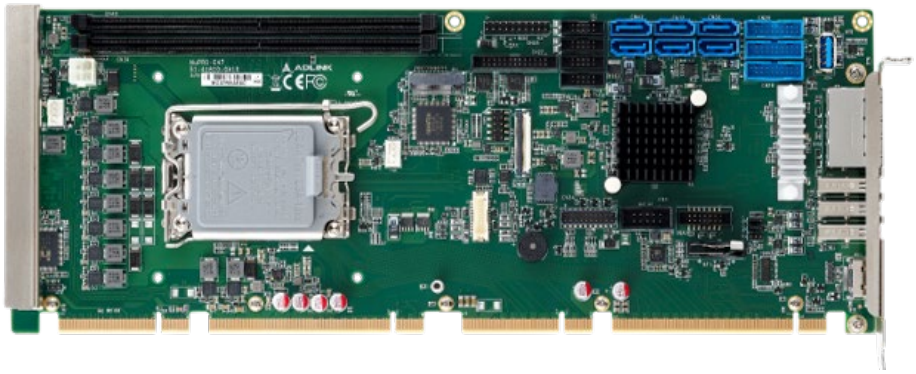
IAP-E47-4U

User's Manual

4U Rackmount Industrial Automation Platforms with
Q670 PCH and Intel® 12 th/13 th/14th Gen Core™ Processors



Manual Rev.:	0.1 Preliminary
Revision Date:	July 8, 2024
Part Number:	50M-12901-1000

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Leading EDGE COMPUTING

Preface

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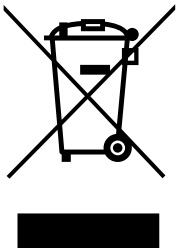
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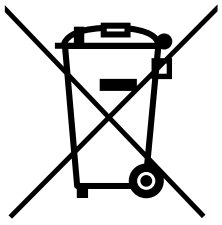
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Battery Labels (for products with battery)









California Proposition 65 Warning



WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Revision History

Revision	Description	Date	By
0.1	Preliminary release	2024-07-08	AL

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1 Introduction

The ADLINK's IAP-E47-4U IPC system is a PICMG1.3 supporting 12th/13th/14th Generation Intel® Core™ i9/i7/i5/i3 desktop processors with an Intel® Q670 Chipset, and provides 14 expansion slots for a cost-competitive embedded computing solution. The NuPRO-E47 supports 10nm process CPUs at up to 5.0 GHz, with integrated graphics and memory controllers, and Direct Media Interface (DMI) connectivity to the Intel® Q670E Express chipset. Dual-channel DDR5 memory is supported up to a maximum of 64GB on two DIMM slots.

These advanced features, coupled with PCI Express® x16 expansion capability, dual PCI Express®-based Gigabit Ethernet, SATA 6 Gb/s, and USB 3.2 support, make the NuPRO-E47 ideal for vision and automation control applications.

Table 1: IAP-E47-4U Processor

Model Number	Chipset
IAP-E47-4U	Q670

Latest revisions of the datasheet, user's manual, BIOS, drivers, and board support packages, can be downloaded from the product webpage on the ADLINK web site: www.adlinktech.com

1.1 Packing List

- IMB-E47-4U IPC system

1.2 Packing Content

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from the dealer before returning any product to ADLINK.

- NuPRO-E47
- SATA data cable with latch (x2)
- 2-port USB 3.0 cable with bracket (2.0 mm pitch)
- 2-port COM cable with bracket (2.0 mm pitch)
- Printer port cable with bracket (2.0 mm pitch)

WARNING: The NuPRO-E47 must be protected from static discharge and physical shock. Never remove any of the socketed parts except at a static-free workstation. Use the anti-static bag shipped with the product to handle the board. Wear a grounded wrist strap when installing and/or servicing.

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1.3 Driver Installation

Download and install the following requisite drivers for your system from https://www.adlinktech.com

- Intel® Chipset Device Software
- Intel® Management Engine Components
- Intel® UHD Graphics Driver
- Intel® Serial IO Driver
- Intel® Network Connections Drivers
- Intel® HID Event Filter
- Intel® Dynamic Tuning Technology
- Intel® GNA
- Intel® PPM
- Intel® Rapid Storage Technology
- Realtek Audio ALC262

Note: To enable RAID or AHCI mode, you must pre-install the Intel® Rapid Storage Technology driver during the Windows* installation process, using the F6 installation method.

1.4 Optional Accessories

ADLINK offers optional accessories for NuPRO-E47. Please contact ADLNIK sales representatives for details.

- DB-Audio2 (high-definition audio) 91-49030-0010
- LGA1700 1U CPU cooler 32-21002-0000-A0
- LGA1700 2U CPU cooler 32-20976-1000-A0
- DVI-D/VGA cable with bracket 30-25309-0000-A0
- 4-port USB 3.0 cable with bracket 30-25305-0020-A0
- 2-port USB 3.0 cable (right angle) with bracket 30-25046-0110-A0
- 1-port COM cable with bracket 30-25003-2100
- DIO cable with bracket 30-25304-0000-B0

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1.5 Features

Dimension	427 mm (W) x 177 mm (H) x 447.9 mm(D)
CPU	Intel® Core™ i9-12900E Processor
Motherboard	ALDINK NuPRO-E47
DRAM	64GB DDR5 4800MHz DIMM Non-ECC
Storage	128GB MLC SATA SSD
Display	1 x HDMI on rear I/O, resolution up to 4096 x 2160 @ 60Hz 1x DVI-D via onboard pin header, resolution up to 1920 x 1200 @ 60Hz VGA 1x VGA via onboard pin header, resolution up to 1920 x 1200 @ 60Hz
COM	2x RS-232 via onboard 2.0 pitch box header 2x RS-232/422/485 with auto flow control via onboard 2.0 pitch box header
USB	3x USB 3.2 Gen 2x1 ports (10Gbps) on rear I/O 6x USB 3.2 Gen 1x1 via onboard box headers 1x USB 3.2 Gen 1x1 vertical type A port 4x USB 2.0 to backplane
Ethernet	LAN1: Intel® I225-V via RJ45 LAN2: Intel® I225-LM via RJ45
Expansion Slot	1x PCIe x16 slots 3x PCIe x4 7x PCI
Audio	Intel® High-Definition Audio via onboard box header
Button	Power button, reset button
LED Indicator	Power LED, storage LED
PSU	Built in 1200W ATX

