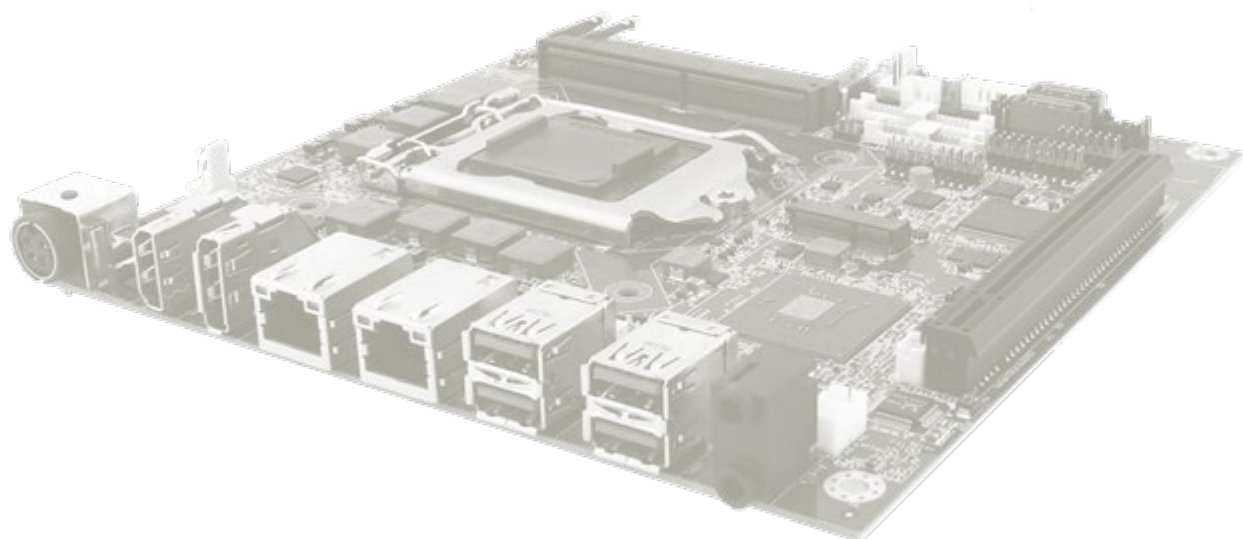


IF70 Mini-ITX SBC

Mini-ITX SBC with Intel® 9th Generation Core i3/i5/i7 processor, HDMI, Display Port, LVDS, Dual Giga Ethernet, USB 3.2 Gen.1 and NGFF Interface
V110



User Manual

Document Version 1.1 Document

Part No. 91711110114G

Please read these instructions carefully before using this product, and save this manual for future use.

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Preface

Copyright Notice

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Disclaimer

We reserve the right to make changes, without notice, to any product, including circuits and/or software described or contained in this manual in order to improve design and/or performance. We assume no responsibility or liability for the use of the described product(s), conveys no license or title under any patent, copyright, or masks work rights to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified. Applications that are described in this manual are for illustration purposes only. We make no representation or warranty that such application will be suitable for the specified use without further testing or modification.

Warranty

We warrant that each of its products will be free from material and workmanship defects for a period of one year from the invoice date. (Standard is one year, extended warranty will need to discuss with our sales representatives. If the customer discovers a defect, we will, at its option, repair or replace the defective product at no charge to the customer, provided it is returned during the warranty period of one year, with transportation charges prepaid. The returned product must be properly packaged in its original packaging to obtain warranty service.

If the serial number and the product shipping data differ by over 30 days, the in-warranty service will be made according to the shipping date. In the serial numbers the third and fourth two digits give the year of manufacture, and the fifth digit means the month (e. g., with A for October, B for November and C for December).

For example, the serial number 1W19Axxxxxxx means October of year 2019.

Packing List

Before using this Motherboard, please make sure that all the items listed below are present in your package:

- IF70 Mini-ITX SBC
- User Manual & Driver CD

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Customer Service

We provide a service guide as below for any problem by the following steps: First, contact your distributor, sales representative, or our customer service center for technical support if you need additional assistance.

You need to prepare the following information before you call:

- Product serial number
- Peripheral attachments
- Software (OS, version, application software, etc.)
- Detailed problem description
- The exact wording of any error messages

In addition, free technical support is available from our engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products. Please do not hesitate to call or e-mail us.

Advisory Conventions

Four types of advisories are used throughout the user manual to provide helpful information or to alert you to the potential for hardware damage or personal injury. These are Notes, Important, Cautions, and Warnings. The following is an example of each type of advisory.

**Note:**

A note is used to emphasize helpful information

**Important:**

An important note indicates information that is important for you to know.



Caution A Caution alert indicates potential damage to hardware and explains how to avoid the potential problem.

Attention Une alerte Attention indique des dommages potentiels au matériel et explique comment éviter le problème potentiel.



Warning! An Electrical Shock Warning indicates the potential harm from electrical hazards and how to avoid the potential problem.

Avertissement! Un avertissement de choc électrique indique les dommages potentiels dus aux risques électriques et comment éviter le problème potentiel.

Safety Precautions



Caution Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

Attention Mettez-vous toujours à la terre pour éliminer toute charge statique avant de toucher la carte CPU. Les appareils électroniques modernes sont très sensibles aux charges électrostatiques. Par mesure de sécurité, utilisez à tout moment un bracelet antistatique. Placez tous les composants électroniques dans une surface antistatique ou dans un sac antistatique lorsqu'ils ne sont pas dans le châssis.

Safety and Warranty

1. Please read these safety instructions carefully.
2. Please keep this user manual for later reference.
3. Please disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.
4. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
8. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
9. All cautions and warnings on the equipment should be noted.
10. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.
11. If any of the following situations arises, get the equipment checked by service personnel:
 - A. The power cord or plug is damaged.
 - B. Liquid has penetrated into the equipment.
 - C. The equipment has been exposed to moisture.
 - D. The equipment does not work well, or you cannot get it to work according to the user's manual.
 - E. The equipment has been dropped and damaged.
 - F. The equipment has obvious signs of breakage.

About This User Manual

This User Manual provides information about using the IF70 Mini-ITX SBC. The documentation set for the IF70 Mini-ITX SBC provides information for specific user needs, and includes:

- **IF70 Mini-ITX SBC User Manual** – contains detailed description on how to use the motherboard, its components and features.



Note: Some pictures in this guide are samples and can differ from actual product.

Document Revision History

Version	Date	Note
1.0	10-May -2020	Initial document release
1.1	19-Oct -2020	Revise board version to V110

Chapter 1: General Information

This chapter includes the IF70 Mini-ITX SBC background information.

- 1.1 Introduction
 - 1.2 Features
 - 1.3 Motherboard Specifications
 - 1.4 Functional Description
 - 1.5 Physical Description
-

1.1 Introduction

Thank you for choosing the IF70 Motherboard. The IF70 Motherboard is powered by Intel® Q370 chipset, 17x17 mm, and Socket G3 Intel® 9th Generation Core i7/i5/i3 Processor. The Intel®9th Generation Core™ processor based on 64-bit, multi-core processors built on 22-nanometer process technology. The processors are designed for a two-chip platform consisting of a processor and Platform Controller Hub (PCH) to be used with the mobile chipset. High performance platform delivers the performance and high scalability cutting-edge embedded computing application.

In peripheral connectivity, IF70 Motherboard features two NGFF Sockets two Serial ATA III (6Gb/s) connectors, four serial ports (four pin headers), 4 super-speed USB 3.2 connectors and four hi-speed USB 2.0 connectors(four pin headers). Additionally, IF70 SBC features build-in a 12V DC in power adapter.

Abundant I/O connectors and expandability makes IF70 Motherboard to be the right fit in the majority of industrial computer applications such as machine vision and control, gaming, POS, KIOSK systems, industrial automation, and others. Powerful processor in Mini ITX form-factor meets the demanding performance requirements of modern industrial applications.

1.2 Features

IF70 Mini-ITX SBC features:

- IF70 Motherboard features:
- Mini ITX Form Factor (170 x 170 mm)
- Intel® 9th Generation Core™ i7/i5/i3 (Coffee Lake Refresh S)
- Intel®Q370 Chipset
- Integrated UHD Graphics 630 supports DirectX 12 and OpenGL 4.4
- 2 x DDR4 SO-DIMM, max. 64GB
- Integrated Dual Gigabit Ethernet
- 1 x PCI-E(x16)(Optional)
- 2x SATAIII, 4 x USB3.2 Gen.1 , 4 x USB 2.0

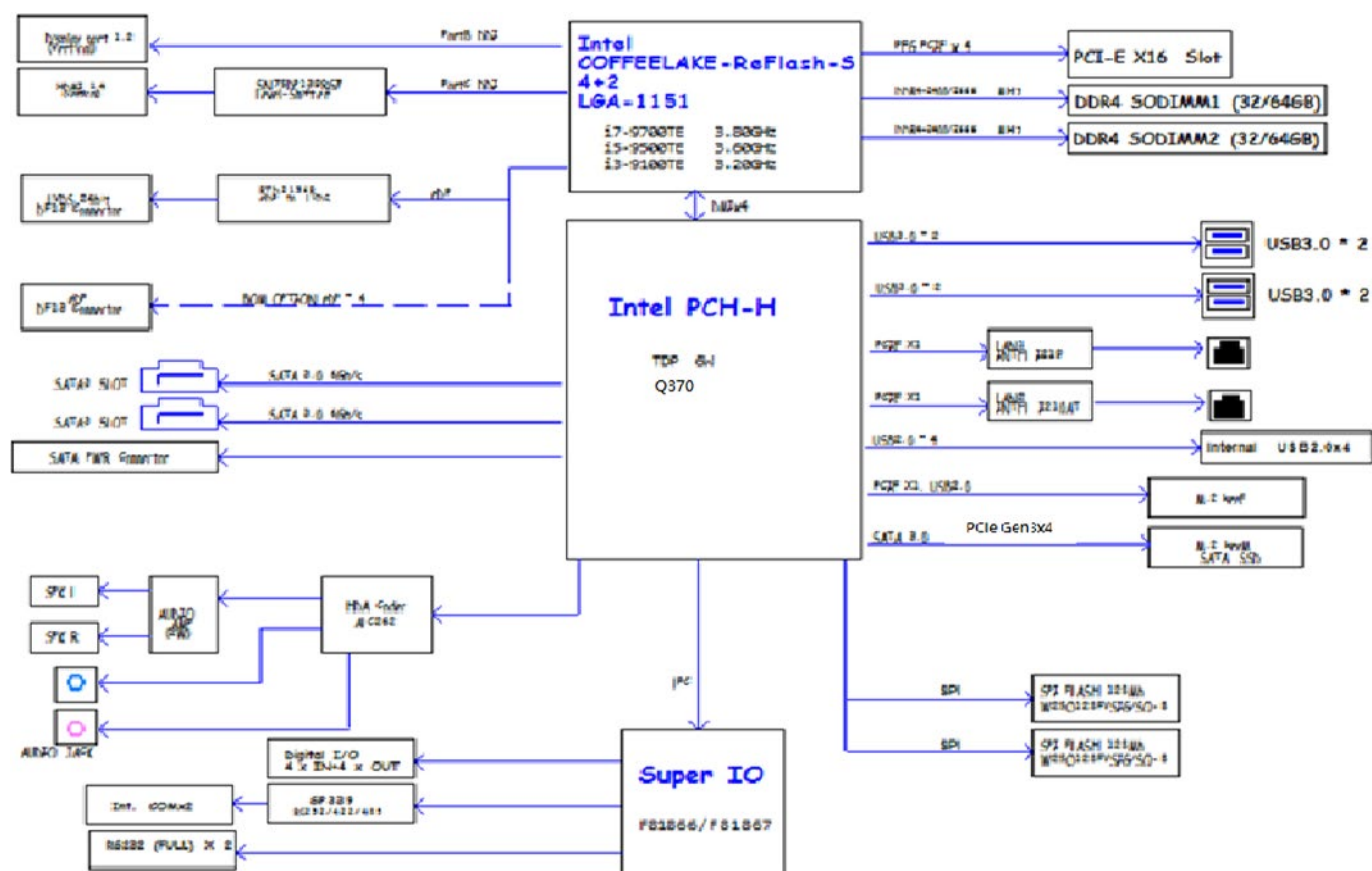
1.3 Motherboard Specifications

	Model Name	
	IF70 Mini-ITX SBC	
System Specifications	CPU	Intel® Core™ i7-9700TE Processor, 1.8GHz~3.8GHz Intel® Core™ i5-9500TE Processor, 2.2GHz~3.6GHz Intel® Core™ i3-9100TE Processor, 2.2GHz~3.2GHz
	Chipset	Intel® Q370
	System Memory	2x SO-DIMM socket ® DDR4-2666 Non ECC RAM. Max. 64GB
	Storage	2 x SATA3 2.5" HDD/SSD, (Max. 512GB/1TB)
	BIOS	Insyde System BIOS
	Graphic	Intel® UHD Graphics 630
	Super IO Chipset	Fintek F81867
	Audio	Realtek HD Audio Codec
	LAN	2 x Giga LAN (Intel® I211-AT Gigabit-LAN Controller + I219-LM Gigabit-LAN PHY)
	USB	4 ports USB 3.2 Gen.1 (5Gbps)
	OS	Windows® 10 IoT Enterprise
Display Specifications	Display Interface	Supports DirectX 12 and OpenGL 4.4
		Analog monitor resolution up to 1920 x 1200 @60Hz
		HDMI supports HDMI 1.4, max. resolution 4096 x 2160@30Hz
		Display Port: supports DP 1.2, max. resolution 4096 x 2304@60Hz
		eDp: supports 1 lane eDP display, max. resolution 4096 x 2304@60Hz
I/O Ports Specification	External I/O	4 x USB 3.2 Gen.1 2 x RJ-45 for Giga LAN with LED 1 x DP 1.2 1 x HDMI 1.4(Optional) 1 x Audio Jack (Mic-in, Line-out) 1 x (+12V) Power Input 4P Mini DIN Jack 1 x Clear CMOS Button 1 x Reset Button
	Internal I/O	2 x RS232 Serial Console to 2x5 Pin Header (COM1/COM2) 2 x LVTTTL Serial COM Console to 2x5 Pin Header

		(COM3/COM4) SPK R / SPK L 2 x USB 2.0 Pin Wafer 1 x CPU FAN Connector 1 x SYS FAN Connector (Optional in Backplane BD) 1 x LPC DB 2 x SATA III Connectors (SATA0/SATA1) 2 x 5V power connector 1 x 12V power connector 1 x SATA Power Connector 1 x Panel Backlight Connector 1 x LVDS Wafer Connector 1 x eDP Wafer Connector 1 x VR Control Connector 1 x Panel Button connector
	Expansions Slot	1 x M.2 NGFF KEY E for WWAN/WALN PCIe Card 1 x M.2 2242 Key B SATA3/2280 Key M NVMe SSD, (Max. 4TB) 1 x PCIe (x16) slot(Optional)
Indicators	LAN (2 x RJ45)	10/100 Mbps (Green LED)
Security	TPM	TPM 2.0
Mechanical Specifications	Dimensions	170 (W) x 170(L) mm
Environment Considerations	Operating Temp.	-20°C ~ 60°C
	Storage Temp.	-40°C ~ 70°C
	Operating Humidity	10% ~ 95%, non-condensing
Power Management	Power Supply	+12V Power Input
	Power Consumption	Maximum 50W
Packing List	Standard	IF70-110 Mini-ITX SBC IF70 Mini-ITX SBC Manual & Driver CD

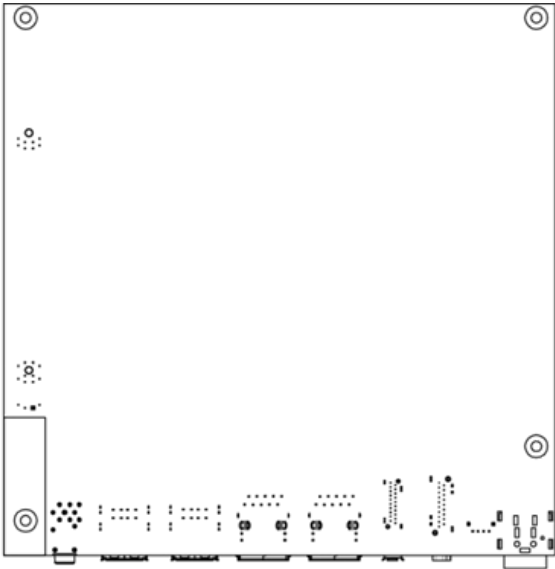
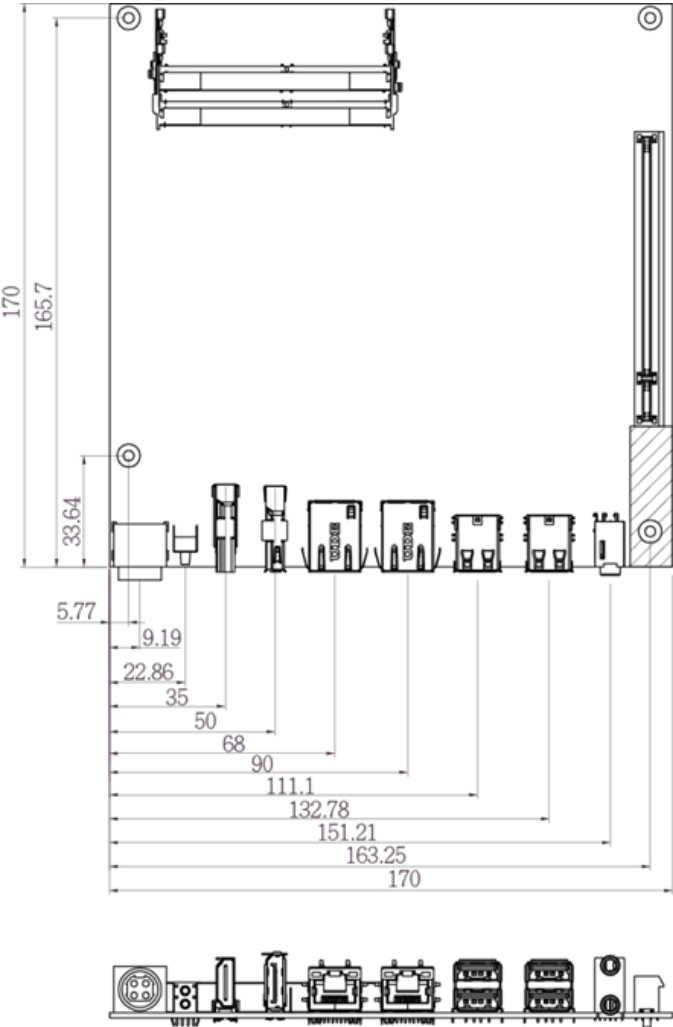
1.4 Functional Description

Function block (V110)



1.5 Physical Description

Board Dimensions (V110)



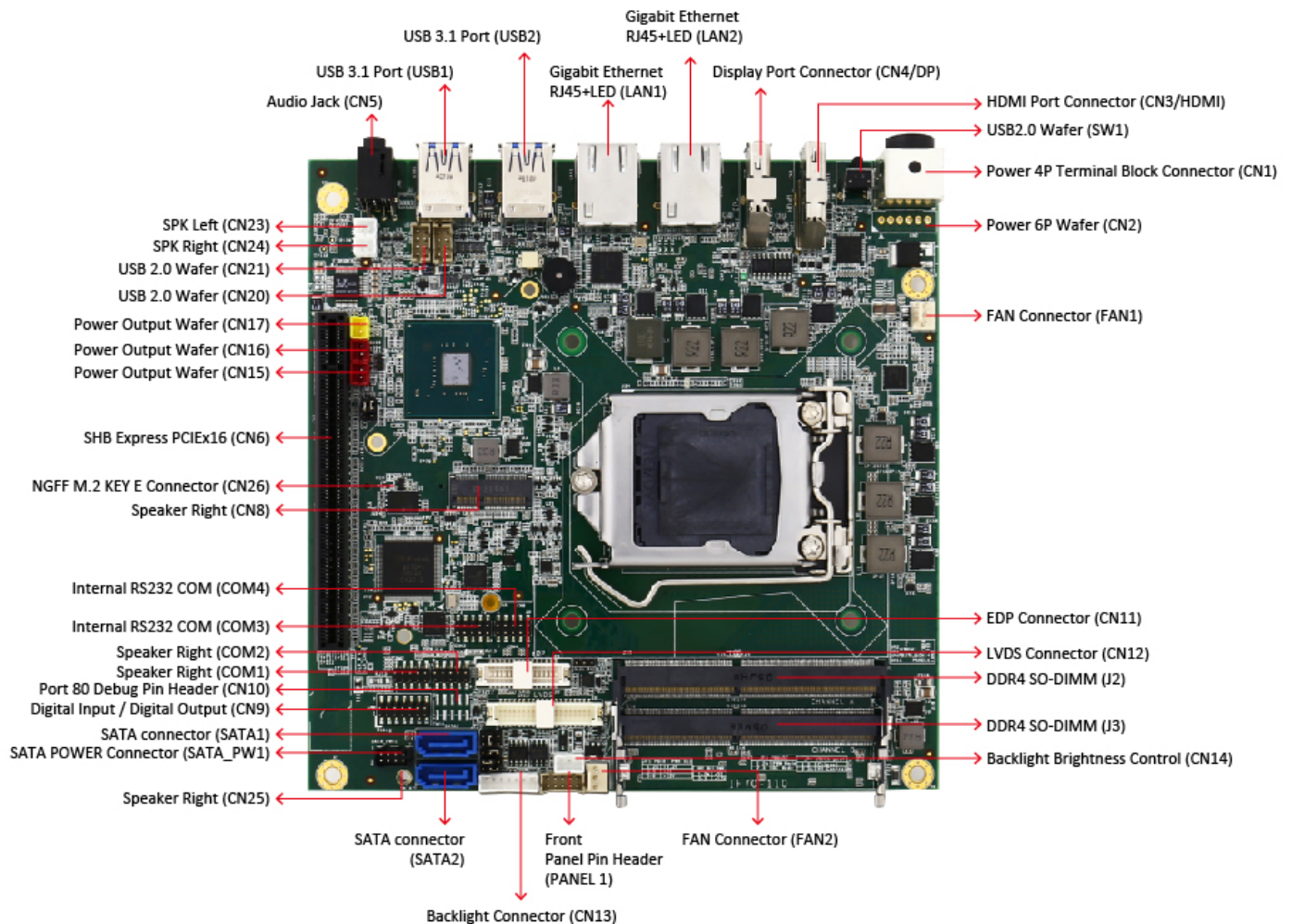
Chapter 2: Hardware Installation

This chapter provides information on how to use jumpers and connectors on the IF70 Mini-ITX SBC. Be cautious while working with these modules. Carefully read the content of this chapter in order to avoid any damages.

- 2.1 Motherboard Components
 - 2.2 Memory Module Installation
 - 2.3 I/O Equipment Installation
 - 2.4 Jumper Settings
 - 2.5 Motherboard Connectors
-

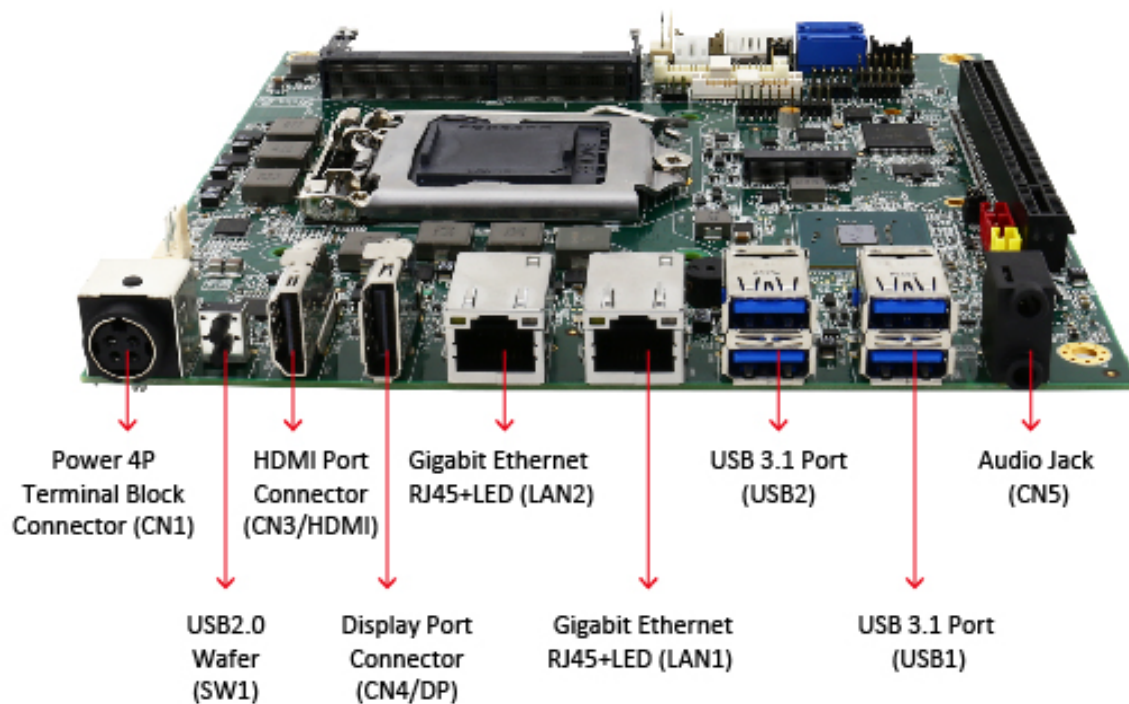
2.1 Motherboard Components

2.1.1 Component Side



IF70 Mini-ITX SBC Top Layer (CPU Side, Top View)

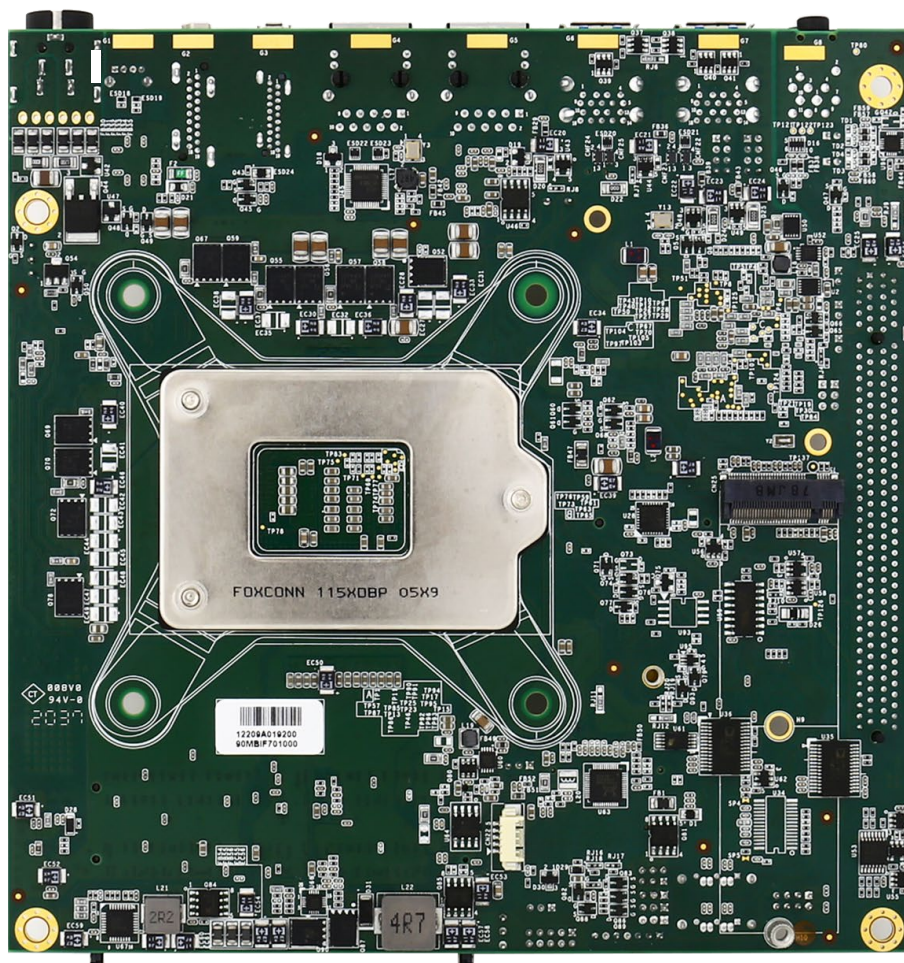
Note: HDMI is an optional connector



IF70 Mini-ITX SBC Side Layer (IO Side, Front View)

Note: HDMI is an optional connector

2.1.2 Solder Side



IF70 Mini-ITX SBC Bottom Layer (IO Side, Top View)

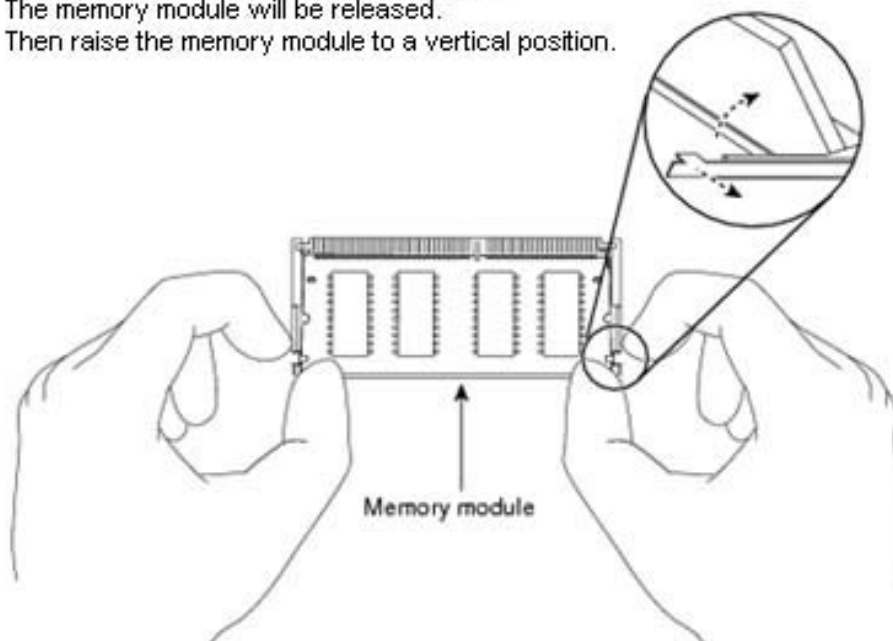
2.2 Memory Module (SO-DIMM) Installation

The IF70 Mini-ITX SBC has two 260-pin SODIMM slot. The socket supports DDR4.

When installing the memory unit, please follow the steps below:

1. Firmly insert the SO-DIMM at an angle of about 30-degree into the slot. Align the SO-DIMM with the slot until it is fully inserted. The notch on the SO-DIMM should match the break on the slot.
2. Press downwards on SO-DIMM until the retaining clips at both ends fully snap closed and the SO-DIMM is properly seated.

Pull the tabs away with your thumbs,
bracing your forefingers against the rails.
The memory module will be released.
Then raise the memory module to a vertical position.



Caution The SO-DIMM only fits in one correct orientation. It will cause permanent damage to the development board and the SO-DIMM if the SO-DIMM is forced into the slot at the incorrect orientation.

Attention Le SO-DIMM ne tient que dans une seule orientation correcte. Cela causera des dommages permanents à la carte de développement et au SO-DIMM si le SO-DIMM est forcé dans le logement avec une orientation incorrecte.

