

MI981

**Intel® Q87 Based Mini-ITX board
Mini ITX Motherboard**

USER'S MANUAL

Version 1.0

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Introduction

Product Description

The MI981 Mini ITX motherboard is based on the latest Intel® Q87 chipset. The platform supports Intel® 4th Generation Core™ DT i7/i5/i3 processors. The latest Intel® processors provide advanced performance in both computing and graphics quality. This meets the requirement of customers in the gaming, POS, digital signage and server market segment.

The platform supports two SO-DIMM sockets that can accommodate up to 16GB of DDR3-1600 Non ECC memory. The Intel® 4th Gen. Core™ DT processor integrated HD graphics supports 3 independent displays, Direct X 11.1, OpenGL 3.2, and Open CL 1.2. Display interfaces are for HDMI, DisplayPort and VGA CRT.

With two Gigabit Ethernet, the MI981 Mini ITX board utilizes the dramatic increase in performance provided Intel's latest cutting-edge technology. Expansion is provided by PCIe(16x), one full sized MiniPCIe and a half sized MiniPCIe. Onboard connectors support 4x SATA III, 4x or 6x USB 2.0 depending on the MI981 model and 6x COM ports. The board measures 170mm x 170mm.

Checklist

Your MI981 package should include the items listed below.

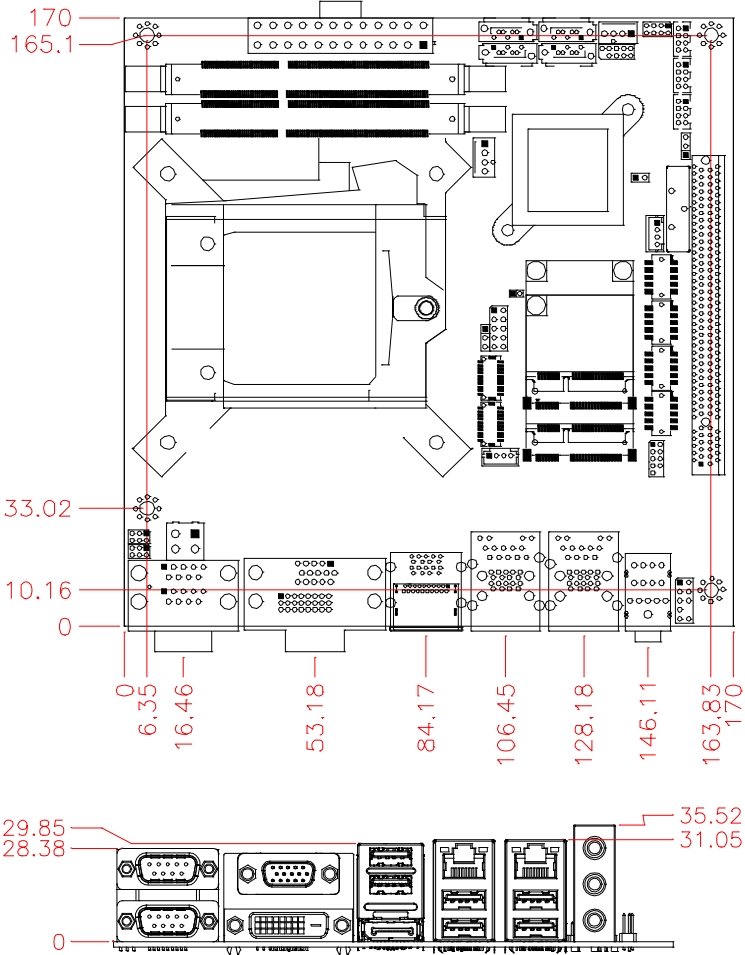
- The MI981 MINI ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility

MI981 Specifications

Model Name	MI981AF
Form Factor	Mini ITX
CPU Type	- Haswell Refresh 4 th Generation Intel® Core™ i7/i5/i3/Pentium DT processor & FCLGA1150 package [37.5 mm x 37.5mm] - TDP: 35W ~ 84W
CPU Speed	Up to 4.0GHz
Cache Size	Up to 8MB
CPU Socket	LGA1150 (Socket H3)
Chipset	Intel® Q87 PCH Package =23 mm x 22 mm, 0.65 mm ball pitch
BIOS	AMI BIOS
Memory	Haswell Refresh 4 th Generation Intel® Core™ DT processors integrated memory controller, - DDR3-1600 MHz@1.5V - SO-DIMM x 2, Max. 16GB (Non-ECC)
VGA	Haswell Refresh 4 th Generation Intel® DT processor integrated HD Gfx, supports 3 independent displays, Direct X 11.1, OpenGL 3.2, Open CL 1.2 - DVI-D x 1 (Thru port C, with level shifter ASM1442K) - DisplayPort x 1 (Thru port D) - LVDS (Thru port B, via NXP PTN3460) - VGA x 1 (Thru PCH)
LAN	1. Intel® I217LM PHY GbE 2. Intel® I211AT PCIe GbE as 2 nd LAN
USB	USB 2.0 host controller [Q87 Integrated], supports 8 ports - 6 ports via onboard pin header - 2 ports via MiniPCIe socket USB 3.0 host controller [Q87 Integrated], supports 6 ports - 6 ports via the rear panel I/O
Serial ATA	Intel® Q87 PCH built-in SATA controller, supports 4x SATA 3.0 (6Gbps)
Storage Device	mSATA x 1 thru Mini-PCIe slot [full-sized]
Audio	Intel® Q87 PCH built-in High Definition Audio controller + Realtek ALC892 w/ 7.1 channels
LPC I/O	Fintek F81866AD-1 (128-pin LQFP [14mm x 14 mm]) - COM #1 (RS232/422/485) support ring-in with power @500 mA (selectable for 5V or 12V) [EXAR SP339EER1 232/422/485 transceiver x 1 for jumper-less] - COM #2 (RS232 only), support ring-in with power @500 mA (selectable for 5V or 12V) - COM #3-COM #6 (RS232 only) Hardware Monitor (2 thermal inputs, 4 voltage monitor inputs & 2 Fan headers) - CPU FAN x 1 (PWN Fan type, 4-pin connector) SYS fan x 1 (PWM Fan type, 4-pin connector)]
Digital IO	4 in & 4 out
IAMT 9.1	Intel® Active Management Technology ver. 9.1
TPM 1.2	Infineon SLB9655

Expansion Slots	- PCI-Express (16x) x1 [Gen 3.0 PEG] - Mini PCI-Express x 2 port [1 x Full-sized, 1 x Half-sized] , both support USB 2.0 signal / supports mSATA thru full-size mini PCIe slot
Edge Connectors	Dual DB9 stack connector for COM #1 / #2 VGA + DVI-D stack connector x1 DisplayPort + dual USB (3.0) stack connector x1 RJ-45 + dual USB (3.0) stack connector x2 Triplet type Jack 3x1 for Audio port [Line-in / Line-out / Mic-in]
Onboard Header/Connector	4 ports x SATA III [Blue color] DF-11 2x4 header x 3 for 6 ports USB 2.0 DF-11 2x5 box header x 4 for COM2/3/4 (RS232 only) DF-20 20-pin connector x 2 for Dual channel LVDS 1x4 box header for LCD backlight control 2x5 header for Digital IO 2x5 header for front Audio 2x4 header for front panel I/O (2.54 pitch) 2x2 pin ATX power connector x1 1x ATX standard 24-pin type for power connector
Watchdog Timer	Yes (256 segments, 0, 1, 2...255 sec/min)
System Voltage	ATX standard 24-pins type 4 pin type (+12V only)
Other	- LAN Wakeup - iSMART 3.0
Environment	Operation Temperature: 0~60 degree C Storage Temperature: -20~80 degree C Relative humidity: 0~90%, non-condensing
Board Size	170mm x 170mm
Operation System	Windows 7, Windows 8, Linux