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2 Specifications

2.1 Core System

CPU	Intel® Core™ i9-12900E, up to 5.0 GHz, 16 Cores, 30M Cache, 65W TDP Intel® Core™ i9-12900TE, up to 4.8 GHz, 16 Cores, 30M Cache, 35W TDP Intel® Core™ i7-12700E, up to 4.8 GHz, 12 Cores, 25M Cache, 65W TDP Intel® Core™ i7-12700TE, up to 4.7 GHz, 12 Cores, 25M Cache, 35W TDP Intel® Core™ i5-12500E, up to 4.5 GHz, 6 Cores, 18M Cache, 65W TDP Intel® Core™ i5-12500TE, up to 4.3 GHz, 6 Cores, 18M Cache, 35W TDP Intel® Core™ i3-12100E, up to 4.2 GHz, 4 Cores, 12M Cache, 60W TDP Intel® Core™ i3-12100TE, up to 4.0 GHz, 4 Cores, 12M Cache, 35W TDP Intel® Pentium® Gold G7400E, up to 3.6 GHz, 2 Cores, 6M Cache, 46W TDP Intel® Pentium® Gold G7400TE, up to 3.0 GHz, 2 Cores, 6M Cache, 35W TDP Intel® Celeron® G6900E, up to 3.0 GHz, 2 Cores, 4M Cache, 46W TDP Intel® Celeron® G6900TE, up to 2.4 GHz, 2 Cores, 4M Cache, 35W TDP
Chipset	Intel® Q670 Express Chipset
Memory	Dual channel DDR5 4800 MHz, up to 64GB
Embedded BIOS	AMI® UEFI BIOS 256 Mbit SPI flash memory
Hardware Monitor	CPU temperature, system temperature, system voltage, CPU fan speed

2.2 Environmental

Temperature	**Operating Temperature**	0 to 40° C (32 to 104° F)
	Storage (Non-Operating) Temperature	-20°C to 60°C (-4°F to 140°F)
Humidity	**Operating Humidity**	10% to 85% (non-condensing)
	Storage (Non-Operating) Humidity	10% to 95% (non-condensing)

2.3 Certification

EMC	CE & FCC Class A
Safety	LVD

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2.4 Functional Block Diagram

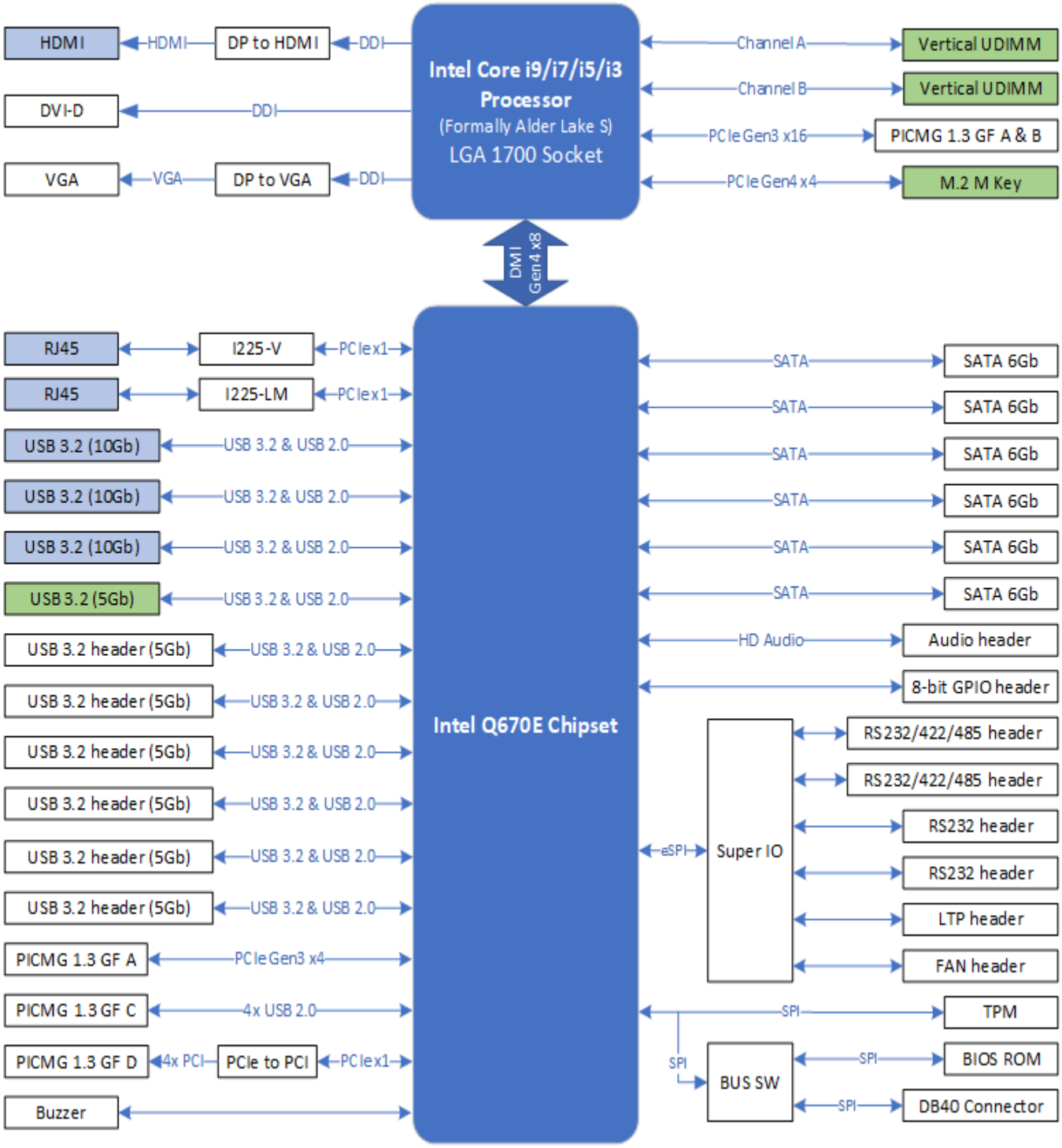


Figure 1: Functional Block Diagram

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3 Mechanical Layout

3.1 Schematics and Dimensions

All dimension measurements are in mm (millimeters).

