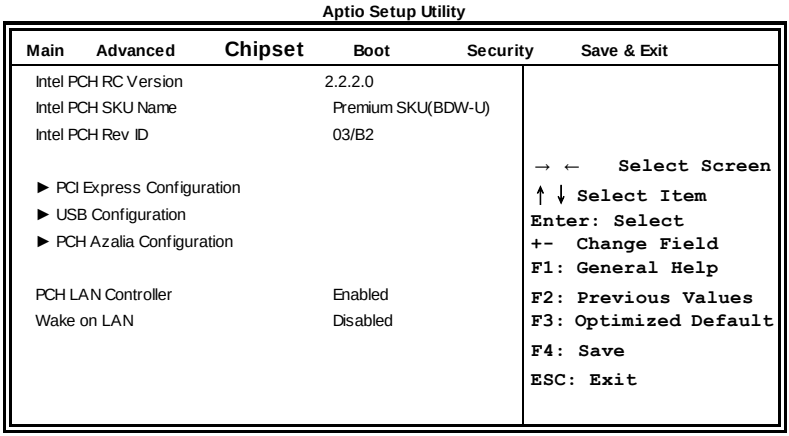


VT-d

Check to enable VT-d function on MCH.

PCH-IO Configuration

This section allows you to configure the North Bridge Chipset.



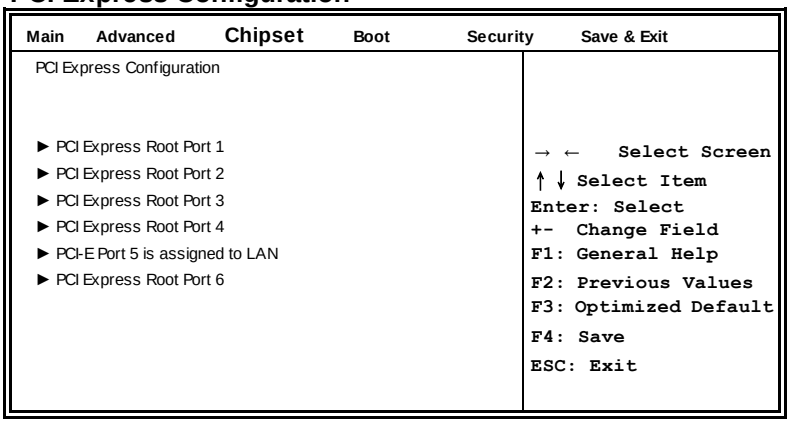
PCH LAN Controller

Enable or disable onboard NIC.

Wake on LAN

Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)

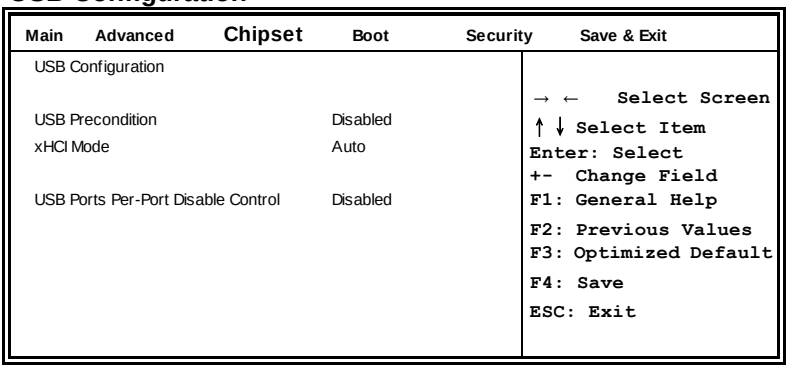
PCI Express Configuration



PCI Express Configuration

PCI Express Root Port Settings.

USB Configuration



USB Precondition

Precondition work on USB host controller and root ports for faster enumeration.