2.3 I/O Equipment Installation

2.3.1 Power Input 12V DC in

The IF70 Mini-ITX SBC allows plugging 12V DC-IN jack on the board without another power module converter under power consumption by Intel® 9th Generation Core i7/i5/i3 Processor and Q370 chipset.

2.3.2 Serial COM Port

Four COM Port Pin Headers build in the IF70 Mini-ITX SBC. Optional COM ports support RS-422/485.

**When an optional touch-screen is ordered with PPC, serial com port can connect to a serial or an optional touch-screen.*

2.3.3 HDMI (Optional)

The IF70 Mini-ITX SBC has one HDMI port that can be connected to an external LCD monitor. Use HDMI cable to connect to an external LCD monitor, and connect the power cable to the outlet. The HDMI connector is a standard 19-pin HDMI connector.

2.3.4 Display Port

The Motherboard has one Display Port that can be connected to an external LCD monitor. Use Display Port cable to connect to an external LCD monitor, and connect the power cable to the power outlet. The Display Port connector is a standard 20-pin DP connector.

2.3.5 Ethernet Interface

The IF70 Mini-ITX SBC is equipped with Intel® I211-AT Gigabit-LAN Controller + I219-LM Gigabit-LAN PHY which is fully compliant with the PCI 10/100/1000 Mbps Ethernet protocol compatible. It is supported by major network operating systems. The Ethernet ports provide two standard RJ-45 jacks.

2.3.6 USB Port

Eight USB devices (four with pin headers) may be connected to the system though an adapter cable. Various adapters may come with USB ports. USB usually connect the external system to the system. The USB ports support hot plug-in connection. Whatever, you should install the device driver before you use the device.

2.3.7 Audio

The Audio 7.1 channel capabilities are provided by a Realtek chipset supporting digital audio outputs. The audio interface includes two jacks: line-out and mic-in.

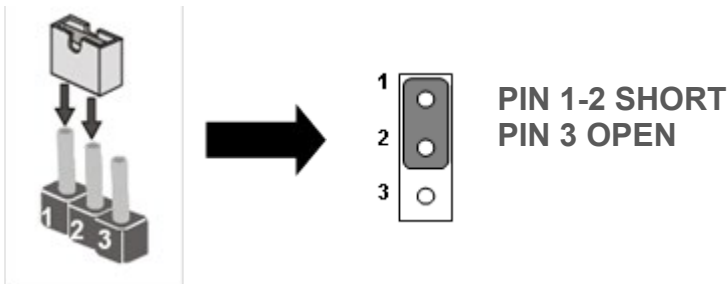
2.4 Jumper Settings

This section explains how to set jumpers for correct configuration of the motherboard.



Note: A pair of needle nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

The jumper setting diagram is shown below. When the jumper cap is placed on both pins, the jumper is **SHORT**. The illustration below shows a 3-pin jumper; pins 1 and 2 are short. If you remove the jumper cap, the jumper is **OPEN**.

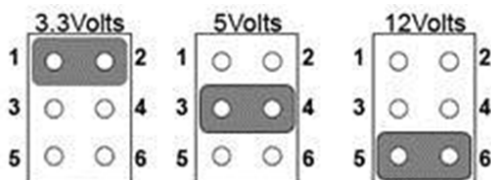


Caution To avoid damaging the module, always turn off the power supply before setting jumpers or clearing CMOS.

Attention Pour éviter d'endommager le module, coupez toujours l'alimentation avant de régler les cavaliers ou d'effacer le CMOS.

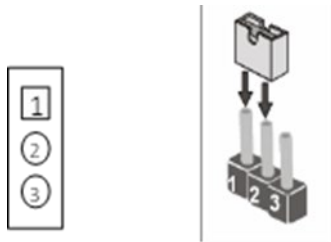
Jumpers		
Label	Function	Note
JP1	Panel Power Select	2x3 header, pitch 2.0mm
JP2	Backlight Power Select	1x3 header, pitch 2.0mm
JP3	Backlight Dimming Select	1x3 header, pitch 2.0mm
JP4	Backlight Dimming Control Select	1x3 header, pitch 2.0mm
CLR_CMOS	Clear CMOS	1*3p P:2.0mm DIP 180o
CLR_RTC	Clear RTC	1*3p P:2.0mm DIP 180o

2.4.1 JP1: Panel Power Select



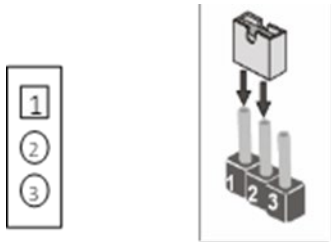
Pin №	Name
1-2	+3.3V
3-4 (Default)	+5V
5-6	+12V

2.4.2 JP2: Backlight Power Select



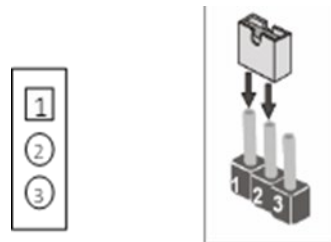
Pin №	Name
1-2	+5V
2-3 (Default)	+12V

2.4.3 JP3: Backlight Dimming Select



Pin №	Name
1-2 (Default)	PWM Mode
2-3	DC Mode


2.4.4 JP4: Backlight Dimming Control Select



Pin №	Name
1-2	Chipset
2-3(Default)	VR Control

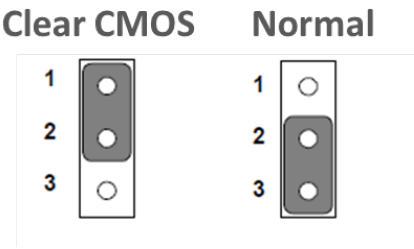
2.4.5 CLR CMOS: Clear CMOS Jumper

Remember to set jumper back to Normal before turning on the power supply.



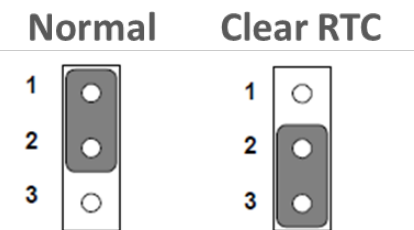
Caution TURN OFF the power supply before setting Clear CMOS.

Attention COUPEZ l'alimentation avant de régler Clear CMOS.



Pin №	Function
1-2 (Default)	Normal
2-3	Clear CMOS

2.4.6 CLR RTC: Clear RTC Jumper



Pin №	Function
1-2 (Default)	Normal
2-3	Clear RTC

2.5 Mainboard Connectors

2.5.1 Connector List

Connectors		
Label	Function	Note
CN1	Power 4P Terminal Block Connector	Din 4p dip Quick Lock
CN2	Power 6P Wafer	Wafer 6p dip
CN3/ HDMI1 (Optional)	HDMI Port Connector	HDMI1.4a
CN4/ DP	Display Port Connector	Display Port 1.2
CN5	Audio Jack	PJD-035-17A
CN6	SHB Express PCIEx16	16x164p180°2EG08217-D2D
CN25	NGFF M.2 KEY M Connector	NGFF M.2 KEY M Connector
CN8	NGFF M.2 KEY E Connector	NXSE0-S6705-TP50
CN9	Digital Input / Digital Output	Header/2*5p P: 2.0mm SMD 180°, black color
CN11	eDP Connector	DF13 2*15p P:1.25mm SMD 180°
CN12	LVDS Connector	2*20p P:1.25mm SMD 180° White color
CN13	Backlight Connector	7p P:2.0mm DIP 180°
CN14	Backlight Brightness Control	3p P:2.0mm DIP 180°
CN15, CN16,CN17	Power Output Wafer	CN15 / CN16: 2p P:2.0mm DIP 180°, red color CN17 - 2p P:2.0mm DIP 180°, yellow color
CN18	RTC Wafer	Hirose:DF13-2P-1
CN20, CN21	USB2.0 Wafer	2*4p P:2.0mm DIP 180°
COM1,COM2, COM3, COM4	Internal COM Port	2*5p P:2.0mm SMD 180°
LAN1, LAN2	Gigabit Ethernet	RJ45+LED
PANEL 1	Front Panel Pin Header	2*5p P:2.0mm SMD 180°
SATA1, SATA2,	SATA Connector	WATM-07ABN4A2B8UW
SW1	Clear COM, Reset	Button
FAN1, FAN2	Fan Connector	3P 2.54mm DIP 180°

Connectors		
Label	Function	Note
J1	DDR4 SO-DIMM	ASAA82X-EASB0-7H 9.2mm 1.2V SMT
J2	AS0AB26-H2SB-7H 5.2mm 1.2V SMT	AS0AB26-H2SB-7H 5.2mm 1.2V SMT
USB1, USB2	USB 3.2 Gen.1	USB Type A

2.5.2 Connector Description

2.5.2.1 CN1: Power 4P Terminal Block Connector

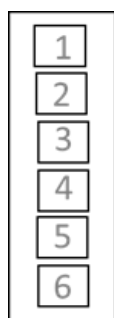
The DC power input for the IF70 Mini-ITX SBC allows a voltage input of 12V DC.



CN1

Pin №	Signal Name	Pin №	Signal Name
1	12VDC	2	GND
3	12VDC	4	GND

2.5.2.2 CN2: Power 6P Wafer



CN2

Pin №	Signal Name
1	+12V
2	+12V
3	+12V
4	DC_GND
5	DC_GND
6	DC_GND

2.5.2.3 CN3: HDMI Port Connector (Optional)

Use HDMI connector to connect the IF70 Mini-ITX SBC to an external monitor.

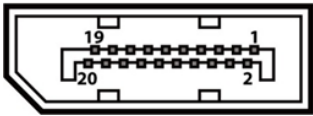


HDMI

Pin №	Signal Name	Pin №	Signal Name
1	TMDS_DATA2+	2	GND
3	TMDS_DATA2-	4	TMDS_DATA1+
5	GND	6	TMDS_DATA1-
7	TMDS_DATA0+	8	GND
9	TMDS_DATA0-	10	TMDS_CLOCK+
11	GND	12	TMDS_CLOCK-
13	CEC	14	NC
15	DDC_CLOCK	16	DDC_DATA
17	GND	18	5V
19	Hot Plug Detect		

2.5.2.4 CN4: Display Port Connector

IF70 Mini-ITX SBC provides one Display Port 1.2 connector.



CN4

Pin №	Signal Name	Pin №	Signal Name
1	Lane 0+	2	GND
3	Lane 0-	4	Lane 1+
5	GND	6	Lane 1-
7	Lane 2+	8	GND
9	Lane 2-	10	Lane 3+
11	GND	12	Lane 3-
13	AUX_EN_N	14	GND
15	AUX+	16	GND
17	AUX-	18	Hot Plug
19	GND	20	+3.3V

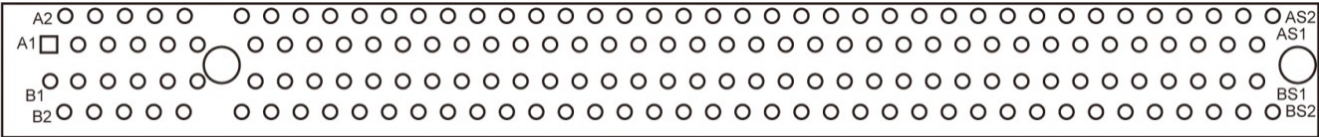
2.5.2.5 CN5: Audio Jack

IF70 Mini-ITX SBC has two stereo audio ports with phone jack connectors, one is Line-out, and the other one is Mic-in.



Color	Signal Name
1	Line-out
2	Mic-in

2.5.2.6 CN6: SHB Express PCIe16



CN6

	Side B	Net	Description	Side A	Net	Description
1	Side B	SMB_SHB_CLK	PCIE 12V power	Side A	SMB_SHB_DATA	External pull down
2	Side B	GND	PCIE 12V power	Side A	GND	PCIE 12V power
3	Side B	SHB_TDI	PCIE 12V power	Side A	SHB_TCK	PCIE 12V power
4	Side B	SHB_TDO	GND	Side A	SHB_TMS	GND
5	Side B	SHB_TRST#	SMBUD CLK	Side A	SHB_WAKE_N	
6	Side B	SYSFANIN	SMBUS DATA	Side A	SHB_PCI_WAKE_N_R	
7	Side B	NC	GND	Side A	SHB_PSON_N	
8	Side B	NC	PCIE 3.3V power	Side A	SHB_PERST_N	
9	Side B	SHB_CFG0_R	NC	Side A	SHB_CFG1_R	PCIE 3.3V power
10	Side B	SHB_CFG2_R	PCIE 3.3V aux	Side A	SHB_CFG3_R	PCIE 3.3V power
11	Side B	SHB_RSVD1	Wake signal	Side A	GND	Platform Reset
12	Side B	GND	NC	Side A	SHB_RSVD3	GND
13	Side B	PCIE9_SHB_TX_DP	GND	Side A	GND	PCIE CLK+
14	Side B	PCIE9_SHB_TX_DN	PCIE Group A TX0+	Side A	GND	PCIE CLK-
15	Side B	GND	PCIE Group A TX0-	Side A	PCIE9_SHB_RX_DP	GND
16	Side B	GND	GND	Side A	PCIE9_SHB_RX_DN	PCIE Group A RX0+
17	Side B	PCIE10_SHB_TX_DP	PCIEX16 PRSNT	Side A	GND	PCIE Group A RX0-
18	Side B	PCIE10_SHB_TX_DN	GND	Side A	GND	GND
19	Side B	GND	PCIE Group A TX1+	Side A	PCIE10_SHB_RX_DP	NC
20	Side B	GND	PCIE Group A TX1-	Side A	PCIE10_SHB_RX_DN	GND
21	Side B	PCIE11_SHB_TX_DP	GND	Side A	GND	PCIE Group A RX1+
22	Side B	PCIE11_SHB_TX_DN	GND	Side A	GND	PCIE Group A RX1-
23	Side B	GND	PCIE Group A TX2+	Side A	PCIE11_SHB_RX_DP	GND
24	Side B	GND	PCIE Group A TX2-	Side A	PCIE11_SHB_RX_DN	GND
25	Side B	PCIE12_SHB_TX_DP	GND	Side A	GND	PCIE Group A RX2+
26	Side B	PCIE12_SHB_TX_DN	GND	Side A	GND	PCIE Group A RX2-
27	Side B	GND	PCIE Group A TX3+	Side A	PCIE12_SHB_RX_DP	GND
28	Side B	GND	PCIE Group A TX3-	Side A	PCIE12_SHB_RX_DN	GND
29	Side B	CLK_PCIE_SHB_B0_P	GND	Side A	GND	PCIE Group A RX3+
30	Side B	CLK_PCIE_SHB_B0_N	NC	Side A	GND	PCIE Group A RX3-
31	Side B	GND	PCIEX16 PRSNT	Side A	CLK_PCIE_SHB_B1_P	GND
32	Side B	NC	GND	Side A	CLK_PCIE_SHB_B1_N	NC
33	Side B	CLK_PCIE_SHB_B2_P	PCIE Group A TX4+	Side A	GND	NC
34	Side B	CLK_PCIE_SHB_B2_N	PCIE Group A TX4-	Side A	GND	GND
35	Side B	GND	GND	Side A	CLK_PCIE_SHB_B3_P	PCIE Group A RX4+
36	Side B	NC	GND	Side A	CLK_PCIE_SHB_B3_N	PCIE Group A RX4-
37	Side B	CLK_PCIE_SHB_A0_P	PCIE Group A TX5+	Side A	GND	GND
38	Side B	CLK_PCIE_SHB_A0_N	PCIE Group A TX5-	Side A	GND	GND
39	Side B	GND	GND	Side A	CLK_PCIE_SHB_A1_P	PCIE Group A RX5+
40	Side B	NC	GND	Side A	CLK_PCIE_SHB_A1_N	PCIE Group A RX5-
41	HSOP_6	SHB_PCIE_A6_TXP	PCIE Group A TX6+	Side A	GND	GND
41	Side B	CLK_PCIE_SHB_A2_P	PCIE Group A TX6-	Side A	GND	GND
42	Side B	CLK_PCIE_SHB_A2_N	GND	Side A	GND	PCIE Group A RX6+
43	Side B	GND	GND	Side A	CLK_PCIE_SHB_A3_P	PCIE Group A RX6-
44	Side B	GND	PCIE Group A TX7+	Side A	CLK_PCIE_SHB_A3_N	GND
45	Side B	EXP_A_TX_15_DP	PCIE Group A TX7-	Side A	GND	GND
46	Side B	EXP_A_TX_15_DN	GND	Side A	GND	PCIE Group A RX7+
47	Side B	GND	PCIEX16 PRSNT	Side A	EXP_A_RX_15_DP	PCIE Group A RX7-
48	Side B	GND	GND	Side A	EXP_A_RX_15_DN	GND
49	Side B	EXP_A_TX_14_DP	PCIE Group A TX8+	Side A	GND	NC
50	Side B	EXP_A_TX_14_DN	PCIE Group A TX8-	Side A	GND	GND

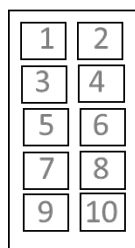
51	Side B	GND	GND	Side A	EXP_A_RX_14_DP	PCIE Group A RX8+
52	Side B	GND	GND	Side A	EXP_A_RX_14_DN	PCIE Group A RX8-
53	Side B	EXP_A_TX_13_DP	PCIE Group A TX9+	Side A	GND	GND
54	Side B	EXP_A_TX_13_DN	PCIE Group A TX9-	Side A	GND	GND
55	Side B	GND	GND	Side A	EXP_A_RX_13_DP	PCIE Group A RX9+
56	Side B	GND	GND	Side A	EXP_A_RX_13_DN	PCIE Group A RX9-
57	Side B	EXP_A_TX_12_DP	PCIE Group A	Side A	GND	GND
58	Side B	EXP_A_TX_12_DN	PCIE Group A	Side A	GND	GND
59	Side B	GND	GND	Side A	EXP_A_RX_12_DP	PCIE Group A RX10+
60	Side B	GND	GND	Side A	EXP_A_RX_12_DN	PCIE Group A RX10-
61	Side B	EXP_A_TX_11_DP	PCIE Group A	Side A	GND	GND
62	Side B	EXP_A_TX_11_DN	PCIE Group A	Side A	GND	GND
63	Side B	GND	GND	Side A	EXP_A_RX_11_DP	PCIE Group A RX11+
64	Side B	GND	GND	Side A	EXP_A_RX_11_DN	PCIE Group A RX11-
65	Side B	EXP_A_TX_10_DP	PCIE Group A	Side A	GND	GND
66	Side B	EXP_A_TX_10_DN	PCIE Group A	Side A	GND	GND
67	Side B	GND	GND	Side A	EXP_A_RX_10_DP	PCIE Group A RX12+
68	Side B	GND	GND	Side A	EXP_A_RX_10_DN	PCIE Group A RX12-
69	Side B	EXP_A_TX_9_DP	PCIE Group A	Side A	GND	GND
70	Side B	EXP_A_TX_9_DN	PCIE Group A	Side A	GND	GND
71	Side B	GND	GND	Side A	EXP_A_RX_9_DP	PCIE Group A RX13+
72	Side B	GND	GND	Side A	EXP_A_RX_9_DN	PCIE Group A RX13-
73	Side B	EXP_A_TX_8_DP	PCIE Group A	Side A	GND	GND
74	Side B	EXP_A_TX_8_DN	PCIE Group A	Side A	GND	GND
75	Side B	GND	GND	Side A	EXP_A_RX_8_DP	PCIE Group A RX14+
76	Side B	GND	GND	Side A	EXP_A_RX_8_DN	PCIE Group A RX14-
77	Side B	NC	PCIE Group A	Side A	GND	GND
78	Side B	+V3.3S_SHB	PCIE Group A	Side A	+V3.3S_SHB	GND
79	Side B	+V3.3S_SHB	GND	Side A	+V3.3S_SHB	PCIE Group A RX15+
80	Side B	+V3.3S_SHB	PCIEX16 PRSNT	Side A	+V3.3S_SHB	PCIE Group A RX15-
81	Side B	+V3.3S_SHB	NC	Side A	+V3.3S_SHB	GND
82	SB	+V3.3A_SHB		SA	+V3.3A_SHB	

2.5.2.7 CN8: NGFF M.2 KEY B Connector

The IF70 Mini-ITX SBC NGFF M.2 connector supports 2 M.2 card applications:

- PCIe I/F + USB

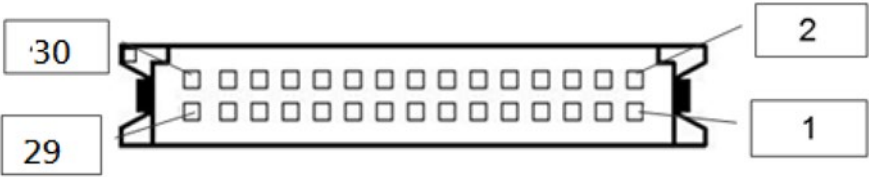
2.5.2.8 CN9: Digital Input / Digital Output



CN9

Pin №	Signal Name	Pin №	Signal Name
1	GND	2	DIO_5V
3	DOUT3	4	DOUT1
5	DOUT2	6	DOUT0
7	DINT3	8	DINT1
9	DINT2	10	DINT0

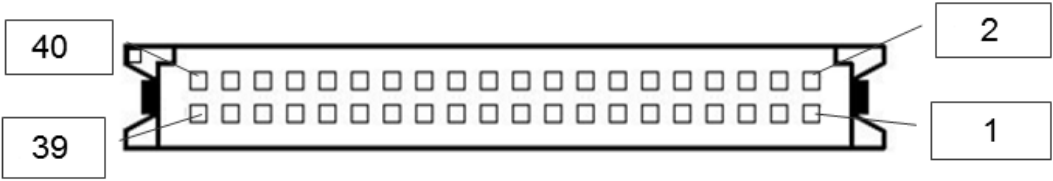
2.5.2.9 CN11:EDP Connector



CN11

Pin №	Signal Name	Pin №	Signal Name
1	EMB_AUXN	2	SMB_DATA_MAIN
3	EMB_AUXP	4	SMB_DATA_CLK
5	GND	6	GND
7	DP_TXN3_C	8	+VCC_EDP_BKLT
9	DP_TXP3_C	10	+VCC_EDP_BKLT
11	GND	12	+VCC_EDP_BKLT
13	DP_TXN2_C	14	GND
15	DP_TXP2_C	16	GND
17	GND	18	GND
19	DP_TXN1_C	20	GND
21	DP_TXP1_C	22	LCDVDD
23	GND-	24	LCDVDD
25	DP_TXN0_C	26	LCDVDD
27	DP_TXP0_C	28	LCDVDD
29	GND	30	+VCC_EDP_BKLT

2.5.2.10 CN12:LVDS Connector



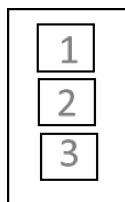
CN12

Pin №	Signal Name	Pin №	Signal Name
1	LCDVDD	2	LVDS0_TX0_N
3	LCDVDD	4	LVDS0_TX0_P
5	LCDVDD	6	LVDS0_TX1_N
7	GND	8	LVDS0_TX1_P
9	GND	10	LVDS0_TX2_N
11	GND	12	LVDS0_TX2_P
13	GND	14	LVDS0_CLK_N
15	GND	16	LVDS0_CLK_P
17	GND	18	LVDS0_TX3_N
19	GND	20	LVDS0_TX3_P
21	GND	22	LVDS1_TX0_N
23	GND	24	LVDS1_TX0_P
25	GND	26	LVDS1_TX1_N
27	GND	28	LVDS1_TX1_P
29	GND	30	LVDS1_TX2_N
31	GND	32	LVDS1_TX2_P
33	GND	34	LVDS1_CLK_N
35	GND	36	LVDS1_CLK_P
37	GND	38	LVDS1_TX3_N
39	GND	40	LVDS1_TX3_P

2.5.2.11 CN13: Backlight Connector

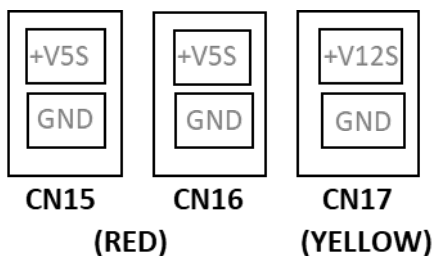
CN13

Pin №	Signal Name
1	+BKLPWR_R
2	+BKLPWR_R
3	+BKLPWR_R
4	GND
5	BRIGHT
6	GND
7	BLON_5V

2.5.2.12 CN14: Backlight Brightness Control

CN14

Pin №	Signal Name
1	+V5S
2	VRD_ADC
3	GND

2.5.2.13 CN15/ CN16/ CN17: Power output wafer

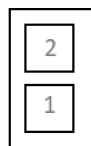
CN15

CN16

CN17

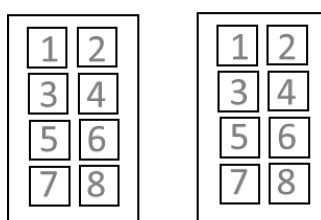
(RED)

(YELLOW)

2.5.2.14 CN18: Power output wafer

CN18

Pin №	Signal Name
1	GND
2	BACKUP_VBAT

2.5.2.15 CN20 & CN21: USB2.0 Wafer

CN20

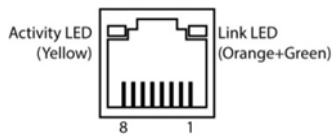
CN21

Pin №	Signal Name	Pin №	Signal Name
1	USB_VCC	2	USB_VCC9
3	USB_DN	4	USB_DN
5	USB_DP	6	USB_DP
7	GND	8	GND

Pin №	Signal Name	Pin №	Signal Name
1	USB_VCC8	2	USB_VCC
3	USB_DN	4	USB_DN
5	USB_DP	6	USB_DP
7	GND	8	GND

2.2.2.16 LAN1, LAN2: LAN Conector

IF70 Mini-ITX SBC has two Ethernet connectors located on the front. Ethernet ports provide a standard RJ45 10/100/1000 Mbps jack connector with LED indicators on the front side to show its Active/ Link status and Speed status.



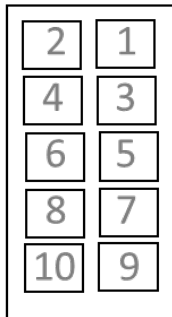
LAN1, LAN2

10/100 Mbps- Green

1G Mbps – Orange

Pin №	Signal Name	Pin №	Signal Name
1	TX1+	2	TX1-
3	TX2+	4	TX2-
5	TX3+	6	TX3-
7	TX4+	8	TX4-

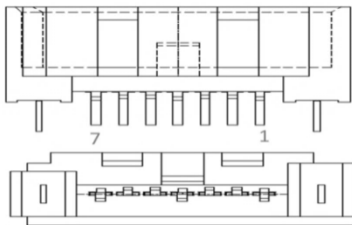
2.5.2.17 Panel1: Front Panel Pin Header



PANEL1

Pin №	Signal Name	Pin №	Signal Name
1	PW_LED+	2	HD_LED+
3	GND	4	HD_LED-
5	PW_BT	6	GND
7	BRI+	8	RST-BT
9	BRI-	10	5VSB

2.5.2.18 SATA1/ SATA2: SATA connector

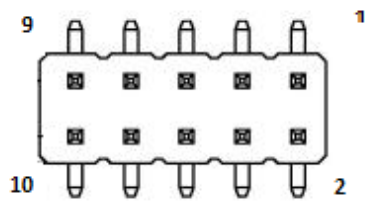


SATA1/ SATA2

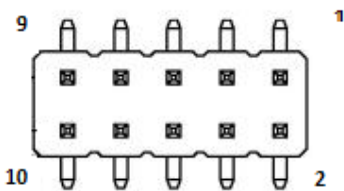
Pin №	Signal Name	Pin №	Signal Name
1	GND	2	SATA_TXP
3	SATA_TXN	4	GND
5	SATA_RXN	6	SATA_RXP
7	GND		

2.5.2.19 COM1/COM2/COM3/COM4: Internal RS232 COM

The serial port which is Winbond I/O support is RS232 only.



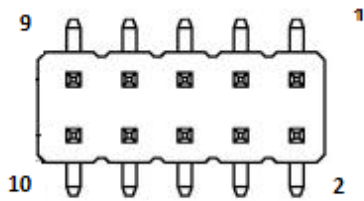
COM1



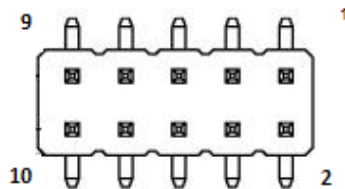
COM2

Pin №	Signal Name	Pin №	Signal Name
1	FK_NDCD1	2	FK_NDSR1
3	FK_NSIN1	4	FK_NRTS1
5	FK_NSOUT1	6	FK_NCTS1
7	FK_NDTR1	8	FK_NRI3
9	GND	10	COM1_5V

Pin №	Signal Name	Pin №	Signal Name
1	FK_NDCD2	2	FK_NDSR2
3	FK_NSIN2	4	FK_NRTS2
5	FK_NSOUT2	6	FK_NCTS2
7	FK_NDTR2	8	FK_NRI2
9	GND	10	COM2_5V



COM3

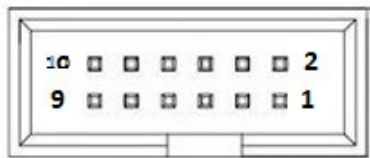


COM4

Pin №	Signal Name	Pin №	Signal Name
1	FK_NDCD3	2	FK_NDSR3
3	FK_NSIN3	4	FK_NRTS3
5	FK_NSOUT3	6	FK_NCTS3
7	FK_NDTR3	8	USB
9	GND	10	COM3_5V

Pin №	Signal Name	Pin №	Signal Name
1	FK_NDCD4	2	FK_NDSR4
3	FK_NSIN4	4	FK_NRTS4
5	FK_NSOUT4	6	FK_NCTS4
7	FK_NDTR4	8	FK_NRI4
9	GND	10	COM4_5V

2.5.2.20 SATA_PWR1: SATA POWER Connector



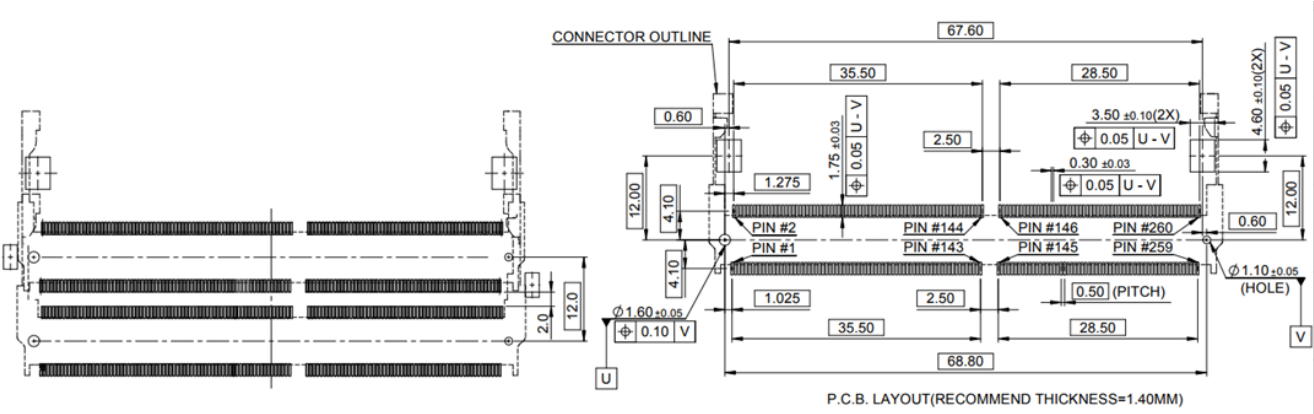
SATA_PWR1

Pin №	Signal Name	Pin №	Signal Name
1	+V12S	2	+V12S
3	GND	4	GND
5	GND	6	GND
7	+V5S	8	+V5S

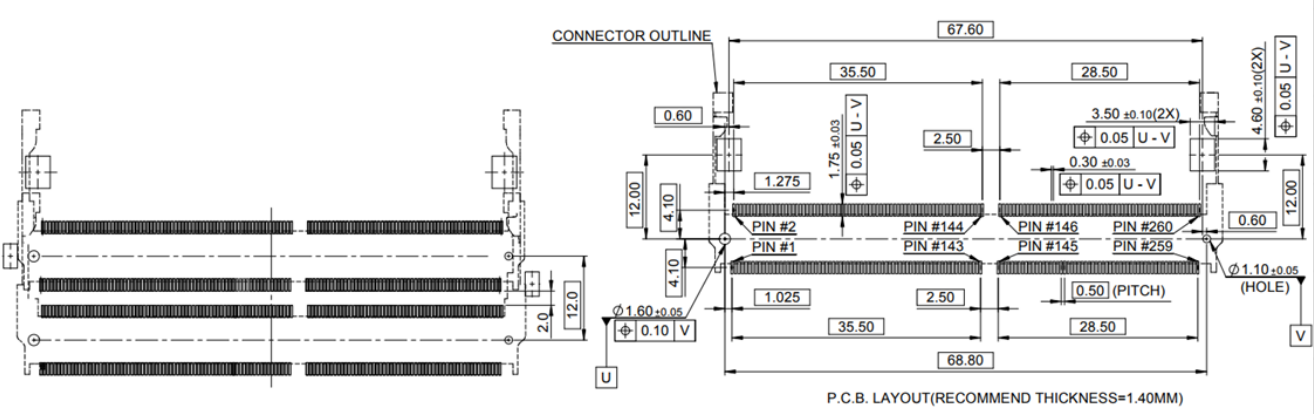
2.5.2.21 FAN1/ FAN2: FAN Connector



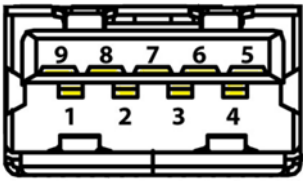
2.5.2.22 J1: DDR4 SO-DIMM



2.5.2.23 J2: DDR4 SO-DIMM



2.5.2.24 USB1, USB2 (USB 3.2 Gen.1) Connector



USB1, USB2

Pin №	Signal Name	Pin №	Signal Name
1	+5V	2	USB_D-
3	USB_D+	4	GND
5	STDA_SSRX-	6	STDA_SSRX+
7	GND_DRAIN	8	STDA_SSTX-
9	STDA_SSTX+		

Chapter 3: Insyde H20 BIOS Setup

This chapter describes the different settings available in the INSYDE BIOS that comes with the board. This chapter offers information on the Award BIOS installation utility.