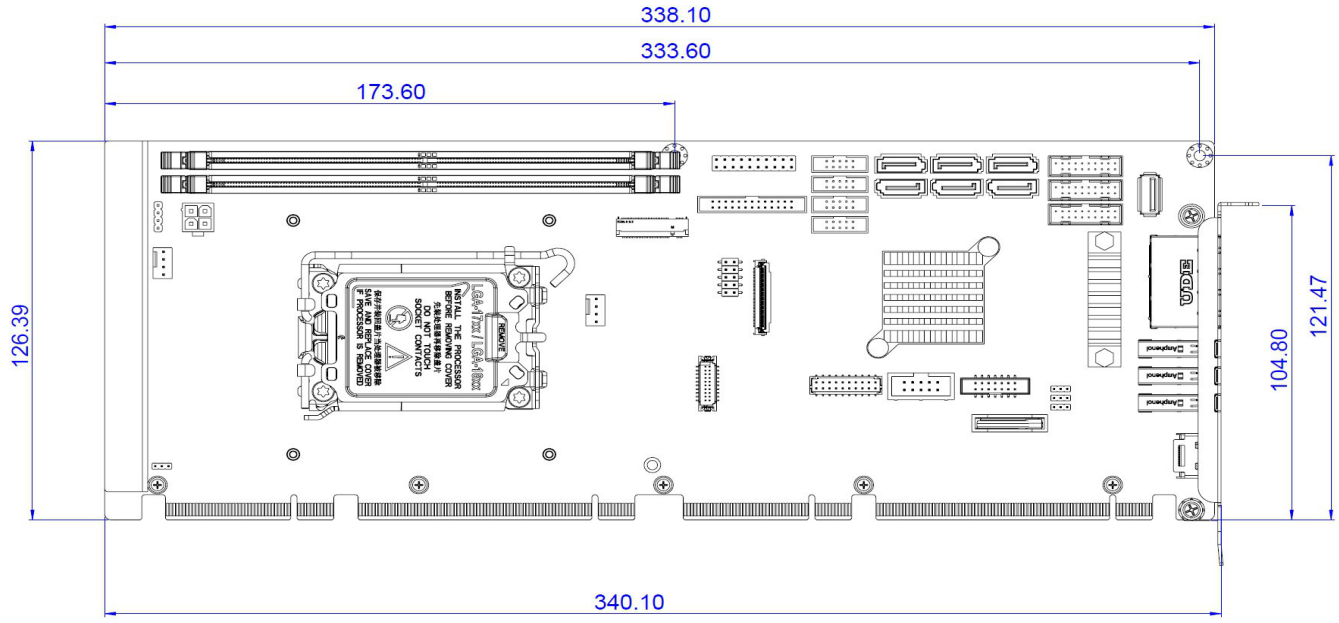


Figure 2: Board Dimensions

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3.2 Rear Panel I/O Ports

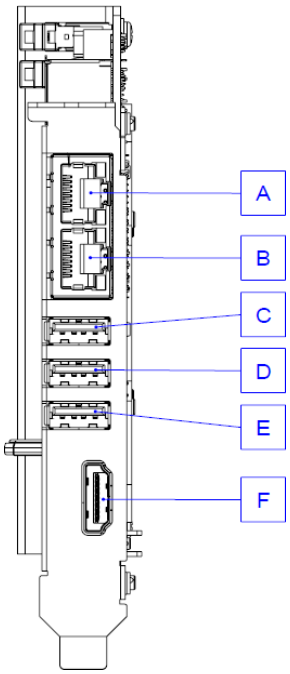


Figure 3: Rear Panel I/O Ports

	Connector	Description
A	LAN2 (RJ-45)	2.5 Gigabit Ethernet (supports Intel® AMT)
B	LAN1 (RJ-45)	2.5 Gigabit Ethernet
C/D/E	USB 3.x x3	USB 3.2 Gen2 x1 ports
F	HDMI	HDMI connector for LCD monitor

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3.3 Board layout

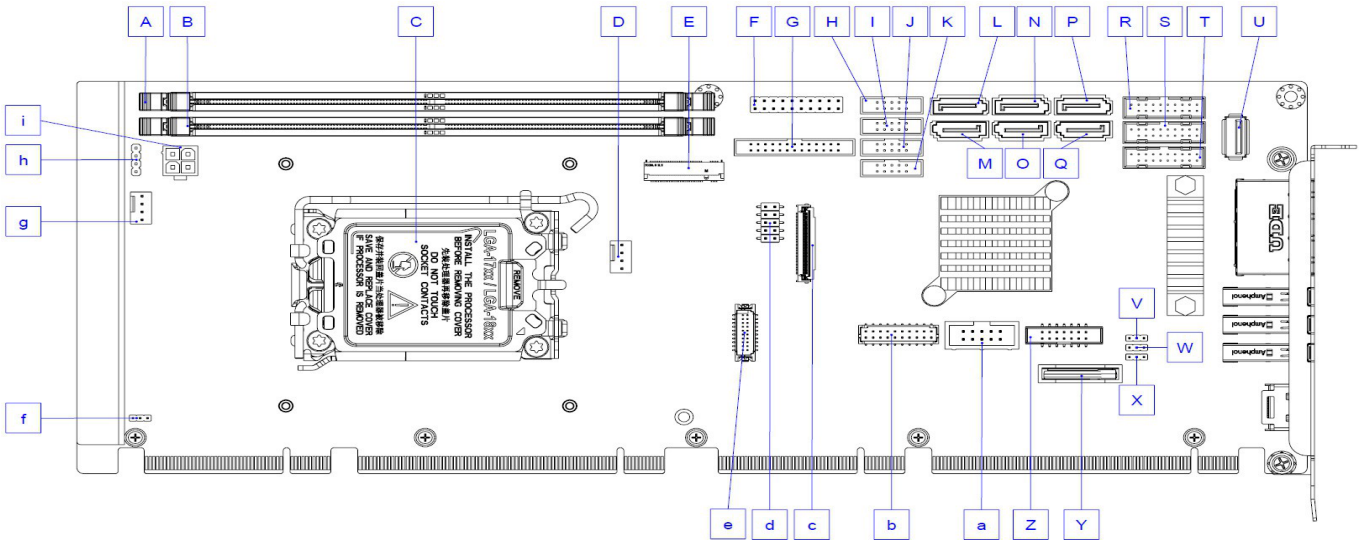


Figure 4: IAP-E47 Board Layout

	Connector	Description		Connector	Description
A	CN40	DIMM B0	S	CN27	USB3.0 #6/7
B	CN38	DIMM A0	T	CN28	USB3.0 #8/9
C	CN1	CPU	U	USB4	USB3.0 #10
D	FAN1	CPU fan header	V	CN41	Clear CMOS
E	M2M1	M.2 M Key	W	CN42	Clear RTC
F	CN35	System panel header	X	CN2	SMBus pull high voltage jumper (reserved)
G	CN22	LTP	Y	BT1	RTC battery
H	CN7	COM #1	Z	VGA1	VGA header
I	CN8	COM #2	a	CN5	Audio header
J	CN9	COM #3	b	CN34	DVI-D header
K	CN10	COM #4	c	DB3	DB40
L	CN43	SATA #5	d	CN50	Debug header
M	CN44	SATA #6	e	DIO	8-bit GPIO header
N	CN32	SATA #3	f	CN49	PCI BUS 5V/3.3V jumper (reserved)
O	CN33	SATA #4	g	FAN2	System fan header
P	CN30	SATA #1	h	PCN1	IMVP IC FW update jumper
Q	CN31	SATA #2	i	CN36	Power 4-pin (ATX 12V)
R	CN26	USB3.0 #4/5			