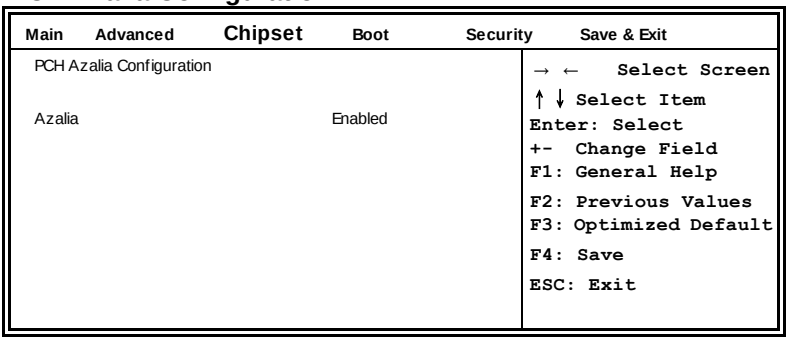
xHCI Mode

Mode of operation of xHCI controller.

USB Ports Per-Port Disable Control

Control each of the USB ports (0~13) disabling.

PCH Azalia Configuration

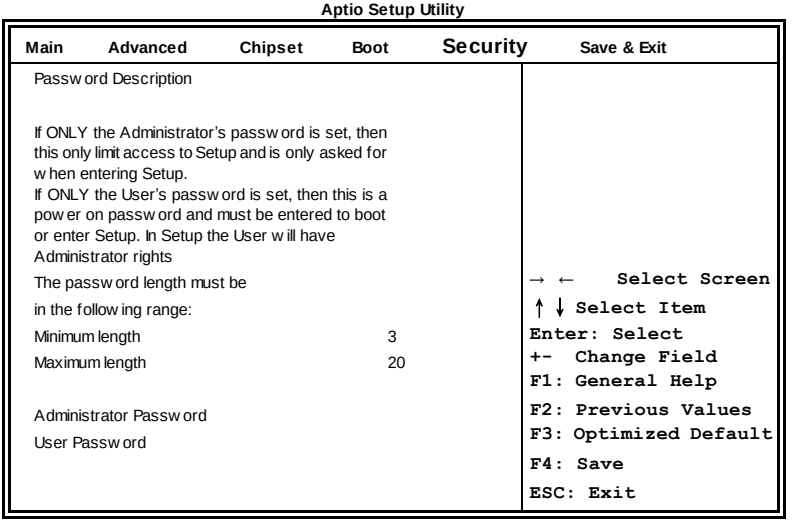


Azalia

Control Detection of the Azalia device.
Disabled = Azalia will be unconditionally be disabled.
Enabled = Azalia will be unconditionally be enabled.
Auto = Azalia will be enabled if present, disabled otherwise.

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.



Administrator Password

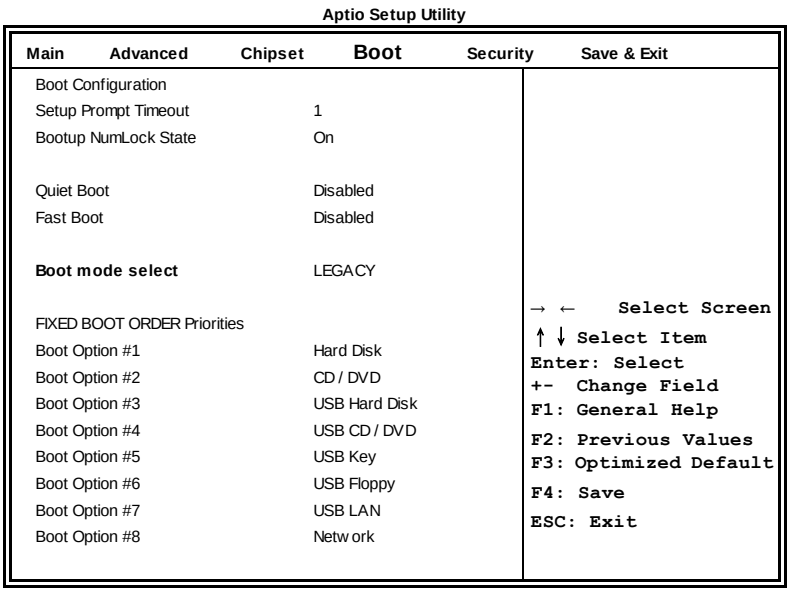
Set Setup Administrator Password.

