2I640CW

Intel Elkhart Lake ATOM® x6413E / J6412 SoC CPU, On Board LPDDR4, 2 x LAN / HDMI / USB / COM / M.2

All-In-One SBC

Intel Elkhart Lake ATOM® x6413E / J6412 SoC CPU

HDMI, eDP, Touch Screen

M.2, Mini PCIe, 2 x LAN, 1 x Nano SIM

USB, COM, Wide Range DC-IN 9～24V

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

NO. 2I640CW
Release date: JAN. 10. 2023

Contents

2I640CW

User Manual edition 0.1, JAN. 2023

Warning !

1. Battery
   Batteries on board are consumables.
   The life time of them are not guaranteed.

2. Fanless solution with HDD
   The specification & limitation of HDD should be considered carefully when the fanless solution is implemented.

3. We will not give further notification in case of changes of product information and manual.

4. SATA interface does not support Hot SWAP function.

5. There might be a 20% inaccuracy of WDT at room temperature.

6. Please make sure the voltage specification meets the requirement of equipment before plugging in.

7. There are two types of SSD, commercial grade and industrial grade, which provide different read/write speed performance, operation temperature and life cycle. Please contact sales for further information before making orders.

8. Caution! Please notice that the heat dissipation problem could cause the MB system unstable. Please deal with heat dissipation properly when buying single MB set.

9. Please avoid approaching the heat sink area to prevent users from being scalded with fanless products.

10. If users repair, modify or destroy any component of product unauthorizedly, We will not take responsibility or provide warranty anymore.

11. DO NOT apply any other material which may reduce cooling performance onto the thermal pad.

12. It is important to install a system fan toward the CPU to decrease the possibility of overheating / system hanging up issues, or customer is suggested to have a fine cooling system to dissipate heat from CPU.

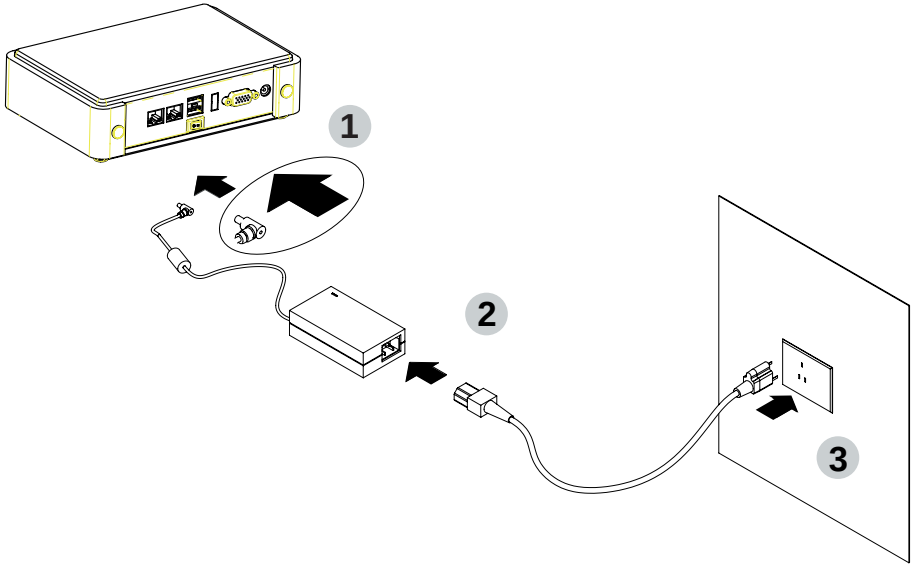
✱ Hardware Notice Guide

1. Before linking power supply with the motherboard, please attach DC-in adapter to the motherboard first. Then plug the adapter power to AC outlet.
   Always shut down the computer normally before you move the system unit or remove the power supply from the motherboard. Please unplug the DC-in adapter first and then unplug the adapter from the AC outlet.
   Please refer photo 1 as standard procedures.
2. In case of using DIRECT DC-in (without adapter), please check the allowed range for voltage & current of cables. And make sure you have the safety protection for outer issues such as short / broken circuit, overvoltage, surge, lightning strike.
3. In case of using DC-out to an external device, please make sure its voltage and current comply with the motherboard specification.
4. The total power consumption is determined by various conditions (CPU / motherboard type, device, application, etc.). Be cautious to the power cable you use for the system, one with UL standard will be highly recommended.
5. It's highly possible to burn out the CPU if you change / modify any parts of the CPU cooler.
6. Please wear wrist strap and attach it to a metal part of the system unit before handling a component. You can also touch an object which is ground connected or attached with metal surface if you don't have wrist strap.
7. Please be careful to handle & don't touch the sharp-pointed components on the bottom of PCBA.
8. Remove or change any components form the motherboard will VOID the warranty of the motherboard.
9. Before you install / remove any components or even make any jumper setting on the motherboard, please make sure to disconnect the power supply first. (follow the aforementioned instruction guide)
10. "POWERON after PWR-Fail" function must be used carefully as below:
    When the DC power adaptor runs out of power, unplug it from the DC current; Once power returns, plug it back after 5 seconds.
    If there is a power outage, unplug it from the AC current, once power returns, plug it back after 30 seconds. Otherwise it will cause system locked or made a severe damage.

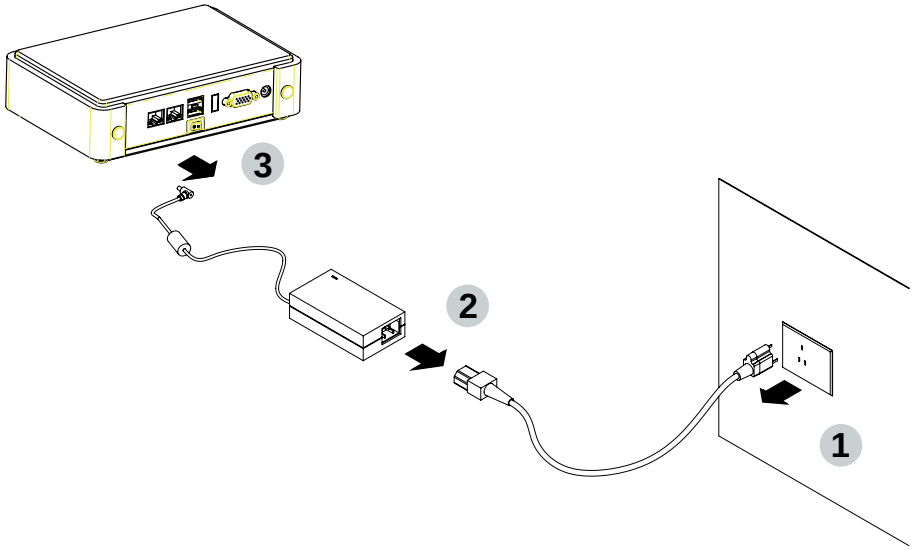
Remark 1:
Always insert / unplug the DC-in horizontally & directly to / from the motherboard. DO NOT twist, it is designed to fit snugly.
Moreover, erratic pull / push action might cause an unpredictable damage to the component & system unit.

Photo 1

Insert



Unplug



Chapter-1

General Information

The 2I640CW is a 2.5" (102 x 98 mm) motherboard powered with Intel Atom® x6000E series and Celeron® J (formerly Elkhart Lake) processor & offered the ideal platform for high performance applications. The ultra compact (102 x 98 mm) motherboard with wide range 9~24V DC power input & embeds multiple Intel 2.5GbE LAN, USBs, COM Ports and HDMI display interface that offer the ideal platforms for high performance applications in Networking, Smart Automation, Machine Vision, In-vehicle, Industry 4.0 and any compact high-performance Internet of Things (IoT) applications.

The 2I640CW supports high-speed data transfer interfaces such as PCIe gen3, USB 3.0, and SATA 6 Gb/s (SATA III) for SATA interface M.2 B-Key device, with onboard LPDDR4 memory 8GB and supports one serial ports RS232 / RS485 / RS422 jumper free auto switch by BIOS and 3 RS232 ports. It supports 2 port of USB 3.0, 2 port of USB 2.0. The expandable interfaces include 1 Mini card for PCIe USB interface, and 1 M.2 B-Key SATA and USB 3.0 / 2.0 interface. 2I640CW supports 1 eDP interface for LCD Panel and 1 panel inverter power for panel dimming control. It suitable for ALL-IN ONE Panel PC, POS Kiosk and automation control systems.

The embedded motherboard 2I640CW is specially designed with Wide-Range Voltage DC in (9~24V) for widely varying input voltage requirement. All wafer IO design offers superb performance and PC specification in the industry using the specific housing. It supports with two 2.5Gbps Ethernet for seamless broadband connectivity. With Wake-On LAN function and the PXE function in BIOS, these are perfect control boards for networking devices.

The All-In-One motherboard 2I640CW is fully compatible with industry standards, plus technical enhancements and thousands of software applications developed for IBM PC / AT compatible computers. These control logic provides high-speed performance for the most advanced multi user and multitasking applications available today.

1-1 Major Feature

1. Intel® Atom x6413E Processor 1.5GHz / 2.7GHz (Quad Core),
   Intel® Celeron Processor J6412 2.0GHz / 2.6GHz (Quad Core)
2. Intel® UHD Graphics for 10th Gen Intel® Atom x6413E 500MHz / 750MHz,
   Intel® Celeron J6412 400MHz / 800MHz
3. LPDDR4 onboard, up to 8GB
4. Support 2 x 2.5 Gbps Intel LAN ports.
5. Support 1 x RS232 selectable to RS485 / RS422 by BIOS & 3 RS232 only
6. 2 x USB 3.0 and 2 x USB 2.0
7. Support extended 1 x Mini card for PCIe and USB interface, 1 x M.2 B-Key for SATA and USB 3.0 / 2.0 interface with Nano SIM.
8. Hardware digital Input & Output, 4 x DI / 4 x DO, Hardware Watch Dog Timer, 0~255 sec programmable
9. Wide Range DC IN +9V~24V

1-2 Specification

1. **SOC:** Intel® Atom x6413E Processor 1.5GHz / 2.7GHz (Quad Core),
   Intel® Celeron Processor J6412 2.0GHz / 2.6GHz (Quad Core)
2. **Memory:** LPDDR4 onboard, up to 8GB
3. **Graphics:** Intel® UHD Graphics for 10th Gen Intel® Atom x6413E 500MHz / 750MHz,
   Intel® Celeron J6412 400MHz / 800MHz
4. **LAN:** 2 Intel I225-V LAN chipset with 10 / 100 / 1000 / 2500 Mbps for PCIe x 1 V2.1
5. **I/O Chip:** Switch chipset for 1 port RS232 / RS422 / RS485 selected by BIOS
   & 3 port RS232 only
6. **USB:** 2 type A USB 3.0, 2 USB 2.0
7. **WDT / DIO:** Hardware digital Input & Output, 4 x DI / 4 x DO (Option)
   / Hardware Watch Dog Timer, 0~255 sec programmable
8. **Expansion interface:** one Mini PCIe for PCIe and USB interface,
   one M.2 B-key for SATA and USB 3.0 / 2.0 interface with Nano SIM
9. **BIOS:** Insyde UEFI BIOS
10. **Dimension:** 102 x 98 mm
11. **Power:** On board DC +9~24V

1-3 Installing the Mini PCI-e Card (Full Size)

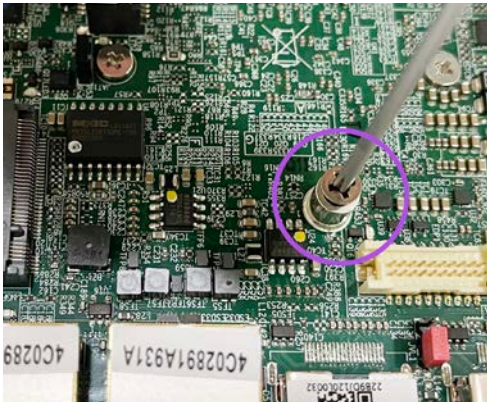
1. Unscrew the screw on the board

2. Plug in the Mini Card in a 45 angle

3. Gently push down the Mini Card and screw the screw back.

1-4 Directions for installing the M.2 B Key Mini Card

1. Unscrew the screw on the board

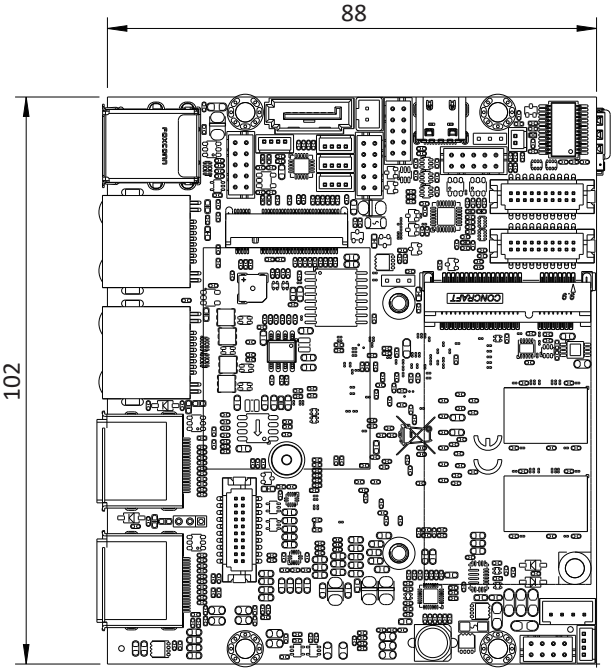


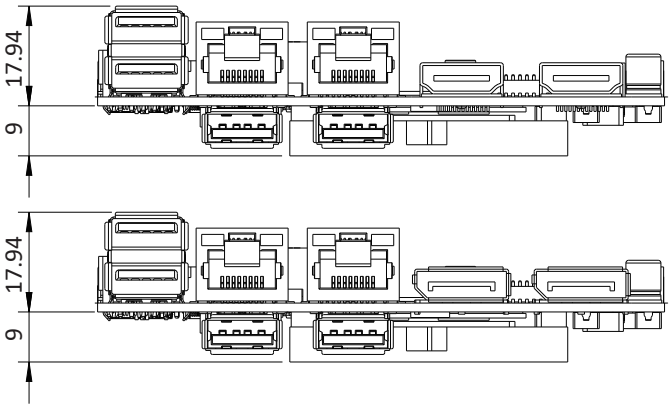
2. Plug in the Mini Card in a 45 angle

3. Gently push down the Mini Card and screw the screw back.

Chapter-2

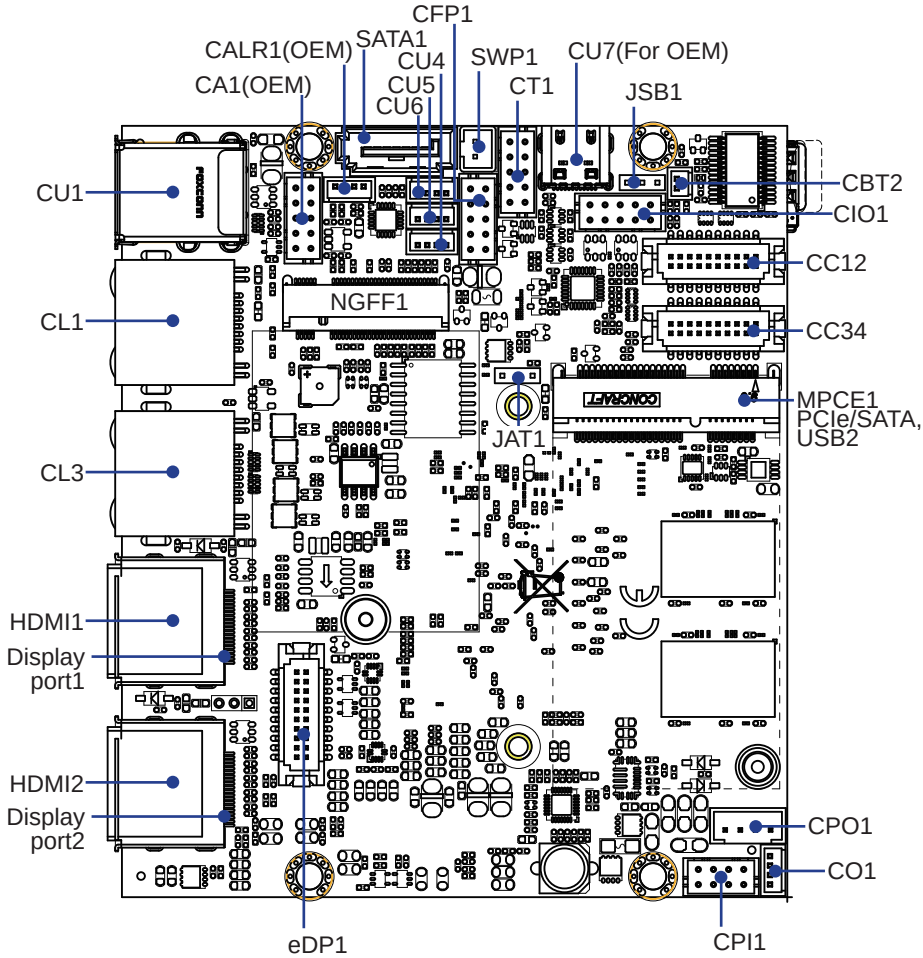
2-1 Dimension-2I640CW





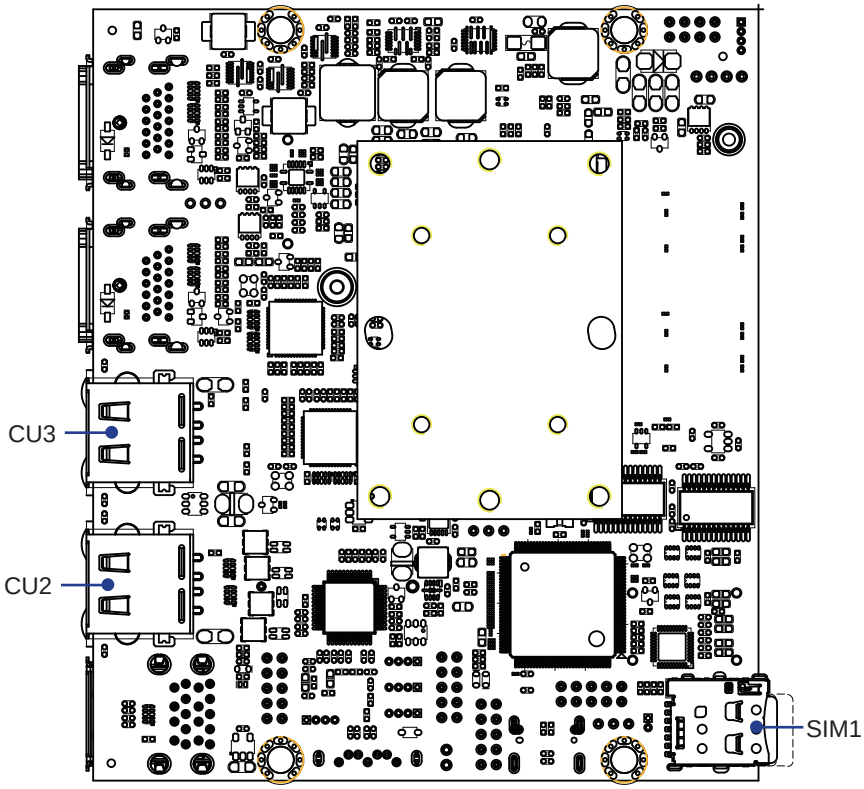
2-2 Layout-2I640CW-Connector and Jumper

TOP



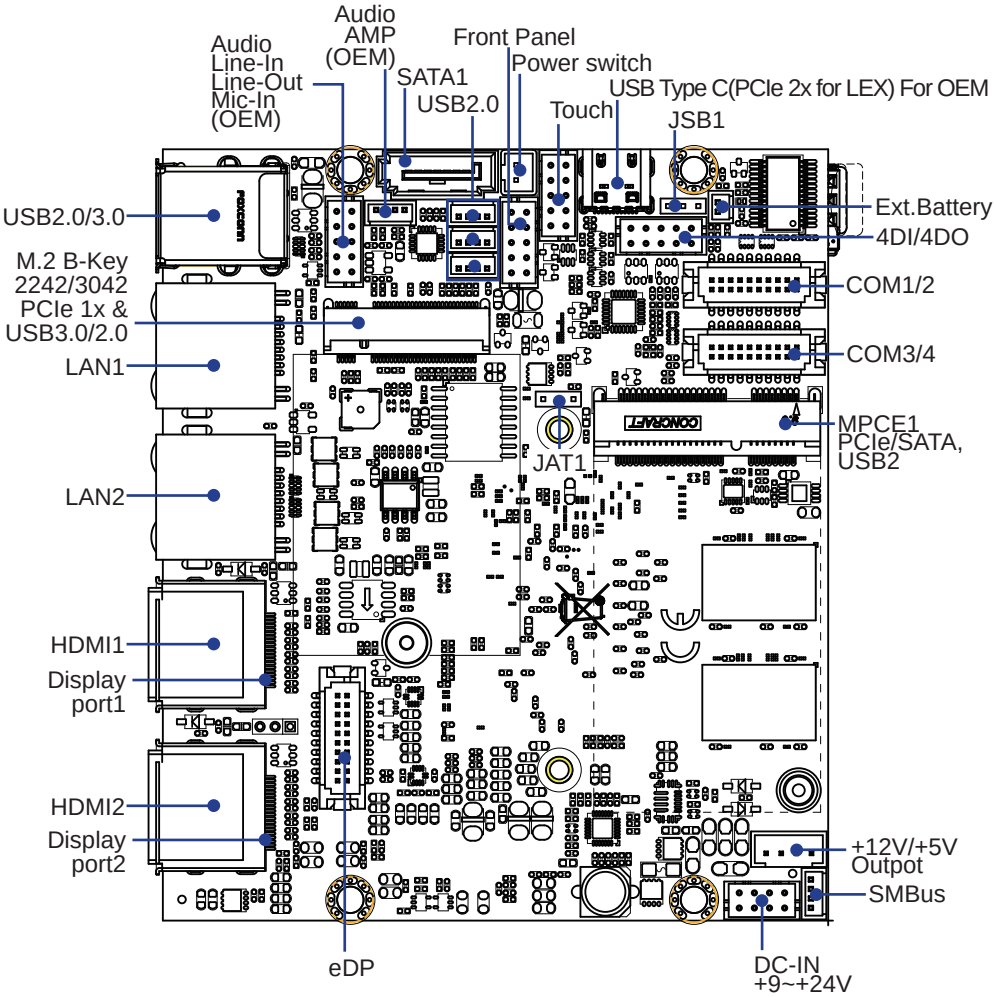
2-2-1 Layout-2I640CW-Connector and Jumper Bottom