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4 Connectors and Jumpers

4.1 I/O Connectivity

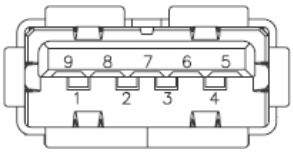
I/O	Bracket	Onboard	Edge Connector	Remarks
VGA	—	Y	—	Cable w/ bracket optional
DVI-D	—	Y	—	Cable w/ bracket optional
LAN1/2 (RJ-45)	Y	—	—	Act/Link/ Speed LEDs
USB 3.2 Gen2 x1	3	—	—	
USB 3.2 Gen1 x1	—	7	—	Cable w/ bracket optional
USB 2.0	—	—	4	
COM	—	4	—	2.00” pitch
SATA	—	6	—	—
PCIe x4	—	—	Y	—
PCIe x16	—	—	Y	—
PCI 32bit/33MHz	—	—	Y	via ITE IT8892

Table 2: NuPRO-E47 I/O Connectivity

4.2 Rear IO Connectors

4.2.1 USB 3.0 Connectors

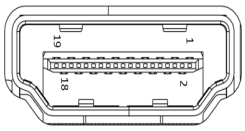
Pin	Signal
1	USB3.0_P5VA
2	USB2_CMAN
3	USB2_CMAP
4	GND
5	USB3A_CMRXN
6	USB3A_CMRXP
7	GND
8	USB3A_CMTXN
9	USB3A_CMTXP



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4.2.2 HDMI

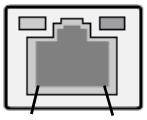
Pin	Signal	Pin	Signal
1	HDMI0_P2	11	GND
2	GND	12	HDMI0_CKN
3	HDMI0_N2	13	TP_HDMI0_CEC
4	DMI0_P1	14	NC
5	GND	15	HDMI0_SCL_SNK
6	HDMI0_N1	16	HDMI0_SDA_SNK
7	HDMI0_P0	17	GND
8	GND	18	P_+5V_S0_HDMI0
9	HDMI0_N0	19	HDMI0_HPD_SNK
10	HDMI0_CKP		



4.2.3 Ethernet Connectors

LAN (RJ-45) Ports

Pin	10BASE-T/ 100BASE-TX	1000BASE-T
1	TX+	BI_DA+
2	TX-	BI_DA-
3	RX+	BI_DB+
4	--	BI_DC+
5	--	BI_DC-
6	RX-	BI_DB-
7	--	BI_DD+
8	--	BI_DD-



LAN Behavior

LED 1		LED 2	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	10/100 Mb connection
Yellow	Linked	Green	1 Gb connection
Blinking	Data Activity	Orange	2.5 Gb connection

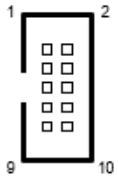
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4.3 Onboard Connectors

4.3.1 COM1 to COM4 Connectors

(RS-232) (CN7/8/9/10)

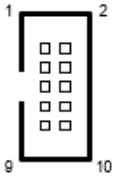
Pin	RS-232
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	GND
10	NC



4.3.2 COM 1-2 Connectors

(RS-422/485) (CN7/8)

Pin	Signal	
	RS-422	RS-485
1	TXD-	Data-
2	NC	NC
3	TXD+	Data+
4	NC	NC
5	RXD+	NC
6	NC	NC
7	RXD-	NC
8	NC	NC
9	GND	GND

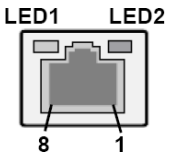


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4.3.3 Etrhernet Connectors (LAN1, LAN2, LAN3)

Three 10/100/1000/2500 Mbps LAN Ethernet controllers based on Intel® i226LM, supporting PXE and WOL. LAN2 supports vPro.

Pin	10BASE-T/100BASE-TX	1000BASE-T
1	TX+	LAN_MDI0+
2	TX-	LAN_MDI0-
3	RX+	LAN_MDI1+
4	--	LAN_MDI2+
5	--	LAN_MDI2-
6	RX-	LAN_MDI1-
7	--	LAN_MDI3+
8	--	LAN_MDI3-

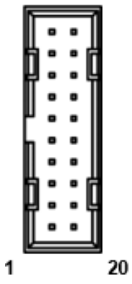


LED1 (Speed)		LED2 (Link/Activity)	
Status	**Description**	**Status**	**Description**
	10/100 Mbps connection	Off	No Link
Orange	1 Gbps connection	On	Linked
Green	2.5 Gbps connection	Blinking	Data Activity

4.3.4 USB 3.0 Connectors

(CN26/27/28)

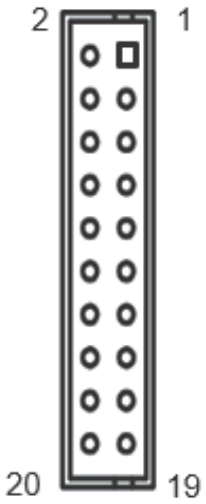
Pin	Signal	Pin	Signal
1	P5V_USB3B	20	NC
2	S_USB3_RN3_R	19	P5V_USB3B
3	S_USB3_RP3_R	18	S_USB3_RN4_R
4	GND	17	S_USB3_RP4_R
5	S_USB3_TN3_R	16	GND
6	S_USB3_TP3_R	15	S_USB3_TN4_R
7	GND	14	S_USB3_TP4_R
8	S_USB2_N2_R	13	GND
9	S_USB2_P2_R	12	S_USB2_N3_R
10	S_USB_OC1#	11	S_USB2_P3_R



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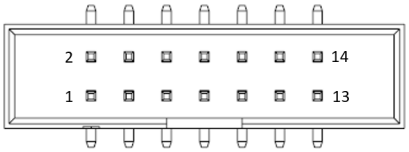
4.3.5 DVI-D Header (CN34)

Pin	Signal	Pin	Signal
1	GND	2	GND
3	TMD_CKP	4	TMD_N2
5	TMD_CKN	6	TMD_P2
7	GND	8	GND
9	TMD_SCL	10	TMD_N1
11	TMD_SDA	12	TMD_P1
13	GND	14	GND
15	TMD_HPD	16	TMD_N0
17	+5V_PSU_DVI	18	TMD_P0
19	GND	20	GND



4.3.6 VGA Header (VGA1)

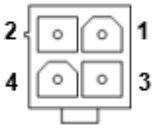
Pin	Signal	Pin	Signal
1	+5V	8	Green
2	DDC_DAT	9	GND
3	NC	10	Blue
4	DDC_CLK	11	GND
5	GND	12	HSYNC
6	Red	13	GND
7	GND	14	VSYNC



4.3.7 ATX 12V Power Connector

(CN36)

Pin	Signal
1	GND
2	GND
3	+12V DC
4	+12V DC

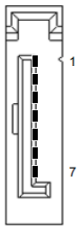


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4.3.8 Serial SATA Connectors

(CN30 to 33, CN43, CN44)

Pin	Signal
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

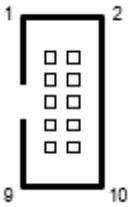


4.3.9 Audio Header

(CN5)

This connector is designed for use with the ADLINK DB-Audio2 daughter board.