User Password

Set User Password.

Boot Settings

This section allows you to configure the boot settings.



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/Disables Quiet Boot option.

Fast Boot

Enables/Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

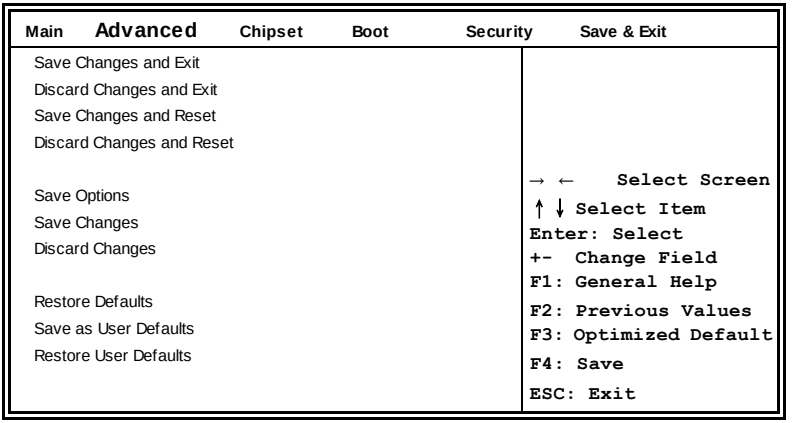
Boot mode select

Select boot mode LEGACY/UEFI

FIXED BOOT ORDER Priorities

Sets the system boot order.

Save & Exit Settings



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 board. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

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.

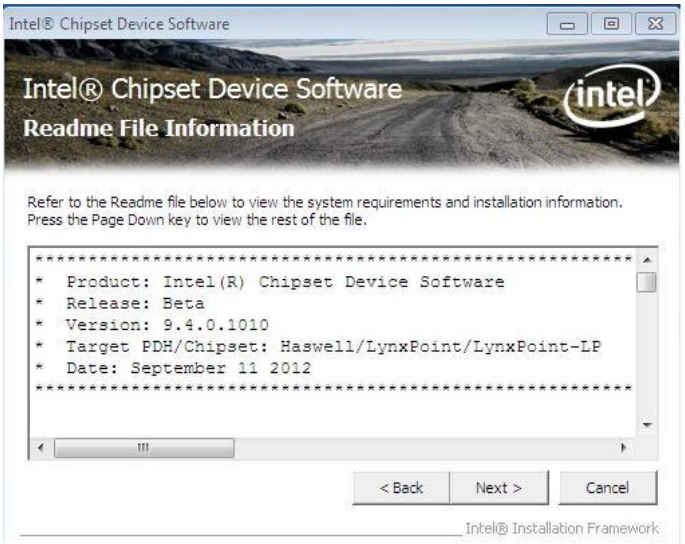
1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) Broadwell ULT Chipset Drivers***.

2. Click ***Intel(R) Chipset Software Installation Utility.***

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. On the Readme File Information screen, click ***Next*** to continue the installation.