BOT



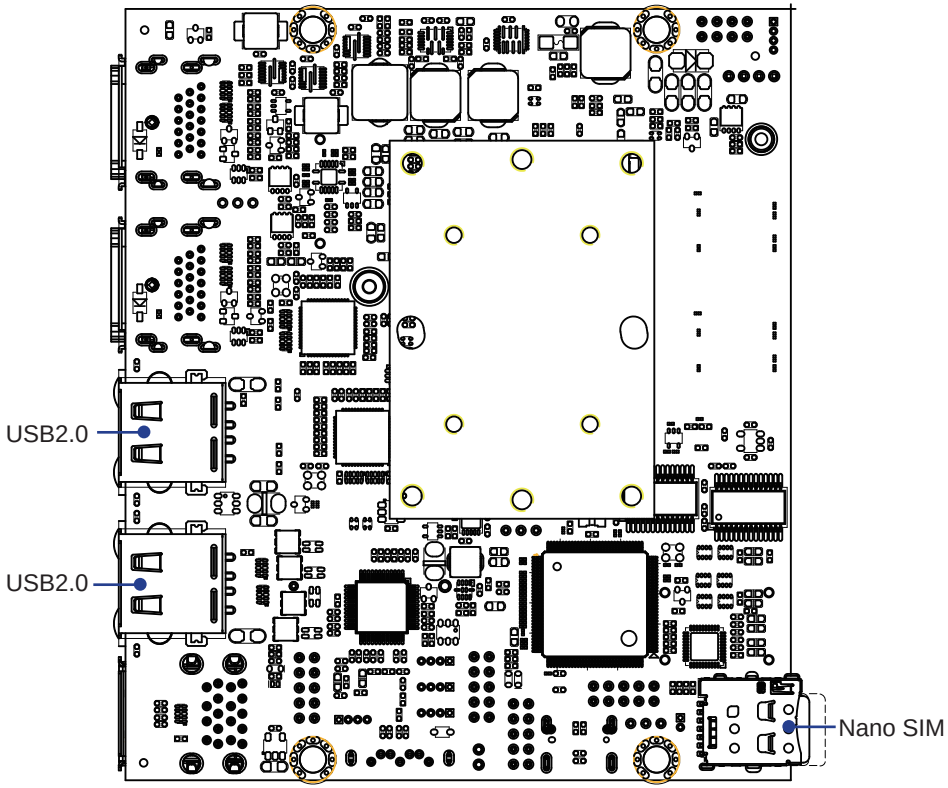
2-3 Layout-2I640CW-Function MAP

TOP



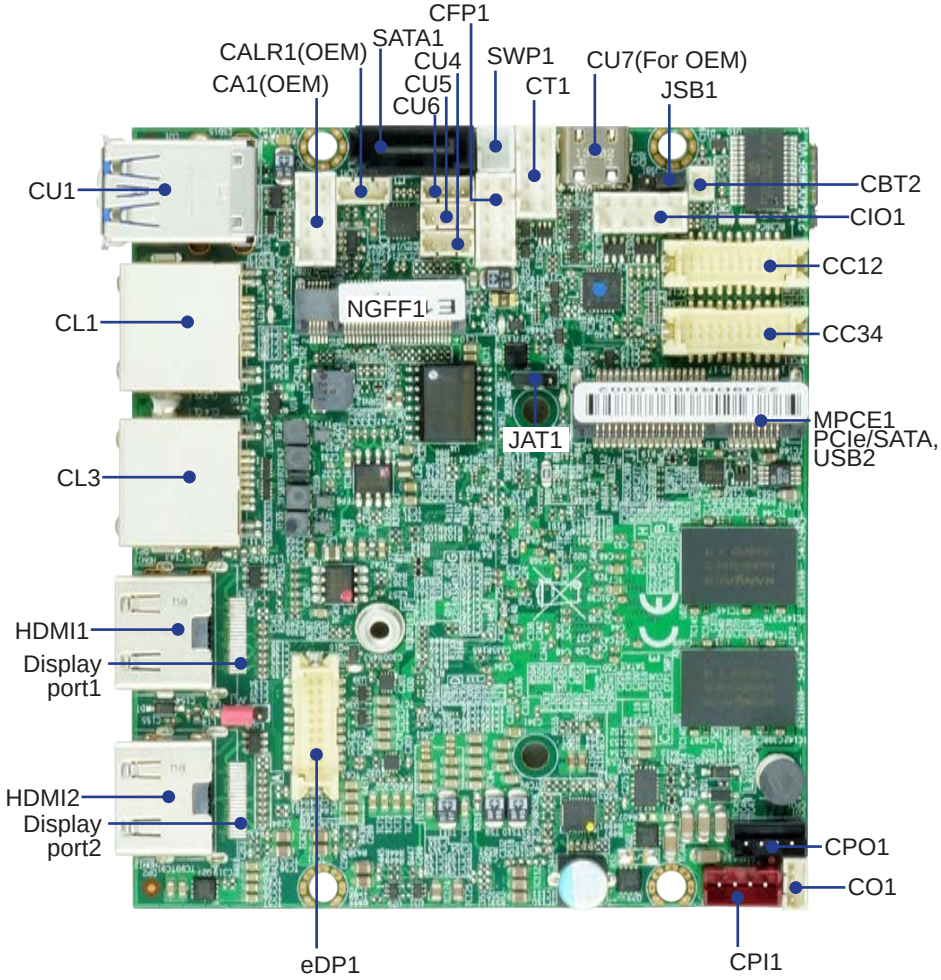
2-3-1 Layout-2I640CW-Function MAP

BOT



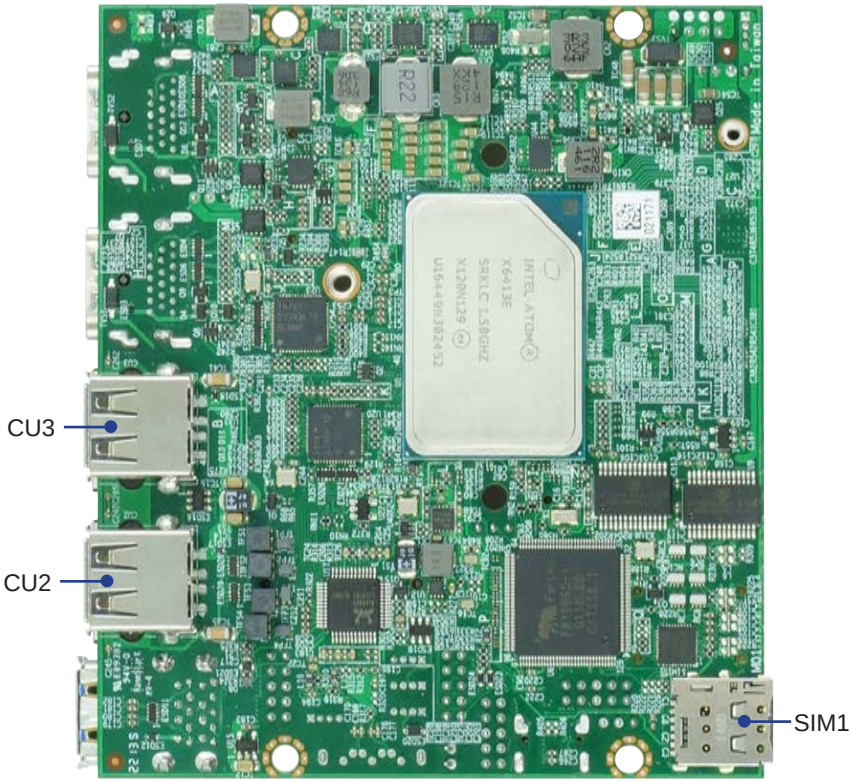
2-4 Diagram- 2I640CW

TOP



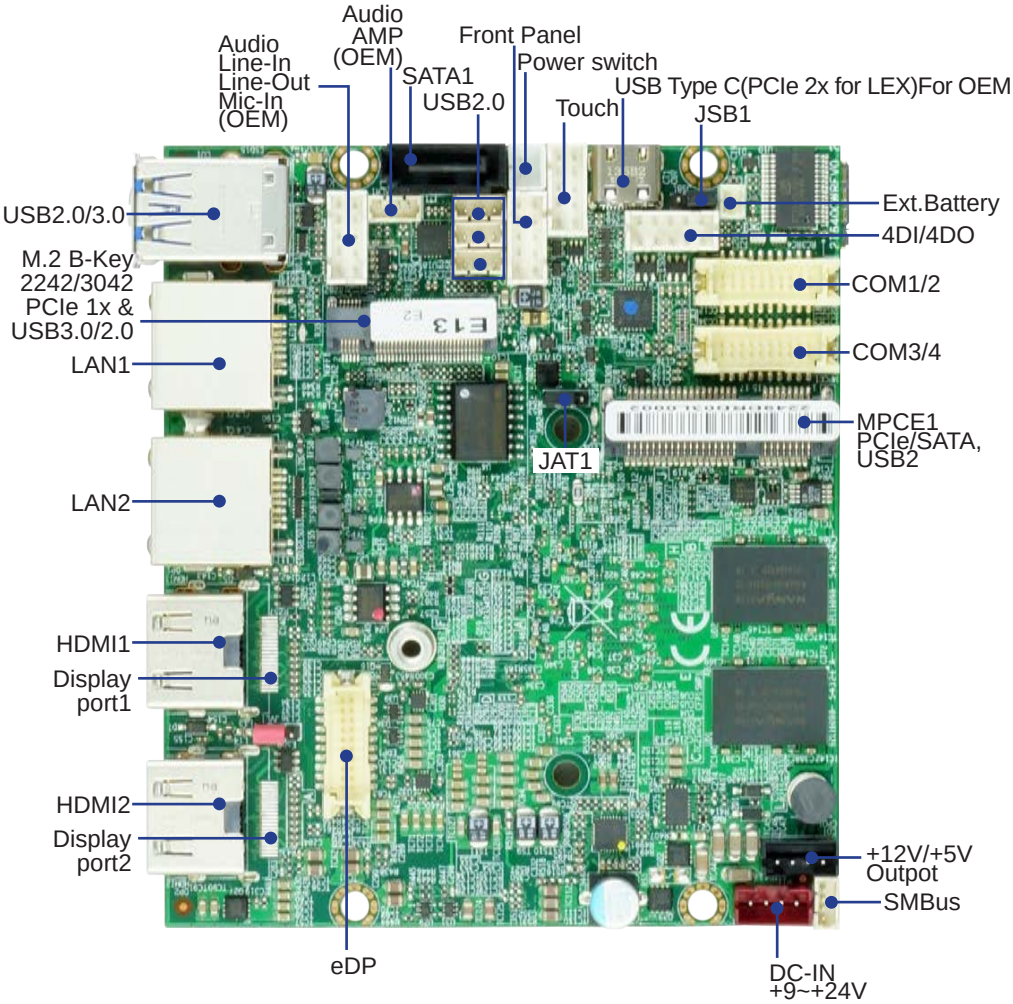
2-4-1 Diagram- 2I640CW

BOT



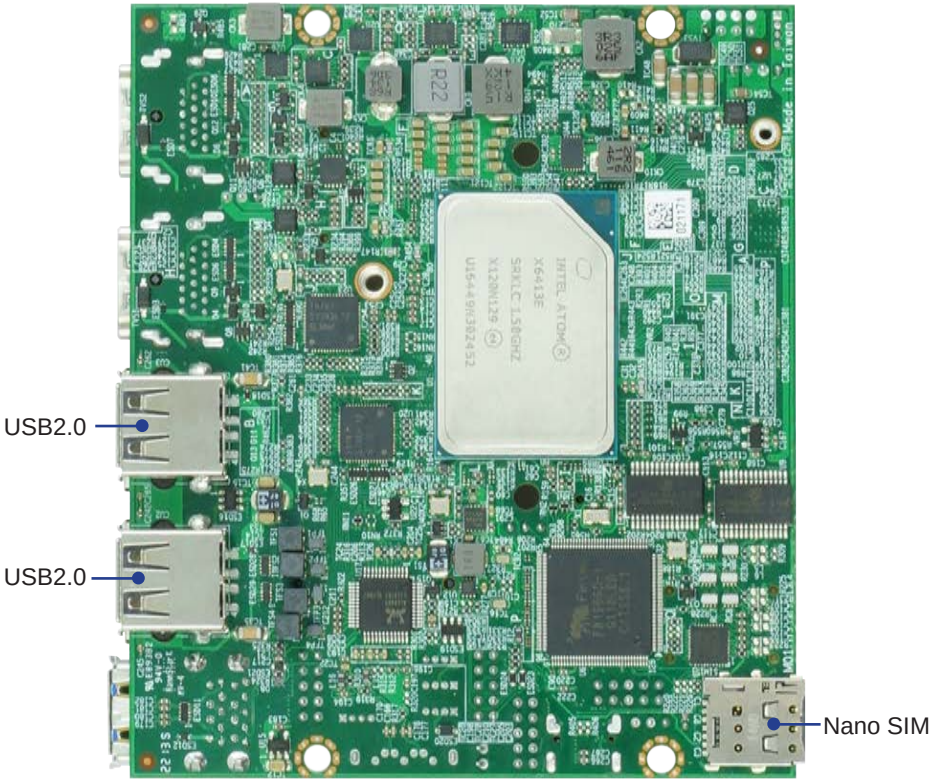
2-5 Function MAP- 2I640CW

TOP



2-5-1 Function MAP- 2I640CW

BOT



2-6 List of Jumpers

JSB1: CMOS DATA Clear

JAT1: Power in always ON function

JVL1: eDP panel power select

2-7 Jumper Setting Description

A jumper is ON as a closed circuit with a plastic cap covering two pins. A jumper is OFF as an open circuit without the plastic cap. Some jumpers have three pins, labeled 1, 2, and 3. You could connect either pin 1 and 2 or 2 and 3.

The below figure 2.2 shows the examples of different jumper settings in this manual.

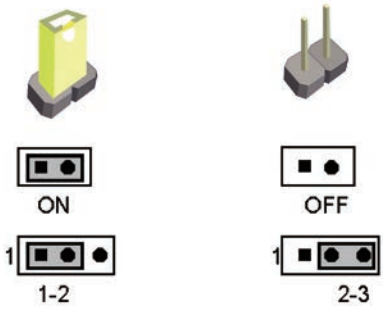


Figure 2.2

All jumpers already have its default setting with the plastic cap inserted as ON, or without the plastic cap as OFF. The default setting may be referred in this manual with a " * " symbol .

2-8 JSB1: CMOS DATA Clear

A battery must be used to retain the motherboard configuration in CMOS RAM.

Close Pin1 and pin 2 of JSB1 to store the CMOS data.

To clear the CMOS, follow the procedures below:

1. Turn off the system and unplug the AC power
2. Remove DC IN power cable from DC IN power connector
3. Locate JSB1 and close pin 1-2 for few seconds
4. Return to default setting by Close pin 1-2
5. Connect DC IN power cable back to DC IN Power connector

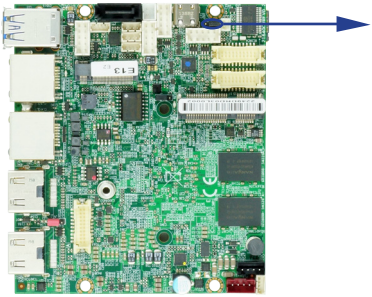
JSB1	DESCRIPTION
*1-2	Normal set
2-3	CMOS data clear

Note: Do not clear CMOS unless

1. Troubleshooting

2. Forget password

3. You fail over-clocking system



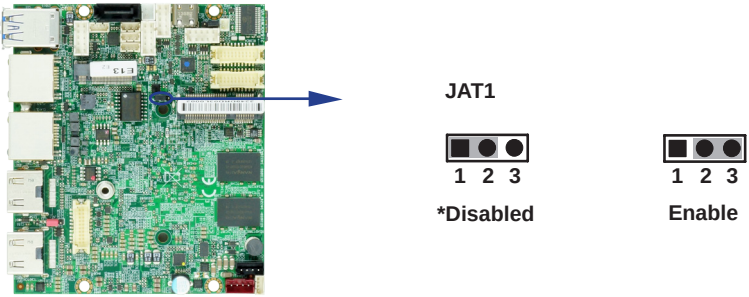
JSB1

***Normal** **CMOS**

2-9 JAT1: Power in always ON function

JAT1	DESCRIPTION
*1-2	Disabled
2-3	Enable

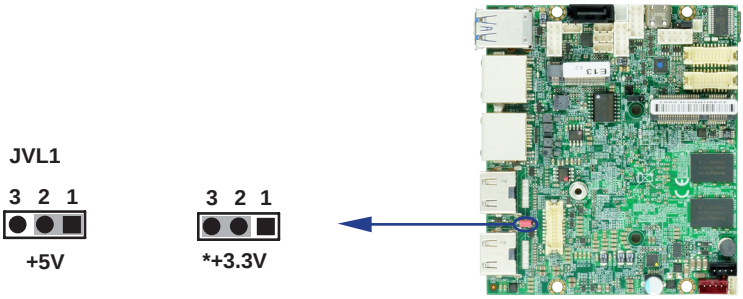
NOTE: Power always on function default is disabled.



2-10 JVL1: eDP panel power select

JVL1	DESCRIPTION
1-2	+5V
*2-3	+3.3V

Note: Attention! Check Device Power in spec



Chapter-3

Connection

This chapter provides all necessary information of the peripheral's connections, switches and indicators. Always power off the board before you install the peripherals.