Pin	Signal	Function
1	GND	Ground
2	AUD_BCLK	Audio Clock
3	GND	Ground
4	ICH_AUD_SDIN1	Audio Data Input
5	P5V	+ 5V
6	ICH_AUD_SDOUT	Audio Data Output
7	P5V_AUD	+ 5V
8	P3V3_DVDD	3.3V
9	AUD_SYNC	Audio Synchronous
10	AUD_RSTJ	Audio Reset

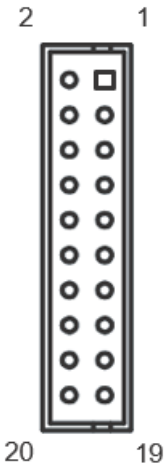


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4.3.10 System Panel Header (CN35)

Connects to chassis-mounted buttons, speakers, and LEDs.

Pin	Signal	Pin	Signal
1	GND	2	SPKR
3	RSTBTN	4	NC
5	NC	6	NC
7	GND	8	+5V_PSU
9	PWRBTN	10	NC
11	NC	12	GND
13	NC	14	KEYLOCK
15	HLED	16	PLED
17	HLED_POWER	18	NC
19	NC	20	+5V_PSU



4.3.11 FAN Header

(FAN1, FAN2)

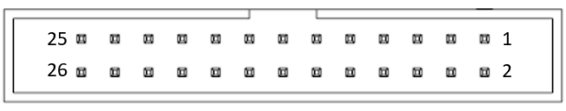
Pin	Signal
1	GND
2	Fan power (+12V)
3	Fan Tachometer
4	Fan Speed Control



4.3.12 LTP Header

(CN22)

Pin	Signal	Pin	Signal
1	STB-L	14	GND
2	AFD-L	15	PD6
3	PD0	16	GND
4	ERR-L	17	PD7
5	PD1	18	GND
6	INIT-L	19	ACK-L
7	PD2	20	GND
8	SLIN-L	21	BUSY
9	PD3	22	GND
10	GND	23	PE
11	PD4	24	GND
12	GND	25	SLCT



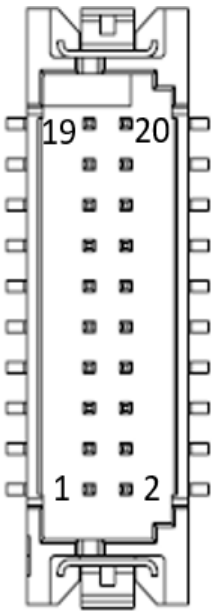
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Pin	Signal	Pin	Signal
13	PD5	26	NC

4.3.13 8-Bit GPIO Header

(DIO)

Pin	Signal
1	DO0
2	DO4
3	DO1
4	DO5
5	DO2
6	DO6
7	DO3
8	DO7
9	DI0
10	DI4
11	DI1
12	DI5
13	DI2
14	DI6
15	DI3
16	DI7
17	GND
18	GND



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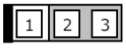
4.4 Jumpers and Switches

4.4.1 Clear CMOS Jumper

(CN41)

To clear the BIOS settings (RTC RST#):

1. Power down and disconnect the power from the system.
2. Short pins 2-3 on CN41.
3. Reconnect the power and power up the system.
4. Wait 3 for seconds or more.
5. Power down and disconnect the power from the system.
6. Re-short pins 1-2 and power up the system.

CMOS Status	Connection	CN41
Normal	1 – 2	
Clear CMOS	2 – 3	

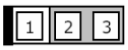
4.4.2 Clear RTC Jumper

(CN42)

To clear the BIOS settings and data/time (SRTCRST#):

1. Power down and disconnect power from the system.
2. Short pins 2-3 on CN42.
3. Reconnect power and power up the system.

After power up, remove the jumper cap from pins 2-3 and reinstall it to pins 1-2.

CMOS Status	Connection	CN41
Normal	1 – 2	
Clear CMOS	2 – 3	

Note: To reset the CMOS, clear both CMOS and RTC jumpers at the same time.

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5 BIOS Setup

5.1 Menu Structure

This section presents the primary menus of the BIOS (UEFI) Setup Utility. Use the following table as a quick reference forthe contents of the UEFI Setup Utility. The subsections describe the submenus and options for each menu item.

Options to enter UEFI Setup Utility:

- Press [F2] or [Del] during POST (Power-On-Self-Test)
- Press [Ctl] + [Alt] + [Del] after POST

Main	**Advanced**	**Chipset**
- System Date - System Time	► CPU Configuration ► Power Management ► Serial Console Redirection ► USB Configuration ► TPM 2.0 Configuration ► Onboard Devices Configuration ► NCT6106D HW Monitor ► BIOS Watchdog Timer ► PCIe Express Configuration ► Miscellaneous ► Network Stake Configuration ► Intel® Ethernet Controller (3) I225-V ► Intel® Ethernet Controller (3) I225-LM	► System Agent (SA) Configuration ► PCH-I/O Configuration - PCH digital I/O device
Security	**Boot**	**Save & Exit**
- Administrator Password - User Password ► Secure Boot menu ► Security Configuration	- Setup Prompt Timout - Bootup NumLock State - Quiet Boot - Fast Boot - Boot Option#1 - Boot Option#2 - Boot Option#3 - Boot Option#4 - Boot Option#5 - Boot Option#6 - Boot Option#7 - Boot Option#8 - Boot Option#9 - Boot Option#10 - Boot Option#11	- Save Changes and Exit - Discard Changes and Exit - Save Changes and Reset - Discard Changes and Reset - Save Changes - Discard Changes - Restore Defaults - Save as User Defaults - Restore User Defaults - Launch EFI Shell from the filesystem device
MEBx		
Intel(R) ME Password		

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5.2 Main Menu

Upon entering the UEFI Setup Utility, the Main Menu is displayed, providing read-only information about your system and also allows you to set the System Date and Time.

Feature	Option	Description
System Date	xxx mm/dd/yyyy	Sets the date and time. Use the tab to switch between elements.
System Time	hh:mm:ss	

5.3 Advanced Menu

This section contains the settings for most of the user interfaces in the system.