Board Dimensions



Installations

This section provides information on how to use the jumpers and connectors on the MI981 in order to set up a workable system. The topics covered are:

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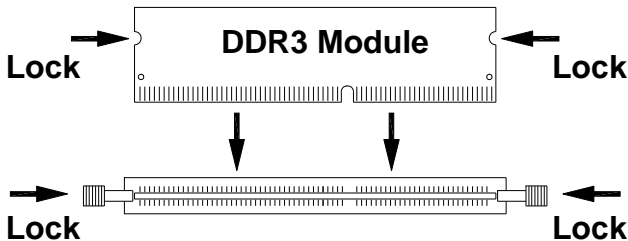
Installing the Memory

The MI981 board supports two DDR3 memory modules for a maximum total of 16GB in DDR3 SODIMM memory type.

Installing and Removing Memory Modules

To install the DDR3 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR3 module so that the key of the DDR3 module aligned with that on the memory slot.
2. Gently push the DDR3 module in an upright position until the clips of the slot close to hold the DDR3 module in place when the DDR3 module touches the bottom of the slot.
3. To remove the DDR3 module, press the clips with both hands.

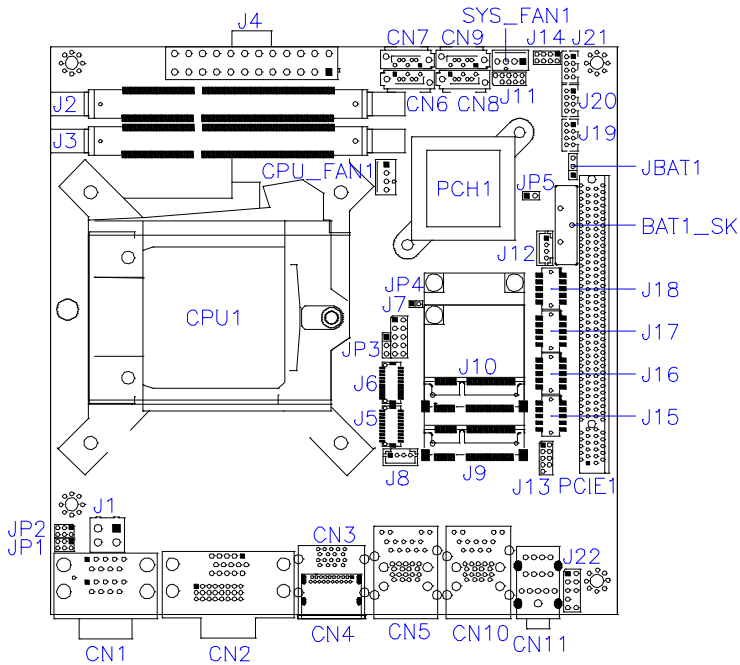


Setting the Jumpers

Jumpers are used on MI981 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 MI981 and their respective functions.

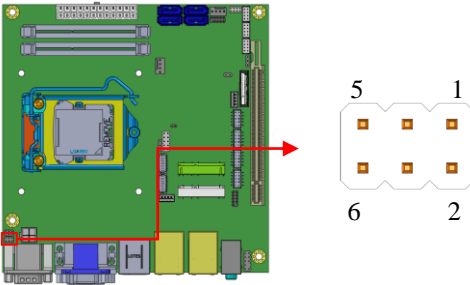
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Jumper Locations on MI981



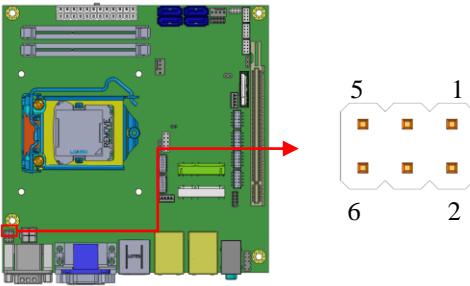
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JP1: COM2 RS232 RI/+5V/+12V Power Setting



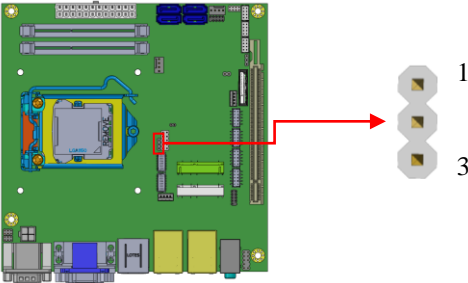
JP1	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 3-5 Short/Closed	+5V



JP2: COM1 RS232 RI/+5V/+12V Power Setting



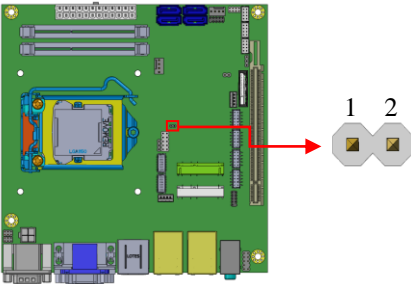
JP2	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 3-5 Short/Closed	+5V

JP3: LVDS Panel Power Selection



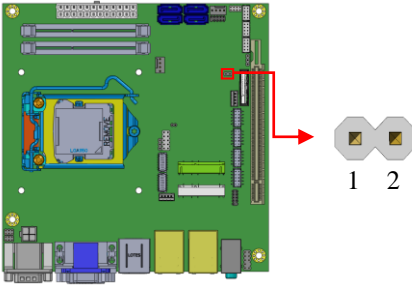
JP3	Setting	Panel Voltage
	Pin 1-2 Short/Closed	3.3V (default)
	Pin 2-3 Short/Closed	5V

JP4: Power Good Selection



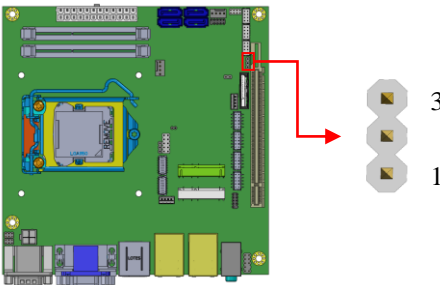
JP4	Function
Short	Factory use only
Open	Normal



JP5: Flash Descriptor Security Override (Factory use only)