3-1 List of Connectors

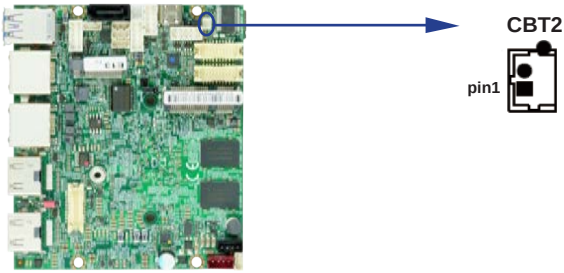
CBT2:	CMOS Battery in 1x2 pin (1.25mm) wafer
CA1:	Line-out / Line-in / Mic-in 2x5 pin (2.0mm) Wafer
CALR1:	Amp Line-out 2 channel 4pin (1.25mm) wafer
CU1:	Dual USB 3.0 type A connector
CU2:	USB 2.0 type A connector
CU3:	USB 2.0 type A connector
CU4:	USB 2.0 port 1x4 pin (1.25mm) wafer
CU5:	USB 2.0 port 1x4 pin (1.25mm) wafer
CU6:	USB 2.0 port 1x4 pin (1.25mm) wafer
CL1:	RJ45 LAN connector
CL3:	RJ45 LAN connector
CL2:	LAN port 2x4 pin (2.0mm) wafer (option)
CL4:	LAN port 2x4 pin (2.0mm) wafer (option)
CC12:	COM1/2 2x10 pin (1.25mm) wafer
CC34:	COM3/4 2x10 pin (1.25mm) wafer
CFP1:	Front Panel connector 2x5 pin (2.0mm) wafer
CIO1:	4DI / 4DO 2x5 pin (2.0mm) wafer
CO1:	SMBus 1x4 pin (1.25mm) wafer
CPI1:	DC-IN 1x4 pin (2.0mm) Red wafer
EDP1:	eDP 2x10 pin (1.25mm) wafer
SATA1:	SATA connector 7pin
SIM1:	Nano SIM card socket
MPCE1:	Full size mini card port 1 sockets 52pin
NGFF1:	M.2 B key 2242 / 3042 H=8.5 sockets 75pin
HDMI1:	HDMI typeA connector
HDMI2:	HDMI typeA connector
DP1:	Display Port connector (option)
DP2:	Display Port connector (option)
CU7:	USB Type C connector For LEX PIN Define (OEM)

3-2 CMOS battery connector

• CBT2: CMOS Battery in 1x2 pin (1.25mm) wafer

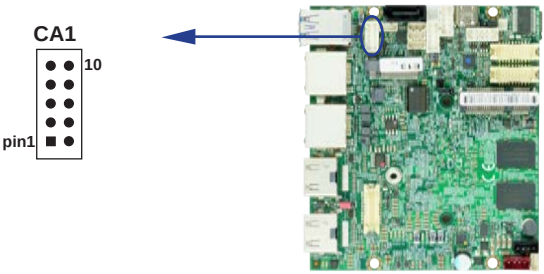
PIN NO.	DESCRIPTION
1	Battery in (GND)
2	Battery in (+3V)

Note:
NOTE: CBT2 for external connector can extend battery capacity.



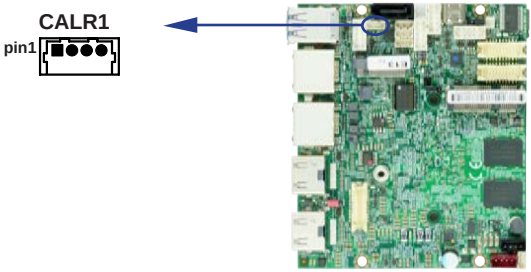
3-3 CA1: Line-out / Line-in / MIC-in 2x5 pin (1.25mm) wafer

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Line-out-R	2	MIC-IN
3	Line-in-R	4	GND
5	GND	6	GND
7	Line-in-L	8	+5V
9	Line-out-L	10	MIC-IN



3-4 CALR1: Amplifier Line-out Right & Left channel 1x4 pin (1.25mm) wafer

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Left+	2	Left-
3	Right-	4	Right+



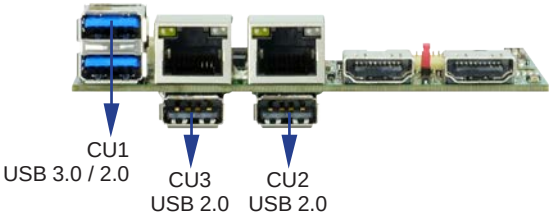
3-5 USB Interface

- **CU1: Dual USB 3.0 / 2.0 Type A connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
		1	USB 3.0 TX+
1	+5V		
2	USB 2.0 D-	2	USB 3.0 TX-
		3	GND
3	USB 2.0 D+	4	USB 3.0 RX+
4	GND		
		5	USB 3.0 RX-

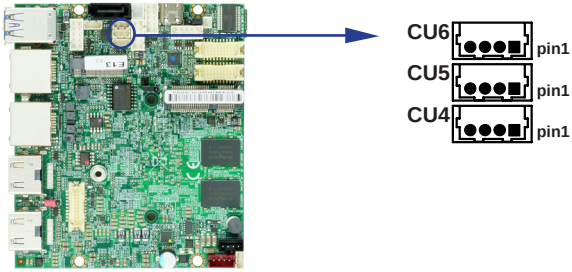
- **CU2. CU3: USB2.0 Type A Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	DATA-
3	DATA+	4	GND



- **CU4 / CU5 / CU6: USB 2.0 1x4 pin (1.25mm) wafer**

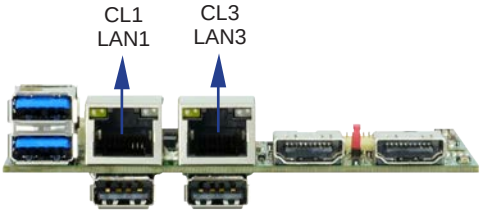
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	DATA-
3	DATA+	4	GND



3-6 LAN Interface

• CL1 / CL3: RJ45 LAN Connector

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TD0+ / TX+	2	TD0- / TX-
3	TD1+ / RX+	4	TD2+ / NC
5	TD2- / NC	6	TD1- / RX-
7	TD3+ / NC	8	TD3- / NC



• CL2 / CL4: LAN signal out 2x4 pin (2.0mm) wafer (option)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TR0-	2	TR0+
3	TR2+	4	TR1+
5	TR1-	6	TR2+
7	TR3-	8	TR3+

3-7 COM interface

CC12 / CC34: COM1 / 2 / 3 / 4 2x10 pin (1.25mm) wafer

● (RS232 Mode)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NC	2	NC
3	DCD1/3	4	DCD2/4
5	DSR1/3	6	DSR2/4
7	RXD1/3	8	RXD2/4
9	RTS1/3	10	RTS2/4
11	TXD1/3	12	TXD2/4
13	CTS1/3	14	CTS2/4
15	DTR1/3	16	DTR2/4
17	RI1/3	18	RI2/4
19	GND	20	GND

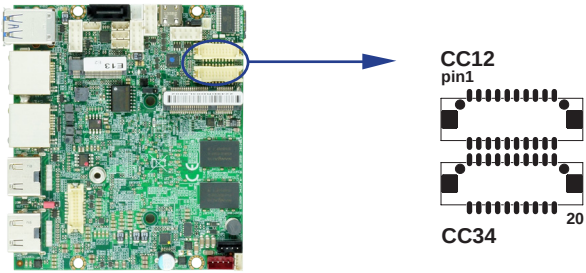
Note:
1. COM 1 Default RS232, RS485 / RS422 by BIOS control.
2. COM 2 / 3 / 4 Default RS232.
3. The pin17 / 18 RI can be modify to Power to supply device.
   The power voltage can be set +12V or +5V. The RI change Voltage function set by BOM control.
   Default is RI signal.

● (RS485 Mode)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NC	2	NC
3	RS485_Data-	4	NC
5	NC	6	NC
7	RS485_Data+	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	GND	20	GND

- **(RS422 Mode)**

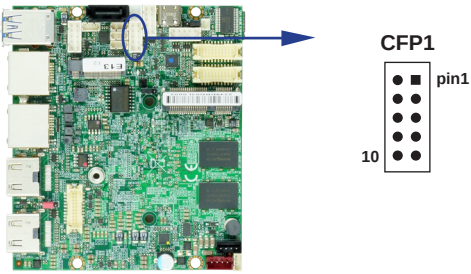
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NC	2	NC
3	RS485_Data-	4	NC
5	NC	6	NC
7	RS485_Data+	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	GND	20	GND



3-8 Front Panel Pin Header

- **CFP1: Front Panel 2x5 pin (2.0mm) wafer**

PIN NO.	Description	PIN NO.	Description
1	Power button pin	2	Power button GND
3	Reset pin	4	Reset GND
5	Power LED-	6	Power LED+
7	HDD LED-	8	HDD LED+
9	LAN LED-	10	LAN LED+

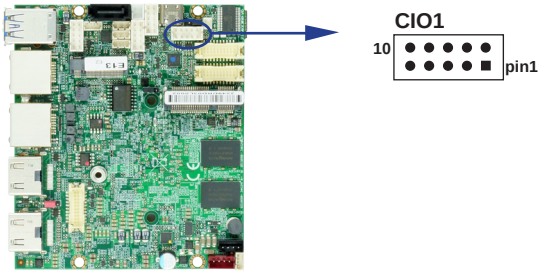


3-9 DIO Interface

• CIO1: DIO 0~3 2x5 pin (2.0mm) wafer

PIN NO.	Description	PIN NO.	Description
1	DI-0	2	DO-3
3	DI-1	4	DO-2
5	DI-2	6	DO-1
7	DI-3	8	DO-0
9	GND	10	+5V

Note:
1. DI pin default pull up 10KΩ to +5V.
2. If use need isolate circuit to control external device.



• WDT For F81966D-I watch dog timer device:

DC spec:

Input low Voltage (VIL): +0.8 Max

Input High Voltage(VIH): +2V Min

Output low Current (IOL): 10mA (Min) VOL=0.4V

Output High Current (IOH): -10mA (Min) VOH=2.4V

Watch Dog Time value 0~255 sec

The system will be issued reset. When WDT is enable the hardware start down counter to zero.

The reset timer have 10~20% tolerance upon the Temperature.

Note: If want to SDK support. Please contact to sales window.

3-9-1 IO Device: F81966 LPC DIO under Windows

The Sample code source you can download from

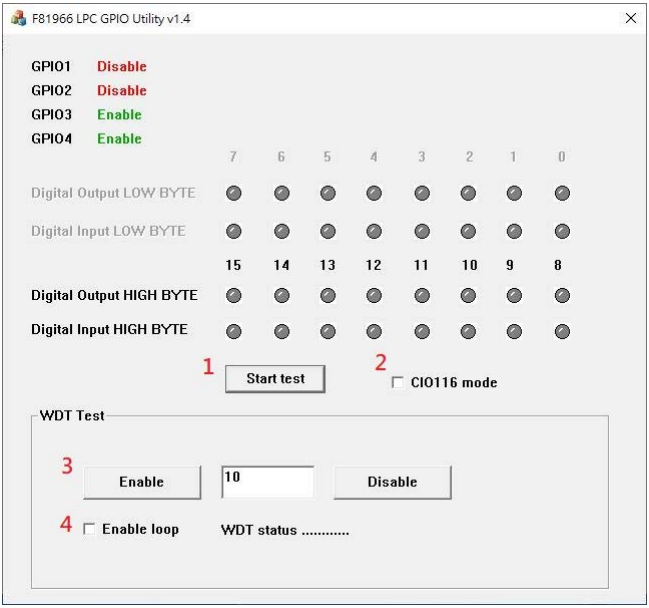
http://tprd.info/lexwiki/index.php/IO_Device:F81966_LPC_DIO_under_Windows

Source file: F81966_LPC_GPIO_Utility_v1.5_Src

Binary file: F81966_LPC_GPIO_Utility_v1.5.1_Bin_x86 F81966_LPC_GPIO_Utility_v1.5.1_Bin_x64

F81966 DLL : F81966_DLL_v1.1_x86 F81966_DLL_v1.1_x64

Introduction F81966 DIO



1. Start test Button, Send bits one by one and one by one receive
2. CIO116 mode for CIO116 module use
3. Set time countdown, If the end of the countdown, the trigger signal to reboot
4. Enable loop, Continuously reset the WDT to ensure that when the system is normal, the restart signal will not be triggered.

F81966_DLL Function

```
F81966_DLL_API bool  F81966_LPC_Init(pF81966_status status);

F81966_DLL_API BYTE  F81966_LPC_Digital_Read_LOW();
F81966_DLL_API void  F81966_LPC_Digital_Write_LOW(BYTE byteValue);
F81966_DLL_API BYTE  F81966_LPC_Digital_Read_HIGH();
F81966_DLL_API void  F81966_LPC_Digital_Write_HIGH(BYTE byteValue);

F81966_DLL_API void  F81966_LPC_Set_WDT_Enable(BYTE byteValue);
F81966_DLL_API void  F81966_LPC_Set_WDT_Disable();
```

Digital Input / Output test

Note when using the following boards: 2I640CW
CIO1 needs to be controlled by CIO3

	Digital output Low Byte		Digital iutput Low Byte	
CIO1	Do	0	Di	0
	Do	1	Di	1
	Do	2	Di	2
	Do	3	Di	3
CIO2	Do	4	Di	4
	Do	5	Di	5
	Do	6	Di	6
	Do	7	Di	7

	Digital output High Byte		Digital iutput High Byte	
CIO3	Do	8	Di	8
	Do	9	Di	9
	Do	10	Di	10
	Do	11	Di	11
CIO4	Do	12	Di	12
	Do	13	Di	13
	Do	14	Di	14
	Do	15	Di	15

sample code

```
Set CIO1 CIO2 Digital Output all high
F81966_LPC_Digital_Write_LOW(256);

Set CIO1 CIO2 Digital Output all low
F81966_LPC_Digital_Write_LOW(0);

Set CIO1 Digital Output bit 4 high
F81966_LPC_Digital_Write_LOW(16);

Set CIO2 Digital Output bit 10 high
F81966_LPC_Digital_Write_HIGH(4);
```

```
Read Din
value = F81966_LPC_Digital_Read_LOW();
```

Watch Dog test

sample code

```
Set WDT 10 sec
F81966_LPC_Set_WDT_Enable(10);
```

```
Disable WDT
F81966_LPC_Set_WDT_Disable();
```

3-9-2 IO Device: F81966 LPC DIO under Linux console

The Sample code source you can download from

http://tprd.info/lexwiki/index.php/IO_Device:F81966_LPC_DIO_under_Linux_console

Source file: F81966_DIO_v1.1L_Src

Binary file: F81966_DIO_v1.1L_Bin_x86 F81966_DIO_v1.1L_Bin_x64

F81966 Libary : F81966_LIB_v1.1L_x86 F81966_LIB_v1.1L_x64

Introduction F81966 DIO

```
root@ubuntu: /home/test/Desktop/f81966/F81966_DIO
root@ubuntu:/home/test/Desktop/f81966/F81966_DIO# ./f81966 -h
F81966 OPEN FAIL!!!!
Usage: ./f81966 [OPTION] ... [--mode value]

 -h,--help              printf this help and exit
 -s DOx, --setDo value  | value:number of bits
 -r DIx, --readD value  | value:number of bits
 --CIO12                | test CIO1,CIO2
 --CIO34                | test CIO3,CIO4
Example:
 ./f81966 --CIO12

root@ubuntu:/home/test/Desktop/f81966/F81966_DIO#
```

1. Start test Button, Send bits one by one and one by one receive
2. CIO116 mode for CIO116 module use
3. Set time countdown, If the end of the countdown, the trigger signal to reboot
4. Enable loop, Continuously reset the WDT to ensure that when the system is normal, the restart signal will not be triggered.

F81966_DLL Function

```
bool F81966_OPEN();
void F81966_Init();
void F81966_LPC_Write(BYTE LDNData, BYTE reg, BYTE value);
BYTE F81966_LPC_Read(BYTE LDNData, BYTE reg);
void F81966_LPC_Digital_Write_LOW(BYTE byteValue);
void F81966_LPC_Digital_Write_HIGH(BYTE byteValue);
BYTE F81966_LPC_Digital_Read_LOW();
BYTE F81966_LPC_Digital_Read_HIGH();
void F81966_LPC_Set_WDT_Enable(BYTE byteValue);
void F81966_LPC_Set_WDT_Disable();
void EntryLPC();
void ExitLPC();
```

Digital Input / Output test

Note when using the following boards: 2I640CW
CIO1 needs to be controlled by CIO3

	Digital output Low Byte		Digital iutput Low Byte	
CIO1	Do	0	Di	0
	Do	1	Di	1
	Do	2	Di	2
	Do	3	Di	3
CIO2	Do	4	Di	4
	Do	5	Di	5
	Do	6	Di	6
	Do	7	Di	7

	Digital output High Byte		Digital iutput High Byte	
CIO3	Do	8	Di	8
	Do	9	Di	9
	Do	10	Di	10
	Do	11	Di	11
CIO4	Do	12	Di	12
	Do	13	Di	13
	Do	14	Di	14
	Do	15	Di	15

sample code

```
Set CIO1 CIO2 Digital Output all high
F81966_LPC_Digital_Write_LOW(256);

Set CIO1 CIO2 Digital Output all low
F81966_LPC_Digital_Write_LOW(0);

Set CIO1 Digital Output bit 4 high
F81966_LPC_Digital_Write_LOW(16);

Set CIO2 Digital Output bit 10 high
F81966_LPC_Digital_Write_HIGH(4);
```

```
Read Din
value = F81966_LPC_Digital_Read_LOW();
```

Watch Dog test

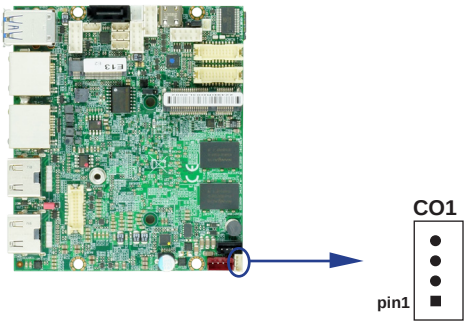
sample code

```
Set WDT 10 sec
F81966_LPC_Set_WDT_Enable(10);
```

```
Disable WDT
F81966_LPC_Set_WDT_Disable();
```

3-10 CO1: SMBus 1x4 pin (1.25mm) wafer

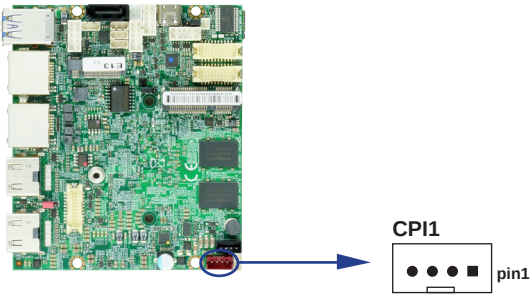
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3V	2	GND
3	SMBus-Clock	4	SMBus-Data



3-11 CPI1: DC Power input 1x4 pin (2.0mm) wafer (RED)

PIN NO.	DESCRIPTION
1,4	GND
2,3	DC-IN

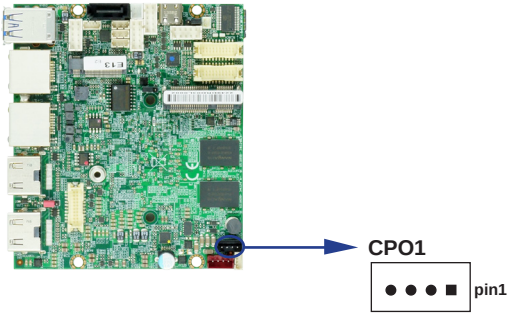
Note: Very important check DC-in Voltage.



3-12 CPO1: +12V / +5V DC voltage output 1x4 pin (2.0mm) wafer (Black)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	GND
3	GND	4	+12V

Note: Attention! Check Device Power in spec.

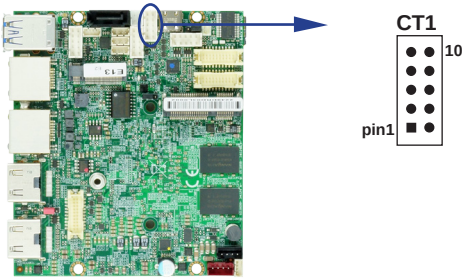


3-13 CT1: Touch screen 2x5 pin (1.25mm) USB interface

• For 8-wire type pin define

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Bottom	2	Bottom Sense
3	Top Sense	4	Top
5	Right	6	Right Sense
7	Left	8	Left Sense
9	GND	10	NC

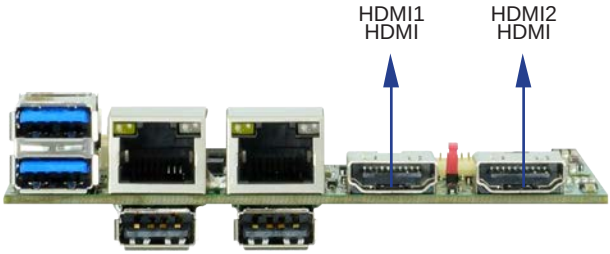
Note: For eight wire type cable Pin 3 and Pin4 need short.