- 3.1 How and When to Use BIOS Setup
 - 3.2 BIOS Functions
 - 3.3 Using Recovery Wizard to Restore Computer
 - 3.4 How to Enable Watchdog
-

3.1 How and When to Use BIOS Setup

To enter the BIOS setup, you need to connect an external USB keyboard, external monitor and press Del key when the prompt appears on the screen during start up. The prompt screen shows only few seconds so need press Del key quickly.



Important: Updated BIOS version may be published after the manual released. Check the latest version of BIOS on the website.

You may need to run BIOS setup utility for reasons listed below:

1. Error message on screen indicates to check BIOS setup
2. Restoring the factory default settings.
3. Modifying the specific hardware specifications
4. Necessity to optimize specifications

BIOS Navigation Keys

The following keys are enabled during POST:

Key	Function
Del	Enters the BIOS setup menu.
F7	Display the boot menu. Lists all bootable devices that are connected to the system. With cursor ↑ and cursor ↓ and by pressing <ENTER>, select the device used for the boot.
Pause	Pressing the [Pause] key stops the POST. Press any other key to resume the POST.

The following Keys can be used after entering the BIOS Setup.

Key	Function
F1	Help
F5/ F6	Change Values
F9	Setup Defaults
F10	Save & Exit
Esc	Exit
Enter	Select SubMenu
↑ / ↓	Select Item
← / →	Select Item

For items marked ► press <Enter> for more options.

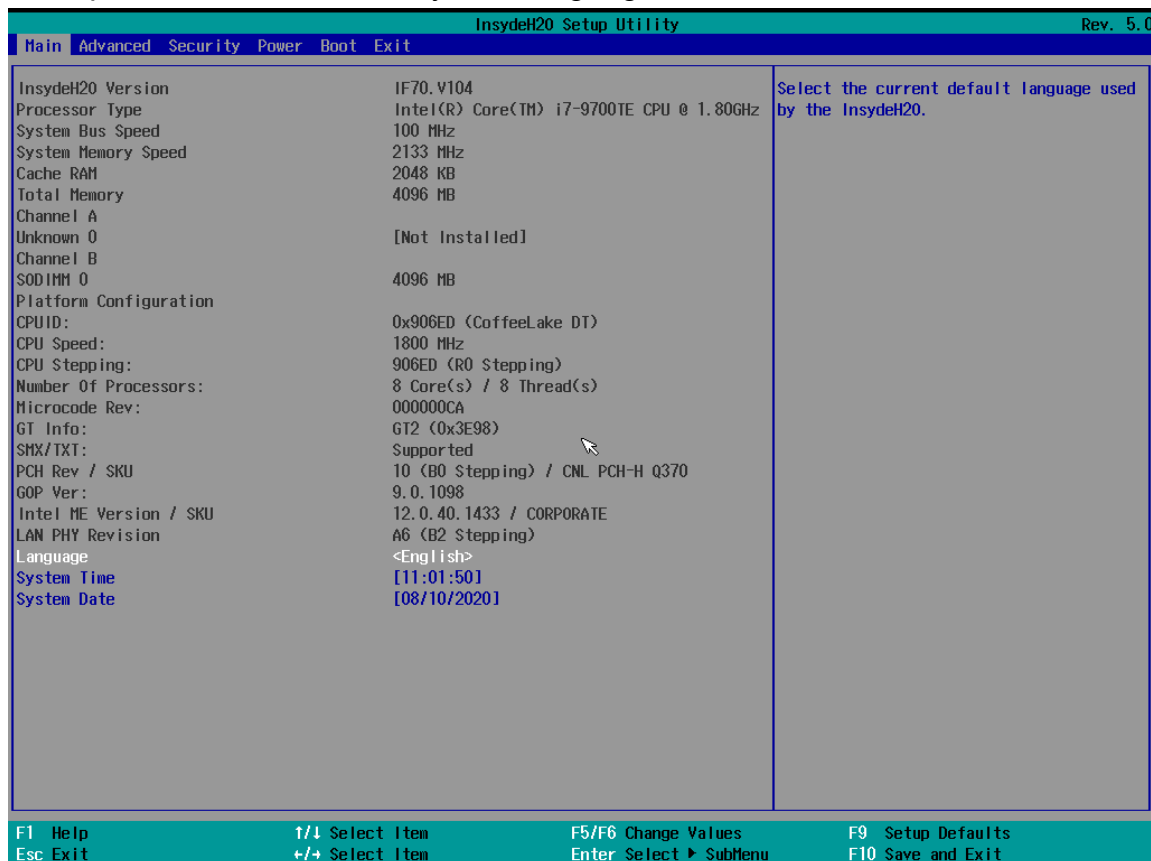


Note: You can press the F1, F2, F3, F4, –/+, and Esc keys by connecting a USB keyboard to your computer.

3.2 BIOS Functions

3.2.1 Main Menu

The Main menu displays the basic information about your system including BIOS version, processor RC version, system language, time, and date. When you enter BIOS setup, the first menu that appears on the screen is the main menu. It contains the system information including BIOS version, processor RC version, system language, time, and date.



BIOS Setting	Description	Setting Option	Effect
Language	Displays the system language. [English] is set up by default.	Adjustment of the language	Set the language in other language. The language in this device is English.
System Time	This is current time setting. The time is maintained by the battery when the device is turned off.	Date and time changes.	Set the time in the format: [hh/mm/ss]
System Date	This is current date setting.	Date and time changes.	Set the date in the format [mm/dd/yyyy];

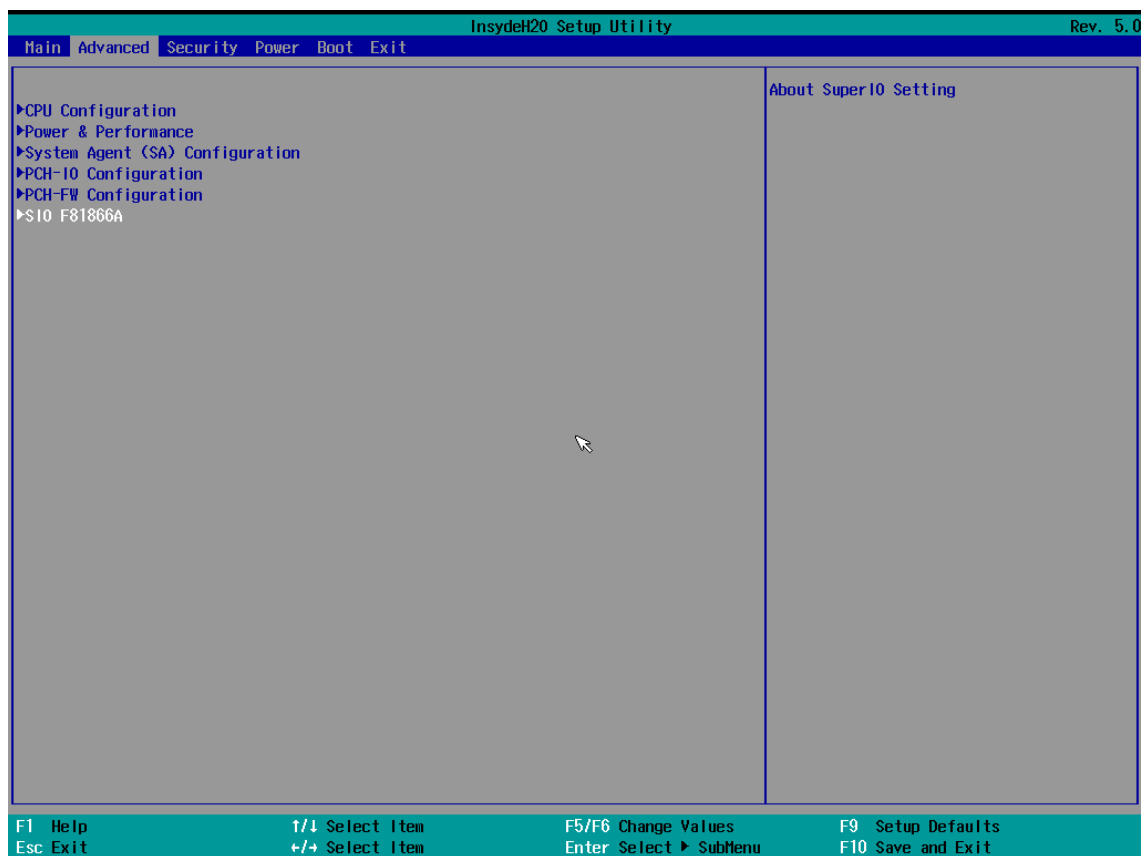
3.2.2 Advanced

Select the Advanced Tab from the setup menu to enter the advanced BIOS setup screen. You can select any of the items on the left frame of the screen to go to the sub menu for the item, such as CPU Configuration. You can use the <Arrow> keys enter all advanced BIOS setup options. The advanced BIOS setup menu is shown below. The submenus described on the following pages.



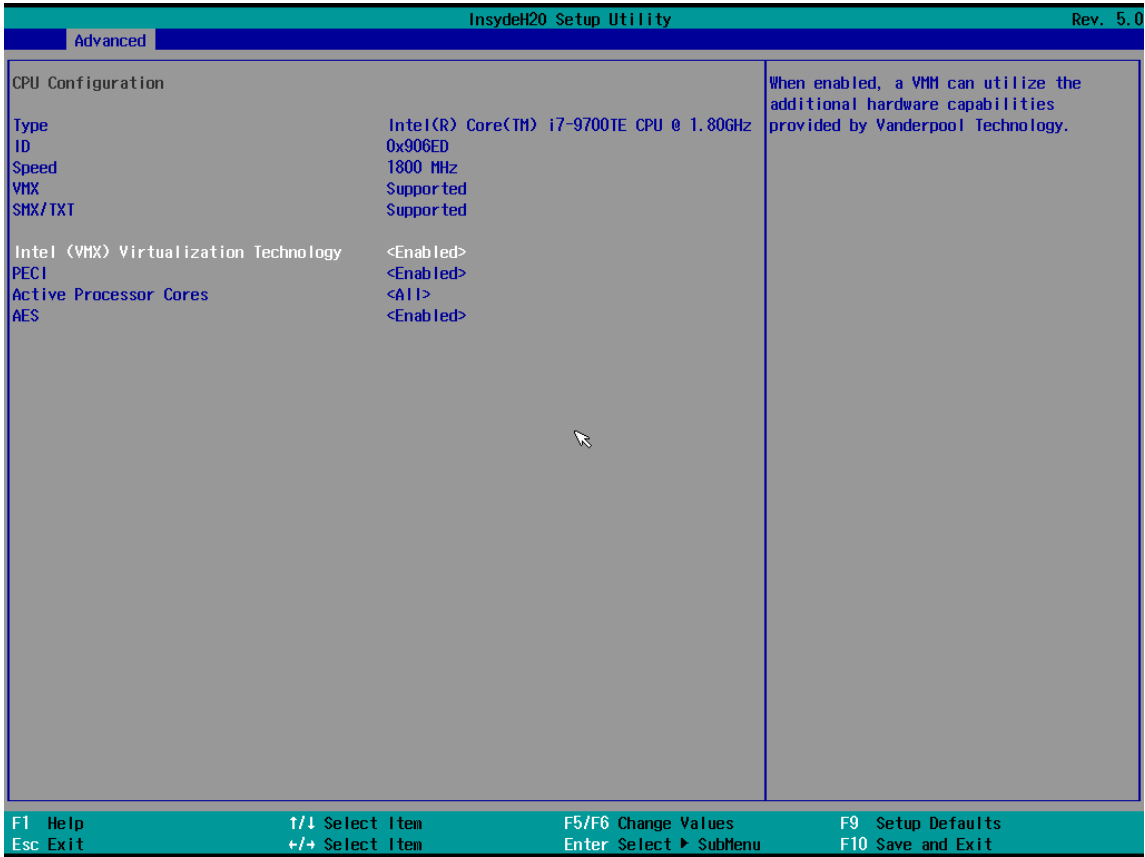
Caution Handle advanced BIOS settings page with caution. Any changes can affect the operation of your computer.

Attention Gérez la page des paramètres avancés du BIOS avec prudence. Tout changement peut affecter le fonctionnement de votre ordinateur.



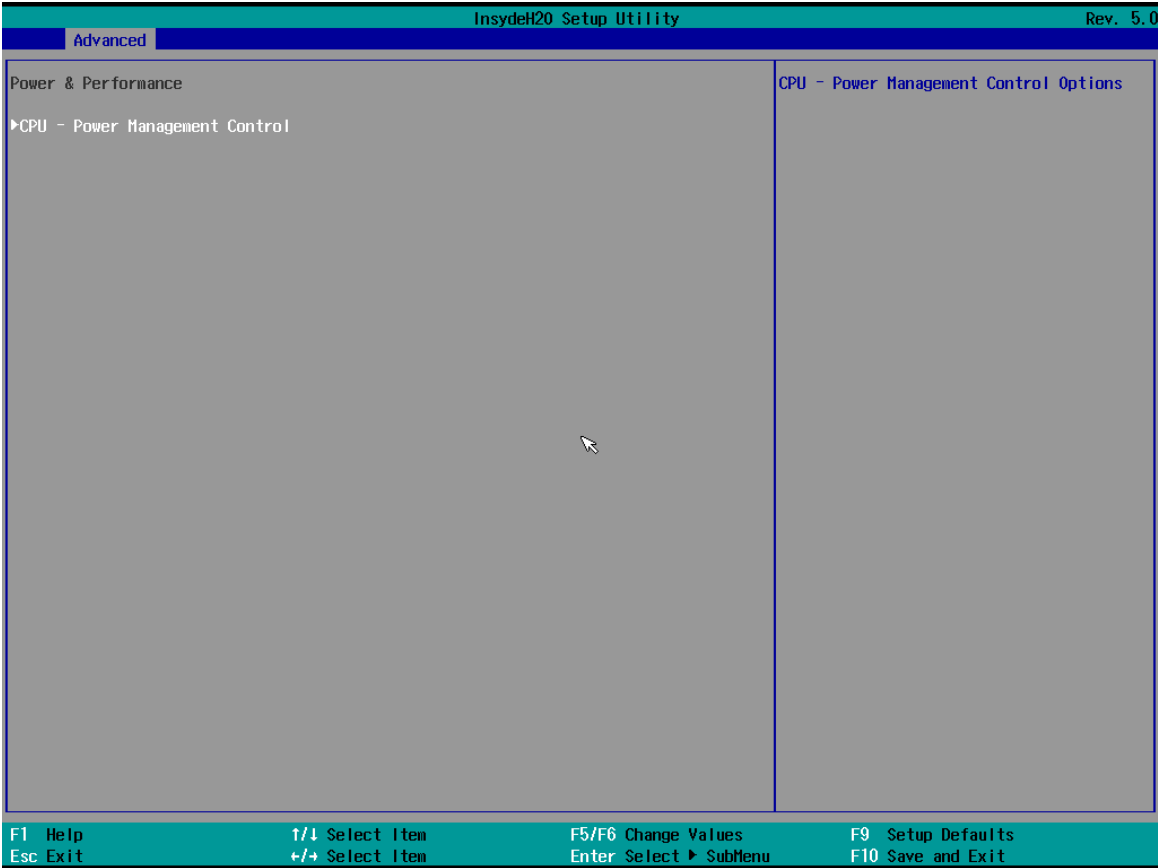
BIOS Setting	Description	Setting Option	Effect
CPU Configuration	Configures Trusted Computing parameters	Enter	Opens submenu
Power & Performance	Configures Power & Performance parameters	Enter	Opens submenu
System Agent Configuration	Configures System Agent Configuration parameters	Enter	Opens submenu
PCH-IO Configuration	Configures PCH-IO parameters	Enter	Opens submenu
PCH-FM Configuration	Configures PCH-FM parameters	Enter	Opens submenu
SIO F81866A	SIO F81866A parameters	Enter	Opens submenu

3.2.2.1 CPU Configuration

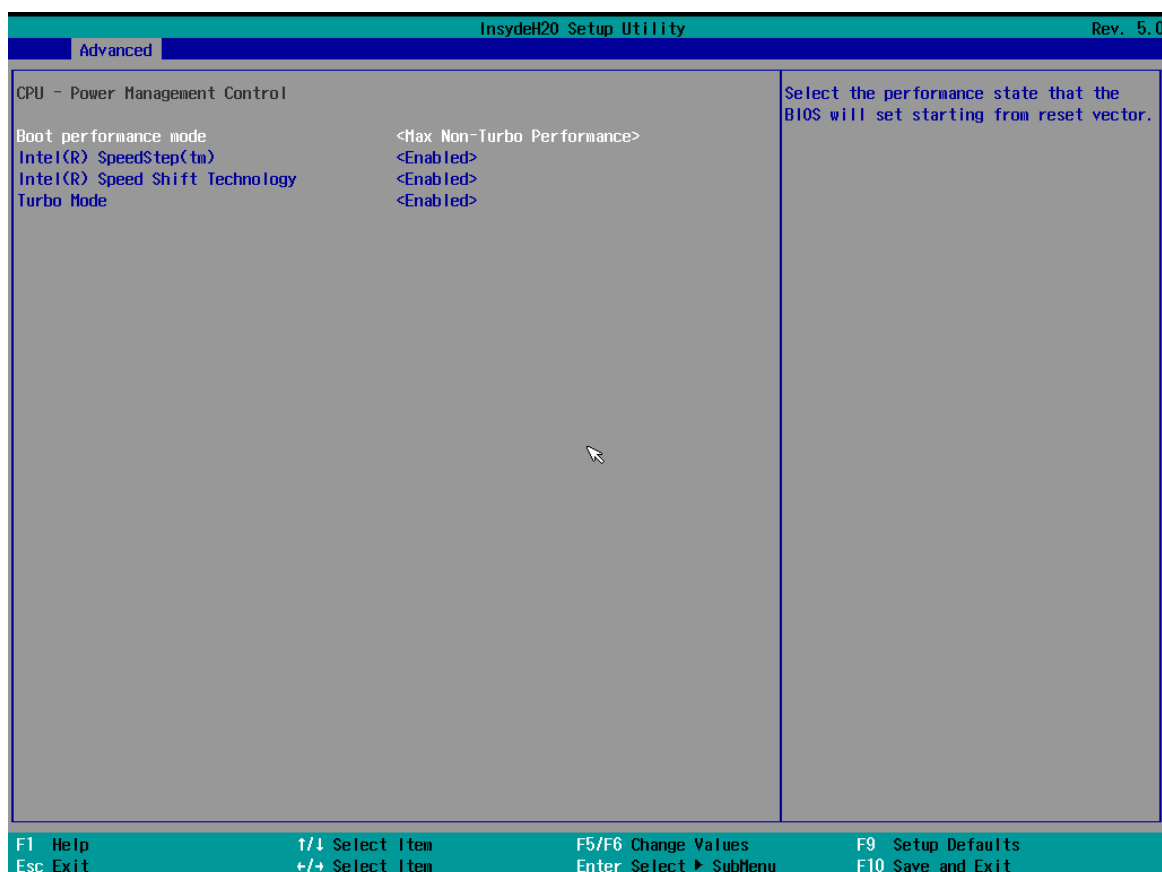


BIOS Setting	Description	Setting Option	Effect
Intel (VMM) Virtualization Technology	Enable or disable Intel Virtualization Technology.	Enable/Disable	When enabled, a VMM can utilized the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	Number of core to enable in each processor package	All / 1 / 2/ 3	Select number of core to enable in each processor package
AES	Enable or disable AES (Advanced Encyption Standard)	Enable/Disable	Enable or disable AES

3.2.2.2 Power & Performance

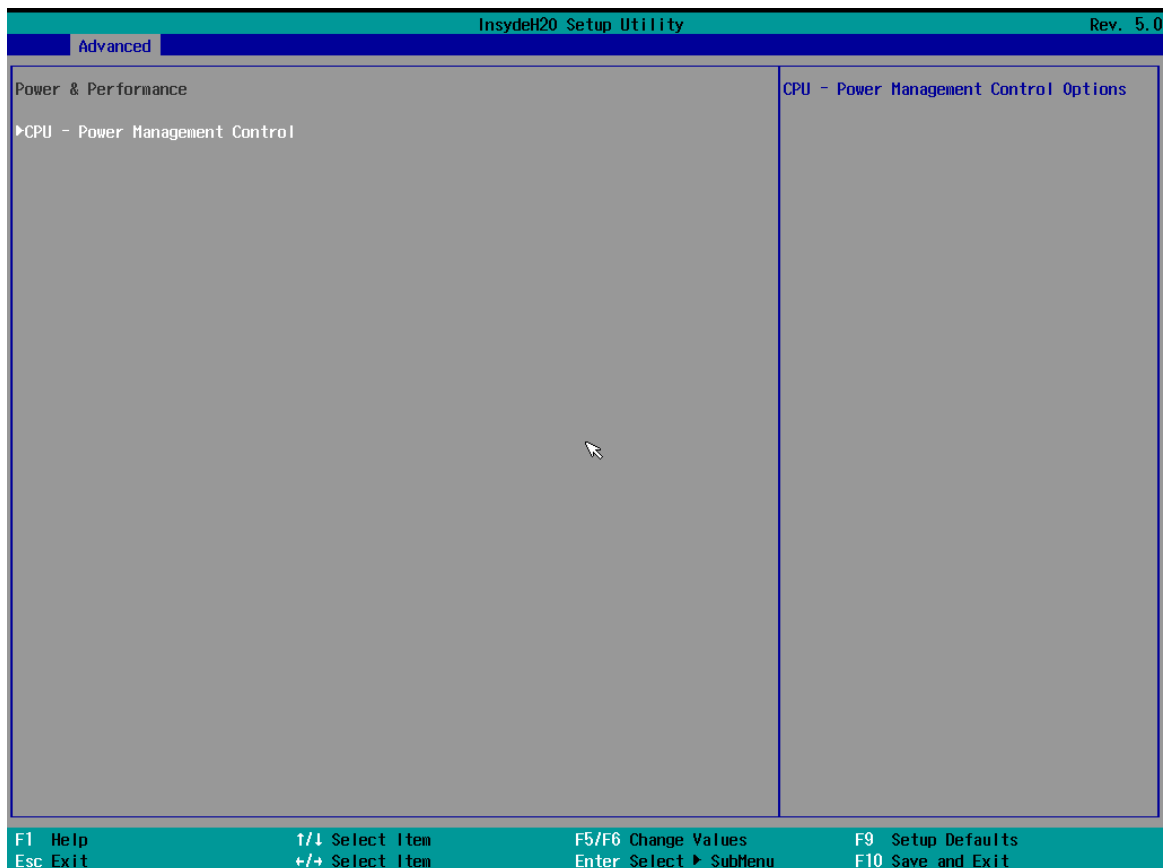
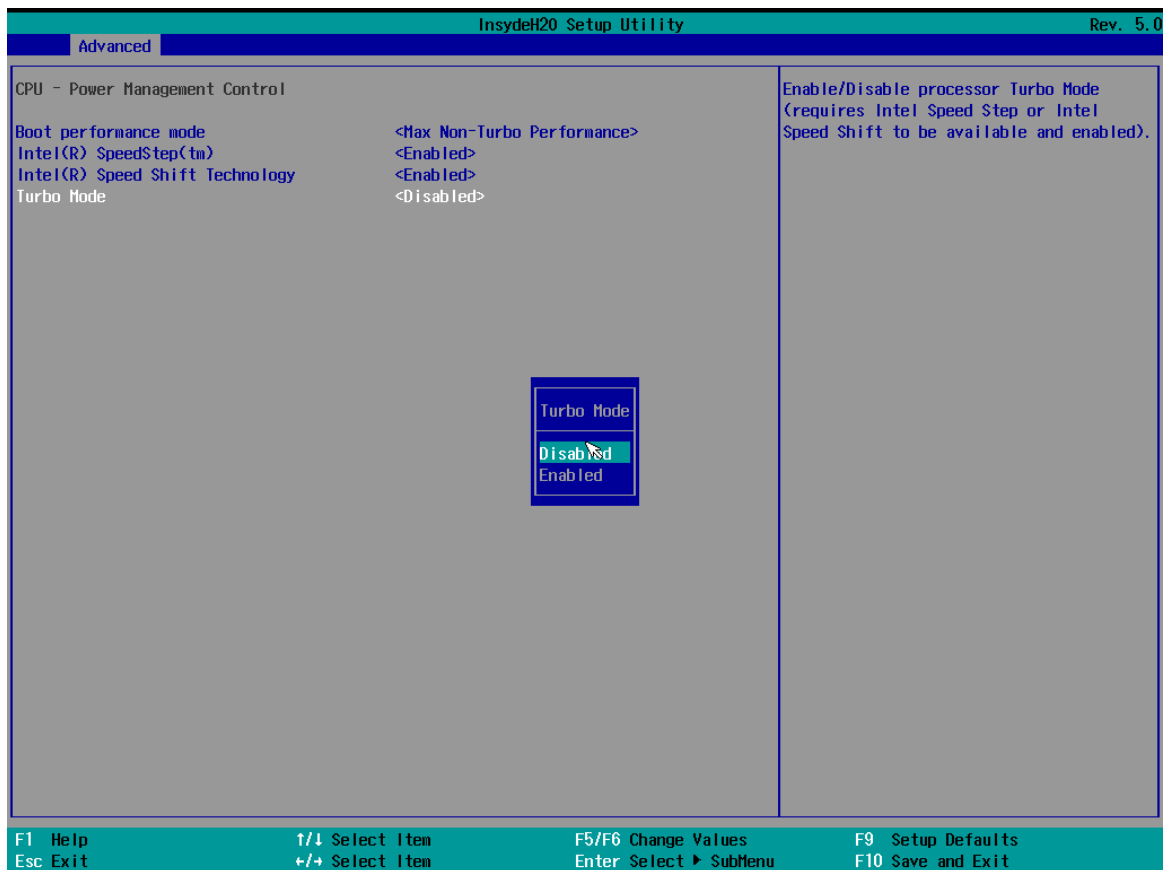


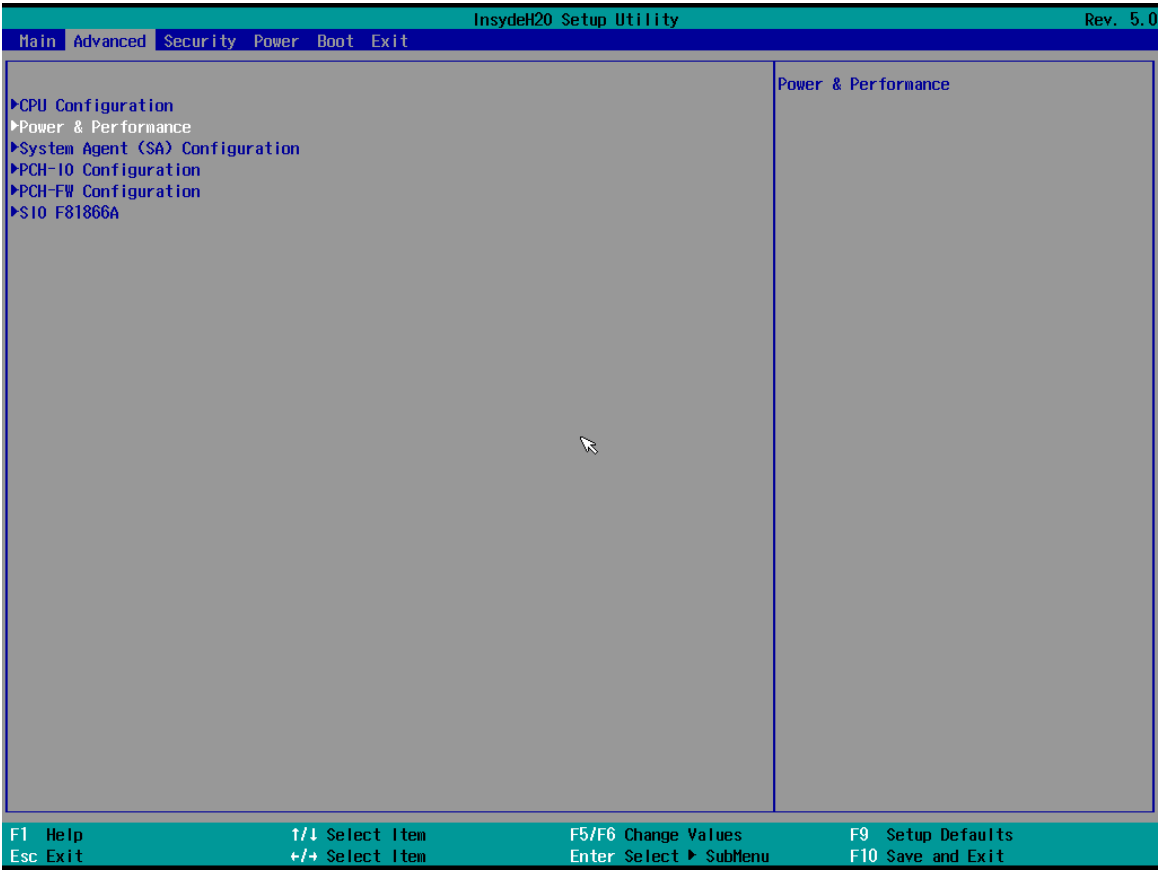
BIOS Setting	Description	Setting Option	Effect
CPU – Power Management Control	Configure CPU – Power Management Control parameters	Enter	Enters sub-menu