JP5	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled

JBAT1: Clear CMOS Contents

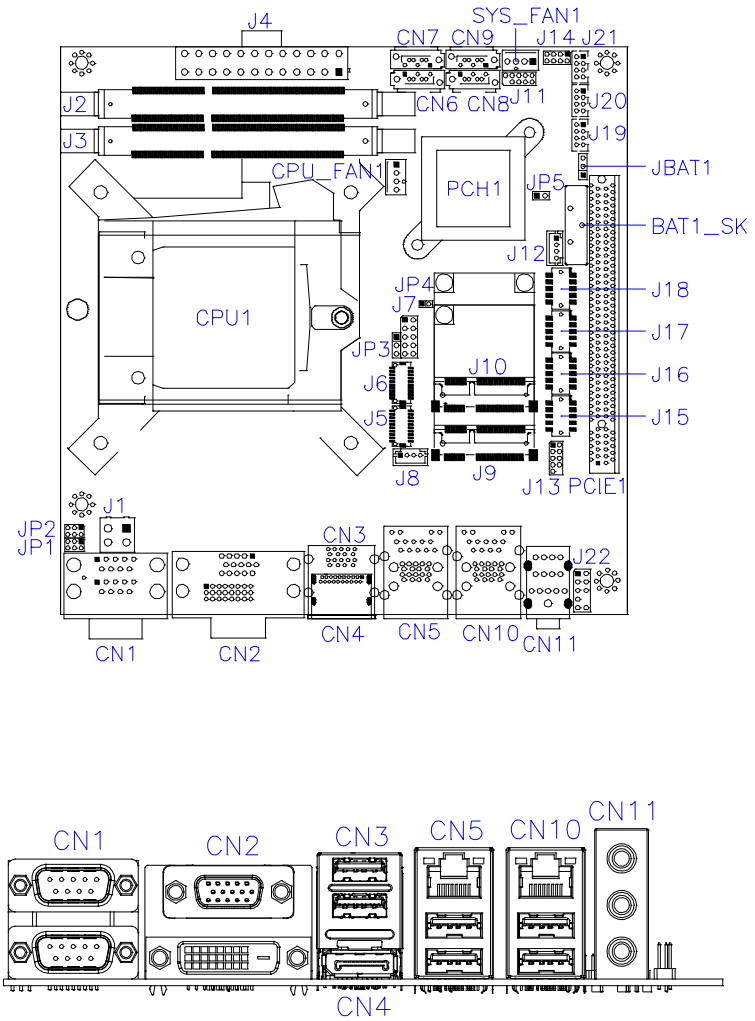


JBAT1	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Normal
 1 2 3	Pin 2-3 Short/Closed	Clear CMOS

Connectors on MI981

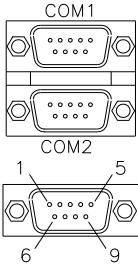
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Connector Locations on MI981



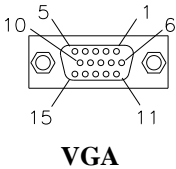
INSTALLATIONS

CN1: COM1 and COM2 Serial Ports

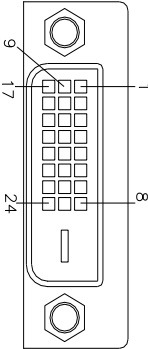


Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC

CN2: VGA and DVI-D Connector



Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	N.C.
GND	5	6	GND
GND	7	8	GND
N.C.	9	10	GND
N.C.	11	12	DDCDATA
HSYNC	13	14	VSYNC
DDCCLK	15		



Signal Name	Pin #	Pin #	Signal Name
DATA 2-	1	16	HOT POWER
DATA 2+	2	17	DATA 0-
GROUND	3	18	DATA 0+
N.C.	4	19	GROUND
N.C.	5	20	N.C.
DDC CLOCK	6	21	N.C.
DDC DATA	7	22	GROUND
N.C	8	23	CLOCK +
DATA 1-	9	24	CLOCK -
DATA 1+	10		
GROUND	11		
N.C.	12		
N.C.	13		
DDC POWER	14		
GROUND	15		

CN3: USB3.0 Connector

CN4: DP Connector

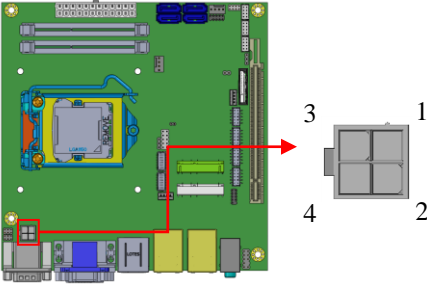
CN5: Gigabit LAN (Intel I217LM) / USB3.0

CN6, CN7, CN8, CN9: SATA Connectors

CN10: Gigabit LAN (Intel I211AT) / USB3.0

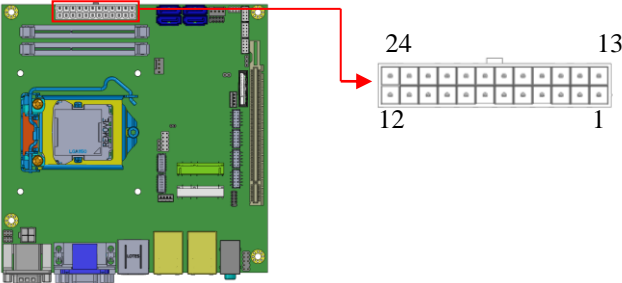
CN11: HD Audio Connector

J1: ATX 12V Power Connector



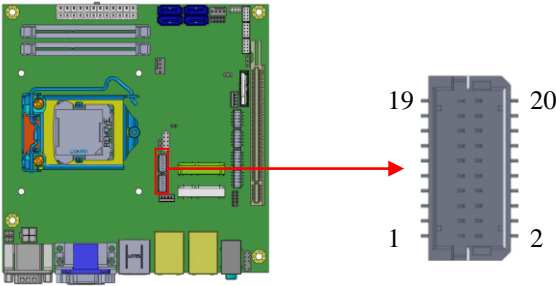
Pin #	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

J4: ATX Power Supply Connector



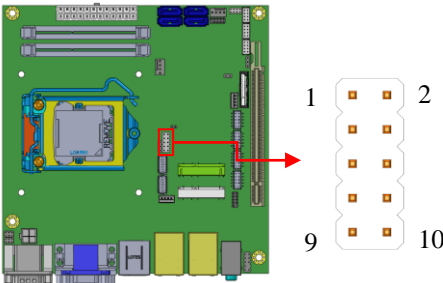
Signal Name	Pin #	Pin #	Signal Name
3.3V	13	1	3.3V
-12V	14	2	3.3V
Ground	15	3	Ground
PS-ON	16	4	+5V
Ground	17	5	Ground
Ground	18	6	+5V
Ground	19	7	Ground
-5V	20	8	Power good
+5V	21	9	5VSB
+5V	22	10	+12V
+5V	23	11	+12V
Ground	24	12	+3.3V

J5, J6: LVDS Connectors



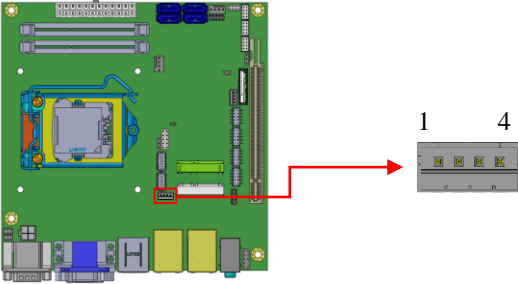
Signal Name	Pin #	Pin #	Signal Name
LCD_PWR	19	20	LCD_PWR
LD3+	17	18	LD3-
GND	15	16	GND
CLK+	13	14	CLK-
GND	11	12	GND
LD2+	9	10	LD2-
GND	7	8	GND
LD1+	5	6	LD1-
GND	3	4	GND
LD0+	1	2	LD0-