6. The Setup process is now complete. Click ***Finish*** to restart the computer and for changes to take effect.

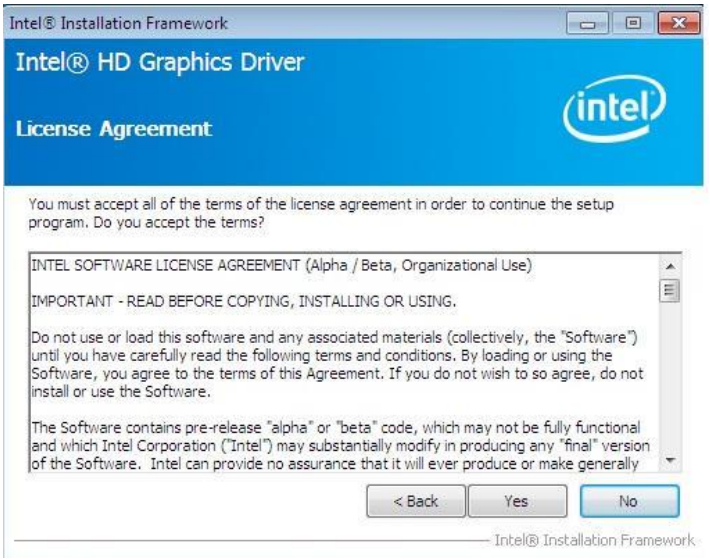
VGA Drivers Installation

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) Broadwell ULT Chipset Drivers***.

2. Click ***Intel(R) HD Graphics Driver.***

3. When the Welcome screen appears, click ***Next*** to continue.

4. Click ***Yes*** to to agree with the license agreement and continue the installation.



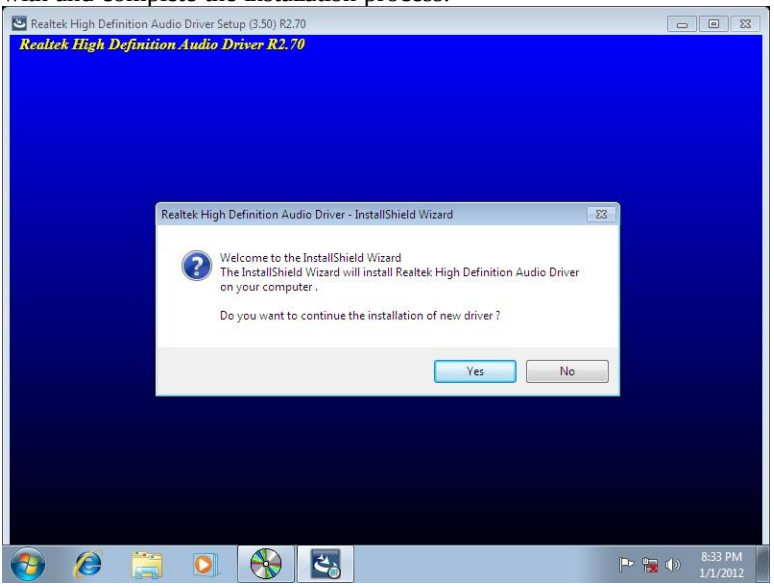
5. Setup complete. Click ***Finish*** to restart the computer and for changes to take effect.

Realtek HD Audio Driver Installation

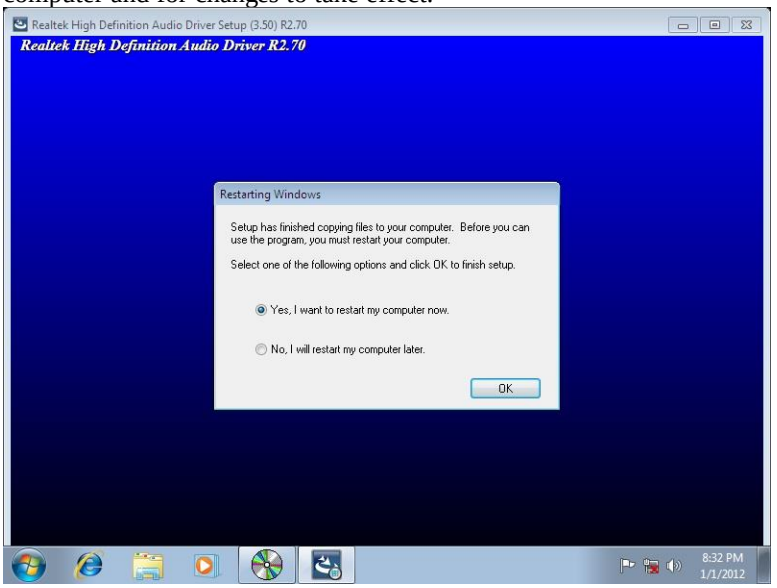
1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) Broadwell ULT Chipset Drivers***.