3-14 Display Interface

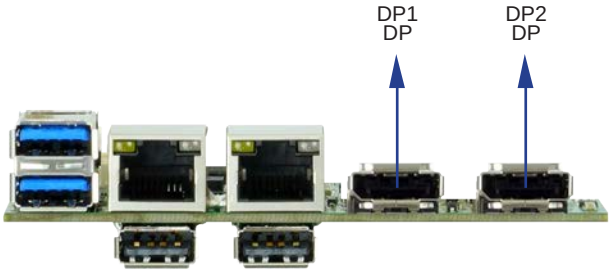
• HDMI1 / HDMI2: HDMI type A connector

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
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 CLK+
11	GND	12	TMDS CLK-
13	NC	14	NC
15	DDC CLOCK	16	DDC DATA
17	GND	18	+5V
19	H.P. Detect		



• DP1 / DP2: Display Port connector (option)

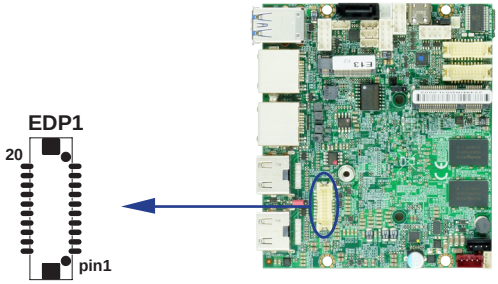
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Lane0+	2	GND
3	Lane0-	4	Lane1+
5	GND	6	Lane1-
7	Lane2+	8	GND
9	Lane2-	10	Lane3+
11	GND	12	Lane3-
13	GND	14	GND
15	AUX_CH+	16	GND
17	AUX_CH-	18	H.P. Detect
19	GND	20	+3.3V



• EDP1: eDP interface 2x10 pin (1.25mm) wafer

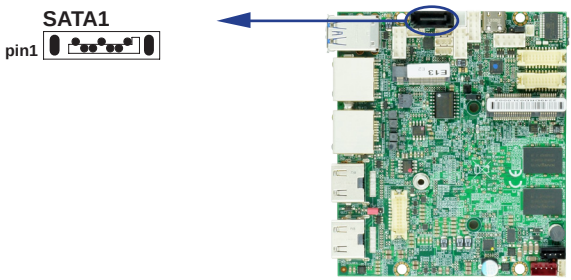
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Lane-0-DATA-	2	+12V
3	Lane-0-DATA+	4	+12V
5	Lane-1-DATA-	6	GND
7	Lane-1-DATA+	8	GND
9	Backlight Enable	10	GND
11	PWM dimming	12	GND
13	I2C Clock	14	+LCD (5V or 3.3V)
15	I2C Data	16	+LCD (5V or 3.3V)
17	eDP Aux+	18	+LCD (5V or 3.3V)
19	eDP Aux-	20	EDP_HPD

Note:
1. eDP interface support 2 lanes.
2. JVL1: eDP panel +5V / +3.3V (default) Voltage select.
3. eDP1 PIN 9 for panel backlight enable. +3.3V Level
4. eDP1 PIN 11 for panel backlight dimming control



3-15 SATA1: SATA port 1x7pin Connector

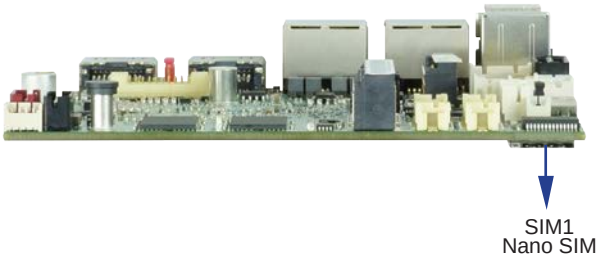
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND		



3-16 SIM1: Nano SIM Card Push-Push

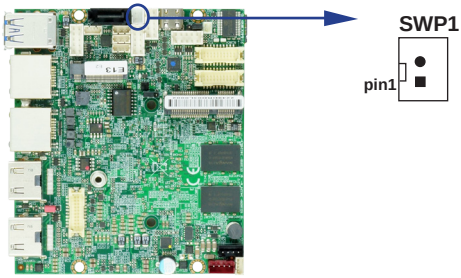
- **Follow ISO 7816-2 Smart Card Standard.**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	RST
3	CLK	4	NC
5	GND	6	VPP
7	DATA	8	NC



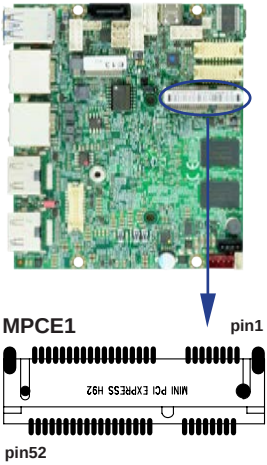
3-17 SWP1: Power On/off switch Wafer (1x2 pin 2.0mm wafer)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Power button pin	2	Power button GND



3-18 MPCE1: PCI Express Mini card

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	WAKE_N	2	+3.3V
3	NC	4	+3.3V
5	NC	6	FULL_CARD_PWR
7	NC	8	NC
9	GND	10	M2_LED
11	PCIe-CLK-	12	NC
13	PCIe-CLK+	14	NC
15	GND	16	NC
KEY			
17	NC	18	GND
19	NC	20	NC
21	GND	22	Reset
23	PCIe-RX-	24	+3.3V
25	PCIe-RX+	26	GND
27	GND	28	+1.5V
29	GND	30	SMB-CLK
31	PCIe-TX-	32	SMB-DATA
33	PCIe-TX+	34	GND
35	GND	36	USB-DATA-
37	GND	38	USB-DATA+
39	+3.3V	40	GND
41	+3.3V	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	mSATA / PCIe detect	52	+3.3V

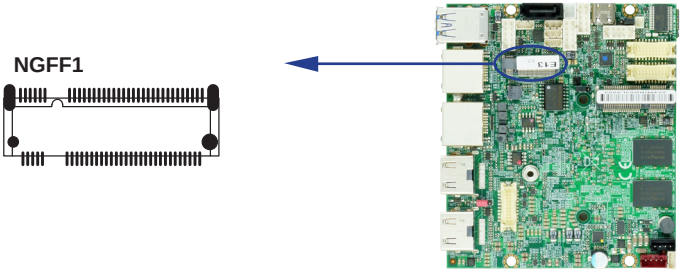


3-19 NGFF1: PCI Express M.2 B key 2242 / 3042 H=8.5 sockets 75pin

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	CFG3_USB3_PCIE	2	+3.3V / +3.7V
3	GND	4	+3.3V / +3.7V
5	GND	6	FULL_CARD_PWR
7	USB2.0_P	8	W_DISABLE_1
9	USB2.0_N	10	M2_LED
11	GND		
B Key notch			
		20	NC
21	GND	22	NC
23	NC	24	NC
25	NC	26	W_DISABLE_2
27	GND	28	NC
29	USB3Rn \ PERn1	30	SIM_RST_M2
31	USB3Rp \ PERp1	32	SIM_CLK_M2
33	GND	34	SIM_DATA_M2
35	USB3Tn \ PETn1	36	SIM_PWR_M2
37	USB3Tp \ PETp1	38	NC
39	GND	40	NC
41	SATA-RX+ \ PERn0	42	NC
43	SATA-RX- \ PERp0	44	NC
45	GND	46	NC
47	SATA-TX- \ PETn0	48	NC
49	SATA-TX+ \ PETp0	50	PREST
51	GND	52	SRCCLKREQ_N
53	PCIE_CLK_N0	54	NC
55	PCIE_CLK_P0	56	NC
57	GND	58	NC
59	NC	60	NC

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
61	NC	62	NC
63	NC	64	NC
65	NC	66	SIM_DET
67	MD_RESET_N	68	NC
69	NC	70	+3.3V / +3.7V
71	GND	72	+3.3V / +3.7V
73	GND	74	+3.3V / +3.7V
75	CONFIG_2		

Note:
1. NGFF1 support USB 3.0 / SATA-SSD. PCIe x2 by BOM control.
2. VCC voltage default support +3.3V.
3. BOM control, if need 4G LTE device VCC voltage is +3.7V.



Chapter-4

Introduction of BIOS

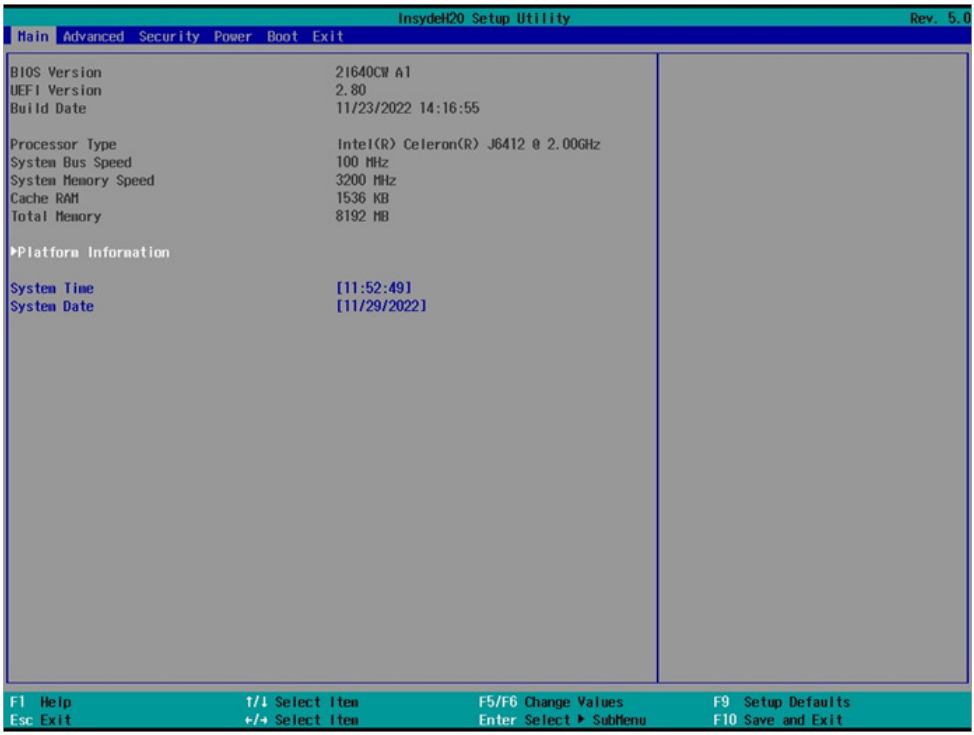
The BIOS is a program located in the Flash Memory on the motherboard.
This program is a bridge between motherboard and operating system.
When you start the computer, the BIOS program gains control.
The BIOS first operates an auto-diagnostic test called POST (Power on Self Test) for all the necessary hardware, it detects the entire hardware devices and configures the parameters of the hardware synchronization. After these tasks are completed, BIOS will give control of the computer back to operating system (OS). Since the BIOS is the only channel for hardware and software to communicate with, it is the key factor of system stability and of ensuring your system performance at best.
In the BIOS Setup main menu, you can see several options. We will explain these options in the following pages. First, let us see the function keys you may use here:

Press <Esc> to quit the BIOS Setup.
Press ↑↓←→(up, down, left, right) to choose the option you want to confirm or modify.
Press <F10> to save these parameters and to exit the BIOS Setup menu after you complete the setup of BIOS parameters.
Press Page Up / Page Down or +/- keys to modify the BIOS parameters for the active option.

4-1 Enter Setup

Power on the computer and press <Del> key immediately to enter Setup.
If the message disappears before your respond but you still wish to enter Setup, restart the system by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart the system by simultaneously pressing <Ctrl>, <Alt> and <Delete> keys.

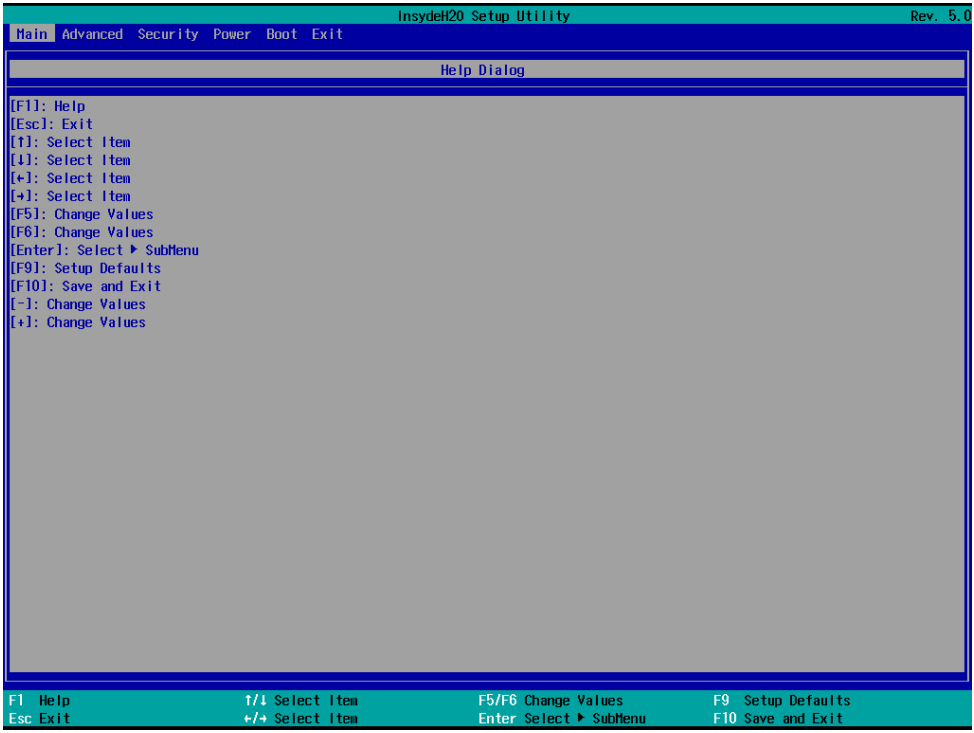
4-2 BIOS Menu Screen & Function Keys



In the above BIOS Setup main menu of, you can see several options.
We will explain these options step by step in the following pages of this chapter, but let us first see a short description of the function keys you may use here:

- Press >< (right, left) to select screen;
- Press ↑↓ (up, down) to choose, in the main menu, the option you want to confirm or to modify.
- Press <Enter> to select.
- Press <+>/<–> or <F5>/<F6> keys when you want to modify the BIOS parameters for the active option.
- [F1]: General help.
- [F2]: Previous values.
- [F3]: Optimized defaults.
- [F4]: Save & Reset.
- Press <Esc> to quit the BIOS Setup.

4-3 Getting Help



Status Page Setup Menu / Option Page Setup Menu

Press F1 to pop up a help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press <Esc>.

4-4 Menu Bars

There are six menu bars on top of BIOS screen:

Main To change system basic configuration

Advanced To change system advanced configuration

Chipset To change PCH IO configuration

Security Password settings

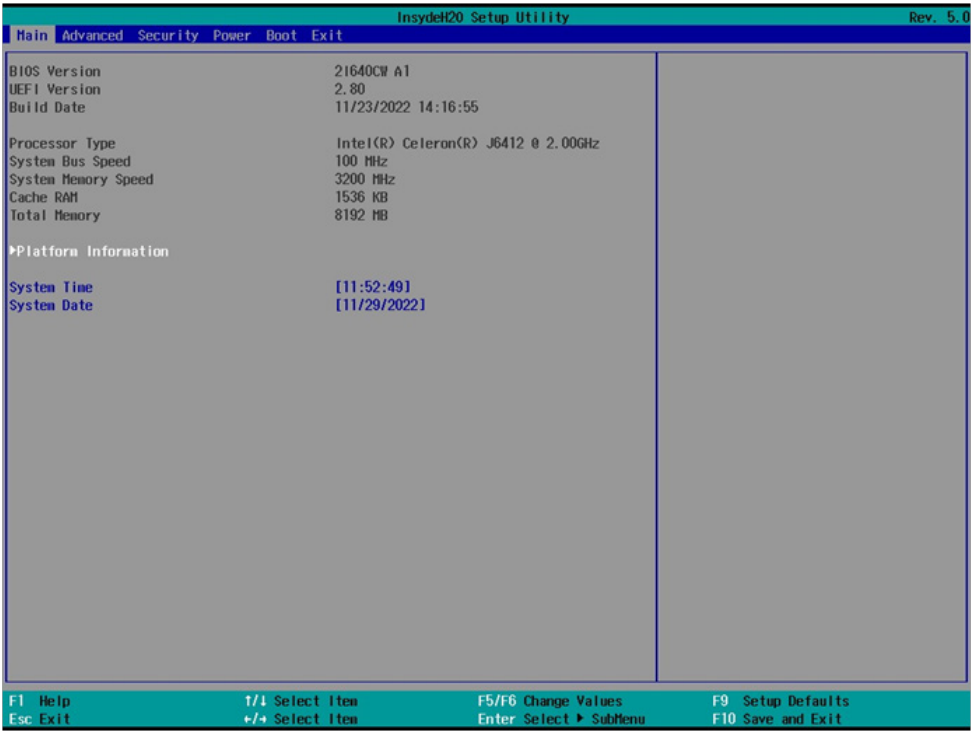
Boot Quiet boot or boot from USB selected.

Save & Exit Save setting, loading and exit options.

User can press the right or left arrow key on the keyboard to switch from menu bar.

The selected one is highlighted.

4-5 Main



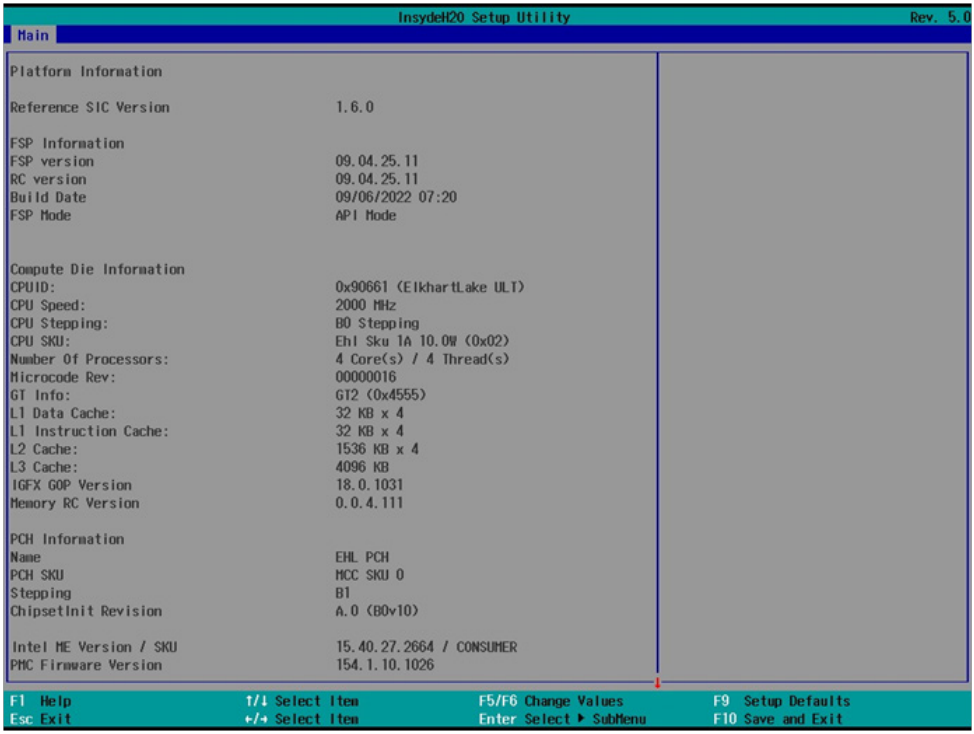
Main menu screen includes some basic system information. Highlight the item and then use the <+> or <-> and numerical keyboard keys to select the value you want in each item.

System Date

Set the Date. Please use [Tab] to switch between data elements.