J7: Digital I/O



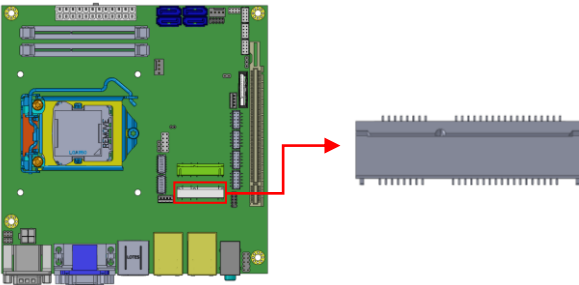
Signal Name	Pin	Pin	Signal Name
GND	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

J8: LCD Backlight Connector

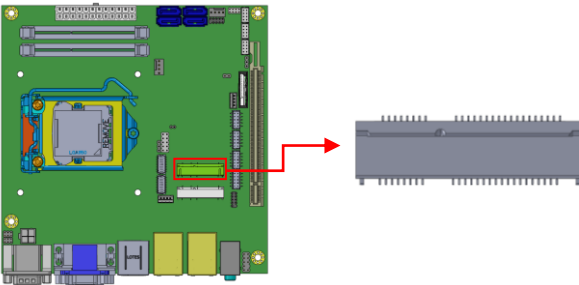


Pin #	Signal Name
1	Backlight Power
2	Backlight Enable
3	Brightness Control
4	Ground

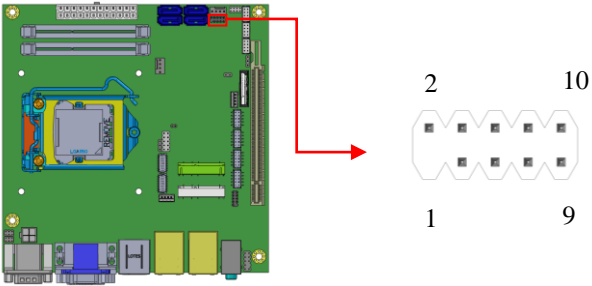
J9: Mini PCIE/mSATA Connector



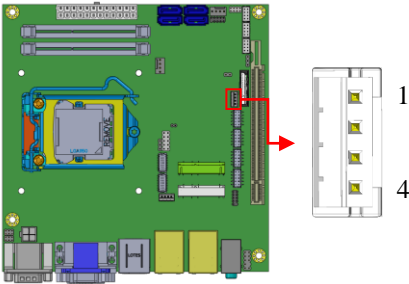
J10: Mini PCIE Connector



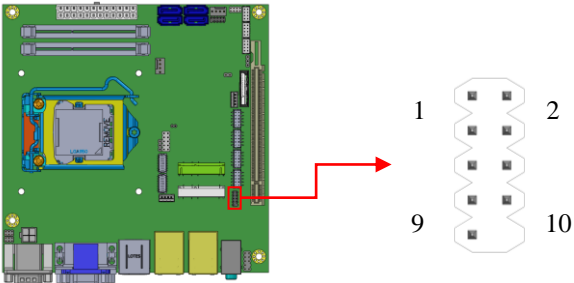
J11: SPI Flash Connector (Factory use only)



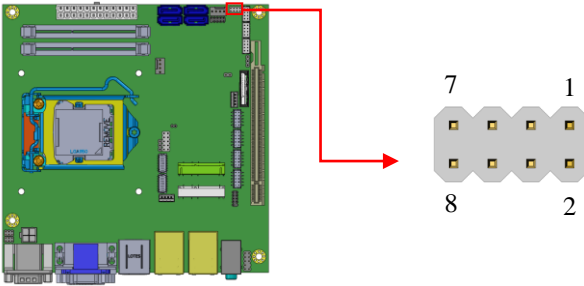
J12: MCU Flash Connector (factory use only)



J13: Debug 80 Port Connector (factory use only)



J14: Front Panel Function Connector



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.

Hard Disk Drive LED Connector: Pins 3 and 4

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
4	HDD Active
3	3.3V

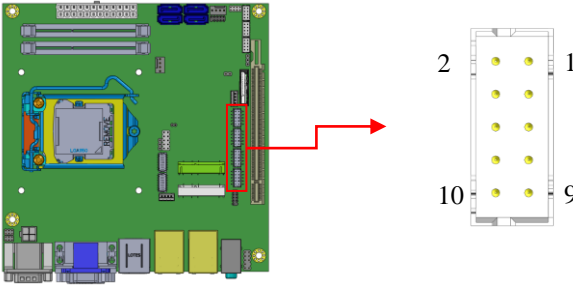
Reset Switch: Pins 5 and 6

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.

Power LED: Pins 7 and 8

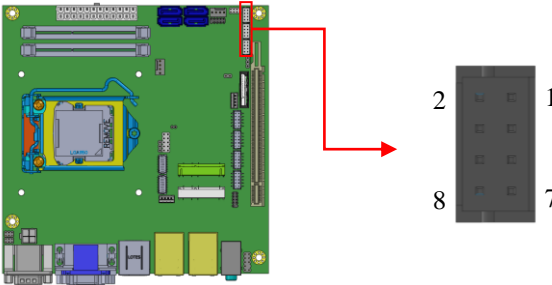
Pin #	Signal Name
7	+5V
8	GND

J15, J16, J17, J18: COM3/COM4/COM5/COM6 Connector



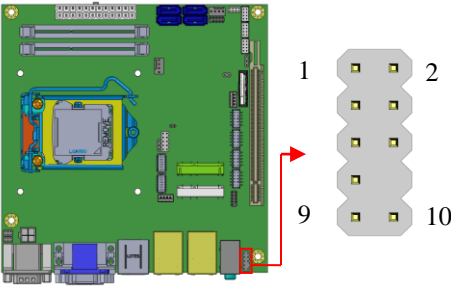
Signal Name	Pin #	Pin #	Signal Name
DCD, Data carrier detect	1	2	RXD, Receive data
TXD, Transmit data	3	4	DTR, Data terminal ready
GND, ground	5	6	DSR, Data set ready
RTS, Request to send	7	8	CTS, Clear to send
RI, Ring indicator	9	10	Not Used

J19, J20, J21: USB Connectors



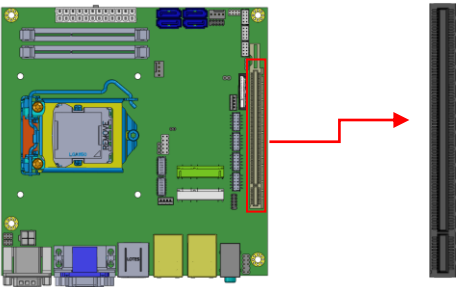
Signal Name	Pin	Pin	Signal Name
VCC	1	2	GND
D0-	3	4	D1+
D0+	5	6	D1-
GND	7	8	VCC

J22: Audio Front Header

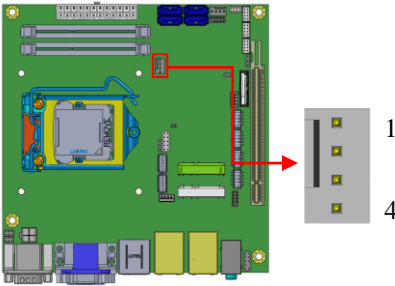


Signal Name	Pin #	Pin #	Signal Name
MIC2_L	1	2	Ground
MIC2_R	3	4	Presence#
Line2_R	5	6	MIC2_ID
Sense	7	8	NC
Line2_L	9	10	Line2_ID