2. Click ***Realtek High Definition Audio Driver.***

3. On the Welcome to the InstallShield Wizard screen, click ***Yes*** to proceed with and complete the installation process.



4. The InstallShield Wizard Complete. Click ***Finish*** to restart the computer and for changes to take effect.

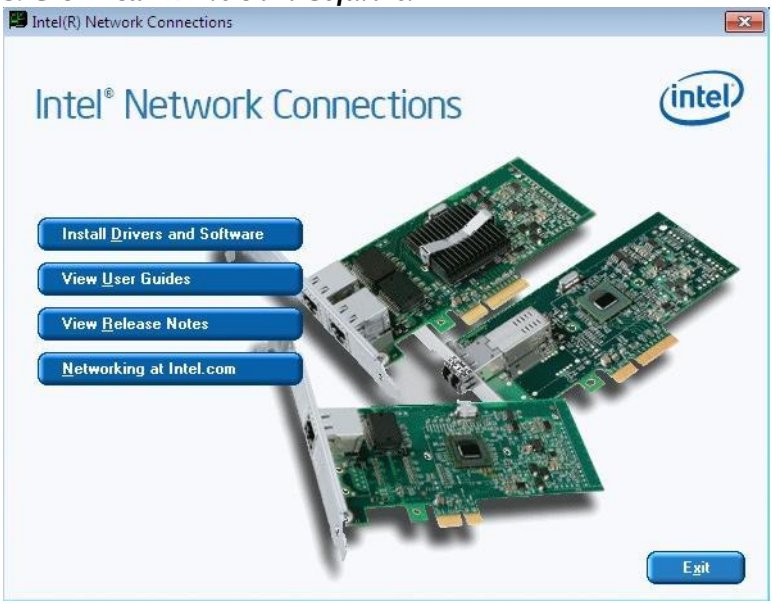


LAN Drivers Installation

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) Broadwell ULT Chipset Drivers***.

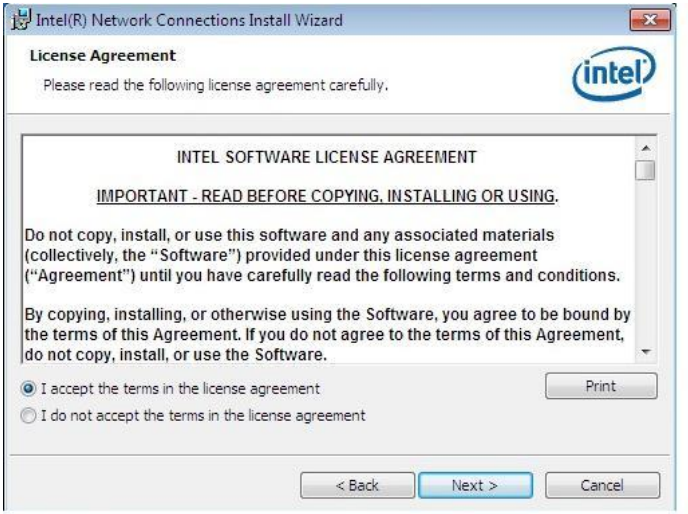
2. Click ***Intel(R) PRO LAN Network Driver.***