Feature	Description
CPU Configuration	CPU Configuration
Power Management	System ACPI Parameters
Serial Console Redirection	Serial Console Redirection
USB Configuration	USB Configuration Parameters
TPM 2.0 Configuration	TPM 2.0 Configuration
Onboard Devices Configuration	Onboard Device Parameters
NCT6106D HW Monitor	Monitor Hardware Status
BIOS Watchdog Timer	BIOS Watch Dog Configuration
PCI Express Configuration	PCI Express Configuration Settings
Miscellaneous	Miscellaneous
Network Stake	Network Stack Settings
Intel® Ethernet Controller I225-V	Configure Gigabit Ethernet Device Parameters
Intel® Ethernet Controller I225-LM	

5.3.1 Advanced Menu > CPU Configuration

Feature	Option	Description
Hyper-Threading	***Enabled*** Disabled	Enable or disable the Hyper-Threading technology
Active Performance-cores	***All*** 3 2 1	Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are considered together. When both are {0,0}, Pcode will enable all cores.
Intel (VMX) Virtualization Technology	***Enabled*** Disabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Intel(R) SpeedStep(TM)	***Enabled*** Disabled	Allow more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	***Enabled*** Disabled	Enable/disable Intel(R) Speed Shift Technology Support. Enabling will expose the CPPC v2 interface to allow for hardware-controlled P-states.

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Turbo Mode	***Enabled*** Disabled	Enable/disable processor Turbo Mode (required EMTTM enabled too). AUTO means enabled.
C states	***Disabled*** Enabled	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
TCC Activation Offset	***0***	Offset from factory set Tcc activation temperature at which the Thermal Control Circuit must be activated. Tcc will be activated at: Tcc activation Temp – Tcc Activation Offset. Tcc Activation Offset range is 0 to 63.

5.3.2 Advanced > Power Management

Feature	Option	Description
Power Supply Unit	***ATX Mode*** Emulate AT Mode	Select Emulation AT or ATX function. If this option is set to [Emulation AT], BIOS will report no suspend functions (S3 & S4) to ACPI OS. In windows XP, it will make the OS show shutdown message during system shutdown. ATX: OS will turn off system power when shutdown.
State After G3	***Last State*** Power Off Last State	Specify what state to go to when the power is re-applied after a power failure (G3 states).
RTC Wake system from S5	***Disabled*** Fixed Time Dynamic Time	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, system will wake on the current time + Increase minutes(S).
PCIe Wake	***Enabled*** Disabled	Enable or disable PCI Express wake capability.

5.3.3 Advanced > Serial Console Redirection

Feature	Option	Description
Console Redirection	***Disabled*** Enabled	Console Redirection Enable or Disable
Terminal Type	***ANSI*** VT100 VT100Plus VT-UTF9	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT- UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bites per second	***115200*** 9600 19200 38400 57600	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	***8*** 7	Data Bites
Parity	***None*** Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection.

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Stop Bits	***1*** 2	Stop bits indicate the end of a serial data packet. (A stat bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may requires more than 1 stop bit.

5.3.4 Advanced > USB Configuration

Feature	Option	Description
USB Mass Storage Driver Support	***Enabled*** Disabled	Enable/Disable USB Mass Storage Driver Support
USB transfer time-out	***20 sec*** 1 sec 5 sec 10 sec	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	***20 sec*** 10 sec 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	***Auto*** Manual	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 100 ms, for a Hub port the delay is taken from Hub descriptor.

5.3.5 Advanced > TPM 2.0 Configuration

Feature	Option	Description
Security Device Support	***Enable*** Disable	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
SHA256 PCR Bank	***Enabled*** Disabled	Enable or Disable SHA256 PCR Bank
SHA384 PCR Bank	***Disabled*** Enabled	Enable or Disable SHA384 PCR Bank
Pending operation	***None*** TPM Clear	Schedule an Operation for the Security Device. NOTE: Your computer will reboot during a restart to change the state of the Security Device.
Platform Hierarchy	***Enabled*** Disabled	Enable or Disable Platform Hierarchy
Storage Hierarchy	***Enabled*** Disabled	Enable or Disable Storage Hierarchy
Endorsement Hierarchy	***Enabled*** Disabled	Enable or Disable Endorsement Hierarchy
Physical Presence Spec Version	***1.3*** 1.2	Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
PH Randomization	***Enabled*** Disabled	Enables or Disables Platform Hierarchy Randomization. DO NOT ENABLE THIS QUESTION IN

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5.3.6 Advanced > Onboard Device Configuration

Feature	Option	Description
COM1	***Enabled*** Disabled	Enable or Disable Serial Port (COM)
COM1 Mode Control	***RS232*** RS422 RS485	Select COM1 mode. RS232, RS422, RS485
COM2	***Enabled*** Disabled	Enable or Disable Serial Port (COM)
COM2 Mode Control	***RS232*** RS422 RS485	Select COM1 mode. RS232, RS422, RS485
COM3	***Enabled*** Disabled	Enable or Disable Serial Port (COM)
COM4	***Enabled*** Disabled	Enable or Disable Serial Port (COM)
Parallel Port	***Enabled*** Disabled	Enable or Disable Parallel Port (LPT/LPTE)
Change Settings	***Auto*** IO=378h; IRQ=5; IO=378h; IRQ=5,6,7,9,10,11,12; IO=278h; IRQ=5,6,7,9,10,11,12; IO=3BCh; IRQ=5,6,7,9,10,11,12;	Select an optimal setting for Super IO Device
Device Mode	***STD Printer Mode*** SPP Mode EPP-1.9 and SPP Mode EPP-1.7 and SPP Mode ECP Mode ECP and EPP-1.9 Mode ECP and EPP-1.7 Mode	Change the Printer Port Mode
LAN #1	***Enabled*** Disabled	Enable/Disable
LAN #2	***Enabled*** Disabled	Enable/Disable

5.3.7 Advanced > NCT6126H Hardware Monitor

Feature	Option	Description
CPU Fan Control Mode(Fan 1)	***SMART FAN IV*** Manual mode	Configure Fan Control Mode. Select Manual Mode, user can configure a fix fan duty. Select SMART FAN IV, user can configure 4 temperatures and 4 fan duties. Select Auto Mode, FAN will run at automatic speed with thermal.
Temperature 1	***25***	The value of temperature1.
FD/PRM 1	***140***	The value of Fan Duty/RPM when temperature is T1.
Temperature 2	***35***	The value of temperature2.
FD/PRM 2	***170***	The value of Fan Duty/RPM when temperature is T2.