PCIE1: PCI-E X16 Slot

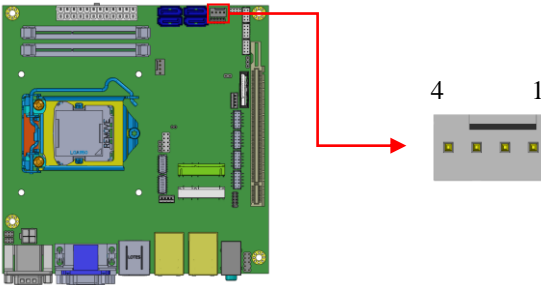


CPU_FAN1: CPU Fan Power Connector



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

SYS_FAN1: System Fan1 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 AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

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BIOS Introduction

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 has 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 key immediately allows you to enter the Setup utility. If you are a little bit late pressing the 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 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

Aprio Setup Utility – Copyright © 2012 American Megatrends, Inc.

Main	Advanced	Chipset	Boot	Security	Save & Exit
System Language		[English]			Choose the system default language → ← Select Screen
System Date		[Tue 01/20/2009]			↑ ↓ Select Item
System Time		21:25:55			Enter: Select
Access Level		Administrator			+ - Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit

System Language

Choose the system default language.

System Date

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

System Time

Set the Time. Use Tab to switch between Time 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.

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Main	Advanced	Chipset	Boot	Security	Save & Exit
	<ul style="list-style-type: none"> ▶ PCI Subsystem Settings ▶ ACPI Settings ▶ Trusted Computing ▶ Wake up event Configuration ▶ CPU Configuration ▶ SATA Configuration ▶ Shutdown Temperature Configuration ▶ LVDS (eDP/DP) Configuration ▶ iSmart Controller 3.1 ▶ AMT Configuration ▶ USB Configuration ▶ F81866 Super IO Configuration ▶ F81866 H/W Monitor 				→ ← Select Screen ↑ ↓ Select Item Enter: Select + - Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

PCI Subsystem Settings

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Main	Advanced	Chipset	Boot	Security	Save & Exit
	PCI Bus Driver Version		V 2.05.02		→ ← Select Screen
	PCI Common Settings				↑ ↓ Select Item
	PCI Latency Timer		32 PCI Bus Clocks		Enter: Select
	VGA Palette Snoop		Disabled		+ - Change Opt.
	PERR# Generation		Disabled		F1: General Help
	SERR# Generation		Disabled		F2: Previous Values
	▶ PCI Express Settings				F3: Optimized Defaults
					F4: Save & Exit
					ESC: Exit

PCI Latency Timer

Value to be programmed into PCI Latency Timer Register.

VGA Palette Snoop

Enables or disables VGA Palette Registers Snooping.

PERR# Generation

Enables or disables PCI device to generate PERR#.

SERR# Generation

Enables or disables PCI device to generate SERR#.

PCI Express Settings

Change PCI Express devices settings.

PCI Express Settings

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Express Device Register Settings					
Relaxed Ordering			Disabled		
Extended Tag			Disabled		
No Snoop			Enabled		
Maximum Payload			Auto		
Maximum Read Request			Auto		
PCI Express Link Register Settings					
ASPM Support			Disabled		
WARNING: Enabling ASPM may cause some PCI-E devices to fail					→ ← Select Screen
Extended Synch			Disabled		↑ ↓ Select Item
Link Training Retry			5		Enter: Select
Link Training Timeout (uS)			100		+ - Change Field
Unpopulated Links			Keep Link ON		F1: General Help
Restore PCIE Registers			Disabled		F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Relaxed Ordering

Enables or disables PCI Express Device Relaxed Ordering.

Extended Tag

If ENABLED allows device to use 8-bit Tag field as a requester.

No Snoop

Enables or disables PCI Express Device No Snoop option.

Maximum Payload

Set Maximum Payload of PCI Express Device or allow System BIOS to select the value.

Maximum Read Request

Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value.

ASPM Support

Set the ASPM Level: Force L0s – Force all links to L0s State:
 AUTO – BIOS auto configure: DISABLE – Disables ASPM.

Extended Synch

If ENABLED allows generation of Extended Synchronization patterns.

Link Training Retry

Defines number of Retry Attempts software will take to retrain the link if previous training attempt was unsuccessful.

Link Training Timeout (uS)

Defines number of Microseconds software will wait before polling 'Link Training' bit in Link Status register. Value range from 10 to 1000 uS.

Unpopulated Links

In order to save power, software will disable unpopulated PCI Express links, if this option set to 'Disable Link'.

Restore PCIE Registers

On non-PCI Express aware OS's (Pre Windows Vista) some devices may not be correctly reinitialized after S3. Enabling this restore PCI Express device configuration on S3 resume

Warning: Enabling this may cause issues with other hardware after S3 resume.

ACPI Settings

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
ACPI Settings					→ ← Select Screen
Enable Hibernation			Enabled		↑ ↓ Select Item
ACPI Sleep State			S3 (Suspend to R...)		Enter: Select
Lock Legacy Resources			Disabled		+ - Change Field
S3 Video Repost			Disabled		F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

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.

S3 Video Repost

Enable or disable S3 Video Repost.

Trusted Computing

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Main	Advanced	Chipset	Boot	Security	Save & Exit
Configuration					
Security Device Support			Disabled		
Current Status Information					
SUPPORT TURNED OFF					
					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

Security Device Support

This configuration is supported only with MI981AF. Enables or disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

TPM State

Enable/Disable Security Device. NOTE: Your Computer will reboot during restart in order to change State of the Device.

Pending operation

Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.

Wake up event settings

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Main	Advanced	Chipset	Boot	Security	Save & Exit
			Wake on Ring	Disabled	
			Wake on PCIE Wake Event	Disabled	
					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

Wake up by Ring / Wake up by PCIE WAKE#

The options are Disabled and Enabled.

CPU Configuration

This section shows the CPU configuration parameters.

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Main	Advanced	Chipset	Boot	Security	Save & Exit
CPU Configuration					
Intel(R) CPU Core(TM)i3-4340TE @ 2.60GHz					
CPU Signature			306c3		
Processor Family			6		
Microcode Patch			17		
FSB Speed			100MHz		
Max CPU Speed			2600 MHz		
Min CPU Speed			800 MHz		
CPU Speed			2600 MHz		
Processor Cores			2		
Intel HT Technology			Supported		
Intel VT-x Technology			Supported		
Intel SMX Technology			Supported		
64-bit			Supported		
EIST			Supported		
Hyper-threading			Enabled		
Active Processor Cores			All		
Execute Disable Bit			Enabled		
Intel Virtualization Technology			Enabled		
Boot performance mode			Turbo performance		
EIST			Enabled		
					→ ← Select Screen
					↑ ↓ Select Item
					Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Active Processor Cores

Number of cores to enable in each processor package.

Execute Disable Bit

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS

Intel Virtualization Technology

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

Boot Performance Mode

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

EIST

Enabled/Disabled Intel Speedstep.