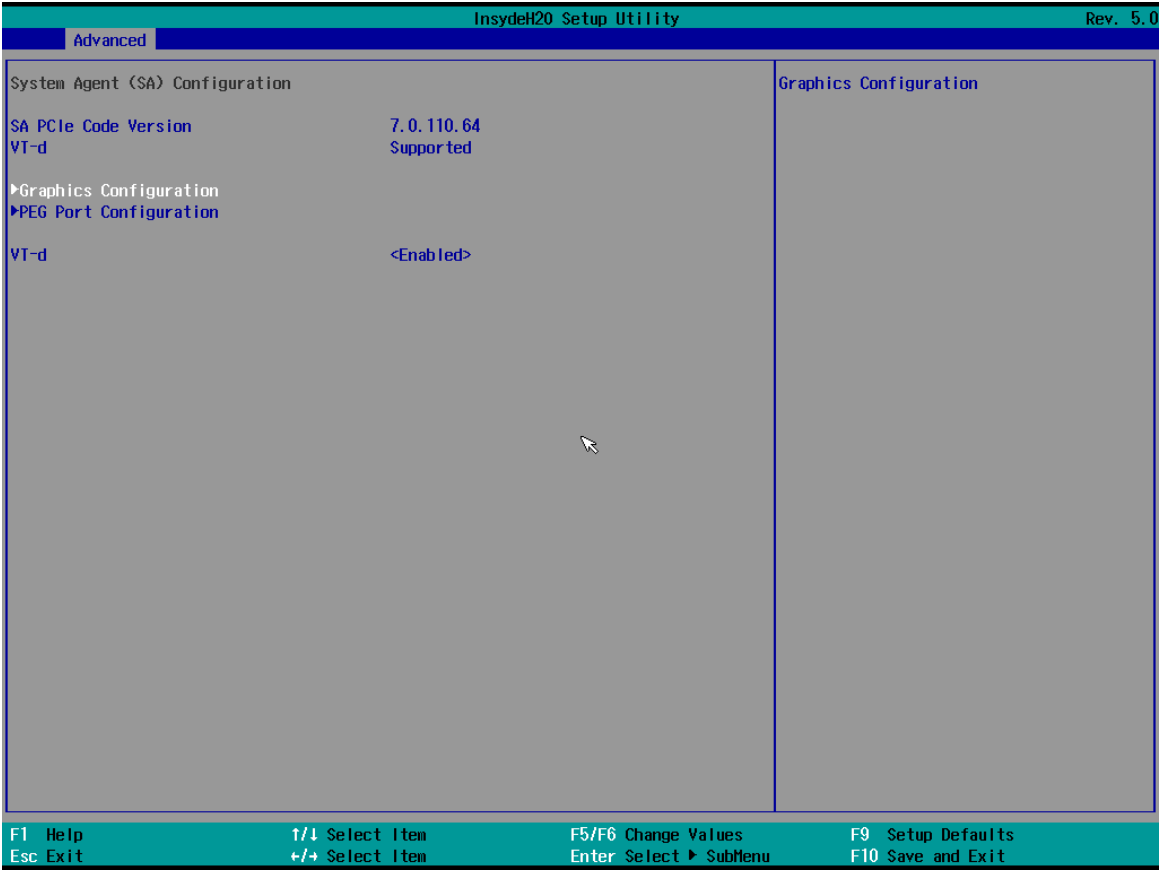
BIOS Setting	Description	Setting Option	Effect
Boot Performance Mode	Configure Boot Performance Mode parameters	-Max non-turbo performance -Max battery -Turbo Performance	Select the performance state that the BIOS will set starting from reset vector
Intel SpeedStep (ta)	Configure Intel SpeedStep (ta) parameters	Enabled/ Disabled	Allows more than two frequency ranges to be supported
Intel Speed Shift Technology	Configure Intel Speed Shift Technology parameters	Enabled/ Disabled	Enable/ Disable Intel Speed Shift Technology support. Enabling will expose the CPP v2 interface to allow for hardware controlled P-states
-Turbo Mode	Enable or disable Turbo Mode	Enabled/ Disabled	Enable/ Disable processor Turbo Mode (requires EMTTM enabled too). Auto means enabled, unless max turbo ratio is bigger than 16 – SKL AO W/A

3.2.2.2.1 How to Enable/Disable Turbo Mode



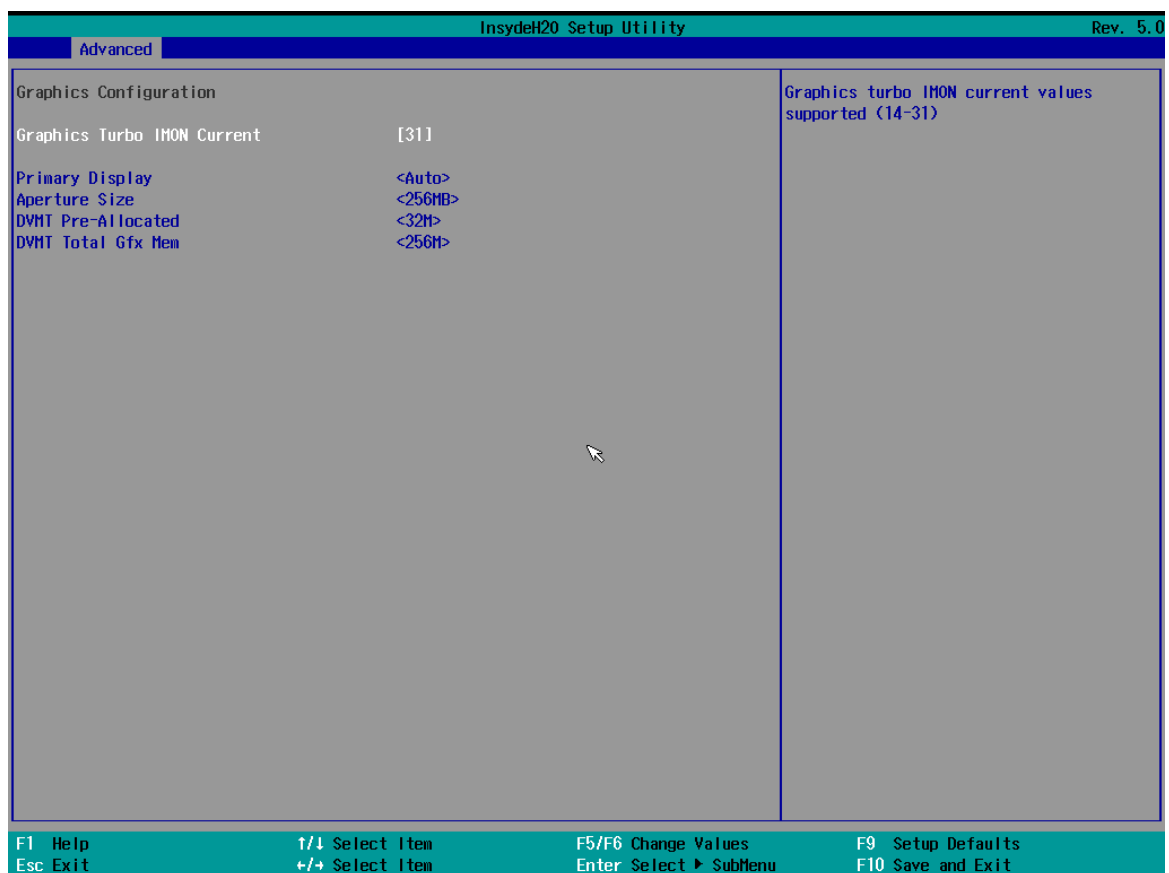


3.2.2.3 System Agent (SA) Configuration



BIOS Setting	Description	Setting Option	Effect
Graphics Configuration	Configure Graphics Configuration parameters	Enter	Opens sub-menu
PEG Port Configuration	Configure PEG Port Configuration parameters	Enter	Opens sub-menu
Vt-d	Intel® Virtualization Technology for Directed I/O	Enabled Disabled	Vt-d capability

3.2.2.3.1 Graphics Configuration



BIOS Setting	Description	Setting Option	Effect
Graphics Turbo IMON Current	Graphics Turbo IMON Current values supported	14-31	Select Graphics Turbo IMON Current values supported
Primary Display	Select Primary Display	Auto IGFX PEG PCI	Select which of IGFX/PEG/PCI Graphics device should be primary display or select SG for Switchable Gfx
Aperture Size	Select the aperture size	128MB 256MB 512MB 1024MB 2048 MB	Select the aperture size <i>Note: Above 4MB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature please disable CSM port</i>
DVMT Pre-Allocated	Select DVMT Pre-Allocated	0M~60M	Select DVMT 5.0 Pre-Allocated (Fixed) Graphic Memory size used by Internal Graphic Device
DVMT Total Gfx Mem	Select DVMT Total Gfx Mem	256M 128M MAX	Select DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device

3.2.2.3.2 PEG Port Configuration

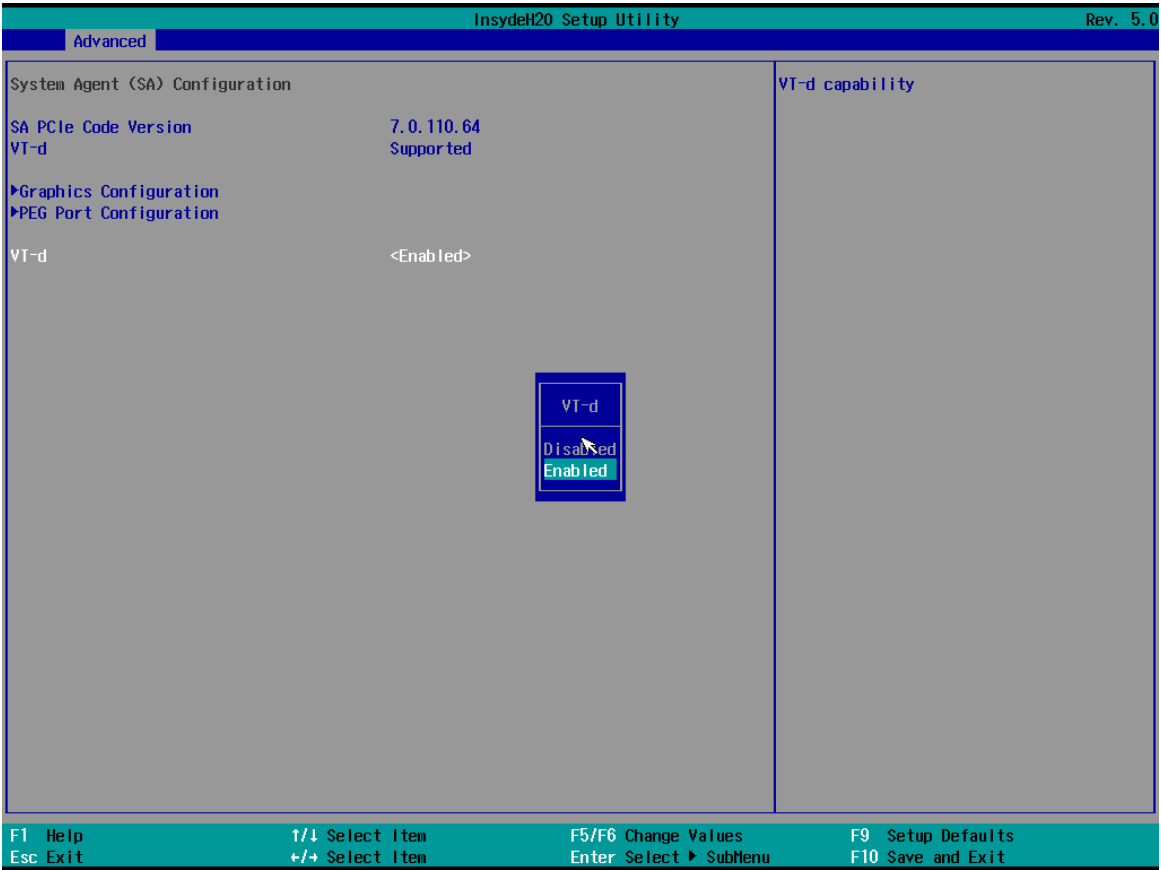
InsydeH20 Setup Utility		Rev. 5.0
Advanced		
PEG Port Configuration		Enable or Disable the Root Port
PEG 0:1:0	Not Present	
Enable Root Port	<Auto>	
Max Link Speed	<Auto>	
PEG0 Slot Power Limit Value	[75]	
PEG0 Slot Power Limit Scale	<1.0x>	
PEG0 Physical Slot Number	[1]	
PEG 0:1:1	Not Present	
Enable Root Port	<Auto>	
Max Link Speed	<Auto>	
PEG1 Slot Power Limit Value	[75]	
PEG1 Slot Power Limit Scale	<1.0x>	
PEG1 Physical Slot Number	[2]	
PEG 0:1:2	Not Present	
Enable Root Port	<Auto>	
Max Link Speed	<Auto>	
PEG2 Slot Power Limit Value	[75]	
PEG2 Slot Power Limit Scale	<1.0x>	
PEG2 Physical Slot Number	[3]	
PEG 0:6:0	Not Present	
Enable Root Port	<Auto>	
Max Link Speed	<Auto>	
PEG3 Slot Power Limit Value	[75]	
PEG3 Slot Power Limit Scale	<1.0x>	
PEG3 Physical Slot Number	[3]	
Program PCIe ASPM after OpROM	<Disabled>	
Program Static Phase1 Eq	<Enabled>	
▶ Gen3 Root Port Preset value for each Lane		
▶ Gen3 Endpoint Preset value for each Lane		
▶ Gen3 Endpoint Hint value for each Lane		
▶ Gen3 RxCTLE Control		
Gen3 Adaptive Software Equalization		
F1 Help	↑/↓ Select Item	F5/F6 Change Values
Esc Exit	+/- Select Item	Enter Select ▶ SubMenu
		F9 Setup Defaults
		F10 Save and Exit

InsydeH20 Setup Utility		Rev. 5.0
Advanced		
Always Attempt SW EQ	<Disabled>	Allows disabling Spread Spectrum
Number of Presets to test	<Auto>	Clocking for compliance testing
Allow PERST# GPIO Usage	<Enabled>	
SW EQ Enable VOC	<Auto>	
Jitter Dwell Time	[3000]	
Jitter Error Target	[2]	
VOC Dwell Time	[10000]	
VOC Error Target	[2]	
Generate BDAT PEG Margin Data	<Disabled>	
PCIe Rx CEM Test Mode	<Disabled>	
PCIe Spread Spectrum Clocking	<Enabled>	
F1 Help	↑/↓ Select Item	F5/F6 Change Values
Esc Exit	+/- Select Item	Enter Select ▶ SubMenu
		F9 Setup Defaults
		F10 Save and Exit

BIOS Setting	Description	Setting Option	Effect
Enable Root Port	Configure Root Port parameters	Enabled Disabled Auto	Enable or disable Root Port
Max Link Speed	Select Max Link Speed	Auto Gen1 Gen2 Gen3	Configure PEG 0:1:0 Max Speed
PEG0 Slot Power Limit Value	PEG0 Slot Power Limit Value	75	PEG0 Slot Power Limit Value
PEG0 Slot Power Limit Scale	Select PEG0 Slot Power Limit Scale	1.0x 0.1x 0.01x 0.001x	Select the scale used for Slot Power Limit Value
Program PCIe ASPM after OpROM	Program PCIe ASPM after OpROM	Disabled	PCIe ASPM will be programmed before OpROM
		Enabled	PCIe ASPM will be programmed after OpROM
Program Static Phase1 Eq	Program Static Phase1 Eq	Disabled Enabled	Program Phase1 Presents/CTLEp
Always Attemp SW EQ	Always Attemp SW EQ	Disabled Enabled	Always Attemp SW EQ, even it has been done once
Number of Presents to test	Select number of Presents to test	7,3,5,8 0-9 Auto	Choose between 7,3,5,8 and 0-9. Auto = current default (7,3,5,8 for SKL). Do not change the default unless debugging.
Allow PERST # GPIO Usage	Allow PERST # GPIO Usage	Disabled Enabled	Enable/ Disable GPIO-based resets to PEG endpoint(s) during margin search, if needed
SW EQ Enable VOC	Select Jitter, VOC test mode	-Jitter Only Test Mode -Jitter & VOC Test Mode -Auto	Select Jitter & VOC test mode (default) or Jitter only test mode. Auto will current default (Enabled)

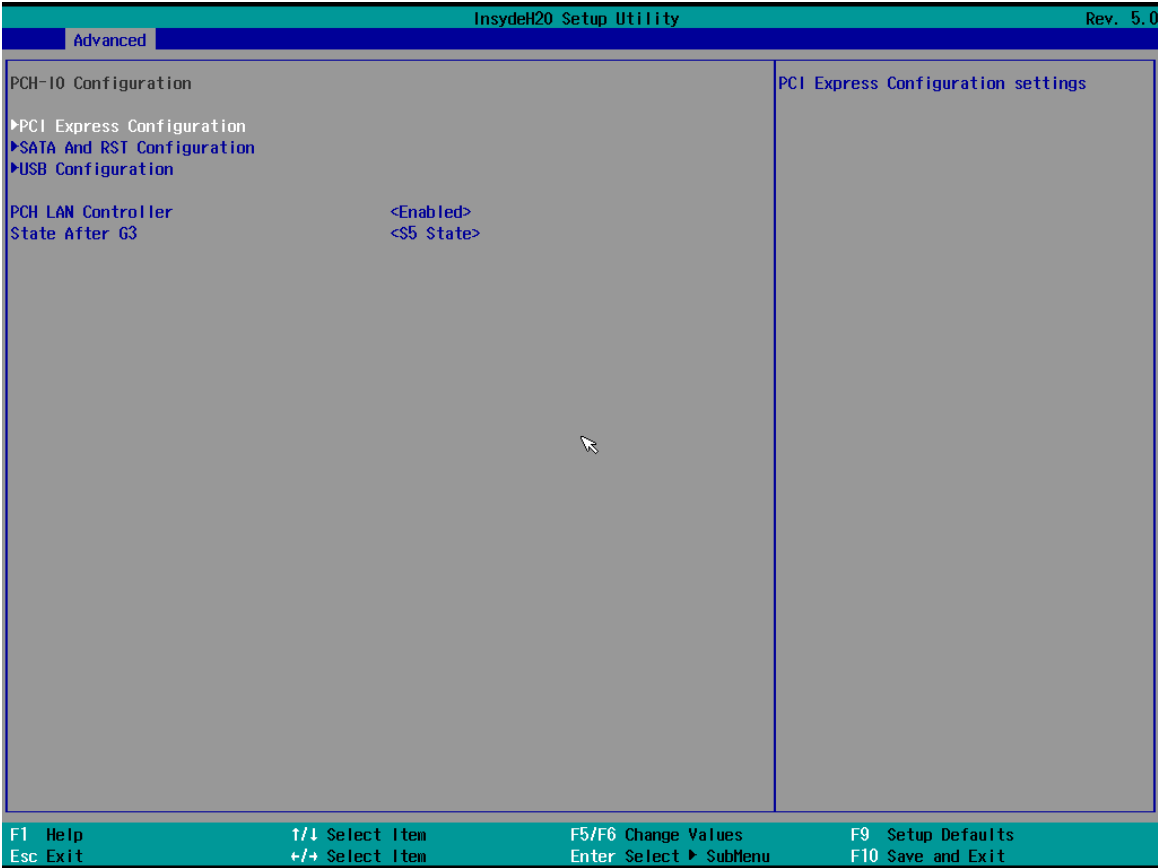
BIOS Setting	Description	Setting Option	Effect
Generate BDAT PEG Margin Data	Generate BDAT PEG Margin Data	-Disabled -Generate Port Gitter Data	Enable to generate BDAT PCIe margin tables
PCIe Rx CEM Test Mode	PCIe Rx CEM Test Mode settings	Disabled Enabled	Enable/ Disable PEG Rx CEM Loopback Mode
PCIe Spread Spectrum Clocking	PCIe Spread Spectrum Clocking	Enabled Disabled	Allow disabling Spread Spectrum Clocking for compliance testing
Gen3 Root Port Present value for each Lane	Gen3 Root Port Present value for each Lane	Lane 0-Lane 15	Value for Lane 0- Lane 15
Gen3 Root Port Endpoint value for each Lane	Gen3 Root Port Endpoint value for each Lane	Lane 0-Lane 15	Value for Lane 0- Lane 15
Gen3 Endpoint Hint value for each Lane	Gen3 Endpoint Hint value for each Lane	Lane 0-Lane 15	Value for Lane 0- Lane 15
Gen3 RxCTLE Control	Gen3 RxCTLE Control	Bundle0-Bundle7	Gen3 RxCTLE settings for Bundle0 (Lane0, Lane1)
		RxCTLE Override	When enabled, it overrides PEG's RxCTLE adaptive behavior

3.2.2.3.3 VT-d



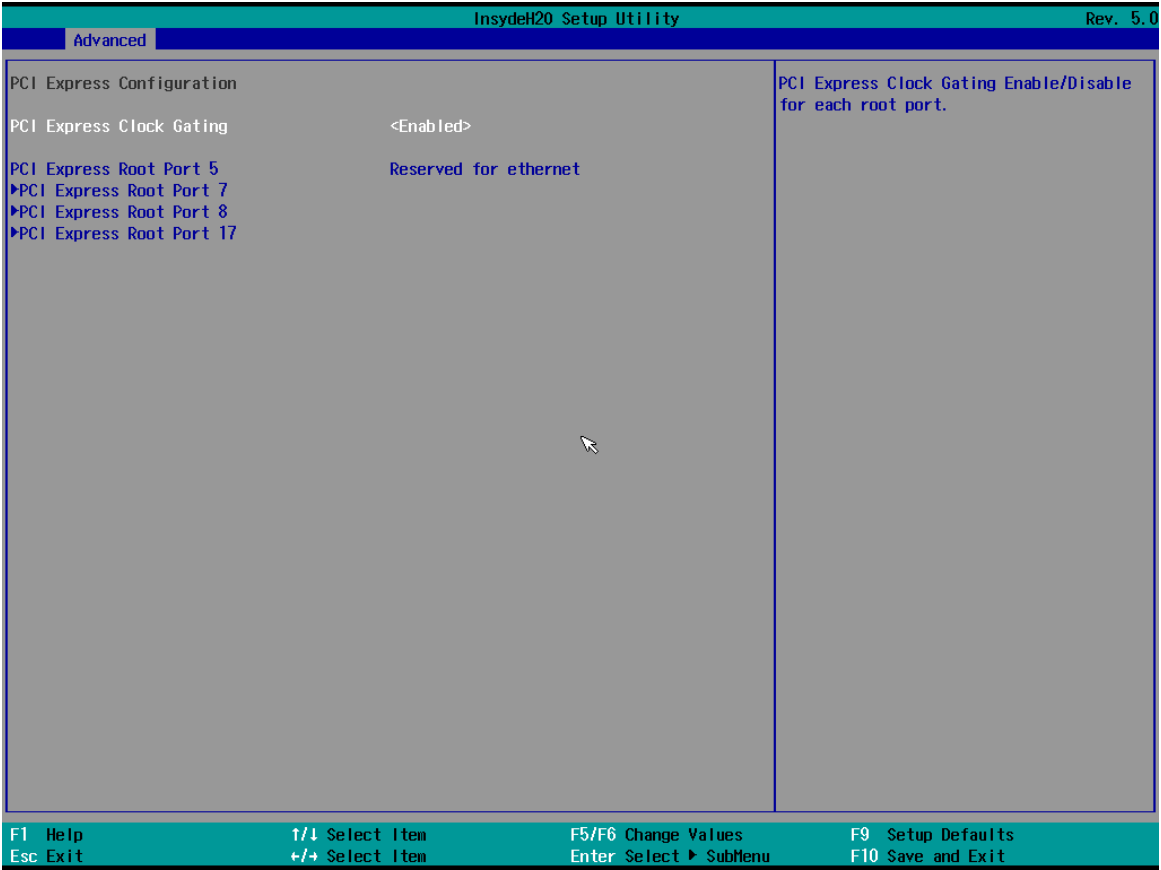
BIOS Setting	Description	Setting Option	Effect
Vt-d	Intel® Virtualization Technology for Directed I/O	Enabled Disabled	Vt-d capability

3.2.2.4 PCH-IO Configuration

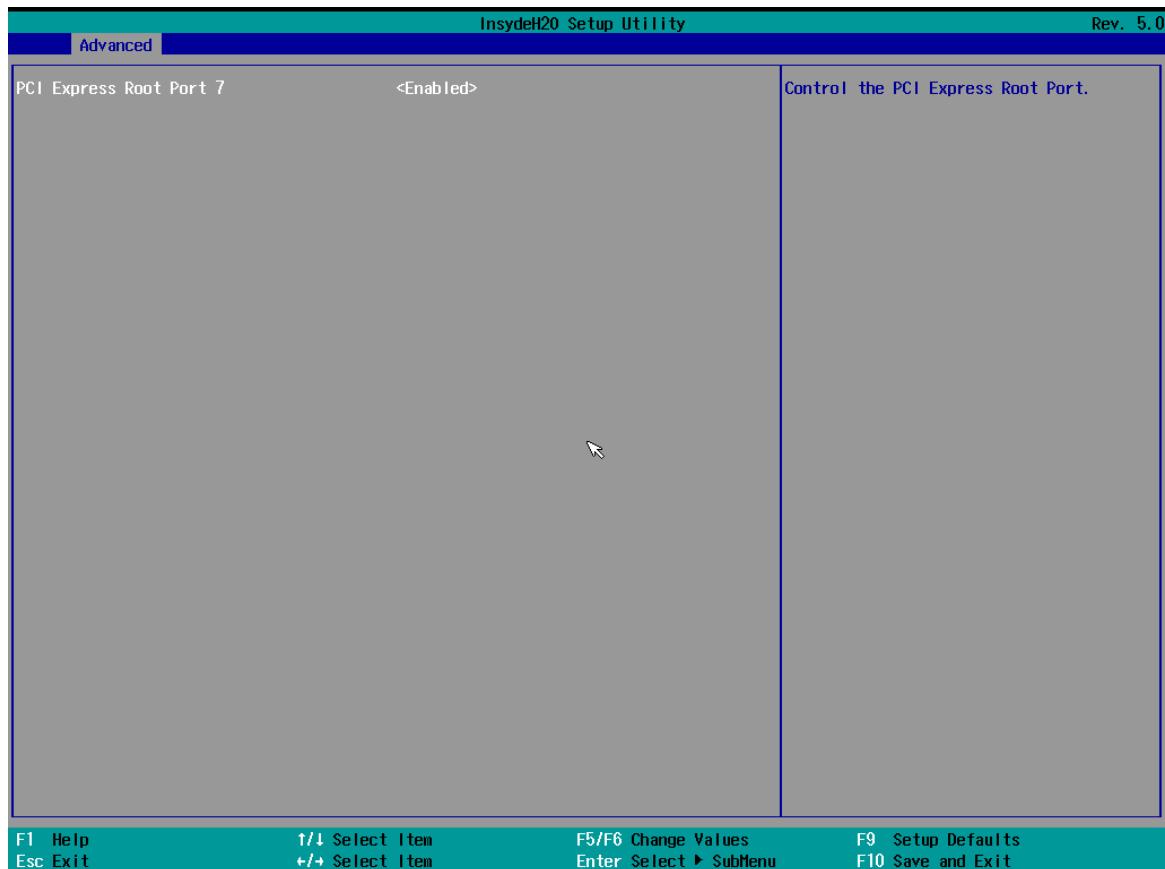


BIOS Setting	Description	Setting Option	Effect
PCI Express Configuration	Configure PCI Express settings	Enter	Opens sub-menu
SATA And RST Configuratuion	Configure SATA And RST settings	Enter	Opens sub-menu
USB Configuration	Configure USB settings	Enter	Opens sub-menu
State After G3			

4.2.2.4.1 PCI Express Configuration



BIOS Setting	Description	Setting Option	Effect
PCI Express Clock Gating	PCI Express Clock Gating settings	Enabled Disabled	PCI Express Clock Gating Enable/Disable for each root port
PCI Port assigned to LAN	PCI Port assigned to LAN settings	Value	Choose value
PCI Express Root Port 4	Control the PCI Express Root Port 4	Enter	Opens sub-menu
PCI Express Root Port 7	Control the PCI Express Root Port 7	Enter	Opens sub-menu

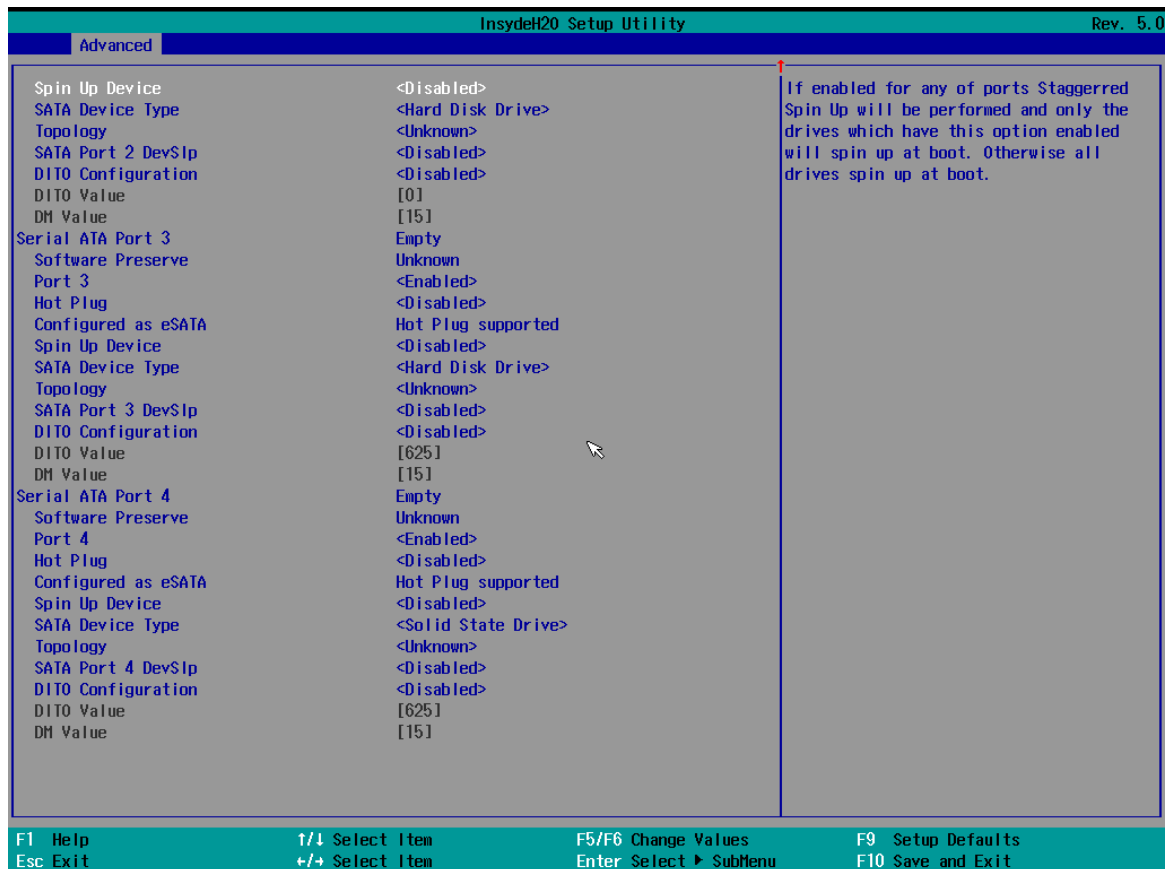


BIOS Setting	Description	Setting Option	Effect
PCI Express Root Port 7	Control the PCI Express Root Port 7	Enter	Opens sub-menu
Topology	Topology settings	Unknown x1 x4 SATA Express M2	Identify the SATA Topology if it is Default or ISATA or Flex or DirectConnect or M2
ASPM	ASPM settings	Auto L0sL1 L1 L0s Disabled	Automatically enable ASPM based on reported capabilities and known issues
L1 Substates	PCIE Express L1 Substates settings	Disabled L1.1 L1.2 L1.1 & L1.2	PCIE Express L1 Substates settings
Gen3 Eq Phase3 Method	Gen3 Eq Phase3 Method settings	Hardware Static Coefic Software Search	PCle Gen3 Equalization Phase 3 Method