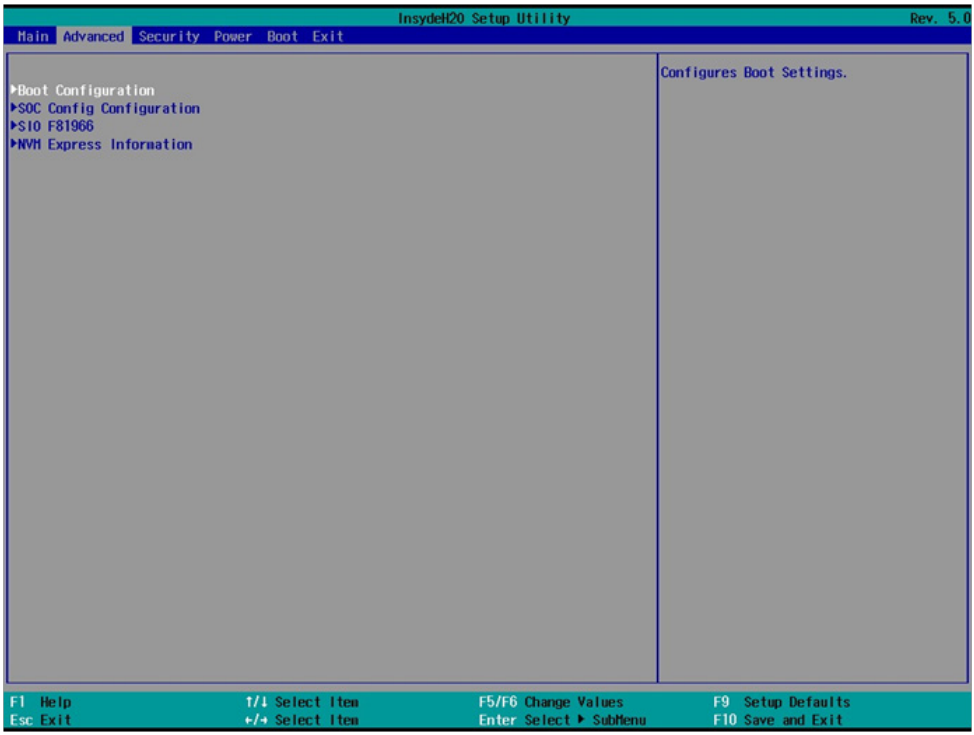
System Time

Set the Time. Please use [Tab] to switch between data elements.



Platform information

4-6 Advanced



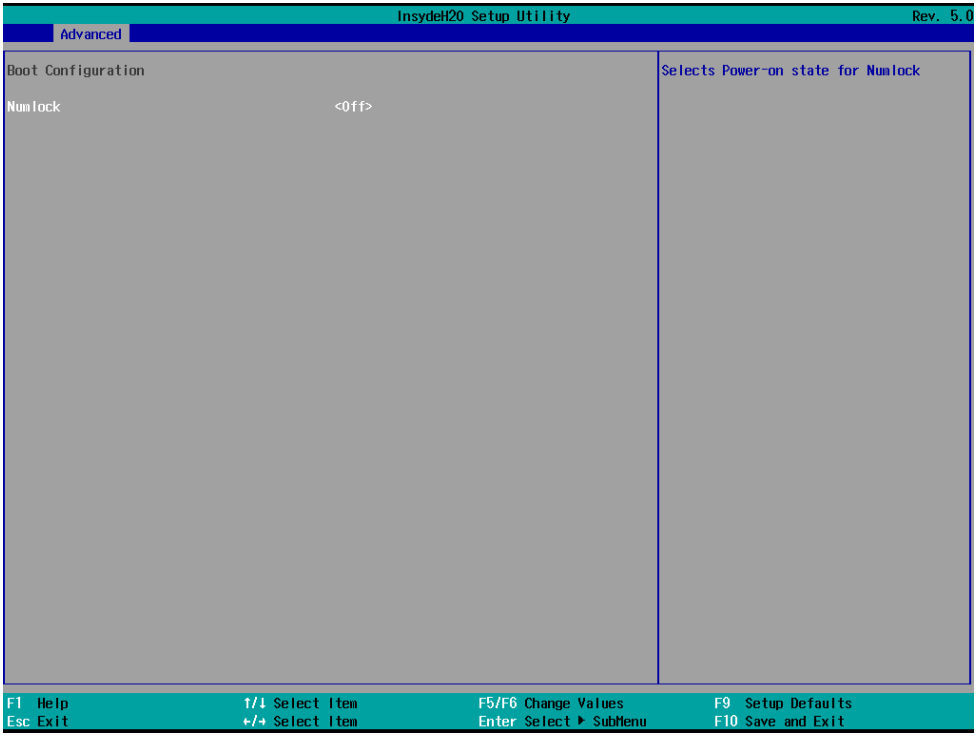
Boot Configuration
Please refer section 4-6-1

SOC Config Configuration
Please refer section 4-6-2

SIO F81966
Please refer section 4-6-3

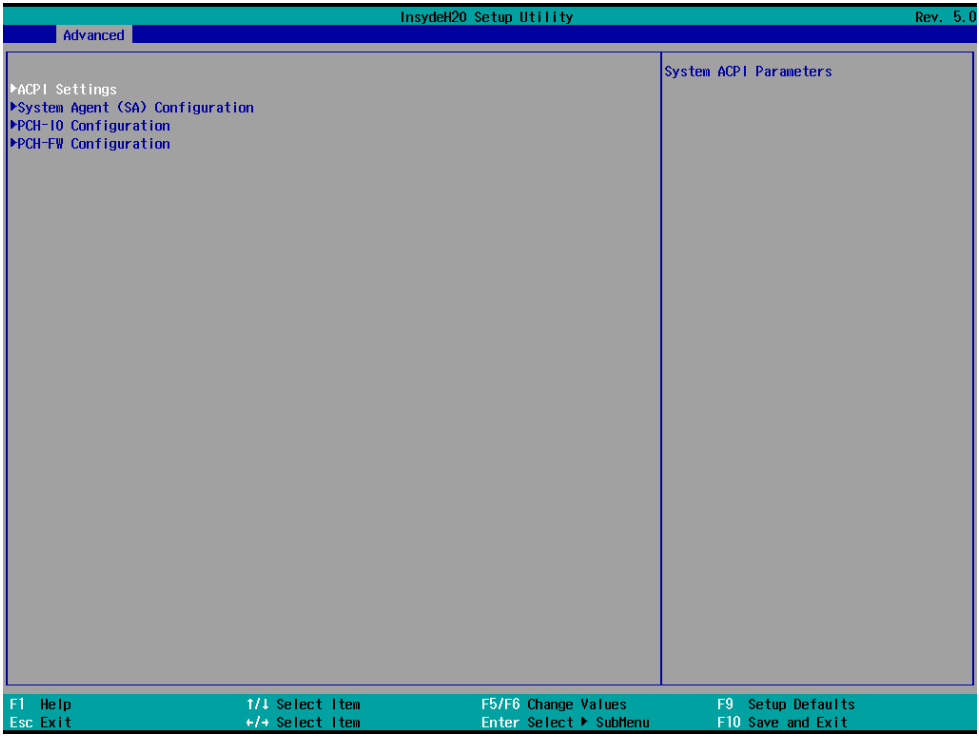
NVM Express information
Please refer section 4-6-4

4-6-1 Boot Configuration



To select Power-on state for NumLock, default is <off>

4-6-2 SOC Config Configuration



ACPI Settings

Please refer section 4-6-2-1

System Agent (SA) Configuration

Please refer section 4-6-2-2

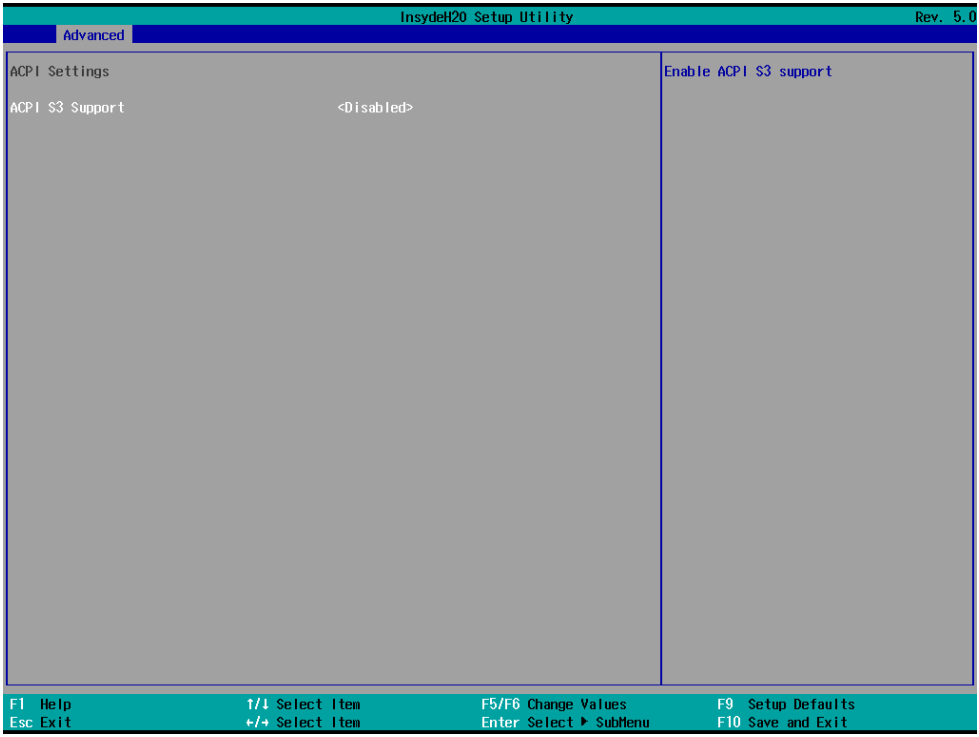
PCH-IO Configuration

Please refer section 4-6-2-3

PCH-FW Configuration

Please refer section 4-6-2-4

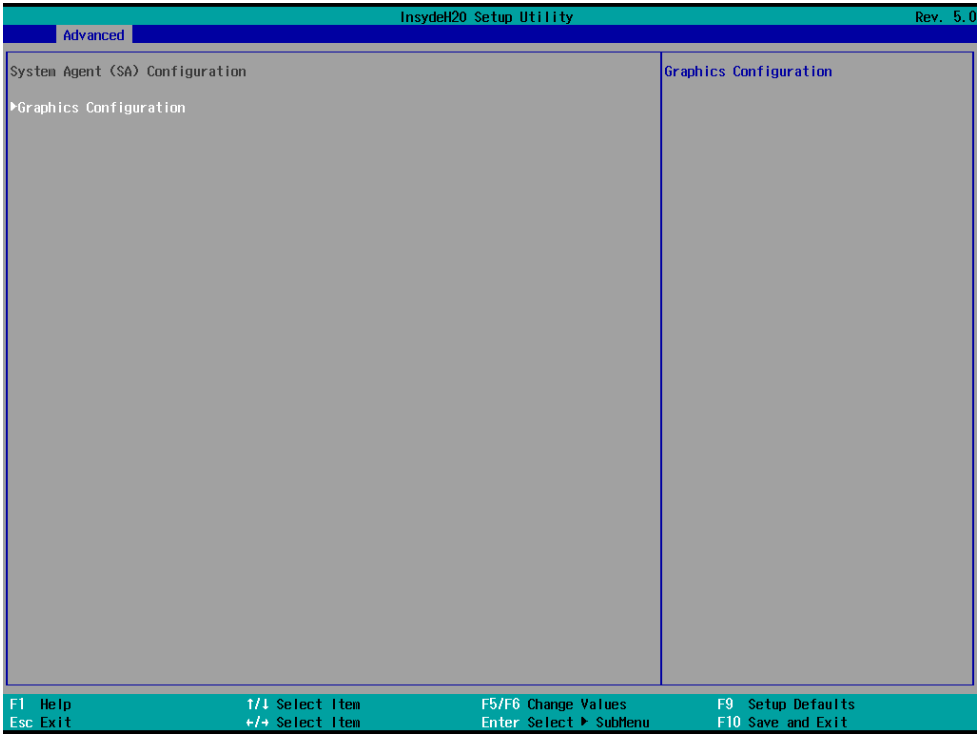
4-6-2-1 ► ACPI Settings

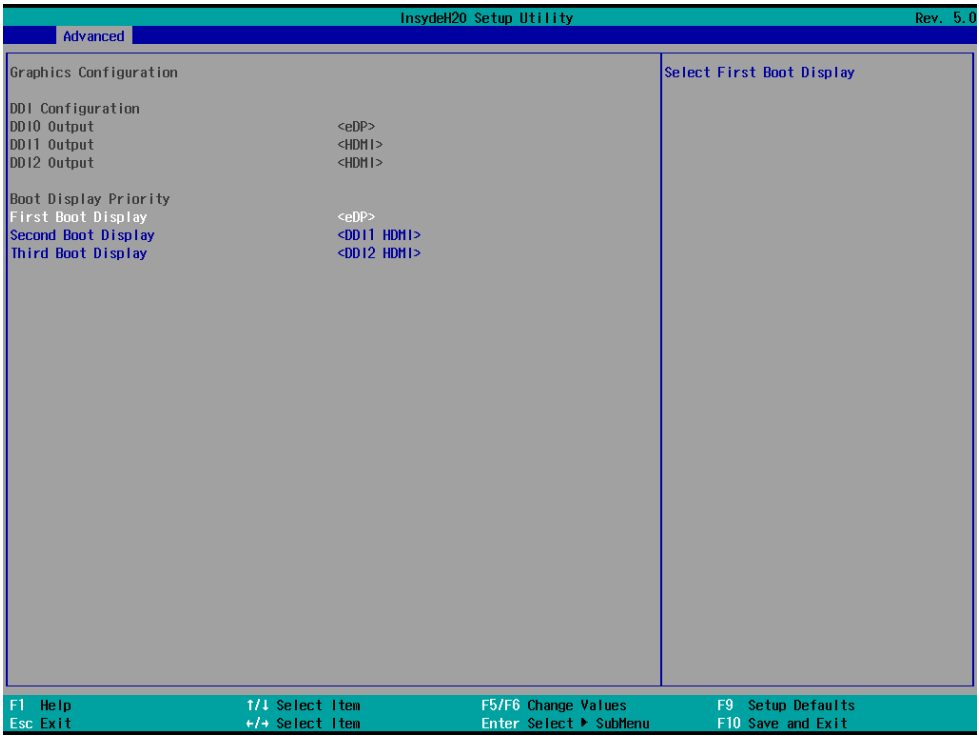


ACPI S3 Support

To enable BIOS support security device or not, default is Enabled.

4-6-2-2 ► System Agent (SA) Configuration





Graphic Configuration

First Boot Display

To select First Boot Display priority, there are eDP, DDI1 HDMI, DDI2 HDMI, default is eDP.

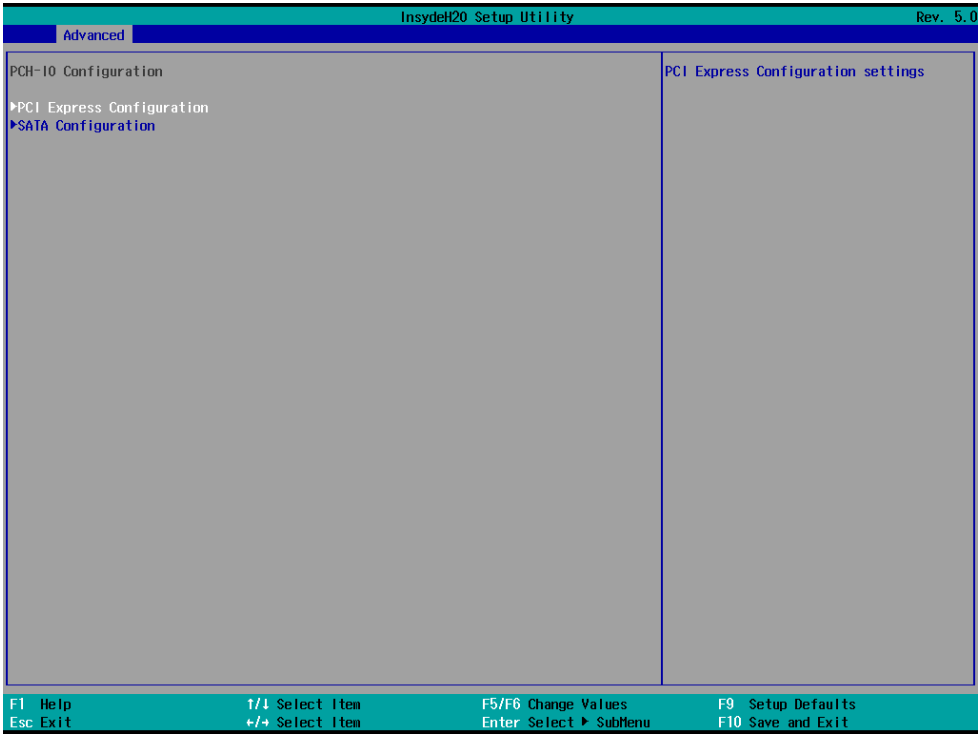
Second Boot Display

To select Second Boot Display priority, there are DDI1 HDMI, DDI2 HDMI, default is DDI1 HDMI.

Third Boot Display

To select First Boot Display priority, there is DDI2 HDMI.