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Temperature 3	***45***	The value of temperature3.
FD/PRM 3	***200***	The value of Fan Duty/RPM when temperature is T3.
Temperature 4	***55***	The value of temperature4.
FD/PRM 4	***230***	The value of Fan Duty/RPM when temperature is T4.
Critical Temperature	***60***	Fan temperature critical value.
CPU Fan Control Mode(Fan 2)	***SMART FAN IV*** Manual mode	Configure Fan Control Mode. Select Manual Mode, user can configure a fix fan duty. Select SMART FAN IV, user can configure 4 temperatures and 4 fan duties. Select Auto Mode, FAN will run at automatic speed with thermal.
Temperature 1	***25***	The value of temperature1.
FD/PRM 1	***140***	The value of Fan Duty/RPM when temperature is T1.
Temperature 2	***35***	The value of temperature2.
FD/PRM 2	***170***	The value of Fan Duty/RPM when temperature is T2.
Temperature 3	***45***	The value of temperature3.
FD/PRM 3	***200***	The value of Fan Duty/RPM when temperature is T3.
Temperature 4	***55***	The value of temperature4.
FD/PRM 4	***230***	The value of Fan Duty/RPM when temperature is T4.
Critical Temperature	***60***	Fan temperature critical value.

5.3.8 Advanced > Watchdog Timer

Feature	Option	Description
BIOS POST Watchdog	***Disabled*** Second Mode Minute Mode	1. Disable: Disable WatchDog Timer; 2. Second Mode: Enable Watchdog Timer in second mode; 3. Minute Mode: Enable Watchdog Timer in minute mode.

5.3.9 Advanced > PCI Express Configuration

Feature	Option	Description
PEG Port Configuration		PEG Port Options
PCI Express Root Port B0		PCI Express Root Port B0 Settings.
Pcie PII SCC	***Auto*** 0.0% - 2.0% Disable	Pcie PII SSC percentage. AUTO - Keep hw default, no BIOS override. Range is 0.0%-2.0%.PEG Port Options
Clock B0 Assignment (REFCLK0)	***Enabled*** Platform-POR Disabled	Platform-POR = clock is assigned to PCIe port or LAN according to board layout. Enabled = keep clock enabled even if unused. Disabled = Disable clock.
Clock B0 Assignment (REFCLK1)	***Enabled*** Platform-POR Disabled	
Clock B0 Assignment (REFCLK2)	***Enabled*** Platform-POR Disabled	

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Clock B0 Assignment (REFCLK3)	***Enabled*** Platform-POR Disabled	

5.3.9.1 Advanced > PCI Express Configuration > PEG Port Configuration

Feature	Option	Description
PCI Express Root Port 1	***Enabled*** Disabled	Control the PCI Express Root Port
PCIe Speed	***Auto*** Gen1 Gen2 Gen3 Gen4 Gen5	Configure PCIe Speed
PEG1 Max Payload Size	***256*** 128	Select PEG Max Payload Size; Choose Auto(Default Device Capability) or force to 128/256 Bytes
PCI Express Root Port 2	***Enabled*** Disabled	Control the PCI Express Root Port
PCIe Speed	***Auto*** Gen1 Gen2 Gen3 Gen4 Gen5	Configure PCIe Speed
PEG2 Max Payload Size	***256*** 128	Select PEG Max Payload Size; Choose Auto(Default Device Capability) or force to 128/256 Bytes
PCI Express Root Port 3	***Enabled*** Disabled	Control the PCI Express Root Port
PCIe Speed	***Auto*** Gen1 Gen2 Gen3 Gen4 Gen5	Configure PCIe Speed
PCIe Speed	***Auto*** Gen1 Gen2 Gen3 Gen4 Gen5	Configure PCIe Speed

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5.3.9.2 Advanced > PCI Express Configuration > PCI Express Root Port B0

Feature	Option	Description
PCI Express Root Port B0	***Enabled*** Disabled	Control the PCI Express Root Port
PCIe Speed	***Auto*** Gen1 Gen2 Gen3 Gen4 Gen5	Configure PCIe Speed
Detect Non-Compliance Device	***Disabled*** Enabled	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.
Advanced Error Reporting	***Enabled*** Disabled	Advanced Error Reporting Enable/ Disable.
Max Payload	***256*** 128 512	Max Payload settings

5.3.10 Advanced > Miscellaneous

Feature	Option	Description
Control Iommu Pre-boot Behavior	***Disable IOMMU*** Enable IOMMU during boot	Enable IOMMU in Pre-boot environment (If DMAR table is installed in DXE and If VTD_INFFO_PPI is installed in PEI.)
DMA Control Guarantee	***Disabled*** Enabled	Enable/Disable DMA_CONTROL_GUARANTEE bit
Above 4GB MMIO BIOS assignment	***Enabled*** Disabled	Enable/Disable above 4GB Memory MappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

5.3.11 Advanced > Network Stack Configuration

Feature	Option	Description
Network Stack	***Disabled*** Enabled	Enable/Disable UEFI Network Stack
IPv4 PXE Support	***Disabled*** Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	***Disabled*** Enabled	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
IPv6 PXE Support	***Disabled*** Enabled	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
IPv6 HTTP Support	***Disabled*** Enabled	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
PXE boot wait time	***0***	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

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Media detect count	***1***	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

5.4 Chipset

Feature	Option	Description
► System (SA) Configuration		System Agent (SA) Parameters
► PCH-IO Configuration		PCH Parameters
PCH digital I/O device	***Disabled*** Enabled	Disable/Enable ACPI GPIO Device support for PCH digital I/O and user LED

5.4.1 Chipset > System Agent (SA) Configuration

Feature	Option	Description
Memory Configuration		Memory Configuration Parameters
Graphics Configuration		Graphics Configuration
VMD setup menu		VMD Configuration Settings
NVMe Configuration		NVMe Device Options Settings
NVMe Controller	***Enabled*** Disabled	Control the PCI Express Root Port
VT-d	***Enabled*** Disabled	VT-d capability

5.4.1.1 Chipset > System Agent (SA) Configuration > Graphic Configuration

Feature	Option	Description
Primary Display	***IGFX*** Auto PEG Slot PCH PCI	Select which of IGFX/PEG/PCI Graphics device should be Primary Display or select HG for Hybrid Gfx.
Internal Graphics	***Enabled*** Auto Disabled	Keep IGFX enabled based on the setup options.
GTT Size	***8MB*** 2MB 4MB	Select the GTT Size
Aperture Size	***256MB*** 128MB 512MB 1024MB 2048MB	Select the Aperture Size Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting > 2048MB aperture. To use this feature, please disable CSM Support.