SATA Configuration

SATA Devices Configuration.

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Main	Advanced	Chipset	Boot	Security	Save & Exit
	SATA Controller(s)		Enabled		
	SATA Mode Selection		AHCI		
	SATA Controller Speed		Default		
	SATA Port0		Empty		
	Software Preserve		Unknown		
	Hot Plug		Dissabled		
	SATA Port1		Empty		
	Software Preserve		Unknown		
	Hot Plug		Dissabled		
	SATA Port2		Empty		
	Software Preserve		Unknown		
	Hot Plug		Dissabled		→ ← Select Screen
	SATA Port3		Empty		↑ ↓ Select Item
	Software Preserve		Unknown		Enter: Select
	Hot Plug		Dissabled		+ - Change Opt.
	SATA Port4		Empty		F1: General Help
	Software Preserve		Unknown		F2: Previous Values
	Hot Plug		Dissabled		F3: Optimized Defaults
	SATA Port5		Empty		F4: Save & Exit
	Software Preserve		Unknown		ESC: Exit
	Hot Plug		Dissabled		

SATA Controller(s)

Enable or disable SATA Device.

SATA Mode Selection

Determines how SATA controller(s) operate.

- (1) IDE Mode.
- (2) AHCI Mode.
- (3) RAID Mode. (MI981AF only)

SATA Controller Speed

Indicates the maximum speed the SATA controller can support.

Hot Plug

Designates this port as Hot Pluggable.

Shutdown Temperature Configuration

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Main	Advanced	Chipset	Boot	Security	Save & Exit
ACPI Shutdown Temperature			Disabled		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save ESC: Exit

ACPI Shutdown Temperature

The default setting is Disabled.

LVDS (eDP/DP) Configuration

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Main	Advanced	Chipset	Boot	Security	Save & Exit
LVDS (eDP/DP) Configuration					
DP/eDP LVDS Control		Disable		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save ESC: Exit	

DP/eDP LVDS Control

The default setting is Disabled.

iSmart Controller 3.1

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Main	Advanced	Chipset	Boot	Security	Save & Exit
iSmart Controller 3.1					→ ← Select Screen
Power-On after Power failure			Disable		↑ ↓ Select Item
Temperature Guardian			Disable		Enter: Select
Schedule Slot 1			None		+ - Change Opt.
Schedule Slot 2			None		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.

Temperature Guardian

Generate the reset signal when system hangs up on POST

Schedule Slot 1 / 2

Setup the hour/minute for system power on.

AMT Configuration

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Main	Advanced	Chipset	Boot	Security	Save & Exit
			Intel AMT	Enabled	
			BIOS Hotkey Pressed	Disabled	
			MEBx Selection Screen	Disabled	
			Hide Un-Configure ME Confirmation	Disabled	
			Un-Configure ME	Disabled	→ ← Select Screen
			Amt Wait Timer	0	↑ ↓ Select Item
			Activate Remote Assistance Process	Disabled	Enter: Select
			USB Configure	Enabled	+ - Change Opt.
			PET Progress	Enabled	F1: General Help
			AMT CIRA Timeout	0	F2: Previous Values
			Watchdog	Disabled	F3: Optimized Defaults
			OS Timer	0	F4: Save & Exit
			BIOS Timer	0	ESC: Exit

AMT configuration is supported only with MI981AF (with iAMT function).

Intel AMT

Enable/Disable Intel (R) Active Management Technology BIOS Extension.

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.

BIOS Hotkey Pressed

OEMFLag Bit 1: Enable/Disable BIOS hotkey press.

AMT Configuration

OEMFLag Bit 2: Enable/Disable MEBx selection screen.

Hide Un-Configure ME Configuration

OEMFLag Bit 6: Hide Un-Configure ME without password Confirmation Prompt.

Un-Configure ME

OEMFLag Bit 15: Un-Configure ME without password.

Amt Wait Timer

Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

Activate Remote Assistance Process

Trigger CIRA boot.

USB Configure

Enable/Disable USB Configure function.

PET Progress

User can Enable/Disable PET Events progress to receive PET.

Watchdog Timer

Enable/Disable Watchdog Timer.

USB Configuration

Aptio Setup Utility – Copyright © 2012 American Megatrends, Inc.

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Module Version		8.10.28			
USB Devices: 2 Keyboards, 1 Mouse, 2 Hubs					
Legacy USB Support		Enabled		→ ← Select Screen	
USB3.0 Support		Enabled		↑ ↓ Select Item	
XHCI Hand-off		Enabled		Enter: Select	
EHCI Hand-off		Enabled		+- Change Opt.	
USB Mass Storage Driver Support		Enabled		F1: General Help	
USB hardware delays and time-outs:					
USB Transfer time-out		20 sec		F2: Previous Values	
Device reset time-out		20 sec		F3: Optimized Defaults	
Device power-up delay		Auto		F4: Save & Exit	
				ESC: Exit	

Legacy USB Support

Enables Legacy USB support.

AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep 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

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

USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support.

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.

F81866 Super IO Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Super IO Configuration					
F81866 Super IO Chip			F81866		
▶ Serial Port 1 Configuration					→ ← Select Screen
▶ Serial Port 2 Configuration					↑ ↓ Select Item
▶ Serial Port 3 Configuration					Enter: Select
▶ Serial Port 4 Configuration					+ - Change Field
▶ Serial Port 5 Configuration					F1: General Help
▶ Serial Port 6 Configuration					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

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.

F81866 H/W Monitor

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Main	Advanced	Chipset	Boot	Security	Save & Exit
PC Health Status					
CPU temperature		+33.0 C			
System temperature		+34.5 C			
CPU Fan Speed		4066 RPM			
System Fan Speed		N/A			→ ← Select Screen
Vcore		+1.704 V			↑ ↓ Select Item
+5V		+5.144 V			Enter: Select
+12V		+12.096V			+ - Change Opt.
+1.5V		+1.512V			F1: General Help
+3.3V		+3.424			F2: Previous Values
CPU smart fan control		Disabled			F3: Optimized Defaults
System smart fan control		Disabled			F4: Save & Exit
					ESC: Exit

CPU/System smart fan control

This field enables or disables the smart fan feature.

Disabled (default)

50 °C

60 °C

70 °C

80 °C

90 °C

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.

PCI Express Configuration

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Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Express Configuration					
DMI Link ASPM Control			Disabled		
DMI Link Extended Synch Control			Disabled		
PCIe-USB Glitch W/A			Disabled		
Subtractive Decode			Disabled		
▶ PCI Express Root Port 1					→ ← Select Screen
▶ PCI Express Root Port 2					↑ ↓ Select Item
▶ PCI Express Root Port 3					Enter: Select
▶ PCI Express Root Port 4					+ - Change Opt.
▶ PCI Express Root Port 5					F1: General Help
PCI-E Port 6 is assigned to LAN					F2: Previous Values
▶ PCI Express Root Port 7					F3: Optimized Defaults
▶ PCI Express Root Port 8					F4: Save & Exit
					ESC: Exit

DMI Link ASPM Control

The control of Active State Power Management on both NB side and SB side of the DMI Link.

DMI Link Extended Synch Control

The control of Extended Synch on SB side of the DMI Link.

PCIe-USB Glitch W/A

PCIe-USB Glitch W/A for bad USB device(s) connected behind PCIe/PEG port.