3. Click ***Install Drivers and Software.***

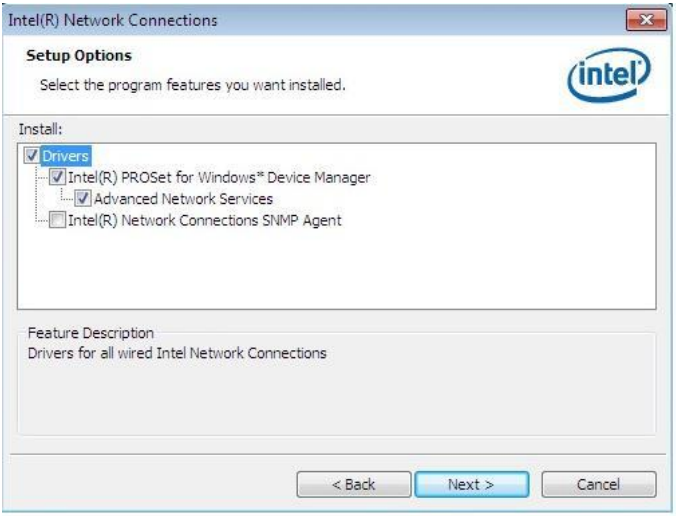


4. When the Welcome screen appears, click ***Next***.

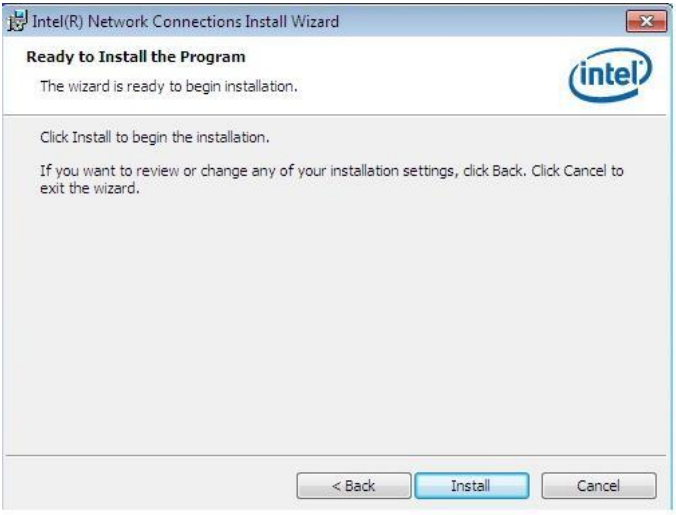
5. Click ***Next*** to to agree with the license agreement.



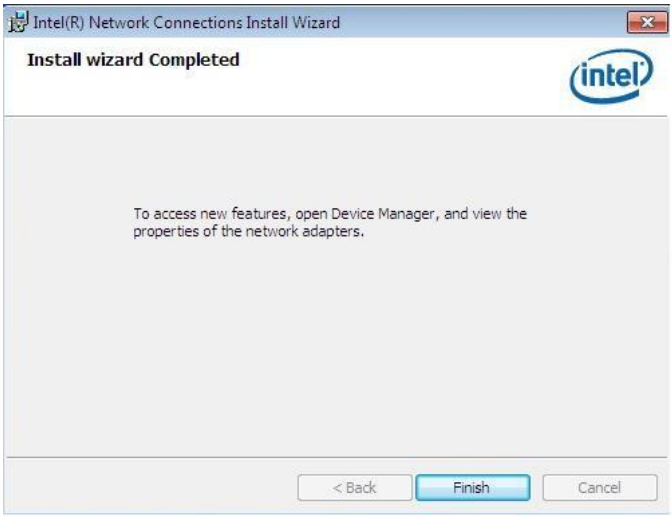
6. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.



7. The wizard is ready to begin installation. Click ***Install*** to begin the installation.



8. When InstallShield Wizard is complete, click ***Finish***.



Intel® Management Engine Interface

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) Broadwell ULT Chipset Drivers***.

2. Click ***Intel(R) AMT 10.0 Drivers***.

3. When the Welcome screen to the InstallShield Wizard for Intel® Management Engine Components, click the checkbox for **Install Intel® Control Center** & click ***Next***.

4. Click ***Yes*** to to agree with the license agreement.

5. When the Setup Progress screen appears, click ***Next***. Then, click ***Finish*** when the setup progress has been successfully installed.