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DVMT Pre-Allocated	***32M*** 4M 8M 16M 64M	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device

5.4.1.2 Chipset > System Agent (SA) Configuration > VMD Setup Menu

Feature	Option	Description
Enable VMD controller	***Disabled*** Enabled	Enable/Disable to VMD controller
Enable VMD Global Mapping	***Enabled*** Disabled	Enable/Disable to VMD Global Mapping
RAID0	***Enabled*** Disabled	Enable/Disable RAID0 support
RAID1	***Enabled*** Disabled	Enable/Disable RAID1 support
RAID5	***Enabled*** Disabled	Enable/Disable RAID5 support
RAID10	***Enabled*** Disabled	Enable/Disable RAID10 support
Intel Rapid Recovery Technology	***Enabled*** Disabled	Enable/Disable Intel Rapid Recovery Technology.
RRT volumes can span internal and eSATA device	***Enabled*** Disabled	Enable/Disable RRT volumes can span internal and eSATA drives
Intel(R) Optane(TM) Memory	***Enabled*** Disabled	Enable/Disable System Acceleration with Intel(R) Optane(TM) Memory feature.

5.4.2 Chipset > PCH-IO Configuration

Feature	Option	Description
► SATA Configuration		SATA Device Options Settings
► USB Configuration		USB Configuration Settings

5.4.2.1 Chipset > PCH-IO Configuration > SATA Configuration

Feature	Option	Description
SATA Mode Selection	***AHCI***	Determines how SATA controller(s) operate.
SATA Controller Speed	***Gen3*** Default Gen1 Gen2	Indicates the maximum speed the SATA controller can support.

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SATA HDD 0	***Enabled*** Disabled	Enable or Disable SATA Port
SATA HDD 1	***Enabled*** Disabled	
SATA HDD 2	***Enabled*** Disabled	
SATA HDD 3	***Enabled*** Disabled	
SATA HDD 4	***Enabled*** Disabled	
SATA HDD 5	***Enabled*** Disabled	

5.4.2.2 Chipset > PCH-IO Configuration > USB Configuration

Feature	Option	Description
USB Port Disable Override	***Disable Link*** Select Per-Pin	Selectively enable/disable the corresponding USB port from reporting a Device Connection to the controller.
USB SS Physical Connector #0	***Enabled*** Disabled	Enable/disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB SS Physical Connector #1	***Enabled*** Disabled	
USB SS Physical Connector #2	***Enabled*** Disabled	
USB SS Physical Connector #3	***Enabled*** Disabled	
USB SS Physical Connector #4	***Enabled*** Disabled	
USB SS Physical Connector #5	***Enabled*** Disabled	
USB SS Physical Connector #6	***Enabled*** Disabled	
USB SS Physical Connector #7	***Enabled*** Disabled	
USB SS Physical Connector #8	***Enabled*** Disabled	
USB SS Physical Connector #9	***Enabled*** Disabled	
USB HS Physical Connector #0	***Enabled*** Disabled	Enable/disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #1	***Enabled*** Disabled	
USB HS Physical Connector #2	***Enabled*** Disabled	
USB HS Physical Connector #3	***Enabled*** Disabled	

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USB HS Physical Connector #4	***Enabled*** Disabled	
USB HS Physical Connector #5	***Enabled*** Disabled	
USB HS Physical Connector #6	***Enabled*** Disabled	
USB HS Physical Connector #7	***Enabled*** Disabled	
USB HS Physical Connector #8	***Enabled*** Disabled	
USB HS Physical Connector #9	***Enabled*** Disabled	

5.5 Security

Feature	Option	Description
Administrator Password		Set Administrator Password
User Password		Set User Password
Secure Boot menu		Secure Boot configuration
Security Configuration		Security Configuration settings

5.5.1 Security > Secure Boot Menu

Feature	Option	Description
Secure Boot Control	***Disabled*** Enabled	Secure Boot feature is active if the Secure Boot is enabled, Platform key (PK) is enrolled and the system is in User mode. The mode change requires platform reset.
Secure Boot Mode	***Standard*** Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

5.5.2 Security > Security Configuration

Feature	Option	Description
BIOS Lock	***Enabled*** Disabled	Enable/disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protect of flash.

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5.6 Boot

Feature	Option	Description
Setup Prompt Timeout	***1***	Number of seconds to wait for setup activation key. The maximum value is 8.
Bootup NumLock State	***Off*** On	Select the keyboard NumLock state
Quiet Boot	***Enabled*** Disabled	Enables or disables Quiet Boot option
Fast Boot	***Disable Link*** Enabled	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Boot Option #1	***Hard Disk*** NVME UEFI AP CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	Sets the system boot order
Boot Option #2	***NVME*** Hard Disk UEFI AP CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	Sets the system boot order
Boot Option #3	***UEFI AP*** Hard Disk NVME CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	Sets the system boot order
Boot Option #4	***CD/DVD*** Hard Disk NVME UEFI AP SD	Sets the system boot order

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	USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	
Boot Option #5	***SD*** Hard Disk NVME UEFI AP CD/DVD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	Sets the system boot order
Boot Option #6	***USB Hard Disk*** Hard Disk NVME UEFI AP CD/DVD SD USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	Sets the system boot order
Boot Option #7	***USB CD/DVD*** Hard Disk NVME UEFI AP CD/DVD SD USB Hard Disk USB Key USB Floppy USB Lan Network Disabled	Sets the system boot order
Boot Option #8	***USB Key*** Hard Disk NVME UEFI AP CD/DVD SD USB Hard Disk USB CD/DVD USB Floppy USB Lan Network Disabled	Sets the system boot order

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Boot Option #9	***USB Floppy*** Hard Disk NVME UEFI AP CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Lan Network Disabled	Sets the system boot order
Boot Option #10	***USB Lan*** Hard Disk NVME UEFI AP CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy Network Disabled	Sets the system boot order
Boot Option #11	***Network*** Hard Disk NVME UEFI AP CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Disabled	Sets the system boot order

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5.7 Save & Exit

Feature	Description
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 the system 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 Default 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
Launch EFI Shell from file system device	Attempts to Launch EFI Shell application (Shell.efi) from one of the available file system devices

5.8 MEBx

Feature	Description
Intel(R) ME Password	MEBx Login

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Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User‘s Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

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Getting Service

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

ADLINK Technology, Inc.
Address: No. 66, Huaya 1st Road, Guishan District
Taoyuan City 333, Taiwan
Tel: +886-3-216-5088
Fax: +886-3-328-5723
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.
Address: 6450 Via Del Oro, San Jose, CA 95119-1208, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-600-1189
Email: info@adlinktech.com

ADLINK Technology (China) Co., Ltd.
Address: 300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area
Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

ADLINK Technology GmbH
Address: Hans-Thoma-Strasse 11, D-68163, Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

Please visit the Contact page at www.adlinktech.com for information on how to contact the ADLINK regional office nearest you.

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