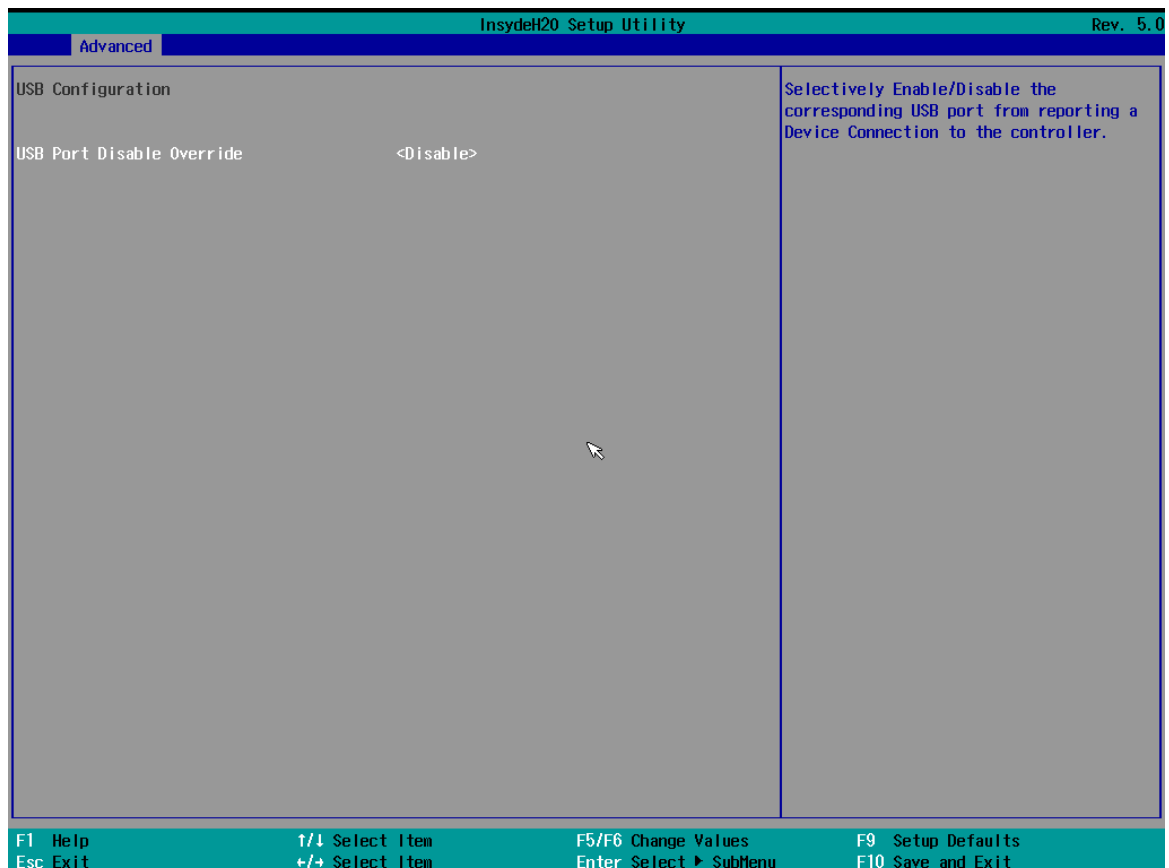
BIOS Setting	Description	Setting Option	Effect
ACS	Access Control Services Extended Capability settings	Disabled Enabled	Enable/Disable Access Control Services Extended Capability
PCIe Speed	Configure PCIe Speed	Auto Gen1 Gen2 Gen3	Configure PCIe Speed
PCH PCIe4 LTR	PCH PCI Latency Reporting Enable/Disable	Disabled Enabled	PCH PCI Latency Reporting Enable/Disable
PCIe4 LTR Lock	PCIe4 LTR Lock settings	Disabled Enabled	PCIe4 LTR Configuration Lock
PCIe4 CLKREQ Mapping Override	PCIe4 CLKREQ Mapping Override	Default No CLKREQ Custom Number	PCIe4 CLKREQ Mapping Override for default platforma mapping

3.2.2.4.1 SATA and RST Configuration



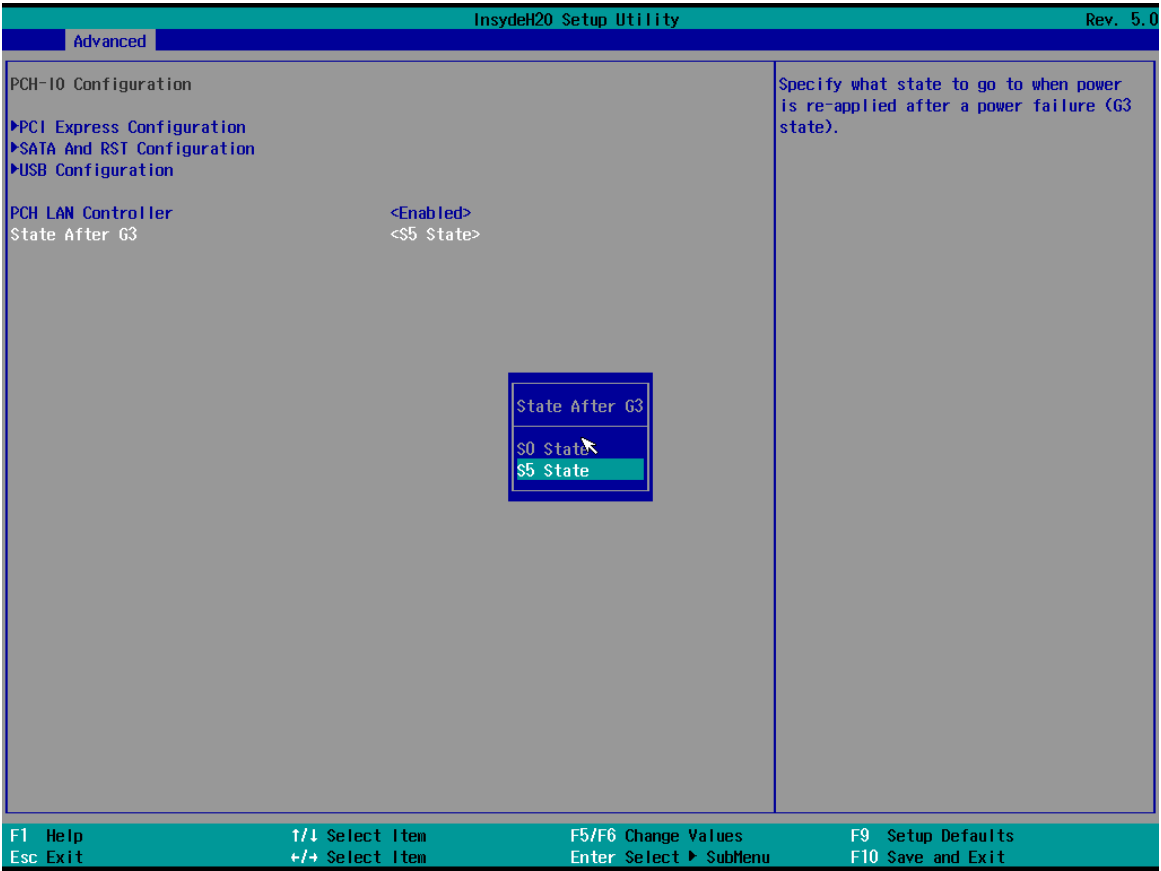


3.2.2.4.2 USB Configuration



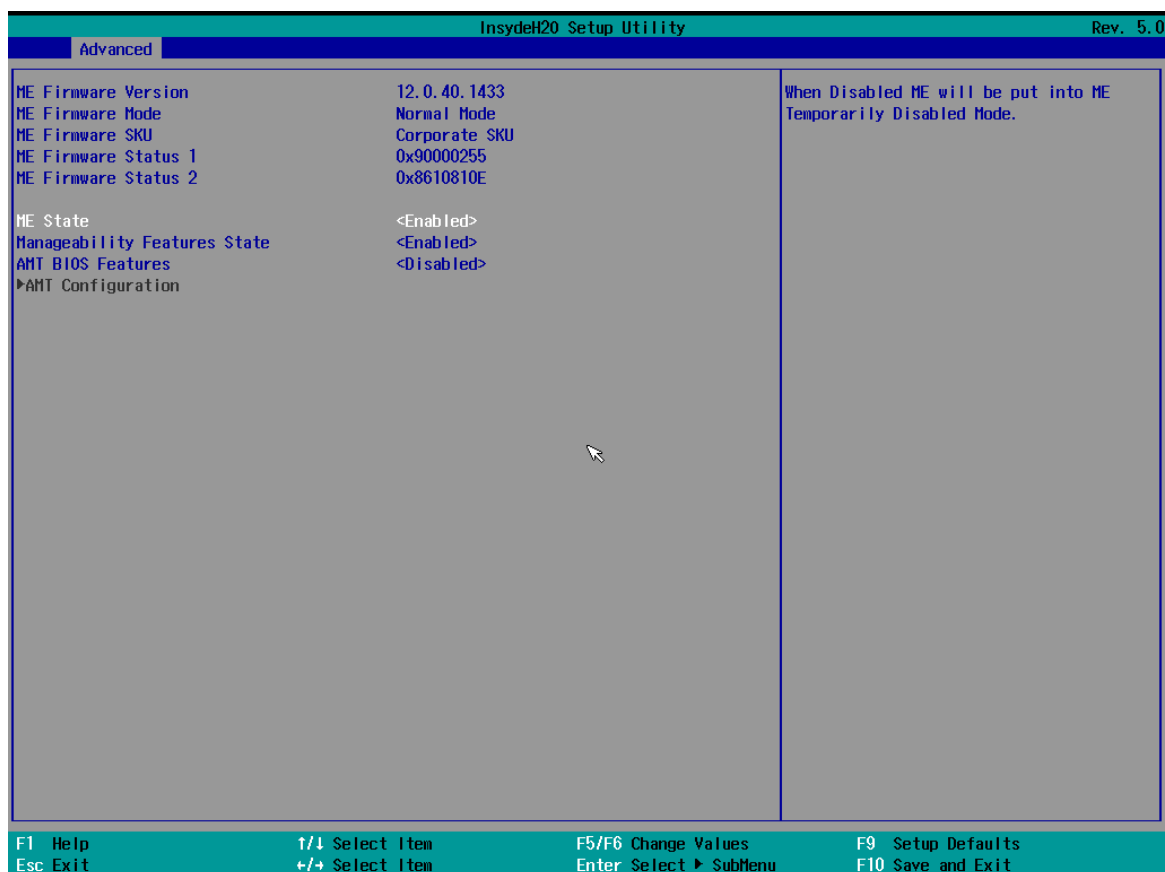
BIOS Setting	Description	Setting Option	Effect
USB Port Disable Override	USB Port Disable Override configuration	Disable Select Per-Pin	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller

3.2.2.4.3 State After G3



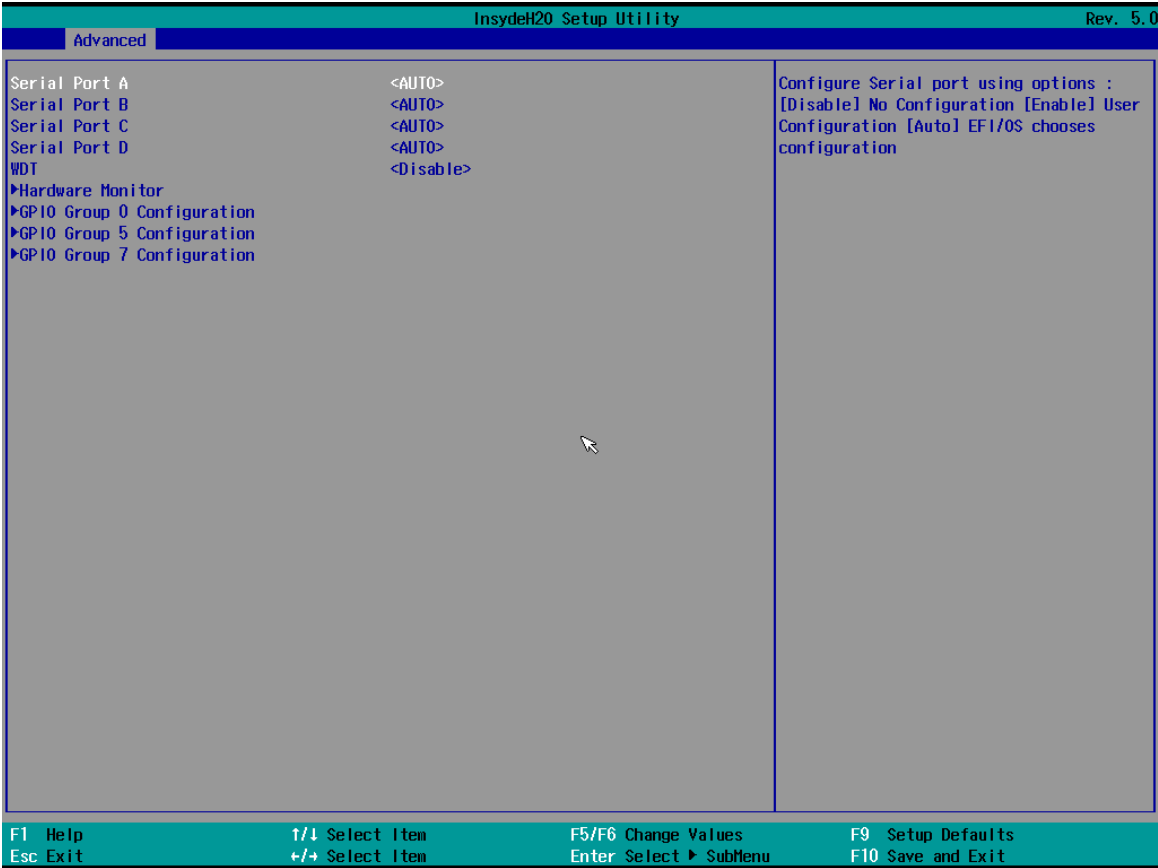
BIOS Setting	Description	Setting Option	Effect
State After G3	State After G3 configuration	S0 State S5 State	Specify what state to go to when power is re-applied after a power failure (G3 state)

3.2.2.5 PCH-FW Configuration



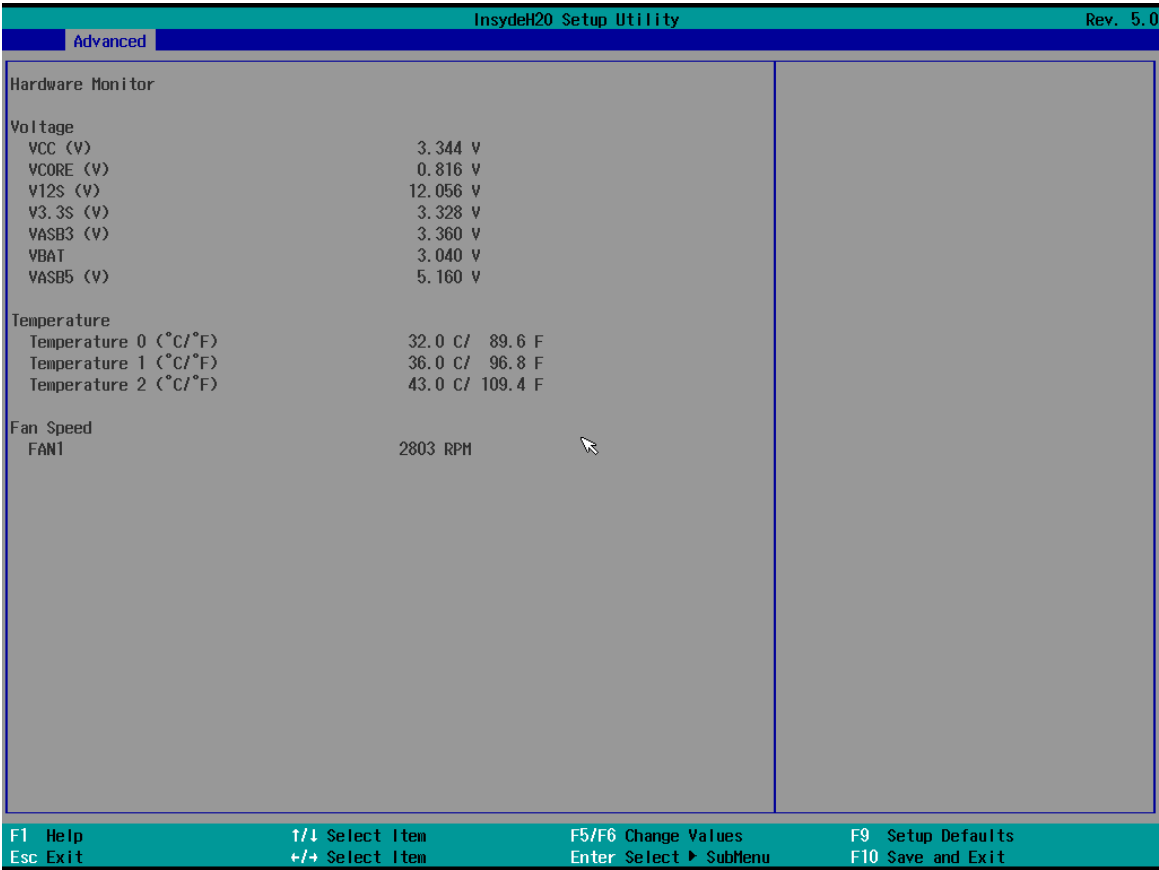
BIOS Setting	Description	Setting Option	Effect
ME State	ME State configuration	Disabled Enabled	When Disabled ME will be put into ME Temporarily Disabled Mode
Manageability Features State	Manageability Features State configuration	Disabled Enabled	Enable/ Disable Intel Manageability Features <i>Note: this option disabled/enables Manageability Features support in FW. To disable support platform must be in an unprovisioned state first.</i>
AMT BIOS Features	AMT BIOS Features	Disabled Enabled	Enable/ Disable Intel Active Management Technology BIOS Extension. <i>Note: iAMT H/W Is always enabled. This option just controls the BIOS Extension execution.</i>
AMT Configuration	AMT Configuration	Enter	Opens sub-menu
ME Unconfig on RTC Clear State	ME Unconfig on RTC Clear State	Disabled Enabled	Disabling this option will cause ME not to unconfigure on RST clear
Comms Hub Support	Comms Hub Support	Disabled Enabled	Enable/Disable support for Comms Hub
JHI Support	JHI Support	Disabled Enabled	Enable/Disable Intel DAL Host Interface Service (JHI)
Core BIOS Done Message	Core BIOS Done Message	Disabled Enabled	Enable /Disable Core BIOS Done message sent to ME
Firmware Update Configuration	Firmware Update Configuration	Enter	Opens sub-menu
PTT Configuration		Enter	Opens sub-menu
ME Debug Configuration			

3.2.2.6 SIO F81866A



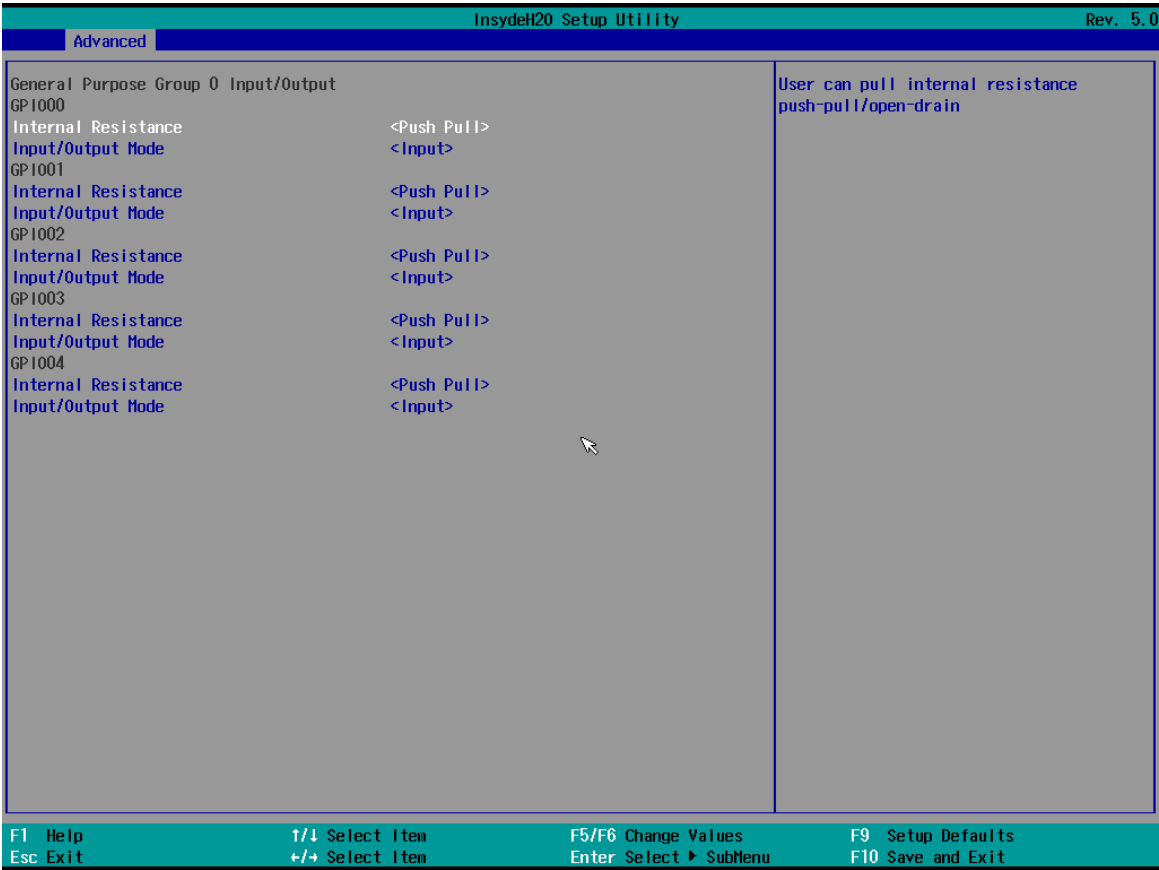
BIOS Setting	Description	Setting Option	Effect
Serial Port A ~ Serial Port D	Configure Serial port settings	Disable	No configuration
		Enable	User configuration
		Auto	EFI/OS chooses configuration
WDT	Watchdog Timer configuration	Disable Enable	Enable or disable Watchdog Timer
Hardware Monitor	Hardware Monitor	Enter	Opens sub-section
GPIO Group 0 Configuration	GPIO Group 0 Configuration	Enter	Opens sub-section
GPIO Group 1 Configuration	GPIO Group 1 Configuration	Enter	Opens sub-section

3.2.2.6.1 Hardware Monitor



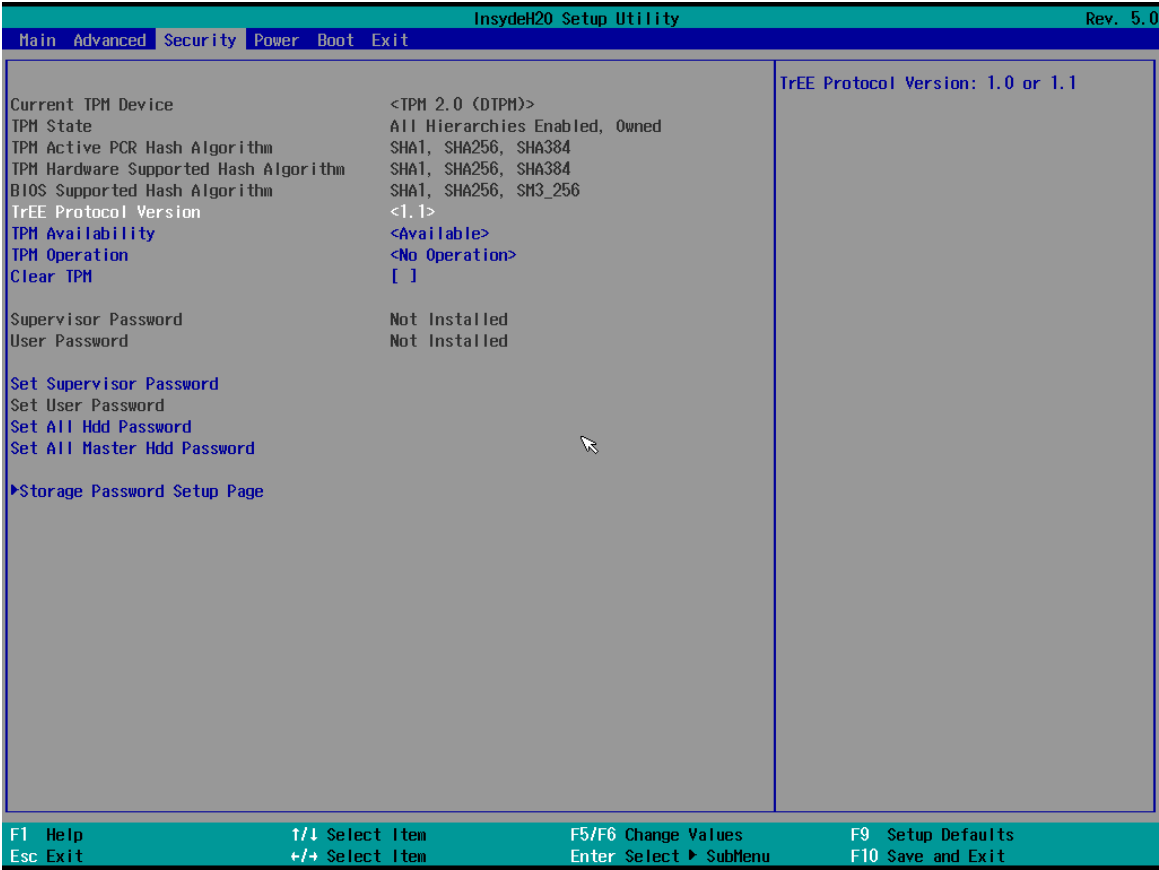
BIOS Setting	Description	Setting Option	Effect
FAN1 Mode	FAN1 Mode configuration	Manual Linear Stage	Select FAN1 Mode configuration

3.2.2.6.2 GPIO Configuration



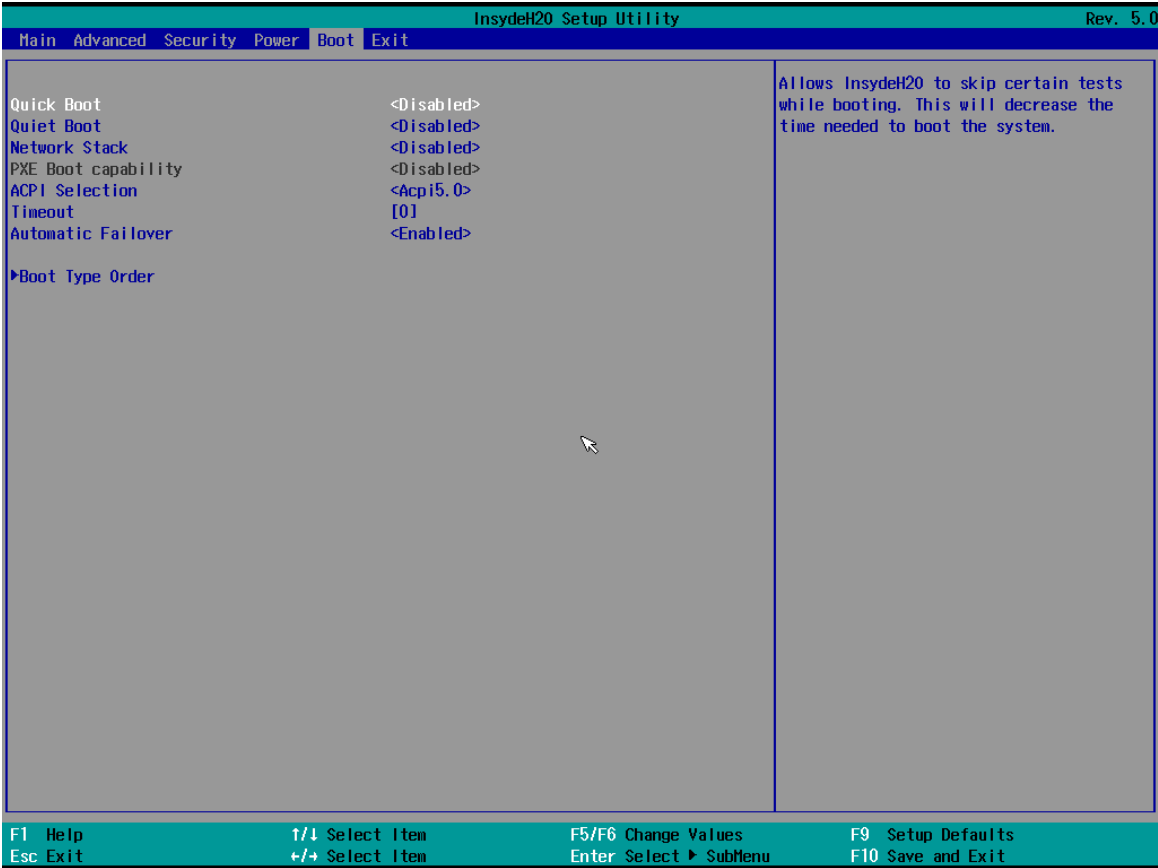
BIOS Setting	Description	Setting Option	Effect
Internal Resistance	Internal Resistance configuration	Push Pull Open Drain	User can pull internal resistance push-pull / open-drain
Input/ Output Mode	GPIO pin configuration	Input Output	Set GPIO pin is input or output