4-6-2-3 ► PCH-IO Configuration



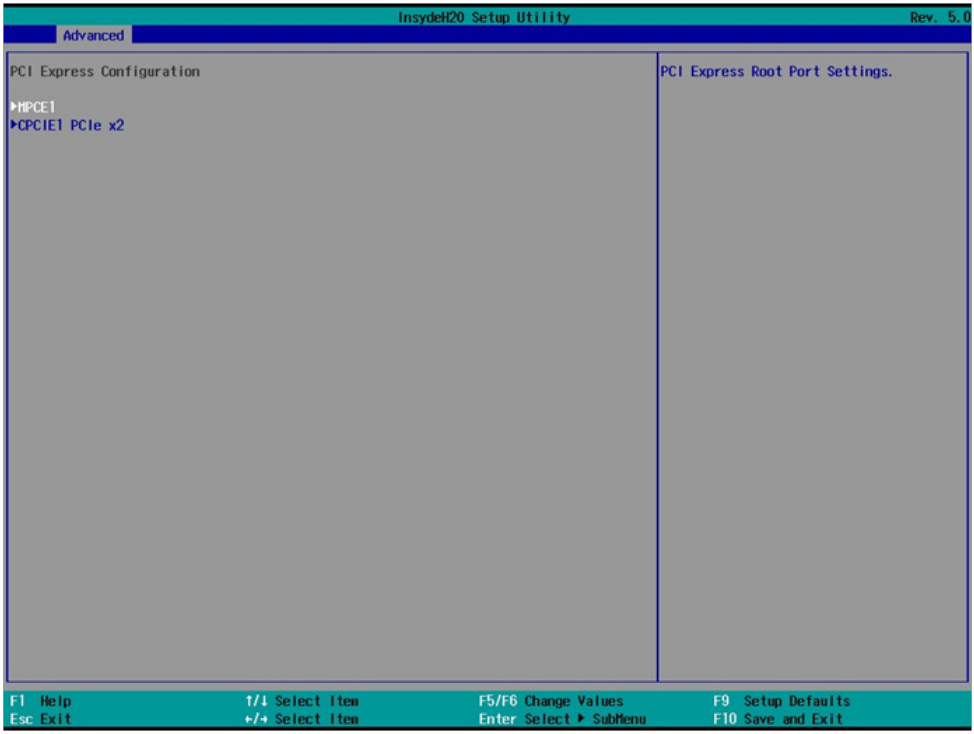
PCI Express Configuration

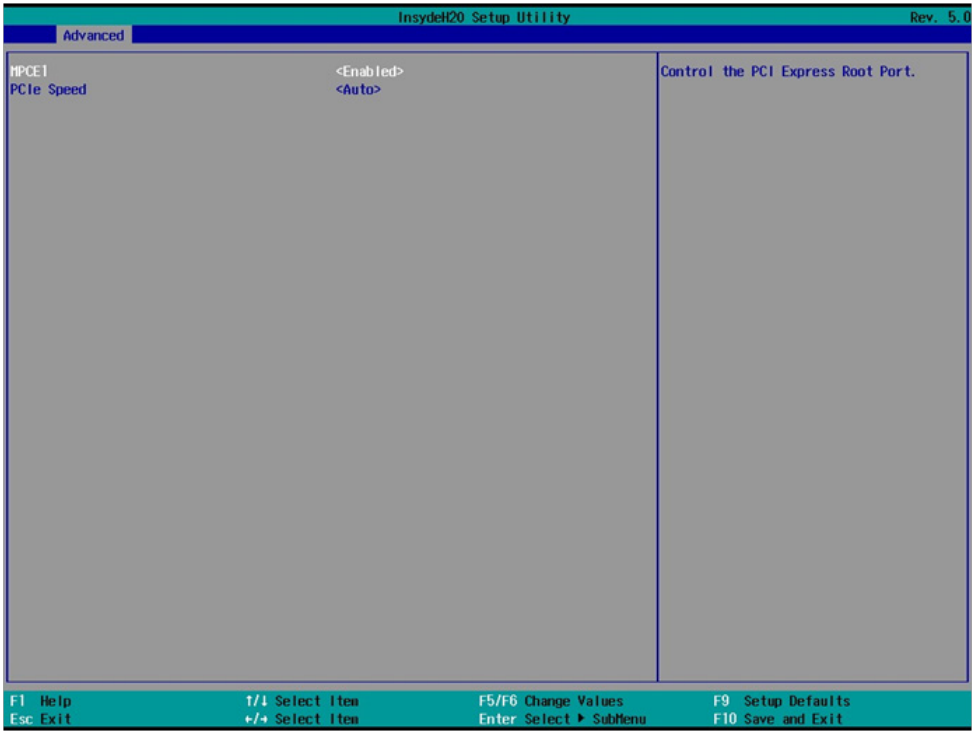
Please refer section 4-6-2-3-1

SATA Configuration

Please refer section 4-6-2-3-2

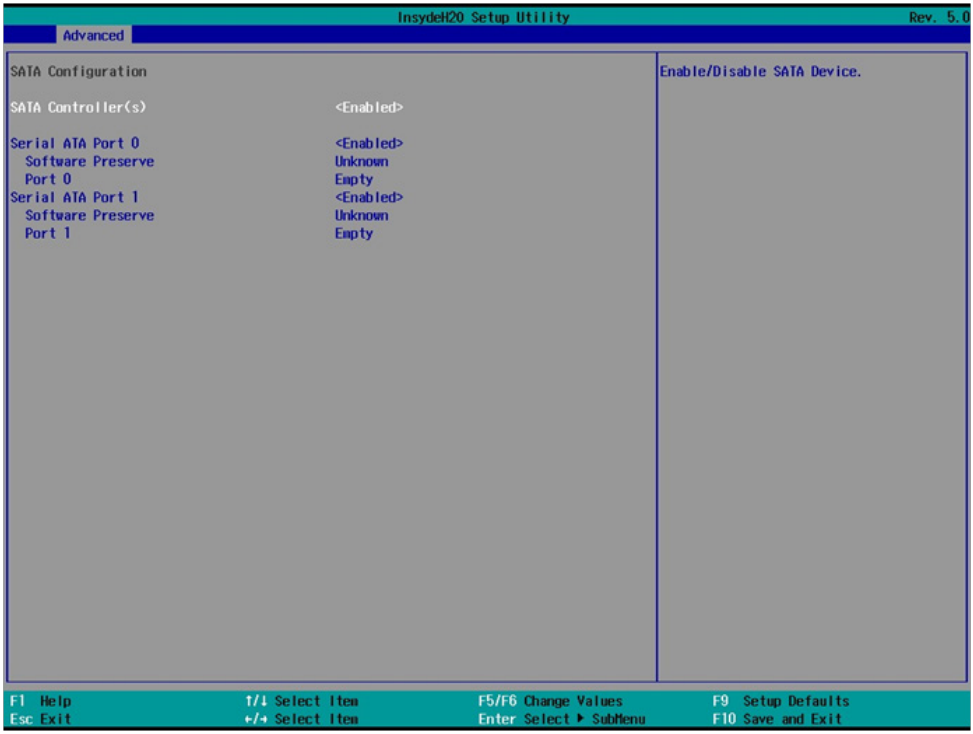
4-6-2-3-1 ► PCI Express Configuration





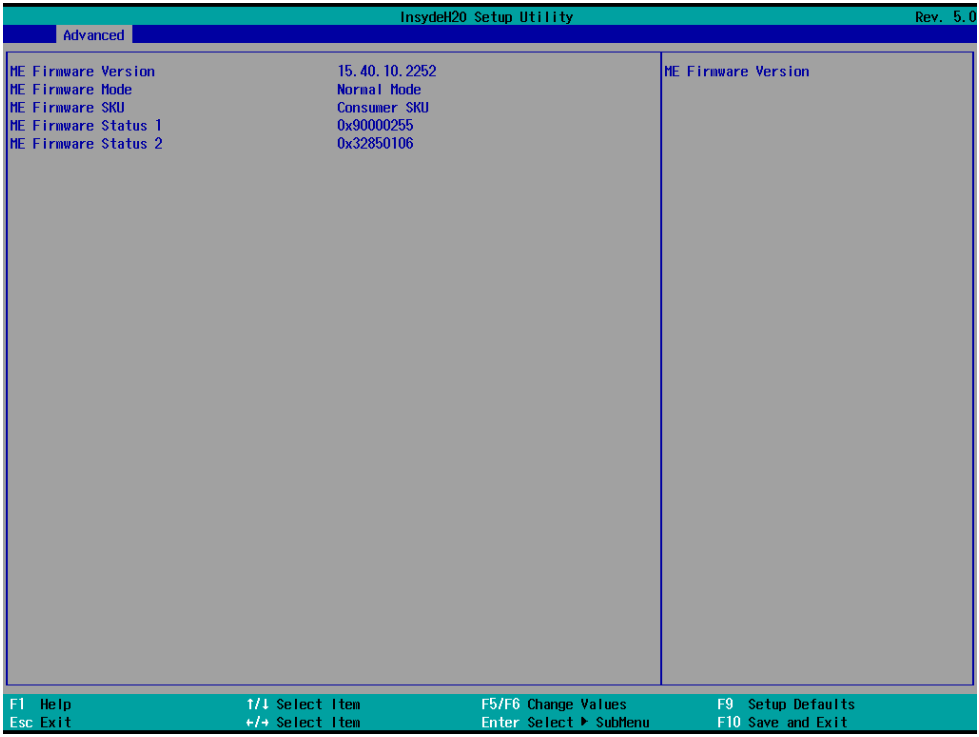
To select MPCE1 & CPCIE1 device enabled or not and to change the PCIe Speed, there are Auto, Gen1, Gen2, Gen3, default is Auto

4-6-2-3-2 ► SATA Configuration

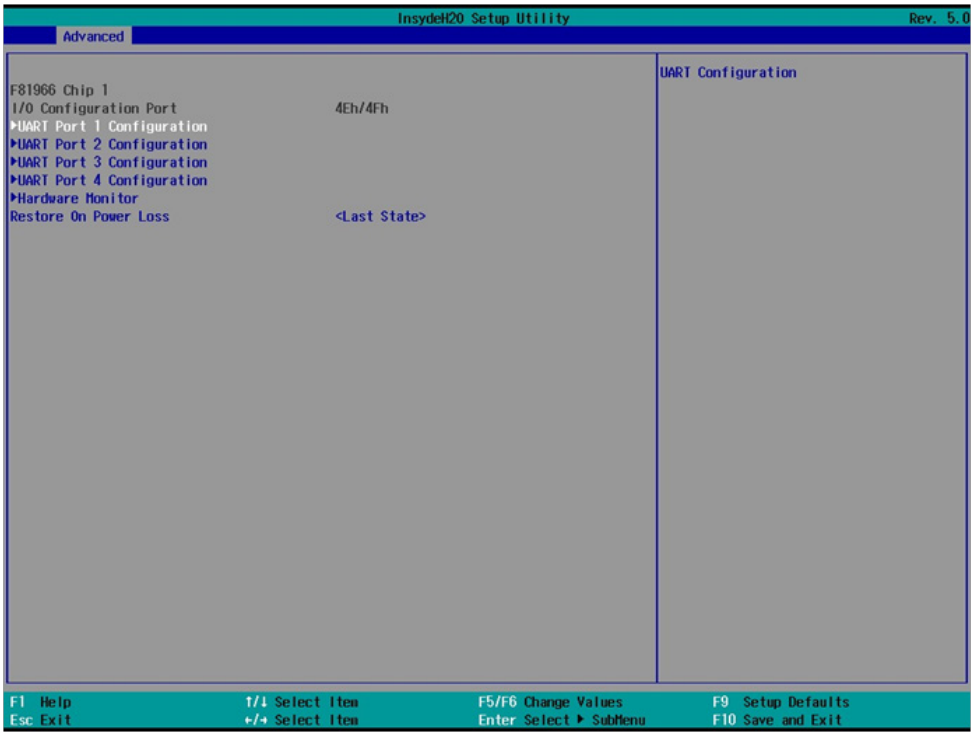


To select SATA1 & NGFF1 M.2 SATA device enabled or not.

4-6-2-4 ► PCH-FW Configuration



4-6-3 SIO F81966



UART Port 1 Configuration
Please refer section 4-6-3-1

UART Port 2 Configuration
Please refer section 4-6-3-2

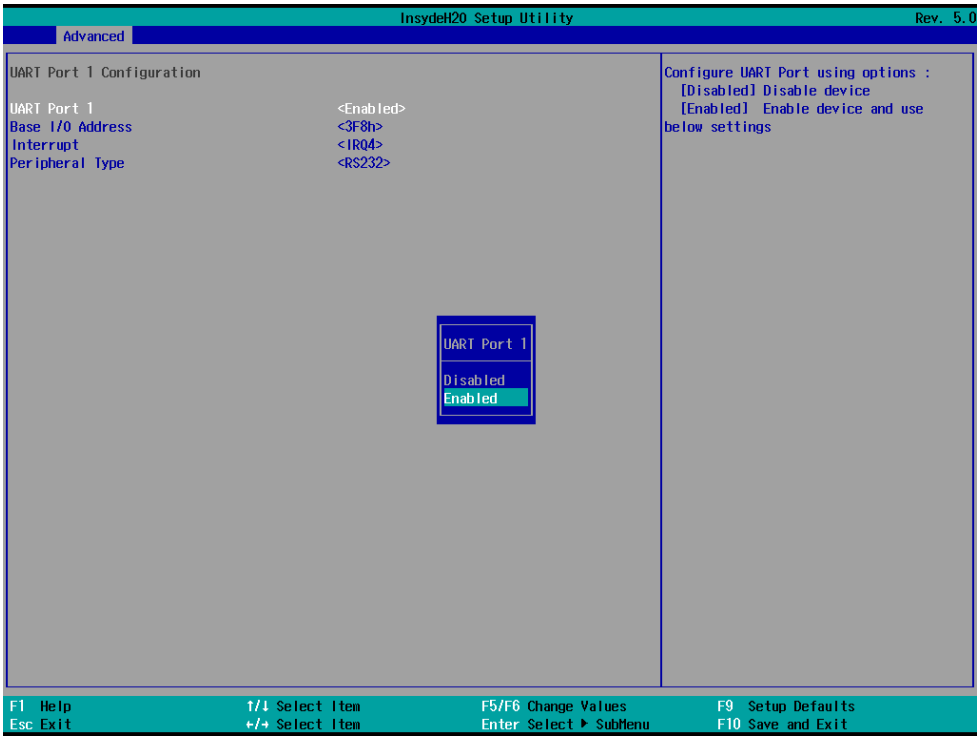
UART Port 3 Configuration
Please refer section 4-6-3-3

UART Port 4 Configuration
Please refer section 4-6-3-4

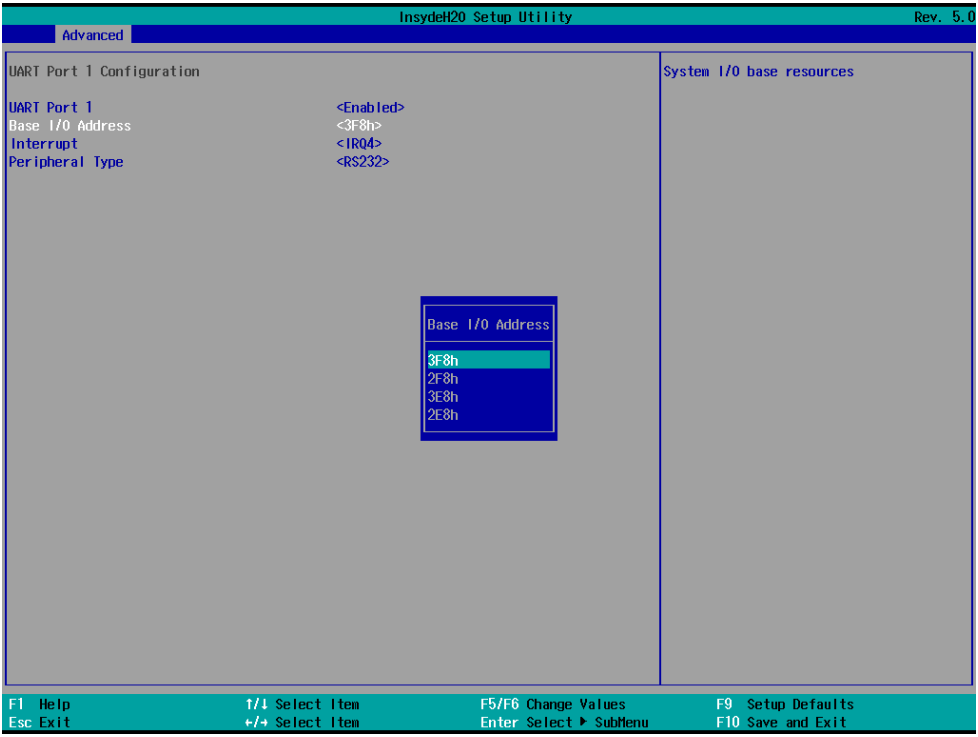
Hardware Monitor
Please refer section 4-6-3-5

Restore on Power Loss
Please refer section 4-6-3-4

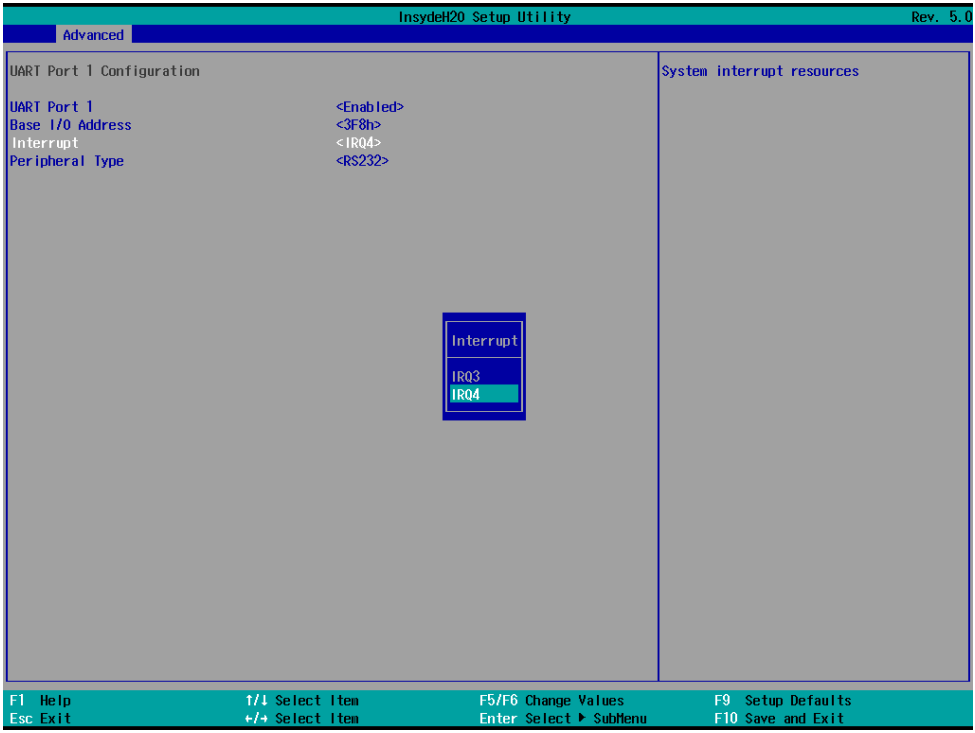
4-6-3-1 ► UART Port 1 Configuration



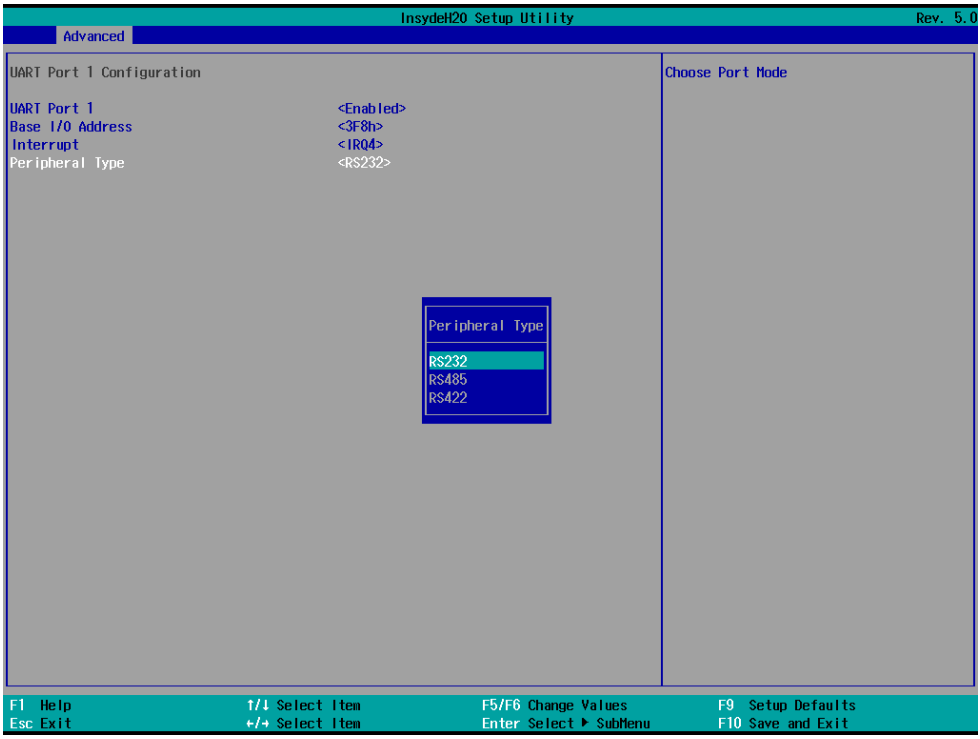
To Enable Serial port or not, default is Enabled.



Base I/O Address, default is 3F8h.

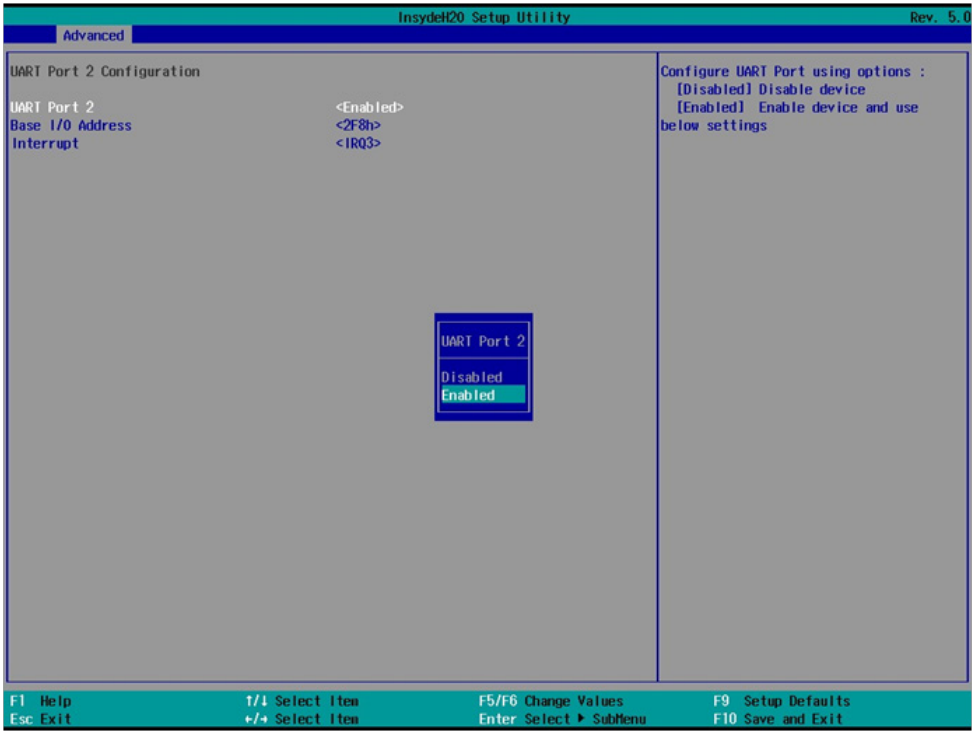


Interrupt, default is IRQ4.