Subtractive Decode

Enable or disable PCI Express Subtractive Decode.

USB Configuration

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Precondition			Disabled	→ ← Select Screen	
xHCI Mode			Auto	↑ ↓ Select Item	
USB Ports Per-Port Disable Control			Disabled	Enter: Select	
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

USB Precondition

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

PCH Azalia Configuration

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Main	Advanced	Chipset	Boot	Security	Save & Exit
PCH Azalia Configuration					
Azalia			Auto	→ ← Select Screen	
					↑ ↓ Select Item
					Enter: Select
					+ - Change Opt.
					F1: General Help
					F2: Previous Values
					F3: Optimized Defaults
					F4: Save & Exit
					ESC: Exit

Azalia

Control Detection of the Azalia device.

Disabled = Azalia will be unconditionally disabled.

Enabled Azalia will be unconditionally Enabled.

Auto = Azalia will be enabled if present, disabled otherwise.

System Agent (SA) Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
		System Agent Bridge Name	Haswell		
		System Agent RC Version	1.8.0.0		
		VT-d Capability	Unsupported		
		CHAP Device (B0:D7:F0)	Disabled		→ ← Select Screen
		Thermal Device (B0:D4:F0)	Disabled		↑ ↓ Select Item
		CPU SA Audio Device (B0:D3:F0)	Enabled		Enter: Select
		Enable NB CRID	Disabled		+ - Change Field
		▶ Graphics Configuration			F1: General Help
		▶ Memory Configuration			F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

VT-d

Check to enable VT-d function on MCH.

Enable NB CRID

Enable or disable NB CRID WorkAround.

Graphics Configuration

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Main	Advanced	Chipset	Boot	Security	Save & Exit
		Graphics Configuration			
		IGFX VBIOS Version	2179		
		IGfx Frequency	700 MHz		→ ← Select Screen
		Primary Display	Auto		↑ ↓ Select Item
		Primary PEG	Auto		Enter: Select
		Primary PCIe	Auto		+ - Change Opt.
		Internal Graphics	Auto		F1: General Help
		Aperture Size	256MB		F2: Previous Values
		DVMT Pre-Allocated	32M		F3: Optimized Defaults
		DVMT Total Gfx Mem	256MB		F4: Save & Exit
					ESC: Exit

Primary Display

Select which of IGFX/PEG/PCI graphics device should be Primary Display or select SG for switchable Gfx.

Primary PEG

Select PEG0/PEG1/PEG2/PEG3 Graphics device should be Primary PEG.

BIOS SETUP

Primary PCIE

Select PCIE0/PCIE1/PCIE2/PCIE3/PCIE4/PCIE5/PCIE6/PCIE7
Graphics device should be Primary PCIE.

Internal Graphics

Keep IGD enabled based on the setup options.

Aperture Size

Select the Aperture Size.

DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory Size used by the Internal Graphics Device.

DVMT Total Gfx Mem

Select DVMT 5.0 Total Graphics Memory Size used by the Internal Graphics Device.

Memory Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Memory Information					
Memory Frequency			1333 MHz		
Total Memory			4096 MB (DDR3)		
DIMM#0			2048 MB (DDR3)		
DIMM#1			Not Present		→ ← Select Screen
DIMM#2			2048 MB (DDR3)		↑ ↓ Select Item
DIMM#3			Not Present		Enter: Select
CAS Latency (tCL)			11		+ - Change Field
Minimum delay time					F1: General Help
CAS to RAS (tRCDmin)			11		F2: Previous Values
Row Precharge (tRPmin)			11		F3: Optimized Default
Active to Precharge (tRASmin)			28		F4: Save ESC: Exit

Boot Settings

This section allows you to configure the boot settings.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Boot Configuration					
Setup Prompt Timeout			1		
Bootup NumLock State			On		
Quiet Boot			Disabled		
Fast Boot			Disabled		
Boot mode Select			LEGACY		
FIXED BOOT ORDER Priorities					
Boot Option #1			Hard Disk		
Boot Option #2			CD/DVD		
Boot Option #3			USB Hard Disk		
Boot Option #4			USB CD/DVD		
Boot Option #5			USB Key		
Boot Option #6			USB Floppy		
Boot Option #7			Network		
▶ CSM16 Parameters					
CSM Parameters					
				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

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.

FIXED BOOT ORDER Priorities

Sets the system boot order.

CSM parameters

This section allows you to configure the boot settings.

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Main	Advanced	Chipset	Boot	Security	Save & Exit
Launch CSM			Enabled		
Boot option filter			UEFI and Legacy		→ ← Select Screen
Launch PXE OpROM policy			Do not launch		↑ ↓ Select Item
Launch Storage OpROM policy			Legacy only		Enter: Select
Launch Video OpROM policy			Legacy only		+ - Change Opt.
					F1: General Help
					F2: Previous Values
					F3: Optimized Defaults
					F4: Save & Exit
					ESC: Exit
Other PCI device ROM priority			Legacy OpROM		

Launch CSM

This option controls if CSM will be launched.

Boot option filter

This option controls what devices system can boot to.

Launch PXE OpROM policy

Controls the execution of UEFI and Legacy PXE OpROM.

Launch Storage OpROM policy

Controls the execution of UEFI and Legacy Storage OpROM.

Launch Video OpROM policy

Controls the execution of UEFI and Legacy Video OpROM.

Other PCI device ROM priority

For PCI devices other than Network, Mass storage or Video defines which OpROM to launch.

Save & Exit Settings

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Main	Advanced	Chipset	Boot	Security	Save & Exit
Save Changes and Exit					
Discard Changes and Exit					
Save Changes and Reset					
Discard Changes and Reset					
Save Options					
Save Changes					
Discard Changes					
Restore Defaults					
Save as User Defaults					
Restore User Defaults					

→ ← 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	52
VGA Drivers Installation.....	53
Realtek HD Audio Driver Installation	54
LAN Drivers Installation	55
Intel® Management Engine Interface	56
Intel® USB 3.0 Drivers	57

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) 8 Series 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) 8 Series Chipset Drivers*. Click *Intel(R) Graphics Driver*.

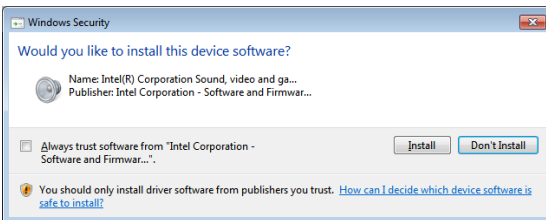
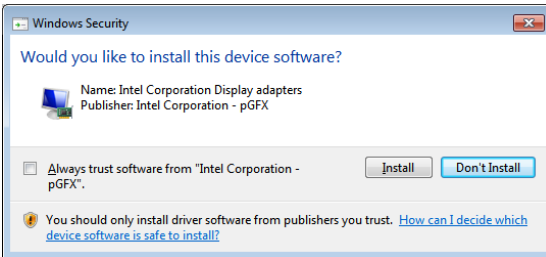


2. When the Welcome screen appears, click *Next* to continue.

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

4. On the Readme File Information screen, click *Next* to continue the installation of the Intel® HD Graphics Driver.

5. On the screen shown below, click *Install* to continue.



6. On the Setup Progress screen, click *Next* to continue.

7. 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) 8 Series Chipset Drivers*. Click *Realtek High Definition Audio Driver*.