3.2.3 Security



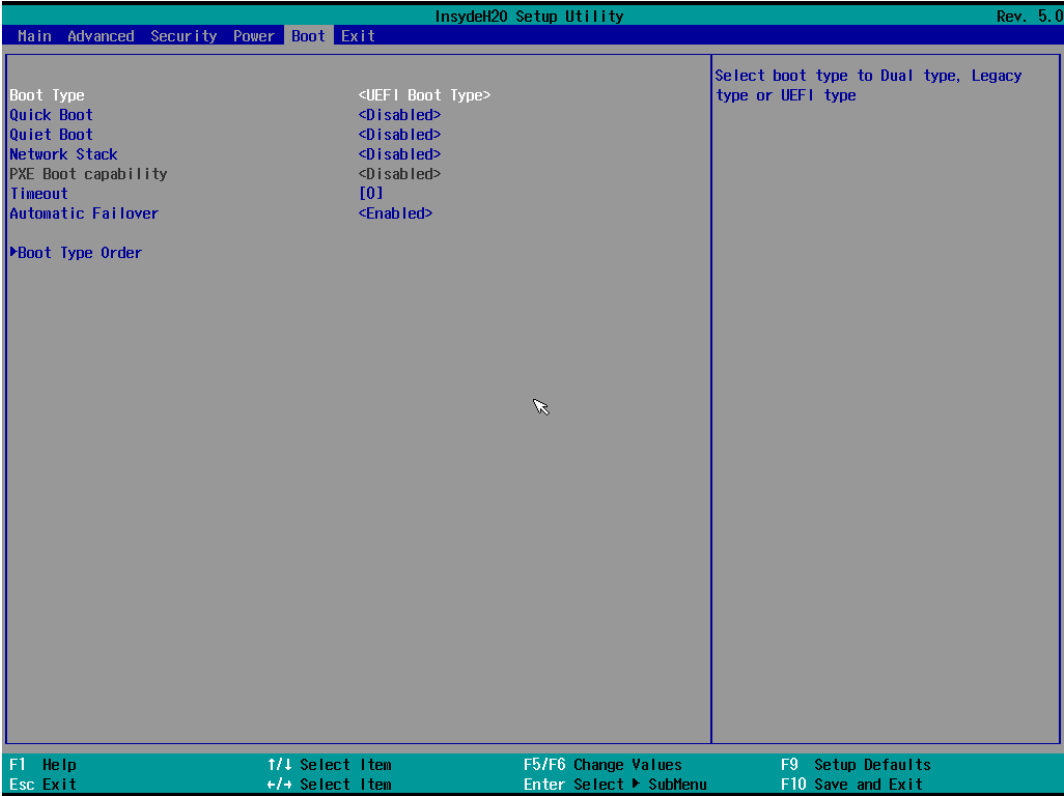
BIOS Setting	Description	Setting Option	Effect
TrEE Protocol Version	Choose TrEE Protocol Version	1.0 1.1	TrEE Protovol Version: 1.0 or 1.1
TPM Availability	TPM Availability configuration	Available Hidden	When hidden don't exposes TPM to 0
TPM Operation	TPM Operation configuration	[]	Select one of the supported operation to change TPM2state
Clear TPM	Clear TPM configuration	[]	Select to Clear TPM
Set Supervisor Password	Set Supervisor Password	Enter New password	Install or Change the password and the length of password must be greater than one character

3.2.4 Power



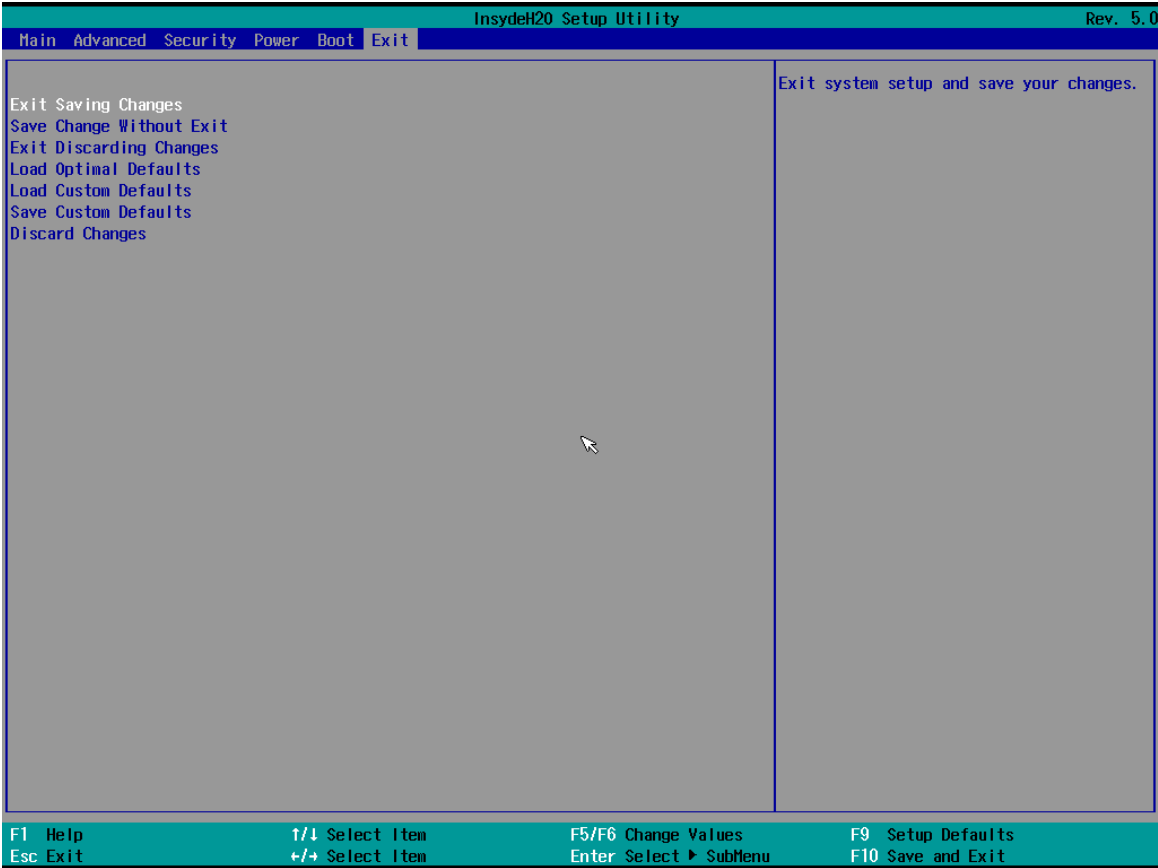
BIOS Setting	Description	Setting Option	Effect
ACPI S3	ACPI S3 configuration	Disabled Enabled	Enable/ Disable ACPI S1/S3 Sleep state
Auto Wake on S5	Auto Wake on S5 configuration	Disabled By Every Day By Every Month	Auto Wake on S5, by Day or Month or fixed time of every day

3.2.5 Boot



BIOS Setting	Description	Setting Option	Effect
Boot Type	Boot Type configuration	UEFI Boot Type	Select boot type to Dual type, Legacy type or UEFI type
Quick Boot	Quick Boot configuration	Enabled Disabled	Allows InsydeH20 to skip certain tests while booting. This will decrease the time needed to boot the system
Quiet Boot	Quiet Boot configuration	Enabled Disabled	Disable or enable booting in text Mode.
Network Stack	Network Stack configuration	Disabled Enabled	Network Stack Support: Windows 8 Bitlocker Unlock UEFI IPv4/ IPv6 PXE Legacy PXE OPRON
Timeout	Timeout	[Value]	Timeout settings
Automatic Failover		Enable	If boot to default device fail, it will directly try to boot next device
		Disable	If boot to default device fail, it will pop warning message then go to firmware UI
Boot Type Order	Boot Type Order	Enter	Opens sub-menu

3.2.6 Exit



3.3 Using Recovery Wizard to Restore Computer



Note: Before starting the recovery process, make sure to backup all user data. The data will be lost after the recovery process.



Important:

Before starting the recovery process, remove any expansion card.

To enable quick one-key recovery procedure:

1. Connect the computer to the power source. Make sure the computer stays plugged in to power source during the recovery process.
2. Turn on the computer, and when the boot screen shows up, press **F6** to initiate the Recovery Wizard.
3. The following screen shows the Recovery Wizard. Click **Recovery** button to continue.



4. A warning message about data loss will show up. Make sure the data is backed up before recovery, and click **Yes** to continue.





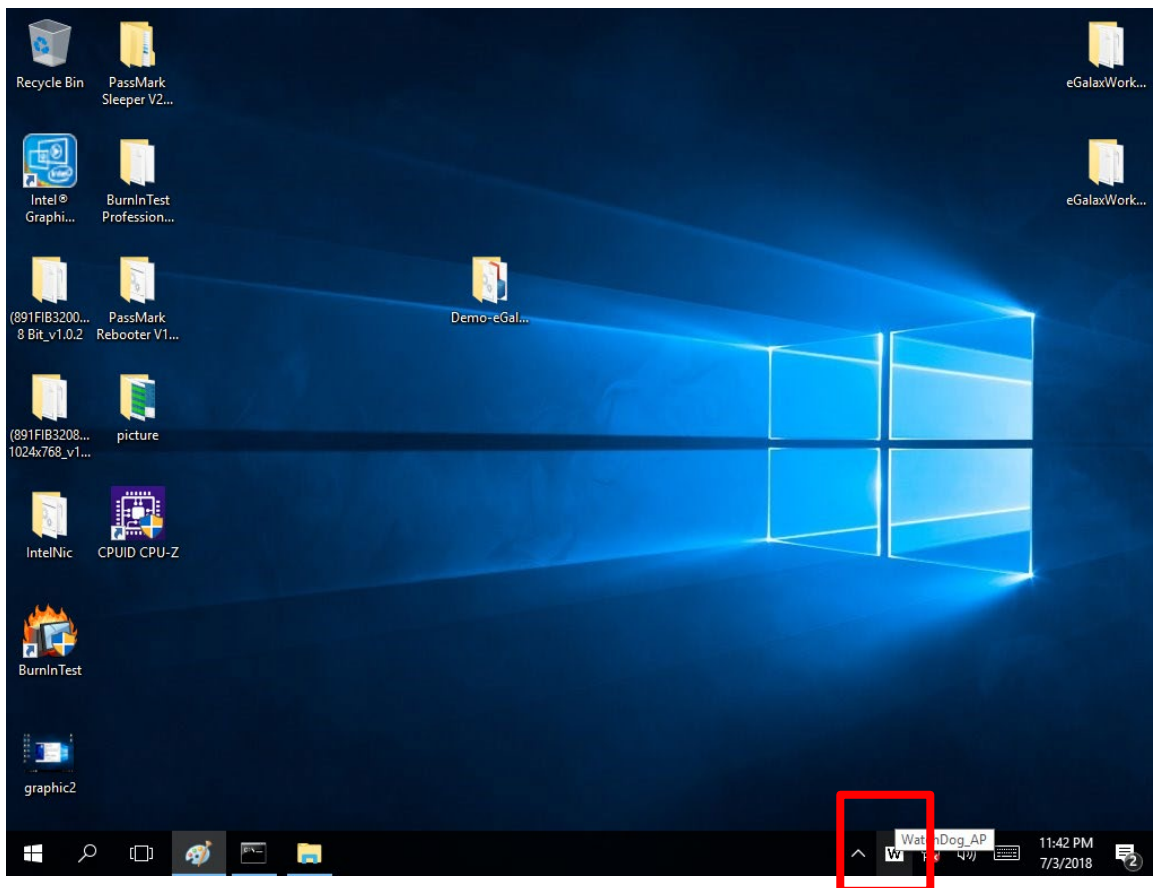
5. Wait the recovery process to complete. During the recovery process, a command prompt will show up to indicate the percent of recovery process complete. Please restart your computer manually.

3.4 How to Enable Watchdog

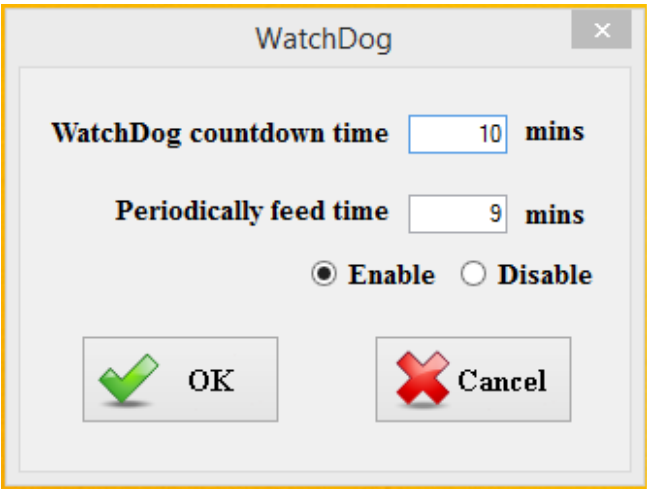
To enable Watchdog, you need to download Winmate Watchdog utility. Find more information on Watchdog in “Watchdog Guide” that you can download from Winmate Download Center or File Share. Refer to the User Manual for more details.

To enable watchdog in Watchdog AP follow the instructions below:

1. On the right bottom side of the desktop screen, click  **triangle button** to show hidden icons.
2. lick  icon to open Watchdog utility.



3. In Watchdog utility window set countdown time and periodically feed time, or disable watchdog.



Example:


Every 10 min watchdog will monitor the system, in case any error occurs the system will restart automatically when the countdown time reaches 0.

Every 9 min watchdog timer will be reset to 10 min.

Setting	Description
Watchdog Countdown Time	The system automaticity restarts when this countdown time reaches zero. <i>Default: 10 min</i>
Periodically Feed Time	To set a cycle time to automatically reset watchdog timer. <i>Default: 9 min</i>
Enable / Disable	Enable or disable watchdog. <i>Default: Enable</i>

Chapter 4: Driver Installation

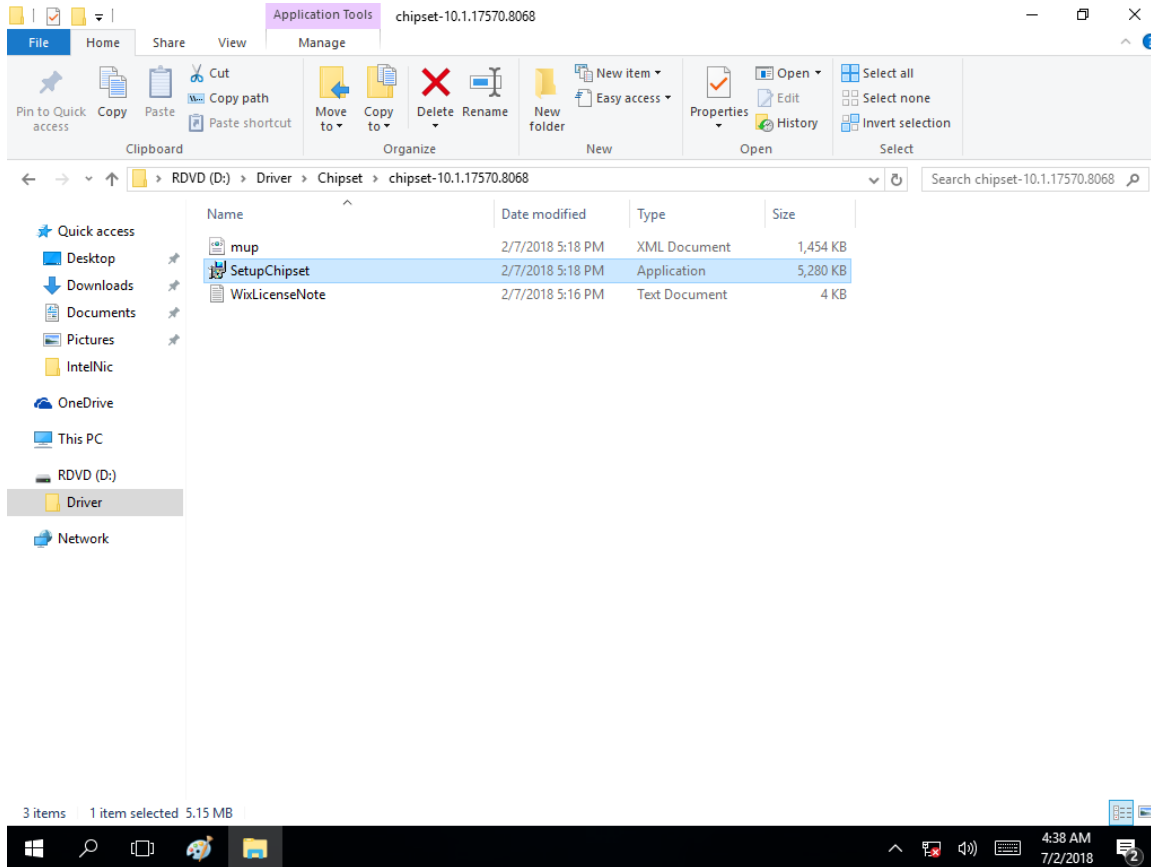
This chapter contains driver installation guide. Follow the instructions below to complete the installation. You will quickly complete the installation. This chapter provides instructions on how to install drivers on the IF70 Mini-ITX SBC.

- 4.1 Chipset Driver Installation
 - 4.2 Graphic Driver Installation
 - 4.3 Management Engine (ME) and .NET Framework
 - 4.4 Audio Driver Installation
 - 4.5 Ethernet Driver Installation
 - 4.6 RST Driver Installation
 - 4.7 Microsoft .NET Framework Driver Installation
 - 4.8 Watchdog Driver Installation
- 

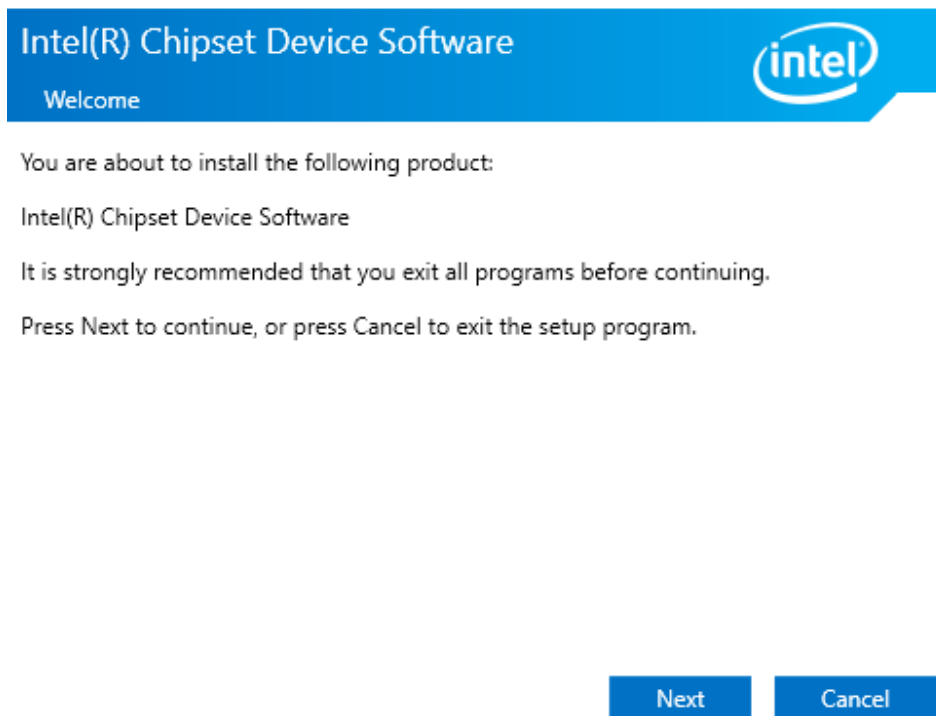
4.1 Chipset Driver

Follow instructions below to install Chipset driver.

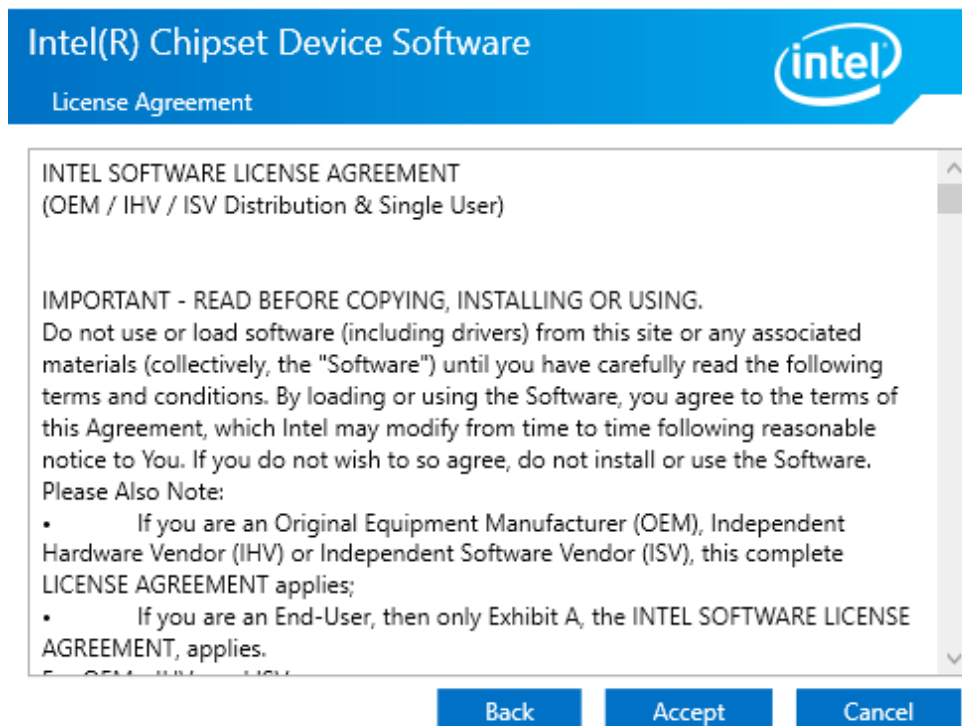
1. Open the Driver CD (included in the package) and select **Chipset** driver.



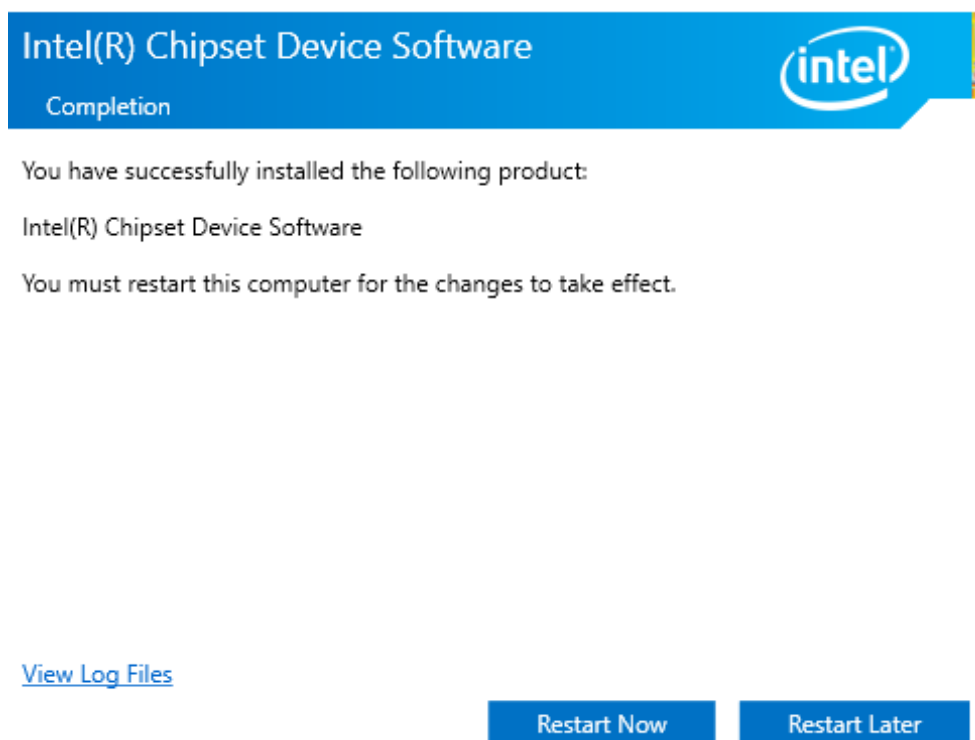
2. Installation window will pop up, select **Next**.



3. Select **Accept** to agree with the terms of license agreement.



4. Check the ReadMe file information, select **Install** to continue.



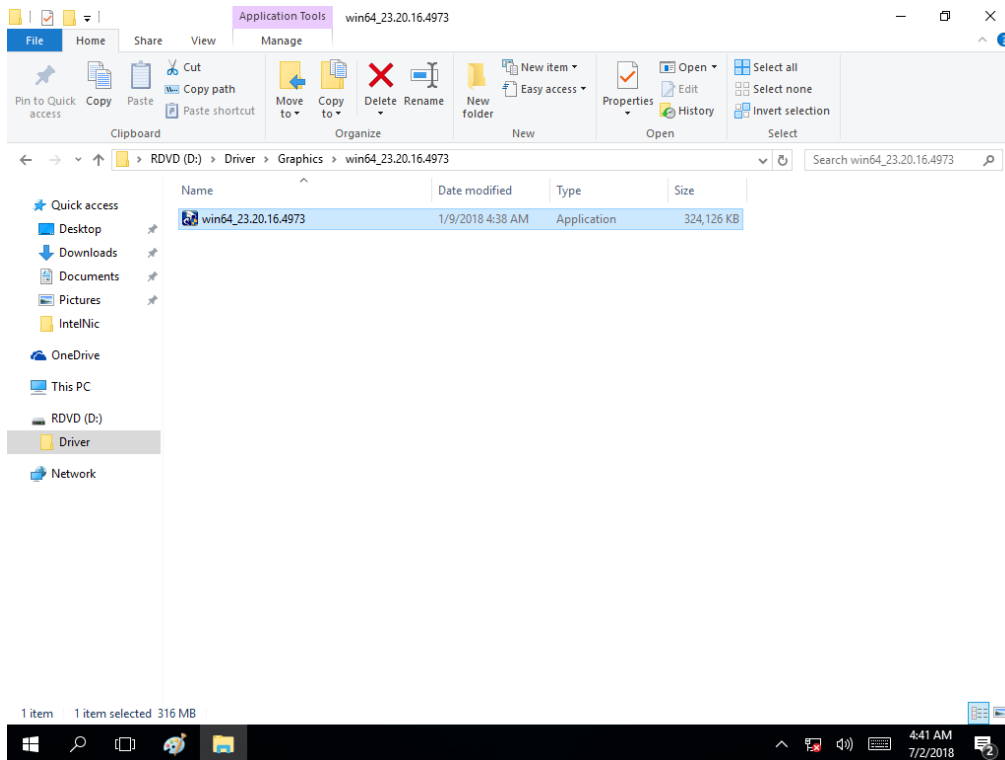
5. Wait for the driver to be installed. When installation completed, select **Restart Now** to restart your computer.



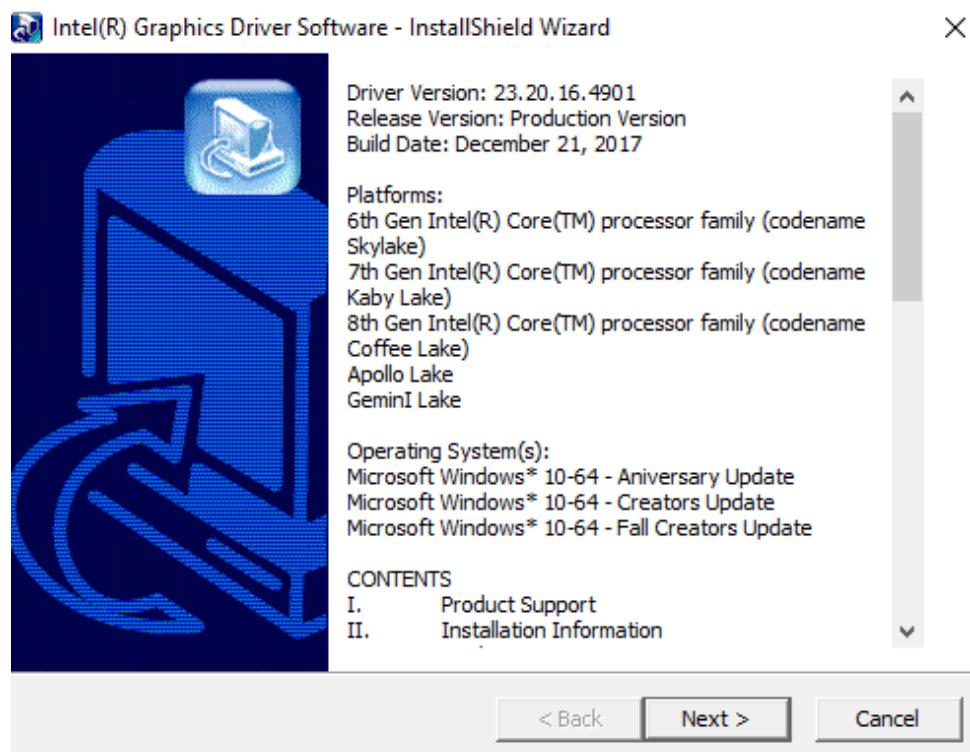
4.2 Graphic Driver

Follow instructions below to install Graphic driver.

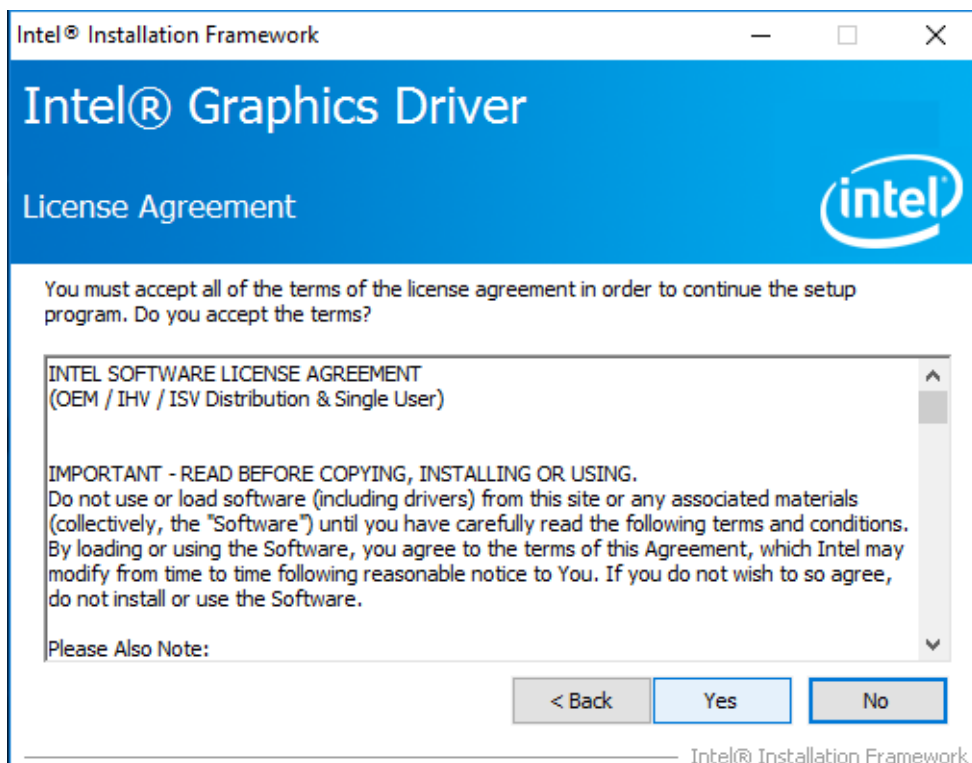
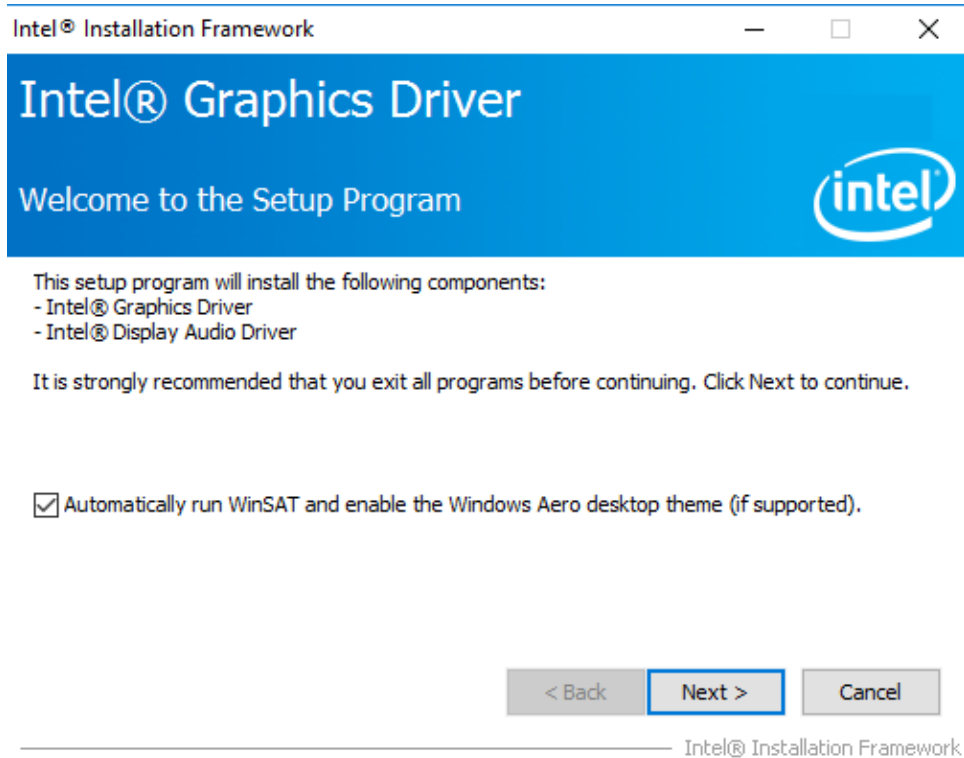
1. Open the Driver CD (included in the package) and select **Graphic** driver.