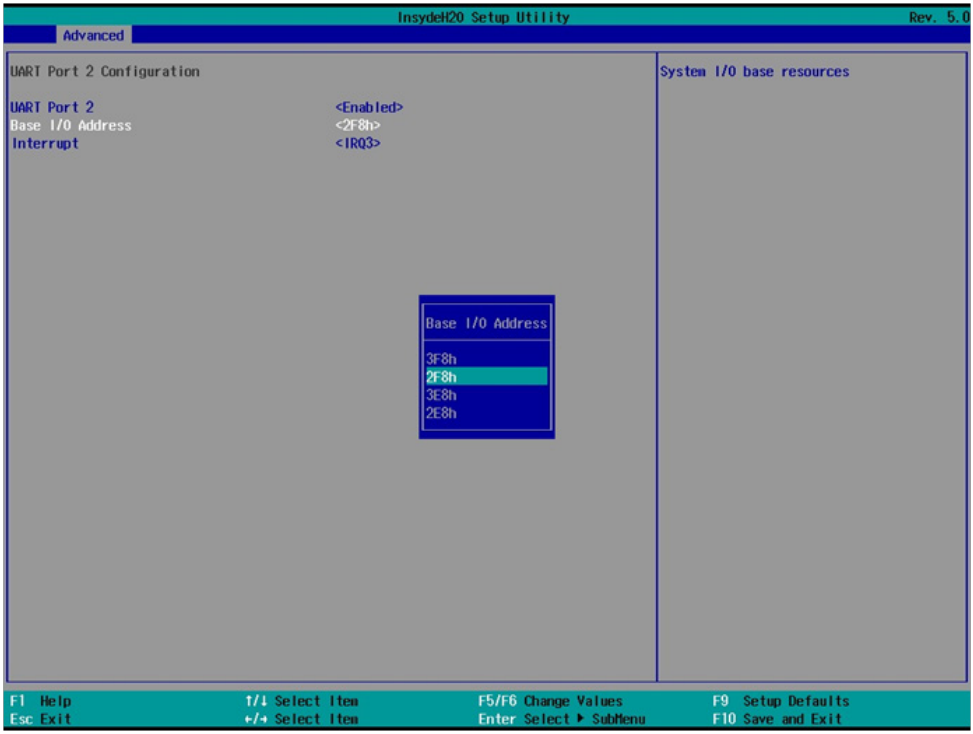


Peripheral, to select the Serial port to RS232 / RS422 / RS485, default is RS232.

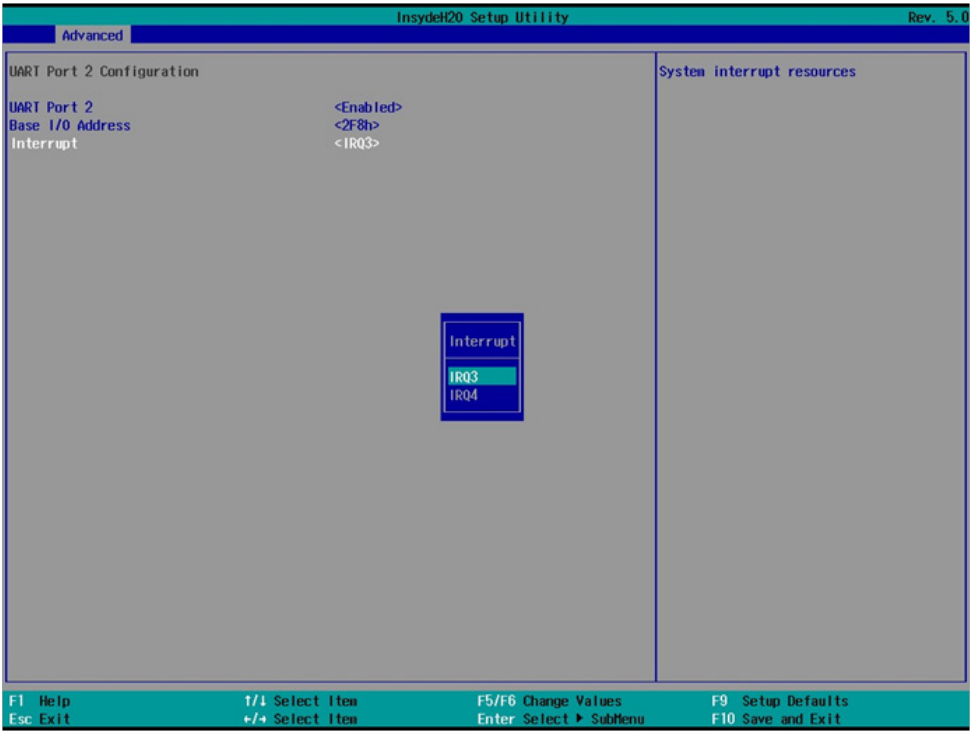
4-6-3-2 ► UART Port 2 Configuration



To Enable Serial port or not, default is Enabled.

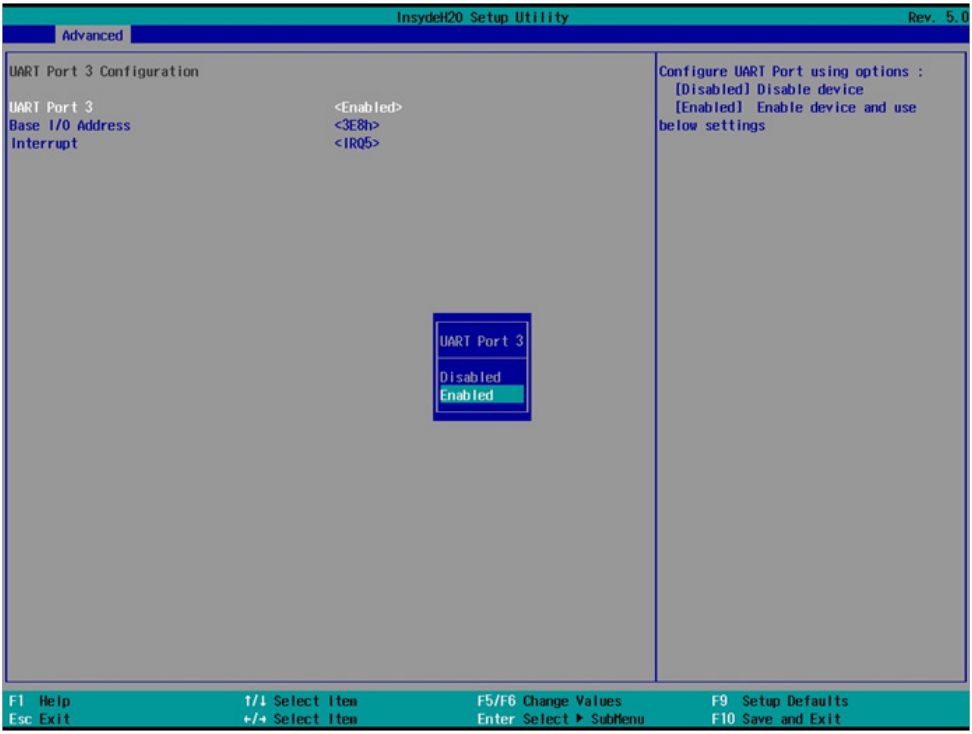


Base I/O Address, default is 2F8h.

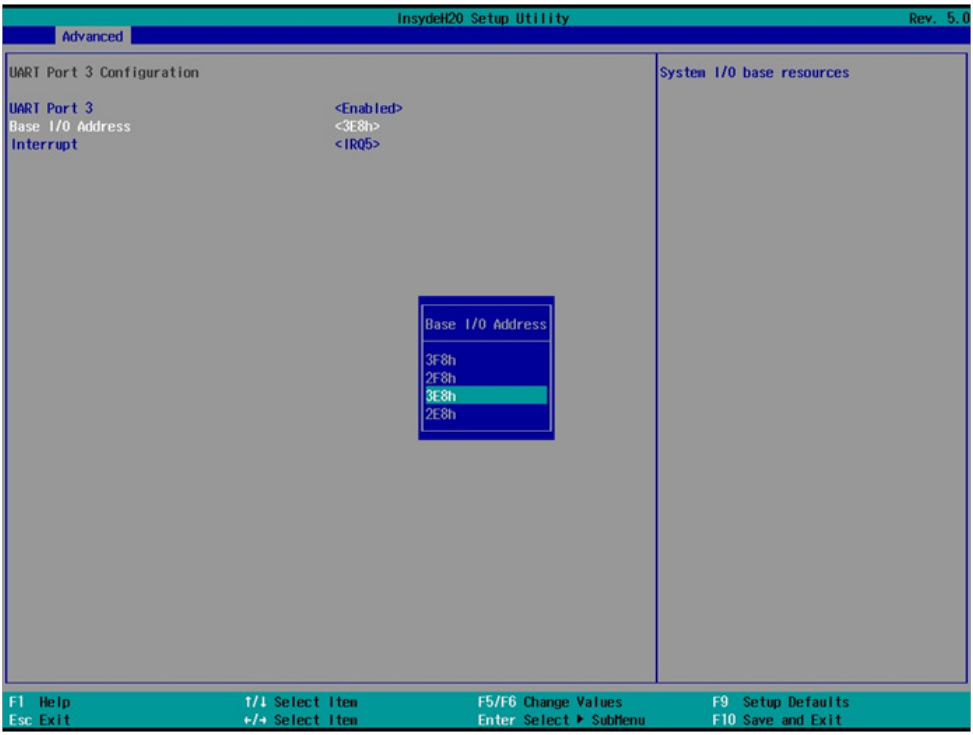


Interrupt, default is IRQ3.

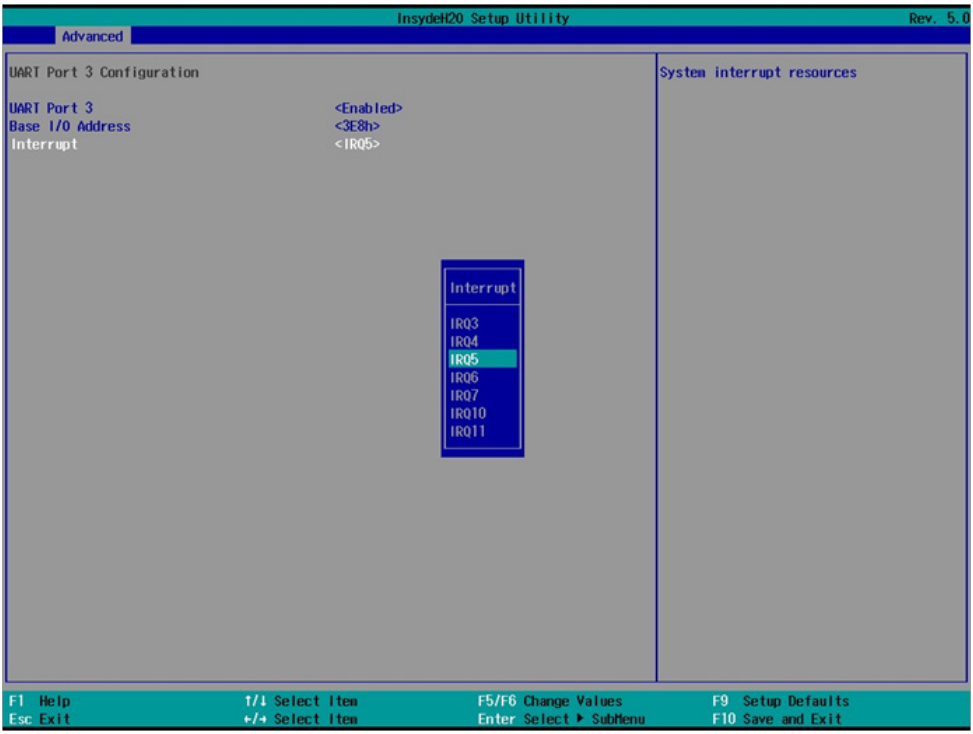
4-6-3-3 ► UART Port 3 Configuration



To Enable Serial port or not, default is Enabled.

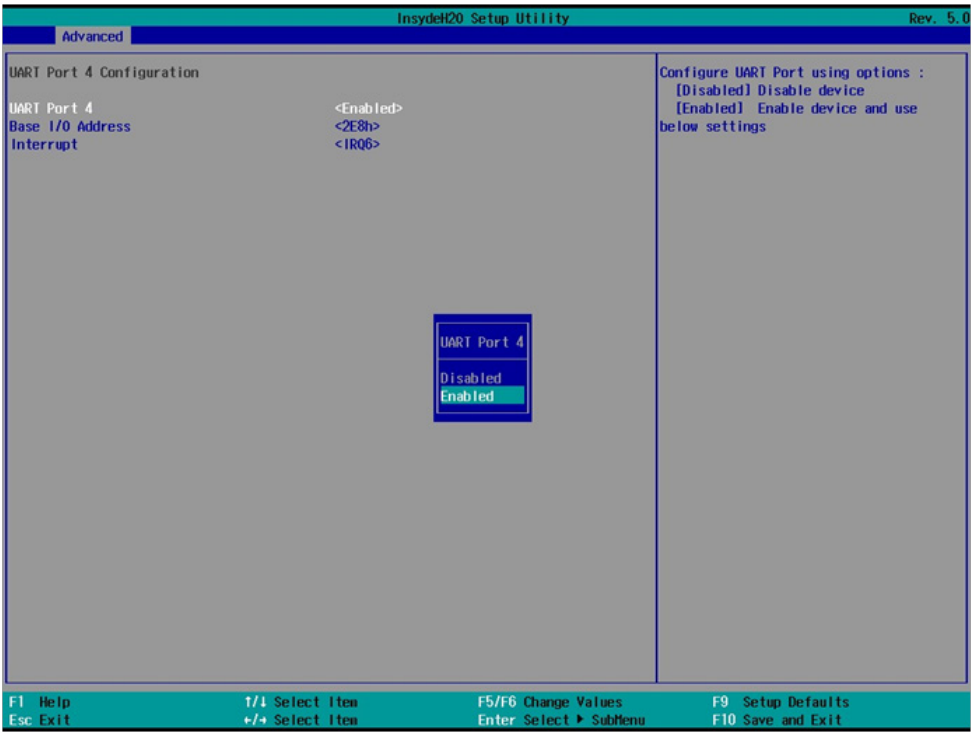


Base I/O Address, default is 3E8h.

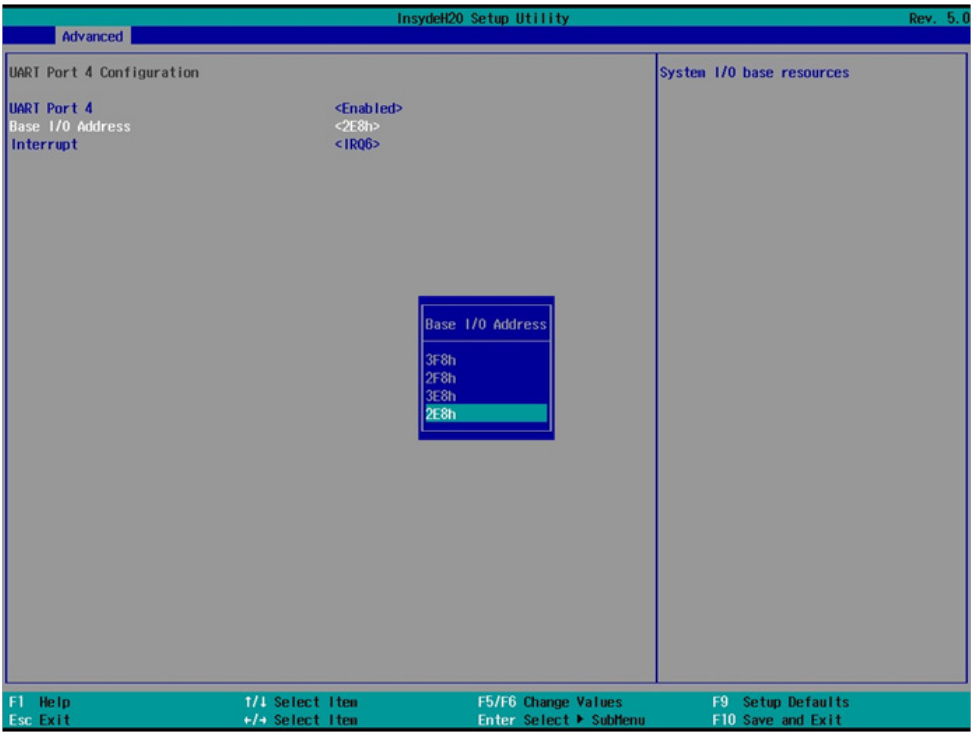


Interrupt, default is IRQ5.

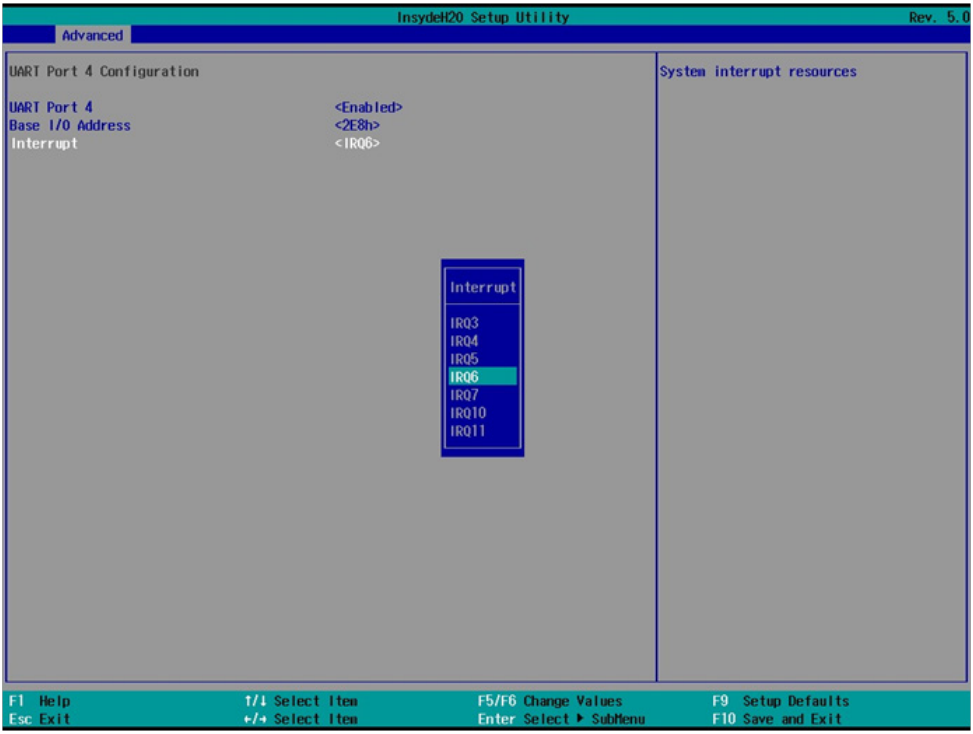
4-6-3-4 ► UART Port 4 Configuration



To Enable Serial port or not, default is Enabled.



Base I/O Address, default is 2E8h.

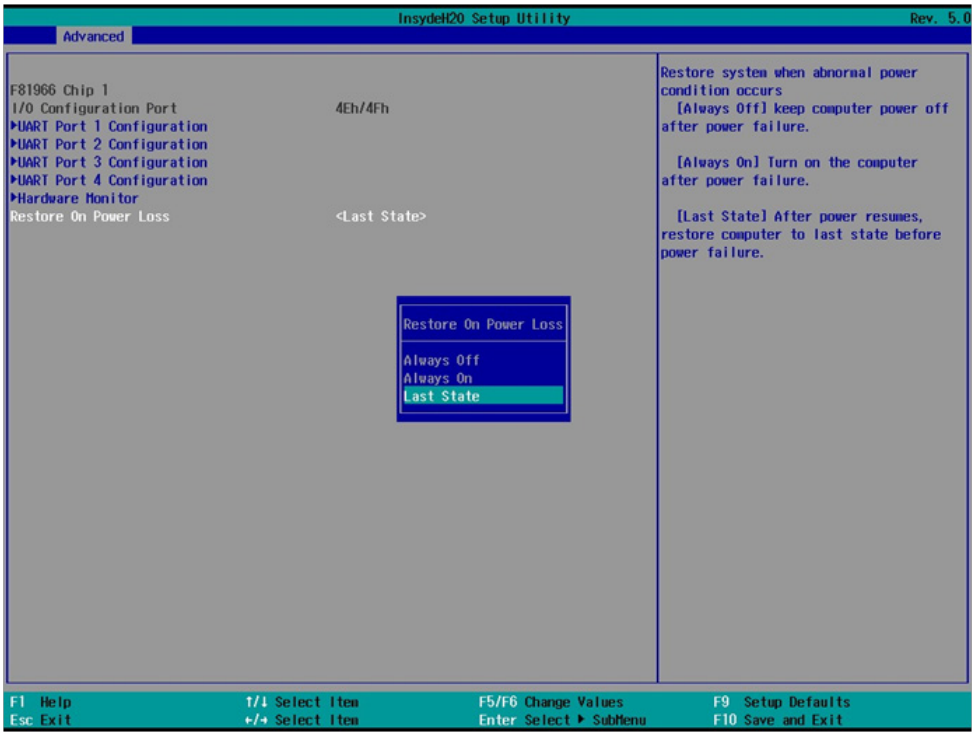


Interrupt, default is IRQ6.