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.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 021h	Interrupt Controller #1
040h - 043h	System Timer
070h - 077h	System/CMOS Real Time Clock
081h - 091h	DMA Controller #2
0A0h – 0A1h	Interrupt Controller #2
081h - 091h	DMA Controller #3
2F8h - 2FFh	Serial Port #2(COM2)
3C0h- 3DFh	Graphics adapter Controller
3F8h - 3FFh	Serial Port #1(COM1)
D000 - FFFh	PCI Root Ports

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.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	SMBus Controller
IRQ8	Real Time Clock
IRQ19	SATA AHCI Controller

C. 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:

```
//---------------------------------------------------------------------------
//
// 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 "6106"
//---------------------------------------------------------------------------
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//---------------------------------------------------------------------------
int main (int argc, char *argv[])
{
                                                    unsigned char bBuf;
                                                   unsigned char bTime;
                                                     char **endptr;

//                                                          char SIO;

                                                 printf("6106 watch dog program\n");



                                                      bTime = strtol (argv[1], endptr, 10);
                                              printf("System will reset after %d seconds\n", bTime);

                                                        if (bTime)
                                                          {
                                                        else
                                                          {

                                                 if (bTime > 0 && bTime < 256)
                                                          {

          A=2;

           unsigned char result;
           Set_6106_LD(0x08);
```

```
        gotoxy(1,12);
                                                                                pri

                                                                        }
```

```
                                                                    return 0;
}
//---------------------------------------------------------------------------
void EnableWDT(int interval)
{
                                                                    unsigned char bBuf;

                                                                    Set_6106_LD(0x08);
                                                                    Set_6106_Reg(0x30, 0x01);

                                                                    Set_6106_Reg(0xF1, interval);

}
//---------------------------------------------------------------------------
void DisableWDT(void)
{
                                                                    unsigned char bBuf;

                                                                    Set_6106_LD(0x08);
                                                                    Set_6106_Reg(0x30, 0x00);

}
//---------------------------------------------------------------------------




//---------------------------------------------------------------------------
//
// 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 "6106.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int 6106_BASE;
void Unlock_6106 (void);
void Lock_6106 (void);
//---------------------------------------------------------------------------
unsigned int Init_6106(void)
{
        unsigned int result;
        unsigned char ucDid;

        6106_BASE = 0x4E;
        result = 6106_BASE;

        ucDid = Get_6106_Reg(0x20);
        if (ucDid == 0x07)                                      //6106
        {       goto Init_Finish;       }

        6106_BASE = 0x2E;
        result = 6106_BASE;

        ucDid = Get_6106_Reg(0x20);
        if (ucDid == 0x07)                                      //6106
        {       goto Init_Finish;       }

        6106_BASE = 0x00;
        result = 6106_BASE;
```

```
Init_Finish:
        return (result);
```

```
}
//---------------------------------------------------------------------------
void Unlock_6106 (void)
{
        outportb(6106_INDEX_PORT, 6106_UNLOCK);
        outportb(6106_INDEX_PORT, 6106_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_6106 (void)
{
        outportb(6106_INDEX_PORT, 6106_LOCK);
}
//---------------------------------------------------------------------------
void Set_6106_LD( unsigned char LD)
{
        Unlock_6106();
        outportb(6106_INDEX_PORT, 6106_REG_LD);
        outportb(6106_DATA_PORT, LD);
        Lock_6106();
}
//---------------------------------------------------------------------------
void Set_6106_Reg( unsigned char REG, unsigned char DATA)
{
        Unlock_6106();
        outportb(6106_INDEX_PORT, REG);
        outportb(6106_DATA_PORT, DATA);
        Lock_6106();
}
//---------------------------------------------------------------------------
unsigned char Get_6106_Reg(unsigned char REG)
{
        unsigned char Result;
        Unlock_6106();
        outportb(6106_INDEX_PORT, REG);
        Result = inportb(6106_DATA_PORT);
        Lock_6106();
        return Result;
}
//---------------------------------------------------------------------------
```