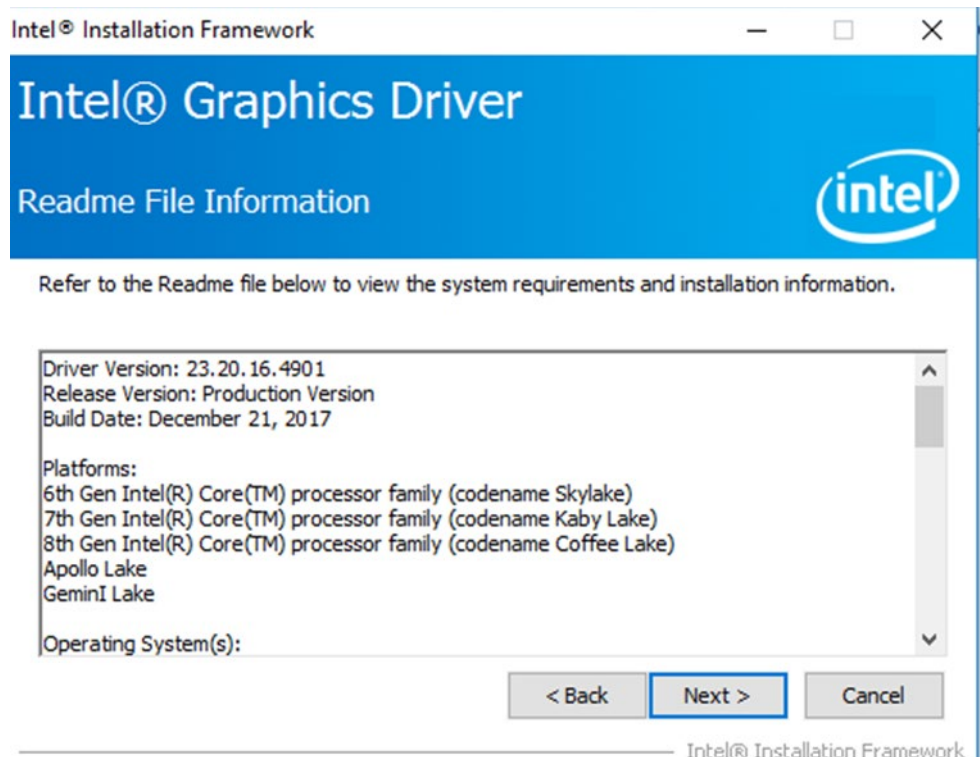
2. Installation window will pop up, select **Next**.



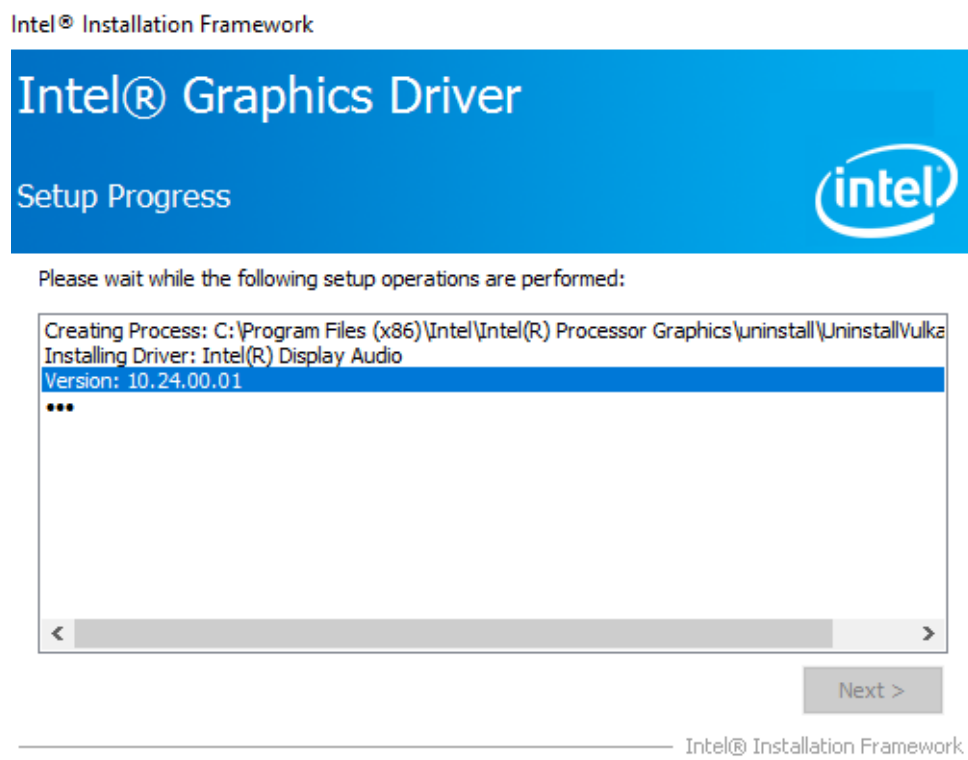
3. Select Accept to agree with the terms of license agreement.

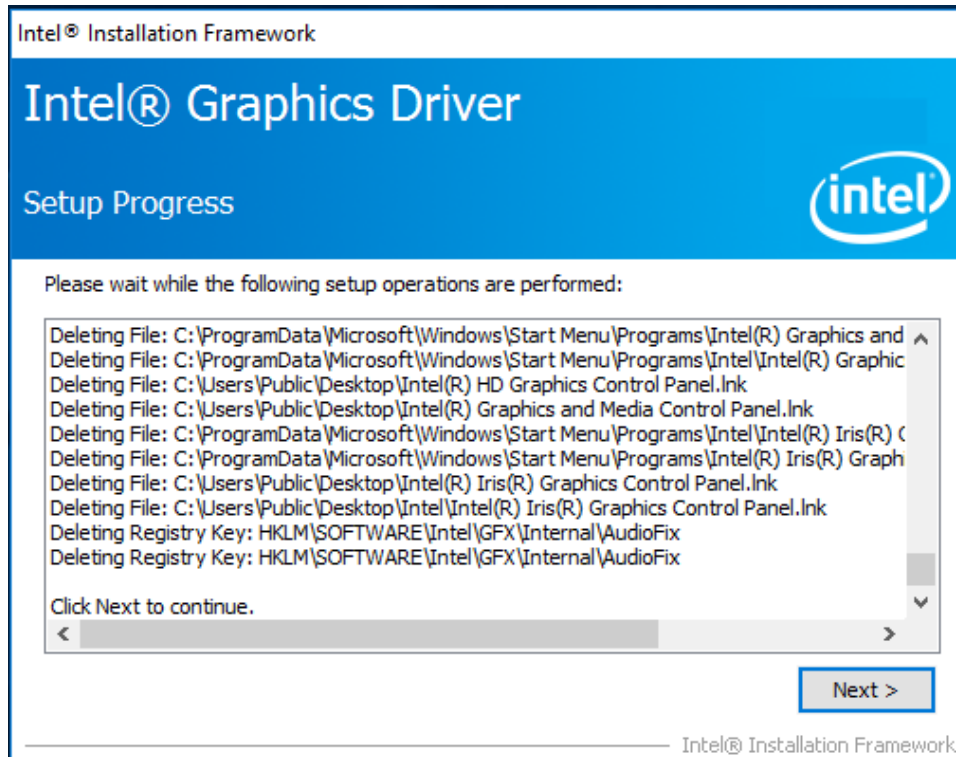


4. Check the ReadMe file information, select **Next** to continue.

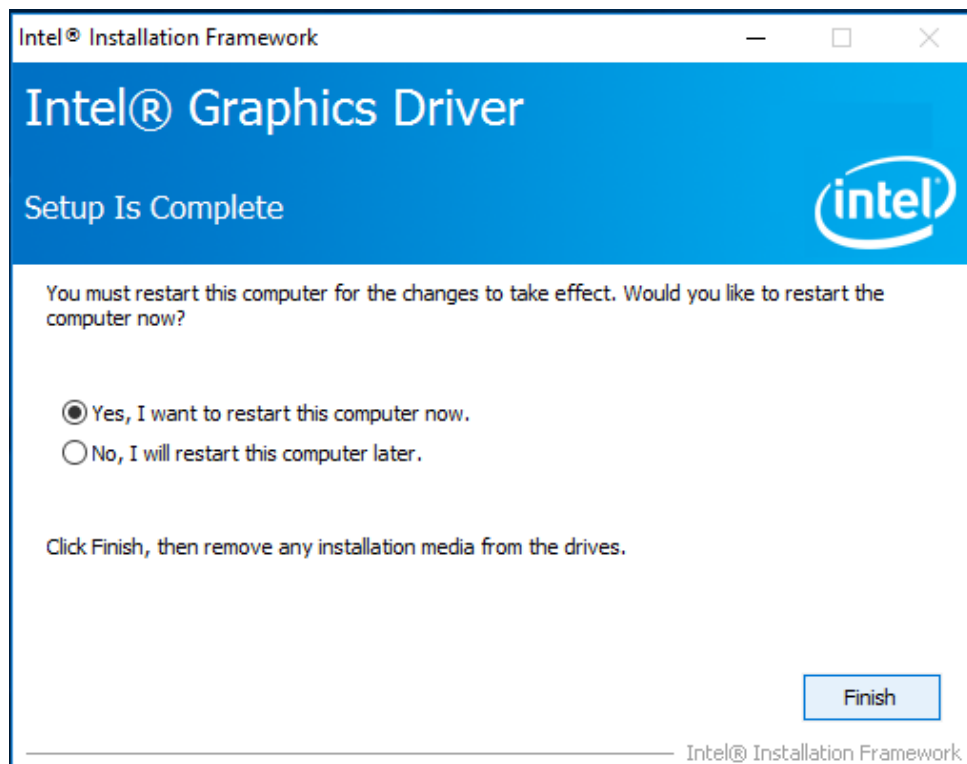


5. Wait for the driver to be installed.



6. Select **Next** to continue.

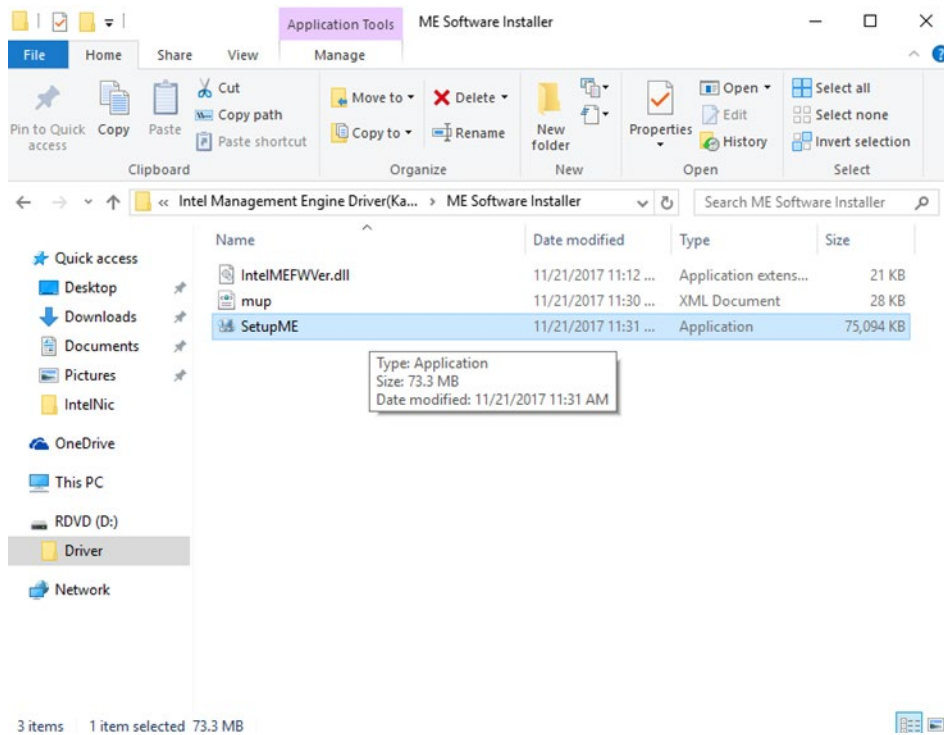
7. After installation is completed, select “**Yes, I want to restart this computer now**”, and click **Finish**.



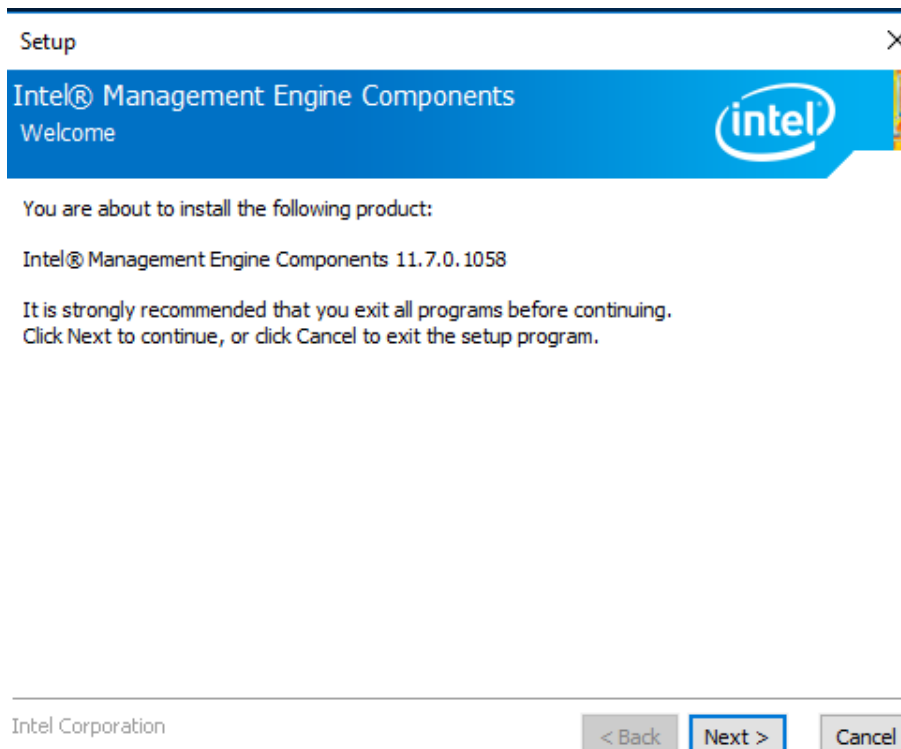
4.3 Management Engine (ME)

Follow instructions below to install Management Engine (ME) .

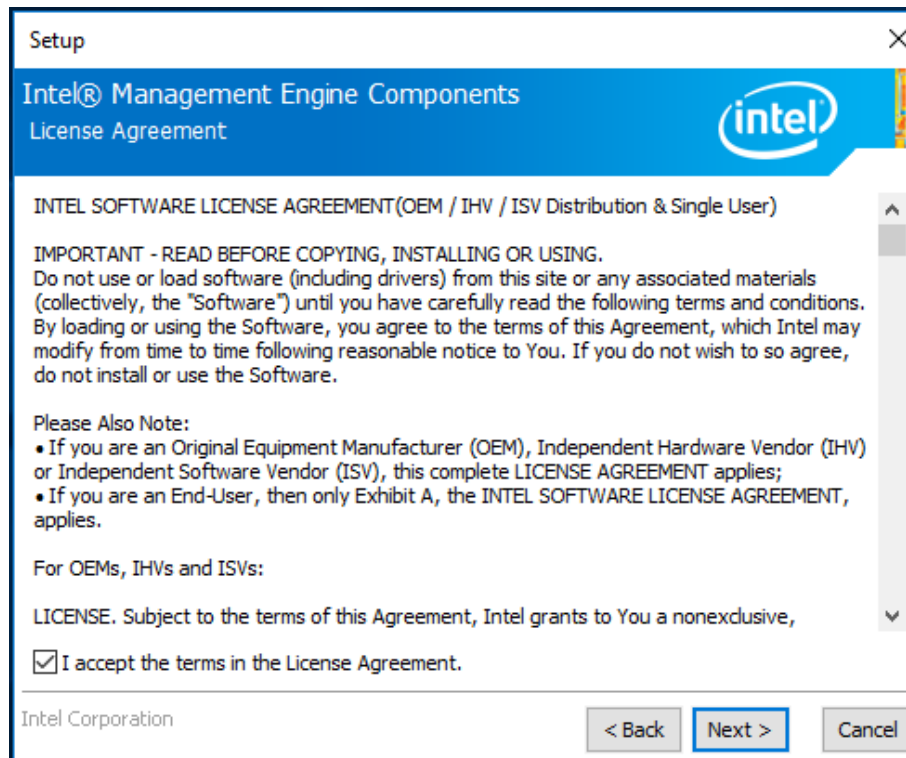
1. Open the Driver CD (included in the package) and select **ME** driver.



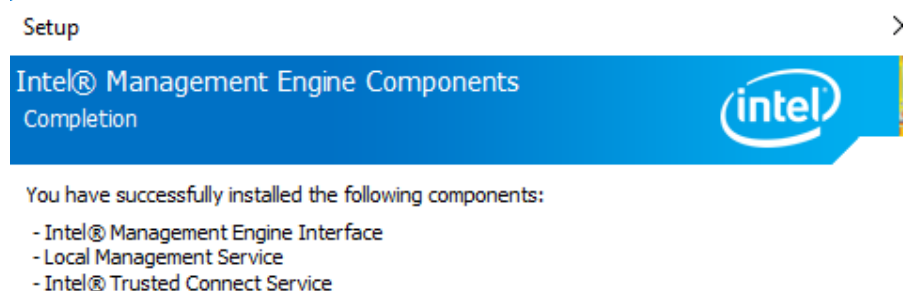
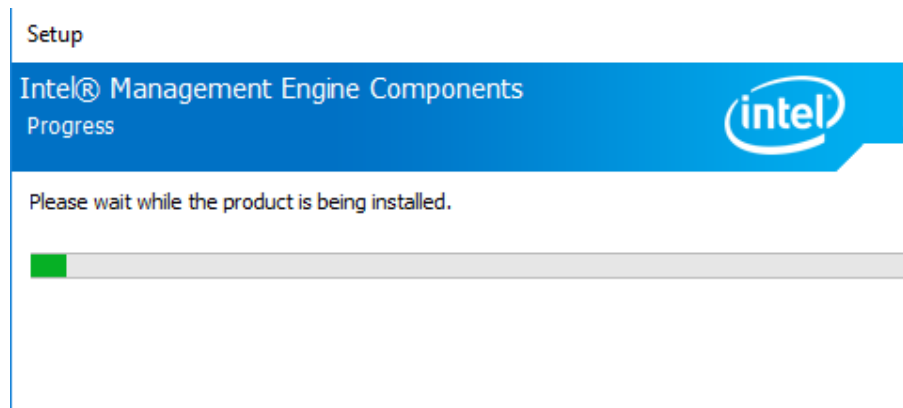
2. Select **Next** to start the installation.



3. Select **Next** to agree with the terms of license agreement.



4. Wait for the driver to be installed.



5. When installation completed, select **Finish** complete

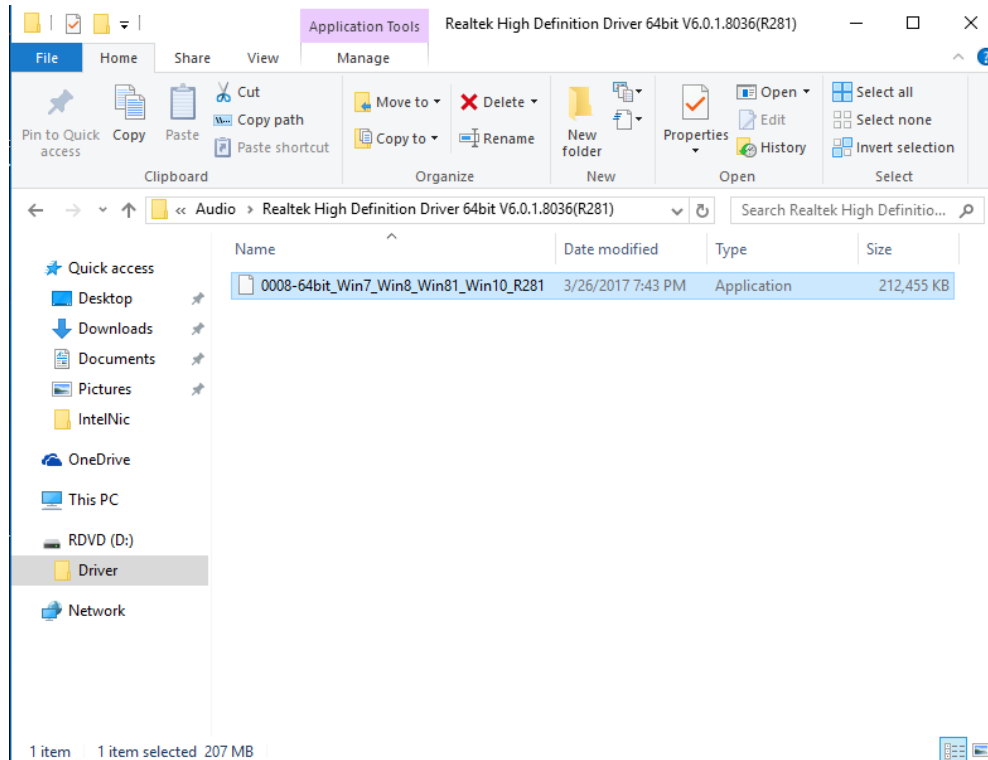


installation.

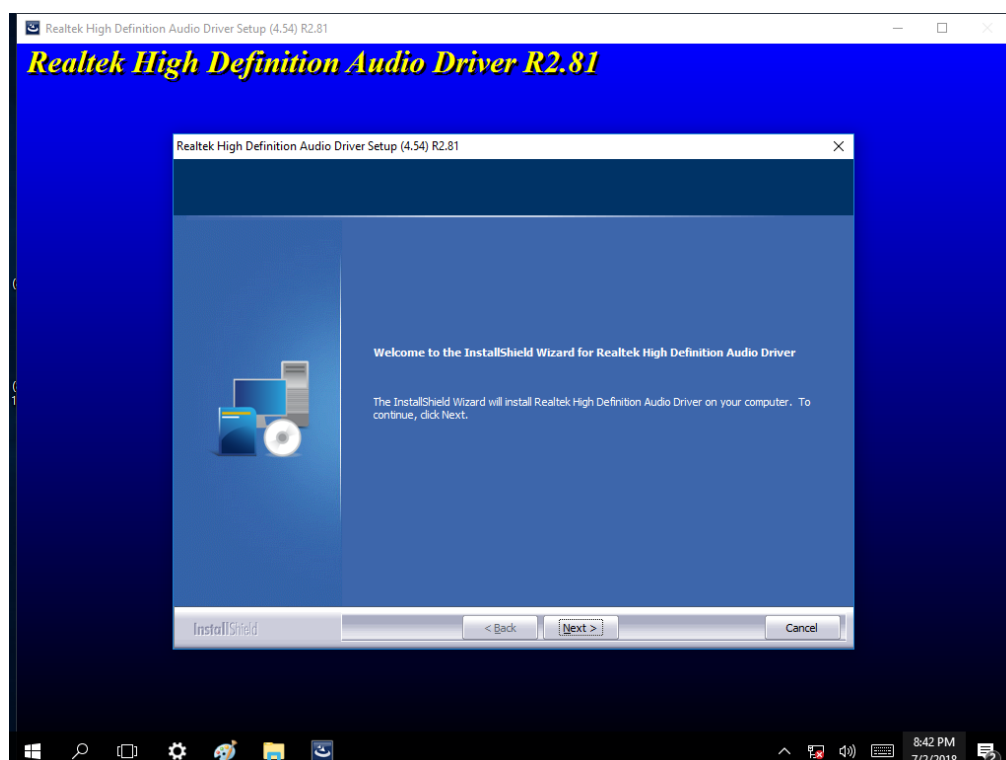
4.4 Audio Driver

Follow instructions below to install Audio driver.

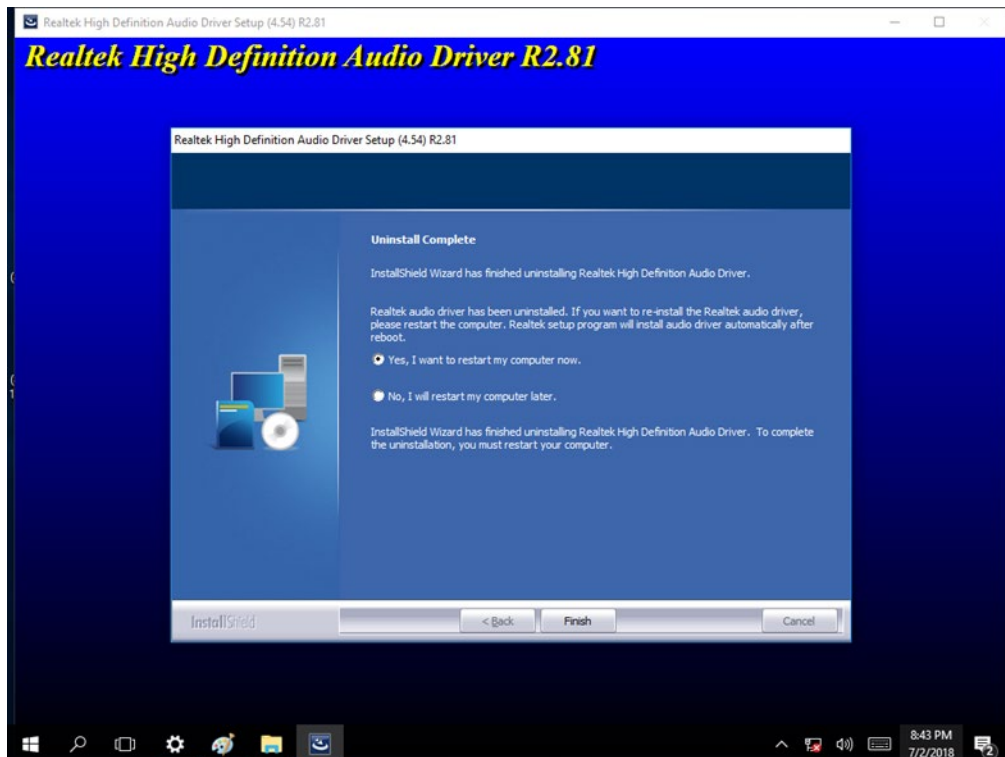
1. Open the Driver CD (included in the package) and select **Audio** driver.



2. Select **Next** to continue.



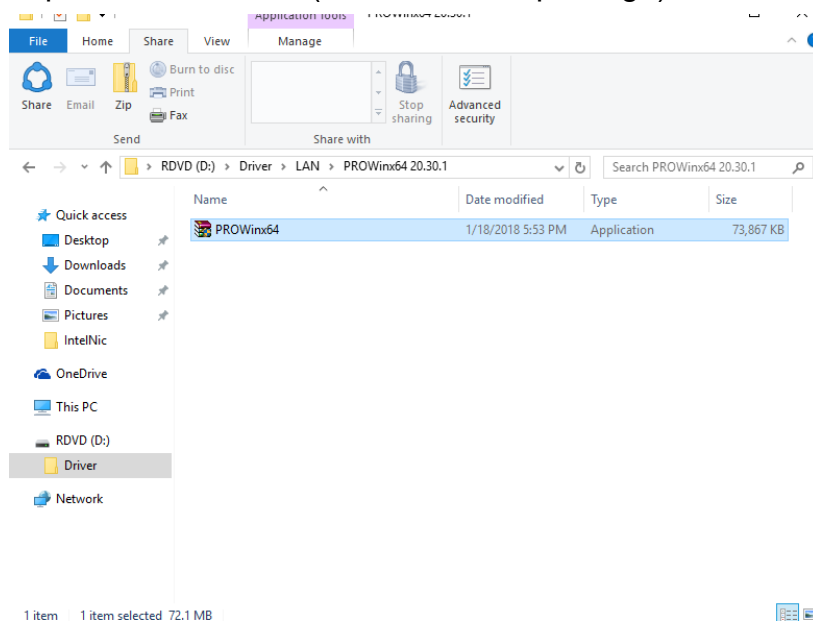
- When installation completed, select **Finish** complete installation.



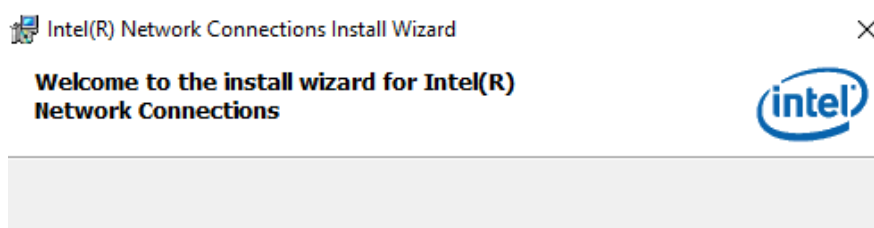
4.5 Ethernet Driver

Follow instructions below to install LAN driver.