4-6-3-5 ► Hardware Monitor

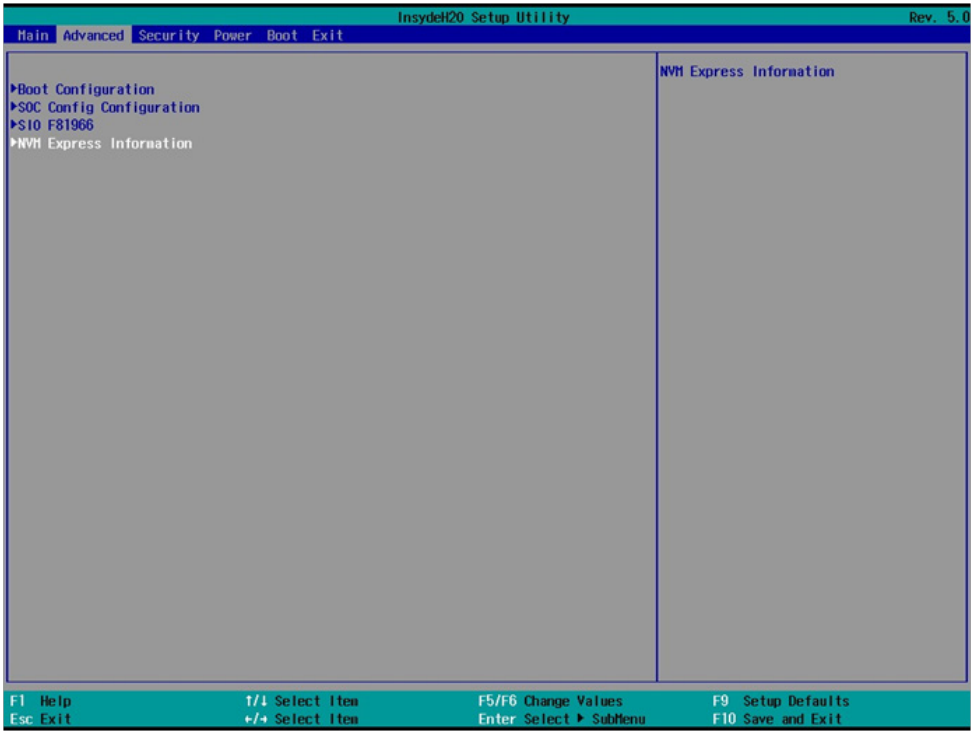
Press [Enter] to view PC health status.
This section shows the status of your CPU, Fan, and overall system.
This is only available when there is Hardware Monitor function onboard.

4-6-3-6 Restore On Power Loss



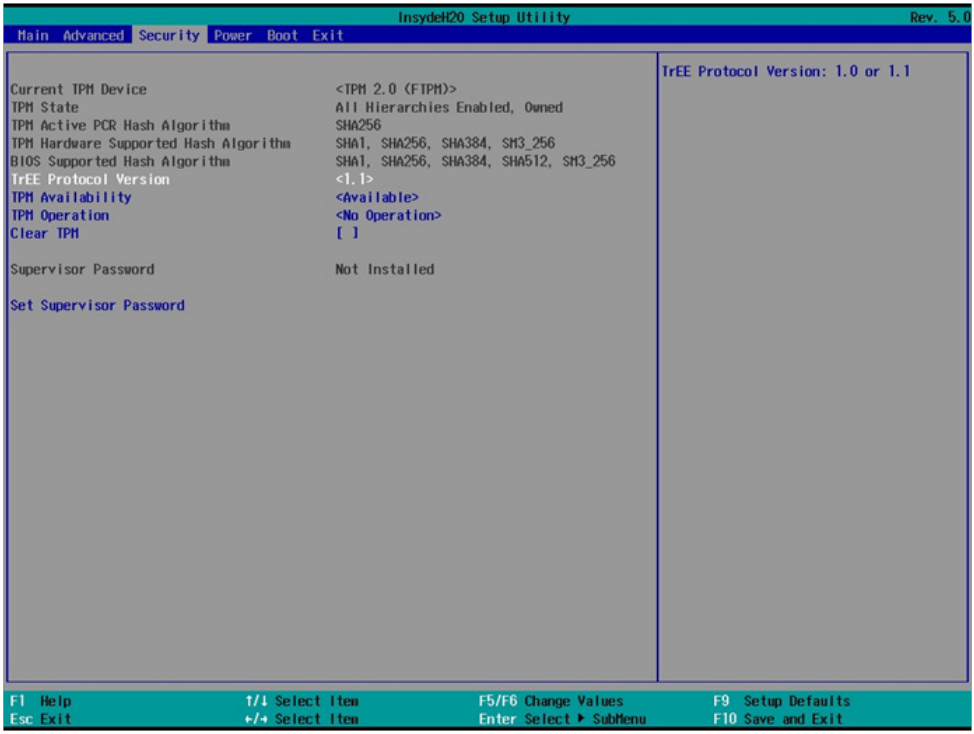
To select the power behavior after power fail, default is last state.

4-6-4 NVM Express Information



Press [Enter] to view the NVMe storage devices information.

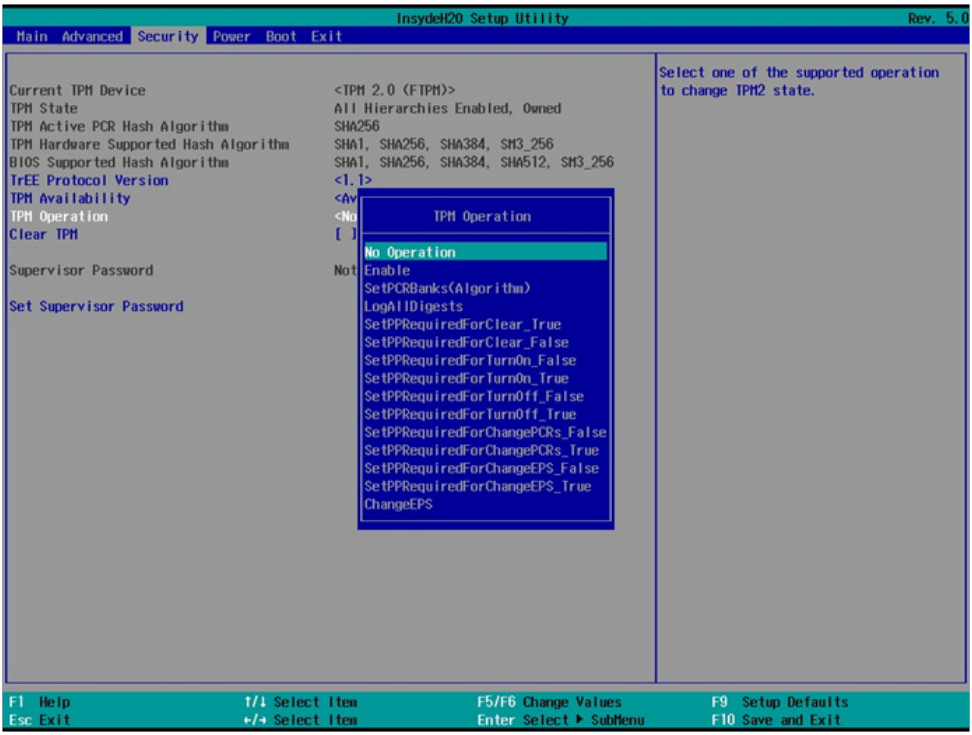
4-7 Security



TrEE Protocol Version
There are 1.0 and 1.1 versions.

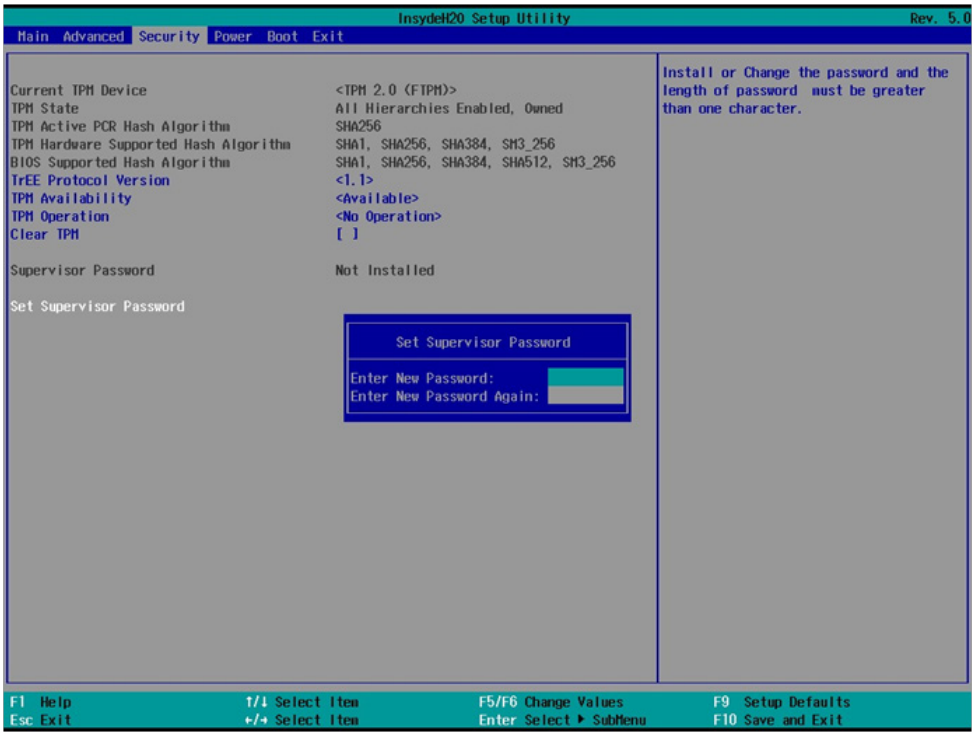
TPM Availability
To select TPM available or hidden

TPM Operation



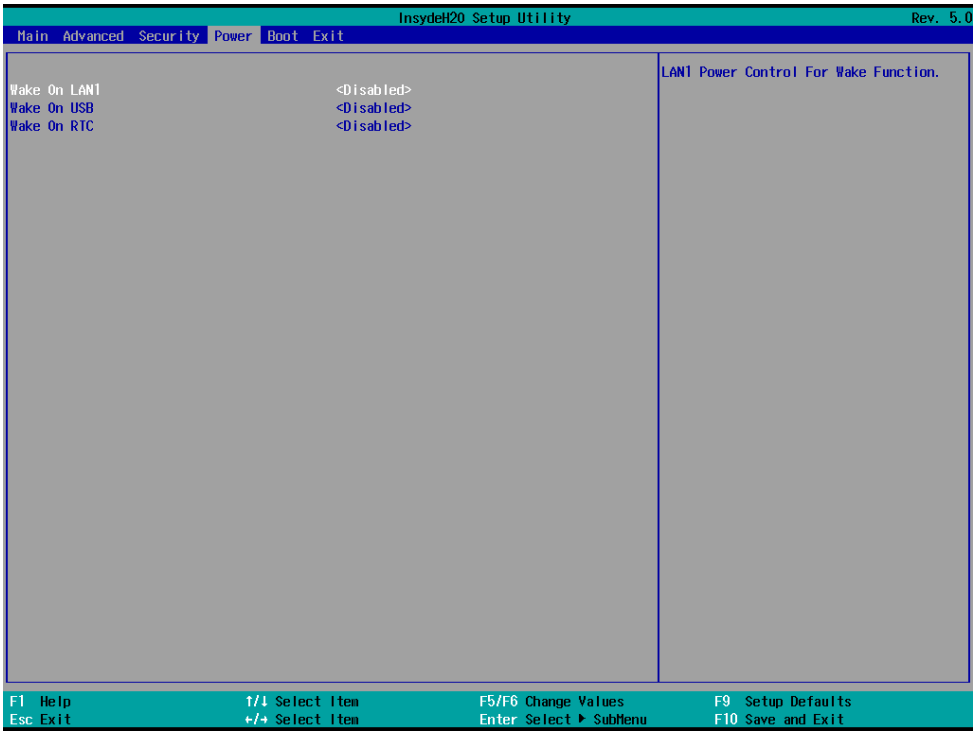
To select TPM operations

Set Supervisor Password



To set up an Supervisor password

4-8 Power



Wake On LAN1

To select S3, S5 or S3 / S5 wake on LAN1, default is Disabled.

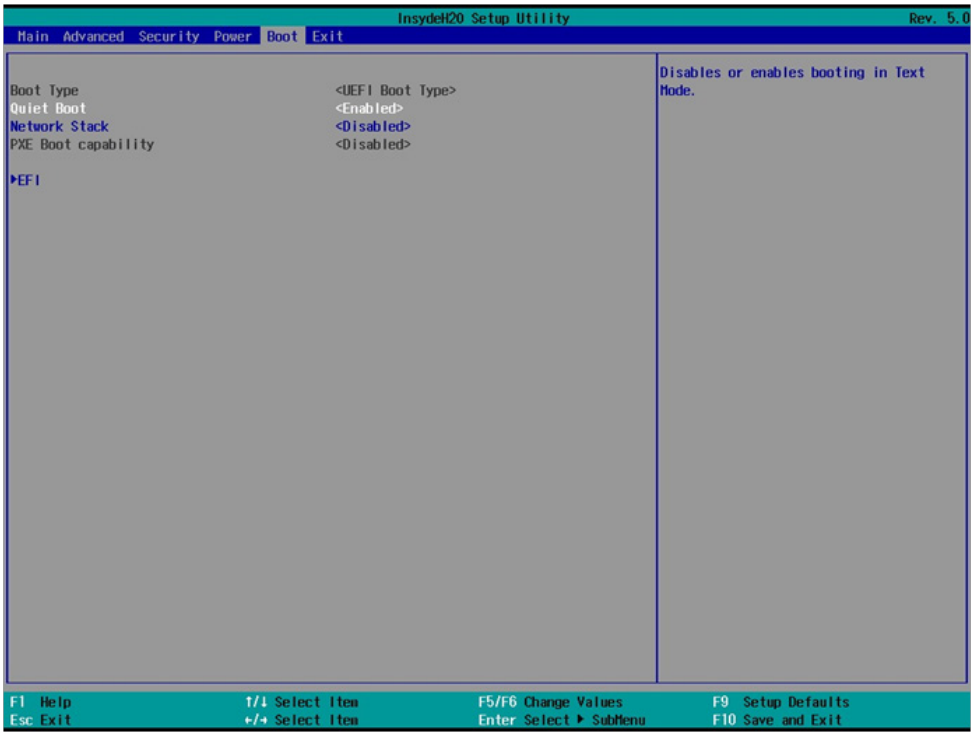
Wake On USB

To select S3 wake on USB, default is Disabled.

Wake On RTC

The optional settings are: Disabled (default), By every day, By day of month.

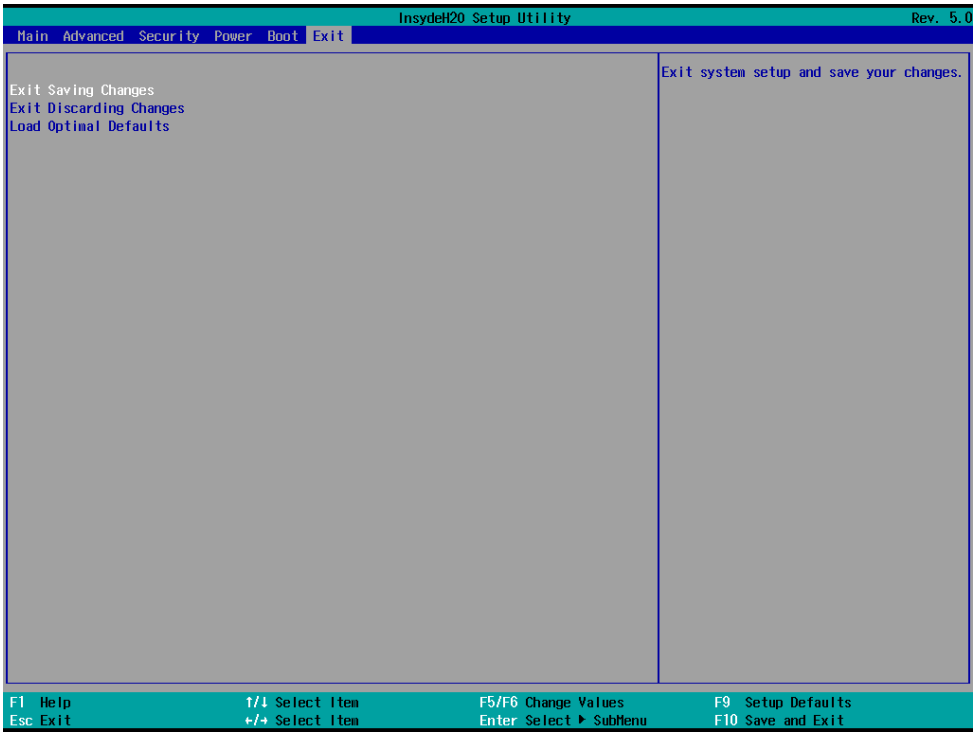
4-9 Boot



Quiet Boot
The optional settings are: Enabled (default), Disabled.

Network Stack
The optional settings are: Enabled, Disabled (default).

4-10 Save & Exit



Exit Saving Changes
Save configuration and reset

Exit Discarding Changes
Reset without saving the changes

Load Optimal Defaults
To restore the optimal default for all the setup options

4-11 How to update Insyde BIOS

Under DOS Mode

STEP 1. Prepare a bootable disc.
(Storage device could be USB FDD or USB pen drive.)

STEP 2. Copy utility program to your bootable disc. You may download it from our website.

STEP 3. Copy the latest BIOS for your LEX motherboard from our website to your bootable disc.

STEP 4. (Here take 2I640CW as an example, please enter your motherboard's name)
Insert your bootable disc into X: (X could be C:, A: or others.
It depends on which type of storage device you use.)

Start the computer and type

X:\: H2OFFT-D.EXE 2I640CWA2.ROM –BIOS -ALL

2I640CWA2.ROM is the file name of the latest BIOS.

It may be 2I640CWA1.ROM or 2I640CWA2.ROM, etc.

Please leave one space between .ROM & -BIOS -ALL

By Bay Trail series mainboard, please type

X:\: H2OFFT-D.EXE 2I640CWA2.ROM –BIOS -ALL

-BIOS : Flash BIOS region

-ALL : Flash all

STEP 5. Press ENTER and the BIOS will be updated,
Computer will restart automatically.

Appendix B: Resolution list

640 x 480 x (256 / 16bit / 32bit)
800 x 600 x (256 / 16bit / 32bit)
1024 x 768 x (256 / 16bit / 32bit)
1152 x 864 x (256 / 16bit / 32bit)
1280 x 600 x (256 / 16bit / 32bit)
1280 x 720 x (256 / 16bit / 32bit)
1280 x 768 x (256 / 16bit / 32bit)
1280 x 800 x (256 / 16bit / 32bit)
1280 x 960 x (256 / 16bit / 32bit)
1280 x 1024 x (256 / 16bit / 32bit)
1400 x 1050 x (256 / 16bit / 32bit)
1440 x 900 x (256 / 16bit / 32bit)
1600 x 900 x (256 / 16bit / 32bit)
1600 x 1200 x (256 / 16bit / 32bit)
1680 x 1050 x (256 / 16bit / 32bit)
1920 x 1080 x (256 / 16bit / 32bit)
1920 x 1200 x (256 / 16bit / 32bit)