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

3. 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) 8 Series Chipset Drivers*. Click *Intel(R) PRO LAN Network Drivers*.



2. Click *Install Drivers and Software*.

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

5. Click *Next* 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



The following application requires Microsoft .NET Framework 3.5 or later: Intel® Management Engine Components. Please install the latest version of Microsoft .NET Framework from Microsoft Download Center to run this application correctly.

Follow the steps below to install the Intel Management Engine.

1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) 8 Series Chipset Drivers* and then *Intel(R) ME 9.0 Drivers*.



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

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

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

Intel® USB 3.0 Drivers

1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) 8 Series Chipset Drivers**. Click **Intel(R) USB 3.0 Drivers**.



2. When the Welcome screen to the InstallShield Wizard for Intel® USB 3.0 eXtensible Host Controller Driver, click **Next**.

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

4. On the Readme File Information screen, click **Next** to continue the installation of the Intel® USB 3.0 eXtensible Host Controller Driver.

5. When the Setup Progress screen appears, click **Next**. Setup complete. Click **Finish** to restart the computer and for changes to take effect.

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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
0000h-001Fh	Direct memory access controller
0000h-001Fh	PCI bus
0040h-0043h	System timer
0050h-0053h	System timer
0070h-0077h	System CMOS/real time clock
0081h-0091h	Direct memory access controller
0093h-009Fh	Direct memory access controller
00C0h-00DFh	Direct memory access controller
00F0h-00F0h	Numeric data processor
02E0h-02E7h	Communications Port (COM6)
02E8h-02EFh	Communications Port (COM4)
02F0h-02F7h	Communications Port (COM5)
02F8h-02FFh	Communications Port (COM2)
03B0h-03BBh	Intel(R) HD Graphics 4600
03C0h-03DFh	Intel(R) HD Graphics 4600
03E8h-03EFh	Communications Port (COM3)
03F8h-03FFh	Communications Port (COM1)
0D00h-FFFFh	PCI bus
E000h-EFFFh	Intel(R) 8 Series/C220 Series PCI Express Root Port #7 - 8C1C
F000h-F03Fh	Intel(R) HD Graphics 4600
F040h-F05Fh	Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
F060h-F07Fh	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
F0A0h-F0A3h	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
F0B0h-F0B7h	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
F0C0h-F0C3h	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
F0D0h-F0D7h	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
F0E0h-F0E7h	Intel(R) Active Management Technology - SOL (COM7)

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
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Serial Port #3
IRQ5	Serial Port #4
IRQ7	Serial Port #5
IRQ7	Serial Port #6
IRQ8	Real Time Clock
IRQ 10	Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
IRQ 13	Numeric data processor
IRQ 16	High Definition Audio Controller
IRQ 16	Intel(R) 8 Series/C220 Series USB EHCI #2 - 8C2D
IRQ 16	Intel(R) Management Engine Interface
IRQ 16	Intel(R) 8 Series/C220 PCI-Express Root Port #1 - 8C10
IRQ 16	Intel(R) Xeon(R) processor E3-1200 v3/4th Gen Core processor PCI Express x16 Controller - 0C01
IRQ 19	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
IRQ 19	Intel(R) Active Management Technology - SOL (COM7)
IRQ 22	High Definition Audio Controller
IRQ 23	Intel(R) 8 Series/C220 Series USB EHCI #1 - 8C26

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 "F81866.H"
//-----
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("Fintek 81866 watch dog program\n");

    SIO = Init_F81866();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81866, program abort.\n");
        return(1);
    }/if (SIO == 0)

    if (argc != 2)
    {
        printf(" Parameter incorrect!!\n");
        return (1);
    }

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

    if (bTime)
    {
        EnableWDT(bTime); }
    else
    {
        DisableWDT(); }

    return 0;
}
```

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

    bBuf = Get_F81866_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81866_Reg(0x2B, bBuf); //Enable WDTO

    Set_F81866_LD(0x07); //switch to logic device 7
    Set_F81866_Reg(0x30, 0x01); //enable timer

    bBuf = Get_F81866_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81866_Reg(0xF5, bBuf); //count mode is second

    Set_F81866_Reg(0xF6, interval); //set timer

    bBuf = Get_F81866_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81866_Reg(0xFA, bBuf); //enable WDTO output

    bBuf = Get_F81866_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81866_Reg(0xF5, bBuf); //start counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;

    Set_F81866_LD(0x07); //switch to logic device 7

    bBuf = Get_F81866_Reg(0xFA);
    bBuf &= ~0x01;
    Set_F81866_Reg(0xFA, bBuf); //disable WDTO output

    bBuf = Get_F81866_Reg(0xF5);
    bBuf &= ~0x20;
    bBuf |= 0x40;
    Set_F81866_Reg(0xF5, bBuf); //disable WDT
}
//-----
```

```

//-----
//
// 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 "F81866.H"
#include <dos.h>
//-----
unsigned int F81866_BASE;
void Unlock_F81866 (void);
void Lock_F81866 (void);
//-----
unsigned int Init_F81866(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81866_BASE = 0x4E;
    result = F81866_BASE;

    ucDid = Get_F81866_Reg(0x20);
    if (ucDid == 0x07) //Fintek 81866
    {
        goto Init_Finish;
    }

    F81866_BASE = 0x2E;
    result = F81866_BASE;

    ucDid = Get_F81866_Reg(0x20);
    if (ucDid == 0x07) //Fintek 81866
    {
        goto Init_Finish;
    }

    F81866_BASE = 0x00;
    result = F81866_BASE;

Init_Finish:
    return (result);
}
//-----
void Unlock_F81866 (void)
{
    outportb(F81866_INDEX_PORT, F81866_UNLOCK);
    outportb(F81866_INDEX_PORT, F81866_UNLOCK);
}
//-----
void Lock_F81866 (void)
{
    outportb(F81866_INDEX_PORT, F81866_LOCK);
}
//-----
void Set_F81866_LD( unsigned char LD)
{
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, F81866_REG_LD);
    outportb(F81866_DATA_PORT, LD);
    Lock_F81866();
}
//-----
void Set_F81866_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, REG);
    outportb(F81866_DATA_PORT, DATA);
    Lock_F81866();
}
//-----

```

```
unsigned char Get_F81866_Reg(unsigned char REG)
```

```
{  
    unsigned char Result;  
    Unlock_F81866();  
    outportb(F81866_INDEX_PORT, REG);  
    Result = inportb(F81866_DATA_PORT);  
    Lock_F81866();  
    return Result;  
}  
//-----
```

```
//-----  
//  
// 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 __F81866_H  
#define __F81866_H                1  
//-----  
#define F81866_INDEX_PORT        (F81866_BASE)  
#define F81866_DATA_PORT        (F81866_BASE+1)  
//-----  
#define F81866_REG_LD            0x07  
//-----  
#define F81866_UNLOCK            0x87  
#define F81866_LOCK              0xAA  
//-----  
unsigned int Init_F81866(void);  
void Set_F81866_LD(unsigned char);  
void Set_F81866_Reg(unsigned char, unsigned char);  
unsigned char Get_F81866_Reg(unsigned char);  
//-----  
#endif __F81866_H
```

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