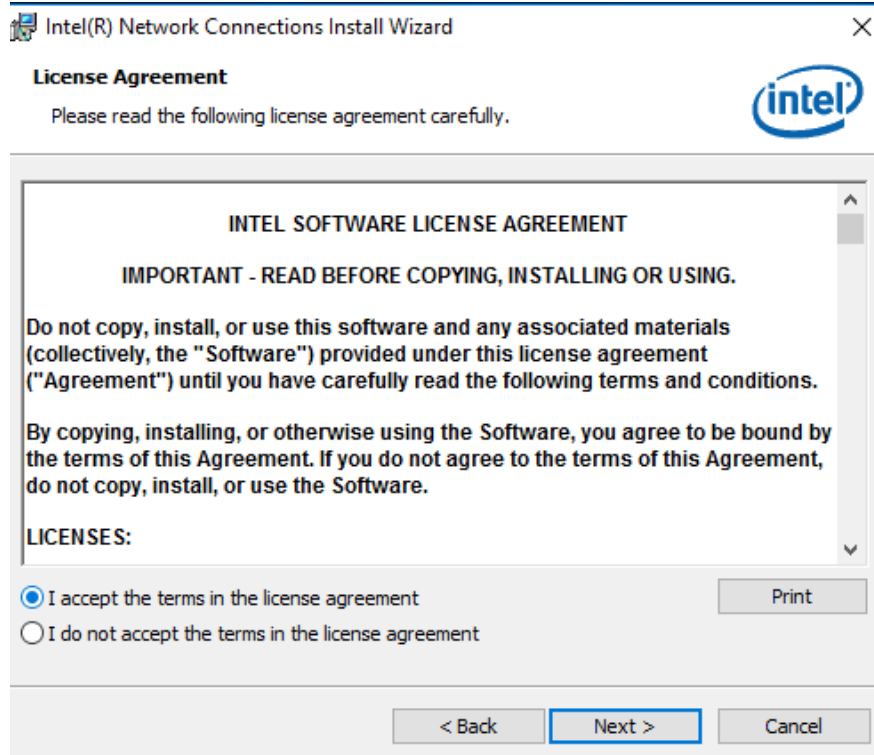
- Open the Driver CD (included in the package) and select **LAN** driver.



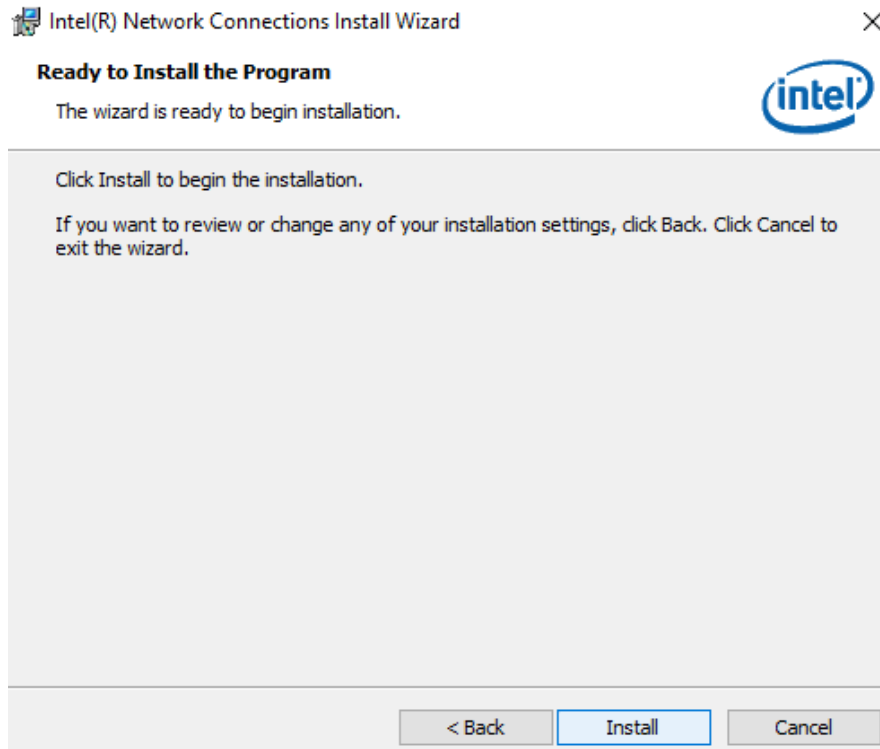
- When compression is complete, select **Next**.



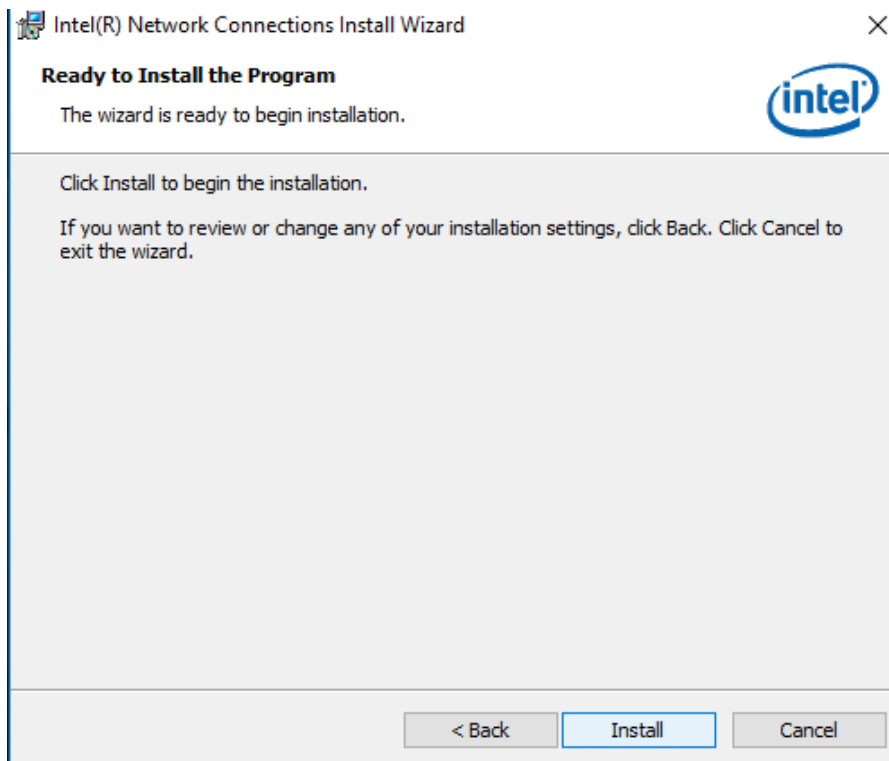
3. Read the license agreement, and then select **Next**.



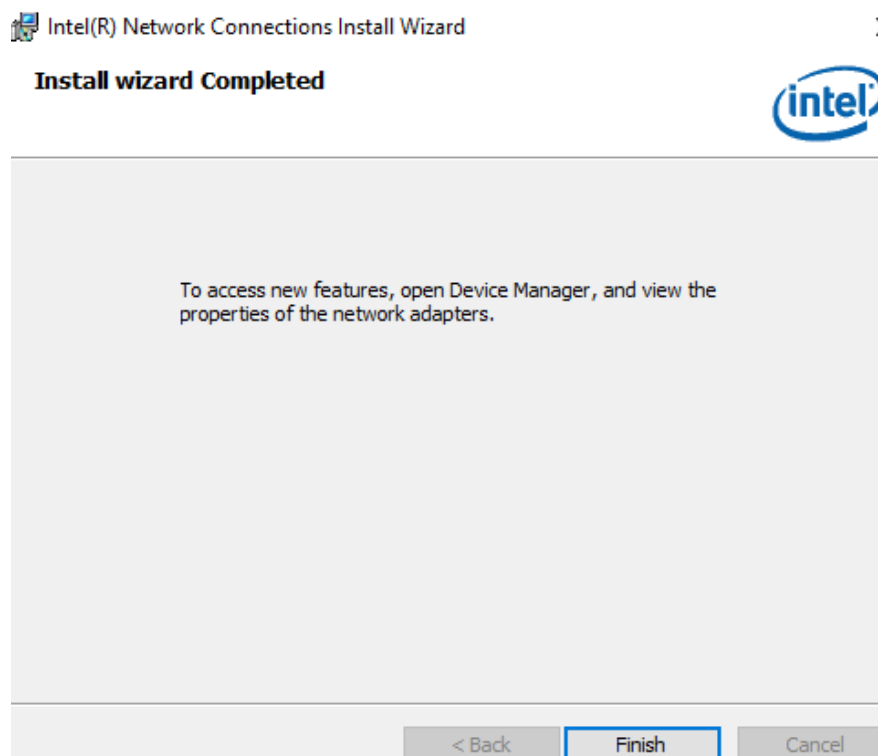
4. System displays the installed packages, select **Next**.



5. Confirm the installation, select **Install** to start the installation.



6. When installation is completed, select **Finish** to close the window.

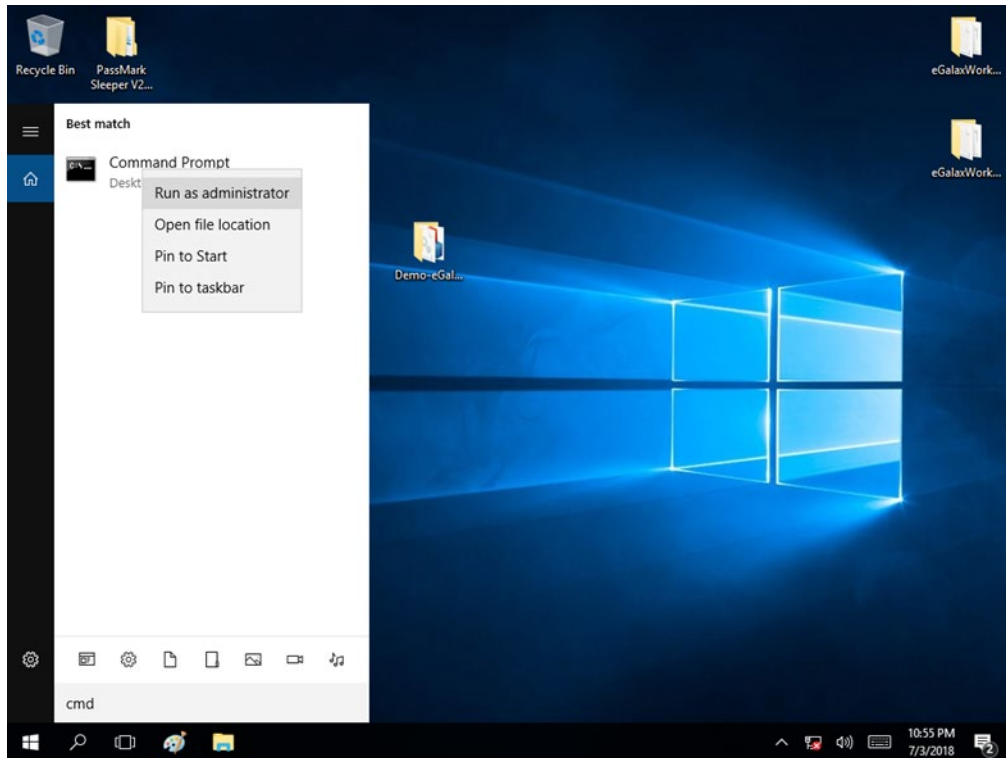


4.6 Watchdog Driver Installation

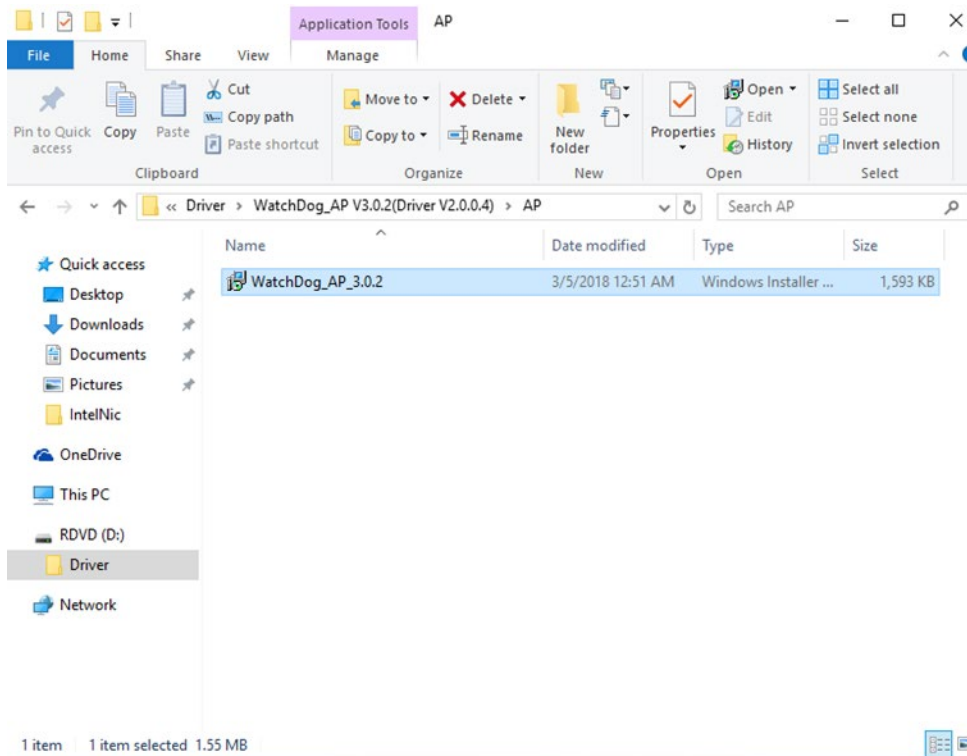
For more details about Winmate Watchdog, please download Watchdog Guide from Winmate Downloads Center [here](#).

Follow instructions below to install **Watchdog** driver.

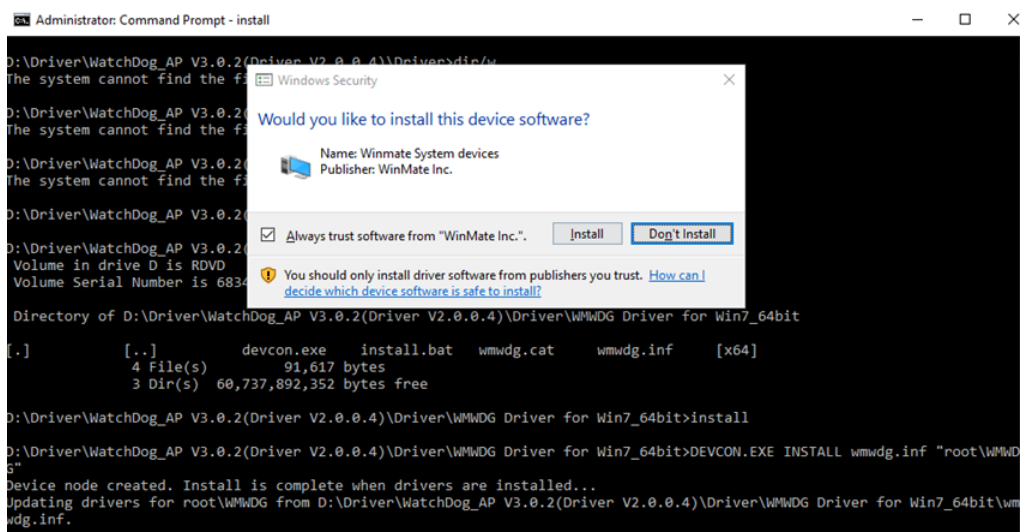
1. Type “cmd” in the run box then the cmd.exe will appear in programs.



2. Right click on the cmd.exe and click on “Run as administrator” to start
3. Open the Driver CD (included in the package) and select Watchdog driver.



4. When Windows Security dialog appear, select **install** to continue the Installation.



5. Wait for installation to complete. When installation is complete, press any key to close.

```
Administrator: Command Prompt - install
D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver>dir
The system cannot find the file specified.

D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver>dir/w
The system cannot find the file specified.

D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver>cd WMMWDG Driver for Win7_64bit

D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver\WMMWDG Driver for Win7_64bit>dir/w
Volume in drive D is RDVD
Volume Serial Number is 6834-E6A5

Directory of D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver\WMMWDG Driver for Win7_64bit

.                [..]                devcon.exe    install.bat    wmmwdg.cat    wmmwdg.inf    [x64]
4 File(s)        91,617 bytes
3 Dir(s)         60,737,892,352 bytes free

D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver\WMMWDG Driver for Win7_64bit>install

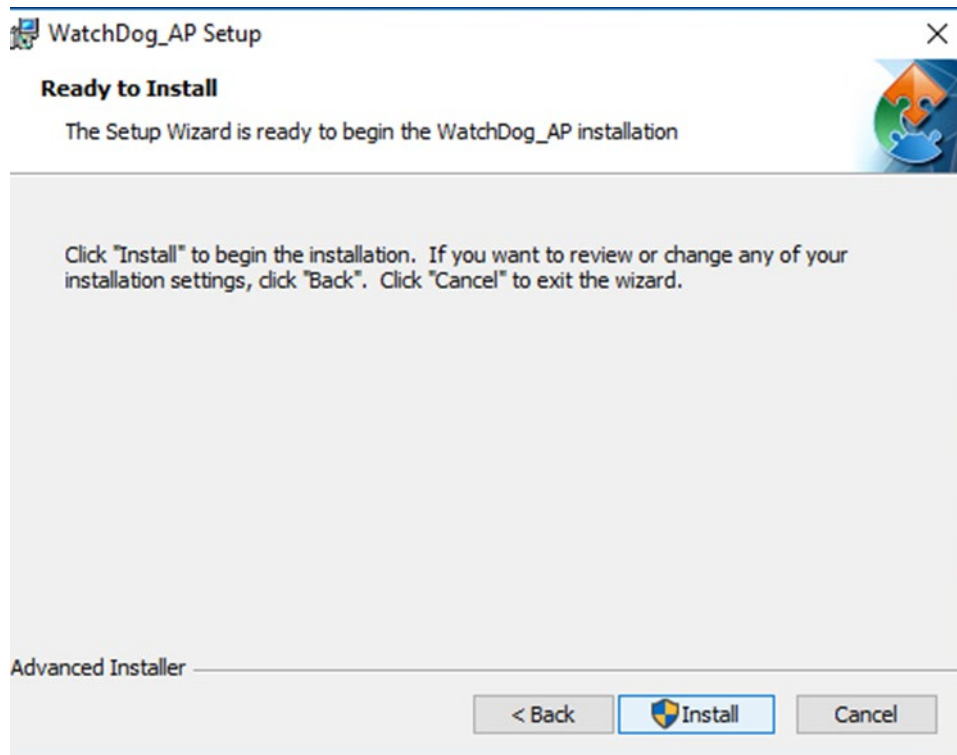
D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver\WMMWDG Driver for Win7_64bit>DEVCON.EXE INSTALL wmmwdg.inf "root\WMMWD
Device node created. Install is complete when drivers are installed...
Updating drivers for root\WMMWDG from D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver\WMMWDG Driver for Win7_64bit\wmm
wg.inf.
Drivers installed successfully.

D:\Driver\WatchDog_AP V3.0.2(Driver V2.0.0.4)\Driver\WMMWDG Driver for Win7_64bit>pause
```

6. Open the Driver CD (included in the package) and select **Watchdog AP**.
7. Select **Next**.

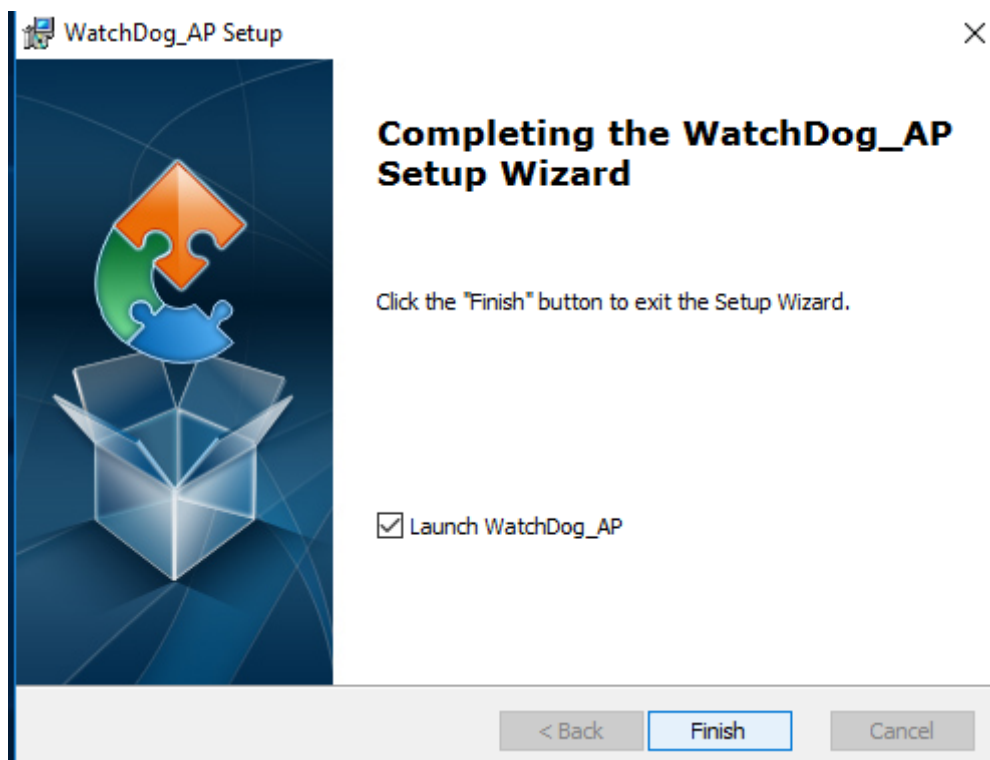


8. The installed storage location is displayed, select **Next** to continue.



9. Select **Next** to start the installation.

10. When installation is completed, select **Finish** to close the window.

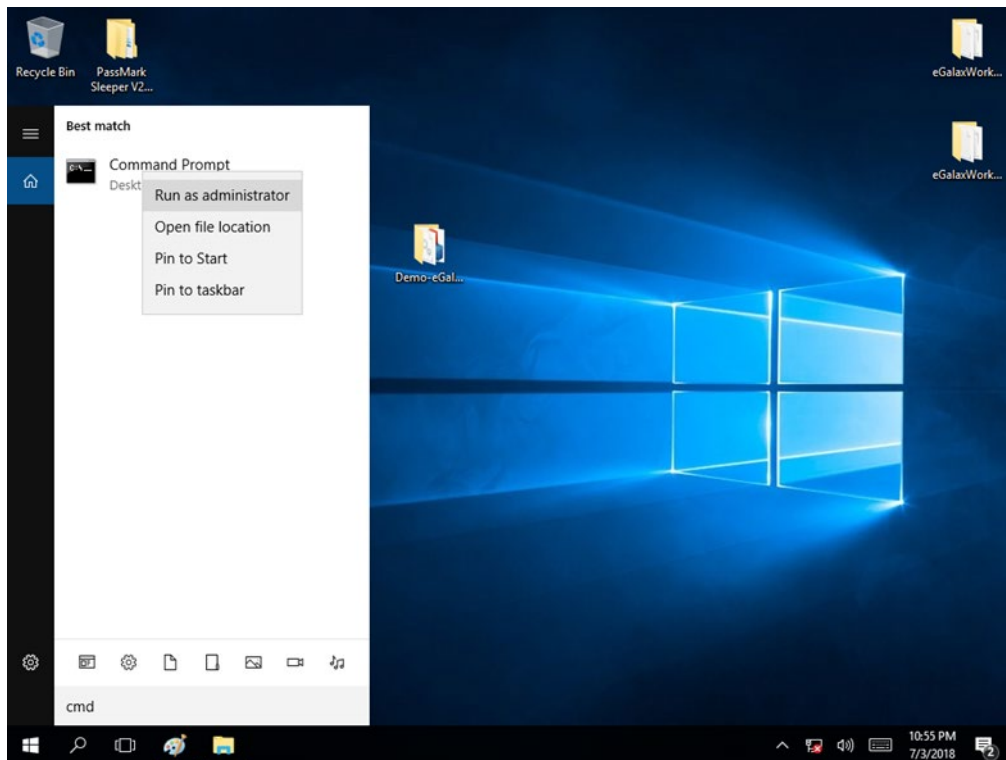


4.7 Digital IO Driver Installation

For more details about Winmate Watchdog, please download Digital IO Guide from Winmate Downloads Center:

Follow instructions below to install **Digital IO** river.

1. Type “cmd” in the run box then the cmd.exe will appear in programs.
2. Right click on the cmd.exe and click on “Run as administrator” to start



3. Open the Driver CD (included in the package) and select Digital IO driver.
4. When Windows Security dialog appear, select **install** to continue the Installation.
5. Wait for installation to complete. When installation is complete, press any key to close.

```

Administrator: Command Prompt

[.] [..]
WMDIO 64bit Driver Installation Guide v101.pdf WMDIO Driver for Win7_32bit.zip
WMDIO Driver for Win7_64bit.zip
3 File(s) 227,270 bytes
2 Dir(s) 60,734,410,752 bytes free

D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0>CD WMDIO Driver for Win7_64bit
D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit>DIR/W
Volume in drive D is RDVD
Volume Serial Number is 6834-E6A5

Directory of D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit

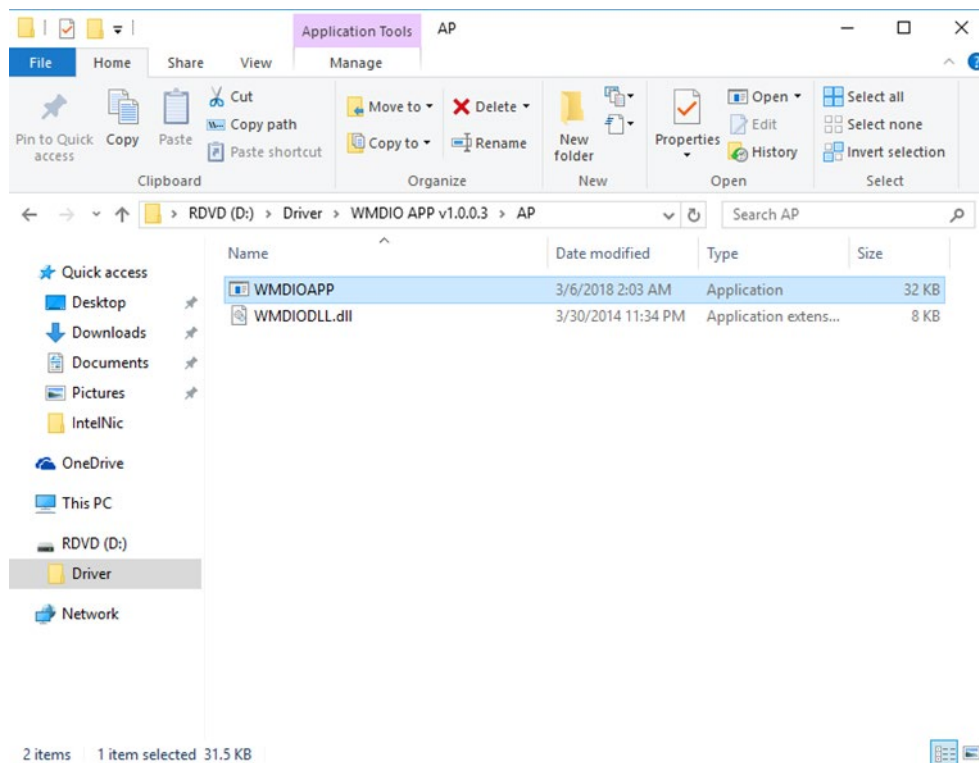
[.] [..] devcon.exe install.bat wmdio.cat wmdio.inf [x64]
4 File(s) 91,614 bytes
3 Dir(s) 60,736,315,392 bytes free

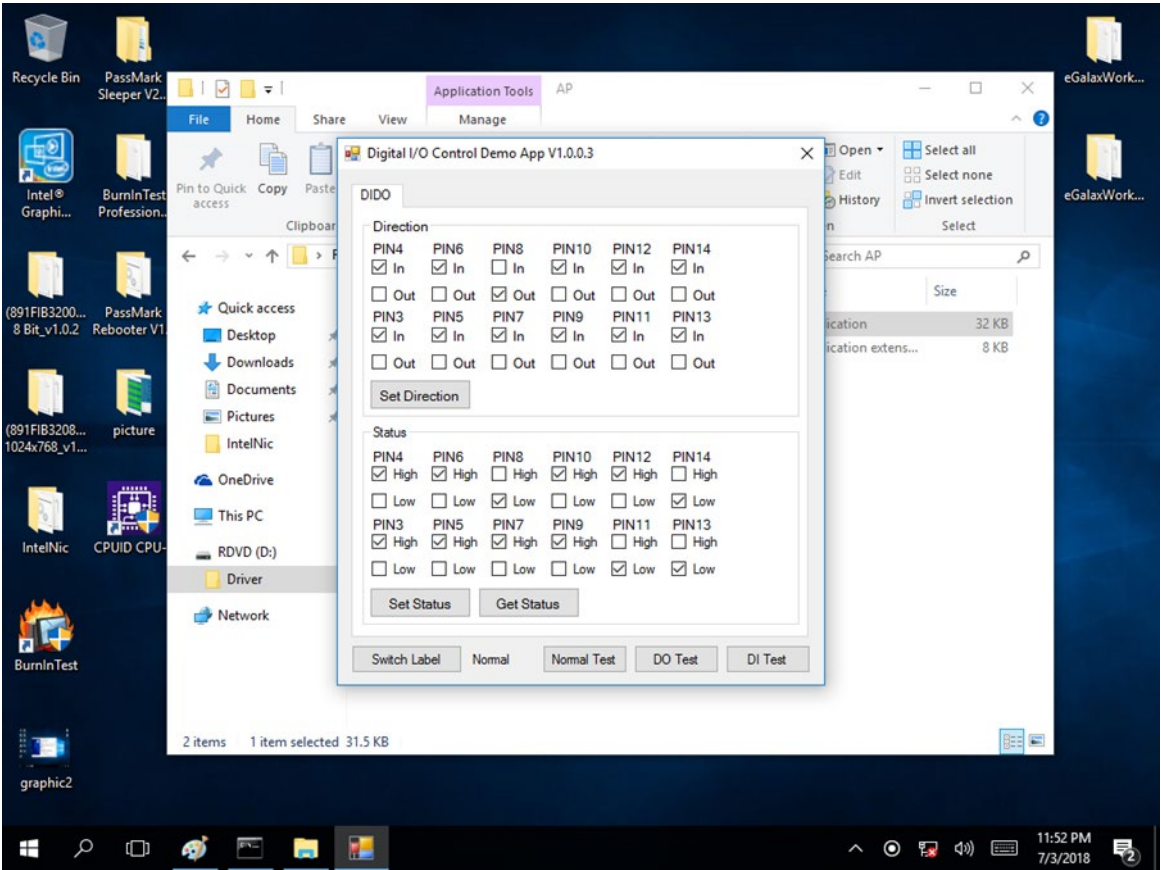
D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit>INSTALL
D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit>DEVCON.EXE INSTALL wmdio.inf "root\WMDIO"
Device node created. Install is complete when drivers are installed...
Updating drivers for root\WMDIO from D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit\wmdio.inf.
Drivers installed successfully.

D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit>pause
Press any key to continue . . .
D:\Driver\WMDIO APP v1.0.0.3\Driver\5.0.6.0\WMDIO Driver for Win7_64bit>

```

6. Open the Driver CD (included in the package) and select **Digital IO AP**.





Chapter 5: Technical Support

This chapter includes the directory for technical support. Free technical support is available from our engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products. If any problem occurs immediately contact us.

5.1 Drivers

5.2 Software Development Kit (SDK)

5.1 Drivers

The list of drivers available for IF70 Mini-ITX SBC:

Item	Driver
1	Chipset Driver
2	Graphic Driver
3	ME Driver
4	Audio Driver
5	Ethernet Driver
6	Watchdog Driver/AP
7	Digital IO Driver/AP

To find the Drivers, please refer to the Driver CD that comes in the package or contact us.

5.2 Software Development Kit (SDK)

The list of SDK available for IF70 Mini-ITX SBC:

Item	File Type	Description
1	SDK	Watchdog SDK
2	SDK	Digital IO SDK

To find the SDK, please refer to the Driver CD that comes in the package or [contact us](#).

Notes

Notes

